

# MN3208

## 2048-STAGE LOW VOLTAGE OPERATION LOW NOISE BBD

### General description

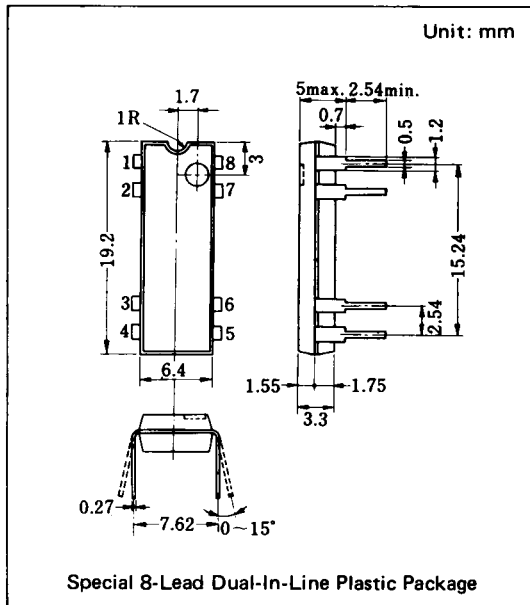
The MN3208 is a 2048-stage low voltage operation ( $V_{DD} = 5V$ ) low noise BBD that provides a signal delay of up to 102.4ms and is suitable as a device for generation of reverberation effect of audio equipment such as stereo equipments.

### Features

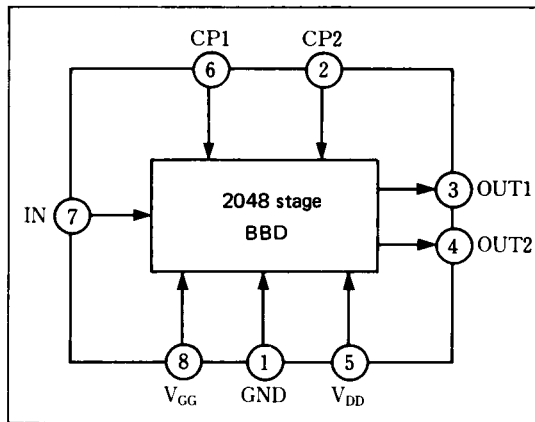
- Variable delay of audio signals: 10.24ms ~ 102.4ms.
- Wide supply voltage: 4 ~ 10V.
- Clock component cancellation capability.
- No insertion loss:  $L_i = 0dB$  typ.
- Wide dynamic range: S/N = 71dB typ.
- Low distortion: THD = 0.5% typ. ( $V_i = 0.25V_{rms}$ )
- N-channel silicon gate process.
- Special 8-lead dual-in-line plastic package.

### Applications

- Reverberation and echo effects of audio equipment such as radio cassette recorder, car radio, portable radio, portable stereo, echo microphone and pre-taped musical accompaniment (Karaoke), etc.
- Sound effect in electronic musical instruments.
- Variable or fixed delay of analog signals.
- Telephone time compression and delay line for voice communication system.



### Block Diagram



### Quick Reference Data

| Item                      | Symbol           | Value                     | Unit |
|---------------------------|------------------|---------------------------|------|
| Supply Voltage            | $V_{DD}, V_{GG}$ | + 5, $\frac{1}{3} V_{DD}$ | V    |
| Signal Delay Time         | $t_D$            | 10.24~102.4               | ms   |
| Total Harmonic Distortion | THD              | 0.5                       | %    |
| Signal to Noise Ratio     | S/N              | 71                        | dB   |

■ Absolute Maximum Ratings (Ta = 25°C)

| Item                  | Symbol   | Ratings  | Unit |
|-----------------------|--|----------|------|
| Terminal Voltage      | V <sub>DD</sub> , V <sub>GG</sub> , V <sub>CP</sub> , V <sub>I</sub> | -0.3~+11 | V    |
| Output Voltage        | V <sub>O</sub>   | -0.3~+11 | V    |
| Operating Temperature | T <sub>opr</sub>   | -20~+60  | °C   |
| Storage Temperature   | T <sub>stg</sub>   | -55~+125 | °C   |

