

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8122AN, TA8122AF, TA8123AN, TA8123AF

3V AV / FM 1CHIP TUNER IC

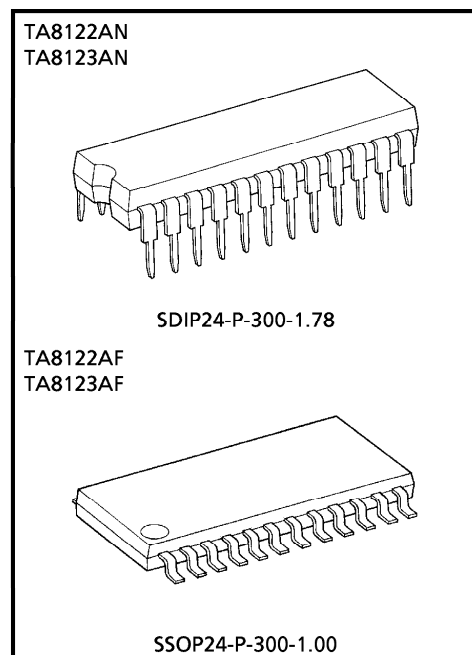
TA8122AN/AF and TA8123AN/AF are the AM/FM 1Chip Tuner ICs, which are designed for Portable Radios and 3V Headphone Radios.

FEATURES

- Built-in
FM F/E, AM/FM IF and FM ST DET
- AM Detector Coil, FM IFT and IF Coupling Condenser are not needed.
- For adopting Ceramic Discriminator and Ceramic Resonator, it is not necessary to adjust the FM Quad Detector Circuit and FM ST DET VCO Circuit.
- S curve characteristics of FM detection output in TA8122AN/AF and TA8123AN/AF are reverse to each other.

TA8122AN/AF : Reverse characteristic
TA8123AN/AF : Normal characteristic

- Compact Package
TA8122AN/23AN : Shrink DIP 24 pin (1.78mm pitch)
TA8122AF/23AF : 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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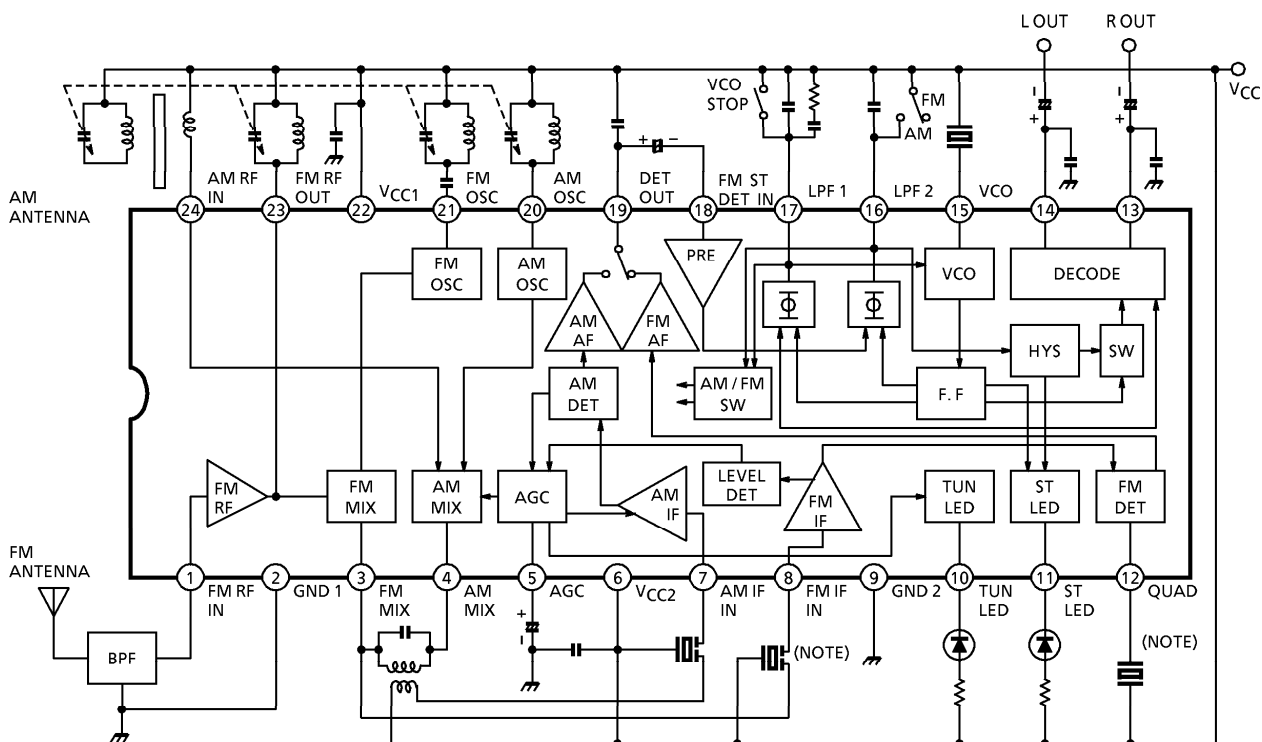
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BLOCK DIAGRAM



(Note)

We recommend the kit of the ceramic filter and the ceramic resonator which are shown in the table as below.
It is necessary to meet the center frequency of the ceramic filter and the ceramic resonator, otherwise there are some cases that the characteristics get worse.

