

# 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
- S Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- 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   | mAdc |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### 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.

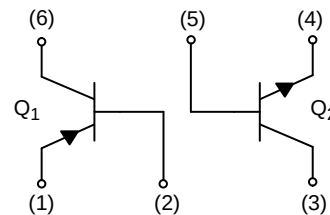


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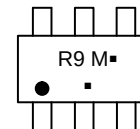
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SC-74  
CASE 318F  
STYLE 3



### MARKING DIAGRAM



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

### ORDERING INFORMATION

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

# 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>( $I_C = 2.0\text{ mAdc}$ , $I_E = 0$ )                                                                                                                  | $V_{(BR)CEO}$ | –50         | –                    | Vdc                                        |
| Collector–Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{Adc}$ , $I_E = 0$ )                                                                                                             | $V_{(BR)CBO}$ | –60         | –                    | Vdc                                        |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ }\mu\text{Adc}$ , $I_C = 0$ )                                                                                                               | $V_{(BR)EBO}$ | –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>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | –<br>–<br>– | –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>( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )                                                                                                    | $V_{CE(sat)}$ | –           | –0.3                 | 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>( $I_C = 10\text{ }\mu\text{Adc}$ , $I_E = 0$ )                                                                                                             | $V_{(BR)CBO}$ | 60          | –                 | Vdc                                        |
| Emitter–Base Breakdown Voltage<br>( $I_E = 10\text{ }\mu\text{Adc}$ , $I_C = 0$ )                                                                                                               | $V_{(BR)EBO}$ | 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>( $V_{CE} = 30\text{ Vdc}$ , $I_B = 0$ , $T_A = 80^\circ\text{C}$ ) | $I_{CEO}$     | –<br>–<br>– | 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>( $I_C = 100\text{ mAdc}$ , $I_B = 10\text{ mAdc}$ )                                                                                                    | $V_{CE(sat)}$ | –           | 0.25              | Vdc                                        |

