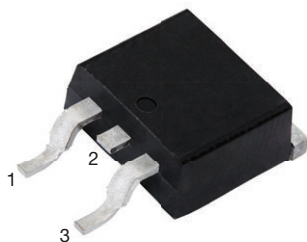
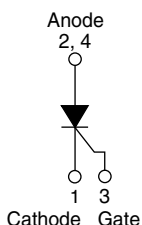


Thyristor, Surface Mount, Phase Control SCR, 16 A


D²PAK (TO-263AB)


FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Designed and qualified according JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Input rectification (soft start)
- Vishay input diodes, switches and output rectifiers which are available in identical package outlines

DESCRIPTION

The VS-25TTS...S-M3 high voltage series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications. The glass passivation technology used has reliable operation up to 125 °C junction temperature.

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-------------------------------|
| $I_{T(AV)}$ | 16 A |
| V_{DRM}/V_{RRM} | 800 V, 1200 V |
| V_{TM} | 1.25 V |
| I_{GT} | 45 mA |
| T_J | -40 to +125 °C |
| Package | D ² PAK (TO-263AB) |
| Circuit configuration | Single SCR |

OUTPUT CURRENT IN TYPICAL APPLICATIONS

| APPLICATIONS | SINGLE-PHASE BRIDGE | THREE-PHASE BRIDGE | UNITS |
|----------------------------------------------------------------------|---------------------|--------------------|-------|
| NEMA FR-4 or G10 glass fabric-based epoxy with 4 oz. (140 µm) copper | 3.5 | 5.5 | A |
| Aluminum IMS, $R_{thCA} = 15$ °C/W | 8.5 | 13.5 | |
| Aluminum IMS with heatsink, $R_{thCA} = 5$ °C/W | 16.5 | 25.0 | |

Note

- $T_A = 55$ °C, $T_J = 125$ °C, footprint 300 mm²

MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER | TEST CONDITIONS | VALUES | UNITS |
|-------------------|---------------------|-------------|-------|
| $I_{T(AV)}$ | Sinusoidal waveform | 16 | A |
| I_{RMS} | | 25 | |
| V_{RRM}/V_{DRM} | | 800 to 1200 | V |
| I_{TSM} | | 350 | A |
| V_T | 16 A, $T_J = 25$ °C | 1.25 | V |
| dV/dt | | 500 | V/µs |
| dI/dt | | 150 | A/µs |
| T_J | | -40 to +125 | °C |

VOLTAGE RATINGS

| PART NUMBER | V_{RRM} , MAXIMUM PEAK REVERSE VOLTAGE V | V_{DRM} , MAXIMUM PEAK DIRECT VOLTAGE V | I_{RRM}/I_{DRM} , AT 125 °C mA |
|----------------|-----------------------------------------------|----------------------------------------------|-------------------------------------|
| VS-25TTS08S-M3 | 800 | 800 | 10 |
| VS-25TTS12S-M3 | 1200 | 1200 | |

**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | | UNITS |
|-------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------|------|-------------------|
| | | | | TYP. | MAX. | |
| Maximum average on-state current | I _{T(AV)} | T _C = 93 °C, 180° conduction half sine wave | | 16 | | A |
| Maximum RMS on-state current | I _{RMS} | | | 25 | | |
| Maximum peak, one-cycle, non-repetitive surge current | I _{TSM} | 10 ms sine pulse, rated V _{RRM} applied | | 300 | | |
| | | 10 ms sine pulse, no voltage reapplied | | 350 | | |
| Maximum I ² t for fusing | I ² t | 10 ms sine pulse, rated V _{RRM} applied | | 450 | | A ² s |
| | | 10 ms sine pulse, no voltage reapplied | | 630 | | |
| Maximum I ² √t for fusing | I ² √t | t = 0.1 ms to 10 ms, no voltage reapplied | | 6300 | | A ² √s |
| Maximum on-state voltage drop | V _{TM} | 16 A, T _J = 25 °C | | 1.25 | | V |
| On-state slope resistance | r _t | T _J = 125 °C | | 12.0 | | mΩ |
| Threshold voltage | V _{T(TO)} | | | 1.0 | | V |
| Maximum reverse and direct leakage current | I _{RM} /I _{DM} | T _J = 25 °C | V _R = rated V _{RRM} /V _{DRM} | 0.5 | | mA |
| | | T _J = 125 °C | | 10 | | |
| Holding current | I _H | VS-25TTS08, VS-25TTS12 | Anode supply = 6 V, resistive load, initial I _T = 1 A, T _J = 25 °C | - | 150 | |
| Maximum latching current | I _L | Anode supply = 6 V, resistive load, T _J = 25 °C | | 200 | | |
| Maximum rate of rise of off-state voltage | dV/dt | T _J = T _J max., linear to 80 %, V _{DRM} = R _g - k = open | | 500 | | V/μs |
| Maximum rate of rise of turned-on current | dI/dt | | | 150 | | A/μs |

