

# HN1B01FDW1T1G, SHN1B01FDW1T1G

## Complementary Dual General Purpose Amplifier Transistor

### PNP and NPN Surface Mount

#### Features

- High Voltage and High Current:  $V_{CEO} = 50\text{ V}$ ,  $I_C = 200\text{ mA}$
- High  $h_{FE}$ :  $h_{FE} = 200 \sim 400$
- Moisture Sensitivity Level: 1
- ESD Rating
  - ♦ Human Body Model: 3A
  - ♦ Machine Model: C
- AEC-Q101 Qualified and PPAP Capable
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant\*

#### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

| Rating                         | Symbol        | Value | Unit             |
|--------------------------------|---------------|-------|------------------|
| Collector-Base Voltage         | $V_{(BR)CBO}$ | 60    | Vdc              |
| Collector-Emitter Voltage      | $V_{(BR)CEO}$ | 50    | Vdc              |
| Emitter-Base Voltage           | $V_{(BR)EBO}$ | 7.0   | Vdc              |
| Collector Current - Continuous | $I_C$         | 200   | mA <sub>dc</sub> |

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.

#### THERMAL CHARACTERISTICS

| Characteristic       | Symbol    | Max         | Unit             |
|----------------------|-----------|-------------|------------------|
| Power Dissipation    | $P_D$     | 380         | mW               |
| Junction Temperature | $T_J$     | 150         | $^\circ\text{C}$ |
| Storage Temperature  | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

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

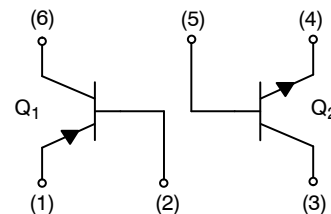


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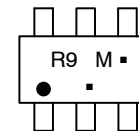
<http://onsemi.com>



SC-74  
CASE 318F  
STYLE 3



#### MARKING DIAGRAM



R9 = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

#### ORDERING INFORMATION

| Device         | Package         | Shipping <sup>†</sup> |
|----------------|-----------------|-----------------------|
| HN1B01FDW1T1G  | SC-74 (Pb-Free) | 3,000/Tape & Reel     |
| SHN1B01FDW1T1G | SC-74 (Pb-Free) | 3,000/Tape & 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.

# HN1B01FDW1T1G, SHN1B01FDW1T1G

## Q1: PNP

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

| Characteristic  | Symbol        | Min   | Max                  | Unit                                       |
|---|---------------|-------|----------------------|--|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 2.0\text{ mAdc}$ , $I_B = 0$ )  | $V_{(BR)CEO}$ | -50   | -                    | Vdc  |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\ \mu\text{Adc}$ , $I_E = 0$ )   | $V_{(BR)CBO}$ | -60   | -                    | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\ \mu\text{Adc}$ , $I_C = 0$ )   | $V_{(BR)EBO}$ | -7.0  | -                    | Vdc  |
| Collector–Base Cutoff Current<br>( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )   | $I_{CBO}$     | -     | -0.1                 | $\mu\text{Adc}$                            |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | -     | -0.1<br>-2.0<br>-1.0 | $\mu\text{Adc}$<br>$\mu\text{Adc}$<br>mAdc |
| DC Current Gain (Note 1)<br>( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mAdc}$ )   | $h_{FE}$      | -200  | -400                 | -  |
| Collector–Emitter Saturation Voltage<br>( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )  | $V_{CE(sat)}$ | -0.15 | -0.3                 | Vdc  |

