New Jersey Semi-Conductor Products, Inc.

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SPRINGFIELD, NEW JERSEY 07081
U.S.A.

NPN Silicon Power Darlington Transistors

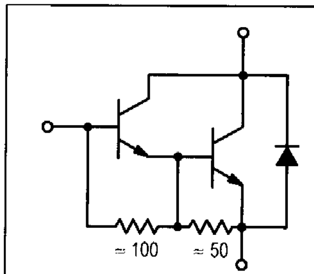
MJE5740
MJE5741*
MJE5742*

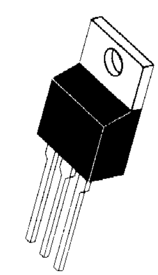
*Motorola Preferred Device

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

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





TO–220AB

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 — Peak (1)	I_C I_{CM}		8 16		Adc
Base Current — Continuous — Peak (1)	I_B I_{BM}		2.5 5		Adc
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D		2 16		Watts mW/°C
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D		80 640		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}		–65 to +150		°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	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8″ from Case for 5 Seconds	T_L	275	°C

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (2)						
Collector–Emitter Sustaining Voltage (I_C = 50 mA, I_B = 0)	MJE5740 MJE5741 MJE5742	$V_{CEO(sus)}$	300 350 400	— — —	— — —	Vdc
Collector Cutoff Current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc) (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc, T_C = 100°C)		I_{CEV}	— —	— —	1 5	mAdc
Emitter Cutoff Current (V_{EB} = 8 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)

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

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (1)						
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 5 Vdc) (I_C = 4 Adc, V_{CE} = 5 Vdc)		h_{FE}	50 200	100 400	— —	—
Collector–Emitter Saturation Voltage (I_C = 4 Adc, I_B = 0.2 Adc) (I_C = 8 Adc, I_B = 0.4 Adc) (I_C = 4 Adc, I_B = 0.2 Adc, T_C = 100°C)		$V_{CE(sat)}$	— — —	— — —	2 3 2.2	Vdc
Base–Emitter Saturation Voltage (I_C = 4 Adc, I_B = 0.2 Adc) (I_C = 8 Adc, I_B = 0.4 Adc) (I_C = 4 Adc, I_B = 0.2 Adc, T_C = 100°C)		$V_{BE(sat)}$	— — —	— — —	2.5 3.5 2.4	Vdc
Diode Forward Voltage (2) (I_F = 5 Adc)		V_f	—	—	2.5	Vdc
SWITCHING CHARACTERISTICS						
Typical Resistive Load (Table 1)						
Delay Time	(V_{CC} = 250 Vdc, $I_{C(pk)}$ = 6 A I_{B1} = I_{B2} = 0.25 A, t_p = 25 µs, Duty Cycle ≤ 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 A, $V_{CE(pk)}$ = 250 Vdc I_{B1} = 0.06 A, $V_{BE(off)}$ = 5 Vdc)	t_{sv}	—	4	—	µs
Crossover Time		t_c	—	2	—	µs

(1) Pulse Test: Pulse Width 300 µs, 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

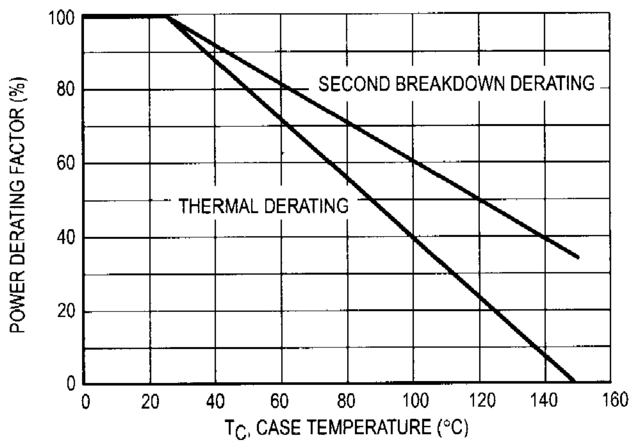


Figure 1. Power Derating

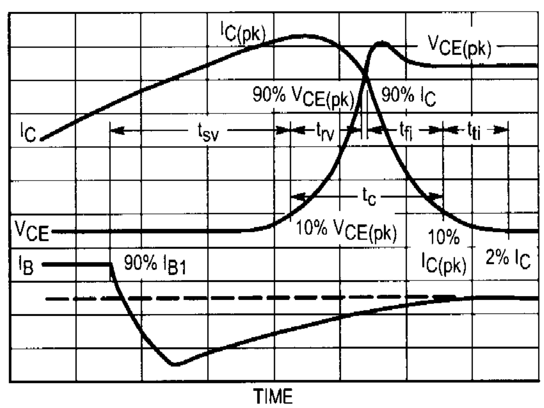


Figure 2. Inductive Switching Measurements

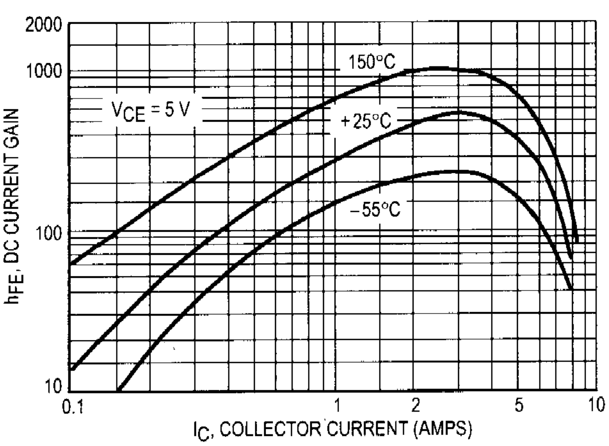


Figure 3. DC Current Gain

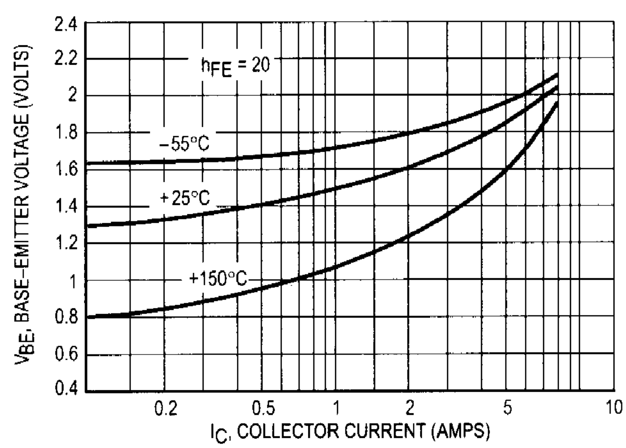


Figure 4. Base–Emitter Voltage