TOSHIBA BiCMOS INTEGRATED CIRCUIT, SILICON MONOLITHIC

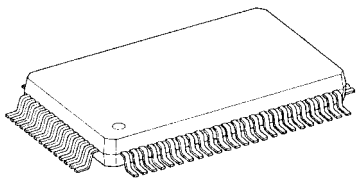
TB1261F/TB1262F

PAL/NTSC/SECAM 1CHIP

(IF + VCD PROCESSOR)

The TB1261F/TB1262F are TV signal processor ICs, which contains PIF, SIF, Video, Chroma and Deflection blocks. They can be applied for worldwide Multi system TV sets.

The flexibility of this TB1261F/TB1262F contributes to reduce development costs and components in a TV set.



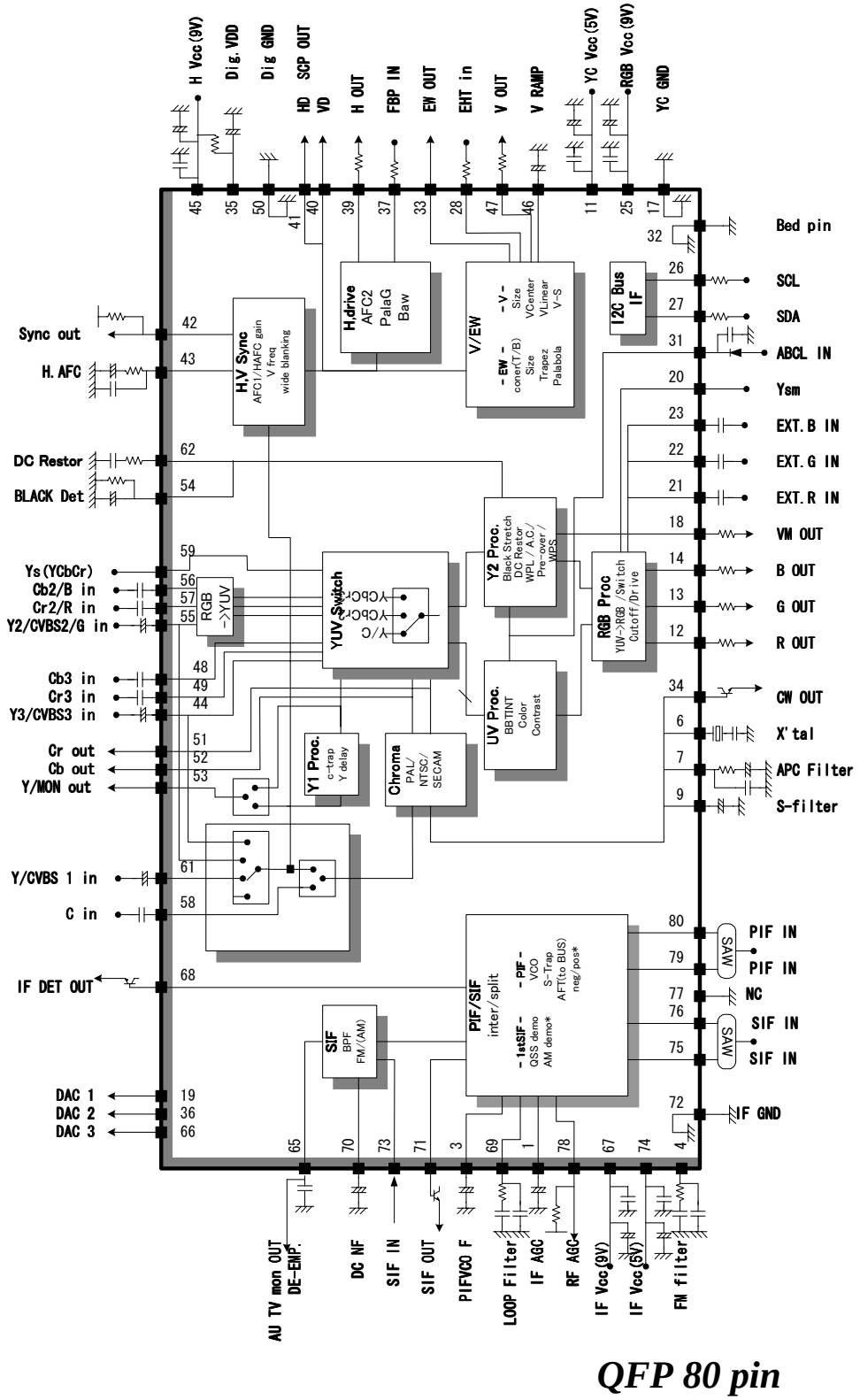
QFP80-P-1420-0.80C

FEATURES

- IF
  - Integrated PIF VCO, aligned automatically.
  - Inter/ split carrier input
  - SIF BPF built-in
  - SIF Trap filter built in
  - Tank-less SIF demodulator
  - Neg/pos demodulation PIF line up *
  - AM sound demodulation line up *
- Video
  - Chroma trap
  - Y delay line
  - Black stretch
  - Y-gamma
  - Pre/over shoot control
  - VM signal output
- Chroma
  - PAL/ NTSC/ SECAM demodulation
  - with 1Xtal and Built in 1HDL system
  - External YCbCr in/out Interface
  - Base band TINT
  - SCART RGB interface
- RGB Analog RGB interface
  - Half-tone and transparent for OSD
  - RGB cut-off/ drive controls by bus
  - ABCL (ABL and ACL combined)
- Sync./ DEF HVCO integrated
  - V saw tooth single output
  - EW output available for flat wide TV

- *; TB1262F only

1, Block diagram



TB1261F/62F BLOCK DIAGRAM

QFP 80 pin

2, BUS CONTROL MAP of the “TB1261F/62F”

[WRITE] Slave Address: 88H

	D7	D6	D5	D4	D3	D2	D1	D0	
0	WPS	Contrast							0000_0000
1	Brt on RGB	Bright							0000_0000
2	Col-γ	Color							0100_0000
3	Demo-P		Sharpness						0010_0000
4	Y+C sw	Tint							0100_0000
5	(0)	Video sw		C-in sw	N-Comb	CbCr sw	Ys in	Y/Mon out	0000_0000
6	RGB Mute	Color System			RGB>YUV	Blue Back	C-Trap	Coring	0000_0000
7	R Cut Off								0000_0000
8	G Cut Off								0000_0000
9	B Cut Off								0000_0000
0A	Drive ref	B Drive Gain							0100_0000
0B	BLK SW	R/G Drive Gain							0100_0000
0C	Spl/Int	PLL S	RF AGC						0000_0000
0D	PIF Freq.			S-Trap			VCO-M	SIF-in	0000_0000
0E	AFT-S	Buzz-R	Over Mod	Au-G	FM-Band	SIF-Freq.		SIF-574	0000_0000
0F	S-col feint	VM-P	VM-G		DC-Restore		Y-γ Point		1010_0000
10	Y-Mute	Y-DL			ABL-SP		ABL-G		0001_0000
11	F ID	PN ID S	BPF/TOF	Shoot Balance			Black Stretch		0000_0000
12	S GP Phase		S Inhibit	S ID Sense	S-ID M	HP-Boost	L-AGC	L-SECAM	0000_0000
13	Black Adj. R-Y				Black Adj. B-Y				1000_1000
14	sync gate	F sync	312/313	H Phase					0001_0000
15	V Freq.			V Phase					0000_0000
16	VRamp Ref	V Size							1100_0000
17	V Linearity				V-S Corr.				1000_1000
18	AFC Gain		V Cent.						0010_0000
19	H Side BLK	V BLK Bottom			V BLK Top				0000_0000
1A	RFAGC-Adj.	LAGC lim	PIF Det Lev		Noise Det Level				0100_1000
1B	V AGC	EW Para							0100_0000
1C	dac1	H Stop	H Size						0010_0000
1D	dac2	xxx	EW Trape						0010_0000
1E	V. EHT			EW Corner Top					0001_0000
1F	H. EHT			EW Corner Bottom					0001_0000
20	dac3	DCNF	H. Par			H. Bow			0110_0100
21	TEST								0000_0000
	Strap-HP/LP		P PLL u	S2-Q	Strap-GD		Strap-Q		0000_0000

[READ]

	D7	D6	D5	D4	D3	D2	D1	D0
R0	POR	IF Lock	H Lock	Color System			AFT-C	AFT-W
R1	V Freq.	V-STD	Noise	RFAGC	C IN DC	Sound Dev.	Station Det	PVCO-Err

3, Features comparizon for TB1261F and TB1262F

TB1261F and TB1262F are distinguished with their assured specifications for its IF systems. Basically, TB1261 is for Asian models and TB1262 is for Europeans. The comparisons are shown in the next table.

	TB1261F	TB1262F
Picture IF	- Neg. demo	- Neg. demo - Pos. demo (L/L')
Sound IF	- Split/ inter carrier - BG, DK, I, M (FM) - BG (IGR-bilingual fm)	- Split/ inter carrier - BG, DK, I (FM) - L (AM sound demo)

These difference are realized by its Bus controls. The bits marked 'n/a' in the next table should not be selected by controller micro processor , in fact they can be set but not assured.

BUS CONTROL ITEMS	BITS	CONTROLS	TB1261F	TB1262F
PIF Freq. (00) [Sub; 0Dh D7~D5 3 bits]	000	45.75 MHz	x	n/a
	001	39.5 MHz	n/a	x
	010	38.9 MHz	x	x
	011	38.0 MHz	x	n/a
	100	34.2 MHz	n/a	x
	101	33.9 MHz	n/a	x
L-SECAM (0), L-AGC(0), FM Stop [Sub; 12h D1,D0 2 bits]	00	not LSECAM, not FM stop	x	x
	01	L-SECAM	n/a	x
	10	L-SECAM & AGC speed up	n/a	x
	11	FM Stop	x	x
SIF-Freq (00) [Sub; 0Eh D1-D2 2 bits]	00	5.5MHz	x	x
	01	6.0MHz	x	x
	10	6.5MHz	x	x
	11	4.5MHz	x	n/a
SIF-574 (0) [Sub; 0Eh D0 1 bit]	0	Others	x	x
	1	5.74MHz	x	n/a

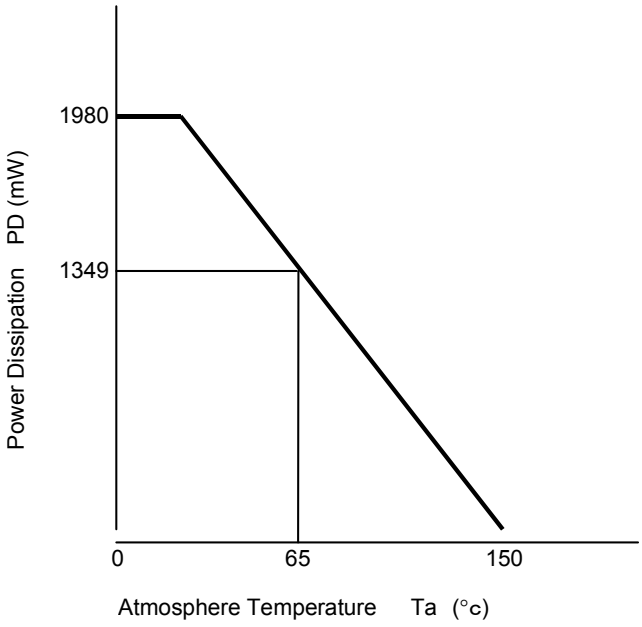
x ; can be selected
n/a ; the feature not guaranteed

4, MAXIMUM RATINGS (Ta=25℃)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage (9V Vcc)	Vcc max9	12	V
Supply Voltage (5V Vcc)	Vcc max5	6.5	V
Supply Voltage (3.3V Vdd)	Vdd max3.3	5.0	V
Power Dissipation	PD max	1980(*1)	mW
Input terminal Voltage	V in	GND – 0.3 ~ Vcc + 0.3	V
Operating Temperature	Topr	-20 ~ 65	℃
Storage Temperature	Tstg	-55 ~ 150	℃

(*1) When using this device at above Ta=25℃, the power dissipation decreases by 15.9mV per 1℃ rise.
(*2) This IC is weak against static electricity and surge impulse. Please take counter measure to meet, if necessary.
(*3) This IC is not proofed enough against a strong E-M field by CRT which mau cause function error and/or poor characteristics. Keeping the distance from CRT to the IC longer than 20cm, or if cannot, placing shield metal over the IC, is recommended in an application.

Ta-PD Curve (on a PCB)

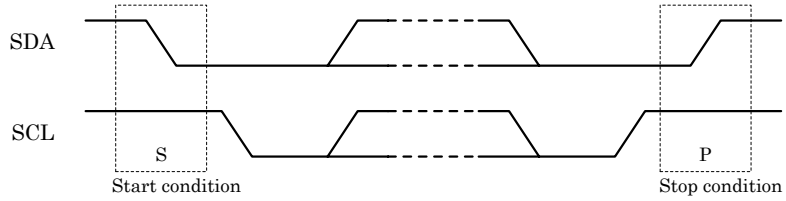


5, OPERATING POWER SUPPLY VOLTAGE

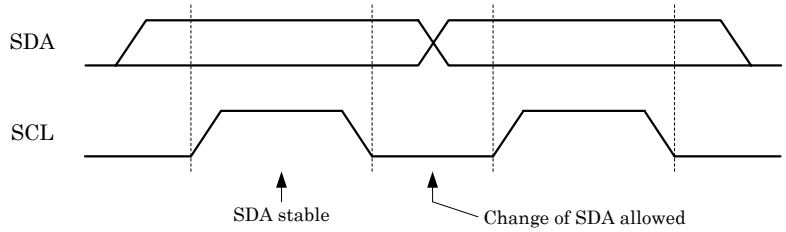
PIN NO.	PIN NAME	MIN.	TYP.	MAX.	UNIT	NOTE
74	IF Vcc (5V)	4.75	5	5.25	V	—
67	IF Vcc (9V)	8.55	9	9.45		
25	RGB VCC (9V)	8.55	9	9.45	V	—
45	H VCC (9V)	8.55	9	9.45	V	—
35	DIGITAL VDD	3.1	3.3	3.5	V	This pin should be supplied from HVcc via 270 ohms of resister.
11	Y/C VCC (5V)	4.75	5	5.25	V	

6, DATA TRANSFER FORMAT VIA I2C BUS

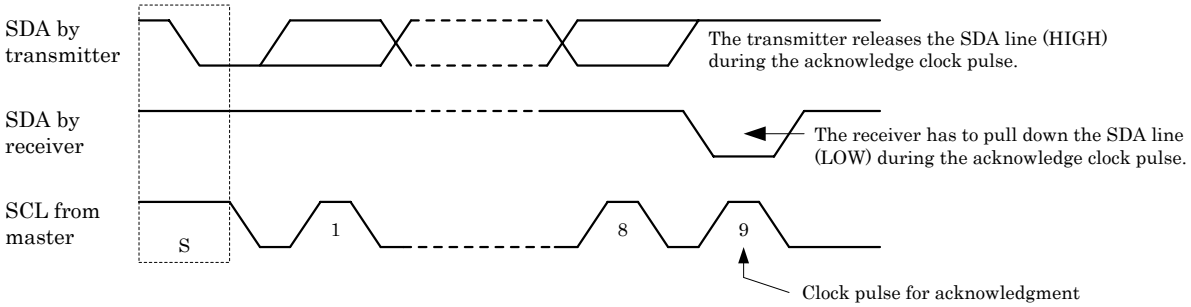
Start and stop condition



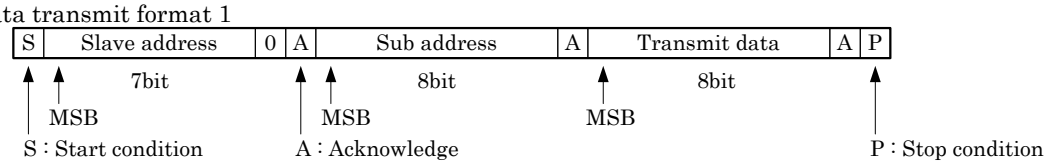
Bit transfer



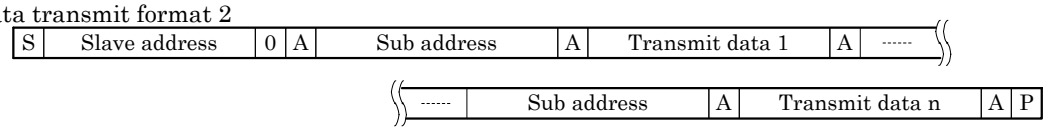
Acknowledge



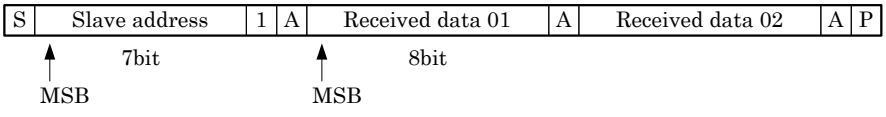
Data transmit format 1



Data transmit format 2

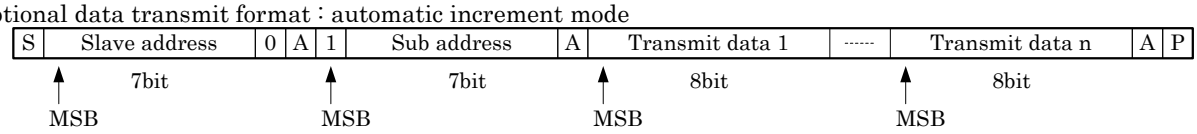


Data received format



At the moment of the first acknowledge, the master transmitter becomes a master receiver and the slave receiver becomes a slave transmitter. This acknowledge is still generated by the slave.
The Stop condition is generated by the master.

Optional data transmit format : automatic increment mode



In this transmission methods, data is set on automatically incremented sub-address from the specified sub-address.

Purchase of TOSHIBA I²C components conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

7, Terminal Descriptions

Pin #	Description
1 (8)	**IF AGC;** A terminal should be connected to an IF AGC filter. Connect 0.47uF of capacitor to GND. In selecting L system, the capacitor works for 1st SIF AGC.
2	nc;
3 (9)	**PIF Filter**; A terminal to be connected to a filter for stabilizing the PIF VCO center frequency. Put a capacitor of 10 uF.
4 (10)	**FM Filter;** A terminal should be connected to an FM PLL filter. Put a lag lead CR filter.;
5	nc;
6 (11)	**Xtal (4.43MHz);** A terminal should be connected with a 4.433619MHz crystal oscillator. The oscillated signal leads to the chroma demodulation, H out frequency tuning, AFT, etc.;
7 (12)	**APC Filter;** A terminal should be connected with an APC filter for chroma demodulation. This terminal voltage controls the frequency of VCXO.;
8	nc;
9 (13)	**SECAM Filter;** The terminal should be connected a SECAM filter for holding SECAN reference frequency. Connect 0.47uF to GND, If not using SECAM decoder on TB1261, put at least 0.01uF of capacitor to GND.
10	nc;
11 (14)	**Y/C VCC;** A Vcc terminal for Y/C circuit. Supply 5V.;
12 13 14 (15) (16) (17)	**R OUT;** **G OUT;** **B OUT;** Terminals for R/G/B signal output, should be lead to CRT driver. Connect resistances to GND, for the current source if the slew rate is not enough. Due to the source current limitation, the resistances should be 2.0kΩ or more.;
15	nc;
16	nc;
17 (18)	**Y/C GND;** The GND terminal for Y/C circuit.;
18 (19)	**VM OUT;** The output terminal for applying veracity scanning modulation (VSM). The IIC Bus controls phase and Gain of VSM.;

Pin #	Description
19 QFP only	**DAC1;** A terminal to be output High/ Low status by an open collector interface. The pull up resistance should be fixed as a sink current is 1mA or less and the pull up voltage should be less than the voltage of RGB Vcc.
20 (20)	**YS/YM SW;** A terminal for switching of EXT RGB Mode and fast transparent. EXT. RGB 2.1V ---------- Half tone 0.7V ---------- TV 0V ----------
21 22 23 (21) (22) (23)	**EXT. R IN;** **EXT. G IN;** **EXT. B IN;** Input terminals for EXT R/G/B signals. The signals are clamped by capacitors, therefore the input impedance should be low, 100 ohms or less is recommended. For this input, the brightness control with ABL is available. ABL OFF: for small area like OSD ABL ON: for large area like TELETEXT (input level 0.7Vp-p/100IRE)
24	nc;
25 (24)	**RGB VCC (9V);** A Vcc terminal for RGB block. Supply 9V.
26 (25)	**SCL;** An input terminal for IICBUS clock.;
27 (26)	**SDA;** An input/output terminal for IICBUS data.;
28 (27)	**EHT IN;** The input terminal for EHT. The ratio of EW / V is controlled by bus.;
29	nc;
30	nc;
31 (28)	**ABCL IN;** An input terminal for ABL/ACL control. Control voltage range is 5.0 - 6.0V. The ratio of ABL versus ACL can be set by bus control.;
32 QFP only	**Bed pin;** Connect GND. The earth pattern should be recommended to be isolated from Def GND and connect IF GND.
33 (29)	**EW OUT;** An output terminal for E-W OUT.
34 (30)	**CW OUT;** An output terminal for the continuous chroma sub-carrier frequency wave, with amplitude of 0.4Vp-p (typ).

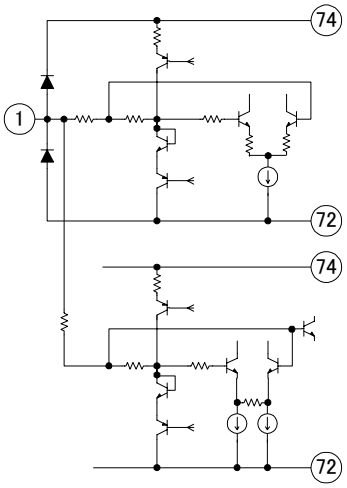
Pin #	Description
35 (31)	**DIG. VDD ;** A Vdd terminal for of digital block. Supply HVcc voltage through 270 ohms of resistance. The coupling capacitor should be 10uF or less, in order to keep rise up time good enough. The voltage of this terminal is clipped to approximately 3.3V by the internal regulator.
36 QFP only	**Dac2;** A terminal to be output High/ Low status by an open collector interface. The pull up resistance should be fixed as a sink current is 1mA or less and the voltage is less than the voltage of H Vcc.
37 (32)	**FBP IN;** An input terminal for FBP. V/GP pulses are output over this FBP. The Threshold levels are; 1.4 V ; for Blanking 3.7 V; for HAFC2
38	nc;
39 (33)	**H OUT;** An output terminal for horizontal driving pulses.;
40 QFP only	**VD OUT;** An output terminal for VD pulses. The pulses are 3V for its level.
41 QFP only	**HD OUT;** An output terminal fot HD pulses. GP Pulses are overlaid as SCP. Also BPP is overlaid to stop black stretch detecting. Those levels are 5V; for GP out 3V; for HD out 0.7V; for BPP in
42 QFP only	**Sync out;** An output terminal of the sliced sync pulses. Pull up this pin with 5.1kΩ of resistance.
43 (34)	**H AFC Filter;** A terminal should be connected with H. AFC Filter. The DC voltage of this pin controls the H VCO frequency.
44 QFP only	**Y3/CVBS3 IN;** An alternative input terminal for; - Y + Sync signals of Y/Cb/Cr_3 - Or CVBS_3 Those two are selected by IICBUS This terminal is clamped by charging / discharging the coupling capacitors. It is recommended that input impedance is kept at or below 100Ω. Input level 1Vp-p/140IRE
45 (35)	**H VCC (9V);** A Vcc terminal for DEF circuit, HOUT, IICBUS POR, etc. Supply 9V.;

Pin #	Description
46 (36)	**V RAMP;** A terminal should be connected with a capacitor to generate the V.Ramp signal.Connect this pin to GND via 0.47uF.The V.Ramp amplitude is kept constant by the V.AGC.;
47 (37)	**V OUT;** An output terminal for the vertical saw tooth wave.
48 49 QFP only	**Cb3 IN;** **Cr3 IN;** Input terminals for ; - Cb and Cr signals of Y/Cb/Cr_3 These terminals are clamped by charging / discharging the coupling capacitors. It is recommended that input impedance is kept at or below 100Ω.
50 (38)	**DIG GND;** A GND terminal for digital block.;
51 52 (39) (40)	**Cr OUT;** **Cb OUT;** Output terminals for demodulated Cb and Cr signals.
53 (41)	**Y/Mon OUT** An alternative output terminal for; - Y signal after Y1 process - Or Mon out after selector Those two are selected by IICBUS
54 (42)	**BLACK DET;** A terminal should be connected with Black level detecting filter for black stretch. This terminal voltage controls the Black stretching gain. The IIC Bus controls the on/off and start point of the Black stretch. ;
55 (43)	**Y2/CVBS2/G IN** An alternative input terminal for; - Y + Sync signals of Y/Cb/Cr_2 in - Or CVBS_2 - Or G signal of Scart Y/R/G/B in Those three are selected by IICBUS. These terminals are clamped by charging / discharging the coupling capacitors. It is recommended that input impedance is kept at or below 100Ω.
56 57 (44) (45)	**Cb2/B IN;** **Cr2/R IN;** Alternative input terminals for; - Cb and Cr signals of Y/Cb/Cr_2 - Or R and B signal of Scart Y/R/G/B in Those three are selected by IICBUS These terminals are clamped by charging / discharging the coupling capacitors. It is recommended that input impedance is kept at or below 100Ω.
58 (46)	**C-IN;** An input terminal for chroma signal (standard burst amplitude level 286mVp-p). The dc level of this pin can be read by bus to detect if S port is connected or not.;

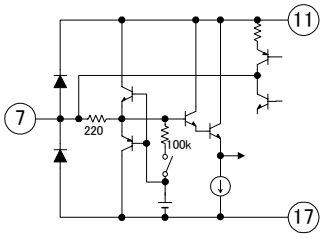
Pin #	Description
59 (47)	**Ys(YCbCr)** A fast switch for selecting Y/Cb/Cr2 in (or fast blanking for scart R/G/B in). Forced Y/Cb/Cr (or scart R/G/B in) 0.7V ---------- Selecting by IICBUS 0V ----------
60	nc;
61 (48)	**Y/CVBS1 IN** An alternative input terminal for; - Y + Sync signals of Y/C - Or CVBS_1 Those two are selected by IICBUS This terminal is clamped by charging / discharging the coupling capacitors. It is recommended that input impedance is kept at or below 100Ω. Input level 1Vp-p/140IRE
62 (49)	**DC RESTOR;** A terminal to be connected with a capacitor to detect the average picture level for DC restoration. The ratio of the DC restoration is set by bus.Leave this terminal open if the DC restoration is not required. ;
63	nc;
64	nc;
65 (50)	**De-Emphasis/Mon-OUT;** A terminal to De-Emphasis Audio signal, and pick up detected Audio signal. Connect capacitor (4700pF) to GND. The time constant 50/75us is set by the IICBUS control "SIF Freq". Remove the capacitor for connecting US/JPN sound multiplex system.
66 QFP only	**DAC 3;** A terminal to be output High/ Low status by an open collector interface. The pull up resistance should be fixed as a sink current is 1mA or less and the voltage is less than the voltage of IF Vcc.
67 (51)	**IF Vcc(9V);** A Vcc terminal for Y/C circuit. Supply 9V.;
68 (52)	**IF DET OUT;** Detected PIF output terminal.(typical output level 2.2Vp-p)
69 (53)	**LOOP Filter;** A terminal to be connected with loop filter for PIF PLL. The terminal voltage controls the PIF VCO frequency.;
70 (54)	**DC NF;** A terminal for connecting a capacitor for DC NF. This filter is very sensitive for the Audio quality; therefore connect capacitor to a stable GND point. In selecting L system, the capacitor works for PIF AGC filter.
71 (55)	**SIF OUT;** An output terminal for a 2'nd SIF signal, which is mixed down by a regenerated carrier.
72 (56)	**IF GND;** The GND terminal for IF circuit.;
73 (1)	**SIF IN / H corr.;** An input terminal for 2'nd SIF signal and H. curve correction.
74 (2)	**IF VCC (5V);** A Vcc terminal for the IF circuit. Supply 5V.;
75 76 (3) (4)	**1'st SIF IN(1);** **1'st SIF IN(2);** Input terminals for 1'st SIF signals. If not using Split input, leave these pins open, and turn the IICBUS bit of "Spl/ Int" [s0C/d7] to "1"
77	**Nc (to GND);** Connect this pin to GND to isolate PIF and 1stSIF input.
78 (5)	**RF AGC;** An output terminal for RF AGC. A pull up resistor is required because of its open collector output. A de-coupling capacitor should be also connected to adjust the response.
79 80 (6) (7)	**IF IN(1);** **IF IN(2);** Input terminals for IF signals. Pin 6 and 7 are the both input poles of a differential amplifier. The normal input level is 90dB(uV); input impedance is 1.5 k ohms.