## Q2: NPN

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

| Characteristic  | Symbol        | Min  | Max               | Unit                                       |
|---|---------------|------|-------------------|--|
| Collector–Emitter Breakdown Voltage<br>( $I_C = 2.0\text{ mAdc}$ , $I_B = 0$ )  | $V_{(BR)CEO}$ | 50   | -                 | Vdc  |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\ \mu\text{Adc}$ , $I_E = 0$ )   | $V_{(BR)CBO}$ | 60   | -                 | Vdc  |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\ \mu\text{Adc}$ , $I_C = 0$ )   | $V_{(BR)EBO}$ | 7.0  | -                 | Vdc  |
| Collector–Base Cutoff Current<br>( $V_{CB} = 45\text{ Vdc}$ , $I_E = 0$ )   | $I_{CBO}$     | -    | 0.1               | $\mu\text{Adc}$                            |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 10\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ )<br>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | -    | 0.1<br>2.0<br>1.0 | $\mu\text{Adc}$<br>$\mu\text{Adc}$<br>mAdc |
| DC Current Gain (Note 1)<br>( $V_{CE} = 6.0\text{ Vdc}$ , $I_C = 2.0\text{ mAdc}$ )   | $h_{FE}$      | 200  | 400               | -  |
| Collector–Emitter Saturation Voltage<br>( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )  | $V_{CE(sat)}$ | 0.15 | 0.25              | Vdc  |

1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , D.C.  $\leq 2\%$ .

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## TYPICAL ELECTRICAL CHARACTERISTICS: PNP Transistor

