

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA2132BP, TA2132BF

AM/FM Radio IC

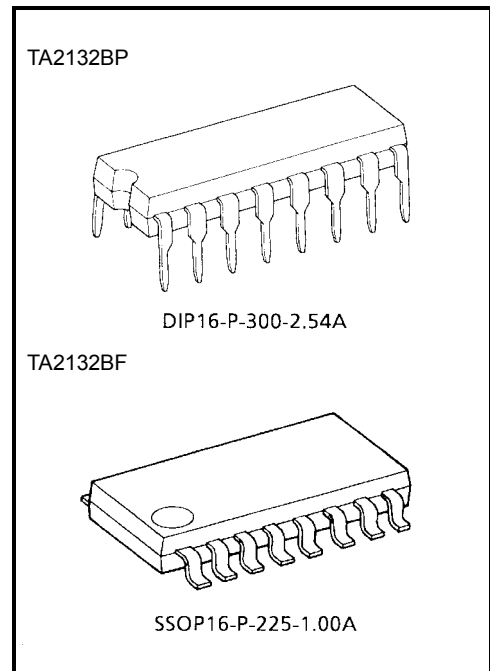
TA2132BP, TA2132BF are AM/FM Radio IC (FM F/E + AM/FM IF) which are designed for AM/FM Radios.

FM Local Oscillation Voltage is set up low relativity, for NEW FCC.

Features

- For NEW FCC.
- AM detector coil, FM IFT, IF coupling condenser are not needed.
- For adopting ceramic discriminator, it is not necessary to adjust the FM quad detector circuit.
- Built-in varactor diode for AFC
- Low supply current: ($V_{CC} = 3\text{ V}$, $T_a = 25^\circ\text{C}$)
 $I_{CCq}(\text{FM}) = 7.3\text{ mA (typ.)}$
 $I_{CCq}(\text{AM}) = 3.6\text{ mA (typ.)}$
- Operating supply voltage range: $V_{CC} = 1.8\sim 7\text{ V}$ ($T_a = 25^\circ\text{C}$)

Note: The IC may be destroyed due to incorrect orientation of device's mounting.



Weight

DIP16-P-300-2.54A : 1.00 g (typ.)
SSOP16-P-225-1.00A : 0.14 g (typ.)

The diagram illustrates the internal architecture of a radio receiver, organized into two main horizontal sections. The top section, labeled 1 through 16, represents the RF and IF stages, while the bottom section, labeled 1 through 8, represents the baseband and audio stages.

Top Section (RF and IF Stages):

- 16 AM RF IN:** The input for AM signals, connected to an **AM RF** amplifier.
- 15 FM RF OUT:** The output for FM signals, connected to an **FM/AM** switch.
- 14 AM/FM SW:** A switch that selects between AM and FM paths.
- 13 FM OSC:** The FM oscillator output, connected to the **FM OSC** block.
- 12 AM OSC:** The AM oscillator output, connected to the **AM OSC** block.
- 11 AFC:** Automatic Frequency Control output, connected to the **FM OSC** and **AM OSC** blocks.
- 10 DET OUT:** The detector output, connected to the **AF BUFF** and **FM DET** blocks.
- 9 QUAD:** The quad output, connected to the **FM DET** block.

Bottom Section (Baseband and Audio Stages):

- 1 FM RF IN:** The input for FM signals, connected to a **BPF** (Band Pass Filter) and the **FM RF** amplifier.
- 2 RF GND:** The RF ground connection.
- 3 MIX OUT:** The mixer output, connected to the **FM MIX** and **AM MIX** blocks.
- 4 AGC:** The Automatic Gain Control output, connected to the **FM MIX**, **AM MIX**, and **AGC** block.
- 5 VCC:** The power supply connection, connected to the **AGC**, **FM IF**, and **AM IF** blocks.
- 6 FM IF IN:** The FM intermediate frequency input, connected to the **FM IF** amplifier.
- 7 AM IF IN:** The AM intermediate frequency input, connected to the **AM IF** amplifier.
- 8 GND:** The ground connection.

