



**THE DATASHEET OF  
VS-86HF20**



## Standard Recovery Diodes, (Stud Version), 85 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 industrial level



**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

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

### PRODUCT SUMMARY

$I_{F(AV)}$	85 A
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### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	85HF(R)		UNITS
		10 TO 120	140/160	
$I_{F(AV)}$		85		A
	$T_C$	140	110	°C
$I_{F(RMS)}$		133		A
$I_{FSM}$	50 Hz	1700		A
	60 Hz	1800		
$I^2t$	50 Hz	14 500		A <sup>2</sup> s
	60 Hz	13 500		
$V_{RRM}$	Range	100 to 1200	1400/1600	V
$T_J$		- 65 to 180	- 65 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 $T_J = T_J$ MAXIMUM mA
85HF(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		85HF(R)		UNITS
				10 to 120	140/160	
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		85		A
				140	110	°C
Maximum RMS forward current	$I_{F(RMS)}$			133		A
Maximum peak, one-cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms	No voltage reappplied	1700		A
		t = 8.3 ms	No voltage reappplied	1800		
		t = 10 ms	100 % $V_{RRM}$ reappplied	1450		
		t = 8.3 ms	100 % $V_{RRM}$ reappplied	1500		
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reappplied	14 500		A <sup>2</sup> s
		t = 8.3 ms	No voltage reappplied	13 500		
		t = 10 ms	100 % $V_{RRM}$ reappplied	10 500		
		t = 8.3 ms	100 % $V_{RRM}$ reappplied	9400		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	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)	$V_{F(TO)}$	$T_J = T_J$ maximum		0.68		V
Value of threshold voltage (for 1400 V, 1600 V)				0.69		
Value of forward slope resistance (up to 1200 V)	$r_f$	$T_J = T_J$ maximum		1.62		mΩ
Value of forward slope resistance (for 1400 V, 1600 V)				1.75		
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 267$ A, $T_J = 25$ °C, $t_p = 400$ μs rectangular wave		1.2	1.4	V

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		85HF(R)		UNITS
				10 to 120	140/160	
Maximum junction operating and storage temperature range	$T_J, T_{Stg}$			- 65 to 180	- 65 to 150	°C
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation		0.35		K/W
Maximum thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth, flat and greased		0.25		
Maximum shock <sup>(1)</sup>				1500		g
Maximum constant vibration <sup>(1)</sup>		50 Hz		20		
Maximum constant acceleration <sup>(1)</sup>		Stud outwards		5000		
Maximum allowable mounting torque (+ 0 %, - 10 %)		Not lubricated thread, tightening on nut <sup>(2)</sup>		3.4 (30)		N · m (lbf · in)
		Lubricated thread, tightening on nut <sup>(2)</sup>		2.3 (20)		
		Not lubricated thread, tightening on hexagon <sup>(3)</sup>		4.2 (37)		
		Lubricated thread, tightening on hexagon <sup>(3)</sup>		3.2 (28)		
Approximate weight		Unleaded device		17		g
				0.6		oz.
Case style		See dimensions - link at the end of datasheet		DO-203AB (DO-5)		

**Notes**

(1) Available only for 88HF

(2) Recommended for pass-through holes

(3) Recommended for holed threaded heatsinks

$\Delta R_{thJC}$ CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.10	0.08	T <sub>J</sub> = T <sub>J</sub> maximum	K/W
120°	0.11	0.11		
90°	0.13	0.13		
60°	0.17	0.17		
30°	0.26	0.26		

