SHARP

TO: SECT
Att: Mr. VINCENT LIN
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SPECIFICATIONS

Product Type VIDEO PROCESSING IC FOR COLOR TFT LCD

Model No. IR3Y31M

AN-RCB-96

※This specifications contains 44 pages including the cover and appendix.
If you have any objections, please contact us before issuing purchasing order.

CUSTOMERS ACCEPTANCE

DATE: ____________

BY: ____________

PRESENTED

BY: T. Ohno
T. OHNO
Dept. General Manager

SHARP CORPORATION ★ 4.17'98. MAIL DATE ★ IC TENRI GROUP

REVIEWED BY: H. Fujita

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Devices Engineering Dept.
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Tenri Integrated Circuits Group
SHARP CORPORATION

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●When using the products covered herein, please observe the conditions written herein and the precautions outlined in the following paragraphs. In no event shall the company be liable for any damages resulting from failure to strictly adhere to these conditions and precautions.

(1) The products covered herein are designed and manufactured for the following application areas. When using the products covered herein for the equipment listed in Paragraph (2), even for the following application areas, be sure to observe the precautions given in Paragraph (2). Never use the products for the equipment listed in Paragraph (3).

- ·Office electronics
- ·Instrumentation and measuring equipment
- ·Machine tools
- ·Audiovisual equipment
- ·Home appliances
- ·Communication equipment other than for trunk lines

(2) Those contemplating using the products covered herein for the following equipment which demands high reliability, should first contact a sales representative of the company and then accept responsibility for incorporating into the design fail-safe operation, redundancy, and other appropriate measures for ensuring reliability and safety of the equipment and the overall system.

- ·Control and safety devices for airplanes, trains, automobiles, and other transportation equipment
- ·Mainframe computers
- ·Traffic control systems
- ·Gas leak detectors and automatic cutoff devices
- ·Rescue and security equipment
- ·Other safety devices and safety equipment, etc.

(3) Do not use the products covered herein for the following equipment which demands extremely high performance in terms of functionality, reliability, or accuracy.

- ·Aerospace equipment
- ·Communications equipment for trunk lines
- ·Control equipment for the nuclear power industry
- ·Medical equipment related to life support, etc.

(4) Please direct all queries and comments regarding the interpretation of the above three Paragraphs to a sales representative of the company.

●Please direct all queries regarding the products covered herein to a sales representative of the company.

CONTENTS

1. Description

The Sharp IR3Y31M is a compact multi-functional IC with a luminance, chroma, interface and sync separator circuit for the NTSC/PAL TFT LCD color monitors all integrated onto a single chip. This IC contains a luminance AGC circuit, gamma correction circuits to convert composite video signal or Y/C signal to RGB signal that meets the specific requirements of the LCD panels.

Applications:
LCD color viewfinders, televisions and monitors

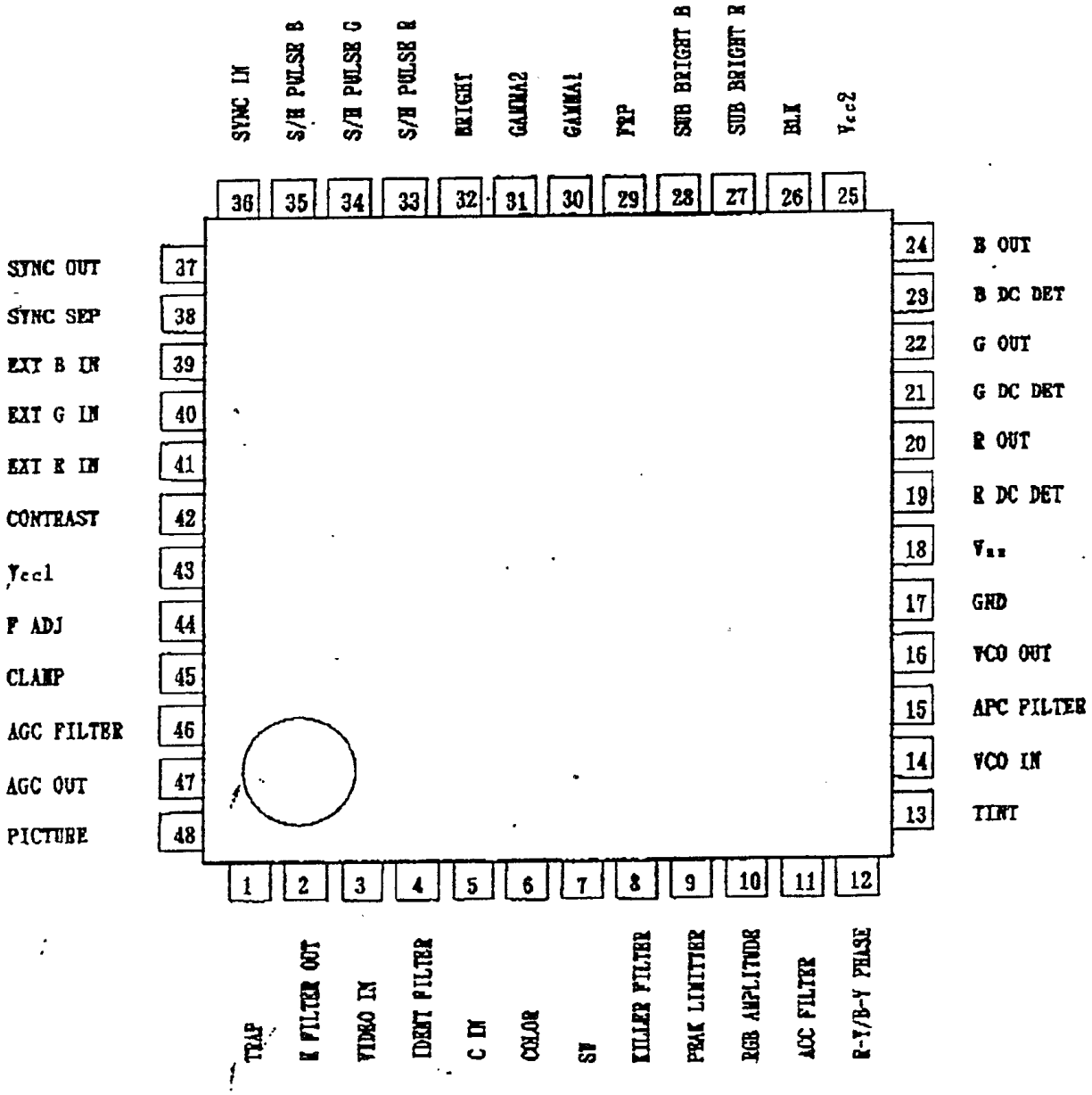
Features:
(1) Low power dissipation (160mW TYP.)
(2) Applicable to both NTSC and PAL (Simple PAL only)
(3) Accepts composite video signal and Y/C signal input
(4) Built-in TRAP and HPF
(5) Built-in image control circuit
(6) Built-in AGC circuit (AGC OFF function)
(7) Built-in gamma correction circuits
(8) Built-in polarity invertor circuits
(9) Accepts external analog R.G.B. inputs
(10) Built-in RB output signal delay circuits (S/H form)
(11) Built-in Blanking circuits

* Not designed or rated as radiation hardened
* Packaging material: Plastic
* Chip material and wafer substrate type: P type silicon
* Number of pins and package type: 48-pin quad-flat Package (0.5mm pich)
* Process (Structure): Bipolar

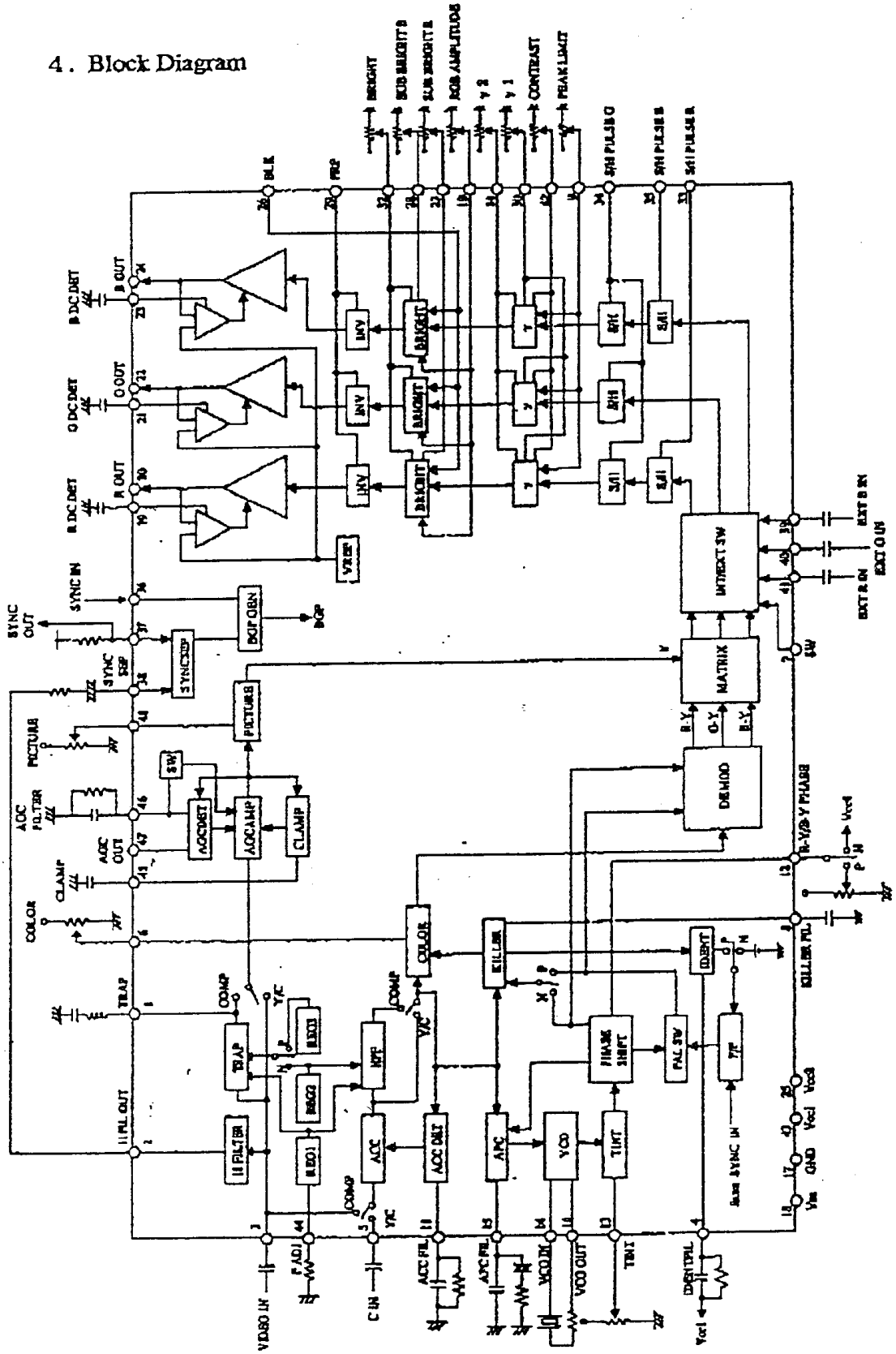
2. Terminal Name

Pin No.	Terminal Name	Pin No.	Terminal Name
1	TRAP	25	Vcc2
2	H FILTER OUT	26	BLK
3	VIDEO IN	27	SUB BRIGHT R
4	IDENT FILTER	28	SUB BRIGHT B
5	C IN	29	FBP
6	COLOR	30	GAMMA1
7	SW	31	GAMMA2
8	KILLER FILTER	32	BRIGHT
9	PEAK LIMITTER	33	S/H PULSE R
10	RGB AMPLITUDE	34	S/H PULSE G
11	ACC FILTER	35	S/H PULSE B
12	R-Y/B-Y PHASE	36	SYNC IN
13	TINT	37	SYNC OUT
14	VCO IN	38	SYNC SEP
15	APC FILTER	39	EXT B IN
16	VCO OUT	40	EXT G IN
17	GND	41	EXT R IN
18	V_{EE}	42	CONTRAST
19	R DC DET	43	Vcc1
20	R OUT	44	F ADJ
21	G DC DET	45	CLAMP
22	G OUT	46	AGC FILTER
23	B DC DET	47	AGC OUT
24	B OUT	48	PICTURE

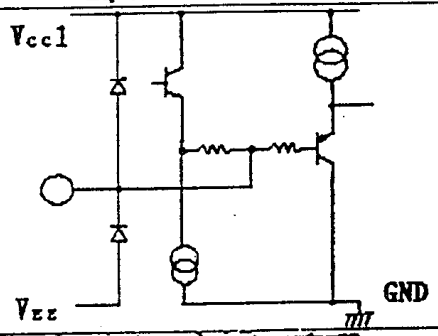
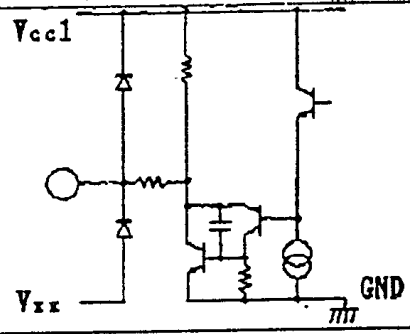
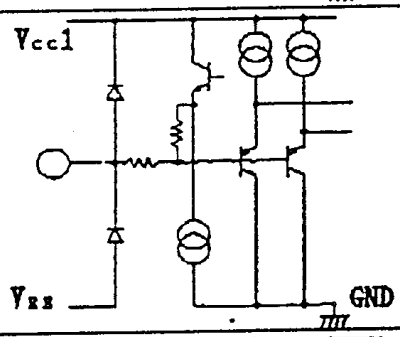
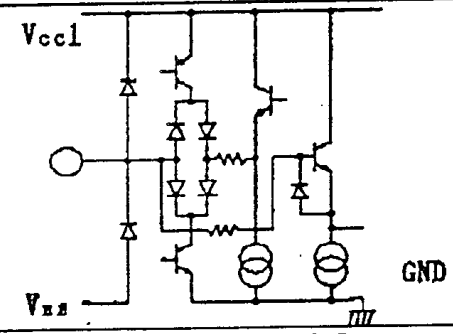
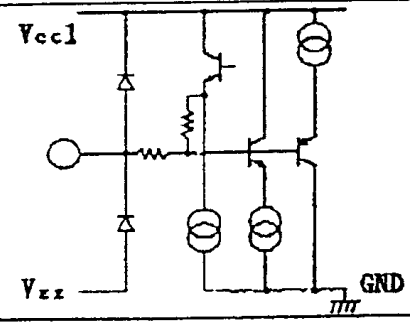
3. Terminal Assignments (TOP VIEW)

