



## AUDIO PROCESSOR with BBE ViVA

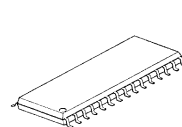
### ■ GENERAL DESCRIPTION

The **NJW1147** is a TV audio processor with BBE ViVA High Definition 3D Sound process. BBE's traditional sound clarity enhancement technology is combined with the new ViVA 3D process to create an authentic and exciting spatial effect. BBE ViVA is compatible with news, music and movie programs as well as video games.

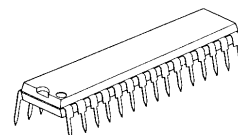
The **NJW1147** contains all necessary functions to process TV audio signal such as volume control, tone control, balance, mute, AGC and NJRC's proprietary surround sound process, eala. The eala reproduces a natural surround sound with clear vocal orientation.

The total modes and variables are controlled by the I<sup>2</sup>C bus interface.

### ■ PACKAGE OUTLINE



NJW1147M

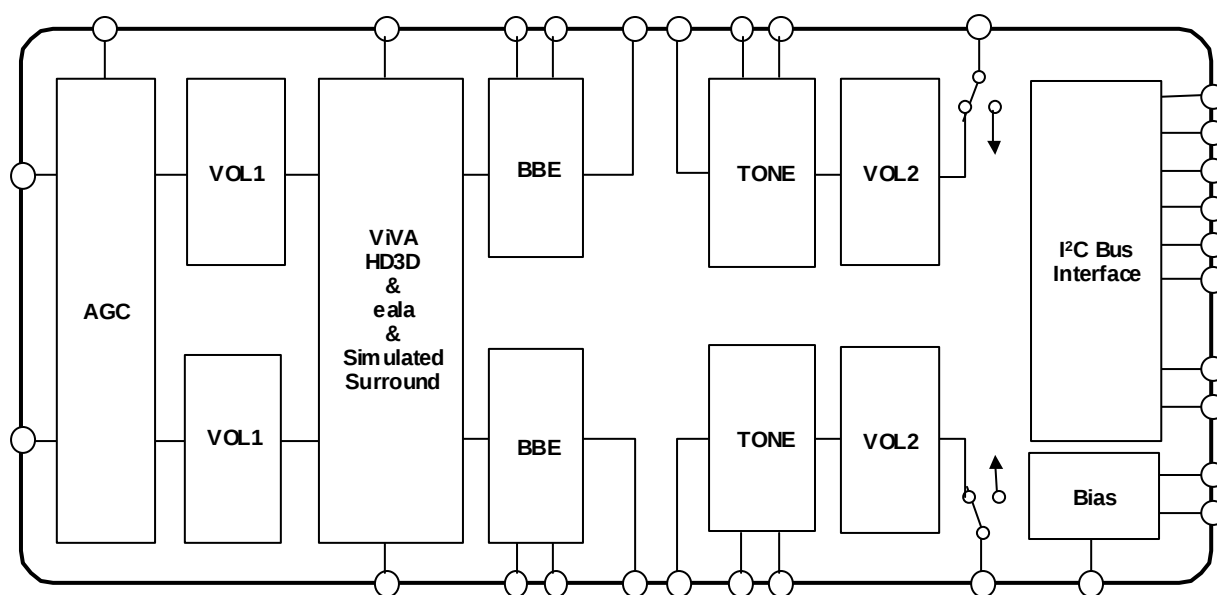


NJW1147L

### ■ FEATURES

- Operating Voltage        8 to 13V
- I<sup>2</sup>C BUS Interface
- BBE Sound Enhancement (Low Boost and High Boost: 15dB max.)
- BBE ViVA High Definition 3D Sound
- eala (NJRC Original Surround)
- AGC Circuit (It reduces volume difference among input sources.)
- Simulated Surround
- Bi-CMOS Technology
- Package Outline        SDMP30, SDIP30

### ■ BLOCK DIAGRAM



## ■ PIN FUNCTION

|    |          |          |    |
|----|----------|----------|----|
| 1  | INa      | INb      | 30 |
| 2  | BBE1a    | BBE1b    | 29 |
| 3  | BBE2a    | BBE2b    | 28 |
| 4  | BBEOUTa  | BBEOUTb  | 27 |
| 5  | TONE INa | TONE INb | 26 |
| 6  | TONE-Ha  | TONE-Hb  | 25 |
| 7  | TONE-La  | TONE-Lb  | 24 |
| 8  | OUTa     | OUTb     | 23 |
| 9  | AGC      | SR-FIL   | 22 |
| 10 | SS-FIL   | VREF     | 21 |
| 11 | CVB      | CTH      | 20 |
| 12 | CVA      | CTL      | 19 |
| 13 | SDA      | AUX0     | 18 |
| 14 | SCL      | AUX1     | 17 |
| 15 | GND      | Vcc      | 16 |

| No. | Symbol   | Function                                 | No | Symbol   | Function                               |
|-----|----------|------------------------------------------|----|----------|----------------------------------------|
| 1   | INa      | Ach Input                                | 16 | Vcc      | Power Supply Pin                       |
| 2   | BBE1a    | Ach BBE Filter1 (Process)                | 17 | AUX1     | Auxiliary Output1                      |
| 3   | BBE2a    | Ach BBE Filter2 (Lo Contour)             | 18 | AUX0     | Auxiliary Output0                      |
| 4   | BBE OUTa | Ach Output for the Other Accessories     | 19 | CTL      | Pop Noise reduction for Bass Control   |
| 5   | TONE INa | Ach Input From the Other Accessories     | 20 | CTH      | Pop Noise reduction for Treble Control |
| 6   | TONE-Ha  | Ach Treble Filter                        | 21 | VREF     | Reference Voltage                      |
| 7   | TONE-La  | Ach Bass Filter                          | 22 | SR-FIL   | Surround Filter                        |
| 8   | OUTa     | Ach Output                               | 23 | OUTb     | Bch Output                             |
| 9   | AGC      | AGC Filter                               | 24 | TONE-Lb  | Bch Bass Filter                        |
| 10  | SS-FIL   | Simulated Stereo Filter                  | 25 | TONE-Hb  | Bch Treble Filter                      |
| 11  | CVB      | Pop Noise Reduction for Volume & Balance | 26 | TONE INb | Bch Input from the Other Accessories   |
| 12  | CVA      | Pop Noise Reduction for Volume & Balance | 27 | BBE OUTb | Bch Output for the Other Accessories   |
| 13  | SDA      | SDA Data Input (I <sup>2</sup> C BUS)    | 28 | BBE2b    | Bch BBE Filter2 (Process)              |
| 14  | SCL      | SCL Data Input (I <sup>2</sup> C BUS)    | 29 | BBE1b    | Bch BBE Filter1 (Lo Contour)           |
| 15  | GND      | GND                                      | 30 | INb      | Bch Input                              |

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

| PARAMETER                   | SYMBOL         | RATING      | UNIT |
|-----------------------------|----------------|-------------|------|
| Supply Voltage              | V <sup>+</sup> | 14          | V    |
| Power Dissipation           | P <sub>D</sub> | 700         | mW   |
| Operating Temperature Range | Topr           | -20 to +75  | °C   |
| Storage Temperature Range   | Tstg           | -40 to +125 | °C   |

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V+=9V, Rg=600Ω, RL=47kΩ, Vin=100mVrms/1kHz unless otherwise specified)

| PARAMETER                 | SYMBOL            | TEST CONDITION                      | MIN. | TYP.          | MAX.          | UNIT           |
|---------------------------|-------------------|-------------------------------------|------|---------------|---------------|----------------|
| Operating Voltage         | V <sup>+</sup>    |                                     | 8.0  | 9.0           | 13.0          | V              |
| Supply Current            | I <sub>CC</sub>   | No Signal                           | -    | 13            | 25            | mA             |
| Reference Voltage         | V <sub>REF</sub>  | No Signal                           | 4.0  | 4.5           | 5.0           | V              |
| Maximum Input Voltage     | V <sub>IM</sub>   | VOL=-20dB, THD=1%                   | 2.8  | 3.0           | -             | Vrms           |
| Maximum Output Voltage    | V <sub>OM</sub>   | OUTPUT<br>VOL=0dB, THD=1%           | -    | 2.5           | -             | Vrms           |
| Channel Balance           | G <sub>CB</sub>   | VOL=0dB                             | -1.5 | 0.0           | 1.5           | dB             |
| Balance Boost A           | BA <sub>BST</sub> | CHS="0", BAL="11111"                | -2.0 | 0.0           | 2.0           | dB             |
| Balance Cut A             | BA <sub>CUT</sub> | CHS="1", BAL="11111"<br>Vin = 1Vrms | -    | -             | -70           | dB             |
| Balance Boost B           | BB <sub>BST</sub> | CHS="1", BAL="11111"                | -2.0 | 0.0           | 2.0           | dB             |
| Balance Cut B             | BB <sub>CUT</sub> | CHS="0", BAL="11111"<br>Vin = 1Vrms | -    | -             | -70           | dB             |
| Total Harmonic Distortion | THD               | Vo=0.5Vrms<br>BW=400Hz to 30kHz     | -    | -             | 0.5           | %              |
| Maximum Gain              | G <sub>VMAX</sub> | VOL = 0dB                           | -2.0 | 0.0           | 2.0           | dB             |
| Minimum Gain              | G <sub>VMIN</sub> | VOL = MUTE                          | -    | -             | -70           | dB             |
| Channel Separation        | CS                | Vin = 2Vrms                         | -    | -             | -70           | dB             |
| Output Noise 1            | V <sub>NO1</sub>  | VOL = 0dB<br>BW=400Hz to 30kHz      | -    | -90<br>(31.6) | -85<br>(56.2) | dBV<br>(μVrms) |
| Output Noise 2            | V <sub>NO2</sub>  | VOL = MUTE<br>BW = 400Hz to 30kHz   | -    | -106<br>(5.0) | -96<br>(15.8) | dBV<br>(μVrms) |
| AUX Output Voltage        | V <sub>AUX</sub>  | Logic Output: High                  | 4.5  | -             | 5.0           | V              |
|                           |                   | Logic Output: Low                   | 0    | -             | 0.3           |                |

BW: Band Width

## ◆ TONE CONTROL

| PARAMETER            | SYMBOL            | TEST CONDITION                | MIN.  | TYP.  | MAX.  | UNIT |
|----------------------|-------------------|-------------------------------|-------|-------|-------|------|
| High Frequency Boost | HF <sub>BST</sub> | BCT="1", TREB="1111", f=10kHz | 12.5  | 15.0  | 17.5  | dB   |
| High Frequency Flat  | HF <sub>FLT</sub> | TRBE="0000", f=10kHz          | -2.0  | 0.0   | 2.0   | dB   |
| High Frequency Cut   | HF <sub>CUT</sub> | BCT="0", TRBE="1111", f=10kHz | -17.5 | -15.0 | -12.5 | dB   |
| Low Frequency Boost  | LF <sub>BST</sub> | BCB="1", BASS="1111", f=100Hz | 12.5  | 15.0  | 17.5  | dB   |
| Low Frequency Flat   | LF <sub>FLT</sub> | BASS="0000", f=100Hz          | -2.0  | 0.0   | 2.0   | dB   |
| Low Frequency Cut    | LF <sub>CUT</sub> | BCB="0", BASS="1111", f=100Hz | -17.5 | -15.0 | -12.5 | dB   |

