

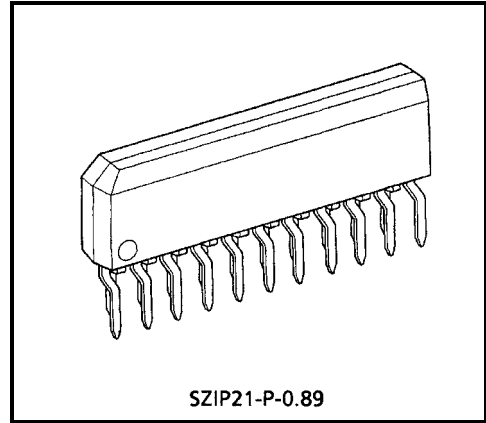
# TA1230Z

## TV SOUND MULTIPLEX BROADCAST DEMODULATOR IC FOR EIAJ SYSTEM

The TA1230Z incorporates the functions required for EIAJ system TV sound multiplex broadcast demodulation and a trap for eliminating facsimile broadcast signals multiplexed in the sound multiplex broadcasting band. Automatic adjustment based on a 32 f<sub>H</sub>-oscillator makes adjustments other than separation unnecessary.

### FEATURES

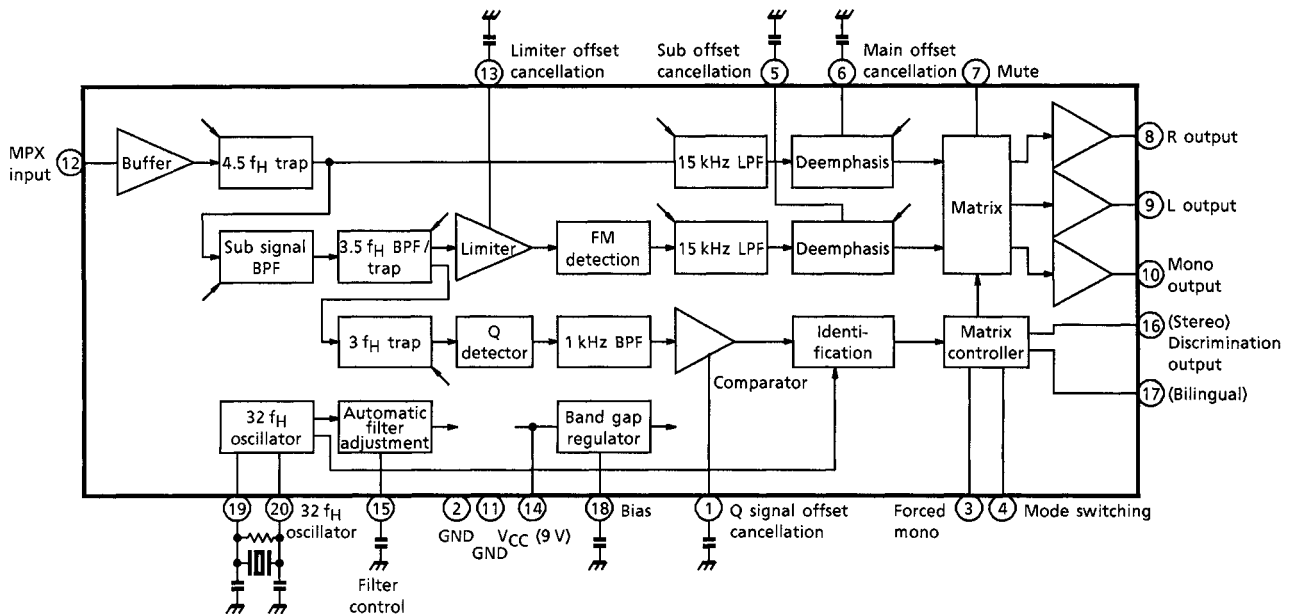
- Self-adjusting filter and discriminator circuit based on a 32 f<sub>H</sub>-oscillator
- Built-in trap eliminates facsimile broadcast signals



SZIP21-P-0.89

Weight: 1.00 g (Typ.)

