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## **NTE384**

### **Silicon NPN Transistor**

### **High Voltage Power Amp/Switch**

**Description:**

The NTE384 is a multiple epitaxial silicon NPN power transistor in a TO66 type package utilizing a multiple-emitter site structure. Multiple-epitaxial construction maximizes the volt-ampere characteristic of the device and provides fast switching speeds. Multiple-emitter design ensures uniform current flow throughout the structure, which produces a high  $I_{S/b}$  and a large safe-operation-area.

The NTE384 is characterized for use in inverters operating directly from a rectified 110V power line. The leakage current is specified at 450V; therefore the device can also be used in a series bridge configuration on a 220V line. The  $V_{EBO}$  rating of 9V eases requirements on the drive transformer in inverter applications.

**Features:**

- Maximum Safe-Area-of-Operation
- Low Saturation Voltages
- High Voltage Rating:  $V_{CER(sus)} = 375V$
- High Dissipation Rating:  $P_T = 45W$

**Absolute Maximum Ratings:**

Collector-Base Voltage, $V_{CBO}$ .....	375V
Collector-Emitter Sustaining Voltage	
With Base Open, $V_{CEO(sus)}$ .....	350V
With Reverse Bias ( $V_{BE}$ ) of $-1.5V$ , $V_{CEX(sus)}$ .....	375V
With External Base-Emitter Resistance ( $R_{BE}$ ) $\leq 50\Omega$ , $V_{CER(sus)}$ .....	375V
Emitter-Base Voltage, $V_{EBO}$ .....	9V
Collector Current, $I_C$	
Continuous .....	7A
Peak .....	10A
Continuous Base Current, $I_B$ .....	4A
Transistor Dissipation ( $T_C \leq +25^\circ C$ , $V_{CE} \leq 40V$ ), $P_T$ .....	45W
Operating Junction Temperature Range, $T_{opr}$ .....	$-65^\circ$ to $+200^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ C$
Lead Temperature (During Soldering, 1/32 in. (0.8mm) from case, 10sec max), $T_L$ .....	$+230^\circ C$
Thermal Resistance, Junction to Case ( $V_{CE} = 20V$ , $I_C = 2.25A$ ), $R_{\theta JC}$ .....	$3.9^\circ C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Cutoff Current	$I_{CEV}$	$V_{CE} = 450\text{V}, V_{BE} = -1.5\text{V}$	-	-	0.5	mA
		$V_{CE} = 450\text{V}, V_{BE} = -1.5\text{V}, T_C = +125^\circ\text{C}$	-	-	5.0	mA
Emitter-Cutoff Current	$I_{EBO}$	$V_{BE} = -9\text{V}, I_C = 0$	-	-	1.0	mA
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 200\text{mA}, \text{Note 1, Note 2}$	350	-	-	V
		$I_C = 200\text{mA}, R_{BE} = 50\Omega, \text{Note 1, Note 2}$	375	-	-	V
Emitter-Base Voltage	$V_{EBO}$	$I_C = 0$	9	-	-	V
DC Forward Current	$h_{FE}$	$V_{CE} = 1\text{V}, I_C = 1.2\text{A}, \text{Note 1}$	12	28	50	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 1.2\text{A}, I_B = 200\text{mA}, \text{Note 1}$	-	1.0	1.6	V
		$I_C = 4\text{A}, I_B = 800\text{mA}, \text{Note 1}$	-	1.3	2.0	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 1.2\text{A}, I_B = 200\text{mA}, \text{Note 1}$	-	0.15	0.5	V
		$I_C = 4\text{A}, I_B = 800\text{mA}, \text{Note 1}$	-	0.5	3.0	V
Output Capacitance	$C_{obo}$	$V_{CB} = 10\text{V}, f = 1\text{MHz}$	-	-	150	pF
Small-Signal Forward Current Transfer Ratio	$ h_{fe} $	$V_{CE} = 10\text{V}, I_C = 200\text{mA}, f = 1\text{MHz}$	1	7	-	
Second Breakdown Collector Current	$I_{S/b}$	$V_{CE} = 50\text{V}$ , with Base forward biased, Pulse duration (non-repetitive) = 1sec	0.9	-	-	A
Second Breakdown Energy	$E_{S/b}$	$V_{BE} = -4\text{V}, I_C = 3\text{A}$ , with Base reverse biased, $R_B = 50\Omega, L = 100\mu\text{H}$	0.45	-	-	mJ
Delay Time	$t_d$	$V_{CC} = 250\text{V}, I_{B1} = I_{B2} = 200\text{mA}, I_C = 1.2\text{A}$	-	0.02	-	$\mu\text{s}$
Rise Time	$t_r$		-	0.3	0.75	$\mu\text{s}$
Storage Time	$t_s$		-	2.8	5.0	$\mu\text{s}$
Fall Time	$t_f$		-	0.3	0.75	$\mu\text{s}$

Note 1. Pulsed: Pulse Duration  $\leq 350\mu\text{s}$ , Duty Factor = 2%.