TRIGGERING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---------------------------------------------|-------------|-------------------------------------------------------------------------|--------|-------|
| Maximum peak gate power | P_{GM} | | 8.0 | W |
| Maximum average gate power | $P_{G(AV)}$ | | 2.0 | |
| Maximum peak positive gate current | $+I_{GM}$ | | 1.5 | A |
| Maximum peak negative gate voltage | $-V_{GM}$ | | 10 | V |
| Maximum required DC gate current to trigger | I_{GT} | Anode supply = 6 V, resistive load, $T_J = -10\text{ }^{\circ}\text{C}$ | 60 | mA |
| | | Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$ | 45 | |
| | | Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$ | 20 | |
| Maximum required DC gate voltage to trigger | V_{GT} | Anode supply = 6 V, resistive load, $T_J = -10\text{ }^{\circ}\text{C}$ | 2.5 | V |
| | | Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$ | 2.0 | |
| | | Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$ | 1.0 | |
| Maximum DC gate voltage not to trigger | V_{GD} | $T_J = 125\text{ }^{\circ}\text{C}$, $V_{DRM} = \text{rated value}$ | 0.25 | mA |
| Maximum DC gate current not to trigger | I_{GD} | | 2.0 | |

SWITCHING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|-------------------------------|----------|-------------------------------------|--------|---------|
| Typical turn-on time | t_{gt} | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.9 | μs |
| Typical reverse recovery time | t_{rr} | $T_J = 125\text{ }^{\circ}\text{C}$ | 4 | |
| Typical turn-off time | t_q | | 110 | |



| THERMAL AND MECHANICAL SPECIFICATIONS | | | | |
|-------------------------------------------------------------|------------------|------------------------------------------|-------------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum junction and storage temperature range | T_J, T_{Stg} | | -40 to +125 | °C |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation | 1.1 | °C/W |
| Typical thermal resistance, junction to ambient (PCB mount) | $R_{thJA}^{(1)}$ | | 40 | |
| Approximate weight | | | 2 | g |
| | | | 0.07 | oz. |
| Marking device | | Case style D ² PAK (TO-263AB) | 25TTS08S | |
| | | | 25TTS12S | |

Note

(1) When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 μm) copper 40 °C/W.
For recommended footprint and soldering techniques refer to application note #AN-994

