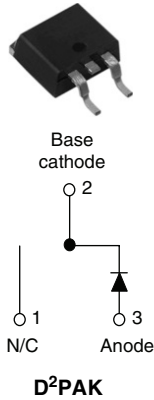
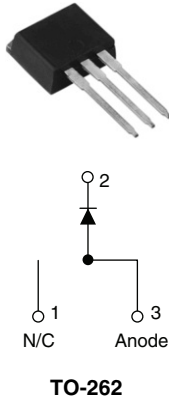


Ultrafast Rectifier, 15 A FRED Pt™

MURB1520PbF



MURB1520-1PbF



FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for AEC Q101 level



Available
RoHS*
COMPLIANT

DESCRIPTION/APPLICATIONS

MUR.. series are the state of the art ultrafast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultrafast 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} | 35 ns |
| $I_{F(AV)}$ | 15 A |
| V_R | 200 V |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|---|----------------|--|-------------|-------|
| Peak repetitive reverse voltage | V_{RRM} | | 200 | V |
| Average rectified forward current | $I_{F(AV)}$ | Total device, rated V_R , $T_C = 150\text{ °C}$ | 15 | A |
| Non-repetitive peak surge current | I_{FSM} | | 200 | |
| Peak repetitive forward current | I_{FM} | Rated V_R , square wave, 20 kHz, $T_C = 150\text{ °C}$ | 30 | |
| 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 | $I_R = 100\ \mu\text{A}$ | 200 | - | - | V |
| Forward voltage | V_F | $I_F = 15\text{ A}$ $I_F = 15\text{ A}, T_J = 150\text{ °C}$ | - | - | 1.05 0.85 | |
| Reverse leakage current | I_R | $V_R = V_R$ rated $T_J = 150\text{ °C}, V_R = V_R$ rated | - | - | 10 500 | μA |
| Junction capacitance | C_T | $V_R = 200\text{ V}$ | - | 55 | - | pF |
| Series inductance | L_S | Measured lead to lead 5 mm from package body | - | 8.0 | - | nH |

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

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| DYNAMIC RECOVERY CHARACTERISTICS ($T_J = 25\text{ }^\circ\text{C}$ 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 |
| | | $T_J = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 160\text{ V}$ | - | 22 | - | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 39 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 160\text{ V}$ | - | 1.6 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 4.1 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | $I_F = 15\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 160\text{ V}$ | - | 19 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 90 | - | |

| 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 | R_{thJC} | | - | - | 1.5 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction to ambient | R_{thJA} | | - | - | 50 | |
| Thermal resistance, case to heatsink | R_{thCS} | Mounting surface, flat, smooth and greased | - | 0.5 | - | |
| Weight | | | - | 2.0 | - | g |
| | | | - | 0.07 | - | oz. |
| Mounting torque | | | 6.0 (5.0) | - | 12 (10) | kgf · cm (lbf · in) |
| Marking device | | Case style D ² PAK | MURB1520 | | | |
| | | Case style TO-262 | MURB1520-1 | | | |



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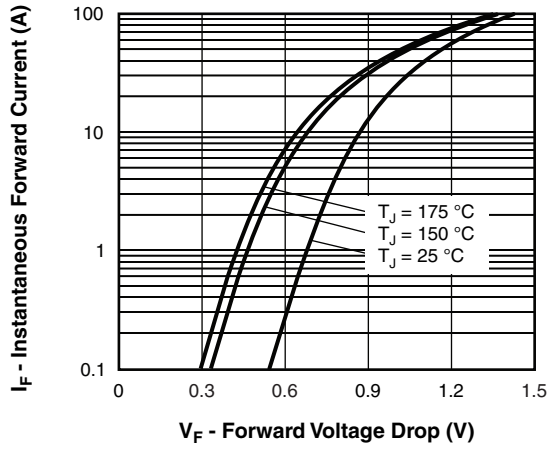