KIT NAME	COMBINATION			
	CERAMIC FILTER	Q'ty	CERAMIC RESONATOR	Q'ty
KMFC403-Z	SFE10.7MA5-Z	2	CDA10.7MG16-Z	1
KMFC411-Z	SFE10.7MA5-Z	1	CDA10.7MG16-Z	1
KMFC422-Z	SFE10.7MA2-Z	2	CDA10.7MG16-Z	1
KMFC435-Z	SFE10.7MA5L-Z	2	CDA10.7MG16-Z	1
KMFC445-Z	SFE10.7MA5L-Z	1	CDA10.7MG16-Z	1

MANUFACTURER : MURATA MFG. CO., LTD

EXPLANATION OF TERMINALS

PIN No.	CHARACTERISTIC	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		2.3	1.8
4	AM MIX		2.3	1.8
5	AGC (AM AGC)		0	0
6	VCC2 (VCC For IF/MPX Stage)	—	3.0	3.0

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
7	AM IF IN		3.0	3.0
8	FM IF IN		3.0	3.0
9	GND2 (GND For IF/MPX Stage)	—	0	0
10	TUN LED (Tuning LED)		—	—
11	ST LED (Stereo LED)		—	—
12	QUAD (FM QUAD. Detector)		2.4	2.1

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
13 14	R-OUT (R-ch Output) L-OUT (L-ch Output)		1.0	1.0
15	VCO		2.5	2.5 (VCO stop mode)
16	LPF2 <ul style="list-style-type: none"> ● LPF Terminal For Synchronous Detector ● Bias Terminal For AM / FM SW Circuit $V_{16} = V_{CC} \rightarrow \text{AM}$ $V_{16} = \text{Open} \rightarrow \text{FM}$		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
18	FM ST DET IN		0.7	0.7

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
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 _{CC}	8	V
LED Current		I _{LED}	10	mA
LED Voltage		V _{LED}	8	V
Power	TA8122AN / 23AN	P _D (Note)	1200	mW
Dissipation	TA8122AF / 23AF		400	
Operating Temperature		T _{opr}	- 25~75	°C
Storage Temperature		T _{stg}	- 55~150	°C

Note : Derated above 25°C in the proportion of 9.6mW/°C for TA8122AN / 23AN and of 3.2mW/°C for TA8122AF / 23AF

