

M52743BSP

I²C BUS Controlled 3-Channel Video Preamplifier

REJ03F0193-0201

Rev.2.01

Mar 31, 2008

Description

M52743BSP is semiconductor integrated circuit for CRT display monitor.

It includes OSD blanking, OSD mixing, retrace blanking, wide band amplifier, brightness control.

Main/sub contrast and OSD adjust function can be controlled by I²C BUS.

Features

- Frequency band width: RGB 150 MHz (at -3 dB)
OSD 80 MHz
- Input: RGB 0.7 V_{P,P} (typ.)
OSD 3 V_{P,P} min. (positive)
BLK (for OSD) 3 V_{P,P} min. (positive)
Retrace BLK 3 V_{P,P} min. (positive)
- Output: RGB 5.5 V_{P,P} (max.)
OSD 5 V_{P,P} (max.)
- Main contrast and sub contrast can be controlled by I²C BUS.
- Include internal and external pedestal clamp circuit.

Application

CRT display monitor

Recommended Operating Condition

Supply voltage range: 11.5 to 12.5 V (V3, V8, V12, V36)

4.5 to 4.4 V (V17)

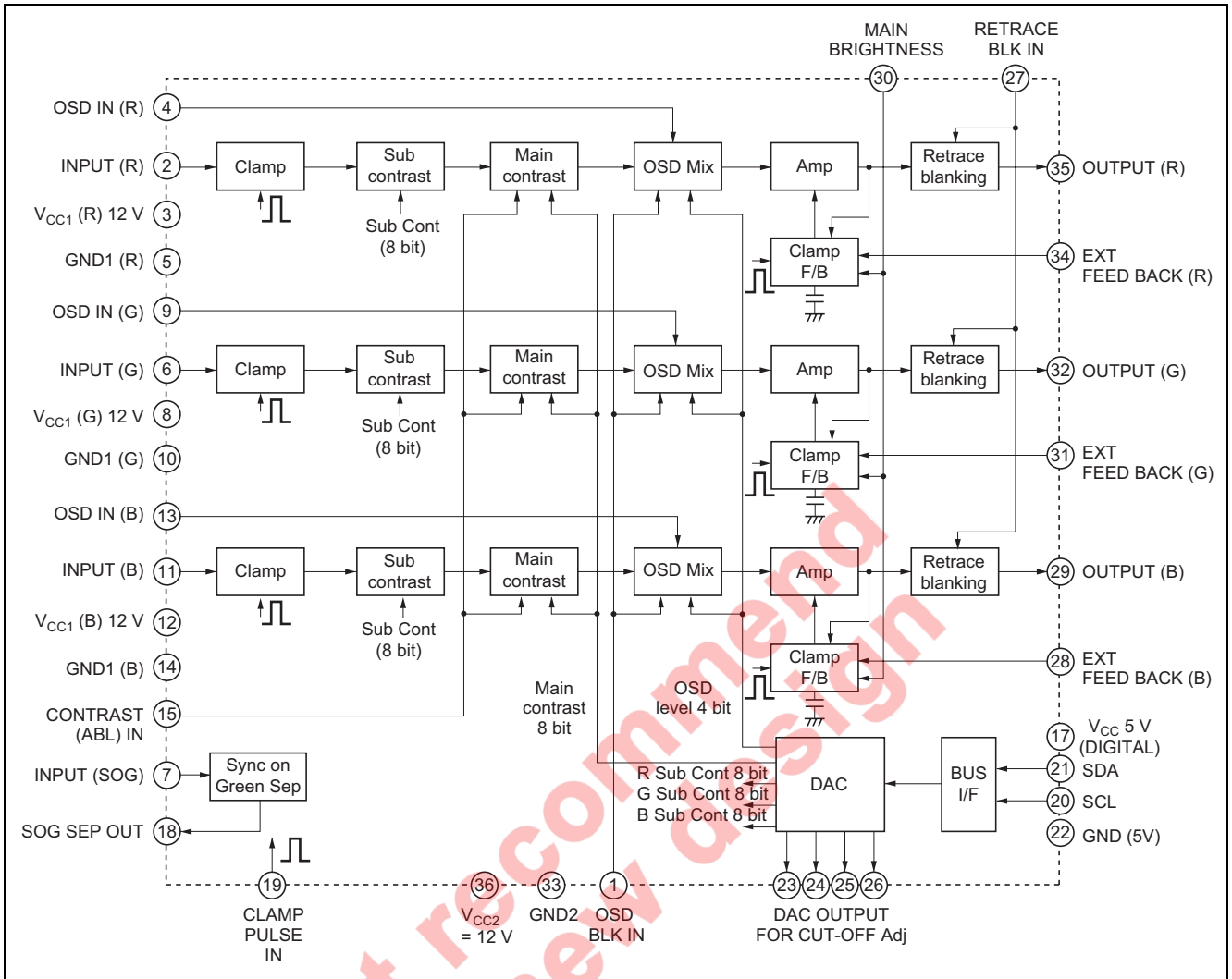
Rated supply voltage: 12.0 V (V3, V8, V12, V36)

5.0 V (V17)

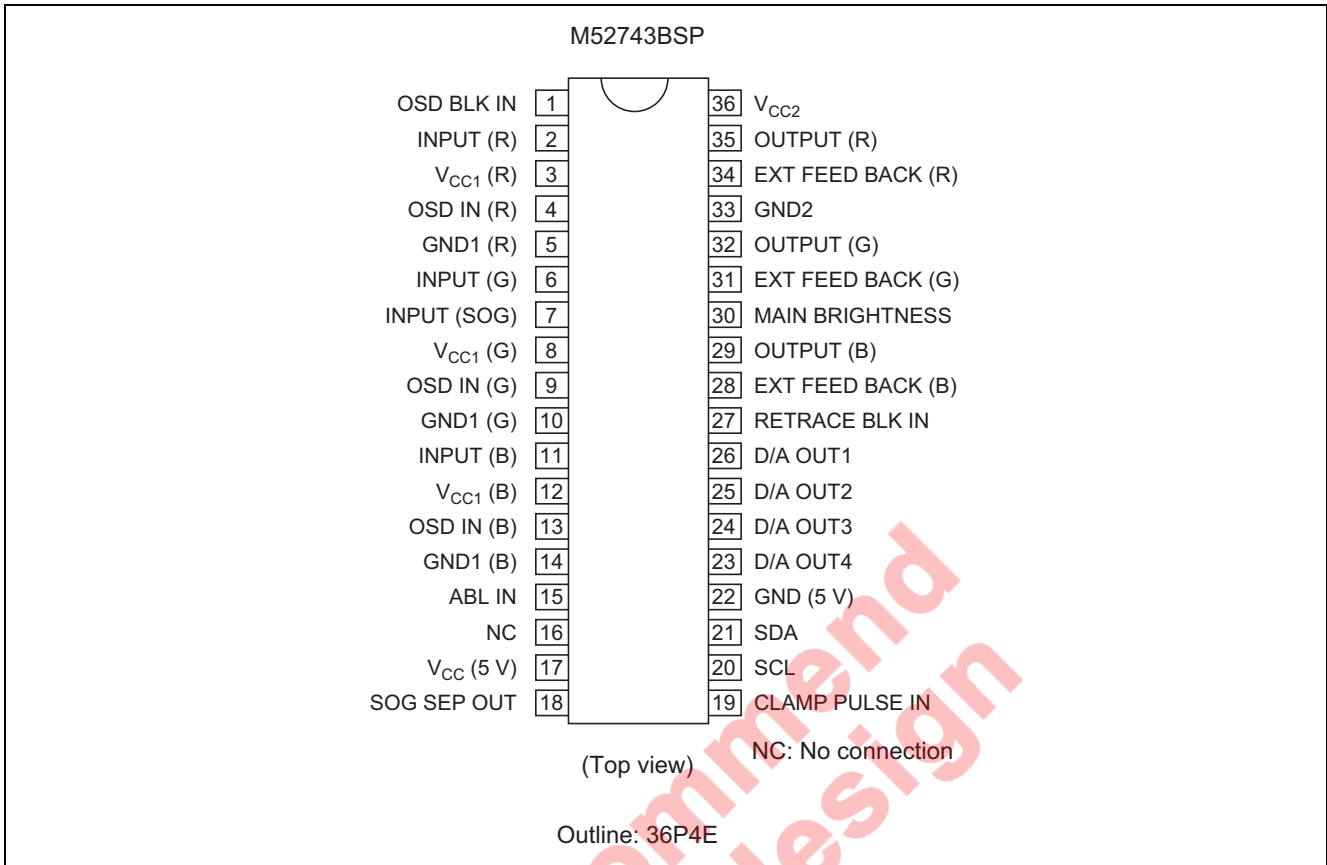
Major Specification

BUS controlled 3ch video pre-amp with OSD mixing function and retrace blanking function

Block Diagram



Pin Arrangement



Not recommended for new design

Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|---------------------|------------------|--------------|------|
| Supply voltage | V _{CC} | 13.0 | V |
| Power dissipation | P _d | 2403 | mW |
| Ambient temperature | T _{opr} | -20 to +75 | °C |
| Storage temperature | T _{stg} | -40 to +150 | °C |
| Recommended supply | V _{opr} | 12.0 | V |
| Voltage range | V _{opr} | 10.5 to 12.5 | V |
| Case temperature | θ _{jc} | 22 | °C/W |

