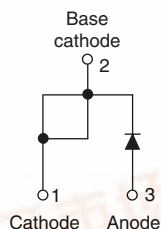


## Fast Soft Recovery Rectifier Diode, 20 A



TO-220AC



### FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level


RoHS  
COMPLIANT

### APPLICATIONS

- Output rectification and freewheeling in inverters, choppers and converters
- Input rectifications where severe restrictions on conducted EMI should be met

### DESCRIPTION

The VS-20ETF..PbF fast soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

### PRODUCT SUMMARY

|               |               |
|---------------|---------------|
| $V_F$ at 20 A | < 1.31 V      |
| $I_{FSM}$     | 355 A         |
| $V_{RRM}$     | 800 to 1200 V |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS            | VALUES      | UNITS |
|-------------|----------------------------|-------------|-------|
| $V_{RRM}$   |                            | 800 to 1200 | V     |
| $I_{F(AV)}$ | Sinusoidal waveform        | 20          | A     |
| $I_{FSM}$   |                            | 355         |       |
| $t_{rr}$    | 1 A, 100 A/μs              | 95          | ns    |
| $V_F$       | 20 A, $T_J = 25\text{ °C}$ | 1.31        | V     |
| $T_J$       | Range                      | - 40 to 150 | °C    |

### 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>AT 150 °C<br>mA |
|---------------|-----------------------------------------------|--------------------------------------------------------------|------------------------------|
| VS-20ETF08PbF | 800                                           | 900                                                          | 6                            |
| VS-20ETF10PbF | 1000                                          | 1100                                                         |                              |
| VS-20ETF12PbF | 1200                                          | 1300                                                         |                              |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                            | VALUES | UNITS             |
|-----------------------------------------------------|---------------|------------------------------------------------------------|--------|-------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 97\text{ °C}$ , 180° conduction half sine wave      | 20     | A                 |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                  | 300    |                   |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                     | 355    |                   |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                  | 450    | A <sup>2</sup> s  |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                     | 635    |                   |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied | 6350   | A <sup>2</sup> √s |

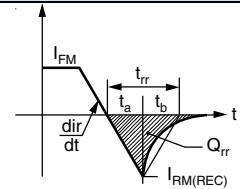
# VS-20ETF..PbF Soft Recovery Series



Vishay High Power Products Fast Soft Recovery Rectifier Diode, 20 A

| ELECTRICAL SPECIFICATIONS       |             |                                          |                               |        |
|---------------------------------|-------------|------------------------------------------|-------------------------------|--------|
| PARAMETER                       | SYMBOL      | TEST CONDITIONS                          |                               | VALUES |
| Maximum forward voltage drop    | $V_{FM}$    | 20 A, $T_J = 25\text{ }^{\circ}\text{C}$ |                               | 1.31   |
| Forward slope resistance        | $r_t$       | $T_J = 150\text{ }^{\circ}\text{C}$      |                               | 11.88  |
| Threshold voltage               | $V_{F(TO)}$ |                                          |                               | 0.93   |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^{\circ}\text{C}$       | $V_R = \text{Rated } V_{RRM}$ | 0.1    |
|                                 |             | $T_J = 150\text{ }^{\circ}\text{C}$      |                               | 6      |

| RECOVERY CHARACTERISTICS |          |                                                                 |        |               |
|--------------------------|----------|-----------------------------------------------------------------|--------|---------------|
| PARAMETER                | SYMBOL   | TEST CONDITIONS                                                 | VALUES | UNITS         |
| Reverse recovery time    | $t_{rr}$ | $I_F$ at 20 Apk<br>25 A/ $\mu\text{s}$<br>25 $^{\circ}\text{C}$ | 400    | ns            |
| Reverse recovery current | $I_{rr}$ |                                                                 | 6.1    | A             |
| Reverse recovery charge  | $Q_{rr}$ |                                                                 | 1.7    | $\mu\text{C}$ |
| Snap factor              | S        | Typical                                                         | 0.6    |               |



