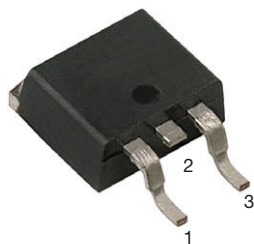
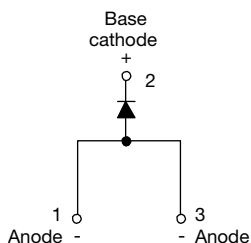


Surface Mount Fast Soft Recovery Rectifier Diode, 20 A


D²PAK (TO-263AB)


FEATURES

- Glass passivated pellet chip junction
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Meets JESD 201 class 1A whisker test
- Flexible solution for reliable AC power rectification
- High surge, low V_F rugged blocking diode for DC charging stations
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- On-board and off-board EV / HEV battery chargers
- Renewable energy inverters

DESCRIPTION

The VS-20ETF06SLHM3 soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-------------------------------|
| $I_{F(AV)}$ | 20 A |
| V_R | 600 V |
| V_F at I_F | 1.3 V |
| I_{FSM} | 300 A |
| t_{rr} | 60 ns |
| T_J max. | 150 °C |
| Snap factor | 0.6 |
| Package | D ² PAK (TO-263AB) |
| Circuit configuration | Single |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------|---------------------|-------------|-------|
| $I_{F(AV)}$ | Sinusoidal waveform | 20 | A |
| V_{RRM} | | 600 | V |
| I_{FSM} | | 300 | A |
| V_F | 10 A, $T_J = 25$ °C | 1.2 | V |
| t_{rr} | 1 A, 100 A/μs | 60 | ns |
| T_J | Range | -40 to +150 | °C |

VOLTAGE RATINGS

| PART NUMBER | V_{RRM} , MAXIMUM PEAK REVERSE VOLTAGE V | V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM} AT 150 °C mA |
|-----------------|---|--|---------------------------|
| VS-20ETF06SLHM3 | 600 | 700 | 5 |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---------------|---|--------|-------------------|
| Maximum average forward current | $I_{F(AV)}$ | $T_C = 97$ °C, 180° conduction half sine wave | 20 | A |
| Maximum peak one cycle non-repetitive surge current | I_{FSM} | 10 ms sine pulse, rated V_{RRM} applied | 250 | |
| | | 10 ms sine pulse, no voltage reapplied | 300 | A ² s |
| Maximum I^2t for fusing | I^2t | 10 ms sine pulse, rated V_{RRM} applied | 316 | |
| | | 10 ms sine pulse, no voltage reapplied | 442 | A ² √s |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | $t = 0.1$ ms to 10 ms, no voltage reapplied | 4420 | |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
|---------------------------------|-------------|--|-------------------------------|--------|------------|
| Maximum forward voltage drop | V_{FM} | 20 A, $T_J = 25\text{ }^{\circ}\text{C}$ | | 1.30 | V |
| | | 60 A, $T_J = 25\text{ }^{\circ}\text{C}$ | | 1.67 | |
| Forward slope resistance | r_t | | | 12.5 | m Ω |
| Threshold voltage | $V_{F(TO)}$ | $T_J = 150\text{ }^{\circ}\text{C}$ | | 0.9 | V |
| Maximum reverse leakage current | I_{RM} | $T_J = 25\text{ }^{\circ}\text{C}$ | $V_R = \text{rated } V_{RRM}$ | 0.1 | mA |
| | | $T_J = 150\text{ }^{\circ}\text{C}$ | | 5.0 | |

RECOVERY CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS | |
|--------------------------|----------|--|--------|---------------|--|
| Reverse recovery time | t_{rr} | I_F at 20 A _{pk} 100 A/ μ s 25 $^{\circ}\text{C}$ | 160 | ns | |
| Reverse recovery current | I_{rr} | | 10 | A | |
| Reverse recovery charge | Q_{rr} | | 1.25 | μC | |
| Snap factor | S | Typical | 0.6 | | |

THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|------------------|--|-------------|----------------------|
| Maximum junction and storage temperature range | T_J, T_{Stg} | | -40 to +150 | $^{\circ}\text{C}$ |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation | 0.9 | $^{\circ}\text{C/W}$ |
| Maximum thermal resistance junction to ambient (PCB mount) | $R_{thJA}^{(1)}$ | | 40 | |
| Soldering temperature | T_S | | 260 | $^{\circ}\text{C}$ |
| Approximate weight | | | 2 | g |
| | | | 0.07 | oz. |
| Marking device | | Case style D ² PAK (TO-263AB) | 20ETF06SH | |

Note

⁽¹⁾ When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 μ m) copper 40 $^{\circ}\text{C/W}$.

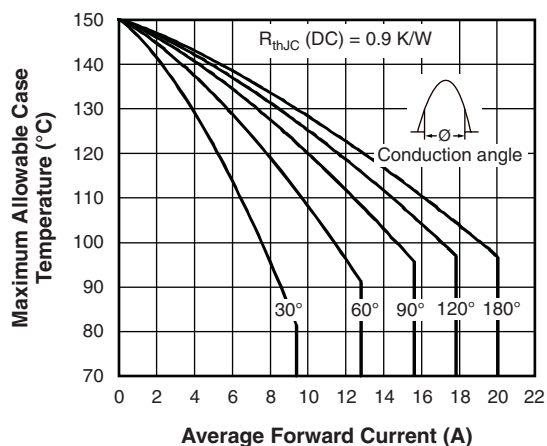


Fig. 1 - Current Rating Characteristics

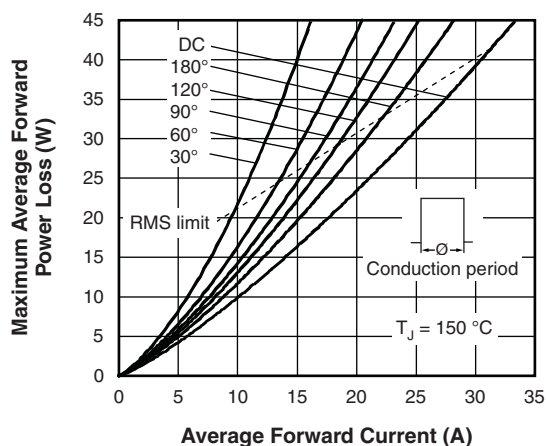


Fig. 4 - Forward Power Loss Characteristics

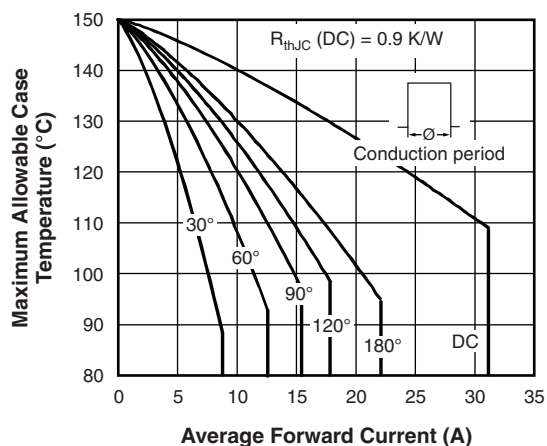


Fig. 2 - Current Rating Characteristics

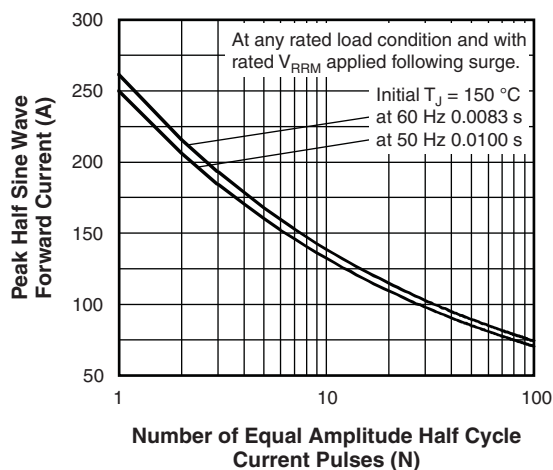


Fig. 5 - Maximum Non-Repetitive Surge Current