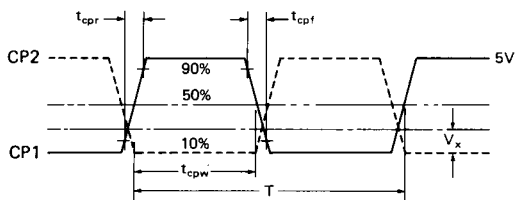
■ Operating Condition (Ta = 25°C)

| Item                    | Symbol           | Condition | Min. | Typ.                  | Max.                | Unit |
|-------------------------|------------------|-----------|------|-----------------------|---------------------|------|
| Drain Supply Voltage    | V <sub>DD</sub>  |           | +4   | +5                    | +10                 | V    |
| Gate Supply Voltage     | V <sub>GG</sub>  |           |      | $\frac{14}{15}V_{DD}$ |                     | V    |
| Clock Voltage "H" Level | V <sub>CPH</sub> |           |      | V <sub>DD</sub>       |                     | V    |
| Clock Voltage "L" Level | V <sub>CPL</sub> |           | 0    |                       | +1                  | V    |
| Clock Frequency         | f <sub>CP</sub>  |           | 10   |                       | 100                 | kHz  |
| Clock Pulse Width *1    | t <sub>CPW</sub> |           |      |                       | 0.5T *2             |      |
| Clock Rise Time *1      | t <sub>CPr</sub> |           |      |                       | 500                 | ns   |
| Clock Fall Time *1      | t <sub>CPf</sub> |           |      |                       | 500                 | ns   |
| Clock Input Capacitance | C <sub>CP</sub>  |           |      |                       | 1400                | pF   |
| Clock Cross Point *1    | V <sub>X</sub>   |           | 0    |                       | 0.3V <sub>CPH</sub> | V    |

■ Electrical Characteristics (Ta=25°C, V<sub>DD</sub>=V<sub>CPH</sub>=+5V, V<sub>CPL</sub>=0V, V<sub>GG</sub>= $\frac{14}{15}V_{DD}$ , R<sub>L</sub>=100kΩ)

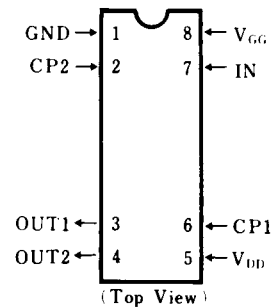
| Item                      | Symbol          | Condition  | Min.  | Typ. | Max.  | Unit  |
|---------------------------|-----------------|--|-------|------|-------|-------|
| Signal Delay Time         | t <sub>D</sub>  |  | 10.24 |      | 102.4 | ms    |
| Input Signal Frequency    | f <sub>i</sub>  | f <sub>CP</sub> = 40kHz, 3dB down (0dB at f <sub>i</sub> = 1kHz)       | 9     |      |       | kHz   |
| Input Signal Swing        | V <sub>i</sub>  | THD=2.5%   | 0.36  |      |       | Vrms  |
| Insertion Loss            | L <sub>i</sub>  | f <sub>CP</sub> =40kHz, f <sub>i</sub> =1kHz                           | -4    | 0    | 4     | dB    |
| Total Harmonic Distortion | THD             | f <sub>CP</sub> =40kHz, f <sub>i</sub> =1kHz, V <sub>i</sub> =0.25Vrms |       | 0.5  | 2.5   | %     |
| Noise                     | V <sub>no</sub> | f <sub>CP</sub> = 100kHz Weighted by "A" curve                         |       |      | 0.3   | mVrms |
| Signal To Noise Ratio     | S/N             |  |       | 71   |       | dB    |

