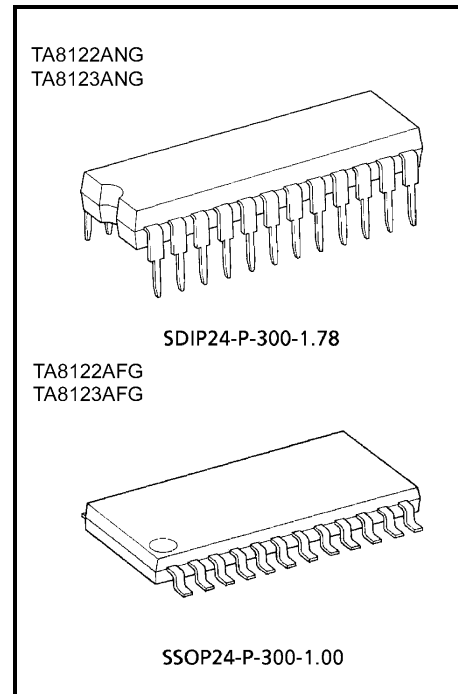


TA8122ANG, TA8122AFG, TA8123ANG, TA8123AFG**3V AV / FM 1Chip Tuner IC**

TA8122ANG / AFG and TA8123ANG / AFG are the AM / FM 1chip tuner ICs, which are designed for portable radios and 3V headphone radios.

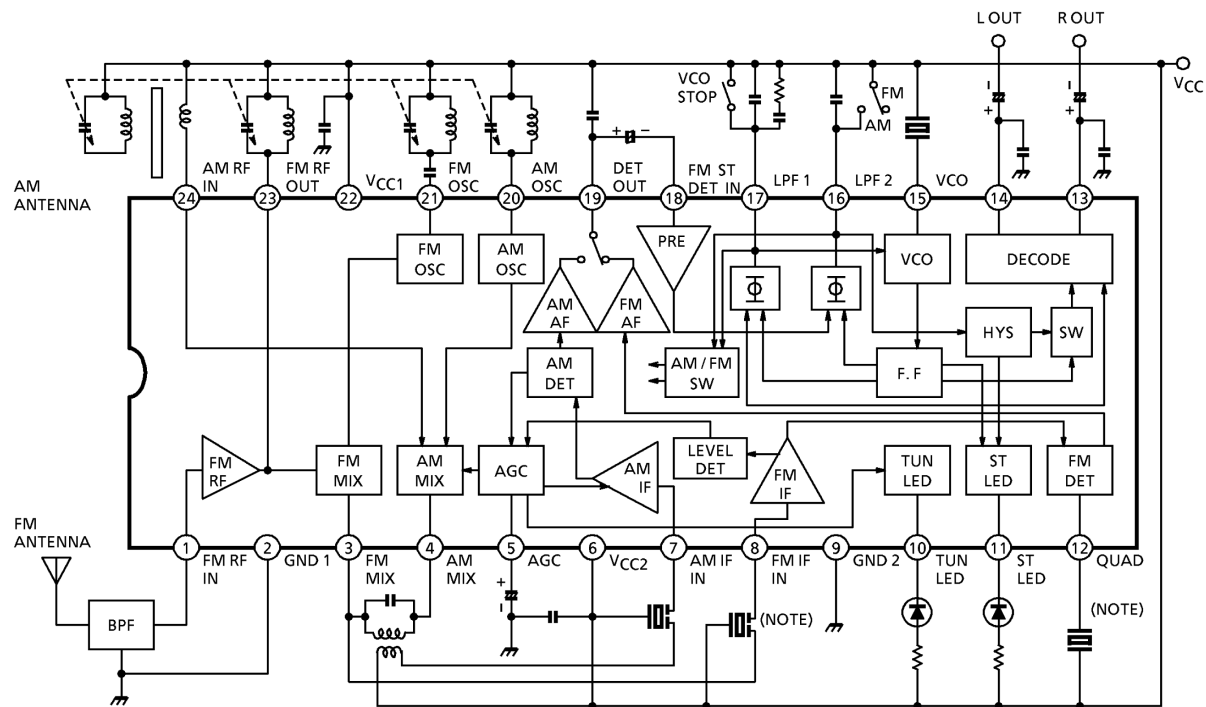
Features

- 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 TA8122ANG / AFG and TA8123ANG / AFG are reverse to each other.
TA8122ANG / AFG: Reverse characteristic
TA8123ANG / AFG: Normal characteristic
- Compact package
TA8122ANG / 23ANG: Shrink DIP 24 pin (1.78mm pitch)
TA8122AFG / 23AFG: 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.)

