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NTE322 Silicon NPN Transistor RF Power Output

Description:

The NTE322 is a silicon NPN RF power transistor in a TO202N type package designed for use in Citizen-Band and other high-frequency communications equipment operating to 30MHz. Higher breakdown voltages allow a high percentage of up-modulation in AM circuits.

Features:

- Output Power: 3.5W (Min) @ $V_{CC} = 13.6V$
- Power Gain: 11.5dB (Min)
- High Collector Emitter Breakdown Voltage: $V_{(BR)CES} \geq 65V$
- DC Current Gain: Linear to 500mA

Absolute Maximum Ratings:

Collector-Emitter Voltage, V_{CES}	65V
Emitter-Base Voltage, V_{EB}	3V
Continuous Collector Current, I_C	500mA
Total Power Dissipation ($T_A = +25^\circ C$), P_D	1.0W
Derate above $25^\circ C$	8.0mW/ $^\circ C$
Total Power Dissipation ($T_C = +25^\circ C$), P_D	10W
Derate above $25^\circ C$	80mW/ $^\circ C$
Operating Junction Temperature Range, T_J	-55° to $+150^\circ C$
Storage Junction Temperature Range, T_{stg}	-55° to $+150^\circ C$
Thermal Resistance, Junction-to-Case, R_{thJC}	12.5 $^\circ C/W$
Thermal Resistance, Junction to Ambient (Note 1), R_{thJA}	125 $^\circ C/W$

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	$V_{(BR)CES}$	$I_C = 150\text{mA}$, $V_{BE} = 0$, Note 2	65	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 1\text{mA}$, $I_C = 0$	3	–	–	V
Collector Cutoff Current	I_{CBO}	$V_{CB} = 50\text{V}$, $I_E = 0$	–	–	0.01	mA
ON Characteristics						
DC Current Gain	h_{FE}	$I_C = 100\text{mA}$, $V_{CE} = 10\text{V}$, Note 3	10	–	–	
Dynamic Characteristics						
Output Capacitance	C_{ob}	$V_{CB} = 12\text{V}$, $I_E = 0$, $f = 1\text{MHz}$	–	–	40	pF
Functional Test						
Common–Emitter Amplifier Power Gain	G_{PE}	$P_O = 3.5\text{W}$, $V_{CC} = 13.6\text{V}$, $f = 27\text{MHz}$	11.5	–	–	dB
Output Power	P_O	$P_{IN} = 250\text{mW}$, $V_{CC} = 13.6\text{V}$, $f = 27\text{MHz}$	3.5	–	–	W
Collector Efficiency	η	$P_O = 3.5\text{W}$, $V_{CC} = 13.6\text{V}$, $f = 27\text{MHz}$, Note 4	–	70	–	%
Percentage Up–Modulation		$f = 27\text{MHz}$, Note 5	–	85	–	%

Note 2. Pulsed thru a 25mH inductor

Note 3. Pulse test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

Note 4. $\eta = \frac{R_F P_O}{(V_{CC}) (I_C)} \cdot 100$

Note 5. Percentage Up–Modulation is measured by setting the Carrier Power (P_C) to 3.5 Watts with $V_{CC} = 13.6\text{V}$ and noting the power input. Then the peak envelope power (PEP) is noted after doubling the original power input to simulate driver modulation (at a 25% duty cycle for thermal considerations) and raising the V_{CC} to 25V (to simulate the modulating voltage). Percentage Up–Modulation is then determined by the relation:

$$\text{Percentage Up–Modulation} = \left[\left(\frac{\text{PEP}}{P_C} \right)^{1/2} - 1 \right] \cdot 100$$



