

CHROMINANCE AND LUMINANCE PROCESSOR FOR NTSC COLOR TV

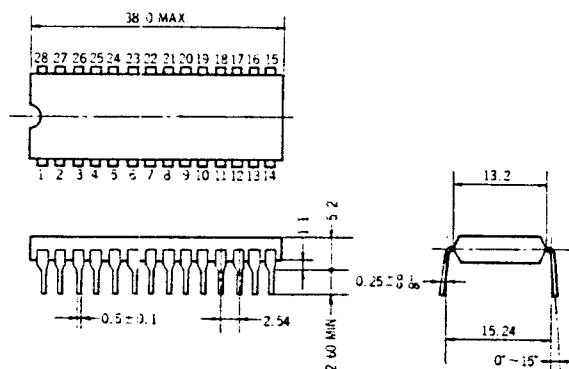
DESCRIPTION

uPC1372C is an integrated circuit for NTSC system to process both color and luminance signals of the color televisions. It is an MSI contained in a 28 pins dual in line package and provides two functions. One is the processing of color signal for the band pass amplifier, color synchronizer, demodulator circuits, and the other is the processing of luminance signal for the luminance amplifier and pedestal clamp circuits, the number of peripheral parts and controls can be minimized, and the manhours required for the assembling can be considerably reduced.

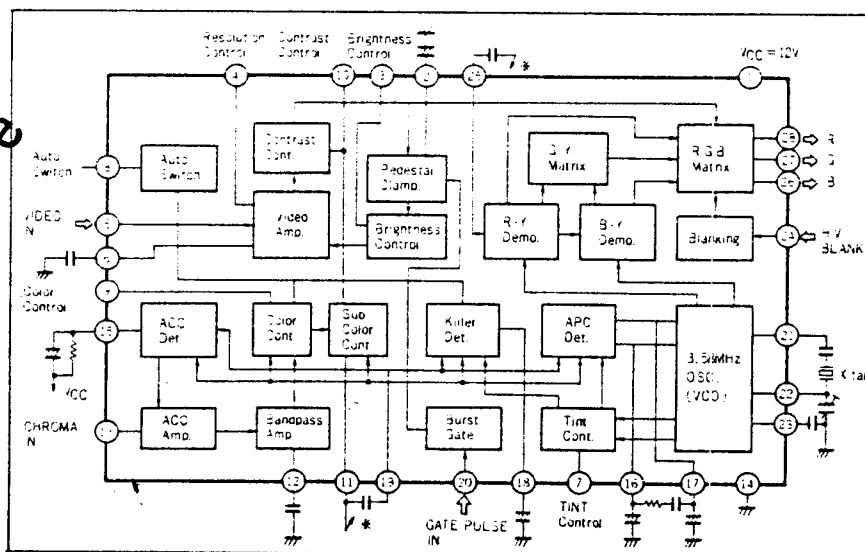
FEATURES

- It needs very few external components, and minimize the adjustments.
- DC controlled circuits make a remote controlled system easy.
- Protection diodes in every input terminals and output terminals.
- "Color killer" does not need any adjustments.
- "Contrast" control does not prevent the natural color of the picture any more, as the color saturation level changes simultaneously.
- ACC (Automatic color controller) circuit operates very smoothly with peak level detector.
- "Brightness control" terminal can be used for ABL (Automatic beam limiter) also.

PACKAGE DIMENSIONS in millimeters



BLOCK DIAGRAM



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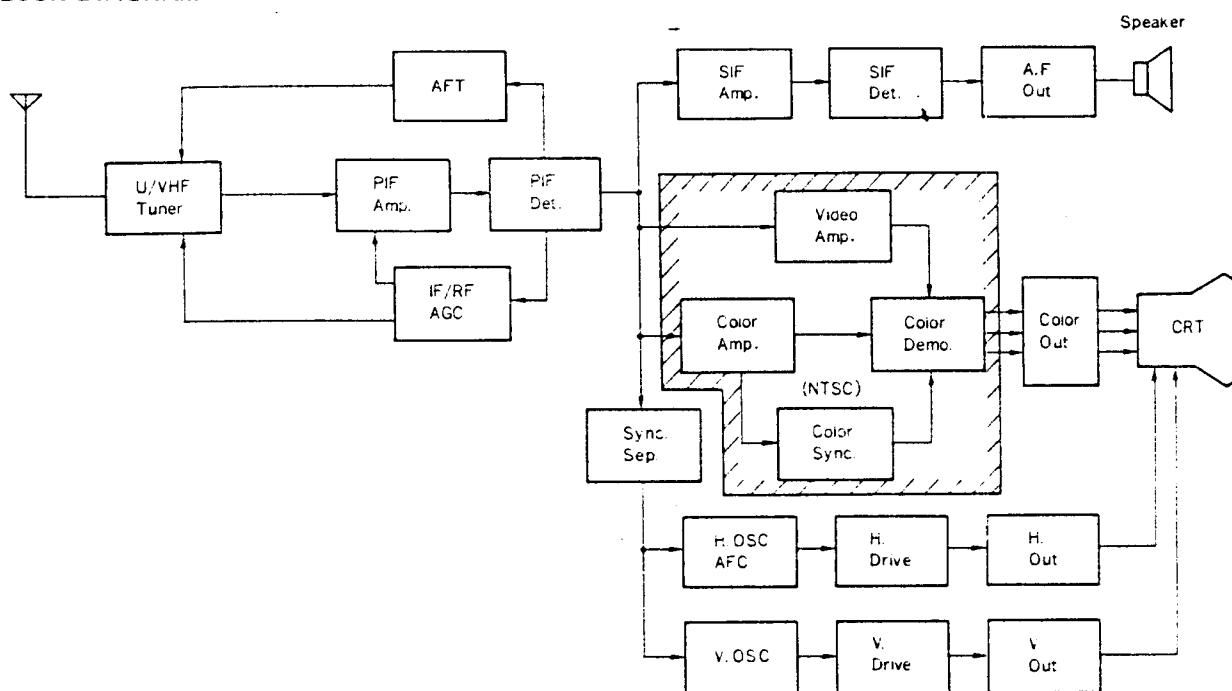
Nippon Electric Co., Ltd.

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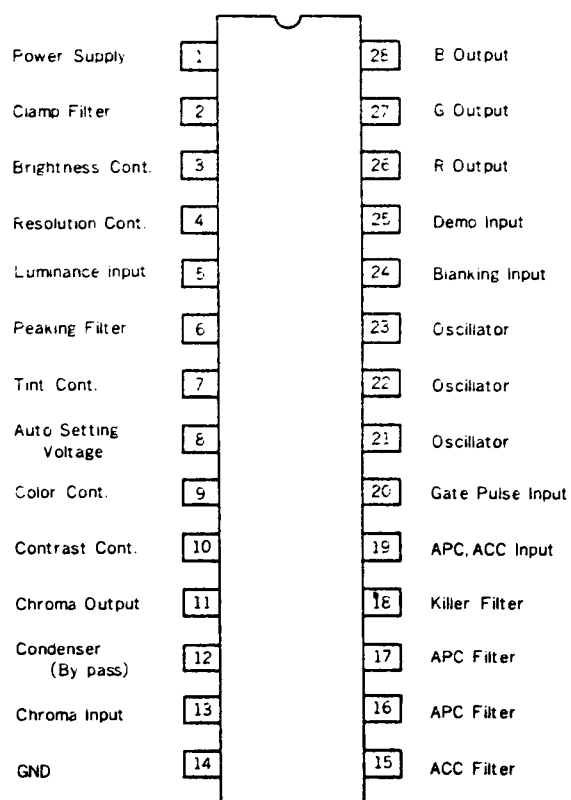
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TV BLOCK DIAGRAM



