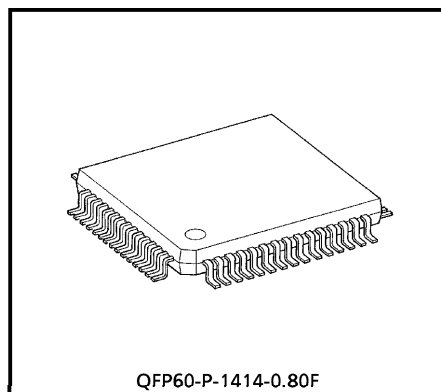


TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8795BF

VIDEO SIGNAL PROCESSOR IC FOR LCD TVs

Offered in a flat 60-pin plastic package, the TA8795BF is a multi-system IC integrating video, chroma, and sync signal processor circuits for PAL, NTSC, and SECAM systems with B, G, M, and N variations. Such automatic signal detection functions as PAL/NTSC/SECAM chroma system detection, 4.43/3.58MHz subcarrier detection, and 50/60Hz vertical sync frequency detection make this IC ideal for processing the signals of portable LCD televisions designed to be used anywhere in the world. (Uses M/N PAL external detection.)



QFP60-P-1414-0.80F

Weight : 0.8g (Typ.)

FEATURES

Video circuit

- Brightness control, unicolor control
- Second-order differential sharpness control
- Black stretch circuit
- DC restoration adjustable circuit
- YNR (coring)
- γ correction (two-point approximation)

Chroma circuit

- Color control, tint control
- Automatic detection of PAL/NTSC/SECAM systems, system forced mode
- Automatic detection of 3.58/4.43MHz subcarrier frequency (M/N PAL detected externally)
- Direct PAL demodulation (without 1H delay line)

Sync circuit

- Auto slice sync separator circuit
- Countdown horizontal oscillator circuit
- Automatic detection of 50/60Hz vertical sync frequency
- Sync separation output

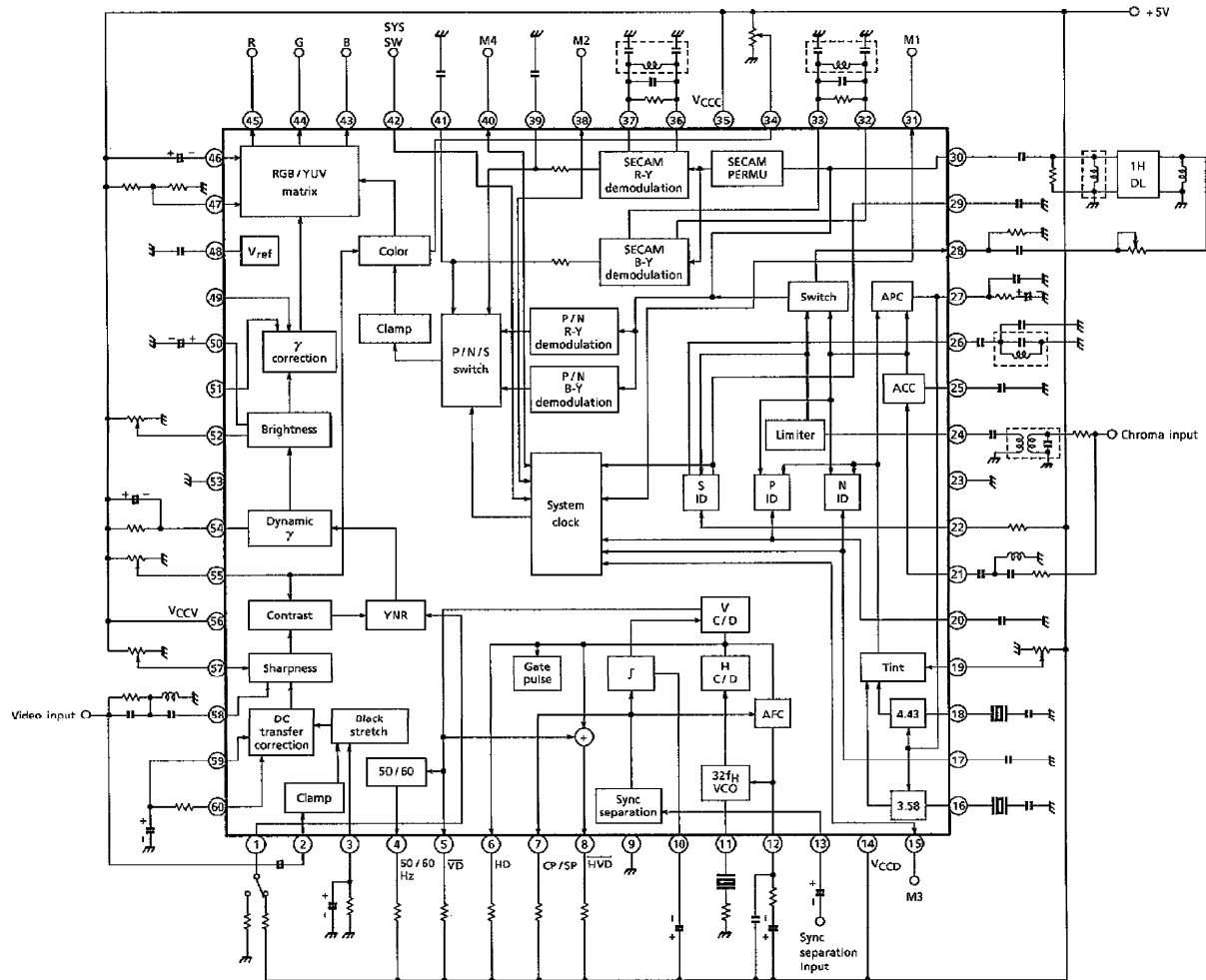
Demodulation output circuit

- Selectable output between RGB and YUV

961001EBA1

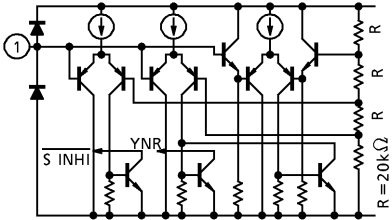
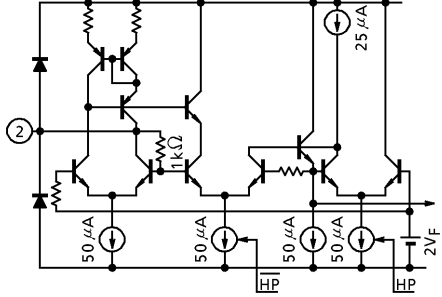
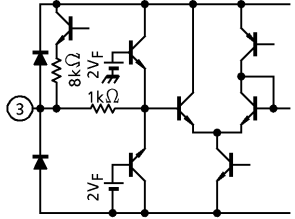
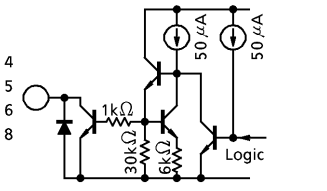
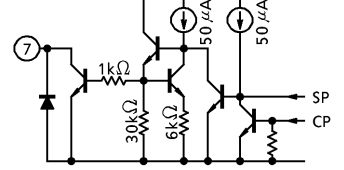
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BLOCK DIAGRAM

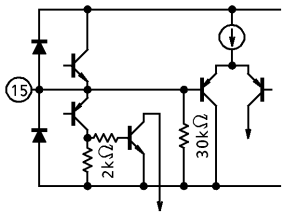
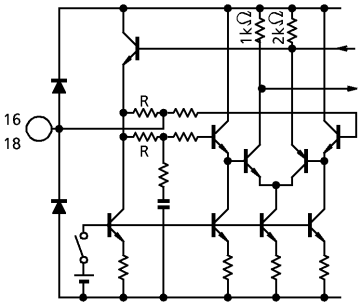
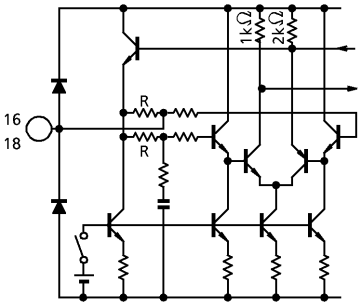
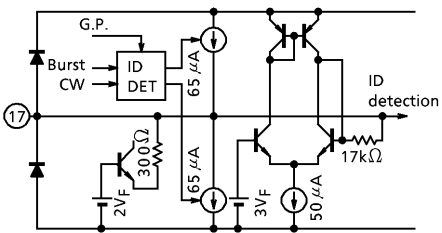
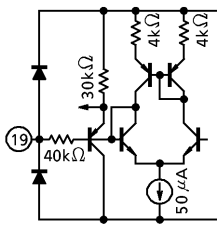
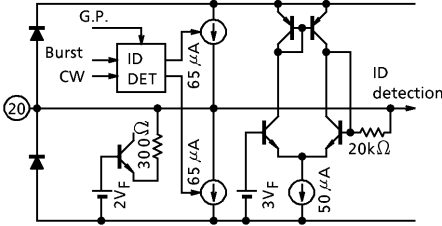


TA8795BF - 2

PIN FUNCTIONS

PIN No.	PIN NAME	FUNCTION	INTERFACE
1	YNR switch	YNR circuit switching pin. This pin also features a SECAM inhibit mode. For switching between the modes, see the Technical Data on P.13.	
2	Y _{in}	Video signal input pin. The typical input level is 0.5V _{p-p} .	
3	Maximum black detection	Maximum black level detection filter pin.	
4	50 / 60Hz output	Detects 50 / 60Hz vertical sync frequency. 50Hz triggers low-level output; 60Hz triggers high-level output.	
5	VD output	VD output pin.	
6	HD output	HD output pin.	
8	HD + VD output	HD + VD output pin.	
7	CP / SP output	CP / SP output pin.	
9	Def. GND	Def. ground pin.	—

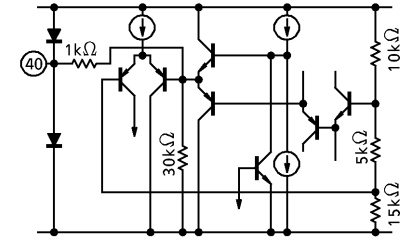
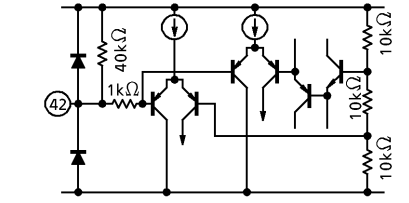
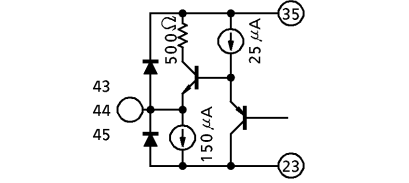
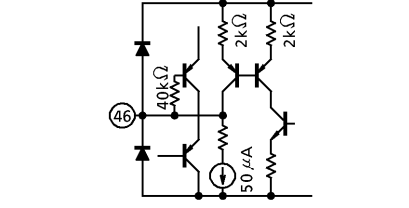
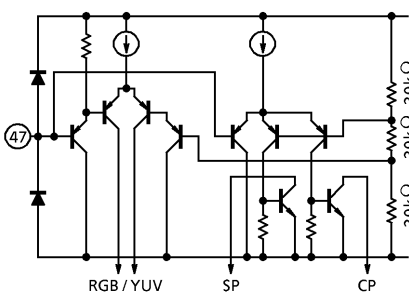
PIN No.	PIN NAME	FUNCTION	INTERFACE
10	Vertical sync separation filter	Vertical sync signal separation filter pin.	
11	32f _H VCO	32f _H VCO connecting pin.	
12	AFC filter	AFC filter pin.	
13	Sync separation input	Sync signal separation input pin. The typical input level is 1V _{p-p} .	
14	Def. V _{CC}	Def. V _{CC} pin.	—

PIN No.	PIN NAME	FUNCTION	INTERFACE
15	M3 (Mode switch 3)	Receive mode switching pin. For switching between the modes, see the Technical Data on P.12 and 13.	
16	3.58 / M / N VCXO	Connects 3.58MHz / M / N subcarrier VCXO.	
18	4.43MHz VCXO	Connects 4.43MHz subcarrier VCXO.	 <p>Pin 16 : R = 2.5kΩ Pin 18 : R = 1.5kΩ</p>
17	NTSC ID	NTSC signal identification pin.	
19	Tint	Tint adjustment pin.	
20	PAL ID	PAL signal identification pin.	

