

RF Manual 15th edition

Application and design manual
for High Performance RF products
May 2011



NXP's RF Manual makes design work much easier

NXP's RF Manual is one of the most important reference tools on the market for today's RF designers. It features our complete range of RF products, from low- to high-power signal conditioning and high-speed data converters.

High Performance RF for the most demanding applications

When it comes to the most demanding RF applications, the first thing on the designer's mind is to meet the specified performance. So that is exactly what NXP enables you to do, with the added benefits of silicon-based, volume manufacturing process technologies. That means you can design your systems to the highest specifications, while still retaining potential trade-offs with respect to efficiency, power, ruggedness, consistency, and integration levels.

Shipping more than four billion RF products annually, NXP is a clear industry leader in High Performance RF. From satellite receivers, cellular base stations, and broadcast transmitters to ISM (Industrial, Scientific, and Medical) and aerospace and defense applications, you will find the High Performance RF products you need at NXP. And constant innovation ensures you always have the most effective solutions at your fingertips – whether it's innovative Doherty power amplifier architectures, JESD204A CGV™ serialized data interfaces, or tiny GPS LNAs.

So if you're looking to improve your RF performance, design a highly efficient signal chain, or break new ground with an innovative ISM application, then NXP's creative thinking and expert support can help you every step of the way.

High Performance RF design challenge

The day-to-day work offers many challenges to the RF designer, from the high diversity of signals to integration, or simply the time spent. We recently started a design challenge (www.hprf-design-challenge.nxp.com). It offers a forum for RF enthusiasts to walk with us through the steps of a design, from concept to prototype. This is, in essence, the goal of the RF Manual – to make design work easier.

What's new?

This RF Manual provides updated information on RF applications clustered in different segments. The segments are as follows: wireless and broadband communication infrastructure, TV and satellite, portable devices, automotive, ISM, and aerospace and defense.

We describe in detail the new developments in our core technologies, QUBiC4 and LDMOS. We have also added GaN technology to our product offering; this key technology lets high-power amplifiers deliver very high efficiency in next generation wireless communication systems.

New products include GaN power amplifiers, a complete line of overmolded plastic (OMP) RF power transistors and MMICs, and our eighth generation LDMOS transistors (Gen8). Next-generation devices and improved products include GPS LNAs, medium power amplifiers, IF gain blocks, LO generators, satellite LNB ICs, and CATV modules.

Our portfolio for the wireless communication infrastructure has expanded, with a comprehensive set of best-in-class Doherty amplifier designs, a broad selection of amplifiers (medium power, variable gain, low noise), mixers, IQ modulators, and our JESD204A-compliant, high-speed DACs and ADCs.

"I'm proud to present the 15th edition of our RF Manual. It covers NXP's entire range of RF products and solutions in one comprehensive catalog, and I'm convinced that you'll find this version the most compelling and useful yet."

Kind regards,



John Croteau

Sr. Vice President & General Manager
Business Line High Performance RF

RF Manual web page
www.nxp.com/rfmanual

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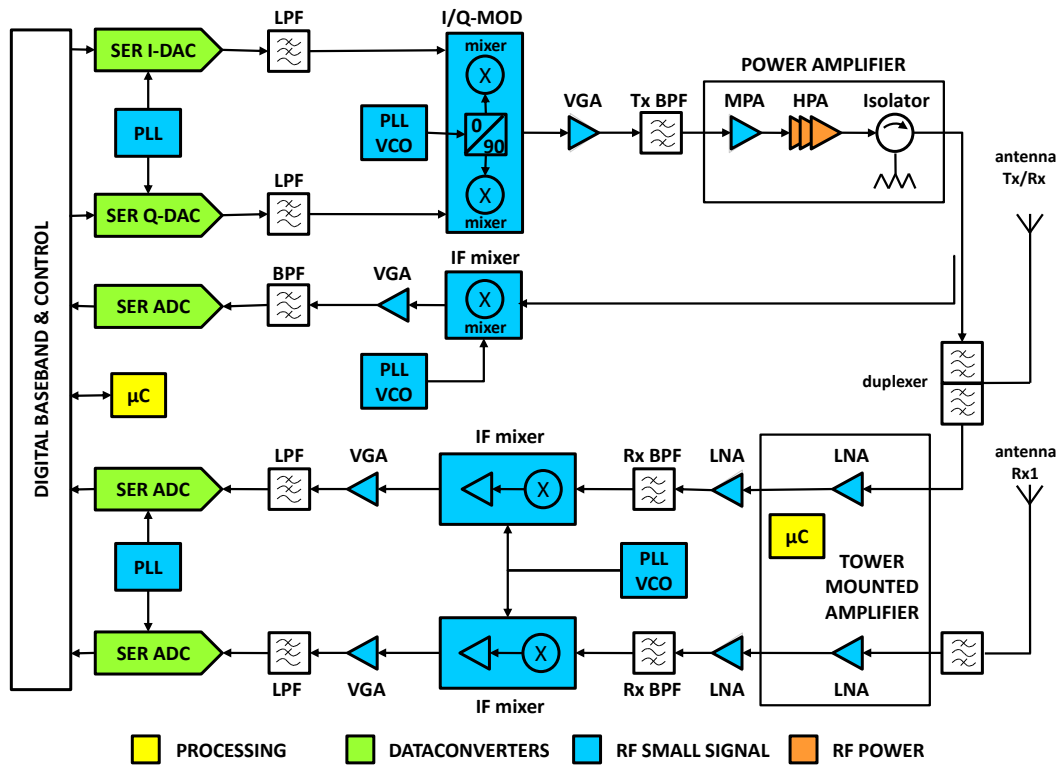
1. Products by application

1.1 Wireless communication infrastructure

1.1.1 Base stations (all cellular standards and frequencies)

See also brochure: 'Your partner in Mobile Communication Infrastructure design', document number 9397 750 16837.

Application diagram



The block diagram above shows base station transmit (upper part, Tx) and receive (lower part, Rx) functions, and includes the Tx feedback function (middle part, Tx feedback).

The signals generated in the "Digital Baseband & Control" block follow the air interface standard requirements. These signals are interfaced to the DAC via serial interface SER. The SER can use the LVDS or JEDEC standard. After the signals are fed to the I-DAC and Q-DAC, they are converted to the analog domain. Before the I and Q signals enter the IQ modulator, they are first low-pass filtered to remove any aliasing signals. At the IQ modulator, the signals are up-converted to RF using an LO signal coming from the PLL/VCO device, typically called the LO generator. Due to device aging and variation in cell load, the up-converted signals are fed to the VGA to control the power level. An additional band pass filter is needed to remove the out-of-band spurs. The clean signal is fed to the RF power board, where the desired transmit power is made. Finally, the RF power signal is fed to the antenna via a duplexer.

Directly after the final stage amplifier, a signal coupler picks up a certain amount of the RF signal, which is attenuated and then down-mixed using the IF Mixer. This signal is called the observation signal, and is used to derive coefficients for the digital pre-distortion algorithm. Since power levels vary, the observation is first fed to the VGA to control the power level, and after band pass filtering, the signal is converted to the digital domain using an ADC. The same serial interface is used to send the digital signals to the baseband processor.

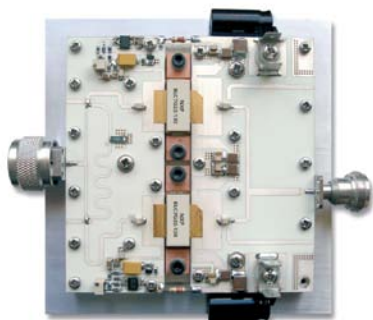
At the receiver, the received signal directly after the duplexer is fed to the LNA for direct amplification, since the received signal level is quite low. If the first LNA is mounted in the tower top, a long RF cable is used to interface the RF signals with a base transceiver station (BTS). A second LNA is used to amplify the received signals. Band pass filtering is applied to reduce the out-of-band signals levels before these signals are applied to the IF mixer. Signal levels that change dramatically require a VGA to maintain the full scale ranges of the I-ADC and Q-ADC for optimal conversion performance. Low pass filtering is used before the ADC to remove the aliasing signals. These digital signals are interfaced to the baseband using a serial interface such as JEDEC.

The sample clocks and LO signals are derived from clock cleaners and PLLs respectively. This is denoted as Clock and PLL / VCO in the block diagram. This set-up is required to make a synchronized system. Typically denoted in SNRs, and in order to improve reception quality, the receive function is equipped with a second receiver, which is also called a diversity receiver.

Recommended products

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	G_p (dB)	Package	Type
HPA	MMIC	920	960	30	29	SOT822-1	BLM6G10-30(G)
	Final	920	960	250	19	SOT502	BLF7G10L(S)-250
		700	1000	80	19	SOT502	BLF8G10L(S)-80
		700	1000	140	19	SOT1204	BLP7G10S-140G
		700	1000	160	19	SOT502	BLF8G10L(S)-160
		500	1000	300	19	SOT1121	BLF6H10L(S)-300P
		700	1000	300	19	SOT539	BLF8G10L(S)-300P
		1805	1880	250	18	SOT539	BLF7G20L(S)-250P
	Integrated Doherty	2010	2025	50	14,5	SOT1130	BLD6G21L(S)-50
	Final	1800	2050	140	19	SOT1204	BLP7G21(S)-140P(G)
	Driver/Final	2110	2170	40	19	SOT1121	BLF6G22L(S)-40P
	Driver	1800	2200	10	19	SOT1179	BLP7G22-10
	Final	2000	2200	160	18	SOT502	BLF7G22L(S)-160
	Driver/Final	2500	2700	40	17,5	SOT1121	BLF6G27L(S)-40P
	Integrated Doherty	2500	2700	50	17,5	SOT1130	BLD7G27S-50
	Final	2500	2700	100	17,5	SOT502	BLF7G27L(S)-100
		2500	2700	140	17	SOT502	BLF7G27L(S)-140
3400		3600	100	13	SOT502	BLF6G38(LS)-100	
		3500	3800	90	13	SOT1246B	BLF7G38LS-90P

Function	Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain Eff. (%)	Type	Main transistor	Peak transistor
HPA Doherty designs	728-768	58	50	32	20.5	47	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
	920-960	57.3	49.3	30	16	50	ASYM	BLF8G10LS-160	BLF7G10LS-250
	1476-1511	58.1	49.6	28	16	42	ASYM	BLF7G15LS-200	BLF7G15LS-300P
	1805-1880	58.6	51	28	16	47.6	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
	1930-1990	58.2	50	28	16	40	SYM	BLF7G20LS-250P	BLF7G20LS-250P
	2110-2170	47	39	28	13	38	SYM	BLD6G22L(S)-50	BLD6G22L(S)-50
	2110-2170	57.2	49.2	28	16	47	3-WAY	BLF7G22LS-160	2x BLF7G22L(S)-160
	2300-2400	55	47.5	28	15.2	44	ASYM	BLF7G24LS-100	BLF7G24LS-140
	2500-2700	50.3	42.3	28	14.5	39	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
3400-3600	51	43	28	11.5	32	SYM	BLF6G38-50	BLF6G38-50	



Product highlight: BLF7G27L(S)-100/140

Utilising NXP's Gen7 LDMOS technology, this pair of transistors is designed to give leading performance in 2.7 GHz LTE applications. The BLF7G27L(S)-100 is designed to be the main amplifier, and the BLF7G27L(S)-140 the peak amplifier, in asymmetrical Doherty designs. This pair, along with others at different operational frequencies, are already firm industry favourites with many design wins around the world.

Features

- ▶ Asymmetrical Doherty efficiency 37.6% with 15.2 dB gain at 47.5 dB output power
- ▶ Capable of 26-32 V operation
- ▶ Extremely low thermal resistance
- ▶ Consistent device performance
- ▶ Unrivalled ruggedness

Function	Product		Package	Type
Discrete attenuator	RF diode	PIN diode	SOT753	BAP64Q
			SOT753	BAP70Q
			Various^	BAP64

Function	Product		Package	Type
LNA (low noise amplifier)	RF transistor	SiGe:C transistor	SOT343F	BFU725F/N1
				BFU690F
				BFU730F
				BFU760F
				BFU790F
	MMIC	SiGe:C MMIC	SOT650	BGU7051
				BGU7052 BGU7053

Function	Product	Gain range	Package	Type
Single VGA (variable gain amplifier)	MMIC	23 dB	SOT617	BGA7202
		31 dB		BGA7204

Function	Product	Gain range	Package	Type
Dual VGA (variable gain amplifier)	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	P _L (1dB) @ 940 MHz	Package	Type
MPA (medium power amplifier)	MMIC	25 dBm	SOT908	BGA7124
		24 dBm	SOT89	BGA7024
		28 dBm	SOT908	BGA7127
		28 dBm	SOT89	BGA7027
		30 dBm	SOT908	BGA7130*

Function	Product	Frequency	Package	Type
Dual mixer	MMIC	0.7 - 1.2 GHz	SOT1092	BGX7220*
		1.7 - 2.7 GHz		BGX7221*

Function	Product	Noise	Package	Type
PLL + VCO (LO generator)	MMIC	131 dBc/Hz @ 1 MHz offset @ 5.3 GHz	SOT617	BGX7300*

Function	Product	NFL	Package	Type
IQ modulator	MMIC	-159 dBm/Hz	SOT616	BGX7100*

* = check status at 3.1 new products, as this type has not been released for mass production.

^ = SOD523, SOD323, SOT23 & SOT323

Function	Product	Max. sampling frequency	# of bits	Interface	Type
Data converter	Dual-channel DAC	650 Msps	14	LVC MOS	DAC1405D650
		160 Msps	14	LVC MOS	DAC1405D160
		125 Msps	14	LVC MOS	DAC1401D125
		750 Msps	14	JESD204A	DAC1408D750
	Single-channel ADC	80 Msps	12	LVC MOS	ADC1207S080
		125 Msps	14	LVC MOS&LVDS DDR	ADC1415S125
		125 Msps	14	LVC MOS&LVDS DDR	ADC1410S125
	Dual-channel ADC	125 Msps	11	LVC MOS&LVDS DDR	ADC1112D125
		125 Msps	14	LVC MOS&LVDS DDR	ADC1412D125
		125 Msps	14	JESD204A	ADC1413D125

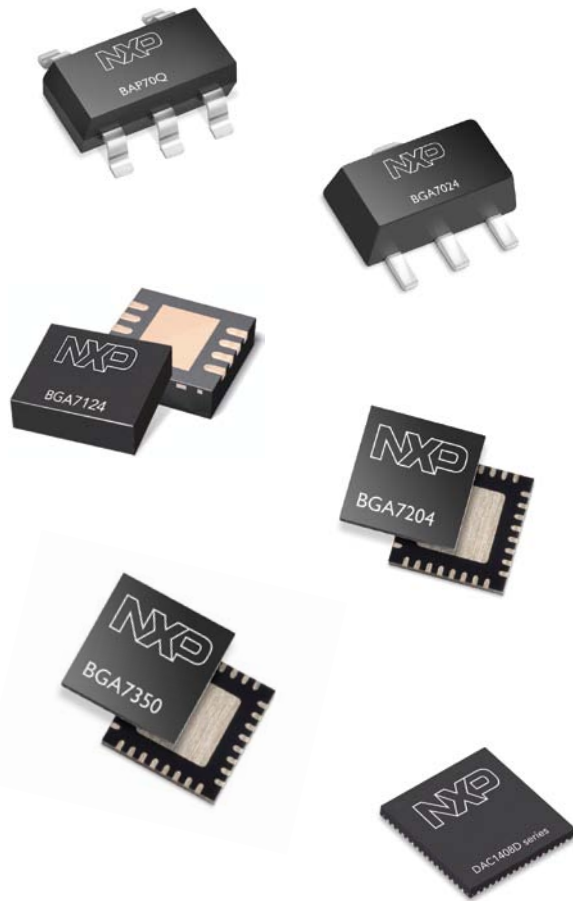
Product highlight:

DAC1408D750 dual 14-bit DAC with JESD204A interface

Optimized for high-speed applications, such as 2.5/3/4G wireless, video broadcast, and instrumentation, this advanced 14-bit DAC has selectable interpolating filters and a four-lane CGV™ serial interface compliant with JEDEC JESD204A standard.

Features

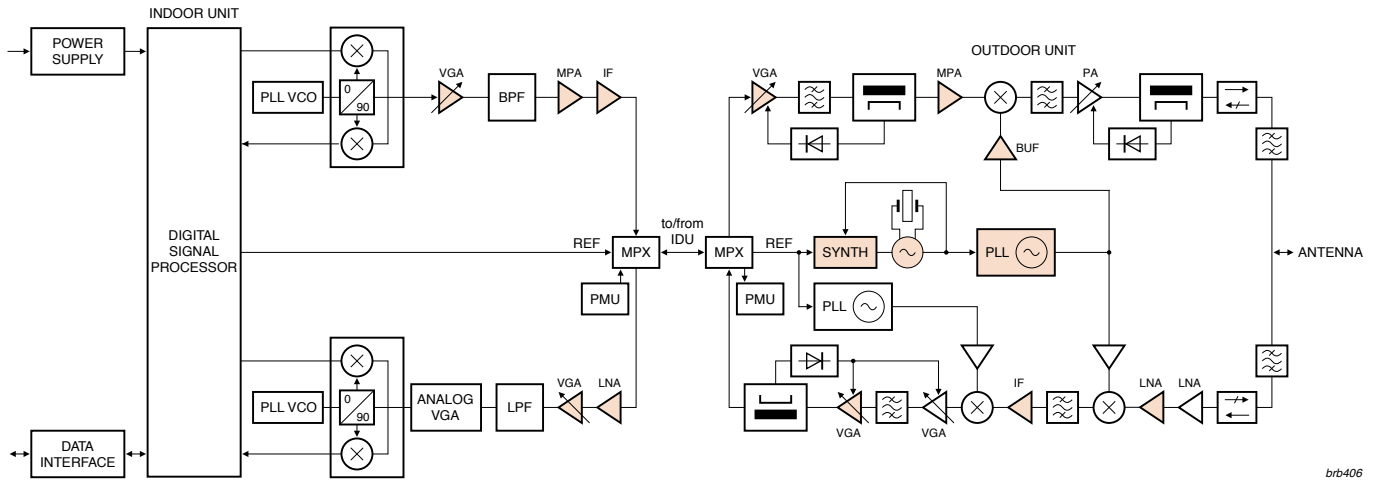
- ▶ Dual-channel, 14-bit resolution
- ▶ 750 Msps maximum output rate
- ▶ Interpolation filters: 2x, 4x, 8x
- ▶ Four-lane JEDEC JESD204A serial digital input
- ▶ 32-bit programmable NCO frequency synthesizer with low-power option
- ▶ MDS (Multi-DAC Synchronization)
- ▶ SPI interface
- ▶ HVQFN64 package



Products by application

1.1.2 Point-to-point

Application diagram



Recommended products

Indoor unit

Function	Product	Gain range	Package	Type
Single VGA (variable gain amplifier)	MMIC	23 dB	SOT617	BGA7202
		31 dB		BGA7204

Function	Product	Gain range	Package	Type
Dual VGA (variable gain amplifier)	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	P_L (1dB) @ 940 MHz	Package	Type
MPA (medium power amplifier)	MMIC	17 dBm	SOT89	BGA6289
		20 dBm		BGA6489
		21 dBm		BGA6589
		25 dBm	SOT908	BGA7124
		24 dBm	SOT89	BGA7024
		28 dBm	SOT908	BGA7127
		28 dBm	SOT89	BGA7027
30 dBm	SOT908	BGA7130*		

Function	Product	NFL	Package	Type
IQ modulator	MMIC	-159 dBm/Hz	SOT616	BGX7100*

Function	Product	Package	Type
IF	IF gain block	MMIC	SOT363
			BGA2800
			BGA2801
	MMIC	General purpose wideband amplifiers	SOT363
			BGA2815
			BGA2816
			BGM1012
			BGA2714
			BGA2748
			BGA2771

Function	Product	Package	Type
LNA	RF MMIC	SiGe:C MMIC	SOT891
			BGU7003
			BGU7051
			BGU7052
			BGU7053
	RF transistor	SiGe:C transistor	SOT343F
			BFU725F/N1
			BFU710F
			BFU730F
			BFU730F
Wideband transistor		SOT343R	
		BFG425W	
		BFG424W	
		SOT143R	
			BFG325/XR

* = check status at 3.1 new products, as this type has not been released for mass production.

Outdoor unit

Function	Product	Gain range	Package	Type
Single VGA (variable gain amplifier)	MMIC	23 dB	SOT617	BGA7202
		31 dB		BGA7204

Function	Product	P _L (1dB) @ 940 MHz	Package	Type
MPA (medium power amplifier)	MMIC	17 dBm	SOT89	BGA6289
		20 dBm		BGA6489
		21 dBm		BGA6589
		25 dBm	SOT908	BGA7124
		24 dBm	SOT89	BGA7024
		28 dBm	SOT908	BGA7127
		28 dBm	SOT89	BGA7027
30 dBm	SOT908	BGA7130*		

Function	Product	Package	Type
Buffer	RF transistor	SiGe:C transistor	SOT343F
			BFU725F/N1
			BFU730F
			BFU760F
			BFU790F

Function	Product	Package	Type
LNA	RF transistor	SiGe:C transistor	SOT343F
			BFU725F/N1
			BFU730F
			BFU760F
			BFU790F

Function	Product	Package	Type
IF	IF gain block	MMIC	SOT363
			BGA2800
			BGA2801
			BGA2815
			BGA2816
			BGA2850
			BGA2865
	BGA2866		
	MMIC	General purpose wideband amplifiers	BGM1014
			BGM1013
			BGM1012
			BGA2714

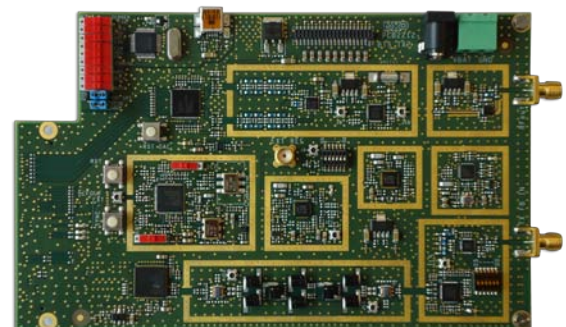
Function	Product	Gain range	Package	Type
Dual VGA (variable gain amplifier)	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	Noise	Package	Type
PLL + VCO (LO generator)	MMIC	-131 dBc/Hz @ 1 MHz offset @ 5.3 GHz	SOT617	BGX7300*

Function	Product	Package	Type
Oscillator	RF transistor	Wideband transistor	SOT343R
			BFG424W
			BFG425W
	SiGe:C transistor	SOT343F	BFU725F/N1
			BFU730F
			BFU760F
BFU790F			

* = check status at 3.1 new products, as this type has not been released for mass production.

NXP BTS Tx component demonstrator board



Product highlight:

BGA7350 MMIC variable gain amplifier

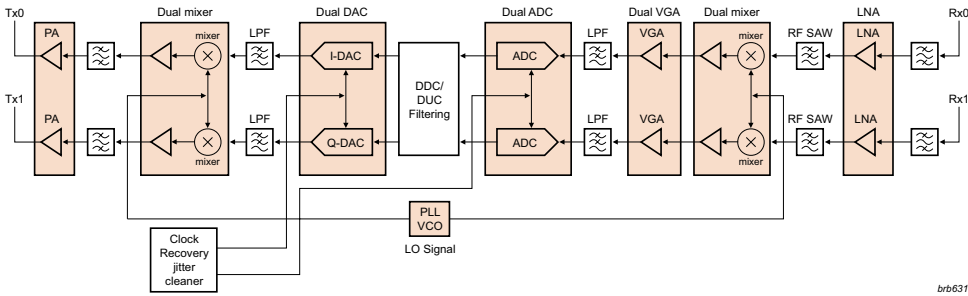
The BGA7350 MMIC is a dual independent digitally controlled IF variable gain amplifier (VGA) operating from 50 to 250 MHz. Each IF VGA amplifies with a gain range of 24 dB and, at its maximum gain setting, delivers 17 dBm output power at 1 dB gain compression and a superior linear performance. The BGA7350 is optimized for a differential gain error of less than ± 0.1 dB for accurate gain control and has a total integrated gain error of less than ± 0.4 dB. It is housed in a 32-pin leadless HVQFN package (5 x 5 mm).

Features

- ▶ Dual independent digitally controlled 24 dB gain range VGAs, with 5-bit control interface
- ▶ 50 to 250 MHz frequency operating range
- ▶ Gain step size: 1 dB \pm 0.1 dB
- ▶ 18.5 dB power gain
- ▶ Fast gain stage switching capability
- ▶ 17 dBm output power at 1 dB gain compression
- ▶ 5 V single supply operation with power-down control
- ▶ Logic-level shutdown control pin reduces supply current
- ▶ ESD protection at all pins
- ▶ Unconditionally stable

1.1.3 Repeater

Application diagram



brb631

Function	Product	Max. sampling frequency	# of bits	Interface	Type
Data converter	Dual-channel DAC	650 Msp/s	14	LVC MOS	DAC1405D650
		160 Msp/s	14	LVC MOS	DAC1405D160
		125 Msp/s	14	LVC MOS	DAC1401D125
	Dual-channel ADC	750 Msp/s	14	JESD204A	DAC1408D750
		125 Msp/s	11	LVC MOS&LVDS DDR	ADC1112D125
		125 Msp/s	14	LVC MOS&LVDS DDR	ADC1412D125
		125 Msp/s	14	JES204A	ADC1413D125

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	G_p (dB)	Package	Type
HPA	Driver/Final	1450	1550	40	22	SOT1112A	BLF6G15L-40BRN
		1800	2000	40	18.8	SOT608A	BLF6G20-40
	Integrated Doherty	2010	2025	50	14.5	SOT1130B	BLD6G21LS-50
	Driver/Final	1	2200	10	18.5	SOT538A	BLF6G21-10G
	MMIC	2100	2200	30	29.5	SOT834-1	BLM6G22-30
	Integrated Doherty	2110	2170	50	14	SOT1130B	BLD6G22LS-50
	Driver/Final	2300	2700	75	17	SOT1121B	BLF7G27LS-75P
		3400	3800	25	15	SOT608B	BLF6G38S-25
3400		3800	50	14	SOT502A	BLF6G38-50	

Function	Product	$P_{L(1\text{ dB})}$ @ 940 MHz	Package	Type
MPA (medium power amplifier)	MMIC	21 dBm	SOT89	BGA6589
		25 dBm	SOT908	BGA7124
		24 dBm	SOT89	BGA7024
		28 dBm	SOT908	BGA7127
		28 dBm	SOT89	BGA7027
		30 dBm	SOT908	BGA7130

Function	Product	Gain range	Package	Type
Dual VGA (variable gain amplifier)	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	Frequency range	Package	Type
Dual mixer	MMIC	1.7 - 2.7 GHz	SOT1092	BGX7220*
		0.7 - 1.2 GHz		BGX7221*

Function	Product	Package	Type
LNA	MMIC	SOT650	BGU7051
			BGU7052
			BGU7053

Function	Product	Noise	Package	Type
PLL + VCO (LO generator)	MMIC	-131 dBc/Hz @ 1 MHz offset @ 5.3 GHz	SOT617	BGX7300*

* = check status at 3.1 new products, as this type has not been released for mass production.

Product highlight:

BGX7221 MMIC dual down-mixer

The BGX7221 combines a pair of high performance, high linearity down-mixers for use in receivers that have a common local oscillator used with, for example, main and diversity paths. The device covers frequency bands from 1700 to 2700 MHz with an extremely flat behavior.

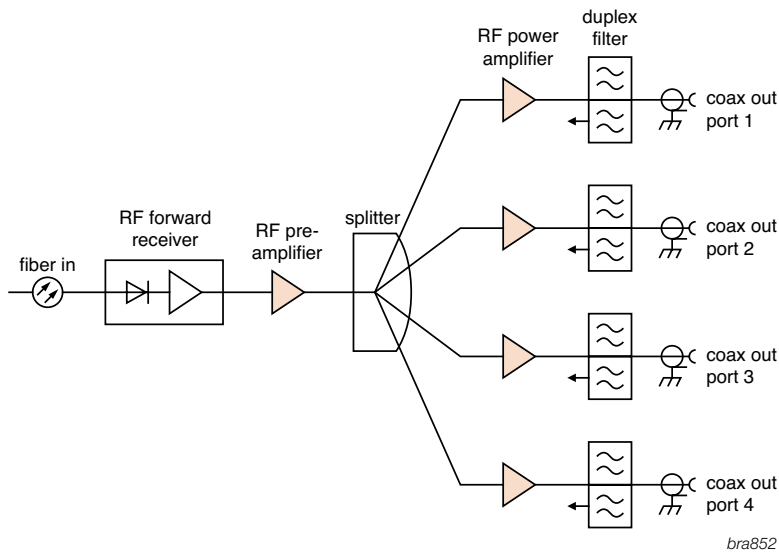
Features

- ▶ 8.5 dB conversion gain over all bands
- ▶ 13 dBm input, 1 dB compression point
- ▶ 25.5 dBm input third-order intercept point
- ▶ 10 dB (typ) small signal noise figure
- ▶ Integrated active biasing
- ▶ Single +5 V supply operation
- ▶ Power-down per mixer with hardware control pins
- ▶ Low bias current in power-down mode
- ▶ Matched 50 Ω single-ended RF and LO input impedances
- ▶ ESD protection at all pins

1.2 Broadband communication infrastructure

1.2.1 CATV optical (optical node with multiple out-ports)

Application diagram



Recommended products

Function	Product	Frequency	Package	Type
RF forward receiver	Forward path receiver	870 MHz	SOT115	BGO807
			SOT115	BGO807CE
			SOT115	BGO827

Function	Product	Frequency	Gain (dB)	Type	
RF pre-amplifier	Power doubler	870 MHz	18.2 - 18.8	BGD812	
			18 - 19	BGY885A	
	Push-pulls	870 MHz	21 - 22	BGY887	
			1 GHz	23 - 24.5	CGY1043
				27 - 28.5	CGY1047

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	870 MHz	22 - 24	CGD942C
			24 - 26	CGD944C
		1 GHz	22 - 23.5	CGD1042Hi
			26.5 - 28	CGD1046Hi



Product highlight: BGO807CE optical receiver

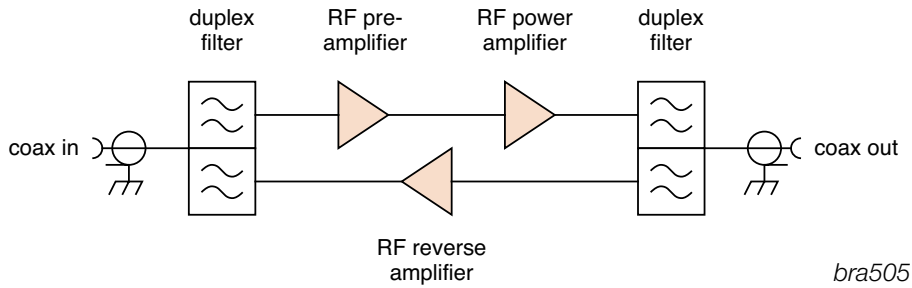
The BGO807CE is an integrated optical receiver module that provides high output levels and includes an integrated temperature-compensated circuitry. In your optical node design, BGO807CE enables a high performance/ price ratio and ruggedness. When upgrading an HFC network from analog to digital, our BGO807CE is the perfect fit.

Features

- ▶ Excellent linearity
- ▶ Low noise
- ▶ Excellent flatness
- ▶ Standard CATV outline
- ▶ Rugged construction
- ▶ Gold metallization ensures excellent reliability
- ▶ High optical input power range

1.2.2 CATV electrical (line extenders)

Application diagram



Recommended products

Function	Product	Frequency	Gain (dB)	Type
RF pre-amplifier	Push-pulls	550 MHz	34 - 35	BGY588N
			33.5 - 35.5	BGY588C
			26.2 - 27.8	BGY587B
		600 MHz	21 - 22	BGY687
			33.2 - 35.2	BGE788C
		750 MHz	18 - 19	BGY785A
			21 - 22	BGY787
			18 - 19	BGY885A
		870 MHz	21 - 22	BGY887
			33.5 - 34.5	BGY888
			34.5 - 36.5	CGY888C
			18 - 19	BGY1085A
			21 - 22.5	CGY1041
		1003 MHz	23 - 24.5	CGY1043
27 - 28.5	CGY1047			
29 - 31	CGY1049			
32 - 34	CGY1032			

Function	Product	Frequency	Gain (dB)	Type
RF reverse amplifier	Reverse hybrids	5-75 MHz	29.2 - 30.8	BGY68
		5-120 MHz	24.5 - 25.5	BGY66B
		5-200 MHz	23.5 - 24.5	BGY67A

All available in SOT115 package.

Function	Product	Frequency	Gain (dB)	Type
RF power amplifier	Power doublers	550 MHz	18-19	BGD502
			19.5 - 20.5	BGD704
		750 MHz	18.2 - 18.8	BGD712
			18.2 - 18.8	BGD712C
			20 - 20.6	BGD714
		870 MHz	18 - 19	BGD802
			18.2 - 18.8	BGD812
			19.7 - 20.3	BGD814
			22 - 23	CGD942C
			24 - 26	CGD944C
			22 - 24	CGD1042H
		1003 MHz	24 - 26	CGD1044H
			19.5 - 22	CGD1040Hi
			22 - 23.5	CGD1042Hi
			23.5 - 25.5	CGD1044Hi
			26 - 28	CGD1046Hi
			22 - 24	CGD982HCi
			23.5 - 25.5	CGD985HCi
26 - 28	CGD987HCi			



Product highlight: CGD1046Hi

The CGD1046Hi with a high-output power level is primarily designed for use in fiber deep-optical-node applications (N+1/2/3). This 1 GHz hybrid amplifier solution offers an extended temperature range, high power overstress capabilities in case of surges, and high ESD levels resulting in a low cost of ownership. It's designed for durability and offering superior ruggedness.

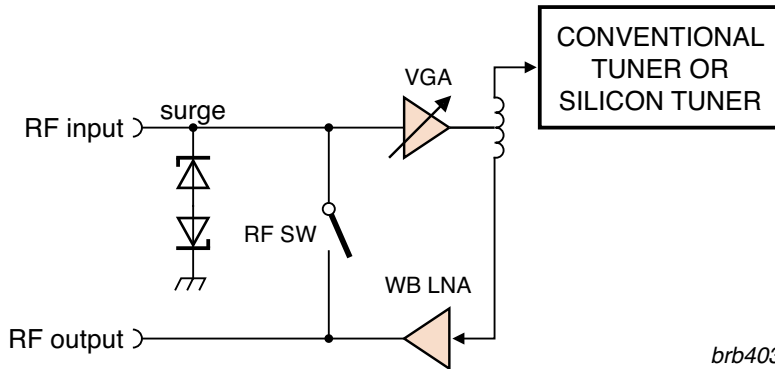
Features

- ▶ High-output power
- ▶ High power gain for power doublers
- ▶ Extremely low noise
- ▶ Dark Green products
- ▶ GaAs HFET dies for high-end applications
- ▶ Rugged construction
- ▶ Superior levels of ESD protection
- ▶ Integrated ringwave protection
- ▶ Design optimized for digital channel loading
- ▶ Temperature compensated gain response
- ▶ Optimized heat management
- ▶ Excellent temperature resistance

1.3 TV and satellite

1.3.1 Network interface module (NIM) for TV reception

Application diagram



Recommended products

Function	Product	Package	Type	
RF Switch / PLT switch	MOSFET	5 V silicon RF switch	SOT23	BF1107
			SOT143B	BF1108
			SOT143R	BF1108R
			SOT343	BF1108W
			SOT343R	BF1108WR
		3.3 V silicon RF switch	SOT143B	BF1118
			SOT143R	BF1118R
			SOT343	BF1118W
			SOT343R	BF1118WR

Function	Product	Package	Type	
AGC control amplifier	MOSFET	2-in-1 with band switch @ 5 V	SOT363	BF1215
		2-in-1 @ 5 V	SOT363	BF1216
		5 V	SOT343	BF1217

Note: given that there is now an LNA before the MOSFET, the gain of these MOSFETs is made slightly lower and the cross-modulation higher. That way, the MOSFET would not constantly be under AGC even under nominal RF input level.



Product highlight:

Save energy with BF11x8

The BF11x8 series are small signal, RF switching MOSFETs that can be used for switching RF signals up to 1 GHz. By using the BF11x8 series as an RF switch, you can save a considerable amount of energy. When a recording device (DVD-R, HDD-R, VCR, DVR) is powered off, viewers can still watch TV, although the antenna is looped via the recording device. Without the BF11x8, the antenna signal is lost.

When power to the recording device is on, the BF11x8 is open, so the RF signal travels via the recording device to the TV tuner. When power to the recording device is off, the BF11x8 closes. This ensures that the RF signal is looped through directly to the TV tuner and that TV reception is guaranteed. Energy is saved because the recording device can be powered off.

Recommended products

Function	Product		Package	Type
VGA	MMIC	Wideband amplifier with gain levels of 5 and 10 dB, plus a bypass mode. Vsupply = 5 V	SOT363	BGU7033 [^]
		Wideband amplifier with gain level of 10 dB and a bypass mode. Vsupply = 5 V	SOT363	BGU7032 [^]
		Wideband amplifier with gain level of 10 dB and a bypass mode. Vsupply = 3.3V	SOT363	BGU7042 [^]
		Wideband amplifier with gain level of 10 dB. Vsupply = 5 V	SOT363	BGU7031 [^]
		Wideband amplifier with gain level of 10 dB. Vsupply = 3.3V	SOT363	BGU7041 [^]
LNA	RF bipolar transistor	Wideband transistor	SOT143	BFG520
			SOT89	BFG540

[^] = This new series of LNA MMICs is designed specifically for high linearity (IP3O of 29 dBm), low noise applications like those in an active splitter or NIM tuner. Housed in a 6-pin SOT363 plastic SMD package, these MMICs are equipped with internal bias and matched to 75 Ω internally. For the VGAs, current consumption is < 5 mA during the bypass mode. Only two external components are needed, thus saving precious circuit board space.



Product highlight:

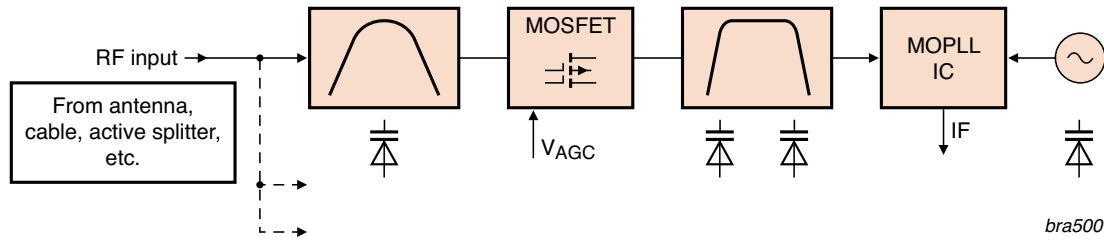
Make a high performance active splitter in a NIM tuner with BGU703x/ BGU704x

Today's TV tuners require complicated signal handling and benefit from flexibility in design. The front-end of a TV signal receiver is no longer just a tuned receiver, but has evolved into an RF Network Interface Module (NIM) with tuned demodulators, active splitters,

and remodulators. The active splitter requires an LNA with excellent linearity. NXP has developed two new series of LNA/VGA MMICs (BGU703x/BGU704x), designed especially for high linearity (P3O of 29 dBm) in low noise applications such as an active splitter in a NIM tuner. The BGU703x family operates at a supply voltage of 5 V and is intended for use with normal can tuners. The BGU704x family operates at 3.3 V and works seamlessly with our Si tuner ICs, which also operate at 3.3 V.

1.3.2 Basic TV tuner

Application diagram



Recommended products

Function	Product	Package	Type	
Input filter	Varicap diode	VHF low	SOD323	BB152
			SOD523	BB182
			SOD882D	BB182LX
		VHF high	SOD323	BB153
			SOD523	BB178
			SOD523	BB187
			SOD882D	BB178LX
			SOD882D	BB187LX
			SOD882D	BB179LX
		UHF	SOD323	BB149A
			SOD882D	BB179LX
			SOD523	BB179
SOD523	BB189			

Function	Product	Package	Type		
RF pre-amplifier	MOSFET	5 V	SOT143	BF1201	
			SOT143	BF1202	
			SOT143	BF1105	
			SOT143	BF1211	
			SOT143	BF1212	
		2-in-1 @ 5 V	SOT363	BF1102R	
			SOT363	BF1203	
			SOT363	BF1204	
			SOT363	BF1205	
			SOT363	BF1205C	
			SOT363	BF1206	
			SOT363	BF1207	
			SOT666	BF1208	
			SOT666	BF1208D	
			SOT363	BF1210	
			SOT363	BF1214	
			SOT363	BF1218	
			2-in-1 @ 3 V	SOT666	BF1206F

Function	Product	Package	Type
Bandswitching	Bandswitch diode	SOD523	BA277
		SOD523	BA891
		SOD523	BA591
		SOD523	

Function	Product	Package	Type	
Bandpass filter	Varicap diode	VHF low	SOD323	BB152
			SOD882D	BB182LX
			SOD523	BB182
		VHF high	SOD323	BB153
			SOD882D	BB178LX
			SOD523	BB178
			SOD882D	BB187LX
			SOD523	BB187
			SOD523	BB189
		UHF	SOD323	BB149A
			SOD882D	BB179LX
			SOD523	BB179
SOD523	BB189			

Function	Product	Package	Type	
Oscillator	Varicap diode	VHF low	SOD323	BB152
			SOD882D	BB182LX
			SOD523	BB182
		VHF high	SOD323	BB153
			SOD882D	BB178LX
			SOD523	BB178
			SOD882D	BB187LX
			SOD523	BB187
			SOD523	BB189
		UHF	SOD323	BB149A
			SOD882D	BB179LX
			SOD523	BB179
SOD523	BB189			

Function	Product	Package	Type	
RF pre-amplifier	MOSFET	2-in-1 with band switch @ 5 V	SOT363	BF1215
		2-in-1 @ 5 V	SOT363	BF1216
		5 V	SOT343	BF1217

Product highlight:

BF1206F dual gate MOSFET double amplifier

The device consists of two dual gate MOSFET amplifiers in a small SOT666 flat lead package. The BF1206F is a true low power device specified for low voltage and low currents, intended for use in mobile applications where power consumption is critical. Performance is suitable for application at supply voltages of 3 V and drain currents of 4 mA.

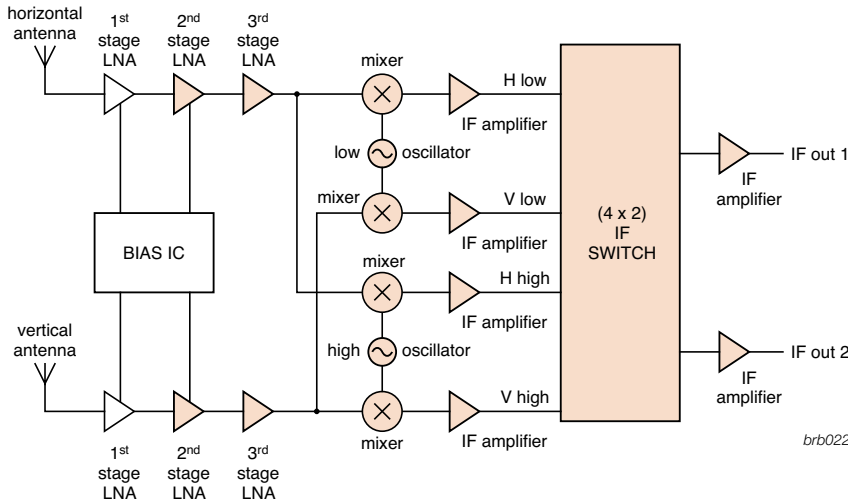
Features

- ▶ Low-power specified
- ▶ Two amplifiers in one small SOT666 package
- ▶ Shared gate 2 and source leads
- ▶ Each amplifier is biased by an external bias resistor
- ▶ Excellent noise and cross-modulation performance

1.3.3 Satellite outdoor unit, low noise block (LNB) for multiple users

Looking for fully integrated mixer/oscillator/downconverter?
See chapter 2.3.2 Complete satellite portfolio for all LNB architectures

Application diagram



brb022

Recommended products

Function	Product	Package	Type
Oscillator	RF bipolar transistor	Wideband transistor	SOT343 BFG424W
		SOT343F	BFG424F
	RF transistor	SiGe:C transistor	SOT343F BFU710F
			BFU725F/N1 BFU730F

Function	Product	Package	Type	
1 st stage IF amplifier	MMIC	General purpose amplifier	SOT363 BGA2711	
			SOT363 BGA2712	
			SOT363 BGA2748	
			SOT363 BGA2714	
			SOT363 BGA2717	
			SOT363 BGA2800	
		IF gain block	SOT363 BGA2801	
			SOT363 BGA2815	
			SOT363 BGA2816	
			SOT363 BGA2850	
			SOT363 BGA2865	
			SOT363 BGA2866	
		RF bipolar transistor	Wideband transistor	SOT343 BFG424W
			SOT343F	BFG424F

Function	Product	Package	Type
IF switch	RF diode	PIN diode	various BAP64 [^]
			various BAP51 [^]
			various BAP1321 [^]
			various BAP50 [^]
			various BAP63 [^]

[^] = also available in ultra small leadless package SOD882D.

Function	Product	Package	Type
Output stage IF amplifier	MMIC	General purpose amplifier	SOT363 BGA2709
			SOT363 BGA2776
			SOT363 BGM1014
			SOT363 BGM1012
			SOT363 BGA2716
			SOT363 BGA2800
		IF gain block	SOT363 BGA2801
			SOT363 BGA2815
			SOT363 BGA2816
			SOT363 BGA2850
RF bipolar transistor	Wideband transistor	SOT343	BFG325
		SOT343F	BFU710F
2 nd stage LNA	RF transistor	SiGe:C	SOT343F BFU730F

Function	Product	Package	Type
3 rd stage LNA	RF transistor	SiGe:C transistor	SOT343F BFU710F
			BFU730F

Function	Product	Package	Type
Mixer	RF transistor	SiGe:C transistor	SOT343F BFU710F
			BFU730F

Product highlight: BGA28xx-family of IF gain blocks

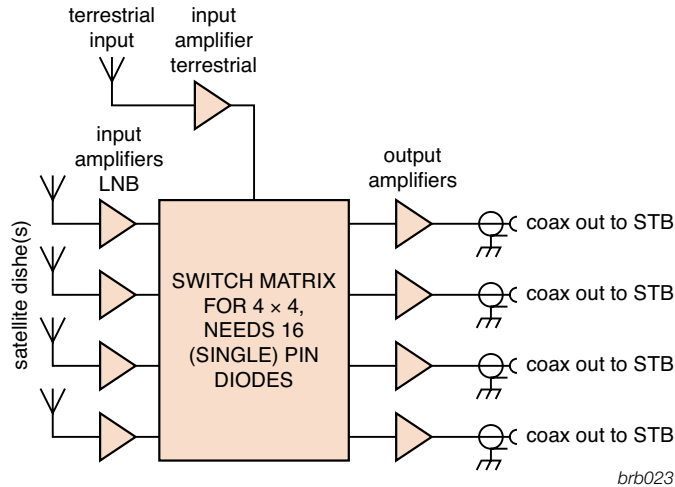
The BGA28xx IF gain blocks are silicon Monolithic Microwave Integrated Circuit (MMIC) wideband amplifiers with internal matching circuit in a 6-pin SOT363 plastic SMD package.

Features

- ▶ No output inductor necessary when used at the output stage
- ▶ Internally matched to 50 Ω
- ▶ Reverse isolation > 30 dB up to 2 GHz
- ▶ Good linearity with low second order and third order products
- ▶ Unconditionally stable ($K > 1$)

1.3.4 Satellite multi-switch box - 4 x 4 (up to 16 x 16) / DiSEqC / SMATV

Application diagram



Recommended products

Function	Product		Package	Type
Input amplifier terrestrial	MMIC	General purpose medium power amplifier	SOT89	BGA6289
				BGA6489
				BGA6589
				BGA7024
			SOT908	BGA7124



Function	Product		Package	Type	
Input amplifier LNB	MMIC	General purpose amplifier	SOT363	BGA2771	
			SOT363	BGA2776	
			SOT363	BGA2709	
			SOT363	BGM1012	
	RF bipolar transistor	Wideband transistor	SOT343	BFG325	
			SOT343	BFG425W	
			SOT143	BFG520	
			SOT143	BFG540	
			SiGe:C transistor	SOT343F	BFU725F/N1
					BFU730F

Function	Product		Package	Type
Switch matrix	RF diode	PIN diode	Various	BAP50^
				BAP51^
				BAP63^
				BAP64^
				BAP70^
				BAP1321^
				BAP1321^
	RF transistor	SiGe:C transistor	SOT343F	BFU725F/N1
				BFU730F
				BFU730F

^ = also available in ultra small leadless package SOD882D.

Function	Product		Package	Type	
Output amplifier	MMIC	General purpose medium power amplifier	SOT89	BGA6289	
				BGA6489	
				BGA6589	
				BGA7024	
			SOT908	BGA7124	
	RF bipolar transistor	General purpose amplifier	Wideband transistor	SOT363	BGM1011
				SOT363	BGM1013
				SOT363	BGM1014
				SOT223	BFG135
				SOT223	BFG 591
SiGe:C transistor	Wideband transistor	SiGe:C transistor	SOT223	BFG198	
			SOT143	BFG540	
			SOT343F	BFU725F/N1	
				BFU730F	
				BFU730F	

Product highlight:

PIN diodes for switching matrix

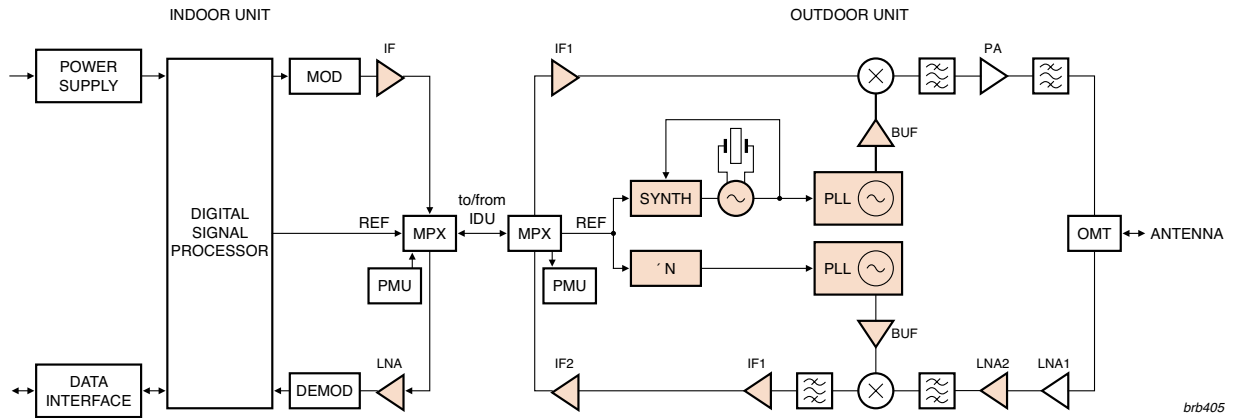
In addition to delivering outstanding RF performance, this component simplifies design-in because of its extremely low forward resistance, diode capacitance, and series inductance. Significant board space is saved by supplying a range of highly compact package options – including SOD523, SOD323 and leadless SOD882D.

Features

- ▶ High isolation, low distortion, low insertion loss
- ▶ Low forward resistance (R_d) and diode capacitance (C_d)
- ▶ Ultra-small package options

1.3.5 VSAT

Application diagram



Recommended products

Indoor unit

Function	Product	Package	Type
IF	IF gain block	MMIC	BGA2800
	MMIC	General purpose wideband amplifiers	BGA2801
			BGA2815
			BGA2816
			BGM1012
			BGA2714
			BGA2748
			BGA2771

Function	Product	Package	Type
LNA	RF transistor	SiGe:C transistor	SOT343F
			BFU725F/N1
			BFU710F
		Wideband transistor	SOT343R
			BFG425W
			BFG424W
SOT143R	BFG325/XR		



Recommended products

Outdoor unit

Function	Product		Package	Type
IF	IF gain block	MMIC	SOT363	BGA2800
				BGA2801
				BGA2815
				BGA2816
				BGA2850
				BGA2865
				BGA2866
				BGM1014
				BGM1013
				BGM1012
				BGA2714

Function	Product		Package	Type
LNA2	RF transistor	SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F
				BGU7003
	MMIC	SiGe:C MMIC	SOT891	BGU7003

Function	Product		Package	Type
PLL	RF IC	SiGe:C IC	SOT616	TFF1003HN
				TFF1007HN
				TFF11xxxHN [^]

Function	Product		Package	Type
Oscillator	RF transistor	Wideband transistor	SOT343R	BFG424W
				BFG425W
		SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F

Function	Product		Package	Type
Synth	RF diode	Varicap diode	SOD523	BB202

Function	Product		Package	Type
Buffer	RF transistor	SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
				BFU760F
				BFU790F



[^] = 17 different types with LO ranges: 7-15 GHz, see 3.4.4

Product highlight:

TFF1003HN

The TFF1003HN is a Ku-band frequency generator intended for low phase noise Local Oscillator (LO) circuits for Ku-band VSAT transmitters and transceivers. The specified phase noise complies with IESS-308 from Intelsat.

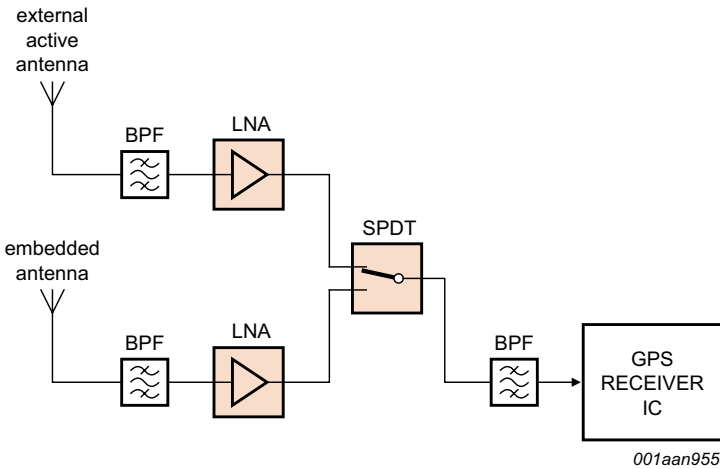
Features

- ▶ Phase noise compliant with IESS-308 (Intelsat)
- ▶ LO generator with VCO range from 12.8 GHz to 13.05 GHz
- ▶ Input signal 50 MHz to 815 MHz
- ▶ Divider settings 16, 32, 64, 128 or 256

1.4 Portable devices

1.4.1 GPS

Application diagram



Recommended products

Function	Product	Package	Type	
SPDT Switch	RF diode	PIN diode	various	BAP64 [^]
				BAP1321 [^]
				BAP51 [^]

Function	Product	Package	Type	
LNA	RF transistor	SiGe:C transistor	SOT343F	BFU725F /N1
				BFU710F
				BFU730F
				BGU7003
				BGU7003W
	MMIC	SiGe:C MMIC	SOT886	BGU7004
				BGU7005
				BGU7007
				BGU7008
				BGU7008

[^] = also available in ultra-small leadless package SOD882D.



Product highlight:

BGU7007 SiGe:C LNA MMIC for GPS, GLONASS, and Galileo

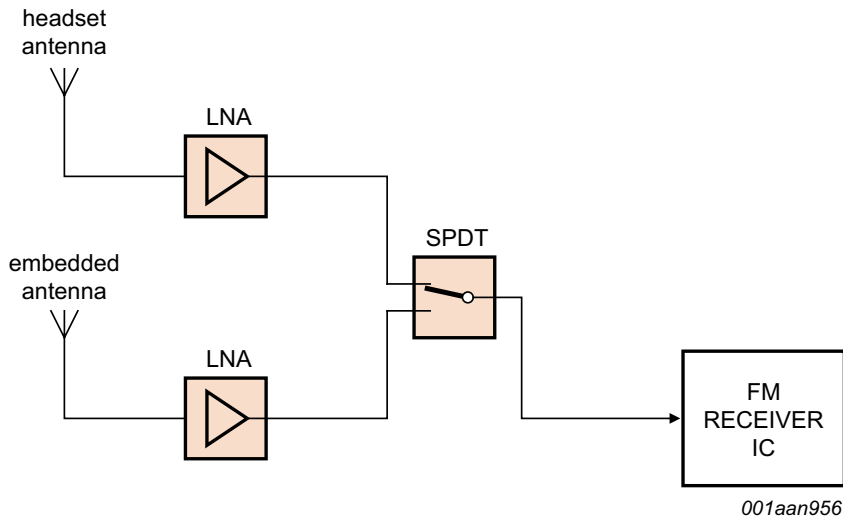
The BGU7007 is a low noise amplifier (LNA) for GNSS receiver applications in a plastic, leadless, 6-pin, extremely-small SOT886 package. It requires only one external matching inductor and one external decoupling capacitor.

Features

- ▶ Covers full GNSS L1 band, from 1559 to 1610 MHz
- ▶ Noise figure (NF) = 0.85 dB
- ▶ Gain = 18.5 dB
- ▶ High 1 dB compression point of -12 dBm
- ▶ High out-of-band IP3i of 4 dBm
- ▶ Supply voltage 1.5 to 2.85 V
- ▶ Power-down mode current consumption < 1 μ A
- ▶ Optimized performance at low supply current of 4.8 mA
- ▶ Integrated temperature stabilized bias for easy design
- ▶ Requires only one input matching inductor and one supply decoupling capacitor

1.4.2 FM radio

Application diagram



Recommended products

Function	Product	Package	Type	
SPDT switch	RF diode	PIN diode	various	BAP64 [^]
				BAP 65 [^]
				BAP1321 [^]
				BAP51 [^]

Function	Product	Package	Type	
LNA	RF transistor	SiGe:C transistor	SOT343F	BFU725F /N1
	MMIC	SiGe:C MMIC	SOT891 SOT886	BGU7003 BGU7003W

[^] = also available in ultra-small leadless package SOD882D.

Product highlight:

BGU7003W MMIC wide band amplifier

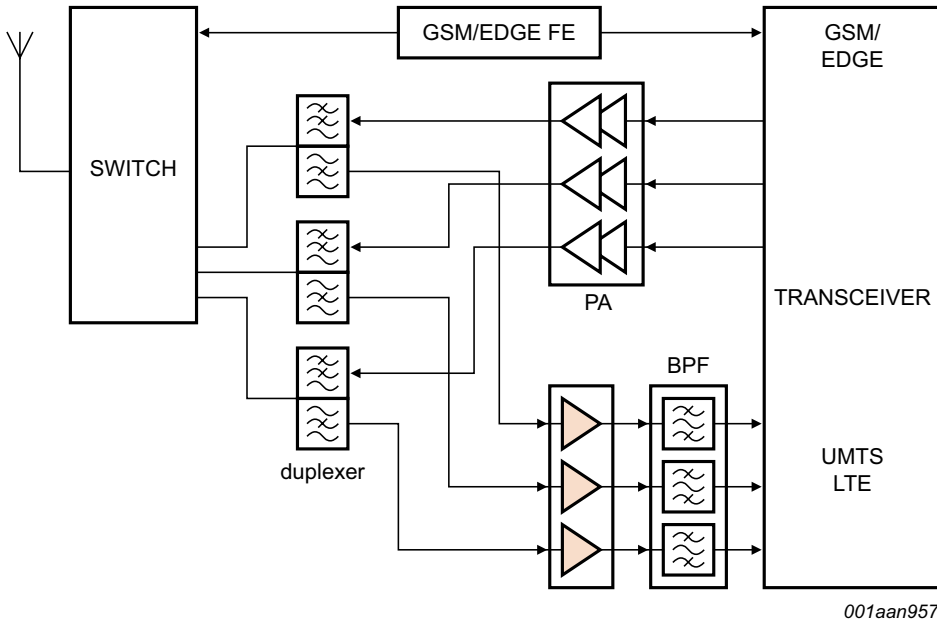
The BGU7003W is a wideband amplifier in SiGe:C technology for high-speed, low noise applications. It is housed in a plastic, leadless, 6-pin, extremely-thin, small-outline SOT886 package.

