

# General Purpose Transistors

NPN, 65 V, 100 mA

## NST846MTWFT

The NST846MTWFT is designed for general purpose amplifier applications. It is housed in an ultra-compact DFN1010-3 with wettable flanks, recommended for the automotive industry's optical inspection methods. The transistor is ideal for low-power surface mount applications where board space and reliability are at a premium.

### Features

- Wettable Flank Package for Optimal Automated Optical Inspection (AOI)
- NSV 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 ( $T_A = 25^\circ\text{C}$ )

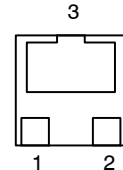
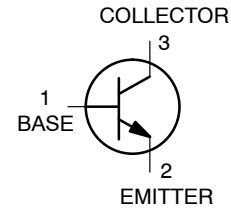
| Rating                         | Symbol    | Max | Unit |
|--------------------------------|-----------|-----|------|
| Collector – Emitter Voltage    | $V_{CEO}$ | 65  | Vdc  |
| Collector – Base Voltage       | $V_{CBO}$ | 80  | Vdc  |
| Emitter – Base Voltage         | $V_{EBO}$ | 5.0 | Vdc  |
| Collector Current – Continuous | $I_C$     | 100 | mA   |
| Collector Current – Peak       | $I_{CM}$  | 200 | mA   |

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                      |
|------------------------------------------------------------------------|-----------------|-------------|---------------------------|
| Thermal Resistance Junction-to-Ambient (Note 1)                        | $R_{\theta JA}$ | 220         | $^\circ\text{C}/\text{W}$ |
| Total Power Dissipation per Device @ $T_A = 25^\circ\text{C}$ (Note 1) | $P_D$           | 570         | mW                        |
| Junction and Storage Temperature Range                                 | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$          |

1. Per JESD51-7 with standard PCB footprint and 2 oz. Cu.



XDFNW3  
CASE 521AC

### MARKING DIAGRAM



46 = Specific Device Code  
M = Month Code

### ORDERING INFORMATION

| Device         | Package          | Shipping†          |
|----------------|------------------|--------------------|
| NST846MTWFTBG  | XDFNW3 (Pb-Free) | 3000 / Tape & Reel |
| NSVT846MTWFTBG | XDFNW3 (Pb-Free) | 3000 / 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.

# NST846MTWFT

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

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

### OFF CHARACTERISTICS

|                                                                                                                  |               |        |        |             |                     |
|------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|-------------|---------------------|
| Collector – Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ )                                                   | $V_{(BR)CEO}$ | 65     | –      | –           | V                   |
| Collector – Emitter Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )                           | $V_{(BR)CES}$ | 80     | –      | –           | V                   |
| Collector – Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ )                                             | $V_{(BR)CBO}$ | 80     | –      | –           | V                   |
| Emitter – Base Breakdown Voltage ( $I_E = 0.1\text{ }\mu\text{A}$ , $I_C = 0$ )                                  | $V_{(BR)EBO}$ | 6.0    | –      | –           | V                   |
| Collector Cutoff Current<br>( $V_{CB} = 30\text{ V}$ )<br>( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ ) | $I_{CBO}$     | –<br>– | –<br>– | 15.0<br>5.0 | nA<br>$\mu\text{A}$ |
| Emitter – Base Cutoff Current ( $V_{BE} = 6\text{ V}$ , $I_C = 0$ )                                              | $I_{EBO}$     | –      | –      | 0.1         | $\mu\text{A}$       |

### ON CHARACTERISTICS

|                                                                                                                                                 |                        |          |            |              |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------|------------|--------------|---|
| DC Current Gain<br>( $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )           | (Note 2) $h_{FE}$      | –<br>220 | 150<br>290 | –<br>450     |   |
| Collector – Emitter Saturation Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ ) | (Note 2) $V_{CE(sat)}$ | –<br>–   | –<br>–     | 0.25<br>0.60 | V |
| Base – Emitter Saturation Voltage<br>( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )      | (Note 2) $V_{BE(sat)}$ | –<br>–   | 0.7<br>0.9 | –<br>–       | V |
| Base – Emitter Turn-on Voltage<br>( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )     | (Note 2) $V_{BE(on)}$  | 0.6<br>– | –<br>–     | 0.75<br>0.82 | V |

### SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                                                  |           |     |     |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|-----|-----|-----|
| Transition Frequency<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ , $f = 100\text{ MHz}$ )                                                | $f_T$     | 100 | –   | –   | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                          | $C_{obo}$ | –   | 1.0 | 3.0 | pF  |
| Noise Figure<br>( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF        | –   | 1.0 | –   | dB  |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Condition: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS

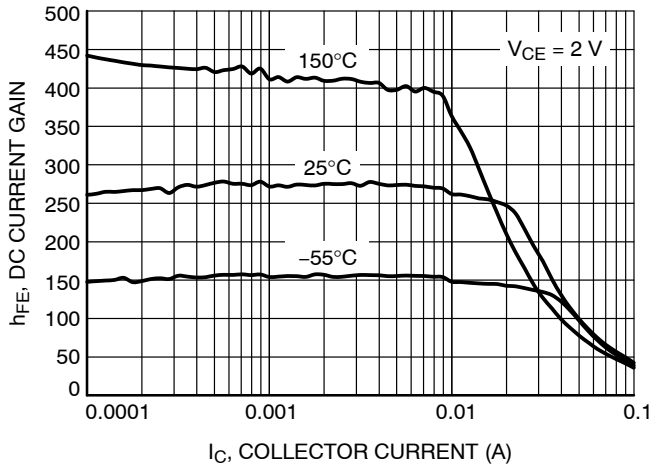


Figure 1. DC Current Gain

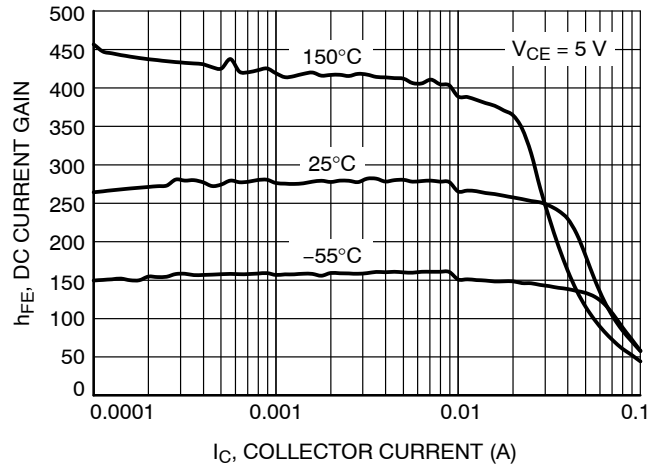


Figure 2. DC Current Gain

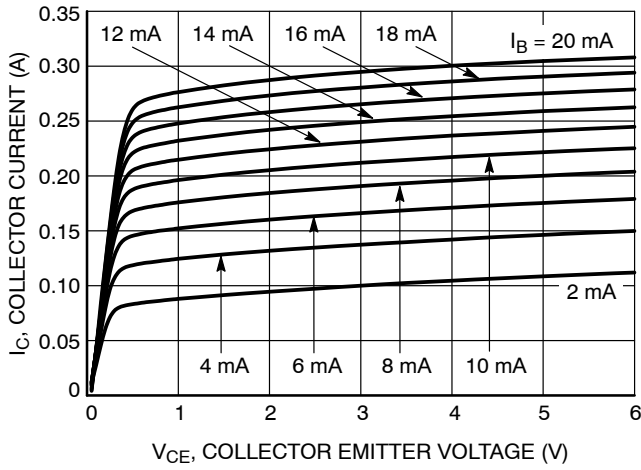


Figure 3. Collector Current as a Function of Collector Emitter Voltage

