


## SOT-227 Power Module Insulated Standard Recovery Rectifier, 160 A



SOT-227

**FEATURES**

- Two fully independent diodes
- Fully insulated package
- High voltage rectifiers optimized for very low forward voltage drop
- Industry standard outline
- UL approved file E78996 
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS  
COMPLIANT**
**DESCRIPTION / APPLICATIONS**

These devices are intended for use in main rectification. Single or three phase bridge.

**PRIMARY CHARACTERISTICS**

|                           |  |
|---------------------------|--|
| $I_{F(AV)}$ per module    | 160 A, $T_C = 101\text{ }^\circ\text{C}$ |
| $V_{FM}$ typical at 100 A | 1.16 V                                   |
| Type                      | Modules - diode, high voltage            |
| Package                   | SOT-227                                  |
| Circuit configuration     | Two separate diodes, parallel pin-out    |

**MAJOR RATINGS AND CHARACTERISTICS**

| SYMBOL        | CHARACTERISTICS     | VALUES      | UNITS                       |
|---------------|---------------------|-------------|-----------------------------|
| $I_{F(AV)}$   | 90 $^\circ\text{C}$ | 91          | A                           |
| $I_{F(RMS)}$  |                     | 138         |                             |
| $I_{FSM}$     | 50 Hz               | 940         |                             |
|               | 60 Hz               | 985         |                             |
| $I^2t$        | 50 Hz               | 4420        | $\text{A}^2\text{s}$        |
|               | 60 Hz               | 4015        |                             |
| $I^2\sqrt{t}$ |                     | 44 180      | $\text{A}^2\sqrt{\text{s}}$ |
| $V_{RRM}$     |                     | 1200        | V                           |
| $T_J$         |                     | -55 to +150 | $^\circ\text{C}$            |

**ELECTRICAL SPECIFICATIONS**
**VOLTAGE RATINGS**

| TYPE NUMBER   | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ TYPICAL AT 150 $^\circ\text{C}$<br>mA |
|---------------|--------------|--|--|---|
| VS-RA160FA120 | 120          | 1200   | 1300   | 1.0   |



| FORWARD CONDUCTION  |               |  |                           |        |                   |
|---|---------------|--|---------------------------|--------|-------------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS  |                           | VALUES | UNITS             |
| Maximum average forward current at case temperature per leg           | $I_{F(AV)}$   | 180° conduction, half sine wave, 90 °C   |                           | 91     | A                 |
| Maximum RMS forward current per leg                                   | $I_{F(RMS)}$  | DC at 101 °C case temperature  |                           | 138    | A                 |
| Maximum peak, one-cycle forward, non-repetitive surge current per leg | $I_{FSM}$     | t = 10 ms  | No voltage reapplied      | 940    |                   |
|   |               | t = 8.3 ms   | No voltage reapplied      | 985    |                   |
|   |               | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 790    |                   |
|   |               | t = 8.3 ms   | 100 % $V_{RRM}$ reapplied | 825    |                   |
| Maximum $I^2t$ for fusing per leg                                     | $I^2t$        | t = 10 ms  | No voltage reapplied      | 4420   | A <sup>2</sup> s  |
|   |               | t = 8.3 ms   | No voltage reapplied      | 4015   |                   |
|   |               | t = 10 ms  | 100 % $V_{RRM}$ reapplied | 3125   |                   |
|   |               | t = 8.3 ms   | 100 % $V_{RRM}$ reapplied | 2840   |                   |
| Maximum $I^2\sqrt{t}$ for fusing per leg                              | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reapplied  |                           | 44 180 | A <sup>2</sup> √s |
| Low level of threshold voltage per leg                                | $V_{F(TO)1}$  | $(16.7\% \times \pi \times I_{F(AV)}) < I < \pi \times I_{F(AV)}, T_J = T_J \text{ maximum}$ |                           | 0.80   | V                 |
| Low level value of forward slope resistance                           | $r_{f1}$      |  |                           | 4.32   | mΩ                |
| High level of threshold voltage per leg                               | $V_{F(TO)2}$  | $(I > \pi \times I_{F(AV)}, T_J = T_J \text{ maximum})$                                      |                           | 0.93   | V                 |
| High level value of forward slope resistance                          | $r_{f2}$      |  |                           | 4.14   | mΩ                |
| Maximum forward voltage drop per leg                                  | $V_{FM}$      | $I_{FM} = 100 \text{ A}, T_J = 25 \text{ °C}$  |                           | 1.27   | V                 |
|   |               | $I_{FM} = 100 \text{ A}, T_J = 150 \text{ °C}$   |                           | 1.22   |                   |