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 • 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	⑧ LOW→FM, HIGH→AM ⑨ LOW→AM, HIGH→FM	1.5	1.2
20	AM OSC		3.0	3.0
21	FM OSC		3.0	3.0
22	V _{CC1} (V _{CC} for RF stage)	—	3.0	3.0
23	FM RF out	cf. Pin(1)	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	TA8122ANG / 23ANG	P _D (Note)	1200	mW
	TA8122AFG / 23AFG		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 TA8122ANG / 23ANG and of 3.2mW / °C for TA8122AFG / 23AFG

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

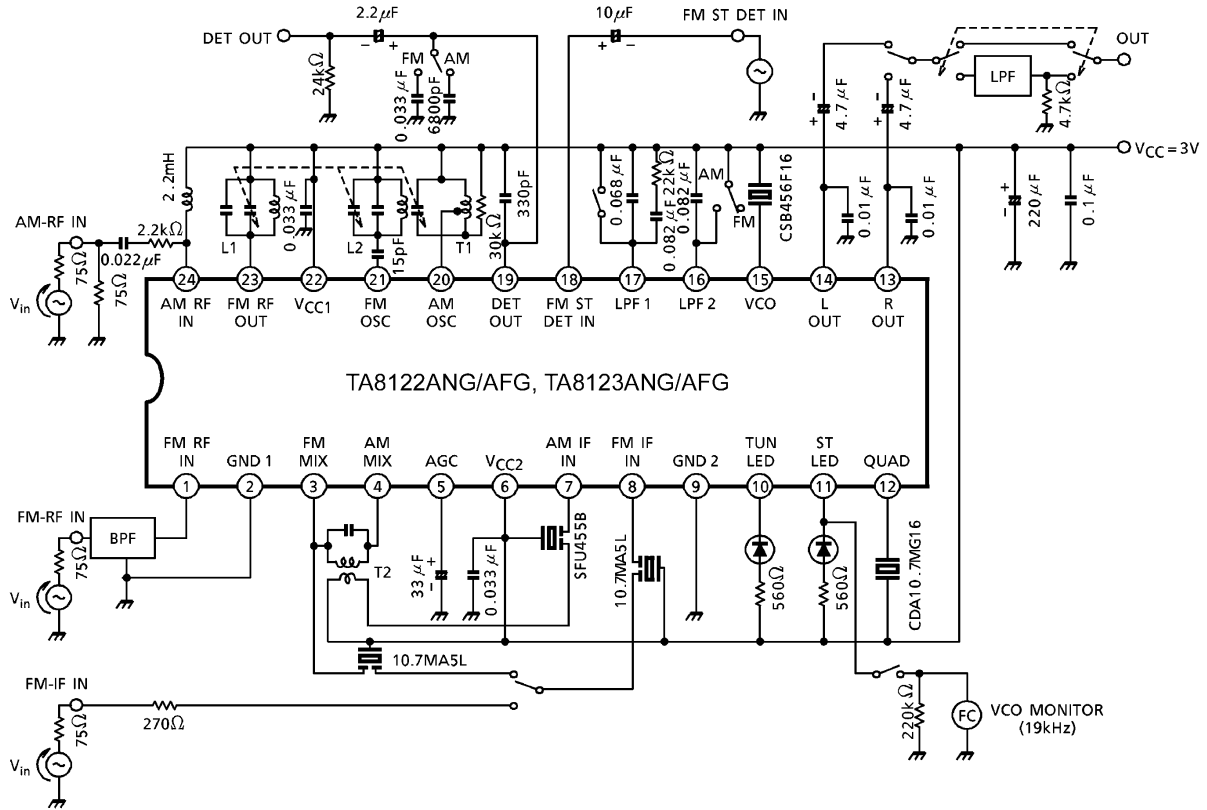
AM: f = 1MHz, MOD = 30%, fm = 1kHz

FM ST DET: fm = 1kHz

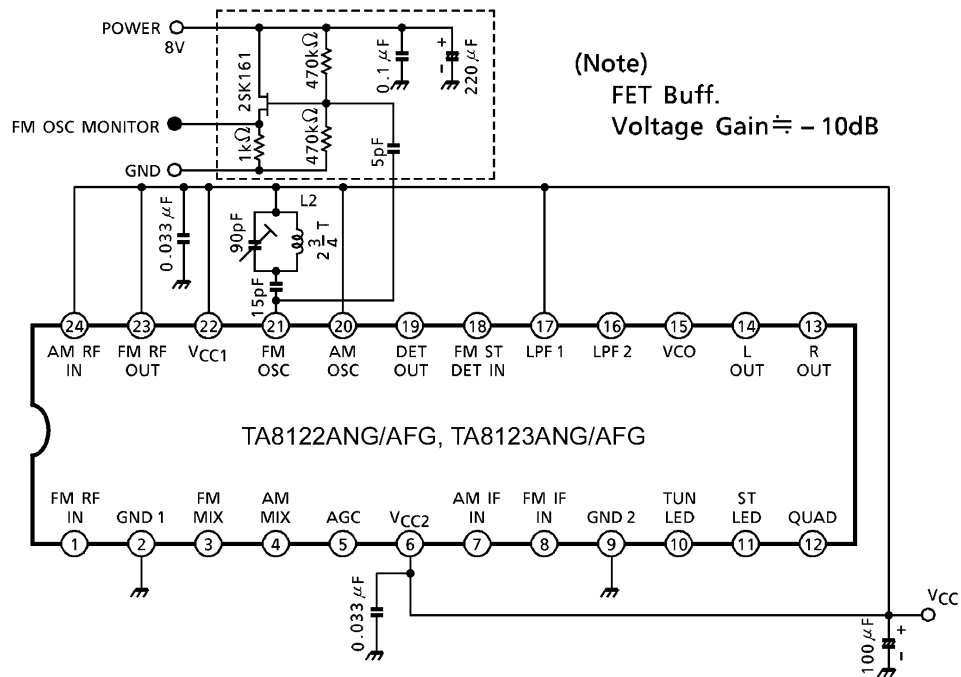
Characteristic		Symbol	Test Circuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current		ICC (FM)	1	Vin = 0, FM mode	—	14.0	18.5	mA
		ICC (AM)	1	Vin = 0, AM mode	—	6.0	8.3	
F / E	Input limiting voltage	Vin (lim.)	1	−3dB limiting	—	14.0	—	dBμV EMF
	Local OSC voltage	VOSC	2	fOSC = 72.3MHz	70	105	140	mVrms
	Input limiting voltage	Vin (lim.) IF	1	−3dB limiting	39	44	49	dBμV EMF
