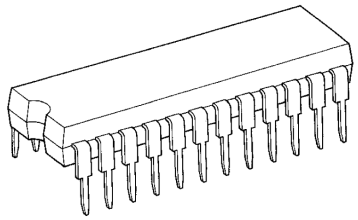
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA2008ANG

5V AM / FM 1 Chip Tuner IC
(for digital tuning system)

The TA2008ANG is the AM / FM 1 chip tuner IC, which is designed for radio cassette players and music centers.
This is suitable for digital tuning system applications.



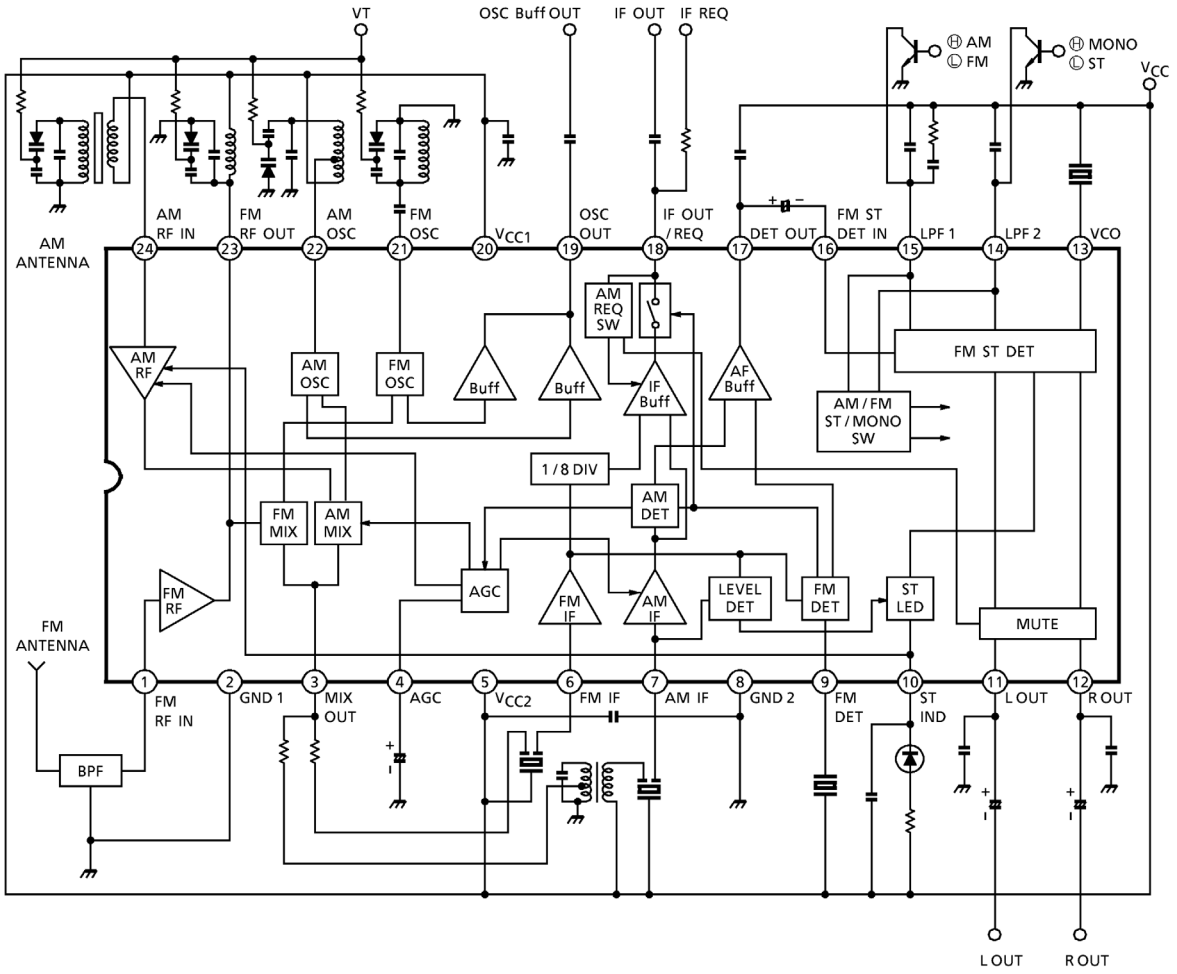
SDIP24-P-300-1.78

Weight: 1.2g (typ.)

