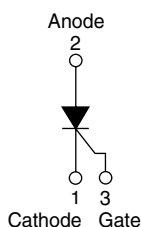


## Surface Mountable Phase Control SCR, 16 A



D<sup>2</sup>PAK



### DESCRIPTION/FEATURES

The 25TTS...S 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.

Typical applications are in input rectification (soft start) and these products are designed to be used with Vishay HPP input diodes, switches and output rectifiers which are available in identical package outlines.

This product has been designed and qualified for industrial level.

### PRODUCT SUMMARY

|               |               |
|---------------|---------------|
| $V_T$ at 16 A | < 1.25 V      |
| $I_{TSM}$     | 300 A         |
| $V_{RRM}$     | 800 to 1600 V |

### 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 mm<sup>2</sup>

### 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 1600 | V     |
| $I_{TSM}$         |                     | 300         | 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<br>V | $V_{DRM}$ , MAXIMUM PEAK DIRECT VOLTAGE<br>V | $I_{RRM}/I_{DRM}$ ,<br>AT 125 °C<br>mA |
|-------------|---|--|--|
| 25TTS08S    | 800   | 800  | 10                                     |
| 25TTS12S    | 1200  | 1200   |  |
| 25TTS16S    | 1600  | 1600   |  |

# 25TTS...S High Voltage Series



Vishay High Power Products Surface Mountable Phase  
Control SCR, 16 A

| 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                      | $I^2\sqrt{t}$   | $t = 0.1$ to 10 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            | $I_{RM}/I_{DM}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                  | $V_R = \text{Rated } V_{RRM}/V_{DRM}$                          |      | mA            |
|   |                 | $T_J = 125\text{ }^{\circ}\text{C}$                                 |  |      |               |
| Holding current                                       | $I_H$           | 25TTS08, 25TTS12  | Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$ | -    | 100           |
|   |                 | 25TTS16   |  | 100  | 150           |
| Maximum latching current                              | $I_L$           | Anode supply = 6 V, resistive load                                  | 200  |      |               |
| Maximum rate of rise of off-state voltage             | $dV/dt$         |   | 500  |      | V/ $\mu s$    |
| Maximum rate of rise of turned-on current             | $dI/dt$         |   | 150  |      | A/ $\mu s$    |

| TRIGGERING                                  |                    |  |        |       |
|---|--------------------|--|--------|-------|
| PARAMETER                                   | SYMBOL             | TEST CONDITIONS  | VALUES | UNITS |
| Maximum peak gate power                     | P <sub>GM</sub>    |  | 8.0    | W     |
| Maximum average gate power                  | P <sub>G(AV)</sub> |  | 2.0    |       |
| Maximum peak positive gate current          | + I <sub>GM</sub>  |  | 1.5    | A     |
| Maximum peak negative gate voltage          | - V <sub>GM</sub>  |  | 10     | V     |
| Maximum required DC gate current to trigger | I <sub>GT</sub>    | Anode supply = 6 V, resistive load, T <sub>J</sub> = - 10 °C | 60     | mA    |
|   |                    | Anode supply = 6 V, resistive load, T <sub>J</sub> = 25 °C   | 45     |       |
|   |                    | Anode supply = 6 V, resistive load, T <sub>J</sub> = 125 °C  | 20     |       |
| Maximum required DC gate voltage to trigger | V <sub>GT</sub>    | Anode supply = 6 V, resistive load, T <sub>J</sub> = - 10 °C | 2.5    | V     |
|   |                    | Anode supply = 6 V, resistive load, T <sub>J</sub> = 25 °C   | 2.0    |       |
|   |                    | Anode supply = 6 V, resistive load, T <sub>J</sub> = 125 °C  | 1.0    |       |
| Maximum DC gate voltage not to trigger      | V <sub>GD</sub>    | T <sub>J</sub> = 125 °C, V <sub>DRM</sub> = Rated value      | 0.25   | mA    |
| Maximum DC gate current not to trigger      | I <sub>GD</sub>    |  | 2.0    |       |