8, Interfaces

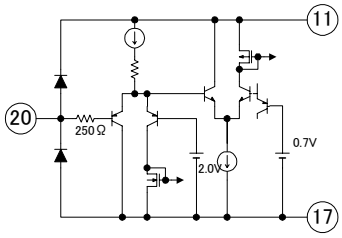
1; IF AGC



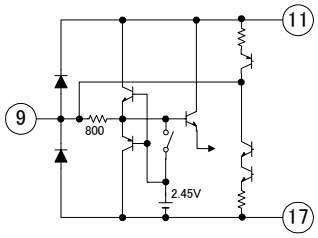
7; APC Filter



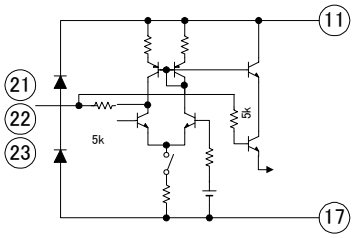
20; Ysm 22; EXT.G IN



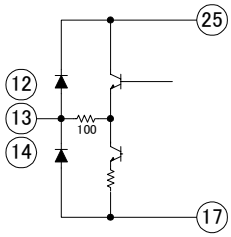
9; S-filter



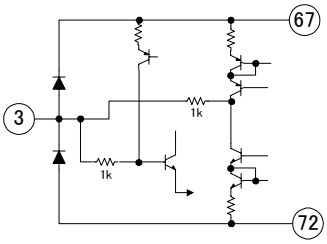
21; EXT.R IN
23; EXT.B IN



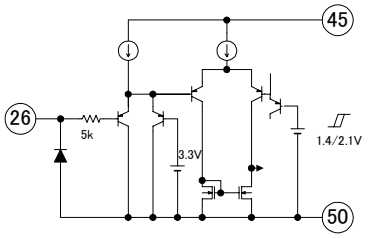
12; R OUT 13; G OUT
14; B OUT



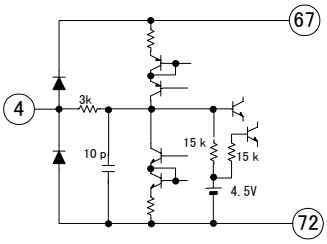
3; PIF filter



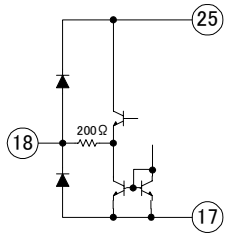
26; SCL



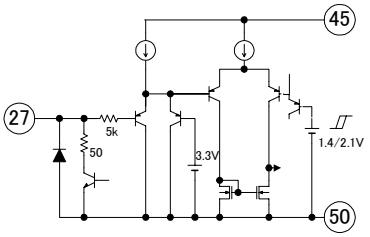
4; FM filter



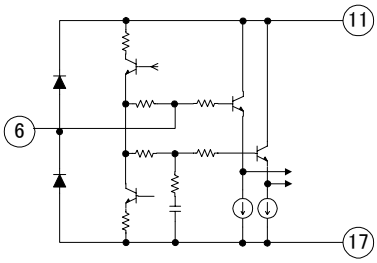
18; VM OUT



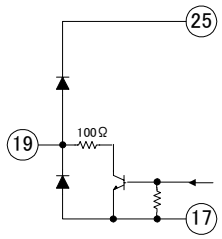
27; SDA



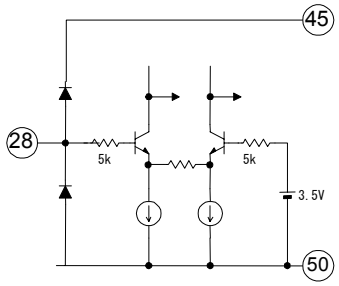
6; X'tal



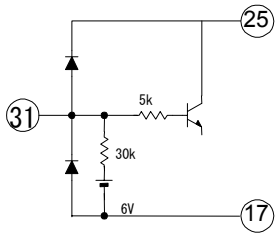
19; DAC 1



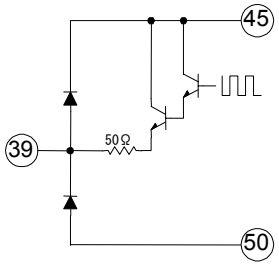
28; EHT in



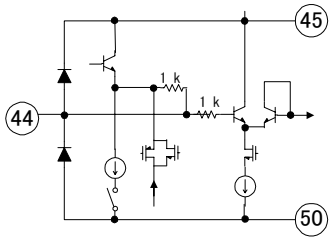
31; ABCL IN



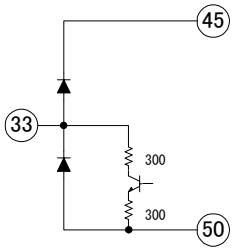
39; H OUT



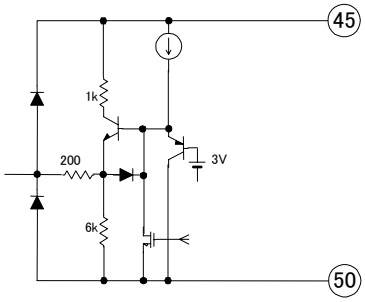
44; Y3/CVBS3 in



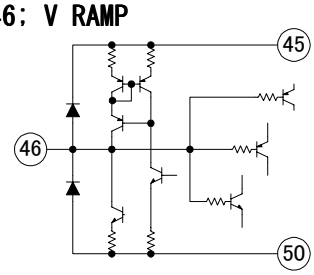
33; EW OUT



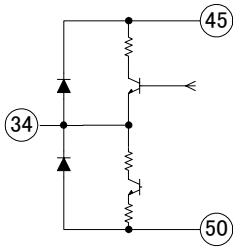
40; VD



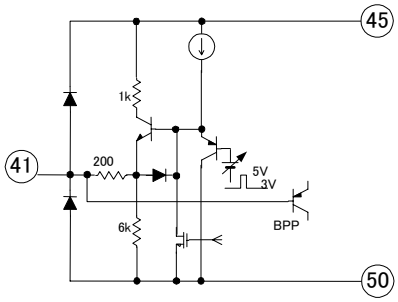
46; V RAMP



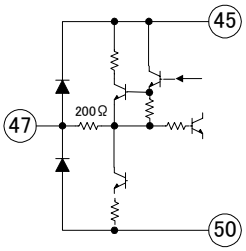
34; CW OUT



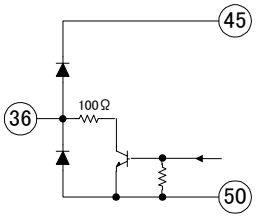
41; HD/SCP OUT



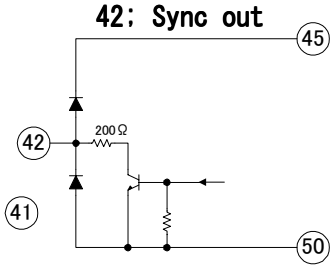
47; V OUT



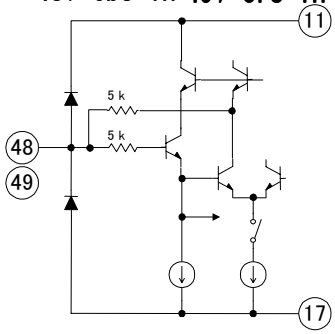
36; DAC 2



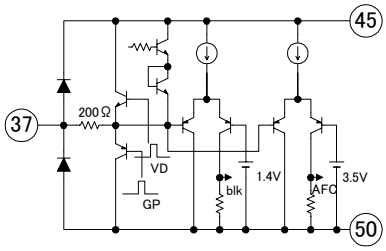
42; Sync out



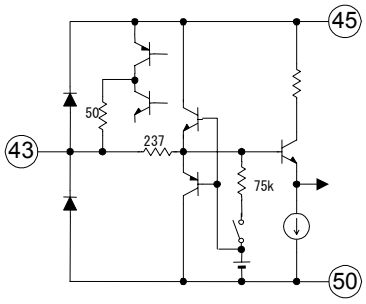
48; Cb3 in 49; Cr3 in



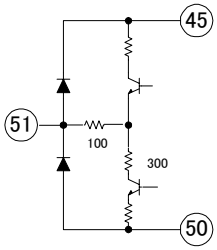
37; FBP IN



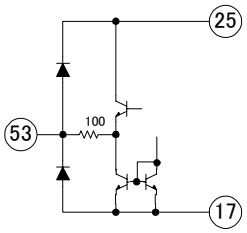
43; H.AFC



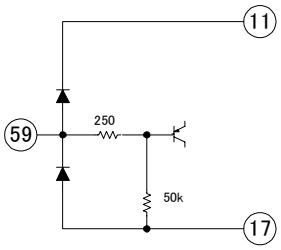
51; Cr out 52; Cb out



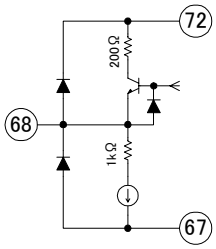
53; Y/MON out



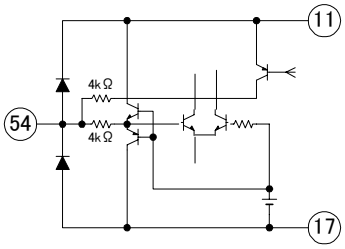
59; Ys(YCbCr)



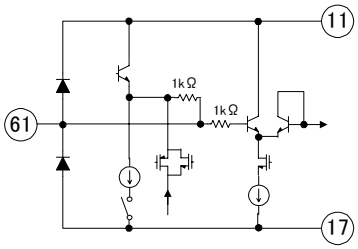
68; IF DET OUT



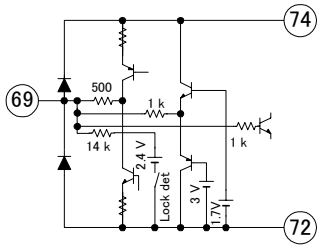
54; BLACK Det



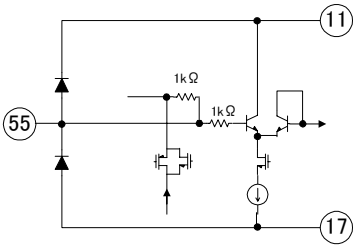
61; Y/CVBS 1 in



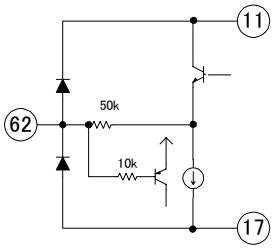
69; LOOP Filter



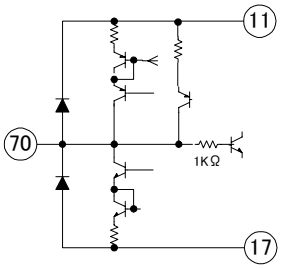
55; Y2/CVBS2/G in



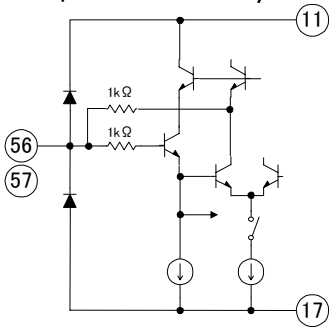
62; DC Restor



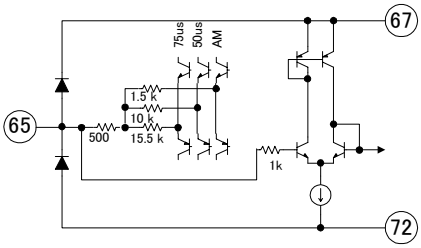
70; DC NF/AM AGC



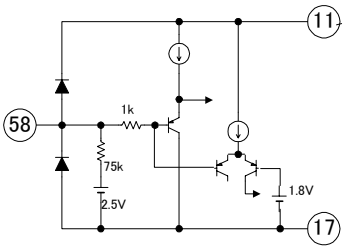
56; Cb2/B in 57; Cr2/R in



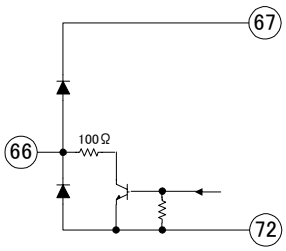
65; DE-EMP.AUDIO OUT



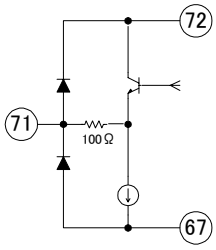
58; C in



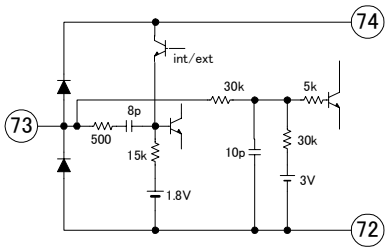
66; DAC 3



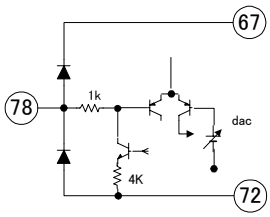
71; SIF OUT



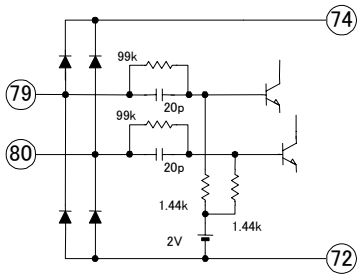
73; SIF IN



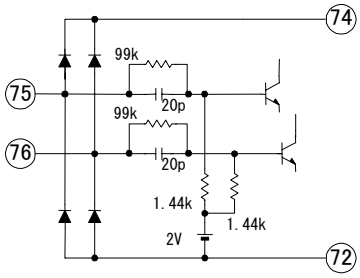
78; RF AGC



79; PIF IN
80; PIF IN



75; SIF IN 76; SIF IN



9, BUS Description

WRITE MODE

[PIF]

RF AGC (00) [Sub; 0Ch D5~D0 6 bits]

Data	Descriptions
00	IF mute Stops Demodulation
01	65dB(uV)
3F	105 dB(uV)

RF AGC delay point (Pin6-7)

PIF Freq. (00) [Sub; 0Dh D7~D5 3 bits]

Data	Descriptions
000	45.75 MHz
001	39.5 MHz
010	38.9 MHz
011	38.0 MHz
100	34.2 MHz
101	33.9 MHz

Setting IF frequency according to tuner frequency. It fixes the VCO frequency and AFT center frequency.

VCO-M (0) [Sub; 0Dh D1 1 bit]

Data	Descriptions
0	Absolute (duration of searching)
1	Relative (normal)

VCO tuning mode
TB1261 has two VCO tuning mode, which are 'Absolute' and 'relative'. The 'Absolute' mode refers the crystal oscillation frequency 4.43MHz, the 'Relative' mode refers the IF input frequency, which is tuned by AFT loop.
Set 'Relative' mode in normal receiving, and 'Absolute' in channel searching. Even setting the 'Relative' mode, the VCO
mode works as 'Absolute' in status of 'PIF Unlock' automatically.

AFT-S (0) [Sub; 0Eh D7 1 bit]

Data	Descriptions
0	Wide 400kHz
1	Narrow 100kHz

The range of the AFT-W read.

Over Mod (0) [Sub; 0Eh D5 1 bit]

Data	Descriptions
0	Off (recommended)
1	On

on/off the over modulation switch
The measure circuit against over modulation stops the APC in detecting the over modulation, in order to avoid folding the detected signal. It may cause, however, malfunction against the phase modulated RF signals. So evaluate carefully in using this function.

PLL-S (0) [Sub; 0Ch D6 1 bit]

Data	Descriptions
0	Normal (recommended)
1	speed-up (x2)

PLL Sensitivity. Set always '0; normal'

Buzz-R (0) [Sub; 0Eh D6 1 bit]

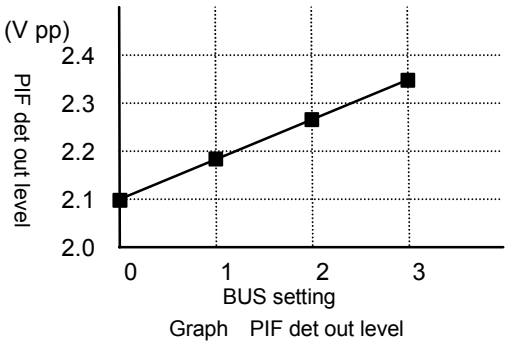
Data	Descriptions
0	On (recommended)
1	Off

Nyquist Buzz Reducer SW.

PIF Det lev (4) [Sub; 1Ah D5~D4 2 bits]

Data	Descriptions
0	Min
3	Max

PIF detected output level trimming



Graph PIF det out level

L-SECAM (0), L-AGC(0), FM Stop
[Sub; 12h D1,D0 2 bits]

D1	D0	Descriptions
0	0	not LSECAM, not FM stop
0	1	L-SECAM
1	1	L-SECAM & AGC speed up
1	0	FM Stop

{L-SECAM}
Selecting the IF mode to the L-system or not.
This mode is available only for the TB1262. This bit set to L-system as to;
- Turn the modulation polarity to positive
- Delay the AGC time constant (Peek AGC), with switching the IF AGC filter to the capacitor of DCNF pin (10uF) instead of IFAGC pin (0.47uF) .
- SIF AM demodulation (Split carrier only) with switching the SIF AGC filter to the capacitor of IFAGC pin (0.47uF) .

{L-SECAM AGC speed up}
Speed up the AGC response for channel search
{FM Stop}
Stopping the FM demodulator to use in NICAM demodulation.

S-Trap(100) [Sub; 0Dh D2-D4 3 bits]

Data	Descriptions
000	S-trap Off
001	fo tuning min
111	fo tuning max

Trap fo tuning and on/off switch. Need to set the tuning data for each sound system.

Strap-Q (00) [Sub; 22h D1-D0 2 bits]

Data	Descriptions
00	Q = 3
01	Q = 5
10	Q = 7 (recommended)
11	Q = 9

Sound trap Q control. Need to set the tuning data for each sound system.

Strap-GD (00) [Sub; 22h D1-D0 2 bits]

Data	Descriptions
00	off
01	60 ns
10	90 ns
11	120 ns

Sound trap Group delay control. Need to set the tuning data for each sound system.

L AGC-lim [Sub; 1Ah D6 1 bit]

Data	Descriptions
0	on
1	off

AGC limiter for L system. It works when set L system.

PIF PLL u [Sub; 22h D5 1 bit]

Data	Descriptions
0	normal
1	1/3

Reduce the u of the PIF PLL

S trap-HP LP (00) [Sub; 22h D7-D6 2 bits]

Data	Descriptions
00	off
01	1 dB (HPF)
10	- 3 dB (LPF)
11	- 2 dB (LPF)

Frequency response control. Need to set the tuning data for each sound system

S2-Q [Sub; 22h D4 1 bit]

Data	Descriptions
0	normal
1	fixed Q=3 for S2 trap

RFAGC-adj [Sub; 1Ah D7 1 bit]

Data	Descriptions
0	Normal
1	adjusting mode

RF AGC delay point adjusting mode. See ***.

[SIF]

SIF-Freq (00) [Sub; 0Eh D1-D2 2 bits]

Data	Descriptions
00	5.5MHz
01	6.0MHz
10	6.5MHz
11	4.5MHz

Set the SIF frequency for BPF
Set the SIF frequency for Trap filter
Select the SIF FM demodulator band
select the de-emphasis speed

SIF-574 (0) [Sub; 0Eh D0 1 bit]

Data	Descriptions
0	Others
1	5.74MHz

To use this bit, an external BPF of 5.74MHz is required

Au-G (0) [Sub; 0Eh D4 1 bit]

Data	Descriptions
0	927mVrms at 25kHz/DEV
1	500mVrms at 25kHz/DEV

Audio Gain Switch for M system

FM-band (0) [Sub; 0Eh D3 1 bit]

Data	Descriptions
0	Wide
1	Narrow

Select FM band width
It controls the bandwidth or pull-in range of the FM demodulator. This bit should be set depending on the region as to put wide/narrow bandwidth ceramic BPF.

SIF-in (0) [Sub; 0Dh D0 1 bit]

Data	Descriptions
0	Internal
1	External

Select 2nd SIF limiter input path. External BPF is required in selecting 'External'.

Spl/ Int (0) [Sub; 0Ch D7 1 bit]

Data	Descriptions
0	Split carrier
1	Inter carrier

Split carrier / Inter carrier selecting.

DCNF (1) [Sub; 20h D6 1 bit]

Data	Descriptions
0	Normal
1	Speed up

DCNF Speed. Need to set '1 speed up' at least 500ms after power on.

[YUV, RGB]

- Y1

Y-DL (001) [Sub; 10h D4-D6 3 bits]

Data	Descriptions
000	-120ns
001	-80ns
010	-40ns
011	+0ns
100	+400ns
101	+80ns
110	+120ns
111	+160ns

Y Delay time

C-Trap (0) [Sub; 06h D1 1 bit]

Data	Descriptions
0	Off; for Y / C Separated input
1	On; for internal C trap (-20dB or less)

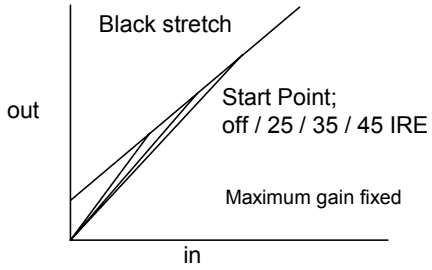
Chroma trap filter for Y input

- Y2

Black Stretch (00) [Sub; 11h D0-D1 2 bits]

Data	Descriptions
00	Off
01	25IRE
10	35IRE
11	45IRE

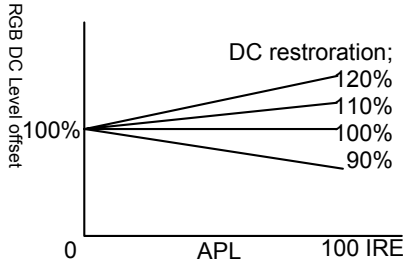
Set the black stretch start poin.



DC-Restor. (00) [Sub; 0Fh D2-D3 2 bits]

Data	Descriptions
00	120%
01	90%
10	100%
11	110%

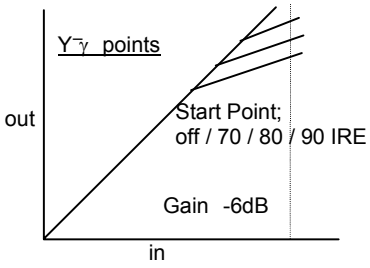
DC Restoration control



Y-γ point (00) [Sub; 0Fh D1-D0 2 bits]

Data	Descriptions
00	Off
01	90IRE
10	80IRE
11	70IRE

Set the point of non linear curve for Y signal



Sharpness (20) [Sub; 03h D5-D0 6 bits]

Data	Descriptions
00	-5.9dB
20	3.7dB
3F	5.0 dB

Sharpness control peak:4MHz

Shoot balance (00) [Sub; 11h D4-D2 3 bits]

Data	Descriptions
0	pre
7	over

shoot balance control

coring (0) [Sub; 06h D0 1 bit]

Data	Descriptions
0	On
1	Off

on/off the coring

WPS (0) [Sub; 00h D7 1 bit]

Data	Descriptions
0	On
1	Off

White Peak Suppresser Switch

VM-P (0) [Sub; 0Fh D6 1 bit]

Data	Descriptions
0	-120ns
1	-60ns

VSM output phase switching

VM-G (10) [Sub; 0Fh D4-D5 2 bits]

Data	Descriptions
00	- 10dB
01	- 3dB
10	0dB
11	Off

VSM output gain switching

- UV

TINT (40) [Sub; 04h D6-D0 7 bits]

Data	Descriptions
00	-35°
7F	35°

Tint control (Base Band TINT)

Black Adj. R-Y (4) [Sub; 13h D7-D4 4 bits]
Black Adj. B-Y (4) [Sub; 13h D3-D0 4 bits]

Data	Descriptions
0	-92 mV
F	+85mV 14mV/dev

UV Black level adjust

Color (40) [Sub; 02h D6-D0 7 bits]

Data	Descriptions
00	-20 dB or less
7F	6.5 dB

Color control

DEMO-P (00) [Sub; 03h D6-D7 2 bits]

Data	Descriptions
00	PAL1
01	PAL2
10	NTSC1 (105°)
11	NTSC2 (95°)

the relative phase / amplitude

The relative amplitude and phase are fixed as the following table. The setting are depend on only IICBUS command, so that a set micro computer should select DEMO-P mode on read out 'Color system' in changing the phase on received color system.

Table The relative amplitude and phase

BUS mode		00 PAL1	01 PAL2	10 NTSC 1	11 NTSC 2
Relative Amplitude	R-Y/B-Y	0.55	0.78	0.79	0.78
	G-Y/B-Y	0.33	0.33	0.28	0.33
Relative Phase	R-Y/B-Y	90	90	105	105
	G-Y/B-Y	240	240	246	237
CbCr out	Cr out	330mVpp / 90 deg			
	Cb out	330mVpp / 0 deg			

Col-γ (0) [Sub; 02h D7 1 bit]

Data	Descriptions
0	Off
1	On

on/off the color γ on R

- YUV

Contrast (00) [Sub; 00h D6-D0 7 bits]

Data	Descriptions
00	DB
7F	-24dB

contrast control

ABL-SP (00) [Sub; 00h D3-D2 2 bits]

Data	Descriptions
00	0V
01	-0.20 V
10	-0.30 V
11	-0.50 V

Selecting ABL start point

ABL-G (00) [Sub; 00h D1-D0 2 bits]

Data	Descriptions
00	-0.21 V
01	-0.38 V
10	-0.50 V
11	-0.67 V

ABL Gain control

Y-Mute (0) [Sub; 10h D7 1 bit]

Data	Descriptions
0	Off
1	On

on / off the Y MUTE

RGB

Bright (00) [Sub; 01h D6-D0 7 bits]

Data	Descriptions
00	1.75 V (Pedestal Level)
7F	3.25 V (Pedestal Level)

Brightness control

Brt on RGB (0) [Sub 01h D7 1 bit]

Data	Descriptions
0	RGB Brt on
1	RGB Brt off

Brightness on RGB input

Blue Back (0) [Sub; 06h D2 1 bit]

Data	Descriptions
0	Off
1	on (50 IRE)

Blue Back Switch

R Cutoff (00) [Sub; 07h D7-D0 8 bits]
G Cutoff (00) [Sub; 08h D7-D0 8 bits]
B Cutoff (00) [Sub; 09h D7-D0 8 bits]

Data	Descriptions
00	-0.65 V
FF	0.65 V

R,G,B Cutoff control

B Drive (40) [Sub; 0Ah D6-D0 7 bits]
R/G Drive (40) [Sub; 0Bh D6-D0 7 bits]

Data	Descriptions
00	-5.5 dB
7F	3.5 dB

R/G, B Drive control

Drive ref (0) [Sub; 0Ah D7 1 bit]

Data	Descriptions
0	R reference (G active)
1	G reference (R active)

Drive control reference

Blk (0) [Sub; 0Bh D7 1 bit]

Data	Descriptions
0	Blanking on (normal mode)
1	Blanking off

Hor. And Vert. blanking for RGB outputs

RGB-M (1) [Sub; 06h D7 1 bit]

Data	Descriptions
0	Off
1	On (-20 IRE)

on / off the RGB mute

[CHROMA STAGE]

Color System (000) [Sub; 06h D6-D4 3 bits]

Data	Descriptions
000	Auto 1 (for Eu, Asia,,,,) 443PAL , 358NTSC , SECAM , 443NTSC
001	Auto 2 (for S-America) 358NTSC , M-PAL , N-PAL
010	Fixed 358NTSC
011	Fixed 443NTSC
100	Fixed 443PAL
101	Fixed SECAM
110	Fixed M PAL
111	Fixed N PAL

Color system selection

N-Comb (0) [Sub; 05h D3 1 bit]

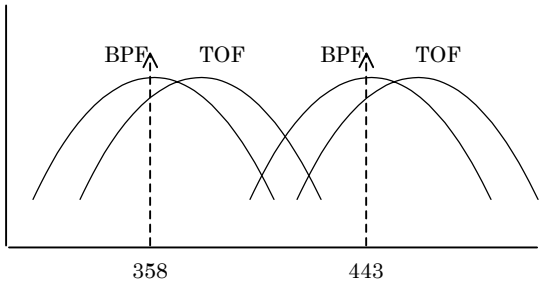
Data	Descriptions
0	Off
1	On

Comb filter for base-band color signal of NTSC

BPF/TOF (0) [Sub; 11h D5 1 bit]

Data	Descriptions
0	BPF
1	TOF

Select chroma BPF frequency response



P/N ID S (0) [Sub; 11h D6 1 bit]

Data	Descriptions
0	Normal
1	Low

PAL / NTSC ID sensitivity for digital comb filter

F ID (0) [Sub; 11h D7 1 bit]

Data	Descriptions
0	Normal
1	always color on on a fixed color systems

Forced killer off (This function dose not work on Auto 1 and Auto 2 mode)

SGP (00) [Sub; 12h D7-D6 2 bits]

Data	Descriptions
00	Auto
01	+500ns (delayed)
10	center
11	-500ns (forwarded)

SECAM Gate pulse phase

S- inhibit (0) [Sub; 12h D5 1 bit]

Data	Descriptions
0	Normal
1	SECAM inhibit

SECAM inhibit

S-ID S (0) [Sub; 12h D4 1 bit]

Data	Descriptions
0	Normal
1	Low

SECAM ID Sensitivity

S-ID M (0) [Sub; 12h D3 1 bit]

Data	Descriptions
0	H * recommended
1	H+V

SECAM ID mode

HP Boost (0) [Sub; 12h D2 1 bit]

Data	Descriptions
0	Normal
1	Boost

Enhance the higher side of SECAM Bell filter, to eliminate cross color

S-col-feint (0) [Sub; 0Fh D7 1 bit]

Data	Descriptions
0	on ; for RF in
1	off; for AV in

On / off the SECAM color feinting feature, which decrease color gain on RF level.

