# Insulated Gen 2 Schottky Rectifier Module, 300 A

SOT-227

## ADDITIONAL RESOURCES

Application Notes

## FEATURES

- Max. $T_J$ = 175 °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

Pb-free

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.

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

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|---|---|---|---|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $V_F$ | $T_J$ = 150 °C | 0.69 | V |
| $T_J$ | Range | -55 to +175 | °C |

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

| ELECTRICAL SPECIFICATIONS PER DIODE ($T_J$ = 25 °C unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Cathode to anode breakdown voltage | $V_{BR}$ | $I_R$ = 2 mA | 170 | - | - | V |
| Forward voltage | $V_{FM}$ | $I_F$ = 100 A | - | 0.79 | 0.85 | |
| | | $I_F$ = 100 A, $T_J$ = 150 °C | - | 0.62 | - | |
| | | $I_F$ = 200 A | - | 0.89 | 0.98 | |
| | | $I_F$ = 200 A, $T_J$ = 150 °C | - | 0.75 | - | |
| Reverse leakage current | $I_{RM}$ | $V_R$ = 170 V | - | 13 | 200 | µA |
| | | $T_J$ = 125 °C, $V_R$ = 170 V | - | 20 | - | mA |
| Junction capacitance | $C_T$ | $V_R$ = 170 V | - | 737 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS ($T_J$ = 25 °C unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Reverse recovery time | $t_{rr}$ | $T_J$ = 25 °C | $I_F$ = 50 A<br>$di_F/dt$ = 200 A/µs<br>$V_R$ = 100 V | - | 71 | - | ns |
| | | $T_J$ = 125 °C | | - | 82 | - | |
| Peak recovery current | $I_{RRM}$ | $T_J$ = 25 °C | | - | 7.1 | - | A |
| | | $T_J$ = 125 °C | | - | 8.8 | - | |
| Reverse recovery charge | $Q_{rr}$ | $T_J$ = 25 °C | | - | 252 | - | nC |
| | | $T_J$ = 125 °C | | - | 352 | - | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **TEST CONDITIONS** | **MIN.** | **TYP.** | **MAX.** | **UNITS** |
| Junction-to-case, single leg conducting | $R_{thJC}$ | | - | - | 0.26 | °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 | | | |

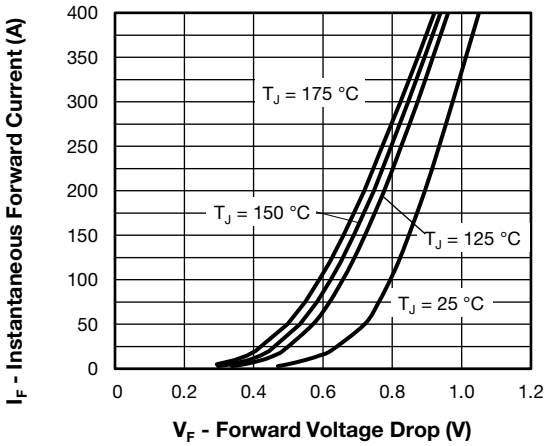



Fig. 1 - Typical Forward Voltage Drop vs. Instantaneous Forward Current (Per Diode)

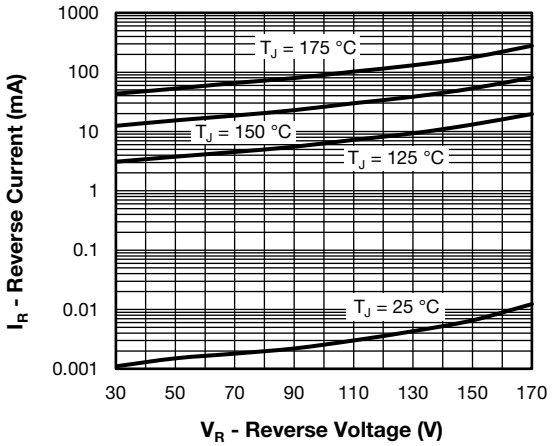



Fig. 2 - Typical Reverse Current vs. Reverse Voltage (Per Diode)

