

## Darlington Power Transistor DPAK For Surface Mount Application

... for general purpose power and switching output or driver stages in applications such as switching regulators, converters, and power amplifiers.

- Lead Formed for Surface Mount Application in Plastic Sleeves (No Suffix)
- Straight Lead Version in Plastic Sleeves ("–1" Suffix)
- Lead Formed Version in 16 mm Tape and Reel for Surface Mount ("T4" Suffix)
- Electrically Similar to Popular D44E3 Device
- High DC Gain — 1000 Min @ 5.0 Adc
- Low Sat. Voltage — 1.5 V @ 5.0 Adc
- Compatible With Existing Automatic Pick & Place Equipment

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	80	Vdc
Emitter–Base Voltage	$V_{EB}$	7	Vdc
Collector Current — Continuous	$I_C$	10	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	20 0.16	Watts W/ $^\circ\text{C}$
Total Power Dissipation (1) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.75 0.014	Watts W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	–55 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

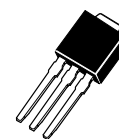
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	6.25	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (1)	$R_{\theta JA}$	71.4	$^\circ\text{C/W}$
Lead Temperature for Soldering	$T_L$	260	$^\circ\text{C}$

(1) These ratings are applicable when surface mounted on the minimum pad size recommended.

**MJD44E3\***

\*Motorola Preferred Device

**NPN DARLINGTON  
SILICON  
POWER TRANSISTOR  
10 AMPERES  
80 VOLTS  
20 WATTS**

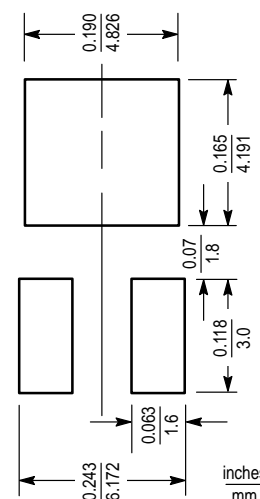


CASE 369–07



CASE 369A–13

### MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS



Preferred devices are Motorola recommended choices for future use and best overall value.

# MJD44E3

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CE0}, V_{BE} = 0$ )	$I_{CES}$	—	—	10	$\mu\text{A}$
Emitter Cutoff Current ( $V_{EB} = 7 \text{ Vdc}$ )	$I_{EBO}$	—	—	1	$\mu\text{A}$

### ON CHARACTERISTICS

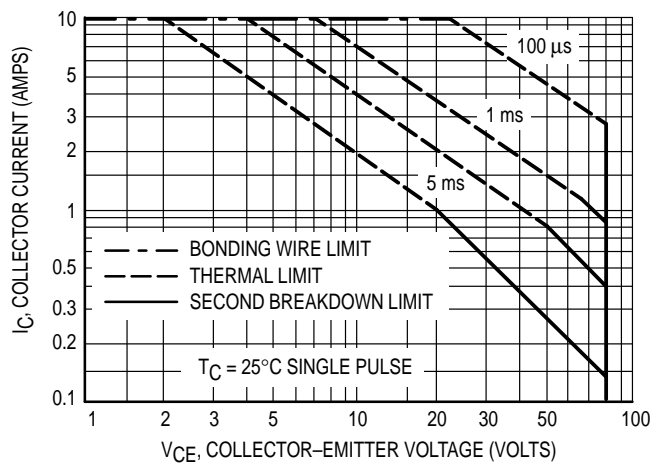
Collector–Emitter Saturation Voltage ( $I_C = 5 \text{ Adc}, I_B = 10 \text{ mAdc}$ ) ( $I_C = 10 \text{ Adc}, I_B = 20 \text{ mAdc}$ )	$V_{CE(\text{sat})}$	— —	— —	1.5 2	Vdc
Base–Emitter Saturation Voltage ( $I_C = 5 \text{ Adc}, I_B = 10 \text{ mAdc}$ )	$V_{BE(\text{sat})}$	—	—	2.5	Vdc
DC Current Gain ( $V_{CE} = 5 \text{ Vdc}, I_C = 5 \text{ Adc}$ )	$h_{FE}$	1000	—	—	—

### DYNAMIC CHARACTERISTICS

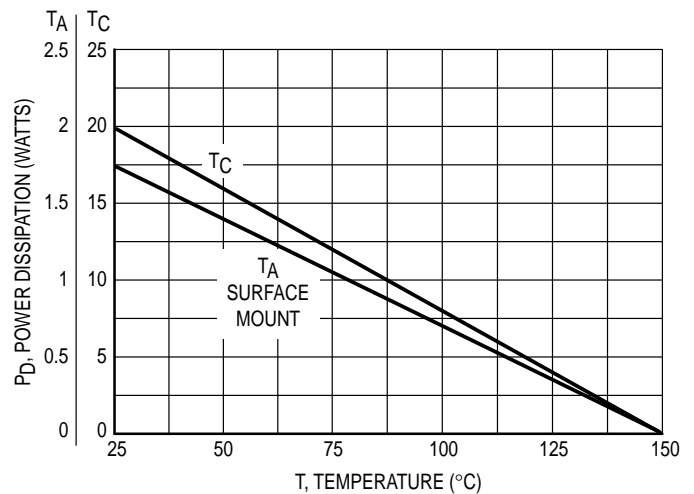
Collector Capacitance ( $V_{CB} = 10 \text{ Vdc}, f_{\text{test}} = 1 \text{ MHz}$ )	$C_{cb}$	—	—	130	pF
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### SWITCHING TIMES

