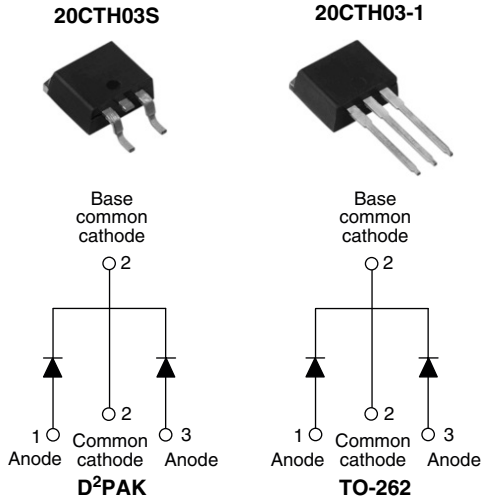


Hyperfast Rectifier, 2 x 10 A FRED Pt™



FEATURES

- Hyperfast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Designed and qualified for industrial level

DESCRIPTION/APPLICATIONS

300 V series are the state of the art hyperfast recovery rectifiers designed with optimized performance of forward voltage drop and hyperfast recovery time.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, dc-to-dc converters as well as freewheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY

| | |
|--------------------|----------|
| t_{rr} (maximum) | 35 ns |
| $I_{F(AV)}$ | 2 x 10 A |
| V_R | 300 V |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|---|----------------|----------------------|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 300 | V |
| Average rectified forward current | $I_{F(AV)}$ | per diode | 10 | A |
| | | per device | 20 | |
| Non-repetitive peak surge current | I_{FSM} | $T_J = 25\text{ °C}$ | 120 | |
| Operating junction and storage temperatures | T_J, T_{Stg} | | - 65 to 175 | °C |

ELECTRICAL SPECIFICATIONS ($T_J = 25\text{ °C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------|---------------|---|------|--------------|--------------|---------------|
| Breakdown voltage, blocking voltage | V_{BR}, V_R | $I_R = 100\text{ }\mu\text{A}$ | 300 | - | - | V |
| Forward voltage | V_F | $I_F = 10\text{ A}$ $I_F = 10\text{ A}, T_J = 125\text{ °C}$ | - | 1.05 0.85 | 1.25 0.95 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated $T_J = 125\text{ °C}, V_R = V_R$ rated | - | - | 20 200 | μA |
| Junction capacitance | C_T | $V_R = 300\text{ V}$ | - | 30 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8 | - | nH |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|--|-----------|---|------|------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Reverse recovery time | t_{rr} | $I_F = 1.0\text{ A}$, $di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | - | 35 | ns |
| | | $I_F = 1.0\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ | - | - | 30 | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 31 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 42 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | - | 2.4 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 5.6 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | - | 36 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 120 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--|-------------------|-------------------------------|--------------|------|------------|---------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | T_J , T_{Stg} | | - 65 | - | 175 | $^\circ\text{C}$ |
| Thermal resistance, junction to case per diode | R_{thJC} | | - | - | 1.5 | $^\circ\text{C}/\text{W}$ |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6.0 (5.0) | - | 12 (10) | kgf · cm (lb · in) |
| Marking device | | Case style D ² PAK | 20CTH03S | | | |
| | | Case style TO-262 | 20CTH03-1 | | | |

