

TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA1281F,TA1281FA,TA1281FN

UHF / VHF TUNER IC

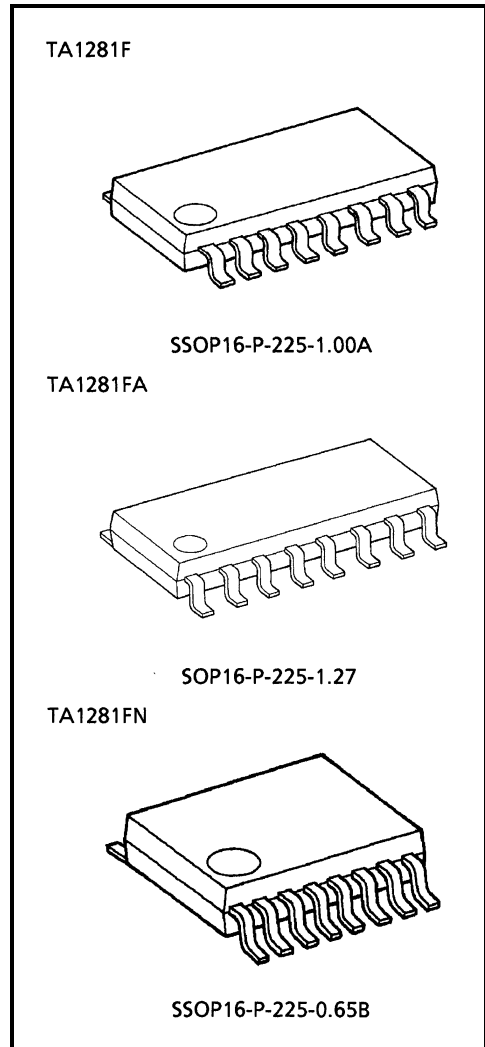
The TA1281F, TA1281FA, and TA1281FN are TV tuner ICs which integrate on a single chip IF amp, a mixer / oscillator for VHF band and cable TV, together with a mixer / oscillator for UHF band.

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

FEATURES

- Supply voltage : 5V
- VHF, CATV bands : MIX · OSC
- UHF band : MIX · OSC
- Built-in IF amp
- IF unbalanced output
- Low power dissipation

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



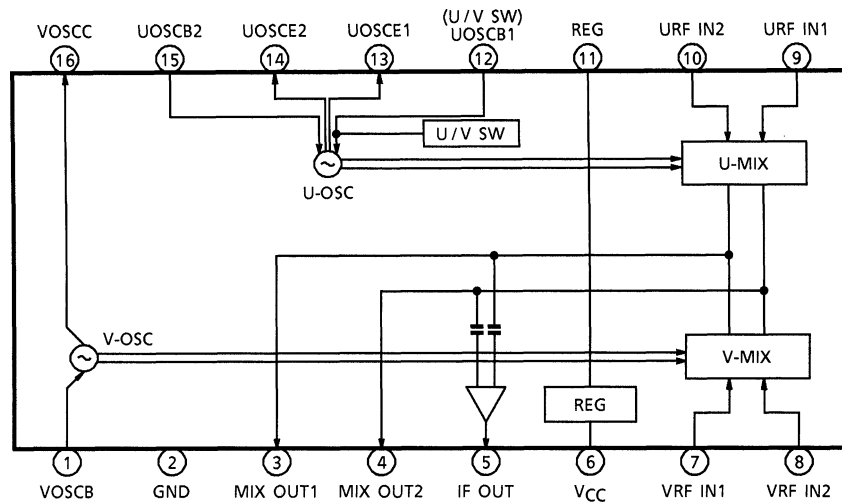
Weight
 SSOP16-P-225-1.000A : 0.14g (Typ.)
 SOP16-P-225-1.27 : 0.16g (Typ.)
 SSOP16-P-225-0.65B : 0.07g (Typ.)

000707EBA2

• TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
 In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..

• The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.

