



## Standard Recovery Diodes, (Stud Version), 300 A



DO-9 (DO-205AB)

### FEATURES

- Wide current range
- High voltage rating up to 2500 V
- High surge current capabilities
- Stud cathode and stud anode version
- High resistance to acceleration
- 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
- Medium traction applications

### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	300 A
Package	DO-9 (DO-205AB)
Circuit configuration	Single

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	301U(R)		UNITS
		160 TO 200	250	
$I_{F(AV)}$		330	300	A
	$T_C$	120	120	°C
$I_{F(RMS)}$		520	470	A
$I_{FSM}$	50 Hz	8250	6050	A
	60 Hz	8640	6335	
$I^2t$	50 Hz	340	183	kA <sup>2</sup> s
	60 Hz	311	167	
$V_{RRM}$	Range	1600 to 2000	2500	V
$T_J$		-40 to +180	-40 to +180	°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-301U(R) VS-303U(R)	160	1600	1700	15
VS-305U(R) VS-307U(R)	200	2000	2100	
VS-309U(R)	250	2500	2600	



<b>FORWARD CONDUCTION</b>							
PARAMETER	SYMBOL	TEST CONDITIONS		301U(R)		UNITS	
				160 TO 200	250		
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		330	300	A	
Maximum RMS forward current	$I_{F(RMS)}$	DC at $T_C = 115\text{ °C}$ (up to 2000 V), $T_C = 102\text{ °C}$ (2500 V)		520	470	A	
Maximum peak, one cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	8250	6050	A
		t = 8.3 ms			8640	6335	
		t = 10 ms	100 % $V_{RRM}$ reappplied		6940	5090	
		t = 8.3 ms			7270	5330	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reappplied		340	183	kA <sup>2</sup> s
		t = 8.3 ms			311	167	
		t = 10 ms	100 % $V_{RRM}$ reappplied		241	129	
		t = 8.3 ms			220	118	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reappplied		3400	1830	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	0.90	V	
High level value of threshold voltage	$V_{F(TO)2}$	(I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum		0.84	0.97		
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	0.59	mΩ	
High level value of forward slope resistance	$r_{f2}$	(I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum		0.49	0.55		
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 942\text{ A}$ , $T_J = T_J$ maximum, $t_p = 10\text{ ms}$ sinusoidal wave		1.22	1.46	V	

<b>SPECIAL SELECTION FORWARD VOLTAGE (<math>T_J = 25\text{ °C}</math>)</b>					
DEVICE CLASSIFICATION	BAND	MIN.	MAX.	UNIT	TEST CONDITIONS
VS-305U250P4 VS-307UA250P4 VS-305UR250P4 VS-307URA250P4	P4	1.31	1.40	V	1000 A <sub>pk</sub>

<b>THERMAL AND MECHANICAL SPECIFICATIONS</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction operating temperature range	$T_J$		-40 to 180	°C
Maximum storage temperature range	$T_{Stg}$		-40 to 200	
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	0.14	K/W
Maximum thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth, flat and greased	0.08	
Maximum allowed mounting torque +0 -20 %		Not lubricated threads	37	N · m
		Lubricated threads	28	
Weight	301U		250 ± 5	g
	303U		152 ± 5	
	305U		177 ± 5	
	307U		197 ± 5	
	309U		160 ± 5	
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
	80 TO 200	250	80 TO 200	250		
180°	0.015	0.015	0.011	0.011	$T_J = T_J$ maximum	K/W
120°	0.018	0.018	0.019	0.019		
90°	0.023	0.023	0.025	0.025		
60°	0.034	0.034	0.035	0.035		
30°	0.056	0.056	0.057	0.057		

**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. 1 - Current Ratings Characteristics



Fig. 3 - Current Ratings Characteristics



Fig. 4 - Forward Power Loss Characteristics



Fig. 5 - Forward Power Loss Characteristics



Fig. 6 - Forward Power Loss Characteristics



Fig. 7 - Forward Power Loss Characteristics



Fig. 8 - Maximum Non-Repetitive Surge Current



Fig. 10 - Maximum Non-Repetitive Surge Current



Fig. 9 - Maximum Non-Repetitive Surge Current



Fig. 11 - Maximum Non-Repetitive Surge Current



Fig. 12 - Forward Voltage Drop Characteristics



Fig. 13 - Forward Voltage Drop Characteristics



Fig. 14 - Thermal Impedance  $Z_{thJC}$  Characteristic



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - 30 = essential part number
- 3** -
  - 1 = standard device
  - 3 = top threaded version
  - 5 = type for rotating application with top threaded version 3/8 16UNC-2A
  - 7 = type for rotating application with flexible lead
  - 9 = type for rotating application with top threaded version 3/8 24UNF
- 4** -
  - U = stud normal polarity (cathode to stud)
  - UR = stud reverse polarity (anode to stud)
- 5** - A = maximum leakage selection  $I_{RRM} = 2 \text{ mA}$ ,  $T_J = 25 \text{ }^\circ\text{C}$
- 6** - Voltage code x 10 =  $V_{RRM}$  (see Voltage Ratings table)
- 7** - Refer special selection table for applicable parts

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95337">www.vishay.com/doc?95337</a>

## DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

**DIMENSIONS FOR 301U(R) SERIES - DO-205AB (DO-9)** in millimeters (inches)





# Outline Dimensions



Vishay Semiconductors DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

## DIMENSIONS FOR 307U(R) SERIES - B-60 in millimeters (inches)





DO-205AB (DO-9), B-60, B-61, B-41, B-40 for Vishay Semiconductors  
301U(R), 307U(R), 305U(R) and 309U(R) Series

## DIMENSIONS FOR 305U(R) SERIES - B-61 in millimeters (inches)



## DIMENSIONS FOR 309U(R) SERIES - B-41 in millimeters (inches)



# Outline Dimensions



Vishay Semiconductors DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

## DIMENSIONS FOR 303U(R) SERIES - B-40 in millimeters (inches)





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