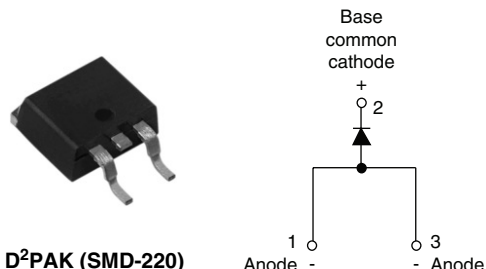


## Surface Mountable Fast Soft Recovery Rectifier Diode, 20 A



### PRODUCT SUMMARY

|               |              |
|---------------|--------------|
| $V_F$ at 10 A | < 1.2 V      |
| $I_{FSM}$     | 300 A        |
| $V_{RRM}$     | 200 to 600 V |

### FEATURES/DESCRIPTION

The 20ETF..S 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.

This product series has been designed and qualified for industrial level.

### APPLICATIONS

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

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                | VALUES      | UNITS            |
|-------------|--------------------------------|-------------|------------------|
| $I_{F(AV)}$ | Sinusoidal waveform            | 20          | A                |
| $V_{RRM}$   |                                | 200 to 600  | V                |
| $I_{FSM}$   |                                | 300         | A                |
| $V_F$       | 10 A, $T_J = 25^\circ\text{C}$ | 1.2         | V                |
| $t_{rr}$    | 1 A, 100 A/ $\mu\text{s}$      | 60          | ns               |
| $T_J$       | Range                          | - 40 to 150 | $^\circ\text{C}$ |

### VOLTAGE RATINGS

| PART NUMBER | $V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ AT 150 $^\circ\text{C}$<br>mA |
|-------------|-----------------------------------------------|--------------------------------------------------------------|-----------------------------------------|
| 20ETF02S    | 200                                           | 300                                                          | 5                                       |
| 20ETF04S    | 400                                           | 500                                                          |                                         |
| 20ETF06S    | 600                                           | 700                                                          |                                         |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                           | SYMBOL        | TEST CONDITIONS                                           | VALUES | UNITS                       |
|-----------------------------------------------------|---------------|-----------------------------------------------------------|--------|-----------------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 97^\circ\text{C}$ , 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                 | 250    |                             |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                    | 300    |                             |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                 | 316    | $\text{A}^2\text{s}$        |
|                                                     |               | 10 ms sine pulse, no voltage reapplied                    | 442    |                             |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1$ to 10 ms, no voltage reapplied                  | 4420   | $\text{A}^2\sqrt{\text{s}}$ |

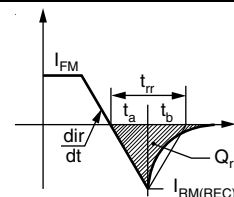
# 20ETF..S Soft Recovery Series

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



| ELECTRICAL SPECIFICATIONS       |             |                                          |                               |        |
|---------------------------------|-------------|------------------------------------------|-------------------------------|--------|
| PARAMETER                       | SYMBOL      | TEST CONDITIONS                          |                               | VALUES |
| Maximum forward voltage drop    | $V_{FM}$    | 20 A, $T_J = 25\text{ }^{\circ}\text{C}$ |                               | 1.30   |
|                                 |             | 60 A, $T_J = 25\text{ }^{\circ}\text{C}$ |                               | 1.67   |
| Forward slope resistance        | $r_t$       |                                          |                               | 12.5   |
| Threshold voltage               | $V_{F(TO)}$ | $T_J = 150\text{ }^{\circ}\text{C}$      |                               | 0.9    |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^{\circ}\text{C}$       | $V_R = \text{Rated } V_{RRM}$ | 0.1    |
|                                 |             | $T_J = 150\text{ }^{\circ}\text{C}$      |                               | 5.0    |

