


SURFACE MOUNTABLE PHASE CONTROL SCR

Description/Features

The 16TTS..S **SAFEIR** 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 International Rectifier input diodes, switches and output rectifiers which are available in identical package outlines.

| | |
|---|-----------------------------------|
|  | $V_T < 1.4V @ 10A$ |
| | $I_{TSM} = 200A$ |
| | $V_{RRM} = 800 \text{ to } 1600V$ |

Output Current in Typical Applications

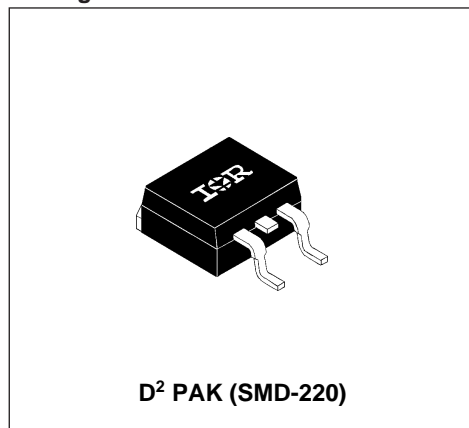
| Applications | Single-phase Bridge | Three-phase Bridge | Units |
|--|---------------------|--------------------|-------|
| NEMA FR-4 or G10 glass fabric-based epoxy with 4 oz (140µm) copper | 2.5 | 3.5 | A |
| Aluminum IMS, $R_{thCA} = 15^\circ C/W$ | 6.3 | 9.5 | |
| Aluminum IMS with heatsink, $R_{thCA} = 5^\circ C/W$ | 14.0 | 18.5 | |

$T_A = 55^\circ C$, $T_J = 125^\circ C$, footprint 300mm²

Major Ratings and Characteristics

| Characteristics | 16TTS..S | Units |
|---------------------------------|------------|-------|
| $I_{T(AV)}$ Sinusoidal waveform | 10 | A |
| I_{RMS} | 16 | A |
| V_{RRM}/V_{DRM} | up to 1600 | V |
| I_{TSM} | 200 | A |
| $V_T @ 10 A, T_J = 25^\circ C$ | 1.4 | V |
| dv/dt | 500 | V/µs |
| di/dt | 150 | A/µs |
| T_J | -40 to 125 | °C |

Package Outline



Voltage Ratings

| Part Number | V_{RRM} , maximum peak reverse voltage V | V_{DRM} , maximum peak direct voltage V | I_{RRM}/I_{DRM} 125°C mA |
|-------------|---|--|----------------------------------|
| 16TTS08S | 800 | 800 | 10 |
| 16TTS12S | 1200 | 1200 | |
| 16TTS16S | 1600 | 1600 | |

Absolute Maximum Ratings

| Parameters | 16TTS..S | Units | Conditions | |
|--|----------|---------------------------------------|---|-----|
| $I_{T(AV)}$ Max. Average On-state Current | 10 | A | @ $T_C = 98^\circ\text{C}$, 180° conduction half sine wave | |
| I_{RMS} Max. RMS On-state Current | 16 | | | |
| I_{TSM} Max. Peak One Cycle Non-Repetitive Surge Current | 170 | | 10ms Sine pulse, rated V_{RRM} applied | |
| | 200 | 10ms Sine pulse, no voltage reapplied | | |
| I^2t Max. I^2t for fusing | 144 | A^2s | 10ms Sine pulse, rated V_{RRM} applied | |
| | 200 | | 10ms Sine pulse, no voltage reapplied | |
| $I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for fusing | 2000 | $A^2\sqrt{s}$ | t=0.1 to 10ms, no voltage reapplied | |
| V_{TM} Max. On-state Voltage Drop | 1.4 | V | @ 10A, $T_J = 25^\circ\text{C}$ | |
| r_t On-state slope resistance | 24.0 | mΩ | $T_J = 125^\circ\text{C}$ | |
| $V_{T(TO)}$ Threshold Voltage | 1.1 | V | | |
| I_{RM}/I_{DM} Max. Reverse and Direct Leakage Current | 0.5 | mA | $T_J = 25^\circ\text{C}$ | |
| | 10 | | $T_J = 125^\circ\text{C}$ | |
| I_H Holding Current | Typ. | mA | Anode Supply = 6V, Resistive load, Initial $I_T=1A$ 16TTS08S, 16TTS12S 16TTS16S | |
| | -- | | | 100 |
| | 100 | | | 150 |
| I_L Max. Latching Current | 200 | mA | Anode Supply = 6V, Resistive load | |
| dv/dt Max. Rate of Rise of off-state Voltage | 500 | V/μs | | |
| di/dt Max. Rate of Rise of turned-on Current | 150 | A/μs | | |

