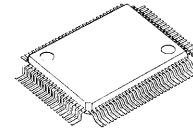


## 8-CHANNEL ELECTRONIC VOLUME WITH INPUT SELECTOR

### ■ GENERAL DESCRIPTION

**NJW1157** is an eight channel electronic volume IC. It includes Input selector, tone control, volume, mute, input selector gain control, volume output gain control and 5 REC outputs. It's suitable for multi-channel audio equipments such as AV receivers and DVD receivers. These functions are controlled by three-wired serial data.

### ■ PACKAGE OUTLINE



**NJW1157FC2**

### ■ FEATURES

- Operating Voltage
- Three-Wired Serial Data Control
- Input Selector (x 12)
- REC Output (x 5) with Selector
- Input Selector Gain Control
- Volume Output Gain Control
- Volume
- Tone Control
- Subwoofer output addition to L, R channel output
- Subwoofer output ON/OFF control
- Bi-CMOS Technology
- Package Outline

$\pm 4.5$  to  $\pm 7.5$ V

Gain : 0/-3/-6/-9/-12dB

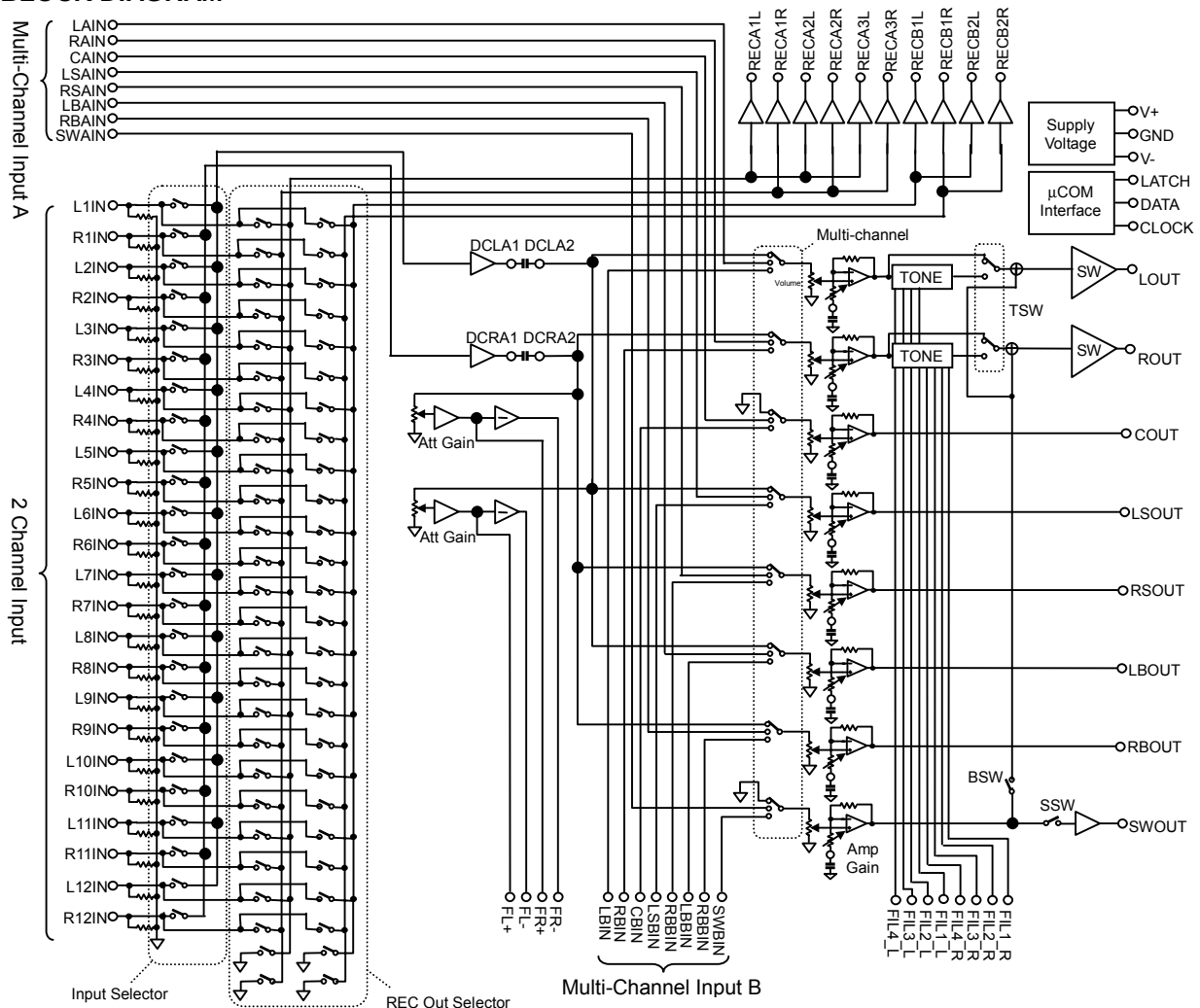
Gain : 0/+3/+6/+9/+12/+15/+18dB

0 to -100dB/1dBstep, MUTE

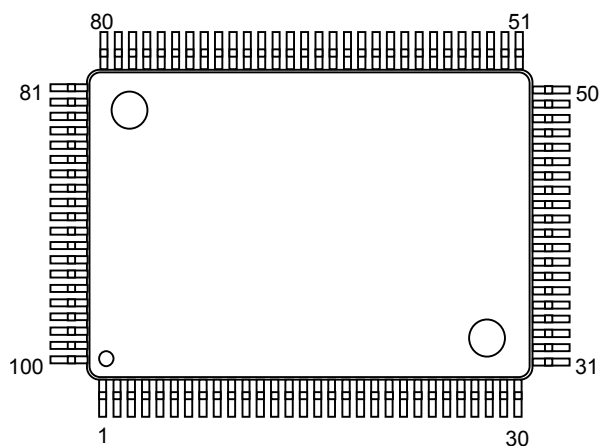
0 to  $\pm 10$ dB/1dBstep

QFP100 – C2

### ■ BLOCK DIAGRAM



## PIN FUNCTION



| No. | SYMBOL   | FUNCTION                                             | No. | SYMBOL  | FUNCTION                                |
|-----|----------|------------------------------------------------------|-----|---------|-----------------------------------------|
| 1   | LOUT     | Lch output                                           | 51  | L1IN    | "Input selector" Lch input 1            |
| 2   | ROUT     | Rch output                                           | 52  | R1IN    | "Input selector" Rch input 1            |
| 3   | COUT     | Cch output                                           | 53  | L2IN    | "Input selector" Lch input 2            |
| 4   | LSOUT    | LSch output                                          | 54  | R2IN    | "Input selector" Rch input 2            |
| 5   | RSOUT    | RSch output                                          | 55  | L3IN    | "Input selector" Lch input 3            |
| 6   | LBOUT    | LBch output                                          | 56  | R3IN    | "Input selector" Rch input 3            |
| 7   | RBOUT    | RBch output                                          | 57  | L4IN    | "Input selector" Lch input 4            |
| 8   | SWOUT    | SWch output                                          | 58  | R4IN    | "Input selector" Rch input 4            |
| 9   | DC_L1    | Lch Bass filter DC cut capacitor output terminal     | 59  | L5IN    | "Input selector" Lch input 5            |
| 10  | DC_L2    | Lch Bass filter DC cut capacitor input terminal      | 60  | R5IN    | "Input selector" Rch input 5            |
| 11  | FIL_BL   | Lch Bass filter terminal                             | 61  | L6IN    | "Input selector" Lch input 6            |
| 12  | FIL_TL   | Lch Treble filter terminal                           | 62  | R6IN    | "Input selector" Rch input 6            |
| 13  | DC_R1    | Rch Bass filter DC cut capacitor output terminal     | 63  | L7IN    | "Input selector" Lch input 7            |
| 14  | DC_R2    | Rch Bass filter DC cut capacitor input terminal      | 64  | R7IN    | "Input selector" Rch input 7            |
| 15  | FIL_BR   | Rch Bass filter terminal                             | 65  | L8IN    | "Input selector" Lch input 8            |
| 16  | FIL_TR   | Rch Treble filter terminal                           | 66  | R8IN    | "Input selector" Rch input 8            |
| 17  | N.C.     | No Connect                                           | 67  | L9IN    | "Input selector" Lch input 9            |
| 18  | N.C.     | No Connect                                           | 68  | R9IN    | "Input selector" Rch input 9            |
| 19  | V+       | + Power supply voltage input                         | 69  | L10IN   | "Input selector" Lch input 10           |
| 20  | V-       | - Power supply voltage input                         | 70  | R10IN   | "Input selector" Rch input 10           |
| 21  | REC_A1L  | "Input selector" Lch REC output A1                   | 71  | L11IN   | "Input selector" Lch input 11           |
| 22  | REC_A1R  | "Input selector" Rch REC output A1                   | 72  | R11IN   | "Input selector" Rch input 11           |
| 23  | REC_A2L  | "Input selector" Lch REC output A2                   | 73  | L12IN   | "Input selector" Lch input 12           |
| 24  | REC_A2R  | "Input selector" Rch REC output A2                   | 74  | R12IN   | "Input selector" Rch input 12           |
| 25  | REC_A3L  | "Input selector" Lch REC output A3                   | 75  | N.C.    | No Connect                              |
| 26  | REC_A3R  | "Input selector" Rch REC output A3                   | 76  | DGND    | Digital Ground                          |
| 27  | REC_B1L  | "Input selector" Lch REC output B1                   | 77  | DATA    | Control data signal input               |
| 28  | REC_B1R  | "Input selector" Rch REC output B1                   | 78  | CLOCK   | Clock signal input                      |
| 29  | REC_B2L  | "Input selector" Lch REC output B2                   | 79  | LATCH   | Latch signal input                      |
| 30  | REC_B2R  | "Input selector" Rch REC output B2                   | 80  | LAIN    | Multi-channel Lch input A               |
| 31  | DCCAP_L  | Switching noise rejection capacitor                  | 81  | RAIN    | Multi-channel Rch input A               |
| 32  | DCCAP_R  | Switching noise rejection capacitor                  | 82  | CAIN    | Multi-channel Cch input A               |
| 33  | DCCAP_C  | Switching noise rejection capacitor                  | 83  | LSAIN   | Multi-channel LSch input A              |
| 34  | GND      | Ground                                               | 84  | RSAIN   | Multi-channel RSch input A              |
| 35  | GND      | Ground                                               | 85  | LBAIN   | Multi-channel LBch input A              |
| 36  | DCCAP_LS | Switching noise rejection capacitor                  | 86  | RBAIN   | Multi-channel RBch input A              |
| 37  | DCCAP_RS | Switching noise rejection capacitor                  | 87  | SWAIN   | Multi-channel SWch input A              |
| 38  | DCCAP_LB | Switching noise rejection capacitor                  | 88  | LBIN    | Multi-channel Lch input B               |
| 39  | DCCAP_RB | Switching noise rejection capacitor                  | 89  | RBIN    | Multi-channel Rch input B               |
| 40  | DCCAP_SW | Switching noise rejection capacitor                  | 90  | CBIN    | Multi-channel Cch input B               |
| 41  | DCL_OUT  | "Input selector" Lch output                          | 91  | LSBIN   | Multi-channel LSch input B              |
| 42  | DCL_IN   | "Multi-channel selector" Lch input                   | 92  | RSBIN   | Multi-channel RSch input B              |
| 43  | DCR_OUT  | "Input selector" Rch output                          | 93  | LBBIN   | Multi-channel LBch input B              |
| 44  | DCR_IN   | "Multi-channel selector" Rch input                   | 94  | RBBIN   | Multi-channel RBch input B              |
| 45  | FL+      | "Input selector gain control" Lch no-inverted output | 95  | SWBIN   | Multi-channel SWch input B              |
| 46  | FL-      | "Input selector gain control" Lch inverted output    | 96  | GND     | Ground                                  |
| 47  | FR+      | "Input selector gain control" Rch no-inverted output | 97  | GND     | Ground                                  |
| 48  | FR-      | "Input selector gain control" Rch inverted output    | 98  | VSSOUT2 | Internal Digital -Power Supply Output 2 |
| 49  | VDDOUT   | Internal Digital +Power Supply Output                | 99  | VDDOUT2 | Internal Digital +Power Supply Output 2 |
| 50  | VSSOUT   | Internal Digital -Power Supply Output                | 100 | TCCAP   | Switching noise rejection capacitor     |

