

# TENTATIVE

MITSUBISHI<LINEAR IC>

## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

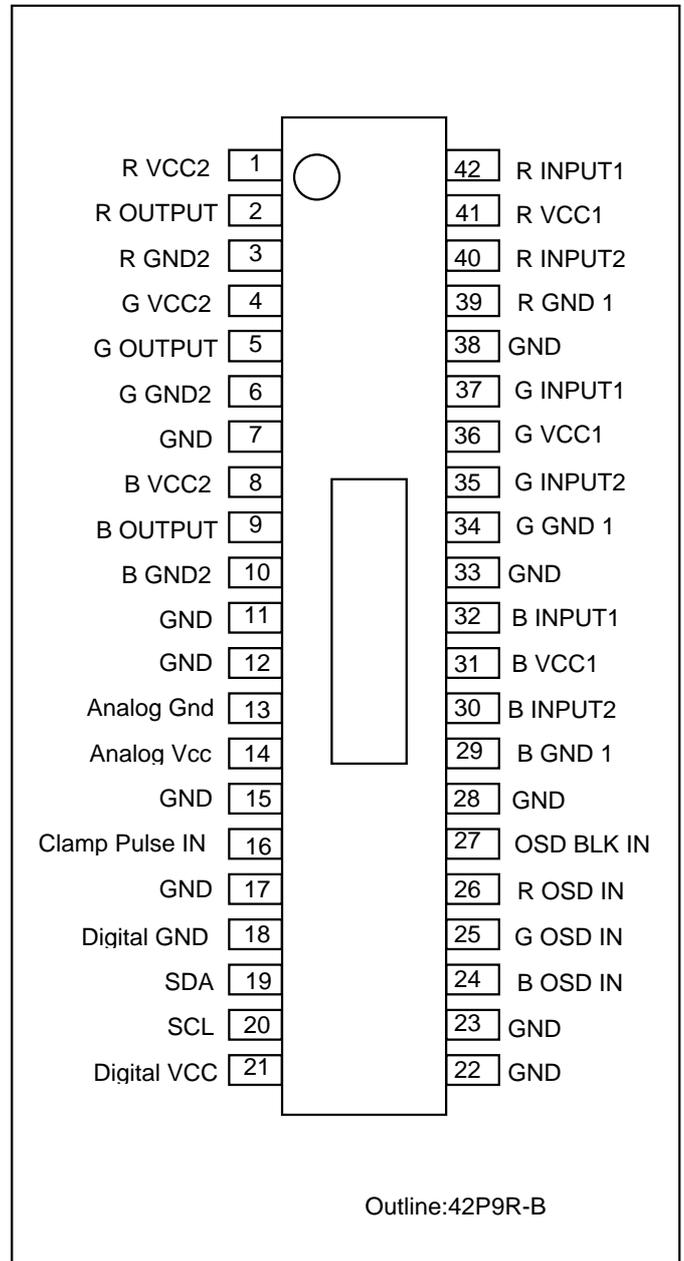
### DESCRIPTION

M52739FP is integrated Circuit for LCD Display Monitor.It is controled IIC BUS and Band Wide is 180MHz. It includes OSD Blanking ,OSD Mixing,Wide Band Amplifier,Main/Sub Contrast Main/Sub Brightness ,and 2 Input routes.  
Vcc Voltage is 5V and Flat package is used. then it is the suitable to LCD monitor.

### FEATURES

- 1.Frequency : RGB 180MHz(at -3dB)  
Band Width OSD 80MHz
- 2.Input :  
RGB Input D range:Max1VP-P positive  
2 input routes is changed by IIC BUS  
RGB OSD 3.5VP-P ~ 5.0VP-P(positive)
- 3.Output : OSD BLK 3.5VP-P ~ 5.0VP-P(positive)  
  
RGB 2.2VP-P (Max)  
OSD 2.0VP-P (Max)
- 4.Contrast : Output dynamic range 0.5 ~ 3.0V  
It can drive 14pF
- 5.Brightness : Both of sub and main contrast are controlled by IIC Bus(8bit).  
Control Range :-15dB ~ +15dB.
- 6.OSD Adjust :  
  
Both of sub and main contrast are controlled by IIC Bus(8bit).  
Control Range :0.5V ~ 3.0V.  
  
2 Control Ranges (Max1VP-P or Max2VP-P ) are able to be changed by IIC Bus.

### PIN CONFIGURATION



### RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range 4.7V ~ 5.3V  
Rated Supply Voltage 5.0V  
Consumption of electricity 800mW

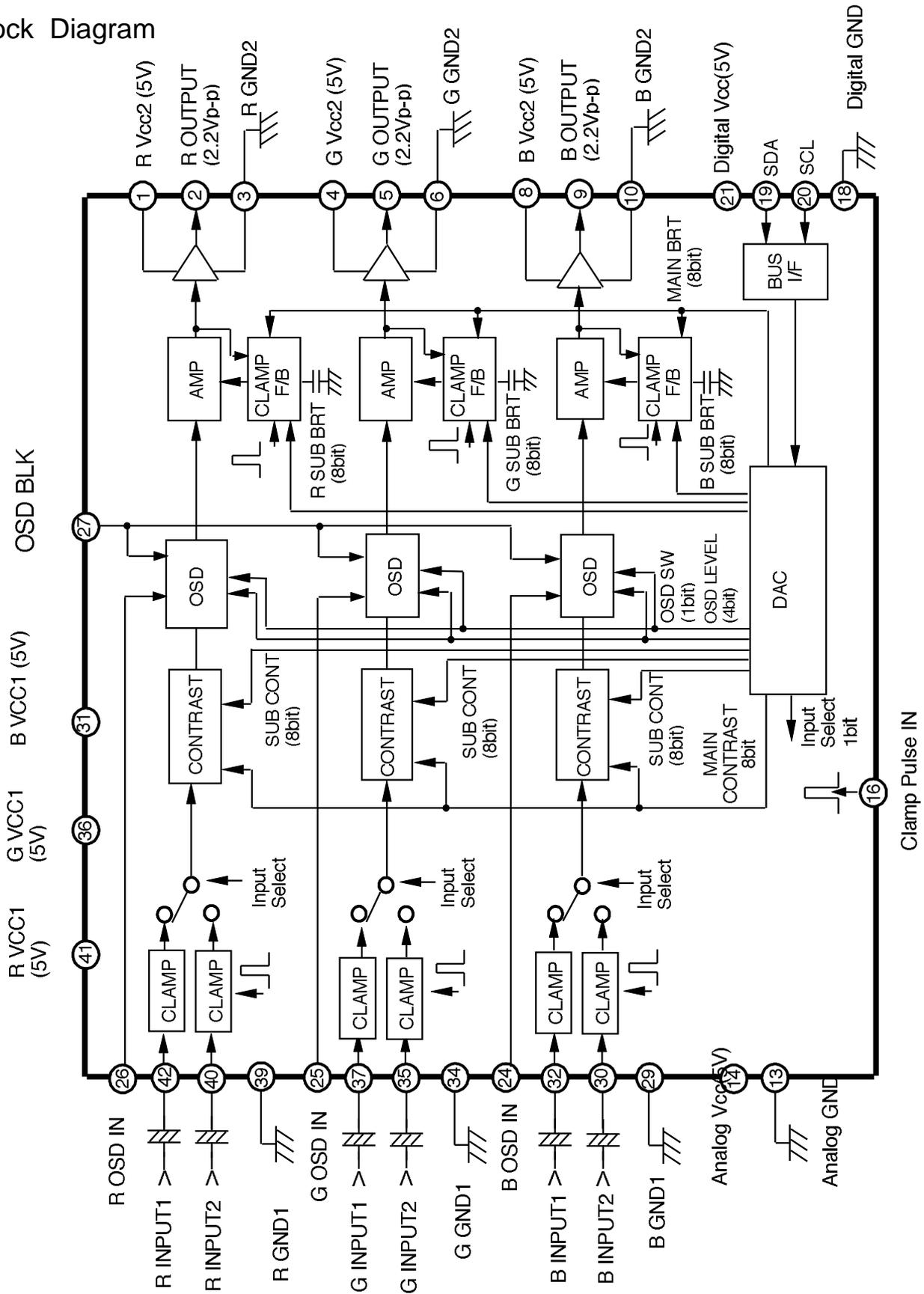
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Block Diagram



