

**TOSHIBA**

**TA8127N/F**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

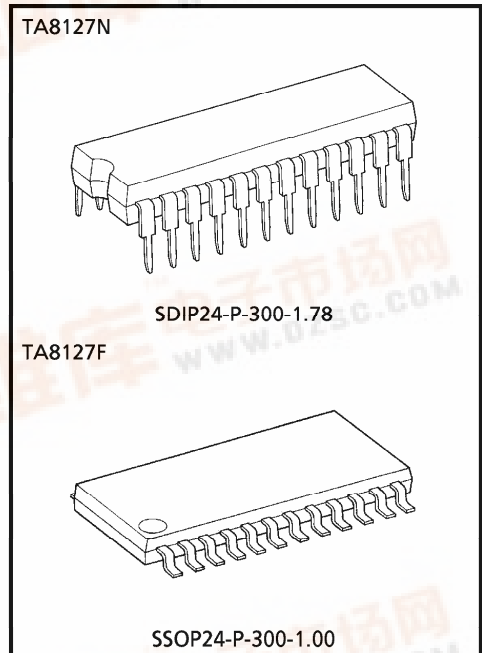
# TA8127N, TA8127F

## 3V AM / FM 1CHIP TUNER IC

TA8127N and TA8127F are the AM/FM 1Chip Tuner ICs, which are designed for Portable Radios and 3V Headphone Radios.

### FEATURES

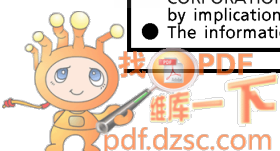
- Built-in  
FM F/E, AM/FM IF and FM MPX
- AM Detector Coil and IF Coupling Condenser are not needed.
- Compact Package  
TA8127N : Shrink DIP 24 pin (1.78mm pitch)  
TA8127F : Mini Flat Package 24 pin
- Operating Supply Voltage Range  
 $V_{CC} = 1.8 \sim 7.0V$  ( $T_a = 25^\circ C$ )



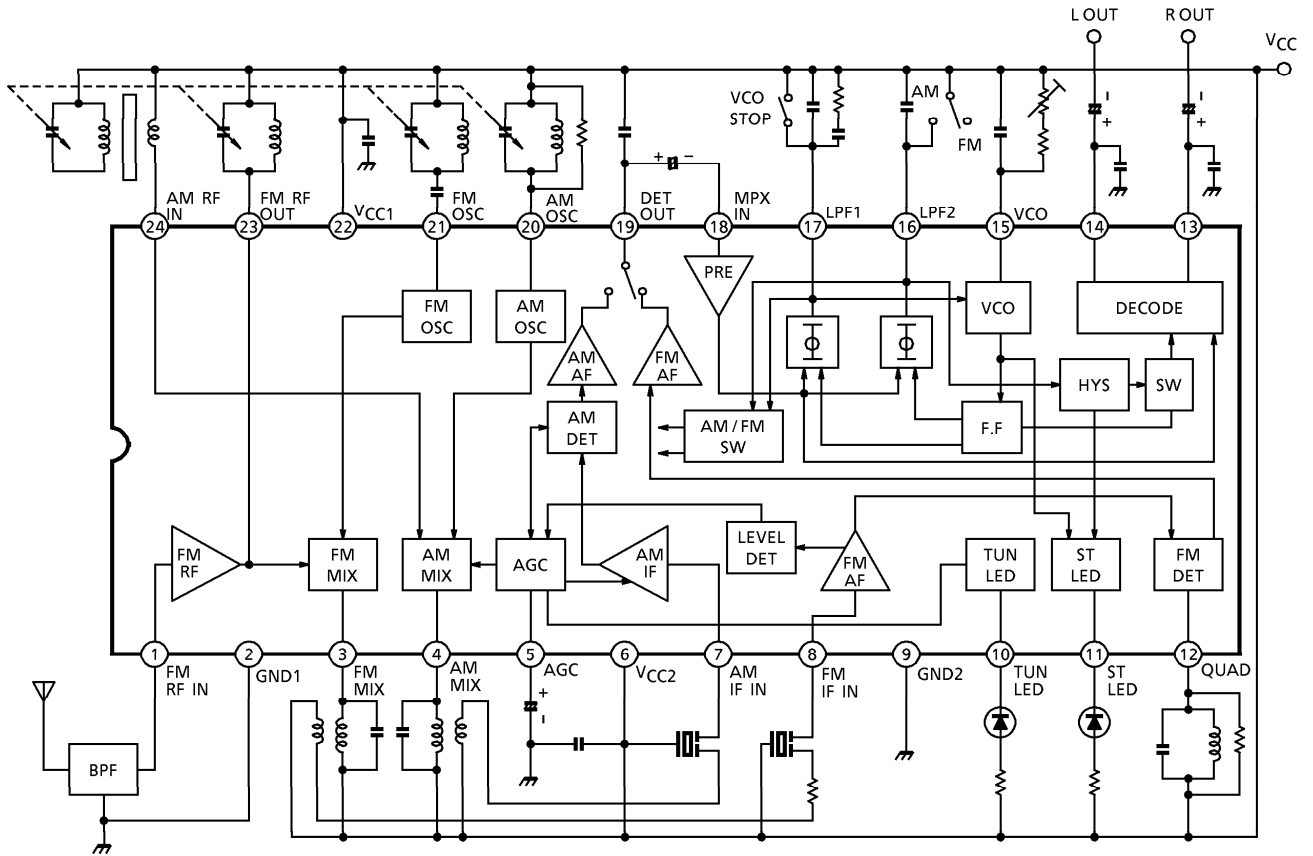
Weight  
SDIP24-P-300-1.78 : 1.2g (Typ.)  
SSOP24-P-300-1.00 : 0.31g (Typ.)

