ATT:

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		PAGE 10
		REPRESENTATIVE DIVISION ☒ ELECTRONIC COMPONENTS DIV. ☐ OPTICAL DEVICE DIV. ☐ PHOTO VOLTAICS DIV.

DEVICE SPECIFICATION FOR

4MODE SYSTEM PLL RF MODULATOR

MODEL NO. E2354T

(PLL, PAL-G/I/K/M, TSG, 21ch~69ch)

☐ CUSTOMER'S APPROVAL

DATE

BY

PUBLISHED

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SHARP CORPORATION
ELECTRONIC COMPONENTS
ENGINEERING DEPT

PRESENTED

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SHARP CONFIDENTIAL
AND PROPRIETARY

MODEL No.	

RECORDS OF REVISION

DATE	REVISED No.	SUMMARY	A SPACE FOR REMARKS	CHECK & APPROVAL
26. MAR. 1997	△1	1 3)Output channel 21－69CH → 21－69CH(471.25－855.25MHz) Frequency add. 4 (7) software information I2C BUS timming chart add. I2C BUS DATA FORMAT Control Byte1 C1;LSB part 1 → 0 Correction.		
1. JUL. 1997	△2	4 (7) software information Beginning sentence change. Bus data transmission change. Example data add. POWER ON RESET MODE Del. 5 6) Cross modulation a) 50dB min. → 60dB min. b) 55dB min. → 65dB min.		K. Sato

1. General Description

1) Transmission system: Europe standard system
2) Color system : PAL-G/I/K/M
⚠ 3) Output channel : 21－69CH(471.25－855.25MHz)
4) Output impedance : 75Ω unbalanced
5) Power source : +B(MOD) DC 5V, +B(BST) DC 5V, +B(BT) DC 33V~28V
6) Video carrier frequency controls : I²C bus (21ch～69ch)
7) P/S ratio controles : I²C bus (-10dB～-17dB)
8) TSG controles : I²C bus (TSG ON/OFF)
9) Sound carrier frequency controls : I²C bus (5.5/6/6.5/4.5MHz)

2. Test Condition

1) Power source +B(MOD): DC 5V±0.1V(Ripple 10mV p-p max.)
+B(BST): DC 5V±0.1V(Ripple 10mV p-p max.)
+B(BT) : DC 33V~28V±0.1V(Ripple 5mVp-p max.)
2) Unit setting conditions
a) Video
Apply 75% modulated color bar signal 1Vp-p and set modulation factor and V/S ratio to specified values. For modulation factor setting, WHITE signal shall be 1Vp-p V/S=7/3, APL=50%
b) Audio
Apply sine wave of 1kHz, －5dBs(approx 1.24Vp-p)
3) Ambient conditions
Temperature: 25±3℃
Humidity : 65±5% RH
However, if judgement is not in doubt, standard temperature may considered as 15～30℃ and humidity 45～85% RH.
4) Operating conditions
ANT-TV through mode : +B(BST) ON
ANT-TV through, MOD mode : +B(BST) ON, +B(MOD) ON

3. Mechanical Performance

1) Appearance : There shall be no noticeable defects.
2) Shape and dimensions : As shown in the outline drawings.

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4. Electorical perfoormance(RF MOD portion)

(1) Video characteristics

Item	Specified Value	Remarks
1) Input impedance	1kΩ±20% unbalanced	Measuru at 0～5MHz
2) Input signal level	1Vp-p synchronous(−)	When load of 82Ω is applied.
3) Modulation factor	80±6%(36CH) 80±7%(other ch)	When load of 82Ω is applied.
4) VS/ratio	7 +0.25, −0	Input:Staircase wave 1Vp-p synchronous(−)
	3+0, −0.25	V/S=7/3
5) Amplitude freguency characteristics	+2, −3dB max.	Using 1MHz as a standard in the 0.5～5MHz range, measure at RF output using multiburst or sweep generator. Spectrum analyzer band is 300kHz.
6) Differential gain	±10% max.	Superimposed 4.42MHz sine wave level shall be 20% of staircase wave level, measured in a modulation factor range of 65～78% and an APL range of 10～90%, However, differential gain of demodulator unit shall reguire correction.
7) Differential phase	±10° max.(36CH) ±15° max.(other ch)	Same as Para.6) above
8) Change in modulation factor to APL	±5% max.	Within an APL range of 10～90% With APL 50% as reference.
9) S/N ratio	45dB(p-p/rms)min.	Measure With standard demodulator output.

