

# MN3207

## 1024-STAGE LOW VOLTAGE OPERATION LOW NOISE BBD

### General description

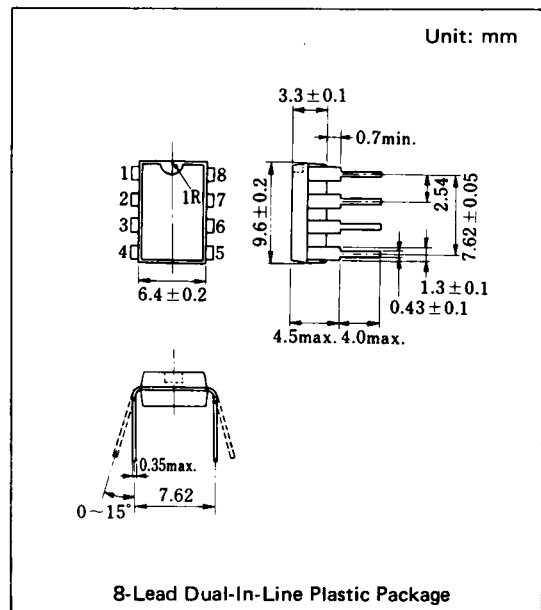
The MN3207 is a 1024-stage long delay low noise BBD that provides a signal delay of up to 51.2ms and is particularly suitable as a device for generation of reverberation effect in audio equipment such as low voltage operation portable stereo and radio cassette recorders.

### Features

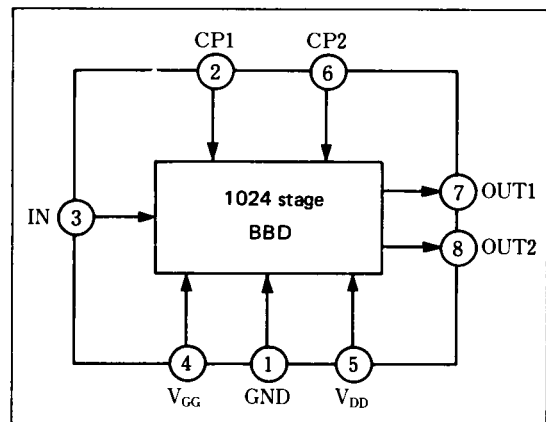
- Variable delay of audio signals: 2.56ms ~ 51.2ms.
- Wide supply voltage: 4 ~ 10V.
- No insertion loss:  $L_i = 0\text{dB typ.}$
- Wide dynamic range:  $S/N = 73\text{dB typ.}$
- Low distortion:  $\text{THD} = 0.4\% \text{ typ. (} V_i = 0.25 V_{\text{rms}} \text{)}$ .
- Clock frequency range: 10KHz ~ 200KHz.
- N-channel silicon gate process.
- 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.



### 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         | $t_D$            | 2.56~51.2                 | ms   |
| Total Harmonic Distortion | THD              | 0.4                       | %    |
| Signal to Noise Ratio     | S/N              | 73                        | dB   |

■ Absolute Maximum Ratings (Ta = 25°C)

| Item                  | Symbol   | Rating   | 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   |

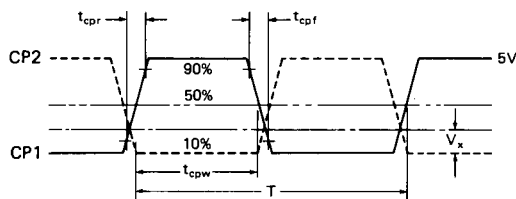
■ Operating Condition (Ta = 25°C)

| 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   |                       | 200                 | 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>  |           |      |                       | 700                 | 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> = 4.67V, R<sub>L</sub> = 100kΩ)

