

NTE2320
Silicon NPN/PNP Transistor
Quad, General Purpose Switch, Amp
(Complementary Pair)

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 ($T_A = +25^\circ\text{C}$, Each Die, Note 1), P_D	0.65W
Derate Above 25°C	5.18mW/ $^\circ\text{C}$
Total Device Dissipation ($T_A = +25^\circ\text{C}$, Four Die Equal Power, Note 1), P_D	1.25W
Derate Above 25°C	10mW/ $^\circ\text{C}$
Total Device Dissipation ($T_C = +25^\circ\text{C}$, Each Die, Note 1), P_D	1.0W
Derate Above 25°C	8.0mW/ $^\circ\text{C}$
Total Device Dissipation ($T_C = +25^\circ\text{C}$, Four Die Equal Power, Note 1), P_D	3.0W
Derate Above 25°C	24mW/ $^\circ\text{C}$
Operating Junction Temperature Range, T_J	-55° to $+150^\circ\text{C}$
Storage Temperature Range, T_{stg}	-55° to $+150^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient, R_{thJA}	
Each Die	193 $^\circ\text{C}/\text{W}$
Effective, 4 Die	100 $^\circ\text{C}/\text{W}$
Thermal Resistance, Junction–to–Case, R_{thJC}	
Each Die	125 $^\circ\text{C}/\text{W}$
Effective, 4 Die	41.6 $^\circ\text{C}/\text{W}$
Coupling Factors, Junction–to–Ambient	
Q1–Q4 or Q2–Q3	60%
Q1–Q2 or Q3–Q4	24%
Coupling Factors, Junction–to–Case	
Q1–Q4 or Q2–Q3	30%
Q1–Q2 or Q3–Q4	20%

Note 1. Voltage and current are negative for PNP transistors.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
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_{CBO}	$V_{CB} = 50\text{V}$, $I_E = 0$	–	–	30	nA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 3\text{V}$, $I_C = 0$	–	–	30	nA
ON Characteristics (Note 3)						
DC Current Gain	h_{FE}	$V_{CE} = 10\text{V}$, $I_C = 1\text{mA}$	50	–	–	
		$V_{CE} = 10\text{V}$, $I_C = 10\text{mA}$	75	–	–	
		$V_{CE} = 10\text{V}$, $I_C = 150\text{mA}$	100	–	–	
		$V_{CE} = 10\text{V}$, $I_C = 300\text{mA}$	20	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$	–	–	0.4	V
		$I_C = 300\text{mA}$, $I_B = 30\text{mA}$	–	–	0.4	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 150\text{mA}$, $I_B = 15\text{mA}$	–	–	1.3	V
		$I_C = 300\text{mA}$, $I_B = 30\text{mA}$	–	–	2.0	V
Small–Signal Characteristics						
Current Gain–Bandwidth Product	f_T	$V_{CE} = 20\text{V}$, $I_C = 50\text{mA}$, $f = 100\text{MHz}$, Note 3	200	350	–	MHz
Output Capacitance NPN PNP	C_{obo}	$V_{CB} = 10\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	–	6.0	8.0	pF
			–	4.5	8.0	pF
Input Capacitance NPN PNP	C_{ibo}	$V_{EB} = 2\text{V}$, $I_C = 0$, $f = 1\text{MHz}$	–	20	30	pF
			–	17	30	pF
Switching Characteristics						
Turn–On Time	t_{on}	$V_{CC} = 30\text{V}$, $V_{EB} = 0.5\text{V}$, $I_C = 150\text{mA}$, $I_{B1} = 15\text{mA}$	–	30	–	ns
Turn–Off Time	t_{off}	$V_{CC} = 30\text{V}$, $I_C = 150\text{mA}$, $I_{B1} = I_{B2} = 15\text{mA}$	–	225	–	ns

Note 1. Voltage and current are negative for PNP transistors.

Note 2. Second Breakdown occurs at power levels greater than 3 times the power dissipation rating.

Note 3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

Pin Connection Diagram

