

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



DO-9 (DO-205AB)

### 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

### TYPICAL APPLICATIONS

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

### PRIMARY CHARACTERISTICS

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

### 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 V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM 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 <sub>F(AV)</sub>	180° conduction, half sine wave			400	A
					120	°C
Maximum RMS forward current	I <sub>F(RMS)</sub>	DC at 110 °C case temperature			630	A
Maximum peak, one cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum	8250	A
		t = 8.3 ms			8640	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		6940	
		t = 8.3 ms			7270	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reapplied		340	kA <sup>2</sup> s
		t = 8.3 ms			311	
		t = 10 ms	100 % V <sub>RRM</sub> reapplied		241	
		t = 8.3 ms			220	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 to 10 ms, no voltage reapplied			3400	kA <sup>2</sup> √s
Low level value of threshold voltage	V <sub>F(TO)1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.77	V
High level value of threshold voltage	V <sub>F(TO)2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.85	
Low level value of forward slope resistance	r <sub>f1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.49	mΩ
High level value of forward slope resistance	r <sub>f2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum			0.49	
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>pk</sub> = 1500 A, T <sub>J</sub> = T <sub>J</sub> maximum, t <sub>p</sub> = 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-9 (DO-205AB)	

$\Delta R_{thJC}$ 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

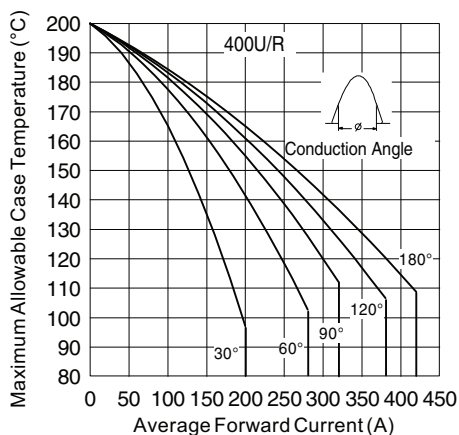


Fig. 1 - Current Ratings Characteristics

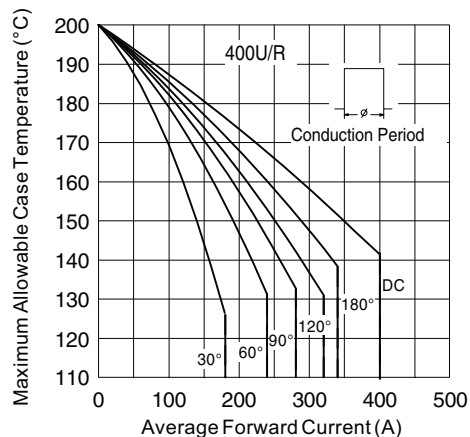


Fig. 2 - Current Ratings Characteristics

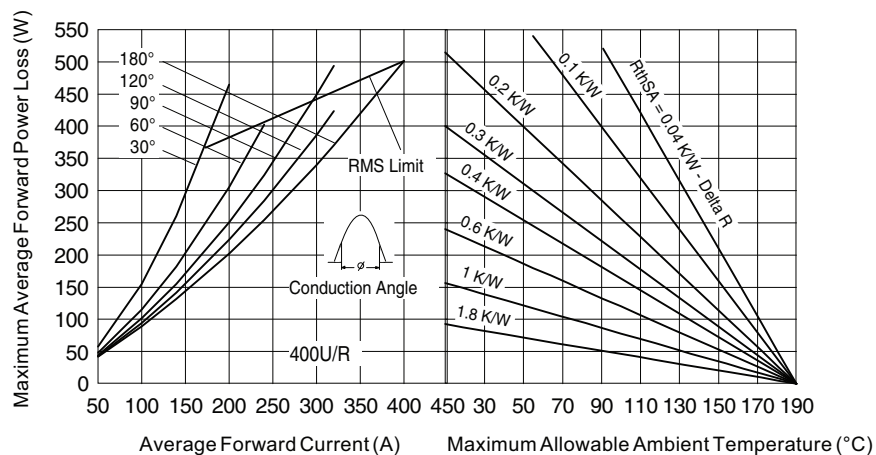


Fig. 3 - Forward Power Loss Characteristics

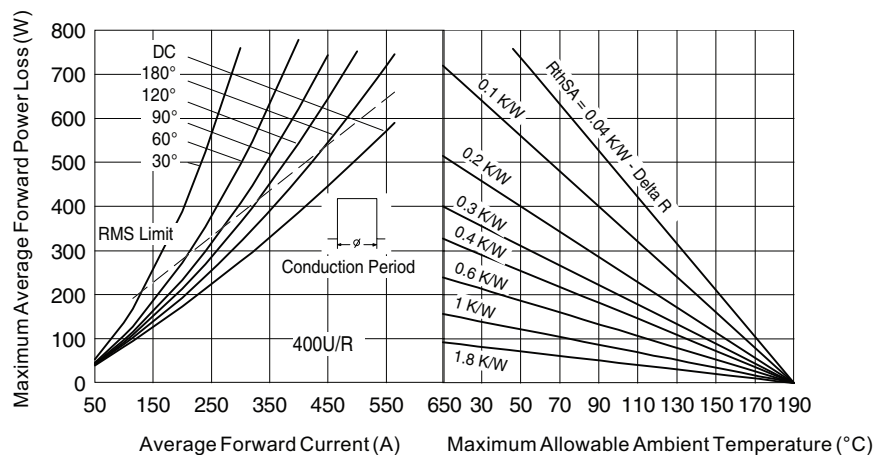


Fig. 4 - Forward Power Loss Characteristics

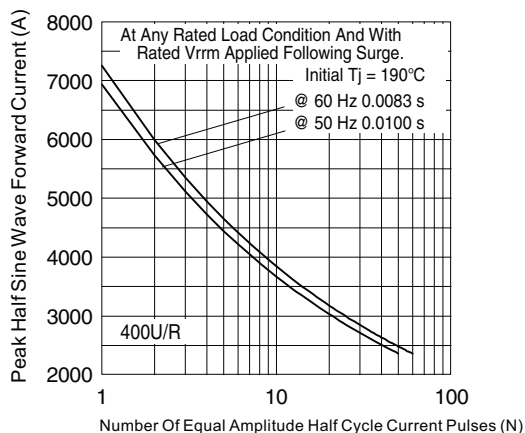


Fig. 5 - Maximum Non-Repetitive Surge Current

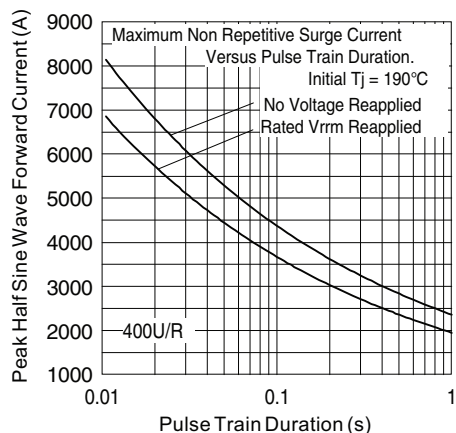


Fig. 6 - Maximum Non-Repetitive Surge Current

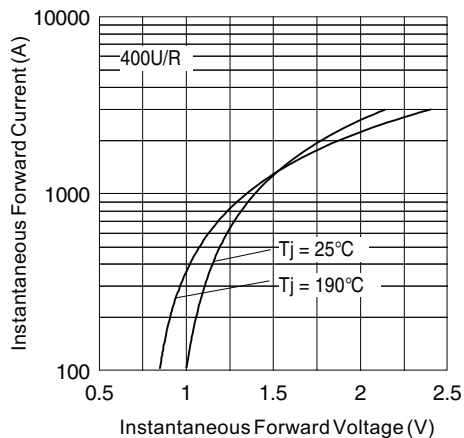
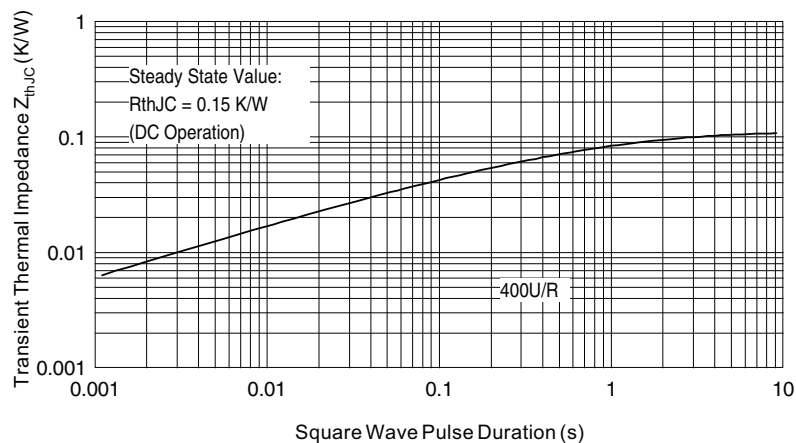