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

TYPICAL ELECTRICAL CHARACTERISTICS: PNP Transistor

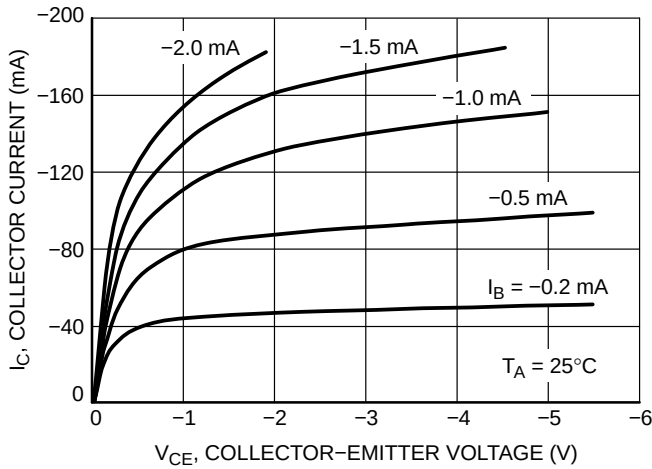


Figure 1. Collector Saturation Region

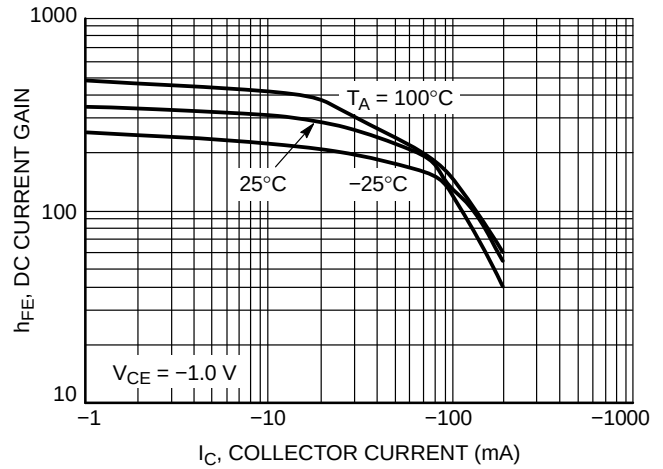


Figure 2. DC Current Gain

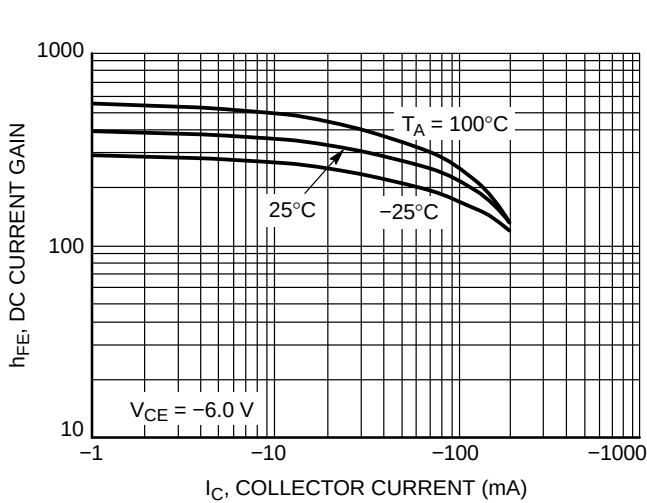


Figure 3. DC Current Gain

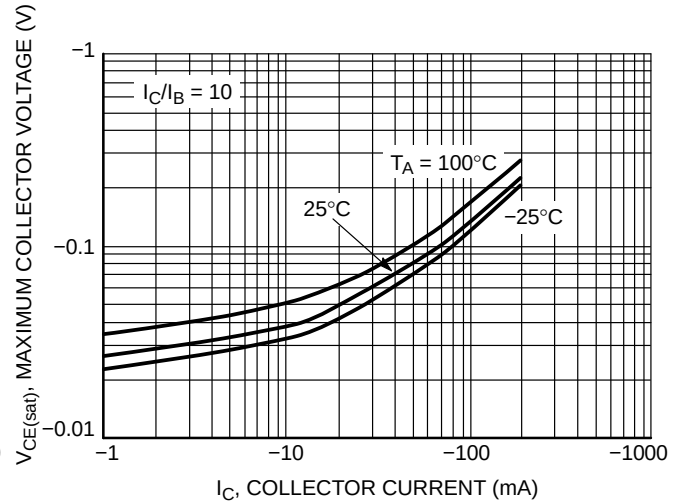


Figure 4.  $V_{CE(sat)}$  versus  $I_C$

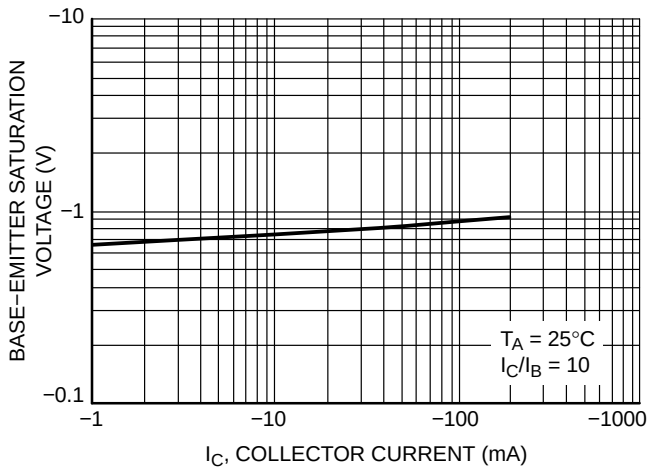


Figure 5.  $V_{BE(sat)}$  versus  $I_C$

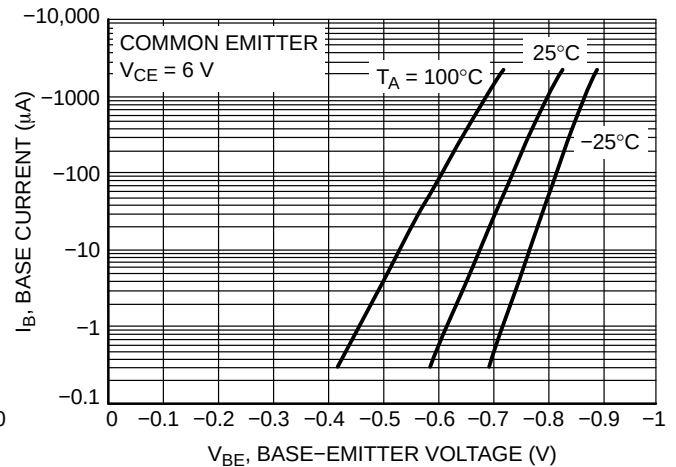


Figure 6. Base-Emitter Voltage

TYPICAL ELECTRICAL CHARACTERISTICS: NPN Transistor

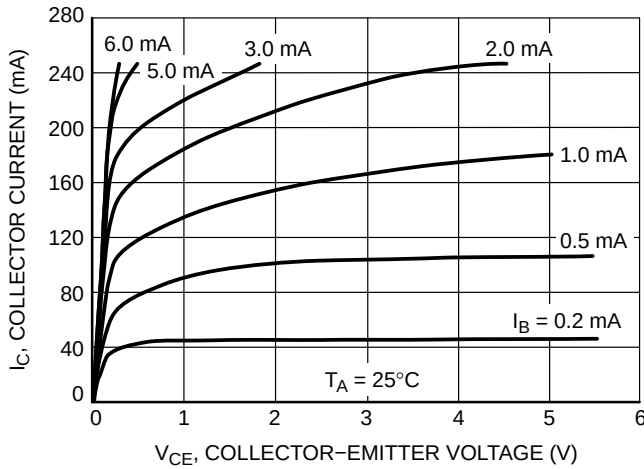


Figure 7. Collector Saturation Voltage

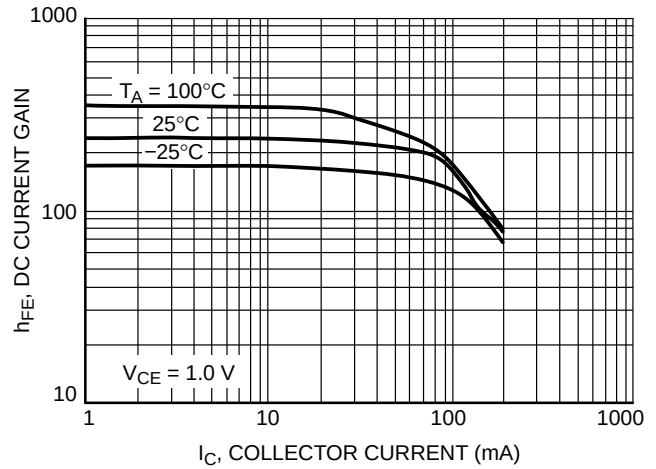


Figure 8. DC Current Gain

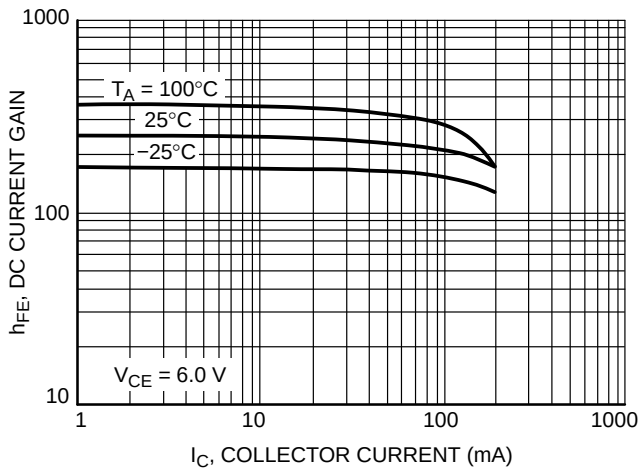


