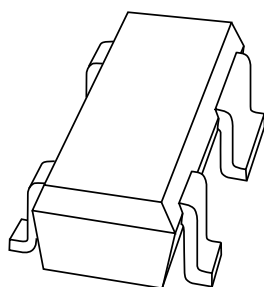


DATA SHEET



BGA2001 Silicon MMIC amplifier

Product specification
Supersedes data of 1999 Jul 23

1999 Aug 11



Silicon MMIC amplifier

BGA2001

FEATURES

- Low current, low voltage
- Very high power gain
- Low noise figure
- Integrated temperature compensated biasing
- Supply and RF output pin combined.

APPLICATIONS

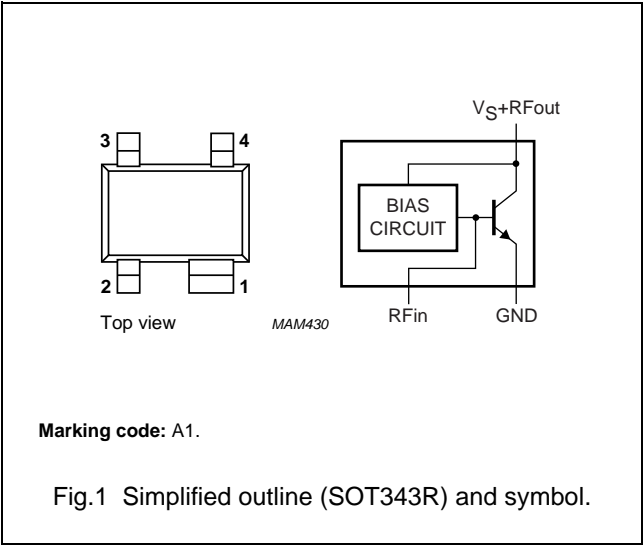
- RF front end
- Wideband applications, e.g. analog and digital cellular telephones, cordless telephones (PHS, DECT, etc.)
- Radar detectors
- Low noise amplifiers
- Satellite television tuners (SATV)
- High frequency oscillators.

DESCRIPTION

Silicon MMIC amplifier consisting of an NPN double polysilicon transistor with integrated biasing for low voltage applications in a plastic, 4-pin dual-emitter SOT343R package.

PINNING

PIN	DESCRIPTION
1	GND
2	RF in
3	GND
4	V _S + RFout



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V _S	DC supply voltage	RF input AC coupled	–	4.5	V
I _S	DC supply current	V _{V_S-OUT} = 2.5 V; RF input AC coupled	4.5	–	mA
MSG	maximum stable gain	V _{V_S-OUT} = 2.5 V; f = 1.8 GHz; T _{amb} = 25 °C	19.5	–	dB
NF	noise figure	V _{V_S-OUT} = 2.5 V; f = 1.8 GHz; Γ _S = Γ _{opt}	1.3	–	dB

Silicon MMIC amplifier

BGA2001

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_S	supply voltage	RF input AC coupled	–	4.5	V
I_S	supply current (DC)	forced by DC voltage on RF input	–	30	mA
P_{tot}	total power dissipation	$T_s \leq 100\text{ }^{\circ}\text{C}$	–	135	mW
T_{stg}	storage temperature		–65	+150	$^{\circ}\text{C}$
T_j	operating junction temperature		–	150	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	350	K/W

CHARACTERISTICS

RF input AC coupled; $T_j = 25\text{ }^{\circ}\text{C}$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_S	supply current	$V_{VS-OUT} = 1\text{ V}$	–	0.7	–	mA
		$V_{VS-OUT} = 2.5\text{ V}$	3	4.5	6	mA
		$V_{VS-OUT} = 4.5\text{ V}$	–	11	–	mA
MSG	maximum stable gain	$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 900\text{ MHz}$	–	22	–	dB
		$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 1.8\text{ GHz}$	–	19.5	–	dB
$ s_{21} ^2$	insertion power gain	$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 900\text{ MHz}$	–	18	–	dB
		$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 1.8\text{ GHz}$	–	14	–	dB
P_L	load power	at 1 dB gain compression point; $V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4.4\text{ mA}$; $f = 900\text{ MHz}$;	–	–2	–	dBm
NF	noise figure	$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 900\text{ MHz}$; $\Gamma_S = \Gamma_{opt}$	–	1.3	–	dB
		$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4\text{ mA}$; $f = 1.8\text{ GHz}$; $\Gamma_S = \Gamma_{opt}$	–	1.3	–	dB
IP3(in)	input intercept point; note 1	$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4.4\text{ mA}$; $f = 900\text{ MHz}$	–	–7.4	–	dBm
		$V_{VS-OUT} = 2.5\text{ V}$; $I_{VS-OUT} = 4.5\text{ mA}$; $f = 1800\text{ MHz}$	–	–4.5	–	dBm

