

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8874Z

SOUND MULTIPLEX BROADCAST DEMODULATOR IC FOR DOMESTIC TV / VTR

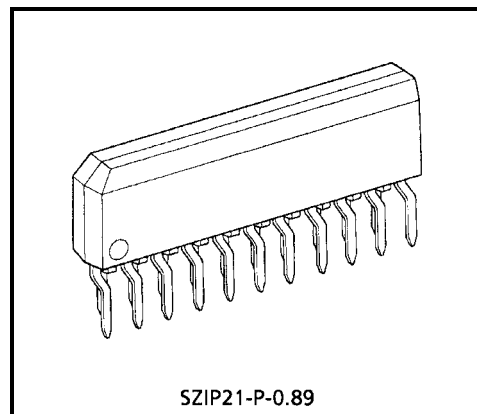
The TA8874Z stores a function necessary for demodulating domestic TV sound multiplex broadcast and trap for eliminating facsimile broadcasting signals that superimpose within the sound multiplex broadcast bandwidth.

Furthermore no adjustment other than separation is necessary by using a 32fH oscillation.

Using an I²C bus it switches an output mode and performs separation adjustment and broadcast mode read out.

FEATURES

- Band pass filter for sub audio signal
- FM demodulator for sub audio signal
- Stereo matrix
- Main / sub de-emphasis
- Output for stereo / bilingual indication
- Trap for facsimile broadcast (4.5fH, 6fH)
- Various controls by I²C bus

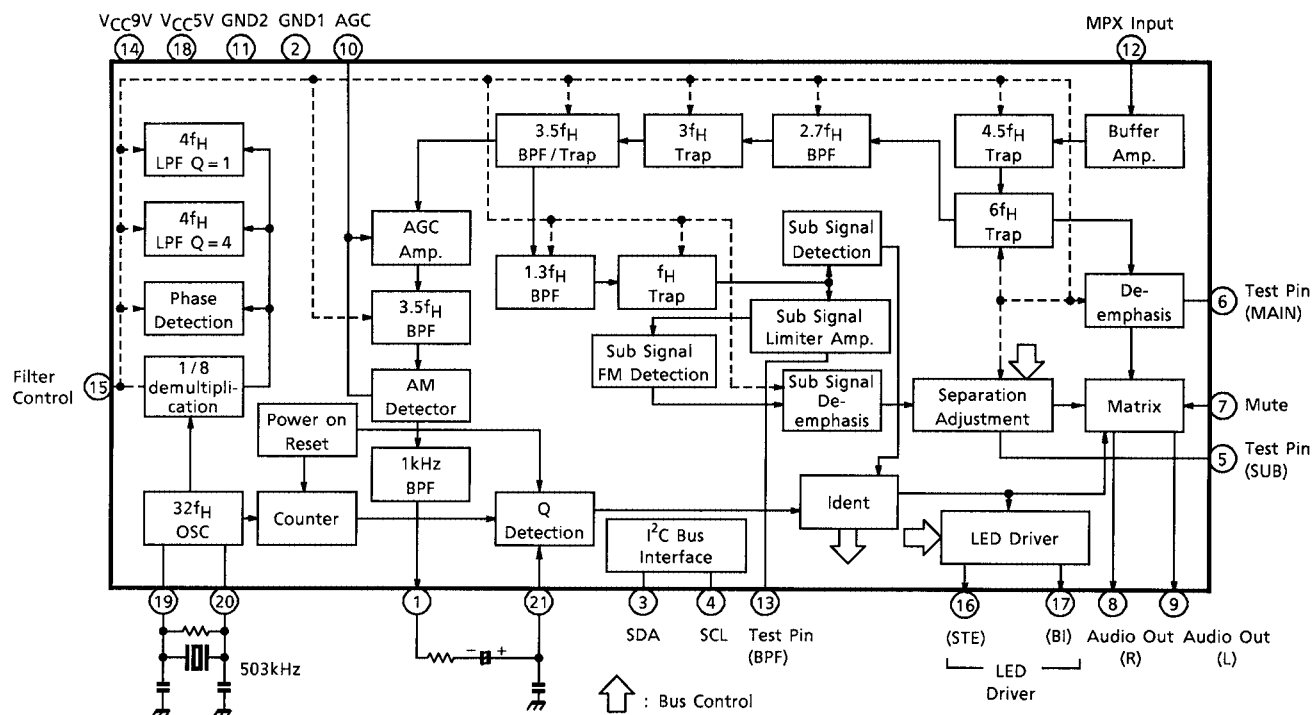


Weight: 1.0 g (Typ.)