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 1 and the external capacitor.	
2	GND	GND	—
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	Vcc	Vcc	—

000707EBA2

- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

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 13 14 15	UHF oscillator	UHF oscillator. Pin 12 uses both as band switch. Connecting pin 12 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 12 and 15 of test circuit 2 varies the oscillation frequency range. Be careful not to set the constant too large, because abnormal oscillation may occur.	

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	6.5	V
Power Dissipation	P _D	(Note)	mW
Operating Temperature	T _{opr}	-20~85	°C
Storage Temperature	T _{stg}	-55~150	°C

Note: 641mW for TA1281F (F-type), 543mW for TA1281FA (FA-type), 568mW for TA1281FN (FN-type).
When using the device at above Ta=25°C, decrease the power dissipation F-type by 5.2mW, FA-type by 4.4mW and FN-type by 4.6mW for each increase of 1°C.

RECOMMENDED OPERATING CONDITION

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

ELECTRICAL CHARACTERISTICS

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

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Power Supply and Current For VHF		I _{CC-V}	1	—	21	29	36	mA	
Power Supply and Current For UHF		I _{CC-U}		—	22	30	38		
Terminal Voltage (*1)	Pin 1 For VHF	V1-V	1	—	1.8	2.1	2.5	V	
	Pin 1 For UHF	V1-U		—	2.0	2.3	2.7		
	Pin 3 For VHF	V3-V		—	3.5	3.8	4.2		
	Pin 3 For UHF	V3-U		—	3.4	3.7	4.1		
	Pin 4 For VHF	V4-V		—	3.5	3.8	4.2		
	Pin 4 For UHF	V4-U		—	3.4	3.7	4.1		
	Pin 5 For VHF	V5-V		—	1.8	2.1	2.5		
	Pin 5 For UHF	V5-U		—	1.8	2.1	2.5		
	Pin 7 For VHF	V7-V		—	1.3	1.6	2.0		
	Pin 7 For UHF	V7-U		—	1.4	1.7	2.1		
	Pin 8 For VHF	V8-V		—	1.3	1.6	2.0		
	Pin 8 For UHF	V8-U		—	1.4	1.7	2.1		
	Pin 9 For VHF	V9-V		—	1.4	1.7	2.1		
	Pin 9 For UHF	V9-U		—	1.3	1.6	2.0		
	Pin 10 For VHF	V10-V		—	1.4	1.7	2.1		
	Pin 10 For UHF	V10-U		—	1.3	1.6	2.0		
	Pin 11 For VHF	V11-V		—	3.9	4.1	4.3		
	Pin 11 For UHF	V11-U		—	3.9	4.1	4.3		
	Pin 12 For VHF	V12-V		—	—	0	—		
	Pin 12 For UHF	V12-U		—	—	1.8	2.1		2.5
	Pin 13 For VHF	V13-V		—	—	0	—		
	Pin 13 For UHF	V13-U		—	—	1.0	1.3		1.7
	Pin 14 For VHF	V14-V		—	—	1.5	1.8		2.2
	Pin 14 For UHF	V14-U		—	—	1.0	1.3		1.7
Pin 15 For VHF	V15-V	—	—	2.1	2.4	2.7			
Pin 15 For UHF	V15-U	—	—	1.8	2.1	2.5			
Pin 16 For VHF	V16-V	—	—	3.5	3.8	4.2			
Pin 16 For UHF	V16-U	—	—	—	5.0	—			

*1 : Upper : VHF mode
Lower : UHF mode

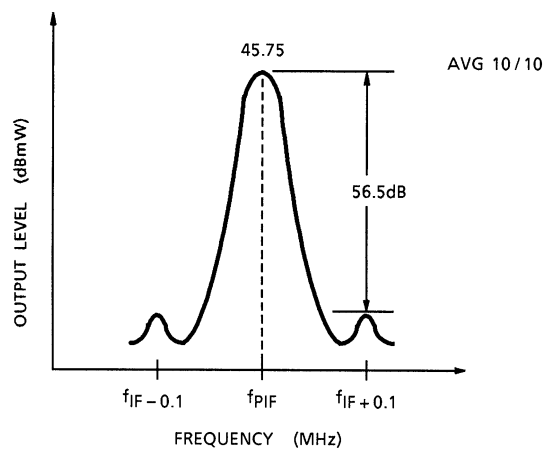
AC CHARACTERISTICS (Unless otherwise specified, $V_{CC}=5V$, $T_a = 25^\circ C$)

