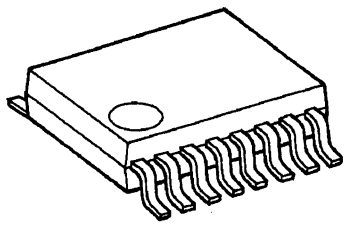
TENTATIVE

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT
SILICON MONOLITHIC

TA1284FN

UHF / VHF TUNER IC (Low Phase Noise Oscillator)

The TA1284FN is TV tuner IC which integrate mixer / oscillator for VHF and CATV bands, mixer / oscillator for UHF band, and IF amplifier on a single chip.
Supply voltage of 5 V helps lower power dissipation from the set.
Compact 16-pin SSOP makes the tuner more compact.



SSOP16-P-225-0.65B

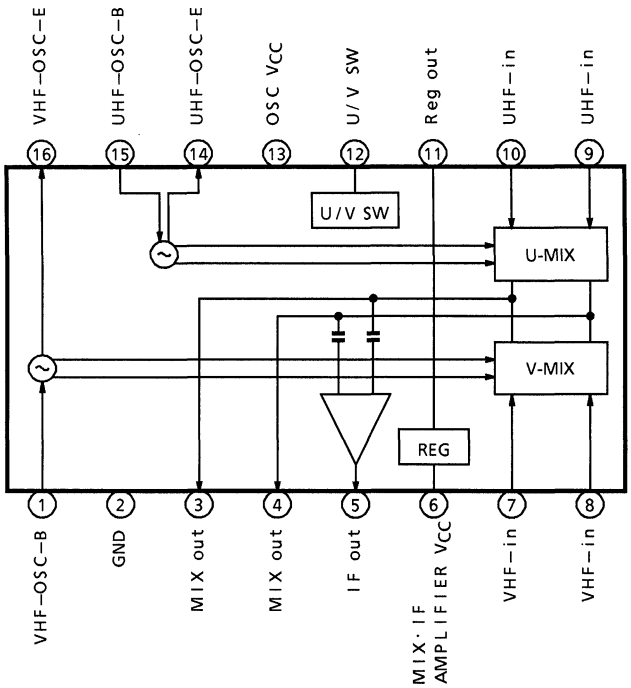
Weight: 0.07g (Typ.)

FEATURES

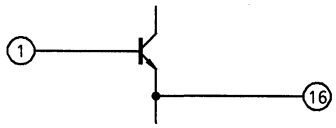
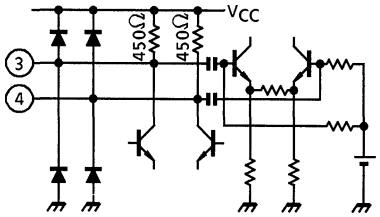
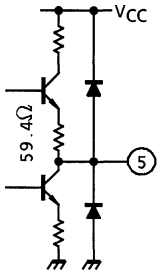
- Supply voltage : 5V
- Built-in mixer / oscillator for VHF and CATV bands
- Built-in mixer / oscillator for UHF band
- Oscillator circuits is low phase noise.
- Built-in IF amplifier
- Low power dissipation.

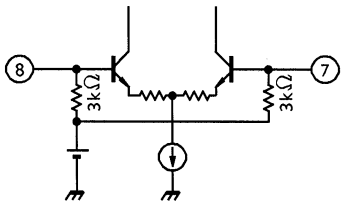
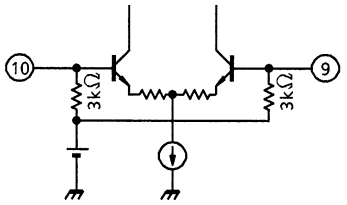
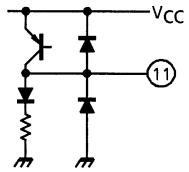
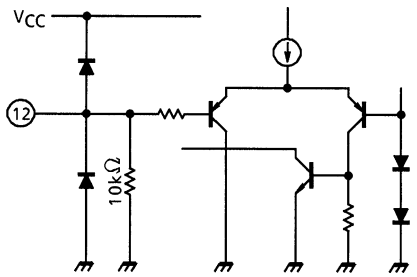
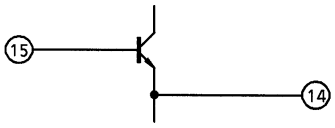
Note: These devices are easily damaged by high static voltage or electric fields. In this regard, please handle with care.

