

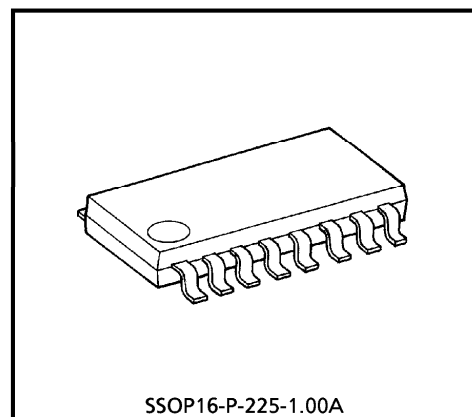
TA7765AF

AM / FM IF SYSTEM (1.5V USE)

The TA7765AF is an AM / FM IF system IC designed for low voltage operation (1.5V), which is especially suitable for a stereo headphone radio and a radio cassette recorder. This IC can realize the low power dissipation and few external parts.

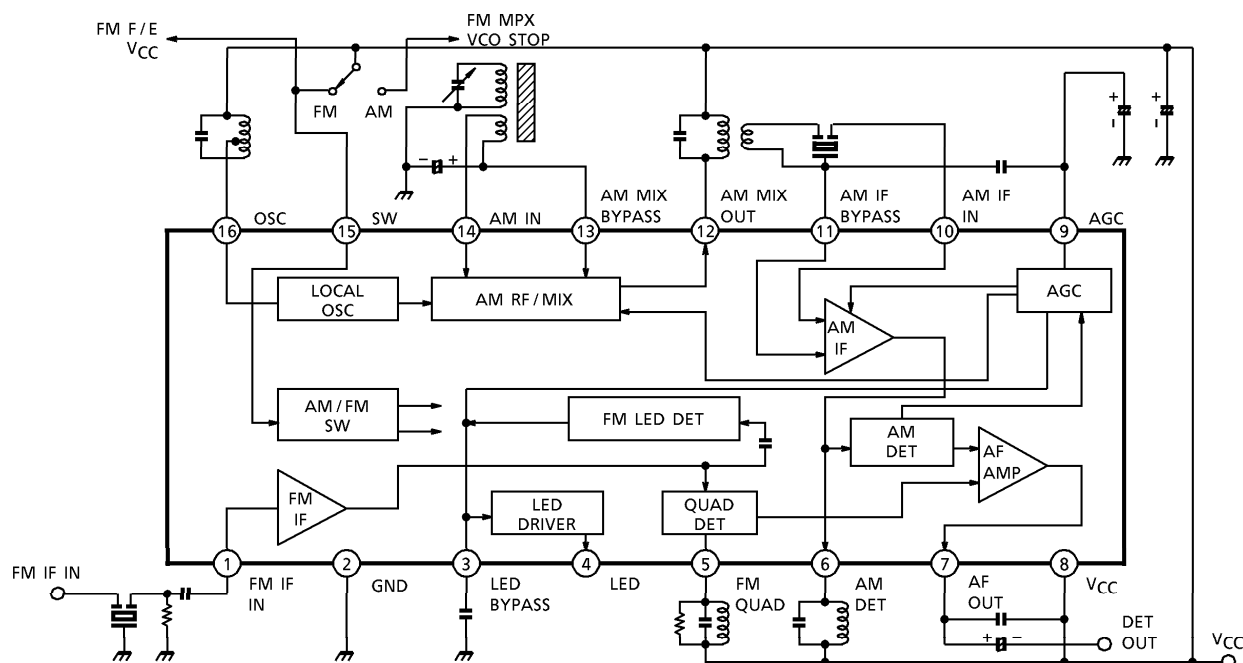
FEATURES

- Including the AM / FM switch.
- Including the single output terminal for AM / FM.
- Including the LED driver for tuning indicator.
($V_{LED} \geq 2.5V$)
- Few external parts and small installed area.
- Excellent supply current : ($V_{CC} = 1.5V, T_a = 25^\circ C$)
AM : $I_{CC} = 1.1mA$ (Typ.)
FM : $I_{CC} = 1.8mA$ (Typ.)
- Operating supply voltage range.
: $V_{CC} (opr) = 0.95 \sim 5V$ ($T_a = 25^\circ C$)



