

# MJD44H11 (NPN) MJD45H11 (PNP)

Preferred Device

## Complementary Power Transistors

### DPAK For Surface Mount Applications

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

#### Features

- Pb-Free Packages are Available
- 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 D44H/D45H Series
- Low Collector Emitter Saturation Voltage –  $V_{CE(sat)} = 1.0$  Volt Max @ 8.0 Amperes
- Fast Switching Speeds
- Complementary Pairs Simplifies Designs
- Epoxy Meets UL 94, V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V

#### MAXIMUM RATINGS

| Rating   | Symbol         | Max            | Unit                     |
|--|----------------|----------------|--------------------------|
| Collector-Emitter Voltage  | $V_{CEO}$      | 80             | Vdc                      |
| Emitter-Base Voltage   | $V_{EB}$       | 5              | Vdc                      |
| Collector Current – Continuous<br>Peak   | $I_C$          | 8<br>16        | Adc                      |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$  | $P_D$          | 20<br>0.16     | W<br>W/ $^\circ\text{C}$ |
| Total Power Dissipation* @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.75<br>0.014  | W<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature<br>Range                                    | $T_J, T_{stg}$ | -55 to<br>+150 | $^\circ\text{C}$         |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

#### THERMAL CHARACTERISTICS

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

\*These ratings are applicable when surface mounted on the minimum pad sizes recommended.

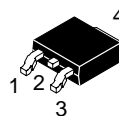


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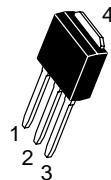
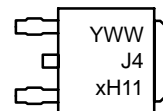
<http://onsemi.com>

**SILICON  
POWER TRANSISTORS  
8 AMPERES  
80 VOLTS  
20 WATTS**

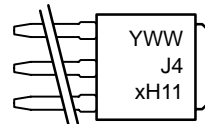
#### MARKING DIAGRAMS



DPAK  
CASE 369C  
STYLE 1



DPAK-3  
CASE 369D  
STYLE 1



Y = Year  
WW = Work Week  
x = 4 or 5

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.

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

## MJD44H11 (NPN) MJD45H11 (PNP)

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

#### OFF CHARACTERISTICS

|   |               |    |   |    |               |
|---|---------------|----|---|----|---------------|
| Collector-Emitter Sustaining Voltage<br>( $I_C = 30\text{ mA}$ , $I_B = 0$ )    | $V_{CE(sus)}$ | 80 | - | -  | Vdc           |
| Collector Cutoff Current<br>( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE} = 0$ ) | $I_{CES}$     | -  | - | 10 | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5\text{ Vdc}$ )                           | $I_{EBO}$     | -  | - | 50 | $\mu\text{A}$ |

#### ON CHARACTERISTICS

|   |               |    |   |     |     |
|---|---------------|----|---|-----|-----|
| Collector-Emitter Saturation Voltage<br>( $I_C = 8\text{ Adc}$ , $I_B = 0.4\text{ Adc}$ ) | $V_{CE(sat)}$ | -  | - | 1   | Vdc |
| Base-Emitter Saturation Voltage<br>( $I_C = 8\text{ Adc}$ , $I_B = 0.8\text{ Adc}$ )      | $V_{BE(sat)}$ | -  | - | 1.5 | Vdc |
| DC Current Gain<br>( $V_{CE} = 1\text{ Vdc}$ , $I_C = 2\text{ Adc}$ )                     | $h_{FE}$      | 60 | - | -   | -   |
| DC Current Gain<br>( $V_{CE} = 1\text{ Vdc}$ , $I_C = 4\text{ Adc}$ )                     |               | 40 | - | -   | -   |

#### DYNAMIC CHARACTERISTICS

|   |                      |          |   |            |   |               |
|---|----------------------|----------|---|------------|---|---------------|
| Collector Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )                     | MJD44H11<br>MJD45H11 | $C_{cb}$ | - | 130<br>230 | - | $\mu\text{F}$ |
| Gain Bandwidth Product<br>( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ ) | MJD44H11<br>MJD45H11 | $f_T$    | - | 50<br>40   | - | MHz           |