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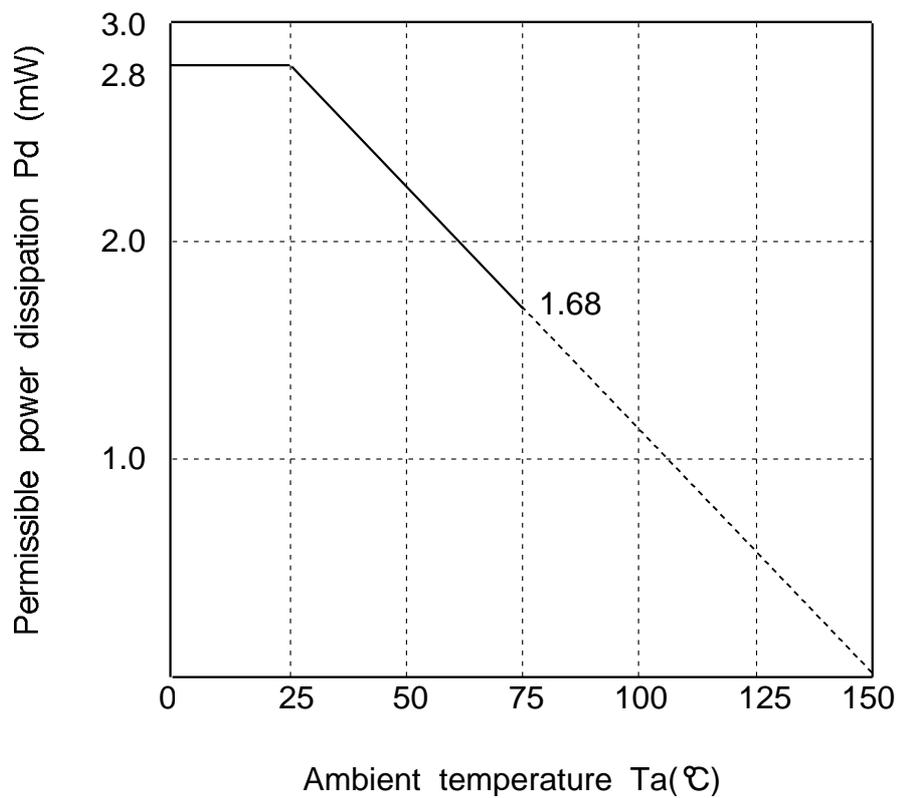
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Absolute Maximum Rating (Ambient temperature: 25 °C)

| Parameter           | Symbol | Rating     | Unit |
|---------------------|--------|------------|------|
| Supply voltage      | Vcc    | 6.0        | V    |
| Power dissipation   | Pd     | 1700       | mW   |
| Ambient temperature | Topr   | -20 ~ +75  | °C   |
| Storage temperature | Tstg   | -40 ~ +150 | °C   |
| Recommended supply  | Vopr   | 5.0        | V    |
| voltage range       | Vopr'  | 4.7 ~ 5.3  | V    |

Thermal Derating Curve



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### BUS CONTROL TABLE

(1) Slave address:

|          | D7 | D6 | D5 | D4 | D3 | D2 | D1 | R/W |      |
|----------|----|----|----|----|----|----|----|-----|------|
| M52739FP | 1  | 0  | 0  | 0  | 1  | 0  | 0  | 0   | =88H |

(2) Each function's sub address:

| NO | function       | bit | sub add. | Data Byte |     |     |     |     |     |     |     |
|----|----------------|-----|----------|-----------|-----|-----|-----|-----|-----|-----|-----|
|    |                |     |          | D7        | D6  | D5  | D4  | D3  | D2  | D1  | D0  |
| 1  | Main contrast  | 8   | 00H      | A07       | A06 | A05 | A04 | A03 | A02 | A01 | A00 |
|    |                |     |          | 0         | 1   | 0   | 0   | 0   | 0   | 0   | 0   |
| 2  | Sub contrast R | 8   | 01H      | A17       | A16 | A15 | A14 | A13 | A12 | A11 | A10 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 3  | Sub contrast G | 8   | 02H      | A27       | A26 | A25 | A24 | A23 | A22 | A21 | A20 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 4  | Sub contrast B | 8   | 03H      | A37       | A36 | A35 | A34 | A33 | A32 | A31 | A30 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 5  | Main bright    | 8   | 04H      | A47       | A46 | A45 | A44 | A43 | A42 | A41 | A40 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 6  | Sub bright R   | 8   | 05H      | A57       | A56 | A55 | A54 | A53 | A52 | A51 | A50 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 7  | Sub bright G   | 8   | 06H      | A67       | A66 | A65 | A64 | A63 | A62 | A61 | A60 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 8  | Sub bright B   | 8   | 07H      | A77       | A76 | A75 | A74 | A73 | A72 | A71 | A70 |
|    |                |     |          | 1         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 9  | OSD level      | 4   | 08H      | -         | -   | -   | -   | A83 | A82 | A81 | A80 |
|    |                |     |          | 0         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 10 | INPUT SW       | 1   | 09H      | -         | -   | -   | -   | -   | -   | -   | A90 |
|    |                |     |          | 0         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 11 | OSD SW         | 1   | 0AH      | -         | -   | -   | -   | -   | -   | -   | AA0 |
|    |                |     |          | 0         | 0   | 0   | 0   | 0   | 0   | 0   | 0   |

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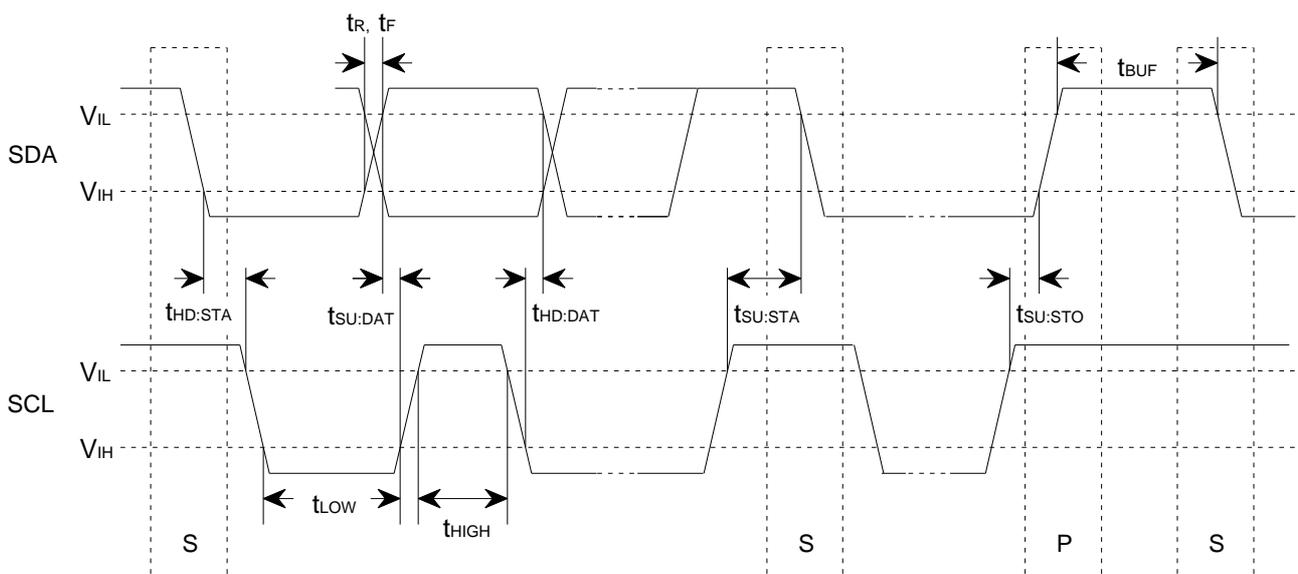
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I<sup>2</sup>C BUS CONTROL SECTION