Note

1. See application note: RNR-T45-99-B-0513.

Silicon MMIC amplifier

BGA2001

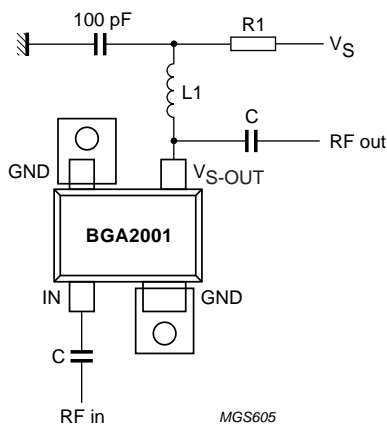


Fig.2 Typical application circuit.

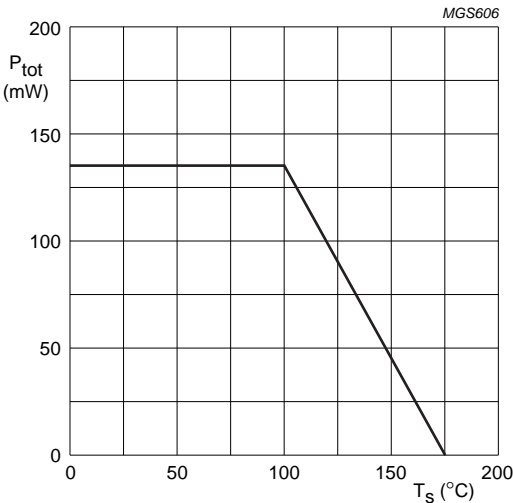


Fig.3 Power derating curve.

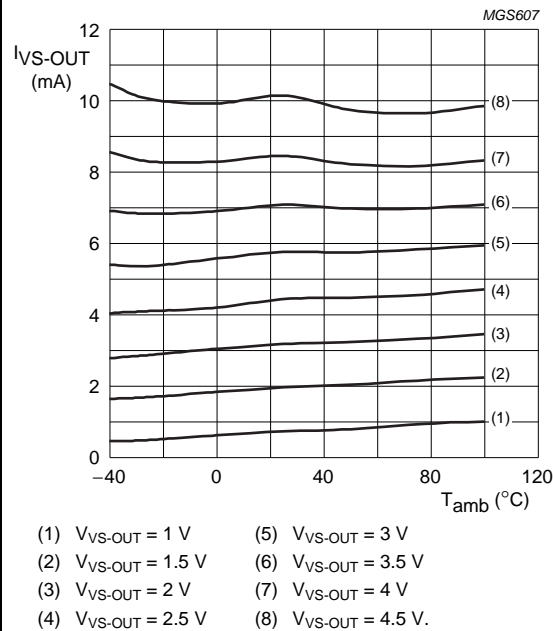


Fig.4 Bias current (I_{VS-OUT}) as a function of ambient temperature with V_{VS-OUT} as parameter; typical values.

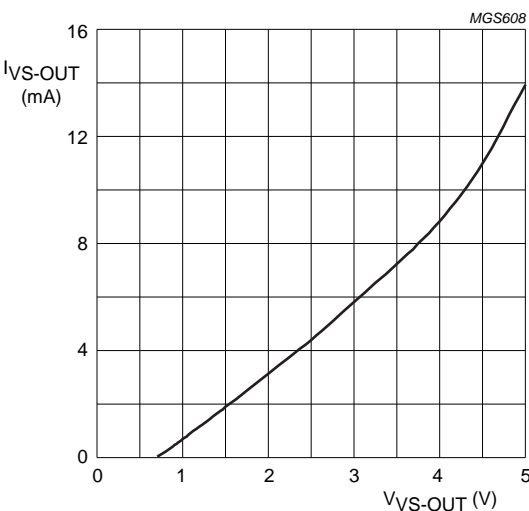
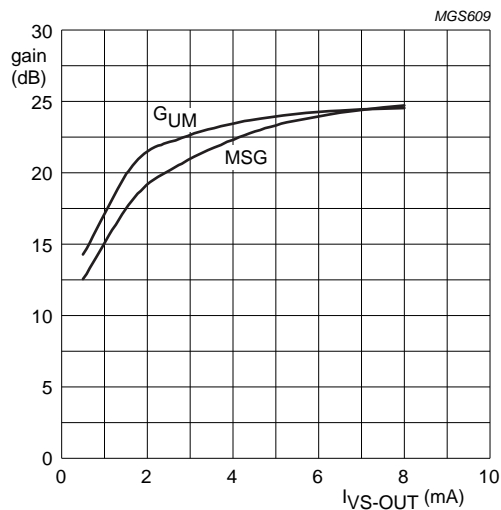


Fig.5 Bias current (I_{VS-OUT}) as a function of voltage at the output pin (V_{VS-OUT}); typical values.