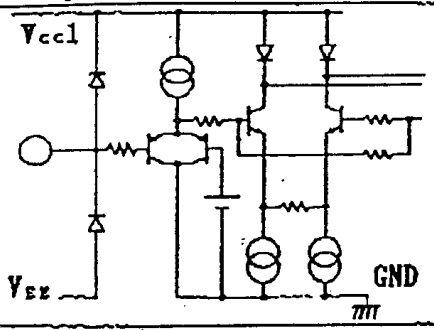
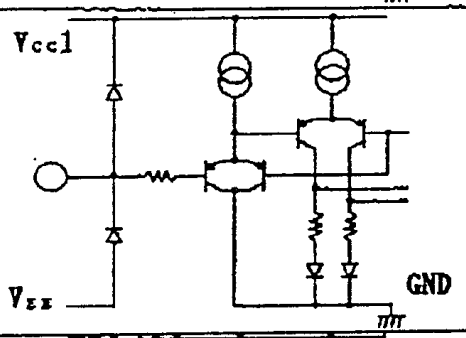
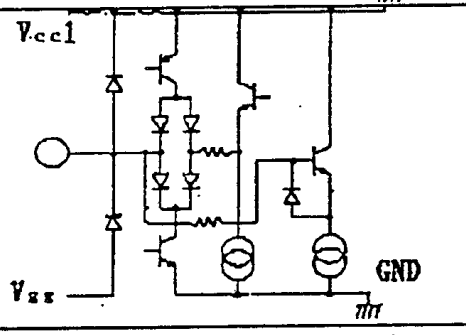
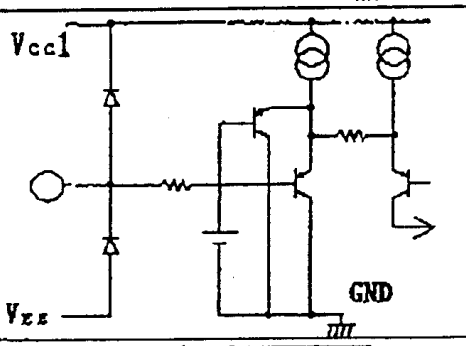
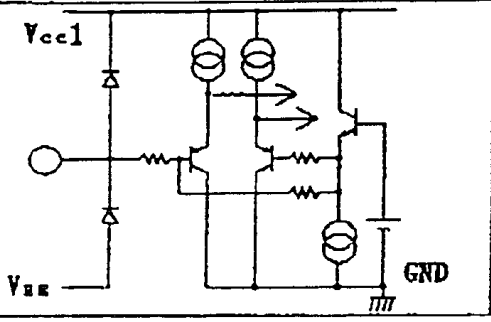


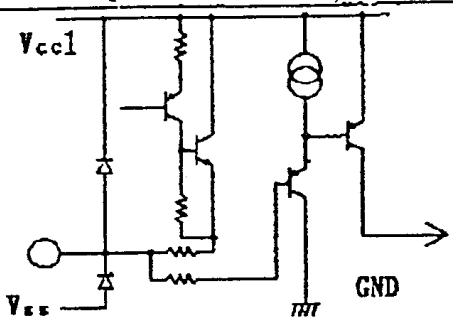
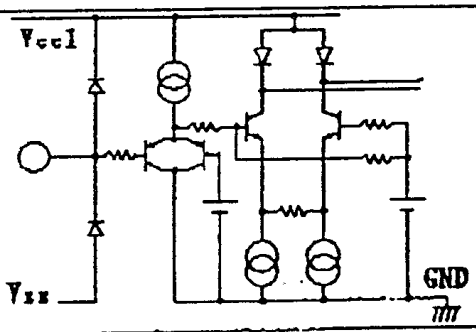
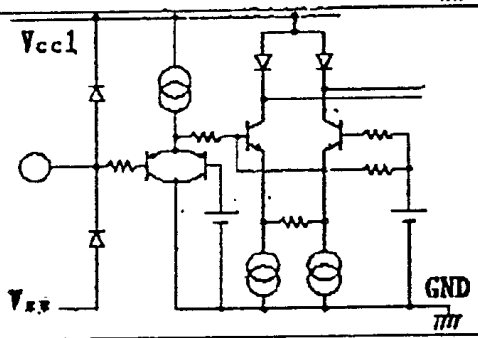
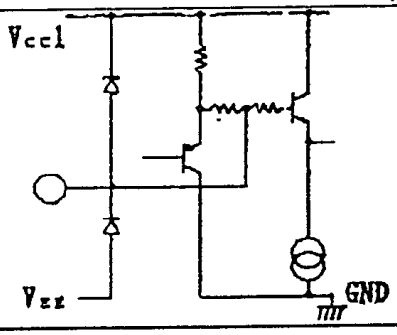
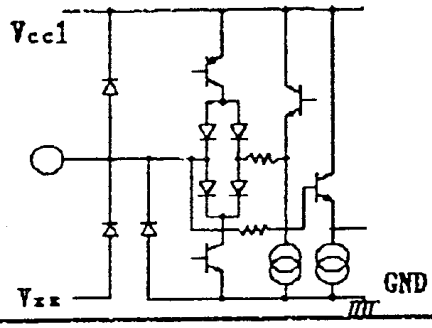
4. Block Diagram

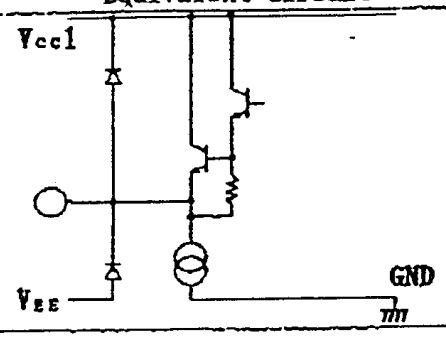
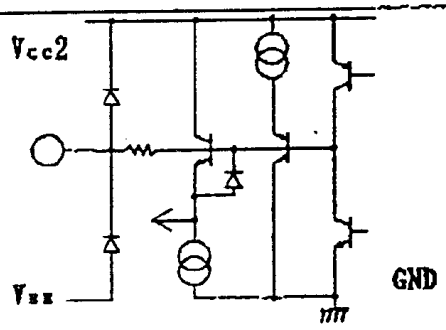
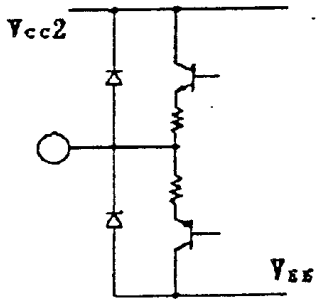
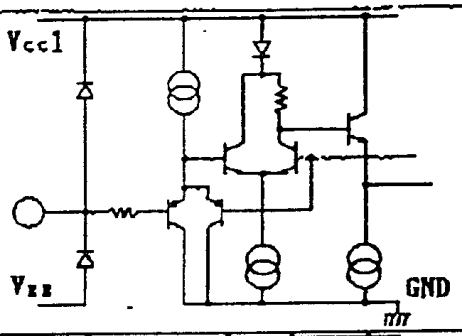
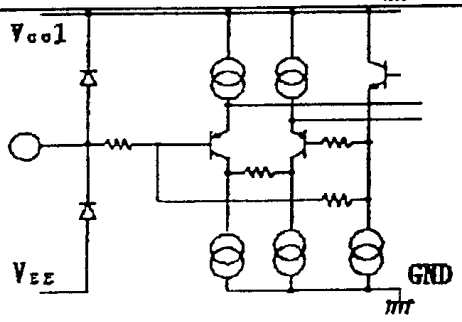


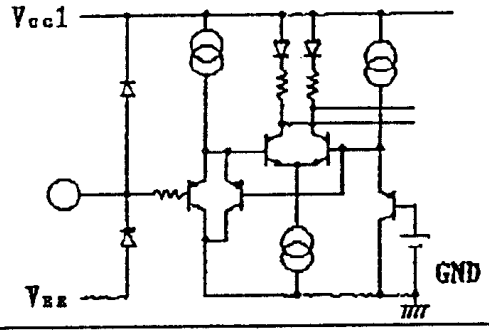
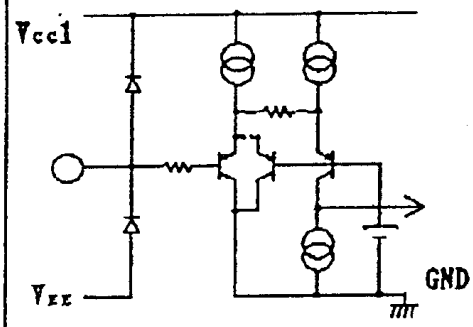
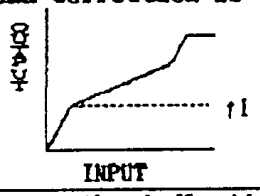
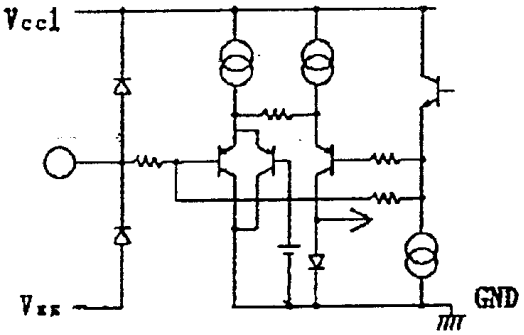
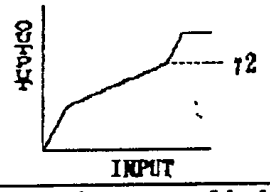
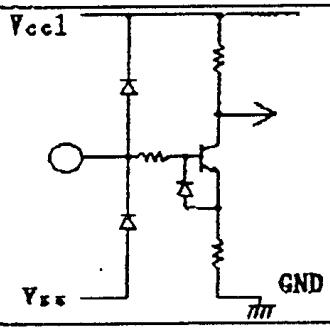
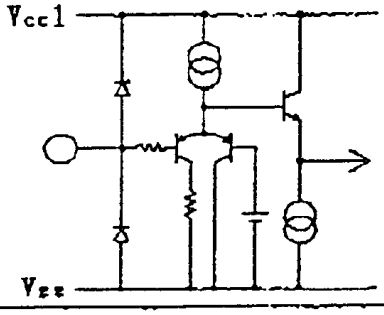
5. Description of Terminals (V_{cc1}=4.5V)

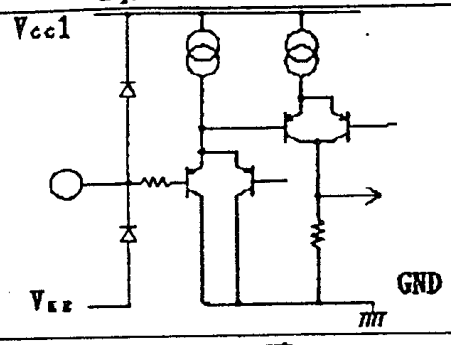
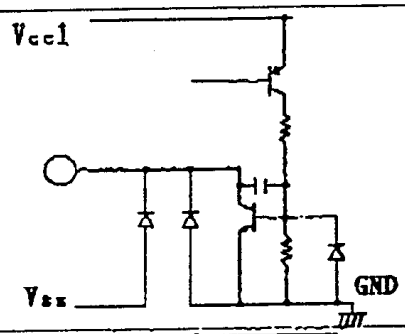
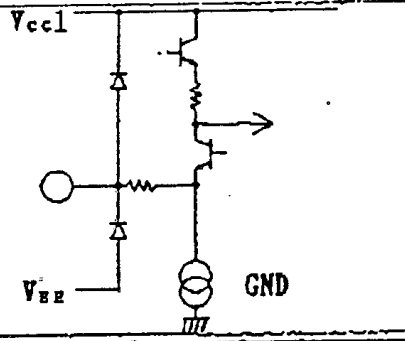
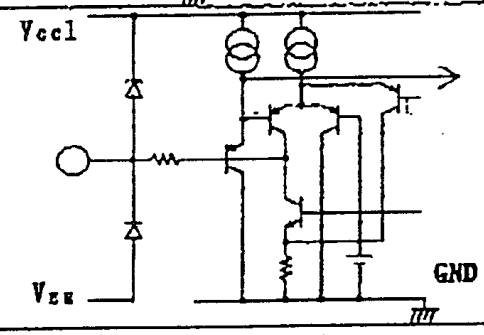
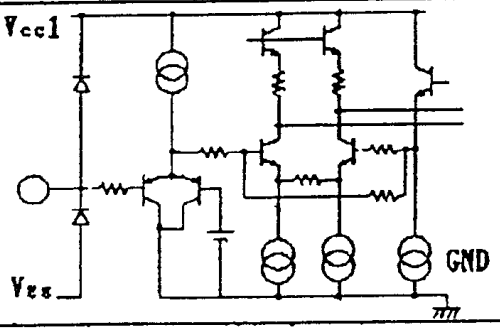
Term. No	Term. Name	voltage	Equivalent Circuit	Description
1	TRAP	2.0V		Connected to TRAP.
2	H FILTER OUT			Outputs video signal for sync separator circuit.
3	VIDEO IN	2.25V		Input composite video signal. (Inputs luminance signal in the case of Y/C input).
4	IDENT FILTER			Connected to the IDENT detector filter.
5	C IN	2.5V		Input the chrominance signal in the case of Y/C input. When this terminal is connected to ground, the composite video signal input is accepted.