FM in	Recovered output voltage	VOD	1	Vin = 80dBμV EMF	55	80	110	mVrms
	Signal to noise ratio	S / N	1	Vin = 80dBμV EMF	—	70	—	dB
	Total harmonic distortion	THD	1	Vin = 80dBμV EMF	—	0.4	—	%
	AM rejection ratio	AMR	1	Vin = 80dBμV EMF	—	50	—	dB
	LED on sensitivity	VL	1	IL = 1mA	43	48	53	dBμV EMF
AM	Gain	GV	1	Vin = 23dBμV EMF	20	40	80	mVrms
	Recovered output voltage	VOD	1	Vin = 60dBμV EMF	50	60	100	mVrms
	Signal to noise ratio	S / N	1	Vin = 60dBμV EMF	—	44	—	dB
	Total harmonic distortion	THD	1	Vin = 60dBμV EMF	—	1.0	—	%
	LED on sensitivity	VL	1	IL = 1mA	19	24	29	dBμV EMF
Pin(19) output resistance		R19	1	FM mode	—	0.75	—	kΩ
			1	AM mode	—	12.5	—	

Characteristic			Symbol	Test Cir- cuit	Test Condition	Min.	Typ.	Max.	Unit	
FM ST DET	Input resistance		R _{IN}	—	—	—	24	—	kΩ	
	Output resistance		R _{OUT}	—	—	—	5	—		
	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 (FM ST DET)	1	V _{in} = 150mV _{rms}		−5	−3	−1	dB
	Channel balance		C.B.	1	V _{in} = 150mV _{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} = 150mV _{rms}		—	70	—	dB	

