TENTATIVE

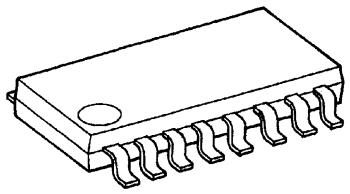
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT
SILICON MONOLITHIC

TA1231F,TA1231FN

UHF / VHF TUNER IC

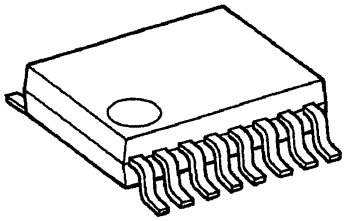
The TA1231F and TA1231FN are TV tuner ICs which integrate on a single chip IF amp, a mixer / oscillator for VHF band and cable TV, together with a mixer / oscillator for UHF band.
The package is an SSOP16-P-225A (1-mm pitch) or SSOP16-P-225B (0.65-mm pitch) optimal for surface mounting to help make tuners more compact.

TA1231F



SSOP16-P-225-1.00A

TA1231FN



SSOP16-P-225-0.65B

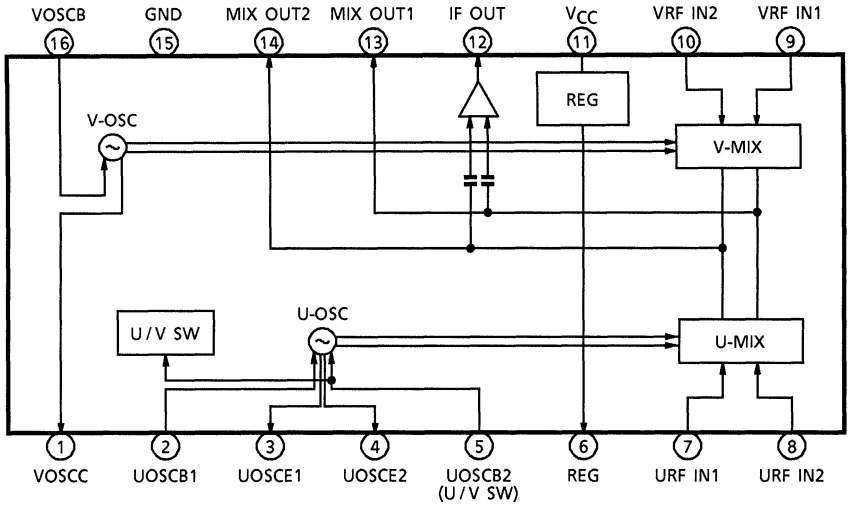
Weight
SSOP16-P-225-1.00A : 0.14g (Typ.)
SSOP16-P-225-0.65B : 0.07g (Typ.)

FEATURES

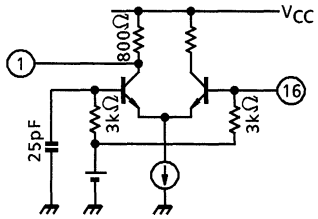
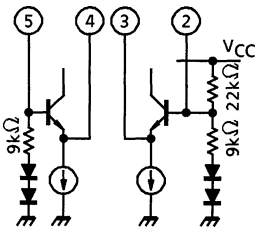
- Supply voltage : 9V
- VHF, CATV bands : MIX · OSC
- UHF band : MIX · OSC
- Built-in IF amp
- IF unbalanced output

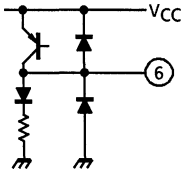
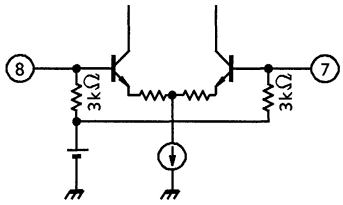
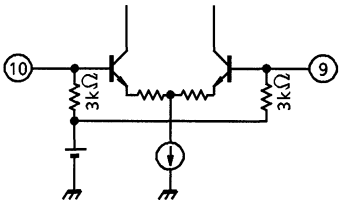
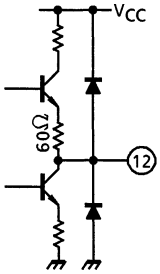
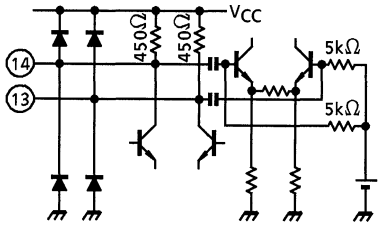
Note: These devices are easy to be damaged by high static voltage or electric fields.
In regards to this, please handle with care.