No.	CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION (*2)	MIN.	TYP.	MAX.	UNIT	
1	Conversion Gain	CG	2		VHF-L	18	21	24	dB
					VHF-H	16	21	23	
					UHF	19	24	27	
2	Noise Figure	NF	2		VHF-L	—	10.5	11.5	dB
					VHF-H	—	12.5	14.5	
					UHF	—	11.0	13.0	
3	IF Out Power Level	IFp	2		VHF-L	5	7	—	dBmW
					VHF-H	5	7	—	
					UHF	5	7	—	
4	Conversion Gain Shift	CGs	2	(Note 1)	VHF-L	—	—	±1.0	dB
					VHF-H	—	—	±1.0	
					UHF	—	—	±1.0	
5	Frequency Shift	Δf_B	2	(Note 2)	VHF-L	—	—	±200	kHz
					VHF-H	—	—	±350	
					UHF	—	—	±200	
6	Switching On Drift	Δf_s	2	(Note 3)	VHF-L	—	—	±100	kHz
					VHF-H	—	—	±100	
					UHF	—	—	±150	
7	1 % Cross Modulation	CM	2	(Note 4)	VHF-L	81.0	82.5	—	dB μ V
					VHF-H	79.0	82.0	—	
					UHF	78.0	79.5	—	
8	Inter Modulation	IM3	2	(Note 5)	VHF-L	-56	-62	—	dBc
					VHF-H	-54	-61	—	
					UHF	-54	-62	—	
9	6-ch Beat	B_6	2	(Note 6)	VHF-L (6ch)	-55	-60	—	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 $V_{CC} \pm 10\%$ with input level = -50dBmW , $V_{CC} = 5\text{V}$ as the reference.
- Note 2: Frequency Shift
Measure frequency change when $V_{CC} \pm 10\%$ with input level = -40dBmW , $V_{CC} = 5\text{V}$ 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 : -30dBmW)
- Note 4: 1% Cross Modulation
- $f_D = f_P$ f_D : input level = -30dBmW
 - $f_{UD} = f_D + 12\text{MHz}$ 100kHz, 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 56.5dB. (Averaging 10 times using a spectrum analyzer)

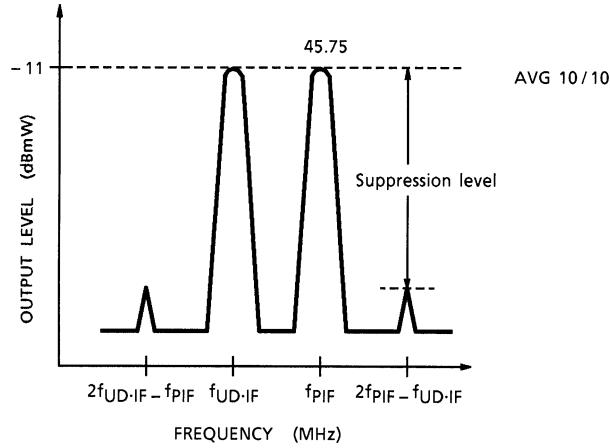


Note 5: Inter Modulation

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

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

When the IF out level is -11dBmW , measure the suppression level. (Averaging 10 times using a spectrum analyzer)