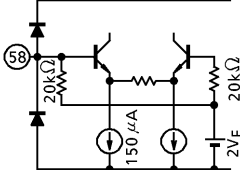
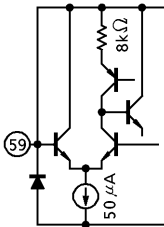
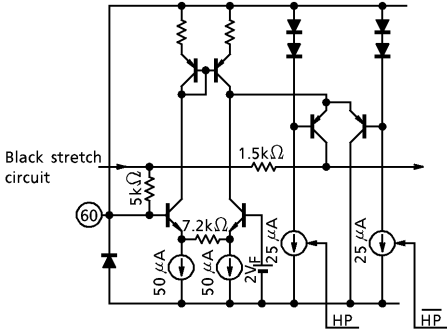
PIN No.	PIN NAME	FUNCTION	INTERFACE
21	Chroma input	PAL/NTSC chroma signal input pin.	
22	SECAM ID. switch	SECAM H-ID/V-ID switching pin. High level : H ID Low level : H + V ID	
23	Chroma GND	Chroma ground pin.	—
24	SECAM input	SECAM chroma signal input pin.	
25	ACC filter	ACC filter pin.	
26	S-ID detector	SECAM ID detector pin.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
27	APC filter	Chroma APC filter pin.	
28	1H delay line output	Outputs to the 1H delay line.	
29	SECAM ID	SECAM ID filter pin.	
30	1H delay line input	Inputs to the 1H delay line.	
31	M1 (Mode switch 1)	Receive mode switching pin. For switching between the modes, see the Technical Data on P.12 and 13.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
32 33	SECAM B-Y detection 1, 2	SECAM B-Y demodulation pins.	
36 37	SECAM R-Y detection 1, 2	SECAM R-Y demodulation pins.	
34	Color	Color adjustment pin.	
35	Chroma V _{CC}	Chroma V _{CC} pin.	—
38	M2 (Mode switch 2)	Receive mode switching pin. For switching between the modes, see the Technical Data on P.12 and 13.	
39 41	SECAM de-emphasis	SECAM de-emphasis pins.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
40	M4 (Mode switch 4)	Receive mode switching pin. For switching between the modes, see the Technical Data on P.12 and 13.	
42	SYS SW (system switch)	Receiver system switch. For system switching, see the Technical Data on P.12.	
43 44 45	R, G, B output	R (R-Y), G (Y), and B (B-Y) output pins.	
46	Clamp filter	G output clamp filter.	
47	PIP switch	R, G, B, and R-Y, B-Y, and Y output switch. Also switches between clamp pulse output and sync pulse separation output of pin 7. For switching between the modes, see the Technical Data on P.13.	

PIN No.	PIN NAME	FUNCTION	INTERFACE
48	V _{ref.} filter	V _{ref.} filter pin.	
50	Brightness filter	Brightness clamp filter.	
52	Brightness	Brightness control pin.	
49	γ correction 2	Sets the γ correction point.	
51	γ correction 1	Sets the γ correction point.	
53	Video GND	Video signal ground pin.	
54	Dynamic γ filter	Dynamic γ filter pin.	
55	Contrast	Contrast control pin.	
57	Sharpness	Sharpness control pin.	
56	Video V _{CC}	Video V _{CC} pin.	—

PIN No.	PIN NAME	FUNCTION	INTERFACE
58	YH input	Second-order differential signal input pin for sharpness.	
59	Black stretch point	Determines the black stretch point.	
60	DC transfer correction filter	DC transfer correction filter pin.	

○ System switch specifications (Unless otherwise specified, $V_{CC} = 4.5V$, $T_a = 25^{\circ}C \pm 3^{\circ}C$)

Pin 42 system switch

SYS SW (PIN 42)	MODE	RECEIVER SYSTEM
V_{CC}	Normal mode	PAL (B/G, etc), NTSC (3.58/4.43), SECAM
$1/2 V_{CC}$	South American mode	M, N, PAL (M/N/B/G, etc), NTSC (3.58/4.43), SECAM
GND (*)	Pseudo-PAL mode	M, N, PAL (M/N/B/G, etc), NTSC (3.58/4.43)

(*) In Pseudo-PAL mode, PAL demodulation uses the NTSC demodulation circuit, CW tint adjustment is supported, and a 1H delay line is not required (direct PAL demodulation).

(1) Normal mode (pin 42- V_{CC})

Color system automatic detection output

RECEIVED SIGNAL	M1	M2	M3	M4
	PIN 31	PIN 38	PIN 15	PIN 40
PAL	H	H	M	L
SECAM	H	M	M	L
4.43NTSC	L	H	M	L
3.58NTSC	L	L	M	L
Black & white	L	M/L	L	L

H : 3V
M : 1.5V
L : 0V

Color system forced mode

INPUT MODE				SYSTEM
M1	M2	M3	M4	
H	H	H	Open	PAL
H	(**)	H	Open	SECAM
(**)	H	H	Open	4.43NTSC
(**)	(**)	H	Open	3.58NTSC

$V_{th} = 2.3V$
(**) High-impedance drive

Special system switches

SW_2 : Input current switch ($I_{th} = 0.6mA$) ... PAL/SECAM receive mode

SW_3 : Input current switch ($I_{th} = 0.6mA$) ... Forced black & white mode (in PAL/SECAM mode)

YNR : Voltage switch ($V_{th} = 1.5V$) PAL/NTSC receive mode

Vertical sync detection output

Pin 4 High level = 60Hz
Low level = 50Hz

(2) South American mode / Pseudo-PAL mode (pin 42-1/2 V_{CC} / GND)

Automatic color system detection output

RECEIVED SIGNAL	M1	M2	M3	M4
	PIN 31	PIN 38	PIN 15	PIN 40
PAL (M/N)	H	L	M	M
PAL (B/G, etc)	H	H	M	L
SECAM	H	M	M	L
4.43NTSC	L	H	M	L
3.58NTSC	L	L	M	L
Black & white	L	M/L	L	L

H : 3V
M : 1.5V
L : 0V

Forced color system mode

INPUT MODE				SYSTEM
M1	M2	M3	M4	
(**)	(**)	(**)	H#	PAL (M/N)
H	H	H	(**)	PAL (B/G, etc)
H	(**)	H	(**)	SECAM
(**)	H	H	(**)	4.43NTSC
(**)	(**)	H	(**)	3.58NTSC

$V_{th} = 2.3V$
(**) High-impedance drive
: In this mode, the pin is internally clamped to 3.75V. Does not support switching driven by current to the pin.

(Note) Because a 1H delay line is not used, SECAM cannot be demodulated in Pseudo-PAL mode. (Same as SECAM non-supported mode.)

○ Switches

YNR switch

PIN 1 VOLTAGE	YNR	RECEIVER SYSTEM
V_{CC}	OFF	P/N/S
$2/3 V_{CC}$		P/N
$1/3 V_{CC}$	ON	P/N/S
GND		P/N/S

SECAM ID switch

Pin 22 Voltage : High level = H ID
Low level = H + V ID ($V_{th} = 1/2 V_{CC}$)

Output signal mode switches

PIN 47 VOLTAGE	OUTPUT SIGNAL	CP/SP
V_{CC}	RGB	CP
$1/2 V_{CC}$		SP
GND	YUV	

CP : Clamp pulse
SP : Sync separation output
RGB : Primary color output
(pins 45/44/43 : R/G/B output)
YUV : Color difference output
(pins 45/44/43 : R-Y/Y/B-Y output)

γ correction switch

Pin 51 voltage : $2V_F$ or higher : Off
 $2V_F$ or lower : On ($V_{th} = 2V_F$)

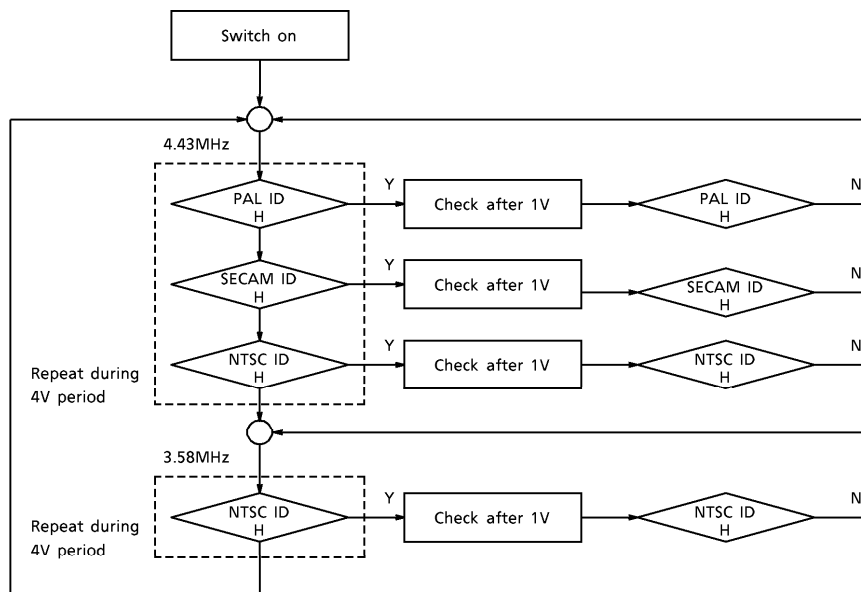
○ Flow Chart for Color System Detection

(1) Normal mode (pin 42-V_{CC})

