

# M61250BFP

## NTSC 1 chip TV signal processor

REJ03F0088-0100Z

Rev.1.0

Sep.23.2003

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### Description

The M61250BFP is a single-chip semiconductor integrated circuit that contains the signal processing for NTSC color television.

All of the signal processing circuits for video intermediate frequencies, vocal intermediate frequencies, video, color, and polarization, as well as I<sup>2</sup>C bus control, are built in, and television sets ranging from popular-class to medium-grade sets are supported. Moreover, the M37150 8-bit microcomputer for the television and the interconnection pin are opposite each other, so that less space is required for mounting.

### Features

- No VCO coil for VIF required
- Internal unregulated vocal demodulator
- PLL-SPLIT SIF system for FM radio
- Fsc output
- ACL or ABCL can be selected
- Internal horizontal oscillation probe
- Internal perpendicular sawtooth wave generator
- Internal self-diagnosis function
- Internal black peak hold, AFC2, killer filter
- H & V pulse output for OSD
- Internal reset circuit and clock output for microcomputer use
- Internal 5 V and 8 V regulators

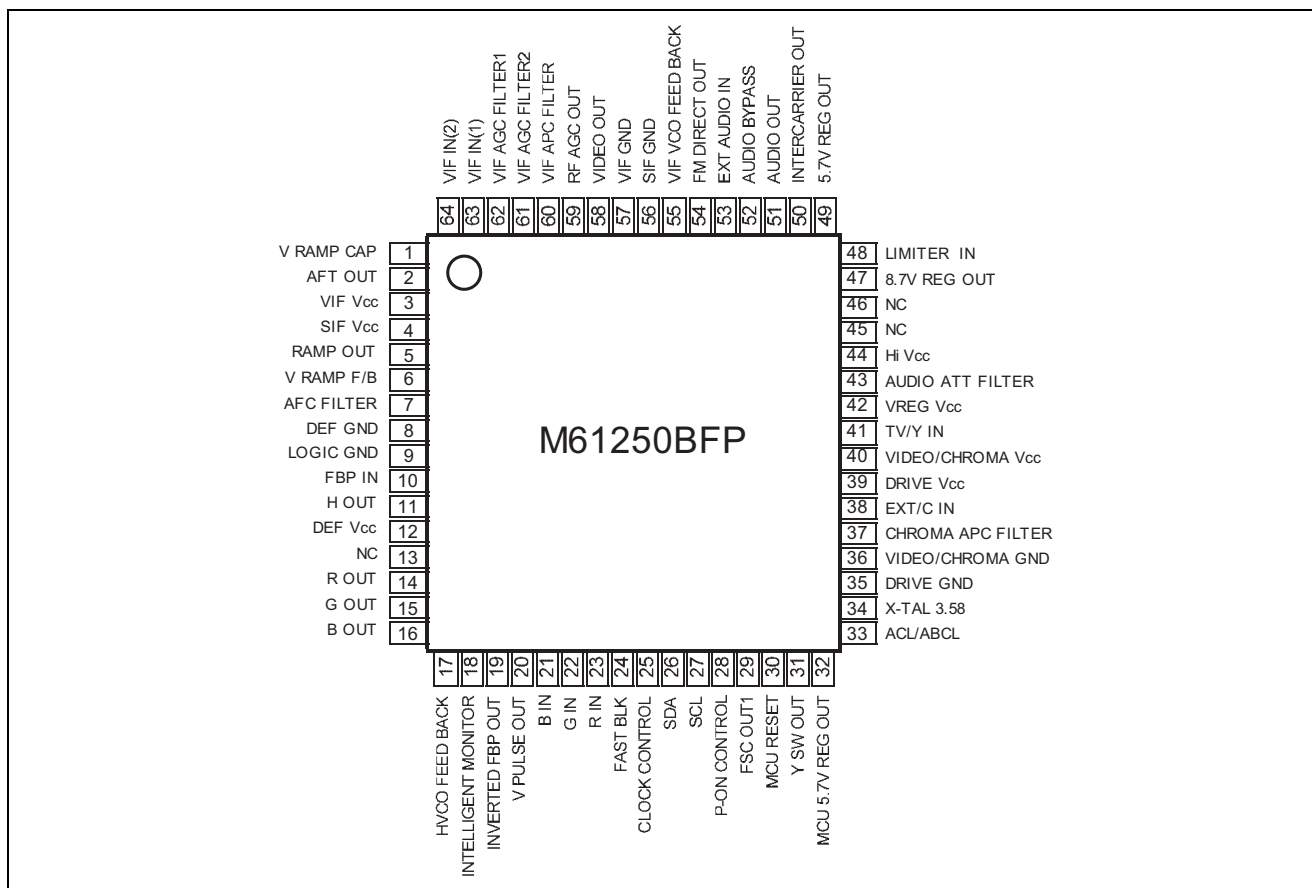
### Applications

- NTSC color television receivers

### Recommended Operating Conditions

- Power supply voltage range:
  - 4.75 V to 5.25 V (Pins 3, 4, 39, 40)
  - 7.6 V to 8.4 V (Pins 12, 44)
  - 8.3 V to 9.1 V (Pin 42)
- Recommended power supply voltage:
  - 5.0 V (Pins 3, 4, 39, 40)
  - 8.0 V (Pins 12, 44)
  - 8.7 V (Pin 42)

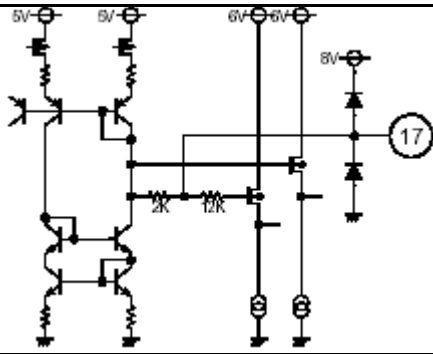
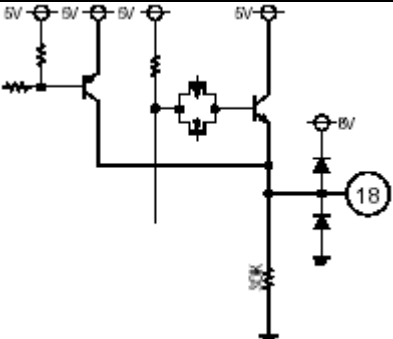
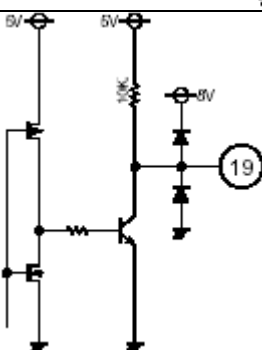
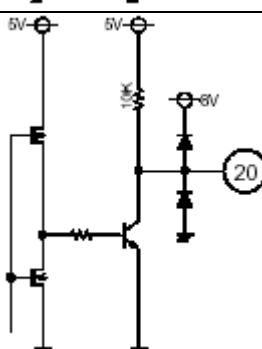
## Pin Configuration (Top View)



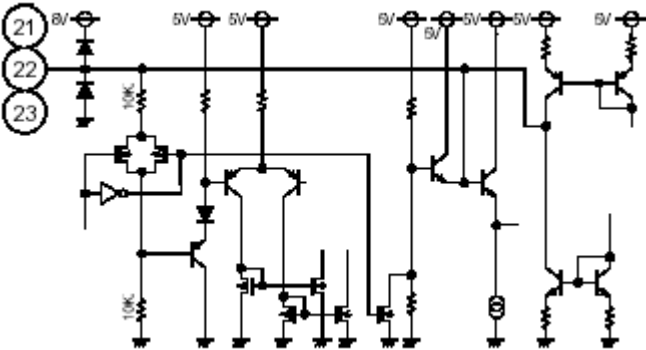
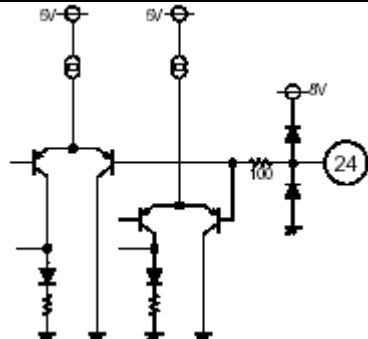
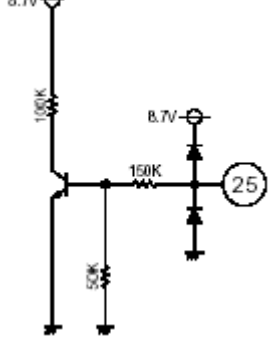
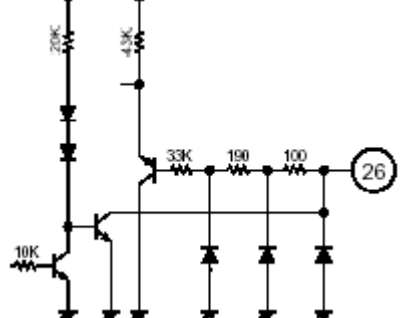
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## Pin Explanations (cont)

| Pin No. | Name                   | Pin peripheral circuit                                                              | DC voltage (V)                                   |
|---------|------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------|
| 17      | H VCO<br>FEEDBACK      |    | 3.0 V                                            |
| 18      | INTELLIGENT<br>MONITOR |    |                                                  |
| 19      | INV FBP OUT            |   | $V_{OL}: 0.0\text{ V}$<br>$V_{OH}: 5.0\text{ V}$ |
| 20      | V PULSE OUT            |  | $V_{OL}: 0.0\text{ V}$<br>$V_{OH}: 5.0\text{ V}$ |

## Pin Explanations (cont)

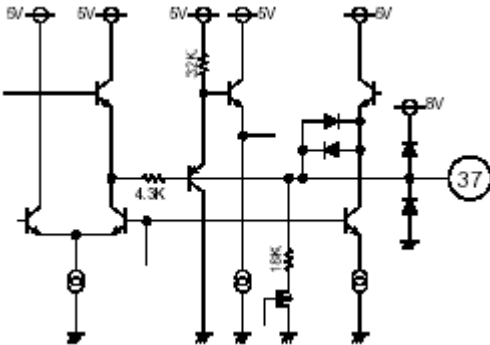
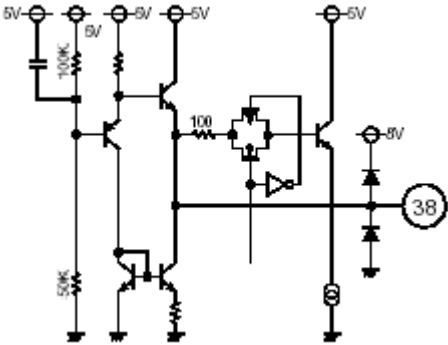
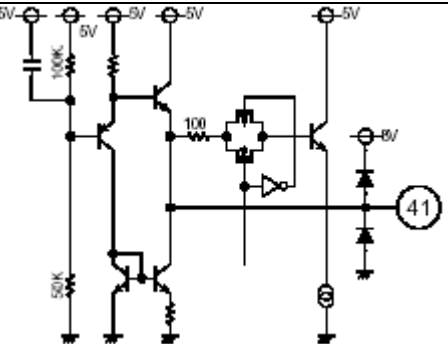
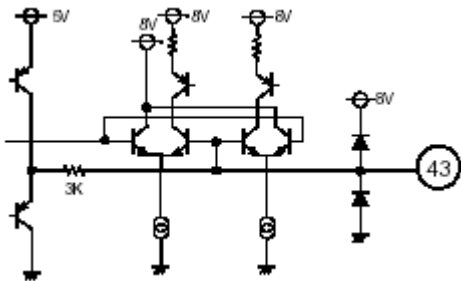
| Pin No.        | Name                 | Pin peripheral circuit                                                              | DC voltage (V)                                                            |
|----------------|----------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 21<br>22<br>23 | B IN<br>G IN<br>R IN |   | (1) Digital OSD<br>VIL: 0.0 V<br>VIH: 3.0 V<br>(2) Analog OSD<br>0.7 Vp-p |
| 24             | FAST BLK             |    | 0.0-0.5 V: INT RGB<br>1.5-3.0 V: H TONE<br>4.0-5.0 V: EXT RGB             |
| 25             | CLK CONTROL          |   | V <sub>TH</sub> : 3.0 V                                                   |
| 26             | SDA                  |  | V <sub>IL</sub> : 0.75 V<br>V <sub>IH</sub> : 4.25 V                      |

## Pin Explanations (cont)

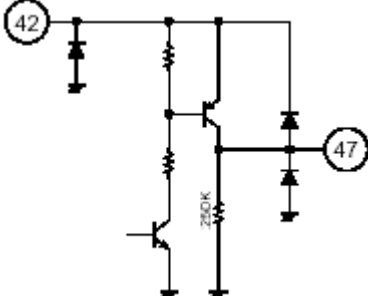
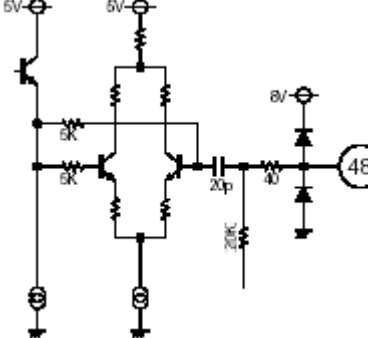
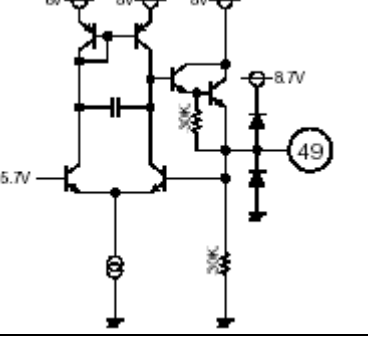
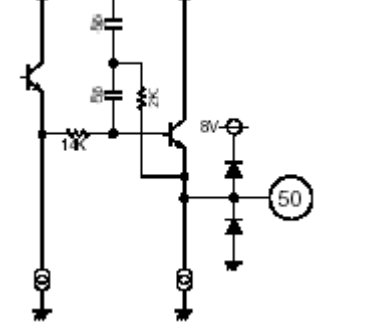
| Pin No. | Name             | Pin peripheral circuit | DC voltage (V)                         |
|---------|------------------|------------------------|----------------------------------------|
| 27      | SCL              |                        | $V_{IL}$ : 0.75 V<br>$V_{IH}$ : 4.25 V |
| 28      | POWER ON CONTROL |                        | $V_{TH}$ : 3.0 V                       |
| 29      | fsc OUT 1        |                        | 3.0 V                                  |
| 30      | MCU RESET        |                        | $H$ : 5.0 V<br>$L$ : 0.0 V             |

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## Pin Explanations (cont)

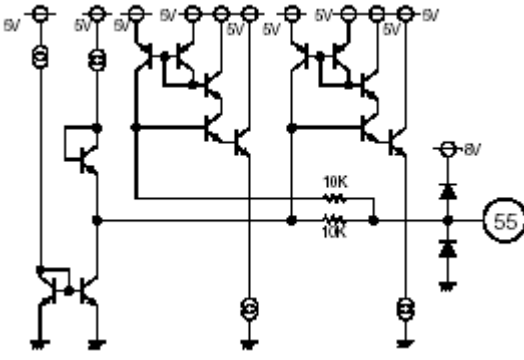
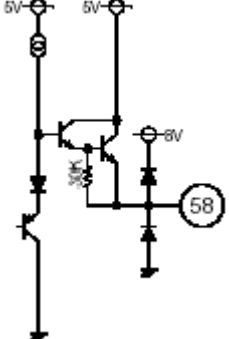
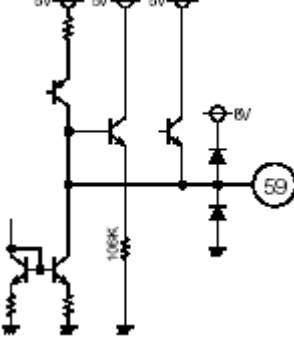
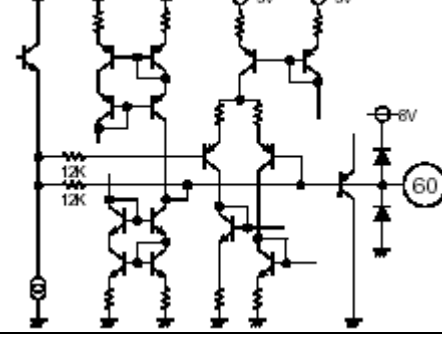
| Pin No. | Name                         | Pin peripheral circuit                                                              | DC voltage (V)   |
|---------|------------------------------|-------------------------------------------------------------------------------------|------------------|
| 37      | CHROMA APC FILTER            |   | 3.2 V            |
| 38      | EXT/C IN                     |    | 1.7 V            |
| 39      | DRIVE V <sub>CC</sub>        | _____                                                                               | 5.0 V            |
| 40      | Video/Chroma V <sub>CC</sub> | _____                                                                               |                  |
| 41      | TV/Y IN                      |  | 1.7 V            |
| 42      | VREG V <sub>CC</sub>         | _____                                                                               | 8.7 V            |
| 43      | AUDIO ATT FILTER             |  | 2.75 V to 3.25 V |
| 44      | Hi V <sub>CC</sub>           | _____                                                                               | 8 V              |
| 45      | NC                           | _____                                                                               |                  |
| 46      |                              | _____                                                                               |                  |