PIN CONNECTION (Top View)



THE STANDARD OPERATING CONDITIONS

Characteristic	Value	Unit
Supply Voltage	12	V
Chrominance Input Voltage (Burst signal level)	150	mVp-p
Luminance Input Voltage (Sync White Level)	1.0	Vp-p
Burst Gate Pulse Input Voltage	3.0	Vp
Blanking Pulse Input Voltage	2.5	Vp
Color saturation controlling Voltage Range	0~5.7 (at $V_{CC}=12$ V)	V
Tint controlling Voltage Range	0~5.7 (at $V_{CC}=12$ V)	V
Contrast controlling Voltage Range	0~12 (at $V_{CC}=12$ V)	V
Resolution controlling Voltage Range	0~12 (at $V_{CC}=12$ V)	V
Brightness controlling Voltage Range	8~10 (at $V_{CC}=12$ V)	V

Note: In case of operating in $V_{CC}=14.4$ V, Set the surrounding temperature T_a to be 67 °C.

ABSOLUTE MAXIMUM RATINGS ($T_a = +25$ °C)

Supply Voltage	V_{CC}	14.4	V
Brightness Controlling Voltage	V3	14.4	V
Resolution Controlling Voltage	V4	14.4	V
Contrast Controlling Voltage	V10	14.4	V
Tint Controlling Voltage	V7	14.4	V
Color Controlling Voltage	V9	14.4	V
Auto Controlling Voltage	V8	14.4	V
Luminance Input Signal Voltage	V5	+5	V
Chrominance Signal Input Voltage	V13	+2.5	V
Demodulator Input Signal Voltage	V25	+5	V
R.G.B Output Current	I26,I27,I28	-40	mA
Gate Pulse Input Voltage	V20	+5	V
Gate Pulse Output Current	I20	-10	mA
Blanking Pulse Input Voltage	V24	±6	V
Power Dissipation	$Pd1$ ($T_a = 25$ °C)	1.2	W
Power Dissipation	$Pd2$ ($T_a = 70$ °C)	750	mW
Operating Temperature	T_{opt}	-20~+70	°C
Storage Temperature	T_{stg}	-40~+125	°C

Test Conditions ($V_{CC} = 12$ V)

Characteristic	MIN.	TYP.	MAX.
Color saturation controlling terminal 9	0 V	V8/2 V	V8 V
Tint controlling terminal 7	0 V	V8/2 V	V8 V
Contrast controlling terminal 10	0 V	$V_{CC} \times 0.78$ V	V_{CC} V
Resolution controlling terminal 4	0 V	—	V_{CC} V

ELECTRICAL CHARACTERISTICS (Ta=25 °C unless otherwise noted V_{CC} = 12 V)

Color control is manual state and tint is center for the items not specifically specified

No.	Characteristic	Symbol	Test Ckt.	Test Condition	MIN.	TYP.	MAX.	Unit
1	Supply Current	I _{CC}	1		33	45	56	mA
2	Burst Output Voltage	e _B	3	Rainbow color bar signal input 150 mVp-p, Color auto center, Contrast max.	0.5	0.7	0.9	Vp-p
3	ACC Range 1	ACC1	3	Rainbow color bar signal input 300 mVp-p, Burst Output Voltage/e _B	0.9	1.0	1.1	times
4	ACC Range 2	ACC2	3	Rainbow color bar signal input 15 mVp-p, Burst Output Voltage/e _B	0.6	0.8	1.0	times
5	Chroma Output Voltage 1	e _{c1}	3	Rainbow color bar signal input 150 mVp-p, Color min, Contrast max.	0.5	0.7	0.9	Vp-p
6	Chroma Output Voltage 2	e _{c2}	3	Rainbow color bar signal input 150 mVp-p, Color min, Contrast max.	—	—	5	mVp-p
7	Chroma Output Voltage 3	e _{c3}	3	Rainbow color bar signal input 150 mVp-p, Color center, Contrast max.	120	190	260	mVp-p
8	Chroma Output Voltage 4	e _{c4}	3	Rainbow color bar signal input 150 mVp-p, Color auto center, Contrast max.	130	190	260	mVp-p
9	Variable Range of Chroma Output Voltage at auto	Δe _{ca}	3	Rainbow color bar signal input 150 mVp-p, Color auto max min, Contrast max.	+25 -25	+35 -35	+45 -45	%
10	Free running Frequency	f _o	2	No input signal to Terminal 19 Be trimed 3.579545 MHz by using a trimer capacitor for standard sample, Deviation from f; 3.579545 MHz	—	—	±150	Hz
11	Oscillator controlling sensitivity	β	2	Burst signal input 0.7 Vp-p, Converted from V16—17 in case of 100 Hz burst frequency variation	1.0	1.5	2.0	Hz/mV
12	Phase detector sensitivity	μ	2	Burst signal input 0.7 Vp-p, Converted from phase error and V16—17 in case of 100 Hz burst frequency variation	25	45	65	mV/ degree
13	Phase error	Δφ	2	Burst signal input 0.7 Vp-p, Phase error to 100 Hz of burst frequency variation	—	1.5	3.0	degree /100 Hz
14	A.P.C. pull-in frequency range	f _p	2	Burst signal input 0.7 Vp-p, Mesured by changing the burst frequency	±350	±500	—	Hz
15	Variable Range of Tint	Δθ1	2	Burst signal input 0.7 Vp-p, Tint; max min, manual, Tint center, Range from 0 as a standard	+37 -37	+45 -45	+53 -53	degree
16	Variable Range of Tint at auto	Δθ2	2	Burst signal input 0.7 Vp-p, Tint; max min, auto Tint center, Range from 0 as a standard	12 -12	+17 -17	+22 -22	degree

