

# MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

## Complementary Silicon Plastic Power Transistors

### D<sup>2</sup>PAK for Surface Mount

#### Features

- Lead Formed for Surface Mount Applications in Plastic Sleeves (No Suffix)
- Electrically the Same as TIP41 and T1P42 Series
- NJV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available

#### MAXIMUM RATINGS

| Rating                                                                                   | Symbol         | Value        | Unit                     |
|------------------------------------------------------------------------------------------|----------------|--------------|--------------------------|
| Collector-Emitter Voltage                                                                | $V_{CEO}$      | 100          | Vdc                      |
| Collector-Base Voltage                                                                   | $V_{CB}$       | 100          | Vdc                      |
| Emitter-Base Voltage                                                                     | $V_{EB}$       | 5.0          | Vdc                      |
| Collector Current – Continuous<br>– Peak                                                 | $I_C$          | 6.0<br>10    | Adc                      |
| Base Current                                                                             | $I_B$          | 2.0          | Adc                      |
| Total Power Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 65<br>0.52   | W<br>W/ $^\circ\text{C}$ |
| Total Power Dissipation<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 2.0<br>0.016 | W<br>W/ $^\circ\text{C}$ |
| Unclamped Inductive Load Energy (Note 1)                                                 | E              | 62.5         | mJ                       |
| Operating and Storage Junction<br>Temperature Range                                      | $T_J, T_{stg}$ | -65 to +150  | $^\circ\text{C}$         |

#### THERMAL CHARACTERISTICS

| Characteristic                                                                    | Symbol          | Max  | Unit               |
|-----------------------------------------------------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Case                                              | $R_{\theta JC}$ | 1.92 | $^\circ\text{C/W}$ |
| Thermal Resistance,<br>Junction-to-Ambient                                        | $R_{\theta JA}$ | 62.5 | $^\circ\text{C/W}$ |
| Thermal Resistance,<br>Junction-to-Ambient (Note 2)                               | $R_{\theta JA}$ | 50   | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering<br>Purposes, 1/8" from Case for 10 Seconds | $T_L$           | 260  | $^\circ\text{C}$   |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1.  $I_C = 2.5\text{ A}$ ,  $L = 20\text{ mH}$ , P.R.F. = 10 Hz,  $V_{CC} = 10\text{ V}$ ,  $R_{BE} = 100\ \Omega$
2. When surface mounted to an FR-4 board using the minimum recommended pad size.



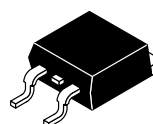
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## COMPLEMENTARY SILICON POWER TRANSISTORS

### 6 AMPERES, 100 VOLTS, 65 WATTS

#### MARKING DIAGRAM



D<sup>2</sup>PAK  
CASE 418B  
STYLE 1



J4xC = Specific Device Code  
x = 1 or 2  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### ORDERING INFORMATION

| Device       | Package                         | Shipping <sup>†</sup> |
|--------------|---------------------------------|-----------------------|
| MJB41C       | D <sup>2</sup> PAK              | 50 Units / Rail       |
| MJB41CG      | D <sup>2</sup> PAK<br>(Pb-Free) | 50 Units / Rail       |
| MJB41CT4     | D <sup>2</sup> PAK              | 800 / Tape &<br>Reel  |
| MJB41CT4G    | D <sup>2</sup> PAK<br>(Pb-Free) | 800 / Tape &<br>Reel  |
| NJVMJB41CT4G | D <sup>2</sup> PAK<br>(Pb-Free) | 800 / Tape &<br>Reel  |
| MJB42C       | D <sup>2</sup> PAK              | 50 Units / Rail       |
| MJB42CG      | D <sup>2</sup> PAK<br>(Pb-Free) | 50 Units / Rail       |
| MJB42CT4     | D <sup>2</sup> PAK              | 800 / Tape &<br>Reel  |
| MJB42CT4G    | D <sup>2</sup> PAK<br>(Pb-Free) | 800 / Tape &<br>Reel  |
| NJVMJB42CT4G | D <sup>2</sup> PAK<br>(Pb-Free) | 800 / Tape &<br>Reel  |

<sup>†</sup>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.

# MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

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

| Characteristic                                                                       | Symbol         | Min | Max | Unit            |
|--------------------------------------------------------------------------------------|----------------|-----|-----|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                           |                |     |     |                 |
| Collector-Emitter Sustaining Voltage (Note 3) ( $I_C = 30\text{ mAdc}$ , $I_B = 0$ ) | $V_{CEO(sus)}$ | 100 | –   | Vdc             |
| Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ )                    | $I_{CEO}$      | –   | 0.7 | mAdc            |
| Collector Cutoff Current ( $V_{CE} = 100\text{ Vdc}$ , $V_{EB} = 0$ )                | $I_{CES}$      | –   | 100 | $\mu\text{Adc}$ |
| Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )                     | $I_{EBO}$      | –   | 50  | $\mu\text{Adc}$ |

## ON CHARACTERISTICS (Note 3)

|                                                                                                                                     |               |          |         |     |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------|----------|---------|-----|
| DC Current Gain<br>( $I_C = 0.3\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )<br>( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ ) | $h_{FE}$      | 30<br>15 | –<br>75 | –   |
| Collector-Emitter Saturation Voltage ( $I_C = 6.0\text{ Adc}$ , $I_B = 600\text{ mAdc}$ )                                           | $V_{CE(sat)}$ | –        | 1.5     | Vdc |
| Base-Emitter On Voltage ( $I_C = 6.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )                                                      | $V_{BE(on)}$  | –        | 2.0     | Vdc |

## DYNAMIC CHARACTERISTICS

|                                                                                                                       |          |     |   |     |
|-----------------------------------------------------------------------------------------------------------------------|----------|-----|---|-----|
| Current-Gain – Bandwidth Product ( $I_C = 500\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ ) | $f_T$    | 3.0 | – | MHz |
| Small-Signal Current Gain ( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )                | $h_{fe}$ | 20  | – | –   |