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

BLOCK DIAGRAM



961001EBA2

● TOSHIBA is continually working to improve the quality and the 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 observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product 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 products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

APPLICATION NOTE

(1) FM-IF input stage

The terminal pin① is the FM-IF input terminal which is the base of common-emitter transistor. (Fig.1)

(2) FM-IF stage

This is composed of the six stage of the common-emitter amplifiers with active loads. As the third stage and the fourth stage are connected with internal coupling condenser, it is composed of HPF. Therefore, it is possible to reduce the noise of low frequency range.

(3) AM input stage

The terminal pin⑭ is the AM input terminal which is the base of common-emitter transistor. And this transistor is the current source of the Mixer which is composed of emitter coupled pair transistors. (Fig.2)

(4) AM-IF input stage

The AM-IF signal from the MIX OUT terminal (pin⑫) is applied to the AM-IF input terminal (pin⑩) through the transformer. The terminal pin⑩ is the base of common-emitter transistor, and the input resistance is $3k\Omega$ (Typ.).

(5) AGC circuit

This AGC circuit is composed of the internal Double-AGC get high applied widely.

- ┌ medium input : AGC applied to IF section.
- └ strong input : AGC applied to RF and IF section.

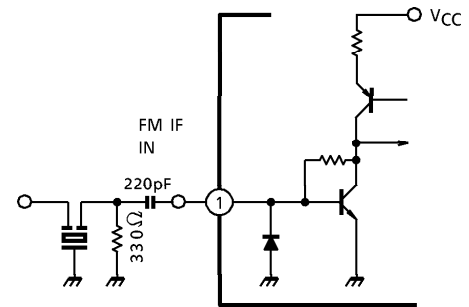


Fig.1

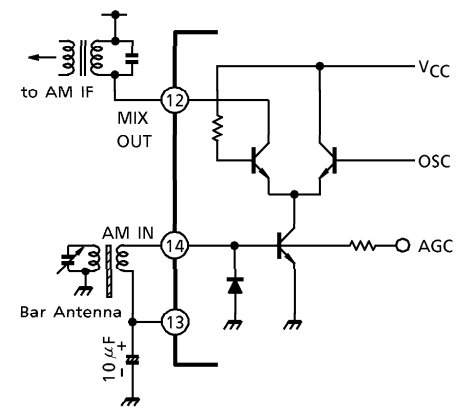


Fig.2

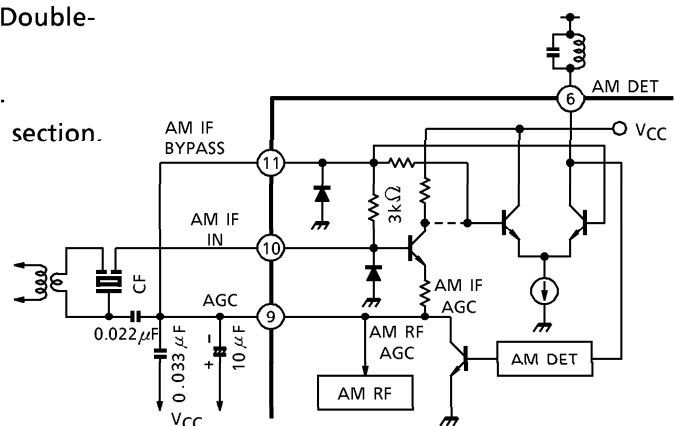


Fig.3

961001EBA2'

● The products described in this document are subject to foreign exchange and foreign trade control 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.

(6) Output buffer amplifier (AF)

The output impedance differs in FM/AM mode. At FM mode, it is low output impedance due to pass the sub-carrier. On the other hand, at AM mode, it is high output impedance due to high frequency-cut easily.

$$R_{OUT} (FM) = 1.3k\Omega \text{ (Typ.)}$$

$$R_{OUT} (AM) = 8k\Omega \text{ (Typ.)}$$

(7) LED driver

Fig.4 shows the LED driver.