\*1 Clock Pulse Waveforms

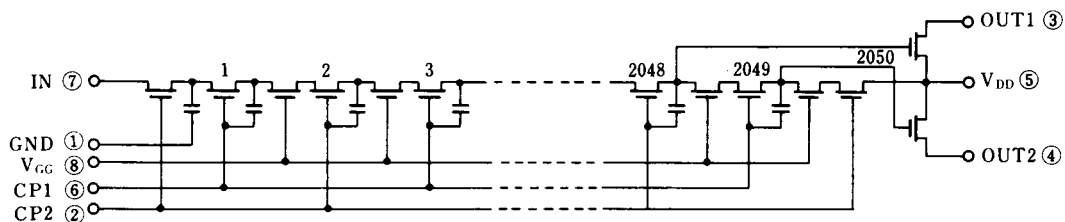


\*2 T = 1/f<sub>CP</sub> (Clock Period)

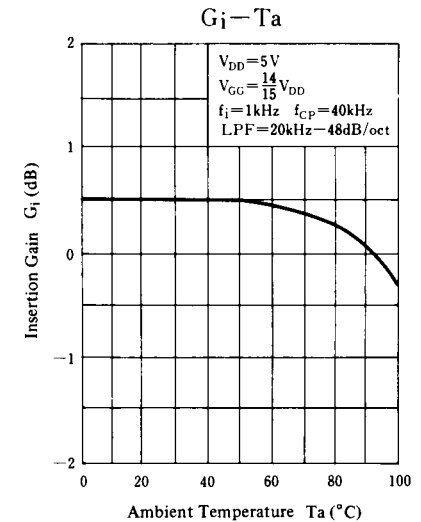
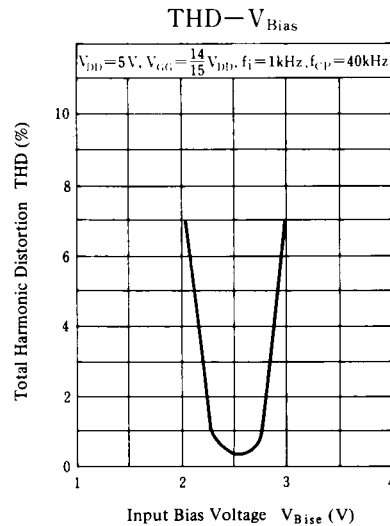
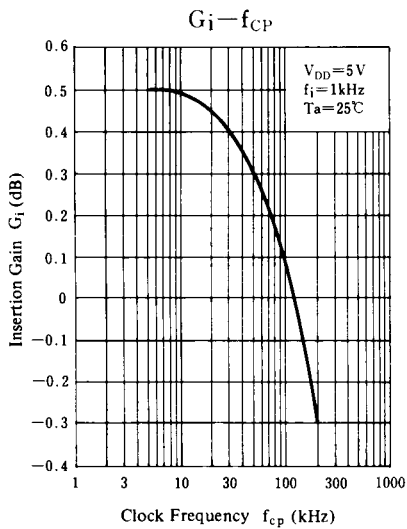
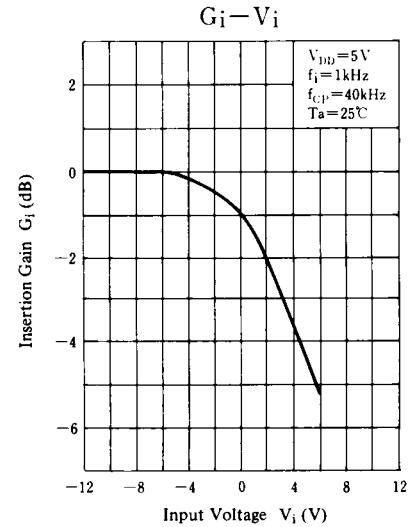
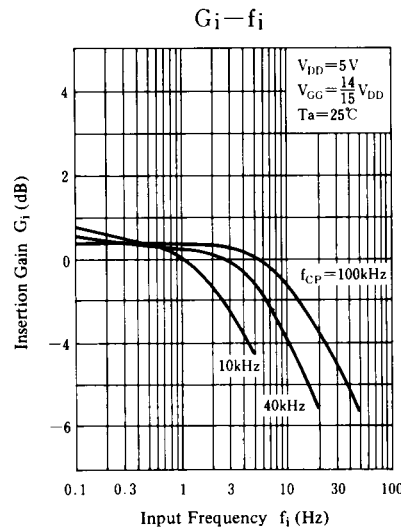
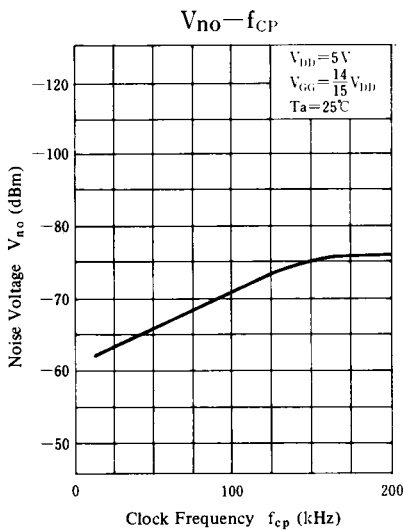
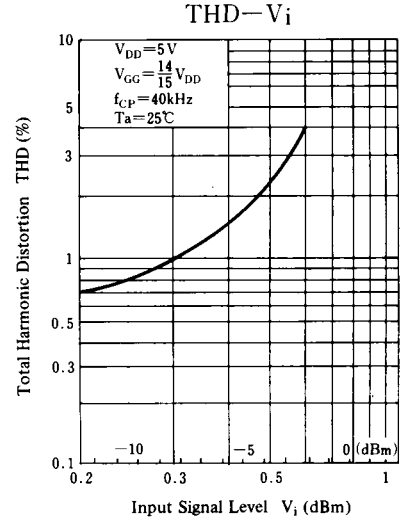
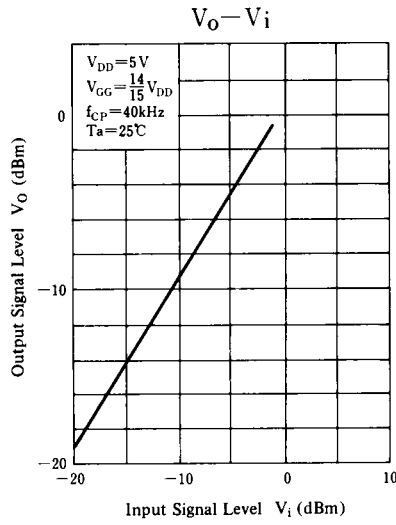
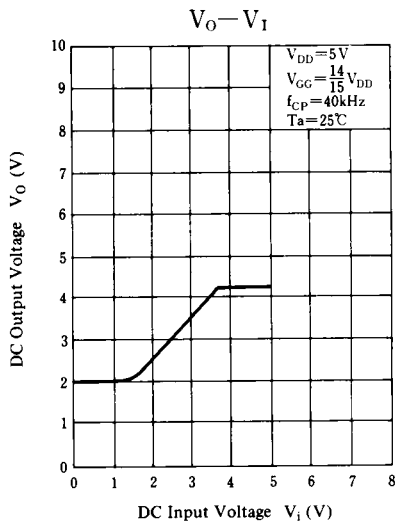
■ Terminal Assignments

