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## **NTE1648 and NTE1649 Integrated Circuit Telephone Tone Ringer**

**Description:**

The NTE1648 and NTE1649 are bipolar integrated circuits in an 8-Lead DIP type package designed for telephone bell replacement.

**Functions:**

- Two Oscillators
- Output Amplifier
- Power Supply Control Circuit

**Features:**

- Designed for Telephone Bell Replacement
- Low Current Drain
- Small Size 8-Lead MINIDIP Package
- Adjustable 2-Frequency Tone
- Adjustable Warbling Rate
- Built-in Hysteresis Prevents False Triggering and Rotary Dial "CHIRPS"
- Extension Tone Ringer Modules
- Alarms or Other Altering Devices
- External Triggering or Ringer Disable (NTE1648)
- Adjustable for Reduced Supply Initiation Current (NTE1649)

**Absolute Maximum Ratings:** ( $T_A = +25^{\circ}\text{C}$  unless otherwise specified)

|  |   |
|--|---|
| Supply Voltage, $V_{CC}$ .....               | 30V                                     |
| Power Dissipation, $P_D$ .....               | 400mW                                   |
| Operating Temperature Range, $T_{opr}$ ..... | $-45^{\circ}$ to $+65^{\circ}\text{C}$  |
| Storage Temperature Range, $T_{stg}$ .....   | $-65^{\circ}$ to $+150^{\circ}\text{C}$ |

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ , All voltage referenced to GND unless otherwise specified)

| Parameter                 | Symbol          | Test Conditions   | Min | Typ  | Max            | Unit          |
|---------------------------|-----------------|---|-----|------|----------------|---------------|
| Operating Supply Voltage  | $V_{CC}$        |   | –   | –    | 29             | V             |
| Initiation Supply Voltage | $V_{SI}$        | Note 1  | 17  | 19   | 21             | V             |
| Initiation Supply Current | $I_{SI}$        | NTE1649–6.8k–Pin2 to GND, Note 1  | 1.4 | 2.5  | 4.2            | mA            |
| Sustaining Voltage        | $V_{SUS}$       | Note 2  | 9.7 | 11.0 | 12.0           | V             |
| Sustaining Current        | $I_{SUS}$       | No Load, $V_{CC} = V_{SUS}$ , Note 2                                    | 0.7 | 1.4  | 2.5            | mA            |
| Trigger Voltage           | $V_{TR}$        | NTE1648 ONLY, $V_{CC} = 15\text{V}$ , Note 3                            | 9.0 | 10.5 | 12.0           | V             |
| Trigger Current           | $I_{TR}$        | NTE1648 ONLY, Note 3  | –   | 20.0 | 1000<br>Note 5 | $\mu\text{A}$ |
| Disable Voltage           | $V_{DIS}$       | NTE1648 ONLY, Note 4  | –   | –    | 0.5            | V             |
| Disable Current           | $I_{DIS}$       | NTE1648 ONLY, Note 4  | –40 | –50  | –              | $\mu\text{A}$ |
| Output Voltage High       | $V_{OH}$        | $V_{CC} = 21\text{V}$ , $I_B = -15\text{mA}$ ,<br>Pin6 = 6V, Pin7 = GND | 17  | 19   | 21             | V             |
| Output Voltage Low        | $V_{OL}$        | $V_{CC} = 21\text{V}$ , $I_B = 15\text{mA}$ ,<br>Pin6 = 6V, Pin7 = GND  | –   | –    | 1.6            | V             |
| Sink Current              | $I_{IN}$ (Pin3) | Pin3 = 6V, Pin4 = GND   | –   | –    | 500            | nA            |
|                           | $I_{IN}$ (Pin7) | Pin7 = 6V, Pin6 = GND   | –   | –    | 500            | nA            |
| High Frequency            | $f_{H1}$        | $R_3 = 191\text{k}$ , $C_3 = 6800\text{pf}$                             | 461 | 512  | 563            | Hz            |
|                           | $f_{H2}$        | $R_3 = 191\text{k}$ , $C_3 = 6800\text{pf}$                             | 576 | 640  | 704            | Hz            |
| Low Frequency             | $f_L$           | $R_2 = 165\text{k}$ , $C_2 = 0.47\mu\text{f}$                           | 9   | 10   | 11             | Hz            |