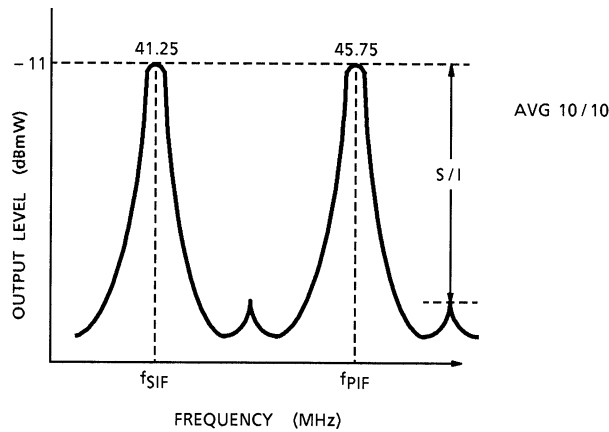


Note 6: 6-ch Beat

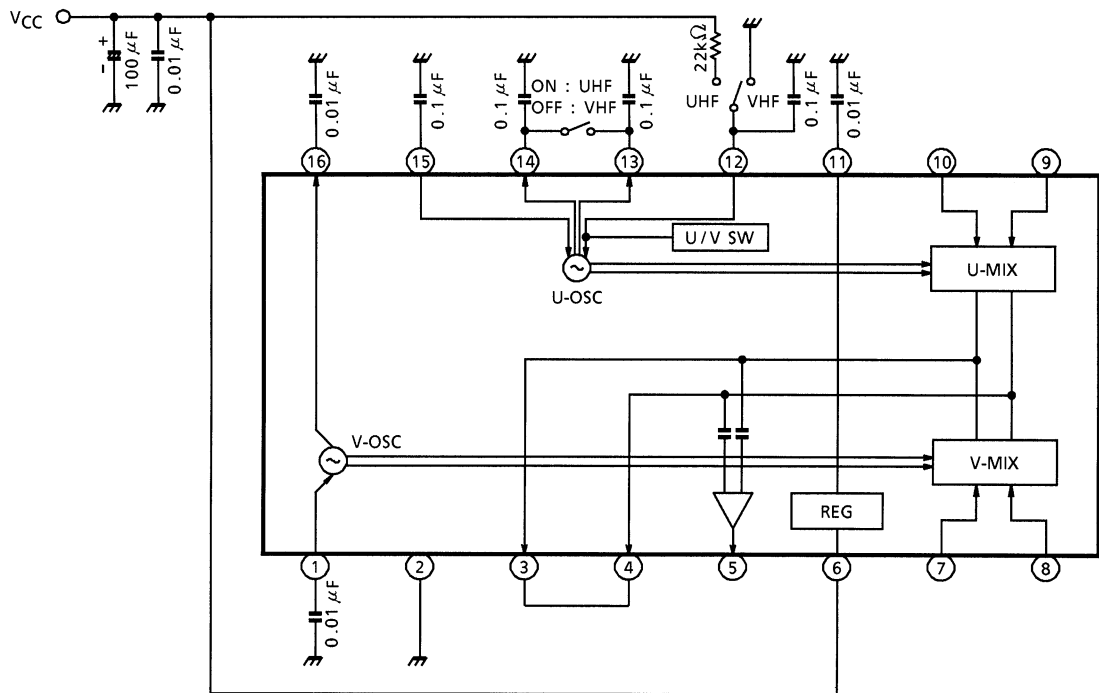
- $f_P = 83.25\text{MHz}$ (USA : 6ch)
- $f_S = 87.75\text{MHz}$ (USA : 6ch)