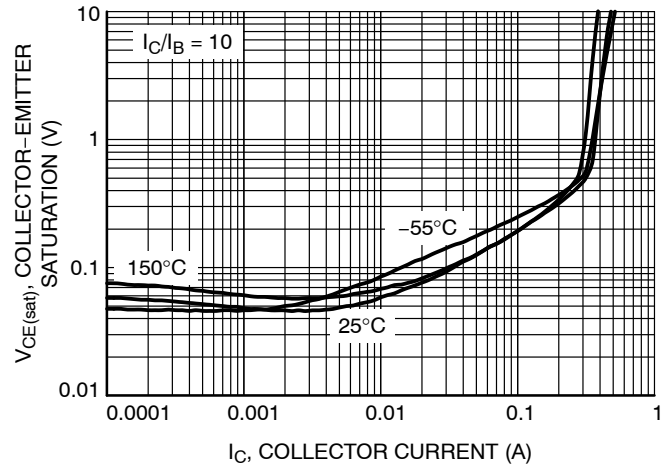


Figure 4. Collector-Emitter Saturation Voltage

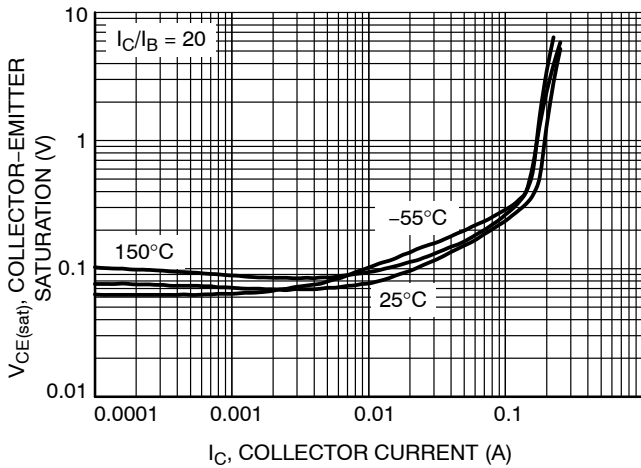


Figure 5. Collector-Emitter Saturation Voltage

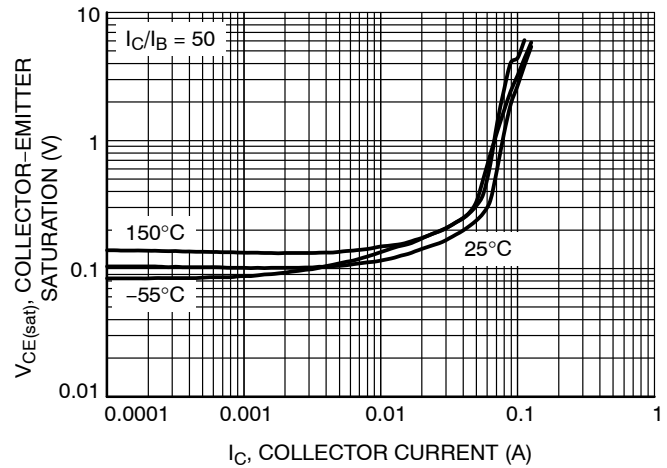


Figure 6. Collector-Emitter Saturation Voltage

TYPICAL CHARACTERISTICS

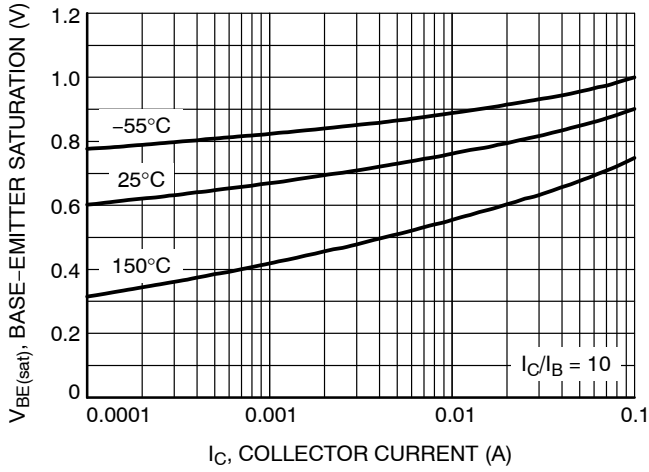


Figure 7. Base-Emitter Saturation Voltage

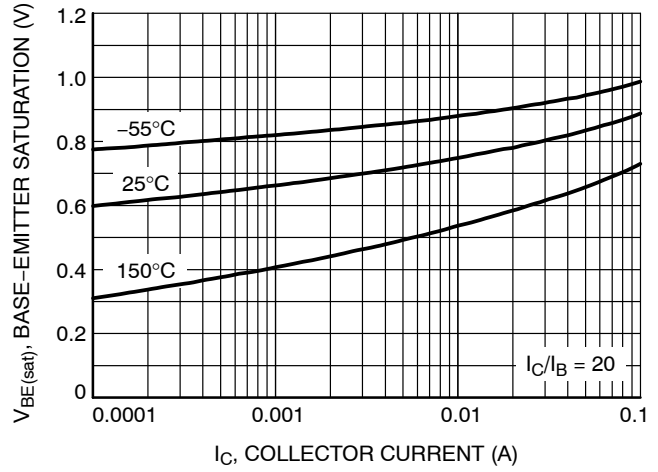


Figure 8. Base-Emitter Saturation Voltage

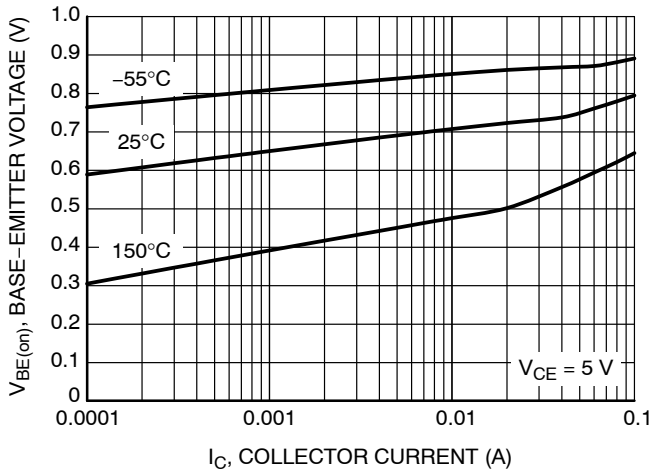


