

International  
**IR** Rectifier

## SAFEIR Series 25TTS..FP


### PHASE CONTROL SCR TO-220 FULLPAK

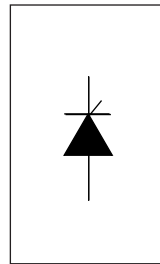
#### Description/Features

The 25TTS..FP **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.

Fully isolated package ( $V_{INS} = 2500 V_{RMS}$ )

UL E78996 approved 



$$\begin{aligned} V_T &< 1.25V @ 16A \\ I_{TSM} &= 300A \\ V_{RRM} &800 \text{ to } 1600V \end{aligned}$$

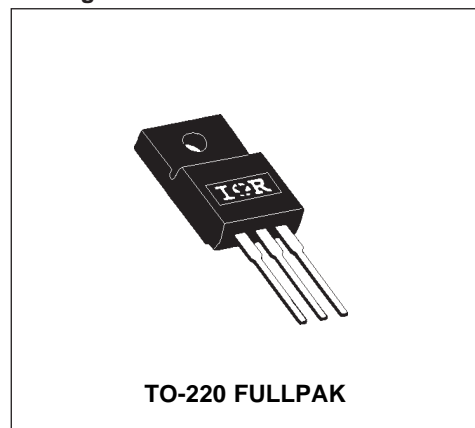
#### Output Current in Typical Applications

| Applications  | Single-phase Bridge | Three-phase Bridge | Units |
|---|---------------------|--------------------|-------|
| Capacitive input filter $T_A = 55^\circ C, T_J = 125^\circ C$ ,<br>common heatsink of $1^\circ C/W$ | 18                  | 22                 | A     |

#### Major Ratings and Characteristics

| Characteristics                  | 25TTS..FP  | Units      |
|----------------------------------|------------|------------|
| $I_{T(AV)}$ Sinusoidal waveform  | 16         | A          |
| $I_{RMS}$                        | 25         | A          |
| $V_{RRM}/V_{DRM}$                | upto 1600  | V          |
| $I_{TSM}$                        | 300        | A          |
| $V_T$ @ 16 A, $T_J = 25^\circ C$ | 1.25       | V          |
| $dv/dt$                          | 500        | V/ $\mu s$ |
| $di/dt$                          | 150        | A/ $\mu s$ |
| $T_J$                            | -40 to 125 | $^\circ C$ |

#### Package Outline



## Voltage Ratings

| Part Number | $V_{RRM}$ , maximum<br>peak reverse voltage<br>V | $V_{DRM}$ , maximum<br>peak direct voltage<br>V | $I_{RRM}/I_{DRM}$<br>125°C<br>mA |
|-------------|--|---|----------------------------------|
| 25TTS08FP   | 800  | 800   | 10                               |
| 25TTS12FP   | 1200   | 1200  |                                  |
| 25TTS16FP   | 1600   | 1600  |                                  |

## Absolute Maximum Ratings

| Parameters      |  | 25TTS..FP |      | Units                       | Conditions  |                                     |  |
|-----------------|--|-----------|------|-----------------------------|---|-------------------------------------|--|
| $I_{T(AV)}$     | Max. Average On-state Current          | 16        |      | A                           | @ $T_C=85^{\circ}\text{C}$ , 180° conduction half sine wave                                     |                                     |  |
| $I_{RMS}$       | Max. RMS On-state Current              | 25        |      |                             |   |                                     |  |
| $I_{TSM}$       | Max. Peak One Cycle Non-Repetitive     | 300       |      |                             | 10ms Sine pulse, rated $V_{RRM}$ applied  |                                     |  |
|                 | Surge Current                          | 350       |      |                             | 10ms Sine pulse, no voltage reappplied  |                                     |  |
| $I^2t$          | Max. $I^2t$ for fusing                 | 450       |      | $\text{A}^2\text{s}$        | 10ms Sine pulse, rated $V_{RRM}$ applied  |                                     |  |
|                 |  | 630       |      |                             | 10ms Sine pulse, no voltage reappplied  |                                     |  |
| $I^2\sqrt{t}$   | Max. $I^2\sqrt{t}$ for fusing          | 6300      |      | $\text{A}^2\sqrt{\text{s}}$ | $t=0.1$ to 10ms, no voltage reappplied  |                                     |  |
| $V_{TM}$        | Max. On-state Voltage Drop             | 1.25      |      | V                           | @ 16A, $T_J=25^{\circ}\text{C}$   |                                     |  |
| $r_t$           | On-state slope resistance              | 12.0      |      | $\text{m}\Omega$            | $T_J=125^{\circ}\text{C}$   |                                     |  |
| $V_{T(TO)}$     | Threshold Voltage                      | 1.0       |      | V                           |   |                                     |  |
| $I_{RM}/I_{DM}$ | Max. Reverse and Direct                | 0.5       |      | mA                          | $T_J=25^{\circ}\text{C}$  | $V_R=\text{rated } V_{RRM}/V_{DRM}$ |  |
|                 | Leakage Current                        | 10        |      |                             | $T_J=125^{\circ}\text{C}$   |                                     |  |
| $I_H$           | Holding Current                        | Typ.      | Max. | mA                          | Anode Supply = 6V, Resistive load, Initial $I_T=1\text{A}$<br>25TTS08FP, 25TTS12FP<br>25TTS16FP |                                     |  |
|                 |  | –         | 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/ $\mu\text{s}$            |   |                                     |  |
| $di/dt$         | Max. Rate of Rise of turned-on Current | 150       |      | A/ $\mu\text{s}$            |   |                                     |  |