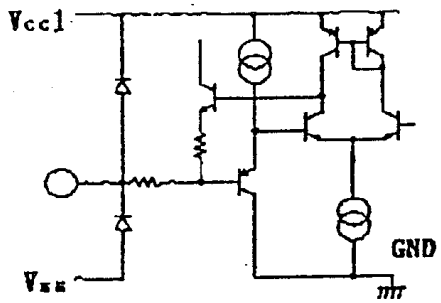
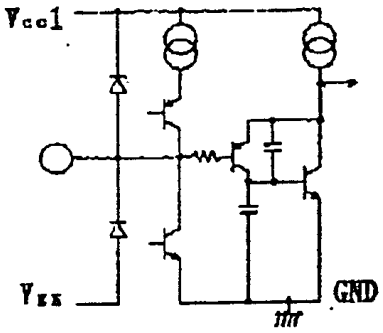
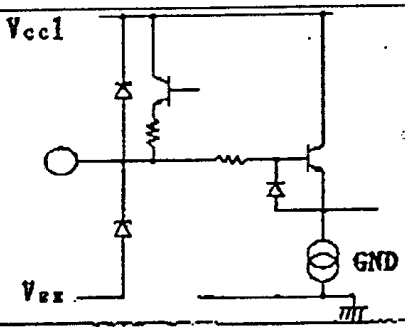
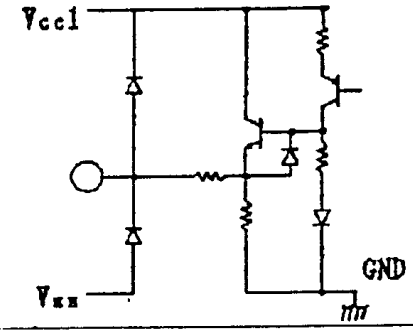
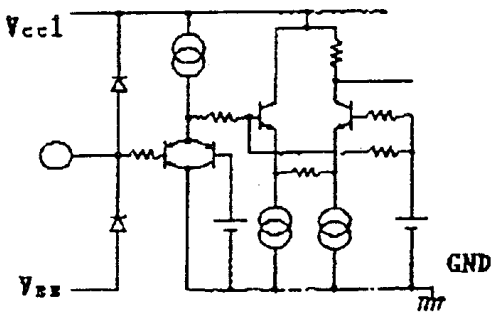
Term. No.	Term. Name	voltage	Equivalent Circuit	Description
6	COLOR			The DC voltage applied to this terminal adjusts the color gain.
7	SW			The input terminal for the source selection signal. Give the "Low" level in case of the VIDEO IN inputs, and give the "High" level in case of the EXT RGB IN inputs.
8	KILLER FILTER			Connected to the killer detector filter.
9	PEAK LIMITER			The DC voltage applied to this terminal adjusts the white limit level.
10	RGB AMPLITUDE	0.7V		Adjusts the amplitude between the inverted level and the non-inverted level of the R.G.B. outputs. This terminal is preset inside the IC. Do not lower the DC voltage under 0.7V.

Term. No.	Term. Name	Voltage	Equivalent Circuit	Description
11	ACC FILTER			Connected to the ACC. detector filter.
12	R-Y/B-Y PHASE			Adjusts the angle of the R-Y/B-Y in case of the PAL mode. Connect to VCC1 for NTSC mode.
13	TINT			The voltage applied to this terminal adjusts the tint. Corrects the color of output amplitude every 1H in case of the PAL mode.
14	VCO IN	3.9V		Input terminal for oscillator circuit.
15	APC FILTER			Connected to APC detector filter.

Term. No.	Term. Name	Voltage	Equivalent Circuit	Description
16	VCO OUT	2.7V		Output terminal for oscillator circuit.
17	GND			Ground.
18	VEE			Negative going power supply
19 21 23	R DC DET G DC DET B DC DET			Connected to the capacitor that smoothes and holds the deviation from the R.G.B. outputs DC voltage. Because of the high impedance, use less leaky capacitor.
20 22 24	R OUT G OUT B OUT	$\frac{V_{CC2}+V_{EE}}{2}$		Outputs the primary color signal.
25	Vcc2			Connected to power supply for the R.G.B. outputs.
26	BLK			The input terminal of the Blanking pulse. "High": Blanking "Low" : No Blanking
27 28	SUB BRIGHT R SUB BRIGHT B	1.5V		The DC voltage applied to these terminals adjusts the brightness of the R and B signals finely. The gamma correction curve link the voltage of their terminals. These terminals are preset inside the IC.

Term. No.	Term. Name	Voltage	Equivalent Circuit	Description
29	FRP			Input the invert signal that goes "Low" level in the case of inverted and "High" level in the case of non-inverted.
30	GAMMA1			Adjusts the inflection point(γ1) on the DC voltage gain of the gamma correction. When this terminal is connected to Vcc1, the gamma correction is OFF. 
31	GAMMA2	1.5V		Adjusts the inflection point(γ2) on the DC voltage gain of the gamma correction. This terminal is preset inside the IC. 
32	BRIGHT			The DC voltage applied to this terminal adjusts the brightness of RGB outputs. Gamma correction curve doesn't link this terminal voltage.
33 34 35	S/H PULSE R S/H PULSE G S/H PULSE B			Input the sampling pulse for RB output delay circuit. "High": hold "Low" : sample "ALL Low" : No delay Vth=1.5V

Term. No.	Term. Name	Voltage	Equivalent Circuit	Description
36	SYNC IN			The rising edge of this input pulse must be before the fall edge of the SYNC OUT pulse. In the case of PAL mode, inner flip-flop switches at the rising of the input pulse.
37	SYNC OUT			Outputs the sync signal separated by the sync separator circuit. The output is provided by an open collector. This output signal goes "High" level when in sync and "Low" level when out of sync.
38	SYNC SEP	1.8V		Inputs the video signal to the sync separator circuit. Input the H FILTER output signal.
39 40 41	EXT B IN EXT G IN EXT R IN			The input terminal of the external analog RGB signal. The coupling capacitor works as a pedestal clamp capacitor.
42	CONTRAST			The DC voltage applied to this terminal adjusts the contrast of R.G.B. output.

Term. No.	Term. Name	Voltage	Equivalent Circuit	Description
43	Vcc1			Connected to power supply.
44	P ADJ	1.2V		The value of the resistance connected between this terminal and GND adjusts the frequency characteristics of the filters. In the case of both NTSC and PAL mode, connect the resistance of 18kΩ. Resistance accuracy ±2% Temp. stability ±200ppm
45	CLAMP			Connected to the capacitor that clamps the pedestal of the luminance line. Because of the high impedance, use less leaky capacitor.
46	AGC FILTER			Connected to the AGC detector filter for luminance line. When this terminal is connected to Vcc1, the AGC gain is fixed.
47	AGC OUT			Outputs the voltage detected at the AGC detector circuit for luminance line. The output voltage goes "High" at high-gain.
48	PICTURE			The DC voltage applied to this terminal adjusts the frequency characteristics of the luminance line. The outline is emphasized by reducing the terminal voltage.

6. Functional operation

* TRAP
  TRAP frequency is switched between 3.58MHz(NTSC) and 4.43MHz(PAL). In the case of the Y/C input, the signals do not pass through the TRAP.
* AGC circuit
  Different AGC characteristics can be obtained according to the APL level of the luminance signal.
  Detects the peak of the amplitude of the luminance signal to form the AGC loop.
  When the AGC FILTER terminal is connected to Vcc, the AGC gain is fixed.
* ACC detection, ACC amplifier
  Detects the peak of the amplitude of the burst signal to form the ACC loop.
* VCO, APC detection
  The VCO local oscillator circuit is a pierce type X'tal oscillator circuit.
  The APC and the VCO organize a PLL loop to eliminate the need for adjustment. The APC detector compares the phase of the burst signal with the VCO oscillation output, and the APC detector output controls the oscillating frequency of the VCO.
* External inputs
  Input the analog RGB signals.
  Because the each terminal of the External inputs is clamped, the signal is required to be AC coupled.
  Clamp timing is a back-porch.

* Gamma correction

Corrects the output characteristics curve as shown in Figure 1 according to the LCD panel. Pin 30 and 31 adjust the γ1 and γ2 positions where the ramp of the curve can be adjusted as shown in Figure 2 and Figure 3.

Gamma adjustment doesn't influence the peak limit level.

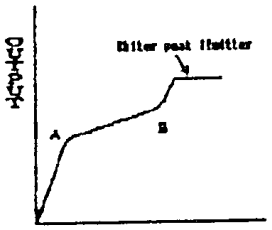


Figure 1

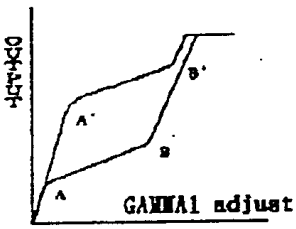


Figure 2

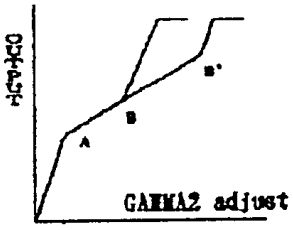


Figure 3

* RGB outputs

The R.G.B. outputs (Pins 20, 22, 24) are inverted according to the FRP pulse input to Pin 29 as shown in Figure 4.

The feedback loops that keep the center voltages of the output signals at (VCC+VEE)/2 are used.

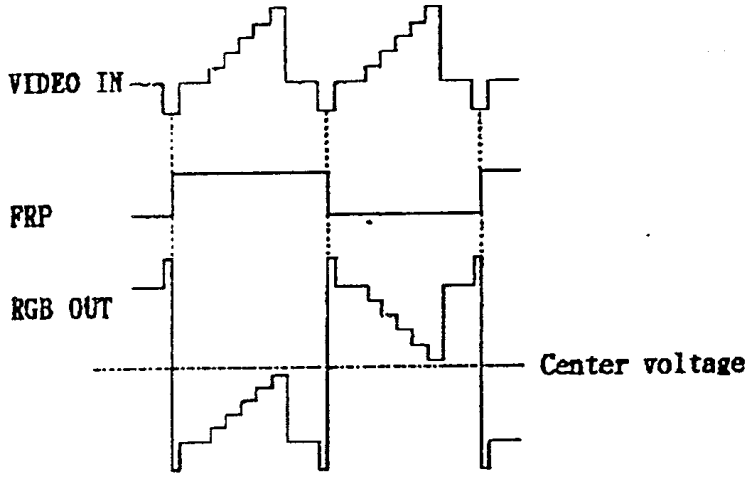
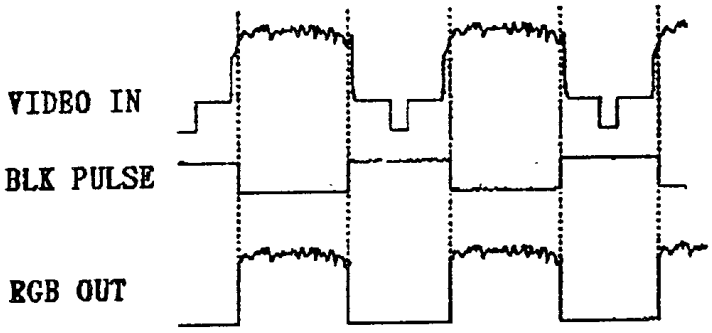


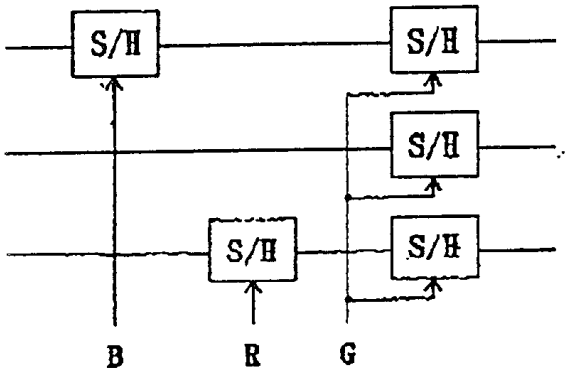
Figure 4

- Blanking function

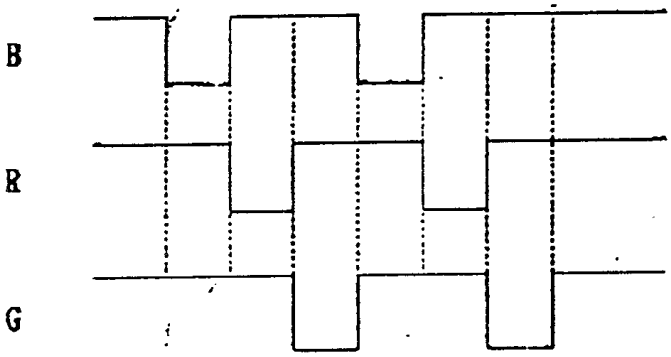
Give the "High" level in case of the Blanking.
Blanking operation is permitted during the synchronize pulse timing.
The DC voltage applied to RGB AMPLITUDE adjusts the blanking level.



- R B delay circuit (S/H form)



The pulse in order of G→R→B output signal. (sampling = "Low")



Sampling Pulse Width : 40~150ns
Pulse Level : 3V~Vcc1
duty : 1/3 active low-pulse

- Adjustment (PAL)

This IC support simple PAL only.
Adjust the TINT terminal in order to equalize the amplitude on R output signal by the 1H. Then Adjust the R-Y/B-Y PHASE terminal in order to equalize the amplitude on B output signal every 1H.

7. Precautions

* Power supply pin

Ensure Pin 18 is at the lowest potential and not open.
Make sure the voltage applied to power supply pin
must be as follows: $V_{EE} \leq GND \leq V_{CC1} \leq V_{CC2}$

* The procedure of turning on the power supply

When the value of V_{xx} is minus, turn on V_{xx} first.

* Whitebalance adjust

SUB BRIGHT R.B (Pin 27, 28) is pre-set inside the IC.
When these pre-set terminals are in operation without regulating whitebalance in LCD display system, the whitebalance could be lost by electronic components deviation in the system.
Therefore, regulating the whitebalance, in someway, is recommended.

