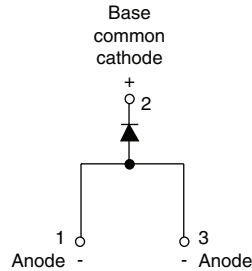


## Fast Soft Recovery Rectifier Diode, 10 A



D<sup>2</sup>PAK (SMD-220)



### FEATURES/DESCRIPTION

The 10ETF..SPbF fast soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.



**RoHS\***  
COMPLIANT

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 and lead (Pb)-free.

### APPLICATIONS

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

### PRODUCT SUMMARY

|               |              |
|---------------|--------------|
| $V_{RRM}$     | 200 to 600 V |
| $V_F$ at 10 A | < 1.2 V      |
| $t_{rr}$      | 50 ns        |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                | VALUES      | UNITS            |
|-------------|--------------------------------|-------------|------------------|
| $V_{RRM}$   |                                | 200 to 600  | V                |
| $I_{F(AV)}$ | Sinusoidal waveform            | 10          | A                |
| $I_{FSM}$   |                                | 150         |                  |
| $t_{rr}$    | 1 A, 100 A/ $\mu$ s            | 50          | ns               |
| $V_F$       | 10 A, $T_J = 25^\circ\text{C}$ | 1.2         | V                |
| $T_J$       | 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 |
|-------------|---|--|---|
| 10ETF02SPbF | 200   | 300  | 2                                       |
| 10ETF04SPbF | 400   | 500  |   |
| 10ETF06SPbF | 600   | 700  |   |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL        | TEST CONDITIONS  | VALUES | UNITS                       |
|---|---------------|--|--------|-----------------------------|
| Maximum average forward current                     | $I_{F(AV)}$   | $T_C = 128^\circ\text{C}$ , 180 $^\circ$ conduction half sine wave | 10     | A                           |
| Maximum peak one cycle non-repetitive surge current | $I_{FSM}$     | 10 ms sine pulse, rated $V_{RRM}$ applied                          | 150    |                             |
|   |               | 10 ms sine pulse, no voltage reapplied                             | 160    |                             |
| Maximum $I^2t$ for fusing                           | $I^2t$        | 10 ms sine pulse, rated $V_{RRM}$ applied                          | 112.5  | $\text{A}^2\text{s}$        |
|   |               | 10 ms sine pulse, no voltage reapplied                             | 160    |                             |
| Maximum $I^2\sqrt{t}$ for fusing                    | $I^2\sqrt{t}$ | $t = 0.1$ to 10 ms, no voltage reapplied                           | 1125   | $\text{A}^2\sqrt{\text{s}}$ |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# 10ETF..SPbF Soft Recovery Series

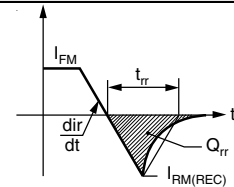


Vishay High Power Products

Fast Soft Recovery  
Rectifier Diode, 10 A

| ELECTRICAL SPECIFICATIONS       |             |  |                               |        |           |
|---------------------------------|-------------|--|-------------------------------|--------|-----------|
| PARAMETER                       | SYMBOL      | TEST CONDITIONS                        |                               | VALUES | UNITS     |
| Maximum forward voltage drop    | $V_{FM}$    | 10 A, $T_J = 25\text{ }^\circ\text{C}$ |                               | 1.2    | V         |
| Forward slope resistance        | $r_t$       | $T_J = 150\text{ }^\circ\text{C}$      |                               | 12.7   | $m\Omega$ |
| Threshold voltage               | $V_{F(TO)}$ |  |                               | 1.25   | V         |
| Maximum reverse leakage current | $I_{RM}$    | $T_J = 25\text{ }^\circ\text{C}$       | $V_R = \text{Rated } V_{RRM}$ | 0.1    | mA        |
|                                 |             | $T_J = 150\text{ }^\circ\text{C}$      |                               | 2.0    |           |

