

NTE108 Silicon NPN Transistor High Frequency Amplifier

Description:

The NTE108 is a silicon NPN transistor in a TO92 type case 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 $< 300\mu\text{s}$, Duty Cycle $< 1\%$.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
ON Characteristics						
DC Current Gain	h_{FE}	$I_C = 3\text{mA}$, $V_{CE} = 1\text{V}$, Note 2	20	—	—	
		$I_C = 8\text{mA}$, $V_{CE} = 10\text{V}$, 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	$I_C = 4\text{mA}$, $V_{CE} = 10\text{V}$, $f = 100\text{MHz}$, 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 $< 300\mu\text{s}$, Duty Cycle $< 1\%$.