

Low $V_{CE(sat)}$ PNP Transistor 60 V, 2 A

NSS60200SMT

onsemi's e²PowerEdge family of low $V_{CE(sat)}$ transistors are miniature surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC-DC converters and LED lighting, power management...etc. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- NSV60200SMTWTBG – Wettable Flanks Device
- 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} | 60 | Vdc |
| Collector-Base Voltage | V_{CBO} | 60 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 6 | Vdc |
| Collector Current - Continuous | I_C | 2 | A |
| Collector Current - Peak | I_{CM} | 3 | A |

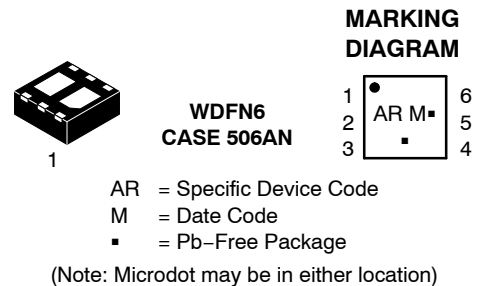
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

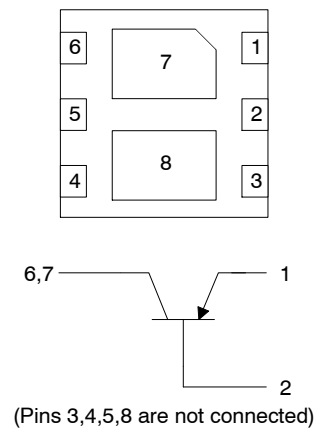
| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|---------------------------|
| Thermal Resistance Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 69 | $^\circ\text{C}/\text{W}$ |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2) | P_D | 1.8 | W |
| Junction and Storage Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

2. Per JESD51-7 with 100 mm² pad area and 2 oz. Cu.

60 Volt, 2 Amp PNP Low $V_{CE(sat)}$ Transistor



PIN CONNECTIONS



ORDERING INFORMATION

| Device | Package | Shipping† |
|----------------|-----------------|--------------------|
| NSS60200SMTTBG | WDFN6 (Pb-Free) | 3000 / Tape & Reel |

DISCONTINUED (Note 1)

| | | |
|-----------------|-----------------|--------------------|
| NSV60200SMTWTBG | WDFN6 (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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your onsemi representative for information. The most current information on this device may be available on www.onsemi.com.

