

Single Phase Fast Recovery Bridge (Power Modules), 61 A



SOT-227

FEATURES

- Fast recovery time characteristic
- Electrically isolated base plate
- Simplified mechanical designs, rapid assembly
- Excellent power/volume ratio
- Designed and qualified for industrial and consumer level
- UL approved file E78996 
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

DESCRIPTION

The semiconductor in the SOT-227 package is isolated from the copper base plate, allowing for common heatsinks and compact assemblies to be built.

PRIMARY CHARACTERISTICS

| | |
|-----------------------|------------------------|
| V_{RRM} | 600 V |
| I_O | 61 A |
| t_{rr} | 170 ns |
| Type | Modules - Bridge, Fast |
| Package | SOT-227 |
| Circuit configuration | Single phase bridge |

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-----------|-----------------|-------------|------------------|
| I_O | | 61 | A |
| | T_C | 57 | °C |
| I_{FSM} | 50 Hz | 300 | A |
| | 60 Hz | 310 | |
| I^2t | 50 Hz | 442 | A ² s |
| | 60 Hz | 402 | |
| V_{RRM} | | 600 | V |
| T_J | | -55 to +150 | °C |

ELECTRICAL SPECIFICATIONS

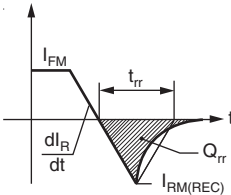
VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | V_{RRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V | V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM} MAXIMUM AT T_J MAXIMUM mA |
|-------------|--------------|--|--|--|
| SA61BA60 | 60 | 600 | 700 | 10 |

FORWARD CONDUCTION

| PARAMETER | SYMBOL | TEST CONDITIONS | | | VALUES | UNITS |
|--|--------------------|---|----------------------------------|---|--------|--------------------|
| Maximum DC output current at case temperature | I _O | Resistive or inductive load | | | 61 | A |
| | | | | | 57 | °C |
| Maximum peak, one-cycle non-repetitive forward current | I _{FSM} | t = 10 ms | No voltage reapplied | Initial T _J = T _J maximum | 300 | A |
| | | t = 8.3 ms | | | 310 | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 250 | |
| | | t = 8.3 ms | | | 260 | |
| Maximum I ² t for fusing | I ² t | t = 10 ms | No voltage reapplied | | 442 | A ² s |
| | | t = 8.3 ms | | | 402 | |
| | | t = 10 ms | 100 % V _{RRM} reapplied | | 313 | |
| | | t = 8.3 ms | | | 284 | |
| Maximum I ² √t for fusing | I ² √t | I ² t for time t _x = I ₂ √t x √t _x ; 0.1 ≤ t _x ≤ 10 ms, V _{RRM} = 0 V | | | 4.4 | kA ² √s |
| Value of threshold voltage | V _{F(TO)} | T _J maximum | | | 0.914 | V |
| Forward slope resistance | r _t | | | | 10.5 | mΩ |
| Maximum forward voltage drop | V _{FM} | T _J = 25 °C, I _{FM} = 30 A _{pk} | | t _p = 400 μs | 1.33 | V |
| | | T _J = T _J maximum, I _{FM} = 30 A _{pk} | | | 1.23 | |
| RMS isolation voltage base plate | V _{ISOL} | f = 50 Hz, t = 1 s | | | 3000 | |

RECOVERY CHARACTERISTICS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS | |
|-----------------------------------|----------|--|--------|-------|---|
| Reverse recovery time, typical | t_{rr} | $T_J = 25\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 170 | ns |  |
| | | $T_J = 125\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 250 | | |
| Reverse recovery current, typical | I_{rr} | $T_J = 25\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 10.5 | A | |
| | | $T_J = 125\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 16 | | |
| Reverse recovery charge, typical | Q_{rr} | $T_J = 25\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 900 | nC | |
| | | $T_J = 125\text{ }^{\circ}\text{C}$, $I_F = 20\text{ A}$, $V_R = 30\text{ V}$, $di_F/dt = 100\text{ A}/\mu\text{s}$ | 1970 | | |
| Snap factor, typical | S | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.6 | - | |
| Junction capacitance, typical | C_T | $V_R = 600\text{ V}$ | 67 | pF | |

