

## Fast Recovery Diodes (Stud Version), 40 A/70 A/85 A



DO-203AB (DO-5)

### FEATURES

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Stud cathode and stud anode versions
- Types up to 100 V<sub>RRM</sub>
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT

### PRODUCT SUMMARY

|             |                |
|-------------|----------------|
| $I_{F(AV)}$ | 40 A/70 A/85 A |
|-------------|----------------|

### TYPICAL APPLICATIONS

- DC power supplies
- Inverters
- Converters
- Choppers
- Ultrasonic systems
- Freewheeling diodes

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL        | CHARACTERISTICS | 40HFL                              | 70HFL  | 85HFL  | UNITS            |
|---------------|-----------------|------------------------------------|--------|--------|------------------|
| $I_{F(AV)}$   |                 | 40                                 | 70     | 85     | A                |
|               | Maximum $T_C$   | 85                                 | 85     | 85     | °C               |
| $I_{FSM}$     | 50 Hz           | 400                                | 700    | 1100   | A                |
|               | 60 Hz           | 420                                | 730    | 1151   |                  |
| $I^2t$        | 50 Hz           | 800                                | 2450   | 6050   | A <sup>2</sup> s |
|               | 60 Hz           | 730                                | 2240   | 5523   |                  |
| $I^2\sqrt{t}$ |                 | 11 300                             | 34 650 | 85 560 | $I^2\sqrt{s}$    |
| $V_{RRM}$     | Range           | 100 to 1000                        |        |        | V                |
| $t_{rr}$      |                 | See Recovery Characteristics table |        |        | ns               |
| $T_J$         | Range           | - 40 to 125                        |        |        | °C               |

# 40HFL, 70HFL, 85HFL Series

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## ELECTRICAL SPECIFICATIONS

| VOLTAGE RATINGS                    |                                                                                                                                      |                                                                                                                                         |                                                                     |                                     |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------|
| TYPE NUMBER <sup>(1)</sup>         | $V_{RRM}$ , MAXIMUM<br>PEAK REPETITIVE<br>REVERSE VOLTAGE<br>$T_J = -40\text{ }^{\circ}\text{C TO }125\text{ }^{\circ}\text{C}$<br>V | $V_{RSM}$ , MAXIMUM PEAK<br>NON-REPETITIVE<br>REVERSE VOLTAGE<br>$T_J = 25\text{ }^{\circ}\text{C TO }125\text{ }^{\circ}\text{C}$<br>V | $I_{FM}$ , MAXIMUM PEAK REVERSE<br>CURRENT AT RATED $V_{RRM}$<br>mA |                                     |
|                                    |                                                                                                                                      |                                                                                                                                         | $T_J = 25\text{ }^{\circ}\text{C}$                                  | $T_J = 125\text{ }^{\circ}\text{C}$ |
| 40HFL10S02, 40HFL10S05, 40HFL10S10 | 100                                                                                                                                  | 150                                                                                                                                     | 0.1                                                                 | 10                                  |
| 40HFL20S02, 40HFL20S05, 40HFL20S10 | 200                                                                                                                                  | 300                                                                                                                                     |                                                                     |                                     |
| 40HFL40S02, 40HFL40S05, 40HFL40S10 | 400                                                                                                                                  | 500                                                                                                                                     |                                                                     |                                     |
| 40HFL60S02, 40HFL60S05, 40HFL60S10 | 600                                                                                                                                  | 700                                                                                                                                     |                                                                     |                                     |
| 40HFL80S05, 40HFL80S10             | 800                                                                                                                                  | 900                                                                                                                                     |                                                                     |                                     |
| 40HFL100S05, 40HFL100S10           | 1000                                                                                                                                 | 1100                                                                                                                                    |                                                                     |                                     |
| 70HFL10S02, 70HFL10S05, 70HFL10S10 | 100                                                                                                                                  | 150                                                                                                                                     | 0.1                                                                 | 15                                  |
| 70HFL20S02, 70HFL20S05, 70HFL20S10 | 200                                                                                                                                  | 300                                                                                                                                     |                                                                     |                                     |
| 70HFL40S02, 70HFL40S05, 70HFL40S10 | 400                                                                                                                                  | 500                                                                                                                                     |                                                                     |                                     |
| 70HFL60S02, 70HFL60S05, 70HFL60S10 | 600                                                                                                                                  | 700                                                                                                                                     |                                                                     |                                     |
| 70HFL80S05, 70HFL80S10             | 800                                                                                                                                  | 900                                                                                                                                     |                                                                     |                                     |
| 70HFL100S05, 70HFL100S10           | 1000                                                                                                                                 | 1100                                                                                                                                    |                                                                     |                                     |
| 85HFL10S02, 85HFL10S05, 85HFL10S10 | 100                                                                                                                                  | 150                                                                                                                                     | 0.1                                                                 | 20                                  |
| 85HFL20S02, 85HFL20S05, 85HFL20S10 | 200                                                                                                                                  | 300                                                                                                                                     |                                                                     |                                     |
| 85HFL40S02, 85HFL40S05, 85HFL40S10 | 400                                                                                                                                  | 500                                                                                                                                     |                                                                     |                                     |
| 85HFL60S02, 85HFL60S05, 85HFL60S10 | 600                                                                                                                                  | 700                                                                                                                                     |                                                                     |                                     |
| 85HFL80S05, 85HFL80S10             | 800                                                                                                                                  | 900                                                                                                                                     |                                                                     |                                     |
| 85HFL100S05, 85HFL100S10           | 1000                                                                                                                                 | 1100                                                                                                                                    |                                                                     |                                     |

### Note

<sup>(1)</sup> Types listed are cathode case, for anode case add "R" to code, i.e. 40HFLR20S02, 85HFLR100S05 etc.



