

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

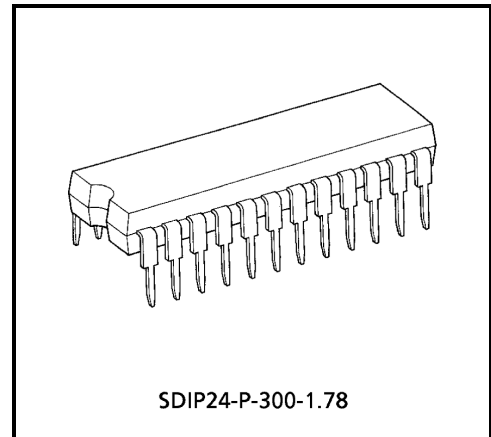
TA2008AN

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.

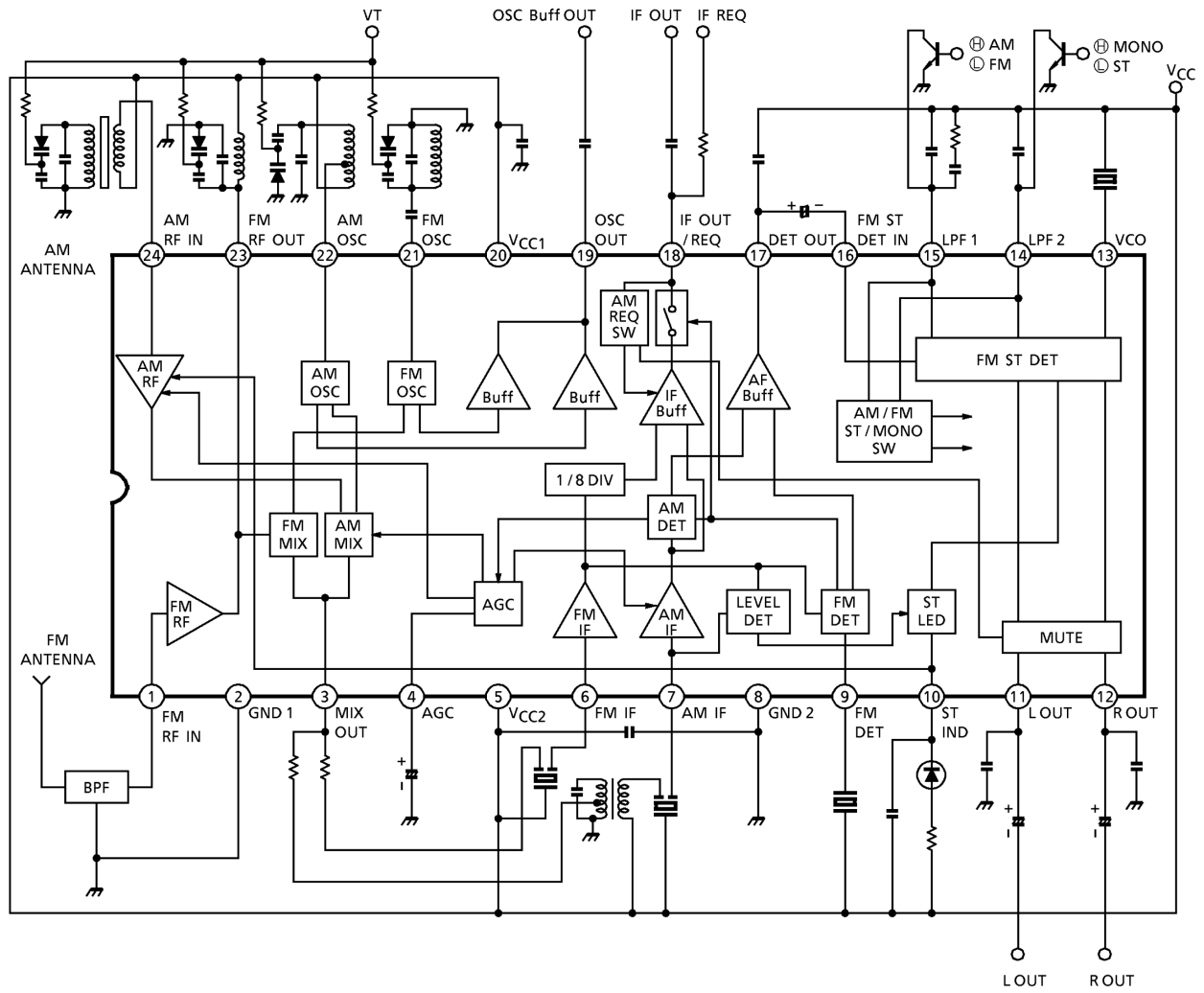
Features

- 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: $V_{CC} = 3.5\sim 14V$ ($T_a = 25^\circ C$)



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	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	<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 ₁₈ = GND → IF out	<p> VCC2 (5) 100Ω (18) </p>	4.0	4.0
19	OSC out	<p> VCC1 (20) AM OSC FM OSC (19) GND1 (2) </p>	4.0	4.0
20	V _{CC1} (V _{CC} 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. 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