**Note**

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

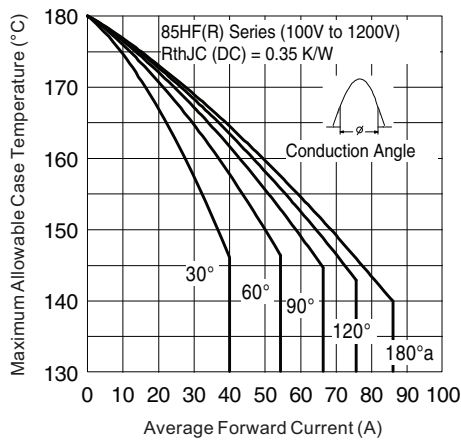


Fig. 1 - Current Ratings Characteristics

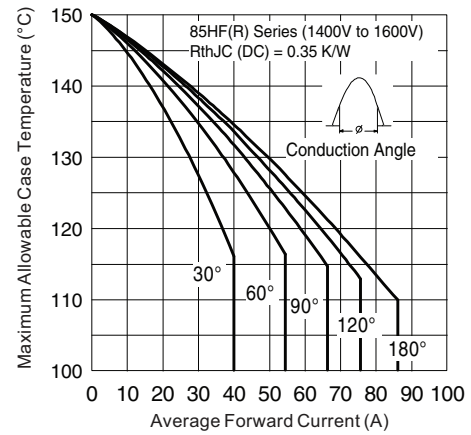


Fig. 3 - Current Ratings Characteristics

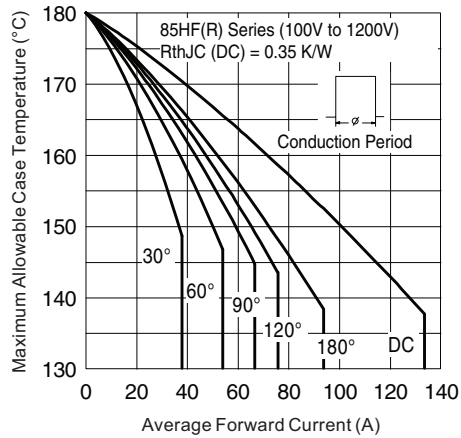


Fig. 2 - Current Ratings Characteristics

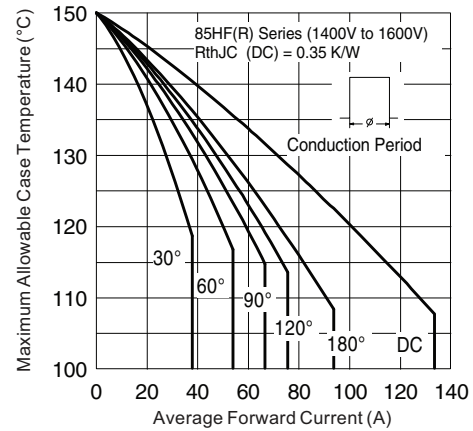


Fig. 4 - Current Ratings Characteristics

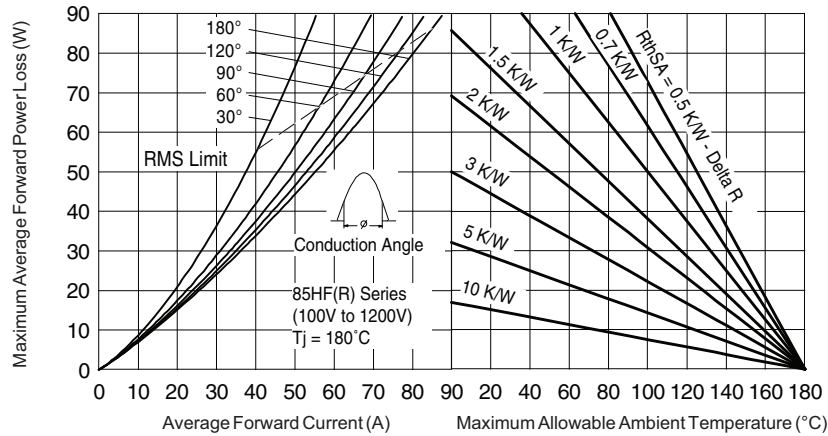


Fig. 5 - Forward Power Loss Characteristics