NSS60200SMT

Table 1. ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|------------------------|--|--|------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = -10\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | -60 | | | V |
| Collector–Base Breakdown Voltage ($I_C = -0.1\text{ mA}$, $I_E = 0$) | $V_{(BR)CBO}$ | -80 | | | V |
| Emitter–Base Breakdown Voltage ($I_E = -0.1\text{ mA}$, $I_C = 0$) | $V_{(BR)EBO}$ | -6 | | | V |
| Collector Cutoff Current ($V_{CB} = -60\text{ V}$, $I_E = 0$) | I_{CBO} | | | -100 | nA |
| Emitter Cutoff Current ($V_{BE} = -5.0\text{ V}$) | I_{EBO} | | | -100 | nA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (Note 3) ($I_C = -100\text{ mA}$, $V_{CE} = -2.0\text{ V}$) ($I_C = -500\text{ mA}$, $V_{CE} = -2.0\text{ V}$) ($I_C = -1\text{ A}$, $V_{CE} = -2.0\text{ V}$) ($I_C = -2\text{ A}$, $V_{CE} = -2.0\text{ V}$) | h_{FE} | 150 120 90 40 | 230 180 140 80 | | |
| Collector–Emitter Saturation Voltage (Note 3) ($I_C = -500\text{ mA}$, $I_B = -50\text{ mA}$) ($I_C = -700\text{ mA}$, $I_B = -7.0\text{ mA}$) ($I_C = -1\text{ A}$, $I_B = -50\text{ mA}$) ($I_C = -1\text{ A}$, $I_B = -100\text{ mA}$) ($I_C = -2\text{ A}$, $I_B = -200\text{ mA}$) | $V_{CE(sat)}$ | | -0.115 -0.295 -0.250 -0.200 -0.365 | -0.160 -0.420 -0.350 -0.300 -0.450 | V |
| Base–Emitter Saturation Voltage (Note 3) ($I_C = -500\text{ mA}$, $I_B = -50\text{ mA}$) ($I_C = -1\text{ A}$, $I_B = -50\text{ mA}$) ($I_C = -1\text{ A}$, $I_B = -100\text{ mA}$) | $V_{BE(sat)}$ | | | -1.0 -1.0 -1.1 | V |
| Base–Emitter Turn-on Voltage (Note 3) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$) | $V_{BE(on)}$ | | | -0.9 | V |
| DYNAMIC CHARACTERISTICS | | | | | |
| Output Capacitance ($V_{CB} = 10\text{ V}$, $f = 1.0\text{ MHz}$) | C_{obo} | | 18 | | pF |
| Cutoff Frequency ($I_C = 50\text{ mA}$, $V_{CE} = 2.0\text{ V}$, $f = 100\text{ MHz}$) | f_T | | 155 | | MHz |
| SWITCHING TIMES | | | | | |
| Delay Time ($V_{CC} = -10\text{ V}$, $I_C = -0.5\text{ A}$, $I_{B1} = -25\text{ mA}$, $I_{B2} = 25\text{ mA}$) | t_d | | 15 | | ns |
| Rise Time ($V_{CC} = -10\text{ V}$, $I_C = -0.5\text{ A}$, $I_{B1} = -25\text{ mA}$, $I_{B2} = 25\text{ mA}$) | t_r | | 13 | | ns |
| Storage Time ($V_{CC} = -10\text{ V}$, $I_C = -0.5\text{ A}$, $I_{B1} = -25\text{ mA}$, $I_{B2} = 25\text{ mA}$) | t_s | | 360 | | ns |
| Fall Time ($V_{CC} = -10\text{ V}$, $I_C = -0.5\text{ A}$, $I_{B1} = -25\text{ mA}$, $I_{B2} = 25\text{ mA}$) | t_f | | 22 | | ns |

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.