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



## 25TTS...S High Voltage Series

Surface Mountable Phase Control SCR, 16 A Vishay High Power Products

| THERMAL AND MECHANICAL SPECIFICATIONS                       |                  |   |             |       |
|---|------------------|---|-------------|-------|
| PARAMETER   | SYMBOL           | TEST CONDITIONS                         | VALUES      | UNITS |
| Maximum junction and storage temperature range              | $T_J, T_{Stg}$   |   | - 40 to 125 | °C    |
| Soldering temperature                                       | $T_S$            | For 10 s (1.6 mm from case)             | 240         |       |
| 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 <sup>2</sup> PAK (SMD-220) | 25TTS08S    |       |
|   |                  |   | 25TTS12S    |       |
|   |                  |   | 25TTS16S    |       |

### Note

<sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) 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

# 25TTS...S High Voltage Series

Vishay High Power Products Surface Mountable Phase Control SCR, 16 A

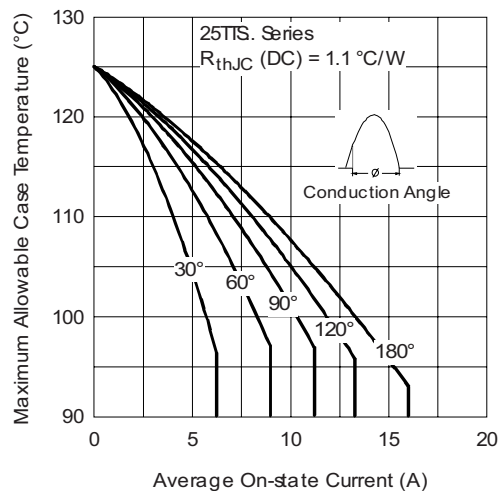


Fig. 1 - Current Rating Characteristics

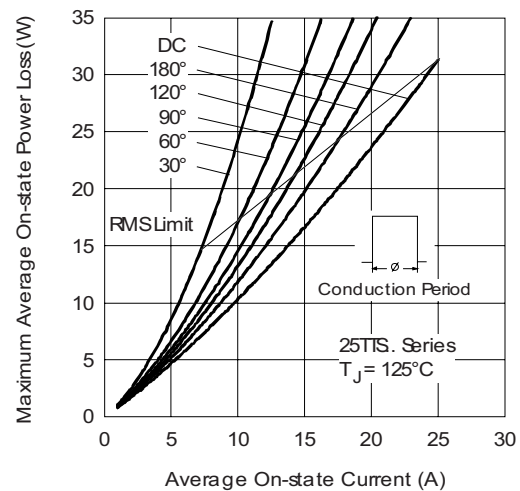


