

## 4-channel Electronic Volume with Input Selector

### ■GENERAL DESCRIPTION

The **NJW1192** is 4-channel Electronic Volume with input selector. It includes main volume, balance and fader trim, 3 stereo inputs and 1 mono input selector, loudness and tone control.

The **NJW1192** performs low noise and low distortion characteristics with resistance ladder type electrical volume.

All of internal status and variables are controlled by I<sup>2</sup>C BUS interface.

### ■PACKAGE OUTLINE

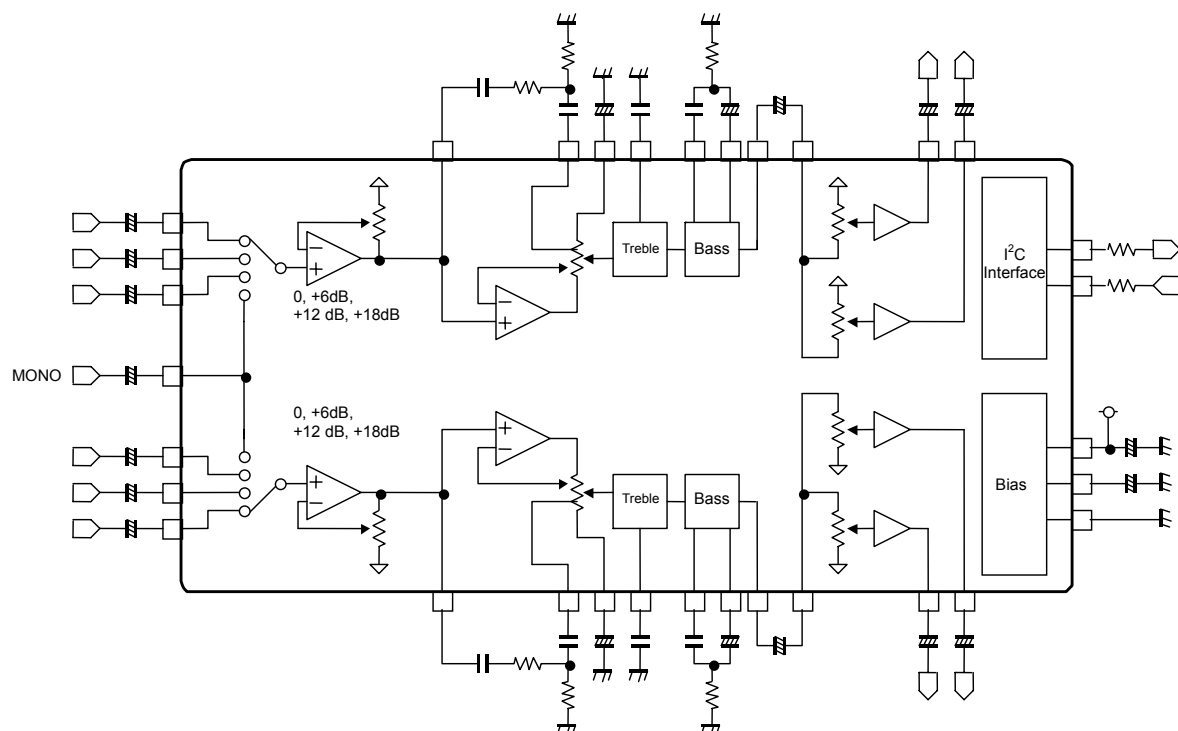


NJW1192V

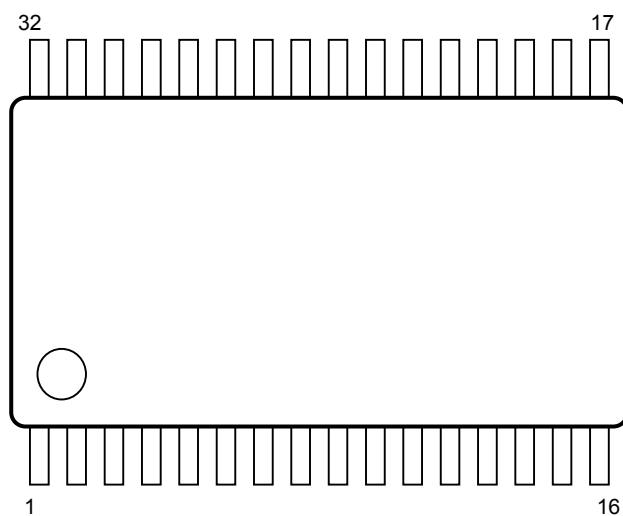
### ■FEATURES

- Operating Voltage           7.5 to 13V
- I<sup>2</sup>C BUS Interface
- Low Output Noise       -103dBV typ.
- Low Distortion         0.005% typ.
- 3ch Stereo & 1ch Monaural Input Selector
- Tone Control            Bass / Treble
- Main Volume
- Balance & Fader
- Bi-CMOS Technology
- Package Outline         SSOP32

### ■BLOCK DIAGRAM



## ■PIN FUNCTION



| No. | SYMBOL    | FUNCTION                              | No. | SYMBOL    | FUNCTION                                         |
|-----|-----------|---------------------------------------|-----|-----------|--------------------------------------------------|
| 1   | GND       | Ground                                | 17  | SDA       | I <sup>2</sup> C Data Input / Acknowledge Output |
| 2   | VREF      | Reference Voltage                     | 18  | RL_OUT    | Lch Rear Vol. Output                             |
| 3   | IN1R      | Rch Input 1                           | 19  | FL_OUT    | Lch Front Vol. Output                            |
| 4   | IN2R      | Rch Input 2                           | 20  | VOL2IN_L  | Lch 2 <sup>nd</sup> Vol. Input                   |
| 5   | IN3R      | Rch Input 3                           | 21  | TONEOUT_L | Lch Tone Output                                  |
| 6   | CAPR      | Rch Volume DC cut Capacitor           | 22  | DCCL      | Lch Tone Bass DC cut Capacitor                   |
| 7   | TAP1R     | Rch Loudness High Freq. Time Constant | 23  | TLCL      | Lch Tone Bass Time Constant                      |
| 8   | TAP2R     | Rch Loudness Low Freq. Time Constant  | 24  | THCL      | Lch Tone Treble Time Constant                    |
| 9   | THCR      | Rch Tone Treble Time Constant         | 25  | TAP2L     | Lch Loudness Low Freq. Time Constant             |
| 10  | TLCR      | Rch Tone Bass Time Constant           | 26  | TAP1L     | Lch Loudness High Freq. Time Constant            |
| 11  | DCCR      | Rch Tone Bass DC cut Capacitor        | 27  | CAPL      | Lch Volume DC cut Capacitor                      |
| 12  | TONEOUT_R | Rch Tone Output                       | 28  | IN3L      | Lch Input 3                                      |
| 13  | VOL2IN_R  | Rch 2 <sup>nd</sup> Vol. Input        | 29  | IN2L      | Lch Input 2                                      |
| 14  | FR_OUT    | Rch Front Vol. Output                 | 30  | IN1L      | Lch Input 1                                      |
| 15  | RR_OUT    | Rch Rear Vol. Output                  | 31  | INMONO    | Monaural Input                                   |
| 16  | SCL       | I <sup>2</sup> C Clock Input          | 32  | V+        | Power Supply                                     |

## ■ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER                   | SYMBOL         | RATING                                                                               | UNIT |
|-----------------------------|----------------|--------------------------------------------------------------------------------------|------|
| Supply Voltage              | V <sup>+</sup> | 15                                                                                   | V    |
| Power Dissipation           | P <sub>D</sub> | 800<br>NOTE: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting | mW   |
| Operating Temperature Range | Topr           | -40 to +85                                                                           | °C   |
| Storage Temperature Range   | Tstg           | -40 to +125                                                                          | °C   |

## ■ELECTRICAL CHARACTERISTICS

( Ta=25°C, V+=9V, R<sub>g</sub>=600Ω, R<sub>L</sub>=47kΩ, Vin=1.5Vrms, f=1kHz, all controls flat(Gv=0dB) unless otherwise specified)

| PARAMETER                 | SYMBOL           | Condition                                                                                      | MIN. | TYP.        | MAX.          | UNIT           |
|---------------------------|------------------|------------------------------------------------------------------------------------------------|------|-------------|---------------|----------------|
| Operating Voltage         | V <sup>+</sup>   |                                                                                                | 7.5  | 9.0         | 13.0          | V              |
| Supply Current            | I <sub>CC</sub>  | No Signal                                                                                      | -    | 14          | 19            | mA             |
| Reference Voltage         | V <sub>REF</sub> | No Signal                                                                                      | 4.0  | 4.5         | 5.0           | V              |
| Maximum Input Voltage     | V <sub>IM</sub>  | VOL1=-20dB<br>THD=1%                                                                           | 2.0  | 2.4         | -             | Vrms           |
| Maximum Output Voltage 1  | V <sub>OM1</sub> | THD=1%                                                                                         | 2.0  | 2.4         | -             | Vrms           |
| Maximum Output Voltage 2  | V <sub>OM2</sub> | THD=1%, f=50kHz                                                                                | 1.5  | 2.4         | -             | Vrms           |
| Input Gain                | G <sub>vin</sub> | VOL1=0dB, INPUT GAIN=+18dB<br>Vin=0.1Vrms                                                      | +16  | +18         | +20           | dB             |
| Voltage Gain 1            | G <sub>V1</sub>  | VOL1=+6dB, INPUT GAIN=0dB<br>Vin=0.1Vrms                                                       | +5   | +6          | +7            | dB             |
| Voltage Gain 2            | G <sub>V2</sub>  |                                                                                                | -1   | 0           | 1             | dB             |
| Voltage Gain 3            | G <sub>V3</sub>  | VOL1=-68dB, f=10kHz                                                                            | -71  | -68         | -64           | dB             |
| Voltage Gain 4            | G <sub>V4</sub>  | VOL2FL,FR,BL,BR=-42dB                                                                          | -45  | -42         | -39           | dB             |
| Mute Level                | Mute             | VOL2FL,FR,BL,BR=Mute<br>Filter : 400Hz to 30kHz                                                | -    | -100        | -90           | dB             |
| Channel Balance           | G <sub>CB</sub>  |                                                                                                | -1   | 0           | 1             | dB             |
| Total Harmonic Distortion | THD              | BW : 400Hz to 30kHz                                                                            | -    | 0.005       | 0.01          | %              |
| Output Noise Voltage 1    | V <sub>NO1</sub> | Rg=0Ω, Filter : A-weighted                                                                     | -    | -103<br>(7) | -90<br>(32)   | dBV<br>(μVrms) |
| Output Noise Voltage 2    | V <sub>NO2</sub> | VOL2FL,FR,BL,BR=Mute<br>Rg=0Ω, Filter : A-weighted                                             | -    | -108<br>(4) | -95<br>(17.8) | dBV<br>(μVrms) |
| Cross Talk                | CT               | Selected Input : No signal Rg=0Ω<br>Unselected Input : Input signal<br>Filter : 400Hz to 30kHz | 90   | 100         | -             | dB             |
| Channel Separation        | CS               | Rg=0Ω, Filter : 400Hz to 30kHz                                                                 | 90   | 100         | -             | dB             |

