

Zener Diode Voltage Regulators

250 mW Wettable Flank

NZ8F Series

This series of Zener diodes is packaged in a X2DFNW2 surface mount package with an industry standard size of 0402 in. They are designed to provide voltage regulation protection and are especially attractive in situations where space is at a premium. They are well suited for applications such as cellular phones, hand held portables, and automotive control units.

Specification Features

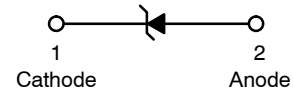
- Zener Breakdown Voltage Range -2.4 V to 47 V
 - ◆ Standard Tolerance Series – NZ8FxxxMX2WT5G
 - ◆ Tight Tolerance Series – NZ8FxxxSMX2WT5G
- Low Body Height: 0.016" (0.40 mm)
- Wettable Flank Package for optimal Automated Optical Inspection (AOI)
- SZ Prefix for Automotive and Other Applications Requiring 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

| Rating | Symbol | Max | Unit |
|--|-----------------------------------|----------------|-------------|
| Total Device Dissipation FR-5 Board, (Note 1) @ T _A = 25°C Derate above 25°C | P _D | 250 1.5 | mW mW/°C |
| Total Device Dissipation FR-5 Board, (Note 2) @ T _A = 25°C Derate above 25°C | P _D | 500 1.2 | mW mW/°C |
| Thermal Resistance from Junction-to-Ambient (Note 1) (Note 2) | R _{θJA} | 415 247 | °C/W |
| Non-Repetitive Peak Reverse Power (Note 3) | P _{ZSM} | 40 | W |
| Junction and Storage Temperature Range | T _J , T _{stg} | -65 to +150 | °C |

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.

1. FR-4 Minimum Pad, 1 oz. Cu.
2. FR-4 150 mm², 1 oz. Cu.
3. T_A = 25°C, t_p = 100 μs.



X2DFNW2
CASE 711BG

MARKING DIAGRAM



XX = Specific Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|---------------------------------------|----------------------|-----------------------|
| NZ8FxxxMX2WT5G, SZNZ8FxxxMX2WT5G | X2DFNW2 (Pb-Free) | 8000 / Tape & Reel |
| NZ8FxxxSMX2WT5G, SZNZ8FxxxSMX2WT5G | X2DFNW2 (Pb-Free) | 8000 / 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.

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

NZ8F Series

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted)

| Symbol | Parameter |
|-----------------|---|
| V _Z | Reverse Zener Voltage @ I _{ZT} |
| I _{ZT} | Reverse Current |
| Z _{ZT} | Maximum Zener Impedance @ I _{ZT} |
| I _R | Reverse Leakage Current @ V _R |
| V _R | Reverse Voltage |
| I _F | Forward Current |
| V _F | Forward Voltage @ I _F |
| ΘV _Z | Maximum Temperature Coefficient of V _Z |
| C | Max. Capacitance @ V _R = 0 and f = 1 MHz |

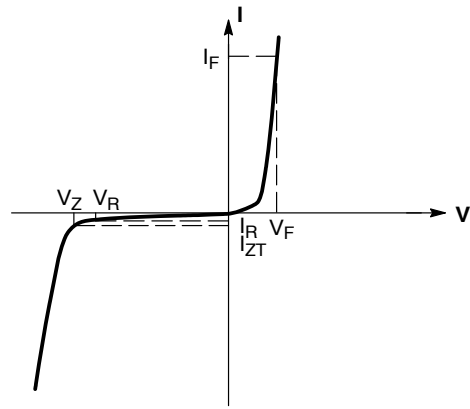


Figure 1. Uni-directional Zener

ELECTRICAL CHARACTERISTICS (NZ8FxxxMX2W Standard Tolerance Series)