Receiver system priority

AT PIN 18 X'tal OSCILLATION	AT PIN 16 X'tal OSCILLATION
4.43PAL	—
—	3.38NTSC
SECAM	SECAM
4.43NTSC	—

Detection flow chart



○ Flow Chart for Color System Identification

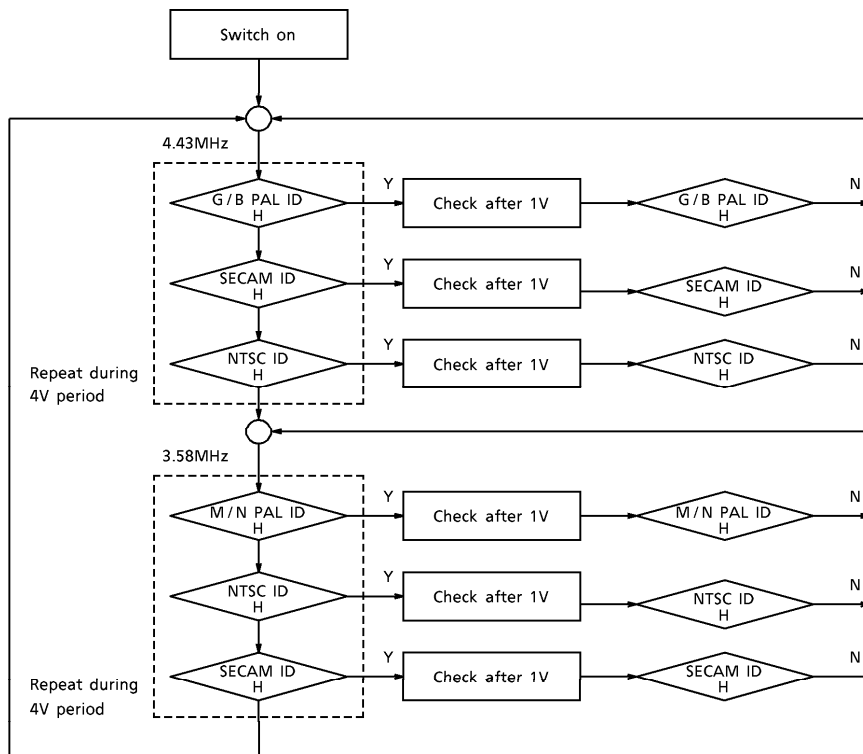
(2) South American mode / Pseudo-PAL mode (pin 42-1/2 V_{CC} / GND)

Receiver system priority

AT PIN 18 X'tal OSCILLATION	AT PIN 16 X'tal OSCILLATION
4.43PAL	—
—	N / M PAL
—	3.58NTSC
(SECAM)	(SECAM)
4.43NTSC	—

SECAM signals are not received in Pseudo-PAL mode.

Detection flow chart



MAXIMUM RATINGS (Unless otherwise specified, $V_{CC} = 5V$, $T_a = 25^\circ C$)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	7	V
Power Dissipation	PD max (Note 1)	800	mW
Input Signal Voltage	e_{in}	2	V_{p-p}
Pin Voltage	V_{in}	$GND - 0.2 \sim V_{CC} + 0.2$	V
Operating Temperature	T_{opr}	-10~65	$^\circ C$
Storage Temperature	T_{stg}	-55~150	$^\circ C$

(Note 1) When the IC is mounted on the PCB. If the IC is operated at $25^\circ C$ or higher, reduce power dissipation by 6.4mW per degree.

(Note 2) In some areas, depending on the input signal state, automatic identification function or killer function may malfunction.

RECOMMENDED OPERATING CONDITIONS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Video Block Supply Voltage	V_{CC56}	4.0	5.0	5.5	V	In Multi mode
Chroma Block Supply Voltage	V_{CC35}	4.0	5.0	5.5	V	
Sync Supply Voltage	V_{CC14}	4.0	5.0	5.5	V	
Video Input Signal	Y_{in}	—	0.5	—	V_{p-p}	—
Second-order Differential Input	YH_{in}	—	75	—	mV_{p-p}	—
Chroma Input Signal	$C_{in P/N}$	—	100	—	mV_{p-p}	—
	C_{inS}	—	300	—		—
Sync Separation Input Signal	S_{in}	—	1.0	—	V_{p-p}	—
Control Pin Voltage	$V_{19, 34, 55, 57}$	0	2.5	5.0	V	Pins 19, 34, 55, 57
SECAM ID Switch	V_{22}	4.7	5.0	5.0	V	When H-ID selected
PIP Switch	V_{47}	2.2	2.5	5.0	V	In RGB output mode

ELECTRICAL CHARACTERISTICSPower consumption (Unless otherwise specified, $V_{CC} = 5V$, $T_a = 25^\circ C \pm 3^\circ C$)

BLOCK NAME	TYPICAL IC INTERNAL CURRENT (mA)	V_{CC} (V)	P_C (mW)
Video	8.1	5	40.5
Chroma	33.83	5	169.15
Sync	14.33	5	71.65
Total	56.26	5	281.3

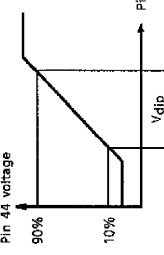
DC CharacteristicsPin DC voltage (Unless otherwise specified, $V_{CC} = 5V$, $T_a = 25^\circ C \pm 3^\circ C$)

CIRCUIT TYPE	PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Video	1	YNR switch	V_1	—	—	—	V	NR off (multi on)
	2	Y_{in}	V_2	1.10	1.30	1.50		—
	3	Maximum black detection	V_3	—	—	—		—
Sync	4	50/60Hz output	V_4	0	0.02	0.10		Low level
	5	\overline{VD} output	V_5	4.50	4.95	5.00		High level
	6	HD output	V_6	0	0.15	0.30		Low level
	7	CP/SP output	V_7	0	0.17	0.30		Low level
	8	\overline{HVD} output	V_8	4.00	4.24	4.50		High level
	9	Def. GND	V_9	—	—	—		—
	10	Vertical sync separation filter	V_{10}	—	—	—		—
	11	32f _H VCO	V_{11}	2.80	3.10	3.40		—
	12	AFC filter	V_{12}	—	—	—		—
	13	Sync separation input	V_{13}	1.50	1.77	2.10		—
	14	Def V_{CC}	V_{14}	—	5.00	—		—
Chroma	15	M3 (mode switch 3)	V_{15}	—	—	—		—
	16	3.58/M/N VCXO	V_{16}	3.70	4.04	4.30		Forced 3.58 mode
	17	NTSC ID	V_{17}	—	—	—		Forced NTSC mode
	18	4.43MHz VCXO	V_{18}	3.70	4.03	4.30		Forced 4.43 mode
	19	Tint	V_{19}	—	2.50	—		—
	20	PAL ID	V_{20}	—	—	—		Forced PAL mode
	21	Chroma input	V_{21}	4.10	4.30	4.50		—
	22	SECAM ID switch	V_{22}	—	5.00	—		—
	23	Chroma GND	V_{23}	—	—	—		—
	24	SECAM input	V_{24}	4.10	4.32	4.50		—
	25	ACC filter	V_{25}	—	—	—		—
	26	SECAM ID detector	V_{26}	—	—	—		—
	27	APC filter	V_{27}	—	—	—		—
	28	1H delay line output	V_{28}	3.20	3.50	3.80		—
	29	SECAM ID	V_{29}	—	—	—		Forced SECAM mode

CIRCUIT TYPE	PIN No.	PIN NAME	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARKS
Chroma	30	1H delay line input	V ₃₀	1.80	2.09	2.40	V	—
	31	M1 (mode switch 1)	V ₃₁	—	—	—		—
	32	B-Y detection 1	V ₃₂	0.90	1.22	1.50		—
	33	B-Y detection 2	V ₃₃	0.90	1.22	1.50		—
	34	Color	V ₃₄	—	2.50	—		—
	35	Chroma V _{CC}	V ₃₅	—	5.00	—		—
	36	R-Y detection 1	V ₃₆	0.90	1.22	1.50		—
	37	R-Y detection 2	V ₃₇	0.90	1.22	1.50		—
	38	M2 (mode switch 2)	V ₃₈	—	—	—		—
	39	B-Y de-emphasis	V ₃₉	1.70	1.95	2.20		S-ID high level
	40	M4 (mode switch 4)	V ₄₀	—	—	—		—
	41	R-Y de-emphasis	V ₄₁	1.70	1.95	2.20		S-ID high level
	42	SYS SW (system switch)	V ₄₂	—	—	—		—
	43	B output	V ₄₃	0.80	0.95	1.20		—
	44	G output	V ₄₄	0.80	0.99	1.20		—
	45	R output	V ₄₅	0.80	0.96	1.20		—
46	Clamp filter	V ₄₆	—	—	—	—		
Video	47	PIP switch	V ₄₇	—	5.00	—	—	
	48	V _{ref} filter	V ₄₈	1.70	1.88	2.10	—	
	49	γ correction 1	V ₄₉	0.80	0.95	1.10	—	
	50	Brightness filter	V ₅₀	3.60	3.79	4.00	—	
	51	γ correction 2	V ₅₁	1.20	1.38	1.60	—	
	52	Brightness	V ₅₂	0.80	0.95	1.10	—	
	53	Video GND	V ₅₃	—	—	—	—	
	54	Dynamic γ filter	V ₅₄	4.50	4.97	5.00	—	
	55	Contrast	V ₅₅	—	2.50	—	—	
	56	Video V _{CC}	V ₅₆	—	5.00	—	—	
	57	Sharpness	V ₅₇	—	2.50	—	—	
	58	YH input	V ₅₈	1.10	1.28	1.50	—	
	59	Black stretch point	V ₅₉	—	—	—	—	
	60	DC transfer correction	V ₆₀	—	—	—	—	

(Note) Unless otherwise specified, Y and C are not input during DC measurement.

AC Characteristics (Unless otherwise specified, $V_{CC} = 5V$, $T_a = 25^\circ C$)
Video Block

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : $V_{CC} = 5V$, $T_a = 25 \pm 3^\circ C$						TEST METHOD	
							SW1	SW3	SW51	SW54	SW60	CON-TRAST		BRIGHT-NESS
V1	Second-order differential input dynamic range	V_{dip}	V	0.13	0.18	0.35	OFF	OFF	OFF	OFF	Center	Adjust	Center	<p>1. Adjust the bright VR so that the pin 44 DC voltage is 0.95V.</p> <p>2. Measure the DC voltage V_{50} of pin 50.</p> <p>3. Apply the DC voltage V_{50} to pin 50.</p> <p>4. Change the DC voltage V_{58} of pin 58. Measure V_{58} at 10% and 90% of the voltage variation range of pin 44 and calculate the balance (V_{dip}).</p> 
V2	Minimum output	V_{do1}	V	0.55	0.75	0.95	OFF	OFF	OFF	OFF	Center	Adjust	Center	<p>1. To pin 2, input a signal with a video component amplitude of $50mV_{pp}$ and a three-level chroma signal with a sync amplitude of $143mV_{pp}$.</p> <p>2. Set the chroma amplitude of the three-level chroma signal to the minimum and adjust the bright VR so that the pin 44 pedestal is 0.95V.</p> <p>3. Gradually amplify the chroma amplitude of the three-level chroma signal. Measure the saturation voltage when the lower side of the chroma amplitude in the pin 44 output waveform is saturated.</p>
V3	Maximum output	V_{do2}	V	1.60	1.75	2.25	OFF	OFF	OFF	OFF	Center	Adjust	Center	<p>1. To pin 2, input a signal with a video component amplitude of $50mV_{pp}$ and a sine wave ($f = 100kHz$) with a sync amplitude of $143mV_{pp}$.</p> <p>2. Adjust the bright VR so that the pin 44 pedestal is 0.95V.</p> <p>3. Gradually increase the video component amplitude. Measure the saturation voltage when the upper side of the video component amplitude in the pin 44 output waveform is saturated.</p>