## ◆LOUDNESS

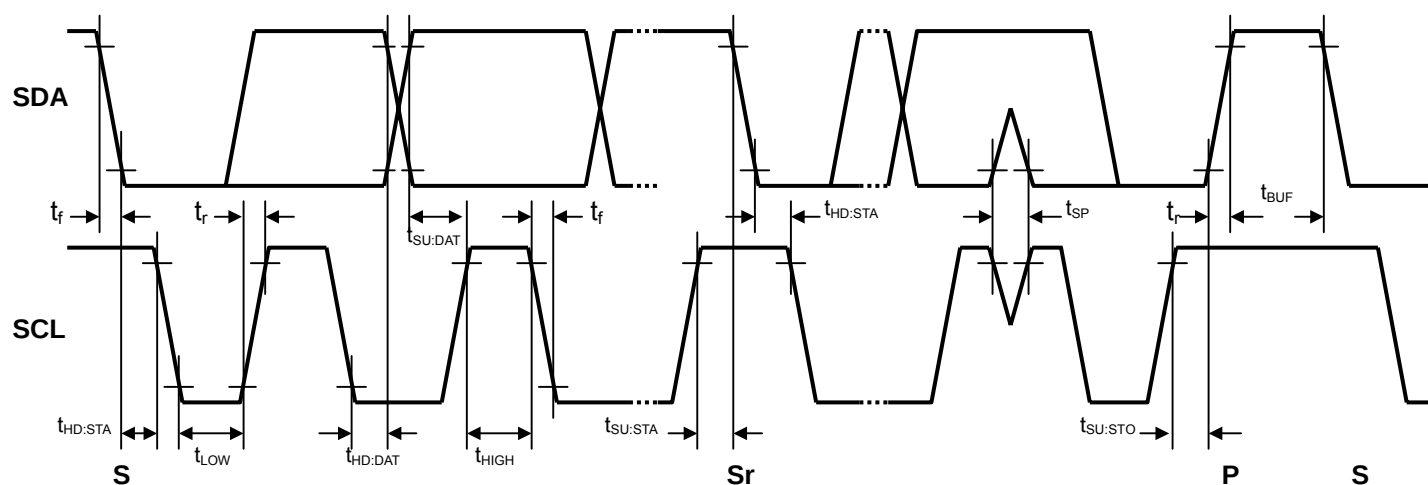
|                          |                  |                                |     |    |      |    |
|--------------------------|------------------|--------------------------------|-----|----|------|----|
| Maximum Low Boost Level  | G <sub>LDL</sub> | Loudness=ON,VOL1=-24dB,f=40Hz  | 9.5 | 12 | 14.5 | dB |
| Maximum High Boost Level | G <sub>LDH</sub> | Loudness=ON,VOL1=-24dB,f=10kHz | 2.5 | 5  | 7.5  | dB |

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V+=9V, R<sub>g</sub>=600Ω, R<sub>L</sub>=47kΩ, Vin=1.5Vrms, f=1kHz, all controls flat(Gv=0dB) unless otherwise specified)

| PARAMETER          | SYMBOL            | Condition                                   | MIN.  | TYP.  | MAX.  | UNIT |
|--------------------|-------------------|---------------------------------------------|-------|-------|-------|------|
| ◆TONE              |                   |                                             |       |       |       |      |
| Treble Boost Level | G <sub>HBST</sub> | BCT="1", TREB="111", f=10kHz<br>Vin=0.1Vrms | 11.5  | 14.0  | 16.5  | dB   |
| Treble Flat Level  | G <sub>HFLT</sub> | TREB="000", f=10kHz                         | -2.0  | 0.0   | 2.0   | dB   |
| Treble Cut Level   | G <sub>HCUT</sub> | BCT="0", TREB="111", f=10kHz                | -16.5 | -14.0 | -11.5 | dB   |
| Bass Boost Level   | G <sub>LBST</sub> | BCB="1", BASS="111", f=100Hz<br>Vin=0.1Vrms | 11.5  | 14.0  | 16.5  | dB   |
| Bass Flat Level    | G <sub>LFLT</sub> | BASS="000", f=100Hz                         | -2.0  | 0.0   | 2.0   | dB   |
| Bass Cut Level     | G <sub>LCUT</sub> | BCB="0", BASS="111", f=100Hz                | -16.5 | -14.0 | -11.5 | dB   |

## ■TIMING ON THE I<sup>2</sup>C BUS (SDA,SCL)



## ■CHARACTERISTICS OF I/O STAGES FOR I2C BUS (SDA,SCL)

I<sup>2</sup>C BUS Load Conditions

STANDARD MODE : Pull up resistance 4k $\Omega$  (Connected to +5V), Load capacitance 200pF (Connected to GND)

FAST MODE : Pull up resistance 4k $\Omega$  (Connected to +5V), Load capacitance 50pF (Connected to GND)

| PARAMETER                                                                                             | SYMBOL   | Standard mode |      |      | Fast mode |      |      | UNIT    |
|-------------------------------------------------------------------------------------------------------|----------|---------------|------|------|-----------|------|------|---------|
|                                                                                                       |          | MIN.          | TYP. | MAX. | MIN.      | TYP. | MAX. |         |
| Low Level Input Voltage                                                                               | $V_{IL}$ | 0.0           | -    | 1.5  | 0.0       | -    | 1.5  | V       |
| High Level Input Voltage                                                                              | $V_{IH}$ | 2.5           | -    | 5.5  | 2.5       | -    | 5.5  | V       |
| Low level output voltage (3mA at SDA pin)                                                             | $V_{OL}$ | 0             | -    | 0.4  | 0         | -    | 0.4  | V       |
| Input current each I/O pin with an input voltage between 0.1V <sub>DD</sub> and 0.9V <sub>DDmax</sub> | $I_i$    | -10           | -    | 10   | -10       | -    | 10   | $\mu$ A |

## ■CHARACTERISTICS OF BUS LINES (SDA,SCL) FOR I<sup>2</sup>C-BUS DEVICES

| PARAMETER                                        | SYMBOL              | Standard mode |      |      | Fast mode |      |      | UNIT |
|--------------------------------------------------|---------------------|---------------|------|------|-----------|------|------|------|
|                                                  |                     | MIN.          | TYP. | MAX. | MIN.      | TYP. | MAX. |      |
| SCL clock frequency                              | f <sub>SCL</sub>    | -             | -    | 100  | -         | -    | 400  | kHz  |
| Hold time (repeated) START condition.            | t <sub>HD:STA</sub> | 4.0           | -    | -    | 0.6       | -    | -    | μs   |
| Low period of the SCL clock                      | t <sub>LOW</sub>    | 4.7           | -    | -    | 1.3       | -    | -    | μs   |
| High period of the SCL clock                     | t <sub>HIGH</sub>   | 4.0           | -    | -    | 0.6       | -    | -    | μs   |
| Set-up time for a repeated START condition       | t <sub>SU:STA</sub> | 4.7           | -    | -    | 0.6       | -    | -    | μs   |
| Data hold time <sup>NOTE)</sup>                  | t <sub>HD:DAT</sub> | 0             | -    | -    | 0         | -    | -    | μs   |
| Data set-up time                                 | t <sub>SU:DAT</sub> | 250           | -    | -    | 100       | -    | -    | ns   |
| Rise time of both SDA and SCL signals            | t <sub>r</sub>      | -             | -    | 1000 | -         | -    | 300  | ns   |
| Fall time of both SDA and SCL signals            | t <sub>f</sub>      | -             | -    | 300  | -         | -    | 300  | ns   |
| Set-up time for STOP condition                   | t <sub>SU:STO</sub> | 4.0           | -    | -    | 0.6       | -    | -    | μs   |
| Bus free time between a STOP and START condition | t <sub>BUF</sub>    | 4.7           | -    | -    | 1.3       | -    | -    | μs   |
| Capacitive load for each bus line                | C <sub>b</sub>      | -             | -    | 400  | -         | -    | 400  | pF   |
| Noise margin at the Low level                    | V <sub>nL</sub>     | 0.5           | -    | -    | 0.5       | -    | -    | V    |
| Noise margin at the High level                   | V <sub>nH</sub>     | 1             | -    | -    | 1         | -    | -    | V    |

C<sub>b</sub> ; total capacitance of one bus line in pF.

NOTE). Data hold time : t<sub>HD:DAT</sub>

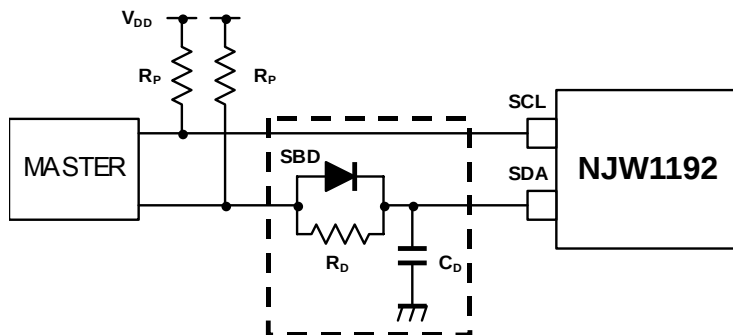
Please hold the Data Hold Time (t<sub>HD:DAT</sub>) to 300ns or more to avoid status of unstable at SCL falling edge.

The SDA block in the NJW1192 does not hold data. Add external data-delay-circuit of the SDA terminal, in case of not providing a hold time of at least 300nsec for the SDA in the master device.