SDA,SCL CHARACTERISTICS

| parameter  | symbol              | MIN  | MAX  | unit |
|--|---------------------|------|------|------|
| min. input LOW voltage.  | V <sub>IL</sub>     | -0.5 | 1.5  | V    |
| max. input HIGH voltage.   | V <sub>IH</sub>     | 3.0  | 5.5  | V    |
| SCL clock frequency.   | f <sub>SCL</sub>    | 0    | 100  | KHz  |
| Time the bus must be free before a new transmission can start.                   | t <sub>BUF</sub>    | 4.7  | -    | us   |
| Hold time start condition.After this period the first clock pulse is generated.  | t <sub>HD:STA</sub> | 4.0  | -    | us   |
| The LOW period of the clock.   | t <sub>LOW</sub>    | 4.7  | -    | us   |
| The HIGH period of the clock.  | t <sub>HIGH</sub>   | 4.0  | -    | us   |
| Set up time for start condition. (Only relevant for a repeated start condition.) | t <sub>SU:STA</sub> | 4.7  | -    | us   |
| Hold time DATA.  | t <sub>HD:DAT</sub> | 0    | -    | us   |
| Set-up time DATA.  | t <sub>SU:DAT</sub> | 250  | -    | ns   |
| Rise time of both SDA and SCL lines.   | t <sub>R</sub>      | -    | 1000 | ns   |
| Fall time of both SDA and SCL lines.   | t <sub>F</sub>      | -    | 300  | ns   |
| Set-up time for stop condition.  | t <sub>SU:STO</sub> | 4.0  | -    | us   |



If SW connect is not designated RGB Input SW :

SW(30,35,40)=a(b) SW(32,37,42)=b (a),SW(2,5,9,16,19,20,23,24,25,26,27)= a

Vcc=5V Ta=25°C

| No | parameter  | Symbol | Test Point                 | RGB Input Signal       | SW Connect Supply Voltage   | BUS CTL ( H ) |                |                |                |              |              |              |              |             |              |            | Standard |      |      | Unit |
|----|--|--------|----------------------------|------------------------|---|---------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|-------------|--------------|------------|----------|------|------|------|
|    |  |        |                            |                        |   | 00H Main cont | 01H Sub cont 1 | 02H Sub cont 2 | 03H Sub cont 3 | 04H Main brt | 05H Sub brt1 | 06H Sub brt2 | 07H Sub brt3 | 08H OSD Adj | 09H INPUT SW | 0AH OSD SW | MIN      | TYP  | MAX  |      |
| 1  | Circuit current1                                   | Icc1   | IA                         | —                      | RGBInput SW =a(ALL)   | A6H 166       | A6H 166        | A6H 166        | A6H 166        | 00H 0        | 00H 0        | 00H 0        | 00H 0        | 00H 0       | —            | —          | —        | 100  | 130  | mA   |
| 2  | Output dynamic range                               | Vomax  | OUT                        | SG2                    | —   | ↓             | ↓              | ↓              | ↓              | Variable     | Variable     | Variable     | Variable     |             |              |            | 2.2      | —    | —    | Vp-p |
| 3  | Maximum input1                                     | Vimax1 | IN OUT                     | SG2 Amplitude Variable | ↓   | 7FH 127       | 7FH 127        | 7FH 127        | 7FH 127        | 40H 64       | 7FH 127      | 7FH 127      | 7FH 127      |             |              |            | 1.0      | —    | —    | Vp-p |
| 4  | Maximum input2                                     | Vimax2 | IN OUT                     | SG2 Amplitude Variable | SW(30,35,40)=b SW(32,37,42)=a                                     | ↓             | ↓              | ↓              | ↓              |              |              |              |              |             |              |            | 1.0      | —    | —    | Vp-p |
| 5  | Maximum gain                                       | Gv     | OUT                        | SG1                    | —   | FFH 255       | FFH 255        | FFH 255        | FFH 255        |              |              |              |              |             |              |            | 12.0     | 15.0 | 18.0 | dB   |
| 6  | Relative maximum gain                              | Gv     | —                          | —                      | —   | —             | —              | —              | —              |              |              |              |              |             |              |            | 0.8      | 1.0  | 1.2  | —    |
| 7  | Main contrast control characteristics 1            | VC1    | OUT                        | SG1                    | —   | C8H 200       | 7FH 127        | 7FH 127        | 7FH 127        |              |              |              |              |             |              |            | 7.1      | 8.6  | 10.1 | dB   |
| 8  | Main contrast control characteristics 2            | VC2    | OUT                        | SG1                    | —   | 64H 100       |                |                |                |              |              |              |              |             |              |            | 2.7      | 4.2  | 5.7  | dB   |
| 9  | Main contrast control characteristics 3            | VC3    | OUT                        | SG1                    | —   | 14H 20        | ↓              | ↓              | ↓              |              |              |              |              |             |              |            | 0.2      | 0.4  | 0.6  | Vp-p |
| 10 | Sub contrast control characteristics 1             | VSC1   | OUT                        | SG1                    | —   | 7FH 127       | C8H 200        | C8H 200        | C8H 200        |              |              |              |              |             |              |            | 7.1      | 8.6  | 10.1 | dB   |
| 11 | Sub contrast control characteristics 2             | VSC2   | OUT                        | SG1                    | —   |               | 64H 100        | 64H 100        | 64H 100        |              |              |              |              |             |              |            | 2.7      | 4.2  | 5.7  | dB   |
| 12 | Sub contrast control characteristics 3             | VSC3   | OUT                        | SG1                    | —   |               | 14H 20         | 14H 20         | 14H 20         |              |              |              |              |             |              |            | 0.2      | 0.4  | 0.6  | Vp-p |
| 13 | Main/sub contrast control characteristics          | VMSC   | OUT                        | SG1                    | —   | A6H 166       | A6H 166        | A6H 166        | A6H 166        | ↓            |              |              |              |             |              |            | 1.7      | 2.0  | 2.3  | Vp-p |
| 14 | Main brightness control characteristics 1          | VB1    | OUT                        | —                      | RGBInput SW =a(ALL)   | A6H 166       | A6H 166        | A6H 166        | A6H 166        | FFH 255      |              |              |              |             |              |            | 2.2      | 2.5  | 2.8  | V    |
| 15 | Main brightness control characteristics 2          | VB2    | OUT                        | —                      | —   |               |                |                |                | 7FH 127      |              |              |              |             |              |            | 1.3      | 1.5  | 1.7  | V    |
| 16 | Main brightness control characteristics 3          | VB3    | OUT                        | —                      | —   |               |                |                |                | 00H 0        | ↓            | ↓            | ↓            |             |              |            | 0.3      | 0.5  | 0.7  | V    |
| 17 | Sub brightness control characteristics 1           | VSB1   | OUT                        | —                      | —   |               |                |                |                | 7FH 127      | FFH 255      | FFH 255      | FFH 255      |             |              |            | 1.8      | 2.0  | 2.2  | V    |
| 18 | Sub brightness control characteristics 2           | VSB2   | OUT                        | —                      | —   |               |                |                |                | 7FH 127      | 7FH 127      | 7FH 127      |              |             |              |            | 1.3      | 1.5  | 1.7  | V    |
| 19 | Sub brightness control characteristics 3           | VSB3   | OUT                        | —                      | —   | Variable      |                |                |                | 00H 0        | 00H 0        | 00H 0        | ↓            | ↓           | ↓            |            | 0.8      | 1.0  | 1.2  | V    |
| 20 | Frequency characteristics 1 (50MHz-2Vpp)           | FC1    | OUT                        | SG3                    | —   | A6H 166       |                |                |                | 40H 64       | 7FH 127      | 7FH 127      | 7FH 127      | 00H 0       | —            | —          | -3.0     | 0    | 3.0  | dB   |
| 21 | Frequency relative characteristics 1 (180MHz-2Vpp) | FC1    | —                          | —                      | —   |               |                |                |                |              |              |              |              |             |              |            | -1.0     | 0    | 1.0  | dB   |
| 22 | Frequency characteristics 2 (50MHz-2Vpp)           | FC2    | OUT                        | SG3                    | —   |               |                |                |                |              |              |              |              |             |              |            | -3.0     | 3.0  | 5.0  | dB   |
| 23 | Frequency relative characteristics 2 (50MHz-2Vpp)  | FC2    | —                          | —                      | —   |               |                |                |                |              |              |              |              |             |              |            | -1.0     | 0    | 1.0  | dB   |
| 24 | Frequency characteristics 3 (180MHz-1Vpp)          | FC3    | OUT                        | SG3                    | —   | 37H 55        |                |                |                |              |              |              |              |             |              |            | -1.0     | 0    | 1.0  | dB   |
| 25 | Frequency relative characteristics 3 (180MHz-1Vpp) | FC3    | —                          | —                      | —   |               |                |                |                |              |              |              |              |             |              |            | -1.0     | 0    | 1.0  | dB   |
| 26 | Frequency characteristics 4 (180MHz-2Vpp)          | FC4    | OUT                        | SG3                    | SW(2,5,9)=b   | A6H 166       |                |                |                |              |              |              |              |             |              |            | -3.0     | 3.0  | 5.0  | dB   |
| 27 | Frequency relative characteristics 4 (180MHz-2Vpp) | FC4    | —                          | —                      | —   |               |                |                |                |              |              |              |              |             |              |            | -1.0     | 0    | 1.0  | dB   |
| 28 | Crosstalk 1 input1 - 2 50MHz-1                     | INCT1  | OUT(2)<br>OUT(5)<br>OUT(9) | SG3                    | SW(42)=b,Other SW=a<br>SW(37)=b,Other SW=a<br>SW(32)=b,Other SW=a |               |                |                |                |              |              |              |              | 00H 0       |              |            | —        | -50  | -40  | dB   |
| 29 | Crosstalk 1' input1 - 2 50MHz-1                    | INCT1' | OUT(2)<br>OUT(5)<br>OUT(9) | SG3                    | ↓   |               |                |                |                |              |              |              |              | ↓           |              |            | —        | -30  | -20  | dB   |
| 30 | Crosstalk 2 input1 - 2 50MHz-2                     | INCT2  | OUT(2)<br>OUT(5)<br>OUT(9) | SG3                    | SW(40)=b,Other SW=a<br>SW(35)=b,Other SW=a<br>SW(30)=b,Other SW=a |               |                |                |                |              |              |              |              | 01H 1       |              |            | —        | -50  | -40  | dB   |
| 31 | Crosstalk 2' input1 - 2 50MHz-2                    | INCT2' | OUT(2)<br>OUT(5)<br>OUT(9) | SG3                    | ↓   |               |                |                |                |              |              |              |              | ↓           |              |            | —        | -30  | -20  | dB   |