# 40HFL, 70HFL, 85HFL Series

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| FORWARD CONDUCTION                                          |                     |                                                                  |                                                                                                         |        |        |        |                   |
|-------------------------------------------------------------|---------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|--------|--------|--------|-------------------|
| PARAMETER                                                   | SYMBOL              | TEST CONDITIONS                                                  |                                                                                                         | 40HFL  | 70HFL  | 85HFL  | UNITS             |
| Maximum average forward current at maximum case temperature | I <sub>F(AV)</sub>  | 180° conduction, half sine wave                                  |                                                                                                         | 40     | 70     | 85     | A                 |
|                                                             |                     |                                                                  |                                                                                                         | 75     |        |        | °C                |
| Maximum RMS forward current                                 | I <sub>F(RMS)</sub> |                                                                  |                                                                                                         | 63     | 110    | 134    | A                 |
| Maximum peak repetitive forward current                     | I <sub>FRM</sub>    | Sinusoidal half wave, 30° conduction                             |                                                                                                         | 220    | 380    | 470    | A                 |
| Maximum peak, one-cycle non-repetitive forward current      | I <sub>FSM</sub>    | t = 10 ms                                                        | Sinusoidal half wave, 100 % V <sub>RRM</sub> reapplied, initial T <sub>J</sub> = T <sub>J</sub> maximum | 400    | 700    | 1100   | A                 |
|                                                             |                     | t = 8.3 ms                                                       |                                                                                                         | 420    | 730    | 1151   |                   |
|                                                             |                     | t = 10 ms                                                        | Sinusoidal half wave, no voltage reapplied, initial T <sub>J</sub> = T <sub>J</sub> maximum             | 475    | 830    | 1308   |                   |
|                                                             |                     | t = 8.3 ms                                                       |                                                                                                         | 500    | 870    | 1369   |                   |
| Maximum I <sup>2</sup> t for fusing                         | I <sup>2</sup> t    | t = 10 ms                                                        | 100 % V <sub>RRM</sub> reapplied, initial T <sub>J</sub> = T <sub>J</sub> maximum                       | 800    | 2450   | 6050   | A <sup>2</sup> s  |
|                                                             |                     | t = 8.3 ms                                                       |                                                                                                         | 730    | 2240   | 5523   |                   |
|                                                             |                     | t = 10 ms                                                        | No voltage reapplied, initial T <sub>J</sub> = T <sub>J</sub> maximum                                   | 1130   | 3460   | 8556   |                   |
|                                                             |                     | t = 8.3 ms                                                       |                                                                                                         | 1030   | 3160   | 7810   |                   |
| Maximum I <sup>2</sup> √t for fusing <sup>(1)</sup>         | I <sup>2</sup> √t   | t = 0.1 ms to 10 ms, no voltage reapplied                        |                                                                                                         | 11 300 | 34 650 | 85 560 | A <sup>2</sup> √s |
| Maximum value of threshold voltage                          | V <sub>F(TO)</sub>  | T <sub>J</sub> = 125 °C                                          |                                                                                                         | 1.081  | 1.085  | 1.128  | V                 |
| Maximum value of forward slope resistance                   | r <sub>F</sub>      |                                                                  |                                                                                                         | 6.33   | 3.40   | 2.11   | mΩ                |
| Maximum forward voltage drop                                | V <sub>FM</sub>     | T <sub>J</sub> = 25 °C, I <sub>FM</sub> = π × I <sub>F(AV)</sub> |                                                                                                         | 1.95   | 1.85   | 1.75   | V                 |

## Note

<sup>(1)</sup>  $I^2t$  for time  $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$

| RECOVERY CHARACTERISTICS         |                 |                                                                                                         |          |      |      |          |      |      |          |      |      |       |
|----------------------------------|-----------------|---------------------------------------------------------------------------------------------------------|----------|------|------|----------|------|------|----------|------|------|-------|
| PARAMETER                        | SYMBOL          | TEST CONDITIONS                                                                                         | 40HFL... |      |      | 70HFL... |      |      | 85HFL... |      |      | UNITS |
|                                  |                 |                                                                                                         | S02      | S05  | S10  | S02      | S05  | S10  | S02      | S05  | S10  |       |
| Typical reverse recovery time    | t <sub>rr</sub> | T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, - di <sub>F</sub> /dt = 100 A/μs | 70       | 180  | 350  | 60       | 150  | 290  | 50       | 120  | 270  | ns    |
|                                  |                 | T <sub>J</sub> = 25 °C, - di <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub> | 200      | 500  | 1000 | 200      | 500  | 1000 | 200      | 500  | 1000 |       |
| Typical reverse recovered charge | Q <sub>rr</sub> | T <sub>J</sub> = 25 °C, I <sub>F</sub> = 1 A to V <sub>R</sub> = 30 V, - di <sub>F</sub> /dt = 100 A/μs | 160      | 750  | 3100 | 90       | 500  | 1600 | 70       | 340  | 1350 | nC    |
|                                  |                 | T <sub>J</sub> = 25 °C, - di <sub>F</sub> /dt = 25 A/μs, I <sub>FM</sub> = π x rated I <sub>F(AV)</sub> | 240      | 1300 | 6000 | 240      | 1300 | 6000 | 240      | 1300 | 6000 |       |

# 40HFL, 70HFL, 85HFL Series



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(Stud Version), 40 A/70 A/85 A

| THERMAL AND MECHANICAL SPECIFICATIONS                |                   |                                                             |                 |       |       |                     |
|------------------------------------------------------|-------------------|-------------------------------------------------------------|-----------------|-------|-------|---------------------|
| PARAMETER                                            | SYMBOL            | TEST CONDITIONS                                             | 40HFL           | 70HFL | 85HFL | UNITS               |
| Junction operating temperature range                 | T <sub>J</sub>    |                                                             | - 40 to 125     |       |       | °C                  |
| Storage temperature range                            | T <sub>Stg</sub>  |                                                             | - 40 to 150     |       |       |                     |
| Maximum thermal resistance, junction to case         | R <sub>thJC</sub> | DC operation                                                | 0.60            | 0.36  | 0.30  | K/W                 |
| Maximum thermal resistance, case to heatsink         | R <sub>thCS</sub> | Mounting surface, smooth, flat and greased                  | 0.25            |       |       |                     |
| Maximum allowable mounting torque<br>(+ 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                                   |                   |                                                             | 25              |       |       |                     |
|                                                      |                   |                                                             | 0.88            |       |       |                     |
| Case style                                           |                   | JEDEC                                                       | DO-203AB (DO-5) |       |       |                     |

## Notes

- (1) Recommended for pass-through holes  
(2) Recommended for holed threaded heatsinks

