

TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA1284FN

## UHF / VHF TUNER IC (Low Phase Noise Oscillator)

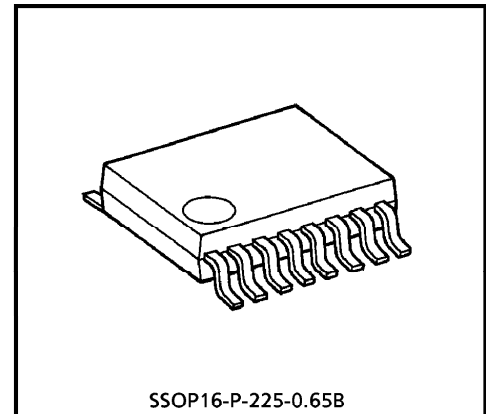
The TA1284FN is TV tuner IC which integrate mixer / oscillator for VHF and CATV bands, mixer / oscillator for UHF band, and IF amplifier on a single chip.

Supply voltage of 5V helps lower power dissipation from the set. Compact 16-pin SSOP makes the tuner more compact.

### 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.



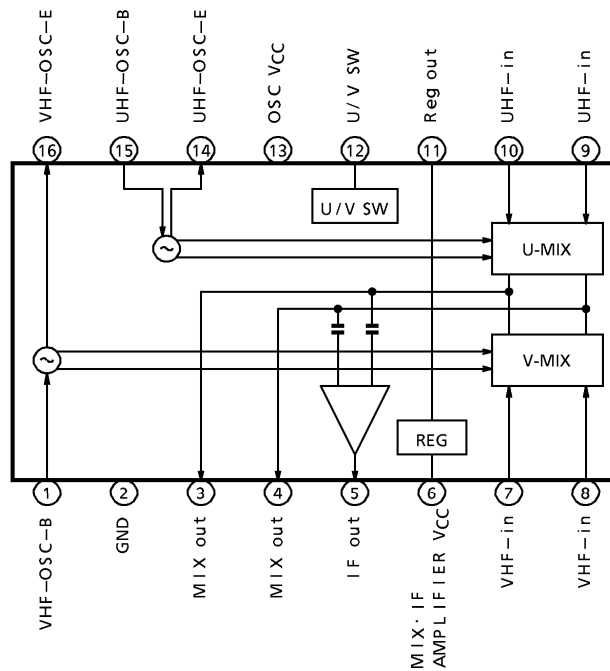
SSOP16-P-225-0.65B

Weight : 0.07 g (Typ.)

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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 : 75 Ω	
6	VCC (MIX-IF AMPLIFIER Block)	VCC (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 <sub>CC</sub>	
13	V <sub>CC</sub> (OSC)	V <sub>CC</sub> 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 <sub>CC</sub>	6.5	V
Power Dissipation	P <sub>D</sub>	568 「 IC only 」	mW
Operating Temperature	T <sub>opr</sub>	- 20~85	°C
Storage Temperature	T <sub>stg</sub>	- 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 <sub>CC</sub>	4.5	5.0	5.5	V

**ELECTRICAL CHARACTERISTICS**

DC CHARACTERISTICS (Unless otherwise specified, V<sub>CC</sub> = 5 V, a = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply and Current For VHF		I <sub>CC-V</sub>	1	—	26.0	33.5	45.0	mA
Power Supply and Current For UHF		I <sub>CC-U</sub>		—	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 VHF	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 <sub>CC</sub>	—	
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) Upper : VHF mode  
Lower : UHF mode

AC CHARACTERISTICS (Unless otherwise specified,  $V_{CC} = 5\text{ V}$ ,  $T_a = 25^\circ\text{C}$ )

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)	$\Delta f_B$	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)	$\Delta f_s$	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	—	dB $\mu$ V
			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

- $f_d = f_p$  ( $f_{dRF}$  input level = -30 dBmW)

- $f_{ud} = f_p + 12 \text{ MHz}$  100 kHz, 30%AM

Input two signals, and increase the  $f_{udRF}$  input level.

Measure the  $f_{udRF}$  input level when the suppression level reaches 56.5 dB.