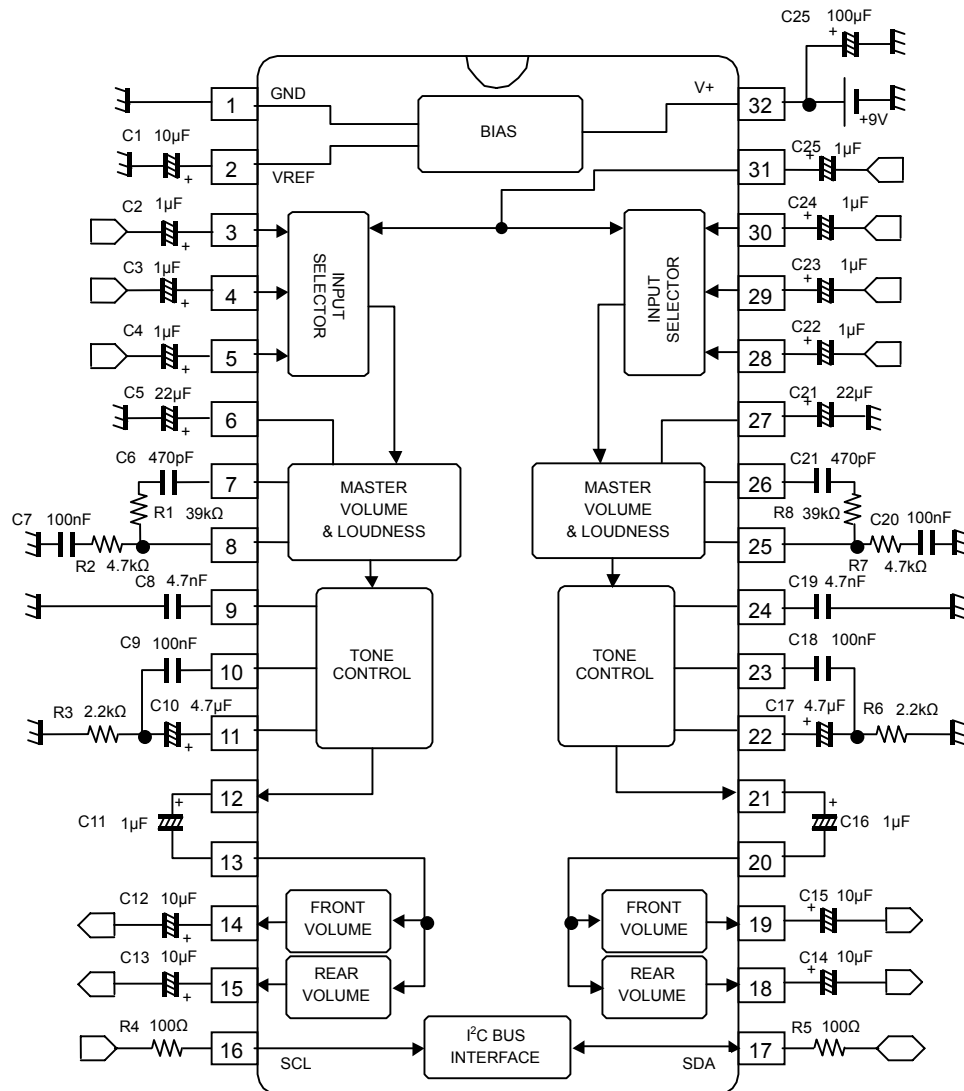
The time-consists of the data-delay-circuit of the SDA terminal are as follows.

- (a) Low level → High level :  $T_{LH} \approx R_P \cdot C_D$   
 (b) High level → Low level :  $T_{HL} \approx R_D \cdot C_D$

In addition, Schottky barrier diode (SBD) influences a Low level at the Acknowledge. Therefore choose the low forward voltage (V<sub>f</sub>) as much as possible.



## APPLICATION CIRCUIT



## APPLICATION NOTES

| Pin No.          | Function                          | Note                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2                | Vref                              | C1 can be adjusted rise and fall time of reference voltage at power on and off. Take care that the reduced C1 makes sensitive to ripple of power supply.                                                                                                                                                                                                                                                                                                                               |
| 3-5, 28-31       | Inputs                            | The input impedance is designed about 48k ohms.<br>The ground line should be inserted between each input lines to avoid cross talk.                                                                                                                                                                                                                                                                                                                                                    |
| 6,27             | Volume DC cut capacitor terminals | The wiring pattern between these terminals and capacitors should be shortened to prevent the generating of wiring resistance.<br>C5, C21 affect pop-noise when "VOL1" or "Tone Bass" are immediately controlled after powered. Though reducing the capacity of C5, C21 may reduce pop-noise, it affects bass frequency characteristic on volume1 attenuation (See Page.22 Voltage Gain vs. Frequency characteristics).<br>Use Pre Charge function for reducing pop-noise.(See Page.14) |
| 7,8,25,26        | Loudness filter Taps              | Loudness frequency can be adjusted with external parts (See Page.7). Especially, 8 and 25 pins should be kept from large signal lines such as digital signal lines or the other sound signal lines to avoid the digitaly noise or cross talk in Loudness mode.                                                                                                                                                                                                                         |
| 9,10,11,22,23,24 | Tone filter terminals             | Tone Bass and Treble cut off frequency can be adjusted with external parts (See Page.7). These pins should be kept from large signal lines such as digital signal lines or the other sound signal lines to avoid the digitaly noise or cross talk in Loudness mode.                                                                                                                                                                                                                    |
| 12,21            | Tone outputs                      | Output impedance is designed about 50 ohms.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 13,20            | Balance Fader volume inputs       | Input impedance is designed about 24k ohms.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 14,15,18,19      | Balance Fader volume outputs      | Output impedance is designed about 50 ohms.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 16,17            | I²C control signal ports          | These terminals should be inserted resistance about 100 ohms between terminal and signal sources to reduce the digitaly noise. These lines should be kept from analog signal lines and or near by the chip to avoid digitaly noises. Inserted ground line between analog line and digital line should be recommended.                                                                                                                                                                  |

## ■APPLICATION NOTES

### < Loudness fc adjustment >

Loudness High and Low Boost cut off frequencies are able to adjust with the external parts as shown in fig.A. They are given by the functions below.

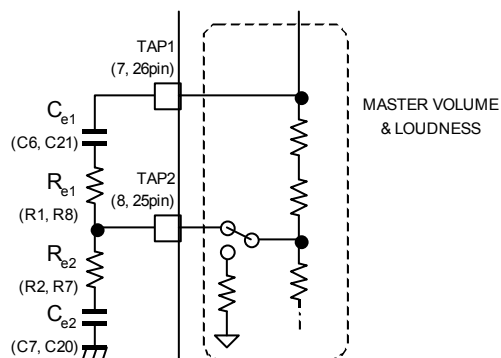


fig. A Loudness circuit

$$\text{High Boost cut off frequency: } f_{CH} = \frac{1}{2\pi R_{e1} \cdot C_{e1}} \text{ (Hz)}$$

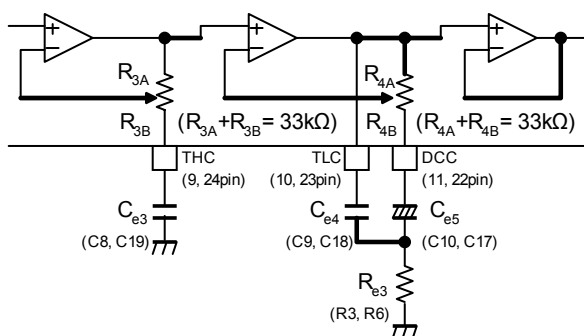
$$\text{Low Boost cut off frequency: } f_{CL} = \frac{1}{2\pi R_{e2} \cdot C_{e2}} \text{ (Hz)}$$

#### <NOTE>

$R_{e2}$  should be fixed to 4.7kΩ for the precise level of volume in Loudness mode.

### < Tone fc adjustment >

Tone High and Low cut off frequencies are able to adjust with the external parts as shown in fig.B. They are given by the functions below. .



(Boost)

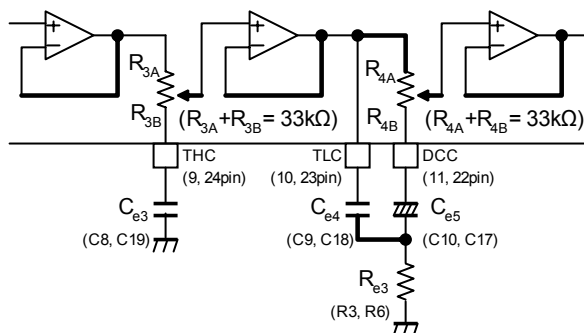
$$\text{Treble cut off frequency: } f_{CT} = \frac{1}{2\pi R_{3B} \cdot C_{e3}} \text{ (Hz)}$$

( $R_{3B}=5.5k\Omega$  at 14dB set)

$$\text{Bass cut off frequency: } f_{CBL} = \frac{(R_{4B} + R_{e3})}{2\pi(R_{4A} + R_{4B}) \cdot R_{e3} \cdot C_{e4}} \text{ (Hz)}$$

$$\left[ \text{DC cut off frequency: } f_{CDC} = \frac{1}{2\pi(R_{4B} + R_{e3}) \cdot C_{e5}} \text{ (Hz)} \right]$$

( $R_{4B}=3.3k\Omega$  at 14dB set)



(Cut)

fig. B Tone circuit

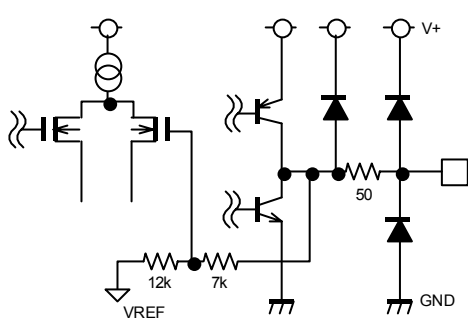
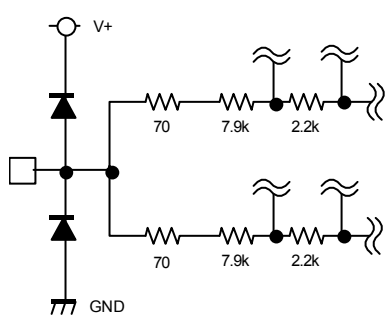
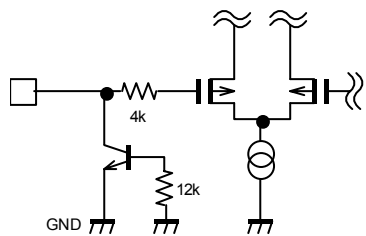
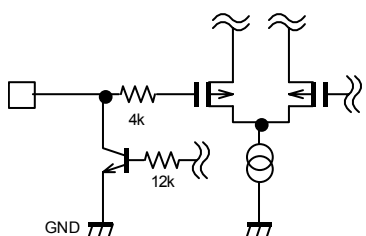
## ■TERMINAL DESCRIPTION

| No.                           | SYMBOL                                       | FUNCTION                                                                               | EQUIVALENT CIRCUIT | VOLTAGE |
|-------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------|--------------------|---------|
| 2                             | VREF                                         | Reference Voltage                                                                      |                    | $V+/2$  |
| 3<br>4<br>5<br>30<br>29<br>28 | IN1R<br>IN2R<br>IN3R<br>IN1L<br>IN2L<br>IN3L | Rch Input 1<br>Rch Input 2<br>Rch Input 3<br>Lch Input 1<br>Lch Input 2<br>Lch Input 3 |                    | $V+/2$  |
| 6<br>27                       | CAPR<br>CAPL                                 | Rch Volume DC cut Capacitor<br>Lch Volume DC cut Capacitor                             |                    | $V+/2$  |
| 7<br>26                       | TAP1R<br>TAP1L                               | Rch Loudness High Freq. Time Constant<br>Lch Loudness High Freq. Time Constant         |                    | $V+/2$  |

