

## 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 $25^\circ\text{C}$ .....	12mW/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ 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
<b>OFF Characteristics</b>						
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  $< 300\mu\text{s}$ , Duty Cycle  $< 1\%$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics</b>						
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
<b>Small-Signal Characteristics</b>						
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
<b>Functional Test</b>						
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	$\eta$	$I_C = 8\text{mA}, V_{CB} = 15\text{V}, P_{out} = 30\text{mW}, f = 500\text{MHz}$	25	-	-	%

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