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

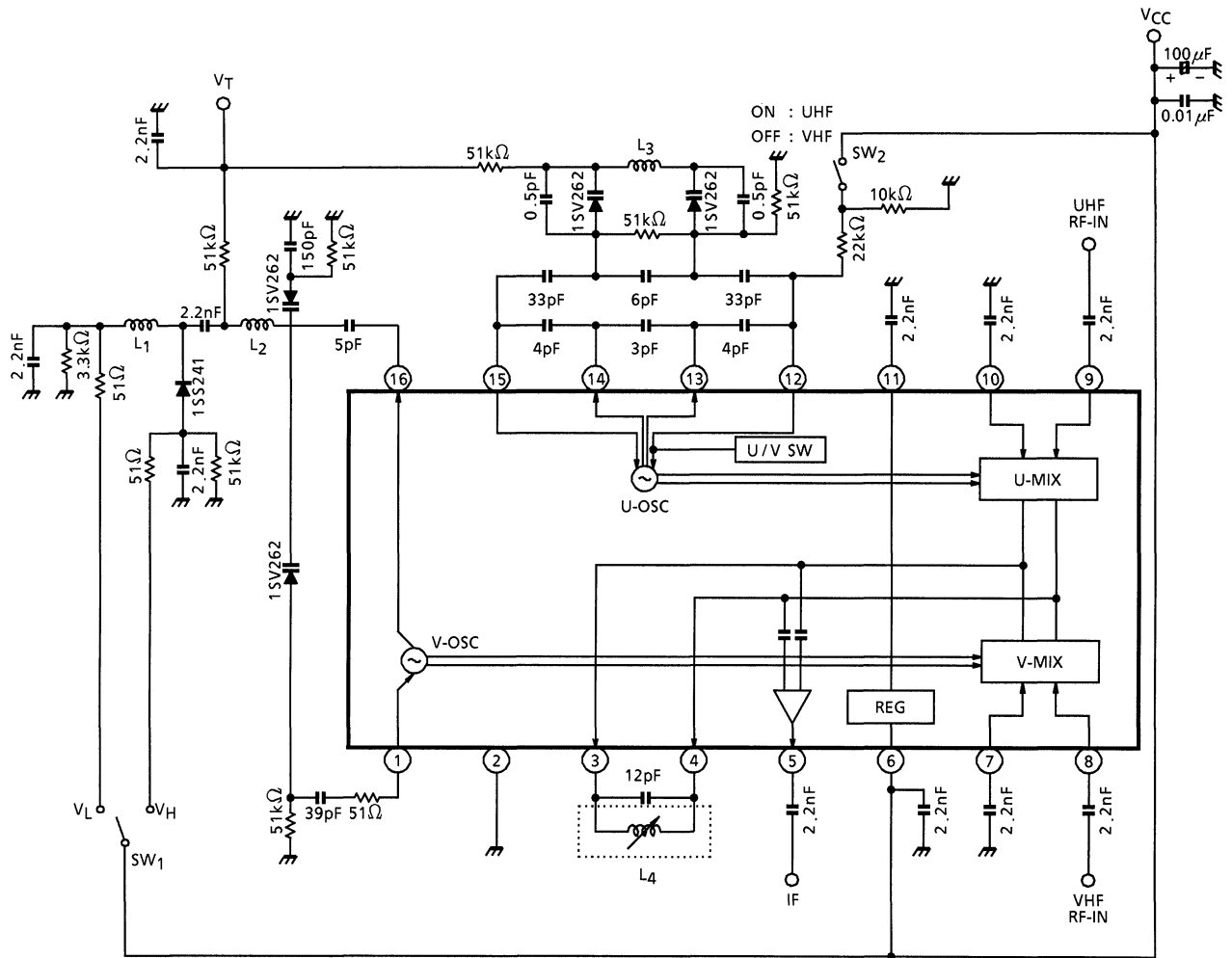
When the IF out level is -11dBmW , measure the suppression level. (Averaging 10 times using a spectrum analyzer)



