

**TENTATIVE**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT  
SILICON MONOLITHIC

## TA1231F,TA1231FN

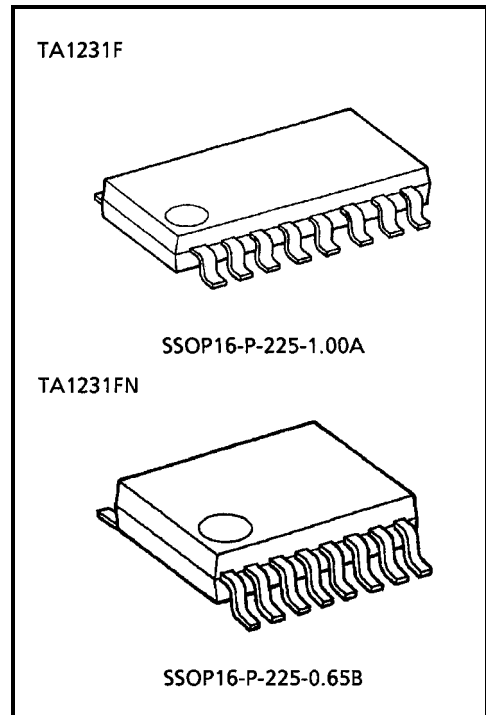
### UHF / VHF TUNER IC

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.

### 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.

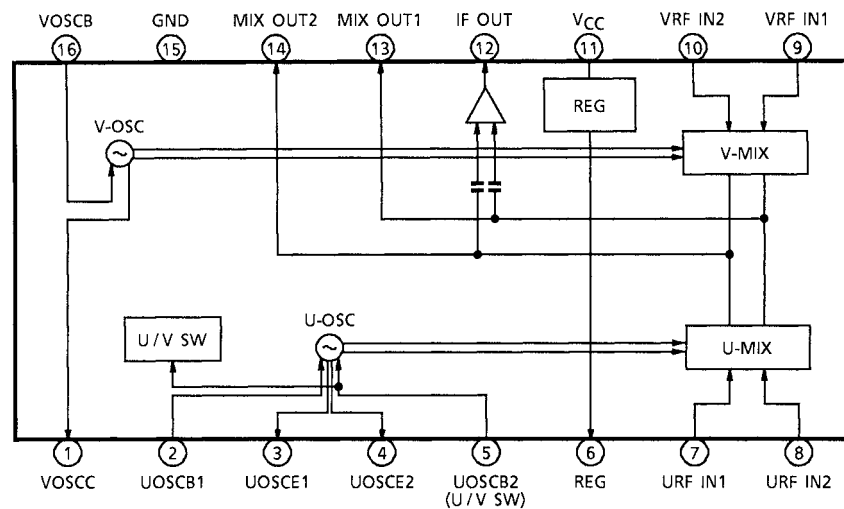


Weight  
SSOP16-P-225-1.00A : 0.14g (Typ.)  
SSOP16-P-225-0.65B : 0.07g (Typ.)

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## 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 VCC 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	VCC	VCC	—
12	IF output	IF output. Output impedance : 75Ω	
13 14	MIX output	Mixer output. For tuning, 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 <sub>CC</sub>	11	V
Power Dissipation	P <sub>D</sub>	(Note 1)	mW
Operating Temperature	T <sub>opr</sub>	-20~75	°C
Storage Temperature	T <sub>stg</sub>	-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 <sub>CC</sub>	8.1	9.0	9.9	V

## ELECTRICAL CHARACTERISTICS

### DC CHARACTERISTICS (Unless otherwise specified, V<sub>CC</sub> = 9V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply and Current for VHF		I <sub>CC-V</sub>	1	—	34	42	52	mA
Power Supply and Current for UHF		I <sub>CC-U</sub>		—	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	$\Delta f_s$	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	—	dB $\mu$ V
					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:  $f_f$  : 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  $VCC \pm 10\%$  with input level =  $-50\text{dBmW}$ ,  $VCC = 9\text{V}$  as the reference.