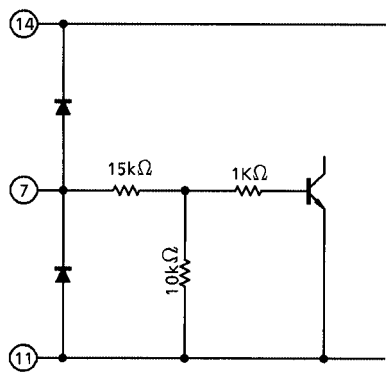
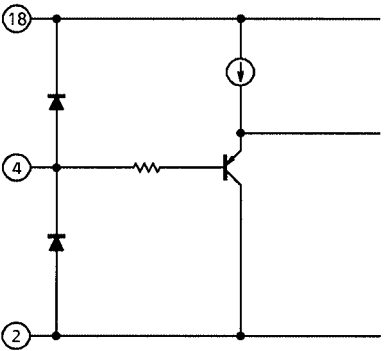
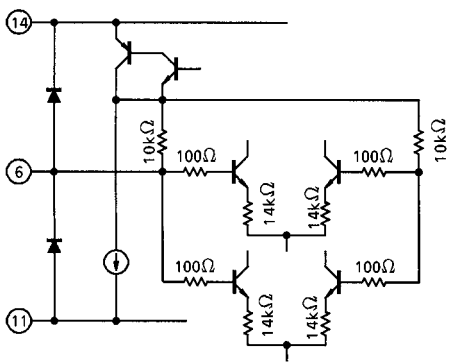
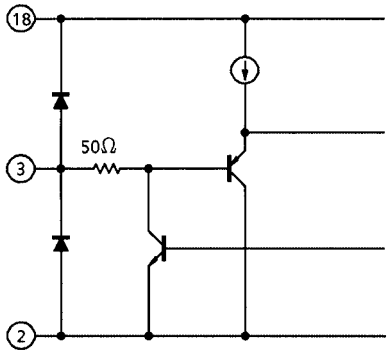
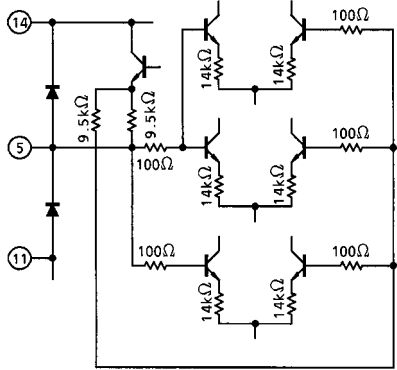
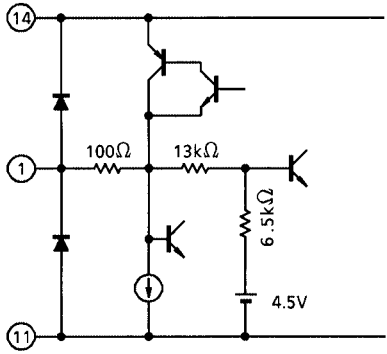
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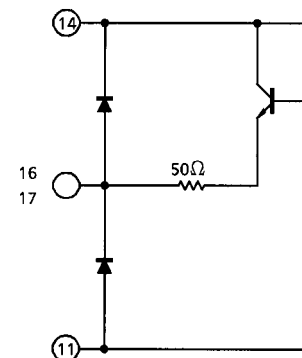
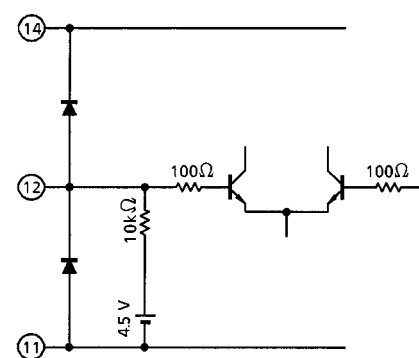
