

## Standard Recovery Diodes (Stud Version), 400 A



DO-205AB (DO-9)

### FEATURES

- Wide current range
- High surge current capabilities
- Stud cathode and stud anode version
- Standard JEDEC® types
- Designed and qualified for industrial level
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 400 A           |
| Package               | DO-205AB (DO-9) |
| Circuit configuration | Single diode    |

### TYPICAL APPLICATIONS

- Converters
- Power supplies
- Machine tool controls
- High power drives

### MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER    | TEST CONDITIONS | VALUES      | UNITS             |
|--------------|-----------------|-------------|-------------------|
| $I_{F(AV)}$  |                 | 400         | A                 |
|              | $T_C$           | 120         | °C                |
| $I_{F(RMS)}$ |                 | 630         | A                 |
| $I_{FSM}$    | 50 Hz           | 8250        | A                 |
|              | 60 Hz           | 8640        |                   |
| $I^2t$       | 50 Hz           | 340         | kA <sup>2</sup> s |
|              | 60 Hz           | 311         |                   |
| $V_{RRM}$    | Range           | 800 to 1600 | V                 |
| $T_J$        |                 | -40 to 200  | °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 | $I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM<br>mA |
|-------------|--------------|--|--|--|
| VS-400U(R)  | 80           | 800  | 900  | 15   |
|             | 120          | 1200   | 1300   |  |
|             | 160          | 1600   | 1700   |  |



| FORWARD CONDUCTION  |               |   |                           |   |                    |
|---|---------------|---|---------------------------|---|--------------------|
| PARAMETER   | SYMBOL        | TEST CONDITIONS   |                           | VALUES  | UNITS              |
| Maximum average forward current at case temperature           | $I_{F(AV)}$   | 180° conduction, half sine wave   |                           | 400   | A                  |
|   |               |   |                           | 120   | °C                 |
| Maximum RMS forward current                                   | $I_{F(RMS)}$  | DC at 110 °C case temperature   |                           | 630   | A                  |
| Maximum peak, one cycle forward, non-repetitive surge current | $I_{FSM}$     | t = 10 ms   | No voltage reapplied      | Sinusoidal half wave, initial $T_J = T_J$ maximum | A                  |
|   |               | t = 8.3 ms  |                           |   |                    |
|   |               | t = 10 ms   | 100 % $V_{RRM}$ reapplied |   |                    |
|   |               | t = 8.3 ms  |                           |   |                    |
| Maximum $I^2t$ for fusing                                     | $I^2t$        | t = 10 ms   | No voltage reapplied      | Sinusoidal half wave, initial $T_J = T_J$ maximum | kA <sup>2</sup> s  |
|   |               | t = 8.3 ms  |                           |   |                    |
|   |               | t = 10 ms   | 100 % $V_{RRM}$ reapplied |   |                    |
|   |               | t = 8.3 ms  |                           |   |                    |
| Maximum $I^2\sqrt{t}$ for fusing                              | $I^2\sqrt{t}$ | t = 0.1 to 10 ms, no voltage reapplied  |                           | 3400  | kA <sup>2</sup> √s |
| Low level value of threshold voltage                          | $V_{F(TO)1}$  | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum |                           | 0.77  | V                  |
| High level value of threshold voltage                         | $V_{F(TO)2}$  | (I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      |                           | 0.85  |                    |
| Low level value of forward slope resistance                   | $r_{f1}$      | (16.7 % $\times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum |                           | 0.49  | mΩ                 |
| High level value of forward slope resistance                  | $r_{f2}$      | (I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum                                      |                           | 0.49  |                    |
| Maximum forward voltage drop                                  | $V_{FM}$      | $I_{pk} = 1500$ A, $T_J = T_J$ maximum, $t_p = 10$ ms sinusoidal wave                   |                           | 1.62  | V                  |

| THERMAL AND MECHANICAL SPECIFICATIONS                    |                |   |  |                 |       |
|--|----------------|---|--|-----------------|-------|
| PARAMETER  | SYMBOL         | TEST CONDITIONS                               |  | VALUES          | UNITS |
| Maximum junction operating and storage temperature range | $T_J, T_{Stg}$ |   |  | -40 to 200      | °C    |
| Maximum thermal resistance, junction to case             | $R_{thJC}$     | DC operation                                  |  | 0.15            | K/W   |
| Maximum thermal resistance, case to heatsink             | $R_{thCS}$     | Mounting surface, smooth, flat and greased    |  | 0.04            |       |
| Maximum allowed mounting torque ± 10 %                   |                | Not lubricated threads                        |  | 27              | N · m |
| Approximate weight                                       |                |   |  | 250             | g     |
| Case style   |                | See dimensions - link at the end of datasheet |  | DO-205AB (DO-9) |       |