8. Absolute Maximum Ratings (Ta=25℃)

Parameter	Symbol	Condition	Rating	Units
Supply voltage	V_{cc1} - GND		7	V
	V_{cc2} - V_{EE}		17	V
	V_{EE} - GND		-10	V
Power dissipation	P_D	Ta ≤ 25℃	560	mW
Derating ratio		Ta > 25℃	4.5	mW/℃
Operating temperature range	Topr		-30 ~ 85	℃
Storage temperature range	Tstg		-55 ~ 150	℃
Each adjust pin voltage	V_{IN}		V_{cc1}	V
SYNC OUT output withstand voltage	V_{SD}		V_{EE}+17	V
Video input pin signal voltage	V_{VDIN}		3	Vp-p
External input pin signal voltage	EXT_{IN}		V_{cc1}	V
FRP input pin signal voltage	FRP_{IN}		V_{cc1}	V
SYNC IN input pin signal voltage	$SYNC_{IN}$		V_{cc1}	V

Operating supply voltage ranges

Parameter	Symbol	Condition	Rating	Units
Operating supply voltage range	V_{cc1}-GND		4.25~5.25	V
	V_{cc2}-GND		4.25~16.0	V
	V_{EE}- GND		-8.75~0	V
	V_{cc2}-V_{EE}		11.25~16.0	V

Recommended operating conditions

Parameter	Symbol	Condition	Rating	Units
COMPOSITE VIDEO IN input signal voltage	V_{VDIN}	pedestal-white	0.7	Vp-p
LUMINANCE IN input signal voltage	Y_{IN}	pedestal-white	0.7	Vp-p
CHROMINANCE IN input signal voltage	C_{IN}	Amplitude of burst signal	0.3	Vp-p
Adjust terminal input voltage	V_{IN}		0~3.0	V
External input pin signal voltage	EXT_{IN}	pedestal-white	0.7	Vp-p
Sampling pulse voltage	V_{SH}		3.0~V_{cc1}	V

9. Electrical characteristics

DC characteristics

Unless otherwise specified, $V_{cc}1$=4.5V, $V_{cc}2$=12V, V_{ss}=GND, Ta=25℃, SW5→a, SW8→a, SW10→OFF, SW20→OFF, SW22→OFF, SW24→OFF, SW26→b, SW27→OFF, SW28→OFF, SW31→OFF, SW33→b, SW34→b, SW35→b, SW38→a, SW46→OFF

V6=2.6V, V7=0V, V9=3.0V, V12=4.5V, V13=1.5V, V26=0V, V30=3.0V, V32=2.1V, V33=0V, V34=0V, V35=0V, V42=1.5V, V48=1.5V

SG11 applied to (C) and SG7b(4.5Vp-p) applied to (D).

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Current dissipation (pin 43)	Icc1			25.0	35.0	mA
Current dissipation (pin 25)	Icc2			3.0	4.3	mA
Current dissipation (pin 43) operation in S/H circuit	Icc1			27.0	37.0	mA
TRAP output impedance	Z1			1.0		kΩ
VIDEO IN input impedance	Z3			12.0		kΩ
C IN input impedance	Z5			3.6		kΩ
RGB AMPLITUDE input impedance	Z10			53		kΩ
SUB BRIGHT R input impedance	Z27			153		kΩ
SUB BRIGHT B input impedance	Z28			153		kΩ
GAMMA 2 input impedance	Z31			53		kΩ
C IN input current	I5	V5=GND		4.0	6.0	μA
COLOR input current	I6	V6=GND		-0.3	-1.0	μA
SW input current	I7	V7=GND		-0.3	-1.0	μA
PEAK LIMITTER input current	I9	V9=GND		-0.3	-1.0	μA
R-Y/B-Y PHASE input current H	I12H	V12=GND		0.2	1.0	μA
R-Y/B-Y PHASE input current L	I12L	V12=GND		-0.3	-1.0	μA
TINT input current	I13	V13=GND		-0.3	-1.0	μA
BLK input current	I26	V26=GND		-0.2	-1.0	μA
FRP input current	I29	V29=GND		-0.2	-1.0	μA
GAMMA 1 input current H	I30H	V30=4.5V		0.2	1.0	μA
GAMMA 1 input current L	I30L	V30=GND		-0.3	-1.0	μA
BRIGHT input current	I32	V32=2.5V		0.2	1.0	μA
S/H PULSE R input current	I33	V33=GND		-0.5	-2.0	μA
S/H PULSE G input current	I34	V34=GND		-0.5	-2.0	μA
S/H PULSE B input current	I35	V35=GND		-0.5	-2.0	μA
SYNC IN input current	I36	V36=GND		-0.2	-1.0	μA
CONTRAST input current	I42	V42=GND		-0.2	-1.0	μA
PICTURE input current	I48	V48=GND		-0.5	-2.0	μA
TRAP terminal voltage	V1		1.7	2.0	2.3	V
VIDEO IN terminal voltage	V3		1.95	2.25	2.55	V
C IN terminal voltage	V5		2.2	2.5	2.8	V
RGB AMPLITUDE terminal voltage	V10	V10=OPEN	0.4	0.7	1.0	V
VCO IN terminal voltage	V14		3.6	3.9	4.2	V
VCO OUT terminal voltage	V16		2.4	2.7	3.0	V
SUB BRIGHT R terminal voltage	V27	V27=OPEN	1.2	1.5	1.8	V
SUB BRIGHT B terminal voltage	V28	V28=OPEN	1.2	1.5	1.8	V
GAMMA 2 terminal voltage	V31	V31=OPEN	1.2	1.5	1.8	V
SYNC SEP terminal voltage	V38		1.4	1.8	2.2	V
F ADJ terminal voltage	V44		0.9	1.2	1.5	V

AC characteristics

Unless otherwise specified: V_{cc1}=4.5V, V_{cc2}=12V, V_{BB}=GND, Ta=25℃, SW5→a, SW7→b, SW8→a, SW10→ORF, SW20→OFF, SW22→OFF, SW24→OFF, SW26→b, SW27→OFF, SW28→OFF, SW31→OFF, SW33→b, SW34→b, SW35→b, SW38→a, SW46→OFF

V5=0V, V6=1.5V, V7=0V, V9=3.0V, V12=4.5V, V13=1.5V, V26=0V, V30=4.5V, V32=2.1V, V33=0V, V34=0V, V35=0V, V42=3.0V, V46=4.5V, V48=2.5V

SG11 applied to (C) and SG7b(4.5Vp-p) applied to (D).

Video Part

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Luminance maximum gain (1) (AGC ON)	Gmax1	With V42=0V and SG8(-17dB) applied to (A). Measures the ratio of the output amplitude (black-white) to the input amplitude on TP22.	32	35	38	dB
Luminance maximum gain (2) (AGC OFF)	Gmax2	With V42=0V, SW46→ON, V46=4.5V and SG8(-17dB) applied to (A). Measure the ratio of the output amplitude (black-white) to the input amplitude on TP22.	27	30	33	dB
AGC ON-OFF switch voltage	Vth_{AGC}	Measure the DC voltage on TP46 that causes TP22 to change from Luminance maximum gain to Gmax2.	3.7	4.0	4.2	V
AGC amplitude characteristics	Va1	With SW46→OFF, SG1(0dB) applied to (A), and APL=50%, adjust V42 so that the amplitude (black-3rd level) of the output on TP22 is 4V. Observe the waveform on TP22 as APL is changed to 10% and 90%. The amplitude (Black-3rd level) at these APL shall be Va1 and Va2 respectively.	4.5	5.5	6.5	Vp-p
	Va2		2.1	2.6	3.1	Vp-p
AGC detection output voltage	Vad1	With SW46→OFF and SG1(0dB) applied to (A), when APL is changed to 10%, 50% and 90%, the voltages on TP47 shall be Vad1, Vad2 and Vad3 respectively.	2.2	2.7	3.2	V
	Vad2		1.0	1.5	2.0	V
	Vad3		0.2	0.4	0.7	V
Image quality adjust variable range (composite signal input, NTSC)	Gp1	With SW5→b and SG2(100kHz) applied to (A), adjust V42 so that the amplitude of the 100kHz component on TP22 is 1Vp-p. With SG2(f=1.6MHz) applied , observe the difference of the amplitude on TP22 as V48 is changed to 0V and 3V. The amplitude difference at these two V48 voltages shall be Gp1 and GP2, respectively.	3.0	7.0		dB
	Gp2			-2.0	1.0	dB

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Image quality adjust variable range (composite signal input, PAL)	Gp3	With SW5→b, V12=1.5V and SG2(100kHz) applied to (A), adjust V42 so that the amplitude of the 100kHz component on TP22 is 1Vp-p. With SG2(f=1.6MHz) applied , observe the difference of the amplitude on TP22 as V48 is changed to 0V and 3V. The amplitude difference at these two V48 voltages shall be Gp3 and GP4, respectively.	3.0	7.0		dB
	Gp4			-2.0	1.0	dB
Image quality adjust variable range (Y/C input)	Gp5	With SG2(100kHz) applied to (A), adjust V42 so that the amplitude of the 100kHz component on TP22 is 1Vp-p. With SG2(f=2.0MHz) applied , observe the difference of the amplitude on TP22 as V48 is changed to 0V and 3V. The amplitude difference at these two V48 voltages shall be Gp5 and Gp6, respectively.	7.0	11.0		dB
	Gp6			0	3.0	dB
Trap attenuation (NTSC)	Gtf (NT)	With SG3(f=100kHz, 0dB) applied to (A), observe the waveform on TP1, the amplitude of the 100kHz component of the signal shall be v0. Then, apply SG3(f=3.58MHz, 0dB), the amplitude of the 3.58MHz component on TP1 shall be v1. Gtf = 20 log (v1/v0)	-30	-47		dB
Trap attenuation (PAL)	Gtf (PAL)	With V12=1.5V and SG3(f=100kHz, 0dB) applied to (A), observe the waveform on TP1, the amplitude of the 100kHz component of the signal shall be v0. Then, apply SG3(f=4.43MHz, 0dB), the amplitude of the 4.43MHz component on TP1 shall be v1. Gtf = 20 log (v1/v0)	-30	-47		dB
DC reproduction ratio	K	With SG1(APL10%, 0dB) applied to (A), measure the amplitude (black-black) on TP22. Let the measured amplitude be V1. Then with SG1(APL90%, 0dB) applied to (A), measure the amplitude (black-black) on TP22. Let the measured amplitude be V2. K = ((V1- |V1-V2|)/ v1) ×100	95			%

Chroma part

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
ACC characteristics (composite signal input, NTSC)	GA1	With SW5→b and SG5(0dB, +6dB, -25dB, burst/chroma phase=180°) applied to (A), measure the amplitude of waveform on TP24 at 0dB, +6dB and -25dB. Let the measured amplitude for each input be v0, v1 and v2. GA1 = 20 log (v1/v0) GA2 = 20 log (v2/v0)		0	2.0	dB
	GA2		-12	-4.0		dB
ACC characteristics (Y/C signal input, NTSC)	GA3	With SG5(0dB, +6dB, -25dB, burst/chroma phase=180°) applied to (B), measure the amplitude of waveform on TP24 at 0dB, +6dB and -25dB. Let the measured amplitude for each input be v0, v1 and v2. GA3 = 20 log (v1/v0) GA4 = 20 log (v2/v0)		0	2.0	dB
	GA4		-5.0	0		dB
ACC characteristics (composite signal input, PAL)	GA5	With SW5→b, V12=1.5V and SG5(0dB, +6dB, -25dB, burst/chroma phase=±135°) applied to (A), measure the amplitude of waveform on TP24 at 0dB, +6dB and -25dB. Let the measured amplitude for each input be v0, v1 and v2. GA5 = 20 log (v1/v0) GA6 = 20 log (v2/v0)		0	2.0	dB
	GA6		-10	-3.0		dB
ACC characteristics (Y/C signal input, PAL)	GA7	With V12=1.5V and SG5(0dB, +6dB, -25dB, burst/chroma phase=±135°) applied to (B), measure the amplitude of waveform on TP24 at 0dB, +6dB and -25dB. Let the measured amplitude for each input be v0, v1 and v2. GA7 = 20 log (v1/v0) GA8 = 20 log (v2/v0)		0	2.0	dB
	GA8		-5.0	0		dB
Color control gain variable range	GC1	With SG5(0dB, burst/chroma phase = 180°) applied to (B), allow V6 to change to 0V, 1.5V then 3V to measure the amplitude on TP24. Let these amplitudes be v1, v0 and v2, respectively. GC1 = 20 log (v1/v0) GC2 = 20 log (v2/v0)		-30	-20	dB
	GC2		4.0	6.0		dB