Figure 9. Base-Emitter "ON" Voltage

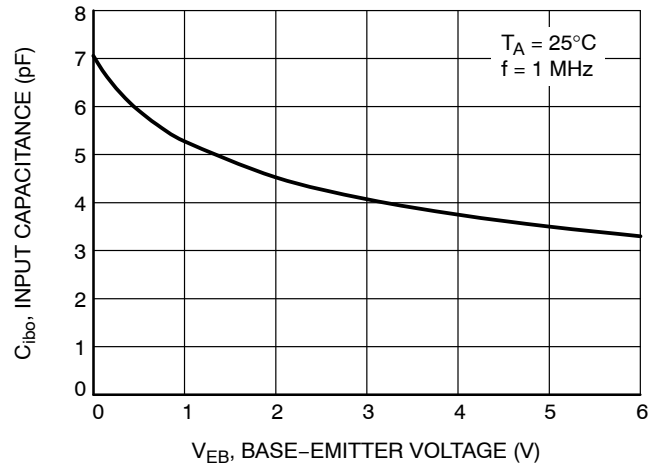


Figure 10. Input Capacitance

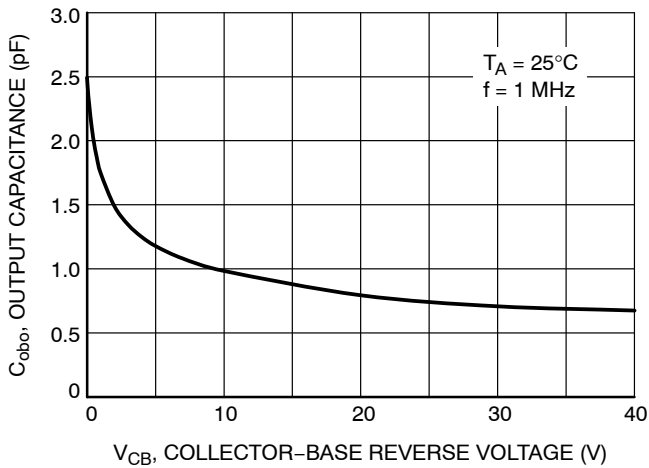


Figure 11. Output Capacitance

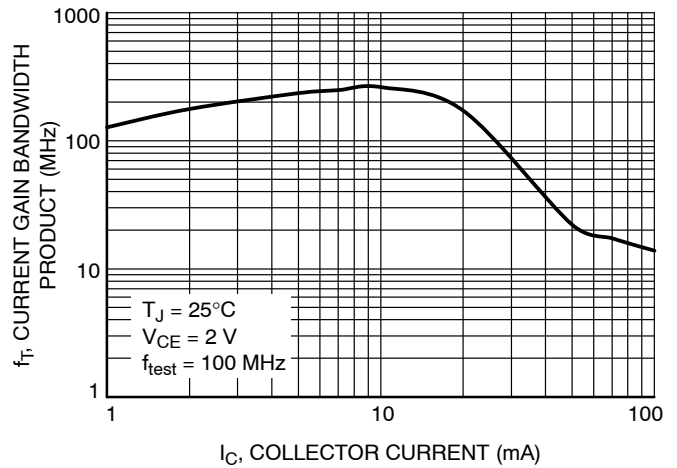


Figure 12.  $f_T$ , Current Gain Bandwidth Product

TYPICAL CHARACTERISTICS

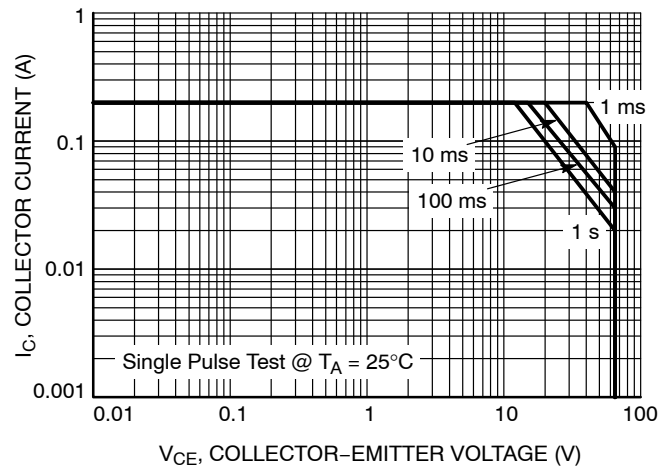


Figure 13. Safe Operating Area

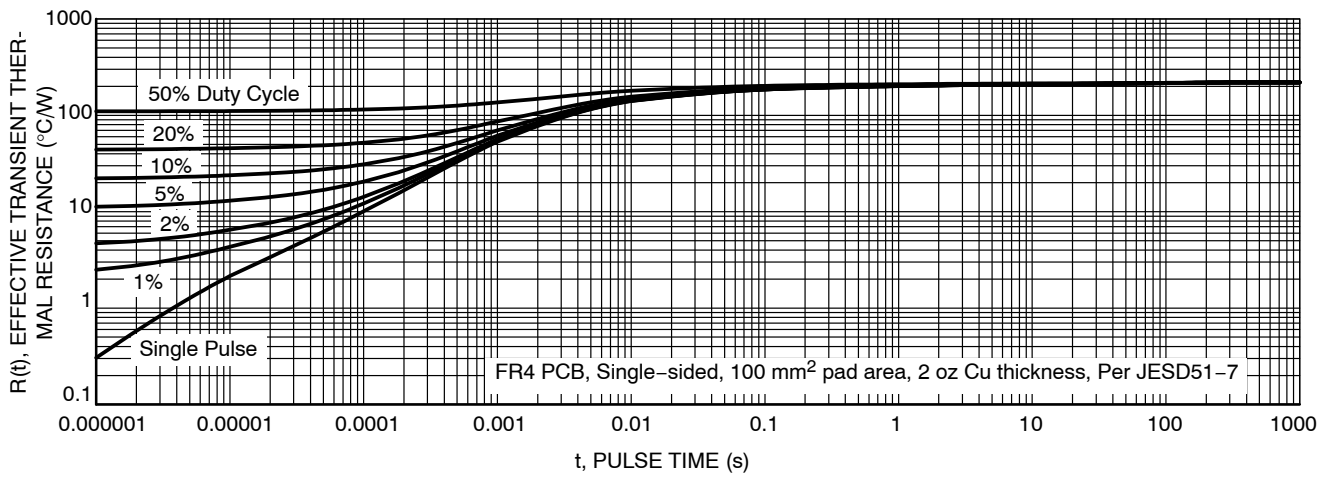
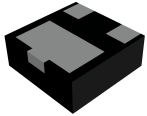
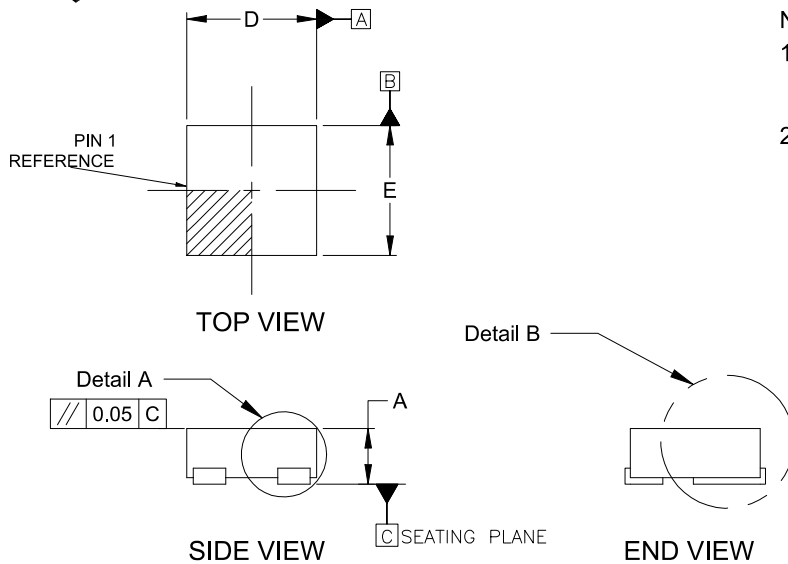