Electrical Characteristics

(V_{CC} = 12 V, 5 V, Ta = 25°C, unless otherwise noted)

| Item | Symbol | Limits | | | Unit | Test Point (s) | Input | | | | | | | | | | CTL Voltage | | BUS CTL (H) | | | | | | | | | |
|---|-------------------|--------|------|------|------------------|----------------|-----------------|-----------|-----------------|----------|------------|----------|-----------|--------|---------------|----------------|----------------|----------------|-------------|-------------|---------------|---------------|---------------|---------------|-------------|--|--|--|
| | | Min. | Typ. | Max. | | | 2, 6, 11 RGB in | 1 OSD BLK | 4, 9, 13 OSD in | 19 CP in | 27 ReT BLK | 7 SOG in | 30 Bright | 15 ABL | 00H Main Cont | 01H Sub Cont 1 | 02H Sub Cont 2 | 03H Sub Cont 3 | 04H OSD Adj | 05H BLK Adj | 06H D/A OUT 1 | 07H D/A OUT 2 | 08H D/A OUT 3 | 09H D/A OUT 4 | 0BH INT EXT | | | |
| Circuit current1 | I _{CC1} | — | 110 | 130 | mA | I _A | a | a | a | b SG5 | a | a | 4.0 | 5.0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | 00H 0 | 00H 0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | 00H 0 | | | |
| Circuit current2 | I _{CC2} | — | 18 | 22 | mA | I _B | a | a | a | b SG5 | a | a | 4.0 | 5.0 | | | | | | | | | | | | | | |
| Output dynamic range | V _{omax} | 6.0 | 8.0 | — | V _{p-p} | OUT | b SG2 | a | a | b SG5 | a | a | Variable | 5.0 | | | | | | | | | | | | | | |
| Maximum input | V _{imax} | 1.6 | — | — | V _{p-p} | IN OUT | b SG2 Variable | a | a | b SG5 | a | a | 2.0 | 5.0 | 64H 100 | | | | | | | | | | | | | |
| Maximum gain | G _v | 16.5 | 17.7 | 19.7 | dB | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | FFH 255 | | | | | | | | | | | | | |
| Relative maximum gain | ΔG _v | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Main contrast control characteristics1 | V _{C1} | 14.5 | 16.0 | 17.5 | dB | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | C8H 200 | | | | | | | | | | | | | |
| Main contrast control relative characteristics1 | ΔV _{C1} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Main contrast control characteristics2 | V _{C2} | 8.5 | 10.0 | 11.5 | dB | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | 64H 100 | | | | | | | | | | | | | |
| Main contrast control relative characteristics2 | ΔV _{C2} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Main contrast control characteristics3 | V _{C3} | 0.2 | 0.4 | 0.6 | V _{p-p} | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | 14H 20 | | | | | | | | | | | | | |
| Main contrast control relative characteristics3 | ΔV _{C3} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Sub contrast control characteristics1 | V _{SC1} | 14.8 | 16.3 | 17.8 | dB | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | FFH 255 | C8H 200 | C8H 200 | C8H 200 | | | | | | | | | | |
| Sub contrast control relative characteristics1 | ΔV _{SC1} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Sub contrast control characteristics2 | V _{SC2} | 11.1 | 12.6 | 14.1 | dB | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | FFH 255 | 64H 100 | 64H 100 | 64H 100 | | | | | | | | | | |
| Sub contrast control relative characteristics2 | ΔV _{SC2} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |
| Sub contrast control characteristics3 | V _{SC3} | 1.4 | 1.7 | 2.0 | V _{p-p} | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | FFH 255 | 14H 20 | 14H 20 | 14H 20 | | | | | | | | | | |
| Sub contrast control relative characteristics3 | ΔV _{SC3} | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | | | | | | | | | | | | | |

Electrical Characteristics (cont.)

| Item | Symbol | Limits | | | Unit | Test Point (s) | Input | | | | | | | CTL Voltage | | BUS CTL (H) | | | | | | | | | | | |
|---|-------------------|--------|------|------|------------------|-------------------|-----------------|-----------|----------------|----------|------------|----------|-----------|-------------|---------------|----------------|----------------|----------------|-------------|-------------|---------------|---------------|---------------|---------------|-------------|---------|-------|
| | | Min. | Typ. | Max. | | | 2, 6, 11 RGB in | 1 OSD BLK | 4, 9 13 OSD in | 19 CP in | 27 ReT BLK | 7 SOG in | 30 Bright | 15 ABL | 00H Main Cont | 01H Sub Cont 1 | 02H Sub Cont 2 | 03H Sub Cont 3 | 04H OSD Adj | 05H BLK Adj | 06H D/A OUT 1 | 07H D/A OUT 2 | 08H D/A OUT 3 | 09H D/A OUT 4 | 0BH INT EXT | | |
| Main/sub contrast control characteristics2 | VMSC | 3.2 | 3.8 | 4.4 | V _{p-p} | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | C8H 200 | C8H 200 | C8H 200 | C8H 200 | 00H 0 | 00H 0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | 00H 0 |
| Main/sub contrast control relative characteristics2 | ΔVMSC | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| ABL control characteristics1 | ABL1 | 3.8 | 4.6 | 5.4 | V _{p-p} | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 4.0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | — | — | — | — | — | — | — | — | — |
| ABL control relative characteristics1 | ΔABL1 | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| ABL control characteristics2 | ABL2 | 2.2 | 2.7 | 3.2 | V _{p-p} | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 2.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| ABL control relative characteristics2 | ΔABL2 | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control characteristics1 | V _{B1} | 3.3 | 3.7 | 4.1 | V | OUT | a | a | a | b SG5 | a | a | 4.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control relative characteristics1 | ΔV _{B1} | -0.3 | 0 | 0.3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control characteristics2 | V _{B2} | 1.5 | 1.8 | 2.1 | V | OUT | a | a | a | b SG5 | a | a | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control relative characteristics2 | ΔV _{B2} | -0.3 | 0 | 0.3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control characteristics3 | V _{B3} | 0.7 | 0.9 | 1.1 | V | OUT | a | a | a | b SG5 | a | a | 1.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Brightness control relative characteristics3 | ΔV _{B3} | -0.3 | 0 | 0.3 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency characteristics1 (f = 50 MHz) | F _{C1} | -2.0 | 0 | 2.5 | dB | OUT | b SG3 | a | a | a 5 V | a | a | Variable | 5.0 | Variable | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency relative characteristics1 (f = 50 MHz) | ΔF _{C1} | -1.0 | 0 | 1.0 | dB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency characteristics1 (f = 150 MHz) | F _{C1'} | -3.0 | 0 | 3.0 | dB | OUT | b SG3 | a | a | a 5 V | a | a | Variable | 5.0 | Variable | FFH 255 | FFH 255 | FFH 255 | 00H 0 | 00H 0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | 00H 0 | |
| Frequency relative characteristics1 (f = 150 MHz) | ΔF _{C1'} | -1.0 | 0 | 1.0 | dB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency characteristics2 (f = 150 MHz) | F _{C2} | -3.0 | 3.0 | 5.0 | dB | OUT | b SG3 | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency relative characteristics2 (f = 150 MHz) | ΔF _{C2} | -1.0 | 0 | 1.0 | dB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk1 (f = 50 MHz) | C.T.1 | — | -25 | -20 | dB | OUT (29) OUT (32) | 2bSG3 6a 11a | a | a | a 5 V | a | a | Variable | 5.0 | FFH 255 | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk1 (f = 150 MHz) | C.T.1' | — | -15 | -10 | dB | OUT (29) OUT (32) | 2bSG3 6a 11a | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk2 (f = 50 MHz) | C.T.2 | — | -25 | -20 | dB | OUT (29) OUT (35) | 2a 6bSG3 11a | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk2 (f = 150 MHz) | C.T.2' | — | -15 | -10 | dB | OUT (29) OUT (35) | 2a 6bSG3 11a | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk3 (f = 50 MHz) | C.T.3 | — | -25 | -20 | dB | OUT (32) OUT (35) | 2a 6a 11bSG3 | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Crosstalk3 (f = 150 MHz) | C.T.3' | — | -15 | -10 | dB | OUT (32) OUT (35) | 2a 6a 11bSG3 | a | a | a 5 V | a | a | Variable | 5.0 | — | — | — | — | — | — | — | — | — | — | — | — | — |

Electrical Characteristics (cont.)