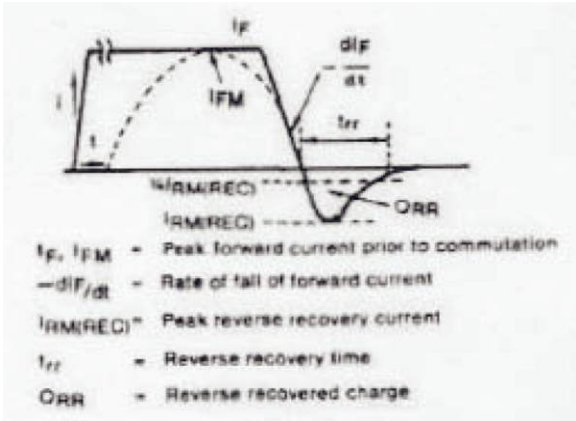


Fig. 1 - Reverse Recovery Time Test Waveform

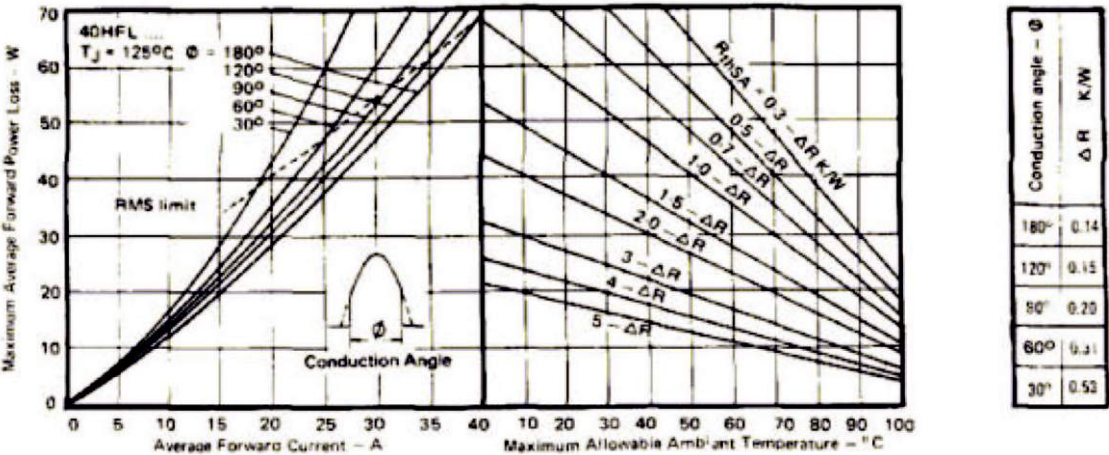


Fig. 2 - Current Rating Nomogram (Sinusoidal Waveforms), 40HFL Series

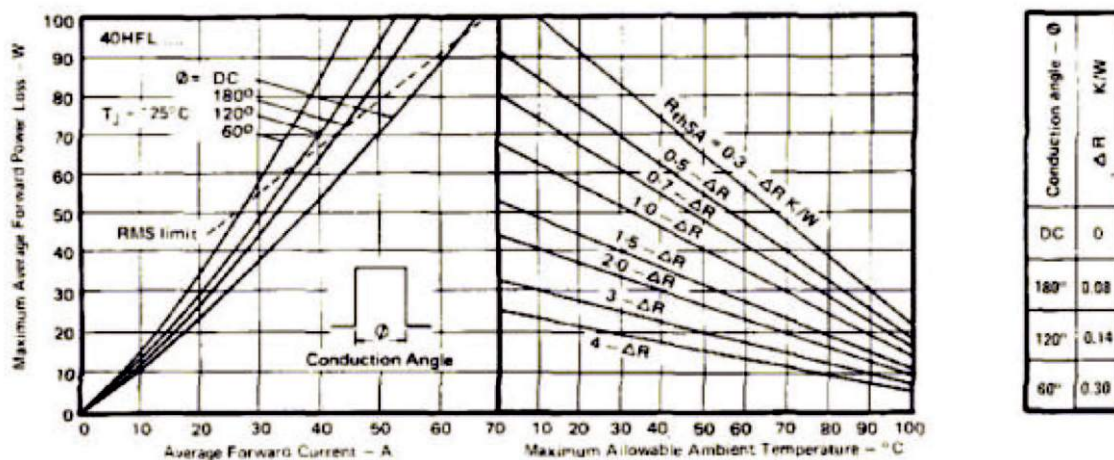


Fig. 3 - Current Rating Nomogram (Rectangular Waveforms), 40HFL Series

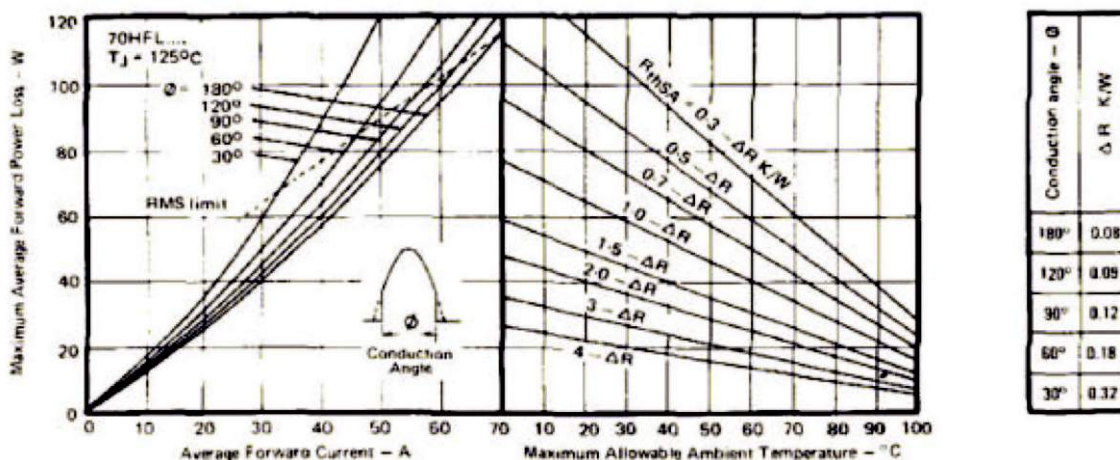


Fig. 4 - Current Rating Nomogram (Sinusoidal Waveforms), 70HFL Series

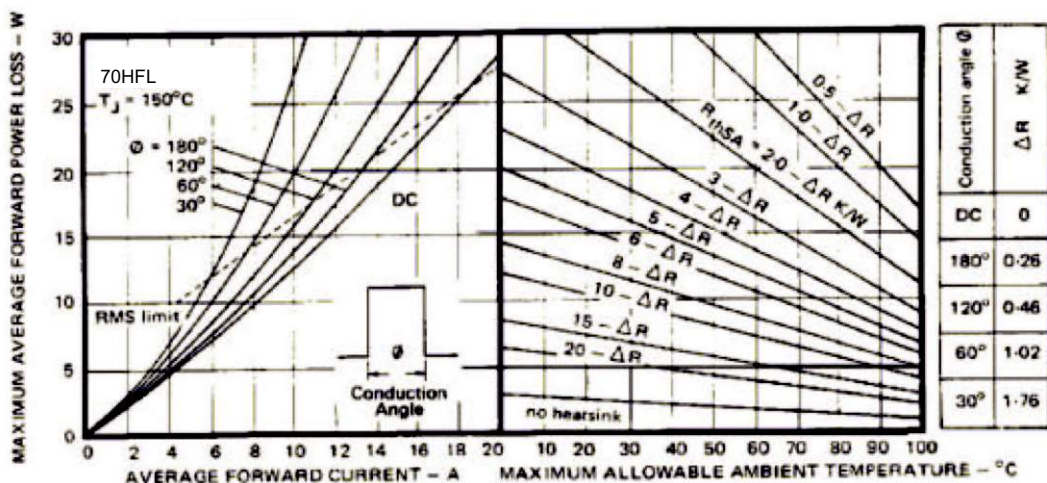


Fig. 5 - Current Rating Nomogram (Rectangular Waveforms), 70HFL Series

# 40HFL, 70HFL, 85HFL Series



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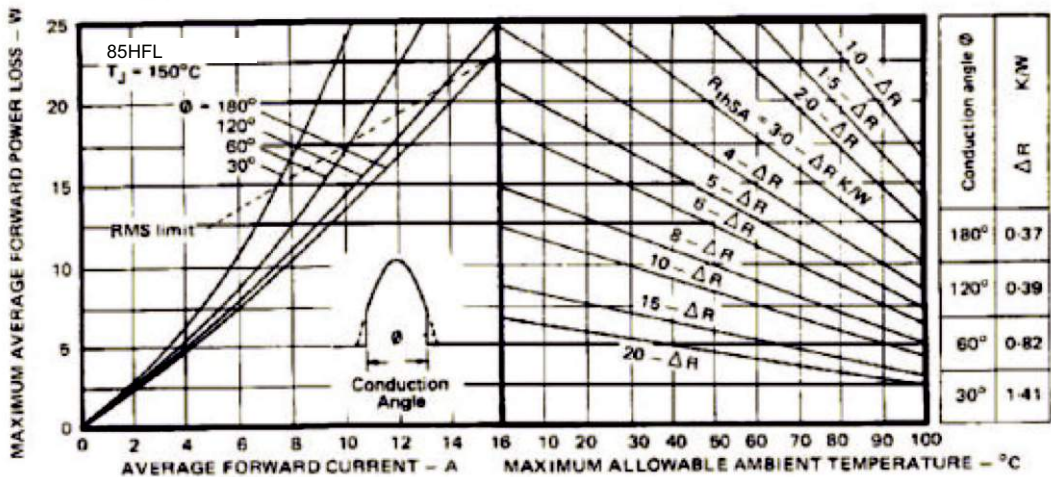


