

# 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<sub>A</sub> = 25°C)

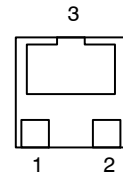
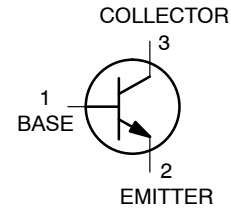
Rating	Symbol	Max	Unit
Collector - Emitter Voltage	V <sub>CEO</sub>	65	Vdc
Collector - Base Voltage	V <sub>CBO</sub>	80	Vdc
Emitter - Base Voltage	V <sub>EBO</sub>	5.0	Vdc
Collector Current - Continuous	I <sub>C</sub>	100	mA
Collector Current - Peak	I <sub>CM</sub>	200	mA

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 <sub>θJA</sub>	220	°C/W
Total Power Dissipation per Device @T <sub>A</sub> = 25°C (Note 1)	P <sub>D</sub>	570	mW
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-65 to +150	°C

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



XDFNW3  
CASE 521AC

46 = Specific Device Code  
M = Month Code

### MARKING DIAGRAM



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

## ON CHARACTERISTICS

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

## SMALL-SIGNAL CHARACTERISTICS

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

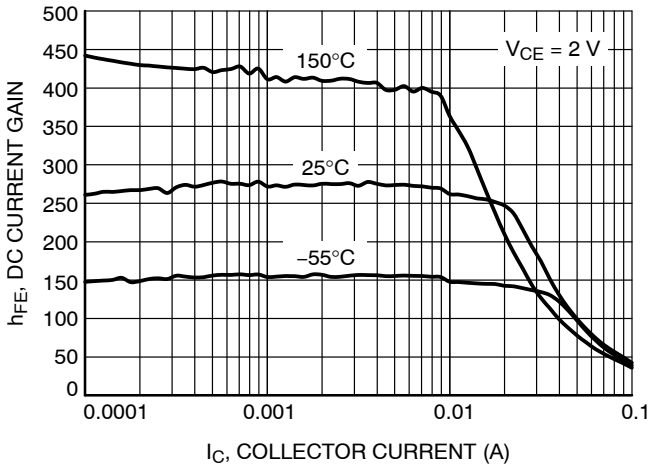


Figure 1. DC Current Gain

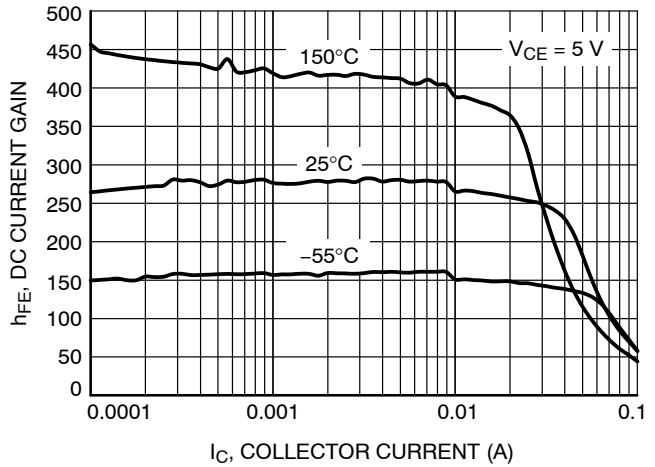


Figure 2. DC Current Gain

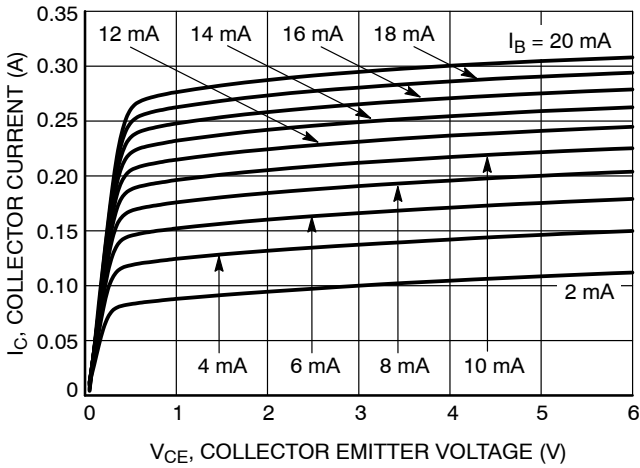


Figure 3. Collector Current as a Function of Collector Emitter Voltage