## ■TERMINAL DESCRIPTION

| No.      | SYMBOL         | FUNCTION                                                                     | EQUIVALENT CIRCUIT | VOLTAGE |
|----------|----------------|------------------------------------------------------------------------------|--------------------|---------|
| 8<br>25  | TAP2R<br>TAP2L | Rch Loudness Low Freq. Time Constant<br>Lch Loudness Low Freq. Time Constant |                    | V+/2    |
| 9<br>24  | THCR<br>THCL   | Rch Tone Treble Time Constant<br>Lch Tone Treble Time Constant               |                    | V+/2    |
| 10<br>23 | TLCR<br>TLCL   | Rch Tone Bass Time Constant<br>Lch Tone Bass Time Constant                   |                    | V+/2    |
| 11<br>22 | DCCR<br>DCCL   | Rch Tone Bass DC cut Capacitor<br>Lch Tone Bass DC cut Capacitor             |                    | V+/2    |

## ■TERMINAL DESCRIPTION

| No.                              | SYMBOL                                                         | FUNCTION                                                                                                                             | EQUIVALENT CIRCUIT                                                                   | VOLTAGE |
|----------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| 12<br>14<br>15<br>19<br>18<br>21 | TONEOUT_R<br>FR_OUT<br>RR_OUT<br>FL_OUT<br>RL_OUT<br>TONEOUT_L | Rch Tone Output<br>Rch Front Vol. Output<br>Rch Rear Vol. Output<br>Lch Front Vol. Output<br>Lch Rear Vol. Output<br>Lch Tone Output |    | V+/2    |
| 13<br>20                         | VOL2IN_R<br>VOL2IN_L                                           | Rch 2 <sup>nd</sup> Vol. Input<br>Lch 2 <sup>nd</sup> Vol. Input                                                                     |   | V+/2    |
| 16                               | SCL                                                            | I <sup>2</sup> C Clock Input                                                                                                         |  | -       |
| 17                               | SDA                                                            | I <sup>2</sup> C Data Input / Acknowledge Output                                                                                     |  | -       |

| No. | SYMBOL | FUNCTION       | EQUIVALENT CIRCUIT | VOLTAGE |
|-----|--------|----------------|--------------------|---------|
| 31  | INMONO | Monaural Input |                    | $V+/2$  |

## ■ DEFINITION OF I<sup>2</sup>C REGISTER

### ◆ I<sup>2</sup>C BUS FORMAT



S: Starting Term

A: Acknowledge Bit

P: Ending Term

### ◆ SLAVE ADDRESS

| Slave Address |   |   |   |     |   |   |   | Hex   |
|---------------|---|---|---|-----|---|---|---|-------|
| MSB           |   |   |   | LSB |   |   |   | -     |
| 1             | 0 | 0 | 0 | 0   | 0 | 0 | 0 | 80(h) |

### ◆ CONTROL REGISTER TABLE

The select address sets each function (Volume, Loudness, Balance, Fader, Tone Control, Input Selector).

The auto increment function cycles the select address as follows.

00H→01H→02H→03H→04H→00H

#### <Write Mode>

| Select Address | BIT                 |           |        |        |                      |             |          |        |
|----------------|---------------------|-----------|--------|--------|----------------------|-------------|----------|--------|
|                | D7                  | D6        | D5     | D4     | D3                   | D2          | D1       | D0     |
| 00H            | Input Gain          |           |        | VOL1   |                      |             |          |        |
| 01H            | VOL2FL (Front Left) |           |        |        | VOL2FR (Front Right) |             |          |        |
| 02H            | VOL2RL (Rear Left)  |           |        |        | VOL2RR (Rear Right)  |             |          |        |
| 03H            | BCB                 | Tone Bass |        |        | BCT                  | Tone Treble |          |        |
| 04H            | FLMute              | FRMute    | RLMute | RRMute | Input Selector       |             | Loudness | Test * |

\* Test : Set D0=0 in usually.  
(For device check use only)

### ◆ CONTROL REGISTER DEFAULT VALUE

Control register default value is all "0".

| Select Address | BIT |    |    |    |    |    |    |    |
|----------------|-----|----|----|----|----|----|----|----|
|                | D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 00H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 01H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 02H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 03H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| 04H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

## ■INSTRUCTION CODE

### a) MAIN VOLUME (VOL1, Input Gain) SETTING

| Select Address | BIT        |    |      |    |    |    |    |    |
|----------------|------------|----|------|----|----|----|----|----|
|                | D7         | D6 | D5   | D4 | D3 | D2 | D1 | D0 |
| 00H            | Input Gain |    | VOL1 |    |    |    |    |    |

- Input Gain : 0dB, +6dB, +12dB, +18dB
- VOL1 : Volume 1 Level setting +6 to -30dB (1dB/Step), -30 to -68dB (2dB/Step), Mute

### b) BALANCE, FADER VOLUME (VOL2FL,FR,RL,RR ) SETTING

| Select Address | BIT    |    |    |    |        |    |    |    |
|----------------|--------|----|----|----|--------|----|----|----|
|                | D7     | D6 | D5 | D4 | D3     | D2 | D1 | D0 |
| 01H            | VOL2FL |    |    |    | VOL2FR |    |    |    |
| 02H            | VOL2RL |    |    |    | VOL2RR |    |    |    |

- VOL2FL,FR,RL,RR : 0,-2,-4,-6,-8,-10,-12,-16,-18,-20,-24,-32,-34,-36,-38,-42 dB

### c) TONE SETTING

| Select Address | BIT |           |    |    |     |             |    |    |
|----------------|-----|-----------|----|----|-----|-------------|----|----|
|                | D7  | D6        | D5 | D4 | D3  | D2          | D1 | D0 |
| 03H            | BCB | TONE BASS |    |    | BCT | TONE TREBLE |    |    |

- BCB : Boost cut select for Bass control  
 “0” : Cut  
 “1” : Boost
- TONE BASS : BASS Level Setting  
 Cut Level : -14 to 0dB(2dB/Step)  
 Boost Level : 0 to +14dB(2dB/Step)
- BCT : Boost cut select for Treble control  
 “0” : Cut  
 “1” : Boost
- TONE TREBLE : TREBLE Level Setting  
 Cut Level : -14 to 0dB(2dB/Step)  
 Boost Level : 0 to +14dB(2dB/Step)

### d) INPUT SELECTOR SETTING

| Select Address | BIT    |        |        |        |                |    |          |      |
|----------------|--------|--------|--------|--------|----------------|----|----------|------|
|                | D7     | D6     | D5     | D4     | D3             | D2 | D1       | D0   |
| 04H            | FLMute | FRMute | RLMute | RRMute | Input Selector |    | Loudness | Test |

- FLMute, FRMute, RLMute, RRMute : VOL2FL,FR,RL,RR Mute
- Input Selector: INPUT1 to 3 and MONO
- Loudness : Loudness ON/OFF
- Test : For device check use only. Set D0 = 0 in usual.

## ■VOL1(Select Address : 00H)

| Gain(dB)    | VOL1 |    |    |    |    |    |
|-------------|------|----|----|----|----|----|
|             | D5   | D4 | D3 | D2 | D1 | D0 |
| 0           | 1    | 1  | 1  | 1  | 1  | 1  |
| -1          | 1    | 1  | 1  | 1  | 1  | 0  |
| -2          | 1    | 1  | 1  | 1  | 0  | 1  |
| -3          | 1    | 1  | 1  | 1  | 0  | 0  |
| -4          | 1    | 1  | 1  | 0  | 1  | 1  |
| -5          | 1    | 1  | 1  | 0  | 1  | 0  |
| -6          | 1    | 1  | 1  | 0  | 0  | 1  |
| -7          | 1    | 1  | 1  | 0  | 0  | 0  |
| -8          | 1    | 1  | 0  | 1  | 1  | 1  |
| -9          | 1    | 1  | 0  | 1  | 1  | 0  |
| -10         | 1    | 1  | 0  | 1  | 0  | 1  |
| -11         | 1    | 1  | 0  | 1  | 0  | 0  |
| -12         | 1    | 1  | 0  | 0  | 1  | 1  |
| -13         | 1    | 1  | 0  | 0  | 1  | 0  |
| -14         | 1    | 1  | 0  | 0  | 0  | 1  |
| -15         | 1    | 1  | 0  | 0  | 0  | 0  |
| -16         | 1    | 0  | 1  | 1  | 1  | 1  |
| -17         | 1    | 0  | 1  | 1  | 1  | 0  |
| -18         | 1    | 0  | 1  | 1  | 0  | 1  |
| -19         | 1    | 0  | 1  | 1  | 0  | 0  |
| -20         | 1    | 0  | 1  | 0  | 1  | 1  |
| -21         | 1    | 0  | 1  | 0  | 1  | 0  |
| -22         | 1    | 0  | 1  | 0  | 0  | 1  |
| -23         | 1    | 0  | 1  | 0  | 0  | 0  |
| -24         | 1    | 0  | 0  | 1  | 1  | 1  |
| -25         | 1    | 0  | 0  | 1  | 1  | 0  |
| -26         | 1    | 0  | 0  | 1  | 0  | 1  |
| -27         | 1    | 0  | 0  | 1  | 0  | 0  |
| -28         | 1    | 0  | 0  | 0  | 1  | 1  |
| -29         | 1    | 0  | 0  | 0  | 1  | 0  |
| -30         | 1    | 0  | 0  | 0  | 0  | 1  |
| -32         | 1    | 0  | 0  | 0  | 0  | 0  |
| -34         | 0    | 1  | 1  | 1  | 1  | 1  |
| -36         | 0    | 1  | 1  | 1  | 1  | 0  |
| -38         | 0    | 1  | 1  | 1  | 0  | 1  |
| -40         | 0    | 1  | 1  | 1  | 0  | 0  |
| -42         | 0    | 1  | 1  | 0  | 1  | 1  |
| -44         | 0    | 1  | 1  | 0  | 1  | 0  |
| -46         | 0    | 1  | 1  | 0  | 0  | 1  |
| -48         | 0    | 1  | 1  | 0  | 0  | 0  |
| -50         | 0    | 1  | 0  | 1  | 1  | 1  |
| -52         | 0    | 1  | 0  | 1  | 1  | 0  |
| -54         | 0    | 1  | 0  | 1  | 0  | 1  |
| -56         | 0    | 1  | 0  | 1  | 0  | 0  |
| -58         | 0    | 1  | 0  | 0  | 1  | 1  |
| -60         | 0    | 1  | 0  | 0  | 1  | 0  |
| -62         | 0    | 1  | 0  | 0  | 0  | 1  |
| -64         | 0    | 1  | 0  | 0  | 0  | 0  |
| -66         | 0    | 0  | 1  | 1  | 1  | 1  |
| -68         | 0    | 0  | 1  | 1  | 1  | 0  |
| Mute        | 0    | 0  | 1  | 1  | 0  | 1  |
| Mute        | 0    | 0  | 1  | 1  | 0  | 0  |
| Mute        | 0    | 0  | 1  | 0  | 1  | 1  |
| Mute        | 0    | 0  | 1  | 0  | 1  | 0  |
| Mute        | 0    | 0  | 1  | 0  | 0  | 1  |
| Mute        | 0    | 0  | 1  | 0  | 0  | 0  |
| 0           | 0    | 0  | 0  | 1  | 1  | 1  |
| +1          | 0    | 0  | 0  | 1  | 1  | 0  |
| +2          | 0    | 0  | 0  | 1  | 0  | 1  |
| +3          | 0    | 0  | 0  | 1  | 0  | 0  |
| +4          | 0    | 0  | 0  | 0  | 1  | 1  |
| +5          | 0    | 0  | 0  | 0  | 1  | 0  |
| +6          | 0    | 0  | 0  | 0  | 0  | 1  |
| Pre Charge* | 0    | 0  | 0  | 0  | 0  | 0  |

