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°C, Each Die, Note 1), P_D 0.65W
      Derate Above 25°C . . . . 5.18mW/°C

Total Device Dissipation (T_A = +25°C, Four Die Equal Power, Note 1), P_D 1.25W
      Derate Above 25°C . . . . 10mW/°C

Total Device Dissipation (T_C = +25°C, Each Die, Note 1), P_D 1.0W
      Derate Above 25°C . . . . 8.0mW/°C

Total Device Dissipation (T_C = +25°C, Four Die Equal Power, Note 1), P_D 3.0W
      Derate Above 25°C . . . . 24mW/°C

Operating Junction Temperature Range, T_J . . . . −55° to +150°C

Storage Temperature Range, T_{stg} . . . . −55° to +150°C

Thermal Resistance, Junction–to–Ambient, R_{thJA}
      Each Die . . . . 193°C/W
      Effective, 4 Die . . . . 100°C/W

Thermal Resistance, Junction–to–Case, R_{thJC}
      Each Die . . . . 125°C/W
      Effective, 4 Die . . . . 41.6°C/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°C, Note 1 unless otherwise specified)
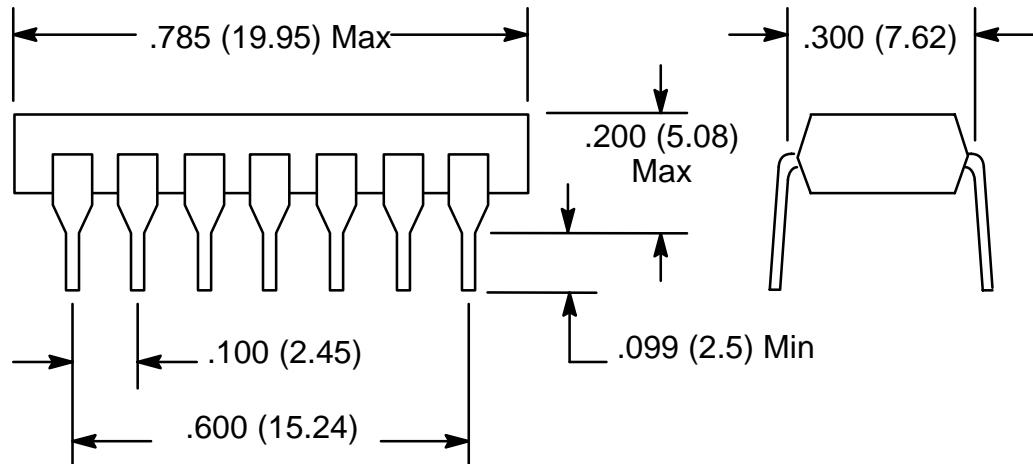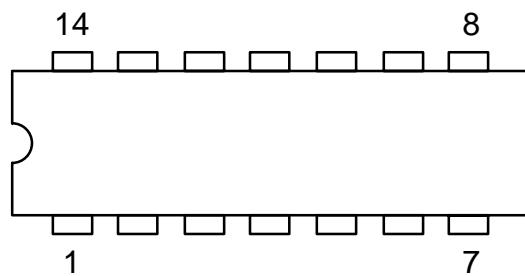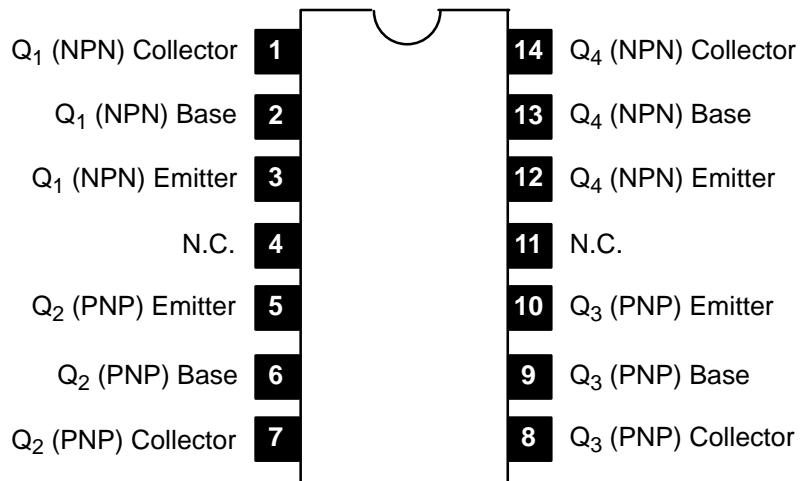
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, I_B = 0, Note 2	30	–	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10µA, I_E = 0	60	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10µA, I_C = 0	5	–	–	V
Collector Cutoff Current	I_{CBO}	V_{CB} = 50V, I_E = 0	–	–	30	nA
Emitter Cutoff Current	IE_{BO}	V_{EB} = 3V, I_C = 0	–	–	30	nA
ON Characteristics (Note 3)						
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 1mA	50	–	–	
		V_{CE} = 10V, I_C = 10mA	75	–	–	
		V_{CE} = 10V, I_C = 150mA	100	–	–	
		V_{CE} = 10V, I_C = 300mA	20	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 150mA, I_B = 15mA	–	–	0.4	V
		I_C = 300mA, I_B = 30mA	–	–	01.4	V
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 150mA, I_B = 15mA	–	–	1.3	V
		I_C = 300mA, I_B = 30mA	–	–	2.0	V
Small–Signal Characteristics						
Current Gain–Bandwidth Product	f_T	V_{CE} = 20V, I_C = 50mA, f = 100MHz, Note 3	200	350	–	MHz
Output Capacitance NPN	C_{obo}	V_{CB} = 10V, I_E = 0, f = 1MHz	–	6.0	8.0	pF
PNP			–	4.5	8.0	pF
Input Capacitance NPN	C_{ibo}	V_{EB} = 2V, I_C = 0, f = 1MHz	–	20	30	pF
PNP			–	17	30	pF
Switching Characteristics						
Turn–On Time	t_{on}	V_{CC} = 30V, V_{EB} = 0.5V, I_C = 150mA, I_{B1} = 15mA	–	30	–	ns
Turn–Off Time	t_{off}	V_{CC} = 30V, I_C = 150mA, I_{B1} = I_{B2} = 15mA	–	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 $\leq$ 300µs, Duty Cycle $\leq$ 2%.

Pin Connection Diagram

Q$_1$ (NPN) Collector	**1**	**14** Q$_4$ (NPN) Collector
Q$_1$ (NPN) Base	**2**	**13** Q$_4$ (NPN) Base
Q$_1$ (NPN) Emitter	**3**	**12** Q$_4$ (NPN) Emitter
N.C.	**4**	**11** N.C.
Q$_2$ (PNP) Emitter	**5**	**10** Q$_3$ (PNP) Emitter
Q$_2$ (PNP) Base	**6**	**9** Q$_3$ (PNP) Base
Q$_2$ (PNP) Collector	**7**	**8** Q$_3$ (PNP) Collector

14   8

1   7

.785 (19.95) Max

.300 (7.62)

.200 (5.08) Max

.099 (2.5) Min

.100 (2.45)

.600 (15.24)

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