Delay and Rise Times ( $I_C = 10 \text{ Adc}, I_{B1} = 20 \text{ mAdc}$ )	$t_d + t_r$	—	0.6	—	$\mu\text{s}$
Storage Time ( $I_C = 10 \text{ Adc}, I_{B1} = I_{B2} = 20 \text{ mAdc}$ )	$t_s$	—	2	—	$\mu\text{s}$
Fall Time ( $I_C = 10 \text{ Adc}, I_{B1} = I_{B2} = 20 \text{ mAdc}$ )	$t_f$	—	0.5	—	$\mu\text{s}$

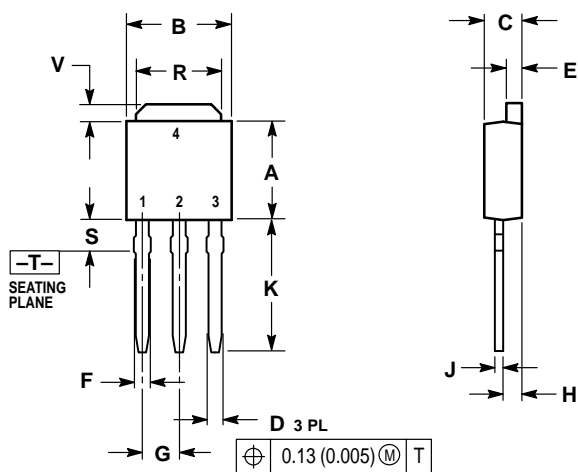


**Figure 1. Maximum Forward Bias Safe Operating Area**



**Figure 2. Power Derating**

PACKAGE DIMENSIONS

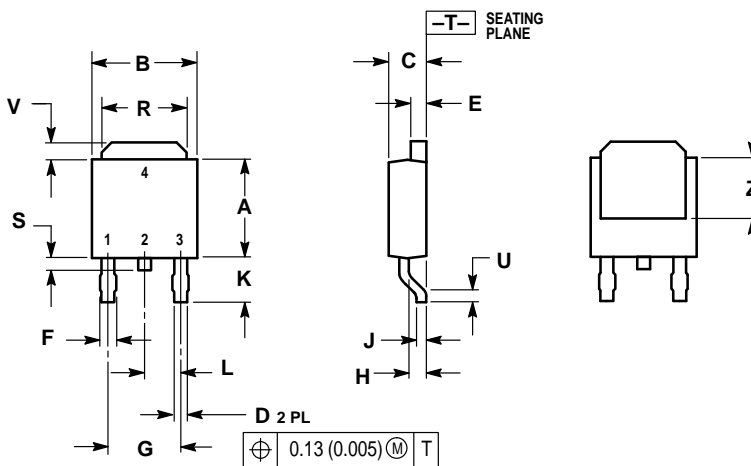


NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

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|--|---|---|--|--|
| <p>STYLE 1:<br/>                 PIN 1. BASE<br/>                 2. COLLECTOR<br/>                 3. EMITTER<br/>                 4. COLLECTOR</p> | <p>STYLE 2:<br/>                 PIN 1. GATE<br/>                 2. DRAIN<br/>                 3. SOURCE<br/>                 4. DRAIN</p> | <p>STYLE 3:<br/>                 PIN 1. ANODE<br/>                 2. CATHODE<br/>                 3. ANODE<br/>                 4. CATHODE</p> | <p>STYLE 4:<br/>                 PIN 1. CATHODE<br/>                 2. ANODE<br/>                 3. GATE<br/>                 4. ANODE</p> | <p>STYLE 5:<br/>                 PIN 1. GATE<br/>                 2. ANODE<br/>                 3. CATHODE<br/>                 4. ANODE</p> |
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NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	—	0.51	—
V	0.030	0.050	0.77	1.27
Z	0.138	—	3.51	—

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|--|---|---|--|--|
| <p>STYLE 1:<br/>                 PIN 1. BASE<br/>                 2. COLLECTOR<br/>                 3. EMITTER<br/>                 4. COLLECTOR</p> | <p>STYLE 2:<br/>                 PIN 1. GATE<br/>                 2. DRAIN<br/>                 3. SOURCE<br/>                 4. DRAIN</p> | <p>STYLE 3:<br/>                 PIN 1. ANODE<br/>                 2. CATHODE<br/>                 3. ANODE<br/>                 4. CATHODE</p> | <p>STYLE 4:<br/>                 PIN 1. CATHODE<br/>                 2. ANODE<br/>                 3. GATE<br/>                 4. ANODE</p> | <p>STYLE 5:<br/>                 PIN 1. GATE<br/>                 2. ANODE<br/>                 3. CATHODE<br/>                 4. ANODE</p> |
|--|---|---|--|--|

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