## ◆ SUB-TONE CONTROL

| PARAMETER            | SYMBOL             | TEST CONDITION                   | MIN. | TYP. | MAX. | UNIT |
|----------------------|--------------------|----------------------------------|------|------|------|------|
| High Frequency Boost | SHF <sub>BST</sub> | BCST="1", SUB-TREB="11", f=10kHz | 2.0  | 3.0  | 4.0  | dB   |
| High Frequency Cut   | SHF <sub>CUT</sub> | BCST="0", SUB-TREB="11", f=10kHz | -4.0 | -3.0 | -2.0 | dB   |
| Low Frequency Boost  | SLF <sub>BST</sub> | BCSB="1", SUB-BASS="11", f=100Hz | 2.0  | 3.0  | 4.0  | dB   |
| Low Frequency Cut    | SLF <sub>CUT</sub> | BCSB="0", SUB-BASS="11", f=100Hz | -4.0 | -3.0 | -2.0 | dB   |

## ◆ AGC CONTROL

| PARAMETER | SYMBOL              | TEST CONDITION       | MIN. | TYP. | MAX. | UNIT |
|-----------|---------------------|----------------------|------|------|------|------|
| AGC Boost | AGC <sub>BST</sub>  | Vin=50mVrms, f=1kHz  | 1.5  | 3.5  | 5.5  | dB   |
| AGC Flat1 | AGC <sub>FLT1</sub> | Vin=150mVrms, f=1kHz | -2.5 | 0.0  | 2.5  | dB   |
| AGC Flat2 | AGC <sub>FLT2</sub> | Vin=300mVrms, f=1kHz | -2.5 | 0.0  | 2.5  | dB   |
| AGC Flat3 | AGC <sub>FLT3</sub> | Vin=400mVrms, f=1kHz | -2.5 | 0.0  | 2.5  | dB   |
| AGC Flat4 | AGC <sub>FLT4</sub> | Vin=540mVrms, f=1kHz | -2.5 | 0.0  | 2.5  | dB   |
| AGC Cut   | AGC <sub>CUT</sub>  | Vin=2Vrms, f=1kHz    | -14  | -10  | -6.0 | dB   |

## ◆ BBE

| PARAMETER                      | SYMBOL              | TEST CONDITION             | MIN. | TYP. | MAX. | UNIT |
|--------------------------------|---------------------|----------------------------|------|------|------|------|
| BBE Low Frequency Boost Range  | BBE <sub>LOW</sub>  | BBE-Low="1111", f = 50Hz   | -    | 15.0 | -    | dB   |
| BBE High Frequency Boost Range | BBE <sub>HIGH</sub> | BBE-High="1111", f = 10KHz | -    | 15.0 | -    | dB   |

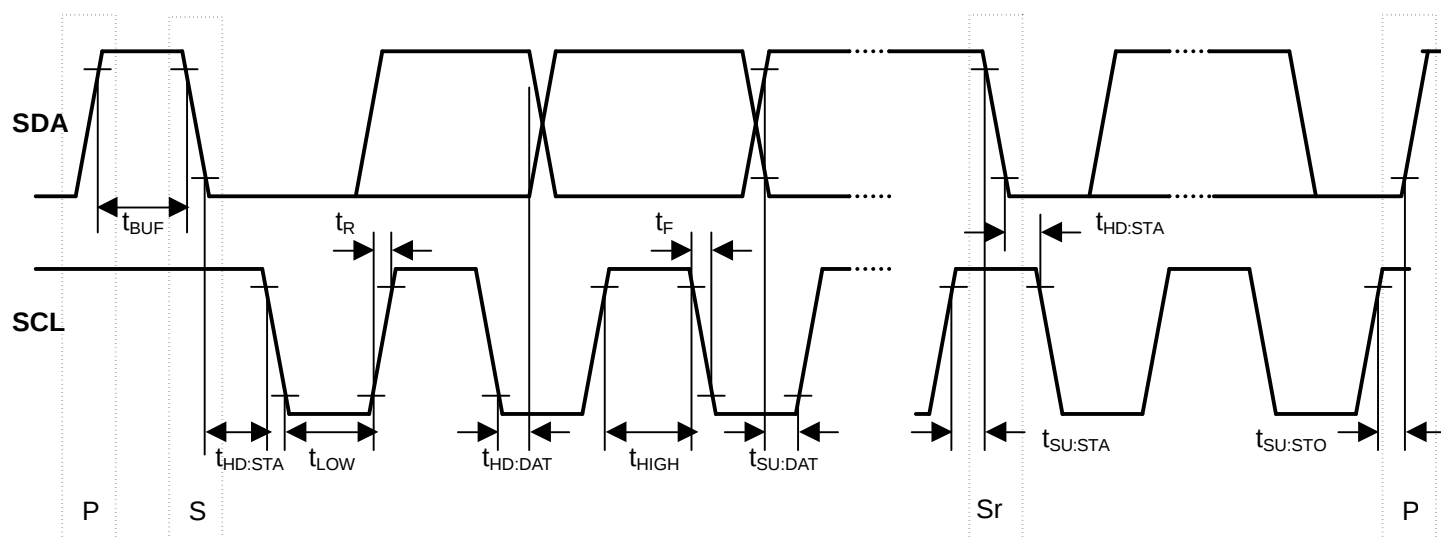
## ◆ SURROUND (SURROUND-ON)

| PARAMETER                | SYMBOL              | TEST CONDITION                            | MIN. | TYP. | MAX. | UNIT |
|--------------------------|---------------------|-------------------------------------------|------|------|------|------|
| Surround Gain1           | SR <sub>GAIN1</sub> | Ain→Aout, f=100Hz<br>SUR0="0", SUR="1"    | 3.5  | 5.5  | 7.5  | dB   |
| Surround Gain2           | SR <sub>GAIN2</sub> | Ain→Bout, f=100Hz<br>SUR0="0", SUR="1"    | -3.0 | -1.0 | 1.0  | dB   |
| Surround Gain3           | SR <sub>GAIN3</sub> | Ain→Aout, f=100Hz<br>SUR0="1", SUR="1"    | 8.0  | 10.0 | 12.0 | dB   |
| Surround Gain4           | SR <sub>GAIN4</sub> | Ain→Bout, f=100Hz<br>SUR0="1", SUR="1"    | 5.0  | 7.0  | 9.0  | dB   |
| Simulated Surround Gain1 | SR <sub>SIM1</sub>  | Ain+Bin→Aout, f=1kHz<br>SUR0="1", SUR="0" | 1.0  | 3.0  | 5.0  | dB   |
| Simulated Surround Gain2 | SR <sub>SIM2</sub>  | Ain+Bin→Bout, f=1kHz<br>SUR0="1", SUR="0" | 1.0  | 3.0  | 5.0  | dB   |

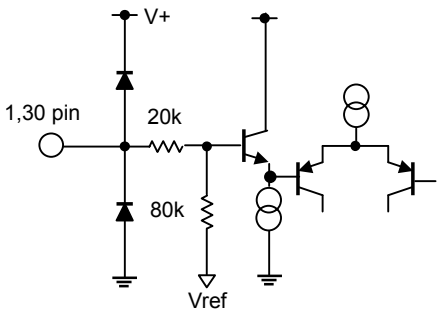
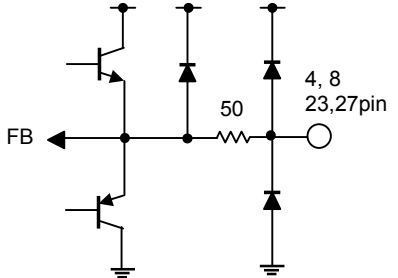
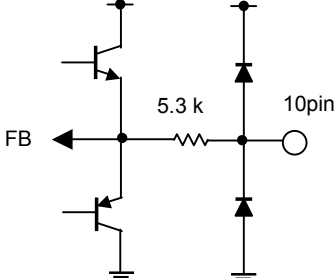
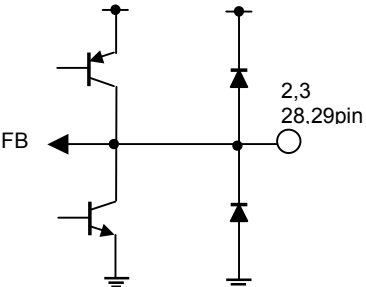
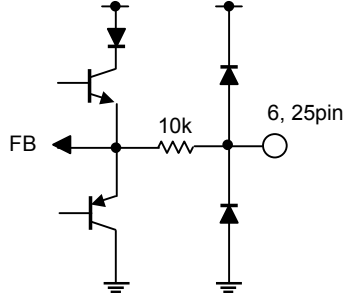
## ■ I<sup>2</sup>C BUS BLOCK CHARACTERISTICS (SDA, SCL)

| PARAMETER                                 | SYMBOL              | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------------|---------------------|------|------|------|------|
| High Level Input Voltage                  | V <sub>IH</sub>     | 3.0  | -    | 5.0  | V    |
| Low Level Input Voltage                   | V <sub>IL</sub>     | 0    | -    | 1.5  | V    |
| High Level Input Current                  | I <sub>IH</sub>     | -    | -    | 10   | μA   |
| Low Level Input Current                   | I <sub>IL</sub>     | -    | -    | 10   | μA   |
| Low Level Output Voltage (3mA at SDA pin) | V <sub>OL</sub>     | 0    | -    | 0.4  | V    |
| Maximum Output Current                    | I <sub>OL</sub>     | -3.0 | -    | -    | mA   |
| Maximum Clock Frequency                   | f <sub>SCL</sub>    | -    | -    | 100  | kHz  |
| Data Change Minimum Waiting Time          | t <sub>BUF</sub>    | 4.7  | -    | -    | μs   |
| Data Transfer Start Minimum Waiting Time  | t <sub>HD:STA</sub> | 4.0  | -    | -    | μs   |
| Low Level Clock Pulse Width               | t <sub>LOW</sub>    | 4.7  | -    | -    | μs   |
| High Level Clock Pulse Width              | t <sub>HIGH</sub>   | 4.0  | -    | -    | μs   |
| Minimum Start Preparation Waiting Time    | t <sub>SU:STA</sub> | 4.7  | -    | -    | μs   |
| Minimum Data Hold Time                    | t <sub>HD:DAT</sub> | 5.0  | -    | -    | μs   |
| Minimum Data Preparation Time             | t <sub>SU:DAT</sub> | 250  | -    | -    | ns   |
| Rise Time                                 | t <sub>R</sub>      | -    | -    | 1.0  | μs   |
| Fall Time                                 | t <sub>F</sub>      | -    | -    | 300  | ns   |
| Minimum Stop Preparation Waiting Time     | t <sub>SU:STO</sub> | 4.0  | -    | -    | μs   |

