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MC12095

2.5 GHz Low Power Prescaler With Stand-By Mode

Description

The MC12095 is a single modulus prescaler for low power frequency division of a 2.5 GHz high frequency input signal. MOSAIC V™ technology is utilized to achieve low power dissipation of 24 mW at a minimum supply voltage of 2.7 V.

On-chip output termination provides output current to drive a 2.0 pF (typical) high impedance load. If additional drive is required for the prescaler output, an external resistor can be added in parallel from the OUT pin to GND to increase the output power. Care must be taken not to exceed the maximum allowable current through the output.

Divide ratio control input (SW) selects the required divide ratio of +2 or +4. Stand-By mode is available to reduce current drain to 100 µA typical when the standby pin SB is switched LOW disabling the prescaler.

Features

- 2.5 GHz Toggle Frequency
- Supply Voltage 2.7 V to 5.5 Vdc
- Low Power 8.7 mA Typical
- Operating Temperature -40°C to 85°C
- Divide by 2 or 4 Selected by the SW Pin
- Pb-Free Packages are Available

Table 1. FUNCTIONAL TABLE

| SW | Divide Ratio |
|----|--------------|
| H | 2 |
| L | 4 |

1. SW: H = (V_{CC} - 0.4 V) to V_{CC}; L = OPEN
2. SB: H = 2.0 V to V_{CC}; L = GND to 0.8 V

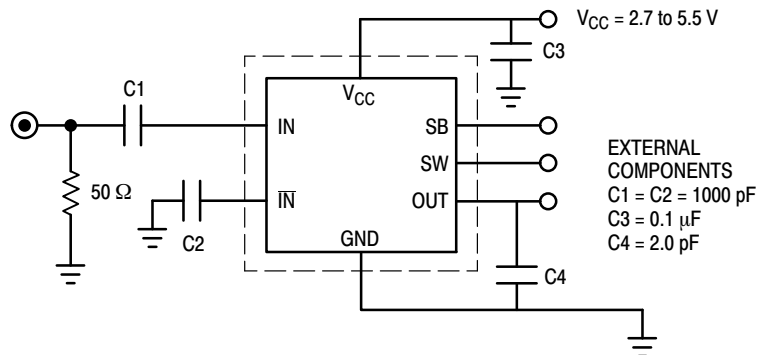


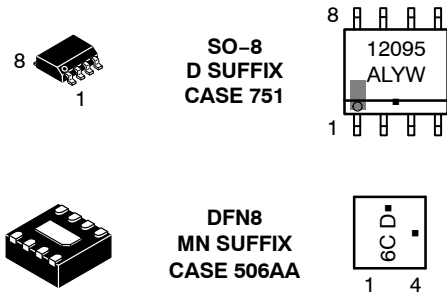
Figure 1. AC Test Circuit



ON Semiconductor™

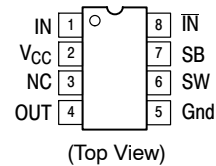
<http://onsemi.com>

MARKING DIAGRAMS



- A = Assembly Location
 - L = Wafer Lot
 - Y = Year
 - W = Work Week
 - = Pb-Free Package
- (Note: Microdot may be in either location)

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

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Table 2. ATTRIBUTES

| Characteristics | Value | |
|---|---|-----------------------------|
| Internal Input Pulldown Resistor | N/A | |
| Internal Input Pullup Resistor | N/A | |
| ESD Protection | Human Body Model Machine Model Charged Device Model | > 4 kV > 200 V > 2 kV |
| Moisture Sensitivity, Indefinite Time Out of Drypack (Note 1) | Pb Pkg | Pb-Free Pkg |
| | SOIC-8 DFN8 | Level 1 Level 1 |
| Flammability Rating | Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in |
| Transistor Count | 125 Devices | |
| Meets or exceeds JEDEC Spec EIA/JESD78 IC Latchup Test | | |

