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## NTE3096 Optoisolator Low LED Drive NPN Transistor Output

**Description:**

The NTE3096 is a gallium arsenide, infrared emitting diode optically coupled to a silicon phototransistor in a 6-Lead DIP type package. This device is designed for applications requiring low LED drive current, high electrical isolation, small package size and low cost such as interfacing and coupling systems, phase feedback controls, solid-state relays and general purpose switching circuits.

**Features:**

- High Transfer Ratio with Low LED Drive
- High Electrical Isolation
- Low Collector-Emitter Saturation Voltage

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

**Infrared Emitting Diode**

Reverse Voltage, $V_R$ .....	6V
Forward Current, $I_C$	
Continuous .....	60mA
Peak (Pulse Width 1 $\mu$ sec, 2% Duty Cycle) .....	3A
Power Dissipation (Negligible Power in Transistor), $P_D$ .....	100mW
Derate above 25 $^{\circ}\text{C}$ ambient .....	1.3mW/ $^{\circ}\text{C}$

**Phototransistor**

Collector-Emitter Voltage, $V_{CEO}$ .....	30V
Collector-Base Voltage, $V_{CBO}$ .....	70V
Emitter-Base Voltage, $V_{EBO}$ .....	7V
Collector Current (Continuous), $I_C$ .....	100mA
Power Dissipation (Negligible Power in Transistor), $P_D$ .....	300mW
Derate above 25 $^{\circ}\text{C}$ ambient .....	4.0mW/ $^{\circ}\text{C}$

**Total Device**

Power Dissipation (Negligible Power in Transistor), $P_D$ .....	300mW
Derate above 25 $^{\circ}\text{C}$ ambient .....	4.0mW/ $^{\circ}\text{C}$
Surge Isolation Voltage (60Hz, Peak AC, 5sec) .....	7500V
Operating Junction Temperature Range, $T_J$ .....	-55 $^{\circ}$ to +100 $^{\circ}\text{C}$
Storage Temperature Range, $T_{stg}$ .....	-55 $^{\circ}$ to +150 $^{\circ}\text{C}$
Lead Temperature (During Soldering, 10sec), $T_L$ .....	+260 $^{\circ}\text{C}$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>Infrared Emitting Diode</b>							
Forward Voltage	$V_F$	$I_F = 1\text{mA}$ , $T_A = 0^\circ$ to $+70^\circ\text{C}$	0.7	1.1	1.4	V	
Reverse Leakage Current	$I_R$	$V_R = 6\text{V}$	–	0.05	10	$\mu\text{A}$	
Capacitance	$C_J$	$V = 0$ , $f = 1\text{MHz}$	–	150	–	pf	
<b>Phototransistor</b> ( $I_F = 0$ unless otherwise specified)							
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$	30	–	–	V	
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 100\mu\text{A}$	70	–	–	V	
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 100\mu\text{A}$	7	–	–	V	
Collector–Emitter Dark Current	$I_{CEO}$	$V_{CE} = 5\text{V}$ , Base Open	–	1.0	25	nA	
		$V_{CE} = 30\text{V}$ , Base Open, $T_A = +70^\circ\text{C}$	–	–	50	$\mu\text{A}$	
Collector–Base Dark Current	$I_{CBO}$	$V_{CB} = 5\text{V}$ , Emitter Open	–	–	10	nA	
<b>Coupled Characteristics</b>							
DC Current Transfer Ratio	$I_C/I_F$	$I_F = 1\text{mA}$ , $V_{CE} = 5\text{V}$		50	–	–	%
			$T_A = 0^\circ$ to $+70^\circ\text{C}$	30	–	–	%
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_F = 1\text{mA}$ , $I_C = 100\mu\text{A}$	–	–	0.5	V	
Isolation Resistance	$R_{(I-O)}$	$V_{(I-O)} = 500\text{V}_{DC}$ , Note 1	$10^{11}$	–	–	$\Omega$	
Isolation Surge Voltage	$V_{ISO}$	60Hz, Peak AC, 5sec, Note 1	7500	–	–	V	
Isolation Capacitance	$C_{(I-O)}$	$V_{(I-O)} = 0$ , $f = 1\text{MHz}$	–	1.3	2.5	pF	
<b>Switching Characteristics</b>							
Turn–On Time	$t_{on}$	$V_{CE} = 10\text{V}$ , $V$ , $R_L = 100\Omega$	–	–	20	$\mu\text{s}$	
Turn–Off Time	$t_{off}$		–	–	20	$\mu\text{s}$	

Note 1. For this test, LED Pin1 and Pin2 are common and phototransistor Pin4, Pin5, and Pin6 are common.

