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SPRINGFIELD, NEW JERSEY 07081
U.S.A.

NPN Silicon Power Darlington Transistors

The MJE5740, 41, 42 Darlington transistors are designed for high-voltage power switching in inductive circuits. They are particularly suited for operation in applications such as:

- Small Engine Ignition
- Switching Regulators
- Inverters
- Solenoid and Relay Drivers
- Motor Controls

MAXIMUM RATINGS

Rating	Symbol	MJE5740	MJE5741	MJE5742	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	300	350	400	Vdc
Collector-Emitter Voltage	V_{CEV}	600	700	800	Vdc
Emitter Base Voltage	V_{EB}	8			Vdc
Collector Current — Continuous	I_C	8			Adc
— Peak (1)	I_{CM}	16			
Base Current — Continuous	I_B	2.5			Adc
— Peak (1)	I_{BM}	5			
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	2 16			Watts mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	80 640			Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150			$^\circ\text{C}$

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle = 10%.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.56	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T_L	275	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS (2)

Collector-Emitter Sustaining Voltage ($I_C = 50\text{ mA}, I_B = 0$)	MJE5740 MJE5741 MJE5742	$V_{CEO(sus)}$	300 350 400	— — —	— — —	Vdc
Collector Cutoff Current ($V_{CEV} = \text{Rated Value}, V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CEV} = \text{Rated Value}, V_{BE(off)} = 1.5\text{ Vdc}, T_C = 100^\circ\text{C}$)		I_{CEV}	— —	— —	1 5	mAdc
Emitter Cutoff Current ($V_{EB} = 8\text{ Vdc}, I_C = 0$)		I_{EBO}	—	—	75	mAdc

SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased	$I_{S/b}$	See Figure 6
Clamped Inductive SOA with Base Reverse Biased	RBSOA	See Figure 7

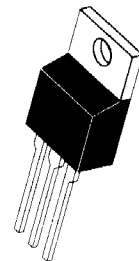
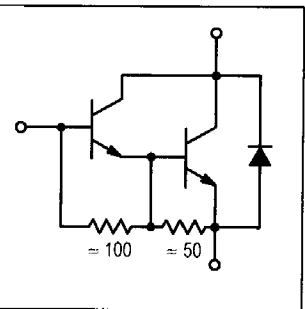
(2) Pulse Test: Pulse Width = 300 μs , Duty Cycle = 2%.

(continued)

MJE5740
MJE5741*
MJE5742*

*Motorola Preferred Device

**POWER DARLINGTON
TRANSISTORS**
8 AMPERES
300, 350, 400 VOLTS
80 WATTS



TO-220AB



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MJE5740 MJE5741 MJE5742

ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (1)					
DC Current Gain ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 5 \text{ Vdc}$) ($I_C = 4 \text{ Adc}$, $V_{CE} = 5 \text{ Vdc}$)	h_{FE}	50 200	100 400	— —	—
Collector–Emitter Saturation Voltage ($I_C = 4 \text{ Adc}$, $I_B = 0.2 \text{ Adc}$) ($I_C = 8 \text{ Adc}$, $I_B = 0.4 \text{ Adc}$) ($I_C = 4 \text{ Adc}$, $I_B = 0.2 \text{ Adc}$, $T_C = 100^\circ\text{C}$)	$V_{CE(sat)}$	— — —	— — —	2 3 2.2	Vdc
Base–Emitter Saturation Voltage ($I_C = 4 \text{ Adc}$, $I_B = 0.2 \text{ Adc}$) ($I_C = 8 \text{ Adc}$, $I_B = 0.4 \text{ Adc}$) ($I_C = 4 \text{ Adc}$, $I_B = 0.2 \text{ Adc}$, $T_C = 100^\circ\text{C}$)	$V_{BE(sat)}$	— — —	— — —	2.5 3.5 2.4	Vdc
Diode Forward Voltage (2) ($I_F = 5 \text{ Adc}$)	V_f	—	—	2.5	Vdc

SWITCHING CHARACTERISTICS

Typical Resistive Load (Table 1)						
Delay Time	$V_{CC} = 250 \text{ Vdc}$, $I_{C(pk)} = 6 \text{ A}$ $I_{B1} = I_{B2} = 0.25 \text{ A}$, $t_p = 25 \mu\text{s}$, Duty Cycle $\leq 1\%$	t_d	—	0.04	—	μs
Rise Time		t_r	—	0.5	—	μs
Storage Time		t_s	—	8	—	μs
Fall Time		t_f	—	2	—	μs
Inductive Load, Clamped (Table 1)						
Voltage Storage Time	$I_{C(pk)} = 6 \text{ A}$, $V_{CE(pk)} = 250 \text{ Vdc}$ $I_{B1} = 0.06 \text{ A}$, $V_{BE(off)} = 5 \text{ Vdc}$	t_{sv}	—	4	—	μs
Crossover Time		t_c	—	2	—	μs