1. For additional information, see Application Note AND8003/D.

Table 3. MAXIMUM RATINGS

| Symbol | Rating | Value | Unit |
|---------------|---|-------------|------|
| V_{CC} | Power Supply Voltage, Pin 2 | -0.5 to 6.0 | Vdc |
| T_A | Operating Temperature Range | -40 to 85 | °C |
| T_{stg} | Storage Temperature Range | -65 to 150 | °C |
| I_O | Maximum Output Current, Pin 4 | 8.0 | mA |
| θ_{JC} | Thermal Resistance (Junction-to-Case) (Note 2) DFN8 | 35 to 40 | °C/W |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

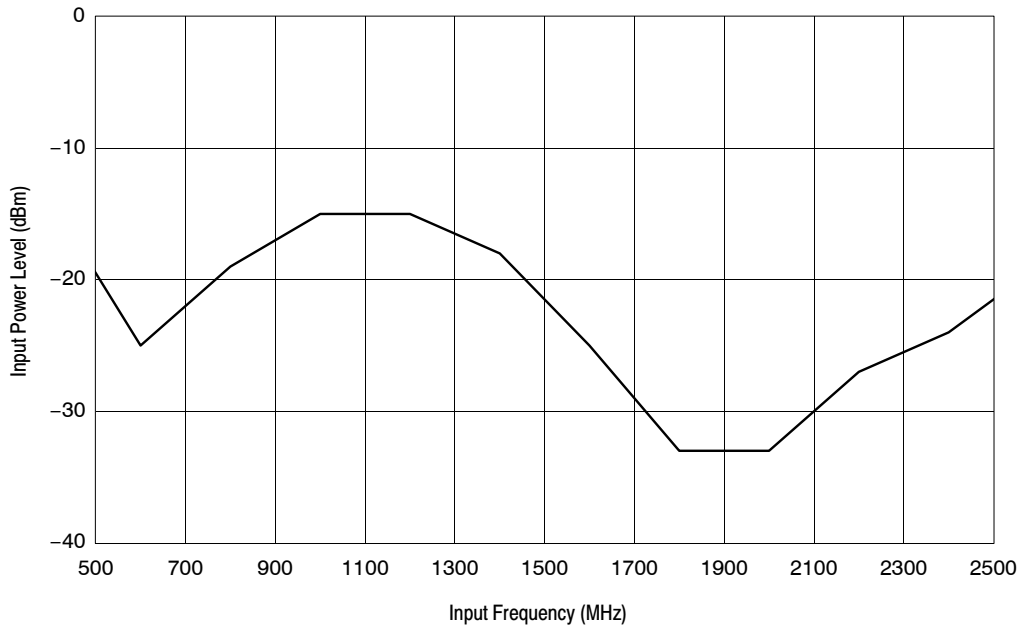
NOTE: ESD data available upon request.

2. JEDEC standard multilayer board - 2S2P (2 signal, 2 power). For DFN8 only, thermal exposed pad must be connected to a sufficient thermal conduit. Electrically connect to the most negative supply (GND) or leave unconnected, floating open.

Table 4. ELECTRICAL CHARACTERISTICS ($V_{CC} = 2.7$ to 5.5 V; $T_A = -40$ to 85°C , unless otherwise noted.)

| Symbol | Characteristic | Min | Typ | Max | Unit | |
|-----------|--------------------------------------|--|-------------------|------------------|---------------|------|
| f_t | Toggle Frequency (Sine Wave) | 500 | 3.0 | 2.5 | GHz | |
| I_{CC} | Supply Current | - | 8.7 | 14 | mA | |
| I_{SB} | Stand-By Current | - | 100 | 200 | μA | |
| V_{IH1} | Stand-By Input HIGH (SB) | 2.0 | - | $V_{CC} + 0.5$ V | V | |
| V_{IL1} | Stand-By Input LOW (SB) | GND | - | 0.8 | V | |
| V_{IH2} | Divide Ratio Control Input HIGH (SW) | $V_{CC} - 0.4$ | V_{CC} | $V_{CC} + 0.5$ V | V | |
| V_{IL2} | Divide Ratio Control Input LOW (SW) | OPEN | OPEN | OPEN | | |
| V_{OUT} | Output Voltage Swing (2pF Load) | 500-1000 MHz Input 1000-1500 MHz Input 1500-2500 MHz Input | 800 400 200 | - 450 250 | - - - | mVpp |
| V_{IN} | Input Voltage Sensitivity | 200 | - | 1000 | mVpp | |