Triggering

| Parameters | 16TTS..S | Units | Conditions |
|---|----------|-------|--|
| P_{GM} Max. peak Gate Power | 8.0 | W | |
| $P_{G(AV)}$ Max. average Gate Power | 2.0 | | |
| $+I_{GM}$ Max. peak positive Gate Current | 1.5 | A | |
| $-V_{GM}$ Max. peak negative Gate Voltage | 10 | V | |
| I_{GT} Max. required DC Gate Current to trigger | 90 | mA | Anode supply = 6V, resistive load, $T_J = -10^\circ\text{C}$ |
| | 60 | | Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$ |
| | 35 | | Anode supply = 6V, resistive load, $T_J = 125^\circ\text{C}$ |
| V_{GT} Max. required DC Gate Voltage to trigger | 3.0 | V | Anode supply = 6V, resistive load, $T_J = -10^\circ\text{C}$ |
| | 2.0 | | Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$ |
| | 1.0 | | Anode supply = 6V, resistive load, $T_J = 125^\circ\text{C}$ |
| V_{GD} Max. DC Gate Voltage not to trigger | 0.25 | | $T_J = 125^\circ\text{C}$, $V_{DRM} = \text{rated value}$ |
| I_{GD} Max. DC Gate Current not to trigger | 2.0 | mA | $T_J = 125^\circ\text{C}$, $V_{DRM} = \text{rated value}$ |

Switching

| Parameters | 16TTS..S | Units | Conditions |
|--|----------|---------------|---------------------------|
| t_{gt} Typical turn-on time | 0.9 | μs | $T_J = 25^\circ\text{C}$ |
| t_{rr} Typical reverse recovery time | 4 | | $T_J = 125^\circ\text{C}$ |
| t_q Typical turn-off time | 110 | | |

Thermal-Mechanical Specifications

| Parameters | 16TTS..S | Units | Conditions |
|--|------------------------------|---------------------------|---|
| T_J Max. Junction Temperature Range | -40 to 125 | $^\circ\text{C}$ | |
| T_{stg} Max. Storage Temperature Range | -40 to 125 | $^\circ\text{C}$ | |
| | Soldering Temperature | 240 | $^\circ\text{C}$ for 10 seconds (1.6mm from case) |
| R_{thJC} Max. Thermal Resistance Junction to Case | 1.3 | $^\circ\text{C}/\text{W}$ | DC operation |
| R_{thJA} Typ. Thermal Resistance Junction to Ambient (PCB Mount)** | 40 | $^\circ\text{C}/\text{W}$ | |
| wt Approximate Weight | 2 (0.07) | g(oz.) | |
| T Case Style | D ² Pak (SMD-220) | | |