BLOCK DIAGRAM



TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE
1 16	VHF Oscillator	VHF oscillator. Oscillator circuit is low phase noise.	
2	GND	GND pin	—
3 4	MIX Output	Mixer output. For tuning, connect a tank circuit between pins 3 and 4.	
5	IF Output	IF output. Output impedance : 75Ω	
6	V_{CC} (MIX·IF AMPLIFIER Block)	V_{CC} (Mixer and IF amplifier block)	—

PIN No.	PIN NAME	FUNCTION	INTERFACE
7 8	VHF input	VHF-RF input. Normally, ground pin 7 to AC using a capacitor and input to pin 8.	
9 10	UHF input	UHF·RF input. Either apply balanced input to pins 9 and 10 or ground pin 10 to AC and input to pin 9.	
11	REG	Regulator output.	
12	U / V band switch	Band changeover switch. VHF ; [L] or Open UHF ; [H] * [L] = 0 V [H] = V_{CC}	
13	V_{CC} (OSC)	V_{CC} pin (oscillator block)	—
14 15	UHF Oscillator	UHF oscillator. Oscillator circuit is low phase noise.	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	6.5	V
Power Dissipation	P_D	568 [IC only]	mW
Operating Temperature	T_{opr}	−20~85	°C
Storage Temperature	T_{stg}	−55~150	°C

Note: When using the device at above Ta = 25°C, decrease the power dissipation by 4.6 mW for each increase of 1°C.

RECOMMENDED OPERATING CONDITION

PIN No.	SYMBOL	MIN	TYP.	MAX	UNIT
6, 13	V_{CC}	4.5	5.0	5.5	V

ELECTRICAL CHARACTERISTICS
DC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5 V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply and Current For VHF		I_{CC}-V	1	—	26.0	33.5	45.0	mA
Power Supply and Current For UHF		I_{CC}-U		—	29.5	38.0	51.0	
Terminal Voltage (*1)	Pin 1 For VHF	V1-V	1	—	1.7	2.0	2.3	V
	Pin 1 For UHF	V1-U		—	0	0	0.2	
	Pin 3 For VHF	V3-V		—	3.6	3.9	4.2	
	Pin 3 For UHF	V3-U		—	3.3	3.6	4.0	
	Pin 4 For VHF	V4-V		—	3.6	3.9	4.2	
	Pin 4 For UHF	V4-U		—	3.3	3.6	4.0	
	Pin 5 For VHF	V5-V		—	1.9	2.2	2.6	
	Pin 5 For UHF	V5-U		—	1.9	2.2	2.6	
	Pin 7 For VHF	V7-V		—	1.4	1.7	2.0	
	Pin 7 For UHF	V7-U		—	1.4	1.7	2.0	
	Pin 8 For VHF	V8-V		—	1.4	1.7	2.0	
	Pin 8 For UHF	V8-U		—	1.4	1.7	2.0	
	Pin 9 For VHF	V9-V		—	1.4	1.7	2.0	
	Pin 9 For UHF	V9-U		—	1.3	1.6	1.9	
	Pin 10 For VHF	V10-V		—	1.4	1.7	2.0	
	Pin 10 For UHF	V10-U		—	1.3	1.6	1.9	
	Pin 11 For VH	V11-V		—	3.8	4.1	4.4	
	Pin 11 For UHF	V11-U		—	3.8	4.1	4.4	
	Pin 12 For VHF	V12-V		—	0	0	0	
	Pin 12 For UHF	V12-U		—	—	V_{CC}	—	
	Pin 14 For VHF	V14-V		—	0	0	0.2	
	Pin 14 For UHF	V14-U		—	0.9	1.2	1.5	
	Pin 15 For VHF	V15-V		—	0	0	0.2	
	Pin 15 For UHF	V15-U		—	1.8	2.1	2.4	
	Pin 16 For VHF	V16-V		—	0.9	1.2	1.5	
	Pin 16 For UHF	V16-U		—	0	0	0.2	