Internal Blocks and Connections:

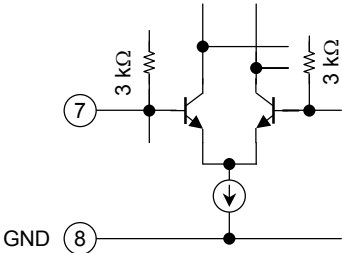
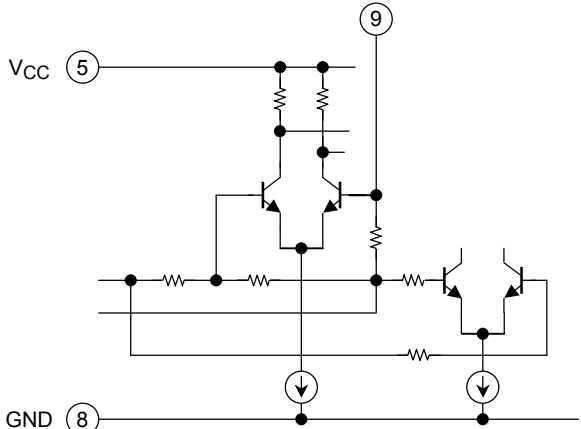
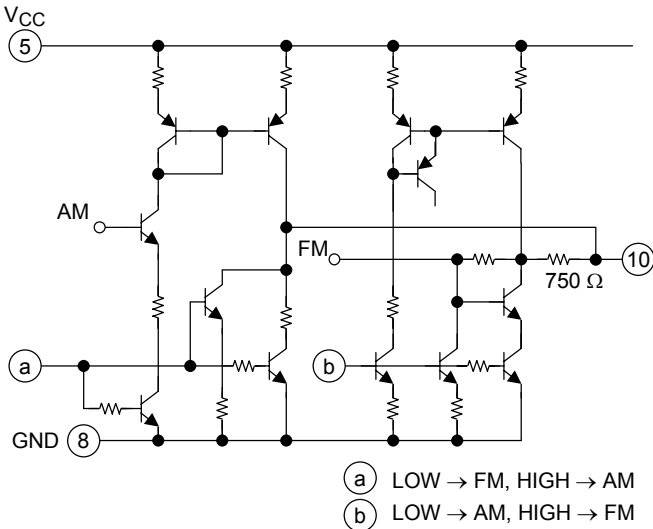
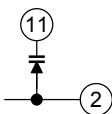
- AM RF:** Amplifier for AM RF signals.
- FM/AM:** Switch for selecting between FM and AM paths.
- FM OSC:** FM oscillator block.
- AM OSC:** AM oscillator block.
- FM MIX:** FM mixer block.
- AM MIX:** AM mixer block.
- AGC:** Automatic Gain Control block.
- FM IF:** FM intermediate frequency amplifier block.
- AM IF:** AM intermediate frequency amplifier block.
- AM DET:** AM detector block.
- FM DET:** FM detector block.
- AF BUFF:** Audio Frequency Buffer block.

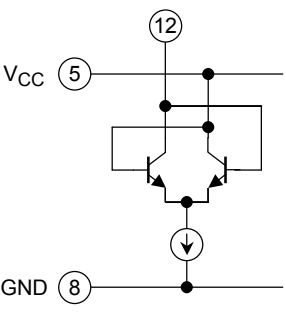
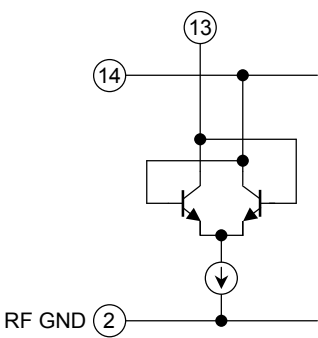
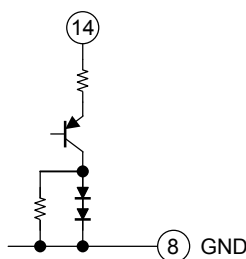
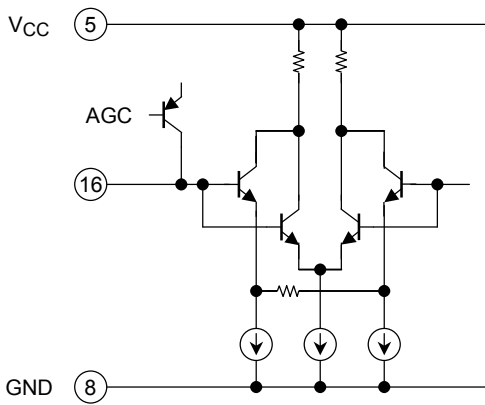
The diagram shows the flow of signals from the input (16 AM RF IN) through the RF stages (15 FM RF OUT, 14 AM/FM SW) to the mixers (13 FM OSC, 12 AM OSC), then through the baseband stages (1 FM RF IN, 2 RF GND, 3 MIX OUT, 4 AGC) to the detectors (10 DET OUT, 9 QUAD) and finally to the output (10 DET OUT, 9 QUAD). The power supply (5 VCC) and ground (8 GND) connections are also shown.