3. Pulse Condition: Pulse Width = 300 μsec , Duty Cycle $\leq 2\%$

TYPICAL CHARACTERISTICS

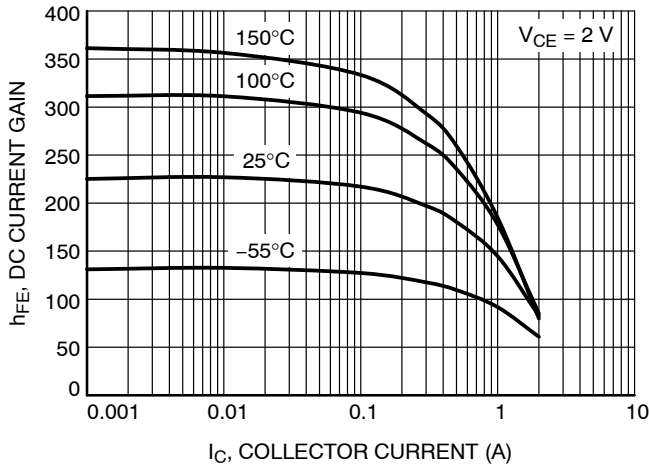


Figure 1. DC Current Gain

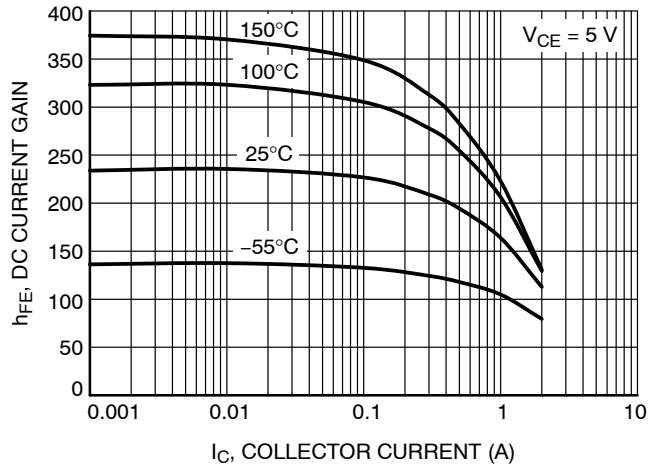


Figure 2. DC Current Gain

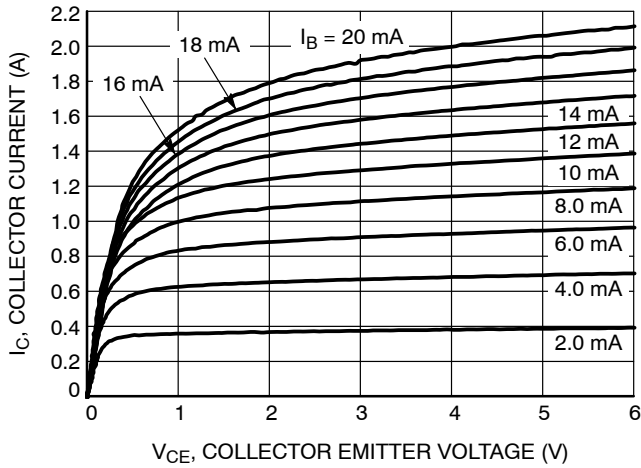


Figure 3. Collector Current as a Function of Collector Emitter Voltage

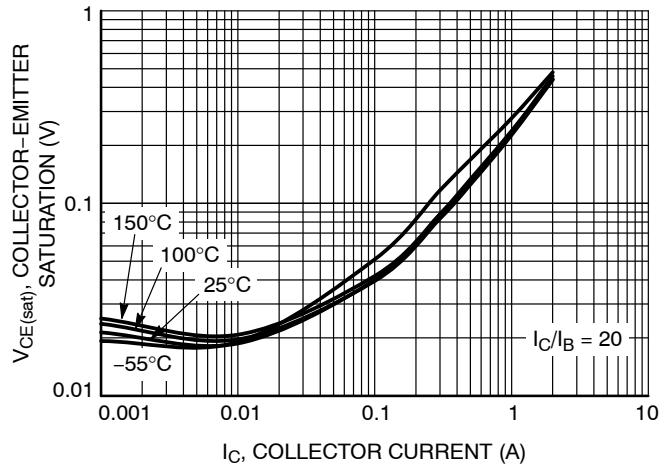


Figure 4. Collector-Emitter Saturation Voltage

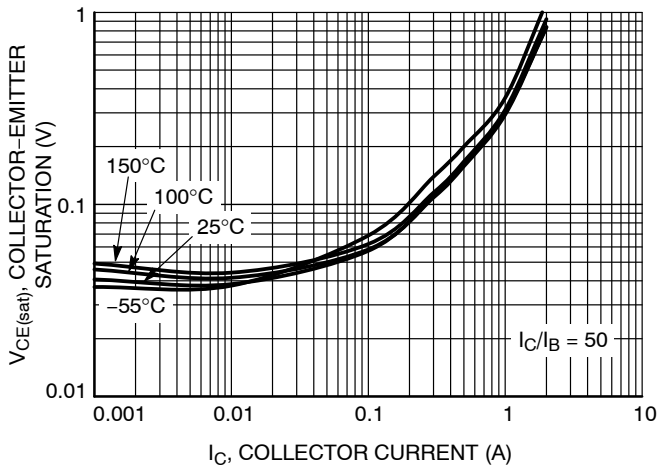


Figure 5. Collector-Emitter Saturation Voltage

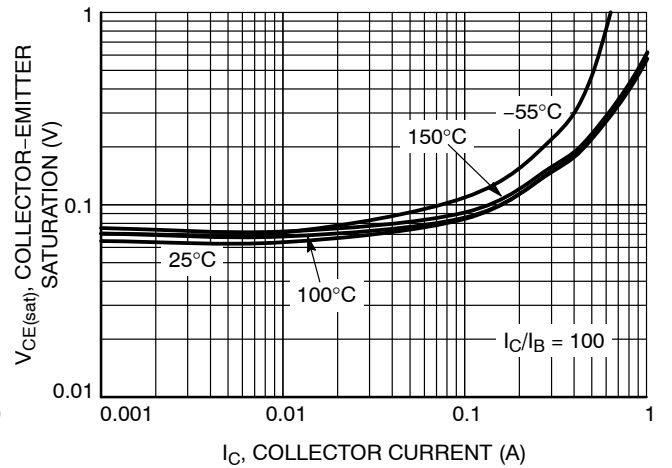


