

Insulated Gen 2 Schottky Rectifier Module, 300 A



SOT-227

ADDITIONAL RESOURCES



Application Notes

| PRIMARY CHARACTERISTICS | |
|---|---------------------------------------|
| $I_{F(AV)}$ per module at $T_C = 132\text{ }^\circ\text{C}$ | 300 A |
| V_R | 170 V |
| V_{FM} at 100 A, $T_C = 25\text{ }^\circ\text{C}$ | 0.79 V |
| Package | SOT-227 |
| Circuit configuration | Two separate diodes, parallel pin-out |

FEATURES

- Max. $T_J = 175\text{ }^\circ\text{C}$
- Two fully independent diodes
- Fully insulated package
- Trench MOS Barrier Schottky technology
- Ultra low forward voltage drop
- Optimized for power conversion: welding and industrial SMPS applications
- Easy to use and parallel
- Industry standard outline
- 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-QA300FA17 insulated modules integrate two state of the art Trench MOS Schottky technology rectifiers in the compact, industry standard SOT-227 package.

These devices are thus intended for high frequency converters and switching power supplies.

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|--------|-----------------------------------|-------------|------------------|
| V_F | $T_J = 150\text{ }^\circ\text{C}$ | 0.69 | V |
| T_J | Range | -55 to +175 | $^\circ\text{C}$ |

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$ unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|----------------|--|-------------|------------------|
| Average forward current per module | $I_{F(AV)}$ | $T_C = 132\text{ }^\circ\text{C}$ | 300 | A |
| Cathode to anode voltage | V_R | | 170 | V |
| Continuous forward current per diode | I_F | $T_C = 90\text{ }^\circ\text{C}$ | 330 | A |
| Single pulse forward current per diode | I_{FSM} | $T_C = 175\text{ }^\circ\text{C}$, $t = 6\text{ ms}$, square | 1575 | |
| Maximum power dissipation per diode | P_D | $T_C = 90\text{ }^\circ\text{C}$ | 327 | W |
| Non-repetitive avalanche energy per diode | E_{AS} | $T_J = 25\text{ }^\circ\text{C}$, $I_{AS} = 27\text{ A}$, $L = 10\text{ mH}$ | 3700 | mJ |
| RMS isolation voltage | V_{ISOL} | Any terminal to case, $t = 1\text{ min}$ | 2500 | V |
| Operating junction and storage temperatures | T_J, T_{Stg} | | -55 to +175 | $^\circ\text{C}$ |



| 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} | $I_R = 2\text{ mA}$ | 170 | - | - | V |
| Forward voltage | V_{FM} | $I_F = 100\text{ A}$ | - | 0.79 | 0.85 | |
| | | $I_F = 100\text{ A}, T_J = 150\text{ }^\circ\text{C}$ | - | 0.62 | - | |
| | | $I_F = 200\text{ A}$ | - | 0.89 | 0.98 | |
| Reverse leakage current | I_{RM} | $V_R = 170\text{ V}$ | - | 13 | 200 | μA |
| | | $T_J = 125\text{ }^\circ\text{C}, V_R = 170\text{ V}$ | - | 20 | - | mA |
| Junction capacitance | C_T | $V_R = 170\text{ V}$ | - | 737 | - | pF |

| 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} | $T_J = 25\text{ }^\circ\text{C}$ | - | 71 | - | ns |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 82 | - | |
| Peak recovery current | I_{RRM} | $T_J = 25\text{ }^\circ\text{C}$ | - | 7.1 | - | A |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 8.8 | - | |
| Reverse recovery charge | Q_{rr} | $T_J = 25\text{ }^\circ\text{C}$ | - | 252 | - | nC |
| | | $T_J = 125\text{ }^\circ\text{C}$ | - | 352 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|------------|-----------------------|---------|------|------------|--------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Junction-to-case, single leg conducting | R_{thJC} | | - | - | 0.26 | $^\circ\text{C/W}$ |
| Junction-to-case, both leg conducting | | | - | - | 0.13 | |
| Case-to-heatsink | R_{thCS} | Flat, greased surface | - | 0.1 | - | |
| Weight | | | - | 30 | - | g |
| Mounting torque | | Torque to terminal | - | - | 1.1 (9.7) | Nm (lbf.in) |
| | | Torque to heatsink | - | - | 1.8 (15.9) | Nm (lbf.in) |
| Case style | | | SOT-227 | | | |