### Triggering

| Parameters  | 25TTS..FP | 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 | 60        | mA    | Anode supply = 6V, resistive load, $T_J = -10^\circ\text{C}$ |
|   | 45        |       | Anode supply = 6V, resistive load, $T_J = 25^\circ\text{C}$  |
|   | 20        |       | Anode supply = 6V, resistive load, $T_J = 125^\circ\text{C}$ |
| $V_{GT}$ Max. required DC Gate Voltage to trigger | 2.5       | 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                             | 25TTS..FP | Units         | Conditions                |
|--|-----------|---------------|---------------------------|
| $t_{gt}$ Typical turn-on time          | 0.9       | $\mu\text{s}$ | $T_J = 25^\circ\text{C}$  |
| $t_{rr}$ Typical reverse recovery time | 4         |               | $T_J = 125^\circ\text{C}$ |
| $t_q$ Typical turn-off time            | 110       |               |                           |

### Thermal-Mechanical Specifications

| Parameters   | 25TTS..FP     | Units              | Conditions                           |
|--|---------------|--------------------|--------------------------------------|
| $T_J$ Max. Junction Temperature Range                  | -40 to 125    | $^\circ\text{C}$   |                                      |
| $T_{stg}$ Max. Storage Temperature Range               | -40 to 125    |                    |                                      |
| $R_{thJC}$ Max. Thermal Resistance Junction to Case    | 1.5           | $^\circ\text{C/W}$ | DC operation                         |
| $R_{thJA}$ Max. Thermal Resistance Junction to Ambient | 62            |                    |                                      |
| $R_{thCS}$ Typ. Thermal Resistance Case to Heatsink    | 1.5           |                    | Mounting surface, smooth and greased |
| wt Approximate Weight                                  | 2 (0.07)      | g (oz.)            |                                      |
| T Mounting Torque                                      | Min.          | 6 (5)              | Kg-cm (lbf-in)                       |
|  | Max.          | 12 (10)            |                                      |
| Case Style   | TO-220FULLPAK |                    | (94/V0)                              |