Figure 6. Collector-Emitter Saturation Voltage

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TYPICAL CHARACTERISTICS

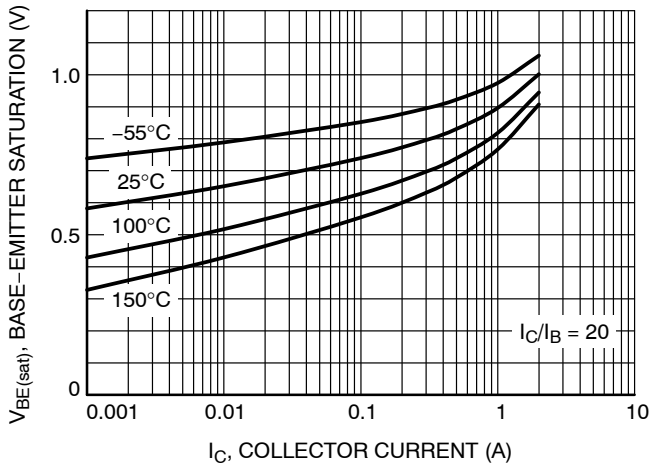


Figure 7. Base-Emitter Saturation Voltage

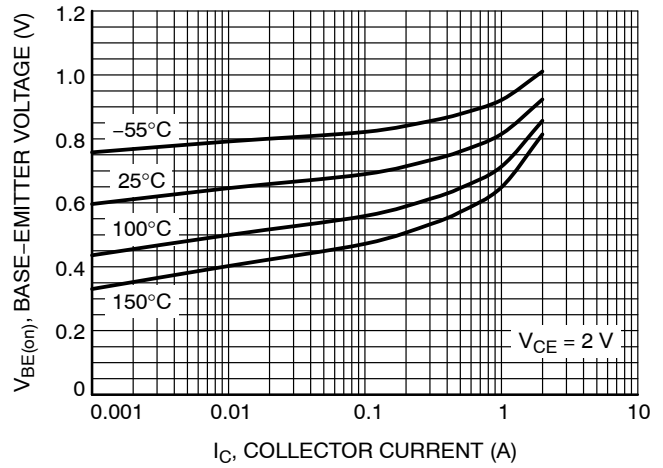


Figure 8. Base-Emitter "ON" Voltage

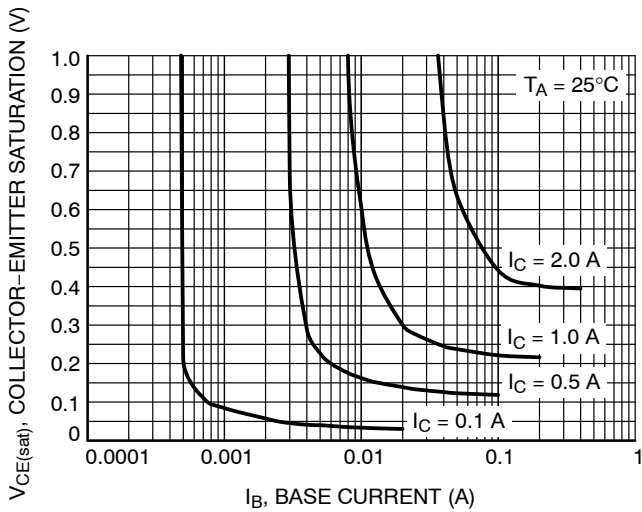


Figure 9. Collector Saturation Region

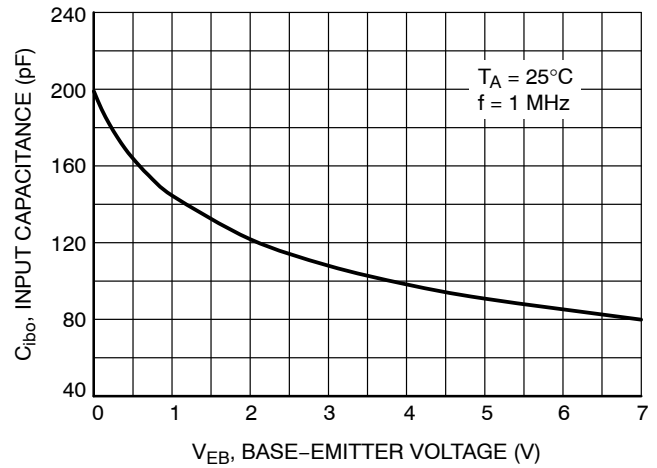


Figure 10. Input Capacitance

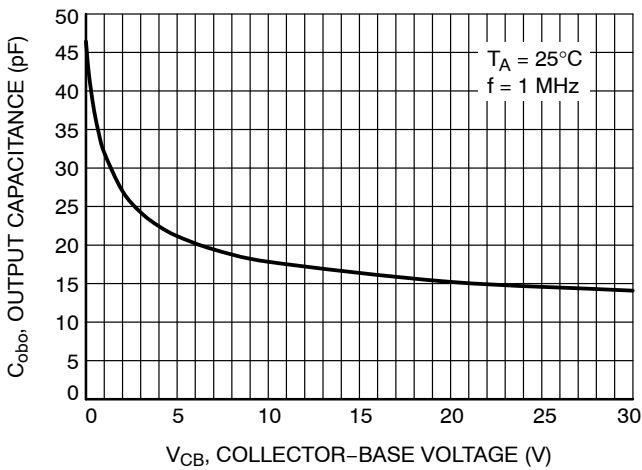


Figure 11. Output Capacitance

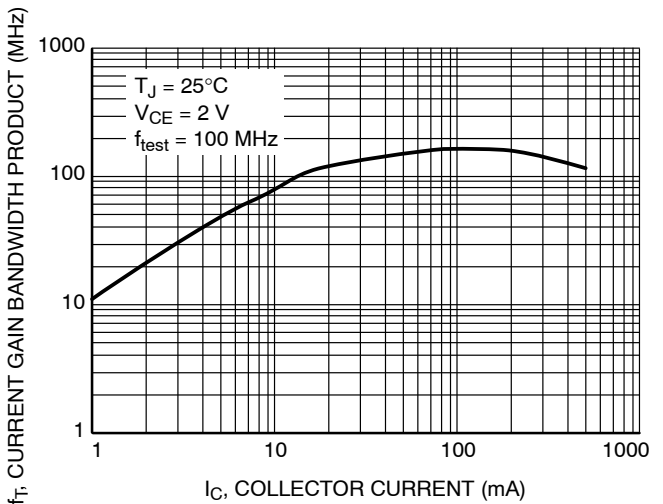