I<sup>2</sup>C BUS Load Condition: Pull up resistance 4kΩ (Connected to +5V)  
Load capacitance 200pF (Connected to GND)



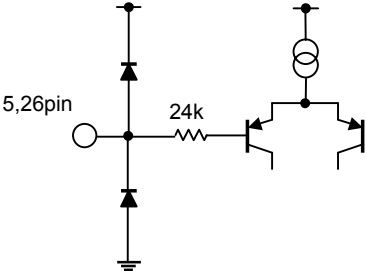
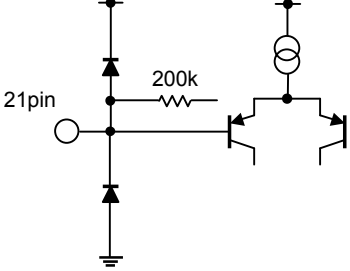
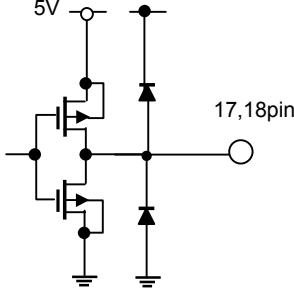
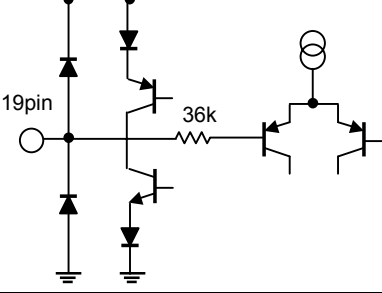
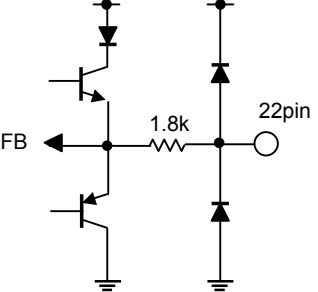
## ■TERMINAL DESCRIPTION

| No.                | SYMBOL                               | FUNCTION                                                                                                               | EQUIVALENT CIRCUIT                                                                   | VOLTAGE |
|--------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| 1<br>30            | INa<br>INb                           | Ach Input terminal<br>Bch Input terminal                                                                               |    | $V+/2$  |
| 4<br>8<br>23<br>27 | BBE OUTa<br>OUTa<br>OUTb<br>BBE OUTb | Ach Output for the Other Accessories<br>Ach Output<br>Bch Output<br>Bch Output for the Other Accessories               |    | $V+/2$  |
| 10                 | SS-FIL                               | Simulated Stereo Filter terminal                                                                                       |  | $V+/2$  |
| 2<br>3<br>28<br>29 | BBE1a<br>BBE2a<br>BBE2b<br>BBE1b     | Ach BBE Filter1 (Process)<br>Ach BBE Filter2 (Lo Contour)<br>Bch BBE Filter2 (Lo Contour)<br>Bch BBE Filter1 (Process) |  | $V+/2$  |
| 6<br>25            | TONE-Ha<br>TONE-Hb                   | Treble (tone control) filter terminal                                                                                  |  | $V+/2$  |

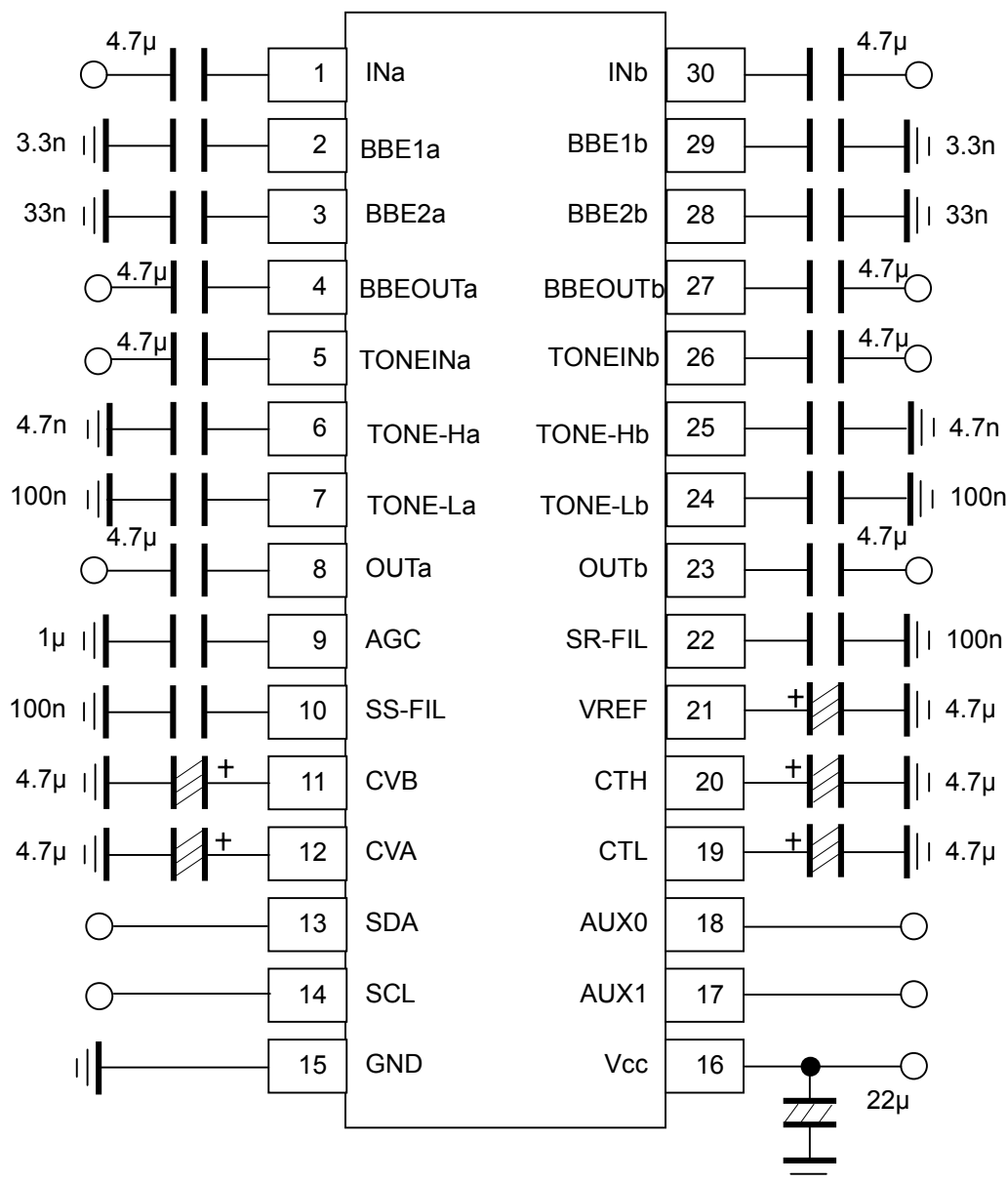
## ■TERMINAL DESCRIPTION

| No.      | SYMBOL             | FUNCTION                                                               | EQUIVALENT CIRCUIT | VOLTAGE |
|----------|--------------------|------------------------------------------------------------------------|--------------------|---------|
| 7<br>24  | TONE-La<br>TONE-Lb | Bass (tone control) filter terminal                                    |                    | V+/2    |
| 9        | AGC                | Capacitor connection terminal for AGC attack and recovery time setting |                    | -       |
| 11<br>12 | CVB<br>CVA         | Pop Noise Reduction for Volume & Balance                               |                    | -       |
| 13       | SDA                | I <sup>2</sup> C data terminal                                         |                    | -       |
| 14       | SCL                | I <sup>2</sup> C clock terminal                                        |                    | -       |

## ■TERMINAL DESCRIPTION

| No.      | SYMBOL               | FUNCTION                                                                       | EQUIVALENT CIRCUIT                                                                   | VOLTAGE |
|----------|----------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------|
| 5<br>26  | TONE INa<br>TONE INb | Ach Input from the Other Accessories<br>Bch Input from the Other Accessories   |    | $V+/2$  |
| 21       | Vref                 | Reference voltage terminal                                                     |    | $V+/2$  |
| 17<br>18 | AUX0<br>AUX1         | Auxiliary 2 values voltage output terminal                                     |   | 0/5V    |
| 20<br>19 | CTH<br>CTL           | Pop Noise reduction for Bass Control<br>Pop Noise reduction for Treble Control |  | -       |
| 22       | SR-FIL               | Surround filter terminal                                                       |  | $V+/2$  |
| 15<br>16 | V+<br>GND            | Ground terminal<br>Supply voltage terminal                                     | -                                                                                    | -       |

## APPLICATION CIRCUIT



### (NOTE)

1. Separate the I<sup>2</sup>C bus line from the following terminals for avoiding digital noise problem.

| Pin No. | Symbol | Pin No. | Symbol  | Pin No. | Symbol | Pin No. | Symbol  | Pin No. | Symbol |
|---------|--------|---------|---------|---------|--------|---------|---------|---------|--------|
| 2       | BBE1a  | 6       | TONE-Ha | 10      | SS FIL | 24      | TONE-Lb | 28      | BBE2b  |
| 3       | BBE2a  | 7       | TONE-La | 22      | SR FIL | 25      | TONE-Hb | 29      | BBE1b  |

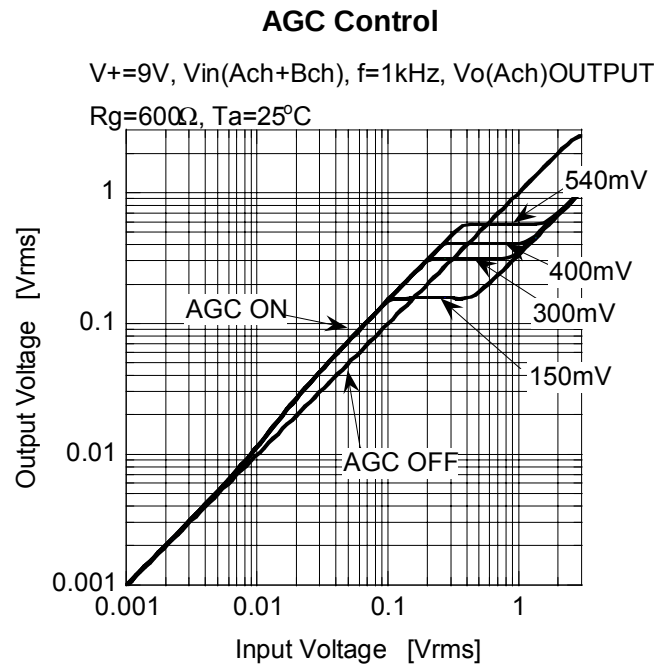
2. The constant of capacitors connected to the terminals No.2, 3, 28 and 29 are designated by BBE Sound Inc. And the capacitor connected to the terminal No.22 fixes the BBE VIVA's effects. Do not change the constant of these capacitors without the approval of BBE Sound Inc.