The "LED supply voltage" must be more than about 2.5V, for using this function.

Without the LED, it is necessary to connect the terminal pin④ to GND, then the supply current is reduced.

(8) FM/AM mode switch circuit

When the terminal pin⑮ is connected to VCC directly, the FM mode is given, and when this terminal is opened, the AM mode is given.

In case of connecting as Fig.5, one-circuit switch is enough to stop the VCO at AM mode.

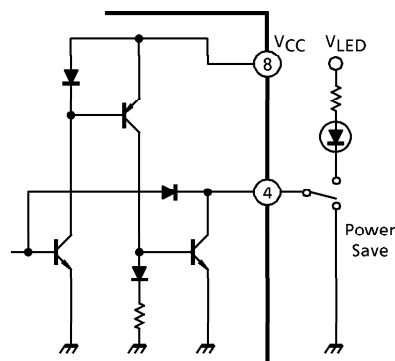


Fig.4

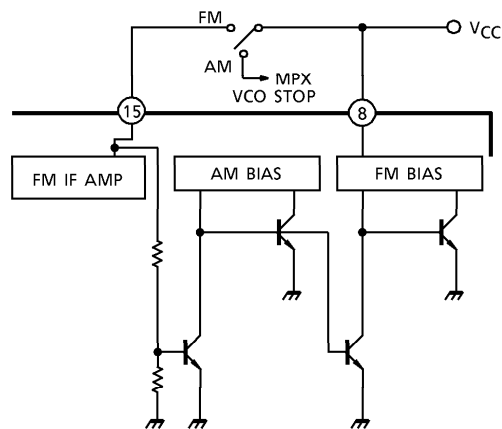


Fig.5

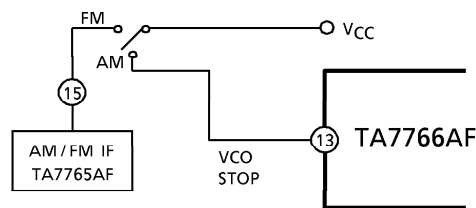


Fig.6

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	5	V
Lamp Voltage	V _{LAMP}	6	V
Lamp Current	I _{LAMP}	5	mA
Power Dissipation	P _D (Note)	350	mW
Operating Temperature	T _{opr}	-25~75	°C
Storage Temperature	T _{stg}	-55~150	°C

(Note) Derated above Ta = 25°C in the proportion of 2.8mW/°C.