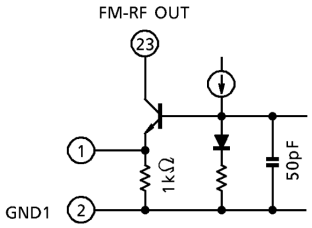
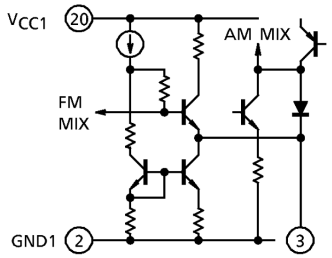
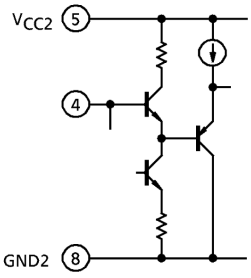
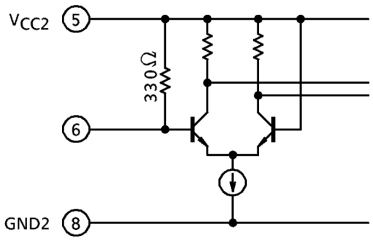
Features

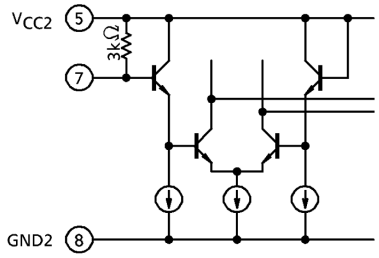
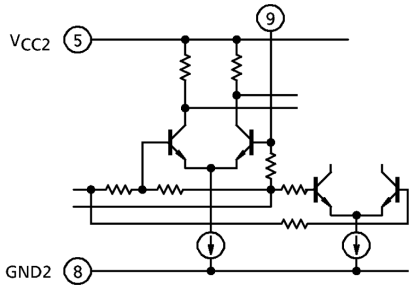
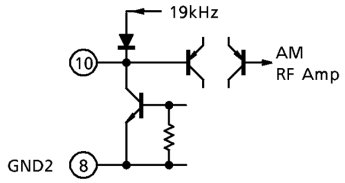
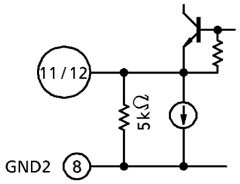
- Suitable for combination with digital tuning system which is included IF counter.
- One terminal type AM / FM IF count output (auto stop signal) for IF counter of digital tuning system.
  - FM: 1.3375MHz (1 / 8 dividing)
  - AM: 450kHz
- Built−in mute circuit for IF count output.
- For adopting ceramic discriminator and ceramic resonator, it is not necessary to adjust the FM quad detector circuit and FM stereo detector vco circuit.
- Built−in one terminal type AM / FM local oscillator buffer output for digital tuning system applications.
- Operating supply voltage range: V_{CC} = 3.5~14V (Ta = 25°C)

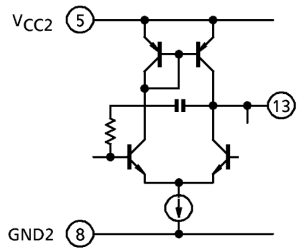
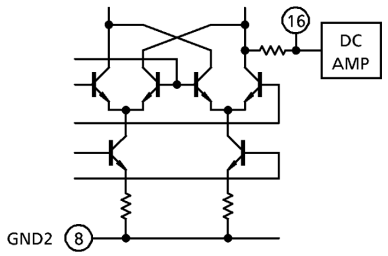
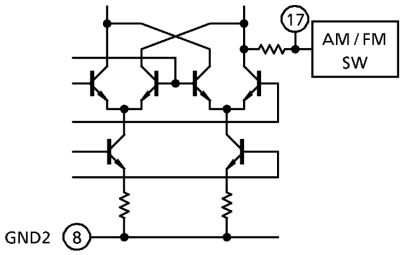
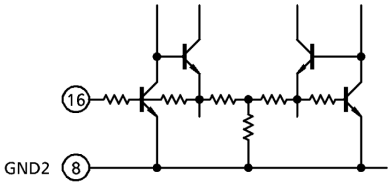
BLOCK DIAGRAM