## Pin Explanations (cont)

| Pin No. | Name              | Pin peripheral circuit                                                              | DC voltage (V) |
|---------|-------------------|-------------------------------------------------------------------------------------|----------------|
| 47      | 8.7 VREG OUT      |    | 8.7 V          |
| 48      | LIMITER IN        |    | 2.5 V          |
| 49      | 5.7 VREG OUT      |   | 5.7 V          |
| 50      | INTER CARRIER OUT |  | 2.3 V          |

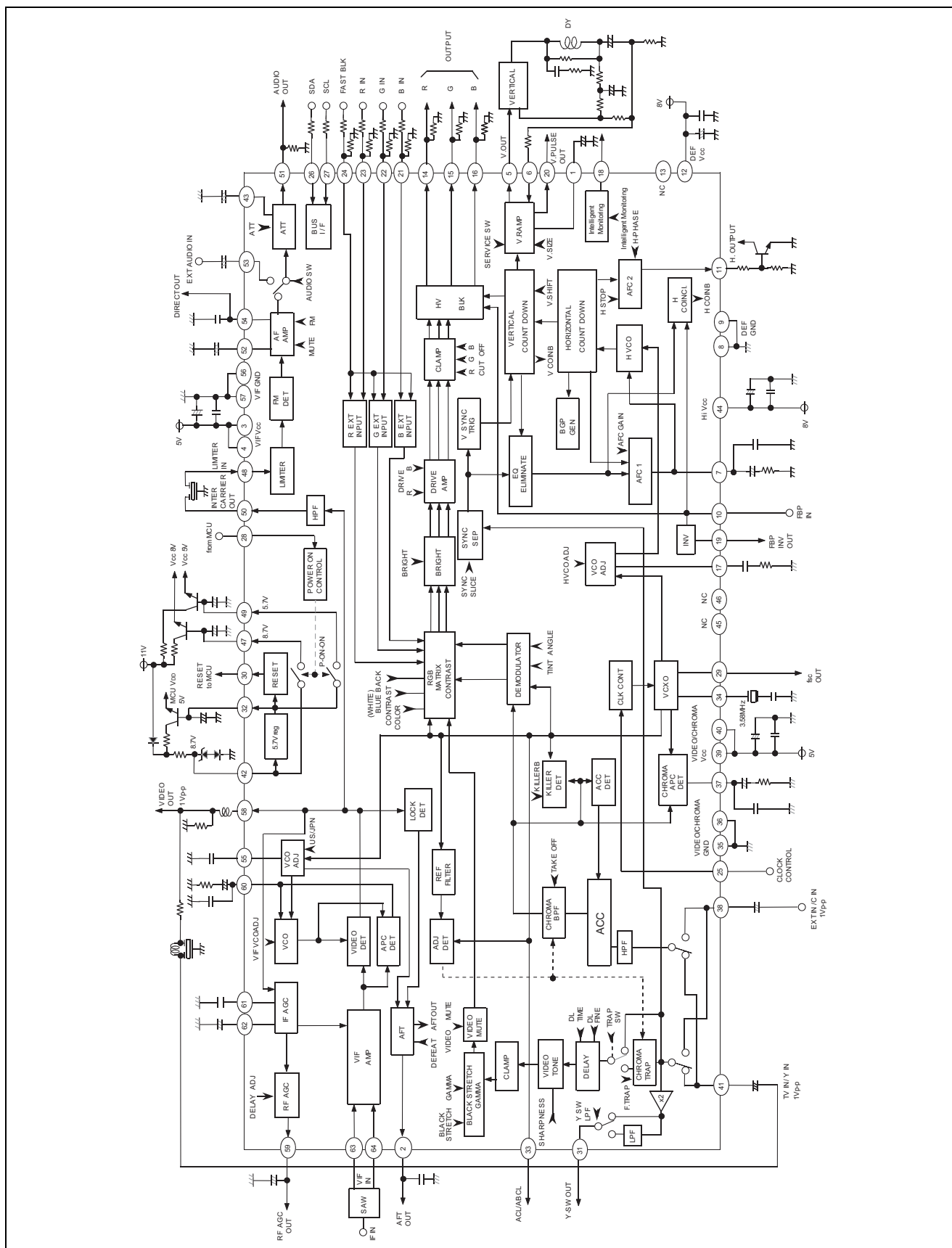
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## Pin Explanations (cont)

| Pin No. | Name                | Pin peripheral circuit                                                              | DC voltage (V) |
|---------|---------------------|-------------------------------------------------------------------------------------|----------------|
| 55      | VIF VCO<br>FEEDBACK |   | 3.0 V          |
| 56      | SIF GND             |    |                |
| 57      | VIF GND             |                                                                                     |                |
| 58      | VIDEO OUT           |    | 2.7 V          |
| 59      | RF AGC OUT          |  | 0.3 to 4.7 V   |
| 60      | VIF APC<br>FILTER   |  | 3.0 V          |

## Pin Explanations (cont)

| Pin No. | Name                | Pin peripheral circuit | DC voltage (V) |
|---------|---------------------|------------------------|----------------|
| 61      | VIF AGC<br>FILTER 2 |                        | 2.3 V          |
| 62      | VIF AGC<br>FILTER 1 |                        |                |
| 63      | VIF IN (1)          |                        | 1.6 V          |
| 64      | VIF IN (2)          |                        |                |

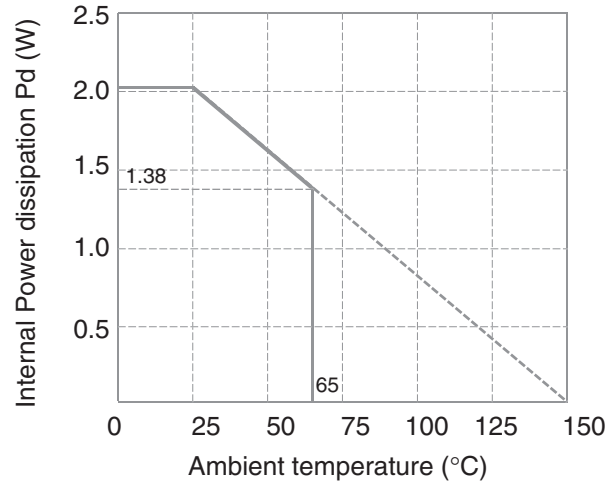


## Absolute Maximum Ratings

(Ta = 25°C)

| Item                          | Symbol | Rating      | Unit  |
|-------------------------------|--------|-------------|-------|
| Power supply voltage          | VCC    | 6.0, 10.0   | V     |
| Internal power dissipation    | Pd     | 2026        | mW    |
| Thermal derating              | Kt     | 16.2        | mW/°C |
| Ambient operating temperature | Topr   | –20 to +65  | °C    |
| Storage temperature           | Tstg   | –40 to +150 | °C    |

## Thermal Derating (Maximum Ratings)



I<sup>2</sup>C Bus Table

## 1. SLAVE ADDRESS= BAH(WRITE), BBH(READ)

| A6 | A5 | A4 | A3 | A2 | A1 | A0 | R/W |
|----|----|----|----|----|----|----|-----|
| 1  | 0  | 1  | 1  | 1  | 0  | 1  | 1/0 |

## 2. WRITE TABLE(input bytes )

| SUB ADDRESS |          | DATA                    |                  |                      |              |               |               |                 |              | INITIAL |
|-------------|----------|-------------------------|------------------|----------------------|--------------|---------------|---------------|-----------------|--------------|---------|
| HEX         | BIN      | D7                      | D6               | D5                   | D4           | D3            | D2            | D1              | D0           |         |
| 00H         | 00000000 | (inhibited)             | RF Delay Adj     |                      |              |               |               |                 |              | 40H     |
|             |          | 0                       | 1                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 01H         | 00000001 | (inhibited)             | VIF VCO ADJ      |                      |              |               |               |                 |              | 20H     |
|             |          | 0                       | 0                | 1                    | 0            | 0             | 0             | 0               | 0            |         |
| 02H         | 00000010 | Video Mute              | Audio EXT        | C. Clip level        | TRAP Off     | Video T Sharp | ABCL          | Black Stre. Off | Take Off     | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 03H         | 00000011 | Audio Mute              | Audio ATT        |                      |              |               |               |                 |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 04H         | 00000100 | ABCL Gain               | AFT Defeat       | Video Tone           |              |               |               |                 |              | 20H     |
|             |          | 0                       | 0                | V1                   | V0           | V0            | V0            | V0              | V0           |         |
| 05H         | 00000101 | EXTRGB C. Clip          | Contrast Control |                      |              |               |               |                 |              | 40H     |
|             |          | V0                      | V1               | V0                   | V0           | V0            | V0            | V0              | V0           |         |
| 06H         | 00000110 | VIF Video Out Gain      |                  |                      | Y/C          | EXT           | Y DL Fine Adj | Y DL Time Adj   |              | 80H     |
|             |          | 1                       | 0                | 0                    | V0           | V0            | 0             | 0               | 0            |         |
| 07H         | 00000111 | VIF Defeat              | Tint Control     |                      |              |               |               |                 |              | 40H     |
|             |          | 0                       | V1               | V0                   | V0           | V0            | V0            | V0              | V0           |         |
| 08H         | 00001000 | Blue Back               | Color Control    |                      |              |               |               |                 |              | 40H     |
|             |          | V0                      | V1               | V0                   | V0           | V0            | V0            | V0              | V0           |         |
| 09H         | 00001001 | HV BLK OFF              | VOUT STOP        | FSC FREE             | HTONE SW     | (inhibited)   |               |                 |              | 04H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 1             | 0               | 0            |         |
| 0AH         | 00001010 | Brightness Control      |                  |                      |              |               |               |                 | 80H          |         |
|             |          | V1                      | V0               | V0                   | V0           | V0            | V0            | V0              | V0           |         |
| 0BH         | 00001011 | (inhibited)             | Drive(R)         |                      |              |               |               |                 |              | 40H     |
|             |          | 0                       | 1                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 0CH         | 00001100 | (inhibited)             | Drive(B)         |                      |              |               |               |                 |              | 40H     |
|             |          | 0                       | 1                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 0DH         | 00001101 | Cut Off(R)              |                  |                      |              |               |               |                 | 80H          |         |
|             |          | 1                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 0EH         | 00001110 | Cut Off(G)              |                  |                      |              |               |               |                 | 80H          |         |
|             |          | 1                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 0FH         | 00001111 | Cut Off(B)              |                  |                      |              |               |               |                 | 80H          |         |
|             |          | 1                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 10H         | 00010000 | White Back              | V-free           | (inhibited)          |              |               | H VCO Adj     |                 |              | 24H     |
|             |          | 0                       | 0                | 1                    | 0            | 0             | 1             | 0               | 0            |         |
| 11H         | 00010001 | (inhibited)             | V-Size           |                      |              |               |               |                 |              | 20H     |
|             |          | 0                       | 0                | 1                    | 0            | 0             | 0             | 0               | 0            |         |
| 12H         | 00010010 | Monitoring              |                  |                      |              | Gamma Control |               | TRAP Fine Adj   |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 13H         | 00010011 | H-free                  | V.1Window        | YSW LPF              | H Start      | Service SW    | V Shift       |                 |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 14H         | 00010100 | Black Stretch Discharge |                  | Black Stretch Charge |              | S.Slice Down2 | S.Slice Down1 | (inhibited)     |              | 03H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 1               | 1            |         |
| 15H         | 00010101 | AFC1 Gain               | AFC2 Gain        | OSD level            | Analog OSD   | US/JPN SW     |               |                 | Killer level | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 16H         | 00010110 | VSYNCDDET               | Aoto slice down  | FBP Vth L            | AFC2 H Phase |               |               |                 | 90H          |         |
|             |          | 1                       | 0                | 0                    | 1            | 0             | 0             | 0               | 0            |         |
| 17H         | 00010111 | (reserved)              |                  |                      |              |               |               |                 | 40H          |         |
|             |          | 0                       | V1               | V0                   | V0           | V0            | V0            | V0              | V0           |         |
| 18H         | 00011000 | Test1                   |                  | (inhibited)          |              |               |               |                 |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 19H         | 00011001 | BGPFBP OFF              | Test2            | (inhibited)          |              |               |               |                 |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 1AH         | 00011010 | Test3                   |                  | (inhibited)          |              |               |               |                 |              | 00H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 1BH         | 00011011 | (inhibited)             |                  |                      |              |               |               |                 | 00H          |         |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 0             | 0               | 0            |         |
| 1CH         | 00011100 | TEST4                   | VFREE INT        | (inhibited)          |              | VBLKSHIFT ON  |               | VBLK SHIFT      |              | 04H     |
|             |          | 0                       | 0                | 0                    | 0            | 0             | 1             | 0               | 0            |         |

NOTE: V0 / V1 ==&gt; V- LATCH BIT

## 3. READ TABLE (output bytes)

| SUB ADDRESS |          | D7      | D6            | D5     | D4     | D3   | D2   | D1     | D0            |
|-------------|----------|---------|---------------|--------|--------|------|------|--------|---------------|
| 00H         | 00000000 | KILLERB | (not asigned) | VCOINB | STDETB | AFT0 | AFT1 | HCOINB | (not asigned) |