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta = 25°C, V_{CC} = 1.5V

FM : f = 10.7MHz, Δf = ±22.5kHz, f_m = 1kHz, V_{in} = 90dBμV EMF

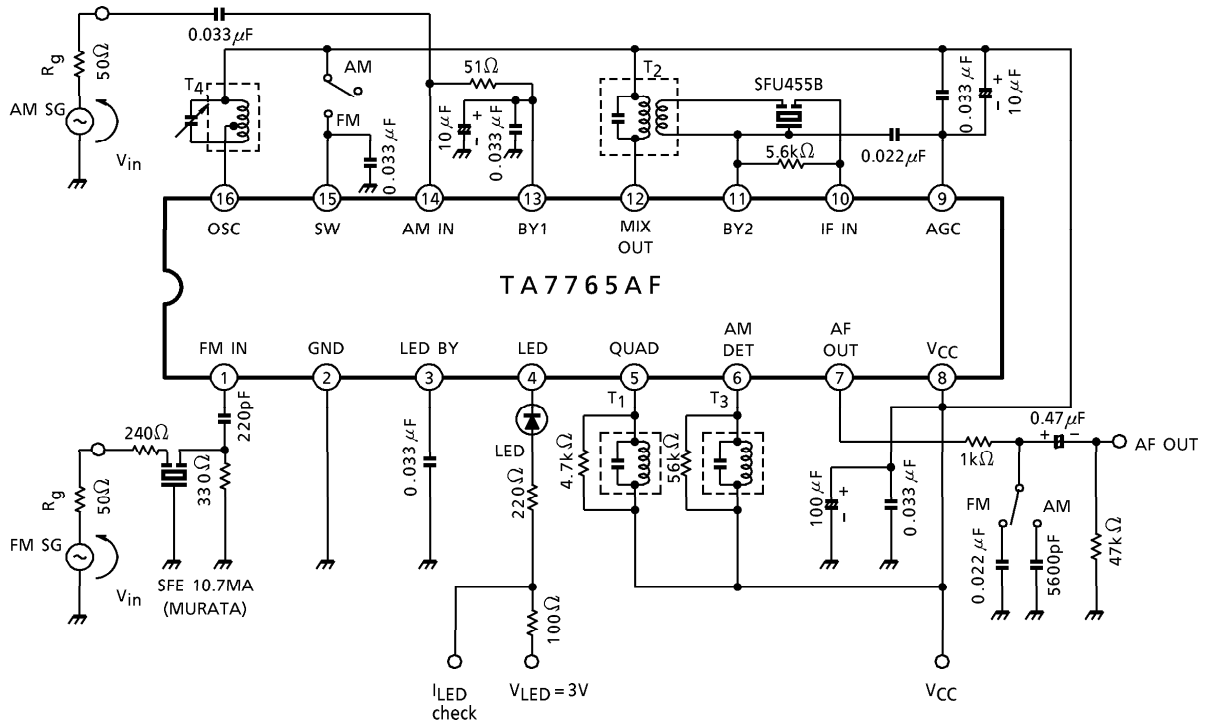
AM : f = 1MHz, MOD = 30%, f_m = 1kHz, V_{in} = 60dBμV EMF

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I _{CC} (1)	—	FM V _{in} = 0	—	1.8	2.8	mA
		I _{CC} (2)	—	AM V _{in} = 0	—	1.1	1.8	
FM	Input Limiting Voltage	V _{in} (lim)	—	-3dB Limiting point	—	53	59	dBμV EMF
	Recovered Output Voltage	V _{OD}	—		28	48	60	mV _{rms}
	Signal To Noise Ratio	S/N	—		—	62	—	dB
	Total Harmonic Distortion	THD	—		—	0.5	—	%
	AM Rejection Ratio	AMR	—	MOD = 30%	—	22	—	dB
Lamp On Sensitivity		V _L	—	I _L = 1mA	—	48	56	dBμV EMF
AM	Gain	G _V	—	V _{in} = 30dBμV EMF	10	32	50	mV _{rms}
	Recovered Output Voltage	V _{OD}	—		30	48	75	mV _{rms}
	Signal To Noise Ratio	S/N	—		—	40	—	dB
	Total Harmonic Distortion	THD	—		—	1.6	—	%
	Lamp On Sensitivity	V _L	—	I _L = 1mA	—	30	—	dBμV EMF
Local OSC Stop Voltage		V _{stop}	—		—	—	0.95	V
Pin⑦ Output Resistance		R _O (FM)	—	f = 1kHz	—	1.3	—	kΩ
		R _O (AM)	—		—	8	—	

DC CHARACTERISTICS ($V_{CC} = 1.5V$, $T_a = 25^\circ C$, terminal voltage at no signal)

PIN No.	SYMBOL	TYP.		UNIT
		AM	FM	
PIN ① (FM IF IN)	V ₁	—	0.7	V
PIN ② (GND)	V ₂	0	0	V
PIN ③ (LED BYPASS)	V ₃	—	—	V
PIN ④ (LED)	V ₄	—	—	V
PIN ⑤ (FM QUAD DET)	V ₅	1.5	1.5	V
PIN ⑥ (AM DET)	V ₆	1.5	1.5	V
PIN ⑦ (AF OUT)	V ₇	0.6	0.7	V
PIN ⑧ (V_{CC})	V ₈	1.5	1.5	V
PIN ⑨ (AGC)	V ₉	0.8	—	V
PIN ⑩ (AM IF IN)	V ₁₀	1.4	1.5	V
PIN ⑪ (AM IF BYPASS)	V ₁₁	1.4	1.5	V
PIN ⑫ (AM MIX OUT)	V ₁₂	1.5	1.5	V
PIN ⑬ (AM MIX BYPASS)	V ₁₃	0.7	—	V
PIN ⑭ (AM IN)	V ₁₄	0.7	—	V
PIN ⑮ (SW)	V ₁₅	—	1.5	V
PIN ⑯ (OSC)	V ₁₆	1.5	1.5	V