Features

- ▶ Applicable between 40 MHz and 6 GHz
- ▶ High ohmic FM LNA: 13 dB gain and 1.1 dB NF at 100 MHz
- ▶ 50 Ω FM LNA: 15 dB gain and 1.4 dB NF at 100 MHz
- ▶ Integrated temperature-stabilized bias for easy design
- ▶ Bias current configurable with external resistor
- ▶ Power-down mode current consumption < 1 μA
- ▶ ESD protection > 1 kV Human Body Model (HBM) on all pins

1.4.3 Cellular receive

Application diagram



Recommended products

Function	Product	Package	Type
LNA	MMIC	SiGe:C MMIC	SOT891
			SOT886
			BGU7003
			BGU7003W



Product highlight:

BGU7003 MMIC wideband amplifier

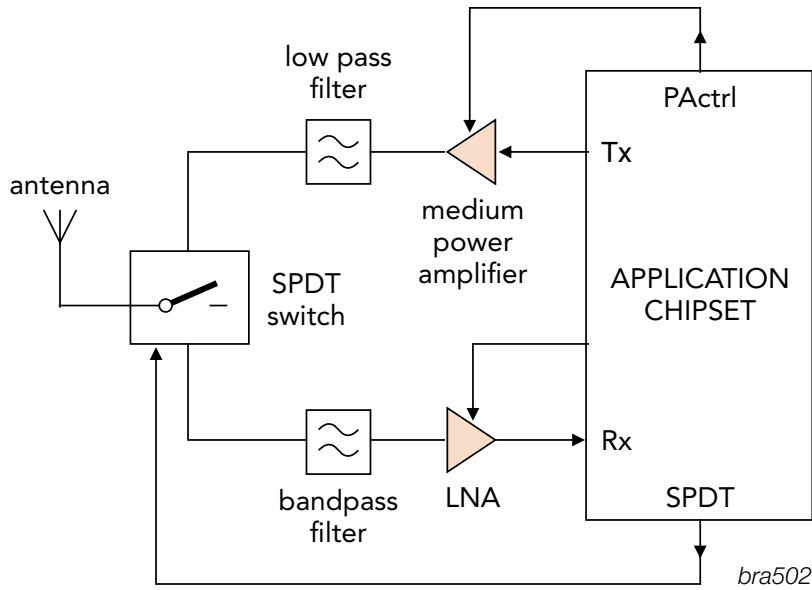
The BGU7003 MMIC is a wideband amplifier in SiGe:C technology for high-speed, low noise applications. It is housed in a plastic leadless 6-pin extremely thin small outline SOT886 package.

Features

- ▶ Applicable between 40 MHz and 6 GHz
- ▶ LTE LNA: 1 dB NF, 18.5 dB gain and -5 dBm IIP3 at 750 MHz
- ▶ Integrated temperature stabilized bias for easy design
- ▶ Bias current configurable with external resistor
- ▶ Power-down mode current consumption < 1 μ A
- ▶ ESD protection > 1 kV Human Body Model (HBM) on all pins

1.4.4 802.11n WLAN (dual concurrent)

Application diagram



Recommended products

Function	Product	Package	Type	
Medium power amplifier	MMIC	Medium power amplifier	SOT89	BGA7024
				BGA7027
		SOT908	BGA7124	
			BGA7127	

Function	Product	Package	Type	
LNA	RF Transistor	SiGe:C transistor	SOT343F	BFU725F/N1
				BFU730F
	MMIC	SiGe:C MMIC	SOT891	BGU7003



Product highlight:

BGA7127 MMIC medium power amplifier

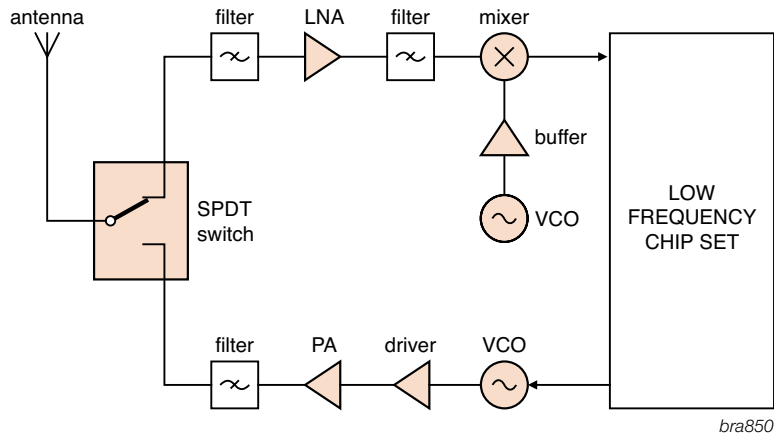
The BGA7127 MMIC is a one-stage driver amplifier, offered in a low-cost ultra small SOT908 leadless package. It delivers 28 dBm output power at 1 dB gain compression and superior performance for various narrowband-tuned application circuits at frequencies up to 2700 MHz.

Features

- ▶ 400 to 2700 MHz operating range
- ▶ 13 dB small signal gain at 2 GHz
- ▶ 28 dBm output power at 1 dB gain compression
- ▶ Integrated active biasing
- ▶ 3.3 / 5 V single supply operation
- ▶ Simple quiescent current adjustment
- ▶ 1 μ A shutdown mode

1.4.5 Generic RF front-end

Application diagram



Recommended products

Function	Product	Package	Type	
SPDT Switch	RF diode	Bandswitch diode	SOD523 BA277	
		PIN diode	SOD323 BA591	
			various	BAP51^
				various

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
			SOT343 BFG425W
	MMIC	Linear mixer	SOT363 BFG480W
			BGA2022

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951	
			SOT323 PRF957	
			SOT323 PRF947	
		SiGe:C transistor	SOT343F	BFU610F
				BFU630F
				BFU660F
				BFU690F
				BFU710F
				BFU725F/N1
				BFU730F
	MMIC	Low noise wideband ampl.	SOT343R BGA2001	
			SOT343R BGA2003	

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Power amplifier	MMIC	Gen. purpose wideband ampl.	SOT89 BGA6289
			BGA6489
			BGA6589
			BGA7024
			BGA7027

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB198
			SOD323 BB156

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957
			SOT23 PBR951
	MMIC	Amplifier	SOT363 BGA2031/1
		Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

^ = also available in ultra small leadless package SOD882D

Product highlight:

BFU790F silicon NPN germanium microwave transistor

Silicon NPN germanium microwave transistor for high-speed, low noise applications in a plastic, 4-pin dual-emitter SOT343F package.

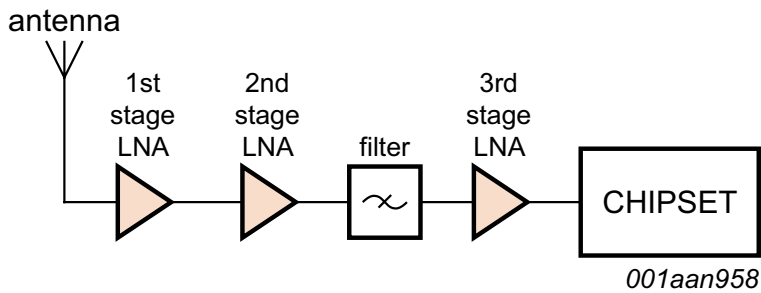
Features

- ▶ Low noise, high linearity microwave transistor
- ▶ 110 GHz f_T silicon germanium technology
- ▶ High maximum output power at 1 dB compression of 20 dBm at 1.8 GHz

1.5 Automotive

1.5.1 Active antenna, e.g. SDARS, GPS

Application diagram



Recommended products

Function	Product		Package	Type
1 st stage LNA	MMIC	Low noise wideband amplifier	SOT343R	BGA2001
			SOT343F	BGA2003
2 nd stage LNA	MMIC	General purpose wideband amplifier	SOT343F	BFU690F
			SOT363	BGM1013
				BGM1011
				BGA2715
				BGA2748
3 rd stage LNA	RF transistor	SiGe:C transistor	SOT343F	BFU690F
				BFU725F/N1
	MMIC	SiGe:C MMIC	SOT891	BFU790F
				BGU7003



Product highlight: BGU7003 MMIC wideband amplifier

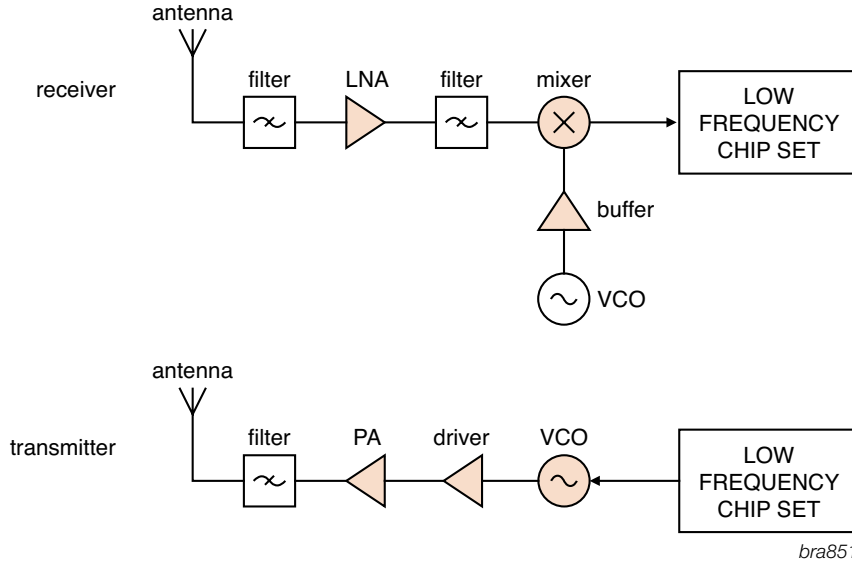
Manufactured in NXP's latest SiGe:C process, this high frequency RF MMIC delivers high-quality reception with extended battery life. It is a cost-effective, silicon-based alternative to GaAs devices, and offers higher integration and easier design-in than discrete bipolar transistors.

Features

- ▶ Low noise, high-gain microwave MMIC
- ▶ Maximum stable gain = 19 dB at 1.575 GHz
- ▶ 110 GHz f_T -silicon germanium technology
- ▶ Optimized performance at low (5 mA) supply current
- ▶ Extremely thin, leadless 6-pin SOT891 package
- ▶ Integrated biasing and shutdown for easy integration

1.5.2 Remote keyless entry, RF generic front-end with dedicated antenna for reception and transmission

Application diagram



Recommended products

Function	Product	Package	Type	
LNA	RF bipolar transistor	Wideband transistor	SOT23 PBR951	
			SOT323 PRF957	
			SOT323 PRF947	
	MMIC	Low noise wideband ampl.	SOT343R	BGA2001 BGA2002^ BGA2003
			SiGe:C MMIC	SOT891 BGU7003

Function	Product	Package	Type	
Driver	RF bipolar transistor	Wideband transistor	SOT323 PRF957	
			SOT23 PBR951	
		Amplifier	SOT363 BGA2031/1	
	MMIC	Gen. purpose wideband ampl.	SOT363	BGA2771
			SOT363	BGA2776

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD323 BB148
			SOD323 BB149A
			SOD523 BB198
			SOD323 BB156

^ = AEC-Q101 qualified (some limitations apply)

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
			SOT343 BFG425W
			SOT343 BFG480W
	MMIC	Linear mixer	SOT363 BGA2022

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type	
Power amplifier	RF bipolar transistor	Wideband transistor	SOT323 PRF957	
			SOT23 PBR951	
		Amplifier	SOT363 BGA2031/1	
	MMIC	Gen. purpose wideband ampl.	SOT363	BGA2771
			SOT363	BGA2776
			SOT908	BGA7124

Product highlight:

Varicap diodes as VCO

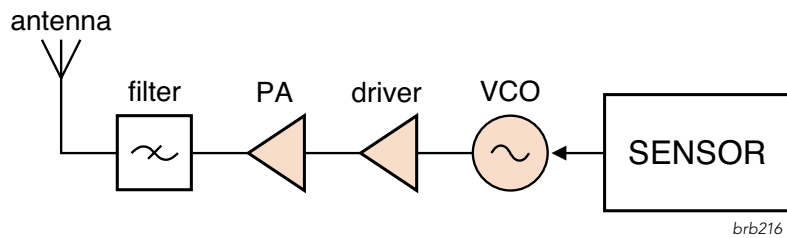
Varicap diodes are principally used as voltage varicap capacitors, with their diode function a secondary option. These devices are ideal for voltage controlled oscillators (VCOs) in ISM band applications.

Features

- ▶ Excellent linearity
- ▶ Excellent matching
- ▶ Very low series resistance
- ▶ High capacitance ratio

1.5.3 Tire pressure monitoring system

Application diagram



Recommended products

Function	Product		Package	Type
PA	RF bipolar transistor	Wideband transistor	SOT23	BFR92A
			SOT323	BFR92AW
			SOT23	BFR94A^
			SOT323	BFR93AW
			SOT323	BFR94AW^

Function	Product		Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT323	PRF957
			SOT23	PBR951
	MMIC	Amplifier	SOT363	BGA2031/1
		Gen. purpose wideband ampl.	SOT363	BGA2771
			SOT363	BGA2776

Function	Product		Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523	BB198
			SOD323	BB156

^ = AEC-Q101 qualified (some limitations apply)

Product highlight:

BFR94AW silicon NPN transistor

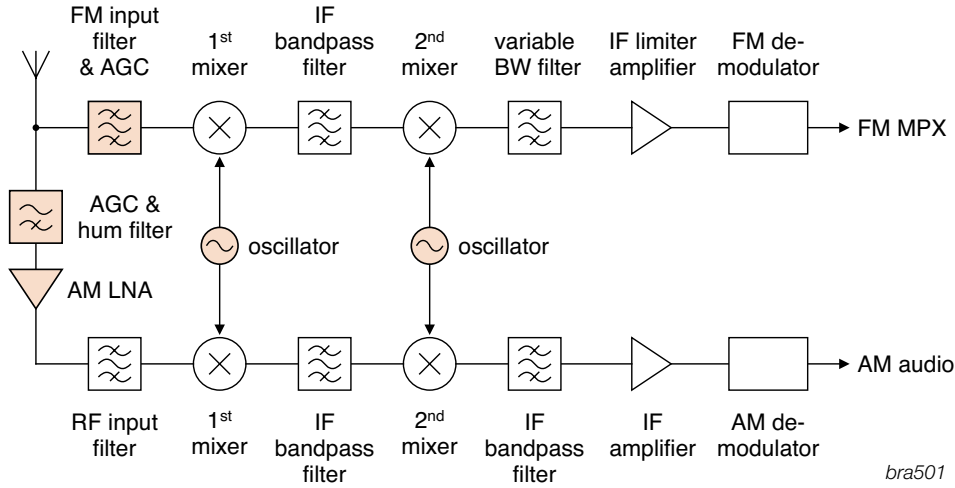
Designed for use in RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz, this silicon NPN transistor is housed in a plastic SOT323 (S-mini) package.

Features

- ▶ High power gain
- ▶ Gold metallization ensures excellent reliability
- ▶ SOT323 (S-mini) package
- ▶ AEC-Q101 qualified

1.5.4 Car radio receiver (CREST ICs: TEF6860HL, TEF6862HL)

Application diagram



Recommended products

Function	Product	Package	Type	
AM LNA	RF transistor	JFET	SOT23	BF862
FM input filter & AGC	RF diode	Varicap diode	SOT23	BB201 [^]
			SOT23	BB207
		PIN diode	SOD523	BAP70-02
			SOD323	BAP70-03

[^] = OIRT

Function	Product	Package	Type	
AGC & hum filter	RF diode	PIN diode	SOT363	BAP70AM
Oscillator	RF diode	Varicap diode	SOD323	BB156
			SOD523	BB208-02

Note 1:

These recommended discrete products are applicable for NICEPACS, CCC and DDICE: NICE:TEA6840H,TEA6845H,TEA6846H, NICEPACS:TEA6848H,TEA6849H; CCC:TEF6901H,TEF6903H; DDICE:TEA6721HL. All recommended discrete products are applicable, excluding AM LNA in: DICE2:TEF6730HWCE.

Note 2:

Phone and portable radio (IC:TEA5767/68) use varicap BB202 as FM oscillator.

Product highlight: BF862 junction field effect transistor

Our tuning portfolio contains excellent products for car radio reception applications and in-vehicle media platforms. The NXP devices for this application ensure excellent reception quality and ease of design-in. Performance is demonstrated in reference designs.

The high performance junction FET BG862 is specially designed for AM radio amplifiers.

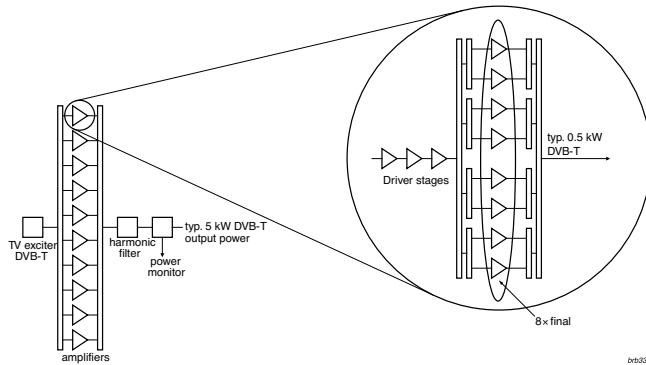
Features

- ▶ High transition frequency and optimized input capacitance for excellent sensitivity
- ▶ High transfer admittance resulting in high gain
- ▶ Encapsulated in the versatile and easy to use SOT23 package

1.6 Industrial, scientific & medical (ISM)

1.6.1 Broadcast / ISM (10 - 1500 MHz range)

Application diagram



Recommended broadcast products

Function	f_{\min} (MHz)	f_{\max} (MHz)	P1dB (W)	η_D (%)	VDS (V)	Package	Type
Driver	470	860	7	33	50	SOT467C	BLF642
	470	860	24	33	42	SOT467	BLF871(S)
	470	860	30	31	50	SOT467	BLF881(S)
Final	470	860	70	32	50	SOT539A	BLF884P
	470	860	75	32	42	SOT979A	BLF878
	470	860	90	31	42	SOT1121	BLF879P
	470	860	110	30	50	SOT539A	BLF888
	470	860	120	31	50	SOT539A	BLF888A

Recommended ISM products

Function	f_{\min} (MHz)	f_{\max} (MHz)	P1dB (W)	VDS (V)	Package	Type
Driver	0	1000	5	50	SOT1179	BLP10H605
	0	1000	10	50	SOT1179	BLP10H610
	0	1500	5	32	SOT1179	BLP15M705
	0	1500	10	32	SOT1179	BLP15M710
	10	500	20	50	SOT467C	BLF571
	1	1400	35	32	SOT467C	BLF642
	1	1000	100	42	SOT467	BLF871
Final	1	1000	120	50	SOT467	BLF881
	1	1400	100	32	SOT540A	BLF645
	1	800	300	32	SOT540A	BLF647
	1	1500	150	32	SOT1120	BLF647P
	10	500	300	50	SOT502	BLF573(S)
	470	860	300	50	SOT539A	BLF884P
	10	500	500	50	SOT1121A/B	BLF573P
	1400	1500	500	50	SOT539	BLF6G15L(S)-500H
	10	500	600	50	SOT539A	BLF574
	470	860	600	50	SOT539	BLF888A(S)
	470	860	450	42	SOT539A3	BLF879P
	88	108	1000	50	SOT539	BLF178P
	10	500	500	50	SOT1240	BLF278XR
	10	500	1200	50	SOT539A	BLF578
10	500	1200	50	SOT539A	BLF578XR	

Product highlight:

BLF888A LDMOS power transistor

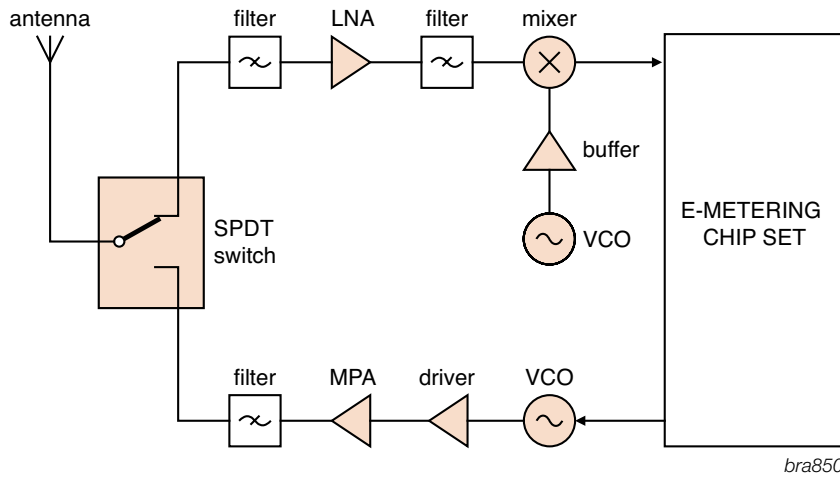
NXP's 50 V high voltage LDMOS process enables highest power and unequalled ruggedness. The BLF888A (VSWR > 50:1) delivers the highest power level for digital broadcasting available to date.

Features

- ▶ Best broadband efficiency
- ▶ Highest power devices
- ▶ Unrivalled ruggedness
- ▶ Low-thermal resistance design for reliable operation
- ▶ Consistent device performance

1.6.2 E-metering, RF generic front-end with a single antenna / ZigBee

Application diagram



Recommended products

Function	Product	Package	Type
SPDT Switch	RF diode	Bandswitch diode	SOD523 BA277
			SOD323 BA591
		PIN diode	various BAP51^
			various BAP1321^

Function	Product	Package	Type
Mixer	RF bipolar transistor	Wideband transistor	SOT343 BFG410W
			SOT343 BFG425W
	MMIC	Linear mixer	SOT343 BFG480W
			SOT363 BGA2022

Function	Product	Package	Type
LNA	RF transistor	SiGe:C transistor	SOT343F BFU610F
			BFU630F
			BFU660F
			BFU690F
			BFU710F
			BFU725F/N1
			BFU730F
	MMIC	Low noise wideband ampl.	SOT343R BGA2001
			SOT343R BGA2003
			SiGe:C MMIC SOT891 BGU7003

Function	Product	Package	Type
Buffer	RF bipolar transistor	Wideband transistor	SOT23 PBR951
			SOT323 PRF957
			SOT323 PRF947
			SOT416 PRF949

Function	Product	Package	Type
Medium power amplifier	RF bipolar transistor	Wideband transistor	SOT343 BFG21W
	MMIC	Gen. purpose wideband ampl.	SOT89 BGA6289
			BGA6489
			SOT908 BGA6589
		SOT908 BGA7124	
		SOT908 BGA7127	

Function	Product	Package	Type
Driver	RF bipolar transistor	Wideband transistor	SOT343 BFG425W
			Amplifier
	MMIC	Gen. purpose wideband ampl.	SOT363 BGA2771
			SOT363 BGA2776

Function	Product	Package	Type
VCO	Varicap diodes	VCO varicap diodes	SOD523 BB198
			SOD323 BB156

^ = also available in ultra small leadless package SOD882D.

Product highlight:

BGA7127 MMIC medium power amplifier

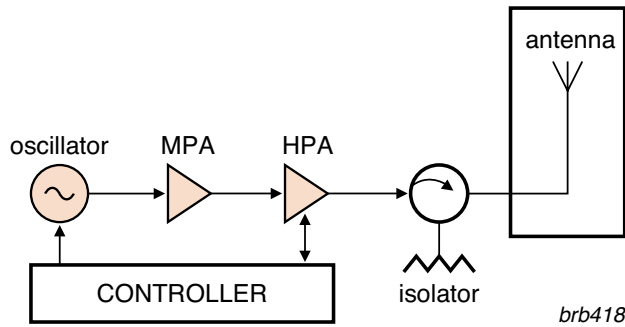
The BGA7127 MMIC is a one-stage driver amplifier, offered in a low-cost, ultra small SOT908 leadless package. It delivers 27 dBm output power at 1 dB gain compression and superior performance for various narrowband-tuned application circuits at frequencies up to 2700 MHz.

Features

- ▶ Operating range: 400 to 2700 MHz
- ▶ 16 dB small signal gain at 2 GHz
- ▶ 27 dBm output power at 1 dB gain compression
- ▶ Integrated active biasing
- ▶ 3.3 / 5 V single supply operation
- ▶ Simple quiescent current adjustment
- ▶ 1 μ A shutdown mode

1.6.3 RF Microwave furnace application

Application diagram



Recommended products

Function	Product	Package	Type
Oscillator	RF transistor	SOT343R	BFG410W
			BFG424W
			BFG425W
		SOT343F	BFG424F
			BFU610F
			BFU630F
			BFU660F
			BFU690F
			BFU710F
			BFU725F/N1
			BFU730F
			BFU760F
BFU790F			

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	Package	Type
HPA	Driver	1	2500	4	SOT1179	BLP25M74
		1	2500	10	SOT1179	BLP25M710
		1	2500	12	SOT975B	BLF25M612
	Final	2400	2500	20	SOT1138	BLM2425M720
		2400	2500	140	SOT1179	BLP2425M8140
		2400	2500	180	SOT539	BLF2425M6L(S)180P
		2400	2500	200	SOT502	BLF2425M7L(S)200
		2400	2500	250	SOT539	BLF2425M7L(S)250P
		2400	2500	250	SOT1179	BLP2425M8250P

Function	Product	Package	Type
MPA (medium power amplifier)	MMIC	SOT89	BGA6289
			BGA6489
			BGA6589
		SOT908	BGA7124
		SOT89	BGA7024
		SOT908	BGA7127
		SOT89	BGA7027
		SOT908	BGA7130*

* = check status at 3.1 new products, as this type has not been released for mass production.

Product highlight:

New family for ISM 2.45 GHz

NXP's 6th and 7th generation LDMOS technology, along with advanced packaging concepts, enables power amplifiers that deliver best-in-class performance at 2.45 GHz. The unsurpassed ruggedness and low thermal resistance, along with the intrinsic efficiency of the LDMOS process, make these transistors ideally suited for the furnace application.

Features

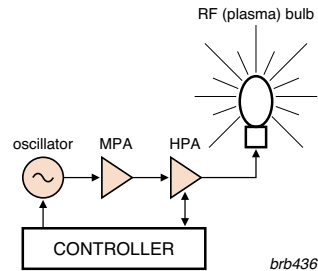
- ▶ Excellent ruggedness
- ▶ Consistent device performance
- ▶ Low thermal resistance design for unrivalled reliability
- ▶ Ease of design

1.6.4 RF plasma lighting

Looking for more information on RF plasma lighting?

See chapter 2.5.2 RF-driven plasma lighting: The next revolution in light sources are powered by solid-state RF technology

Application diagram



Recommended products

Function	Product	Package	Type
Oscillator	RF transistor	SOT143	BFG520
		SOT143	BFG325/XR
		SOT23	BFR520
		SOT323	BFR92AW
		SOT323	BFR93AW
		SOT323	BFS520
		SOT343	BFG520W
		SOT343	BFG325W/XR
		SOT363	BFM520
SOT416	BFR520T		

Function	Product	Package	Type
MPA (medium power amplifier)	MMIC	SOT89	BGA6289
			BGA6489
			BGA6589
		SOT908	BGA7124
		SOT89	BGA7024
		SOT908	BGA7127
		SOT89	BGA7027
SOT908	BGA7130*		



* = check status at 3.1 new products, as this type has not been released for mass production.

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	Package	Type	
HPA	Driver	10	500	20	SOT467C	BLF571	
		Final	10	500	300	SOT502A	BLF573(S)
	10		500	500	SOT539A	BLF574	
	10		500	500	SOT1240	BLF278XR	
	10		500	1000	SOT539A	BLF578	
	10		500	1000	SOT539A	BLF578XR	
	Driver		10	1000	10	SOT1179	BLP10H610
		Final	10	1000	100	SOT467C	BLF871(S)
			10	1000	120	SOT1138	BLP10H6120
	10		1000	300	SOT1138	BLP10H6300P	
	Driver	10	2500	4	SOT1179	BLP25M74	
		10	2500	12	SOT975B	BLF25M612	
	Final	2400	2500	140	SOT1179	BLP2425M8140	
		2400	2500	180	SOT502	BLF2425M7L(S)180	
		2400	2500	200	SOT502	BLF2425M7L(S)200	
		2400	2500	250	SOT539	BLF2425M7L(S)250P	
2400		2500	250	SOT1179	BLP2425M8250P		

Product highlight:

LDMOS enables RF lighting

NXP's 50 V high voltage LDMOS process enables highest power at the unprecedented ruggedness levels necessary for this kind of application.

BLF578: 1000 W CW operation - highest power LDMOS

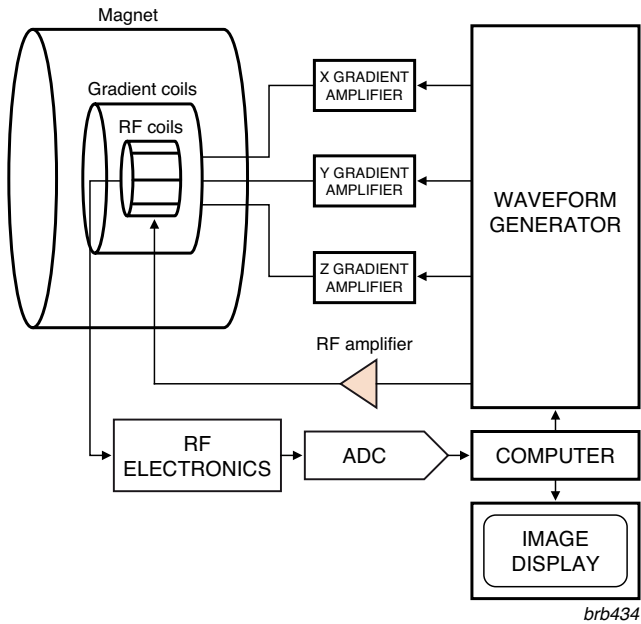
Features

- ▶ Highest power device
- ▶ Unprecedented ruggedness
- ▶ Low-thermal resistance design for reliable operation
- ▶ Consistent device performance
- ▶ Broadband device for flexible use

1.6.5 Medical imaging

Looking for more information on medical applications?
See chapter 2.5.1 Medical applications driven by RF power: From imaging to cancer treatment, a flexible and versatile technology in the doctor's toolbox

Application diagram



Recommended products

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	Package	Type
HPA	Driver	10	500	20	SOT467C	BLF571
		10	500	300	SOT502A	BLF573(S)
	Final	10	500	500	SOT539A	BLF574
		10	500	500	SOT1240	BLF278XR
		10	500	1000	SOT539A	BLF578
		10	500	1000	SOT539A	BLF578XR
	Driver	10	1000	10	SOT1179	BLP10H610
		10	1000	100	SOT467C	BLF871(S)
	Final	10	1000	120	SOT1138	BLP10H6120
		10	1000	300	SOT1138	BLP10H6300P
	Driver	10	2500	4	SOT1179	BLP25M74
		10	2500	12	SOT975B	BLF25M612
	Final	2400	2500	140	SOT1179	BLP2425M8140
		2400	2500	180	SOT502	BLF2425M7L(S)180
		2400	2500	200	SOT502	BLF2425M7L(S)200
2400		2500	250	SOT539	BLF2425M7L(S)250P	
2400		2500	250	SOT1179	BLP2425M8250P	

Product highlight:

LDMOS in emerging medical applications

NXP's line of 50 V high voltage LDMOS devices enables highest power output and features unequalled ruggedness for pulsed operation in MRI and NMR applications. The high power densities enable compact amplifier design.

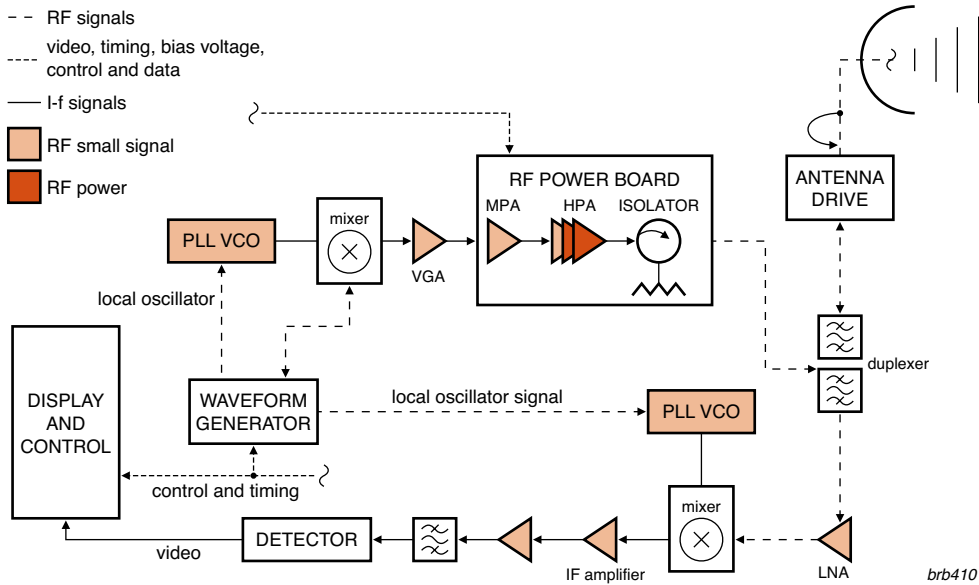
Features

- ▶ Best broadband efficiency
- ▶ Highest power (density) devices
- ▶ Unrivalled ruggedness
- ▶ Consistent device performance

1.7 Aerospace and defense

1.7.1 Microwave products for avionics, L- and S-band radar applications

Application diagram



Recommended products

Function	Product	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	Package	Applications	Type
HPA	Driver	1030	1090	2	SOT538A	Avionics	BLA1011-2
		1030	1090	10	SOT467C	Avionics	BLA1011-10
	Final	1030	1090	200	SOT502A	Avionics	BLA6G1011-200R
		1030	1090	200	SOT502A	Avionics	BLA6G1011LS-200RG
		960	1215	250	SOT502A	Avionics	BLA0912-250R
		1030	1090	300	SOT957A	Avionics	BLA1011-300
		960	1215	500	SOT634A	Avionics	BLA6H0912-500
		1030	1090	600	SOT539A	Avionics	BLA6H1011-600
		960	1215	1000	SOT539A3	Avionics	BLA6H0912-1000
	Driver	500	1400	25	SOT467C	L-band	BLL6H0514-25
		1200	1400	35	SOT467C	L-band	BLL1214-35
		500	1400	130	SOT1135	L-band	BLL6H0514L(S)-130
	Final	1200	1400	250	SOT502A	L-band	BLL6G1214L-250
		1200	1400	250	SOT502	L-band	BLL6H1214L(S)-250
		1200	1400	500	SOT539A	L-band	BLL6H1214-500
		2700	3100	6	SOT975C	S-band	BLS6G2731-6G
	Driver	3100	3500	20	SOT608	S-band	BLS6G3135(S)-20
		2700	3500	30	SOT1135	S-band	BLS6G2735L(S)-30
		2900	3300	100	SOT502A	S-band	BLS2933-100
	Final	2700	3100	120	SOT502	S-band	BLS6G2731(S)-120
		3100	3500	120	SOT502	S-band	BLS6G3135(S)-120
		2700	3100	130	SOT922-1	S-band	BLS6G2731S-130
		2900	3300	130	SOT922-1	S-band	BLS6G2933S-130
		2900	3300	150	SOT922-1	S-band	BLS7G2933S-150
		2700	2900	350	SOT539	S-band	BLS7G2729L(S)-350P
		3100	3500	350	SOT539	S-band	BLS7G3135L(S)-350P
		2900	3300	200	pallet	S-band	BLS6G2933P-200
		2700	3100	200	pallet	S-band	BLS6G2731P-200

Function	Product	Package	Type
Discrete attenuator	RF diode PIN diode	Various [^]	BAP64

[^] = SOD523, SOD323, SOT23 & SOT323

Function	Product	Package	Type
LNA (low noise amplifier) & Mixer	RF transistor SiGe:C transistor	SOT343F	BFU710F BFU725F/N1 BFU730F

Function	Product	Package	Type
IF amplifier	MMIC	SOT363	BGA2800
			BGA2801
			BGA2815
			BGA2816
			BGA2850
			BGA2865
			BGA2866
	General purpose wideband amplifiers		BGM1014
			BGM1013
			BGM1012

Function	Product	Package	Type
PLL/VCO LO generator	RF IC SiGe:C IC	SOT616	TFF1003HN TFF1007HN TFF11xxxHN [^]

Function	Product	Gain range	Package	Type
Single VGA (variable gain amplifier)	MMIC	23 dB	SOT617	BGA7202
		31 dB		BGA7204

Function	Product	Gain range	Package	Type
Dual VGA (variable gain amplifier)	MMIC	24 dB	SOT617	BGA7350
		28 dB		BGA7351

Function	Product	P_{1dB} @ 940 MHz	Package	Type
MPA (medium power amplifier)	MMIC	21 dBm	SOT89	BGA6589
		25 dBm	SOT908	BGA7124
		24 dBm	SOT89	BGA7024
		28 dBm	SOT908	BGA7127
		28 dBm	SOT89	BGA7027
		30 dBm	SOT908	BGA7130*

[^] = 17 different types with LO ranges: 7-15 GHz, see 3.4.4



Product highlight:
NXP launches high quality pallets for S-band

The BLS6G2933P-200 is the first LDMOS-based, industry-standard pallet available on the market. This pallet offers more than 40% efficiency, includes the complete bias network and can be used as direct replacement for current solutions.

- Features**
- ▶ P_1 dB > 200 W
 - ▶ Efficiency > 40%
 - ▶ Industry-standard footprint
 - ▶ 50 Ω in/out matched for entire bandwidth
 - ▶ Lightweight heat sink included

2. Focus applications, products & technologies

2.1 Wireless communication infrastructure

2.1.1 VGAs with superior linearity for enhanced system performance

NXP variable gain amplifiers BGA7202/4, BGA7350/1

Manufactured in NXP's innovative QUBiC4 process, these VGAs deliver more on-chip functionality in less space, and meet the most demanding requirements for system performance.

Key features

- ▶ BGA720x: transmit VGAs
 - Frequency band: 700 to 2200 or 2750 MHz
 - Gain range: 23 or 31.5 dB
 - OIP3: +36 dBm/110 mA (BGA7202), +41 dBm/520 mA (BGA7204) @ minimum attenuation
- ▶ BGA735x: dual receive IF VGAs
 - Frequency band: 50 to 250 MHz
 - Gain range: 24 or 28 dB
 - OIP3: +44 dBm/245 mA or higher @ minimum attenuation
 - Gain flatness: 0.1 dB
 - Differential phase error: 0.1 degrees
- ▶ Best-in-class linearity (OIP3) at low power consumption
- ▶ ESD protection > 2 kV HBM and > 1.5 kV CDM on all pins
- ▶ HVQFN32 leadless packages (5 x 5 mm)

Key applications

- ▶ Wireless infrastructure base stations
- ▶ Multi-carrier systems

These high performance variable gain amplifiers (VGAs) support multiple frequency bands and the latest air interfaces. They offer best-in-class linearity, very low power consumption, high immunity to out-of-band signals, spurious performance, and output power. They are ideally suited for GSM, W-CDMA, WiMAX, LTE base-station infrastructure, and multi-carrier systems.

The BGA7202 and BGA7204 are RF VGAs used in the transmit path. The BGA7202 offers an output third-order intercept (OIP3) of +45 dBm and 27 dB of attenuation. The attenuation is controlled by means of an analog interface.

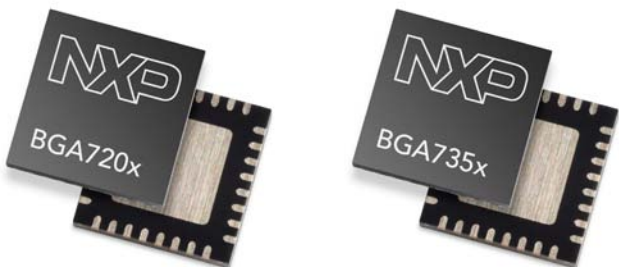
The BGA7204 provides an OIP3 of +37 dBm and 32 dB of attenuation. The attenuation is controlled by means of a digital interface. In addition, the gain curve of the BGA7204 can be programmed via an SPI interface.

The BGA7350 and BGA7351 are dual, independently controlled receive IF VGAs that operate from 50 to 250 MHz. Integrated matching improves performance in the receiver chain, because the VGA can drive the filter directly into the analog-to-digital converter to ensure a constant input level.

The BGA7350 has a gain range of 24 dB, while the BGA7351 has a range of 28 dB. For both devices, the maximum gain setting delivers 18 dBm output power at 1 dB gain compression (P1dB), with superior linear performance and overdrive performance up to +20 dBm. For gain control, each amplifier uses a separate digital gain-control code, which is provided externally through two sets of five bits. The resulting gain flatness is 0.1 dB.

Other features

All four devices are RoHS-compatible and available in space-saving HVQFN32 leadless packages that measure just 5 x 5 mm. They are unconditionally stable devices that offer ESD protection at all pins and meet moisture sensitivity level 1.



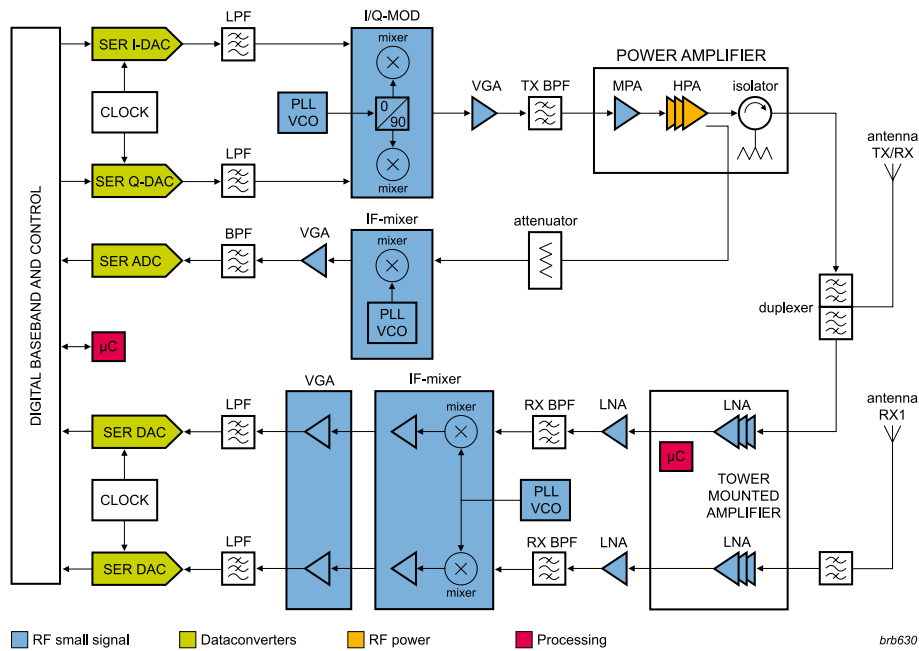
State-of-the-art QUBiC4

NXP's industry-leading QUBiC4 technology, available since 2002, has been widely deployed in the field and offers more consistent parameter performance compared to GaAs technology. It speeds the migration from GaAs to silicon and delivers more functionality in less space. High integration reduces the design footprint and enables more cost competitive designs. It also improves reliability and offers significant savings in manufacturing expenditures.

Complete signal chain

NXP is one of the very few companies that supplies products for the complete signal chain – from analog mixed-signal components such as ADCs and DACs to RF small signal devices and high-power RF amplifiers. This system-level approach allows engineers to purchase products that work well together as part of the overall system design, and makes it easier for designers to optimize performance in today's wireless infrastructure.

Furthermore, since NXP has in-house access to all the core IP, the company is positioned to support even higher levels of integration in the future.



Selection guide

Type	Package	Control interface	V _{sup} (V)	I _{sup} (mA)	Frequency (MHz)	Gain range (dB)	@ minimum attenuation			@ maximum attenuation		
							Gain (dB)	OIP3 (dBm)	NF (dB)	Gain (dB)	OIP3 (dBm)	NF (dB)
BGA7202	SOT617	Analog	5	530	700 to 1450	23	23	41	7	0	30	30
					1450 to 2200	23	23	41	7	0	30	30
BGA7204	SOT617	Parallel, serial, digital	5	110	700 to 1450	31.5	18	38	6.5	-13.5	10	38
					1450 to 2100	30.5	17	36	6.5	-13.5	10	38
					2100 to 2750	29.5	16	34	7.5	-13.5	10	38
BGA7350	SOT617	Parallel, digital	5	245	50 to 250	24	18.5	44	6	-5.5	50	30
BGA7351	SOT618	Parallel, digital	5	250	50 to 250	28	22	45	6	-6	50	34

2.1.2 Doherty amplifier technology for state-of-the-art wireless infrastructure

Best-in-class PA designs enable considerable energy savings

NXP's latest power amplifier designs let the wireless infrastructure run with significantly higher energy efficiency – towards “Green Base Stations”. In order to achieve the highest efficiencies currently possible, NXP combines its latest generations of LDMOS technology (Gen7 & 8) with the Doherty concept. The high performance of our LDMOS technology, matched with the efficiency of the Doherty technology, creates power amplifiers that offer high efficiency, high gain, are easily linearizable, and are more cost-effective to operate.

Developed by W.H. Doherty in 1936, the Doherty amplifier remained largely unused because the dominant mobile communication system modulation techniques (FM, GMSK, and EDGE) did not require high peak-to-average ratio (PAR) signals. For today's base stations, however, transmitting 3G, 4G, and multi-carrier signals makes the high power and added efficiency of the Doherty approach the preferred option for most service providers.

NXP's Doherty designs ensure high efficiency while maintaining a very similar peak power capability of two transistors combined. The input and output sections are internally matched, benefiting the amplifiers with high gain, good gain flatness, and phase linearity over a wide frequency band.

Integrated Doherty

NXP can even offer the world's first fully integrated Doherty designs. From the outside these devices look like ordinary transistors. In fact, they are completely integrated Doherty amplifiers that readily deliver the associated high efficiency levels for base station applications. With the ease of design-in of an ordinary Class AB transistor, they also provide significant space and cost savings.

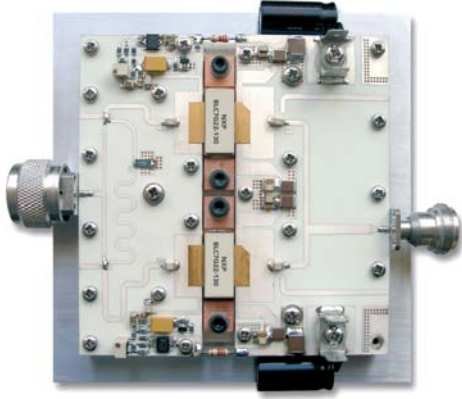
Key features & benefits

- ▶ Contains splitter, main and peak amplifier, delay lines, and combiner in one package
 - 40% efficiency @ 10 W average power
 - no additional tuning in manufacturing
- ▶ Design is as easy as with a single Class AB transistor
- ▶ Ideally suited for space-constrained applications (e.g. remote radio heads, antenna arrays)
- ▶ Currently available for TD-SCDMA (BLD6G21L(S)-50) and W-CDMA (BLD22L(S)-50); see chapter 3.7.1.4 for details

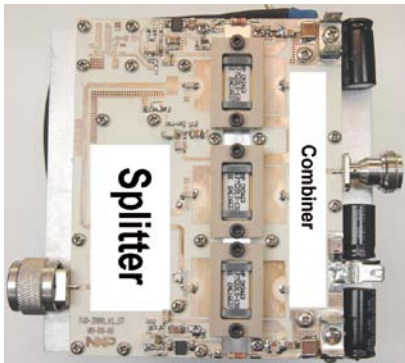


Discrete Doherty amplifiers

In addition to the integrated versions, NXP offers product demonstrators for very efficient, high-power, discrete two- and three-way Doherty amplifiers. The two-way designs, based on the BLF7G22LS-130 device, deliver 47.0 dBm (50 W) with 43% efficiency and 15.7 dB gain for W-CDMA applications.



Our flagship three-way Doherty demonstrator even achieves 48% efficiency at 48 dBm (63 W) average output power and 15.0 dB gain with a two-carrier W-CDMA signal. The current design covers the W-CDMA standard for band 1 operation and is tailored towards high-yield, minimum-tuning, volume manufacturing.



Key features & benefits

- ▶ Most efficient Doherty amplifier designs available to date
- ▶ Production-proven, consistent designs
- ▶ NXP's LDMOS provides unsurpassed ruggedness
- ▶ Currently available for the following frequency bands:
 - 728 to 821 MHz
 - 869 to 960 MHz
 - 1805 to 1880 MHz (DCS)
 - 1930 to 1990 MHz (PCS)
 - 1880 to 2025 MHz (TD-SCDMA)
 - 2110 to 2170 MHz (UMTS / LTE)
 - 2300 to 2400 MHz (WiBRO / LTE)
 - 2500 to 2700 MHz (WiMAX / LTE)
 - 3300 to 3800 MHz (WiMAX)

All of our product demonstrators are supported by comprehensive documentation and hardware. Please see chapter 3.7.1.7 for a complete list of available designs.

Featured Doherty designs

Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain Eff. (%)	Type	Main transistor	Peak transistor
728-768	58	50	32	20.5	47	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
920-960	57.3	49.3	30	16	50	ASYM	BLF8G10LS-160	BLF7G10LS-250
1476-1511	58.1	49.6	28	16	42	ASYM	BLF7G15LS-200	BLF7G15LS-300P
1805-1880	58.6	51	28	16	47.6	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
1930-1990	58.2	50	28	16	40	SYM	BLF7G20LS-250P	BLF7G20LS-250P
2110-2170	47	39	28	13	38	SYM	BLD6G22L(S)-50	BLD6G22L(S)-50
2110-2170	57.2	49.2	28	16	47	3-WAY	BLF7G22LS-160	2x BLF7G22L(S)-160
2300-2400	55	47.5	28	15.2	44	ASYM	BLF7G24LS-100	BLF7G24LS-140
2500-2700	50.3	42.3	28	14.5	39	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
3400-3600	51	43	28	11.5	32	SYM	BLF6G38-50	BLF6G38-50

2.1.3 The new generation of LDMOS RF power for wireless infrastructures: NXP's Gen8

NXP recently announced the 8th generation of its renowned RF power device portfolio for base stations. Listening carefully to the world's leading infrastructure providers and understanding their requirements, a holistic approach was taken during the development of Gen8. This basically means that we scrutinized every little detail of a power transistor and reconsidered the entire "transistor system" to come up with a new generation, which performs markedly better than its predecessors and again sets standards for the industry.

Gen8 clearly addresses the key trends in the wireless infrastructure industry

- ▶ Increasing signal bandwidths up to 100 MHz
- ▶ Cost sensitivity
- ▶ Reduction in the size/weight/volume of the cabinet
- ▶ Continuous need for greater electrical efficiency to reduce cooling requirements and operational expenditure
- ▶ Ever increasing output power to unprecedented levels
- ▶ Need to deploy multi-standard and future-proof solutions

Gen8 is the answer to all these often conflicting requirements. The package and die design, as well as input and output match structures, have been optimized to enable wideband, affordable, compact, multi-standard and highly efficient Doherty power amplifiers.

The first wave of Gen8 transistors is deployed for applications up to 960 MHz with excellent linearization capabilities, state-of-the-art ruggedness and efficiencies in excess of 55% for multicarrier GSM PAs. The second wave of products covers WCDMA-LTE applications at 2.1 GHz. Solutions for all other cellular frequency bands are currently being developed.



The first wave of Gen8 transistors

Function	Type	f _{min} (MHz)	f _{max} (MHz)	P1dB (W)	Package	Planned release	Description
HPA	BLF8G10L-160	700	1000	160	SOT502A	Q311	Gen8 ceramic LDMOS transistor for GSM & LTE applications
	BLF8G10L-300P	700	1000	300	SOT539A	Q112	Gen8 ceramic push-pull LDMOS transistor for GSM & LTE applications
	BLF8G10L-320	700	1000	320	SOT502A	Q112	Gen8 ceramic LDMOS transistor for GSM & LTE applications
	BLF8G10L-80	700	1000	80	SOT502A3	Q411	Gen8 ceramic LDMOS transistor for GSM & LTE applications
	BLF8G10LS-160	700	1000	160	SOT502B3	Q311	Gen8 ceramic LDMOS transistor for GSM & LTE applications
	BLF8G10LS-300P	700	1000	300	SOT539B	Q112	Gen8 ceramic push-pull LDMOS transistor for GSM & LTE applications
	BLF8G10LS-320	700	1000	320	SOT502B3	Q112	Gen8 ceramic LDMOS transistor for GSM & LTE applications
	BLF8G10LS-80	700	1000	80	SOT502B	Q411	Gen8 ceramic LDMOS transistor for GSM & LTE applications

2.2 Broadband communication infrastructure

2.2.1 Connecting people, protecting your network: NXP's CATV C-family for the Chinese SARFT standard

Specially designed for the Chinese Hybrid Fiber Coax (HFC) infrastructure, NXP's CATV C-family offers you a total solution for cable TV networks. It is both flexible enough for connecting rural communities as part of China's "Connecting every village" program and powerful enough for upgrading major cities from analog to high-end digital services. All C-type devices are compliant with the Chinese State Administration for Radio, Film and Television (SARFT) standard, and cover most HFC applications in the 550 MHz to 1 GHz range.

Products

- ▶ BGY588C, BGE788C and CGY888C push-pull amplifiers
- ▶ BGD712C, CGD944C, CGD942C, CGD982HCi, CGD985HCi and CGD987HCi power doublers
- ▶ BGO807C, BGO807CE optical receivers

Benefits

- ▶ Compliant with Chinese SARFT HFC networks standard
- ▶ Transparent cap allows confirmation of product authenticity
- ▶ Rugged construction
- ▶ Highest by Design internal ESD protection

Features

- ▶ Excellent linearity, stability and reliability
- ▶ High power gain
- ▶ Extremely low noise
- ▶ Silicon nitride passivity
- ▶ GaAs HFET dies for high end devices

Further extending our high quality CATV portfolio, this new family lets you address an even wider range of HFC applications. Dedicated solutions for the implementation of CATV systems in China, our C-type devices deliver the performance you need for modern TV infrastructures.

The BGY588C, BGE788C and BGD712C devices cover the frequency range from 550 MHz to 750 MHz. Extending the C-family portfolio into the high-end segment, the CGD944C, CGD942C, CGY888C and BGO807C operate between 40 MHz and 870 MHz and have been specifically tested under Chinese raster conditions. Manufactured using our GaAs HFET die process, the CGD942C and CGD944C are high-gain, high-performance 870 MHz power doublers. The CGD982HCi, CGD985HCi and CGD987HCi operate from 40 MHz to 1003 MHz and are specified for 870 MHz and 1 GHz. These power doublers are optimized for the Chinese SARFT standard. They are capable of satisfying the demanding requirements of top-end applications including high-power optical nodes.

Our GaAs HFET MMIC dies are providing by design the best ESD protection levels with no needs for the external TVS components normally used with GaAs pHEMT devices.

All CATV C-type devices feature a transparent cap that makes it easy to distinguish them from counterfeit products.

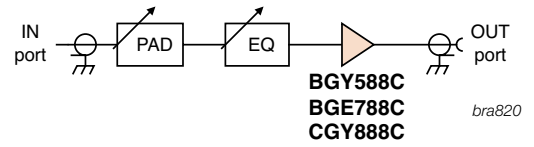
C-family application information

NXP C-family by application

Application	BGY588C	BGE788C	CGY888C	BGD712C	BGO807C BGO807CE	CGD942C CGD944C	CGD982HCi CGD985HCi CGD987HCi
Optical node				•	•	•	•
Ordinary optical receiver				•	•	•	•
Distribution amplifier			•	•		•	•
Line extender amplifier			•	•		•	•
Terminating amplifier	•	•	•				

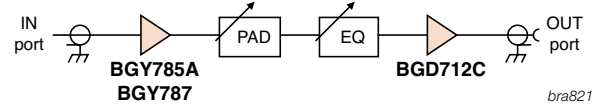
BGY588C, BGE788C and CGY888C

The last stage of an HFC network structure is called a 'terminating amplifier' or 'user amplifier' as it is close to the subscribers. Each terminating amplifier requires a single module such as BGY588C for 550 MHz, BGE788C for 750 MHz and CGY888C for 870 MHz systems. These modules are fitting perfectly in the Chinese "Connecting to Every Village" projects.



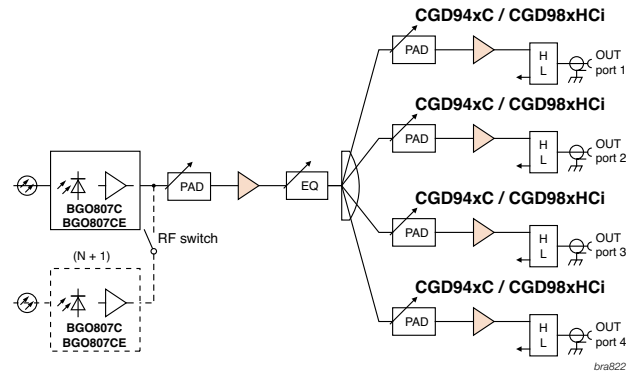
BGD712C

The BGD712C is a 750 MHz, 18 dB power doubler module. It has been designed for 750 MHz optical nodes including ordinary or optical receivers and distribution amplifiers. It can also be used in line extender amplifiers together with a 750 MHz push-pull module, such as BGY785A or BGY787. As such it can be used widely in Chinese "Connecting to Every Village" projects.



CGD944C and CGD942C

Our full GaAs power doublers modules, CGD942C and CGD944C offer high output power and better CTB and CSO than other modules. Designed for high-end HFC networks containing optical nodes with multiple out-ports, these modules enable each port to directly cover at least 125 subscribers. These two devices are ideal when used in upgrading HFC networks to 870 MHz.

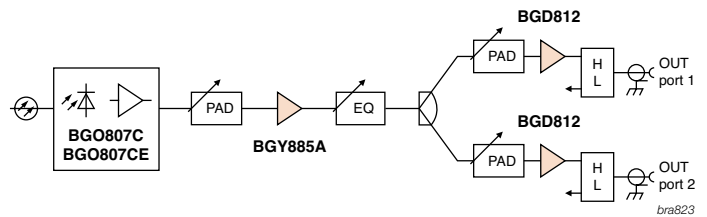


CGD982HCi, CGD985HCi and CGD987HCi

Our newest GaAs power doubler modules, CGD982HCi, CGD985HCi and CGD987HCi are customized designs for CATV hybrid fiber coax Chinese networks operating in the 40 MHz to 1003 MHz bandwidth, and specified with the Chinese cable TV network official loading raster on top of the NTSC loading traditional rasters. For use in optical nodes for fiber deep applications where the output power level needs to be at its highest.

BGO807C

The BGO807C is an integrated optical receiver module that provides high output levels and includes an integrated temperature compensated circuitry. In your optical node design, BGO807C enables a high performance / price ratio and ruggedness. When upgrading an HFC network from analog to digital, our BGO807C is the perfect fit.



