

International  
**IR** Rectifier

## SAFEIR Series 20ETS12, 20ETS12S

### INPUT RECTIFIER DIODE

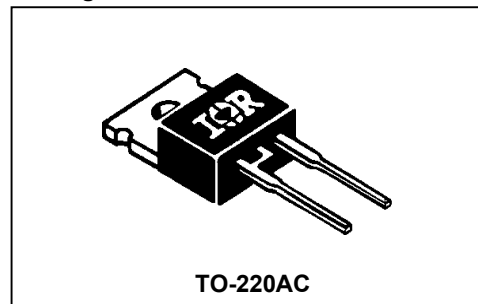
#### Description/Features

The 20ETS.. rectifier **SAFEIR** series has been optimized for very low forward voltage drop, with moderate leakage. The glass passivation technology used has reliable operation up to 150°C junction temperature.

Typical applications are in input rectification and these products are designed to be used with International Rectifier Switches and Output Rectifiers which are available in identical package outlines.

|                                                                                   |                                 |
|-----------------------------------------------------------------------------------|---------------------------------|
|  | $V_F < 1V @ 10A$                |
|                                                                                   | $I_{FSM} = 300A$                |
|                                                                                   | $V_{RRM} 800 \text{ to } 1200V$ |

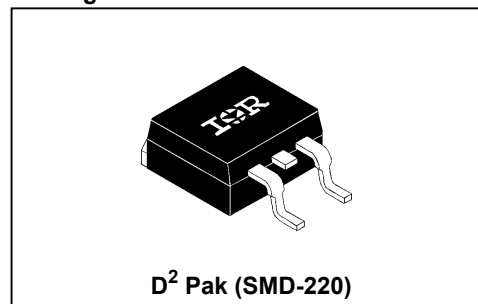
#### Package Outline



#### Major Ratings and Characteristics

| Characteristics                 | 20ETS..     | Units |
|---------------------------------|-------------|-------|
| $I_{F(AV)}$ Sinusoidal waveform | 20          | A     |
| $V_{RRM}$ Range (*)             | 800 to 1200 | V     |
| $I_{FSM}$                       | 300         | A     |
| $V_F @ 10A, T_J = 25^\circ C$   | 1.0         | V     |
| $T_J$                           | -40 to 150  | °C    |

#### Package Outline



#### Output Current in Typical Applications

|                                                                                                     | Single-phase Bridge | Three-phase Bridge | Units |
|-----------------------------------------------------------------------------------------------------|---------------------|--------------------|-------|
| Capacitive input filter $T_A = 55^\circ C$ , $T_J = 125^\circ C$ , common heatsink of $1^\circ C/W$ | 16.3                | 21                 | A     |

## 20ETS.., 20ETS..S *SAFEIR* Series

Bulletin I2101 rev. D 12/01

International  
**IOR** Rectifier

### Voltage Ratings

| Part Number       | $V_{RRM}$ , maximum<br>peak reverse voltage<br>V | $V_{RSM}$ , maximum non repetitive<br>peak reverse voltage<br>V | $I_{RRM}$<br>150°C<br>mA |
|-------------------|--------------------------------------------------|-----------------------------------------------------------------|--------------------------|
| 20ETS08, 20ETS08S | 800                                              | 900                                                             | 1                        |
| 20ETS12, 20ETS12S | 1200                                             | 1300                                                            |                          |

### Absolute Maximum Ratings

| Parameters                                                 | 20ETS.. | Units         | Conditions                                                   |
|------------------------------------------------------------|---------|---------------|--------------------------------------------------------------|
| $I_{F(AV)}$ Max. Average Forward Current                   | 20      | A             | @ $T_C = 105^\circ\text{C}$ , 180° conduction half sine wave |
| $I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current | 250     | A             | 10ms Sine pulse, rated $V_{RRM}$ applied                     |
|                                                            | 300     |               | 10ms Sine pulse, no voltage reapplied                        |
| $I^2t$ Max. $I^2t$ for fusing                              | 316     | $A^2s$        | 10ms Sine pulse, rated $V_{RRM}$ applied                     |
|                                                            | 442     |               | 10ms Sine pulse, no voltage reapplied                        |
| $I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for fusing                | 4420    | $A^2\sqrt{s}$ | $t = 0.1$ to 10ms, no voltage reapplied                      |

