

**TENTATIVE**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT  
SILICON MONOLITHIC

# TA1284FN

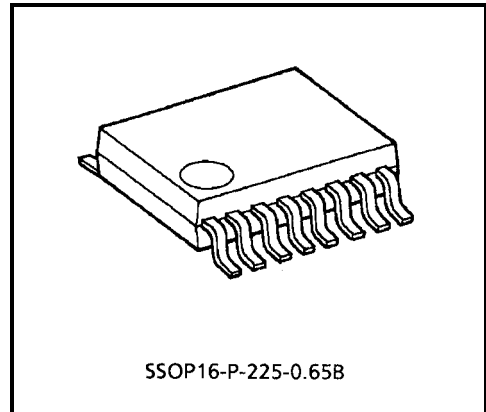
## UHF / VHF TUNER IC (Low Phase Noise Oscillator)

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.

### 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.



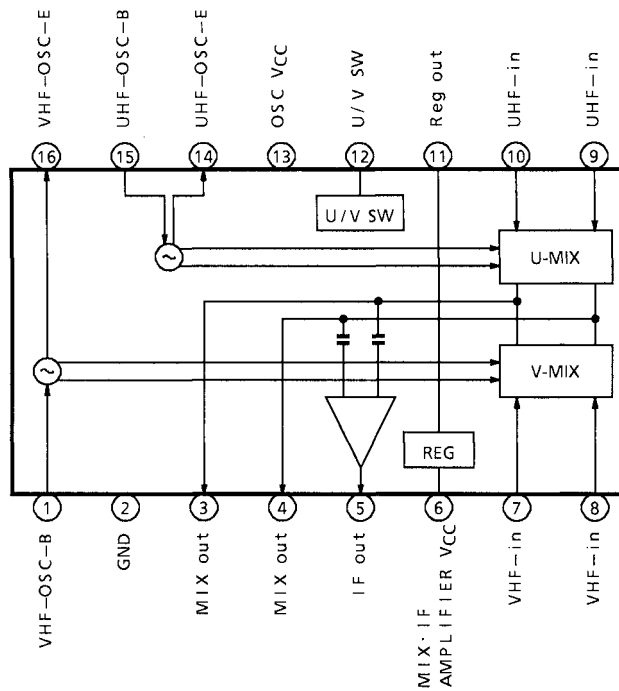
Weight: 0.07g (Typ.)

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

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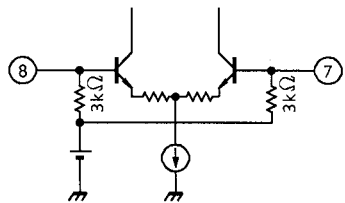
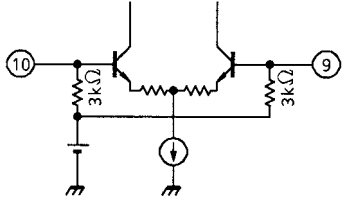
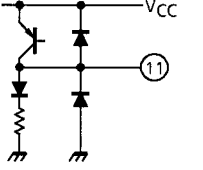
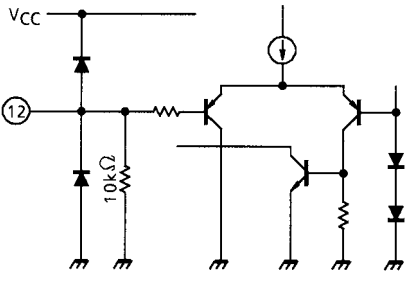
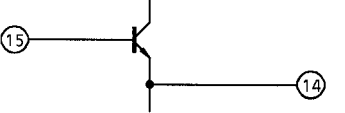
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## BLOCK DIAGRAM



## 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 : 75Ω	
6	V <sub>CC</sub> (MIX-IF AMPLIFIER Block)	V <sub>CC</sub> (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.