#### SWITCHING TIMES

|   |                      |             |   |            |   |    |
|---|----------------------|-------------|---|------------|---|----|
| Delay and Rise Times<br>( $I_C = 5\text{ Adc}$ , $I_{B1} = 0.5\text{ Adc}$ )  | MJD44H11<br>MJD45H11 | $t_d + t_r$ | - | 300<br>135 | - | ns |
| Storage Time<br>( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ ) | MJD44H11<br>MJD45H11 | $t_s$       | - | 500<br>500 | - | ns |
| Fall Time<br>( $I_C = 5\text{ Adc}$ , $I_{B1} = I_{B2} = 0.5\text{ Adc}$ )    | MJD44H11<br>MJD45H11 | $t_f$       | - | 140<br>100 | - | ns |

## MJD44H11 (NPN) MJD45H11 (PNP)

### ORDERING INFORMATION

| Device       | Package Type      | Package | Shipping†        |
|--------------|-------------------|---------|------------------|
| MJD44H11     | DPAK              | 369C    | 75 Units / Rail  |
| MJD44H11-001 | DPAK-3            | 369D    | 75 Units / Rail  |
| MJD44H11G    | DPAK<br>(Pb-Free) | 369C    | 75 Units / Rail  |
| MJD44H11RL   | DPAK              | 369C    | 1800 Tape & Reel |
| MJD44H11T4   | DPAK              | 369C    | 2500 Tape & Reel |
| MJD44H11T4G  | DPAK<br>(Pb-Free) | 369C    | 2500 Tape & Reel |
| MJD44H11T5   | DPAK              | 369C    | 2500 Tape & Reel |
| MJD45H11     | DPAK              | 369C    | 75 Units / Rail  |
| MJD45H11-001 | DPAK-3            | 369D    | 75 Units / Rail  |
| MJD45H11G    | DPAK<br>(Pb-Free) | 369C    | 75 Units / Rail  |
| MJD45H11RL   | DPAK              | 369C    | 1800 Tape & Reel |
| MJD45H11T4   | DPAK              | 369C    | 2500 Tape & Reel |
| MJD45H11T4G  | DPAK<br>(Pb-Free) | 369C    | 2500 Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MJD44H11 (NPN) MJD45H11 (PNP)