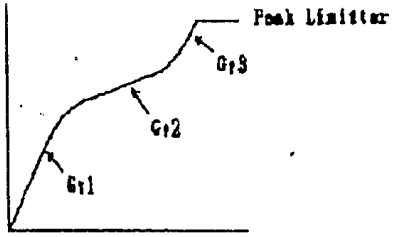
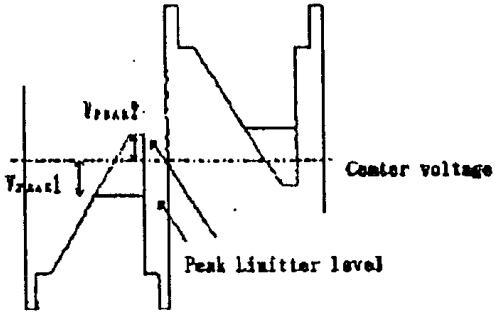
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
APC capture range (NTSC)	fA1	With SG5(0dB) applied to (B), allow the frequency of the burst signal to change to measure the input frequency at which the voltage on TP8 drops below 2V. Work out the difference by subtracting the measured frequency from 3.579545MHz.	±500	+1500 -800		Hz
APC capture range (PAL)	fA2	With V12=1.5V and SG5(0dB) applied to (B), allow the frequency of the burst signal to change to measure the input frequency at which the voltage on TP8 drops below 2V. Work out the difference by subtracting the measured frequency from 4.433619MHz.	±500	+1300 -1700		Hz
Killer operating input level (NTSC)	vbk1	With SG5(variable amplitude, burst/chroma phase = 180°) applied to (B), observe the waveform on TP24 as decreasing the input amplitude until the killer turns on. Measure the input attenuation.		-46	-40	dB
Killer operating input level (PAL)	vbk2	With V12=1.5V and SG5(variable amplitude, burst/chroma phase =±135°) applied to (B), observe the waveform on TP24 as decreasing the input amplitude until the killer turns on. Measure the input attenuation.		-43	-37	dB
Killer color ghost (NTSC)	vbs1	With SW8→b and SG5(burst/chroma phase = 180°) applied to (B), measure the amplitude of the color different output on TP24.		50	100	mVp-p
Killer color ghost (PAL)	vbs2	With SW8→b, V12=1.5V and SG5(burst/chroma phase = ±135°) applied to (B), measure the amplitude of the color different output on TP24.		90	180	mVp-p
Demodulation output ratio (NTSC)	R-Y/B-Y	With SG5(0dB) applied to (B), allow the chroma phase to change. Let the amplitude causing the maximum amplitude on TP20 be VR. Let the amplitude causing the maximum amplitude on TP22 be VG.	0.46	0.56	0.66	
	G-Y/B-Y	Let the amplitude causing the maximum amplitude on TP24 be VB. (R-Y)/(B-Y)=VR/VB (G-Y)/(B-Y)=VG/VB	0.26	0.34	0.42	

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Demodulation output ratio (PAL)	R-Y/B-Y	With V12=1.5V and SG5(0dB) applied to (B), allow the chroma phase to change. Let the amplitude causing the maximum amplitude on TP20 be VR. Let the amplitude causing the maximum amplitude on TP22 be VG. Let the amplitude causing the maximum amplitude on TP24 be VB. (R-Y)/(B-Y)=VR/VB (G-Y)/(B-Y)=VG/VB	0.44	0.54	0.64	
	G-Y/B-Y		0.26	0.34	0.42	
Demodulation relative phase (NTSC)	∮RB	With SG5(0dB) applied to (B), allow the chroma phase to change. Let the angle causing the maximum amplitude on TP20 be ∮R. Let the angle causing the maximum amplitude on TP22 be ∮G. Let the angle causing the maximum amplitude on TP24 be ∮B. ∮RB = ∮R-∮B , ∮GB = ∮G-∮B	80	90	100	deg.
	∮GB		225	235	245	deg.
Demodulation relative phase (PAL)	∮RB	With V12=1.5V and SG5(0dB) applied to (B), allow the chroma phase to change. Let the angle causing the maximum amplitude on TP20 be ∮R. Let the angle causing the maximum amplitude on TP22 be ∮G. Let the angle causing the maximum amplitude on TP24 be ∮B. ∮RB = ∮R-∮B , ∮GB = ∮G-∮B	80	90	100	deg.
	∮GB		220	230	245	deg.
Demodulation output residual carrier (NTSC)	VCAR(N)	With (C)=OPEN and SG5(0dB, burst/chroma =180°) applied to (B), adjust the chroma phase so that the amplitude on TP24 is at its maximum. Observe TP24 with a spectrum analyzer to measure the ratio of v1 to v0, where v1 is the 7.15909MHz component, v0 being the 15.734kHz component. vCAR1 = 20 log (v1/v0)		-60	-40	dB
Demodulation output residual carrier (PAL)	VCAR(P)	With V12=1.5V, (C)=OPEN and SG5(0dB, burst/chroma=±135°) applied to (B), adjust the chroma phase so that the amplitude on TP24 is at its maximum. Observe TP24 with a spectrum analyzer to measure the ratio of v1 to v0, where v1 is the 8.867238MHz component, v0 being the 15.625kHz component. vCAR2 = 20 log (v1/v0)		-65	-45	dB

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
TINT variable range	θ+	With SG5(0db) applied to (B), allow the chroma phase to change. Let the angle causing the maximum amplitude on TP24 be θ1 in the case of V13=0V. Let the angle causing the maximum amplitude on TP24 be θ2 in the case of V13=1.5V. Let the angle causing the maximum amplitude on TP24 be θ3 in the case of V13=3.0V. θ+ = θ1-θ2, θ- = θ3-θ2	30	40		deg.
	θ-		-30	-40		deg.
Composite→Y/C input switching voltage	VthCY	With SW5→b and SG5(0dB, burst/chroma phase = 180°) applied to (A), increase V5 from 0V until the signal from TP24 disappears. Measure the voltage on V5 that causes the signal to disappear.	1.3	1.5	1.7	V
Y/C→composite input switching voltage	VthYC	With SW5→b and SG5(0dB, burst/chroma phase = ±135°) applied to (A), decrease V5 from 0V until the signal from TP24 appears. Measure the voltage on V5 that causes the signal to appear.	0.7	0.9	1.1	V
NTSC↔PAL	VthNP	With SG5(0dB, burst/chroma phase =180°) applied to (B), decrease V12 until the signal from TP24 disappears. Measure the voltage on V12 that causes the signal to disappear.	3.4	3.7	4.0	V

Interface part

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Contrast adjust gain variable range	Gct	With SG8(-14dB) applied to (A), observe the waveform on TP22 as V42 is changed to 0V then 3V. The amplitude between the black level and the white level at these voltages shall be v1 and v2, respectively. Gct = 20 log (v1/v2)		-15	-11	dB
Brightness adjust variable range	Vb1	With no input to (A) and (B). V32=1.8V. Measure the amplitudes (black-black) on TP20, TP22 and TP24.	9.0			Vp-p
Brightness adjust variable range	Vb2	With no input to (A) and (B). V32=2.8V. Measure the amplitudes (black-black) on TP20, TP22 and TP24.			1.0	Vp-p
Sub-brightness adjust variable range	Vsb	With no input to (A) and (B). V32=2.3V. V27=0V and 3V, V28=0V and 3V measure the amplitudes difference (black-black) on TP20 and TP24 between SW27→OFF, SW28→OFF and SW27→ON, SW28→ON.	±1.0	±2.3		V
RGB output DC voltage	VRGB	With no input (A) and (B), adjust V32 to set the amplitude on TP22 to 9Vp-p (black-black) and measure the DC voltage on TP20, TP22 and TP24.	5.8	6.0	6.2	V
RGB output black level voltage difference	ΔVBL	With no input to (A) and (B), measure the black level voltage difference between maximum and minimum black level voltage on TP20, TP22 and TP24 in invert mode and non invert mode.			300	mV
Gain difference between invert and non-invert	ΔGinv	With V42=1.5V and SG8(-11dB) applied to (A), measure the amplitude (black-white) difference invert and non-invert on TP20, TP22 and TP24.		±0.3	±0.6	dB
Gain difference among RGB	ΔGRGB	With V42=1.5V and SG8(-11dB) applied to (A), measure the amplitude differences (white-black) between maximum and minimum level on TP20, TP22 and TP24 in non invert mode.		0.3	0.6	dB
FRP pin threshold voltage	VthFRP	With V42=1.5V and SG8(-11dB) applied to (A), increase the voltage on (C) from 0V until the signals from TP20, TP22 and TP24 are inverted. Measure the voltage on (C) that inverts these signals.	1.3	1.6	1.9	V

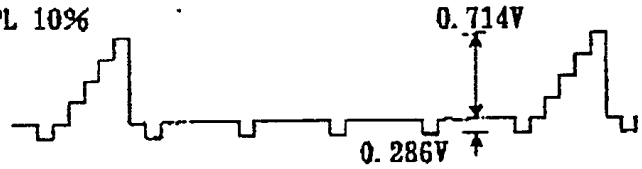
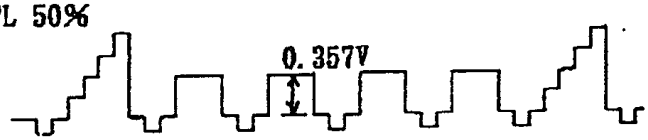
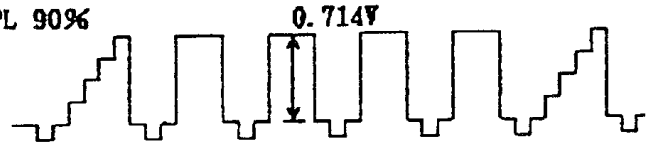
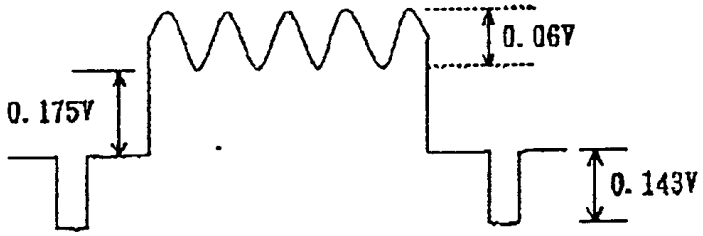
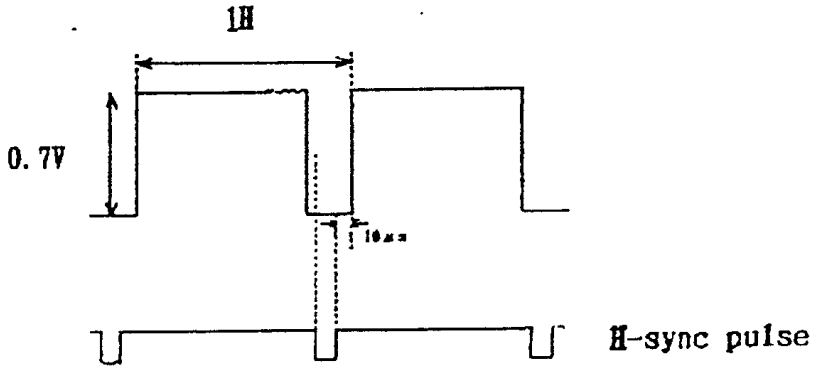
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Gamma correction characteristics	$G_{\gamma}1$	With V30=1.5V, SW31→ON, V31=1.5V, V42=0V (CONTRAST set Maximum), and SG9 applied to (A), measure the gain each specific point on the output waveform of TP20, TP22 and TP24. 	32	35	38	dB
	$G_{\gamma}2$		17	21	25	dB
	$G_{\gamma}3$		32	35	38	dB
Peak limitter characteristics	$V_{PEAK}1$	With V42=0V and SG9 applied to (A). Then V9=0.5V and V8=3V, measure the amplitude difference (center level - peak limitter level) on TP20, TP22 and TP24. 	2.5	3.0	3.5	V
	$V_{PEAK}2$		-4.8	-4.2	-3.6	V
Input - Output propagation delay time (composite video signal input)	tpLH1	With SG4 applied to (A), SW5→b, SW20→ON, SW22→ON, SW24→ON. Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the propagation delay time of the rising edge tpLH1, and that of the falling edge tpHL1.	450	660	870	ns
	tpHL1		450	660	870	ns
Input - Output propagation delay time (Y/C input)	tpLH2	With SG4 applied to (A), SW20→ON, SW22→ON, SW24→ON. Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the propagation delay time of the rising edge tpLH2, and that of the falling edge tpHL2.	300	500	700	ns
	tpHL2		300	500	700	ns

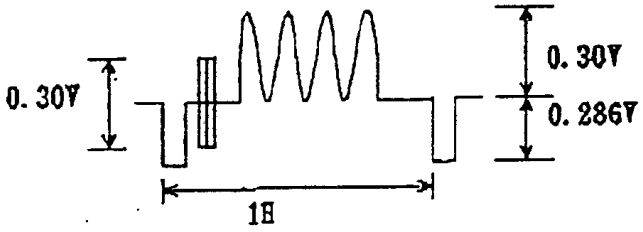
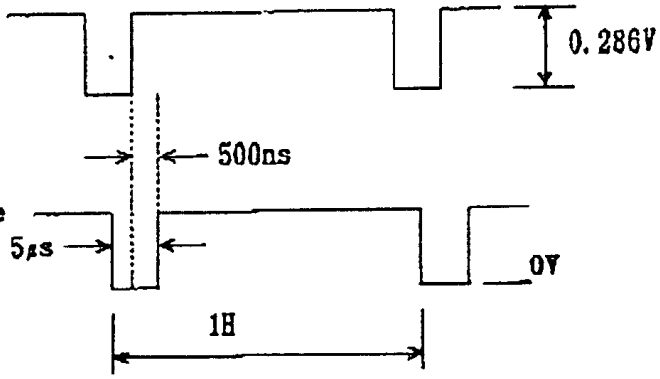
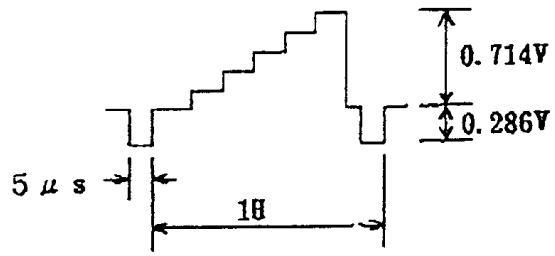
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
EXT - Output Propagation delay time	tpLH3	With SW20→ON, SW22→ON, SW24→ON, V7=3.0V and SG4 applied to (F), (G), (H). Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the propagation delay time of the rising edge tpLH3, and that of the falling edge tpHL3.	30	80	130	ns
	tpHL3		60	120	180	ns
RGB output Rise time, Fall time (External input)	tTLH	With SW20→ON, SW22→ON, SW24→ON, V7=3.0V and SG10 applied to (F), (G), (H). Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the propagation delay time of the rising edge tTLH, and that of the falling edge tTHL.	40	90	160	ns
	tTHL		60	110	180	ns
Frequency characteristics	f1	With SW46→ON, SW20→ON, SW22→ON, SW24→ON, SG2(100kHz) applied to (A), measure the frequency f1 when the amplitude of the output TP20, TP22 and TP24 decreases 3dB lower than that of 100kHz at V48=0V. f2 at V48=3V.	4.5	7.0		MHz
	f2		3.5	5.0		MHz
	f3	With V7=3V, SG2 applied to (F), (G) and (H), measure the frequency f3 similarly.	2.5	3.7		MHz
RGB output amplitude adjust variable range	V_{RGB}	With no input to (A) and (B). Measure the amplitude differences (black-black) on TP20, TP22 and TP24 between SW10→OFF and SW10→ON, V10=3V.	4.0	5.1		V
BLK threshold voltage	Vth_{BLK}	With SG8(-11dB) applied to (A), increase V26 from 0V until the signal of TP24 disappears. Measure the voltage on V26 that causes the signal to start disappearing.	1.2	1.5	1.9	V
S/H linear error	E_{LSHR}	With V7=3.0V, (K)="Low", (L)="Hi", SG12a applied to (J), SG12b applied to (H). Define, adjust amplitude on SG12b to 0.2Vp-p and 0.7Vp-p, measure the amplitude on TP20 as v1 and v2.	90	100		%
	E_{LSHG}	Then (J)="Hi", (L)="Low", SG12a applied to (K), SG12b applied to (G). Define, adjust amplitude on SG12b to 0.2Vp-p and 0.7Vp-p, measure the amplitude on TP22 as v3 and v4.	90	100		%
	E_{LSHB}	Then (J)="Hi", (K)="Low", SG12a applied to (L), SG12b applied to (F). Define, adjust amplitude on SG12b to 0.2Vp-p and 0.7Vp-p, measure the amplitude on TP24 as v5 and v6. E_{LSHR} = ((0.2v2/0.7v1)×100, E_{LSHG} = ((0.2v4/0.7v3)×100 E_{LSHB} = ((0.2v6/0.7v5)×100	90	100		%