(V_F = 0.9 V Max @ I_F = 10 mA for all types)

| Device* | Device Marking | Zener Voltage (Note 1) | | | Zener Impedance | Leakage Current | | C @ V _R = 0 f = 1 MHz |
|----------------|----------------|------------------------|-------|-------------------|-----------------------------------|---------------------------------|-------|----------------------------------|
| | | V _Z (Volts) | | @ I _{ZT} | Z _{ZT} @ I _{ZT} | I _R @ V _R | | |
| | | Min | Max | mA | Ω | μA | Volts | |
| NZ8F2V4MX2WT5G | AA | 2.11 | 2.69 | 5 | 100 | 50 | 1 | 210 |
| NZ8F2V7MX2WT5G | AC | 2.43 | 2.97 | 5 | 100 | 20 | 1 | 210 |
| NZ8F3V0MX2WT5G | AD | 2.75 | 3.25 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V3MX2WT5G | AE | 3.05 | 3.55 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V6MX2WT5G | AF | 3.35 | 3.85 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V9MX2WT5G | AG | 3.65 | 4.15 | 5 | 100 | 5 | 1 | 210 |
| NZ8F4V3MX2WT5G | AH | 4.09 | 4.52 | 5 | 100 | 5 | 1 | 210 |
| NZ8F4V7MX2WT5G | AJ | 4.47 | 4.94 | 5 | 100 | 2 | 1 | 150 |
| NZ8F5V1MX2WT5G | AK | 4.85 | 5.36 | 5 | 80 | 2 | 1.5 | 130 |
| NZ8F5V6MX2WT5G | AL | 5.32 | 5.88 | 5 | 60 | 1 | 2.5 | 115 |
| NZ8F6V2MX2WT5G | AM | 5.89 | 6.51 | 5 | 60 | 1 | 3 | 110 |
| NZ8F6V8MX2WT5G | AN | 6.46 | 7.14 | 5 | 40 | 0.5 | 3.5 | 105 |
| NZ8F7V5MX2WT5G | AQ | 7.13 | 7.88 | 5 | 30 | 0.5 | 4 | 100 |
| NZ8F8V2MX2WT5G | AP | 7.79 | 8.61 | 5 | 30 | 0.5 | 5 | 90 |
| NZ8F9V1MX2WT5G | AR | 8.65 | 9.56 | 5 | 30 | 0.5 | 6 | 80 |
| NZ8F10VMX2WT5G | AT | 9.50 | 10.50 | 5 | 30 | 0.1 | 7 | 80 |
| NZ8F11VMX2WT5G | AU | 10.45 | 11.55 | 5 | 30 | 0.1 | 8 | 80 |
| NZ8F12VMX2WT5G | AV | 11.40 | 12.60 | 5 | 30 | 0.1 | 9 | 80 |
| NZ8F13VMX2WT5G | AW | 12.35 | 13.65 | 5 | 37 | 0.1 | 10 | 75 |
| NZ8F15VMX2WT5G | AX | 14.25 | 15.75 | 5 | 42 | 0.1 | 11 | 70 |
| NZ8F16VMX2WT5G | AY | 15.20 | 16.80 | 5 | 50 | 0.1 | 12 | 65 |
| NZ8F18VMX2WT5G | AZ | 17.10 | 18.90 | 5 | 50 | 0.1 | 14 | 60 |
| NZ8F20VMX2WT5G | A2 | 19.00 | 21.00 | 5 | 55 | 0.1 | 15.4 | 55 |
| NZ8F22VMX2WT5G | A3 | 20.90 | 23.10 | 5 | 55 | 0.1 | 16.8 | 55 |
| NZ8F24VMX2WT5G | A4 | 22.80 | 25.20 | 5 | 70 | 0.1 | 18.9 | 50 |
| NZ8F27VMX2WT5G | A5 | 25.65 | 28.35 | 5 | 80 | 0.1 | 22 | 50 |
| NZ8F33VMX2WT5G | A6 | 31.35 | 34.65 | 5 | 95 | 0.1 | 26 | 45 |
| NZ8F47VMX2WT5G | A7 | 44.65 | 49.35 | 2 | 170 | 0.1 | 38 | 40 |