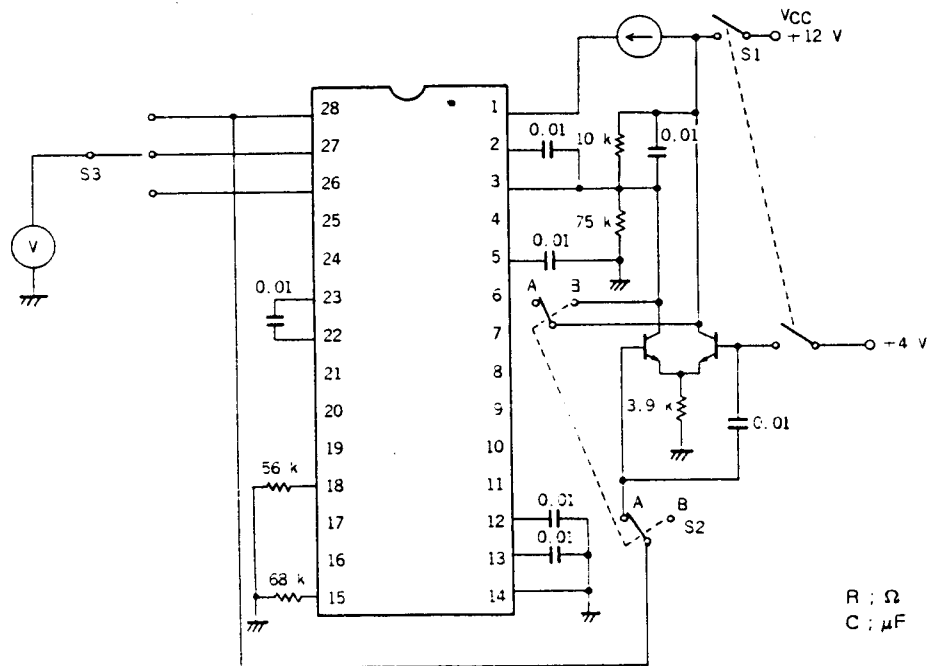
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No.	Characteristic	Symbol	Test Ckt.	Test Condition	MIN.	TYP.	MAX.	Unit
17	B-Y Output Voltage	e_{o1}	3	Dem. input 0.2 Vp-p, $f=3.59$ MHz, Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	1.5	2.0	2.5	Vp-p
18	Ratio of R-Y to B-Y	R/B	3	Dem. input 0.2 Vp-p, $f=3.59$ MHz, R Output Voltage/ e_{o1} Bright VR was set to be $V_{26}=3.5$ (DC) No blanking input	0.86	0.94	1.04	times
19	Ratio of G-Y to B-Y	G/B	3	Dem. input 0.2 Vp-p, $f=3.59$ MHz, G Output Voltage/ e_{o1} Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	0.25	0.30	0.35	times
20	Relative Output phase G-Y to R-Y	$\angle R$	3	Dem. input 0.2 Vp-p, $f=3.59$ MHz, B=O degree, phase difference Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	92	96	100	degree
21	Relative Output phase G-Y to B-Y	$\angle G$	3	Dem. input 0.2 Vp-p, $f=3.59$ MHz, B=O degree, phase difference Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	228	235	242	degree
22	Maximum Color difference Output Voltage	e_{o2}	3	Dem. input 1.2 Vp-p, $f=3.59$ MHz, Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	4.8	5.7	—	Vp-p
23	Residual Carrier	e_{car}	3	No signal input, Output: 3.58 MHz each, Carrier leak component, Bright VR was set to be $V_{26}=3.5$ V(DC) No blanking input	—	—	100	mVp-p
24	Demodulation frequency characteristic	e_{of}	3	Attenuation factor of demodulation output at $f=500$ kHz, Dem. input 0.2 Vp-p, $f=3.08$ MHz, Assuming the output at $f=10$ kHz is 0 dB	-1.5	-0.9	-0.4	dB
25	Overall Color difference Output Voltage	e_{o3}	3	Rainbow color bar signal input 150 mVp-p, Color auto center, Contrast max, in R output	1.0	1.7	2.4	Vp-p
26	Overall Color difference Output Variable Range by Contrast	Δe_{oc}	3	Rainbow color bar signal input 150 mVp-p, Color auto center, Contrast max/min, in R output	3.4	3.35	4.3	Vp-p
27	Color killer tolerance	e_k	3	Burst input Voltage at terminal 13 150 mVp-p=0 dB, Attenuation value in operating the killer	-27	-32	-40	dB
28	Luminance Gain	A_{v1}	3	R,G,B Output each, Studio color bar input 1 Vp-p in white level, Contrast max, Resolution min, Pedestal of terminal 26 is 2 V, Bright VR was set	4.5	5.0	5.5	times
29	Luminance Gain Variable Range by Contrast	Δe_{vc}	3	Studio color bar input 1 Vp-p in white level, Contrast max/min, Resolution min, in B output	4.0	4.5	5.0	times

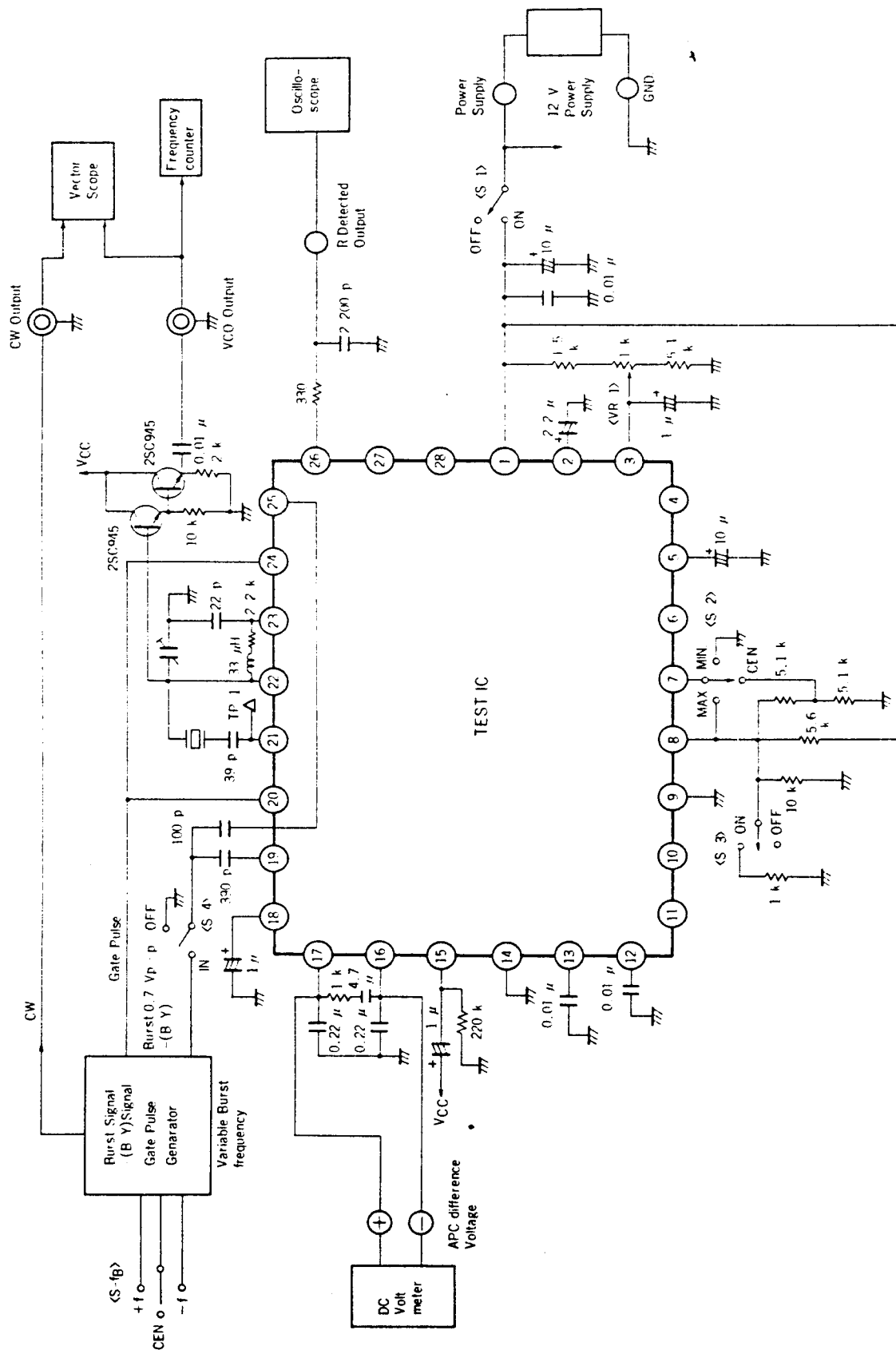
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No.	Characteristic	Symbol	Test Ckt.	Test Condition	MIN.	TYP.	MAX.	Unit
30	Luminance Amp. frequency characteristic	f_v	3	Sine wave signal input 0.1 Vr.m.s. Input frequency at Av1=-6 dB Resolution min, in B output, Bright VR was set to be V26=3.5 V(DC) No blanking input, 0 dB=16 kHz Output	5	6	-	MHz
31	Resolution Variation Range	Δf_{vp}	3	Sine wave signal 0.1 Vr.m.s., f=2 MHz Contrast max, Resolution min~max, in E Output max/min	5.0	7.0	9.0	dB
32	DC Restored	T _{DC}	3	Stair Step signal input 1 Vp-p, APL 10~90 % in B Output	90	97	100	%
33	Brightness controlling sensitivity	BR	3	$\Delta E_o: \Delta V_3$, $E_o=2V \sim 5V$, R,G,B Output each	4.2	4.7	5.2	-
34	Maximum R,G,B Output Voltage	E _{oM}	1	R,G,B Output Voltage each at V3=12 V	7.0	-	-	V
35	Differential Gain	D.G.	3	Stair Step signal input 1 Vp-p, f=3.58 MHz, APL=50 %, Contrast max, Resolution min, Pedestal of terminal 26 is 2 V, Bright VR was set	-	-	5.0	%
36	Quiescent Output Voltage	E _o	3	R,G,B Output each, Bright VR was set to be V3=9 V, No Luminance signal input, Contrast max, VCO is operating, Blanking	2.5	3.5	4.5	V
37	E _o Supply Voltage Coefficient	E _{o-v}	3	V _{CC} =12 V $\pm 20\%$, V26=3.5 V (V _{CC} =12 V), R, G, B Output each Blanking	0.2	0.25	0.3	V/V
38	E _o Temperature Coefficient	ΔE_{o-t}	3	T _a =-20~+70 °C, V26=3.5 V (T _a =25 °C) R,G,B Output each	-4.0	-2.0	0	mV/°C
39	Difference Output Voltage	ΔE_{R-G} ΔE_{G-B} ΔE_{B-R}	3	V26=3.5 V VCO is operating, R,G,B Output each, No blanking input	-	0	300	mV
40	Constant Sink Current	I26	1	-	1.6	2.2	3.2	mA
41	Clamping Level	Vc26	1	-	0.4	0.55	0.7	V

