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	13. MAR '97		

DEVICE SPECIFICATION FOR
Single conversion tuner for cable modem

MODEL NO. CASD19E04

FOR CUSTOMER'S APPROVAL

PUBLISHED
MAR-13 '97
SHARP CORPORATION
ELECTRONIC COMPONENTS GROUP
ENGINEERING COMPONENTS DIVISION

☐ CUSTOMER'S APPROVAL

DATE

BY

PRESENTED
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ELECTRONIC COMPONENTS (ELECOM) GROUP

1	General	
1-1	Application	This tuner is intended to use in cable modem.
1-2	Receiving frequency range	VHF LOW 17to 113MHz, VHF HIGH 150 to 410MHz, UHF 418 to 866MHz
1-3	Input level	-12dBmV to 17dBmV
1-4	Nominal input impedance	75 Ω Unbalance
1-5	Nominal output impedance	75 Ω Unbalance
1-6	Intermediate frequency	36.15MHz
1-7	3dB Band width	8MHz (typ.)
1-8	Channel selection system	Frequency synthesizer (I2C-bus)
1-9	PLL step size	62.5kHz (PLL internal reference : 62.5kHz)
1-10	X'tal reference frequency	4.0MHz

1-11 Operating voltage

Terminal	Description		Voltage (V)	Condition
B1	Main supply		9.0±0.45	
B2	Main supply		5.0±0.25	
BT	Tuning supply		30.0±1.5	
AGC	Gain control		0～5	5V to max gain
PLL control		VH(=1)	3～5.5	SCL, SDA
		VL(=1)	1.5 max	

1-12 Breakdown voltage

B1	Main supply	11.0	
B2	Main supply	6.0	
BT	Tuning supply	32.0	
AGC	Gain control	6.0	
PLL control		5.5	SCL, SDA

1-13 Temperature and humidity

Temperature	Humidity		Condition
-15℃～70℃	90%RH max.	Storage	
-10℃～50℃	85%RH max.	Operating	

1-14 Circuit block diagram — Figure 1

2	Mechanical characteristics	
2-1	Appearance	No appreciable defects in appearance
2-2	Shape and dimensions	As per attached outline drawing. (Figure 2)
2-3	Mounting on PC board	Must insert easily into PC board tuner holes as shown in the attached drawing. (Figure 2)

2-1	Terminal strength 1) IF output and Power supply terminal. 2) ANT terminal	Tensile strength Terminal No. 2～10 : 29.4N min. (3kgf) Forses required for insertion and extraction. 1. Force required for initial insertion :68.6N max. (Senter contact : ϕ 2.36mm±0.076mm) (Outer contact : ϕ 9.525mm±0.05) 2. Force required for initial extraction : 9.8N min. (Senter contact : ϕ 2.36mm±0.076mm) (Outer contact : ϕ 9.5257mm±0.05)
3	Test condition	
3-1	Supply voltage	B1 : 9.0V±0.1V B2 : 5.0V±0.1V BT : 30.0V±0.1V AGC : 5.0V±0.1V
3-2	Ambient temperature	25°C±2°C
3-3	Ambient humidity	55%RH±10%RH
3-4	Receiving channel and input level (CM, IM, CTB)	Receiving channel: STD103(47MHz～862MHz); Input level: +17dBmV; Modulation: CW or 15.75kHz, 100%AM
		Set AGC voltage to keep IF output at +30dBmV
4	Electrical characteristics	Electrical characteristics involve the spread of values guaranteed within the specified test condition. (Refer to 3-1～3-3)

		Min.	Typ.	Max.	Unit	Condition
4-1	Current consumption					
	B1 (9.0V)		25		mA	
	B2 (5.0V)		145		mA	
	BT (30.0V)		1.5		mA	
	AGC (5V)			1	μA	
4-2	Conversion gain	28		45	dB	
4-3	Noise figure			9	dB	
4-4	AGC range	25			dB	AGC=0.5V
4-5	Return loss					
	Input terminal	10			dB	From 5MHz to 40MHz
		14			dB	From 40MHZ to 862MHZ(slope allowed:-1.5dB/oct until 10dBmin)
4-6	IF output bandpass response			3	dB	36.15MHz±2.75MHz
4-7	Group delay flatness			100	ns	36.15MHz±2.5MHz
4-8	Cross modulation			-50	dBc	Refer to 3-4