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BLOCK DIAGRAM



**EXPLANATION OF TERMINALS**

PIN NO.	ITEM	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
1	FM-RF IN		0	0.7
2	GND1 (GND for RF Stage)	—	0	0
3	FM MIX		3.0	3.0
4	AM MIX		3.0	3.0
5	AGC (AM AGC)		0	0
6	VCC2 (VCC for IF / MPX Stage)	—	3.0	3.0
7	AM IF IN		3.0	3.0
8	FM IF IN		3.0	3.0

PIN NO.	ITEM	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
9	GND2 (GND for IF / MPX Stage)	—	0	0
10	TUN LED (Tuning LED)		—	—
11	ST LED (Stereo LED)		—	—
12	QUAD (FM QUAD. Detector)		3.0	3.0
13	R-OUT (R-ch Output)		1.0	1.0
14	L-OUT (L-ch Output)			
15	VCO		2.5	2.5 (VCO STOP MODE)
16	LPF2 <ul style="list-style-type: none"> <li>● LPF Terminal for Synchronous Detector</li> <li>● Bias Terminal for AM / FM SW Circuit</li> </ul> $V_{16} = V_{CC} \rightarrow \text{AM (VCO Stop)}$ $V_{16} = \text{Open} \rightarrow \text{FM}$		3.0	2.2 (VCO STOP MODE) 2.7
17	LPF1 <ul style="list-style-type: none"> <li>● LPF Terminal for Phase Detector</li> <li>● VCO Stop Terminal</li> </ul> $V_7 = V_{CC} \rightarrow \text{VCO Stop}$		2.7	2.2

PIN NO.	ITEM	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
18	MPX IN		0.7	0.7
19	DET OUT	<p>                     (a) LOW→FM, HIGH→AM                      (b) LOW→AM, HIGH→FM                 </p>	1.5	1.2
20	AM OSC		3.0	3.0
21	FM OSC		3.0	3.0
22	VCC1 (VCC for RF Stage)	—	3.0	3.0
23	FM RF OUT	cf. pin①	3.0	3.0
24	AM RF IN		3.0	3.0

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	8	V
LED Current	I <sub>LED</sub>	10	mA
LED Voltage	V <sub>LED</sub>	8	V
Power Dissipation	TA8127N	P <sub>D</sub>	1200
	TA8127F	(Note)	400
Operating Temperature	T <sub>opr</sub>	-25~75	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

Note : Derated above 25°C in the proportion of 9.6mW/°C for TA8127N and of 3.2mW/°C for TA8127F.

**ELECTRICAL CHARACTERISTICS**

Unless otherwise specified,

$T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3\text{V}$ , F/E :  $f = 83\text{MHz}$ ,  $f_m = 1\text{kHz}$

FM IF :  $f = 10.7\text{MHz}$ ,  $\Delta f = \pm 22.5\text{kHz}$ ,  $f_m = 1\text{kHz}$