ELECTRICAL CHARACTERISTICS

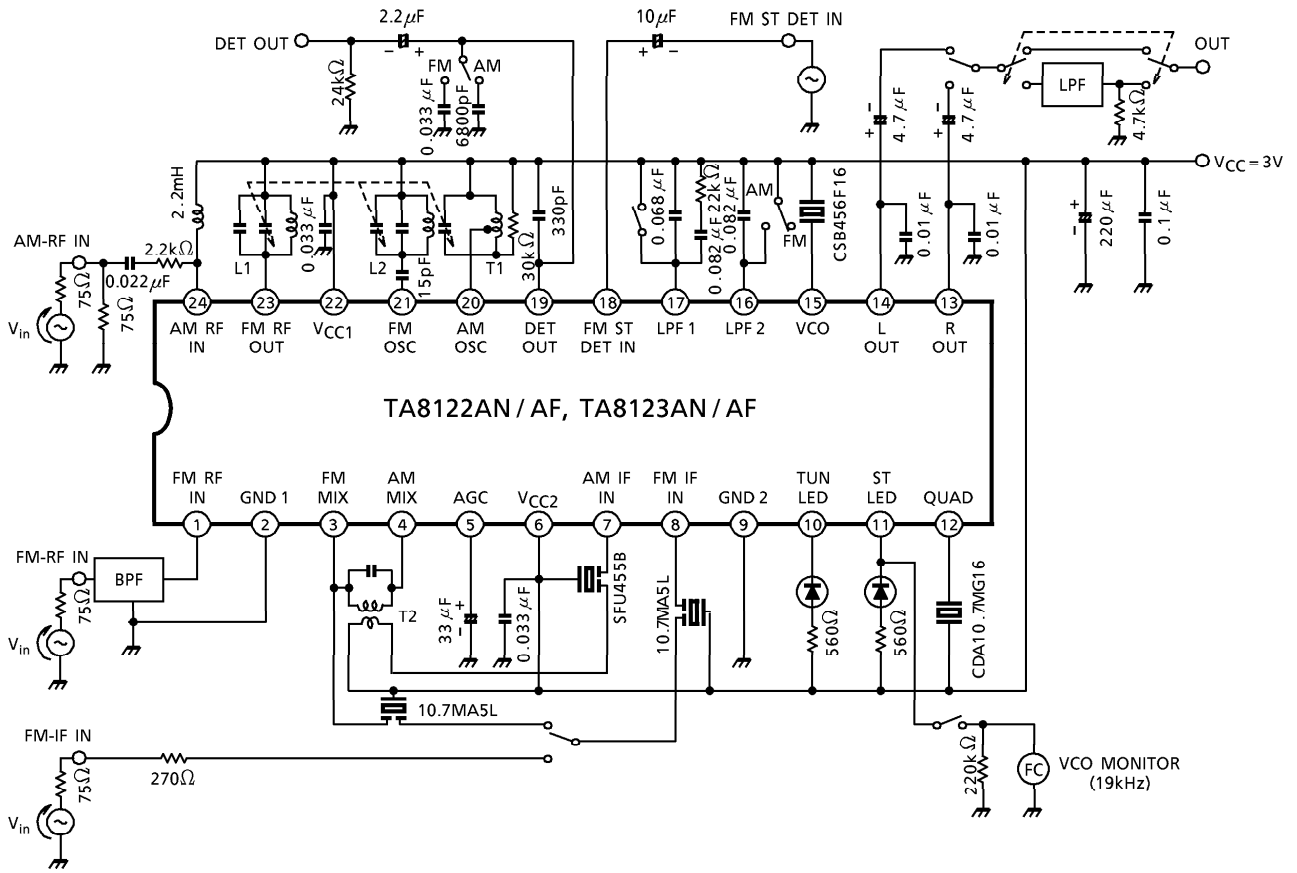
Unless otherwise specified,

Ta = 25°C, VCC = 3V, F/E : f = 83MHz, fm = 1kHz
 FM IF : f = 10.7MHz, Δf = ± 22.5kHz, fm = 1kHz
 AM : f = 1MHz, MOD = 30%, fm = 1kHz
 FM ST DET : fm = 1kHz

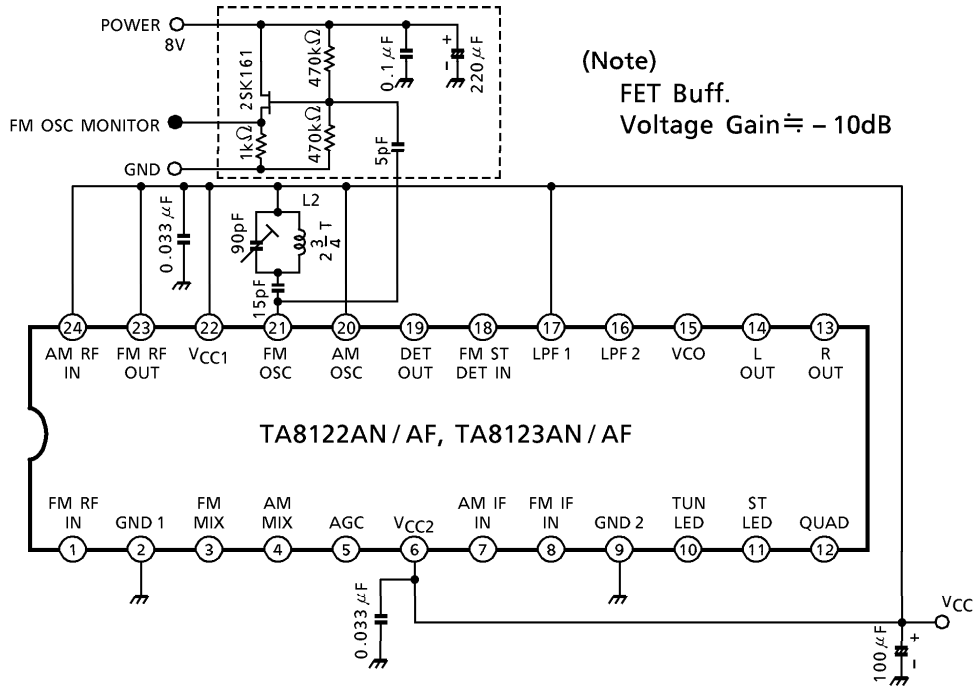
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I _{CC} (FM)	1	V _{in} = 0, FM mode	—	14.0	18.5	mA
		I _{CC} (AM)	1	V _{in} = 0, AM mode	—	6.0	8.3	
F/E	Input Limiting Voltage	V _{in} (lim.)	1	- 3dB limiting	—	14.0	—	dB _μ V EMF
	Local OSC Voltage	V _{OSC}	2	f _{OSC} = 72.3MHz	70	105	140	mV _{rms}
	Input Limiting Voltage	V _{in} (lim.) IF	1	- 3dB limiting	39	44	49	dB _μ V EMF
FM IN	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	—	50	—	dB
	LED ON Sensitivity	V _L	1	I _L = 1mA	43	48	53	dB _μ V EMF
AM	Gain	G _V	1	V _{in} = 23dB _μ V EMF	20	40	80	mV _{rms}
	Recovered Output Voltage	V _{OD}	1	V _{in} = 60dB _μ V EMF	50	60	100	mV _{rms}
	Signal To Noise Ratio	S/N	1	V _{in} = 60dB _μ V EMF	—	44	—	dB
	Total Harmonic Distortion	THD	1	V _{in} = 60dB _μ V EMF	—	1.0	—	%
	LED ON Sensitivity	V _L	1	I _L = 1mA	19	24	29	dB _μ V EMF
Pin ¹⁹ Output Resistance		R ₁₉	1	FM mode	—	0.75	—	kΩ
				AM mode	—	12.5	—	