## ■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER                   | SYMBOL                         | RATING                         | UNIT |
|-----------------------------|--------------------------------|--------------------------------|------|
| Power Supply Voltage        | V <sub>+</sub> /V <sub>-</sub> | +7.5/-7.5                      | V    |
| Maximum Input Voltage       | V <sub>IM</sub>                | V <sub>+</sub> /V <sub>-</sub> | V    |
| Power Dissipation           | P <sub>D</sub>                 | 1300 (* On board)              | mW   |
| Operating Temperature Range | Topr                           | -40 to +85                     | °C   |
| Storage Temperature Range   | Tstg                           | -40 to +125                    | °C   |

## ■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V<sub>+</sub>/V<sub>-</sub>=±7V)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-----------|--------|----------------|------|------|------|------|
|-----------|--------|----------------|------|------|------|------|

### ◆ Power Supply

|                     |                 |                             |      |      |      |    |
|---------------------|-----------------|-----------------------------|------|------|------|----|
| Operating Voltage 1 | V <sub>+</sub>  | -                           | 4.5  | 7.0  | 7.5  | V  |
| Operating Voltage 2 | V <sub>-</sub>  | -                           | -7.5 | -7.0 | -4.5 | V  |
| Supply Current 1    | I <sub>CC</sub> | No signal (V <sub>+</sub> ) | -    | 25   | 43   | mA |
| Supply Current 2    | I <sub>EE</sub> | No signal (V <sub>-</sub> ) | -    | 25   | 43   | mA |

### ◆ Input/Output Characteristics (Output : 1 to 8pin)

|                           |                  |                                                                    |      |                |               |                            |
|---------------------------|------------------|--------------------------------------------------------------------|------|----------------|---------------|----------------------------|
| Maximum Output Voltage    | V <sub>OM</sub>  | f=1kHz, THD=1%<br>Volume=0dB                                       | 3.0  | 4.0            | -             | V <sub>rms</sub>           |
| Voltage Gain              | G <sub>V</sub>   | V <sub>IN</sub> =1V <sub>rms</sub> , f=1kHz<br>Volume=0dB          | -0.5 | 0              | 0.5           | dB                         |
| Voltage Gain Error        | ΔG <sub>V</sub>  | V <sub>IN</sub> =1V <sub>rms</sub> , f=1kHz<br>Volume=0dB          | -0.5 | 0              | 0.5           | dB                         |
| Maximum Attenuation       | A <sub>TT</sub>  | f=1kHz, V <sub>IN</sub> =1V <sub>rms</sub><br>Volume=Mute          | -    | -110           | -             | dB                         |
| Attenuation Error         | ΔA <sub>TT</sub> | f=1kHz, V <sub>IN</sub> =1V <sub>rms</sub><br>Volume=-60dB         | -1   | 0              | 1             | dB                         |
| Output Noise              | V <sub>NO</sub>  | Volume=0dB,<br>R <sub>g</sub> =0, A-weight                         | -    | -110<br>(3.2μ) | -100<br>(10μ) | dBV<br>(V <sub>rms</sub> ) |
| Total Harmonic Distortion | T.H.D.           | f=1kHz, V <sub>o</sub> =1V <sub>rms</sub> ,<br>Volume=0dB          | -    | 0.005          | 0.05          | %                          |
| Channel Separation        | CS               | f=1kHz, V <sub>o</sub> =1V <sub>rms</sub> , A-weight<br>Volume=0dB | -    | -100           | -90           | dB                         |

### ◆ Input/Output Characteristics (REC output : 21 to 30pin)

|                                      |                       |                                             |      |       |      |    |
|--------------------------------------|-----------------------|---------------------------------------------|------|-------|------|----|
| REC Out Voltage Gain                 | G <sub>VREC</sub>     | V <sub>IN</sub> =1V <sub>rms</sub> , f=1kHz | -0.5 | 0     | 0.5  | dB |
| REC Out<br>Total Harmonic Distortion | T.H.D. <sub>REC</sub> | f=1kHz, V <sub>o</sub> =1V <sub>rms</sub> , | -    | 0.005 | 0.05 | %  |

### ◆ Input Selector Gain Control Characteristics

|                                               |                    |                             |       |       |       |    |
|-----------------------------------------------|--------------------|-----------------------------|-------|-------|-------|----|
| Input Selector Gain Control<br>Voltage Gain 1 | G <sub>VINC1</sub> | Input Selector Gain = 0dB   | -0.5  | 0     | +0.5  | dB |
| Input Selector Gain Control<br>Voltage Gain 2 | G <sub>VINC2</sub> | Input Selector Gain = -6dB  | -6.5  | -6.0  | -5.5  | dB |
| Input Selector Gain Control<br>Voltage Gain 3 | G <sub>VINC3</sub> | Input Selector Gain = -12dB | -12.5 | -12.0 | -11.5 | dB |

## ■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V<sup>+</sup>/V<sup>-</sup>=±7V)

| PARAMETER                                          | SYMBOL              | TEST CONDITION                                  | MIN.  | TYP.  | MAX. | UNIT |
|----------------------------------------------------|---------------------|-------------------------------------------------|-------|-------|------|------|
| <b>◆Tone Control Characteristics</b>               |                     |                                                 |       |       |      |      |
| Treble Voltage Gain 1                              | G <sub>VTREB1</sub> | Vo=1Vrms, f=10kHz<br>Volume=0dB<br>Treble=0dB   | -2.0  | 0     | 2.0  | dB   |
| Treble Voltage Gain 2                              | G <sub>VTREB2</sub> | Vo=1Vrms, f=10kHz<br>Volume=0dB<br>Treble=10dB  | 8.0   | 10.0  | 12.0 | dB   |
| Treble Voltage Gain 3                              | G <sub>VTREB3</sub> | Vo=1Vrms, f=10kHz<br>Volume=0dB<br>Treble=-10dB | -12.0 | -10.0 | -8.0 | dB   |
| Bass Voltage Gain 1                                | G <sub>VBASS1</sub> | Vo=1Vrms, f=100Hz<br>Volume=0dB<br>Bass=0dB     | -2.0  | 0     | 2.0  | dB   |
| Bass Voltage Gain 2                                | G <sub>VBASS2</sub> | Vo=1Vrms, f=100Hz<br>Volume=0dB<br>Bass=10dB    | 8.0   | 10.0  | 12.0 | dB   |
| Bass Voltage Gain 3                                | G <sub>VBASS3</sub> | Vo=1Vrms, f=100Hz<br>Volume=0dB<br>Bass=-10dB   | -12.0 | -10.0 | -8.0 | dB   |
| <b>◆Volume Output Gain Control Characteristics</b> |                     |                                                 |       |       |      |      |
| Volume Output Gain Control Voltage Gain 1          | G <sub>VOUTC1</sub> | Volume=0dB<br>Volume Output Gain=3dB            | 2.0   | 3.0   | 4.0  | dB   |
| Volume Output Gain Control Voltage Gain 2          | G <sub>VOUTC2</sub> | Volume =0dB<br>Volume Output Gain =9dB          | 8.0   | 9.0   | 10.0 | dB   |
| Volume Output Gain Control Voltage Gain 3          | G <sub>VOUTC3</sub> | Volume =0dB<br>Volume Output Gain =18dB         | 17.0  | 18.0  | 19.0 | dB   |
| <b>◆Logic Control Characteristics</b>              |                     |                                                 |       |       |      |      |
| High Level Input Voltage                           | V <sub>IH</sub>     | -                                               | 2.5   | -     | 5.5  | V    |
| Low Level Input Voltage                            | V <sub>IL</sub>     | -                                               | 0     | -     | 1.5  | V    |