| RECOVERY CHARACTERISTICS |          |                       |        |               |
|--------------------------|----------|-----------------------|--------|---------------|
| PARAMETER                | SYMBOL   | TEST CONDITIONS       | VALUES | UNITS         |
| Reverse recovery time    | $t_{rr}$ | $I_F$ at 20 Apk       | 160    | ns            |
| Reverse recovery current | $I_{rr}$ | 100 A/ $\mu\text{s}$  | 10     | A             |
| Reverse recovery charge  | $Q_{rr}$ | 25 $^{\circ}\text{C}$ | 1.25   | $\mu\text{C}$ |
| Snap factor              | S        | Typical               | 0.6    |               |



| THERMAL - MECHANICAL SPECIFICATIONS                         |                  |                                         |             |                      |
|-------------------------------------------------------------|------------------|-----------------------------------------|-------------|----------------------|
| PARAMETER                                                   | SYMBOL           | TEST CONDITIONS                         | VALUES      | UNITS                |
| Maximum junction and storage temperature range              | $T_J, T_{Stg}$   |                                         | - 40 to 150 | $^{\circ}\text{C}$   |
| Maximum thermal resistance, junction to case                | $R_{thJC}$       | DC operation                            | 0.9         | $^{\circ}\text{C/W}$ |
| Maximum thermal resistance, junction to ambient (PCB mount) | $R_{thJA}^{(1)}$ |                                         | 40          |                      |
| Soldering temperature                                       | $T_S$            |                                         | 240         | $^{\circ}\text{C}$   |
| Approximate weight                                          |                  |                                         | 2           | g                    |
|                                                             |                  |                                         | 0.07        | oz.                  |
| Marking device                                              |                  | Case style D <sup>2</sup> PAK (SMD-220) | 20ETF02S    |                      |
|                                                             |                  |                                         | 20ETF04S    |                      |
|                                                             |                  |                                         | 20ETF06S    |                      |

## Note

<sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz. (140  $\mu\text{m}$ ) copper 40  $^{\circ}\text{C/W}$   
For recommended footprint and soldering techniques refer to application note #AN-994



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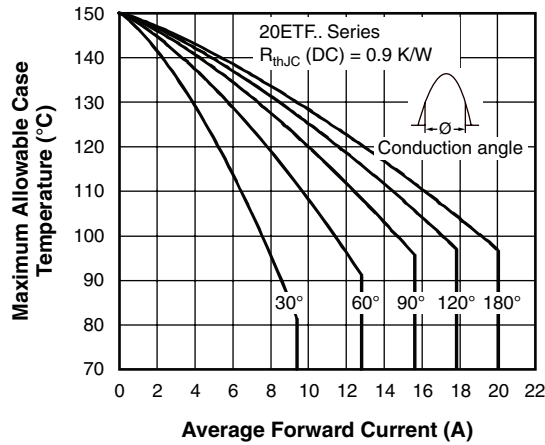