Test Circuit 1



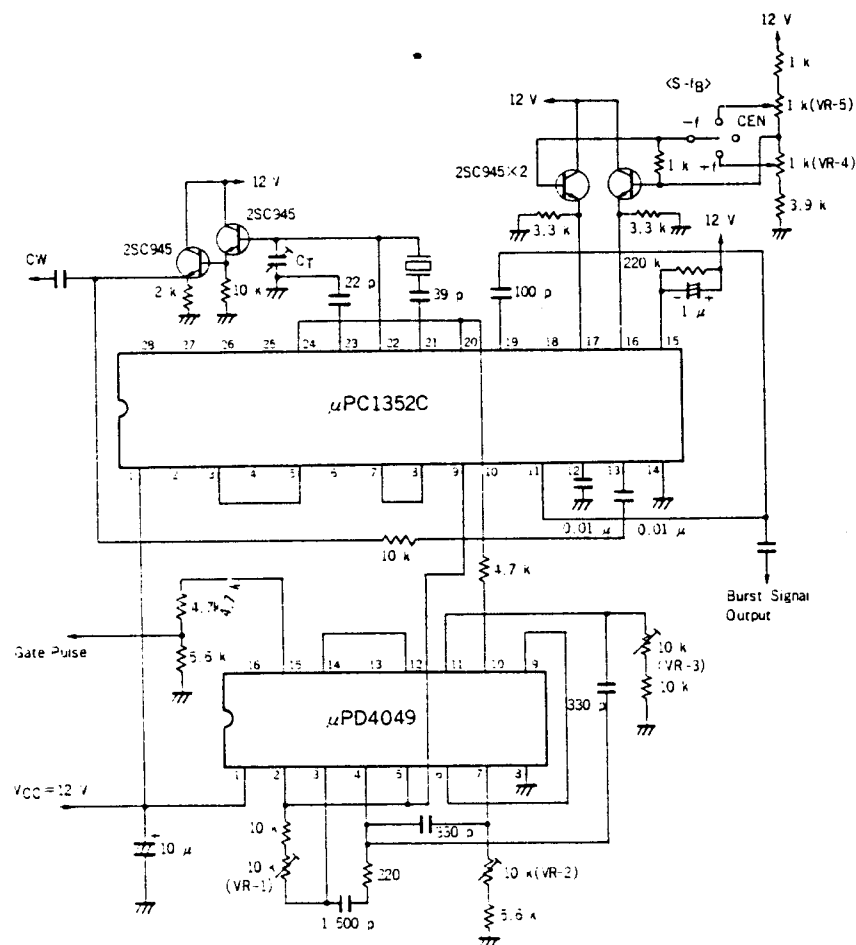
Supply Current	I_{CC}	S1 ; ON	S2 ; Side A	
Maximum R,G,B	E_{OM}	S1 ; ON	S2 ; Side B	S3 ; Each
Output Voltage				