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

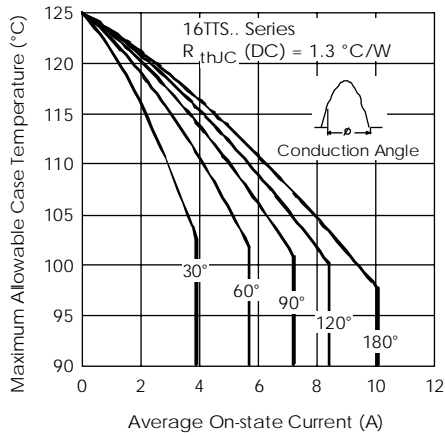


Fig. 1 - Current Rating Characteristics

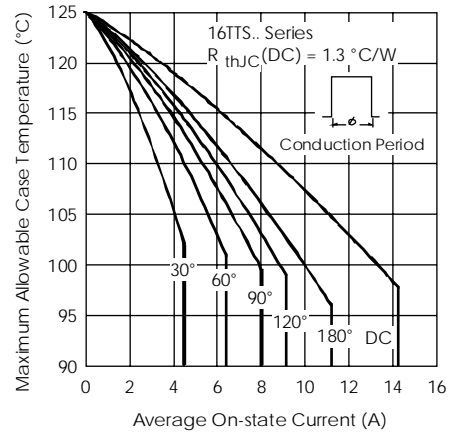


Fig. 2 - Current Rating Characteristics

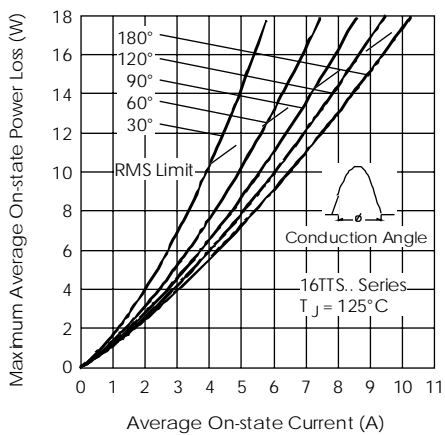


Fig. 3 - On-state Power Loss Characteristics