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(Divide By 2 Mode, T = 25°C, V_{CC} = 2.7 V)

Figure 2. Typical Minimum Input Sensitivity versus Input Frequency

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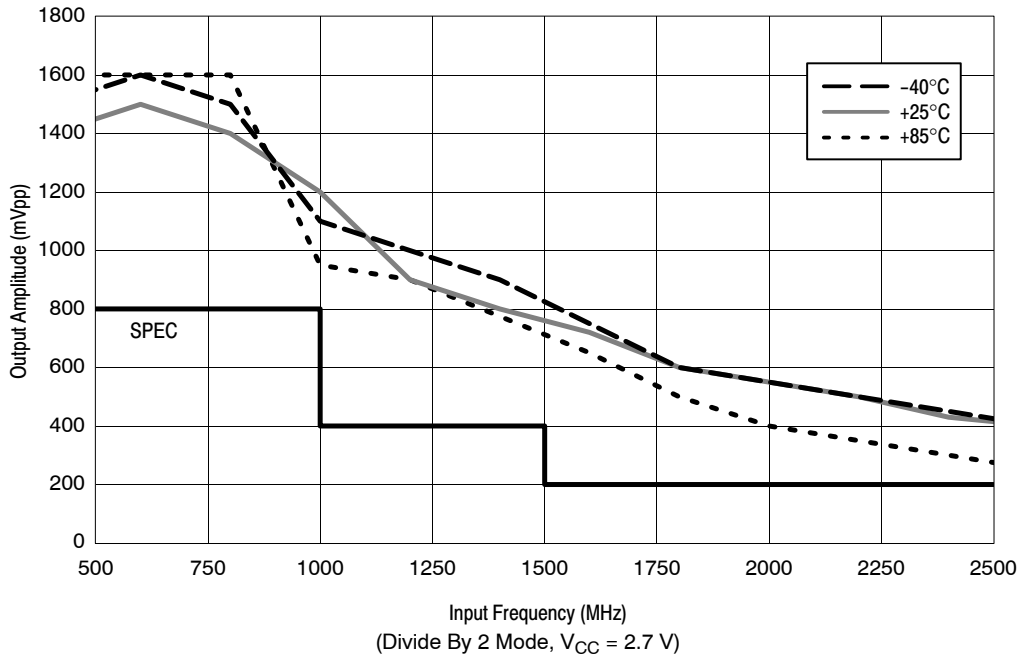