(2) Audio system characteristics

Item	Specified Value	Remarks
1) Input impedance	10kΩ min.unbalanced	Measure at 0.1～10kHz.
2) Input signal level	−5dBs	Referred to as sine wave 1.24Vp-p.
3) Amplitude freguency characteristics	+2, −3dB(PAL-G/I/K)	Using 1kHz as a standard in the 100Hz～10kHz range, measure deviation from 50μS preemphasis characteristics theoretical value.
4) Modulation factor	100±24%(PAL-G/I/K) 100±28%(NTSC-M)	100%=±50kHz(PAL-G/I/K) 100%=±25kHz(NTSC-M)
5) Distortion rate	3.0% max.	
6) S/N ratio(incls. buzz)	40dB min.	

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(3) output system characteristics

Item	Specified Value	Remarks
1) Video carrier freguency	±100kHz max.	For test conditions, temperature shall be 25℃, and humidity 65% RH.
2) Audio freguency	±8kHz max.	Same as above.
3) Video output level	72^{+4}_{-4}dBμ (36ch) 72^{+4}_{-5}dBμ (other ch)	p-p level(AT modulation):75Ω load
4) Audio output level difference (P/S ratio)	±3dB max. (36ch) ±4dB max. (other ch)	Difference between video output level and audio output level(Audio non modulation).
5) output terminal spurious(for fp output level)		
a) Specific frequency i)	±5dB max.	fp−5.5/6/6.5/4.5MHz
ii)	-55dB max.	G:fp+11/16.5MHz, 1/2fp, 3/2fp, 1.5fp I:fp+12/18MHz, 1/2fp, 3/2fp, 1.5fp K:fp+13/19.5MHz, 1/2fp, 3/2fp, 1.5fp M:fp+9/13.5MHz, 1/2fp, 3/2fp, 1.5fp (fp:video carrier freguency)
b) Other frequencies i)	-60dB max.	Measure as per FTZ Regulations:0～1,000MHz, excluding the freguency in Para.a) above.
ii)	46dBμ max.	2fp(twice video carrier frequency)
iii)	46dBμ max.	3fp(thrice video carrier frequency)
6) Spurious radiation within the band	-55dB max.	Between fp and fs.
7) Chroma beat (at P/S ratio 16dB)	55dB max.	Apply 4.43MHz 0.4Vp-p sine wave to video input and measure using spectrum analyzer.

(4) Temperature characteristic

Item	Specified Value	Remarks
1) Video modulation factor, temperature stability	±12%	Measure at 0～60℃:Check for variation from initial value. 25℃ standard
2) Vidio carrier, temperature stability	±250kHz	Same as above
3) Audio modulation factorte, temperature stability	±10%	Same as above
4) Audio carrier, temperature stability	±15kHz	Same as above

Item	Specified Value	Remarks
5) Video output level temperature stability	±5dB	Measuru at 0~60℃:Check for variation from initial value. 25℃ standard.
6) Audio output level difference	±5dB	Same as above
7) Synchronous level, temperature stability	V/S=7±0.5/3±0.5	Same as above
8) Differential gain, temperature stability	±15% max.	Same as above

(5) Overall picture and total guality

Operation shall be problem-free. This paragraph is subject to sensory tests; therefore, any discrepancy arising between the parties concerned regarding final judgement shall be settled by mutual consent. (Limit standards shall be specified as needed.)