Figure 9. DC Current Gain

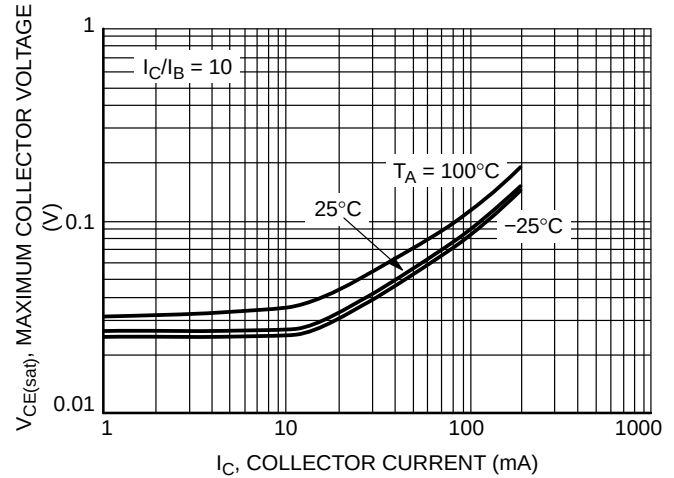


Figure 10.  $V_{CE(sat)}$  versus  $I_C$

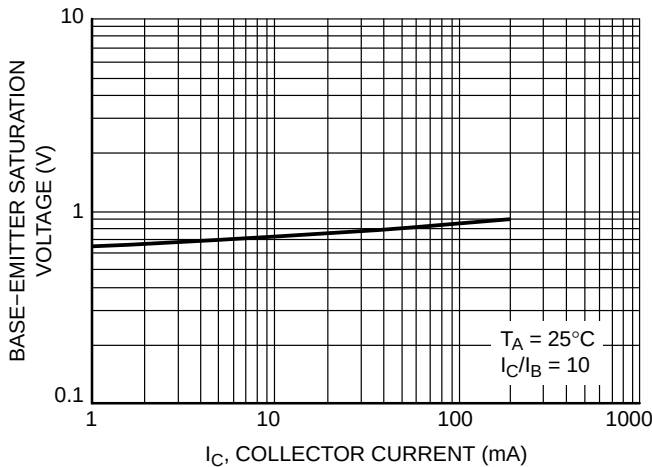


Figure 11.  $V_{BE(sat)}$  versus  $I_C$

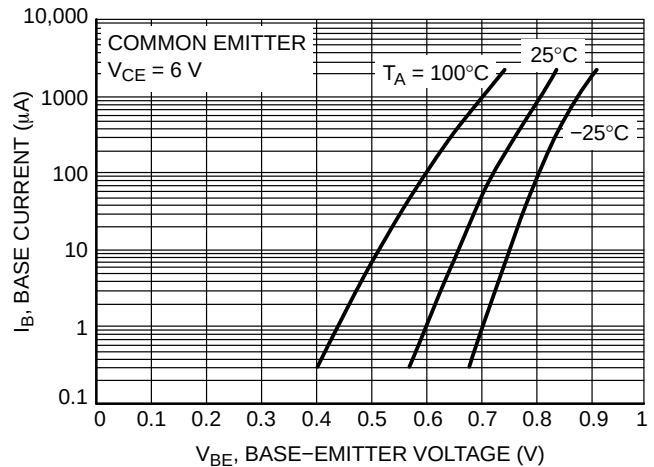


Figure 12. Base-Emitter Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

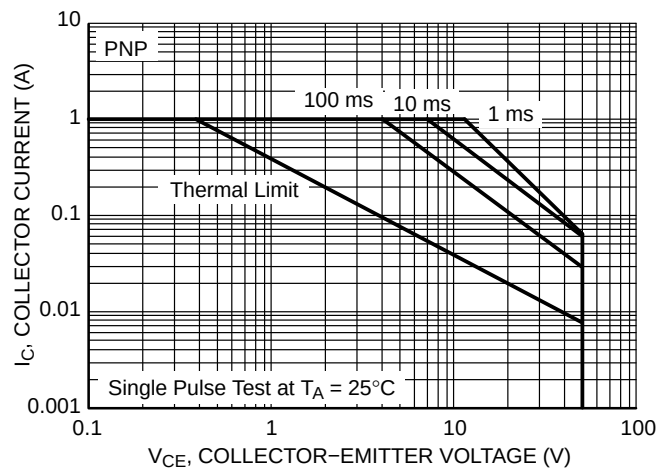


Figure 13. PNP Safe Operating Area

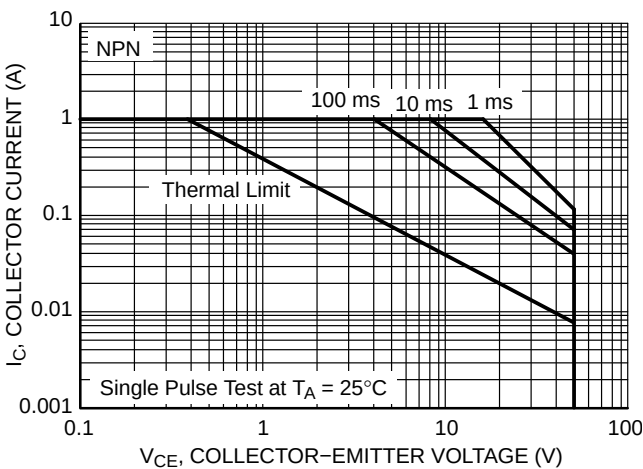


Figure 14. NPN Safe Operating Area

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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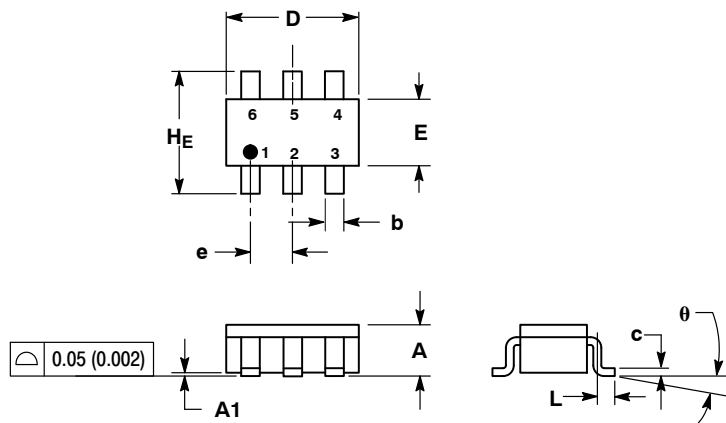
### SC-74

#### CASE 318F-05

#### ISSUE N

DATE 08 JUN 2012

SCALE 2:1

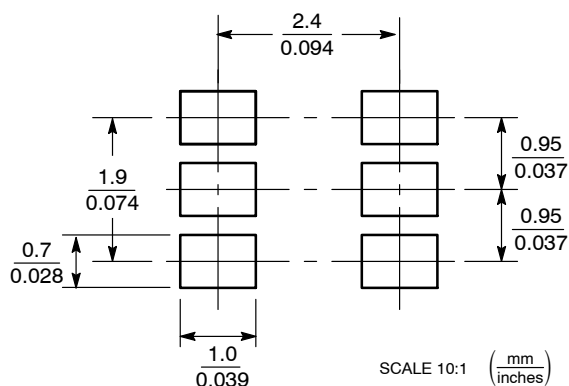


#### NOTES:

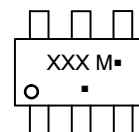
