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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, $T_J$ .....	$-55^\circ$ to $+150^\circ C$
Storage Junction Temperature Range, $T_{stg}$ .....	$-55^\circ$ 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
<b>OFF Characteristics</b>						
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
<b>ON Characteristics</b>						
DC Current Gain	$h_{FE}$	$I_C = 100\text{mA}$ , $V_{CE} = 10\text{V}$ , Note 3	10	–	–	
<b>Dynamic Characteristics</b>						
Output Capacitance	$C_{ob}$	$V_{CB} = 12\text{V}$ , $I_E = 0$ , $f = 1\text{MHz}$	–	–	40	pF
<b>Functional Test</b>						
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	$\eta$	$P_O = 3.5\text{W}$ , $V_{CC} = 13.6\text{V}$ , $f = 27\text{MHz}$ , 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:

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