Fig. 1 - Typical Forward Voltage Drop Characteristics

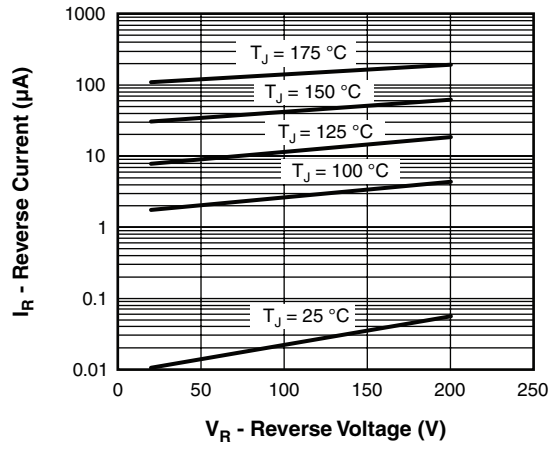


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

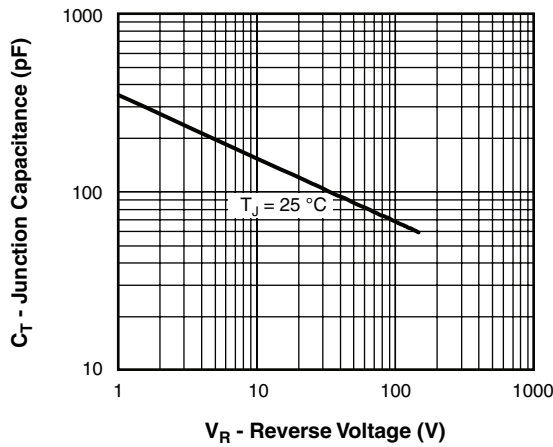


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

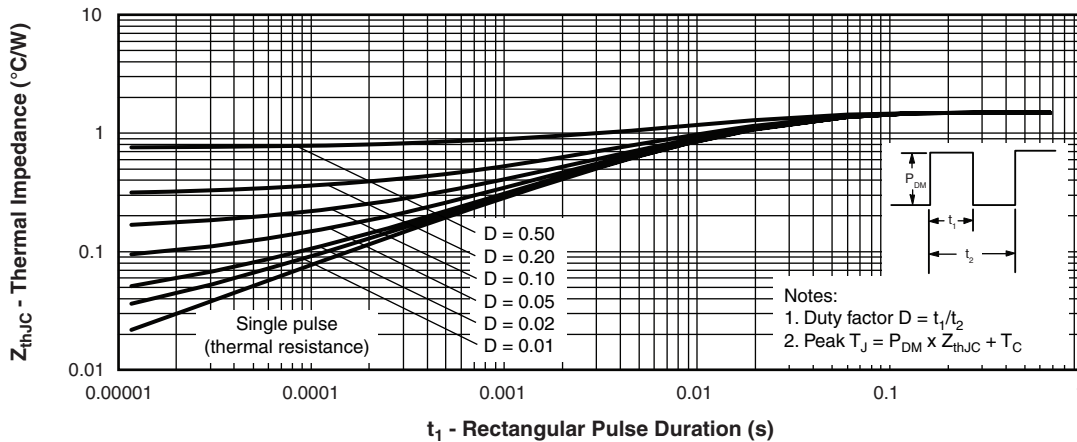


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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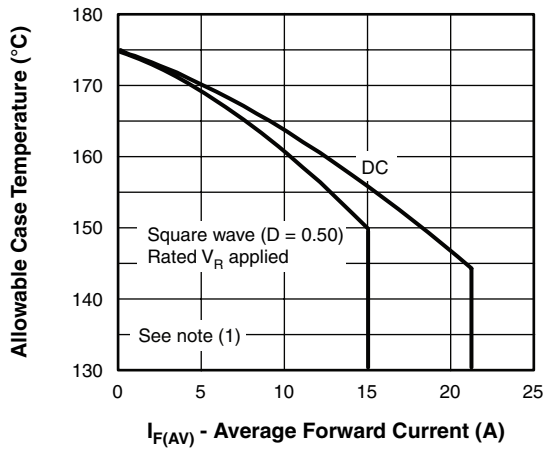