### BLOCK DIAGRAM



000707EBA1

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## PIN FUNCTIONS

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	Q signal offset cancellation	<p>Cuts the DC component of the circuit shaping the waveform of the AM-detected cue signal. Connect a 0.1 <math>\mu\text{F}</math> capacitor between this pin and GND.</p> <p>A 0.01 <math>\mu\text{F}</math> capacitor may cause lower discrimination sensitivity because of the fluctuations in a capacitor of that rating.</p>	
2	GND	—	—
3	Forced mono	<p>Setting this pin to 5 V forcibly sets the mode to mono. This does not affect the discrimination output or bilingual broadcast decoding.</p> <p>As this is the PNP transistor input circuit, leaving the pin open sets the mode to forced mono. However, do not leave the pin open.</p>	
4	Mode switching	<p>The voltage of this pin is used to control the output state for bilingual broadcasting.</p> <p>0 V : Main sound                  2.5 V : Main / sub sound                  5 V : Sub sound                  9 V : Main / sub sound</p>	
5	Sub offset elimination	<p>Cuts the DC component of the sub sound signal processing section. Connect a 10 <math>\mu\text{F}</math> capacitor between this pin and GND.</p>	
6	Main offset elimination	<p>Cuts the DC component of the main-sound signal processing section. Connect a 10 <math>\mu\text{F}</math> capacitor between this pin and GND.</p>	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
7	Mute	Setting this pin to 5V mutes all the outputs. Normally, fix to GND.	
8 9 10	R output L output Mono output	Output pins. A mono sound signal is output from pin 10 regardless of the state of pins 3 and 4 and the broadcasting mode. Set so that the maximum current output from these pins does not exceed 500 μA.	
11	GND	—	—
12	MPX input	Sound multiplex signal input pin. The input resistance is 10 kΩ (Typ.). The standard input level is 250 mV <sub>rms</sub> (Equivalent to 100% modulation)	
13	Limiter offset elimination	Cuts the DC component of the sub-sound signal demodulation section. Connect a 0.01 μF capacitor between this pin and GND.	
14	V <sub>CC</sub>	The operating power supply voltage range is 9 V ± 10%.	—
15	Filter control	Used for the automatic filter adjustment circuit incorporated into the IC. Connect a 0.01 μF capacitor between this pin and GND.	
16 17	Stereo discrimination output Bilingual discrimination output	Broadcast mode discrimination output pins. This circuit is an open collector whose maximum sink current is 1 mA.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
18	Bias	Eliminates IC internal bias noise. Connect a 10 $\mu$ F capacitor between this pin and GND.	
19 20	32 f <sub>H</sub> oscillation	Ceramic oscillator connecting pins. TA1230Z uses this oscillation to automatically adjust the internal filter and to perform discrimination. Use a Murata CSB503E7 ceramic oscillator.	

## ABSOLUTE RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	15	V
Power Dissipation	P <sub>D</sub>	890	mW
Operating Temperature	T <sub>opr</sub>	-20~75	°C
Storage Temperature	T <sub>str</sub>	-55~150	°C

Note: The power dissipation rating drops by 7.2 mW for every 1°C over 25°C.

## OPERATING SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN	TYP.	MAX	UNIT
14	V <sub>CC</sub>	8.1	9.0	9.9	V

## ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V<sub>CC</sub> = 9 V, Ta = 25°C)

### DC CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Current Dissipation	I <sub>CC</sub>	—	—	28	34	42	mA
Pin Voltage	V <sub>1</sub>	—	—	4.2	5.2	6.2	V
	V <sub>5</sub>	—	—	3.5	4.5	5.5	
	V <sub>6</sub>	—	—	3.5	4.5	5.5	
	V <sub>8</sub>	—	—	2.1	3.1	4.1	
	V <sub>9</sub>	—	—	2.1	3.1	4.1	
	V <sub>10</sub>	—	—	2.1	3.1	4.1	
	V <sub>12</sub>	—	—	3.5	4.5	5.5	
	V <sub>13</sub>	—	—	2.8	3.9	4.9	
	V <sub>15</sub>	—	—	2.5	4.5	6.5	
	V <sub>18</sub>	—	—	5.0	5.7	6.4	
	V <sub>19</sub>	—	—	3.5	4.5	5.5	
V <sub>20</sub>	—	—	7.0	7.6	8.2		