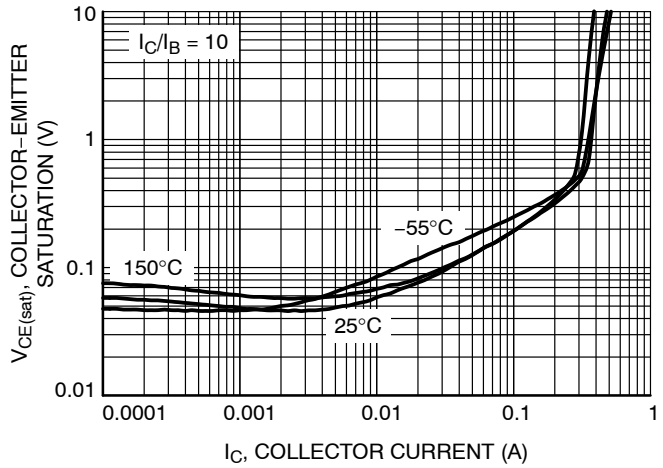


Figure 4. Collector-Emitter Saturation Voltage

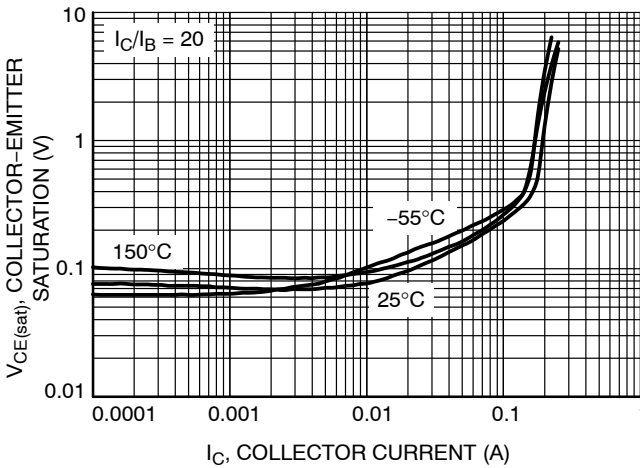


Figure 5. Collector-Emitter Saturation Voltage

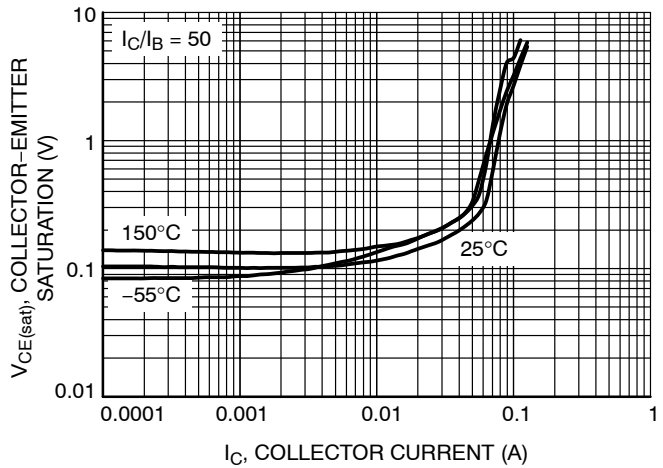


Figure 6. Collector-Emitter Saturation Voltage

# NST846MTWFT

## TYPICAL CHARACTERISTICS

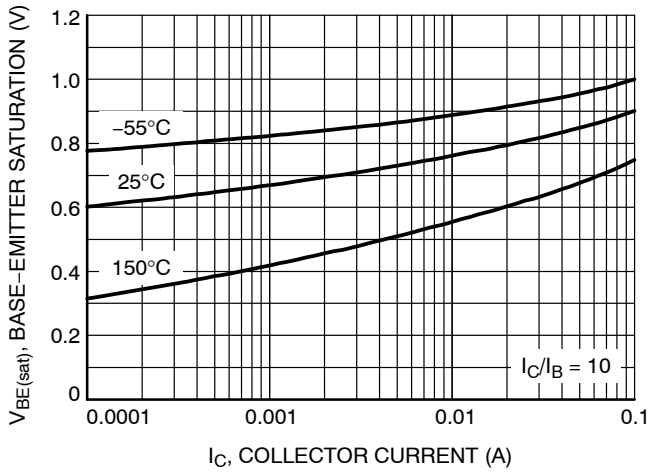


Figure 7. Base-Emitter Saturation Voltage

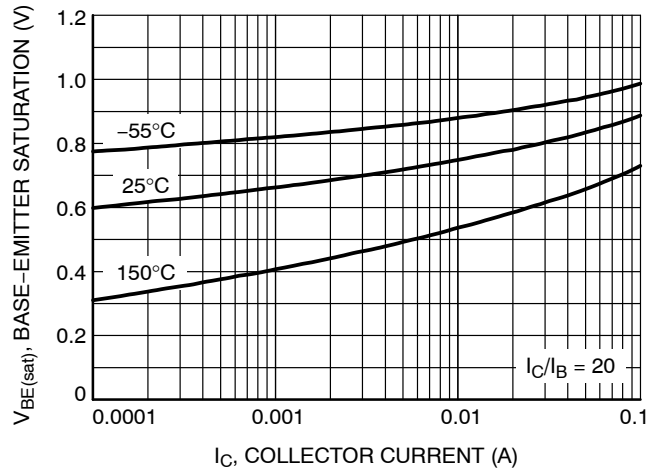


Figure 8. Base-Emitter Saturation Voltage

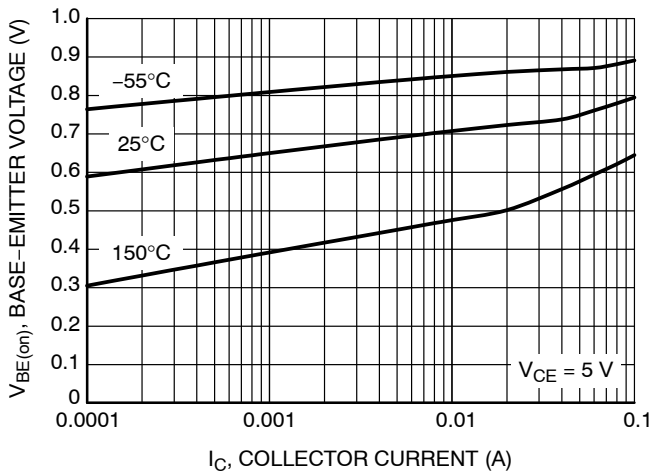


Figure 9. Base-Emitter "ON" Voltage

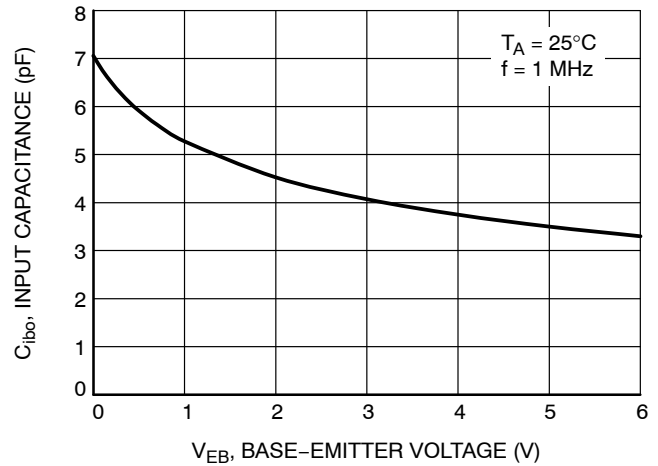


Figure 10. Input Capacitance