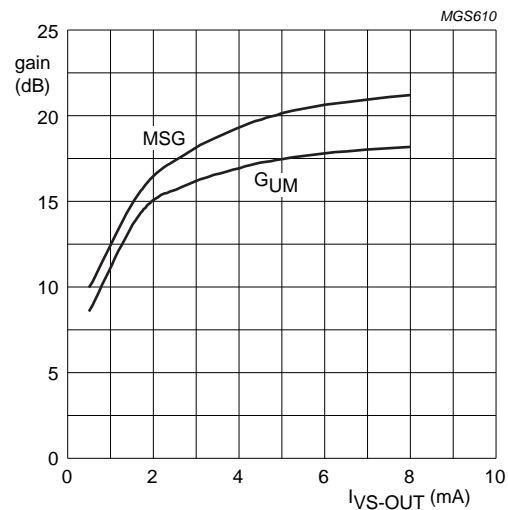
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BGA2001



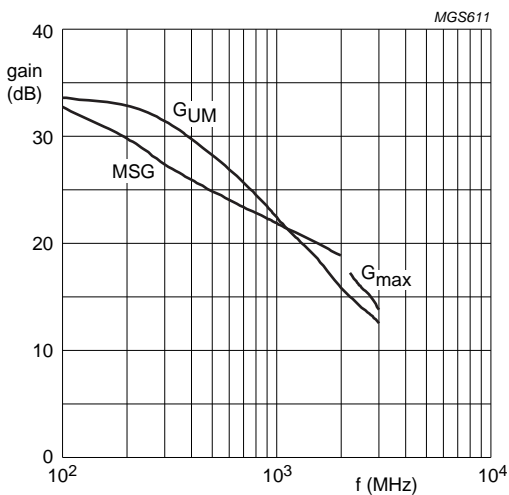
$f = 900$ MHz.

Fig.6 Gain as a function of bias current (I_{VS-OUT}); typical values.



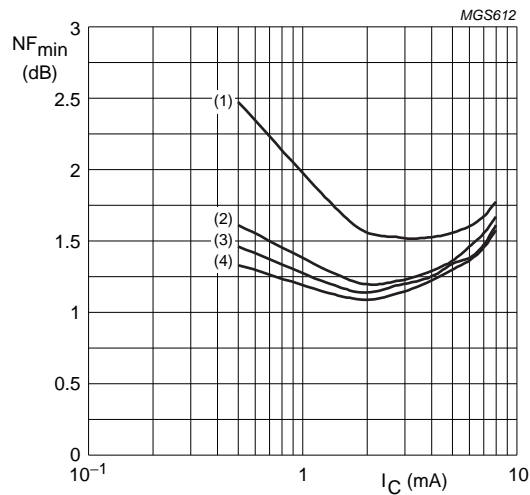
$f = 1800$ MHz.

Fig.7 Gain as a function of bias current (I_{VS-OUT}); typical values.



$V_{VS-OUT} = 2.5$ V; $I_{VS-OUT} = 4$ mA.

Fig.8 Gain as a function of frequency; typical values.



(1) $f = 2400$ MHz (3) $f = 900$ MHz
(2) $f = 1000$ MHz (4) $f = 1800$ MHz.

Fig.9 Minimum noise figure as a function of bias current (I_{VS-OUT}); typical values.