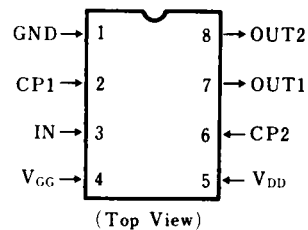
| Item                      | Symbol          | Condition  | Min. | Typ. | Max. | Unit  |
|---------------------------|-----------------|--|------|------|------|-------|
| Signal Delay Time         | t <sub>D</sub>  |  | 2.56 |      | 51.2 | ms    |
| Input Signal Frequency    | f <sub>i</sub>  | f <sub>CP</sub> = 40kHz, V <sub>i</sub> = 0.35Vrms<br>3dB down (0dB at f <sub>i</sub> = 1kHz) = 1kHz | 10   |      |      | kHz   |
| Input Signal Swing        | V <sub>i</sub>  | f <sub>CP</sub> = 40kHz, f <sub>i</sub> = 1kHz, THD = 2.5%   | 0.36 |      |      | Vrms  |
| Insertion Loss            | L <sub>i</sub>  | f <sub>CP</sub> = 40kHz, f <sub>i</sub> = 1kHz, V <sub>i</sub> = 0.36Vrms                            | -4   | 0    | 4    | dB    |
| Total Harmonic Distortion | THD             | f <sub>CP</sub> = 40kHz, f <sub>i</sub> = 1kHz, V <sub>i</sub> = 0.25Vrms                            |      | 0.4  | 2.5  | %     |
| Noise Voltage             | V <sub>no</sub> | f <sub>CP</sub> = 100kHz, Weighted by "A" curve  |      |      | 0.25 | mVrms |
| Signal to Noise Ratio     | S/N             |  |      | 73   |      | dB    |

\*1 Clock Pulse Waveforms

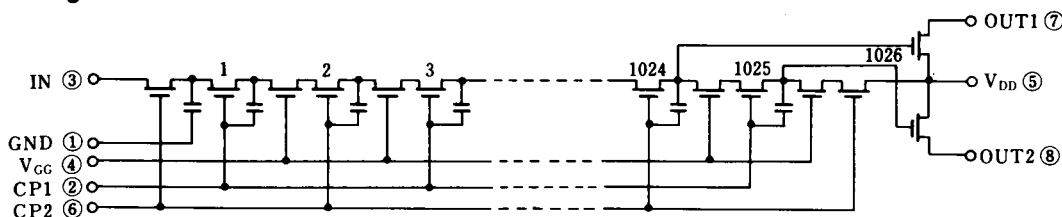


\*2 T = 1/f<sub>CP</sub> (Clock Period)