## Bus Functions

## WRITE

|        | FUNCTION                | BIT | SUB<br>ADD | DATA  | DISCRIPTION                                                                                              | INI-<br>TIAL | NOTE    |
|--------|-------------------------|-----|------------|-------|----------------------------------------------------------------------------------------------------------|--------------|---------|
| VIF    | RF delay adj            | 7   | 00H        | D0-D6 | RF AGC delay point adjustment                                                                            | 40H          |         |
| SIF    | VIF VCO adj             | 6   | 10H        | D0-D5 | VIF VCC free-running frequency adjustment<br>(adjust by setting VIF Defeat = 1 to center the AFT output) | 20H          |         |
|        | VIF freq. 58.75         | 1   | 01H        | D6    | IF 45.75/58.75 switching; 0: 45.75, 1: 58.75 MHz                                                         | 0            |         |
|        | VIF Video out gain      | 3   | 06H        | D5-D7 | Pin 58 IVF video-detection-wave output level adjustment                                                  | 80H          |         |
|        | AFT defeat              | 1   | 04H        | D6    | AFT output on/off (defeat) switching; 0: AFT on (non defeat), 1: Defeat                                  | 0            |         |
|        | VIF defeat              | 1   | 07H        | D7    | VIF AGC gain normal/minimum switching; 0: AGC function, 1: Defeat (minimum gain)                         | 0            |         |
|        | Audio ATT               | 7   | 03H        | D0-D6 | Pin 51 audio output level adjustment                                                                     | 00H          |         |
|        | Audio EXT               | 1   | 02H        | D6    | Audio internal signal and external signal input switching; 0: internal, 1: external                      | 0            |         |
|        | Audio mute              | 1   | 03H        | D7    | Pin 53 audio direct output on/off (mute) switching; 0: audio on (non-muted), 1: mute                     | 0            |         |
| VIDEO  | Video tone              | 6   | 04H        | D0-D5 | Sharpness level control                                                                                  | 20H          | V Latch |
|        | Contrast control        | 7   | 05H        | D0-D6 | Contrast level control                                                                                   | 40H          | V Latch |
|        | EXTRGB contrast clip    | 1   | 05H        | D7    | EXT RGB contrast lower-limit clipping on/off; 0: clipping on, 1: clipping off                            | 0            | V Latch |
|        | C. clip level           | 1   | 02H        | D5    | EXT RGB contrast lower-limit clipping level switching; 0: low (20H), 1: high (40H)                       | 0            |         |
|        | Y DL time adj           | 2   | 06H        | D0-D1 | Y signal delay adjustment                                                                                | X0H          |         |
|        | Y DL fine adj           | 1   | 06H        | D2    | Y signal delay fine adjustment                                                                           | 0            |         |
|        | EXT                     | 1   | 06H        | D3    | Video input pins 41/38 switching; 0: pin 41, 1: pin 38                                                   | 0            | V Latch |
|        | Y/C                     | 1   | 06H        | D4    | Pins 38/41 composite input/YC input switching; 0: composite, 1: Y/C mode                                 | 0            | V Latch |
|        | Y SW LPF                | 1   | 13H        | D5    | Pin 31 (Y SW OUT) output f-characteristic switching; 0: flat, 1: LPF (fc=700 kHz)                        | 0            |         |
|        | Video tone sharp        | 1   | 02H        | D3    | Video tone level two level (sharp/soft) switching; 0: standard (soft), 1: sharp                          | 0            |         |
|        | Video mute              | 1   | 02H        | D7    | Y signal output on/off (mute) switching; 0: mute off, 1: mute                                            | 0            |         |
|        | TRAP off                | 1   | 02H        | D4    | Y signal chroma trap on/off switching; 0: trap on, 1: trap off                                           | 0            |         |
|        | TRAP fine adj           | 2   | 12H        | D0-D1 | Chroma trap frequency fine adjust                                                                        | X0H          |         |
|        | Black stretch off       | 1   | 02H        | D1    | Black stretch circuit on/off switching; 0: black stretch on, 1: black stretch off                        | 0            |         |
|        | Black stretch charge    | 2   | 14H        | D4-D5 | Black stretch charge time constant adjustment                                                            | 0XH          |         |
|        | Black stretch discharge | 2   | 14H        | D6-D7 | Black stretch discharge time constant adjustment                                                         | 0XH          |         |
|        | Gamma control           | 2   | 12H        | D2-D3 | Gamma level adjustment                                                                                   | X0H          |         |
| CHROMA | Tint control            | 7   | 07H        | D0-D6 | Hue control                                                                                              | 40H          | V Latch |
|        | Color control           | 7   | 08H        | D0-D6 | Color level control                                                                                      | 40H          | V Latch |
|        | Take off                | 1   | 02H        | D0    | Chroma BPF take-off function on/off switching; 0: BPF; 1: take off                                       | 0            |         |
|        | US/JPN SW               | 1   | 15H        | D1-D3 | US mode/JPN mode switching; 100: US mode, 011: JPN mode                                                  | 0            |         |
|        | Killer level            | 1   | 15H        | D0    | Colorkiller sensitivity switching (active shallow direction); 0: 41 dB, 1: 34 dB                         | 0            |         |
|        | Fsc                     | 1   | 09H        | D5    | X'tal oscillation circuit forced free-running mode; 0: off, 1: free-running                              | 0            |         |

## Bus Functions (cont)

## WRITE (cont)

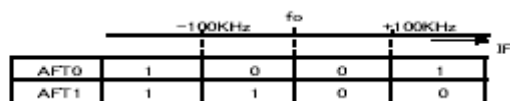
|     | FUNCTION           | BIT | SUB<br>ADD | DATA  | DISCRIPTION                                                                                                                  | INI-<br>TIAL | NOTE    |
|-----|--------------------|-----|------------|-------|------------------------------------------------------------------------------------------------------------------------------|--------------|---------|
| RGB | Brightness control | 8   | 0AH        | D0-D7 | Bright level control                                                                                                         | 80H          | V Latch |
|     | Driver (R)         | 7   | 0BH        | D0-D6 | R output level control                                                                                                       | 40H          |         |
|     | Driver (B)         | 7   | 0CH        | D0-D6 | B output level control                                                                                                       | 40H          |         |
|     | Cut off (R)        | 8   | 0DH        | D0-D7 | R output DC level control                                                                                                    | 80H          |         |
|     | Cut off (B)        | 8   | 0EH        | D0-D7 | G output DC level control                                                                                                    | 80H          |         |
|     | Cut off (B)        | 8   | 0FH        | D0-D7 | B output DC level control                                                                                                    | 80H          |         |
|     | Blue back          | 1   | 08H        | D7    | Blue back screen on/off switching; 0: off, 1: blue back                                                                      | 0            |         |
|     | White back         | 1   | 10H        | D7    | White raster on/off switching; 0: off, 1: white back                                                                         | 0            |         |
|     | ABCL               | 1   | 02H        | D2    | ABCL on/off switching; 0: off, 1: ABCL on                                                                                    | 0            |         |
|     | ABCL gain          | 1   | 04H        | D7    | ABCL sensitivity low/high switching; 0: low, 1: hi                                                                           | 0            |         |
|     | OSD level          | 1   | 15H        | D5    | OSD level (70%/90%) switching; 0: 70%, 1: 90%                                                                                | 0            |         |
|     | HTONE SW           | 1   | 09H        | D4    | Halftone on/off switching; 0: off, 1: halftone                                                                               | 0            |         |
|     | Analog OSD         | 1   | 15H        | D4    | OSD input digital/analog switching; 0: digital, 1: analog                                                                    | 0            |         |
| DEF | AFC2 H phase       | 5   | 16H        | D0-D4 | Screen horizontal position adjustment                                                                                        | 90H          |         |
|     | Ramp stop          | 1   | 09H        | D6    | Pin 5 VOUT (ramp/pulse) forced stop mode (when stopped, pin 5 at DC GND level); 0: VOUT, 1: STOP                             | 0            |         |
|     | Service SW         | 1   | 13H        | D3    | Vertical output on/off switching; 0: vertical output on, 1: vertical output off                                              | 0            |         |
|     | H start            | 1   | 13H        | D4    | Horizontal output out/stop switching; 0: stop, 1: H out                                                                      | 0            |         |
|     | AFC 1 gain         | 1   | 15H        | D7    | Horizontal AFC gain a high/low switching; 0: low, 1: hi                                                                      | 0            |         |
|     | AFC 2 gain         | 1   | 15H        | D6    | Horizontal AFC2 gain high/low switching; 0: high, 1: low                                                                     | 0            |         |
|     | H VCO adj          | 3   | 10H        | D0-D2 | H VCO free-running frequency adjustment                                                                                      | 24H          |         |
|     | V shift            | 3   | 13H        | D0-D2 | Vertical ramp start timing adjustment                                                                                        | X0H          |         |
|     | V-size             | 6   | 11H        | D0-D5 | Vertical ramp amplitude adjustment                                                                                           | 20H          |         |
|     | H-free             | 1   | 13H        | D7    | Horizontal output forced free-running mode on/off switching; 0: off, 1: horizontal free-running                              | 0            |         |
|     | V-free             | 1   | 10H        | D6    | Vertical output forced free-running mode on/off switching; 0: off, 1: vertical free-running                                  | 0            |         |
|     | S slice down 1     | 1   | 14H        | D2    | Sync detection slice level (50%/30%) switching; 0: 50%, 1: 30%                                                               | 0            |         |
|     | S slice down 2     | 1   | 14H        | D3    | Sync detection slice level (50%/40%) switching; 0: 50%, 1: 40%                                                               | 0            |         |
|     | Audio slice down   | 1   | 16H        | D6    | Sync detection slice level (50%/40%) switching during image period; 0: slice level fixed, 1: slice level reduced             | 0            |         |
|     | FBP Vth L          | 1   | 16H        | D5    | Pin 10 (FBP in) slice level switching during image period; 0: Vth = 2V (HBLK width: narrow), 1: Vth = 1 V (HBLK width: wide) | 0            |         |
|     | HV BLK OFF         | 1   | 09H        | D7    | Horizontal/vertical blanking on/off switching; 0: blanking on, 1: blanking off                                               | 0            |         |
|     | V SYNK DET         | 1   | 16H        | D7    | Vertical minimum sync detection width switching; 0: sync detect width =18 $\mu$ s, 1: sync detect width =14 $\mu$ s          | 90H          |         |
|     | 1 window           | 1   | 13H        | D6    | Vertical sync detection switching (1 window/2 window s); 0: 2 windows, 1: 1 window                                           | 0            |         |
|     | BGPFBP OFF         | 1   | 19H        | D7    | Internal BGP on/off switching when no FBP input; 0: BGP on, 1: BGP off                                                       | 0            |         |
|     | VREF INT           | 1   | 1CH        | D6    | Interface/non-interface switching at vertical free-running                                                                   | 04H          |         |
|     | VBLK SHIFT ON      | 1   | 1CH        | D3    | 0: Normal (VBLK shifts by VSHIFT), 1: Vertical blanking width can be setted by un-interlocking VSHIFT                        | 04H          |         |
|     | VBLK SHIFT         | 3   | 1CH        | D0-D2 | D0-D2: VBLK SHIFT (Initial value: 100=4)                                                                                     | 04H          |         |
|     | Monitoring         | 4   | 12H        | D4-D7 | Pin 18 intelligent monitoring mode switching                                                                                 | 0XH          |         |
|     | Test1              | 1   | 18H        | D6-D7 | NO use for Customer (Test bit)                                                                                               | 0            |         |
|     | Test2              | 1   | 19H        | D6    | NO use for Customer (Test bit)                                                                                               | 0            |         |
|     | Test3              | 1   | 1AH        | D6-D7 | NO use for Customer (Test bit)                                                                                               | 0            |         |
|     | Test4              | 1   | 1CH        | D6    | NO use for Customer (Test bit)                                                                                               | 04H          |         |

## READ

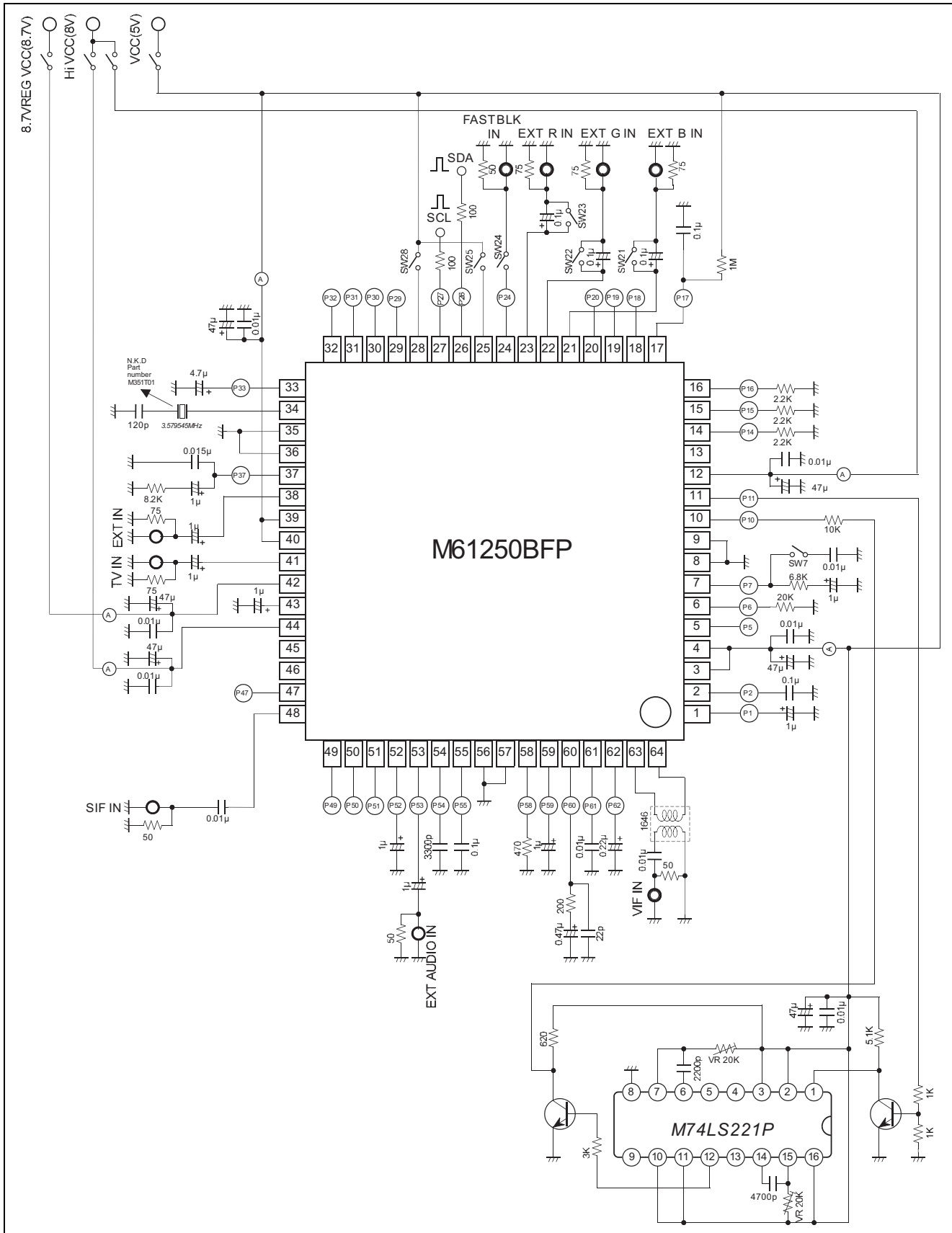
| FUNCTION  | BIT | SUB<br>ADD | DATA | DISCRIPTION                                         |
|-----------|-----|------------|------|-----------------------------------------------------|
| KILLERB   | 1   | 00H        | D7   | Colorkiller information output; "1" when killer off |
| AFT0      | 1   | 00H        | D3   | AFT information output (See note 1)                 |
| AFT1      | 1   | 00H        | D2   | AFT information output (See note 1)                 |
| HCOINB    | 1   | 00H        | D1   | Horizontal sync detection; "1" when asynchronous    |
| FM STDETB | 1   | 00H        | D6   | FM radio mode detection; "1" when not detected      |
| VCOINB    | 1   | 00H        | D5   | Vertical sync detection; "1" when asynchronous      |
| STDETB    | 1   | 00H        | D4   | TF mode detection; "1" when not detected            |

Note: 1. <READ BYTE: AFT OUTPUT>

AFT0/AFT1



## Test Circuits

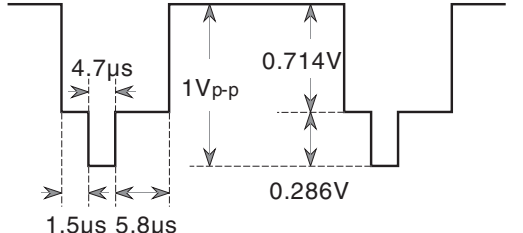
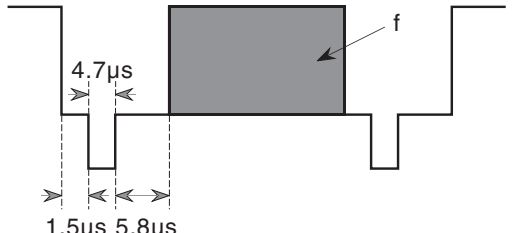
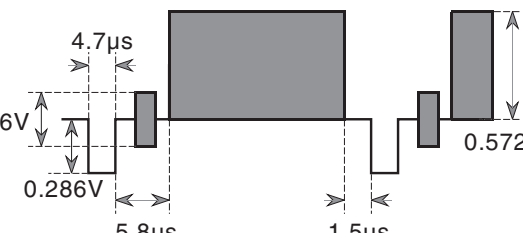
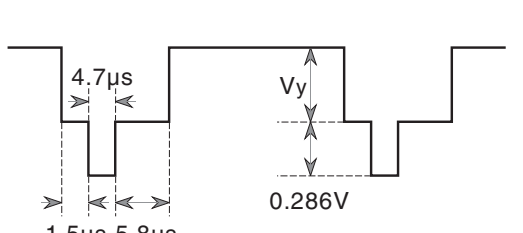
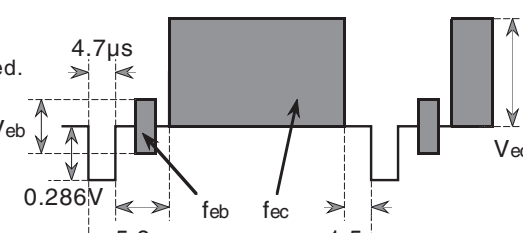
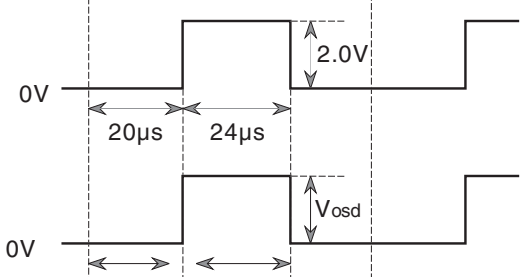