| Item | Symbol | Limits | | | Unit | Test Point (s) | Input | | | | | | CTL Voltage | | BUS CTL (H) | | | | | | | | | | |
|---|------------------|--------|------|------|------------------|------------------|-----------------|----------------|----------------|----------------|----------------|----------------|-------------|--------|---------------|----------------|----------------|----------------|-------------|-------------|---------------|---------------|---------------|---------------|-------------|
| | | Min. | Typ. | Max. | | | 2, 6, 11 RGB in | 1 OSD BLK | 4, 9 13 OSD in | 19 CP in | 27 ReT BLK | 7 SOG in | 30 Bright | 15 ABL | 00H Main Cont | 01H Sub Cont 1 | 02H Sub Cont 2 | 03H Sub Cont 3 | 04H OSD Adj | 05H BLK Adj | 06H D/A OUT 1 | 07H D/A OUT 2 | 08H D/A OUT 3 | 09H D/A OUT 4 | 0BH INT EXT |
| Pulse characteristics1 (4 V _{P-P}) | Tr | — | 1.7 | — | ns | OUT | b SG1 | a | a | b SG5 | a | a | Variable | 5.0 | Variable | FFH 255 | FFH 255 | FFH 255 | 00H 0 | 00H 0 | FFH 255 | FFH 255 | FFH 255 | FFH 255 | 00H 0 |
| Pulse characteristics2 (4 V _{P-P}) | Tf | — | 3.0 | — | ns | OUT | b SG1 | a | a | b SG5 | a | a | Variable | 5.0 | Variable | | | | | | | | | | |
| Clamp pulse threshold voltage | VthCP | 1.0 | 1.5 | 2.0 | V | OUT | b SG1 | a | a | b SG5 Variable | a | a | 2.0 | 5.0 | FFH 255 | | | | | | | | | | |
| Clamp pulse minimum width | WCP | 0.2 | 0.5 | — | μs | OUT | b SG1 | a | a | b SG5 Variable | a | a | 2.0 | 5.0 | | | | | | | | | | | |
| Pedestal voltage temperature characteristics1 | P _{DCH} | -3.0 | 0 | 0.3 | V | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | | | | | | | | | | | |
| Pedestal voltage temperature characteristics2 | P _{DCL} | -3.0 | 0 | 0.3 | V | OUT | b SG1 | a | a | b SG5 | a | a | 2.0 | 5.0 | | | | | | | | | | | |
| OSD pulse characteristics1 | OTr | — | 3.0 | 6.0 | ns | OUT | a | a | b SG6 | b SG5 | a | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| OSD pulse characteristics2 | OTf | — | 3.0 | 6.0 | ns | OUT | a | a | b SG6 | b SG5 | a | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| OSD adjust control characteristics1 | Oaj1 | 4.6 | 5.4 | 6.2 | V _{P-P} | OUT | a | b SG6 | b SG6 | b SG5 | a | a | 2.0 | 5.0 | | | | | 0FH 15 | | | | | | |
| OSD adjust control relative characteristics1 | ΔOaj1 | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | | | | | — | | | | | | |
| OSD adjust control characteristics2 | Oaj2 | 2.8 | 3.3 | 3.8 | V _{P-P} | OUT | a | b SG6 | b SG6 | b SG5 | a | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| OSD adjust control relative characteristics2 | ΔOaj2 | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | | | | | — | | | | | | |
| OSD adjust control characteristics3 | Oaj3 | 0 | 0.1 | 0.5 | V _{P-P} | OUT | a | b SG6 | b SG6 | b SG5 | a | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| OSD adjust control relative characteristics3 | ΔOaj3 | 0.8 | 1.0 | 1.2 | — | — | — | — | — | — | — | — | — | — | | | | | — | | | | | | |
| OSD input threshold voltage | VthOSD | 2.2 | 2.7 | 3.2 | V | OUT | a | b SG6 | b SG6 Variable | b SG5 | a | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| OSD BLK input threshold voltage | VthBLK | 2.2 | 2.7 | 3.2 | V | OUT | b SG1 | b SG6 Variable | a | b SG5 | a | a | 2.0 | 5.0 | | | | | 00H 0 | | | | | | |
| Retrace BLK characteristics1 | HBLK1 | 1.7 | 2.0 | 2.3 | V | OUT | a | a | a | b SG5 | b SG7 | a | 2.0 | 5.0 | | | | | 0FH 15 | | | | | | |
| Retrace BLK characteristics2 | HBLK2 | 0.7 | 1.0 | 1.3 | V | OUT | a | a | a | b SG5 | b SG7 | a | 2.0 | 5.0 | | | | | 06H 6 | | | | | | |
| Retrace BLK characteristics3 | HBLK3 | 0.1 | 0.4 | 0.7 | V | OUT | a | a | a | b SG5 | b SG7 | a | 2.0 | 5.0 | | | | | 00H 0 | | | | | | |
| Retrace BLK input threshold voltage | VthRET | 1.0 | 1.5 | 2.0 | V | OUT | a | a | a | b SG5 | b SG7 Variable | a | 2.0 | 5.0 | | | | | 0BH 8 | | | | | | |
| SOG input maximum noise voltage | SS-NV | 0 | 0.01 | 0.02 | V _{P-P} | SonG IN Sync OUT | a | a | a | a | a | b SG4 Variable | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — |
| SOG minimum input voltage | SS-SV | 0.2 | 0.3 | — | V _{P-P} | SonG IN Sync OUT | a | a | a | a | a | b SG4 Variable | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — |
| Sync output high level | VSH | 4.5 | 4.9 | 5.0 | V | Sync OUT | a | a | a | a | a | b SG4 | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — |
| Sync output low level | VSL | 0 | 0.3 | 0.6 | V | Sync OUT | a | a | a | a | a | b SG4 | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — |
| Sync output delay time1 | TDS-F | 0 | 60 | 90 | ns | Sync OUT | a | a | a | a | a | b SG4 | 2.0 | 5.0 | — | — | — | — | — | — | — | — | — | — | — |

G_V Maximum Gain

Input SG1, and read the amplitude output at OUT (29, 32, 35). The amplitude is called VOUT (29, 32, 35).

Maximum gain G_V is calculated by the equation below:

$$G_V = 20 \log \frac{V_{OUT}}{0.7} \text{ (dB)}$$

ΔG_V Relative Maximum Gain

Relative maximum gain ΔG_V is calculated by the equation below:

$$\begin{aligned} \Delta G_V &= V_{OUT} (29) / V_{OUT} (32), \\ &V_{OUT} (32) / V_{OUT} (35), \\ &V_{OUT} (35) / V_{OUT} (29) \end{aligned}$$

V_{C1} Main Contrast Control Characteristics1

Measuring the amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35).

Main contrast control characteristics V_{C1} is calculated by the equation below:

$$V_{C1} = 20 \log \frac{V_{OUT}}{0.7} \text{ (dB)}$$

ΔV_{C1} Main Contrast Control Relative Characteristics1

Relative characteristics ΔV_{C1} is calculated by the equation below:

$$\begin{aligned} \Delta V_{C1} &= V_{OUT} (29) / V_{OUT} (32) , \\ &V_{OUT} (32) / V_{OUT} (35) , \\ &V_{OUT} (35) / V_{OUT} (29) \end{aligned}$$

V_{C2} Main Contrast Control Characteristics2

Measuring condition and procedure are the same as described in V_{C1}.

ΔV_{C2} Main Contrast Control Relative Characteristics2

Measuring condition and procedure are the same as described in ΔV_{C1}.

V_{C3} Main Contrast Control Characteristics3

Measuring condition and procedure are the same as described in V_{C1}.

ΔV_{C3} Main Contrast Control Relative Characteristics3

Measuring condition and procedure are the same as described in ΔV_{C1}.

V_{SC1} Sub Contrast Control Characteristics1

Measure the amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35). Sub contrast control characteristics V_{SC1} is calculated by the equation below:

$$V_{SC1} = 20 \log \frac{V_{OUT}}{0.7} \text{ (dB)}$$

ΔV_{SC1} Sub Contrast Control Relative Characteristics1

Relative characteristics ΔV_{SC1} is calculated by the equation below:

$$\begin{aligned} \Delta V_{SC1} &= V_{OUT} (29) / V_{OUT} (32), \\ &V_{OUT} (32) / V_{OUT} (35), \\ &V_{OUT} (35) / V_{OUT} (29). \end{aligned}$$

V_{SC2} Sub Contrast Control Characteristics2

Measuring condition and procedure are the same as described in V_{SC1}.

ΔV_{SC2} Sub Contrast Control Relative Characteristics2

Measuring condition and procedure are the same as described in ΔV_{SC1}.

V_{SC3} Sub Contrast Control Characteristics3

Measuring condition and procedure are the same as described in V_{SC1}.

ΔV_{SC3} Sub Contrast Control Relative Characteristics3

Measuring condition and procedure are the same as described in ΔV_{SC1}.

VMSC Main/sub Contrast Control Characteristics2

Measure the amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35). Main/Sub contrast control characteristics VMSC1 is calculated by the equation below:

$$VMSC1 = 20\log \frac{VOUT}{0.7} \text{ (dB)}$$

ΔVMSC Main/sub Contrast Control Relative Characteristics2

Relative characteristics ΔVMSC1 is calculated by the equation below:

$$\begin{aligned} \Delta VMSC &= VOUT (29) / VOUT (32), \\ &VOUT (32) / VOUT (35), \\ &VOUT (35) / VOUT (29) \end{aligned}$$

ABL1 ABL Control Characteristics1

Measure the amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35), and is treated as ABL1.

ΔABL1 ABL Control Relative Characteristics1

Relative characteristics ΔABL1 is calculated by the equation below:

$$\begin{aligned} \Delta ABL1 &= VOUT (29) / VOUT (32), \\ &VOUT (32) / VOUT (35), \\ &VOUT (35) / VOUT (29) \end{aligned}$$

ABL2 ABL Control Characteristics2

Measuring condition and procedure are the same as described in ABL1.

