

## NTE3041 Optoisolator NPN Transistor Output

**Description:**

The NTE3041 is an optoisolator in a 6-Lead DIP type package consisting of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

**Features:**

- High Current Transfer Ratio: 100% Min @ Spec Conditions
- Guaranteed Switching Speeds

**Applications:**

- General Purpose Switching Circuits
- Interfacing and Coupling Systems of Different Potentials and Impedances
- Regulation Feedback Circuits
- Monitor & Detection Circuits
- Solid State Relays

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

**Input LED**

Reverse Voltage, $V_R$ .....	6V
Continuous Forward Current, $I_F$ .....	60mA
LED Power Dissipation (With Negligible Power in Output Detector), $P_D$ .....	120mW
Derate Above $25^\circ\text{C}$ .....	1.41mW/ $^\circ\text{C}$

**Output Transistor**

Collector–Emitter Voltage, $V_{CEO}$ .....	30V
Emitter–Base Voltage, $V_{EBO}$ .....	7V
Collector–Base Voltage, $V_{CBO}$ .....	70V
Continuous Collector Current, $I_C$ .....	150mA
Detector Power Dissipation (With Negligible Power in Output Detector), $P_D$ .....	150mW
Derate Above $25^\circ\text{C}$ .....	1.76mW/ $^\circ\text{C}$

**Total Device**

Isolation Source Voltage (Peak AC Voltage, 60Hz, 1sec Duration, Note 1), $V_{ISO}$ .....	7500V
Total Device Power Dissipation, $P_D$ .....	250mW
Derate Above $25^\circ\text{C}$ .....	2.94mW/ $^\circ\text{C}$
Operating Ambient Temperature Range, $T_A$ .....	$-55^\circ$ to $+100^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Lead Temperature (During Soldering, 1/16" from case, 10sec), $T_L$ .....	$+260^\circ\text{C}$

Note 1. Isolation Surge Voltage is an internal device dielectric breakdown rating. For this test, Pin1 and Pin2 are common, and Pin4, Pin5, and Pin6 are common.

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Input LED</b>						
Forward Voltage	$V_F$	$I_F = 10\text{mA}$	0.8	1.15	1.5	V
		$I_F = 10\text{mA}, T_A = -55^\circ\text{C}$	0.9	1.3	1.7	V
		$I_F = 10\text{mA}, T_A = +100^\circ\text{C}$	0.7	1.05	1.4	V
Reverse Leakage Current	$I_R$	$V_R = 6\text{V}$	–	–	10	$\mu\text{A}$
Capacitance	$C_J$	$V = 0, f = 1\text{MHz}$	–	18	–	pF
<b>Output Transistor</b>						
Collector–Emitter Dark Current	$I_{CEO}$	$V_{CE} = 10\text{V}$	–	1	50	nA
		$V_{CE} = 30\text{V}, T_A = +100^\circ\text{C}$	–	–	500	$\mu\text{A}$
Collector–Base Dark Current	$I_{CBO}$	$V_{CB} = 10\text{V}$	–	0.2	20	nA
		$V_{CB} = 10\text{V}, T_A = +100^\circ\text{C}$	–	100	–	nA
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$	30	45	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}$	70	100	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}$	7.0	7.8	–	V
DC Current Gain	$h_{FE}$	$I_C = 2\text{mA}, V_{CE} = 5\text{V}$	–	400	–	
Collector–Emitter Capacitance	$C_{CE}$	$V_{CE} = 5\text{V}, f = 1\text{MHz}$	–	7	–	pF
Collector–Base Capacitance	$C_{CB}$	$V_{CB} = 0, f = 1\text{MHz}$	–	19	–	pF
Emitter–Base Capacitance	$C_{EB}$	$V_{EB} = 0, f = 1\text{MHz}$	–	9	–	pF
<b>Coupled</b>						
Output Collector Current	$I_C$	$I_F = 10\text{mA}, V_{CE} = 10\text{V}$	10	30	–	mA
		$I_F = 10\text{mA}, V_{CE} = 10\text{V}, T_A = -55^\circ\text{C}$	4	–	–	mA
		$I_F = 10\text{mA}, V_{CE} = 10\text{V}, T_A = +100^\circ\text{C}$	4	–	–	mA
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 0.5\text{mA}, I_F = 10\text{mA}$	–	0.14	0.3	V
Turn–On Time	$t_{on}$	$I_C = 2\text{mA}, V_{CC} = 10\text{V}, R_L = 100\Omega$	–	7.5	10	$\mu\text{s}$
Turn–Off Time	$t_{off}$		–	5.7	10	$\mu\text{s}$
Rise Time	$t_r$		–	3.2	–	$\mu\text{s}$
Fall Time	$t_f$		–	4.7	–	$\mu\text{s}$
Isolation Voltage	$V_{ISO}$	$f = 60\text{Hz}, t = 1\text{sec}$	7500	–	–	V
Isolation Current	$I_{ISO}$	$V_{I-O} = 3550V_{pk}$	–	–	100	$\mu\text{A}$
Isolation Resistance	$R_{ISO}$	$V = 500\text{V}$	$10^{11}$	–	–	$\Omega$
Isolation Capacitance	$C_{ISO}$	$V = 0, f = 1\text{MHz}$	–	0.2	2.0	pF

### Pin Connection Diagram

