

NTE161 Silicon NPN Transistor VHF-UHF Amplifier, Mixer/Osc

Features:

- High Current Gain-Bandwidth Product: $f_T = 600\text{MHz}$ (Min) @ $f = 100\text{MHz}$
- Low Output Capacitance: $C_{ob} = 1.7\text{pF}$ (Max) @ $V_{CB} = 10\text{V}$

Absolute Maximum Ratings:

| | |
|---|-------------------------------------|
| Collector-Emitter Voltage, V_{CES} | 45V |
| Collector-Base Voltage, V_{CBO} | 45V |
| Emitter-Base Voltage, V_{EBO} | 3V |
| Continuous Collector Current, I_C | 50mA |
| Total Device Dissipation ($T_A = +25^\circ\text{C}$), P_D | 200mW |
| Derate Above 25°C | 1.14mW/ $^\circ\text{C}$ |
| Total Device Dissipation ($T_C = +25^\circ\text{C}$), P_D | 300mW |
| Derate Above 25°C | 1.71mW/ $^\circ\text{C}$ |
| Operating Junction Temperature Range, T_J | -65° to $+200^\circ\text{C}$ |
| Storage Temperature Range, T_{stg} | -65° to $+200^\circ\text{C}$ |

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 | $V_{(BR)CBO}$ | $I_C = 1.0\mu\text{A}, I_E = 0$ | 30 | - | - | V |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E = 10\mu\text{A}, I_C = 0$ | 3.0 | - | - | V |
| Collector-Emitter Sustaining Voltage | $V_{CEO(sus)}$ | $I_C = 3\text{mA}, I_B = 0$ | 15 | - | - | V |
| Collector Cutoff Current | I_{CBO} | $V_{CB} = 15\text{V}, I_E = 0$ | - | - | 0.01 | μA |
| | | $V_{CB} = 15\text{V}, I_E = 0, T_A = +150^\circ\text{C}$ | - | - | 1.0 | μA |

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} | $I_C = 3\text{mA}, V_{CE} = 1\text{V}$ | 20 | – | – | |
| 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 | $I_C = 10\text{mA}, V_{CE} = 10\text{V},$ $f = 100\text{MHz}, \text{Note 1}$ | 600 | – | – | MHz |
| Output Capacitance | C_{obo} | $V_{CB} = 10\text{V}, I_E = 0, f = 140\text{kHz}$ | – | – | 1.7 | pF |
| | | $V_{CB} = 0, I_E = 0, f = 140\text{kHz}$ | – | – | 3.0 | pF |
| Input Capacitance | C_{ibo} | $V_{EB} = 0.5\text{V}, I_C = 0, f = 140\text{kHz}$ | – | – | 2.0 | pF |
| Noise Figure | NF | $I_C = 1\text{mA}, V_{CE} = 6\text{V},$ $R_G = 400\Omega, f = 60\text{MHz}$ | – | – | 6.0 | dB |
| Functional Test | | | | | | |
| Amplifier Power Gain | G_{pe} | $V_{CB} = 12\text{V}, I_C = 6\text{mA}, f = 200\text{MHz}$ | 15 | – | – | dB |
| Power Output | P_o | $V_{CB} = 15\text{V}, I_C = 8\text{mA}, f = 500\text{MHz}$ | 30 | – | – | mW |
| Collector Efficiency | η | $V_{CB} = 15\text{V}, I_C = 8\text{mA}, f = 500\text{MHz}$ | 25 | – | – | % |

Note 1. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