## OPERATING SUPPLY VOLTAGE

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, Ta = 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 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 <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, $V_{CC} = 5\text{ V}$ , $T_a = 25^\circ\text{C}$ )

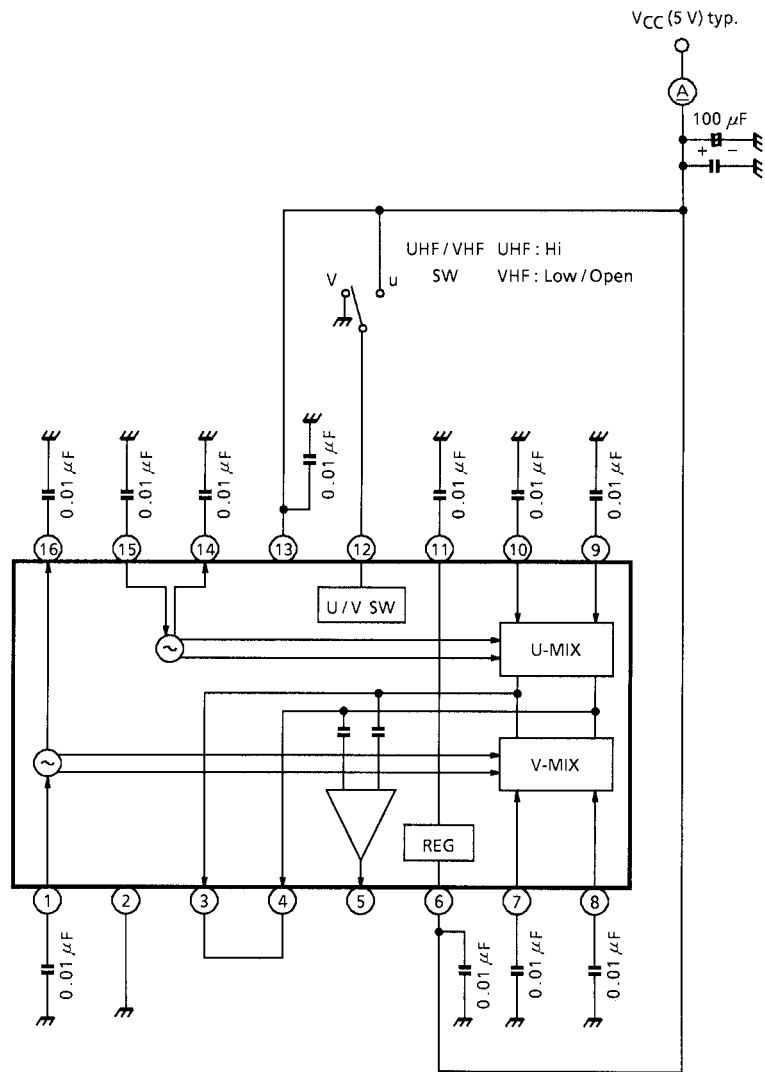
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	BAND	TEST CONDITION(*2)	MIN	TYP.	MAX	UNIT
Conversion Gain (Note 1)	CG	2	VHF	fRF = 91.25 MHz	21.0	22.0	24.0	dB
			VHF	fRF = 217.25 MHz	21.0	22.0	24.5	
			UHF	fRF = 471.25 MHz	24.0	25.5	27.0	
			UHF	fRF = 765.25 MHz	23.0	24.5	26.5	
Noise Figure (Note 2)	NF	2	VHF	fRF = 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	—	dBm W
			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 ]