[DEF]

V Phase (00h) [Sub; 15h D4-D0 5 bits]

Data	Descriptions
0	(0H)
31	(31H)

Vertical Position control by delaying the V-ramp timing

H Phase (10h) [Sub; 14h D4-D0 5 bits]

Data	Descriptions
00	-3us
1F	3us

Horizontal Position control

V-Freq (000) [Sub; 15h D7-D5 3 bits]

Data	Descriptions
000	Auto
001	50 Hz
010	60 Hz
011	50Hz in no input
100	Forced 312.5 H , stopped V pull-in
101	Forced 262.5 H , stopped V pull-in
110	Forced 313 H , stopped V pull-in
111	Forced 263 H , stopped V pull-in

Vertical frequency pull-in mode selection

AFC Gain (00) [Sub; 18h D7-D6 2 bits]

Data	Descriptions
00	Normal
01	1 / 3 sensitivity
10	X 3 at V blanking duration
11	AFC OFF

AFC gain

Sync gate (0) [Sub; 14h D7 1 bit]

Data	Descriptions
0	Normal
1	Gated

F sync (0) [Sub; 14h D6 1 bit]

Data	Descriptions
0	Normal ; for input from RF
1	F sync ; for input from AV equipments

Forced sync

H STOP (0) [Sub; 1Ch D6 1 bit]

Data	Descriptions
0	Normal
1	& Y-mute & RGB mute; H STOP

H OUT stop

312/313 (0) [Sub; 14h D5 1 bit]

Data	Descriptions
0	Normal
1	TELETXT(312/313)

(This function makes V-scanning non-interlace for teletext)

V-AGC (1) [Sub; 1Bh D7 1 bit]

Data	Descriptions
0	Normal
1	Speed up (x3)

V Size (40h) [Sub; 16h D6-D0 7 bits]

Data	Descriptions
00	V Stop
01	-47 %
7F	47 %

Vertical size alignment / Vstop

V Linearity (4h) [Sub; 17h D7-D4 4 bits]

Data	Descriptions
0	-12 %
F	12 %

V linearity alignment

V cent. (10h) [Sub; 18h D5-D0 6 bits]

Data	Descriptions
0	-12 %
3F	12 %

V centering

V-S Corr (4h) [Sub; 17h D3-D0 4 bits]

Data	Descriptions
0	20 %
F	-12 %

V Ramp Ref. (0) [Sub; 16h D7 1 bit]

Data	Descriptions
0	External (YC Vcc)
1	Internal

Select the reference voltage

V.EHT (0h) [Sub; 1Eh D7-D5 3 bits]

Data	Descriptions
0	Min (0 %)
7	Max gain (-9 %)

Adjust the sensitivity for V

H Size (10) [Sub; 1Ch D5-D0 5 bits]

Data	Descriptions
00	700 uA
3F	0 uA (at top)

Adjust the H size by biasing the EW DC voltage

EW Para (40) [Sub; 1Bh D6-D0 7 bits]

Data	Descriptions
00	0 uA(p-p)
7F	440 uA(p-p)

Adjust the EW Parabola amplitude

EW Corner Top (10) [Sub; 1Eh D4-D0 5 bits]

Data	Descriptions
00	720 uA (-36%)
1F	160 uA (36%)

Adjust upper EW corner

EW Corner Bottom (19) [Sub; 1Fh D4-D0 5 bits]

Data	Descriptions
00	720 uA (-36%)
1F	160 uA (36%)

EW Trape (20) [Sub; 1Dh D5-D0 6 bits]

Data	Descriptions
00	- 6.5 %
1F	6.5 %

Adjusting EW trapezium

V BLK Bottom (0h) [Sub; 19h D6-D4 3 bits]

Data	Descriptions
0	Normal
7	80 %

Lower V Blanking for RGB outs

V BLK top (0h) [Sub; 19h D3-D0 4 bits]

Data	Descriptions
0	Normal
F	85 %

Upper V Blanking for RGB outs

H Side BLK (0) [Sub; 19h D7 1 bit]

Data	Descriptions
0	Off
1	on (92%)

H side Blanking

H bow (4) [Sub; 20h D2-D0 3 bits]

Data	Descriptions
0	)) - 1uS
7	((+ 1uS

H Bow curve correction

H Par (4) [Sub; 20h D5-D3 3 bits]

Data	Descriptions
0	\ \ -/+ 2 uS
7	/ / +/- 2 uS

H Parallelogram correction

H.EHT (0) [Sub; 1Fh D7-D5 3 bits]

Data	Descriptions
0	Min (0 %)
7	Max

Adjust the sensitivity for H EHT

[OTHERS]

noise det (4) [Sub; 1Ah D3-D0 4 bits]

Data	Descriptions
0	
F	

Noise det level setting

Dac 1 (0) [Sub; 1Ch D7 1 bit]
Dac 2 (0) [Sub; 1Dh D7 1 bit]
Dac 3 (0) [Sub; 20h D7 1 bit]

Data	Descriptions
0	High impedance
1	Low

TEST (00) [Sub; 21h D7-D0 8 bits]

Data	Descriptions
00	Normal
others	For testing IC

Leave these bits preset data ; 0000 0000 0

IO selection

switch [A]

Video sw (00) **[Sub; 05h D6-D5 2 bits]**

Y/mon out (0) **[Sub; 05h D0 1 bit]**

Data		Descriptions
Y/mon out	Video sw	
1	00	V1
	01	V2
	10	V3
	11	inhibit
0	* *	V1

V2 cannot select in using RGB>YUV mode
V3 is available only for QFP version

switch [B]

C in sw (0) **[Sub; 05h D4 1 bit]**

Data	Descriptions
0	Vsw out for CVBS in
1	C-in for Y/C in

switch [C]

Y+C sw (0) **[Sub; 04h D7 1 bit]**

Data	Descriptions
0	Through
1	Y+C

switch [D]

Y/mon out (0) **[Sub; 05h D0 1 bit]**

Data	Descriptions
0	Y out
1	Mon out

switch [E]

CbCr sw (0) **[Sub; 05h D2 1 bit]**

Video sw (00) **[Sub; 05h D6-D5 2 bits]**

Ys(CbCr) **Pin# 59**

Data			Descriptions
CbCr	Video	Ys	
0	*	Low	YUV 1
1	00/01	Low	YUB 2
1	10/11	Low	YUV 3
*	**	High	YUV 2

switch [F]

RGB->YUV (0) **[Sub; 06h D3 1 bit]**

Data	Descriptions
0	RGB in (RGB->YCbCR sw on)
1	YCbCr in

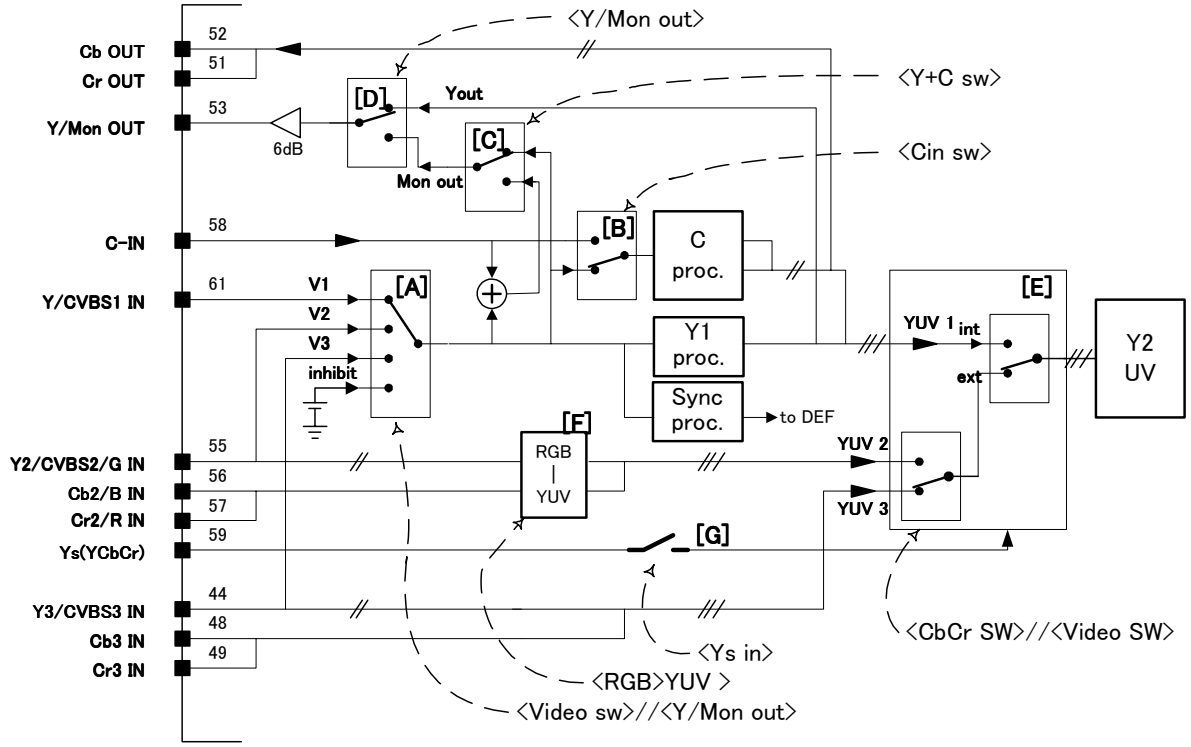
RGB->YCbCR sw

switch [G]

Ys in (0) **[Sub; 05h D1 1 bit]**

Data	Descriptions
0	Activate
1	Prohibited

Fig. TB1261F Switch box



READ MODE

! General warning
The read bus flags indicate that a certain signal is detected at the moment. But reliability of detection result is not so accurate if checking only one flag, that confirming several flags, which means similar result by each other, at the same time is recommended.

POR

Data	Descriptions
0	After the first bus accessed, always 0
1	A reset condition occurred just before

IF Lock

Data	Descriptions
0	IF PLL lock detection, locked out
1	Locked in

This bit shows the locked/unlocked status of PIF PLL.

H Lock

Data	Descriptions
0	Horizontal sync lock detection, Lock out
1	Lock in

The 'H Lock' indicates whether H sync pulses are within the certain windows which generated by H counter.

Color System

Data	Descriptions
0 0 0	No color
0 0 1	4.43 PAL
0 1 0	M-PAL
0 1 1	N-PAL
1 0 0	358 NTSC
1 0 1	443 NTSC
1 1 0	SECAM
1 1 1	N/A

AFT-W

Data	Descriptions
0	Out of the AFT window
1	In the AFT window

AFT-C

Data	Descriptions
0	Upper frequency
1	Lower frequency

V Freq

Data	Descriptions
0	50 Hz
1	60 Hz

Vertical oscillation frequency.

V-STD

Data	Descriptions
0	Non standard vertical frequency
1	Standard vertical frequency

Vertical synchronization pulse is within the window of 0.625H from 312.5/262.5, or not.

Noise

Data	Descriptions
0	Lower noise level than reference voltage
1	Larger

It shows the noise level on H sync pulse. The slice level is set by 'Noise det' of IICBUS.
The detected result is hold one H period after every H sync periods. Decide the result with the majority of several readings.

RF AGC 1

Data	Descriptions
0	High
1	Low

This bit can show the DC voltage for RF AGC pin.

C-in DC

Data	Descriptions
0	Cin voltage not GND
1	GND

The DC voltage on C-in terminal. It is to detect S-jack switch status with external circuit.

Sound dev

Data	Descriptions
0	within the range (of 300%)
1	out of range

'Sound dev' detects over deviation of the SIF, which set to '1' in detecting the frequency offset of more than 157kHz, or 300%.
The detected result is hold until the first 'read' is commanded by means of S/R latch, and reset to '0' after that. Decide the result with the majority of several readings.

Station det

Data	Descriptions
0	No-Signal
1	Tuned

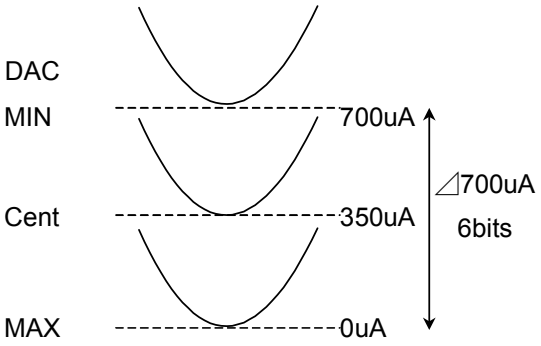
This bit shows the status whether the FM PLL is locked or unlocked. However it may not work so accurate for field signal, that use other parameters to control sound system.

P VCO err

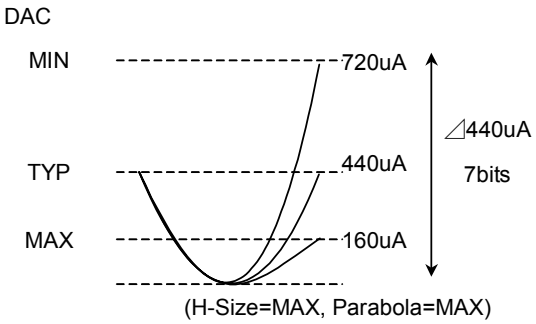
Data	Descriptions
0	Ok
1	error detect

This bit is only for evaluation.

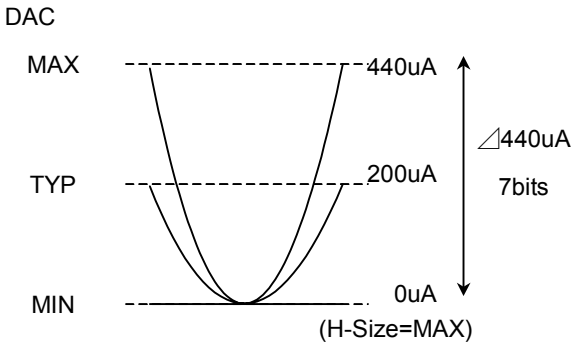
EW control



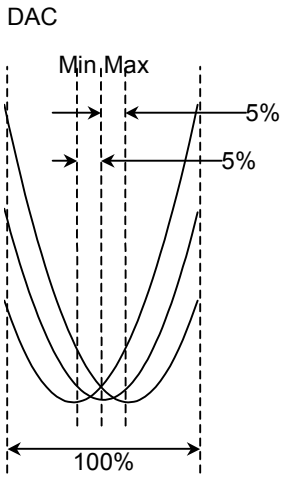
H Size



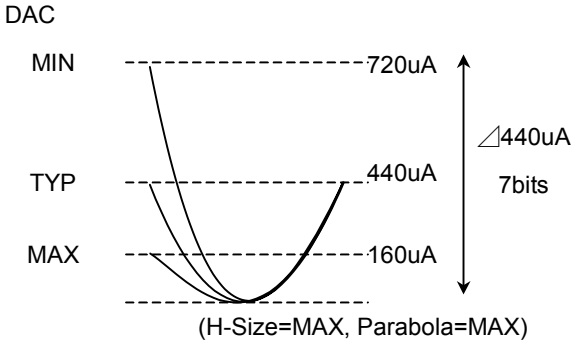
Coner (bottom)



Parabola



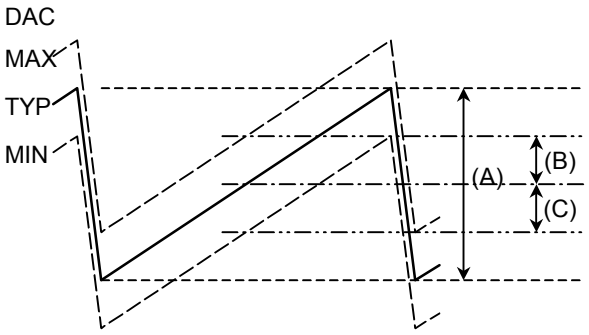
Trapezium



Coner (Top)

Vertical control

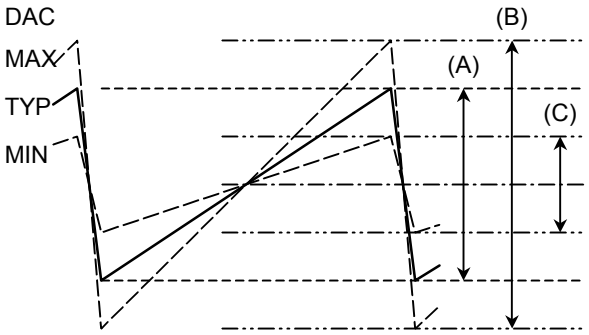
V-centering



-/+ 12% 6bits

V-CENT(+) = B / A x 100%
V-CENT(-) = C / A x 100%

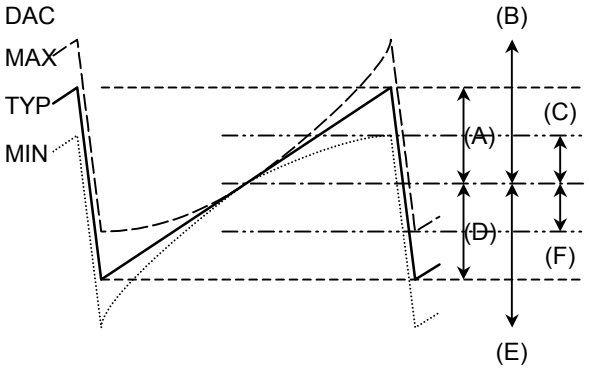
V-Size



-/+ 47% 7 bits

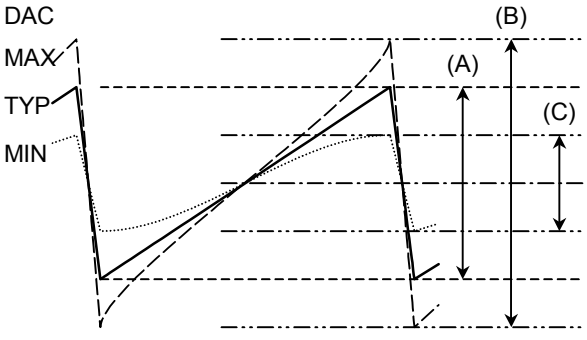
V-Size(max) = (B – A) / A x 100%
V-Size(min) = (C – A) / A x 100%

V-Linearity



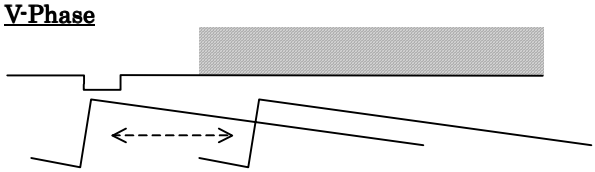
-/+ 12% 4 bits
V-Lin = {(B – C) + (E - F)} / {2 x (A + D)} x 100%

V-S



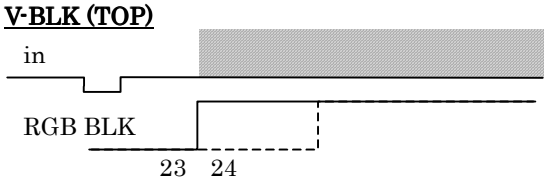
7 bits
V-S(+) = (A – B) / A x 100% +20%
V-S(-) = (A – C) / A x 100% -12%

V-Phase



00h---------1Fh (5bit)
0H ---------31H (V ramp phase)

V-BLK (TOP)

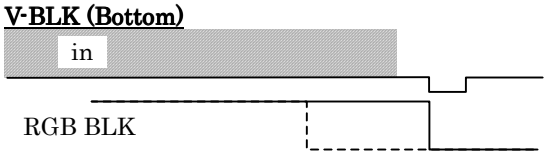


Blanking

	0	1	2	3	4	5	6	7
50Hz	23H	25H	27H	29H	31H	33H	35H	37H
	335H	337H	339H	341H	343H	345H	347H	349H
60Hz	22H	24H	26H	28H	30H	32H	34H	36H
	284H	286H	288H	290H	292H	294H	296H	298H

	8	9	A	B	C	D	E	F
50Hz	39H	41H	43H	45H	47H	49H	51H	53H
	351H	353H	355H	357H	359H	361H	363H	365H
60Hz	38H	40H	42H	44H	46H	48H	50H	52H
	300H	302H	304H	306H	308H	310H	312H	314H

V-BLK (Bottom)



	0	1	2	3	4	5	6	7
50Hz	312H	306	302	298	294	290	286	282
	625H	621	617	613	609	605	601	597
60Hz	263H	259	255	251	247	243	239	235
	1H	522	518	514	510	506	502	498

10, Electrical Characteristics

(unless otherwise specified, Ta = 25°C, V_{CC} = 5.0 and 9.0 V for each appropriate)

DC CHARACTERISTIC

CURRENT CONSUMPTION

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
IF Vcc (5V)	IccIF5		Supply 5.0 V	24	30	38	mA
IF Vcc (9V)	IccIF9		Supply 9.0 V	10	13	16.5	mA
RGB VCC (9V)	IccRGB9		Supply 9.0 V	10.5	14	17.5	mA
H VCC (9V)	IccHVcc		Supply 9.0 V	13.5	18	22.5	mA
DIGITAL VDD (around 3.3V)	Idd		Supply 9.0 V via 270 ohms	16	20	24	mA
Y/C VCC (5V)	IccYC5		Supply 5.0 V	58	78	98	mA

PIN VOLTAGE

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
4	FM Filter	V4			2.5	4.5	6.5	V
6	X'TAL	V6			2.6	3.6	4.6	V
7	APC FILTER	V7			2.0	3.0	4.0	V
9	SECAM Filter	V9			1.6	2.6	3.6	V
18	VSM OUT	V18			2.2	3.2	4.2	V
20	YS/YM SW	V20				0.0	0.25	V
21	EXT. R IN	V21			2.0	3.3	4.5	V
22	EXT. G IN	V22			2.0	3.3	4.5	V
23	EXT. B IN	V23			2.0	3.3	4.5	V
31	ABCL IN	V31			4.0	6.0	7.0	V
34	CW OUT	V34			2.0	2.7	3.5	V
43	H AFC FILTER	V43			6.0	7.0	8.0	V
44	Y3/CVBS3 in	V44		at sync tip in non-selected at 35%of sync in selected		1.8 2.2		V
47	V OUT	V47		Average DC voltage	4.5	5.0	5.5	V
48	Cr3 in	V48			2.2	3.2	4.2	V
49	Cb3 in	V49			2.2	3.2	4.2	V
51	Cr OUT	V51			1.5	2.5	3.5	V
52	Cb OUT	V52			1.5	2.5	3.5	V
54	BLACK DET	V54			1.0	1.6	3.5	V
55	Y2/CVBS2/G in	V55		at sync tip in non-selected at 35%of sync in selected		1.8 2.2		V
56	Cb2/B in	V56			2.0	3.0	4.0	V

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
57	Cr2/R in	V57			2.0	3.0	4.0	V
58	C1 in	V58			1.5	2.5	3.5	V
59	YS	V59				0	0.25	V
61	Y1/CVBS1 in	V61		at sync tip in non-selected at 35%of sync in selected		1.8 2.2		V
62	DC RESTORE	V62		on input 50IRE Y signal	1.5	2.5	3.5	V
65	De-Emp/Mon OUT	V65			1	4.1	8	V
69	LOOP FILTER	V69			1.2	2.2	3.2	V
71	SIF OUT	V71			1.0	2.0	3.0	V
73	SIF in / H corr.	V73				3.0		V
75	SIF in(1)	V75			1.0	2.0	3.0	V
76	SIF in(2)	V76			1.0	2.0	3.0	V
79	PIF in(1)	V79			1.0	2.0	3.0	V
80	PIF in(2)	V80			1.0	2.0	3.0	V

AC CHARACTERISTIC

PIF STAGE

ITEM		SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
PIF STAGE								
Video output signal amplitude	Nega	V Det (p)n	in; #79,80	P1	2.0	2.2	2.4	V
	Posi	V Det (p)p	out; #68		2.0	2.2	2.4	
PIF input sensitivity		vin min(p)		P2	-	42	47	dB(uV)
PIF maximum input signal		vin max(p)			100	105	-	
PIF gain control range		RAGC(p)			53	63	-	dB
Synchronous signal level	Nega	Vsync n		P3	2.6	2.8	3.0	V
	Posi	Vsync p			2.6	2.8	3.0	
Differential gain		DG		P4	-	2	5	%
Differential phase		DP			-	2	5	deg
Video bandwidth (-3dB)		fDet(p)		P5	6	8	-	MHz
Video output S/N		S/N(p)		P6	54	60	-	dB
Inter Modulation		I M		P7	34	40	-	dB
PIF input resistance (*)		Zin R(p)	in; #79,80	P8	-	3	-	kΩ
PIF input capacitance (*)		Zin C(p)	out; #79,80		-		-	pF
RF AGC output voltage	max	VAGC max	in; #79,80	P9		9.0-	-	V
	min	VAGC min	out; #78		-	-	0.3	
RF AGC delay point	min	v Dly min		P10	-	70	80	dB(uV)
	max	v Dly max			100	110	-	
Capture range of the PLL	Upper	fpH(p)	in; #79,80	P11	1.4	1.7	-	MHz
	Lower	fpL(p)	out; #68		-	-1.7	-1.4	
Hold range of the PLL	Upper	fhH(p)			1.4	1.7	-	
	Lower	fhL(p)			-	-1.7	-1.4	
Control steepness of the VCO		β	in; #79,80 out; #69	P12	-	3.0	-	MHz/V
AFT Center turn Frequency		fAFTC	in; #79,80	P13		0		MHz
AFT window narrow		fAFTW(n)L	out; BUS (r)	P14		-50		kHz
		fAFTW(n)H				50		
	Wide	fAFTW(w)L				-200		
		fAFTW(w)H				200		
S-trap reduction			in; #79,80 out; #68	P15		-30	-24	