| BLOCKING                                     |           |  |  |        |       |
|--|-----------|--|--|--------|-------|
| PARAMETER                                    | SYMBOL    | TEST CONDITIONS  |  | VALUES | UNITS |
| Maximum peak reverse leakage current per leg | $I_{RRM}$ | $T_J = 25 \text{ °C}$                                      |  | 150    | μA    |
|  |           | $T_J = 150 \text{ °C}$                                     |  | 1.5    | mA    |
| RMS insulation voltage                       | $V_{INS}$ | $T_J = 25 \text{ °C}$ , any terminal to case, t = 1 minute |  | 2500   | V     |

| THERMAL AND MECHANICAL SPECIFICATIONS |            |         |      |            |              |  |
|---------------------------------------|------------|---------|------|------------|--------------|--|
| PARAMETER                             | SYMBOL     | MIN.    | TYP. | MAX.       | UNITS        |  |
| Thermal resistance, junction to case  | per leg    | -       | -    | 0.26       | °C/W         |  |
|                                       | per module | -       | -    | 0.13       |              |  |
| Thermal resistance, case to heatsink  | per module | -       | 0.1  | -          |              |  |
| Weight                                |            | -       | 30   | -          | g            |  |
| Mounting torque to terminal           |            | -       | -    | 1.1 (9.7)  | Nm (lbf. in) |  |
| Mounting torque to heatsink           |            | -       | -    | 1.8 (15.9) | Nm (lbf. in) |  |
| Case style                            |            | SOT-227 |      |            |              |  |

| ΔR CONDUCTION PER JUNCTION |                           |       |       |       |       |                             |       |       |       |       |       |
|----------------------------|---------------------------|-------|-------|-------|-------|-----------------------------|-------|-------|-------|-------|-------|
| DEVICE                     | SINE HALF WAVE CONDUCTION |       |       |       |       | RECTANGULAR WAVE CONDUCTION |       |       |       |       | UNITS |
|                            | 180°                      | 120°  | 90°   | 60°   | 30°   | 180°                        | 120°  | 90°   | 60°   | 30°   |       |
| VS-RA160FA120              | 0.109                     | 0.122 | 0.149 | 0.213 | 0.355 | 0.069                       | 0.119 | 0.159 | 0.223 | 0.358 | °C/W  |

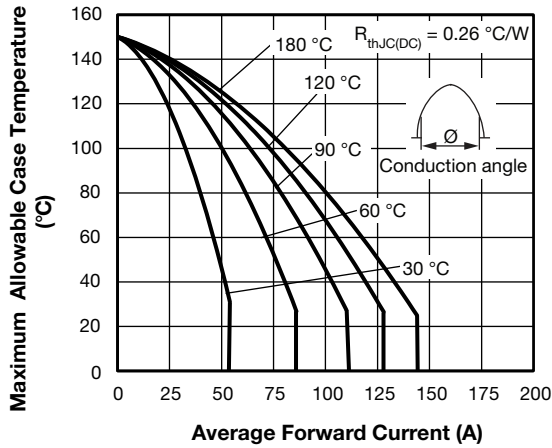


Fig. 1 - Current Ratings Characteristics (A)

