# Phase Control SCR, 10 A


**TO-220AB**

## DESCRIPTION/FEATURES

Available

**RoHS*** **COMPLIANT**

The 16TTS..PbF 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 and lead (Pb)-free ("PbF" suffix).

| PRODUCT SUMMARY | |
|---|---|
| $V_T$ at 10 A | < 1.4 V |
| $I_{TSM}$ | 200 A |
| $V_{RRM}$ | 800/1200 V |

| OUTPUT CURRENT IN TYPICAL APPLICATIONS | | | |
|---|---|---|---|
| **APPLICATIONS** | **SINGLE-PHASE BRIDGE** | **THREE-PHASE BRIDGE** | **UNITS** |
| Capacitive input filter $T_A$ = 55 °C, $T_J$ = 125 °C, common heatsink of 1 °C/W | 13.5 | 17 | A |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| **PARAMETER** | **TEST CONDITIONS** | **VALUES** | **UNITS** |
| $I_{T(AV)}$ | Sinusoidal waveform | 10 | A |
| $I_{RMS}$ | | 16 | |
| $V_{DRM}/V_{RRM}$ | Range (1) | 800/1200 | V |
| $I_{TSM}$ | | 200 | A |
| $V_T$ | 10 A, $T_J$ = 25 °C | 1.4 | V |
| dV/dt | | 500 | V/µs |
| dI/dt | | 150 | A/µs |
| $T_J$ | Range | - 40 to 125 | °C |

**Note**

(1) For higher voltage up to 1600 V contact factory

| 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** |
| 16TTS08PbF | 800 | 800 | 10 |
| 16TTS12PbF | 1200 | 1200 | |

* Pb containing terminations are not RoHS compliant, exemptions may apply

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES TYP. | VALUES MAX. | UNITS |
|---|---|---|---|---|---|
| Maximum average on-state current | $I_{T(AV)}$ | $T_C$ = 98 °C, 180° conduction, half sine wave | 10 | | A |
| Maximum RMS on-state current | $I_{RMS}$ | | 16 | | |
| Maximum peak, one-cycle, non-repetitive surge current | $I_{TSM}$ | 10 ms sine pulse, rated $V_{RRM}$ applied | 170 | | |
| | | 10 ms sine pulse, no voltage reapplied | 200 | | |
| Maximum $I^2t$ for fusing | $I^2t$ | 10 ms sine pulse, rated $V_{RRM}$ applied | 144 | | $A^2s$ |
| | | 10 ms sine pulse, no voltage reapplied | 200 | | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied | 2000 | | $A^2\sqrt{s}$ |
| Maximum on-state voltage drop | $V_{TM}$ | 10 A, $T_J$ = 25 °C | 1.4 | | V |
| On-state slope resistance | $r_t$ | $T_J$ = 125 °C | 24.0 | | mΩ |
| Threshold voltage | $V_{T(TO)}$ | | 1.1 | | 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, $V_R$ = Rated $V_{RRM}/V_{DRM}$ | 10 | | |
| Holding current | $I_H$ | Anode supply = 6 V, resistive load, initial $I_T$ = 1 A 16TTS08PbF, 16TTS12PbF | - | 100 | |
| Maximum latching current | $I_L$ | Anode supply = 6 V, resistive load | 200 | | |
| Maximum rate of rise of off-state voltage | dV/dt | | 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, $T_J$ = - 65 °C | 90 | mA |
| | | Anode supply = 6 V, resistive load, $T_J$ = 25 °C | 60 | |
| | | Anode supply = 6 V, resistive load, $T_J$ = 125 °C | 35 | |
| Maximum required DC gate voltage to trigger | $V_{GT}$ | Anode supply = 6 V, resistive load, $T_J$ = - 65 °C | 3.0 | V |
| | | Anode supply = 6 V, resistive load, $T_J$ = 25 °C | 2.0 | |
| | | Anode supply = 6 V, resistive load, $T_J$ = 125 °C | 1.0 | |
| Maximum DC gate voltage not to trigger | $V_{GD}$ | $T_J$ = 125 °C, $V_{DRM}$ = Rated value | 0.2 | |
| Maximum DC gate current not to trigger | $I_{GD}$ | | 2.0 | mA |

## SWITCHING

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|---|---|---|---|
| Typical turn-on time | $t_{gt}$ | $T_J$ = 25 °C | 0.9 | µs |
| Typical reverse recovery time | $t_{rr}$ | $T_J$ = 125 °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 | 1.3 | °C/W |
| Maximum thermal resistance, junction to ambient | | $R_{thJA}$ | | 62 | |
| Typical thermal resistance, case to heatsink | | $R_{thCS}$ | Mounting surface, smooth and greased | 0.5 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | | Case style TO-220AB | 16TTS08 | |
| | | | | 16TTS12 | |

