



NTE2406 Silicon NPN Transistor General Purpose Amp, Surface Mount (Compl to NTE2407)

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

| | |
|---|-------------------------------------|
| Collector–Base Voltage, V_{CBO} | 75V |
| Collector–Emitter Voltage, V_{CEO} | 40V |
| Emitter–Base Voltage, V_{EBO} | 6V |
| Continuous Collector Current, I_C | 600mA |
| Total Device Dissipation (FR–5 Board, Note 1), P_D | 225mW |
| Derate above $+25^\circ\text{C}$ | 1.8mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction–to–Ambient (FR–5 Board, Note 1), R_{thJA} | 556 $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation (Alumina Substrate, Note 2), P_D | 300mW |
| Derate above $+25^\circ\text{C}$ | 2.4mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction–to–Ambient (Alumina Substrate, Note 2), R_{thJA} | 417 $^\circ\text{C}/\text{W}$ |
| Operating Junction Temperature Range, T_J | -55° to $+150^\circ\text{C}$ |
| Storage Temperature Range, T_{stg} | -55° to $+150^\circ\text{C}$ |

Note 1. FR–5 = 1.000 (25.4mm) x .750 (19.05mm) x .062 (1.57mm).

Note 2. Alumina = .400 (10.2mm) x .300 (7.62mm) x .024 (.609mm), 99.5% alumina.

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-------------------------------------|---------------|--|-----|-----|------|---------------|
| OFF Characteristics | | | | | | |
| Collector–Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C = 10\mu\text{A}$, $I_E = 0$ | 75 | – | – | V |
| Collector–Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 10\text{mA}$, $I_B = 0$ | 40 | – | – | V |
| Emitter–Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = 10\mu\text{A}$, $I_C = 0$ | 6 | – | – | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = 60\text{V}$, $I_E = 0$ | – | – | 0.01 | μA |
| | | $V_{CB} = 60\text{V}$, $I_E = 0$, $T_A = +125^\circ\text{C}$ | – | – | 10 | μA |
| | I_{CEX} | $V_{CE} = 60\text{V}$, $V_{EB(off)} = 3\text{V}$ | – | – | 10 | nA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB} = 3\text{V}$, $I_C = 0$ | – | – | 10 | nA |
| Base Cutoff Current | I_{BL} | $V_{CE} = 60\text{V}$, $V_{EB(off)} = 3\text{V}$ | – | – | 20 | nA |

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--------------------------------------|---------------|--|------|-----|------|------------------|
| ON Characteristics (Note 3) | | | | | | |
| DC Current Gain | h_{FE} | $V_{CE} = 10\text{V}, I_C = 0.1\text{mA}$ | 35 | – | – | |
| | | $V_{CE} = 10\text{V}, I_C = 1\text{mA}$ | 50 | – | – | |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}$ | 75 | – | – | |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}, T_A = -55^\circ\text{C}$ | 35 | – | – | |
| | | $V_{CE} = 1\text{V}, I_C = 150\text{mA}$ | 50 | – | – | |
| | | $V_{CE} = 10\text{V}, I_C = 150\text{mA}$ | 100 | – | 300 | |
| | | $V_{CE} = 10\text{V}, I_C = 500\text{mA}$ | 40 | – | – | |
| Collector–Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | – | – | 0.3 | V |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | – | – | 1.0 | V |
| Base–Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | 0.6 | – | 1.2 | V |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | – | – | 2.0 | V |
| Small–Signal Characteristics | | | | | | |
| Current Gain–Bandwidth Product | f_T | $I_C = 20\text{mA}, V_{CB} = 20\text{V}, f = 100\text{MHz}$ | 300 | – | – | MHz |
| Output Capacitance | C_{obo} | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$ | – | – | 8 | pF |
| Input Capacitance | C_{ibo} | $V_{EB} = 0.5\text{V}, I_C = 0, f = 1\text{MHz}$ | – | – | 25 | pF |
| Input Impedance | h_{ie} | $V_{CE} = 10\text{V}, I_C = 1\text{mA}, f = 1\text{kHz}$ | 2 | – | 8 | $k\Omega$ |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}, f = 1\text{kHz}$ | 0.25 | – | 1.25 | $k\Omega$ |
| Voltage Feedback Ratio | h_{re} | $V_{CE} = 10\text{V}, I_C = 1\text{mA}, f = 1\text{kHz}$ | – | – | 8 | $\times 10^4$ |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}, f = 1\text{kHz}$ | – | – | 4 | $\times 10^4$ |
| Small–Signal Current Gain | h_{fe} | $V_{CE} = 10\text{V}, I_C = 1\text{mA}, f = 1\text{kHz}$ | 50 | – | 300 | |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}, f = 1\text{kHz}$ | 75 | – | 375 | |
| Output Admittance | h_{oe} | $V_{CE} = 10\text{V}, I_C = 1\text{mA}, f = 1\text{kHz}$ | 5 | – | 35 | μmhos |
| | | $V_{CE} = 10\text{V}, I_C = 10\text{mA}, f = 1\text{kHz}$ | 25 | – | 200 | μmhos |
| Collector–Base Time Constant | $r_b'C_c$ | $V_{CB} = 20\text{V}, I_E = 20\text{mA}, f = 31.8\text{MHz}$ | – | – | 150 | ps |
| Noise Figure | NF | $I_C = 100\mu\text{A}, V_{CE} = 10\text{V}, R_S = 1k\Omega, f = 1\text{kHz}$ | – | – | 4 | dB |
| Switching Characteristics | | | | | | |
| Delay Time | t_d | $V_{CC} = 30\text{V}, I_C = 150\text{mA}, V_{BE(off)} = 0.5\text{V}, I_{B1} = 15\text{mA}$ | – | – | 10 | ns |
| Rise Time | t_r | | – | – | 25 | ns |
| Storage Time | t_s | $V_{CC} = 30\text{V}, I_C = 150\text{mA}, I_{B1} = I_{B2} = 15\text{mA}$ | – | – | 225 | ns |
| Fall Time | t_f | | – | – | 60 | ns |

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