| RECOVERY CHARACTERISTICS |          |  |        |               |
|--------------------------|----------|--|--------|---------------|
| PARAMETER                | SYMBOL   | TEST CONDITIONS  | VALUES | UNITS         |
| Reverse recovery time    | $t_{rr}$ | $I_F$ at 10 Apk<br>25 A/ $\mu\text{s}$<br>$25\text{ }^\circ\text{C}$ | 145    | ns            |
| Reverse recovery current | $I_{rr}$ |  | 2.75   | A             |
| Reverse recovery charge  | $Q_{rr}$ |  | 0.32   | $\mu\text{C}$ |
| Snap factor              | S        |  | 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                            | 1.5         | $^\circ\text{C/W}$ |
| 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) | 10ETF02S    |                    |
|  |                  |   | 10ETF04S    |                    |
|  |                  |   | 10ETF06S    |                    |

**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



# 10ETF..SPbF Soft Recovery Series

Fast Soft Recovery  
Rectifier Diode, 10 A

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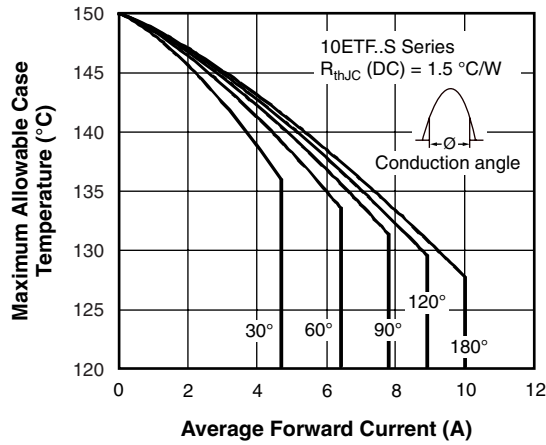