Silicon MMIC amplifier

BGA2001

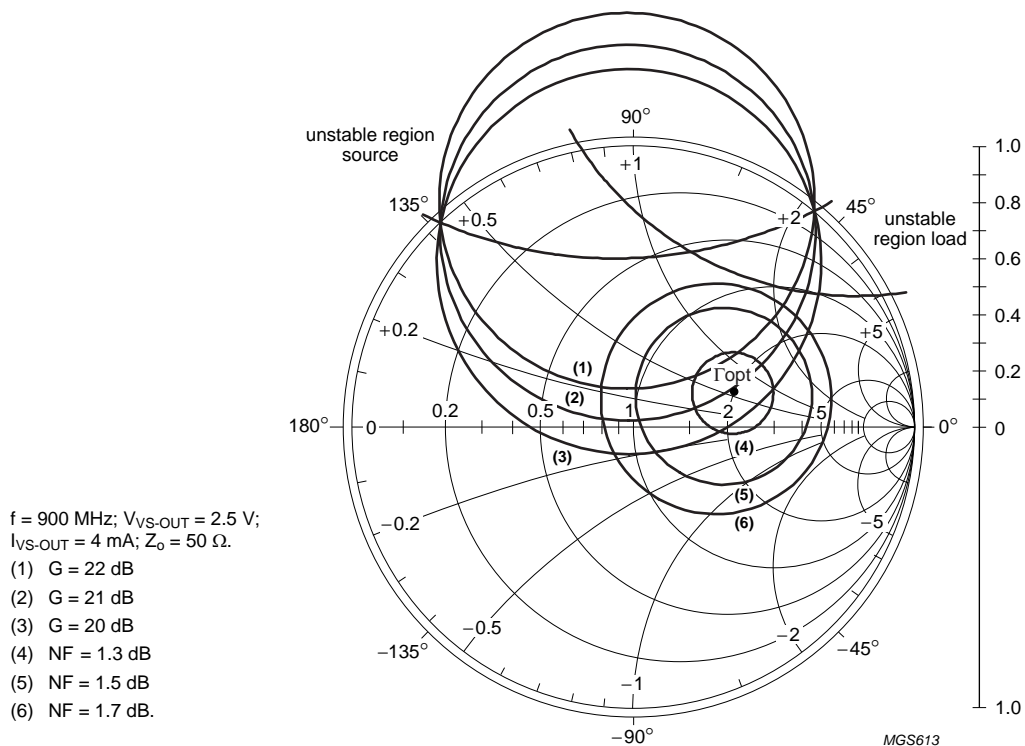


Fig.10 Noise, stability and gain circles; typical values.