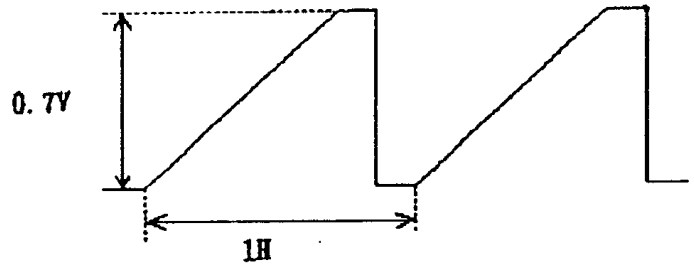
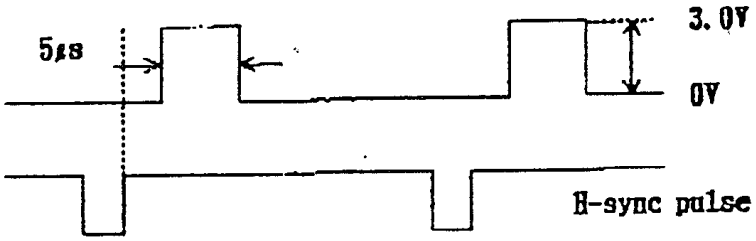
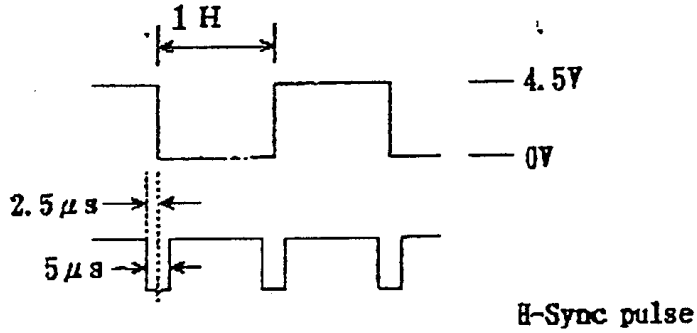
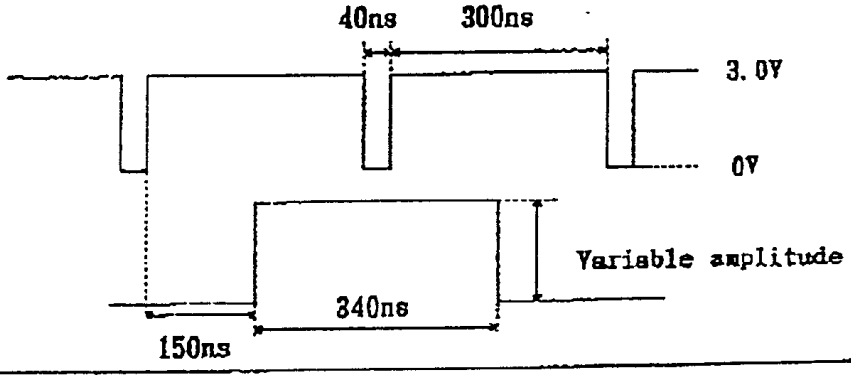
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
SW propagation delay time	tpLH4	With no input to (A), SG10 applied to (M), SG4 applied to (F), (G) and (H), SW7→a, SW20→ON, SW22→ON, SW24→ON.	60	120	180	ns
	tpHL4	Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the waveform of TP20, TP22 and TP24.	70	130	190	ns
BLK propagation delay time	tpLH5	With V32=2.5V, SG10 applied to (I), SW26→a, SW20→ON, SW22→ON, SW24→ON.	70	150	210	ns
	tpHL5	Adjust V42 so that the amplitude (black-white) of TP20, TP22 and TP24 are 5Vp-p and measure the waveform of TP20, TP22 and TP24.	140	210	290	ns
SW switching voltage	Vthsw	With SW7→a, SG8 applied to (F), increase V7 from 0V until the signal on TP24 appears. Measure the voltage on V7 that causes the signal to start appearing.	0.6	0.8	1.0	V
Input - Output maximum gain (External input)	Gext	With SW7→a, V42=0V, SG8(-14dB) applied to (F), (G) and (H). Measure the ratio of the output amplitude (white-black) on TP20, TP22 and TP24 to the input amplitude.	27	30	33	dB
Inside - Outside Voltage gain difference	$\Delta G_{IN/EXT}$	With SW5→b, SW7→a, SW46→ON, SG8 applied to (F), (G) and (H), Measure the amplitude (white-black) difference between output amplitude and with SG8 applied to (A), output amplitude on TP20, TP22 and TP24.	-2.0		2.0	dB

Sync part

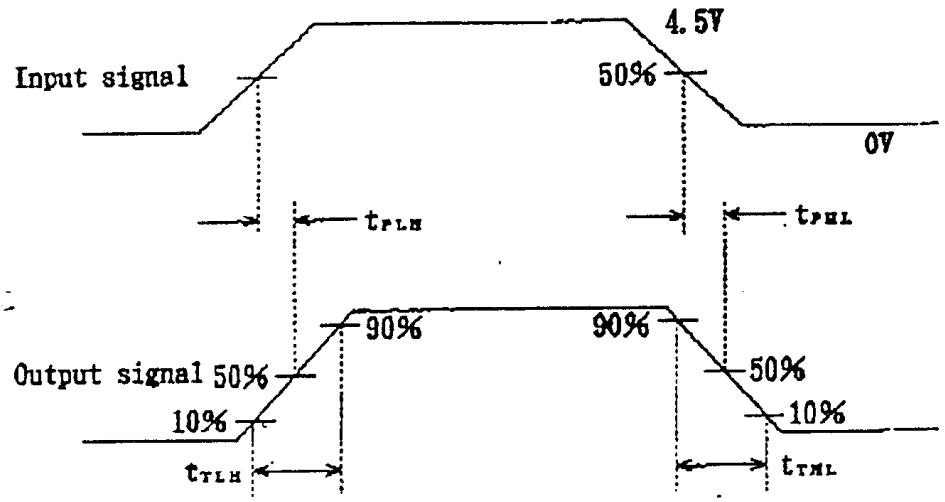
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Sync separator input sensitivity current	Iis	Allow the current to flow out of (E), and measure the input current that causes TP37 to go from "Low"(→GND) to "High"(→VCC).		22	30	μA
Sync separator output ON-state voltage	Von	Measure the output voltage on TP37.		0.2	0.5	V
External sync input threshold voltage	Veth	Increase the amplitude of SG7b from 0V and measure the amplitude of SG7b that causes the clamp circuit to start operating.	1.2	1.5	1.8	V
H filter output gain	Ghf	With SG7a applied to (A), measure the amplitude on TP2.	3.5	4.5	6.5	dB
H filter output propagation delay time	tpLH(HF)	With SG7a applied to (A), measure the propagation delay time to TP2.	500	900	1300	ns
	tpHL(HF)	rise time → tpLH(HF) fall time → tpHL(HF)	300	500	800	ns
Sync separator output propagation delay time	tpLH (sync)	With SW38→b, SG7a(0.15Vp-p) applied to (A), measure the propagation delay time to TP37.	0.6	1.0	1.6	μs
	tpHL (sync)	rise time → tpLH(sy) fall time → tpHL(sy)	0.3	0.7	1.1	μs

SG No.	Wave form
SG 1	Valiable APL 5step stair signal APL 10%  APL 50%  APL 90% 
SG 2	Sine video signal, variable frequency and amplitude 
SG 3	Sine signal amplitude 300mVp-p, variable frequency
SG 4	

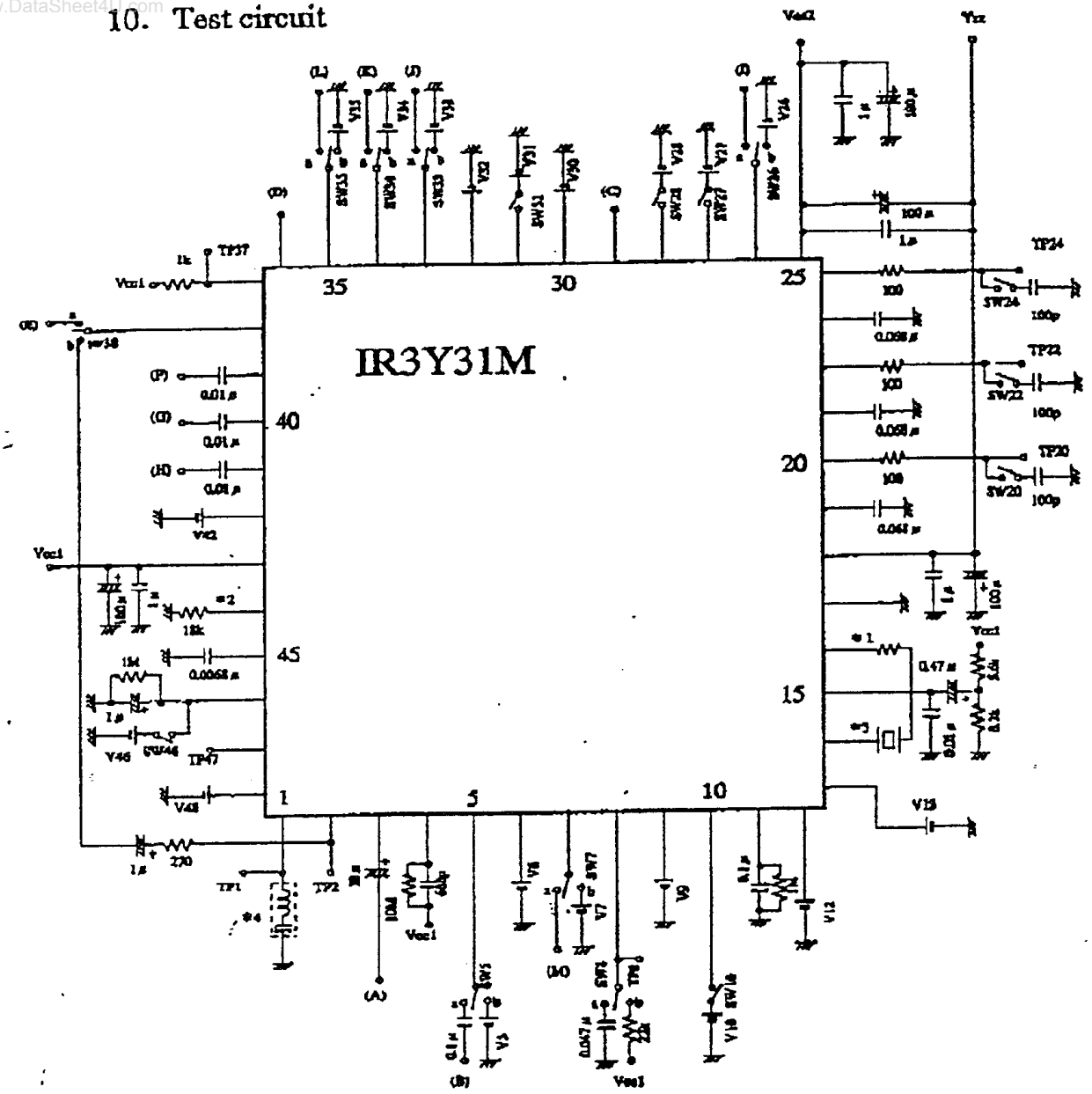
SG No.	Wave form
SG 5	Chrominance signal Burst amplitude 300mVp-p, chroma amplitude 300mVp-p burst and chromafrequency 4.433619MHz (PAL) Variable chroma phase 3.579545MHz (NTSC) 
SG 6	Sine video signal. Variable frequency 
SG 7	a Video input sync pulse b External sync pulse Variable amplitude 5μs 
SG 8	0dB 5step stair signal 

SG No.	Wave form
SG 9	
SG 10	tr, tf<50ns  Synchronized with H-Sync pulse
SG 11	FRP pulse tr, tf < 50ns 
SG 12	