Connecting people, protecting your network

NXP CATV C-family for the Chinese SARFT standard

Push-pull amplifiers

Parameters		BGY588C	BGE788C	CGY888C
Power gain (dB)	typ.	34.5	34.2	35.5
Slope cable equivalent (dB)	range	0.2 - 1.7	0.3 - 2.3	1.5 typ.
Composite triple beat (dB)	max.	-57	-49	-68 typ.
Composite 2nd order distortion (dB)	max.	-62	-52	-66 typ.
Noise (@ f_{max}) (dB)	max.	8	8	4 typ.
Total current consumption (mA)	typ.	325	305	280
Frequency range (MHz)	range	40 - 550	40 - 750	40 - 870

Power doublers

Parameters		BGD712C	CGD942C	CGD944C	CGD982HCi	CGD985HCi	CGD987HCi
Power gain (dB)	typ.	18.5	23	25	23	24.5	27
Slope cable equivalent (dB)	range	0.5 - 1.5	1 - 2	1 - 2	0.5 - 2	0.5 - 2	0.7 - 2
Composite triple beat (dB)	max.	-62	-66 typ.	-66 typ.	-66	-66	-66
Composite 2 nd order distortion (dB)	max.	-63	-66 typ.	-66 typ.	-69	-69	-66
Noise (@ f_{max}) (dB)	max.	7	5	5	5.5	5.5	5.5
Total current consumption (mA)	typ.	395	450	450	440	440	440
Frequency range (MHz)	range	40 - 750	40 - 870	40 - 870	40 - 1003	40 - 1003	40 - 1003

Optical receiver

Parameters		BGO807C	BGO807CE
Responsivity (R_{min})	min.	800	800
Slope cable equivalent (dB)	range	0 - 2	0 - 2
Composite triple beat (dB)	max.	-71	-69
Composite 2nd order distortion (dB)	typ.	-54	-53
Noise (@ f_{max}) (dB)	max.	8.5	8.5
Total current consumption (mA)	typ.	190	190
Frequency range (MHz)	range	40 - 870	40 - 870
Connector		- / SC0 / FC0	



2.2.2 Highly efficient line-up of 1 GHz GaAs modules for sustainable CATV networks

NXP high gain power doublers CGD104xHi and push-pulls CGY104x

Designed for 1 GHz “sustainable networks,” these high performance GaAs devices enable extended bandwidth and higher data rates. They deliver increased network capacity and make way for high-end services like HDTV, VoIP, and digital simulcasting.



New CATV GaAs platform lay-out

Key features

- ▶ Excellent linearity, stability, and reliability
- ▶ High power gain for power doublers
- ▶ Extremely low noise
- ▶ Dark Green products
- ▶ GaAs HFET dies for high-end applications
- ▶ Rugged construction
- ▶ Superior levels of ESD protection
- ▶ Integrated ringwave protection
- ▶ Design optimized for digital channel loading
- ▶ Temperature compensated gain response
- ▶ Optimized heat management
- ▶ Excellent temperature resistance

Key benefits

- ▶ Simple upgrade to 1-GHz capable networks
- ▶ Low total cost of ownership
- ▶ High power-stress capability
- ▶ Highly automated assembly

Key applications

- ▶ Hybrid Fiber Coax (HFC) applications
- ▶ Line extenders
- ▶ Trunk amplifiers
- ▶ Fiber deep-optical-node (N+0/1/2)
- ▶ Bridgers

The NXP power doublers CGD104xH and CGD104xHi are ideal for use in line extenders and trunk amplifiers. They support fiber deep-optical-node applications (N+0/1/2), delivering the highest output power on the market today. The GaAs HFET die process delivers high gain, excellent CTB and CSO ratings, along with lower current.

The new NXP CGY1047x push-pull family is the first line-up on the market combining very low noise, best-in-class distortion parameters, and low, “carbon footprint” capabilities. It delivers the best performance for the lowest power consumption, so it reduces OPEX and CO₂ emissions

All of NXP’s 1 GHz solutions are designed for durability and offer superior ruggedness, an extended temperature range, high power overstress capabilities, and extremely high ESD levels. As a result, they also reduce the cost of ownership.

The GaAs die is inserted in an HVQFN package that is then mounted on thermal vias that manage heat transfer to the heat sink. Temperature-control circuitry keeps the modules high performance stable over a wide range of temperature. Assembly is fully automated and requires almost no human intervention, so repeatability remains very high.

Upcoming products

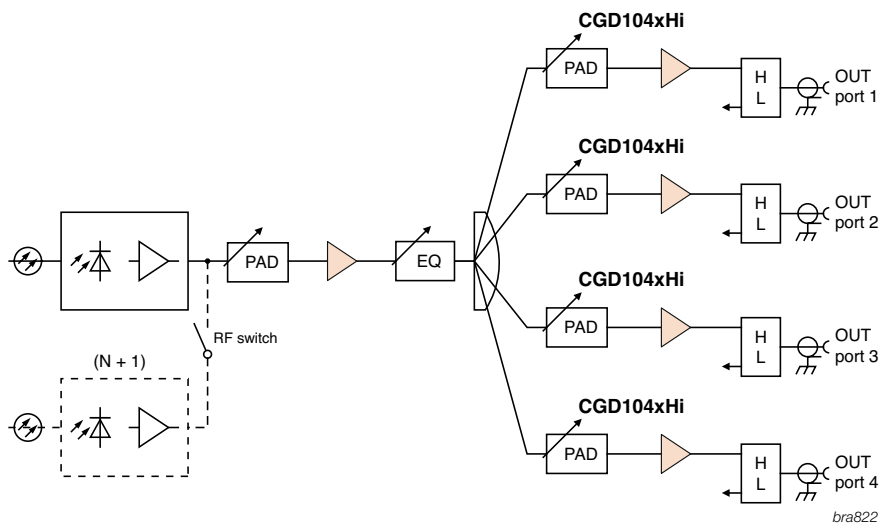
Additional push-pulls, currently under development, will extend the capabilities of the power doublers even further, supporting almost all modern HFC applications. The push-pull CGY1041 will deliver a gain of 21 dB, the CGY1043 a gain of 23 dB, the CGY1049 a gain of 29 dB and the CGY1032 a gain of

32 dB. NXP is also developing a new, highly integrated power doubler. The CGD1046Hi will deliver, in one IC, a 26 dB power gain with 60 dBmV output power and excellent ESD protection, for the ultimate in high quality, distortionless devices.

Quick reference data CATV 1 GHz power doublers and push-pulls

Parameters		CATV 1-GHz power doublers					
		CGD1040Hi	CGD1042H	CGD1042Hi	CGD1044H	CGD1044Hi	CGD1046Hi
Power gain (dB)	typ.	21	23	23	25	25	27
Slope cable equivalent (dB)	typ.	1.5	1.5	1.5	1	1.5	0.5 - 2.0
Composite triple beat (dB)	typ.	-69	-69	-69	-69	-69	-73
Composite 2 nd order distortion (dB)	typ.	-68	-68	-68	-68	-68	-68
Noise (@f _{max}) (dB)	max	6	6	6	6	6	5
Total current consumption (mA)	typ.	440	450	440	450	440	460
Frequency range (MHz)	range	40 - 1003	40 - 1003	40 - 1003	40 - 1003	40 - 1003	40 - 1003

Parameters		CATV 1-GHz push-pulls				
		CGY1041	CGY1043	CGY1047	CGY1049	CGY1032
Power gain (dB)	typ.	22	24	28	30	33
Slope cable equivalent (dB)	typ.	2	2	2	1.6	1.8
Composite triple beat (dB)	typ.	-62	-62	-64	-62	-62
Composite 2 nd order distortion (dB)	typ.	-64	-64	-66	-64	-64
Noise (@f _{max}) (dB)	max.	5	5	4.5	5	5
Total current consumption (mA)	typ.	250	250	250	250	265
Frequency range (MHz)	range	40 - 1003	40 - 1003	40 - 1003	40 - 1003	40 - 1003



An optical node with multiple out-ports using the CGD1040Hi / CGD1042Hi / CGD1044Hi / CGD1046Hi

2.3 TV and satellite

2.3.1 LNAs for TV/STB tuners with programmable gain

NXP LNAs for STBs BGU703x for 5 V and BGU704x for 3.3 V supply voltage

This family of 5 V and 3.3 V wideband, low noise amplifiers is specifically designed for high linearity, low noise performance for TV, DVR/PVR, set-top box tuner applications from 40 MHz to 1 GHz. The unique programmable gain compensates for tuner switch signal loss, which is becoming more important following the trend of more tuners in one system, and improves overall system performance with 7-10 dB.

Key features

- ▶ Equipped with internal bias
- ▶ Programmable gain and bypass modes
- ▶ Flat gain between 40 MHz and 1 GHz
- ▶ Noise figure = 4 dB
- ▶ High linearity: IP3O = 29 dBm
- ▶ 75 Ω input and output impedance
- ▶ Power-down during bypass mode (current consumption < 5 mA)
- ▶ ESD protection > 2 kV human body model (HBM) on all pins

Key applications

- ▶ Terrestrial and cable STBs
- ▶ Silicon and can tuners
- ▶ Personal and digital video recorders (PVRs, DVRs)
- ▶ Home networking and in-house signal distribution
- ▶ FM radios
- ▶ Antenna amplifiers

In set-top boxes that use multiple or network-interfaced module (NIM) tuners, the RF signal usually needs to be distributed or split. Very often, a low noise amplifier (LNA) is used to compensate for signal loss when the signal is split with a balun core.

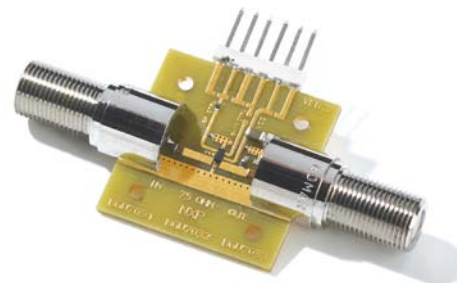
The NXP BGU703x/BGU704x are LNA MMICs produced in an SiGe:C process. All five products in the series are matched to 75 Ω at both the input and the output, for easier use. The BGU703x are suitable for supply voltages of 5 Volts and the BGU704x for 3.3 Volts. The BGU7031 and BGU7041 are LNAs with fixed gain. The BGU7032 and BGU7042 have an additional bypass mode. The BGU7033 has two gain levels ($G_p = 10$ dB or 5 dB) and the bypass mode.

All five devices are designed for high linearity and low noise over a frequency range of 40 MHz to 1 GHz. They can be used in conventional can tuners or with silicon tuner ICs. Compared to GaAs solutions, they are less susceptible to ESD and offer a cost savings of more than 50 percent.

Integrated biasing and switching functions reduce the number of external components from roughly 17 to just two or three. By comparison, a discrete LNA design would typically require six to nine external components and, to realize the bypass function, would need an extra four pin diodes and at least eight additional passive components.

Each MMIC in the BGU703x/BGU704x are housed in a 6-pin SOT363 (SMD) package. Each offers a flat gain between 40 MHz and 1 GHz, so there's no gain fluctuation over the typical frequency range. The low noise figure of 4 dB reduces overall tuner noise, and the high linearity (IP3O = 29 dBm) minimizes distortion. The input and output impedance is adapted to the application (75 Ω), so there's no need for external matching.

To save power, the ICs can be powered-down during bypass mode, for a total current consumption of less than 5 mA. Also, to protect the LNA from external electrical discharge in its function as the tuner input, every pin is equipped with ESD protection of >2 kV human body model (HBM).



LNAs for set-up boxes (75 Ω)



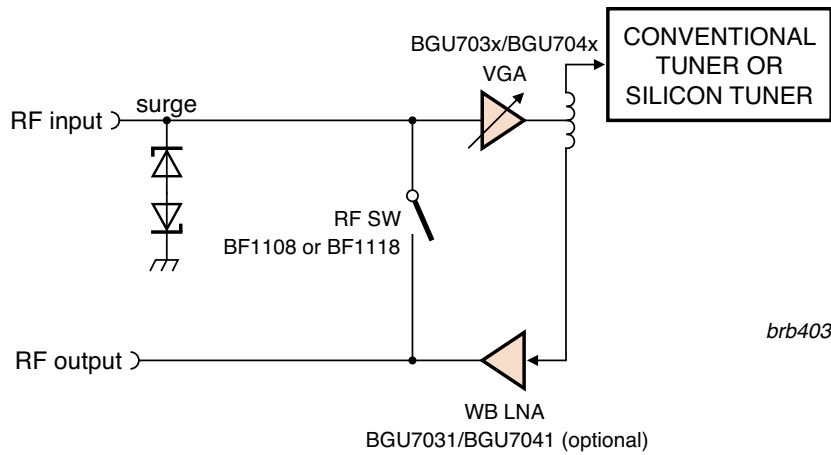
Type	Package	Frequency range (MHz)	Mode	@		Gain ⁽¹⁾ (dB)	NF (dB)	P _L ^(1dB) (dBm)	OIP3 (dBm)	FL ⁽²⁾ (dB)	RL _{out} (dB)	RL _{in} (dB)
				V _{CC}	I _{CC}							
				(V)	(mA)							
BGU7033	SOT363	40 - 1000	G _p 10 dB	5	43	10	4.5	14	29	-0.2	12	18
			G _p 5 dB	5	43	5	6	9	29	-0.2	12	17
			Bypass	5	4	-2	2.5	-	29	-0.2	8	8
BGU7032	SOT363	40 - 1000	G _p 10 dB	5	43	10	4.5	14	29	-0.2	12	18
			Bypass	5	4	-2	2.5	-	29	-0.2	8	8
BGU7031	SOT363	40 - 1000	G _p 10 dB	5	43	10	4.5	14	29	-0.2	12	18
BGU7042	SOT363	40 - 1000	G _p 10 dB	3.3	38	10	4	12	29	-0.2	12	21
			Bypass	3.3	3	-2	2.5	-	29	-0.2	10	10
BGU7041	SOT363	40 - 1000	G _p 10 dB	3.3	38	10	4	12	29	-0.2	12	21

Notes:

(1) Gain = Programmable gain (G_p)

(2) Flatness of frequency response = FL

Block diagram of active splitter with passive loop-through



2.3.2 Complete satellite portfolio for all LNB architectures

NXP Satellite LNB devices TFF101xHN, BFU710F/730F, and BGA28xx

Designed for use in LNAs, mixers, and IF amplifiers, these robust, small-footprint products are the latest additions to NXP's leading portfolio for satellite LNB architectures. They are manufactured in NXP's groundbreaking QUBiC4X SiGe:C and QUBiC4+ process technology.

Fully integrated Ku-band downconverters TFF101xHN

The TFF101xHN is a family of fully integrated downconverters for Ku-band LNBs. They give the best RF performance in terms of phase noise, gain, and noise figure at the lowest current consumption in the market.

Ku-band downconverter TFF101xHN/N1 for LNB

- ▶ Typical application: Universal Single LNB & Twin LNB
- ▶ Ultra-low current consumption: 54 mA over PVT
- ▶ Only 7 external components
- ▶ No inductors
- ▶ Single supply domain: 5 V
- ▶ Uses low-cost fundamental 25 MHz crystal
- ▶ High PL1dB_o = 3 dBm / 3OIP_o = 13 dBm
- ▶ Best-in-class PN < 1.8 deg RMS
 - 10 kHz to 13 MHz integration bandwidth
- ▶ Multiple gain types available
 - TFF1014HN/N1 36 dB
 - TFF1015HN/N1 39 dB
 - TFF1017HN/N1 42 dB
 - TFF1018HN/N1 45 dB
- ▶ Flat gain over frequency (< 2 dBpp)
- ▶ Input & output matched 50 Ω
- ▶ Small leadless DHVQFN16 package (2.5 x 3.5 x 0.85 mm)

RF transistors BFU710F/730F

The BFU710F and BFU730F are wideband RF transistors that can be used as an LNA or as a mixer for a DBS LNB in the Ku-band. In either application, they deliver good noise and linearity, a higher gain at a lower current consumption compared to their GaAs pHEMT equivalents, and the cost advantage of silicon.

BFU710F as LNA in Ku-band LNB

- ▶ Typical application: LNA2 for single output LNB
- ▶ Overall similar RF performance to GaAs pHEMT LNAs
- ▶ Power consumption: 3.5 mA
- ▶ Single supply: 3/5/6 V
- ▶ High RF gain: 13.5 dB
- ▶ Low noise figure: 1.6 dB
- ▶ Linearity (OIP3): 12 dBm

BFU710F as mixer in Ku-band LNB

- ▶ Typical application: Active mixer for single output LNB
- ▶ Single supply 3/5/6 V
- ▶ Low power consumption: 2.5 mA
- ▶ LO drive < 0 dBm
- ▶ SSB noise figure < 8 dB (including BPF at the input)
- ▶ SSB conversion gain > 5 dB (including BPF at the input)
- ▶ Linearity (OIP3) > 0 dBm
- ▶ LO-RF isolation min 20 dB
- ▶ RF match better than 10 dB
- ▶ IF match better than 8 dB

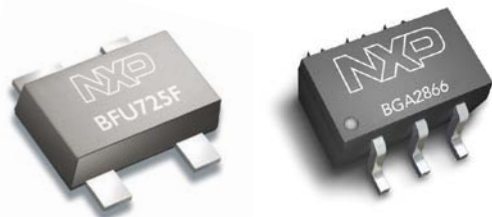
BFU730F as LNA in Ku-band LNB

- ▶ Typical application: LNA2 and LNA3 for multiple output LNB
- ▶ Overall similar RF performance to GaAs pHEMT LNAs
- ▶ Power consumption: 11 mA
- ▶ Single supply 3/5/6 V
- ▶ Very high RF gain: 11.5 dB
- ▶ Low noise figure: 1.25 dB
- ▶ Linearity (OIP3) > 17 dBm
- ▶ Return loss > 10 dB

MMICs BGA28xx as IF amplifiers (1st stage & output stage)

For compatibility with existing designs, the series uses market standard packages: the SOT363 and the pin-compliant SOT363F. The pinning is identical to NXP's current gain block family, and the blocks deliver similar noise figures. New features include flatter gain, a positive gain slope, improved P1dB vs I_{cc}, and no necessity for an output inductor.

- ▶ Internally matched at 50 Ω
- ▶ Gain slope > 0.5 dB
- ▶ Single supply voltage: 3.3 or 5 V



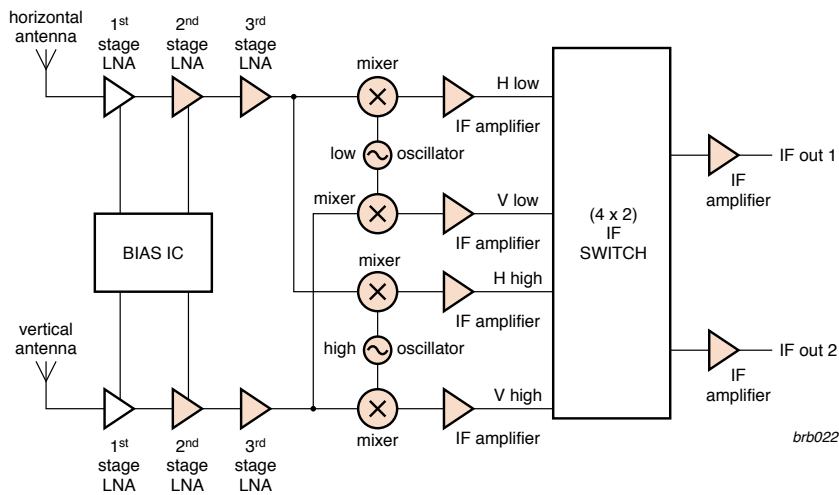
- ▶ Reverse isolation: > 30 dB up to 2 GHz
- ▶ Best-in-class power vs current consumption
- ▶ Noise figure: 4 to 6 dB at 1 GHz
- ▶ Unconditionally stable ($K > 1$)
- ▶ High-compression-point models work without output inductor
- ▶ 6-pin SOT363 plastic SMD package

These products – the integrated downconverters TFF101xHN, the wideband transistors BFU710F/730F for LNA and mixer functionality, and the BGA28xx series of IF MMICs – are the most recent additions to NXP's leading portfolio for

satellite LNB. They join the other discrete products, including oscillators, amplifiers, and switches, to provide complete coverage for all LNB architectures.

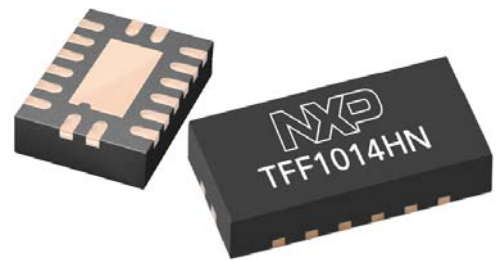
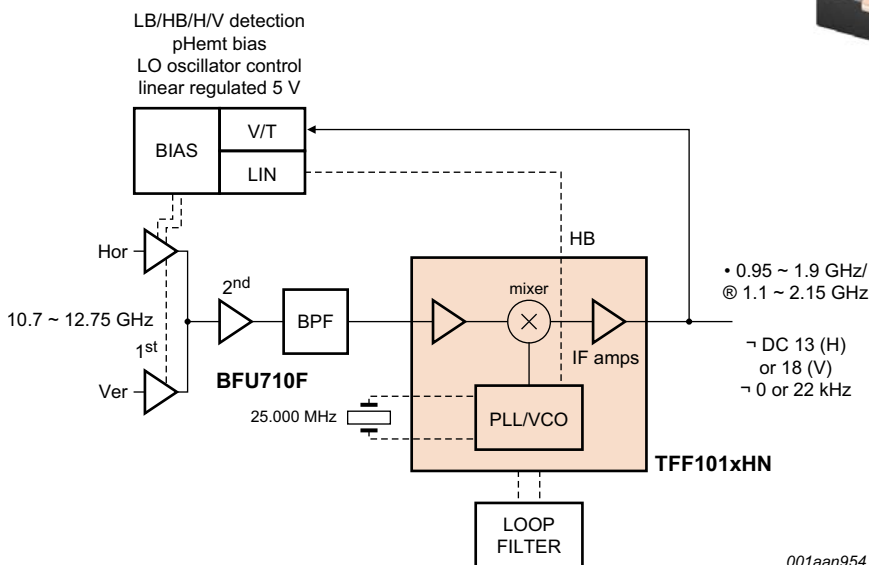
Since the ICs, transistors, and the MMICs are manufactured in NXP's industry-leading QUBiC4X SiGe:C and QUBiC4+ process, they offer better overall RF performance and are more robust than their GaAs equivalents with the cost advantage of silicon. The process technology also enables higher integration, for added features. NXP owns the industrial base for production (wafer fab, test, assembly), so volume supplies can be assured.

Satellite outdoor unit, LNB for multiple users



NOTE: Also look at chapter 1.4.4 satellite outdoor unit.

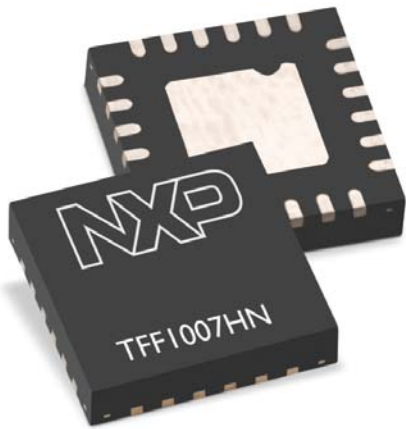
Fully integrated mixer/oscillator/downconverter



2.3.3 VSAT, 2-way communication via satellite

Design a Ku-/ Ka-band VSAT transceiver that meets IESS-308 with NXP's Ku-/ Ka-band RF LO generators

The TFF100xHN family are Ku-band RF PLLs, with integrated VCO intended for low phase-noise local-oscillator (LO) circuits in Ku- & Ka-band VSAT transmitters and transceivers. Manufactured in a high performance SiGe:C process, these devices deliver extremely low phase noise and comply with the IESS-308 from Intelsat.



Features

- ▶ Phase noise compliant with IESS-308 (Intelsat)
- ▶ Differential input and output
- ▶ Divider settings at 16, 32, 64, 128 or 256
- ▶ Lock-detect output
- ▶ SiGe:C technology (120 GHz f_T process)
- ▶ HVQFN24 (SOT616-1) package

Applications

- ▶ VSAT block upconverters
- ▶ VSAT down conversion
- ▶ Local oscillator signal generation

VSAT networks are commonly used to transmit narrowband data, such as point-of-sale transactions for credit cards, or to transmit broadband data that supports satellite Internet access to a remote location, VoIP, or video.

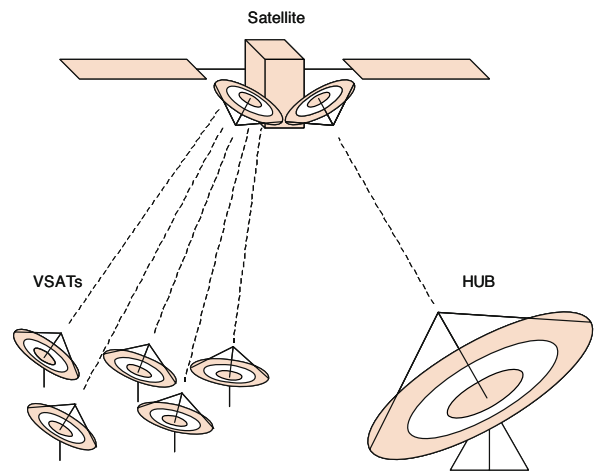
The network typically consists of a dish antenna, an outdoor unit, and an indoor unit. The outdoor unit is used for frequency translation between RF and IF, and usually includes a microwave-based uplink/downlink separator, a low noise block (LNB) for receiving the downlink signals, and a block Upconverter (BUC).

The VSAT ICs can be used to create the LO generator for a linear BUC (meaning the IF or RF conversion is done by mixing with an LO).

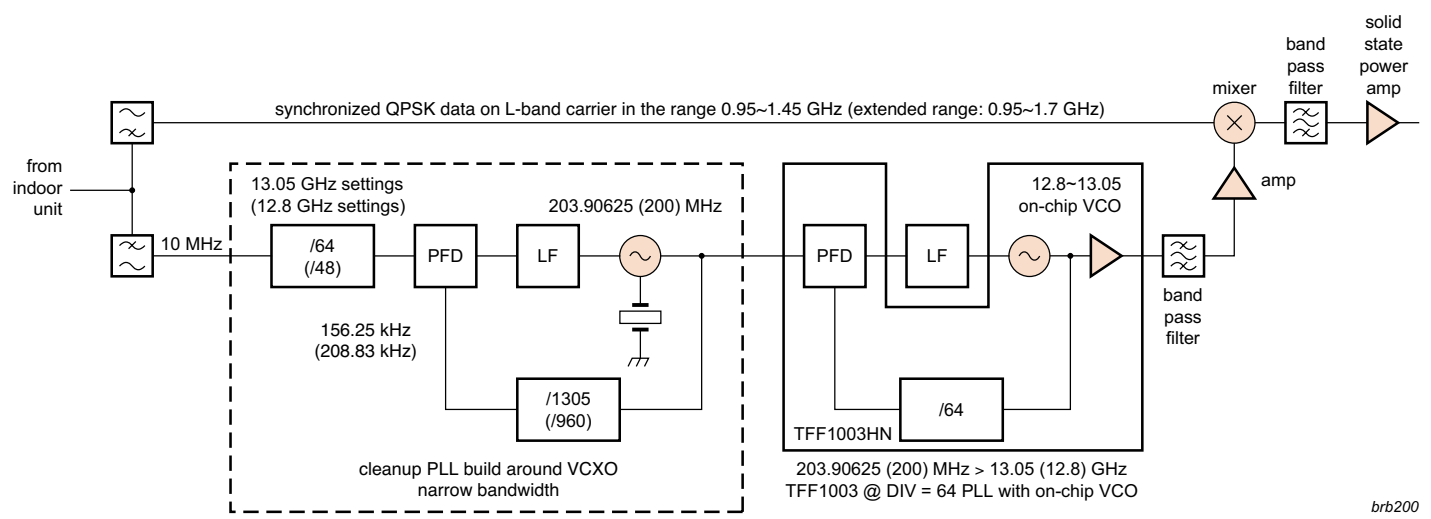
To enable precise frequency and time multiplexing, the downlink signal provides an accurate frequency reference of 10 MHz. The indoor unit frequency multiplexes this with the uplink IF signal, and the LO signal in the BUC needs to be frequency-locked to the reference.

The TFF100xHN ICs are housed in a 24-pin HVQFN (SOT616-1) package. The pins have been assigned for optimal performance. Three voltage domains are used to separate the block on the IC, and two pins for each output (OUT-P and OUT-N) have been reserved to match a typical layout using a linewidth of $Z = 50 \Omega$ microstrip on a 20-mil RO4003 board (1.1 mm).

The ground pins have been placed next to the reference input and the output, and, to minimize crossings in the application, all the supply pins are on the same side of the IC.



Typical VSAT network



brb200

Complete LO generator for linear BUC with TFF1003HN

Type	Package	$f_{IN(REF)}$ (MHz)	V_{CC} (V)	I_{CC} (mA)	PLL phase noise @ N=64 @ 100 kHz (dBc/Hz)	PLL	Output buffer		Input
						$f_{o(RF)}$ (GHz)	P_o	$RL_{out(RF)}$	S_i
							Typ	Max	Min
TFF1003HN	SOT616	50 - 815	3.3	100	-92	12.8 - 13.05	-5	-10	-10
TFF1007HN	SOT616	228.78 - 234.38	3.3	130	-104	14.62 - 15	-3	-10	-10
TFF1008HN	SOT616	220.91 - 225.2	3.3	130	-104	14.1 - 14.4	-3	-10	-10

2.3.4 Low noise LO generators for microwave & mmWave radios

NXP LO generators (integrated VCO/PLL) TFF11xxxHN

Manufactured in NXP's breakthrough QUBiC4X SiGe:C process technology, these highly integrated, alignment-free LO generators are low-power and low-spurious solutions that simplify design-in and lower the total cost of ownership.



Features

- ▶ TFF11xxxHN family: lowest-noise LO generators for a full family in 7 to 15 GHz range
- ▶ Maximum power consumption for all types is 330 mW (typ)
- ▶ Phase-noise compliant with IESS-308 (Intelsat)
- ▶ Proven QUBiC4X SiGe:C technology (120 GHz f_r process)
- ▶ External loop filter
- ▶ Differential input and output
- ▶ Lock-detect output
- ▶ Internally stabilized voltage reference for loop filter
- ▶ 24-pin HVQFN (SOT616-1) package

Applications: TFF11xxxHN family

- ▶ Industrial/medical test and measurement equipment
- ▶ Electronic warfare (EW)
- ▶ Electronic countermeasures (ECM)
- ▶ Point-to-point
- ▶ Point-to-multipoint
- ▶ Satellite communication/VSAT
- ▶ Radar systems

These low noise local-oscillator (LO) generators, optimized for use in many different microwave applications between 7 and 15 GHz, deliver highly accurate performance in a small footprint. They require no alignment or frequency modification on the production line, so they simplify manufacturing. High integration saves board space and makes design-in easier, for lower overall cost and faster development.

Since these ICs are manufactured in NXP's industry-leading QUBiC4X SiGe:C process, they offer better overall RF performance, are more robust than their GaAs equivalents, and consume much less power. The process technology also enables higher integration, for added features. NXP owns the industrial base for production (wafer fab, test, assembly), so volume supplies can be assured.

The TFF1003HN is the basis for the entire family of LO generators. It has VCO coverage of 12.8 to 13.05 GHz and accepts input signals from 50 to 816 MHz. The divider can be set for 16, 32, 64, 128, or 256, and the output level is -5 dBm with a stability of ± 2 dB. The family of LO generators is completed by a range of 18 different devices operating in a center frequency ranging from 7 to 15 GHz. The RF performance of all these devices is consistent with the TFF1003HN.

All the LO generators have low power dissipation (330 mW typ), and all are available in a space-saving 24-pin HVQFN package.

Full portfolio overview of low noise LO generators for general microwave applications at chapter 3.4.4

2.4 Portable devices

2.4.1 QUBiC4X SiGe:C LNAs for GPS, GloNass and Galileo with AEC-Q100 qualification

NXP's GPS low noise amplifiers offer the best reception of weak signals because of dynamic suppression of strong cellular and WLAN transmit signals. Moreover, as only two external components are required, designers can save up to 50% in PCB size and 10% in component cost.

Key features & benefits

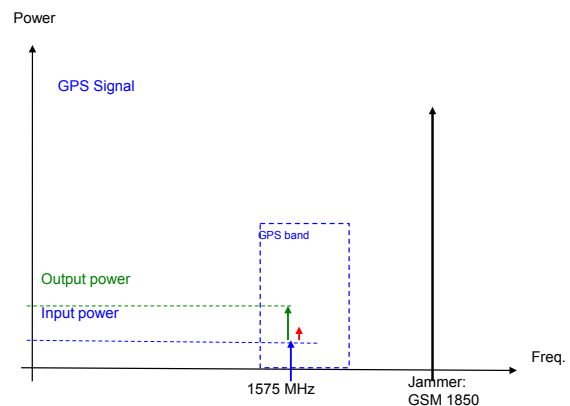
- ▶ Low noise figure of 0.9 dB and choice of system-optimized gain of 16.5 or 18.5 dB, allowing for the best GPS reception
- ▶ Adaptive biasing dynamically suppresses strong cellular and WLAN transmit signals, further optimizing GPS reception
- ▶ Only 2 external components and 1.45 x 1.0 mm package size, enabling the smallest footprint and lowest external component cost
- ▶ AEC-Q100 qualification (BGU7004, BGU7008), meaning highest reliability under harsh conditions

Key applications

- ▶ Smart phones
- ▶ Feature phones
- ▶ Tablets
- ▶ Personal navigation devices (PND)
- ▶ Digital still camera (DSC)
- ▶ Digital video camera (DVC)
- ▶ RF front end modules (used in phones)
- ▶ Complete GPS chipset modules (used in DSC)
- ▶ Automotive applications (BGU7004/8): toll collection, emergency call
- ▶ Theft protection (laptop, ATM)

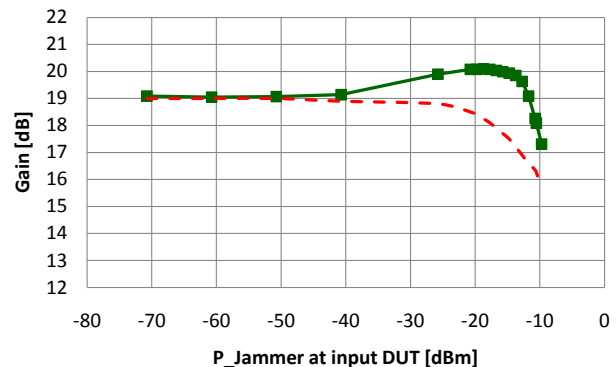
Adaptive biasing

GPS signal power levels are weak and below the noise floor at -155 dBm. Moreover, in many consumer products such as smart phones, inter-modulation and harmonics caused by strong transmitters such as WLAN, can drive the GPS LNA into compression. With adaptive biasing, increasing output power from jammers is immediately detected, and current is temporarily increased. Adaptive biasing dynamically suppresses jammers, maintaining optimal GPS signal reception for as long as possible.



Gain vs. jammer power for NXP GPS LNA adaptive biasing vs Competitor.

(Pin 1575 MHz = -45 dBm, jammer at 1850 MHz).



Smallest footprint

Type	Package	Package size	MMIC *					SMD's Appl.	SMD size		SMD's area	Appl. area
			X	Y	Pins	Pitch	Area		X	Y		
			mm	mm	mm	#	mm		mm ²	#		
BGU7005/7	SOT886	1.45 x 1	1.7	1.25	6	0.5	2.13	2	1.5	0.8	2.4	4.53
Competitor	Wafer level package	1.26 x 0.86	1.5	1.1	6	0.4	1.65	6	1.5	0.8	7.2	8.85
Competitor	Wafer level package	0.86 x 0.86	1.1	1.1	4	0.4	1.21	4	1.5	0.8	4.8	6.01
Competitor	Thin small leadless package	2 x 1.3	2.25	1.55	6	0.5	3.49	4	1.5	0.8	4.8	8.29
Competitor	Thin small leadless package	1.4 x 1.26	1.65	1.5	6	0.48	2.48	4	1.5	0.8	4.8	7.28
Competitor	Thin small outline non-leaded	1.5 x 1.5	1.75	1.75	6	0.5	3.06	5	1.5	0.8	6	9.06

* Incl. keep out area on pcb (common used assembly rule)

Selection guide

		@ 1.575 GHz																		
Type	Package	Supply voltage		Supply current			Insertion power gain			Noise figure	Input power at 1 dB gain compression					Input third-order intercept point $f_1 = 1713 \text{ MHz}, f_2 = 1851 \text{ MHz}$				
		V_{cc}		I_{cc}			$ s_{21} ^2$			NF	$P_{L(1dB)}$					IP3 _i				
		(V)		(mA)			(dB)			(dB)	(dBm)					(dBm)				
		Min	Max	Min	Typ	Max	Min	Typ	Max	Typ	$V_{cc} = 1.8 \text{ V},$ Min	$V_{cc} = 1.8 \text{ V},$ Typ	$V_{cc} = 2.5 \text{ V},$ $I_{cc} = 5 \text{ mA}$	$V_{cc} = 2.85 \text{ V},$ Min	$V_{cc} = 2.85 \text{ V},$ Typ	$V_{cc} = 1.8 \text{ V},$ Min	$V_{cc} = 1.8 \text{ V},$ Typ	$V_{cc} = 2.5 \text{ V},$ $I_{cc} = 5 \text{ mA}$	$V_{cc} = 2.85 \text{ V},$ Min	$V_{cc} = 2.85 \text{ V},$ Typ
BGU7003	SOT891	2.2	2.85	3	-	15	16	18.3	20	0.8	-	-	-20	-	-	-	-	0	-	-
BGU7004 [^]	SOT886	1.5	2.85	-	4.5	-	-	16.5*	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12
BGU7005	SOT886	1.5	2.85	-	4.5	-	-	16.5*	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12
BGU7007	SOT886	1.5	2.85	-	4.8	-	-	18.5**	-	0.9	-15	-12	-	-14	-11	1	4	-	2	5
BGU7008 [^]	SOT886	1.5	2.85	-	4.8	-	-	18.5**	-	0.9	-15	-12	-	-14	-11	1	4	-	2	5

[^] = AEC-Q101 qualified (some limitations apply)

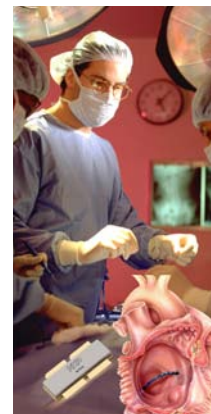
* = 16.5 dB without jammer / 17.5 dB with jammer

** = 18.5 dB without jammer / 19.5 dB with jammer

2.5 Industrial, scientific & medical

2.5.1 Medical applications driven by RF power: From imaging to cancer treatment, a flexible and versatile technology in the doctor's toolbox

RF technology is making its way into all kinds of medical applications, ranging from the well-known imaging techniques (MRI, EPRI) over low frequency, external heat treatment, and electro-surgical tools, to minimally invasive endoscopic cancer treatment (RF ablation). One clear trend is the increasing share of RF-based technologies for ablation. Another is the trend towards higher RF frequencies (several GHz) and higher powers (> 100 W) in order to achieve higher spatial resolution, better control, and shorter treatment times.



RF radiation is not a new technology in medicine. It is currently used for imaging purposes in MRI (magnetic resonance imaging) and EPRI (electron paramagnetic resonance imaging), techniques that employ frequencies from a few megahertz to about 500 MHz. Other well-known external heat-treatments to rejuvenate skin or relieve muscle pain make use of frequencies around 480 kHz – not too demanding in terms of RF. Surgical equipment to cut and simultaneously coagulate blood vessels runs off RF at about 5 MHz. The latter application belongs to a class of treatment techniques that is growing rapidly and uses RF radiation to deposit energy locally at various parts of the body – in general to “ablate” (remove) unwanted tissue. Inside the body, the RF energy heats the surrounding tissue until it is desiccated and/or necrotized. The damaged tissue will later be re-absorbed by the surrounding, living tissue. Further application examples for RF ablation include cancer treatment in the lung, kidney, breast, bone and liver, removal of varicose veins, treatment of heart arrhythmia, and a growing list of other applications that benefit from the high control and feedback possible with RF.

Another advantage of RF in this context is the fact that it can be applied via small catheters ending in antennas that deploy the RF signal. Unlike older, direct-current techniques, the tissue is heated only very locally around the antenna. Neighboring nerves (and the heart) are not stimulated. This led to the development of a variety of specialized catheters, used during minimally invasive surgery, along with ultrasound or X-ray imaging to determine the exact location of the RF-active part. During the treatment, the impedance of the surrounding tissue can be monitored and the end-point determined. With proper catheters, one can even achieve “self limitation” due to the reduced uptake of RF energy in desiccated tissue. Likewise, the RF frequency can be used to tune the energy deposition zone around the catheter: the higher the frequency, the smaller the penetration depth – and hence the volume to deposit the RF energy – in the watery tissue.

With the trend towards higher RF frequencies and powers, the complexity of RF generators and the requirements for the device technology also increase. Above 10 MHz, say, up to 3.8 GHz, the technology of choice for power amplifiers is Si LDMOS (laterally

diffused metal oxide semiconductor). This technology has proven to be powerful, efficient, and rugged in base stations, radar systems, broadcast transmitters, and other industrial, scientific, and medical (ISM) applications. LDMOS is available from up to 50 V supply to achieve power levels up to 1,200 W per single device, with outstanding ruggedness and high gain and efficiency. To drive and control the LDMOS power amplifier stages, it takes voltage-controlled oscillators, phase locked loops, and medium power amplifiers. These parts of the RF signal chain are conveniently available based on reliable and high volume SiGe:C (QUBiC) semiconductor technologies. Going a step further, one can even use high-speed converters to drive the signal chain entirely from the digital domain, for full and easy control over the shape and modulation of the applied RF.

RF implications

These in-situ medical applications and, in general, most of the ISM applications, usually form highly mismatched RF loads during some part of the usage cycle. This in turn means that, without protection or other measures, all of the “injected” RF power reflects back into the final stage of the amplifier and needs to be dissipated in the transistor(s), and most likely destroys the device(s) if this situation lasts too long. LDMOS transistors are designed to be extremely rugged and generally withstand these mismatch situations without degrading over time.

This device ruggedness, or the ability to withstand “harsh” RF conditions in general, be it mismatch or extremely short pulse rise and fall times, is essential for reliable device performance. RF power companies have gone to great lengths to achieve best-in-class device ruggedness. The technologies have been hardened under the most stringent ruggedness tests during development, which is particularly true for the 50 V technology. Among other factors, the base resistance of the parasitic bipolar and the drain extension of the LDMOS device play key roles in this respect.

This ruggedness, combined with the power density and the high efficiencies achievable, make LDMOS the preferred technology for RF power amplifiers up to 3.8 GHz.

2.5.2 RF-driven plasma lighting:

The next revolution in light sources are powered by solid-state RF technology

Recent developments in RF power technology, such as improved cost structure, ruggedness, and power levels of up to 1200 W per device, have enabled a breakthrough light source technology, called 'RF plasma lighting'. All RF plasma lighting sources make use of a small, electrode-less quartz lightbulb that contains argon gas and metal halide mixtures. The bulb is powered by direct RF radiation, which ignites the gas mixtures to create and power a bright plasma, the color of which can be tuned by the composition of its constituents.

This technology works without any additional electrodes in the bulb, unlike standard high-intensity discharge lamps. No electrodes means very long operating lifetimes, since the contamination and wire erosion that lead to decreased efficiency and eventual lamp failure are precluded. The RF light source lives up to 50,000 hrs when it reaches 50% of its original light output. Typical high-intensity discharge lamps, by comparison, achieve 20,000 hrs operating life. Another strong point of the plasma light is its efficiency: 1 W of RF power is converted to 130-140 lm of light. This leads to very compact, very bright lamps that easily emit 10,000 to 20,000 lm of white light with a close-to-sunlight color rendition.

The key enabler for the RF light source is RF technology, based on Si LDMOS RF power transistors. LDMOS technology operating at 28 V is the leading RF power technology for cellular base stations or broadcast transmitters as final amplifier stages in the frequency range between a few MHz up to 3.8 GHz. Recently, another LDMOS format, 50 V LDMOS, has emerged for use in broadcast, ISM, defense and avionics applications. It combines high power density to achieve power levels up to 1,200 W per single device and outstanding ruggedness, with high gain and efficiency at frequencies of up to 1.5 GHz.

Comparison of lighting technologies

The table below summarizes currently available technologies that generate bright light with varying degrees of efficiency. It lists a few key parameters, including lifetime, luminous flux, efficacy, color rendition index, color temperature, start-up time, and re-strike time (time to start after switch-off from normal operation).

Type	Lifetime (hrs)	Luminous flux (klm)	Efficacy (lm/W)	Color rendering	Color temperature (K)	Start-up time (s)	Re-strike time (s)
Incandescent	2,000	1,700	10 to 17	100	3200	0.1	0.1
Fluorescent	10,500	3,000	115	51 to 76	2940 to 6430	0.3	0.1
LED	25,000	130	60 to 100	30	6000	0.1	0.1
HID (high-intensity discharge)	20,000	25,000	65 to 115	40 to 94	4000 to 5400	60	480
RF plasma	50,000	25,000	100 to 140	70 to 94	4000 to 5500	30	25

Table 1: Comparison of light-generation. Note: numbers are only valid for a qualitative comparison. Source: www.wikipedia.org and references therein.

The plasma light source is among the brightest and most efficient available to date and boasts a very long life time. Important to note is the high brightness per bulb: much brighter than LEDs, for example. Consequently, it takes multiple LEDs to generate the light output of a single plasma light source. Hence, LED luminaries for street lighting will be considerably larger than those for plasma light sources.

RF implications

The RF plasma lighting sources can operate at a wide range of RF frequencies, but initial applications typically focus at frequencies of around a few hundred megahertz. At these frequencies both the 28 and 50 V LDMOS technologies can be used, yielding high efficiency values of 70% to more than 80% and low-heat dissipation making compact plasma lamp designs possible.

The RF-driven plasma light is a perfect example of novel applications that can be powered by RF energy in the industrial, scientific, and medical (ISM) realm. Established technologies use RF to pump a gas discharge in a laser cavity. These "gas discharge" applications and in general, most of the ISM applications, typically form highly mismatched RF loads during some part of the usage cycle. In the case of gas discharges, for example, the gas cavity acts as an "open circuit" during switch-on. This in turn means that without protection or other measures, all of the "injected" RF power reflected back into the final stage of the amplifier needs to be dissipated in the transistor(s) right there and most likely destroys the device(s) if this situation lasts too long. After the discharge strikes, the load impedance reverts to "matched," eventually, and the transistor sees an acceptable load. Obviously, these mismatched conditions occur every time the plasma is "switched on," exerting strain on the finals. LDMOS transistors are designed to be extremely rugged and generally withstand these mismatch situations without degrading over time.

This ruggedness, combined with the high power density and efficiency achievable, make LDMOS the preferred technology for RF lighting and other equally demanding applications in the ISM realm.

2.5.3 QUBiC4 Si and SiGe:C transistors for any RF function

NXP's 6th (Si) and 7th (SiGe:C) generation RF transistors offer the best RF noise figure versus gain performance at 12 GHz, drawing the lowest current. This performance allows for better signal reception at low power and enables RF receivers to operate more robustly in noisy environments. This family of 6th (Si) and 7th (SiGe:C) generation RF transistors can be used in most RF applications as low noise amplifiers (BFUx10F, BFUx30F, BFU725/N1), high linearity and high output amplifiers (BFUx60F, BFUx90F), buffer amplifiers, mixers, and oscillators.

Key features & benefits

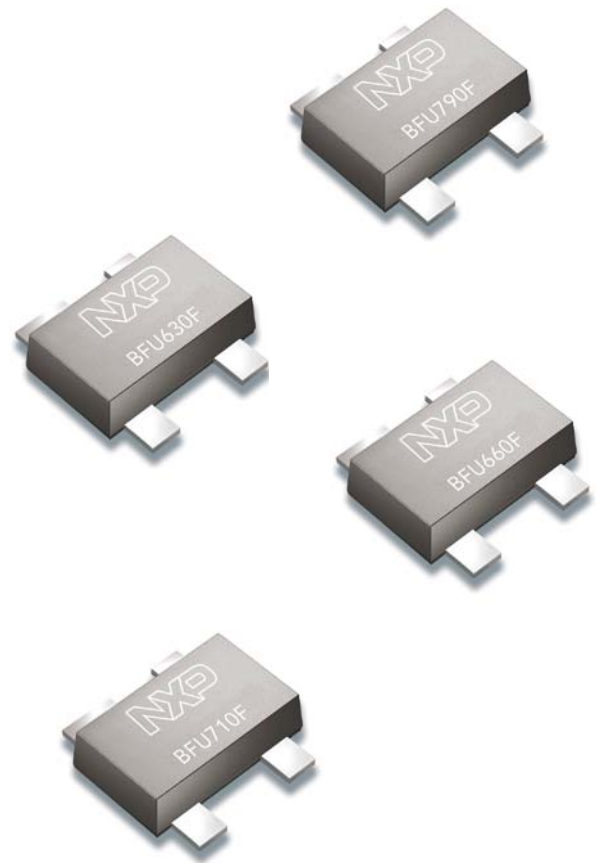
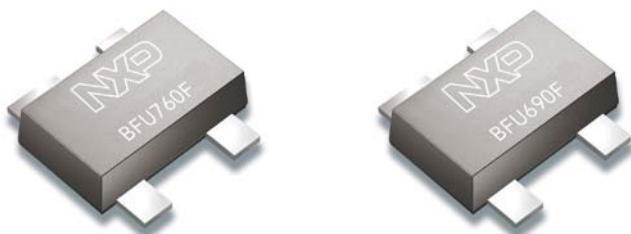
- ▶ 40 / 110 GHz transition frequency allows for applications up to 18 GHz and beyond.
- ▶ From low noise figure of 1.45 dB and high gain of 13.5 dB at 12 GHz to high linearity of 34dBm (OIP3) at 1.8 GHz, gives a broad choice of parts for the perfect fit for each application.
- ▶ Consuming only 3 mA to generate 13.5 dB gain at 12 GHz
- ▶ Plastic surface-mount SOT343F package for high performance and easy manufacturing

Key applications

- ▶ 2nd and 3rd LNA stage and mixer stage in DBS LNBS
- ▶ Ka- / Ku-band DROs
- ▶ Satellite radio (SDARS) LNA
- ▶ C-band / X-band high-output buffer amplifier
- ▶ AMR
- ▶ WLAN / WiFi
- ▶ ZigBee
- ▶ Bluetooth
- ▶ FM radio
- ▶ GPS
- ▶ LTE, cellular, UMTS
- ▶ Mobile TV
- ▶ RKE
- ▶ High linearity applications
- ▶ Low current, battery-equipped systems
- ▶ Low noise amplifiers for microwave communications systems
- ▶ Medium output power applications
- ▶ Microwave driver / buffer applications

Demo boards and application notes

- ▶ Single-stage Ku-band LNA using BFU730F
- ▶ Single-stage 2.3-2.7 GHz LNA with BFU730F
- ▶ Single-stage 5-6 GHz WLAN LNA with BFU730F
- ▶ 1st stage SDARS LNA with BFU730F
- ▶ 2nd stage SDARS LNA with BFU690F



Full portfolio overview of 6th and 7th generation RF wideband transistors at chapter 3.3.1

2.5.4 Building on decades of innovation in microwave and radar

NXP builds on more than 50 years of history in semiconductor technology and component design. For more than three decades we have led in providing high performance RF technologies for microwave applications. The company has built a strong position in the field of RF small signal and power transistors for microwave amplifiers with best-in-class Si devices and processing technologies.

We were the first semiconductor company to supply S-band transistors (2700 to 3500 MHz) based on laterally diffused metal-oxide-silicon (LDMOS). To further strengthen our position towards the future, we are currently developing new high power and high-bandwidth technologies based on gallium nitride (GaN) material.

Another enabling technology is NXP's BICMOS process QUBiC, which is available in several variants with f_T up to 200 GHz, each specialized to address specific small signal RF applications.

The product portfolio encompasses:

- Low noise amplifiers (LNAs)
- Variable gain amplifiers (VGAs)
- Mixers
- Local oscillators (LOs)
- LO generators

NXP now also focuses on architectural breakthroughs and has developed highly integrated products for microwave and millimeter wave. One example is a family of LO generators from 7 GHz to 15 GHz with integrated PLL and VCO. Another example is an integrated RF power module in S-band (3.1-3.5 GHz) at 200 W.

RF small signal product highlight:

Manufactured in NXP's breakthrough QUBiC4X SiGe:C process technology, these highly integrated, alignment-free LO generators TFF1xxxHN are low-power, low-spurious solutions that simplify design-in and lower the total cost of ownership.

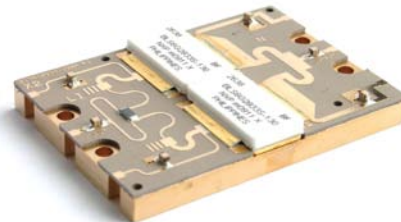


Features

- ▶ Lowest noise LO generators for 7 to 15 GHz range
- ▶ Maximum power consumption for all types, typical 330 mW
- ▶ Phase-noise compliant with IESS-308 (Intelsat)
- ▶ Proven QUBiC4X SiGe:C technology (120 GHz f_T process)
- ▶ External loop filter
- ▶ Differential input and output
- ▶ Lock-detect output
- ▶ Internally stabilized voltage reference for loop filter

RF power product highlight

The BLS6G2933P-200 is the first LDMOS-based, industry-standard pallet produced by NXP. This pallet offers more than 40% efficiency and includes the complete bias network for S-band applications.



Features:

- ▶ Reduces component count and considerably simplifies radar system design
- ▶ P1 dB output power 200 W
- ▶ Efficiency > 40%
- ▶ Industry-standard footprint
- ▶ 50 Ω in/out matched for entire bandwidth
- ▶ Lightweight heat sink included
- ▶ The advantages of LDMOS in comparison with Bipolar
 - Higher gain and better efficiency
 - Better ruggedness – overdrive without risk to 5 dB
 - Improved pulse droop and insertion phase
 - Consistent performance – no tuning required
 - Improved thermal characteristics – no thermal runaway
 - Non-toxic packaging and RoHS-compliance

Microwave applications and bands of operation

System	Frequency
VHF and UHF	<1 GHz
L-band	1200 - 1400 MHz
S-band	2700 - 3500 MHz
X-band	8000 - 12000 MHz
Commercial Avionics	
DME (Distance Measuring Equipment)	978 - 1215 MHz
Transponders	
Mode A / Mode S / Mode C / TCAS	1030 - 1090 MHz
Military Avionics	
IFF transponders (Identification, Friend or Foe)	1030 - 1090 MHz
TACAN (Tactical Air Navigation)	960 - 1215 MHz
JTIDS / MIDS (Joint Tactical Information Distribution System)	960 - 1215 MHz
Marine radar	9300 - 9500 MHz

For a complete list of products, see the respective small signal and power microwave pages

2.5.5 Digital broadcasting at its best

The BLF881 / BLF888A transistor line-up enables today's most powerful and efficient digital broadcast transmitter applications.

BLF881

This transistor is based on NXP's 50 V LDMOS technology and features 120 W RF output power for broadcast transmitter and industrial applications. An unmatched device, the BLF881 can be used in the HF to 1 GHz range. The excellent ruggedness and broadband performance of this device makes it ideal for digital transmitter applications – either on its own or as a driver in combination with the high power transistor BLF888A.

The BLF881 is also available in an earless version, the BLF881S, which enables an even more compact PCB design.

BLF888A

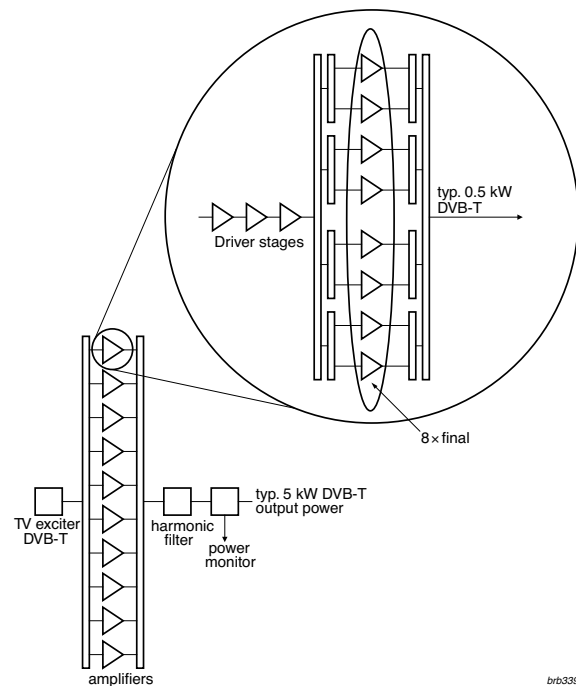
Running from a 50 V supply voltage, the BLF888A is a 600W LDMOS RF power transistor for broadcast transmitter and industrial applications. Being a matched device, BLF888A is optimized for digital signal broadcasting and can deliver 120 W average DVB-T output power over the full UHF band from 470 MHz to 860 MHz with 20 dB power gain and 31% drain efficiency. The excellent ruggedness of this transistor (it withstands a VSWR in excess of 40:1) makes it the ultimate choice as final stage for digital transmitter applications – ideally accompanied by a BLF881 as the driver. This device is also available as an earless package, denoted BLF888AS, to enable surface mount assembly processes and take optimum advantage of the very low thermal resistance package.

Key features and benefits

- ▶ Excellent efficiency and reliability
- ▶ Highest power levels in the market
- ▶ Best-in-class ruggedness designed into all devices
- ▶ Best broadband performance
- ▶ Easy power control
- ▶ Best-in-class design support
- ▶ Low thermal resistance design for unrivalled reliability
- ▶ Advanced flange material for optimum thermal behavior and reliability
- ▶ Designed for broadband operation (470 to 860 MHz)

Key applications

- ▶ Analogue and digital TV transmitters



Function	Type	f_{\min} (MHz)	f_{\max} (MHz)	CW - P _{1dB} (W)	V _{DS} (V)	DVB-T P _L (W)	DVB-T η_D (%)	DVB-T G _p (dB)	Package
Driver	BLF642	1	1400	35	32	7	33	20	SOT467C
	BLF881(S)	1	1000	140	50	30	31	21	SOT467C
Final	BLF884P	470	860	350	50	70	32	20	SOT539A
	BLF888A(S)	470	860	600	50	120	31	21	SOT539
	BLF879P	470	860	450	42	90	31	20	SOT539A

2.5.6 Broadband medium power amplifiers for all 400 to 2700 MHz applications

NXP medium power MMICs BGA7xxx for broadband applications

Produced in NXP's proven QUBiC4 Si BiCMOS process, these MMICs bring improved thermal performance and added-value features to all 400 to 2700 MHz applications – at a lower cost than GaAs versions.



