Standard Recovery Diodes (Stud Version), 300 A



DO-205AB (DO-9)

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

RoHS COMPLIANT

TYPICAL APPLICATIONS

- Converters
- Power supplies
- Machine tool controls
- High power drives
- Medium traction applications

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

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^2s
	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) VS-305U(R) VS-307U(R) VS-309U(R)	160	1600	1700	15
	200	2000	2100	
	250	2500	2600	

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FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			301U(R) 160 TO 200	301U(R) 250	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			330	300	A
					120	120	°C
Maximum RMS forward current	$I_{F(RMS)}$	DC at T_C = 115 °C (up to 2000 V), T_C = 102 °C (2500 V)			520	470	A
Maximum peak, one cycle forward, non-repetitive surge current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	8250	6050	A
		t = 8.3 ms			8640	6335	
		t = 10 ms	100 % V_{RRM} reapplied		6940	5090	
		t = 8.3 ms			7270	5330	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		340	183	kA^2s
		t = 8.3 ms			311	167	
		t = 10 ms	100 % V_{RRM} reapplied		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 reapplied			3400	1830	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.77	0.90	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.84	0.97	
Low level value of forward slope resistance	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.49	0.59	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.49	0.55	
Maximum forward voltage drop	V_{FM}	I_{pk} = 942 A, $T_J = T_J$ maximum, t_p = 10 ms sinusoidal wave			1.22	1.46	V

SPECIAL SELECTION FORWARD VOLTAGE (T_j = 25 °C)

DEVICE CLASSIFICATION	BAND	MIN.	MAX.	UNIT	TEST CONDITIONS
VS-305U250P4 VS-307UA250P4 VS-305UR250P4 VS-307URA250P4	P4	1.31	1.40	V	1000 A_{pk}

THERMAL AND MECHANICAL SPECIFICATIONS

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-205AB (DO-9)	

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ΔR_{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