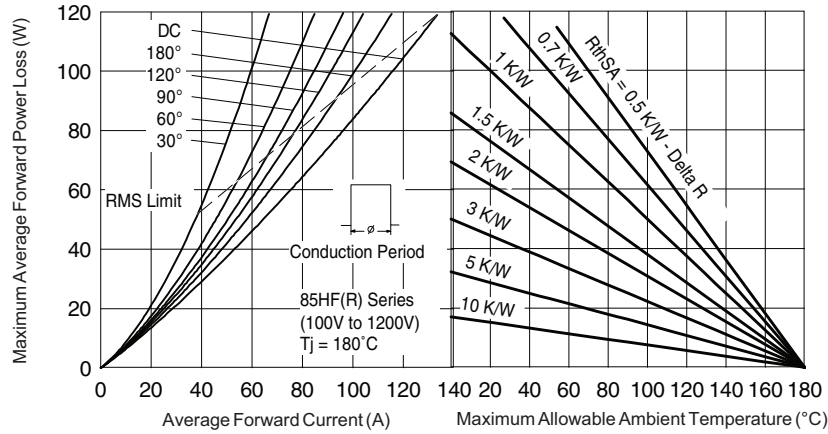


Fig. 6 - Forward Power Loss Characteristics

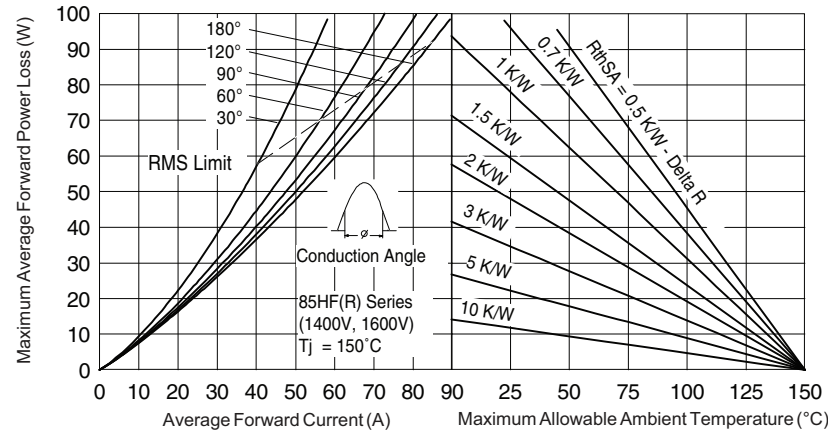


Fig. 7 - Forward Power Loss Characteristics

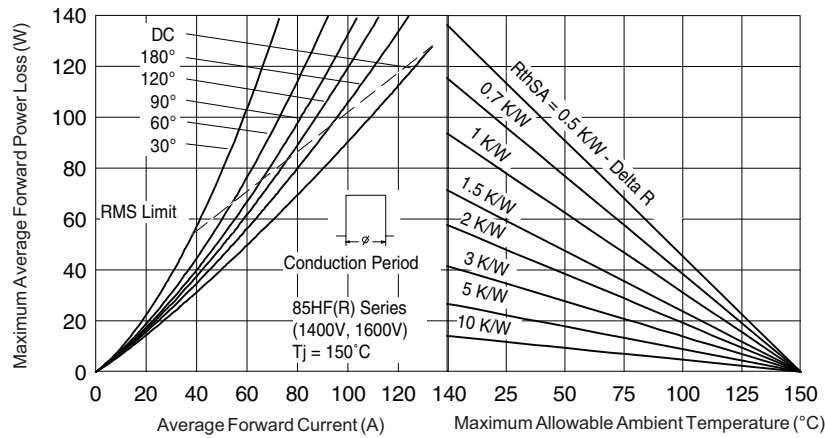


Fig. 8 - Forward Power Loss Characteristics

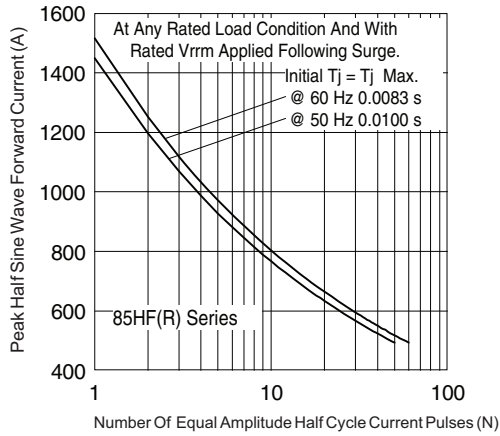


Fig. 9 - Maximum Non-Repetitive Surge Current

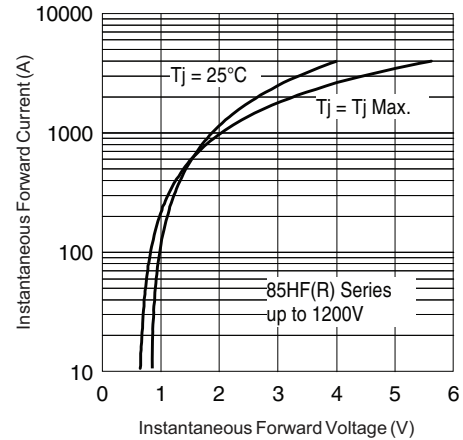


Fig. 11 - Forward Voltage Drop Characteristics (up to 1200 V)