**AC CHARACTERISTICS**

CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Level		V <sub>OUT</sub>	—	(Note 1)	500	600	700	mV <sub>rms</sub>
Output Level Fluctuation		ΔV <sub>OUT</sub>	—	(Note 2)	—	0.0	1.5	dB
Sub Output Level Power Dependency		ΔV <sub>SUB</sub>	—	(Note 3)	—	0.0	0.5	dB
Frequency Characteristics	Main Sound 100 Hz	A100 M	—	(Note 4)	0.0	1.0	2.5	dB
	Main Sound 10 kHz	A10k M	—		-16	-13	-10	
	Sub Sound 100 Hz	A100 S	—		0.0	1.0	2.5	
	Sub Sound 10 kHz	A10k S	—		-16	-13	-10	
Total Harmonic Distortion	Main Sound	THD M	—	(Note 5)	—	0.2	1.0	%
	Sub Sound	THD S	—		—	0.7	1.0	
S / N	Main Sound	S / N M	—	(Note 6)	70	75	—	dB
	Sub Sound	S / N S	—		60	65	—	
Carrier Leakage	Main Sound	VLeak M	—	(Note 7)	—	50	70	mV <sub>p-p</sub>
	Sub Sound	VLeak S	—		—	50	70	
Stereo Separation		Sepa	—	(Note 8)	34	—	—	dB
Bilingual Crosstalk		CT	—	(Note 9)	60	—	—	dB
Bilingual Mode Switching Voltage	Main (Max.)	V <sub>max</sub> M	—	(Note 10)	1.0	—	—	V
	Main / Sub (1) (Min.)	V <sub>min</sub> B (1)	—		—	—	1.2	
	Main / Sub (1) (Max.)	V <sub>max</sub> B (1)	—		2.9	—	—	
	Sub (Min.)	V <sub>min</sub> S	—		—	—	4.2	
	Sub (Max.)	V <sub>max</sub> S	—		5.4	—	—	
	Main / Sub (2) (Min.)	V <sub>min</sub> B (2)	—		—	—	6.6	
Forced Mono Voltage	Off Voltage	V <sub>min</sub> FMono	—	(Note 11)	2.4	—	—	V
	On Voltage	V <sub>max</sub> FMono	—		—	—	2.6	
Mute on Voltage		V Mute	—	(Note 12)	—	—	2.0	V
Mute Residual Noise		V Mute	—	(Note 13)	—	—	1.5	mV <sub>p-p</sub>
Mute DC Offset Voltage	L / R Output	V <sub>OS</sub>	—	(Note 14)	—	5	100	mV
	M Output		—		—	—	300	
Sub Carrier Sensitivity		S <sub>SUB</sub>	—	(Note 15)	—	—	12	dB
Cue Signal Sensitivity	No Modulation	SQ <sub>0</sub>	—	(Note 16)	8	—	—	dB
	L-R 900 Hz 100%	SQ <sub>900</sub>	—		6	—	—	
	Sub Sound 1kHz 100%	SQ <sub>1k</sub>	—		6	—	—	
Input Resistance		R <sub>IN</sub>	—	(Note 17)	7	10	13	kΩ
Output Resistance		R <sub>OUT</sub>	—	(Note 18)	70	100	130	Ω

