

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

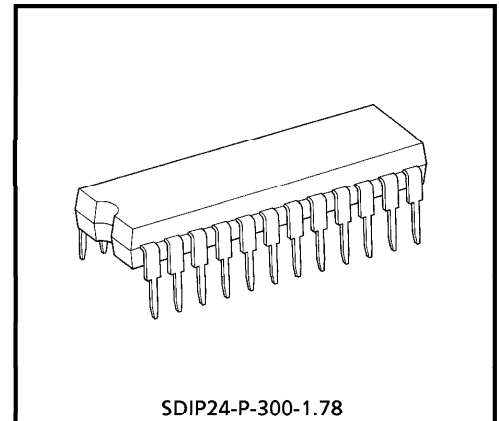
# TA2008AN

## 5V AM / FM 1 CHIP TUNER IC (for Digital Tuning System)

The TA2008AN 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.

### FEATURES

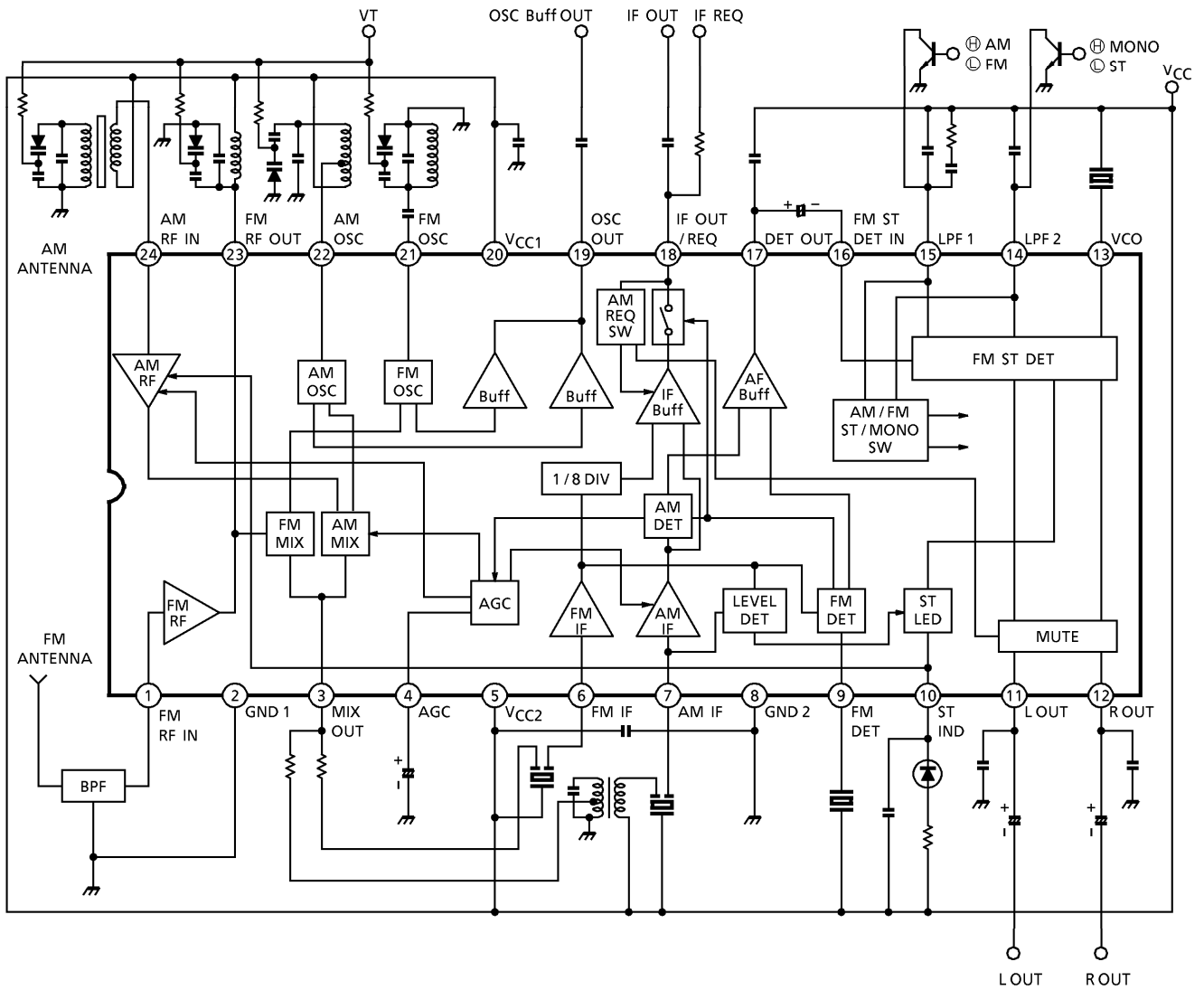
- Suitable for combination with Digital Tuning System which is included IF Counter.
- One terminal type AM/FM IF Count Output (Auto Stop Signal) for IF Counter of Digital Tuning System.
  - FM : 1.3375MHz (1/8 dividing)
  - AM : 450kHz
- Built-in Mute Circuit for IF Count Output.
- For adopting Ceramic 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 :  $V_{CC} = 3.5 \sim 14V$  ( $T_a = 25^\circ C$ )