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If SW connect is not designated RGB Input SW :

SW(30,35,40)=a(b) SW(32,37,42)=b (a),SW(2,5,9,16,19,20,23,24,25,26,27)= a

Vcc=5V Ta=25°C

| No | parameter                                     | Symbol | Test Point | RGB Input Signal | SW Connect Supply Voltage | BUS CTL ( H ) |                |                |                |              |              |              |              |             |              |            | Standard |     |      | Unit |
|----|---|--------|------------|------------------|---------------------------|---------------|----------------|----------------|----------------|--------------|--------------|--------------|--------------|-------------|--------------|------------|----------|-----|------|------|
|    |   |        |            |                  |                           | 00H Main cont | 01H Sub cont 1 | 02H Sub cont 2 | 03H Sub cont 3 | 04H Main brt | 05H Sub brt1 | 06H Sub brt2 | 07H Sub brt3 | 08H OSD Adj | 09H INPUT SW | 0AH OSD SW | MIN      | TYP | MAX  |      |
| 32 | Crosstalk 1 between RGB ch 50MHz-1            | CHCT1  | OUT        | SG3              | SW(42)=b,OtherSW=a        | A6H 166       | A6H 166        | A6H 166        | A6H 166        | 40H 64       | 7FH 127      | 7FH 127      | 7FH 127      | 00H 0       | —            | —          | —        | -25 | -20  | dB   |
| 33 | Crosstalk 1' between RGB ch 180MHz-1          | CHCT1' | OUT        | SG3              | ↓                         |               |                |                |                |              |              |              |              |             |              |            | —        | -15 | -10  | dB   |
| 34 | Crosstalk 2 between RGB ch 50MHz-2            | CHCT2  | OUT        | SG3              | SW(37)=b,OtherSW=a        |               |                |                |                |              |              |              |              |             |              |            | —        | -25 | -20  | dB   |
| 35 | Crosstalk 2' between RGB ch 180MHz-2          | CHCT2' | OUT        | SG3              | ↓                         |               |                |                |                |              |              |              |              |             |              |            | —        | -15 | -10  | dB   |
| 36 | Crosstalk 3 between RGB ch 50MHz-3            | CHCT3  | OUT        | SG3              | SW(32)=b,OtherSW=a        |               |                |                |                |              |              |              |              |             |              |            | —        | -25 | -20  | dB   |
| 37 | Crosstalk 3' between RGB ch 50MHz-3           | CHCT3' | OUT        | SG3              | ↓                         |               |                |                |                |              |              |              |              |             |              |            | —        | -15 | -10  | dB   |
| 38 | Pulse characteristics Tr1                     | Tr1    | OUT        | SG1              | —                         |               |                |                |                |              |              |              |              |             |              |            | —        | 1.7 | —    | nS   |
| 39 | Relative pulse characteristics Tr1            | Tr1    | —          | —                | ↓                         |               |                |                |                |              |              |              |              |             |              |            | -0.8     | 0.0 | -0.8 | nS   |
| 40 | Pulse characteristics Tr2                     | Tr2    | OUT        | SG1              |                           |               |                |                |                |              |              |              |              |             |              |            | —        | 1.7 | —    | nS   |
| 41 | Relative pulse characteristics Tr2            | Tr2    | —          | —                | ↓                         |               |                |                |                |              |              |              |              |             |              |            | -0.8     | 0.0 | -0.8 | nS   |
| 42 | Clamp pulse threshold voltage                 | VthCP  | OUT        | SG1              |                           |               |                |                |                |              |              |              |              |             |              |            | 1.5      | 2.0 | 2.5  | V    |
| 43 | Clamp pulse minimum width                     | WCP    | OUT        | SG1              |                           |               |                |                |                |              |              |              |              |             |              |            | 0.2      | 0.5 | —    | uS   |
| 44 | OSD input threshold voltage                   | PDCH   | OUT        | SG1              |                           |               |                |                |                |              |              |              |              |             |              |            | —        | 0.0 | —    | V    |
| 45 | OSD BLK input threshold voltage               | PDCL   | OUT        | SG1              | ↓                         |               |                |                |                |              |              |              |              |             |              |            | —        | 0.0 | —    | V    |
| 46 | OSD Pulse characteristics Tr                  | OTr1   | OUT        | —                | SW(24,25,26,27)=b         | 00H 0         | 00H 0          | 00H 0          | 00H 0          | 40H 64       | 7FH 127      | 7FH 127      | 7FH 127      | 0FH 15      |              | 00H 0      | —        | 3.0 | 6.0  | ns   |
| 47 | OSD Pulse characteristics Tf                  | OTf2   | —          | —                |                           | ↓             | ↓              | ↓              | ↓              |              |              |              |              |             |              |            | —        | 3.0 | 6.0  | ns   |
| 48 | OSD adjust control characteristics 1          | Oaj1   | OUT        | —                | ↓                         | A6H 166       | A6H 166        | A6H 166        | A6H 166        |              |              |              |              |             |              |            | 1.7      | 2.0 | 2.3  | Vp-p |
| 49 | OSD adjust control relative characteristics 1 | Oaj1   | —          | —                |                           |               |                |                |                |              |              |              |              |             |              |            | 0.8      | 1.0 | 1.2  | —    |
| 50 | OSD adjust control characteristics 2          | Oaj2   | OUT        | —                | ↓                         |               |                |                |                |              |              |              |              | 01H 1       |              | 00H 0      | 0.7      | 1.0 | 1.3  | Vp-p |
| 51 | OSD adjust control relative characteristics 2 | Oaj2   | —          | —                |                           |               |                |                |                |              |              |              |              |             |              |            | 0.8      | 1.0 | 1.2  | —    |
| 52 | OSD adjust control characteristics 3          | Oaj3   | OUT        | —                | SW(24,25,26,27)=b         |               |                |                |                |              |              |              |              | 0FH 15      |              | 01H 1      | 0.7      | 1.0 | 1.3  | Vp-p |
| 53 | OSD adjust control relative characteristics 3 | Oaj3   | —          | —                |                           |               |                |                |                |              |              |              |              |             |              |            | 0.8      | 1.0 | 1.2  | —    |
| 54 | OSD adjust control characteristics 4          | Oaj4   | OUT        | —                | ↓                         |               |                |                |                |              |              |              |              | 01H 1       |              | 01H 1      | 0.3      | 0.5 | 0.7  | Vp-p |
| 55 | OSD adjust control relative characteristics 4 | Oaj4   | —          | —                |                           |               |                |                |                |              |              |              |              |             |              |            | 0.8      | 1.0 | 1.2  | —    |
| 56 | OSD BLK characteristics                       | OBLK   | OUT        | —                | ↓                         |               |                |                |                |              |              |              |              | 00H 0       |              |            | 0.0      | 0.0 | 0.2  | Vp-p |
| 57 | OSD BLK relative characteristics              | OBLK   | —          | —                |                           |               |                |                |                |              |              |              |              |             |              |            | -0.15    | 0.0 | 0.15 | —    |
| 58 | OSD input threshold voltage                   | VthOSD | OUT        | —                | ↓                         |               |                |                |                |              |              |              |              |             |              |            | 2.0      | 2.5 | 3.0  | V    |
| 59 | OSD BLK input threshold voltage               | VthBLK | OUT        | SG1              | SW(27)=b                  | ↓             | ↓              | ↓              | ↓              | ↓            | ↓            | ↓            | ↓            | ↓           | ↓            | ↓          | 2.0      | 2.5 | 3.0  | V    |