Fig. 4 - On-State Power Loss Characteristics

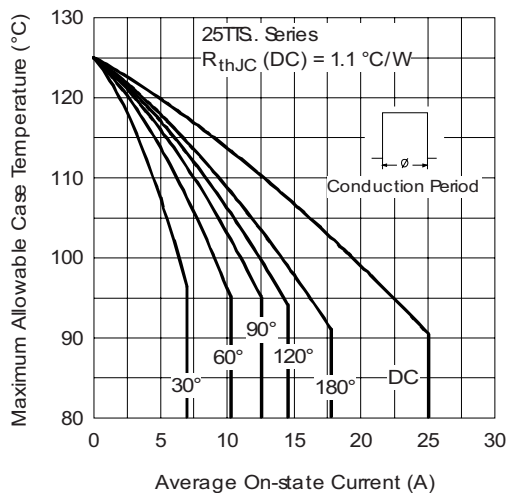


Fig. 2 - Current Rating Characteristics

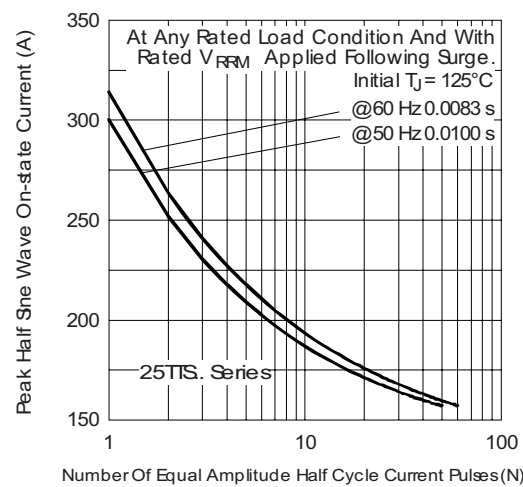


Fig. 5 - Maximum Non-Repetitive Surge Current

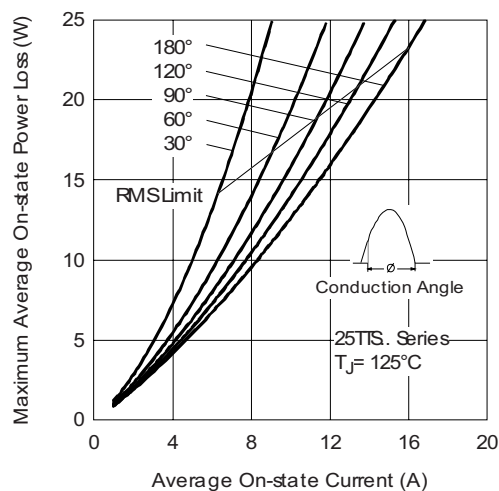


Fig. 3 - On-State Power Loss Characteristics

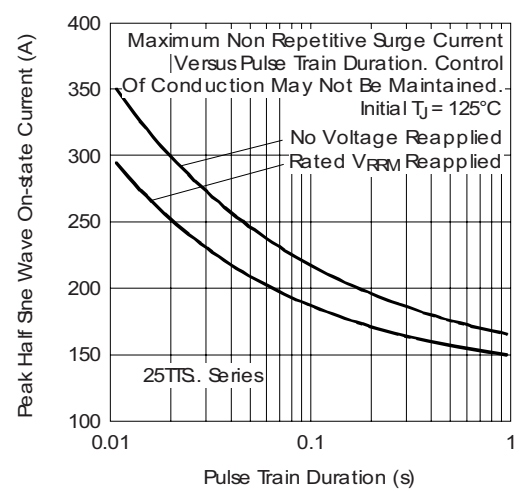


Fig. 6 - Maximum Non-Repetitive Surge Current



## 25TTS...S High Voltage Series

Surface Mountable Phase  
Control SCR, 16 A

Vishay High Power Products

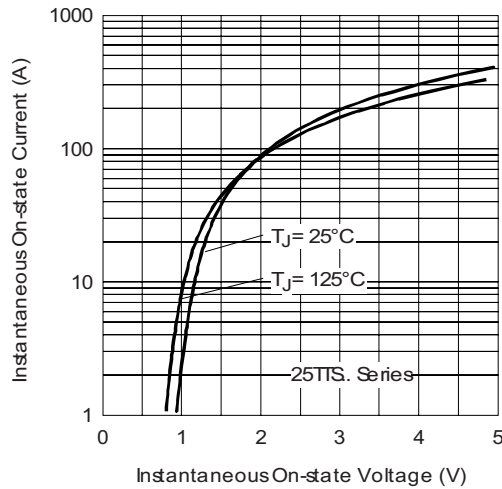


Fig. 7 - On-State Voltage Drop Characteristics

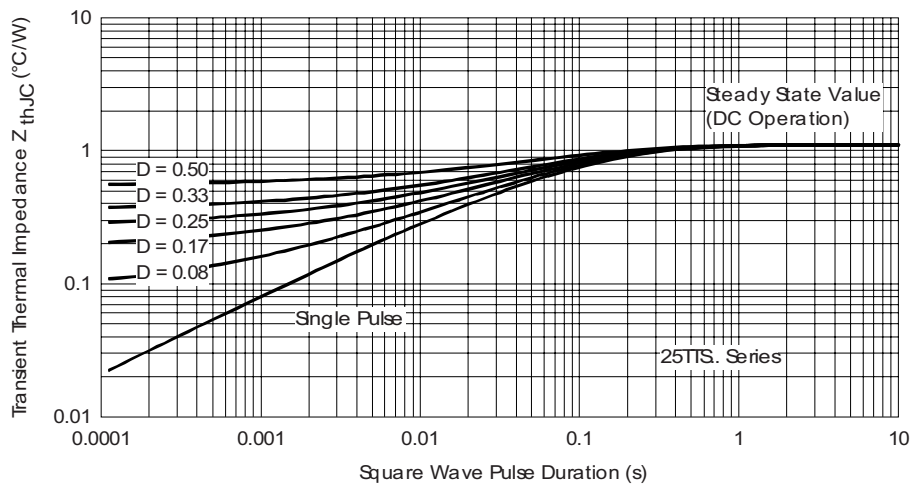


Fig. 8 - Gate Characteristics

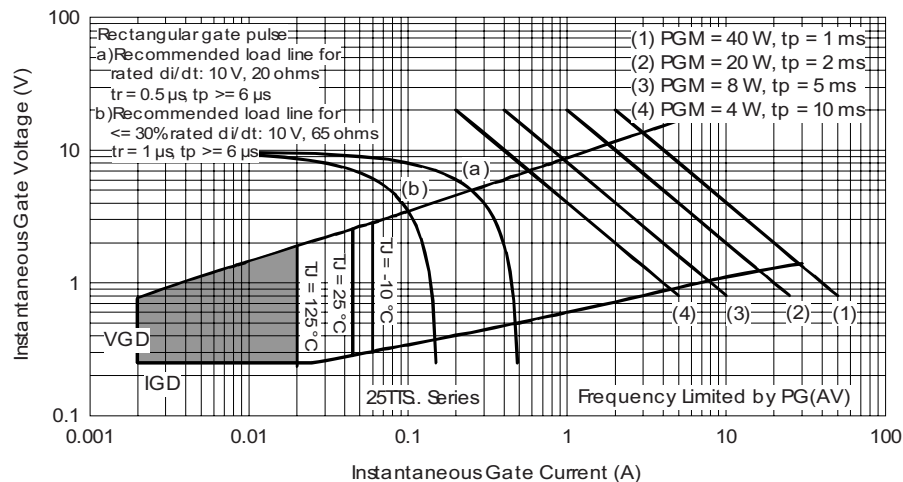


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

# 25TTS...S High Voltage Series

Vishay High Power Products Surface Mountable Phase  
Control SCR, 16 A



## ORDERING INFORMATION TABLE

|             |    |  |   |   |    |   |     |   |
|-------------|----|--|---|---|----|---|-----|---|
| Device code | 25 | T  | T | S | 16 | S | TRL | - |
|             | 1  | 2  | 3 | 4 | 5  | 6 | 7   | 8 |
| 1           | -  | Current rating (25 = 25 A)   |   |   |    |   |     |   |