SDIP24-P-300-1.78

Weight : 1.2g (Typ.)

BLOCK DIAGRAM

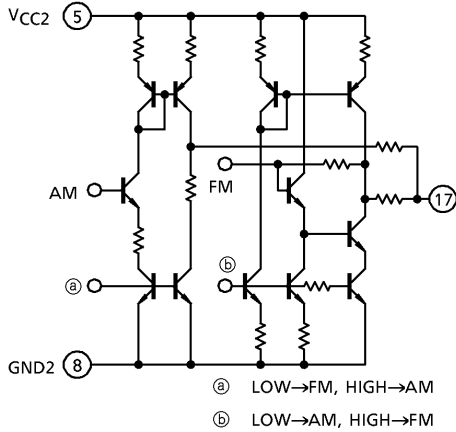
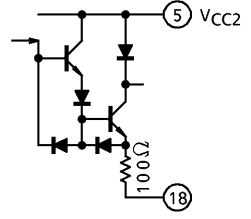
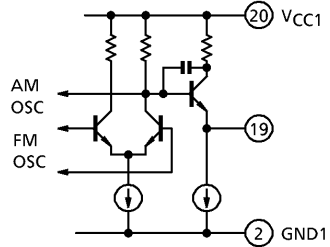
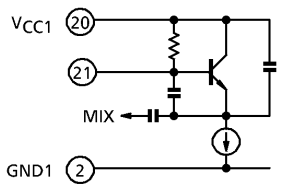


**EXPLANATION OF TERMINALS**

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	VCC2 (VCC 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 <ul style="list-style-type: none"> <li>• Stereo LED Terminal</li> <li>• Offset Voltage Cancel for AM RF Amp.</li> </ul>		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 $V_{14} = \text{GND} \rightarrow \text{VCO Stop}$		5.0	3.4
15	LPF1 ● LPF Terminal for Phase Detector ● Bias Terminal for AM/FM SW Circuit $V_{15} = \text{GND} \rightarrow \text{AM}$ $V_{15} = \text{OPEN} \rightarrow \text{FM}$		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	 <p>                     VCC2 (5)                      AM                      FM                      (a)                      (b)                      GND2 (8)                 </p> <p>                     (a) LOW→FM, HIGH→AM                      (b) LOW→AM, HIGH→FM                 </p>	1.4	1.4
18	IF OUT / REQ V <sub>18</sub> = GND→IF OUT	 <p>                     VCC2 (5)                      100Ω                      (18)                 </p>	4.0	4.0
19	OSC OUT	 <p>                     VCC1 (20)                      AM OSC                      FM OSC                      MIX                      GND1 (2)                 </p>	4.0	4.0
20	V <sub>CC1</sub> (V <sub>CC</sub> for RF Stage)	—	5.0	5.0
21	FM OSC	 <p>                     VCC1 (20)                      (21)                      MIX                      GND1 (2)                 </p>	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. pin①	5.0	5.0
24	AM RF IN		5.0	5.0