(6) Power source

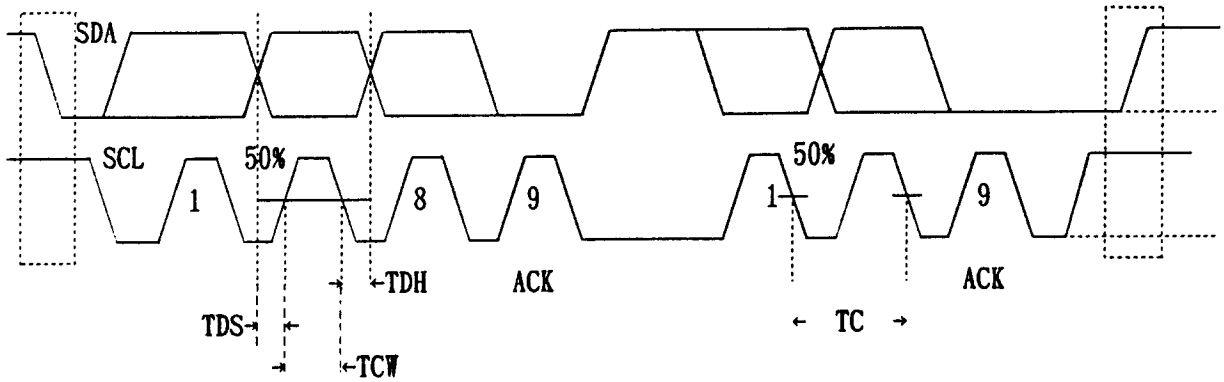
1) Input voltage : +B(MOD)DC 5±0.2V: +B(BT)DC33V~28V±0.2V
Alowable ripple voltage: 10mVp-p max. +B(MOD)
:10mVp-p max. +B(BST)
: 5mVp-p max. +B(BT)

2) Current consumption : MOD: 85mA Max. TYP. 65mA
BST: 55mA Max. TYP. 35mA

(7) Software information

⚠ The synthsizer is controlled via a two-wire I²C bus receiver. For programming, the address byte has to be sent first. Then data bytes are used to set the 10 programmable bits of the dividing number N, the test bits and the output port state. Note that at the power-up of the IC, the four data byte must be sent.

	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	



I2C BUS DATA FORMAT

byte		MSB							LSB	
Address Byte	ADR	1	1	0	0	1	0	1	0	ack.
Control Byte1	C1	1	*	*	*	PS2	PS1	PS0	0	ack.
Control Byte2	C2	0	PSA	0	FA1	FA0	*	*	*	ack.
Prog. Data Byte1	PD1	0	TSG	N10	N9	N8	N7	N6	N5	ack.
Prog. Data Byte2	PD2	N4	N3	N2	N1	0	1	0	0	ack.

* Don't care

⚠ Bus data transmission : ADR+C1+C2+PD1+PD2 or
ADR+PD1+PD2+C1+C2

ack. is the acknowledge bit.

N1, N2, ···, N9, N10 are the 10 programmable bits of N.

1. PS2~PS0:Picture to sound ratio setting

PS ratio	PS2	PS1	PS0
-10dB	0	0	0
-11dB	0	0	1
-12dB	0	1	0
-13dB	0	1	1
-14dB	1	0	0
-15dB	1	0	1
-16dB	1	1	0
-17dB	1	1	1

2. PSA:Output Control(Control of power save)

1 ... Normal operation(Power save off.)

0 ... RF signal is not output.(Power save on.)Becomes waiting for the bus data.
And power supplies other than the bus decoder are turned off.

The data of the decoder is maintained while Vcc is added.

When Vcc is turned off , power on reset changes the data of the decoder by turning on Vcc again.