| $\Delta R_{thJC}$ CONDUCTION |                       |                        |                     |       |
|------------------------------|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE             | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS     | UNITS |
| 180°                         | 0.020                 | 0.013                  | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.023                 | 0.023                  |                     |       |
| 90°                          | 0.029                 | 0.031                  |                     |       |
| 60°                          | 0.042                 | 0.044                  |                     |       |
| 30°                          | 0.073                 | 0.074                  |                     |       |

**Note**

- The table above shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC

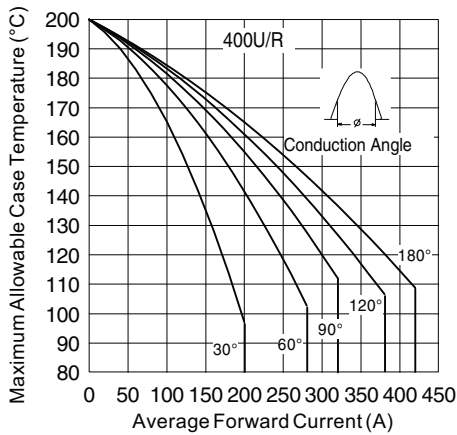


Fig. 1 - Current Ratings Characteristics

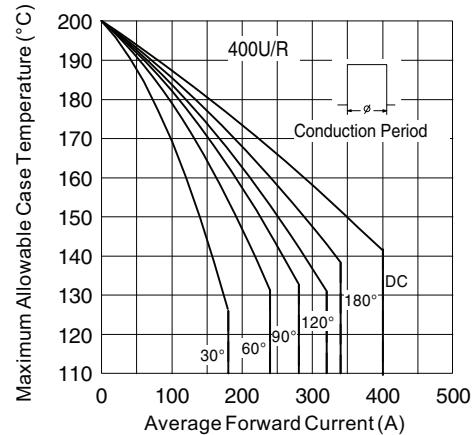


Fig. 2 - Current Ratings Characteristics

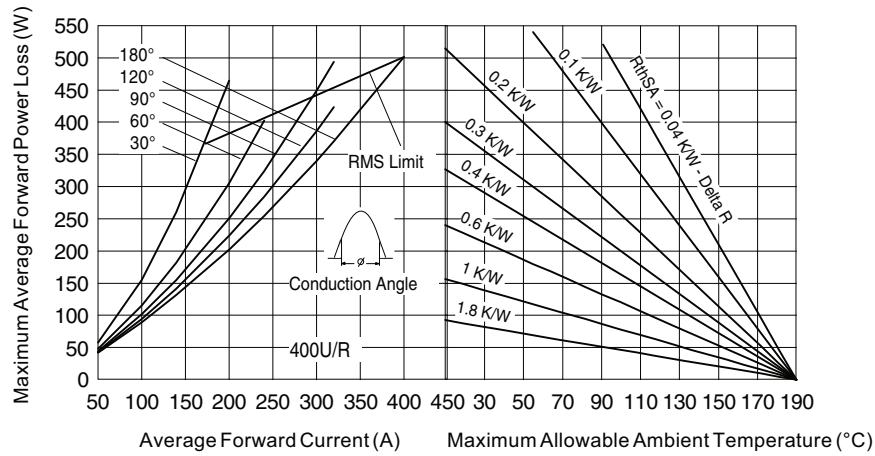