Note 2: Frequency Shift

Measure frequency change when  $VCC \pm 10\%$  with input level =  $-40\text{dBmW}$ ,  $VCC = 9\text{V}$  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 :  $-30\text{dBmW}$ )

Note 4: 1% Cross Modulation

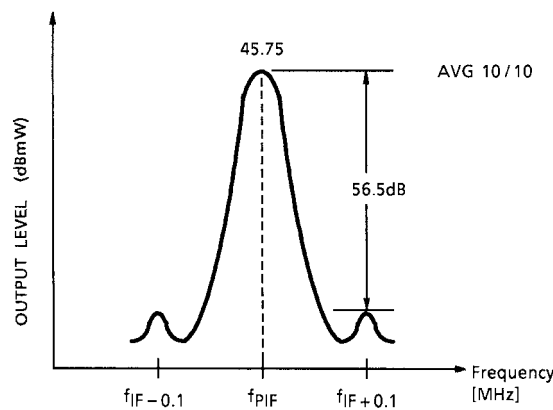
- $f_D = f_p$   $f_D$  : Input level =  $-30\text{dBmW}$

- $f_{UD} = f_D + 12\text{MHz}$   $100\text{kHz}$ , 30% AM.

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

Measure the  $f_{UD}$  input level when the suppression level reaches  $56.5\text{dB}$ .

(Averaging 10 times using a spectrum analyzer.)



Note 5: Inter Modulation

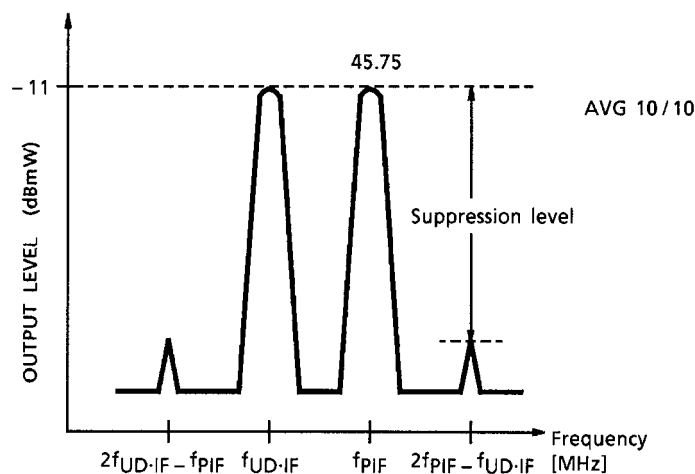
- $f_D = f_p$

- $f_{UD} = f_D + 1\text{MHz}$

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

When the IF output level is  $-11\text{dBmW}$ , measure the suppression level.

(Averaging 10 times using a spectrum analyzer.)



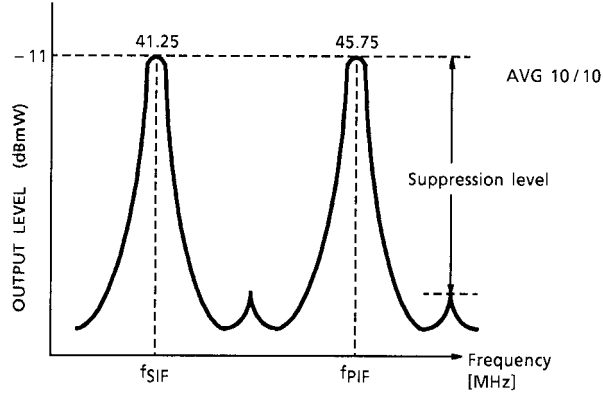
Note 6: 6-ch Beat

- $f_p = 83.25\text{MHz}$  (USA : 6ch)
- $f_s = 87.75\text{MHz}$  (USA : 6ch)