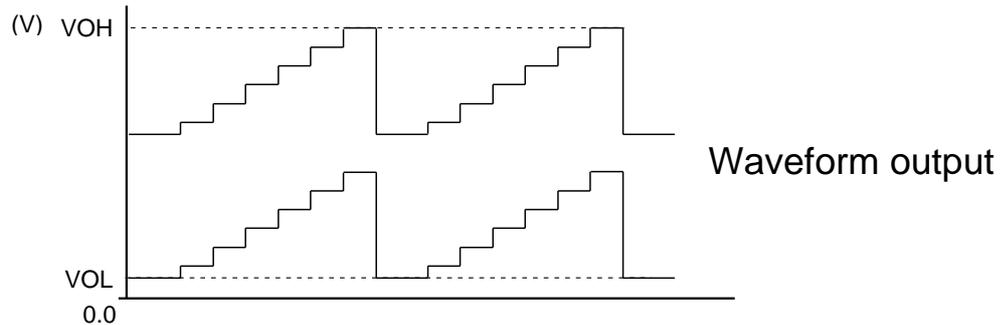


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- 1) Measuring conditions are as listed in supplementary Table.  
Measured with a current meter at test point IA.
- 2) Decrease Main Brt or Sub Brt gradually, and measure the voltage when the bottom of waveform output is distorted. The voltage is called VOL.  
Next, increase V30 gradually, and measure the voltage when the top of waveform output is distorted. The voltage is called VOH. Voltagr Vomax is calculated by the equation below:  
 $V_{omax} = VOH - VOL$



- 3) Increase the input signal(SG2) at Input1 amplitude gradually, starting from 700mVp-p. Measure the amplitude of the input signal when the output signal starts becoming distorted.
- 4) Increase the input signal(SG2) at Input2 amplitude gradually, starting from 700mVp-p. Measure the amplitude of the input signal when the output signal starts becoming distorted.
- 5) Input SG1, and read the amplitude output at OUT(2,5,9). The amplitude is called VOUT(2,5,9).Maximum gain GV is calculated by the equation below:

$$\Delta GV = 20 \text{ LOG } \frac{V_{OUT}}{0.7} \quad (\text{dB})$$

- 6) Relative maximum gain  $\Delta V$  is calculated by the equation below:

$$\Delta GV = V_{OUT}(2) / V_{OUT}(5), V_{OUT}(5) / V_{OUT}(9), V_{OUT}(9) / V_{OUT}(2)$$

- 7) Measuring the amplitude output at OUT(2,5,9). The measured value is called VOUT(2,5,9).

$$VC1 = 20 \text{ LOG } \frac{V_{OUT}}{0.7} \quad (\text{dB})$$

- 8) Measuring condition and procedure are the same as described in Note7.
- 9) Measuring condition and procedure are the same as described in Note7.
- 10) Measuring condition and procedure are the same as described in Note7.
- 11) Measuring condition and procedure are the same as described in Note7.
- 12) Measuring condition and procedure are the same as described in Note7.
- 13) Measuring condition and procedure are the same as described in Note7.

# TENTATIVE

MITSUBISHI<LINEAR IC>

## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

- 14) Measure the DC voltage output at OUT(2,5,9). The measured value is called VB1.
- 15) Measuring condition and procedure are the same as described in Note14.
- 16) Measuring condition and procedure are the same as described in Note14.
- 17) Measuring condition and procedure are the same as described in Note14.
- 18) Measuring condition and procedure are the same as described in Note14.
- 19) Measuring condition and procedure are the same as described in Note14.
- 20) First, SG3 to 1MHz is as input signal.  
Control the main contrast in order that the amplitude of sine wave output is 2.0Vp-p. Control the brightness in order that the bottom of sine wave output is 1.0V. By the same way, measure the output amplitude when SG3 to 50MHz is as input signal. The measured value is called VOUT(2,5,9).  
Frequency characteristics FC1(2,5,9) is calculated by the equation below:

$$FC1=20 \text{ LOG } \frac{V_{\text{OUT}} \text{ Vp-p}}{\text{output amplitude when inputted SG3(1MHz) : 4.0Vp-p}} \quad (\text{dB})$$

- 21) Relative characteristics FC1 is calculated by the difference in the output between the channels.
- 22) Measuring condition and procedure are the same as described in Note33, expect SG3 to
- 23) Relative characteristics FC2 is calculated by the difference in the output between the channels.
- 24) SG3 to 1MHz is as input signal. Control the main contrast in order that the amplitude of sine wave output is 1.0Vp-p. By the same way, measure the output amplitude when SG3 to 180MHz is as input signal.
- 25) Relative characteristics FC3 is calculated by the difference in the output between the channels.
- 26) Change OUT SW from a to b. Measuring condition and procedure are the same as described in Note33
- 27) Relative characteristics FC4 is calculated by the difference in the output between the channels.

- 28) Input SG3 (50MHz) to pin42 only, set Input SW of IIC BUS to 0 and then measure the waveform amplitude output at OUT(2).The measured value is called VOUT(2).On equal terms set Input SW of IIC BUS to 1.And then measure the waveform amplitude output at OUT(2)'.Crosstalk INCT1 is calculated by the equation below:

$$\text{INCT1} = 20 \text{ LOG } \frac{\text{VOUT(2)'}}{\text{VOUT(2)}} \quad (\text{dB})$$

Similarly measure the waveform amplitude output at OUT(5) when signal input only Pin37 and OUT(9)when signal input only Pin32 and calculate crosstalk

- 29) Measuring condition and procedure are the same as described in Note28,expect SG3 to 180MHz.
- 30) Input SG3 (50MHz) to pin40 only, set Input SW of IIC BUS to 1 and then measure the waveform amplitude output at OUT(2).The measured value is called VOUT(2).On equal terms set Input SW of IIC BUS to 0.And then measure the waveform amplitude output at OUT(2)'.Crosstalk INCT2 is calculated by the equation below:

$$\text{INCT2} = 20 \text{ LOG } \frac{\text{VOUT(2)'}}{\text{VOUT(2)}} \quad (\text{dB})$$

Similarly measure the waveform amplitude output at OUT(5) when signal input only Pin35 and OUT(9)when signal input only Pin30 and calculate crosstalk.

- 31) Measuring condition and procedure are the same as described in Note30,expect SG3 to 180MHz.
- 32) Input SG3 (50MHz) to pin42 only, and then measure the waveform amplitude output at OUT(2,5,9).The measured value is called VOUT(2,5,9).Crosstalk CHCT1 is calculated by the equation below:

$$\text{CHCT1} = 20 \text{ LOG } \frac{\text{VOUT(5,9)}}{\text{VOUT(2)}} \quad (\text{dB})$$

- 33) Measuring condition and procedure are the same as described in Note32,expect SG3 to 180MHz.
- 34) Input SG3 (50MHz) to pin37 only, and then measure the waveform amplitude output at OUT(2,5,9).The measured value is called VOUT(2,5,9).Crosstalk CHCT2 is calculated by the equation below:

$$\text{CHCT2} = 20 \text{ LOG } \frac{\text{VOUT(2,9)}}{\text{VOUT(5)}} \quad (\text{dB})$$

- 35) Measuring condition and procedure are the same as described in Note34,expect SG3 to 180MHz.
- 36) Input SG3 (50MHz) to pin32 only, and then measure the waveform amplitude output at OUT(2,5,9).The measured value is called VOUT(2,5,9).Crosstalk CHCT3 is calculated by the equation below:

$$\text{CHCT3} = 20 \text{ LOG } \frac{\text{VOUT(2,5)}}{\text{VOUT(9)}} \quad (\text{dB})$$

- 37) Measuring condition and procedure are the same as described in Note36,expect SG3 to 180MHz.