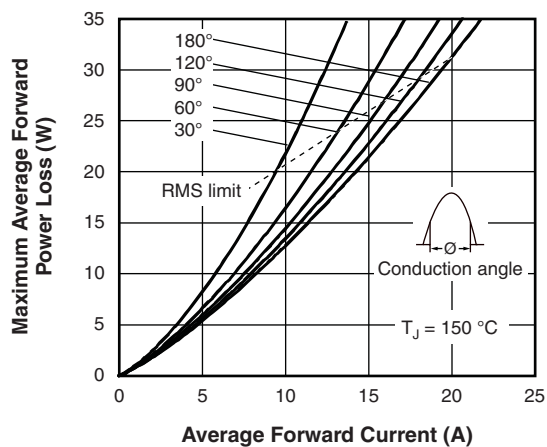


Fig. 3 - Forward Power Loss Characteristics

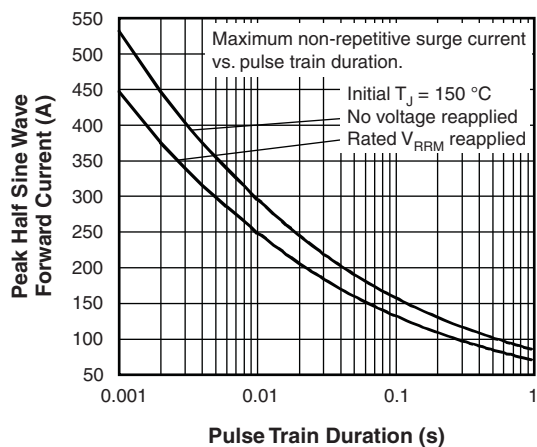


Fig. 6 - Maximum Non-Repetitive Surge Current

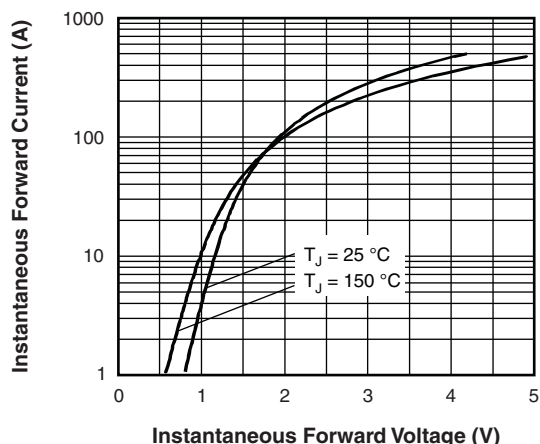
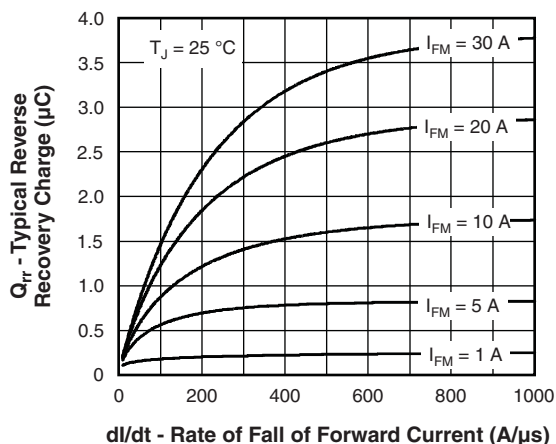
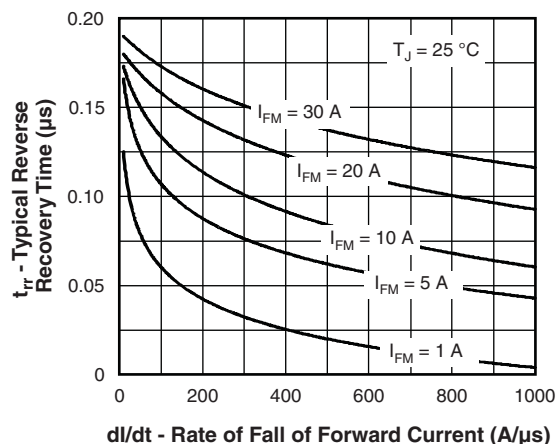
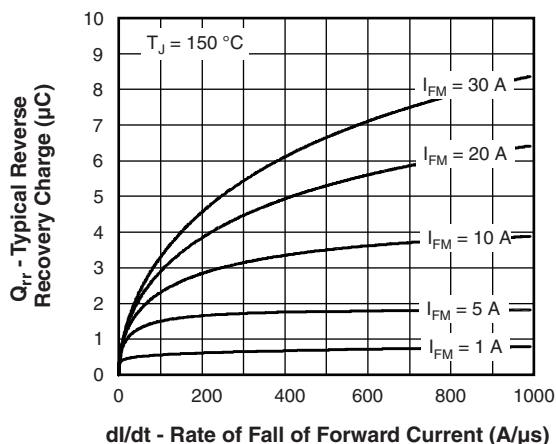
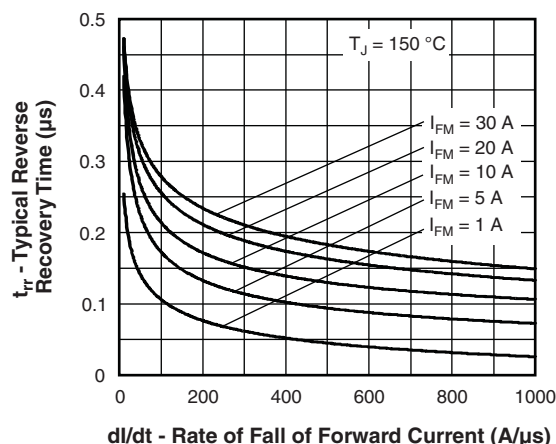
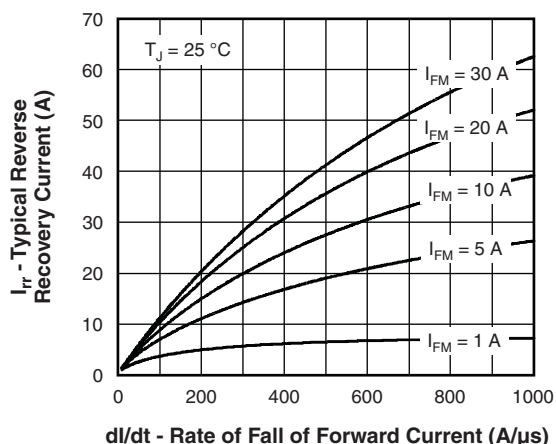
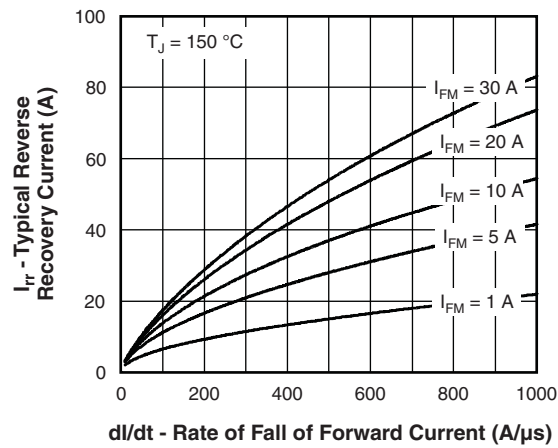
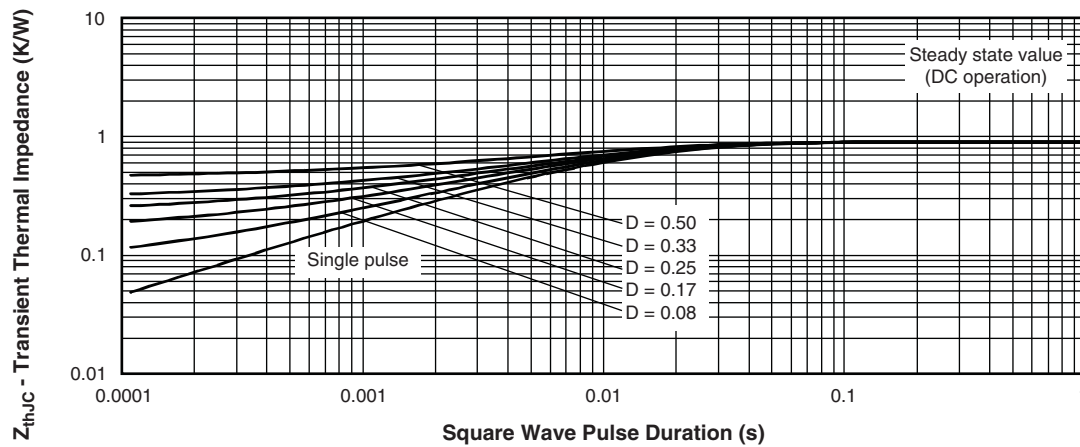