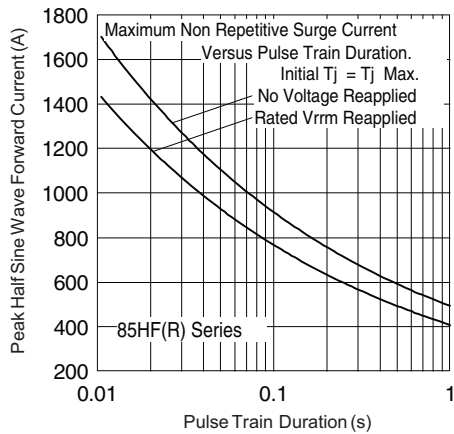


Fig. 10 - Maximum Non-Repetitive Surge Current

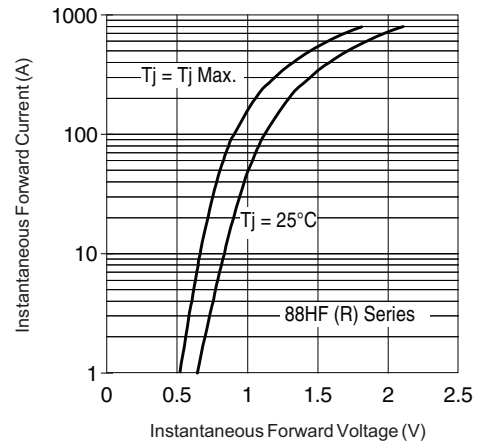


Fig. 12 - Forward Voltage Drop Characteristics (for 1400 V, 1600 V)