BLOCK DIAGRAM



TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE
1 16	VHF oscillator	VHF oscillator. To prevent abnormal oscillation, connect a resistor between pin 16 and the external capacitor.	
2 3 4 5	UHF oscillator	UHF oscillator. Pin 5 uses both as band switch.Connecting pin 5 to V_{CC} via 22kΩ sets to UHF ; connecting pin 12 to GND sets to VHF. To use VHF SW voltage OPEN rather than GND, connect a resistor of around 10kΩ. Changing capacitor of 6pF connected to pins 2 and 5 of test circuit 2 varies the oscillation frequency range. Be careful not to set the constant too large, because abnormal oscillation may occur.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
6	REG	Regulator output.	
7 8	UHF input	UHF · RF input. Either apply balanced input to pins 7 and 8, or ground pin 7 to AC and apply input to pin 8.	
9 10	VHF input	VHF-RF input. Normally ground pin 10 to AC using a capacitor and input to pin 9.	
11	V_{CC}	V_{CC}	—
12	IF output	IF output. Output impedance : 75Ω	
13 14	MIX output	Mixer output. For turning, connect a tank circuit between pins 13 and 14.	
15	GND	GND	—

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V_{CC}	11	V
Power Dissipation	P_D	(Note 1)	mW
Operating Temperature	T_{opr}	−20~75	°C
Storage Temperature	T_{stg}	−55~150	°C

Note 1: 641mW for TA1231F
568mW for TA1231FN
When using the device at above Ta = 25°C, decrease the power dissipation F-type by 5.2mW and FN-type by 4.6mW for each increase of 1°C.
The above values are for the IC only. When using the device in an application, take the effect of heat dissipation into consideration.

RECOMMENDED OPERATING CONDITION

PIN No.	SYMBOL	MIN	TYP.	MAX	UNIT
11	V_{CC}	8.1	9.0	9.9	V

ELECTRICAL CHARACTERISTICS
DC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 9V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply and Current for VHF		I_{CC}-V	1	—	34	42	52	mA
Power Supply and Current for UHF		I_{CC}-U		—	37	44	56	
Terminal Voltage (*1)	Pin 1 for V	V1-V	1	—	6.5	6.9	7.3	V
	Pin 1 for U	V1-U		—		9		
	Pin 2 for V	V2-V		—	3.3	3.7	4.1	
	Pin 2 for U	V2-U		—	2.9	3.3	3.7	
	Pin 3 for V	V3-V		—	3.7	4.3	4.8	
	Pin 3 for U	V3-U		—	2.1	2.5	2.9	
	Pin 4 for V	V4-V		—		0		
	Pin 4 for U	V4-U		—	2.1	2.5	2.9	
	Pin 5 for V	V5-V		—		0		
	Pin 5 for U	V5-U		—	2 .9	3.3	3.7	
	Pin 6 for V	V6-V		—	5.8	6.1	6.4	
	Pin 6 for U	V6-U		—	5.8	6.1	6.4	
	Pin 7 for V	V7-V		—	2.7	3.1	3.5	
	Pin 7 for U	V7-U		—	2.4	2.8	3.2	
	Pin 8 for V	V8-V		—	2.7	3.1	3.5	
	Pin 8 for U	V8-U		—	2.4	2.8	3.2	

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Terminal Voltage (*1)	Pin 9 for V	V9-V	1	—	2.4	2.8	3.2	V
	Pin 9 for U	V9-U		—	2.7	3.1	3.5	
	Pin 10 for V	V10-V		—	2.4	2.8	3.2	
	Pin 10 for U	V10-U		—	2.7	3.1	3.5	
	Pin 12 for V	V12-V		—	4.7	5.1	5.5	
	Pin 12 for U	V12-U		—	4.7	5.1	5.5	
	Pin 13 for V	V13-V		—	6.8	7.2	7.6	
	Pin 13 for U	V13-U		—	6.6	7.0	7.4	
	Pin 14 for V	V14-V		—	6.8	7.2	7.6	
	Pin 14 for U	V14-U		—	6.6	7.0	7.4	
	Pin 16 for V	V16-V		—	2.1	2.5	2.9	
	Pin 16 for U	V16-U		—	2.5	2.9	3.3	