Figure 14. Thermal Resistance

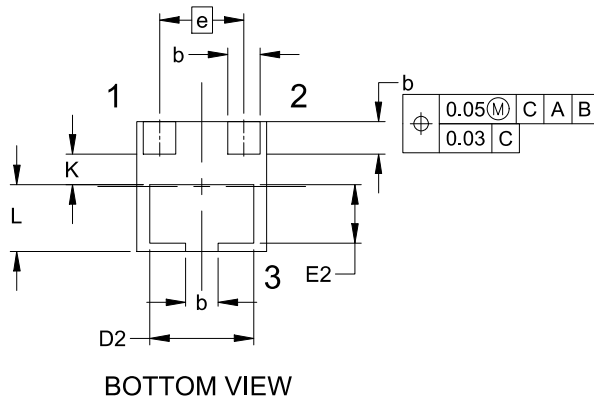
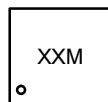

**XDFNW3 1.00x1.00x0.38 0.65P**  
CASE 521AC  
ISSUE B

DATE 07 MAY 2024

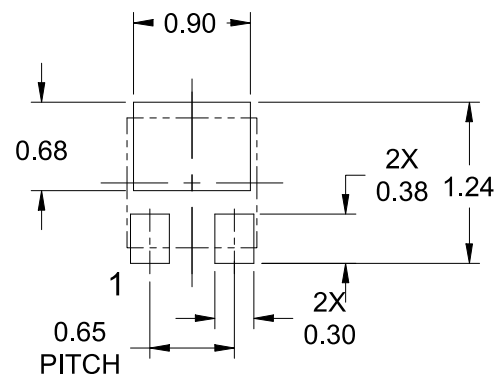
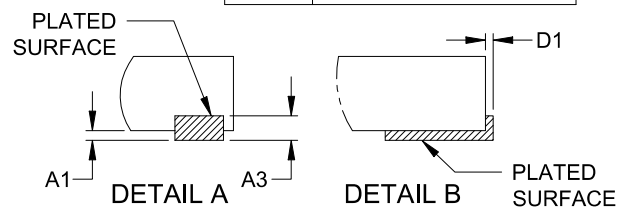

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS

| DIM | MILLIMETERS |       |       |
|-----|-------------|-------|-------|
|     | MIN.        | NOM.  | MAX.  |
| A   | 0.32        | 0.38  | 0.44  |
| A1  | 0.00        | ---   | 0.04  |
| A3  | 0.125 REF   |       |       |
| b   | 0.20        | 0.25  | 0.30  |
| D   | 0.90        | 1.00  | 1.10  |
| D1  | 0.00        | ---   | 0.04  |
| D2  | 0.75        | 0.80  | 0.85  |
| E   | 0.90        | 1.00  | 1.10  |
| E2  | 0.40        | 0.45  | 0.50  |
| e   | 0.65 BSC    |       |       |
| L   | 0.465       | 0.515 | 0.565 |
| K   | 0.23 REF    |       |       |


**GENERIC MARKING DIAGRAM\***

XX = Specific Device Code  
M = Month Code

\*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. Some products may not follow the Generic Marking.


**RECOMMENDED MOUNTING FOOTPRINT\***

\* For additional information on our Pb-Free strategy and soldering details, please download the ONSEMI Soldering and Mounting Techniques Reference Manual, S•LDERRM/D.

|                         |                                    |                                                                                                                                                                                  |
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