Figure 12. f_T , Current Gain Bandwidth Product

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TYPICAL CHARACTERISTICS

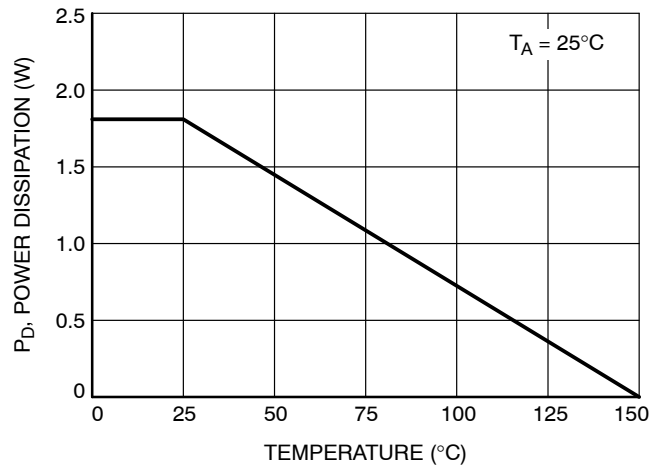


Figure 13. Power Derating

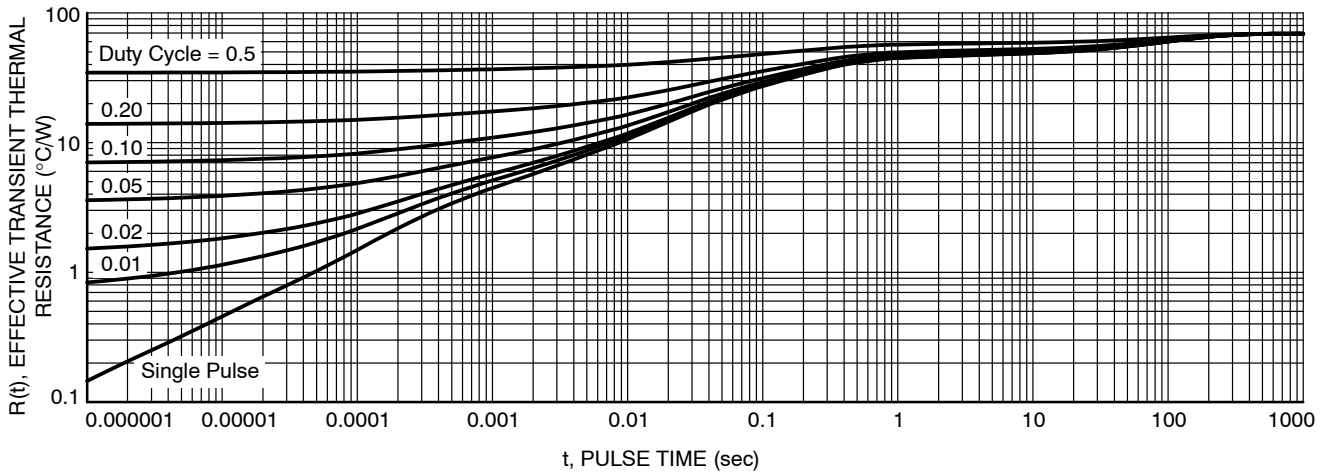


Figure 14. Thermal Resistance by Transistor

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



WDFN6 2x2, 0.65P
CASE 506AN
ISSUE H

DATE 25 JAN 2022



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION *b* APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.



| DIM | MILLIMETERS | |
|----------|-------------|------|
| | MIN. | MAX. |
| A | 0.70 | 0.80 |
| A1 | 0.00 | 0.05 |
| A3 | 0.20 REF | |
| <i>b</i> | 0.25 | 0.35 |
| D | 2.00 BSC | |
| D2 | 0.57 | 0.77 |
| E | 2.00 BSC | |
| E2 | 0.90 | 1.10 |
| <i>e</i> | 0.65 BSC | |
| F | 0.95 BSC | |
| <i>k</i> | 0.25 REF | |
| L | 0.20 | 0.30 |
| L1 | --- | 0.10 |

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" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



| | | |
|-------------------------|-------------------------|--|
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