Figure 3. Typical Output Amplitude versus Frequency Over Temperature

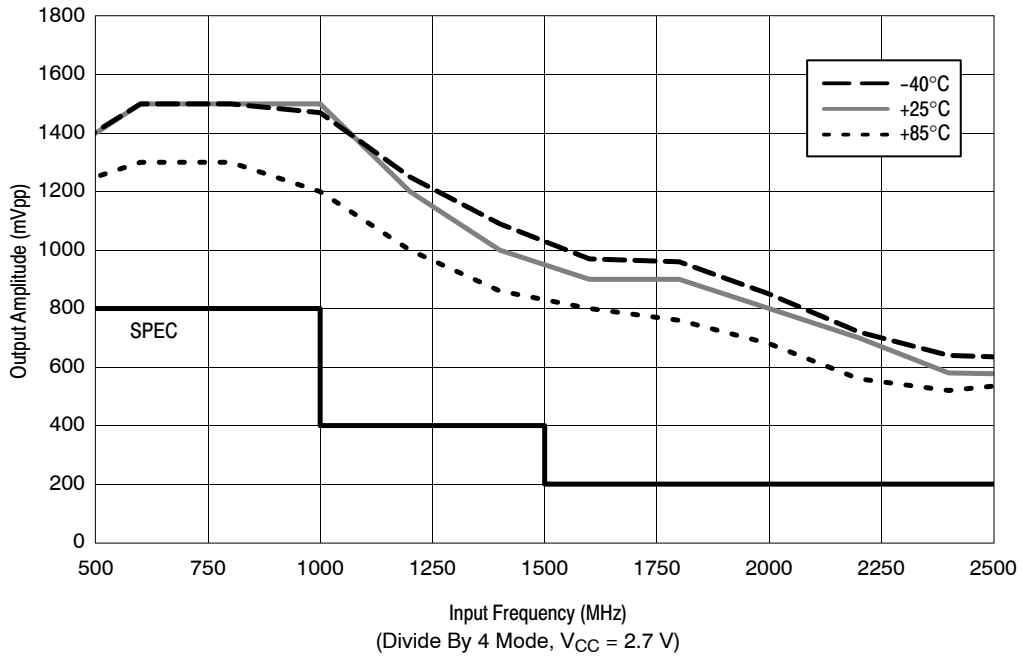


Figure 4. Typical Output Amplitude versus Frequency Over Temperature

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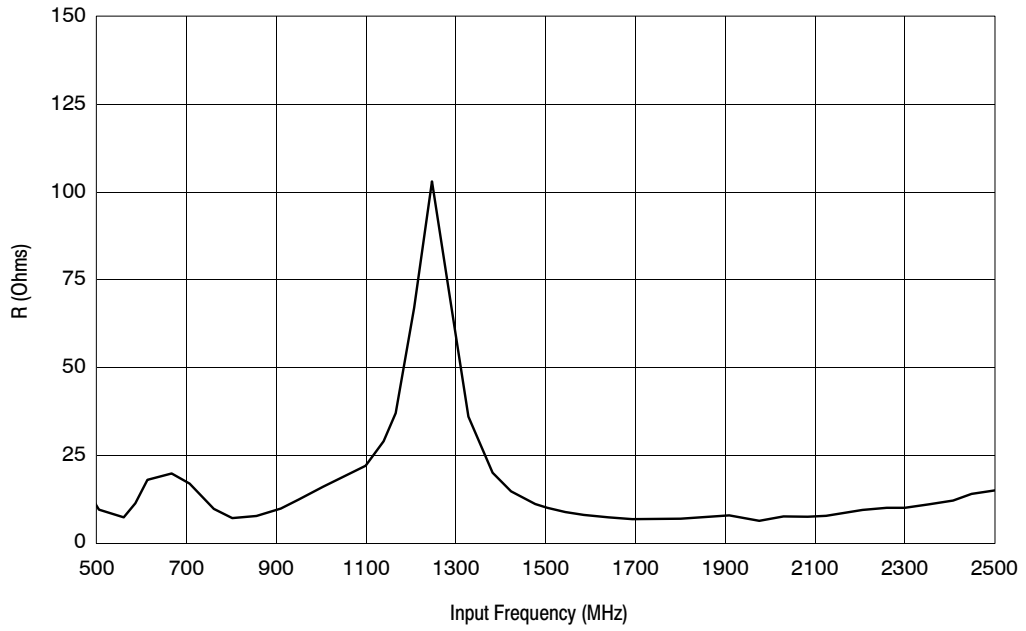