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

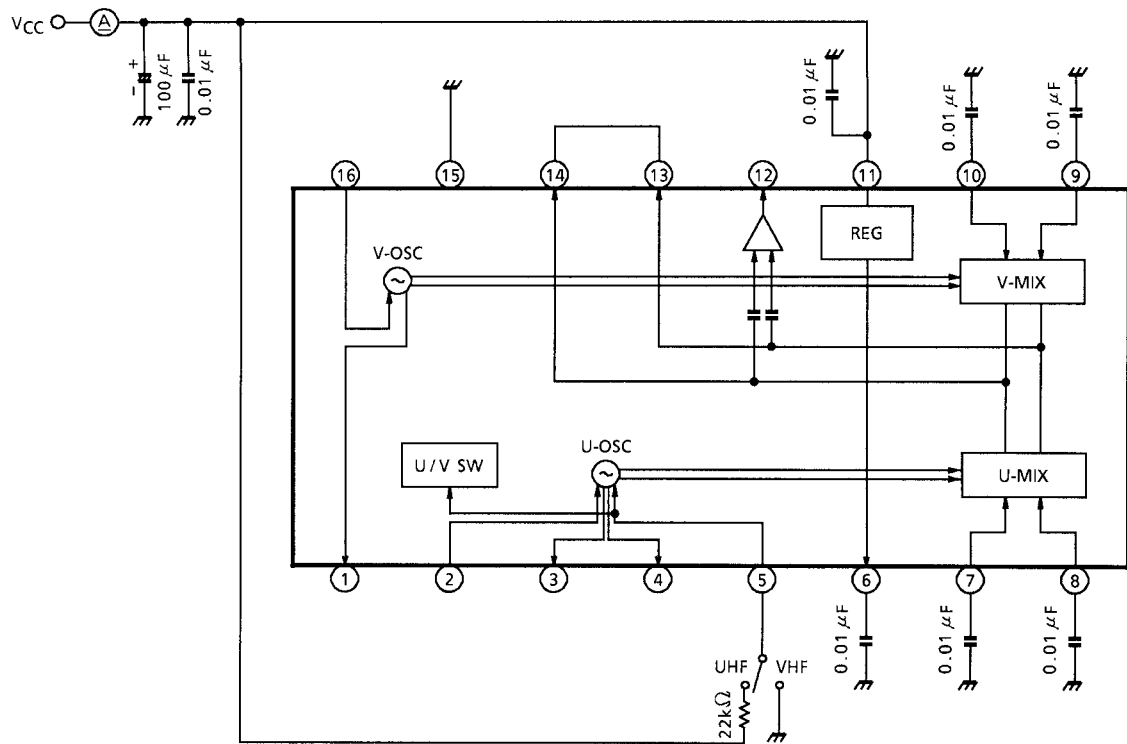
When the IF output level is  $-11\text{dBmW}$ , measure the suppression level.

(Averaging 10 times using a spectrum analyzer.)

