# NTE1641
# Integrated Circuit
## 1024 Stage BBD for Audio Signal Delays

## Description:

The NTE1641 is a 1024–stage long delay low noise BBD that provides a signal delay of up to 51.2msec. This device is suitable for use as the reverberation effect of an electronic musical instrument, or in stereo equipment, due to its long delay times.

## Features:

- Variable delay time of audio signal:  5.12ms to 51.2ms.
- Clock component cancellation capability.
- No insertion loss:  $L_i$ = 0dB typ.
- Wide dynamic range: S/N $\cong$ 80dB typ.
- Wide frequency response:  $f_i \leq$ 12kH$_Z$.
- Low distortion:  THD = 0.5% typ. ($V_i$ = 0.78V$_{rms}$)
- Clock frequency range:  10 to 100kH$_Z$.
- P channel silicon gate process.
- 8–Lead DIP plastic package.

## Applications:

- Reverberation effect  echo for P.A. and stereo equipment.
- Chorus effect in electronic musical instruments.
- Variable or fixed delay of analog signals
- Telephone time compression and delay line for voice communication systems, etc.

## Absolute Maximum Ratings:  ($T_A$ = +25°C unless otherwise specified)

Pin Voltage, $V_{DD}$, $V_{GG}$, $V_{CP}$, $V_I$ . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −18V to +0.3V

Output Voltage, $V_O$ . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −18V to +0.3V

Operating Ambient Temperature Range, $T_{opr}$ . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −20° to +60°C

Storage Temperature Range, $T_{stg}$ . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . −55° to +125°C

**Operating Conditions:** ($T_A$ = +25°C unless otherwise specified)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain Supply Voltage | $V_{DD}$ | | −14 | −15 | −16 | V |
| Gate Supply Voltage | $V_{GG}$ | | − | $V_{DD}+1$ | − | V |
| Clock Voltage "H" Level | $V_{CPH}$ | | 0 | − | −1 | V |
| Clock Voltage "L" Level | $V_{CPL}$ | | − | $V_{DD}$ | − | V |
| Clock Frequency | $f_{CP}$ | | 10 | − | 100 | $kH_Z$ |
| Clock Pulse Width | $t_{W(CP)}^2$ | | | | $0.5T^1$ | − |
| Clock Rise Time | $t_{r(CP)}^2$ | | − | − | 500 | µs |
| Clock Fall Time | $t_{f(CP)}^2$ | | − | − | 500 | ns |
| Clock Input Capacitance | $C_{CP}$ | | − | − | 700 | V |
| Clock Cross Point | $V_X^2$ | | 0 | − | −3 | V |
| Input DC Bias Voltage | $V_{Bias}$ | | −5 | − | −10 | V |

**Electrical Characteristics:** ($T_A$ = +25°C, $V_{DD}$ = $V_{CPL}$ = −15V, $V_{CPH}$ = 0V, $V_{GG}$ = −14V, $R_L$ = 100kΩ)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Signal Delay Time | $t_D$ | | 5.12 | − | 51.2 | ms |
| Input Singal Frequency | $f_i$ | $f_{CP}$ = 40kHz, $V_i$ = 1.5Vrms, 3dB down (0dB at $f_i$ = $1kH_Z$) | 12 | − | − | $kH_Z$ |
| Input Voltage Amplitude | $\upsilon i$ | $f_{CP}$ = $40kH_Z$, fi = $1kH_Z$, THD = 2.5% | 1.5 | − | − | $V_{rms}$ |
| Insertion Loss | Li | $f_{CP}$ = $40kH_Z$, fi = $1kH_Z$, $V_i$ = $1.5V_{rms}$ | −4 | 0 | 4 | dB |
| Total Harmonic Distortion | THD | $f_{CP}$ = $40kH_Z$, fi = $1kH_Z$, $V_i$ = $0.78V_{rms}$ | − | 0.5 | 2.5 | % |
| Output Noise Voltage | $V_{no}$ | $f_{CP}$ = $100kH_Z$, Weighted by "A" curve | − | − | 0.3 | $mV_{rms}$ |
| Signal to noise ratio | S/N | | − | 80 | − | dB |

Note 1. T = $1/f_{cp}$ (Clock Period)
Note 2. Clock pulse waveforms

**Pin Connection Diagram**

| | | |
|---|---|---|
| GND | **1** | **8** Output 2 |
| CP 1 | **2** | **7** Output 1 |
| Input | **3** | **6** CP 2 |
| $V_{GG}$ | **4** | **5** $V_{DD}$ |

8          5

.256 (6.52) Max

1          4

.393 (10.0) Max

.150 (3.81)

.300 (7.62)

.100 (2.54)

.070 (1.77) Min

.300 (7.62)