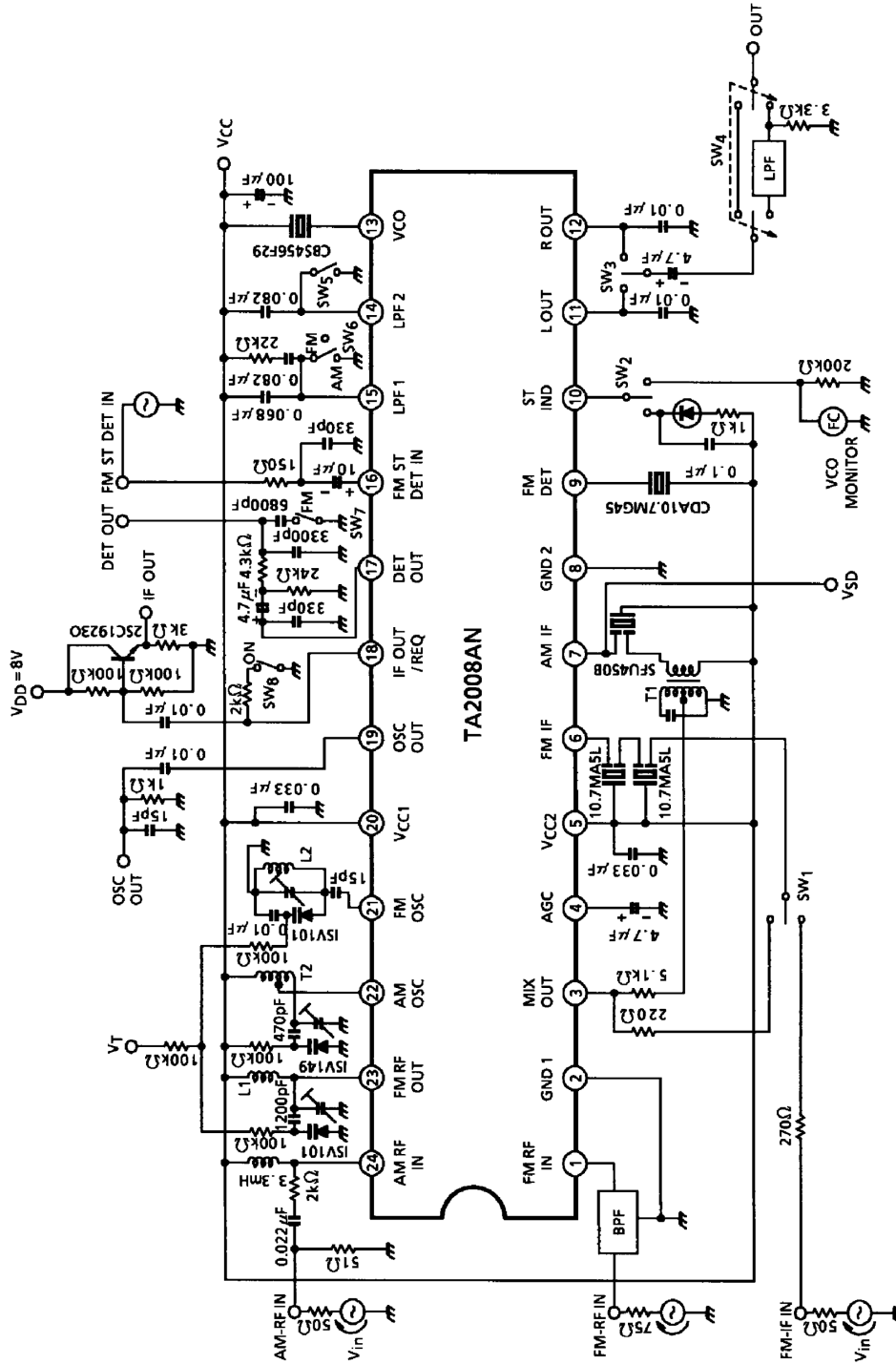
AM: f = 1MHz, MOD = 30%, f_m = 1kHz

FM ST DET: f_m = 1kHz

Characteristic		Symbol	Test Circuit	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	f _{1 / 8 IF} (FM)	—	V _{in} = 80dBμV EMF, SW8: On	1.3373	1.3375	1.3377	MHz
	IF count output voltage	V _{1 / 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 Circuit	Test Condition	Min.	Typ.	Max.	Unit		
AM	Gain	G_V	—	$V_{in} = 26\text{dB}\mu\text{V EMF}$	20	45	80	mV_{rms}		
	Recovered output voltage	V_{OD}	—	$V_{in} = 60\text{dB}\mu\text{V EMF}$	45	65	90	mV_{rms}		
	Signal to noise ratio	S / N	—	$V_{in} = 60\text{dB}\mu\text{V EMF}$	—	42	—	dB		
	Total harmonic distortion	THD	—	$V_{in} = 60\text{dB}\mu\text{V EMF}$	—	1.0	—	%		
	Local OSC buffer output voltage	V_{OSC} (buff) AM	—	$f_{OSC} = 1.45\text{MHz}$	90	150	—	mV_{rms}		
	IF count output voltage	V_{IF} (AM)	—	$V_{in} = 60\text{dB}\mu\text{V EMF}$, SW8: On,	350	500	—	$\text{mV}_{\text{p-p}}$		
	IF count output sensitivity	IF sens (AM)	—	SW8: On	35	40	45	$\text{dB}\mu\text{V EMF}$		
Pin (17) output resistance		R_{17}	—	FM mode	—	0.75	—	k Ω		
				AM mode	—	15.5	—			
FM ST DET	Input resistance		R_{IN}	—	—	24	—	k Ω		