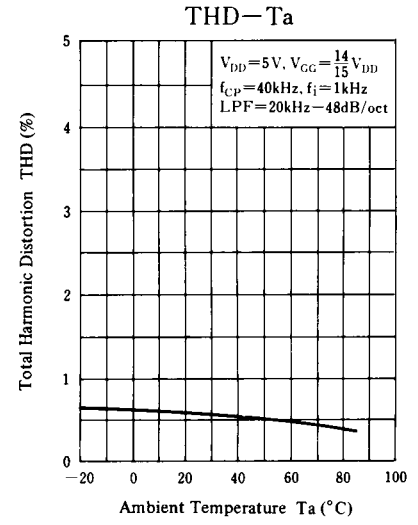
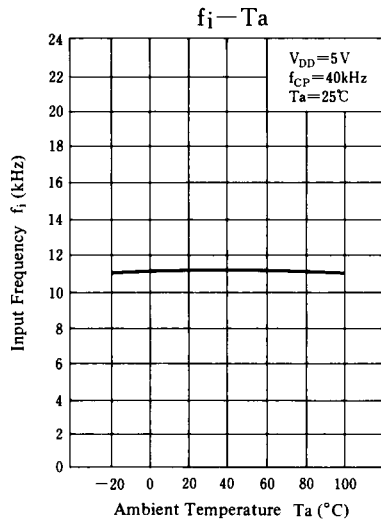
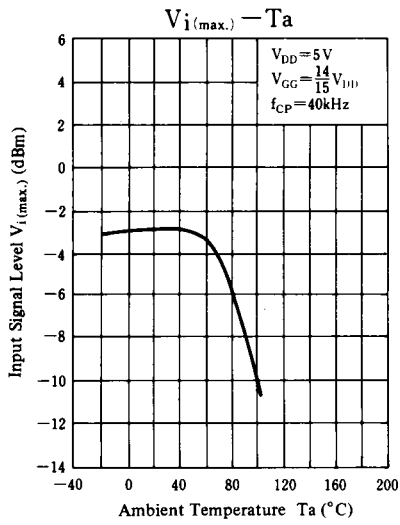


