

## Standard Recovery Diodes, (Stud Version), 40 A



DO-203AB (DO-5)

### FEATURES

- High surge current capability
- Stud cathode and stud anode version
- Leaded version available
- Types up to 1600 V  $V_{RRM}$
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for multiple level



**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

- Battery charges
- Converters
- Power supplies
- Machine tool controls
- Welding

### PRODUCT SUMMARY

|             |      |
|-------------|------|
| $I_{F(AV)}$ | 40 A |
|-------------|------|

### MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER                   | TEST CONDITIONS | 40HF(R)     |             | UNITS            |
|-----------------------------|-----------------|-------------|-------------|------------------|
|                             |                 | 10 TO 120   | 140/160     |                  |
| I <sub>F(AV)</sub>          |                 | 40          | 40          | A                |
|                             | T <sub>C</sub>  | 140         | 110         | °C               |
| I <sub>F(RMS)</sub>         |                 | 62          |             | A                |
| I <sub>FSM</sub>            | 50 Hz           | 570         |             | A                |
|                             | 60 Hz           | 595         |             |                  |
| I <sup>2</sup> <sub>t</sub> | 50 Hz           | 1600        |             | A <sup>2</sup> s |
|                             | 60 Hz           | 1450        |             |                  |
| V <sub>RRM</sub>            | Range           | 100 to 1200 | 1400/1600   | V                |
| T <sub>J</sub>              |                 | - 65 to 190 | - 65 to 160 | °C               |

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE<br>PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM<br>AT $T_J = T_J$ MAXIMUM<br>mA |
|-------------|--------------|-------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------|
| 40HF(R)     | 10           | 100                                                         | 200                                                             | 9                                                 |
|             | 20           | 200                                                         | 300                                                             |                                                   |
|             | 40           | 400                                                         | 500                                                             |                                                   |
|             | 60           | 600                                                         | 700                                                             |                                                   |
|             | 80           | 800                                                         | 900                                                             |                                                   |
|             | 100          | 1000                                                        | 1100                                                            |                                                   |
|             | 120          | 1200                                                        | 1300                                                            |                                                   |
|             | 140          | 1400                                                        | 1500                                                            | 4.5                                               |
|             | 160          | 1600                                                        | 1700                                                            |                                                   |

| FORWARD CONDUCTION                                            |                     |                                                                                           |                                   |                                                                       |           |         |                   |
|---------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------|-----------|---------|-------------------|
| PARAMETER                                                     | SYMBOL              | TEST CONDITIONS                                                                           |                                   |                                                                       | 40HF(R)   |         | UNITS             |
|                                                               |                     |                                                                                           |                                   |                                                                       | 10 TO 120 | 140/160 |                   |
| Maximum average forward current at case temperature           | I <sub>F(AV)</sub>  | 180° conduction, half sine wave                                                           |                                   |                                                                       | 40        | 40      | A                 |
|                                                               |                     |                                                                                           |                                   |                                                                       | 140       | 110     | °C                |
| Maximum RMS forward current                                   | I <sub>F(RMS)</sub> |                                                                                           |                                   |                                                                       | 62        |         | A                 |
| Maximum peak, one-cycle forward, non-repetitive surge current | I <sub>FSM</sub>    | t = 10 ms                                                                                 | No voltage reappplied             | Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum | 570       |         | A                 |
|                                                               |                     | t = 8.3 ms                                                                                |                                   |                                                                       | 595       |         |                   |
|                                                               |                     | t = 10 ms                                                                                 | 100 % V <sub>RRM</sub> reappplied |                                                                       | 480       |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                |                                   |                                                                       | 500       |         |                   |
| Maximum I <sup>2</sup> t for fusing                           | I <sup>2</sup> t    | t = 10 ms                                                                                 | No voltage reappplied             |                                                                       | 1600      |         | A <sup>2</sup> s  |
|                                                               |                     | t = 8.3 ms                                                                                |                                   |                                                                       | 1450      |         |                   |
|                                                               |                     | t = 10 ms                                                                                 | 100 % V <sub>RRM</sub> reappplied |                                                                       | 1150      |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                |                                   |                                                                       | 1050      |         |                   |
| Maximum I <sup>2</sup> √t for fusing                          | I <sup>2</sup> √t   | t = 0.1 ms to 10 ms, no voltage reappplied                                                |                                   |                                                                       | 16 000    |         | A <sup>2</sup> √s |
| Value of threshold voltage (up to 1200 V)                     | V <sub>F(TO)</sub>  | T <sub>J</sub> = T <sub>J</sub> maximum                                                   |                                   |                                                                       | 0.65      |         | V                 |
| Value of threshold voltage (for 1400 V/1600 V)                | V <sub>F(TO)</sub>  |                                                                                           |                                   |                                                                       | 0.76      |         |                   |
| Value of forward slope resistance (up to 1200 V)              | r <sub>f</sub>      | T <sub>J</sub> = T <sub>J</sub> maximum                                                   |                                   |                                                                       | 4.29      |         | mΩ                |
| Value of forward slope resistance (for 1400 V/1600 V)         | r <sub>f</sub>      |                                                                                           |                                   |                                                                       | 3.8       |         |                   |
| Maximum forward voltage drop                                  | V <sub>FM</sub>     | I <sub>pk</sub> = 125 A, T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs rectangular wave |                                   |                                                                       | 1.30      | 1.50    | V                 |