*Includes SZ prefix where applicable: SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

NZ8F Series

ELECTRICAL CHARACTERISTICS (NZ8FxxxSMX2W Tight Tolerance Series)

($V_F = 0.9\text{ V Max @ }I_F = 10\text{ mA}$ for all types)

| Device* | Device Marking | Zener Voltage (Note 1) | | | Zener Impedance | Leakage Current | | C@ $V_R = 0\text{ f}$ = 1 MHz |
|-----------------|----------------|------------------------|-------|------------|---------------------|-----------------|-------|----------------------------------|
| | | V_Z (Volts) | | @ I_{ZT} | Z_{ZT} @ I_{ZT} | I_R @ V_R | | |
| | | Min | Max | mA | Ω | μA | Volts | |
| NZ8F2V4SMX2WT5G | CA | 2.26 | 2.55 | 5 | 100 | 50 | 1 | 210 |
| NZ8F2V7SMX2WT5G | CC | 2.54 | 2.86 | 5 | 100 | 20 | 1 | 210 |
| NZ8F3V0SMX2WT5G | CD | 2.85 | 3.15 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V3SMX2WT5G | CE | 3.14 | 3.47 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V6SMX2WT5G | CF | 3.42 | 3.78 | 5 | 100 | 10 | 1 | 210 |
| NZ8F3V9SMX2WT5G | CG | 3.71 | 4.10 | 5 | 100 | 5 | 1 | 210 |
| NZ8F4V3SMX2WT5G | CH | 4.16 | 4.45 | 5 | 100 | 5 | 1 | 210 |
| NZ8F4V7SMX2WT5G | CJ | 4.59 | 4.81 | 5 | 100 | 2 | 1 | 150 |
| NZ8F5V1SMX2WT5G | CK | 4.98 | 5.22 | 5 | 80 | 2 | 1.5 | 130 |
| NZ8F5V6SMX2WT5G | CL | 5.47 | 5.73 | 5 | 60 | 1 | 2.5 | 115 |
| NZ8F6V2SMX2WT5G | CM | 6.06 | 6.34 | 5 | 60 | 1 | 3 | 110 |
| NZ8F6V8SMX2WT5G | CN | 6.64 | 6.96 | 5 | 40 | 0.5 | 3.5 | 105 |
| NZ8F7V5SMX2WT5G | CP | 7.33 | 7.67 | 5 | 30 | 0.5 | 4 | 100 |
| NZ8F8V2SMX2WT5G | CQ | 8.01 | 8.39 | 5 | 30 | 0.5 | 5 | 90 |
| NZ8F9V1SMX2WT5G | CR | 8.89 | 9.31 | 5 | 30 | 0.5 | 6 | 80 |
| NZ8F10VSMX2WT5G | CT | 9.77 | 10.23 | 5 | 30 | 0.1 | 7 | 80 |
| NZ8F11VSMX2WT5G | CU | 10.75 | 11.25 | 5 | 30 | 0.1 | 8 | 80 |
| NZ8F12VSMX2WT5G | CV | 11.72 | 12.28 | 5 | 30 | 0.1 | 9 | 80 |
| NZ8F13VSMX2WT5G | CW | 12.70 | 13.30 | 5 | 37 | 0.1 | 10 | 75 |
| NZ8F15VSMX2WT5G | CX | 14.66 | 15.35 | 5 | 42 | 0.1 | 11 | 70 |
| NZ8F16VSMX2WT5G | CY | 15.63 | 16.37 | 5 | 50 | 0.1 | 12 | 65 |
| NZ8F18VSMX2WT5G | CZ | 17.59 | 18.41 | 5 | 50 | 0.1 | 14 | 60 |
| NZ8F20VSMX2WT5G | C2 | 19.54 | 20.46 | 5 | 55 | 0.1 | 15.4 | 55 |
| NZ8F22VSMX2WT5G | C3 | 21.49 | 22.51 | 5 | 55 | 0.1 | 16.8 | 55 |
| NZ8F24VSMX2WT5G | C4 | 23.45 | 24.55 | 5 | 70 | 0.1 | 18.9 | 50 |
| NZ8F27VSMX2WT5G | C5 | 26.38 | 27.62 | 5 | 80 | 0.1 | 22 | 50 |
| NZ8F33VSMX2WT5G | C6 | 32.24 | 33.76 | 5 | 95 | 0.1 | 26 | 45 |
| NZ8F47VSMX2WT5G | C7 | 45.92 | 48.08 | 2 | 170 | 0.1 | 38 | 40 |