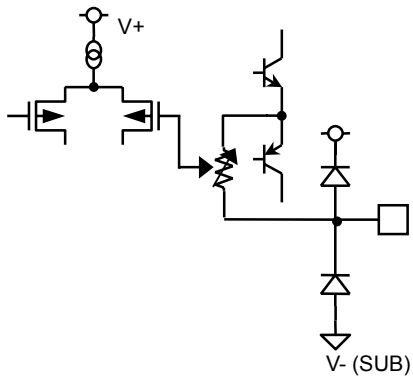
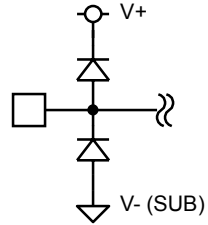
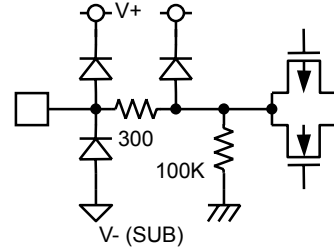
## ■ TERMINAL DESCRIPTION

| PIN NO.                    | SYMBOL                                            | FUNCTION                                                                                             | EQUIVALENT CIRCUIT | TERMINAL DC VOLTAGE |
|----------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------|---------------------|
| 1<br>2                     | LOUT<br>ROUT                                      | Lch Output<br>Rch Output                                                                             |                    | 0                   |
| 3<br>4<br>5<br>6<br>7<br>8 | COUT<br>LSOUT<br>RSOUT<br>LBOUT<br>RBOUT<br>SWOUT | Cch Output<br>LSch Output<br>RSch Output<br>LBch Output<br>RBch Output<br>SWch Output                |                    | 0                   |
| 9<br>13                    | DC_L1<br>DC_R1                                    | Lch Bass filter DC cut capacitor output terminal<br>Rch Bass filter DC cut capacitor output terminal |                    | 0                   |
| 10<br>14                   | DC_L2<br>DC_R2                                    | Lch Bass filter DC cut capacitor input terminal<br>Rch Bass filter DC cut capacitor input terminal   |                    | 0                   |

## ■ TERMINAL DESCRIPTION

| PIN NO.                                                                          | SYMBOL                                                                                                                                         | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | EQUIVALENT CIRCUIT | TERMINAL DC VOLTAGE |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|
| 11<br>15                                                                         | FIL_BL<br>FIL_BR                                                                                                                               | Lch Bass filter terminal<br>Rch Bass filter terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    | 0                   |
| 12<br>16                                                                         | FIL_TL<br>FIL_TR                                                                                                                               | Lch Treble filter terminal<br>Rch Treble filter terminal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                    | 0                   |
| 19                                                                               | V+                                                                                                                                             | +Power Supply Voltage Input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    | V+                  |
| 21<br>22<br>23<br>24<br>25<br>26<br>27<br>28<br>29<br>30<br>41<br>43<br>45<br>47 | REC_A1L<br>REC_A1R<br>REC_A2L<br>REC_A2R<br>REC_A3L<br>REC_A3R<br>REC_B1L<br>REC_B1R<br>REC_B2L<br>REC_B2R<br>DCL_OUT<br>DCR_OUT<br>FL+<br>FR+ | "Input selector" Lch REC output A1<br>"Input selector" Rch REC output A1<br>"Input selector" Lch REC output A2<br>"Input selector" Rch REC output A2<br>"Input selector" Lch REC output A3<br>"Input selector" Rch REC output A3<br>"Input selector" Lch REC output B1<br>"Input selector" Rch REC output B1<br>"Input selector" Lch REC output B2<br>"Input selector" Rch REC output B2<br>"Input selector" Lch output<br>"Input selector" Rch output<br>"Input selector gain control" Lch no-inverted output<br>"Input selector gain control" Rch no-inverted output |                    | 0                   |

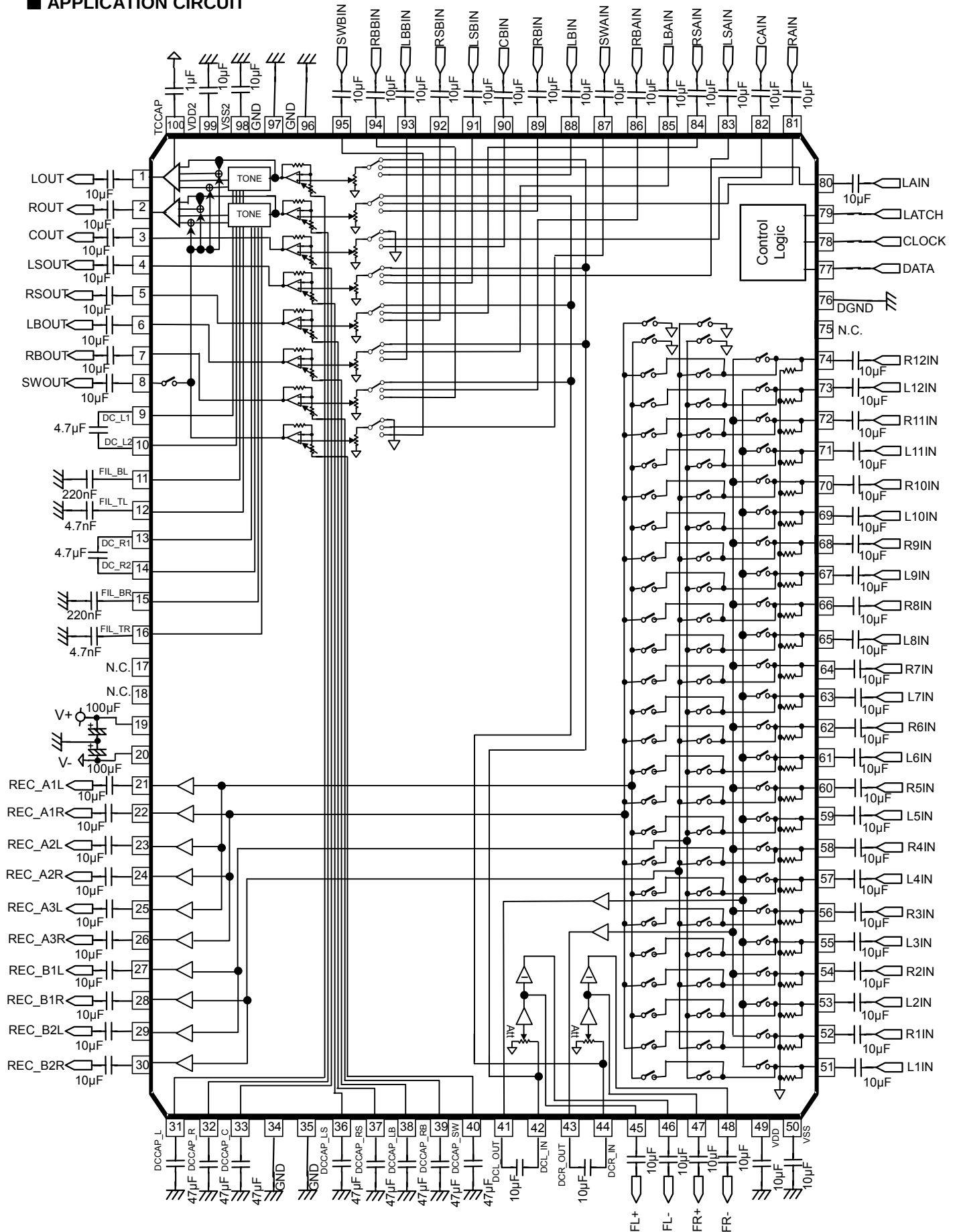
## ■ TERMINAL DESCRIPTION

| PIN NO.                                                                                                                                                  | SYMBOL                                                                                                                                                                                                                                         | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | EQUIVALENT CIRCUIT                                                                   | TERMINAL DC VOLTAGE |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------|
| 31<br>32<br>33<br>36<br>37<br>38<br>39<br>40                                                                                                             | DCCAP_L<br>DCCAP_R<br>DCCAP_C<br>DCCAP_LS<br>DCCAP_RS<br>DCCAP_LB<br>DCCAP_RB<br>DCCAP_SW                                                                                                                                                      | Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor<br>Switching noise rejection capacitor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    | 0                   |
| 34<br>35<br>76<br>96<br>97                                                                                                                               | GND<br>GND<br>DGND<br>GND<br>GND                                                                                                                                                                                                               | Ground<br>Ground<br>Digital Ground<br>Ground<br>Ground                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   | 0                   |
| 42<br>44<br>51<br>52<br>53<br>54<br>55<br>56<br>57<br>58<br>59<br>60<br>61<br>62<br>63<br>64<br>65<br>66<br>67<br>68<br>69<br>70<br>71<br>72<br>73<br>74 | DCL_IN<br>DCR_IN<br>L1_IN<br>R1_IN<br>L2_IN<br>R2_IN<br>L3_IN<br>R3_IN<br>L4_IN<br>R4_IN<br>L5_IN<br>R5_IN<br>L6_IN<br>R6_IN<br>L7_IN<br>R7_IN<br>L8_IN<br>R8_IN<br>L9_IN<br>R9_IN<br>L10_IN<br>R10_IN<br>L11_IN<br>R11_IN<br>L12_IN<br>R12_IN | "Multi-channel selector" Lch input<br>"Multi-channel selector" Rch input<br>"Input selector" Lch input 1<br>"Input selector" Rch input 1<br>"Input selector" Lch input 2<br>"Input selector" Rch input 2<br>"Input selector" Lch input 3<br>"Input selector" Rch input 3<br>"Input selector" Lch input 4<br>"Input selector" Rch input 4<br>"Input selector" Lch input 5<br>"Input selector" Rch input 5<br>"Input selector" Lch input 6<br>"Input selector" Rch input 6<br>"Input selector" Lch input 7<br>"Input selector" Rch input 7<br>"Input selector" Lch input 8<br>"Input selector" Rch input 8<br>"Input selector" Lch input 9<br>"Input selector" Rch input 9<br>"Input selector" Lch input 10<br>"Input selector" Rch input 10<br>"Input selector" Lch input 11<br>"Input selector" Rch input 11<br>"Input selector" Lch input 12<br>"Input selector" Rch input 12 |  | 0                   |