TEST CIRCUIT



COIL DATA (Test circuit)

Ⓢ : SUMIDA ELECTRIC Co., Ltd.

COIL No.	STAGE	f	L (μH)	C ₀ (pF)	Q ₀	TURN				WIRE (mm φ)	REF.
						1-2	2-3	1-3	4-6		
T ₁	FM DET	10.7MHz	—	82	130	—	—	—	11	0.12UEW	Ⓢ 0133-3099-181
T ₂	AM IFT	455kHz	—	180	110	88	60	—	8	0.07UEW	Ⓢ 48T-037-423
T ₃	AM DET	455kHz	—	180	110	146	6	—	13	0.07UEW	Ⓢ 44M-037-935C
T ₄	AM OSC	796kHz	288	—	125	13	75	—	—	0.08UEW	Ⓢ 0137-135-262

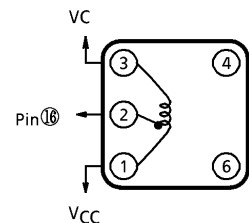
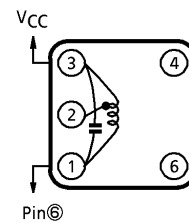
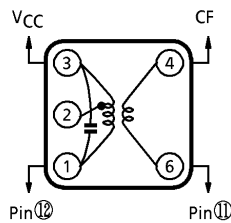
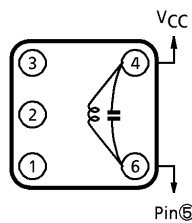
(Bottom view)