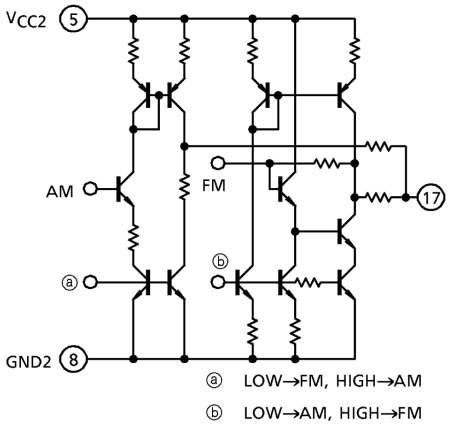
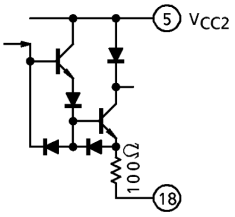
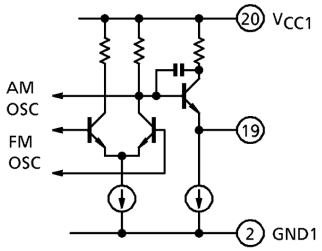
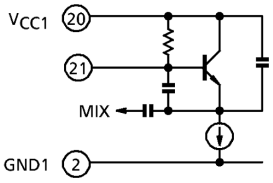


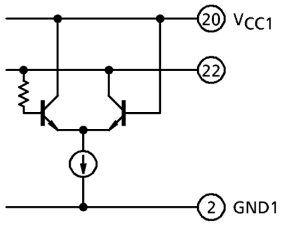
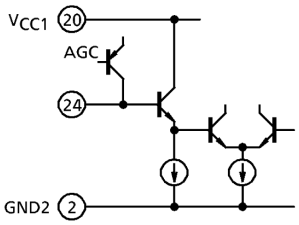
Explanation Of Terminals

Pin No.	Characteristic	Internal Circuit	DC Voltage (V) (at no signal)	
			AM	FM
1	FM−RF in		0	0.8
2	GND1 (GND for RF stage)	—	0	0
3	Mix out		0.3	0.8
4	AGC		1.2	0.9
5	V_{CC2} (V_{CC} for IF / FM ST DET stage)	—	5.0	5.0
6	FM IF in		5.0	5.0

Pin No.	Characteristic	Internal Circuit	DC Voltage (V) (at no signal)	
			AM	FM
7	AM IF in		5.0	5.0
8	GND2 (GND for if / FM ST DET stage)	—	0	0
9	QUAD (FM QUAD. Detector)		4.1	3.6
10	St ind ・Stereo LED terminal ・Offset voltage cancel for AM RF amp.		4.2	—
11 12	L−out (L−ch output) R−out (R−ch output)		1.35	1.35

Pin No.	Characteristic	Internal Circuit	DC Voltage (V) (at no signal)	
			AM	FM
13	VCO		5.0	4.1
14	LPF2 ・LPF terminal for synchronous detector. ・VCO stop terminal V_{14} = GND → VCO stop		5.0	3.4
15	LPF1 ・LPF terminal for phase detector ・Bias terminal for AM / FM SW circuit V_{15} = GND → AM V_{15} = open → FM		0	2.8
16	FM ST DET in		1.4	1.4

Pin No.	Characteristic	Internal Circuit	DC Voltage (V) (at no signal)	
			AM	FM
17	DET out		1.4	1.4
18	IF out / REQ V_{18} = GND → IF out		4.0	4.0
19	OSC out		4.0	4.0
20	V_{CC1} (V_{CC} for RF stage)	—	5.0	5.0
21	FM OSC		5.0	5.0

Pin No.	Characteristic	Internal Circuit	DC Voltage (V) (at no signal)	
			AM	FM
22	AM OSC		5.0	5.0
23	FM RF out	cf. pin (1)	5.0	5.0
24	AM RF in		5.0	5.0

Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Supply voltage	V_{CC}	15	V
LED current	I_{LED}	10	mA
LED voltage	V_{LED}	15	V
Power dissipation	P_D*	1200	mW
Operating temperature	T_{opr}	−25~75	°C
Storage temperature	T_{stg}	−55~150	°C