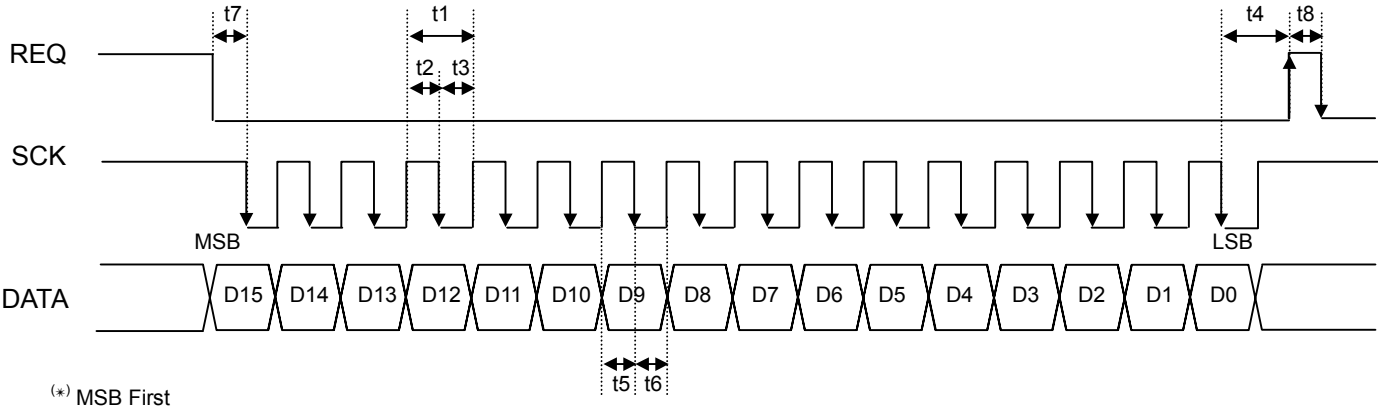
## ■ TERMINAL DESCRIPTION

| PIN NO.                                                                                      | SYMBOL                                                                                                                                 | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | EQUIVALENT CIRCUIT | TERMINAL DC VOLTAGE                          |
|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------|
| 46<br>48                                                                                     | FL-<br>FR-                                                                                                                             | "Input selector gain control" Lch inverted output<br>"Input selector gain control" Rch inverted output                                                                                                                                                                                                                                                                                                                                                                                 |                    | 0                                            |
| 49<br>50<br>98<br>99                                                                         | VDD<br>VSS<br>VSS2<br>VDD2                                                                                                             | Internal Digital +Power Supply Output<br>Internal Digital -Power Supply Output<br>Internal Digital -Power Supply Output2<br>Internal Digital +Power Supply Output2                                                                                                                                                                                                                                                                                                                     |                    | VDD=VDD2<br>=+2.5V<br><br>VSS=VSS2<br>=-2.5V |
| 77<br>78<br>79                                                                               | DATA<br>CLOCK<br>LATCH                                                                                                                 | Control data signal input<br>Clock signal input<br>Latch signal input                                                                                                                                                                                                                                                                                                                                                                                                                  |                    | 0                                            |
| 80<br>81<br>82<br>83<br>84<br>85<br>86<br>87<br>88<br>89<br>90<br>91<br>92<br>93<br>94<br>95 | LAIN<br>RAIN<br>CAIN<br>LSAIN<br>RSAIN<br>LBAIN<br>RBAIN<br>SWAIN<br>LBIN<br>RBIN<br>CBIN<br>LSBIN<br>RSBIN<br>LBBIN<br>RBBIN<br>SWBIN | Multi-channel Lch input A<br>Multi-channel Rch input A<br>Multi-channel Cch input A<br>Multi-channel LSch input A<br>Multi-channel RSch input A<br>Multi-channel LBch input A<br>Multi-channel RBch input A<br>Multi-channel SWch input A<br>Multi-channel Lch input B<br>Multi-channel Rch input B<br>Multi-channel Cch input B<br>Multi-channel LSch input B<br>Multi-channel RSch input B<br>Multi-channel LBch input B<br>Multi-channel RBch input B<br>Multi-channel SWch input B |                    | 0                                            |

## APPLICATION CIRCUIT



■ CONTROL DATA FORMAT



| SYMBOL | PARAMETER              | MIN | TYP | MAX | UNIT |
|--------|------------------------|-----|-----|-----|------|
| t1     | SCK Clock Width        | 2   | -   | -   | μs   |
| t2     | SCK Pulse Width (High) | 0.8 | -   | -   | μs   |
| t3     | SCK Pulse Width (Low)  | 0.8 | -   | -   | μs   |
| t4     | REQ Rise Hold Time     | 1.6 | -   | -   | μs   |
| t5     | DATA Setup Time        | 0.8 | -   | -   | μs   |
| t6     | DATA Hold Time         | 0.8 | -   | -   | μs   |
| t7     | SCK Setup Time         | 0.8 | -   | -   | μs   |
| t8     | REQ High Pulse Width   | 1.6 | -   | -   | μs   |

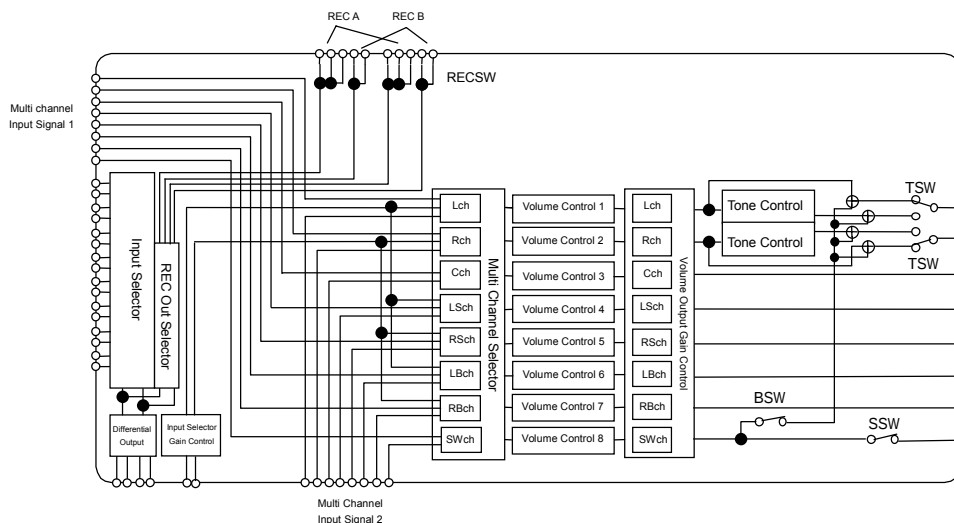
## ■ CONTROL DATA

NJW1157 is controlled by 16-bits serial data.

MSB

LSB

| D15  | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7             | D6 | D5 | D4 | D3           | D2 | D1 | D0 |
|------|-----|-----|-----|-----|-----|----|----|----------------|----|----|----|--------------|----|----|----|
| Data |     |     |     |     |     |    |    | Select Address |    |    |    | Chip Address |    |    |    |



MSB

LSB

| D15                         | D14                 | D13 | D12                        | D11                    | D10        | D9         | D8         | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------------------------|---------------------|-----|----------------------------|------------------------|------------|------------|------------|----|----|----|----|----|----|----|----|
| Volume Control 1            |                     |     |                            |                        |            |            | Don't Care | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 2            |                     |     |                            |                        |            |            | Don't Care | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 3            |                     |     |                            |                        |            |            | Don't Care | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 4            |                     |     |                            |                        |            |            | Don't Care | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 5            |                     |     |                            |                        |            |            | Don't Care | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 6            |                     |     |                            |                        |            |            | Don't Care | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 7            |                     |     |                            |                        |            |            | Don't Care | 0  | 1  | 1  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 8            |                     |     |                            |                        |            |            | Don't Care | 0  | 1  | 1  | 1  | 0  | 1  | 0  | 1  |
| Input Selector Gain Control |                     |     | Volume Output Gain Control |                        |            | BSW        | SSW        | 1  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |
| TC/B                        | Tone Control Treble |     |                            |                        | TSW        | Don't Care | Don't Care | 1  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| BC/B                        | Tone Control Bass   |     |                            |                        | Don't Care | Don't Care | Don't Care | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| Input Selector              |                     |     |                            | Multi Channel Selector |            | Don't Care |            | 1  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |
| REC B Selector              |                     |     |                            | REC A Selector         |            |            |            | 1  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |

## ■ INITIAL CONDITION

MSB

LSB

| D15 | D14 | D13 | D12 | D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 1  | 1  | 0  | 0  | 1  | 0  | 1  |
| 1   | 1   | 1   | 1   | 1   | 1   | 1  | 1  | 0  | 1  | 1  | 1  | 0  | 1  | 0  | 1  |
| 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |
| 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 1  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |
| 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |

## ■ DEFINITION OF RESISTOR

◆Volume Control 1 – 8 : 0dB to -100dB in 1dB/step.

| D15              | D14 | D13 | D12 | D11 | D10 | D9 | D8         | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|------------------|-----|-----|-----|-----|-----|----|------------|----|----|----|----|----|----|----|----|
| Volume Control 1 |     |     |     |     |     |    | Don't Care | 0  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 2 |     |     |     |     |     |    | Don't Care | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 3 |     |     |     |     |     |    | Don't Care | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 4 |     |     |     |     |     |    | Don't Care | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 5 |     |     |     |     |     |    | Don't Care | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 6 |     |     |     |     |     |    | Don't Care | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 1  |
| Volume Control 7 |     |     |     |     |     |    | Don't Care | 0  | 1  | 1  | 0  | 0  | 1  | 0  | 1  |
| Volume Control 8 |     |     |     |     |     |    | Don't Care | 0  | 1  | 1  | 1  | 0  | 1  | 0  | 1  |

