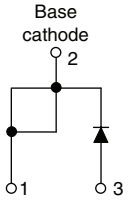
# Fast Soft Recovery Rectifier Diode, 20 A




**TO-220AC FULL-PAK** Cathode Anode

## FEATURES/DESCRIPTION

The 20ETF..FP 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.

The fully isolated package ($V_{INS}$ = 2500 $V_{RMS}$) is UL E78996 approved.

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

| PRODUCT SUMMARY | |
|---|---|
| $V_F$ at 20 A | < 1.31 V |
| $I_{FSM}$ | 355 A |
| $V_{RRM}$ | 1000 to 1200 V |

## 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** |
| $V_{RRM}$ | | 1000 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 °C | 1.31 | V |
| $T_J$ | Range | - 40 to 150 | °C |

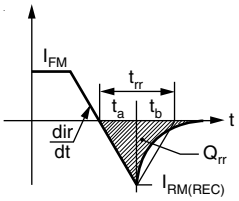
| VOLTAGE RATINGS | | | |
|---|---|---|---|
| **PART NUMBER** | **$V_{RRM}$, MAXIMUM PEAK REVERSE VOLTAGE V** | **$V_{RSM}$, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V** | **$I_{RRM}$ AT 150 °C mA** |
| 20ETF10FP | 1000 | 1100 | 6 |
| 20ETF12FP | 1200 | 1300 | |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **VALUES** | **UNITS** |
| Maximum average forward current | $I_{F(AV)}$ | $T_C$ = 97 °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 | $A^2s$ |
| | | 10 ms sine pulse, no voltage reapplied | 635 | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied | 6350 | $A^2\sqrt{s}$ |

## ELECTRICAL SPECIFICATIONS

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

## RECOVERY CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS | |
|---|---|---|---|---|---|
| Reverse recovery time | $t_{rr}$ | $I_F$ at 20 Apk<br>25 A/µs<br>25 °C | 400 | ns |  |
| Reverse recovery current | $I_{rr}$ | | 6.1 | A | |
| Reverse recovery charge | $Q_{rr}$ | | 1.7 | µC | |
| 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 | °C |
| Maximum thermal resistance, junction to case | | $R_{thJC}$ | DC operation | 1.5 | °C/W |
| Maximum thermal resistance, junction to ambient | | $R_{thJA}$ | | 62 | |
| Typical thermal resistance, case to heatsink | | $R_{thCS}$ | Mounting surface, smooth and greased | 1.5 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | | Case style TO-220AC FULL-PAK | 20ETF12FP | |

