



**ELECTRONICS, INC.**  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089

## NTE3095 Optoisolator

### Description:

The NTE3095 is a dual photocoupler optoisolator in an 8-Lead DIP type package consisting of a pair of Gallium Aluminum Arsenide light emitting diodes and integrated photodetectors. Separate connections for the photodiode bias and output transistor collectors improve the speed up to a hundred times that of a conventional phototransistor coupler by reducing the base-collector capacitance.

### Features:

- TTL Compatible
- High Switching Speed

### Absolute Maximum Ratings:

#### **LED**

Forward Current (Each Channel), $I_F$ .....	25mA
Derate above +70°C .....	0.8mA/°C
Pulse Forward Current (Each Channel, Note 1), $I_{FP}$ .....	50mA
Derate above +70°C .....	1.6mA/°C
Total Pulse Forward Current (Each Channel, Note 2), $I_{FPT}$ .....	1A
Reverse Voltage (Each Channel), $V_R$ .....	5V
Diode Power Dissipation (Each Channel), $P_D$ .....	45mW
Derate above +70°C .....	0.9mW/°C

#### **DETECTOR**

Output Current (Each Channel), $I_O$ .....	8mA
Peak Output Current (Each Channel), $I_{OP}$ .....	16mA
Supply Voltage, $V_{CC}$ .....	-0.5 to +15V
Output Voltage (Each Channel), $V_O$ .....	-0.5 to +15V
Output Power Dissipation (Each Channel), $P_O$ .....	35mW
Derate above +70°C .....	1mW/°C

#### **COUPLED**

Operating Temperature Range, $T_{opr}$ .....	-55° to +100°C
Storage Temperature Range, $T_{stg}$ .....	-55° to +125°C
Lead Temperature (During Soldering, 1.6mm below seating plane, 10s), $T_L$ .....	+260°C
Isolation Voltage (AC, 1min., R.H. ≤ 60%, Note 3), $V_{ISO}$ .....	2500V <sub>rms</sub>

Note 1. Pulse Width = 1ms, Duty Cycle = 50%

Note 2. Pulse Width = 1μs, 300pps.

Note 3. Device considered a two terminal device. Pins 1, 2, 3, and 4 shorted together and Pins 5, 6, 7, and 8 shorted together.

**Recommended Operation Conditions:**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$		0	–	12	V
Forward Current, Each Channel	$I_F$		–	16	25	mA
Operating Temperature	$T_{opr}$		–25	–	+85	°C