ITEM	SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
1ST SIF STAGE							
SIF maximum input signal	vin max(s)1	in; #75,76	S1	100	110	-	dB(uV)
SIF minimum input signal	vin min(s)1	in(uc); #79,80		-	40	50	dB(uV)
SIF gain control range	RAGC(s)1	out; #71		50	70	-	dB
2nd SIF output level	vSIF1			100	103	106	dB(uV)
SIF input resistance(*)	Zin R(s)	in; #75,76	S2	-	10	-	kΩ
SIF input capacitance(*)	Zin C(s)	out; #75,76		-	5	-	pF
AM sound							
AM input sensitivity	vin minAM	in; #75,76	S3	-	40	50	dB(uV)
AM maximum input level	vin maxAM	in(uc); #79,80		100	110	-	
2nd SIF output level (L)	vSIF L			100	103	106	dB(uV)
AF output signal amplitude (AM)	vDet(s)AM	out; #65	S4	375	500	665	mVrms
AF output S/N (AM)	S/N(s)AM			48	54	-	dB
Total harmonics distortion (AM)	THDAM			-	0.7	3.0	%
2nd SIF stage							
AF output signal amplitude(5.5MHz)	vDet(s)5.5M	in; 73		695	927	1236	mVrms
AF output S/N (5.5MHz)	S/Ns)5.5M	out; 71	S5	55	60	-	dB
Total harmonics distortion (5.5MHz)	THD5.5M			-	0.3	1.0	%
AF output signal amplitude (6.0MHz)	vDet(s)6.0M			695	927	1236	mVrms
AF output S/N (6.0MHz)	S/N(s)6.0M		S6	55	60	-	dB
Total harmonics distortion (6.0MHz)	THD6.0M			-	0.3	1.0	%
AF output signal amplitude (6.5MHz)	vDet(s)6.5M			695	927	1236	mVrms
AF output S/N (6.5MHz)	S/N(s)6.5M		S7	55	60	-	dB
Total harmonics distortion (6.5MHz)	THD6.5M			-	0.3	1.0	%
AF output signal amplitude (4.5MHz Low)	vDet(s)4.5M L		S8	350	500	710	mVrms
AF output S/N (4.5MHz Low)	S/N(s)4.5ML			52	58	-	dB
Total harmonics distortion (4.5MHz Low)	THD4.5ML			-	0.3	1.0	%
AF output signal amplitude (4.5MHz High)	vDet(s)4.5M H			649	927	1324	mVrms
AF output S/N (4.5MHz High)	S/N(s)4.5M H		S9	52	58	-	dB
Total harmonics distortion (4.5MHz High)	THD4.5MH			-	0.3	1.0	%
Limiting sensitivity (4.5MHz Low)	lim(s)4.5ML				40	45	
(4.5MHz High)	im(s)4.5MH			-	45	50	
(5.5MHz)	lim(s)5.5M		S10	-	40	45	dB(uV)
(6.0MHz)	lim(s)6.0M			-	40	45	
(6.5MHz)	lim(s)6.5M			-	45	50	
AM reduction ratio (4.5MHz High)	AMR4.5MH			50	55	-	dB
(4.5MHz Low)	AMR 4.5ML			50	55	-	
(5.5MHz)	AMR5.5M		S11	50	60	-	dB
(6.0MHz)	AMR6.0M			50	60	-	dB
(6.5MHz)	AMR6.5M			50	60	-	
Demodulation band width of the FM demodulator (Upper 1)	fpH(s)1		S12		130	-	kHz
Demodulation band width of the FM demodulator (Lower1)	fpL(s)1			-	-130		
VIDEO STAGE							
Y Input Dynamic Range Y1 in		in; #61	V1	0.9	1.0	—	V(p-p)
Y Delay time (PAL NTSC)	t_{YDELP}	out; #53	V2	350	440	530	ns
(SECAM)	t_{YDELS}			570	680	790	
(000)	$t_{YDEL-120}$			-80	-120	-160	ns
(111)	$t_{YDEL160}$			120	160	200	
1step	$t_{YDEL\ step}$			30	40	50	
Chroma Trap Gain 3.58MHz	$G_{TRAP}358$		V3	—	-27	-23	dB
4.43MHz	$G_{TRAP}443$			—	-27	-23	
Y gain (Y)	G Y1		V4	5.0	5.5	6.0	dB
Y frequency response	FR_Y		V5	5.5	8.0	—	MHz
Mon out gain (MON) (Y1/CVBS1)	G_{TV1}	in;#61 / out;#53		5.5	6	6.5	dB
(Y2/CVBS2)	G_{TV2}	in;#55 / out;#53	V6	5.5	6	6.5	dB
(Y3/CVBS3)	G_{TV3}	in;#44 / out;#53		5.5	6	6.5	dB
Y frequency response	FR_Y	in;#61 / out;#53	V7	5.5	8.0	—	MHz

ITEM	SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
V switch cross-talk (CVBS1-CVBS2)	CT_{V1_2}	in; #61, 55 or 44 out; #53	V8			-55	dB
(CVBS1-CVBS3)	CT_{CVBS1_3}					-55	
(CVBS2-CVBS1)	CT_{CVBS2_1}					-55	
(CVBS2-CVBS3)	CT_{CVBS2_3}					-55	
(CVBS3-CVBS1)	CT_{CVBS3_1}					-55	
(CVBS3-CVBS2)	CT_{CVBS3_2}					-55	
RGB input D-range				0.9	1.0	−	V (p-p)
Ys Mode Switching Level				0.5	0.7	0.9	
CHROMA STAGE							
ACC Characteristic	V_{ACCL}		C1	−	25	40	mV(p-p)
	V_{ACCH}			600	1000	−	
TOF Characteristic.(4.43) fo	F_{0T443}	(*) test mode	C2	4.87	5.07	5.27	MHz
Q	Q_{T443}			1.6	1.8	2.0	
BPF Characteristic. (4.43) fo	F_{0B443}			4.26	4.46	4.66	MHz
Q	Q_{B443}			1.6	1.8	2.0	
TOF Characteristic. (3.58) fo	F_{0T358}			4.05	4.25	4.46	MHz
Q	Q_{T358}			1.6	1.8	2.0	
BPF Characteristic. (3.58) fo	F_{0B358}			3.43	3.63	3.83	MHz
Q	Q_{B358}			1.6	1.8	2.0	
C Delay Time (PAL)	t_{CDELN}		C3	595	700	805	ns
(NTSC)	t_{CDELP}			510	600	690	
(SECAM)	t_{CDELS}			765	900	1035	
APC Pull- In Range (4.43MHz)	F_{4APCP+}	in; #58 uc_in ; #61 out; #51, 52	C4	350	450	−	Hz
	F_{4APCP-}			-1500	-600	-450	
APC Hold Range (4.43MHz)	F_{4APCH+}			350	450	−	
	F_{4APCH-}			-2000	-600	-450	
APC Pull-In Range (3.58MHz)	F_{3APCP+}			350	450	−	
	F_{3APCP-}			-1500	-600	-450	
APC Hold Range (3.58MHz)	F_{3APCH+}			350	450	−	
	F_{3APCH-}			-2000	-600	-450	
APC Control Sensitivity (4.43MHz)	β_{443}	in:#58 (#61) out; #7	C5	0.6	1.1	1.6	Hz/mV
APC Control Sensitivity (3.58MHz)	β_{358}			0.4	0.9	1.4	
PAL ID Sensitivity (Normal Mode)	V_{PIDON}	in; #58 in ; #61 out; #51, 52	C6	0.8	1.6	3.2	mV(p-p)
	V_{PIDOFF}			0.9	1.8	3.6	
PAL ID Sensitivity (Low Mode)	V_{PIDLON}			1.2	2.5	5.0	
	$V_{PIDLOFF}$			1.6	3.2	6.4	
NTSC ID Sensitivity (Normal Mode)	V_{NIDON}			0.8	1.6	3.2	
	V_{NIDOFF}			1.0	2.0	4.0	
NTSC ID Sensitivity (Low Mode)	V_{NIDLON}			1.4	2.8	5.6	
	$V_{NIDLOFF}$			1.8	3.6	7.2	
black adjustment (internal)	$V_{B\ INT\ MAX}$		C7	27.5	35.5	43.5	mV
	$V_{R\ INT\ MAX}$			18.0	24.0	30.0	mV
	$V_{B\ INT\ MIN}$			-39.5	-31.5	-30.7	mV
	$V_{R\ INT\ MIN}$			-28.5	-22.5	-16.5	mV
Black adjustment sensitivity (internal)	$\Delta V_{B\ INT}$			3.5	4.5	5.5	mV
	$\Delta V_{R\ INT}$			2.1	3.1	4.1	mV
black adjustment (external)	$V_{B\ EXT\ MAX}$			345	425	505	mV
	$V_{R\ EXT\ MAX}$			190	230	290	mV
	$V_{B\ EXT\ MIN}$			-585	-505	-425	mV
	$V_{R\ EXT\ MIN}$			-355	-295	-235	mV
Black adjustment sensitivity (external)	$\Delta V_{B\ EXT}$			49	62	75	mV
	$\Delta V_{R\ EXT}$			27	35	43	mV
CWOUT Amplitude 4.43M	V_{CW}	color bar (75%)	C8	0.40	0.55	0.70	V(p-p)
3.58M				0.60	0.75	0.90	
CbCr out amplitude Cr PAL				0.38	0.53	0.68	V(p-p)
Cb PAL				0.38	0.55	0.68	
Cr NTSC				0.38	0.55	0.68	
Cb NTSC				0.38	0.57	0.68	
SECAM STAGE							
SECAM CbCr Output Amplitude	VBS	in:#58 (Color bar 75%)	C9	0.37	0.52	0.67	V(p-p)
	VRS			0.39	0.54	0.69	
SECAM CbCr out Relative Amplitude	R/B-S		C10	0.90	1.05	1.20	

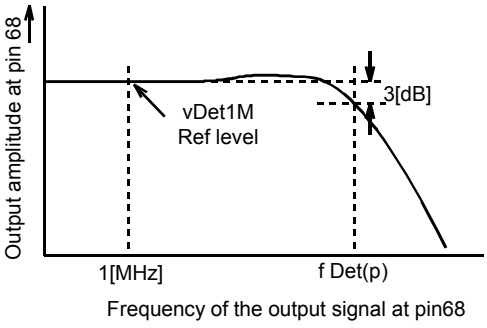
ITEM		SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
SECAM CbCr out S/N Ratio		SNB-S	uc_in ; #61	C11	-	-44.	-28	dB
		SBR-S	out; #51, 52		-	-45.	-32	
SECAM Linearity		LinB		C12	83	100	117	%
		LinR			83	90	117	%
SECAM Rising-Fall Time		trfB		C13	-	0.70	1.5	us
		trfR			-	0.90	1.5	
SECAM ID Sensitivity (Normal Mode)	H	V_{SIDHON}		C14	1.2	2.5	5.0	mV(p-p)
		$V_{SIDHOFF}$			1.4	2.8	5.6	mV(p-p)
	H+V	$V_{SIDHVON}$			0.4	0.8	1.6	mV(p-p)
		$V_{SIDHVOFF}$			0.9	1.8	3.6	mV(p-p)
SECAM ID Sensitivity (Low Mode)	H	$V_{SIDLHON}$			1.3	2.6	5.2	mV(p-p)
		$V_{SIDLHOFF}$			1.6	3.2	6.4	mV(p-p)
	H+V	$V_{SIDLHVON}$			0.4	0.8	1.6	mV(p-p)
		$V_{SIDLHVOFF}$			1.0	2.0	4.0	mV(p-p)
YUV (Y)								
Brightness Control Characteristics		V_{BRTMAX}	in; #61	Y1	2.95	3.40	3.80	V (dc)
		V_{BRTCEN}	out; #14(B)		1.95	2.40	2.85	
		V_{BRTMIN}			0.95	1.40	1.85	
Brightness Control resolution		ΔV_{BRT}			13.2	15.3	17.3	mV(/step)
Contrast Control for Y		G_{UCYMAX}		Y2	13.0	14.7	16.3	dB
		G_{UCYCEN}			8.2	9.8	11.4	
		G_{UCYMIN}			-4.4	-2.8	-1.2	
Sharpness Control		G_{SHMAX}		Y3	6.0	9.0	12.0	dB
		G_{SHCEN}			3.5	4.5	5.5	
		G_{SHMIN}			-16.0	-13.0	-10.0	
Sharpness Peaking Frequency		F_{SHP}		Y4	2.7	3.7	4.7	MHz
Sharpness Coring		G_{COR}			-0.9	-0.7	-0.5	dB
Y γ correction start point		$V_{Y\gamma\ 70}$		Y5	67	70	73	(IRE)
		$V_{Y\gamma\ 80}$			74	77	80	
		$V_{Y\gamma\ 90}$			82	85	88	
Y γ correction curve		$G_{Y\gamma}$			-6	-5	-4	dB
Black stretch AMP Gain		G_{BLEX}		Y6	1.15	1.3	1.55	
Black stretch Start Point		$V_{BLEX\ 25IRE}$			21	25	29	V
		$V_{BLEX\ 35IRE}$			30	34	38	
		$V_{BLEX\ 45IRE}$			39	43	47	
DC restoration gain		$V_{dcrest90}$		Y7	85	90	95	(IRE)
		$V_{dcrest110}$			103	108	113	
		$V_{dcrest120}$			110	115	120	
		$V_{dcrest\ step}$			5	8	11	
WPS Level		V_{WPS}		Y8	3.94	4.24	4.54	V(p)
VSM Peak Frequency		F_{VSM}	in; #61	Y9	2.5	3.5	4.5	MHz
VSM Gain	(VM-G = 0dB)	$G_{VSM\ 0}$	out; #18	Y10	-0.7	0.50	1.70	dB
	(VM-G = -3dB)	G_{VSM-3}			2.7	4	5.	
	(VM-G = -10dB)	G_{VSM-10}			8.	9.	10.5	
	(VM-G = off)	$G_{VSM\ OFF}$			-	- 22.5	-18.5	
VSM Phase	2T Pulse (0)	$T_{VM2T\ (0)}$		Y11	-190	-150	-110	ns
	2T Pulse (1)	$T_{VM2T\ (1)}$			-120	-90	-60	
	BUS (1)−(0)	T_{VMBUS}			45	60	75	
VSM Mute Threshold Level on Ys		V_{VMMBLK}		V18	0.5	0.7	0.9	V
YUV (UV)								
TINT control range	MAX	$\Delta\theta_{MAX}$	in; #58	UV1	28	35	43	deg
	MIN	$\Delta\theta_{MIN}$	uc_in ; #61		-28	-35	-43	
Color Control	MAX	G_{COLMAX}	out; #12, 13, 14	UV2	4.7	6.2	7.7	dB
	MIN	G_{COLMIN}			—	—	-25	
Contrast Control for UV	Min	G_{UCCMIN}		UV3	-15.0	-13.0	-11.0	±2dB
	Center	G_{UCCCEN}			—	0	—	
	Max	G_{UCCMAX}			3.0	5.00	7.0	±2dB
		G_{UCC}			14.5	18.00	21.5	±3.5dB
Relative Amplitude (PAL1)	R/B	$V_{P1R/B}$		UV4	0.45	0.55	0.65	
	G/B	$V_{P1G/B}$			0.27	0.33	0.39	

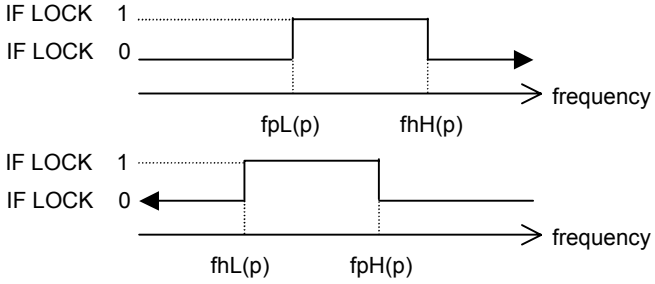
ITEM		SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
Relative Amplitude (PAL2)	R/B	$V_{P2R/B}$			0.68	0.78	0.88	
	G/B	$V_{P2G/B}$			0.27	0.33	0.39	
Relative Amplitude (NTSC1)	R/B	$V_{N1R/B}$			0.69	0.79	0.89	
	G/B	$V_{N1G/B}$			0.22	0.28	0.34	
Relative Amplitude (NTSC2)	R/B	$V_{N2R/B}$			0.68	0.78	0.88	
	G/B	$V_{N2G/B}$			0.27	0.33	0.39	
Relative Phase (PAL1)	R-B	θ_{P1R-B}		UV5	85	90	95	deg
	G-B	θ_{P1G-B}			235	240	245	
Relative Phase (PAL2)	R-B	θ_{P2R-B}			85	90	95	
	G-B	θ_{P2G-B}			235	240	245	
Relative Phase (NTSC1)	R-B	θ_{N1R-B}			100	105	110	
	G-B	θ_{N1G-B}			241	246	251	
Relative Phase (NTSC2)	R-B	θ_{N2R-B}			99	104	109	
	G-B	θ_{N2G-B}			232	237	242	
Half Tone reduction. for UV		G_{HTC}		UV6	-7	-6	-5	dB
Half Tone reduction for Y		G_{HTY}		UV7	-7	-6	-5	dB
RGB STAGE								
V-BLK Pulse Output Level		V_{VBLK}	in; #61	T1	0.1	0.6	1.1	V(p)
H-BLK Pulse Output Level		V_{HBLK}	out; #12		0.1	0.6	1.1	
RGB Output Black Level (0IRE DC)		V_{BLACK}		T2	2.25	2.5	2.75	V
RGB Output White Level(100IRE AC)		V_{WHITE}		T3	3.3	3.7	4.1	V(p)
Cut-Off Voltage Variable Range		V_{CUT+}		T4	0.6	0.65	0.7	V
		V_{CUT-}			-0.7	-0.65	-0.6	V
Drive Control Variable Range		G_{DR+}		T5	3.0	4.0	5.0	dB
		G_{DR-}			-7.5-	-6.5	-5.5	dB
ABCL Control Voltage Range		V_{ABCLH}		T6	5.6	5.9	6.2	V
		V_{ABCLL}			4.2	4.5	4.8	V
ACL Gain		G_{ACL}			-19.5	-17.5	-15.5	dB
ABL Point		V_{ABLP1}		T7	-0.1	0	0.1	V
		V_{ABLP2}			-0.26	-0.16	-0.06	
		V_{ABLP3}			-0.33	-0.23	-0.13	
		V_{ABLP4}			-0.36	-0.26	-0.16	
ABL Gain		V_{ABLG1}		T8	-0.32	-0.22	-0.12	V
		V_{ABLG2}			-0.45	-0.35	-0.25	
		V_{ABLG3}			-0.62	-0.52	-0.42	
		V_{ABLG4}			-0.10	0	+0.10	
Analog RGB Gain			in; #20,21,22,23		11.40	12.20	13.00	dB
Analog RGB reduction on Ym			out; #12, 13, 14			-6		
Analog RGB Dynamic Range		DR_{TX}		T9	0.7	1.0	-	V(p-p)
Analog RGB Brightness Control Characteristic	MAX.	$V_{TXBRMAX}$		T11	2.9	3.3	3.7	V
	CEN.	VT_{XBRCEN}			1.9	2.3	2.7	V
	MIN.	$V_{TXBRMIN}$			0.9	1.3	1.7	V
YsYm Mode Switching Level		V_{YSANA}		T12	0.52	0.72	0.92	V
		V_{YSBLK}			1.82	2.02	2.22	
Analog RGB Mode Transfer Characteristic		τR_{YS}		T13	—	40	100	ns
		tPR_{YS}			—	40	100	
		τF_{YS}			—	40	100	
		tPF_{YS}			—	40	100	
Cross Talk from Analog RGB toTV		CT_{TX-TV}		T14	—	-55	-40	dB
Cross Talk from TV to Analog RGB		CT_{TV-TX}		T15	—	-46	-40	dB
Analog RGB / RGB Output Voltage Axes Difference		ΔV_{R-G}		T17	-50	-	50	mV
		ΔV_{G-B}			-50	-	50	
		ΔV_{B-R}			-50	-	50	
RGB Mute DC level		V_{RGBMR}		T18	1.7	1.9	2.1	V
Blue Back level		V_{BB}			3.84	4.14	4.44	V
DEF STAGE								
AFC Inactive Period	50Hz	$T_{50AFCOFF}$		D1	—	309-7	—	(H)
	60Hz	$T_{60AFCOFF}$			—	262-10	—	
H-OUT Start Voltage		V_{HON}		D2	4.4	4.7	5.0	V
H-OUT Pulse Duty		W_{HOUT}		D3	38.5	40.5	42.5	%
H-OUT Freq. On AFC Stop Mode		$F_{HAFCOFF}$		D4	15.38	15.39	15.40	kHz
Horizontal Free-Run Frequency	50Hz	F_{H50FR}		D5	15.475	15.625	15.775	kHz

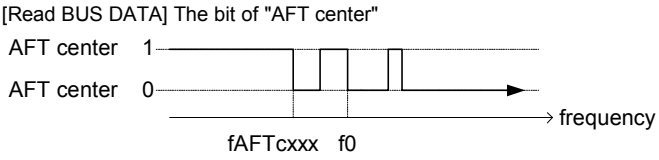
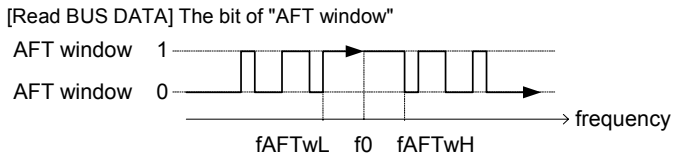
ITEM		SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
	60Hz	F_{H60FR}			15.585	15.734	15.885	kHz
Horizontal Freq. Variable Range	MAX.	F_{HMAX}		D6	16.200	16.400	16.600	kHz
	MIN.	F_{HMIN}			14.600	14.900	15.200	
Horizontal Freq. Control Sensitivity		β_{HAFC}		D7	2.4	2.9	3.4	Hz/mV
Horizontal Pull-In Range		F_{HPH}		D8	500	–	–	Hz
		F_{HPL}			500	–	–	
H-OUT Voltage		V_{HOUTH}		D9	4.2	4.6	5.0	V
		V_{HOUT}			–	0.15	0.30	
Horizontal Freq. Dependence on Vcc		ΔF_{HVCC}		D10	-20	0	20	Hz/V
FBP Phase		PH_{FBP}		D11	2.7	3.2	3.7	us
H-Sync. Phase		PH_{HSYNC}			0.2	0.3	0.4	
Horizontal Position Variable Range		ΔPH_{HPOS}		D12	6.3	6.8	7.3	us
H correction control range	(+)	ΔPH_{HCOR+}			1.0	1.2	1.4	us
	(-)	ΔPH_{HCOR-}			-1.4	-1.2	-1.0	us
AFC-2 Pulse Threshold Level		V_{AFC2}		D13	3.2	3.5	3.8	V
H-BLK Pulse Threshold Level		V_{HBLK}		D14	0.8	1.3	1.6	V
Wide H blank ratio 50Hz Left side		$\Delta W_{WHBLK50L}$			91	92	93	%
50Hz Right side		$\Delta W_{WHBLK50R}$			88	89	90	%
60Hz Left side		$\Delta W_{WHBLK60L}$			91	92	93	%
60Hz Right side		$\Delta W_{WHBLK60R}$			91.5	92.5	93.5	%
BLACK Peak Det. Stop Period (H)		PHBPDET		D15	8.5	9.0	9.5	us
		WBPDET			14.5	15.0	15.5	
Gate Pulse Start Phase		PH_{GP}		D16	2.8	3.0	3.2	us
Gate Pulse Width		W_{GP}			2.0	2.2	2.4	
Vertical Free-Run Frequency	$Auto_{50}$	$F_{VAUFR50}$		D18	45	50	55	Hz
	$Auto_{60}$	$F_{VAUFR60}$			55	60	65	
	50Hz	F_{V50FR}			45	50	55	
	60Hz	F_{V60FR}			55	60	65	
Gate Pulse V-Masking Period	50Hz	T_{50GPM}		D19	–	308-7	–	(H)
	60Hz	T_{60GPM}			–	261-10	–	
V.Ramp DC on Service Mode		$V_{NOVRAMP}$		D20	3.1	3.3	3.5	V
Vertical Pull-In Range (Auto)		F_{VPAUL}		D21	–	224.5	–	(H)
		F_{VPAUH}			–	344.5	–	
Vertical Pull-In Range (50Hz)		F_{VP50L}			–	274.5	–	
		F_{VP50H}			–	344.5	–	
Vertical Pull-In Range (60Hz)		F_{VP60L}			–	224.5	–	
		F_{VP60H}			–	294.5	–	
Vertical Period on Fixed Mode		$T_{V312.5}$		D22	–	312.5	–	(H)
		$T_{V262.5}$			–	262.5	–	
		T_{V313}			–	313	–	
		T_{V263}			–	263	–	
VD Start Phase	50Hz	PH_{50VD}		D23	27	29	31	us
	60Hz	PH_{60VD}			27	29	31	
VD Width	50Hz	W_{50VD}			–	12	–	(H)
	60Hz	W_{60VD}			–	12	–	
V-BLK Start Phase	50Hz	PH_{50VBLK}		D24	27	29	31	us
	60Hz	PH_{60VBLK}			27	29	31	
V-BLK Width	50Hz	W_{50VBLK}			–	22	–	(H)
	60Hz	W_{60VBLK}			–	18	–	
Sand Castle Pulse Level		V_{SCPH}		D25	6.70	7.00	7.30	V
		V_{SCPM}			4.60	4.90	5.20	
		V_{SCPL}			1.55	1.85	2.15	
HD pulse level	GP				4.5	5	5.5	V
	HD				2.5	3	3.5	V
	Low				–	0	0.1	V
VD pulse level	High				2.5	3	3.5	V
	Low				–	0	0.1	V
V-Ramp Amplitude		V_{VRAMP}		D26	1.50	1.67	1.84	V(p-p)
Vertical out Amplitude	Cen	$V_{VOUT,}$			1.8	2.0	2.2	V(p-p)
	Max	$R_{VOUT\ MAX}$			+48	+52	+56	%
	Min	$R_{VOUT\ MIN}$			-51	-47	-43	%
Vertical center voltage		V_{OUTDC}			4.8	5	5.2	V

ITEM		SYMBOL	TEST CIRCUIT	TEST CONDITON	MIN	TYP	MAX	UNIT
Vertical center	Max	$V_{CENT\ MAX}$			+10	+12	+14	%
	Min	$V_{CENT\ MIN}$			-14	-12	-10	
Vertical Linearity Variable Range		V_{LIN}		D27	±10.5	±12.5	±14.5	%
Vertical S Correction Variable Range		$V_{S(+)}$		D28	+21	+23	+25	%
		$V_{S(-)}$			-19	-17	-15	
Vertical Amplitude EHT Correction		ΔV_{EHT}		D29	8.0	9.0	10.0	%
E-W H size	Max	$V_{EWDCMAX}$		D30	550	700	850	uA
	Min	$V_{EWDCMIN}$			−	0	60	
E-W Parabola	Max	V_{EWPMAX}		D35	360	480	600	uA (p-p)
	Min	V_{EWPMIN}			−	0	10	
E-W Conner top	Max	$V_{EWCTMAX}$		D35	590	720	850	uA (p-p)
	Min	$V_{EWCTMIN}$			60	130	200	
E-W Conner bottom	Max	$V_{EWCBMAX}$		D36	590	720	850	uA (p-p)
	Min	$V_{EWCBMIN}$			60	130	200	
E-W Trapezium Correction	Max	V_{TRMAX}		D37	1	3	5	%
	Min	V_{TRMIN}			-9	-7	-5	%
E-W DC EHT Correction		$V_{EWDCEHT}$		D38	110	170	230	uA
H-Bow Correction	Max	$T_{HBOWMAX}$		D39	+300	+400	+500	us
	Min	$T_{HBOWMIN}$			-650	-550	-450	us
H-Parallelogram Correction	Max	$T_{HPARAMAX}$			±100	±200	±300	us
	Min	$T_{HPARAMIN}$			±150	±250	±350	us
NoiseDet level BUS(0011)		V_{NDET3}		D40	10	25	40	mVpp
BUS (1111)		V_{NDET15}			265	280	295	mVpp