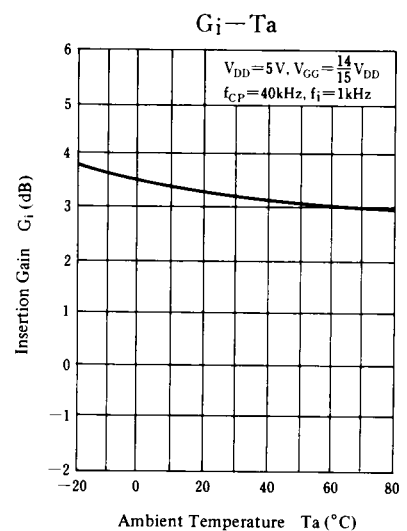
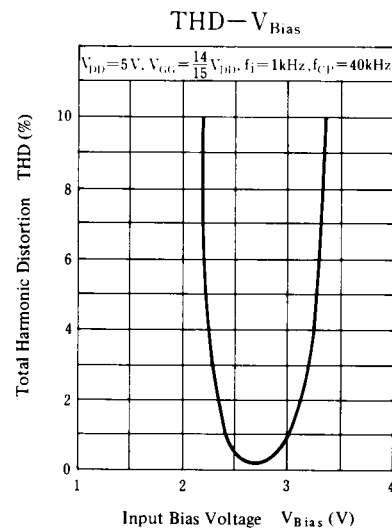
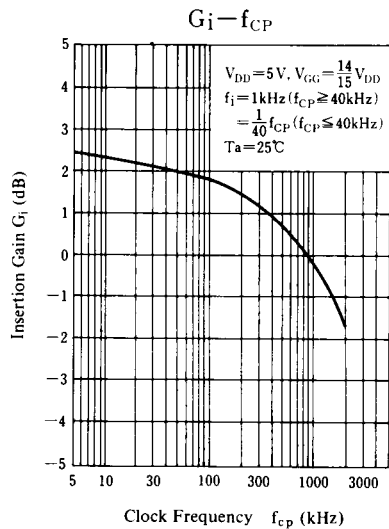
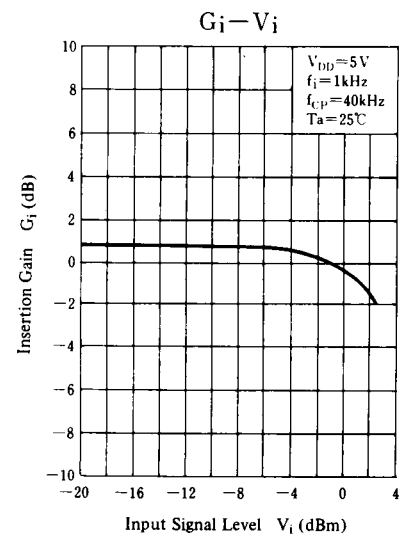
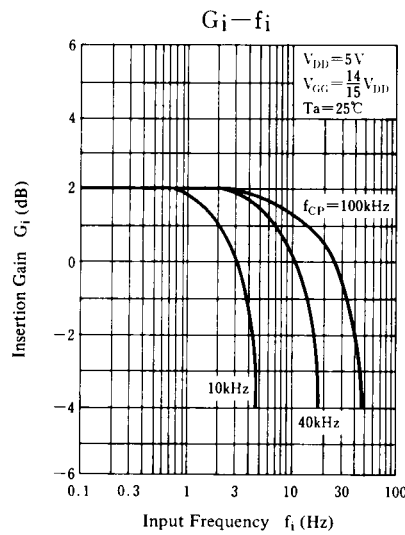
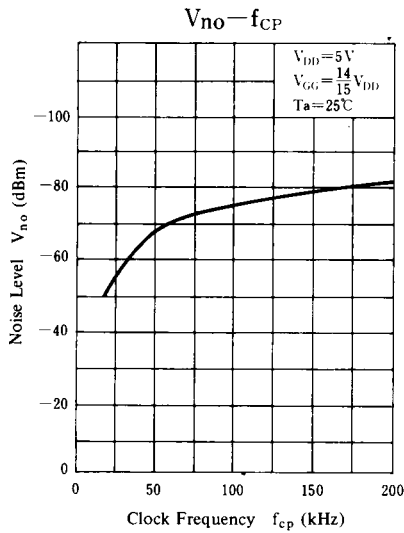
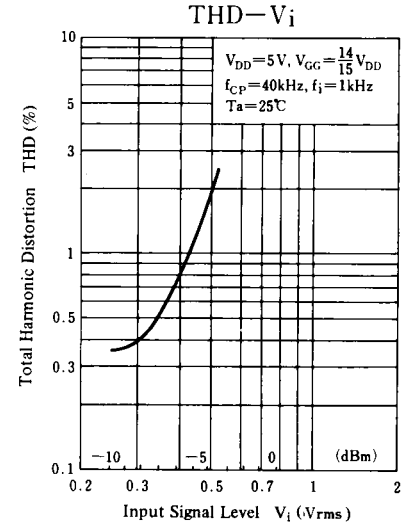
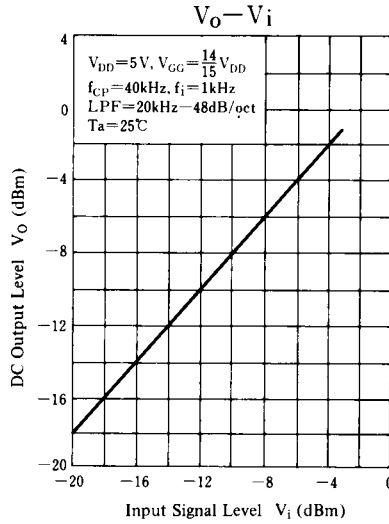
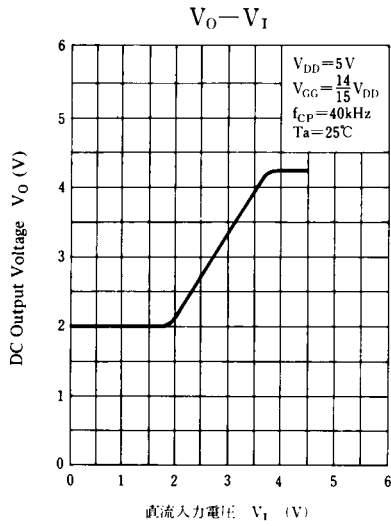
■ Terminal Assignments

