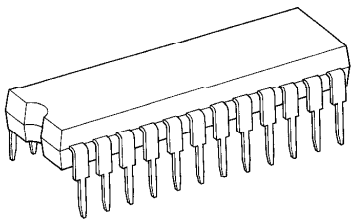
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

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.



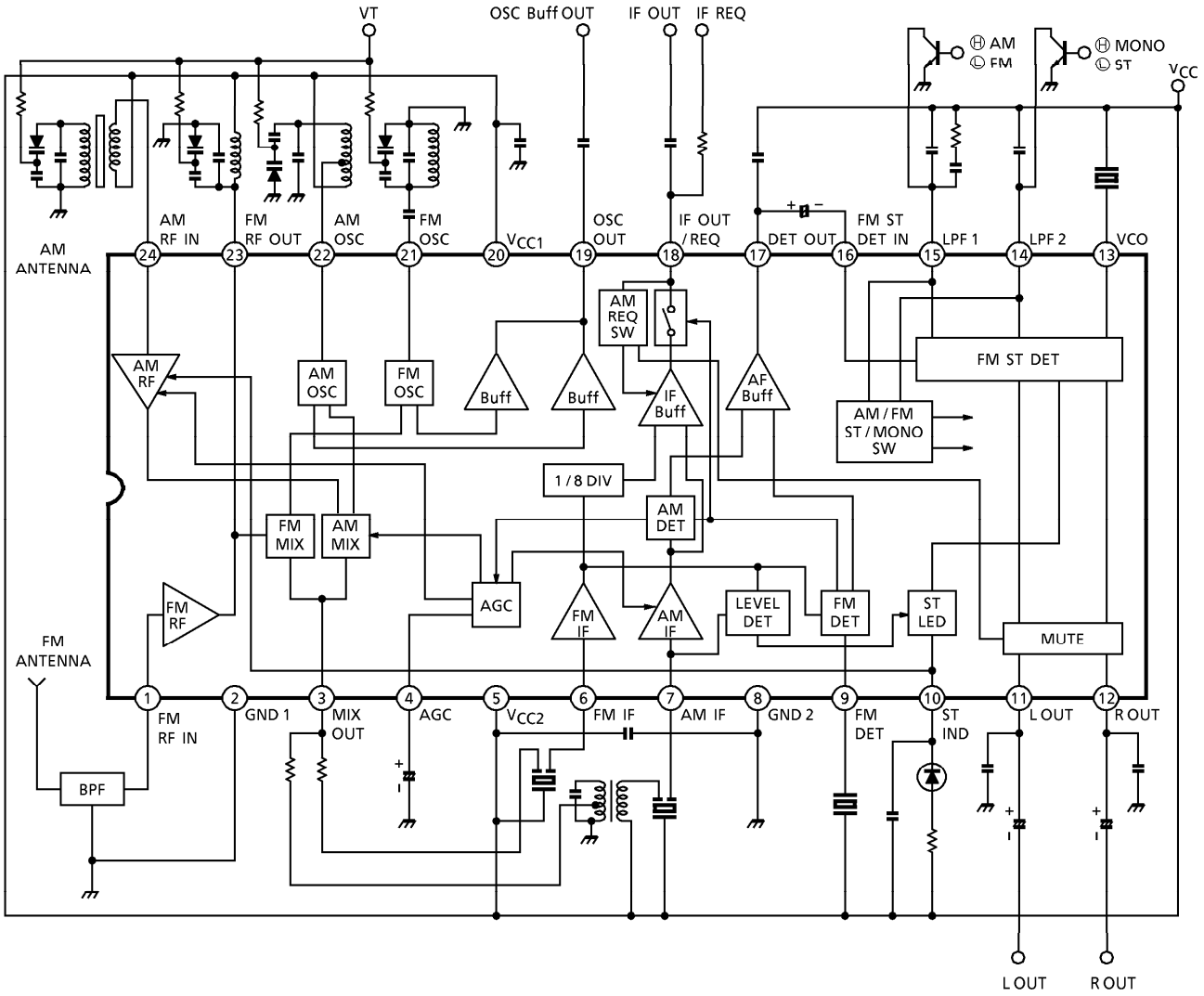
SDIP24-P-300-1.78

Weight : 1.2g (Typ.)