* 1: upper : VHF mode
lower : UHF mode

AC CHARACTERISTICS

No.	CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION (*2)		MIN	TYP.	MAX	UNIT
1	Conversion Gain	CG	2		VHF-L	22.0	24.5	27.0	dB
					VHF-H	19.0	22.5	26.0	
					UHF	25.0	28.0	31.0	
2	Noise Figure	NF	2		VHF-L	—	11.0	13.0	dB
					VHF-H	—	14.0	17.0	
					UHF	—	11.0	13.0	
3	IF Out Power Level	IFp	2		VHF-L	10.0	13.0	—	dBmW
					VHF-H	10.0	13.0	—	
					UHF	10.0	13.0	—	
4	Conversion Gain Shift	CGs	2	(Note 1)	VHF-L	—	—	±1.0	dB
					VHF-H	—	—	±1.0	
					UHF	—	—	±1.0	
5	Frequency Shift	ΔfB	2	(Note 2)	VHF-L	—	—	±200	kHz
					VHF-H	—	—	±250	
					UHF	—	—	±250	

No.	CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION (*2)		MIN	TYP.	MAX	UNIT
6	Switching On Drift	Δfs	2	(Note 3)	VHF-L	—	—	±350	kHz
					VHF-H	—	—	±350	
					UHF	—	—	±400	
7	1% Cross Modulation	CM	2	(Note 4)	VHF-L	85.0	89.0	—	dBμV
					VHF-H	84.0	87.0	—	
					UHF	79.0	83.0	—	
8	Inter Modulation	IM3	2	(Note 5)	VHF-L	−65.0	−70.0	—	dBc
					VHF-H	−65.0	−70.0	—	
					UHF	−65.0	−70.0	—	
9	6-ch Beat	B_6	2	(Note 6)	VHF-L (6ch)	−50.0	−53.0		dBc
					VHF-H	—	—	—	
					UHF	—	—	—	

* 2: f_{IF} : 45.75 [MHz]
VHF-L : f_{RF} = 55.25 [MHz]~127.25 [MHz]
VHF-H : f_{RF} = 133.25 [MHz]~367.25 [MHz]
UHF : f_{RF} = 373.25 [MHz]~801.25 [MHz]

TEST CONDITIONS

Note 1: Conversion Gain Shift
Measure conversion gain change when V_{CC}±10% with input level = −50dBmW, V_{CC} = 9V as the reference.

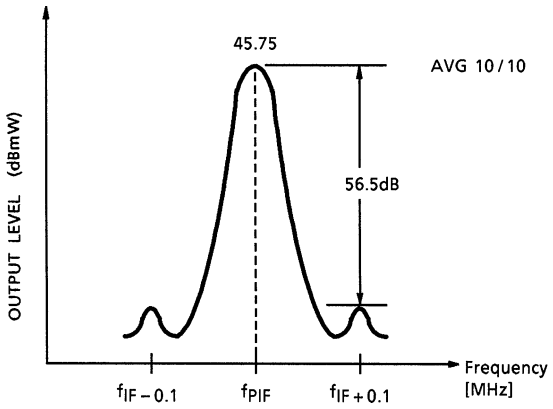
Note 2: Frequency Shift
Measure frequency change when V_{CC}±10% with input level = −40dBmW, V_{CC} = 9V as the reference.

Note 3: Switching On Drift
Measure frequency change up to 3 minutes with the frequency at 2 seconds after switching on, as the reference. (Input level : −30dBmW)

Note 4: 1% Cross Modulation

- fD = fp fD : Input level = −30dBmW
- fUD = fD+12MHz 100kHz, 30% AM.