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
FM ST DET	Input Resistance	R_{IN}	—	—	—	24	—	k Ω	
	Output Resistance	R_{OUT}	—	—	—	5	—		
	Max. Composite Signal Input Voltage	V_{in} (MAX.) STEREO	1	L + R = 90%, P = 10% $f_m = 1\text{kHz}$, THD = 3%	—	350	—	mV _{rms}	
	Separation	Sep.	1	L + R = 135mV _{rms} P = 15mV _{rms}	$f_m = 100\text{Hz}$	—	42	—	dB
					$f_m = 1\text{kHz}$	35	42	—	
					$f_m = 10\text{kHz}$	—	42	—	
	Total Harmonic Distortion	Monaural	THD (MONAURAL)	1	$V_{in} = 150\text{mV}_{rms}$	—	0.2	—	%
		Stereo	THD (STEREO)		L + R = 135mV _{rms} , P = 15mV _{rms}	—	0.2	—	
	Voltage Gain	G_V (FM ST DET)		1	$V_{in} = 150\text{mV}_{rms}$	-5	-3	-1	dB
	Channel Balance	C.B.		1	$V_{in} = 150\text{mV}_{rms}$	-2	0	2	
	Stereo LED Sensitivity	ON	V_L (ON)	1	Pilot Input	—	8	15	mV _{rms}
		OFF	V_L (OFF)			2	6	—	
Stereo LED Hysteresis	V_H		1	To LED turn off from LED turn on	—	2	—	mV _{rms}	
Capture Range	C.R.		1	P = 15mV _{rms}	—	1.3	—	%	
Signal To Noise Ratio	S/N		1	$V_{in} = 150\text{mV}_{rms}$	—	70	—	dB	

TEST CIRCUIT 1



TEST CIRCUIT 2

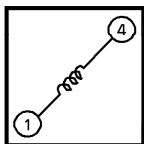


COIL DATA

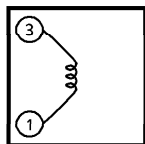
COIL No.	TEST FREQ.	L (μH)	C ₀ (pF)	Q ₀	TURNS					WIRE (mm φ)	REFERENCE
					1-2	2-3	1-3	1-4	4-6		
L ₁ FM RF	100MHz	—	—	100	—	—	—	2 $\frac{1}{2}$	—	0.5UEW	Ⓢ 53T-037-202
L ₂ FM OSC	100MHz	—	—	100	—	—	2 $\frac{3}{4}$	—	—	0.5UEW	Ⓢ 0258-244
T ₁ AM OSC	796kHz	288	—	115	13	73	—	—	—	0.08UEW	Ⓢ 4147-1356-038
T ₂ AM IFT	455kHz	—	180	120	—	—	180	—	15	0.08UEW	Ⓢ 2150-2162-165

Ⓢ : SUMIDA ELECTRIC CO., LED.

