

## 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<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$     | $P_D$          | 20<br>0.16    | Watts<br>W/ $^\circ\text{C}$ |
| Total Power Dissipation (1)<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.75<br>0.014 | Watts<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                          | $T_J, T_{stg}$ | –55 to +150   | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

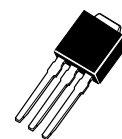
| Characteristic                              | Symbol          | Max  | Unit               |
|---------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction to Case        | $R_{\theta JC}$ | 6.25 | $^\circ\text{C/W}$ |
| Thermal Resistance, 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**

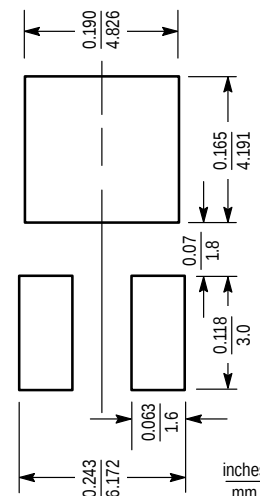


CASE 369–07



CASE 369A–13

### MINIMUM PAD SIZES RECOMMENDED FOR SURFACE MOUNTED APPLICATIONS



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



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

| Characteristic                                                               | Symbol    | Min | Typ | Max | Unit          |
|------------------------------------------------------------------------------|-----------|-----|-----|-----|---------------|
| <b>OFF CHARACTERISTICS</b>                                                   |           |     |     |     |               |
| Collector Cutoff Current<br>( $V_{CE} = \text{Rated } V_{CEO}, V_{BE} = 0$ ) | $I_{CES}$ | —   | —   | 10  | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 7 \text{ Vdc}$ )                       | $I_{EBO}$ | —   | —   | 1   | $\mu\text{A}$ |

**ON CHARACTERISTICS**

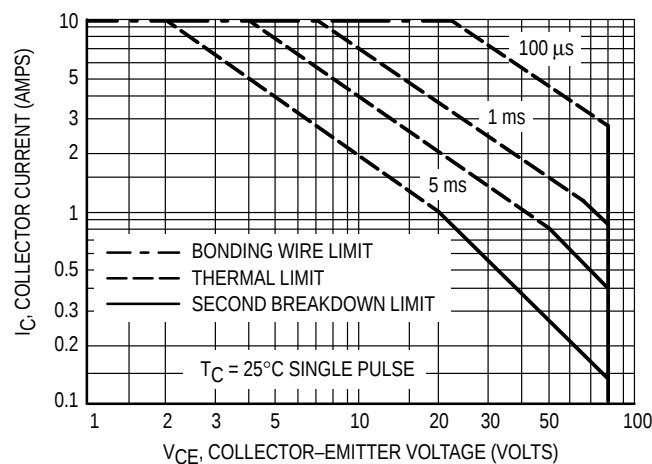
|                                                                                                                                               |                      |        |        |          |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------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

**DYNAMIC CHARACTERISTICS**

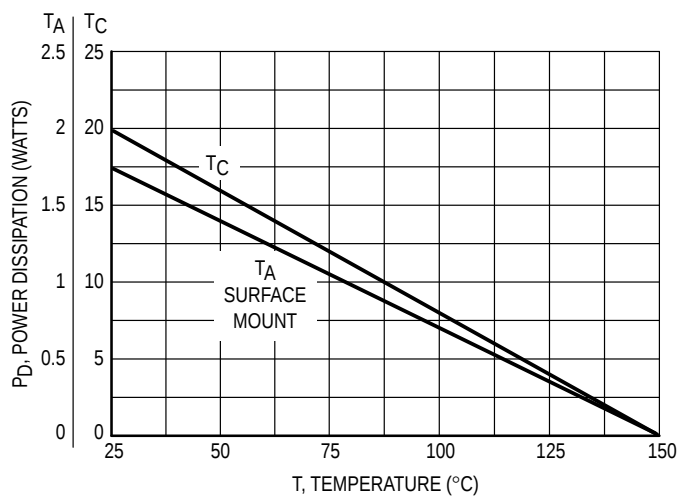
|                                                                                         |          |   |   |     |    |
|-----------------------------------------------------------------------------------------|----------|---|---|-----|----|
| Collector Capacitance<br>( $V_{CB} = 10 \text{ Vdc}, f_{\text{test}} = 1 \text{ MHz}$ ) | $C_{cb}$ | — | — | 130 | pF |
|-----------------------------------------------------------------------------------------|----------|---|---|-----|----|

**SWITCHING TIMES**

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

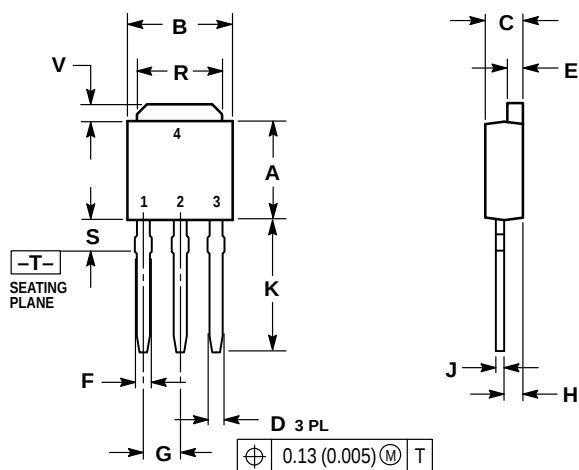


**Figure 1. Maximum Forward Bias  
Safe Operating Area**



**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 |

## STYLE 1:

- PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

## STYLE 2:

- PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

## STYLE 3:

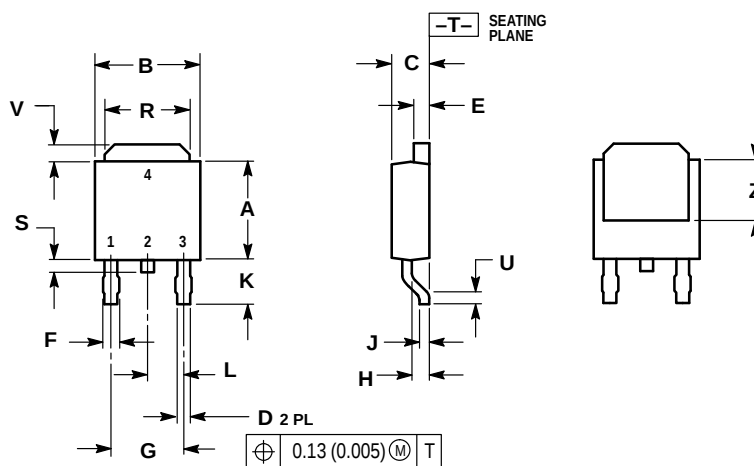
- PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

## STYLE 4:

- PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

## STYLE 5:

- PIN 1. GATE  
2. ANODE  
3. CATHODE  
4. ANODE

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ISSUE K

## 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        | —    |

## STYLE 1:

- PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

## STYLE 2:

- PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

## STYLE 3:

- PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

## STYLE 4:

- PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

## STYLE 5:

- PIN 1. GATE  
2. ANODE  
3. CATHODE  
4. ANODE

CASE 369A-13  
ISSUE W

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**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
– US & Canada ONLY 1-800-774-1848

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

**INTERNET:** <http://www.mot.com/SPS/>

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