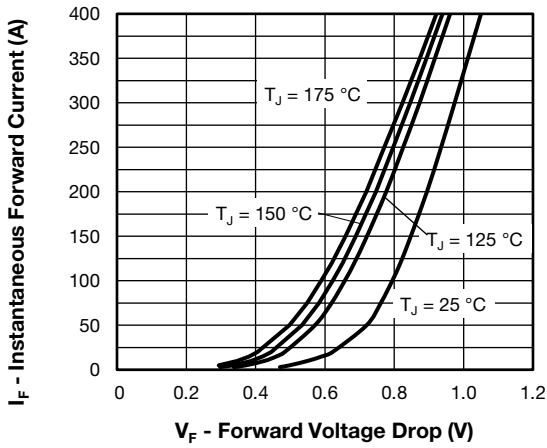


Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

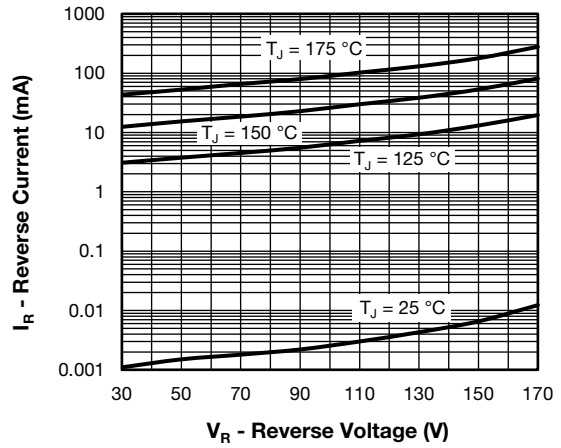


Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

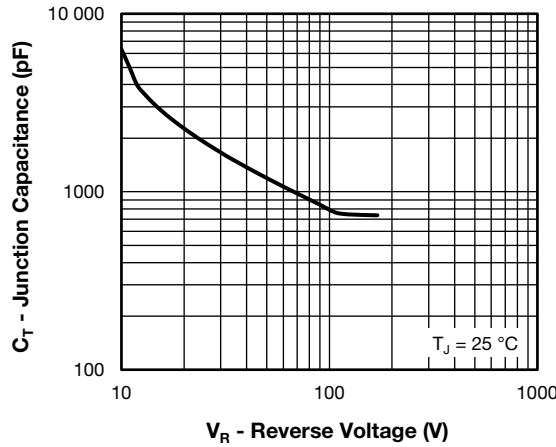


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Diode)

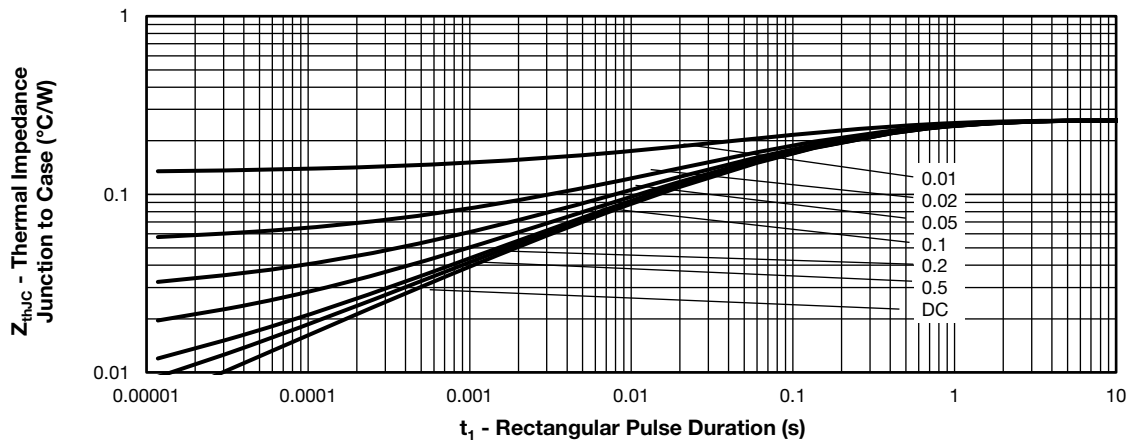


Fig. 4 - Maximum Thermal Impedance Junction-to-Case Characteristics (Per Diode)

