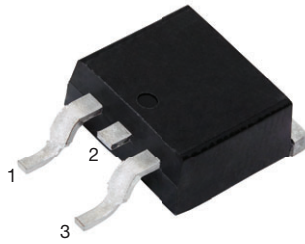
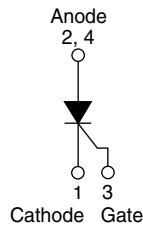


Thyristor, Surface Mount, Phase Control SCR, 16 A


D²PAK (TO-263AB)


FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Designed and qualified according to 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 | $I_{T(AV)}$ | $T_C = 93\text{ }^\circ\text{C}$, 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^2t for fusing | I^2t | 10 ms sine pulse, rated V_{RRM} applied | 450 | | A^2s | |
| | | 10 ms sine pulse, no voltage reapplied | 630 | | | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to }10\text{ ms}$, no voltage reapplied | 6300 | | $A^2\sqrt{s}$ | |
| Maximum on-state voltage drop | V_{TM} | 16 A, $T_J = 25\text{ }^\circ\text{C}$ | 1.25 | | V | |
| On-state slope resistance | r_t | $T_J = 125\text{ }^\circ\text{C}$ | 12.0 | | $m\Omega$ | |
| Threshold voltage | $V_{T(TO)}$ | | 1.0 | | V | |
| Maximum reverse and direct leakage current | I_{RM}/I_{DM} | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{rated } V_{RRM}/V_{DRM}$ | 0.5 | | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 10 | | |
| Holding current | I_H | VS-25TTS08, VS-25TTS12 | Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$ | - | 150 | |
| Maximum latching current | I_L | Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$ | | 200 | | |
| Maximum rate of rise of off-state voltage | dV/dt | $T_J = T_J\text{ max.}$, linear to 80 %, $V_{DRM} = R_g - k = \text{open}$ | | 500 | | |
| Maximum rate of rise of turned-on current | dI/dt | | | 150 | | |

| 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 | |
| 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