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

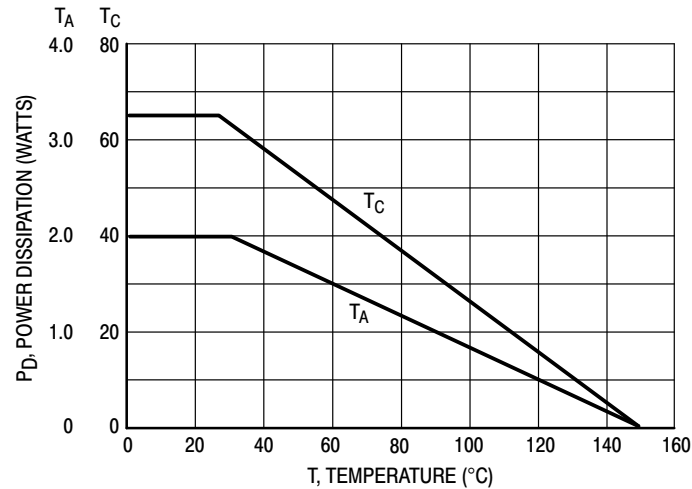


Figure 1. Power Derating

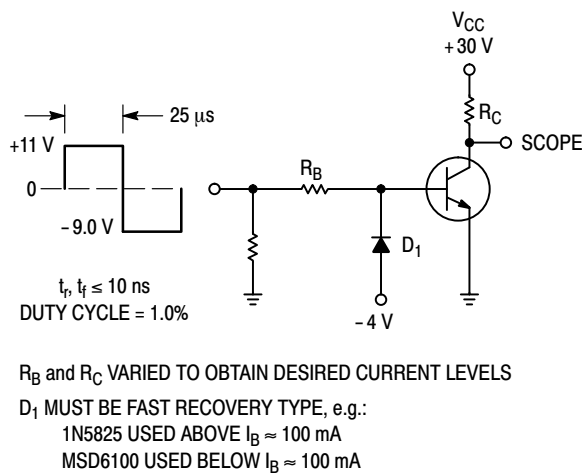


Figure 2. Switching Time Test Circuit

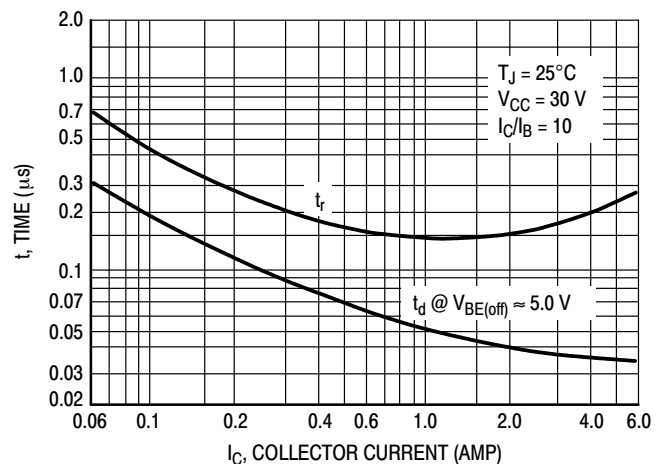


Figure 3. Turn-On Time

# MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

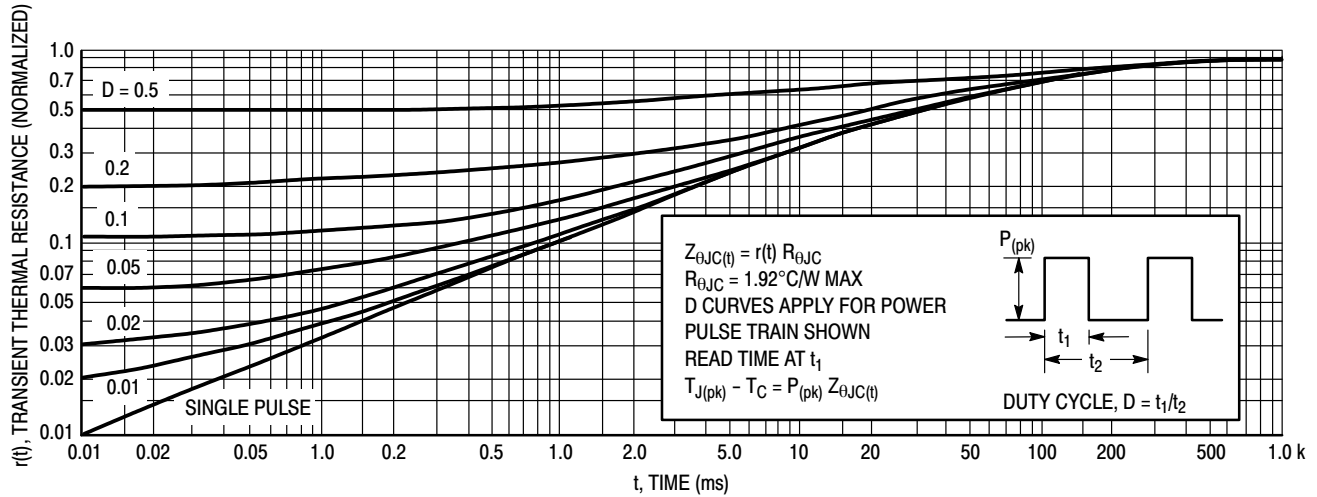


