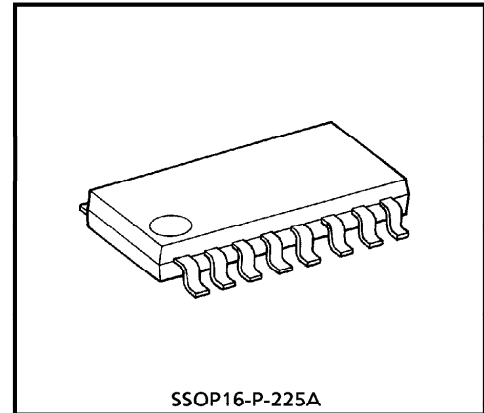


AM / FM IF SYSTEM (1.5V USE)

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.

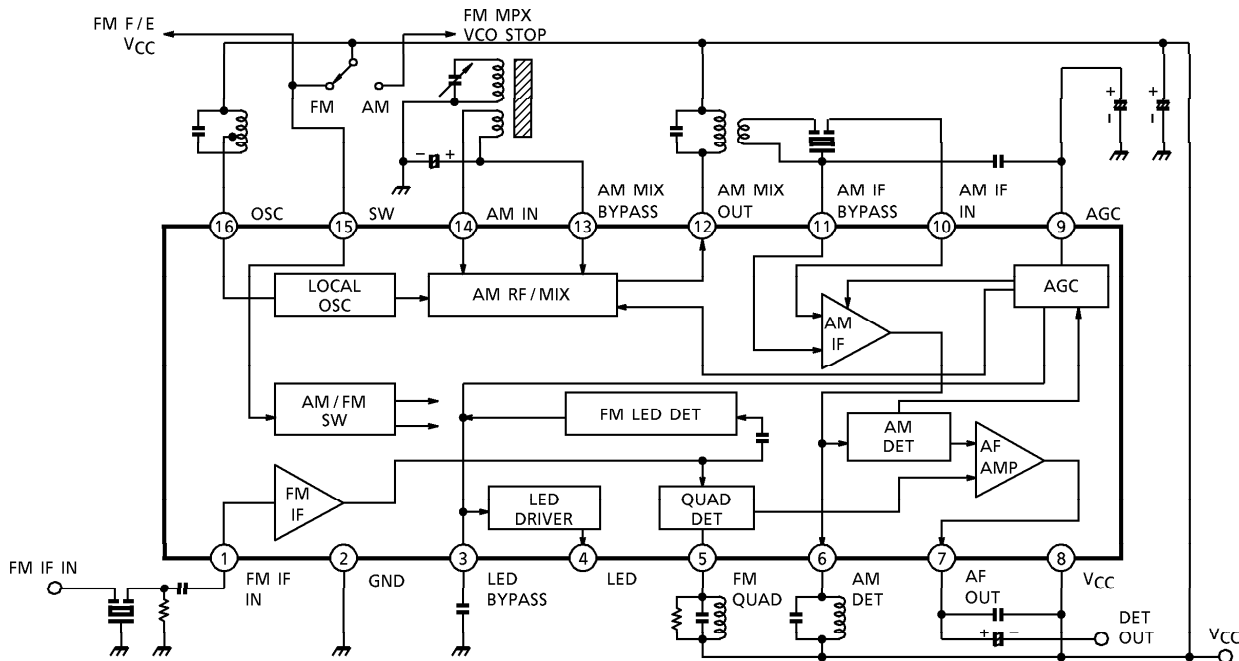
FEATURES

- 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.
: $V_{CC} (opr) = 0.95 \sim 5V$ ($T_a = 25^\circ C$)



Weight : 0.14g (Typ.)

BLOCK DIAGRAM



© 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 of otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.

© These TOSHIBA products are intended for use in general commercial applications (office equipment, communication equipment, measuring equipment, domestic appliances, etc.). please make sure that you consult with us before you use these TOSHIBA products in equipment which requires extraordinarily high quality and/or reliability, and in equipment which may involve life threatening or critical application, including but not limited to such uses as atomic energy control, airplane or spaceship instrumentation, traffic signals, medical instrumentation, combustion control, all types of safety devices, etc. TOSHIBA cannot accept and hereby disclaims liability for any damage which may occur in case the TOSHIBA products are used in such equipment or applications without prior consultation with TOSHIBA.