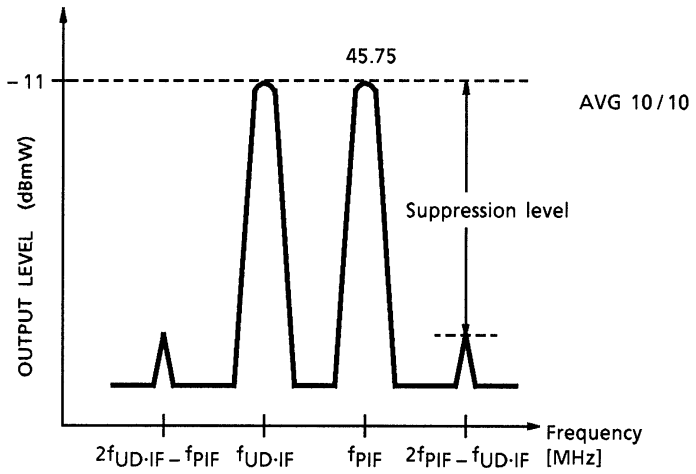
Input the two signals above, and increase the fUD input level.
Measure the fUD input level when the suppression level reaches 56.5dB.
(Averaging 10 times using a spectrum analyzer.)



Note 5: Inter Modulation

- fD = fp
- fUD = fD+1MHz

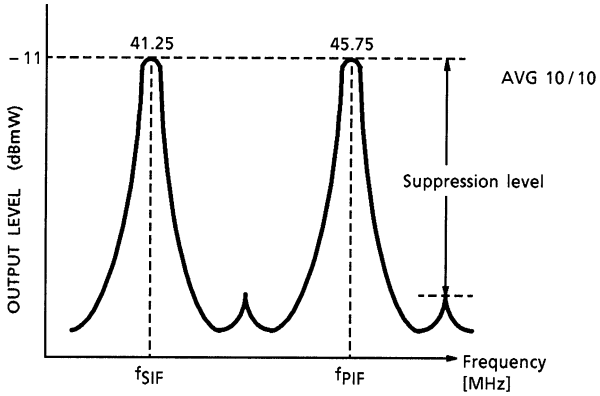
Input the two signals above, and increase the input levels.
When the IF output level is −11dBmW, measure the suppression level.
(Averaging 10 times using a spectrum analyzer.)



