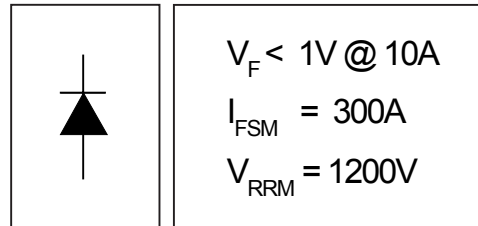


**INPUT RECTIFIER DIODE**  
Lead-Free ("PbF" suffix)



**Description/ Features**

The 20ETS12PbF 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.

**Output Current in Typical Applications**

| Applications  | Single-phase Bridge | Three-phase Bridge | Units |
|---|---------------------|--------------------|-------|
| Capacitive input filter TA = 55°C, TJ = 125°C, common heatsink of 1°C/W | 16.3                | 21                 | A     |

**Major Ratings and Characteristics**

| Characteristics            | Values     | Units |
|----------------------------|------------|-------|
| IF(AV) Sinusoidal waveform | 20         | A     |
| VRRM                       | 1200       | V     |
| IFSM                       | 300        | A     |
| VF @10A, TJ=25°C           | 1.0        | V     |
| TJ                         | -40 to 150 | °C    |

**Package Outline**



## Voltage Ratings

| Part Number | $V_{RRM}$ , maximum peak reverse voltage<br>V | $V_{RSM}$ , maximum non repetitive peak reverse voltage<br>V | $I_{RRM}$<br>150°C<br>mA |
|-------------|---|--|--------------------------|
| 20ETS12PbF  | 1200  | 1300   | 1                        |

## 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    | $m\Omega$ | $T_J = 150^\circ\text{C}$       |
| $V_{F(TO)}$ 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                           |
|--|------------|---------------------------|--------------------------------------|
| $T_J$ Max. Junction Temperature Range                  | -40 to 150 | $^\circ\text{C}$          |                                      |
| $T_{stg}$ Max. Storage Temperature Range               | -40 to 150 | $^\circ\text{C}$          |                                      |
| $R_{thJC}$ Max. Thermal Resistance Junction to Case    | 1.3        | $^\circ\text{C}/\text{W}$ | DC operation                         |
| $R_{thJA}$ Max. Thermal Resistance Junction to Ambient | 62         | $^\circ\text{C}/\text{W}$ | (*) For D <sup>2</sup> Pak version   |
| $R_{thCS}$ Typ. Thermal Resistance Case to Heatsink    | 0.5        | $^\circ\text{C}/\text{W}$ | Mounting surface, smooth and greased |
| wt Approximate Weight                                  | 2 (0.07)   | g (oz.)                   |                                      |
| T Mounting Torque                                      | Min.       | 6 (5)                     | Kg-cm<br>(lbf-in)                    |
|  | Max.       | 12 (10)                   |                                      |
| Case Style   | TO-220AC   |                           |                                      |
| Device Marking   | 10ETS12    |                           |                                      |

