

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

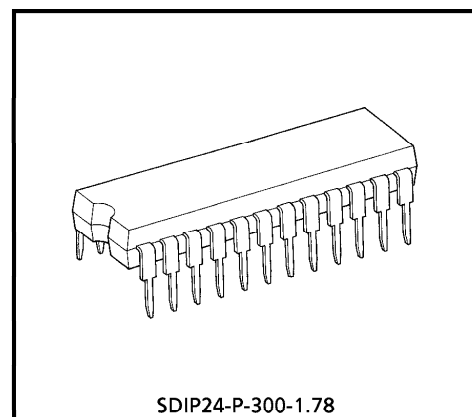
TA8167N

3V AM / FM 1CHP TUNER IC

TA8167N is the AM / FM 1chip tuner IC, which is 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.
- S curve characteristics of FM detection output is Reverse characteristic.
- The FM Local Oscillation Voltage is set up low relatively for measures against FM radiation.
- Operating Supply Voltage Range
 $V_{CC} = 1.8 \sim 7.0V$ ($T_a = 25^\circ C$)

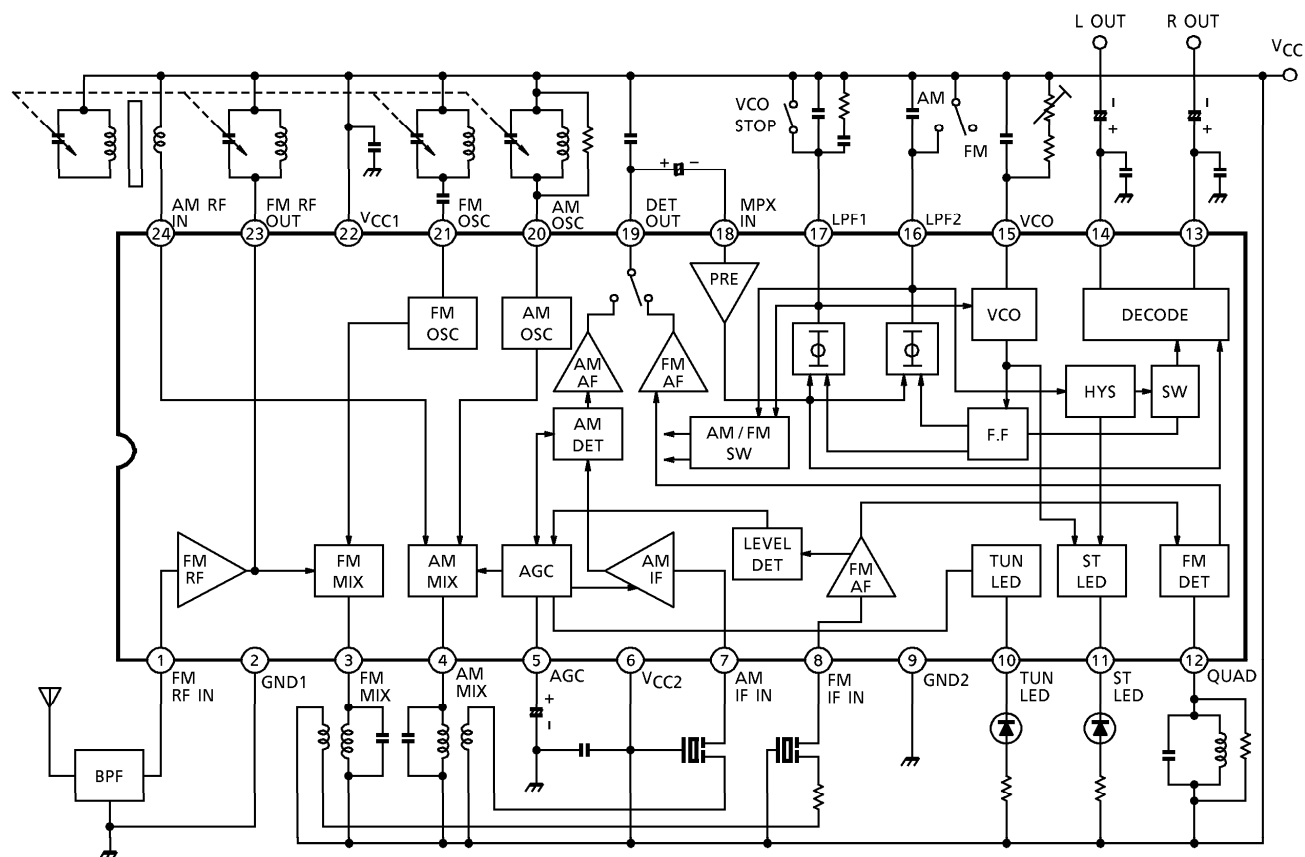


SDIP24-P-300-1.78
Weight : 1.2g (Typ.)