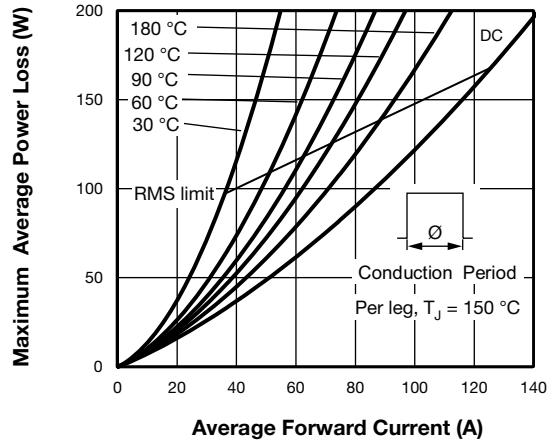


Fig. 4 - Forward Power Loss Characteristics

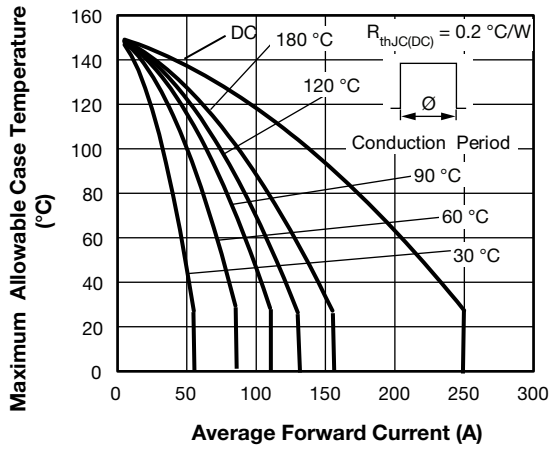


Fig. 2 - Current Ratings Characteristics (A)

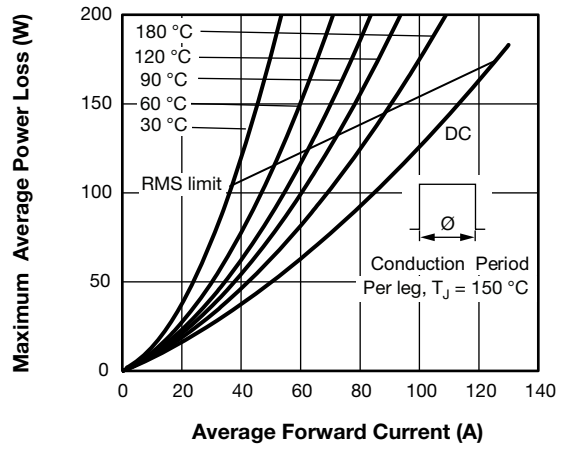


Fig. 5 - Forward Power Loss Characteristics

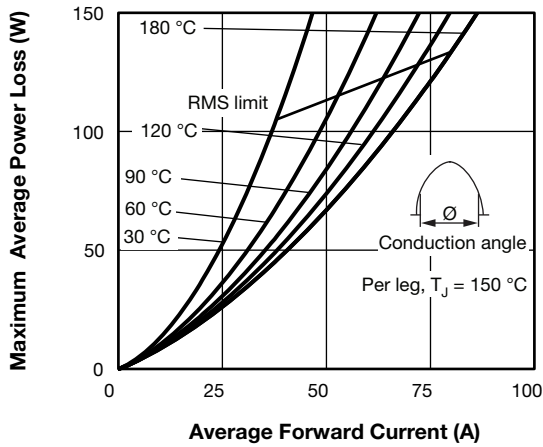


Fig. 3 - Current Ratings Characteristics (A)