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318F-01, -02, -03, -04 OBSOLETE. NEW STANDARD 318F-05.

| 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°   |

#### SOLDERING FOOTPRINT\*



#### GENERIC MARKING DIAGRAM\*



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

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

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

#### STYLE 1:

PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. CATHODE  
5. ANODE  
6. CATHODE

#### STYLE 2:

PIN 1. NO CONNECTION  
2. COLLECTOR  
3. EMITTER  
4. NO CONNECTION  
5. COLLECTOR  
6. BASE

#### STYLE 3:

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

#### STYLE 4:

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

#### STYLE 5:

PIN 1. CHANNEL 1  
2. ANODE  
3. CHANNEL 2  
4. CHANNEL 3  
5. CATHODE  
6. CHANNEL 4

#### STYLE 6:

PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. CATHODE  
5. CATHODE  
6. CATHODE

#### STYLE 7:

PIN 1. SOURCE 1  
2. GATE 1  
3. DRAIN 2  
4. SOURCE 2  
5. GATE 2  
6. DRAIN 1

#### STYLE 8:

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

#### STYLE 9:

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

#### STYLE 10:

PIN 1. ANODE/CATHODE  
2. BASE  
3. EMITTER  
4. COLLECTOR  
5. ANODE  
6. CATHODE

#### STYLE 11:

PIN 1. EMITTER  
2. BASE  
3. ANODE/CATHODE  
4. ANODE  
5. CATHODE  
6. COLLECTOR

|                  |             |                                                                                                                                                                                  |
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