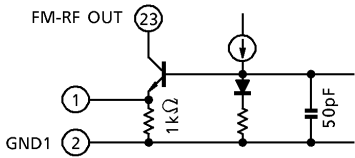
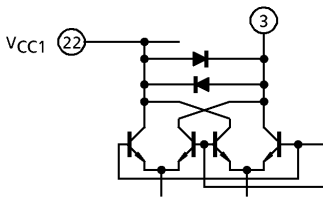
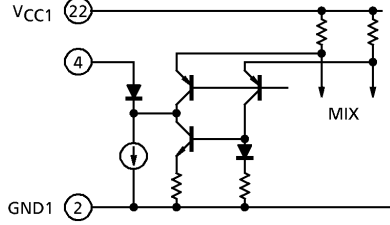
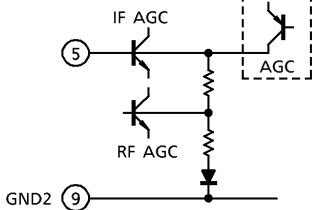
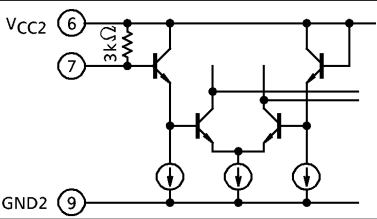
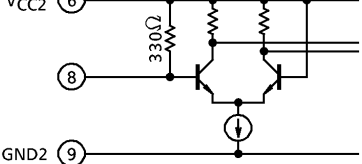
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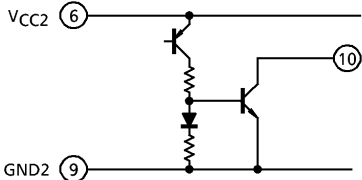
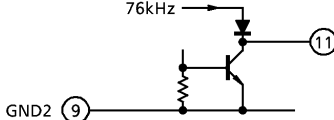
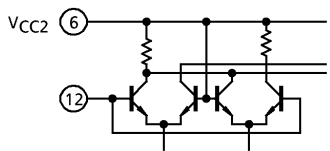
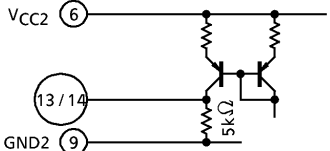
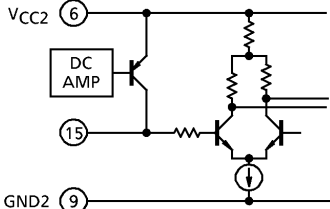
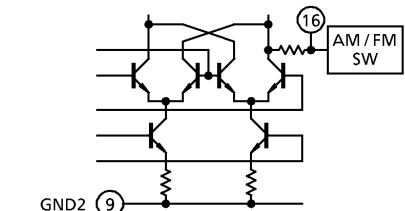
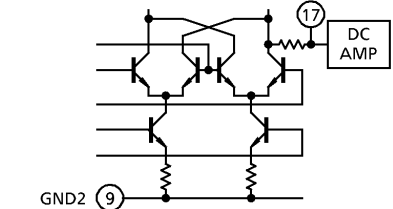
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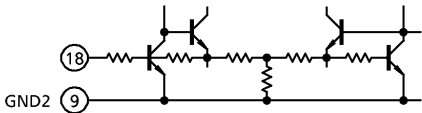
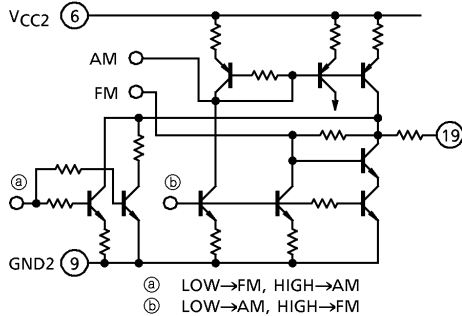
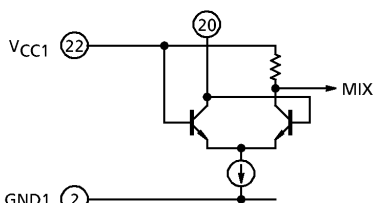
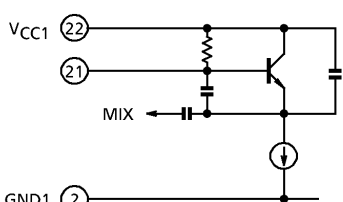
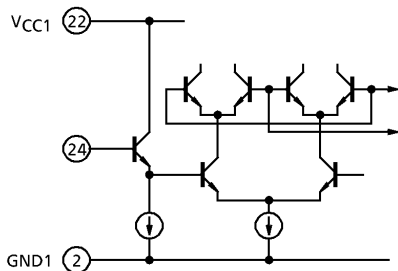
BLOCK DIAGRAM