Explanation of Terminals

(Terminal Voltage: Typical DC voltage at no signal with test circuit, $V_{CC} = 3\text{ V}$, $T_a = 25^\circ\text{C}$)

Pin No.	Characteristics	Internal Circuit	DC Voltage (V)	
			AM	FM
1	FM RF IN		0	0.8
2	RF GND (GND for FM RF, FM OSC stage)	—	0	0
3	MIX OUT		3.0	2.9
4	AGC (FM IF level output)		0	0
5	V_{CC} (V_{CC} for AM, FM IF stage)	—	3.0	3.0
6	FM IF IN		3.0	3.0

Pin No.	Characteristics	Internal Circuit	DC Voltage (V)	
			AM	FM
7	AM IF IN		2.3	2.6
8	GND (GND for AM, FM IF stage)	—	0	0
9	QUAD		2.5	2.2
10	DET OUT		1.0	0.9
11	AFC		—	—

Pin No.	Characteristics	Internal Circuit	DC Voltage (V)	
			AM	FM
12	AM OSC		3.0	3.0
13	FM OSC		3.0	3.0
14	AM/FM SW • SW condition V14 = VCC → FM V14 = OPEN → AM • VCC for FM RF, FM OSC stage		—	3.0
15	FM RF OUT	Cf-Pin 1	3.0	3.0
16	AM RF IN		3.0	3.0

Maximum Ratings (Ta = 25°C)

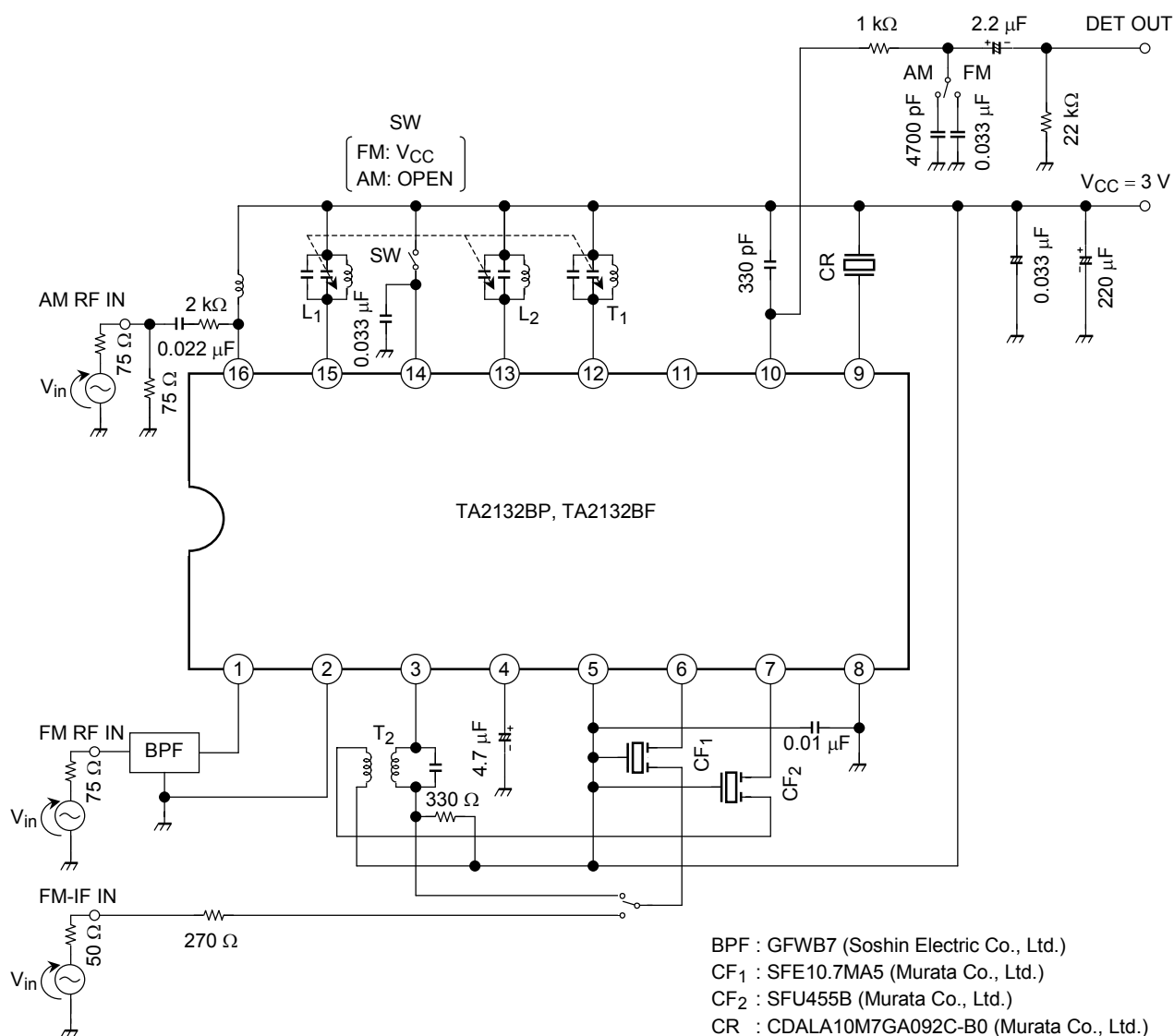
Characteristics		Symbol	Rating	Unit
Supply voltage		V _{CC}	8	V
Power dissipation	TA2132BP	P _D (Note 1)	750	mW
	TA2132BF		350	
Operating temperature		T _{opr}	−25~75	°C
Storage temperature		T _{stg}	−55~150	°C