# TENTATIVE

## MITSUBISHI<LINEAR IC> M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

- 38) Control the contrast in order that the amplitude of output signal is 2.0Vp-p.  
Control the brightness in order that the Black level of output signal is 1.0V.  
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 prove.  
Pulse characteristics TR is calculated by the equations below :

$$TR = \sqrt{(Tr2)^2 - (Tr1)^2} \text{ (nsec)}$$

- 39) Relative Pulse characteristics1  $\Delta Tr$  is calculated by the equation below:

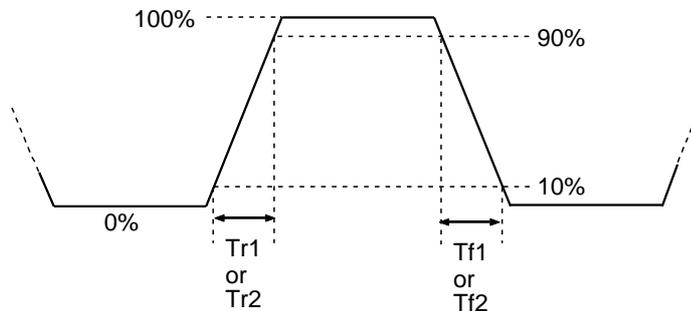
$$\Delta Tr = VOUT(2) - VOUT(5) \cdot VOUT(5) - VOUT(9) \cdot VOUT(9) - VOUT(2)$$

- 40) Measure the time needed for the input pulseto fall from 90 % to 10 % (Tf1) and for the output pulse to fall from 90 % to 10 % (Tf2) with an active prove.  
Pulse characteristics TF is calculated by the equations below :

$$TF = \sqrt{(Tf2)^2 - (Tf1)^2} \text{ (nsec)}$$

- 41) Relative Pulse characteristics2  $\Delta Tf$  is calculated by the equation below:

$$\Delta Tf = VOUT(2) - VOUT(5) \cdot VOUT(5) - VOUT(9) \cdot VOUT(9) - VOUT(2)$$



- 42) Turn down the SG4 input level gradually from 5.0Vp-p, monitoring the waveform output. Measure the top level of input pulse when the output pedestal voltage turn decrease with unstable.
- 43) Decrease the SG4 pulse width gradually from 0.5us, monitoring the output. Measure the SG4 pulse width (a point of 1.5V) when the output pedestal voltage turn decrease with unstable.
- 44) 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:
- 45) 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:

- 46) Measure the time needed for the output pulse to rise from 10% to 90% (OTR) with an active prove.
- 47) Measure the time needed for the output pulse to fall from 90% to 10% (OTF) with an active prove.
- 48) Measure the amplitude output at OUT(2,5,9). The measured value is called VOUT(2,5,9), and is treated as Oai1.
- 49) Relative characteristics  $\Delta O_{ai1}$  is calculated by the equation below:

$$\Delta O_{ai1} = VOUT(2) / VOUT(5), VOUT(5) / VOUT(9), VOUT(9) / VOUT(2)$$

- 50) Measuring condition and procedure are the same as described in Note48.
- 51) Measuring condition and procedure are the same as described in Note49.
- 52) Measuring condition and procedure are the same as described in Note48.
- 53) Measuring condition and procedure are the same as described in Note49.
- 54) Measuring condition and procedure are the same as described in Note48.
- 55) Measuring condition and procedure are the same as described in Note49.
- 56) Measuring the amplitude output at OUT(2,5,9). The measured value is called OBLK.
- 57) Relative OSD BLK characteristics  $\Delta O_{BLK}$  is calculated by the equation below:

$$\Delta O_{BLK} = VOUT(2) / VOUT(5), VOUT(5) / VOUT(9), VOUT(9) / VOUT(2)$$

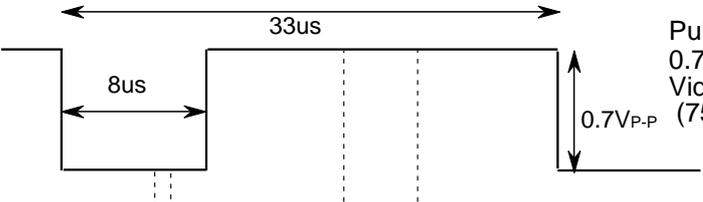
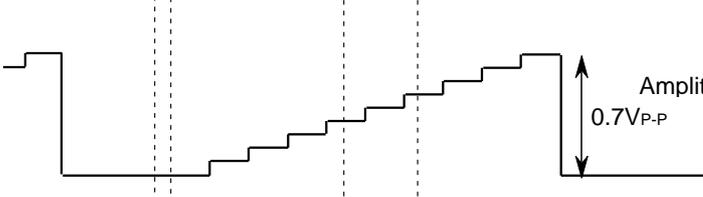
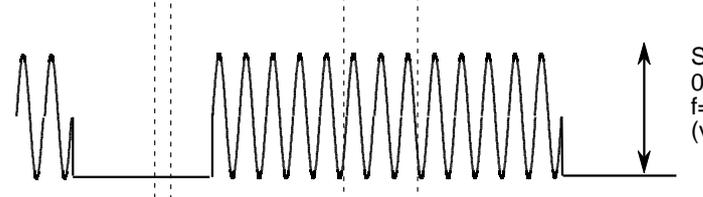
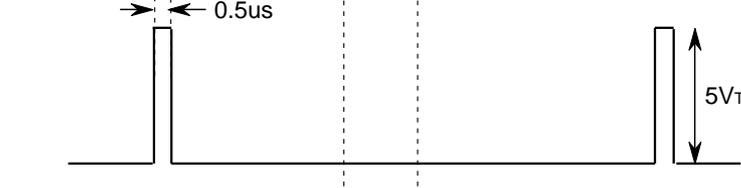
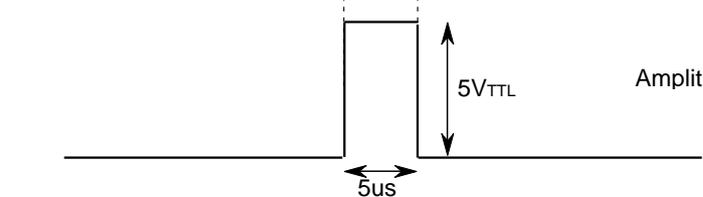
- 58) Reduce the SG5 input level gradually, monitoring output. Measure the SG5 level when the output reaches 0V. The measured value is called VthOSD.
- 59) Confirm that output signal is being blanked by the SG5 at the time. Monitoring to output signal, decreasing the level of SG5. Measure the top level of SG6 when the blanking period is disappeared. The measured value is called VthBLK.
- 60) Supply 5V to V16, and then measure input current into Pin16
- 61) Supply 0V to V16, and then measure input current into Pin16
- 62) Supply 5V to V19, and then measure input current into Pin19
- 63) Supply 0V to V19, and then measure input current into Pin19
- 64) Supply 5V to V20, and then measure input current into Pin20
- 65) Supply 0V to V20, and then measure input current into Pin20
- 66) Supply 5V to V(24,25,26) and then measure input current into Pin(24,25,26)
- 67) Supply 0V to V(24,25,26) and then measure input current into Pin(24,25,26)
- 68) Supply 5V to V27, and then measure input current into Pin27
- 69) Supply 0V to V27, and then measure input current into Pin27

TENTATIVE

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**M52739FP**

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

| SG No.   | INPUT SIGNAL  |
|--|---|
| <p>SG1<br/>Video signal<br/>(all white)</p>    |  <p>Pulse with amplitude of 0.7Vp-p (f=30KHz).<br/>Video width of 25us.<br/>(75%)</p> |
| <p>SG2<br/>Video signal<br/>(step wave)</p>    |  <p>Amplitude is partially variable<br/>0.7Vp-p</p>                                   |
| <p>SG3<br/>Sine wave<br/>(for freq. char.)</p> |  <p>Sine wave amplitude of 0.7Vp-p.<br/>f=1MHz,50MHz,150MHz<br/>(variable)</p>       |
| <p>SG4<br/>Clamp<br/>pulse</p>                 |  <p>Pulse width and amplitude are variable.<br/>5VTTL</p>                           |
| <p>SG5<br/>OSD pulse</p>                       |  <p>Amplitude is partially variable<br/>5VTTL</p>                                   |