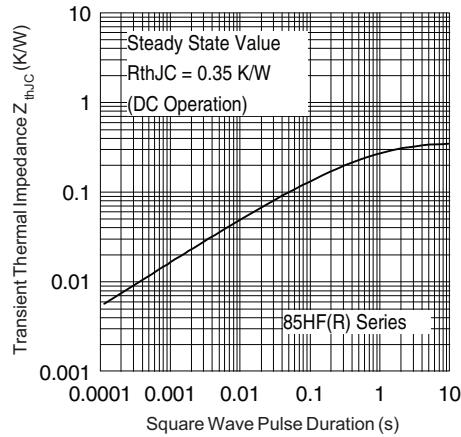


Fig. 13 - Thermal Impedance  $Z_{thJC}$  Characteristics

## ORDERING INFORMATION TABLE

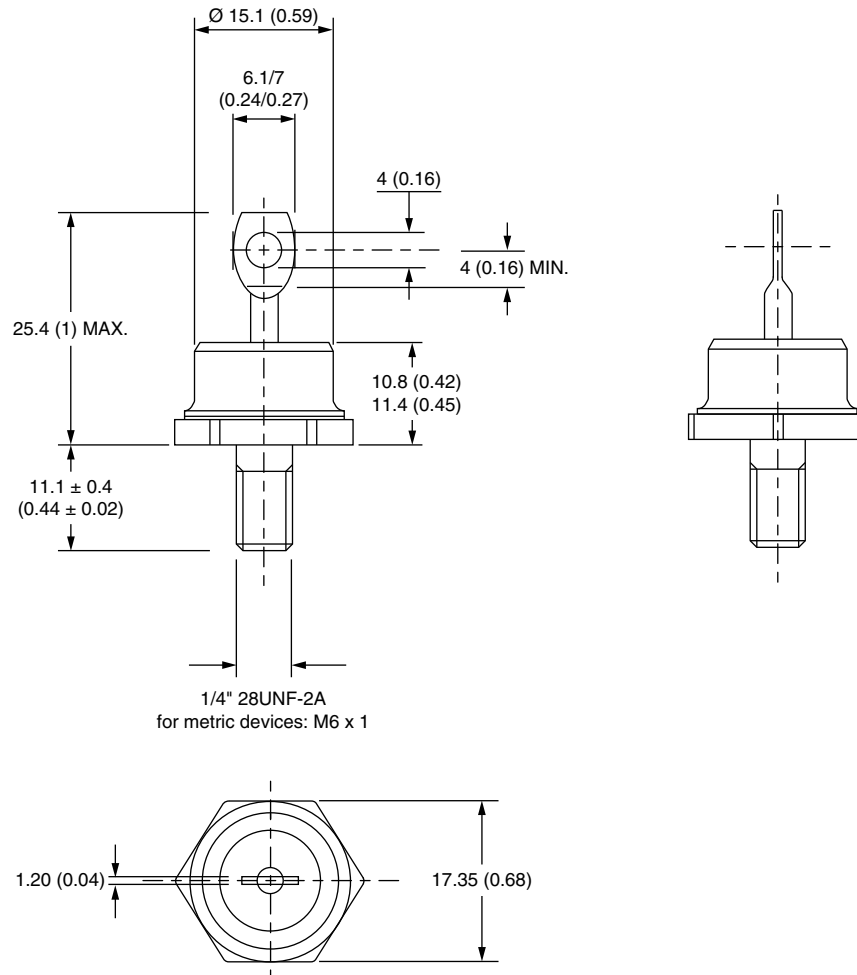
Device code	<b>85</b>	<b>HF</b>	<b>R</b>	<b>160</b>	<b>M</b>
	①	②	③	④	⑤

- 1** - 85 = Standard device  
86 = Not isolated lead  
87 = Isolated lead with silicone sleeve  
(red = Reverse polarity)  
(blue = Normal polarity)  
88 = Type for rotating application
- 2** - HF = Standard diode
- 3** - None = Stud normal polarity (cathode to stud)  
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  
M = Stud base DO-203AB (DO-5) M6 x 1 (not available for 88HF)

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95342">www.vishay.com/doc?95342</a>

## DO-203AB (DO-5) for 85HF(R) and 86HF(R) Series

**DIMENSIONS FOR 85HF(R) SERIES** in millimeters (inches)



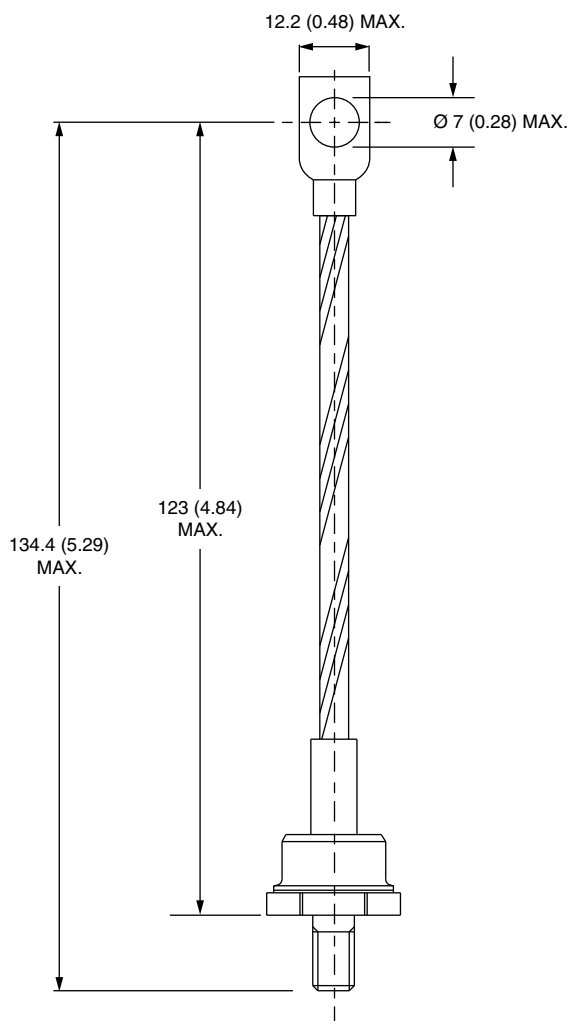
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for 85HF(R)  
and 86HF(R) Series



## DIMENSIONS FOR 86HF(R) SERIES in millimeters (inches)





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