THERMAL AND MECHANICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
|---|----------------|-----------------------|------|------|------------|-------------|
| Junction and storage temperature range | T_J, T_{Stg} | | - 55 | - | 150 | °C |
| Thermal resistance junction to case, per diode | R_{thJC} | | - | - | 1.2 | °C/W |
| Thermal resistance junction to case, per module | | | - | - | 0.30 | |
| Thermal resistance case to heatsink | R_{thCS} | Flat, greased surface | - | 0.05 | - | |
| 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 | |

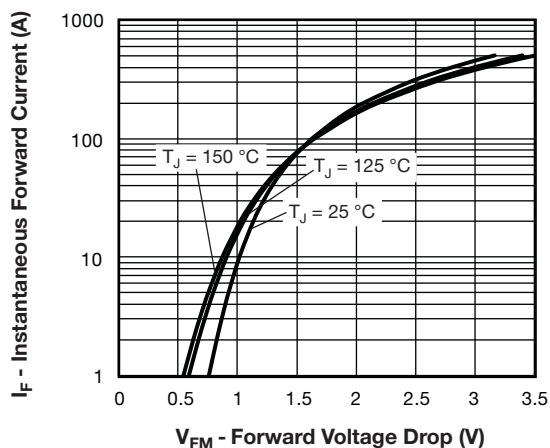