## Input Signals

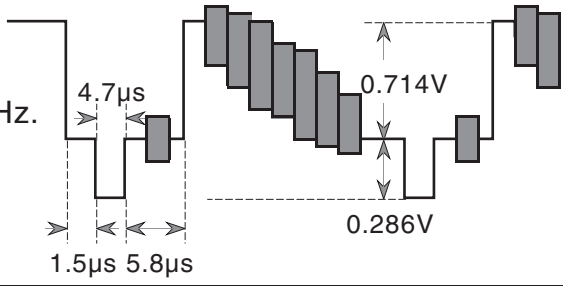
### 1. 10.1 VIF/SIF Block

| SG No. | Signal description (50 $\Omega$ termination)                                                                            |
|--------|-------------------------------------------------------------------------------------------------------------------------|
| SG1    | fo = 45.75 MHz, 90 dB $\mu$ , fm = 20 kHz, AM 77.8%                                                                     |
| SG2    | fo = 58.75 MHz, 90 dB $\mu$ , fm = 20 kHz, AM 77.8%                                                                     |
| SG3    | fo = 45.75 MHz, 90 dB $\mu$ , CW                                                                                        |
| SG4    | f1 = 45.75 MHz, 90 dB $\mu$ , CW<br>f2 = 45.75 $\pm$ 4.5MHz, 70 dB $\mu$ , CW                                           |
| SG5    | fo = 45.75 MHz, amplitude width variable, fm = 20 kHz, AM 77.8%                                                         |
| SG6    | fo = 45.75 MHz, amplitude width variable, fm = 20 kHz, AM 16%                                                           |
| SG7    | fo = 45.75 MHz, 80 dB $\mu$ , fm = 20 kHz, CW                                                                           |
| SG8    | fo = 45.75 MHz, 110 dB $\mu$ , fm = 20 kHz, CW                                                                          |
| SG9    | fo = 40.75 to 50.75 MHz (frequency variable), 90 dB $\mu$ , CW                                                          |
| SG10   | fo = 45.75 MHz, 90 dB $\mu$ , CW                                                                                        |
| SG11   | fo = 45.75 MHz, 90 dB $\mu$ , CW                                                                                        |
| SG12   | fo = 53.75 to 63.75 MHz (frequency variable), 90 dB $\mu$ , CW                                                          |
| SG13   | f1 = 45.75 MHz, 90 dB $\mu$ , RED raster signal, AM = 87.5% video modulation,<br>f2 = 4.5 $\pm$ 4.5MHz, CW, P/S = 20 dB |
| SG14   | fo = 45.75 MHz, standard 10-step wave, sync rate: 28.6%, AM = 87.5% video modulation,<br>sync chip level: 90 dB $\mu$   |
| SG15   | fo = 45.75 MHz, 93 dB $\mu$ , CW                                                                                        |
| SG16   | fo = 45.75 MHz, 73 dB $\mu$ , CW                                                                                        |
| SG17   | fo = 4.5 MHz, 100 dB $\mu$ , fm = 400 Hz, FM $\pm$ 25 kHz dev.                                                          |
| SG18   | fo = 4.5 MHz, 100 dB $\mu$ , fm = 400 kHz, AM 30%                                                                       |
| SG19   | fo = 4.5 MHz, 100 dB $\mu$ , CW                                                                                         |
| SG20   | fo = 400 Hz, 500 mVrms, CW                                                                                              |
| SG21   | fo = 0.5 to 8.5 MHz, 100 dB $\mu$ , fm = 400 kHz, FM $\pm$ 25 kHz dev.                                                  |

## 2. Video/Chroma/RGB/DEF Block

| SG No. | Signal description (75Ω termination)                                                                                                                                                                                                                                                                                                               |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SG. A  | <p>NTSC format APL 100% typical video signal. Vertical signal is interlaced at 60 Hz.</p>                                                                                                                                                                        |
| SG. B  | <p>In the SG.A signal, the Lumi. signal frequency and amplitude can be changed. However, typical amplitude is 0.714 Vp-p. In the figure on the right, the Lumi. signal is represented by f.</p>                                                                  |
| SG. C  | <p>NTSC typical monochrome video signal. Vertical signal is interlaced at 60 Hz.</p>                                                                                                                                                                            |
| SG. D  | <p>NTSC format video signal; APL variable. Vertical signal is interlaced at 60 Hz.</p>                                                                                                                                                                         |
| SG. E  | <p>NTSC format monochrome video signal. In the SG.C signal, the burst and chroma part frequency and amplitude can be changed. Vertical signal is interlaced at 60 Hz.</p> <p>( Typical state:<br/> Veb=0.286V,<br/> Vec=0.572V<br/> feb=fec=3.579545MHz )</p>  |
| SG. F  | <p>Fast blanking signal; synchronized with video input signal.</p> <p>Fast blanking signal; synchronized with video input signal.</p>                                                                                                                          |

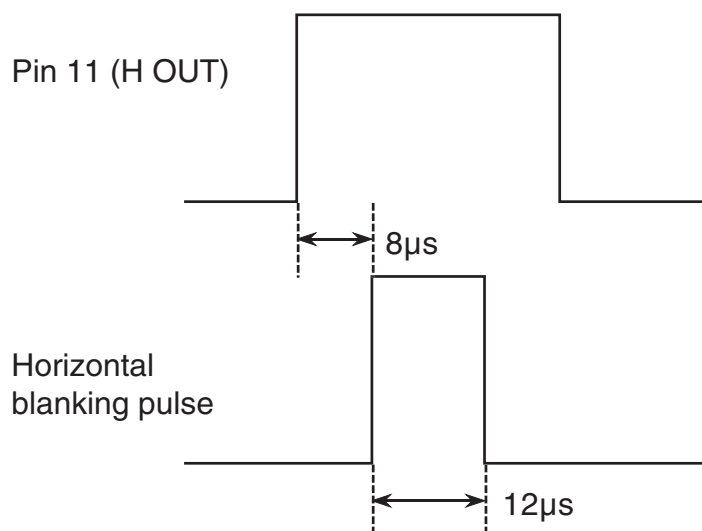
## 2. Video/Chroma/RGB/DEF Block (cont)

| SG No. | Signal description (75 $\Omega$ termination)                                                                                                                                            |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SG. G  | NTSC format rainbow color bar video signal.<br>Vertical signal is interlaced at 60 Hz.                                                                                                  |
| SG. H  | Duty 90%, variable frequency, variable level. (Typical: 1 V <sub>p-p</sub> )<br>                      |
| SG. I  | Duty variable (typical 95%), frequency variable, level variable<br>(Typical: 1 V <sub>p-p</sub> )<br> |
| SG. J  | NTSC format typical color bar video signal;<br>vertical signal is interlaced at 60 Hz.<br>           |
| SG. K  | NTSC format, typical 8-step wave signal;<br>vertical signal is interlaced at 60 Hz.                                                                                                     |

## Setup instruction for evaluation PCB

### 1. Horizontal blanking pulse adjustment

The horizontal blanking pulse timing and pulse width are adjusted using the variable resistances of a one-shot multivibrator, as shown below.

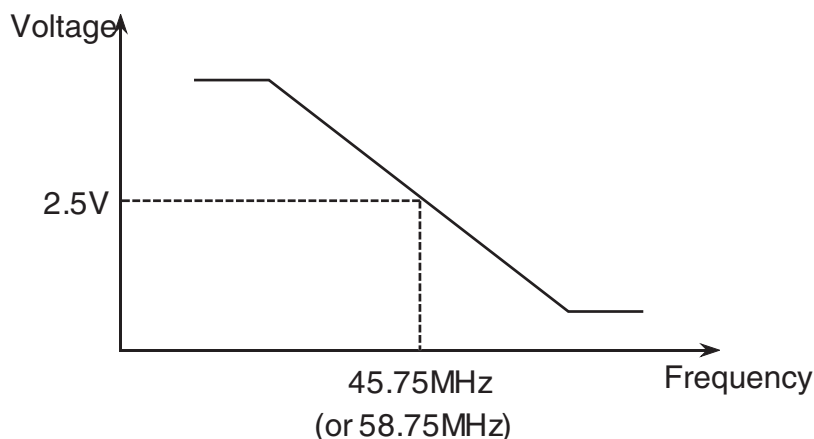


The timing is adjusted to 8 μs using the pin 15 variable resistance of the M74LS221P TTL IC. Also, the pulse width is adjusted to 12 μs using the pin 7 variable resistance.

### 2. VIF VOC adjustment

Before carrying out the M61250BFP measurements, the VIF VCO should be adjusted using the following procedure.

- (1) Input the I<sup>2</sup>C bus data for the VIF frequency (01H D6) based on the IF frequency. (45.75 MHz: 0, 58.75 MHz: 1)
- (2) Input the I<sup>2</sup>C bus data for VIF Defeat ON (07H D7 = 1).
- (3) Adjust the I<sup>2</sup>C bus data for the VCO control (01H D0 – D5) so that the voltage of Pin 2 (AFT OUT) is closest to 2.5 V.
- (4) Input the I<sup>2</sup>C bus data for VIF Defeat OFF (07H D7 = 0).



### 3. H VCO adjustment

Prior to measurement of the M61250BFP, the following method is used for H VCO adjustment.

- (1) The H VCO control I<sup>2</sup>C bus data (1 CH D0-D3) is adjusted, and the pin 11 (H OUT) frequency is set to approx. 15.734 kHz.

## Electrical Characteristics

(Ta = 25°C)

| Symbol | Item | Input signal |    | Test point | Limits |      |     | Unit | Notes | Subaddress |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|        |      |              |    |            | Min.   | Typ. | Max |      |       | 00H        | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH | 1BH | 1CH |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|        |      | Pin          | SG |            |        |      |     |      |       |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| Symbol  | Item                                                   | Input signal |      | Test point | Limits |      | Unit | Notes  | Subaddress                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------|--------------------------------------------------------|--------------|------|------------|--------|------|------|--------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|         |                                                        |              |      |            | Min.   | Typ. |      |        | Max.                               | 00H | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH |
|         |                                                        | Pin          | SG   |            |        |      |      |        |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /IF     | IF typical conditions                                  | -            | -    | 58         | 2.2    | 2.7  | 3.2  | V      | Pin 28=5 V, pin 25=5 V, pin 24=0 V | 40  | adj | 02  | 00  | 20  | 40  | 80  | 40  | 00  | 80  | 40  | 80  | 40  | 80  | 24  | 20  | 00  | 10  | 00  | 88  | 40  | 00  | 00  | 00  | 00  | 00  | 00  |
| /dc     | Video-detection-waveform output direct current voltage |              |      |            |        |      |      |        | Pin 62=0 V                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /o4575  | Video-detection-waveform output (45.75 MHz)            | 63.64        | SG1  | 58         | 0.8    | 1.2  | 1.5  | Vpp    |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /o5875  | Video-detection-waveform output (48.75 MHz)            | 63.64        | SG2  | 58         | 0.8    | 1.2  | 1.5  | Vpp    |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /N      | Video S/N                                              | 63.64        | SG3  | 58         | 43     | 50   | -    | dB     |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /f      | Video frequency characteristics                        | 63.64        | SG4  | 58         | 4      | 5.4  | -    | MHz    |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /in min | Input sensitivity                                      | 63.64        | SG5  | 58         | -      | 45   | 50   | dBμ    |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /in max | Maximum allowable input                                | 63.64        | SG6  | 58         | 100    | 108  | -    | dBμ    |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /3R     | AG control range                                       | -            | -    | -          | 50     | -    | -    | dB     | Vo max - Vo min                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /63H    | IF AGC maximum voltage                                 | -            | -    | 62         | 3.8    | 4.3  | 4.8  | V      |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /63T    | IF AGC voltage (80 dBμ)                                | 63.64        | SG7  | 62         | 2.3    | 2.8  | 3.3  | V      |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /63L    | IF AGC minimum voltage                                 | 63.64        | SG8  | 62         | 1.3    | 1.8  | 2.3  | V      |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /defeat | VIF DETEAT function                                    | 63.64        | SG1  | 58         | 0      | 0.1  | 0.2  | Vpp    |                                    |     |     |     |     |     |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /AFT    | AFT-detection-waveform sensitivity                     | 63.64        | SG9  | 2          | 7      | 10   | 13   | mV/kHz |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /60H    | AFT maximum voltage                                    | 63.64        | SG10 | 2          | 4.2    | 4.7  | -    | V      |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /60L    | AFT minimum voltage                                    | 63.64        | SG11 | 2          | -      | 0.3  | 0.8  | V      |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /60D    | AFT DETEAT function                                    | -            | -    | 2          | 2.0    | 2.5  | 3.0  | V      |                                    |     |     |     |     |     |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CU45   | Capture range (45.75MHz upper)                         | 63.64        | SG9  | 58         | 1.5    | 2.2  | -    | MHz    | Center frequency=45.75MHz          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CL45   | Capture range (45.75MHz lower)                         | 63.64        | SG9  | 58         | -      | -1.8 | -1.1 | MHz    | Center frequency=45.75MHz          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CT45   | Capture range (45.75MHz total)                         | -            | -    | 58         | 2.6    | 4.0  | -    | MHz    | VCU45-VCL45                        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CU58   | Capture range (58.75MHz upper)                         | 63.64        | SG12 | 58         | 1.5    | 2.2  | -    | MHz    | Center frequency=58.75MHz          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CL58   | Capture range (58.75MHz lower)                         | 63.64        | SG12 | 58         | -      | -1.8 | -1.1 | MHz    | Center frequency=58.75MHz          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /CT58   | Capture range (58.75MHz total)                         | -            | -    | 58         | 2.6    | 4.0  | -    | MHz    | VCU58-VCL58                        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /       | Inter modulation                                       | 63.64        | SG13 | 58         | -      | 42   | -    | dB     | Reference data                     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Symbol  | Item                               | Input signal |      | Test point | Limits |      |      | Unit              | Notes                              | Subaddress     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|---------|------------------------------------|--------------|------|------------|--------|------|------|-------------------|------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|         |                                    | Pin          | SG   |            | Min.   | Typ. | Max. |                   |                                    | 00H            | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH | 1BH | 1CH |  |
| DG      | DG                                 | 63.64        | SG14 | 58         | -      | 3    | -    | %                 | Reference data                     |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| DP      | DP                                 | 63.64        | SG14 | 58         | -      | 3    | -    | deg               |                                    | Reference data |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| V62H    | RF AG maximum voltage              | 63.64        | SG15 | 59         | 4.3    | 4.8  | -    | V                 |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| V62L    | RF AG minimum voltage              | 63.64        | SG16 | 59         | -      | 0.2  | 0.7  | V                 |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| DLPH    | RF AG delay maximum point          | 63.64        | SG5  | 59         | 95     | 108  | -    | dB $\mu$          | 00                                 |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| DLPL    | RF AG delay minimum point          | 63.64        | SG5  | 59         | -      | 58   | 71   | dB $\mu$          | 7F                                 |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| DLP     | RF AG delay point adjustment range | -            | -    | -          | 33     | 43   | -    | dB $\mu$          | DLPH-DLPL                          | 00-7F          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| SPN     | Sync rate                          | 63.64        | SG14 | 58         | 25     | 28   | 33   | %                 |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| SIF     | SIF typical conditions             |              |      |            |        |      |      |                   | Pin 28=5 V, pin 25=5 V, pin 24=0 V | 40             | adj | 02  | 00  | 20  | 40  | 80  | 40  | 40  | 00  | 80  | 40  | 40  | 80  | 80  | 24  | 20  | 00  | 10  | 00  | 00  | 88  | 40  | 00  | 00  | 00  | 00  | 00  |     |  |
| VAF     | AF direct output DC voltage        | -            | -    | 54         | 2.2    | 3.0  | 3.8  | V                 |                                    |                |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| VoAF    | AF direct output voltage           | 48           | SG17 | 54         | 280    | 400  | 520  | mV <sub>rms</sub> |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| THD AF  | AF distortion rate output          | 48           | SG17 | 54         | -      | 0.5  | 3    | %                 |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| LIM     | Input limit sensitivity            | 48           | SG17 | 54         | -      | 46   | 58   | dB $\mu$          |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| AMR     | AMR                                | 48           | SG18 | 54         | 48     | 54   | -    | dB                |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| AFSN    | AF S/N                             | 48           | SG19 | 51         | 49     | 55   | -    | dB                |                                    |                |     | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| GEAu    | EXT Audio gain                     | 53           | SG20 | 51         | -4.1   | -2.1 | -0.1 | dB                |                                    |                |     | 40  | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| SCFU    | SIF capture range (upper)          | 48           | SG21 | 54         | 5.5    | 7.5  | -    | MHz               | Variable input frequency           |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| SCFL    | SIF capture range (lower)          | 48           | SG21 | 54         | -      | 3    | 4.0  | MHz               | Variable input frequency           |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| VOL-max | Audio output maximum amplitude     | 48           | SG17 | 51         | 280    | 400  | 550  | mV <sub>rms</sub> |                                    |                |     |     | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
| VOL-min | Audio output maximum attenuation   | 48           | SG17 | 51         | -      | -80  | -69  | dB                |                                    |                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |

| Symbol | Item                                   | Input signal |      | Test point | Limits |      |      | Unit | Notes                                    | Subaddress                         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
|--------|----------------------------------------|--------------|------|------------|--------|------|------|------|------------------------------------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|        |                                        | Pin          | SG   |            | Min.   | Typ. | Max. |      |                                          | 00H                                | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH   |
| /VIDEO | Video typical conditions               | -            | -    | -          | -      | -    | -    | -    | -                                        | Pin 28=5 V, pin 25=5 V, pin 24=0 V | 40  | adj | 02  | 00  | 20  | 40  | 80  | 40  | 00  | 80  | 40  | 00  | 80  | 40  | 00  | 88  | 40  | 00  | 00  | 00  | 00  | 00  | 00  | 00  | 00  | 00    |
| /2AGTV | Video SW output level (TV input)       | 41           | SG.A | 31         | 1.6    | 2.0  | 2.6  | Vpp  |                                          |                                    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /2AGEV | Video SW output level (External input) | 38           | SG.A | 31         | 1.6    | 2.0  | 2.6  | Vpp  |                                          |                                    |     |     |     |     |     |     | 8C  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /Ymax  | Maximum video output                   | 38           | SG.A | 14,15, 16  | 2.9    | 4.2  | 5.6  | V    |                                          |                                    |     |     |     |     |     |     | 7F  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /GY    | Video gain                             | 38           | SG.A | 14,15, 16  | 12     | 15   | 18   | dB   |                                          |                                    |     |     |     |     |     |     | 7F  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /FBY   | Video frequency characteristic         | 38           | SG.B | 16         | -4     | -1   | -    | dB   | f=5MHz, C-trap : OFF                     |                                    | 10  |     |     |     |     |     | 7F  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /CRF1  | Chroma trap attenuation 1              | 38           | SG.C | 16         | -      | -    | -18  | dB   |                                          |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 02    |
| /TRF   | Chroma trap maximum attenuation        | 38           | SG.C | 16         | -      | -    | -20  | dB   | At Trap line adj. adjustment             |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 00-03 |
| /YDL1  | YDL time 1                             | 38           | SG.A | 14,15, 16  | 190    | 260  | 330  | nS   |                                          |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /YDL2  | YDL time 2                             | 38           | SG.A | 14,15, 16  | 120    | 200  | 280  | nS   | YDL2=measured value -YDL1 measured value |                                    |     |     |     |     |     |     | 8D  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /YDL3  | YDL time 3                             | 38           | SG.A | 14,15, 16  | 120    | 200  | 280  | nS   | YDL3=measured value -YDL2 measured value |                                    |     |     |     |     |     |     | 8E  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /YDL4  | YDL time 4                             | 38           | SG.A | 14,15, 16  | 120    | 200  | 280  | nS   | YDL4=measured value -YDL3 measured value |                                    |     |     |     |     |     |     | 8F  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /3Tnor | Video tone control characteristic 1    | 38           | SG.B | 14,15, 16  | 1.0    | 1.4  | 1.8  | V    | f=2.5MHz                                 |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /3Tmax | Video tone control characteristic 2    | 38           | SG.B | 14,15, 16  | 7      | 10   | 14   | dB   | f=2.5MHz                                 |                                    |     |     |     |     |     |     | 3F  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /3Tmin | Video tone control characteristic 3    | 38           | SG.B | 14,15, 16  | -6     | -2   | 2    | dB   | f=2.5MHz                                 |                                    |     |     |     |     |     |     | 00  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /3T2M  | Video tone control characteristic 4    | 38           | SG.B | 14,15, 16  | -1     | 2    | 5    | dB   | f=2MHz                                   |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /3T5M  | Video tone control characteristic 5    | 38           | SG.B | 14,15, 16  | -9     | -5   | -1   | dB   | f=5MHz                                   |                                    |     |     |     |     |     |     | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |
| /BLS   | Black expansion characteristic         | 38           | SG.K | 14,15, 16  | 0.01   | 0.03 | 0.05 | V    |                                          |                                    |     |     |     |     |     |     | adj | 8C  | 00  |     | adj |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 80    |
| /VMF   | Video mute function                    | 38           | SG.A | 14,15, 16  | -      | -45  | -35  | dB   |                                          |                                    | 80  |     |     |     |     |     | 7F  | 8C  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |

| Symbol   | Item                                    | Input signal | Test point | Limits |        |        | Unit   | Notes | Subaddress                           |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------|-----------------------------------------|--------------|------------|--------|--------|--------|--------|-------|--------------------------------------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|          |                                         |              |            | Limits |        |        |        |       |                                      |      |      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|          |                                         |              |            | Pin    | SG     |        |        |       | Min.                                 | Typ. | Max. | 00H | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H |
| CHROMA   | Chroma typical c conditions             | -            | -          | -      | -      | -      | -      | -     | Pin 28=5 V, pin 25=5 V, pin 24=0 V   | 40   | adj  | 02  | 00  | 20  | 40  | 80  | 40  | 00  | 80  | 40  | 40  | 80  | 40  | 00  | 80  | 40  | 00  | 10  | 00  | 00  | 88  | 40  | 00  | 00  | 00  | 00  |
| ChorR    | Chroma typical output (R-Y)             | 38           | SG.C       | 59     | 390    | 560    | 790    | mV    |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| ChorB    | Chroma typical output (B-Y)             | 38           | SG.C       | 59     | 640    | 920    | 1290   | mV    |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| ACC1     | ACC characteristic 1                    | 38           | SG.E       | 59     | -3     | 0      | 3      | dB    | Veb, Vec: typical input level +6 dB  |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| ACC2     | ACC characteristic 2                    | 38           | SG.E       | 59     | -4.5   | 0      | 1.5    | dB    | Veb, Vec: typical input level -20 dB |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| OV       | Chroma overload characteristic          | 38           | SG.E       | 59     | -3     | 2      | 5      | dB    | V = 800 mV                           |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| VikR     | Killer operation input level            | 38           | SG.E       | 59     | -      | -43    | -35    | dB    | Veb, Vec: variable                   |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| KlIP     | Color remaining on colorkilling         | 38           | SG.E       | 59     | -      | -45    | -30    | dB    | Vto = 0mV                            |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| APCU     | APC pull-in range (upper)               | 38           | SG.E       | 59     | -      | -600   | -300   | Hz    | feb=fec: variable                    |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| APCL     | APC pull-in range (lower)               | 38           | SG.E       | 59     | 300    | 600    | -      | Hz    | feb=fec: variable                    |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| REB      | Demodulation ratio                      | 38           | SG.E       | 59     | 0.40   | 0.57   | 0.80   | -     | feb=fec+50KHz                        |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| REBU     | Demodulation ratio (US mode)            | 38           | SG.J       | 14, 15 | -      | 1.33   | -      | -     | Reference data                       |      |      |     |     | 20  | 88  |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     | 08  |     |     |     |     |     |
| GBU      | Demodulation ratio (US mode)            | 38           | SG.J       | 15, 16 | -      | 0.43   | -      | -     | Reference data                       |      |      |     |     | 20  | 88  |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     | 08  |     |     |     |     |     |
| REB      | Demodulation ratio (JPN mode)           | 38           | SG.J       | 14, 15 | -      | 1.31   | -      | -     | Reference data                       |      |      |     |     | 20  | 88  |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     | 06  |     |     |     |     |     |
| GBU      | Demodulation ratio (JPN mode)           | 38           | SG.J       | 15, 16 | -      | 0.47   | -      | -     | Reference data                       |      |      |     |     | 20  | 88  |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     | 06  |     |     |     |     |     |
| R-YN1    | Demodulation angle 1                    | 38           | SG.E       | 59     | 86     | 103    | 120    | deg   | feb=fec+50KHz                        |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| R-YN2    | Demodulation angle 2                    | 38           | SG.E       | 59     | 73     | 90     | 107    | deg   | feb=fec+50KHz                        |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| TC1      | TINT control characteristic 1           | 38           | SG.E       | 59     | 30     | 45     | 60     | deg   | feb=fec+50KHz                        |      |      |     |     |     | 88  | F7  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| TC2      | TINT control characteristic 2           | 38           | SG.E       | 59     | 30     | 45     | 60     | deg   | feb=fec+50KHz                        |      |      |     |     |     | 88  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| fsc      | fsc output frequency                    | 38           | SG.C       | 29     | 3.5793 | 3.5796 | 3.5799 | MHz   |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /fsc     | fsc output amplitude 1                  | 38           | SG.C       | 29     | 1.4    | 2      | 2.6    | Vpp   |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| fiscfree | fsc output frequency in fsc free mode   | 38           | SG.C       | 29     | 3.5790 | 3.5795 | 3.5810 | MHz   |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| /fsc     | fsc output amplitude 1 in fsc free mode | 38           | SG.C       | 29     | 1.4    | 2      | 2.6    | Vpp   |                                      |      |      |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Symbol     | Item                                   | Input signal |            | Test point | Limits |      | Unit | Notes                              | Subaddress |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------|----------------------------------------|--------------|------------|------------|--------|------|------|------------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|            |                                        |              |            |            |        |      |      |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|            |                                        | Pin          | SG         |            | Min.   | Typ. | Max. |                                    | 00H        | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH | 1BH |
| RGB        | RGB typical conditions                 | -            | -          | -          | -      | -    | -    | Pin 28=5 V, pin 25=5 V, pin 24=0 V | 40         | adj | 02  | 00  | 20  | 40  | 80  | 40  | 40  | 00  | 80  | 40  | 40  | 80  | 80  | 24  | 20  | 00  | 10  | 00  | 88  | 40  | 00  | 00  | 00  | 00  | 00  |     |
| VBLK       | Output blanking voltage                | 38           | SG.A       | 14,15, 16  | 0      | 0.1  | 0.3  | V                                  |            |     |     |     |     |     | 88  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3Yvp       | Contrast control characteristic 1      | 38           | SG.B       | 14,15, 16  | 2.2    | 2.8  | 3.3  | Vpp                                |            |     |     |     |     |     | 88  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3Ymin      | Contrast control characteristic 2      | 38           | SG.B       | 14,15, 16  | -      | 200  | 300  | mV                                 |            |     |     |     |     |     | 00  | 88  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3YError    | Contrast control characteristic 3      | 38           | SG.A       | 14,15, 16  | 2.2    | 2.8  | 3.3  | V                                  |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3YEmin     | Contrast control characteristic 4      | 38           | SG.A       | 14,15, 16  | -      | 100  | 200  | mV                                 |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3YEclip    | Contrast control characteristic 5      | 21,22, 23    | SG.F       | 14,15, 16  | 0.50   | 0.65 | 0.80 | V                                  |            |     |     |     |     |     | 00  | 88  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Lum nor    | Brightness control characteristic 1    | 38           | SG.D       | 14,15, 16  | 1.7    | 2.1  | 2.5  | V                                  |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Lum max    | Brightness control characteristic 2    | 38           | SG.D       | 14,15, 16  | 2.3    | 3    | -    | V                                  |            |     |     |     |     |     | 88  | 00  | 00  | FF  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Lum min    | Brightness control characteristic 3    | 38           | SG.D       | 14,15, 16  | -      | 1.3  | 2    | V                                  |            |     |     |     |     |     | 88  | 00  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| D(R)1      | R driving control characteristic 1     | 38           | SG.A       | 14         | 2.0    | 4.0  | 6.0  | dB                                 |            |     |     |     |     |     | 88  | 00  | 00  | 00  | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| D(B)1      | B driving control characteristic 1     | 38           | SG.A       | 16         | 2.0    | 4.0  | 6.0  | dB                                 |            |     |     |     |     |     | 88  | 00  | 00  | 00  | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| D(R)2      | R driving control characteristic 2     | 38           | SG.A       | 14         | -5.0   | -3.0 | -1.0 | dB                                 |            |     |     |     |     |     | 88  | 00  | 00  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| D(B)2      | B driving control characteristic 3     | 38           | SG.A       | 16         | -5.0   | -3.0 | -1.0 | dB                                 |            |     |     |     |     |     | 88  | 00  | 00  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(R)    | Digital OSD (R) I/O characteristic 1   | 23,24, 38    | SG.F, SG.A | 14         | 1.0    | 1.5  | 2.0  | Vpp                                |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(G)    | Digital OSD (G) I/O characteristic 1   | 22,24, 38    | SG.F, SG.A | 15         | 1.0    | 1.5  | 2.0  | Vpp                                |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(B)    | Digital OSD (B) I/O characteristic 1   | 21,24, 38    | SG.F, SG.A | 16         | 1.0    | 1.5  | 2.0  | Vpp                                |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD2(R)    | Digital OSD (R) I/O characteristic 2   | 23,24, 38    | SG.F, SG.A | 14         | 200    | 300  | 400  | mV                                 |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD2(G)    | Digital OSD (G) I/O characteristic 2   | 22,24, 38    | SG.F, SG.A | 15         | 200    | 300  | 400  | mV                                 |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD2(B)    | Digital OSD (B) I/O characteristic 2   | 21,24, 38    | SG.F, SG.A | 16         | 200    | 300  | 400  | mV                                 |            |     |     |     |     |     | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(R-G)3 | Digital OSD (R-G) amplitude difference | -            | -          | -          | -350   | 0    | 350  | mV                                 |            |     |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(G-B)9 | Digital OSD (G-B) amplitude difference | -            | -          | -          | -350   | 0    | 350  | mV                                 |            |     |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXD1(B-R)4 | Digital OSD (B-R) amplitude difference | -            | -          | -          | -350   | 0    | 350  | mV                                 |            |     |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXA(R)     | Analog OSD (R) I/O characteristic      | 23,24, 38    | SG.F, SG.A | 14         | 1.2    | 2.1  | 3.0  | Vpp                                |            |     |     |     |     |     | 40  | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXA(G)     | Analog OSD (G) I/O characteristic      | 22,24, 38    | SG.F, SG.A | 15         | 1.2    | 2.1  | 3.0  | Vpp                                |            |     |     |     |     |     | 40  | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| EXA(B)     | Analog OSD (B) I/O characteristic      | 21,24, 38    | SG.F, SG.A | 16         | 1.2    | 2.1  | 3.0  | Vpp                                |            |     |     |     |     |     | 40  | 88  | 00  | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Symbol   | Item                                   | Input signal |            | Test point | Limits |      |      | Unit | Notes | Subaddress |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------|----------------------------------------|--------------|------------|------------|--------|------|------|------|-------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|          |                                        | Pin          | SG         |            | Min.   | Typ. | Max. |      |       | 00H        | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH | 1BH |
| EXA(R-G) | Analog OSD (R-G) amplitude difference  | -            | -          | -          | -350   | 0    | 350  | mV   |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     | 10  |     |     |     |     |     |     |     |     |
| EXA(G-B) | Analog OSD (G-B) amplitude difference  | -            | -          | -          | -350   | 0    | 350  | mV   |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     | 10  |     |     |     |     |     |     |     |     |
| EXA(B-R) | Analog OSD (B-R) amplitude difference  | -            | -          | -          | -350   | 0    | 350  | mV   |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     | 10  |     |     |     |     |     |     |     |     |
| OFRG     | Offset voltage (R-G)                   | 38           | SG.D       | 14,15      | -100   | 0    | 100  | mV   |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| OFBG     | Offset voltage (B-G)                   | 38           | SG.D       | 15,16      | -100   | 0    | 100  | mV   |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(R)1    | R cutoff control characteristic 1      | 38           | SG.D       | 14         | 2.6    | 2.9  | 3.2  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(G)1    | G cutoff control characteristic 1      | 38           | SG.D       | 15         | 2.6    | 2.9  | 3.2  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(B)1    | B cutoff control characteristic 1      | 38           | SG.D       | 16         | 2.6    | 2.9  | 3.2  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     | FF  |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(R)1    | R cutoff control characteristic 2      | 38           | SG.D       | 14         | 1.1    | 1.4  | 1.7  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(G)1    | G cutoff control characteristic 2      | 38           | SG.D       | 15         | 1.1    | 1.4  | 1.7  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| C(B)2    | B cutoff control characteristic 2      | 38           | SG.D       | 16         | 1.1    | 1.4  | 1.7  | V    |       |            |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Ccon 1   | Color control characteristic 1         | 38           | SG.C       | 14,15, 16  | 2      | 5    | 8    | dB   |       |            | 80  |     |     |     | 88  |     | 7F  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Ccon 2   | Color control characteristic 2         | 38           | SG.C       | 14,15, 16  | -      | -15  | -10  | dB   |       |            | 80  |     |     |     | 88  |     | 01  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Ccon 3   | Color control characteristic 3         | 38           | SG.C       | 14,15, 16  | -      | -40  | -35  | dB   |       |            | 80  |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MTXRB    | Matrix ratio R/B                       | 38           | SG.G       | 14,16      | 0.81   | 0.98 | 1.08 | -    |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MTXGB    | Matrix ratio G/B                       | 38           | SG.G       | 15,16      | 0.29   | 0.37 | 0.45 | -    |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| DOSD1    | Digital OSD switching characteristic 1 | 23,24, 38    | SG.F, SG.A | 14         | -      | 0.05 | 0.13 | us   |       |            |     |     |     |     | 7F  | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| DOSD2    | Digital OSD switching characteristic 2 | 23,24, 38    | SG.F, SG.A | 14         | -      | 0.05 | 0.13 | us   |       |            |     |     |     |     | 7F  | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| AOSD1    | Analog OSD switching characteristic 1  | 23,24, 38    | SG.F, SG.A | 14         | -      | 0.05 | 0.13 | us   |       |            |     |     |     |     | 7F  | 88  |     |     |     |     |     |     |     |     |     |     |     |     | 10  |     |     |     |     |     |     |     |     |
| AOSD2    | Analog OSD switching characteristic 2  | 23,24, 38    | SG.F, SG.A | 14         | -      | 0.05 | 0.13 | us   |       |            |     |     |     |     | 7F  | 88  |     |     |     |     |     |     |     |     |     |     |     |     | 10  |     |     |     |     |     |     |     |     |
| BB(R)    | Blue background function (R)           | 38           | SG.A       | 14         | 1.7    | 2.1  | 2.5  | V    |       |            |     |     |     |     | 88  |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| BB(G)    | Blue background function (G)           | 38           | SG.A       | 15         | 1.7    | 2.1  | 2.5  | V    |       |            |     |     |     |     | 88  |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| BB(B)    | Blue background function (B)           | 38           | SG.A       | 16         | 2.7    | 3.7  | 4.7  | V    |       |            |     |     |     |     | 88  |     | 80  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| WB       | White raster function                  | 38           | SG.A       | 14,15, 16  | 2.7    | 3.7  | 4.7  | V    |       |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     | A0  |     |     |     |     |     |     |     |     |     |     |     |     |     |

