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## NTE3098 Optoisolator Phototransistor <sup>w</sup>/NPN Transistor Output

**Description:**

The NTE3098 consists of a phototransistor optically coupled to a gallium arsenide infrared emitting diode in a single 4-Lead DIP type package.

**Features:**

- Collector-Emitter Voltage:  $V_{CEO} = 55V$  Min
- Current Transfer Ratio:  $CTR = 100\%$  Min
- Isolation Voltage:  $BV_S = 5000V_{rms}$  Min

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

**LED**

Forward Current, $I_F$ .....	60mA
Derate above $+39^\circ C$ .....	0.7mA/ $^\circ C$
Pulse Forward Current (100 $\mu s$ Pulse, 100pps), $I_{FP}$ .....	1A
Power Dissipation, $P_D$ .....	100mW
Derate above $+25^\circ C$ .....	1mW/ $^\circ C$
Reverse Voltage, $V_R$ .....	5V
Junction Temperature, $T_J$ .....	+125 $^\circ C$

**DETECTOR**

Collector-Emitter Voltage, $V_{CEO}$ .....	55V
Emitter-Collector Voltage, $V_{ECO}$ .....	7V
Collector Current, $I_C$ .....	50mA
Collector Power Dissipation, $P_C$ .....	150mW
Derate above $+25^\circ C$ .....	1.5mW/ $^\circ C$
Junction Temperature, $T_J$ .....	+125 $^\circ C$

**COUPLED**

Total Package Power Dissipation, $P_T$ .....	250mW
Derate above $+25^\circ C$ .....	2.5mW/ $^\circ C$
Isolation Voltage (AC, 1 min., $RH \leq 60\%$ ), $BV_S$ .....	5000 $V_{rms}$
Storage Temperature Range, $T_{stg}$ .....	-55 $^\circ$ to +150 $^\circ C$
Operating Temperature Range, $T_{opr}$ .....	-55 $^\circ$ to +100 $^\circ C$
Lead Temperature (During Soldering, 10sec), $T_L$ .....	+260 $^\circ C$

**Recommended Operating Characteristics:**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	$V_{CC}$		–	5	24	V
Forward Current	$I_F$		–	16	20	mA
Collector Current	$I_C$		–	1	10	mA
Operating Temperature	$T_{opr}$		–25	–	+85	°C

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Individual, LED</b>						
Forward Voltage	$V_F$	$I_F = 10\text{mA}$	1.00	1.15	1.30	V
Reverse Current	$I_R$	$V_R = 5\text{V}$	–	–	10	$\mu\text{A}$
Capacitance	$C_T$	$V = 0, f = 1\text{MHz}$	–	30	–	pF
<b>Individual, Detector</b>						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 0.5\text{mA}$	55	–	–	V
Emitter–Collector Breakdown Voltage	$V_{(BR)ECO}$	$I_E = 0.1\text{mA}$	7	–	–	V
Collector Dark Current	$I_{CEO}$	$V_{CE} = 24\text{V}$	–	10	100	nA
		$V_{CE} = 24\text{V}, T_A = +85^\circ\text{C}$	–	2	50	$\mu\text{A}$
Capacitance (Collector–Emitter)	$C_{CE}$	$V = 0, f = 1\text{MHz}$	–	10	–	pF
<b>Coupled</b>						
Current Transfer Ratio	CTR	$I_F = 5\text{mA}, V_{CE} = 5\text{V}$	100	–	600	%
Current Transfer Ratio (Saturated)	CTR (sat)	$I_F = 1\text{mA}, V_{CE} = 0.4\text{V}$	30	–	–	%
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 0.2\text{mA}, I_F = 1\text{mA}$	–	–	0.4	V
<b>Isolation</b>						
Capacitance (Input–Output)	$C_S$	$V_S = 0, f = 1\text{MHz}$	–	0.8	–	pF
Isolation Resistance	$R_S$	$V_S = 500\text{V}$	$5 \times 10^{10}$	$10^{14}$	–	$\Omega$
Isolation Voltage	$BV_S$	AC, 1 minute	5000	–	–	$V_{rms}$
		AC, 1 second	–	10000	–	$V_{rms}$
		DC, 1 minute	–	10000	–	$V_{rms}$
<b>Switching</b>						
Rise Time	$t_r$	$V_{CC} = 10\text{V}, I_C = 2\text{mA}, R_L = 100\Omega$	–	2	–	$\mu\text{s}$
Fall Time	$t_f$		–	3	–	$\mu\text{s}$
Turn–On Time	$t_{on}$		–	3	–	$\mu\text{s}$
Turn–Off Time	$t_{off}$		–	3	–	$\mu\text{s}$
Turn–On Time	$t_{ON}$	$V_{CC} = 5\text{V}, I_F = 16\text{mA}, R_L = 1.9\text{k}\Omega$	–	2	–	$\mu\text{s}$
Storage Time	$t_s$		–	15	–	$\mu\text{s}$
Turn–Off Time	$t_{OFF}$		–	25	–	$\mu\text{s}$

### Pin Connection Diagram