Fig. 1 - Typical Forward Voltage Drop Characteristics

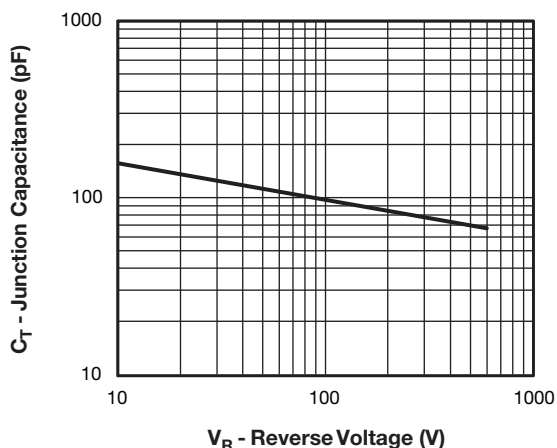


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

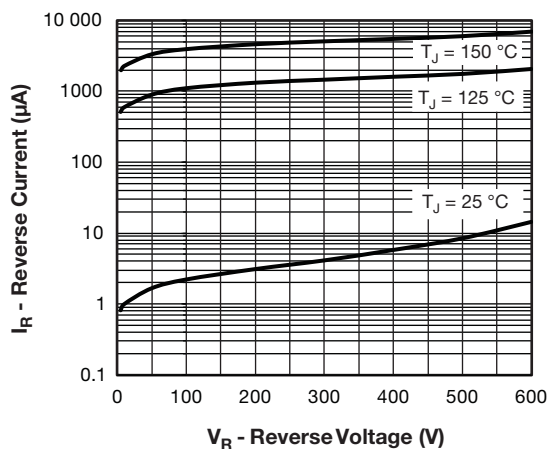


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

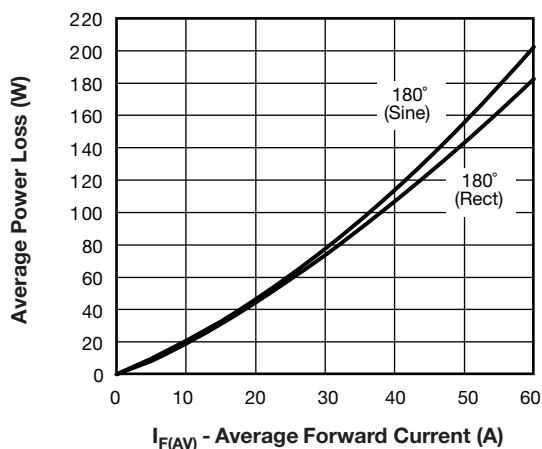


Fig. 4 - Current Rating Characteristics

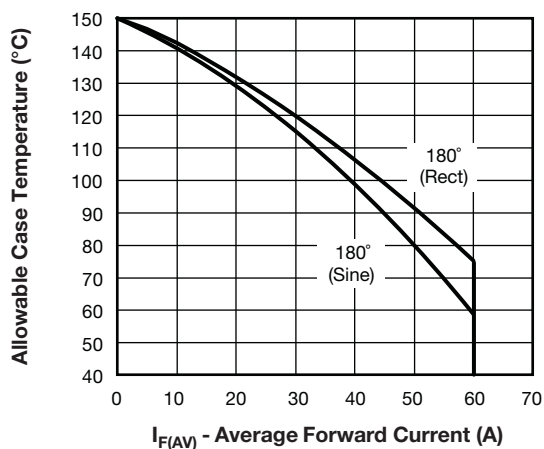


Fig. 5 - Forward Power Loss Characteristics

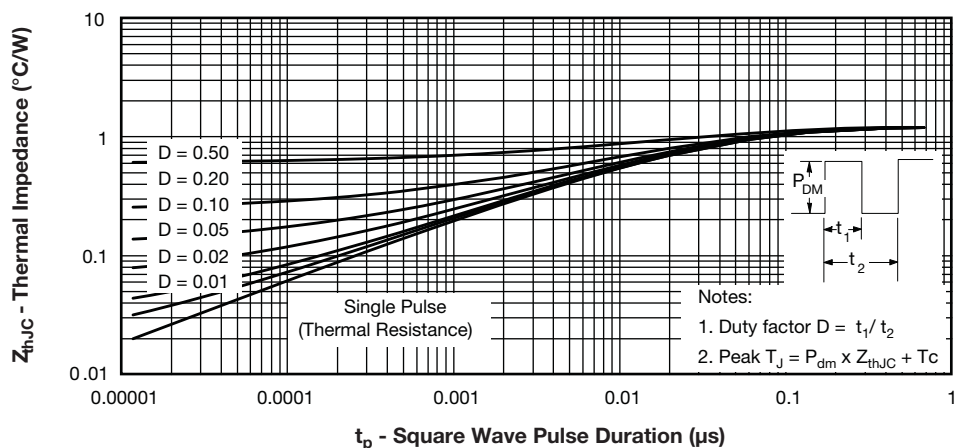
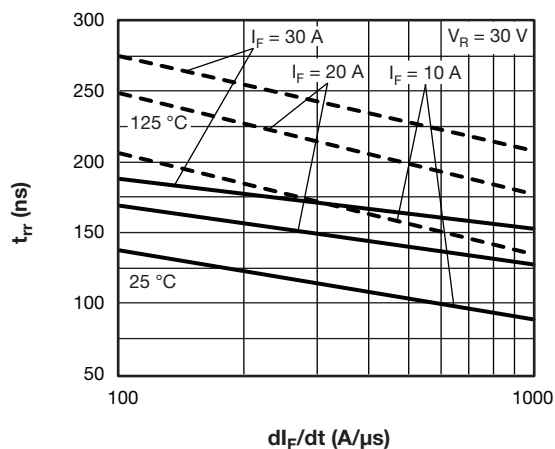
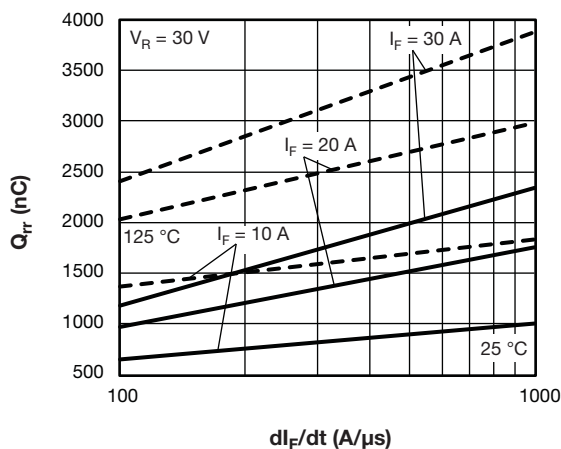
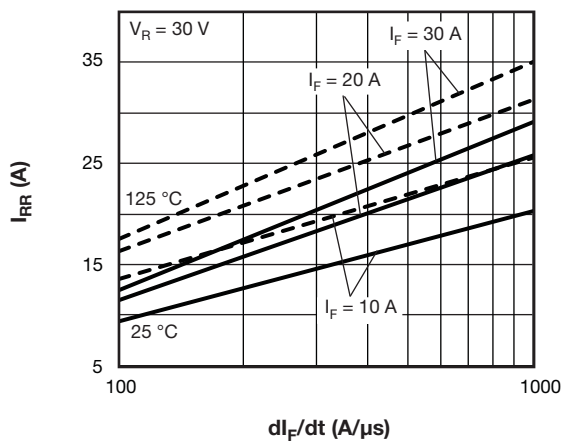