3. FA1~FA0:Sound Inter Carrier Frequencies setting

FA1	FA0	SOUND INTER CARRIER FREQUENCY	FREQUENCY DEVIATION
0	0	4.5MHz(NTSC-M)	±25kHz
0	1	5.5MHz(PAL-G)	±50kHz
1	0	6.0MHz(PAL-I)	±50kHz
1	1	6.5MHz(PAL-K)	±50kHz

4. TPSG:Contorol of test pattern signal generator

1 ... ON

0 ... OFF(normal operation)

5. N10~N1:Programmable Divider data setting

The Frequency of Vco is calculated by next expression.

fv_{co} = 31.25kHzx32xN+250kHz

N = 512xN10+256xN9+128xN8+64xN7+32xN6+16xN5+8xN4+4xN3+2xN2+N1

The frequency step is 1MHz, and 250kHz is given in the IC.

The divider data N is made frequency -250kHz of the set channel.

⚠ @EXAMPLE Data for use modulator

- VCO Frequency Setting : 591.25MHz(CCIR 36ch)
- Television System : System G(Sound carrier frequency:5.5MHz,
  FM deviation:±50kHz,
  Video modulation polarity:negative modulation)
- P/S Ratio Set Up : -16dB
- White Clip : ON
- Power Save : OFF(Normal operation. RF signal is output.)
- TPSG : OFF

Byte		MSB							LSB	
Address Byte	ADR	1	1	0	0	1	0	1	0	ack.
Control Byte1	C1	1	*	*	*	1	1	0	0	ack.
Control Byte2	C2	0	1	0	0	1	*	*	*	ack.
Prog. Data Byte1	PD1	0	0	1	0	0	1	0	0	ack.
Prog. Data Byte2	PD2	1	1	1	1	0	1	0	0	ack.

* Don't care

5. Booster

Item	Specified Value	Remarks
1) Working frequency	BAND : 47～862MHz	
2) Gain		
ANT IN→TV OUT	0 $^{+3}_{-4}$ dB	
3) Noise facter		
ANT IN→TV OUT	11dB max.	Next NF 3dB max.
4) VSWR		
a) ANT IN	3 max.	At 75Ω terminal(other terminals)
b) TV OUT	3 max.	At 75Ω terminal(other termainls)
5) ANT IN terminal leakage voltage	46dBμ max. (At 75Ω terminal)	At 75Ω terminal(other terminals)
⚠ 6) Cross modulation		
ANT IN→TV OUT		MOD power sourse:OFF
a) f1=200MHz, f2=500MHz, f(IM2)=700MHz	60dB min.	f(IM2)=f1+f2 RF input level=80dBμ (At 75Ω terminal)
b) f1=500MHz, f2=600MHz, f(IM3)=700MHz	65dB min.	f(IM3)=2f2-f1 RF inputy level=85dBμ (At 75Ω terminal)

6. Durabitity Test

1) Vibration test

Apply vibration of 2mm full amplitude, 1,500 times/minute from three directions for 10 minutes each:there shall be no looseness,etc.,and all performance reguirements shall be satisfied.

2) Impact test

Apply a 70G impact using an impact tester; no damaged parts or looseness shall be observed,and performance shall not be remarkably affected.

3) Moisture resistance

Test samples shall be left in an environment with temperature at 40±5℃ and relative humidity at 90+0,−3%, for 96 hours,then left at nomal temperature and humidity for 90 minutes.The unit shall then operate normally without malfunction.

4) High temperature resistance

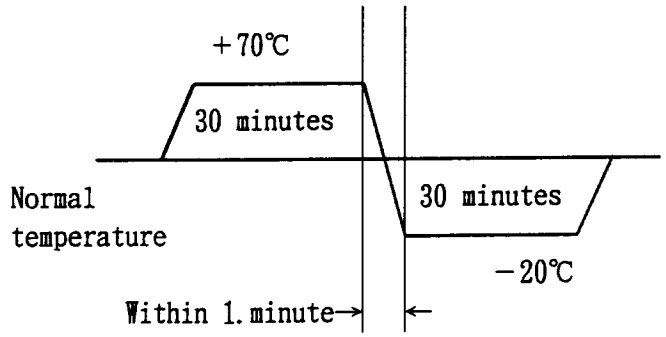
Test samples shall be left in a 70±2℃ bath for 98 hours, then at normal temperature and humidity for 90 minutes. The unit shall then operate normally without malfunction.