EXPLANATION OF TERMINALS

PIN No.	SYMBOL	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.	SYMBOL	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 • LPF Terminal for Synchronous Detector • Bias Terminal for AM / FM SW Circuit $V_{16} = V_{CC} \rightarrow \text{AM (VCO Stop)}$ $V_{16} = \text{Open} \rightarrow \text{FM}$		3.0	2.2 (VCO STOP MODE) 2.7
17	LPF1 • LPF Terminal for Phase Detector • VCO Stop Terminal $V_{17} = V_{CC} \rightarrow \text{VCO Stop}$		2.7	2.2

PIN No.	SYMBOL	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
18	MPX IN		0.7	0.7
19	DET OUT	 a LOW→FM, HIGH→AM b LOW→AM, HIGH→FM	1.5	1.2
20	AM OSC		3.0	3.0
21	FM OSC		3.0	3.0
22	V _{CCL} (V _{CC} 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 _{CC}	8	V
LED Current	I _{LED}	10	mA
LED Voltage	V _{LED}	8	V
Power Dissipation	P _D (Note)	1200	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 9.6mW / °C.

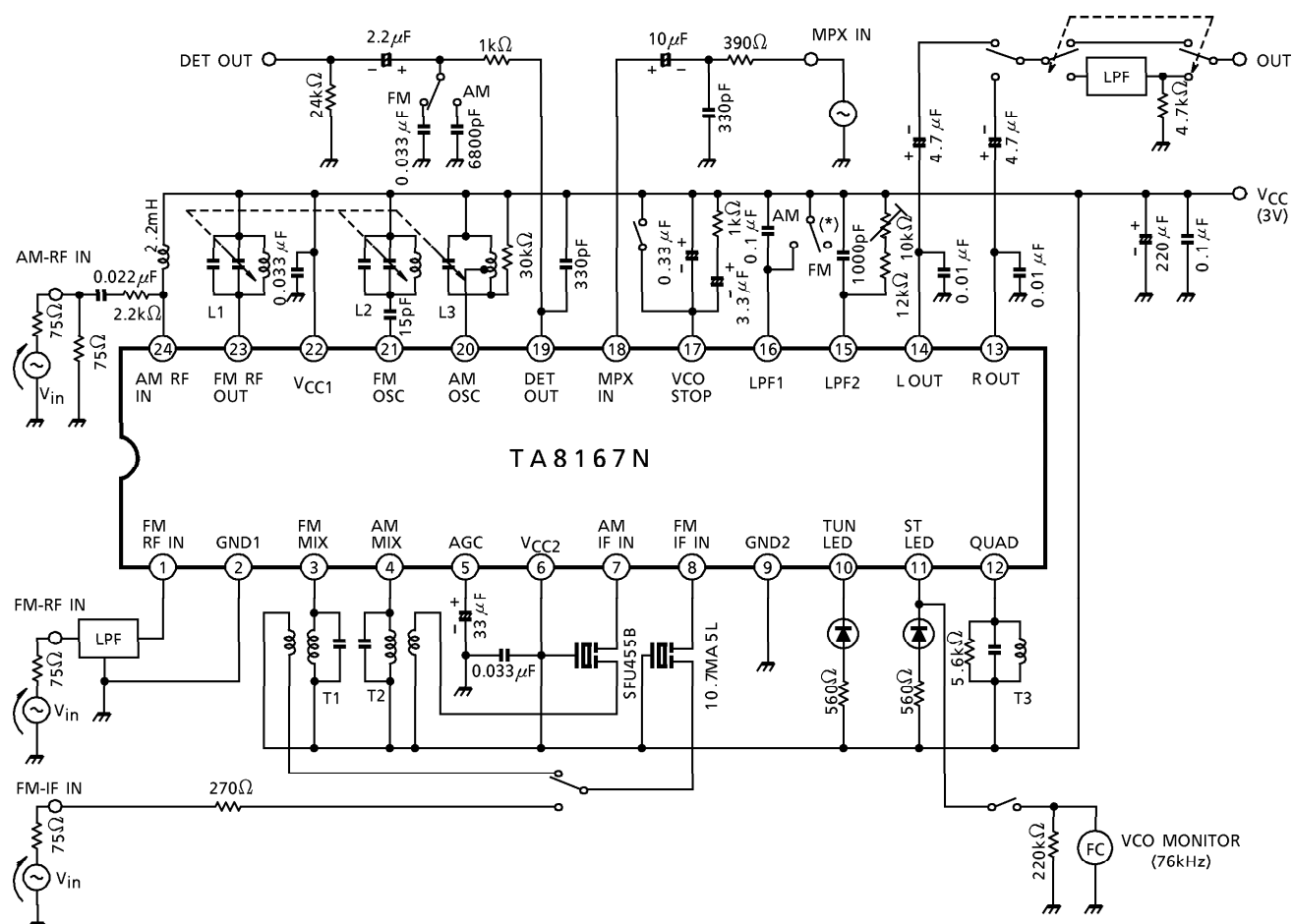
ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta = 25°C, V_{CC} = 3V, F / E : f = 83MHz, f_m = 1kHz
 FM IF : f = 10.7MHz, Δf = ± 22.5kHz, f_m = 1kHz
 AM : f = 1MHz, MOD = 30%, f_m = 1kHz
 MPX : f_m = 1kHz