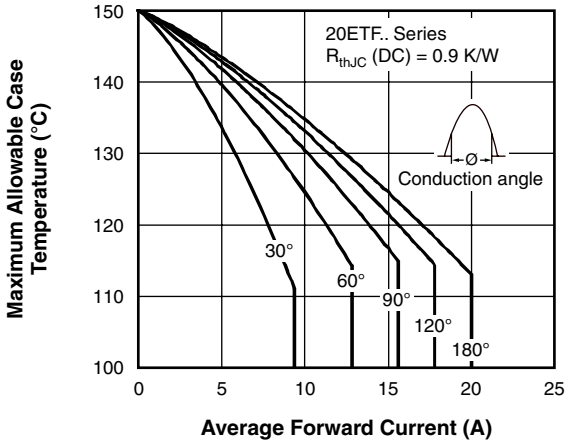



Fig. 1 - Current Rating Characteristics

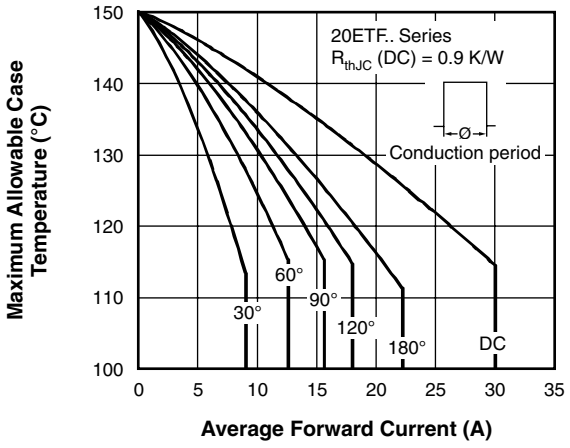



Fig. 2 - Current Rating Characteristics

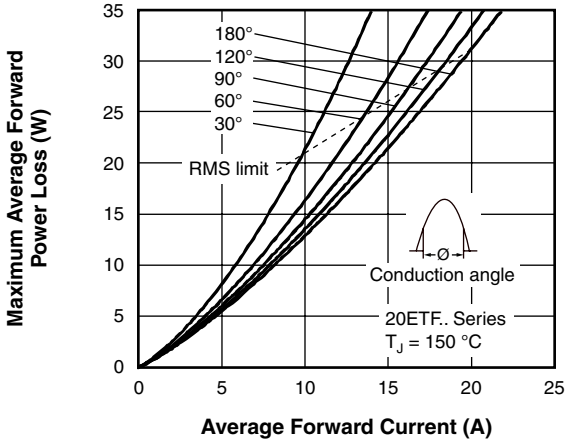



Fig. 3 - Forward Power Loss Characteristics

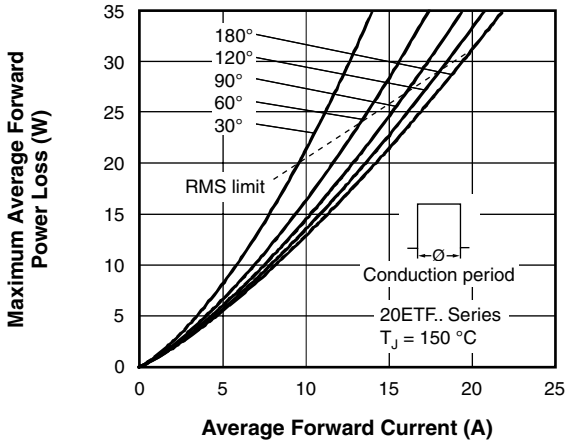



Fig. 4 - Forward Power Loss Characteristics

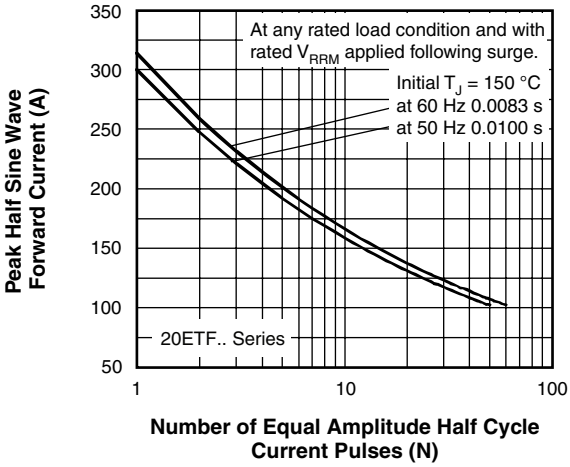



Fig. 5 - Maximum Non-Repetitive Surge Current

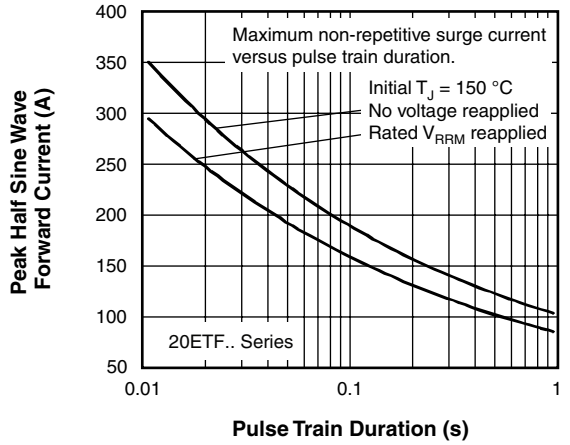



Fig. 6 - Maximum Non-Repetitive Surge Current

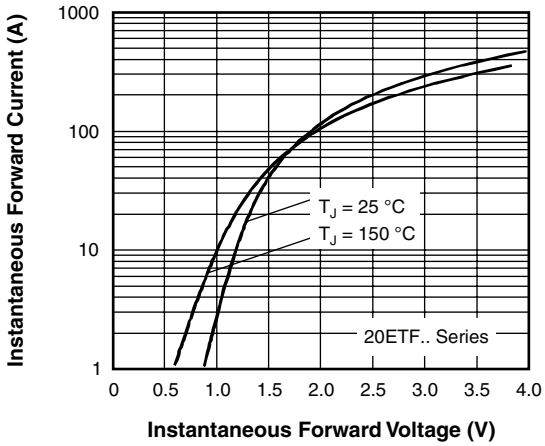



Fig. 7 - Forward Voltage Drop Characteristics