AM :  $f = 1\text{MHz}$ ,  $\text{MOD} = 30\%$ ,  $f_m = 1\text{kHz}$

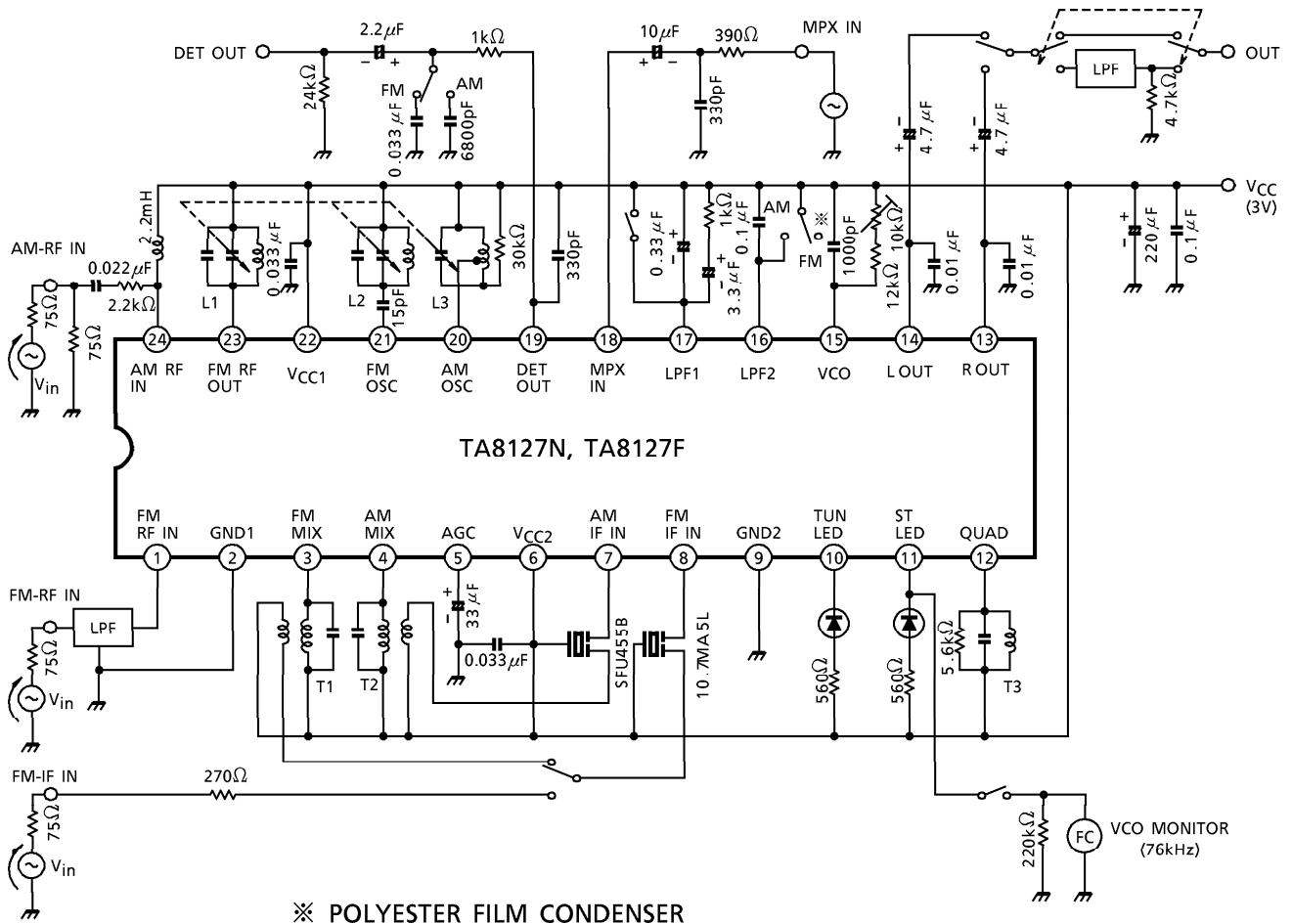
MPX :  $f_m = 1\text{kHz}$

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		$I_{CC}(\text{FM})$	1	$V_{in} = 0$ , FM Mode	—	13.2	20.0	mA
		$I_{CC}(\text{AM})$	1	$V_{in} = 0$ , AM Mode	—	8.4	13.5	
F/E	Input Limiting Voltage	$V_{in}(\text{lim.})$	1	-3dB Limiting	—	10.0	—	$\text{dB}\mu\text{V EMF}$
	Local OSC Voltage	$V_{OSC}$	2	$f_{OSC} = 72.3\text{MHz}$	—	105	—	$\text{mV}_{rms}$
FM IF	Input Limiting Voltage	$V_{in}(\text{lim.})$ IF	1	-3dB Limiting	40	46	53	$\text{dB}\mu\text{V EMF}$
	Recovered Output Voltage	$V_{OD}$	1	$V_{in} = 80\text{dB}\mu\text{V EMF}$	55	80	110	$\text{mV}_{rms}$
	Signal to Noise Ratio	S/N	1	$V_{in} = 80\text{dB}\mu\text{V EMF}$	—	70	—	dB
	Total Harmonic Distortion	THD	1	$V_{in} = 80\text{dB}\mu\text{V EMF}$	—	0.4	—	%
	AM Rejection Ratio	AMR	1	$V_{in} = 80\text{dB}\mu\text{V EMF}$	—	32	—	dB
	Lamp ON sensitivity	$V_L$	1	$I_L = 1\text{mA}$	45	51	56	$\text{dB}\mu\text{V EMF}$
AM	Gain	$G_V$	1	$V_{in} = 26\text{dB}\mu\text{V EMF}$	40	70	110	$\text{mV}_{rms}$
	Recovered Output Voltage	$V_{OD}$	1	$V_{in} = 60\text{dB}\mu\text{V EMF}$	55	80	110	
	Signal to Noise Ratio	S/N	1	$V_{in} = 60\text{dB}\mu\text{V EMF}$	—	42	—	dB
	Total Harmonic Distortion	THD	1	$V_{in} = 60\text{dB}\mu\text{V EMF}$	—	1.0	—	%
	Lamp ON Sensitivity	$V_L$	1	$I_L = 1\text{mA}$	20	25	30	$\text{dB}\mu\text{V EMF}$
Pin <sup>19</sup> Output Resistance		$R_{19}$	1	FM Mode	—	0.75	—	$\text{k}\Omega$
				AM Mode	—	12.5	—	

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
MPX	Input Resistance	R <sub>IN</sub>	—	—	—	24	—	kΩ	
	Output Resistance	R <sub>OUT</sub>	—	—	—	5	—		
	Max. Composite Signal Input Voltage	V <sub>in</sub> (max.) STEREO	1	L + R = 90%, P = 10% f <sub>m</sub> = 1kHz, THD = 3%	—	350	—	mV <sub>rms</sub>	
	Separation	Sep	1	L + R = 135mV <sub>rms</sub> P = 15mV <sub>rms</sub>	f <sub>m</sub> = 100Hz	—	42	—	dB
					f <sub>m</sub> = 1kHz	35	42	—	
					f <sub>m</sub> = 10kHz	—	42	—	
	Total Harmonic Distortion	Monaural	THD (MONAURAL)	1	V <sub>in</sub> = 150mV <sub>rms</sub>	—	0.2	—	%
		Stereo	THD (STEREO)		L + R = 135mV <sub>rms</sub> , P = 15mV <sub>rms</sub>	—	0.2	—	
	Voltage Gain		G <sub>V</sub> (MPX)	1	V <sub>in</sub> = 150mV <sub>rms</sub>	-5	-3	-1	dB
	Channel Balance		C.B.	1	V <sub>in</sub> = 150mV <sub>rms</sub>	-2	0	2	
	Stereo Lamp Sensitivity	ON	V <sub>L</sub> (ON)	1	Pilot Input	—	8	16	mV <sub>rms</sub>
OFF		V <sub>L</sub> (OFF)	Pilot Input		2	6	—		
Stereo Lamp Hysteresis		V <sub>H</sub>	1	To LED turn off from LED turn on	—	2	—	mV <sub>rms</sub>	
Capture Range		C.R.	1	P = 15mV <sub>rms</sub>	—	±3	—	%	
Signal to Noise Ratio		S/N	1	V <sub>in</sub> = 150mV <sub>rms</sub>	—	70	—	dB	