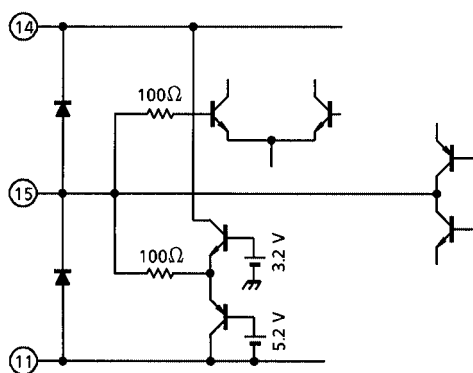
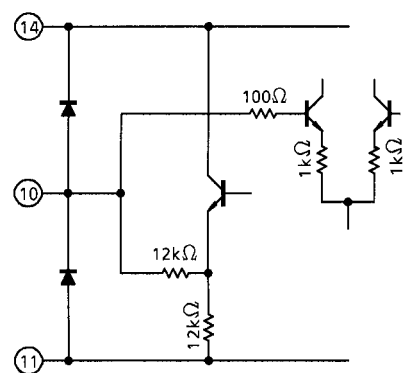
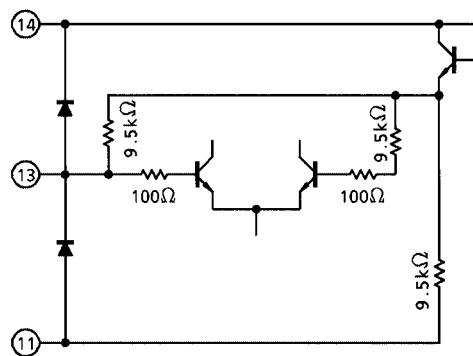
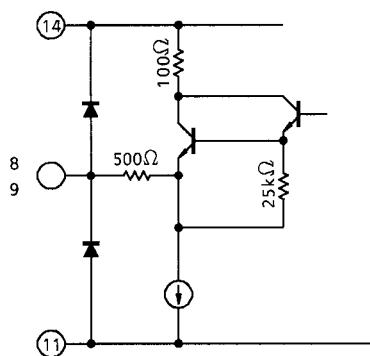
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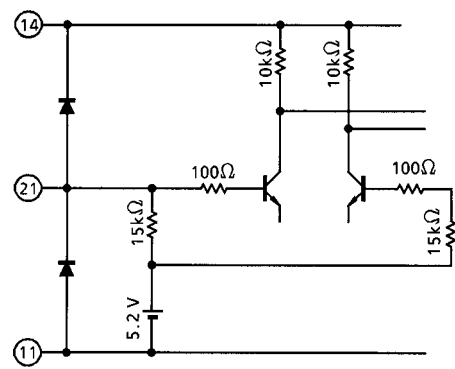
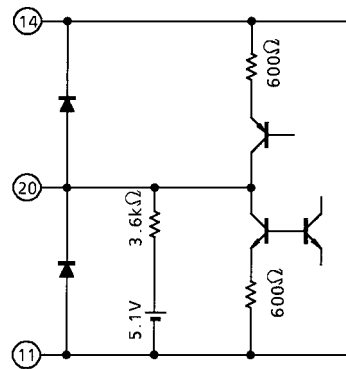
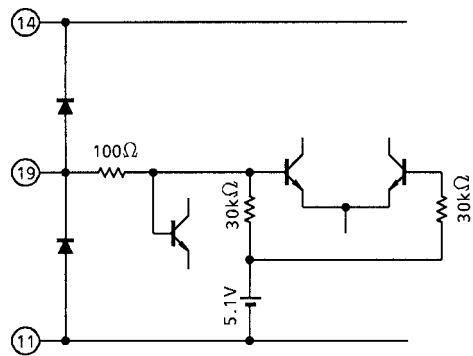
BLOCK DIAGRAM