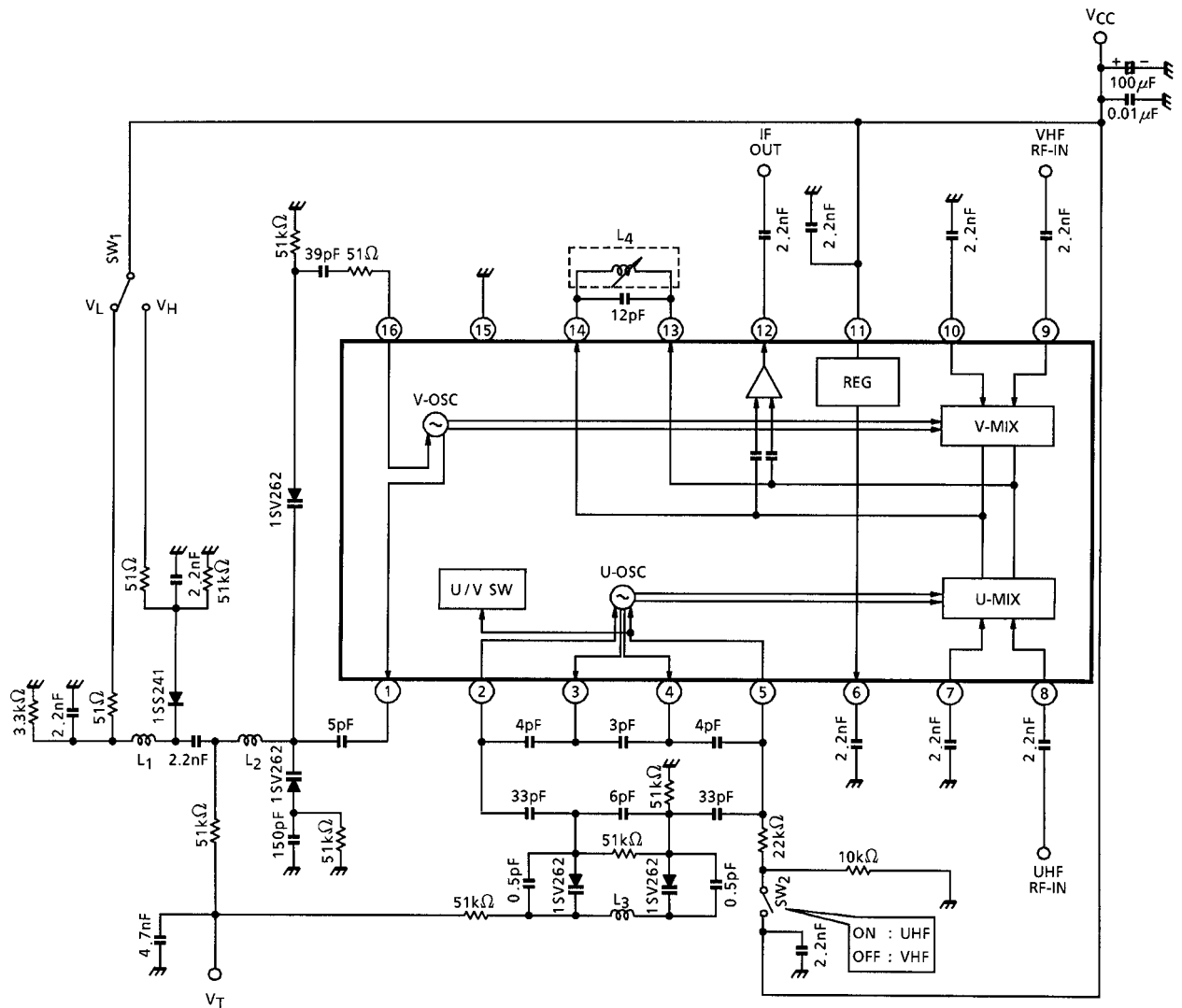




## TEST CIRCUIT 1 DC CHARACTERISTICS



## TEST CIRCUIT 2 AC CHARACTERISTICS



	LINE DIAMETER	TURN DIAMETER	NUMBER OF TURNS
L <sub>1</sub>	0.32mm	2.0mm	7.5T
L <sub>2</sub>	0.32mm	1.5mm	2.5T
L <sub>3</sub>	0.32mm	2.5mm	2.5T

L<sub>4</sub> : 0.9µH ± 5%

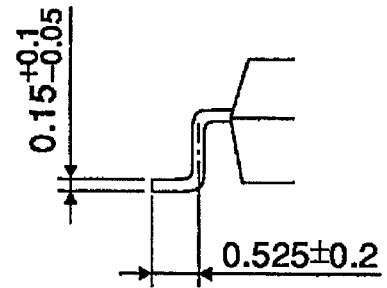
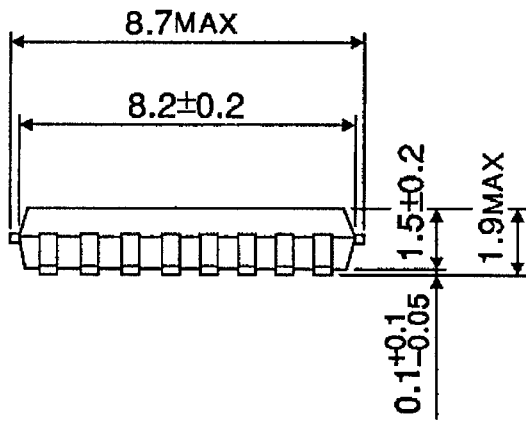
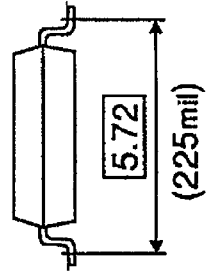
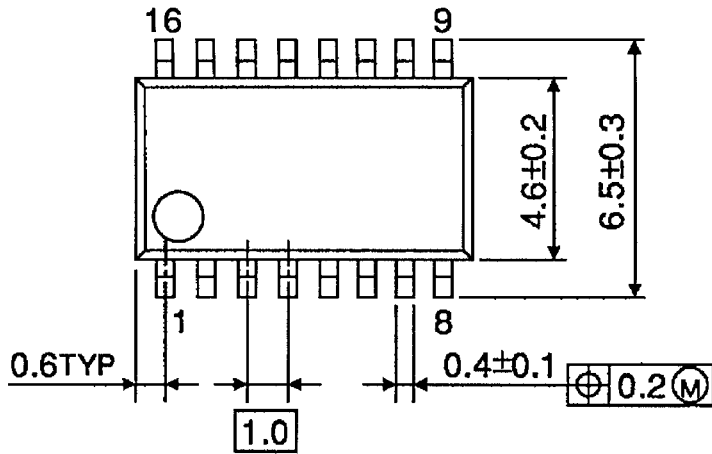
SW<sub>1</sub> — V<sub>LOW</sub> / V<sub>H</sub>I