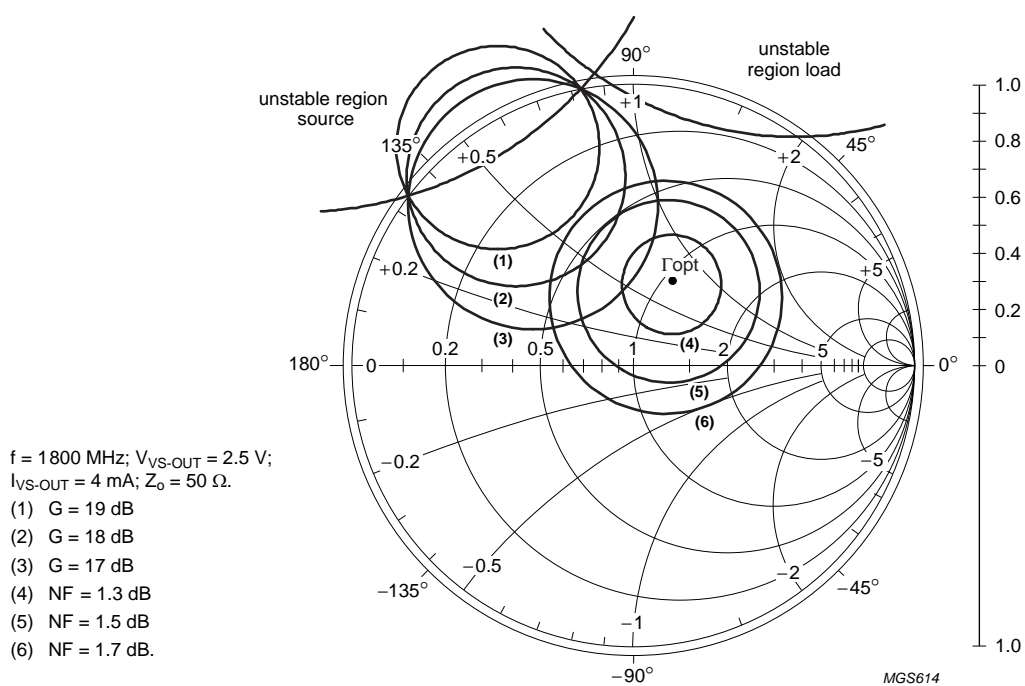
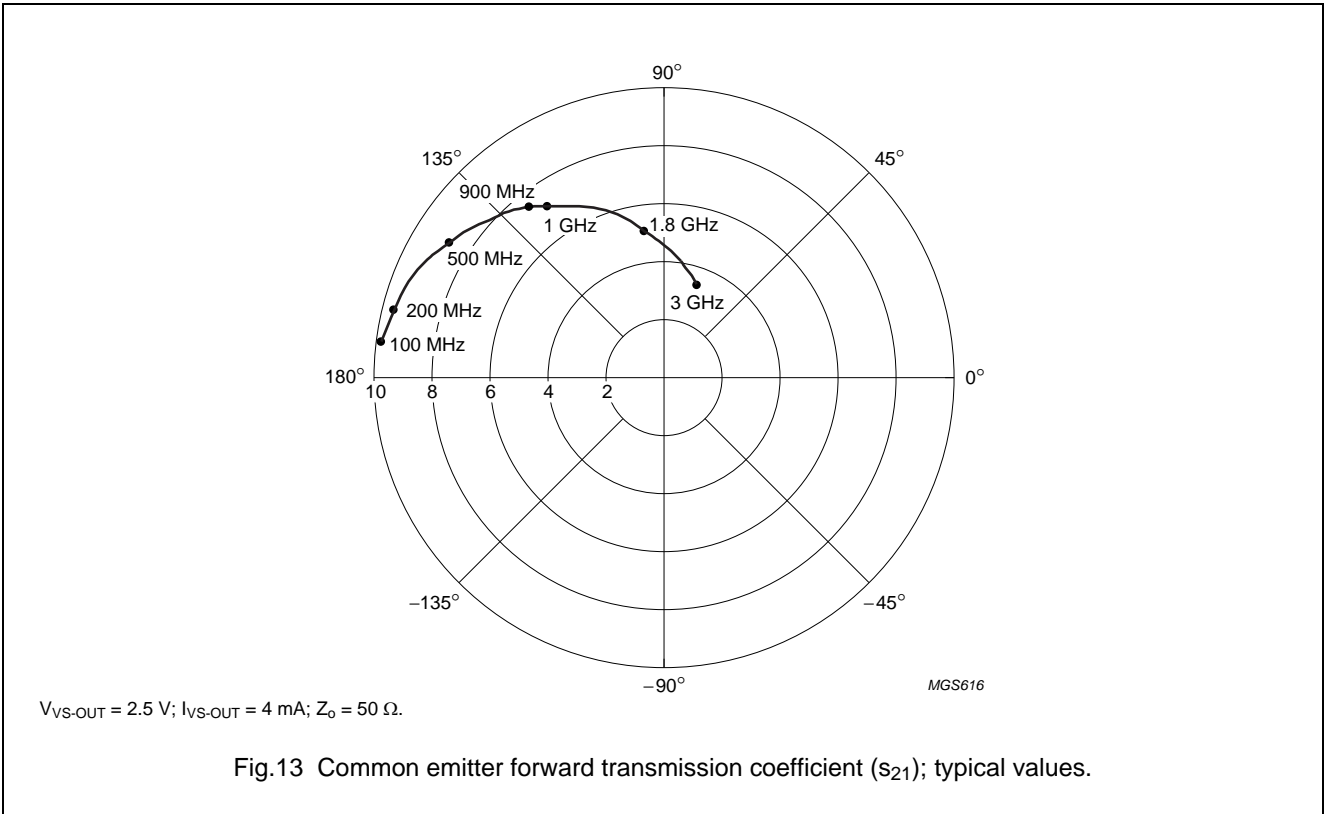
