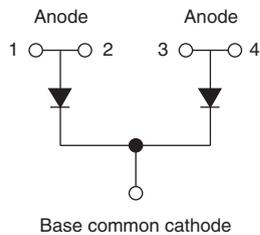


Not Insulated SOT-227 Power Module Ultrafast Rectifier, 310 A



SOT-227



FEATURES

- Not insulated package
- Ultrafast reverse recovery
- Ultrasoft reverse recovery current shape
- Optimized for power conversion: welding and industrial SMPS applications
- Plug-in compatible with other SOT-227 packages
- Easy to assemble
- Direct mounting to heatsink
- Designed and qualified for industrial level
- UL approved file E78996
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

DESCRIPTION

The VS-UFB310CB40 not insulated modules integrate two state of the art ultrafast recovery rectifiers in the compact, industry standard SOT-227 package. The planar structure of the diodes, and the platinum doping life time control, provide a ultrasoft recovery current shape, together with the best overall performance, ruggedness and reliability characteristics.

These devices are thus intended for high frequency applications in which the switching energy is designed not to be predominant portion of the total energy, such as in the output rectification stage of welding machines, SMPS, DC/DC converters. Their extremely optimized stored charge and low recovery current reduce both over dissipation in the switching elements (and snubbers) and EMI/RFI.

PRODUCT SUMMARY

| | |
|----------------------------------------------------------------------------|---------------------------|
| V_R | 400 V |
| $I_{F(AV)}$ at $T_C = 119\text{ }^\circ\text{C}$ per module ⁽¹⁾ | 310 A |
| t_{rr} | 39 ns |
| at T_C | 135 $^\circ\text{C}$ |
| Type | Modules - Diode, FRED Pt® |

Note

⁽¹⁾ All 4 anode terminals connected

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | MAX. | UNITS |
|---------------------------------------------|--------------------------|-----------------------------------|-------------|------------------|
| Cathode to anode voltage | V_R | | 400 | V |
| Continuous forward current per diode | I_F ⁽¹⁾ | $T_C = 135\text{ }^\circ\text{C}$ | 155 | A |
| Single pulse forward current per diode | I_{FSM} ⁽²⁾ | $T_C = 25\text{ }^\circ\text{C}$ | 1300 | |
| Maximum power dissipation per module | P_D | $T_C = 135\text{ }^\circ\text{C}$ | 421 | W |
| Operating junction and storage temperatures | T_J, T_{Stg} | | - 55 to 175 | $^\circ\text{C}$ |

Notes

- ⁽¹⁾ Both anode terminals connected;
Maximum I_{RMS} current per leg 200 A to do not exceed the maximum temperature of terminals
- ⁽²⁾ 10 ms sine or 6 ms rectangular pulse



| ELECTRICAL SPECIFICATIONS PER DIODE ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | |
|-----------------------------------------------------------------------------------------------------------|----------|-----------------------------------------------------------|------|------|------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Cathode to anode breakdown voltage | V_{BR} | $I_R = 100\text{ }\mu\text{A}$ | 400 | - | - | V |
| Forward voltage, per leg | V_{FM} | $I_F = 100\text{ A}$ | - | 1.11 | 1.34 | |
| | | $I_F = 100\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | - | 0.99 | 1.1 | |
| | | $I_F = 100\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | - | 0.97 | - | |
| | | $I_F = 200\text{ A}$ | - | 1.3 | 1.6 | |
| | | $I_F = 200\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | - | 1.22 | 1.4 | |
| Reverse leakage current, per leg | I_{RM} | $V_R = V_R\text{ rated}$ | - | 1.3 | 50 | μA |
| | | $V_R = V_R\text{ rated}, T_J = 125\text{ }^\circ\text{C}$ | - | 100 | - | mA |
| | | $V_R = V_R\text{ rated}, T_J = 175\text{ }^\circ\text{C}$ | - | 1 | 4 | |
| Junction capacitance, per leg | C_T | $V_R = 400\text{ V}$ | - | 100 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS PER DIODE ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified) | | | | | | | |
|------------------------------------------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|------|-------|----|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS | |
| Reverse recovery time, per leg | t_{rr} | $I_F = 1.0\text{ A}, di_F/dt = 400\text{ A}/\mu\text{s}, V_R = 30\text{ V}$ | - | 39 | - | ns | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | - | 89 | - | | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 184 | - | | |
| Peak recovery current, per leg | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | $I_F = 50\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_R = 200\text{ V}$ | - | 9 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 20 | - | |
| Reverse recovery charge, per leg | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | | - | 400 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 1840 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--------------------------------------------|----------------|-----------------------|---------|------|-------|---------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Junction and storage temperature range | T_J, T_{Stg} | | - 55 | - | 175 | $^\circ\text{C}$ |
| Junction to case, single leg conducting | R_{thJC} | | - | - | 0.19 | $^\circ\text{C}/\text{W}$ |
| Junction to case, both leg conducting | | | - | - | 0.095 | |
| Case to heatsink | R_{thCS} | Flat, greased surface | - | 0.07 | - | |
| Weight | | | - | 30 | - | g |
| Mounting torque | | | - | - | 1.3 | Nm |
| Case style | | | SOT-227 | | | |