Fig. 6 - Current Rating Nomogram (Sinusoidal Waveforms), 85HFL Series

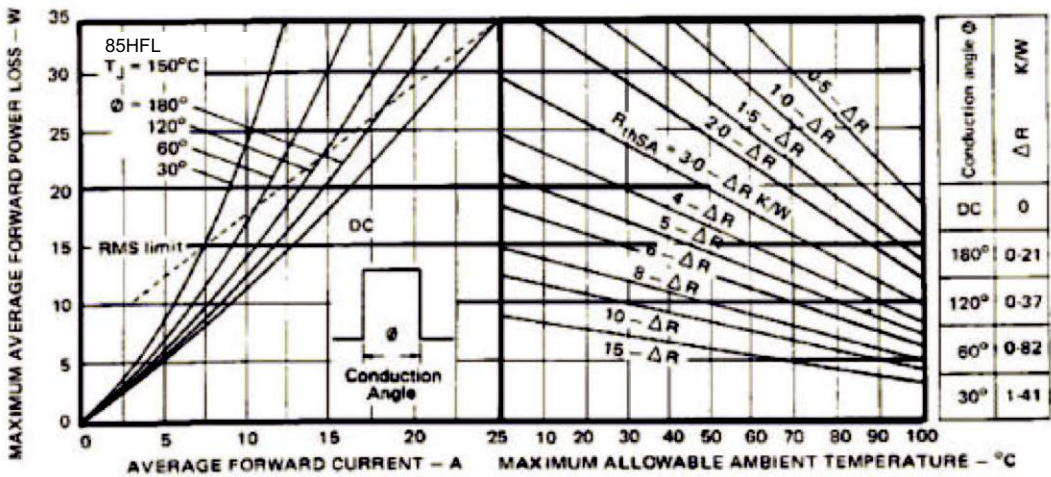


Fig. 7 - Current Rating Nomogram (Rectangular Waveforms), 85HFL Series

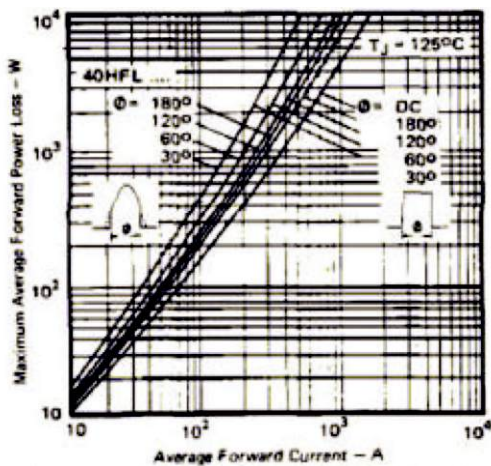


Fig. 8 - Maximum High Level Forward Power Loss vs. Average Forward Current, 40HFL Series

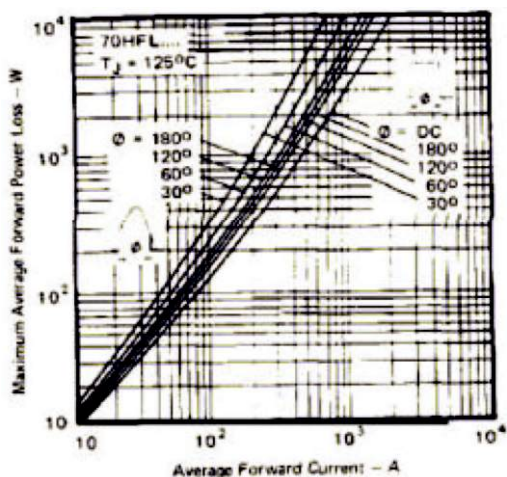


Fig. 9 - Maximum High Level Forward Power Loss vs. Average Forward Current, 70HFL Series

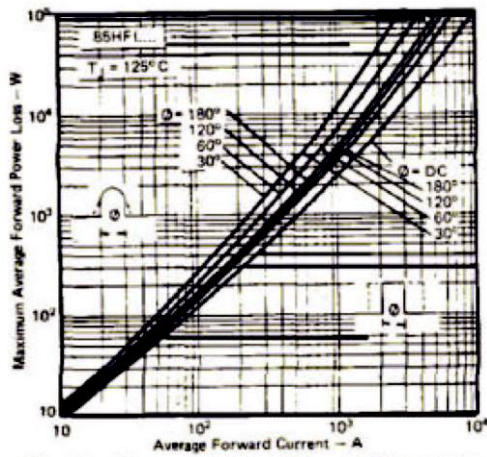


Fig. 10 - Maximum High Level Forward Power Loss vs. Average Forward Current, 85HFL Series