\* Pre Charge : Charge the DC cut capacitor of VOL1 (CAPL, CAPR) and Tone Bass (DCCL, DCCR) for reducing pop-noise when "VOL1" or "Tone Bass" are immediately controlled after powered.  
This device should be provided the Pre Charge time of at least 2 sec for reducing pop-noise under application circuit condition.

## ■INPUT GAIN (Select Address : 00H)

| Gain(dB) | INPUT GAIN |    |
|----------|------------|----|
|          | D7         | D6 |
| 0        | 0          | 0  |
| +6       | 0          | 1  |
| +12      | 1          | 0  |
| +18      | 1          | 1  |

## ■VOL2 FL,FR (Select Address : 01H) : Front Channel VOL2 RL,RR (Select Address : 02H) : Rear Channel

| Gain(dB) |            | VOL2 |    |    |    |
|----------|------------|------|----|----|----|
|          |            | D7   | D6 | D5 | D4 |
|          | Lch<br>Rch | D3   | D2 | D1 | D0 |
| 0        |            | 1    | 1  | 1  | 1  |
| -2       |            | 1    | 1  | 1  | 0  |
| -4       |            | 1    | 1  | 0  | 1  |
| -6       |            | 1    | 1  | 0  | 0  |
| -8       |            | 1    | 0  | 1  | 1  |
| -10      |            | 1    | 0  | 1  | 0  |
| -12      |            | 1    | 0  | 0  | 1  |
| -16      |            | 1    | 0  | 0  | 0  |
| -18      |            | 0    | 1  | 1  | 1  |
| -20      |            | 0    | 1  | 1  | 0  |
| -24      |            | 0    | 1  | 0  | 1  |
| -32      |            | 0    | 1  | 0  | 0  |
| -34      |            | 0    | 0  | 1  | 1  |
| -36      |            | 0    | 0  | 1  | 0  |
| -38      |            | 0    | 0  | 0  | 1  |
| -42      |            | 0    | 0  | 0  | 0  |

## ■TONE (Select Address : 03H)

| Cut/Boost<br>Select | BCB |
|---------------------|-----|
|                     | D7  |
|                     | BCT |
|                     | D3  |
| Cut                 | 0   |
| Boost               | 1   |

|                 |                   | TONE BASS   |    |    |
|-----------------|-------------------|-------------|----|----|
|                 |                   | D6          | D5 | D4 |
| Cut<br>Gain(dB) | Boost<br>Gain(dB) | TONE TREBLE |    |    |
|                 |                   | D2          | D1 | D0 |
| -14             | 14                | 1           | 1  | 1  |
| -12             | 12                | 1           | 1  | 0  |
| -10             | 10                | 1           | 0  | 1  |
| -8              | 8                 | 1           | 0  | 0  |
| -6              | 6                 | 0           | 1  | 1  |
| -4              | 4                 | 0           | 1  | 0  |
| -2              | 2                 | 0           | 0  | 1  |
| 0               | 0                 | 0           | 0  | 0  |

## ■VOL2 MUTE (Select Address : 04H)

|              |         |
|--------------|---------|
|              | FL Mute |
|              | D7      |
|              | FR Mute |
|              | D6      |
|              | RL Mute |
| Mute Setting | D5      |
|              | RR Mute |
|              | D4      |
| Mute         | 0       |
| Active       | 1       |

## ■INPUT SELECTOR (Select Address : 04H)

|         | Input Selector |    |
|---------|----------------|----|
|         | D3             | D2 |
| INPUT 1 | 0              | 0  |
| INPUT 2 | 0              | 1  |
| INPUT 3 | 1              | 0  |
| MONO    | 1              | 1  |

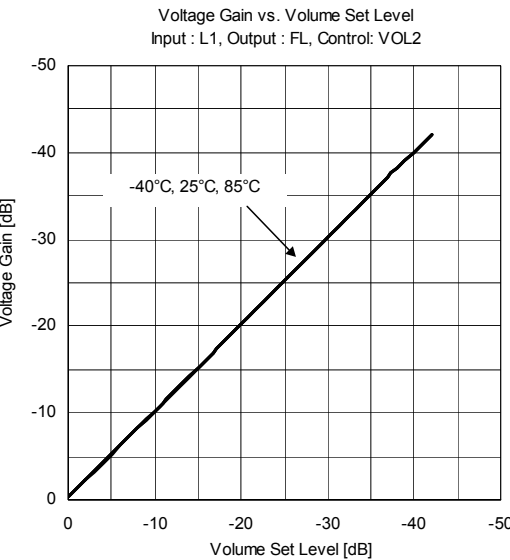
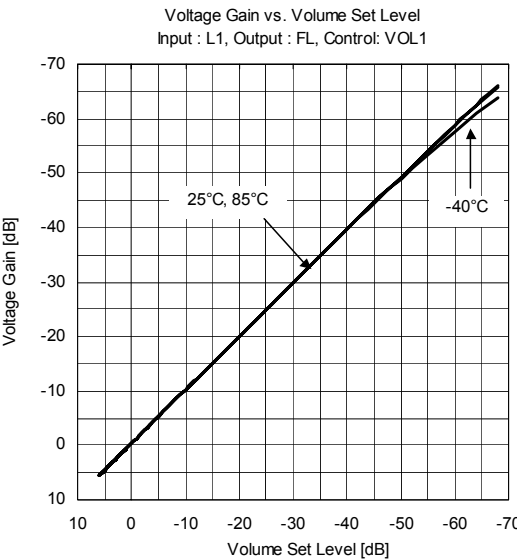
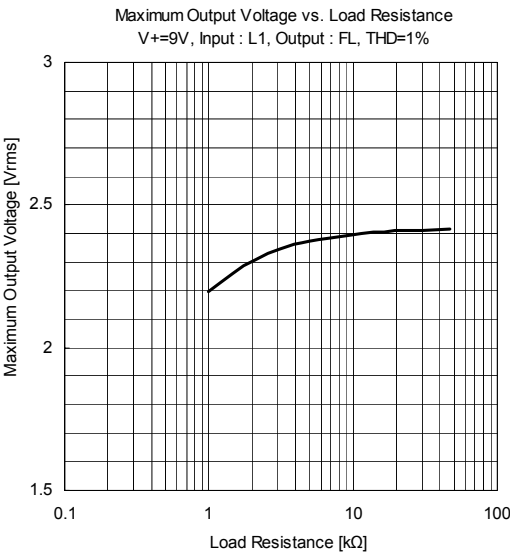
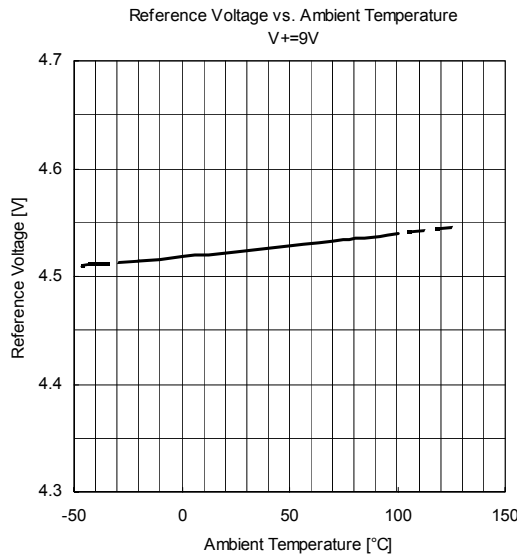
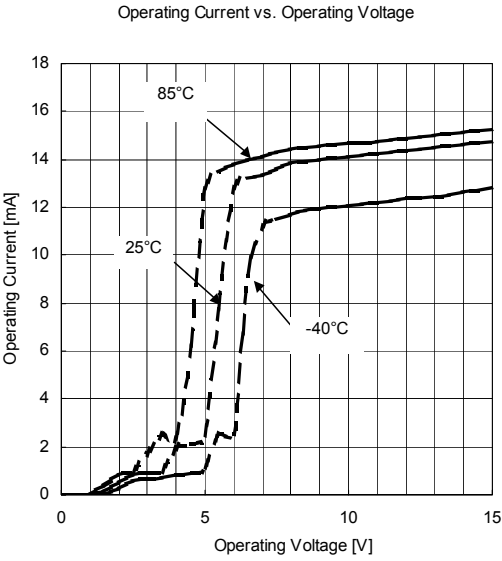
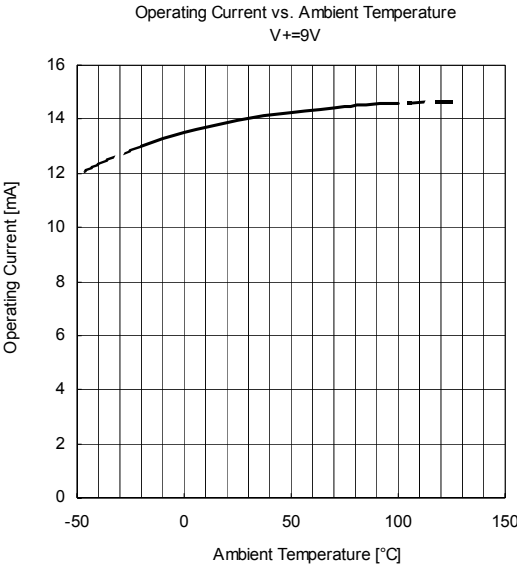
## ■LOUDNESS (Select Address : 04H)

| Loudness Setting | Loudness D1 |
|------------------|-------------|
| OFF              | 0           |
| ON               | 1           |