CHARACTERISTIC		SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I _{CC} (FM)	1	V _{in} = 0, FM Mode	—	13.2	20.0	mA
		I _{CC} (AM)	1	V _{in} = 0, AM Mode	—	8.4	13.5	
F / E	Input Limiting Voltage	V _{in} (lim)	1	- 3dB Limiting	—	10.0	—	dB _μ V EMF
	Local OSC Voltage	V _{OSC}	2	f _{OSC} = 72.3MHz	—	70	—	mV _{rms}
FM IF	Input Limiting Voltage	V _{in} (lim) IF	1	- 3dB Limiting	40	46	53	dB _μ V EMF
	Recovered Output Voltage	V _{OD}	1	V _{in} = 80dB _μ V EMF	55	80	110	mV _{rms}
	Signal To Noise Ratio	S / N	1	V _{in} = 80dB _μ V EMF	—	70	—	dB
	Total Harmonic Distortion	THD	1	V _{in} = 80dB _μ V EMF	—	0.4	—	%
	AM Rejection Ratio	AMR	1	V _{in} = 80dB _μ V EMF	—	32	—	dB
	Lamp ON sensitivity	V _L	1	I _L = 1mA	45	51	56	dB _μ V EMF
AM	Gain	G _V	1	V _{in} = 26dB _μ V EMF	40	70	110	mV _{rms}
	Recovered Output Voltage	V _{OD}	1	V _{in} = 60dB _μ V EMF	55	80	110	mV _{rms}
	Signal To Noise Ratio	S / N	1	V _{in} = 60dB _μ V EMF	—	42	—	dB
	Total Harmonic Distortion	THD	1	V _{in} = 60dB _μ V EMF	—	1.0	—	%
	Lamp ON Sensitivity	V _L	1	I _L = 1mA	20	25	30	dB _μ V EMF
Pin ^⑩ Output Resistance		R ₁₉	—	FM Mode	—	0.75	—	kΩ
				AM Mode	—	12.5	—	

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

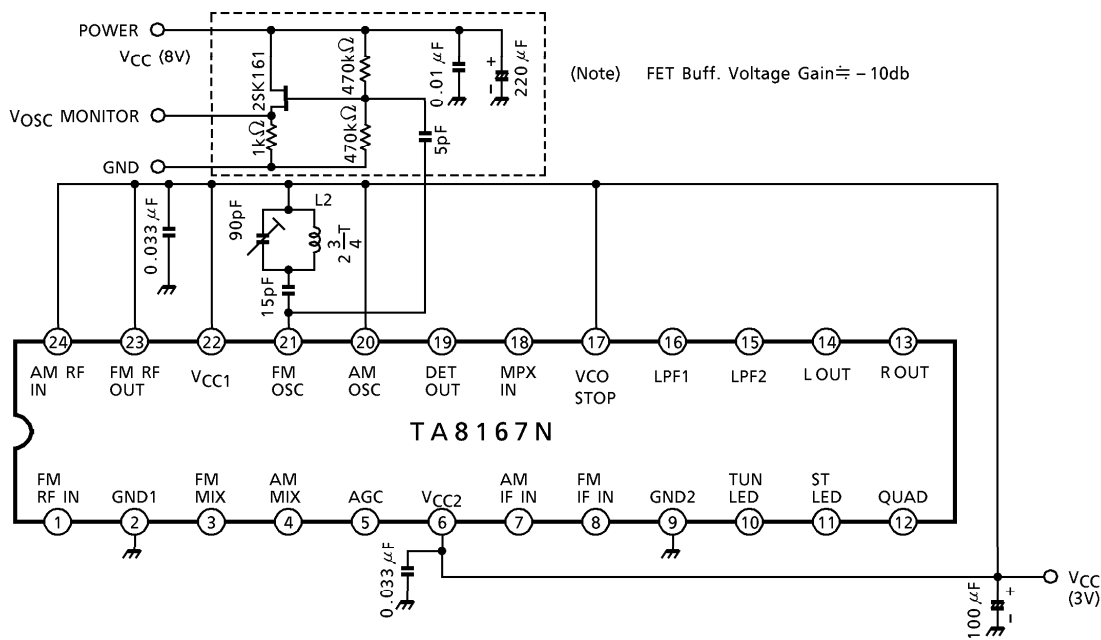
TEST CIRCUIT 1



(*) 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.