* : Derated above Ta = 25°C in the proportion of 9.6mW / °C

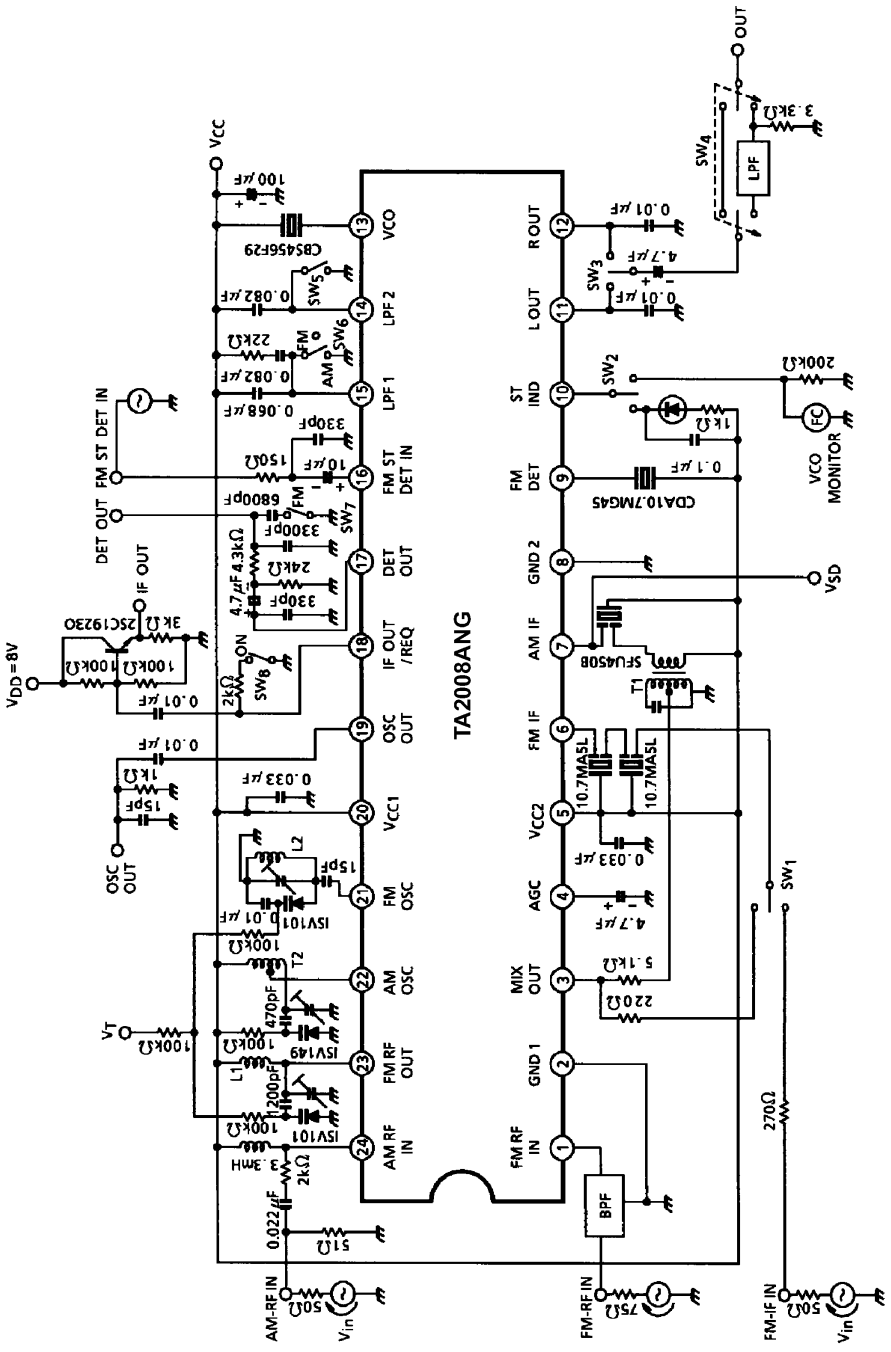
Electrical Characteristics

Unless Otherwise Specified, Ta = 25°C, V_{CC} = 5V, SW8: Off, F / E: f = 98MHz, f_m = 1kHz
FM IF: f = 10.7MHz, Δf = ±22.5kHz, f_m = 1kHz
AM: f = 1MHz, MOD = 30%, f_m = 1kHz
FM ST DET: f_m = 1kHz