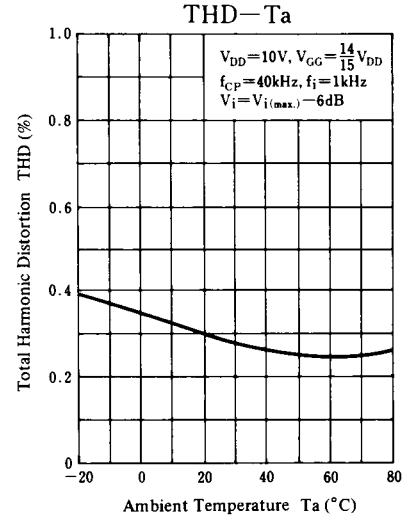
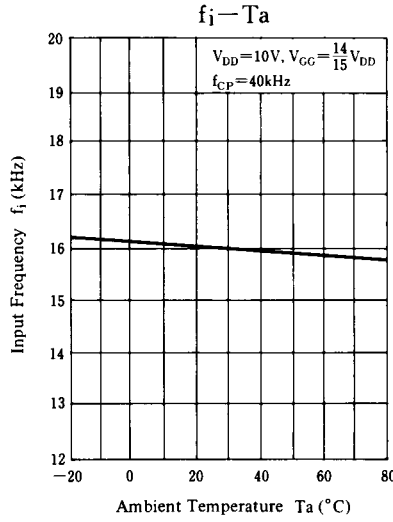
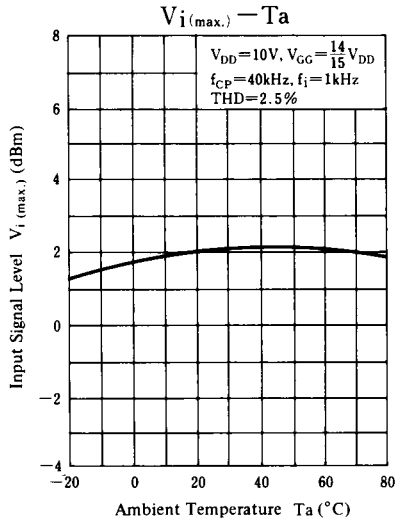


■ Circuit Diagram

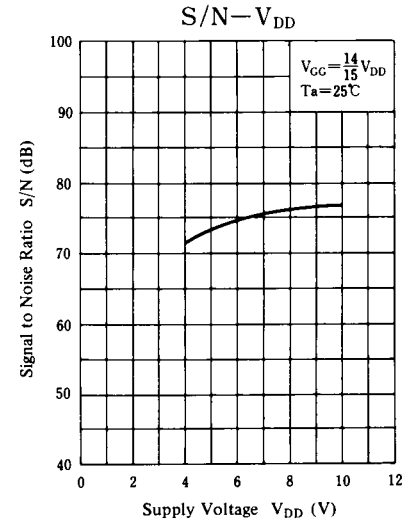
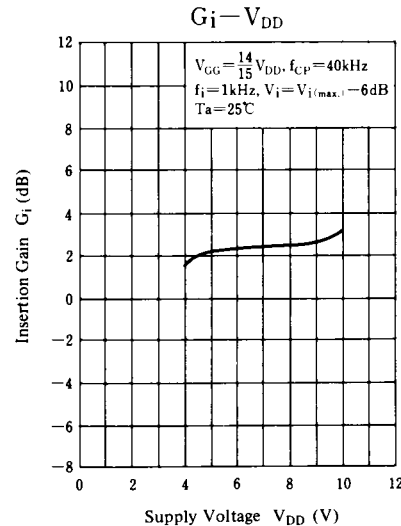
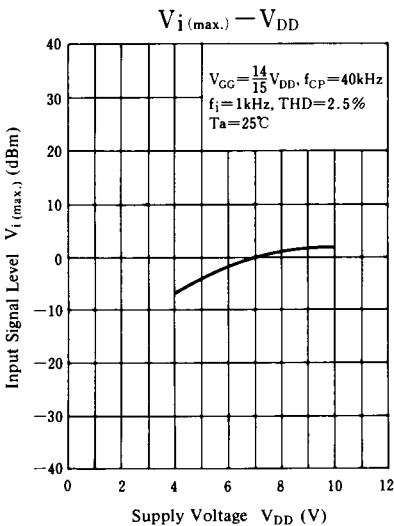
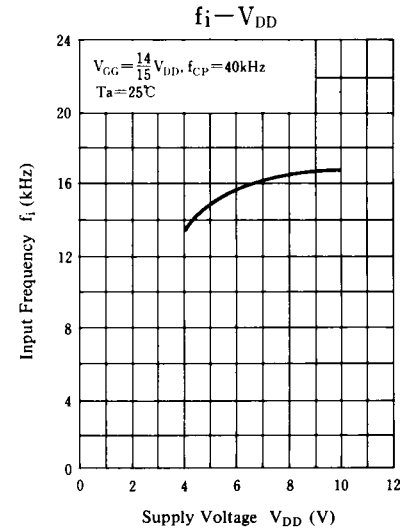
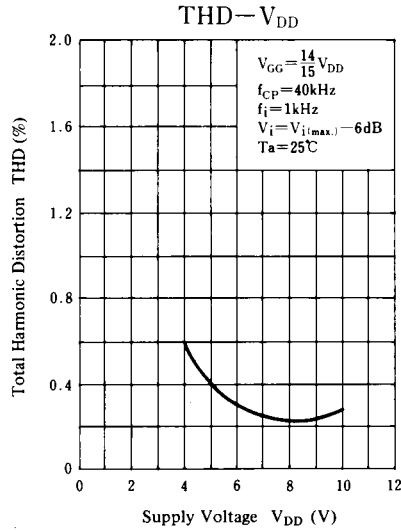
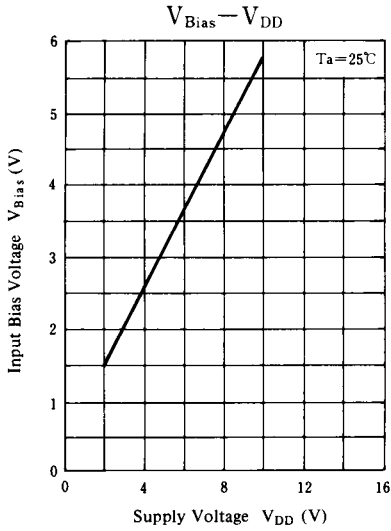