## ■ APPLICATION NOTE

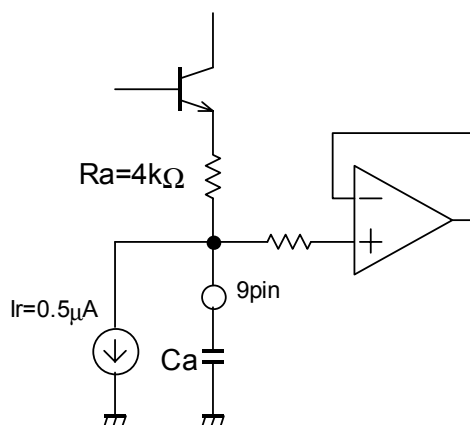
### 1. AGC (Auto Gain Control) Circuit

AGC circuit adjusts the input signal level with Boost/Attenuate circuit. AGC boost the low input signal level and attenuate high input signal level automatically.

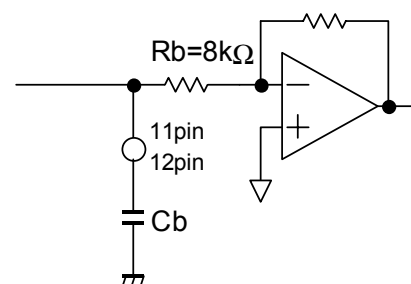
The AGC flat levels (150mV, 300mV, 400mV and 540mV) are selectable via I<sup>2</sup>C bus. (Refer to the following figure.)



### Attack-Recovery



Smoothing circuit of Attenuate



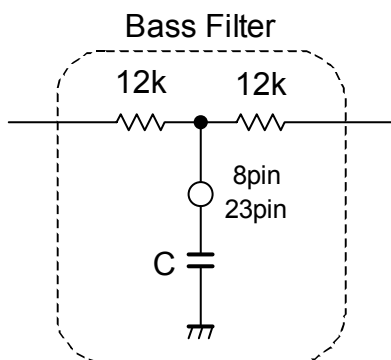
Smoothing circuit of Boost

Attack and recovery time in the attenuation processing depends on external part  $C_a$ , and it in the boost processing depends on external part  $C_b$ . They become longer as the capacity bigger and become shorter as it gets smaller. (Recommendation value:  $C_a=1\mu F$ ,  $C_b=4.7\mu F$ )

Reducing the capacity of  $C_a$  may cause the distortion. As for  $C_b$ , since it serves as the click noise prevention, reducing the capacity may cause the click noise upon volume changing.

## 2. Tone Control

### a) Bass: Setting the Cut-off frequency

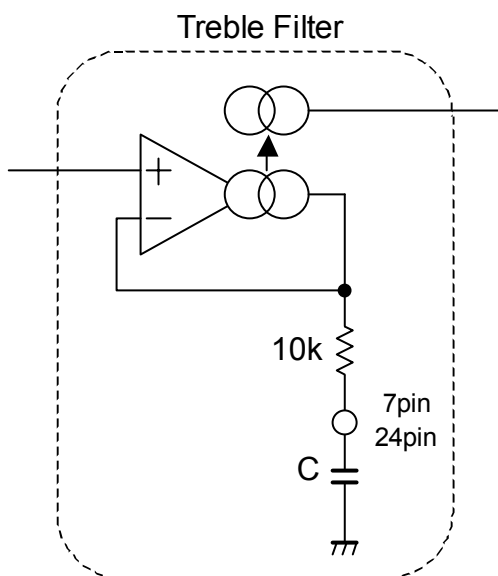


$$f_c = \frac{M}{2\pi \times C \times 12k}$$

M changes by gain setting of Tone.

|          |         |
|----------|---------|
| M ≈ 2.65 | (±15dB) |
| M ≈ 3.45 | (±10dB) |
| M ≈ 8.10 | (±5dB)  |

### b) Treble: Setting the Cut-off frequency



$$f_c = \frac{N}{2\pi \times C \times 10k}$$

N changes by gain setting of Tone.

|          |         |
|----------|---------|
| N ≈ 0.76 | (±15dB) |
| N ≈ 0.58 | (±10dB) |
| N ≈ 0.25 | (±5dB)  |

3. BBE, Surround mode and "OUT" switch settings  
The click noise may be generated by changing the BBE, Surround mode setting and "OUT" switch.  
Provide the external circuit for avoiding the click noise on above condition.
4. External parts for BBE circuits  
The constant of capacitors connected to the terminals No.2, 3, 28 and 29 are designated by BBE Sound Inc.  
And the capacitor connected to the terminal No.22 fixes the BBE ViVA's effects.  
Do not change the constant of these capacitors without the approval of BBE Sound Inc.
5. AUX1, AUX0 Terminal  
AUX1/0 are enable to control external logic circuit is  
Source current : 1mA typ. (Ta=25°C)  
Sink current : 0.5mA typ. (Ta=25°C)
6. Capacitor for Reference Voltage (21pin)  
22μF should be recommended for ripple filter connected to Vref terminal (21pin).  
Reducing this capacity may cause to reduce the maximum attenuation level and to increase the output noise.

## ■ 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

|     |   |   |   |   |   |   |     |
|-----|---|---|---|---|---|---|-----|
| MSB |   |   |   |   |   |   | LSB |
| 1   | 0 | 0 | 0 | 0 | 0 | 1 | R/W |

R/W=0: Receive Only

R/W=1: No Output Data

### ◆ CONTROL REGISTER TABLE

The select address sets each function (Volume, Balance, AGC, Surround, Tone Control, BBE, AUX).

The auto increment function cycles the select address as follows.

00H→01H→02H→03H→04H→05H→00H

| Select Address | BIT              |            |            |      |               |      |          |      |
|----------------|------------------|------------|------------|------|---------------|------|----------|------|
|                | D7               | D6         | D5         | D4   | D3            | D2   | D1       | D0   |
| 00H            | VOL              |            |            |      |               |      |          |      |
| 01H            | CHS              | BAL        |            |      |               |      | AGC      | SUR  |
| 02H            | BCB              | BASS       |            |      |               | BCSB | SUB-BASS |      |
| 03H            | BCT              | TREB       |            |      |               | BCST | SUB-TREB |      |
| 04H            | BBE (Lo Contour) |            |            |      | BBE (Process) |      |          |      |
| 05H            | OUT              | Don't care | Don't care | SUR0 | AGC1          | AGC0 | AUX1     | AUX0 |

### ◆ 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  |
| 05H            | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

## ■INSTRUCTION CODE

### a) MASTER VOLUME SETTING

| Select Address | BIT |    |    |    |    |    |    |    |
|----------------|-----|----|----|----|----|----|----|----|
|                | D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 00H            | VOL |    |    |    |    |    |    |    |

The volume control for both Ach and Bch (0.33dB/step).

The volume is consisted of volume1 and volume2 and the level is divided into half to each volume1 and volume2.

### b) BALANCE, AGC AND SURROUND SETTING

| Select Address | BIT |     |    |    |    |    |     |     |
|----------------|-----|-----|----|----|----|----|-----|-----|
|                | D7  | D6  | D5 | D4 | D3 | D2 | D1  | D0  |
| 01H            | CHS | BAL |    |    |    |    | AGC | SUR |

- CHS: Channel select for balance control

“0”: Ach “Bch is attenuated”

“1”: Bch “Ach is attenuated”

- BAL: Balance control for both Ach and Bch (1dB/Step)

The balance is consisted of volume1 and volume2 and the level is divided into half to each volume1 and volume2.

- AGC: AGC switch

“0”: AGC OFF

“1”: AGC ON

- SUR: Surround mode switch

“0”: Surround OFF

“1”: Surround ON

NOTE) The click noise may be generated by changing the Surround mode setting.  
Provide the external circuit for avoiding the click noise on above condition.

### c) TONE CONTROL BASS SETTING

| Select Address | BIT |      |    |    |    |      |          |    |
|----------------|-----|------|----|----|----|------|----------|----|
|                | D7  | D6   | D5 | D4 | D3 | D2   | D1       | D0 |
| 02H            | BCB | BASS |    |    |    | BCSB | SUB-BASS |    |

- BCB: Boost cut select for Bass control

“0”: Cut

“1”: Boost

- BASS: BASS control

Cut Level : -15dB to 0dB(1dB/Step)

Boost Level : 0dB to +15dB(1dB/Step)

- BCSB: Boost cut select for SUB-BASS control

“0”: Cut

“1”: Boost

- SUB-BASS: SUB- BASS control (1dB/Step)

Sub-Cut Level : -3dB to 0dB(1dB/Step)

Sub-Boost Level : 0dB to +3dB(1dB/Step)

## d) TONE CONTROL TREBLE SETTING

| Select Address | BIT |      |    |    |    |      |          |    |
|----------------|-----|------|----|----|----|------|----------|----|
|                | D7  | D6   | D5 | D4 | D3 | D2   | D1       | D0 |
| 03H            | BCT | TREB |    |    |    | BCST | SUB-TREB |    |

- BCT: Boost cut select for Treble control  
 "0": Cut  
 "1": Boost
- TREB: Treble control (1dB/step)  
 Cut Level : -15dB to 0dB(1dB/Step)  
 Boost Level : 0dB to +15dB(1dB/Step)
- BCST: Boost cut select for Sub-Treble control  
 "0": Cut  
 "1": Boost
- SUB-TREB: Sub-Treble control (1dB/step)  
 Sub-Cut Level : -3dB to 0dB(1dB/Step)  
 Sub-Boost Level : 0dB to +3dB(1dB/Step)

## e) BBE Boost Level Setting

| Select Address | BIT              |    |    |    |               |    |    |    |
|----------------|------------------|----|----|----|---------------|----|----|----|
|                | D7               | D6 | D5 | D4 | D3            | D2 | D1 | D0 |
| 04H            | BBE (Lo Contour) |    |    |    | BBE (Process) |    |    |    |

- BBE Lo Contour : 0dB to 15dB(1dB/step)
- BBE Process : 0dB to 15dB (1dB/step)

When all bits are "0"(=00H), BBE becomes off

NOTE) The click noise may be generated by changing the BBE setting.  
 Provide the external circuit for avoiding the click noise on above condition.

## f) OUTPUT AND AUXILIARY SETTING

| Select Address | BIT |            |            |      |      |      |      |      |
|----------------|-----|------------|------------|------|------|------|------|------|
|                | D7  | D6         | D5         | D4   | D3   | D2   | D1   | D0   |
| 05H            | OUT | Don't Care | Don't Care | SUR0 | AGC1 | AGC0 | AUX1 | AUX0 |

- OUT: ON/OFF Switch for OUTPUT  
 "0" : OFF  
 "1" : ON

NOTE) The click noise may be generated by changing the "OUT" switch.  
 Provide the external circuit for avoiding the click noise on above condition.