5) Low temperature resistance

Test samples shall be left in a −20±2℃ bath for 96hours, then at normal temperature and humidity for 90 minutes. The unit shall then operate nomally without malfunction.

6) Thermal shock resistance

10 test cycles shall be conducted under the following conditions and samples shall then be placed in a normal temperature and humidity atmosphere, cleared of excess water, left for 90 minutes. Subseguent operation shall be trouble-free.



7. Operating Conditions

1) Operating guarantee Conditions

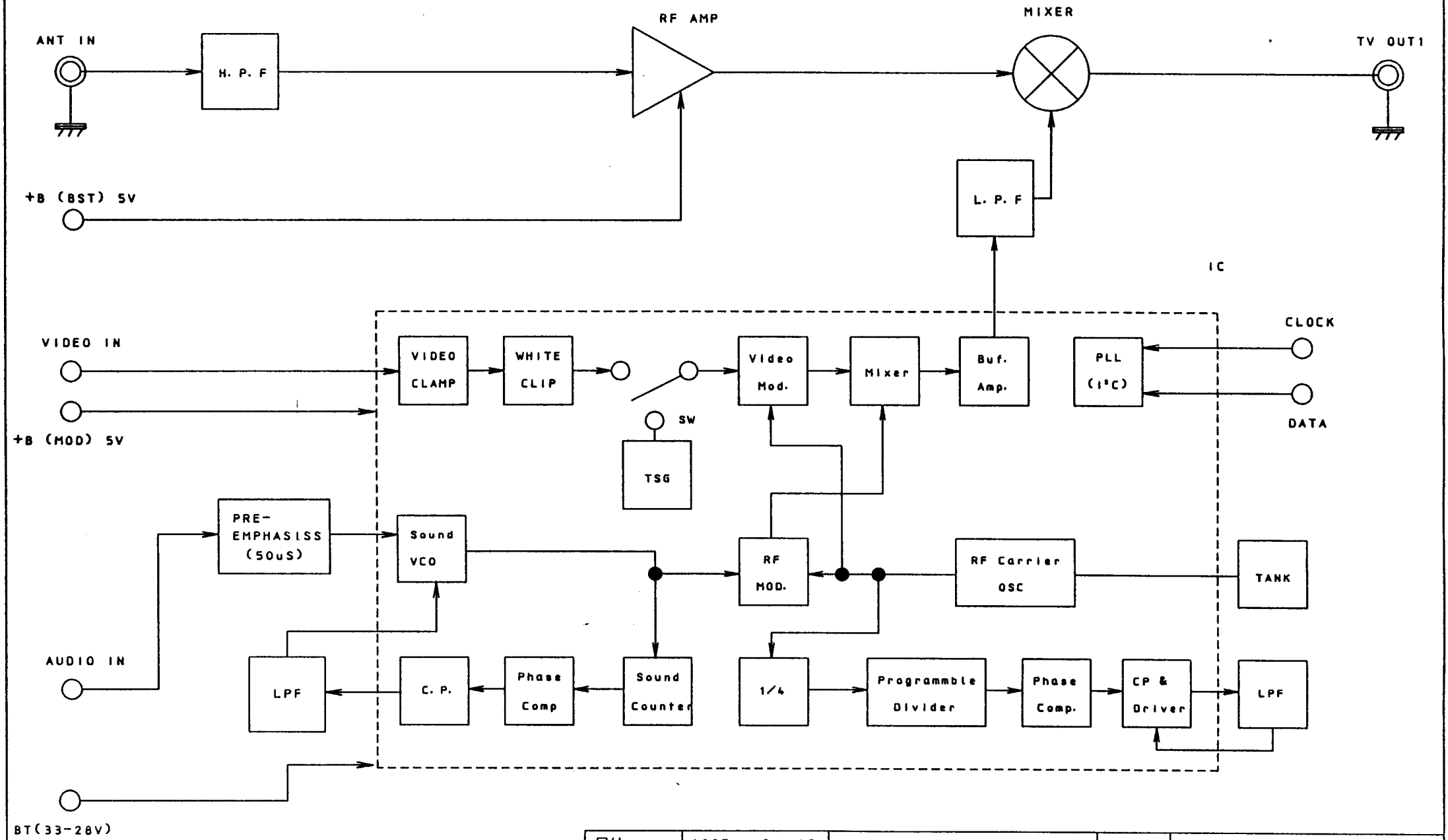
Operation shall be trouble-free nuder ±0～60℃ and 85% RH max.