Test Circuit 1



Test Circuit 2

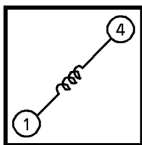


Coil Data

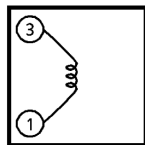
Coil No.	Test Freq.	L (μH)	C ₀ (pF)	Q ₀	Turns					Wire (mmφ)	Reference
					1-2	2-3	1-3	1-4	4-6		
L ₁ FM RF	100MHz	—	—	100	—	—	—	2 $\frac{1}{2}$	—	0.5UEW	(S) 53T-037-202
L ₂ FM OSC	100MHz	—	—	100	—	—	2 $\frac{3}{4}$	—	—	0.5UEW	(S) 0258-244
T ₁ AM OSC	796kHz	288	—	115	13	73	—	—	—	0.08UEW	(S) 4147-1356-038
T ₂ AM IFT	455kHz	—	180	120	—	—	180	—	15	0.08UEW	(S) 2150-2162-165

(S): SUMIDA ELECTRIC CO., LED.

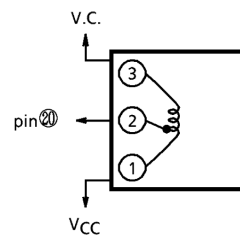
L₁ : FM RF



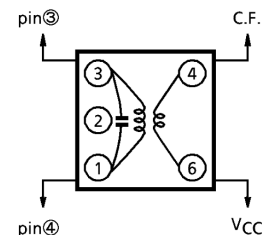
L₂ : FM OSC



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.

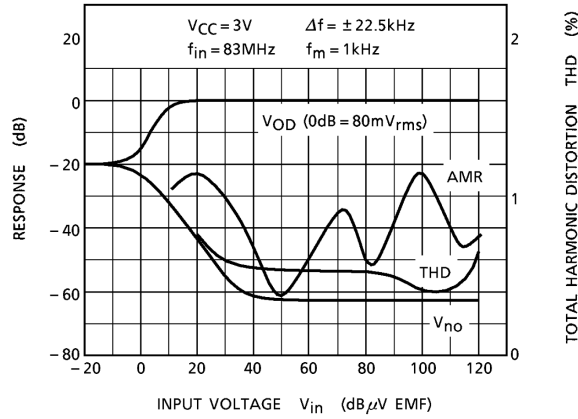
In this case, please take care that $V_{in} (lim.)$ falls a little.



Test Frequency	C_o (pF)	Q_o	Turns				Wire (mmφ)	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

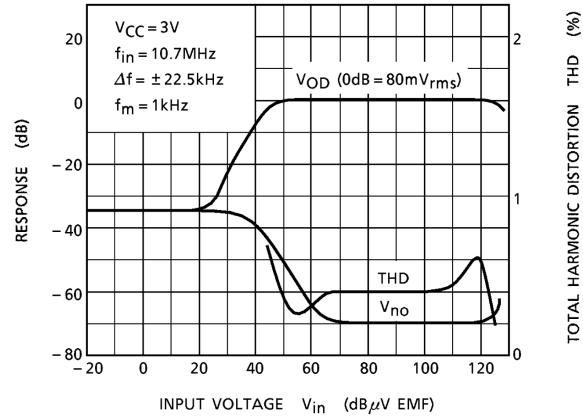
FM (F/E + IF)

V_{OD} , V_{no} , THD, AMR – V_{in}



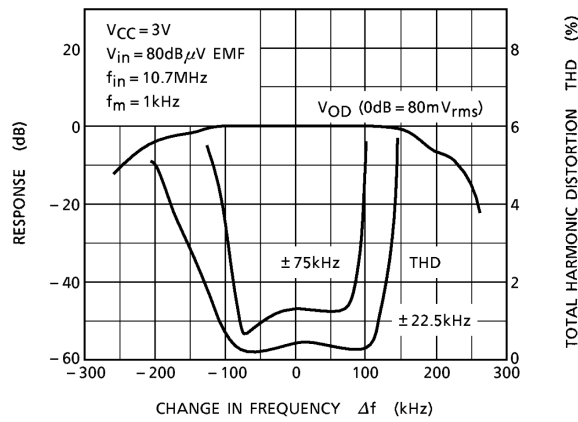
FM (IF)