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C							TEST METHOD	
							SW No. AND VR (VARIABLE RESISTOR) MODE								SHARP- NESS
							SW1	SW3	SW51	SW54	SW60	CON- TRAST	BRIGHT- NESS		
V4	AC gain	G _{v1}	% IRE	1.8	2.5	3.3	OFF	OFF	ON	OFF	OFF	Center	Center	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Measure the output amplitude reflected at pin 44 and calculate the ratio of the amplitude to the input. G _{v1} = output amplitude / input amplitude (←50mV _{p-p})	
V5	Frequency characteristics	f _s	MHz	2	3	—	OFF	OFF	OFF	OFF	Center	Center	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Connect a 1.6V power supply to pin 51. 3. Measure the pin 44 output amplitude V ₄₄ (f = 100kHz). 4. Gradually increase the input frequency and measure the frequency when the pin 44 output frequency reaches 70% of V ₄₄ (f = 100kHz).		
V6	Sharpness Adjustment range	G _{ps1}	dB	10.0	14.0	—	OFF	OFF	ON	OFF	Center	Adjust	Adjust	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Adjust the bright VR so that the pin 44 pedestal is 0.95V. 3. Measure the pin 44 amplitude when the sharpness VR is at minimum (V _{44min}) and measure the pin 44 amplitude when the sharpness VR is at maximum (V _{44max}). Calculate the following equation using the result of V _{44min} and V _{44max} : $G_{ps1} = 20 \log (V_{44max} / V_{44min})$ [dB]	
V7	Sharpness Adjustment gain	G _{ps2}	dB	6.0	10.0	—	OFF	OFF	ON	OFF	Center	Adjust	Maximum	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 2.4MHz) with a sync amplitude of 143mV _{p-p} . 2. Adjust the bright VR so that the pin 44 pedestal is 0.95V. 3. Measure the pin 44 amplitude V ₄₄ (2.4MHz) and V ₄₄ (100kHz) when a frequency of f = 2.4MHz and 100kHz are input respectively. Calculate the following equation using the result of V ₄₄ (2.4MHz) and V ₄₄ (100kHz). $G_{ps2} = 20 \log (V_{44} (2.4MHz) / V_{44} (100kHz))$ [dB]	

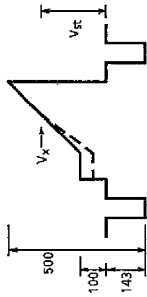
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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C					TEST METHOD	
							SW No.	AND VR (VARIABLE RESISTOR) MODE	CON-TRAST	BRIGHT-NESS	SHARP-NESS		
V8	Contrast adjustment voltage adjustment	ΔV_{ct}	V	2.1	3.0	—	SW1	SW3	SW51	SW54	SW60	Center	<ol style="list-style-type: none"> To pin 2, input a signal with a video component amplitude of 50mV_{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV_{p-p}. Adjust the bright VR so that the pin 44 pedestal is 0.95V. Measure the pin 44 amplitude and determine 100% and 0% of the pin 44 amplitude when the contrast VR is at maximum and minimum respectively. Adjust the contrast VR and measure the pin 55 voltage (V_{90%}, V_{10%}) when the pin 44 amplitude is at 90% and 10%. Calculate the following equation using the result of V_{90%} and V_{10%}. $\Delta V_{ct} = V_{90\%} - V_{10\%}$
V9	Contrast adjustment gain variation range	ΔG_{ct}	dB	12.0	15.0	—	OFF	OFF	ON	OFF	Adjust	Center	<ol style="list-style-type: none"> To pin 2, input a signal with a video component amplitude of 50mV_{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV_{p-p}. Adjust the bright VR so that the pin 44 pedestal is 0.95V. Measure the pin 44 amplitude when the contrast VR is at maximum and minimum respectively (V_{44max} and V_{44min}). Calculate the following equation using the result of V_{44max} and V_{44min}. $\Delta G_{ct} = 20 \log (V_{44max} / V_{44min})$
V10	Brightness voltage	V _{BR}	V	0.75	0.95	1.15	OFF	OFF	OFF	OFF	Center	Center	<ol style="list-style-type: none"> To pin 2, input a signal with a video component amplitude of 50mV_{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV_{p-p}. Adjust the bright VR so that the pin 44 pedestal is 0.95V. Measure the pin 52 DC voltage.
V11	Brightness control sensitivity	GBR		0.4	0.5	0.6	OFF	OFF	OFF	OFF	Center	Center	<ol style="list-style-type: none"> To pin 2, input a signal with a video component amplitude of 50mV_{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV_{p-p}. Adjust the bright VR so that the pin 44 pedestal is 0.95V. Adjust the bright VR so that the pin 52 DC voltage increases by just 0.1V, then measure the pin 44 pedestal level V_{44H}. Calculate the following equation using the result. $GBR = (V_{44H} - 0.95) / 0.1$

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C						TEST METHOD	
							SW No. AND VR (VARIABLE RESISTOR) MODE							
							SW1	SW3	SW51	SW54	SW60	CON-TRAST		BRIGHT-NESS
V12	Brightness Adjustment voltage range	V _{pdH}	V	1.2	1.5	1.7	OFF	OFF	OFF	OFF	Center	Adjust	Center	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Measure the pin 44 pedestal when the bright VR is at maximum (V _{pdH}). 3. Measure the pin 44 pedestal when the bright VR is at minimum (V _{pdL}).
		V _{pdL}	V	0.3	0.5	0.7	OFF	OFF	OFF	OFF	Center	Adjust	Center	
V13	Three-axis output DC offset (B/G)	ΔV _{of} (B/G)	mV	-200	0.0	200	OFF	OFF	OFF	OFF	Center	Adjust	Center	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Adjust the bright VR so that the pin 44 pedestal is 0.95V (= V ₄₄). 3. Measure the pin 43 pedestal V ₄₃ and the pin 45 pedestal V ₄₅ , then calculate the following equations using the values of V ₄₃ and V ₄₅ . ΔV _{of} (B/G) = V ₄₃ - V ₄₄ ΔV _{of} (R/G) = V ₄₅ - V ₄₄
		ΔV _{of} (R/G)	mV	-200	0.0	200	OFF	OFF	OFF	OFF	Center	Adjust	Center	
V14	Three-axis output AC gain deflection (B/G)	ΔV _{dif} (B/G)	dB	-1.0	0.0	1.0	OFF	OFF	OFF	OFF	Center	Adjust	Center	1. To pin 2, input a signal with a video component amplitude of 50mV _{p-p} and a sine wave (f = 100kHz) with a sync amplitude of 143mV _{p-p} . 2. Adjust the bright VR so that the pin 44 pedestal is 0.95V. 3. Measure the pin 43 amplitude V ₄₃ , the pin 44 amplitude V ₄₄ , and the pin 45 amplitude V ₄₅ , then calculate the following equations using the values of V ₄₃ , V ₄₄ , and V ₄₅ . ΔV _{dif} (B/G) = 20log (V ₄₃ /V ₄₄) ΔV _{dif} (R/G) = 20log (V ₄₅ /V ₄₄)
		ΔV _{dif} (R/G)	dB	-1.0	0.0	1.0	OFF	OFF	OFF	OFF	Center	Adjust	Center	

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} =5V, T _a =25±3°C						TEST METHOD		
							SW1	SW3	SW51	SW54	SW60	CON-TRAST		BRIGHT-NESS	SHARP-NESS
V15	Black stretch start voltage	V _{st}	% IRE	30	60	70	OFF	ON	ON	OFF	ON	Center	Adjust	Center	<p>1. To pin 2, input a signal with a ramp wave amplitude of 500mV_{p-p}. The sync amplitude must be 143mV_{p-p} and the setup amplitude, 100mV_{p-p}.</p> <p>2. Monitor pins 2 and 60 with an oscilloscope. Set the pin 60 monitor channel to uncarrier and adjust pins 20 and 60 so that the pedestals and white peaks of both pins overlap.</p> <p>3. Compare the signals and read the voltage where the signal starts to move to the black side (= V_x (mV)) using the pedestal voltage as reference.</p> <p>4. Calculate following equation to seek the start voltage V_{st}. $V_{st} = V_x / (500 - 143) \times 100$ (% IRE)</p> 
V16	Black stretch gain	G _{blk}		1.1	1.3	1.5	OFF	ON	ON	OFF	ON	Center	Adjust	Center	<p>1. To pin 2, input a sine wave (f=100kHz) with an amplitude of 50mV_{p-p} and a signal with a sync amplitude of 143mV_{p-p}.</p> <p>2. Adjust the bright VR so that the pin 44 pedestal is 0.95V.</p> <p>3. Apply a voltage of 0.65V to pin 3.</p> <p>4. Apply a voltage of 1.6V to pin 59.</p> <p>5. Monitoring pin 44, adjust only the signal generator sine wave amplitude so that the sine wave amplitude is 25mV_{p-p}.</p> <p>6. Turn SW3 off. Now read the pin 44 amplitude (= V_{off} (mV_{p-p}))</p> <p>7. Calculate the following equation to seek the black stretch gain. $G_{blk} = V_{off} / 25$ (times)</p>

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC = 5V, Ta = 25 ± 3°C					TEST METHOD
							SW No. AND VR (VARIABLE RESISTOR) MODE	CON-TRAST	8 BRIGHT-NESS	SHARP-NESS		
V17	DC transfer correction	Vdct	%	93	98	100	SW1 OFF	SW3 OFF	SW51 ON	SW54 OFF	SW60 OFF	<p>1. To pin 2, input a ramp wave with an amplitude of 500mV_{pp}. The sync amplitude in the ramp wave must be 143mV_{pp}.</p> <p>2. Read the pin 44 output amplitude (= Vdct off).</p> <p>3. Turn SW60 on and read the voltage fluctuation (= ΔVdct) during the horizontal blanking period of the output amplitude of pin 44.</p> <p>4. Calculate the DC transfer correction using the following equation.</p> $Vdct = \frac{(Vdct\ off - \Delta Vdct)}{Vdct\ off} \times 100 (\%)$ 


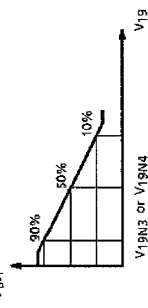
Chroma Block		TEST CONDITIONS : V _{CC} =5V, T _a =25±3°C										TEST METHOD					
		SW No. AND VR MODE															
No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	15	16	18	19	21	24	31	34	38	47	55
C1	ACC characteristics (3N)	B-YOUT1 A3N	V _{p-p}	0.60 0.70	0.80 1.00	1.00 1.30	Open	A	A	ON	A	B	Open	Open	Open	ON	—
							Open	A	A	Vary	A	B	Open	Open	Open	ON	—
C2	Delay line output (PAL)	ep28 Vp28 Vn28	V _{p-p}	0.90 2.30 3.30	1.20 2.60 3.60	1.50 2.90 3.90	Open	A	A	ON	A	B	Open	Open	Open	ON	—
							Open	A	A	Vary	A	B	Open	Open	Open	ON	—

1. Define as e_{B-Y} the B-Y output amplitude of pin 43 when the burst and chroma signals, which have the same amplitude of 10mV_{p-p} are input to pin 21. Also define the B-Y output amplitude of pin 43 when the burst and chroma signals have the same amplitude of 100 and 300mV_{p-p} (the 3N rainbow color-bar signal) and are input to pin 21 as B-Y OUT1 and B-Y OUT2 respectively. Also, define the ratio between B-Y OUT1 and B-Y OUT2 as A.