Features

- ▶ ESD protection at all pins
- ▶ Single-supply operation (3.3 or 5 V)
- ▶ Integrated active biasing
- ▶ Fast shutdown
- ▶ Quiescent current adjustment
- ▶ Two package options, smallest leadless package (3 x 3 mm) and leaded SOT-89

Applications

- ▶ Wireless infrastructure (base station, repeater)
- ▶ eMetering
- ▶ Broadband CPE (MoCA)
- ▶ Satellite Master Antenna TV (SMATV)
- ▶ Industrial applications
- ▶ W-LAN / ISM / RFID

Manufactured in NXP's breakthrough QUBiC4 process, these MMICs deliver RF performance comparable to that of their GaAs equivalents, but at a lower cost and with additional features, like thermal performance and ESD robustness. The QUBiC4 process makes it possible to support even more features, including active biasing, quiescent adjustment, VGA interfaces, and a power saving shutdown mode. To increase design flexibility, all the MMICs support single-supply (3.3/5 V) operation. And, to save space, they are available in the smallest package size (3 x 3 mm) and with leadless options.

Base station

The high power level of these MMICs makes them an excellent choice for mobile infrastructure applications. They offer the highest gain over all base stations frequencies. The quiescent current feature allows for high efficiency and linearity in Class AB operation. The bias circuitry delivers stable performance over temperature and supply variations. The integrated shutdown function is a power-saving feature and can be used for fast shutdown. The MMICs can be tuned for any band between VHF and 2.7 GHz. Unbeatable thermal performance (30 °C/W) improves overall quality and reliability.

eMetering

These MMICs are also very well suited to eMetering applications in the 900-2400 MHz ISM band. High integration and single supply operation mean that the MMICs can be combined with just a few other components to create a full-featured solution. The MMICs can be operated on battery power (with an energy saving shutdown mode) and are tunable between Class A and AB. They can also work on a power line network, so they support gas metering with or without a power connection. The built-in reliability and quality of a silicon-based process provides longevity, as does the improved ESD performance.

Type	Package		f (MHz)	Supply			Shutdown control					RF performance				RF performance			
				V _{cc}		I _{cc}	V _{I(D)LSHDN}		V _{I(D)HSHDN}		I _{I(D)LSHDN}	Typ @ f = 940 MHz				Typ @ f = 1960 MHz			
				Typ	Typ	Max	Min	Max	Min	Max	Typ	Gp	P _{L(dB)}	OIP3	NF	Gp	P _{L(dB)}	OIP3	NF
(V)	(mA)	(mA)	(V)	(V)	(V)	(V)	(μA)	dB	dBm	dBm	dB	dB	dBm	dBm	dBm	dB			
BGA7124	SOT908	leadless	400 - 2700	5	130	200	0	0.7	2.5	Vbias	4	22	25	38	5	16	24	38	5
BGA7024	SOT89	leaded	400 - 2700	5	110	-	-	-	-	-	-	22	24	38	3	16	25	38	4
BGA7127	SOT908	leadless	400 - 2700	5	180	325	0	0.7	2.5	Vbias	4	20	28	44	3	13	28	43	5
BGA7027	SOT89	leaded	400 - 2700	5	170	-	-	-	-	-	-	19	28	41	3	12	28	43	4
BGA7130*	SOT908	leadless	400 - 2700	5	-	-	0	0.7	2.5	Vbias	4	18	30	45	4	12	30	45	4

The specifications of the BGA7130 and BGA7133 are target specifications until development is completed.

* = check status at 3.1 new products, as this type has not been released for mass production.

2.6 Technology

2.6.1 Boost efficiency and operational cost in wireless infrastructure with GaN

NXP GaN technology for RF power

This new gallium-nitride (GaN) technology, the result of a collaborative development effort, enables high-power amplifiers that deliver very high efficiency in next-generation wireless communication systems.

Features

- ▶ Power density up to five times higher than Si LDMOS
- ▶ 50 V operation
- ▶ High gain
- ▶ High efficiency
- ▶ High reliability
- ▶ Low parasitics

Benefits

- ▶ High frequency combined with high power
- ▶ Broadband operation that lets a single power amplifier function at multiple frequencies
- ▶ Enabling technology for next-generation, high power, Switch Mode Power Amplifier (SMPA) architectures
- ▶ Lowers system costs and operational expenditures
- ▶ Ideal for tower-top base stations

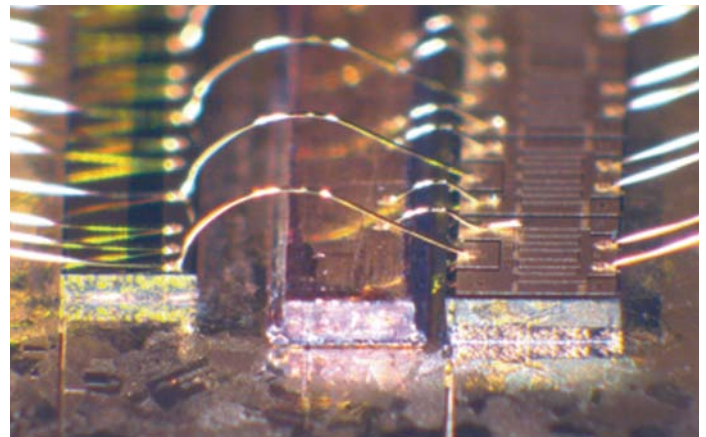
Applications

- ▶ Cellular base stations
- ▶ WiMAX
- ▶ Broadcast
- ▶ Radar

Collaborating with United Monolithic Semiconductors and the Fraunhofer Institute for Applied Solid State Physics, NXP has developed a gallium-nitride (GaN) process technology that boosts performance of next-generation RF power amplifiers. The new GaN process, with its high frequency combined with high power, puts NXP in the ideal position to support future applications while continuing to evolve its well-established LDMOS technology. The GaN technology delivers numerous benefits to manufacturers of infrastructure equipment. Using the GaN technology in a transmitter represents a significant cost savings in system operation due to the high efficiencies achievable, along with major improvements in system performance and flexibility. Most of today's base station power amplifiers are limited to specific applications. The new GaN-based technology creates a "universal transmitter" that can be applied in multiple systems and frequencies. Such universal power amplifier architecture, enabled by NXP's GaN

technology, simplifies transmitter production and logistics. The technology also allows operators to switch between frequency bands to instantly meet demands in the base station's coverage area. GaN transistors enable much more efficient power amplifiers and, as a result, drive down the operational costs of telecom operators. GaN transistors can operate at much higher junction temperatures than Si- and GaAs-based devices, so GaN is an ideal candidate for environments with reduced cooling capabilities, such as tower-top base stations. Also, with its high power densities, GaN has the potential to expand into other areas, including high power broadcast applications, where solid-state power amplifiers built with vacuum tubes are still the norm. NXP's first GaN broadband power amplifiers are expected to be available at the beginning of 2012, with Switch Mode Power Amplifiers (SMPAs) following in subsequent years.

Performance (targets)	
Saturated output power at 50 V	100 W
Frequency	2.2 GHz
Maximum PAE	68%
Linear power gain	19 dB
2C-WCDMA linear efficiency with DPD	40% at -52 dBc IM3 at 8 dB OPBO



Assembly of GaN power bar in standard ceramic package

2.6.2 Looking for a leader in SiGe:C? You've just found us!

NXP QUBiC4 process technology

NXP's innovative, high performance SiGe:C QUBiC4 process lets customers implement more functions into less space, with the added benefits of competitive cost, superb reliability, and significant manufacturing advantages. Our state-of-the-art QUBiC4 technology and extensive IP availability speed the migration from GaAs components to silicon by enabling cutting-edge products with best-in-class low noise performance, linearity, power consumption, immunity to out-of-band signals, spurious performance, and output power. QUBiC is a mature process that has been in mass production since 2002 and has had continuous performance upgrades added ever since. The QUBiC4 process is automotive-qualified and dual-sourced in two high volume, NXP-owned 8-inch waferfabs that provide flexible, low-cost manufacturing with high yields and very low ppm in the field.

QUBiC4 in three variants, each having its own benefits for specific application areas:

QUBiC4+

The QUBiC4+ BiCMOS process features 0.25 μm CMOS with 5 metal layers for integration of dense digital logic-based smart functionality, a rich set of active and passive devices for high frequency mixed-signal designs including thick top metal layers for high quality inductors. The device set includes a 37 GHz f_T NPNs with 3.8 V breakdown voltage (BV_{ce0}) and low noise figure ($NF < 1.1 @ 2 \text{ GHz}$), 7 GHz f_T VPNNs, a 28 GHz high voltage NPN with 5.9 V breakdown voltage, differential and single-ended varicaps with Q-factor > 30 , scalable inductors with Q-factor > 20 , 800 MHz FT lateral PNP's, 0.25 μm CMOS, 137, 220 & 12 to 2000 ohm/sq. poly and active resistors, a 270 ohm/sq. SiCr thin film resistor, a 5.7 fF/ μm^2 oxide capacitor and a 5 fF/ μm^2 MIM capacitor, 1 to 6 fF/ μm^2 oxide capacitors and various other devices including L-PNNs, isolated NMOS, 3.3 V CMOS and RF-CMOS transistors capacitor. The QUBiC4+ process is silicon-based and ideal for applications up to 5 GHz ($f_T = 37 \text{ GHz}$, $NF < 1.1 \text{ dB @ } 1.2 \text{ GHz}$), as well as for medium power amplifiers up to 33 dBm.

QUBiC4X

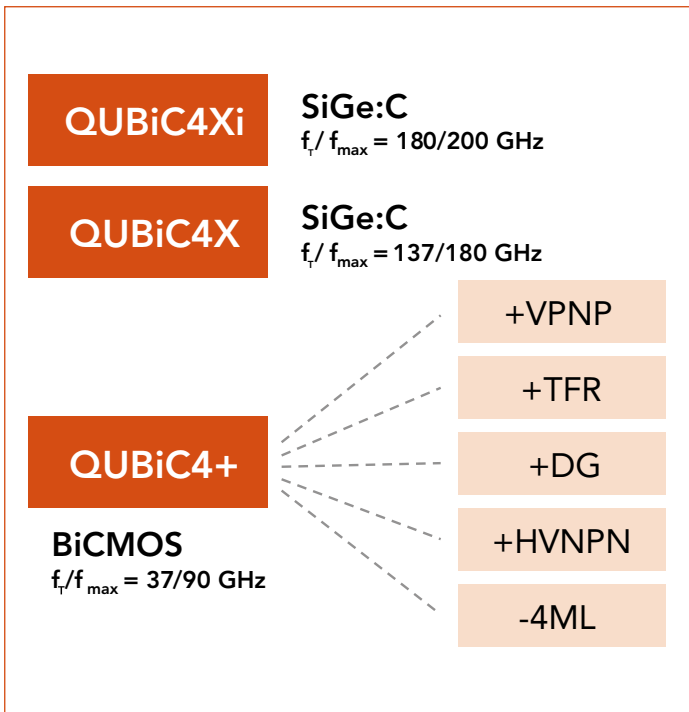
The QUBiC4X BiCMOS process is a SiGe:C-based extension of the QUBiC process for high frequency mixed-signal designs and offers a rich set of devices for QUBiC high frequency mixed-signal designs, including a 140 GHz f_T NPN with 2.5 V breakdown voltage and very low noise figure ($NF < 1.0 @ 10 \text{ GHz}$), 0.25 μm CMOS, a variety of resistors, a 5.7 fF/ μm^2 oxide capacitor, and a 5 fF/ μm^2 MIM capacitor.

The QUBiC4X is ideal for applications that typically operate at up to 30 GHz ($f_T = 137 \text{ GHz}$, $NF < 0.8 \text{ dB @ } 10 \text{ GHz}$) and ultra-low noise applications such as LNAs and mixers.

QUBiC4Xi

The QUBiC4Xi BiCMOS process further enhances the QUBiC4X process and offers an additional features set of devices for high frequency mixed-signal designs, including 180 GHz f_T NPNs with 1.4 V breakdown voltage and ultra-low noise figure ($NF < 0.7 @ 10 \text{ GHz}$), 0.25 μm CMOS, several resistors, a 5.7 fF/ μm^2 oxide capacitor and a 5 fF/ μm^2 MIM capacitor. QUBiC4Xi represents the newest SiGe:C process, with improved on $f_T (> 200 \text{ GHz})$ and even lower noise figure ($NF < 0.57 \text{ dB @ } 10 \text{ GHz}$). It is ideal for applications beyond 30 GHz, such as LO generators.





QUBiC4+

- ▶ Baseline, 0.25um CMOS, single poly, 5 metal
- ▶ Digital gate density 26k gates/mm²
- ▶ $f_T/f_{MAX} = 37/90$ GHz
- ▶ +TFR – Thin Film Resistor
- ▶ +DG – Dual Gate Oxide MOS
- ▶ +HVNPN – High Voltage NPN
- ▶ +VPNP – Vertical PNP (high V_{early})
- ▶ -4ML – high density 5fF/μm² MIM capacitor
- ▶ Wide range of active and high quality passive devices
- ▶ Optimized for up to 5 GHz applications

QUBiC4X

- ▶ SiGe:C process
- ▶ $f_T/f_{MAX} = 137/180$ GHz
- ▶ Optimized for up to 30 GHz applications
- ▶ Transformers

QUBiC4Xi

- ▶ SiGe:C process
- ▶ Improves f_T/f_{max} up to 180/200 GHz
- ▶ Optimized for ultra-low noise for microwave above 30 GHz

Features	QUBiC4+	QUBiC4X	QUBiC4Xi
Release for production	2004	2006	2008
CMOS/Bipolar	CMOS 0.25um, Bipolar 0.4um, Double poly, Deep trench, Si	CMOS 0.25um, Bipolar LV 0.4um, Double poly, Deep trench, SiGe:C	CMOS 0.25um, Bipolar LV 0.3um, Double poly, Deep trench, SiGe:C
LV NPN f_T/f_{max} (GHz)	37/90 (Si)	137/180 (SiGe:C)	180/200 (SiGe:C)
HV NPN f_T/f_{max} (GHz)	28/70 (Si)	60/120 (SiGe:C)	tbd (SiGe:C)
NPN BVce0: HV/LV **	5.9 / 3.8 V	3.2 / 2.0 V	2.5 / 1.4 V
V-PNP f_T / BVcb0 (GHz / V)	7 / >9	planned	planned
CMOS Voltage / Dual Gate	2.5 / 3.3 V	2.5 V	2.5 V
Noise figure NPN (dB)	2 GHz: 1.1	10 GHz: 0.8	10 GHz: 0.5
RFCMOS f_T (GHz)	NMOS 58, PMOS 19	NMOS 58, PMOS 19	NMOS 58, PMOS 19
Isolation (60 dB @ 10 GHz)	STI and DTI	STI and DTI	STI and DTI
Interconnection (AlCu with CMP W Plugs)	5 LM, 3 μm top Metal	5 LM, 3 μm top Metal 2 μm M4	5 LM, 3 μm top Metal
Capacitors	NW, DN, Poly-Poly 5fF/um ² MIM	NW, DN, Poly-Poly 5fF/um ² MIM	NW, DN, Poly-Poly 5fF/um ² MIM
Resistors (Ω/sq)	Poly (64/220/330/2K), Active (12, 57), High Precision SiCr (270)	Poly (64/220/330/2K), Active (12, 57), High Precision SiCr (270)	Poly (64/220/330/2K), Active (12, 57), High Precision SiCr (270)
Varicaps (single-ended & differential)	2x single ended, Q > 40 3x differential, Q 30-50	2x single ended, Q > 40 3x differential, Q 30-50	2x single ended, Q > 40 3x differential, Q 30-50
Inductors (1.5nH @ 2 GHz) - scalable	Q > 21, Thick Metal, Deep trench isolation, High R substrate	Q > 21, Thick Metal, Deep trench isolation, High R substrate	Q > 21, Thick Metal, Deep trench isolation, High R substrate
Other devices	LPNP, Isolated NMOS	Isolated-NMOS tbd	LPNP, Isolated-NMOS tbd
Mask count	31 / 32 (MIM) / 33 (DG)	35 (MIM)	35 (MIM)

2.6.3 Completing NXP's RF power transistor offering: products in plastic packages (OMP)

NXP is currently developing a complete line of overmolded plastic (OMP) RF power transistors and MMICs with peak powers ranging from 3 to 500 W. The main benefit of plastic packages is cost effectiveness with little or no impact on performance. The range of plastic devices will complement the extensive range of RF power products that NXP offers in ceramic packages for all frequency ranges and applications up to 2.45 GHz.



The products in development include

- ▶ Single-stage broadband drivers in HSOP-outlines, from 3 to 10 W
 - ▶ Single-stage OMP drivers from 25 to 45 W, replacing their ceramic equivalents for cost sensitive applications
 - ▶ Dual-stage MMICs from 30 to 60 W that can be used as high-gain drivers or combined as low power dual-stage Doherty amplifiers
 - ▶ Fully integrated plug-and-play Doherty PAs in a single package (50 to 100 W)
 - ▶ Final transistors in OMP package (SOT502-sized) ranging from 140 to 200 W in frequency bands from 730 MHz to 2.2 GHz
 - ▶ Final transistors in OMP package (SOT502-sized) ranging from 3 to 500 W in ISM frequency bands from a few MHz up to 2.45 GHz
- Some of these products are available for sampling now, while the rest of the portfolio will be rolled out throughout 2011.

Function	Type	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	Package	Planned release	Description
HPA	BLP05H6100P	1	500	100	SOT1138	Q112	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP05H6500P	1	500	500	SOT1138	Q411	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP05H650P	1	500	50	SOT1138	Q112	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP09H620	700	960	20	SOT1138	Q112	Gen6 high-voltage OMP LDMOS transistor for broadcast/ISM applications
	BLP10H6120	700	1000	120	SOT1138	Q411	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP10H6120P	700	1000	120	SOT1138	Q411	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP10H6300P	700	1000	300	SOT1138	Q411	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP10H6xx	1	1000	3, 5, 10	SOT1179	Q311	Gen6 high-voltage OMP LDMOS driver transistor family for broadcast/ISM applications
	BLP15M6100P	1200	1500	100	SOT1138	Q112	Gen6 OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP15M630	1200	1500	30	SOT1138	Q112	Gen6 OMP LDMOS transistor for broadcast/ISM applications
	BLP15M660P	1200	1500	60	SOT1138	Q411	Gen6 OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP15M7150P	1200	1500	150	SOT1138	Q112	Gen7 OMP push-pull LDMOS transistor for broadcast/ISM applications
	BLP15M7xx	1	1500	3, 5, 10	SOT1179	Q411	Gen7 OMP LDMOS driver transistor family for broadcast/ISM applications
	BLP25M710	1	2500	10	SOT1179	Q211	Gen7 OMP LDMOS driver transistor for broadcast/ISM applications
	BLP25M74	1	2500	4	SOT1179	Q311	Gen7 OMP LDMOS driver transistor for broadcast/ISM applications
	BLP7G10S-140P	700	1000	140	SOT1138	Q311	Gen7 OMP LDMOS transistor for GSM & LTE applications
	BLP7G10S-140PG	700	1000	140	SOT1204	Q311	Gen7 OMP LDMOS transistor for GSM & LTE applications (gull-wing)
	BLP7G10S-25P	700	1000	25	SOT1138	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications
	BLP7G10S-25PG	700	1000	25	SOT1204	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications (gull-wing)
	BLP7G10S-45P	700	1000	45	SOT1138	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications
	BLP7G10S-45PG	700	1000	45	SOT1204	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications (gull-wing)
	BLP7G20S-45P	1800	2000	45	SOT1138	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications
	BLP7G20S-45PG	1800	2000	45	SOT1204	Q411	Gen7 OMP LDMOS transistor for GSM & LTE applications (gull-wing)
	BLP7G21S-140P	1800	2050	140	SOT1138	Q411	Gen7 OMP LDMOS transistor for TD-SCDMA applications
	BLP7G21S-140PG	1800	2050	140	SOT1204	Q411	Gen7 OMP LDMOS transistor for WCDMA applications (gull-wing)
	BLP7G22-10	1800	2200	10	SOT1179	Q311	Gen7 OMP LDMOS transistor for WCDMA & GSM applications
	BLP7G22S-140	2000	2200	140	SOT1138	Q411	Gen7 OMP LDMOS transistor for WCDMA applications
	BLP7G22S-140G	2000	2200	140	SOT1204	Q411	Gen7 OMP LDMOS transistor for WCDMA applications (gull-wing)
	BLP7G22S-45P	2000	2200	45	SOT1138	Q112	Gen7 OMP LDMOS transistor for WCDMA applications
	BLP7G22S-45PG	2000	2200	45	SOT1204	Q112	Gen7 OMP LDMOS transistor for WCDMA applications (gull-wing)

3. Products by function

NXP RF product catalog:

<http://www.nxp.com/rf>

3.1 New products

DEV = In development

CQS = Customer qualification samples

RFS = Release for supply

Type	Application / Description	Expected status May 2011	Planned release	Chapter
NEW: Wideband transistors				
BFU610F	Gen6 wideband transistor	RFS	Released	3.3.1
BFU630F	Gen6 wideband transistor	RFS	Released	3.3.1
BFU660F	Gen6 wideband transistor	RFS	Released	3.3.1
BFU690F	Gen6 wideband transistor	RFS	Released	3.3.1
BFU710F	Gen7 wideband transistor	RFS	Released	3.3.1
BFU730F	Gen7 wideband transistor	RFS	Released	3.3.1
BFU760F	Gen7 wideband transistor	RFS	Released	3.3.1
BFU790F	Gen7 wideband transistor	RFS	Released	3.3.1
NEW: AEC-Q101 qualified wideband MMICs and transistors				
BGA2002	Low noise wideband amplifier MMIC	RFS	Released	3.4.1
BFR94A	RF wideband transistor	RFS	Released	3.3.1
BFR94AW	RF wideband transistor	RFS	Released	3.3.1
NEW: SiGe:C LNAs (for e.g. GPS)				
BGU7005	SiGe:C MMIC, incl matching output for GPS LNA, 16.5 dB	RFS	Released	3.4.1
BGU7007	GPS LNA, 18.5 / 19.5 dB gain	RFS	Released	3.4.1
BGU7004	GPS LNA, 16.5 / 17.5 dB gain, AEC-Q100	RFS	Released	3.4.1
BGU7008	GPS LNA, 18.5 / 19.5 dB gain, AEC-Q100	RFS	Released	3.4.1
BGU7003W	General-purpose unmatched LNA for FM radio	CQS	Q2 2011	3.4.1
NEW: LNAs for set-up boxes				
BGU7042	LNA for STB tuning	RFS	Released	3.4.1
BGU7041	LNA for STB tuning	RFS	Released	3.4.1
NEW: General purpose wideband amplifiers (50 Ω gain blocks)				
BGA2802	IF gain block 25 dB	RFS	Released	3.4.1
BGA2803	IF gain block 23.4 dB	RFS	Released	3.4.1
BGA2870	IF gain block 31 dB	RFS	Released	3.4.1
NEW: Medium power amplifier MMICs				
BGA7124	Medium power amplifier, 24 dBm P1dB, leadless SOT908	RFS	Released	3.4.1
BGA7024	Medium power amplifier, 24 dBm P1dB, leaded SOT89	RFS	Released	3.4.1
BGA7127	Medium power amplifier, 27 dBm P1dB, leadless SOT908	RFS	Released	3.4.1
BGA7027	Medium power amplifier, 27 dBm P1dB, leaded SOT89	RFS	Released	3.4.1
BGA7130	Medium power amplifier, 30 dBm P1dB, leadless SOT908	DEV	Q4 2011	3.4.1
NEW: VGAs for wireless infrastructures				
BGA7350	Dual IF VGA, control range 24 dB	RFS	Released	3.4.1
BGA7351	Dual IF VGA, control range 28 dB	CQS	Q3 2011	3.4.1
BGA7202	Tx RF VGA, 0.7 - 2.2 GHz	CQS	Q3 2011	3.4.1
BGA7204	Tx RF VGA, 0.7 - 2.8 GHz	CQS	Q3 2011	3.4.1
NEW: LNAs for wireless infrastructures				
BGU7051	LNA 900 MHz	CQS	Q2 2011	3.4.1
BGU7052	LNA 1.9 GHz	CQS	Q2 2011	3.4.1
BGU7053	LNA 2.5 GHz	CQS	Q2 2011	3.4.1
New: LO generators for wireless infrastructures				
BGX7300	Rx LO generator, 400 MHz to 3 GHz	DEV	Q4 2011	3.4.2
New: IQ modulators for wireless infrastructures				
BGX7100	IQ modulator, OIP3 30 dB, NF 165 dBm/Hz, P < 1 W, 350 MHz	DEV	Q4 2011	3.4.2
NEW: Dual mixers for wireless infrastructures				
BGX7220	Dual mixer, NF 8 dB, IIP3 30 dBm, P < 1 W, 700 MHz to 1.2 GHz	DEV	Q4 2011	3.4.2
BGX7221	Dual mixer, NF 8 dB, IIP3 30 dBm, P < 1 W, 1.7 GHz to 2.7 GHz	DEV	Q4 2011	3.4.2

Type	Application / Description	Expected status May 2011	Planned release	Chapter
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NEW: Low noise LO generators for VSAT applications

TFF1007HN	Low noise LO generator for VSAT applications	RFS	Released	3.4.4
TFF1008HN	Low noise LO generator for VSAT applications	RFS	Released	3.4.4

NEW: RF satellite ICs

TFF1014HN	Satellite LNB downconverter IC	RFS	Released	3.4.3
TFF1015HN	Satellite LNB downconverter IC	RFS	Released	3.4.3
TFF1017HN	Satellite LNB downconverter IC	RFS	Released	3.4.3
TFF1018HN	Satellite LNB downconverter IC	RFS	Released	3.4.3

NEW: RF CATV modules

CGY1041	1 GHz, 21 dB gain push-pull, GaAs HFET SOT115	RFS	Released	3.6.2
CGY1043	1 GHz, 23 dB gain push-pull, GaAs HFET SOT115	RFS	Released	3.6.2
CGY1049	1 GHz, 29 dB gain push-pull, GaAs HFET SOT115	RFS	Released	3.6.2
CGY1032	1 GHz, 32 dB gain push-pull, GaAs HFET SOT115	RFS	Released	3.6.2
CGD1046Hi	1 GHz, 26 dB gain power doubler, GaAs HFET SOT115	RFS	Released	3.6.3
BGO807CE	870 MHz, forward path optical receiver, SOT115	RFS	Released	3.6.4
CGD982HCi	1 GHz, 22 dB gain GaAs high output power doubler	RFS	Released	3.6.3
CGD985HCi	1 GHz, 25 dB gain GaAs high output power doubler	RFS	Released	3.6.3
CGD987HCi	1 GHz, 27 dB gain GaAs high output power doubler	RFS	Released	3.6.3

NEW: RF high-speed data converters

ADC1613D series	Dual 16-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1613S series	Single 16-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1610S series	Single 16-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1415S series	Single 14-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1413D series	Dual 14-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1413S series	Single 14-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1412D series	Dual 14-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1410S series	Single 14-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1215S series	Single 12-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1213D series	Dual 12-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1213S series	Single 12-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1212D series	Dual 12-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1210S series	Single 12-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1207S080	Single 12-bit ADC 80 Msps	RFS	Released	3.8.1
ADC1206S series	Single 12-bit ADC up to 40/55/70 Msps	RFS	Released	3.8.1
ADC1115S125	Single 11-bit ADC up to 125 Msps	RFS	Released	3.8.1
ADC1113D125	Dual 11-bit ADC up to 125 Msps	RFS	Released	3.8.1
ADC1113S125	Single 11-bit ADC up to 125 Msps	RFS	Released	3.8.1
ADC1112D125	Dual 11-bit ADC up to 125 Msps	RFS	Released	3.8.1
ADC1015S series	Single 10-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1010S series	Single 10-bit ADC up to 65/80/105/125 Msps	RFS	Released	3.8.1
ADC1006S series	Single 10-bit ADC up to 55/70 Msps	RFS	Released	3.8.1
ADC1005S060	Single 10-bit ADC 60 Msps	RFS	Released	3.8.1
ADC1004S series	Single 10-bit ADC 30/40/50 Msps	RFS	Released	3.8.1
ADC1003S series	Single 10-bit ADC 30/40/50 Msps	RFS	Released	3.8.1
ADC1002S020	Single 10-bit ADC 20 Msps	RFS	Released	3.8.1
ADC0808S series	Single 8-bit ADC up to 125/250 Msps	RFS	Released	3.8.1
ADC0804S series	Single 8-bit ADC up to 30/40/50 Msps	RFS	Released	3.8.1
ADC0801S040	Single 8-bit ADC 40 Msps	RFS	Released	3.8.1
DAC1408D series	Dual 14-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1405D series	Dual 14-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1403D160	Dual 14-bit DAC 160 Msps	RFS	Released	3.8.2
DAC1401D125	Dual 14-bit DAC 125 Msps	RFS	Released	3.8.2
DAC1208D series	Dual 12-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1205D series	Dual 12-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1203D160	Dual 12-bit DAC 160 Msps	RFS	Released	3.8.2
DAC1201D125	Dual 12-bit DAC 125 Msps	RFS	Released	3.8.2
DAC1008D series	Dual 10-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1005D series	Dual 10-bit DAC up to 650/750 Msps	RFS	Released	3.8.2
DAC1003D160	Dual 10-bit DAC 160 Msps	RFS	Released	3.8.2
DAC1001D125	Dual 10-bit DAC 125 Msps	RFS	Released	3.8.2

NEW: RF power transistors

BLF6G22LS-40P	Gen6 ceramic push-pull driver/final LDMOS transistor for WCDMA & LTE applications	DEV	Q311	3.7.1.4
BLF6G27LS-40P	Gen6 ceramic push-pull driver/final LDMOS transistor for LTE applications	DEV	Q311	3.7.1.5
BLF7G10LS-250	Gen7 ceramic LDMOS transistor for GSM & LTE applications	DEV	Q311	3.7.1.1
BLF7G21LS-160P	Gen7 ceramic push-pull LDMOS transistor for TD-SCDMA applications	DEV	Q311	3.7.1.4
BLF7G22LS-100P	Gen7 ceramic push-pull LDMOS transistor for WCDMA applications	DEV	Q411	3.7.1.4
BLF7G22LS-160	Gen7 ceramic LDMOS transistor for WCDMA applications	DEV	Q311	3.7.1.4
BLF7G24LS-160P	Gen7 ceramic push-pull LDMOS transistor for LTE applications	DEV	Q311	3.7.1.5
BLF7G27LS-200P	Gen7 ceramic push-pull LDMOS transistor for LTE applications	DEV	Q311	3.7.1.5
BLF7G38LS-90P	Gen7 ceramic push-pull LDMOS transistor for WiMAX applications	DEV	Q112	3.7.1.6
BLF8G10LS-160	Gen8 ceramic LDMOS transistor for GSM & LTE applications	DEV	Q311	3.7.1.1
BLF8G10LS-300P	Gen8 ceramic push-pull LDMOS transistor for GSM & LTE applications	DEV	Q112	3.7.1.1
BLM7G22S-60PG	Gen7 LDMOS MMIC for WCDMA applications (gull-wing)	DEV	Q411	3.7.1.4
BLP7G10S-140PG	Gen7 OMP LDMOS transistor for GSM & LTE applications (gull-wing)	DEV	Q311	3.7.1.1
BLP7G22-10	Gen7 OMP LDMOS transistor for WCDMA & GSM applications	DEV	Q311	3.7.1.4

Type	Application / Description	Expected status May 2011	Planned release	Chapter
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NEW: RF power broadcast and ISM transistors

BLF178P	ceramic push-pull LDMOS transistor for FM broadcast applications	DEV	Q211	3.7.2.1
BLF572P	ceramic push-pull LDMOS transistor for VHF/UHF broadcast applications	DEV	Q112	3.7.2.1
BLF573P	ceramic push-pull LDMOS transistor for VHF/UHF broadcast applications	DEV	Q411	3.7.2.1
BLF642	ceramic LDMOS driver transistor for broadcast/ISM applications	DEV	Q211	3.7.2.1
BLF647P	ceramic push-pull LDMOS transistor for VHF/UHF broadcast applications	DEV	Q411	3.7.2.1
BLF278XR	extremely rugged ceramic push-pull transistor for broadcast/ISM applications	DEV	Q311	3.7.2.1
BLF578XR	extremely rugged ceramic push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q311	3.7.2.1
BLF879P	Gen6 ceramic push-pull LDMOS transistor for broadcast applications	DEV	Q111	3.7.2.2
BLF884P	Gen6 ceramic push-pull LDMOS transistor for broadcast applications	DEV	Q311	3.7.2.2
BLF888A	Gen6 ceramic push-pull LDMOS transistor for broadcast/ISM applications	CQS	now	3.7.2.2
BLP05H6100P	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP05H6500P	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q411	3.7.2.1
BLP05H650P	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP09H620	Gen6 high-voltage OMP LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP10H6120	Gen6 high-voltage OMP LDMOS transistor for broadcast/ISM applications	DEV	Q411	3.7.2.1
BLP10H6300P	Gen6 high-voltage OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q411	3.7.2.1
BLP10H6xx	Gen6 high-voltage OMP LDMOS driver transistor family for broadcast/ISM applications	DEV	Q311	3.7.2.1
BLF6G13LS-250P	Gen6 ceramic LDMOS transistor for ISM applications	DEV	Q311	3.7.2.1
BLF6G15LS-500H	Gen6 ceramic push-pull LDMOS transistor for digital broadcast applications	DEV	Q211	3.7.2.1
BLP15M6100P	Gen6 OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP15M630	Gen6 OMP LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP15M660P	Gen6 OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q411	3.7.2.1
BLP15M7150P	Gen7 OMP push-pull LDMOS transistor for broadcast/ISM applications	DEV	Q112	3.7.2.1
BLP15M7xx	Gen7 OMP LDMOS driver transistor family for broadcast/ISM applications	DEV	Q411	3.7.2.1
BLP25M74	Gen7 OMP LDMOS driver transistor for broadcast/ISM applications	DEV	Q311	3.7.2.3
BLP25M710	Gen7 OMP LDMOS driver transistor for broadcast/ISM applications	DEV	Q311	3.7.2.3
BLF25M612	Gen6 ceramic LDMOS driver transistor for 2.45 GHz ISM applications	DEV	Q311	3.7.2.3
BLM2425M720	Gen7 LDMOS MMIC for 2.45 GHz ISM applications	DEV	Q411	3.7.2.3
BLP2425M8140	Gen8 OMP LDMOS transistor for 2.45 GHz ISM applications	DEV	Q112	3.7.2.3
BLF2425M6LS180P	Gen6 ceramic push-pull LDMOS transistor for 2.45 GHz ISM applications	DEV	Q311	3.7.2.3
BLF2425M7LS200	Gen7 ceramic LDMOS transistor for 2.45 GHz ISM applications	DEV	Q311	3.7.2.3
BLF2425M7LS250P	Gen7 ceramic push-pull LDMOS transistor for 2.45 GHz ISM applications	DEV	Q311	3.7.2.3
BLP2425M8250P	Gen8 OMP push-pull LDMOS transistor for 2.45 GHz ISM applications	DEV	Q312	3.7.2.3

NEW: RF microwave transistors

BLA6H0912-1000	1000 W ceramic Avionics LDMOS transistor	Q311	DEV	3.7.3.1
BLA6G1011LS-200RG	Gull-wing ceramic Avionics LDMOS transistor	Q211	DEV	3.7.3.1
BLL6G1214L-250	Gen6 ceramic LDMOS transistor for L-band applications	Q311	DEV	3.7.3.2
BLS6G2731P-200	S-band pallet using 2x Gen6 ceramic LDMOS transistors	Q311	DEV	3.7.3.3
BLS6G2735LS-30	Gen6 ceramic LDMOS driver transistor for S-band radar applications	Q211	DEV	3.7.3.3
BLS7G2729LS-350P	Gen6 ceramic push-pull LDMOS transistor for S-band radar applications	Q211	DEV	3.7.3.3
BLS7G2933S-150	Gen7 ceramic LDMOS transistor for S-band radar applications	released	RFS	3.7.3.3
BLS6G2933P-200	S-band pallet using 2x Gen6 ceramic LDMOS transistors	Q211	DEV	3.7.3.3
BLS7G3135LS-350P	Gen6 ceramic push-pull LDMOS transistor for S-band radar applications	Q211	DEV	3.7.3.3

3.2 RF diodes

3.2.1 Varicap diodes

Varicap selection guide on www.nxp.com/varicaps
Easy-to-use parametric filters help you to choose the right varicap for your design.

Why choose NXP's varicap diodes:

- ▶ Reference designs for TV and radio tuning
- ▶ Direct matching process
- ▶ Small tolerances
- ▶ Short lead time
- ▶ Complete portfolio covering broad frequency range and variety in package (including leadless)
- ▶ Reliable volume supply

VCO and FM radio tuning varicap diodes

Type	Package	Number of diodes	Configuration	@ f = 1 MHz												r _s typ	r _s max	@ f =
				C _d min	C _d typ	C _d max	@ V _R =	C _d min	C _d typ	C _d max	@ V _R =	C _{d1} /C _{d2} min	C _{d1} /C _{d2} max	@ V1 =	@ V2 =			
				(pF)	(pF)	(pF)	(V)	(pF)	(pF)	(pF)	(V)			(V)	(V)			
BB145B	SOD523	1	SG	6.4	-	7.2	1	2.55	-	2.95	4	2.2	-	1	4	-	0.6	470
BB156	SOD323	1	SG	14.4	16	17.6	1	4.2	4.8	5.4	7.5	2.7	3.9	1	7.5	0.4	0.7	470
BB198	SOD523	1	SG	25	-	28.5	1	4.8	-	6.8	4	-	-	-	-	-	0.8	100
BB199	SOD523	1	SG	36.5	-	42.5	0.5	11.8	-	13.8	2	2.8	-	0.5	2	0.25	-	100
BB201	SOT23	2	CC	89	95	102	1	25.5	27.6	29.7	7.5	3.1	3.8	1	7.5	0.25	0.5	100
BB202^^	SOD523	1	SG	28.2	-	33.5	0.2	7.2	-	11.2	2.3	2.5	-	0.2	2.3	0.35	0.6	100
BB202LX^^	SOD882D	1	SG	28.2	-	33.5	0.2	7.2	-	11.2	2.3	2.5	-	0.2	2.3	0.35	-	100
BB207^	SOT23	2	CC	76	81	86	1	25.5	27.6	29.7	7.5	2.6	3.3	1	7.5	0.2	0.4	100
BB208-02^	SOD523	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100
BB208-03^	SOD323	1	SG	19.9	-	23.2	1	4.5	-	5.4	7.5	3.7	5.2	1	7.5	0.35	0.5	100

^ = Including special design for FM car radio (CREST-IC:TEF6860).

^^ = Including special design for mobile phone tuner ICs.

Type of connection:

CC: Common Cathode
SG: Single

TV / VCR / DVD / HDD varicap diodes - UHF tuning

Type	Package	@ f = 1 MHz										r _s typ	r _s max	@ f =	@ C _d =	ΔC _d /C _d	@ V ₁ =	@ V ₂ =	@ N _s =
		C _d min	C _d typ	C _d max	@ V _R =	C _{d1} /C _{d2} min	C _{d1} /C _{d2} typ	C _{d1} /C _{d2} max	@ V ₁ =	@ V ₂ =									
		(pF)	(pF)	(pF)	(V)				(V)	(V)	(Ω)								
Matched																			
BB149	SOD323	1.9	2.1	2.25	28	8.2	9	10	1	28	-	0.75	470	9	2	0.5	28	10	
BB149A	SOD323	1.951	2.1	2.225	28	8.45	9	10.9	1	28	0.6	0.75	470	9	2	1	28	10	
BB179	SOD523	1.951	2.1	2.225	28	8.45	9	10.9	1	28	0.6	0.75	470	9	2	1	28	10	
BB179B	SOD523	1.9	2.1	2.25	28	8.45	9	10	1	28	0.6	0.75	470	9	2	1	28	10	
BB179BLX	SOD882D	1.9	-	2.25	28	-	9	-	1	28	0.65	-	470	9	2	1	28	10	
BB179LX	SOD882D	1.95	2.1	2.22	28	8.45	9	10.9	1	28	0.65	-	470	30	2	1	28	5	
BB184	SOD523	1.87	2	2.13	10	6	7	-	1	10	0.65	-	470	9	2	1	10	5	
BB189	SOD523	1.89	2.04	2.18	25	6.3	7.3	-	2	25	0.65	0.7	470	9	1.8	2	25	10	
Unmatched																			
BB135	SOD323	1.7	-	2.1	28	8.9	-	12	0.5	28	-	0.75	470	9	-	-	-	-	

Bold = Highly recommended product

TV / VCR / DVD / HDD varicap diodes - VHF tuning

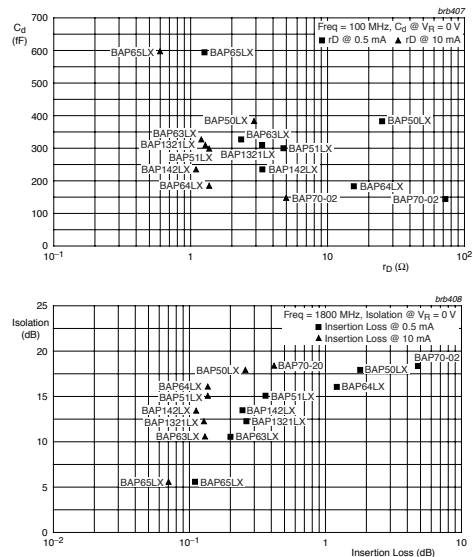
Type	Package	@ f = 1 MHz									r _s typ	r _s max	@ f =	@ C _d =	ΔC _d / C _d	@ V ₁ =	@ V ₂ =	@ N _s =
		C _d min	C _d typ	C _d max	@ V _R =	C _{d1} / C _{d2} min	C _{d1} / C _{d2} typ	C _{d1} / C _{d2} max	@ V ₁ =	@ V ₂ =								
		(pF)	(pF)	(pF)	(V)				(V)	(V)								
Matched																		
BB148	SOD323	2.4	2.6	2.75	28	14.5	15	-	1	28	-	0.9	100	12	2	0.5	28	10
BB152	SOD323	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10
BB153	SOD323	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10
BB178	SOD523	2.361	2.6	2.754	28	13.5	15	-	1	28	0.65	0.8	100	30	2	1	28	10
BB178LX	SOD882D	2.36	2.6	2.75	28	13.5	15	-	1	28	0.7	-	470	30	2	1	28	5
BB182	SOD523	2.48	2.7	2.89	28	20.6	22	-	1	28	1	1.2	100	30	2	1	28	10
BB182LX	SOD882D	2.48	2.7	2.89	28	-	22	-	1	28	1	-	100	30	2	1	28	10
BB187	SOD523	2.57	2.75	2.92	25	11	-	-	2	25	-	0.75	470	-	2	2	25	10
BB187LX	SOD882D	2.57	2.75	2.92	25	11	-	-	2	25	-	0.75	470	-	2	2	25	10
Unmatched																		
BB131	SOD323	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-
BB181	SOD523	0.7	-	1.055	28	12	-	16	0.5	28	-	3	470	9	-	-	-	-
BB181LX	SOD882D	0.7	-	1.055	28	-	14	-	0.5	28	2	-	470	9	-	-	-	-
BBY40	SOT23	4.3	-	6	25	5	-	6.5	3	25	-	0.7	200	25	-	-	-	-

3.2.2 PIN diodes

Pin diode selection guide on www.nxp.com/pindiodes
Easy-to-use parametric filters help you to choose the right pin diode for your design.

Why choose NXP's PIN diodes:

- ▶ Broad portfolio
- ▶ Unrivalled performance
- ▶ Short lead time
- ▶ Low series inductance
- ▶ Low insertion loss
- ▶ Low capacitance



Look for more graphs showing the Pin diode line-up at other frequencies on our web site: www.nxp.com/pindiodes

PIN diodes: typical r_D @ 1 mA ≤ 2, switching diodes

Type	Package	Number of diodes	Conf	V _R max (V)	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz					
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ V _R = 0 V		@ V _R = 1 V		@ V _R = 20 V	
						r _D typ (Ω)	r _D max (Ω)	r _D typ (Ω)	r _D max (Ω)	r _D typ (Ω)	r _D max (Ω)	C _d typ (pF)	C _d max (pF)	C _d typ (pF)	C _d max (pF)	C _d typ (pF)	C _d max (pF)
BAP65LX	SOD882D	1	SG	30	100	-	-	0.94	-	0.49	0.9	0.61	0.48	0.85	0.37	-	
BAP65-02	SOD523	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-	
BAP65-03	SOD323	1	SG	30	100	-	-	1	-	0.56	0.9	0.65	0.55	0.9	0.375	-	
BAP65-05	SOT23	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-	
BAP65-05W	SOT323	2	CC	30	100	-	-	1	-	0.56	0.9	0.7	0.575	0.9	0.425	-	
BAP63LX	SOD882D	1	SG	50	100	2.3	3.3	1.87	3	1.19	1.8	0.34	0.29	-	0.24	0.3	
BAP63-02	SOD523	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.36	0.32	-	0.25	0.32	
BAP63-03	SOD323	1	SG	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.27	0.32	
BAP63-05W	SOT323	2	CC	50	100	2.5	3.5	1.95	3	1.17	1.8	0.4	0.35	-	0.3	0.35	

Bold = Highly recommended product

PIN diodes: typical $r_D @ 1 \text{ mA} = 2.2 - 2.4$, switching diodes

Type	Package	Number of diodes	Conf	$V_R \text{ max (V)}$	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0 \text{ V}$	@ $V_R = 1 \text{ V}$		@ $V_R = 20 \text{ V}$	
						r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	C_d typ (pF)	C_d typ (pF)	C_d max (pF)	C_d typ (pF)	C_d max (pF)
BAP55LX	SOD882D	1	SG	50	100	3.3	4.5	2.2	3.3	0.8	1.2	0.28	0.23	-	0.18	0.28
BAP1321-02	SOD523	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-03	SOD323	1	SG	60	100	3.4	5	2.4	3.6	1.2	1.8	0.4	0.35	0.45	0.25	0.32
BAP1321-04	SOT23	2	SR	60	100	3.4	5	2.4	3.6	1.2	1.8	0.42	0.375	0.45	0.275	0.325
BAP1321LX	SOD882D	1	SG	60	100	3.3	5	2.4	3.6	1.2	1.8	0.32	0.27	0.38	0.21	0.28
BAP142LX	SOD882D	1	SG	50	100	3.3	5	2.4	3.6	1	1.8	0.25	0.22	-	0.16	0.26

PIN diodes: typical $r_D @ 1 \text{ mA} = 3.2 - 3.6$, switching diodes

Type	Package	Number of diodes	Conf	$V_R \text{ max (V)}$	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0 \text{ V}$	@ $V_R = 1 \text{ V}$		@ $V_R = 20 \text{ V}$	
						r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	C_d typ (pF)	C_d typ (pF)	C_d max (pF)	C_d typ (pF)	C_d max (pF)
BAP51LX	SOD882D	1	SG	60	100	4.9	9	3.2	6.5	1.4	2.5	0.3	0.22	0.4	0.17	0.3
BAP51-02	SOD523	1	SG	60	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-03	SOD323	1	SG	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-04W	SOT323	2	SR	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-05W	SOT323	2	CC	50	50	5.5	9	3.6	6.5	1.5	2.5	0.4	0.3	0.55	0.2	0.35
BAP51-06W	SOT323	2	CA	50	50	5.5	-	3.6	-	2	-	0.4	0.3	-	0.2	-

PIN diodes: typical $r_D @ 1 \text{ mA} = 10$, attenuator/switching diodes

Type	Package	Number of diodes	Conf	$V_R \text{ max (V)}$	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0 \text{ V}$	@ $V_R = 1 \text{ V}$		@ $V_R = 20 \text{ V}$	
						r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	C_d typ (pF)	C_d typ (pF)	C_d max (pF)	C_d typ (pF)	C_d max (pF)
BAP64Q	SOT753	4	SR	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-02	SOD523	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-03	SOD323	1	SG	175	100	20	40	10	20	2	3.8	0.48	0.35	-	0.23	0.35
BAP64-04	SOT23	2	SR	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-04W	SOT323	2	SR	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05	SOT23	2	CC	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-05W	SOT323	2	CC	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06	SOT23	2	CA	175	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35
BAP64-06W	SOT323	2	CA	100	100	20	40	10	20	2	3.8	0.52	0.37	-	0.23	0.35

PIN diodes: typical $r_D @ 1 \text{ mA} = 14 - 16$, attenuator diodes

Type	Package	Number of diodes	Conf	$V_R \text{ max (V)}$	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0 \text{ V}$	@ $V_R = 1 \text{ V}$		@ $V_R = 5 \text{ V}$	
						r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	C_d typ (pF)	C_d typ (pF)	C_d max (pF)	C_d typ (pF)	C_d max (pF)
BAP50-02	SOD523	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.22	0.35
BAP50-03	SOD323	1	SG	50	50	25	40	14	25	3	5	0.4	0.3	0.55	0.2	0.35
BAP50-04	SOT23	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
BAP50-04W	SOT323	2	SR	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
BAP50-05	SOT23	2	CC	50	50	25	40	14	25	3	5	0.45	0.3	0.5	0.35	0.6
BAP50-05W	SOT323	2	CC	50	50	25	40	14	25	3	5	0.45	0.35	0.6	0.3	0.5
BAP50LX	SOD882D	1	SG	50	50	26	40	14	25	3	5	0.4	0.28	0.55	0.19	0.35
BAP64LX^	SOD882D	1	SG	60	100	31	50	16	26	2.6	4.4	0.48	0.34	-	0.17*	0.3*

^ = attenuator / switching diode * = @ $V_R = 20 \text{ V}$

PIN diodes: typical $r_D @ 1 \text{ mA} = 40$, attenuator diodes

Type	Package	Number of diodes	Conf	$V_R \text{ max (V)}$	IF max (mA)	@ f = 100 MHz						@ f = 1 MHz				
						@ IF = 0.5 mA		@ IF = 1 mA		@ IF = 10 mA		@ $V_R = 0 \text{ V}$	@ $V_R = 1 \text{ V}$		@ $V_R = 20 \text{ V}$	
						r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	r_D typ (Ω)	r_D max (Ω)	C_d typ (pF)	C_d typ (pF)	C_d max (pF)	C_d max (pF)	C_d typ (pF)
BAP70Q	SOT753	4	SR	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
BAP70-02	SOD523	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
BAP70-03	SOD323	1	SG	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25
BAP70-04W	SOT323	2	SR	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
BAP70-05	SOT23	2	CC	50	100	77	100	40	50	5.4	7	0.6	0.43	-	0.25	0.3
BAP70AM	SOT363	4	SR	50	100	77	100	40	50	5.4	7	0.57	0.4	-	0.2	0.25

Bold = highly recommended product

SG = Single
SR = Series

CC = Common Cathode
CA = Common Anode

3.2.3 Band switch diodes

Why choose NXP's band switch diodes

- ▶ Reliable volume supplier
- ▶ Short lead time
- ▶ Low series inductance
- ▶ Low insertion loss
- ▶ Low capacitance
- ▶ High reverse isolation

Type	Package	V_R max (V)	IF max (mA)	r_D max (Ω)	@ IF = (mA)	@ f = (MHz)	C_d max (pF)	@ V_R = (V)	@ f = (MHz)
BA277	SOD523	35	100	0.7	2	100	1.2	6	1
BA591	SOD323	35	100	0.7	3	100	0.9	3	1
BA891	SOD523	35	100	0.7	3	100	0.9	3	1
BAT18	SOT23	35	100	0.7	5	200	1	20	1

3.2.4 Schottky diodes

Schottky diode selection guide on www.nxp.com/rfschottkydiodes
 Easy-to-use parametric filters help you to choose the right schottky diode for your design.

Why choose NXP's schottky diodes

- ▶ Low diode capacitance
- ▶ Low forward voltage
- ▶ Single- and triple-isolated diode
- ▶ Small package

Applications

- ▶ Digital applications:
 - Ultra high-speed switching
 - Clamping circuits
- ▶ RF applications:
 - Diode ring mixer
 - RF detector
 - RF voltage doubler

Low capacitance schottky diodes

Type	Package	Configuration	V_R max. (V)	I_F max. (mA)	V_F max. (mV)	C_d max. (pF)
BAT17	SOT23	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
PMBD353	SOT23	dual series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
PMBD354^	SOT23	dual series	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS76SB17	SOD323	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS66SB17	SOT666	triple isolated	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS79SB17	SOD523	single	4	30	450 @ IF = 1 mA	1 @ VR = 0 V
1PS88SB82	SOT363	triple isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB82	SOT323	single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB84	SOT323	dual series	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB85	SOT323	dual c.c	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS70SB86	SOT323	dual c.a.	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS66SB82	SOT666	triple isolated	15	30	340 @ IF = 1 mA	1 @ VR = 0 V
1PS10SB82	SOD882	single	15	30	340 @ IF = 1 mA	1 @ VR = 0 V

Bold = highly recommended product

^ Diodes have matched capacitance

3.3 RF Bipolar transistors

3.3.1 Wideband transistors

RF wideband transistor selection guide on www.nxp.com/rftransistors
 Easy-to-use parametric filters help you to choose the right RF wideband transistor for your design.

Why choose NXP's wideband transistors

- ▶ Broad portfolio (1st - 7th generation)
- ▶ Short lead time
- ▶ Smallest packages
- ▶ Volume delivery

Wideband transistors

The f_T - I_C curve represents Transition Frequency (f_T) characteristics as a function of collector current (I_C) for the six generations of RF wideband transistors. A group of transistors having the same collector current (I_C) and similar transition frequencies (f_T) represents a curve. The curve number matches products in the table, detailing their RF characteristics.