### •Surround Setting

| Surround Function   | SUR0(05H:D4) | SUR(01H:D0), | Remarks                        |
|---------------------|--------------|--------------|--------------------------------|
| Surround OFF        | 0            | 0            | Input through                  |
| BBE VIVA HD3D Sound | 0            | 1            | Set the BBE Boost Level        |
| "eala"              | 1            | 1            | NJRC original surround mode    |
| Simulated Stereo    | 1            | 0            | For monaural signal input only |

NOTE) The click noise may be generated by changing the Surround mode setting.  
 Provide the external circuit for avoiding the click noise on above condition.

- AGC Level Setting

| AGC Level | AGC1(D3) | AGC0(D2) |
|-----------|----------|----------|
| 150mVrms  | 0        | 0        |
| 300mVrms  | 0        | 1        |
| 400mVrms  | 1        | 0        |
| 540mVrms  | 1        | 1        |

- AUX1/AUX0: Auxiliary port High/Low

“0”: Logic output “Low”

“1”: Logic output “High”

## ■MASTER VOLUME (Select Address: 00H)

|           |     | VOL |    |    |    |    |    |    |    |
|-----------|-----|-----|----|----|----|----|----|----|----|
| Gain (dB) | HEX | D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 0         | FF  | 1   | 1  | 1  | 1  | 1  | 1  | 1  | 1  |
| -1        | FC  | 1   | 1  | 1  | 1  | 1  | 1  | 0  | 0  |
| -2        | F9  | 1   | 1  | 1  | 1  | 1  | 0  | 0  | 1  |
| -3        | F6  | 1   | 1  | 1  | 1  | 0  | 1  | 1  | 0  |
| -4        | F3  | 1   | 1  | 1  | 1  | 0  | 0  | 1  | 1  |
| -5        | F0  | 1   | 1  | 1  | 1  | 0  | 0  | 0  | 0  |
| -6        | ED  | 1   | 1  | 1  | 0  | 1  | 1  | 0  | 1  |
| -7        | EA  | 1   | 1  | 1  | 0  | 1  | 0  | 1  | 0  |
| -8        | E7  | 1   | 1  | 1  | 0  | 0  | 1  | 1  | 1  |
| -9        | E4  | 1   | 1  | 1  | 0  | 0  | 1  | 0  | 0  |
| -10       | E1  | 1   | 1  | 1  | 0  | 0  | 0  | 0  | 1  |
| -11       | DE  | 1   | 1  | 0  | 1  | 1  | 1  | 1  | 0  |
| -12       | DB  | 1   | 1  | 0  | 1  | 1  | 0  | 1  | 1  |
| -13       | D8  | 1   | 1  | 0  | 1  | 1  | 0  | 0  | 0  |
| -14       | D5  | 1   | 1  | 0  | 1  | 0  | 1  | 0  | 1  |
| -15       | D2  | 1   | 1  | 0  | 1  | 0  | 0  | 1  | 0  |
| -16       | CF  | 1   | 1  | 0  | 0  | 1  | 1  | 1  | 1  |
| -17       | CC  | 1   | 1  | 0  | 0  | 1  | 1  | 0  | 0  |
| -18       | C9  | 1   | 1  | 0  | 0  | 1  | 0  | 0  | 1  |
| -19       | C6  | 1   | 1  | 0  | 0  | 0  | 1  | 1  | 0  |
| -20       | C3  | 1   | 1  | 0  | 0  | 0  | 0  | 1  | 1  |
| -21       | C0  | 1   | 1  | 0  | 0  | 0  | 0  | 0  | 0  |
| -22       | BD  | 1   | 0  | 1  | 1  | 1  | 1  | 0  | 1  |
| -23       | BA  | 1   | 0  | 1  | 1  | 1  | 0  | 1  | 0  |
| -24       | B7  | 1   | 0  | 1  | 1  | 0  | 1  | 1  | 1  |
| -25       | B4  | 1   | 0  | 1  | 1  | 0  | 1  | 0  | 0  |
| -26       | B1  | 1   | 0  | 1  | 1  | 0  | 0  | 0  | 1  |
| -27       | AE  | 1   | 0  | 1  | 0  | 1  | 1  | 1  | 0  |
| -28       | AB  | 1   | 0  | 1  | 0  | 1  | 0  | 1  | 1  |
| -29       | A8  | 1   | 0  | 1  | 0  | 1  | 0  | 0  | 0  |
| -30       | A5  | 1   | 0  | 1  | 0  | 0  | 1  | 0  | 1  |
| -31       | A2  | 1   | 0  | 1  | 0  | 0  | 0  | 1  | 0  |
| -32       | 9F  | 1   | 0  | 0  | 1  | 1  | 1  | 1  | 1  |
| -33       | 9C  | 1   | 0  | 0  | 1  | 1  | 1  | 0  | 0  |
| -34       | 99  | 1   | 0  | 0  | 1  | 1  | 0  | 0  | 1  |
| -35       | 96  | 1   | 0  | 0  | 1  | 0  | 1  | 1  | 0  |
| -36       | 93  | 1   | 0  | 0  | 1  | 0  | 0  | 1  | 1  |
| -37       | 90  | 1   | 0  | 0  | 1  | 0  | 0  | 0  | 0  |
| -38       | 8D  | 1   | 0  | 0  | 0  | 1  | 1  | 0  | 1  |
| -39       | 8A  | 1   | 0  | 0  | 0  | 1  | 0  | 1  | 0  |
| -40       | 87  | 1   | 0  | 0  | 0  | 0  | 1  | 1  | 1  |
| -41       | 84  | 1   | 0  | 0  | 0  | 0  | 1  | 0  | 0  |
| -42       | 81  | 1   | 0  | 0  | 0  | 0  | 0  | 0  | 1  |

## ■MASTER VOLUME (Select Address: 00H)

|           |     | VOL |    |    |    |    |    |    |    |
|-----------|-----|-----|----|----|----|----|----|----|----|
| Gain (dB) | HEX | D7  | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| -43       | 7E  | 0   | 1  | 1  | 1  | 1  | 1  | 1  | 0  |
| -44       | 7B  | 0   | 1  | 1  | 1  | 1  | 0  | 1  | 1  |
| -45       | 78  | 0   | 1  | 1  | 1  | 1  | 0  | 0  | 0  |
| -46       | 75  | 0   | 1  | 1  | 1  | 0  | 1  | 0  | 1  |
| -47       | 72  | 0   | 1  | 1  | 1  | 0  | 0  | 1  | 0  |
| -48       | 6F  | 0   | 1  | 1  | 0  | 1  | 1  | 1  | 1  |
| -49       | 6C  | 0   | 1  | 1  | 0  | 1  | 1  | 0  | 0  |
| -50       | 69  | 0   | 1  | 1  | 0  | 1  | 0  | 0  | 1  |
| -51       | 66  | 0   | 1  | 1  | 0  | 0  | 1  | 1  | 0  |
| -52       | 63  | 0   | 1  | 1  | 0  | 0  | 0  | 1  | 1  |
| -53       | 60  | 0   | 1  | 1  | 0  | 0  | 0  | 0  | 0  |
| -54       | 5D  | 0   | 1  | 0  | 1  | 1  | 1  | 0  | 1  |
| -55       | 5A  | 0   | 1  | 0  | 1  | 1  | 0  | 1  | 0  |
| -56       | 57  | 0   | 1  | 0  | 1  | 0  | 1  | 1  | 1  |
| -57       | 54  | 0   | 1  | 0  | 1  | 0  | 1  | 0  | 0  |
| -58       | 51  | 0   | 1  | 0  | 1  | 0  | 0  | 0  | 1  |
| -59       | 4E  | 0   | 1  | 0  | 0  | 1  | 1  | 1  | 0  |
| -60       | 4B  | 0   | 1  | 0  | 0  | 1  | 0  | 1  | 1  |
| -61       | 48  | 0   | 1  | 0  | 0  | 1  | 0  | 0  | 0  |
| -62       | 45  | 0   | 1  | 0  | 0  | 0  | 1  | 0  | 1  |
| -63       | 42  | 0   | 1  | 0  | 0  | 0  | 0  | 1  | 0  |
| -64       | 3F  | 0   | 0  | 1  | 1  | 1  | 1  | 1  | 1  |
| -65       | 3C  | 0   | 0  | 1  | 1  | 1  | 1  | 0  | 0  |
| -66       | 39  | 0   | 0  | 1  | 1  | 1  | 0  | 0  | 1  |
| -67       | 36  | 0   | 0  | 1  | 1  | 0  | 1  | 1  | 0  |
| -68       | 33  | 0   | 0  | 1  | 1  | 0  | 0  | 1  | 1  |
| -69       | 30  | 0   | 0  | 1  | 1  | 0  | 0  | 0  | 0  |
| -70       | 2D  | 0   | 0  | 1  | 0  | 1  | 1  | 0  | 1  |
| -71       | 2A  | 0   | 0  | 1  | 0  | 1  | 0  | 1  | 0  |
| -72       | 27  | 0   | 0  | 1  | 0  | 0  | 1  | 1  | 1  |
| -73       | 24  | 0   | 0  | 1  | 0  | 0  | 1  | 0  | 0  |
| -74       | 21  | 0   | 0  | 1  | 0  | 0  | 0  | 0  | 1  |
| -75       | 1E  | 0   | 0  | 0  | 1  | 1  | 1  | 1  | 0  |
| -76       | 1B  | 0   | 0  | 0  | 1  | 1  | 0  | 1  | 1  |
| -77       | 18  | 0   | 0  | 0  | 1  | 1  | 0  | 0  | 0  |
| -78       | 15  | 0   | 0  | 0  | 1  | 0  | 1  | 0  | 1  |
| -79       | 12  | 0   | 0  | 0  | 1  | 0  | 0  | 1  | 0  |
| -80       | 0F  | 0   | 0  | 0  | 0  | 1  | 1  | 1  | 1  |
| -81       | 0C  | 0   | 0  | 0  | 0  | 1  | 1  | 0  | 0  |
| -82       | 09  | 0   | 0  | 0  | 0  | 1  | 0  | 0  | 1  |
| -83       | 06  | 0   | 0  | 0  | 0  | 0  | 1  | 1  | 0  |
| -84       | 03  | 0   | 0  | 0  | 0  | 0  | 0  | 1  | 1  |
| Mute      | 00  | 0   | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