## TEST CONDITIONS

NOTE	INPUT SIGNAL	MODE SETTING			TEST PIN	TEST METHOD
		PIN 3	PIN 4	PIN 7		
1	Signal A	0 [V]	0 [V]	0 [V]	Pins 8, 9, 10	Measure the output level of each pin ( $V_{OUT}$ [mV <sub>rms</sub> ])
2	Signal A	0 [V]	0 [V]	0 [V]	Pins 8, 9	Calculate the output level ratio between pins 8 and 9 ( $V_8, V_9$ ). $\Delta V_{OUT}$ [dB] = $20 \cdot \log (V_8 / V_9)$
3	Signal B	0 [V]	5 [V]	0 [V]	Pins 8, 9	Raise $V_{CC}$ from 8.1V to 9.9 V and measure the output level ( $V_V$ ). Calculate the ratio against the output level ( $V_V$ ) when $V_{CC} = 9V$ $\Delta V_{Sub}$ [dB] = $20 \cdot \log (V_V' / V_V)$
4	Signal A Signal B Signal C Signal D	0 [V]	0 / 5 [V]	0 [V]	Pins 8, 9	Set pin 4 to 0 V. Input signal A and measure the output level ( $V_{M1k}$ ). Next, input signal C, D and measure its output level at 100 Hz and 10 kHz ( $V_{M100}$ and $V_{M10k}$ ). A100 M [dB] = $20 \log (V_{M100} / V_{M1k})$ A10k M [dB] = $20 \log (V_{M10k} / V_{M1k})$ Set pin 4 to 5 V. Input signal B and measure the output level ( $V_{S1k}$ ). Next, input signal C, D and measure its output level at 100 Hz and 10 kHz ( $V_{S100}$ and $V_{S10k}$ ). A100 S [dB] = $20 \log (V_{S100} / V_{S1k})$ A10k S [dB] = $20 \log (V_{S10k} / V_{S1k})$
5	Signal A Signal B	0 [V]	0 / 5 [V]	0 [V]	Pins 8, 9	Set pin 4 to 0 V. Input signal A and measure the distortion factor (THD M [%]). Set pin 4 to 5 V. Input signal B and measure the distortion factor (THD S [%]).
6	Signal A Signal B Signal E	0 [V]	0 / 5 [V]	0 [V]	Pins 8, 9	Set pin 4 to 0 V. Input signal B and measure the output level ( $S_M$ ). Next, measure its output level ( $N_M$ ) on no signal input condition. $S / N M$ [dB] = $20 \log (S_M / N_M)$ Set pin 4 to 5 V. Input signal B and measure the output level ( $S_S$ ). Next, input signal E and measure its output level ( $N_S$ ). $S / N M$ [dB] = $20 \log (S_S / N_S)$
7	Signal E	0 [V]	0 / 5 [V]	0 [V]	Pins 8, 9	Set pin 4 to 0 V and set LPF output to through. Measure the output level ( $V_{Leak M}$ ). Set pin 4 to 5 V and set LPF output to through. Measure the output level ( $V_{Leak S}$ ).

NOTE	INPUT SIGNAL	MODE SETTING			TEST PIN	TEST METHOD
		PIN 3	PIN 4	PIN 7		
8	Signal F	0 [V]	0 [V]	0 [V]	Pins 8, 9	Adjust the input signal amplitude so that the output level of pin 8 is at minimum. Measure the output levels of 1 kHz spectrum of pin 8 ( $V_8$ ) and pin 9 ( $V_9$ ) by a spectrum analyzer. Sepa [dB] = $20 \log (V_9 / V_8)$
9	Signal H	0 [V]	2.5 [V]	0 [V]	Pins 8, 9	Measure the output levels of 1 kHz spectrum of pin 8 ( $V_8$ ) and pin 9 ( $V_9$ ) by a spectrum analyzer. CT [dB] = $20 \log (V_9 / V_8)$
10	Signal I	0 [V]	Variable	0 [V]	Pin 4	Raise the voltage of pin 4 from 0 V. Measure the upper limit voltage ( $V_{max M}$ [V]) holding the output from pin 8 at 1 kHz.  Reduce the voltage of pin 4 from 2.5 V. Measure the lower limit voltage ( $V_{min B (1)}$ [V]) holding the output from pin 8 at 400 Hz. Raise the voltage of pin 4 from 2.5 V. Measure the upper limit voltage ( $V_{max B (1)}$ [V]) holding the output from pin 9 at 1 kHz.  Reduce the voltage of pin 4 from 5 V. Measure the lower limit voltage ( $V_{min B (1)}$ [V]) holding the output from pin 9 at 400Hz.  Raise the voltage of pin 4 from 5 V. Measure the upper limit voltage ( $V_{max S}$ [V]) holding the output from pin 9 at 400 Hz.  Reduce the voltage of pin 4 from 9 V. Measure the lower limit voltage ( $V_{min B (2)}$ [V]) holding the output from pin 9 at 1 kHz.
11	Signal E	Variable	0 [V]	0 [V]	Pin 3	Raise the voltage of pin 3 from 0 V. Measure the upper limit voltage ( $V_{max FMono}$ [V]) holding the output from pin 8 to 0 V.  Reduce the voltage of pin 3 from 5 V. Measure the lower limit voltage ( $V_{min FMono}$ [V]) holding the output from pin 8 at 1 kHz.
12	Signal A	0 [V]	0 [V]	Variable	Pin 7	Raise the voltage of pin 7 from 0 V. Measure the voltage ( $V_{mute}$ [V]) when the output from pin 8 or pin 9 changes to 0 V.
13	Signal A	0 [V]	0 [V]	5 [V]	Pins 8, 9, 10	Measure the output levels of the pins ( $V_{Mute}$ [mV <sub>p-p</sub> ]).
14	No signal	0 [V]	0 [V]	0 / 5 [V]	Pins 8, 9, 10	Switch the pin 7 voltage between 0 V and 5 V. Measure the DC voltage change of the pins ( $V_{OS}$ [V]).