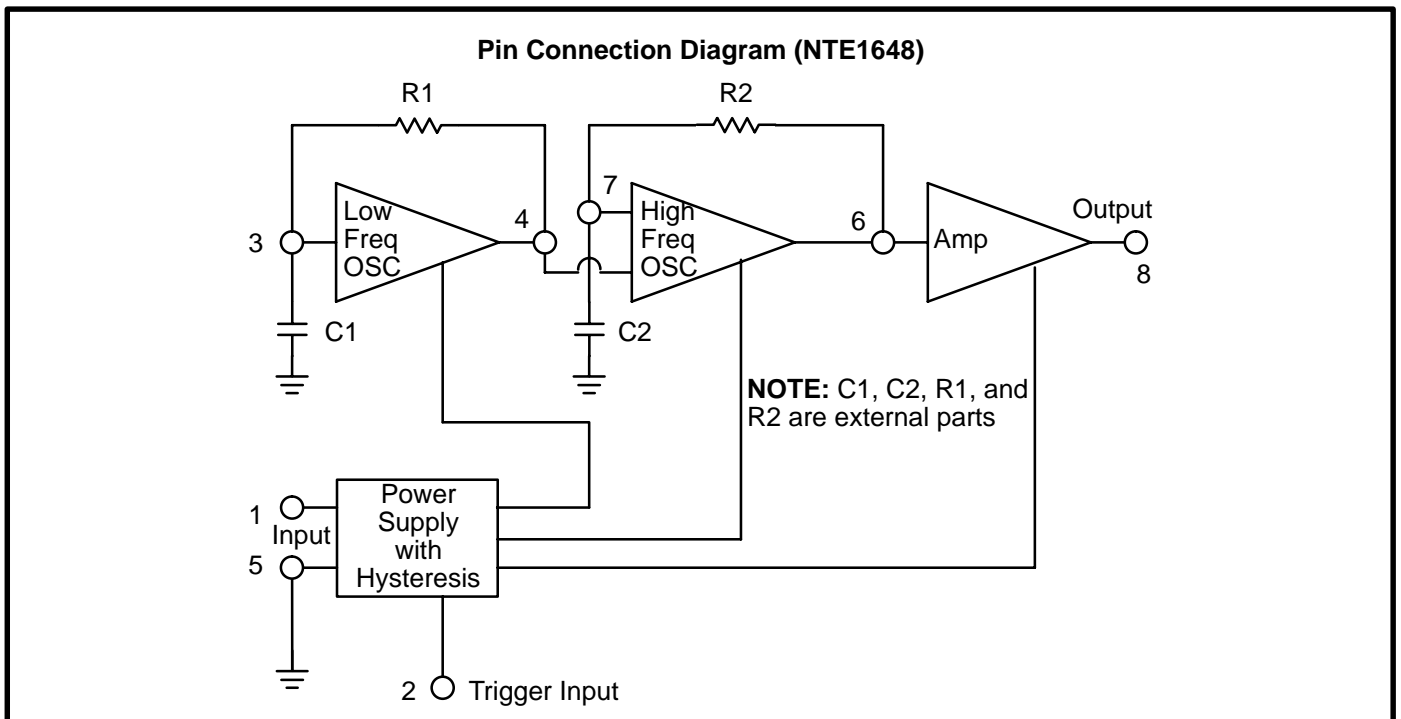
Note 1. Initiation supply voltage ( $V_{SI}$ ) is the supply voltage required to start the tone ringer oscillating.

Note 2. Sustaining voltage ( $V_{SUS}$ ) is the supply voltage required to maintain oscillation.

Note 3.  $V_{TR}$  and  $I_{TR}$  are the conditions applied to trigger in to start oscillation for  $V_{SUS} \leq V_{CC} \leq V_{SI}$ .

Note 4.  $V_{DIS}$  and  $I_{DIS}$  are the conditions applied to trigger in to inhibit oscillation for  $V_{SI} \leq V_{CC}$ .

Note 5. Trigger current must be limited to this value externally.



### Pin Connection Diagram (NTE1649)