(Note 8) Inter Modulation

- $f_d = f_p$

- $f_{ud} = f_p + 1 \text{ MHz}$

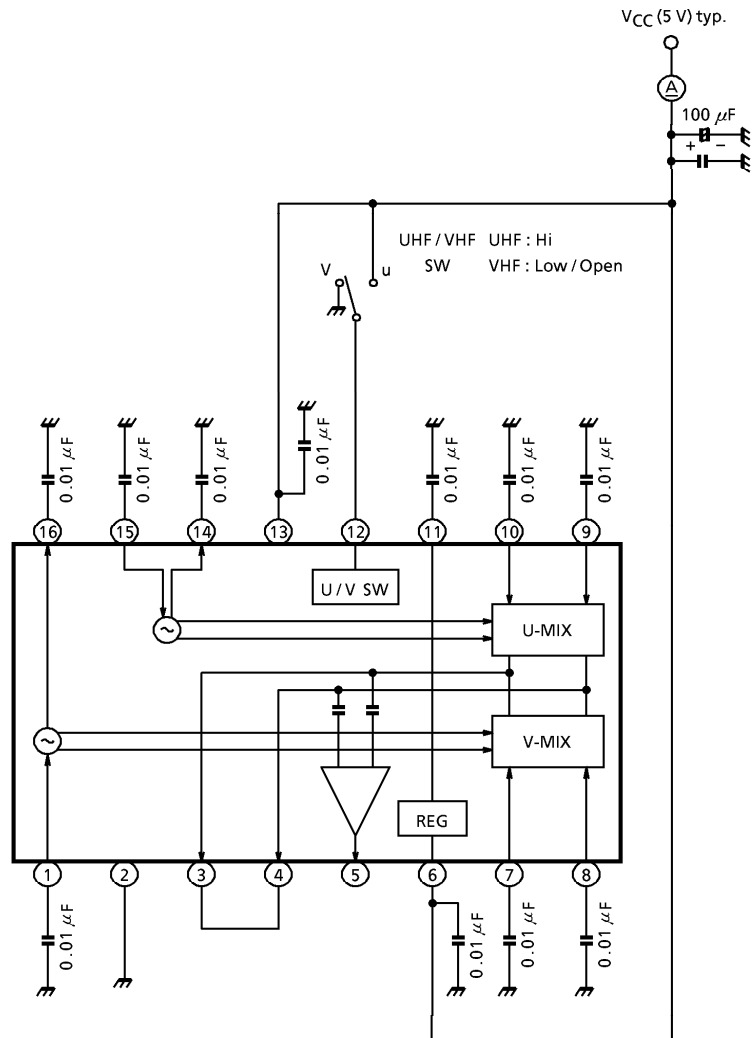
Input the two signals above, and increase the input levels.

When the IF output level is -11 dBmW, measure the suppression level.

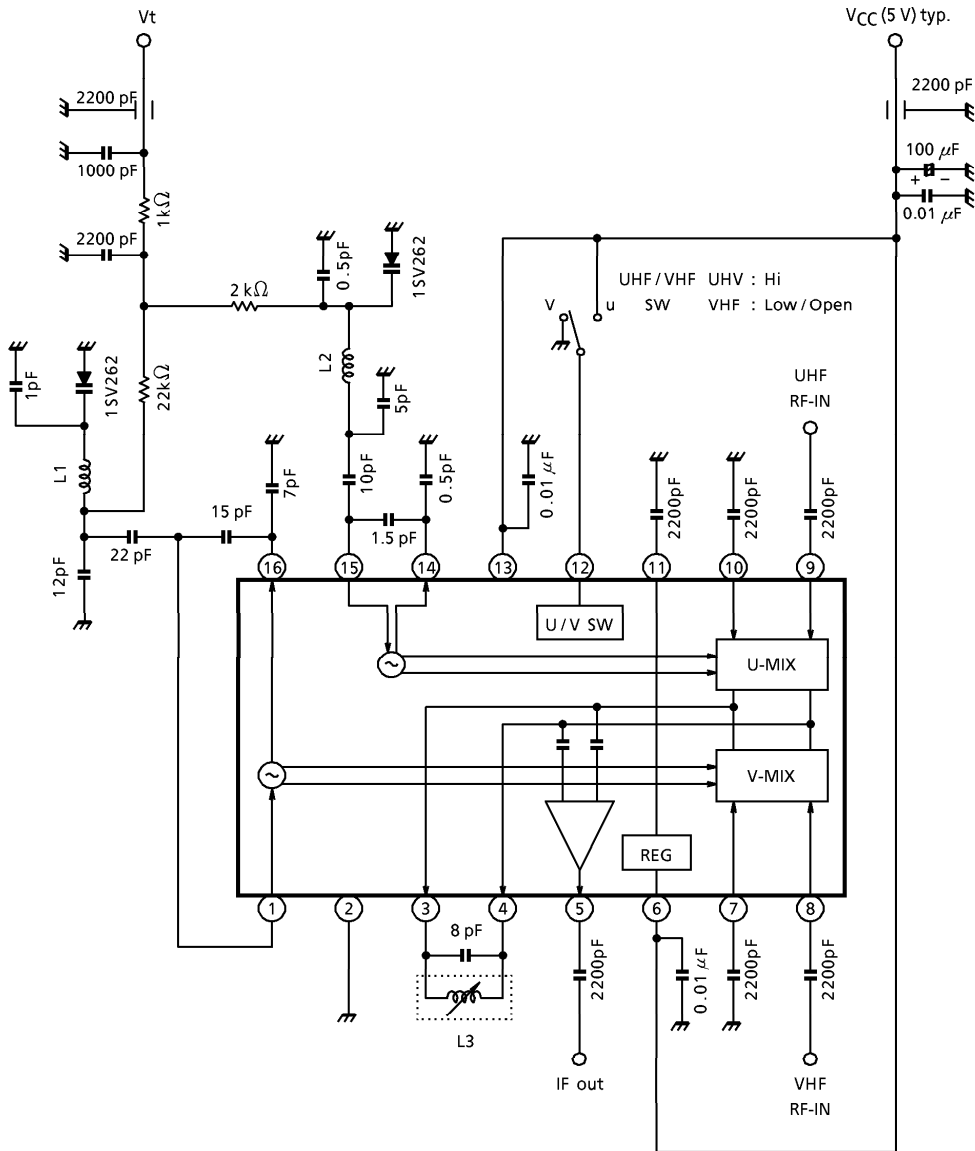
(Note 9) Phase Noise (10 kHz offset)