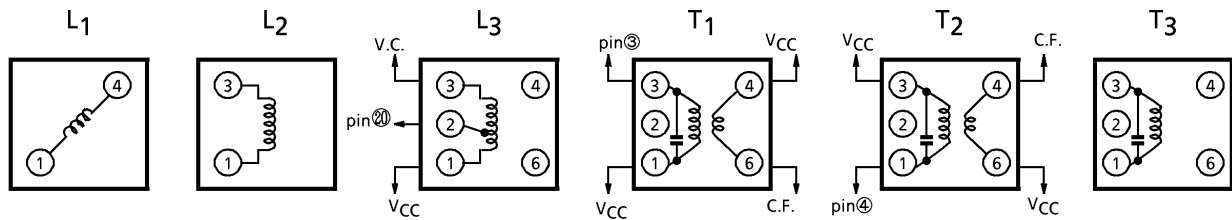
TEST CIRCUIT 2



COIL DATA

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

Ⓢ : SUMIDA ELECTRIC CO., LTD



HINT ON USE OF TA8167N

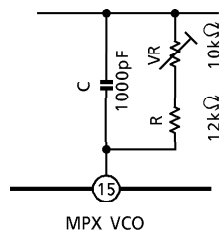
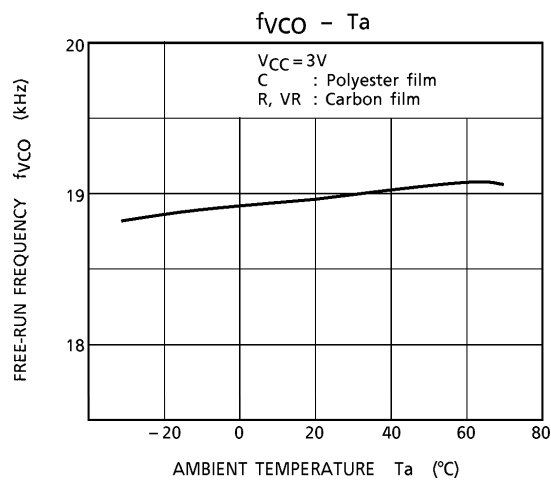
○ External parts of MPX VCO

(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,

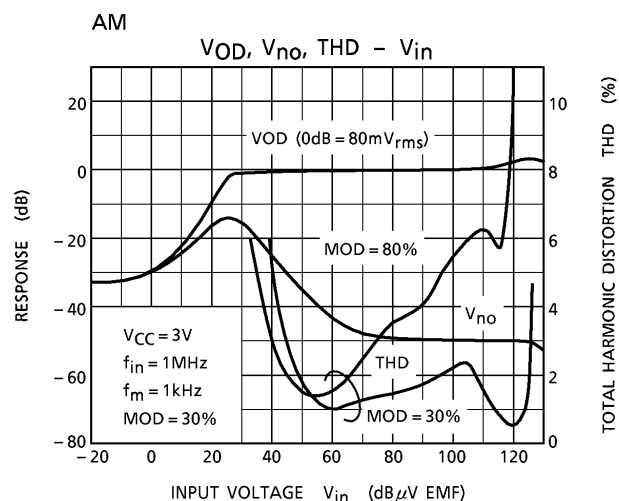
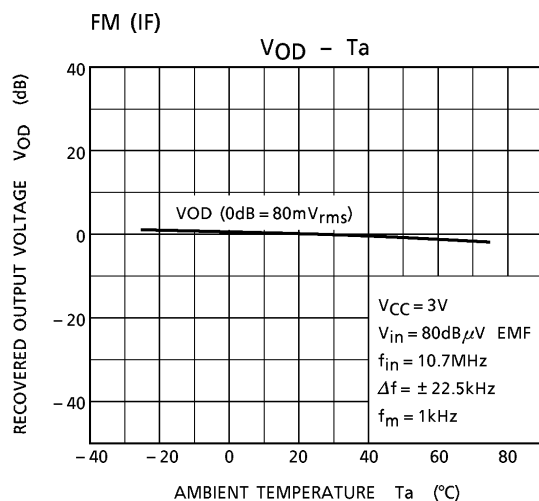
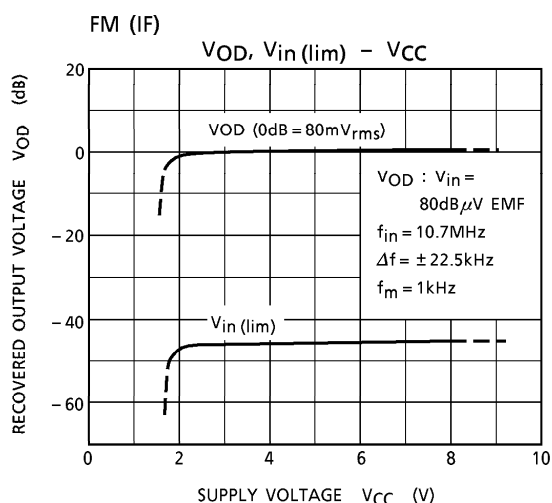
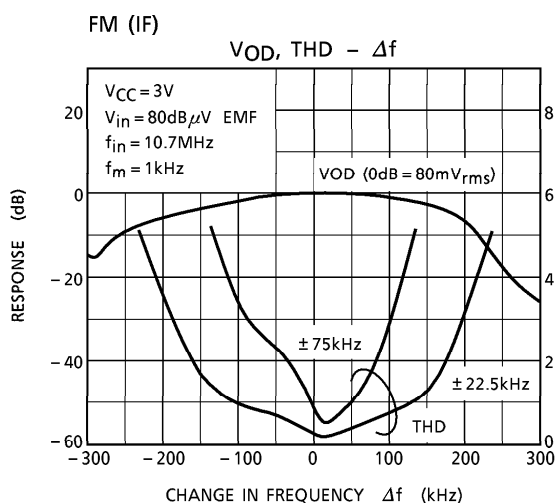
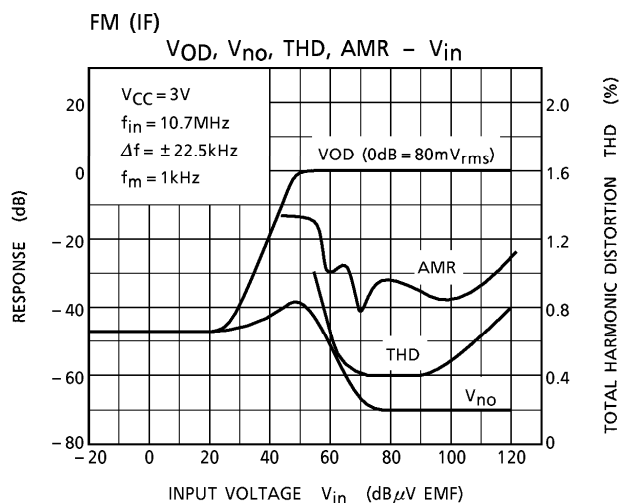
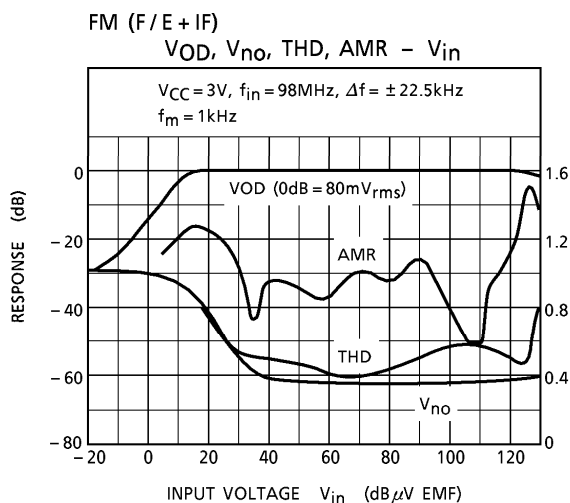
(C : POLYESTER FILM
R, VR.: CARBON FILM