(*1) Uppe : VHF mode
Lower : UHF mode

AC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5 V, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	BAND	TEST CONDITION(*2)	MIN	TYP.	MAX	UNIT
Conversion Gain (Note 1)	CG	2	VHF	fRF = 91.25 MHz	21.0	22.0	24.0	dB
			VHF	fRF = 217.25 MHz	21.0	22.0	24.5	
			UHF	fRF = 471.25 MHz	24.0	25.5	27.0	
			UHF	fRF = 765.25 MHz	23.0	24.5	26.5	
Noise Figure (Note 2)	NF	2	VHF	fRF = 91.25 MHz	—	9.0	10.0	dB
			VHF	fRF = 217.25 MHz	—	9.5	10.5	
			UHF	fRF = 471.25 MHz	—	9.0	9.5	
			UHF	fRF = 765.25 MHz	—	10.5	11.5	
IF Out Power Level (Note 3)	IFp	2	VHF	fRF = 91.25 MHz	8.5	9.5	—	dBmW
			VHF	fRF = 217.25 MHz	8.5	9.5	—	
			UHF	fRF = 471.25 MHz	8.5	9.5	—	
			UHF	fRF = 765.25 MHz	8.5	9.5	—	
Conversion Gain Shift (Note 4)	CGs	2	VHF	fRF = 91.25 MHz	—	—	±0.5	dB
			VHF	fRF = 217.25 MHz	—	—	±0.6	
			UHF	fRF = 471.25 MHz	—	—	±0.6	
			UHF	fRF = 765.25 MHz	—	—	±0.8	
Frequency Shift (Note 5)	ΔfB	2	VHF	fRF = 91.25 MHz	—	—	±100	kHz
			VHF	fRF = 217.25 MHz	—	—	±100	
			UHF	fRF = 471.25 MHz	—	—	±500	
			UHF	fRF = 765.25 MHz	—	—	±300	
Switching On Drift (Note 6)	Δfs	2	VHF	fRF = 91.25 MHz	—	—	±50	kHz
			VHF	fRF = 217.25 MHz	—	—	±50	
			UHF	fRF = 471.25 MHz	—	—	±100	
			UHF	fRF = 765.25 MHz	—	—	±100	
1% Cross Modulation (Note 7)	CM	2	VHF	fRF = 91.25 MHz	81.0	82.0	—	dBμV
			VHF	fRF = 217.25 MHz	81.5	82.0	—	
			UHF	fRF = 471.25 MHz	72.0	75.0	—	
			UHF	fRF = 765.25 MHz	70.5	72.0	—	
Inter Modulation (Note 8)	IM3	2	VHF	fRF = 91.25 MHz	63.0	65.0	—	dB
			VHF	fRF = 217.25 MHz	62.5	65.0	—	
			UHF	fRF = 471.25 MHz	59.5	61.0	—	
			UHF	fRF = 765.25 MHz	58.0	61.0	—	
Phase Noise (10 kHz offset) (Note 9)	PN	2	VHF	fRF = 91.25 MHz	—	−97.0	−94.5	dBc / Hz
			VHF	fRF = 217.25 MHz	—	−99.0	−96.5	
			UHF	fRF = 471.25 MHz	—	−94.5	−92.0	
			UHF	fRF = 765.25 MHz	—	−91.5	−88.0	

(*2) IF = 58.75 [MHz]

TEST CONDITIONS

Note 1: Conversion Gain
f_{RF} input level = −30 dBmW

Note 2: Noise Figure
Noise Figure meter used.

