



**ELECTRONICS, INC.**  
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## NTE81 Silicon NPN Transistor Dual Differential Amp, General Purpose Switch

**Absolute Maximum Ratings:**

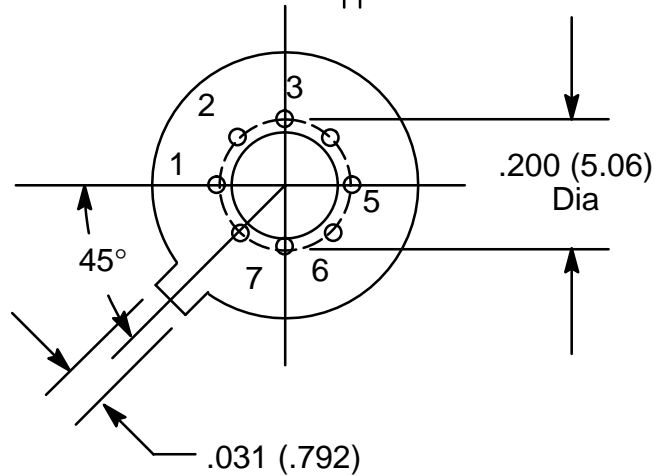
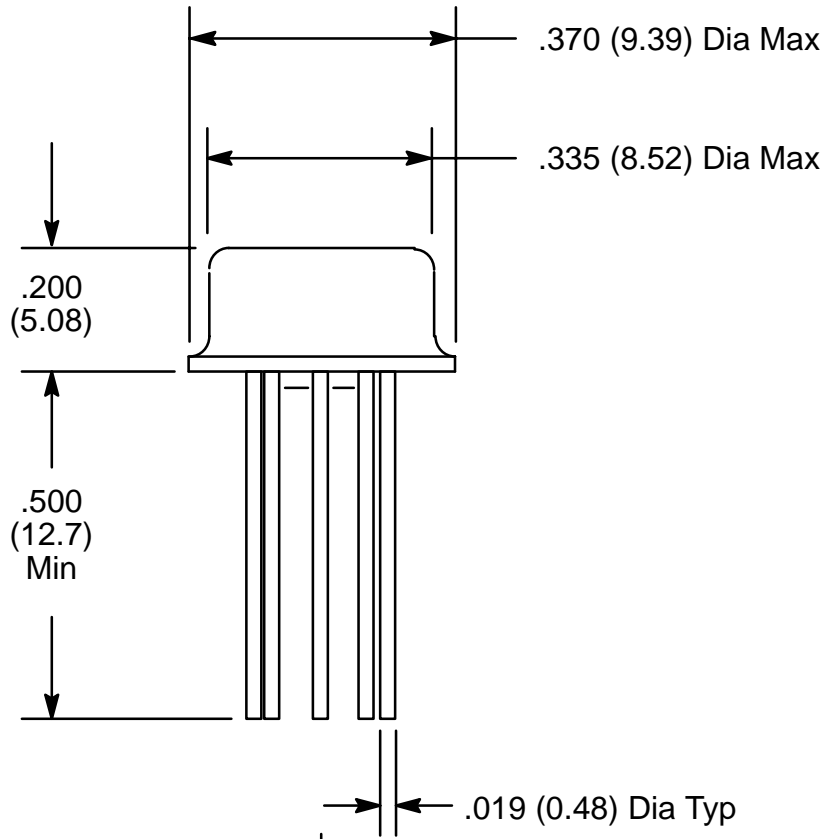
Collector–Emitter Voltage, $V_{CEO}$ .....	30V
Collector–Base Voltage, $V_{CBO}$ .....	60V
Emitter–Base Voltage, $V_{EBO}$ .....	5V
Continuous Collector Current, $I_C$ .....	500mA
Total Device Dissipation ( $T_A = +25^\circ\text{C}$ ), $P_D$	
One Die .....	575mW
All Die Equal Power .....	625mW
Derate Above $25^\circ\text{C}$	
One Die .....	3.29mW/ $^\circ\text{C}$
All Die Equal Power .....	3.57mW/ $^\circ\text{C}$
Total Device Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$	
One Die .....	1.8W
All Die Equal Power .....	2.5W
Derate Above $25^\circ\text{C}$	
One Die .....	10.3mW/ $^\circ\text{C}$
All Die Equal Power .....	14.3mW/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+200^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ\text{C}$
Thermal Resistance, Junction–to–Case, $R_{\theta JC}$	
One Die .....	97 $^\circ\text{C}/\text{W}$
All Die Equal Power .....	70 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction–to–Ambient (Note 1), $R_{thJA}$	
One Die .....	304 $^\circ\text{C}/\text{W}$
All Die Equal Power .....	280 $^\circ\text{C}/\text{W}$
Coupling Factors	
Q1 – Q2	
Junction–to–Ambient .....	57%
Junction–to–Case .....	0%
Q1 – Q3 or Q1 – Q4	
Junction–to–Ambient .....	55%
Junction–to–Case .....	0%