Figure 4. Thermal Response

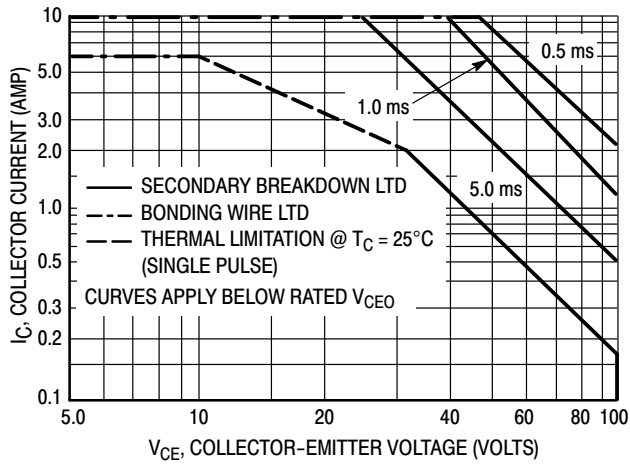


Figure 5. Active-Region Safe Operating Area

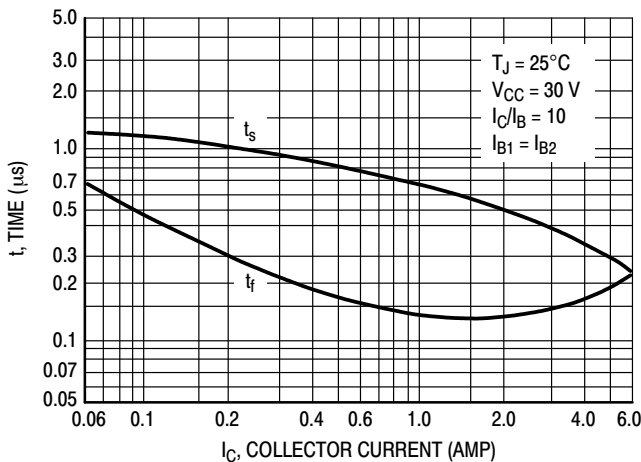


Figure 6. Turn-Off Time

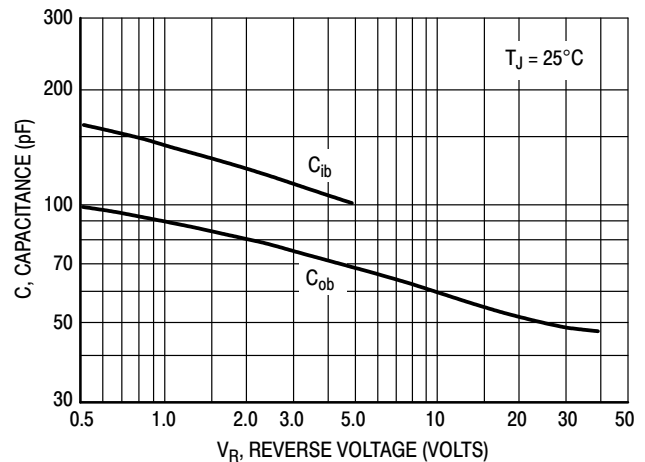


Figure 7. Capacitance

# MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

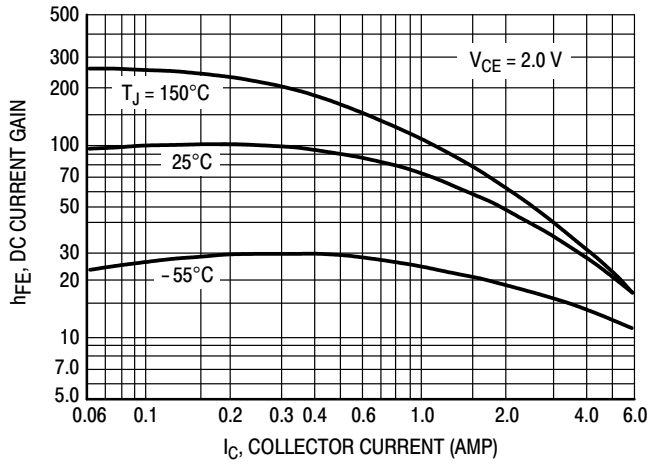


Figure 8. DC Current Gain