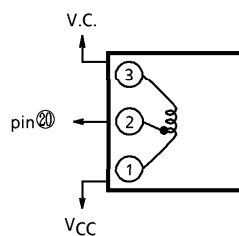
L₁ : FM RF



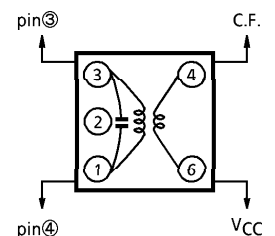
L₂ : FM OSC



T₁ : AM OSC

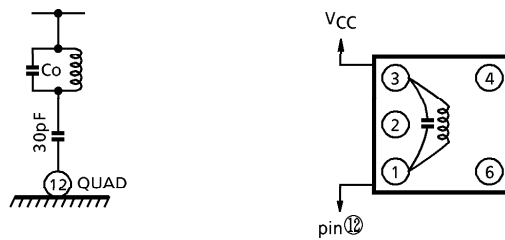


T₂ : AM IFT

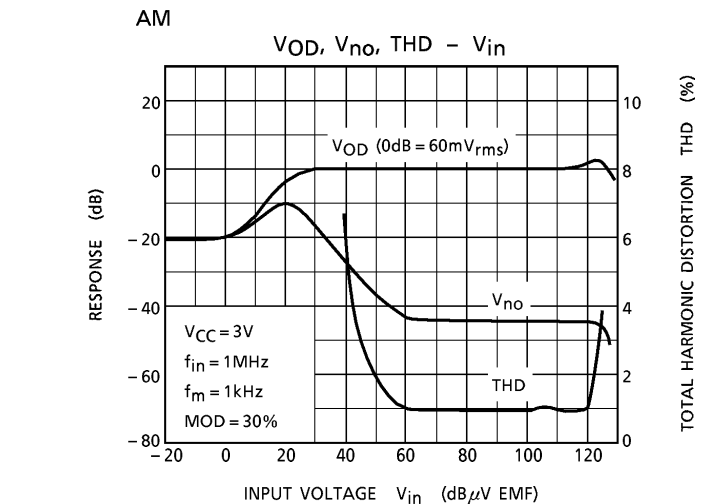
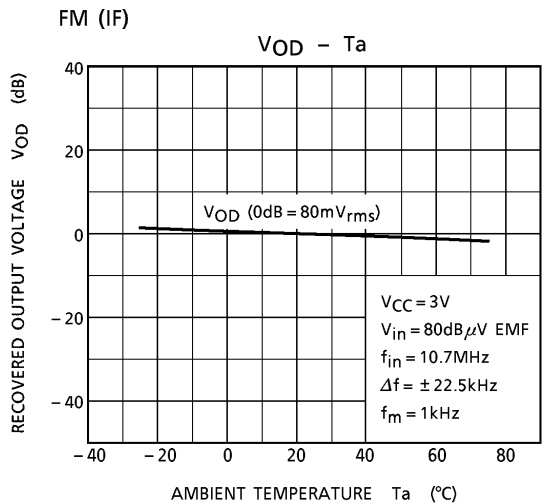
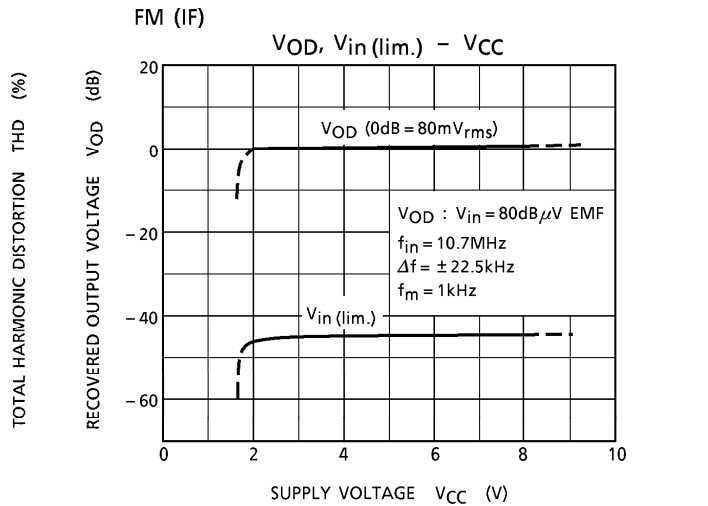
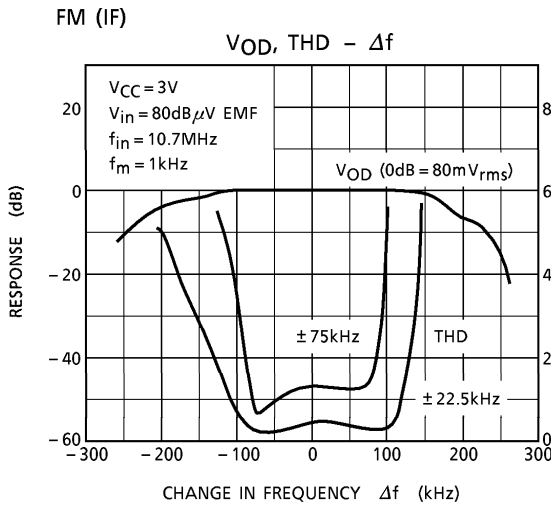
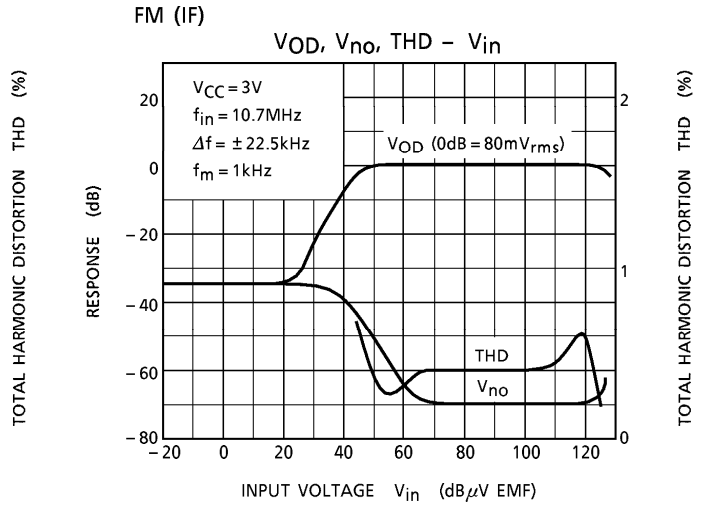
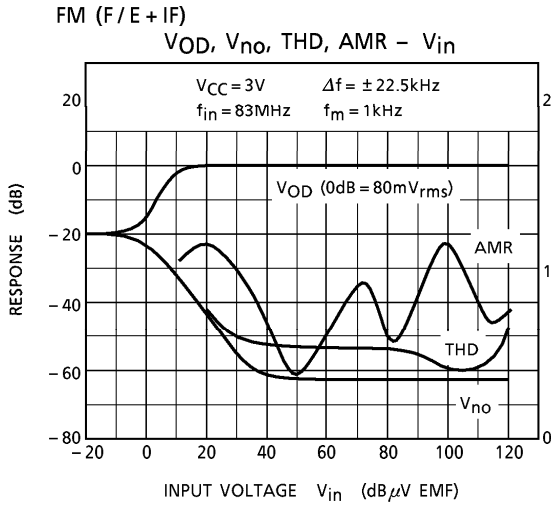


