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## NTE1693 Integrated Circuit Telephone Pulse Dialer (CMOS)

**Description:**

The NTE1693 is a CMOS LSI pulse dialer in a 16-Lead DIP type package with redial which integrates a ceramic resonator as a frequency reference.

**Features:**

- Make Ratio: 33/39% Pin-Selectable.
- Pulse Output: "1" True
- Mute Output: "0" True
- 17-Digit Redial with either \* or # Input
- Uses a Ceramic Oscillator as a Frequency Reference
- Direct Telephone Line Operation
- Uses either a Standard 2-of-7 Matrix Keyboard or a Single Contact Keyboard
- Mute Signal Generated on Pulse Signal

**Absolute Maximum Ratings:**

Supply Voltage (Note 1), $V_{DD}$ .....	-0.3 to +6.2V
Maximum Pin Voltage	
$V_{IN1}$ (Note 2) .....	-0.3V
$V_{IN2}$ (Note 3) .....	+0.3V
Maximum Power Dissipation ( $T_A = +25^{\circ}C$ ), $P_D$ .....	500mW
Operating Temperature Range, $T_{opr}$ .....	-30° to +60°C
Storage Temperature Range, $T_{stg}$ .....	-55° to +150°C

Note 1. Referenced to GND

Note 2. The maximum applicable voltage or any pin with respect to GND

Note 3. The maximum applicable voltage on any pin with respect to  $V_{DD}$

**Recommended Operating Conditions:**

Supply Voltage, $V_{DD}$ .....	2.5 to 6.0V
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**DC Electrical Characteristics:** ( $T_A = -30^\circ$  to  $+60^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Key Contact Resistance	$R_{KI}$		–	–	1	$k\Omega$
Keyboard Capacitance	$C_{KI}$		–	–	30	$\mu\text{F}$
Input Voltage	$K_{1H}$	2-of-7 input mode, Note 4	$0.8V_{DD}$	–	$V_{DD}$	V
			GND	–	$0.2V_{DD}$	V
Key Pull-Up Resistance	$K_{IRU}$	$V_{DD} = 6.0\text{V}$ , $V_{IN} = 4.8\text{V}$	–	4	–	$k\Omega$
Key Pull-Down Resistance	$K_{IRD}$		–	100	–	$k\Omega$
$\overline{\text{MUTE}}$ Sink Current	$I_M$	$V_{DD} = 2.5\text{V}$ , $V_{OUT} = 0.5\text{V}$ , Note 5	500	–	–	$\mu\text{A}$
Pulse Output Sink Current	$I_P$	$V_{DD} = 2.5\text{V}$ , $V_{OUT} = 0.5\text{V}$ , Note 6	1.0	–	–	$\text{mA}$
$V_{DD}-V_{RFF}$ Value	$V_{REF}$	$I_{SUPPLY} = 150\mu\text{A}$ , Note 7	1.5	2.5	3.5	V
Memory Retention Current	$I_{MR}$	All outputs in no-load state	–	0.7	–	$\mu\text{A}$
Operating Current	$I_{OP}$	All outputs in no-load state	–	100	150	$\mu\text{A}$
$\overline{\text{MUTE}}$ , PULSE Leakage	$I_{LKG}$	$V_{DD} = 6.0\text{V}$ , $V_{OUT} = 6.0\text{V}$ , Note 5, Note 6	–	0.001	1	$\mu\text{A}$

Note 4. Applies to key input pins (ROW1–ROW4 COL1–COL3)

Note 5. Applies to  $\overline{\text{MUTE}}$  output pin.

Note 6. Applies to PULSE output pin

Note 7. Applies to  $V_{REF}$  pin.

**AC Electrical Characteristics:**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Oscillator Frequency	$f_{OSC}$	Note 8	–	480	–	$\text{kHz}$
Keyboard Debounce Time	$t_{DB}$		–	10	–	ms
Time for Valid Key Entry	$t_{KD}$		40	–	–	ms
Oscillator Start-Up Time	$t_{ON}$	Note 9	–	6	–	ms
Pulse Rate	$P_R$		–	10	–	pps
Break Time	$t_B$	Pin9 tied to $V_+$	–	61	–	ms
		Pin9 tied to $V_-$	–	67	–	ms
Inter-Digital Pause	$t_{IDP}$		–	800	–	ms

Note 8. Typical values are exact with a nominal 480kHz frequency reference (except for oscillator start-up time)

Note 9. Ceramic resonator should have the following equivalent values:  $R < 20\Omega$ ,  $R_A \geq 70k\Omega$ ,  $C_O \leq 500\text{pF}$ .

### Pin Connection Diagram