## ■BALANCE (Select Address: 01H)

| Channel Select (CHS)    | D7 |
|-------------------------|----|
| Ach (Bch is attenuated) | 0  |
| Bch (Ach is attenuated) | 1  |

|           | BAL |    |    |    |    |
|-----------|-----|----|----|----|----|
| Gain (dB) | D6  | D5 | D4 | D3 | D2 |
| 0         | 0   | 0  | 0  | 0  | 0  |
| -1        | 0   | 0  | 0  | 0  | 1  |
| -2        | 0   | 0  | 0  | 1  | 0  |
| -3        | 0   | 0  | 0  | 1  | 1  |
| -4        | 0   | 0  | 1  | 0  | 0  |
| -5        | 0   | 0  | 1  | 0  | 1  |
| -6        | 0   | 0  | 1  | 1  | 0  |
| -7        | 0   | 0  | 1  | 1  | 1  |
| -8        | 0   | 1  | 0  | 0  | 0  |
| -9        | 0   | 1  | 0  | 0  | 1  |
| -10       | 0   | 1  | 0  | 1  | 0  |
| -11       | 0   | 1  | 0  | 1  | 1  |
| -12       | 0   | 1  | 1  | 0  | 0  |
| -13       | 0   | 1  | 1  | 0  | 1  |
| -14       | 0   | 1  | 1  | 1  | 0  |
| -15       | 0   | 1  | 1  | 1  | 1  |
| -16       | 1   | 0  | 0  | 0  | 0  |
| -17       | 1   | 0  | 0  | 0  | 1  |
| -18       | 1   | 0  | 0  | 1  | 0  |
| -19       | 1   | 0  | 0  | 1  | 1  |
| -20       | 1   | 0  | 1  | 0  | 0  |
| -21       | 1   | 0  | 1  | 0  | 1  |
| -22       | 1   | 0  | 1  | 1  | 0  |
| -23       | 1   | 0  | 1  | 1  | 1  |
| -24       | 1   | 1  | 0  | 0  | 0  |
| -25       | 1   | 1  | 0  | 0  | 1  |
| -26       | 1   | 1  | 0  | 1  | 0  |
| -27       | 1   | 1  | 0  | 1  | 1  |
| -28       | 1   | 1  | 1  | 0  | 0  |
| -29       | 1   | 1  | 1  | 0  | 1  |
| -30       | 1   | 1  | 1  | 1  | 0  |
| Mute      | 1   | 1  | 1  | 1  | 1  |

## ■TONE CONTROL BASS (Select Address: 02H)

| Bass<br>Cut or Boost | BCB |
|----------------------|-----|
|                      | D7  |
| Cut                  | 0   |
| Boost                | 1   |

|               |                 | BASS |    |    |    |
|---------------|-----------------|------|----|----|----|
| Cut Gain (dB) | Boost Gain (dB) | D6   | D5 | D4 | D3 |
| -15           | 15              | 1    | 1  | 1  | 1  |
| -14           | 14              | 1    | 1  | 1  | 0  |
| -13           | 13              | 1    | 1  | 0  | 1  |
| -12           | 12              | 1    | 1  | 0  | 0  |
| -11           | 11              | 1    | 0  | 1  | 1  |
| -10           | 10              | 1    | 0  | 1  | 0  |
| -9            | 9               | 1    | 0  | 0  | 1  |
| -8            | 8               | 1    | 0  | 0  | 0  |
| -7            | 7               | 0    | 1  | 1  | 1  |
| -6            | 6               | 0    | 1  | 1  | 0  |
| -5            | 5               | 0    | 1  | 0  | 1  |
| -4            | 4               | 0    | 1  | 0  | 0  |
| -3            | 3               | 0    | 0  | 1  | 1  |
| -2            | 2               | 0    | 0  | 1  | 0  |
| -1            | 1               | 0    | 0  | 0  | 1  |
| 0             | 0               | 0    | 0  | 0  | 0  |

## ■TONE CONTROL SUB-BASS (Select Address: 02H)

| Sub-Bass<br>Cut or Boost | BCSB |
|--------------------------|------|
|                          | D2   |
| Cut                      | 0    |
| Boost                    | 1    |

|               |                 | SUB-BASS |    |
|---------------|-----------------|----------|----|
| Cut Gain (dB) | Boost Gain (dB) | D1       | D0 |
| -3            | 3               | 1        | 1  |
| -2            | 2               | 1        | 0  |
| -1            | 1               | 0        | 1  |
| 0             | 0               | 0        | 0  |

## ■TONE CONTROL TREBLE (Select Address: 03H)

| Treble<br>Cut or Boost | BCT |
|------------------------|-----|
|                        | D7  |
| Cut                    | 0   |
| Boost                  | 1   |

|               |                 | TREB |    |    |    |
|---------------|-----------------|------|----|----|----|
| Cut Gain (dB) | Boost Gain (dB) | D6   | D5 | D4 | D3 |
| -15           | 15              | 1    | 1  | 1  | 1  |
| -14           | 14              | 1    | 1  | 1  | 0  |
| -13           | 13              | 1    | 1  | 0  | 1  |
| -12           | 12              | 1    | 1  | 0  | 0  |
| -11           | 11              | 1    | 0  | 1  | 1  |
| -10           | 10              | 1    | 0  | 1  | 0  |
| -9            | 9               | 1    | 0  | 0  | 1  |
| -8            | 8               | 1    | 0  | 0  | 0  |
| -7            | 7               | 0    | 1  | 1  | 1  |
| -6            | 6               | 0    | 1  | 1  | 0  |
| -5            | 5               | 0    | 1  | 0  | 1  |
| -4            | 4               | 0    | 1  | 0  | 0  |
| -3            | 3               | 0    | 0  | 1  | 1  |
| -2            | 2               | 0    | 0  | 1  | 0  |
| -1            | 1               | 0    | 0  | 0  | 1  |
| 0             | 0               | 0    | 0  | 0  | 0  |

## ■TONE CONTROL SUB-TREBLE (Select Address : 03H)

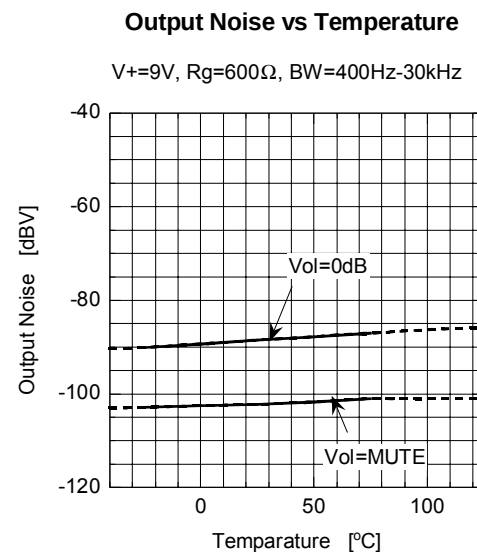
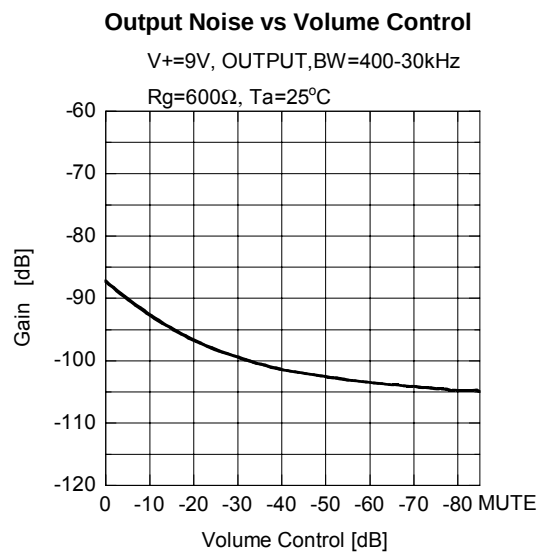
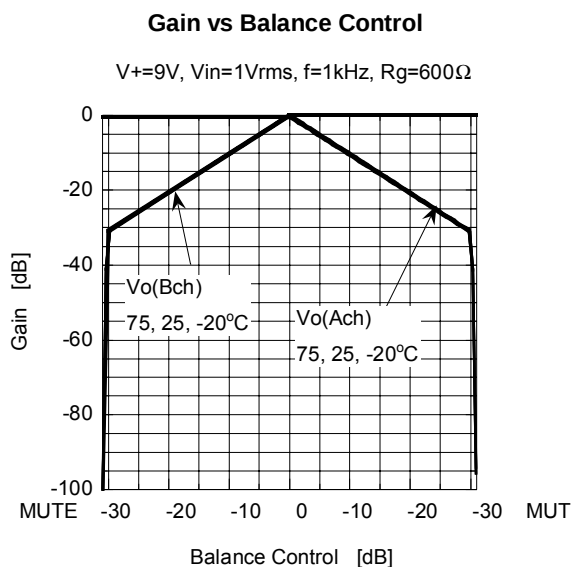
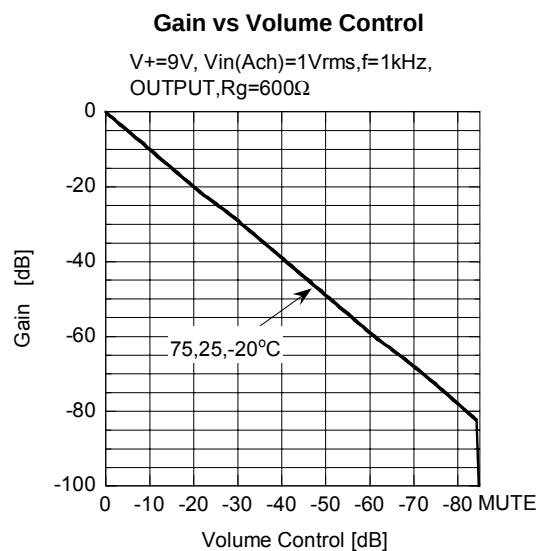
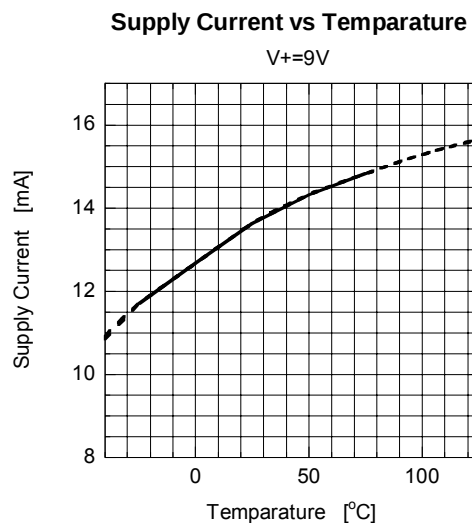
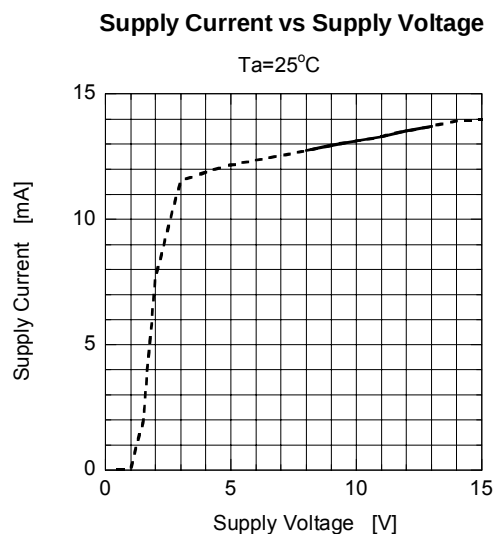
| Sub-Treble<br>Cut or Boost | BCST |
|----------------------------|------|
|                            | D2   |
| Cut                        | 0    |
| Boost                      | 1    |

|               |                 | SUB-TREB |    |
|---------------|-----------------|----------|----|
| Cut Gain (dB) | Boost Gain (dB) | D1       | D1 |
| -3            | 3               | 1        | 1  |
| -2            | 2               | 1        | 0  |
| -1            | 1               | 0        | 1  |
| 0             | 0               | 0        | 0  |