Burst Signal
-(B-Y) Signal
Gate Pulse

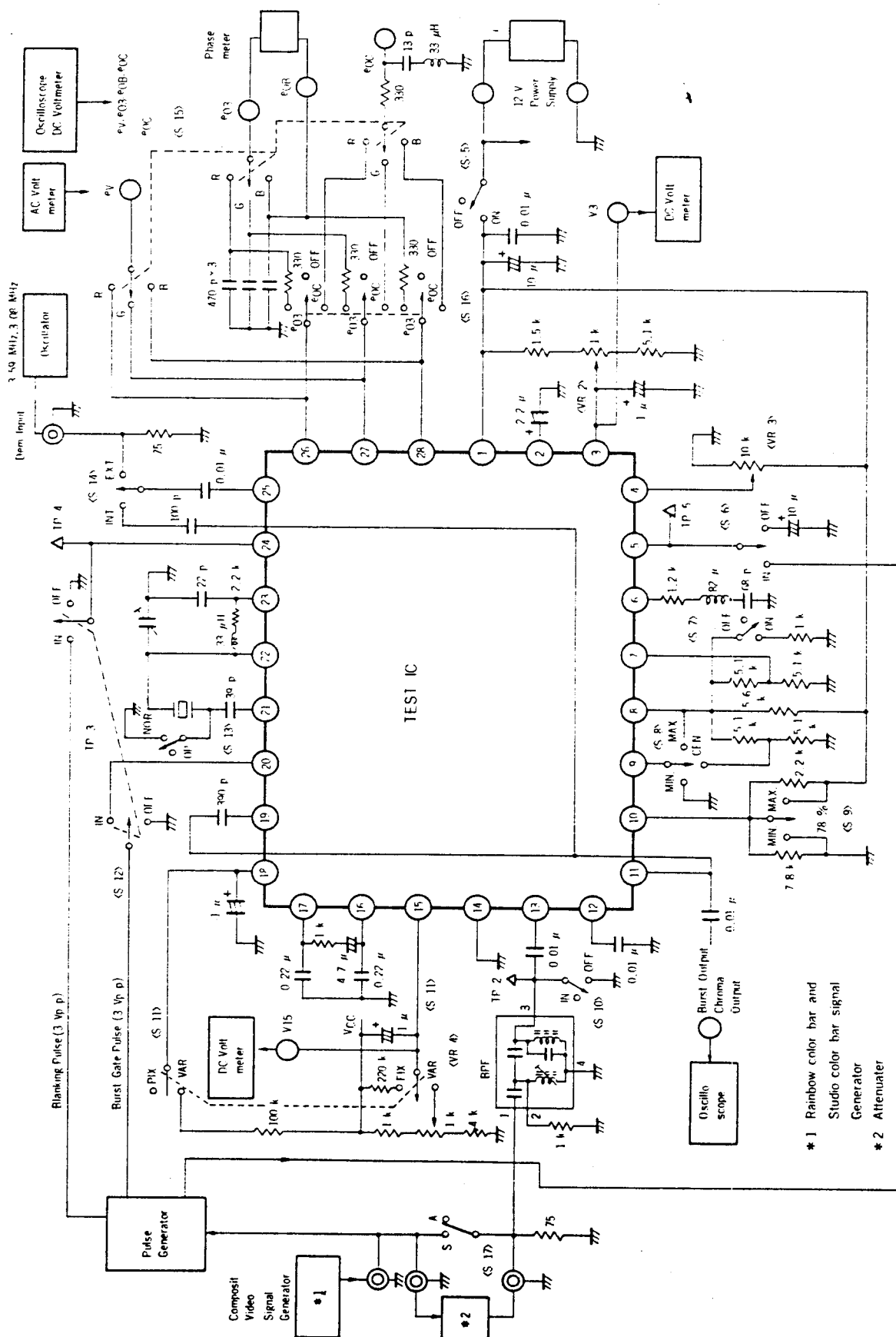
Generator

Test Circuit 2



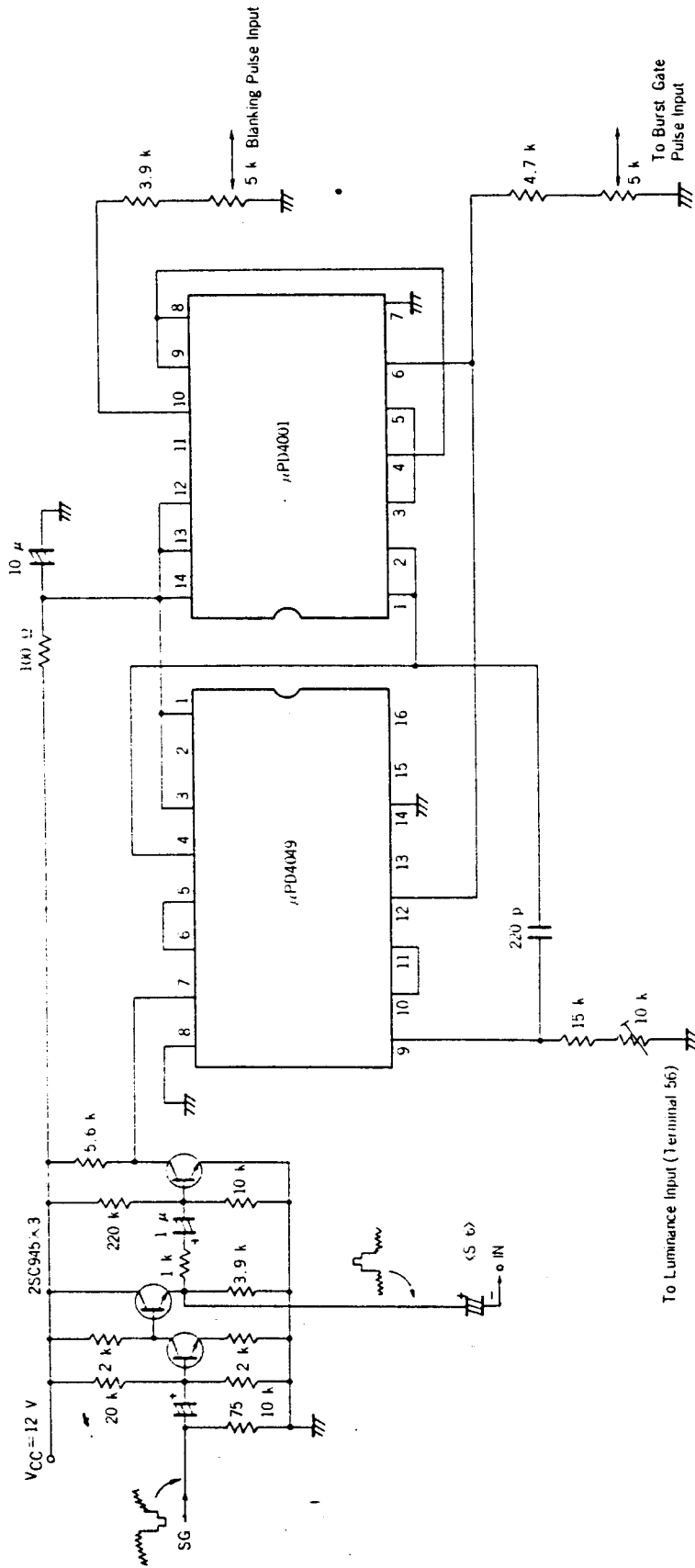
- VR-1 Set to $f_H = 15.75 \text{ kHz}$.
 VR-2 Set to Burst width (10 cycle)
 VR-3 Set to Gate Pulse width = $3.5 \mu\text{s}$.
 VR-4 $+f$
 VR-5 $-f$ Be trimmed $f_0 = 3579545 \text{ Hz}$ by C_T at the VR are center.

Test Circuit 3



* 1 Rainbow color bar and
Studio color bar signal
Generator
* 2 Attenuator

Pulse Generator Circuit (Test Circuit 3)



Characteristic	Symbol	Test Ckt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	Measuring Apparatus
Burst Output Voltage	e_b	3	Power Supply			Burst (R V) Input	OFF	OFF	ON	CEN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN	ACC Level	Oscilloscope Burst signal
ACC Range 1	ACC1	3					OFF	OFF	ON	CEN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 300 mVp-p			MIN		Oscilloscope Burst signal
ACC Range 2	ACC2	3					OFF	OFF	ON	CEN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Burst signal
Chroma Output Voltage	e_{c1}	3					OFF	OFF	OFF	MAX	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Chroma signal
Chroma Output Voltage	e_{c2}	3					OFF	OFF	OFF	MIN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Chroma signal
Chroma Output Voltage	e_{c3}	3					OFF	OFF	OFF	CEN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Chroma signal
Chroma Output Voltage	e_{c4}	3					OFF	OFF	ON	CEN	MAX	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Chroma signal
Variable Range of Chroma Output Voltage at auto	Δe_{cs}	3					OFF	OFF	ON	MAX	MIN	IN	FIX	IN	OP	INT		*0.3	A TP 2 150 mVp-p			MIN		Oscilloscope Variation of Chroma signal
Free running Frequency	f_0	2	OFF	CEN	ON	OFF																		Frequency Counter
Oscillator controlling sensitivity	β	2	OFF	CEN	ON	IN	OFF																	D.C. Voltage Meter
Phase Det. sensitivity	μ	2	OFF	CEN	ON	IN	OFF																	Vector Scope D.C. Vol. Meter Difference APC Voltage
Phase error	$\Delta \phi$	2	OFF	CEN	ON	IN	OFF																	Vector Scope
A.P.C. pull. in Freq. range	f_p	2	OFF	CEN	ON	IN	OFF																	Oscilloscope
Variable Range of Tint	Δt_1	2	OFF	MAX	OFF	IN	OFF																	Vector Scope
Variable Range of Tint at auto	Δt_2	2	OFF	MAX	MIN	IN	OFF																	Vector Scope
B.Y. Output Voltage	e_{o1}	3					OFF	OFF				OFF	FIX	OFF	OP	EXT 0.2 Vp-p 1-3.5V		*0.3				MIN		Oscilloscope Demo. Output Voltage B