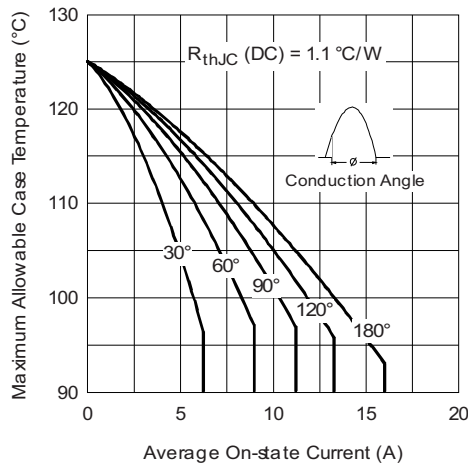


Fig. 1 - Current Rating Characteristics

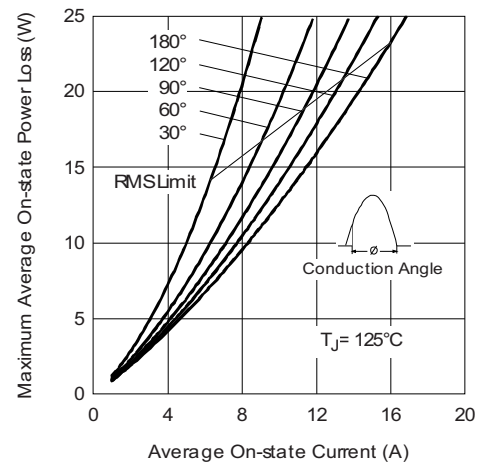


Fig. 3 - On-State Power Loss Characteristics

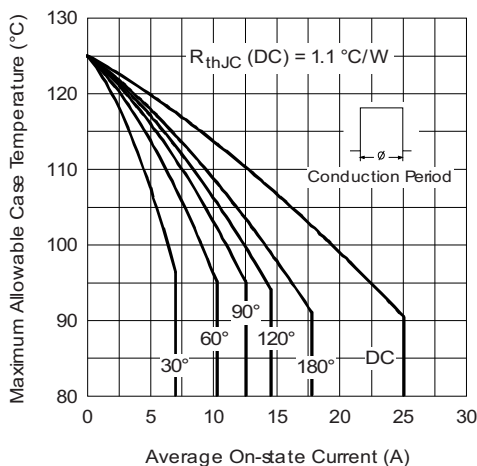


Fig. 2 - Current Rating Characteristics

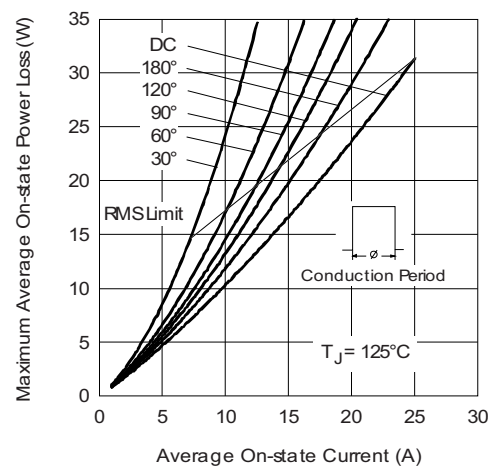


Fig. 4 - On-State Power Loss Characteristics

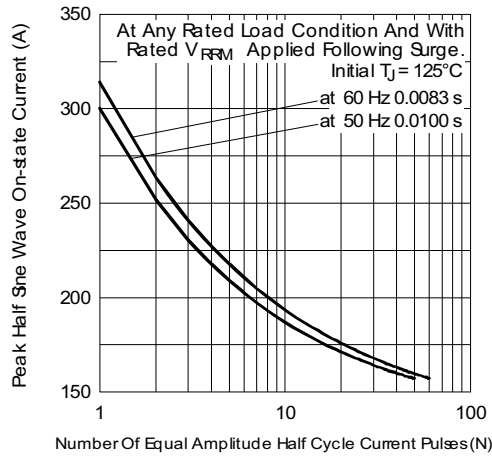


Fig. 5 - Maximum Non-Repetitive Surge Current

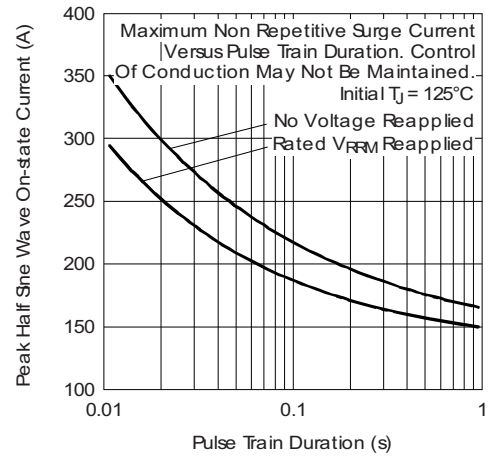


Fig. 6 - Maximum Non-Repetitive Surge Current

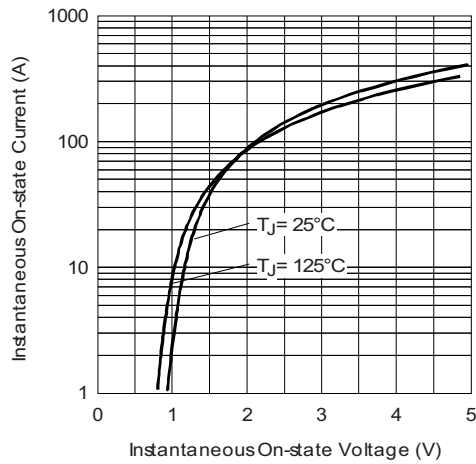


Fig. 7 - On-State Voltage Drop Characteristics

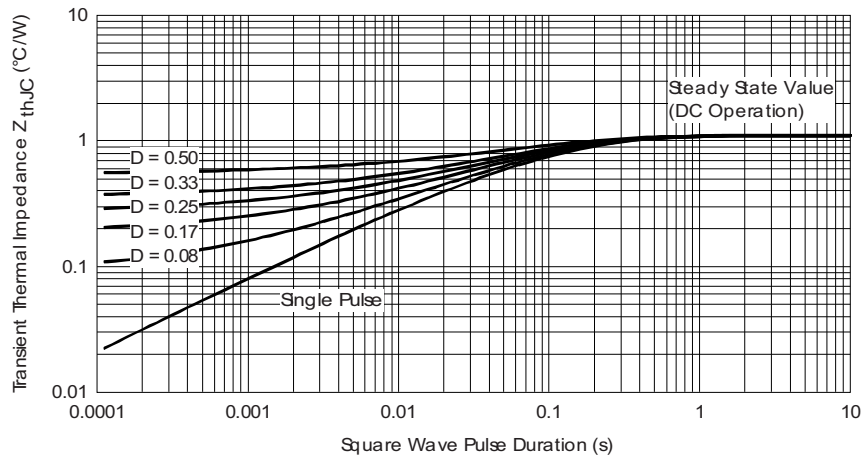


Fig. 8 - Gate Characteristics

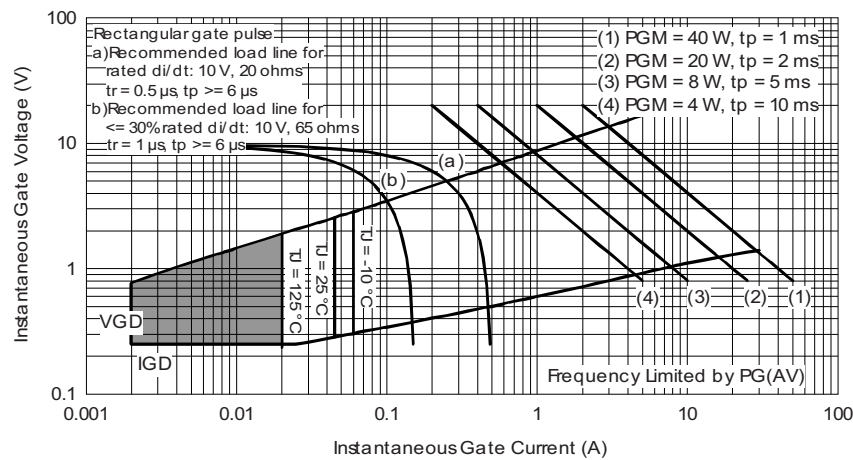


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

**ORDERING INFORMATION TABLE**

| Device code | VS- | 25 | T | T | S | 12 | S | TRL | -M3 |
|-------------|--------------------------------------------------------------------------------------------------|----|---|---|---|----|---|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | Vishay Semiconductors product | | | | | | | | |