Figure 5. Input Impedance versus Frequency

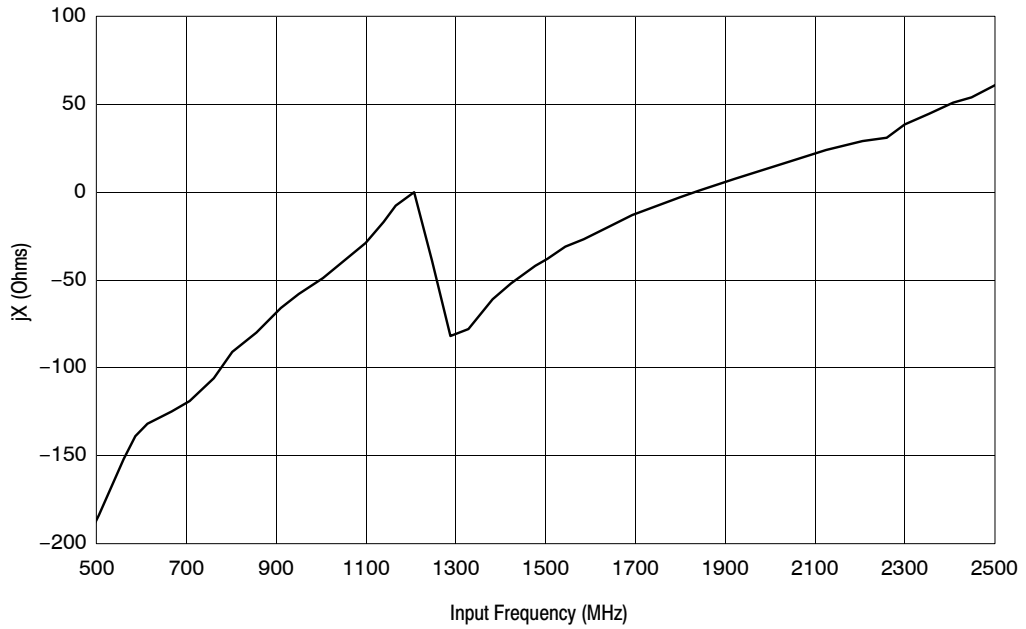


Figure 6. Input Impedance versus Frequency

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ORDERING INFORMATION

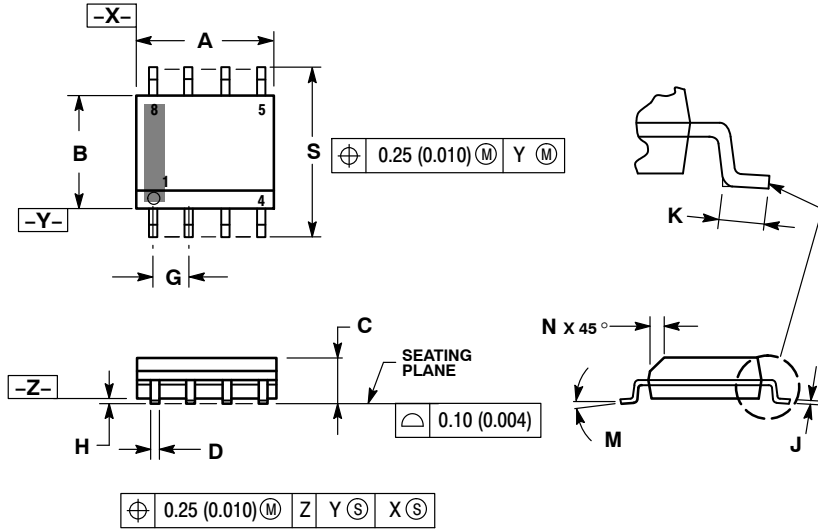
| Device | Package | Shipping† |
|--------------|---------------------|--------------------|
| MC12095D | SOIC-8 | 98 Units / Rail |
| MC12095DG | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC12095DR2 | SOIC-8 | 98 Units / Rail |
| MC12095DR2G | SOIC-8 (Pb-Free) | 98 Units / Rail |
| MC12095MNR4 | DFN8 | 1000 / Tape & Reel |
| MC12095MNR4G | DFN8 (Pb-Free) | 1000 / 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.