Fig. 6 - Typical Forward Voltage Drop Characteristics


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

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

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

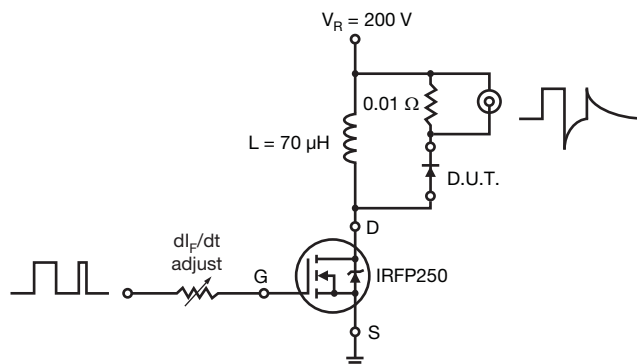
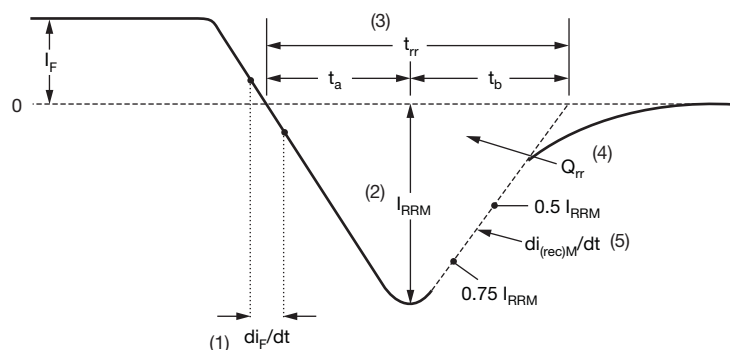


Fig. 10 - Reverse Recovery Parameter Test Circuit



(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}

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

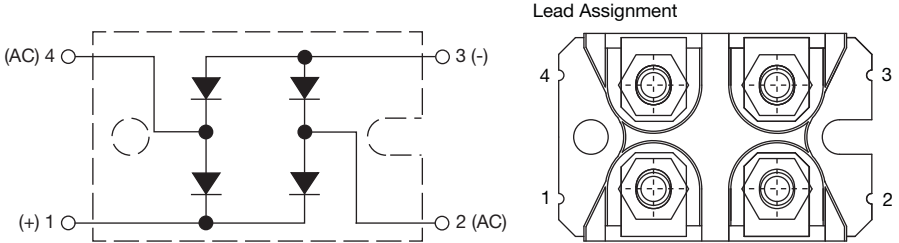
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 11 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

| Device code | VS- | S | A | 61 | B | A | 60 |
|-------------|-----|--------------------------------------|---|----|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | - | Vishay Semiconductors product | | | | | |
| 2 | - | S = fast recovery diode | | | | | |
| 3 | - | A = present silicon generation | | | | | |
| 4 | - | Current rating (61 = 61 A) | | | | | |
| 5 | - | Circuit configuration: | | | | | |
| | | B = single phase bridge | | | | | |
| 6 | - | Package indicator: | | | | | |
| | | A = SOT-227, standard insulated base | | | | | |
| 7 | - | Voltage rating (60 = 600 V) | | | | | |