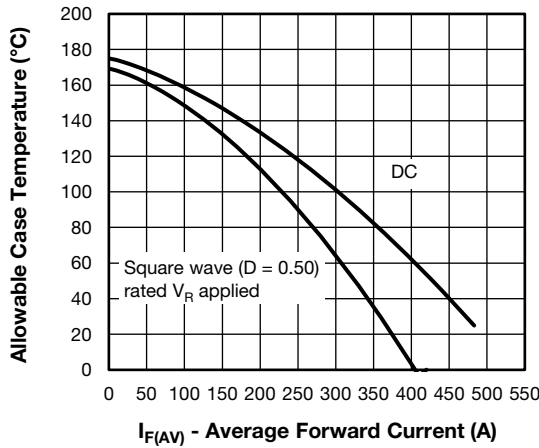


Fig. 5 - Maximum Current Rating Capability (Per Diode)

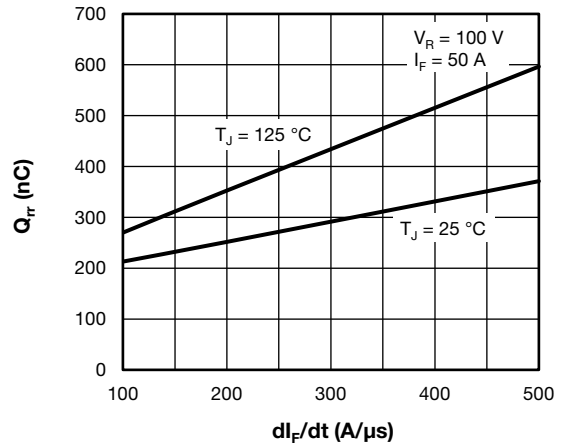


Fig. 7 - Typical Reverse Recovery Charge vs di_F/dt (Per Diode)

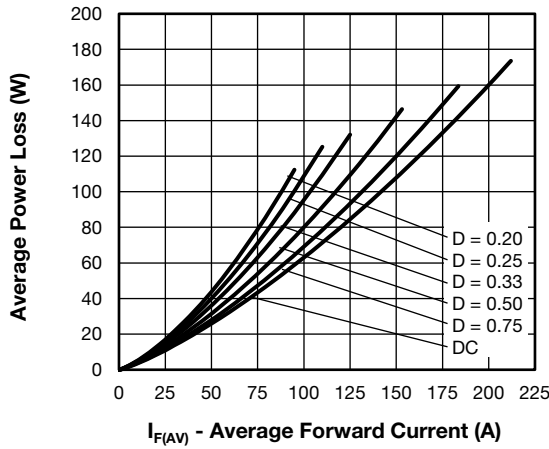


Fig. 6 - Forward Power Loss Characteristics (Per Diode)

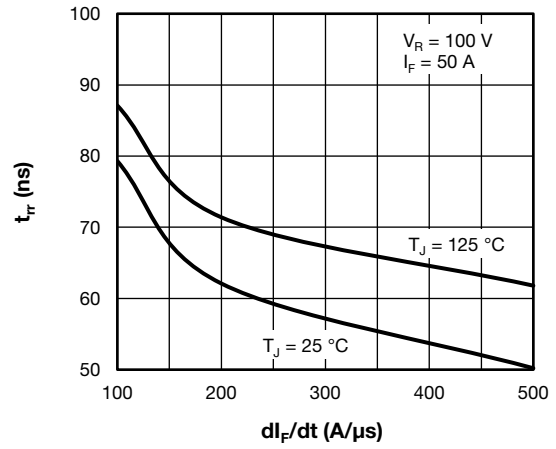


Fig. 8 - Typical Reverse Recovery Time vs di_F/dt (Per Diode)