■BBE (Lo Contour) / (Process) Gain Code (Select Address: 04H)

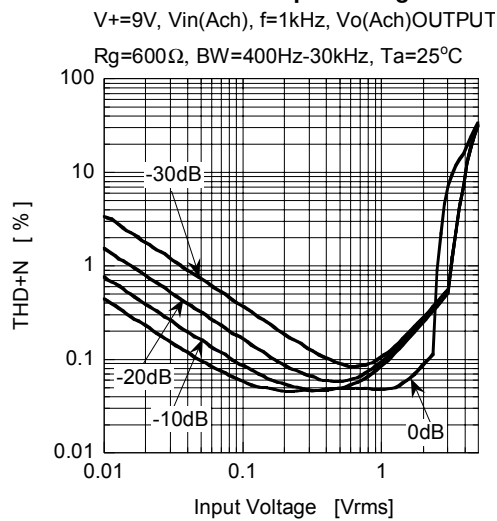
| Gain (dB) | Lo Contour |    |    |    | Process |    |    |    |
|-----------|------------|----|----|----|---------|----|----|----|
|           | D7         | D6 | D5 | D4 | D3      | D2 | D1 | D0 |
| 15        | 1          | 1  | 1  | 1  | 1       | 1  | 1  | 1  |
| 14        | 1          | 1  | 1  | 0  | 1       | 1  | 1  | 0  |
| 13        | 1          | 1  | 0  | 1  | 1       | 1  | 0  | 1  |
| 12        | 1          | 1  | 0  | 0  | 1       | 1  | 0  | 0  |
| 11        | 1          | 0  | 1  | 1  | 1       | 0  | 1  | 1  |
| 10        | 1          | 0  | 1  | 0  | 1       | 0  | 1  | 0  |
| 9         | 1          | 0  | 0  | 1  | 1       | 0  | 0  | 1  |
| 8         | 1          | 0  | 0  | 0  | 1       | 0  | 0  | 0  |
| 7         | 0          | 1  | 1  | 1  | 0       | 1  | 1  | 1  |
| 6         | 0          | 1  | 1  | 0  | 0       | 1  | 1  | 0  |
| 5         | 0          | 1  | 0  | 1  | 0       | 1  | 0  | 1  |
| 4         | 0          | 1  | 0  | 0  | 0       | 1  | 0  | 0  |
| 3         | 0          | 0  | 1  | 1  | 0       | 0  | 1  | 1  |
| 2         | 0          | 0  | 1  | 0  | 0       | 0  | 1  | 0  |
| 1         | 0          | 0  | 0  | 1  | 0       | 0  | 0  | 1  |
| 0         | 0          | 0  | 0  | 0  | 0       | 0  | 0  | 0  |

## TYPICAL CHARACTERISTICS

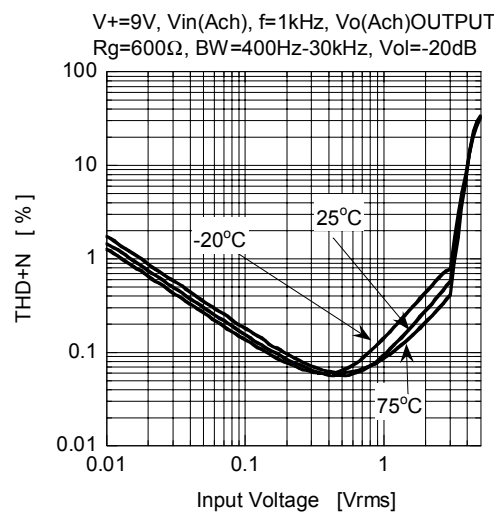


## TYPICAL CHARACTERISTICS

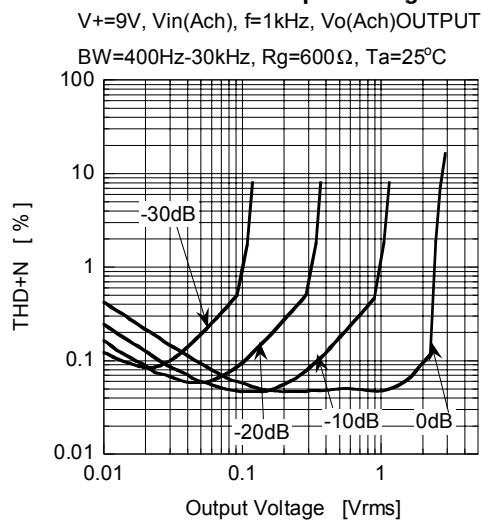
### THD+N vs Input Voltage



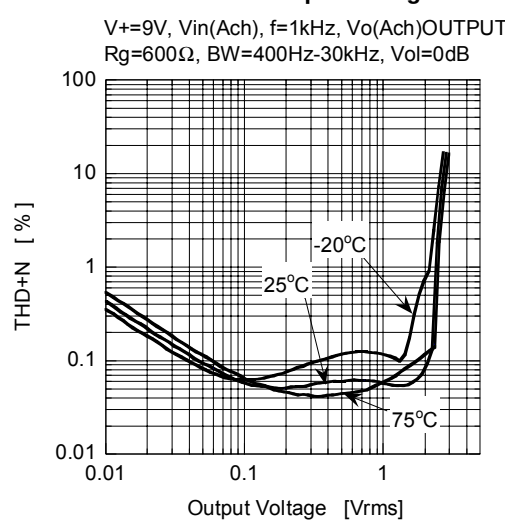
### THD+N vs Input Voltage



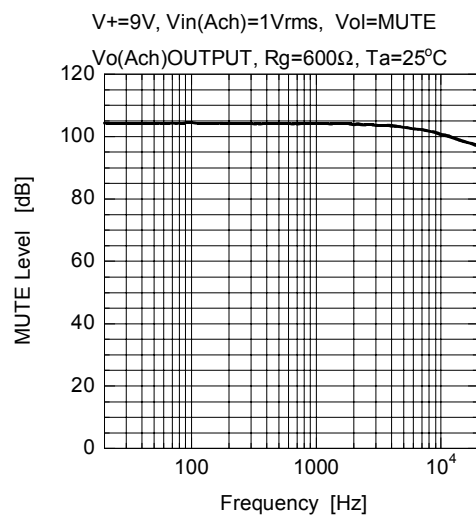
### THD+N vs Output Voltage



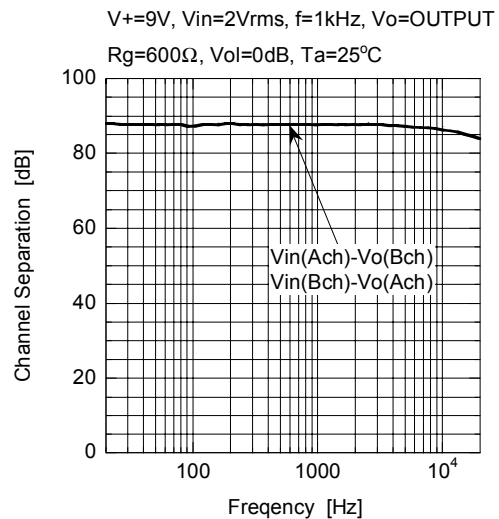
### THD+N vs Output Voltage



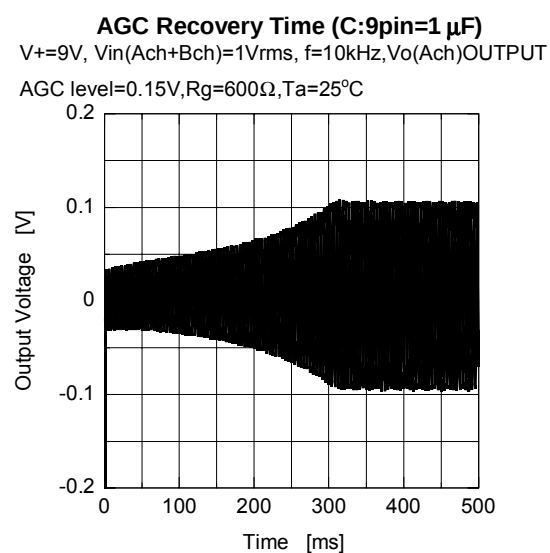
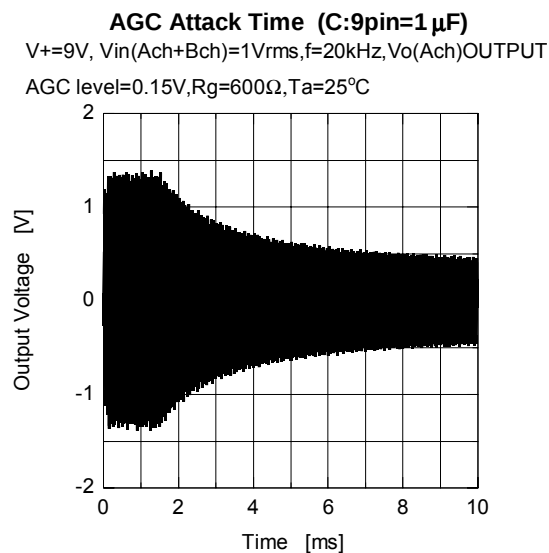
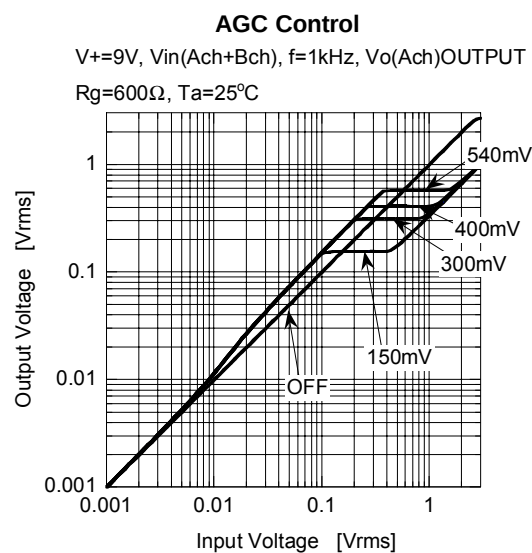
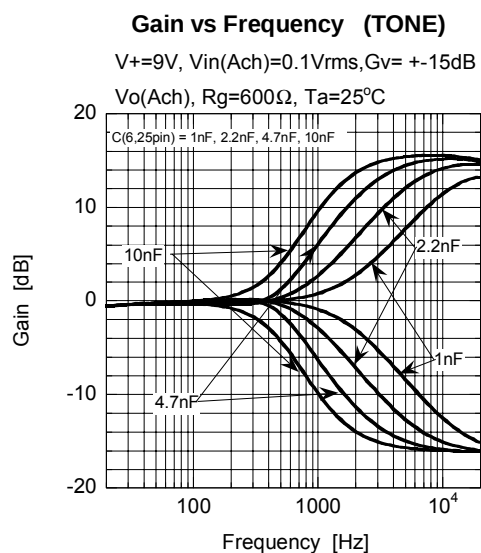
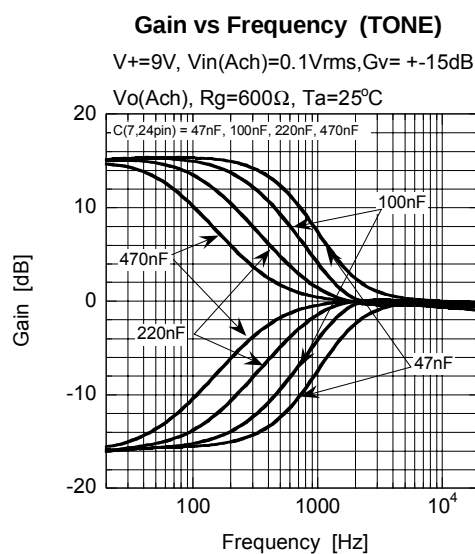
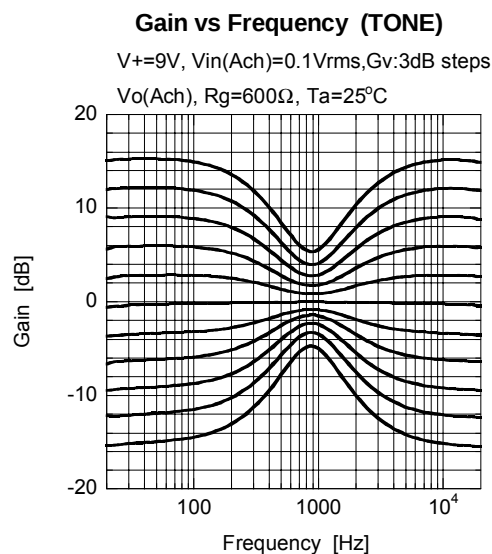
### MUTE Level vs Frequency