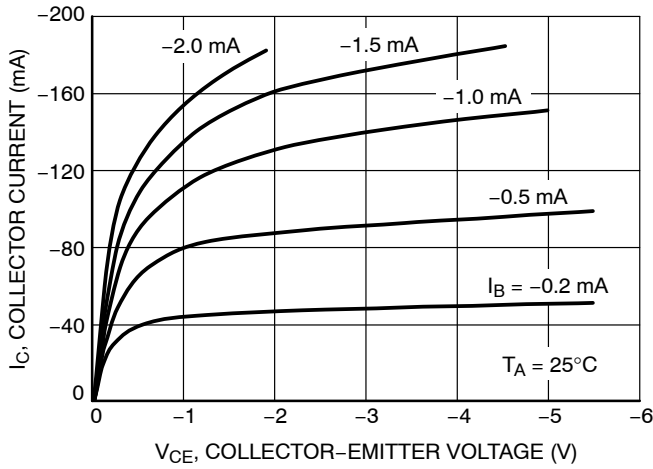


Figure 1. Collector Saturation Region

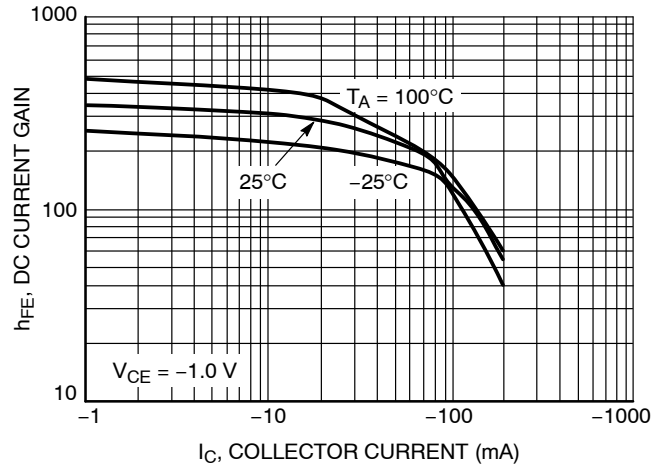


Figure 2. DC Current Gain

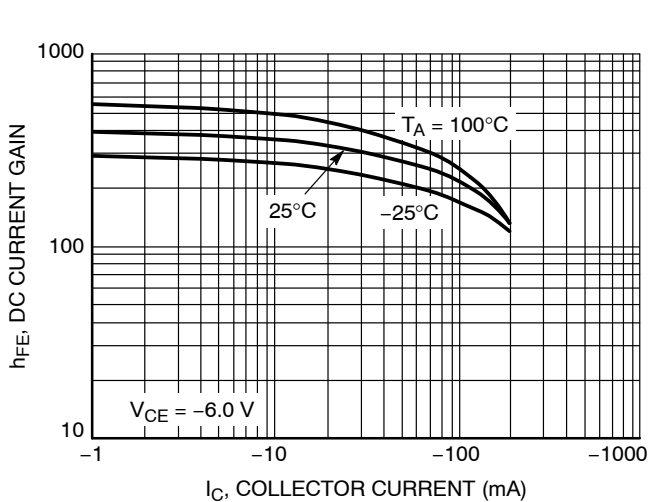


Figure 3. DC Current Gain

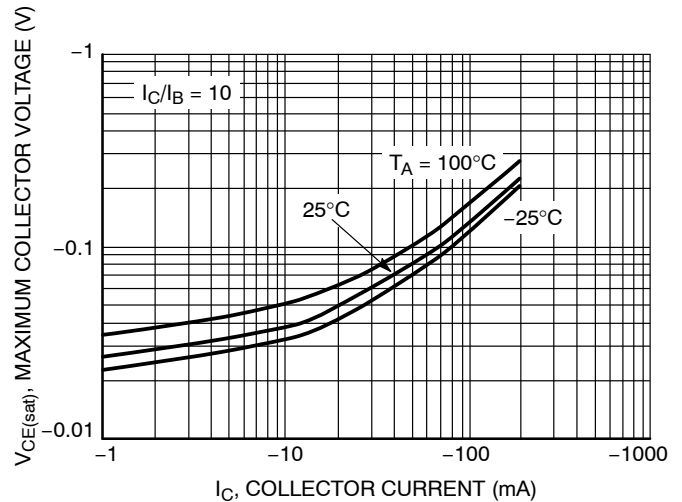


Figure 4.  $V_{CE(sat)}$  versus  $I_C$

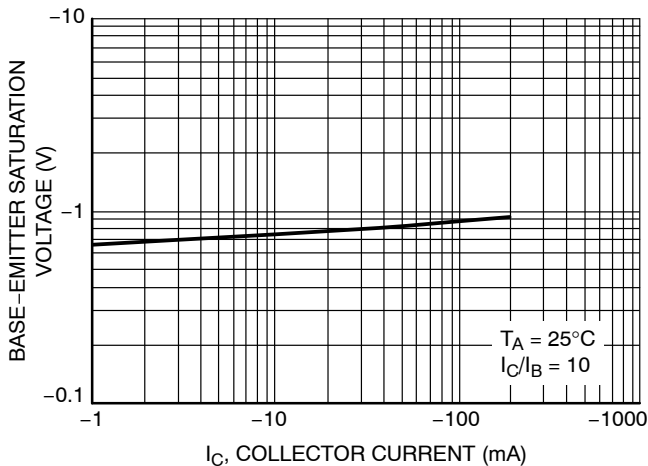


Figure 5.  $V_{BE(sat)}$  versus  $I_C$

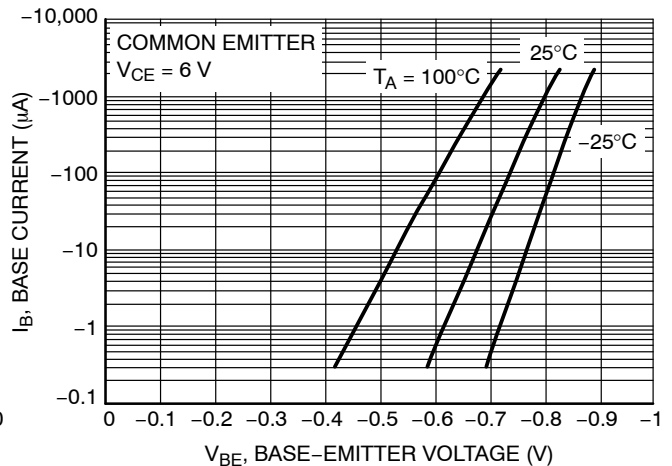


Figure 6. Base-Emitter Voltage

# HN1B01FDW1T1G, SHN1B01FDW1T1G

## TYPICAL ELECTRICAL CHARACTERISTICS: NPN Transistor

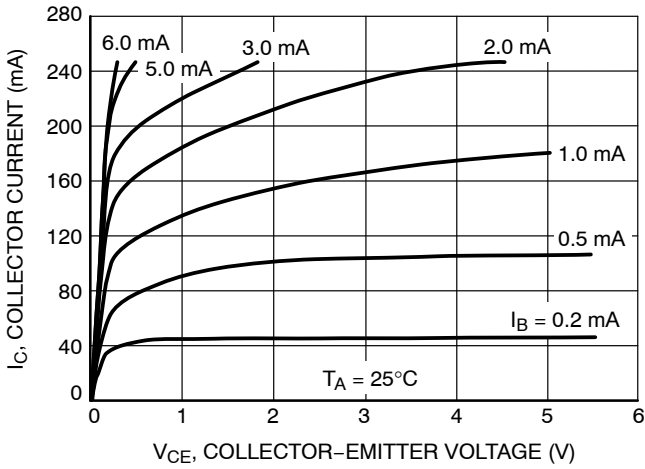


