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NTE100 (PNP) & NTE101 (NPN) Germanium Complementary Transistors Oscillator, Mixer for AM Radio, Medium Speed Switch

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

| | |
|---|-------------------------------------|
| Collector–Base Voltage, V_{CBO} | 25V |
| Collector–Emitter Voltage (Note 1), V_{CEO} | |
| NTE100 | 24V |
| NTE101 | 25V |
| Emitter–Base Voltage, V_{EBO} | |
| NTE100 | 12V |
| NTE101 | 25V |
| Collector Current, I_C | |
| NTE100 | 100mA |
| NTE101 | 300mA |
| Emitter Current (NTE100 Only), I_E | 100mA |
| Total Device Dissipation, P_D | 150mW |
| Derate Above 25°C | 2.5mW/ $^\circ\text{C}$ |
| Operating Collector Junction Temperature, T_J | $+85^\circ\text{C}$ |
| Storage Temperature Range, T_{stg} | -65° to $+100^\circ\text{C}$ |

Note 1. Punch-through voltage.

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

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--|---------------|-------------------------------------|-----|-----|-----|---------------|
| Collector–Base Breakdown Voltage NTE100 | $V_{(BR)CBO}$ | $I_E = 0$ $I_C = 20\mu\text{A}$ | 25 | – | – | V |
| | | | 25 | – | – | V |
| Collector–Base Breakdown Voltage NTE101 | $V_{(BR)CBO}$ | $I_E = 0$ $I_C = 100\mu\text{A}$ | 25 | – | – | V |
| | | | 25 | – | – | V |
| Emitter–Base Breakdown Voltage NTE100 | $V_{(BR)EBO}$ | $I_C = 0$ $I_E = 20\mu\text{A}$ | 12 | – | – | V |
| | | | 25 | – | – | V |
| Emitter–Base Breakdown Voltage NTE101 | $V_{(BR)EBO}$ | $I_C = 0$ $I_E = 100\mu\text{A}$ | 25 | – | – | V |
| | | | 25 | – | – | V |
| Punch Through Voltage NTE100 | V_{PT} | $V_{EBfl} = 1V$, Note 2 | 24 | – | – | V |
| | | | 25 | – | – | V |
| Collector Cutoff Current NTE100 | I_{CBO} | $I_E = 0$ $V_{CB} = 12V$ | – | 1 | 5 | μA |
| | | | – | 40 | 90 | μA |
| | | | – | 3 | 6 | μA |
| NTE101 | | $V_{CB} = 25V$ | – | 3 | 6 | μA |

Note 2. V_{PT} is determined by measuring the Emitter–Base floating potential V_{EBfl} . The Collector–Base Voltage, V_{CB} , is increased until $V_{EBfl} = 1V$; this value of $V_{CB} = (V_{PT} + 1V)$. Care must be taken not to exceed maximum Collector–Base Voltage specified under maximum ratings.

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

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---------------|---|-------------------------------------|------|---------------|------|---------------|
| Emitter Cutoff Current NTE100 | I_{EBO} | $I_C = 0$ | $V_{EB} = 2.5\text{V}$ | – | 1 | 2.5 | μA |
| | | | $V_{EB} = 25\text{V}$ | – | 2 | 6 | μA |
| Static Forward Current Transfer Ratio NTE100 | h_{FE} | $V_{CE} = 0.15\text{V}, I_C = 12\text{mA}$ | | 30 | 100 | – | |
| | | $V_{CE} = 0.20\text{V}, I_C = 24\text{mA}$ | | 24 | 110 | – | |
| | | $V_{CE} = 1\text{V}, I_C = 10\text{mA}$ | | 20 | 100 | – | |
| | | $V_{CE} = 0.35\text{V}, I_C = 200\text{mA}$ | | 10 | 100 | – | |
| Base–Emitter Voltage NTE100 | V_{BE} | $I_B = 0.4\text{mA}, I_C = 12\text{mA}$ | | – | 0.26 | 0.35 | V |
| | | $I_B = 1\text{mA}, I_C = 24\text{mA}$ | | – | 0.30 | 0.40 | V |
| | | $I_B = 0.5\text{mA}, I_C = 10\text{mA}$ | | 0.15 | 0.22 | 0.40 | V |
| Collector–Emitter Saturation Voltage NTE100 | $V_{CE(sat)}$ | $I_B = 0.4\text{mA}, I_C = 12\text{mA}$ | | – | 0.08 | 0.15 | V |
| | | $I_B = 1\text{mA}, I_C = 24\text{mA}$ | | – | 0.08 | 0.20 | V |
| | | $I_B = 0.5\text{mA}, I_C = 10\text{mA}$ | | – | 0.07 | 0.20 | V |
| Small–Signal Forward Current Transfer Ratio NTE100 | h_{fe} | $V_{CE} = 6\text{V}$ | $I_C = 1\text{mA}, f = 1\text{kHz}$ | – | 135 | – | |
| | | $V_{CE} = 5\text{V}$ | | – | 105 | – | |
| Output Capacitance NTE100 | C_{ob} | $V_{CB} = 6\text{V}$ | $I_E = 0, f = 1\text{MHz}$ | – | 9 | 20 | pF |
| | | $V_{CB} = 5\text{V}$ | | – | 14 | 20 | pF |
| Switching Characteristics | | | | | | | |
| Delay Time NTE100 | t_d | $I_C = 10\text{mA}, I_{B(1)} = 1.3\text{mA}, I_{B(2)} = 0.7\text{mA}, V_{BE(off)} = 0.8\text{V}, R_L = 1\text{k}\Omega$ | | – | 0.14 | – | μs |
| | | | | – | 0.07 | – | μs |
| Rise Time | t_r | | | – | 0.20 | – | μs |
| Storage Time NTE100 | t_s | | | – | 0.38 | – | μs |
| | | | | – | 0.70 | – | μs |
| Fall Time NTE100 | t_f | | | – | 0.19 | – | μs |
| | | – | 0.40 | – | μs | | |
| Stored Base Charge | Q_{sb} | $I_{B(1)} = 1\text{mA}, I_C = 10\text{mA}$ | | – | 800 | 1400 | pcb |