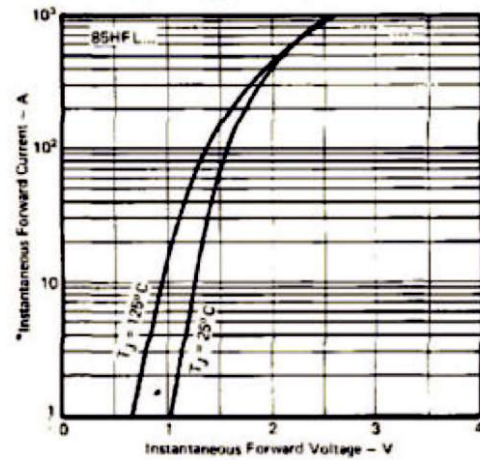


Fig. 13 - Maximum Forward Voltage vs. Forward Current, 85HFL Series

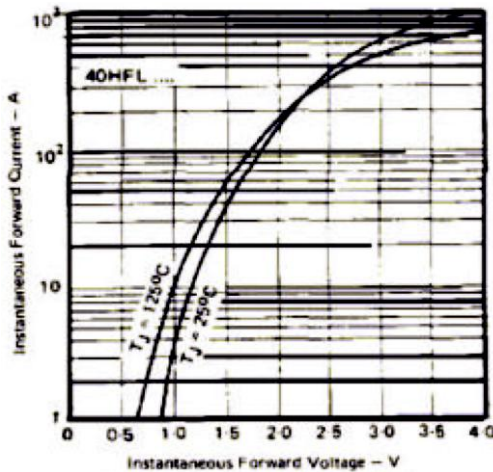


Fig. 11 - Maximum Forward Voltage vs. Forward Current, 40HFL Series

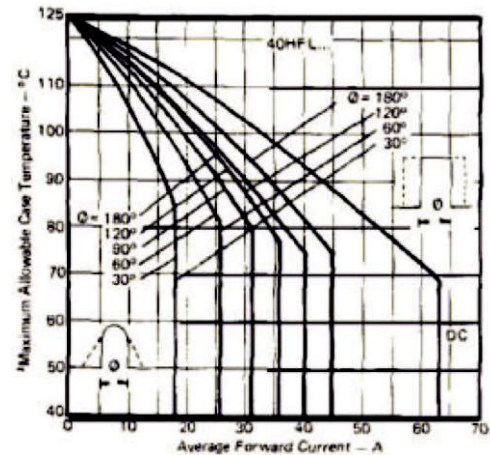


Fig. 14 - Average Forward Current vs. Maximum Allowable Case Temperature, 40HFL Series

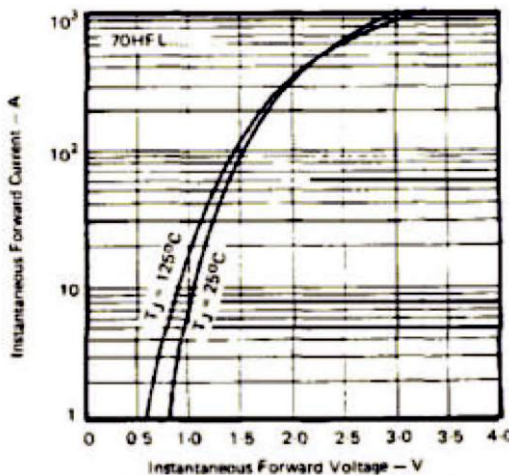


Fig. 12 - Maximum Forward Voltage vs. Forward Current, 70HFL Series

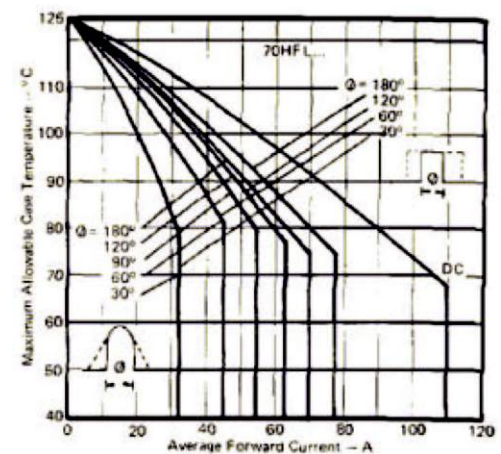


Fig. 15 - Average Forward Current vs. Maximum Allowable Case Temperature, 70HFL Series

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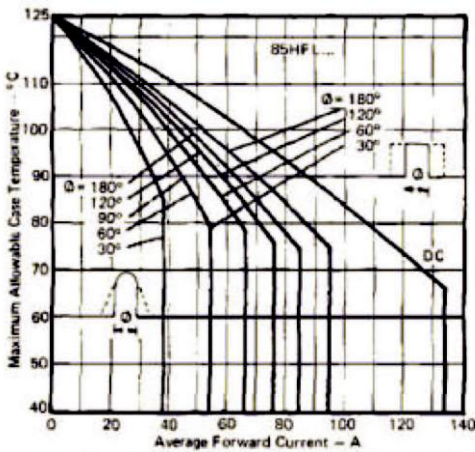


Fig. 16 - Average Forward Current vs. Maximum Allowable Case Temperature, 85HFL Series

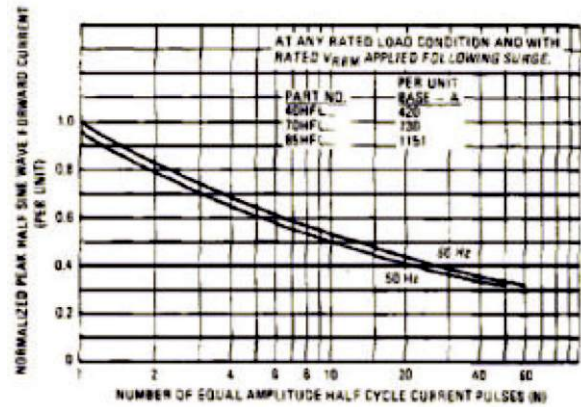


Fig. 17 - Maximum Non-Repetitive Surge Current vs. Number of Current Pulses, All Series

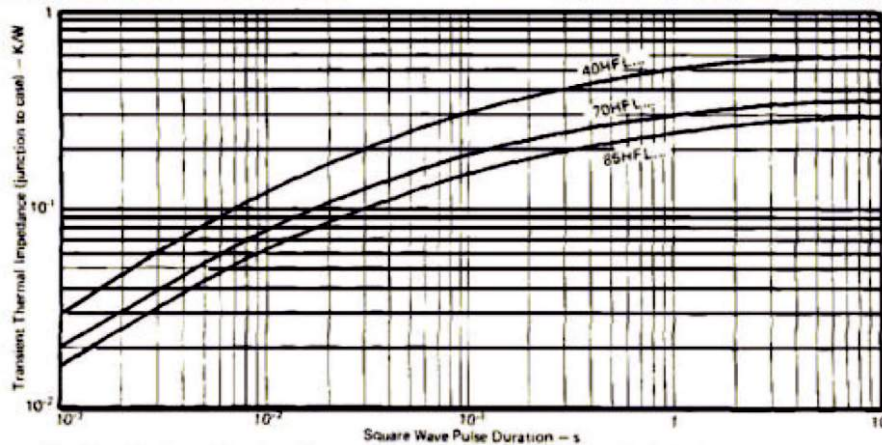


Fig. 18 - Maximum Transient Thermal Impedance, Junction to Case vs. Pulse Duration, All Series