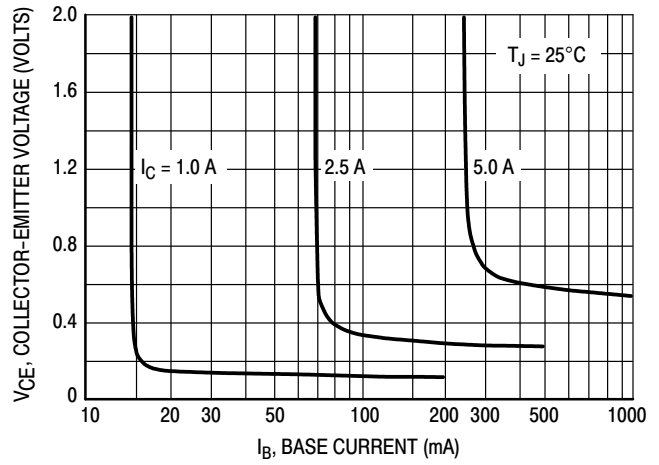


Figure 9. Collector Saturation Region

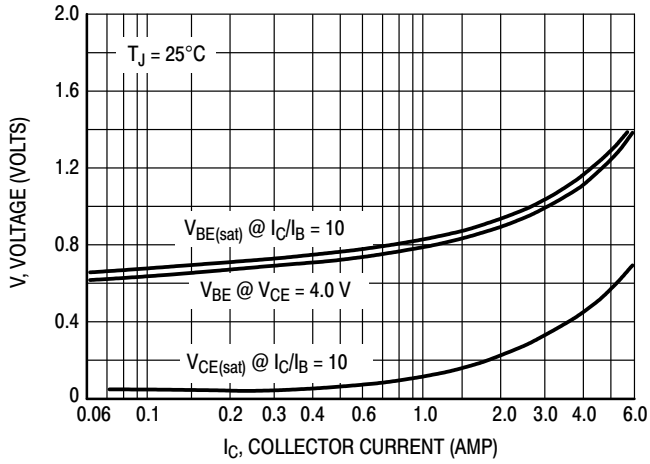


Figure 10. "On" Voltages

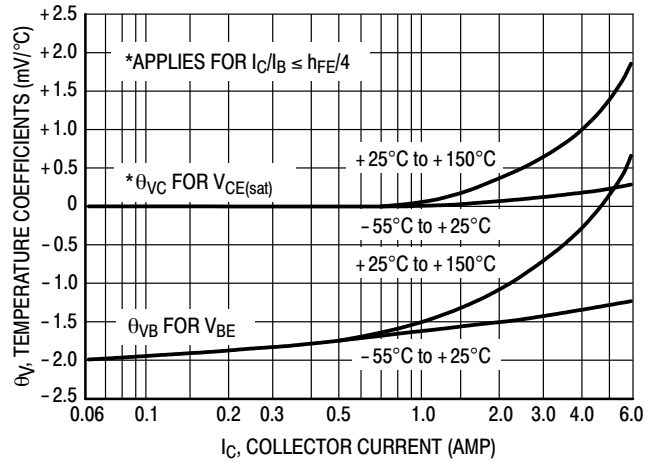


Figure 11. Temperature Coefficients

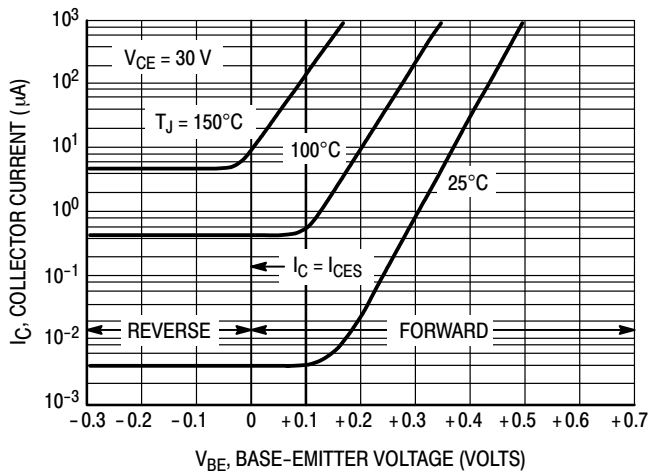


Figure 12. Collector Cut-Off Region

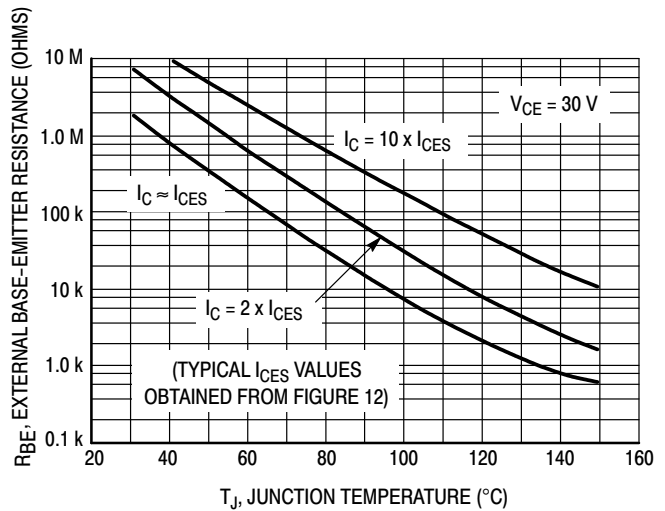
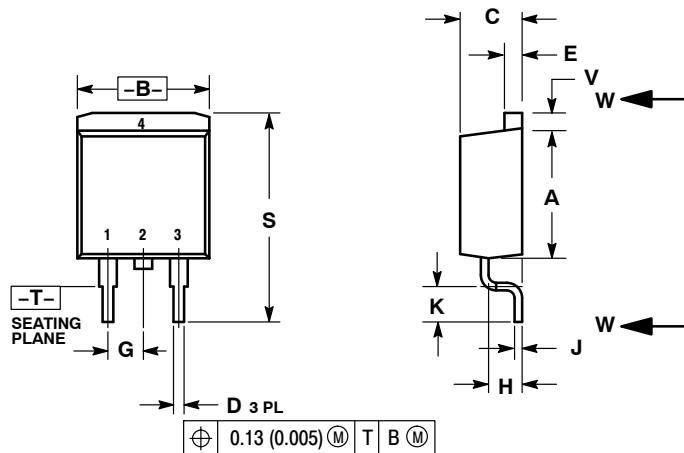