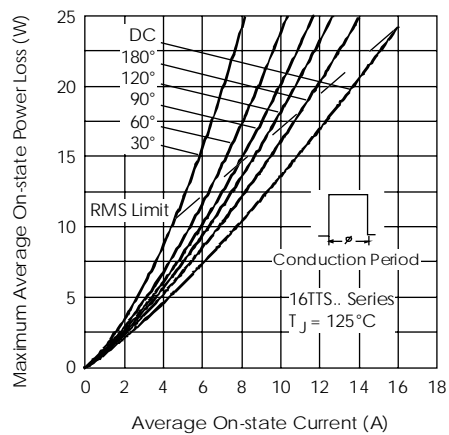


Fig. 4 - On-state Power Loss Characteristics

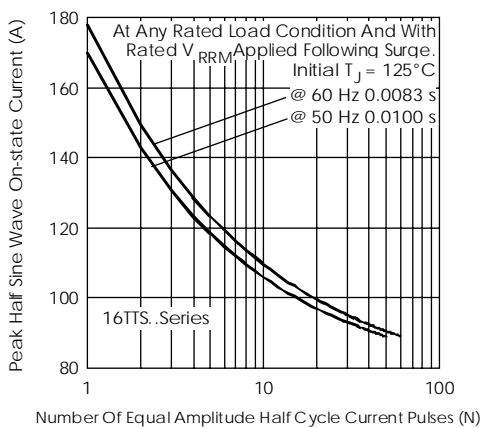


Fig. 6 - Maximum Non-Repetitive Surge Current

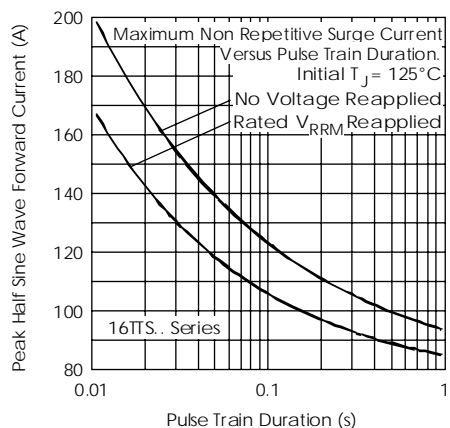


Fig. 7 - Maximum Non-Repetitive Surge Current