2) Storage conditions

Temperature −10～70℃, humidity 90% RH max.

8. Electrostatic Test

Electrostatic test (15kV(+) and(−) polarities, 10 times each)shall be conducted on ANT IN and TV OUT terminals. Subseguent operation shall be troublefree. (C=200PF, R=500Ω)



日付 DATE		1997 2 18			
承認 APPROVE	検図 CHECK	検図 CHECK	製図 DRAW	設計 DESIGN	シャープ株式会社 電子部品事業本部
					部品事業部 1技 技術部
					SHARP CORPORATION

名称 NAME

Figure 1 :
CIRCUIT BLOCK DIAGRAM
E2354T

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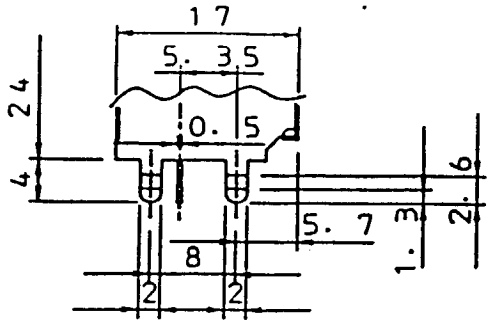
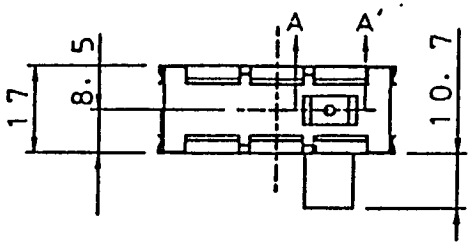
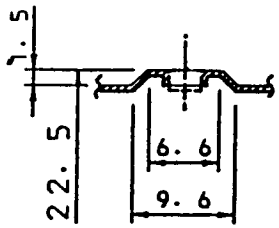
(S=2/1)