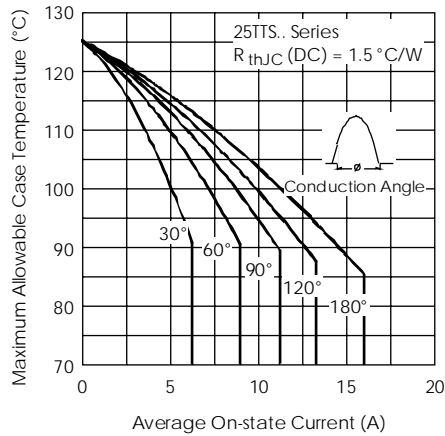


Fig. 1 - Current Rating Characteristics

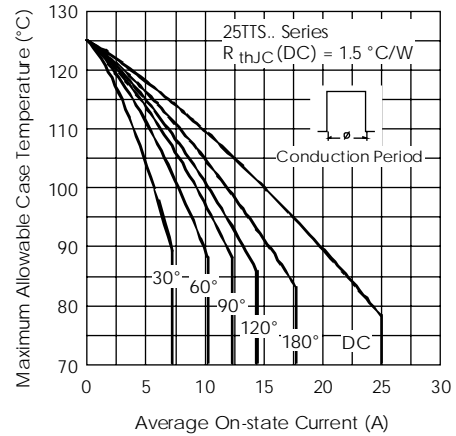


Fig. 2 - Current Rating Characteristics

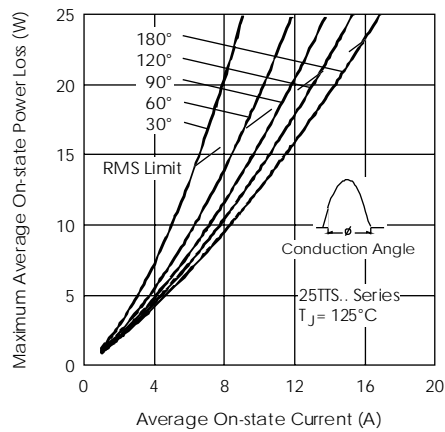


Fig. 3 - On-state Power Loss Characteristics

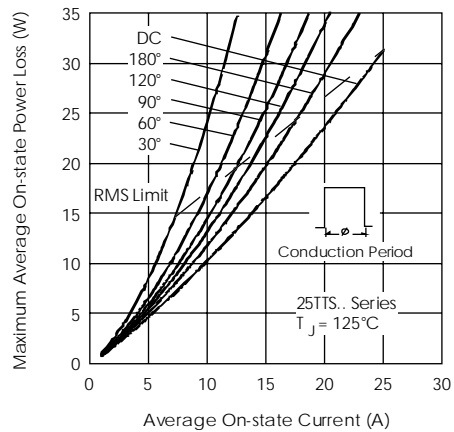


Fig. 4 - On-state Power Loss Characteristics

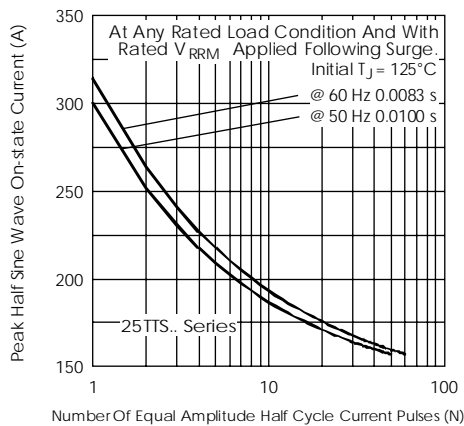


Fig. 5 - Maximum Non-Repetitive Surge Current

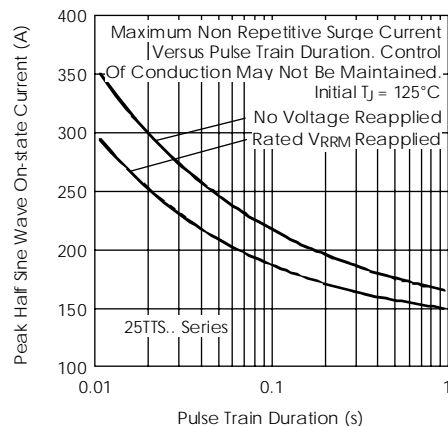


Fig. 6 - Maximum Non-Repetitive Surge Current

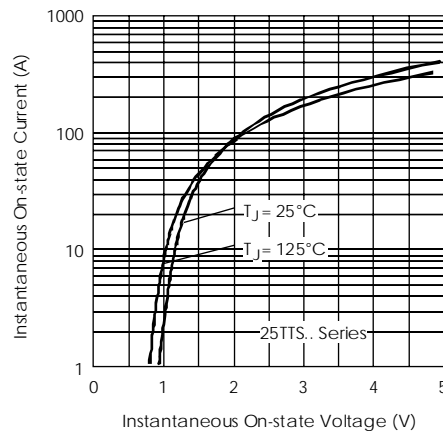


Fig. 7 - On-state Voltage Drop Characteristics

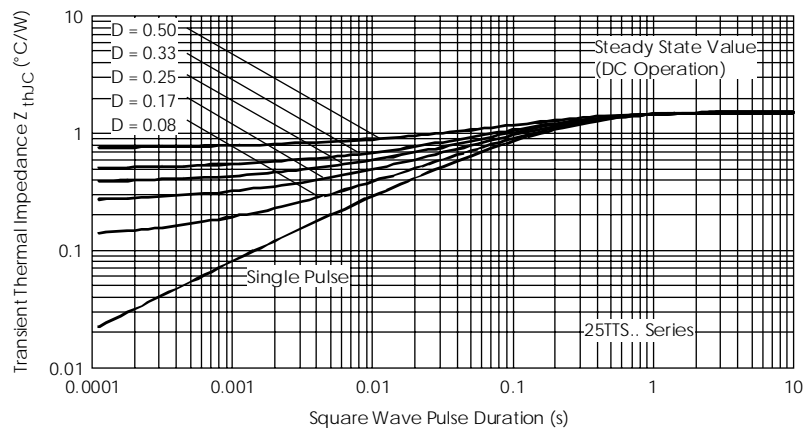


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

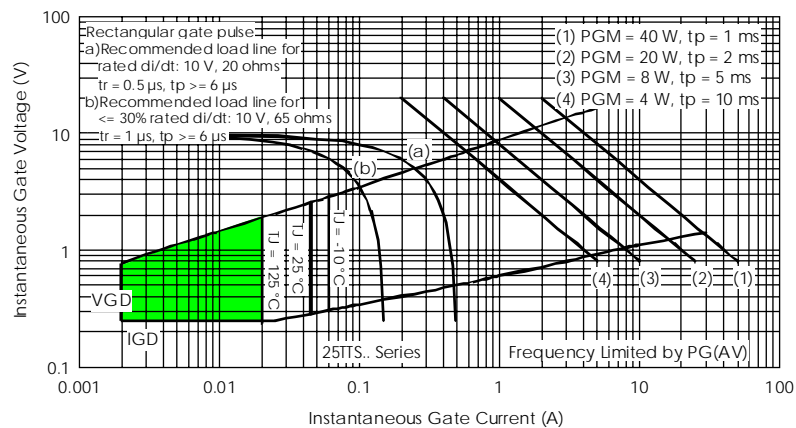


Fig. 9 - Gate Characteristics

## Bulletin I2135 rev. D 03/99

## IOR Rectifier

## Outline Table



## Ordering Information Table