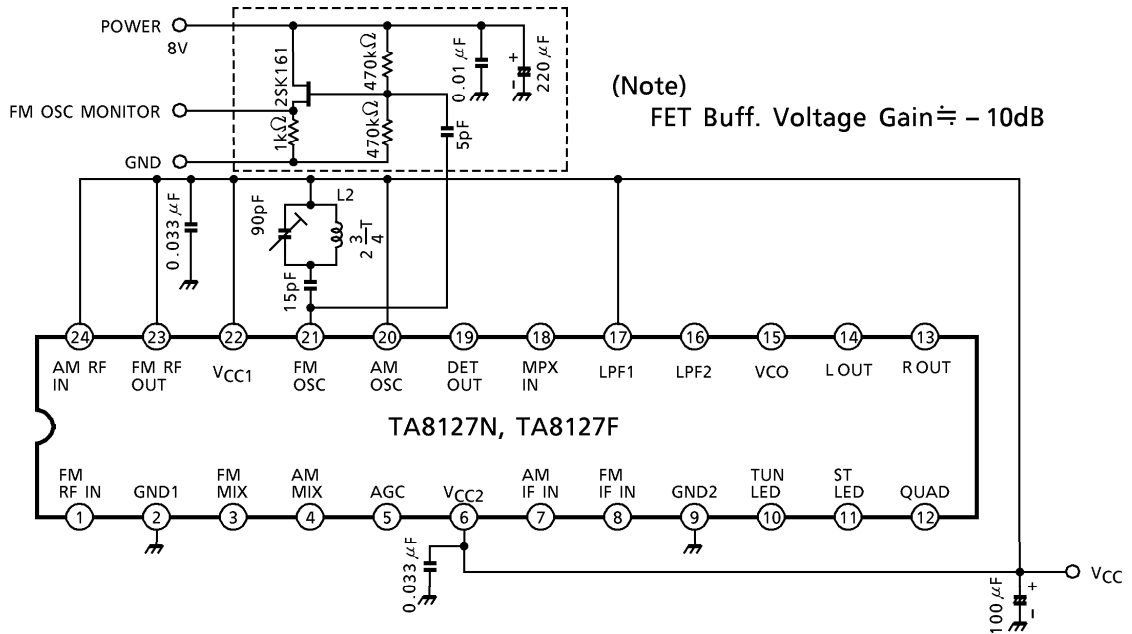
TEST CIRCUIT 1



※ POLYESTER FILM CONDENSER

Using other types of condensers, there are some cases that the MPX does not do normal stereo action at high temperature or low temperature.

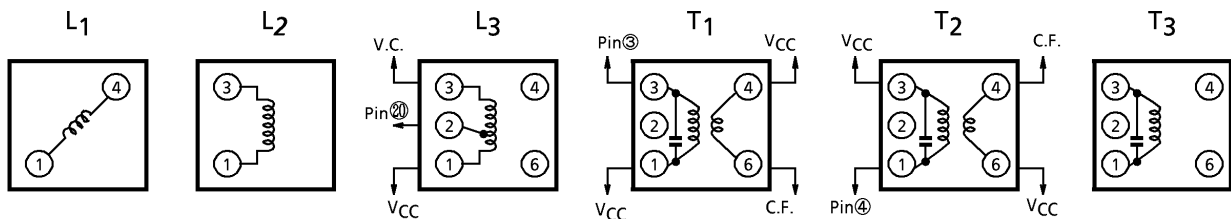
## TEST CIRCUIT 2



## COIL DATA

COIL No.	TEST FREQ. (Hz)	L ( $\mu\text{H}$ )	C <sub>0</sub> (pF)	Q <sub>0</sub>	TURNS					WIRE (mm $\phi$ )	REFERENCE
					1-2	2-3	1-3	1-4	4-6		
L <sub>1</sub> FM RF	100M	—	—	100	—	—	—	2 $\frac{1}{2}$	—	0.5UEW	Ⓢ 53T-037-202
L <sub>2</sub> FM OSC	100M	—	—	100	—	—	2 $\frac{3}{4}$	—	—	0.5UEW	Ⓢ 0258-244
L <sub>3</sub> AM OSC	796k	288	—	115	13	73	—	—	—	0.08UEW	Ⓢ 4147-1356-038
T <sub>1</sub> FM MIX	10.7M	—	75	100	—	—	13	—	2	0.1UEW	Ⓢ 2153-414-041
T <sub>2</sub> AM MIX	455k	—	180	120	—	—	180	—	15	0.08UEW	Ⓢ 2150-2162-165
T <sub>3</sub> FM DET	10.7M	—	47	165	—	—	16	—	—	0.09UEW	Ⓢ 2153-4095-122

Ⓢ : SUMIDA ELECTRIC CO., LTD

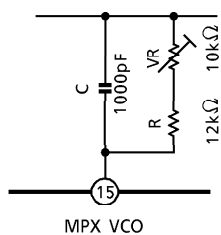
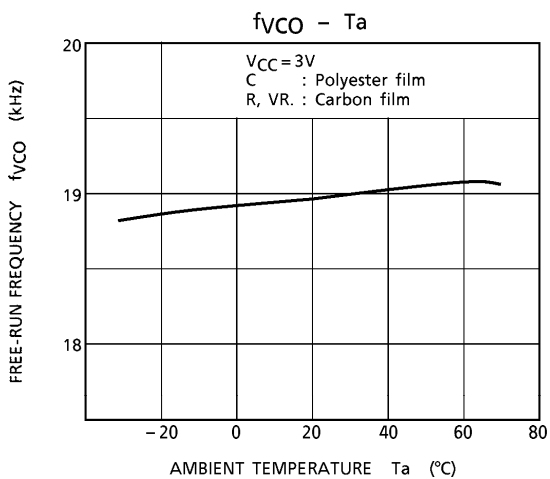