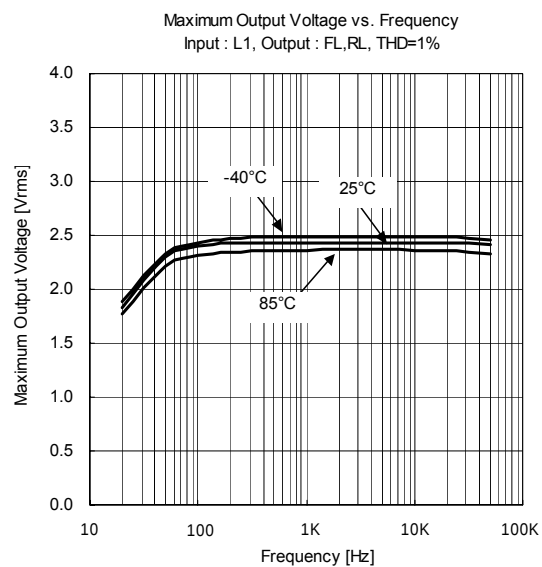
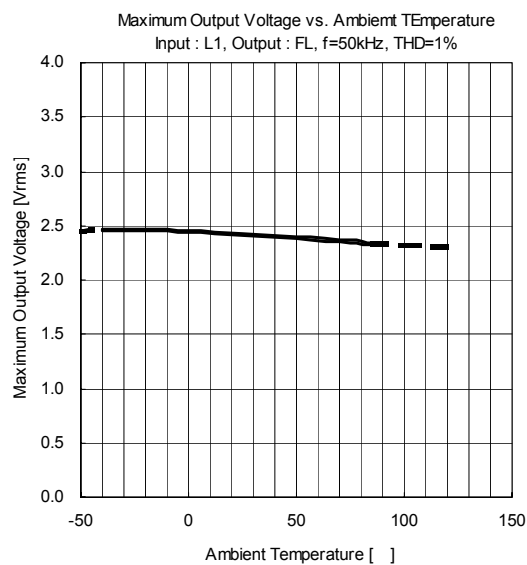
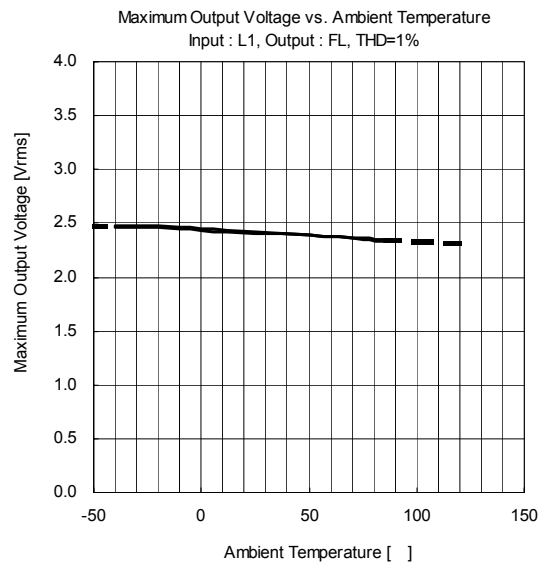
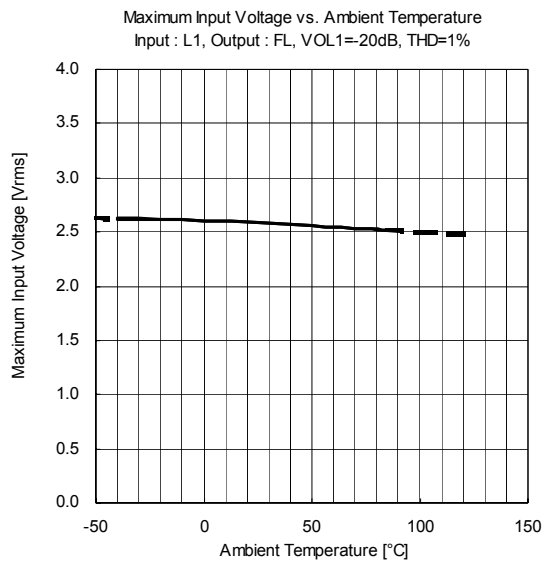
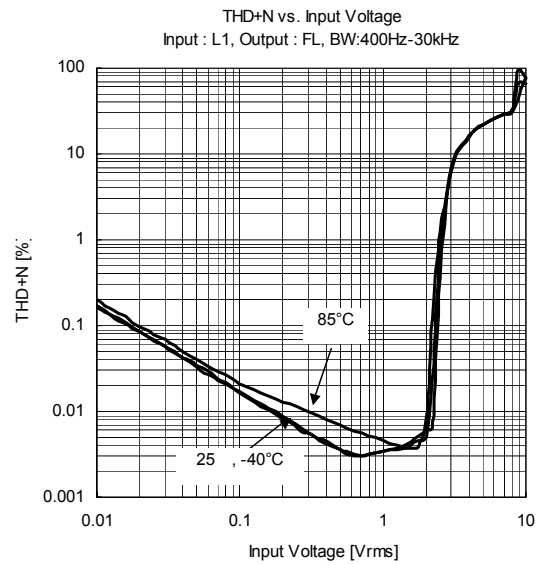
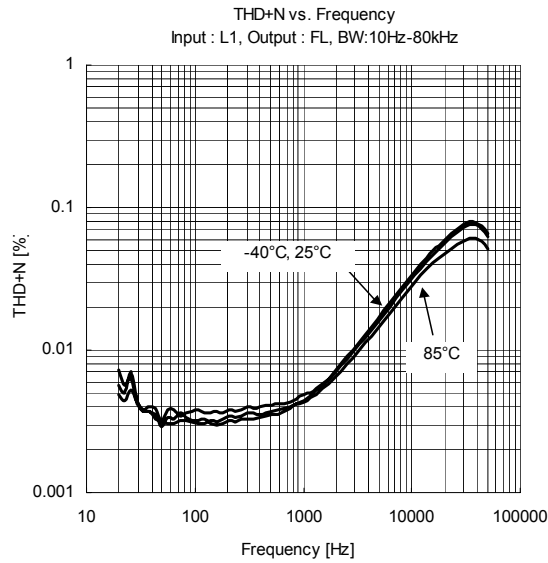
## ■TEST (Select Address : 04H) \* FOR DEVICE CHECK USE ONLY.

|           | Test |
|-----------|------|
|           | D0   |
| Normal    | 0    |
| Test Mode | 1    |

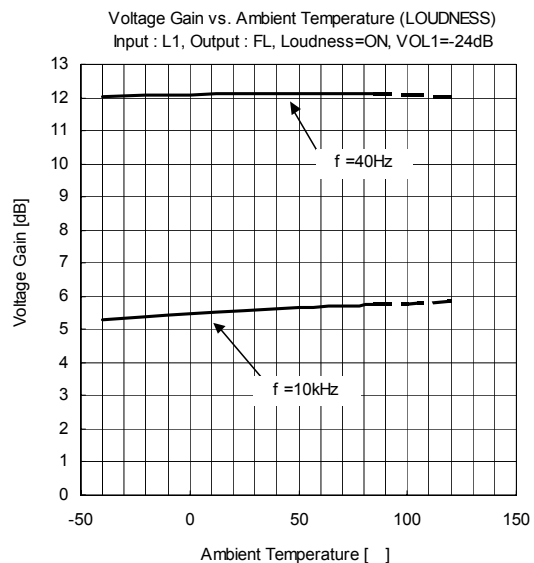
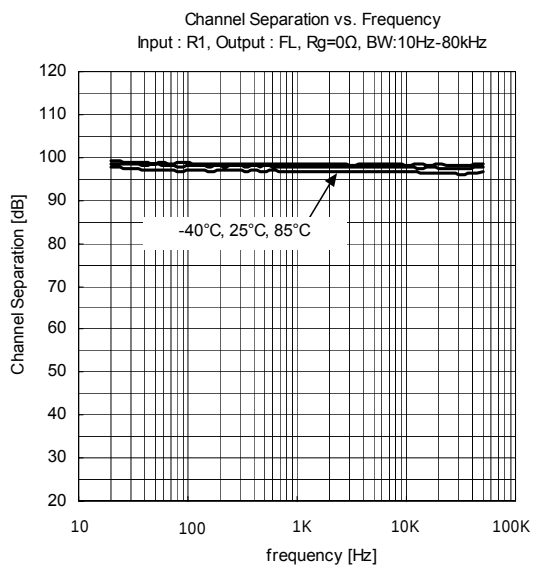
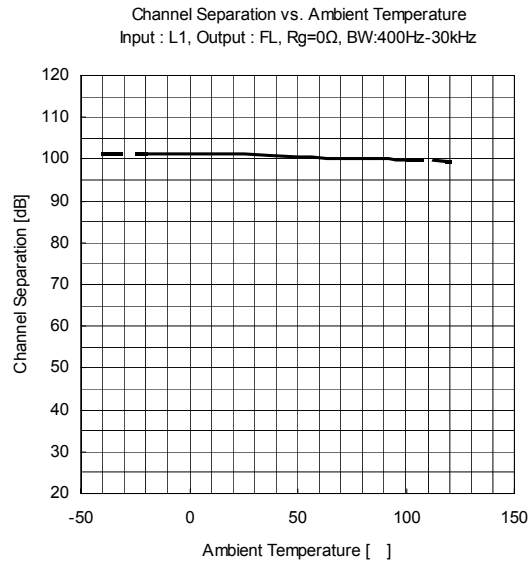
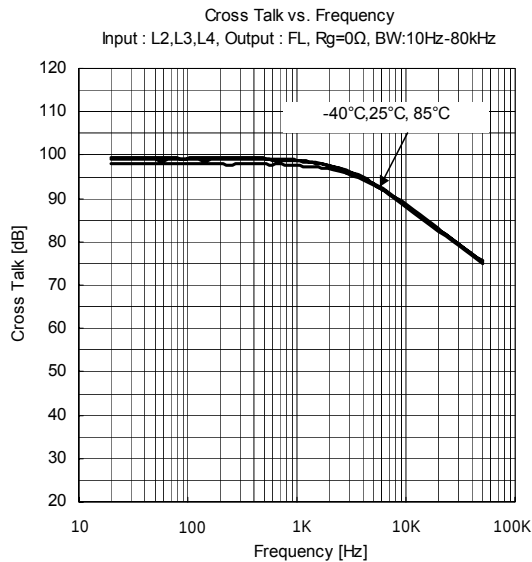
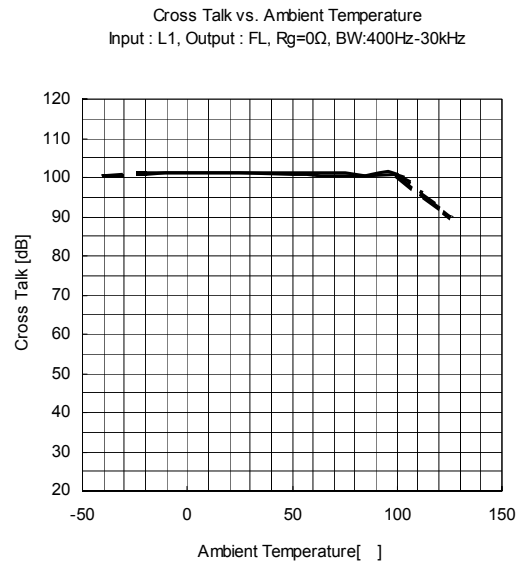
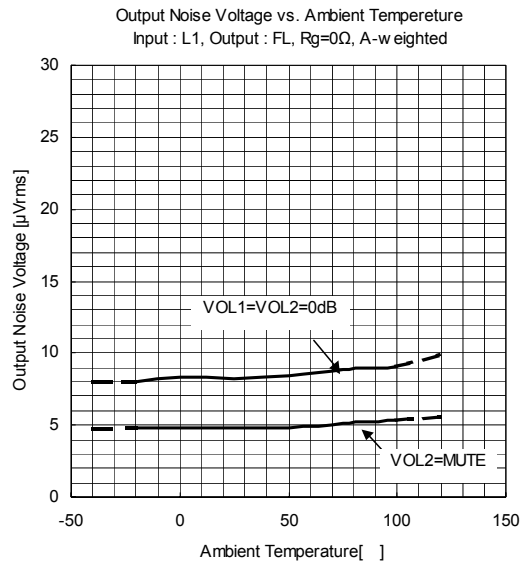
■ TYPICAL CHARACTERISTICS