V_{OD} , V_{no} , THD – V_{in}



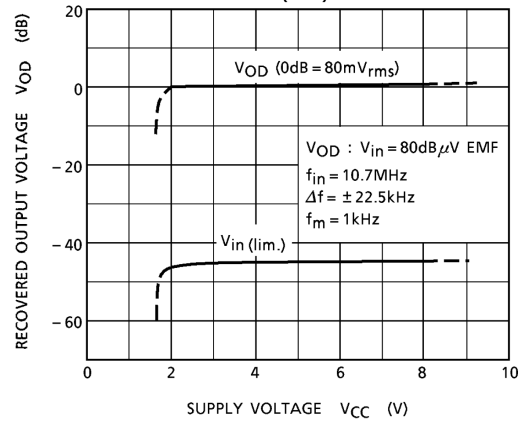
FM (IF)

V_{OD} , THD – Δf



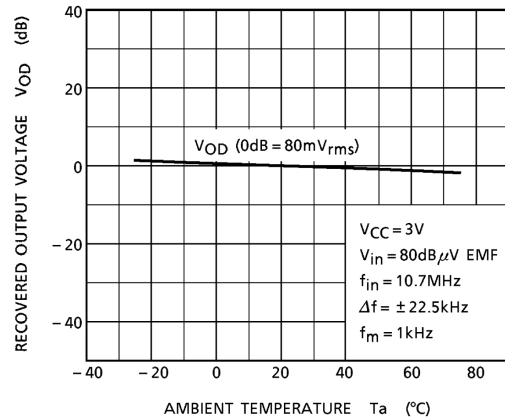
FM (IF)

V_{OD} , $V_{in}(lim.)$ – V_{CC}



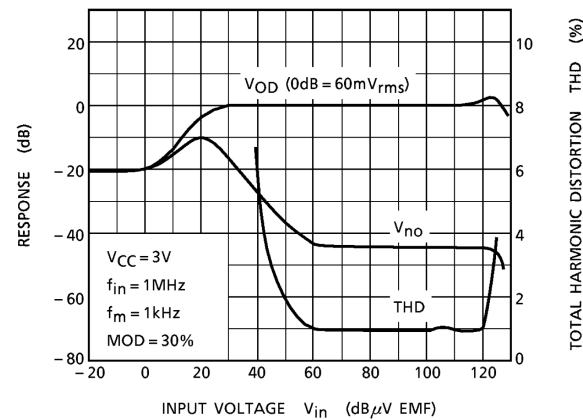
FM (IF)