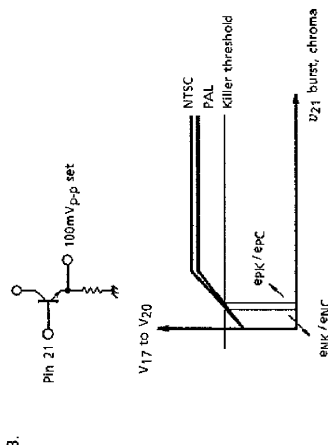
2. Using tint control, set the B-Y output amplitude to the maximum.
A = B-Y OUT1 / B-Y OUT2

1. Measure the pin 28 1H output amplitude when burst and chroma signals with the same amplitude of 100mV_{p-p} (PAL rainbow color bar signal) are input to pin 21.

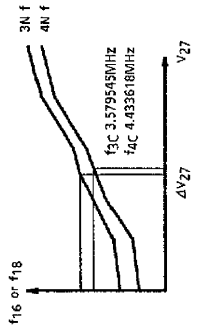
2. Measure the pin 28 DC voltage when there is no input to pin 21 and Forced PAL or NTSC mode is set. Define these voltages as Vp28 and Vn28 respectively (PAL/NTSC switching operation check).

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC = 5V, Tc = 25 ± 3°C										TEST METHOD	
							SW No. AND VR MODE											
							15	16	18	19	21	24	31	34	38	47		55
C3	Tint control range (3N/4N)	$\Delta V19N3$ $\Delta V19N4$	V	—	4.00 4.00	—	Open	A	A	ON Vary	A	B	Open	Arbitrary	Open	ON	—	<p>1. To pin 21, input burst and chroma signals with the same amplitude of (100mV_{p-p}). (3NTSC/4NTSC)</p>  <p>2. Vary the pin 19 tint control, defining the point where the pin 43 B-Y output amplitude is at maximum as the tint center state. Vary the tint VR between maximum and minimum and plot the tint VR phase characteristics.</p>  <p>3. The color control VR position can be set to any point out of color saturation range. Tint control range = θ_{B-Y} (90% to 10%) Tint control voltage = Tint center state</p>
C4	Tint control voltage (3N/4N)	V19N3 V19N4	V	—	2.50 2.50	—	Open	A	A	ON Vary	A	B	Open	Arbitrary	Open	ON	—	
C5	Tint control variable range (3N/4N)	θ_{3N} θ_{4N}	°	—	90.0 90.0	—	Open	A	A	ON Vary	A	B	Open	Arbitrary	Open	ON	—	
C6	Tint control discrimination	θ_{+3N} θ_{-3N} θ_{+4N} θ_{-4N}	°	—	+45.0 -45.0 +45.0 -45.0	—	Open	A	A	ON Vary	A	B	Open	Arbitrary	Open	ON	—	

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : $V_{CC} = 5V, T_a = 25 \pm 3^\circ C$										TEST METHOD
							SW No. AND VR MODE										
							15	16	18	19	21	24	31	34	38	47	
C7	Killer operating input level (P/3N)	ePK		0.60	1.00	1.70											<ol style="list-style-type: none"> 1. Measure the pin 28 1H output amplitude when burst and chroma signals with the same amplitude of 100mV_{p-p} (PAL rainbow color bar signal) are input to pin 21. 2. Attenuate the signal to pin 21 with an attenuator and read the pin 21 burst level where the killer function turns on and off. 3. 
		ePC		0.60	2.50	4.30											
		eNK		0.40	0.70	1.30											
		eNC		0.40	1.80	3.10											

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C								TEST METHOD		
							SW No. AND VR MODE										
							15	16	18	19	21	24	31	34		38	47
C8	Killer operating voltage (P/3N/black & white mode)	PC	V	—	2.60	—	—	Open	A	A	—	A	B	Open	ON	—	<ol style="list-style-type: none"> No signal is input to pin 21. Check the DC voltage of pin 20 (PAL ID) and pin 17 (NTSC ID). Define these as PI and NI respectively. Externally vary the voltage applied to pins 20 and 17. Define the ID voltages for PAL color and NTSC color as PC and NC respectively. Define the difference between the ID voltages in the above no-signal state and the ID voltages in the forced color state as ΔPI and ΔNI respectively.
		PI	V	—	2.08	—	—	—	—	—	—	—	—	—	—	—	
		ΔPI	mV	—	520	—	—	—	—	—	—	—	—	—	—	—	
		NC	V	—	2.60	—	—	—	—	—	—	—	—	—	—	—	
		NI	V	—	2.08	—	—	—	—	—	—	—	—	—	—	—	
		ΔNI	mV	—	520	—	—	—	—	—	—	—	—	—	—	—	
C9	APC pull-in hold range (3N/4N)	f ₃ HH	Hz	+400	+600	+1000	select	A	A	—	A	B	select	—	—	<ol style="list-style-type: none"> To pin 21, input a 3.58MHz/4.4MHz continuous wave with an amplitude of 100mV_{pp}. Vary the above input frequency. Using the held pull-in frequency, compare to 3N and 4N and measure. 3N Ref 3579545Hz 4N Ref 4433618Hz Measure in 3N and 4N Forced modes. 	
		f ₃ PH	Hz	+400	+600	+1000	—	—	—	—	—	—	—	—	—		
		f ₃ HL	Hz	-400	-600	-1000	—	—	—	—	—	—	—	—	—		
		f ₃ PL	Hz	-400	-600	-1000	select	A	A	—	A	B	select	—	—		
		f ₄ HH	Hz	+400	+600	+1000	—	—	—	—	—	—	—	—	—		
		f ₄ PH	Hz	+400	+600	+1000	—	—	—	—	—	—	—	—	—		
		f ₄ HL	Hz	-400	-600	-1000	—	—	—	—	—	—	—	—	—		
		f ₄ PL	Hz	-400	-600	-1000	—	—	—	—	—	—	—	—	—		

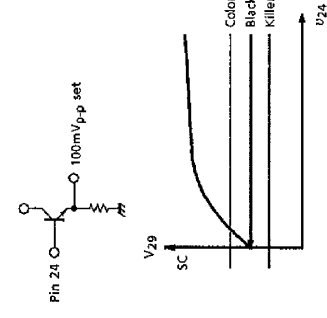
No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C										TEST METHOD			
							SW No. AND VR MODE													
							15	16	18	19	21	24	31	34	38	47		55		
C10	VCXO adjustment sensitivity (3N/4N)	β_{3N} β_{4N}	Hz/ mV	— —	1.00 1.00	— —	Open	B	A	—	C	B	Open	—	B	—	1. No signal is input to pin 21. 2. Fix the 3N/4N X'tal oscillation externally. 3. Apply external DC voltage to pin 27 (APC filter) and check the free-running frequency. 			
							Open	A	B	—	A	—	—	—	A	—		—	—	—
C11	Color difference output (PAL/3N)	ep43 ep44 ep45 e3N43 e3N44 e3N45	V _{p-p}	0.60 0.21 0.35 0.66 0.22 0.39	0.91 0.31 0.51 1.00 0.33 0.57	1.30 0.43 0.70 1.43 0.46 0.78	Open	A	A	—	—	—	—	—	—	—	β $\Delta V_{27} = f_c \pm 25mV$ f_0 sensitivity 1. Input burst and chroma signals with the same amplitude of 100mV _{p-p} (rainbow color bar signal) to pin 21 (PAL/3NTSC). 2. Measure the B/G/R-Y color difference amplitudes for pins 43, 44, and 45. 3. Check the color difference amplitudes of each pin. Calculate the R-Y/B-Y and G-Y/B-Y amplitude ratios. (Note) In PAL mode, adjust the delay line using a Philips pattern signal. Measure the PAL color difference output using the PAL rainbow signal in the video input.			
							Open	A	A	—	—	—	—	—	—	—		—	—	
							Open	A	A	—	—	—	—	—	—	—		—	—	—
							Open	A	A	—	—	—	—	—	—	—		—	—	—
							Open	A	A	—	—	—	—	—	—	—		—	—	—
C12	Relative amplitude (PAL/3N)	PR/PB PG/PB NR/NB NG/NB	—	0.46 0.24 0.46 0.24	0.56 0.34 0.56 0.34	0.66 0.44 0.66 0.44	Open	A	A	ON	A	B	Open	Open	Open	OFF	Open			
							Open	A	A	Vary	A	—	—	—	—	—	—			
							Open	A	A	—	—	—	—	—	—	—	—	—	—	
							Open	A	A	—	—	—	—	—	—	—	—	—	—	

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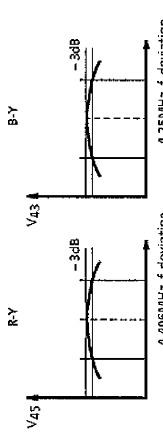
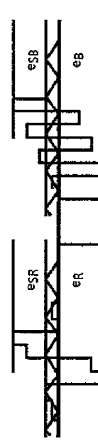
No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} = 5V, T _a = 25 ± 3°C										TEST METHOD	
							SW No. AND VR MODE											
							15	16	18	19	21	24	31	34	38	47		55
C13	Relative phase (PAL/3N)	pr / pb pg / pb nr / nb ng / nb	°	83.0	90.0	97.0	Open	A	A	A	A	B	Open	Open	OFF	Open	1. To pin 21, input burst and chroma signals with the same amplitude of 100mV _{p-p} (monochromatic, blue). 2. Vary the phase of the above monochromatic color and seek the monochromatic input phase where the B-Y output amplitude of pin 43 reaches 0 (θ _{B-Y}).	
				232.0	237.0	247.0												3. Vary the phase of the above monochromatic color and seek the monochromatic input phase where the G-Y output amplitude of pin 44 reaches 0 (θ _{G-Y}).
				87.0	94.0	101.0												4. Vary the phase of the above monochromatic color and seek the monochromatic input phase where the R-Y output amplitude of pin 45 reaches 0 (θ _{R-Y}).
				225.0	240.0	255.0												Also, in PAL mode, adjust the delay line using a Philips pattern signal with the IC mounted in the set and check the phase in the video input using either a PAL or 3N rainbow signal. (θ _{G-Y}) - (θ _{B-Y}) = pg / pb, ng / nb (θ _{R-Y}) - (θ _{B-Y}) = pr / pb, nr / nb

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC=5V, Ta=25±3°C										TEST METHOD
							15	16	18	19	21	24	31	34	38	47	
C14	SECAM limiter characteristics	e24 As	mV _{p-p}	20.0	30.0	44.0											1. To pin 24, input a 4.44MHz continuous wave with an amplitude of 10 to 500mV _{p-p} . 2. Measure the input/output characteristics between the pin 28 1H output and the pin 24 input. 3. Define as e24 the input amplitude where -3dB is subtracted from the pin 28 1H output amplitude and pin 24 inputs a continuous wave amplitude of 100mV _{p-p} . Also, define the 100/300mV _{p-p} output amplitude ratio. 4. Measure the pin 28 output amplitude when pin 24 inputs a continuous wave amplitude of 100mV _{p-p} . Define the amplitude as e28.
				0.70	1.00	1.30											
C15	Delay line output (SECAM)	e28	V _{p-p}	—	1.80	—											