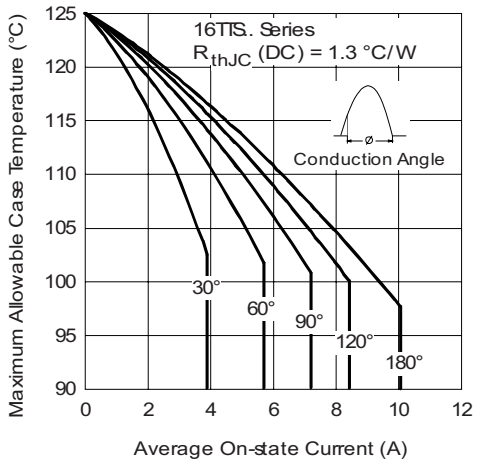



Fig. 1 - Current Rating Characteristics

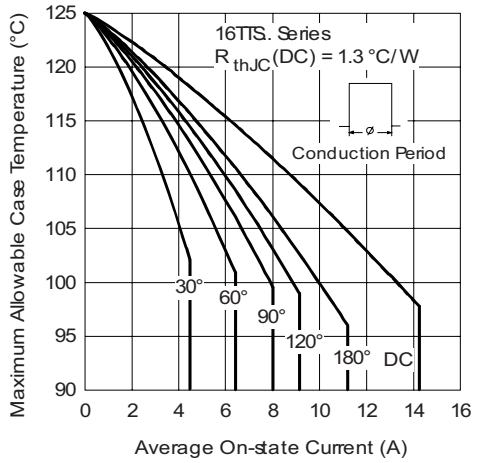



Fig. 2 - Current Rating Characteristics

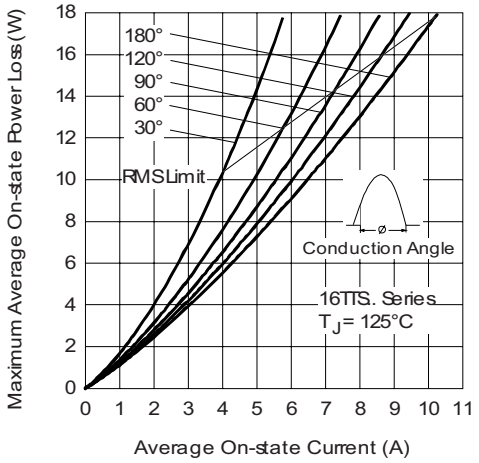



Fig. 3 - On-State Power Loss Characteristics

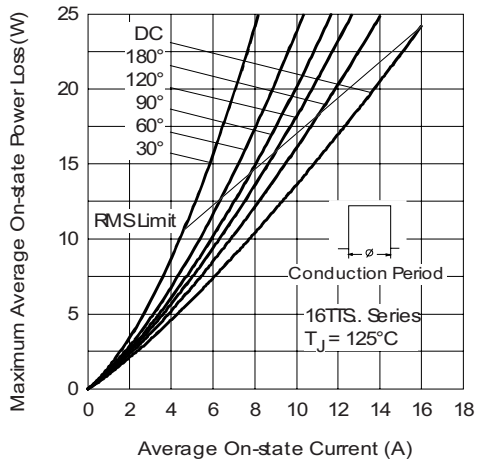



Fig. 4 - On-State Power Loss Characteristics

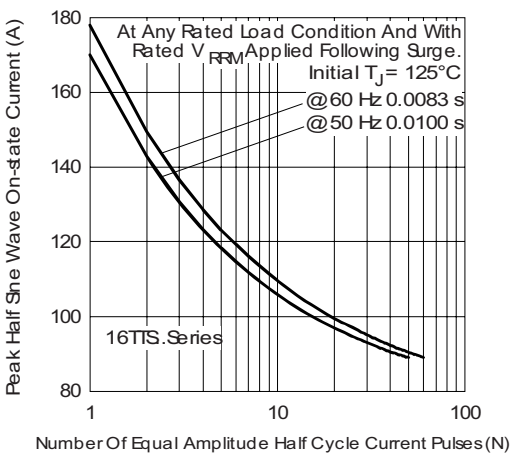



Fig. 5 - Maximum Non-Repetitive Surge Current

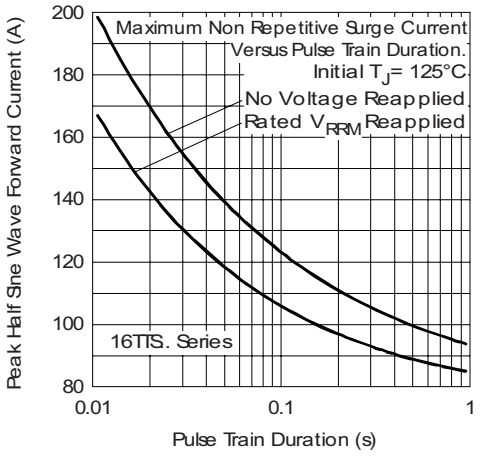



Fig. 6 - Maximum Non-Repetitive Surge Current

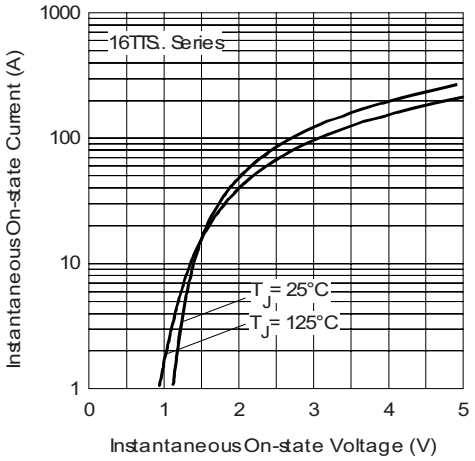



Fig. 7 - On-State Voltage Drop Characteristics

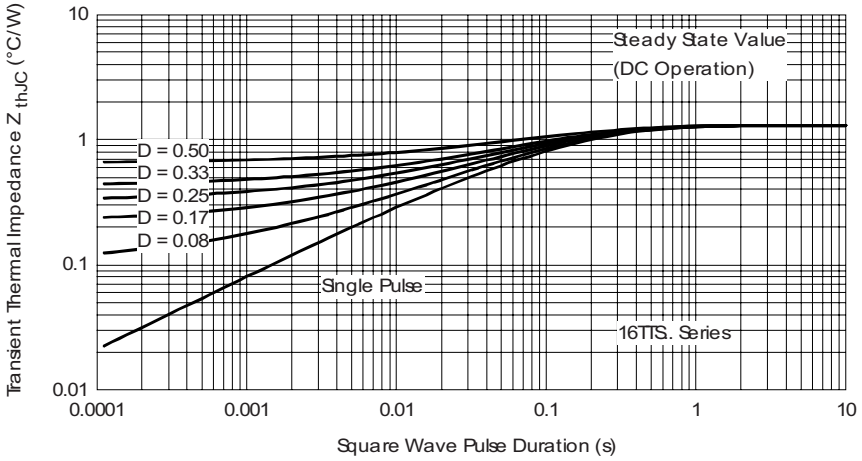



Fig. 8 - Thermal Impedance $Z_{thJC}$ Characteristics