TERMINAL INTERFACE CIRCUIT







I²C BUS ADDRESS MAP

SLAVE ADDRESS	WRITE	84 (HEX)	READ	85 (HEX)
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CHARACTERISTIC	SUB ADDRESS	DATA								DEFAULT	NOTE
		MSB							LSB		
Write											
Mode Select	--	LED STE	LED BIL	LDE EXT	Mono Set	Mute	F mono	MODE sub	MODE main	8 (10)	
Separation Adjustment	--	T1 (*)	x	←			6 bit	→		22 (10)	
Read											
Mode Output		Ident of broad cast mode		CHAG FLAG	x	x	x	x	x	—	
		B1	B0								

*: This bit is for testing mode. This bit must be "0" at any time.

DATA FORMAT

Write mode

S	Slave address	0	A	Mode select	A	Separation adjustment	A	P
---	---------------	---	---	-------------	---	-----------------------	---	---

or

S	Slave address	0	A	Mode select	A	P
---	---------------	---	---	-------------	---	---

Read mode

S	Slave address	1	A	Data	A	P
---	---------------	---	---	------	---	---

CONTROL BIT MAP

Output signal

BROAD CAST MODE	LED STE	LED BIL	LED EXT	MONO SET	MUTE	F MONO	MODE SUB	MODE MAIN	OUTPUT SIGNAL	
									L	R
mono	x	x	x	x	L	x	x	x	L+R	L+R
	x	x	x	x	H	x	x	x	Mute	Mute
Stereo	x	x	x	L	L	L	x	x	L	R
	x	x	x	x	L	H	x	x	L+R	L+R
	x	x	x	x	H	x	x	x	Mute	Mute
	x	x	x	H	L	x	x	x	L+R	L+R
BIL	x	x	x	L	L	x	L	L	main	main
	x	x	x	L	L	x	L	H	main	main
	x	x	x	L	L	x	H	L	sub	sub
	x	x	x	L	L	x	H	H	main	sub
	x	x	x	x	H	x	x	x	Mute	Mute
	x	x	x	H	L	x	x	x	main	main

LED mode

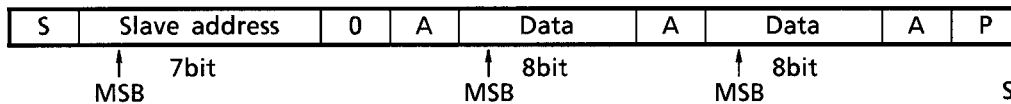
BROAD CAST MODE	LED STE	LED BIL	LED EXT	MONO SET	MUTE	F MONO	MODE SUB	MODE MAIN	LED	
									STE	BIL
mono	x	x	L	x	x	x	x	x	—	—
	L	L	H	x	x	x	x	x	—	—
	L	H	H	x	x	x	x	x	—	O
	H	L	H	x	x	x	x	x	O	—
	H	H	H	x	x	x	x	x	—	—
Stereo	x	x	L	L	x	L	x	x	O	—
	x	x	L	L	x	H	x	x	—	—
	x	x	L	H	x	x	x	x	—	—
	L	L	H	x	x	x	x	x	—	—
	L	H	H	x	x	x	x	x	—	O
	H	L	H	x	x	x	x	x	O	—
BIL	H	H	H	x	x	x	x	x	—	—
	x	x	L	L	x	x	x	x	—	O
	x	x	L	H	x	x	x	x	—	—
	L	L	H	x	x	x	x	x	—	—
	L	H	H	x	x	x	x	x	—	O
	H	L	H	x	x	x	x	x	O	—
	H	H	H	x	x	x	x	x	—	—

Mode output

BROAD CAST MODE	LED STE	LED BIL	LED EXT	MONO SET	MUTE	F MONO	MODE SUB	MODE MAIN	IDENT OF BROAD CAST MODE	
									B1	B0
mono	x	x	x	x	x	x	x	x	L	H
Stereo	x	x	x	x	x	x	x	x	L	L
BIL	x	x	x	x	x	x	x	x	H	L

I²C BUS CONTROLLED FORMAT SUMMARY

Data transfer format

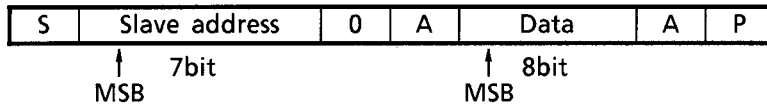


S : Start Condition

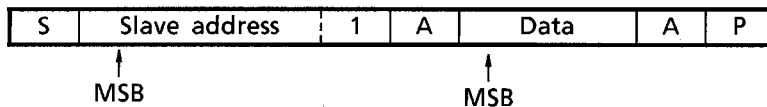
P : Stop Condition

A : Acknowledge

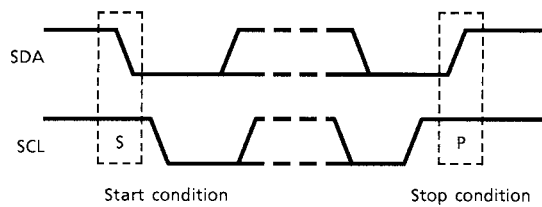
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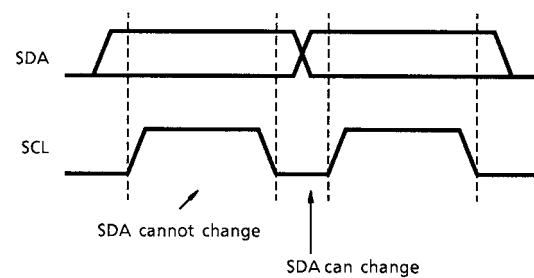
Read mode