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	15	V
LED Current	I <sub>LED</sub>	10	mA
LED Voltage	V <sub>LED</sub>	15	V
Power Dissipation	P <sub>D</sub> *	1200	mW
Operating Temperature	T <sub>opr</sub>	- 25~75	°C
Storage Temperature	T <sub>stg</sub>	- 55~150	°C

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

## ELECTRICAL CHARACTERISTICS

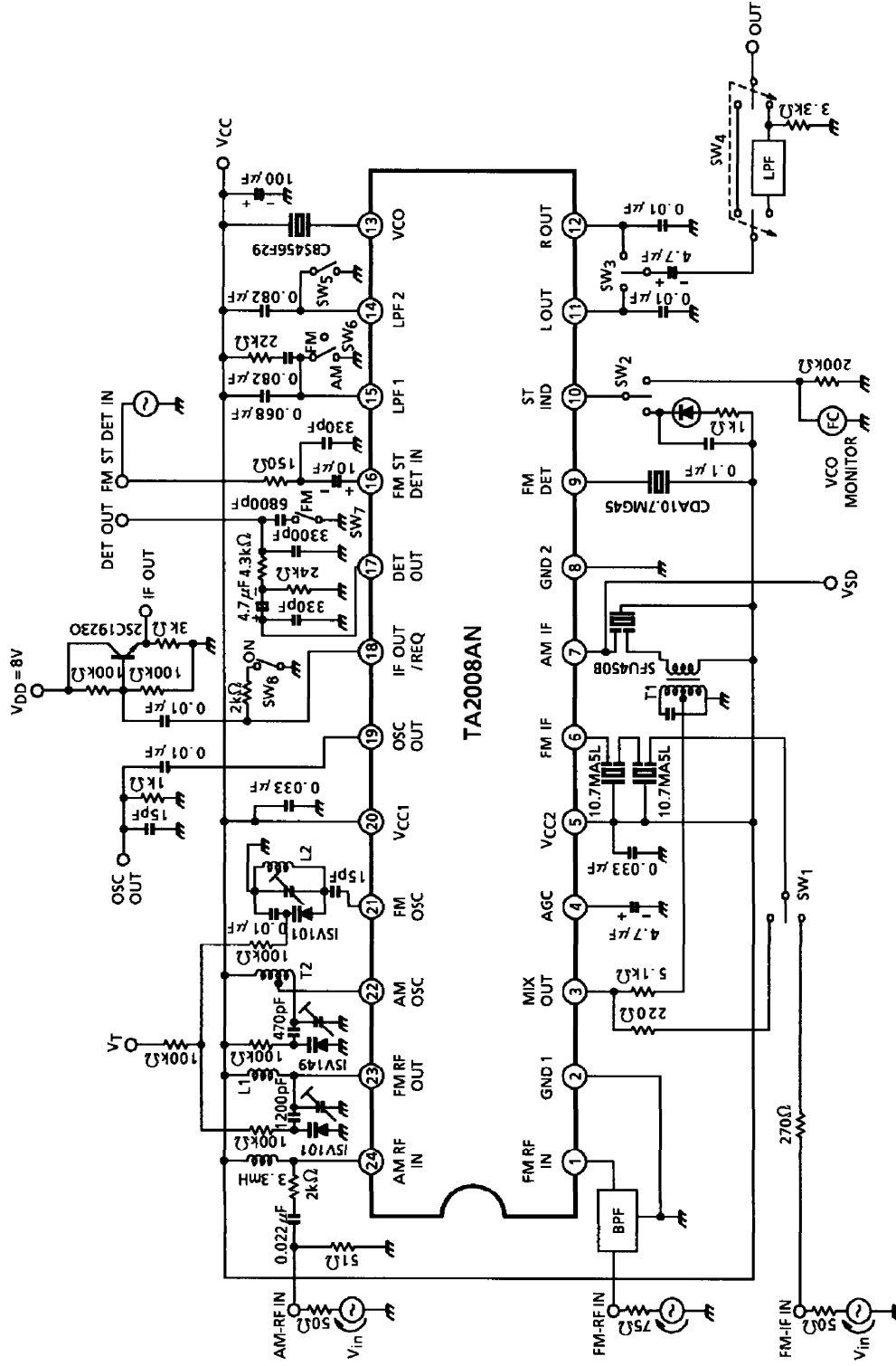
Unless otherwise specified, Ta = 25°C, V<sub>CC</sub> = 5V, SW8 : OFF, F / E : f = 98MHz, f<sub>m</sub> = 1kHz  
 FM IF : f = 10.7MHz, Δf = ± 22.5kHz, f<sub>m</sub> = 1kHz  
 AM : f = 1MHz, MOD = 30%, f<sub>m</sub> = 1kHz  
 FM ST DET : f<sub>m</sub> = 1kHz