**Electrical Characteristics:** ( $T_A = 0^\circ$  to  $+70^\circ\text{C}$ , Note 4 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Current Transfer Ratio (Each Channel)	CTR	$I_F = 16\text{mA}$ , $V_O = 0.4\text{V}$ , $V_{CC} = 4.5\text{V}$ , $T_A = +25^\circ\text{C}$ , Note 5	19	30	–	%
		$I_F = 16\text{mA}$ , $V_O = 0.5\text{V}$ , $V_{CC} = 4.5\text{V}$ , Note 5	15	–	–	%
Logic Low Output Voltage (Each Channel)	$V_{OL}$	$I_F = 16\text{mA}$ , $I_O = 2.4\text{mA}$ , $V_{CC} = 4.5\text{V}$	–	0.1	0.4	V
Logic High Output Current (Each Channel)	$I_{OH}$	$I_F = 0\text{mA}$ , $V_O = V_{CC} = 5.5\text{V}$ , $T_A = +25^\circ\text{C}$	–	3	500	nA
		$I_F = 0\text{mA}$ , $V_O = V_{CC} = 15\text{V}$	–	–	50	$\mu\text{A}$
Logic Low Supply Current	$I_{CCL}$	$I_{F1} = I_{F2} = 16\text{mA}$ , $V_{O1} = V_{O2} = \text{Open}$ , $V_{CC} = 15\text{V}$	–	160	–	$\mu\text{A}$
Logic High Supply Current	$I_{CCH}$	$I_{F1} = I_{F2} = 0\text{mA}$ , $V_{O1} = V_{O2} = \text{Open}$ , $V_{CC} = 15\text{V}$	–	0.05	4.0	$\mu\text{A}$
Input Forward Voltage (Each Channel)	$V_F$	$I_F = 16\text{mA}$ , $T_A = +25^\circ\text{C}$	–	1.66	1.7	V
Temperature Coefficient of Forward Voltage (Each Channel)	$\Delta V_F/\Delta T_A$	$I_F = 16\text{mA}$	–	–2	–	$\text{mV}/^\circ\text{C}$
Input Reverse Breakdown Voltage (Each Channel)	$BV_R$	$I_R = 10\mu\text{A}$ , $T_A = +25^\circ\text{C}$	5	–	–	V
Input Capacitance (Each Channel)	$C_{IN}$	$f = 1\text{MHz}$ , $V_F = 0$	–	60	–	pF
Input–Output Insulation Leakage Current	$I_{I-O}$	Relative Humidity = 45%, $t = 5\text{s}$ , $V_{I-O} = 3000\text{V}$ , $T_A = +25^\circ\text{C}$ , Note 3	–	–	1.0	$\mu\text{A}$
Resistance (Input–Output)	$R_{I-O}$	$V_{I-O} = 500\text{V}$ , Note 3	–	$10^{12}$	–	W
Capacitance (Input–Output)	$C_{I-O}$	$f = 1\text{MHz}$ , Note 3	–	0.6	–	pF
Input–Input Leakage Current	$I_{I-I}$	Relative Humidity = 45%, $t = 5\text{s}$ , $V_{I-I} = 500\text{V}$ , Note 6	–	0.005	–	$\mu\text{A}$
Resistance (Input–Input)	$R_{I-I}$	$V_{I-I} = 500\text{V}$ , Note 6	–	$10^{11}$	–	W
Capacitance (Input–Input)	$C_{I-I}$	$f = 1\text{MHz}$ , Note 6	–	0.25	–	pF

Note 3. Device considered a two terminal device. Pins 1, 2, 3, and 4 shorted together and Pins 5, 6, 7, and 8 shorted together.

Note 4. All typicals at  $T_A = +25^\circ\text{C}$ .

Note 5. DC Current Transfer Ratio is defined as the ratio of output collector current,  $I_O$ , to the forward LED input current,  $I_F$ , times 100%.

Note 6. Measured between Pins 1 and 2 shorted together, and Pins 3 and 4 shorted together.

**Switching Characteristics:** ( $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $I_F = 16\text{mA}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Propagation Delay Time to Logic Low at Output (Each Channel)	$t_{pHL}$	$R_L = 1.9\text{k}\Omega$	–	0.2	0.8	$\mu\text{s}$
Propagation Delay Time to Logic High at Output (Each Channel)	$t_{pLH}$	$R_L = 1.9\text{k}\Omega$	–	0.3	0.8	$\mu\text{s}$
Common Mode Transient Immunity at Logic High Level Output (Each Channel)	$CM_H$	$I_F = 0\text{mA}$ , $V_{CM} = 400\text{V}_{P-P}$ , $R_L = 1.9\text{k}\Omega$ , Note 7	–	1000	–	$\text{V}/\mu\text{s}$
Common Mode Transient Immunity at Logic Low Level Output (Each Channel)	$CM_L$	$I_F = 16\text{mA}$ , $V_{CM} = 400\text{V}_{P-P}$ , $R_L = 1.9\text{k}\Omega$ , Note 7	–	–1000	–	$\text{V}/\mu\text{s}$
Bandwidth (Each Channel)	BW	$R_L = 100\Omega$ , Note 8	–	2	–	MHz

Note 7. Common mode transient immunity in Logic High level is the maximum tolerable (positive)  $dV_{cm}/dt$  on the leading edge of the common mode pulse,  $V_{cm}$ , to assure that the output will remain in a Logic High state (i.e.,  $V_O > 2\text{V}$ ). Common mode transient immunity in Logic Low level is the maximum tolerable (negative)  $dV_{cm}/dt$  on the trailing edge of the common mode pulse signal,  $V_{cm}$ , to assure that the output will remain in a Logic Low state (i.e.,  $V_O > 0.8\text{V}$ ).

Note 8. The frequency at which the AC output voltage is 3dB below the low frequency asymptote.

**Pin Connection Diagram**