### Electrical Specifications

| Parameters                            | 20ETS.. | Units | Conditions                      |
|---------------------------------------|---------|-------|---------------------------------|
| $V_{FM}$ Max. Forward Voltage Drop    | 1.1     | V     | @ 20A, $T_J = 25^\circ\text{C}$ |
| $r_t$ Forward slope resistance        | 10.4    | mΩ    | $T_J = 150^\circ\text{C}$       |
| $V_{F(TO)}$ Threshold voltage         | 0.85    | V     |                                 |
| $I_{RM}$ Max. Reverse Leakage Current | 0.1     | mA    | $T_J = 25^\circ\text{C}$        |
|                                       | 1.0     |       | $T_J = 150^\circ\text{C}$       |

$V_R = \text{rated } V_{RRM}$

### Thermal-Mechanical Specifications

| Parameters        |                                             | 20ETS..                                | Units   | Conditions                           |
|-------------------|---------------------------------------------|----------------------------------------|---------|--------------------------------------|
| T <sub>j</sub>    | Max. Junction Temperature Range             | -40 to 150                             | °C      |                                      |
| T <sub>stg</sub>  | Max. Storage Temperature Range              | -40 to 150                             | °C      |                                      |
| R <sub>thJC</sub> | Max. Thermal Resistance Junction to Case    | 1.3                                    | °C/W    | DC operation                         |
| R <sub>thJA</sub> | Max. Thermal Resistance Junction to Ambient | 62                                     | °C/W    | (*) For D <sup>2</sup> Pak version   |
| R <sub>thCS</sub> | Typ. Thermal Resistance Case to Heatsink    | 0.5                                    | °C/W    | 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-220AC, D <sup>2</sup> Pak (SMD-220) |         |                                      |

\* When mounted on 1" square (650mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz (140μm) copper 40°C/W  
For recommended footprint and soldering techniques refer to application note #AN-994