### Channel Separation vs Frequency



## TYPICAL CHARACTERISTICS

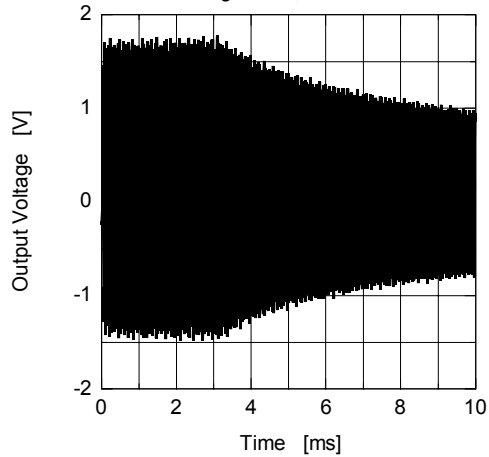


## ■TYPICAL CHARACTERISTICS

### AGC Attack Time (C:9pin=2.2 $\mu$ F)

V+=9V, Vin(Ach+Bch)=1Vrms, f=20kHz, Vo(Ach)OUTPUT

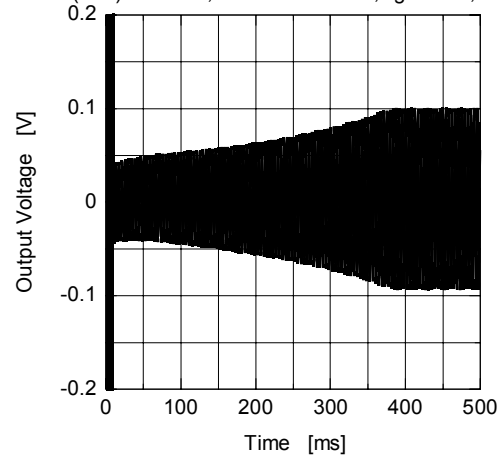
AGC level=0.15V, Rg=600 $\Omega$ , Ta=25°C



### AGC Recovery Time (C:9pin=2.2 $\mu$ F)

V+=9V, Vin(Ach+Bch)=1 to 0.05Vrms, f=10kHz,

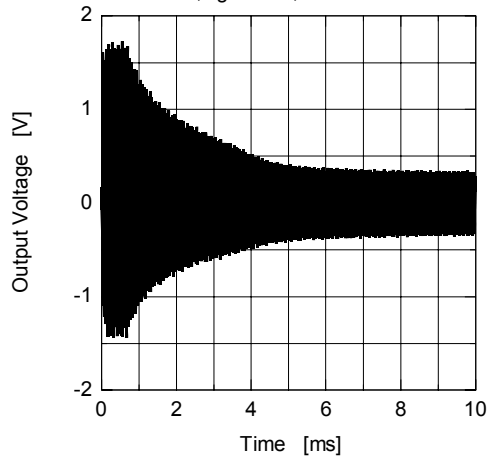
Vo(Ach)OUTPUT, AGC level=0.15V, Rg=600 $\Omega$ , Ta=25°C



### AGC Attack Time (C:9pin=0.47 $\mu$ F)

V+=9V, Vin(Ach+Bch)=1Vrms, f=20kHz, Vo(Ach)OUTPUT

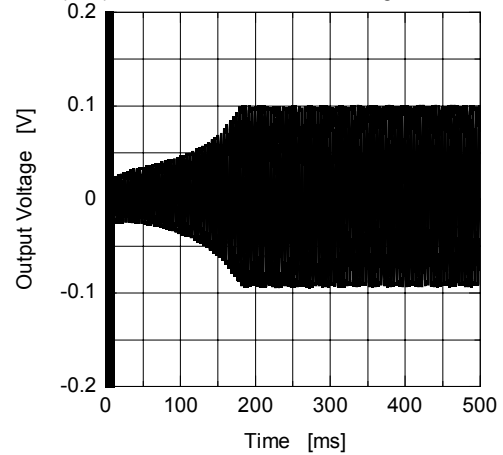
AGC level=0.15V, Rg=600 $\Omega$ , Ta=25°C



### AGC Recovery Time (C:9pin=0.47 $\mu$ F)

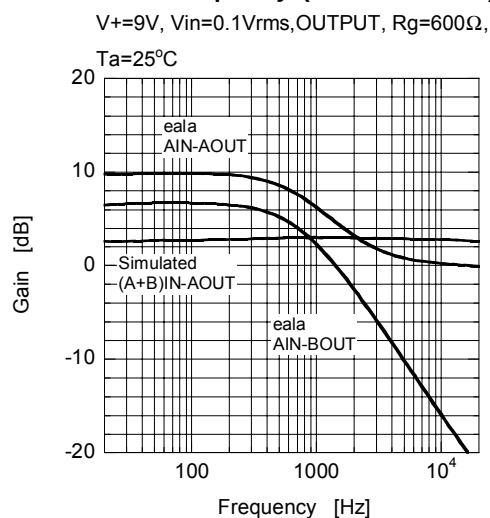
V+=9V, Vin(Ach+Bch)=1 to 0.05Vrms, f=10kHz,

Vo(Ach)OUTPUT, AGC level=0.15V, Rg=600 $\Omega$ , Ta=25°C

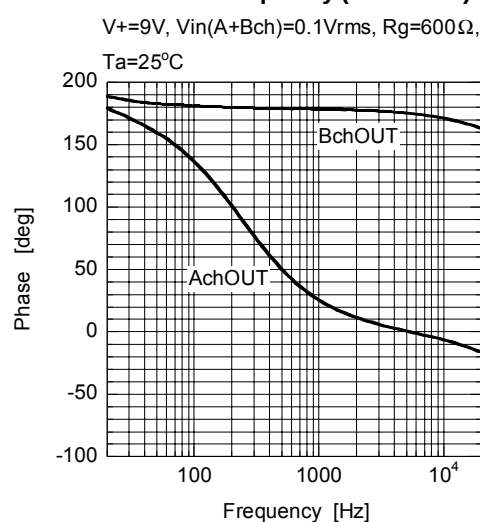


## TYPICAL CHARACTERISTICS

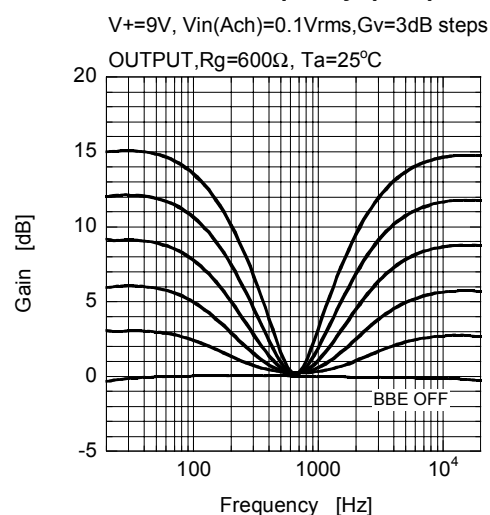
### Gain vs Frequency (eala&Simulated)



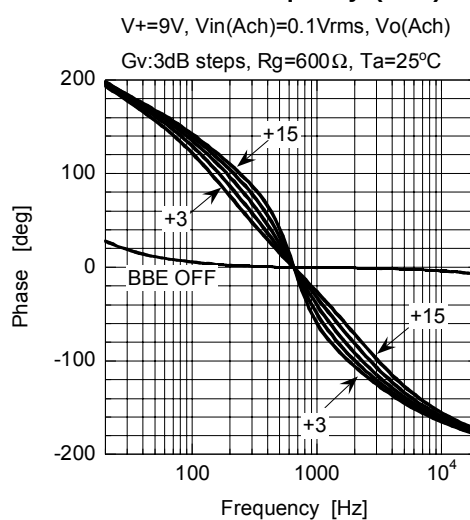
### Phase vs Frequency (Simulated)



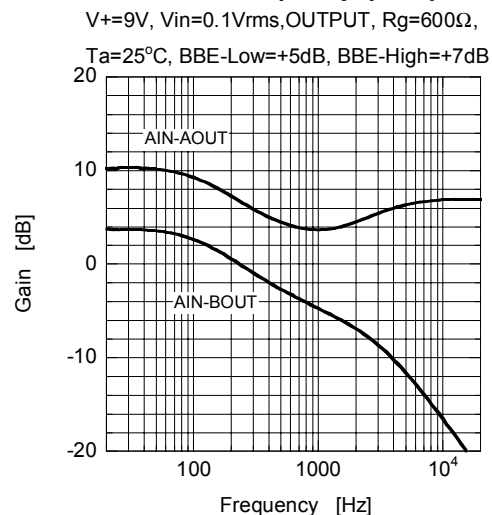
### Gain vs Frequency (BBE)



### Phase vs Frequency (BBE)



### Gain vs Frequency (ViVA)



## ■NOTE

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