	Output resistance		R_{OUT}	—	—	5	—	k Ω		
	Max. Composite signal input voltage		$V_{in \text{ max}}$ (stereo)	—	L + R = 90%, P = 10%, SW4: LPF on $f_m = 1\text{kHz}$, THD = 3%	—	800	—	mV_{rms}	
	Separation		Sep.	—	L + R = 180 mV_{rms} P = 20 mV_{rms} SW4: LPF on	$f_m = 100\text{Hz}$	—	42	—	dB
						$f_m = 1\text{kHz}$	35	42	—	
						$f_m = 10\text{kHz}$	—	42	—	
	Total harmonic distortion	Monaural	THD (monaural)	—	$V_{in} = 200\text{mV}_{\text{rms}}$	—	0.1	—	%	
		Stereo	THD (stereo)	—	L + R = 180 mV_{rms} , P = 20 mV_{rms} , SW4: LPF on,	—	0.1	—		
	Voltage gain		G_V	—	$V_{in} = 200\text{mV}_{\text{rms}}$	-2	0	2	dB	
	Channel balance		C. B.	—	$V_{in} = 200\text{mV}_{\text{rms}}$	-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 = 15 mV_{rms}	—	± 1.3	—	%		
Signal to noise ratio		S / N	—	$V_{in} = 200\text{mV}_{\text{rms}}$	—	80	—	dB		
Muting attenuation		MUTE	—	$V_{in} = 200\text{mV}_{\text{rms}}$	—	80	—	dB		

TEST CIRCUIT



TA2008AN

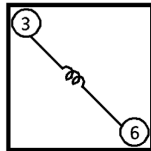
Coil Data

Coil No.	Test Freq.	L (μH)	C ₀ (pF)	Q ₀	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

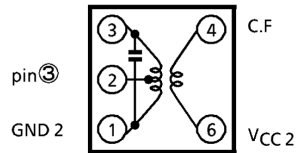
(S): Sumida electric co., ltd.