| 2 | Current rating (25 = 25 A) | | | | | | | | |
| 3 | Circuit configuration: T = single thyristor | | | | | | | | |
| 4 | Package: T = D ² PAK (TO-263AB) | | | | | | | | |
| 5 | Type of silicon: S = standard recovery rectifier | | | | | | | | |
| 6 | Voltage rating: voltage code x 100 = V _{RRM} | | | | | | | | |
| 7 | S = surface mountable | | | | | | | | |
| 8 | • None = tube • TRL = tape and reel (left oriented) • TRR = tape and reel (right oriented) | | | | | | | | |
| 9 | -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free | | | | | | | | |

08 = 800 V

12 = 1200 V

ORDERING INFORMATION (Example)

| PREFERRED P/N | BASE QUANTITY | PACKAGING DESCRIPTION |
|-------------------|---------------|------------------------------------|
| VS-25TTS08S-M3 | 50 | Antistatic plastic tubes |
| VS-25TTS08STRL-M3 | 800 | 13" diameter plastic tape and reel |
| VS-25TTS08STRR-M3 | 800 | 13" diameter plastic tape and reel |
| VS-25TTS12S-M3 | 50 | Antistatic plastic tubes |
| VS-25TTS12STRL-M3 | 800 | 13" diameter plastic tape and reel |
| VS-25TTS12STRR-M3 | 800 | 13" diameter plastic tape and reel |