Note 1.  $R_{thJA}$  is measured with the device soldered into a typical printed circuit board.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 10\text{mA}$ , $I_B = 0$ , Note 2	30	–	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 10\mu\text{A}$ , $I_E = 0$	60	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 10\mu\text{A}$ , $I_C = 0$	5	–	–	V
Collector Cutoff Current	$I_{CEV}$	$V_{CE} = 50\text{V}$ , $V_{BE(off)} = 3\text{V}$	15	–	–	nA
Base Cutoff Current	$I_{BL}$	$V_{CE} = 50\text{V}$ , $V_{EB(off)} = 3\text{V}$	30	–	–	nA
<b>ON Characteristics (Note 2)</b>						
DC Current Gain	$h_{FE}$	$I_C = 0.1\text{mA}$ , $V_{CE} = 10\text{V}$	20	50	–	
		$I_C = 1.0\text{mA}$ , $V_{CE} = 10\text{V}$	25	55	–	
		$I_C = 10\text{mA}$ , $V_{CE} = 10\text{V}$	35	65	–	
		$I_C = 150\text{mA}$ , $V_{CE} = 1.0\text{V}$	20	65	–	
		$I_C = 150\text{mA}$ , $V_{CE} = 10\text{V}$	40	30	120	
		$I_C = 300\text{mA}$ , $V_{CE} = 10\text{V}$	25	75	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}$ , $I_B = 15\text{mA}$	–	0.2	0.4	V
		$I_C = 300\text{mA}$ , $I_B = 30\text{mA}$	–	0.35	1.2	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}$ , $I_B = 15\text{mA}$	0.6	0.95	1.3	V
		$I_C = 300\text{mA}$ , $I_B = 30\text{mA}$	–	–	2.0	V
<b>Small–Signal Characteristics</b>						
Current Gain–Bandwidth Product	$f_T$	$I_C = 20\text{mA}$ , $V_{CE} = 20\text{V}$ , $f = 100\text{MHz}$	200	250	–	MHz
Output Capacitance	$C_{obo}$	$V_{CB} = 10\text{V}$ , $I_E = 0$ , $f = 100\text{kHz}$	–	3.5	8.0	pF
Input Capacitance	$C_{ibo}$	$V_{EB} = 0.5\text{V}$ , $I_C = 0$ , $f = 100\text{kHz}$	–	15	20	pF
<b>Switching Characteristics</b>						
Delay Time	$t_d$	$V_{CC} = 30\text{V}$ , $I_C = 150\text{mA}$ , $V_{BE(off)} = 0.5\text{V}$ , $I_{B1} = 15\text{mA}$	–	–	15	$\mu\text{s}$
Rise Time	$t_r$		–	–	30	$\mu\text{s}$
Storage Time	$t_s$	$V_{CC} = 30\text{V}$ , $I_C = 150\text{mA}$ , $I_{B1} = I_{B2} = 15\text{mA}$	–	–	250	$\mu\text{s}$
Fall Time	$t_f$		–	–	60	$\mu\text{s}$

Note 2. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .



Pin4 and Pin8 Omitted

- Pin 1. C1
- 2. B1
- 3. E1
- 5. E2
- 6. B2
- 7. C2