■ Circuit Diagram

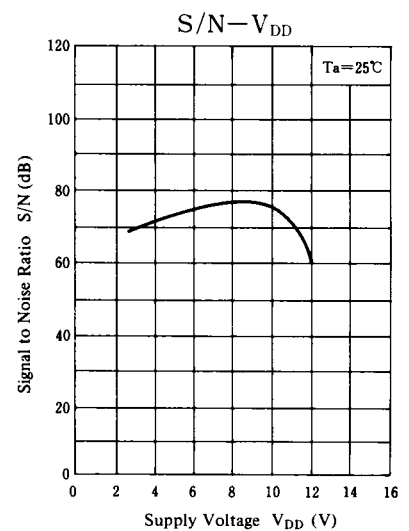
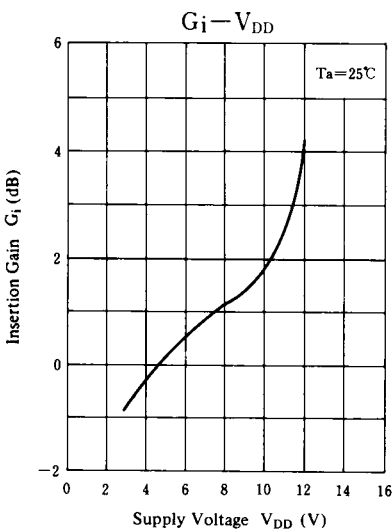
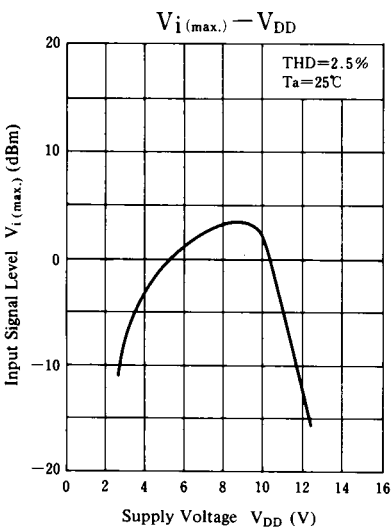
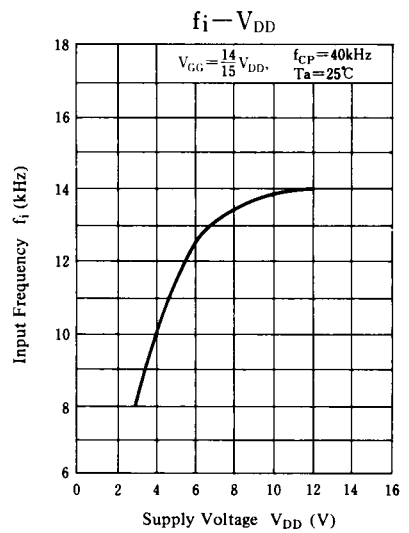
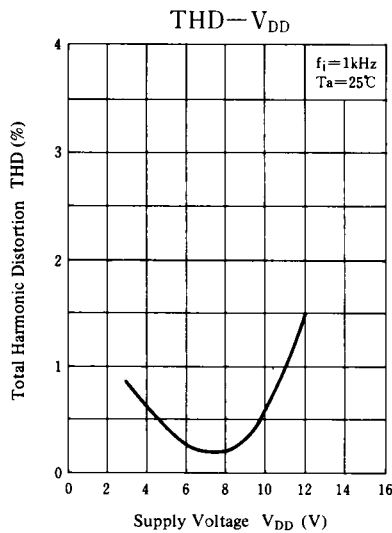
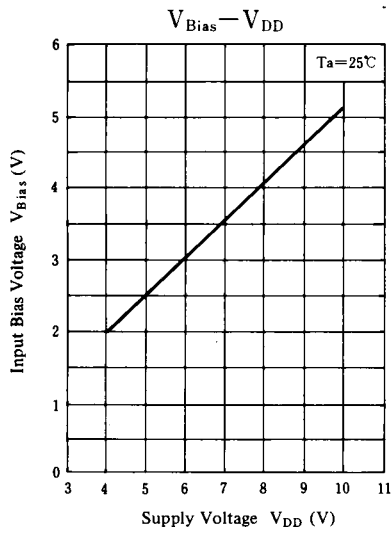