< Volume Control 1 – 8 Data >

| Data |     |     |     |     |     |    | Setting             |
|------|-----|-----|-----|-----|-----|----|---------------------|
| D15  | D14 | D13 | D12 | D11 | D10 | D9 |                     |
| 0    | 0   | 0   | 0   | 0   | 0   | 0  | 0dB                 |
| 0    | 0   | 0   | 0   | 0   | 0   | 1  | -1dB                |
| 0    | 0   | 0   | 0   | 0   | 1   | 0  | -2dB                |
| 0    | 0   | 0   | 0   | 0   | 1   | 1  | -3dB                |
| 0    | 0   | 0   | 0   | 1   | 0   | 0  | -4dB                |
| 0    | 0   | 0   | 0   | 1   | 0   | 1  | -5dB                |
| 0    | 0   | 0   | 0   | 1   | 1   | 0  | -6dB                |
| 0    | 0   | 0   | 0   | 1   | 1   | 1  | -7dB                |
| 0    | 0   | 0   | 1   | 0   | 0   | 0  | -8dB                |
| 0    | 0   | 0   | 1   | 0   | 0   | 1  | -9dB                |
| 0    | 0   | 0   | 1   | 0   | 1   | 0  | -10dB               |
| 0    | 0   | 0   | 1   | 0   | 1   | 1  | -11dB               |
| 0    | 0   | 0   | 1   | 1   | 0   | 0  | -12dB               |
| 0    | 0   | 0   | 1   | 1   | 0   | 1  | -13dB               |
| 0    | 0   | 0   | 1   | 1   | 1   | 0  | -14dB               |
| ...  |     |     |     |     |     |    | ...                 |
| 1    | 1   | 0   | 0   | 0   | 0   | 1  | -97dB               |
| 1    | 1   | 0   | 0   | 0   | 1   | 0  | -98dB               |
| 1    | 1   | 0   | 0   | 0   | 1   | 1  | -99dB               |
| 1    | 1   | 0   | 0   | 1   | 0   | 0  | -100dB              |
| 1    | 1   | 1   | 1   | 1   | 1   | 1  | MUTE <sup>(*)</sup> |

<sup>(\*)</sup>Initial Setting

- ◆ **Input Selector Gain Control** : Gain control for selected signal at the Input Selector  
**Volume Output Gain Control** : Gain control for volume output  
**BSW** : SW ch Output add to L/R ch Output  
**SSW** : SW ch Output ON/OFF

| D15                         | D14 | D13 | D12                        | D11 | D10 | D9  | D8  | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----------------------------|-----|-----|----------------------------|-----|-----|-----|-----|----|----|----|----|----|----|----|----|
| Input Selector Gain Control |     |     | Volume Output Gain Control |     |     | BSW | SSW | 1  | 0  | 0  | 0  | 0  | 1  | 0  | 1  |

< Input Selector Gain Control Data >

| Data |     |     | Setting            |
|------|-----|-----|--------------------|
| D15  | D14 | D13 |                    |
| 0    | 0   | 0   | 0dB <sup>(*)</sup> |
| 0    | 0   | 1   | -3dB               |
| 0    | 1   | 0   | -6dB               |
| 0    | 1   | 1   | -9dB               |
| 1    | 0   | 0   | -12dB              |

< Volume Output Gain Control Data >

| Data |     |     | Setting            |
|------|-----|-----|--------------------|
| D12  | D11 | D10 |                    |
| 0    | 0   | 0   | 0dB <sup>(*)</sup> |
| 0    | 0   | 1   | +3dB               |
| 0    | 1   | 0   | +6dB               |
| 0    | 1   | 1   | +9dB               |
| 1    | 0   | 0   | +12dB              |
| 1    | 0   | 1   | +15dB              |
| 1    | 1   | 0   | +18dB              |

< BSW : SW ch Output add to L/R ch Output >

| D9 | Setting            |
|----|--------------------|
| 0  | OFF <sup>(*)</sup> |
| 1  | Add                |

< SSW : SW ch Output ON/OFF >

| D8 | Setting                     |
|----|-----------------------------|
| 0  | SW Output ON <sup>(*)</sup> |
| 1  | SW Output OFF               |

<sup>(\*)</sup>Initial Setting

◆TC/B : Treble Cut / Boost  
**Tone Control Treble** : Treble Gain  
**TSW** : Tone Control By-pass Switch

| D15  | D14                 | D13 | D12 | D11 | D10 | D9         | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|------|---------------------|-----|-----|-----|-----|------------|----|----|----|----|----|----|----|----|----|
| TC/B | Tone Control Treble |     |     |     | TSW | Don't Care |    | 1  | 0  | 0  | 1  | 0  | 1  | 0  | 1  |

< TC/B : Treble Cut / Boost >

| D15 | Setting            |
|-----|--------------------|
| 0   | Cut <sup>(*)</sup> |
| 1   | Boost              |

< Tone Control Treble : Treble Gain >

| Data |     |     |     | Cut                | Boost |
|------|-----|-----|-----|--------------------|-------|
| D14  | D13 | D12 | D11 |                    |       |
| 0    | 0   | 0   | 0   | 0dB <sup>(*)</sup> | 0dB   |
| 0    | 0   | 0   | 1   | -1dB               | 1dB   |
| 0    | 0   | 1   | 0   | -2dB               | 2dB   |
| 0    | 0   | 1   | 1   | -3dB               | 3dB   |
| 0    | 1   | 0   | 0   | -4dB               | 4dB   |
| 0    | 1   | 0   | 1   | -5dB               | 5dB   |
| 0    | 1   | 1   | 0   | -6dB               | 6dB   |
| 0    | 1   | 1   | 1   | -7dB               | 7dB   |
| 1    | 0   | 0   | 0   | -8dB               | 8dB   |
| 1    | 0   | 0   | 1   | -9dB               | 9dB   |
| 1    | 0   | 1   | 0   | -10dB              | 10dB  |

< Tone Control By-pass Switch >

| D8 | Setting                         |
|----|---------------------------------|
| 0  | Tone Control OFF <sup>(*)</sup> |
| 1  | Tone Control ON                 |

<sup>(\*)</sup>Initial Setting

◆BC/B : Bass Cut / Boost  
**Tone Control Bass** : Bass Gain

| D15  | D14               | D13 | D12 | D11 | D10        | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|------|-------------------|-----|-----|-----|------------|----|----|----|----|----|----|----|----|----|----|
| BC/B | Tone Control Bass |     |     |     | Don't Care |    |    | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 1  |

< BC/B : Bass Cut / Boost >

| D15 | Setting            |
|-----|--------------------|
| 0   | Cut <sup>(*)</sup> |
| 1   | Boost              |

<Tone Control Bass : Bass Gain >

| Data |     |     |     | Cut                | Boost |
|------|-----|-----|-----|--------------------|-------|
| D14  | D13 | D12 | D11 |                    |       |
| 0    | 0   | 0   | 0   | 0dB <sup>(*)</sup> | 0dB   |
| 0    | 0   | 0   | 1   | -1dB               | 1dB   |
| 0    | 0   | 1   | 0   | -2dB               | 2dB   |
| 0    | 0   | 1   | 1   | -3dB               | 3dB   |
| 0    | 1   | 0   | 0   | -4dB               | 4dB   |
| 0    | 1   | 0   | 1   | -5dB               | 5dB   |
| 0    | 1   | 1   | 0   | -6dB               | 6dB   |
| 0    | 1   | 1   | 1   | -7dB               | 7dB   |
| 1    | 0   | 0   | 0   | -8dB               | 8dB   |
| 1    | 0   | 0   | 1   | -9dB               | 9dB   |
| 1    | 0   | 1   | 0   | -10dB              | 10dB  |

<sup>(\*)</sup>Initial Setting

- ◆ **Input Selector** : Selector for the stereo inputs from 1IN to 12IN  
**Multi Channel Selector** : Selector for the 2ch Input signal, or multi channel input signal A, or multi channel input signal B

| D15            | D14 | D13 | D12 | D11                    | D10 | D9         | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----------------|-----|-----|-----|------------------------|-----|------------|----|----|----|----|----|----|----|----|----|
| Input Selector |     |     |     | Multi Channel Selector |     | Don't Care |    | 1  | 0  | 1  | 1  | 0  | 1  | 0  | 1  |

< Input Selector >

| Data |     |     |     | Setting                          |
|------|-----|-----|-----|----------------------------------|
| D15  | D14 | D13 | D12 |                                  |
| 0    | 0   | 0   | 0   | 1IN (2ch Input 1) <sup>(*)</sup> |
| 0    | 0   | 0   | 1   | 2IN (2ch Input 2)                |
| 0    | 0   | 1   | 0   | 3IN (2ch Input 3)                |
| 0    | 0   | 1   | 1   | 4IN (2ch Input 4)                |
| 0    | 1   | 0   | 0   | 5IN (2ch Input 5)                |
| 0    | 1   | 0   | 1   | 6IN (2ch Input 6)                |
| 0    | 1   | 1   | 0   | 7IN (2ch Input 7)                |
| 0    | 1   | 1   | 1   | 8IN (2ch Input 8)                |
| 1    | 0   | 0   | 0   | 9IN (2ch Input 9)                |
| 1    | 0   | 0   | 1   | 10IN (2ch Input 10)              |
| 1    | 0   | 1   | 0   | 11IN (2ch Input 11)              |
| 1    | 0   | 1   | 1   | 12IN (2ch Input 12)              |

< Multi Channel Selector >

| Data |     | Setting                                     |
|------|-----|---------------------------------------------|
| D11  | D10 |                                             |
| 0    | 0   | Input Selector Output Signal <sup>(*)</sup> |
| 0    | 1   | Multi channel Input Signal A                |
| 1    | 0   | Multi channel Input Signal B                |

In "Input Selector Output Signal" setting, the LSch, LBch and RSch, RBch output the signal same as the Lch and Rch, and the Cch and SWch output are set mute condition.