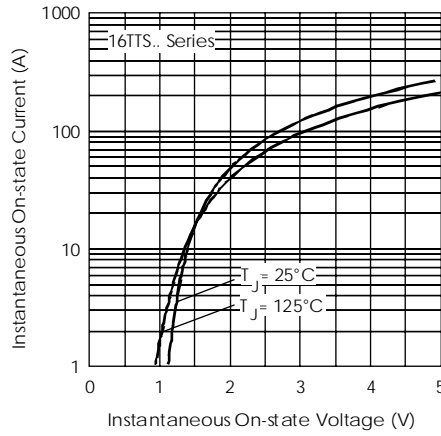


Fig. 7 - On-state Voltage Drop Characteristics

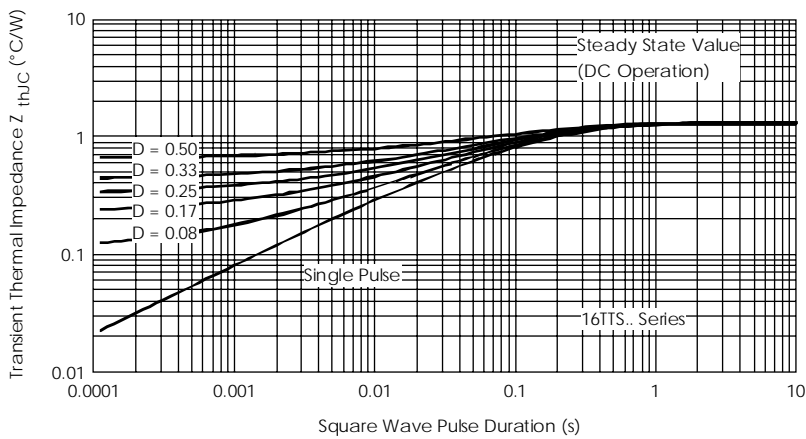


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

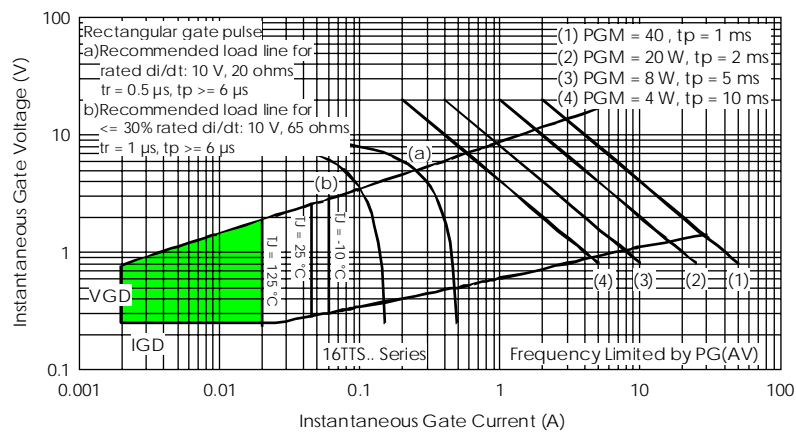
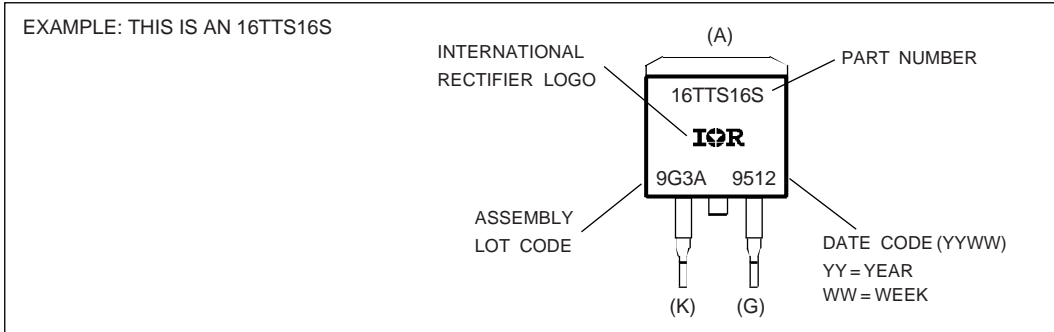
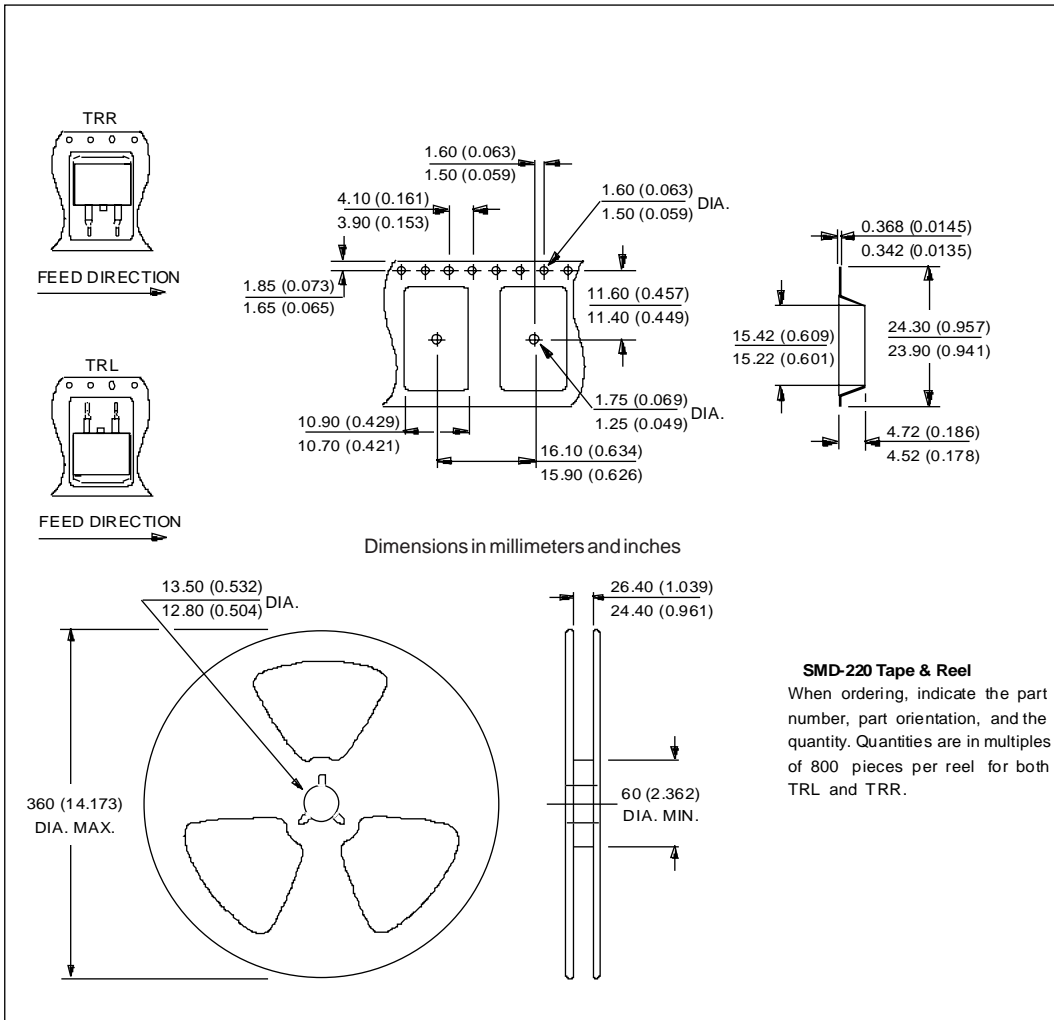