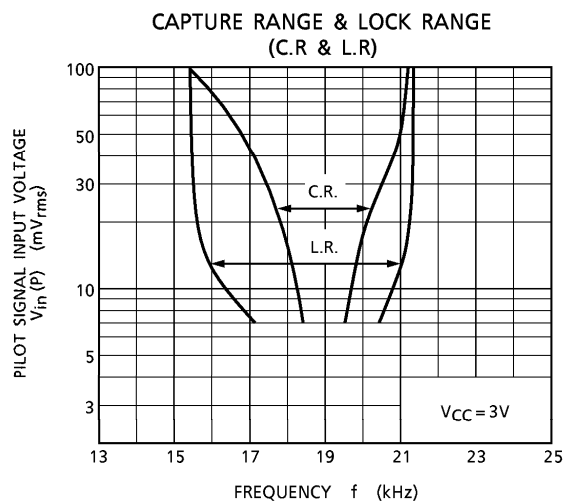
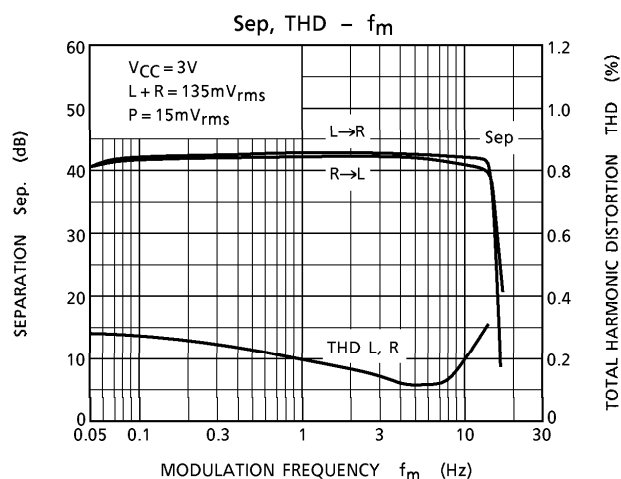
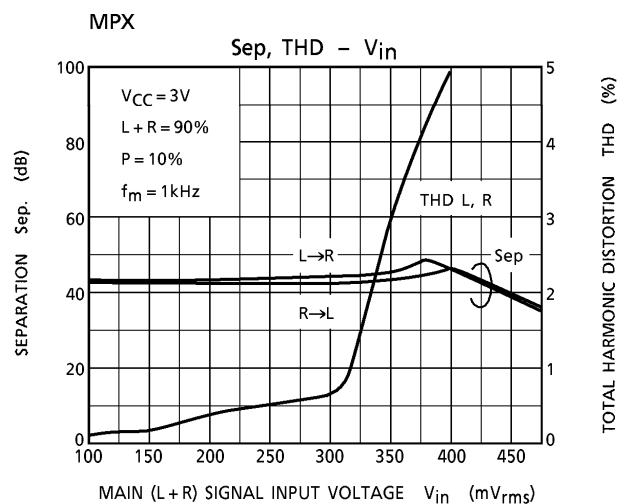
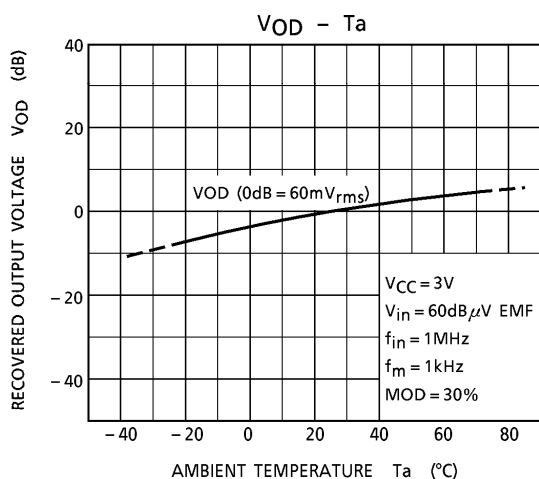
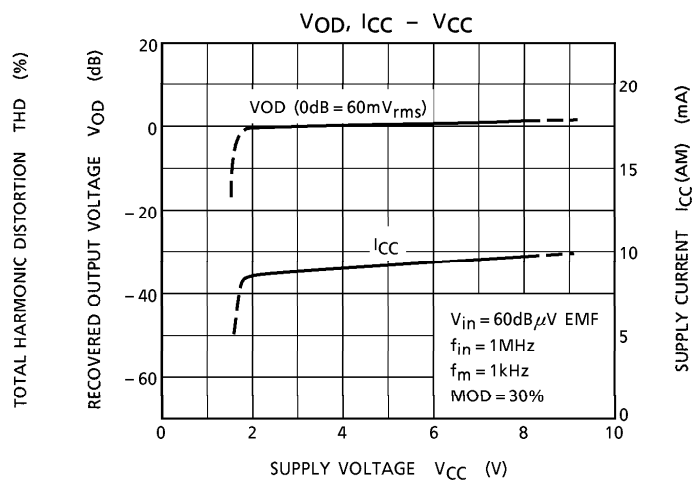
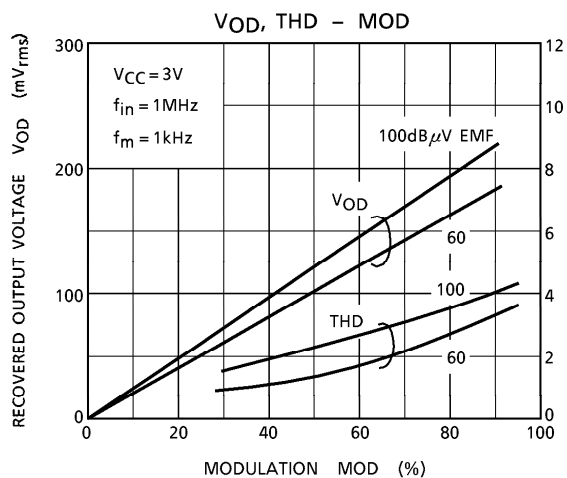