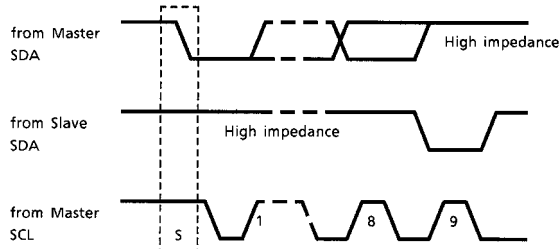
(1) Start and stop condition



(2) Bit transfer



(3) Acknowledge



(4) Slave address

A6	A5	A4	A3	A2	A1	A0	R / $\overline{W}$
1	0	0	0	0	1	0	1 / 0

Purchase of TOSHIBA I²C components conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{CC}	15	V
Power Dissipation	P _D (Note 1)	890	mW
Operating Temperature	T _{opr}	-20~65	°C
Storage Temperature	T _{stg}	-55~150	°C

Note 1: When using the device at above Ta = 25°C decrease the power dissipation by 7.2mW for each increase of 1°C.

Note 2: These in regards to this, please handle with care.

RECOMMENDED SUPPLY VOLTAGE

PIN No.	PIN NAME	MIN	TYP.	MAX	UNIT
14	V _{CC9V}	8.1	9.0	9.9	V
18	V _{CC5V}	5.0	5.6	6.2	V

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 9V, Ta = 25°C)
DC CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power Supply and Current	I _{CC14}	—	—	22	32	42	mA
	I _{CC18}	—	—	12	18	25	
Terminal Voltage	V ₁	—	—	3.5	4.5	5.5	V
	V ₅	—	—	3.5	4.5	5.5	
	V ₆	—	—	3.5	4.5	5.5	
	V ₈	—	—	2.1	3.1	4.1	
	V ₉	—	—	2.1	3.1	4.1	
	V ₁₀	—	—	1.4	2.4	3.4	
	V ₁₂	—	—	3.5	4.5	5.5	
	V ₁₃	—	—	2.8	3.8	4.8	
	V ₁₉	—	—	3.5	4.5	5.5	
	V ₂₀	—	—	3.5	4.5	5.5	
	V ₂₁	—	—	4.2	5.2	6.2	

AC CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION		MIN	TYP.	MAX	UNIT
2f _H (31.5kHz)	A _{2fH}	—	(Note 1)		90	130	170	mV _{p-p}
f _H (15.7kHz)	A _{fH}	—	(Note 2)		—	—	-14	dB
3f _H (47.2kHz)	A _{3fH}	—	(Note 3)		—	—	-6	dB
3.5f _H (55.07kHz)	A _{3.5fH}	—	(Note 4)		—	—	-24	dB
4.5f _H (70.8kHz)	A _{4.5fH}	—	(Note 5)		—	—	-20	dB
6f _H (94.4kHz)	A _{6fH}	—	(Note 6)		—	—	-26	dB
Output (L, R) MONO SUB	V _{TV}	—	(Note 7)	SUB : V ₄ = 5V	500	650	800	mV _{rms}
Output Level Discrepancy (L, R)	ΔV _{TV}	—			-1.5	0	1.5	dB
Output Frequency Characteristic L, R (M, S) 100Hz	A _{TV.L}	—	(Note 8)	SUB : V ₄ = 5V	0	0.9	2.5	dB
Output Frequency Characteristic L, R (MONO) 10kHz	A _{TV.H.M}	—	(Note 9)	—	-16	-13	-10	dB
Output Frequency Characteristic L, R (SUB) 10kHz	A _{TV.H.S}	—	(Note 10)	V ₄ = 5V	-16	-13	-10	dB
Distortion Factor Output MONO (L, R)	THD TV-M	—	(Note 11)		—	0.2	1.1	%
Distortion Factor Output SUB (L, R)	THD TV-S	—	(Note 12)	V ₄ = 5V	—	1.5	3.5	%
S / N MONO (L, R)	S / N TV-M	—	(Note 13)		60	70	—	dB
S / N SUB (L, R)	S / N TV-S	—	(Note 14)	V ₄ = 5V	60	65	—	dB
Cross Talk M→S	CR TV.MS	—	(Note 15)	V ₄ = 5V	60	70	—	dB
Cross Talk S→M	CR TV.SM	—	(Note 16)	V ₄ = 0V	60	70	—	dB
Remaining Carrier MAIN	V _{SUB.M}	—	(Note 17)	V ₄ = 0V	—	40	70	mV _{p-p}
Remaining Carrier SUB	V _{SUB.S}	—	(Note 18)	V ₄ = 5V	—	130	160	mV _{p-p}
Stereo Separation	SE TV	—	(Note 19)		34	—	—	dB
Q Signal AM Detection	V _Q	—	(Note 20)		300	—	—	mV _{p-p}
Q Signal Sensitivity	S _Q	—	(Note 21)		14	—	—	dB
Mute After Sound Output	V _{TV MUT}	—	(Note 22)	V ₇ = 5V	—	—	1.5	mV _{p-p}
Mute DC Offset Output	V _{off TV MUT}	—	(Note 23)	V ₇ = 0→5V	—	5	100	mV
Mute on Voltage	V _{MUT ON}	—	(Note 24)	V ₇ = 0~5V	—	1.75	2.0	V
Input Impedance MPX	R _{IN}	—	Input resistance of pin 12		5	10	15	kΩ
Output Impedance	R _{OUT}	—	Output resistance of pins 8 and 9		—	500	—	Ω
Q Signal Interference Elimination Efficiency	AV _Q	—	(Note 25)		5	10	—	dB