Note 1: Deleted above Ta = 25°C in the proportion of 6 mW/°C for TA2132BP and of 2.8 mW/°C for TA2132BF.

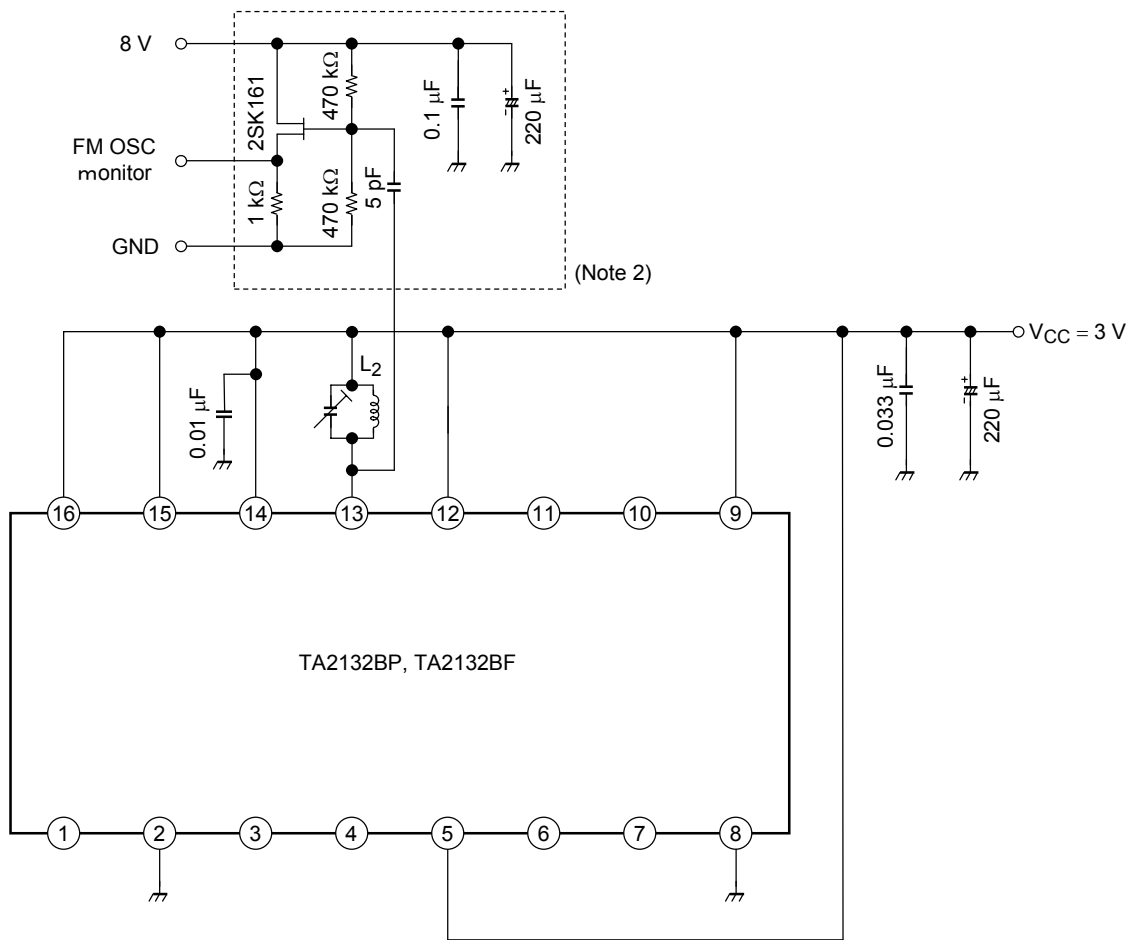
Electrical Characteristics (Unless otherwise specified, Ta = 25°C, V_{CC} = 3 V, F/E : f = 98 MHz, f_m = 1 kHz FM IF : f = 10.7 MHz, Δf = ±75 kHz, f_m = 1 kHz AM : f = 1 MHz, MOD = 30%, f_m = 1 kHz)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Supply current		I _{CC} (FM)	1	FM mode, V _{in} = 0	—	7.3	11.0	mA
		I _{CC} (AM)	1	AM mode, V _{in} = 0	—	3.6	7.0	
F/E	Input limiting voltage	V _{in} (lim)	1	−3dB limiting point	—	10	—	dBμV EMF
	Quiescent sensitivity	Q _S	1	S/N = 40dB	—	15	—	dBμV EMF
	Local OSC voltage	V _{OSC}	2	f _{OSC} = 108 MHz	—	130	—	mV _{rms}
FM IF	Input limiting voltage	V _{in} (lim) IF	1	−3dB limiting point	38	43	48	dBμV EMF
	Recovered output voltage	V _{OD}	1	V _{in} = 80dBμV EMF	180	240	300	mV _{rms}
	Signal to noise ratio	S/N	1	V _{in} = 80dBμV EMF	—	72	—	dB
	Total harmonic distortion	THD	1	V _{in} = 80dBμV EMF	—	0.5	—	%
	AM rejection ratio	AMR	1	V _{in} = 80dBμV EMF	—	60	—	dB
AM	Voltage gain	G _V	1	V _{in} = 28dBμV EMF	20	38	75	mV _{rms}
	Recovered output voltage	V _{OD}	1	V _{in} = 60dBμV EMF	55	80	110	mV _{rms}
	Signal to noise ratio	S/N	1	V _{in} = 60dBμV EMF	—	41	—	dB
	Total harmonic distortion	THD	1	V _{in} = 60dBμV EMF	—	1.0	—	%