Measure phase noise of 10 kHz offset.

TEST CIRCUIT1  
DC CHARACTERISTICS



TEST CIRCUIT2  
AC CHARACTERISTICS



VHF : f<sub>RF</sub> = 91.25 [MHz]~217.25 [MHz]  
 UHF : f<sub>RF</sub> = 471.25 [MHz]~765.25 [MHz]  
 f<sub>IF</sub> : 58.75 [MHz]

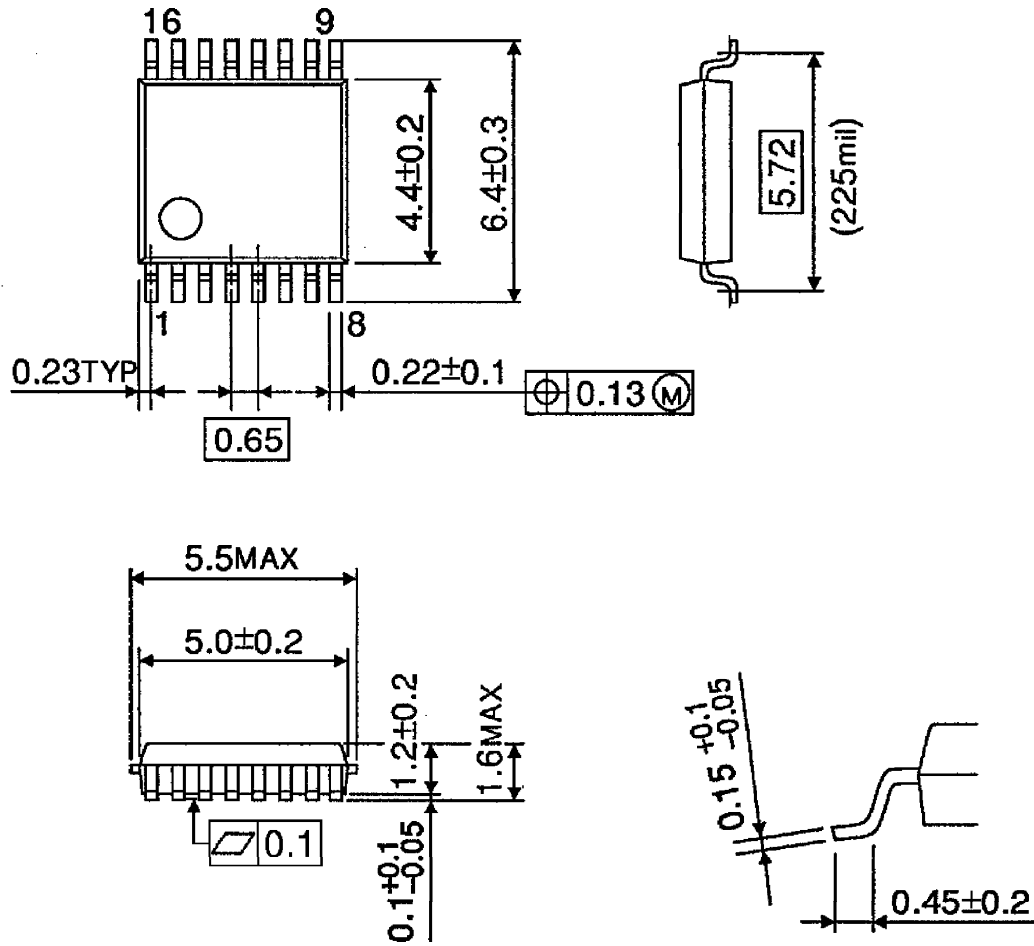
	LINE DIAMETER	TURN DIAMETER	NUMBER OF TURNS
L1	0.3	2.4 mm	7.5 T
L2	0.3	1.4 mm	2.5 T

L3 = 0.9 μH ± 5%



OUTLINE DRAWING  
SSOP16-P-225-0.65B

Unit : mm



Weight : 0.07 g (Typ.)