(T): Toko co., ltd.

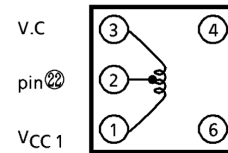
L₁ : FM RF
L₂ : FM OSC



T1 : AM MIX



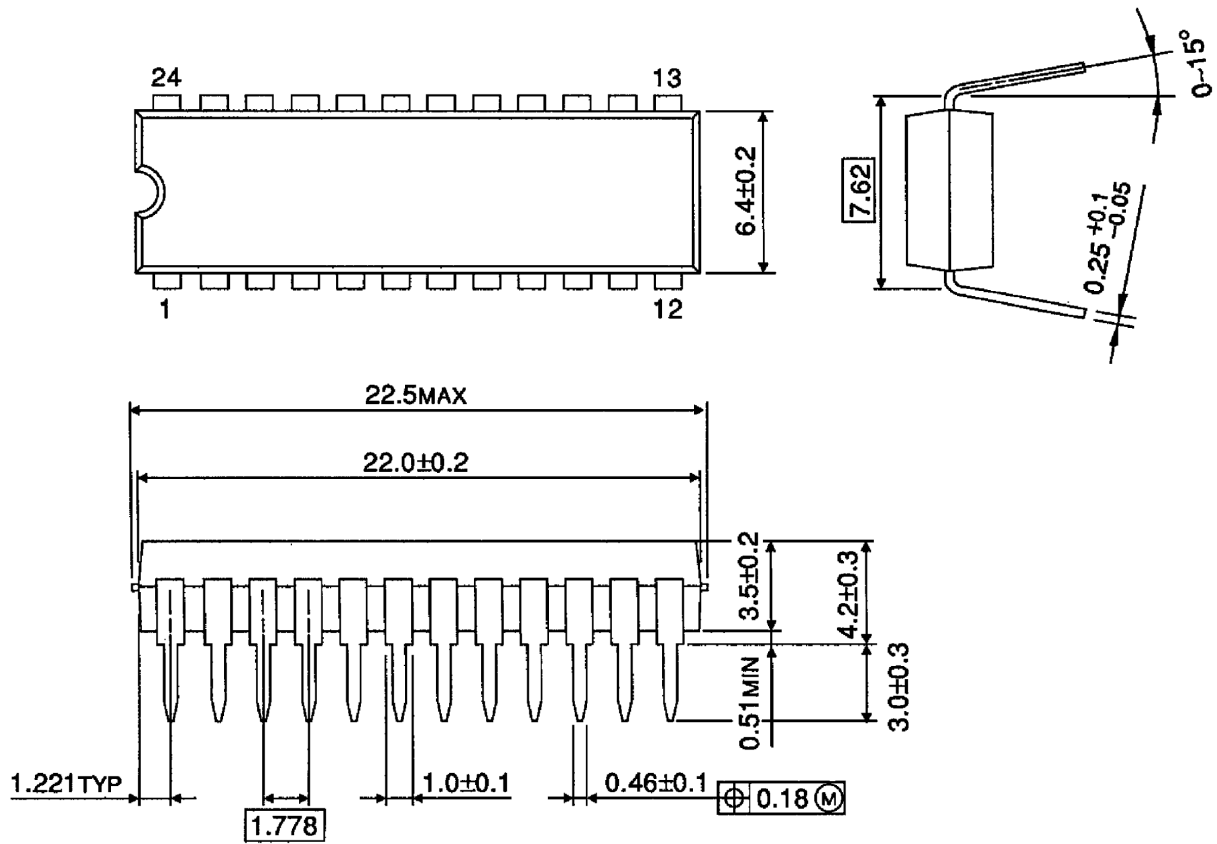
T2 : AM OSC



Package Dimensions

SDIP24-P-300-1.78

Unit : mm



Weight: 1.2g (typ.)

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