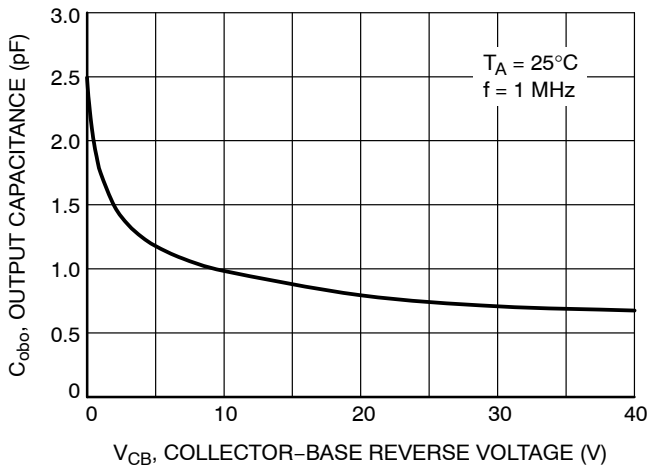


Figure 11. Output Capacitance

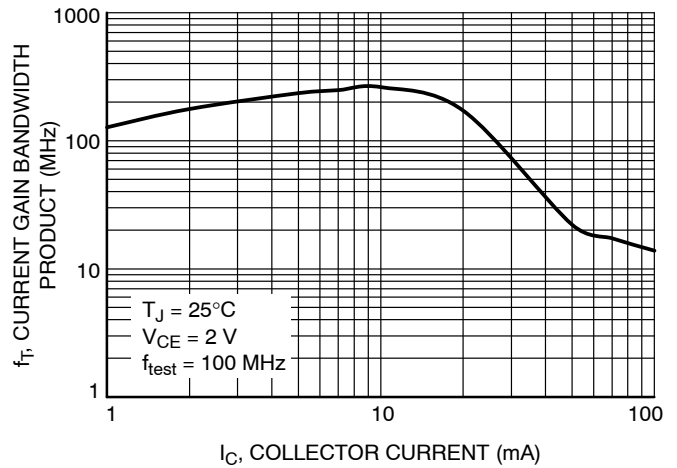


Figure 12.  $f_T$  Current Gain Bandwidth Product

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## TYPICAL CHARACTERISTICS

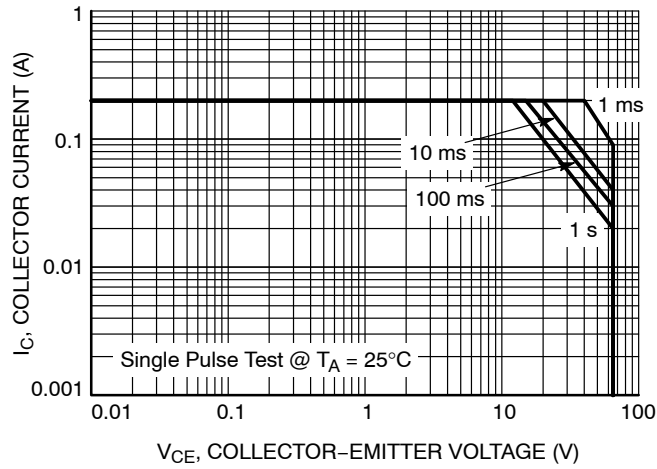


Figure 13. Safe Operating Area

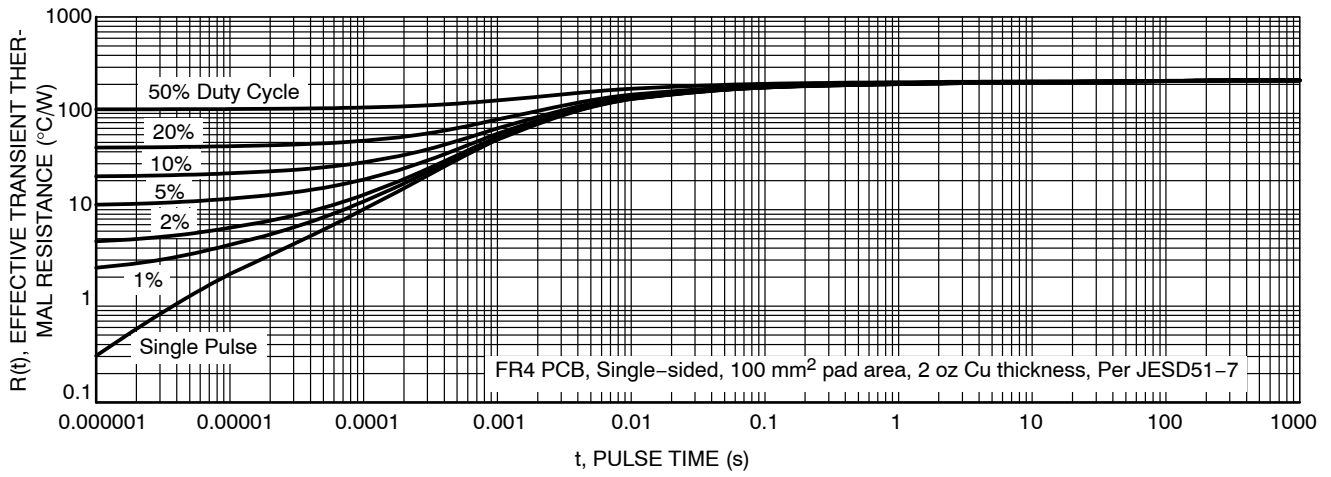
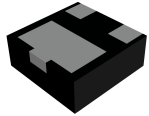
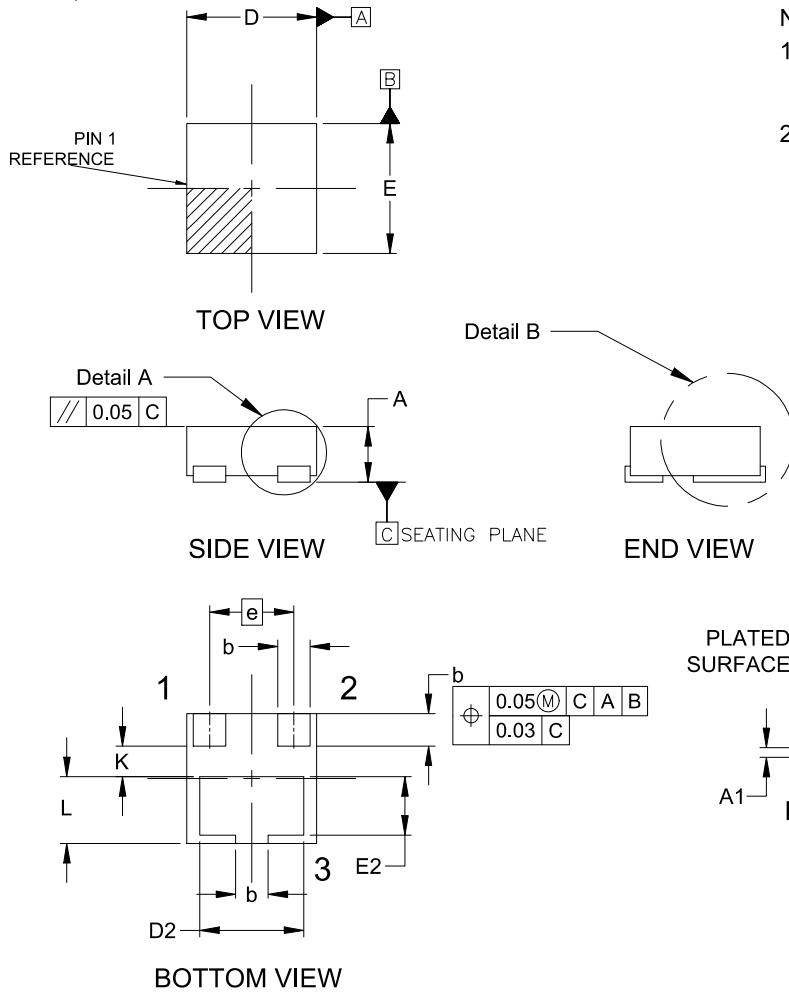


Figure 14. Thermal Resistance



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

DATE 07 MAY 2024

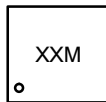


NOTES:

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