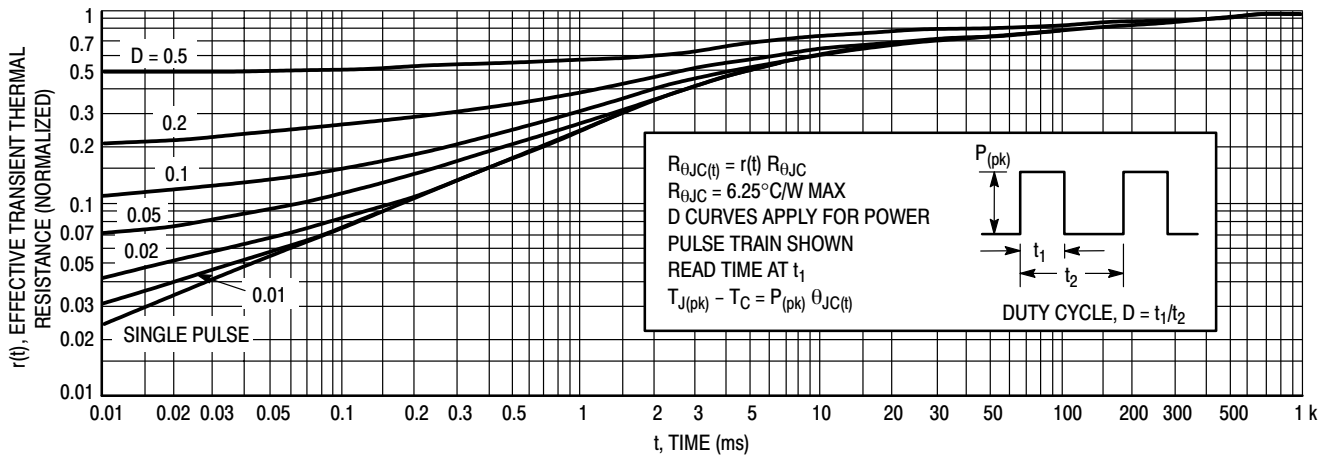


Figure 1. Thermal Response

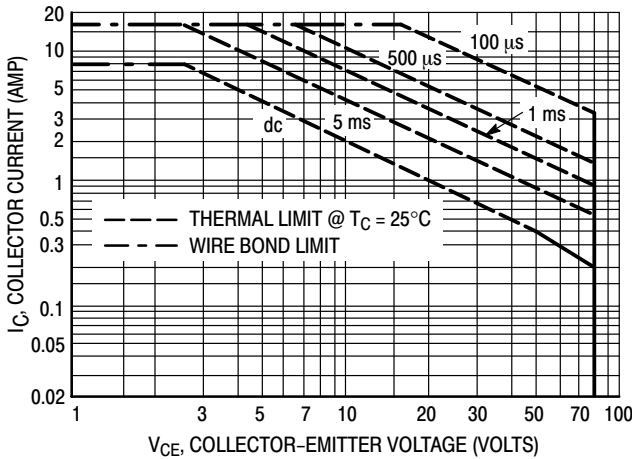


Figure 2. Maximum Forward Bias Safe Operating Area

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 2 is based on  $T_{J(pk)} = 150^{\circ}\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^{\circ}\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 1. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