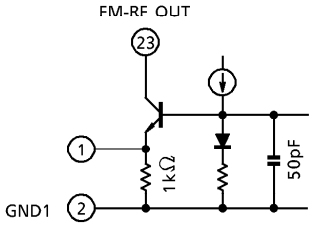
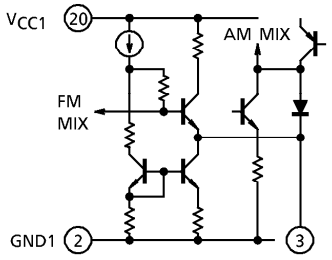
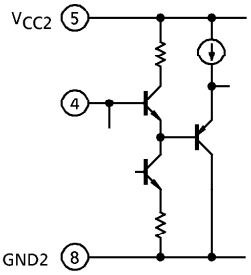
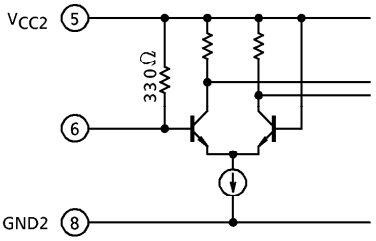
FEATURES

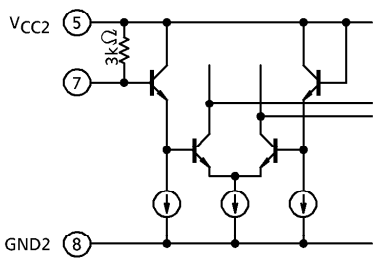
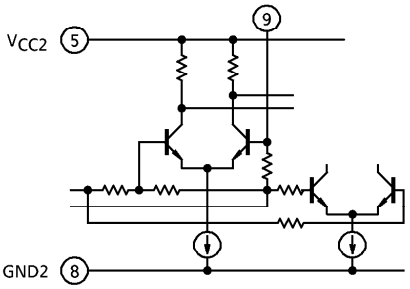
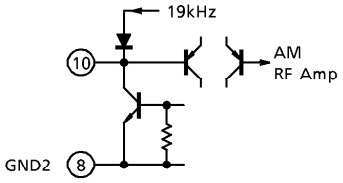
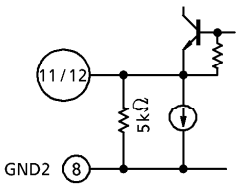
- Suitable for combination with Digital Tuning System which is included IF Counter.
- One terminal type AM / FM IF Count Output (Auto Stop Signal) for IF Counter of Digital Tuning System.
  - FM : 1.3375MHz (1 / 8 dividing)
  - AM : 450kHz
- Built-in Mute Circuit for IF Count Output.
- For adopting Ceramic 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)

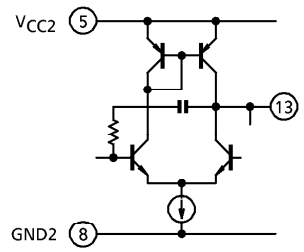
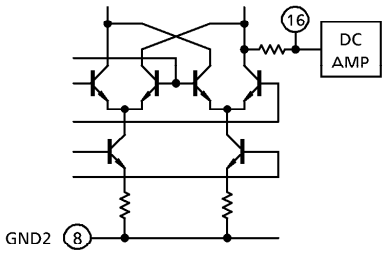
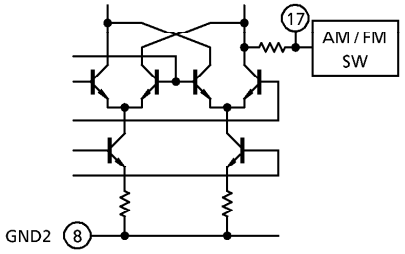
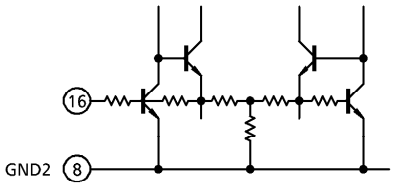
BLOCK DIAGRAM

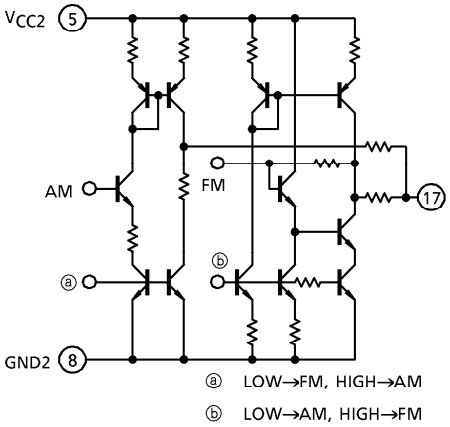
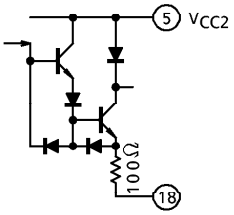
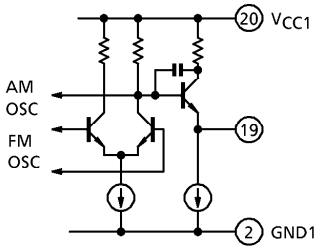
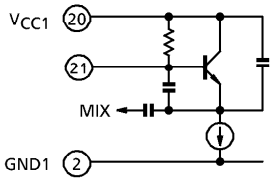