Fig. 7 - Forward Voltage Drop Characteristics


Fig. 10 - Recovery Charge Characteristics, $T_J = 25\text{ }^{\circ}\text{C}$

Fig. 8 - Recovery Time Characteristics, $T_J = 25\text{ }^{\circ}\text{C}$

Fig. 11 - Recovery Charge Characteristics, $T_J = 150\text{ }^{\circ}\text{C}$

Fig. 9 - Recovery Time Characteristics, $T_J = 150\text{ }^{\circ}\text{C}$

Fig. 12 - Recovery Current Characteristics, $T_J = 25\text{ }^{\circ}\text{C}$


Fig. 13 - Recovery Current Characteristics, $T_J = 150\text{ }^{\circ}\text{C}$

Fig. 14 - Thermal Impedance Z_{thJC} Characteristics

**ORDERING INFORMATION TABLE**

| Device code | VS- | 20 | E | T | F | 06 | S | L | H | M3 |
|-------------|--|----|---|---|---|----|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | - Vishay Semiconductors product | | | | | | | | | |
| 2 | - Current rating (20 = 20 A) | | | | | | | | | |
| 3 | - Circuit configuration: E = single diode | | | | | | | | | |
| 4 | - Package: T = D ² PAK | | | | | | | | | |
| 5 | - Type of silicon: F = fast soft recovery rectifier | | | | | | | | | |
| 6 | - Voltage code x 100 = V _{RRM} — 06 = 600 V | | | | | | | | | |
| 7 | - S = surface mountable | | | | | | | | | |
| 8 | - L = tape and reel (left oriented), for different orientation contact factory | | | | | | | | | |
| 9 | - H = AEC-Q101 qualified | | | | | | | | | |
| 10 | - Environmental digit: M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free | | | | | | | | | |