TEST CIRCUIT1 DC CHARACTERISTICS



TEST CIRCUIT2 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%

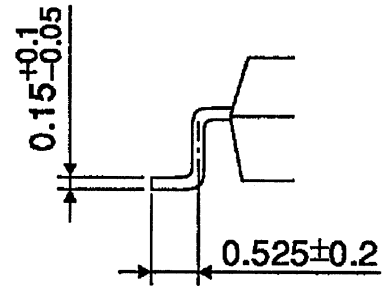
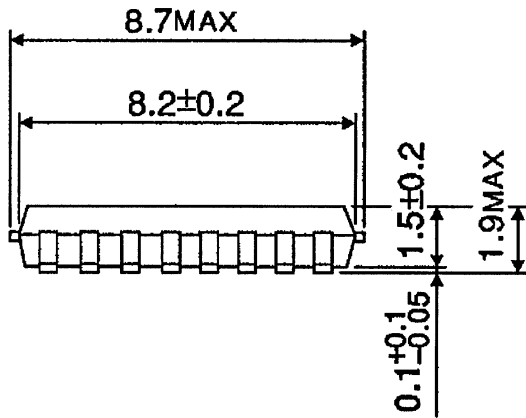
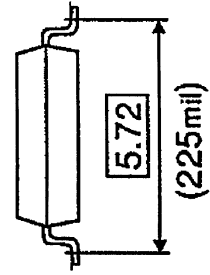
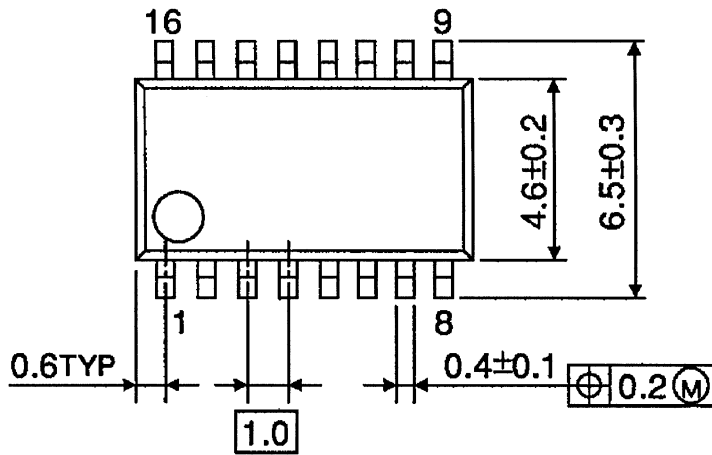
SW1 — V_{LOW} / V_{HI}

SW2 — VHF / UHF

PACKAGE DIMENSIONS

SSOP16-P-225-1.00A

Unit : mm

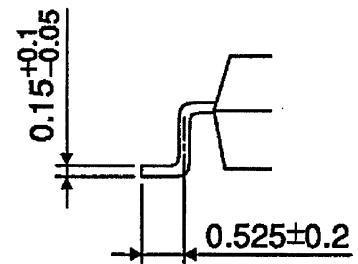
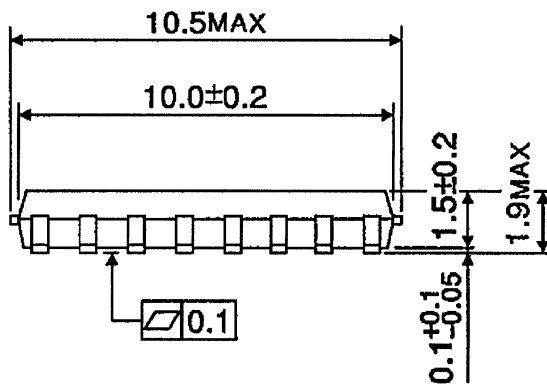
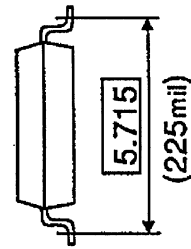
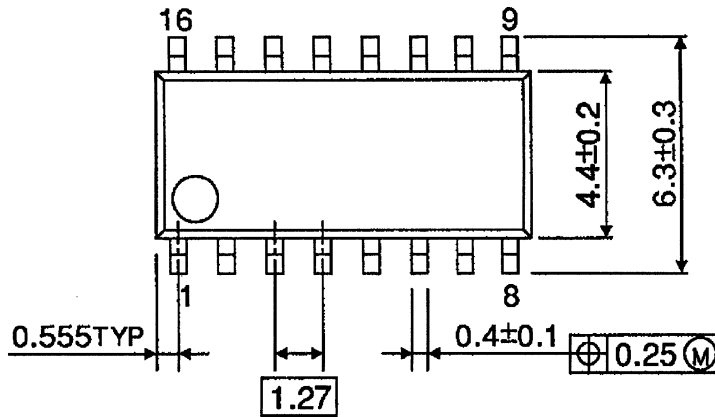


Weight: 0.14g (Typ.)