■ Typical Electrical Characteristic Curves

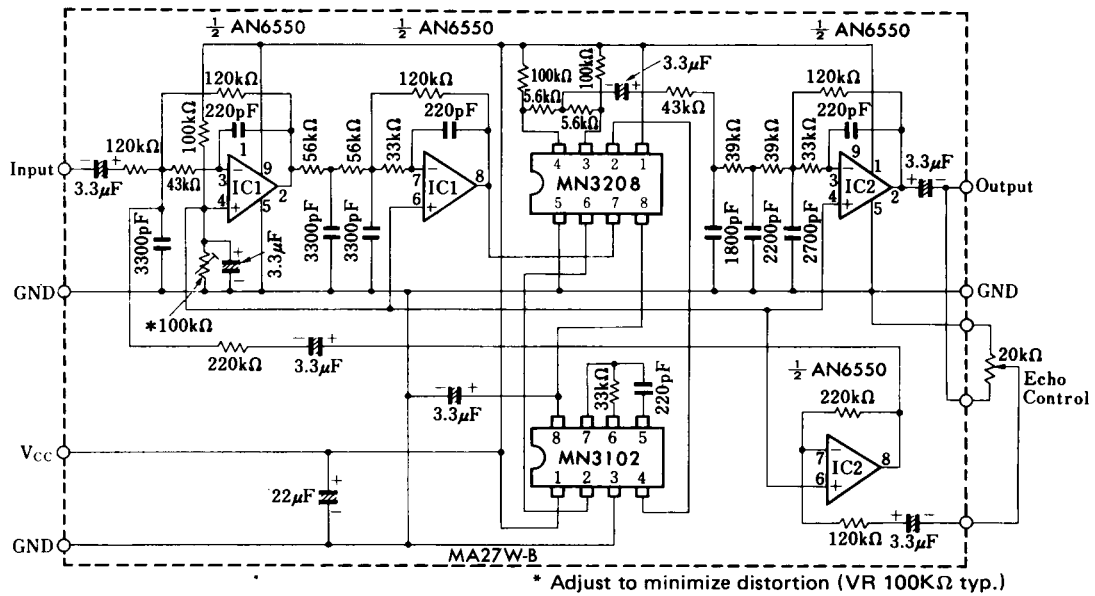




Supply Voltage Characteristics



■ Application Circuit



Reverberation Effect Generation Circuit (Signal Delay Over 100msec.)