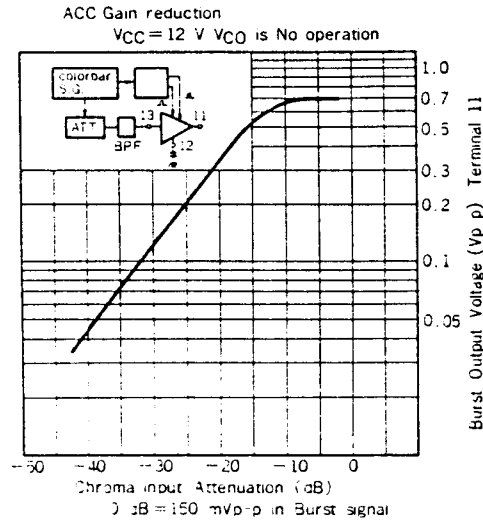
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Characteristic	Symbol	Test Ckt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Bright-ness	1	2	3	4	Measuring Apparatus
Ratio of R-Y to B-Y	H/B	3					OFF ↓ ON	OFF			Cont. test	OFF	FIX	OFF	OP	EXT 0.2 V _{pp} f=3.59	H B	e ₀₃			V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage R-B	
Ratio of G-Y to B-Y	G/B	3					OFF ↓ ON	OFF				OFF	FIX	OFF	OP	EXT 0.2 V _{pp} f=3.59	G B	e ₀₃			V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage G-B	
Relative Output phase B-Y to R-Y	I/R	3					OFF ↓ ON	OFF				OFF	FIX	OFF	OP	EXT 0.2 V _{pp} f=3.59	B H	e ₀₃	—		V26- 3.5 V	MIN	—	Phase Meter Relative phase R-B	
Relative Output phase G-Y to B-Y	I/G	3					OFF ↓ ON	OFF				OFF	FIX	OFF	OP	EXT 0.2 V _{pp} f=3.59	B G	e ₀₃			V26- 3.5 V	MIN	—	Phase Meter Relative phase B-G	
Maximum Detected Output Voltage	e ₀₂	3					OFF ↓ ON	OFF	—	—		OFF	FIX	OFF	OP	EXT 1.2 V _{pp} f=3.59	B H	e ₀₃	—		V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage B-R	
Residual Carrier	e ₀₄	3					OFF ↓ ON	OFF	—	—		OFF	FIX	OFF	OP	EXT No	R G B	e ₀₄	—		V26- 3.5 V	MIN	—	Oscilloscope Output 3.58M Carrier	
Demodulation frequency characteristic	e _{0f}	3					OFF ↓ ON	OFF		—		OFF	FIX	OFF	OP	EXT 0.2 V _{pp} f=3.08	R G B	OFF			V26- 3.5 V	MIN	—	A.C. Voltage Meter	
Overall Detected Output Vol.	e ₀₃	3					OFF ↓ ON	OFF	ON	CEN	MAX	IN	FIX	IN	OP	INT	R	e ₀₃	A TP-2 150 mV _{pp}		V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage R	
Overall Detected Output Variable Range by Cont. controlling	Δe _{0c}	3					OFF ↓ ON	OFF	ON	CEN	MAX ↓ MIN	IN	FIX	IN	OP	INT	R	e ₀₃	A TP-2 150 mV _{pp}		V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage R	
Color killer tolerance	e _k	3					OFF ↓ ON	OFF	—	—		IN	FIX	IN	OP	INT	R	e ₀₃	A TP-2 150 mV _{pp}		V26- 3.5 V	MIN	—	Oscilloscope Demo Output Voltage R	
Luminance Gain 1	AV1	3					OFF ↓ ON	IN Studio Color Bar White 1 V _{pp}			MAX	OFF	VAR	IN	NOP	EXT NO.	R G B	OFF			Terminal 26 Pedestal 2 V	MIN	V15- 8 V	Oscilloscope ev	
Luminance Gain Variable Range by Contrast cont.	Δe _{ve}	3					OFF ↓ ON	IN Studio Color Bar White 1 V _{pp}			MAX	OFF	VAR	IN	NOP	EXT NO.	B	OFF			Terminal 26 Pedestal 2 V	MIN	V15- 8 V	Oscilloscope ev	
Luminance Amp Frequency characteristic	f _v	3					OFF ↓ ON	IN Sine Wave 0.1 Vr.m.s.			MAX	OFF	VAR	OFF	NOP	EXT NO.	B	OFF			V26- 3.5 V	MIN	V15- 8 V	A.C. Voltage Meter 0 dB - 16 kHz ev	
Resolution Variation Range	Δf _{up}	3					OFF ↓ ON	IN Sine Wave 0.1 Vr.m.s.			MAX	OFF	VAR	OFF	NOP	EXT NO.	B	OFF			V26- 3.5 V	MIN MAX	V15- 8 V	A.C. Voltage Meter ev	

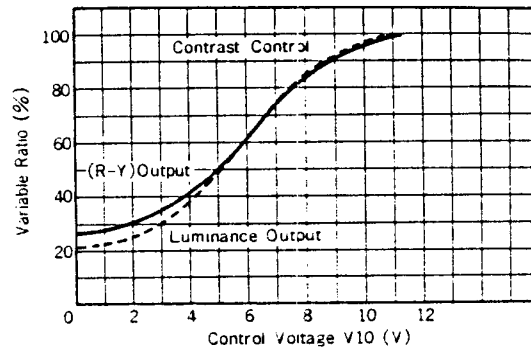
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Characteristic	Symbol	Test Ckt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	2	3	4	Measuring Apparatus
D.C. Transfer	TDC	3					Power Supply OFF I ON	Luminescence Input IN Stair step 1 Vp-p APL 90%	Auto	Color	Contrast MAX	Chroma Input OFF	ACC VAR	Pulse Input IN	VFO NOP	Demod Input EXT NO	RR R	Dem Output OFF	Attenuator	Brightness Terminal 26 Pedestal 2 V	Brightness Terminal 26 Pedestal 2 V	Resolution MIN	ACC Level V15- 8 V	Oscilloscope ev
Brightness Controlling Sensitivity	BR	3					Power Supply OFF I ON	OFF			MAX	OFF	VAR	IN	OP	EXT NO	RR R	Dem Output OFF		V3- D.C. 2.5 V	V15- R V	MIN	V15- R V	V3- D.C. D.C. Voltage Meter
Differential Gain	DG	3					Power Supply OFF I ON	IN Stair step APL 50%			MAX	OFF	VAR	IN	NOP	EXT NO	RR R	Dem Output OFF		Terminal 26 Pedestal 2 V	V15- 8 V	MIN	V15- 8 V	Vector Scope ev
Quiescent Output Voltage	E _o	3					Power Supply OFF I ON	OFF			MAX	OFF	FIX	IN	OP	EXT NO	RR R	Dem Output OFF		V3- 9 V	V15- 8 V	MIN	V15- 8 V	D.C. Voltage Meter
E _o Supply Vol. Coefficient	E _{ov}	3					Power Supply OFF I ON	OFF				OFF	FIX	IN	OP	EXT NO	RR R	Dem Output OFF		V3- 9 V	V15- 8 V	MIN	V15- 8 V	D.C. Voltage Meter
E _o Temperature Coefficient	E _{ot}	3					Power Supply OFF I ON	OFF				OFF	FIX	IN	OP	EXT NO	RR R	Dem Output OFF		V3- 9 V	V15- 8 V	MIN	V15- 8 V	D.C. Voltage Meter
Difference Output Voltage	ERG EGB EBR	3					Power Supply OFF I ON	OFF				OFF	FIX	OFF	OP	EXT NO	RR R	Dem Output OFF		V26- 3.5 V [VCC] 12 V	V15- 8 V	MIN	V15- 8 V	D.C. Voltage Meter