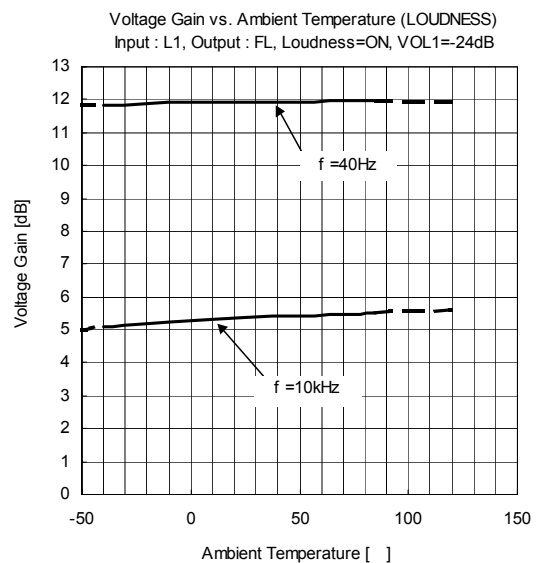
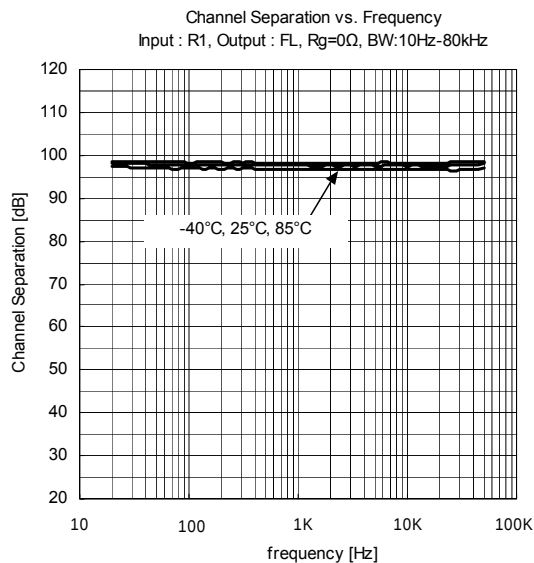
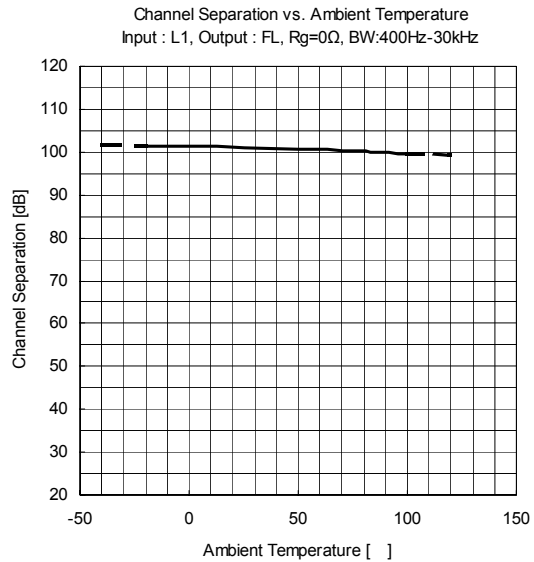
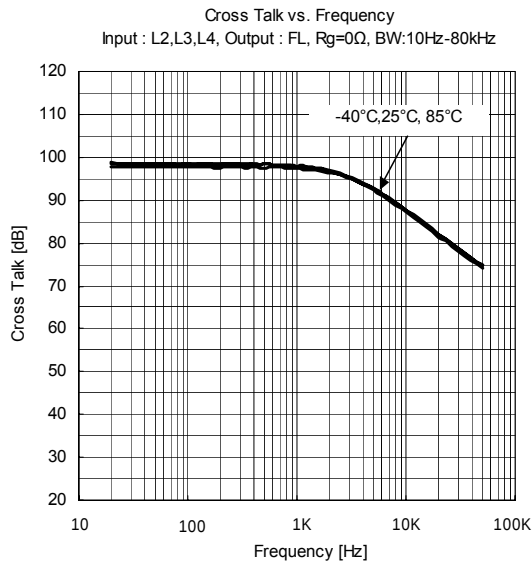
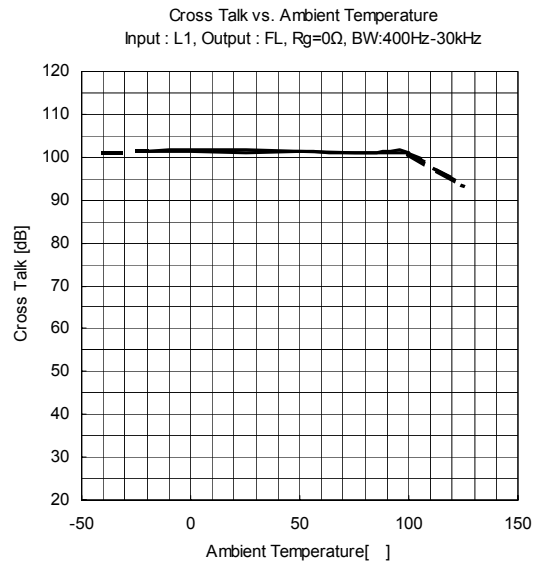
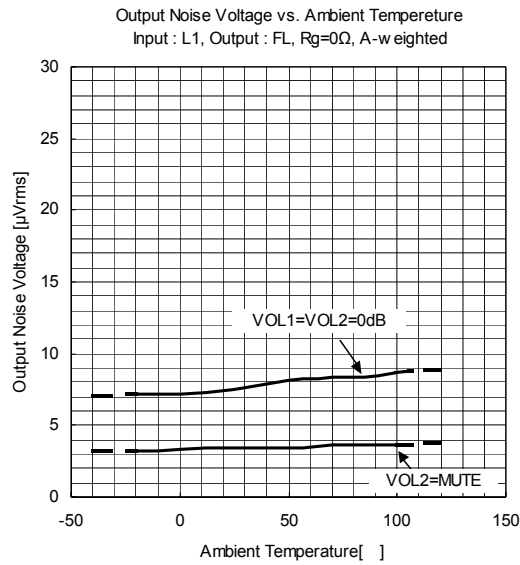
## TYPICAL CHARACTERISTICS