**HINT ON USE OF TA8127N and TA8127F**

External Parts of MPX VCO

(1) Temperature characteristic of MPX VCO free-run frequency. The temperature characteristic of MPX VCO is shown in the diagram as below. Select one with a better temperature characteristic (C, R and VR.) in use. We recommend,

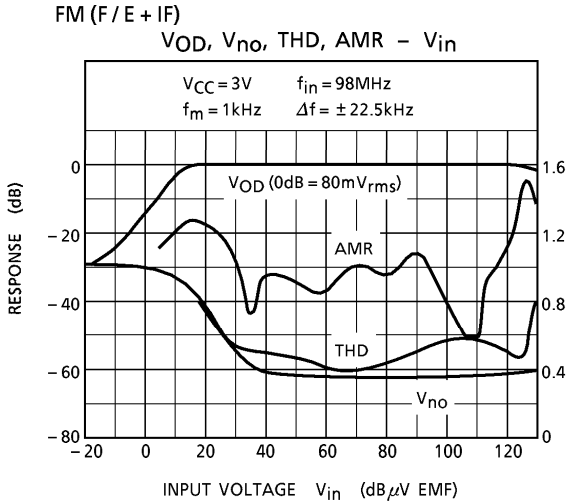
- C : POLYESTER FILM
- R, VR. : CARBON FILM



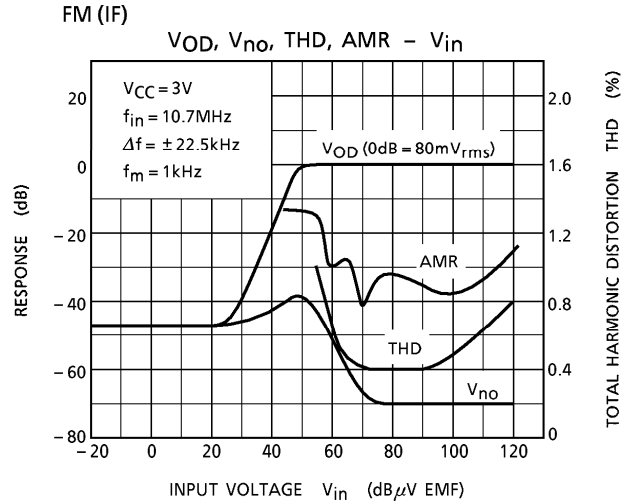
(2) Value of the external parts

We recommend to set up these value as below.

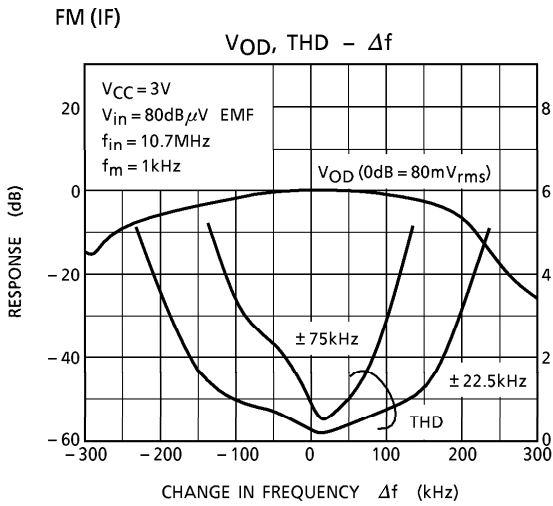
- R = 12kΩ
- VR = 10kΩ
- C = 1000pF



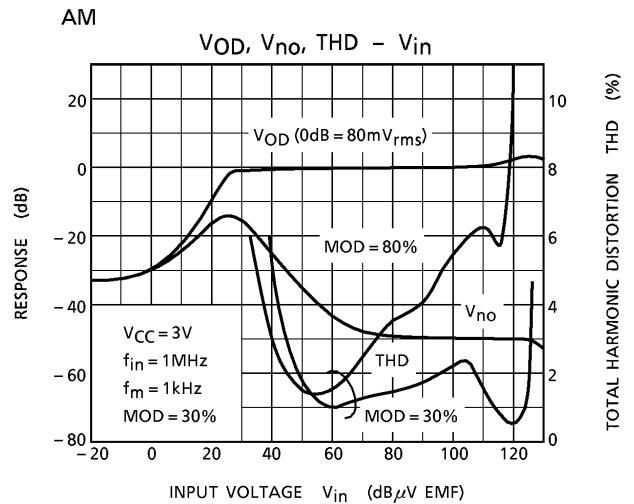
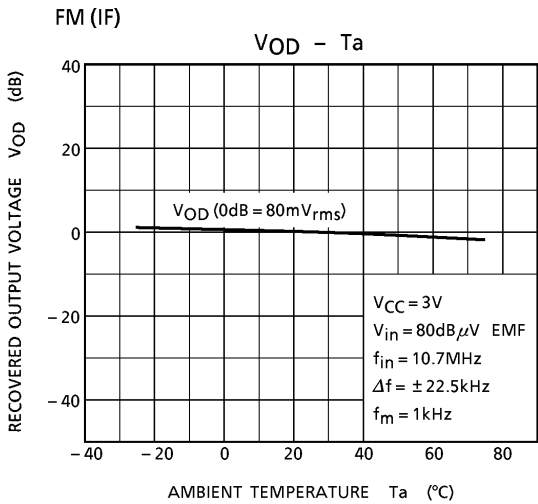
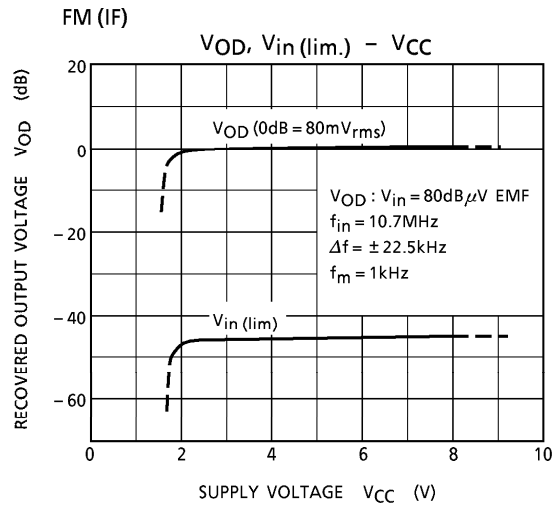
TOTAL HARMONIC DISTORTION THD (%)