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} =5V, T _a =25±3°C										TEST METHOD
							SW No. AND VR MODE										
							15	16	18	19	21	24	31	34	38	47	
C16	Killer operation input level	eSK eSC	mV _{pp}	—	2.80 2.80	—	Open	A	A	—	C	A	Open	Open	Open	—	<p>1. To pin 24, input a f₀₈/f_{0R} signal with an amplitude of 100mV_{pp}.</p> <p>2. Attenuate the input signal with an attenuator and detect the achromatic level. Define the pin 24 input levels where the killer operation turns on and off.</p> <p>3.</p> 
C17	Killer operation voltage	SC SI ΔSI	V V mV	—	2.80 2.08 520	—	Open	A	A	—	C	B	Open	Open	Open	—	<p>1. No signal is input to pin 24.</p> <p>2. Measure the DC voltage of pin 29 (SECAM ID) and define as SI.</p> <p>3. Vary the external voltage applied to pin 29. Define the ID voltage for SECAM color as SC.</p> <p>4. Define the difference between the ID voltages in the above modes as ΔSI (SC-SI).</p>
C18	SECAM ID switch (V-ID on)	V29	V	—	2.30	—	Open	A	A	—	C	A	Open	OFF	Open	—	<p>1. To pin 24, input a f₀₈/f_{0R} signal with an amplitude of 100mV_{pp}.</p> <p>2. Attenuate the input signal with an attenuator and detect the achromatic level. Define the pin 24 input levels where the killer operation turns on and off. (Check the killer operation by turning the SECAM ID switch on and off.)</p> <p>Define the switching SECAM ID voltage as V29.</p>

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} =5V, T _a =25±3°C								TEST METHOD	
							SW No. AND VR MODE									
							15	16	18	19	21	24	31	34		38
C19	SECAM color difference output	e543 e544 e545	mV _{p-p}	—	2.80 2.80	—	Open	A	A	—	C	A	Open	Open	—	1. To pin 24, input a 75% standard color bar signal with an amplitude of 300mV _{p-p} . 2. Measure the color difference levels of pins 43, 44, and 45.
C20	SECAM demodulation bandwidth	#43R BAND #45B BAND	MHz	0.80 0.80	1.15 1.15	—	A	A	A	—	C	A	OFF	Open	OFF	1. To pin 24, input FM 100kHz, 100dB/ΔV, fm 1kHz/div signal. 2. When measuring the R-Y and B-Y signals, vary the f _{OR} =4.406MHz and f _{OB} =4.25MHz signals respectively and measure the -3dB bandwidth in the color difference output. Also measure the relative amplitudes of V ₄₅ and V ₄₃ when f _{OR} is 4.406MHz and f _{OB} is 4.25MHz. 3. No horizontal pulse.
C21	SECAM relative amplitude	SR/SB SG/SB									C / A 24A A Sig ON	OFF	ON	OFF	—	
C22	SECAM crosstalk	e5R eR RC e5B eB BC	V _{p-p} mV _{p-p} dB V _{p-p} mV _{p-p} dB	— — 30.0 — — 30.0	1.00 20 34 1.40 30 33	—	Open	A	A	—	C	A	Open	Open	OFF	1. To pin 24, input a 75% standard color bar signal with an amplitude of 300mV _{p-p} . 2. Measure the pin 43 B-Y and the pin 45 R-Y output color difference amplitudes. Also measure the f _{OR} and f _{OB} 160kHz beat frequency amplitudes. 3. Show the SECAM crosstalk as follows. Attenuation=20log (e _R /e _{SR}) = RC 

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC = 5V, Ta = 25 ± 3°C							TEST METHOD		
							SW No. AND VR MODE									
							15	16	18	19	21	24	31		34	38
C23	M1 output voltage of interface pin 31	Vs1	V	—	3.00	—	Open	A	Open	A	Open	Open	Open	OFF	Open	Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. PAL & SECAM modes Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. 4.43MHz NTSC, 3.58MHz NTSC, black & white 1, black & white 2 modes
C24	M2 output voltage of interface pin 38	Vs2	V	—	1.50	—	Open	A	Open	A	Open	Open	Open	OFF	Open	Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. PAL & 4.43MHz NTSC modes Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. SECAM, black & white 1 modes Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. 3.58MHz NTSC, black & white 2 modes

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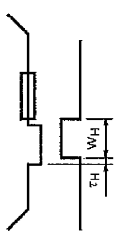
No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC=5V, Ta=25±3°C										TEST METHOD
							SW No. AND VR MODE										
							15	16	18	19	21	24	31	34	38	47	
C25	M3 output voltage of interface pin 15	VS3	V	—	1.50	—	Open	A	A	Open	A	Open	Open	Open	Open	Open	Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. PAL/SECAM, 4.43MHz NTSC, and 3.58MHz NTSC modes. Input to pin 21 (PAL/NTSC) the PAL, 3N, 4N signals and to pin 24 (SECAM) SECAM and black & white signals and measure the M1, M2, and M3 voltages at each signal input state. Black & white 1, black & white 2 modes * Note that black & white 1 mode is 4.43MHz chroma VCO oscillation and black & white 2 mode is 3.58MHz chroma VCO oscillation.
							Open	A	A	Open	A	Open	Open	Open	Open	Open	
C26	Switch threshold current	I _{S1}	mA	—	0.55	—	Open	A	Open	C	B	Open	Open	Open	Open	Open	1. Input either PAL or SECAM signal. 2. Input external current to pin 15 and measure the current when mode changes to black & white.
C27	Switch threshold current	I _{S2}	mA	—	0.58	—	Open	A	Open	C	B	Open	Open	Open	Open	Open	1. Input SECAM signal. 2. Input external current to pin 38 and measure the current when mode changes to black & white.
C28	PIP switch check	UV SP	V	—	1.50 3.00	—	Open	A	Open	A	A	Open	Open	Open	Open	Open	1. To pin 24, input a 75% standard color bar signal with an amplitude of 100mV _{p-p} (PAL/NTSC). Apply external voltage to pin 47 (PIP switch) and measure the pin 47 voltage when pin 43 switches between primary color and color difference states.


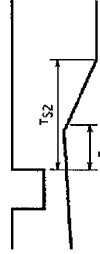
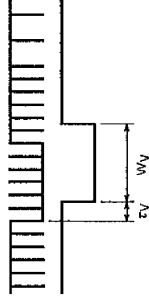
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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC = 5V, Ta = 25 ± 3°C										TEST METHOD
							SW No. AND VR MODE										
							15	16	18	19	21	24	31	34	38	47	
C29	PAL ID malfunction check	V20P			4.20											1. Input the signals corresponding to each mode to pins 21 (PAL/NTSC) and 24 (SECAM) (75% standard color bar signal). 2. Measure the N/P/S ID DC voltage on pins 17, 20, and 29. P : Philips pattern signal N3 : 3.58N 75% standard color bar signal N4 : 4.43N 75% standard color bar signal S : SECAM 75% standard color bar signal Black & white : RETMA signal (Note) When measuring the filtered voltage, measure at high impedance (at least 10MΩ or higher).	
		V20N3	V	—	2.00	—	Open	A	Open	A	Open	Open	Open	Open	Open		Open
		V20N4				2.00											
		V20S				2.00											
		V20BW				2.00											
C30	NTSC ID malfunction check	V17P			4.20											1. To pin 21, input burst and chroma signals with the same amplitude (100mV _{pp}) (rainbow color bar signal). 2. While measuring the pin 43 B-Y, adjust so that the 6 bar reaches the peak using the tint control VR. Vary the color control VR under the above conditions and define the color control pin voltage as V34 where the B-Y output amplitude halves. Also, where the B-Y output amplitudes are 90% and 10%, define the color control pin voltages as V34A and V34B respectively. And define the voltage difference between V34A and V34B as ΔV34, the color control range. $\Delta V34 = V34A - V34B$	
		V17N3	V	—	2.00	—	Open	A	Open	A	Open	Open	Open	Open	Open		
		V17N4				2.00											
		V17S				2.00											
		V17BW				2.00											
C31	SECAM ID malfunction check	V29p			2.25											1. To pin 21, input burst and chroma signals with the same amplitude (100mV _{pp}) (rainbow color bar signal). 2. While measuring the pin 43 B-Y, adjust so that the 6 bar reaches the peak using the tint control VR. Vary the color control VR under the above conditions and define the color control pin voltage as V34 where the B-Y output amplitude halves. Also, where the B-Y output amplitudes are 90% and 10%, define the color control pin voltages as V34A and V34B respectively. And define the voltage difference between V34A and V34B as ΔV34, the color control range. $\Delta V34 = V34A - V34B$	
		V29N3	V	—	2.10	—	Open	A	Open	A	Open	Open	Open	Open	Open		
		V29N4				2.10											
		V29S				3.90											
		V29BW				2.15											
C32	Color control adjustment range	ΔV34	V	—	3.50	—	Open	A	Open	A	B	Open/Adjust	Open	OFF	Open		
		V34	V	—	2.50	—	Open	A	Open	A	B	Open/Adjust	Open	OFF	Open		
C33	Color control adjustment voltage	V34	V	—	2.50	—	Open	A	Open	A	B	Open/Adjust	Open	OFF	Open		