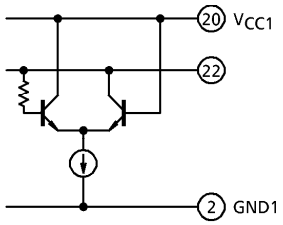
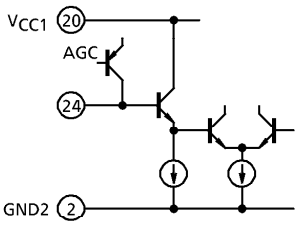
EXPLANATION OF TERMINALS

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. 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_{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

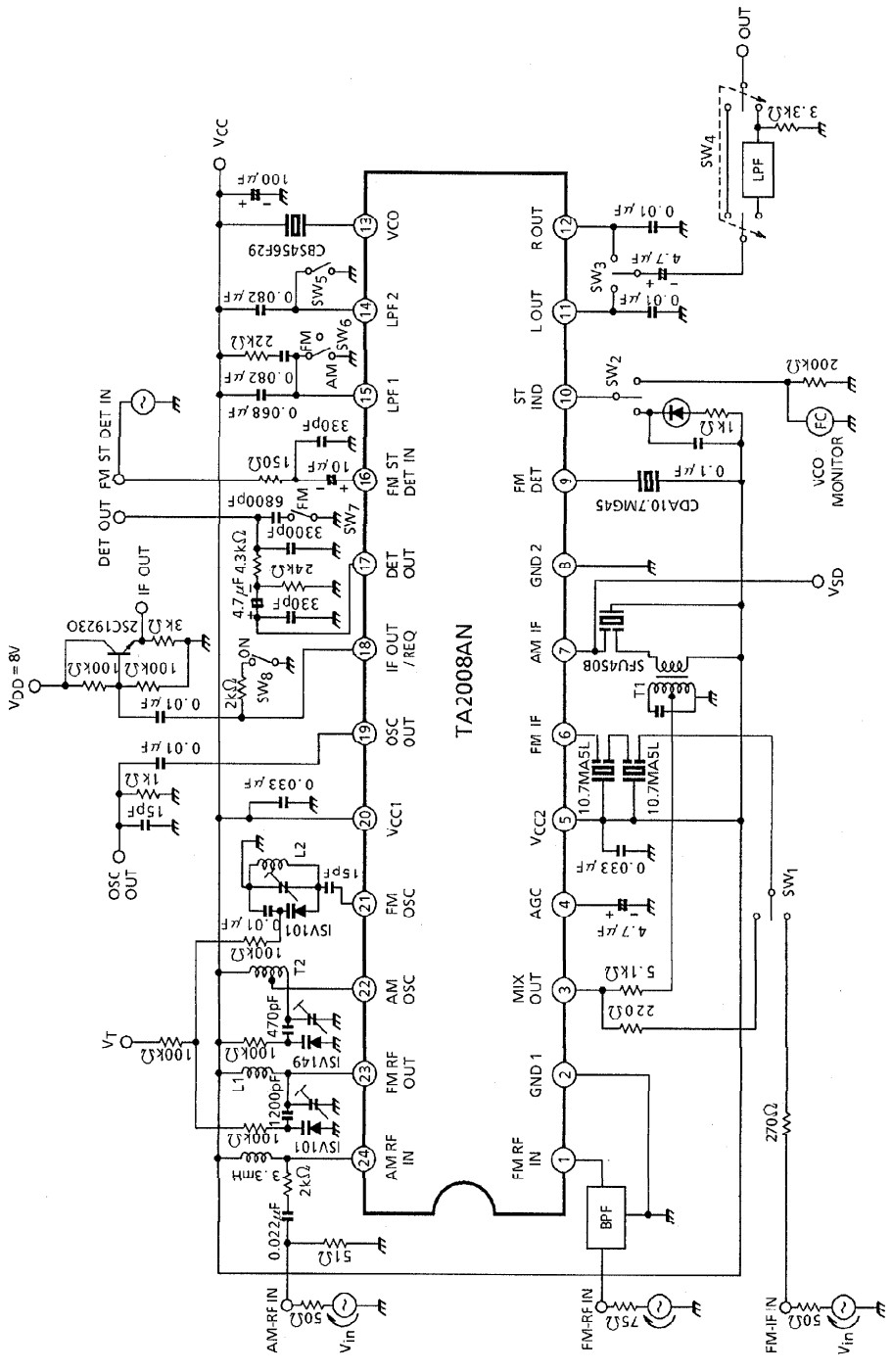
ELECTRICAL CHARACTERISTICS

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 V_{in} = 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
Pin⑰ 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