Wideband transistors line-up per frequency

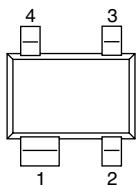
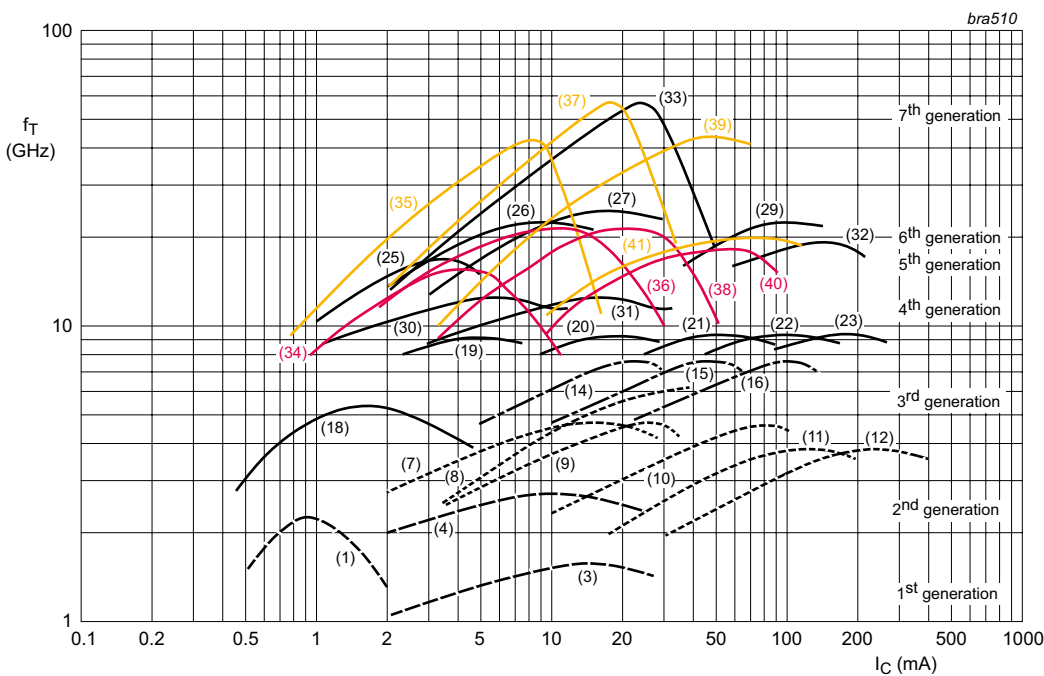


Figure 1

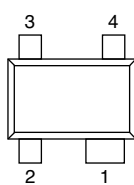


Figure 2

Pin	Description
Type (see Fig.1)	
1	collector
2	base
3	emitter
4	emitter
Type/X (see Fig.1)	
1	collector
2	emitter
3	base
4	emitter
Type/XR (see Fig.2)	
1	collector
2	emitter
3	base
4	emitter

Wideband transistors (RF small signal)

RF power transistors for portable equipment (VHF)

Type	Package	V _{CEO} (max) (V)	I _C (max) (mA)	P _{ret} (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I _C = (mA)	@ V _{CE} = (V)
BFG10	SOT143	8	250	400	NPN	7	1900	1	3.6
BFG10/X	SOT143	8	250	400	NPN	7	1900	1	3.6
BFG10W/X	SOT343	10	250	400	NPN	7	1900	1	3.6
BLT50	SOT223	10	500	2000	NPN	-	-	-	-
BLT70	SOT223H	8	250	2100	NPN	-	-	-	-
BLT80	SOT223	10	250	2000	NPN	-	-	-	-
BLT81	SOT223	9.5	500	2000	NPN	-	-	-	-

RF wideband transistors generation 1 - 3

Type	Generation	Curve	Package	f _T (typ) (GHz)	V _{CEO} (max) (V)	I _C (max) (mA)	P _{ret} (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I _C = (mA)	@ V _{CE} = (V)	GUM (typ) (dB)	@ f = (MHz)	@ I _C = (mA)	@ V _{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I _C = (mA)	@ V _{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I _C = (mA)	@ V _{CE} = (V)
BFS17	1 st	3	SOT23	1	15	25	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
BFS17W	1 st	3	SOT323	1.6	15	50	300	NPN	-	-	-	-	-	-	-	-	4.5	500	2	5	-	-	-	-
BFT25	1 st	1	SOT23	2.3	5	6.5	30	NPN	18	500	1	1	12	800	1	1	3.8	500	1	1	-	-	-	-
BFG25A/X	2 nd	18	SOT143B	5	5	6.5	32	NPN	-	-	-	-	18	1000	0.5	1	1.8	1000	0.5	1	-	-	-	-
BFG25AW	2 nd	18	SOT343N	5	5	6.5	500	NPN	-	-	-	-	16	2000	0.5	1	2	1000	1	1	-	-	-	-
BFG25AW/X	2 nd	18	SOT343N	5	5	6.5	500	NPN	16	1000	0.5	1	8	2000	0.5	1	2	1000	1	1	-	-	-	-
BFG31	2 nd	10	SOT223	5	-15	-100	1000	PNP	16	500	-70	-10	12	800	-70	-10	-	-	-	-	-	-	-	-
BFG35	2 nd	11	SOT223	4	18	150	1000	NPN	15	500	100	10	11	800	100	10	-	-	-	-	-	-	-	-
BFG92A/X	2 nd	7	SOT143B	5	15	25	400	NPN	16	1000	15	10	11	2000	15	10	2	1000	5	10	3	2000	5	10
BFG97	2 nd	10	SOT223	5.5	15	100	1000	NPN	16	500	70	10	12	800	70	10	-	-	-	-	-	-	-	-
BFQ149	2 nd	10	SOT89	5	-15	-100	1000	PNP	12	500	-50	-10	-	-	-	-	3.75	500	-50	-10	-	-	-	-
BFQ18A	2 nd	11	SOT89	4	18	150	1000	NPN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BFQ19	2 nd	10	SOT89	5.5	15	100	1000	NPN	11.5	500	50	10	7.5	800	50	10	3.3	500	50	10	-	-	-	-
BFR106	2 nd	10	SOT23	5	15	100	500	NPN	-	-	-	-	11.5	800	30	6	3.5	800	30	6	-	-	-	-
BFR92A	2 nd	7	SOT23	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	3	2000	5	10	2.1	1000	5	10
BFR92AW	2 nd	7	SOT323	5	15	25	300	NPN	14	1000	15	10	8	2000	15	10	2	1000	5	10	3	2000	5	10
BFS17A	2 nd	4	SOT23	2.8	15	25	300	NPN	-	-	-	-	13.5	800	14	10	2.5	800	2	5	-	-	-	-
BFS25A	2 nd	18	SOT323	5	5	6.5	32	NPN	-	-	-	-	13	1000	0.5	1	1.8	1000	1	1	-	-	-	-
BFT25A	2 nd	18	SOT23	5	5	6.5	32	NPN	-	-	-	-	15	1000	0.5	1	1.8	1000	0.5	1	-	-	-	-
BFT92	2 nd	7	SOT23	5	-15	-25	300	PNP	18	500	-14	-10	-	-	-	-	2.5	500	-5	-10	-	-	-	-
BFT92W	2 nd	7	SOT323	4	-15	-35	300	PNP	17	500	-15	-10	11	1000	-15	-10	2.5	500	-5	-10	3	1000	-5	-10
BFT93	2 nd	9	SOT23	5	-12	-35	300	PNP	16.5	500	-30	-5	-	-	-	-	2.4	500	-10	-5	-	-	-	-
BFT93W	2 nd	9	SOT323	4	-12	-50	300	PNP	15.5	500	-30	-5	10	1000	-30	-5	2.4	500	-10	-5	3	1000	-10	-5
BFG135	3 rd	16	SOT223	7	15	150	1000	NPN	16	500	100	10	12	800	100	10	-	-	-	-	-	-	-	-
BFG198	3 rd	15	SOT223	8	10	100	1000	NPN	18	500	50	8	15	800	50	8	-	-	-	-	-	-	-	-
BFG590	3 rd	22	SOT143B	5	15	200	400	NPN	13	900	80	4	7.5	2000	80	4	-	-	-	-	-	-	-	-
BFG590/X	3 rd	22	SOT143B	5	15	200	400	NPN	13	900	80	4	7.5	2000	80	4	-	-	-	-	-	-	-	-
BFG591	3 rd	22	SOT223	7	15	200	2000	NPN	13	900	70	12	7.5	2000	70	12	-	-	-	-	-	-	-	-
BFG67	3 rd	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG67/X	3 rd	14	SOT143B	8	10	50	380	NPN	17	1000	15	8	10	2000	15	8	1.7	1000	15	8	2.5	2000	5	8
BFG93A	3 rd	8	SOT143B	6	12	35	300	NPN	16	1000	30	8	10	2000	30	8	1.7	1000	5	8	2.3	2000	5	8
BFG93A/X	3 rd	8	SOT143B	6	12	35	300	NPN	16	1000	30	8	10	2000	30	8	1.7	1000	5	8	2.3	2000	5	8
BFG94	3 rd	8	SOT223	6	12	60	700	NPN	-	-	-	-	13.5	1000	45	10	2.7	500	45	10	3	1000	45	10
BFQ591	3 rd	22	SOT89	7	15	200	2250	NPN	11	900	70	12	5.5	2000	70	12	-	-	-	-	-	-	-	-
BFQ67W	3 rd	14	SOT323	8	10	50	300	NPN	13	1000	15	8	8	2000	15	8	1.3	1000	5	8	2.7	2000	15	8
BFR93A	3 rd	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
BFR94A^	3 rd	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
BFR93AR	3 rd	8	SOT23	6	12	35	300	NPN	13	1000	30	8	7	2000	30	8	1.9	1000	5	8	3	2000	5	8
BFR93AW	3 rd	8	SOT323	5	12	35	300	NPN	13	1000	30	8	8	2000	30	8	1.5	1000	5	8	2.1	2000	5	8
BFR94AW^	3 rd	8	SOT323	5	12	35	300	NPN	13	1000	30	8	8	2000	30	8	1.5	1000	5	8	2.1	2000	5	8

Bold = Highly recommended product

Bold Red = New, highly recommended product

^ = AEC-Q101 qualified (some limitations apply)

RF wideband transistors generation 4 - 4.5

Type	Generation	Curve	Package	f_T (typ) (GHz)	V_{CE0} (max) (V)	I_C (max) (mA)	P_{tot} (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	PL(1dB) (typ) (dBmW)	@ V_{CE} = (V)	@ f = (MHz)	@ I_C = (mA)	IP3 (typ) (dBm)	@ I_C = (mA)	@ V_{CE} = (V)
BFG505	4 th	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505/X	4 th	19	SOT143B	9	15	18	150	NPN	13	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W	4 th	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/X	4 th	19	SOT343N	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG505W/XR	4 th	19	SOT343R	9	15	18	500	NPN	12	2000	5	6	1.6	900	5	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFG520	4 th	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520/X	4 th	20	SOT143B	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520/XR	4 th	20	SOT143R	9	15	70	300	NPN	13	2000	20	6	1.6	900	20	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFG520W	4 th	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
BFG520W/X	4 th	20	SOT343N	9	15	70	500	NPN	11	2000	20	6	1.1	900	5	6	1.85	2000	5	6	17	6	900	20	26	20	6
BFG540	4 th	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/X	4 th	21	SOT143B	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540/XR	4 th	21	SOT143R	9	15	120	400	NPN	11	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W	4 th	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/X	4 th	21	SOT343N	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG540W/XR	4 th	21	SOT343R	9	15	120	500	NPN	10	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFG541	4 th	21	SOT223	9	15	120	650	NPN	9	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFM505	4 th	19	SOT363A	9	8	18	500	NPN	10	2000	5	3	1.1	900	1	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFM520	4 th	20	SOT363A	9	8	70	1000	NPN	9	2000	20	3	1.2	900	5	3	1.9	2000	5	3	-	-	-	-	-	-	-
BFQ540	4 th	21	SOT89	9	15	120	1,200	NPN	-	-	-	-	1.9	900	40	8	-	-	-	-	-	-	-	-	-	-	-
BFQ67	4 th	14	SOT23	8	10	50	300	NPN	8	2000	15	8	1.7	1000	15	8	2.7	2000	15	8	-	-	-	-	-	-	-
BFR505	4 th	19	SOT23	9	15	18	150	NPN	10	2000	5	6	1.2	900	5	6	1.9	2000	5	6	4	6	900	5	10	5	6
BFR505T	4 th	19	SOT416	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	5	6	900	5	10	5	6
BFR520	4 th	20	SOT23	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFR520T	4 th	20	SOT416	9	15	70	150	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFR540	4 th	21	SOT23	9	15	120	500	NPN	7	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
BFS505	4 th	19	SOT323	9	15	18	150	NPN	10	2000	5	6	1.2	900	1.25	6	1.9	2000	1.25	6	4	6	900	5	10	5	6
BFS520	4 th	20	SOT323	9	15	70	300	NPN	9	2000	20	6	1.1	900	5	6	1.9	2000	5	6	17	6	900	20	26	20	6
BFS540	4 th	21	SOT323	9	15	120	500	NPN	8	2000	40	8	1.3	900	10	8	2.1	2000	10	8	21	8	900	40	34	40	8
PBR941	4 th	20	SOT23	8	10	50	360	NPN	9.5	2000	15	6	1.4	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PBR951	4 th	21	SOT23	8	10	100	365	NPN	8	2000	30	6	1.3	1000	5	6	2	2000	5	6	-	-	-	-	-	-	-
PRF947	4 th	20	SOT323	8.5	10	50	250	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
PRF949	4 th	20	SOT416	9	10	50	150	NPN	10	2000	15	6	1.5	1000	5	6	2.1	2000	5	6	-	-	-	-	-	-	-
PRF957	4 th	21	SOT323	8.5	10	100	270	NPN	9.2	2000	30	6	1.3	1000	5	6	1.8	2000	5	6	-	-	-	-	-	-	-

BFG310/XR	4.5	30	SOT143R	14	6	10	60	NPN	18	1800	5	3	-	-	-	-	1	2000	1	3	1.8	3	1800	5	8.5	5	3
BFG310W/XR	4.5	30	SOT343R	14	6	10	60	NPN	18	1800	5	3	-	-	-	-	1	2000	1	3	1.8	3	1800	5	8.5	5	3
BFG325/XR	4.5	31	SOT143R	14	6	35	210	NPN	18.3	1800	15	3	-	-	-	-	1.1	2000	3	3	8.7	3	1800	15	19.4	15	3
BFG325W/XR	4.5	31	SOT343R	14	6	35	210	NPN	18.3	1800	15	3	-	-	-	-	1.1	2000	3	3	8.7	3	1800	15	19.4	15	3

RF wideband transistors generation 5 - 7

Type	Generation	Curve	Package	f_T (typ) (GHz)	V_{CE0} (max) (V)	I_C (max) (mA)	P_{tot} (max) (mW)	Polarity	GUM (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	NF (typ) (dB)	@ f = (MHz)	@ I_C = (mA)	@ V_{CE} = (V)	PL(1dB) (typ) (dBmW)	@ V_{CE} = (V)	@ f = (MHz)	@ I_C = (mA)	IP3 (typ) (dBm)	@ I_C = (mA)	@ V_{CE} = (V)
BFG21W	5 th	32	SOT343R	-	4.5	500	600	NPN	10	1900	1	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BFG403W	5 th	25	SOT343R	17	4.5	3.6	16	NPN	22	2000	3	2	1	900	1	2	1.6	2000	1	2	5	1	900	1	6	1	1
BFG410W	5 th	26	SOT343R	22	4.5	12	54	NPN	21	2000	10	2	0.9	900	1	2	1.2	2000	1	2	5	2	2000	10	15	10	2
BFG424F	5 th	27	SOT343F	25	4.5	30	135	NPN	23	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG424W	5 th	27	SOT343R	25	4.5	30	135	NPN	22	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG425W	5 th	27	SOT343R	25	4.5	30	135	NPN	20	2000	25	2	0.8	900	2	2	1.2	2000	2	2	12	2	2000	25	22	25	2
BFG480W	5 th	29	SOT343R	21	4.5	250	360	NPN	16	2000	80	2	1.2	900	8	2	1.8	2000	8	2	20	3.6	2000	1	28	80	2
BFU610F	6 th	34	SOT343F	40	5	10	50	NPN	21	5800	8	2	0.75	2400	1	2	1.4	5800	1	2	-	-	-	-	14	8	5
BFU630F	6 th	35	SOT343F	40	5	30	130	NPN	28	2400	25	2	0.58	1500	5	2	0.73	2400	5	2	-	-	-	-	23	25	5
BFU660F	6 th	36	SOT343F	40	5	70	200	NPN	28.5	1500	60	2	0.6	1500	20	2	0.75	2400	20	2	-	-	-	-	30	60	5
BFU690F	6 th	37	SOT343F	40	5	100	300	NPN	25.6	1500	90	2	0.7	1500	50	2	0.9	2400	50	2	-	-	-	-	35	90	5
BFU710F	7 th	38	SOT343F	70	2.8	10	30	NPN	16.5	12000	8	2	0.9	5800	2	2	1.7	12000	2	2	-	-	-	-	14.5	8	2
BFU725F/N1	7 th	33	SOT343F	70	2.8	40	136	NPN	18	5800	25	2	0.47	2400	5	2	0.7	5800	5	2	8	2	5800	25	19	25	2
BFU730F	7 th	39	SOT343F	70	2.8	30	130	NPN	20.3	5800	25	2	0.56	2400	5	2	1	5800	5	2	-	-	-	-	20.5	25	2
BFU760F	7 th	40	SOT343F	70	2.8	70	200	NPN	25	2400	60	2	0.5	1500	20	2	0.6	2400	20	2	-	-	-	-	23	60	2
BFU790F	7 th	41	SOT343F	70	2.8	100	250	NPN	20.4	2400	90	2	0.56	1500	50	2	0.7	2400	50	2	-	-	-	-	24	90	2

3.4 RF ICs

3.4.1 RF MMIC amplifiers and mixers

RF MMIC amplifiers and mixers selection guide on www.nxp.com/mmics
Easy-to-use parametric filters help you to choose the right zRF MMIC for your design.

Why choose NXP's RF MMIC amplifiers and mixers

- ▶ Reduced RF component count
- ▶ Easy circuit design-in
- ▶ Reduced board size
- ▶ Short time-to-market
- ▶ Broad portfolio
- ▶ Volume delivery
- ▶ Short lead time

General purpose wideband amplifiers (50 Ω)

Type	Package	@		Fu ⁽¹⁾	@ 1 GHz					Gain ⁽³⁾ (dB) @				Limits		
		V _s (V)	I _s (mA)	@-3 dB (GHz)	NF (dB)	P _{sat} (dBm)	Gain ⁽²⁾ (dB)	P _{1dB} (dBm)	OIP3 (dBm)	100 MHz	2.2 GHz	2.6 GHz	3.0 GHz	V _s (V)	I _s (mA)	P _{tot} (mW)
BGA2711	SOT363	5	12.6	3.6 ⁽²⁾	4.8	2.8	13.1	-0.7	8.3	13.0	14.1	13.8	12.7	6	20	200
BGA2748	SOT363	3	5.7	1.9	1.9 ⁽²⁾	-2.3	21.8	-9.2	-1.9	14.8	17.6	15.0	11.9	4	15	200
BGA2771	SOT363	3	33.3	2.4	4.5	13.2 ⁽²⁾	21.4	12.1	21.9	20.3	20.4	17.9	15.5	4	50	200
BGA2776	SOT363	5	24.4	2.8	4.9	10.5	23.2 ⁽²⁾	7.2	18.6	22.4	23.2	21.8	19.3	6	34	200
BGA2709	SOT363	5	23.5	3.6	4.0	12.5	22.7	8.3	22	22.2	23.0	22.1	21.1	6	35	200
BGA2712	SOT363	5	12.3	3.2	3.9	4.8	21.3	0.2	11	20.8	21.9	21.2	19.3	6	25	200
BGM1011	SOT363	5	25.5	-	4.7	13.8	30 ⁽²⁾	12.2	23	25.0	37.0	32.0	28.0	6	35	200
BGM1012	SOT363	3	14.6 ⁽²⁾	3.6	4.8	9.7	20.1	5.6	18	19.5	20.4	19.9	18.7	4	50	200
BGM1013	SOT363	5	27.5	2.1	4.6	14.0	35.5 ⁽²⁾	12.0	22.7	35.2	31.8	29.7	26.1	6	35	200
BGM1014	SOT363	5	21.0 ⁽²⁾	2.5	4.2	12.9	32.3	11.2	20.5	30.0	34.1	30.5	26.4	6	30	200
BGA2714	SOT363	3	4.58	2.7	2.2	-3.4	20.4	-7.9	2.1	20.8	20.8	19.4	16.8	4	10	200
BGA2715	SOT363	5	4.3 ⁽²⁾	3.3	2.6	-4.0	21.7	-8.0	2.3	13.3	23.3	22.1	20.1	6	8	200
BGA2716	SOT363	5	15.9 ⁽²⁾	3.2	5.3	11.6	22.9	8.9	22.2	22.1	22.8	22.1	20.8	6	25	200
BGA2717	SOT363	5	8.0	3.2	2.3 ⁽²⁾	1.4	23.9	-2.6	10.0	18.6	25.1	24.0	22.1	6	15	200

Notes: ⁽¹⁾ Upper -3 dB point, to gain at 1 GHz. ⁽²⁾ Optimized parameter ⁽³⁾ Gain = |S₂₁|²

New general purpose wideband amplifiers (50 Ω)

Type	Package	@		Fu	@ 1 GHz			Gain (dB) @			
		V _s (V)	I _s (mA)	@-3 dB (GHz)	NF (dB)	Gain (dB)	OIP3 (dBm)	250 (MHz)	950 (MHz)	1550 (MHz)	2150 (MHz)
BGA2800	SOT363	3.3	9.7	> 3	3.4	20.2	11.5	20	20.2	20.6	20.6
BGA2801	SOT363	3.3	12.4	3	3.6	22.1	13.6	22.3	22.1	23	23.8
BGA2815	SOT363	3.3	16.4	> 3	3.4	25.4	18.2	26.2	25.4	25.5	25.8
BGA2816	SOT363	3.3	19.6	2.3	2.8	31.2	16.1	32	31.2	30.6	28.7
BGA2850	SOT363	5	7.7	> 3	3.9	23.3	8.7	22.9	23.2	23.9	24
BGA2865	SOT363	5	22.7	2.6	3.7	31.9	20.9	31.2	31.8	32.6	31.4
BGA2866	SOT363	5	15.4	> 3	3.6	23.4	17.7	23	23.3	24	24.3
BGA2802	SOT363	3.3	13	2.8	4.1	25.8	16	25	25	25	25.5
BGA2803	SOT363	3	5.8	2.8	3.6	23.5	5	23.6	23.4	23.2	23
BGA2870	SOT363	2.5	16	1.7	3.7	31	12	31	31*	-	-



= Gain at 750 MHz

No output inductor necessary when using the new BGA28xx IF Gain blocks at the output stage.

General purpose low noise wideband amplifiers

Type	Package	@		@ 900 MHz			@ 1800 MHz			Gain ⁽³⁾ (dB) @				Limits		
		V _s (V)	I _s (mA)	NF (dB)	Gain (dB)	IIP3 (dBm)	NF (dB)	Gain (dB)	IIP3 (dBm)	100 MHz	1 GHz	2.6 GHz	3.0 GHz	V _s (V)	I _s (mA)	P _{tot} (mW)
BGA2001	SOT343R	2.5	4	1.3	22 ⁽¹⁾	-7.4	1.3	19.5 ⁽¹⁾	-4.5	20	17.1	11.6	10.7	4.5	30	135
BGA2002[^]	SOT343R	2.5	4	1.3	22 ⁽¹⁾	-7.4	1.3	19.5 ⁽¹⁾	-4.5	20	17.1	11.6	10.7	4.5	30	135
BGA2003	SOT343R	2.5	10 ⁽²⁾	1.8	24 ⁽¹⁾	-6.5	1.8	16 ⁽¹⁾	-4.8	26	18.6	11.1	10.1	4.5	30	135
BGA2011	SOT363	3	15	1.5	19 ⁽³⁾	10	-	-	-	24	14.8	8	6.5	4.5	30	135
BGA2012	SOT363	3	7	-	-	-	1.7	16 ⁽³⁾	10	22	18.2	11.6	10.5	4.5	15	70

Notes: ⁽¹⁾ MSG ⁽²⁾ Adjustable bias ⁽³⁾ |S₂₁|²

Bold = Highly recommended product

Bold Red = New, highly recommended product

[^] = AEC-Q101 qualified (some limitations apply)

SiGe:C LNAs (for e.g. GPS)

Type	Package	Supply voltage		Supply current			@ 1.575 GHz													
							Insertion power gain			Noise figure	Input power at 1 dB gain compression					Input third-order intercept point f1 = 1713 MHz, f2 = 1851 MHz				
		V _{cc}		I _{cc}			S ₂₁ ²			NF	P _{L(1dB)}					IP ₃				
		Min	Max	Min	Typ	Max	Min	Typ	Max	Typ	V _{cc} = 1.8 V, Min	V _{cc} = 1.8 V, Typ	V _{cc} = 2.5 V, I _{cc} = 5 mA	V _{cc} = 2.85 V, Min	V _{cc} = 2.85 V, Typ	V _{cc} = 1.8 V, Min	V _{cc} = 1.8 V, Typ	V _{cc} = 2.5 V, I _{cc} = 5 mA	V _{cc} = 2.85 V, Min	V _{cc} = 2.85 V, Typ
BGU7003	SOT891	2.2	2.85	3	-	15	16	18.3	20	0.8	-	-	-20	-	-	-	-	0	-	-
BGU7003W	SOT886	2.2	2.85	3	-	15	16	18.3	20	0.8	-	-	-20	-	-	-	-	0	-	-
BGU7004^	SOT886	1.5	2.85	-	4.5	-	-	16.5*	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12
BGU7005	SOT886	1.5	2.85	-	4.5	-	-	16.5*	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12
BGU7007	SOT886	1.5	2.85	-	4.8	-	-	18**	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12
BGU7008^	SOT886	1.5	2.85	-	4.8	-	-	18**	-	0.9	-14	-11	-	-11	-8	5	9	-	5	12

^AEC-Q101 qualified (some limitations apply) * = 16.5 dB without jammer / 17.5 dB with jammer ** = 18.5 dB without jammer / 19.5 dB with jammer

LNAs for set-top boxes (75 Ω)

Type	Package	Frequency range	Mode	@		Gain ⁽¹⁾	NF	P _{L(1dB)}	OIP3	FL ⁽²⁾	RL _{out}	RL _{in}
				V _{cc}	I _{cc}							
		(MHz)		(V)	(mA)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(dB)	(dB)
BGU7033	SOT363	40 - 1000	GP 10 dB	5	43	10	4.5	14	29	-0.2	12	18
			GP 5 dB	5	43	5	6	9	29	-0.2	12	17
			Bypass	5	4	-2	2.5	10	29	-0.2	8	8
BGU7032	SOT363	40 - 1000	GP 10 dB	5	43	10	4.5	13	29	-0.2	12	18
			Bypass	5	4	-2	2.5	10	29	-0.2	8	8
BGU7031	SOT363	40 - 1000	GP 10 dB	5	43	10	4.5	13	29	-0.2	12	18
BGU7041	SOT363	40 - 1000	GP 10 dB	3.3	38	10	4	12	29	-0.2	12	21
BGU7042	SOT363	40 - 1000	GP 10 dB	3.3	38	10	4	12	29	-0.2	12	21
			Bypass	3.3	3	-2	2.5	-	29	-0.2	10	10

Notes: ⁽¹⁾ Gain = Programmable gain (G_p) ⁽²⁾ Flatness of frequency response = FL

LNAs for wireless infrastructures (50 Ω)

Type	Package	V _{supply} (typ)	@ I _c =	@ f =	G _{ass} (typ)	NF (typ)	P _{L(1dB)} (typ)	OIP3 (typ)	IRL	ORL
		(V)	(mA)	(MHz)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(dB)
BGU7051	SOT650	3.3	65	900	20.9	0.7	17.8	34	22	15.8
BGU7052	SOT650	3.3	65	1900	20.1	0.9	18	35.5	20	15
BGU7053	SOT650	3.3	65	2500	20	1	18	35	20	15



General purpose medium power amplifiers (50 Ω)

Type	Package	@		@ 900 MHz				@ 1800 MHz				Gain ⁽²⁾	Limits		
		V _s ⁽¹⁾	I _s	NF	Gain ⁽²⁾	OIP3	P _L 1 dB	NF	Gain ⁽²⁾	OIP3	P _{L(1dB)}	2.5	V _s ⁽¹⁾	I _s	P _{tot}
		(V)	(mA)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	GHz	(V)	(mA)	(mW)
BGA6289	SOT89	4.1	84	3.5	15	31	17	3.7	13	28	15	12	6	120	480
BGA6489	SOT89	5.1	78	3.1	20	33	20	3.3	16	30	17	15	6	120	480
BGA6589	SOT89	4.8	81	3.0	22	33	21	3.3	17	32	20	15	6	120	480

Notes: ⁽¹⁾ Device voltage without bias resistor. ⁽²⁾ Gain = |S₂₁|²

General purpose medium power amplifiers for all 400 - 2700 applications (50 Ω)

Type	Package	f	supply			shutdown control			RF performance					RF performance					
			V _{cc}	I _{cc}		V _{(D)L(SHDN)}	V _{(D)H(SHDN)}		I _{(D)L(SHDN)}		Typ @ f = 940 MHz					Typ @ f = 1960 MHz			
			Typ	Typ	Max	Min	Max	Min	Max	Typ	Gp	P _{L(1dB)}	OIP3	NF	Gp	P _{L(1dB)}	OIP3	NF	
			(MHz)	(V)	(mA)	(mA)	(V)	(V)	(V)	(V)	(μA)	(dB)	(dBm)	(dB)	(dB)	(dB)	(dBm)	(dBm)	(dB)
BGA7124	SOT908	leadless	400 - 2700	5	130	200	0	0.7	2.5	V _{bias}	4	22	25	38	5	16	24	38	5
BGA7024	SOT89	leaded	400 - 2700	5	110	-	-	-	-	-	22	24	38	3	16	25	38	4	
BGA7127	SOT908	leadless	400 - 2700	5	180	325	0	0.7	2.5	V _{bias}	4	20	28	44	3	13	28	43	5
BGA7027	SOT89	leaded	400 - 2700	5	170	-	-	-	-	-	19	28	41	3	12	28	43	4	
BGA7130*	SOT908	leadless	400 - 2700	5	-	-	0	0.7	2.5	V _{bias}	4	18	30	45	4	12	30	45	4

* = check status at 3.1 new products, as this type has not been released for mass production.

Bold = Highly recommended product

Bold Red = New, highly recommended product

VGAs for wireless infrastructures

Type	Package	Control interface	V _{sup}	I _{sup}	frequency	Gain range	@ minimum attenuation			@ maximum attenuation				
			(V)	(mA)			(MHz)	(dB)	(dB)	(dB)	(dB)	(dB)	(dBm)	(dB)
BGA7202	SOT617	Analog	5	710	700 ... 1450	23	23	41	7	0	30	30		
BGA7204	SOT617	Parallel, serial	5	160	1450 ... 2200	23	23	41	7	0	30	30		
					700 ... 2750	31.5	24	37	6.5	-7.5	19	38		
					1450 ... 2100	30.5	17	36	6.5	-13.5	10	38		
BGA7350 BGA7351	SOT617	Parallel, digital	5	240	2100 ... 2750	29.5	16	34	7.5	-13.5	10	38		
					50 ... 250	24	18.5	44	6	-5.5	50	30		
						28	22	45	6	-6	50	34		

BGA7350 and BGA7351 are dual, independently controlled, receive IF VGAs on one chip.

2-stage variable gain linear amplifier

Type	Package	@		Frequency Range	@ 900 MHz				@ 1900 MHz				Limits		
		V _s	I _s		Gain ⁽¹⁾	DG ⁽²⁾	P _{1dB}	ACPR	Gain ⁽¹⁾	DG ⁽²⁾	P _{1dB}	ACPR	V _s	I _s	P _{tot}
		(V)	(mA)		(dB)	(dB)	(dBm)	(dBc)	(dB)	(dB)	(dBm)	(dBc)	(V)	(mA)	(mW)
BGA2031/1	SOT363	3	51	800-2500	24	62	11	49	23	56	13	49	3.3	77	200

Notes: ⁽¹⁾ Gain = GP, power gain. ⁽²⁾ DG = Gain control range

Wideband linear mixer

Type	Package	@		RF Input Frequency Range	IF Output Frequency Range	@ 880 MHz			@ 1900 MHz			Limits		
		V _s	I _s			NF	Gain ⁽¹⁾	OIP3	NF	Gain ⁽¹⁾	OIP3	V _s	I _s	P _{tot}
		(V)	(mA)			(dB)	(dB)	(dBm)	(dB)	(dB)	(dBm)	(V)	(mA)	(mW)
BGA2022	SOT363	3	6	800 - 2500	50 - 500	9	5	4	9	6	10	4	10	40

Notes: ⁽¹⁾ Gain = GP, power gain. ⁽²⁾ DG = Gain control range

3.4.2 Wireless infrastructure ICs

Low noise LO generator for wireless infrastructures

Type	Package	f _{IN(REF)}	V _{CC}	I _{CC}	Noise 1 MHz offset @5.3 GHz	Output buffer (P _o)
			Typ	Typ	Typ	Typ
		(MHz)	(V)	(mA)	(dBc/Hz)	(dBm)
BGX7300*	SOT617	10-160	3.3	140	-131	0 -10

IQ modulator for wireless infrastructures

Type	Package	Bandwidth of IQ modulator	V _{CC}	I _{CC}	NFL (Output noise floor)	Output	Voltage gain
						OIP3	G _v
						(dBm)	(dB)
BGX7100*	SOT616	650	5	180	-159	27	1.5

Dual mixer for wireless infrastructures

Type	Package	Second order spur rejection (2RF-2LO)	V _{CC}	I _{CC}	Frequency range	NF _{ssb} (small signal noise figure)	IIP3	Conversion gain
		(dBc)	(V)	(mA)	(GHz)	(dB)	(dBm)	(dB)
BGX7220*	SOT617	60	5	380	0.7 - 1.2	10	26	7.5
BGX7221*	SOT617	60	5	380	1.7 - 2.7	10	26	8.5

* = check status at 3.1 new products, as this type has not been released for mass production.

3.4.3 Satellite LNB RF ICs

Type	Package	Input freq range	V _{CC}	I	G _{conv}	NF	OIP3	LO Freq	Integrated Phase noise density (degrees RMS)
			(V)	(mA)	(dB)	(dB)	(dB)	(GHz)	
TFF1014HN	SOT763-1	10.7 - 12.75	5	52	36	7	13	9.75 / 10.6	1.5
TFF1015HN	SOT763-1	10.7 - 12.75	5	52	39	7	13	9.75 / 10.6	1.5
TFF1017HN	SOT763-1	10.7 - 12.75	5	52	42	7	13	9.75 / 10.6	1.5
TFF1018HN	SOT763-1	10.7 - 12.75	5	52	45	7	13	9.75 / 10.6	1.5

Bold Red = New, highly recommended product

3.4.4 Low noise LO generators for VSAT and general microwave applications

Why choose NXP's low noise LO generators

- ▶ Lowest total cost of ownership
- ▶ Alignment-free concept
- ▶ Easy circuit design-in
- ▶ Improved LO stability



Low noise LO generators for VSAT applications

Type	Package	$f_{IN(REF)}$	V_{CC}	I_{CC}	PLL phase noise @ N=64, @100 kHz	PLL $f_{o(RF)}$	Output buffer		Input
							P_o	$RL_{out(RF)}$	S_i
		(MHz)	Typ	Typ	Max	Typ	Max	Min	
TFF1003HN	SOT616	50 - 815	3.3	100	-92	12.8 - 13.05	-5	-10	-10
TFF1007HN	SOT616	230.46 - 234.38	3.3	100	-104	14.62 - 15	-3	-10	-10
TFF1008HN	SOT616	220.91 - 225.2	3.3	130	-104	14.1 - 14.4	-3	-10	-10

Low noise LO generators for general microwave applications

Type	Package	$f_{IN(REF)}$	V_{CC}	I_{CC}	PLL phase noise @ N=64		PLL			Output buffer		Input	Frequency band
					@ 100 kHz	@ 10 MHz	$f_o(RF)$			P_o	$RL_{out(RF)}$	S_i	
		(MHz)	(V)	(mA)	(dBc/Hz)	(dBc/Hz)	Min	Typ	Max	Typ	Max	Min	
TFF11070HN*	SOT616	27 - 448	3.3	100	-95	-131	6.84	7	7.16	-5	-10	-10	C
TFF11073HN*	SOT616	28 - 468	3.3	100	-95	-131	7.16	7.33	7.49	-5	-10	-10	C
TFF11077HN*	SOT616	29 - 490	3.3	100	-95	-131	7.49	7.67	7.84	-5	-10	-10	C
TFF11080HN*	SOT616	31 - 513	3.3	100	-95	-131	7.84	8.02	8.21	-5	-10	-10	C, X
TFF11084HN	SOT616	32 - 537	3.3	100	-95	-131	8.21	8.4	8.59	-5	-10	-10	X
TFF11088HN	SOT616	34 - 562	3.3	100	-95	-131	8.59	8.79	8.99	-5	-10	-10	X
TFF11092HN	SOT616	35 - 588	3.3	100	-95	-131	8.99	9.2	9.41	-5	-10	-10	X
TFF11094HN	SOT616	36 - 600	3.3	100	-95	-131	9.00	9.4	9.6	-5	-10	-10	X
TFF11096HN	SOT616	37 - 616	3.3	100	-95	-131	9.41	9.63	9.85	-5	-10	-10	X
TFF11101HN*	SOT616	38 - 644	3.3	100	-95	-131	9.85	10.07	10.31	-5	-10	-10	X
TFF11105HN	SOT616	40 - 674	3.3	100	-95	-131	10.31	10.54	10.79	-5	-10	-10	Ku
TFF11110HN*	SOT616	42 - 706	3.3	100	-95	-131	10.79	11.03	11.29	-5	-10	-10	Ku
TFF11115HN	SOT616	44 - 738	3.3	100	-95	-131	11.29	11.55	11.81	-5	-10	-10	Ku
TFF11121HN*	SOT616	46 - 773	3.3	100	-95	-131	11.81	12.09	12.36	-5	-10	-10	Ku
TFF11126HN*	SOT616	48 - 809	3.3	100	-95	-131	12.36	12.65	12.94	-5	-10	-10	Ku
TFF11132HN*	SOT616	51 - 846	3.3	100	-95	-131	12.9	13.2	13.5	-5	-10	-10	Ku
TFF11139HN*	SOT616	53 - 886	3.3	100	-95	-131	13.54	13.85	14.17	-5	-10	-10	Ka
TFF11145HN	SOT616	55 - 927	3.3	100	-95	-131	14.17	14.5	14.83	-5	-10	-10	Ka
TFF11152HN	SOT616	58 - 970	3.3	100	-95	-131	14.83	15.18	15.52	-5	-10	-10	Ka

Bold = Highly recommended product

Bold Red = New, highly recommended product

* = to be released on request, please consult your local NXP representative or authorized distributor

3.5 RF MOS transistors

3.5.1 JFETs

JFET selection guide on www.nxp.com/rffets

Easy-to-use parametric filters help you to choose the right junction field effect transistor for your design.

Why choose NXP's JFETs

- ▶ Reliable volume supplier
- ▶ Short lead time
- ▶ Broad portfolio

N-channel junction field-effect transistors for switching

Type	Package	V_{DS}		I_G		CHARACTERISTICS										
		(V)		(mA)		I_{DSS}		$-V_{GS(off)}$		$R_{DS(on)}$	C_{rs}		t_{on}		t_{off}	
		max	max	min	max	min	max	(Ω)	min	max	typ	max	typ	max		
BSR56	SOT23	40	50	50	-	4	10	25	-	5	-	-	-	25		
BSR57	SOT23	40	50	20	100	2	6	40	-	5	-	-	-	50		
BSR58	SOT23	40	50	8	80	0.8	4	60	-	5	-	-	-	100		
PMBFJ108	SOT23	25	50	80	-	3	10	8	-	15	4	-	6	-		
PMBFJ109	SOT23	25	50	40	-	2	6	12	-	15	4	-	6	-		
PMBFJ110	SOT23	25	50	10	-	0.5	4	18	-	15	4	-	6	-		
PMBFJ111	SOT23	40	50	20	-	3	10	30	-	typ.3	13	-	35	-		
PMBFJ112	SOT23	40	50	5	-	1	5	50	-	typ.3	13	-	35	-		
PMBFJ113	SOT23	40	50	2	-	0.5	3	100	-	typ.3	13	-	35	-		
J108	SOT54	25	50	80	-	3	10	8	-	15	4	-	6	-		
J109	SOT54	25	50	40	-	2	6	12	-	15	4	-	6	-		
J110	SOT54	25	50	10	-	0.5	4	18	-	15	4	-	6	-		
J111	SOT54	40	50	20	-	3	10	30	-	typ.3	13	-	35	-		
J112	SOT54	40	50	5	-	1	5	50	-	typ.3	13	-	35	-		
J113	SOT54	40	50	2	-	0.5	3	100	-	typ.3	13	-	35	-		
PMBF4391	SOT23	40	50	50	150	4	10	30	-	3.5	-	15	-	20		
PMBF4392	SOT23	40	50	25	75	2	5	60	-	3.5	-	15	-	35		
PMBF4393	SOT23	40	50	5	30	0.5	3	100	-	3.5	-	15	-	50		

P-channel junction field-effect transistors for switching

Type	Package	V_{DS}		I_G		CHARACTERISTICS										
		(V)		(mA)		I_{DSS}		$-V_{GS(off)}$		$R_{DS(on)}$	C_{rs}		t_{on}		t_{off}	
		max	max	min	max	min	max	(Ω)	min	max	typ	max	typ	max		
PMBFJ174	SOT23	30	50	20	135	5	10	85	-	typ.4	7	-	15	-		
PMBFJ175	SOT23	30	50	7	70	3	6	125	-	typ.4	15	-	30	-		
PMBFJ176	SOT23	30	50	2	35	1	4	250	-	typ.4	35	-	35	-		
PMBFJ177	SOT23	30	50	1.5	20	0.8	2.25	300	-	typ.4	45	-	45	-		
J174	SOT54	30	50	20	135	5	10	85	-	typ.4	7	-	15	-		
J175	SOT54	30	50	7	70	3	6	125	-	typ.4	15	-	30	-		
J176	SOT54	30	50	2	35	1	4	250	-	typ.4	35	-	35	-		
J177	SOT54	30	50	1.5	20	0.8	2.25	300	-	typ.4	45	-	45	-		

N-channel junction field-effect transistors for general RF applications

Type	Package	V_{DS}		I_G		CHARACTERISTICS							
		(V)		(mA)		I_{DSS}		$V_{GS(off)}$		$ Y_{fs} $		C_{rs}	
		max	max	min	max	min	max	min	max	min	max	min	max
DC, LF and HF amplifiers													
BF245A	SOT54	30	10	2	6.5	< 8	3	6.5	Typ.=1.1	-	-	-	-
BF245B	SOT54	30	10	6	15	< 8	3	6.5	Typ.=1.1	-	-	-	-
BF245C	SOT54	30	10	12	25	< 8	3	6.5	Typ.=1.1	-	-	-	-
BF545A	SOT23	30	10	2	6.5	0.4	7.5	3	6.5	0.8	-	-	-
BF545B	SOT23	30	10	6	15	0.4	7.5	3	6.5	0.8	-	-	-
BF545C	SOT23	30	10	12	25	0.4	7.5	3	6.5	0.8	-	-	-
BF556A	SOT23	30	10	3	7	0.5	7.5	4.5	-	0.8	-	-	-
BF556B	SOT23	30	10	6	13	0.5	7.5	4.5	-	0.8	-	-	-
BF556C	SOT23	30	10	11	18	0.5	7.5	4.5	-	0.8	-	-	-
Pre-amplifiers for AM tuners in car radios													
BF861A	SOT23	25	10	2	6.5	0.2	1.0	12	20	2.1	2.7	-	-
BF861B	SOT23	25	10	6	15	0.5	1.5	16	25	2.1	2.7	-	-
BF861C	SOT23	25	10	12	25	0.8	2	20	30	2.1	2.7	-	-
BF862	SOT23	20	10	10	25	0.3	2	35	-	typ=1.9	-	-	-
RF stages FM portables, car radios, main radios & mixer stages													
BF510 ⁽¹⁾	SOT23	20	10	0.7	3	typ. 0.8	-	2.5	-	0.4	0.5	-	-
BF511 ⁽¹⁾	SOT23	20	10	2.5	7	typ. 1.5	-	4	-	0.4	0.5	-	-
BF512 ⁽¹⁾	SOT23	20	10	6	12	typ. 2.2	-	6	-	0.4	0.5	-	-
BF513 ⁽¹⁾	SOT23	20	10	18	-	typ. 3	-	7	-	0.4	0.5	-	-
Low-level general purpose amplifiers													
BFR30	SOT23	25	5	4	10	< 5	1	4	1.5	-	-	-	-
BFR31	SOT23	25	5	1	5	< 2.5	1.5	4.5	1.5	-	-	-	-
General purpose amplifiers													
BFT46	SOT23	25	5	0.2	1.5	< 1.2	-	> 1	1.5	-	-	-	-
AM input stages UHF/VHF amplifiers													
PMBFJ308	SOT23	25	50	12	60	1	6.5	> 10	-	1.3	2.5	-	-
PMBFJ309	SOT23	25	50	12	30	1	4	> 10	-	1.3	2.5	-	-
PMBFJ310	SOT23	25	50	24	60	2	6.5	> 10	-	1.3	2.5	-	-
PMBFJ620	SOT363	25	50	24	60	2	6.5	10	-	1.3	2.5	-	-

Bold = Highly recommended product

⁽¹⁾ Asymmetrical

3.5.2 MOSFETs

RF MOSFET selection guide on www.nxp.com/rfets Easy-to-use parametric filters help you to choose the right RF MOSFET for your design.

Why choose NXP Semiconductors' MOSFETs

- ▶ Reference designs for TV tuning
- ▶ Short lead time
- ▶ Broad portfolio
- ▶ Smallest packages
- ▶ 2-in-1 FETs for tuner applications
- ▶ Reliable volume supply
- ▶ Best performance MOSFETs for TV tuning



N-channel, single MOSFETs for switching

Type	Package	CHARACTERISTICS																
		V_{DS}	I_D		I_{DSS}		$V_{(p)GS}$		$R_{DS(on)}$	C_{rs}		t_{on}		t_{off}		$ S_{21(on)} _2$	$ S_{21(off)} _2$	MODE
		(V)	(mA)	(mA)	(mA)	(V)	(V)	(Ω)	(pF)	(pF)	(ns)	(ns)	(dB)	(dB)				
BSS83	SOT143	10	50	-	-	0.1 ⁽²⁾	2 ⁽¹⁾	45	typ.0.6	-	-	-	-	-	-	-	-	enh.
Silicon RF Switches																		
BF1107	SOT23	3	10	-	100 ⁽³⁾	-	7 ⁽⁴⁾	20	-	-	-	-	-	-	-	2.5	30	depl.
BF1108⁽⁵⁾	SOT143B	3	10	-	100 ⁽³⁾	-	7 ⁽⁴⁾	20	-	-	-	-	-	-	3	30	depl.	
BF1108R⁽⁵⁾	SOT143R	3	10	-	100 ⁽³⁾	-	7 ⁽⁴⁾	20	-	-	-	-	-	-	3	30	depl.	
BF1108W	SOT343	3	10	-	100	-	7 ⁽⁴⁾	20	-	-	-	-	-	-	3	30	depl.	
BF1108WR	SOT343R	3	10	-	100	-	7 ⁽⁴⁾	20	-	-	-	-	-	-	3	30	depl.	
BF1118	SOT143B	3	10	-	100	-	7 ⁽⁴⁾	22	-	-	-	-	-	-	3	30	depl.	
BF1118R	SOT143R	3	10	-	100	-	7 ⁽⁴⁾	22	-	-	-	-	-	-	3	30	depl.	
BF1118W	SOT343	3	10	-	100	-	7 ⁽⁴⁾	22	-	-	-	-	-	-	3	30	depl.	
BF1118WR	SOT343R	3	10	-	100	-	7 ⁽⁴⁾	22	-	-	-	-	-	-	3	30	depl.	

Bold = Highly recommended product

N-channel, dual-gate MOSFETs

Type	Package	CHARACTERISTICS														
		V_{DS}	I_D	I_{DSX}		$V_{(th)GS}$		$ Y_{fs} $		C_{is}	C_{os}	F @ 800 MHz	VHF	UHF		
		(V)	(mA)	(mA)	(mA)	(V)	(V)	(mS)	(mS)	(pF)	(pF)	(dB)				
With external bias																
BF908	SOT143	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X		
BF908R	SOT143R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X		
BF908WR	SOT343R	12	40	3	27	-	-2	36	50	3.1	1.7	1.5	X	X		
BF991	SOT143	20	20	4	25	-	-2.5	10	-	2.1	1.1	1	X	-		
BF992	SOT143	20	40	-	-	-	-1.3	20	-	4	2	1.2 ⁽⁷⁾	X	-		
BF994S	SOT143	20	30	4	20	-	-2.5	15	-	2.5	1	1 ⁽⁷⁾	X	-		
BF996S	SOT143	20	30	4	20	-	-2.5	15	-	2.3	0.8	1.8	-	X		
BF998	SOT143	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X		
BF998R	SOT143R	12	30	2	18	-	-2.0	21	-	2.1	1.05	1	X	X		
BF998WR	SOT343R	12	30	2	18	-	-2.5	22	-	2.1	1.05	1	X	X		
Fully internal bias																
BF1105	SOT143	7	30	8	16	0.3	1.2 ⁽⁶⁾	25	-	2.2 ⁽⁹⁾	1.2 ⁽⁸⁾	1.7	X	X		
BF1105R	SOT143R	7	30	8	16	0.3	1.2 ⁽⁶⁾	25	-	2.2 ⁽⁹⁾	1.2 ⁽⁸⁾	1.7	X	X		
BF1105WR	SOT343R	7	30	8	16	0.3	1.2 ⁽⁶⁾	25	-	2.2 ⁽⁹⁾	1.2 ⁽⁸⁾	1.7	X	X		
BF1109	SOT143	11	30	8	16	0.3	1.2 ⁽⁶⁾	24	-	2.2 ⁽⁹⁾	1.3 ⁽⁸⁾	1.5	X	X		
BF1109R	SOT143R	11	30	8	16	0.3	1.2 ⁽⁶⁾	24	-	2.2 ⁽⁹⁾	1.3 ⁽⁸⁾	1.5	X	X		
BF1109WR	SOT343R	11	30	8	16	0.3	1.2 ⁽⁶⁾	24	-	2.2 ⁽⁹⁾	1.3 ⁽⁸⁾	1.5	X	X		
Partly internal bias																
BF904A	SOT143	7	30	8	13	0.3	1 ⁽⁶⁾	22	30	2.2	1.3	2	X	X		
BF904AR	SOT143R	7	30	8	13	0.3	1 ⁽⁶⁾	22	30	2.2	1.3	2	X	X		
BF904AWR	SOT343R	7	30	8	13	0.3	1 ⁽⁶⁾	22	30	2.2	1.3	2	X	X		
BF909A	SOT143	7	40	12	20	0.3	1 ⁽⁶⁾	36	50	3.6	2.3	2	X	X		
BF909AR	SOT143R	7	40	12	20	0.3	1 ⁽⁶⁾	36	50	3.6	2.3	2	X	X		
BF909AWR	SOT343R	7	40	12	20	0.3	1 ⁽⁶⁾	36	50	3.6	2.3	2	X	X		

- ⁽¹⁾ Asymmetrical
- ⁽⁶⁾ $V_{GS(th)}$
- ⁽²⁾ $V_{GS(th)}$
- ⁽⁷⁾ @ 200 MHz
- ⁽³⁾ I_D
- ⁽⁸⁾ C_{OSS}
- ⁽⁴⁾ V_{SG}
- ⁽⁹⁾ C_{rg}
- ⁽⁵⁾ Depletion FET plus diode in one package

N-channel, dual-gate MOSFETs

Type	Package	CHARACTERISTICS												
		V_{DS}	I_D	I_{DSX}		$V_{(th)GS}$		Yfs		C_{is}	C_{os}	F @ 800 MHz	VHF	UHF
		(V)	(mA)	(mA)	(mA)	(V)	(V)	(mS)	(pF)	(pF)	(dB)			
max	max	min	max	min	max	min	max	typ	typ	typ				
Partly internal bias														
BF1100	SOT143	14	30	8	13	0.3	1.2 ⁽⁶⁾	24	33	2.2	1.4	2	X	X
BF1100R	SOT143R	14	30	8	13	0.3	1.2 ⁽⁶⁾	24	33	2.2	1.4	2	X	X
BF1100WR	SOT343R	14	30	8	13	0.3	1.2 ⁽⁶⁾	24	33	2.2	1.4	2	X	X
BF1101	SOT143	7	30	8	16	0.3	1 ⁽⁶⁾	25	-	2.2	1.2 ⁽⁸⁾	1.7	X	X
BF1101R	SOT143R	7	30	8	16	0.3	1 ⁽⁶⁾	25	-	2.2	1.2 ⁽⁸⁾	1.7	X	X
BF1101WR	SOT343R	7	30	8	16	0.3	1 ⁽⁶⁾	25	-	2.2	1.2 ⁽⁸⁾	1.7	X	X
BF1102(R) ⁽¹⁰⁾	SOT363	7	40	12	20	0.3	1.2 ⁽⁶⁾	36	-	2.8 ⁽⁹⁾	1.6 ⁽⁸⁾	2	X	X
BF1201	SOT143	10	30 ⁽¹⁾	11	19	0.3	1.2 ⁽⁶⁾	23	35	2.6	0.9	1.9	X	X
BF1201R	SOT143R	10	30 ⁽¹⁾	11	19	0.3	1.2 ⁽⁶⁾	23	35	2.6	0.9	1.9	X	X
BF1201WR	SOT343R	10	30 ⁽¹⁾	11	19	0.3	1.2 ⁽⁶⁾	23	35	2.6	0.9	1.9	X	X
BF1202	SOT143	10	30	8	16	0.3	1.2 ⁽⁶⁾	25	40	1.7	0.85	1.1	X	X
BF1202R	SOT143R	10	30	8	16	0.3	1.2 ⁽⁶⁾	25	40	1.7	0.85	1.1	X	X
BF1202WR	SOT343R	10	30	8	16	0.3	1.2 ⁽⁶⁾	25	40	1.7	0.85	1.1	X	X
BF1203 ⁽¹¹⁾	SOT363	10	30	11	19	0.3	1.2 ⁽⁶⁾	23	35	2.6	0.9	1.9	X	-
		10	30	8	16	0.3	1.2	25	40	1.7	0.85	1.1	-	X
BF1204 ⁽¹⁰⁾	SOT363	10	30	8	16	0.3	1.2 ⁽⁶⁾	25	40	1.7	0.85	1.1	X	X
BF1205C ⁽¹¹⁾⁽¹²⁾⁽¹³⁾	SOT363	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X
BF1205 ⁽¹¹⁾⁽¹²⁾⁽¹³⁾	SOT363	10	30	8	16	0.3	1.0	26	40	1.8	0.75	1.2	X	-
		7	30	8	16	0.3	1.0	26	40	2.0	0.85	1.4	-	X
BF1206 ⁽¹¹⁾	SOT363	6	30	14	23	0.3	1.0	33	48	2.4	1.1	1.6	X	-
		6	30	9	17	0.3	1.0	29	44	1.7	0.85	1.4	-	X
BF1206F ⁽¹¹⁾	SOT666	6	30	3	6.5	0.3	1.0	17	32	2.4	1.1	1.1	X	-
		6	30	3	6.5	0.3	1.0	17	32	1.7	0.85	1.0	-	X
BF1207 ⁽¹¹⁾⁽¹³⁾⁽¹⁴⁾	SOT363	6	30	13	23	0.3	1.0	25	40	2.2	0.9	1.4	X	-
		6	30	9	19	0.3	1.0	26	41	1.8	0.8	1.4	-	X
BF1208 ⁽¹¹⁾⁽¹²⁾⁽¹³⁾	SOT666	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X
BF1208D ⁽¹¹⁾⁽¹²⁾⁽¹³⁾	SOT666	6	30	14	24	0.3	1	26	41	2.1	0.8	1.1	X	-
		6	30	10	20	0.3	1	25	40	2.1	0.85	1.4	-	X
BF1210 ⁽¹¹⁾⁽¹²⁾	SOT363	6	30	14	24	0.3	1	26	41	2.2	0.9	1.4	X	-
		6	30	9	17	0.3	1	28	43	2	0.85	1.4	-	X
BF1211	SOT143	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-
BF1211R	SOT143R	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-
BF1211WR	SOT343	6	30	11	19	0.3	1.0	25	40	2.1	0.9	1.3	X	-
BF1212	SOT143	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X
BF1212R	SOT143R	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X
BF1212WR	SOT343	6	30	8	16	0.3	1.0	28	43	1.7	0.9	1.1	-	X
BF1214 ⁽¹⁰⁾	SOT363	6	30	13	23	0.3	1.0	25	35	2.2	0.9	1.4	X	X
BF1218 ⁽¹¹⁾⁽¹²⁾⁽¹³⁾	SOT363	6	30	14	24	0.3	1	26	41	2.1	0.8	1.1	X	-
		6	30	10	20	0.3	1	25	40	2.1	0.85	1.4	-	X

Bold = Highly recommended product

⁽¹⁾ Asymmetrical

⁽²⁾ $V_{GS(th)}$

⁽³⁾ I_D

⁽⁴⁾ V_{SG}

⁽⁵⁾ Depletion FET plus diode in one package

⁽⁷⁾ @200 MHz

⁽⁸⁾ C_{OSS}

⁽⁹⁾ C_{ig}

⁽¹⁰⁾ Two equal dual gate MOSFETs in one package

⁽¹¹⁾ Two low noise gain amplifiers in one package

⁽¹²⁾ Transistor A: fully internal bias, transistor B: partly internal bias

⁽¹³⁾ Internal switching function

⁽¹⁴⁾ Transistor A: partly internal bias, transistor B: fully internal bias

N-channel, dual gate MOSFETs for set-top-boxes

Type	Package	CHARACTERISTICS									
		V_{DS}	I_D	I_{DSX}	$V_{(th)GS}$		Yfs	C_{is}	C_{os}	F @ 800 MHz	X-Mod @ 40 dB gain reduction
		(V)	(mA)	(mA)	(V)	(V)	(mS)	(pF)	(pF)	(dB)	(dB)
max	max	max	min	max	typ	typ	typ	typ	typ		
BF1215 ⁽¹⁾⁽²⁾⁽³⁾	SOT363	6	30	19.5	0.3	1	27	2.5	0.8	1.9	107
		6	30	23	0.3	1	27	2.5	0.8	1.9	107
BF1216 ⁽¹⁾	SOT363	6	30	19.5	0.3	1	27	2.5	0.8	1.9	107
		6	30	23	0.3	1	27	2.5	0.8	1.9	107
BF1217	SOT343	6	30	23	0.3	1	27	2.5	0.8	1.9	107

⁽¹⁾ Two low noise gain amplifiers in one package

⁽²⁾ Transistor A: fully internal bias, transistor B: partly internal bias

⁽³⁾ Internal switching function

Bold = Highly recommended product



3.6 RF modules

CATV module selection guide on www.nxp.com/catv
Easy-to-use parametric filters help you to choose the right CATV module for your design.

Why choose NXP's RF Modules

- ▶ Excellent linearity, stability, and reliability
- ▶ Rugged construction
- ▶ Extremely low noise
- ▶ High power gain
- ▶ Low total cost of ownership

CATV types for Chinese (C-types) and 1 GHz GaAs HFET line-ups

New in our CATV hybrid portfolio are two families of products. The C-types are specially designed for the Chinese market, customized for two major governmental projects. The GaAs HFET family includes a complete 1 GHz line-up for high-end applications around the world.

Both families will be extended in the following months to cover all of the two specific market segments.

C-types (China)

- ▶ CATV push-pulls, chapter 3.6.2: BGY588C, BGE788C, CGY888C
- ▶ CATV power doublers, chapter 3.6.3: BGD712C, CGD982HCi, CGD985HCi, CGD987HCi
- ▶ CATV optical receivers, chapter 3.6.4: BGO807C, BGO807CE

1 GHz GaAs HFET high-end hybrids

- ▶ CATV push-pulls, chapter 3.6.2 : CGY1032, CGY1041, CGY1043, CGY1047, CGY1049
- ▶ CATV power doublers, chapter 3.6.3: CGD1040Hi, CGD1042Hi, CGD1044Hi, CGD1046Hi, CGD1042H, CGD1044H

3.6.1 CATV push-pulls

Type	Frequency range (MHz)	Gain (dB)	Slope (dB)	FL (dB)	RL _{IN} /RL _{OUT} (dB)	CTB (dB)	X _{mod} (dB)	CSO (dB)	@ Ch	@ Vo (dBmV)	NF @ f _{max} (dB)	I _{tot} (mA)
BGY588C	40 - 550	33.5 - 35.5	0.2 - 1.7	0.5	16 / 16	-57		-62	77	44	8	345
BGY585A		17.7 - 18.7	0.5 - 2	0.2	20 / 20	-59	-62	-59	77	44	8	220
BGY587		21.5 - 22.5	0.2 - 1.5	0.2	20 / 20	-57	-58	-54	77	44	7	220
BGY587B		26.2 - 27.8	0.5 - 2.5	0.4	20 / 20	-57	-60	-57	77	44	6.5	340
BGY588N		34 - 35	0.5 - 1.5	0.3	20 / 20	-57	-59	-62	77	44	6	325
BGY685A	40 - 600	17.7 - 18.7	0.5 - 2.2	0.2	20 / 20	-55	-60	-56	85	44	8.5	240
BGY687		21 - 22	0.8 - 2.2	0.2	20 / 20	-54	-54	-52	85	44	6.5	240
BGY785A	40-750	18 - 19	0 - 2	0.1	20 / 20	-54.5	-57.5	-62	110	44	6	225
BGE788C		33.2 - 35.2	0.3 - 2.3	0.6	16 / 16	-49		-52	110	44	8	325
BGY787		21 - 22	0 - 1.5	0.2	20 / 20	-54.5	-54	-57.5	110	44	5	220
BGE787B		28.5 - 29.5	0.2 - 2.2	0.45	20 / 20	-48	-52	-56	110	44	6.5	340
BGY883		14.5 - 15.5	0 - 2	0.3	20 / 20	-61	-61	-61	49	44	8.5	235
BGE885	40 - 870	16.5 - 17.5	0.2 - 1.2	0.5	14 / 14						8	240
BGX885N		16.5 - 17.5	0.2 - 1.4	0.3	20 / 20						8	240
BGY885A		18 - 19	0 - 2	0.2	20 / 20	-65	-65	-67	49	44	6	225
BGY887		21 - 22	0.2 - 2	0.2	20 / 20	-64.5	-64.5	-67.5	49	44	5	220
CGY888C		34.5 - 36.5	1.5	0.25	20 / 20	-65	-72	-63	112	44	4	280
BGY835C		33.5 - 34.5	0.5 - 2.5	0.5	20 / 20	-60		-55	49	44	7	340
BGY887B		28.5 - 29.5	0.5 - 2.5	0.5	20 / 20	-60	-60	-60	49	44	6.5	340
BGY888		33.5 - 34.5	0.5 - 2.5	0.2	20 / 20	-63.5	-63	-64	49	44	5.5	325

3.6.2 CATV push-pulls 1 GHz

Type	Frequency range	Gain (dB)	Slope (dB)	FL	RL _{IN} /RL _{OUT}	CTB	XMOD	CSO	@ Ch	@ Vo (dBmV)	NF @ f _{MAX}	I _{tot} (mA)
CGY1041	40 - 1003	21 - 22.5	1.2 - 2.7	0.9	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.3	265
CGY1043		23 - 24.5	1.2 - 2.7	0.9	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.2	265
CGY1047		27 - 28.5	1.5 - 2.5	0.8	20 / 18	-64	-60	-66	79 NTSC channels + 75 digital channels	44	4.5	250
CGY1049		29 - 31	0.85 - 2.35	0.85	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.5	265
CGY1032		32 - 34	1.05 - 2.55	0.85	20 / 18	-62	-58	-64	79 NTSC channels + 75 digital channels	44	4.4	265
BGY1085A		18 - 19	0 - 2	0.3	20 / 20	-53	-54	-56	150	40	7.5	240

Bold Red = New, highly recommended product
Bold = Highly recommended product

3.6.3 CATV power doublers

Type	Frequency range (MHz)	Gain (dB)	Slope (dB)	FL (dB)	RL _{IN} /RL _{OUT} (dB)	CTB (dB)	X _{mod} (dB)	CSO (dB)	@ Ch	@ Vo (dBmV)	NF @ f _{max} (dB)	I _{tot} (mA)
BGD502	40 - 550	18 - 19	0.2 - 2.2	0.3	20 / 20	-65	-68	-62	77	44	8	415
BGD702	40 - 750	18 - 19	0.2 - 2	0.2	20 / 20	-59	-64	-63	110	44	6.5	425
BGD702N		18 - 19	0.2 - 2	0.25	20 / 20	-58	-62	-58	110	44	8.5	435
BGD712		18.2 - 18.8	0.5 - 1.5	0.35	23 / 23	-62	-63	-63	112	44	7	395
BGD712C		18.2 - 18.8	0.5 - 1.5	0.35	17 / 17	-62	-63	-63	112	44	7	410
BGD704		19.5 - 20.5	0 - 2	0.2	20 / 20	-58	-63	-61	110	44	6.5	425
BGD714		20 - 20.6	0.5 - 1.5	0.35	23 / 23	-61	-62	-62	112	44	7	395
BGD885		16.5 - 17.5	0.2 - 1.6	0.5	20 / 20						8	450
BGD802		18 - 19	0.2 - 2	0.2	20 / 20	-56.5	-61	-64.5	129	44	6.5	395
BGD812		18.2 - 18.8	0.4 - 1.4	0.5	25 / 23	-57	-62	-58	132	44	7.5	395
BGD804		19.5 - 20.5	0.2 - 2	0.2	20 / 20	-54	-62	-60.5	129	44	6.5	395
BGD814	19.7 - 20.3	0.5 - 1.5	0.5	25 / 24	-56	-61	-57	132	44	7.5	395	
BGD816L	21.2 - 21.8	0.5 - 1.5	0.5	22 / 25	-55	-58	-56	132	44	7.5	360	
CGD942C	22 - 24	1 - 2	0.5	20 / 20	-66	-66	-66	98	48	3.5	450	
CGD944C	24 - 26	1 - 2	0.5	20 / 20	-66	-66	-66	98	48	3.5	450	
CGD1040HI	19.5 - 22	0.5 - 2	1	20 / 20	-70	-66	-76	79	58.4	5.5	440	
CGD1042HI	22 - 23.5	0.5 - 2	1	20 / 20	-70	-65	-75	79	58.4	5.5	440	
CGD1044HI	23.5 - 25.5	0.5 - 2	1	20 / 20	-70	-64	-75	79	58.4	5	440	
CGD1046HI	26.5 - 28	0.7 - 2.2	1	20 / 20	-75	-68	-70	79	56.4	5	450	
CGD1042H	22 - 24	1.5	0.5	20 / 21	-75	-67	-76	79	59	5	450	
CGD1044H	24 - 26	1	0.5	20 / 21	-75	-67	-76	79	59	5	450	
CGD982HCI	22 - 24	0.5 - 2	1	20 / 20	-66	-68	-69	98	48	5.5	440	
CGD985HCI	23.5 - 25.5	0.5 - 2	1	20 / 20	-66	-68	-69	98	48	5	440	
CGD987HCI	26 - 28	0.7 - 2	1	20 / 20	-66	-68	-66	98	48	5	440	

3.6.4 CATV optical receivers

Type	Frequency range (MHz)	S (V/W)	Slope (dB)	FL (dB)	RL _{OUT} (dB)	IMD3 (dB)	IMD2 (dB)	@ f _{measured} (MHz)	@ P _(opt) (mW)	NF @ f _{max} (dB)	I _{tot} (mA)	Remark
BGO807	40 - 870	800	0 - 2	1	11	-71	-55	854.5	1	8.5	205	FC and SC available
BGO807C		800	0 - 2	1	11	-71	-54	854.5	1	8.5	205	FC and SC available
BGO807CE		800	0 - 2	1	11	-69	-53	854.5	1	8.5	205	FC and SC available
BGO827		800	0 - 2	1	11	-73	-57	854.5	1	8.5	205	FC and SC available

3.6.5 CATV reverse hybrids

Type	Frequency range (MHz)	Gain (dB)	Slope (dB)	FL (dB)	RL _{IN} /RL _{OUT} (dB)	CTB (dB)	X _{mod} (dB)	CSO (dB)	@ Ch	@ Vo (dBmV)	NF @ f _{max} (dB)	I _{tot} (mA)
BGY68	5 - 75	29.2 - 30.8	-0.2 - 0.5	0.2	20 / 20	-68	-60		4	50	3.5	135
BGY66B	5 - 120	24.5 - 25.5	-0.2 - 0.5	0.2	20 / 20	-66	-54		14	48	5	135
BGY67	5 - 200	21.5 - 22.5	-0.2 - 0.5	0.2	20 / 20	-67	-60		22	50	5.5	215
BGY67A		23.5 - 24.5	-0.2 - 0.5	0.2	20 / 20	-67	-59		22	50	5.5	215
BGR269		34.5 - 35.5	-0.2 - 0.6	0.5	20 / 20	-57	-50	-66	28	50	5.5	160

Bold Red = New, highly recommended product

Bold = Highly recommended product

NOTES: This table is for reference only.