| THERMAL AND MECHANICAL SPECIFICATIONS                    |                                   |                                                             |                 |             |                     |
|----------------------------------------------------------|-----------------------------------|-------------------------------------------------------------|-----------------|-------------|---------------------|
| PARAMETER                                                | SYMBOL                            | TEST CONDITIONS                                             | 40HF(R)         |             | UNITS               |
|                                                          |                                   |                                                             | 10 TO 120       | 140/160     |                     |
| Maximum junction operating and storage temperature range | T <sub>J</sub> , T <sub>Stg</sub> |                                                             | - 65 to 190     | - 65 to 160 | °C                  |
| Maximum thermal resistance, junction to case             | R <sub>thJC</sub>                 | DC operation                                                | 0.95            |             | K/W                 |
| Maximum thermal resistance, case to heatsink             | R <sub>thCS</sub>                 | Mounting surface, smooth, flat and greased                  | 0.25            |             |                     |
| Maximum allowable mounting torque (+ 0 %, - 10 %)        |                                   | Not lubricated thread, tightening on nut <sup>(1)</sup>     | 3.4 (30)        |             | N · m<br>(lbf · in) |
|                                                          |                                   | Lubricated thread, tightening on nut <sup>(1)</sup>         | 2.3 (20)        |             |                     |
|                                                          |                                   | Not lubricated thread, tightening on hexagon <sup>(2)</sup> | 4.2 (37)        |             |                     |
|                                                          |                                   | Lubricated thread, tightening on hexagon <sup>(2)</sup>     | 3.2 (28)        |             |                     |
| Approximate weight                                       |                                   |                                                             | 17              |             | g                   |
|                                                          |                                   |                                                             | 0.6             |             | oz.                 |
| Case style                                               |                                   | See dimensions - link at the end of datasheet               | DO-203AB (DO-5) |             |                     |

## Notes

<sup>(1)</sup> Recommended for pass-through holes

<sup>(2)</sup> Recommended for holed threaded heatsinks



| $\Delta R_{thJC}$ CONDUCTION |                       |                        |                             |       |
|------------------------------|-----------------------|------------------------|-----------------------------|-------|
| CONDUCTION ANGLE             | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS             | UNITS |
| 180°                         | 0.14                  | 0.10                   | $T_J = T_J \text{ maximum}$ | K/W   |
| 120°                         | 0.16                  | 0.17                   |                             |       |
| 90°                          | 0.21                  | 0.22                   |                             |       |
| 60°                          | 0.30                  | 0.31                   |                             |       |
| 30°                          | 0.50                  | 0.50                   |                             |       |