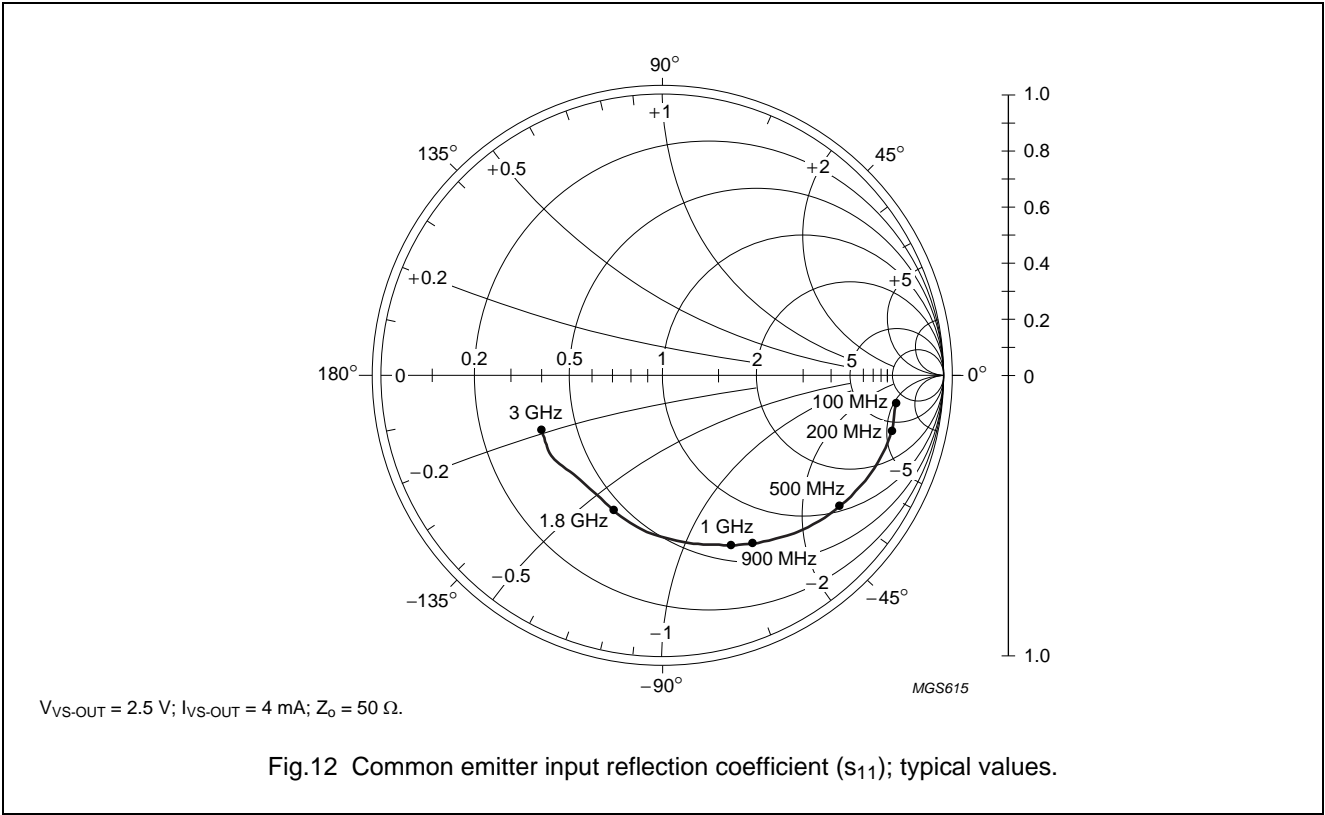