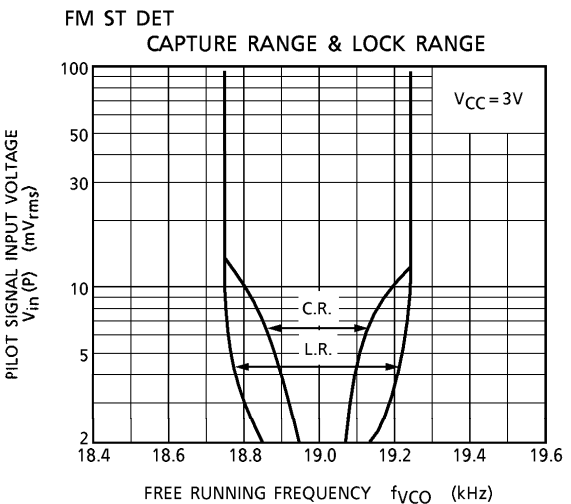
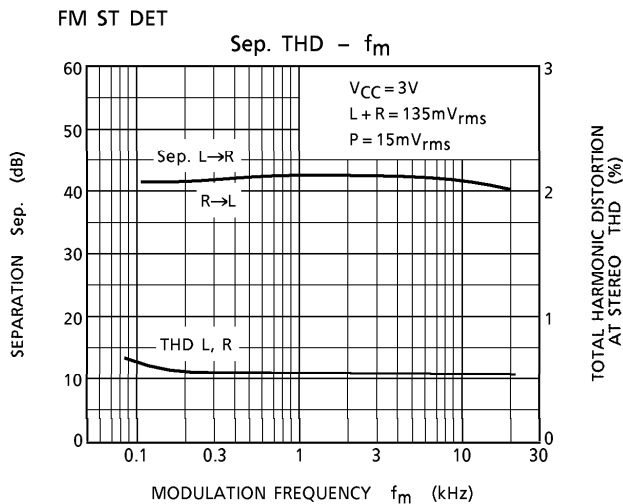
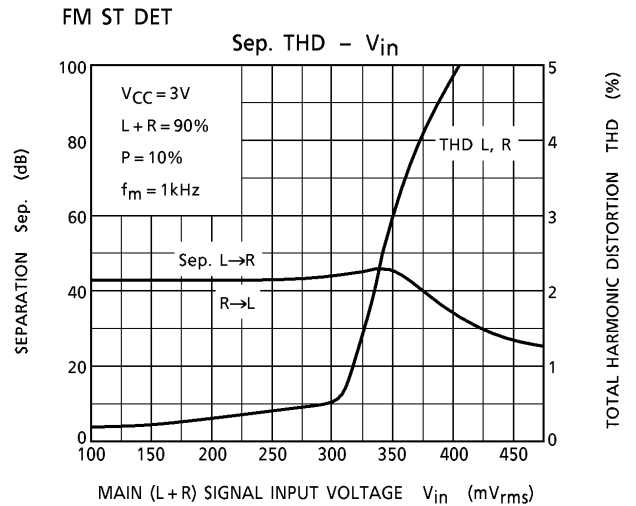
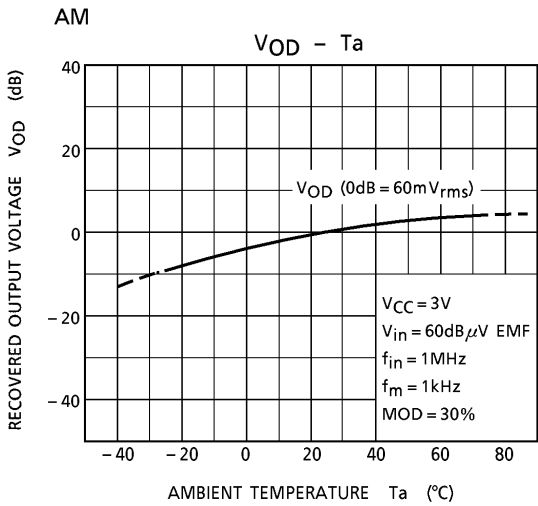
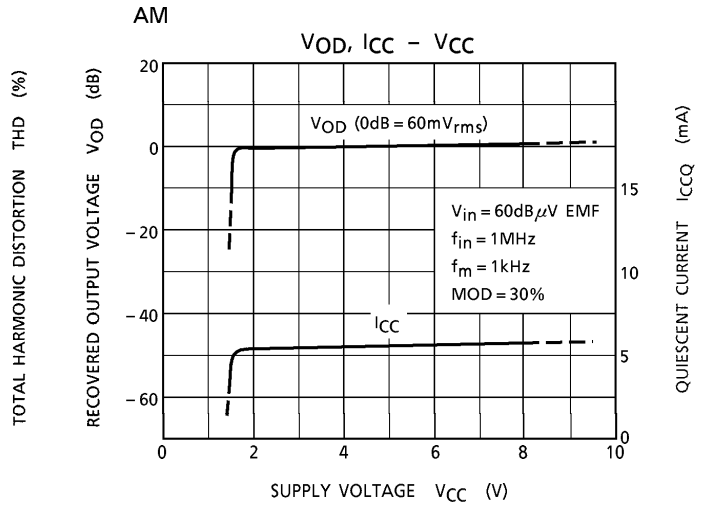
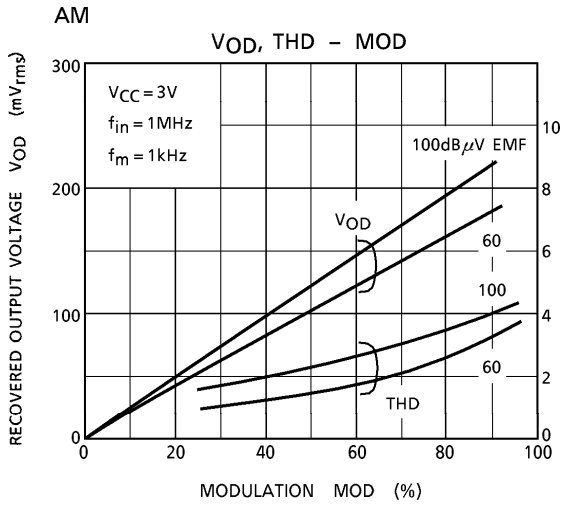
FM DETECTION CIRCUIT