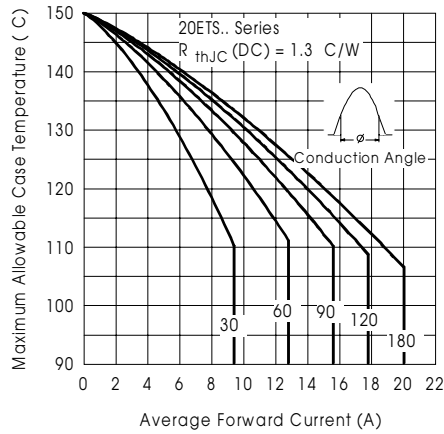


Fig. 1 - Current Rating Characteristics

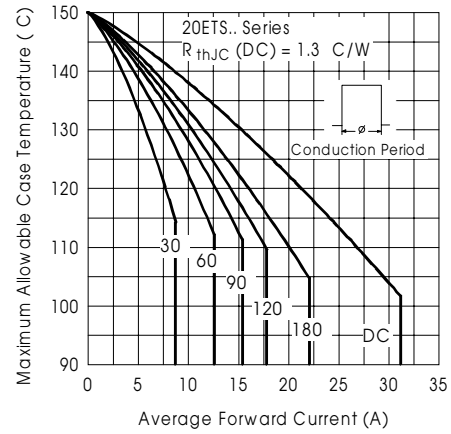


Fig. 2 - Current Rating Characteristics

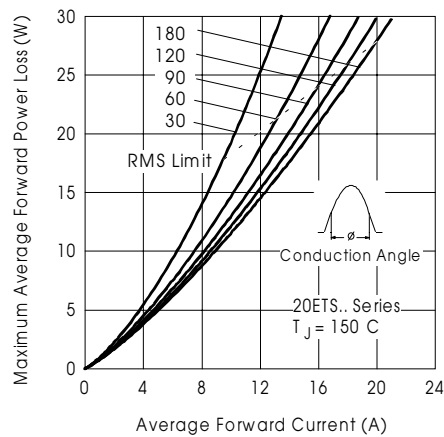


Fig. 3 - Forward Power Loss Characteristics

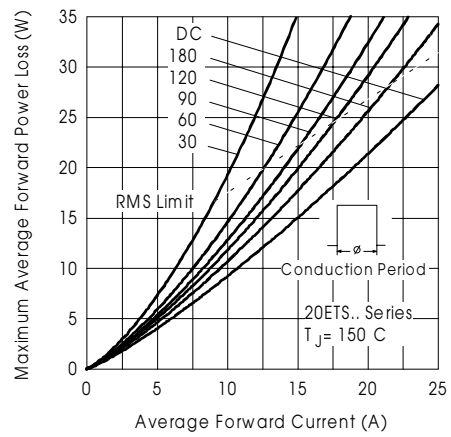


Fig. 4 - Forward Power Loss Characteristics

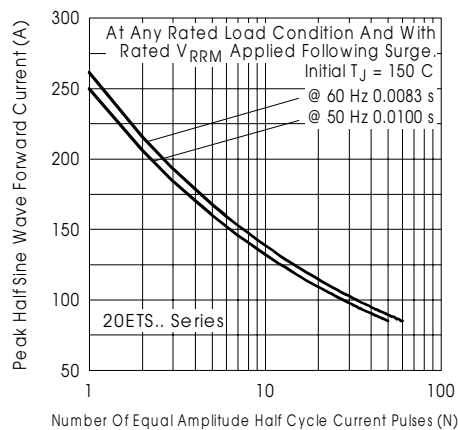