| THERMAL - MECHANICAL SPECIFICATIONS             |         |                                   |                                      |             |                        |
|-------------------------------------------------|---------|-----------------------------------|--------------------------------------|-------------|------------------------|
| PARAMETER                                       |         | SYMBOL                            | TEST CONDITIONS                      | VALUES      | UNITS                  |
| Maximum junction and storage temperature range  |         | T <sub>J</sub> , T <sub>Stg</sub> |                                      | - 40 to 150 | °C                     |
| Maximum thermal resistance, junction to case    |         | R <sub>thJC</sub>                 | DC operation                         | 0.9         | °C/W                   |
| Maximum thermal resistance, junction to ambient |         | R <sub>thJA</sub>                 |                                      | 62          |                        |
| Typical thermal resistance, case to heatsink    |         | R <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.5         |                        |
| Approximate weight                              |         |                                   |                                      | 2           | g                      |
|                                                 |         |                                   |                                      | 0.07        | oz.                    |
| Mounting torque                                 | minimum |                                   |                                      | 6 (5)       | kgf · cm<br>(lbf · in) |
|                                                 | maximum |                                   |                                      | 12 (10)     |                        |
| Marking device                                  |         |                                   | Case style TO-220AC                  | 20ETF08     |                        |

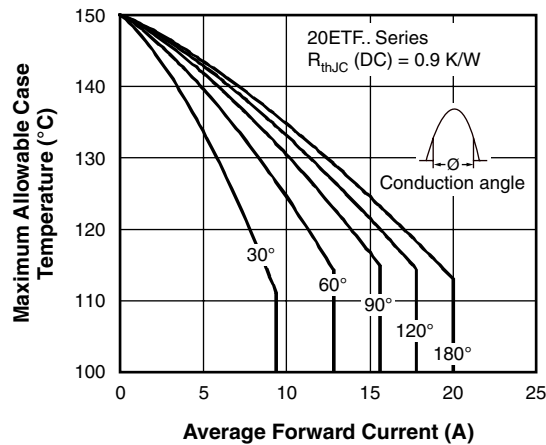


Fig. 1 - Current Rating Characteristics

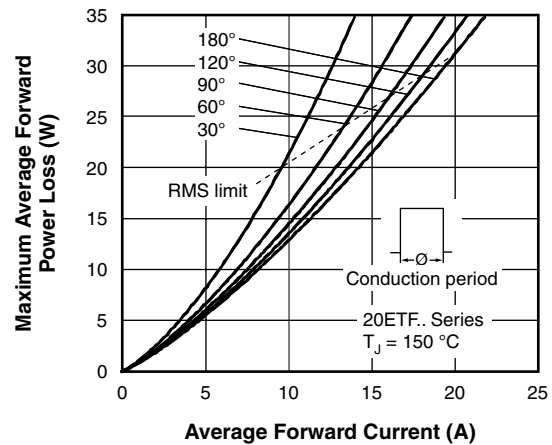


Fig. 4 - Forward Power Loss Characteristics

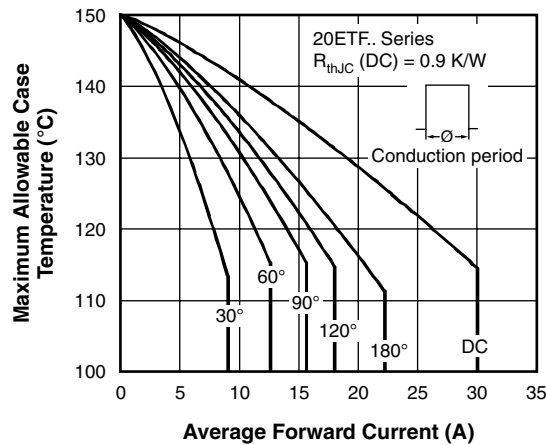


Fig. 2 - Current Rating Characteristics

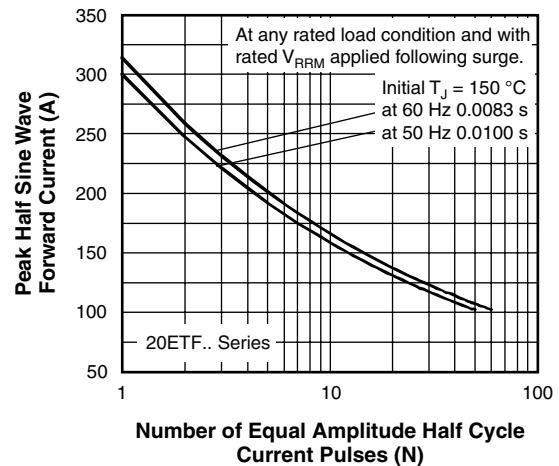


Fig. 5 - Maximum Non-Repetitive Surge Current

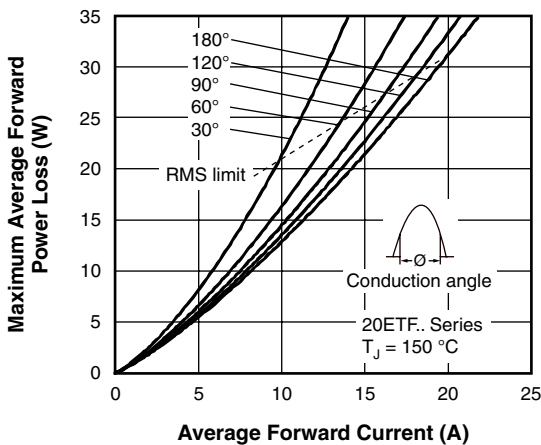