ΔABL2 ABL Control Relative Characteristics2

Measuring condition and procedure are the same as described in ΔABL1.

V_{B1} Brightness Control Characteristics1

Measure the DC voltage at OUT (29, 32, 35) with a voltmeter. The measured value is called V_{OUT} (29, 32, 35), and is treated as V_{B1}.

ΔV_{B1} Brightness Control Relative Characteristics1

Relative characteristics ΔV_{B1} is calculated by the difference in the output between the channels.

$$\begin{aligned}\Delta V_{B1} &= V_{OUT} (29) - V_{OUT} (32), \\ &V_{OUT} (32) - V_{OUT} (35), \\ &V_{OUT} (35) - V_{OUT} (29)\end{aligned}$$

V_{B2} Brightness Control Characteristics2

Measuring condition and procedure are the same as described in V_{B1}.

ΔV_{B2} Brightness Control Relative Characteristics2

Measuring condition and procedure are the same as described in ΔV_{B1}.

V_{B3} Brightness Control Characteristics3

Measuring condition and procedure are the same as described in V_{B1}.

ΔV_{B3} Brightness Control Relative Characteristics3

Measuring condition and procedure are the same as described in ΔV_{B1}.

F_{C1} Frequency Characteristics1 (f = 50 MHz)

First, SG3 to 1 MHz is as input signal. Input a resistor that is about 2 kΩ to offer the voltage at input pins (2, 6, 11) in order that the bottom of input signal is 2.5 V. Control the main contrast in order that the amplitude of sine wave output is 4.0 V_{P-P}. Control the brightness in order that the bottom of sine wave output is 2.0 V_{P-P}. By the same way, measure the output amplitude when SG3 to 50 MHz is as input signal. The measured value is called V_{OUT} (29, 32, 35). Frequency characteristics F_{C1} (29, 32, 35) is calculated by the equation below:

$$F_{C1} = 20 \log \frac{V_{OUT} V_{P-P}}{\text{Output amplitude when inputted SG3 (1 MHz): } 4 V_{P-P}} \quad (\text{dB})$$

ΔF_{C1} Frequency Relative Characteristics1 (f = 50 MHz)

Relative characteristics ΔF_{C1} is calculated by the difference in the output between the channels.

F_{C1'} Frequency Characteristics1 (f = 150 MHz)

Measuring condition and procedure are the same as described in F_{C1}, expect SG3 to 150 MHz.

ΔF_{C1'} Frequency Relative Characteristics1 (f = 150 MHz)

Relative characteristics ΔF_{C1'} is calculated by the difference in the output between the channels.

F_{C2} Frequency Characteristics2 (f = 150 MHz)

SG3 to 1 MHz is as input signal. Control the main contrast in order that the amplitude of sine wave output is 1.0 V_{P-P}. By the same way, measure the output amplitude when SG3 to 150 MHz is as input signal.

The measured value is called V_{OUT} (29, 32, 35). Frequency characteristics F_{C2} (29, 32, 35) is calculated by the equation below:

$$F_{C2} = 20 \log \frac{V_{OUT} V_{P-P}}{\text{Output amplitude when inputted SG3 (1 MHz): } 4 V_{P-P}} \quad (\text{dB})$$

ΔF_{C2} Frequency Relative Characteristics2 (f = 150 MHz)

Relative characteristics ΔF_{C2} is calculated by the difference in the output between the channels.

C.T.1 Crosstalk1 (f = 50 MHz)

Input SG3 (50 MHz) to pin 2 only, and then measure the waveform amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35). Crosstalk C.T.1 is calculated by the equation below:

$$C.T.1 = 20\log \frac{VOUT (29, 32)}{VOUT (35)} \quad (\text{dB})$$

C.T.1' Crosstalk1 (f = 150 MHz)

Measuring condition and procedure are the same as described in C.T.1, expect SG3 to 150 MHz.

C.T.2 Crosstalk2 (f = 50 MHz)

Input SG3 (50 MHz) to pin 6 only, and then measure the waveform amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35). Crosstalk C.T.2 is calculated by the equation below:

$$C.T.2 = 20\log \frac{VOUT (29, 35)}{VOUT (32)} \quad (\text{dB})$$

C.T.2' Crosstalk2 (f = 150 MHz)

Measuring condition and procedure are the same as described in C.T.2, expect SG3 to 150 MHz.

C.T.3 Crosstalk3 (f = 50 MHz)

Input SG3 (50 MHz) to pin 11 only, and then measure the waveform amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35). Crosstalk C.T.3 is calculated by the equation below:

$$C.T.3 = 20\log \frac{VOUT (32, 35)}{VOUT (29)} \quad (\text{dB})$$

C.T.3' Crosstalk3 (f = 150 MHz)

Measuring condition and procedure are the same as described in C.T.3, expect SG3 to 150 MHz.

Tr Pulse Characteristics1 (4 V_{P-P})

Control the main contrast (00H) in order that the amplitude of output signal is 4.0 V_{P-P}.

Control the brightness (V30) in order that the Black level of output signal is 2.0 V.

Measure the time needed for the input pulse to rise from 10% to 90% (Tr1) and for the output pulse to rise from 10% to 90% (Tr2) with an active probe.

Pulse characteristics Tr is calculated by the equations below:

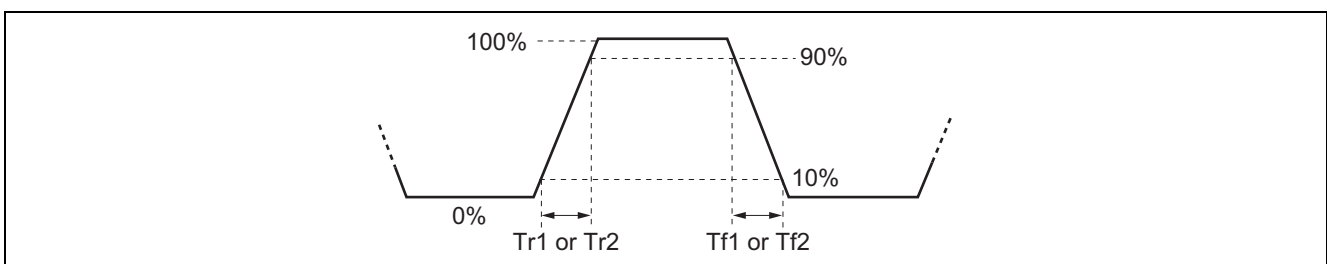
$$Tr = \sqrt{[(Tr2)^2 - (Tr1)^2]} \quad (\text{ns})$$

Tf Pulse Characteristics2 (4 V_{P-P})

Measure the time needed for the input pulse to fall from 90% to 10% (Tf1) and for the output pulse to fall from 90% to 10% (Tf2) with an active probe.

Pulse characteristics Tf is calculated by the equations below:

$$Tf = \sqrt{[(Tf2)^2 - (Tf1)^2]} \quad (\text{ns})$$



VthCP Clamp Pulse Threshold Voltage

Turn down the SG5 input level gradually from 5.0 V_{P-P}, monitoring the waveform output.

Measure the top level of input pulse when the output pedestal voltage turn decrease with unstable.

WCP Clamp Pulse Minimum Width

Decrease the SG5 pulse width gradually from 0.5 μs, monitoring the output. Measure the SG5 pulse width (a point of 1.5 V) when the output pedestal voltage turn decrease with unstable.

P_{DCH} Pedestal Voltage Temperature Characteristics1

Measure the pedestal voltage at 25°C. The measured value is called PDC1.

Measure the pedestal voltage at temperature of -20°C.

The measured value is called PDC2.

Pedestal voltage temperature characteristics 1 is calculated by the equation below:

$$P_{DCH} = PDC1 - PDC2$$

P_{DCL} Pedestal Voltage Temperature Characteristics2

Measure the pedestal voltage at 25°C. The measured value is called PDC1.

Measure the pedestal voltage at temperature of 75°C.

The measured value is called PDC3.

Pedestal voltage temperature characteristics 2 is calculated by the equation below:

$$P_{DCL} = PDC1 - PDC3$$

OTr OSD Pulse Characteristics1

Measure the time needed for the output pulse to rise from 10% to 90% (OTr) with an active probe.

OTf OSD Pulse Characteristics2

Measure the time needed for the output pulse to fall from 90% to 10% (OTf) with an active probe.

Oaj1 OSD Adjust Control Characteristics1

Measure the amplitude output at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35), and is treated as Oaj1.

ΔOaj1 OSD Adjust Control Relative Characteristics1

Relative characteristics ΔOaj1 is calculated by the equation below:

$$\Delta Oaj1 = \frac{VOUT(29)}{VOUT(32)}, \\ \frac{VOUT(32)}{VOUT(35)}, \\ \frac{VOUT(35)}{VOUT(29)}$$

Oaj2 OSD Adjust Control Characteristics2

Measuring condition and procedure are the same as described in Oaj1.

ΔOaj2 OSD Adjust Control Relative Characteristics2

Measuring condition and procedure are the same as described in ΔOaj1.

Oaj3 OSD Adjust Control Characteristics3

Measuring condition and procedure are the same as described in Oaj1.

 Δ Oaj3 OSD Adjust Control Relative Characteristics3

Measuring condition and procedure are the same as described in Δ Oaj1.