Figure 7. Collector Saturation Voltage

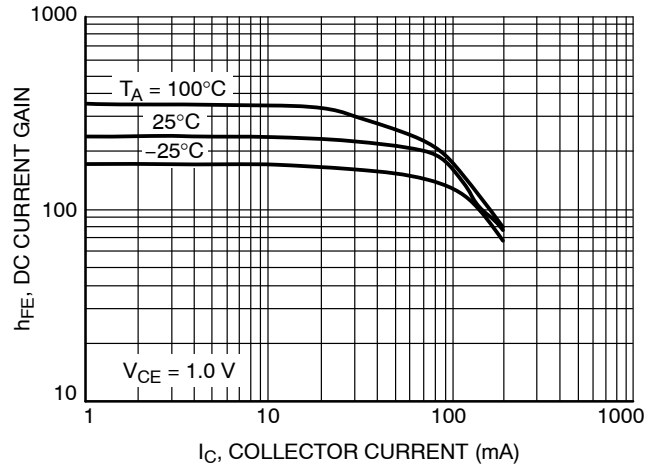


Figure 8. DC Current Gain

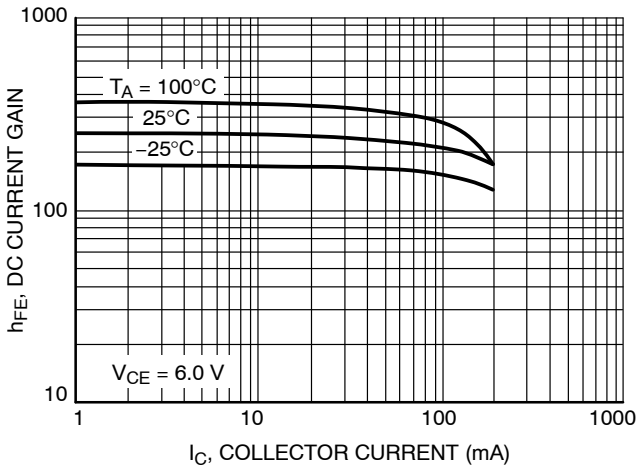


Figure 9. DC Current Gain

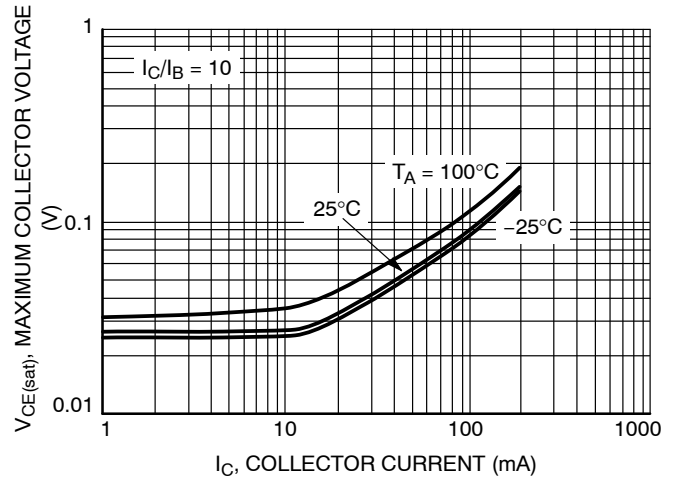


Figure 10.  $V_{CE(sat)}$  versus  $I_C$

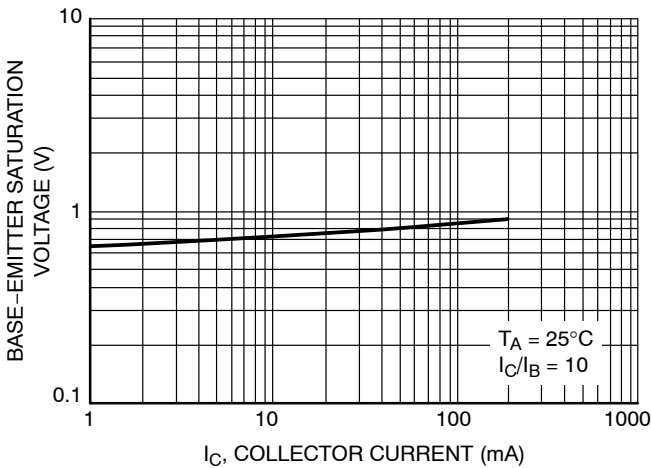


Figure 11.  $V_{BE(sat)}$  versus  $I_C$

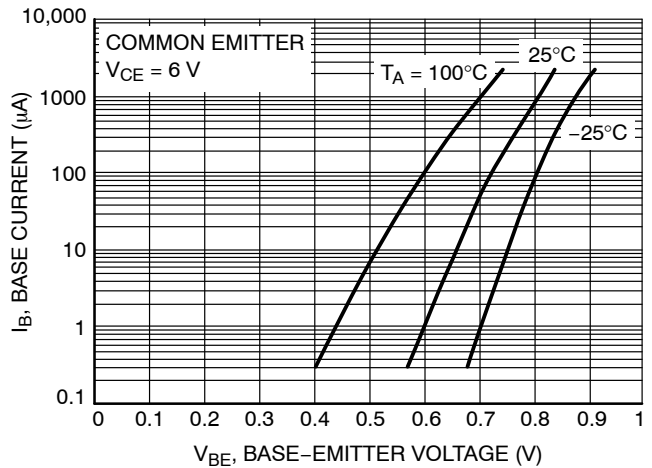


Figure 12. Base-Emitter Voltage

# HN1B01FDW1T1G, SHN1B01FDW1T1G

## TYPICAL ELECTRICAL CHARACTERISTICS

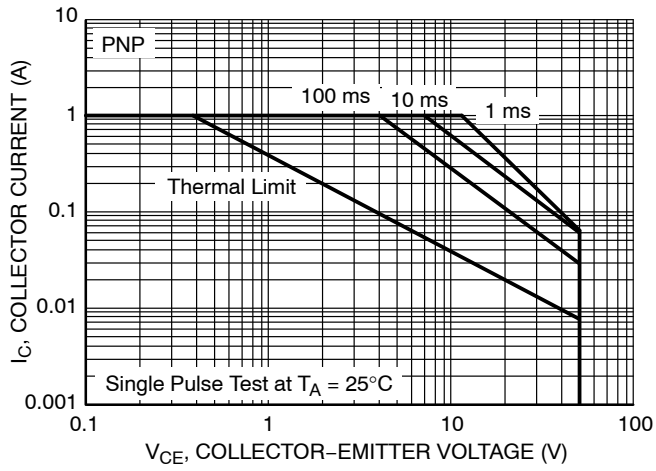


Figure 13. PNP Safe Operating Area