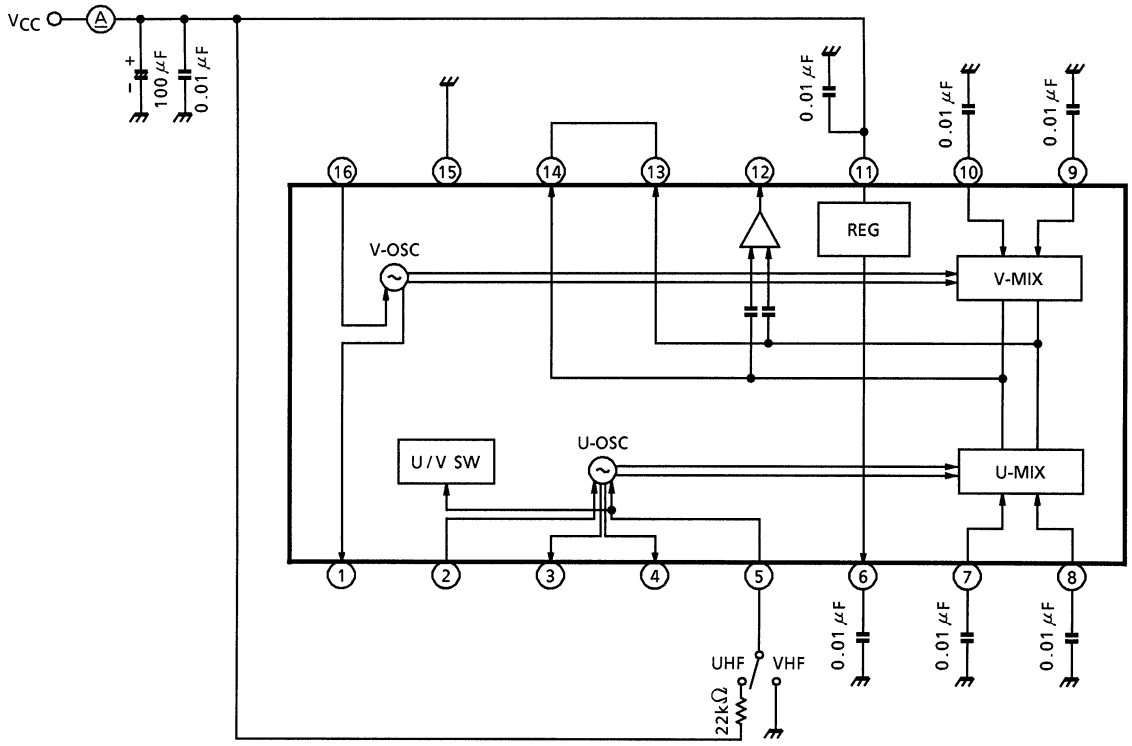
Note 6: 6-ch Beat

- fp = 83.25MHz (USA : 6ch)
- f_S = 87.75MHz (USA : 6ch)

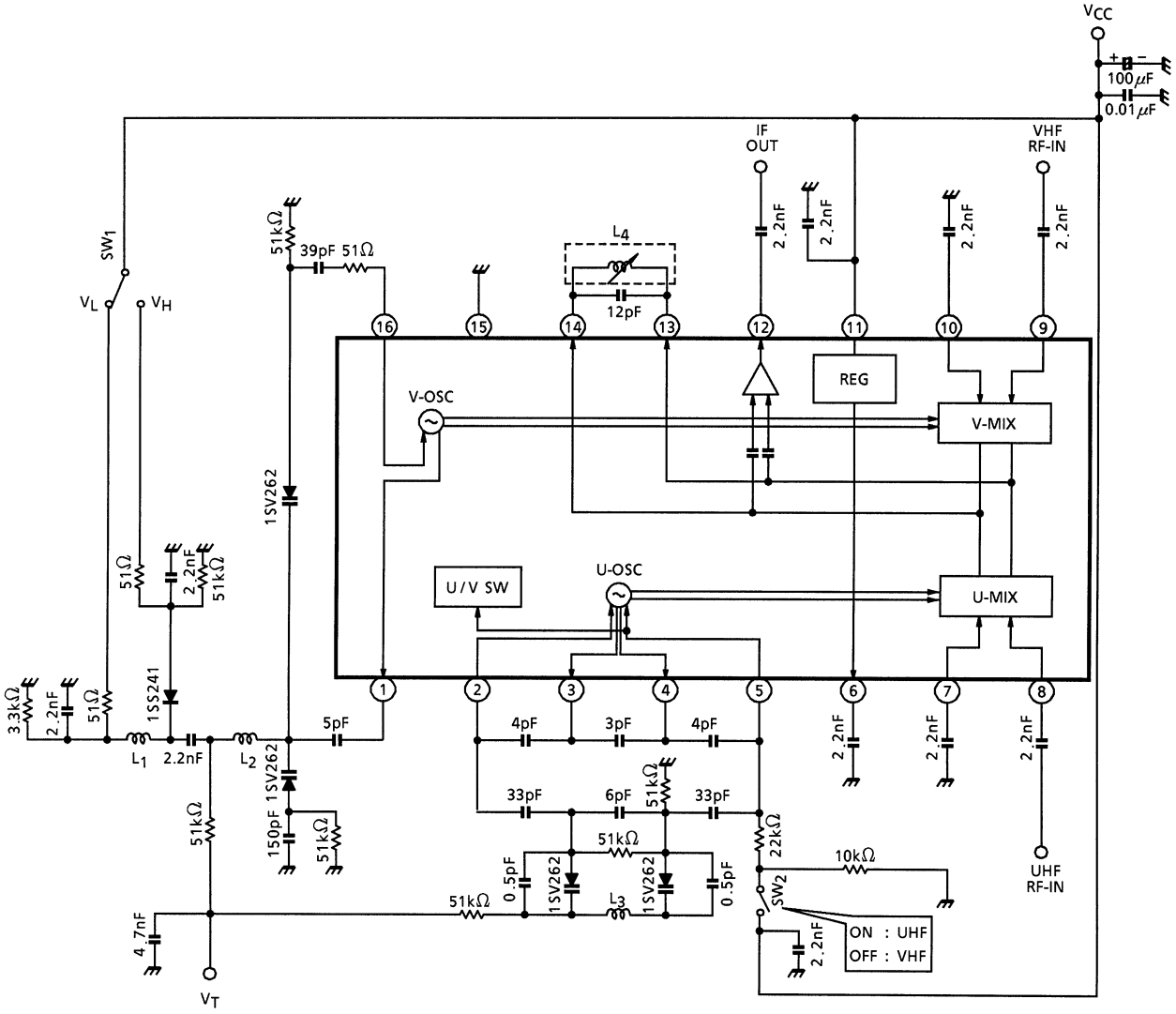
Input the two signals above, and increase the input levels.
When the IF output level is −11dBmW, measure the suppression level.
(Averaging 10 times using a spectrum analyzer.)