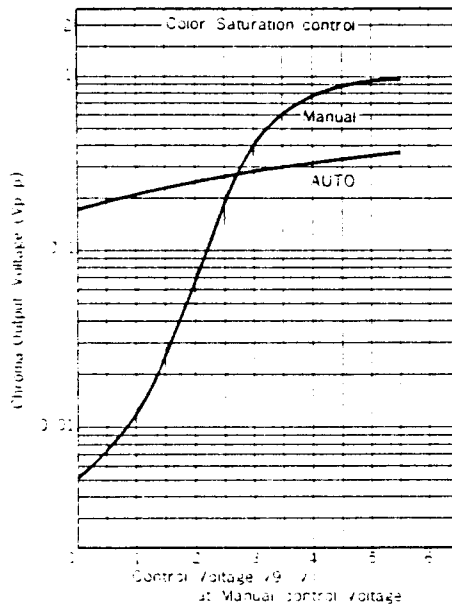
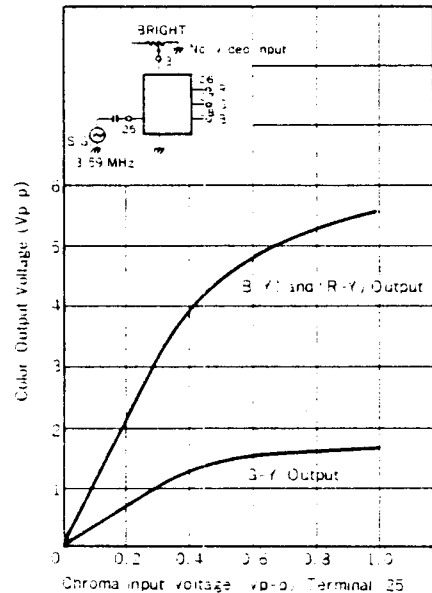
ACC Characteristic