### Note

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

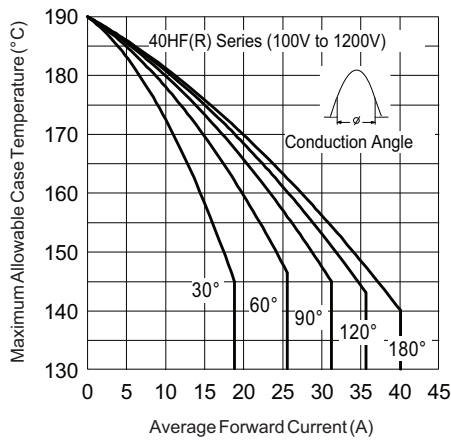


Fig. 1 - Current Ratings Characteristics

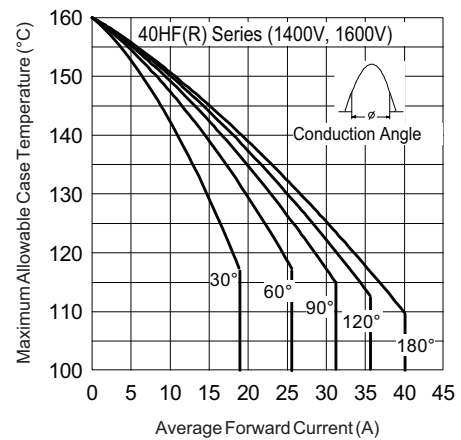


Fig. 3 - Current Ratings Characteristics

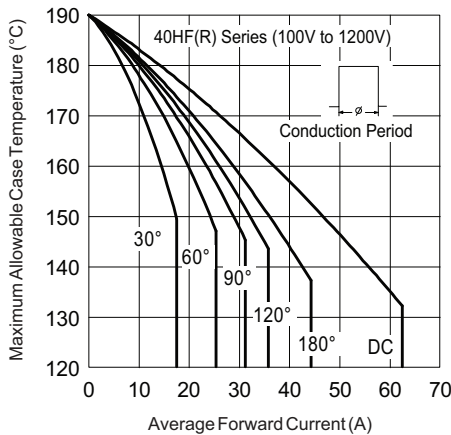


Fig. 2 - Current Ratings Characteristics

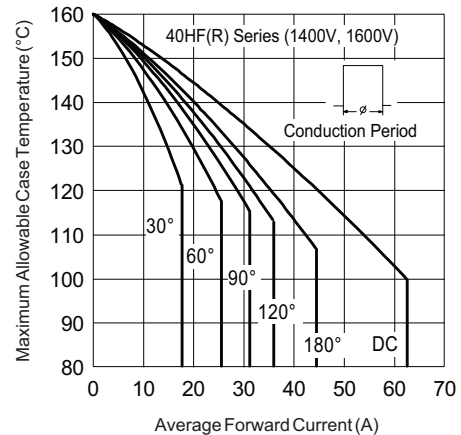


Fig. 4 - Current Ratings Characteristics

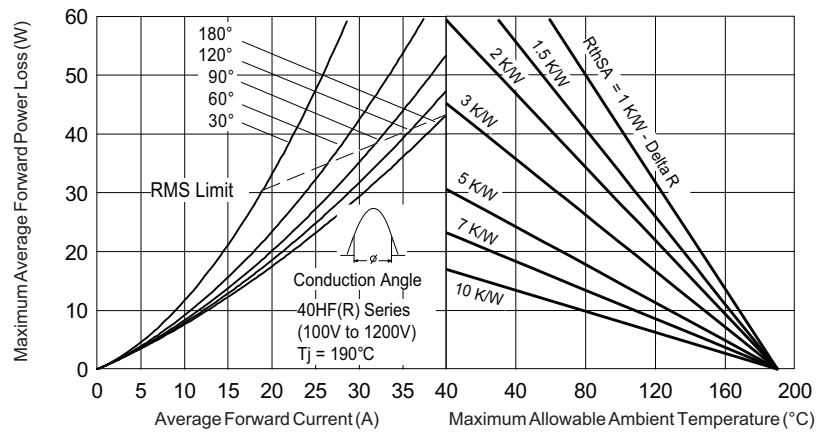


Fig. 5 - Forward Power Loss Characteristics

