

VET123AP
(Replaces obsolete NTE123AP)
Silicon NPN Transistor
Audio Amplifier, Switch

Absolute Maximum Ratings:

| | |
|--|-------------------------------------|
| Collector–Emitter Voltage, V_{CEO} | 40V |
| Collector–Base Voltage, V_{CB} | 60V |
| Emitter–Base Voltage, V_{EB} | 6V |
| Continuous Collector Current, I_C | 600mA |
| Total Device Dissipation ($T_A = 25^\circ\text{C}$), P_D | 350mW |
| Derate Above 25°C | 2.8mW/ $^\circ\text{C}$ |
| Total Device Dissipation ($T_C = 25^\circ\text{C}$), P_D | 1.0W |
| Derate Above 25°C | 8.0mW/ $^\circ\text{C}$ |
| 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 Case, $R_{\theta JC}$ | 125 $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction to Ambient, $R_{\theta JA}$ | 357 $^\circ\text{C}/\text{W}$ |

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|-------------------------------------|---------------|---|-----|-----|-----|---------------|
| OFF Characteristics | | | | | | |
| Collector–Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 1\text{mA}$, $I_B = 0$, Note 1 | 40 | – | – | V |
| Collector–Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C = 0.1\text{mA}$, $I_E = 0$ | 60 | – | – | V |
| Emitter–Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = 0.1\text{mA}$, $I_C = 0$ | 6 | – | – | V |
| Collector Cutoff Current | I_{CEV} | $V_{CE} = 35\text{V}$, $V_{EB(off)} = 0.4\text{V}$ | – | – | 0.1 | μA |
| Base Cutoff Current | I_{BEV} | $V_{CE} = 35\text{V}$, $V_{EB(off)} = 0.4\text{V}$ | – | – | 0.1 | μA |
| ON Characteristics (Note 1) | | | | | | |
| DC Current Gain | h_{FE} | $V_{CE} = 1\text{V}$, $I_C = 0.1\text{mA}$ | 20 | – | – | |
| | | $V_{CE} = 1\text{V}$, $I_C = 1\text{mA}$ | 40 | – | – | |
| | | $V_{CE} = 1\text{V}$, $I_C = 10\text{mA}$ | 80 | – | – | |
| | | $V_{CE} = 1\text{V}$, $I_C = 150\text{mA}$ | 100 | – | 300 | |
| | | $V_{CE} = 1\text{V}$, $I_C = 500\text{mA}$ | 40 | – | – | |

Note 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---------------|--|------|-----|------|------------------|
| ON Characteristics (Note 1) (Cont'd) | | | | | | |
| Collector–Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | – | – | 0.4 | V |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | – | – | 0.75 | V |
| Base–Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | 0.75 | – | 0.95 | V |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | – | – | 1.2 | V |
| Small–Signal Characteristics | | | | | | |
| Current Gain–Bandwidth Product | f_T | $I_C = 20\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}$ | 250 | – | – | MHz |
| Collector–Base Capacitance | C_{cb} | $V_{CB} = 5\text{V}, I_E = 0, f = 100\text{kHz}$ | – | – | 6.5 | pF |
| Emitter–Base Capacitance | C_{eb} | $V_{CB} = 0.5\text{V}, I_C = 0, f = 100\text{kHz}$ | – | – | 30 | pF |
| Input Impedance | h_{ie} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$ | 1.0 | – | 15 | k Ω |
| Voltage Feedback Ratio | h_{re} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$ | 0.1 | – | 8.0 | $\times 10^{-6}$ |
| Small–Signal Current Gain | h_{fe} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$ | 40 | – | 500 | |
| Output Admittance | h_{oe} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}, f = 1\text{kHz}$ | 1.0 | – | 30 | μmhos |
| Switching Characteristics | | | | | | |
| Delay Time | t_d | $V_{CC} = 30\text{V}, V_{EB(off)} = 2\text{V}, I_C = 150\text{mA}, I_{B1} = 15\text{mA}$ | – | – | 15 | ns |
| Rise Time | t_r | | – | – | 20 | 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 | | – | – | 30 | ns |

Note 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