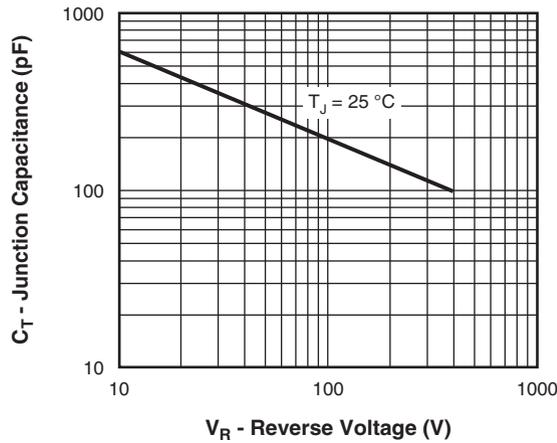
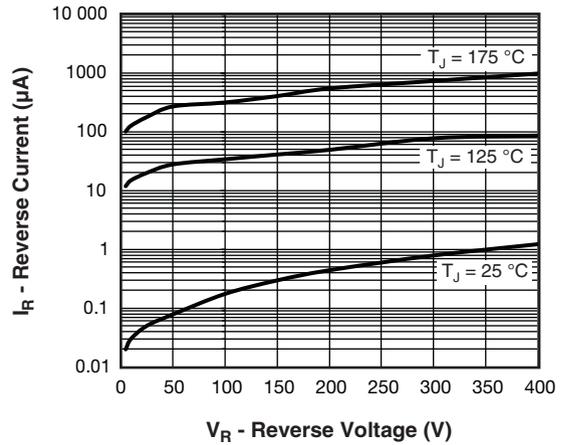
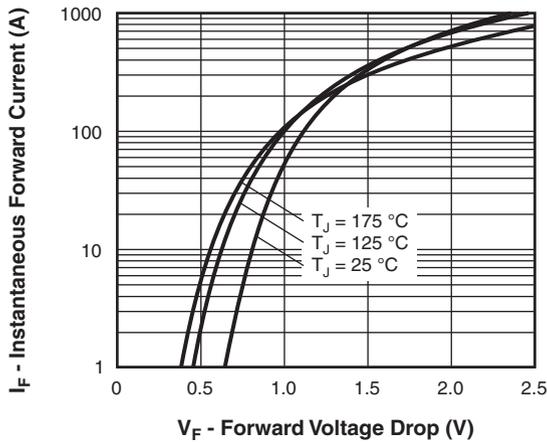