- ◆ **REC A/B Selector** : Selector for the 2 ch Input signal to REC A/B output

| D15            | D14 | D13 | D12 | D11            | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|----------------|-----|-----|-----|----------------|-----|----|----|----|----|----|----|----|----|----|----|
| REC B Selector |     |     |     | REC A Selector |     |    |    | 1  | 1  | 0  | 0  | 0  | 1  | 0  | 1  |

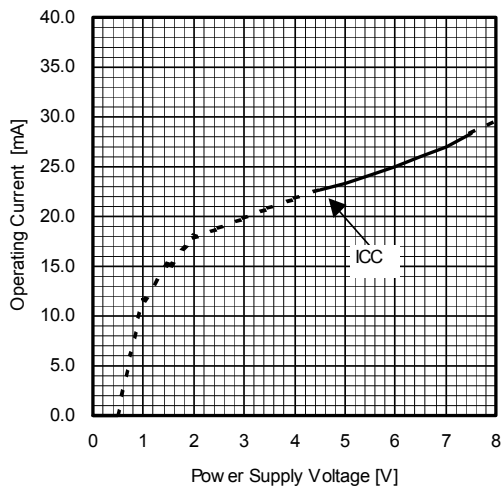
< REC A/B Selector >

| Data |     |     |     | Setting                          |
|------|-----|-----|-----|----------------------------------|
| D15  | D14 | D13 | D12 |                                  |
|      |     |     |     | REC B Selector                   |
|      |     |     |     | REC A Selector                   |
| 0    | 0   | 0   | 0   | 1IN (2ch Input 1) <sup>(*)</sup> |
| 0    | 0   | 0   | 1   | 2IN (2ch Input 2)                |
| 0    | 0   | 1   | 0   | 3IN (2ch Input 3)                |
| 0    | 0   | 1   | 1   | 4IN (2ch Input 4)                |
| 0    | 1   | 0   | 0   | 5IN (2ch Input 5)                |
| 0    | 1   | 0   | 1   | 6IN (2ch Input 6)                |
| 0    | 1   | 1   | 0   | 7IN (2ch Input 7)                |
| 0    | 1   | 1   | 1   | 8IN (2ch Input 8)                |
| 1    | 0   | 0   | 0   | 9IN (2ch Input 9)                |
| 1    | 0   | 0   | 1   | 10IN (2ch Input 10)              |
| 1    | 0   | 1   | 0   | 11IN (2ch Input 11)              |
| 1    | 0   | 1   | 1   | 12IN (2ch Input 12)              |
| 1    | 1   | 0   | 0   | Mute                             |

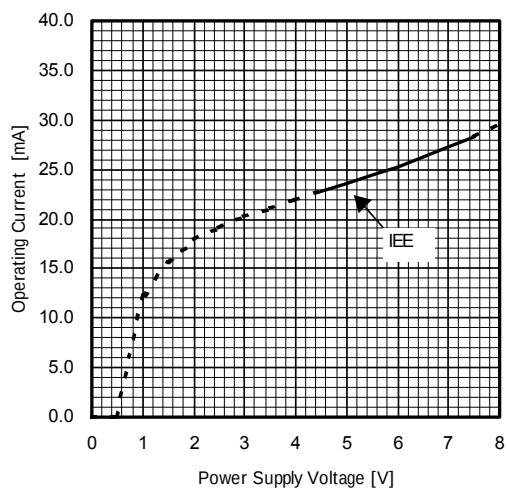
<sup>(\*)</sup>Initial Setting

## TYPICAL CHARACTERISTICS

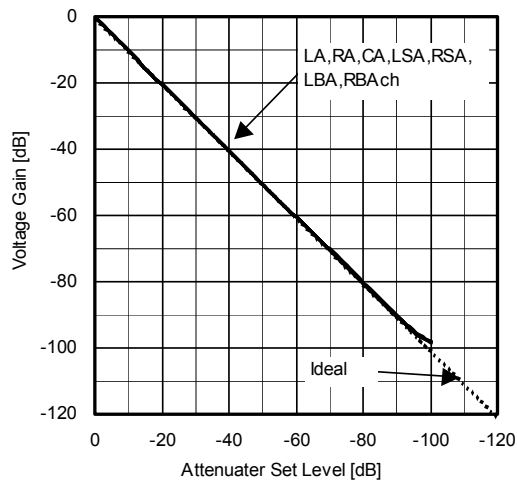
Operating Current vs. Power Supply Voltage  
Ta=25°C



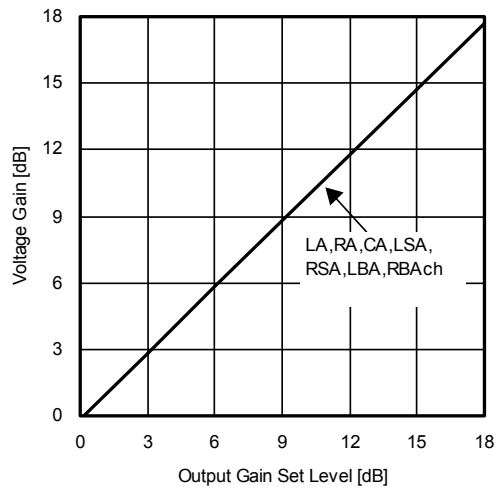
Operating Current vs. Power Supply Voltage  
Ta=25°C



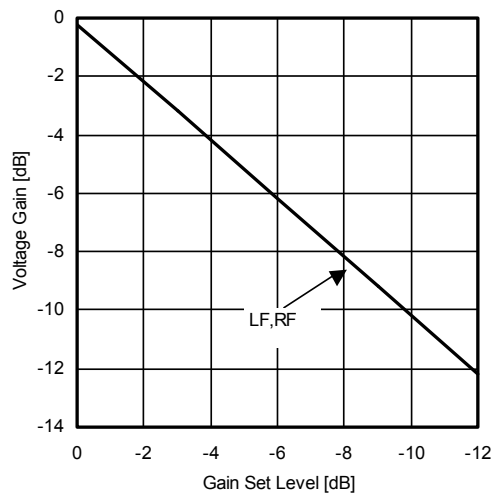
Voltage Gain vs. Attenuator Set Level  
V+=7V V-=7V Vin=0dBV f=1kHz RL=10kΩ Ta=25°C



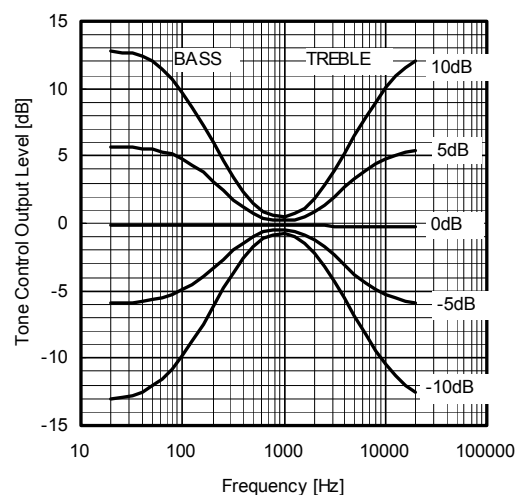
Voltage Gain vs. Output Gain Set Level  
V+=7V V-=7V Vin=0dBV f=1kHz RL=10kΩ Ta=25°C



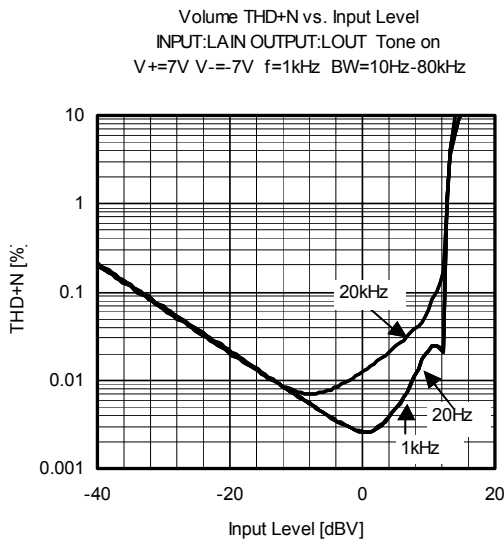
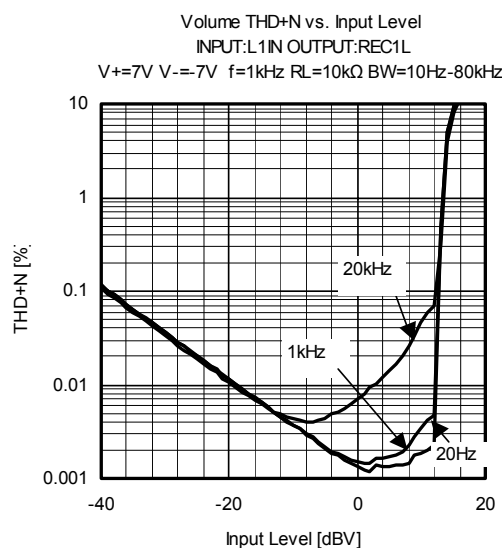
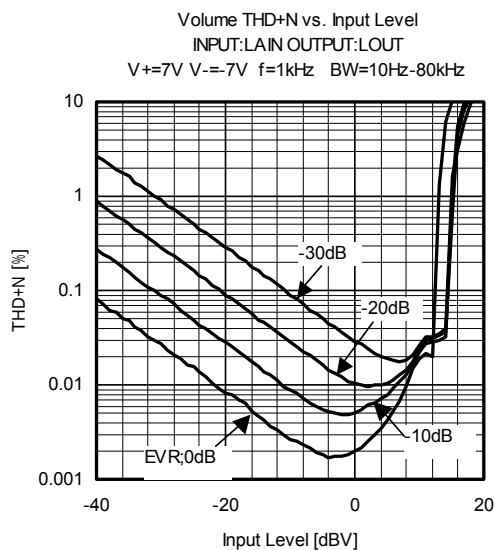
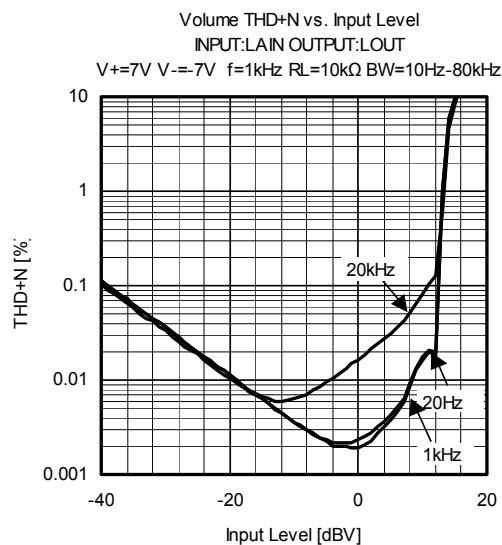
Input Selector Output Gain vs. Gain Set Level  
V+=7V V-=7V Vin=0dBV f=1kHz RL=10kΩ Ta=25°C