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Sync Block

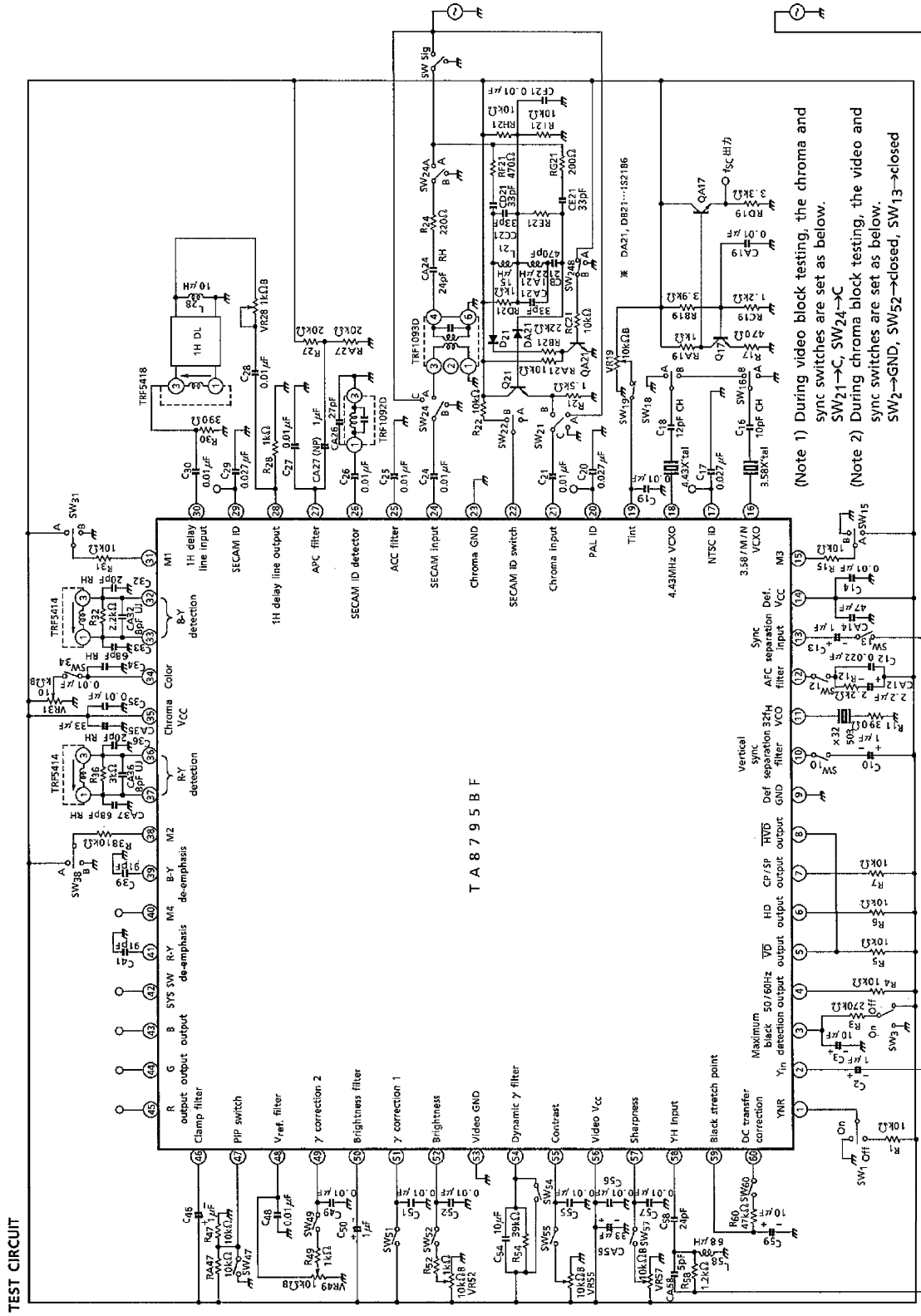
No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC=5V, Ta=25±3°C				TEST METHOD
							SW10	SW12	SW13	SW47	
D1	Horizontal oscillation frequency	f _H	V	15.584	15.734	15.884	—	—	OFF	—	Measure the frequency of pin 6.
D2	Horizontal frequency variable range	f _{Hmax}	kHz	16.384	16.484	—	—	ON	OFF	—	1. Connect a variable voltage supply VAFC to pin 12. 2. Vary the VAFC between 2 and 5V and measure the maximum and minimum frequency of pin 6 during the variation.
		f _{Hmin}		—	14.984	15.084					
D3	Horizontal oscillation control sensitivity	β _H	Hz/mV	7.0	10.0	13.0	—	ON	OFF	—	1. Connect a variable voltage supply VAFC to pin 12. 2. Measure the pin 6 frequency f (3V) when VAFC is 3V and measure the pin 6 frequency f (4V) when VAFC is 4V. 3. β _H = (f(4V) - f(3V)) / 1000. (Hz/mV)
D4	Horizontal oscillation start voltage	VON1	V	—	2.8	3.3	—	—	—	—	1. To pin 14, connect a variable voltage supply VCC'. 2. Increase the VCC' voltage and measure the pin 14 voltage when pin 11 generates an oscillation waveform.
D5	Horizontal output start voltage	VON2	V	—	2.8	3.3	—	—	—	—	1. To pin 14, connect a variable voltage supply VCC'. 2. Increase the VCC' voltage and measure the pin 14 voltage when pin 6 has horizontal output.
D6	Horizontal output pulse width	W _H	μs	4.7	5.0	5.3	ON	ON	ON	—	1. To pin 13, input a 300mV _{p-p} horizontal sync signal via a 1μF capacitor. 2. Observe the waveform on pin 6.
D7	Horizontal output pulse delay	τ _H	μs	0.30	0.45	0.65	—	—	—	—	
D8	Horizontal output saturation level	V _{HS}	V	—	0.2	0.4	—	—	—	—	1. Observe the pin 6 waveform and read the lowest voltage.

No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : VCC = 5V, Ta = 25 ± 3°C				TEST METHOD
							SW10	SW12	SW13	SW47	
D9	PAL/NTSC gate pulse phase	TPN1	μs	—	0.6	—	ON	ON	—	—	1. Connect an additional 20kΩ resistor between pin 17 and VCC. 2. To pin 13, input a 300mV _{p-p} composite sync signal via a 1μF capacitor. 3. Observe the waveform on pin 17. 
		TPN2	μs	—	3.1	—	ON	ON	—	—	
D10	SECAM gate pulse phase	TS1	μs	—	3.1	—	ON	ON	—	—	1. Connect an additional 20kΩ resistor between pin 29 and VCC. 2. To pin 13, input a 300mV _{p-p} composite sync signal via a 1μF capacitor. 3. Observe the waveform on pin 29. 
		TS2	μs	—	4.8	—	ON	ON	—	—	
D11	Vertical output pulse phase	WV	H	—	2.75	—	ON	ON	—	—	1. To pin 13, input a 300mV _{p-p} composite sync signal via a 1μF capacitor. 2. Observe the waveform on pin 5. 
		τV	H	0	—	1.5	ON	ON	—	—	

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No.	PARAMETER	SYMBOL	UNIT	MIN.	TYP.	MAX.	TEST CONDITIONS : V _{CC} =5V, T _a =25 ± 3°C				TEST METHOD
							SW AND VR MODE				
							SW10	SW12	SW13	SW47	
D12	Vertical sync lock-in range	VPH	H	—	345	—	ON	ON	—	—	1. To pin 13, input a 300mV _{p-p} composite sync signal via a 1μF capacitor. 2. Vary the vertical sync of the composite sync signal. 3. Measure the vertical sync where the vertical sync input and the pin 5 output synchronize.
		VPL		—	228	—	ON	ON	—	—	
D13	60Hz vertical sync range	V6H	H	—	287	—	ON	ON	—	—	
		V6L		—	228	—	ON	ON	—	—	

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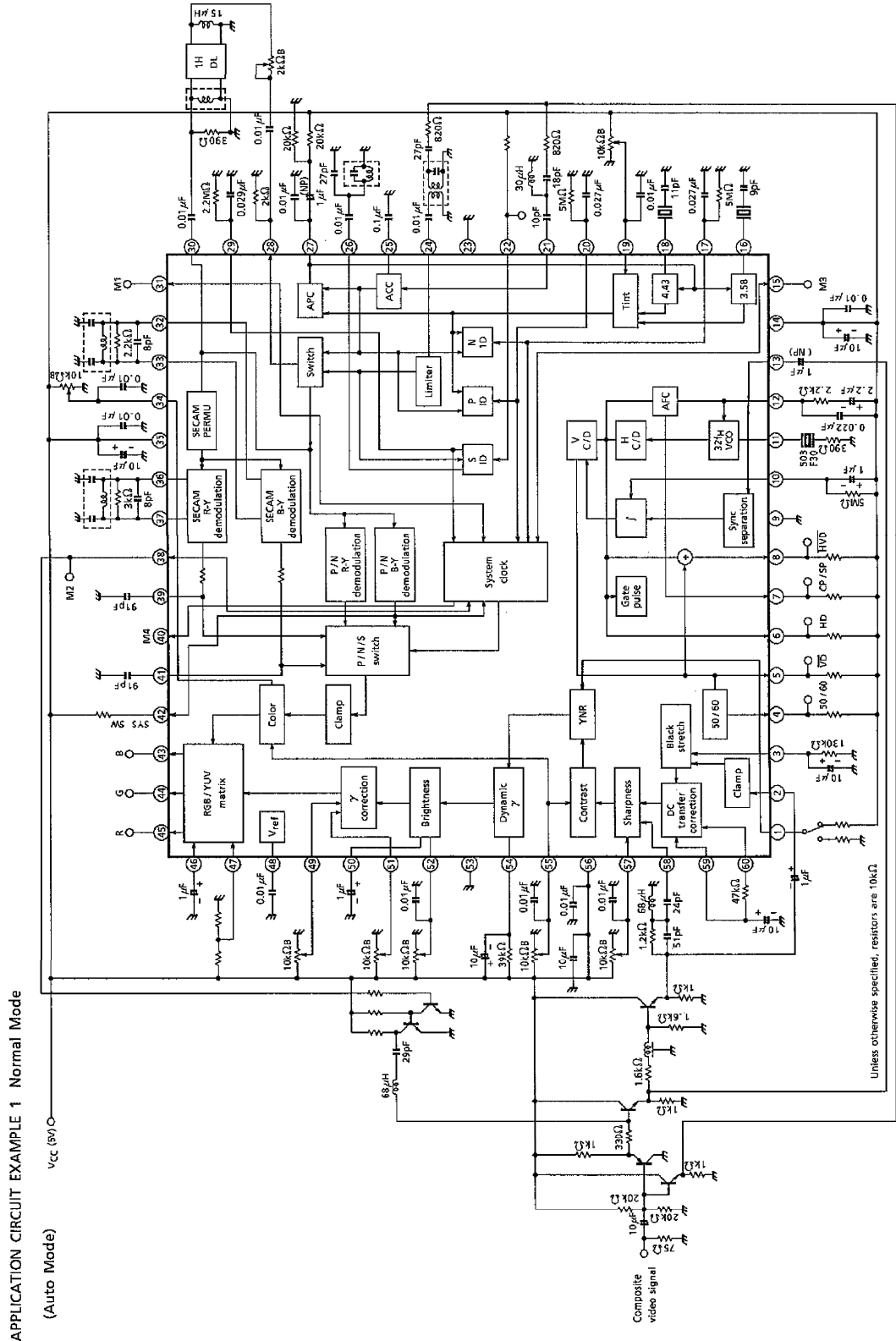


(Note 1) During video block testing, the chroma and sync switches are set as below.
SW₂₁→C, SW₂₄→C
(Note 2) During chroma block testing, the video and sync switches are set as below.
SW₂→GND, SW₅₂→closed, SW₁₃→closed

