MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MJ3040
MJ3041
MJ3042

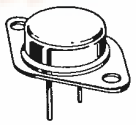
HIGH VOLTAGE SILICON POWER DARLINGTONS

. . . developed for line operated amplifier, series pass and switching regulator applications.

- Collector-Emitter Sustaining Voltage —
  $V_{CEO(sus)}$ = 300 Vdc (Min) — MJ3040, MJ3041
  = 350 Vdc (Min) — MJ3042
- High DC Current Gain —
  h_{FE} = 100 (Min) @ I_C = 2.5 Adc — MJ3040
  = 250 (Min) @ I_C = 2.5 Adc — MJ3041, MJ3042
- Low Collector-Emitter Saturation Voltage —
  $V_{CE(sat)}$ = 2.2 Vdc (Max) @ I_C = 2.5 Adc
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors

DARLINGTON 10 AMPERE POWER TRANSISTORS NPN SILICON

300, 350 VOLTS
175 WATTS



3

MAXIMUM RATINGS

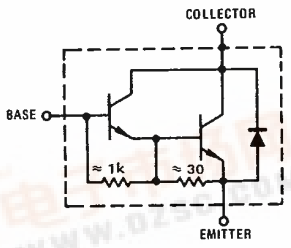
Rating	Symbol	MJ3040	MJ3041	MJ3042	Unit
Collector-Base Voltage	V_{CB}	400	400	500	Vdc
Collector-Emitter Voltage	V_{CEO}	300	300	350	Vdc
Emitter-Base Voltage	V_{EB}	← 8.0 →			Vdc
Collector Current — Continuous	I_C	← 10 →			Adc
— Peak (1)		← 15 →			
Total Device Dissipation @ T_C = 25°C	P_D	← 175 →			Watts
Derate above 25°C		← 1.0 →			W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	← -65 to +200 →			°C

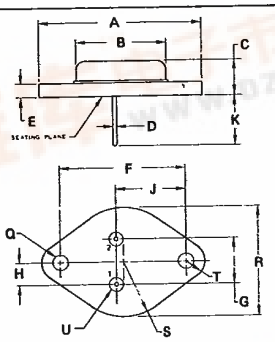
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	°C/W

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

DARLINGTON SCHEMATIC





STYLE 1
PIN 1. BASE
2. EMITTER
CASE COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	7.62	0.250	0.300
D	0.97	1.09	0.038	0.043
E	1.40	1.78	0.055	0.070
F	29.90	30.40	1.177	1.197
G	10.67	11.18	0.420	0.440
H	5.33	5.59	0.210	0.220
J	16.64	17.15	0.655	0.675
K	11.18	12.19	0.440	0.480
Q	3.81	4.19	0.150	0.165
R	—	26.67	—	1.050
U	2.54	3.05	0.100	0.120

CASE 1-04

NOTES:
1. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-3 OUTLINE SHALL APPLY.

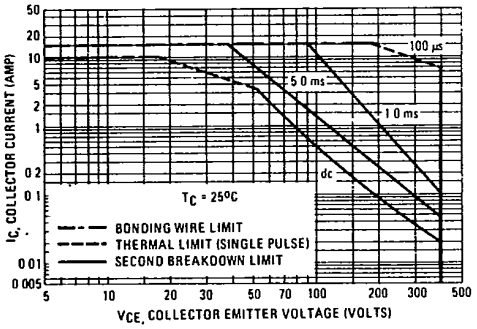
MJ3040, MJ3041, MJ3042

T-33-29

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0)	MJ3040, MJ3041	$V_{CEO(sus)}$	300	–	Vdc
	MJ3042		350	–	
Collector Cutoff Current		I_{CBO}			mAdc
(V_{CB} = 400 Vdc, I_E = 0)	MJ3040, MJ3041		–	1.0	
(V_{CB} = 500 Vdc, I_E = 0)	MJ3042		–	1.0	
(V_{CB} = 400 Vdc, I_E = 0, T_C = 100°C)	MJ3040, MJ3041		–	5.0	
(V_{CB} = 500 Vdc, I_E = 0, T_C = 100°C)	MJ3042		–	5.0	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	40	mAdc
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			–
(I_C = 2.5 Adc, V_{CE} = 5.0 Vdc)	MJ3040		100	–	
	MJ3041, MJ3042		250	–	
(I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	MJ3040		25	–	
	MJ3041, MJ3042		50		
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 2.5 Adc, I_B = 50 mAdc)			–	2.2	
(I_C = 5.0 Adc, I_B = 400 mAdc)			–	2.5	
Base-Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 400 mAdc)		$V_{BE(sat)}$	–	3.0	Vdc
Base-Emitter On Voltage (I_C = 2.5 Adc, V_{CE} = 5.0 Vdc)		$V_{BE(on)}$	–	2.5	Vdc

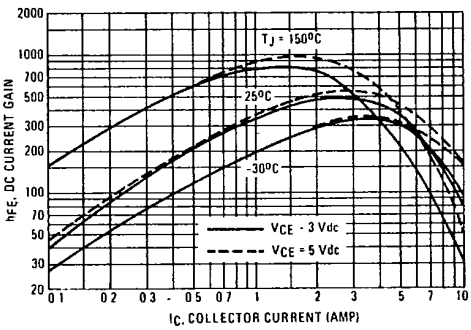
FIGURE 1 – FORWARD BIAS SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor – average junction temperature and second breakdown. Safe operating area curves indicate I_C – V_{CE} limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 1 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

FIGURE 2 – DC CURRENT GAIN



3