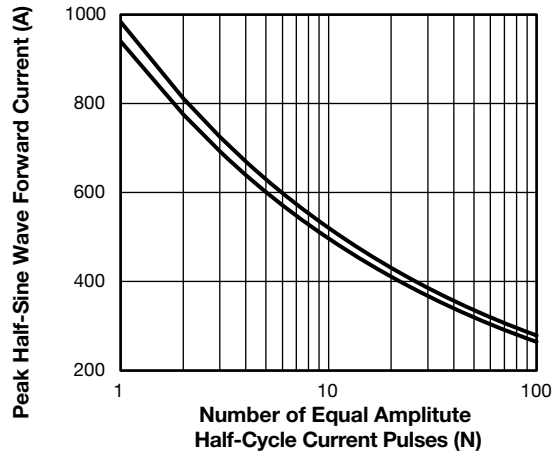


Fig. 6 - Maximum Non-Repetitive Surge Current

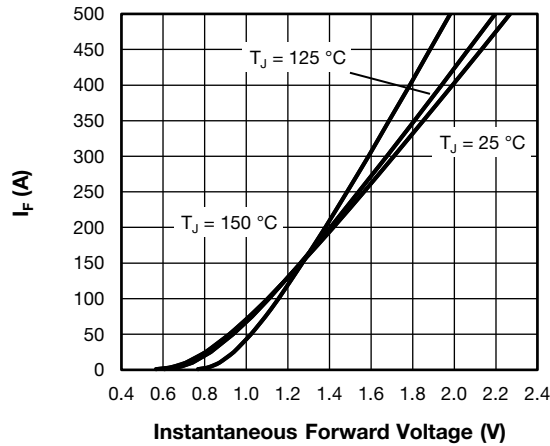


Fig. 7 - Typical Forward Voltage Characteristics

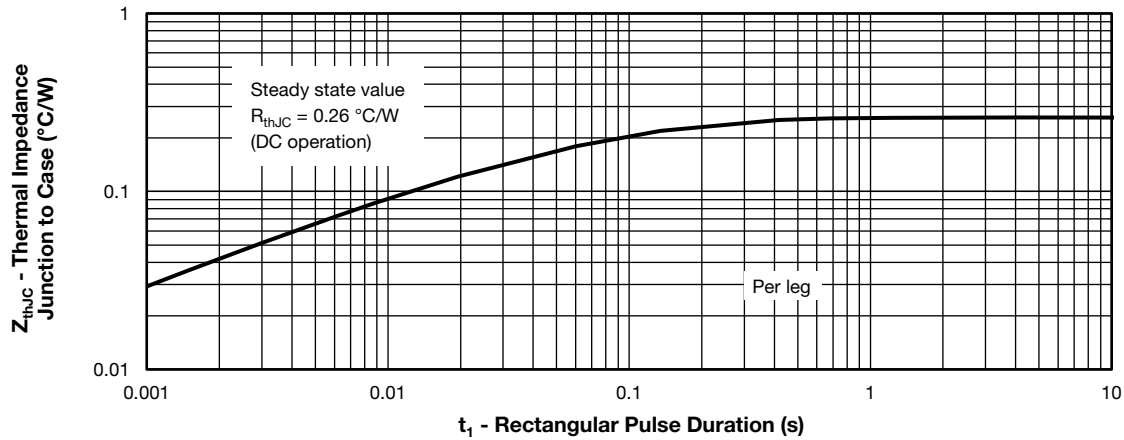
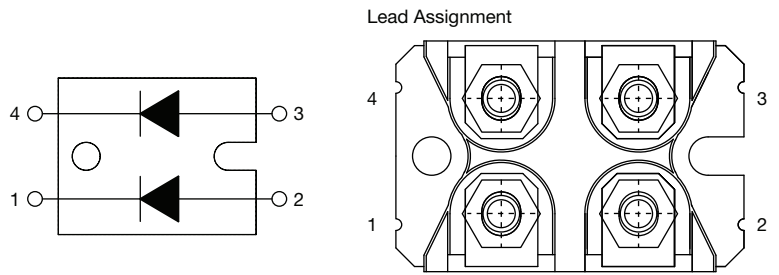


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

|             |            |          |          |            |          |          |            |
|-------------|------------|----------|----------|------------|----------|----------|------------|
| Device code | <b>VS-</b> | <b>R</b> | <b>A</b> | <b>160</b> | <b>F</b> | <b>A</b> | <b>120</b> |
|             | ①          | ②        | ③        | ④          | ⑤        | ⑥        | ⑦          |