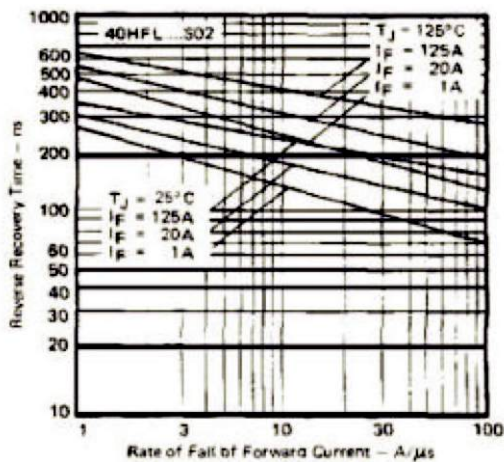


Fig. 19 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 40HFL...S02 Series

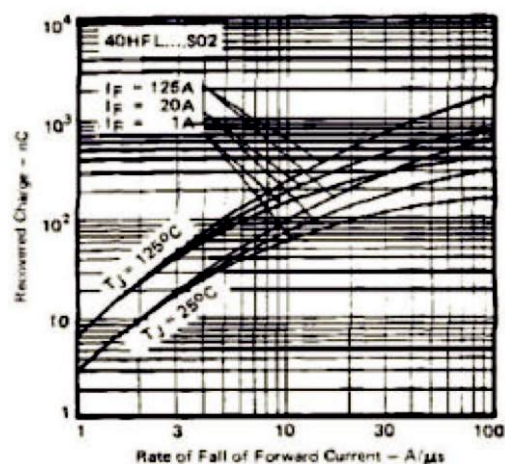


Fig. 20 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 40HFL...S02 Series

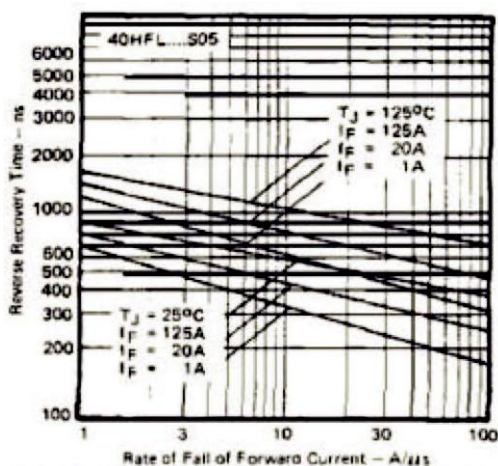


Fig. 21 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 40HFL...S05 Series

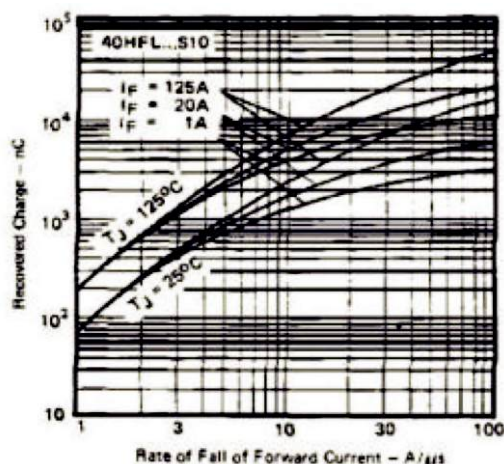


Fig. 24 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 40HFL...S10 Series

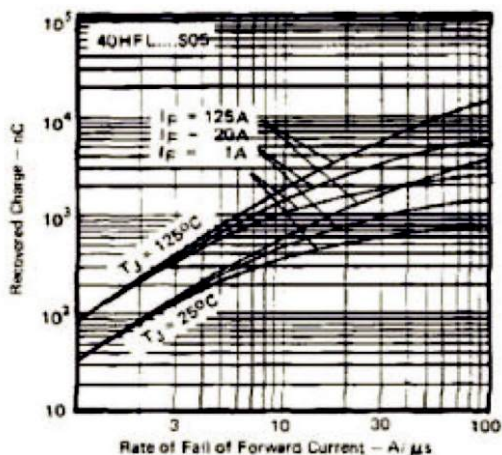


Fig. 22 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 40HFL...S05 Series

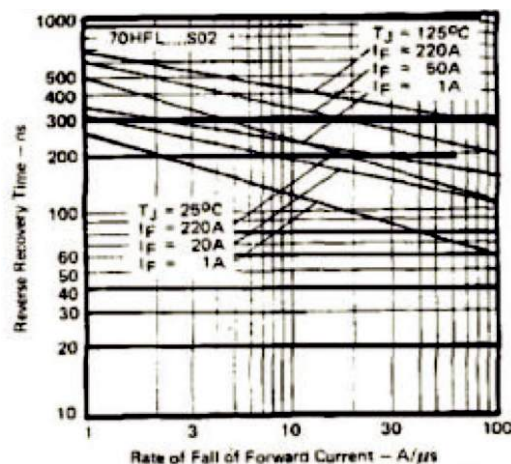


Fig. 25 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 70HFL...S02 Series

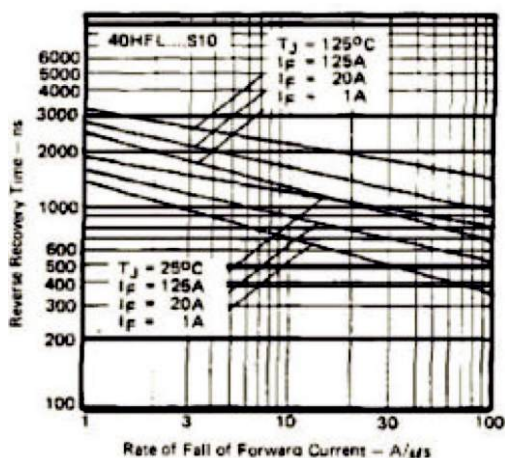


Fig. 23 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 40HFL...S10 Series

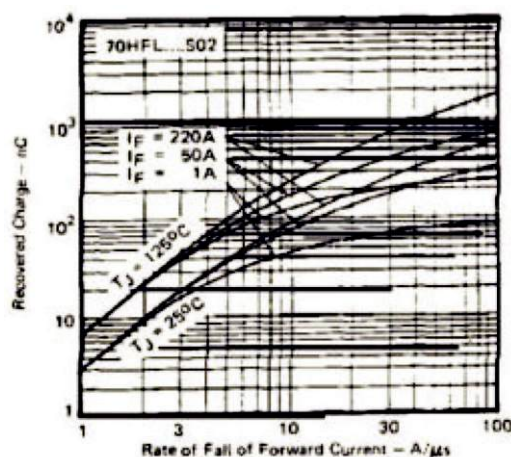


Fig. 26 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 70HFL...S02 Series