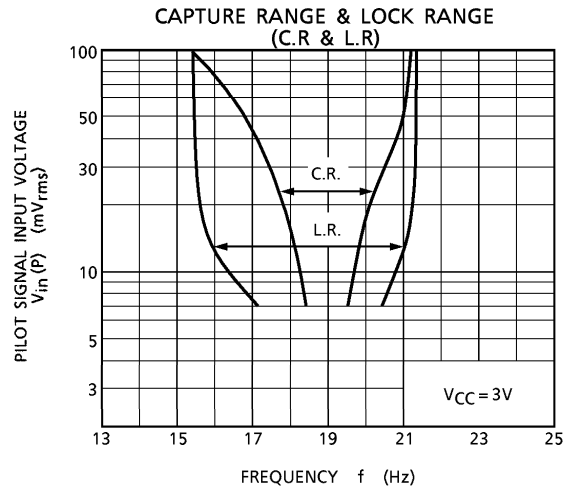
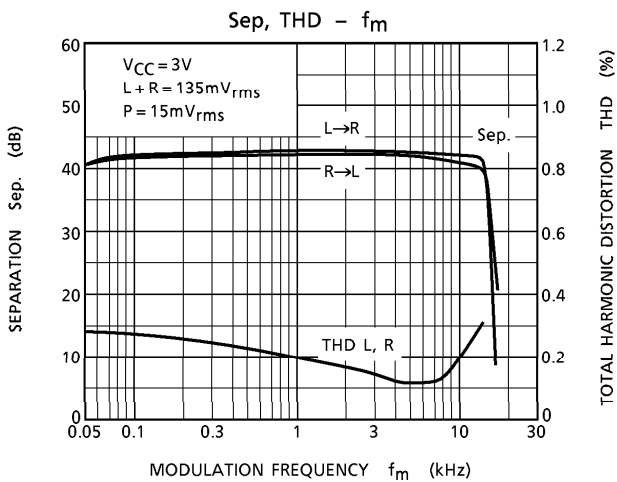
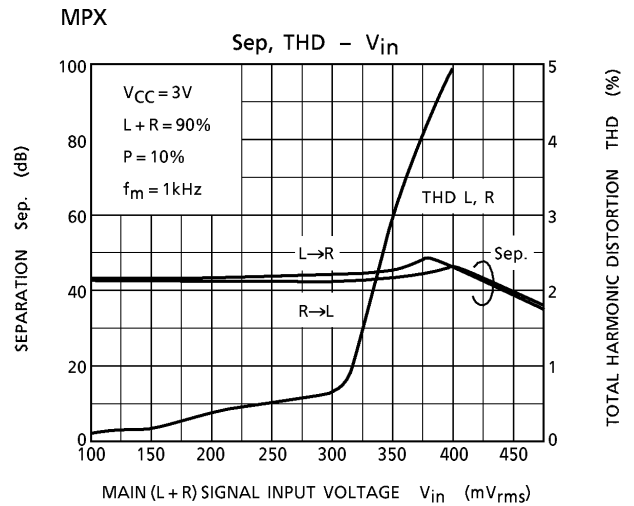
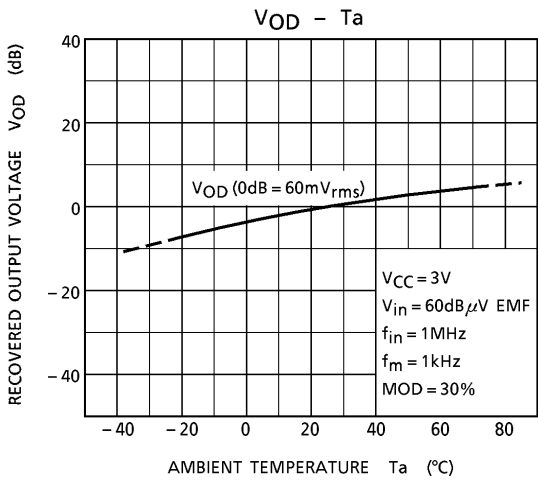
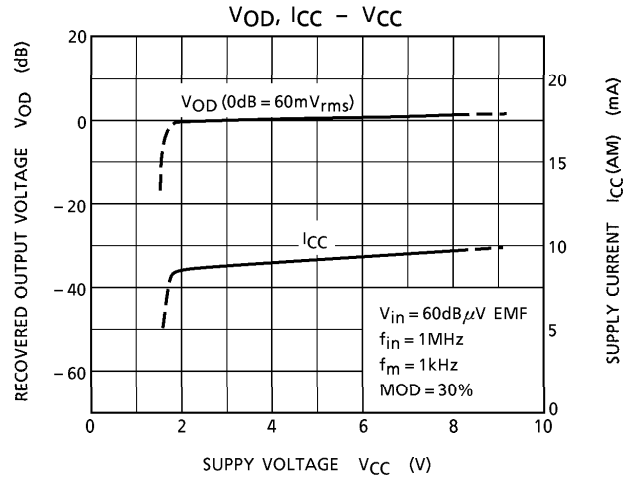
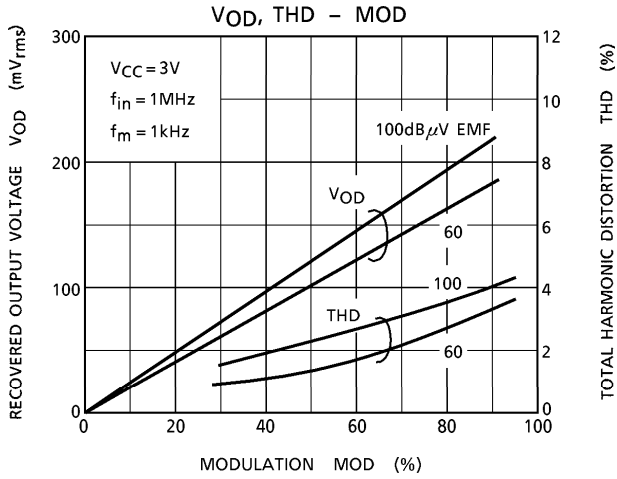
TOTAL HARMONIC DISTORTION THD (%)

