

## NTE3103 Photon Coupled Interrupter Module NPN Darlington

### **Description:**

The NTE3103 Interrupter Module is a gallium arsenide infrared emitting diode coupled to a silicon Darlington connected phototransistor in a plastic housing. The packaging system is designed to optimize the mechanical resolution, coupling efficiency, ambient light rejection, cost, and reliability. The gap in the housing provides a means of interrupting the signal with an opaque material, switching the output from an "ON" into an "OFF" state.

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

#### **Total Device**

Operating Temperature Range,  $T_J$  .....  $-55^\circ$  to  $+100^\circ\text{C}$   
Storage Temperature Range,  $T_{stg}$  .....  $-55^\circ$  to  $+100^\circ\text{C}$   
Lead Temperature (During Soldering, 5sec Max),  $T_L$  .....  $+260^\circ\text{C}$

#### **Infrared Emitting Diode**

Forward Current,  $I_F$   
    Continuous ..... 60mA  
    Peak (Pulse Width  $\leq 1\mu\text{s}$ , PRR  $\leq 300\text{pps}$ ) ..... 3A  
Reverse Voltage,  $V_R$  ..... 6V  
Power Dissipation,  $P_E$  ..... 100mW  
    Derate Above  $25^\circ\text{C}$  .....  $1.33\text{mW}/^\circ\text{C}$

#### **Darlington Connected Phototransistor**

Power Dissipation,  $P_D$  ..... 150mW  
    Derate Above  $25^\circ\text{C}$  .....  $2.0\text{mW}/^\circ\text{C}$   
Continuous Collector Current,  $I_C$  ..... 100mA  
Collector–Emitter Voltage,  $V_{CEO}$  ..... 55V  
Emitter–Collector Voltage,  $V_{ECO}$  ..... 7V

### **Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Emitter</b>						
Reverse Breakdown Voltage	$V_{(BR)R}$	$I_R = 10\mu\text{A}$	6	–	–	V
Forward Voltage	$V_F$	$I_F = 60\text{mA}$	–	–	1.7	V
Reverse Current	$I_R$	$V_R = 5\text{V}$	–	–	100	nA
Capacitance	$C_i$	$V = 0, f = 1\text{MHz}$	–	30	–	pF

Note 1. Stray irradiation can alter values of characteristics. Adequate shielding should be provided.

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$ , Note 1 unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Detector</b>						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 1\text{mA}$	55	–	–	V
Emitter–Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 100\mu\text{A}$	7	–	–	V
Collector Dark Current	$I_{CEO}$	$V_{CE} = 45\text{V}$	–	–	100	nA
Capacitance	$C_{ce}$	$V_{CE} = 5\text{V}$ , $f = 1\text{MHz}$	–	5	8	pF
<b>Coupled</b>						
Photodiode Current	$I_{CE(on)}$	$V_{CE} = 1.5\text{V}$ , $I_F = 2\text{mA}$	0.5	–	–	mA
		$V_{CE} = 1.5\text{V}$ , $I_F = 5\text{mA}$	2.5	–	–	mA
		$V_{CE} = 1.5\text{V}$ , $I_F = 10\text{mA}$	7.5	–	–	mA
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1.8\text{mA}$ , $I_F = 10\text{mA}$	–	–	1.0	V
Turn–On Time	$t_{on}$	$V_{CC} = 5\text{V}$ , $I_F = 10\text{mA}$ , $R_L = 750\Omega$	–	45	–	$\mu\text{s}$
Turn–Off Time	$t_{off}$		–	250	–	$\mu\text{s}$

Note 1. Stray irradiation can alter values of characteristics. Adequate shielding should be provided.