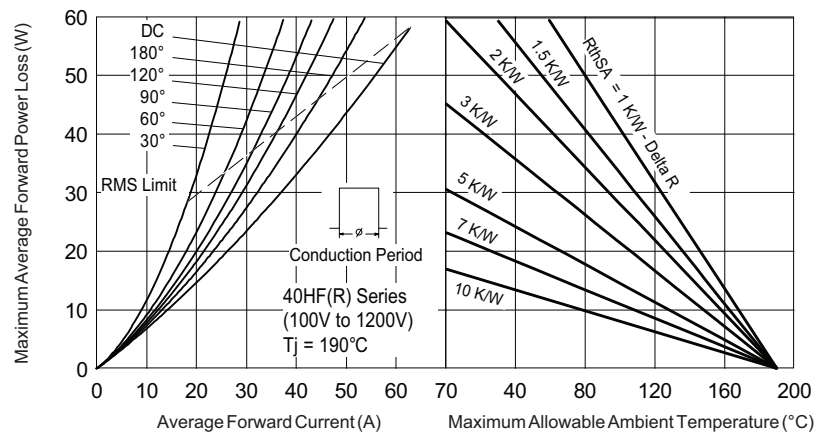


Fig. 6 - Forward Power Loss Characteristics

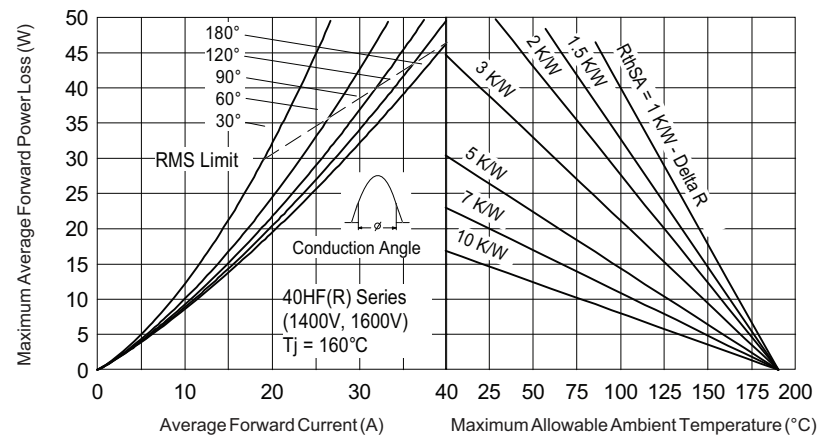


Fig. 7 - Forward Power Loss Characteristics

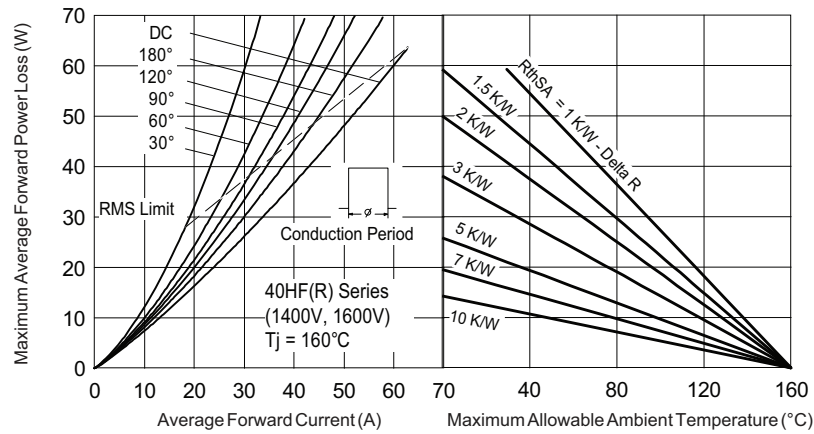


Fig. 8 - Forward Power Loss Characteristics

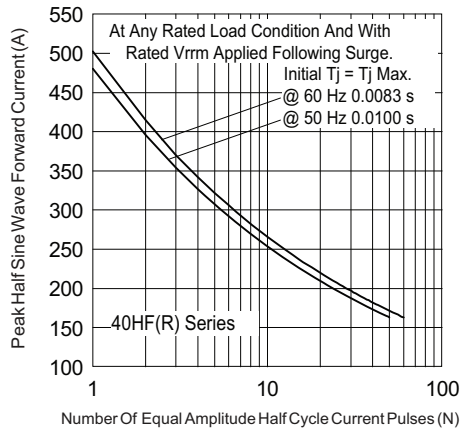


Fig. 9 - Maximum Non-Repetitive Surge Current

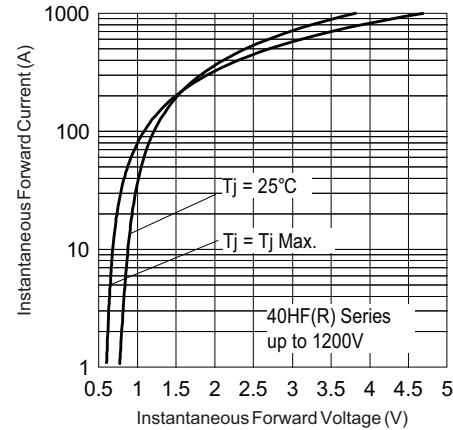


Fig. 11 - Forward Voltage Drop Characteristics  
(Up To 1200 V)