VthOSD OSD Input Threshold Voltage

Reduce the SG6 input level gradually, monitoring output. Measure the SG6 level when the output reaches 0 V. The measured value is called VthOSD.

VthBLK OSD BLK Input Threshold Voltage

Confirm that output signal is being blanked by the SG6 at the time.

Monitoring to output signal, decreasing the level of SG6. Measure the top level of SG6 when the blanking period is disappeared. The measured value is called VthBLK.

HBLK1 Retrace BLK Characteristics1

Measure the amplitude output is blanked by the SG7 at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35), and is treated as HBLK1.

HBLK2 Retrace BLK Characteristics2

Measure the amplitude output is blanked by the SG7 at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35), and is treated as HBLK2.

HBLK3 Retrace BLK Characteristics3

Measure the amplitude output is blanked by the SG7 at OUT (29, 32, 35). The measured value is called VOUT (29, 32, 35), and is treated as HBLK3.

VthRET Retrace BLK Input Threshold Voltage

Confirm that output signal is being blanked by the SG7 at the time.

Monitoring to output signal, decreasing the level of SG7. Measure the top level of SG7 when the blanking period is disappeared. The measured value is called VthRET.

SS-NV SOG Input Maximum Noise Voltage

The sync's amplitude of SG4 be changed all white into all black, increase from 0 V_{P-P} to 0.02 V_{P-P}. No pulse output permitted.

SS-SV SOG Minimum Input Voltage

The sync's amplitude of SG4 be changed all white or all black, decrease from 0.3 V_{P-P} to 0.2 V_{P-P}. Confirm no malfunction produced by noise.

VSH Sync Output High level

Measure the high voltage at SyncOUT. The measured value is treated as VSH.

VSL Sync Output Low Level

Measure the low voltage at SyncOUT. The measured value is treated as VSL.

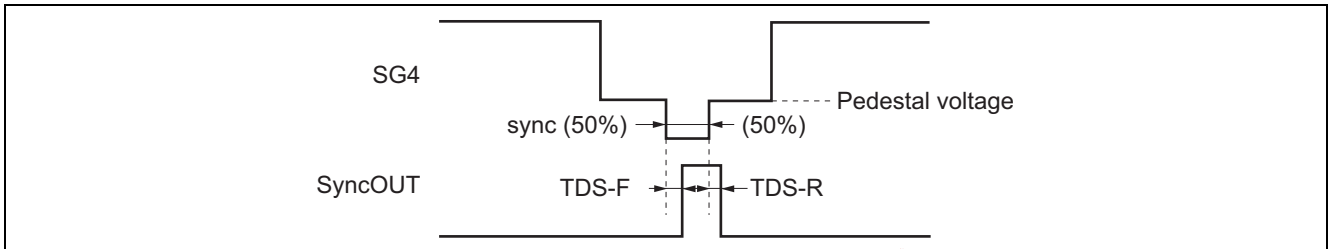
TDS-F Sync Output Delay Time1

SyncOUT becomes High with sync part of SG4.

Measure the time needed for the front edge of SG4 sync to fall from 50% and for SyncOUT to rise from 50% with an active probe. The measured value is treated as TDS-F, less than 90 ns.

TDS-R Sync Output Delay Time2

Measure the time needed for the rear edge of SG4 sync to rise from 50% and for SyncOUT to fall from 50% with an active probe. The measured value is treated as TDS-R, less than 90 ns.

**VOH D/A H Output Voltage**

Measure the DC voltage at D/A OUT. The measured value is treated as VOH.

VOL D/A L Output Voltage

Measure the DC voltage at D/A OUT. The measured value is treated as VOL.

IAO D/A Output Current Range

Electric current flow from the output of D/A OUT must be less than 1.0 mA.

Electric current flow into the output of D/A OUT must be less than 0.4 mA.

DNL D/A Nonlinearity

The difference of differential non-linearity of D/A OUT must be less than ± 1.0 LSB.

Not recommended
for new design

BUS Control Table

(1) Slave address

| D7 | D6 | D5 | D4 | D3 | D2 | D1 | R/W | |
|----|----|----|----|----|----|----|-----|-------|
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | = 88H |

(2) Each functions sub address

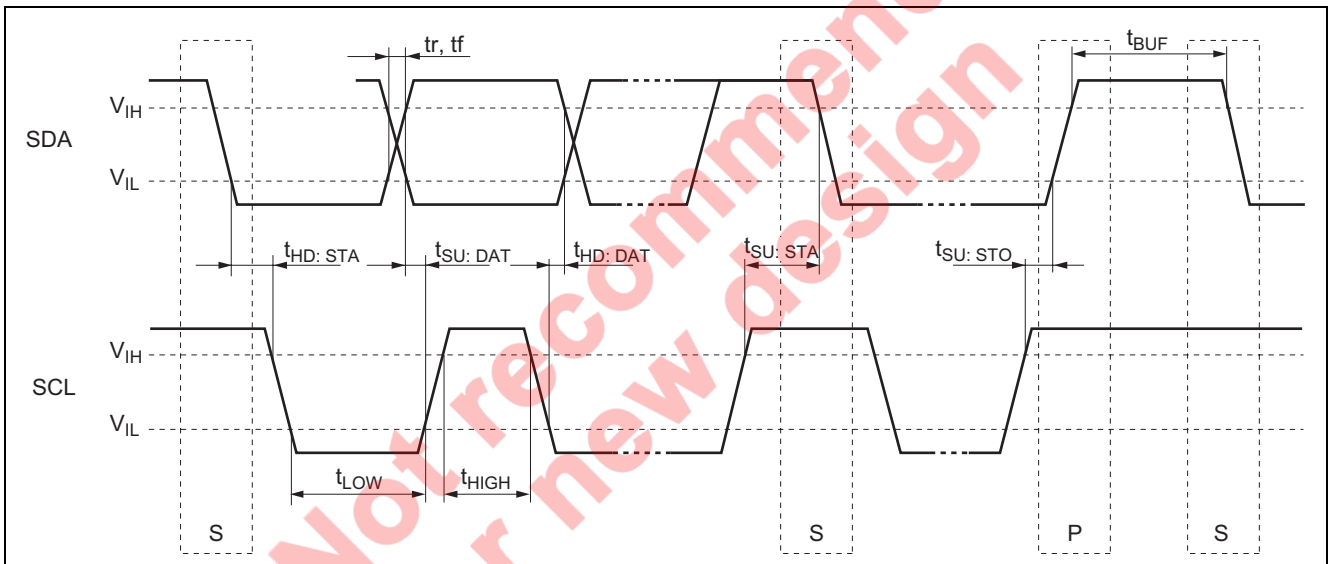
| Function | Bit | Sub Add. | Data Byte (Up: Bit, Information Down: Preset) | | | | | | | |
|---------------------------|-----|----------|---|-----|-----|-----|-----|-----|-----|-----|
| | | | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| Main contrast | 8 | 00H | A07 | A06 | A05 | A04 | A03 | A02 | A01 | A00 |
| | | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub contrast R | 8 | 01H | A17 | A16 | A15 | A14 | A13 | A12 | A11 | A10 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub contrast G | 8 | 02H | A27 | A26 | A25 | A24 | A23 | A22 | A21 | A20 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sub contrast B | 8 | 03H | A37 | A36 | A35 | A34 | A33 | A32 | A31 | A30 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OSD level | 4 | 04H | — | — | — | — | A43 | A42 | A41 | A40 |
| | | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| RE-BLK adjust | 4 | 05H | — | — | — | — | A53 | A52 | A51 | A50 |
| | | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| D/A OUT1 | 8 | 06H | A67 | A66 | A65 | A64 | A63 | A62 | A61 | A60 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D/A OUT2 | 8 | 07H | A77 | A76 | A75 | A74 | A73 | A72 | A71 | A70 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D/A OUT3 | 8 | 08H | A87 | A86 | A85 | A84 | A83 | A82 | A81 | A80 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D/A OUT4 | 8 | 09H | A97 | A96 | A95 | A94 | A93 | A92 | A91 | A90 |
| | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pedestal clamp INT/EXT SW | 1 | 0BH | — | — | — | — | — | — | — | AB0 |
| | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: Pedestal level INT/EXT SW
0 → INT 1 → EXT

I²C BUS Control Section SDA, SCL Characteristics

| Item | Symbol | Min. | Max. | Unit |
|---|--------------|------|------|---------|
| Min. input LOW voltage | V_{IL} | -0.5 | 1.5 | V |
| Max. input HIGH voltage | V_{IH} | 3.0 | 5.5 | V |
| SCL clock frequency | f_{SCL} | 0 | 100 | kHz |
| Time the bus must be free before a new transmission can start | t_{BUF} | 4.7 | — | μ S |
| Hold time start condition. After this period the first clock pulse is generated | $t_{HD:STA}$ | 4.0 | — | μ S |
| The LOW period of the clock | t_{LOW} | 4.7 | — | μ S |
| The HIGH period of the clock | t_{HIGH} | 4.0 | — | μ S |
| Set up time for start condition (Only relevant for a repeated start condition) | $t_{SU:STA}$ | 4.7 | — | μ S |
| Hold time DATA | $t_{HD:DAT}$ | 0 | — | μ S |
| Set-up time DATA | $t_{SU:DAT}$ | 250 | — | ns |
| Rise time of both SDA and SCL lines | t_r | — | 1000 | ns |
| Fall time of both SDA and SCL lines | t_f | — | 300 | ns |
| Set-up time for stop condition | $t_{SU:STO}$ | 4.0 | — | μ S |

