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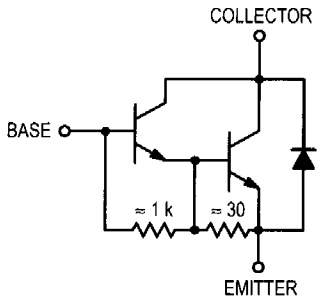
MJ10012
MJH10012

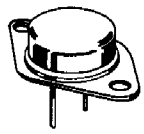
NPN Silicon Power Darlington Transistor

10 AMPERE
POWER TRANSISTORS
DARLINGTON NPN
SILICON
400 VOLTS
175 AND 118 WATTS

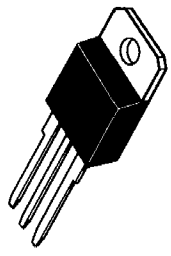
The MJ10012 and MJH10012 are high–voltage, high–current Darlington transistors designed for automotive ignition, switching regulator and motor control applications.

- Collector–Emitter Sustaining Voltage — $V_{CEO(sus)}$ = 400 Vdc (Min)
- 175 Watts Capability at 50 Volts
- Automotive Functional Tests





(TO–3)
MJ10012



TO–218 TYPE
MJH10012

MAXIMUM RATINGS

Rating	Symbol	MJ10012	MJH10012	Unit
Collector–Emitter Voltage	V_{CEO}	400		Vdc
Collector–Emitter Voltage (R_{BE} = 27 Ω)	V_{CER}	550		Vdc
Collector–Base Voltage	V_{CBO}	600		Vdc
Emitter–Base Voltage	V_{EBO}	8.0		Vdc
Collector Current — Continuous — Peak (1)	I_C	10 15		Adc
Base Current	I_B	2.0		Adc
Total Power Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D	 175 100 1.0	 118 47.5 1.05	 Watts Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200	−55 to +150	°C

THERMAL CHARACTERISTICS

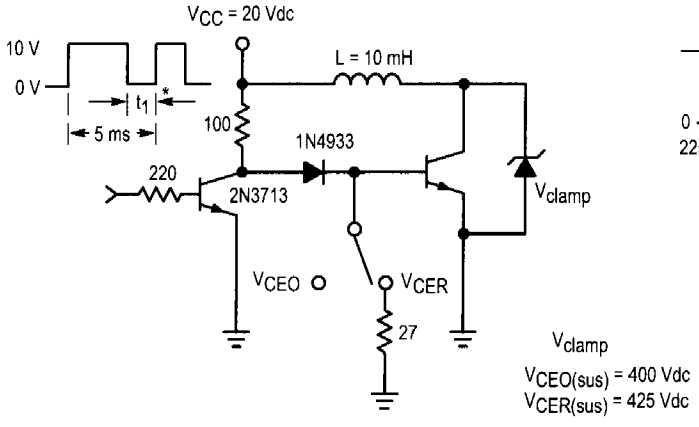
Characteristic	Symbol	Max		Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	0.95	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8″ from Case for 5 Seconds	T_L	275	275	°C

(1) Pulse Test: Pulse Width = 5.0 ms, Duty Cycle ≤ 10%.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (1)					
Collector–Emitter Sustaining Voltage (Figure 1) (I_C = 200 mAdc, I_B = 0, V_{clamp} = Rated V_{CEO})	$V_{CEO(sus)}$	400	—	—	Vdc
Collector–Emitter Sustaining Voltage (Figure 1) (I_C = 200 mAdc, R_{BE} = 27 Ohms, V_{clamp} = Rated V_{CER})	$V_{CER(sus)}$	425	—	—	Vdc
Collector Cutoff Current (Rated V_{CER}, R_{BE} = 27 Ohms)	I_{CER}	—	—	1.0	mAdc
Collector Cutoff Current (Rated V_{CBO}, I_E = 0)	I_{CBO}	—	—	1.0	mAdc
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)	I_{EBO}	—	—	40	mAdc
ON CHARACTERISTICS (1)					
DC Current Gain (I_C = 3.0 Adc, V_{CE} = 6 0 Vdc) (I_C = 6.0 Adc, V_{CE} = 6.0 Vdc) (I_C = 10 Adc, V_{CE} = 6.0 Vdc)	h_{FE}	 300 100 20	 550 350 150	 — 2000 —	—
Collector–Emitter Saturation Voltage (I_C = 3.0 Adc, I_B = 0.6 Adc) (I_C = 6.0 Adc, I_B = 0.6 Adc) (I_C = 10 Adc, I_B = 2.0 Adc)	$V_{CE(sat)}$	 — — —	 — — —	 1 5 2.0 2.5	Vdc
Base Emitter Saturation Voltage (I_C = 6.0 Adc, I_B = 0.6 Adc) (I_C = 10 Adc, I_B = 2.0 Adc)	$V_{BE(sat)}$	 — —	 — —	 2.5 3.0	Vdc
Base Emitter On Voltage (I_C = 10 Adc, V_{CE} = 6.0 Vdc)	$V_{BE(on)}$	—	—	2.8	Vdc
Diode Forward Voltage (I_F = 10 Adc)	V_f	—	2.0	3.5	Vdc
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 100 kHz)	C_{ob}	—	165	350	pF
SWITCHING CHARACTERISTICS					
Storage Time	(V_{CC} = 12 Vdc, I_C = 6.0 Adc, I_{B1} = I_{B2} = 0.3 Adc) Figure 2	t_s	—	7 5	15	µs
Fall Time		t_f	—	5.2	15	µs
FUNCTIONAL TESTS					
Second Breakdown Collector Current with Base–Forward Biased	$I_{S/B}$	See Figure 10			—
Pulsed Energy Test (See Figure 12)	$I_C2_L/2$	—	—	180	mJ

(1) Pulse Test: Pulse Width = 300 µs, Duty Cycle = 2%.



* Adjust t_1 such that I_C reaches 200 mA at V_{CE} = V_{clamp}

Figure 1. Sustaining Voltage Test Circuit

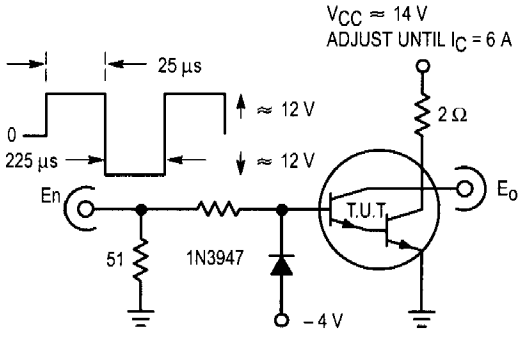


Figure 2. Switching Times Test Circuit