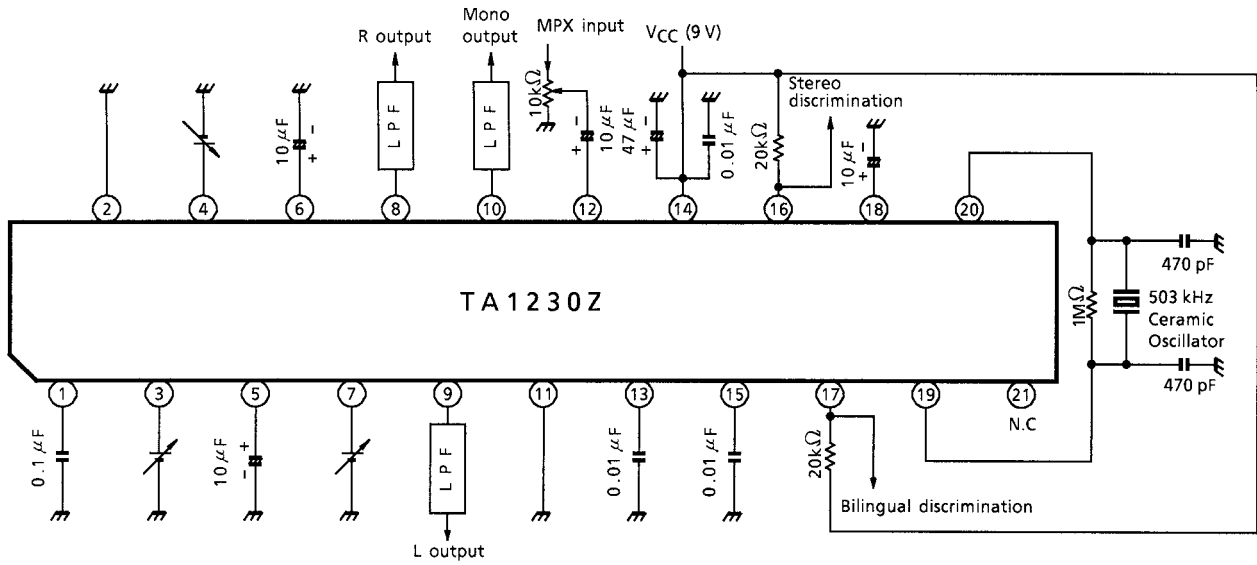
## TEST CONDITIONS

NOTE	INPUT SIGNAL	MODE SETTING			TEST PIN	TEST METHOD
		PIN 3	PIN 4	PIN 7		
15	Signal J	0 [V]	0 [V]	0 [V]	Pin 17	Input signal J. Lower the 31.47 [kHz] signal level from 150 [mV <sub>rms</sub> ]. Measure the 31.47 [kHz] signal level when the pin 17 voltage changes to 9 [V] (VSUB). S SUB = 20 log (150 / VSUB) [dB]
16	Signal K Signal L Signal M	0 [V]	0 [V]	0 [V]	Pins 16, 17	Input signal K. Lower the cue signal level from 20 mV <sub>rms</sub> . Measure the cue signal level when the pin 17 voltage changes to 9 V (V Qo [mV <sub>rms</sub> ]). S Qo [dB] = 20 log (20 / VQo) Input signal L. Lower the cue signal level from 20mV <sub>rms</sub> . Measure the cue signal level when the pin 17 voltage changes to 9 V (VQ900 [mV <sub>rms</sub> ]). S Q900 [dB] = 20 log (20 / VQ900). Input signal M. Lower the cue signal level from 20 [mV <sub>rms</sub> ]. Measure the cue signal level when the pin 16 voltage changes to 9 V (VQ1k [mV <sub>rms</sub> ]). S Q1k [dB] = 20 log (20 / VQ1k).
17	Signal A	0 [V]	0 [V]	0 [V]	Pin 12	Measure the input resistance.
18	Signal A	0 [V]	0 [V]	0 [V]	Pins 8, 9, 10	Measure the output resistance.