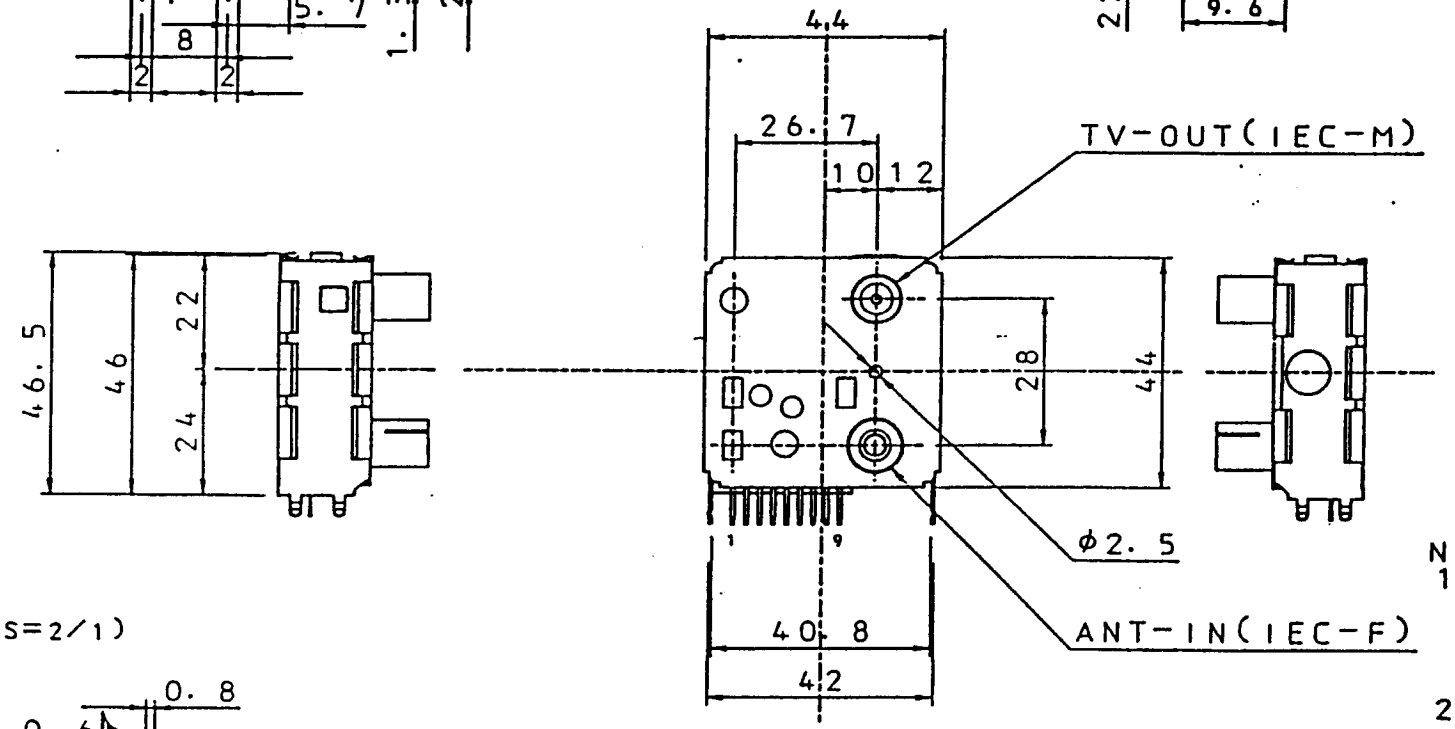






CONNECTOR LAYOUT

1. BT (33V～28V)
2. VIDEO IN
3. AUDIO IN
4. MD. +B(5V)
5. NC
6. NC
7. CLOCK
8. DATA
9. BST. +B(5V)



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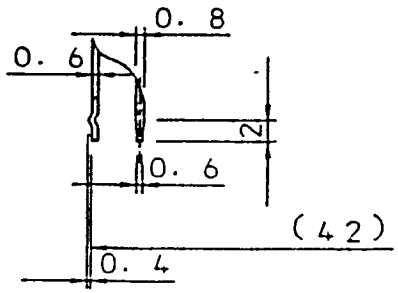

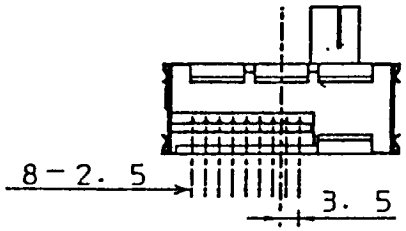

NOTE

1. TOLERANCE SHALL BE WITHIN ±0.5 UNLESS OTHERWISE SPECIFIED.
2. UNIT mm

APPLICABLE MODEL: E2354T	SCALE: 1/1	UNIT: 1=/	NAME: (PLL) RF MODULATOR
THICKNESS / PIECES	MATERIAL / FINISH		CODE
DATE: 1994 SEP 21	シャープ株式会社 電子部品事業本部		DRAWING No.
DESIGN / DRAW / CHECK / CHECK / APPROVED	SHARP CORPORATION		

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