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage, Per Leg

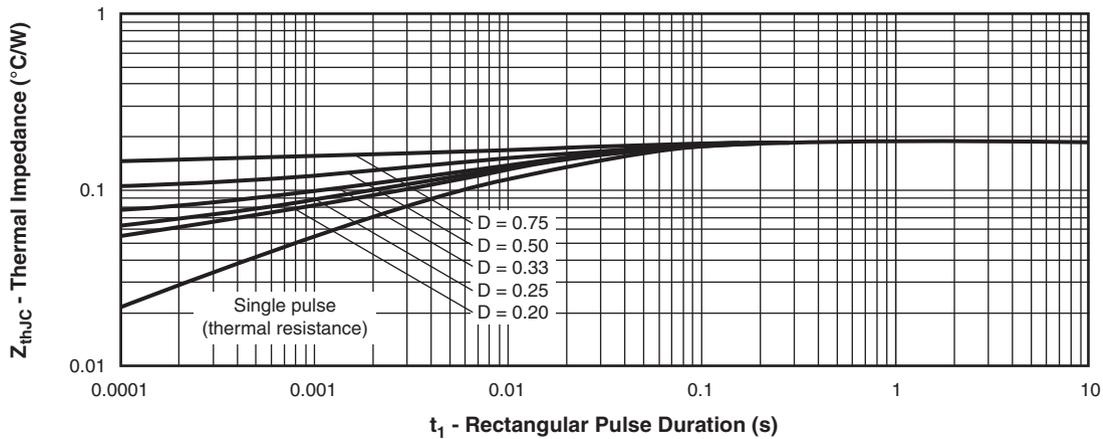


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics, Per Leg

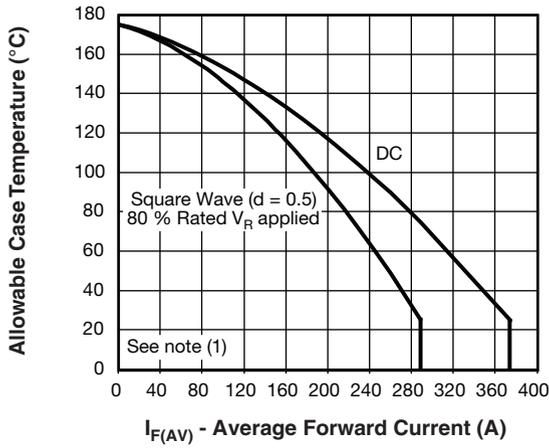


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current, Per Leg

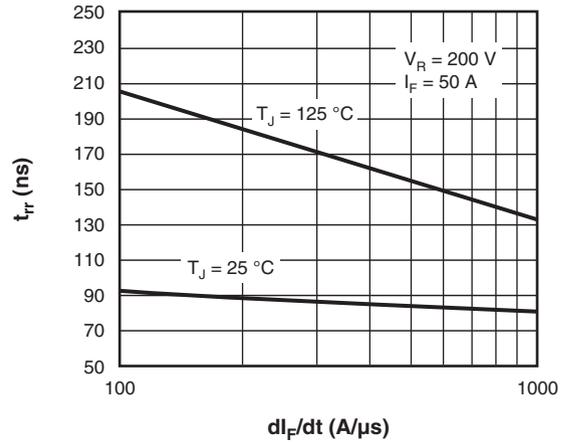


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt , Per Leg

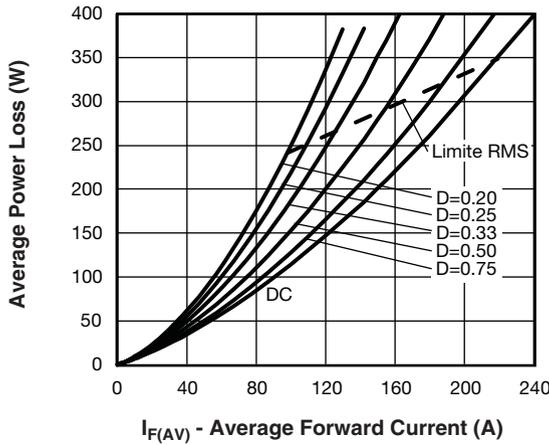


Fig. 6 - Forward Power Loss Characteristics, Per Leg

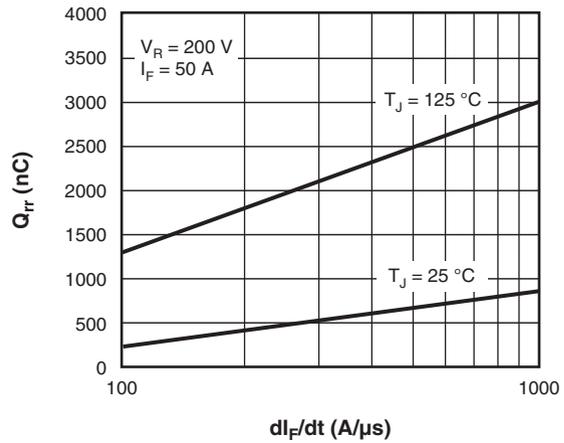


Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt , Per Leg

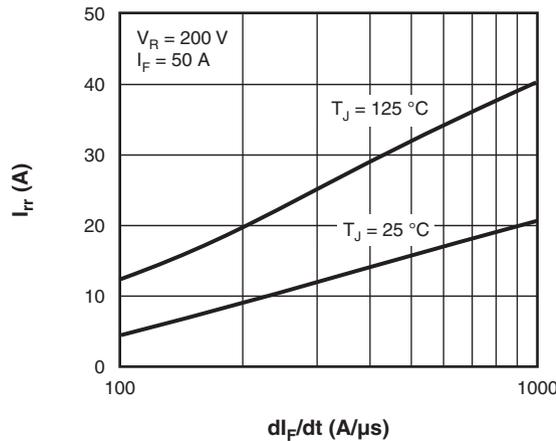


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt , Per Leg

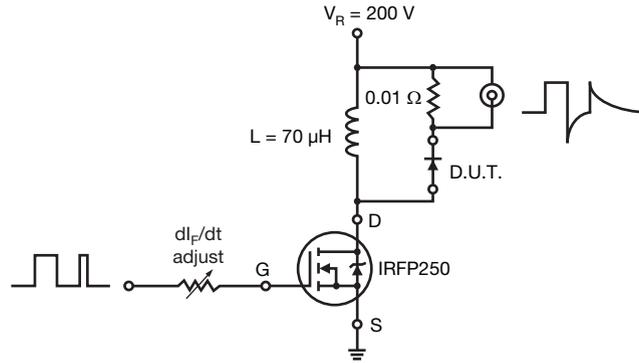
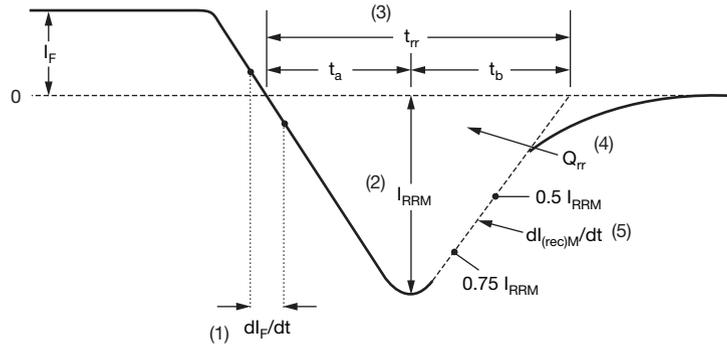


Fig. 10 - Reverse Recovery Parameter Test Circuit



- (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. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|------------|-----------|----------|------------|----------|----------|-----------|
| Device code | VS- | UF | B | 310 | C | B | 40 |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |

- 1** - Vishay Semiconductors product
- 2** - Ultrafast rectifier
- 3** - Ultrafast Pt diffused
- 4** - Current rating (310 = 310 A)
- 5** - Circuit configuration (2 common cathode diodes)
- 6** - Package indicator (SOT-227 standard not insulated)
- 7** - Voltage rating (40 = 400 V)

Quantity per tube is 10 pcs, M4 screw and washer included

| CIRCUIT CONFIGURATION | | |
|-----------------------------------------------|----------------------------|-----------------|
| CIRCUIT | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Common cathodes diodes, not in insulated base | C | |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|------------------------------------------------------------------------|
| Dimensions | www.vishay.com/doc?95423 |
| Packaging Information | www.vishay.com/doc?95425 |



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