TEST CIRCUIT 1
DC CHARACTERISTICS



TEST CIRCUIT 2
AC CHARACTERISTICS



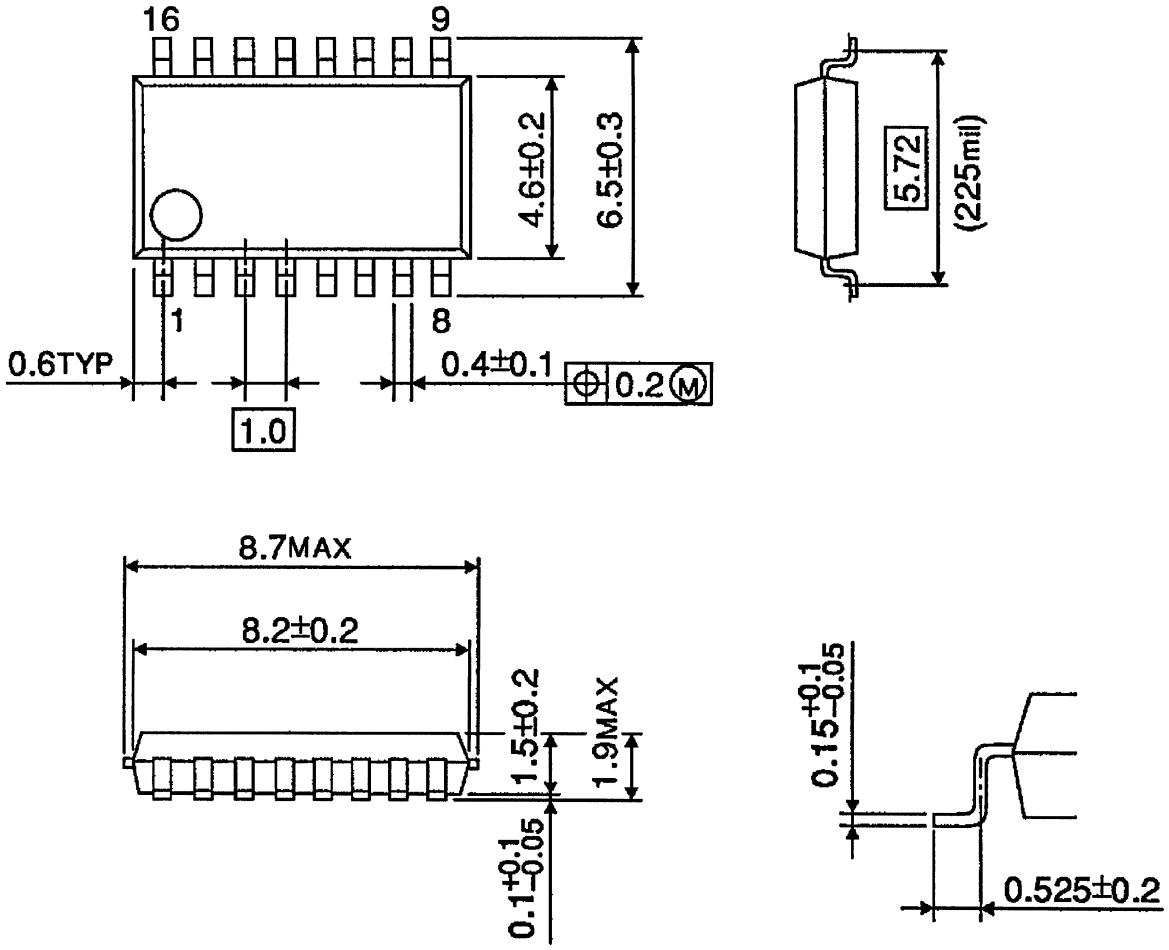
	LINE DIAMETER	TURN DIAMETER	NUMBER OF TURNS
L_1	0.32mm	2.0mm	7.5T
L_2	0.32mm	1.5mm	2.5T
L_3	0.32mm	2.5mm	2.5T