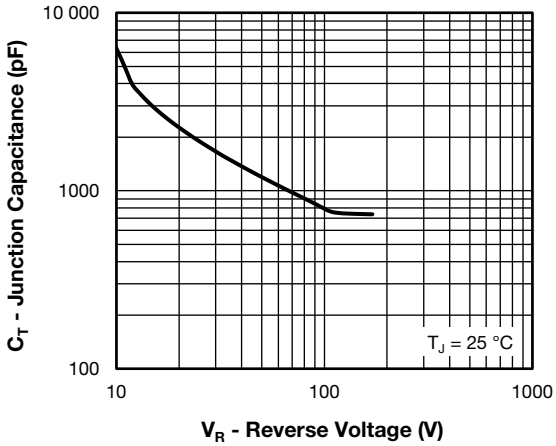



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Diode)

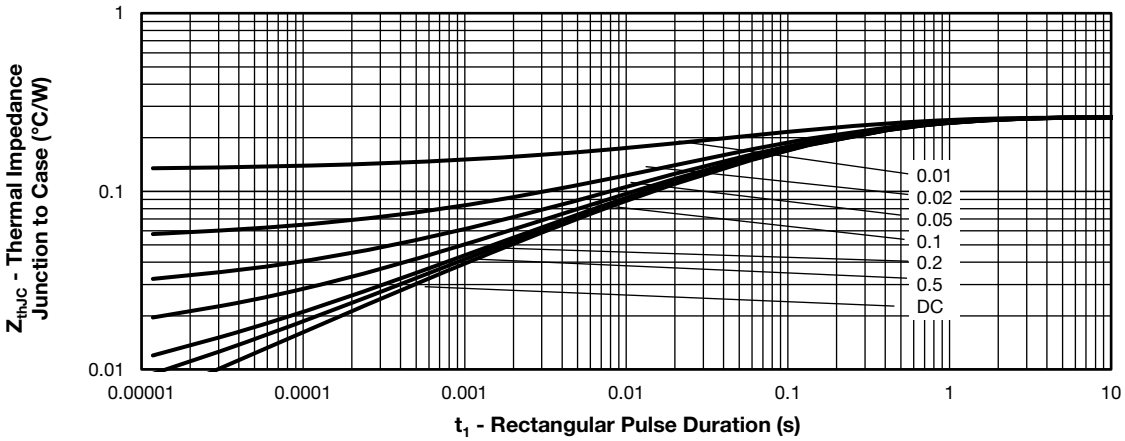



Fig. 4 - Maximum Thermal Impedance Junction-to-Case Characteristics (Per Diode)

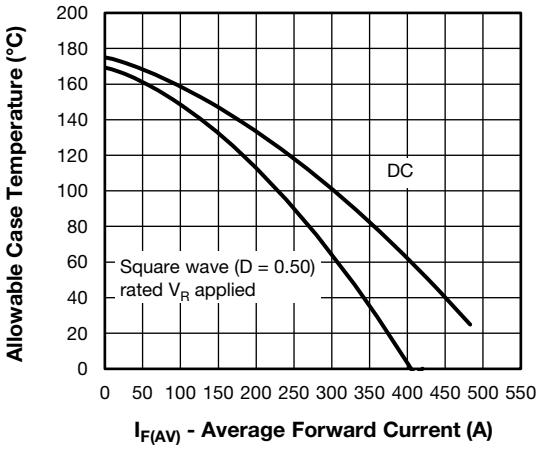



Fig. 5 - Maximum Current Rating Capability (Per Diode)

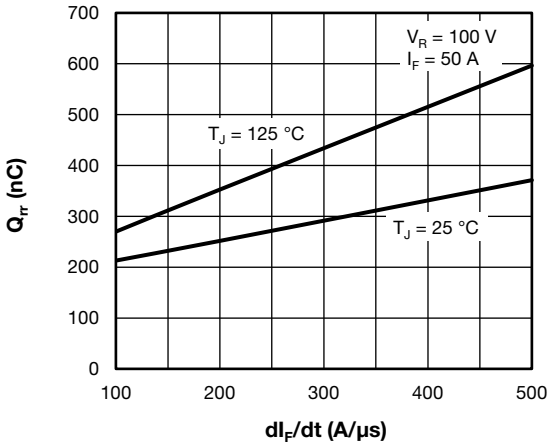



Fig. 7 - Typical Reverse Recovery Charge vs $dI_F/dt$ (Per Diode)

