

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 _{rms}

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	μA
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	–	μA
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	μA
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	μA
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	–	μA
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	μs
Propagation Delay Time to Logic High at Output (Each Channel)	t_{pLH}	$R_L = 1.9\text{k}\Omega$	–	0.3	0.8	μs
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