■ Typical Electrical Characteristic Curves

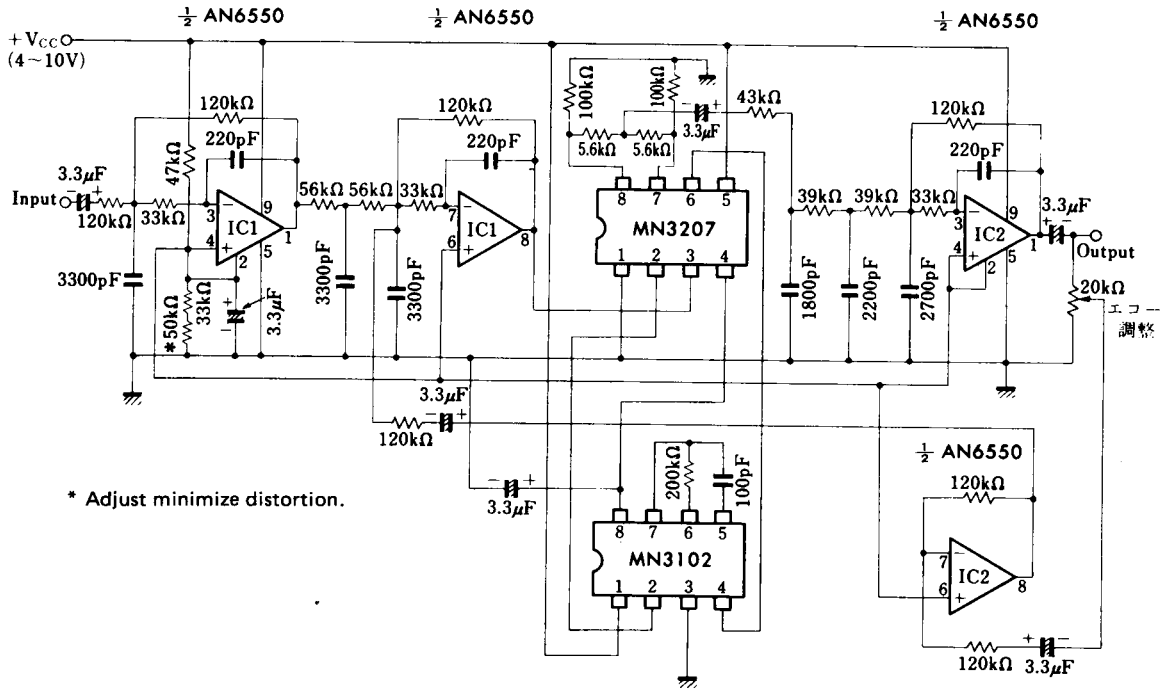




■ Supply Voltage Characteristics



■ Application Circuit



Echo Effect Generation Circuit