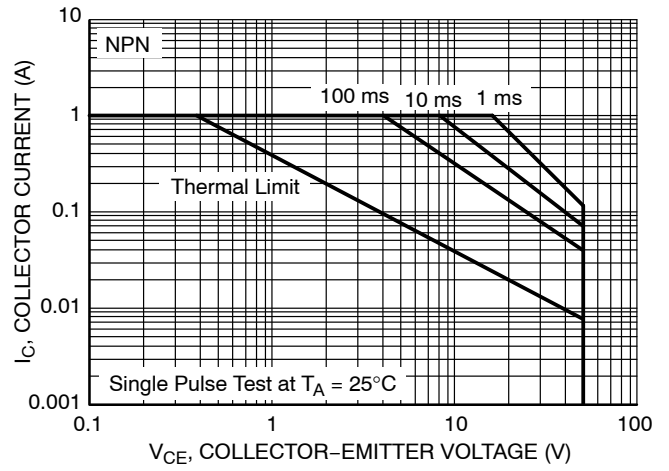
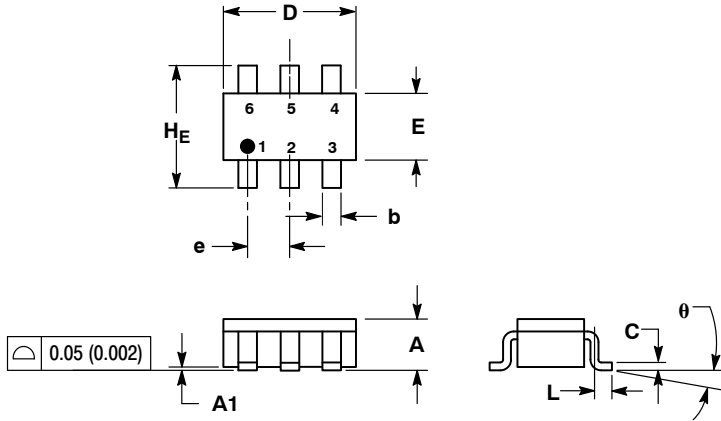


Figure 14. NPN Safe Operating Area

# HN1B01FDW1T1G, SHN1B01FDW1T1G

## PACKAGE DIMENSIONS

SC-74  
CASE 318F-05  
ISSUE M



NOTES:

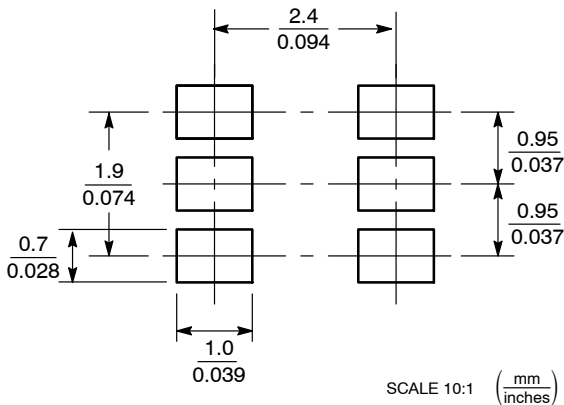
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.90        | 1.00 | 1.10 | 0.035  | 0.039 | 0.043 |
| A1  | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b   | 0.25        | 0.37 | 0.50 | 0.010  | 0.015 | 0.020 |
| c   | 0.10        | 0.18 | 0.26 | 0.004  | 0.007 | 0.010 |
| D   | 2.90        | 3.00 | 3.10 | 0.114  | 0.118 | 0.122 |
| E   | 1.30        | 1.50 | 1.70 | 0.051  | 0.059 | 0.067 |
| e   | 0.85        | 0.95 | 1.05 | 0.034  | 0.037 | 0.041 |
| L   | 0.20        | 0.40 | 0.60 | 0.008  | 0.016 | 0.024 |
| HE  | 2.50        | 2.75 | 3.00 | 0.099  | 0.108 | 0.118 |
| θ   | 0°          | -    | 10°  | 0°     | -     | 10°   |

STYLE 3:

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

### SOLDERING FOOTPRINT\*



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

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Тел: +7 (812) 336 43 04 (многоканальный)

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