Figure 13. Effects of Base-Emitter Resistance

# MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

## PACKAGE DIMENSIONS

### D<sup>2</sup>PAK 3 CASE 418B-04 ISSUE K



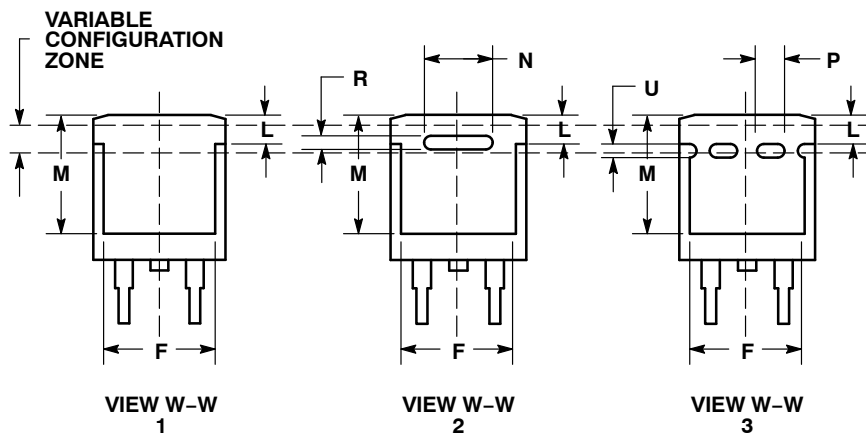
#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

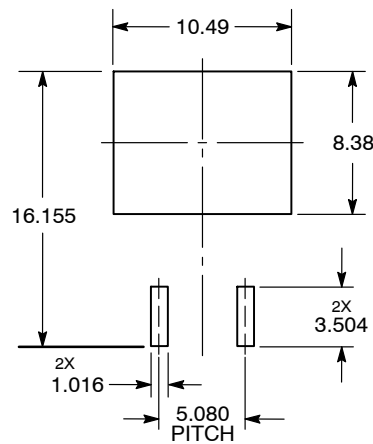
| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.340     | 0.380 | 8.64        | 9.65  |
| B   | 0.380     | 0.405 | 9.65        | 10.29 |
| C   | 0.160     | 0.190 | 4.06        | 4.83  |
| D   | 0.020     | 0.035 | 0.51        | 0.89  |
| E   | 0.045     | 0.055 | 1.14        | 1.40  |
| F   | 0.310     | 0.350 | 7.87        | 8.89  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.080     | 0.110 | 2.03        | 2.79  |
| J   | 0.018     | 0.025 | 0.46        | 0.64  |
| K   | 0.090     | 0.110 | 2.29        | 2.79  |
| L   | 0.052     | 0.072 | 1.32        | 1.83  |
| M   | 0.280     | 0.320 | 7.11        | 8.13  |
| N   | 0.197 REF |       | 5.00 REF    |       |
| P   | 0.079 REF |       | 2.00 REF    |       |
| R   | 0.039 REF |       | 0.99 REF    |       |
| S   | 0.575     | 0.625 | 14.60       | 15.88 |
| V   | 0.045     | 0.055 | 1.14        | 1.40  |

#### STYLE 1:

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



### SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

## MJB41C, NJVMJB41CT4G (NPN), MJB42C, NJVMJB42CT4G (PNP)

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