Fig. 9 - Gate Characteristics

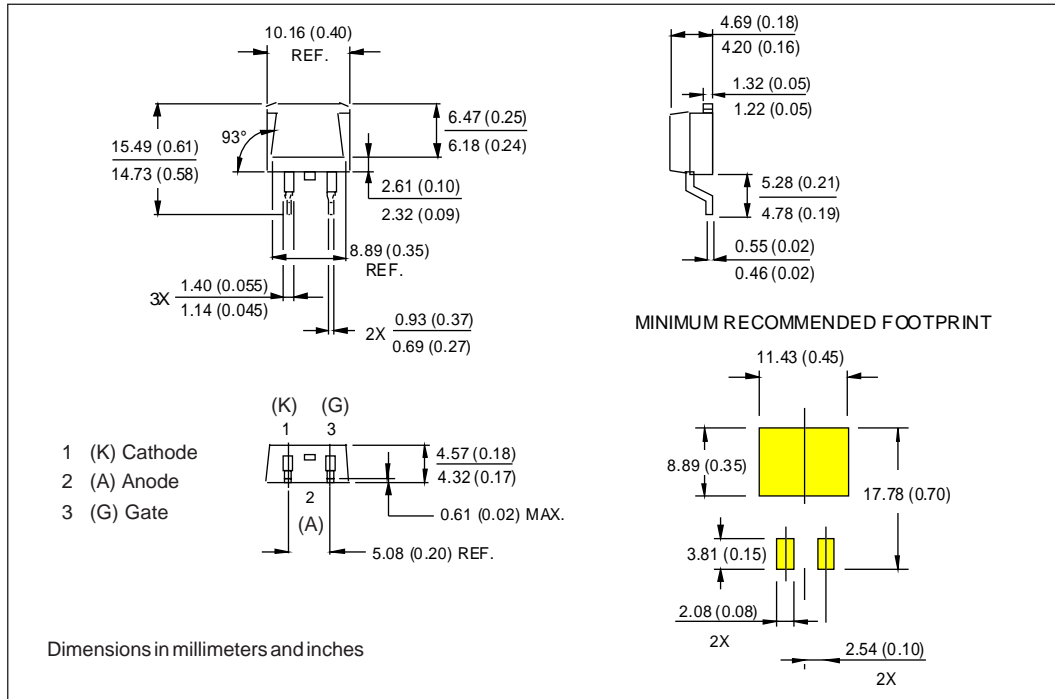
Marking Information



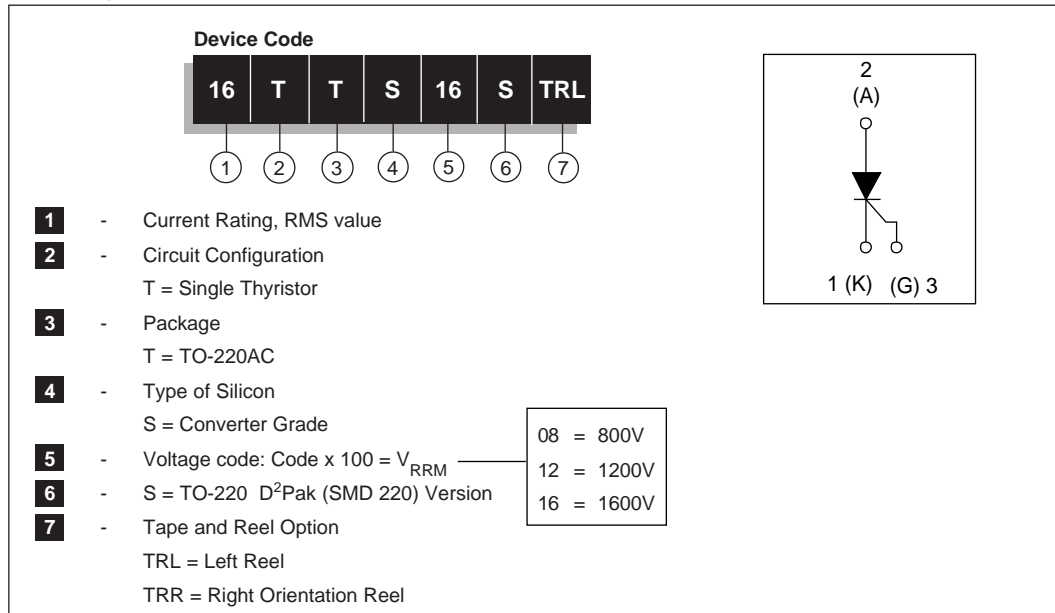
Tape & Reel Information



Outline Table



Ordering Information Table



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