Test Circuit 1



Test Circuit 2

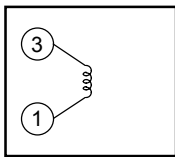


Note 2: FET buff voltage gain \approx 0dB

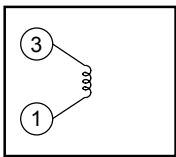
Coil Data

Coil No.	Test Freq.	L (μ H)	Co (pF)	Qo	Turns					Wire (mm ϕ)	Reference
					1-2	2-3	1-3	1-4	4-6		
L ₁ FM RF	100 MHz	—	—	79	—	—	—	2 $\frac{1}{2}$	—	0.16UEW	Toko Co., Ltd. 666SNF-305NK
L ₂ FM OSC	100 MHz	—	—	76	—	—	—	2	—	0.16UEW	Toko Co., Ltd. 666SNF-306NK
T ₁ AM OSC	796 kHz	268	—	65	19	95	—	—	—	0.05UEW	Toko Co., Ltd. 5PNR-5146Y
T ₂ AM IFT	455 kHz	—	470	60	—	—	109	—	7	0.05UEW	Toko Co., Ltd. 5PLG-5147X

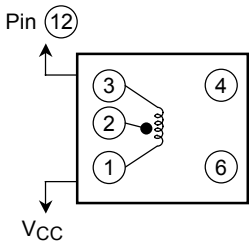
L₁: FM RF



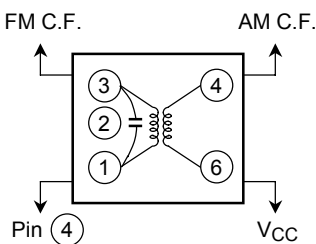
L₂: FM OSC



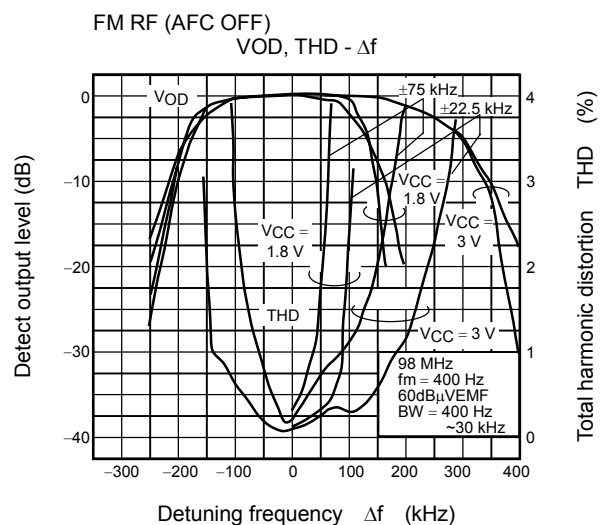
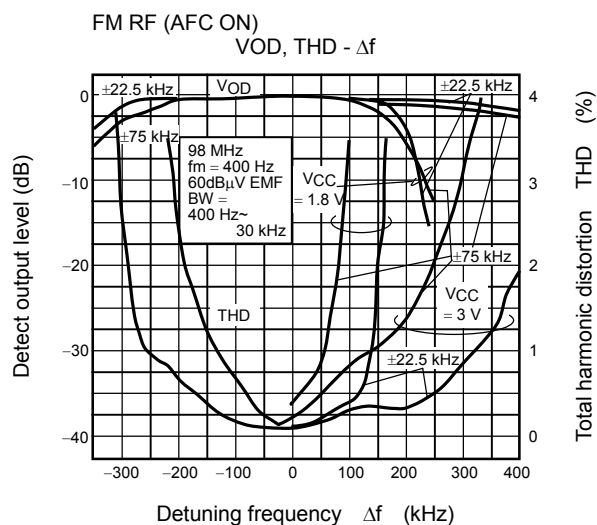
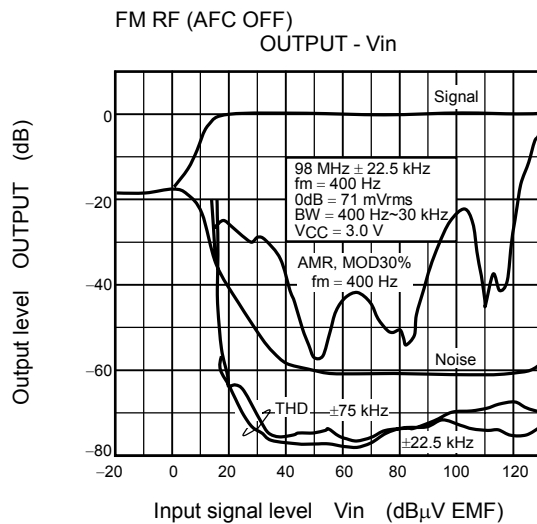
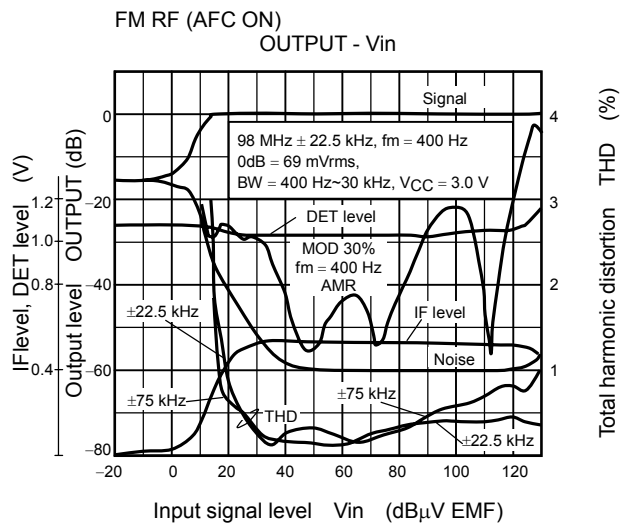
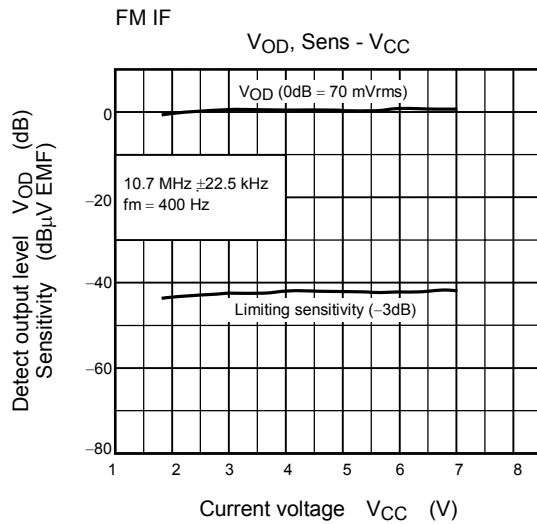
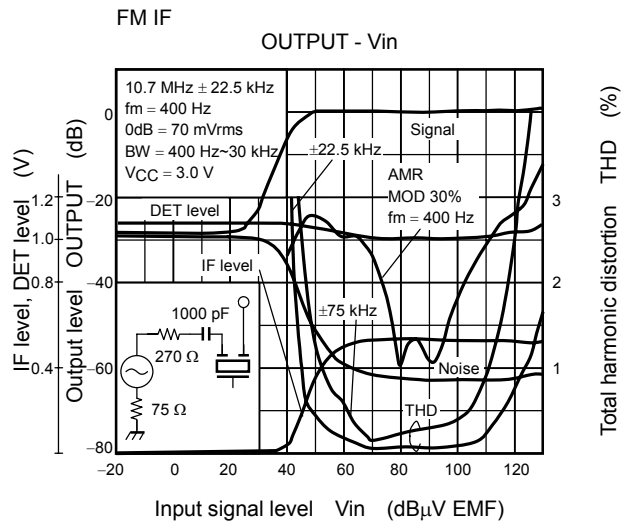
T₁: AM OSC