- (1) Pulse Test: Pulse Width $300 \mu\text{s}$, Duty Cycle = 2%.
- (2) The internal Collector–to–Emitter diode can eliminate the need for an external diode to clamp inductive loads. Tests have shown that the Forward Recovery Voltage (V_f) of this diode is comparable to that of typical fast recovery rectifiers.

TYPICAL CHARACTERISTICS

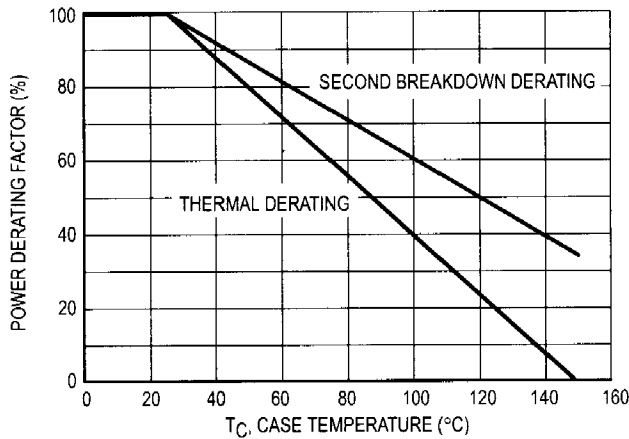


Figure 1. Power Derating

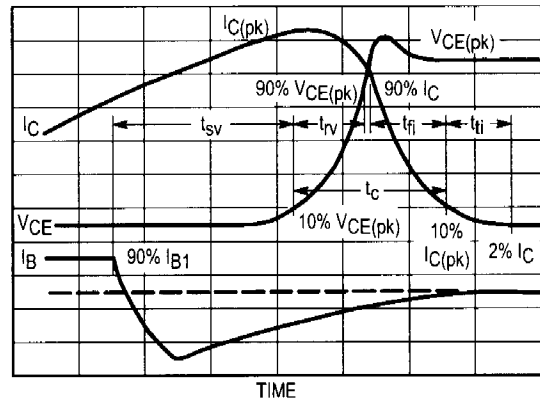


Figure 2. Inductive Switching Measurements

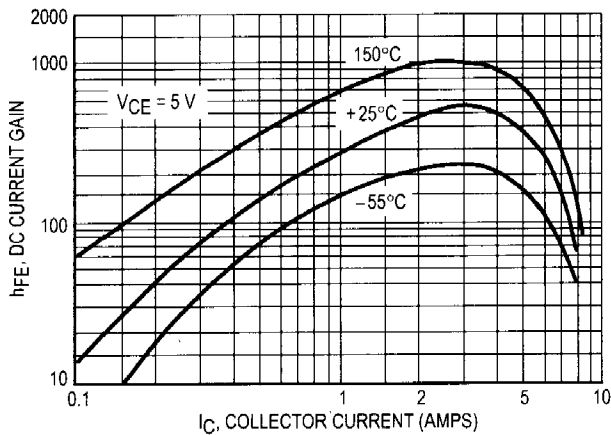


Figure 3. DC Current Gain

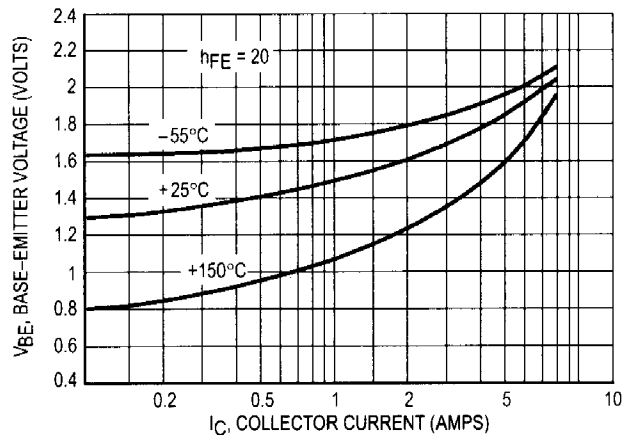


Figure 4. Base–Emitter Voltage