*Includes SZ prefix where applicable: SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

NZ8F Series

TYPICAL CHARACTERISTICS

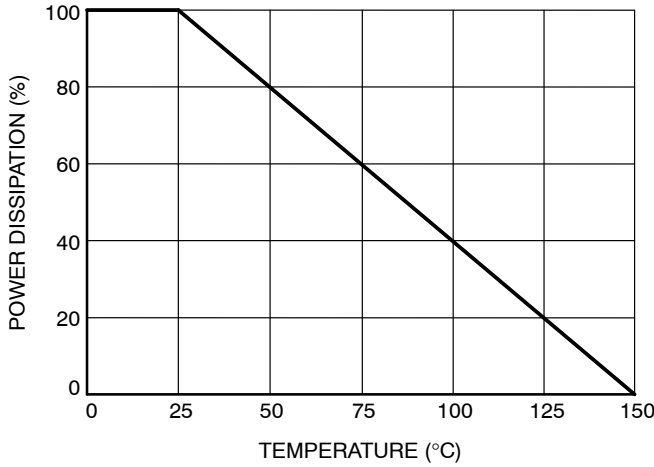
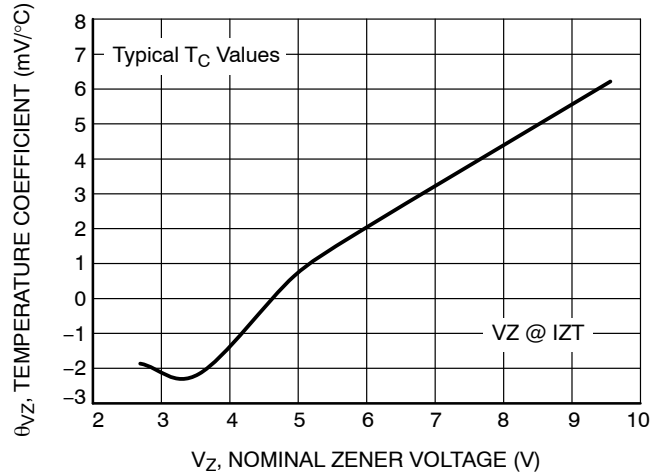
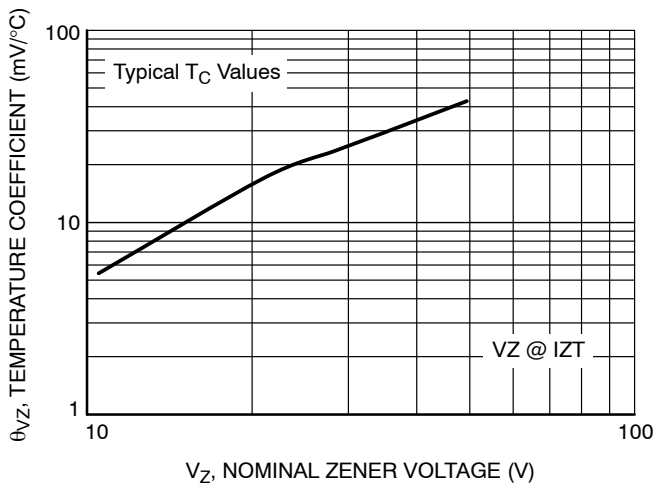