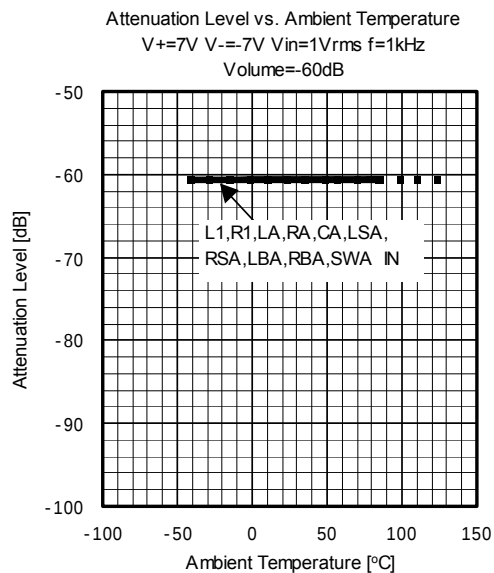
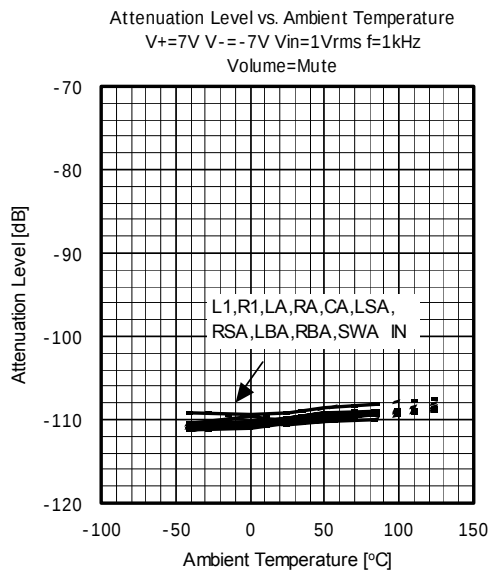
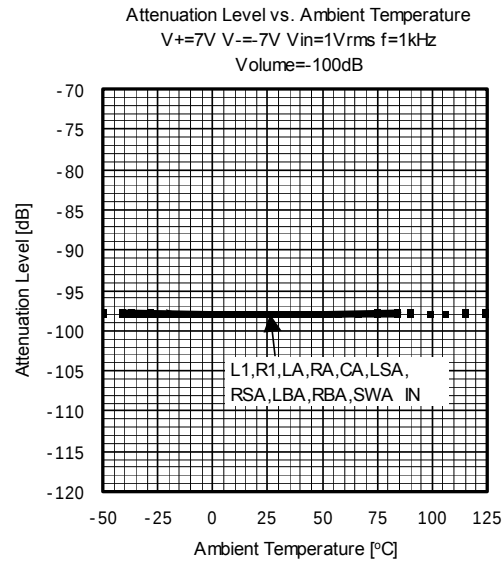
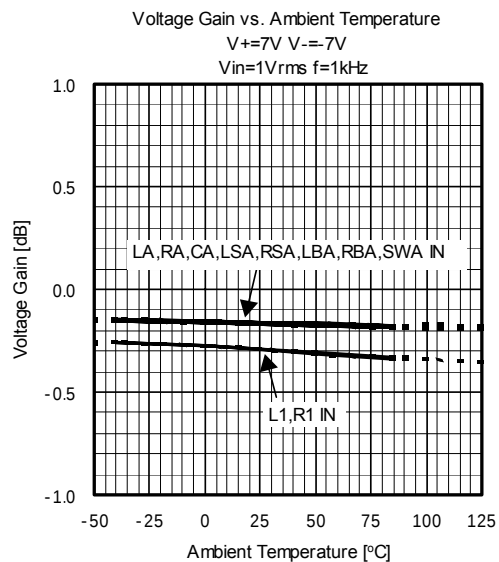
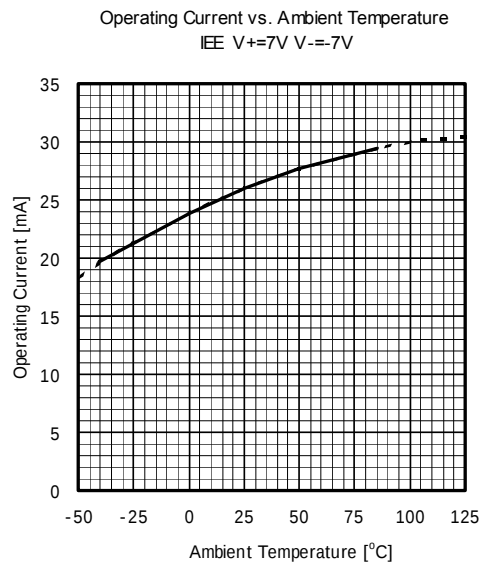
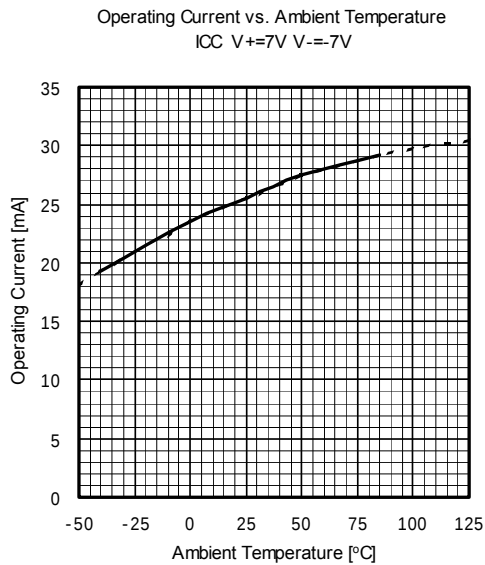
Tone Control Output Level vs. Frequency  
V+=7V V-=7V Vin=0dBV RL=10kΩ, LAch. Ta=25°C



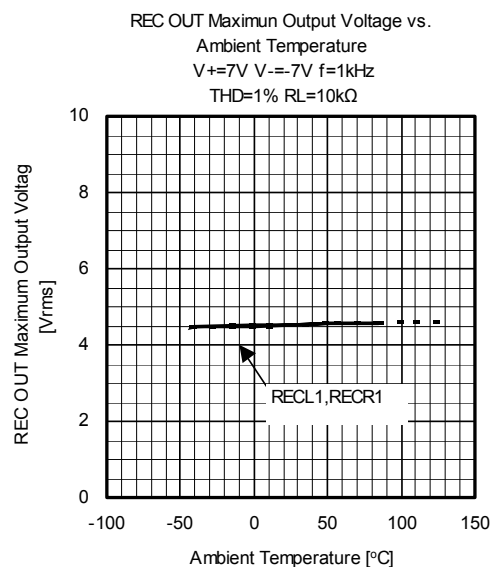
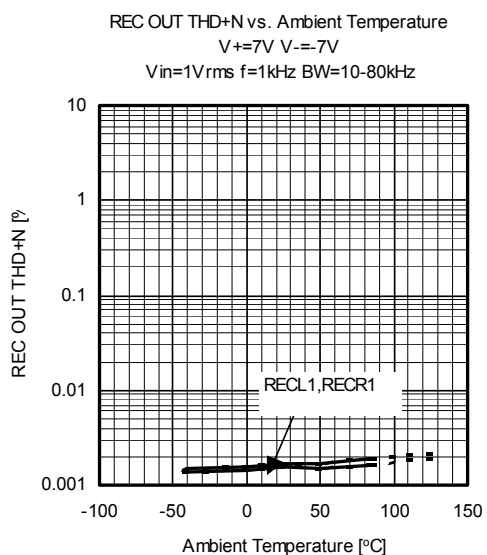
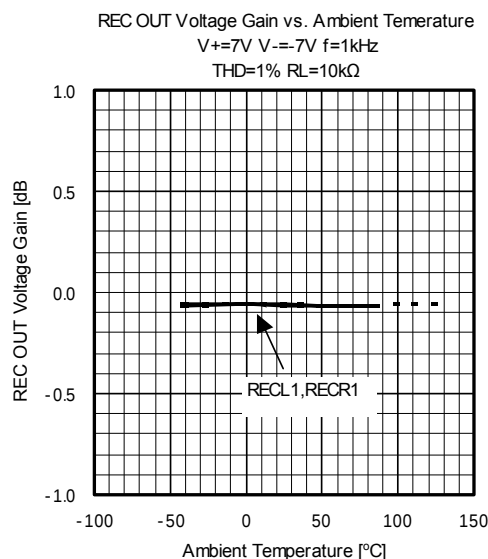
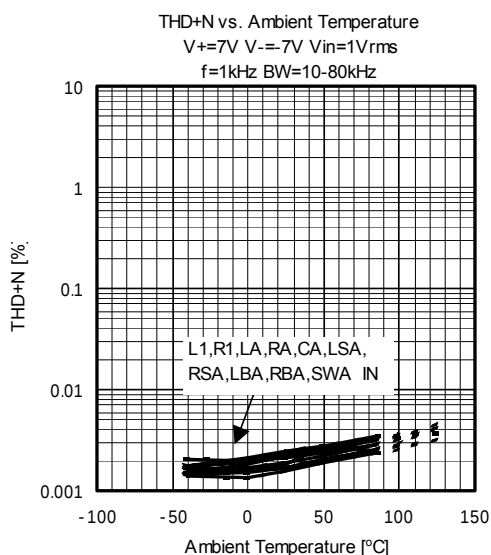
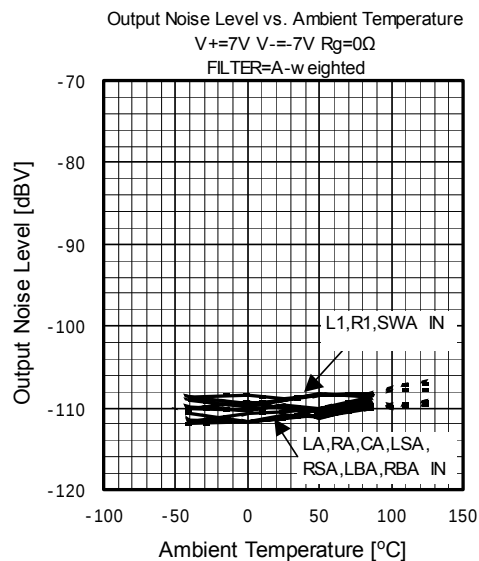
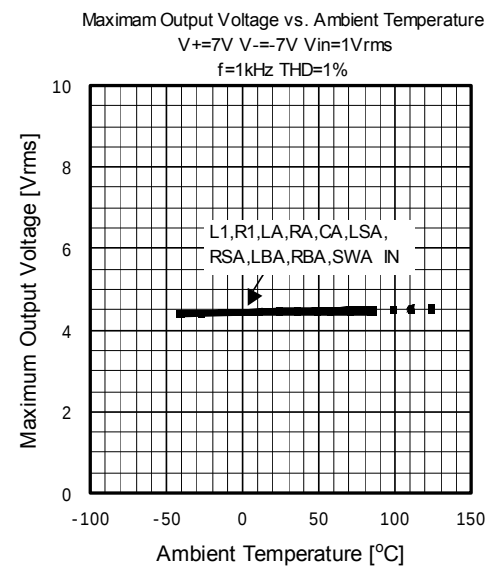
# ■ TYPICAL CHARACTERISTICS