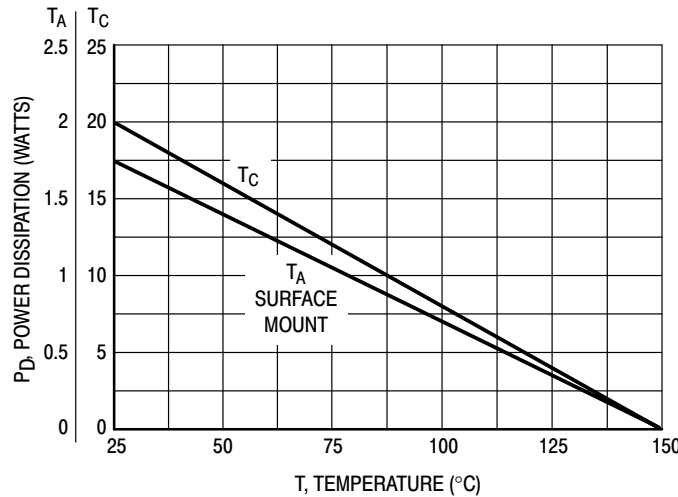


Figure 3. Power Derating

# MJD44H11 (NPN) MJD45H11 (PNP)

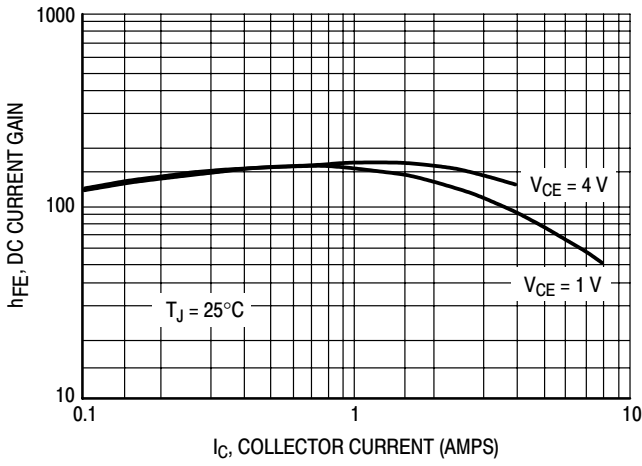


Figure 4. MJD44H11 DC Current Gain

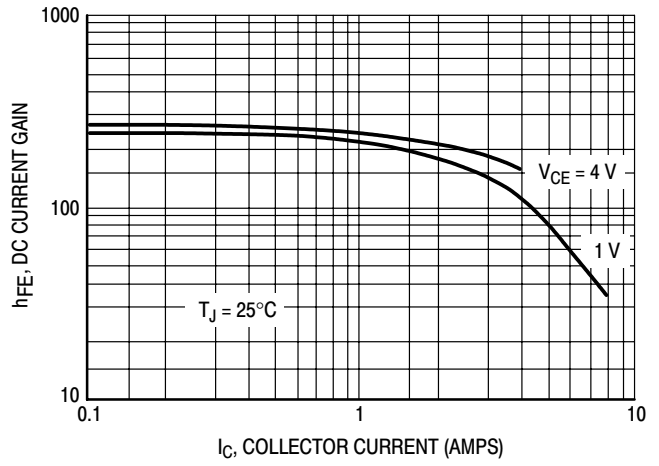


Figure 5. MJD45H11 DC Current Gain

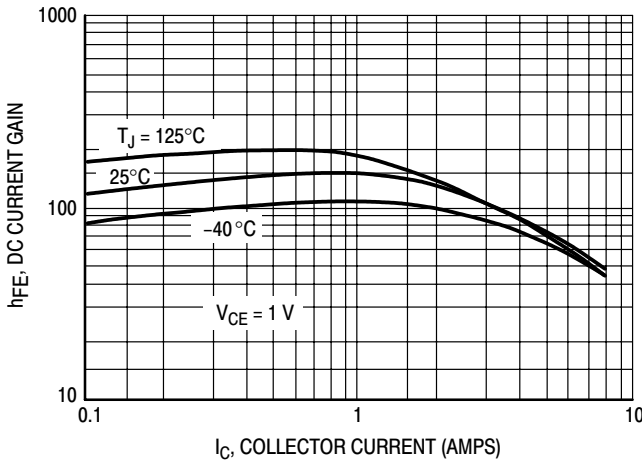


Figure 6. MJD44H11 Current Gain versus Temperature

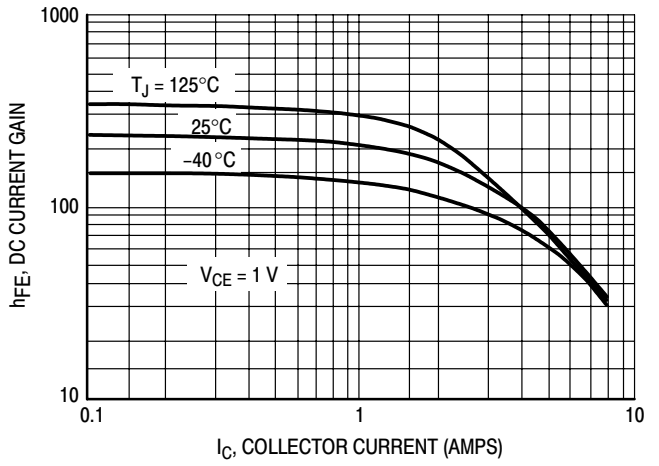


Figure 7. MJD45H11 Current Gain versus Temperature

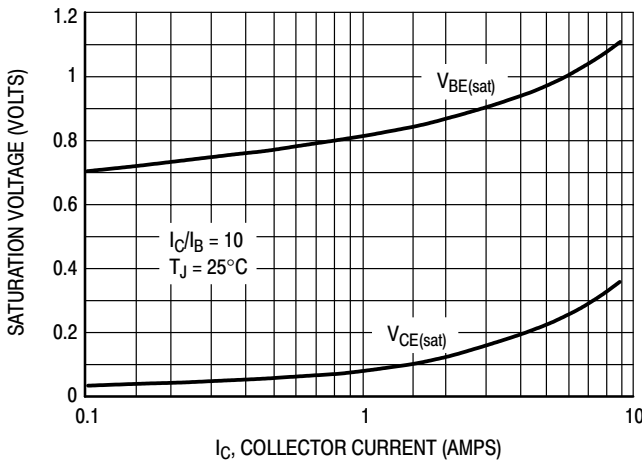


Figure 8. MJD44H11 On-Voltages

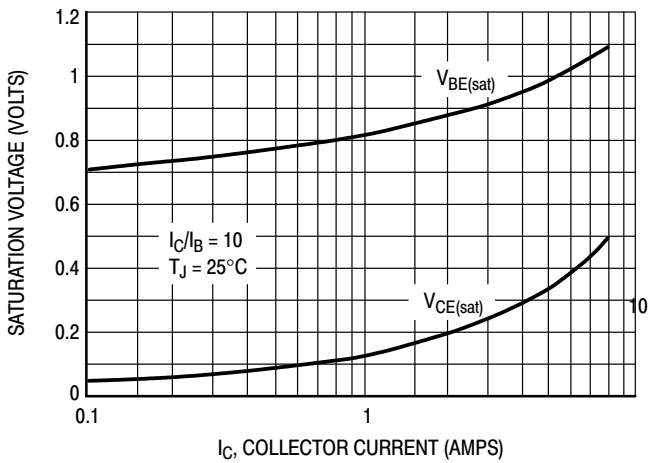
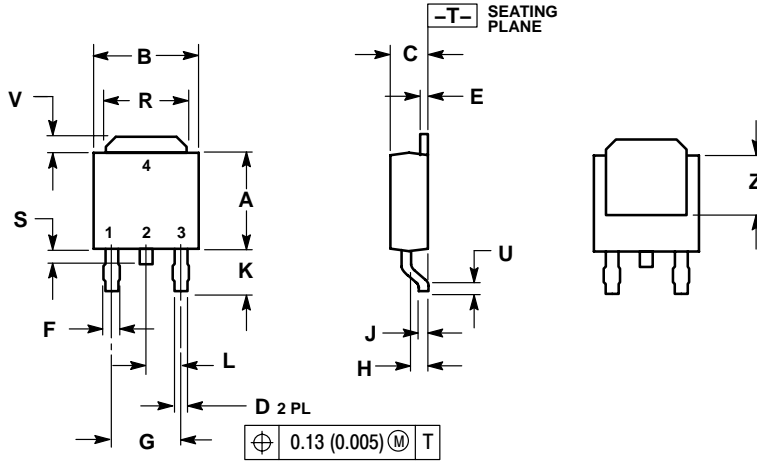