T₁ FM DET

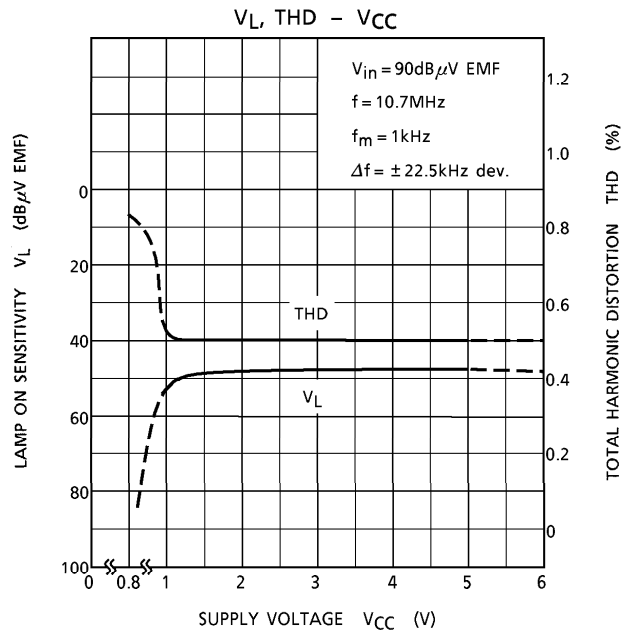
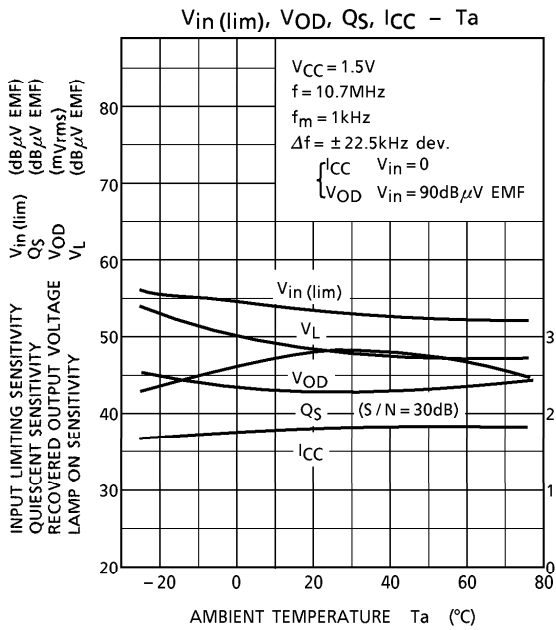
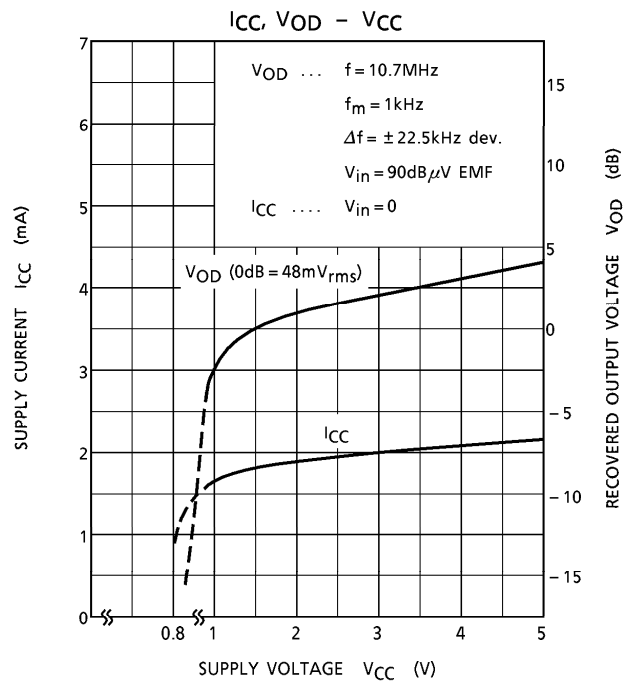
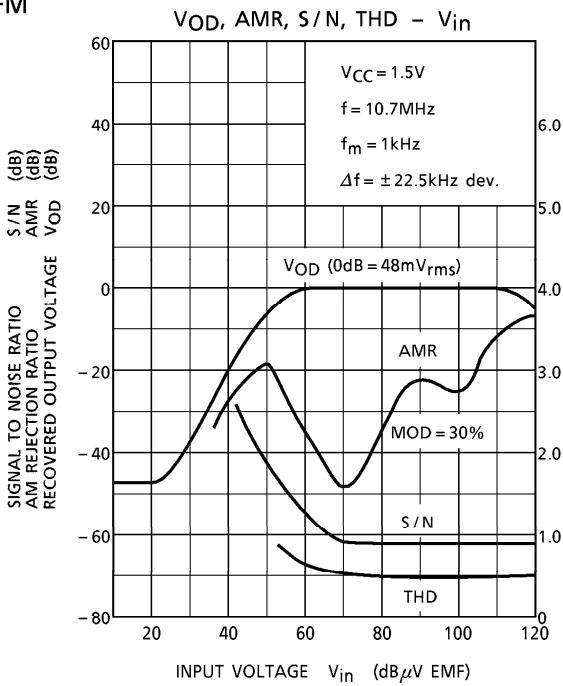
T₂ AM IFT

