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## NTE2311 Silicon NPN Transistor High Voltage, High Speed Switch

**Description:**

The NTE2311 is a silicon NPN transistor in a TO218 type case designed for use in high voltage, high speed switching applications.

**Features:**

- High Blocking Capability:  $V_{CEX} = 1000V$
- Wide Surge Area:  $I_{CSM} = 55A @ 350V$

**Applications:**

- Switchmode Power Supply
- DC/DC and DC/AC Converters
- Motor Control

**Absolute Maximum Ratings:** ( $T_C = +25^{\circ}C$  unless otherwise specified)

Collector–Emitter Voltage, $V_{CEO}$ .....	450V
Collector–Emitter Voltage ( $V_{BE} = -2.5V$ ), $V_{CEX}$ .....	1000V
Emitter–Base Voltage, $V_{EBO}$ .....	7V
Collector Current ( $t_p \leq 5ms$ ), $I_C$	
Continuous .....	15A
Peak .....	30A
Base Current ( $t_p \leq 5ms$ ), $I_B$	
Continuous .....	4A
Peak .....	20A
Power Dissipation, $P_{tot}$	
$T_C = +25^{\circ}C$ .....	150W
$T_C = +60^{\circ}C$ .....	115W
Operating Junction Temperature Range, $T_J$ .....	$-65^{\circ}$ to $+175^{\circ}C$
Thermal Resistance, Junction–to–Case, $R_{thJC}$ .....	$1^{\circ}C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_B = 0, I_C = 200mA, L = 25mH$	450	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	$I_C = 0, I_E = 50mA$	7	–	30	V
Collector Cutoff Current	$I_{CEX}$	$T_J = +25^{\circ}C$	–	–	0.2	mA
		$T_J = +125^{\circ}C$				
	$I_{CER}$	$T_J = +25^{\circ}C$	–	–	0.5	mA
		$T_J = +125^{\circ}C$				

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>OFF Characteristics (Cont,d)</b>							
Emitter Cutoff Current	$I_{EBO}$	$I_C = 0, V_{BE} = -5V$	-	-	1	mA	
<b>ON Characteristics (Note 1)</b>							
DC Current Gain	$h_{FE}$	$I_C = 8A_{dc}, V_{CE} = 5V_{dc}$	10	-	-	-	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 8A, I_B = 1.6A$	-	-	1.5	V	
		$I_C = 12A, I_B = 2.4A$	-	-	5.0	V	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 8A, I_B = 1.6A$	-	-	1.6	V	
<b>Switching Characteristics (Switching Times on Resistive Load)</b>							
Turn–On Time	$t_{on}$	$V_{CC} = 150V, I_C = 8A,$ $I_{B1} = -I_{B2} = 1.6A$	-	0.55	1.0	$\mu s$	
Storage Time	$t_s$		-	1.5	3.0	$\mu s$	
Fall Time	$t_f$		-	0.3	0.8	$\mu s$	
<b>Switching Characteristics (Switching Times on Inductive Load)</b>							
Storage Time	$t_s$	$T_J = +25^\circ\text{C}$	$V_{CC} = 300V,$ $V_{BB} = -5V,$ $L_B = 3\mu H,$ $I_C = 8A,$ $I_{Bend} = 1.6A$	-	3.5	-	$\mu s$
		$T_J = +125^\circ\text{C}$		-	-	5.0	$\mu s$
Fall Time	$t_f$	$T_J = +25^\circ\text{C}$		-	0.08	-	$\mu s$
		$T_J = +125^\circ\text{C}$		-	-	0.4	$\mu s$

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