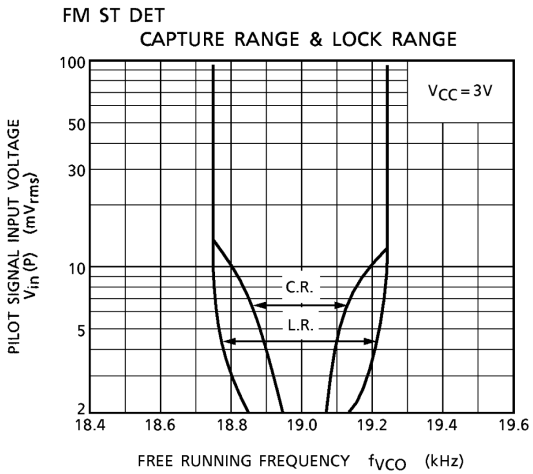
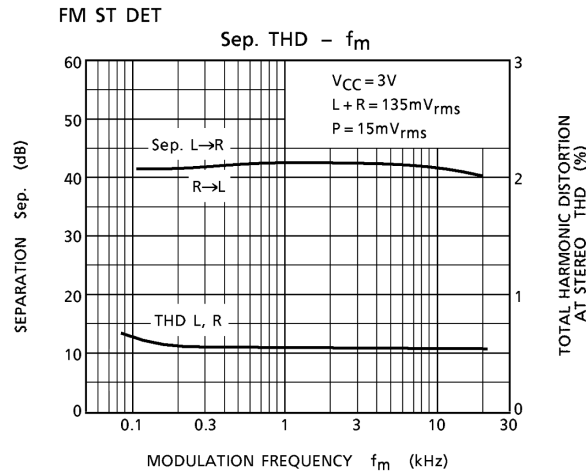
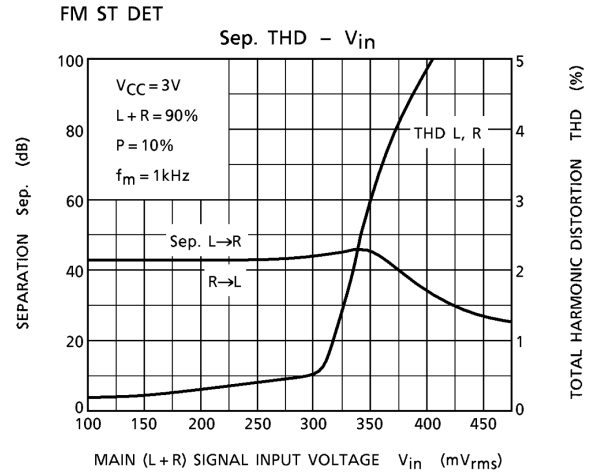
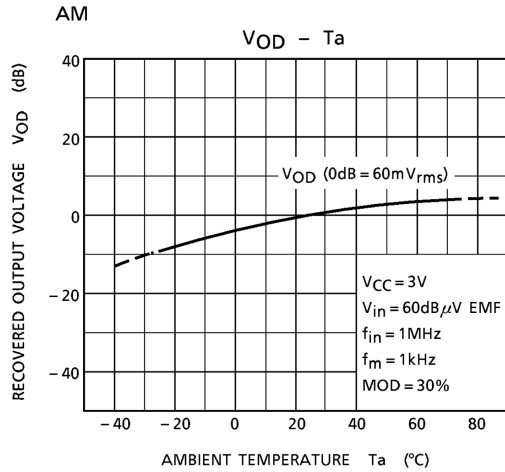
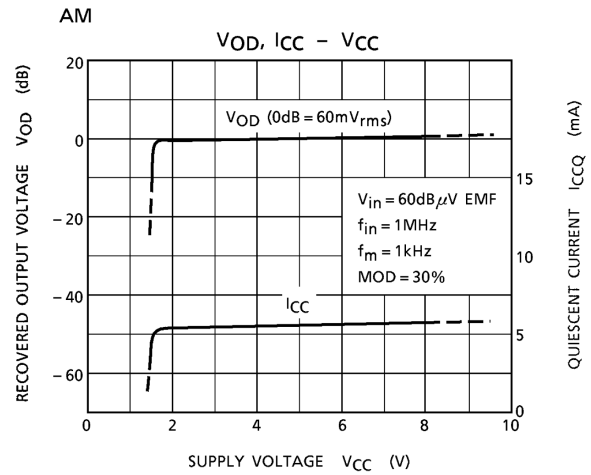
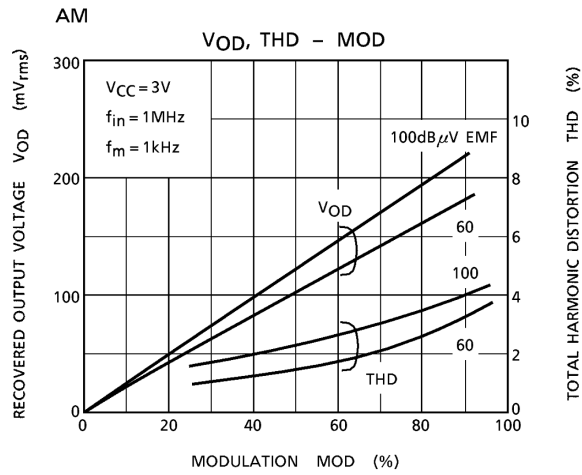
V_{OD} – T_a