Fig. 3 - Forward Power Loss Characteristics

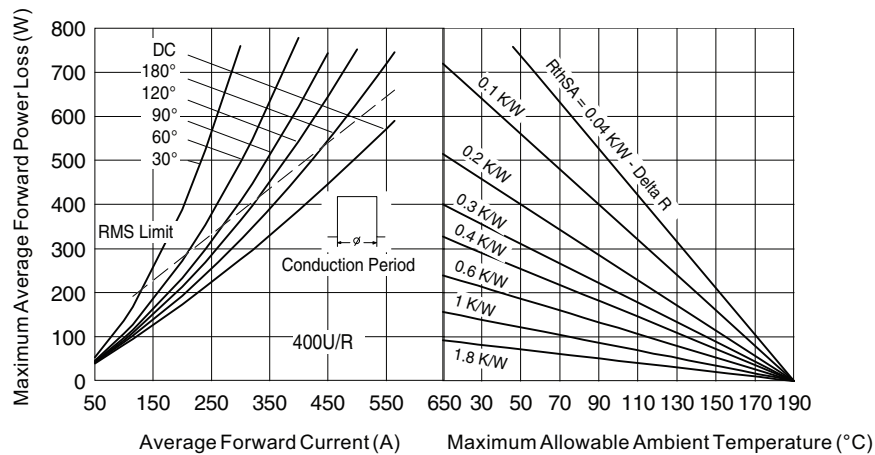


Fig. 4 - Forward Power Loss Characteristics

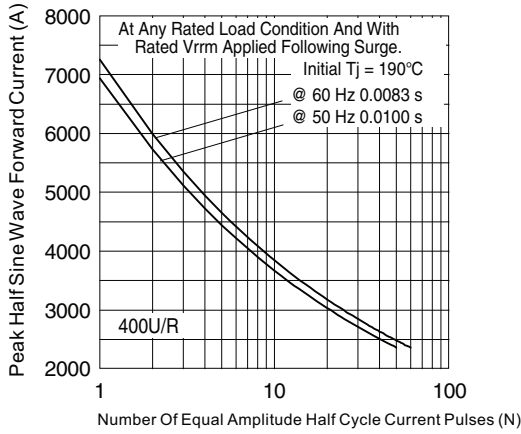


Fig. 5 - Maximum Non-Repetitive Surge Current

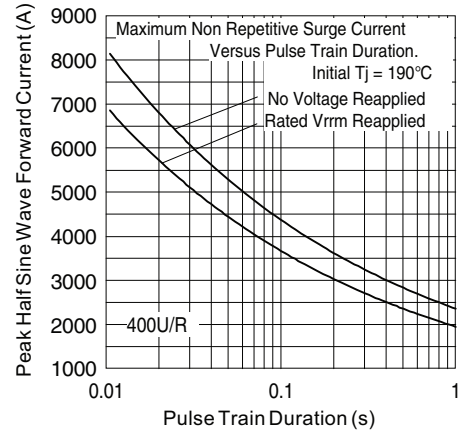


Fig. 6 - Maximum Non-Repetitive Surge Current

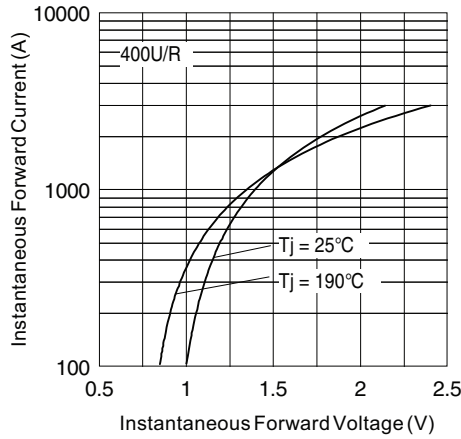


Fig. 7 - Forward Voltage Drop Characteristics

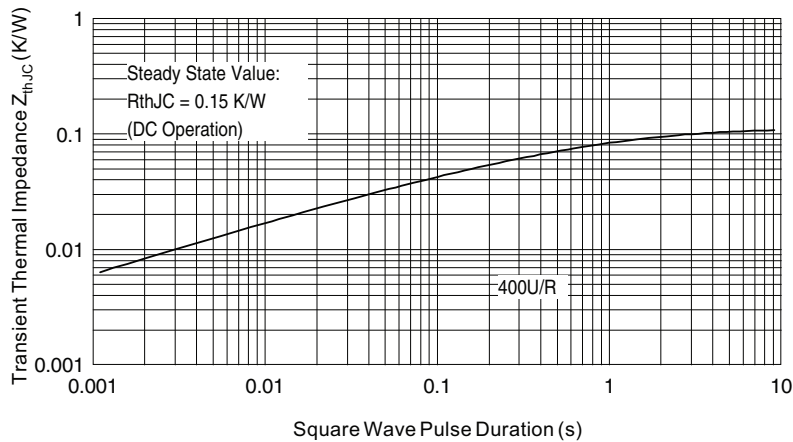


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristic



**ORDERING INFORMATION TABLE**

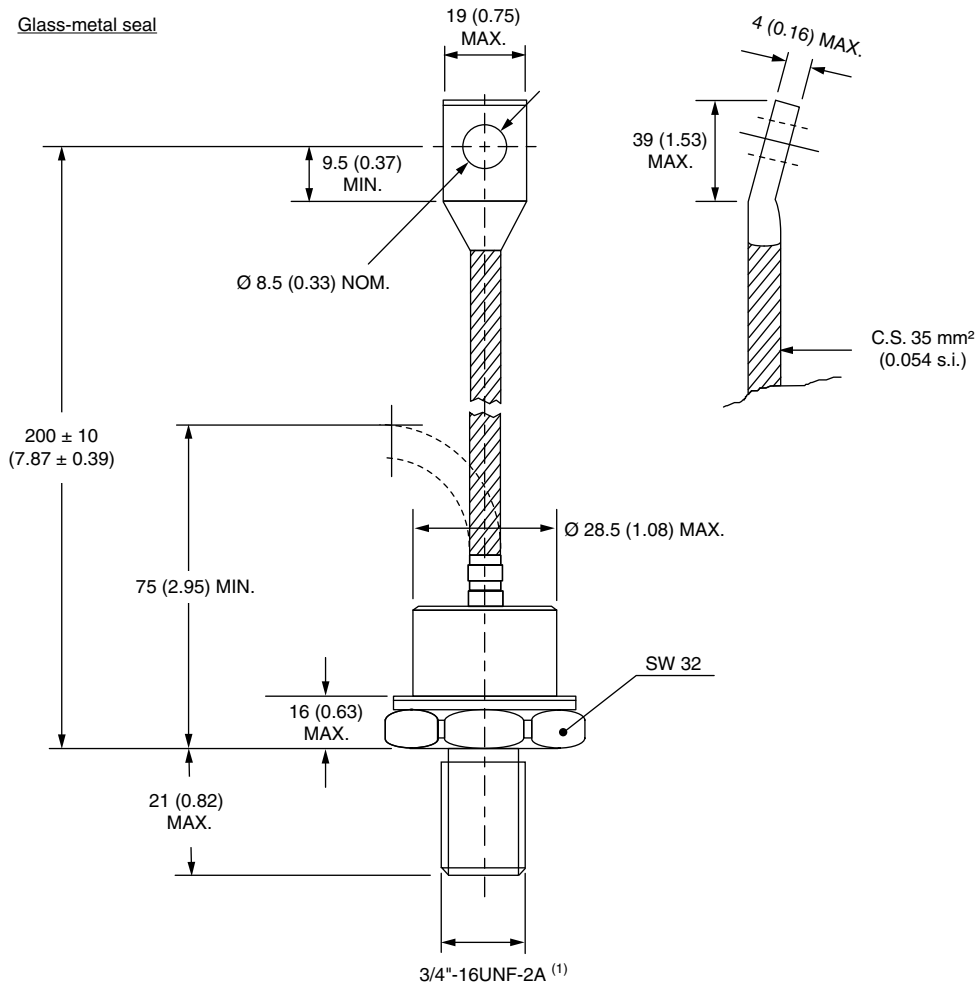
|             |                               |                            |                              |  |  |   |                |
|-------------|-------------------------------|----------------------------|------------------------------|--|--|---|----------------|
| Device code | <b>VS-</b>                    | <b>40</b>                  | <b>0</b>                     | <b>U</b>                                   | <b>R</b>   | <b>160</b>  | <b>D</b>       |
|             | ①                             | ②                          | ③                            | ④  | ⑤  | ⑥   | ⑦              |
|             | <b>1</b>                      | <b>2</b>                   | <b>3</b>                     | <b>4</b>                                   | <b>5</b>   | <b>6</b>  | <b>7</b>       |
|             | -                             | -                          | -                            | -  | -  | -   | -              |
|             | Vishay Semiconductors product | 40 = Essential part number | 0 = Standard recovery device | U = Stud normal polarity (cathode to stud) | <ul style="list-style-type: none"> <li>• None = Stud normal polarity (cathode to stud)</li> <li>• R = Stud reverse polarity (anode to stud)</li> </ul> | Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table) | Diffused diode |

Note: For metric device M16 x 1.5 contact factory

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95339">www.vishay.com/doc?95339</a> |

## DO-205AB (DO-9) for 400U(R) Series

**DIMENSIONS** in millimeters (inches)



**Note**

- For metric device: M16 x 1.5 contact factory



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