TEST CONDITION
PIF STAGE

Note	Items/Symbols	Bus conditions	Measurement methods
P1	Video output signal amplitude / vDet(p)n / vDet(p)p	RF AGC:except 0 PIF Freq. : 38.9MHz PIF det lev;01(b) L-SECAM MODE :0/1 Others : Preset	(1) Input a signal that 38.9[MHz], 90[dB(μV)], and 87.5 [%] negative modulated by 100% white video signal at pin 79. (2) Set the bit of "L-SECAM MODE" to "00". (3) Measure the amplitude of the pin 68 output signal (vDet(p)n[V(p-p)]). (4) Input a signal that 38.9[MHz], 90[dB(μV)], and 97 [%] positive modulated by 100% white video signal at pin 6. (5) Set the bit of "L-SECAM MODE" to "01". (6) Measure the amplitude of the pin 68 output signal (vDet(p)p[V(p-p)]).
P2	PIF Input Sensitivity / vin min(p) PIF maximum input signal / vin max(p) PIF gain control range / RAGC(p)	RF AGC:except 0 PIF Freq.:38.9MHz Others : Preset	(1) Input a signal that 38.9[MHz], 90[dB(μV)], and 30 [%] modulated by 15 [kHz] sine wave at pin 79.. (2) Measure the amplitude at Pin 68(vo#68 [V(p-p)]). (3) Decreasing the IF input level, measure the input level at which the output amplitude at pin 68 turns to be –3dB against "vo#68" (vin min(p)[dB(μV)]). (4) Increasing the IF input level, measure the input level at which the output amplitude at pin 54 turns to be -1dB against "vo#68" (vin min(p)[dB(μV)]). (5) RAGC(p)[dB] = vin max(p) - vin min(p)
P3	Synchronous signal level / Vsync n / Vsync p	RF AGC:except 0 PIF Freq. : 38.9MHz L-SECAM MODE :0/1 Others : Preset	(1) Input a signal that 38.9[MHz], 90[dB(μV)], 87.5[%] negative modulated by 100% white signal at pin 79. (2) Set the bit of "L-SECAM MODE" to "00". (3) Measure the voltage of the sync. tip at pin 68 (Vsync n[V]). (4) Input a signal that 38.9[MHz], 90[dB(μV)], and 97 [%] positive modulated by 100% white video signal at pin 79. (5) Set the bit of "L-SECAM MODE" to "01". (6) Measure the voltage of the sync. tip at pin 68 (Vsync p[V]).
P4	Differential Gain / DG Differential Phase / DP	RF AGC:except 0 PIF Freq.: 38.9MHz Vi Pol:0/1 Others : Preset	(1) Input a signal that 38.9[MHz], 90[dB(μV)], and 87.5 [%] modulated by 10 stair video signal at pin 79. (2) Measure "DG[%]" and "DP[°]" for Pin54 output.
P5	Video bandwidth (-3dB) / fDet(p)	RF AGC:except 0 PIF Freq.: 38.9MHz L-SECAM MODE :0/1 Others : Preset	(1) Input the mixture of 2 signals (signal1 : 38.9[MHz] / 82[dB(μV)], signal 2 : 38.8[MHz] / 69[dB(μV)]) to pin 79. (2) Measure the minimum voltage of the output signal at pin 68 (Vo#68). (3) Apply the DC voltage to pin 1 and adjust it so that the minimum voltage of the output signal at pin 68 is equal to Vo#68. (4) Decrease frequency of the input signal 2 at pin 79, and measure amplitude of the output signal at pin 68. (5) Measure fDet(p) shown as below.  Frequency of the output signal at pin68

Note	Items/Symbols	Bus conditions	Measurement methods
P6	Video output S/N / S/N(p)	RF AGC:except 0 PIF Freq. : 38.9MHz Others : Preset	(1) Input a signal that 38.9[MHz], 90[dB(μV)], and 87.5 [%] modulated by black video signal at pin 6. (2) Measure the video S/N for pin 68 output (HPF : 100[kHz], LPF : 5[MHz], CCIR weighted) (S/N(p)[dB]).
P7	Intermodulation / IM	RF AGC:except 0 PIF Freq. : 38.9MHz Others : Preset	(1) Input a signal composed of following 3 signals at pin 79; 38.90[MHz]/90[dB(μV)], 34.47[MHz]/80dB(μV)] 33.40[MHz]/80[dB(μV)] (2) Adjust pin 1 voltage so that the bottom of pin 68 output is equal to sync. tip level. (3) Measure the 1.07[MHz] level against the 4.43[MHz] level(=0[dB]) (IM[dB]).
P8	PIF input resistance / Zin R(p) PIF input capacitance / Zin C(p)	Preset	(1) Remove all connection from pin 79 and pin 80. (2) Measure the resistance (Zin R(p)[kΩ]) and capacitance (Zin C(p)[pF]) of pin 79 and pin 80 by the impedance meter.
P9	RF AGC output voltage / VAGC max / VAGC min	RF AGC:Adjust PIF Freq. : 38.9MHz Others : Preset	(1) Input a 38.9[MHz], 90[dB(μV)] signal at pin 79. (2) Adjust RF AGC so that the pin 78 voltage is 4.5V. (3) Increase the IF input level to 107dB(uV). (4) Measure the pin 78 voltage (VAGC min[V]). (5) Connect pin 79 and pin 80 to GND. (6) Measure the pin 78 voltage (VAGC max[V]).
P10	RF delay point / v Dly min / v Dly max	RF AGC : Adjust PIF Freq. 38.9MHz RF AGC: 01/3F Others : Preset	(1) Input a 38.9[MHz], 90[dB(μV)] signal at pin 79. (2) Set the data of "RF AGC" to 01(h). (3) Decrease the IF input level, measure the input level at which the voltage at pin 78 turn to be 4.5[V] (v Dly min[dB(μV)]). (4) Set the data of "RF AGC" to 3F(h). (5) Increase the IF input level, measure the input level at which the voltage at pin 78 turn to be 4.5[V] (v Dly max[dB(μV)]).
P11	Capture range of the PLL / fpH(p) / fpL(p) Hold range of the PLL / fhH(p) / fhL(p)	RF AGC : except 0 PIF Freq. : 38.9MHz Others : Preset	(1) Set the bit of "PIF Freq." to "(0,1,1), 38.9MHz". (2) Input a signal that f0=38.9[MHz], 60[dB(□V)] at pin 79. (3) As read the bit of "IF lock", sweep up/down the input signal frequency. (4) Measure fsuL, fsuH, fsdH, fsdL shown as below. fpH(p) = fsdH – f0 fpL(p) = fsuL – f0 fhH(p) = fsuH – f0 fhL(p) = fsdL – f0 [Read BUS DATA] The bit of "IF lock" 
P12	Control steepness of the VCO / β	PIF Freq. : 38.9MHz Others : Preset	(1) Set the bit of "VCO Adj. Req." to "1", and set the bit of "VCO Adj. Req." to "0". (2) Set the FET probe which connected to the spectrum analyzer near by pin 50 or pin 51 (Don't touch the probe directly to pin 50 or to pin 51). (3) Apply 2.3[V] to pin 47, and measure frequency of the VCO oscillation by the spectrum analyzer (fLVCO[MHz]). (4) Apply 2.7[V] to pin 47, and measure frequency of the VCO oscillation by the spectrum analyzer (fHVCO[MHz]). (5) β[MHz/V] = (fHVCO-fLVCO)/0.4

Note	Items/Symbols	Bus conditions	Measurement methods
P13	AFT Center turn Frequency / fAFTC	PIF Freq. : 38.9MHz Others : Preset	(1) Input a signal that f0=38.9[MHz], 60[dB(□V)] at pin 79. (2) As read the bit of "AFT center", sweep up the input signal frequency. (3) Measure the lowest frequency that the bit of "AFT center" is "0", shown as below. That is fAFTC 
P14	AFT window narrow / fAFTW(n)L / fAFTW(n)H /f AFTW(w)L / fAFTW(w)H	PIF Freq. : 38.9MHz Others : Preset	(1) Input a signal that f0=38.9[MHz], 60[dB(□V)] at pin 41. (2) Set the bit of "AFT window" to "(0), narrow". (3) As read the bit of "AFT window", sweep up the input signal frequency. (4) Measure the highest frequency but lower than f0 (38.9MHz) that the bit of "AFT window" is "0", shown as below. That is fAFTw(n)L. (5) Measure the lowest frequency but higher than f0 (38.9MHz) that the bit of "AFT window" is "0", shown as below. That is fAFTw(n)H. (6) Set the bit of "AFT window" to "(1), wide". (7) Measure as (3) ~ (5), that is fAFTw(w)L, fAFTw(w)H. 
P15	S-trap reduction		(1) Input a signal composed of following 3 signals at pin 79; 38.90[MHz]/90[dB(μV)], 33.40[MHz]/80[dB(μV)] (2) Set the "Strap" of IICBUS to "0(h) off" (3) measure the output level of 5.5MHz component for pin #68 by spectrum analyzer. -> V68 (strap off) (4) Set the "Strap" of IICBUS to "4(h)" (5) measure the output level of 5.5MHz component for pin #68 by spectrum analyzer -> V68 (strap on) (6) Calc the result of reduction Strap = V68 (strap off) - V68 (strap on)

SIF STAGE

Note	Items/Symbols	Bus conditions	Measurement methods
S1	SIF maximum input signal / vin max(s)1 SIF minimum input signal / vin min(s)1 SIF gain control range / R AGC(s)1 2nd SIF output level / vSIF1	RF AGC : except 0 PIF Freq. : 38.9MHz Others : Preset	(1) Input a 38.9[MHz], 90[dB(μV)] signal at pin 79. (2) Input a 33.4[MHz], 90[dB(μV)] signal at pin 75. (3) Measure the amplitude at pin 71 (vSIF1[dB(μV)]). (4) Decreasing the 33.4[MHz] signal level, measure the 33.4[MHz] signal level at which the amplitude at pin 3 turns to be –3[dB] against "vSIF1" (vin min(s)1[dB(μV)]). (5) Increasing the 33.4[MHz] signal level, measure the 33.4[MHz] signal level at which the amplitude at pin 3 turns to be +3[dB] against "vSIF1" (vin max(s)1[dB(μV)]). (6) R AGC[dB] = vin max1(s) – vin min1(s)
S2	SIF input resistance / Zin R(s) SIF input capacitance / Zin C(s)	Preset	(1) Remove all connection from pin 75 and 76.. (2) Measure the resistance (Zin R(s)[kΩ]) and capacitance (Zin C(s)[pF]) of pin 75 and 76 by the impedance meter.
S3	AM demodulation sensitivity / vin minAM AM demodulation maximum input level / vin maxAM	RF AGC: except0 PIF Freq. : 38.9MHz SIF Freq. : 6.5MHz L-SECAM MODE : 1 Others : Preset	(1) Input a 38.9[MHz], 90[dB(μV)] signal at pin 79. (2) Input a signal that 32.4[MHz], 80[dB(μV)] and 54[%] modulated by 400[Hz] sine wave at pin 75. (3) Measure the amplitude at pin 71 (v#71[mVrms]). (4) Decrease the 32.4[MHz] signal level, measure the 32.4[MHz] signal level at which the amplitude at pin 71 turns to be –3[dB] against "v#71" (vin minAM[dB(μV)]). (5) Increase the 32.4[MHz] signal level, measure the 32.4[MHz] signal level at which the amplitude at pin 71 turns to be –3[dB] against "v#71" (vin maxAM[dB(μV)]).
S4	AF output signal amplitude / vDet(s)AM AF output S/N / S/N(s)AM Total harmonics distortion / THDAM	SIF-Freq. : 6.5M L SECAM mode : L SECAM Others : Preset	(1) Input a 38.9[MHz], 90[dB(μV)] signal at pin 79. (2) Input a signal that 32.4[MHz], 80[dB(μV)] and 54[%] modulated by 400[Hz] sine wave at pin 75 (3) Measure the amplitude at pin 65 (vDet(s)AM[mVrms]). (4) Measure the total harmonics distortion at pin 65 (THDAM[%]). (5) Input a signal that 32.4[MHz], 80[dB(□V)] at pin 75 (6) Measure the amplitude at pin 65 (vn(s)[mVrms]). (7) S/N AM[dB] = 20log(vDet(s)/vn(s))
S5	AF output signal amplitude / vDet(s)5.5M AF output S/N / S/N(s)5.5M Total harmonics distortion / THD5.5M	SIF-Freq. :5.5M Others : Preset	(1) Input a signal that 5.5[MHz], 100[dB(μV)], 50[kHz] deviated by 400[Hz] sine wave at pin 73. (8) Measure the amplitude at pin 65 (vDet(s)5.5MH[mVrms]). (9) Measure the total harmonics distortion at pin 65 (THD5.5MH[%]). (2) Input a 5.5[MHz], 100[dB(μV)] signal at pin 73. (3) Measure the amplitude at pin 65 (vn(s)[mVrms]). (4) (6)S/N4.5MH[dB] = 20log(vDet(s)/vn(s))
S6	AF output signal amplitude / vDet(s)6.0M AF output S/N / S/N(s)6.0M Total harmonics distortion / THD6.0M	SIF-Freq. : 6.0M AUDIO ATT : 127 Others : Preset	(1) Input a signal that 6.0[MHz], 100[dB(μV)], 50[kHz] deviated by 400[Hz] sine wave at pin 73. (2) Do same measuring as vDet(s)5.5M et al. (vDet(s)6.0M, S/N(s)6.5M, THD6.0M).

Note	Items/Symbols	Bus conditions	Measurement methods
S7	AF output signal amplitude / vDet(s)6.5M AF output S/N / S/N(s)6.5M Total harmonics distortion / THD6.5M	SIF-Freq. : 6.5M AUDIO ATT : 127 Others : Preset	(1) Input a signal that 6.5[MHz], 100[dB(μV)], 50[kHz] deviated by 400[Hz] sine wave at pin 73. (2) Do same measuring as vDet(s)5.5M et al. (vDet(s)6.5M, S/N(s)6.5M, THD6.5M).
S8	AF output signal amplitude / vDet(s)4.5ML AF output S/N / S/N(s)4.5ML Total harmonics distortion / THD4.5ML	SIF-Freq. : 4.5M Au Gain : 1 AUDIO ATT : 127 Others : Preset	(1) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[kHz] sine wave at pin 73. (2) Do same measuring as vDet(s)5.5MH et al. (vDet(s)4.5ML, S/N(s)4.5ML, THD4.5ML).
S9	AF output signal amplitude / vDet(s)4.5MH AF output S/N / S/N(s)4.5MH Total harmonics distortion / THD4.5MH	SIF-Freq. : 4.5M Au Gain : 0 AUDIO ATT : 127 Others : Preset	(1) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (2) Do same measuring as vDet(s)5.5M et al. (vDet(s)4.5MGH, S/N(s)4.5ML, THD4.5MH).
S10	Limiting sensitivity / vin lim(s)4.5MH / vin lim(s)4.5ML / vin lim(s)5.5M / vin lim(s)6.0M / vin lim(s)6.5M	SIF-Freq. : 4.5M/5.5M/6.0M/6.5M AUDIO ATT : 127 Au Gain : 0/1 Others : Preset	(1) Set the bits of "SIF-Freq." to "11", "Au Gain" to "0". (2) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (3) Measure the amplitude at pin 65 (vo#65[mVrms]). (4) Decreasing the 4.5[MHz] signal level, measure the 4.5[MHz] signal level at which the amplitude at pin 65 turns to be –3[dB] against "vo#4" (vin lim(s)4.5MH[dB(μV)]). (5) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (6) Set the bits of "Au Gain" to "1". (7) Do same measuring as above (3)~(4) (vin lim(s)4.5ML). (8) Set the bits of "SIF-Freq." to "00". (9) Change the frequency of the input signal to 5.5MHz, and change the deviation of the input signal to 50[kHz]. (10) Do same measuring as above (3)~(4) (vin lim(s)5.5M). (11) Set the bits of "SIF-Freq." to "01". (12) Change the frequency of the input signal to 6.0MHz, and do same measuring as above (3)~(4) (vin lim(s)6.0M). (13) Set the bits of "SIF-Freq." to "10". (14) Change the frequency of the input signal to 6.5MHz, and do same measuring as above (3)~(4) (vin lim(s)6.5M).

Note	Items/Symbols	Bus conditions	Measurement methods
S11	AM reduction ratio / AMR4.5MH / AMR4.5ML / AMR5.5M / AMR6.0M / AMR6.5M	SIF-Freq. : 4.5M/5.5M/6.0M/ 6.5M AUDIO ATT : 127 Au Gain : 0/1 Others : Preset	(1) Set the bits of "SIF-Freq." to "11", "Au Gain" to "0". (2) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (3) Measure the amplitude at pin 65 (vo#65[mVrms]). (4) Input a signal that 4.5[MHz], 100[dB(μV)], and 30 [%] modulated by 400 [Hz] sine wave at pin 73. (5) Measure the amplitude at pin 65 (v#65[mVrms]). (6) AMR4.5H[dB] = 20log(v#65/ vo#65) (7) Input a signal that 4.5[MHz], 100[dB(μV)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (8) Set the bits of "Au Gain" to "1". (9) Do same measuring as above (3)~(6) (AMR4.5ML). (10) Set the bits of "SIF-Freq." to "00". (11) Change the frequency of the input signals to 5.5MHz, and change the deviation of the input signal to 50[kHz]. (12) Do same measuring as above (3)~(6) (AMR5.5M). (13) Set the bits of "SIF-Freq." to "01". (14) Change the frequency of the input signals to 6.0MHz, and do same measuring as above (3)~(6) (AMR6.0M). (15) Set the bits of "SIF-Freq." to "10". (16) Change the frequency of the input signals to 6.5MHz, and do same measuring as above (3)~(6) (AMR6.5M).
S12	Demodulation band width of the FM demodulator / fpH(s)1 / fpL(s)1	SIF-Freq. : 4.5M AUDIO ATT : 127 Others : Preset	(1) Input a signal that 4.5[MHz], 100[dB(□V)], 25[kHz] deviated by 400[Hz] sine wave at pin 73. (2) Measure the amplitude at pin 65(vo#65 [V(p-p)]). (3) Increase the input signal frequency, measure the input signal frequency at which the output amplitude at pin 65 turn to be -3[dB] against "vo#65" (fpH(s)1[MHz]) (4) Decrease the input signal frequency, measure the input signal frequency at which the output amplitude at pin 65 turn to be -3[dB] against "vo#65" (fpL(s)1[MHz])

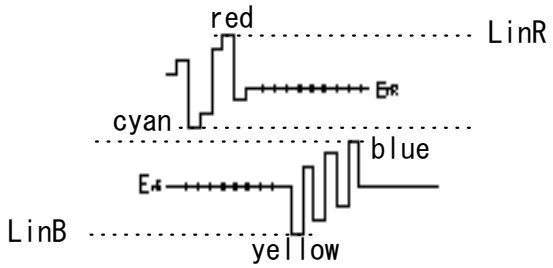
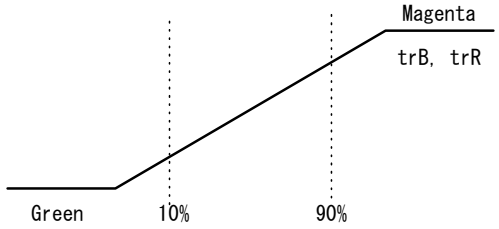
VIDEO stage (RGB Mute:0 / R cut off:128 / DC rest.:2(100%) / WPS:1(OFF))

Note	Items/Symbols	Bus conditions	Measurement methods
V1	Y Input Dynamic Range / DR_Y	Y/Monout=0 ctrap = off Ydl=011(b) Others: Preset	(1) Input a white signal with sync into Pin61. (2) Increasing the Pin61 input amplitude, measure the amplitude at which the Pin53 output is clipped, that is "DR_Y".
V2	Y Delay Time / t_{YDELP} / t_{YDELS} / $\Delta t_{YDEL-120}$ / $\Delta t_{YDEL+160}$ / $\Delta t_{YDEL\ step}$	Y/Monout=0 ctrap = off Ydl=parametric Others: Preset	(1) Input a 2T pulse with sync and PAL burst into Pin61. (2) Set the BUS data so that Y DL is 0ns(011).Observe the Pin53 output, measure the delay time between Pin61 and Pin53, that is "t_{YDELP}". (3) Set the BUS data so that Y DL is –120ns(000). Observe the Pin53 output, measure the delay time between Pin61 and Pin53 that is $t_{YDEL-120}$. (4) Set the BUS data so that Y DL is +160ns(111). Observe the Pin53 output, measure the delay time between Pin61 and Pin53 that is $t_{YDEL+160}$. (5) Calculate, "$\Delta t_{YDEL-120}$"= $t_{YDEL-120}$ - "t_{YDEL}" 1. "$\Delta t_{YDEL+160}$"= $t_{YDEL+160}$ - "t_{YDEL}" 2. "Δt_{YDEL}"= ("$\Delta t_{YDEL+160}$"- "$\Delta t_{YDEL-120}$")/7 (6) Input a 2T pulse with sync and SECAM ID into Pin61. (7) Set the BUS data so that Y DL is 0ns(011).Observe the Pin53 output, measure the delay time between Pin61 and Pin53, that is "t_{YDELS}".
V3	Chroma Trap Gain / G_{TRAP}	Y/Monout=0 ctrap=parametric Ydl=011(b) Others: Preset	(1) Input a 0.5V(p-p), 4.43MHz signal with sync into Pin61. (2) Measure the 4.43MHz amplitude at PIn53 for Chroma Trap:1/0, that is V_{TRAPON} / $V_{TRAPOFF}$. (3) Calculate;"$G_{TRAP443}$"=20*log(V_{TRAPON}/$V_{TRAPOFF}$) (4) Input a 0.5V(p-p), 3.58MHz signal with sync into Pin61. (5) Measure the 3.58MHz amplitude at PIn53 for Chroma Trap:1/0, that is V_{TRAPON} / $V_{TRAPOFF}$. (6) Calculate;"$G_{TRAP358}$"=20*log(V_{TRAPON}/$V_{TRAPOFF}$)
V4	Y gain		(1) Input 1Vp-p white signal with sync into pin #61 (2) Measure the gain between pin#61 and pin #53 for its picture (without sync) level. Gy1
V5	Y Frequency Response / FR_Y	Y/Monout=0 ctrap = off Ydl=011(b) Others: Preset	(1) Input a 0.5V(p-p) sweep signal with sync into Pin61. (2) Measure the frequency at which the output amplitude is 3dB down against the level of 100Hz, which is "FR_Y".
V6	Mon out gain (MON) (Y1/CVBS1) G_{TV1} (Y2/CVBS2) G_{TV2} (Y3/CVBS3) G_{TV3}	Y/Monout=1 videosw=parametric Others: Preset	(1) Input 1Vp-p white signal with sync into pin #61, #55, and #44 (2) Measure the gain from pin#61, #55 and #44 to pin #53 in switching the IICBUS of 'video sw'.
V7	Y frequency response FR_Y	Y/Mon out = 1 video sw = 00 Others: Preset	(1) Input a 0.5V(p-p) sweep signal with sync into Pin61. (2) Measure the frequency at which the output amplitude is 3dB down against the level of 100Hz, which is "FR_Y".
	V switch cross-talk (CVBS1-CVBS2) CT_{CVBS1_2} (CVBS1-CVBS3) CT_{CVBS1_3} (CVBS2-CVBS1) CT_{CVBS2_1} (CVBS2-CVBS3) CT_{CVBS2_3} (CVBS3-CVBS1) CT_{CVBS3_1} (CVBS3-CVBS2) CT_{CVBS3_2}	Y/Monout=1 videosw=parametric Others: Preset	(1) Input a sine wave signal (CVBS, V0=0.5Vp-p, f0=4MHz) into pin 61, connect pin 55 and 44 to GND through 0.1□F capacitor. (2) Set the bit of "Video SW" to "01, V2", and measure the amplitude of 4MHz signal at pin 53, that is V1-2. (3) Set the bit of "Video SW" to "00, V1" and measure the amplitude of 4MHz signal at pin 53, that is V1. (4) "C CVBS1_2" = 20*log (V1-2 / V1) (5) Measure the same way as (1)-(4) for others with the combination of desired and undesired inputs,

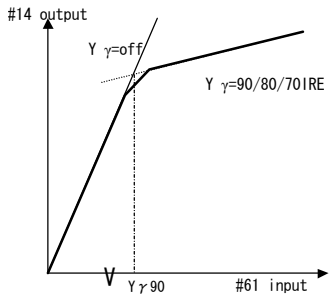
CHROMA STAGE (RGB Mute:0 / RGB cut off:128 / DC rest.:2(100%))

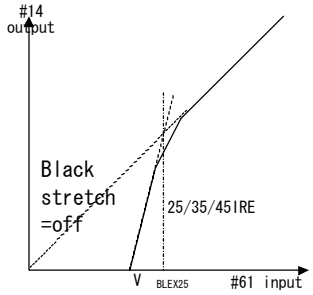
Note	Items/Symbols	Bus conditions	Measurement methods
C1	ACC Characteristics / V_{ACCH} / V_{ACCL}	RGB Mute:0 Y Mute:1 Uni-Color:127 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Changing the amplitude of burst and chroma, measure the input amplitude at which Pin51 output amplitude is +1dB/-1dB against the one for 300mVp-p input, that is "V_{ACCH}"/"V_{ACCL}".
C2	TOF Characteristics (4.43MHz) / F_{0T443} / Q_{T443} BPF Characteristics (4.43MHz) / F_{0B443} / Q_{B443} TOF Characteristics (3.58MHz) / F_{0T358} / Q_{T358} BPF Characteristics (3.58MHz) / F_{0B358} / Q_{B358}	Measure on test mode s;21,d;00010000 s;1A,d;xx00xxxx BPF/TOF :0/1 Color System: 2/4 F-ID =1 C-in sw= 1 (c in) Others: Preset	(1) Set "BPF/TOF" to 1, "Color System" to 4(443PAL). (2) Input a sweep signal into Pin #61 and #58. (3) Observe the frequency response at Pin34 and measure the Peaking Frequency / Q of chroma filter, that is "F_{0T443}" / "Q_{T443}". (4) Set BPF/TOF to 0 and Color System to 4(443PAL) and repeat (2)&(3), that is "F_{0B443}" / "Q_{B443}". (5) Set BPF/TOF to 1 and Color System to 2(358NTSC) and repeat (2)&(3), that is "F_{0T358}" / "Q_{T358}". (6) Set BPF/TOF to 0 and Color System to 2(358NTSC) and repeat (2)&(3), that is "F_{0B358}" / "Q_{B358}".
C3	C Delay Time / t_{CDEL} Delay Time Difference between Y/C / $\Delta t_{Y/C}$	Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Observe the Pin51 output, measure the delay time between Pin61 and Pin51 that is "t_{CDEL}". (3) Calculate;"$\Delta t_{Y/C}$"=t_{YDEL}-t_{CDEL}
C4	APC Pull-in Range (4.43MHz) / ΔF_{4APCP+} / ΔF_{4APCP-} APC Hold Range (4.43MHz) / ΔF_{4APCH+} / ΔF_{4APCH-} APC Pull-in Range (3.58MHz) / ΔF_{3APCP+} / ΔF_{3APCP-} APC Hold Range (3.58MHz) / ΔF_{3APCH+} / ΔF_{3APCH-}	Color System: 4/2 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Set Color System to 4(443PAL). (3) For higher frequency than 4.43MHz, measure the burst frequency at which PLL pulls-in / locks out that is F_{4APCP+} / F_{4APCH+}. (4) For lower frequency than 4.43MHz, repeat (2), that is F_{4APCP-} / F_{4APCH-}. (5) Calculate; "ΔF_{4APCP+}"= F_{4APCP+} - 4433619 "ΔF_{4APCP-}"= F_{4APCP-} - 4433619 "ΔF_{4APCH+}"=F_{4APCH+}-4433619 "ΔF_{4APCH-}"=F_{4APCH-} - 4433619 (6) Input a 3.58MHz NTSC rainbow color-bar (286mV(p-p), burst:chroma=1:1) with sync into Pin61 and 58. (7) Set Color System to 2(358NTSC). (8) For higher frequency than 3.58MHz, repeat (2), that is F_{3APCP+} / F_{3APCH+}. (9) For lower frequency than 3.58MHz, repeat (2), that is F_{3APCP-} / F_{3APCH-}. (10) Calculate; "ΔF_{3APCP+}"=F_{3APCP+}-3579545 "ΔF_{3APCP-}"=3579545-F_{3APCP-} "ΔF_{3APCH+}"=F_{3APCH+}-3579545 "ΔF_{3APCH-}"=3579545-F_{3APCH-}