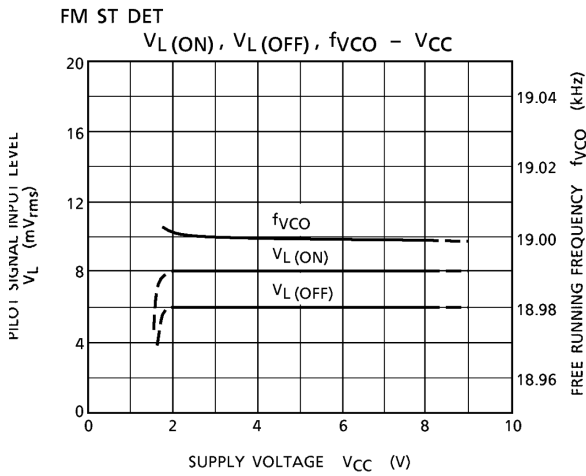
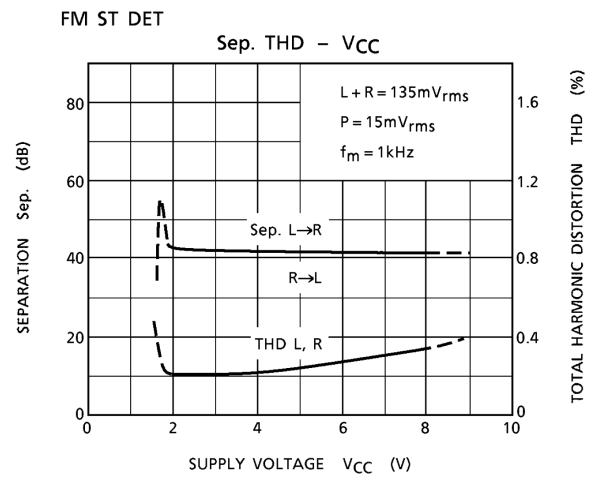
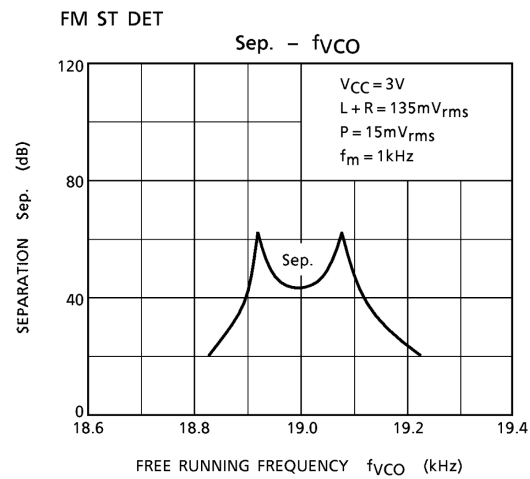