For full data please refer to the latest datasheet.

For availability please check the NXP Sales office.



Description

- ▶ Frequency range: minimum and maximum frequency in MHz at which data are characterized (@ Ch / @ Vo)
- ▶ FL is flatness of frequency response
- ▶ The number of channels and the output voltage at which CTB, X_{mod}, CSO, IMD2 and IMD3 are characterized, are @ f_{max}
- ▶ S is minimum responsivity of optical receivers

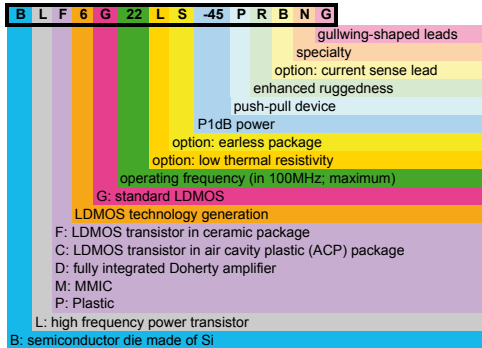
3.7 RF power transistors

NEW: RF power transistor selection guide on www.nxp.com/rfpower
Easy-to-use parametric filters help you to choose the right RF power transistor for your design.

3.7.1 Base station transistors

http://www.nxp.com/products/mosfets/rf_power_transistors_ldmos/basestations/index.html#preview

Device naming conventions RF power base stations transistors



Why choose NXP's RF power transistors for base stations:

- ▶ Leading technology (generation 6, 7 and 8 of LDMOS)
- ▶ Highest efficiency
- ▶ Best ruggedness
- ▶ Advanced Doherty amplifier designs
- ▶ Industry's first 3.8 GHz Doherty
- ▶ Industry's first 3 way, 900 MHz Doherty
- ▶ Industry's first 50V, 600W, single package Doherty

NXP offers complete line-ups of RF power transistors operating from 800 MHz right up to 3.8 GHz for base stations, covering all cellular technologies (MC-GSM/EDGE, TDMA, (TD-S)CDMA, W-CDMA/UMTS) and WiMAX infrastructures.

3.7.1.1 0.7 - 1.0 GHz line-up

Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	WCDMA performance				Test signal	Package
						P_L (W)	BO (dB)	η_D (%)	G_p (dB)		
Driver	BLF6G21-10G	1	2200	10	28	2	11.5	31	19.3	1-C WCDMA	SOT538A
MMIC driver	BLM6G10-30(G)	920	960	30	28	2	11.8	11.5	29	2-C WCDMA	SOT822-1
Driver/final	BLF6G10L-40BRN	700	1000	40	28	2.5	12	15	23	2-C WCDMA	SOT1112A
	BLF6G10(S)-45	700	1000	45	28	1	16.5	8	23	2-C WCDMA	SOT608B
Final	BLP7G10S-140P(G)	700	1000	140	28	32	8	32	19	2-C WCDMA	SOT1204
	BLF6G10(LS)-160RN	700	1000	160	32	32	7	27	22.5	2-C WCDMA	SOT502
	BLF8G10LS-160	700	1000	160	28	40	7	29	22	2-C WCDMA	SOT502B
	BLF6G10-200RN	700	1000	200	28	40	7	28.5	20	2-C WCDMA	SOT502A
	BLF6G10LS-200RN	688	1000	200	28	40	7	28.5	20	2-C WCDMA	SOT502B
	BLF7G10LS-250	920	960	250	28	60	7	30	19	2-C WCDMA	SOT502B
	BLF6G10L(S)-260PRN	700	1000	260	28	40	8.1	26.5	22	2-C WCDMA	SOT539B
	BLF8G10LS-300P	700	1000	300	28	110	7	47	16	IS95	SOT539B

3.7.1.2 1.4 - 1.7 GHz line-up

Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	WCDMA performance				Test signal	Package
						P_L (W)	BO (dB)	η_D (%)	G_p (dB)		
Driver	BLF6G21-10G	1	2200	10	28	0.7	11.5	15	18.5	2-c WCDMA	SOT538A
	BLF6G15L-40BRN	1450	1550	40	28	2.5	12.0	13	22	2-c WCDMA	SOT1112A
Final	BLF7G15LS-200	1450	1550	200	28	50	6.0	29	19.5	2-c WCDMA	SOT502B
	BLF6G15L-250PBRN	1450	1550	250	28	60	6.2	33	18.5	2-c WCDMA	SOT1110A
	BLF7G15LS-300P	1450	1550	300	28	85	5.5	31	18	2-c WCDMA	SOT539B

3.7.1.3 1.8 - 2.0 GHz line-up

						Test signal performance					
Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	P_L (W)	BO (dB)	η_o (%)	G_p (dB)	Test signal	Package
Driver	BLF6G21-10G	1	2200	10	28	0.7	11.5	15	18.5	2-c WCDMA	SOT538A
	BLF6G20-40	1800	2000	40	28	2.5	12.0	15	18.8	2-c WCDMA	SOT608A
	BLF6G20-45	1800	2000	45	28	2.5	12.6	14	19.2	2-c WCDMA	SOT608A
	BLF6G20S-45	1800	2000	45	28	2.5	12.6	14	19.2	2-c WCDMA	SOT608B
	BLD6G21L-50	2010	2025	50	28	8	8.0	43	14.5	TD-SCDMA	SOT1130A
	BLD6G21LS-50	2010	2025	50	28	8	8.0	43	14.5	TD-SCDMA	SOT1130B
Final	BLF6G20-75	1800	2000	75	28	29.5	4.1	37.5	19	GSM EDGE	SOT502A
	BLF6G20LS-75	1800	2000	75	28	29.5	4.1	37.5	19	GSM EDGE	SOT502B
	BLF7G20L-90P	1800	2000	90	28	84	0.3	54	19	GSM EDGE	SOT1121A
	BLF7G20LS-90P	1800	2000	90	28	84	0.3	54	19	GSM EDGE	SOT1121B
	BLF6G20-110	1800	2000	110	28	25	6.4	32	19	2-c WCDMA	SOT502A
	BLF6G20LS-110	1800	2000	110	28	25	6.4	32	19	2-c WCDMA	SOT502B
	BLF6G20LS-140	1800	2000	140	28	35.5	6.0	30	16.5	2-c WCDMA	SOT502B
	BLF7G20LS-140P	1800	2000	140	28	60	3.7	41	17.5	GSM EDGE	SOT1121B
	BLF7G21L(S)-160P	1800	2050	160	28	45	5.5	34	18	2-c WCDMA	SOT1121
	BLF6G20-180PN	1800	2000	180	32	50	5.6	29.5	18	2-c WCDMA	SOT539A
	BLF6G20-180RN	1800	2000	180	30	40	6.5	27	17.2	2-c WCDMA	SOT502A
	BLF6G20LS-180RN	1800	2000	180	30	40	6.5	27	17.2	2-c WCDMA	SOT502B
	BLF7G20L-200	1805	1990	200	28	55	5.6	33	18	2-c WCDMA	SOT502A
	BLF7G20LS-200	1805	1990	200	28	55	5.6	33	18	2-c WCDMA	SOT502B
	BLF6G20-230PRN	1805	1880	230	30	50	6.6	29.5	16.5	2-c WCDMA	SOT539A
BLF6G20S-230PRN	1805	1880	230	30	50	6.6	29.5	16.5	2-c WCDMA	SOT539B	
BLF7G20L-250P	1805	1880	250	28	70	5.5	35	18	2-c WCDMA	SOT539A	
BLF7G20LS-250P	1805	1880	250	28	70	5.5	35	18	2-c WCDMA	SOT539B	

3.7.1.4 2.0 - 2.2 GHz line-up

						Test signal performance					
Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	P_L (W)	BO (dB)	η_o (%)	G_p (dB)	Test signal	Package
Driver	BLF6G21-10G	10	2200	10	28	0.7	11.5	15	18.5	2-c WCDMA	SOT538A
	BLP7G22-10	10	2200	10	28	0.7	11.5	15	17	2-c WCDMA	SOT1179
	BLM6G22-30	2100	2200	30	28	2	11.8	9	29.5	2-c WCDMA	SOT834-1
	BLM7G22S-60PG	2000	2200	60	28	3	11.5	10	29	2-c WCDMA	tbid
	BLF6G22L-40BN	2000	2200	40	28	2.5	12.0	16	19	2-c WCDMA	SOT1112A
	BLF6G22L(S)-40P	2110	2170	40	28	13.5	4.7	30	19	2-c WCDMA	SOT1121B3
	BLF6G22(S)-45	2000	2200	45	28	2.5	12.6	13	18.5	2-c WCDMA	SOT608B
	BLD6G22L(S)-50	2110	2170	50	28	8	8.0	40	14	TD-SCDMA	SOT1130B
Final	BLF6G22LS-75	2000	2200	75	28	17	6.4	30.5	18.7	2-c WCDMA	SOT502B
	BLF7G22LS-100P	2000	2200	100	28	20	7.0	28	18	2-c WCDMA	SOT1121B3
	BLF6G22LS-100	2000	2200	100	28	25	6.0	29	18.5	2-c WCDMA	SOT502B
	BLF7G22L(S)-130	2000	2200	130	28	30	6.4	32	18.5	2-c WCDMA	SOT502B
	BLF7G22L(S)-160	2000	2200	160	28	43	5.7	30	18	2-c WCDMA	SOT502B3
	BLF6G22(LS)-180PN	2000	2200	180	32	50	5.6	27.5	17.5	2-c WCDMA	SOT539B
	BLF6G22(LS)-180RN	2000	2200	180	30	40	6.5	25	16	2-c WCDMA	SOT502B
	BLF7G22L(S)-200	2110	2170	200	28	55	5.6	31	18.5	2-c WCDMA	SOT502B
BLF7G22L(S)-250P	2110	2170	250	28	70	5.5	30	17	2-c WCDMA	SOT539B	

3.7.1.5 2.3- 2.7 GHz line-up

						Test signal performance					
Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	P_L (W)	BO (dB)	η_o (%)	G_p (dB)	Test signal	Package
Driver	BLF7G27L(S)-75P	2300	2700	75	28	12	8.0	26	17	IS-95	SOT1121
	BLF6G27LS-40P	2500	2700	40	28	20	3.0	37	17.5	1-C WCDMA	SOT1121
Final	BLF7G27L(S)-90P	2500	2700	90	28	16	7.5	27.5	17.5	IS-95	SOT1121
	BLF7G24L(S)-100	2300	2400	100	28	14	8.5	24	18	IS-95	SOT502
	BLF7G27L(S)-100	2500	2700	100	28	25	6.0	24	17.5	IS-95	SOT502
	BLF7G24L(S)-140	2300	2400	140	28	30	6.7	22	17	IS-95	SOT502
	BLF7G27L(S)-140	2500	2700	140	28	20	8.5	22	17	IS-95	SOT502
	BLF7G27L(S)-150P	2500	2700	150	28	30	7.0	27	16.5	IS-95	SOT539
	BLF7G24LS-160P	2300	2400	160	28	30	7.3	27	16.5	IS-95	SOT1246
	BLF7G27LS-200P	2600	2700	200	28	42	7.0	25	16.5	IS-95	SOT1246

3.7.1.6 3.5 - 3.8 GHz line-up

						Test signal performance					
Function	Type	f_{min} (MHz)	f_{max} (MHz)	CW P1dB (W)	VDS (V)	P_L (W)	BO (dB)	η_o (%)	G_p (dB)	Test signal	Package
Driver	BLF6G38-10(G)	3400	3600	10	28	2	7.0	20	14	N-CDMA	SOT975
	BLF6G38(LS)-25	3400	3800	25	28	4.5	7.4	24	15	N-CDMA	SOT608
	BLF6G38(LS)-50	3400	3800	50	28	9	7.4	23	14	N-CDMA	SOT502
Final	BLF6G38(LS)-100	3400	3600	100	28	18.5	7.3	21.5	13	N-CDMA	SOT502

3.7.1.7 Power LDMOS Doherty designs

Freq band (MHz)	PPEAK (dBm)	POUT-AVG (dBm)	VDS (V)	Gain (dB)	Drain Eff. (%)	Type	Main transistor	Peak transistor
728-821 MHz								
790-821	55.5	47	28	19	42	SYM	1/2 BLF6G10L(S)-260PRN	1/2 BLF6G10L(S)-260PRN
790-821	57.2	49.5	32	20	42	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
728-768	58	50	32	20.5	47	SYM	BLF6G10LS-200RN	BLF6G10LS-200RN
869-960 MHz								
869-894	52	44	28	20	48	SYM	BLF6G10S-45	BLF6G10S-45
869-894	52.7	44.5	28	15	50	3-WAY	BLF6G10S-45	2x BLF6G10S-45
920-960	55.1	47.1	28	20.5	44	SYM	1/2 BLF6G10L(S)-260PRN	1/2 BLF6G10L(S)-260PRN
920-960	56.2	48	28	18.5	40	SYM	BLF6G10-135RN	BLF6G10-135RN
920-960	57.3	49.3	30	16	50	ASYM	BLF8G10LS-160	BLF7G10LS-250
925-960	57.7	49.7	28	20.5	40	SYM / MPPM	BLF6G10L(S)-260PRN	BLF6G10L(S)-260PRN
869-894	58	50	32	20.5	46	SYM	BLF6G10-200RN	BLF6G10-200RN
925-960	58.9	50.9	32	22	47	SYM / MMPP	BLF6G10L(S)-260PRN	BLF6G10L(S)-260PRN
1476-1511 MHz								
1526-1555	56.6	48.6	28	18.4	42	SYM	BLF7G15LS-200	BLF7G15LS-200
1476-1511	58.1	49.6	28	16	42	ASYM	BLF7G15LS-200	BLF7G15LS-300P
1476-1511	58.6	50.6	32	16.5	42	SYM	BLF6G15LS-250PBRN	BLF6G15LS-250PBRN
1805-1880 MHz (DCS)								
1805-1880	52.5	44.5	28	16	44	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
1805-1880	55	47	32	16	38	SYM	1/2 BLF6G20-230PRN	1/2 BLF6G20-230PRN
1805-1880	55.4	47.5	31	16.3	49	ASYM	BLF7G20LS-90P	BLF7G21LS-160P
1805-1880	55.5	47	28	16	41	SYM	1/2 BLF7G20L(S)-250P	1/2 BLF7G20L(S)-250P
1805-1880	56.1	48.1	30	15.2	48	ASYM	BLF7G20LS-90P	BLF7G20LS-200
1805-1880	57.5	49.5	30	16	42	SYM	BLF7G20LS-200	BLF7G20LS-200
1805-1880	57.9	50	32	15.5	37	SYM / MMPP	BLF6G20-230PRN	BLF6G20-230PRN
1805-1880	58.2	50	28	16	42	SYM	BLF7G20LS-250P	BLF7G20LS-250P
1805-1880	58.6	51	28	16	47.6	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
1930-1990 MHz (PCS)								
1930-1990	53	45	28	16.5	40	SYM	BLF6G20-75	BLF6G20-75
1930-1990	54.3	47.4	28	16.7	48.2	SYM	BLF6G20LS-110	BLF6G20LS-110
1930-1990	55.2	47.2	28	16	40	SYM	1/2 BLF7G20LS-250P	1/2 BLF7G20LS-250P
1930-1990	55.5	47.5	28	14.5	46	ASYM	BLF7G20LS-90P	BLF7G20LS-200
1930-1990	56	48	31	15.3	38	SYM	BLF6G20LS-140	BLF6G20LS-140
1930-1990	56	48	28	14.8	45	ASYM	BLF7G20LS-140P	BLF7G20LS-200
1930-1990	57	49	30	17.2	41	SYM	BLF7G20LS-200	BLF7G20LS-200
1930-1990	58	50	32	15.5	37	SYM	BLF6G20-230PRN	BLF6G20-230PRN
1930-1990	58.2	50	28	16	40	SYM	BLF7G20LS-250P	BLF7G20LS-250P
1930-1990	58.5	50.5	30	15.7	43	3-WAY	BLF7G20LS-200	2x BLF7G20LS-200
1880-2025 MHz (TD-SCDMA)								
1805-2050	52	44.5	28	15.2	41.5	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
2010-2025	47	39	28	14.4	41	SYM	BLD6G21L(S)-50	BLD6G21L(S)-50
1880-2025	50	42	28	17	46	SYM	1/2 BLF7G20L(S)-90P	1/2 BLF7G20L(S)-90P
2010-2025	50	42	28	17.2	47.2	SYM	1/2 BLF7G20L(S)-90P	1/2 BLF7G20L(S)-90P
1880-1920	52.5	44.5	28	16	44	SYM	1/2 BLF7G21LS-160P	1/2 BLF7G21LS-160P
2110-2170 MHz (UMTS / LTE)								
2110-2170	47	39	28	13	38	SYM	BLD6G22L(S)-50	BLD6G22L(S)-50
2110-2170	48.5	40.5	28	17.2	46	SYM	1/2 BLF6G22L-40P	1/2 BLF6G22L-40P
2110-2170	54.7	46.5	28	16.5	43	SYM	BLF6G22LS-100	BLF6G22LS-100
2110-2170	54.9	47	28	17	43	SYM	BLF7G22L(S)-130	BLF7G22L(S)-130
2110-2170	55	47	28	17	43	SYM	1/2 BLF7G22LS-250P	1/2 BLF7G22LS-250P
2110-2170	55	47	28	15.5	38	SYM	BLF6G22L(S)-130	BLF6G22L(S)-130
2110-2170	55.5	46.4	28	15	43	ASYM	BLF7G22L(S)-130	BLF7G22L(S)-200
2110-2170	55.9	47.9	28	17.3	42	SYM	BLF7G22LS-160	BLF7G22LS-160
2110-2170	56	48	28	15	48	3-WAY	BLF7G22L(S)-130	2x BLF7G22L(S)-130
2110-2170	56.5	48.5	28	16.2	41	SYM	BLF7G22L(S)-200	BLF7G22L(S)-200
2110-2170	57	49	32	14.5	41	ASYM	BLF6G22-100	BLF6G22-180PN
2110-2170	57.2	49.2	28	16	47	3-WAY	BLF7G22LS-160	2x BLF7G22L(S)-160
2110-2170	58	50	32	15	40	SYM	BLF6G22-180PN	BLF6G22-180PN
2110-2170	58	50	32	17.5	40	SYM	BLF7G22LS-250P	BLF7G22LS-250P
2300-2400 MHz (WiBRO / LTE)								
2300-2400	49.5	42	28	14.6	44	SYM	1/2 BLF7G27L(S)-75P	1/2 BLF7G27L(S)-75P
2300-2400	55	47.5	28	15.2	44	ASYM	BLF7G24LS-100	BLF7G24LS-140
2500-2700 MHz (WiMAX / LTE)								
2570-2620	49.5	42	28	15	43	SYM	1/2 BLF7G27L(S)-75P	1/2 BLF7G27L(S)-75P
2500-2700	50	42	28	15	37.5	SYM	BLF6G27-45	BLF6G27-45
2500-2700	50.3	42.3	28	14.5	39	SYM	1/2 BLF7G27LS-90P	1/2 BLF7G27LS-90P
2500-2600	52	44	28	14	40	ASYM	BLF6G27-45	2x BLF6G27-45
2600-2700	52	44	28	14	40	ASYM	BLF6G27-45	2x BLF6G27-45
2600-2700	52	44	28	14	40	ASYM	BLF6G27-45	BLF6G27(LS)-100
2500-2700	52.5	44.5	28	14	38	SYM	1/2 BLF7G27LS-150P	1/2 BLF7G27LS-150P
2620-2690	55.2	47.2	30	15	41	ASYM	BLF7G27LS-100	BLF7G27LS-140
2545-2575	55.3	47.3	28	15	41	ASYM	BLF7G27LS-100	BLF7G27LS-140
3300-3800 MHz (WiMAX)								
3400-3600	51	43	28	11.5	32	SYM	BLF6G38-50	BLF6G38-50

3.7.2 Broadcast / ISM (industrial, scientific, medical) RF power transistors

http://www.nxp.com/products/mosfets/rf_power_transistors_ldmos/broadcast_ism/index.html#preview

Why choose NXP's RF power transistors for broadcast / ISM applications:

- ▶ Highest power
- ▶ Best ruggedness
- ▶ Best broadband performance
- ▶ Best-in-class design support
- ▶ Very low thermal resistance design for unrivalled reliability

NXP's leading LDMOS technologies, together with advanced package concepts, enable power amplifiers that deliver best-in-class performance. We offer the industry's highest power and best ruggedness for all broadcast technologies. Our portfolio includes transistors for Ultra High Frequency (UHF), Very High Frequency (VHF) and High Frequency (HF) applications and covers ISM frequency bands.

3.7.2.1 0-1000 MHz (UHF/VHF/HF/ISM) LDMOS line-up

Function	Type	f _{min} (MHz)	f _{max} (MHz)	P1dB (W)	η _D (%)	G _p (dB)	VDS (V)	Test signal	Package
Driver	BLP10H605	10	1000	5	65	20	50	CW	SOT1179
	BLP10H610	10	1000	10	65	20	50	CW	SOT1179
	BLP15M705	10	1500	5	57	18	32	CW	SOT1179
	BLP15M710	10	1500	10	57	18	32	CW	SOT1179
final	BLF178P	10	110	1000	75	26	50	CW	SOT539
Driver	BLF571	10	500	20	70	27,5	50	CW	SOT467C
	BLF642	10	1400	35	63	19	32	CW	SOT467C
	BLF871(S)	10	1000	100	60	21	40	CW	SOT467
Driver/final	BLF645	10	1400	100	56	18	32	CW	SOT540A
Driver	BLF881(S)	10	1000	140	49	21	50	2-tone class AB	SOT467
Final	BLF573(S)	10	500	300	70	27,2	50	CW	SOT502B
	BLF573P	10	500	500	70	26	50	CW	SOT1121
	BLF647P	10	1500	150	55	18	32	CW	SOT1121
	BLF574	10	500	600	73	27	50	CW	SOT539A
	BLF278XR	10	500	500	73	27	50	CW	SOT1240
	BLF888A(S)	470	860	600	58	20	50	pulsed class AB	SOT539
	BLF578	10	500	1000	75	26	50	CW	SOT539A
	BLF578	10	500	1200	71	24	50	pulsed class AB	SOT539A
	BLF578XR	10	500	1000	75	26	50	CW	SOT539A
	BLF578XR	10	500	1200	71	24	50	pulsed class AB	SOT539A

3.7.2.2 UHF 470-860 MHz LDMOS line-up

Function	Type	f _{min} (MHz)	f _{max} (MHz)	P1dB (W)	η _D (%)	G _p (dB)	VDS (V)	Test signal	Package
Driver	BLF642	470	860	17,5	19	48	32	2-tone class AB	SOT467C
		470	860	35	19	63	32	CW	
	BLF871(S)	470	860	100	47	21	42	2-TONE	SOT467C
		470	860	24	33	22	42	DVB-T	
	BLF881(S)	470	860	120	49	21	50	2-tone class AB	SOT467C
		470	860	30	31	21	50	DVB-T	
Final	BLF884P	470	860	75	33	21	50	DVB-T	SOT539A
	BLF878	470	860	300	32	21	42	DVB-T	SOT979A
		470	860	75	32	21	42	DVB-T	
	BLF879P	470	860	95	32	20	42	DVB-T	SOT1121
	BLF888	470	860	250	46	19	50	2-TONE	SOT979A
		470	860	110	31	19	50	DVB-T	
	BLF888A(S)	470	860	250	46	19	50	2-TONE	SOT539
		470	860	120	31	19	50	DVB-T	
BLF888A(S)	470	860	600	58	20	50	pulsed class AB	SOT539	

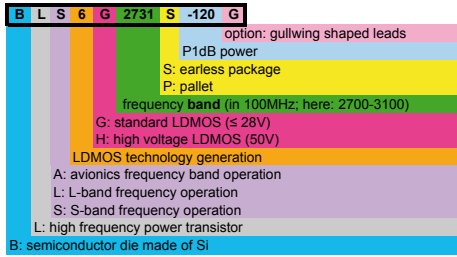
3.7.2.3 2.45 GHz ISM LDMOS transistor line-up

Function	Type	f _{min} (MHz)	f _{max} (MHz)	P1dB (W)	η _D (%)	G _p (dB)	Test signal	Package
Driver	BLP25M74	10	2500	4	53	19	CW	SOT1179
	BLP25M710	10	2500	10	52	19	CW	SOT1179
MMIC	BLM2425M720	2400	2500	20	40	26,5	CW	SOT1138
Final	BLP2425M8140	2400	2500	140	55	18	CW	SOT1179
	BLF2425M7L(S)140	2400	2500	140	55	19	CW	SOT502
	BLF2425M6L(S)180P	2400	2500	180	55	19	CW	SOT539
	BLF2425M7L(S)200	2400	2500	200	52	18,5	CW	SOT502
	BLF2425M7L(S)250P	2400	2500	250	50	18	CW	SOT539

3.7.3 Microwave LDMOS RF power transistors

http://www.nxp.com/products/mosfets/rf_power_transistors_ldmos/microwave_ldmos/index.html#preview

Device naming conventions RF power microwave transistors



Why choose NXP's microwave RF power transistors

- ▶ High gain
- ▶ High efficiency
- ▶ Highest reliability
- ▶ Improved pulse droop and insertion phase
- ▶ Improved ruggedness - overdrive without risk to +5 dB
- ▶ Reduces component count and helps simplify L- and S-band radar design
- ▶ Uses non-toxic, RoHS-compliant packages

3.7.3.1 Avionics LDMOS transistors

Function	Type	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	η_D (%)	G_p (dB)	VDS (V)	Test signal	Package
Driver	BLL6H0514-25	500	1400	25	50	19	50	pulsed RF	SOT467C
	BLA6G1011-200R(G)	1030	1090	200	65	20	28	pulsed RF	SOT502A
Final	BLA6H0912-500	960	1215	500	50	17	50	pulsed RF	SOT634A
	BLA6H1011-600	1030	1090	600	52	19	48	pulsed RF	SOT539A
	BLA6H0912-1000	960	1215	1000	50	17	50	pulsed RF	SOT539A

3.7.3.2 L-band LDMOS transistors

Function	Type	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	η_D (%)	G_p (dB)	VDS (V)	Test signal	Package
Driver	BLL6H0514-25	500	1400	25	58	21	50	pulsed RF	SOT467C
	BLL6H0514L(S)-130	500	1400	130	50	17	50	pulsed RF	SOT1135B
Final	BLL6H1214L(S)-250	1200	1400	250	55	17	50	pulsed RF	SOT502B
	BLL6H1214-500	1200	1400	500	50	17	50	pulsed RF	SOT539A
	BLA6H0912-1000	960	1215	1000	50	17	50	pulsed RF	SOT539A

3.7.3.3 S-band LDMOS transistors

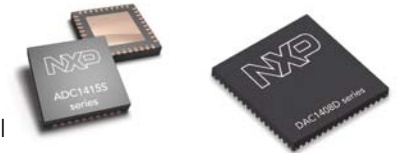
Function	Type	f_{min} (MHz)	f_{max} (MHz)	P1dB (W)	η_D (%)	G_p (dB)	VDS (V)	Test signal	Package
Driver	BLS6G2731-6G	2700	3100	6	33	15	32	pulsed RF	SOT975C
	BLS6G3135(S)-20	3100	3500	20	45	15.5	32	pulsed RF	SOT608
	BLS6G2735L(S)-30	2700	3500	30	50	14	32	pulsed RF	SOT1135
Final	BLS6G2731(S)-120	2700	3100	120	48	13.5	32	pulsed RF	SOT502B
	BLS6G3135(S)-120	3100	3500	120	43	11	32	pulsed RF	SOT502
	BLS6G2731S-130	2700	3100	130	47	12.5	32	pulsed RF	SOT922-1
	BLS6G2933S-130	2900	3300	130	47	12.5	32	pulsed RF	SOT922-1
	BLS7G2933S-150	2900	3300	150	47	13.5	32	pulsed RF	SOT922-1
	BLS6G2731P-200	2700	3100	200	45	11	32	pulsed RF	pallet
	BLS6G2933P-200	2900	3300	220	45	11	32	pulsed RF	pallet
	BLS7G2729L(S)-350P	2700	2900	350	50	13.5	32	pulsed RF	SOT539
	BLS7G3135L(S)-350P	3100	3500	350	45	12	32	pulsed RF	SOT539

3.8 High-speed data converters

As a leader in high performance mixed-signal IC products, NXP offers an extensive selection of high-speed data converters, with digital interfaces including JESD204A (in CGV™ product line), as well as CMOS LVCMOS and LVDS DDR interfaces. NXP's high-speed DACs and ADCs deliver best-in-class converter core performance and ultra-stable dynamic performance across a broad temperature range. NXP is the only semiconductor vendor to offer high-speed data converters, small signal RF building blocks, and RF power amplifiers, to enable system-level integration across the full radio transceiver chain.

More information on NXP's high-speed converters:

- ▶ Fast track your design with NXP's high-speed converters
<http://www.nxp.com/campaigns/fasttrackyourdesign/>
- ▶ All literature: http://www.nxp.com/dynamic/literature/tid-50935_tree-product/data.html



3.8.1 High-speed ADCs

Family	Description	Digital interface				Supply voltage (V)	Power dissipation per channel (mW)	SFDR (dBc)	SNR (dBFS)	Package
		Input buffer	TTL/CMOS	LVCMOS	LVDS/DDR					
ADC1613D series	Dual 16-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	635	89	71.6	HVQFN56 8x8
ADC1613S series	Single 16-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	690	87	71.4	HVQFN32 7x7
ADC1610S series	Single 16-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	630	89	71.6	HVQFN40 6x6
ADC1415S series	Single 14-bit ADC up to 65/80/105/125 Msps	•		•	•	1.8 / 3.0 / 5.0	840	87	71.4	HVQFN40 6x6
ADC1413D series	Dual 14-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	635	87	71.4	HVQFN56 8x8
ADC1413S series	Single 14-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	690	87	71.4	HVQFN32 7x7
ADC1412D series	Dual 14-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	610	87	71.4	HVQFN64 9x9
ADC1410S series	Single 14-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	630	87	71.4	HVQFN40 6x6
ADC1215S series	Single 12-bit ADC up to 65/80/105/125 Msps	•		•	•	1.8 / 3.0 / 5.0	840	87	69.6	HVQFN40 6x6
ADC1213D series	Dual 12-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	635	87	69.6	HVQFN56 8x8
ADC1213S series	Single 12-bit ADC up to 65/80/105/125 Msps					1.8 / 3.0	690	87	71.4	HVQFN32 7x7
ADC1212D series	Dual 12-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	610	87	69.6	HVQFN64 9x9
ADC1210S series	Single 12-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	630	87	69.6	HVQFN40 6x6
ADC1207S080	Single 12-bit ADC 80 Msps	•		•		5.0	840	90	71	HTQFP48 7x7
ADC1206S series	Single 12-bit ADC up to 40/55/70 Msps	•	•			3.3 / 5.0	550	70	64	QFP44
ADC1115S125	Single 11-bit ADC up to 125 Msps	•		•	•	1.8 / 3.0 / 5.0	840	87	66.2	HVQFN40 6x6
ADC1113D125	Dual 11-bit ADC up to 125 Msps					1.8 / 3.0	635	87	66.2	HVQFN56 8x8
ADC1113S125	Single 11-bit ADC up to 125 Msps					1.8 / 3.0	690	86	71.4	HVQFN32 7x7
ADC1112D125	Dual 11-bit ADC up to 125 Msps			•	•	1.8 / 3.0	610	87	66.2	HVQFN56 8x8
ADC1015S series	Single 10-bit ADC up to 65/80/105/125 Msps	•		•	•	1.8 / 3.0 / 5.0	840	87	61.6	HVQFN40 6x6
ADC1010S series	Single 10-bit ADC up to 65/80/105/125 Msps			•	•	1.8 / 3.0	630	87	61.6	HVQFN40 6x6
ADC1006S series	Single 10-bit ADC up to 55/70 Msps	•	•			3.3 / 5.0	550	71	59	QFP44
ADC1005S060	Single 10-bit ADC 60 Msps	•				5.0	312	72	58	SSOP28
ADC1004S series	Single 10-bit ADC 30/40/50 Msps	•				5.0	175	72	58	SSOP28
ADC1003S series	Single 10-bit ADC 30/40/50 Msps	•				5.0	235	70	58	SSOP28
ADC1002S020	Single 10-bit ADC 20 Msps	•				3 to 5.25	53	72	60	LQFP32
ADC0808S series	Single 8-bit ADC up to 125/250 Msps	•				1.8 / 3.3	215	56	48	HTQFP48 7x7
ADC0804S series	Single 8-bit ADC up to 30/40/50 Msps	•				5.0	175	72	49	SSOP28
ADC0801S040	Single 8-bit ADC 40 Msps	•	•			2.7 to 5.5	30	59	47	SSOP20

3.8.2 High-speed DACs

Family	Description	Digital interface		Supply voltage (V)	Power dissipation per channel (mW)	SFDR (dBc)	Interpolation	Package
		LVCMOS	CGV™					
DAC1408D series	Dual 14-bit DAC up to 650/750 Msps		•	1.8 / 3.3	700	76	2x, 4x, 8x	HVQFN64 9x9
DAC1405D series	Dual 14-bit DAC up to 650/750 Msps	•		1.8 / 3.3	435	77	2x, 4x, 8x	HTQFP100 14x14
DAC1403D160	Dual 14-bit DAC 160 Msps	•		3.3	210	80	2x	HTQFP80 12x12
DAC1401D125	Dual 14-bit DAC 125 Msps	•		3.3	95	88	-	LQFP48
DAC1208D series	Dual 12-bit DAC up to 650/750 Msps		•	1.8 / 3.3	700	76	2x, 4x, 8x	HVQFN64 9x9
DAC1205D series	Dual 12-bit DAC up to 650/750 Msps	•		1.8 / 3.3	435	80	2x, 4x, 8x	HTQFP100 14x14
DAC1203D160	Dual 12-bit DAC 160 Msps	•		3.3	210	77	2x	HTQFP80 12x12
DAC1201D125	Dual 12-bit DAC 125 Msps	•		3.3	95	65	-	LQFP48
DAC1008D series	Dual 10-bit DAC up to 650/750 Msps		•	1.8 / 3.3	700	76	2x, 4x, 8x	HVQFN64 9x9
DAC1005D series	Dual 10-bit DAC up to 650/750 Msps	•		1.8 / 3.3	435	77	2x, 4x, 8x	HTQFP100 14x14
DAC1003D160	Dual 10-bit DAC 160 Msps	•		3.3	210	80	2x	HTQFP80 12x12
DAC1001D125	Dual 10-bit DAC 125 Msps	•		3.3	95	65	-	LQFP48

Bold Red = New, highly recommended product

4. Design support

This chapter will guide you through the available tools, documents, materials and links to ease the design-in of our products.

Streamline your RF design with leading RF EDA software

Electronic design automation (EDA) software lets RF engineers predict the behavior of a design by performing simulations. That helps them reduce the number of design cycles, lower design risk, and make better RF component choices. NXP's RF small signal portfolio is supported by a number of EDA toolkits, including Ansoft Designer RF, AWR Microwave Office, and Agilent Advanced Design System (ADS). Installation manual area available on the NXP web site at www.nxp.com/models.

4.1 S-parameters

S-parameters help you to simulate the behavior of NXP devices using your own adjustments for voltage, current, and more.

Wideband transistors, FETs & MMICs

For all types in the below tables there are S-parameters available. In the interactive PDF of the RF manual all these type numbers are hyperlinks that take you directly to the corresponding product information page on the NXP website. Scroll down to find the S-parameters on each product information page.

Wideband transistors		
BFG67	BFG540W	BFR93AW
BFG135	BFG541	BFS17
BFG198	BFG590	BFS17A
BFG21W	BFG591	BFS17W
BFG25A/X	BFG93A	BFS25A
BFG31	BFG94	BFS505
BFG35	BFG97	BFS520
BFG310/XR	BFM505	BFS540
BFG310W/XR	BFM520	BFT25
BFG325/XR	BFQ149	BFT25A
BFG325W/XR	BFQ18A	BFT92
BFG403W	BFQ19	BFT92W
BFG410W	BFQ67	BFT93
BFG424F	BFQ67W	BFT93W
BFG424W	BFR106	BFU725F/N1
BFG425W	BFR505	BRF505T
BFG480W	BFR520	PBR941
BFG505	BFR540	PBR951
BFG520	BFR92A	PRF947
BFG520W	BFR92AW	PRF949
BFG540	BFR93A	PRF957

FETs		
BF1211	BF1212	BF511
BF1211R	BF1212R	BF513
BF1211WR	BF1212WR	BF862

MMICs		
BGA2001	BGM1012	BGA6489
BGA2003	BGM1013	BGA6589
BGA2711	BGM1014	BGA2800
BGA2748	BGM2011	BGA2801
BGA2771	BGA2715	BGA2815
BGA2776	BGA2716	BGA2816
BGA2709	BGA2717	BGA2850
BGU7003	BGA2011	BGA2865
BGA2712	BGA2012	BGA2866
BGM1011	BGA6289	

4.2 Simulation models

4.2.1 Spice models

Spice models help you to optimize performance and make it easier to know which external components impact performance.

Wideband transistors, FETs & Varicaps diodes

For all types in the below tables there are Spice models available. In the interactive PDF of the RF manual all these type numbers are hyperlinks that take you directly to the corresponding product information page on the NXP website. Scroll down to find the Spice models on each product information page.

Wideband transistors			
BFG10	BFG505W/X	BFM505	BFS520
BFG10/X	BFG520	BFM520	BFS540
BFG10W/X	BFG520/X	BFQ149	BFT25A
BFG135	BFG520/XR	BFQ18A	BFT92
BFG198	BFG520W	BFQ19	BFT92W
BFG21W	BFG520W/X	BFQ540	BFT93
BFG25A/X	BFG540	BFQ67	BFT93W
BFG25AW/X	BFG540/X	BFQ67W	BFU610F
BFG31	BFG540/XR	BFR106	BFU630F
BFG310/XR	BFG540W	BFR505	BFU660F
BFG310W/XR	BFG540W/X	BFR505T	BFU690F
BFG325/XR	BFG540W/XR	BFR520	BFU710F
BFG325W/XR	BFG541	BFR540	BFU725F
BFG35	BFG590	BFR92A	BFU730F
BFG403W	BFG590/X	BFR92AW	BFU760F
BFG410W	BFG591	BFR93A	BFU790F
BFG424F	BFG67	BFR93AW	PBR941
BFG424W	BFG67/X	BFS17	PBR951
BFG425W	BFG92A/X	BFS17A	PRF947
BFG480W	BFG93A	BFS17W	PRF949
BFG505	BFG94	BFS25A	PRF957
BFG505/X	BFG97	BFS505	

FETs			
BF862	BF908	BF909	BF998
BF904			

Varicap diodes			
BB145B	BB156	BB201	BB208-02
BB149	BB179	BB202	
BB149A	BB179B	BB207	

4.2.2 Interactive datasheet

Quickly and easily generate custom datasheets for our wideband RF transistors based on your specific operating conditions (<http://www.nxp.com/models>).

4.2.3 Simulation models for RF power devices

For easy design-in, NXP provides fully physics-based, electro-thermal models for the RF power transistors. These models are available for Advanced Design System (ADS)[®] from Agilent and for Microwave Office (MWO)[®] from Applied Wave Research (AWR). Newly developed models per product are based on the best-in-class RFLDMOS model, developed by NXP Research, a recognized leader in physics-based models. This concept yields highly reliable simulation results over a wide range of electrical conditions. The standard models fully support DC, AC, s-parameter (small signal), harmonic balance (large signal) and time-domain simulations. NXP RF power models allow designers to assess the performance of complex PA systems at an early stage of the development process. The available models come with all necessary libraries and documentation, and can be downloaded from NXP's website.

Product type	ADS model	MWO model	Product type	ADS model	MWO model
BLA6G1011-200R	Y	Y	BLF7G20L-250P	Y	N
BLA6H0912-500	Y	Y	BLF7G20L-90P	Y	N
BLA6H1011-600	Y	Y	BLF7G20LS-140P	Y	N
BLF369	Y	N	BLF7G20LS-200	Y	N
BLF3G21-6	Y	N	BLF7G20LS-250P	Y	N
BLF571	Y	Y	BLF7G20LS-90P	Y	N
BLF573	Y	Y	BLF7G21L-160P	Y	N
BLF573S	Y	Y	BLF7G21LS-160P	Y	N
BLF574	Y	Y	BLF7G22L-130	Y	Y
BLF578	Y	Y	BLF7G22L-130N	Y	Y
BLF645	Y	Y	BLF7G22L-160	Y	N
BLF6G10-135RN	Y	Y	BLF7G22L-200	Y	N
BLF6G10-200RN	Y	N	BLF7G22L-250P	Y	N
BLF6G10-45	Y	Y	BLF7G22LS-130	Y	Y
BLF6G10L-260PRN	Y	N	BLF7G22LS-160	Y	N
BLF6G10L-40BRN	Y	N	BLF7G22LS-200	Y	N
BLF6G10LS-135RN	Y	Y	BLF7G22LS-250P	Y	N
BLF6G10LS-200RN	Y	N	BLF7G24L-100	Y	N
BLF6G10LS-260PRN	Y	N	BLF7G24L-140	Y	N
BLF6G10S-45	Y	Y	BLF7G24LS-100	Y	N
BLF6G15L-250PBRN	Y	N	BLF7G24LS-140	Y	N
BLF6G15L-40BRN	Y	N	BLF7G27L-100	Y	N
BLF6G20-180RN	Y	N	BLF7G27L-140	Y	N
BLF6G20-230PRN	Y	N	BLF7G27L-150P	Y	N
BLF6G20-45	Y	Y	BLF7G27L-200PB	Y	N
BLF6G20LS-180RN	Y	N	BLF7G27L-75P	Y	N
BLF6G20S-230PRN	Y	N	BLF7G27L-90P	Y	N
BLF6G20S-45	Y	Y	BLF7G27LS-100	Y	N
BLF6G21-10G	Y	Y	BLF7G27LS-140	Y	N
BLF6G22-180RN	Y	N	BLF7G27LS-150P	Y	N
BLF6G22-45	Y	Y	BLF7G27LS-200PB	Y	N
BLF6G22LS-180RN	Y	N	BLF7G27LS-75P	Y	N
BLF6G22S-45	Y	Y	BLF7G27LS-90P	Y	N
BLF6G27-10	Y	N	BLF871	Y	Y
BLF6G27-10G	Y	Y	BLF871S	Y	Y
BLF6G27-135	Y	N	BLF878	Y	Y
BLF6G27-45	Y	Y	BLF881	Y	Y
BLF6G27-75	Y	N	BLF881S	Y	Y
BLF6G27L-40P	Y	N	BLF888	Y	N
BLF6G27LS-135	Y	N	BLF888A	Y	Y
BLF6G27LS-40P	Y	N	BLF888AS	Y	Y
BLF6G27LS-75	Y	N	BLL6H0514-25	Y	Y
BLF6G27S-45	Y	Y	BLL6H0514L-130	Y	Y
BLF6G38-10	Y	N	BLL6H0514LS-130	Y	Y
BLF6G38-100	Y	N	BLL6H1214-500	Y	N
BLF6G38-10G	Y	Y	BLL6H1214L-250	Y	Y
BLF6G38-25	Y	Y	BLL6H1214LS-250	Y	Y
BLF6G38-50	Y	Y	BLM6G22-30	Y	N
BLF6G38LS-100	Y	N	BLS6G2731-6G	Y	N
BLF6G38LS-50	Y	Y	BLS6G2731S-130	Y	Y
BLF6G38S-25	Y	Y	BLS6G3135-120	Y	Y
BLF7G15L-300P	Y	N	BLS6G3135-20	Y	N
BLF7G15LS-200	Y	N	BLS6G3135S-120	Y	Y
BLF7G20L-200	Y	N	BLS6G3135S-20	Y	N

4.3 Application notes

Multiple RF applications are featured in the RF Manual's first chapter including application diagrams, recommended types and product highlights. More in-depth application information is available in the second chapter. And on the NXP website we have additional application notes available in the RF section (http://www.nxp.com/products/all_appnotes/).

4.4 Demo boards



BGA2001 demo board

4.4.1 RF transistor, MMIC & IC demo boards

RF transistor, MMIC & IC demo boards are available (although limited) via your local NXP representative or authorized distributor (look at the last chapter: Web Links and Contacts).

RF small signal demo boards			
BFU690F	BGA2800	BGM1014	TFF11088HN
BFU725F/N1	BGA2801	BGU7003	TFF11092HN
BGA2001	BGA2815	BGU7005	TFF11096HN
BGA2003	BGA2816	BGU7007	TFF11101HN
BGA2011	BGA2850	BGU7030F	TFF11105HN
BGA2012	BGA2865	BGU7031	TFF11110HN
BGA2031	BGA2866	BGU7032	TFF11115HN
BGA2709	BGA6289	BGU7033	TFF11121HN
BGA2711	BGA6489	BGU7041	TFF11126HN
BGA2712	BGA6589	BGU7042	TFF11132HN
BGA2714	BGA6589	TFF1003HN	TFF11139HN
BGA2715	BGA7024	TFF11070HN	TFF11145HN
BGA2716	BGA7124	TFF11073HN	TFF11152HN
BGA2748	BGM1011	TFF11077HN	
BGA2771	BGM1012	TFF11080HN	
BGA2776	BGM1013	TFF11084HN	



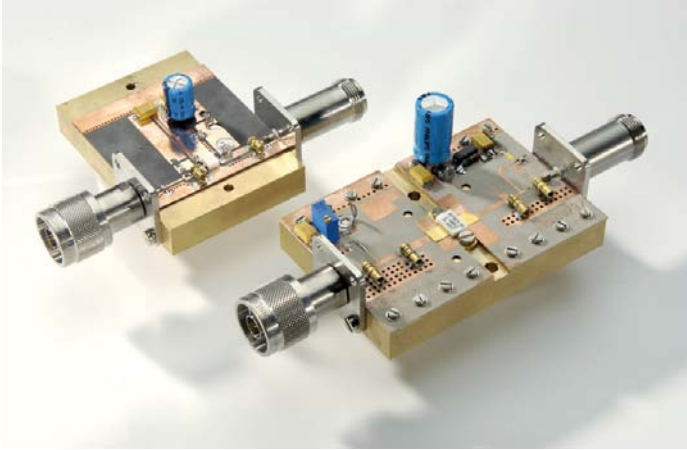
BGU7005 demo board



BGA7124 demo board

4.4.2 RF power transistor demo boards

Demo boards are available (although limited) via your local NXP representative (see the last chapter: Web Links and Contacts).



4.4.3 High-speed converter demo boards

High-speed converter demo boards are available via your local NXP representative or authorized distributor.

ADC demo boards

Type	Description
ADC0801S040	Demo board; both CMOS and TTL outputs
ADC0804S series	Demo boards; both CMOS and TTL outputs
ADC0808S series	Demo boards; CMOS outputs
ADC1002S020	Demo board; both CMOS and TTL outputs
ADC1003S series	Demo boards; both CMOS and TTL outputs
ADC1004S series	Demo boards; both CMOS and TTL outputs
ADC1005S060	Demo board; both CMOS and TTL outputs
ADC1006S series	Demo boards; both CMOS and TTL outputs
ADC1010S series	Demo boards with both CMOS and LVDS outputs Demo boards CMOS version; SPI, regulators and CMOS buffer on board Demo boards LVDS output with SAMTEC connector; SPI, regulators on board
ADC1015S series	Demo boards with both CMOS and LVDS outputs Demo boards; CMOS version; SPI, regulators and CMOS buffer on board; Demo boards; SPI, regulators on board; LVDS output with SAMTEC connector
ADC1112D125	Demo board; CMOS version; SPI, regulators and CMOS buffer on board Demo board; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1113D125	Demo board; VIRTEX 5 FPGA on board
ADC1113D125	Demo board; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors
ADC1113S125	Demo board; VIRTEX 5 FPGA on board
ADC1115S125	Demo board; both CMOS and LVDS Demo board; CMOS version; SPI, regulators and CMOS buffer on board Demo board; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1206S series	Demo boards; both CMOS and TTL outputs
ADC1207S080	Demo board; both CMOS and TTL outputs
ADC1210S series	Demo boards with both CMOS and LVDS Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1212D series	Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1213D series	Demo boards; VIRTEX 5 FPGA on board Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors Demo board; Lattice ECP3 FPGA on board

Type	Description
ADC1213S series	Demo boards; VIRTEX 5 FPGA on board Demo boards with both CMOS and LVDS
ADC1215S series	Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1410S series	Demo boards with both CMOS and LVDS Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1412D series	Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1413D series	Demo boards; VIRTEX 5 FPGA on board Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors
ADC1413S series	Demo board; Lattice ECP3 FPGA on board
ADC1413S series	Demo boards; VIRTEX 5 FPGA on board Demo boards; both CMOS and LVDS outputs
ADC1415S series	Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1610S series	Demo boards; CMOS version; SPI, regulators and CMOS buffer on board Demo boards; SPI, regulators on board; LVDS output only SAMTEC connector
ADC1613D series	Demo boards; VIRTEX 5 FPGA on board Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors
ADC1613S series	Demo boards; VIRTEX 5 FPGA on board

DAC demo boards

Type	Description
DAC1001D125	Demo board; LVCMOS inputs
DAC1003D160	Demo board; LVCMOS inputs
DAC1005D series	Demo boards; SPI, LVCMOS inputs
DAC1201D125	Demo board; LVCMOS inputs
DAC1203D160	Demo board; LVCMOS inputs
DAC1205D series	Demo boards; SPI, LVCMOS inputs
DAC1401D125	Demo board; LVCMOS inputs
DAC1403D160	Demo board; LVCMOS inputs
DAC1405D series	Demo boards; SPI, LVCMOS inputs
DAC1205D series	Demo boards; SPI, LVCMOS inputs
DAC1408D series	Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors Demo boards; Virtex 5 FPGA Demo boards with Lattice ECP3 FPGA
DAC1208D series	Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors Demo boards with Virtex 5 FPGA
DAC1008D series	Demo boards; compliant with Lattice, Altera, Xilinx FPGA boards through specific connectors Demo boards with Virtex 5 FPGA
KIT ECP3	ADC1413D080+DAC1408D650 with Lattice ECP3 FPGA demo kit

4.5 Samples

For samples of released or non-released products, please contact your local NXP sales representative or authorized distributor. NXP sales offices and distributors: <http://www.nxp.com/profile/sales>.

4.6 Datasheets

Datasheets are available on the NXP website: www.nxp.com.

4.7 Design-in support

If you need design-in support, please contact your local NXP sales representative or authorized distributor.

4.8 Interactive selection guides

On the NXP website you can find parametric filters to help you choose the right device for your design. Please go to the product category page of your choice and click on selection guide.

NEW: i-Phone App RF calculator tool available
Check out the App store. Android app to be released in Q3.