Timing Chart

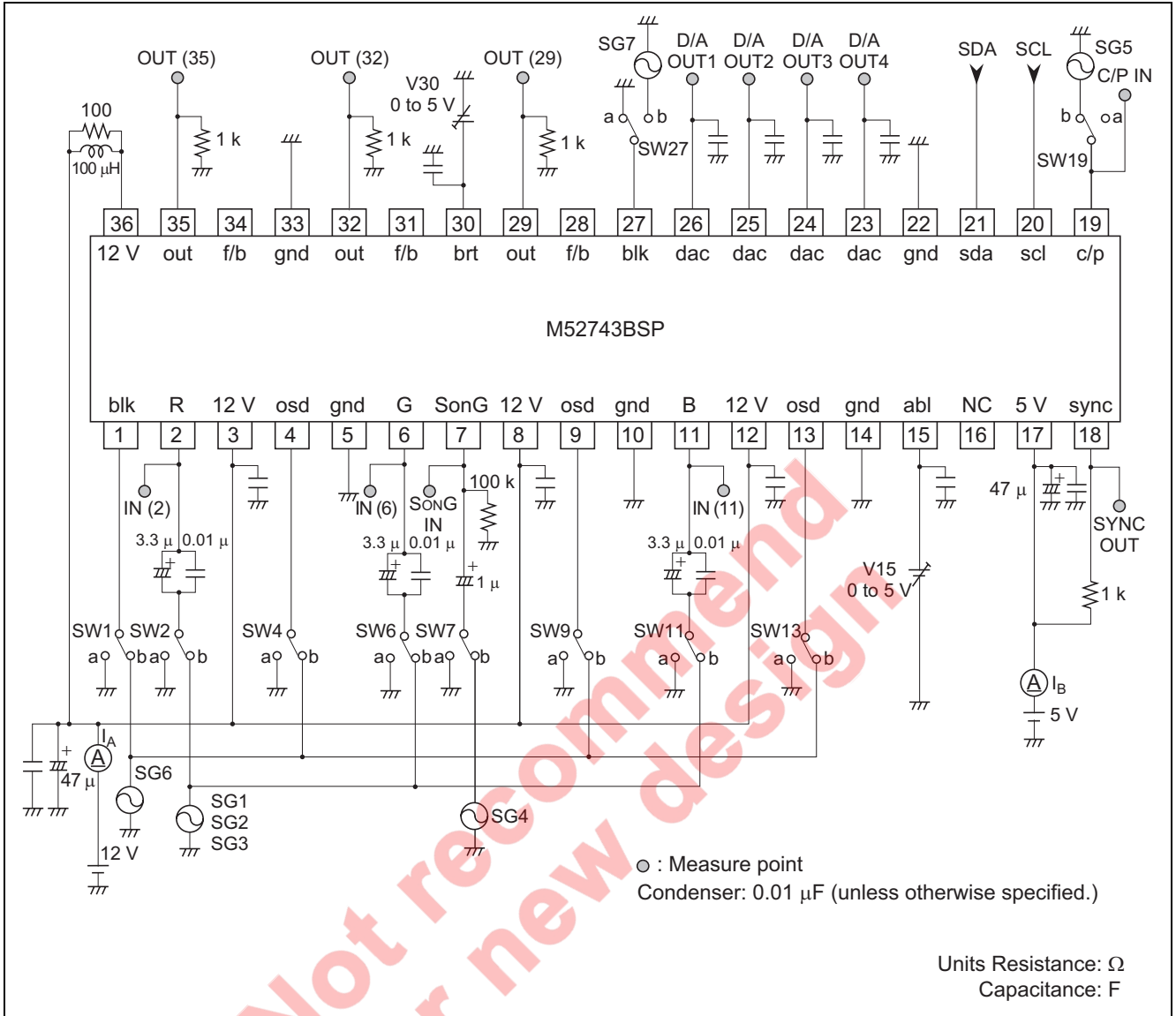


Input Signal

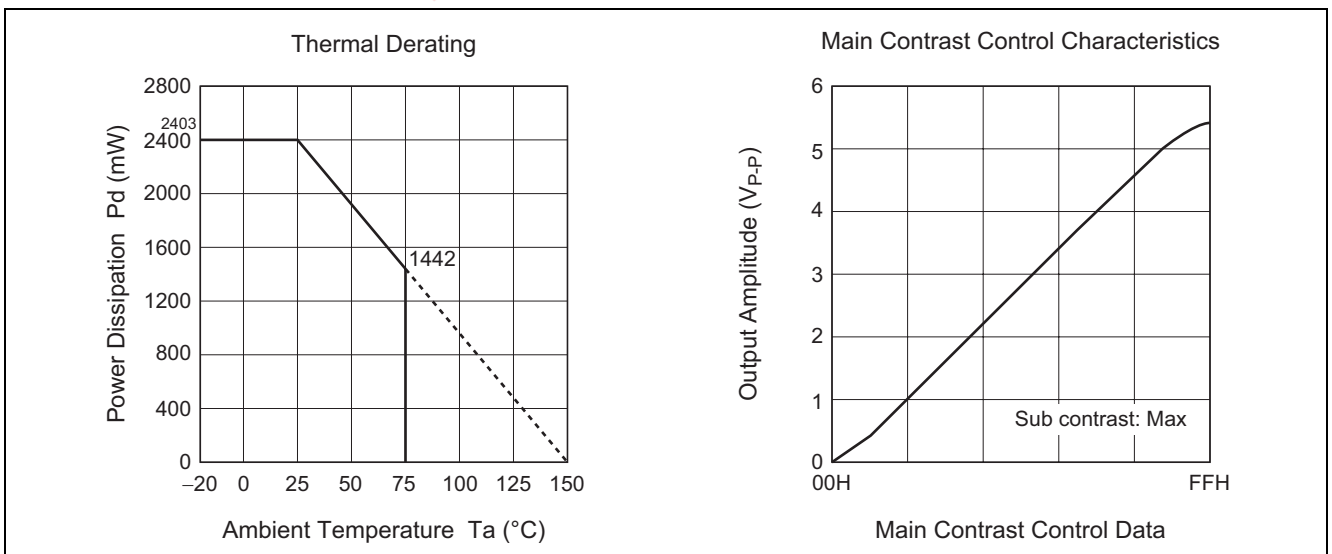
| SG No. | Signals |
|--|--|
| SG1 Video signal (all white) | <p>Pulse with amplitude of $0.7 V_{P-P}$ ($f = 30 \text{ kHz}$). Video width of $25 \mu\text{s}$. (75%)</p> |
| SG2 Video signal (step wave) | <p>$0.7 V_{P-P}$ (Amplitude is partially variable.)</p> |
| SG3 Sine wave (for freq. char.) | <p>Sine wave amplitude of $0.7 V_{P-P}$ $f = 1 \text{ MHz}, 50 \text{ MHz}, 150 \text{ MHz}$ (variable)</p> |
| SG4 Video signal (all white, all black) | <p>Video width of $25 \mu\text{s}$. (75%)</p> <p>$3 \mu\text{s}$</p> <p>$0.7 V_{P-P}$</p> <p>$0.3 V_{P-P}$</p> <p>all white or all black variable. Sync's amplitude is variable.</p> |
| SG5 Clamp pulse | <p>Pulse width and amplitude are variable.</p> <p>$0.5 \mu\text{s}$</p> <p>$5 V_{TTL}$</p> |
| SG6 OSD pulse | <p>$5 V_{TTL}$</p> <p>$5 \mu\text{s}$</p> <p>Amplitude is partially variable.</p> |
| SG7 BLK pulse | <p>$5 \mu\text{s}$</p> <p>$5 V_{TTL}$</p> <p>Amplitude is partially variable.</p> |