AM

V_{OD} , V_{no} , THD – V_{in}



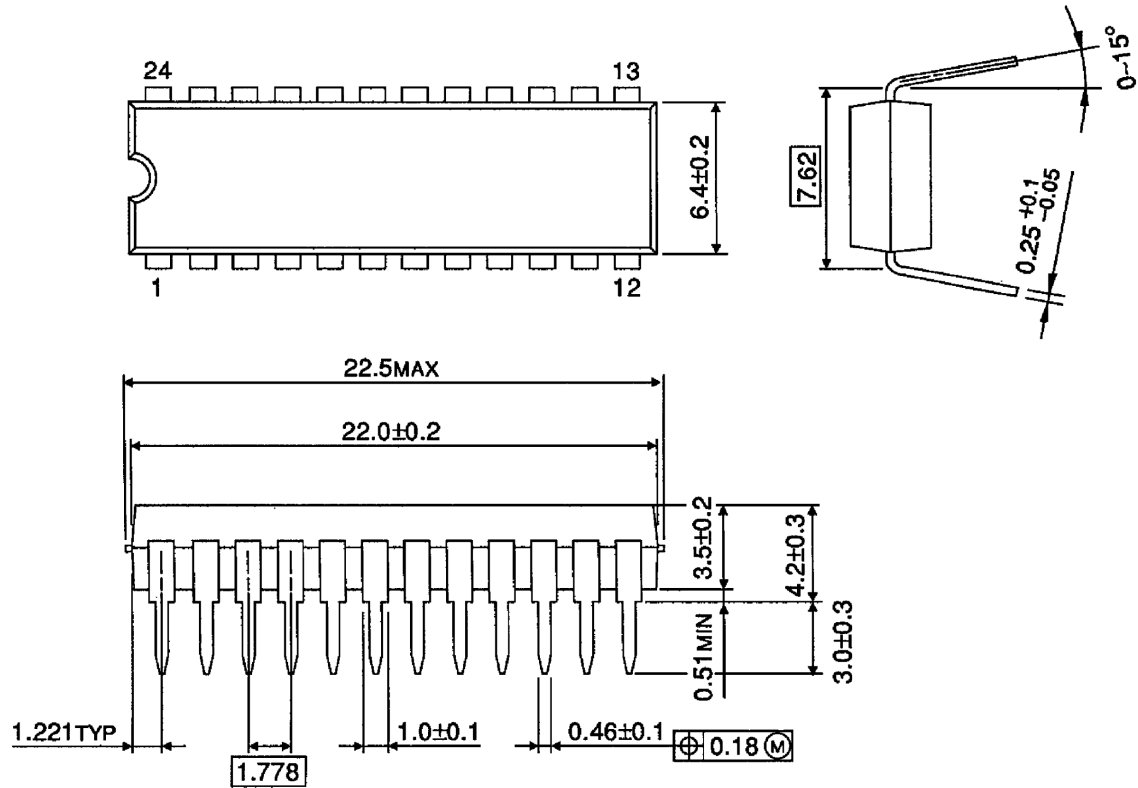




Package Dimensions

SDIP24-P-300-1.78

Unit : mm

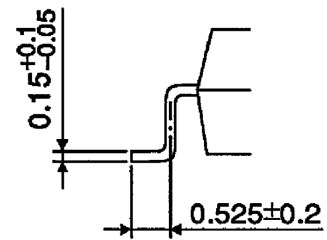
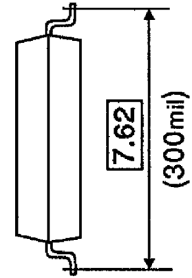
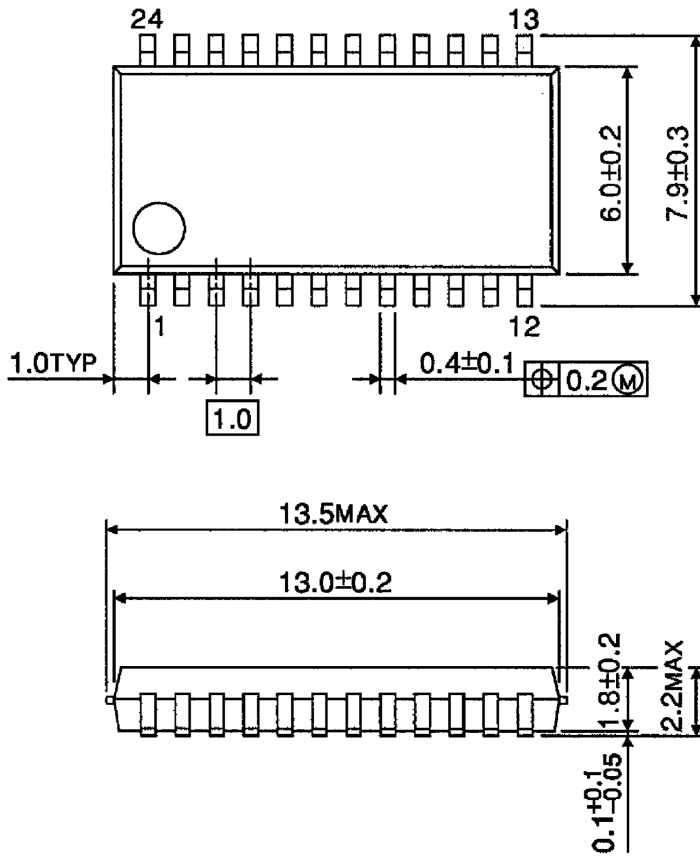


Weight: 1.2g (typ.)

Package Dimensions

SSOP24-P-300-1.00

Unit : mm



Weight: 0.31g (typ.)

About solderability, following conditions were confirmed

- Solderability

- (1) Use of Sn-63Pb solder Bath

- solder bath temperature = 230°C
 - dipping time = 5 seconds
 - the number of times = once
 - use of R-type flux

- (2) Use of Sn-3.0Ag-0.5Cu solder Bath

- solder bath temperature = 245°C
 - dipping time = 5 seconds
 - the number of times = once
 - use of R-type flux

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and 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 comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products 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 TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.