①

TA7765AF - 1

1995 - 5 - 29

TOSHIBA CORPORATION

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.

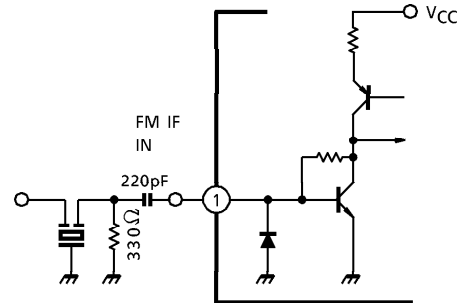


Fig.1

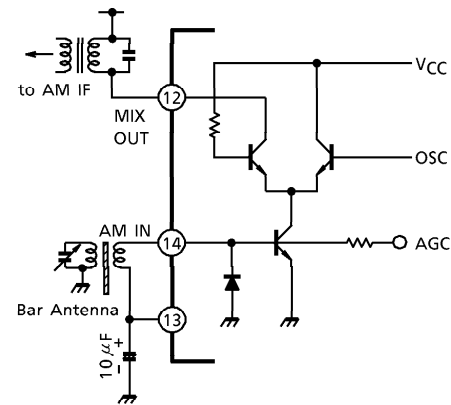


Fig.2

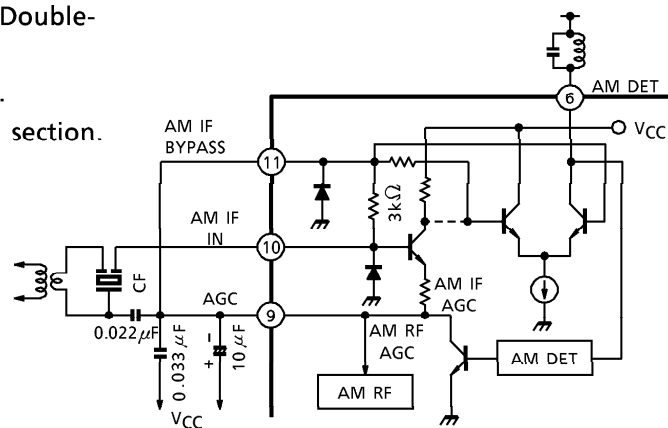


Fig.3

(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 V_{CC} 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.