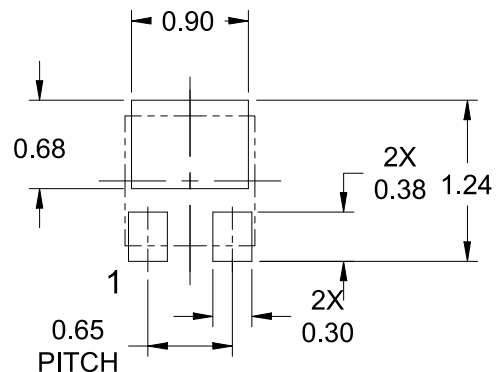
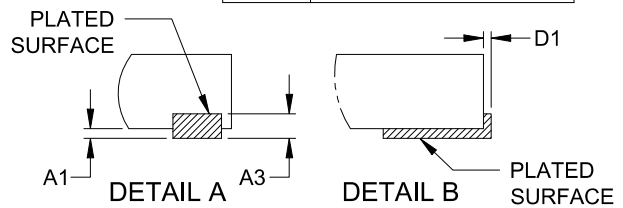
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.32	0.38	0.44
A1	0.00	---	0.04
A3	0.125 REF		
b	0.20	0.25	0.30
D	0.90	1.00	1.10
D1	0.00	---	0.04
D2	0.75	0.80	0.85
E	0.90	1.00	1.10
E2	0.40	0.45	0.50
e	0.65 BSC		
L	0.465	0.515	0.565
K	0.23 REF		

**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.



\* 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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<b>DESCRIPTION:</b>	<b>XDFNW3 1.00x1.00x0.38 0.65P</b>	<b>PAGE 1 OF 1</b>

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