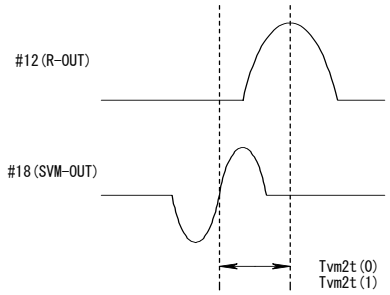
Note	Items/Symbols	Bus conditions	Measurement methods
C5	APC Control Sensitivity (4.43MHz) / β_{443} APC Control Sensitivity (3.58MHz) / β_{358}	Color System: 4/2 Others: Preset	(1) Connect Pin61 to GND via a 1uF capacitor. (2) Set Color System to 4(443PAL). (3) Adjust Pin7 voltage so that the Pin34 output frequency is 4.433619MHz that is $V_{4APCCEN}$. (4) Measure the Pin34 output frequency when Pin7 voltage is $V_{4APCCEN}$+200mV / $V_{4APCCENT}$, that is F_{4APC+} / F_{4APC-}. (5) Calculate; "β_{443}"=(F_{4APC+}-F_{4APC-})/200 (6) Set Color System to 2 (358NTSC). (7) Adjust Pin7 voltage so that the Pin34 output frequency is 3.579545MHz that is $V_{3APCCEN}$. (8) Measure the Pin34 output frequency when Pin7 voltage is $V_{3APCCEN}$+200mV / $V_{3APCCEN}$, that is F_{3APC+} / F_{3APC-}. (9) Calculate; "β_{358}"=(F_{3APC+}-F_{3APC-})/200
C6	PAL ID Sensitivity (Normal Mode) / $V_{PALIDON}$ / $V_{PALIDOFF}$ PAL ID Sensitivity (Low Mode) / $V_{PALIDLON}$ / $V_{PALIDLOFF}$ NTSC ID Sensitivity (Normal Mode) / V_{NTIDON} / $V_{NTIDOFF}$ NTSC ID Sensitivity (Low Mode) / $V_{NTIDLON}$ / $V_{NTIDLOFF}$	P/N ID Sens:0/1 Color System: 4/2 Y Mute:01 Uni-Color:127 RGB Mute:0 BPF/TOF;0 BPF Others: Preset	(1) Set P/N ID Sens. to 0. (2) Set Color System to 4(443PAL). (3) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into pin#61 and 58. (4) Measure the burst amplitude at which Pin13 DC level changes from high to low / from low to high, that is "$V_{PALIDON}$" / "$V_{PALIDOFF}$". (5) Set Color System to 2(358NTSC). (6) Input a 3.58MHz NTSC rainbow color-bar (286mV(p-p), burst:chroma=1:1) with sync into pin#61 and 58, and repeat (3), that is "V_{NTIDON}" / "$V_{NTIDOFF}$". (7) Set P/N ID Sens.to 1, repeat (2) ~ (6) that are "VPALIDLON", "VPALIDLOFF", VNTIDLON and VNTIDLOFF.
C7	Black adjustment (internal) / $V_{BINTMAX}$ / $V_{RINTMAX}$ / $V_{RINTMIN}$ / $V_{RINTMIN}$ Black adjustment sensitivity (Internal) / ΔV_{BINT} / ΔV_{RINT}	B-Y black Adj.: 0/15 R-Y black Adj.: 0/15 Others: Preset	(1) For B-Y/R-Y Black Adj.:8, measure the DC level of picture period at Pin51,52 that is V_{SBCEN} / V_{SRCEN}. (2) For B-Y Black Adj.:0 /15, measure the DC level change of picture period against V_{SBCEN} at Pin52, that is "$V_{BINTMIN}$" / "$V_{BINTMAX}$". (3) For R-Y Black Adj.:0/15, measure the DC level change of picture period against V_{SRCEN} at Pin51, that is "$V_{RINTMIN}$" / $V_{RINTMAX}$ ". (4) Calculate; "ΔV_{BINT} "=(V_{SBMAX}-V_{SBMIN})/15 "ΔV_{RINT} "=(V_{SRMAX} - V_{SRMIN})/15
	Black adjustment (External) / $V_{BINTMAX}$ / $V_{RINTMAX}$ / $V_{RINTMIN}$ / $V_{RINTMIN}$ Black adjustment sensitivity External / ΔV_{BINT} / ΔV_{RINT}	B-Y black Adj.: 0/15 R-Y black Adj.: 0/15 DemoP; 00 Cont; 7F Color; 40 Ymute; 1 CbCrSW; 1 Others: Preset	(1) For B-Y/R-Y Black Adj.:8, measure the DC level of picture period at Pin12,14 that is V_{SBCEN} / V_{SRCEN}. (2) For B-Y Black Adj.:0 /15, measure the DC level change of picture period against V_{SBCEN} at Pin14, that is "$V_{BEXTMIN}$" / "$V_{BEXTMAX}$". (3) For R-Y Black Adj.:0/15, measure the DC level change of picture period against V_{SRCEN} at Pin12, that is "$V_{REXTMIN}$" / $V_{REXTMAX}$ ". (4) Calculate; "ΔV_{BINT} "= ($V_{BEXTMAX}$ - $V_{BEXTMIN}$) / 15 "ΔV_{RINT} "= ($V_{REXTMAX}$ - $V_{REXTMIN}$) / 15
C8	fsc Continuous Wave Output Level / V_{CW}	Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar (300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Measure the amplitude of Pin34 output that is "V_{CW}".
C9	SECAM CbCr output amplitude / VBS / VRS	RGB Mute:0 Color System:5 Uni-Color:64 Y Mute:1 Others: preset	(1) Input a 75% color bar(200mV(p-p) at R ID) into Pin61.. (2) Measure the R-Y output amplitude at Pin51, that is "VRS". (3) Measure the B-Y output amplitude at Pin52, that is "VBS".

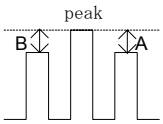
Note	Items/Symbols	Bus conditions	Measurement methods
C10	SECAM CbCr out Relative Amplitude / R/B-S		(1)Calculate : "R/B-S"=VRS/VBS
C11	Color Difference S/N Ratio / SNB-S / SBR-S	RGB Mute:0 Color System:5 Uni-Color:64 Y Mute:1 Others: preset	(1) Input a 200mV(p-p) non-modulated chroma signal into Pin61. (2) Measure the amplitude of noise on Pin51, that is nR. (3) Measure the amplitude of noise on Pin52, that is nB. (4) Calculate : "SNB-S"=20log(2√2VBS/nB) "SNR-S"=20log(2√2VRS/nR)
C12	SECAM Linearity / LinB / LinR	Color System:5 Others: preset	(1) Input a 75% color bar(200mV(p-p) at R ID) into Pin61. (2) Measure the amplitude between Black and Cyan/Red, that is VCyan/VRed for pin #51. (3) Measure the amplitude between Black and Yellow/Blue, that is VYellow/VBlue for pin #52. (4) Calculate : "LinR"=VCync/Vred "LinB"=VYellow/VBlue 
C13	Rising-Fall Time / trfB / trfR	Color System:5 Others: preset	(1) Input a 75% color bar(200mV(p-p) at R ID) into Pin61. (2) Measure the rising time(from 10% to 90%) between Green and Magenta at Pin 51/Pin 52, that is "trR"/"trB". 
C14	SECAM ID Sensitivity (Normal Mode) / V_{SIDHON} / $V_{SIDHOFF}$ / $V_{SIDHVON}$ / $V_{SIDHVOFF}$ SECAM ID Sensitivity (Low Mode) / $V_{SIDLHON}$ / $V_{SIDLHOFF}$ / $V_{SIDLHVON}$ / $V_{SIDLHVOFF}$	S ID Sens:0/1 S ID Mode:0/1 Color System:5 Others: Preset	(1) Input a 75% color bar(200mV(p-p) at R ID) into Pin61.. (2) Set BUS data so that “S ID Sens” is Normal, “S ID Mode” is H. (3) Measure the burst amplitude at which color killer turns on and off, that is "V_{SIDHON}" / "$V_{SIDHOFF}$". (4) Set BUS data so that “S ID Mode” is H+V. (5) Repeat (3), that is "$V_{SIDHVON}$" / "$V_{SIDHVOFF}$". (6) Set BUS data so that “S ID Sens” is Low, “S ID Mode” is H. (7) Repeat (3), that is "$V_{SIDLHON}$" / "$V_{SIDLHOFF}$". (8) Set BUS data so that “S ID Mode” is H+V. (1) (9)Repeat (3), that is "$V_{SIDLHVON}$" / "$V_{SIDLHVOFF}$".

YUV STAGE (RGB Mute:0 / RGB cut off:128 / DC rest.:2(100%))

Note	Items/Symbols	Bus conditions	Measurement methods
Y1	Brightness Control / V_{BRTMAX} / V_{BRTCEN} / V_{BRTMIN} Brightness Control resolution / ΔV_{BRT}	Brightness: 0/64/127 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) Others: Preset	(1) Input a 0(IRE) black signal with sync into Pin61. (2) Measure the DC level of picture period at Pin14 for Brightness:127/64/0, that is "VBRTMAX" / "VBRTCEN" / "VBRTMIN". (3) Calculate;" ΔV_{BRT}"=(V_{BRTMAX}-V_{BRTMIN})/127
Y2	Contrast Control for Y / G_{UCYMAX} / G_{UCYCEN} / G_{UCYMIN}	Uni-Color:0/64/127 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) WPS:1(OFF) Others: Preset	(1)Input a PAL color bar (75%) signal with sync into Pin61. (2)Measure the output picture amplitude at Pin14 for contrast:127/64/0, that is V_{UCYMAX} / V_{UCYCEN} / V_{UCYMIN}. (3)Calculate; "G_{UCYMAX}"=20*log(V_{UCYMAX}/0.35) "G_{UCYCEN}"=20*log(V_{UCYCEN}/0.35) "G_{UCYMIN}"=20*log(V_{UCYMIN}/0.35)
Y3	Sharpness Control / GSHMAX / GSHCEN / GSHMIN	Sharpness:0/32/63 Uni-Color:64 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) Others: Preset	(1)Input a 0.5V(p-p) sweep signal with sync into Pin61. (2)Measure the output picture amplitude for 100kHz at Pin14 that is V_{SH100k}. (3)Measure the output picture amplitude for FSHP when Sharpness is max.,center and min. that are V_{SHMAX}, V_{SHCEN} and V_{SHMIN}. (4)Calculate; "G_{SHMAX}"=20*log(V_{SHMAX}/V_{SH100k}) "G_{SHCEN}"=20*log(V_{SHCEN}/V_{SH100k}) "G_{SHMIN}"=20*log(V_{SHMIN}/V_{SH100k})
Y4	Sharpness Peaking Frequency / F_{SHP}	Sharpness:63 Uni-Color:63 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) Coring=0/1 Others: Preset	(1) Input a 0.5V(p-p) sweep signal with sync into Pin61. (2) Set the IICBUS switch of coring to 1 (3) Measure the frequency at which the Pin14 output amplitude is Max. that is "FSHP". (4) Set the IICBUS switch of coring to 0 (5) Measure the frequency at which the Pin14 output amplitude is Max. that is "FSHPoff". G_{COR} =20*log(FSHPoff / FSHP)
Y5	Y γ correction start point / $V_{Y\gamma\ 70}$ / $V_{Y\gamma\ 80}$ / $V_{Y\gamma\ 90}$ Y γ correction curve / $G_{Y\gamma}$	Uni-Color:127 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) γ point:0/1/2/3 WPS:1(OFF) Others: Preset	(1) Input a gray raster with sync to Pin61. (2) Set BUS data so that γ point is 90IRE. (3) Increasing a video amplitude of input from 50(IRE), measure a video amplitude as the figure below, that is "VY γ 90" (4) Set BUS data so that γ point is 80IRE.And repeat (3), that is "VY γ 80". (5) Set BUS data so that γ point is 70IRE.And repeat (3), that is "VY γ 70". (6) From the measurement in the above, find gain of the portion that the γ correction has an effect on. 

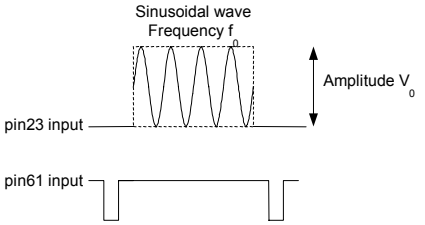
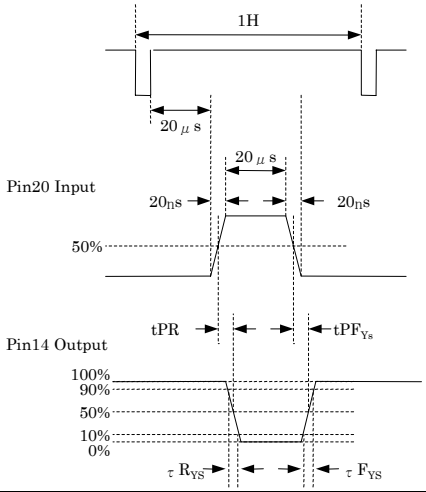
Note	Items/Symbols	Bus conditions	Measurement methods
Y6	Black Expansion Start Point / V_{BLEX25} / V_{BLEX35} / V_{BLEX45} Black Expansion AMP Gain / G_{BLEX}	Uni-Color:127 Color:0 Black stretch: 0/1/2/3 RGB Mute:0 R cut off:128 DC rest.:2(100%) Others: Preset	(1)Input a gray raster with sync to Pin61. (2)Set black stretch to 25(IRE). (3)Decreasing Y amplitude of input from 50(IRE), measure a Y amplitude as the figure below, that is "V_{BLEX25}" (4)Set black stretch to 35(IRE)/45(IRE). (5)Repeat (3), that is 'V_{BLEX35}", "V_{BLEX45}". (6)Find gain of the portion that the black stretch has an effect on. 
Y7	DC Restoration Gain / $V_{Dcrest120}$ / $V_{Dcrest90}$ / $V_{Dcrest\ step}$	Uni-Color:127 Color:0 DC rest.: 0/1/2/3 RGB Mute:0 R cut off:128 Others: Preset	(1) Input a 100(IRE)(=0.7Vp-p) white signal with sync into Pin38&39. (2) Set DC rest. to 10. (3) Measure a Y amplitude of pin20 output that is V100. (4) Set DC rest to 00. (5) Measure a Y amplitude of pin20 output that is V120. (6) Calculate, "Vdcrest120" =(V120/V100)×100 (7) Set DC rest to 11. (8) Repeat (5)&(6), that is "VDcrest90". (9) Calculate, "VDcrest step"=(Vdcrest120 - VDcrest90)/4
Y8	WPS Level / V_{WPS}	Uni-Color:127 Brightness:63 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) WPS:0/1 Others: Preset	(1) Input a 120(IRE) ramp signal with sync into Pin61. (2) Measure the DC voltage from cut-off level to peak(at which output signal is clipped) that is "VWPS".
Y9	VSM Peak Frequency /F_{VSM}	RGB Mute:0 VSM gain:3 Others: Preset	(1) Input 100mV(p-p) sweep signal to pin61(Y in). (2) Measure the peak point frequency "FVSM" at pin18(VSM OUT) by using a spectrum analyzer.
Y10	VSM Gain / $G_{VSM\ 0}$ / $G_{VSM\ -3}$ / $G_{VSM\ -10}$ / G_{VSMOFF}	RGB Mute:0 c-trap=off VSM gain: 0/1/2/3 Others: Preset	(1) Input 100mV(p-p) FVSM sine wave signal (see Y9) to pin61(Y in). (2) Set VSM Gain (0/1/2/3) and measure the amplitude at pin18(VM OUT),that is "VVM0 "/ "VVM-3 "/ "VVM-10 "/ "VVM-OFF". (3) Calculate, $G_{VSM\ 0}=20*\log(V_{VM0}/0.1)$ $G_{VSM-3}=20*\log(V_{VM-3}/0.1)$ $G_{VSM-10}=20*\log(V_{VM-10}/0.1)$ $G_{VSMOFF}=20*\log(V_{VM-off}/0.1)$

Note	Items/Symbols	Bus conditions	Measurement methods
Y11	VSM Phase / T_{VMFP} / T_{VM2T}	RGB Mute:0 VSM gain:7 Ysm Mode:0 Uni-color : 127 Sharpness : Variable Others: Preset	(1) Input 700mV(p-p) FVSM 2T pulse to pin61 (Y in). (2) Set the BUS data of contrast to the maximum and increase the BUS data of Sharpness from the minimum to a value where pin14 (B OUT) waveform is not distorted. (3) Measure the phase difference between the timing at the center level of pin18(B OUT) and the timing at peak level of pin18(VSM OUT) which responses the pin61 input., that is TVMFP. (4) In case that pin61 input signal is 2T pulse, the phase difference is T_{VM2T} 
Y12	VSM Ys Mute Threshold Voltage / V_{VMMBLK}	RGB Mute:0 VSM gain:3 Others: Preset	(1) Input 100mV(p-p) F_{VSM} sine wave signal (see Y9) to pin61(Y in). (2) Apply dc voltage for pin15(Ysm) and increase the voltage from 0V. Measure the power supply voltage when pin18(VSM OUT) output disappears, that is V_{VMMBLK}.
UV1	Tint control range / $\Delta\ \theta_{MAX}$ / $\Delta\ \theta_{MIN}$	RGB Mute:0 Tint:0/64/127 Y Mute:1 contrast:127 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar (burst:chroma=1:1) with sync into Pin61 (2) Set Tint to 64 and adjust the burst phase so that the 6th bar of Pin14 output is maximum, that is θ_{CEN}. (3) Change Tint to 127/0 and adjust the burst phase so that the 6th bar of Pin20 output is maximum, that is θ_{MAX} / θ_{MIN}. (4) Calculate; "$\Delta\ \theta_{MAX}$"=-(θ_{443MAX}- θ_{CEN}) "$\Delta\ \theta_{MIN}$"=-(θ_{443MIN}- θ_{CEN})
UV2	Color Control / G_{COLMAX} / G_{COLMIN}	RGB Mute:0 Color:0/64/127 Y Mute:1 Uni-Color:127 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Measure the Pin14 amplitude for Color 127/64/0, that is V_{COLMAX} / V_{COLCEN}/ V_{COLMIN}. (3) Calculate; "G_{COLMAX}"=20*log(V_{COLMAX}/V_{COLCEN}) "G_{COLMIN}"=20*log(V_{COLMIN}/V_{COLCEN})
UV3	contrast control for UV / G_{UCC}	RGB Mute:0 Uni-Color:0/127 Y Mute:1 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin38&43. (2) Measure the Pin20 amplitude for Uni-Color 127/0 that is V_{UCCMAX}, and V_{UCCMIN}. (3) Calculate;"G_{UCC}"=20*log(V_{UCCMIN}/V_{UCCMAX})
UV4	Relative Amplitude (PAL1) / $V_{P1R/B}$ / $V_{P1G/B}$ Relative Amplitude (PAL2) / $V_{P2R/B}$ / $V_{P2G/B}$ Relative Amplitude (NtsC1) / $V_{N1R/B}$ / $V_{N1G/B}$ Relative Amplitude (NTSC2) / $V_{N2R/B}$ / $V_{N2G/B}$	RGB Mute:0 Y Mute:0/1 Uni-Color:127 Others: Preset	(1) Input a 100IRE signal with sync into pin61. (2) Adjust G/B drive so that each amplitude of pin12/13/14 output are equal. (3) Set Y Mute to 1. (4) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (5) Measure the amplitude of Pin12/13/14 output, that is "VPROUT"/ "VPGOUT" / "VPBOUT" (6) Calculate; " $V_{P1R/B}$ "=VPROUT/VPBOUT " $V_{P1G/B}$ "=VPGOUT/VPBOUT (7) Set 'Demo P' to PAL2/NTSC1/NTSC2. (8) Repeat (6)&(7), that is "$V_{P2R/B}$"/" $V_{P2G/B}$"/ $V_{N1R/B}$"/" $V_{N1G/B}$"/" $V_{N2R/B}$"/" $V_{N2G/B}$".

Note	Items/Symbols	Bus conditions	Measurement methods
UV5	Relative Phase (PAL1) / $\theta_{PR\text{-}B}$ / $\theta_{PG\text{-}B}$ Relative Phase (PAL2) / $\theta_{N1R\text{-}B}$ / $\theta_{N1G\text{-}B}$ Relative Phase (NTSC1) / $\theta_{N2R\text{-}B}$ / $\theta_{N2G\text{-}B}$ Relative Phase (NTSC2) / $\theta_{DR\text{-}B}$ / $\theta_{DG\text{-}B}$	RGB Mute:0 Y Mute:1 Uni-Color:127 NTSC Phase: 0/1/2 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. (2) Observe the Pin12/13/14 output, measure the R/G/B modulation angle (θ_{PR}/ θ_{PG}/ θ_{PB}) according following figure and formula. $\theta p* = \{\theta o* - \mathrm{Arktag}(1/(2A/B+\mathrm{sqrt}(3)) - 15\}$  For θ_{P1R} ; Peak:3rd bar, θ_{0R}=90 For θ_{P1G} ; Peak(negative):4th bar, θ_{0G}=240 For θ_{P1B} ; Peak:6th bar, θ_{0B}=0 Calculate; " $\theta_{P1R\text{-}B}$"= θ_{P1R}- θ_{P1B} " $\theta_{P1G\text{-}B}$"= θ_{P1G}- θ_{P1B} (3) Set ' Demo-P' to 01, 10 and 11, and acquire each PAL2, NTSC1 and NTSC2 results with the same measurements.

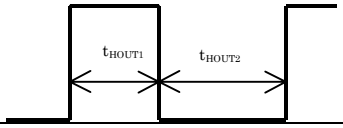
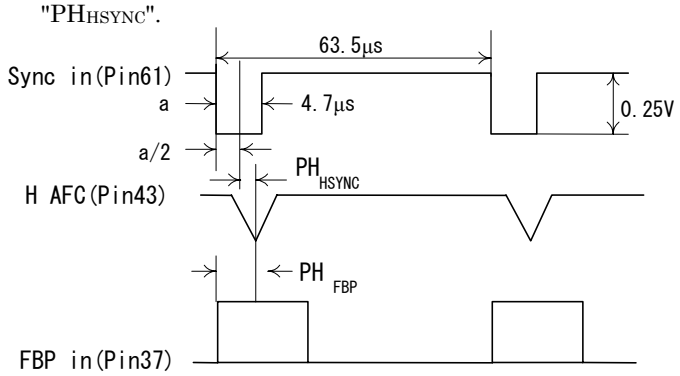
TEXT STAGE (RGB Mute:0 / RGB cut off:128 / DC rest.:2(100%) / WPS:1(off))

Note	Items/Symbols	Bus conditions	Measurement methods
T1	V-BLK Pulse Output Level / V_{VBLK} H-BLK Pulse Output Level / V_{HBLK}	All: Preset	(1) Input a composite sync signal into Pin61. (2) Measure the DC level of V/H blanking period at Pin14, that is "V_{VBLK}" / "V_{HBLK}".
T2	RGB Output Black Level (0IRE DC) / V_{BLACK}	RGB Mute:0 Color:0 B cut off:128 DC rest.:2(100%) Others: Preset	(1) Input a 0(IRE) Y signal with sync into Pin61. (2) Measure the DC level of picture period at Pin14, that is "V_{BLACK}".
T3	RGB Output White Level(100 IRE AC) / V_{WHITE}	RGB Mute:0 B cut off:128 DC rest.:2(100%) Uni-Color:127 Color:0 WPS:1(off) Others: Preset	(1) Input a 100(IRE)(=0.7Vp-p) Y signal with sync into Pin61. (2) Measure the amplitude from 0 to 100IRE at Pin14, that is "V_{WHITE}".
T4	Cut-off Voltage Variable Range / ΔV_{CUT+} / ΔV_{CUT-}	RGB Mute:0 DC rest.:2(100%) B Cut Off:0/255 Color:64 Brt; 64 Others: Preset	(1) Input a 0(IRE) Y signal with sync into Pin61. (2) Measure the DC level of picture period at Pin14 for B Cut-off:255/0 , that is V_{CUTMAX} / V_{CUTMIN}. (3) Calculate; " ΔV_{CUT+}"=V_{CUTMAX}-V_{BLACK} " ΔV_{CUT-}"=V_{CUTMIN}-V_{BLACK}
T5	Drive Control Variable Range / G_{DR+} / G_{DR-}	RGB Mute:0 DC rest.:2(100%) B Drive:0/127 Uni-Color:127 Color:0 WPS:1(OFF) Others: Preset	(1) Input a 100(IRE) (=0.7Vp-p) Y signal with sync into Pin61. (2) Measure the amplitude from 0 to 100IRE at Pin14 for B drive127/0, that is V_{DRMAX} / V_{DRMIN}. (3) Calculate; "G_{DR+}"=20*log(V_{DRMAX}/V_{WHITE}) "G_{DR-}"=20*log(V_{DRMIN}/V_{WHITE})
T6	ABCL Control Voltage Range / V_{ABCLH} / V_{ABCLL} ACL Gain / G_{ACL}	RGB Mute:0 B cut off:128 DC rest.:2(100%) ABL Gain:3 Uni-Color:127 Color:0 WPS:1(OFF) Others: Preset	(1) Input a 100(IRE) (=0.7Vp-p) Y signal with sync into Pin61. (2) Decreasing the Pin31 voltage, measure the voltage at which Pin14 output begins/stops decreasing, that is "VABCLH" / "VABCLL". (3) Measure the minimum amplitude of Pin14 output, that is VACLMIN. (4) Calculate; "GACL"=20*log(V_{ACLMIN}/V_{WHITE})
T7	ABL Start Point / V_{ABLP0} / V_{ABLP1} / V_{ABLP2} / V_{ABLP3}	RGB Mute:0 B cut off:128 DC rest.:2(100%) ABL Start Point: 0/1/2/3 ABL Gain:3 Uni-Color:127 Color:0 WPS:1(OFF) Others: Preset	(1) Input a 0(IRE) Y signal with sync into Pin61. (2) For ABL Point 0/1/2/3, decreasing the Pin31 voltage, measure the voltage at which Pin14 output begins decreasing, that is V_{ABL1}/V_{ABL2}/V_{ABL3}/V_{ABL4}. (3) Calculate; "V_{ABLP0}"=V_{ABL1}-V_{ABCLH} "V_{ABLP1}"=V_{ABL2}-V_{ABCLH} "V_{ABLP2}"=V_{ABL3}-V_{ABCLH} "V_{ABLP3}"=V_{ABL4}-V_{ABCLH}
T8	ABL Gain / V_{ABLG0} / V_{ABLG1} / V_{ABLG2} / V_{ABLG3}	RGB Mute:0 B cut off:128 DC rest.:2(100%) ABL Gain: 00/01/10/11 Uni-Color:127 Color:0 WPS:1(OFF) Others: Preset	(1) Input a 0(IRE) Y signal with sync into Pin61. (2) For ABL Gain 0/1/2/3, measure the DC level of picture period at Pin14 when Pin31 voltage is V_{ABCLL}, that is V_{ABL5}/V_{ABL6}/V_{ABL7}/V_{ABL8}. (3) Calculate; "V_{ABLG0}"=V_{ABL5}-V_{BLACK} "V_{ABLG1}"=V_{ABL6}-V_{BLACK} "V_{ABLG2}"=V_{ABL7}-V_{BLACK} "V_{ABLG3}"=V_{ABL8}-V_{BLACK}