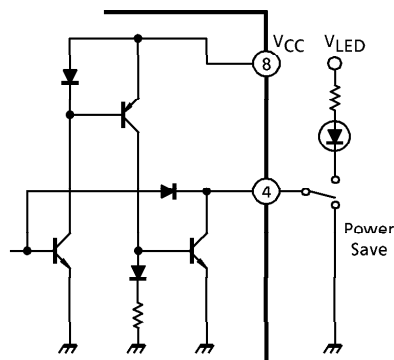


Fig.4

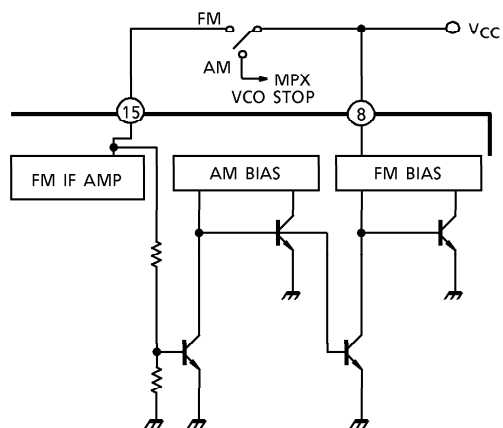


Fig.5

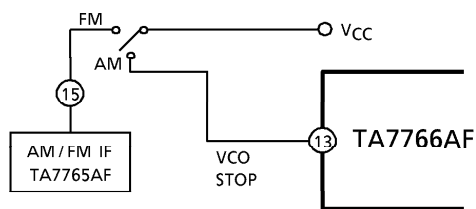


Fig.6

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} = 90dB_μV EMF

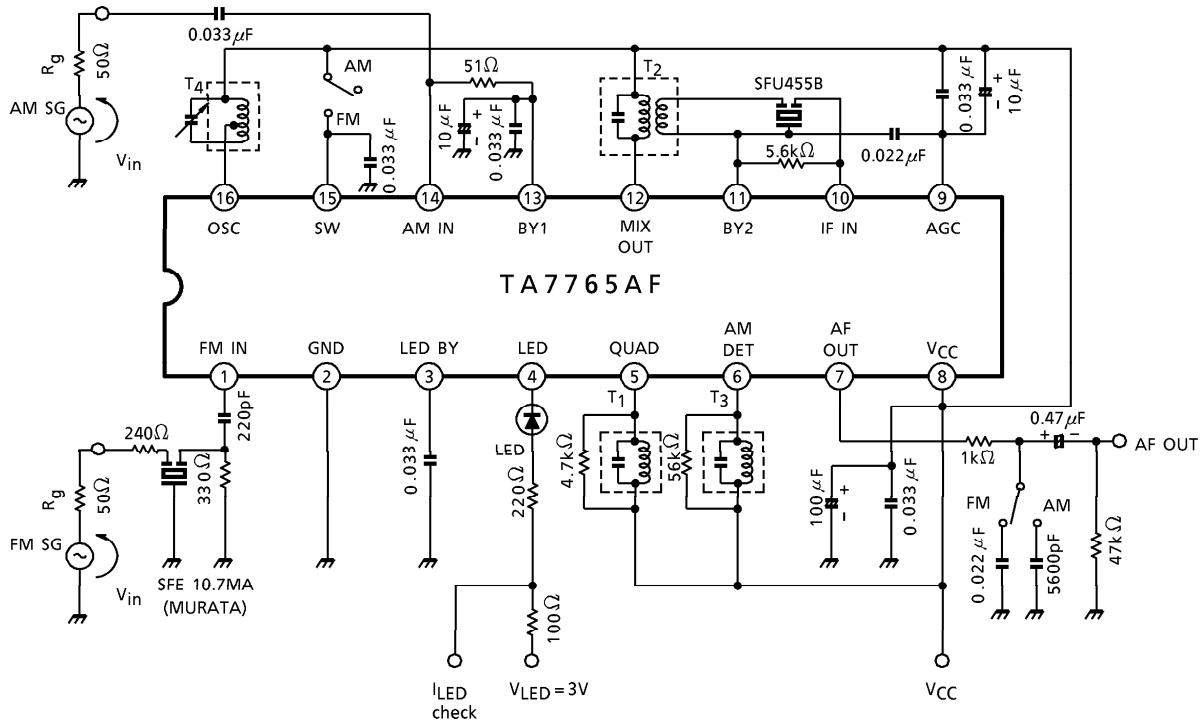
AM : f = 1MHz, MOD = 30%, f_m = 1kHz, V_{in} = 60dB_μV EMF

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	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	dB _μ V 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	dB _μ V EMF
AM	Gain	G _V	—	V _{in} = 30dB _μ V 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	—	dB _μ V 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

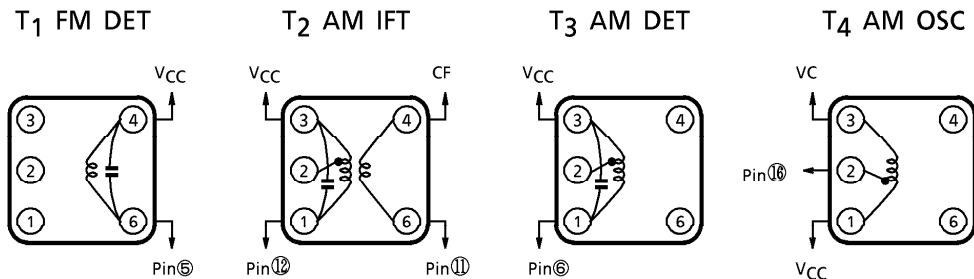


COIL DATA (Test circuit)

Ⓢ : SUMIDA ELECTRIC Co., Ltd.

