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NTE108 and NTE108-1 Silicon NPN Transistor High Frequency Amplifier

Description:

The NTE108 (TO92) and NTE108-1 (TO106) are silicon NPN transistors designed for low-noise, high-frequency amplifiers, 1GHz local oscillators, non-neutralized IF amplifiers, and non-saturating circuits with rise and fall times less than 2.5ns.

Absolute Maximum Ratings:

| | |
|---|-------------------------------------|
| Collector-Emitter Voltage, V_{CEO} | 15V |
| Collector-Base Voltage, V_{CBO} | 30V |
| Emitter-Base Voltage, V_{EBO} | 3V |
| Continuous Collector Current, I_C | 50mA |
| Total Device Dissipation ($T_A = +25^\circ\text{C}$), P_D | 625mW |
| Derate Above 25°C | 12mW/ $^\circ\text{C}$ |
| 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_{thJC} | $+83.3^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient (Note 1), R_{thJA} | $+200^\circ\text{C/W}$ |

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 |
|-------------------------------------|---------------|---|-----|-----|-----|------|
| OFF Characteristics | | | | | | |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = 3\text{mA}$, $I_B = 0$, Note 2 | 15 | - | - | V |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C = 1\mu\text{A}$, $I_E = 0$ | 30 | - | - | V |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = 10\mu\text{A}$, $I_C = 0$ | 3 | - | - | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = 15\text{V}$, $I_E = 0$ | - | - | 10 | nA |

Note 2. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 1%.

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--------------------------------------|---------------|---|-----|-----|-----|------|
| ON Characteristics | | | | | | |
| DC Current Gain | h_{FE} | $I_C = 3\text{mA}, V_{CE} = 1\text{V}, \text{Note 2}$ | 20 | - | - | |
| | | $I_C = 8\text{mA}, V_{CE} = 10\text{V}, \text{Note 2}$ | 20 | - | 200 | |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 10\text{mA}, I_B = 1\text{mA}$ | - | - | 0.4 | V |
| Base-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C = 10\text{mA}, I_B = 1\text{mA}$ | - | - | 1.0 | V |
| Small-Signal Characteristics | | | | | | |
| Current Gain-Bandwidth Product | f_T | $I_C = 4\text{mA}, V_{CE} = 10\text{V}, f = 100\text{MHz}, \text{Note 2}$ | 600 | - | - | MHz |
| Output Capacitance | C_{obo} | $V_{CB} = 0\text{V}, I_E = 0, f = 140\text{kHz}$ | - | - | 3.0 | pF |
| | | $V_{CB} = 10\text{V}, I_E = 0, f = 140\text{kHz}$ | - | - | 1.7 | pF |
| Input Capacitance | C_{ibo} | $V_{EB} = 0.5\text{V}, I_C = 0, f = 140\text{kHz}$ | - | - | 2.0 | pF |
| Noise Figure | NF | $I_C = 1\text{mA}, V_{CE} = 6\text{V}, R_S = 400\Omega, f = 60\text{MHz}$ | - | - | 6 | dB |
| Functional Test | | | | | | |
| Common-Emitter Amplifier Power Gain | G_{pe} | $I_C = 6\text{mA}, V_{CB} = 12\text{V}, f = 200\text{MHz} (G_{fd} + G_{re} < -20\text{dB})$ | 15 | - | - | dB |
| Power Output | P_{out} | $I_C = 8\text{mA}, V_{CB} = 15\text{V}, f = 500\text{MHz}$ | 30 | - | - | mW |
| Oscillator Collector Efficiency | η | $I_C = 8\text{mA}, V_{CB} = 15\text{V}, P_{out} = 30\text{mW}, f = 500\text{MHz}$ | 25 | - | - | % |

Note 2. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 1%.