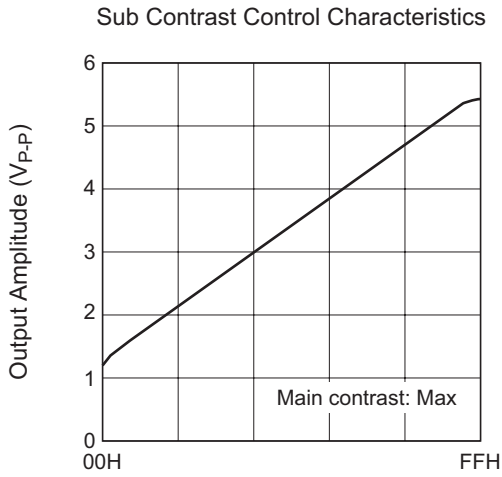
Note: $f = 30 \text{ kHz}$

Test Circuit

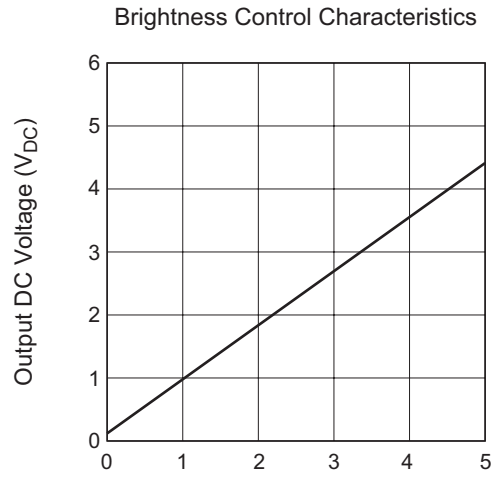


Typical Characteristics

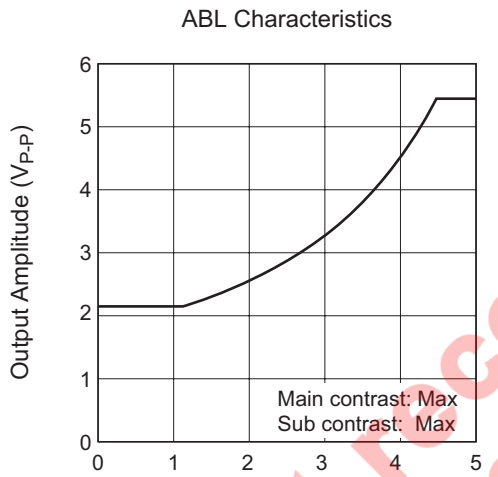




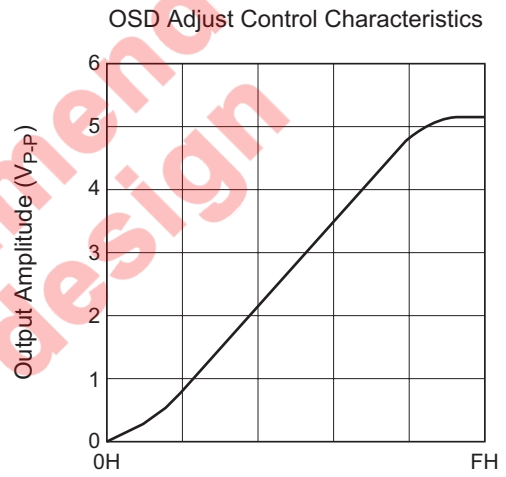
Sub Contrast Control Data



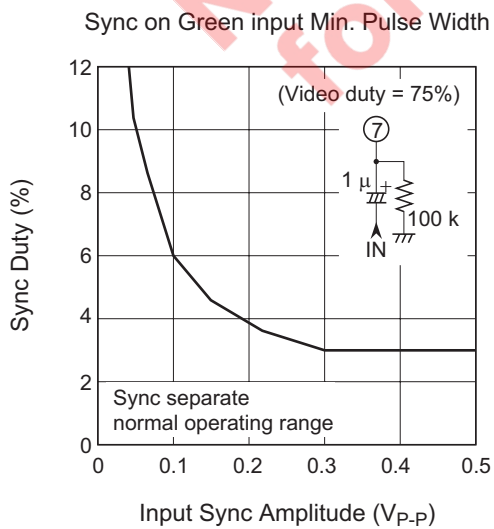
Brightness Control Voltage (V_{DC})



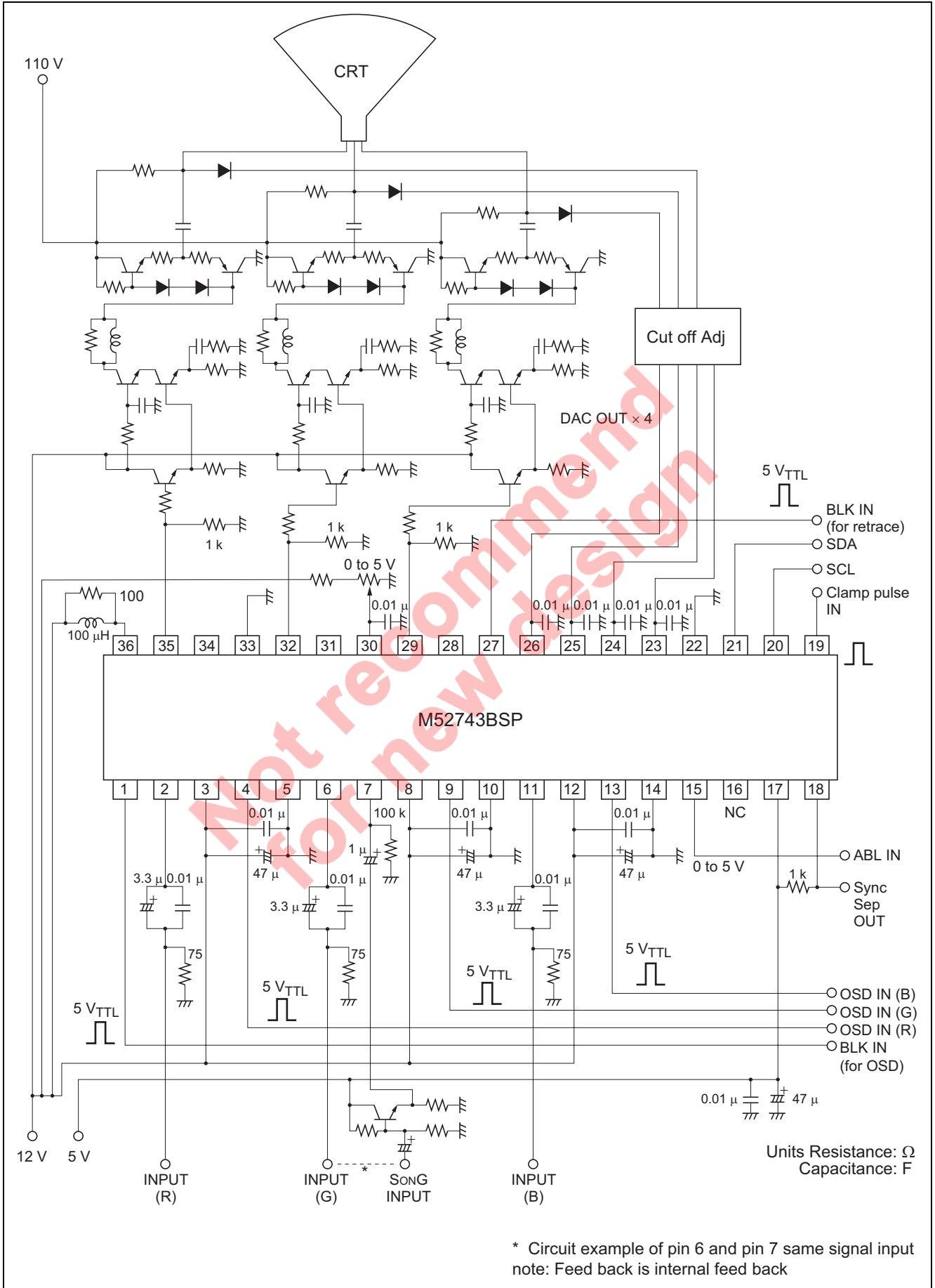
ABL Control Voltage (V_{DC})



OSD Adjust Control Data



Application Example



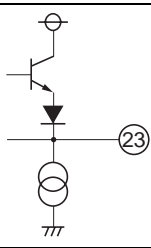
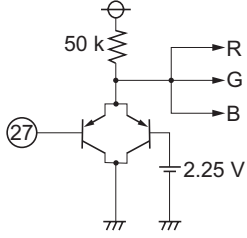
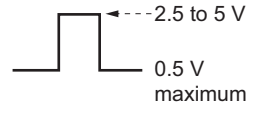
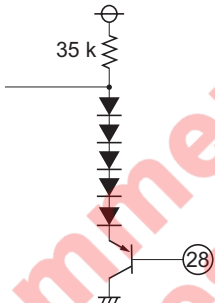
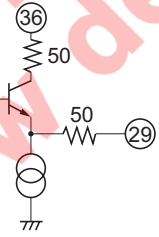

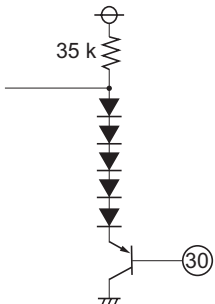
Pin Description

| Pin No. | Name | DC Voltage (V) | Peripheral Circuit | Function |
|---------------------------|--|----------------------|--------------------|--|
| 1 | OSD BLK IN | — | | Input pulses Connected to GND if not used. |
| 2 6 11 | INPUT (R) INPUT (G) INPUT (R) | 2.5 | | Clamped to about 2.5 V due to clamp pulses from pin 19. Input at low impedance. |
| 3 8 12 | V _{CC1} (R) V _{CC1} (G) V _{CC1} (B) | 12 | — | Apply equivalent voltage to 3 channels. |
| 4 9 13 | OSD IN (R) OSD IN (G) OSD IN (B) | — | | Input pulses Connected to GND if not used. |
| 5 10 14 22 33 | GND 1 (R) GND 1 (G) GND 1 (B) GND (5 V) GND 2 | GND | — | — |
| 7 | INPUT (S on G) | When open ≈ 2.5 V | | SYNC ON GREEN Input pin for sync separation. Sync is negative. Input signal at pin 7, compare with the reference voltage of internal circuit in order to separate sync signal. When not used, set to OPEN. |

Pin Description (cont.)