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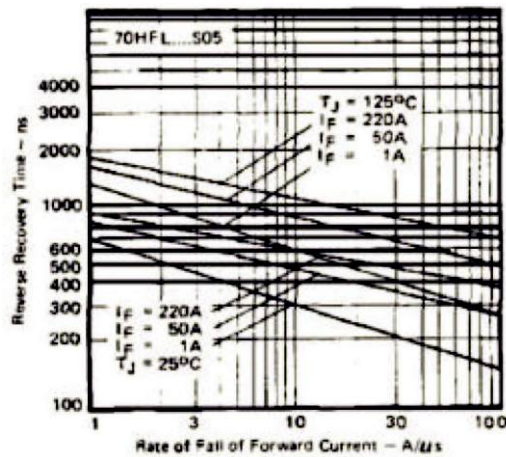


Fig. 27 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 70HFL...S05 Series

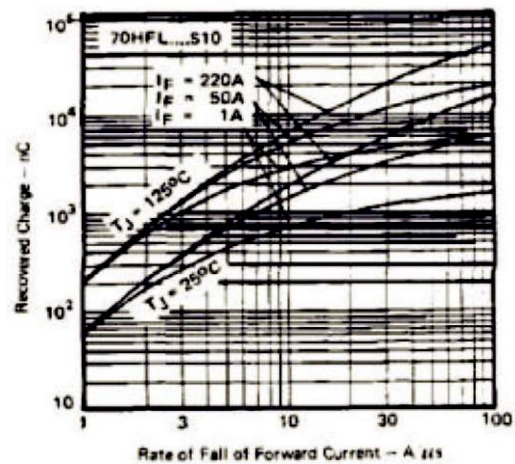


Fig. 30 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 70HFL...S10 Series

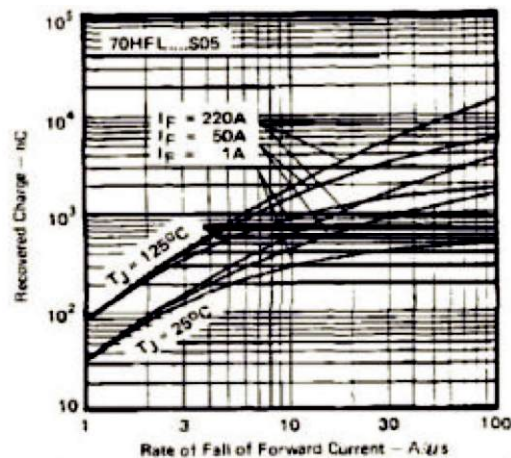


Fig. 28 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 70HFL...S05 Series

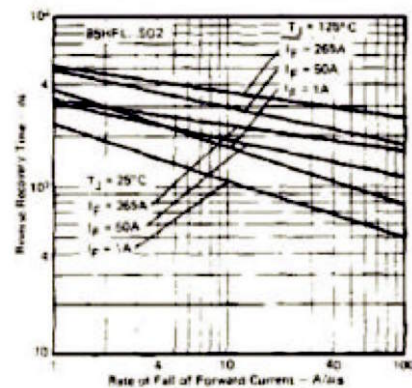


Fig. 31 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 85HFL...S02 Series

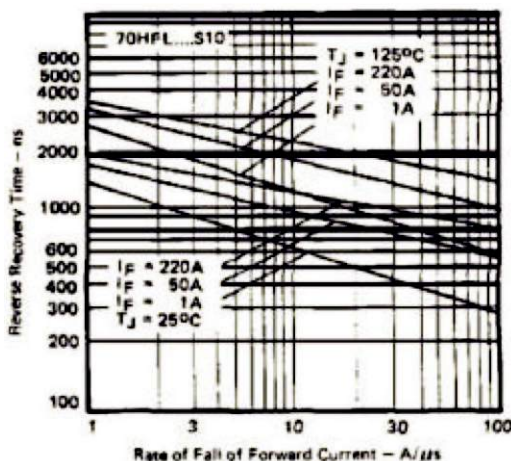


Fig. 29 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 70HFL...S10 Series

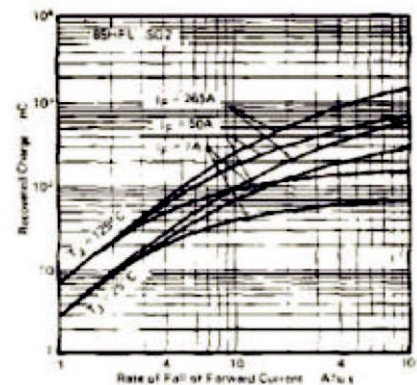


Fig. 32 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 85HFL...S02 Series

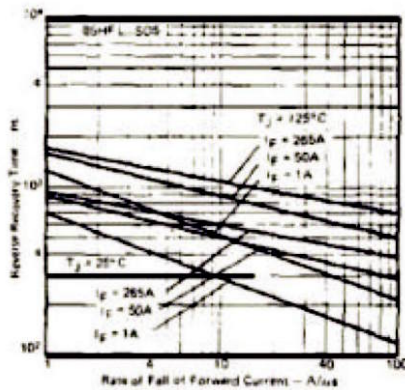


Fig. 33 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 85HFL...S05 Series

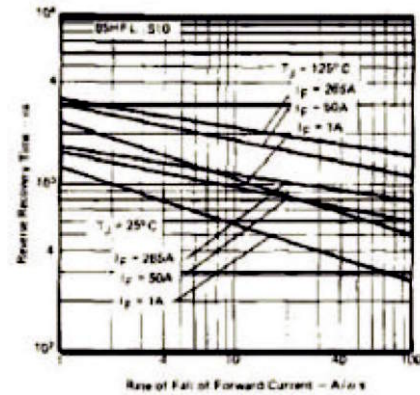


Fig. 35 - Typical Reverse Recovery Time vs. Rate of Fall of Forward Current, 85HFL...S10 Series