L4 : 0.9μH ± 5%

SW_1—V_{LOW} / V_{HI}
SW_2—VHF / UHF

PACKAGE DIEMENSIONS

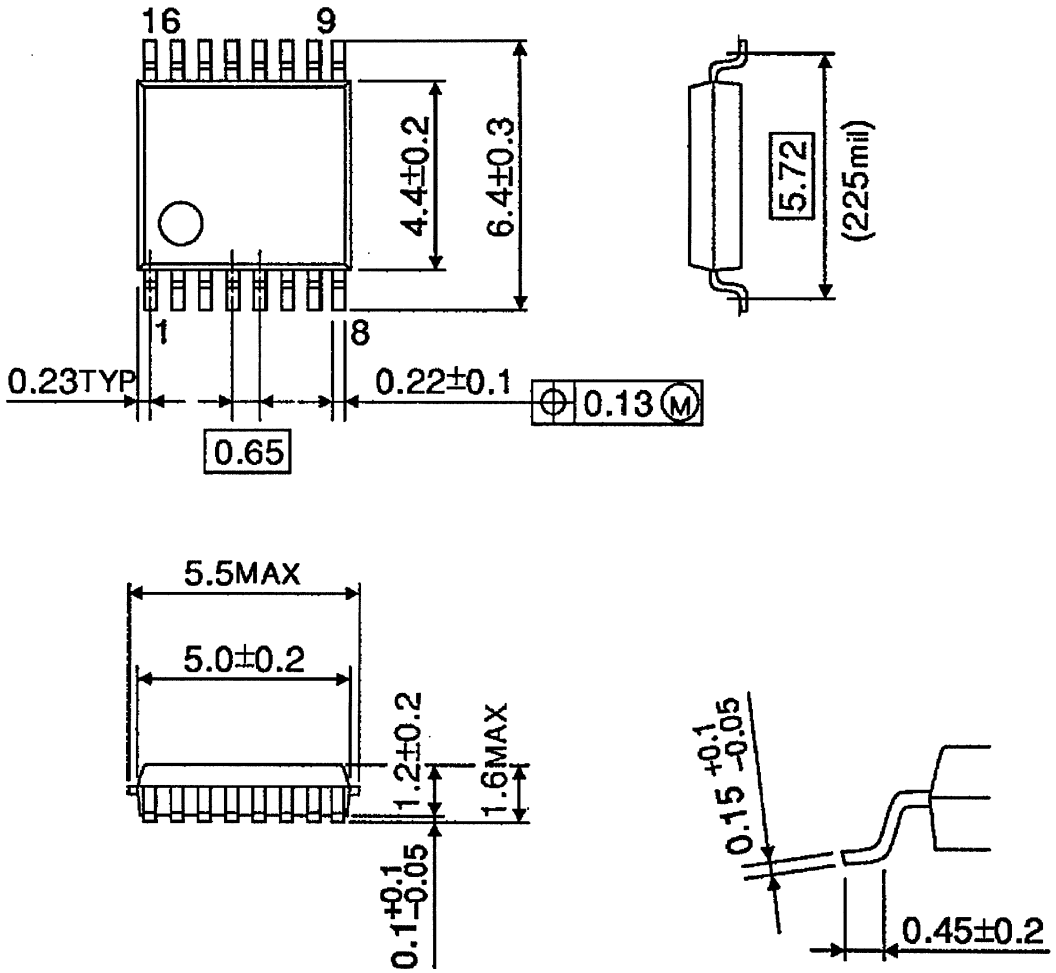
SSOP16-P-225-1.00A Unit : mm



Weight: 0.14g (Typ.)

PACKAGE DIEMENSIONS

SSOP16-P-225-0.65B Unit : mm



Weight: 0.07g (Typ.)