| Pin No. | Name | DC Voltage (V) | Peripheral Circuit | Function |
|---------|-----------------------|-----------------|--------------------|---|
| 15 | ABL IN | When open 2.5 V | | ABL (Automatic Beam Limiter) input pin. Recommended voltage range is 0 to 5 V. When ABL function is not used, set to 5 V. |
| 16 | NC | — | — | — |
| 17 | V _{CC} (5 V) | 5 | — | — |
| 18 | S on G Sep OUT | — | | Sync signal output pin, Being of open collector output type. |
| 19 | Clamp Pulse IN | — | | Input pulses Input at low impedance. |
| 20 | SCL | — | | SCL of I ² C BUS (Serial clock line) V _{TH} = 2.3 V |
| 21 | SDA | — | | SDA of I ² C BUS (Serial data line) V _{TH} = 2.3 V |

Pin Description (cont.)

| Pin No. | Name | DC Voltage (V) | Peripheral Circuit | Function |
|----------------------|---|-----------------|---|--|
| 23 24 25 26 | D/A OUT | — |  | D/A output pin. Output voltage range is 0 to 5 V, Max output current is 0.4 mA. |
| 27 | Retrace BLK IN | — |  | Input pulses  Connected to GND if not used. |
| 28 31 34 | EXT Feed Back (B) EXT Feed Back (G) EXT Feed Back (R) | Variable |  | — |
| 29 32 35 | OUTPUT (B) OUTPUT (G) OUTPUT (R) | Variable |  | A resistor is needed on the GND side. Set discretionally to maximum 15 mA, depending on the required driving capacity. |
| 36 | V _{CC2} | 12 Impressed |  | Used to supply power to output emitter follower only. |
| 30 | Main Brightness | — |  | It is recommended that the IC be used between pedestal voltage 2 V and 3 V. |

Application Method for M52743BSP

Clamp Pulse Input

Clamp pulse width is recommended

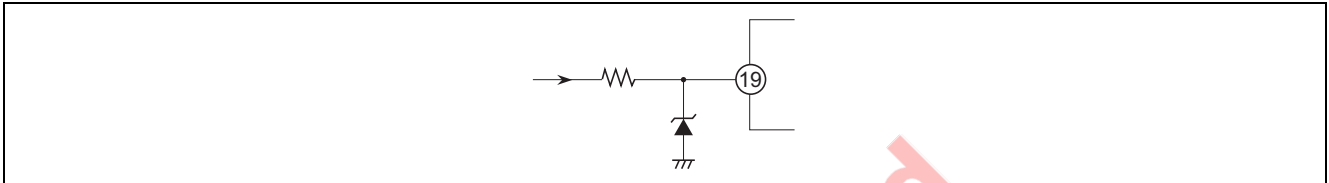
above 15 kHz, 1.0 μ s

above 30 kHz, 0.5 μ s

above 64 kHz, 0.3 μ s.

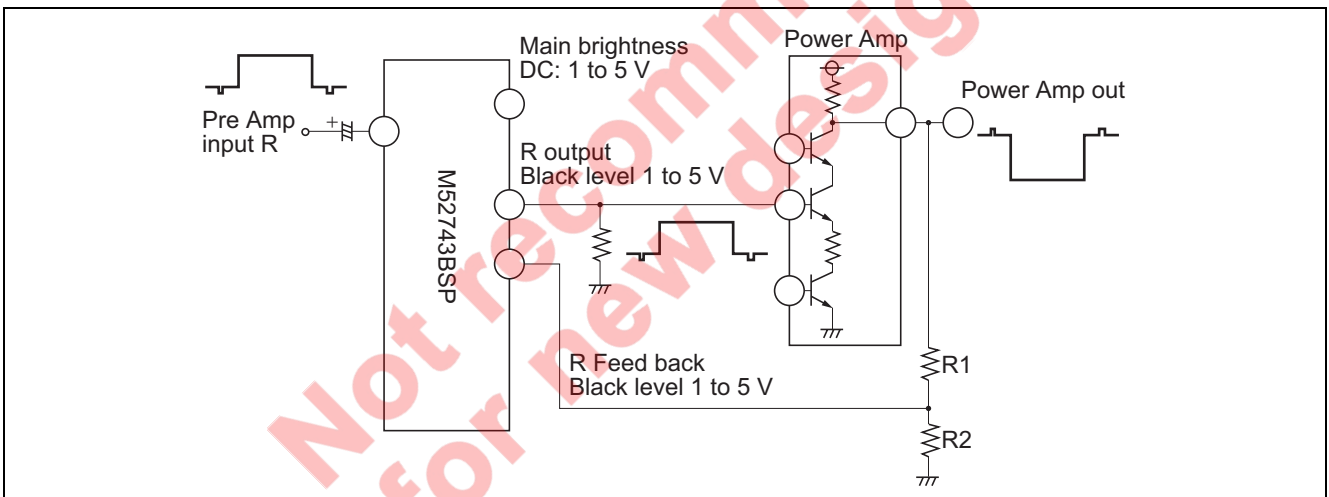
The clamp pulse circuit in ordinary set is a long round about way, and beside high voltage, sometimes connected to external terminal, it is very easy affected by large surge.

Therefore, the Figure shown right is recommended.



EXT-Feed Back

In case of application circuit example of lower figure, Set up R1, R2 which seems that the black level of the signal feed backed from Power AMP is 1 V, when the bottom of output signal is 1 V.



EXT-Feed Back Application Circuit

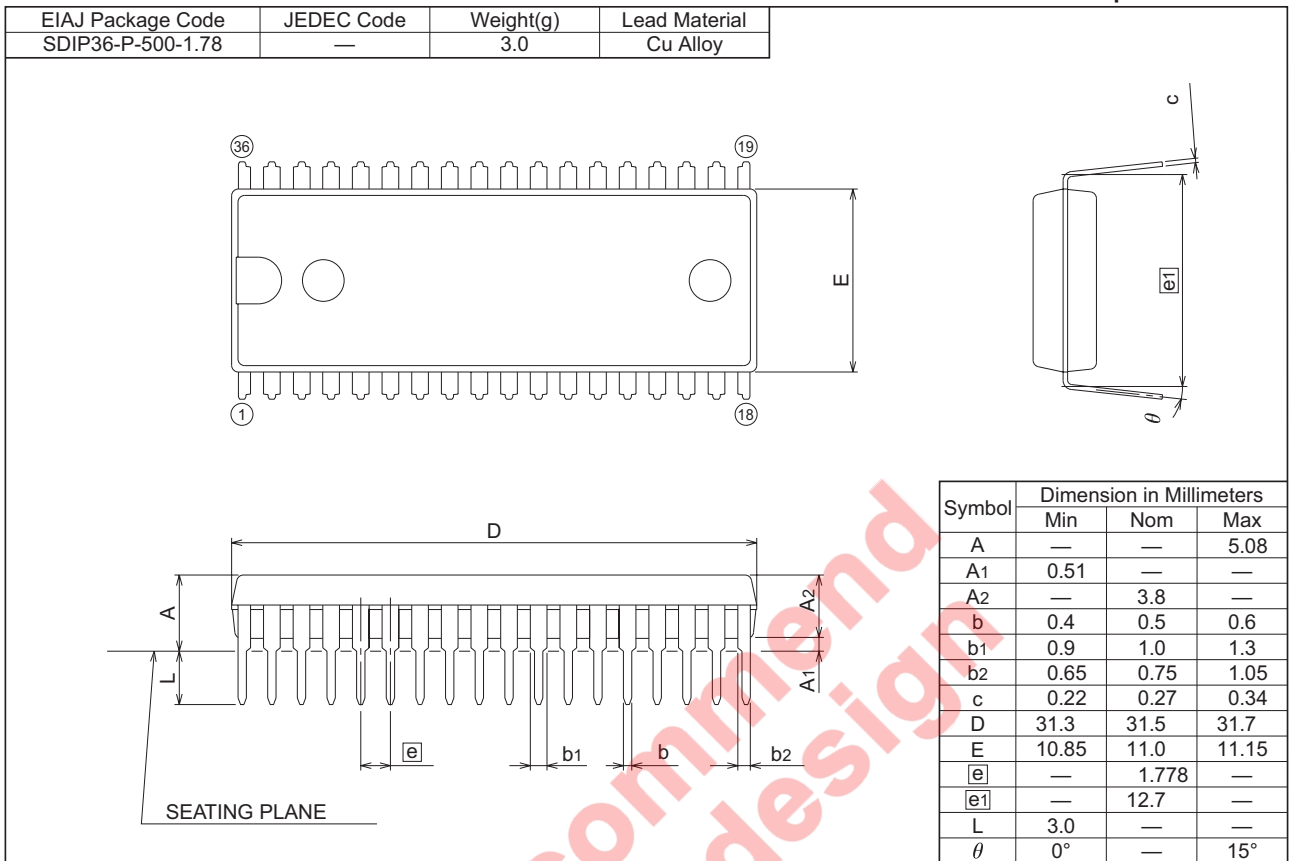
Notice of Application

- Make the nearest distance between output pin and pull down resistor.
- Recommended pedestal voltage of IC output signal is 2 V.

Package Dimensions

36P4E

Plastic 36pin 500mil SDIP



Not recommended for new designs

Notes:

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Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7858/7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2377-3473

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 3518-3399

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510