Figure 2. Steady State Power Derating



**Figure 3. Temperature Coefficients
(Temperature Range -55°C to +150°C)**



**Figure 4. Temperature Coefficients
(Temperature Range -55°C to +150°C)**

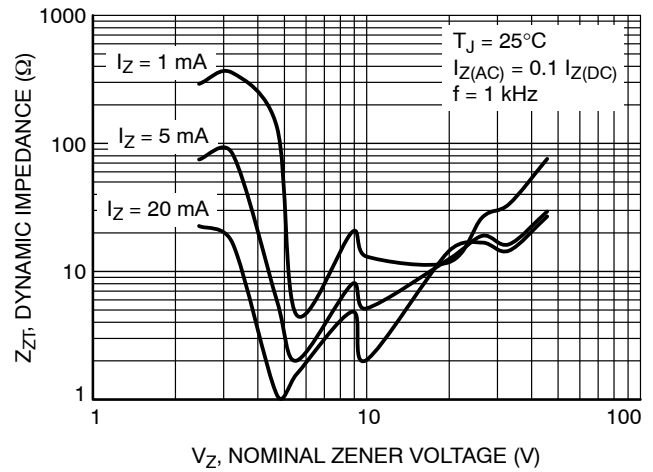


Figure 5. Effect of Zener Voltage on Zener Impedance

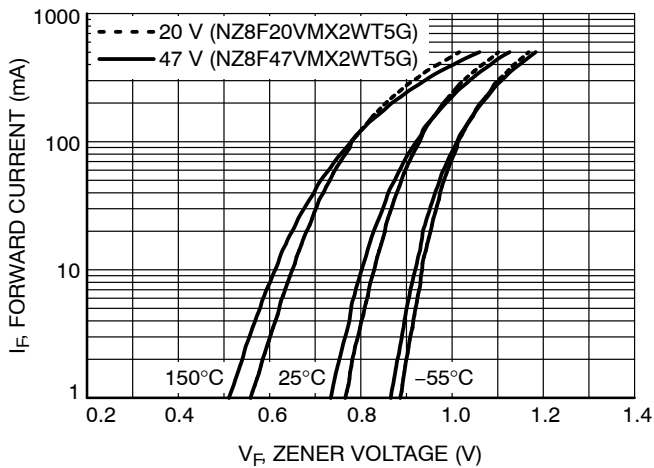


Figure 6. Typical Forward Voltage

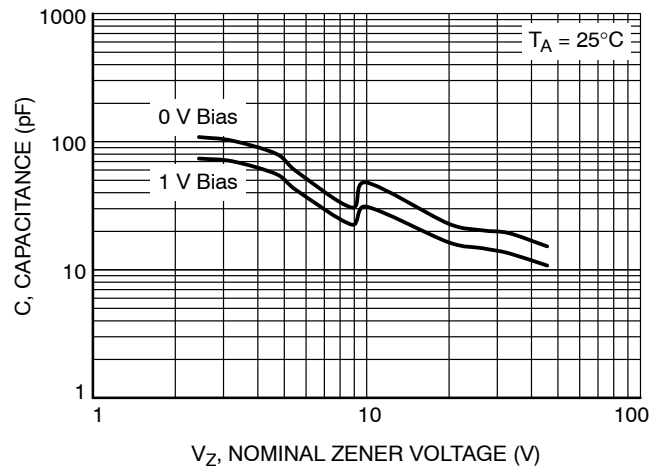