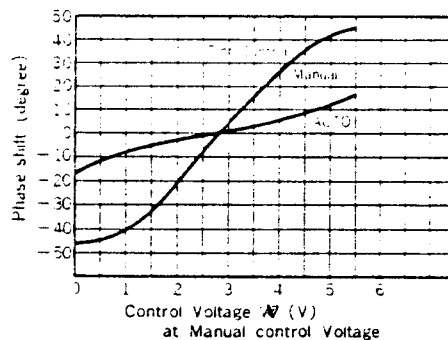
Contrast Control Characteristic



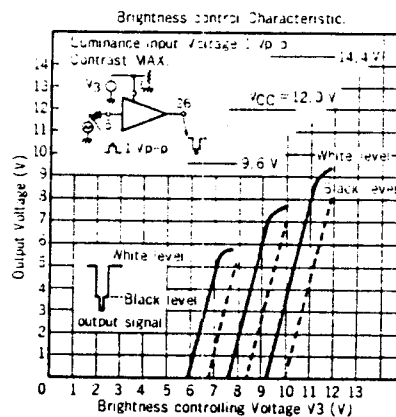
Color Control Characteristic

Brightness Control Characteristic
Demodulator Input vs. Output

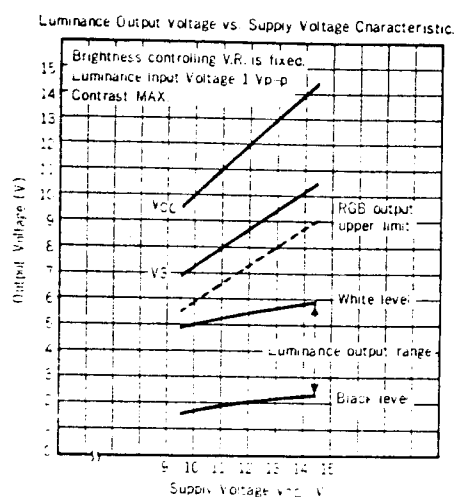
Tint Control Characteristic



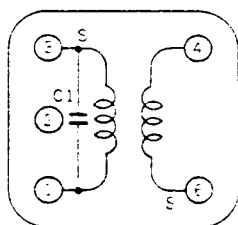
Demodulator Input-Output



R.G.B. Output Stage Dynamic Page



μ PC1352C BAND PASS COIL



Pin Connection

①-③: 88T

Q_u 15±20 % at $f=3.58$ MHz

④-⑥: 43-1/4T

Q_u 24±20 % at $f=3.58$ MHz

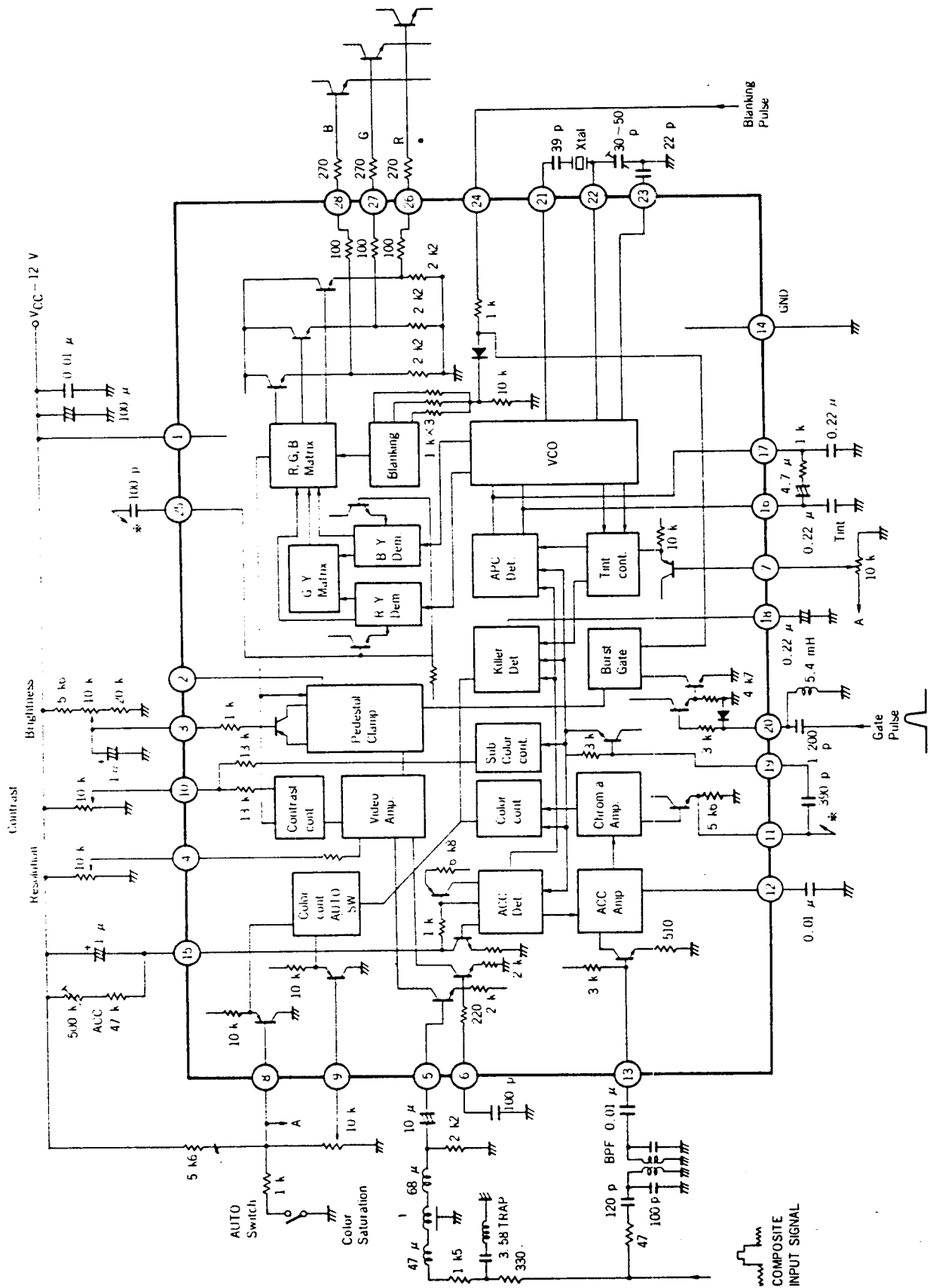
WIRE MATERIAL

0.12 ϕ OUEW

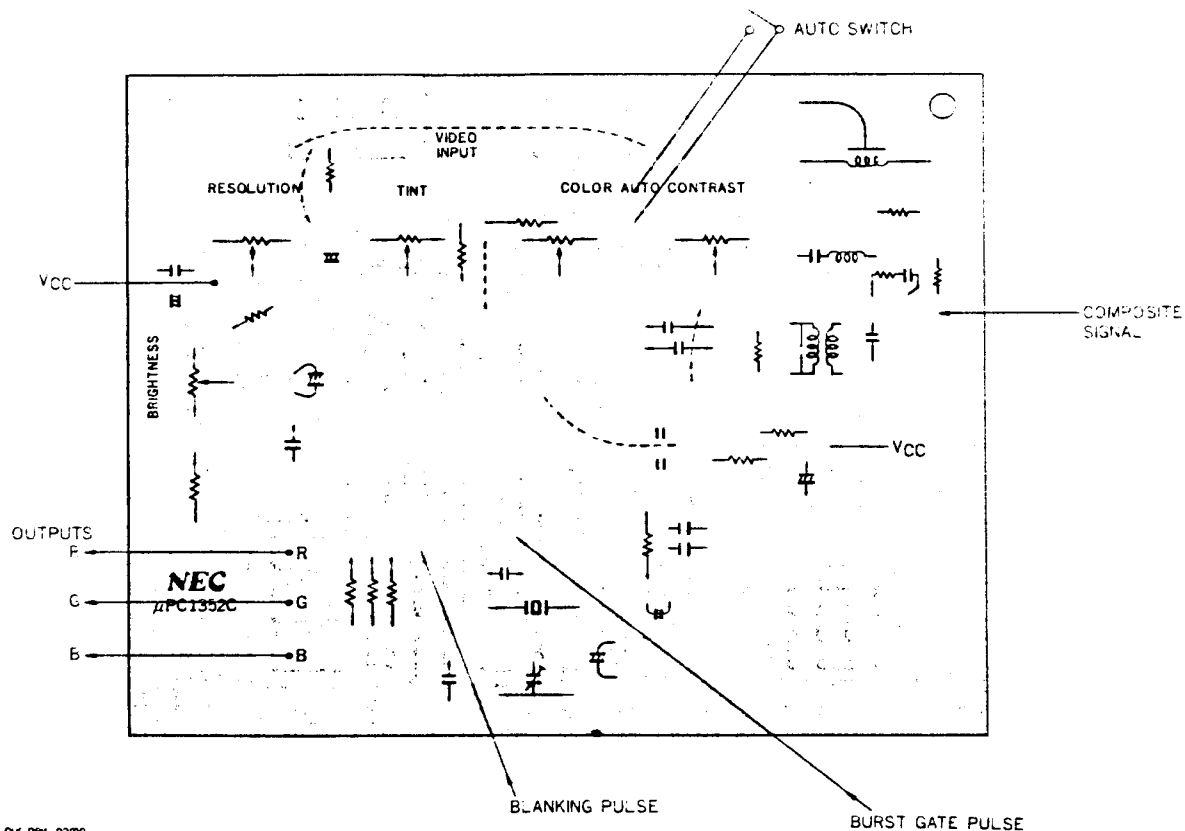
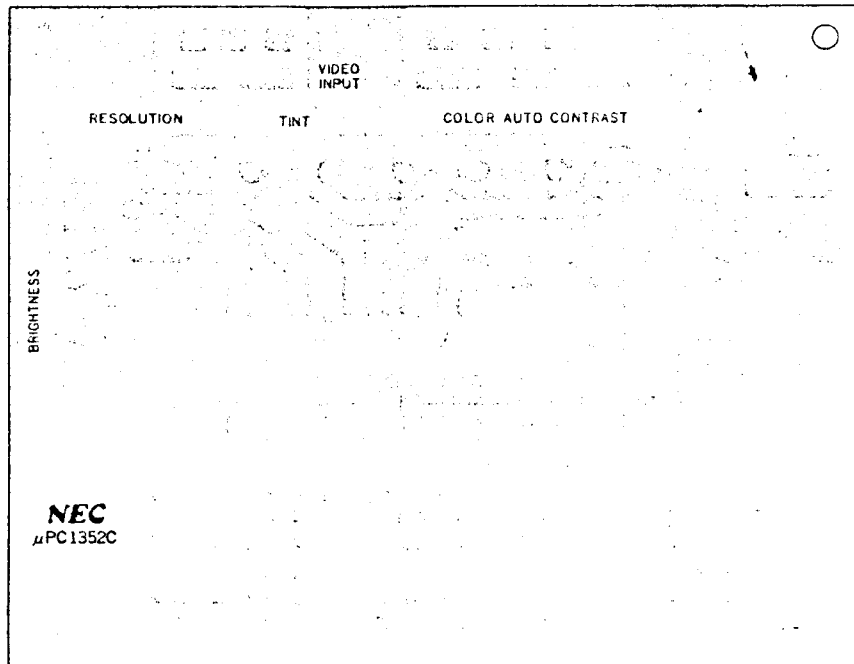
INSIDE CAPACITOR

$C_1 = 47$ pF

APPLICATION CIRCUIT



μPC1352C PRINTED CIRCUIT BOARD PATTERN (BOTTOM VIEW)



Please note our new name,
NEC Corporation
 starting April 1, 1983.

Nippon Electric Co., Ltd.

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