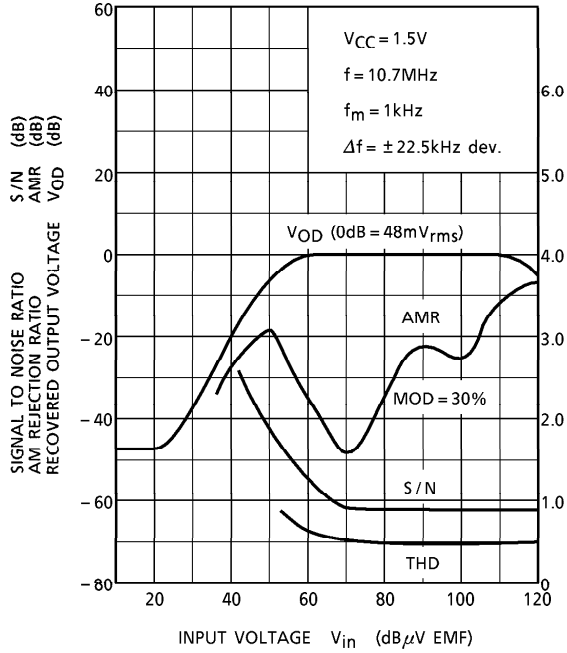
COIL No.	STAGE	f	L (μH)	C ₀ (pF)	Q ₀	TURN				WIRE (mm φ)	REF.
						1-2	2-3	1-3	4-6		
T ₁	FM DET	10.7MHz	—	82	130	—	—	—	11	0.12UEW	Ⓢ 0133-3099-181
T ₂	AM IFT	455kHz	—	180	110	88	60	—	8	0.07UEW	Ⓢ 48T-037-423
T ₃	AM DET	455kHz	—	180	110	146	6	—	13	0.07UEW	Ⓢ 44M-037-935C
T ₄	AM OSC	796kHz	288	—	125	13	75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

(Bottom view)