Fig.11 Noise, stability and gain circles; typical values.

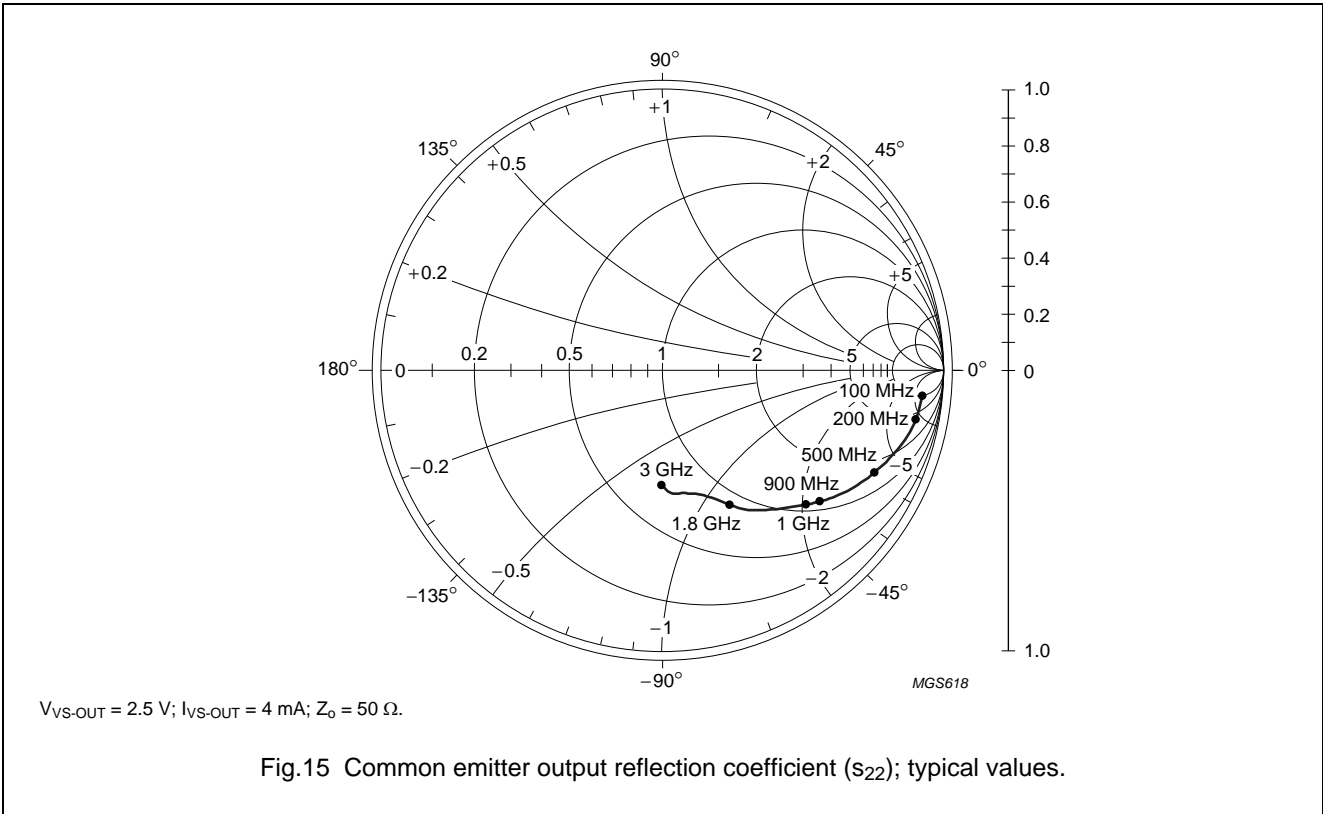
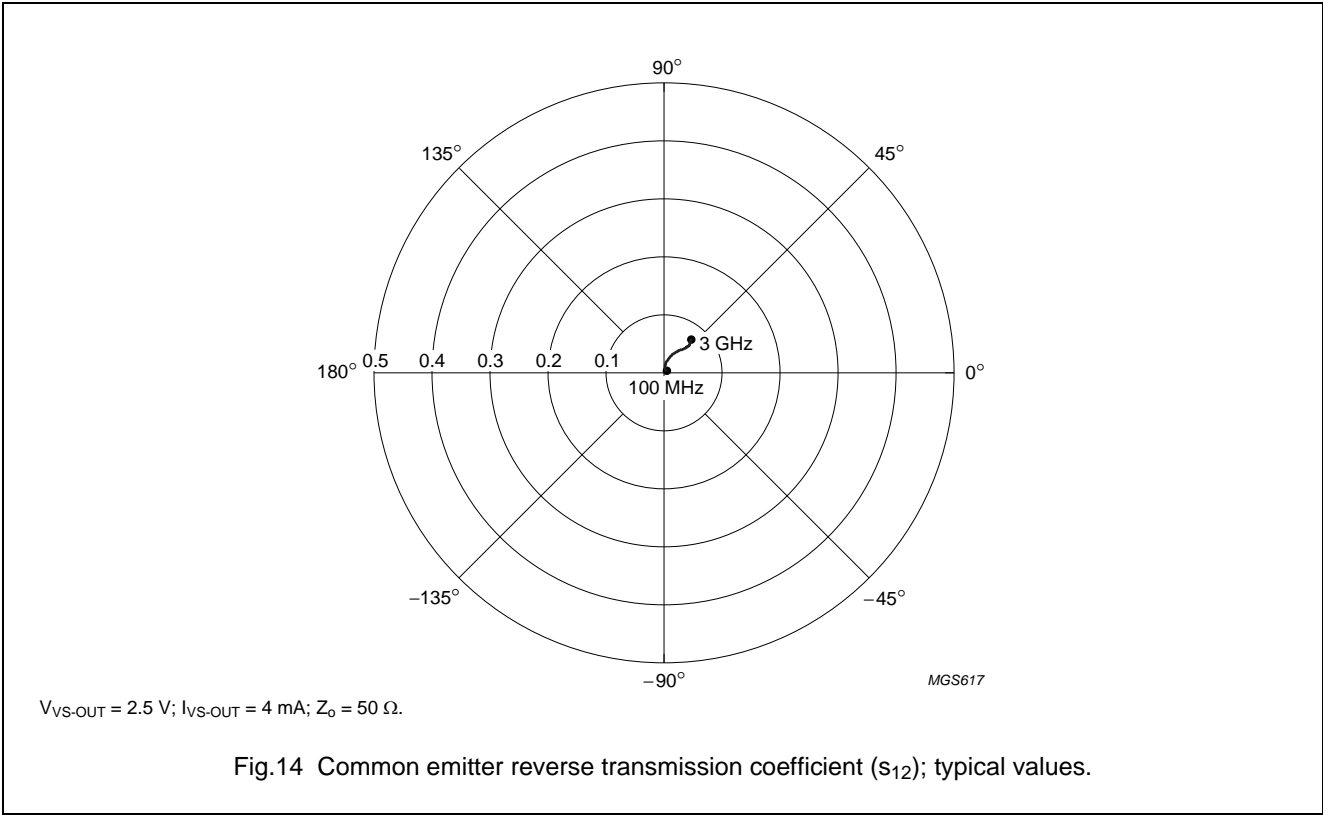
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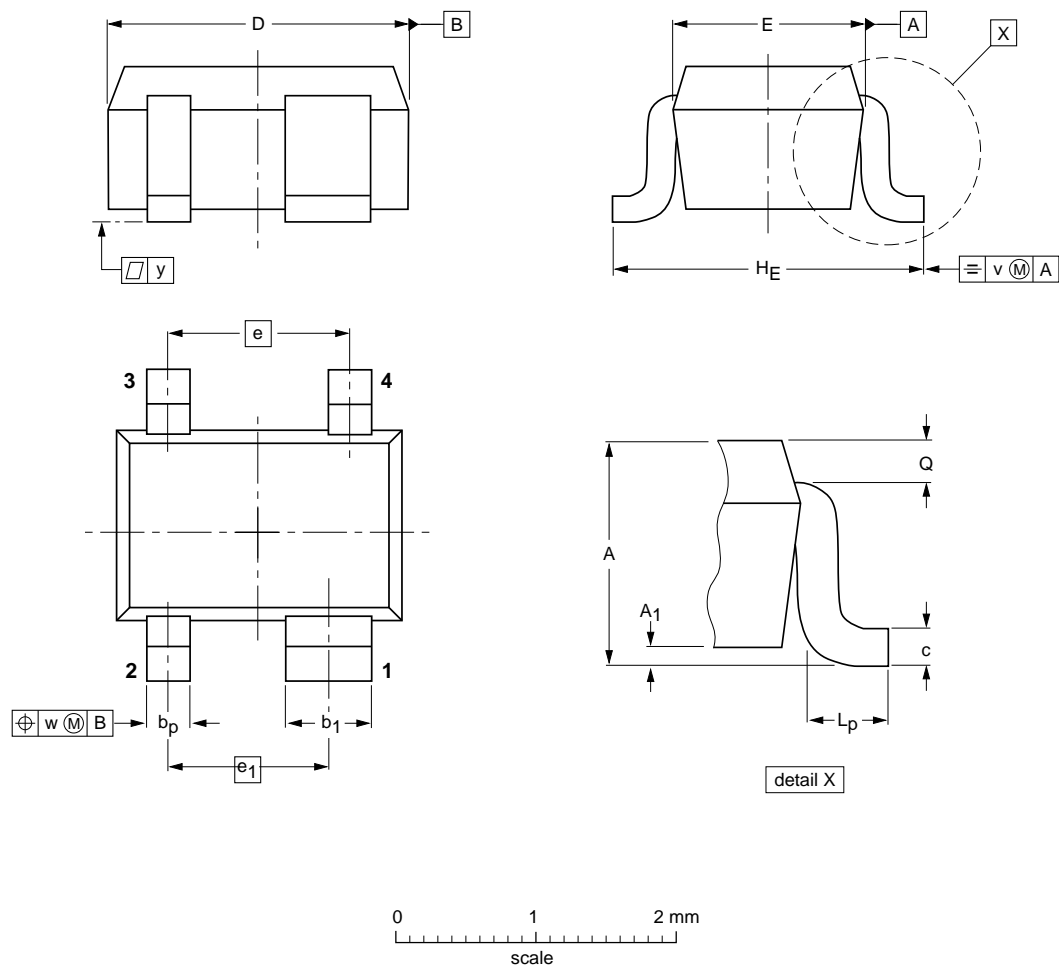
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PACKAGE OUTLINE

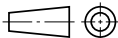
Plastic surface-mounted package; reverse pinning; 4 leads

SOT343R



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	b ₁	c	D	E	e	e ₁	H _E	L _p	Q	v	w	y
mm	1.1 0.8	0.1	0.4 0.3	0.7 0.5	0.25 0.10	2.2 1.8	1.35 1.15	1.3	1.15	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT343R						97-05-21 06-03-16

Silicon MMIC amplifier

BGA2001

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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