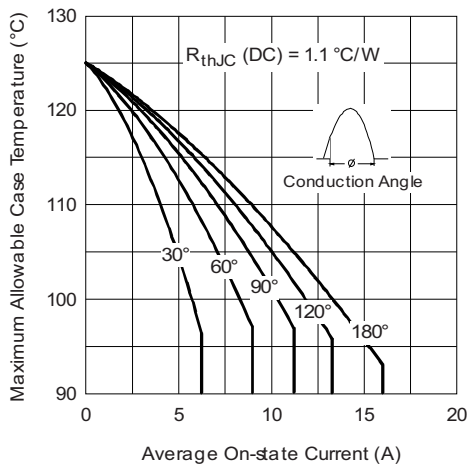


Fig. 1 - Current Rating Characteristics

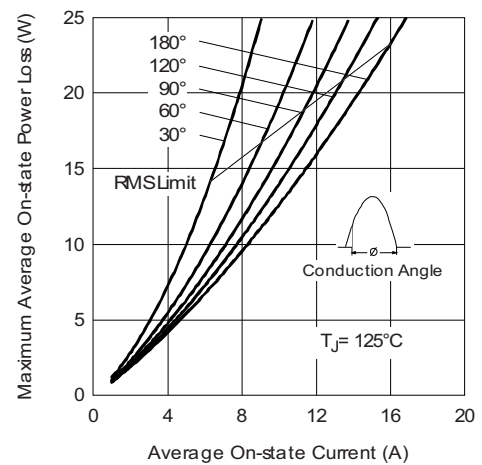


Fig. 3 - On-State Power Loss Characteristics

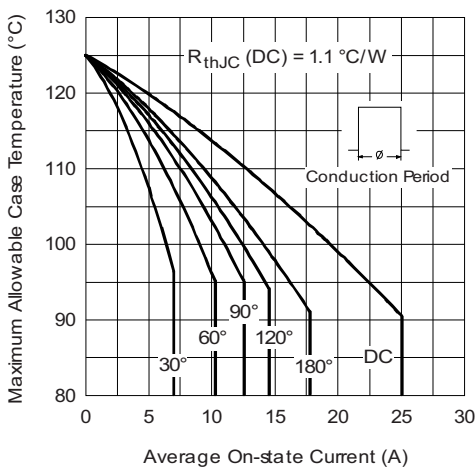


Fig. 2 - Current Rating Characteristics

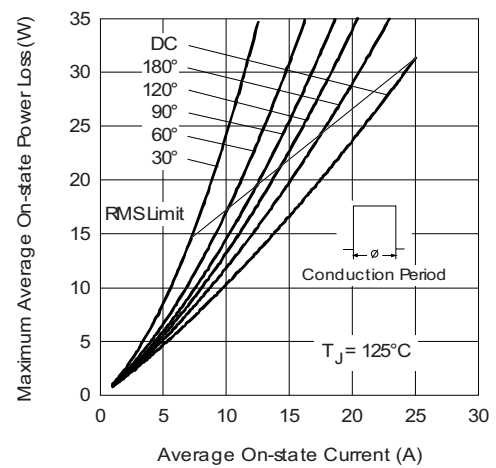


Fig. 4 - On-State Power Loss Characteristics

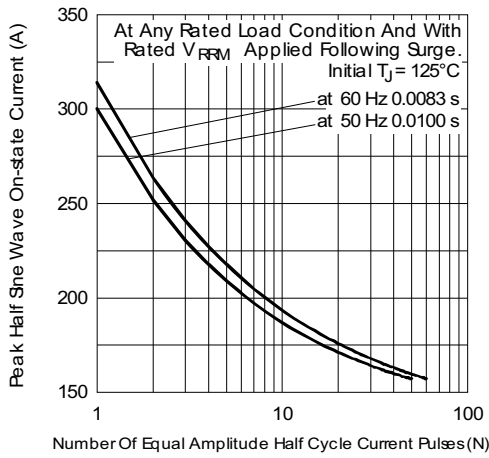


Fig. 5 - Maximum Non-Repetitive Surge Current

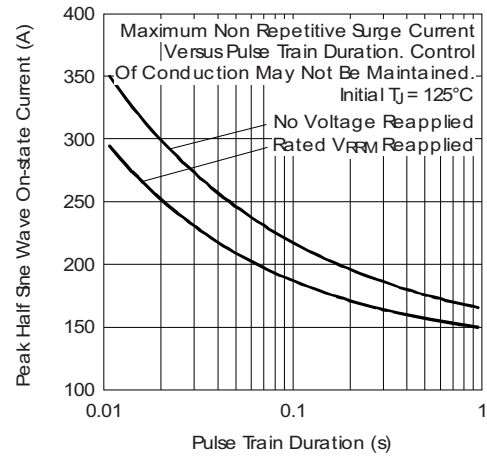


Fig. 6 - Maximum Non-Repetitive Surge Current

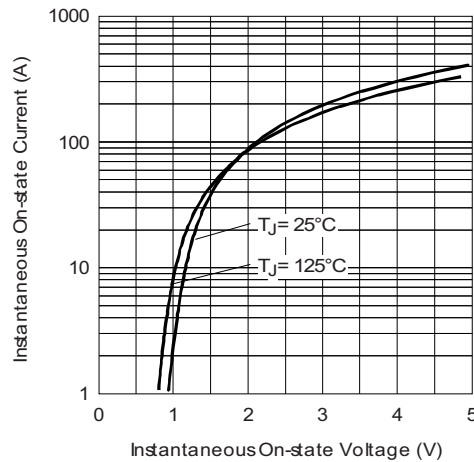


Fig. 7 - On-State Voltage Drop Characteristics

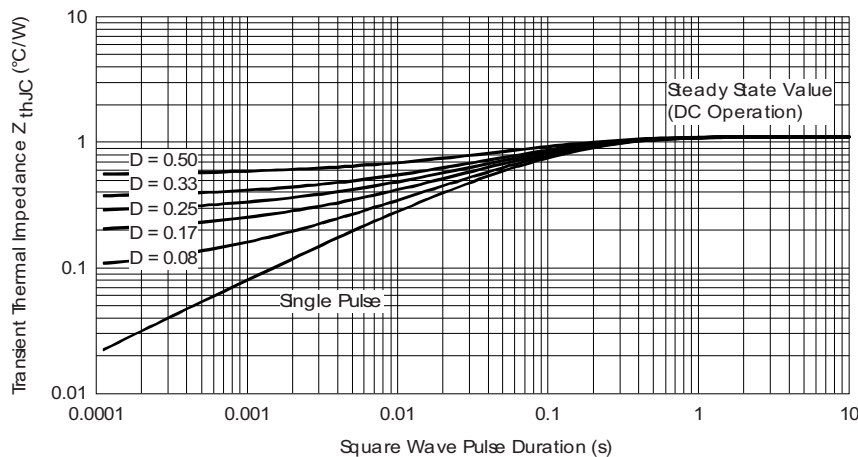


Fig. 8 - Gate Characteristics

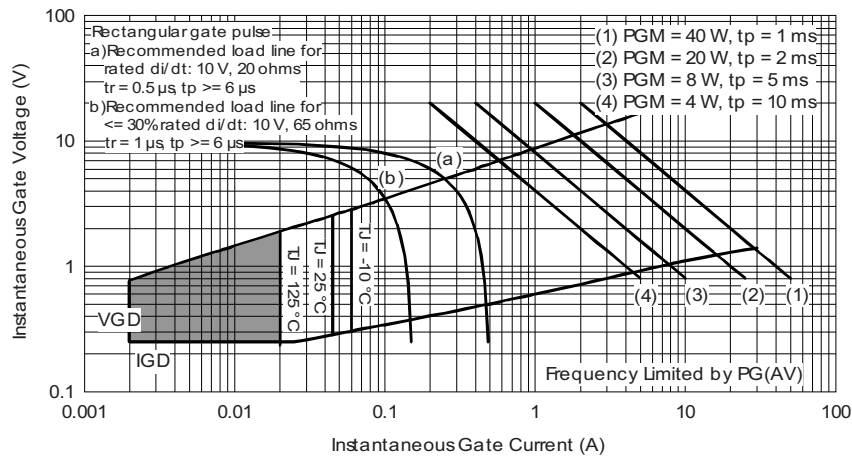


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

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 = D²PAK (TO-263AB)
- 5** - Type of silicon:
S = standard recovery rectifier
- 6** - Voltage rating: voltage code x 100 = V_{RRM}

| |
|-------------|
| 08 = 800 V |
| 12 = 1200 V |
- 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

| ORDERING INFORMATION (Example) | | | |
|---------------------------------------|------------------|------------------------|--------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-25TTS08S-M3 | 50 | 1000 | Antistatic plastic tubes |
| VS-25TTS08STRR-M3 | 800 | 800 | 13" diameter reel |
| VS-25TTS08STRL-M3 | 800 | 800 | 13" diameter reel |
| VS-25TTS12S-M3 | 50 | 1000 | Antistatic plastic tubes |
| VS-25TTS12STRR-M3 | 800 | 800 | 13" diameter reel |
| VS-25TTS12STRL-M3 | 800 | 800 | 13" diameter 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 |



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