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

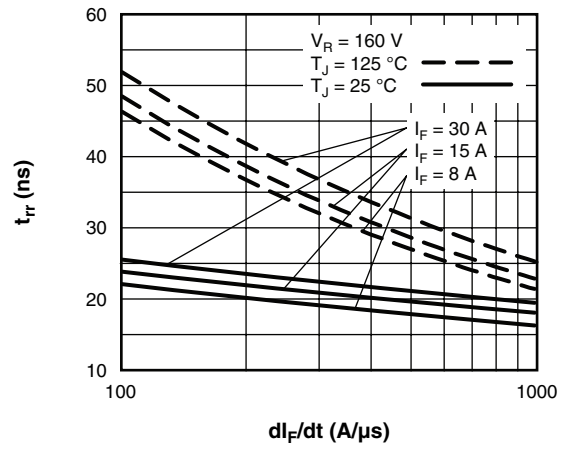


Fig. 7 - Typical Reverse Recovery Time vs. di/dt

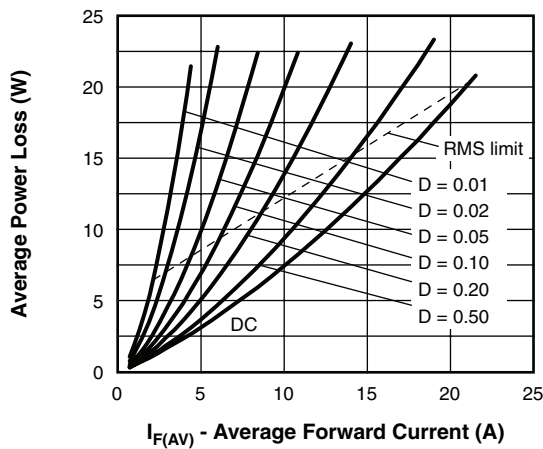


Fig. 6 - Forward Power Loss Characteristics

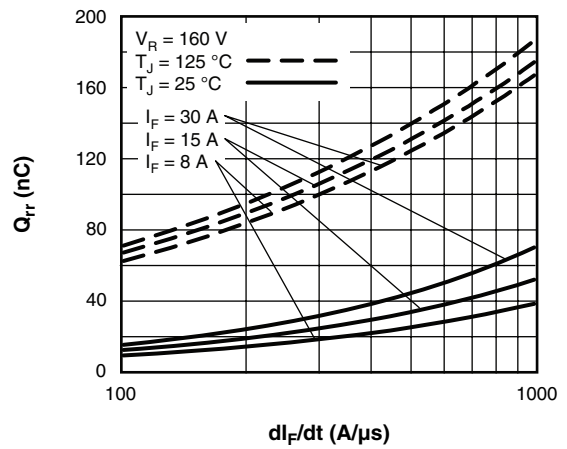


Fig. 8 - Typical Stored Charge vs. di/dt

Note

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

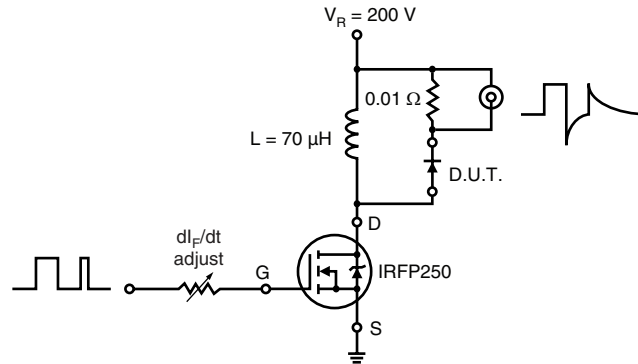
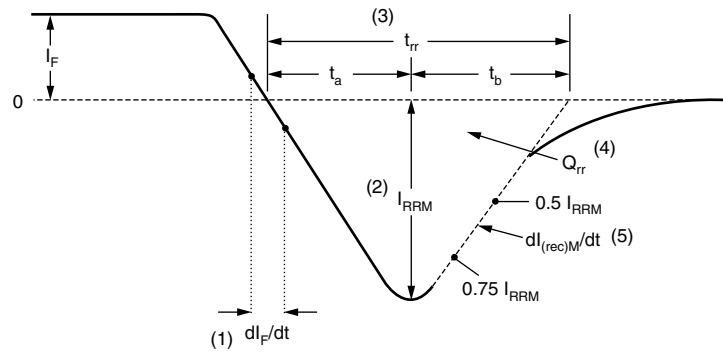


Fig. 9 - Reverse Recovery Parameter Test Circuit



(1) di_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}

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

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|------------|----------|-----------|-----------|-----------|------------|------------|
| Device code | MUR | B | 15 | 20 | -1 | TRL | PbF |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |

- 1** - Ultrafast MUR series
- 2** - B = D²PAK/TO-262
- 3** - Current rating (15 = 15 A)
- 4** - Voltage rating (20 = 200 V)
- 5** -
 - None = D²PAK
 - -1 = TO-262
- 6** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented, for D²PAK package)
 - TRR = Tape and reel (right oriented, for D²PAK package)
- 7** -
 - 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 |
| SPICE model | http://www.vishay.com/doc?95271 |



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