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## MJ10015 & MJ10016 T-NPN, Si, Darlington w/Base-Emitter Speedup Diode

### **Description:**

The MJ10015 and MJ10016 are Darlington transistors in a TO3 type package designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line operated switch-mode applications.

### **Applications:**

- Continuous Collector Current ( $I_C = 50A$ )
- Switching Regulators
- Inverters
- Solenoid and Relay Drivers
- Motor Controls

### **Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEV}$		
MJ10015 .....		600V
MJ10016 .....		700V
Collector-Emitter Voltage, $V_{CEO(SUS)}$		
MJ10015 .....		400V
MJ10016 .....		500V
Emitter-Base Voltage, $V_{EBO}$ .....		8.0V
Collector Current		
Continuous, $I_C$ .....		50A
Peak, $I_{CM}$ .....		75A
Base Current, $I_B$ .....		10A
Total Power Dissipation, $P_D$		
$T_C = +25^\circ C$ .....		250W
$T_C = +100^\circ C$ .....		143W
Derate Above $+25^\circ C$ .....		1.43W/ $^\circ C$
Operating Junction Temperature Range, $T_j$ .....		$-65^\circ$ to $+200^\circ C$
Storage Temperature Range, $T_{stg}$ .....		$-65^\circ$ to $+200^\circ C$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....		0.7 $^\circ C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Collector-Emitter Sustaining Voltage	$V_{CEO(SUS)}$	$I_C = 100mA, I_B = 0, V_{CLAMP} = \text{Rated } V_{CEO}$	400	-	-	V
MJ10015						
MJ10016			500	-	-	V
Collector Cutoff Current	$I_{CEV}$	$V_{CEV} = \text{Rated Value}, V_{BE(OFF)} = 1.5V$	-	-	0.25	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 2.0V, I_C = 0$	-	-	350	mA

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>On Characteristics (Note 1)</b>						
DC Current Gain	$h_{FE}$	$I_C = 20\text{A}, V_{CE} = 5.0\text{V}$	25	-	-	
		$I_C = 40\text{A}, V_{CE} = 5.0\text{V}$	10	-	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 20\text{A}, I_B = 1.0\text{A}$	-	-	2.2	V
		$I_C = 50\text{A}, I_B = 10\text{A}$	-	-	5.0	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 20\text{A}, I_B = 1.0\text{A}$	-	-	2.75	V
Diode Forward Voltage	$V_F$	$I_F = 20\text{A}$	-	-	5.0	V
<b>Dynamic Characteristics</b>						
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 100\text{kHz}$	-	-	750	pF
<b>Switching Characteristics</b>						
Delay Time	$t_d$	$V_{CC} = 250\text{V}, I_C = 20\text{A}, I_{B1} = 1.0\text{A}, V_{BE(off)} = 5\text{V}, t_p = 25\mu\text{s}, \text{Duty Cycle} \leq 2\%$	-	-	0.3	us
Rise Time	$t_r$		-	-	1.0	us
Storage Time	$t_s$		-	-	2.5	us
Fall Time	$t_f$		-	-	1.0	us

Note 1. Pulse Test: Pulse width =  $300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