| Symbol | Item                                     | Input signal |      | Test point | Limits |      |      | Unit | Notes                              | Subaddress |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|--------|------------------------------------------|--------------|------|------------|--------|------|------|------|------------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|        |                                          | Pin          | SG   |            | Min.   | Typ. | Max. |      |                                    | 00H        | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH |
| DEF    | Deflection system typical conditions     | -            | -    | -          | -      | -    | -    | -    | Pin 28=5 V, pin 25=5 V, pin 24=0 V | 40         | adj | 02  | 00  | 20  | 40  | 80  | 40  | 00  | 80  | 40  | 00  | 80  | 40  | 80  | 24  | 20  | 00  | 10  | 00  | 00  | 88  | 40  | 00  | 00  | 00  |     |
| H1     | Horizontal free-running frequency 1      | -            | -    | 11         | 15.3   | 15.7 | 16.1 | kHz  |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 20  |     |     |     |     |     |     |     |     |     |     |     |
| H2     | Horizontal free-running frequency 2      | -            | -    | 11         | 14.7   | 15.1 | 15.5 | kHz  |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 26  |     |     |     |     |     |     |     |     |     |     |     |
| H3     | Horizontal free-running frequency 3      | -            | -    | 11         | 15.8   | 16.2 | 16.6 | kHz  |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| hfree  | Forced horizontal free-running operation | 38           | SG.A | 11         | 15.3   | 15.7 | 16.1 | kHz  |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     | 90  |     |     |     |     |     |     |     |     |     |
| FPHU   | Horizontal pull-in range (upper)         | 38           | SG.H | 11         | 250    | 500  | -    | Hz   | Variable input frequency           |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| FPHL   | Horizontal pull-in range (lower)         | 38           | SG.H | 11         | -      | -500 | -250 | Hz   | Variable input frequency           |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| HPT1   | Horizontal pulse timing 1                | 38           | SG.A | 11         | 12.0   | 13.5 | 15.0 | µs   |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 80  | 80  |     |     |     |     |     |
| HPT2   | Horizontal pulse timing 2                | 38           | SG.A | 11         | 2.5    | 4.0  | 5.5  | µs   |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 80  | 9F  |     |     |     |     |
| HPTW   | Horizontal pulse width                   | -            | -    | 11         | 21     | 25   | 29   | µs   |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| VH     | Horizontal pulse amplitude               | -            | -    | 11         | 4.7    | 5.4  | -    | V    |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| HSTA   | Horizontal pulse start operation         | -            | -    | 11         | -      | 0.0  | 0.5  | V    |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 00  |     |     |     |     |     |     |     |     |     |
| AFCG   | AFC gain operation                       | 38           | SG.A | 7          | 2.0    | 3.0  | 10.0 | dB   |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| V      | Vertical free-running frequency          | -            | -    | 5          | 55     | 60   | 65   | Hz   |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Vfree  | Forced vertical free-running operation   | 38           | SG.A | 5          | 55     | 60   | 65   | Hz   |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     | 64  |     |     |     |     |     |     |     |     |     |     |
| SVC    | Service mode operation                   | -            | -    | 5          | 1.0    | 1.5  | 2    | V    |                                    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 18  |     |     |     |     |     |     |     |     |     |
| FPVU   | Vertical pull-in frequency (upper)       | 38           | SG.H | 5          | 63     | 67   | -    | Hz   | Variable input frequency           |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| FPVL   | Vertical pull-in frequency (lower)       | 38           | SG.H | 5          | -      | 55   | 57   | Hz   | Variable input frequency           |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| VRsi 1 | Vertical ramp size control range 1       | 38           | SG.A | 5          | 1.6    | 2.0  | 2.4  | Vpp  |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| VRsc 1 | Vertical ramp size control range 1       | 38           | SG.A | 5          | 2.0    | 2.4  | 2.8  | Vpp  |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     | 30  |     |     |     |     |     |     |     |     |     |     |
| VRsc 2 | Vertical ramp size control range 2       | 38           | SG.A | 5          | 0.8    | 1.2  | 1.6  | Vpp  |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     | 00  |     |     |     |     |     |     |     |     |     |     |
| VRpo 1 | Vertical ramp position control range 1   | 38           | SG.A | 5          | 18     | 38   | 58   | µs   |                                    |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| VRpo 2 | Vertical ramp position control range 2   | 38           | SG.A | 5          | 840    | 860  | 880  | µs   | Measured value - VRpo 1            |            |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     | 17  |     |     |     |     |     |     |     |     |

| Symbol  | Item                                                | Input signal |      | Test point | Limits |      | Unit | Notes | Subaddress |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------|-----------------------------------------------------|--------------|------|------------|--------|------|------|-------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|         |                                                     | Pin          | SG   |            | Min.   | Typ. |      |       | Max.       | 00H | 01H | 02H | 03H | 04H | 05H | 06H | 07H | 08H | 09H | 0AH | 0BH | 0CH | 0DH | 0EH | 0FH | 10H | 11H | 12H | 13H | 14H | 15H | 16H | 17H | 18H | 19H | 1AH |
| VW      | Vertical pulse width                                | 38           | SG.A | 20         | 0.35   | 0.53 | 0.65 | ms    |            |     |     |     |     |     | 88  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|         | Vertical blanking width                             | 38           | SG.A | 14,15,16   | 1.32   | 1.47 | 1.62 | ms    |            |     |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|         | Vertical blanking width (VSHIFT1)                   | 38           | SG.A | 14,15,16   | 1.35   | 1.50 | 1.65 | ms    |            |     |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 08  |
|         | Vertical blanking width (VSHIFT2)                   | 38           | SG.A | 14,15,16   | 1.73   | 1.88 | 2.03 | ms    |            |     |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 0C  |
|         | Vertical blanking width (VSHIFT3)                   | 38           | SG.A | 14,15,16   | 2.11   | 2.26 | 2.41 | ms    |            |     |     |     |     |     | 88  |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 0F  |
| WVSS    | Vertical blanking width                             | 38           | SG.I | 5          | 14     | -    | -    | us    |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MONIT   | Intelligent monitor system typical conditions       | -            | -    | -          | -      | -    | -    | -     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| ORING   | Intelligent monitor 1 (composite sync)              | 41           | SG.A | 18         | 4.0    | 4.9  | 5.0  | Vpp   |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON1    | Intelligent monitor 2 (AFT)                         | 63,64        | SG.7 | 18         | 2.0    | 2.5  | 3.0  | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON3-1  | Intelligent monitor 3-1 (RF AGC1)                   | -            | -    | 18         | 4.0    | 4.3  | 4.6  | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON3-2  | Intelligent monitor 3-2 (RF AGC2)                   | 63,64        | SG.7 | 18         | 0.88   | 0.93 | 0.98 | -     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON6    | Intelligent monitor 6 (video SW output)             | 41           | SG.A | 18         | 0.76   | 0.95 | 1.24 | Vpp   |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON7    | Intelligent monitor 7 (G out)                       | 41           | SG.A | 18         | 1.5    | 2.0  | 2.5  | Vpp   |            |     |     |     |     |     |     |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON8    | Intelligent monitor 8 (R out)                       | 41           | SG.A | 18         | 1.5    | 2.0  | 2.5  | Vpp   |            |     |     |     |     |     |     |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON9    | Intelligent monitor 9 (B out)                       | 41           | SG.A | 18         | 1.5    | 2.0  | 2.5  | Vpp   |            |     |     |     |     |     |     |     | 00  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON10   | Intelligent monitor 10 (ACL)                        | -            | -    | 18         | 3.5    | 4.0  | 4.5  | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON11   | Intelligent monitor 11 (V sync)                     | 41           | SG.A | 18         | 3.5    | 4.0  | 4.5  | Vpp   |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON12   | Intelligent monitor 12 (H out)                      | 41           | SG.A | 18         | 3.6    | 4.0  | 4.4  | Vpp   |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON13   | Intelligent monitor 13 (VIF Vcc)                    | -            | -    | 18         | 2.30   | 2.50 | 2.70 | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON14   | Intelligent monitor 14 (Start-up Vcc)               | -            | -    | 18         | 2.55   | 2.70 | 2.85 | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON15   | Intelligent monitor 15 (video/chroma Vcc)           | -            | -    | 18         | 2.30   | 2.50 | 2.70 | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON16   | Intelligent monitor 16 (H1 Vcc)                     | -            | -    | 18         | 2.55   | 2.70 | 2.85 | V     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| MON11-Q | Intelligent monitor 1-C (Sync ratio at H free mode) | 41           | SG.A | 18         | 50     | 100  | -    | %     |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 90  |     |

## Method of Measurement of Electrical Characteristics

### VIF block

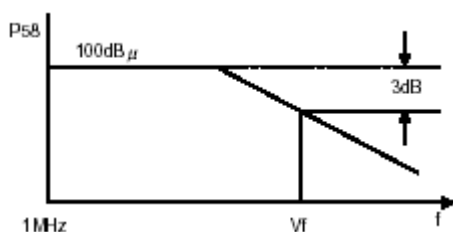
- P/N: Video S/N

1. Input SG3, and measure the rms value (noise value) for the signal output from pin 58.
2. The P/N is defined as follows.

$$P/N = 20 \log \frac{V_0 \text{ measured value } (V_{p-p}) \times 10^3 \times 0.7}{\text{Noise measured value (mVrms)}} \quad (\text{dB})$$

- Vf: Video frequency characteristic

1. Input SG4, and adjust the  $f_2$  frequency so that the 1 MHz beat component is output to pin 58.
2. Adjust the voltage applied to pin 62 so that the 1 MHz beat component at pin 62 is 100 dB $\mu$ .
3. Gradually reduce the  $f_2$  frequency, and measure the frequency at which the beat component is 3 dB lower than the level at 1 MHz.



- Vin min: Input sensitivity

1. Lower the level of SG5 so that the input level is 3 dB lower than the value measured under video-detection-wave output” for the  $V_0$  item.

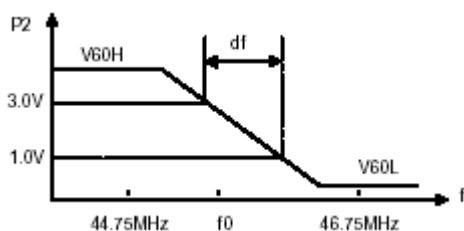
- Vin max: Maximum allowable input

1. Input SG6 at 90 dB $\mu$ .
2. The output level of Pin 58 at this point should be  $V_A$ . Increase the amplitude of SG6 so that the input level indicates an output level for Pin 58 that is 3 dB lower than  $V_A$ .

- $\mu$ AFT: AFT detection sensitivity

V2H: AFT maximum voltage

V2L: AFT minimum voltage



$\mu$ AFT is defined as follows.

$$\mu\text{AFT} = \frac{(3.0 - 1.0) \times 10^3 \text{ mV}}{df \text{ KHz}} \quad (\text{mV/KHz})$$

- IM: Inter-modulation

1. Input SG13 to Pins 63 and 64.
2. Measure the 0.92 MHz component and 3.58 MHz component of the pin 58 output.
3. IM is defined as follows.

$$IM = 20 \log \frac{0.92 \text{ MHz component}}{3.58 \text{ MHz component}} \quad (\text{dB})$$

- DLPH: RF AGC delay maximum point

- DLPL: RF AGC delay minimum point

1. Input SG5 to pins 63 and 64.
2. Change the amplitude of SG5 and measure the level at which the voltage of pin 59 is 2.5 V.

**SIF block**

- LIM: Input limiting sensitivity

Gradually decrease the input level of SG17, and measure the input level at the point when the 400 Hz component of Pin 58 is 3 dB lower than VoAF.

- AMR: AMR

1. Measure the 400 Hz component for Pin 54 and set it as Vam.
2. AMR is defined as follows.

$$AMR = 20 \log \frac{VoAF \text{ (mVrms)}}{Vam \text{ (mVrms)}} \quad (\text{dB})$$

- AFSN: AF S/N

1. Measure the noise (20 Hz to 100 kHz) of the Pin 51 output.
2. AF S/N is defined as follows.

$$AF \text{ S/N} = 20 \log \frac{VoAF \text{ max}}{\text{Measured value}} \quad (\text{dB})$$

**Video clock**

- 2AGTV: Video SW output level (TV input)

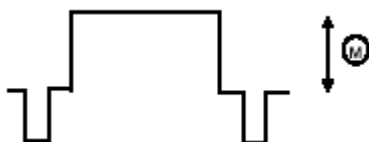
- 2AGEV: Video SW output level (External input)

1. Input SG.A to pin 41 (2AGTV) or pin 38 (2AGEV).
2. The amplitude (p-p) at pin 31 is measured.

\*In order to select TV or external input, use the subaddress 06H.