Note	Items/Symbols	Bus conditions	Measurement methods
T9	Analog RGB Dynamic Range / DR_{TX}	RGB Mute:0 B cut off:128 DC rest.:2(100%) RGB Contrast:32 Ysm Mode:1 Others: Preset	(1) Input a composite sync signal into Pin61. (2) Supply 2.5V to Pin20. (3) Input a signal of following figure into Pin23. (4) Increasing the amplitude of Pin23 input, measure the amplitude at which the Pin14 amplitude stops increasing, that is "DR_{TX}". 
T11	Analog RGB Brightness Control Characteristic / $V_{TXBRMAX}$ / $V_{TXBRCEN}$ / $V_{TXBRMIN}$	RGB Mute:0 B cut off:128 DC rest.:2(100%) Brightness: 0/64/127 Others: Preset	(1) Supply 3V to Pin15. (2) Connect Pin21, 22 and 23 to GND via a 0.1uF of capacitor. (3) For Brightness 127/64/0, measure the DC level of picture period at Pin14, that is "$V_{TXBRMAX}$" / "$V_{TXBRCEN}$" / "$V_{TXBRMIN}$".
T12	Ysm Mode Switching Level /V_{YSANA} / V_{YSBLK}	RGB Mute:0 Others: Preset	(1) Input a composite sync signal into Pin61. (2) Input a signal of NOTE:T9 figure into Pin23. (3) More Increasing the Pin23 voltage, measure the voltage at which the signal inputted into Pin23 appears at Pin14, that is "V_{YSANA}". (4) Increasing the Pin23 voltage, measure the voltage at which the signal disappear at Pin14, that is "V_{YSBLK}".
T13	Analog RGB Mode Transfer Characteristic / τR_{YS} / tPR_{YS} / τF_{YS} / tPF_{YS}	RGB Mute:0 B cut off:128 DC rest.:2(100%) Others: Preset	(1) Input a 50(IRE) (=0.35Vp-p) Y signal with sync into Pin61. (2) Connect Pin21, 22 and 23 to GND via a 0.1uF capacitor. (3) Measure the Analog RGB Mode Transfer time, according to following figure, 
T14	Cross Talk from Analog RGB to TV / $CT_{TX\text{-}TV}$	RGB Mute:0 B cut off:128 DC rest.:2(100%) contrast:127 Others: Preset	(1) Input a composite sync signal into Pin61. (2) Connect Pin61 to GND via a 1uF capacitor. (3) Input a sine wave signal (f=4MHz, Video amplitude=0.5V(p-p)) into Pin23. (4) Supply 0V to Pin20. (5) Measure the amplitude at Pin14, that is V_{TV}. (6) Supply 2.5V to Pin20. (7) Measure the amplitude of 4MHz signal at Pin14, that is V_{TX}. (8) Calculate; "$CT_{TX\text{-}TV}$"=20*log(V_{TV}/ V_{TX})

Note	Items/Symbols	Bus conditions	Measurement methods
T15	Cross Talk from TV to Analog RGB / CT_{TV-TX}	RGB Mute:0 R cut off:128 DC rest.:2(100%) Ysm Mode:1 Uni-color:127 RGB contrast:63 Others: Preset	(1) Input a sine wave signal (f=4MHz, Video amplitude=0.5V(p-p)) with sync into Pin61. (2) Connect Pin21, 22 and 23 to GND via a 0.1uF capacitor. (3) Supply 2.5V to Pin20. (4) Measure the amplitude at Pin14, that is V_{TX}. (5) Supply 0V to Pin20. (6) Measure the amplitude of 4MHz signal at Pin14, that is V_{TV}. (7) Calculate; "CT_{TV-TX}"=20*log(V_{TX}/ V_{TV})
T17	Analog RGB／RGB Output Voltage Axes Difference ／ΔV_{R-G} ／ΔV_{G-B} ／ΔV_{B-R}	RGB Mute:0 R/G/B cut off:128 Brightness:63 DC rest.:2(100%) Color:0 Uni-color:127 Others: Preset	(1)Input a 0IRE signal with sync into Pin61. (2)Connect Pin21, 22 and 23 to GND via 0.01 μ F. (3)Measure the DC level of picture period at Pin12, 13 and 14, that is $R_Y/G_Y/B_Y$. (4)Supply Pin15 to 2.5V. (5) Measure the DC level of picture period at Pin12, 13 and 14, that is $R_T/G_T/B_T$. (6)Calculate; $\Delta R = R_T - R_Y$ $\Delta G = G_T - G_Y$ $\Delta B = B_T - B_Y$ "ΔV_{R-G}" = $\Delta R - \Delta G$ "ΔV_{G-B}" = $\Delta G - \Delta B$ "ΔV_{B-R}" = $\Delta B - \Delta R$
T18	RGB Mute DC level $V_{RGBMUTE}$	RGB Mute:0/1 R/G/B cut off:128 Brightness:63 DC rest.:2(100%) Color:0 Uni-color:127 Others: Preset	(1)Input a 0IRE signal with sync into Pin61. (2)Set the IICBUS switch of RGBMUTE to 1 (3)Connect Pin21, 22 and 23 to GND via 0.01 μ F. (4)Measure the DC level of picture period at Pin 14, that is $V_{RGBMUTE}$ (5)Reset RGBMUTE to 0 and set Blueback to 1 (6)Measure the DC level of picture period at Pin 14, that is V_{BB}
UV6	Half Tone Characteristics for Y / G_{HTY}	Ysm Mode:0 Uni-Color:127 Color:0 RGB Mute:0 R cut off:128 DC rest.:2(100%) Others: Preset	(1) Input a 100(IRE) (=0.7Vp-p) white signal with sync into Pin61. (2) Measure the output picture amplitude at Pin14 that is V_{HTYOFF}. (3) Supply Pin20 1.5V. (4) Measure the output picture amplitude at Pin14 that is V_{HTYON} . Calculate;"G_{HTY}"=20*log(V_{HTYON}/V_{HTYOFF})
UV7	Half Tone Characteristics for C / G_{HTC}	RGB Mute:0 Y Mute:1 Uni-Color:127 Others: Preset	(1) Input a 4.43MHz PAL rainbow color-bar(300mV(p-p), burst:chroma=1:1) with sync into Pin61. . (2) Supply Pin15 1.5V and measure the amplitude of Pin14 output, that is V_{PBHTC}. (3) Calculate; (V_{PBOUT}:see C7) "G_{HTC}"=20*log(V_{PBHTC}/V_{PBOUT})

DEF STAGE

Note	Items/Symbols	Bus conditions	Measurement methods
D1	AFC Inactive Period / $T_{50AFCOFF}$ / $T_{60AFCOFF}$	All: Preset	(1) Input a 50Hz/60Hz composite sync signal into Pin61. (2) Measure "$T_{50AFCOFF}$" / "$T_{60AFCOFF}$" at Pin43. (cf. Fig.D1)
D2	H-OUT Start Voltage / V_{HON}	All: Preset	(1) Let Pin11, 25, 67and 74 be open. (2) Increasing Pin45 voltage, measure the voltage at which H OUT pulse appears at Pin39, that is "V_{HON}".
D3	H-OUT Pulse Duty / W_{HOUT}	All: Preset command IIC read	(1) Measure t_{HOUT1} & t_{HOUT2} at Pin39. (2) Calculate ;"W_{HOUT}"=t_{HOUT1}/(t_{HOUT1}+t_{HOUT2})*100 
D4	H-OUT Freq. on AFC Stop Mode / $F_{HAFCOFF}$	AFC Gain:11 (OFF) Others: Preset	(1) Input a 50Hz composite sync signal into Pin61. (2) Measure the H OUT frequency at Pin32, that is "$F_{HAFCOFF}$".
D5	Horizontal Free-run Frequency / F_{HFR}	V-Freq:001/010 Others: Preset	(1) Measure the H OUT frequency at Pin61, that is "F_{H50FR}" / "F_{H60FR}".
D6	Horizontal Freq. Variable Range / F_{HMAX} / F_{HMIN}	All: Preset	(1) Connect Pin43 to Vcc via a 10kΩ and measure the H OUT frequency at Pin39, that is "F_{HMIN}". (2) Connect Pin43 to GND via a 68kΩ and measure the H OUT frequency at Pin39, that is "F_{HMAX}".
D7	Horizontal Freq. Control Sensitivity / β_{HAFC}	All: Preset	(1) Measure the Pin39 voltage at which H OUT frequency is 15.734kHz, that is V_{H15734}. (2) Measure the H OUT frequency when Pin43 voltage is V_{H15734} + 50mV /V_{H15734} - 50mV, that is F_{HLOW} / F_{HHIGH}. (3) Calculate;"β_{HAFC}"=(F_{HHIGH}-F_{HLOW})/100
D8	Horizontal Pull-in Range / ΔF_{HPH} / ΔF_{HPL}	All: Preset	(1) Input a composite sync signal into Pin61. (2) Decreasing the horizontal frequency from 17kHz, measure the frequency at which H OUT synchronized with Sync in(Pin61), that is F_{HPH}. (3) Increasing the horizontal frequency from 14kHz, measure the frequency at which H OUT synchronized with Sync in(Pin61), that is F_{HPL}. (4) Calculate; "ΔF_{HPH}"=F_{HPH}-15734 "ΔF_{HPL}"=15625-F_{HPL}
D9	H-OUT Voltage / V_{HOUTH} / V_{HOUTL}	All: Preset	(1) Measure the high level of H OUT at Pin39, that is "V_{HOUTH}". (2) Measure the low level of H OUT at Pin39, that is "V_{HOUTL}".
D10	Horizontal Freq. Dependence on Vcc / ΔF_{HVCC}	All: Preset	(1) Measure the H OUT frequency when H Vcc(Pin45) is 8.5V/9.5V, that is F_{HVCCH}/F_{HVCCL}. (2) Calculate;"ΔF_{HVCC}"=(F_{HVCCH}-F_{HVCCL})/1
D11	FBP Phase / PH_{FBP} H-Sync. Phase / PH_{HSYNC}	All: Preset	(1) Input a composite sync signal into Pin61. (2) According to the following figure, measure "PH_{FBP}" & "PH_{HSYNC}". 

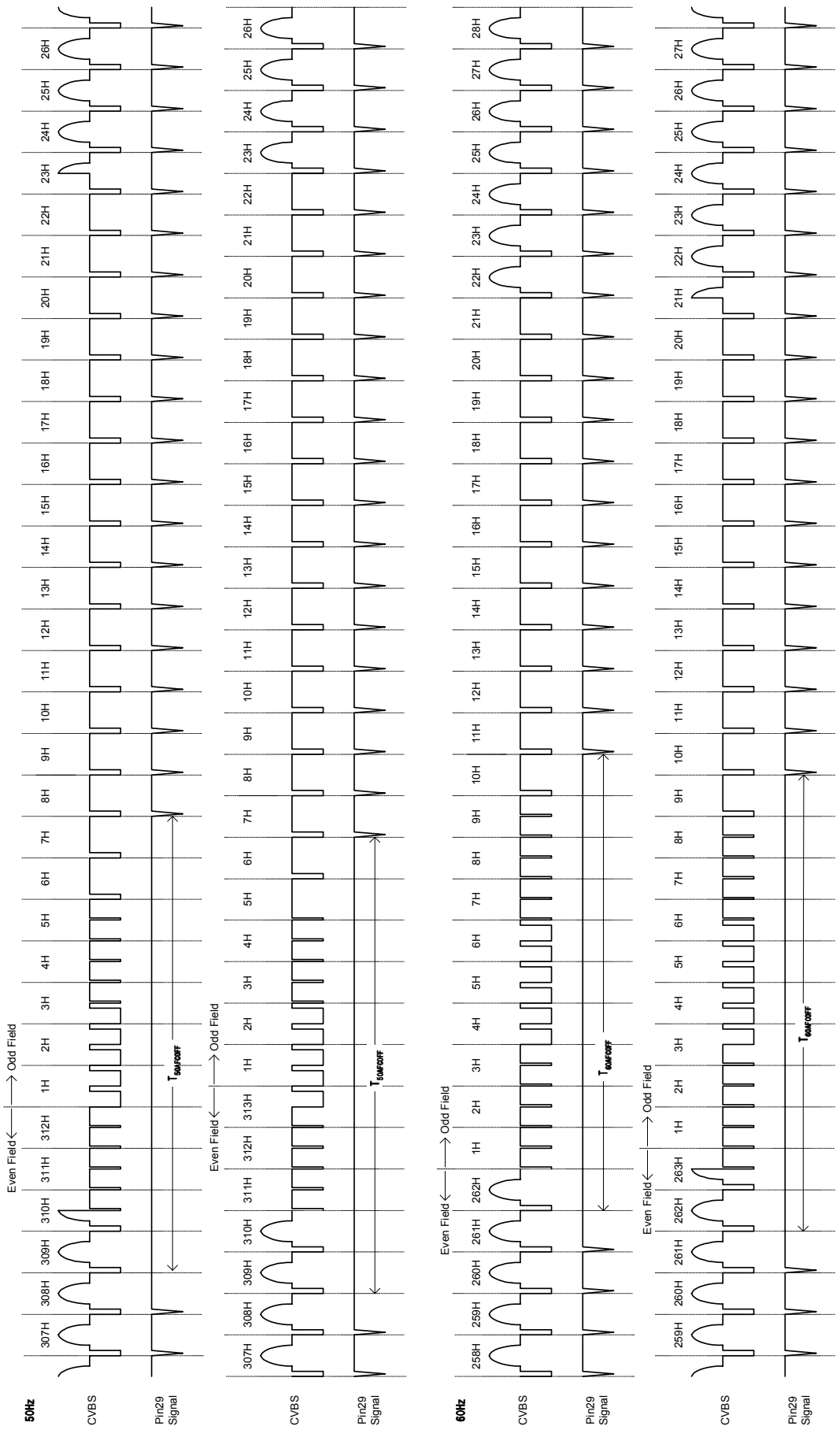
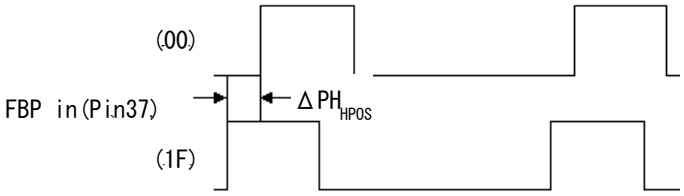
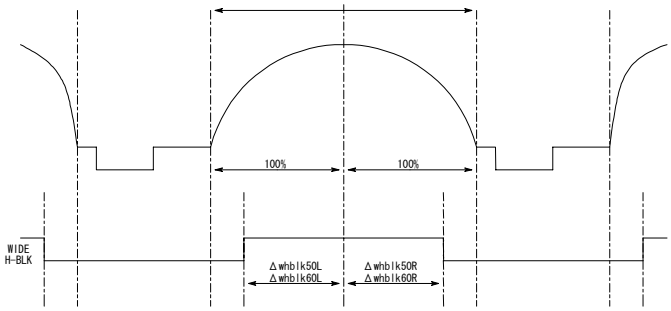
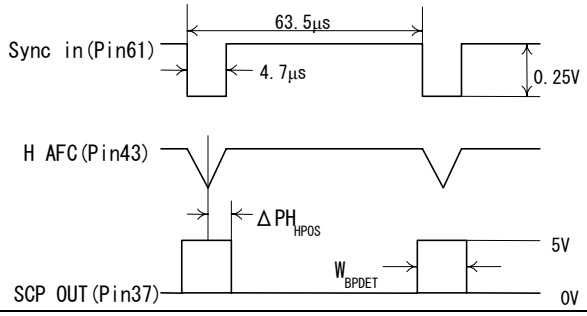
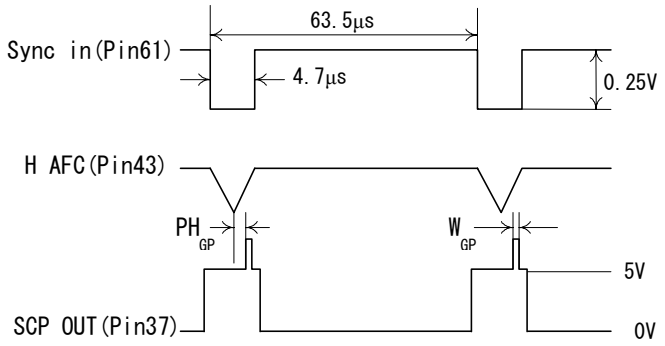

50Hz
CVBS
Pin29 Signal
Even Field
Odd Field
60Hz
CVBS
Pin29 Signal
Even Field
Odd Field

Fig. D1

Note	Items/Symbols	Bus conditions	Measurement methods
D12	Horizontal Position Variable Range / ΔPH_{HPOS} / ΔPH_{HCOR+} / ΔPH_{HCOR-}	H Position:0/31 Others: Preset	(1) Input a composite sync signal into Pin61. (2) Changing BUS data of "Horizontal Position" from 0 to 31, measure "ΔPH_{HPOS}" according to the following figure.  (3) Measure the H phase where the pin #73 (Hcorr) is opened and the HPOS is 16 (4) Measure the H phase shift form (3) when supply 5.5V for pin #73, that is ΔPH_{HCOR+}. (5) Measure the H phase shift from (3) when supply 0.5V for pin #73, that is ΔPH_{HCOR-}.
D13	AFC-2 Pulse Threshold Level / V_{AFC2}	All: Preset	(1) Input a composite sync signal into Pin61. (2) Decreasing the FBP high level, measure the DC level at which H OUT phase changes against Sync in(Pin61) phase, that is "V_{AFC2}".
D14	H-BLK Pulse Threshold Level / V_{HBLK} $\Delta W_{WHBLK50L}$ $\Delta W_{WHBLK50R}$ $\Delta W_{WHBLK60L}$ $\Delta W_{WHBLK60R}$	RGB Mute:0 contrast:127 Others: Preset	(1) Input a composite sync signal into Pin61. (2) Increasing the FBP high level, measure the DC level at which H blanking begins to work, that is "V_{HBLK}". (3) Measure as the figure below when the IICBUS of 'W-HBLK=1' and when input 50/60Hz of V freq. 
D15	Black Peak Det. Stop Period (H) / PH_{BPDET} / W_{BPDET}	TEST:00001000 Black Stretch:01 Others: Preset	(1) Input a composite sync signal into Pin61. (2) According to the following figure, measure "PH_{BPDET}" & "W_{BPDET}". 

Note	Items/Symbols	Bus conditions	Measurement methods
D16	Gate Pulse Start Phase / PH_{GP} Gate Pulse Width / W_{GP}	All: Preset	(1) Input a composite sync signal into Pin61. (2) According to the following figure, measure "PH_{GP}" & "W_{GP}". 
D18	Vertical Free-run Frequency / $F_{VAUFR50}$ / $F_{VAUFR60}$ / F_{V50FR} / F_{V60FR}	V-Freq: 0/1/2 Others: Preset	(1) Input a 50Hz composite sync signal into Pin61. (2) Set V-Freq to 0. (3) For no input, measure the frequency of V Ramp at Pin46, that is "$F_{VAUFR50}$". (4) Input a 60Hz composite sync signal into Pin61. (5) Repeat (2)&(3), that is "$F_{VAUFR60}$" (6) Set V-Freq. To 1/2, repeat (2), that is "F_{V50FR}" / "F_{V60FR}".
D19	Gate Pulse V-Masking Period / T_{50GPM} / T_{60GPM}	All: Preset	(1) Input a 50Hz/60Hz composite sync signal into Pin61. (2) Measure "T_{50GPM}" / "T_{60GPM}" at Pin37. (cf. Fig.D19)

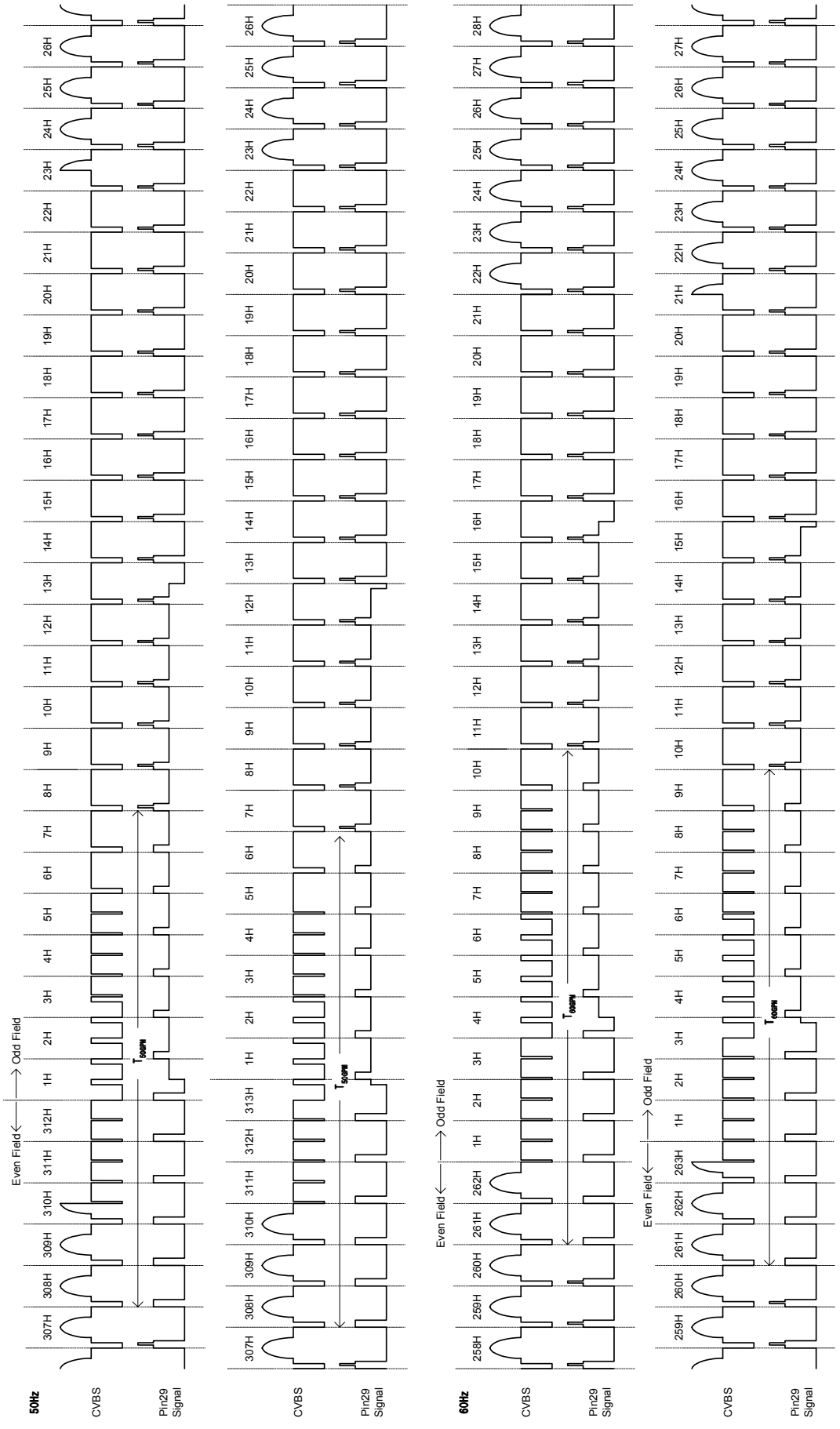
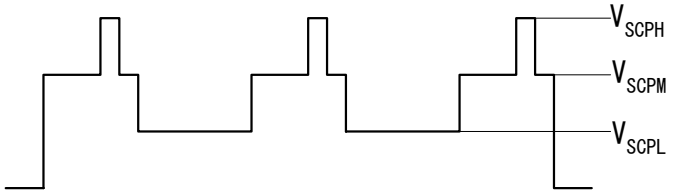

50Hz
CVBS
Pin29 Signal
Even Field
Odd Field
60Hz
CVBS
Pin29 Signal
Even Field
Odd Field

Fig. D19

Note	Items/Symbols	Bus conditions	Measurement methods
D20	V. Ramp DC on Service Mode / $V_{NOVRAMP}$	V STOP:1 Others: Preset	(1) Set V STOP to 1. (2) Measure the DC level of Pin47, that is "$V_{NOVRAMP}$".
D21	Vertical Pull-in Range (Auto) / F_{VPAUL} / F_{VPAUH} Vertical Pull-in Range (50Hz) / F_{VP50L} / F_{VP50H} Vertical Pull-in Range (60Hz) / F_{VP60L} / F_{VP60H}	V-Freq:0/1/2 Others: Preset	(1) Input a composite sync signal into Pin61. (2) For V-Freq 0/1/2, increasing the input vertical period from 220H by 0.5H step, measure the period at which input signal synchronized with V Ramp(Pin46), that is "F_{VPAUL}" /" F_{VP50L}"/ "F_{VP60L}". (3) For V-Freq 0/1/2, decreasing the input vertical period from 360H by 0.5H step, measure the period at which input signal synchronized with V Ramp, that is "F_{VPAUH}" /" F_{VP50H}"/ "F_{VP60H}".
D22	Vertical Period on Fixed Mode / T_{V3125} / T_{V2625} / T_{V313} / T_{V263}	V-Freq:4/5/6/7 Others: Preset	(1) For V-Freq 4/5/6/7, measure the vertical period at SCP out (Pin37), that is "$T_{V312.5}$"/"$T_{V262.5}$" / "T_{V313}"/"T_{V263}" .
D23	VD Start Phase / PH_{50VD} / PH_{60VD} VD Width / W_{50VD} / W_{60D}	All: Preset	(1) Input a 50Hz/60Hz composite sync signal into Pin61. (2) Measure " PH_{50VD} " / " W_{50VD} " and " PH_{60VD} " / " W_{60VD} at Pin40. (cf. Fig.D23)
D24	V-BLK Start Phase / PH_{50VBLK} / PH_{60VBLK} V-BLK Width / W_{50VBLK} / W_{60VBLK}	All: Preset	(1) Input a 50Hz/60Hz composite sync signal into Pin61. (2) Measure " PH_{50VBLK} " / " W_{50VBLK} " and " PH_{60VBLK} " / " W_{60VBLK} "at Pin14.
D25	Sand Castle Pulse Level / V_{SCPH} / V_{SCPM} / V_{SCPL}	All: Preset	(1) Measure "V_{SCPH}" / "V_{SCPM}" / "V_{SCPL}" at Pin37. 
D26	V Ramp Amplitude / V_{VRAMP} / $V_{VOUT,}$ / $V_{VOUT\ MAX}$ / $V_{VOUT\ MIN}$ / $V_{\ OUTDC}$	All: Preset	(1) Measure the V Ramp amplitude at Pin46, that is "V_{VRAMP}". (2) Measure the V Ramp amplitude at pin #47, that is "V_{OUT}" (3) Measure the V Ramp increasing ratio at pin #47 at when 'V Size' = Max, that is "$R_{VOUT\ MAX}$" (4) Measure the V Ramp decreasing ratio at pin #47 at when 'V Size' = 01, that is "$R_{VOUT\ MIN}$" (5) Measure the V Ramp dc voltage at pin #47 at when 'V Size' = 00, that is " $V_{\ OUTDC}$ " (6) Measure the V Ramp dc voltage at pin #47 at when 'V Size' = 00 and 'V cent'=MAX, let it '$V_{\ MAXDC}$' " $V_{\ CENT\ MAX}$ " = ('$V_{\ MAXDC}$' - " $V_{\ OUTDC}$ ") / "V_{OUT}" (7) Measure the V Ramp dc voltage at pin #47 at when 'V Size' = 00 and 'V cent'=Min, let it '$V_{\ MINDC}$' " $V_{\ CENT\ MAX}$ " = ('$V_{\ MINDC}$' - " $V_{\ OUTDC}$ ") / "V_{OUT}"