Figure 9. MJD45H11 On-Voltages

# MJD44H11 (NPN) MJD45H11 (PNP)

## PACKAGE DIMENSIONS

DPAK  
CASE 369C  
ISSUE O

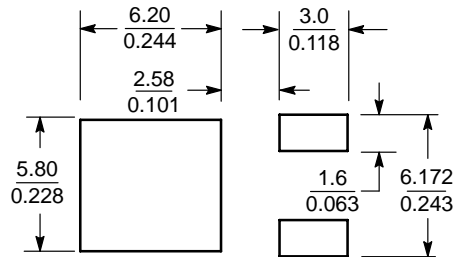


- NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.235     | 0.245 | 5.97        | 6.22 |
| 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   | 0.018     | 0.023 | 0.46        | 0.58 |
| F   | 0.037     | 0.045 | 0.94        | 1.14 |
| 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   | 0.180     | 0.215 | 4.57        | 5.45 |
| S   | 0.025     | 0.040 | 0.63        | 1.01 |
| U   | 0.020     | ---   | 0.51        | ---  |
| V   | 0.035     | 0.050 | 0.89        | 1.27 |
| Z   | 0.155     | ---   | 3.93        | ---  |

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

### SOLDERING FOOTPRINT\*



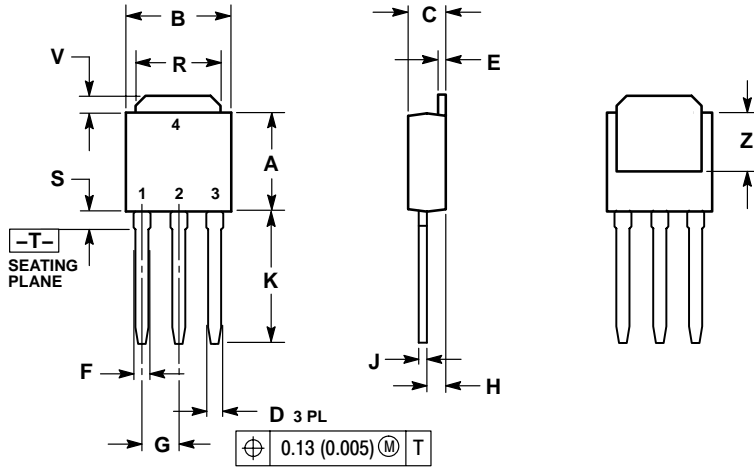
SCALE 3:1  $\left(\frac{\text{mm}}{\text{inches}}\right)$

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MJD44H11 (NPN) MJD45H11 (PNP)

## PACKAGE DIMENSIONS

DPAK-3  
CASE 369D-01  
ISSUE B



NOTES:


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

| DIM | INCHES    |       | MILLIMETERS |      |
|-----|-----------|-------|-------------|------|
|     | MIN       | MAX   | MIN         | MAX  |
| A   | 0.235     | 0.245 | 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   | 0.018     | 0.023 | 0.46        | 0.58 |
| F   | 0.037     | 0.045 | 0.94        | 1.14 |
| 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   | 0.180     | 0.215 | 4.45        | 5.45 |
| S   | 0.025     | 0.040 | 0.63        | 1.01 |
| V   | 0.035     | 0.050 | 0.89        | 1.27 |
| Z   | 0.155     | ---   | 3.93        | ---  |

STYLE 1:

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

## MJD44H11 (NPN) MJD45H11 (PNP)

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