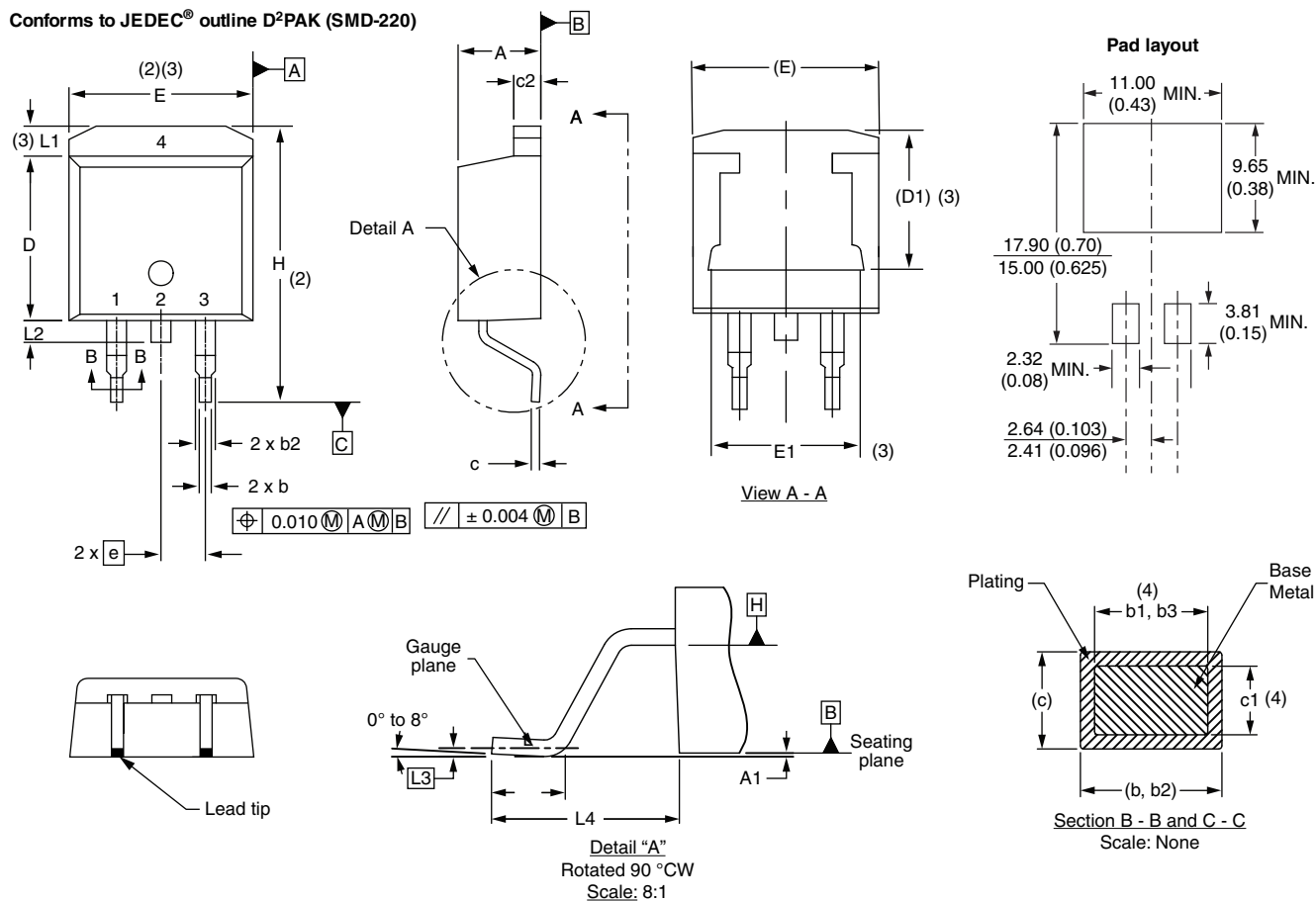
LINKS TO RELATED DOCUMENTS

| | |
|--------------------------|------------------------------------------------------------------------|
| Dimensions | www.vishay.com/doc?96164 |
| Part marking information | www.vishay.com/doc?95444 |
| Packaging information | www.vishay.com/doc?96424 |

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

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inches
- (7) Outline conforms to JEDEC® outline TO-263AB



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