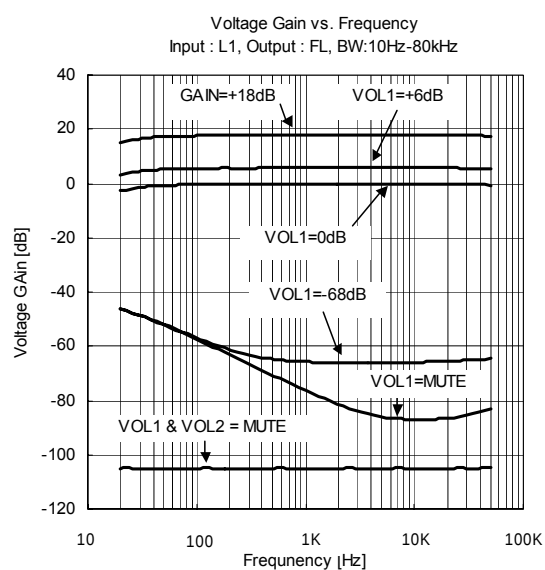
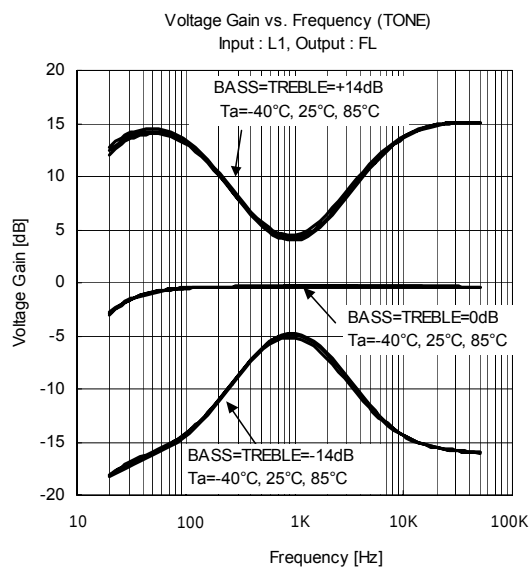
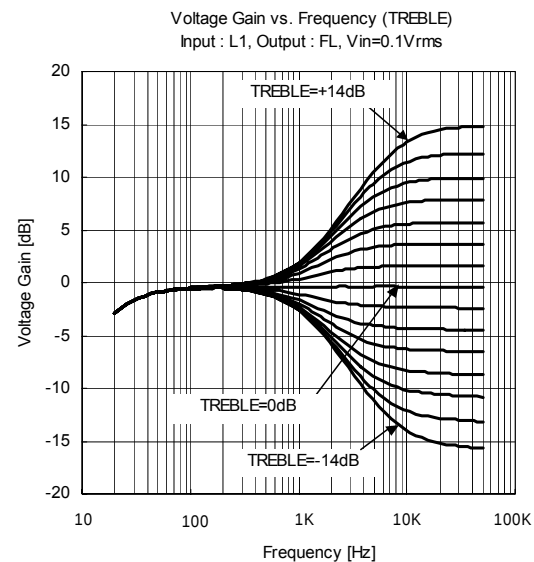
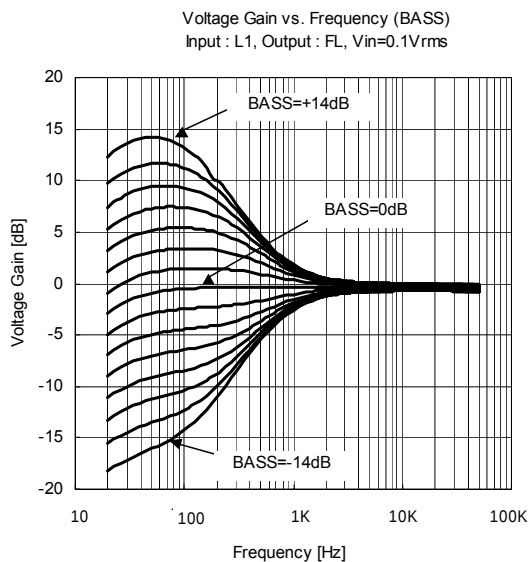
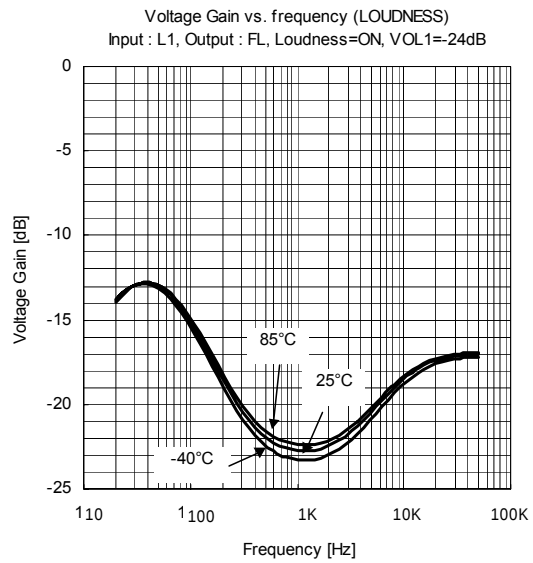
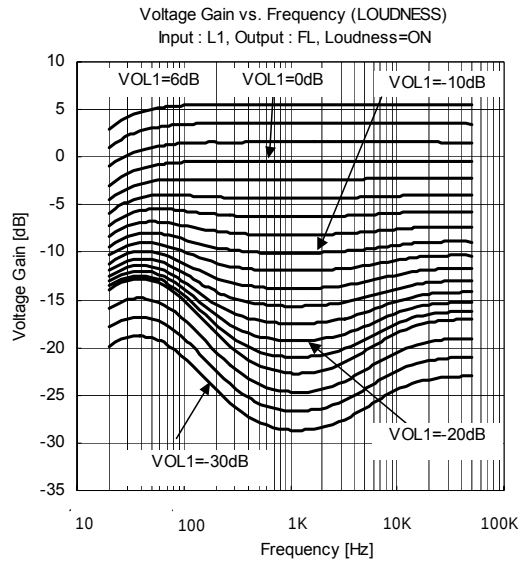
## ■ TYPICAL CHARACTERISTICS



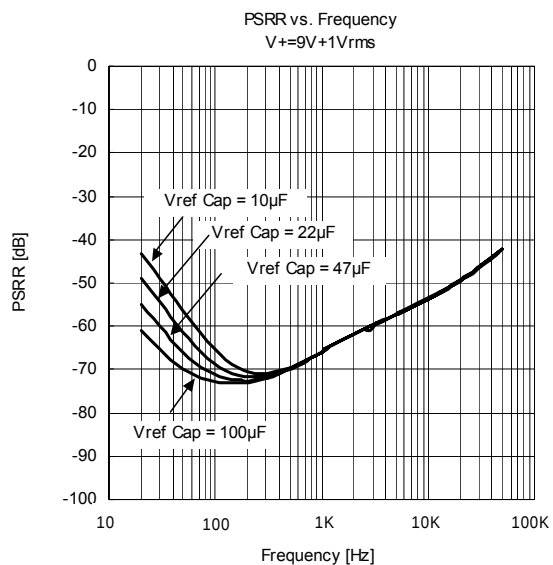
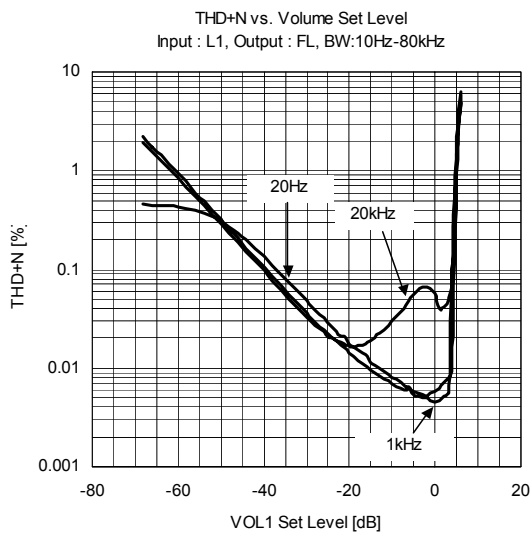
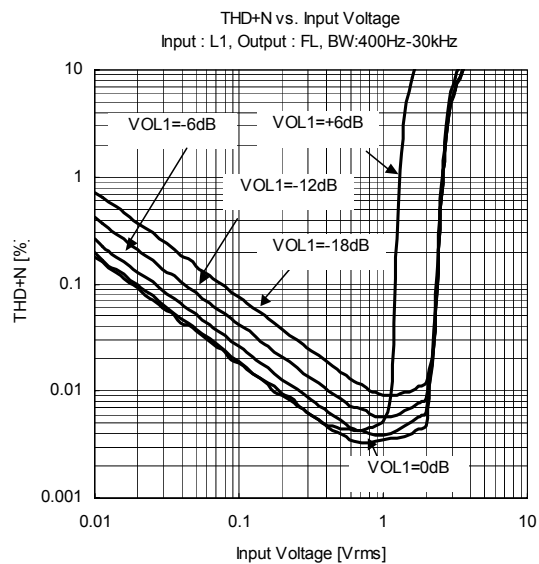
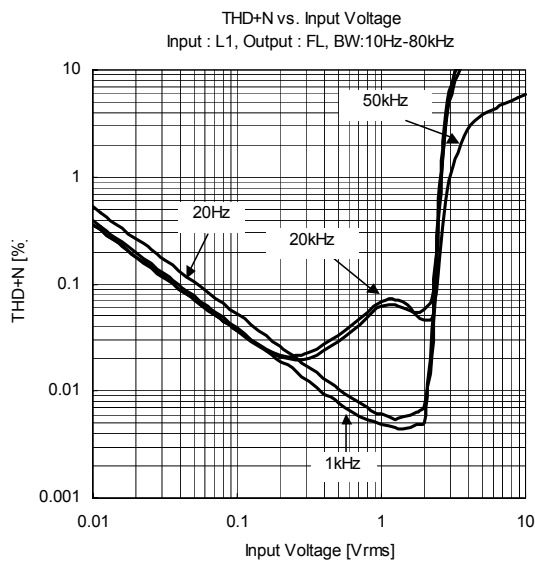
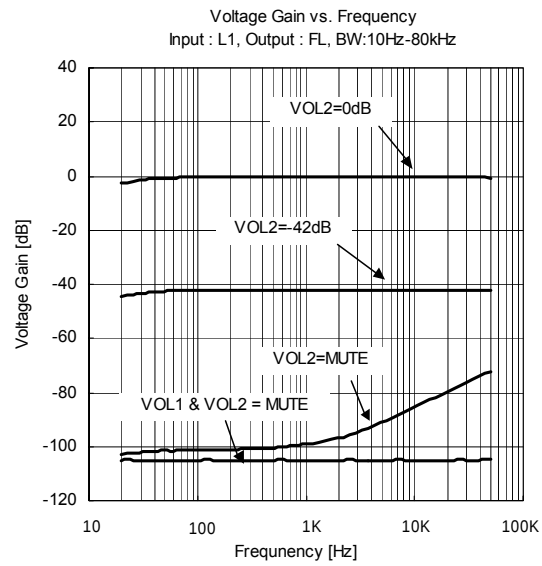
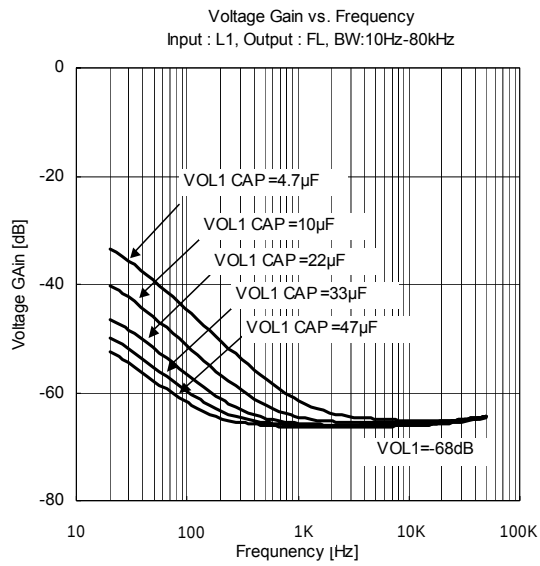
## ■ TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS



## ■NOTE

### [CAUTION]

The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[NJR:](#)

[NJW1192V-TE2](#)

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А