- Ymax: Maximum video output

1. Input SG.A to pin 38.
2. Measure the amplitude (p-p) other than the blanking part of the output of pins 14, 15, 16.



- FBY: Video frequency characteristic

1. Input SG.B (5 MHz, 0.4 Vp-p) to pin 38.
2. Measure the amplitude (p-p) other than the blanking part of the output of pins 14, 15, 16, take the result to be YB.
3. FYB is defined as follows.

$$FYB = 20 \log \frac{YB (Vp-p)}{GY (Vp-p)} \quad (dB)$$

- CRF1: Chroma trap attenuation 1 (normal R/G/B output)

TRF maximum chroma trap attenuation

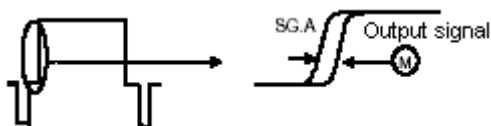
1. Input SG.C to pin 38, measure the 3.58 MHz frequency level with TRAP ON/OFF (02H D4) DATA 1, take this to be  $N_0$ .
2. Also measure the level with TRAP ON/OFF (02H D4) DATA 0.
3. CRF1 is defined as follows.

$$CRF1 = 20 \log \frac{\text{Measured value (mVp-p)}}{N_0 (mVp-p)} \quad (dB)$$

4. Take the minimum value of CRF1 when the I<sup>2</sup>C BUS data of the TRAP fine ADJ (12H D0/D1) is adjusted to be TRF.

- YDL1: YDL time 1

1. Input SG.A to pin 38.
2. Measure the delay time relative to the input signal of pins 14, 15, 16.



The delay time at 50% rise level is measured.

- YDL2, 3, 4: YDL time 2, 3, 4

1. Input SG.A to pin 38.
2. Measure the delay time of the input signal and the pin 14, 15, 16 output signals.
3. YDL2, YDL3, YDL4 are defined as follows.

$$YDL2 = \text{measured value (ns)} - YDL1 (\text{measured value})$$

$$YDL3 = \text{measured value (ns)} - YDL2 (\text{measured value})$$

$$YDL4 = \text{measured value (ns)} - YDL3 (\text{measured value})$$

- GTmax: Video tone control characteristic 2

1. Input SG.B (f = 2.5 MHz) to pin 38.
2. The output amplitude of pins 14, 15, 16 when the video tone data is at the center (20 H) is taken to be GTnor.
3. The output amplitude of pins 14, 15, 16 when the video tone data is maximum is measured.
4. GTmax is defined as follows.

$$GTmax = 20 \log \frac{\text{Measured value (Vp-p)}}{GTnor (mVp-p)} \quad (dB)$$

- GTmin: video tone control characteristic 3

1. Input SG.B (f=2.5 MHz) to pin 38.
2. The output amplitude of pins 14, 15, 16 when the video tone data is at the center (20 H) is taken to be GTnor.
3. The output amplitude of pins 14, 15, 16 when the video tone data is minimum is measured.
4. GTmin is defined as follows.

$$GTmin = 20 \log \frac{\text{Measured value (Vp-p)}}{GTnor \text{ (mVp-p)}} \quad (\text{dB})$$

- GT2M: Video tone control characteristic 4

1. Take pin 14, 15, 16 output amplitude when input signal frequency is 2.5 MHz to be GTnor.
2. Input SG.B (f = 2 MHz) to pin 38.
3. Measure pin 14, 15, 16 output amplitude.
4. GT2M is defined as follows.

$$GT2M = 20 \log \frac{\text{Measured value (Vp-p)}}{GTnor \text{ (mVp-p)}} \quad (\text{dB})$$

- GT5M: Video tone control characteristic 5

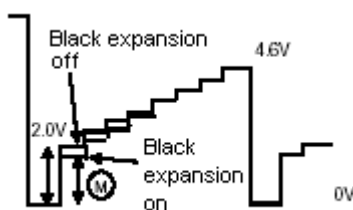
1. Take pin 14, 15, 16 output amplitude when input signal frequency is 2.5 MHz to be GTnor.
2. Input SG.B (f = 2 MHz) to pin 38.
3. Measure pin 14, 15, 16 output amplitude.
4. GT5M is defined as follows.

$$GT5M = 20 \log \frac{\text{Measured value (Vp-p)}}{GTnor \text{ (mVp-p)}} \quad (\text{dB})$$

- BLS: black stretch characteristic

1. Input SG.K to pin 38.
2. With black stretch off (02H D1 = 1), adjust the contrast (05H) and brightness (0AH), and set the pin 14, 15, 16 output level of the first stage (lowest stage) to 2.0 V, and the output level of the eighth stage (highest stage) to 4.6 V.
3. Change black stretch to on (02H D1 = 0), and measure the pin 14, 15, 16 first stage output level.
4. BLS is defined as follows.

$$BLS = 2.0 - \text{measured value (V)}$$



- VMF: Video mute function

1. Input SG.A to pin 38.
2. With the mute switch (02H D7) on "VMFon", off "VMFoff", measure the output amplitude.
3. VMF is defined as follows.

$$VMF = 20 \log \frac{VMFon \text{ (Vp-p)}}{VMFoff \text{ (Vp-p)}} \quad (\text{dB})$$

**Chroma block**

- CnorR: Chroma typical output (R-Y)
- CnorB: Chroma typical output (B-Y)
- 1. Input SG.C to pin 38.
- 2. When "test mode" I<sup>2</sup>C data is 18H D6=1, 18H D7=1 and 19H D6=1 and when "test mode" I<sup>2</sup>C data is 18H D6=0, 18H D7=1 and 19H D6=1, take the pin 59 output amplitude to be the chroma typical output (R-Y) and chroma typical output (B-Y), respectively.

- ACC1: ACC characteristic 1
- 1. Input SG.E (eb=570 mV: level + 6 dB) to pin 38.
- 2. Measure the pin 59 output amplitude.
- 3. ACC1 is defined as follows.

$$\text{ACC1} = 20 \log \frac{\text{measured value (mVp-p)}}{\text{chroma typical output 1 (mVp-p)}} \quad (\text{dB})$$

- ACC2: ACC characteristic 2
- 1. Input SG.E (input level: -18 dB) to pin 38.
- 2. Measure the pin 59 output amplitude.
- 3. ACC2 is defined as follows.

$$\text{ACC2} = 20 \log \frac{\text{measured value (mVp-p)}}{\text{chroma typical output 1 (mVp-p)}} \quad (\text{dB})$$

- OV: Chroma overload characteristic
- 1. Input SG.E (eb=800 mVp-p) to pin 38.
- 2. Measure the pin 59 output amplitude.
- 3. OV is defined as follows.

$$\text{OV} = 20 \log \frac{\text{measured value (mVp-p)}}{\text{chroma typical output 1 (mVp-p)}} \quad (\text{dB})$$

- VikN: Killer operation input level
- 1. Input SG.E (variable level) at input level 0 dB to pin 38.
- 2. While monitoring the pin 59 output amplitude, lower the input level, and measure the input level when the output amplitude vanishes.

- KillP: Hue remaining with killer
- 1. Input SG.E (level: -40 dB) to pin 38.
- 2. Measure the pin 59 output amplitude.

- APCU: APC pull-in range (upper)
- APCL: APC pull-in range (lower)
- 1. Input SG.E (feb-fec-3.579545 MHz) to pin 38.
- 2. After raising the frequency until the output from pin 59 vanishes, lower the frequency, and take the point at which an output appears to be fu.
- 3. After lowering the frequency until the output from pin 59 vanishes, raise the frequency, and take the point at which an output appears to be fl.
- 4. APCU and APCL are defined as follows.

$$\text{APCU} = f_u - 3579545 \text{ Hz}$$

$$\text{APCL} = f_l - 3579545 \text{ Hz}$$

- R/BN: Demodulation ratio R-Y/B-Y

1. Input SG.E (eb = single chroma = ec + 50 kHz) to pin 38.
2. Take the pin 59 output amplitude when "test mode" I<sup>2</sup>C data is 18H D6=1, D7=1 to be VRY.
3. Take the pin 59 output amplitude when "test mode" I<sup>2</sup>C data is 18H D6=0, D7=1 to be VBY.
4. R/BN is defined as follows.

$$R/BN = \frac{VRY (mVp-p)}{VBY (Vp-p)} \quad (dB)$$

- R/BU, G/BU: Demodulation ratio

- R/BJ, G/BJ: Demodulation ratio

1. Input SG.J to pin 38.
2. Take the pins 14, 15, 16 output amplitude when video mute on ( 02H D7 = 1, D7 = 1) and US mode (15H D3 = 1) are specified to be URY, UGY, and UBY, respectively.
3. Take the pins 14, 15, 16 output amplitude when video mute on ( 02H D7 = 1, D7 = 1) and JPN mode (15H D1 = 1, D2=1) are specified to be JRY, JGY, and JBY, respectively.
4. R/BU, G/BU, R/BJ, and G/BJ are defined as follows.

$$R/BU = \frac{URY(Vp-p)}{UBY(Vp-p)} \quad G/BU = \frac{UGY(Vp-p)}{UBY(Vp-p)}$$

$$R/BJ = \frac{JRY(Vp-p)}{JBY(Vp-p)} \quad G/BJ = \frac{JGY(Vp-p)}{JBY(Vp-p)}$$

- R-YN: Demodulation angle

1. Input SG.E (eb = single chroma = ec + 5 kHz) to pin 38.
2. Take the pin 59 output amplitude when "test mode" I<sup>2</sup>C data is 18H D6=1, D7=1 to be VRY.
3. Take the pin 59 output amplitude when "test mode" I<sup>2</sup>C data is 18H D6=0, D7=1 to be VBY.
4. R-YN is defined as follows.

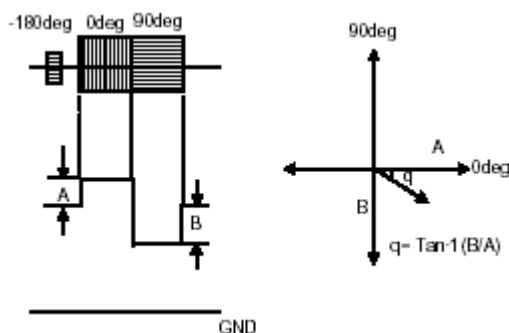
$$R-YN = \tan^{-1} \frac{VRY \times 3.8}{(VBY \times 1.9) + 45} (deg)$$

\*The vector is determined taking the demodulator gain into account.

- TC1: TINT control characteristic 1

- TC2: TINT control characteristic 2

1. Input SG.C (see figure below) to pin 38. Measure the absolute angle with reference to the pin 59 output voltage, referring to the figure below.



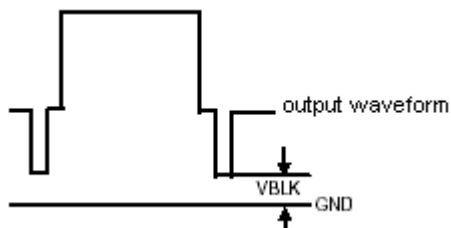
2. Take the TINT data center part (07H data 40H) to be reference angle "TC", determine the TINT DATA maximum and minimum values. TC1 and TC2 are defined as follows.

$$TC = TC_{max} - TC(deg)$$

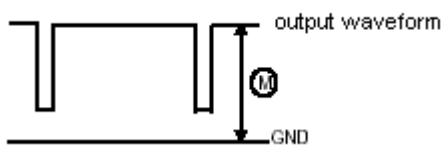
$$TC = TC - TC_{min} (deg)$$

**RGB interface block**

- VBKL: Output blanking voltage
  1. Input SG.A to pin 38.
  2. Measure the voltage of the pin 14, 15, 16 pedestal and blanking parts.



- GYmax: Contrast control characteristic 1
- GYmin: Contrast control characteristic 2
  1. Input SG.B (f=100 kHz) to pin 38.
  2. Measure the pin 14, 15, 16 output amplitude.
- GYEnor: Contrast control characteristic 3
- GYEmin: Contrast control characteristic 4
  1. Input SG.A to pin 38.
  2. Measure the pin 14, 15, 16 output amplitude when applying 2.9 V and 0 V to pin 33.
- GYEclip: Contrast control characteristic 5
  1. Input SG.F to pins 21, 22, 23, 24.
  2. Minimize the contrast control data, and measure the output amplitude at and above the pedestal part of pins 14, 15, 16.  
The amplitude of the blanking part is not measured.
- Lum nor: Brightness control characteristic 1
- Lum max: Brightness control characteristic 2
- Lum min: Brightness control characteristic 3
  1. Input SG.D (Vy=0 V) to pin 38.
  2. Measure the DC voltage other than the blanking part of the output of pins 14, 15, 16.



- D(R)1: R drive control characteristic 1
  1. Input SG.A to pin 38.
  2. Measure the pin 14 output amplitude when the drive control data is at center and is maximum, take the results to be DRnor and DRmax respectively.
  3. D(R)1 is defined as follows.

$$D(R)1 = 20 \log \frac{DR_{\max} (V_{p-p})}{DR_{\text{nor}} (V_{p-p})} (\text{dB})$$

- D(B)1: B drive control characteristic 1
  1. Input SG.A to pin 38.
  2. Measure the pin 16 output amplitude when the drive control data is at center and is maximum, take the results to be DBnor and DBmax respectively.
  3. D(B)1 is defined as follows.

$$D(B)1 = 20 \log \frac{DB_{\max} (V_{p-p})}{DB_{\text{nor}} (V_{p-p})} (\text{dB})$$

- D(R)2: R drive control characteristic 2

1. Input SG.A to pin 38.
2. Measure the pin 14 output amplitude when the drive control data is at center and is minimum, take the results to be DRnor and DRmin respectively.
3. D(R)2 is defined as follows.

$$D(R)2 = 20 \log \frac{DR_{\min} (V_{p-p})}{DR_{\text{nor}} (V_{p-p})} (\text{dB})$$

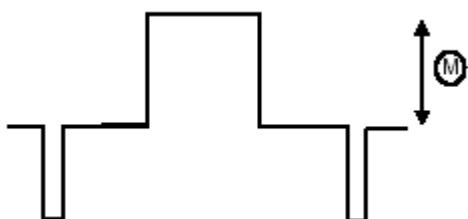
- D(B)2: R drive control characteristic 2

1. Input SG.A to pin 38.
2. Measure the pin 16 output amplitude when the drive control data is at center and is minimum, take the results to be DBnor and DBmin respectively.
3. D(B)2 is defined as follows.

$$D(B)2 = 20 \log \frac{DB_{\min} (V_{p-p})}{DB_{\text{nor}} (V_{p-p})} (\text{dB})$$

- EXD(R): Digital OSD(R) input/output characteristic
- EXD(G): Digital OSD(G) input/output characteristic
- EXD(B): Digital OSD(B) input/output characteristic

1. Input SG.F (Vosd=1.0 V) to pins 21, 22, 23, 14.
2. Measure the output amplitude at and above the pedestal part in pins 14, 15, 16. The amplitude of the blanking part is not measured.



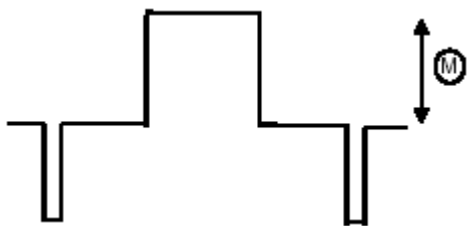
- EXD(R-G): Digital OSD (R-G) amplitude difference
  - EXD(G-B): Digital OSD (G-B) amplitude difference
  - EXD(B-R): Digital OSD (B-R) amplitude difference
1. EXD(R-G), EXD(G-B) and EXD(B-R) are defined as follows.

$$EXD(R-G) = EXD(R) - EXD(G)$$

$$EXD(G-B) = EXD(G) - EXD(B)$$

$$EXD(B-R) = EXD(B) - EXD(R)$$

- EXA(R): Analog OSD(R) input/output characteristic
  - EXA(G): Analog OSD(G) input/output characteristic
  - EXA(B): Analog OSD(B) input/output characteristic
1. Input SG.F (Vosd=1.0 V) to pins 21, 22, 23, 14.
  2. Measure the output amplitude at and above the pedestal part in pins 14, 15, 16. The amplitude of the blanking part is not measured.