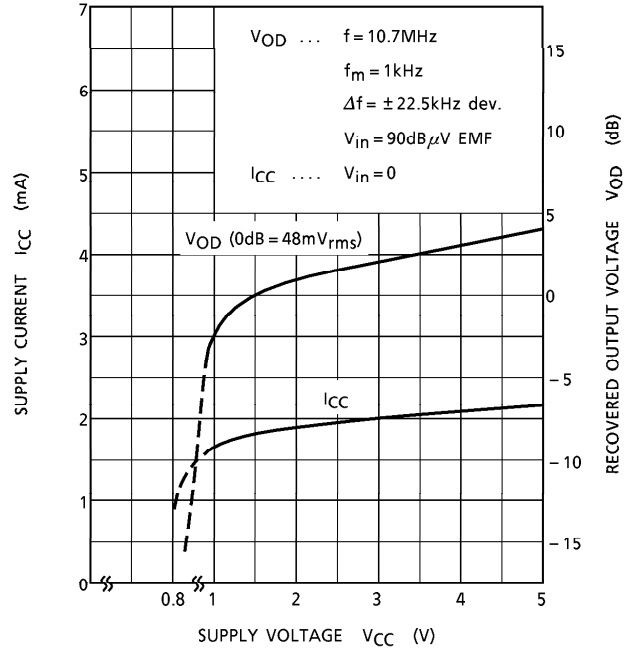


FM

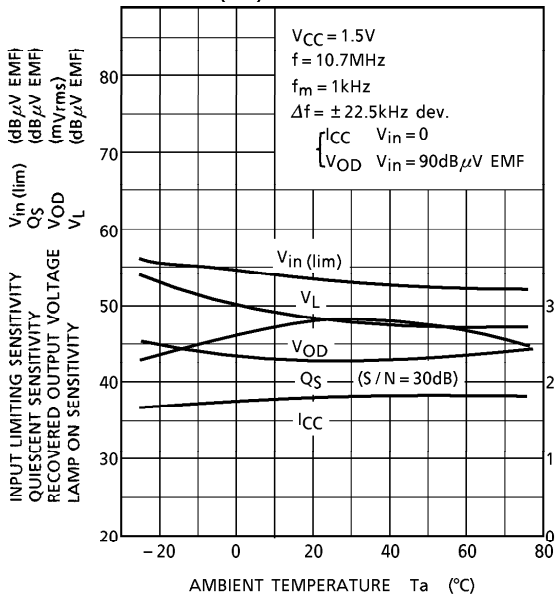
V_{OD} , AMR, S/N, THD - V_{in}



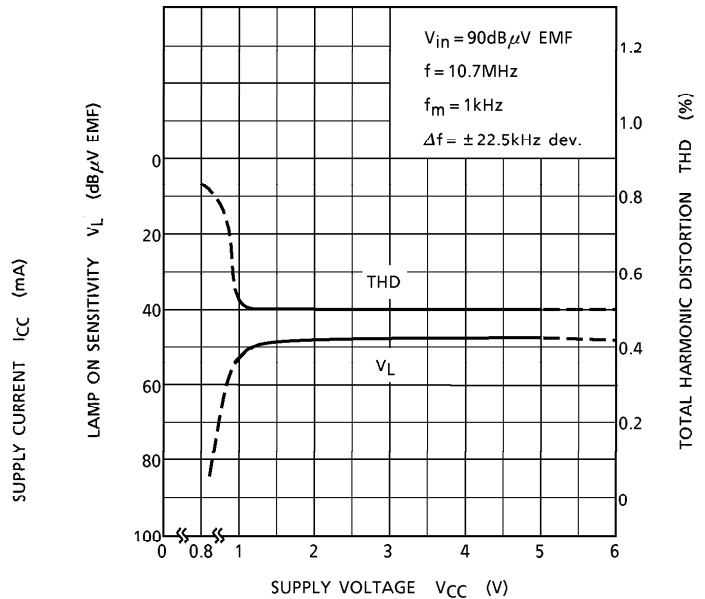
I_{CC} , V_{OD} - V_{CC}



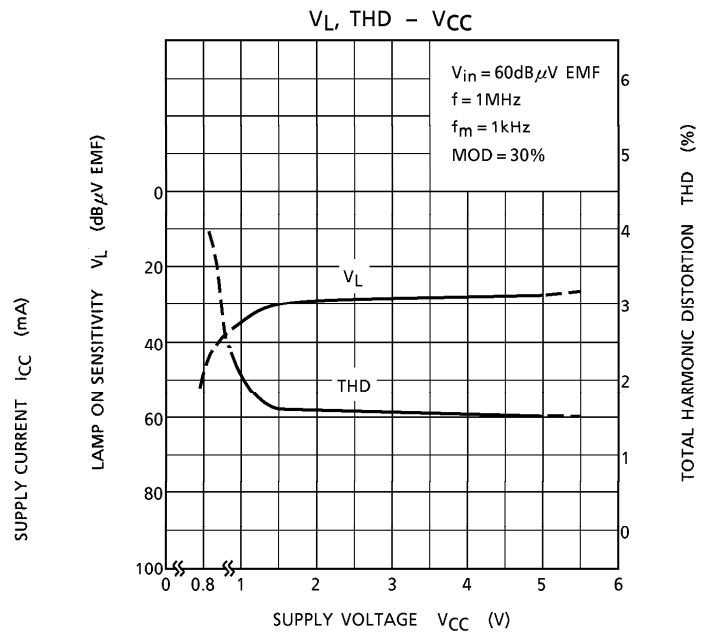
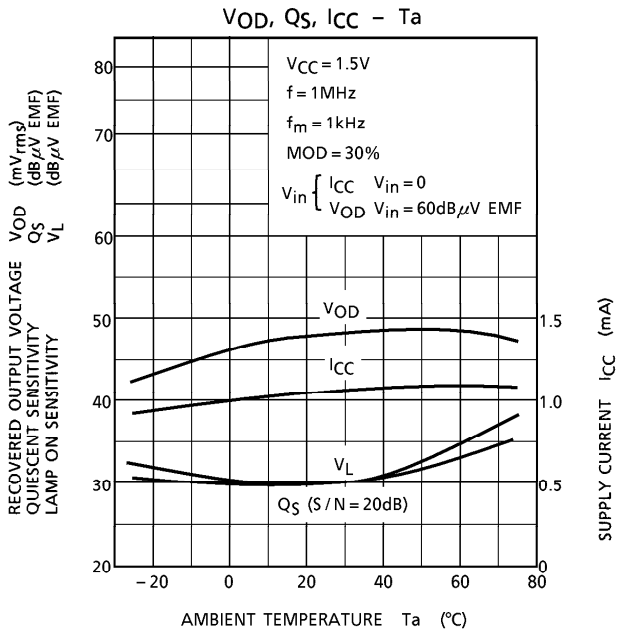
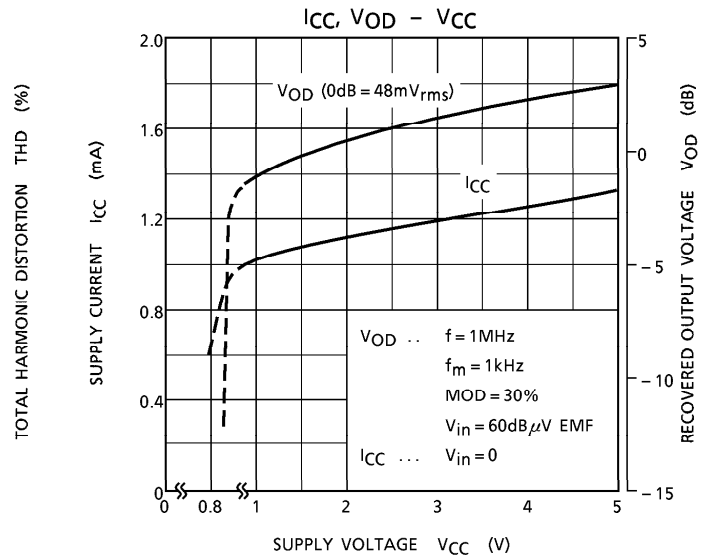
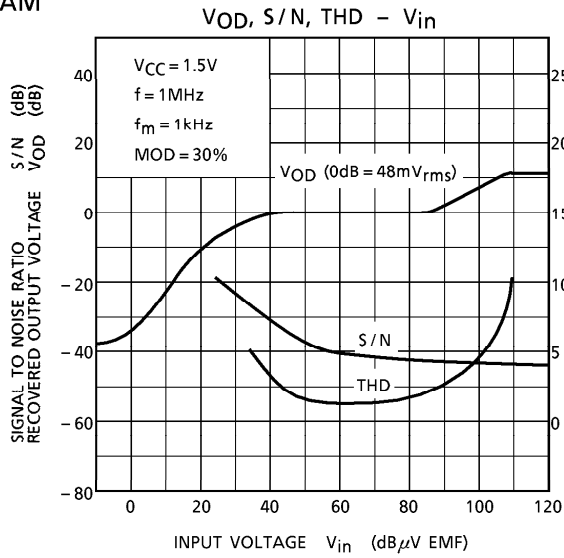
$V_{in} (lim)$, V_{OD} , Q_S , I_{CC} - T_a