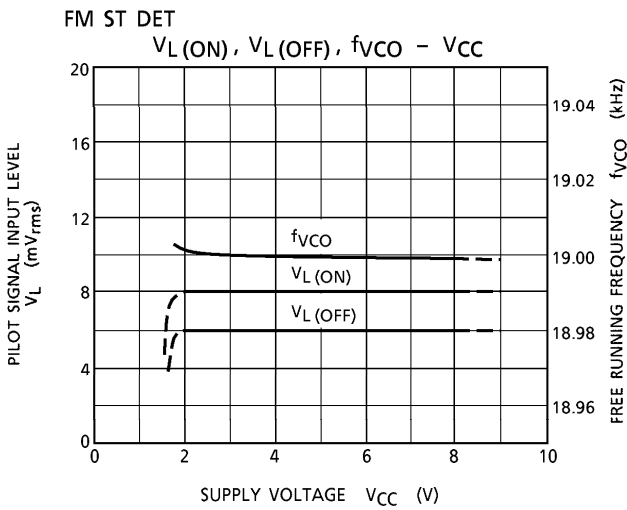
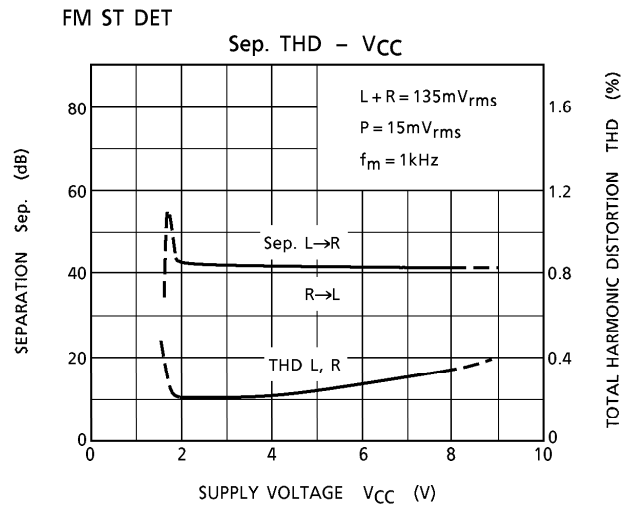
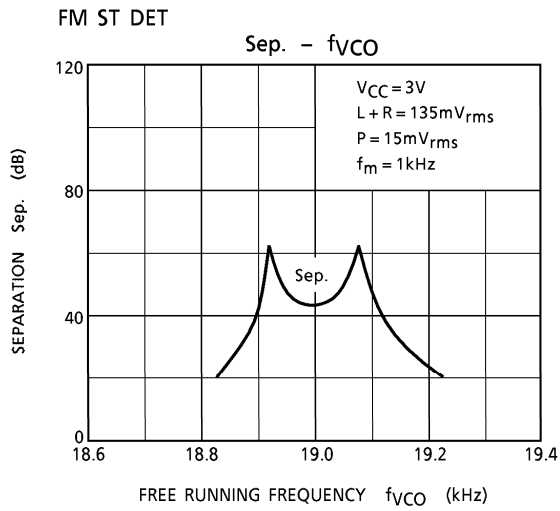
For the FM detection circuit, detection coil is able to use instead of ceramic discriminator.
 Recommended circuit and recommended coil are as follows.
 In this case, please take care that $V_{in} (lim.)$ falls a little.



TEST FREQUENCY	C_o (pF)	Q_o	TURNS				WIRE (mm ϕ)	REF
			1-2	2-3	1-3	4-6		
10.7MHz	100	100	—	—	12	—	0.12UEW	SUMIDA ELECTRIC CO., LTD 2153-4095-189 or Equivalent