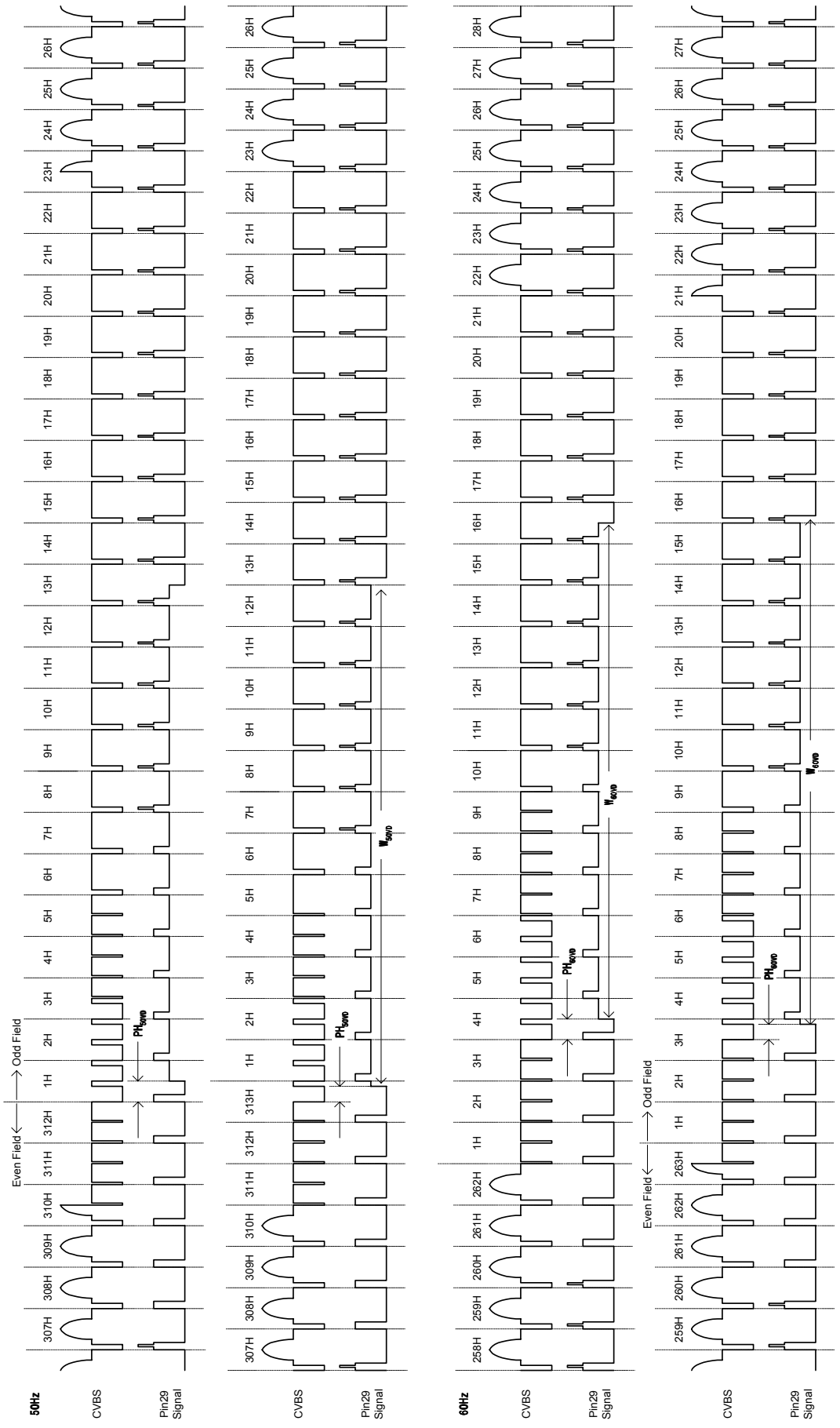
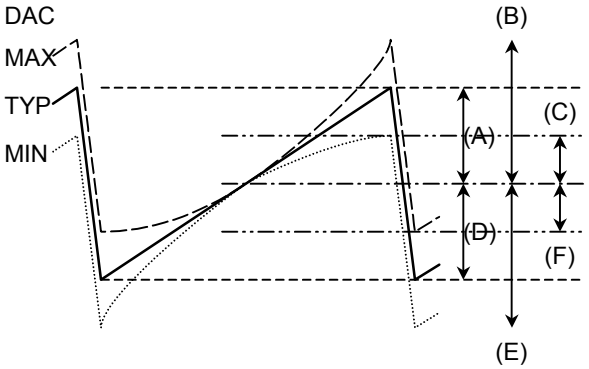
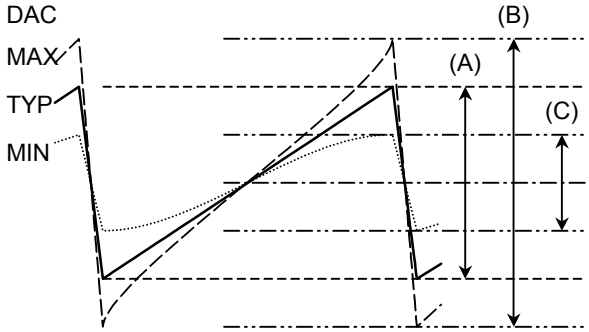
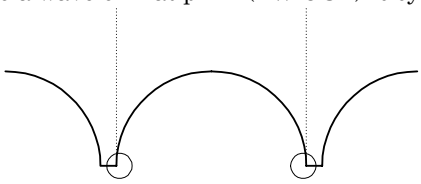
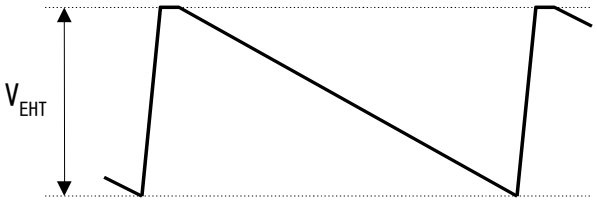
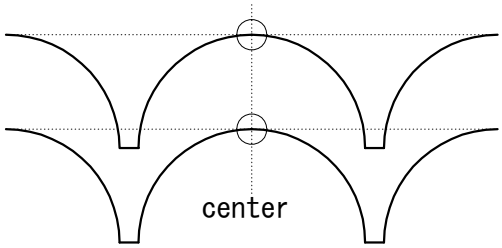
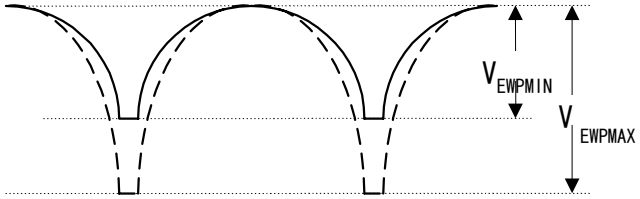
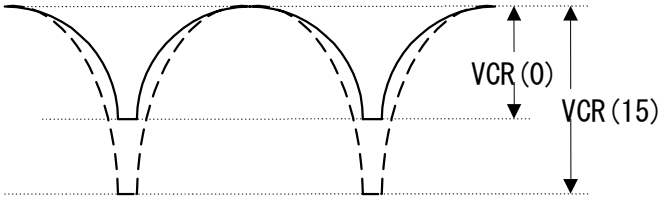
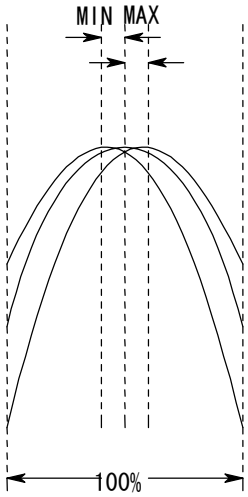
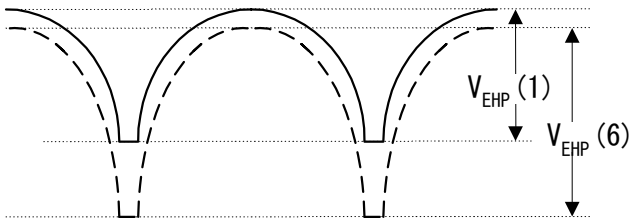

50Hz
CVBS
Pin29 Signal
Even Field
Odd Field
60Hz
CVBS
Pin29 Signal
Even Field
Odd Field

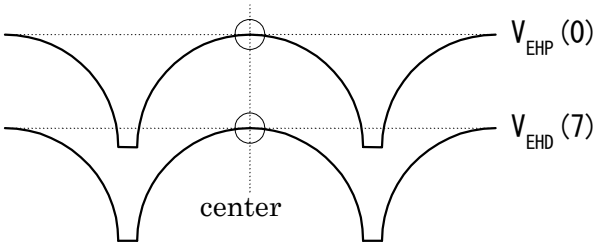
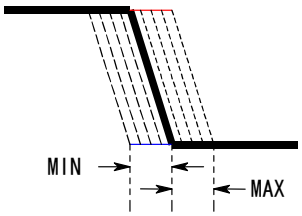
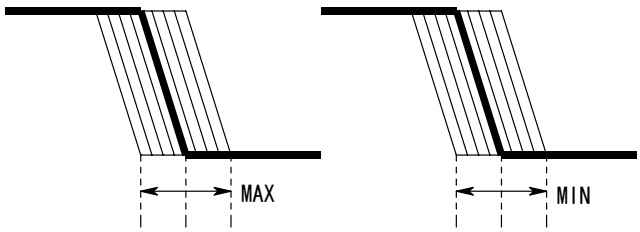
Fig. D23

Note	Items/Symbols	Bus conditions	Measurement methods
D27	Vertical Linearity Variable Range / ΔV_{LIN}	V Linearity:0/8/15 Others: Preset	(1) Supply 6V into pin28(EHT in). (2) Measure the levels of the A - F in the following figure in setting the V-Lin for each. (3) Calc the "V-LIN" with this formula. V-Lin = {(B – C) + (E - F)} / {2 x (A + D)} x 100% 
D28	Vertical S Correction Variable Range / $\Delta V_{S(+)}$ / $\Delta V_{S(-)}$	V S Corr.:0/8/15 Others: Preset	(1) Supply 6V into pin28(EHT in). (2) Measure the levels of the A - F in the following figure in setting the V-S for each. (3) Calc the "V-LIN" with this formula. V-S(+) = (A – B) / A x 100% V-S(-) = (A – C) / A x 100% 

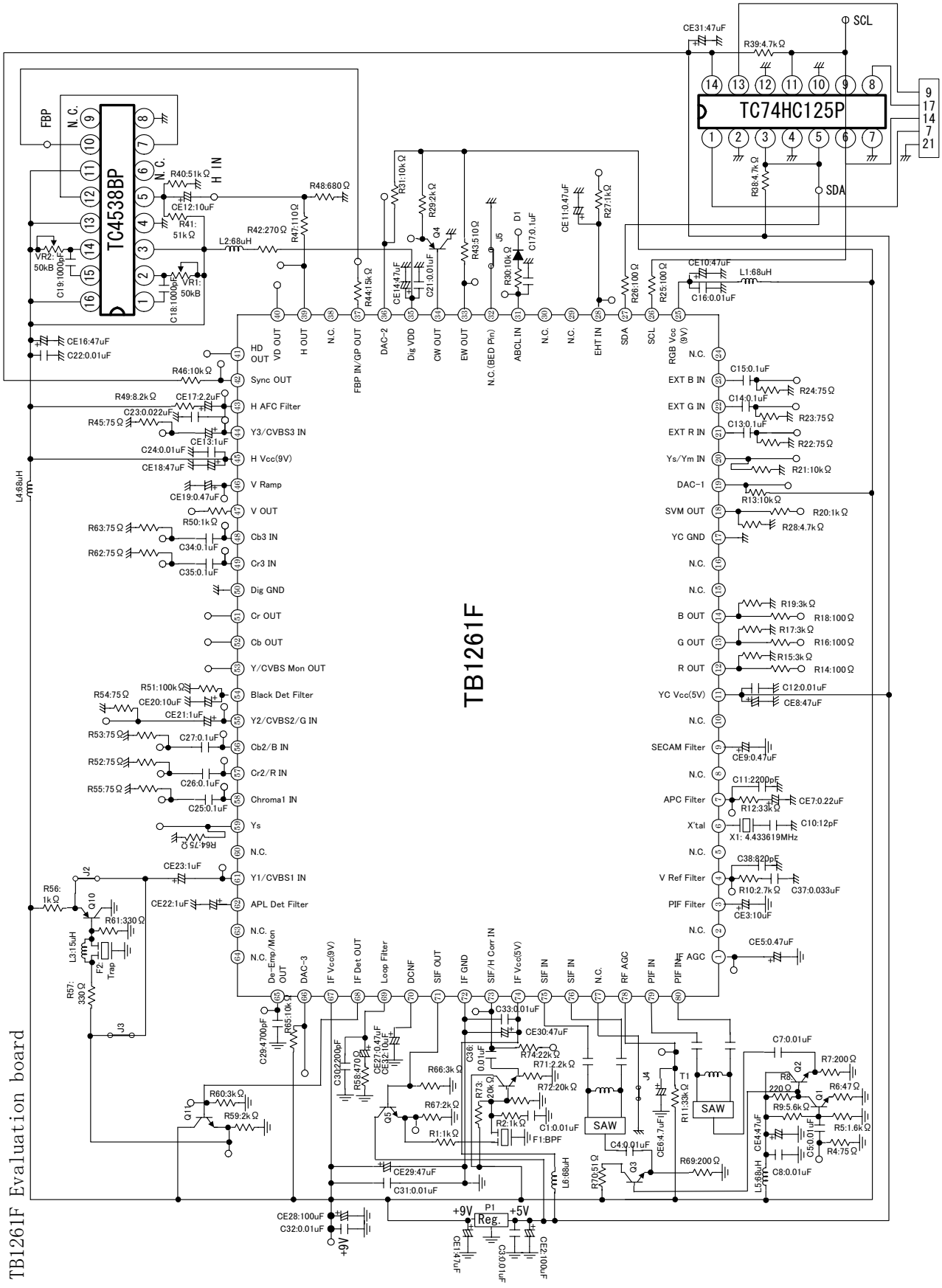
Note	Items/Symbols	Bus conditions	Measurement methods
D29	Vertical Amplitude EHT Correction /ΔV_{EHT}	Parabola correction: 32/63 Trapezium correction: 0~31 V.EHT:0/7 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin41(EW OUT) is symmetrical.  (2) Set the BUS data of Parabola correction to 32(CEN). (3) Supply 1V into pin28(EHT in). (4) Set the BUS data of V.EHT to 0(MIN). (5) Measure the amplitude of waveform at pin47(V out),that is $V_{EHT}(00)$. (6) Set the BUS data of V.EHT to 7(MAX). (7) Measure the amplitude of waveform at pin47(V out),that is $V_{EHT}(07)$. (8) $\Delta V_{EHT} = (V_{EHT}(00) - V_{EHT}(07)) / V_{EHT}(00)) \times 100\%$  Pin47 Waveform
D30	E-W H Size / $V_{EWDCMAX}$ / $V_{EWDCMIN}$	Parabola correction: 32/63 Trapezium correction: 0~31 Horizontal size:0/63 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin33(EW OUT) is symmetrical. (2) Set the BUS data of Parabola correction to 32(CEN). (3) Supply 6V into pin28(EHT in). (4) Set the BUS data of Horizontal size to 0(MAX). Measure the voltage at pin33(EW OUT),that is "$V_{EWDCMAX}$". (5) Set the BUS data of Horizontal size to 63(MIN). Measure the voltage at pin33(EW OUT),that is "$V_{EWDCMIN}$".  Pin41 Waveform

Note	Items/Symbols	Bus conditions	Measurement methods
D35	E-W Parabolic / V_{EWPMAX} / V_{EWPMIN}	Parabola correction: 0/63 Trapezium correction: 0~31 Horizontal size:32 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin33(EW OUT) is symmetrical. (2) Set the BUS data of Horizontal size to 32(CEN). (3) Supply 6V into pin28(EHT in). (4) Set the BUS data of Parabola correction to 0(MAX). Measure the amplitude of waveform at pin33(EW OUT),that is " V_{EWPMAX}". (5) Set the BUS data of Parabola correction to 63(MIN). Measure the amplitude of waveform at pin33(EW OUT),that is " V_{EWPMIN} ".  Pin33 Waveform
D36	E-W Corner / $V_{EWCTMAX}$ / $V_{EWCTMIN}$ / $V_{EWCBMAX}$ / $V_{EWCBMIN}$	Parabola correction:0 Trapezium correction:0~31 Corner correction: 0/15 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin33(EW OUT) is symmetrical. (2) Set the BUS data of Parabola correction to 0(MAX). (3) Supply 6V into pin28(EHT in). (4) Set the BUS data of Corner correction to 0. (5) Measure the amplitude of waveform at pin33(EW OUT),that is $V_{CR}(0)$. (6) Set the BUS data of Corner correction to 15. (7) Measure the amplitude of waveform at pin33(EW OUT),that is $V_{CR}(15)$. (8) $V_{COR} = V_{CR}(15) - V_{CR}(0)$  Pin33 Waveform

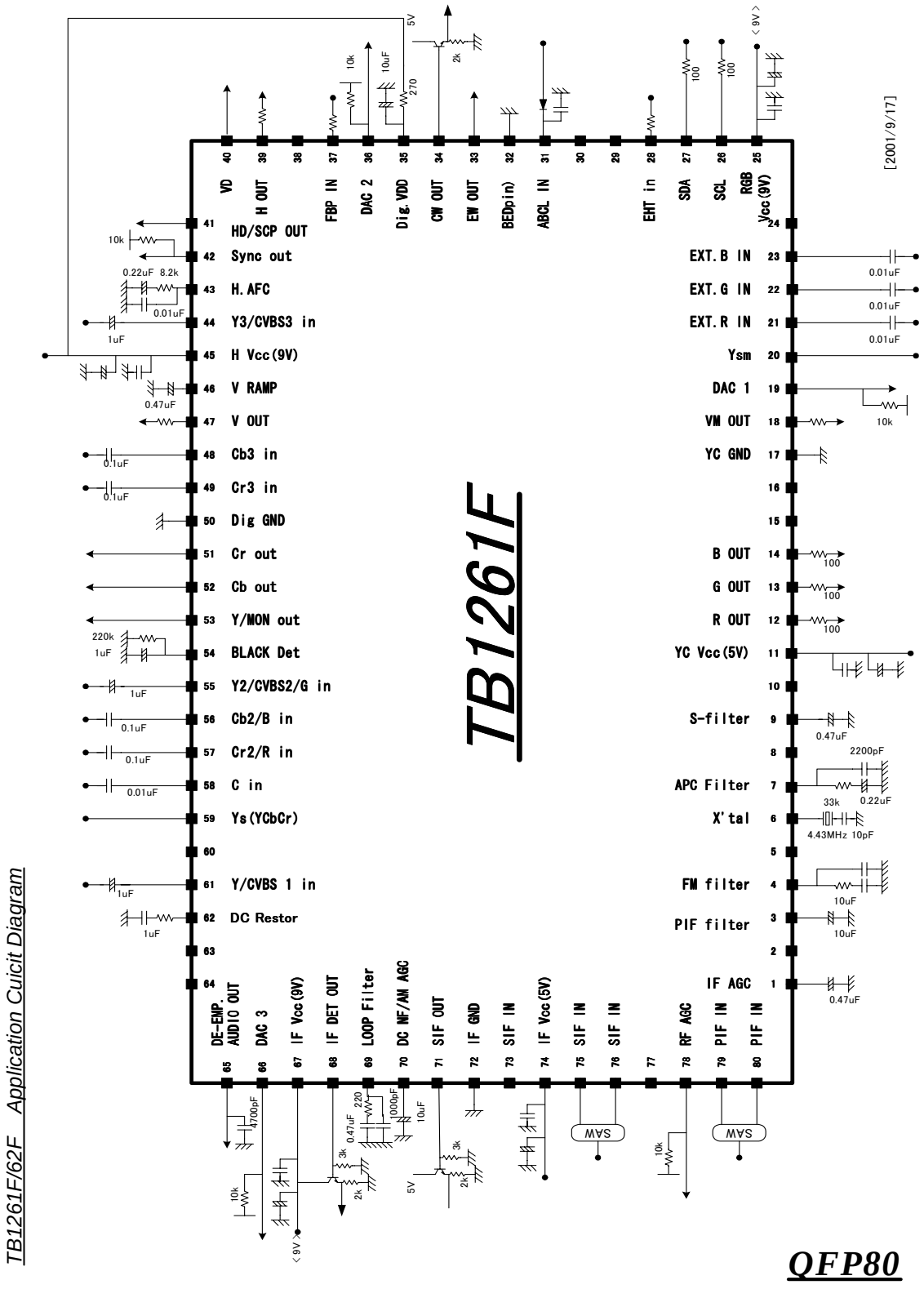
Note	Items/Symbols	Bus conditions	Measurement methods
D37	E-W Trapezium Correction / V_{TRMAX} / V_{TRMIN}	Trapezium correction: 0/31 Others: Preset	(1) Set the BUS data of 'EW Trape' so as to hit the peak at the center of the V period. (2) Set the BUS data of Trapezium correction to 0. (3) Measure the % of the shifts. (4) Set the BUS data of Trapezium correction to 63. (5) Measure the % of the shifts. 
D38	E-W Parabolic EHT Correction / $\Delta V_{EWP\ EHT}$	Trapezium correction:0~31 H.EHT:7 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin33(EW OUT) is symmetrical. (2) Set the BUS data of H.EHT to 7. (3) Supply 6V into pin28(EHT in). (4) Measure the amplitude of waveform at pin34(EW OUT),that is $V_{EHP}(6)$. (5) Supply 1V into pin28(EHT in). (6) Measure the amplitude of waveform at pin33(EW OUT),that is $V_{EHP}(1)$. (7) $\Delta V_{EWP\ EHT}=(V_{EHP}(6)-V_{EHP}(1))/V_{EHP}(6)\times 100\%$  Pin33 Waveform

Note	Items/Symbols	Bus conditions	Measurement methods
D39	E-W DC EHT Correction / $V_{EWDCEHT}$	Trapezium correction: 0~31 H.EHT:0/7 Others: Preset	(1) Set the BUS data of Parabola correction to 0(MAX),and change the BUS data of Trapezium correction so that the parabola waveform at pin33(EW OUT) is symmetrical. (2) Supply 1V into pin28(EHT in). (3) Set the BUS data of H.EHT to 0. (4) Measure the vertical phase center voltage of waveform at pin33(EW OUT),that is $V_{EHD}(0)$. (5) Set the BUS data of H.EHT to 7. (6) Measure the vertical phase center voltage of waveform at pin33(EW OUT),that is $V_{EHD}(7)$. (7) $V_{EWDCEHT} = V_{EHD}(0) - V_{EHD}(7)$  Pin33 Waveform
D40	H-Bow Correction H-Parallelogram Correction / $T_{HBOWMAX}$ / $T_{HBOWMIN}$ / $T_{HPARAMAX}$ / $T_{HPARAMIN}$		(1) Let the phase of the HOUT falling edge by to the H sync is Origin when HBAW = 4 (cent). (2) Measure the phase shifting when H BAW= 0 and 7, that is $T_{HBOWMAX}$ / $T_{HBOWMIN}$. (3) Measure the phase shifting when H PARA= 0 and 7, that is $T_{HPARAMAX}$ / $T_{HPARAMIN}$  H-Bow Correction  H-Parallelogram Correction
D41	Noise Det level V_{NDET3} V_{NDET15}		(1) Input CVBS signals with 10MHz of sin wave for #61(CVBS1in) (2) Set the IICBUS of 'Nose Det Level' to 3 (3) Measure the input sin wave amplitude at the level which the Read bus of NOISE det turned to 1, that is 1VNDET3. (4) Set the IICBUS of 'Nose Det Level' to 15 (5) Measure the same way as (3), that is 1VNDET3.

11, Evaluation board shema



12, Application circuit

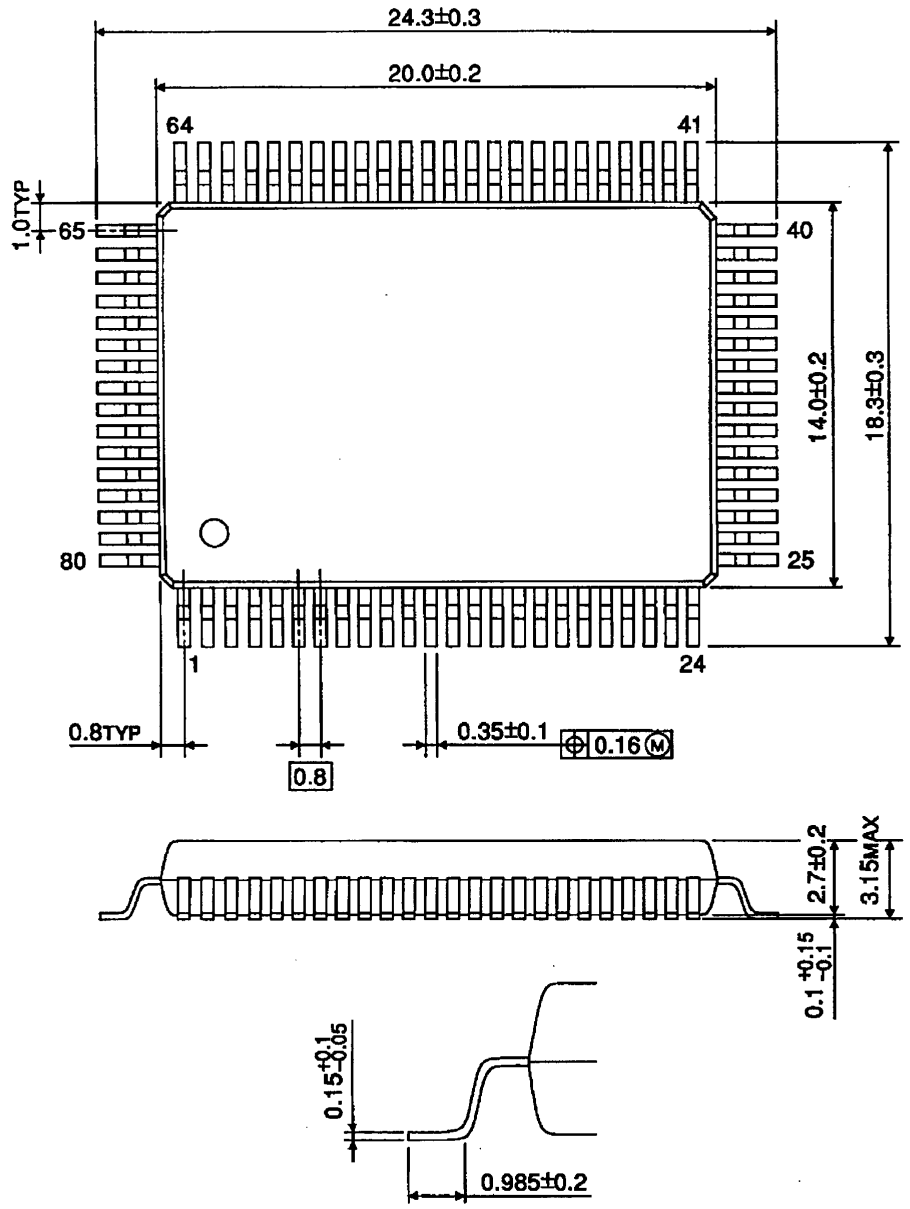


TB1261F/62F Application Cuicit Diagram

QFP80

13, OUTLINE DRAWING

QFP80-P-1420-0.80C Unit : mm



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