T₃ AM DET

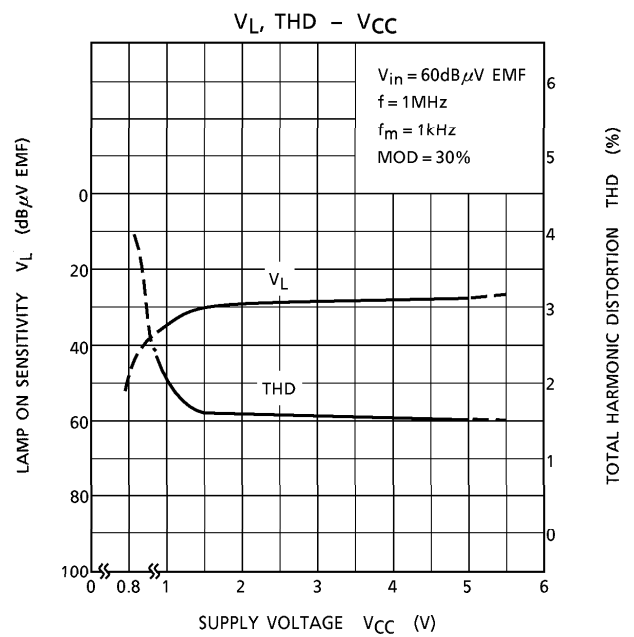
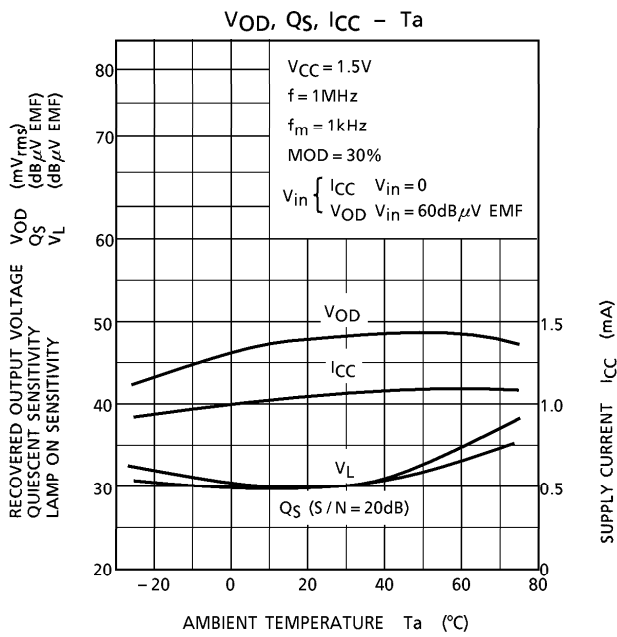
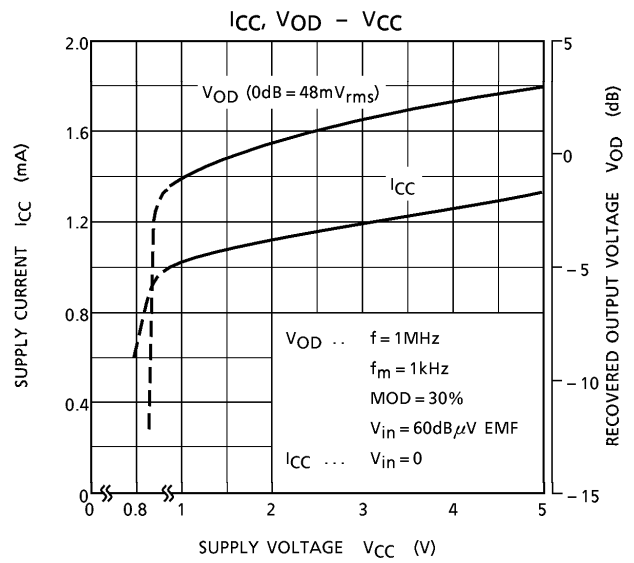
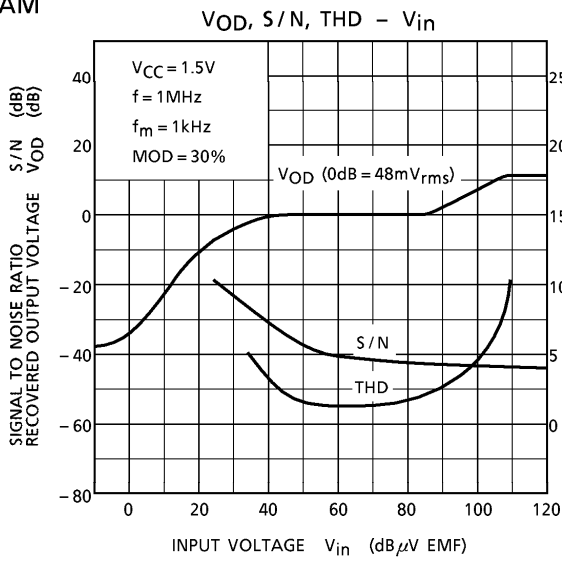
T₄ AM OSC