SW<sub>2</sub> — V<sub>H</sub>F / U<sub>H</sub>F

## PACKAGE DIMENSIONS

SSOP16-P-225-1.00A

Unit : mm

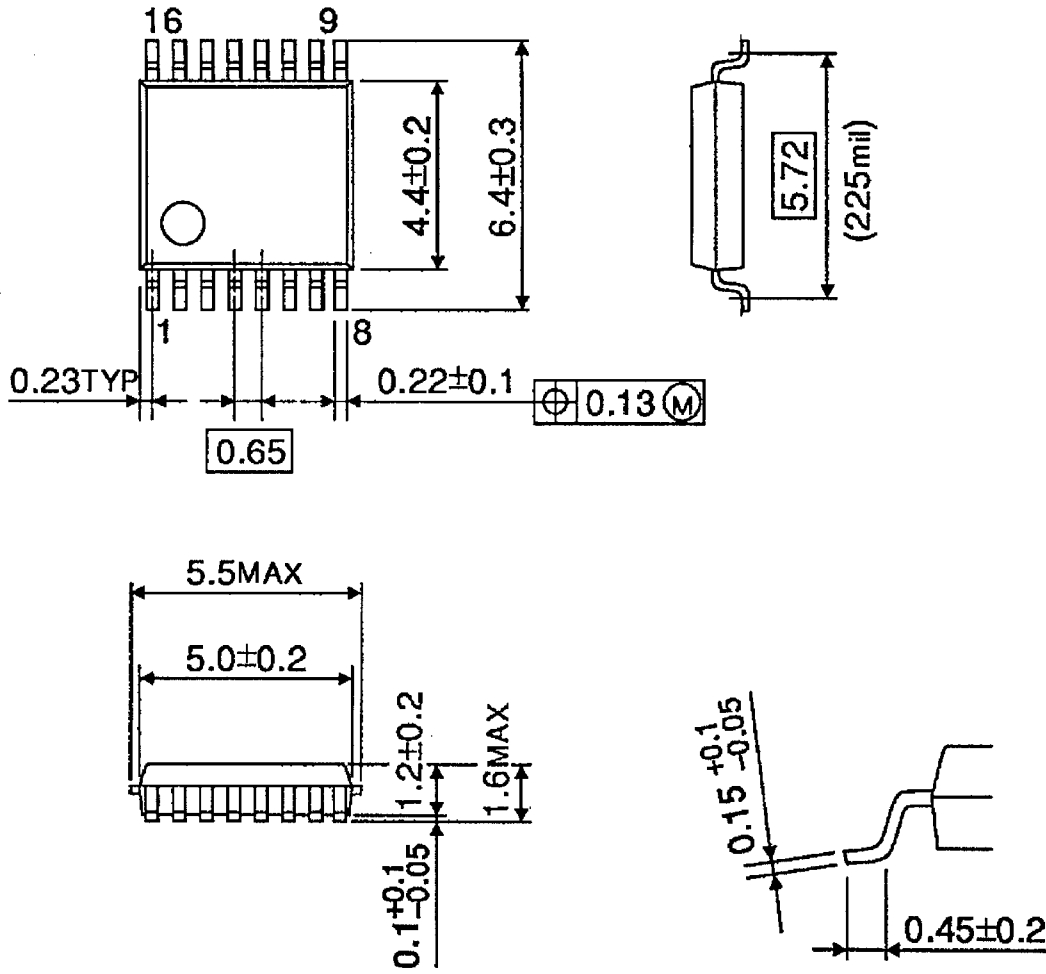


Weight: 0.14g (Typ.)

**PACKAGE DIMENSIONS**

SSOP16-P-225-0.65B

Unit : mm



Weight: 0.07g (Typ.)