V_L , THD - V_{CC}

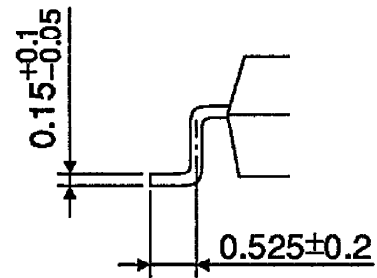
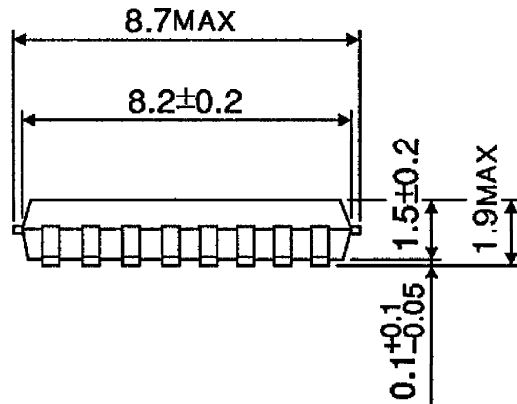
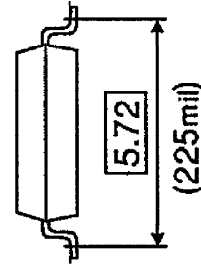
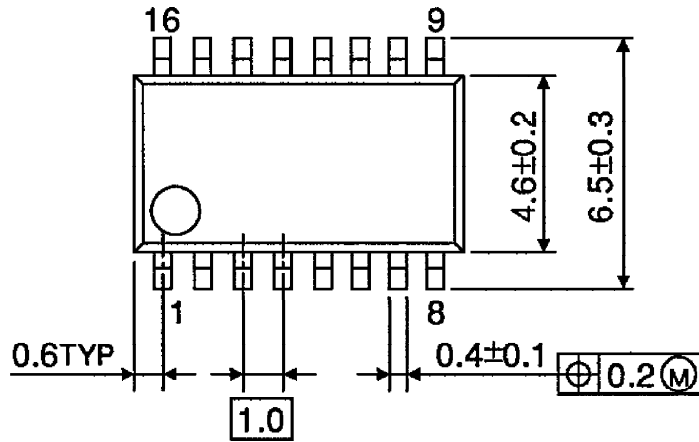


AM



OUTLINE DRAWING
SSOP16-P-225A

Unit : mm



Weight : 0.14g (Typ.)