		Min.	Typ.	Max.	Unit	Condition
4-9	Intermodulation					
	1) 2nd/3rd order beat			-10	dBc	Refer to 3-1
	2) Composite triple beat			-10	dBc	Refer to 3-1
4-10	Spurious signals at input terminal			-35	dBmV	51 to (and including) 300
				-35	dBmV	300 to (and including) 450
	Local leakage			-20	dBmV	450 to (and including) 1000
4-11	Image rejection			-10	dB	
4-12	IF rejection			-60	dB	
4-13	Local phase noise		-82	-75	dBc/Hz	10kHz offset
			-105	-95	dBc/Hz	100kHz offset
4-14	LO frequency accuracy			±50	kHz	Over temperature of-10 to 50℃
4-15	PLL setting time			100	msec	*
4-16	AGC curbe	1.8		2.7	V	At -10dB gain (-10℃ to 50℃)

* Setting time is measured after reference & local frequency set up data is transmitted. (f0±1kHz)

5 Environmental tests

After the test(5-1～5-3) no mechanical looseness shall be present, the conversion gain and noise figure shall stay within ±3dB of the original.

5-1 On-load test

1) In a high temperature, high humidity environment. (40℃, 90%RH for 500hours)

5-2 Vibration test

2) In a high temperature environment. (60℃ for 500hours)

In 3 different directions, scanning time with 1min, for 2hours with peak to peak amplitude of 1.5min at a rate of 10Hz～55Hz.

5-3 Impact test

In 686m/S2(70G) on 6 planes, 3 times each.

6 Others

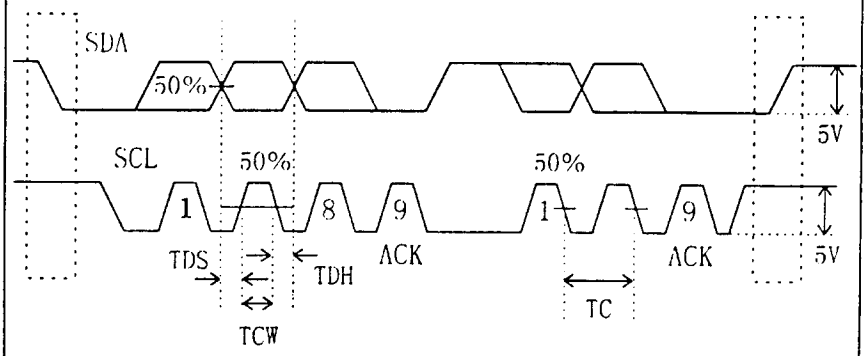
6-1 Terminal affinity to solder

Sample terminals to be soldered shall be dipped in methanol (as per JIS-K-1501) into which rosin (as per JIS-K-5902) is dissolved to a concentration of 7～10% for about 5s, then dipped in a solder bath containing molten solder (JIS-Z-3282H, 63A) maintained at 230℃±5℃ for 3±0.5s. After removal from the solder bath, each sample terminal tested shall show solder adhering over 90% of the submerged portions along the entire circumference.

6-2 PLL data format

Bus inputs SCL, SDA	Symbol	Min	Typ	Max	Units	Con.
HIGH input voltage	VH	3		5.5	V	
LOW input voltage	VL			1.5	V	
HIGH input current	IH			10	μA	VH=5 V
LOW input current	IL	-20			μA	VL=0 V

	Symbol	Min	Typ	Max	Units	Conditions
S DATA set up time	TDS	0.1			μs	
S DATA hold time	TDH	0			μs	
S CLOCK pulse width	TCW	0.6			μs	
S CLOCK frequency	TC	2.5			μs	



	MSB	bit6	bit5	bit4	bit3	bit2	bit1	LSB	Ack
Address Byte	1	1	0	0	0	MA1	MA0	0	Ack
Prog. Divider Byte1	0	n14	n13	n12	n11	n10	n9	n8	Ack
Prog. Divider Byte2	n7	n6	n5	n4	n3	n2	n1	n0	Ack
Control Byte1	1	5I	0	0	1	1	1	0	Ack
Control Byte2	U/V	×	×	×	×	P2	P1	P0	Ack

Ports P0, P1, P2 :
High Open-collector output is active
Low OPen-collector output is inactive

Bandswitch switch V/U :
High switch to OSC/MIX UHF
Low Switch to OSC/MIX VHF
Pump current 5I:
High switch to high current