Note 3: IF Out Power Level
Measure IF output level when it is maximum level.

Note 4: Conversion Gain Shift
The Conversion gain shift is defined as a change in conversion gain when supply voltage varies from V_{CC} = 5 to 4.5 V or from V_{CC} = 5 to 5.5 V.

Note 5: Frequency Shift
The frequency shift is defined as a change in oscillator frequency when the supply voltage varies from V_{CC} = 5 to 4.5 V or from V_{CC} = 5 to 5.5 V.

Note 6: Switching On Drift
Measure frequency change from 2 seconds after switching on to 3 minutes.

Note 7: 1% Cross Modulation
- fd = f_p (fd_{RF} input level = −30 dBmW)
- fud = f_p+12 MHz 100 kHz, 30%AM

Input two signals, and increase the fud_{RF} input level.
Measure the fud_{RF} input level when the suppression level reaches 56.5 dB.

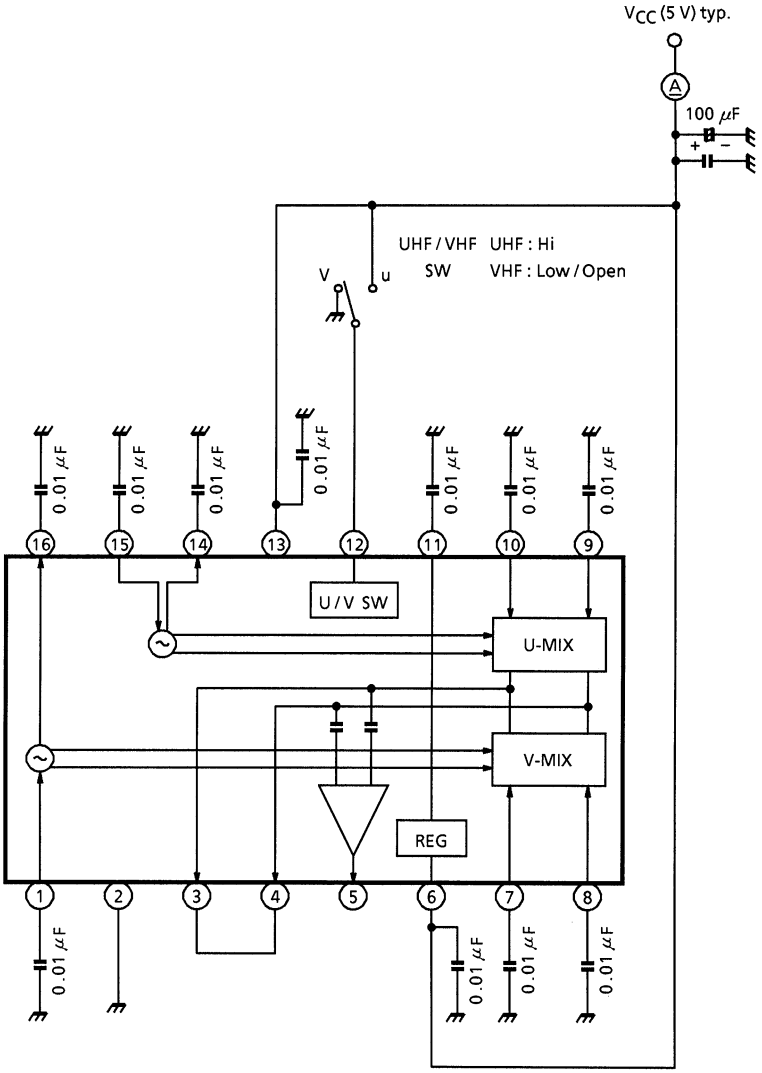
Note 8: Inter Modulation
- fd = f_p
- fud = f_p+1 MHz

Input the two signals above, and increase the input levels.
When the IF output level is −11 dBmW, measure the suppression level.

Note 9: Phase Noise (10 kHz offset)
Measure phase noise of 10 kHz offset.