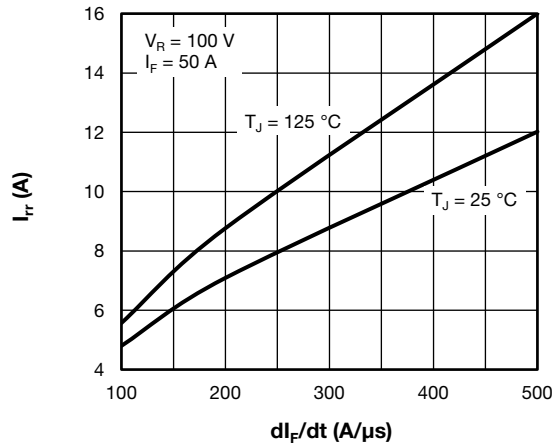


Fig. 9 - Typical Reverse Recovery Current vs di_F/dt (Per Diode)

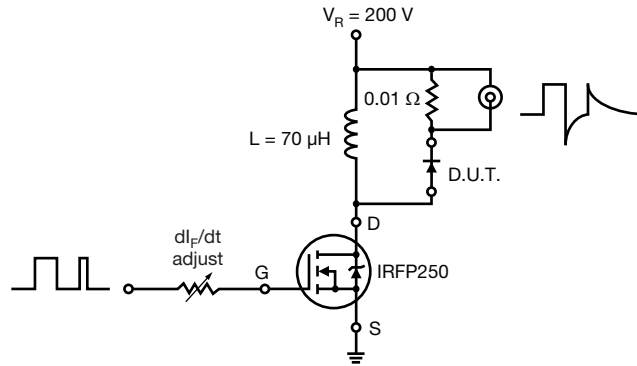
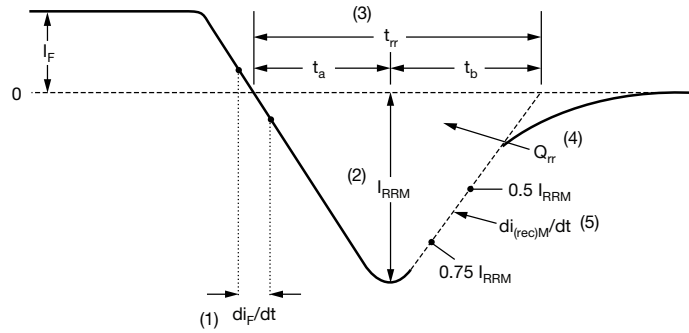


Fig. 10 - Reverse Recovery Parameter Test Circuit

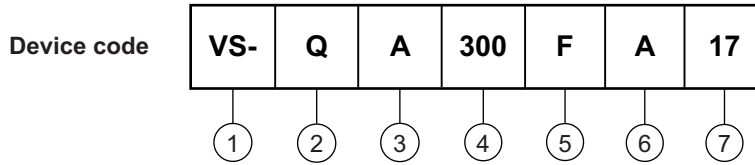


- (1) di_F/dt - rate of change of current through zero crossing
- (2) I_{RRM} - peak reverse recovery current
- (3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through $0.75 I_{RRM}$ and $0.50 I_{RRM}$ extrapolated to zero current.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

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

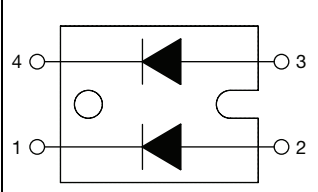
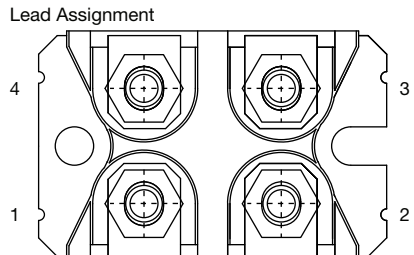
Fig. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Schottky technologies
- 3** - Present silicon generation
- 4** - Current rating (300 = 300 A)
- 5** - Circuit configuration (two separate diodes, parallel pin-out)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (17 = 170 V)

Quantity per tube is 10, M4 screw and washer included

| CIRCUIT CONFIGURATION | | |
|---------------------------------------|-----------------------------------|---|
| CIRCUIT | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Two separate diodes, parallel pin-out | F |   |

| LINKS TO RELATED DOCUMENTS | |
|-----------------------------------|--|
| Dimensions | www.vishay.com/doc?95423 |
| Part marking information | www.vishay.com/doc?95425 |



SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter



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