- 1** - Vishay Semiconductors product
- 2** - Standard recovery diode
- 3** - Present silicon generation
- 4** - Current rating (160 = 160 A)
- 5** - Circuit configuration (2 separate diodes, parallel pin-out)
- 6** - Package indicator (SOT-227 standard insulated base)
- 7** - Voltage rating (120 = 1200 V)

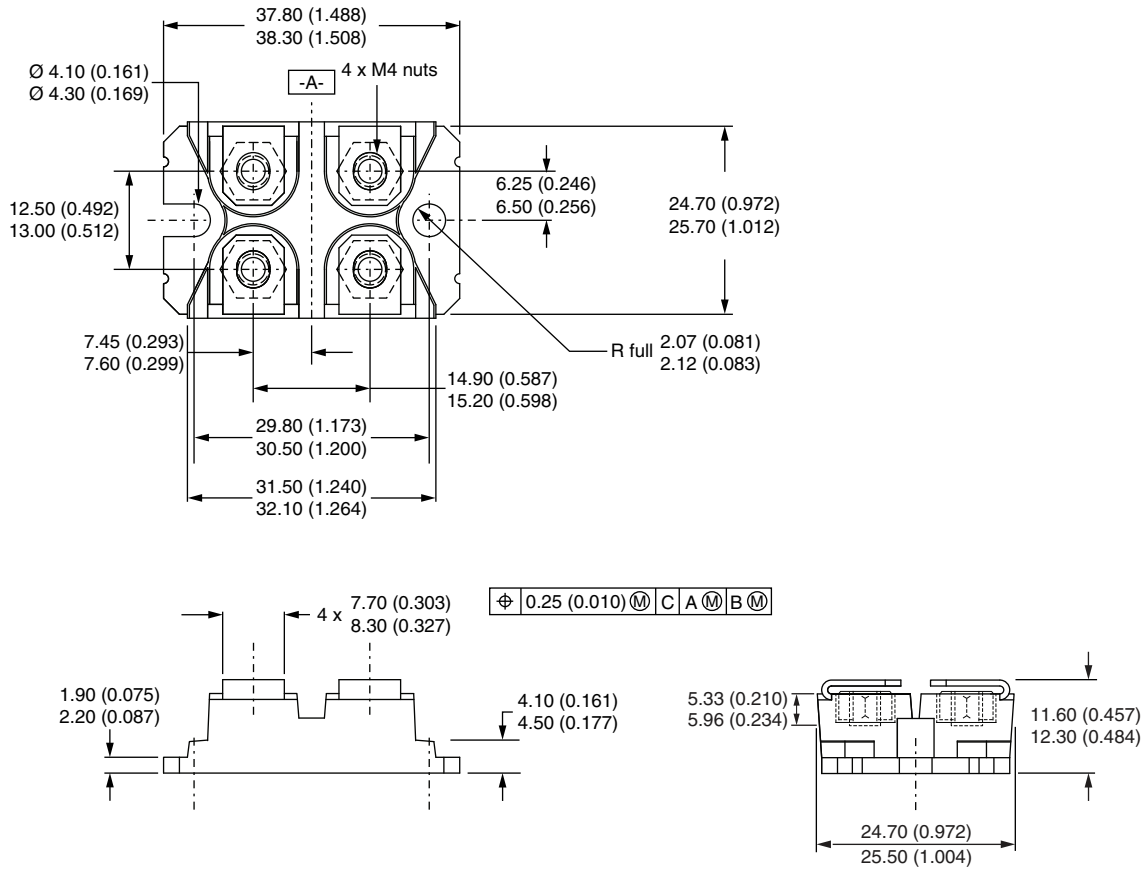
| CIRCUIT CONFIGURATION                 |                            |   |
|---------------------------------------|----------------------------|---|
| CIRCUIT DESCRIPTION                   | CIRCUIT CONFIGURATION CODE | CIRCUIT DRAWING   |
| Two separate diodes, parallel pin-out | F                          |  <p>Lead Assignment</p> |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a> |



## SOT-227 Generation 2

**DIMENSIONS** in millimeters (inches)



**Note**

- Controlling dimension: millimeter



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