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I <sub>CC</sub> (FM)	—	V <sub>in</sub> = 0, FM Mode	—	27	36	mA
		I <sub>CC</sub> (AM)	—	V <sub>in</sub> = 0, AM Mode	—	18	25	
F/E	Input Limiting Voltage	V <sub>in</sub> (lim.)	—	- 3dB Limiting with respect to V <sub>OD</sub> Level at V <sub>in</sub> = 60dB <sub>μ</sub> V EMF	—	11	—	dB <sub>μ</sub> V EMF
	Local OSC Buffer Output Voltage	V <sub>OSC</sub> (buff) FM	—	f <sub>OSC</sub> = 108.7MHz	90	180	—	mV <sub>rms</sub>
FM IF	Input Limiting Voltage	V <sub>in</sub> (lim.) IF	—	- 3dB Limiting with respect to V <sub>OD</sub> Level at V <sub>in</sub> = 80dB <sub>μ</sub> V EMF	40	45	50	dB <sub>μ</sub> V EMF
	Recovered Output Voltage	V <sub>OD</sub>	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF	50	75	100	mV <sub>rms</sub>
	Signal To Noise Ratio	S / N	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF	—	70	—	dB
	Total Harmonic Distortion	THD	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF	—	0.3	—	%
	AM Rejection Ratio	AMR	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF	—	50	—	dB
	SD Output Sensitivity	V <sub>SD</sub>	—	V <sub>SD</sub> = V <sub>CC</sub> - 0.1V	53	58	63	dB <sub>μ</sub> V EMF
	IF Count Output Frequency	f <sub>1/8</sub> IF (FM)	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF, SW8 : ON	1.3373	1.3375	1.3377	MHz
	IF Count Output Voltage	V <sub>1/8</sub> IF (FM)	—	V <sub>in</sub> = 80dB <sub>μ</sub> V EMF, SW8 : ON	350	500	—	mV <sub>p-p</sub>
IF Count Output Sensitivity	IF sens (FM)	—	SW8 : ON	49	54	59	dB <sub>μ</sub> V EMF	



CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT		
AM	Gain	G <sub>V</sub>	—	V <sub>in</sub> = 26dB $\mu$ V EMF	20	45	80	mV <sub>rms</sub>		
	Recovered Output Voltage	V <sub>OD</sub>	—	V <sub>in</sub> = 60dB $\mu$ V EMF	45	65	90	mV <sub>rms</sub>		
	Signal To Noise Ratio	S / N	—	V <sub>in</sub> = 60dB $\mu$ V EMF	—	42	—	dB		
	Total Harmonic Distortion	THD	—	V <sub>in</sub> = 60dB $\mu$ V EMF	—	1.0	—	%		
	Local OSC Buffer Output Voltage	V <sub>OSC</sub> (buff) AM	—	f <sub>OSC</sub> = 1.45MHz	90	150	—	mV <sub>rms</sub>		
	IF Count Output Voltage	V <sub>IF</sub> (AM)	—	V <sub>in</sub> = 60dB $\mu$ V EMF, SW8 : ON	350	500	—	mV <sub>p-p</sub>		
	IF Count Output Sensitivity	IF sens (AM)	—	SW8 : ON	35	40	45	dB $\mu$ V EMF		
Pin⑰ Output Resistance		R17	—	FM Mode	—	0.75	—	k $\Omega$		
				AM Mode	—	15.5	—			
FM ST DET	Input Resistance		R <sub>IN</sub>	—	—	24	—	k $\Omega$		
	Output Resistance		R <sub>OUT</sub>	—	—	5	—	k $\Omega$		
	Max. Composite Signal Input Voltage		V <sub>in</sub> MAX (Stereo)	—	L + R = 90%, P = 10%, SW4 : LPF ON f <sub>m</sub> = 1kHz, THD = 3%	—	800	—	mV <sub>rms</sub>	
	Separation		Sep.	—	L + R = 180mV <sub>rms</sub>	f <sub>m</sub> = 100Hz	—	42	—	dB
					P = 20mV <sub>rms</sub>	f <sub>m</sub> = 1kHz	35	42	—	
					SW4 : LPF ON	f <sub>m</sub> = 10kHz	—	42	—	
	Total Harmonic Distortion	Monaural	THD (Monaural)	—	V <sub>in</sub> = 200mV <sub>rms</sub>	—	0.1	—	%	
		Stereo	THD (Stereo)	—	L + R = 180mV <sub>rms</sub> , P = 20mV <sub>rms</sub> , SW4 : LPF ON	—	0.1	—		
	Voltage Gain		G <sub>V</sub>	—	V <sub>in</sub> = 200mV <sub>rms</sub>	-2	0	2	dB	
	Channel Balance		C.B.	—	V <sub>in</sub> = 200mV <sub>rms</sub>	-2	0	2	dB	
	Stereo LED Sensitivity	ON	V <sub>L</sub> (ON)	—	Pilot Input	—	8	15	mV <sub>rms</sub>	
		OFF	V <sub>L</sub> (OFF)			2	6	—		
	Stereo LED Hysteresis		V <sub>H</sub>	—	To LED turn off from LED Turn on	—	2	—	mV <sub>rms</sub>	
Capture Range		C.R.	—	P = 15mV <sub>rms</sub>	—	± 1.3	—	%		
Signal To Noise Ratio		S / N	—	V <sub>in</sub> = 200mV <sub>rms</sub>	—	80	—	dB		
Muting Attenuation		MUTE	—	V <sub>in</sub> = 200mV <sub>rms</sub>	—	80	—	dB		

TEST CIRCUIT



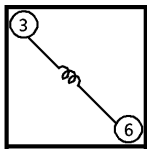
**COIL DATA**

COIL No.	TEST FREQ.	L ( $\mu$ H)	C <sub>0</sub> (pF)	Q <sub>0</sub>	TURNS				WIRE (mm $\phi$ )	REFERENCE
					1-2	2-3	1-3	3-6		
L1 FM RF	100MHz			100				2 $\frac{1}{2}$	0.5UEW	Within Core
L2 FM OSC	100MHz			100				2 $\frac{1}{2}$	0.5UEW	Within Core
T1 AM MIX	455kHz		180	48 $\uparrow$	47	111	158	4-6 20	0.06UEW	Ⓣ : A7LCS-12064N
T2 AM OSC	796kHz	268		125	15	89			0.06UEW	Ⓢ : 2157-2239-213A Ⓣ : A7BRS-11998Y

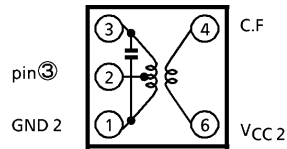
Ⓢ : SUMIDA ELECTRIC Co., Ltd.