Fig. 1 - Current Rating Characteristics

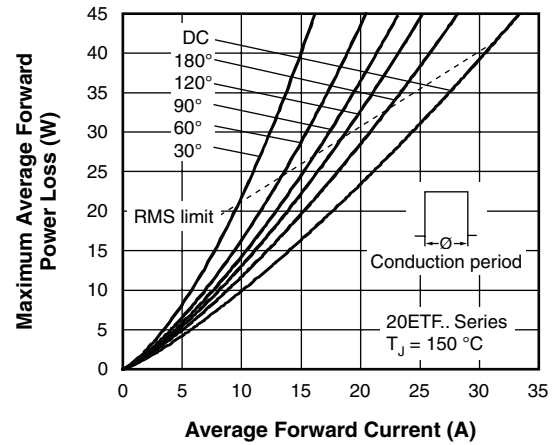


Fig. 4 - Forward Power Loss Characteristics

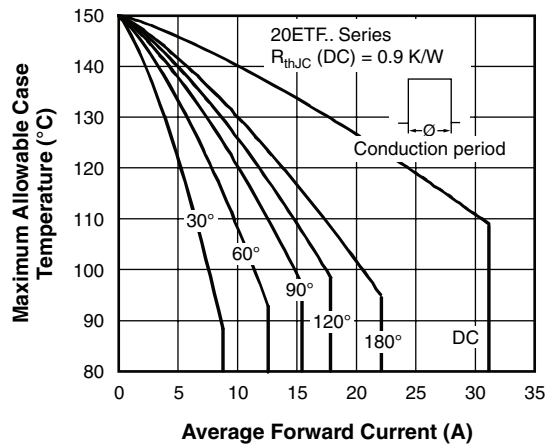


Fig. 2 - Current Rating Characteristics

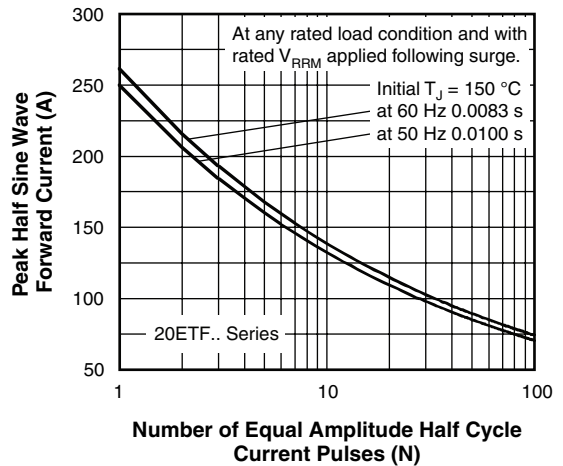


Fig. 5 - Maximum Non-Repetitive Surge Current

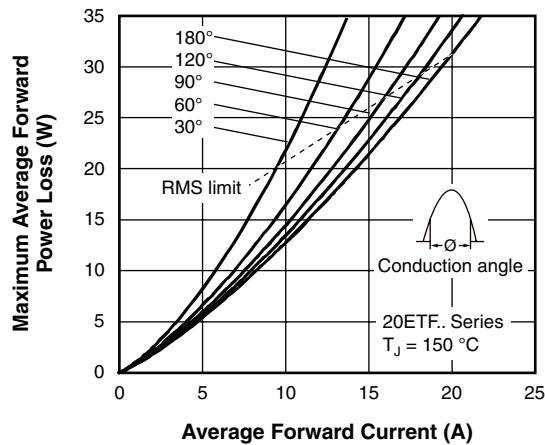


Fig. 3 - Forward Power Loss Characteristics

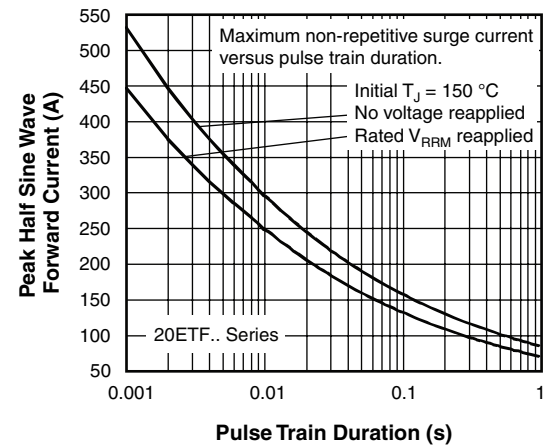


Fig. 6 - Maximum Non-Repetitive Surge Current

# 20ETF..S Soft Recovery Series

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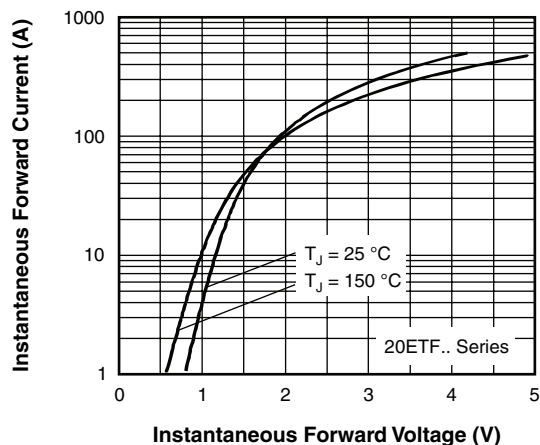