fH=30KHz

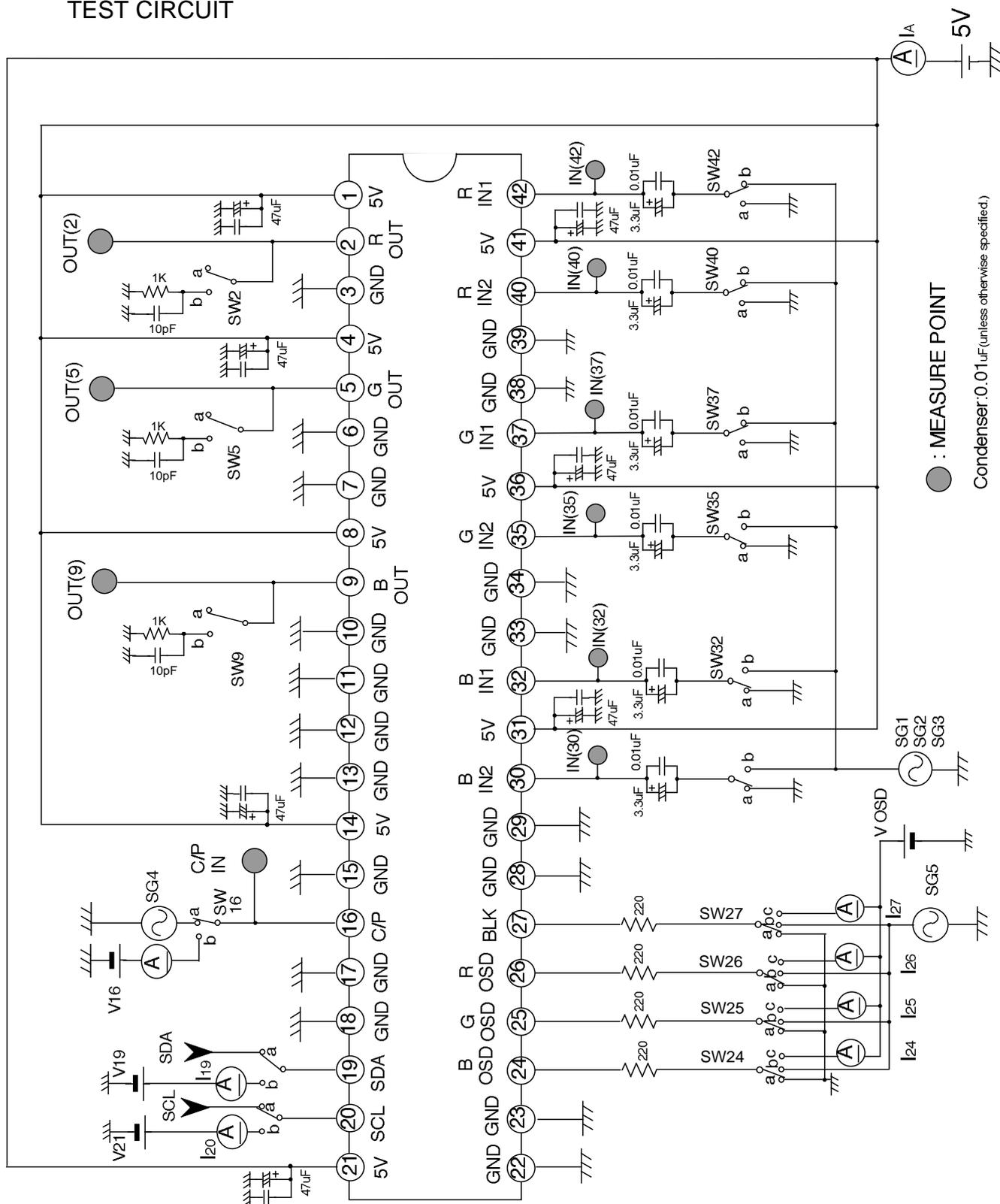
TENTATIVE

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M52739FP

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TEST CIRCUIT



● : MEASURE POINT

Condenser: 0.01μF (unless otherwise specified.)

# TENTATIVE

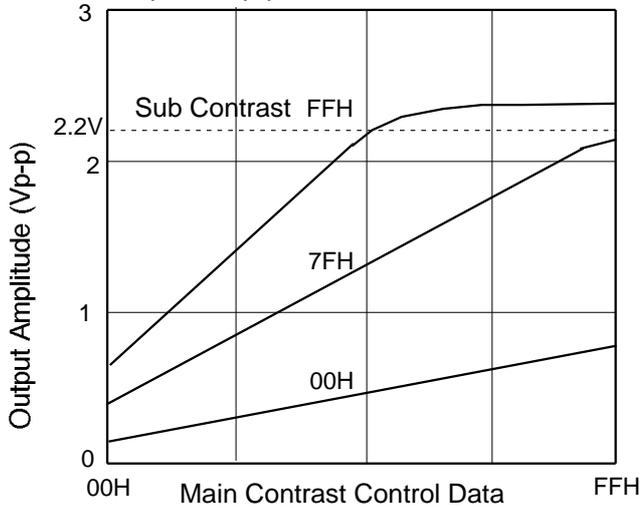
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# M52739FP

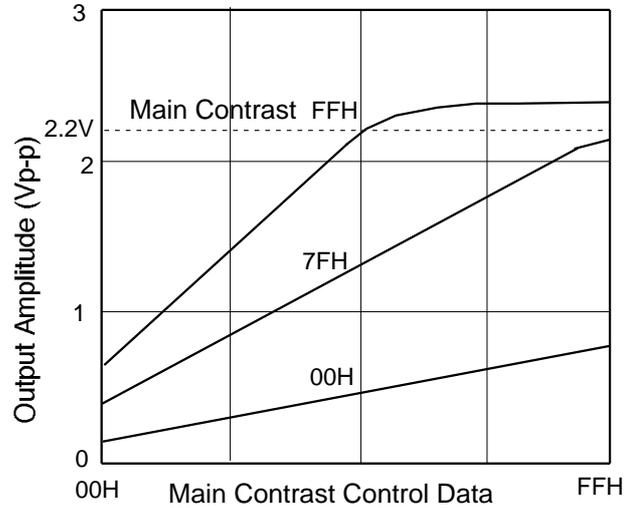
IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

## Electrical Characteristics

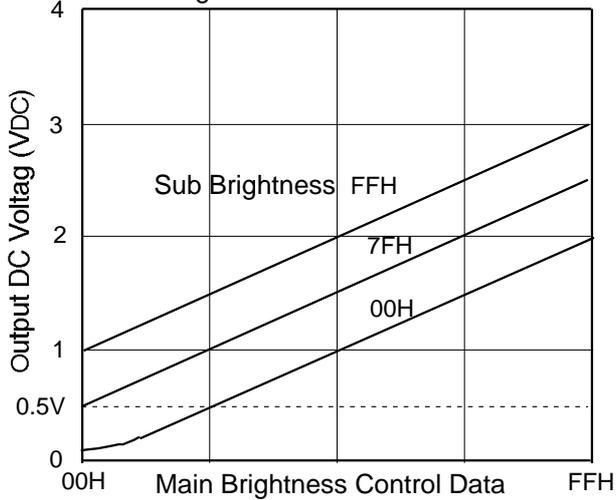
Main Contrast Control Characteristics  
Input 0.7Vp-p



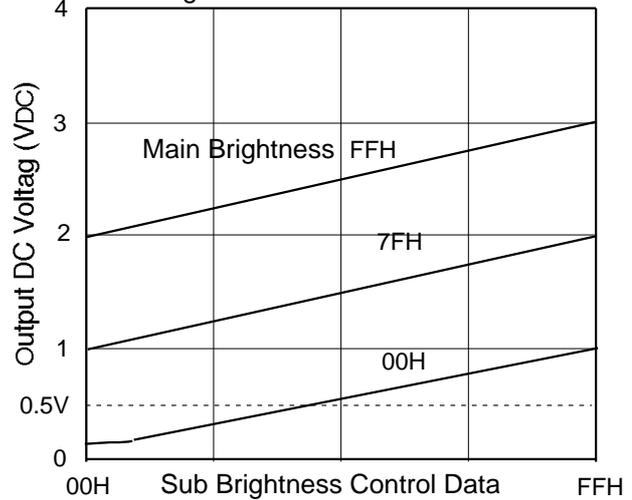
Sub Contrast Control Characteristics  
Input 0.7Vp-p