Fig. 3 - Forward Power Loss Characteristics

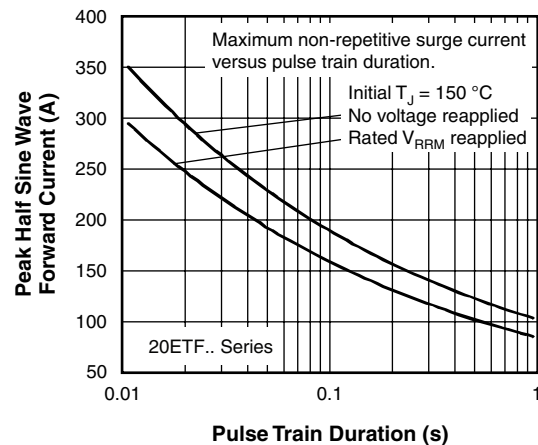


Fig. 6 - Maximum Non-Repetitive Surge Current

# VS-20ETF..PbF Soft Recovery Series



Vishay High Power Products 20ETF.. Series 供应商  
Rectifier Diode, 20 A

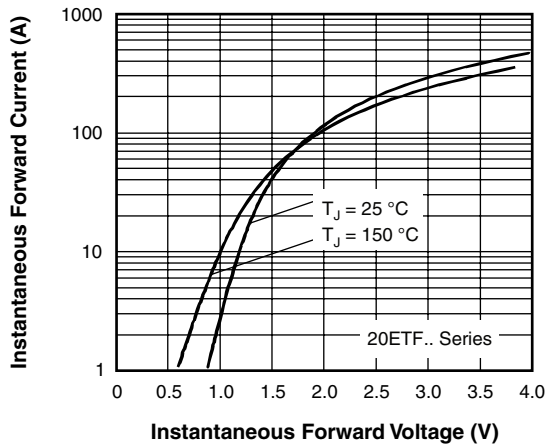


Fig. 7 - Forward Voltage Drop Characteristics

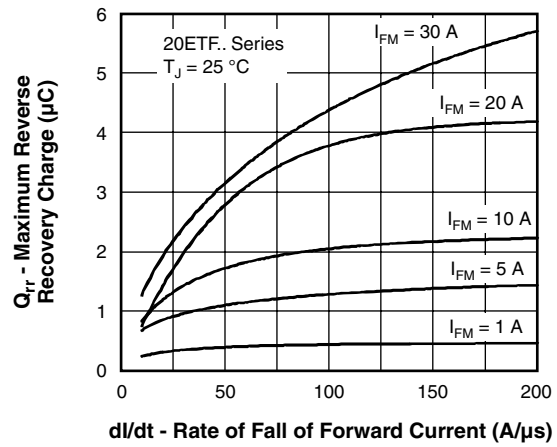


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ °C}$

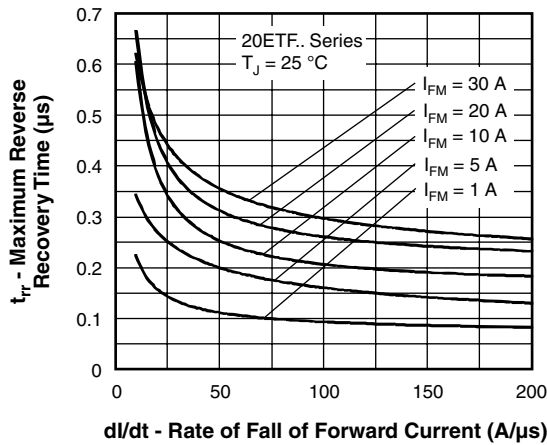


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ °C}$

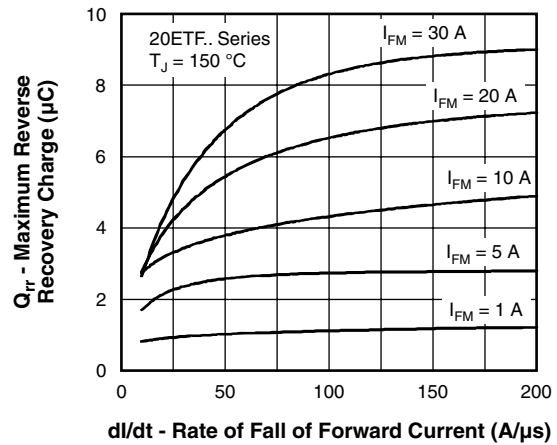


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ °C}$

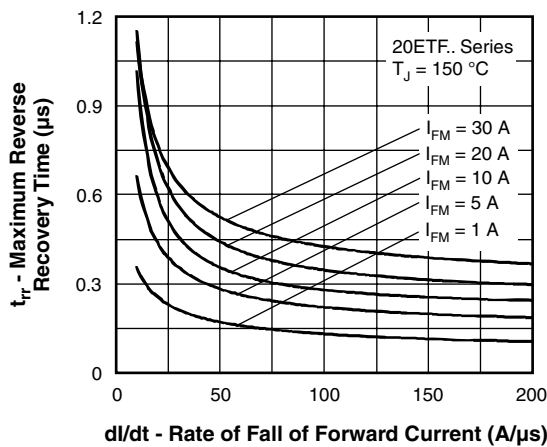


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ °C}$

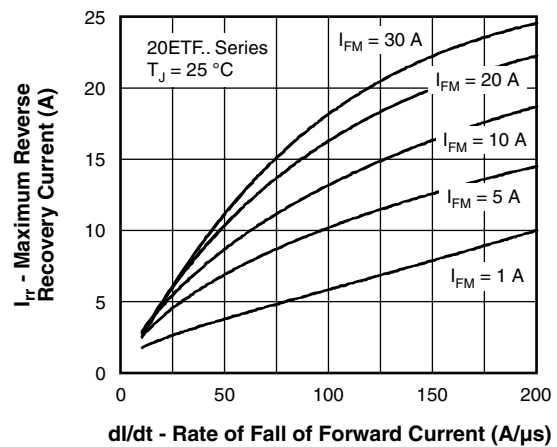


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ °C}$

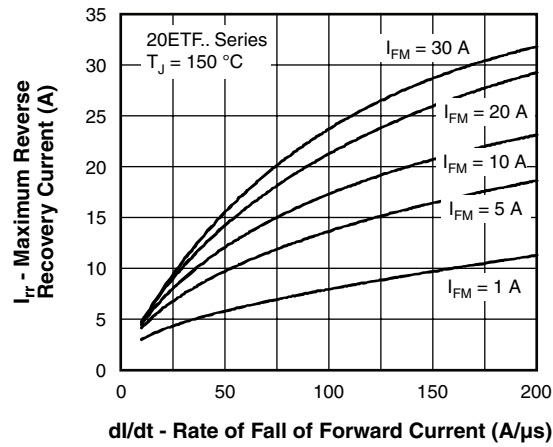


Fig. 13 - Recovery Current Characteristics,  $T_J = 150^\circ C$

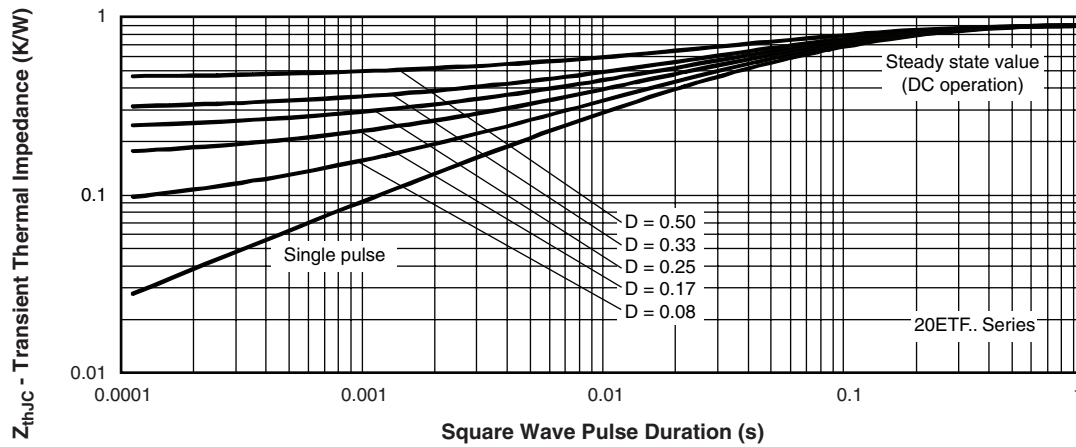


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# VS-20ETF..PbF Soft Recovery Series



Vishay High Power Products 供应商  
Fast Soft Recovery  
Rectifier Diode, 20 A

## ORDERING INFORMATION TABLE

| Device code | VS- | 20                                                   | E | T | F | 12 | PbF |
|-------------|-----|------------------------------------------------------|---|---|---|----|-----|
|             | 1   | 2                                                    | 3 | 4 | 5 | 6  | 7   |
| 1           | -   | HPP product suffix                                   |   |   |   |    |     |
| 2           | -   | Current rating (20 = 20 A)                           |   |   |   |    |     |
| 3           | -   | Circuit configuration:<br>E = Single diode           |   |   |   |    |     |
| 4           | -   | Package:<br>T = TO-220AC                             |   |   |   |    |     |
| 5           | -   | Type of silicon:<br>F = Fast soft recovery rectifier |   |   |   |    |     |
| 6           | -   | Voltage ratings                                      |   |   |   |    |     |
| 7           | -   | PbF = Lead (Pb)-free                                 |   |   |   |    |     |

08 = 800 V  
10 = 1000 V  
12 = 1200 V

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95221">www.vishay.com/doc?95221</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95224">www.vishay.com/doc?95224</a> |

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