Fig. 5 - Maximum Non-Repetitive Surge Current

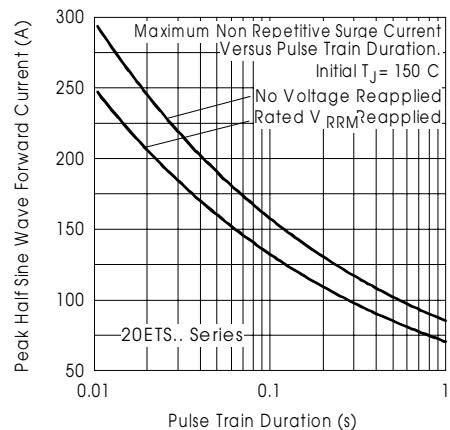


Fig. 6 - Maximum Non-Repetitive Surge Current

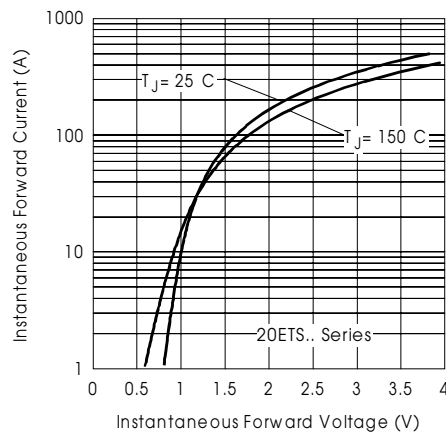


Fig. 7 - Forward Voltage Drop Characteristics

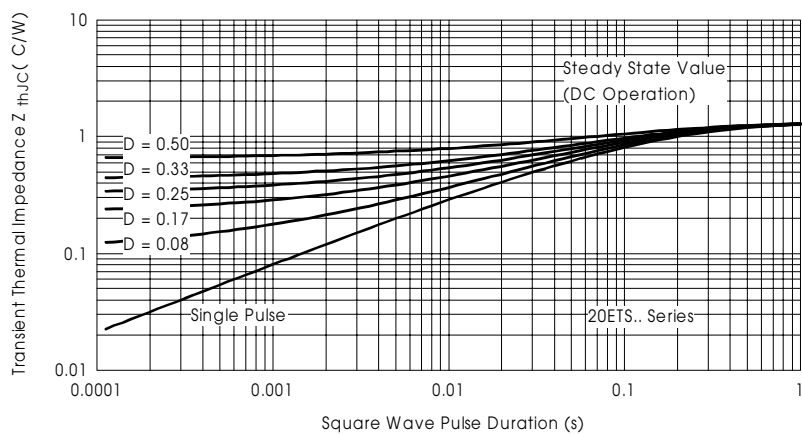
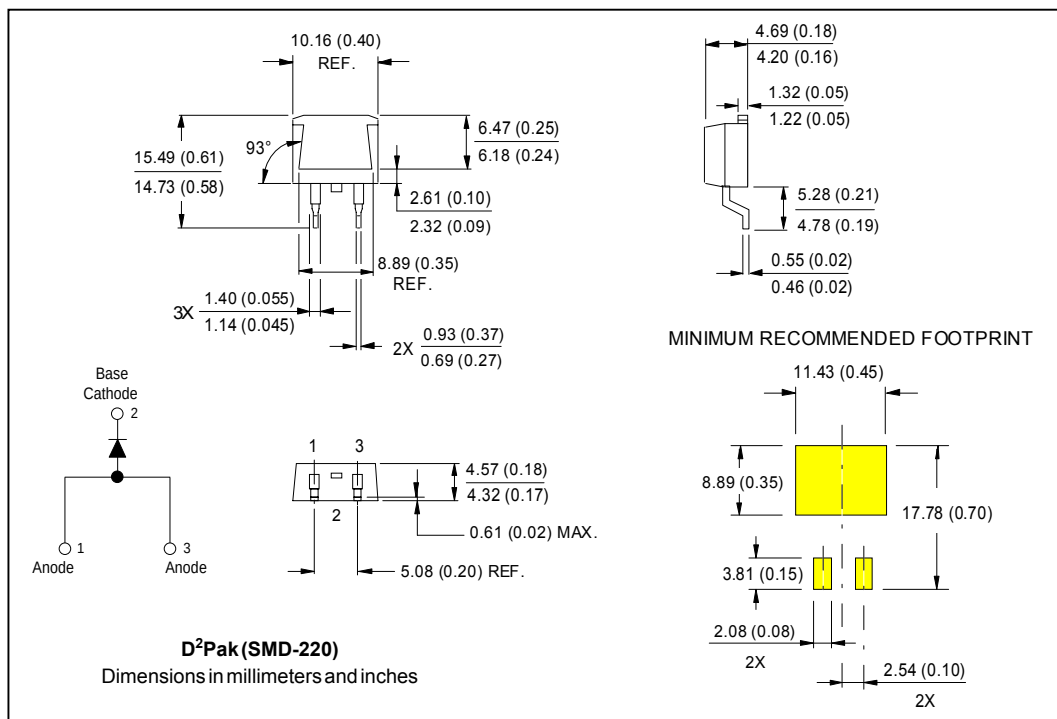
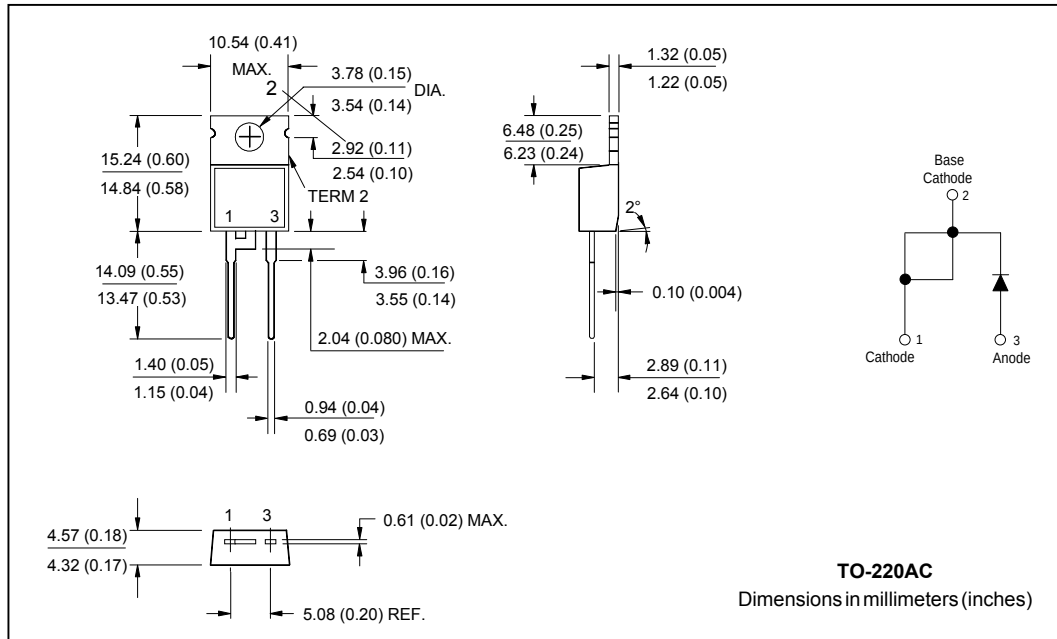
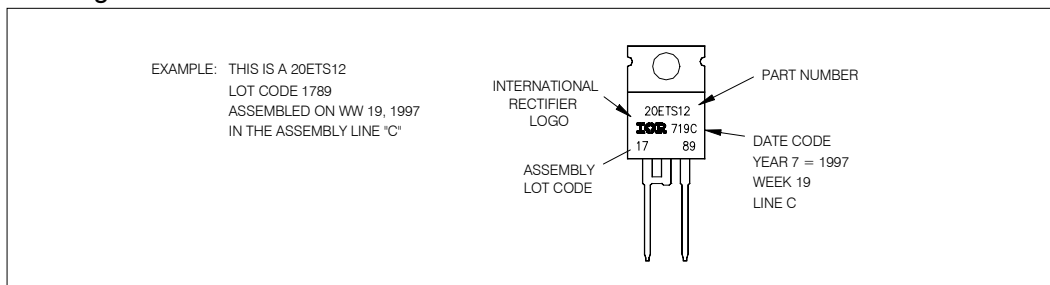