| 2           | -  | Circuit configuration:<br>T = Single thyristor   |   |   |    |   |     |   |
| 3           | -  | Package:<br>T = TO-220AC   |   |   |    |   |     |   |
| 4           | -  | Type of silicon:<br>Standard recovery rectifier  |   |   |    |   |     |   |
| 5           | -  | Voltage code x 100 = $V_{RRM}$   |   |   |    |   |     |   |
| 6           | -  | S = TO-220 D <sup>2</sup> PAK (SMD-220) version  |   |   |    |   |     |   |
| 7           | -  | <ul style="list-style-type: none"><li>• None = Tube</li><li>• TRL = Tape and reel (left oriented)</li><li>• TRR = Tape and reel (right oriented)</li></ul> |   |   |    |   |     |   |
| 8           | -  | <ul style="list-style-type: none"><li>• None = Standard production</li><li>• PbF = Lead (Pb)-free</li></ul>  |   |   |    |   |     |   |

08 = 800 V  
12 = 1200 V  
16 = 1600 V

| LINKS TO RELATED DOCUMENTS |   |
|----------------------------|---|
| Dimensions                 | <a href="http://www.vishay.com/doc?95046">http://www.vishay.com/doc?95046</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95054">http://www.vishay.com/doc?95054</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a> |



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