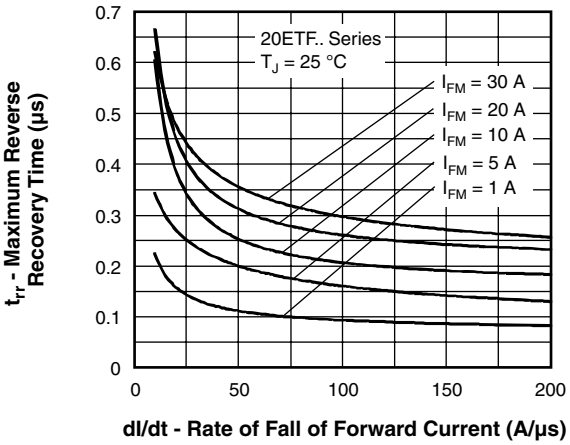



Fig. 8 - Recovery Time Characteristics, $T_J$ = 25 °C

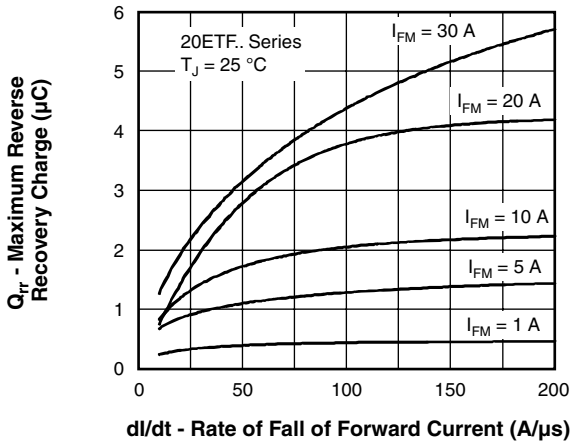



Fig. 10 - Recovery Charge Characteristics, $T_J$ = 25 °C

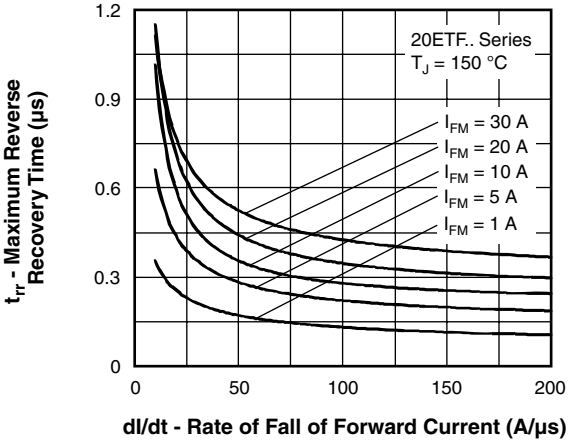



Fig. 9 - Recovery Time Characteristics, $T_J$ = 150 °C

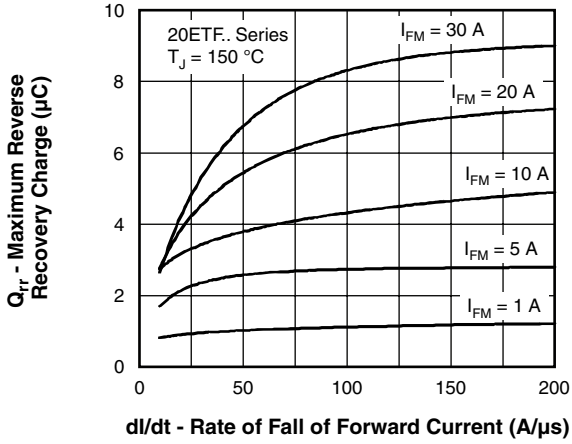



Fig. 11 - Recovery Charge Characteristics, $T_J$ = 150 °C

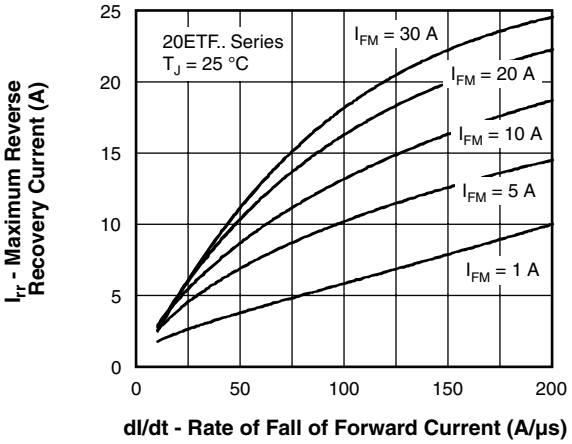



Fig. 12 - Recovery Current Characteristics, $T_J$ = 25 °C

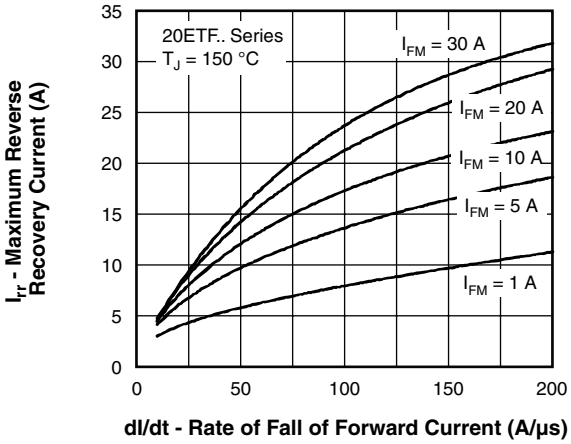



Fig. 13 - Recovery Current Characteristics, $T_J$ = 150 °C

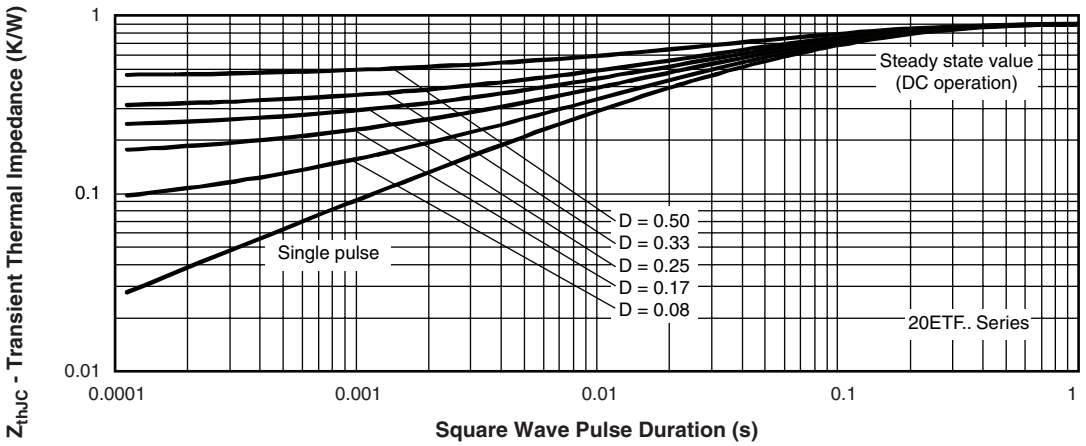
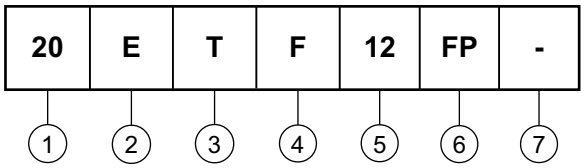



Fig. 14 - Thermal Impedance $Z_{thJC}$ Characteristics

## ORDERING INFORMATION TABLE

**Device code**




1 - Current rating (20 = 20 A)

2 - Circuit configuration:
E = Single diode

3 - Package:
T = TO-220AC

4 - Type of silicon:
F = Fast soft recovery rectifier

5 - Voltage ratings
- 10 = 1000 V
- 12 = 1200 V

6 - FULL-PAK

7 - • None = Standard production
• PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | |
|---|---|
| Dimensions | http://www.vishay.com/doc?95005 |
| Part marking information | http://www.vishay.com/doc?95009 |

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