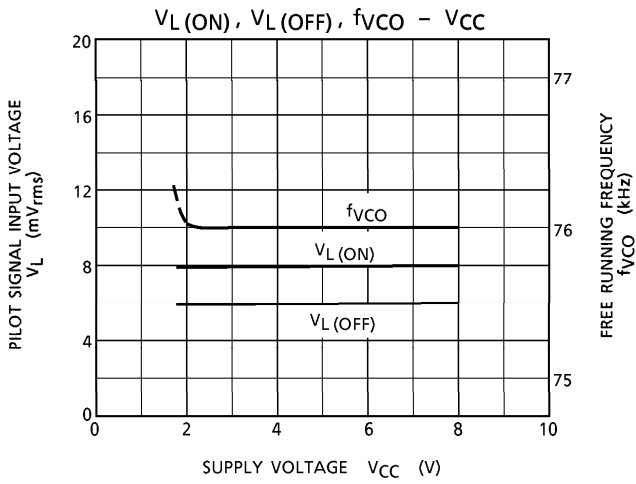
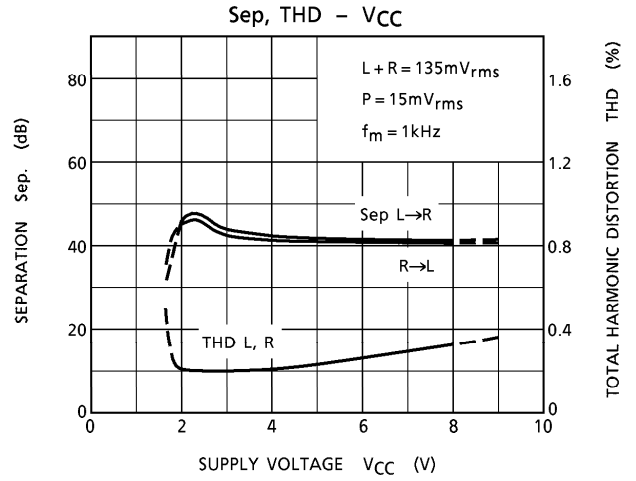
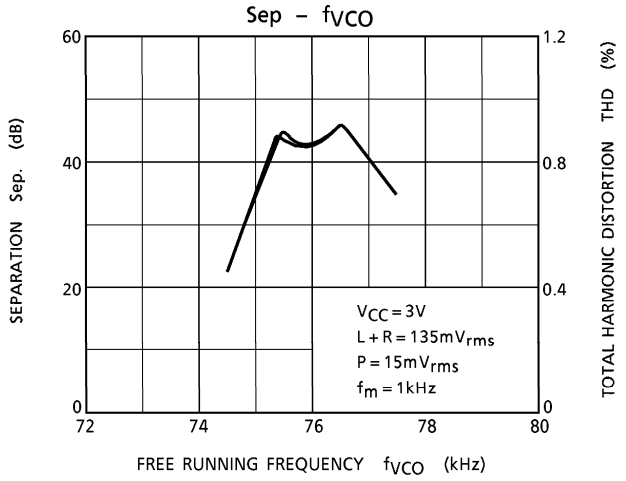


TOTAL HARMONIC DISTORTION THD (%)