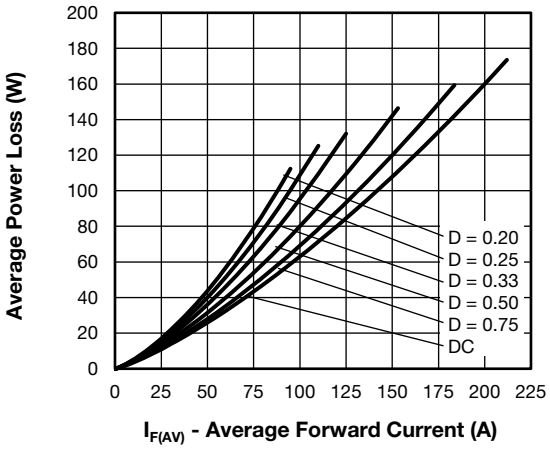



Fig. 6 - Forward Power Loss Characteristics (Per Diode)

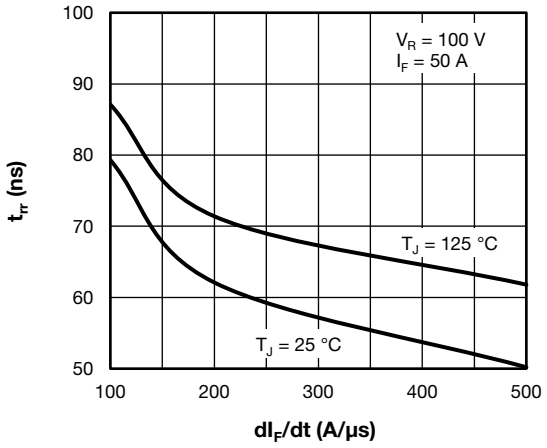



Fig. 8 - Typical Reverse Recovery Time vs $dI_F/dt$ (Per Diode)

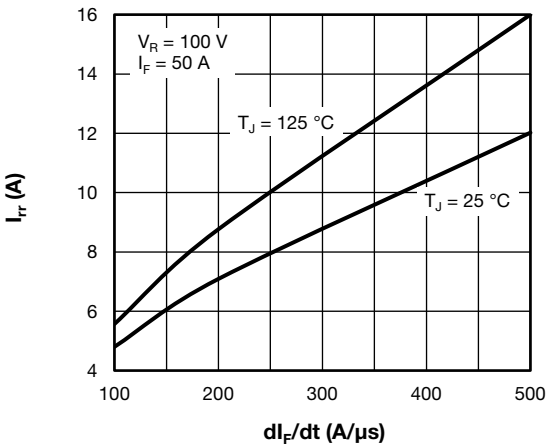



Fig. 9 - Typical Reverse Recovery Current vs dIFdt (Per Diode)

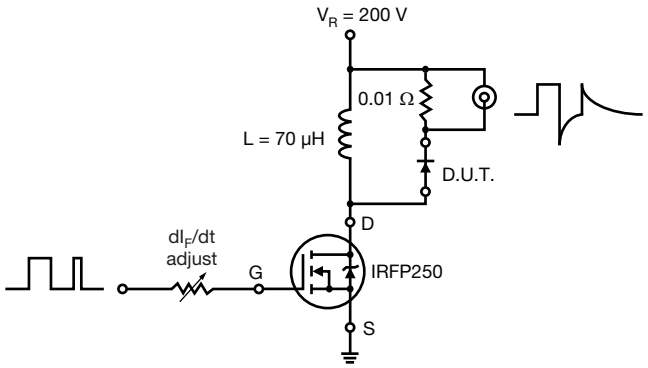
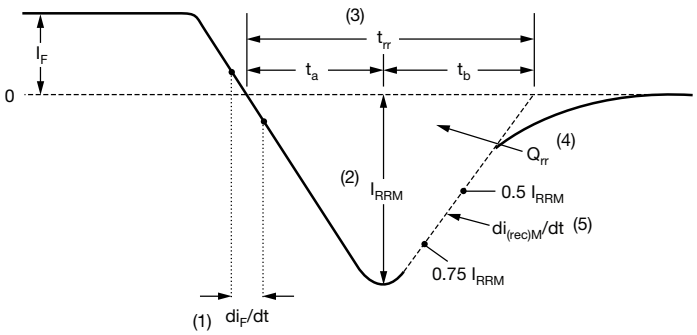