MEASUREMENT CONDITION

NOTE	INPUT SIGNAL	FILTER	APPLIED VOLTAGE	MEASURE- MENT PIN	MEASUREMENT METHOD
1	31.5kHz, 50mV _{p-p} CW	—	—	V ₁₃	Measure output signal amplitude exclusive of pin 13 external capacitance.
2	15.75kHz, 50mV _{p-p} CW	—	—	V ₁₃	Set 2f _H level to 0dB reference.
3	47.2kHz, 50mV _{p-p} CW				
4	55.07kHz, 50mV _{p-p} CW				
5	70.8kHz, 50mV _{p-p} CW				
6	94.4kHz, 50mV _{p-p} CW				
7	MONO : 400Hz, 250mV _{rms} SUB : 400Hz, 150mV _{rms} , 100% modulation BIL.Q signal	15kHz LPF	SUB : V ₄ = 5V	V ₈ , V ₉	Output : measure V ₈ and V ₉ output level. Output level difference : $20 \log (V_8 / V_9)$
8	MONO : 100Hz, 250mV _{rms} SUB : 100Hz, 150mV _{rms} 100% modulation BIL.Q signal	15kHz LPF	SUB : V ₄ = 5V	V ₈ , V ₉	Measure level at 1kHz first and compare to its level.
9	MONO : 10kHz, 250mV _{rms}		—		
10	SUB : 10kHz, 150mV _{rms} , 100% modulation BIL.Q signal		V ₄ = 5V		
11	MONO : 1kHz, 250mV _{rms}	15kHz LPF	—	V ₈ , V ₉	Measure distortion factor of output.
12	SUB : 1kHz, 150mV _{rms} , 100% modulation		V ₄ = 5V	V ₈ , V ₉	Measure distortion factor of output.
13	MONO : 1kHz, 250mV _{rms}	15kHz LPE	—	V ₈ , V ₉	Compare when no signal.
14	SUB : 1kHz, 150mV _{rms} , 100% modulation		V ₄ = 5V	V ₈ , V ₉	Compare when no signal.
15	MONO : 1kHz, 250mV _{rms}	1kHz BPF	V ₄ = 5V	V ₈ , V ₉	Measure output leakage signal in SUB mode.
16	SUB : 1kHz, 150mV _{rms} , 100% modulation		V ₄ = 0V	V ₈ , V ₉	Measure output leakage signal in MAIN mode.
17	SUB carrier, BIL.Q signal	—	V ₄ = 0V	V ₈ , V ₉	Measure residual carrier (31.5kHz)
18	SUB carrier, BIL.Q signal	—	V ₄ = 5V	V ₈ , V ₉	Measure residual carrier (63.0kHz)
19	Only R-ch 100% modulation, STE.Q signal	1kHz BPF	—	V ₈ , V ₉	Measure comparison with signal outputted to L when R is 1.
20	BIL.Q signal	—	—	V ₁	Measure 922.5Hz detection output.
21	BIL.Q signal	—	—	18Pin LED	Measure level difference until pin 18 LED lamp extinguishes, lowering level from 56.6mV _{p-p} .