Switching characteristics timing chart

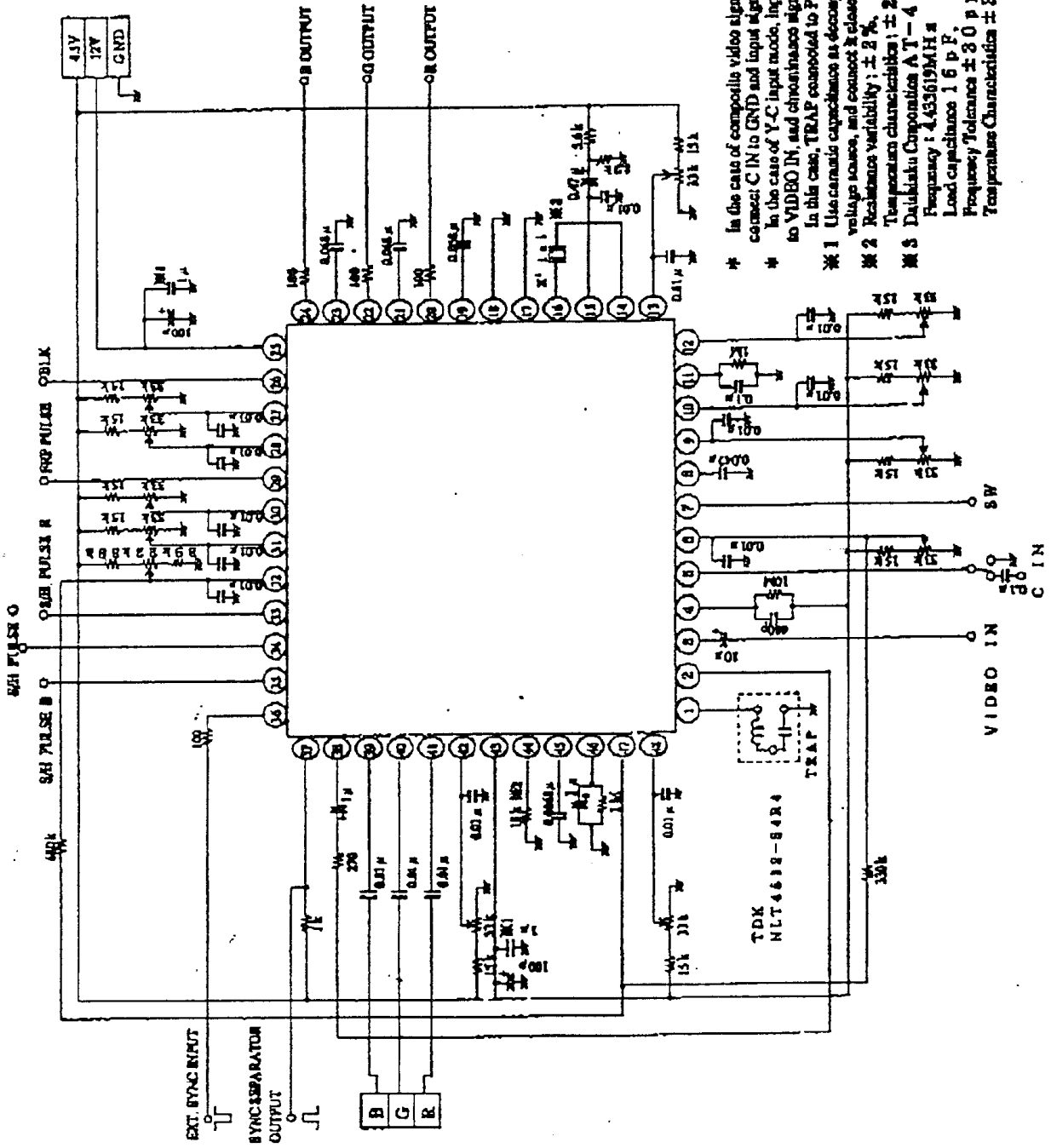


10. Test circuit



* 1 1kΩ (NTSC) 、SHORT (PAL)
* 2 Resistance Variability ±2%、Temperature Characteristics ±200ppm/℃
* 3 DAISHINKU CORPORATION AT-49
  Frequency 3.579545MHz (NTSC mode)
  4.433619MHz (PAL mode)
  Load Capacitance 16pF
  Frequency Tolerance ±30ppm
  Temperature Characteristics ±30ppm
* 4 TDK NLT 4532-S3R6B (NTSC mode)
  NLT 4532-S4R4 (PAL mode)

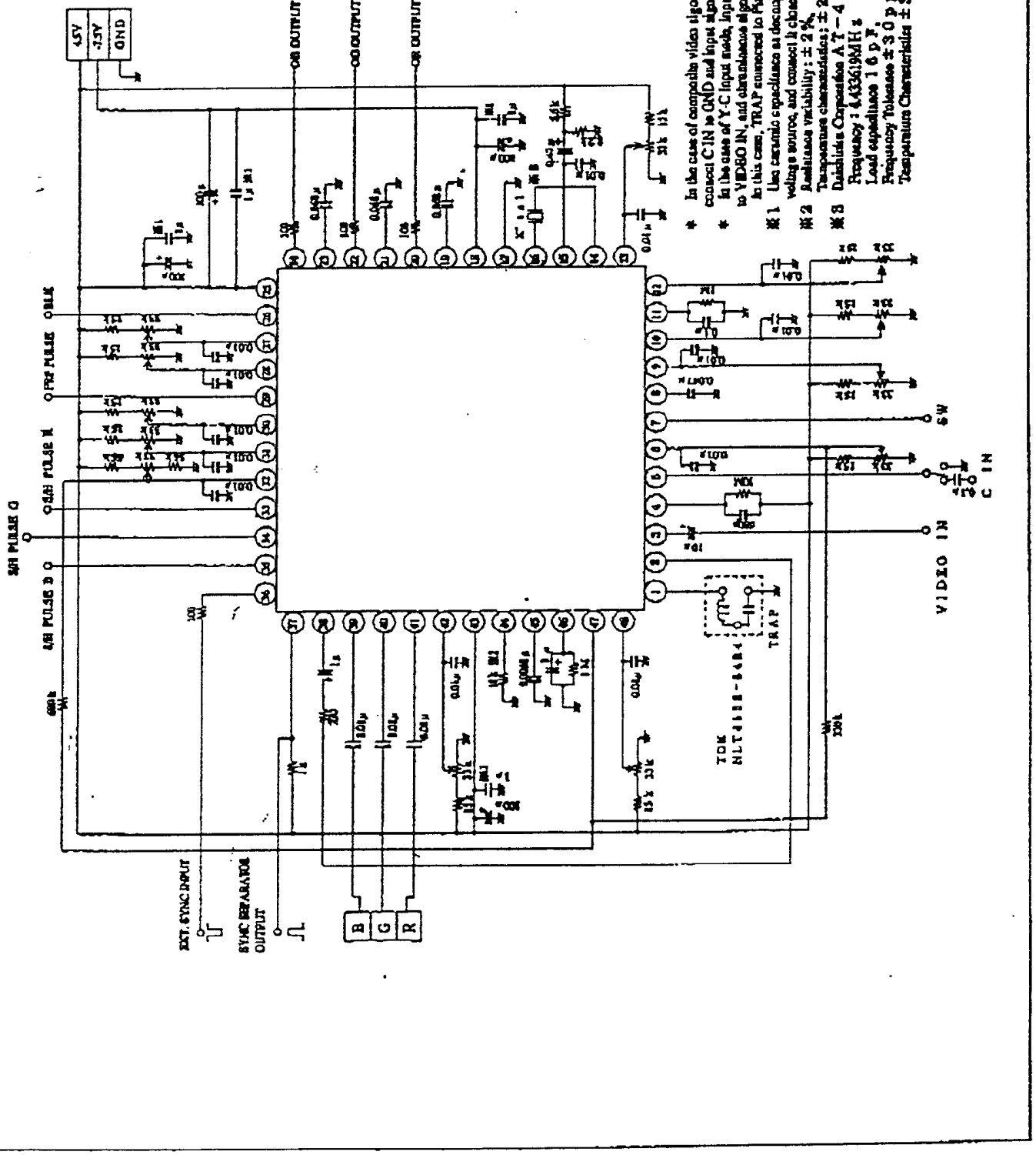
Application circuit example
(PAL/Vcc2=12V, Vss=GND)



* In the case of composite video signal input mode, connect C IN to GND and input signal to VIDEO IN.
* In the case of Y-C input mode, input luminance signal to VIDEO IN, and chrominance signal to C IN. In this case, TRAP connected to Pin 1 is not necessary.

※1 Use ceramic capacitance as decoupling capacitance for a voltage source, and connect it close to the Pin of the IC.
※2 Resistance variability: ±2%.
※3 Temperature characteristics: ±200ppm/℃
Daishinku Corporation AT-49
Frequency: 4.433619MHz
Load capacitance 16pF.
Frequency Tolerance ±30ppm.
Temperature Characteristics ±30ppm

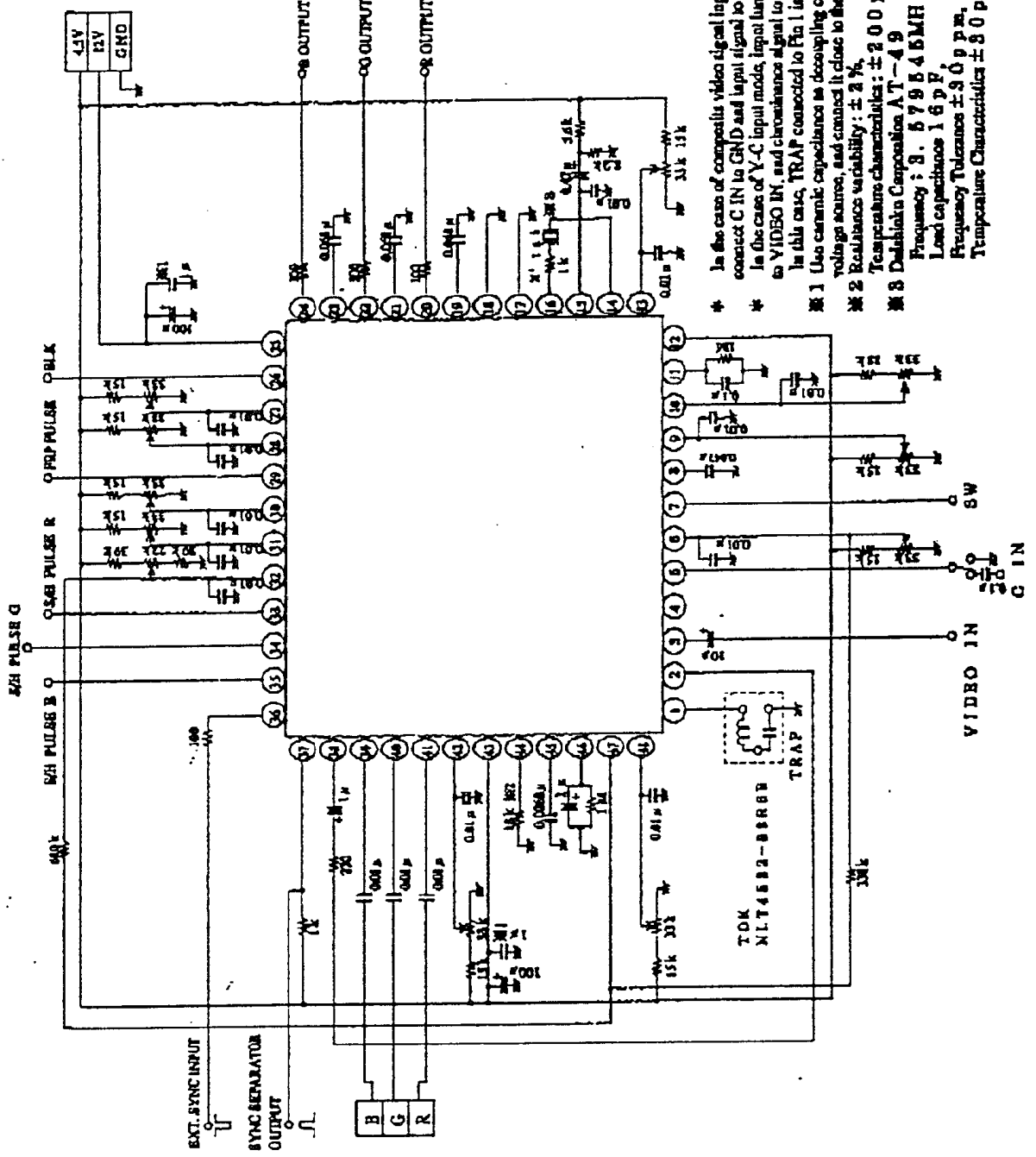
Application circuit example
(PAL/Vcc2=4.5V, Vee=-7.5)



* In the case of composite video signal input mode, connect CIN to GND and input signal to VIDEO IN.
* In the case of Y-C input mode, input luminance signal to VIDEO IN, and chrominance signal to CIN. In this case, TRAP connected to Pin 1 is not necessary.

※1 Use ceramic capacitance as decoupling capacitance for a voltage source, and connect it close to the Pin of the IC.
※2 Resistance variability : ±2%
Temperature characteristics : ±200ppm/℃
※3 Daishinku Corporation AT-49
Frequency : 4.433619MHz
Load capacitance 16pF,
Frequency Tolerance ±30ppm,
Temperature Characteristics ±30ppm

Application circuit example
(NTSC/V_{CC}2=12V, V_{EE}=GND)



* In the case of composite video signal input mode, connect C IN to GND and input signal to VIDEO IN.
* In the case of Y-C input mode, input luminance signal to VIDEO IN, and chrominance signal to C IN.
In this case, TRAP connected to Pin 1 is not necessary.

※1 Use ceramic capacitance as decoupling capacitance for a voltage source, and connect it close to the Pin of the IC.