Ⓣ : TOKO Co., Ltd.

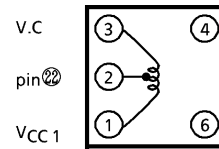
L<sub>1</sub> : FM RF  
L<sub>2</sub> : FM OSC



T1 : AM MIX

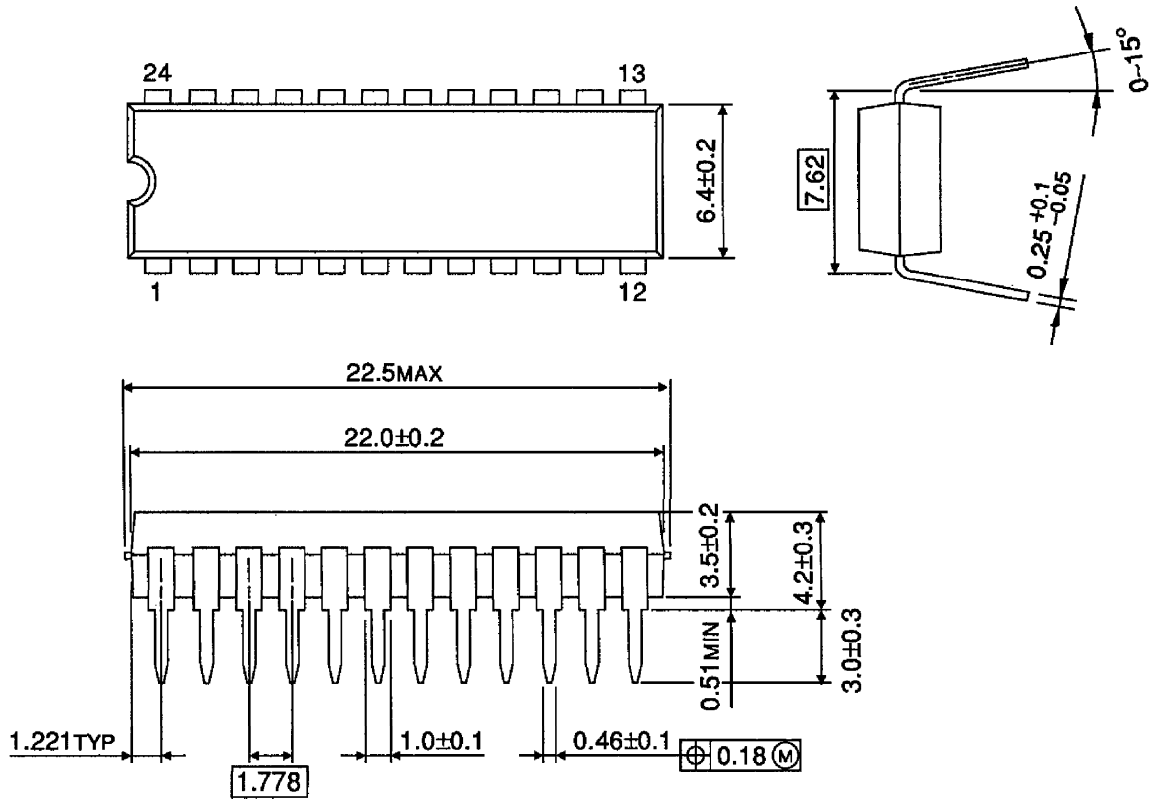


T2 : AM OSC



PACKAGE DIMENSIONS  
SDIP24-P-300-1.78

Unit : mm



Weight : 1.2g (Typ.)

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000707EBA

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