NOTE	INPUT SIGNAL	FILTER	APPLIED VOLTAGE	MEASUREMENT PIN	MEASUREMENT METHOD
22	MONO : 1kHz, 250mV _{rms}	1kHz BPF	V ₇ = 5V	V ₈ , V ₉	Measure signal outputted when muting.
23	—	—	V ₇ = 0→5V	V ₈ , V ₉	Measure voltage change of output when V ₇ = 0 is changed to 5V.
24	MONO : 1kHz, 250mV _{rms}	—	V ₇ = 0 ~ 5V	V ₈ , V ₉	Measure voltage that V ₈ and V ₉ output signal is lower than 1mV _{p-p} , raising V ₇ gradually from 0V.
25	SUB : 1kHz, 150mV _{rms} , 100% modulation BIL.Q signal	—	—	V ₁	Compare level when only SUB signal to level when only BIL.Q signal.

(Input signal)

BIL.Q signal : Carrier 55.07kHz, modulation frequency 922.5Hz, 60% AM modulation, 56.6mV_{p-p}

STE.Q signal : Carrier 55.07kHz, modulation frequency 982.5Hz, 60% AM modulation, 56.6mV_{p-p}

SUB signal : Carrier 31.5kHz, FM modulation, 150mV_{rms}

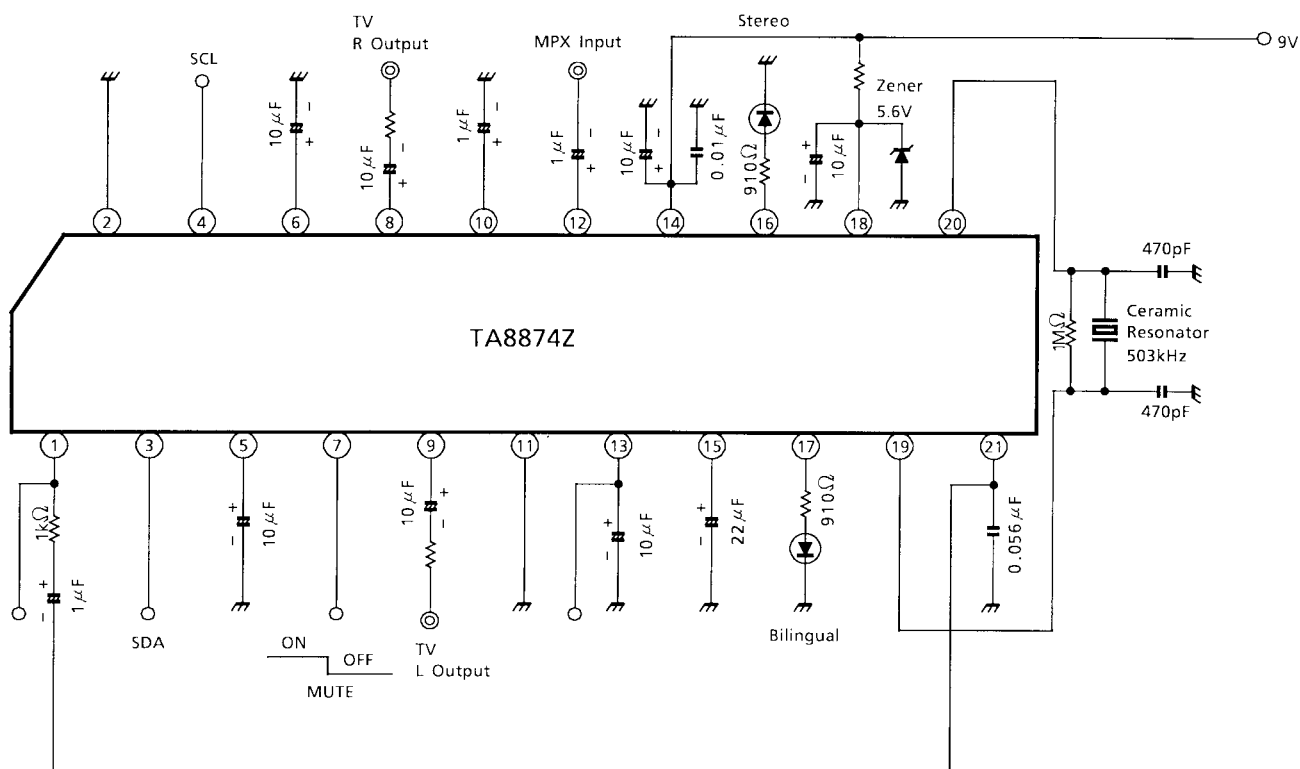
(Filter)