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PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AG

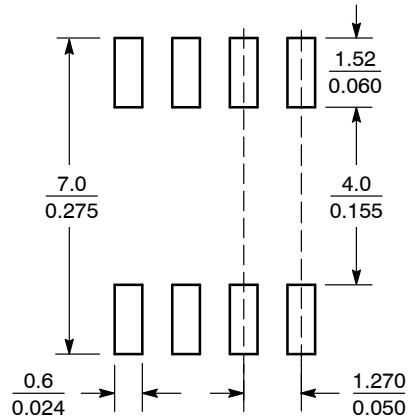


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.80 | 5.00 | 0.189 | 0.197 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.053 | 0.069 |
| D | 0.33 | 0.51 | 0.013 | 0.020 |
| G | 1.27 BSC | | 0.050 BSC | |
| H | 0.10 | 0.25 | 0.004 | 0.010 |
| J | 0.19 | 0.25 | 0.007 | 0.010 |
| K | 0.40 | 1.27 | 0.016 | 0.050 |
| M | 0° | 8° | 0° | 8° |
| N | 0.25 | 0.50 | 0.010 | 0.020 |
| S | 5.80 | 6.20 | 0.228 | 0.244 |

SOLDERING FOOTPRINT*



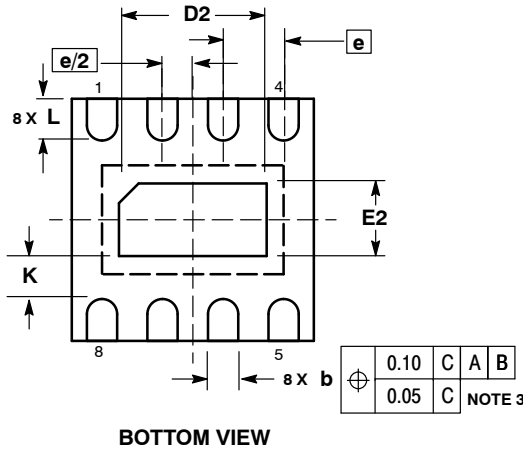
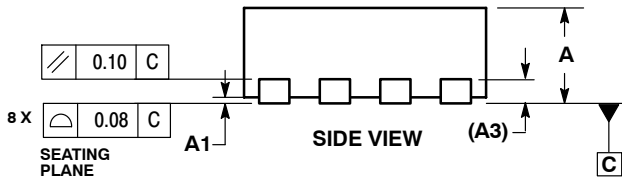
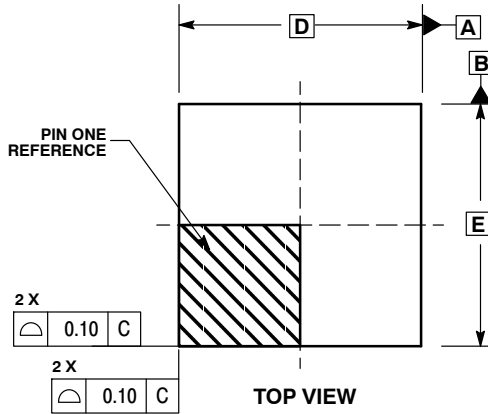
SCALE 6:1 ($\frac{\text{mm}}{\text{inches}}$)

*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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PACKAGE DIMENSIONS

DFN8
CASE 506AA-01
ISSUE C



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 0.25 AND 0.30 MM FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| MILLIMETERS | | |
|-------------|------|------|
| DIM | MIN | MAX |
| A | 0.80 | 1.00 |
| A1 | 0.00 | 0.05 |
| A3 | 0.20 | REF |
| b | 0.20 | 0.30 |
| D | 2.00 | BSC |
| D2 | 1.10 | 1.30 |
| E | 2.00 | BSC |
| E2 | 0.70 | 0.90 |
| e | 0.50 | BSC |
| K | 0.20 | --- |
| L | 0.25 | 0.35 |

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