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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 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	$V_{OH}$	$V_{CC} = 21\text{V}$ , $I_B = -15\text{mA}$ , Pin6 = 6V, Pin7 = GND	17	19	21	V
Output Voltage Low	$V_{OL}$	$V_{CC} = 21\text{V}$ , $I_B = 15\text{mA}$ , 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

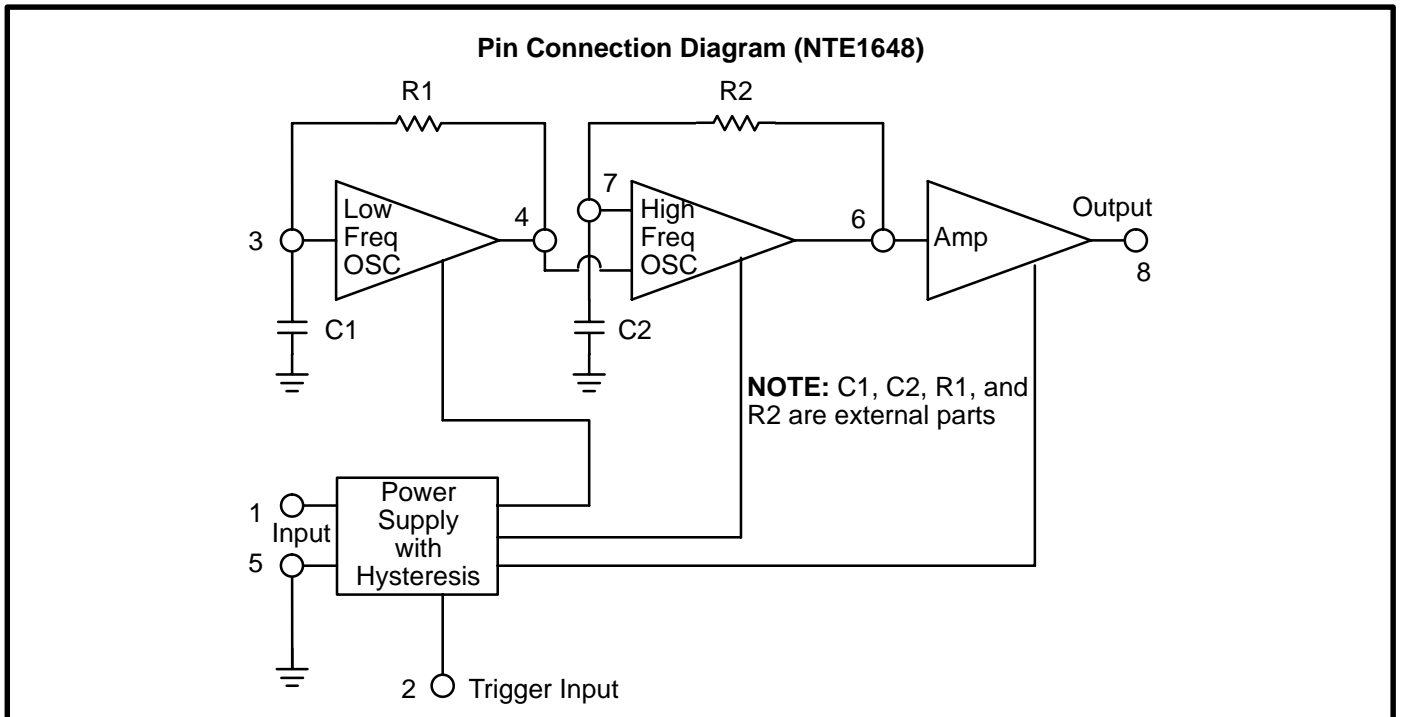
Note 1. Initiation supply voltage ( $V_{SI}$ ) is the supply voltage required to start the tone ringer oscillating.

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)