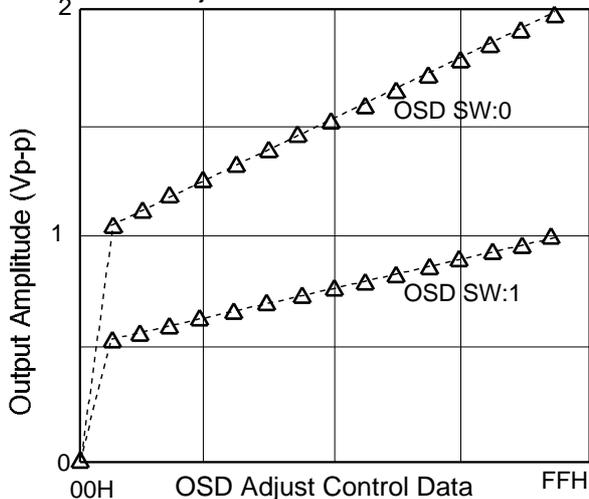
Main Brightness Control Characteristics



Sub Brightness Control Characteristics



OSD Adjust Control Characteristics



# TENTATIVE

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## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

### Application Method

#### CLAMP PULSE INPUT

Clamp pulse width is recommended

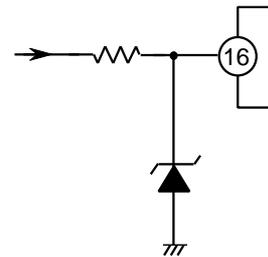
above 15 KHz, 1.0 usec

above 30 KHz, 0.5 usec

above 64 KHz, 0.3 usec

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 Fig. shown right is recommended.



#### Notice of application

- 1.Recommended pedestal voltage of IC output signal is 1V.
- 2.This IC has 2 Input routes. When the 2 Input signal input at different timing,clamp pulses which synchronize with selected signals is needed. In this case,it is necessary to change clamp pulses by the outside circuit.

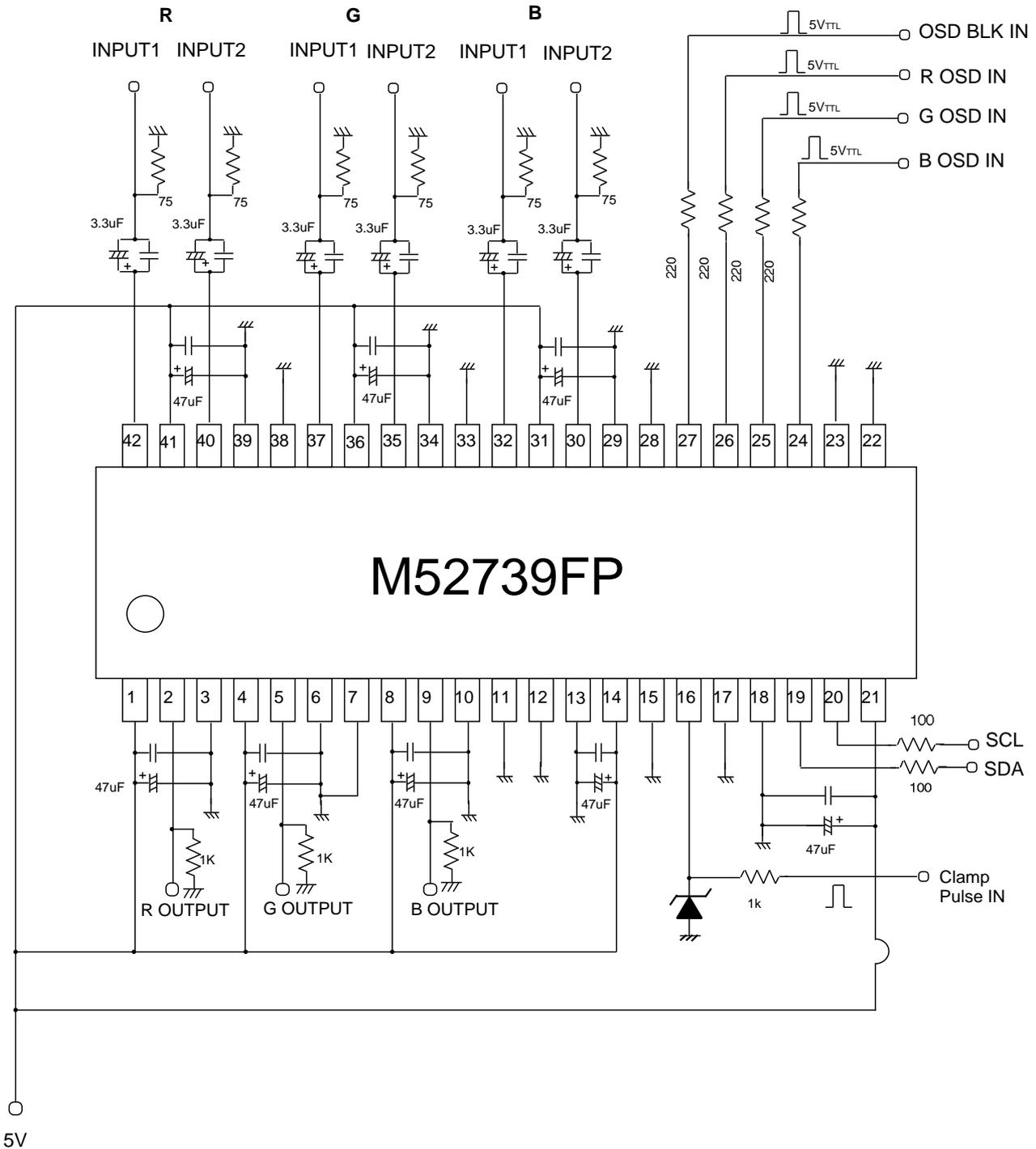
TENTATIVE

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M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

APPLICATION EXAMPLE



Condenser: 0.01 μF (unless otherwise specified.)

# TENTATIVE

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## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

### Terminal Description

|    | Name           | DC Voltage (V) | peripheral Circuit | Remark   |
|----|----------------|----------------|--------------------|--|
| 1  | R VCC 2        | 5              |                    |  |
| 4  | G VCC 2        |                |                    |  |
| 8  | B VCC2         |                |                    |  |
| 2  | OUTPUT (R)     | —              |                    |  |
| 5  | OUTPUT (G)     |                |                    |  |
| 9  | OUTPUT (B)     |                |                    |  |
| 3  | R GND 2        | GND            |                    |  |
| 6  | G GND 2        |                |                    |  |
| 10 | B GND 2        |                |                    |  |
| 13 | Analog Gnd     | GND            |                    |  |
| 14 | Analog Vcc     | 5              |                    |  |
| 16 | Clamp Pulse In | —              |                    | <p>more than 200nSec</p> <p>2.5V ~ 5V</p> <p>0.5V ~ GND</p> <p>Input at low impedance.</p> |

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## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

|    | Name        | DC Voltage (V) | peripheral Circuit | Remark   |
|----|-------------|----------------|--------------------|--|
| 18 | Digital GND | GND            | _____              | _____  |
| 19 | SDA         | —              |                    | SDA for IIC<br>(Serial data line)<br>VTH=2.3V  |
| 20 | SCL         | —              |                    | SCL for IIC<br>(Serial clock line)<br>VTH=2.3V |
| 21 | Digital Vcc | 5V             | _____              | _____  |
| 24 | B OSD IN    | —              |                    | Input pulses<br>                               |
| 25 | G OSD IN    |                |                    |  |
| 26 | R OSD IN    |                |                    |  |

# TENTATIVE

MITSUBISHI<LINEAR IC>

## M52739FP

IIC BUS controled 3channel video pre-amplifier for LCD display monitor.

| No.   | Name   | DC Voltage (V) | peripheral Circuit | Remark  |
|---|--|----------------|--------------------|---|
| 27  | OSD BLK IN   | —              |                    | <p>Input pulses</p> <p>Connected to GND if not used.</p>  |
| 29<br>34<br>39  | B GND 1<br>G GND 1<br>R GND 1  | GND            | _____              | _____   |
| 30<br>32<br>35<br>37<br>40<br>42                      | B INPUT 2<br>B INPUT 1<br>G INPUT 2<br>G INPUT 1<br>R INPUT 2<br>R INPUT 1 | 2.1 V          |                    | <ul style="list-style-type: none"> <li>• Clamped to about 2.1 V due to clamp pulses from pin16.</li> <li>• Input at low impedance.</li> </ul> |
| 31<br>36<br>41  | R VCC 1<br>G VCC 1<br>B VCC 1  | 5              | _____              | _____   |
| 7<br>11<br>12<br>15<br>17<br>2<br>2<br>28<br>33<br>38 | NC   | —              | _____              | Connect GND for radiation of heat   |