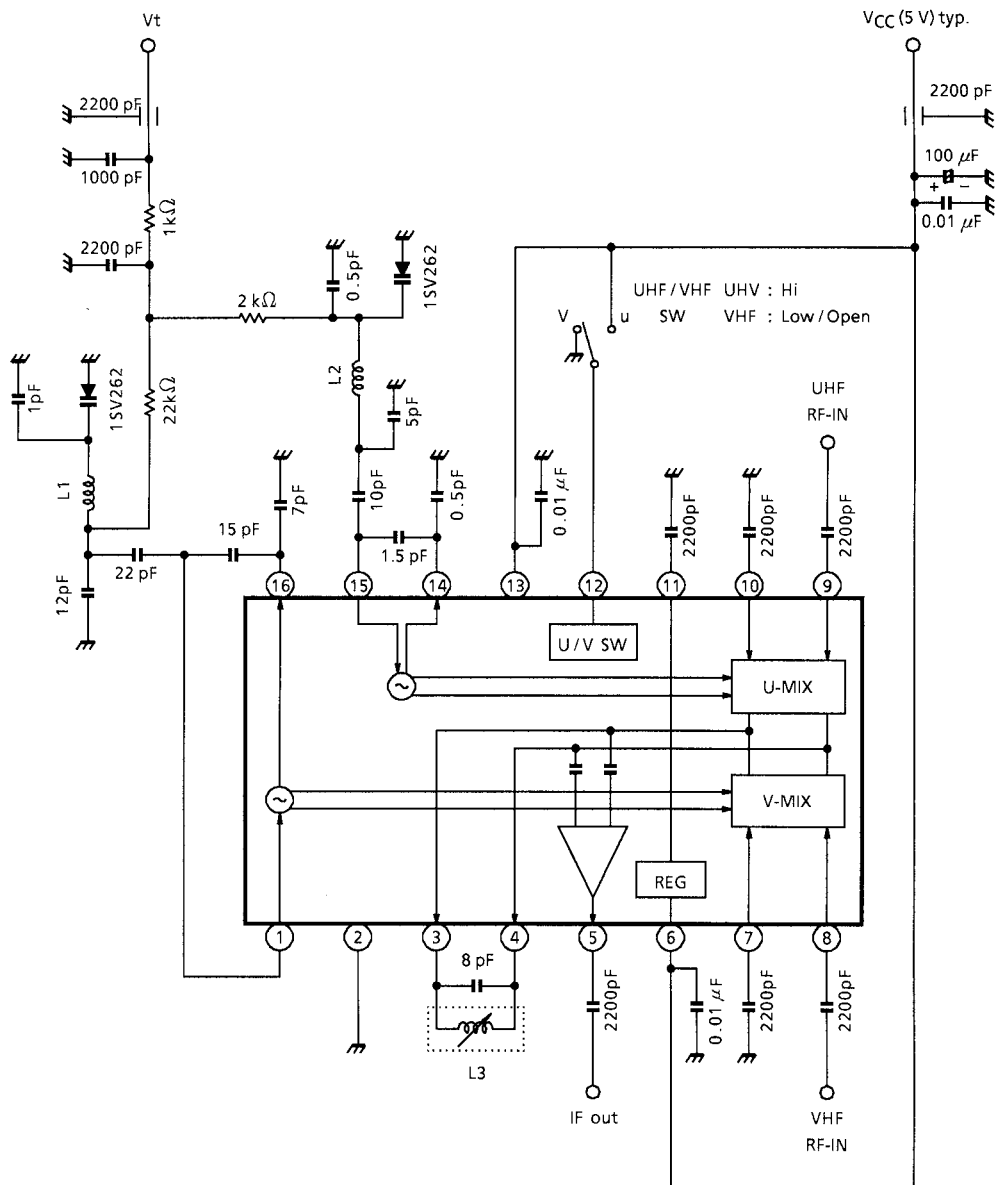
**TEST CONDITIONS**

- Note 1: Conversion Gain  
f<sub>RF</sub> 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<sub>CC</sub> = 5 to 4.5 V or from V<sub>CC</sub> = 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<sub>CC</sub> = 5 to 4.5 V or from V<sub>CC</sub> = 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<sub>d</sub> = f<sub>p</sub> (f<sub>dRF</sub> input level = -30 dBmW)  
• f<sub>ud</sub> = f<sub>p</sub>+12 MHz 100 kHz, 30%AM  
Input two signals, and increase the f<sub>udRF</sub> input level.  
Measure the f<sub>udRF</sub> input level when the suppression level reaches 56.5 dB.
- Note 8: Inter Modulation  
• f<sub>d</sub> = f<sub>p</sub>  
• f<sub>ud</sub> = f<sub>p</sub>+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 :  $f_{RF} = 91.25 \text{ [MHz]} \sim 217.25 \text{ [MHz]}$
- UHF :  $f_{RF} = 471.25 \text{ [MHz]} \sim 765.25 \text{ [MHz]}$
- fIF :  $58.75 \text{ [MHz]}$