Fig. 1 - Current Rating Characteristics

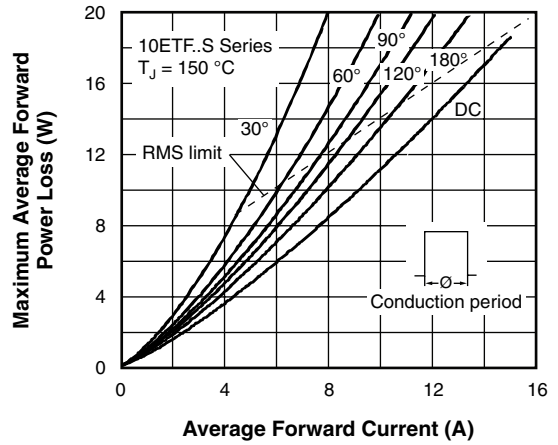


Fig. 4 - Forward Power Loss Characteristics

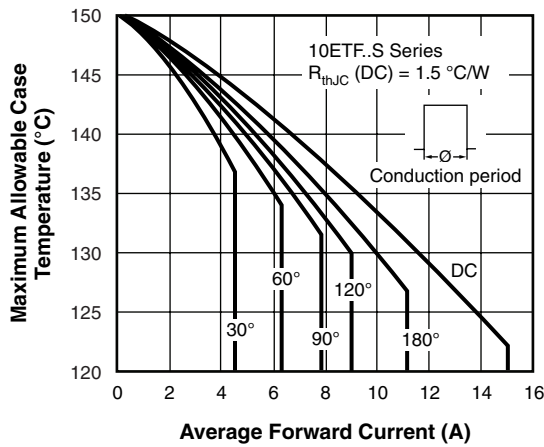


Fig. 2 - Current Rating Characteristics

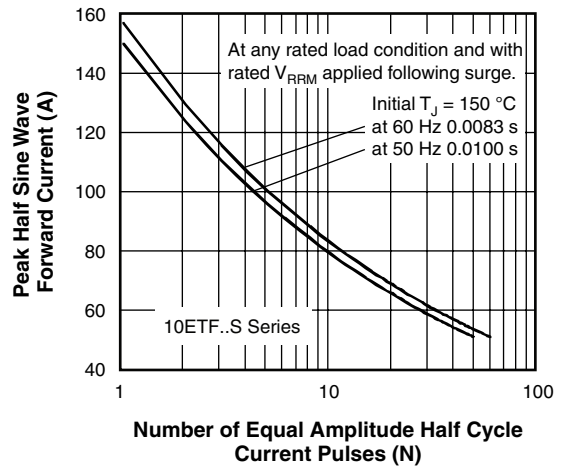


Fig. 5 - Maximum Non-Repetitive Surge Current

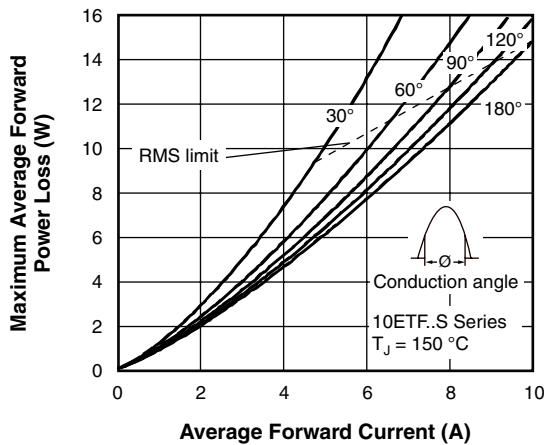


Fig. 3 - Forward Power Loss Characteristics

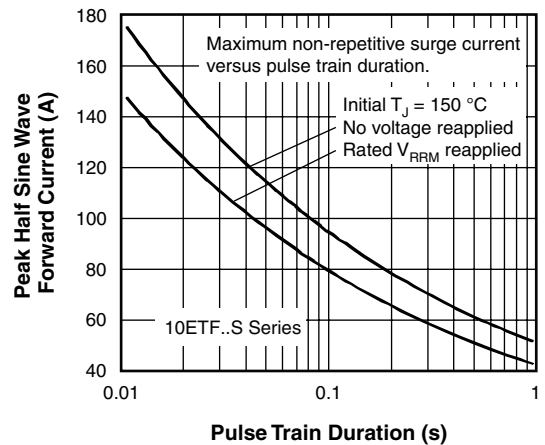


Fig. 6 - Maximum Non-Repetitive Surge Current

# 10ETF..SPbF Soft Recovery Series



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Fast Soft Recovery Rectifier Diode, 10 A