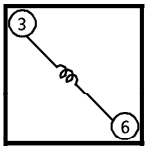


COIL DATA

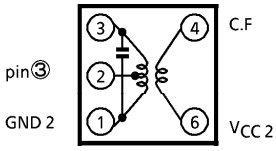
COIL No.	TEST FREQ.	L (μH)	C_O (pF)	Q_O	TURNS 1-2	TURNS 2-3	TURNS 1-3	TURNS 3-6	WIRE (mmϕ)	REFERENCE
L1 FM RF	100MHz			100				$2\frac{1}{2}$	0.5UEW	Within Core
L2 FM OSC	100MHz			100				$2\frac{1}{2}$	0.5UEW	Within Core
T1 AM MIX	455kHz		180	48↑	47	111	158	4-6 20	0.06UEW	Ⓣ : A7LCS-12064N
T2 AM OSC	796kHz	268		125	15	89			0.06UEW	Ⓢ : 2157-2239-213A Ⓣ : A7BRS-11998Y

Ⓢ : SUMIDA ELECTRIC Co., Ltd.
Ⓣ : TOKO Co., Ltd.

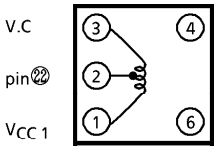
L_1 : FM RF
L_2 : FM OSC



T1 : AM MIX

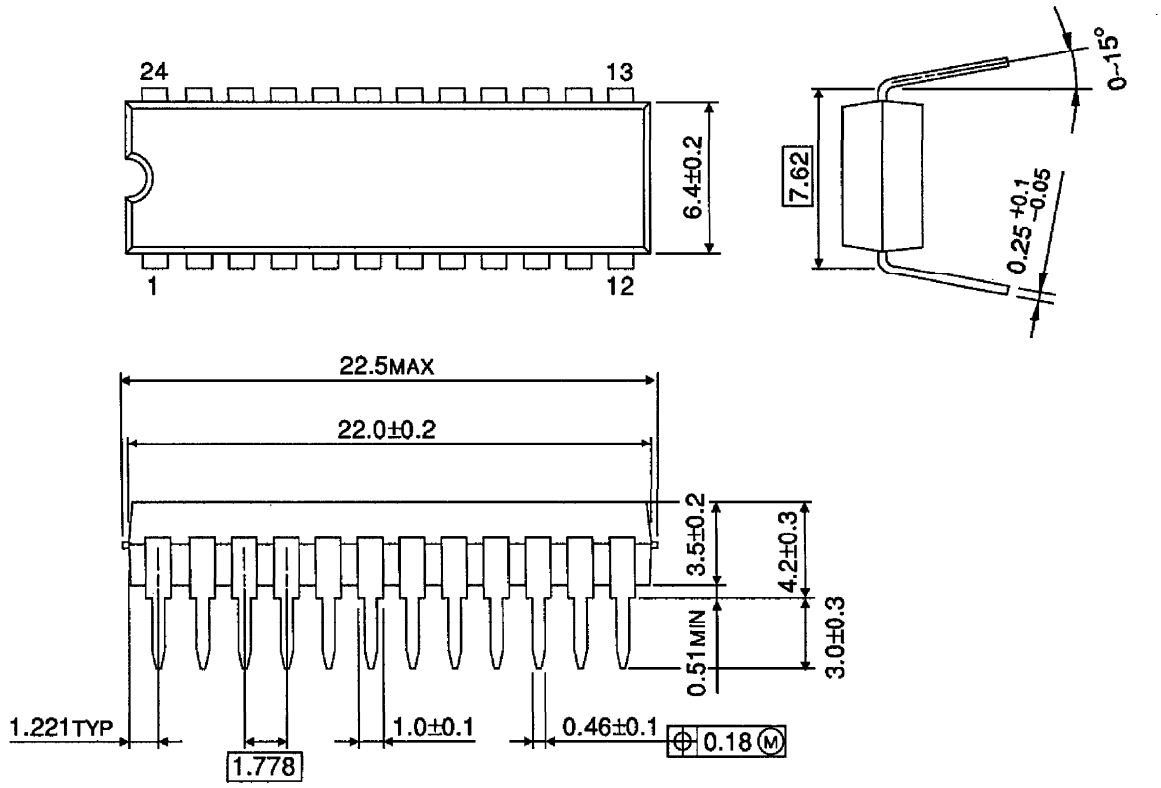


T2 : AM OSC



OUTLINE DRAWING

SDIP24-P-300-1.78 Unit : mm



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