Figure 7. Typical Capacitance

NZ8F Series

TYPICAL CHARACTERISTICS

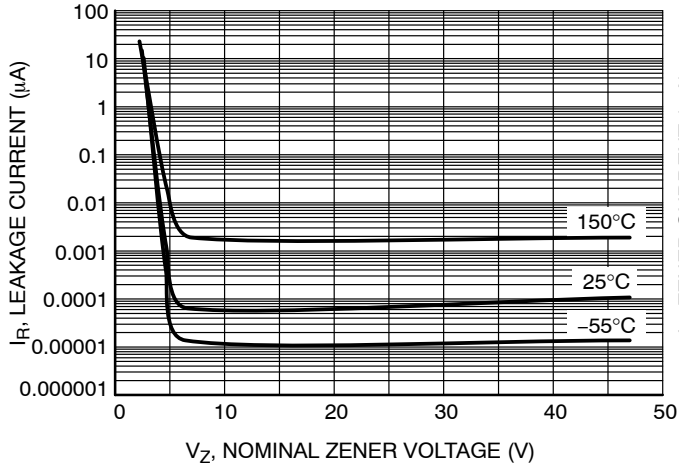


Figure 8. Typical Leakage Current

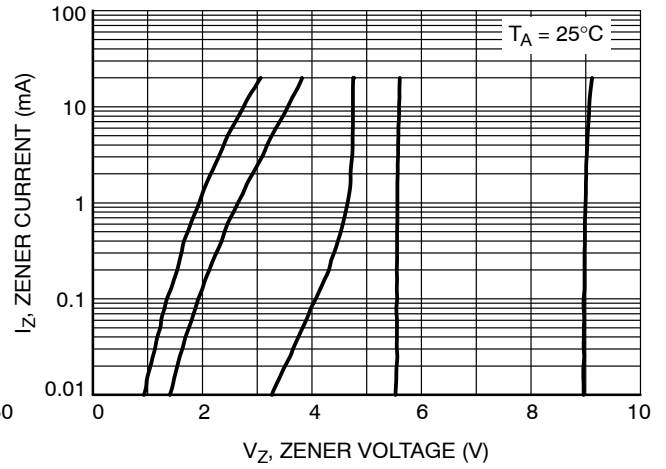


Figure 9. Zener Voltage vs. Zener Current (V_Z up to 9.1 V)

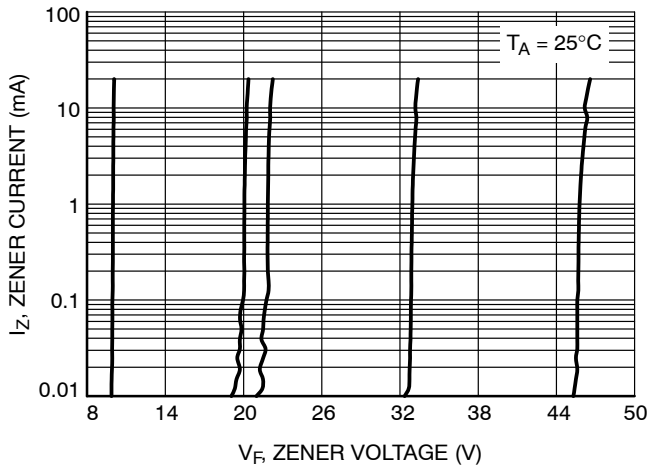


Figure 10. Zener Voltage vs. Zener Current ($V_Z = 9.1 \text{ V to } 47 \text{ V}$)