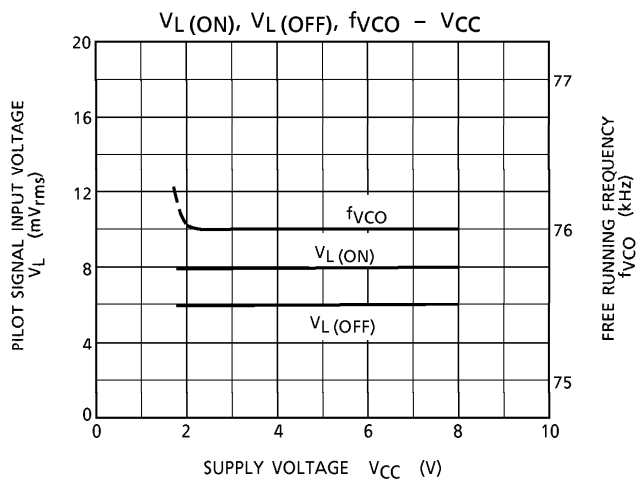
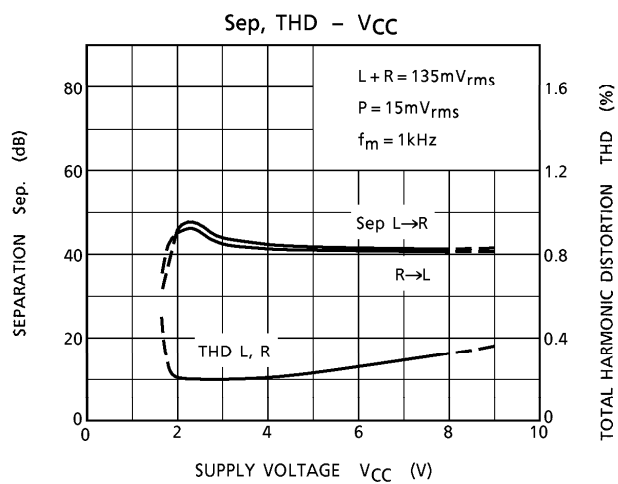
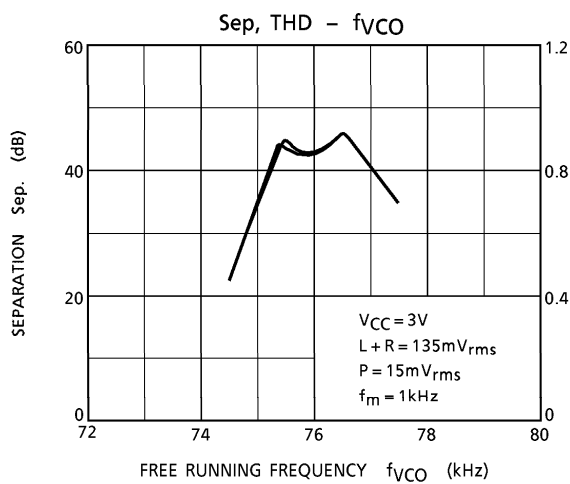
(2) Value of the external parts