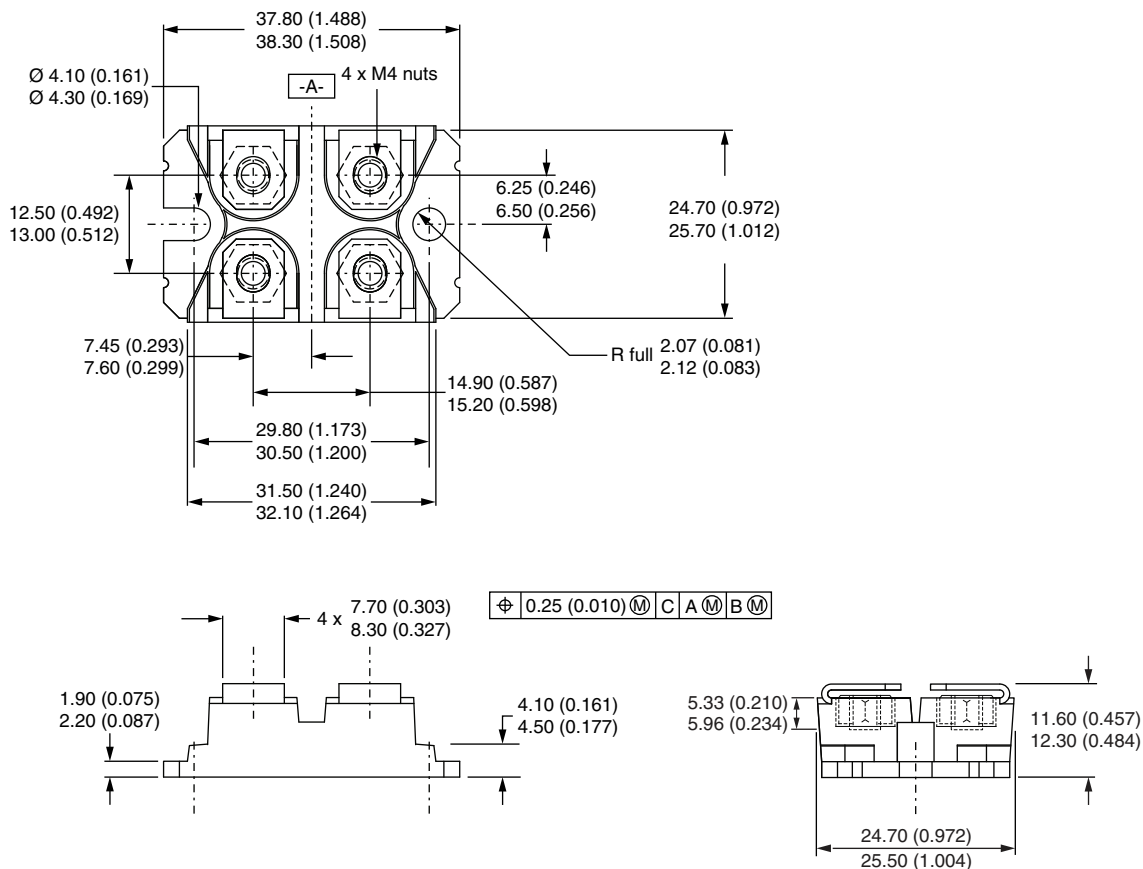


| CIRCUIT CONFIGURATION | | |
|-----------------------|----------------------------|--|
| CIRCUIT | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING |
| Single phase bridge | B |  |

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

SOT-227 Generation 2

DIMENSIONS in millimeters (inches)



Note

- Controlling dimension: millimeter



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