Fig. 7 - Forward Voltage Drop Characteristics


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



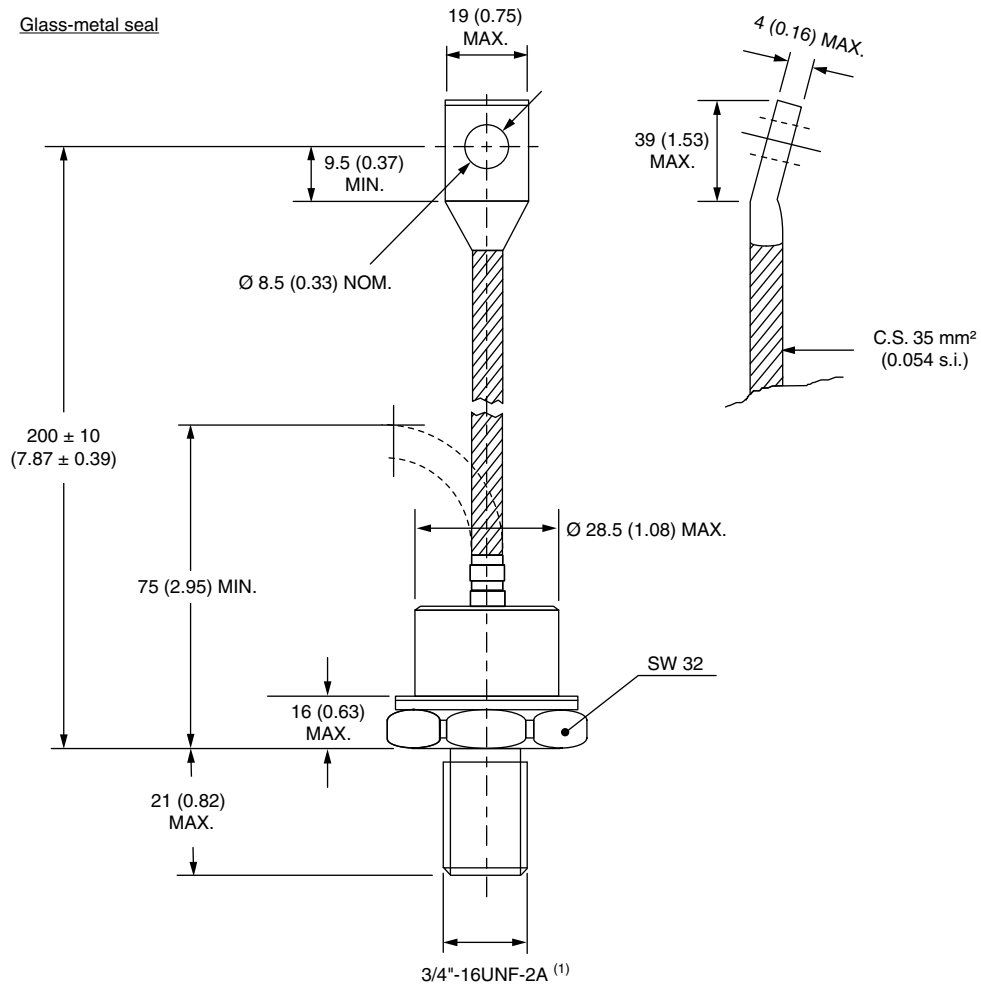
## ORDERING INFORMATION TABLE

Device code	VS-	40	0	U	R	160	D
	1	2	3	4	5	6	7
1	- Vishay Semiconductors product						
2	- 40 = essential part number						
3	- 0 = standard recovery device						
4	- U = stud normal polarity (cathode to stud)						
5	<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>						
6	- Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table)						
7	- Diffused diode						

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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