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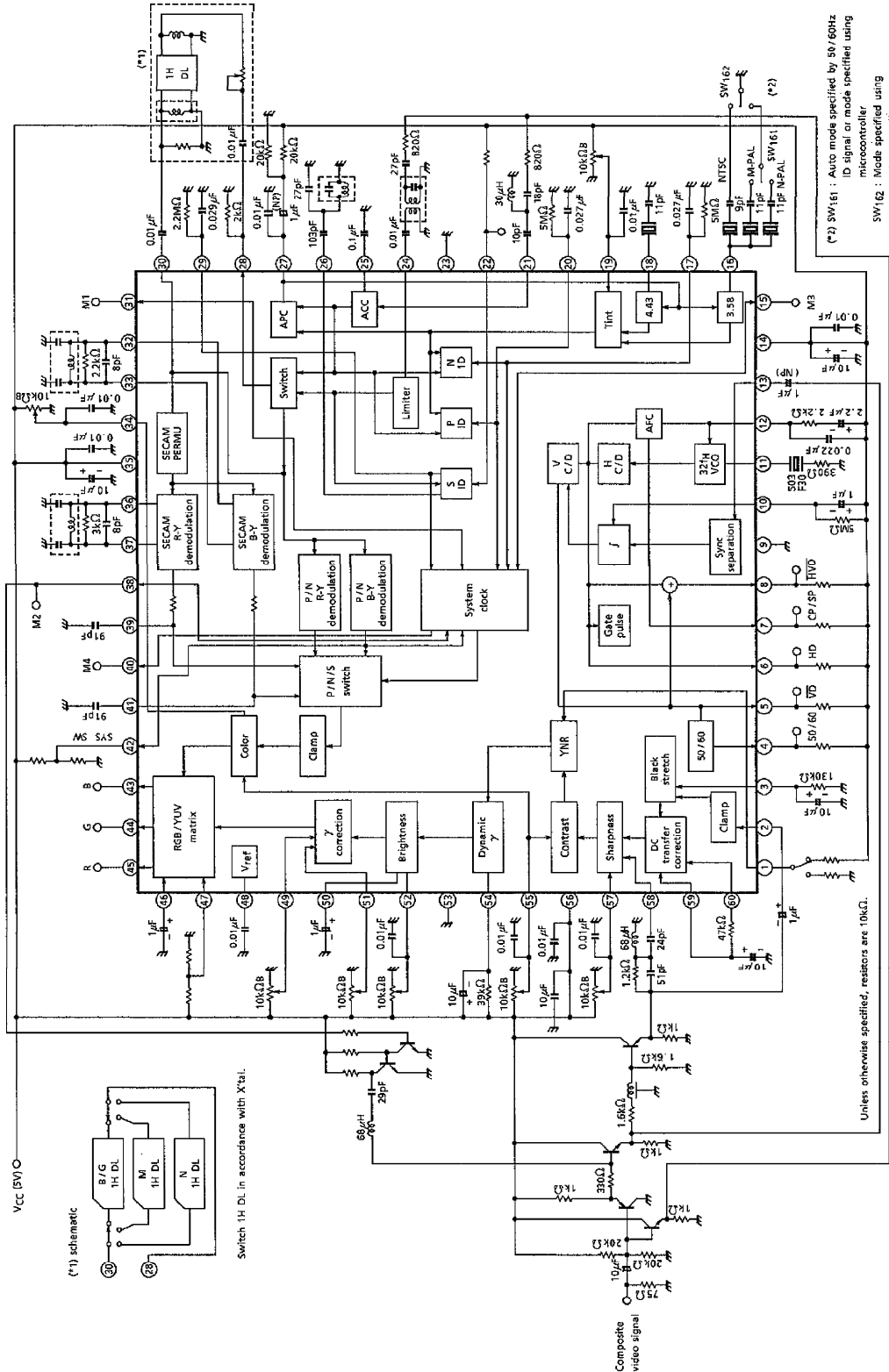
TEST CIRCUIT

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APPLICATION CIRCUIT EXAMPLE 1 Normal Mode (Auto Mode)

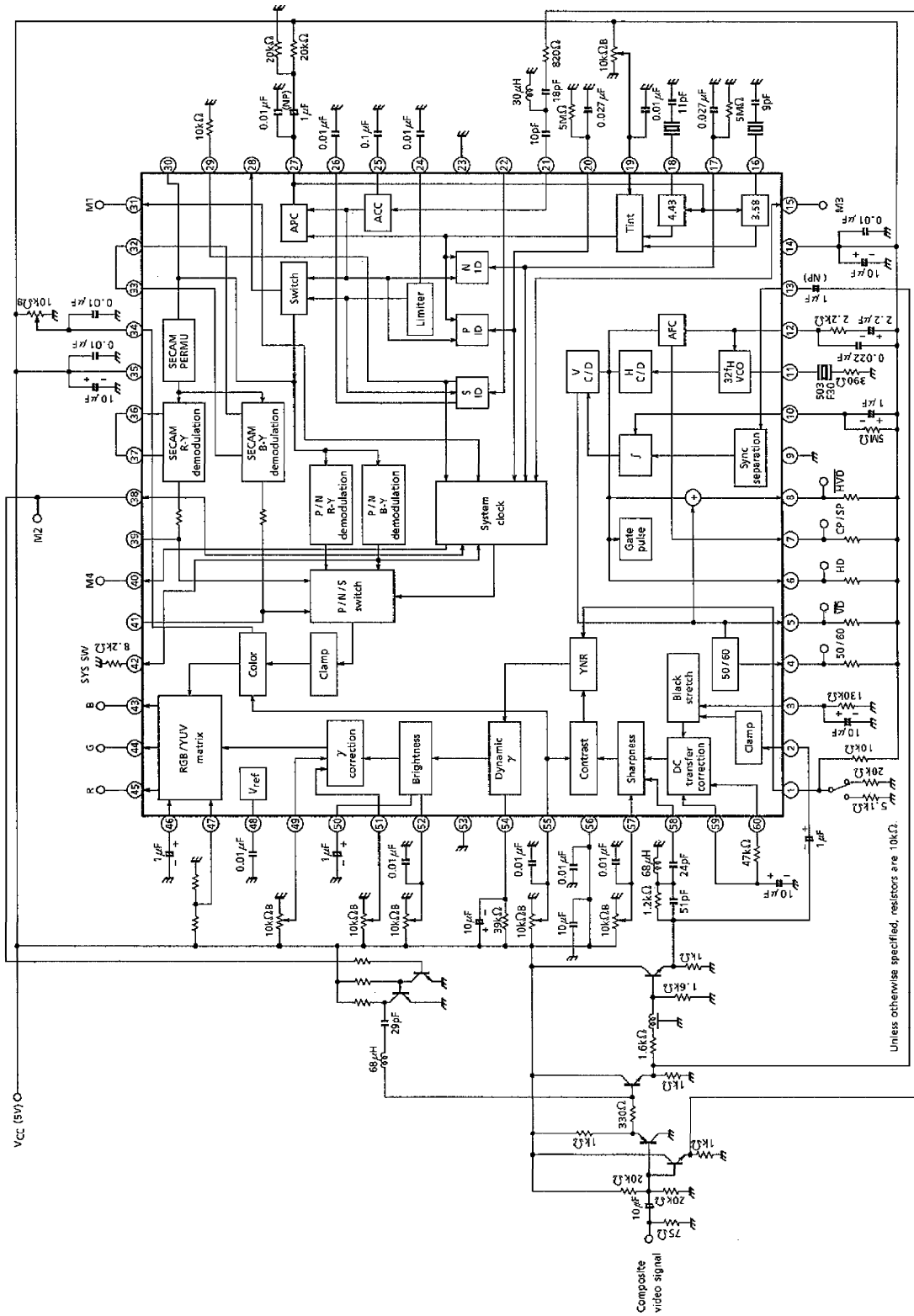
APPLICATION CIRCUIT EXAMPLE 1 South American Mode



(*) SW161 : Auto mode specified by 56/60Hz ID signal or mode specified using microcontroller
 SW162 : Mode specified using microcontroller

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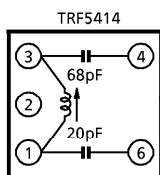
APPLICATION CIRCUIT EXAMPLE 1 Pseudo-PAL Mode



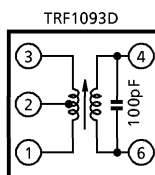
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Peripheral Component Specifications

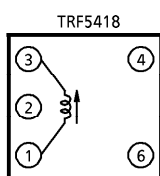
(1) Tank coil (bottom view)



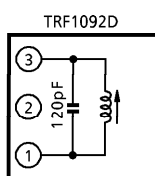
TRF5414
 Lmin 20.0 μ H
 Lmax 37.0 μ H
 Q 26 (at Lmax)



TRF1093D
 f_o max (at 4-6) = 4.9MHz (min)
 f_o min (at 4-6) = 4.4MHz (max)
 Q2 (at f_o min 4-6) = $68 \pm 30\%$
 L1 (at f_o min 1-3) = 9.1μ H $\pm 30\%$
 Qu (at f_o min 1-3) = $36 \pm 30\%$
 L2 (at f_o min 2-3) = 0.36μ H $\pm 15\%$
 Qu (at f_o min 2-3) = $5.8 \pm 30\%$



TRF5418
 Lmin 5.2 μ H
 Lmax 12.2 μ H
 Q 57 (at L = 8.6 μ H)



TRF1092D
 f_{min} 4.7MHz
 f_{max} 7.4MHz
 Q 75 (at f_{min})

(2) X'tal

NTSC 3.579545MHz

Frequency accuracy : ± 25 ppm
 Temperature coefficient : ± 20 ppm (- 10~75°C)
 Load capacitance : 16pF

PAL 4.433619MHz

Frequency accuracy : ± 25 ppm
 Temperature coefficient : ± 30 ppm (- 10~75°C)
 Load capacitance : 16pF

Product recommended : NR-18 (Nippon Denpa Kogyo Corp.)

(3) 1H Delay line

Nominal frequency : 4.433619MHz (f_o)
 Insertion loss : 10 ± 3 dB (at f_o), delay time 63.945 μ s
 3dB bandwidth : $f_o \pm 1.0$ MHz or more
 不要反射 : 32dB 以上 ($f_o \pm 1$ MHz 内)

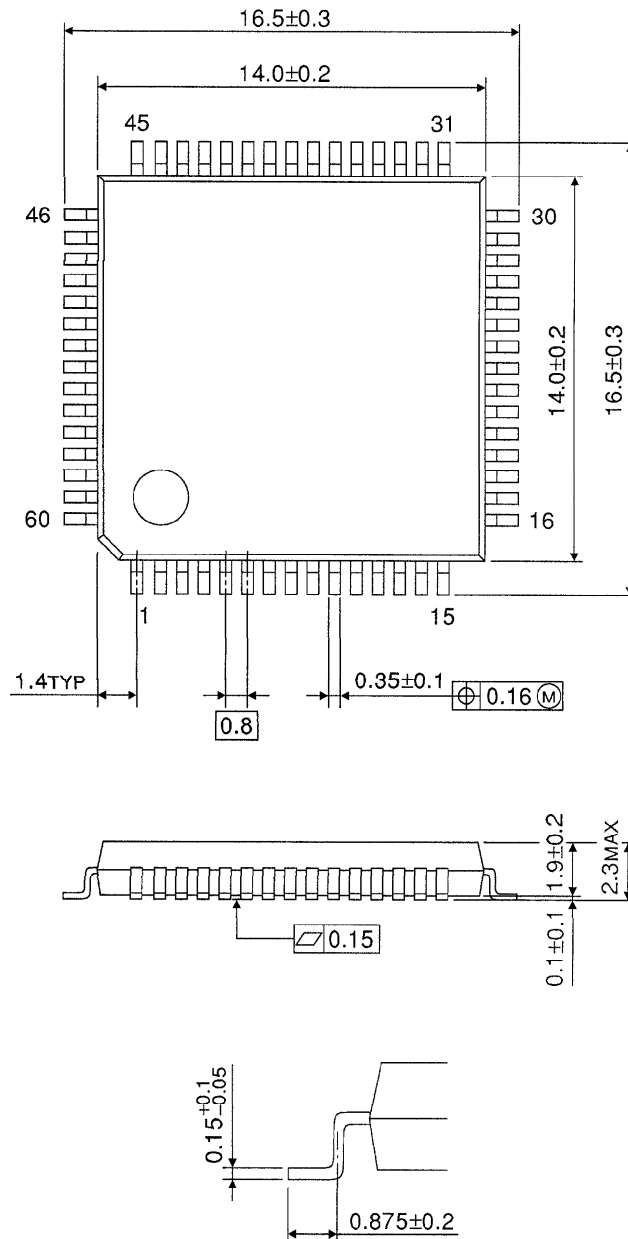
Product recommended : EFD-ED645A41T (Matsushita Electronics Corp.)

(4) 32f_H ceramic oscillator

Product recommended : CSB503F30 (Murata Mfg. Co., Ltd.)

OUTLINE DRAWING
QFP60-P-1414-0.80F

Unit : mm



Weight : 0.8g (Typ.)