5. Cross-references & replacements

NXP cross-references:

<http://www.nxp.com/search/>

NXP end-of-life:

<http://www.nxp.com/products/eol/>

5.1 Cross-references: manufacturer types versus NXP types

In alphabetical order of manufacturer type

Abbreviations:

Base station	Base station power transistors
Broadcasts	Broadcast power transistors
BS diode	Band switch diode
CATV OR	CATV optical receiver
CATV PD	CATV power doubler
CATV PPA	CATV push-pull amplifier
CATV PPA/HG	CATV push-pull amplifier high gain
CATV RA	CATV reverse amplifier
FET	Field-effect transistor
Microwave	Microwave power transistors
MMIC	Monolithic microwave integrated circuit
Varicap	Varicap diode
WB trs 1-4	Wideband transistor 1-4 generation
WB trs 5-7	Wideband transistor 5-7 generation

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
10500	Microsemi	BLA6H0912-500	Microwave	1SV241	Sanyo	BAP64-02	PIN diode
10502	Microsemi	BLA6H0912-500	Microwave	1SV246	Sanyo	BAP64-04W	PIN diode
PTF 081301F - 130 W	Infineon	BLF881	Broadcast	1SV247	Sanyo	BAP70-02	PIN diode
AH125	Triquint	BGA7127	MMIC	1SV248	Sanyo	BAP50-02	PIN diode
SXB-4089	RFMD	BGA7127	MMIC	1SV249	Sanyo	BAP50-04W	PIN diode
0910-150M	Microsemi	BLF871	Broadcast	1SV250	Sanyo	BAP50-03	PIN diode
0910-300M	Microsemi	BLF878	Broadcast	1SV251	Sanyo	BAP50-04	PIN diode
0910-60M	Microsemi	BLF878	Broadcast	1SV252	Toshiba	BAP50-04W	PIN diode
0912-45	Microsemi	BLL6H0514-25	Microwave	1SV254	Toshiba	BB179	Varicap
1011LD200	Microsemi	BLA6G1011-200R	Microwave	1SV263	Sanyo	BAP50-02	PIN diode
1011LD300	Microsemi	BLA6G1011-200R	Microwave	1SV264	Sanyo	BAP50-04W	PIN diode
1015MP	Microsemi	BLL6H0514-25	Microwave	1SV266	Sanyo	BAP50-03	PIN diode
1035MP	Microsemi	BLL6H0514-25	Microwave	1SV267	Sanyo	BAP50-04	PIN diode
1214-30	Microsemi	BLL6H0514-25	Microwave	1SV269	Toshiba	BB148	Varicap
1214-32L	Microsemi	BLL6H0514-26	Microwave	1SV270	Toshiba	BB156	Varicap
1SS314	Toshiba	BA591	BS diode	1SV271	Toshiba	BAP50-03	PIN diode
1SS356	Rohm	BA591	BS diode	1SV278	Toshiba	BB179	Varicap
1SS381	Toshiba	BA277	BS diode	1SV279	Toshiba	BB179	Varicap
1SS390	Rohm	BA891	BS diode	1SV282	Toshiba	BB178	Varicap
1SV172	Toshiba	BAP50-04	PIN diode	1SV282	Toshiba	BB187	Varicap
1SV214	Toshiba	BB149	Varicap	1SV283	Toshiba	BB178	Varicap
1SV214	Toshiba	BB149A	Varicap	1SV283	Toshiba	BB187	Varicap
1SV215	Toshiba	BB153	Varicap	1SV284	Toshiba	BB156	Varicap
1SV228	Toshiba	BB201	Varicap	1SV288	Toshiba	BB152	Varicap
1SV231	Toshiba	BB152	Varicap	1SV290	Toshiba	BB182	Varicap
1SV232	Toshiba	BB148	Varicap	1SV294	Sanyo	BAP70-03	PIN diode
1SV233	Sanyo	BAP70-03	PIN diode	1SV305	Toshiba	BB202	Varicap
1SV234	Sanyo	BAP64-04	PIN diode	1SV307	Toshiba	BAP51-03	PIN diode
1SV239	Toshiba	BB145B	Varicap	1SV308	Toshiba	BAP51-02	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
1SV322	Toshiba	BB202LX	Varicap	2SC4842	Toshiba	BFG540W/XR	WB trs 1-4
1T362	PEC	BB149	Varicap	2SC4899	Renesas	BFS505	WB trs 1-4
1T362A	PEC	BB149A	Varicap	2SC4900	Renesas	BFG520/XR	WB trs 1-4
1T363A	PEC	BB153	Varicap	2SC4901	Renesas	BFS520	WB trs 1-4
1T368A	PEC	BB148	Varicap	2SC4988	Renesas	BFQ540	WB trs 1-4
1T369	PEC	BB152	Varicap	2SC5011	NEC	BFG540W/XR	WB trs 1-4
1T379	PEC	BB131	Varicap	2SC5012	NEC	BFG540W/XR	WB trs 1-4
1T397	PEC	BB152	Varicap	2SC5065	Toshiba	PRF957	WB trs 1-4
1T399	PEC	BB148	Varicap	2SC5085	Toshiba	PRF957	WB trs 1-4
1T402	PEC	BB179B	Varicap	2SC5087	Toshiba	BFG520/XR	WB trs 1-4
1T403	PEC	BB178	Varicap	2SC5088	Toshiba	BFG540W/XR	WB trs 1-4
1T404A	PEC	BB187	Varicap	2SC5090	Toshiba	BFS520	WB trs 1-4
1T405A	PEC	BB187	Varicap	2SC5092	Toshiba	BFG520/XR	WB trs 1-4
1T406	PEC	BB182	Varicap	2SC5095	Toshiba	BFS505	WB trs 1-4
1T408	PEC	BB187	Varicap	2SC5107	Toshiba	BFS505	WB trs 1-4
2729-125	Microsemi	BLS6G2731-120	Microwave	2SC5463	Toshiba	BFQ67W	WB trs 1-4
2729-170	Microsemi	BLS6G2731-120	Microwave	2SC5593	Renesas	BFG410W	WB trs 5-7
2731-100M	Microsemi	BLS6G2731-120	Microwave	2SC5594	Renesas	BFG425W	WB trs 5-7
2931-150	Microsemi	BLS6G2731-120	Microwave	2SC5623	Renesas	BFG410W	WB trs 5-7
2F1G20DS	RFHIC	CGD1042H	CATV PD	2SC5624	Renesas	BFG425W	WB trs 5-7
2F1G20DS	RFHIC	CGD1040Hi	CATV PD	2SC5631	Renesas	BFQ540	WB trs 1-4
2F1G20P	RFHIC	CGY1041	CATV PP	2SC6023	Sanyo	BFG424W	WB trs 5-7
2F1G22DS	RFHIC	CGD1042H	CATV PD	2SJ105GR	Standard	J177	FET
2F1G22DS	RFHIC	CGD1042Hi	CATV PD	2SK163-K	Renesas	J113	FET
2F1G22DS	RFHIC	CGD982HCi	CATV PD	2SK163-L	Renesas	J113	FET
2F1G23P	RFHIC	CGY1043	CATV PP	2SK163-M	Renesas	J113	FET
2F1G23P	RFHIC	CGY1041	CATV PP	2SK163-N	Renesas	J113	FET
2F1G24D	RFHIC	CGD1044Hi	CATV PD	2SK210BL	Renesas	PMBFJ309	FET
2F1G24D	RFHIC	CGD985HCi	CATV PD	2SK370BL	Renesas	J109	FET
2F1G24DS	RFHIC	CGD1044H	CATV PD	2SK370GR	Renesas	J109	FET
2F722DS	RFHIC	BGD816L	CATV PD	2SK370V	Renesas	J109	FET
2F8718P	RFHIC	BGY885A	CATV PP	2SK381	Renesas	J113	FET
2F8719DS	RFHIC	BGD812	CATV PD	2SK43	Renesas	J113	FET
2F8720DS	RFHIC	BGD814	CATV PD	2SK435	Renesas	J113	FET
2F8723P	RFHIC	BGY887	CATV PP	2SK508	Renesas	PMBFJ308	FET
2F8734P	RFHIC	CGY888C	CATV PP	3SK290	Renesas	BF998WR	FET
2N3330	Standard	J176	FET	AH118	Triquint	BGA7124	MMIC
2N3331	Standard	J176	FET	AH118	Triquint	BGA7024	MMIC
2N4220	Standard	BF245A	FET	AH215	Triquint	BGA7130	MMIC
2N4856	Standard	BSR56	FET	BA592	Infineon	BA591	BS diode
2N4857	Standard	BSR57	FET	BA595	Infineon	BAP51-03	PIN diode
2N4858	Standard	BSR58	FET	BA595	Infineon	BAP70-03	PIN diode
2N5114	Standard	J174	FET	BA597	Infineon	BAP70-03	PIN diode
2N5115	Standard	J175	FET	BA885	Infineon	BAP70-03	PIN diode
2N5116	Standard	J175	FET	BA892	Infineon	BA891	BS diode
2N5432	Standard	J108	FET	BA892-02V	Infineon	BA277	PIN diode
2N5433	Standard	J108	FET	BA892-02V	Infineon	BA891	PIN diode
2N5434	Standard	J109	FET	BA892V-02V-GS08	Vishay	BA891	PIN diode
2N5457	Standard	BF245A	FET	BA895	Infineon	BAP70-02	PIN diode
2N5458	Standard	BF245A	FET	BAR14-1	Infineon	BAP70-03	PIN diode
2N5459	Standard	BF245B	FET	BAR15-1	Infineon	BAP70-03	PIN diode
2N5653	Standard	J112	FET	BAR16-1	Infineon	BAP70-03	PIN diode
2N5654	Standard	J111	FET	BAR17	Infineon	BAP50-03	PIN diode
2SC4094	NEC	BFG520/XR	WB trs 1-4	BAR50-02L	Infineon	BAP50LX	PIN diode
2SC4095	NEC	BFG520/XR	WB trs 1-4	BAR50-02V	Infineon	BAP50-02	PIN diode
2SC4182	NEC	BFS17W	WB trs 1-4	BAR50-02V	Infineon	BAP50-03	PIN diode
2SC4184	NEC	BFS17W	WB trs 1-4	BAR50-02V	Infineon	BAP50-05	PIN diode
2SC4185	NEC	BFS17W	WB trs 1-4	BAR50-03W	Infineon	BAP70-02	PIN diode
2SC4186	NEC	BFR92AW	WB trs 1-4	BAR60	Infineon	BAP50-03	PIN diode
2SC4226	NEC	PRF957	WB trs 1-4	BAR61	Infineon	BAP50-03	PIN diode
2SC4227	NEC	BFQ67W	WB trs 1-4	BAR63	Infineon	BAP63-03	PIN diode
2SC4228	NEC	BFS505	WB trs 1-4	BAR63-02L	Infineon	BAP63-02	PIN diode
2SC4247	Toshiba	BFR92AW	WB trs 1-4	BAR63-02L	Infineon	BAP63LX	PIN diode
2SC4248	Toshiba	BFR92AW	WB trs 1-4	BAR63-02V	Infineon	BAP63-02	PIN diode
2SC4315	Toshiba	BFG520/XR	WB trs 1-4	BAR63-02W	Infineon	BAP63-02	PIN diode
2SC4320	Toshiba	BFG520/XR	WB trs 1-4	BAR63-03W	Infineon	BAP63-03	PIN diode
2SC4321	Toshiba	BFQ67W	WB trs 1-4	BAR63-05	Infineon	BAP63-05W	PIN diode
2SC4325	Toshiba	BFS505	WB trs 1-4	BAR63-05W	Infineon	BAP63-05W	PIN diode
2SC4394	Toshiba	PRF957	WB trs 1-4	BAR63V-02V-GS08	Vishay	BAP63-02	PIN diode
2SC4536	NEC	BFQ19	WB trs 1-4	BAR63V-05W-GS08	Vishay	BAP63-05W	PIN diode
2SC4537	Renesas	BFR93AW	WB trs 1-4	BAR64-02LRH	Infineon	BAP64LX	PIN diode
2SC4592	Renesas	BFG520/XR	WB trs 1-4	BAR64-02V	Infineon	BAP64-02	PIN diode
2SC4593	Renesas	BFS520	WB trs 1-4	BAR64-02W	Infineon	BAP64-02	PIN diode
2SC4703	NEC	BFQ19	WB trs 1-4	BAR64-03W	Infineon	BAP64-03	PIN diode
2SC4784	Renesas	BFS505	WB trs 1-4	BAR64-04	Infineon	BAP64-04	PIN diode
2SC4807	Renesas	BFQ18A	WB trs 1-4	BAR64-04W	Infineon	BAP64-04W	PIN diode

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
BAR64-05	Infineon	BAP64-05	PIN diode	BF5020R	Infineon	BF1212R	FET
BAR64-05W	Infineon	BAP64-05W	PIN diode	BF5020W	Infineon	BF1212WR	FET
BAR64-06	Infineon	BAP64-06	PIN diode	BF5030W	Infineon	BF909WR	FET
BAR64-06W	Infineon	BAP64-06W	PIN diode	BF770A	Infineon	BFR93A	WB trs 1-4
BAR64V-02V-GS08	Vishay	BAP64-02	PIN diode	BF771	Infineon	PBR951	WB trs 1-4
BAR64V-04-GS08	Vishay	BAP64-04	PIN diode	BF771W	Infineon	BF5540	WB trs 1-4
BAR64V-05-GS08	Vishay	BAP64-05	PIN diode	BF772	Infineon	BFG540	WB trs 1-4
BAR64V-06-GS08	Vishay	BAP64-06	PIN diode	BF775	Infineon	BFR92A	WB trs 1-4
BAR64V-06W-GS08	Vishay	BAP64-06W	PIN diode	BF775A	Infineon	BFR92A	WB trs 1-4
BAR65-02L	Infineon	BAP65LX	PIN diode	BF775W	Infineon	BFR92AW	WB trs 1-4
BAR65-02V	Infineon	BAP65-02	PIN diode	BF851A	Standard	BF861A	FET
BAR65-02W	Infineon	BAP65-02	PIN diode	BF851B	Standard	BF861B	FET
BAR65-03W	Infineon	BAP65-03	PIN diode	BF851C	Standard	BF861C	FET
BAR65V-02V-GS08	Vishay	BAP65-02	PIN diode	BF994S	Vishay	BF994S	FET
BAR66	Infineon	BAP1321-04	PIN diode	BF996S	Vishay	BF996S	FET
BAR67-02W	Infineon	BAP1321-02	PIN diode	BF998	Infineon	BF998	FET
BAR67-03W	Infineon	BAP1321-03	PIN diode	BF998	Vishay	BF998	FET
BAT18-04	Infineon	BAT18	PIN diode	BF998-GS08	Vishay	BF998	FET
BB304C	Renesas	BF1201WR	FET	BF998R	Vishay	BF998R	FET
BB304M	Renesas	BF1201R	FET	BF998R	Infineon	BF998R	FET
BB305C	Renesas	BF1201WR	FET	BF998R-GS08	Vishay	BF998R	FET
BB305M	Renesas	BF1201R	FET	BF998RW	Vishay	BF998WR	FET
BB403M	Renesas	BF909R	FET	BF998W	Infineon	BF998WR	FET
BB501C	Renesas	BF1202WR	FET	BFG135A	Infineon	BFG135	WB trs 1-4
BB501M	Renesas	BF1202R	FET	BFG193	Infineon	BFG198	WB trs 1-4
BB502C	Renesas	BF1202WR	FET	BFG194	Infineon	BFG31	WB trs 1-4
BB502M	Renesas	BF1202R	FET	BFG196	Infineon	BFG541	WB trs 1-4
BB503C	Renesas	BF1202WR	FET	BFG19S	Infineon	BFG97	WB trs 1-4
BB503M	Renesas	BF1202R	FET	BFG235	Infineon	BFG135	WB trs 1-4
BB535	Infineon	BB149	Varicap	BFP180	Infineon	BFG505/X	WB trs 1-4
BB545	Infineon	BB149A	Varicap	BFP181	Infineon	BFG67/X	WB trs 1-4
BB555	Infineon	BB179B	Varicap	BFP181T-GS08	Vishay	BFG67/X	WB trs 1-4
BB565	Infineon	BB179	Varicap	BFP182	Infineon	BFG67/X	WB trs 1-4
BB601M	Renesas	BF1202	FET	BFP183	Infineon	BFG520/X	WB trs 1-4
BB639	Infineon	BB148	Varicap	BFP183R	Infineon	BFG520/XR	WB trs 1-4
BB639	Infineon	BB153	Varicap	BFP183T-GS08	Vishay	BFG520/X	WB trs 1-4
BB640	Infineon	BB152	Varicap	BFP183TW-GS08	Vishay	BFG520W/X	WB trs 1-4
BB641	Infineon	BB152	Varicap	BFP193	Infineon	BFG540/X	WB trs 1-4
BB659	Infineon	BB178	Varicap	BFP193W	Infineon	BFG540W/XR	WB trs 1-4
BB664	Infineon	BB178	Varicap	BFP196T-GS08	Vishay	BFG540/X	WB trs 1-4
BB664	Infineon	BB187	Varicap	BFP196TR-GS08	Vishay	BFG540/XR	WB trs 1-4
BB669	Infineon	BB152	Varicap	BFP196TRW-GS08	Vishay	BFG540W/XR	WB trs 1-4
BB814	Infineon	BB201	Varicap	BFP196TW-GS08	Vishay	BFG540W/X	WB trs 1-4
BB831	Infineon	BB131	Varicap	BFP196W	Infineon	BFG540W/XR	WB trs 1-4
BB833	Infineon	BB131	Varicap	BFP280	Infineon	BFG505/X	WB trs 1-4
BB835	Infineon	BB131	Varicap	BFP405	Infineon	BFG410W	WB trs 5-7
BBY58-02V	Infineon	BB202	Varicap	BFP420	Infineon	BFG425W	WB trs 5-7
BBY65	Infineon	BB202	Varicap	BFP450	Infineon	BFG480W	WB trs 5-7
BF1005R	Infineon	BF1105R	FET	BFP67-GS08	Vishay	BFG67/X	WB trs 1-4
BF1005S	Infineon	BF1105	FET	BFP67R-GS08	Vishay	BFG67/X	WB trs 1-4
BF1005SR	Infineon	BF1105R	FET	BFP740	Infineon	BFU725F	WB trs 5-7
BF1009S	Infineon	BF1109	FET	BFP740F	Infineon	BFU725F	WB trs 5-7
BF1009SR	Infineon	BF1109R	FET	BFP81	Infineon	BFG92A/X	WB trs 1-4
BF1009SW	Infineon	BF1109WR	FET	BFP92A-GS08	Vishay	BFG92A/X	WB trs 1-4
BF2030	Infineon	BF1101	FET	BFP93A	Infineon	BFG93A/X	WB trs 1-4
BF2030	Infineon	BF1211	FET	BFP93A-GS08	Vishay	BFG93A/X	WB trs 1-4
BF2030	Infineon	BF1212	FET	BFQ193	Infineon	BFQ540	WB trs 1-4
BF2030R	Infineon	BF1101R	FET	BFQ19S	Infineon	BFQ19	WB trs 1-4
BF2030R	Infineon	BF1211R	FET	BFQ67-GS08	Vishay	BFQ67W	WB trs 1-4
BF2030R	Infineon	BF1212R	FET	BFR106	Infineon	BFR106	WB trs 1-4
BF2030W	Infineon	BF1101WR	FET	BFR180	Infineon	BFR505	WB trs 1-4
BF2030W	Infineon	BF1211WR	FET	BFR180W	Infineon	BFS505	WB trs 1-4
BF2030W	Infineon	BF1212WR	FET	BFR181	Infineon	BFR520	WB trs 1-4
BF2040	Infineon	BF909	FET	BFR181T-GS08	Vishay	BFR520	WB trs 1-4
BF2040R	Infineon	BF909R	FET	BFR181TW-GS08	Vishay	BFS520	WB trs 1-4
BF2040W	Infineon	BF909WR	FET	BFR181W	Infineon	BFS520	WB trs 1-4
BF244A	Standard	BF245A	FET	BFR182	Infineon	PBR941	WB trs 1-4
BF244B	Standard	BF245B	FET	BFR182W	Infineon	PRF947	WB trs 1-4
BF244C	Standard	BF245C	FET	BFR183	Infineon	PBR951	WB trs 1-4
BF247A	Standard	J108	FET	BFR183T-GS08	Vishay	PBR951	WB trs 1-4
BF247B	Standard	J108	FET	BFR183TW-GS08	Vishay	PRF957	WB trs 1-4
BF247C	Standard	J108	FET	BFR183W	Infineon	PRF957	WB trs 1-4
BF256A	Standard	BF245A	FET	BFR193	Infineon	PBR951	WB trs 1-4
BF256B	Standard	BF245B	FET	BFR193T-GS08	Vishay	PRF957	WB trs 1-4
BF256C	Standard	BF245C	FET	BFR193W	Infineon	PRF957	WB trs 1-4
BF5020	Infineon	BF1212	FET	BFR196T-GS08	Vishay	BFR540	WB trs 1-4

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
BFR196TW-GS08	Vishay	BFS540	WB trs 1-4	D8740180GT	RFMD	CGD942C	CATV PD
BFR35AP	Infineon	BFR92A	WB trs 1-4	D8740180GTH	RFMD	CGD942C	CATV PD
BFR92AL	Freescale	BFR92A	WB trs 1-4	D8740220GT	RFMD	CGD942C	CATV PD
BFR92AW-GS08	Vishay	BFR92AW	WB trs 1-4	D8740220GTH	RFMD	CGD942C	CATV PD
BFR92P	Infineon	BFR92A	WB trs 1-4	D8740240GT	RFMD	CGD944C	CATV PD
BFR92W	Infineon	BFR92AW	WB trs 1-4	D8740240GTH	RFMD	CGD944C	CATV PD
BFR93A	Infineon	BFR93A	WB trs 1-4	D8740250GT	RFMD	CGD944C	CATV PD
BFR93AL	Freescale	BFR93A	WB trs 1-4	D8740250GTH	RFMD	CGD944C	CATV PD
BFR93AW	Infineon	BFR93AW	WB trs 1-4	D8740270GT	RFMD	CGD944C	CATV PD
BFR93AW-GS08	Vishay	BFR93AW	WB trs 1-4	D8740270GTH	RFMD	CGD944C	CATV PD
BFR93-GS08	Vishay	BFR93A	WB trs 1-4	D8740320GT	RFMD	CGD888C	CATV PD
BFS17-GS08	Vishay	BFS17	WB trs 1-4	D8740320GTH	RFMD	CGD888C	CATV PD
BFS17-GS08	Vishay	BFS17A	WB trs 1-4	DME500	Microsemi	BLAH0912-500	Microwave
BFS17L	Freescale	BFS17	WB trs 1-4	EC2C03C	Sanyo	BB145B	Varicap
BFS17P	Infineon	BFS17A	WB trs 1-4	F2046	POLYFET	BLF542	Broadcast
BFS17W	Infineon	BFS17W	WB trs 1-4	F2048	POLYFET	BLF543	Broadcast
BFS17W-GS08	Vishay	BFS17W	WB trs 1-4	F2247	POLYFET	BLF522	Broadcast
BFS481	Infineon	BFM505	WB trs 1-4	FSD273TA	Skyworks	BB148	Varicap
BFS483	Infineon	BFM520	WB trs 1-4	FSD273TA	Skyworks	BB178	Varicap
BFT92	Infineon	BFT92	WB trs 1-4	HBFP0405	Agilent	BFG410W	WB trs 5-7
BFT93	Infineon	BFT93	WB trs 1-4	HBFP0420	Agilent	BFG425W	WB trs 5-7
BG3123	Infineon	BF1203	FET	HBFP0450	Agilent	BFG480W	WB trs 5-7
BG3123R	Infineon	BF1203	FET	HMC454ST89E	Hittite	BGA7127	MMIC
BG3130	Infineon	BF1214	FET	HSC277	Renesas	BA277	BS diode
BG3130R	Infineon	BF1214	FET	HSMP3800	Agilent	BAP70-03	PIN diode
BG3430R	Infineon	BF1207	FET	HSMP3802	Agilent	BAP50-04	PIN diode
BG5120K	Infineon	BF1210	FET	HSMP3804	Agilent	BAP50-05	PIN diode
BG5130R	Infineon	BF1206	FET	HSMP3810	Agilent	BAP50-03	PIN diode
BG5412K	Infineon	BF1205C	FET	HSMP3814	Agilent	BAP50-05	PIN diode
BG5412K	Infineon	BF1208D	FET	HSMP381B	Agilent	BAP50-03	PIN diode
BGA615	Infineon	BGU7007	MMIC	HSMP381C	Agilent	BAP50-05	PIN diode
BGA715	Infineon	BGU8007	MMIC	HSMP381F	Agilent	BAP64-05W	PIN diode
BGA915	Infineon	BGU8007	MMIC	HSMP3820	Agilent	BAP1321-03	PIN diode
BIC701C	Renesas	BF1105WR	FET	HSMP3822	Agilent	BAP1321-04	PIN diode
BIC701M	Renesas	BF1105R	FET	HSMP3830	Agilent	BAP64-03	PIN diode
BIC702C	Renesas	BF1105WR	FET	HSMP3832	Agilent	BAP64-04	PIN diode
BIC702M	Renesas	BF1105R	FET	HSMP3833	Agilent	BAP64-06	PIN diode
BIC801M	Renesas	BF1105	FET	HSMP3834	Agilent	BAP64-05	PIN diode
BSR111	Standard	PMBFJ111	FET	HSMP3860	Agilent	BAP50-03	PIN diode
BSR112	Standard	PMBFJ112	FET	HSMP3862	Agilent	BAP50-04	PIN diode
BSR113	Standard	PMBFJ113	FET	HSMP3864	Agilent	BAP50-05	PIN diode
BSR174	Standard	PMBFJ174	FET	HSMP386B	Agilent	BAP50-02	PIN diode
BSR175	Standard	PMBFJ175	FET	HSMP386E	Agilent	BAP50-04W	PIN diode
BSR176	Standard	PMBFJ176	FET	HSMP386L	Agilent	BAP50-05W	PIN diode
BSR177	Standard	PMBFJ177	FET	HSMP3880	Agilent	BAP51-03	PIN diode
CA901	Standard	BGX885N	CATV PPA	HSMP3890	Agilent	BAP51-03	PIN diode
CA901A	Standard	BGX885N	CATV PPA	HSMP3892	Agilent	BAP64-04	PIN diode
CA922	Standard	BGD885	CATV PD	HSMP3894	Agilent	BAP64-05	PIN diode
CA922A	Standard	BGD885	CATV PD	HSMP3895	Agilent	BAP51-02	PIN diode
CMM6004-SC	Mimix	BGA7124	MMIC	HSMP389B	Agilent	BAP51-02	PIN diode
CMM6004-SC	Mimix	BGA7024	MMIC	HSMP389C	Agilent	BAP64-04	PIN diode
CMY91	Infineon	BGA2022	MMIC	HSMP389F	Agilent	BAP51-05W	PIN diode
CMY91	Infineon	BGA2022	WB trs 1-4	HVB145	Renesas	BAP50-04W	PIN diode
CXE1089Z	RFMD	BGA6489	MMIC	HVC131	Renesas	BAP65-02	PIN diode
CXE1089Z	RFMD	BGA6589	MMIC	HVC132	Renesas	BAP51-02	PIN diode
D10040180GT	RFMD	CGD1042H	CATV PD	HVC200A	Renesas	BB178	Varicap
D10040180GTH	RFMD	CGD1042H	CATV PD	HVC200A	Renesas	BB187	Varicap
D10040200GT	RFMD	CGD1042H	CATV PD	HVC202A	Renesas	BB179	Varicap
D10040200GTH	RFMD	CGD1042H	CATV PD	HVC202B	Renesas	BB179B	Varicap
D10040200P1	RFMD	CGD1042H	CATV PD	HVC300A	Renesas	BB182	Varicap
D10040200PH1	RFMD	CGD1042H	CATV PD	HVC300B	Renesas	BB182	Varicap
D10040220GT	RFMD	CGD1042H	CATV PD	HVC306A	Renesas	BB187	Varicap
D10040220GTH	RFMD	CGD1042H	CATV PD	HVC306B	Renesas	BB187	Varicap
D10040230P1	RFMD	CGD1042H	CATV PD	HVC355B	Renesas	BB145B	Varicap
D10040230PH1	RFMD	CGD1042H	CATV PD	HVC359	Renesas	BB202	Varicap
D10040240GT	RFMD	CGD1044H	CATV PD	HVC363A	Renesas	BB178	Varicap
D10040240GTH	RFMD	CGD1044H	CATV PD	HVC376B	Renesas	BB198	Varicap
D10040250GT	RFMD	CGD1044H	CATV PD	HVC376B	Renesas	BB202	Varicap
D10040250GTH	RFMD	CGD1044H	CATV PD	HVD132	Renesas	BAP51-02	PIN diode
D10040270GT	RFMD	CGD1044H	CATV PD	HVU131	Renesas	BAP65-03	PIN diode
D10040270GTH	RFMD	CGD1044H	CATV PD	HVU132	Renesas	BAP51-03	PIN diode
D10040270GTL	RFMD	CGD1044H	CATV PD	HVU202(A)	Renesas	BB149	Varicap
D5540185	Standard	BGD502	CATV PD	HVU202(A)	Renesas	BB149A	Varicap
D7540185	Standard	BGD702	CATV PD	HVU300A	Renesas	BB152	Varicap
D7540200	Standard	BGD704	CATV PD	HVU307	Renesas	BB148	Varicap
D8640185	Standard	BGD802	CATV PD	HVU315	Renesas	BB148	Varicap

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
HVU316	Renesas	BB131	Varicap	MA372	Matsushita	BB149	Varicap
HVU363A	Renesas	BB148	Varicap	MA372	Matsushita	BB149A	Varicap
HVU363A	Renesas	BB153	Varicap	MA4CP101A	Matsushita	BAP65-03	PIN diode
HVU363B	Renesas	BB148	Varicap	MA4P274-1141	Matsushita	BAP51-03	PIN diode
IB0810M100	Integra	BLF871	Broadcast	MA4P275-1141	Matsushita	BAP65-03	PIN diode
IB0912L30	Integra	BLA6H0514-25	Microwave	MA4P275CK-287	Matsushita	BAP65-05	PIN diode
IB0912L70	Integra	BLA6H0514-25	Microwave	MA4P277-1141	Matsushita	BAP70-03	PIN diode
IB0912M210	Integra	BLA6H0514-25	Microwave	MA4P278-287	Matsushita	BAP70-03	PIN diode
IB0912M500	Integra	BLA6H0912-500	Microwave	MA4P789-1141	Matsushita	BAP1321-03	PIN diode
IB0912M600	Integra	BLA6H0912-500	Microwave	MA4P789ST-287	Matsushita	BAP1321-04	PIN diode
IB1011L15	Integra	BLA6H0514-25	Microwave	MAX2659	Maxim	BGU7003	MMIC
IB1011L220	Integra	BLA6G1011-200R	Microwave	MAX2659	Maxim	BGU7005	MMIC
IB1011L40	Integra	BLA6H0514-25	Microwave	MAX2659	Maxim	BGU7007	MMIC
IB1011L470	Integra	BLA6H0912-500	Microwave	MC7712	NEC	BGY785A	CATV PPA
IB1011M140	Integra	BLA6G1011-200R	Microwave	MC7716	NEC	BGY787	CATV PPA
IB1011M190	Integra	BLA6G1011-200R	Microwave	MC7722	NEC	BGY785A	CATV PPA
IB1011M250	Integra	BLA6G1011-200R	Microwave	MC7726	NEC	BGY787	CATV PPA
IB1011S190	Integra	BLA6G1011-200R	Microwave	MC-7831	NEC	BGY885A	CATV PP
IB1011S250	Integra	BLA6G1011-200R	Microwave	MC7831-HA	NEC	BGY1085A	CATV PP
IB1012S10	Integra	BLA6H0514-25	Microwave	MC-7831-HA	NEC	BGY1085A	CATV PP
IB1012S20	Integra	BLA6H0514-25	Microwave	MC-7832	NEC	BGY887	CATV PP
IB2729M5	Integra	BLS6G2731-6G	Microwave	MC7832-HA	NEC	CGY1041	CATV PP
IB2729M90	Integra	BLS6G2731-120	Microwave	MC-7832-HA	NEC	CGY1041	CATV PP
IB2731M110	Integra	BLS6G2731-120	Microwave	MC-7833	NEC	BGY887B	CATV PP
IB2731MH110	Integra	BLS6G2731-120	Microwave	MC-7836	NEC	BGY887B	CATV PP
IB2931MH155	Integra	BLS6G2731-120	Microwave	MC-7836	NEC	CGY1047	CATV PP
IB3134M100	Integra	BLS6G3135S-120	Microwave	MC-7845	NEC	BGD802	CATV PD
IB3135MH100	Integra	BLS6G3135S-120	Microwave	MC-7846	NEC	CGD942C	CATV PD
IBP1214M700	Integra	BLL6H1214-500	Microwave	MC-7847	NEC	CGD944C	CATV PD
IBP1214M700	Integra	BLL6H1214-500	Microwave	MC7852	NEC	BGY885A	CATV PPA
IBP3135M150	Integra	BLS6G3135S-120	Microwave	MC7866	NEC	BGD816L	CATV PD
IDM175CW300	Integra	BLF278	Broadcast	MC-7881	NEC	BGD802	CATV PD
IDM500CW150	Integra	BLF881	Broadcast	MC-7882	NEC	BGD814	CATV PD
IDM500CW200	Integra	BLF888	Broadcast	MC-7883	NEC	CGD942C	CATV PD
IDM500CW300	Integra	BLF878	Broadcast	MC-7884	NEC	CGD944C	CATV PD
IDM500CW80	Integra	BLF871	Broadcast	MC-7891	NEC	CGD1042H	CATV PD
ILD1011M15	Integra	BLL6H0514-25	Microwave	MC7893	NEC	CGD1042Hi	CATV PD
ILD1011M150	Integra	BLA6G1011-200R	Microwave	MC7893	NEC	CGD982HCi	CATV PD
ILD1011M15HV	Integra	BLA6H0514-25	Microwave	MC-7893	NEC	CGD1042H	CATV PD
ILD1011M160HV	Integra	BLA6G1011-200R	Microwave	MC7894	NEC	CGD1044Hi	CATV PD
ILD1011M250	Integra	BLA6G1011-200R	Microwave	MC7894	NEC	CGD985HCi	CATV PD
ILD1011M30	Integra	BLA6H0514-25	Microwave	MC-7894	NEC	CDG1044H	CATV PD
ILD1011M400	Integra	BLA6H0912-500	Microwave	MC7896	NEC	CGD1046Hi	CATV PD
ILD1011M450HV	Integra	BLA6H0912-500	Microwave	MC7896	NEC	CGD987HCi	CATV PD
ILD1011M550HV	Integra	BLA6H1011-600	Microwave	MC-7896	NEC	CGD1044H	CATV PD
ILD1214M10	Integra	BLL6H0514-25	Microwave	MCH4009	Sanyo	BFG424F	WB trs 5-7
ILD2731M140	Integra	BLS6G2731-120	Microwave	MD7P19130	Freescale	BLF6G20LS-110	Base station
ILD3135M120	Integra	BLS6G3135S-120	Microwave	MD7P19130H	Freescale	BLF6G20LS-75	Base station
ILP1214EL200	Integra	BLS7G2933P-200	Microwave	MD7P19130H (2)	Freescale	BLF6G20(LS)-180RN	Base station
INA-51063	Agilent	BGA2001	MMIC	MDS400	Microsemi	BLA6H0912-500	Microwave
J270	Standard	J177	FET	MDS800	Microsemi	BLA6H1011-600	Microwave
J308	Standard	J108	FET	MHW10186N	Freescale	BGY1085A	CATV PP
J309	Standard	J109	FET	MHW10236N	Freescale	CGY1043	CATV PP
J310	Standard	J110	FET	MHW10247AN	Freescale	CGD1044H	CATV PD
JDP2S01E	Toshiba	BAP65-02	PIN diode	MHW10276N	Freescale	CGY1047	CATV PP
JDP2S01U	Toshiba	BAP65-03	PIN diode	MHW1224	Freescale	BGY67	CATV RA
JDP2S02AFS	Toshiba	BAP51-02	PIN diode	MHW1244	Freescale	BGY67A	CATV RA
JDP2S02AS	Toshiba	BAP51-03	PIN diode	MHW1253LA	Freescale	BGY67A	CATV RA
JDP2S02T	Toshiba	BAP63-02	PIN diode	MHW1254L	Freescale	BGY68	CATV RA
JDP2S04E	Toshiba	BAP50-02	PIN diode	MHW1254LA	Freescale	BGY68	CATV RA
JDS2S03S	Toshiba	BA891	BS diode	MHW1304L	Freescale	BGY68	CATV RA
JTDA150A	Microsemi	BLF177	Broadcast	MHW1304LA	Freescale	BGY68	CATV RA
KP2310R	Toko	BAP64-04W	PIN diode	MHW1304LAN	Freescale	BGY68	CATV RA
KTK920BT	KEC	BF1108	FET	MHW1346	Freescale	BGY67A	CATV RA
KTK920T	KEC	BF1108R	FET	MHW1353LA	Freescale	BGY67A	CATV RA
KV1835E	Toko	BB199	Varicap	MHW1354LA	Freescale	BGY68	CATV RA
LC421	POLYFET	BLF544	Broadcast	MHW5182A	Freescale	BGY585A	CATV PPA
MA2S077	Standard	BA277	BS diode	MHW5185B	Freescale	BGD502	CATV PD
MA2S357	Matsushita	BB178	Varicap	MHW5222A	Freescale	BGY587	CATV PPA
MA2S357	Matsushita	BB187	Varicap	MHW5272A	Freescale	BGY587B	CATV PPA/HG
MA2S372	Matsushita	BB179	Varicap	MHW5342A	Freescale	BGY588N	CATV PPA/HG
MA2S374	Matsushita	BB182	Varicap	MHW5342T	Freescale	BGY588N	CATV PPA/HG
MA2SV01	Renesas	BB202	Varicap	MHW6182	Freescale	BGY585A	CATV PPA
MA357	Matsushita	BB153	Varicap	MHW6182-6	Freescale	BGY685A	CATV PPA
MA366	Matsushita	BB148	Varicap	MHW6182T	Freescale	BGY585A	CATV PPA
MA368	Matsushita	BB131	Varicap	MHW6185B	Freescale	BGD502	CATV PD

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
MHW6185T	Freescale	BGD502	CATV PD	MMBR5031L	Freescale	BFS17	WB trs 1-4
MHW6205	Freescale	BGD704	CATV PD	MMBR5179L	Freescale	BFS17A	WB trs 1-4
MHW6222	Freescale	BGY587	CATV PPA	MMBR571L	Freescale	PBR951	WB trs 1-4
MHW6222B	Freescale	BGY687	CATV PPA	MMBR901L	Freescale	BFR92A	WB trs 1-4
MHW6222T	Freescale	BGY587	CATV PPA	MMBR911L	Freescale	BFR93A	WB trs 1-4
MHW6272	Freescale	BGY587B	CATV PPA	MMBR920L	Freescale	BFR93A	WB trs 1-4
MHW6272T	Freescale	BGY587B	CATV PPA	MMBR931L	Freescale	BFT25A	WB trs 1-4
MHW6342	Freescale	BGY588N	CATV PPA	MMBR941BL	Freescale	PBR941	WB trs 1-4
MHW6342T	Freescale	BGY588N	CATV PPA	MMBR941L	Freescale	PBR941	WB trs 1-4
MHW7182B	Freescale	BGY785A	CATV PPA	MMBR951AL	Freescale	PBR951	WB trs 1-4
MHW7182C	Freescale	BGY785A	CATV PPA	MMBR951L	Freescale	PBR951	WB trs 1-4
MHW7185C2	Freescale	BGD712	CATV PD	MMBV105GLT1	ONSemicond.	BB156	Varicap
MHW7185CL	Freescale	BGD712	CATV PD	MMBV109LT1	ONSemicond.	BB148	Varicap
MHW7205C	Freescale	BGD714	CATV PD	MMG2001NT1	Freescale	BGD816L	CATV PD
MHW7205CL	Freescale	BGD714	CATV PD	MMG2001T1	Freescale	BGD816L	CATV PD
MHW7205CLN	Freescale	BGD714	CATV PD	MMG3004NT1	Freescale	BGA7127	MMIC
MHW7222	Freescale	BGY787	CATV PPA	MMG3014	Freescale	BGA7124	MMIC
MHW7222A	Freescale	BGY787	CATV PPA	MMG3014	Freescale	BGA7024	MMIC
MHW7222B	Freescale	BGY787	CATV PPA	MPAL2731M15	Integra	BLS6G2731-6G	Microwave
MHW7242A	Freescale	BGE787B	CATV PPA/HG	MPAL2731M30	Integra	BLS6G2731-6G	Microwave
MHW7272A	Freescale	BGE787B	CATV PPA/HG	MPAL3035M15	Integra	BLS6G2731-6G	Microwave
MHW7292	Freescale	BGE787B	CATV PPA/HG	MPAL3035M30	Integra	BLS6G2731-6G	Microwave
MHW7292A	Freescale	BGE787B	CATV PPA/HG	MPF102	Standard	BF245A	FET
MHW7292AN	Freescale	BGE787B	CATV PPA/HG	MPF970	Standard	J174	FET
MHW7342	Freescale	BGE788	CATV PPA/HG	MPF971	Standard	J176	FET
MHW8142	Freescale	BGY883	CATV PPA	MRF10005	M/A- COM	BLA6H0912-500	Microwave
MHW8182B	Freescale	BGY885A	CATV PPA	MRF1000MB	M/A- COM	BLA6H0912-500	Microwave
MHW8182C	Freescale	BGY885A	CATV PPA	MRF10031	M/A- COM	BLA6H0912-500	Microwave
MHW8182CN	Freescale	BGY885A	CATV PP	MRF1004MB	M/A- COM	BLA6H0912-500	Microwave
MHW8185	Freescale	BGD814	CATV PD	MRF10120	M/A- COM	BLA6H0912-500	Microwave
MHW8185L	Freescale	BGD812	CATV PD	MRF10150	M/A- COM	BLL6H0514-25	Microwave
MHW8188AN	Freescale	CGD942C	CATV PD	MRF10350	M/A- COM	BLL6H0514-25	Microwave
MHW8205	Freescale	BGD814	CATV PD	MRF10502	M/A- COM	BLL6H0514-25	Microwave
MHW820L	Freescale	BGD814	CATV PD	MRF1090MB	M/A- COM	BLA6H0912-500	Microwave
MHW8222BN	Freescale	BGY887	CATV PP	MRF1150MA	M/A- COM	BLA6H0912-500	Microwave
MHW8227A	Freescale	CGD942C	CATV PD	MRF1150MB	M/A- COM	BLA6H0912-500	Microwave
MHW8227AN	Freescale	CGD942C	CATV PD	MRF134	M/A- COM	BLF871	Broadcast
MHW8247A	Freescale	CGD944C	CATV PPA	MRF136	M/A- COM	BLF871	Broadcast
MHW8247AN	Freescale	CGD944C	CATV PD	MRF136Y	M/A- COM	BLF881	Broadcast
MHW8292	Freescale	BGY887B	CATV PPA	MRF137	M/A- COM	BLF881	Broadcast
MHW8342	Freescale	BGY888	CATV PPA	MRF140	M/A- COM	BLF177	Broadcast
MHW8342N	Freescale	CGY888C	CATV PP	MRF141	M/A- COM	BLF177	Broadcast
MHW9146	Freescale	BGY883	CATV PPA	MRF141G	M/A- COM	BLF278	Broadcast
MHW9182B	Freescale	BGY1085A	CATV PPA	MRF148A	M/A- COM	BLF175	Broadcast
MHW9182C	Freescale	BGY1085A	CATV PPA	MRF150	M/A- COM	BLF177	Broadcast
MHW9182CN	Freescale	BGY1085A	CATV PP	MRF151	M/A- COM	BLF177	Broadcast
MHW9186	Freescale	BGY885A	CATV PPA	MRF151A	M/A- COM	BLF177	Broadcast
MHW9186A	Freescale	BGY885A	CATV PPA	MRF151G	M/A- COM	BLF278	Broadcast
MHW9187N	Freescale	CGD942C	CATV PD	MRF154	M/A- COM	BLF574	Broadcast
MHW9188AN	Freescale	CGD942C	CATV PD	MRF157	M/A- COM	BLF574	Broadcast
MHW9188N	Freescale	CGD942C	CATV PD	MRF158	M/A- COM	BLF871	Broadcast
MHW9227AN	Freescale	CGD942C	CATV PD	MRF160	M/A- COM	BLF871	Broadcast
MHW9242A	Freescale	CGD1042	CATV PD	MRF166C	M/A- COM	BLF871	Broadcast
MHW9247	Freescale	CGD944C	CATV PD	MRF166W	M/A- COM	BLF881	Broadcast
MHW9247A	Freescale	CGD944C	CATV PD	MRF171A	M/A- COM	BLF881	Broadcast
MHW9247AN	Freescale	CGD944C	CATV PD	MRF173	M/A- COM	BLF871	Broadcast
MHW9247N	Freescale	CGD944C	CATV PD	MRF173CQ	M/A- COM	BLF871	Broadcast
MHWJ5272A	Freescale	BGY587B	CATV PPA	MRF174	M/A- COM	BLF881	Broadcast
MHWJ7185A	Freescale	BGD712	CATV PD	MRF175GU	M/A- COM	BLF881	Broadcast
MHWJ7205A	Freescale	BGD714	CATV PD	MRF175GV	M/A- COM	BLF278	Broadcast
MHWJ7292	Freescale	BGE787B	CATV PPA/HG	MRF175LU	M/A- COM	BLF871	Broadcast
MHWJ9182	Freescale	BGY1085A	CATV PPA	MRF176GU	M/A- COM	BLF881	Broadcast
MMBF4391	Freescale	PMBF4391	FET	MRF176GV	M/A- COM	BLF573S	Broadcast
MMBF4392	Freescale	PMBF4392	FET	MRF177	M/A- COM	BLF871	Broadcast
MMBF4393	Freescale	PMBF4393	FET	MRF18030ALR3(1)	Freescale	BLF6G21-30	Base station
MMBF4860	Freescale	PMBFJ112	FET	MRF18030ALR3(1)	Freescale	BLF6G20-45	Base station
MMBF5484	Freescale	BFR31	FET	MRF18030ALSR3(1)	Freescale	BLF6G21-30	Base station
MMBFJ113	Freescale	PMBFJ113	FET	MRF18030ALSR3(1)	Freescale	BLF6G20-45	Base station
MMBFJ174	Freescale	PMBFJ174	FET	MRF18030BLR3(1)	Freescale	BLF6G21-30	Base station
MMBFJ175	Freescale	PMBFJ175	FET	MRF18030BLR3(1)	Freescale	BLF6G20-45	Base station
MMBFJ176	Freescale	PMBFJ176	FET	MRF18030BLSR3(1)	Freescale	BLF6G21-30	Base station
MMBFJ177	Freescale	PMBFJ177	FET	MRF18030BLSR3(1)	Freescale	BLF6G20-45	Base station
MMBFJ308	Freescale	PMBFJ308	FET	MRF18060AL(2)	Freescale	BLC6G20-75	Base station
MMBFJ309	Freescale	PMBFJ309	FET	MRF18060BL(2)	Freescale	BLC6G20-75	Base station
MMBFJ310	Freescale	PMBFJ310	FET	MRF18085AL(2)	Freescale	BLC6G20-75	Base station
MMBFU310	Freescale	PMBFJ310	FET	MRF18085BL (2)	Freescale	BLF7G20L(S)-300P	Base station

Manufacturer type	Manufacturer	NXP type	Product family
MRF18085BL(2)	Freescale	BLC6G20-75	Base station
MRF18090AR3(1)	Freescale	BLF6G20-110	Base station
MRF18090B(2)	Freescale	BLF7G20L(S)-300P	Base station
MRF18090B(2)	Freescale	BLF6G20-110	Base station
MRF19030L(2)	Freescale	BLF6G21-30	Base station
MRF19030L(2)	Freescale	BLF6G20-45	Base station
MRF19045L(2)	Freescale	BLF6G20-45	Base station
MRF19060L(2)	Freescale	BLF6G20-45	Base station
MRF19085LR3(1)	Freescale	BLF6G20-110	Base station
MRF19085LSR3(1)	Freescale	BLF6G20-110	Base station
MRF19090R3(1)	Freescale	BLF7G20L(S)-300P	Base station
MRF19090R3(1)	Freescale	BLF6G20-110	Base station
MRF19090SR3(1)	Freescale	BLF7G20L(S)-300P	Base station
MRF19090SR3(1)	Freescale	BLF6G20-110	Base station
MRF19125(2)	Freescale	BLF6G20(LS)-110	Base station
MRF19125(2)	Freescale	BLF6G20-140	Base station
MRF21010LR1(1)	Freescale	BLF3G21-6	Base station
MRF21010LSR1(1)	Freescale	BLF3G21-6	Base station
MRF21030LR3(1)	Freescale	BLF6G22-30	Base station
MRF21030LSR3(1)	Freescale	BLF6G22-45	Base station
MRF21045LR3(1)	Freescale	BLF6G22-45	Base station
MRF21045LSR3(1)	Freescale	BLF6G22-45	Base station
MRF21060L(2)	Freescale	BLF6G22-75	Base station
MRF21085L(2)	Freescale	BLF6G22-100	Base station
MRF21090(2)	Freescale	BLF6G22-100	Base station
MRF21120R6(1)	Freescale	BLF6G22-130	Base station
MRF21125(2)	Freescale	BLF6G22-130	Base station
MRF21125SR3(1)	Freescale	BLF6G22-130	Base station
MRF21180R6(1)	Freescale	BLF6G22-180	Base station
MRF275G	M/A- COM	BLF881	Broadcast
MRF275L	M/A- COM	BLF871	Broadcast
MRF281SR1(1)	Freescale	BLF6G21-6	Base station
MRF281ZR1(1)	Freescale	BLF6G21-6	Base station
MRF282SR1(1)	Freescale	BLF1822-10	Base station
MRF282ZR1(1)	Freescale	BLF1822-10	Base station
MRF284LR1(1)	Freescale	BLF3G21-30	Base station
MRF284LSR1(1)	Freescale	BLF3G21-30	Base station
MRF313	M/A- COM	BLF871	Broadcast
MRF314	M/A- COM	BLF881	Broadcast
MRF316	M/A- COM	BLF871	Broadcast
MRF317	M/A- COM	BLF871	Broadcast
MRF321	M/A- COM	BLF871	Broadcast
MRF323	M/A- COM	BLF871	Broadcast
MRF327	M/A- COM	BLF871	Broadcast
MRF372(3)	Freescale	BLF881	Base station
MRF373ALR1(1)	Freescale	BLF871	Broadcast
MRF373ALR1(2)	Freescale	BLF878	Base station
MRF373ALSRL1(1)	Freescale	BLF871	Broadcast
MRF374A(1)	Freescale	BLF881	Base station
MRF377H(1)	Freescale	BLF888	Broadcast
MRF377H(2)	Freescale	BLF878	Base station
MRF377H(2)	Freescale	BLF872	Broadcast
MRF392	M/A- COM	BLF881	Broadcast
MRF393	M/A- COM	BLF871	Broadcast
MRF421	M/A- COM	BLF871	Broadcast
MRF422	M/A- COM	BLF177	Broadcast
MRF426	M/A- COM	BLF871	Broadcast
MRF428	M/A- COM	BLF177	Broadcast
MRF429	M/A- COM	BLF177	Broadcast
MRF448	M/A- COM	BLF573S	Broadcast
MRF454	M/A- COM	BLF871	Broadcast
MRF455	M/A- COM	BLF871	Broadcast
MRF577	Freescale	PRF957	WB trs 1-4
MRF5811L	Freescale	BFG93A/X	WB trs 1-4
MRF5P20180HR6(1)	Freescale	BLF6G20-180P	Base station
MRF5P21045NR1(1)	Freescale	BLD6G22L(S)-50	Base station
MRF5P21180HR6(1)	Freescale	BLF6G22(LS)-180RN	Base station
MRF5P21180HR6(1)	Freescale	BLF6G20-180P	Base station
MRF5S19060N(2)	Freescale	BLF6G20-75	Base station
MRF5S19090HR3(1)	Freescale	BLF6G20-110	Base station
MRF5S19090HR3(1)	Freescale	BLF6G20-110	Base station
MRF5S19100H(2)	Freescale	BLF7G20L(S)-140P	Base station
MRF5S19100H(2)	Freescale	BLF6G20-110	Base station
MRF5S19130H(2)	Freescale	BLF6G20(LS)-110	Base station
MRF5S19130H(2)	Freescale	BLF6G20-140	Base station
MRF5S19150H(2)	Freescale	BLF6G20LS-140	Base station

Manufacturer type	Manufacturer	NXP type	Product family
MRF5S19150H(2)	Freescale	BLF6G22-150P	Base station
MRF5S21045N(2)	Freescale	BLD6G22L(S)-50	Base station
MRF5S21045N(2)	Freescale	BLF1822-10	Base station
MRF5S21090HR3(1)	Freescale	BLF6G22-100	Base station
MRF5S21090HR3(1)	Freescale	BLF6G22-100	Base station
MRF5S21100HR3(1)	Freescale	BLF6G22-100	Base station
MRF5S21100HR3(1)	Freescale	BLF6G22-100	Base station
MRF5S21130HR3(1)	Freescale	BLF6G22-130	Base station
MRF5S21130HR3(1)	Freescale	BLF6G22-130	Base station
MRF5S21150H(2)	Freescale	BLF6G22-150P	Base station
MRF5S9150H(2)	Freescale	BLF6G10(LS)-160RN	Base station
MRF6P18190HR6(1)	Freescale	BLF6G20-180P	Base station
MRF6P21190HR6(1)	Freescale	BLF7G22LS-130	Base station
MRF6P21190HR6(1)	Freescale	BLF6G20-180P	Base station
MRF6P3300H(2)	Freescale	BLF888	Base station
MRF6P3300H(2)	Freescale	BLF878	Broadcast
MRF6S18060N(2)	Freescale	BLF6G20-75	Base station
MRF6S18100N(2)	Freescale	BLF6G20-110	Base station
MRF6S18140H(2)	Freescale	BLF6G20-140	Base station
MRF6S19060N(2)	Freescale	BLF6G20-75	Base station
MRF6S19100H(2)	Freescale	BLF7G20L(S)-140P	Base station
MRF6S19100H(2)	Freescale	BLF6G20-110	Base station
MRF6S19100H(2)	Freescale	BLF6G20-110	Base station
MRF6S19120H(2)	Freescale	BLF7G20L(S)-140P	Base station
MRF6S19120H(2)	Freescale	BLF6G20-110	Base station
MRF6S19140H(2)	Freescale	BLF6G20LS-75	Base station
MRF6S19140H(2)	Freescale	BLF6G20-140	Base station
MRF6S19200H(2)	Freescale	BLF6G20-180PN, BLF7G20L(S)-200	Base station
MRF6S20010	Freescale	BLM6G22-30	Base station
MRF6S20010	Freescale	BLM6G22-30G	Base station
MRF6S20010N(2)	Freescale	BLM6G22-30	Base station
MRF6S20010N(2)	Freescale	BLF6G21-6	Base station
MRF6S20010N(2)	Freescale	BLF1822-10	Base station
MRF6S21050L(2)	Freescale	BLF6G22-45	Base station
MRF6S21060N(2)	Freescale	BLF6G22LS-75	Base station
MRF6S21060N(2)	Freescale	BLF6G22-75	Base station
MRF6S21100H(2)	Freescale	BLF6G22LS-100	Base station
MRF6S21100H(2)	Freescale	BLF6G22-100	Base station
MRF6S21100N(2)	Freescale	BLF6G22LS-100	Base station
MRF6S21100N(2)	Freescale	BLF6G22-100	Base station
MRF6S21140H(2)	Freescale	BLF6G22L(S)-130	Base station
MRF6S21140H(2)	Freescale	BLF6G22-130	Base station
MRF6S21190H	Freescale	BLF6G22-180P	Base station
MRF6S21190H	Freescale	BLF6G22-180PN	Base station
MRF6S21190H(2)	Freescale	BLF7G22L(S)-200	Base station
MRF6S23100H(2)	Freescale	BLF7G27L(S)-75P	Base station
MRF6S23100H(2)	Freescale	BLF7G27L(S)-75P	Base station
MRF6S27015N	Freescale	BLF6G27-10	Base station
MRF6S27015N(2)	Freescale	BLF6G27-10(G)	Base station
MRF6S27015N(2)	Freescale	BLF6G27-10(G)	Base station
MRF6S27050HR3	Freescale	BLF6G27-45	Base station
MRF6S27050HR3	Freescale	BLF6G27S-45	Base station
MRF6S27085H	Freescale	BLF6G27LS-135	Base station
MRF6S27085H(2)	Freescale	BLF7G27L(S)-140	Base station
MRF6S27085HR3	Freescale	BLF6G27-135	Base station
MRF6S27085HS	Freescale	BLF6G27LS-75	Base station
MRF6S27085HSR3	Freescale	BLF6G27LS-135	Base station
MRF6V10010N(1)	Freescale	BLL6H0514-25	Microwave
MRF6V10250HS(1)	Freescale	BLA0912-250R	Microwave
MRF6V12250H(2)	Freescale	BLA6H0912-500	Microwave
MRF6V12500H(2)	Freescale	BLA6H0912-500	Microwave
MRF6V14300H(2)	Freescale	BLL6H1214-500	Microwave
MRF6V2010N(2)	Freescale	BLF571	Base station
MRF6V2010N(2)	Freescale	BLF244	Broadcast
MRF6V2010NBR1(18a)	Freescale	BLF872	Broadcast
MRF6V2010NR1(18a)	Freescale	BLF871	Broadcast
MRF6V2150N(2)	Freescale	BLF871	Base station
MRF6V2150N(2)	Freescale	BLF177	Broadcast
MRF6V2150NBR1(18a)	Freescale	BLF882	Broadcast
MRF6V2150NR1(18a)	Freescale	BLF881	Broadcast
MRF6V2300N(2)	Freescale	BLF573S	Base station
MRF6V2300N(2)	Freescale	BLF369	Broadcast
MRF6V2300N(2)	Freescale	BLF378	Broadcast
MRF6V3090N(4)	Freescale	BLF871	Broadcast
MRF6V4300N(2)	Freescale	BLF573S	Base station

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
MRF6VP11KH (1)	Freescale	BLF578	Base station	MS1280	Microsemi	BLF888	Broadcast
MRF6VP21KH (1)	Freescale	BLF578	Base station	MS1329	Microsemi	BLF878	Broadcast
MRF6VP2600H (1)	Freescale	BLF871	Base station	MS1453	Microsemi	BLF881	Broadcast
MRF6VP2600HR6(18o)	Freescale	BLF881	Broadcast	MS1503	Microsemi	BLF871	Broadcast
MRF6VP3450	Freescale	BLF878	Broadcast	MS1506	Microsemi	BLF881	Broadcast
MRF6VP3450H (4)	Freescale	BLF878	Base station	MS1507	Microsemi	BLF881	Broadcast
MRF6VP41KH (2)	Freescale	BLF578	Base station	MS1509	Microsemi	BLF871	Broadcast
MRF7S15100H (2)	Freescale	BLF6G15L(S)-40BRN/ BLF6G15L(S)-250PBRN	Base station	MS1511	Microsemi	BLF878	Broadcast
MRF7S18125AHS	Freescale	BLF6G20LS-140	Base station	MS1533	Microsemi	BLF645	Broadcast
MRF7S18170H (2)	Freescale	BLF7G20L(S)-200	Base station	MS2001	Microsemi	BLF6G22-45	Broadcast
MRF7S18170H(2)	Freescale	BLF6G22-180	Base station	MS2003	Microsemi	BLF6G22-45	Broadcast
MRF7S19080H (2)	Freescale	BLF6G20(LS)-110	Base station	MS2003	Microsemi	BLF6G22-45	Broadcast
MRF7S19080H(2)	Freescale	BLF6G20-110	Base station	MS2005	Microsemi	BLF6G22-45	Broadcast
MRF7S19080HS	Freescale	BLF6G20LS-75	Base station	MS2010	Microsemi	BLF6G22-45	Broadcast
MRF7S19100	Freescale	BLF6G20LS-110	Base station	MS2176	Microsemi	BLF878	Broadcast
MRF7S19100N (2)	Freescale	BLF6G20LS-75	Base station	MS2200	Microsemi	BLA6H0912-500	Microwave
MRF7S19100N(2)	Freescale	BLF6G20-110	Base station	MS2207	Microsemi	BLA6H0912-500	Microwave
MRF7S19120N(1)	Freescale	BLF6G20-110	Base station	MS2210	Microsemi	BLA6G1011-200R	Microwave
MRF7S19120NR1 (1)	Freescale	BLF6G20LS-140	Base station	MS2215	Microsemi	BLF177	Broadcast
MRF7S19170H (2)	Freescale	BLF6G20-180PN, BLF7G20L(S)-200	Base station	MS2267	Microsemi	BLA6G1011-200R	Microwave
MRF7S19170H(2)	Freescale	BLF6G20-180	Base station	MS2321	Microsemi	BLL6H0514-25	Microwave
MRF7S19210H	Freescale	BLF6G20-230PRN	Base station	MS24221	Microsemi	BLA6G1011-200R	Microwave
MRF7S21080H (2)	Freescale	BLF6G22LS-100	Base station	MS2441	Microsemi	BLAH0912-500	Microwave
MRF7S21110H (2)	Freescale	BLF6G22L(S)-130	Base station	MS2472	Microsemi	BLAH0912-500	Microwave
MRF7S21110HS	Freescale	BLF6G22LS-100	Base station	MS2473	Microsemi	BLA6H1011-600	Microwave
MRF7S21150H (2)	Freescale	BLF7G22LS-130	Base station	MS2553	Microsemi	BLL6H0514-25	Microwave
MRF7S21170	Freescale	BLF6G22LS-100	Base station	MS2575	Microsemi	BLL6H0514-25	Microwave
MRF7S21170H (2)	Freescale	BLF6G22-180PN	Base station	MS3024	Microsemi	BLF6G22-45	Broadcast
MRF7S21210H (2)	Freescale	BLF7G22L(S)-250P	Base station	MSC1015MP	Microsemi	BLL6H0514-25	Microwave
MRF7S21210H (2)	Freescale	BLF7G27L(S)-140	Base station	MSC1175M	Microsemi	BLA6G1011-200R	Microwave
MRF7S35015HSR3 (1)	Freescale	BLS6G3135-20	Microwave	MSC1400M	Microsemi	BLAH0912-500	Microwave
MRF7S35120HSR3 (1)	Freescale	BLS6G3135-120	Microwave	MSC1450M	Microsemi	BLA6H0912-500	Microwave
MRF7S38010H	Freescale	BLF6G38-10G	Base station	MT4S200T	Toshiba	BFG424W	WB trs 5-7
MRF7S38010H (2)	Freescale	BLF6G38(S)-25	Base station	MT4S200U	Toshiba	BFG425W	WB trs 5-7
MRF7S38040H	Freescale	BLF6G38LS-50	Base station	MT4S34U	Toshiba	BFG410W	WB trs 5-7
MRF7S38040H (2)	Freescale	BLF6G38(LS)-50	Base station	MV2109G	ONSemicond.	BB182LX	Varicap
MRF7S38040HR3	Freescale	BLF6G28-50	Base station	MW6IC2240N (2)	Freescale	BLF6G22LS-75	Base station
MRF7S38040HSR3	Freescale	BLF6G28LS-51	Base station	MW6S004NT1 (1)	Freescale	BLF6G21-10G	Base station
MRF8S18120H (2)	Freescale	BLF7G20L(S)-250P	Base station	MW6S010N (2)	Freescale	BLL6H0514-25	Microwave
MRF9030L (2)	Freescale	BLF6G10(LS)-160RN	Base station	MW7IC2725GNR1	Freescale	BLF6G27-10G	Base station
MRF9030N (2)	Freescale	BLF6G10(LS)-160RN	Base station	MW7IC2725N	Freescale	BLF6G27-10G	Base station
MRF9135L (2)	Freescale	BLF6G10(LS)-135RN	Base station	MW7IC2725NB	Freescale	BLF6G27-10	Base station
MRF917	Freescale	BFQ67W	WB trs 1-4	MW7IC2725NR1	Freescale	BLF6G27-10	Base station
MRF9200L (2)	Freescale	BLF6G10L(S)-260PRN	Base station	MW7IC2750GNR1	Freescale	BLF6G27LS-75	Base station
MRF9210R3 (1)	Freescale	BLF6G10L(S)-260PRN	Base station	MW7IC2750N (3)	Freescale	BLF6G27(LS)-75	Base station
MRF927	Freescale	BFS25A	WB trs 1-4	MW7IC2750NR1	Freescale	BLF6G27-75	Base station
MRF9411L	Freescale	BFG520/X	WB trs 1-4	MW7IC3825GN	Freescale	BLF6G38S-25	Base station
MRF947	Freescale	BFS520	WB trs 1-4	MW7IC3825N	Freescale	BLF6G38-25	Base station
MRF947A	Freescale	PRF947	WB trs 1-4	MW7IC3825N (3)	Freescale	BLF6G38(S)-25	Base station
MRF9511L	Freescale	BFG540/X	WB trs 1-4	MW7IC3825NB	Freescale	BLF6G38-25	Base station
MRF957	Freescale	PRF957	WB trs 1-4	MW7IC915N (1)	Freescale	BLF6G10L(S)-260PRN	Base station
MRFE6P3300H	Freescale	BLF878	Broadcast	NESG3032M14	NEC	BFU725F	WB trs 5-7
MRFE6P3300H (2)	Freescale	BLF573	Broadcast	OS8740230W	RFMD	BGO807C	CATV OR
MRFE6S9125N	Freescale	BLF6G10LS-135R	Base station	PD55012-E	ST	BLF571	Broadcast
MRFE6S9125N (2)	Freescale	BLF6G10(LS)-135RN	Base station	PD55025-E	ST	BLF571	Broadcast
MRFE6S9130H (2)	Freescale	BLF6G10(LS)-135RN	Base station	PD55035-E	ST	BLF571	Broadcast
MRFE6S9135H (2)	Freescale	BLF6G10(LS)-200RN	Base station	PD57018-E	ST	BLL6H0514-25	Microwave
MRFE6S9135HS	Freescale	BLF6G10LS-135R	Base station	PD57030-E	ST	BLL6H0514-25	Microwave
MRFE6S9160H (2)	Freescale	BLF6G10(LS)-160RN	Base station	PD57045-E	ST	BLL6H0514-25	Microwave
MRFE6S9201H (2)	Freescale	BLF6G10(LS)-200RN	Base station	PD57060-E	ST	BLL6H0514-25	Microwave
MRFE6S9205HS	Freescale	BLF6G10LS-200RN	Base station	PD57070-E	ST	BLL6H0514-25	Microwave
MS1003	Microsemi	BLF645	Broadcast	PD85015-E	ST	BLF571	Broadcast
MS1004	Microsemi	BLF888	Broadcast	PD85025-C	ST	BLF571	Broadcast
MS1007	Microsemi	BLF871	Broadcast	PD85025-E	ST	BLF571	Broadcast
MS1008	Microsemi	BLF871	Broadcast	PD85035C	ST	BLF571	Broadcast
MS1011	Microsemi	BLF888	Broadcast	PD85035-E	ST	BLF571	Broadcast
MS1051	Microsemi	BLF871	Broadcast	PRF134	POLYFET	BLF242	Broadcast
MS1076	Microsemi	BLF888	Broadcast	PRF134	Infineon	BLF242	Broadcast
MS1078	Microsemi	BLF871	Broadcast	PRF136	POLYFET	BLF244	Broadcast
MS1079	Microsemi	BLF888	Broadcast	PRF136	Infineon	BLF244	Broadcast
MS1204	Microsemi	BLF645	Broadcast	PRF947B	Motorola	PRF947	WB trs 1-4
MS1277	Microsemi	BLF888	Broadcast	PRF947B	Infineon	PRF947	WB trs 1-4
MS1278	Microsemi	BLF888	Broadcast	PTF 041501E - 150 W	Infineon	BLF881S	Broadcast
MS1279	Microsemi	BLF888	Broadcast	PTF 041501F - 150 W	Infineon	BLF881S	Broadcast
				PTF 080101M - 10 W	Infineon	BLF571	Broadcast