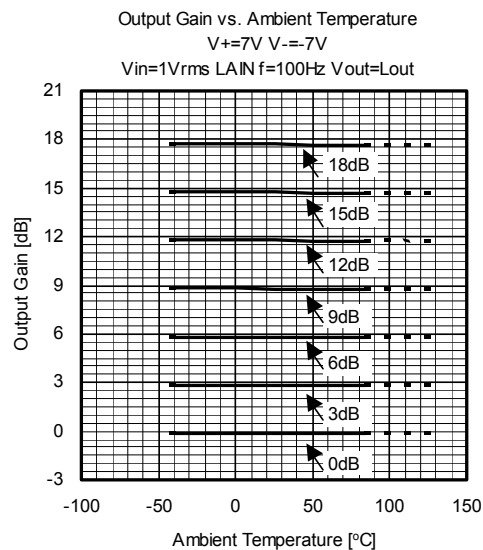
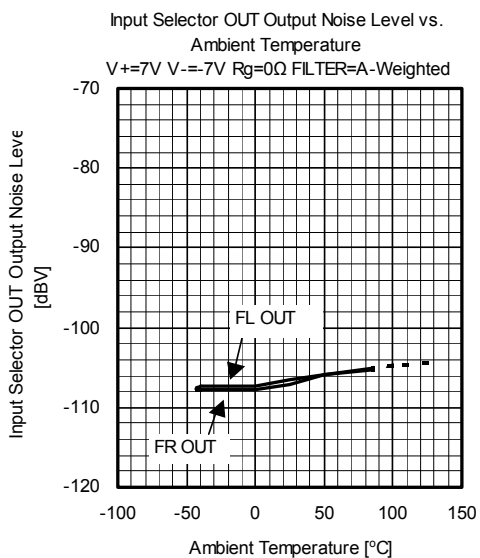
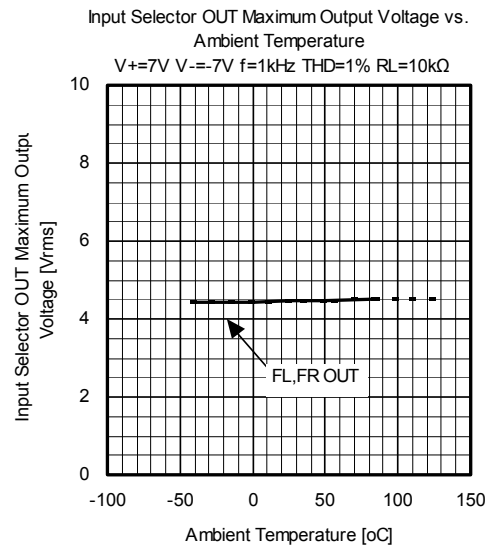
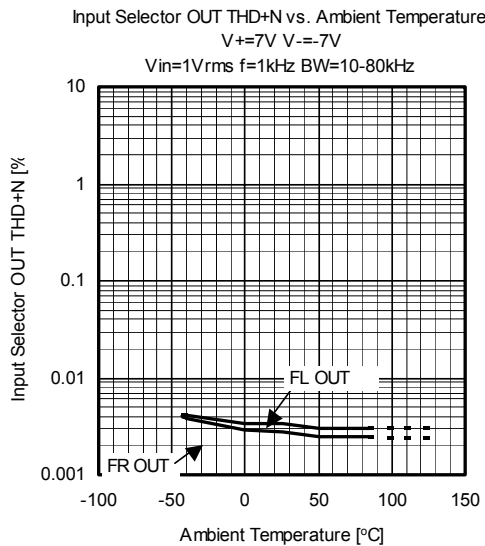
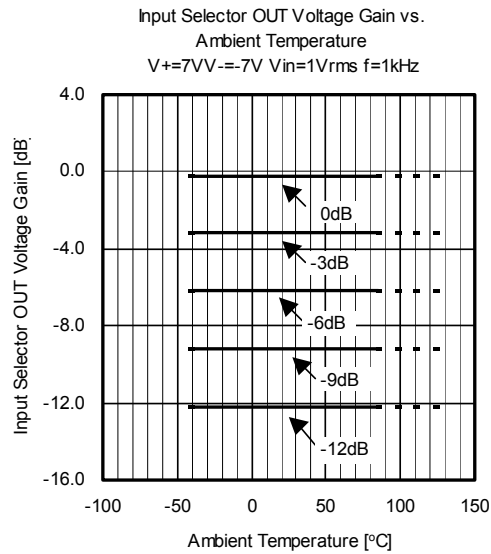
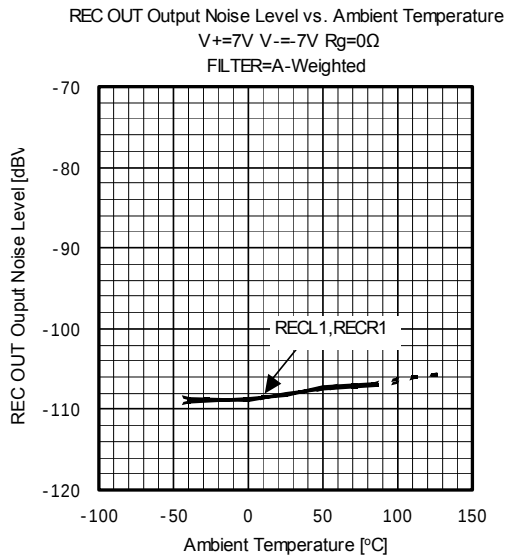
## ■ TYPICAL CHARACTERISTICS



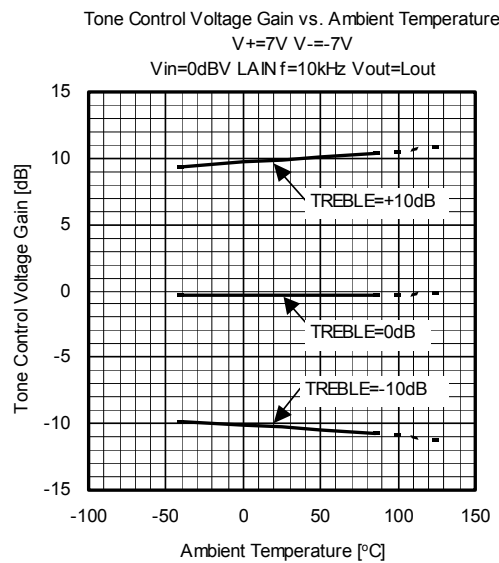
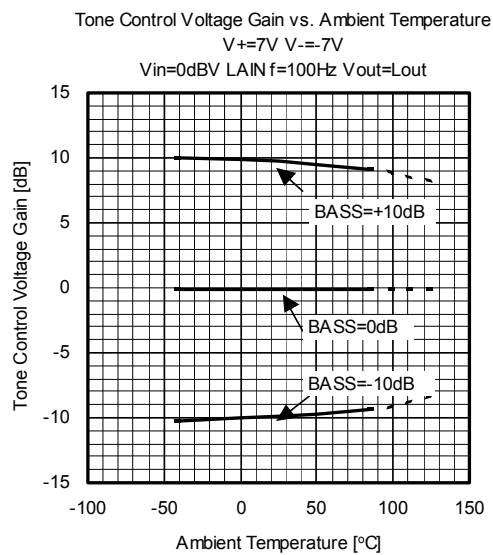
# ■ TYPICAL CHARACTERISTICS



## TYPICAL CHARACTERISTICS



## ■ TYPICAL CHARACTERISTICS



**[CAUTION]**

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