Fig. 10 - Reverse Recovery Parameter Test Circuit




(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 $I_{RRM}$

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

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

Fig. 11 - Reverse Recovery Waveform and Definitions

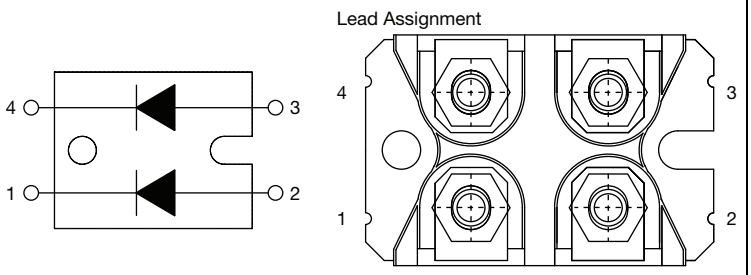
## ORDERING INFORMATION TABLE

Device code

| VS- | Q | A | 300 | F | A | 17 |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- 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)

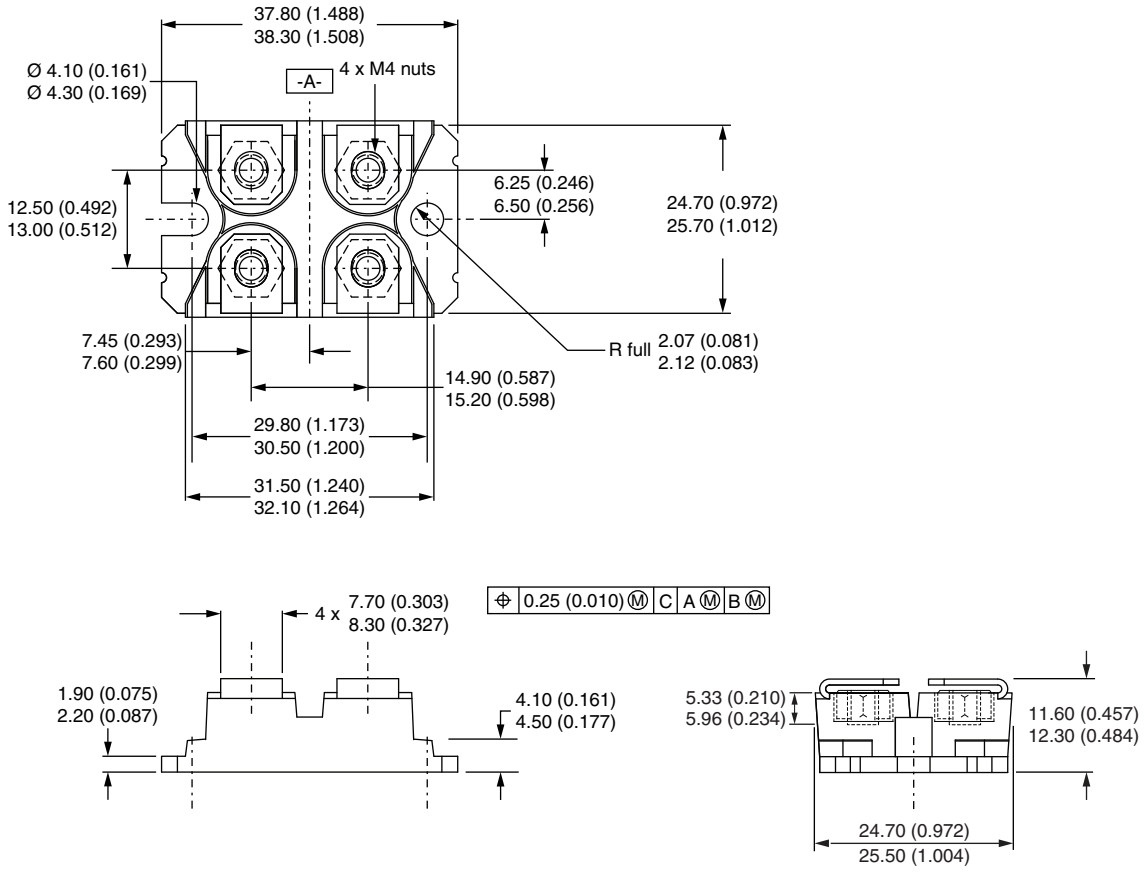
Quantity per tube is 10, M4 screw and washer included

| 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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