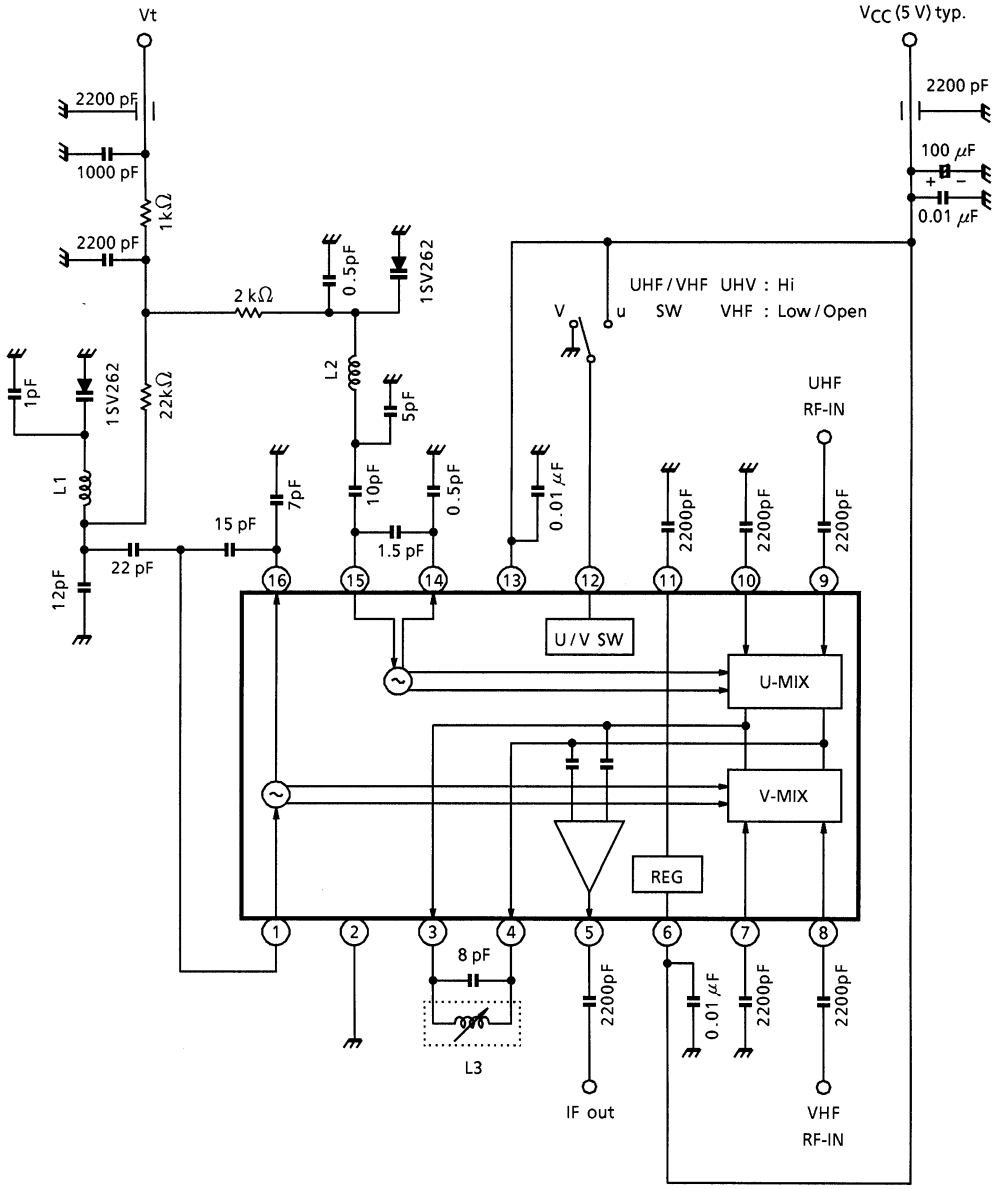
TEST CIRCUIT1

DC CHARACTERISTICS



TEST CIRCUIT2

AC CHARACTERISTICS



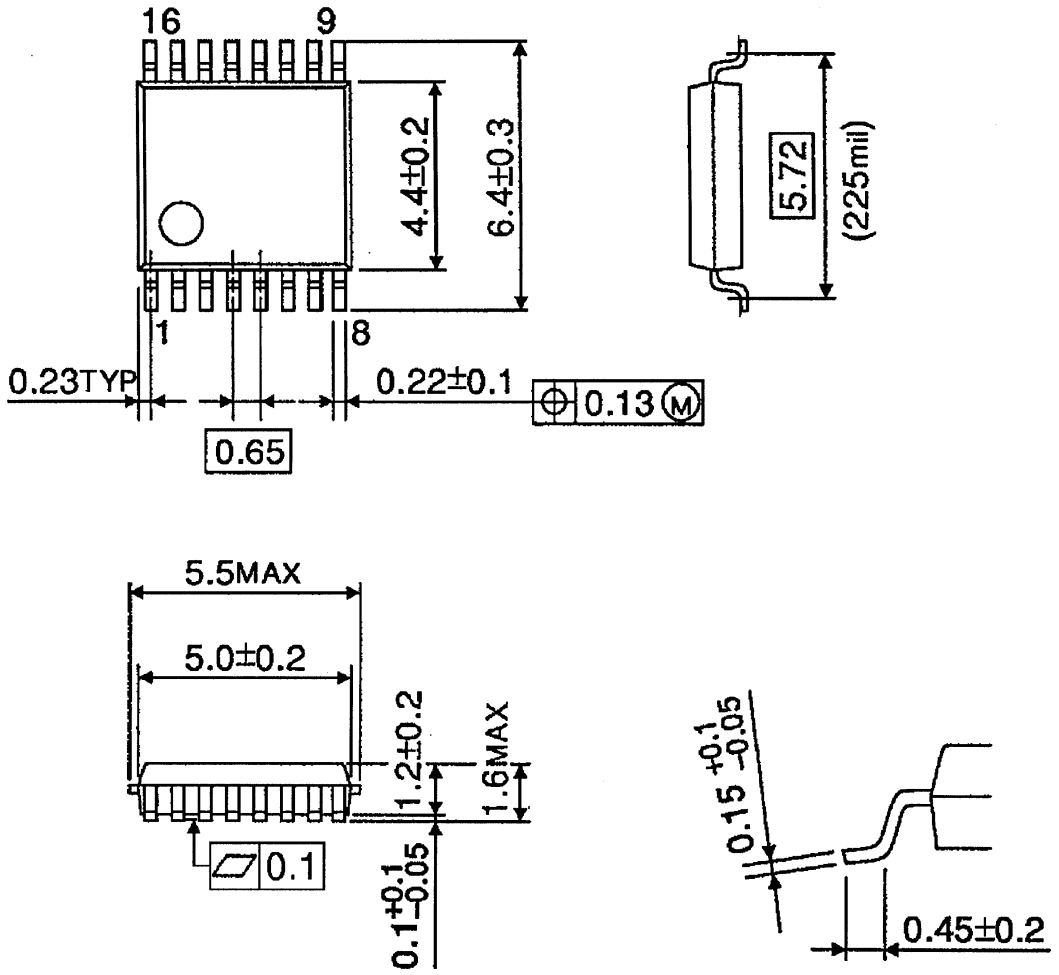
VHF : fRF = 91.25 [MHz]~217.25 [MHz]
UHF : fRF = 471.25 [MHz]~765.25 [MHz]
fIF : 58.75 [MHz]

	LINE DIAMETER	TURN DIAMETER	NUMBER OF TURNS
L1	0.3	2.4 mm	7.5 T
L2	0.3	1.4 mm	2.5 T

L3 = 0.9 μH±5%

PACKAGE DIMENSIONS

SSOP16-P-225-0.65B Unit : mm



Weight: 0.07g (Typ.)