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NTE2638 Silicon NPN Transistor Darlington TO220 Type Package

Features:

- High Voltage, High Forward and Clamped Reverse Energy
- 10A Peak Collector Current
- 80W at +25°C Case Temperature
- Collector–Emitter Sustaining Voltage: 400V Min at 7A

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

Collector–Emitter Voltage ($I_B = 0$), V_{CEO}	400V
Collector–Base Voltage, V_{CBO}	400V
Emitter–Base Voltage, V_{EBO}	8V
Collector Current, I_C	
Continuous	7A
Peak (Note 1)	10A
Continuous Base Current, I_B	1.5A
Continuous Device Dissipation ($T_C = +25^\circ\text{C}$), P_D	80W
Derate Linearly to 150°C	0.64W/°C
Continuous Device Dissipation ($T_A = +25^\circ\text{C}$), P_D	2W
Derate Linearly to 150°C	16mW/°C
Operating Junction Temperature Range, T_J	-65° to +150°C
Storage Temperature Range, T_{stg}	-65° to +150°C
Thermal Resistance, Junction–to–Case, R_{thJC}	1.56°C/W
Thermal Resistance, Junction–to–Ambient, R_{thJA}	62.5°C/W
Typical Thermal Resistance, Case–to–Heat Sink (Note 2), R_{thCHS}	0.7°C/W
Lead Temperature (During Soldering, 1/8" from case, 10sec), T_L	+260°C

Note 1. This value applies for $t_w \leq 5\text{ms}$, duty cycle $\leq 10\%$.

Note 2. This parameter is measured using 0.003" (0.08mm) mica insulator with Dow–Corning 11 compound on both sides of the insulator, a 0.138–32 (formally 6–32) mounting screw with bushing, and a mounting torque of 8 in•lb (0.9 n•m).

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 1\text{mA}, I_E = 0$, Note 3	400	–	–	V
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C = 10\text{mA}, I_B = 0$, Note 3	400	–	–	V
Collector–Emitter Sustaining Voltage	$V_{CEX(sus)}$	$I_C = 7\text{A}$	400	–	–	V
Collector Cutoff Current	I_{CEO}	$V_{CE} = 400\text{V}, I_B = 0$	–	–	250	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 8\text{V}, I_C = 0$	–	–	15	mA
DC Current Gain	h_{FE}	$I_C = 2.5\text{A}, V_{CE} = 5\text{V}$, Note 3, Note 4	150	–	–	
		$I_C = 5\text{A}, V_{CE} = 5\text{V}$, Note 3, Note 4	50	–	–	
		$I_C = 7\text{A}, V_{CE} = 5\text{V}$, Note 3, Note 4	15	–	–	
Base–Emitter Voltage	V_{BE}	$I_B = 100\text{mA}, I_C = 2\text{A}$, Note 3, Note 4	–	–	2.2	V
		$I_B = 250\text{mA}, I_C = 5\text{A}$, Note 3, Note 4	–	–	2.3	V
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_B = 10\text{mA}, I_C = 1\text{A}$, Note 3, Note 4	–	–	1.5	V
		$I_B = 100\text{mA}, I_C = 2\text{A}$, Note 3, Note 4	–	–	1.5	V
		$I_B = 250\text{mA}, I_C = 5\text{A}$, Note 3, Note 4	–	–	2.0	V
Diode Forward Voltage	V_F	$I_F = 7\text{A}$, Note 3, Note 4	–	–	3.5	V
Small–Signal Current Gain	h_{fe}	$V_{CE} = 5\text{V}, I_C = 500\text{mA}, f = 1\text{kHz}$	200	–	–	
Small–Signal Forward Current Transfer Ratio	$ h_{fe} $	$V_{CE} = 5\text{V}, I_C = 500\text{mA}, f = 1\text{kHz}$	10	–	–	
Collector Capacitance	C_{obo}	$I_E = 0, V_{CB} = 10\text{V}, f = 1\text{MHz}$	–	–	100	pF
Resistive–Load Switching Characteristics ($T_C = +25^\circ\text{C}$ unless otherwise specified)						
Turn–Off Storage Time	t_s	$I_C = 5\text{A}, I_{B1} = 250\text{mA}, I_{B2} = -250\text{mA}, V_{BE(off)} = -7.3\text{V}, R_L = 50\Omega$, Note 5	–	3400	–	ns
Turn–Off Fall Time	t_f		–	1520	–	ns
Turn–Off Rise Time	t_r		–	160	–	ns
Turn–On Delay Time	t_d		–	20	–	ns
Inductive–Load Switching Characteristics ($T_C = +25^\circ\text{C}$ unless otherwise specified)						
Voltage Storage Time	t_{sv}	$V_{(clamp)} = \text{Min } V_{CEX(sus)}, I_{CM} = 5\text{A}, I_{B1} = 250\text{mA}, I_{B2} = -250\text{mA}$, Note 5	–	3900	–	ns
Current Storage Time	t_{si}		–	4700	–	ns
Voltage Rise Time	t_{rv}		–	1200	–	ns
Storage Rise Time	t_{ri}		–	1200	–	ns
Turn–Off Crossover Time	t_{xo}		–	2000	–	ns

Note 3. These parameters must be measured using pulse techniques, $t_w = 300\mu\text{s}$, duty cycle $\leq 2\%$.

Note 4. These parameters are measured with voltage–sensing contacts separate from the current–carrying contacts located within 1/8" (3.2mm) from the device body.

Note 5. Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