FM

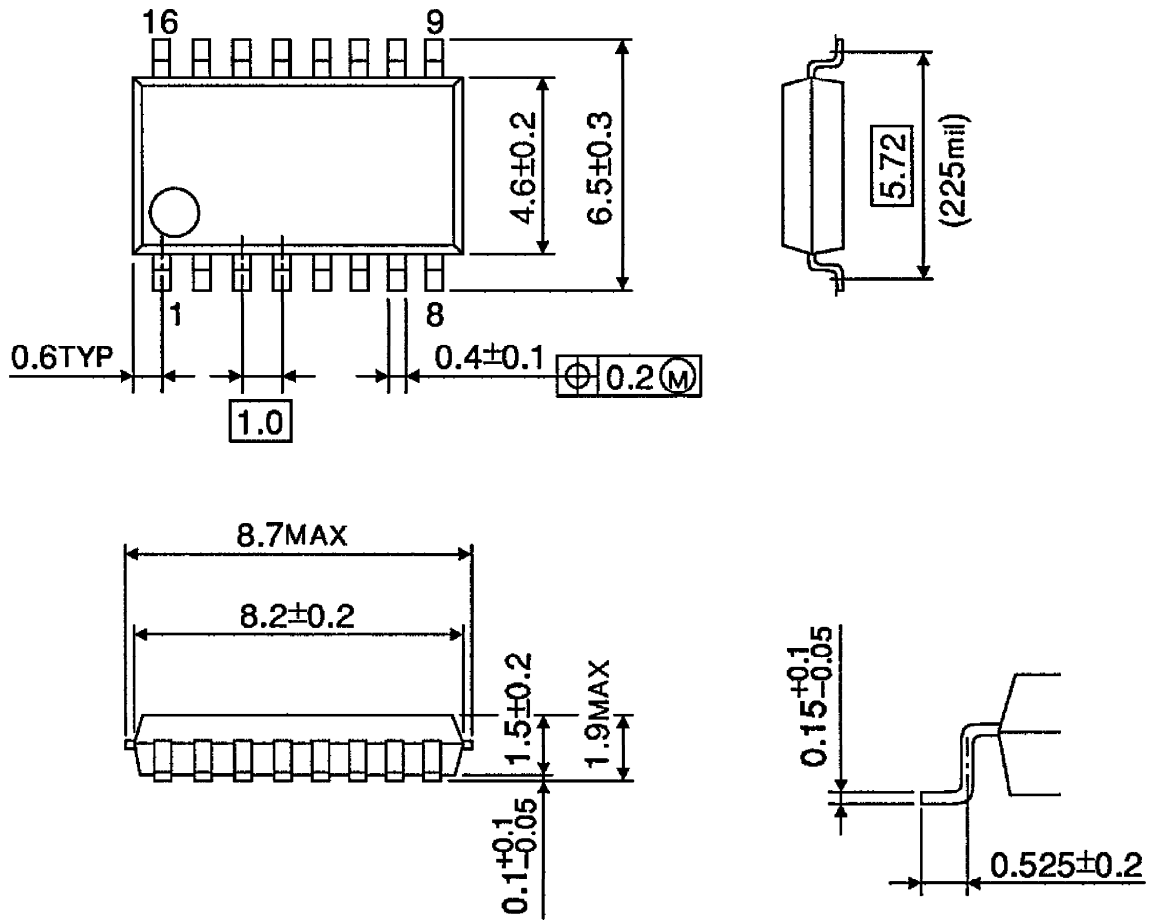


AM



OUTLINE DRAWING
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)