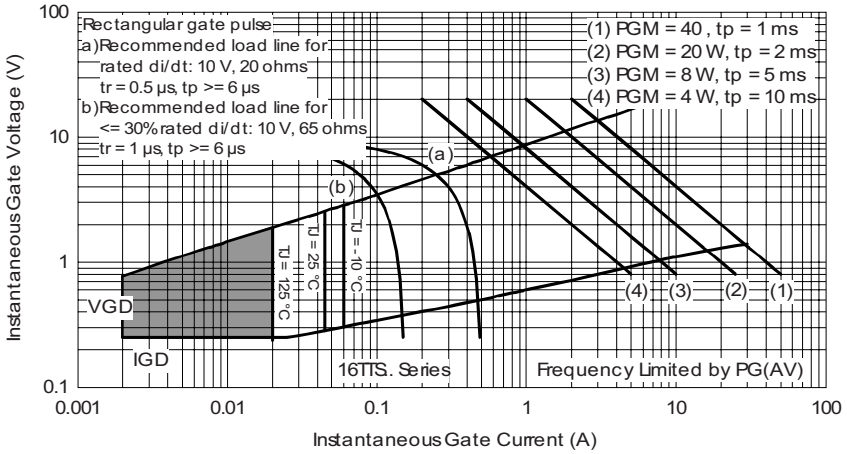
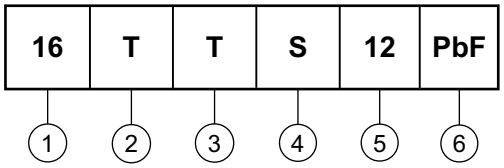



Fig. 9 - Gate Characteristics

## ORDERING INFORMATION TABLE

**Device code**




1 - Current rating

2 - Circuit configuration:
T = Single thyristor

3 - Package:
T = TO-220AB

4 - Type of silicon:
S = Converter grade

5 - Voltage code x 100 = $V_{RRM}$ (08 = 800 V, 12 = 1200 V)

6 - • None = Standard production
• PbF = Lead (Pb)-free

Note: For higher voltage up to 1600 V contact factory

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | http://www.vishay.com/doc?95222 |
| Part marking information | http://www.vishay.com/doc?95225 |

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