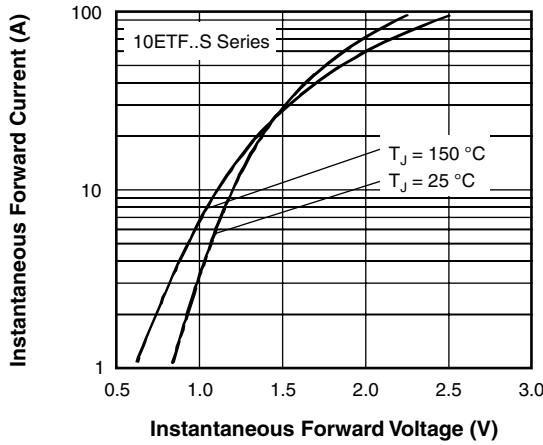


Fig. 7 - Forward Voltage Drop Characteristics

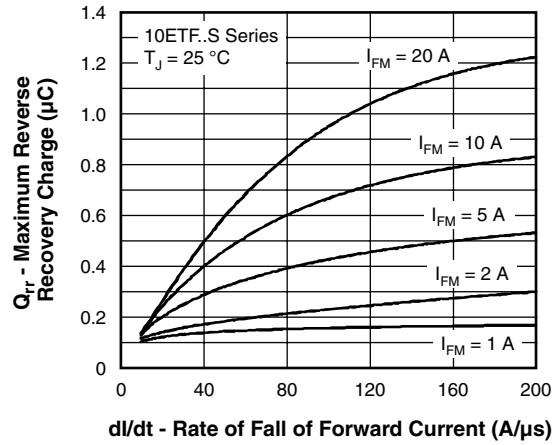


Fig. 10 - Recovery Charge Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

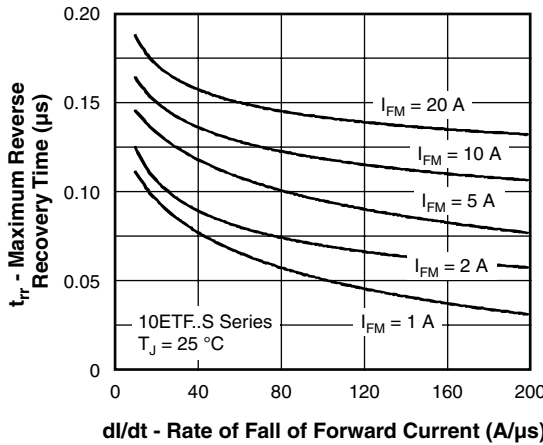


Fig. 8 - Recovery Time Characteristics,  $T_J = 25\text{ }^\circ\text{C}$

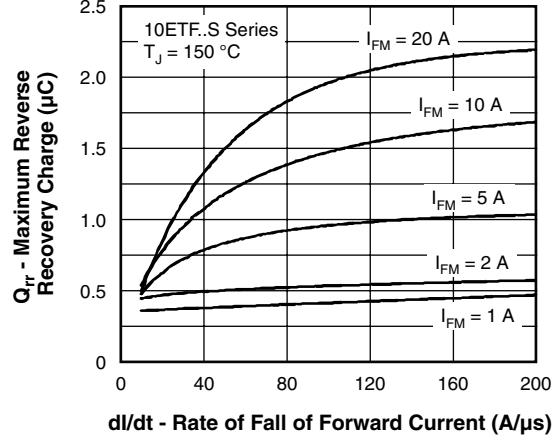


Fig. 11 - Recovery Charge Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

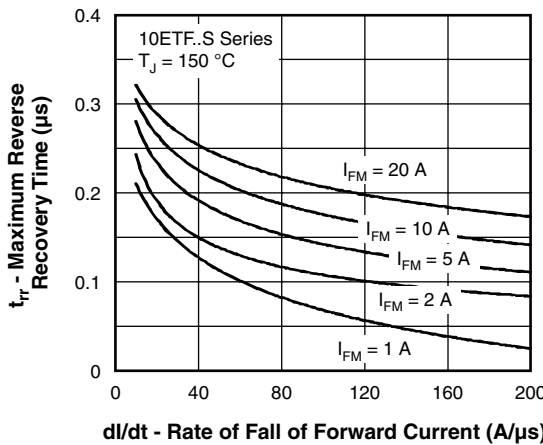


Fig. 9 - Recovery Time Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

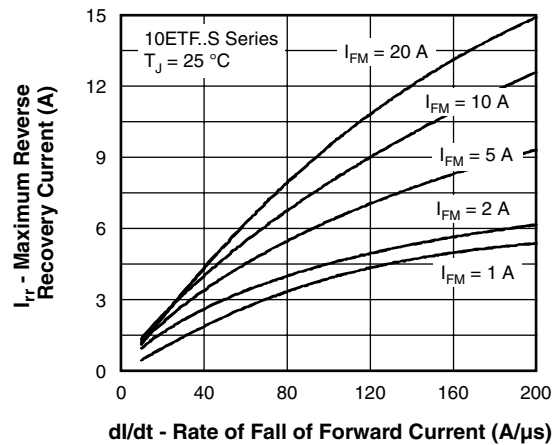


Fig. 12 - Recovery Current Characteristics,  $T_J = 25\text{ }^\circ\text{C}$



# 10ETF..SPbF Soft Recovery Series

Fast Soft Recovery  
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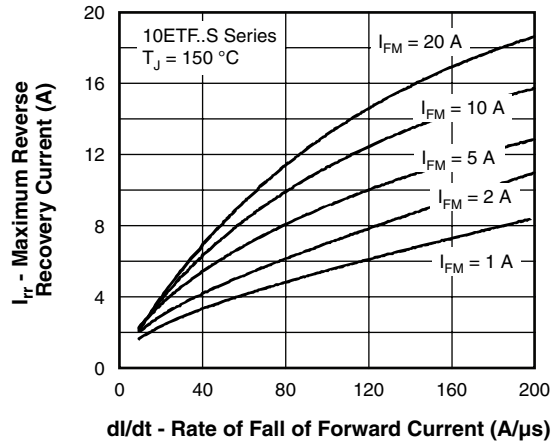


Fig. 13 - Recovery Current Characteristics,  $T_J = 150\text{ }^\circ\text{C}$