Fig. 7 - Forward Voltage Drop Characteristics

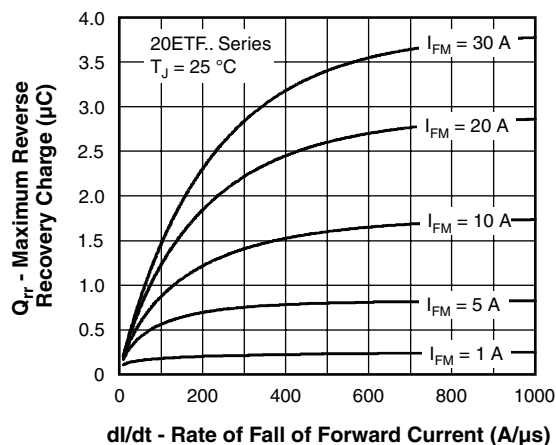


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

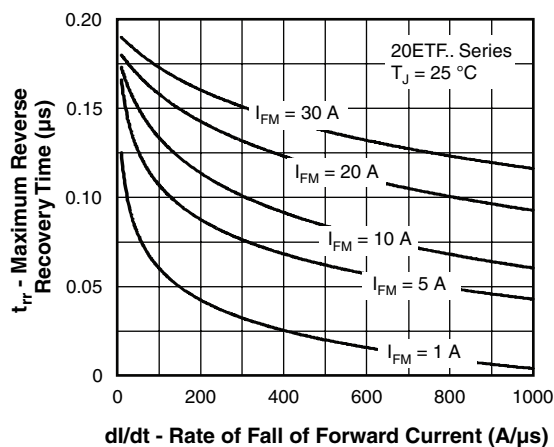


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$

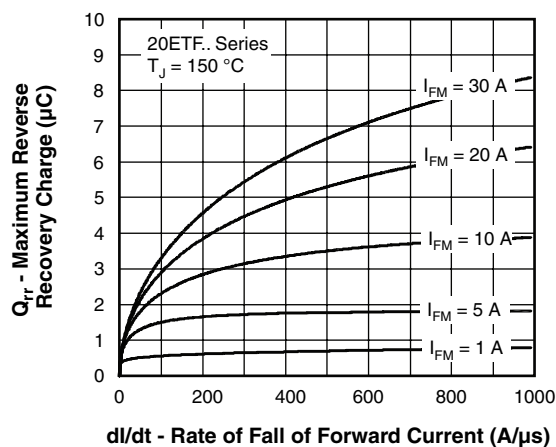


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$

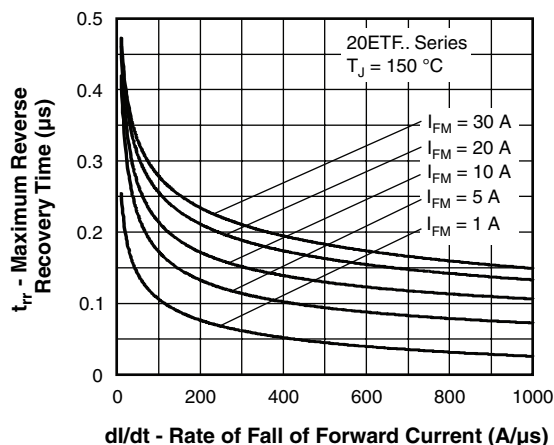


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ }^{\circ}\text{C}$

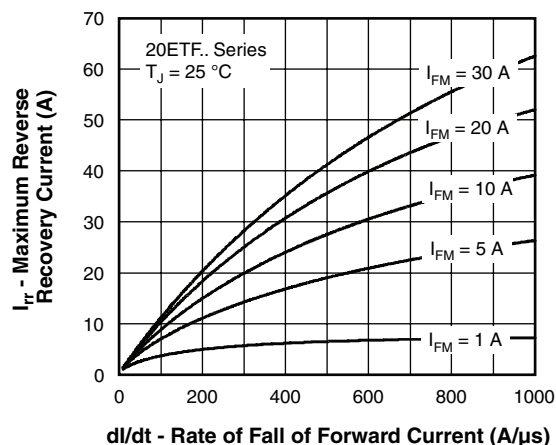


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^{\circ}\text{C}$



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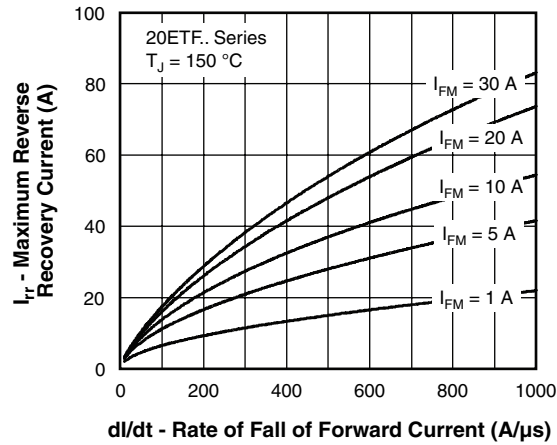


Fig. 13 - Recovery Current Characteristics,  $T_J = 150^\circ C$

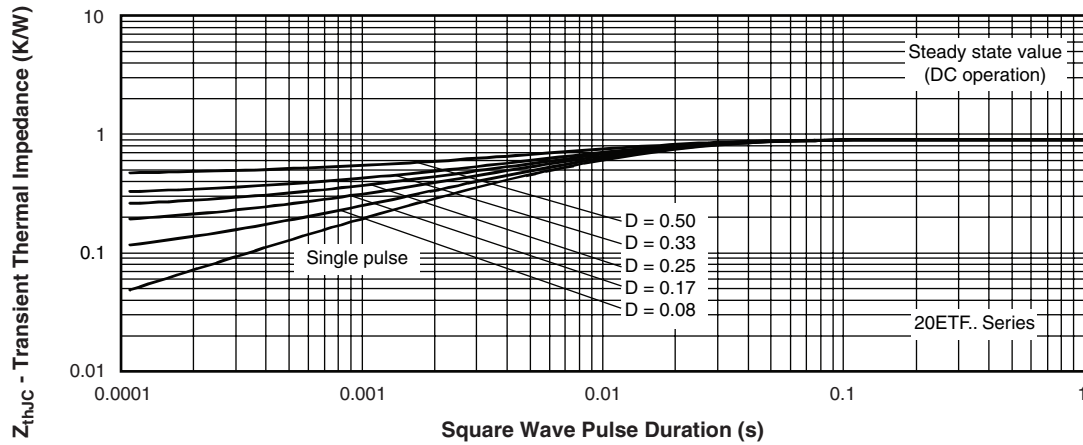


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

# 20ETF..S Soft Recovery Series

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



## ORDERING INFORMATION TABLE

|             |    |   |   |   |    |   |     |   |
|-------------|----|---|---|---|----|---|-----|---|
| Device code | 20 | E | T | F | 06 | S | TRL | - |
|             | 1  | 2 | 3 | 4 | 5  | 6 | 7   | 8 |

- |          |   |                                        |            |
|----------|---|----------------------------------------|------------|
| <b>1</b> | - | Current rating (20 = 20 A)             |            |
| <b>2</b> | - | Circuit configuration:                 |            |
|          |   | E = Single diode                       |            |
| <b>3</b> | - | Package:                               |            |
|          |   | T = D <sup>2</sup> PAK (TO-220AC)      |            |
| <b>4</b> | - | Type of silicon:                       |            |
|          |   | F = Fast soft recovery rectifier       |            |
| <b>5</b> | - | Voltage code x 100 = V <sub>RRM</sub>  | 02 = 200 V |
| <b>6</b> | - | S = Surface mountable                  | 04 = 400 V |
|          |   |                                        | 06 = 600 V |
| <b>7</b> | - | • None = Tube                          |            |
|          |   | • TRR = Tape and reel (right oriented) |            |
|          |   | • TRL = Tape and reel (left oriented)  |            |
| <b>8</b> | - | • None = Standard production           |            |
|          |   | • PbF = Lead (Pb)-free                 |            |

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95046">http://www.vishay.com/doc?95046</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95054">http://www.vishay.com/doc?95054</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a> |



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