※2 Resistance variability : ±2%

Temperature characteristics : ±200ppm/℃

※3 Delaiclain Corporation AT-49

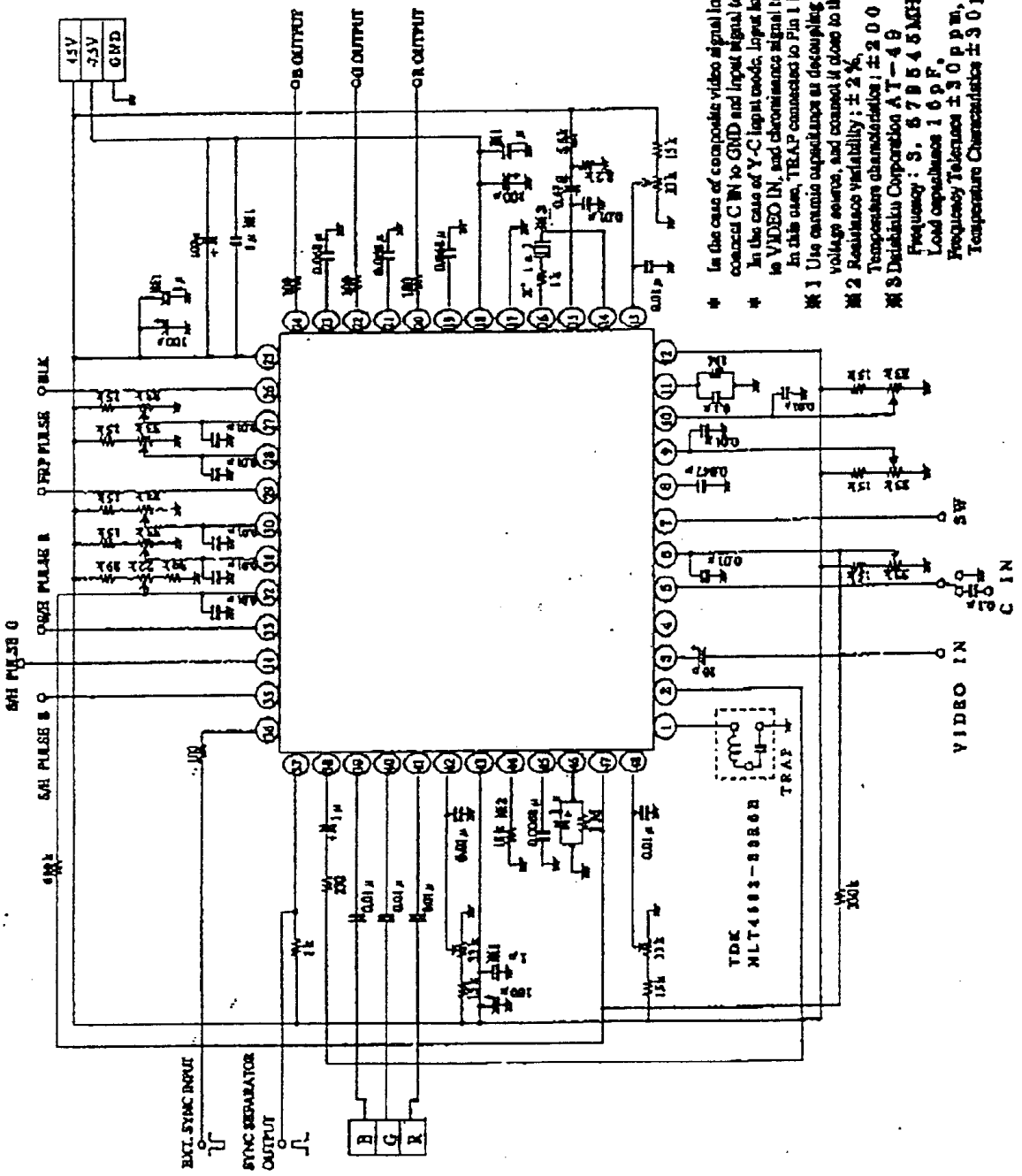
Frequency : 3.579545MHz

Load capacitance 16pF,

Frequency Tolerance ±30ppm,

Temperature Characteristics ±30ppm

Application circuit Example
(NTSC/Vcc2=4.5V, VEE=-7.5)



* In the case of composite video signal input mode, connect C IN to GND and input signal to VIDEO IN.
* In the case of Y-C input mode, input luminance signal to VIDEO IN, and chrominance signal to C IN. In this case, TRAP connected to Pin 1 is not necessary.

※1 Use ceramic capacitors as decoupling capacitance for a voltage source, and connect it close to the Pin of the IC.
※2 Resistance variability: ±2%,
Temperature characteristics: ±200ppm/℃
※3 Daishinku Corporation AT-49
Frequency: 3.579545MHz
Load capacitance 16pF,
Frequency Tolerance ±30ppm,
Temperature Characteristics ±30ppm

12 Package and packing specification

1. Package Outline Specification
   Refer to drawing No.AA1035

2. Markings
   2-1. Marking contents
   (1) Product name : IR3Y31M
   (2) Company name : SHARP
   (3) Date code
   (Example) YY WW X
   - X → Denotes the production ref.code.
   - WW → Denotes the production week. (01, 02, 03, ・・・・・52, 53)
   - YY → Denotes the production year. (Lower two digits of the year.)

   Indicates the product was manufactured in the WWth week of 19YY.

   (4) The marking of "JAPAN" indicates the country of origin.

   2-2. Marking layout
   Refer to drawing No.AA1035
   (This layout does not define the dimensions of marking character and marking position.)

3. Packing Specification
   3-1. Packing materials

Material Name	Material Specification	Purpose
Tray	Conductive plastic (80devices/tray)	Fixing of device
Upper cover tray	Conductive plastic (1tray/case)	Fixing of device
Laminated aluminum bag	Aluminum polyethylene (1bag/case)	Drying of device
Desiccant	Silica gel	Drying of device
P P band	Polypropylene (3 pcs/case)	Device tray fixing
Inner case	Card board (800devices/case)	Packaging of device
Label	Paper	Indicates part number, quantity and date of manufacture
Outer case	Cardboard	Outer packing of device case

   (Devices shall be placed into a tray in the same direction.)

   3-2. Outline dimension of tray
   Refer to attached drawing

4. Precaution For Unpacking
   (1) Unpacking should be done on the stand as well as human body treated with anti-ESD.
   (2) Conductive treatment or anti-ESD treatment is given to a tray. Use the equivalent tray, if it is changed to another one.

5. Surface Mount Conditions

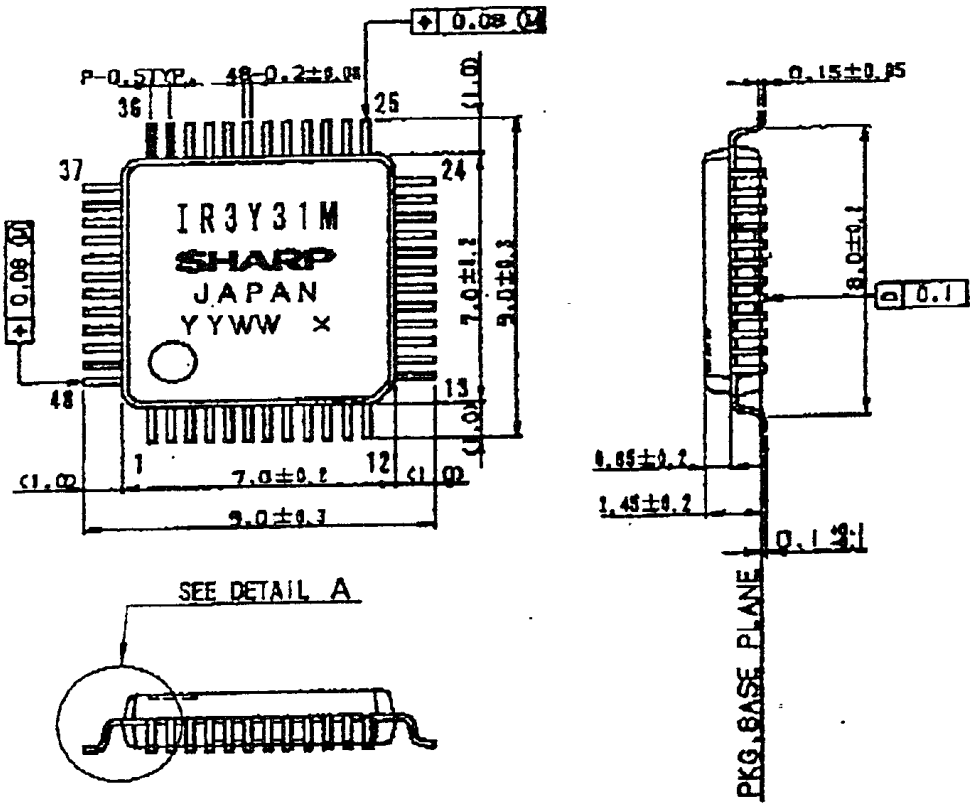
Please perform the following conditions when mounting ICs not to deteriorate IC quality.

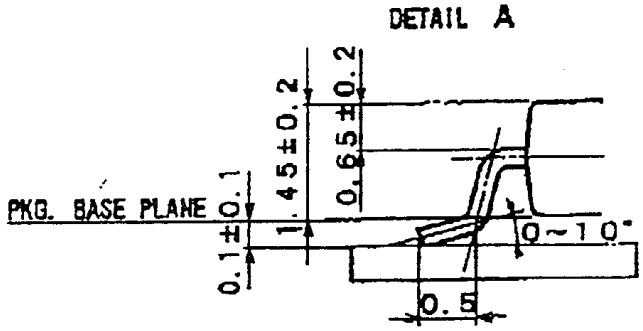
6－1.Soldering conditions(The following conditions are valid only for one time soldering.)

Mounting Method	Temperature and Duration	Measurement Point
Reflow soldering (air)	Peak temperature of 240℃ or less, duration of less than 15 seconds above 230℃, temperature increase rate of 1～4℃/second	IC package surface
Vapor phase soldering	215℃ or less, duration of less than 40 seconds above 200℃	Steam
Manual soldering (soldering iron)	260℃ or less, duration of less than 10 seconds	IC outer lead surface

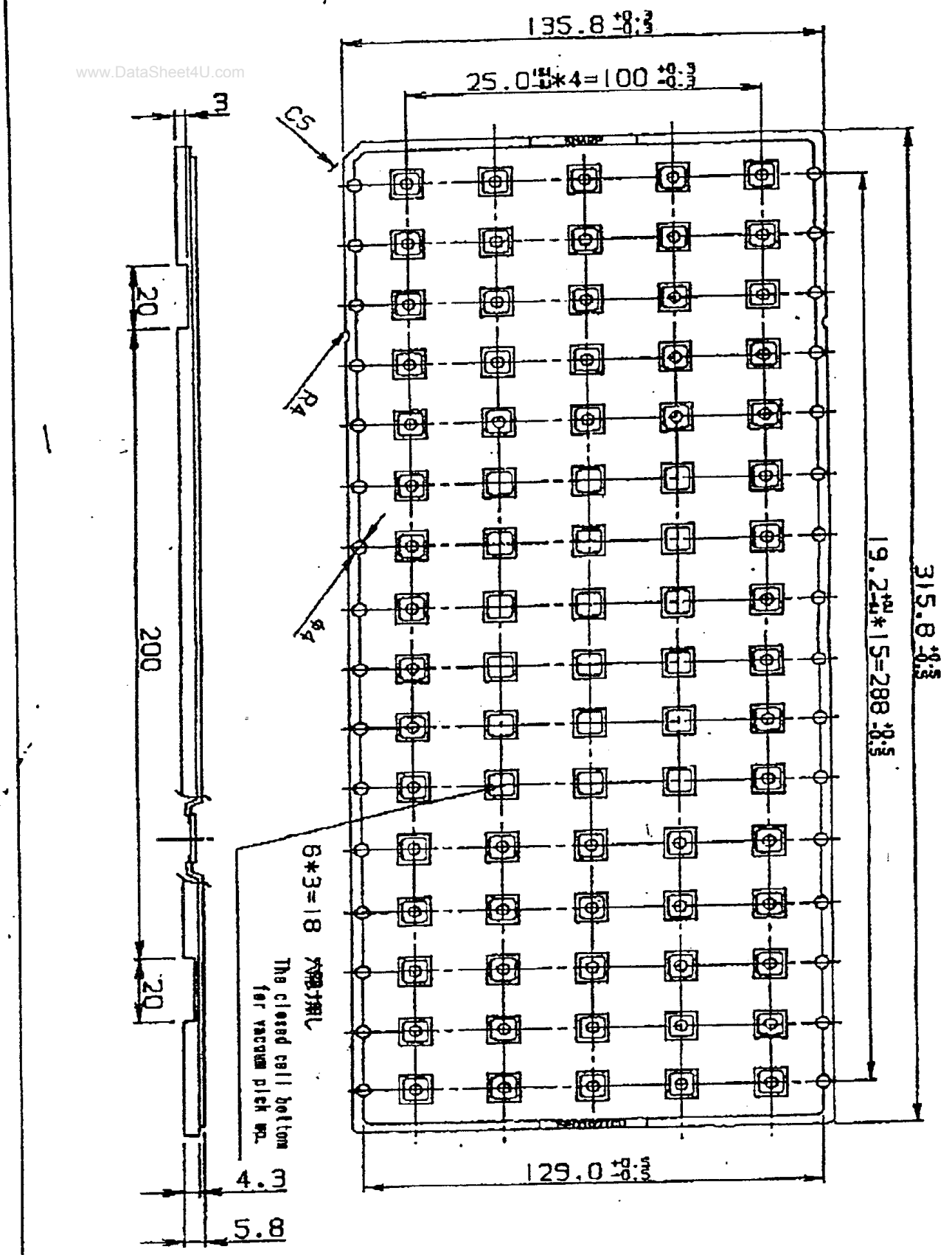
5－2. Conditions for removal of residual flux

(1) Ultrasonic washing power : 25 Watts/liter or less
(2) Washing time : Total 1 minute maximum
(3) Solvent temperature : 15～40℃





名称 NAME	QFP48-P-0707	リード仕上 LEAD FINISH	TIN-LEAD PLATING	備考 NOTE Plastic body dimensions do not include burr of resin.
DRAWING NO.	AA1035	単位 UNIT	mm	



名称 NAME	PP0707TCD		備考 NOTE
DRAWING NO.	CV536	単位 UNIT mm	