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Vishay High Power Products

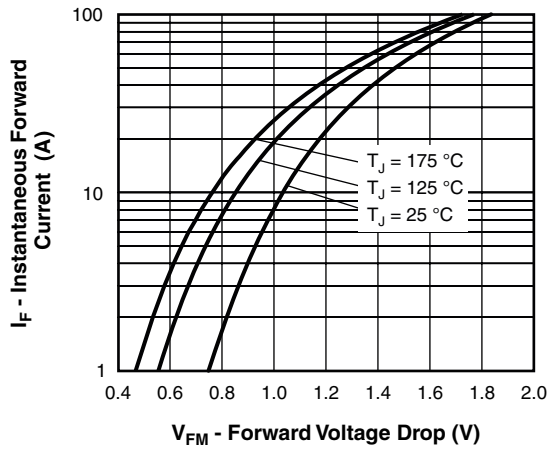


Fig. 1 - Maximum Forward Voltage Drop Characteristics

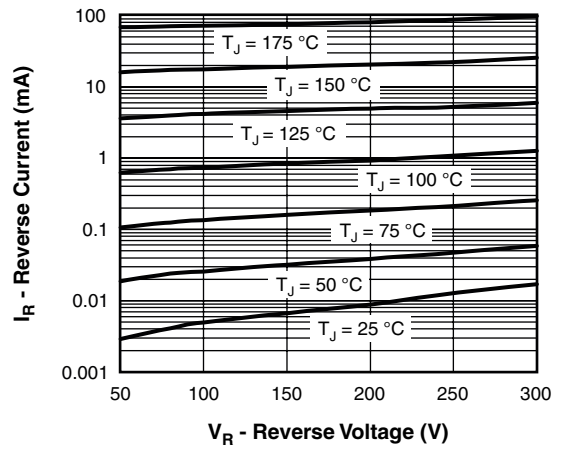


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

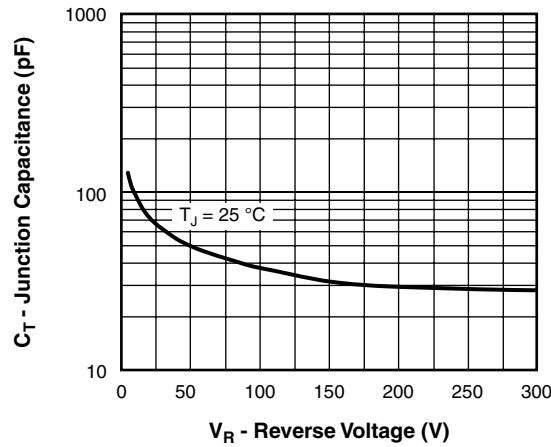


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

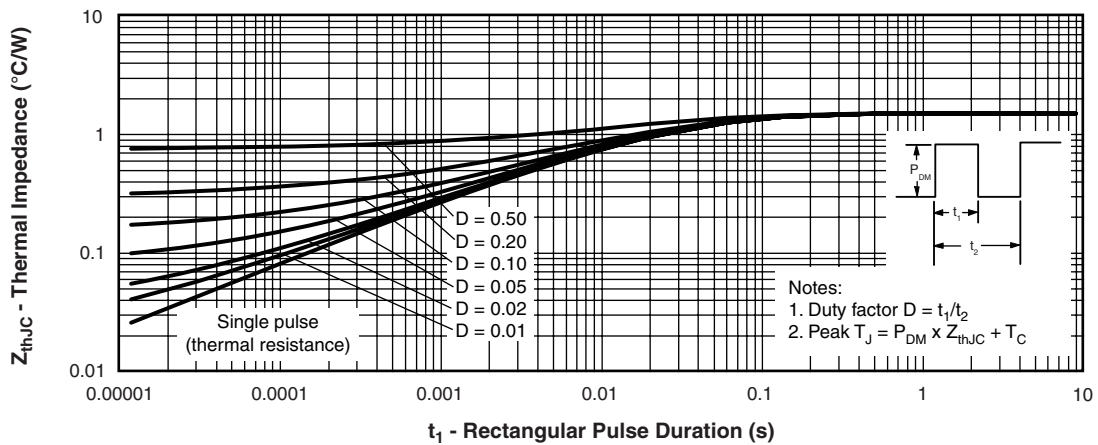


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

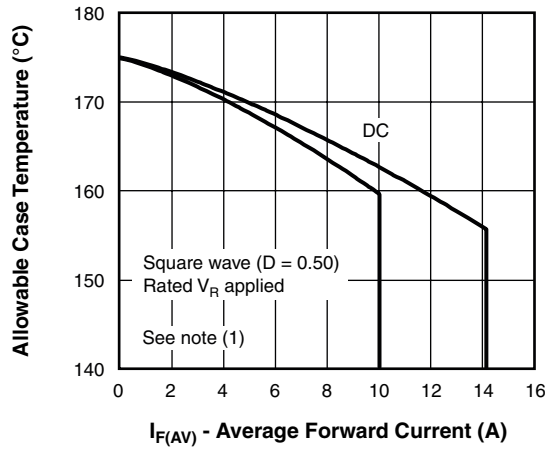


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

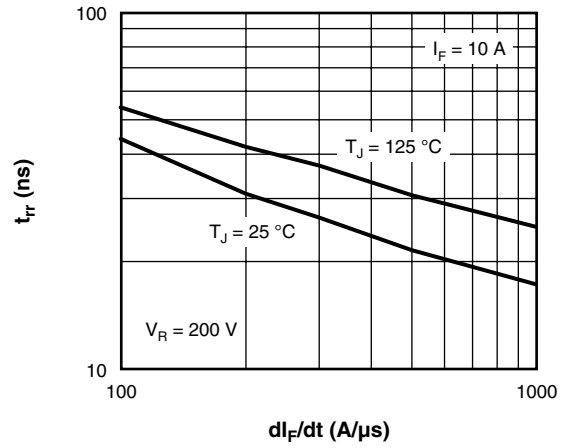


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

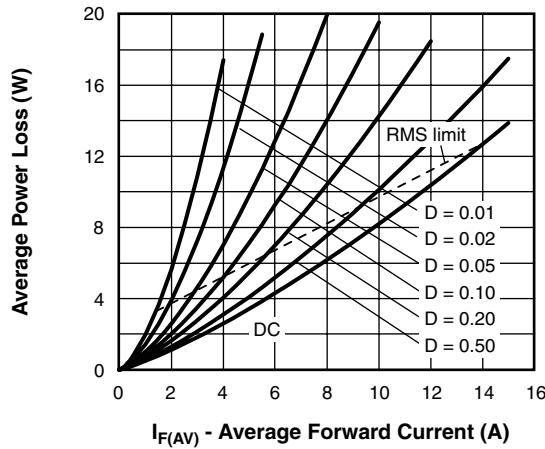


Fig. 6 - Forward Power Loss Characteristics

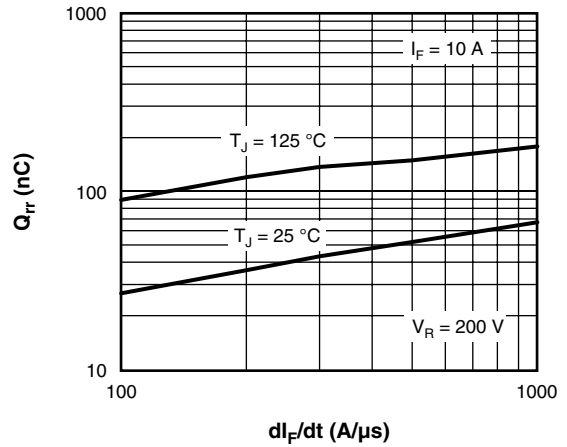


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
 P_d = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 $P_{d_{REV}}$ = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = Rated V_R

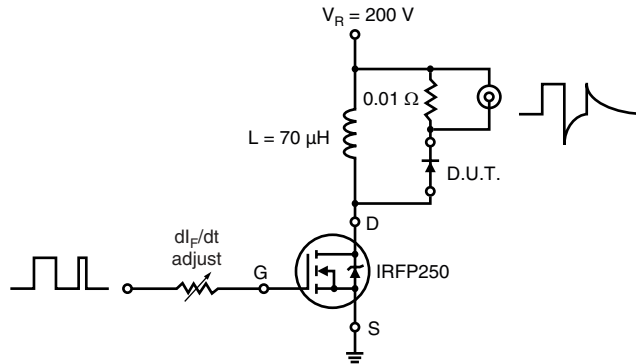