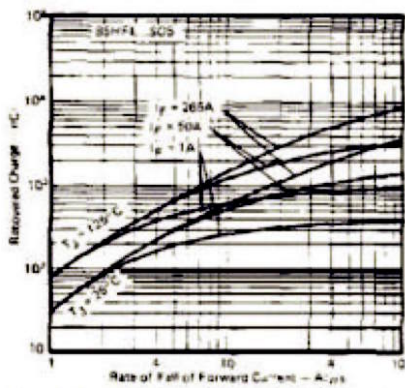


Fig. 34 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 85HFL...S05 Series

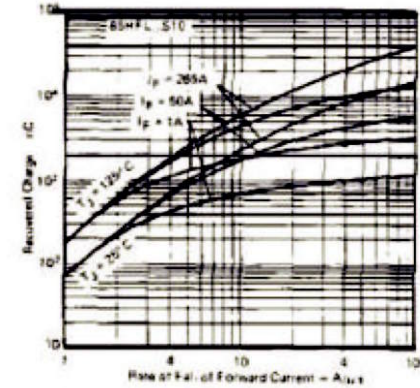


Fig. 36 - Typical Recovered Charge vs. Rate of Fall of Forward Current, 85HFL...S10 Series

## LINKS TO RELATED DOCUMENTS

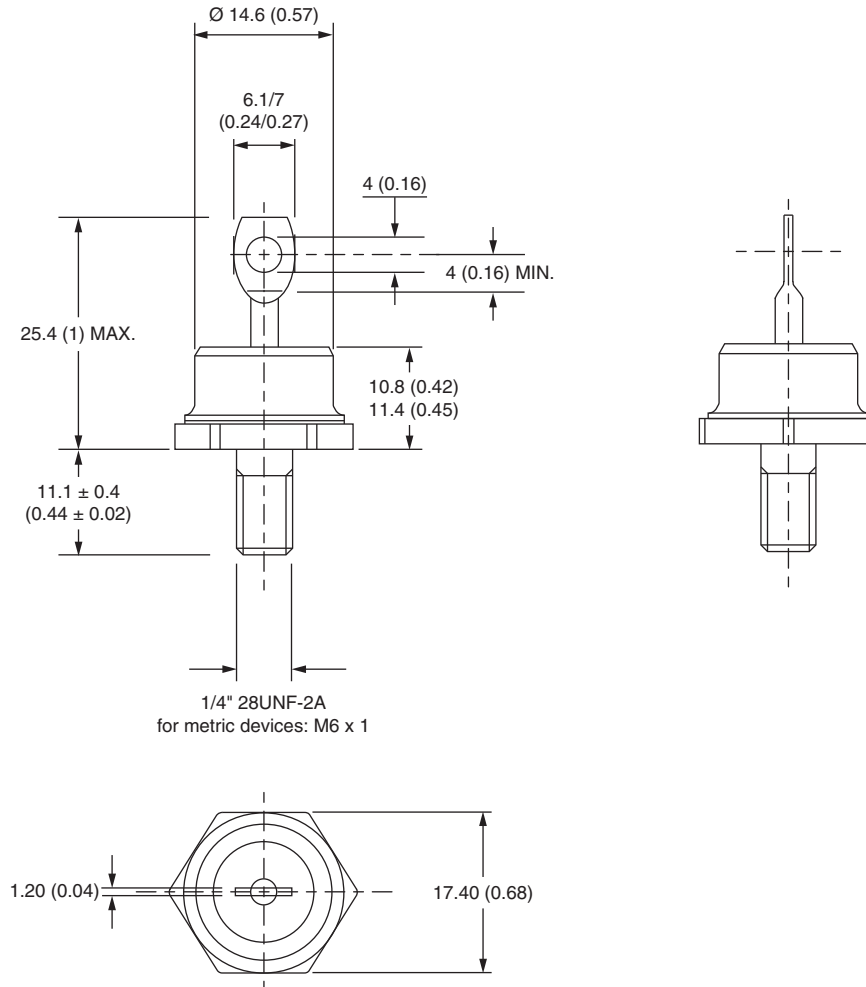
Dimensions

[www.vishay.com/doc?95312](http://www.vishay.com/doc?95312)



## DO-203AB (DO-5) for 40HFL, 70HFL and 85HFL

### DIMENSIONS FOR 40HFL/70HFL in millimeters (inches)



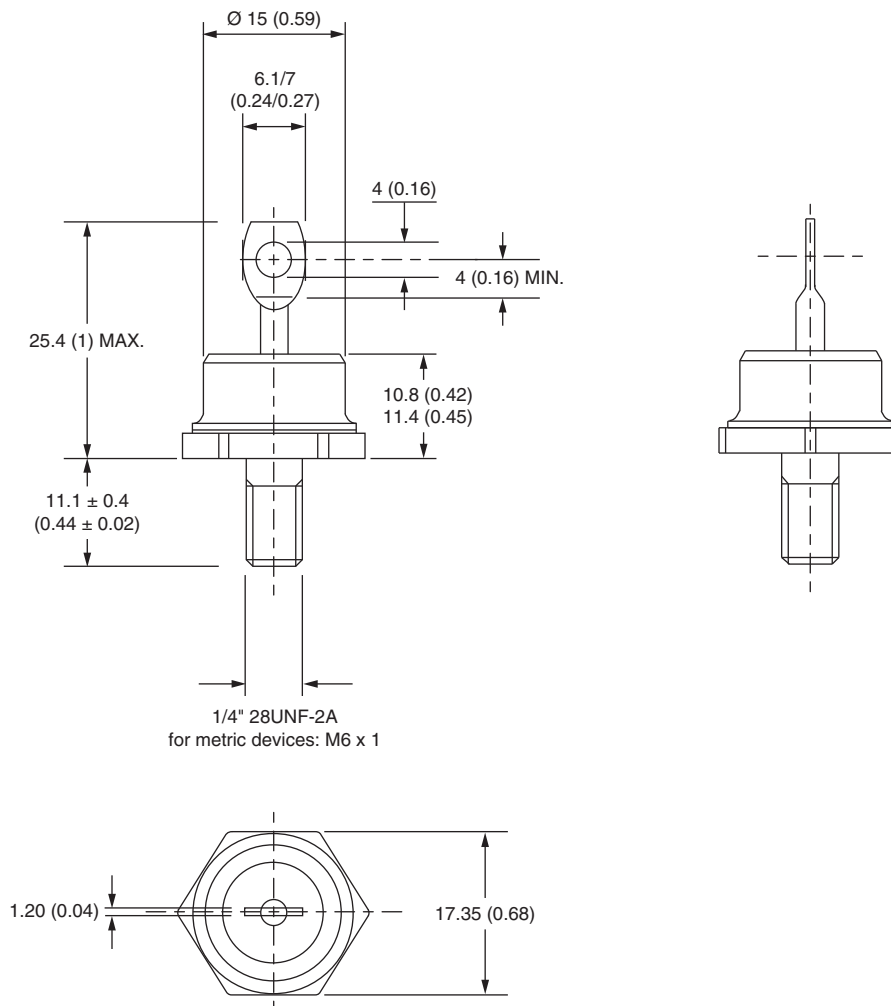
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for  
40HFL, 70HFL and 85HFL



## DIMENSIONS FOR 85HFL in millimeters (inches)





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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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