Characteristic		Symbol	Test Cir–cuit	Test Condition	Min.	Typ.	Max.	Unit
Supply current		$I_{CC\ (FM)}$	—	V_{in} = 0, FM mode	—	27	36	mA
		$I_{CC\ (AM)}$	—	V_{in} = 0. AM mode	—	18	25	
F / E	Input limiting voltage	V_{in} (lim)	—	−3dB limiting with respect to V_{OD} level at Vin = 60dBμV EMF	—	11	—	dBμV EMF
	Local OSC buffer output voltage	V_{OSC} (buff) FM	—	f_{OSC} = 108.7MHz	90	180	—	mV_{rms}
FM IF	Input limiting voltage	V_{in} (lim.) IF	—	−3dB limiting with respect to V_{OD} level at V_{in} = 80dBμV EMF	40	45	50	dBμV EMF
	Recovered output voltage	V_{OD}	—	V_{in} = 80dBμV EMF	50	75	100	mV_{rms}
	Signal to noise ratio	S / N	—	V_{in} = 80dBμV EMF	—	70	—	dB
	Total harmonic distortion	THD	—	V_{in} = 80dBμV EMF	—	0.3	—	%
	AM rejection ratio	AMR	—	V_{in} = 80dBμV EMF	—	50	—	dB
	SD output sensitivity	V_{SD}	—	V_{SD} = V_{CC}−0.1V	53	58	63	dBμV EMF
	IF count output frequency	f1 / 8 IF (FM)	—	V_{in} = 80dBμV EMF, SW8: On	1.3373	1.3375	1.3377	MHz
	IF count output voltage	V1 / 8 IF (FM)	—	V_{in} = 80dBμV EMF,SW8: On	350	500	—	mV_{p-p}
	IF count output sensitivity	IF sens (FM)	—	SW8: On	49	54	59	dBμV EMF

Characteristic			Symbol	Test Cir–cuit	Test Condition		Min.	Typ.	Max.	Unit
AM	Gain		G_V	—	V_{in} = 26dBμV EMF		20	45	80	mV_{rms}
	Recovered output voltage		V_{OD}	—	V_{in} = 60dBμV EMF		45	65	90	mV_{rms}
	Signal to noise ratio		S / N	—	V_{in} = 60dBμV EMF		—	42	—	dB
	Total harmonic distortion		THD	—	V_{in} = 60dBμV EMF		—	1.0	—	%
	Local OSC buffer output voltage		V_{OSC} (buff) AM	—	f_{OSC} = 1.45MHz		90	150	—	mV_{rms}
	IF count output voltage		V_{IF} (AM)	—	V_{in} = 60dBμV EMF, SW8: On,		350	500	—	mV_{p-p}
	IF count output sensitivity		IF sens (AM)	—	SW8: On		35	40	45	dBμV EMF
Pin (17) output resistance			R17	—	FM mode		—	0.75	—	kΩ
					AM mode		—	15.5	—	
FM St DET	Input resistance		R_{IN}	—			—	24	—	kΩ
	Output resistance		R_{OUT}	—			—	5	—	kΩ
	Max. Composite signal input voltage		$V_{in\ max}$ (stereo)	—	L + R = 90%, P = 10%, SW4: LPF on f_m = 1kHz, THD = 3%		—	800	—	mV_{rms}
	Separation		Sep.	—	L + R = 180mV_{rms} P = 20mV_{rms} SW4: LPF on	f_m = 100Hz	—	42	—	dB
						f_m = 1kHz	35	42	—	
						f_m = 10kHz	—	42	—	
	Total harmonic distortion	Monaural	THD (monaural)	—	V_{in} = 200mV_{rms}		—	0.1	—	%
		Stereo	THD (stereo)		L + R = 180mV_{rms}, P = 20mV_{rms}, SW4: LPF on,		—	0.1	—	
	Voltage gain		G_V	—	V_{in} = 200mV_{rms}		–2	0	2	dB
	Channel balance		C. B.	—	V_{in} = 200mV_{rms}		–2	0	2	dB
	Stereo LED sensitivity	On	$V_{L\ (ON)}$	—	Pilot input		—	8	15	mV_{rms}
		Off	$V_{L\ (OFF)}$				2	6	—	
	Stereo LED hysteresis		V_H	—	To LED turn off from LED turn on		—	2	—	mV_{rms}
	Capture range		C. R.	—	P = 15mV_{rms}		—	±1.3	—	%
	Signal to noise ratio		S / N	—	V_{in} = 200mV_{rms}		—	80	—	dB
	Muting attenuation		MUTE	—	V_{in} = 200mV_{rms}		—	80	—	dB