\* 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

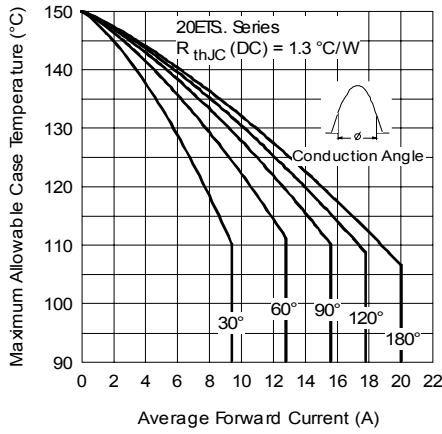


Fig. 1 - Current Rating Characteristics

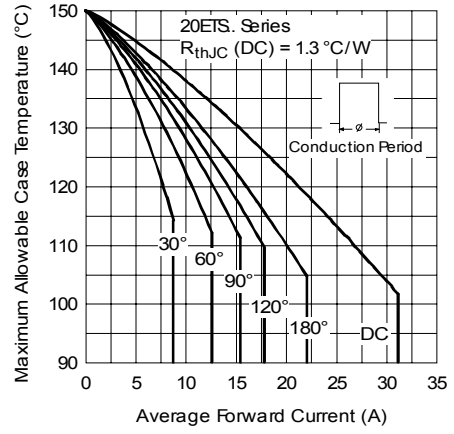


Fig. 2 - Current Rating Characteristics

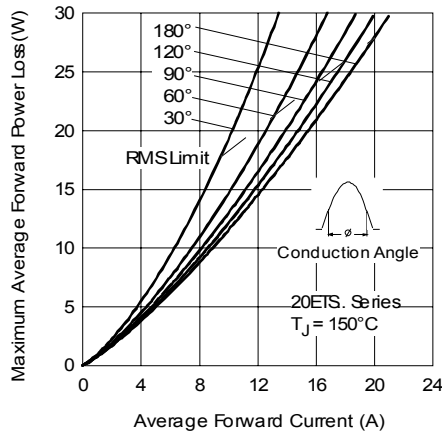


Fig. 3 - Forward Power Loss Characteristics

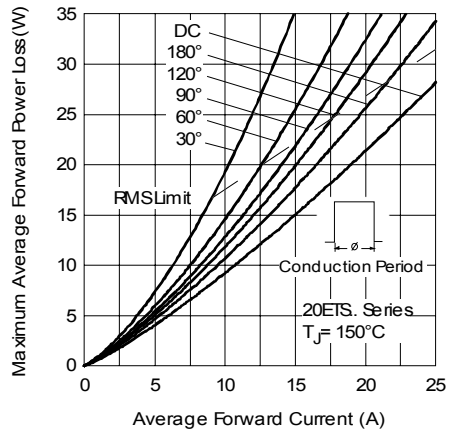


Fig. 4 - Forward Power Loss Characteristics

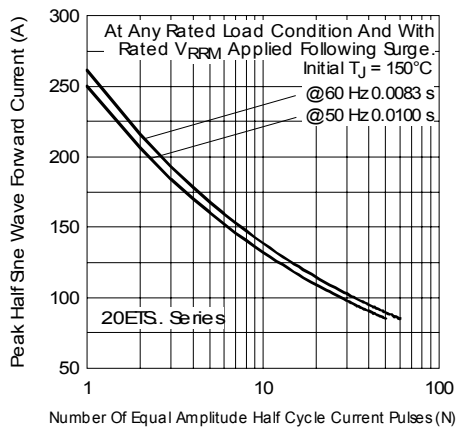


Fig. 5 - Maximum Non-Repetitive Surge Current

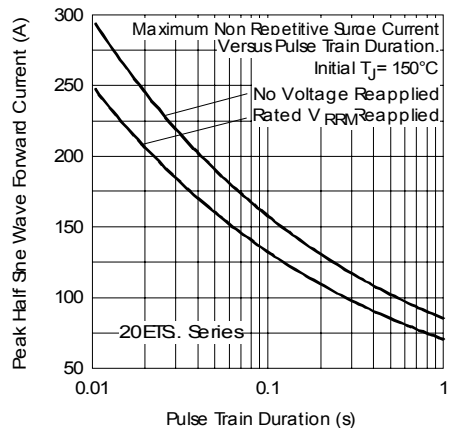


Fig. 6 - Maximum Non-Repetitive Surge Current

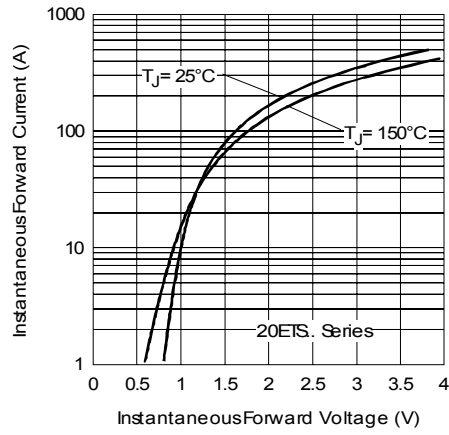


Fig. 7 - Forward Voltage Drop Characteristics

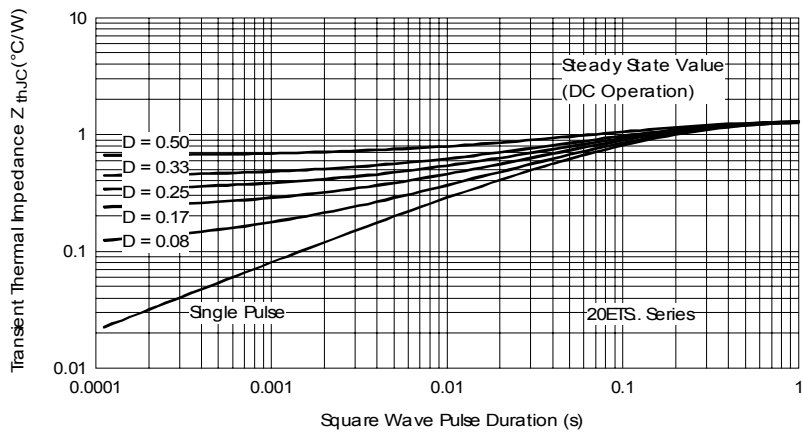
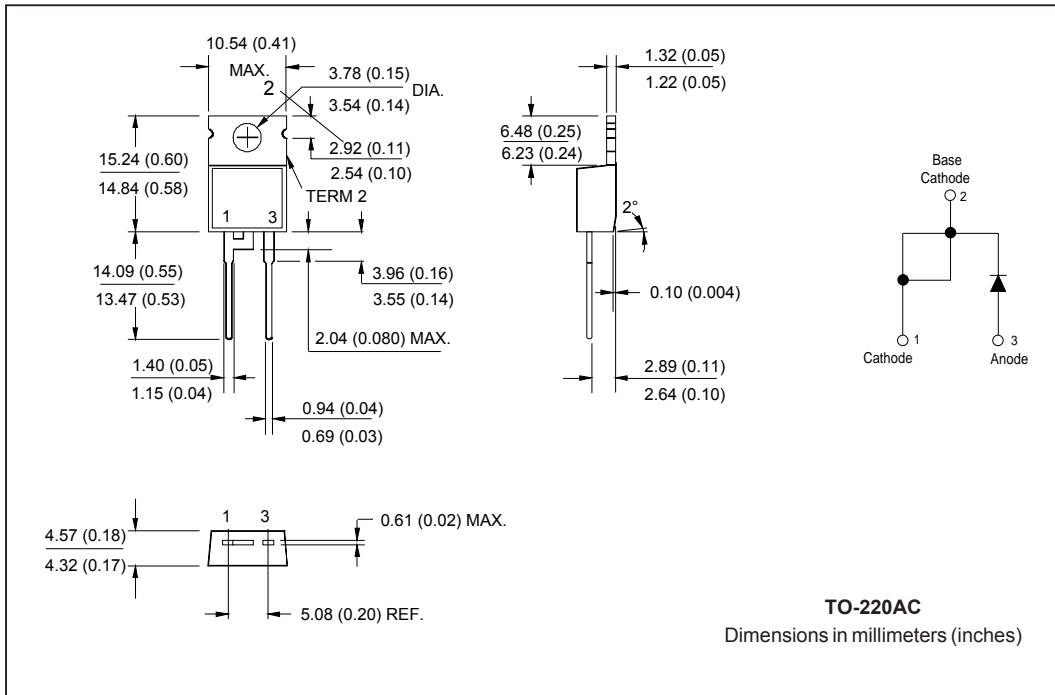
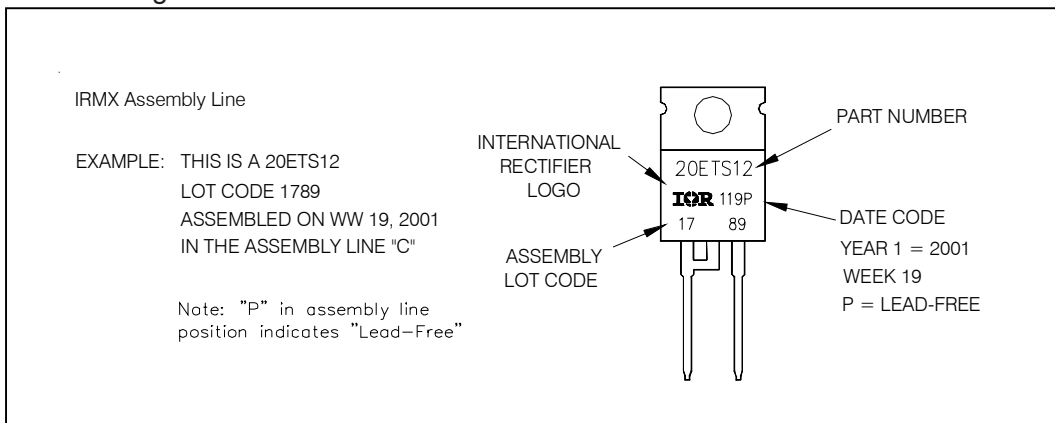


Fig. 8 - Thermal Impedance  $Z_{thjC}$  Characteristics

Outline Table



Part Marking Information



Ordering Information Table

| Device Code |  |   |   |    |     |
|-------------|--|---|---|----|-----|
| 20          | E  | T | S | 12 | PbF |
| ①           | ②  | ③ | ④ | ⑤  | ⑥   |
| <b>1</b>    | - Current Rating (20 = 20A)                          |   |   |    |     |
| <b>2</b>    | - Circuit Configuration<br>E = Single Diode          |   |   |    |     |
| <b>3</b>    | - Package<br>T = TO-220AC                            |   |   |    |     |
| <b>4</b>    | - Type of Silicon<br>S = Standard Recovery Rectifier |   |   |    |     |
| <b>5</b>    | - Voltage Rating (12 = 1200V)                        |   |   |    |     |
| <b>6</b>    | - • none = Standard Production<br>• PbF = Lead-Free  |   |   |    |     |

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