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
PTF 080101S - 10 W	Infineon	BLF571	Broadcast	PTFA 260851F - 85 W	Infineon	BLF6G27(LS)-135	Base station
PTF 081301E - 130 W	Infineon	BLF881	Broadcast	PTFA 261301E - 130 W	Infineon	BLF7G27L(S)-200P	Base station
PTF 180101S - 10 W	Infineon	BLF6G20-40	Base station	PTFA 261301F - 130 W	Infineon	BLF7G27L(S)-100	Base station
PTF 191601E - 160 W	Infineon	BLF7G20L(S)-300P	Base station	PTFA 261702E - 170 W	Infineon	BLF7G27L(S)-140	Base station
PTF 210101M - 10 W	Infineon	BLD6G22L(S)-50	Base station	PTFA043002E-300 W	Infineon	BLF878	Broadcast
PTF 210451E - 45 W	Infineon	BLF7G22L(S)-200	Base station	PTFA043002E-300 W	Infineon	BLF878	Broadcast
PTF 210451F - 45 W	Infineon	BLF7G22L(S)-200	Base station	PTFA080551F-55 W	Infineon	BLF6G10-45	Base station
PTF 240101S - 10 W	Infineon	BLF7G27L(S)-100	Base station	PTFA080551F-55 W	Infineon	BLF6G10-45	Base station
PTF041501E-150 W	Infineon	BLF647	Broadcast	PTFA081501E-150 W	Infineon	BLF6G10-160	Base station
PTF041501E-150 W	Infineon	BLF647	Broadcast	PTFA081501F-150 W	Infineon	BLF6G10-160	Base station
PTF041501F-150 W	Infineon	BLF647	Broadcast	PTFA091201E-120 W	Infineon	BLF4G10-120	Base station
PTF041501F-150 W	Infineon	BLF647	Broadcast	PTFA091201F-120 W	Infineon	BLF4G10-120	Base station
PTF080101M-10 W	Infineon	BLF1043	Base station	PTMA 080152M - 20 W	Infineon	BLF871	Broadcast
PTF080101M-10 W	Infineon	BLF1043	Base station	PTMA 080302M - 40 W	Infineon	BLF881	Broadcast
PTF080101S-10 W	Infineon	BLF1043	Base station	PTMA 210452EL - 45 W	Infineon	BLF6G22(S)-45	Base station
PTF080101S-10 W	Infineon	BLF1043	Base station	PTMA 210452FL - 45 W	Infineon	BLF6G22(S)-45	Base station
PTF081301E-130 W	Infineon	BLF4G10-120	Base station	PZFJ108	Standard	J108	FET
PTF081301E-130 W	Infineon	BLF4G10-120	Base station	PZFJ109	Standard	J109	FET
PTF081301F-130 W	Infineon	BLF4G10-120	Base station	PZFJ110	Standard	J110	FET
PTF081301F-130 W	Infineon	BLF4G10-120	Base station	R0605250L	Standard	BGY66B	CATV RA
PTF082001E-200 W	Infineon	BLF6G10-200	Base station	R0605250L	RFMD	BGS67A	CATV RA
PTF082001E-200 W	Infineon	BLF6G10-200	Base station	R0605300L	Standard	BGY68	CATV RA
PTF180101	Freescale	BLF6G21-10G	Base station	R0605300L	RFMD	BGY68	CATV RA
PTF180101	Infineon	BLF6G21-10G	Base station	R1005250L	RFMD	BGY66B	CATV RA
PTFA 041501E - 175 W	Infineon	BLF888	Broadcast	R2005200P12	RFMD	BGY67	CATV RA
PTFA 041501F - 175 W	Infineon	BLF888	Broadcast	R2005240	Standard	BGY67A	CATV RA
PTFA 041501GL - 175 W	Infineon	BLF888	Broadcast	R2005240	RFMD	BGY67A	CATV RA
PTFA 041501HL - 175 W	Infineon	BLF888	Broadcast	R2005240P12	RFMD	BGY67A	CATV RA
PTFA 043002E - 300 W	Infineon	blf573	Broadcast	R2005350L	RFMD	BGR269	CATV RA
PTFA 070601E - 60 W	Infineon	BLF878	Broadcast	RN142G	Rohm	BAP1321-03	PIN diode
PTFA 070601F - 60 W	Infineon	BLF878	Broadcast	RN142S	Rohm	BAP1321-02	PIN diode
PTFA 072401EL - 240 W	Infineon	BLF573	Broadcast	RN242CS	Rohm	BAP51LX	PIN diode
PTFA 072401FL - 240 W	Infineon	BLF573	Broadcast	RN731V	Rohm	BAP50-03	PIN diode
PTFA 080551E - 55 W	Infineon	BLF878	Broadcast	RN739D	Rohm	BAP50-04	PIN diode
PTFA 080551F - 55 W	Infineon	BLF878	Broadcast	RN739F	Rohm	BAP50-04W	PIN diode
PTFA 081501E - 150 W	Infineon	BLF881	Broadcast	S10040200P	RFMD	CGY1041	CATV PP
PTFA 081501F - 150 W	Infineon	BLF881	Broadcast	S10040220GT	RFMD	CGY1041	CATV PP
PTFA 082201E - 220 W	Infineon	BLF573	Broadcast	S10040220P	RFMD	CGY1041	CATV PP
PTFA 082201F - 220 W	Infineon	BLF573	Broadcast	S10040230GT	RFMD	CGY1043	CATV PP
PTFA 091201E - 120 W	Infineon	BLF881	Broadcast	S10040240P	RFMD	CGY1043	CATV PP
PTFA 091201F - 120 W	Infineon	BLF881	Broadcast	S10040280GT	RFMD	CGY1047	CATV PP
PTFA 091201GL - 120 W	Infineon	BLF881	Broadcast	S10040340	RFMD	CGY1034	CATV PP
PTFA 091201HL - 120 W	Infineon	BLF881	Broadcast	S505T	Vishay	BF1101	FET
PTFA 092201E - 220 W	Infineon	BLF573	Broadcast	S505TR	Vishay	BF1101R	FET
PTFA 092201F - 220 W	Infineon	BLF573	Broadcast	S505TRW	Vishay	BF1101WR	FET
PTFA 092211EL - 250 W	Infineon	BLF573	Broadcast	S5540220	Standard	BGY587	CATV PPA
PTFA 092211FL - 250 W	Infineon	BLF573	Broadcast	S595T	Vishay	BF1105	FET
PTFA 092213 EL - 250 W	Infineon	BLF573	Broadcast	S595TR	Vishay	BF1105R	FET
PTFA 092213 FL - 250 W	Infineon	BLF573	Broadcast	S595TRW	Vishay	BF1105WR	FET
PTFA 142401EL - 240 W	Infineon	BLF6G15L(S)-250PBRN	Base station	S7540185	Standard	BGY785A	CATV PPA
PTFA 142401FL - 240 W	Infineon	BLF6G15L(S)-250PBRN	Base station	S7540215	Standard	BGY787	CATV PPA
PTFA 180701E - 70 W	Infineon	BLF6G20(LS)-110	Base station	S8740180GT	RFMD	BGY885A	CATV PP
PTFA 180701F - 70 W	Infineon	BLF6G20(LS)-110	Base station	S8740190	Standard	BGD812	CATV PD
PTFA 181001E - 100 W	Infineon	BLF6G20(LS)-180RN	Base station	S8740190	RFMD	BGY885A	CATV PP
PTFA 181001F - 100 W	Infineon	BLF6G20(LS)-180RN	Base station	S8740200P	RFMD	BGY887	CATV PP
PTFA 181001GL - 100 W	Infineon	BLF6G20(LS)-180RN	Base station	S8740220	Standard	BGD814	CATV PD
PTFA 191001E - 100 W	Infineon	BLF6G20(LS)-110	Base station	S8740220GT	RFMD	BGY887	CATV PP
PTFA 191001F - 100 W	Infineon	BLF6G20(LS)-110	Base station	S8740220P	RFMD	BGY887	CATV PP
PTFA 192001E - 200 W	Infineon	BLF6G20-180PN	Base station	S8740230	Standard	BGD816L	CATV PD
PTFA 192001F - 200 W	Infineon	BLF6G20-180PN	Base station	S8740240GT	RFMD	BGY887	CATV PP
PTFA 192401E - 240 W	Infineon	BLF6G20-180PN	Base station	S8740240P	RFMD	BGY887	CATV PP
PTFA 192401F - 240 W	Infineon	BLF6G20-180PN	Base station	S8740240P12	RFMD	BGY887	CATV PP
PTFA 210301E - 30 W	Infineon	BLD6G22L(S)-50	Base station	S8740260GT	RFMD	CGY887A	CATV PP
PTFA 210701E - 70 W	Infineon	BLF6G22LS-75	Base station	S8740280GT	RFMD	CGY887B	CATV PP
PTFA 210701F - 70 W	Infineon	BLF6G22LS-75	Base station	S8740340	RFMD	CGY888C	CATV PP
PTFA 211001E - 100 W	Infineon	BLF6G22LS-100	Base station	S8740340PT	RFMD	CGY888C	CATV PP
PTFA 211801E - 180 W	Infineon	BLF7G22L(S)-250P	Base station	S949T	Vishay	BF1109	FET
PTFA 211801F - 180 W	Infineon	BLF7G22L(S)-250P	Base station	S949TR	Vishay	BF1109R	FET
PTFA 212001E - 200 W	Infineon	BLF6G22-180PN	Base station	S949TRW	Vishay	BF1109WR	FET
PTFA 212001F - 200 W	Infineon	BLF6G22-180PN	Base station	S974T	Vishay	BF1109	FET
PTFA 212002E - 200 W	Infineon	BLF7G22LS-130	Base station	S974T-GS08	Vishay	BF1109	FET
PTFA 212401E - 240 W	Infineon	BLF6G22-180PN	Base station	S974TR	Vishay	BF1109R	FET
PTFA 212401F - 240 W	Infineon	BLF6G22-180PN	Base station	S974TR-GS08	Vishay	BF1109R	FET
PTFA 240451E - 45 W	Infineon	BLF7G27L(S)-100	Base station	S974TRW	Vishay	BF1109WR	FET
PTFA 260451E - 45 W	Infineon	BLF6G27(LS)-75	Base station	S974TRW-GS08	Vishay	BF1109WR	FET
PTFA 260851E - 85 W	Infineon	BLF6G27(LS)-45BN	Base station	SA701	POLYFET	BLF145	Broadcast

Manufacturer type	Manufacturer	NXP type	Product family	Manufacturer type	Manufacturer	NXP type	Product family
SA701	POLYFET	BLF245	Broadcast	SST4857	Standard	BSR57	FET
SA741	POLYFET	BLF175	Broadcast	SST4859	Standard	BSR56	FET
SD1018	Microsemi	BLF881	Broadcast	SST4860	Standard	BSR57	FET
SD1018-06	Microsemi	BLF881	Broadcast	SST4861	Standard	BSR58	FET
SD1019-05	Microsemi	BLF645	Broadcast	ST704	POLYFET	BLF346	Broadcast
SD1422	Microsemi	BLF871	Broadcast	ST744	POLYFET	BLF276	Broadcast
SD1485	Microsemi	BLF888	Broadcast	ST744	POLYFET	BLF277	Broadcast
SD56120	ST	BLF871	Broadcast	SVC201SPA	Sanyo	BB187	Varicap
SD56120M	ST	BLF881	Broadcast	SXA-389B	RFMD	BGA7124	MMIC
SD57030	ST	BLL6H0514-25	Microwave	SXA-389B	RFMD	BGA7024	MMIC
SD57030-01	ST	BLL6H0514-25	Microwave	TAN150	Microsemi	BLF177	Broadcast
SD57120	ST	BLF578	Broadcast	TAN250A	Microsemi	BLA6G1011-200R	Microwave
SD702	POLYFET	BLF246B	Broadcast	TAN300	Microsemi	BLA6G1011-200R	Microwave
SDV701Q	AUK	BB179	Varicap	TBB1016	Renesas	BF1204	FET
SDV704Q	AUK	BB178	Varicap	TC5450	Microsemi	BLA6H0912-500	Microwave
SDV705Q	AUK	BB182	Varicap	TCS800	Microsemi	BLA6H1011-600	Microwave
SE701	POLYFET	BLF245B	Broadcast	TMF3201J	AUK	BF1204	FET
SGA8343Z	Sirenza	BFG425W	WB trs 5-7	TMF3202Z	AUK	BF1202WR	FET
SK701	POLYFET	BLF544B	Broadcast	TMPF4091	Standard	PMBF4391	FET
SK701	POLYFET	BLF545	Broadcast	TMPF4092	Standard	PMBF4392	FET
SK702	POLYFET	BLF546	Broadcast	TMPF4093	Standard	PMBF4393	FET
SM341	POLYFET	BLF177	Broadcast	TMPF4391	Standard	PMBF4391	FET
SM704	POLYFET	BLF147	Broadcast	TMPF4392	Standard	PMBF4392	FET
SM704	POLYFET	BLF246	Broadcast	TMPF4393	Standard	PMBF4393	FET
SMP1302-004	Skyworks	BAP50-05	PIN diode	TMPFB246A	Standard	BSR56	FET
SMP1302-005	Skyworks	BAP50-04	PIN diode	TMPFB246B	Standard	BSR57	FET
SMP1302-011	Skyworks	BAP50-03	PIN diode	TMPFB246C	Standard	BSR58	FET
SMP1302-074	Skyworks	BAP50-05W	PIN diode	TMPFJ111	Standard	PMBFJ111	FET
SMP1302-075	Skyworks	BAP50-04W	PIN diode	TMPFJ112	Standard	PMBFJ112	FET
SMP1302-079	Skyworks	BAP50-02	PIN diode	TMPFJ113	Standard	PMBFJ113	FET
SMP1304-001	Skyworks	BAP70-03	PIN diode	TMPFJ174	Standard	PMBFJ174	FET
SMP1304-011	Skyworks	BAP70-03	PIN diode	TMPFJ175	Standard	PMBFJ175	FET
SMP1307-001	Skyworks	BAP70-03	PIN diode	TMPFJ176	Standard	PMBFJ176	FET
SMP1307-011	Skyworks	BAP70-03	PIN diode	TMPFJ177	Standard	PMBFJ177	FET
SMP1320-004	Skyworks	BAP65-05	PIN diode	TPR400	Microsemi	BLAH0912-500	Microwave
SMP1320-011	Skyworks	BAP65-03	PIN diode	TPR500	Microsemi	BLA6H0912-501	Microwave
SMP1320-074	Skyworks	BAP65-05W	PIN diode	TPR500A	Microsemi	BLA6H0912-502	Microwave
SMP1321-001	Skyworks	BAP1321-03	PIN diode	TSDF54040	Vishay	BF1102	FET
SMP1321-005	Skyworks	BAP1321-04	PIN diode	TSDF54040-GS08	Vishay	BF1102	FET
SMP1321-011	Skyworks	BAP1321-03	PIN diode	TSDF54040X-GS08	Vishay	BF1102	FET
SMP1321-075	Skyworks	BAP1321-04	PIN diode	TSDF54040XR-GS08	Vishay	BF1102R	FET
SMP1321-079	Skyworks	BAP1321-02	PIN diode	UF2805B	M/A- COM	BLF871	Broadcast
SMP1322-004	Skyworks	BAP65-05	PIN diode	UF28100H	M/A- COM	BLF871	Broadcast
SMP1322-011	Skyworks	BAP65-03	PIN diode	UF28100M	M/A- COM	BLF871	Broadcast
SMP1322-074	Skyworks	BAP65-05W	PIN diode	UF28100V	M/A- COM	BLF871	Broadcast
SMP1322-079	Skyworks	BAP65-02	PIN diode	UF2810P	M/A- COM	BLF871	Broadcast
SMP1340-011	Skyworks	BAP63-03	PIN diode	UF28150J	M/A- COM	BLF881	Broadcast
SMP1340-079	Skyworks	BAP63-02	PIN diode	UF2815B	M/A- COM	BLF871	Broadcast
SMP1352-011	Skyworks	BAP64-03	PIN diode	UF2820P	M/A- COM	BLF871	Broadcast
SMP1352-079	Skyworks	BAP64-02	PIN diode	UF2820R	M/A- COM	BLF871	Broadcast
SMV1235-004	Skyworks	BB181	Varicap	UF2840G	M/A- COM	BLF881	Broadcast
SMV1236-004	Skyworks	BB156	Varicap	UF2840P	M/A- COM	BLF881	Broadcast
SR341	POLYFET	BLF378	Broadcast	UMIL100	Microsemi	BLF871	Broadcast
SR341	POLYFET	BLF278	Broadcast	UMIL100A	Microsemi	BLF871	Broadcast
SR401	POLYFET	BLF248	Broadcast	UMIL60	Microsemi	BLF878	Broadcast
SR401	POLYFET	BLF348	Broadcast	UMIL80	Microsemi	BLF878	Broadcast
SR401	POLYFET	BLF368	Broadcast	uPC2709	NEC	BGA2709	MMIC
SR703	POLYFET	BLF547	Broadcast	uPC2711	NEC	BGA2711	MMIC
SR704U	POLYFET	BLF548	Broadcast	uPC2712	NEC	BGA2712	MMIC
SST111	Standard	PMBFJ111	FET	uPC2745	NEC	BGA2001	MMIC
SST112	Standard	PMBFJ112	FET	uPC2746	NEC	BGA2001	MMIC
SST113	Standard	PMBFJ113	FET	uPC2748	NEC	BGA2748	MMIC
SST174	Standard	PMBFJ174	FET	uPC2771	NEC	BGA2771	MMIC
SST175	Standard	PMBFJ175	FET	uPC8112	NEC	BGA2022	MMIC
SST176	Standard	PMBFJ176	FET	UTV200	Microsemi	BLF571	Broadcast
SST177	Standard	PMBFJ177	FET	UTV8100B	Microsemi	BLF645	Broadcast
SST201	Standard	BFT46	FET	VAM80	Microsemi	BLF878	Broadcast
SST202	Standard	BFR31	FET	VMIL100	Microsemi	BLF645	Broadcast
SST203	Standard	BFR30	FET	VRF148A	Microsemi	BLF881	Broadcast
SST308	Standard	PMBFJ308	FET	VRF150	Microsemi	BLF177	Broadcast
SST309	Standard	PMBFJ309	FET	VRF151	Microsemi	BLF177	Broadcast
SST310	Standard	PMBFJ310	FET	VRF151G	Microsemi	BLF878	Broadcast
SST4391	Standard	PMBF4391	FET				
SST4392	Standard	PMBF4392	FET				
SST4393	Standard	PMBF4393	FET				
SST4856	Standard	BSR56	FET				

5.2 Cross-references: NXP discontinued types versus NXP replacement types

In alphabetical order of manufacturer discontinued type

Abbreviations:

BS diode	Band switch diode
CATV	Community antenna television system
FET	Field effect transistor
Varicap	Varicap diode
WB trs	Wideband transistor
RFP trs	RF Power transistor

























NXP discontinued type	Product family NXP	Replacement type NXP	NXP discontinued type	Product family NXP	Replacement type NXP
BA277-01	BS diode	BA277	BFU725F	WB trs	BFU725F/N1
BA792	BS diode	BA591	BGA2031	WB trs	BGA2031/1
BAP142L	PIN diode	BAP142LX	BGD102/02	CATV	BGD502
BAP51-01	PIN diode	BAP51LX	BGD102/04	CATV	BGD502
BAP51L	PIN diode	BAP51LX	BGD104	CATV	BGD704
BAP55L	PIN diode	BAP55LX	BGD104/04	CATV	BGD704
BB132	Varicap	BB152	BGD502/01	CATV	BGD502
BB145	Varicap	BB145B	BGD502/03	CATV	BGD502
BB145B-01	Varicap	BB145B	BGD502/05	CATV	BGD502
BB151	Varicap	BB135	BGD502/07	CATV	BGD502
BB157	Varicap	BB187	BGD502/6M	CATV	BGD702
BB178L	Varicap	BB178LX	BGD502/C7	CATV	BGD502
BB179BL	Varicap	BB179BLX	BGD502/R	CATV	BGD502
BB179L	Varicap	BB179LX	BGD504	CATV	BGD704
BB181L	Varicap	BB181LX	BGD504/01	CATV	BGD704
BB182B	Varicap	BB182	BGD504/02	CATV	BGD704
BB182L	Varicap	BB182LX	BGD504/09	CATV	BGD704
BB187L	Varicap	BB187LX	BGD602	CATV	BGD702
BB190	Varicap	BB149	BGD602/02	CATV	BGD702
BB202L	Varicap	BB202LX	BGD602/07	CATV	BGD702
BB804	Varicap	BB207	BGD602/09	CATV	BGD702
BBY42	Varicap	BBY40	BGD602/14	CATV	BGD702
BF1203	FET	BF1203	BGD602D	CATV	BGD712
BF689K	WB trs	BFS17	BGD702D	CATV	BGD712
BF763	WB trs	BFS17	BGD702D/08	CATV	BGD712
BF851A	FET	BF861A	BGD704/01	CATV	BGD704
BF851C	FET	BF861C	BGD704/07S	CATV	BGD704
BF992/01	FET	BF992	BGD704/S9	CATV	BGD704
BFC505	WB trs	BFM505	BGD704N	CATV	BGD714
BFC520	WB trs	BFM520	BGD802/09	CATV	BGD802
BFET505	WB trs	BFM505	BGD802N	CATV	BGD812
BFET520	WB trs	BFM520	BGD802N/07	CATV	BGD812
BFG17A	WB trs	BFS17A	BGD804N	CATV	BGD814
BFG197	WB trs	BFG198	BGD804N/02	CATV	BGD814
BFG197/X	WB trs	BFG198	BGD902	CATV	BGD812
BFG25AW/XR	WB trs	BFG25AW/X	BGD902/07	CATV	BGD902
BFG410W/CA	WB trs	BFG410W	BGD902L	CATV	BGD812
BFG425W/CA	WB trs	BFG425W	BGD904	CATV	BGD814
BFG505/XR	WB trs	BFG505/X	BGD904/02	CATV	BGD904
BFG505W/XR	WB trs	BFG505	BGD904/07	CATV	BGD904
BFG520W/XR	WB trs	BFG520W/X	BGD904L	CATV	BGD814
BFG590/XR	WB trs	BFG590/X	BGD906	CATV	CGD942C
BFG590W	WB trs	BFG590	BGE788	CATV	BGE788C
BFG590W/XR	WB trs	BFG590	BGE847BO	CATV	BGO827
BFG67/XR	WB trs	BFG67	BGE847BO/FC	CATV	BGO827/SC0
BFG92A	WB trs	BFG92A/X	BGE847BO/FC0	CATV	BGO827/SC0
BFG92A/XR	WB trs	BFG92A/X	BGE847BO/FC0	CATV	BGO827/SC0
BFG93A/XR	WB trs	BFG93A/X	BGE847BO/FC1	CATV	BGO827/SC0
BFQ34/01	WB trs	BFG35	BGE847BO/SC	CATV	BGO827/SC0
BFR92	WB trs	BFR92A	BGE847BO/SC0	CATV	BGO827/SC0
BFR92AR	WB trs	BFR92A	BGE887BO	CATV	BGO827
BFR92AT	WB trs	BFR92AW	BGE887BO/FC	CATV	BGO827/SC0
BFR93	WB trs	BFR92A	BGE887BO/FC1	CATV	BGO827/SC0
BFR93AT	WB trs	BFR93AW	BGE887BO/SC	CATV	BGO827/SC0
BFR93R	WB trs	BFR93A	BGO807	CATV	BGO807C
BFU510	WB trs	BFU725F/N1	BGO847/01	CATV	BGO847
BFU540	WB trs	BFU725F/N1	BGO847/01	CATV	BGO847





























NXP discontinued type	Product family NXP	Replacement type NXP
BGO847/FC0	CATV	BGO827/SC0
BGO847/FC01	CATV	BGO827/SC0
BGO847/SC0	CATV	BGO827/SC0
BGQ34/01	WB trs	BFG35
BGU2003	WB trs	BGA2003
BGX885/02	CATV	BGX885N
BGY1085A/07	CATV	BGY1085A
BGY584A	CATV	BGY585A
BGY585A/01	CATV	BGY585A
BGY586	CATV	BGY587
BGY586/05	CATV	BGY587
BGY587/01	CATV	BGY587
BGY587/02	CATV	BGY587
BGY587/07	CATV	BGY587
BGY587/09	CATV	BGY587
BGY587B/01	CATV	BGY587B
BGY587B/02	CATV	BGY587B
BGY587B/09	CATV	BGY587B
BGY588	CATV	BGY588N
BGY588/04	CATV	BGY588N
BGY66B/04	CATV	BGY66B
BGY67/04	CATV	BGY67
BGY67/09	CATV	BGY67
BGY67/14	CATV	BGY67
BGY67/19	CATV	BGY67
BGY67A/04	CATV	BGY67A
BGY67A/14	CATV	BGY67A
BGY68/01	CATV	BGY68
BGY685A/07	CATV	BGY685A
BGY685AD	CATV	BGY785A
BGY685AL	CATV	BGY785A
BGY687/07	CATV	BGY687
BGY687/14	CATV	BGY687
BGY687B	CATV	BGE787B
BGY687B/02	CATV	BGE787B
BGY785A/07	CATV	BGY785A
BGY785A/09	CATV	BGY785A
BGY785AD	CATV	BGY785A
BGY785AD/06	CATV	BGY785A
BGY785AD/8M	CATV	BGY885A
BGY785AD/8M	CATV	BGY885A
BGY787/02	CATV	BGY787
BGY787/07	CATV	BGY787
BGY787/09	CATV	BGY787
BGY847BO	CATV	BGO827
BGY847BO/SC	CATV	BGO827/SC0
BGY84A	CATV	BGY585A
BGY84A/04	CATV	BGY585A
BGY84A/05	CATV	BGY585A
BGY85	CATV	BGY585A
BGY85A	CATV	BGY585A
BGY85A/04	CATV	BGY585A
BGY85A/05	CATV	BGY585A
BGY85H/01	CATV	BGY585A
BGY86	CATV	BGY587
BGY86/05	CATV	BGY587
BGY87	CATV	BGY587
BGY87/J1	CATV	BGY587
BGY87B	CATV	BGY587B
BGY88	CATV	BGY588N
BGY88/04	CATV	BGY588N
BGY88/04	CATV	BGY588N
BGY88/07	CATV	BGY588N
BGY887/02	CATV	BGY887
BGY887BO	CATV	BGO827
BGY887BO/FC	CATV	BGO827/FC0
BGY887BO/SC	CATV	BGO827/SC0
BLC6G22-100	RFP trs	BLF6G22-100
BLF1822-10	RFP trs	BLF6G21-10G
BLF2043	RFP trs	BLF6G21-10G
BLF2045	RFP trs	BLF6G20-45BLF6G22-45
BLF4G08LS-160A	RFP trs	BLF6G10LS-160RN
BLF4G08LS-160A	RFP trs	BLF6G10LS-160RN
BLS2731-110T	RFP trs	BLS6G2731-120
BLS2731-110	RFP trs	BLS6G2731-120
BLS2731-20	RFP trs	BLS6G2731-6G

NXP discontinued type	Product family NXP	Replacement type NXP
BLS2731-50	RFP trs	BLS6G2731-6G
BLF3G22-30	RFP trs	BLF6G22-45
CGD914	CATV	CGD1042H
CGY887A	CATV	CGY1043
CGY887B	CATV	CGY1047
GD923	CATV	CGD942C
OM7650	CATV	BGY588C
OM7670	CATV	BGE788C
ON4520/09	CATV	BGY687
ON4520/2	CATV	BGY687
ON4594/M5	CATV	BGY585A
ON4749	CATV	BGY588N
ON4831-2	CATV	BGY885A
ON4869	CATV	BGY587
ON4876	CATV	BGY1085A
ON4890	CATV	BGD712
ON4990	CATV	BGD885
PMBT3640/AT	WB trs	BFS17
PN4392	FET	PMBF4392
PN4393	FET	PMBF4393
TFF1004HN	Satellite IC	TFF1014HN

6. Packing and packaging information

6.1 Packing quantities per package with relevant ordering code

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method
	SOD323/SC-76	1.7 x 1.25 x 0.9	3,000	115	8 mm tape and reel
			10,000	135	8 mm tape and reel
	SOD523/SC-79	1.2 x 0.8 x 0.6	3,000	115	8 mm tape and reel
			10,000	135	8 mm tape and reel
			8,000	315	2 mm pitch tape and reel
			20,000	335	2 mm pitch tape and reel
	SOD882D	1.0x0.6x0.4	15000	315	reel
	SOT23	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel
			10,000	235	8 mm tape and reel
	SOT54	4.6 x 3.9 x 5.1	5,000	112	bulk, delta pinning
			5,000	412	bulk, straight leads
			10,000	116	tape and reel, wide pitch
			10,000	126	tape ammpack, wide pitch
	SOT89/SC-62	4.5 x 2.5 x 1.5	1,000	115	12 mm tape and reel
			4,000	135	12 mm tape and reel
	SOT115	44.5 x 13.65 x 20.4	100	112	4 tray/box
	SOT121B	28.45 x 28.45 x 7.27	20	112	blister, tray
	SOT143(N/R)	2.9 x 1.3 x 0.9	3,000	215	8 mm tape and reel
			10,000	235	8 mm tape and reel
	SOT223/SC-73	6.7 x 3.5 x 1.6	1,000	115	12 mm tape and reel
			4,000	135	12 mm tape and reel
	SOT307	10 x 10 x 1.75	1,500	518	13" tape and reel dry pack
			96	551	1 tray dry pack
			480	557	5 tray dry pack
	SOT323/SC-70	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
			10,000	135	8 mm tape and reel
	SOT341	5.3 x 10.2	1,000	118	13" tape and reel
			658	112	tube
	SOT343(N/R)	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
			10,000	135	8 mm tape and reel
	SOT343F	2.1 x 1.25 x 0.7	3,000	115	8 mm tape and reel
	SOT360	6.5 x 4.4 x 0.9	2,500	118	16 mm tape and reel
	SOT363/SC-88	2.0 x 1.25 x 0.9	3,000	115	8 mm tape and reel
			10,000	135	8 mm tape and reel
	SOT363	2.1 x 2.0 x 0.9	3,000	115	reel
			10,000	135	
	SOT401	5 x 5 x 1.4	2,000	118	13" tape and reel
			360	151	1 tray
	SOT403	5.0 x 4.4 x 0.9	2,500	118	12 mm tape and reel
	SOT416/SC-75	1.6 x 0.8 x 0.75	3,000	115	8 mm tape and reel
	SOT467B	9.78 x 18.29 x 4.67	60	112	blister, tray
			20	112	blister, tray
	SOT467C	20.45 x 18.54 x 4.67	60	112	blister, tray
			20	112	blister, tray
	SOT502A	19.8 x 9.4 x 4.1	60	112	blister, tray
			300	135	reel

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method
	SOT502B	19.8 x 9.4 x 4.1	60	112	blister, tray
			100	118	reel
	SOT538A	5.1 x 4.1 x 2.6	160	112	blister, tray
	SOT539A	31.25 x 9.4 x 4.65	60	112	blister, tray
			300	135	reel
	SOT540A	21.85 x 10.2 x 5.4	60	112	blister, tray
	SOT608A	10.1 x 10.1 x 4.2	60	112	blister, tray
			60	112	blister, tray
			300	135	reel
	SOT608B	10.1 x 10.1 x 4.2	60	112	blister, tray
			100	118	reel
			300	135	reel
	SOT616	4.0 x 4.0 x 0.85	6,000	118	12 mm tape and reel
			1,500	115	8 mm tape and reel
			100	551	tray
	SOT617	5 x 5 x 0.85	6,000	118	Tape and reel
	SOT618	6 x 6 x 0.85	4,000	118	13" tape and reel
			1,000	515	7" tape and reel dry pack
			490	551	1 tray dry pack
			2,450	157	5 tray
	SOT638	14 x 14 x 1	1,000	518	13" tape and reel dry pack
			90	551	1 tray dry pack
			450	557	5 tray dry pack
	SOT650-1	3.0 x 3.0 x 0.85	6000	118	reel
	SOT666	1.6 x 1.2 x 0.7	4,000	115	8 mm tape and reel
	SOT684	8 x 8 x 0.85	1,000	518	13" tape and reel dry pack
			260	151	1 tray
			260	551	1 tray dry pack
			1,300	157	5 tray dry pack
	SOT724	8.7 x 3.9 x 1.47	2,500	118	16 mm tape and reel
	SOT753	2.9 x 1.5 x 1.0	3,000	125	8 mm tape and reel
	SOT763-1	2.5x3.5x0.85	3,000	115	reel
			6,000	135	
	SOT778	6.0 x 6.0 x 0.85	490	551	tray
			4,000	518	multiple trays
	SOT822-1	15.9 x 11 x 3.6	180	127	tube
	SOT834-1	15.9 x 11 x 3.15	180	127	tube
	SOT886	1.45 x 1.0 x 0.5	5000	115	8 mm tape and reel
	SOT891	1.0 x 1.0 x 0.5	5000	132	8 mm tape and reel
	SOT908	3.0 x 3.0 x 0.85	6000	118	12 mm tape and reel
	SOT922-1	17.4 x 9.4 x 3.88	60	112	blister, tray
	SOT975B	6.5 x 6.5 x 3.3	180	112	blister, tray
			100	118	Tape and reel
	SOT975C	6.5 x 6.5 x 3.3	180	112	blister, tray
			100	118	Tape and reel
	SOT979A	31.25 x 10.2 x 5.3	60	112	blister, tray
	SOT1110A	41.28 x 17.12 x 5.36	60	112	blister, tray
			100	118	reel
	SOT1110B	41.15 x 36.32 x 4.68	60	112	blister, tray

	Package	Package dimensions L x W x H (mm)	Packing quantity	Product 12NC ending	Packing method
	SOT1112A	16.65 x 20.32 x 4.205	60 100	112 118	blister, tray reel
	SOT1112B	16.65 x 15.22 x 4.205	60 100	112 118	blister, tray reel
	SOT1120A	9.4 x 19.815 x 4.1	60 100	112 118	blister, tray reel
	SOT1120B	9.4 x 19.815 x 4.1	60 100	112 118	blister, tray reel
	SOT1121A	34.16 x 19.94 x 4.75	60 100	112 118	blister, tray reel
	SOT1121B	20.70 x 19.94 x 4.75	60 100	112 118	blister, tray reel
	SOT1121C	13.4 x 20.575 x 3.785	DEV	DEV	DEV
	SOT1130A	20.45 x 17.12 x 4.65	60	112	blister, tray
	SOT1130B	9.91 x 17.12 x 4.65	60	112	blister, tray
	SOT1135A	20.45 x 19.94 x 4.65	60 100	112 118	blister, tray reel
	SOT1135B	16.65 x 9.78 x 4.205	60 100	112 118	blister, tray reel
	SOT1135C	16.65 x 9.78 x 4.205	60 100	112 118	blister, tray reel
	SOT1138	19.48 x 20.57 x 3.9	DEV	DEV	DEV
	SOT1179	4.0 x 6.0 x 0.85	DEV	DEV	DEV
	SOT1198-1	10.0 x 5.5 x 0.8	1000	115	reel
	SOT1204	13.2 x 20.57 x 3.9	DEV	DEV	DEV
	SOT1240B	21.60 x 20.575 x 3.875	DEV	DEV	DEV
	SOT1240C	18.00 x 20.575 x 3.875	DEV	DEV	DEV
	SOT1242B	22.60 x 32.45 x 4.455	DEV	DEV	DEV
	SOT1242C	18.00 x 32.45 x 4.455	DEV	DEV	DEV
	SOT1244B	19.43 x 20.575 x 3.875	DEV	DEV	DEV
	SOT1244C	18.00 x 20.575 x 3.875	DEV	DEV	DEV

6.2 Marking codes list

Search online on marking code: <http://www.nxp.com/package/>

In alphabetical order of marking code

In case a '%' is given in the marking code, it means this type can be assembled at different assembly sites.

p = made in Hong-Kong

t = made in Malaysia

W = made in China

Marking code	Type	Package	Marking code	Type	Package	Marking code	Type	Package
10%	BAT18	SOT23	%MA	BF991	SOT143	A8	BAP50-03	SOD323
13%	BB207	SOT23	%MB	BF992	SOT143	A8%	BFG325W/XR	SOT343
20%	BF545A	SOT23	%MC	BF904	SOT143	A8%	PMBFJ620	SOT363
21%	BF545B	SOT23	%MD	BF904R	SOT143	A9	BAP70-03	SOD323
22%	BF545C	SOT23	%ME	BFG505	SOT143	AC	BGU7005	SOT886
24%	BF556A	SOT23	%MF	BFG520	SOT143	B3	BGU7003	SOT891
25%	BF556B	SOT23	%MG	BFG540	SOT143	B6-	BGA2715	SOT363
26%	BF556C	SOT23	%MH	BFG590	SOT143	B6	BGU7007	SOT886
28%	BF861A	SOT23	%MK	BFG505/X	SOT143	B6%	BFU725F	SOT343F
29%	BF861B	SOT23	%ML	BFG520/X	SOT143	B7%	BGA2716	SOT363
30%	BF861C	SOT23	%MM	BFG540/X	SOT143	BC%	BFG591	SOT89
31%	BFR505	SOT23	%MN	BFG590/X	SOT143	BFG135	BFG135	SOT223
32%	BFR520	SOT23	%MP	BFG520/XR	SOT143	BFG198	BFG198	SOT223
33%	BFR540	SOT23	%MR	BFG540/XR	SOT143	BFG31	BFG31	SOT223
34%	BFT25A	SOT23	%MS	BFG10	SOT143	BFG35	BFG35	SOT223
38%	PMBFJ108	SOT23	%MT	BFG10/X	SOT143	BFG541	BFG541	SOT223
39%	PMBFJ109	SOT23	%MU	BFG25A/X	SOT143	BFG591	BFG591	SOT223
40%	PMBFJ110	SOT23	%MV	BFG67/X	SOT143	BFG94	BFG94	SOT223
41%	PMBFJ111	SOT23	%MW	BFG92A/X	SOT143	BFG97	BFG97	SOT223
42%	PMBFJ112	SOT23	%MX	BFG93A/X	SOT143	BLT50	BLT50	SOT223
47%	PMBFJ113	SOT23	%MY	BF1100	SOT143	BLT70	BLT70	SOT223
48%	PMBFJ308	SOT23	%MZ	BF1100R	SOT143	BLT80	BLT80	SOT223
49%	PMBFJ309	SOT23	%VA	BGU7041	SOT363	BLT81	BLT81	SOT223
50%	PMBFJ310	SOT23	%VB	BGU7042	SOT363	C1%	BGM1011	SOT363
1	BA277	SOD523	1B%	BGA2717	SOT363	C2%	BGM1012	SOT363
2	BB182	SOD523	1C%	BAP50-05	SOT23	C4%	BGM1013	SOT363
7	BA891	SOD523	1N%	BAP70-04W	SOT323	C5%	BGM1014	SOT363
8	BB178	SOD523	2A%	BF862	SOT23	D1	BFU610F	SOT343F
9	BB179	SOD523	2L	BF1208	SOT666	D2	BFU630F	SOT343F
%1W	BAP51-05W	SOT323	2N	BF1206F	SOT666	D2	BAP63-03	SOD323
%3A	BGA6289	SOT89	2R	BF1207F	SOT666	D3	BFU660F	SOT343F
%4A	BGA6489	SOT89	4A	BF1208D	SOT666	D3	BAP65-03	SOD323
%5A	BGA6589	SOT89	4K%	BAP64-04	SOT23	D4	BFU690F	SOT343F
%6G	PMBF4393	SOT23	4L%	BAP50-04	SOT23	D4%	BF30/B	SOT23
%6J	PMBF4391	SOT23	4W%	BAP64-04W	SOT323	D5	BFU710F	SOT343F
%6K	BGA7024	SOT89	5K%	BAP64-05	SOT23	D6	BFU730F	SOT343F
%6K	PMBF4392	SOT23	5W%	BAP64-05W	SOT323	D7	BFU760F	SOT343F
%6L	BGA7027	SOT89	6F%	BAP1321-04	SOT23	D8	BFU790F	SOT343F
%6S	PMBFJ176	SOT23	6K%	BAP64-06	SOT23	E1%	BFS17	SOT23
%6W	PMBFJ175	SOT23	6W%	BAP50-04W	SOT323	E1%	BFS17/FD	SOT23
%6X	PMBFJ174	SOT23	7K%	BAP65-05	SOT23	E1%	BFS17W	SOT323
%6Y	PMBFJ177	SOT23	8K%	BAP70-05	SOT23	E2%	BFS17A	SOT23
%AB	BF1210	SOT363	A1	BA591	SOD323	E2%	BGA2712	SOT363
%E7	BGA2800	SOT363	A1	BB208-02	SOD523	E3%	BGA2709	SOT363
%E8	BGA2801	SOT363	A1	BGA2001	SOT343	E6%	BFG17A	SOT23
%E9	BGA2815	SOT363	A1	BAP64Q	SOT753	FB	BFQ19	SOT89
%EA	BGA2816	SOT363	A2	BAP70Q	SOT753	FF	BFQ18A	SOT89
%EB	BGA2850	SOT363	A2	BAT18	SOT23	FG	BFQ149	SOT89
%EC	BGA2865	SOT363	A2	BB184	SOD523	G2	BA278	SOD523
%ED	BGA2866	SOT363	A2	BB208-03	SOD323	G2%	BGA2711	SOT363
%M1	BF908	SOT143	A2%	BGA2022	SOT363	G3%	BGA2748	SOT363
%M2	BF908R	SOT143	A3	BAP64-03	SOD323	G4%	BGA2771	SOT363
%M3	BF909	SOT143	A3	BB198	SOD523	G5%	BGA2776	SOT363
%M4	BF909R	SOT143	A3	BGA2003	SOT343	K1	BAP51-02	SOD523
%M5	BF909A	SOT143	A3%	BGA2031/1	SOT363	K2	BAP51-05W	SOD523
%M6	BF909AR	SOT143	A5	BAP51-03	SOD323	K4	BAP50-02	SOD523
%M7	BF904A	SOT143	A5%	BGA2011	SOT363	K5	BAP63-02	SOD523
%M8	BF904AR	SOT143	A6%	BGA2012	SOT363	K6	BAP65-02	SOD523
%M9	BSS83	SOT143	A7%	BFG310W/XR	SOT343	K7	BAP1321-02	SOD523

Marking code	Type	Package
K8	BAP70-02	SOD523
K9	BB199	SOD523
L1	BB202LX	SOD882D
L2	BAP51LX	SOD882D
L2	BB202	SOD523
L2%	BF1203	SOT363
L3	BB178LX	SOD882D
L3%	BF1204	SOT363
L4	BB179LX	SOD882D
L4%	BF1205	SOT363
L5	BB179BLX	SOD882D
L6	BB181LX	SOD882D
L6%	BF1206	SOT363
L7	BB182LX	SOD882D
L8	BB187LX	SOD882D
L9%	BF1208	SOT363
LA	BF1201WR	SOT343
LA%	BF1201	SOT143
LB%	BF1201R	SOT143
LD%	BF1202	SOT143
LE	BF1202WR	SOT343
LE%	BF1202R	SOT143
LF%	BF1211	SOT143
LG%	BF1212	SOT143
LH%	BF1211R	SOT143
LK%	BF1212R	SOT143
M08	PMBFJ308	SOT23
M09	PMBFJ309	SOT23
M1%	BFR30	SOT23
M10	PMBFJ310	SOT23
M2%	BF1207	SOT363
M2%	BFR31	SOT23
M3%	BFT46	SOT23
M33	BF861A	SOT23
M34	BF861B	SOT23
M35	BF861C	SOT23
M4%	BF1215	SOT363
M5%	BF1216	SOT363
M6%	BF1205C	SOT363
M65	BF545A	SOT23
M66	BF545B	SOT23
M67	BF545C	SOT23
M7%	BF1218	SOT363
M84	BF556A	SOT23
M85	BF556B	SOT23
M86	BF556C	SOT23
MA%	BGA2802	SOT363
MB	BF998WR	SOT343
MB%	BGA2803	SOT363
MC	BF904WR	SOT343
MC%	BGA2851	SOT363
MD	BF908WR	SOT343
MD%	BGA2869	SOT363
ME	BF909WR	SOT343
MF	BF1100WR	SOT343
MG	BF909AWR	SOT343
MG%	BF994S	SOT143
MH	BF904AWR	SOT343
MH%	BF996S	SOT143
MK	BF1211WR	SOT343
ML	BF1212WR	SOT343
MO%	BF998	SOT143
MO%	BF998R	SOT143
N	BB181	SOD523
N0	BFR505T	SOT416
N0%	BFM505	SOT363
N0%	BFS505	SOT323
N1	BFG505W/X	SOT343
N2	BFR520T	SOT416
N2%	BFM520	SOT363
N2%	BFS520	SOT323
N3	BFG520W	SOT343
N4	BFG520W/X	SOT343
N4	BFQ540	SOT89
N4%	BFS540	SOT323
N6%	BFS25A	SOT323
N7	BFG540W/X	SOT343

Marking code	Type	Package
N8	BFG540W/XR	SOT343
N9	BFG540W	SOT343
N9%	BAP70AM	SOT363
NA	BF1105WR	SOT343
NA%	BF1105R	SOT143
NB	BF1109WR	SOT343
NB%	BF1109R	SOT143
NC	BF1101WR	SOT343
NC%	BF1101R	SOT143
ND	BFG424W	SOT343
ND%	BF1101	SOT143
NE	BFG424F	SOT343
NE%	BF1105	SOT143
NF%	BF1109	SOT143
NG%	BF1108	SOT143
NH%	BF1108R	SOT143
P08	PMBFJ108	SOT23
P09	PMBFJ109	SOT23
P1	BFG21W	SOT343
P1	BB131	SOD323
P10	PMBFJ110	SOT23
P11	PMBFJ111	SOT23
P12	PMBFJ112	SOT23
P13	PMBFJ113	SOT23
P2%	BFR92A	SOT23
P2%	BFR92AW	SOT323
P3	BFG403W	SOT343
P4	BFG410W	SOT343
P5	BB135	SOD323
P5	BFG425W	SOT343
P6	BFG480W	SOT343
P7	BB147	SOD523
P8	BB148	SOD323
P9	BB149	SOD323
PB	BB152	SOD323
PC	BB153	SOD323
PE	BB155	SOD323
PF	BB156	SOD323
PL	BB149A	SOD323
R2%	BFR93A	SOT23
R2%	BFR93AW	SOT323
R5	BFR93AR	SOT23
R7%	BFR106	SOT23
R8%	BFG93A	SOT143
S	BAP64-02	SOD523
S1%	BFG310/XR	SOT143
S2%	BBY40	SOT23
S2%	BFG325/XR	SOT143
S3%	BF1107	SOT23
S6%	BF510	SOT23
S7%	BF511	SOT23
S8%	BF512	SOT23
S9%	BF513	SOT23
SB%	BF1214	SOT363
SC%	BGU7031	SOT363
SC%	BB201	SOT23
SD%	BGU7032	SOT363
SE%	BGU7033	SOT363
T5	BFG10W/X	SOT343
UY	BGU7004	SOT886
V1	BFG25AW/X	SOT343
V1%	BFT25	SOT23
V10	BFT25A	SOT23
V2%	BFQ67	SOT23
V2%	BFQ67W	SOT323
V3%	BFG67	SOT143
V4%	BAP64-06W	SOT323
V6%	BAP65-05W	SOT323
V8	BAP1321-03	SOD323
VA	BF1217WR	SOT343
VA	BF1217WR	SOT343R
VB	BF1118W	SOT343
VC	BF1118WR	SOT343
VC	BF1118WR	SOT343R
VC%	BF1118	SOT143
VD%	BF1118R	SOT143
VD%	BF1118R	SOT143R

Marking code	Type	Package
W1	BF1102	SOT363
W1%	BFT92	SOT23
W1%	BFT92W	SOT323
W2%	BF1102R	SOT363
W4%	BAP50-05W	SOT323
W6%	BAP51-04W	SOT323
W7%	BAP51-06W	SOT323
W9%	BAP63-05W	SOT323
X	BB187	SOD523
X1%	BFT93	SOT23
X1%	BFT93W	SOT323

7. Abbreviations

3-way	Doherty design using 3 discrete transistors	MPPM	Main and peak device realized in same push-pull transistor (2 times)
AM	Amplitude Modulation	MoCA	Multimedia over Coax Alliance
ASIC	Application Specific Integrated Circuit	MOSFET	Metal–Oxide–Semiconductor Field Effect Transistor
ASYM	Asymmetrical design of Doherty (main and peak device are different)	MPA	Medium Power Amplifier
BPF	Band Pass Filter	MRI	Magnetic Resonance Imaging
BUC	Block Upconverter	NF	Noise Figure
CATV	Community Antenna Television	NIM	Network Interface Module
CDMA	Code Division Multiple Access	NMR	Nuclear Magnetic Resonance
CMMB	Chinese Multimedia Mobile Broadcasting	PA	Power Amplifier
CMOS	Complementary Metal Oxide Semiconductor	PAR	Peak to Average Ratio
CQS	Customer Qualification Samples	PEP	Peak Envelope Power
DAB	Digital Audio Broadcasting	pHEMT	pseudomorphic High Electron Mobility Transistor
DECT	Digital Enhanced Cordless Telecommunications	PLL	Phase Locked Loop
DiSEqC	Digital Satellite Equipment Control	QUBiC	Quality BiCMOS
DSB	Digital Signal Processor	RF	Radio Frequency
DVB	Digital Video Broadcasting	RFS	Release for Supply
EDGE	Enhanced Data Rates for GSM Evolution	RoHS	Restriction of Hazardous Substances
ESD	Electro Static Device	Rx	Receive
FET	Field Effect Transistor	SARFT	State Administration for Radio, Film and Television
FM	Frequency Modulation	SER	Serializer
GaAs	Gallium Arsenide	SiGe:C	Sillicon Germanium Carbon
GaN	Gallium Nitride	SMATV	Satellite Master Antenna Television
Gen	Generation	SMD	Surface Mounted Device
GPS	Global Positioning System	SPDT	Single Pole, Double Throw
GSM	Global System for Mobile communications	SYM	Symmetrical design of Doherty (main and peak device are the same type of transistor)
HBT	Heterojunction Bipolar Transistor	TD-SCDMA	Time Division-Synchronous Code Division Multiple Access
HDTV	High Definition Television	TCAS	Traffic Collision Avoidance Systems
HF	High Frequency (3-30 MHz)	TMA	Tower Mounted Amplifier
HFC	Hybrid Fiber Coax	TTF	Time to First Fix
HFET	Heterostructure Field Effect Transistor	Tx	Transmit
HPA	High Power Amplifier	UHF	Ultra High Frequency (470-860 MHz)
HVQFN	Plastic thermally enHanced Very thin Quad Flat pack No leads	UMTS	Universal Mobile Telecommunications System
IF	Intermediate Frequency	VCO	Voltage Controlled Oscillator
ISM	Industrial, Scientific, Medical - reserved frequency bands	VGA	Variable Gain Amplifier
LDMOS	Laterally Diffused Metal-Oxide-Semiconductor	VHF	Very High Frequency (30-300 MHz)
LNA	Low Noise Amplifier	VoIP	Voice over Internet Protocol
LNB	Low Noise Block	VSAT	Very Small Aperture Terminal
LO	Local Oscillator	WCDMA	Wideband Code Division Multiple Access
LPF	Low Pass Filter	WiMAX	Worldwide Interoperability for Microwave Access
MESFET	Metal Semiconductor Field Effect Transistor	WLAN	Wireless Local Area Network
MMIC	Monolithic Microwave Integrated Circuit		
MMPP	Main and peak devices realized separately in halves of push-pull transistor		

8. Contacts and web links

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BGA2709	3.4.1	BGX7100	3.4.2	BLF6G20LS-140	3.7.1.3	BLP10H610	3.7.2.1
BGA2711	3.4.1	BGX7220	3.4.2	BLF6G20LS-180RN	3.7.1.3	BLP10H6120	3.7.2.1
BGA2712	3.4.1	BGX7221	3.4.2	BLF6G20LS-75	3.7.1.3	BLP10H6300P	3.7.2.1
BGA2714	3.4.1	BGX7300	3.4.2	BLF6G20S-230PRN	3.7.1.3	BLP10H6xx	3.7.2.1
BGA2715	3.4.1	BGX885N	3.6.1	BLF6G20S-45	3.7.1.3	BLP15M6100P	3.7.2.1
BGA2716	3.4.1	BGY1085A	3.6.2	BLF6G21-10G	3.7.1.1	BLP15M630	3.7.2.1
BGA2717	3.4.1	BGY585A	3.6.1	BLF6G22(LS)-180PN	3.7.1.4	BLP15M660P	3.7.2.1
BGA2748	3.4.1	BGY587	3.6.1	BLF6G22(LS)-180RN	3.7.1.4	BLP15M705	3.7.2.1
BGA2771	3.4.1	BGY587B	3.6.1	BLF6G22(S)-45	3.7.1.4	BLP15M710	3.7.2.1
BGA2776	3.4.1	BGY588C	3.6.1	BLF6G22L-40BN	3.7.1.4	BLP15M7150P	3.7.2.1
BGA2800	3.4.1	BGY588N	3.6.1	BLF6G22L(S)-40P	3.7.1.4	BLP15M7xx	3.7.2.1
BGA2801	3.4.1	BGY66B	3.6.5	BLF6G22LS-100	3.7.1.4	BLP2425M8140	3.7.2.3
BGA2802	3.4.1	BGY67	3.6.5	BLF6G22LS-40P	3.7.1.4	BLP2425M8250P	3.7.2.3
BGA2803	3.4.1	BGY67A	3.6.5	BLF6G22LS-75	3.7.1.4	BLP25M710	3.7.2.3
BGA2815	3.4.1	BGY68	3.6.5	BLF6G27LS-40P	3.7.1.5	BLP25M74	3.7.2.3
BGA2816	3.4.1	BGY685A	3.6.1	BLF6G38-10(G)	3.7.1.6	BLP7G10S-140P(G)	3.7.1.1
BGA2850	3.4.1	BGY687	3.6.1	BLF6G38(LS)-100	3.7.1.6	BLP7G10S-140PG	3.7.1.1
BGA2865	3.4.1	BGY785A	3.6.1	BLF6G38(LS)-25	3.7.1.6	BLP7G22-10	3.7.1.4
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BGA2870	3.4.1	BGY835C	3.6.1	BLF7G10LS-250	3.7.1.1	BLS6G2731(S)-120	3.7.3.3
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BGA6489	3.4.1	BGY885A	3.6.1	BLF7G15LS-300P	3.7.1.2	BLS6G2731S-130	3.7.3.3
BGA6589	3.4.1	BGY887	3.6.1	BLF7G20L-200	3.7.1.3	BLS6G2731S(S)-30	3.7.3.3
BGA7024	3.4.1	BGY887B	3.6.1	BLF7G20L-250P	3.7.1.3	BLS6G2735L(S)-30	3.7.3.3
BGA7027	3.4.1	BGY888	3.6.1	BLF7G20L-90P	3.7.1.3	BLS6G2735LS-30	3.7.3.3
BGA7124	3.4.1	BLA6G1011-200R(G)	3.7.3.1	BLF7G20L-140P	3.7.1.3	BLS6G2933P-200	3.7.3.3
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BGA7130	3.4.1	BLA6H0912-1000	3.7.3.1	BLF7G20LS-200P	3.7.1.3	BLS6G3135(S)-120	3.7.3.3
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