	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

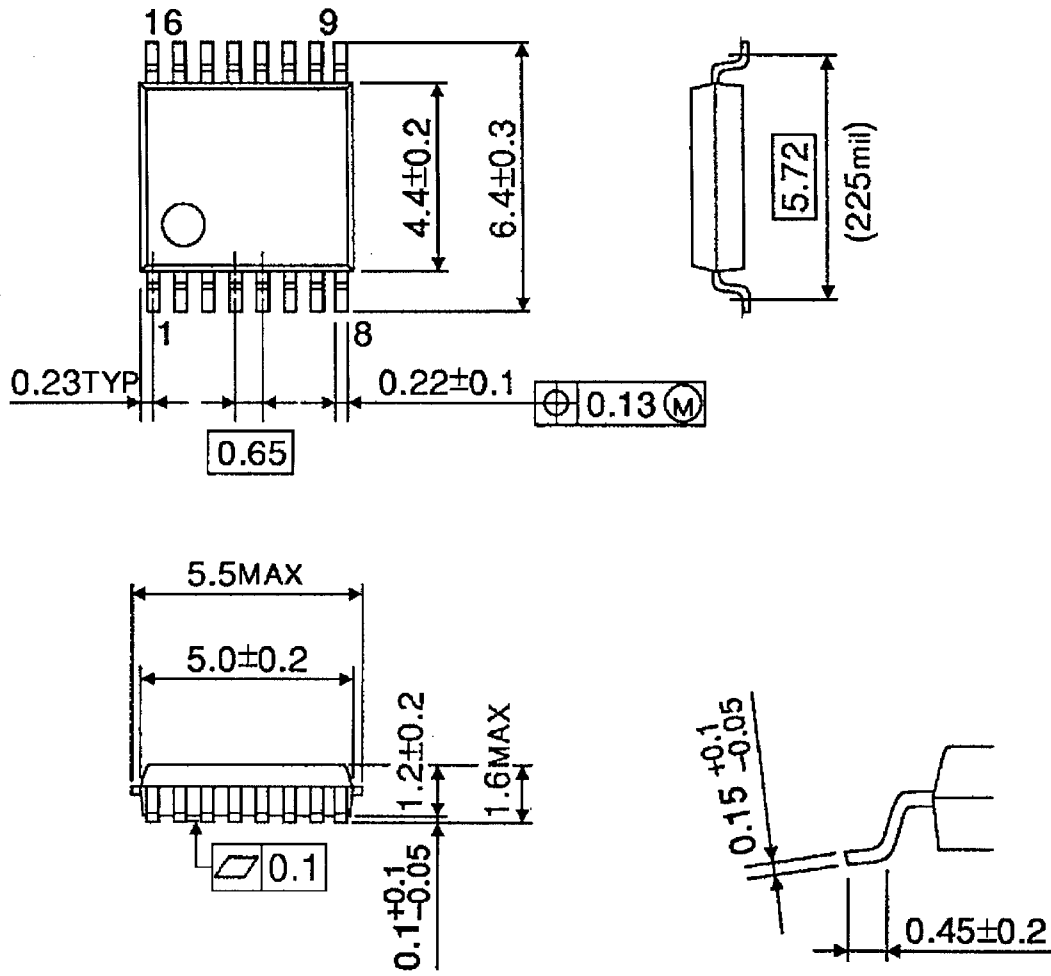
L3 =  $0.9 \mu\text{H} \pm 5\%$



**PACKAGE DIMENSIONS**

SSOP16-P-225-0.65B

Unit : mm



Weight: 0.07g (Typ.)