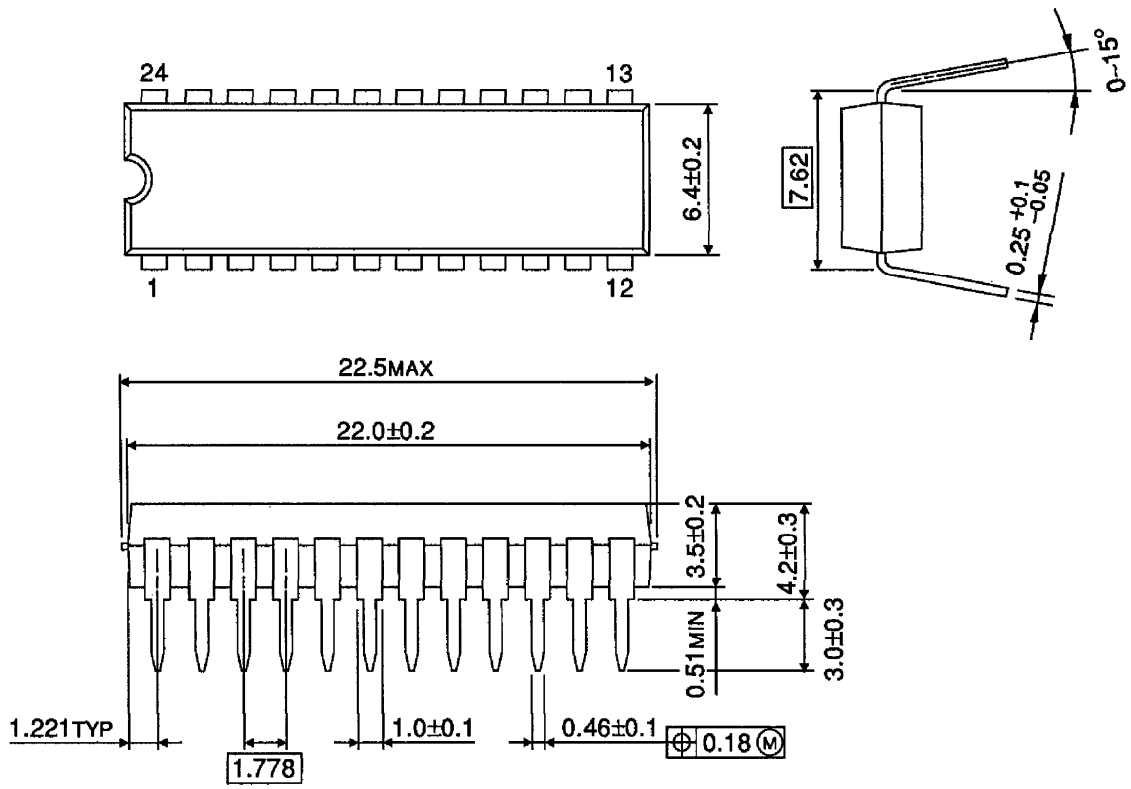






OUTLINE DRAWING
SDIP24-P-300-1.78

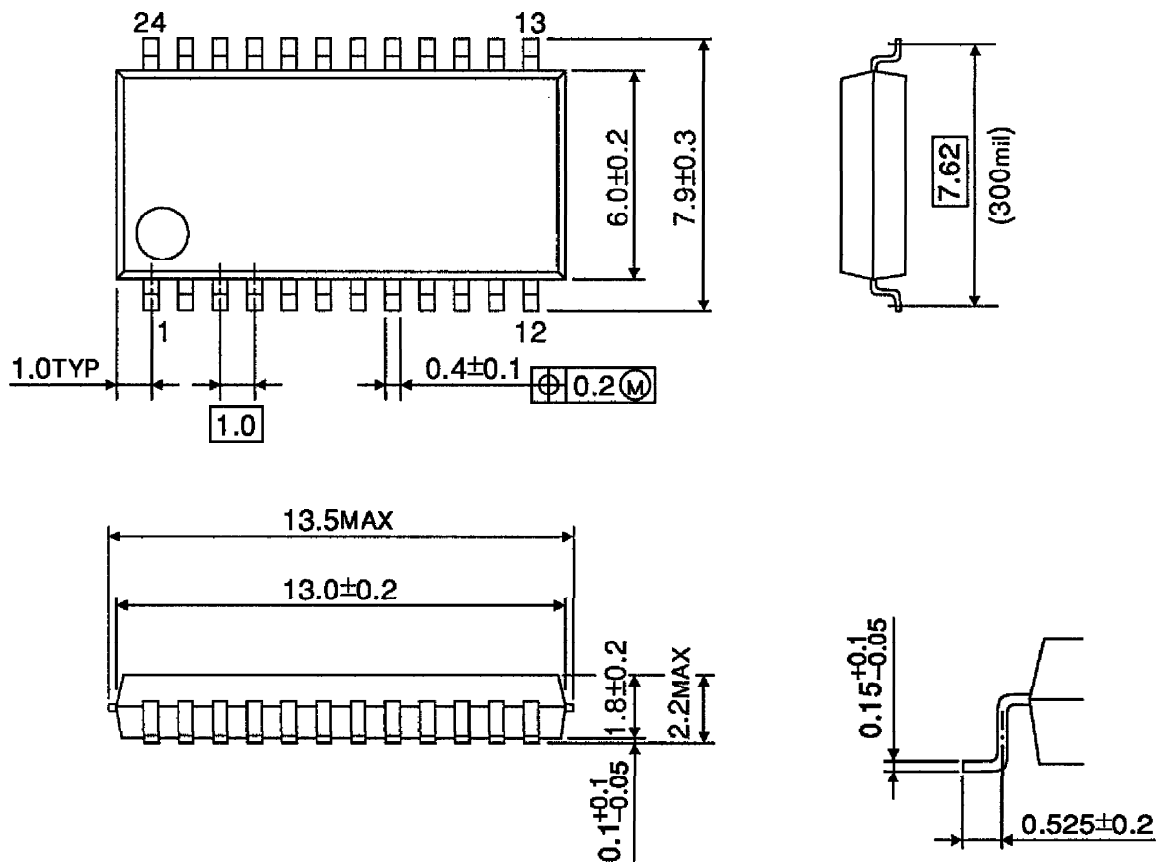
Unit : mm



Weight : 1.2g (Typ.)

OUTLINE DRAWING
SSOP24-P-300-1.00

Unit : mm



Weight : 0.31g (Typ.)