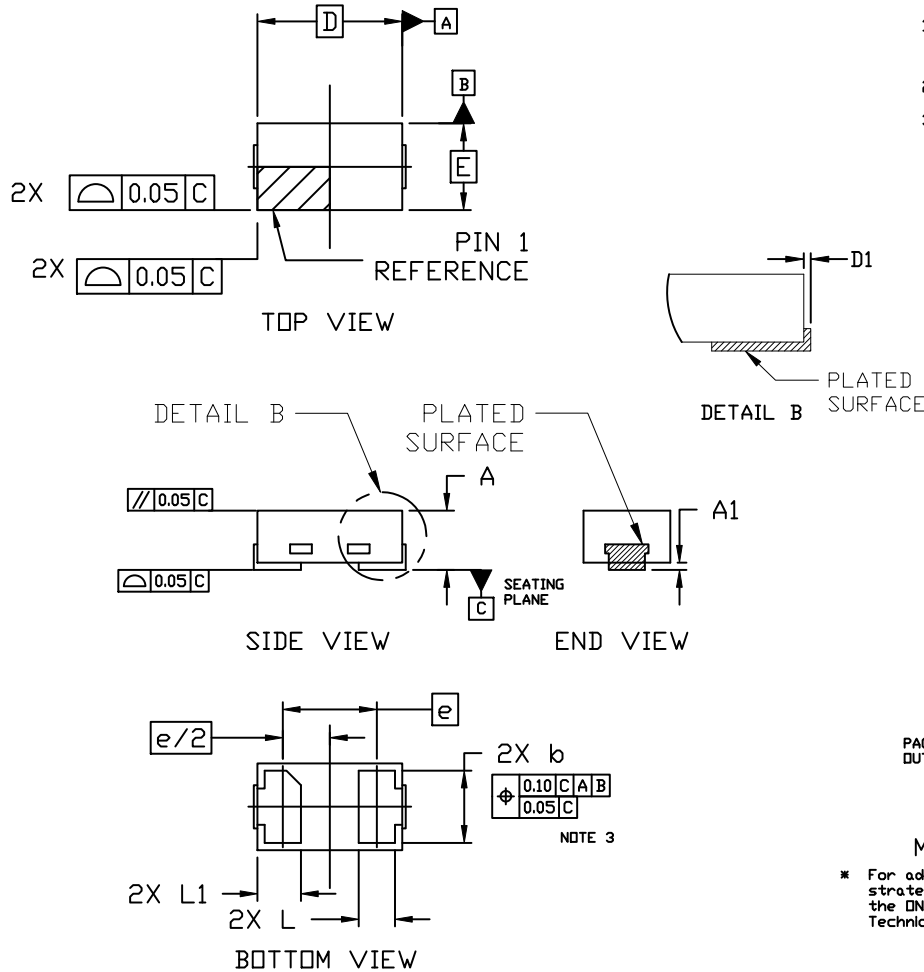
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 8:1

X2DFNW2 1.0x0.6, 0.65P
CASE 711BG
ISSUE C

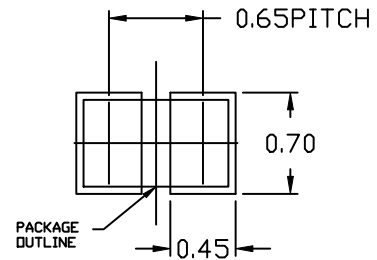
DATE 13 SEP 2019



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION *b* APPLIES TO THE PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 FROM THE TERMINAL TIP.

| DIM | MILLIMETERS | | |
|----------|-------------|-------|------|
| | MIN. | NDM. | MAX. |
| A | 0.34 | 0.37 | 0.40 |
| A1 | --- | --- | 0.05 |
| <i>b</i> | 0.45 | 0.50 | 0.55 |
| D | 0.90 | 1.00 | 1.10 |
| D1 | --- | --- | 0.05 |
| E | 0.50 | 0.60 | 0.70 |
| <i>e</i> | 0.65 BSC | | |
| L | 0.22 REF | | |
| L1 | 0.24 | 0.285 | 0.34 |



RECOMMENDED MOUNTING FOOTPRINT

* For additional information on our Pb-Free strategy and soldering details, please download the [ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D](#).

GENERIC MARKING DIAGRAM*



XX = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present. Some products may not follow the Generic Marking.

| | | |
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| DESCRIPTION: | X2DFNW2 1.0X0.6, 0.65P | PAGE 1 OF 1 |

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