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## MJ10012 NPN Silicon Power Darlington Transistor TO3 Type Package

**Description:**

The MJ10012 is high-voltage, high-current Darlington transistor in a TO3 type package designed for automotive ignition, switching regulation and motor control applications.

**Features:**

- Collector-Emitter Sustaining Voltage:  $V_{CEO(sus)} = 400Vdc$  (Min)
- 175 Watts Capability at 50 Volts

**Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO}$ .....	400V
Collector-Emitter Voltage ( $R_{BE} = 27\leq$ ), $V_{CER}$ .....	550V
Collector-Base Voltage, $V_{CBO}$ .....	600V
Emitter-Base Voltage, $V_{EBO}$ .....	8V
Collector Current, $I_C$	
Continuous .....	10A
Peak (Note 1) .....	15A
Base Current, $I_B$ .....	2A
Total Power Dissipation, $P_D$	
$T_C = +25^\circ C$ .....	175W
$T_C = +100^\circ C$ .....	100W
Derate Above $25^\circ C$ .....	1.0W/ $^\circ C$
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, $R_{thJC}$ .....	1.0 $^\circ C/W$
Lead Temperature (During Soldering, 1/8" from case, 5 sec), $T_L$ .....	$+275^\circ C$

Note 1. Pulse Test: Pulse Width = 5ms, Duty Cycle  $\leq$  10%.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b> (Note 2)						
Collector-Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 200\text{mA}, I_B = 0, V_{clamp} = 400\text{V}$	400	-	-	V
	$V_{CER(sus)}$	$I_C = 200\text{mA}, R_{BE} = 27\leq, V_{clamp} = 400\text{V}$	425	-	-	V
Collector Cutoff Current	$I_{CER}$	$V_{CER} = 550\text{V}, R_{BE} = 27\leq$	-	-	1.0	mA
	$I_{CBO}$	$V_{CBO} = 600\text{V}, I_E = 0$	-	-	1.0	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 6\text{V}, I_C = 0$	-	-	40	mA
<b>ON Characteristics</b> (Note 3)						
DC Current Gain	$h_{FE}$	$V_{CE} = 6\text{V}, I_C = 3\text{A}$	300	550	-	
		$V_{CE} = 6\text{V}, I_C = 6\text{A}$	100	350	2000	
		$V_{CE} = 6\text{V}, I_C = 10\text{A}$	20	150	-	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 3\text{A}, I_B = 600\text{mA}$	-	-	1.5	V
		$I_C = 6\text{A}, I_B = 600\text{mA}$	-	-	2.0	V
		$I_C = 10\text{A}, I_B = 2\text{A}$	-	-	2.5	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 6\text{A}, I_B = 600\text{mA}$	-	-	2.5	V
		$I_C = 10\text{A}, I_B = 2\text{A}$	-	-	3.0	V
Base-Emitter ON Voltage	$V_{BE(on)}$	$I_C = 10\text{A}, V_{CE} = 6\text{V}$	-	-	2.8	V
Diode Forward Voltage	$V_F$	$I_F = 10\text{A}$	-	2.0	3.5	V
<b>Dynamic Characteristics</b>						
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f_{test} = 100\text{kHz}$	165	-	350	pF
<b>Switching Characteristics</b>						
Storage Time	$t_s$	$V_{CC} = 12\text{V}, I_C = 6\text{A}, I_{B1} = I_{B2} = 300\text{mA}$	-	7.5	15	$^\circ\text{s}$
Fall Time	$t_f$		-	5.2	15	$^\circ\text{s}$
<b>Functional Tests</b>						
Pulsed Energy Test	$I_C 2L/2$		-	-	180	mJ

Note 2. Pulse Test: Pulse Width =  $300^\circ\text{s}$ , Duty Cycle = 2%.