We recommend to set up these value as below.

(C = 1000pF
R = 12kΩ
VR = 10kΩ

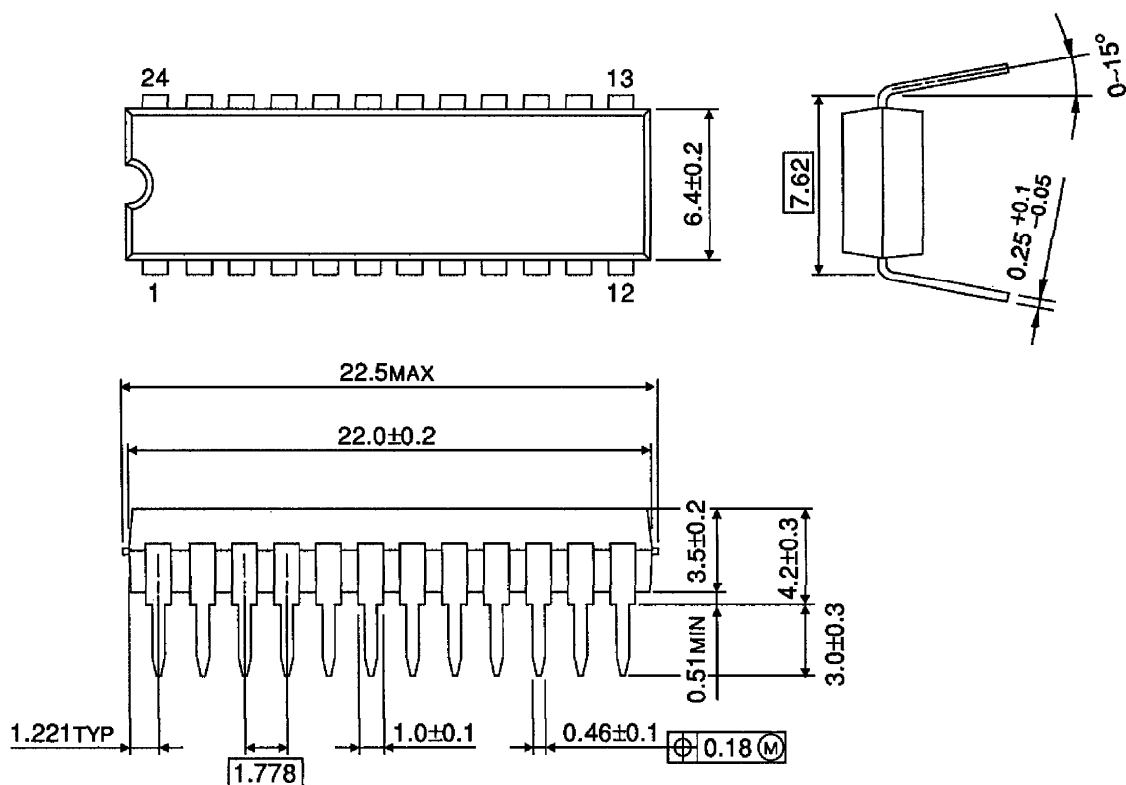






OUTLINE DRAWING
SDIP24-P-300-1.78

Unit : mm



Weight : 1.2g (Typ.)