## INPUT SIGNAL TABLE

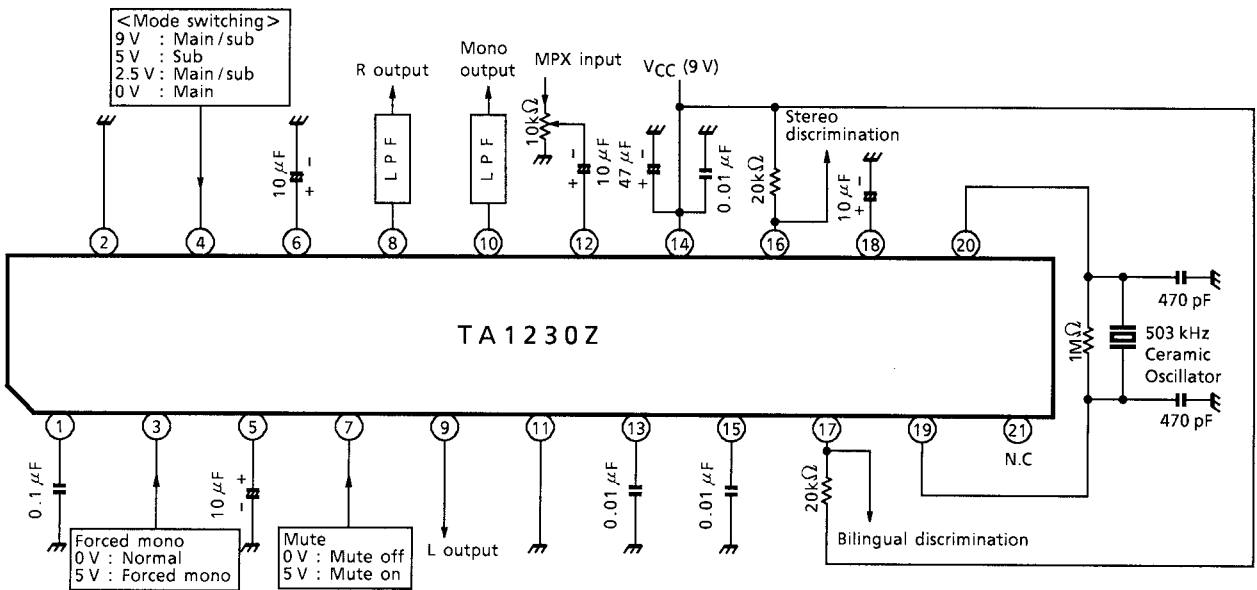
SIGNAL	MAIN SIGNAL	SUB SIGNAL		CUE SIGNAL	
		CARRIER	MODULATION	CARRIER	MODULATION
Signal A	1 kHz, 250 mV <sub>rms</sub>	No signal	—	No signal	—
Signal B	No signal	31.47 kHz, 150 mV <sub>rms</sub>	1 kHz, 100% FM	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal C	100Hz, 250 mV <sub>rms</sub>	31.47 kHz, 150 mV <sub>rms</sub>	100Hz, 100% FM	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal D	10 kHz, 250 mV <sub>rms</sub>	31.47 kHz, 150 mV <sub>rms</sub>	10 kHz, 100% FM	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal E	No signal	31.47 kHz, 150 mV <sub>rms</sub>	No signal	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal F	1 kHz, 125 mV <sub>rms</sub>	31.47 kHz, 200 mV <sub>rms</sub>	1 kHz (In-phase), 50% FM	55.07 kHz, 20 mV <sub>rms</sub>	982.5 Hz, 60%AM
Signal G	1 kHz, 250 mV <sub>rms</sub>	31.47 kHz, 150 mV <sub>rms</sub>	No signal	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal H	1 kHz, 250 mV <sub>rms</sub>	31.47 kHz, 150 mV <sub>rms</sub>	1 kHz, 100% FM	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal I	1 kHz, 250 mV <sub>rms</sub>	31.47 kHz, 150 mV <sub>rms</sub>	400Hz, 100% FM	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal J	No signal	31.47 kHz, Variable	No signal	55.07 kHz, 20 mV <sub>rms</sub>	922.5 Hz, 60%AM
Signal K	No signal	31.47 kHz, 150 mV <sub>rms</sub>	No signal	55.07 kHz, Variable	922.5 Hz, 60%AM
Signal L	No signal	31.47 kHz, 200 mV <sub>rms</sub>	900Hz, 100% FM	55.07 kHz, Variable	982.5 Hz, 60%AM
Signal M	No signal	31.47 kHz, 150 mV <sub>rms</sub>	1 kHz, 100% FM	55.07 kHz, Variable	922.5 Hz, 60%AM