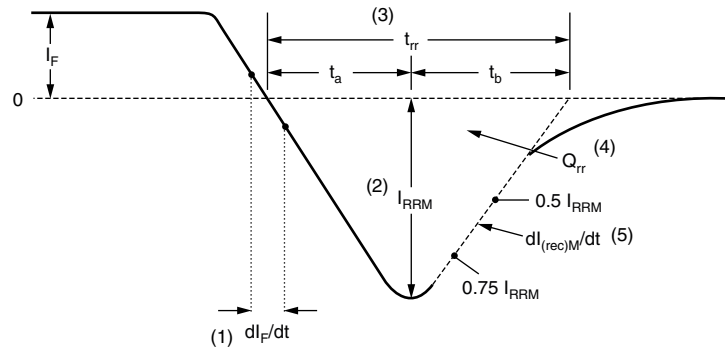


Fig. 9 - Reverse Recovery Parameter Test Circuit

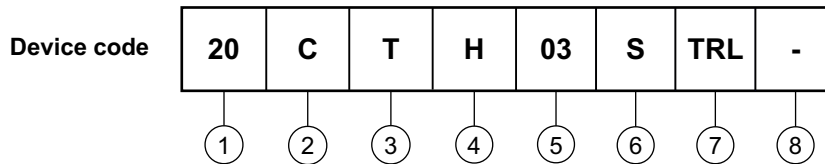


- (1) dl_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.
- (4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}
- (5) $dl_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE



- 1** - Current rating (20 A)
- 2** - C = Common cathode
- 3** - T = TO-220, D²PAK
- 4** - H = Hyperfast recovery
- 5** - Voltage rating (03 = 300 V)
- 6** -
 - S = D²PAK
 - -1 = TO-262
- 7** -
 - None = Tube (50 pieces)
- 6**
 - TRL = Tape and reel (left oriented, for D²PAK package)
 - TRR = Tape and reel (right oriented, for D²PAK package)
- 8** -
 - None = Standard production
 - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|---|
| Dimensions | http://www.vishay.com/doc?95014 |
| Part marking information | http://www.vishay.com/doc?95008 |
| Packaging information | http://www.vishay.com/doc?95032 |



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