TEST CIRCUIT



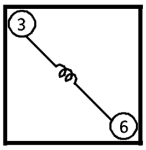
TA2008ANG-10

Coil Data

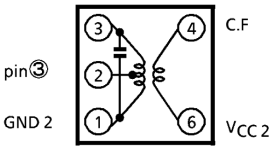
Coil No.	Test Freq.	L (μH)	C_o (pF)	Q_o	Turns				Wire (mmϕ)	Reference
					1–2	2–3	1–3	3–6		
L1 FM RF	100MHz			100				$2\frac{1}{2}$	0.5 UEW	Within core
L1 FM OSC	100MHz			100				$2\frac{1}{2}$	0.5 UEW	Within core
T1 AM mix	455kHz		180	48↑	47	111	158	4–6 20	0.06 UEW	(T): A7LCS–12064N
T2 AM OSC	796kHz	268		125	15	89			0.06 UEW	(S): 2157–2239–213A (T): A7BRS–11998Y

(S): Sumida electric co., ltd.
(T): Toko co., ltd.

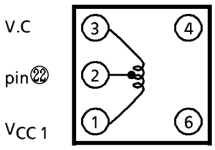
L_1 : FM RF
L_2 : FM OSC



T1 : AM MIX

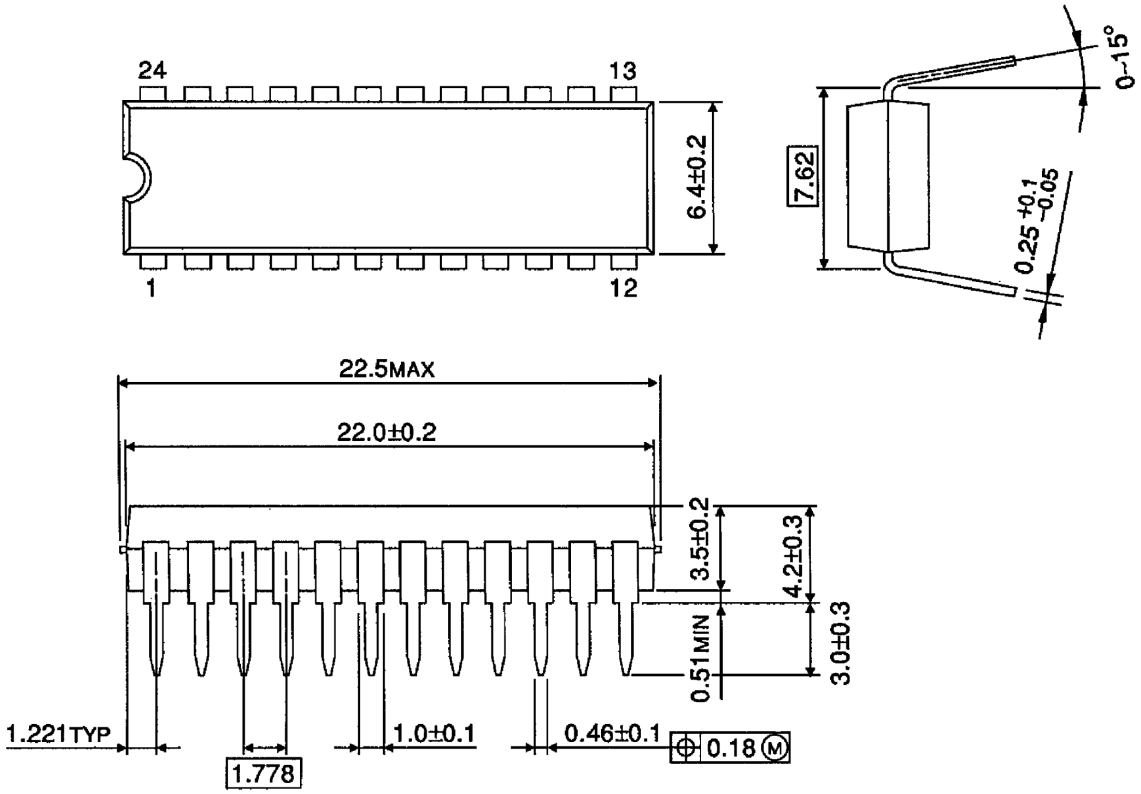


T2 : AM OSC



Package Dimensions

SDIP24-P-300-1.78 Unit : mm



Weight: 1.2g (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

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