- EXA(R-G): Analog OSD (R-G) amplitude difference
  - EXA(G-B): Analog OSD (G-B) amplitude difference
  - EXA(B-R): Analog OSD (B-R) amplitude difference
1. EXA(R-G), EXA(G-B) and EXA(B-R) are defined as follows.
 
$$\text{EXA(R-G)} = \text{EXA(R)} - \text{EXA(G)}$$

$$\text{EXA(G-B)} = \text{EXA(G)} - \text{EXA(B)}$$

$$\text{EXA(B-R)} = \text{EXA(B)} - \text{EXA(R)}$$
- C(R)1: R cutoff characteristic 1
  - C(G)1: G cutoff characteristic 1
  - C(B)1: B cutoff characteristic 1
  - C(R)2: R cutoff characteristic 2
  - C(G)2: G cutoff characteristic 2
  - C(B)2: B cutoff characteristic 2
1. Input SG.D (Vy=0 V) to pin 38.
  2. Measure the DC voltage of other than the blanking part in the outputs of pins 14, 15, 16.
- 
- Ccon1: color control characteristic 1
  - Ccon2: color control characteristic 2
  - Ccon3: color control characteristic 3
1. Input SG.C to pin 38.
  2. Measure the output amplitudes of pins 14, 15, 16 when IIC DATA 08H=40h, take this to be Ccon0.
  3. Measure the output amplitudes of pins 14, 15, 16 under each set of conditions.
  4. Ccon1, Ccon2, Ccon3 are defined as follows.

$$\text{Ccon1, Ccon2, Ccon3} = 20 \log \frac{\text{measured value (Vp-p)}}{\text{Ccon0 (Vp-p)}} \quad (\text{dB})$$

- MTXRB: Matrix ratio R/B

- MTXGB: Matrix ratio G/B

1. Input SG.G (rainbow color bar) to pin 38.
2. Measure the output amplitude when pins 14, 15, 16 are respectively VR, VG, VB.
3. MTXRB, MTXGB are defined as follows.

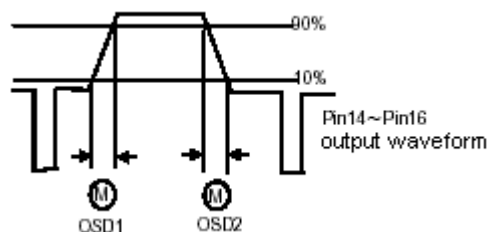
$$MTXRB = \frac{VR (V_{p-p})}{VB (V_{p-p})}$$

$$MTXGB = \frac{VG (V_{p-p})}{VB (V_{p-p})}$$



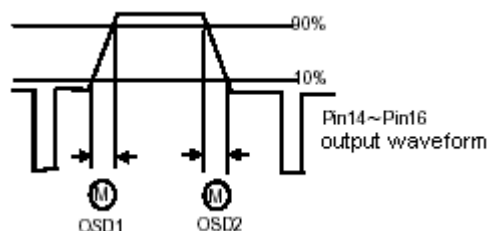
- DOSD1: Digital OSD switching characteristic 1
- DOSD2: Digital OSD switching characteristic 2

1. Input SG.F (Vosd=1.0 V) to pins 21, 22, 23, 24.
2. Measure the rise time and fall time of the output signals of pins 14, 15, 16 at and above pedestal level. The blanking part is not measured.



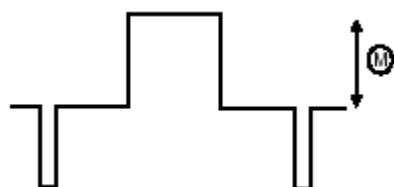
- AOSD1: Analog OSD switching characteristic 1
- AOSD2: Analog OSD switching characteristic 2

1. Input SG.F (Vosd=1.0 V) to pins 21, 22, 23, 24.
2. Measure the rise time and fall time of the output signals of pins 14, 15, 16 at and above pedestal level. The blanking part is not measured.

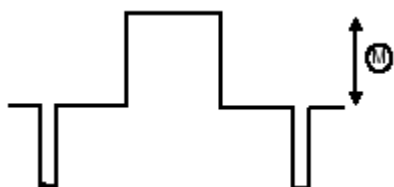


- BB(R): Blue back function (R)
- BB(G): Blue back function (G)
- BB(B): Blue back function (B)

1. Input SG.A to pin 38.
2. Measure the output amplitude (p-p) of pins 14, 15, 16 other than the blanking part.



- WB: White raster function
- 1. Input SG.A to pin 38.
- 2. Measure the output amplitude (p-p) of pins 14, 15, 16 other than the blanking part.



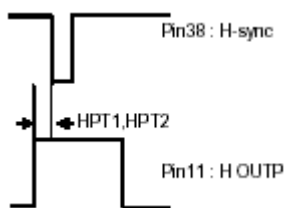
### **Deflection block**

- fH1: Horizontal free-running frequency 1
  - fH2: Horizontal free-running frequency 2
  - fH3: Horizontal free-running frequency 3
- Measure the frequency of pin 11 with no input.

- Hfree: Forced horizontal free-running operation
- 1. Input SG.A to pin 38.
- 2. Set H-FREE CONTROL DATA to on, measure the frequency at pin 11.

- FPHU: Horizontal pull-in range (upper)
- FPHL: Horizontal pull-in range (lower)
- 1. Input SG.H to pin 38.
- 2. Change the frequency of SG.H, measure the frequency range for which the pin 11 output signal and pin 38 input signal are pulled in, with respect to the video signal horizontal frequency.

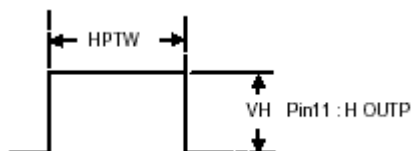
- HPT1: Horizontal pulse timing 1



- HPT2: Horizontal pulse timing 2
- 1. Measure the horizontal pulse timing using the method for HPT1.
- 2. Typical

$$\text{HPT2} = (\text{measured value}) - \text{HPT1}$$

- HPTW: Horizontal pulse width
- VH: Horizontal pulse amplitude



- HSTA: Horizontal pulse stop operation

Confirm that when H.START SW OFF (0FH:D7=0), the horizontal output goes low.

- AFCG: AFC gain operation

1. Measure the pin 7 output amplitude during AFC switching, taking the result during SW ON to be AFCon, and during SW OFF to be AFCoff.
2. AFCG is defined as follows.

$$\text{AFCG} = 20 \log \frac{\text{AFCon (Vp-p)}}{\text{AFCoff (Vp-p)}} \text{ (dB)}$$

- fV: Vertical free-running frequency

Measure the pin 5 output frequency with no input.

- Vfree: Forced vertical free-running operation

1. Input SG.A to pin 38.
2. Set V-FREE CONTROL DATA to on, measure the pin 5 output amplitude.

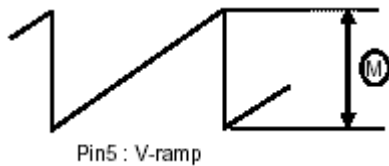
- SCV: Service mode operation

Measure the pin 5 output DC voltage with the service switch on.

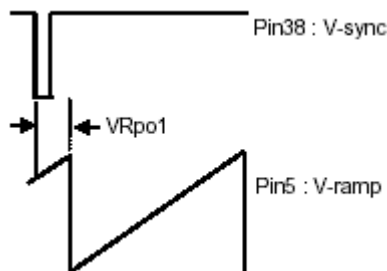
- FPVU: Vertical pull-in frequency (upper)
- FVPL: Vertical pull-in frequency (lower)

Change the SG.H vertical frequency, and measure the frequency when the pin 5 output waveform is pulled in.

- VRsi: Vertical ramp size
- VRsc1: Vertical ramp size control range 1
- VRsc2: Vertical ramp size control range 2



- VRpo1: Vertical ramp position control range 1

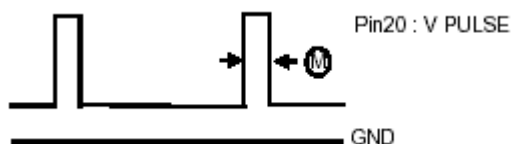


- VRpo2: Vertical ramp position control range 2

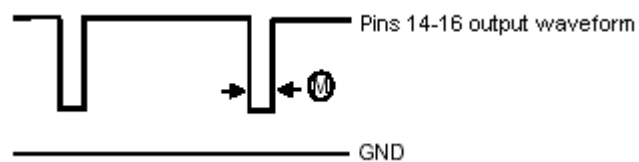
1. Measure the vertical ramp timing using the same method as for VRpo1.
2. VRpo2 is defined as follows.

$$\text{VRpo2} = (\text{measured value}) - \text{VRpo1}$$

- VW: Vertical pulse width



- VBLKW: Vertical BLK width



- WVSS: Minimum width at minimum sync operation

Reduce the width of the SG.I signal, and measure the input signal width when the pin 5 output waveform pull-in is lost.

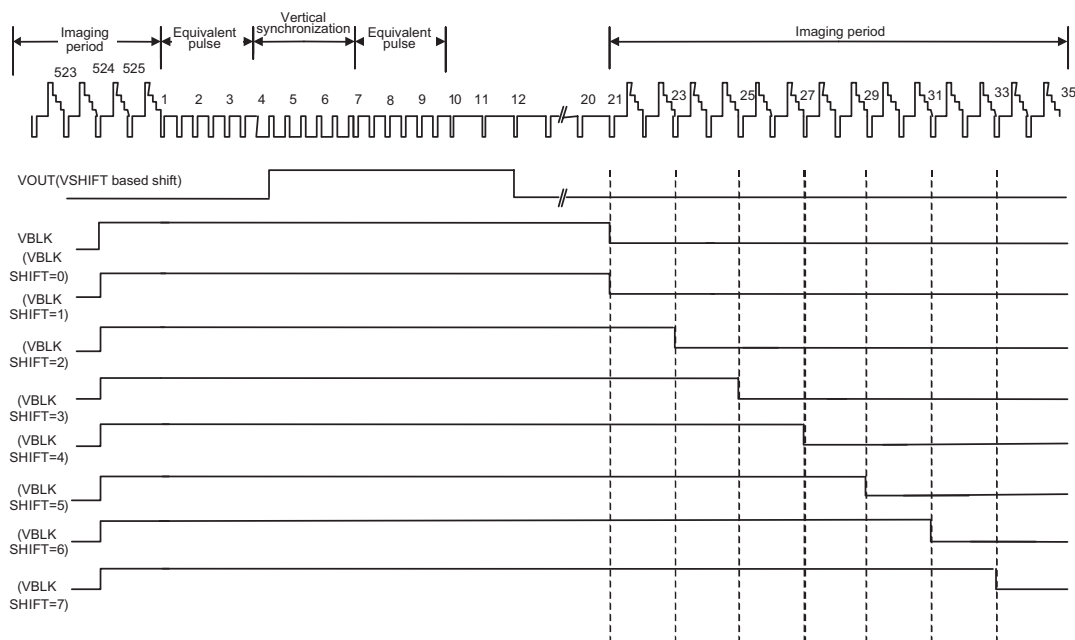
### The following function is added to the M61250BFP (VBLKWVS1 to VBLKWVS3)

The vertical blanking width can be specified independently of VSHIFT.

Note, however, that it operates in the same way as conventional products in the initial state.

### The following bits are added to the I<sup>2</sup>C register.

- VBLK SHIFT ON (1CH D3) Initial value = 0
  - 0: Shifts the VBLK based on the conventional SHIFT
  - 1: Shifts the VBLK based on the VBLK SHIFT.
- VBLK SHIFT (1CH D2 to 1CH D0) Initial value = 4
  - 0: VBLK period is 260 H to 21 H.
  - 1: VBLK period is 260 H to 21 H.
  - 2: VBLK period is 260 H to 23 H.
  - 3: VBLK period is 260 H to 25 H.
  - 4: VBLK period is 260 H to 27 H.
  - 5: VBLK period is 260 H to 29 H.
  - 6: VBLK period is 260 H to 31 H.
  - 7: VBLK period is 260 H to 33 H.



- An image may be output during the V blanking period according to the VSHIFT value. In this case, the VBLK should be shifted in order not to output the image during the blanking period. Carefully consider this because the output condition changes according to the circuit connected externally.

### **Important Information**

- Each application should be thoroughly studied and evaluated before making a decision.
- 47 mF and higher electrolytic capacitors and 0.01 mF and higher ceramic capacitors should be connected in parallel between each of the power supply pins (3, 4, 12, 39, 42, 44) and ground pin. In addition, it is recommended that the connectors be made as close to the IC power supply pins as possible.
- The C-SYNC output operation of the intelligent monitor (18 pins) cannot be guaranteed at Hfree (13H: D7 = 1) .
- When purchasing I2C bus components, a license to use these components within a 12C bus system is provided under the 12C patent rights of Philips Corp.  
However, the bus system must conform to the 12C specifications stipulated by Philips.

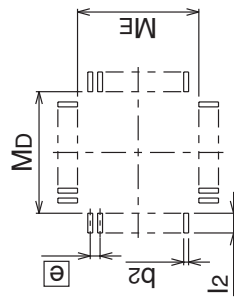
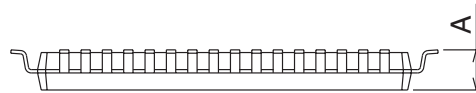
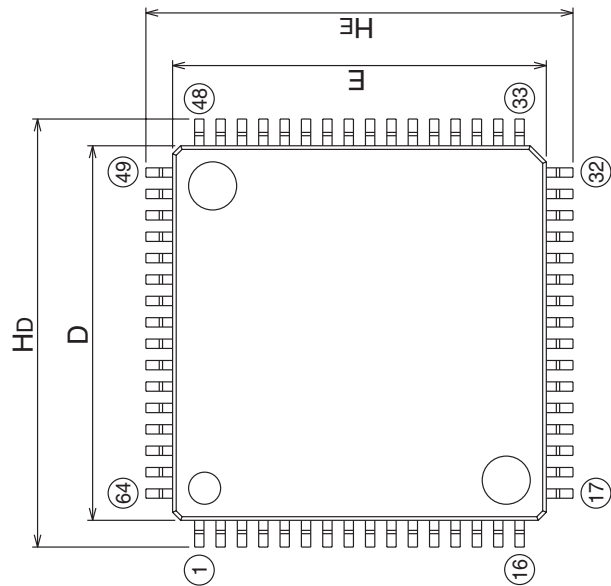
Package Dimensions

64P6U-A

(MMP)

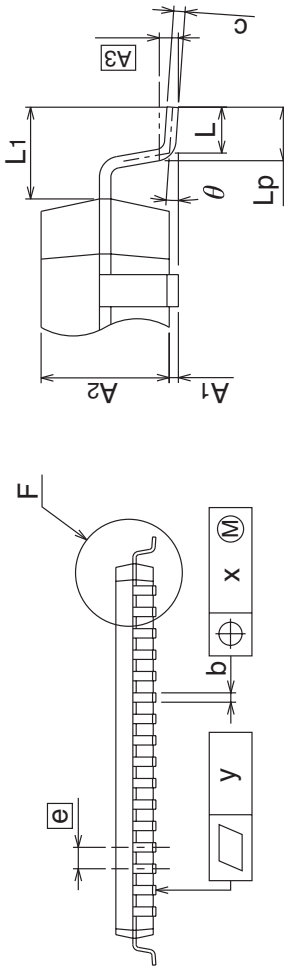
Plastic 64pin 14 14mm body LQFP

| EIAJ Package Code | JEDEC Code | Weight(g) | Lead Material |
|-------------------|------------|-----------|---------------|
| LQFP64-P-1414-0.8 | —          |           | Cu Alloy      |



Recommended Mount Pad

| Symbol | Dimension in Millimeters |       |       |
|--------|--------------------------|-------|-------|
|        | Min                      | Nom   | Max   |
| A      | —                        | —     | 1.7   |
| A1     | 0                        | 0.1   | 0.2   |
| A2     | —                        | 1.4   | —     |
| b      | 0.32                     | 0.37  | 0.45  |
| c      | 0.105                    | 0.125 | 0.175 |
| D      | 13.9                     | 14.0  | 14.1  |
| E      | 13.9                     | 14.0  | 14.1  |
| e      | —                        | 0.8   | —     |
| HD     | 15.8                     | 16.0  | 16.2  |
| HE     | 15.8                     | 16.0  | 16.2  |
| L      | 0.3                      | 0.5   | 0.7   |
| L1     | —                        | 1.0   | —     |
| Lp     | 0.45                     | 0.6   | 0.75  |
| A3     | —                        | 0.25  | —     |
| x      | —                        | —     | 0.2   |
| y      | —                        | —     | 0.1   |
| θ      | 0°                       | —     | 8°    |
| b2     | —                        | 0.5   | —     |
| l2     | 0.95                     | —     | —     |
| MD     | —                        | 14.4  | —     |
| ME     | —                        | 14.4  | —     |



Detail F

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