## TEST CIRCUIT



LFP : 4-stage Butterworth, cutoff frequency 15 kHz

## APPLICATION CIRCUIT

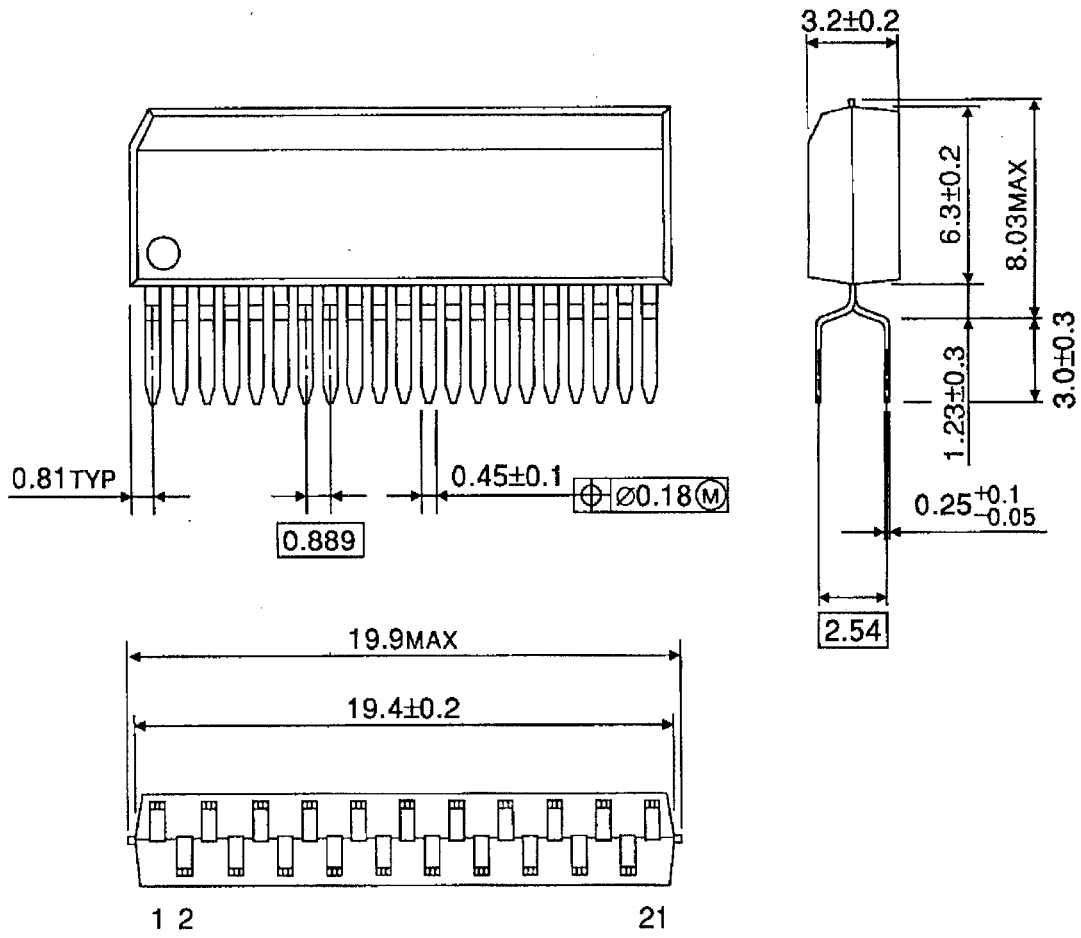


Ceramic oscillator : CSB503E7 (Murata)

## PACKAGE DIMENSIONS

SZIP21-P-0.89

Unit : mm



Weight: 1.00g (Typ.)