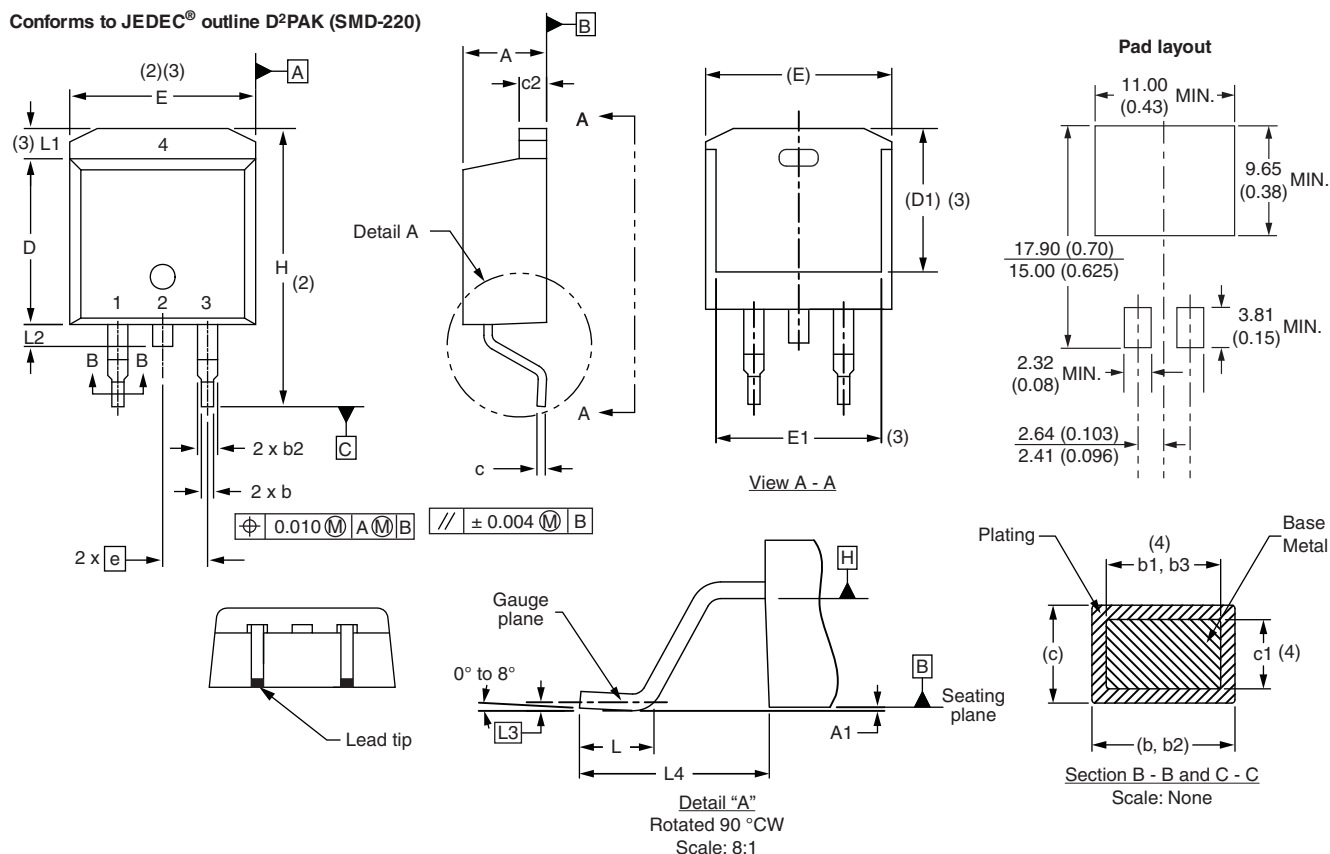
| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-----------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-20ETF06SLHM3 | 800 | 800 | 13" diameter reel |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95046 |
| Part marking information | www.vishay.com/doc?95444 |
| Packaging information | www.vishay.com/doc?96317 |

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 | |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.38 | 0.74 | 0.015 | 0.029 | |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| e | 2.54 BSC | | 0.100 BSC | | |
| H | 14.61 | 15.88 | 0.575 | 0.625 | |
| L | 1.78 | 2.79 | 0.070 | 0.110 | |
| L1 | - | 1.65 | - | 0.066 | 3 |
| L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| L3 | 0.25 BSC | | 0.010 BSC | | |
| L4 | 4.78 | 5.28 | 0.188 | 0.208 | |

Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB



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