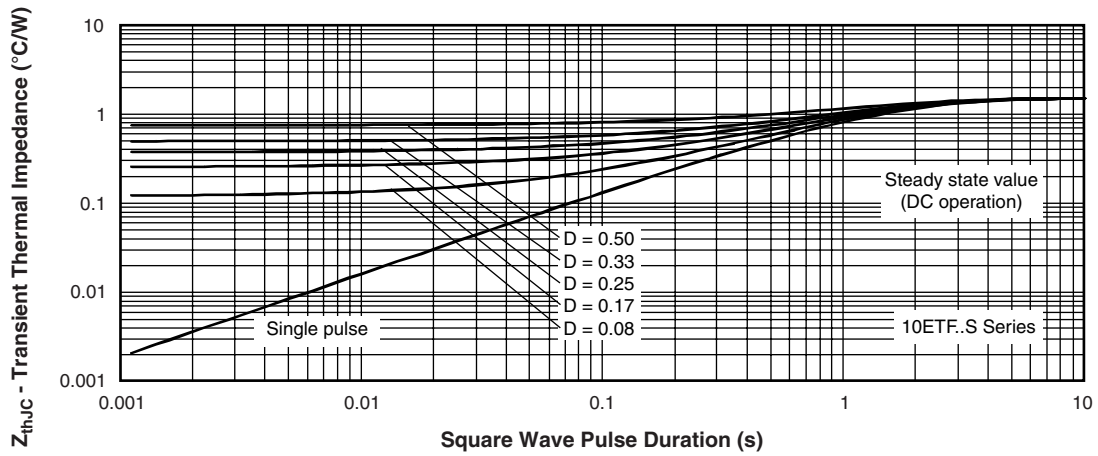


Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristics

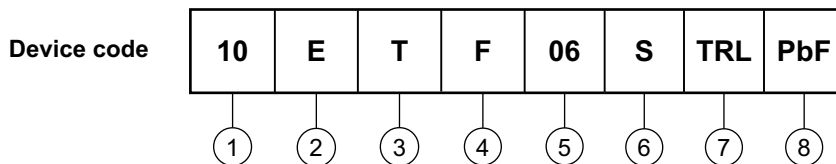
# 10ETF..SPbF Soft Recovery Series

Vishay High Power Products

Fast Soft Recovery  
Rectifier Diode, 10 A



## ORDERING INFORMATION TABLE



- 1** - Current rating (10 = 10 A)
- 2** - Circuit configuration:  
E = Single diode
- 3** - Package:  
T = D<sup>2</sup>PAK (TO-220AC)
- 4** - Type of silicon:  
F = Fast soft recovery rectifier
- 5** - Voltage code x 100 = V<sub>RRM</sub>
- 6** - S = Surface mountable
- 7** -
  - None = Tube
  - TRR = Tape and reel (right oriented)
  - TRL = Tape and reel (left oriented)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

|            |
|------------|
| 02 = 200 V |
| 04 = 400 V |
| 06 = 600 V |

| 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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