PACKAGE DIMENSIONS

SOP16-P-225-1.27

Unit : mm

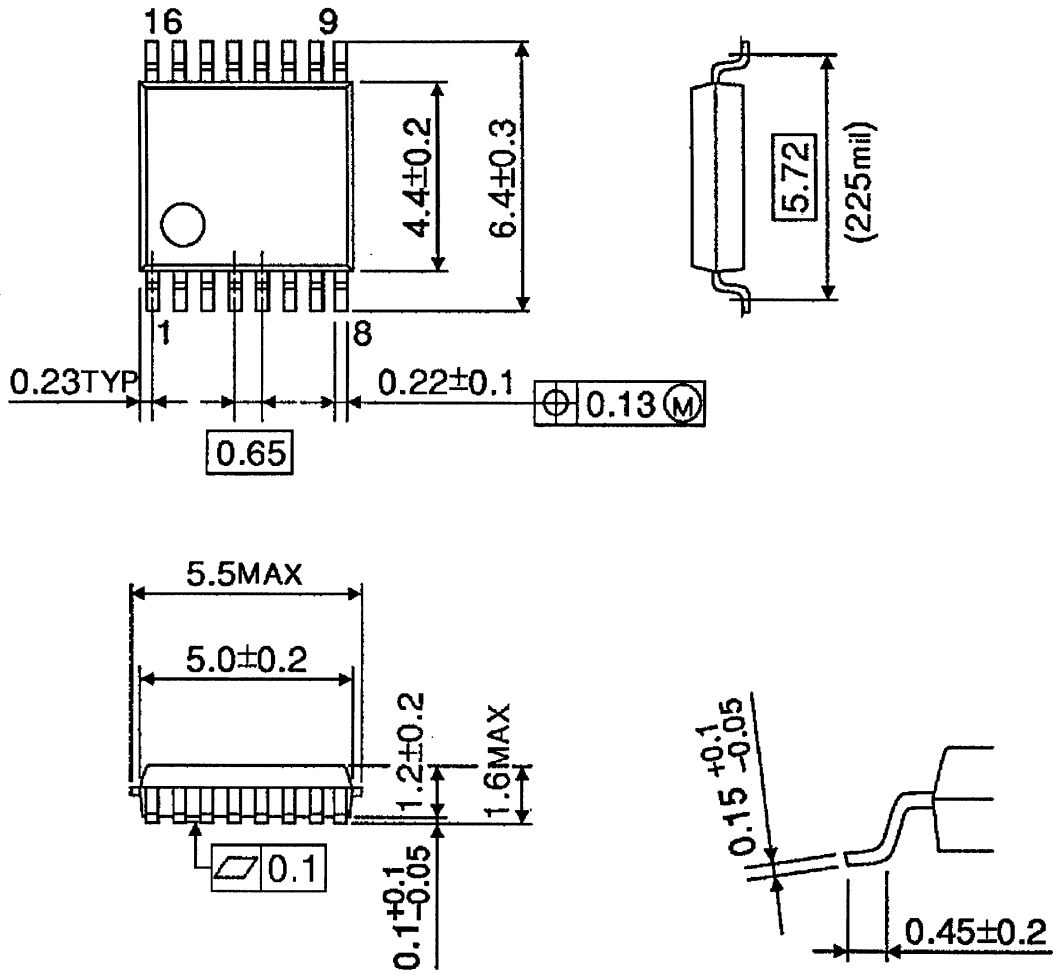


Weight: 0.16g (Typ.)

PACKAGE DIMENSIONS

SSOP16-P-225-0.65B

Unit : mm



Weight: 0.07g (Typ.)