L.P.F. : Biquadratic Butterworth 15kHz

B.P.F. : Quadratic 1kHz, bandwidth 200Hz

— : Through unless otherwise specified.

TEST CIRCUIT

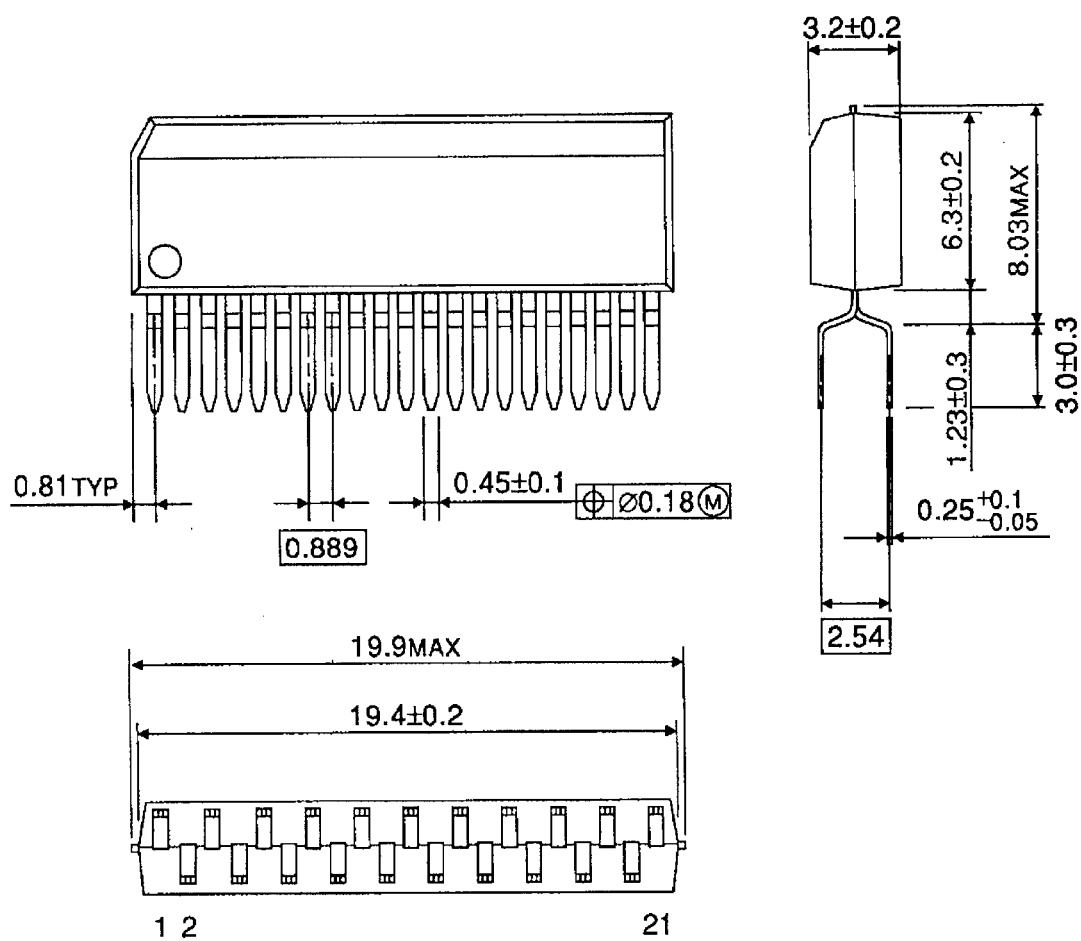


Ceramic resonator : CSB503-E7 (MURATA MFG. Co., LTD.)

PACKAGE DIMENSIONS

SZIP21-P-0.89

Unit : mm



Weight: 1.0 g (Typ.)