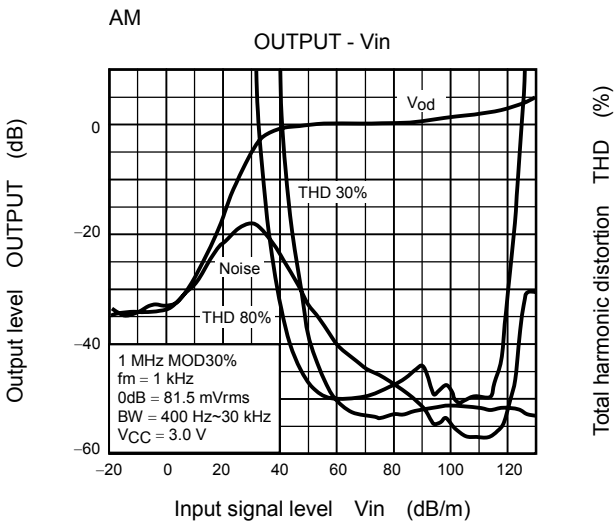


T₂: AM IFT



(BOTTOM VIEW)

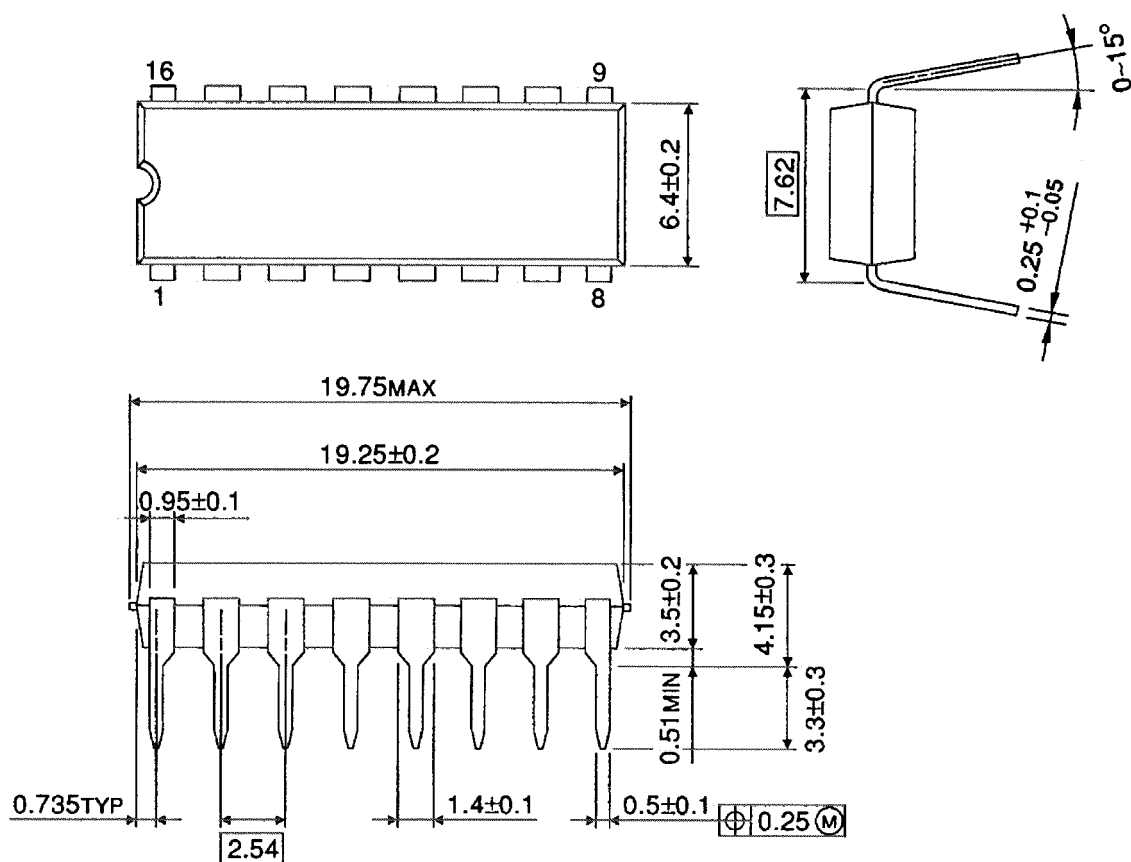




Package Dimensions

DIP16-P-300-2.54A

Unit : mm