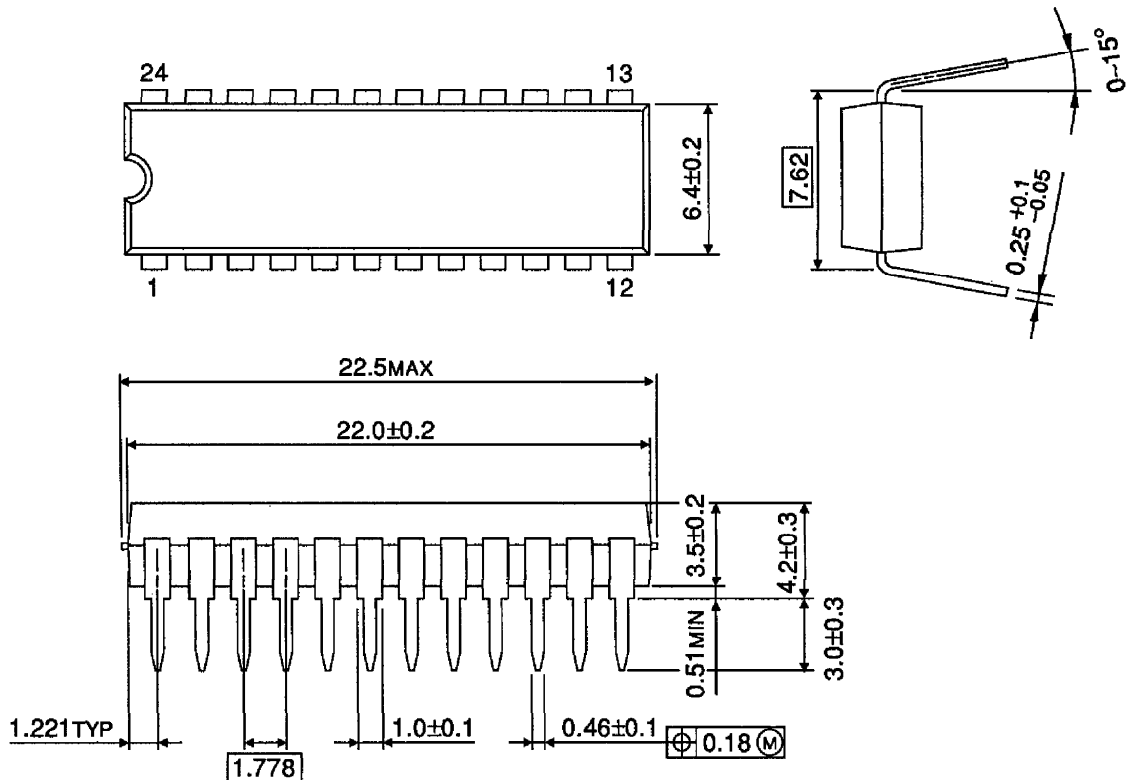
TOTAL HARMONIC DISTORTION THD (%)





OUTLINE DRAWING  
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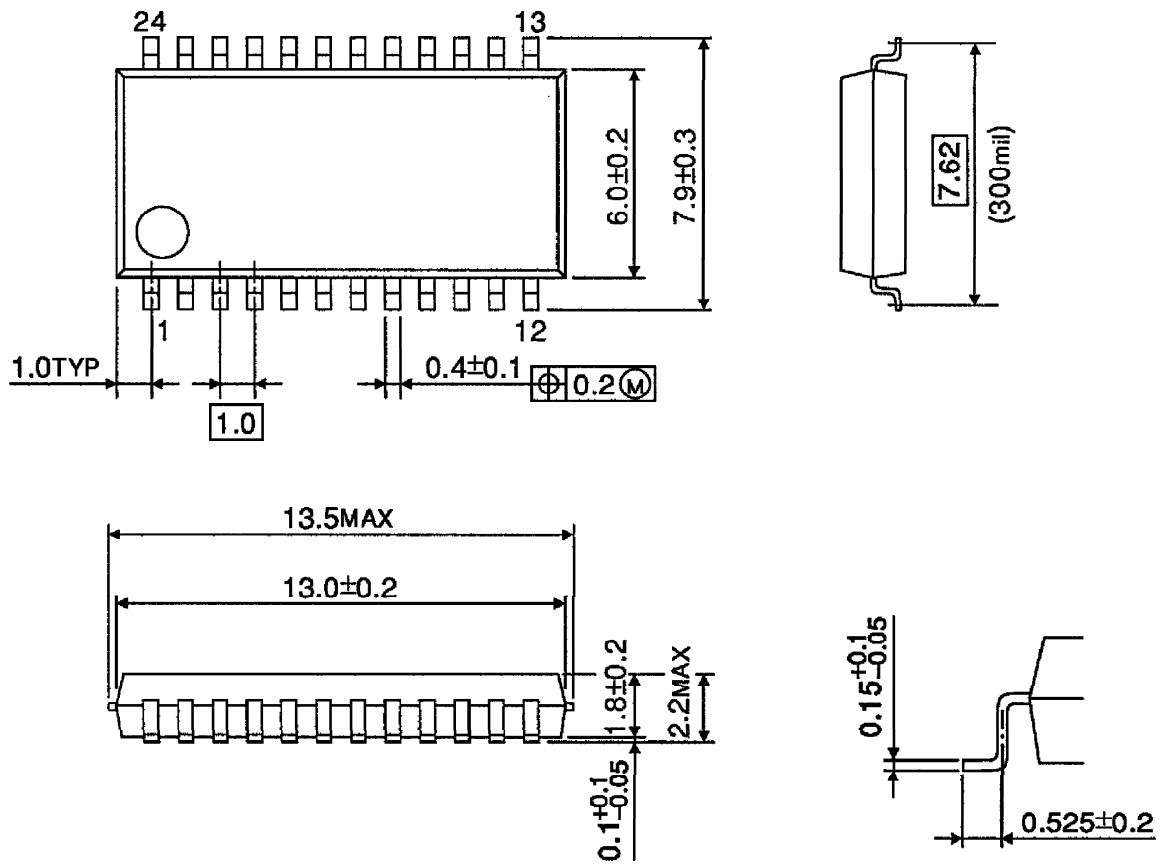
Unit : mm



Weight : 1.2g (Typ.)

OUTLINE DRAWING  
SSOP24-P-300-1.00

Unit : mm



Weight : 0.31g (Typ.)