Table 1 : Band Selection

	U/V	P2	P1	P0
UHF	1	0	0	1
VHF high	0	0	1	0
VHF low	0	1	0	0

Table2:Address Selection

Voltage at CAS	MA1	MA0
(0...0.1)*B2	0	0
open circuit	1	0
(0.4...0.6)*B2	0	1
(0.9...1)*B2	1	1

Divider ratio:

fvco=N×62.5kHz

N = 16384×n14+8192×n13+4096×n12+2048×n11
+1024×n10+512×n9+256×n8+128×n7+64×n6
+32×n5+16×n4+8×n3+4×n2+2×n1+n0

fvco : Local frequency

fosc : 4MHz (X' tal reference frequency)

R : 64 (Reference divider)

6-3 Channel condition

VHF low 83.15MHz～179.15MHz (fvco)

VHF high 186.15MHz～446.15MHz

UHF 454.15MHz～902.15MHz

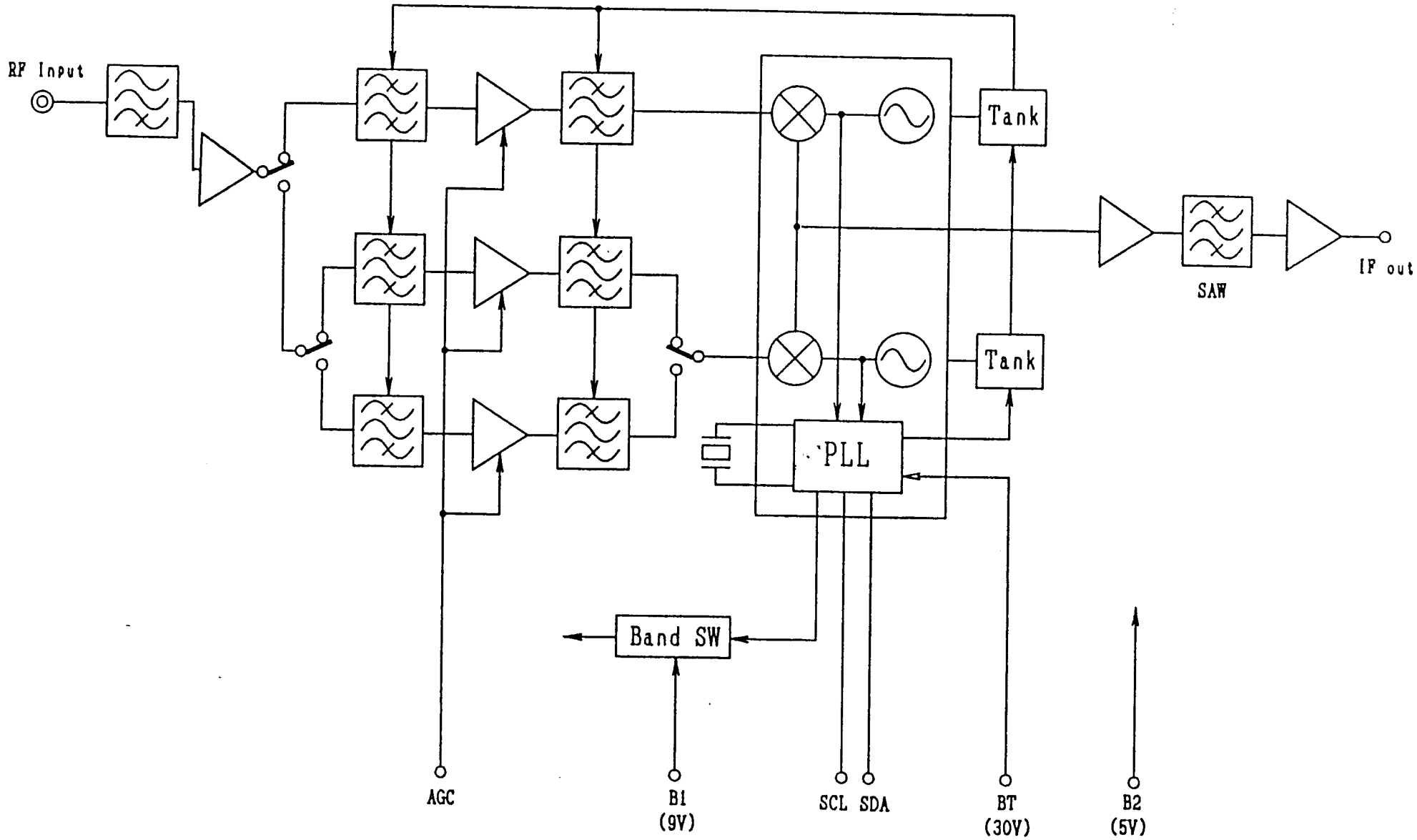


Figure 1 Block Diagram

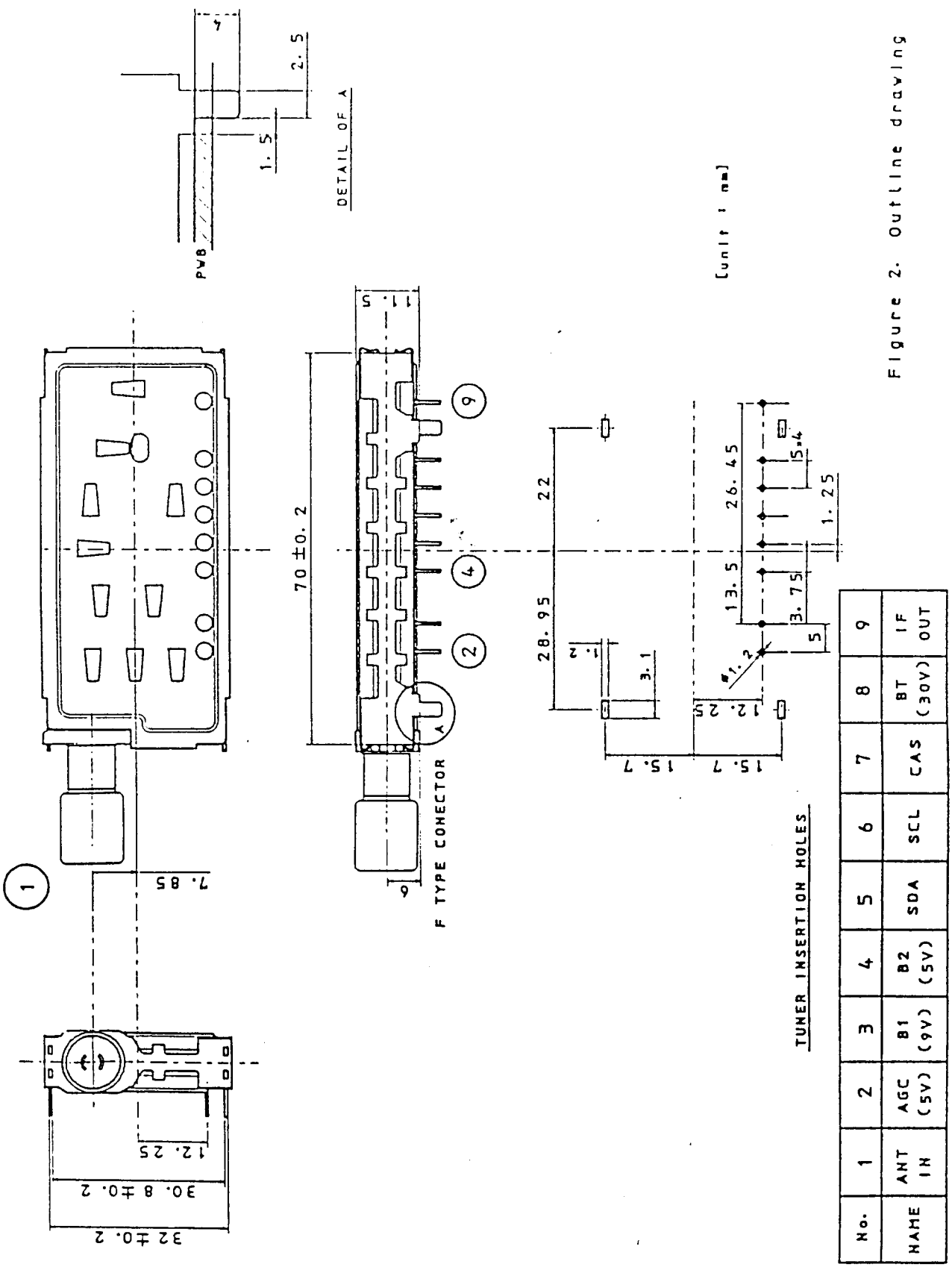


Figure 2. Outline drawing

No.	1	2	3	4	5	6	7	8	9
NAME	ANT IN	AGC (5V)	B1 (9V)	B2 (5V)	SDA	SCL	CAS	BT (30V)	IF OUT