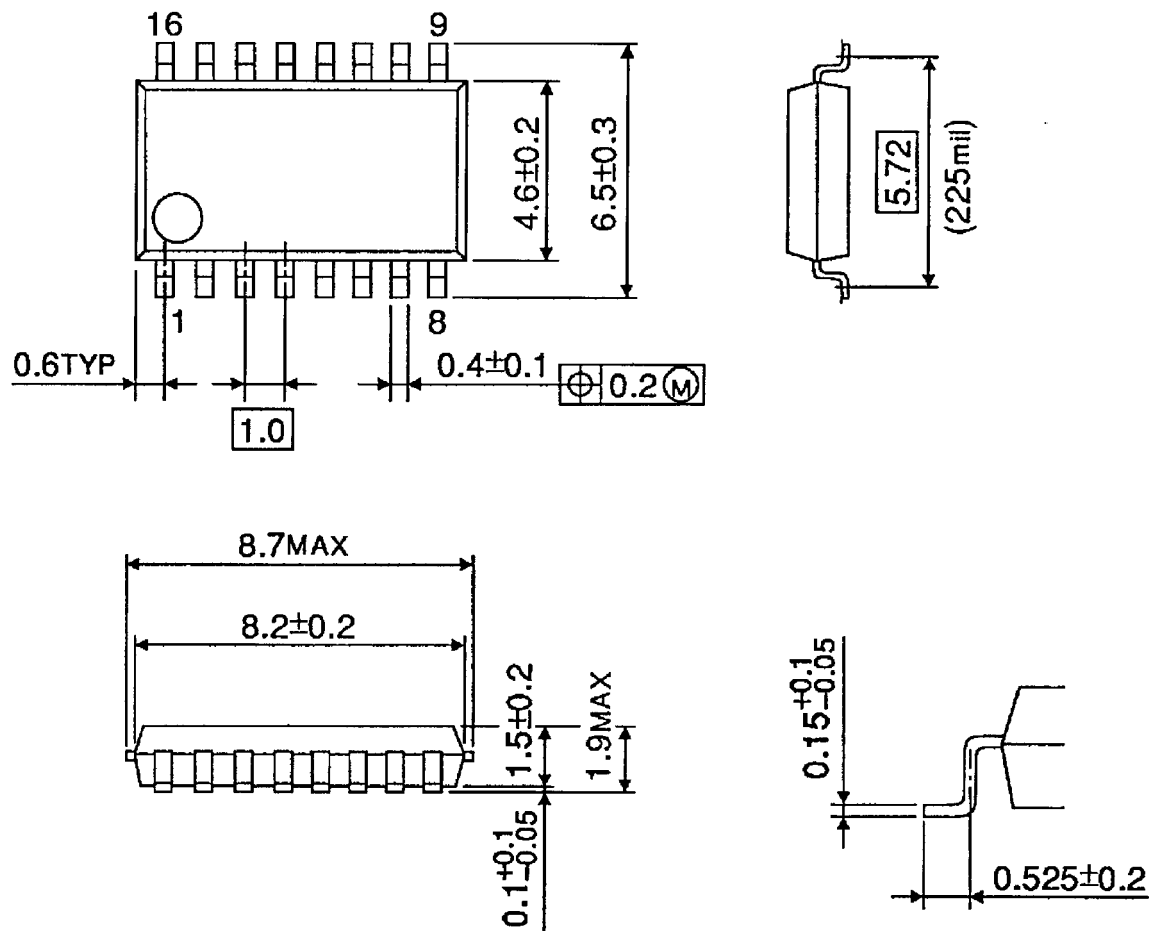


Weight: 1.00 g (typ.)

Package Dimensions

SSOP16-P-225-1.00A

Unit : mm



Weight: 0.14 g (typ.)

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