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

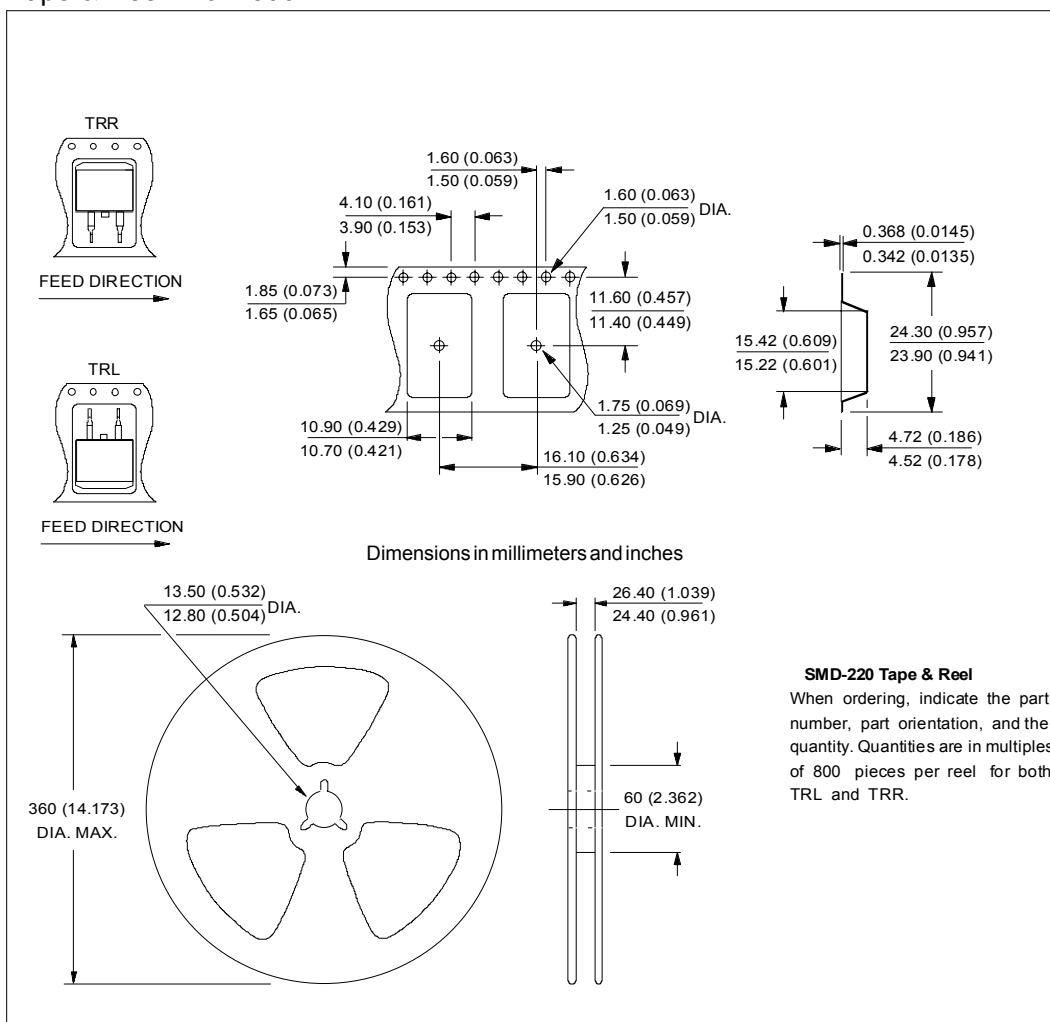
## Outline Table



## Marking Information



## Tape & Reel Information



## Ordering Information Table

| Device Code |   |                                                 |   |    |   |     |
|-------------|---|-------------------------------------------------|---|----|---|-----|
| 20          | E | T                                               | S | 12 | S | TRL |
| 1           | 2 | 3                                               | 4 | 5  | 6 | 7   |
| 1           | - | Current Rating                                  |   |    |   |     |
| 2           | - | Circuit Configuration                           |   |    |   |     |
|             |   | E = Single Diode                                |   |    |   |     |
| 3           | - | Package                                         |   |    |   |     |
|             |   | T = TO-220AC                                    |   |    |   |     |
| 4           | - | Type of Silicon                                 |   |    |   |     |
|             |   | S = Standard Recovery Rectifier                 |   |    |   |     |
| 5           | - | Voltage code: Code x 100 = $V_{RRM}$            |   |    |   |     |
| 6           | - | S = TO-220 D <sup>2</sup> Pak (SMD-220) Version |   |    |   |     |
| 7           | - | Tape and Reel Option                            |   |    |   |     |
|             |   | TRL = Left Reel                                 |   |    |   |     |
|             |   | TRR = Right Orientation Reel                    |   |    |   |     |

08 = 800V  
12 = 1200V

Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level.  
Qualification Standards can be found on IR's Web site.

International  
**IR** Rectifier

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