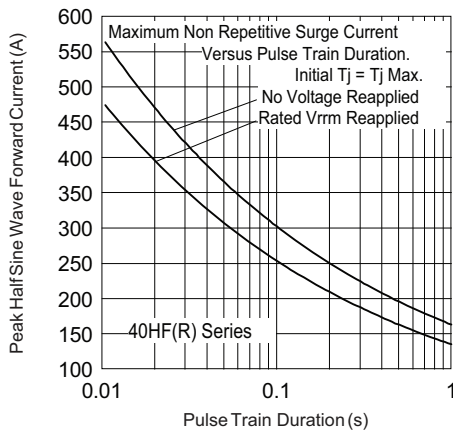


Fig. 10 - Maximum Non-Repetitive Surge Current

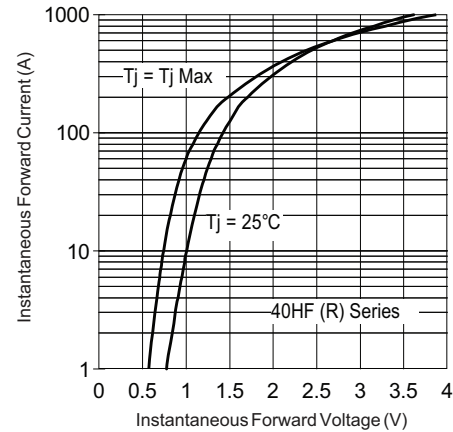


Fig. 12 - Forward Voltage Drop Characteristics  
(For 1400 V/1600 V)

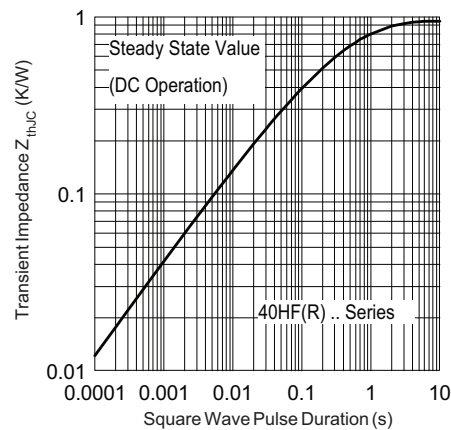


Fig. 13 - Thermal Impedance  $Z_{thJC}$  Characteristics

ORDERING INFORMATION TABLE

| Device code | 40                                                                                                                                                        | HF | R | 160 | M |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|-----|---|
|             | 1                                                                                                                                                         | 2  | 3 | 4   | 5 |
| 1           | - • 40 = Standard device<br>• 41 = Not isolated lead<br>• 42 = Isolated lead with silicone sleeve<br>(red = Reverse polarity)<br>(blue = Normal polarity) |    |   |     |   |
| 2           | - HF = Standard diode                                                                                                                                     |    |   |     |   |
| 3           | - • None = Stud normal polarity (cathode to stud)<br>• R = Stud reverse polarity (anode to stud)                                                          |    |   |     |   |
| 4           | - Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table)                                                                                               |    |   |     |   |
| 5           | - • None = Stud base DO-203AB (DO-5) 1/4" 28UNF-2A<br>• M = Stud base DO-203AB (DO-5) M6 x 1                                                              |    |   |     |   |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95344">www.vishay.com/doc?95344</a> |

## DO-203AB (DO-5) for 40HF(R) and 41HF(R) Series

### DIMENSIONS FOR 40HF(R) SERIES in millimeters (inches)



# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for 40HF(R)  
and 41HF(R) Series



## **DIMENSIONS FOR 41HF(R) SERIES** in millimeters (inches)





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