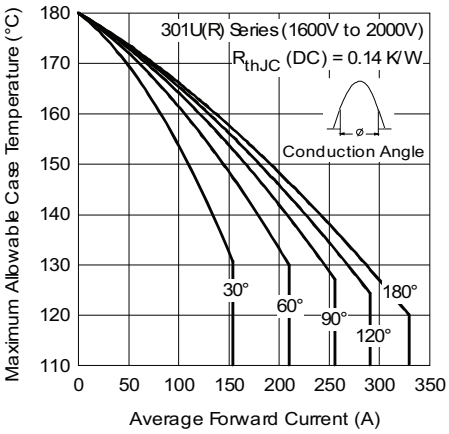


Fig. 1 - Current Ratings Characteristics

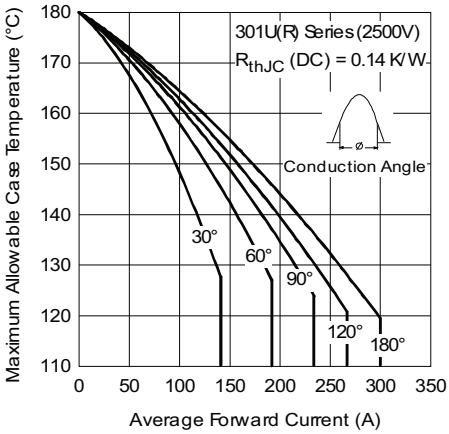


Fig. 2 - Current Ratings Characteristics

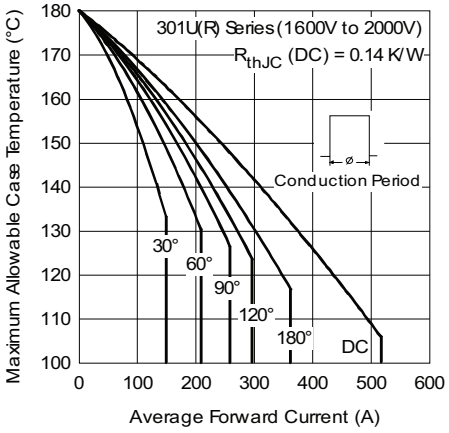


Fig. 1 - Current Ratings Characteristics

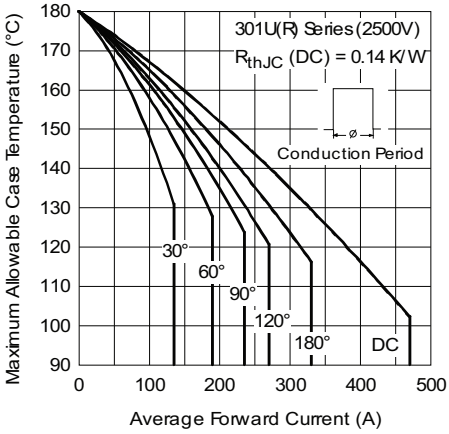


Fig. 3 - Current Ratings Characteristics

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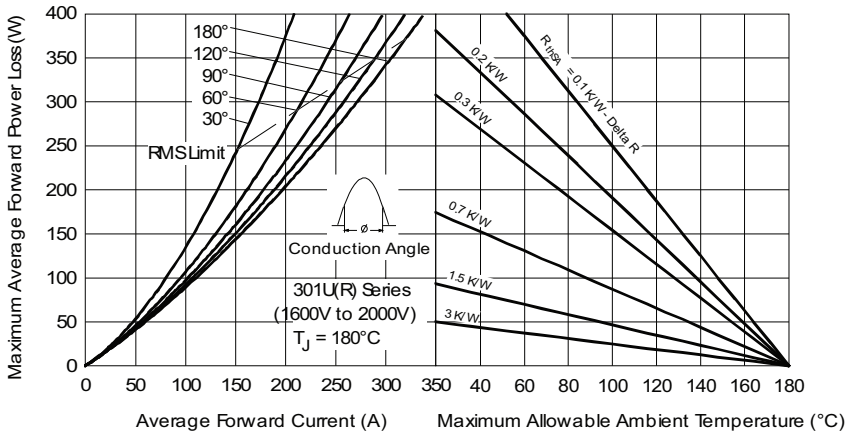


Fig. 4 - Forward Power Loss Characteristics

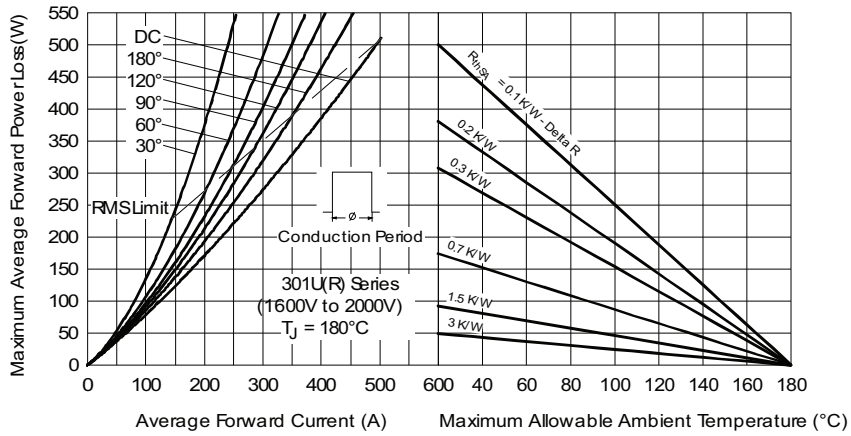


Fig. 5 - Forward Power Loss Characteristics

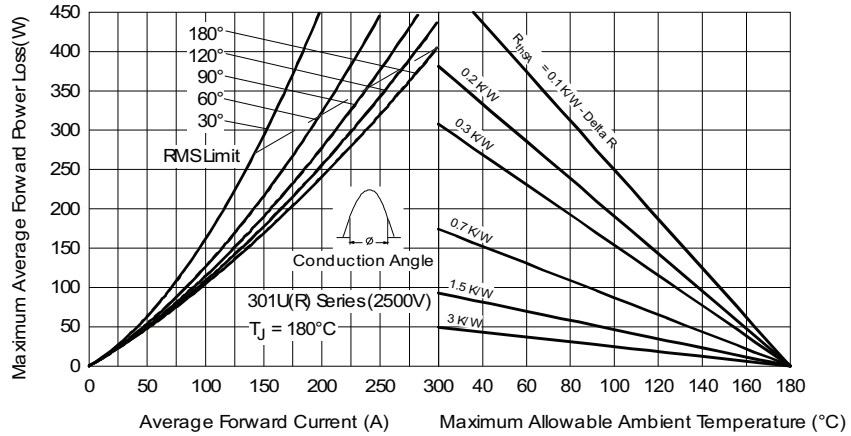


Fig. 6 - Forward Power Loss Characteristics

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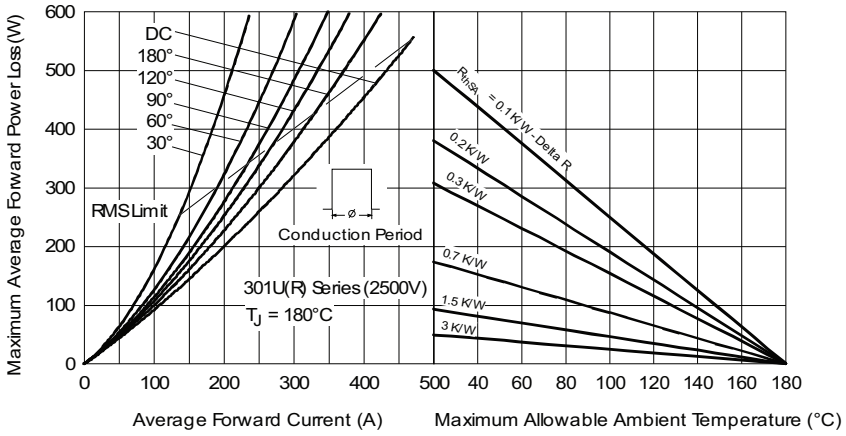


Fig. 7 - Forward Power Loss Characteristics

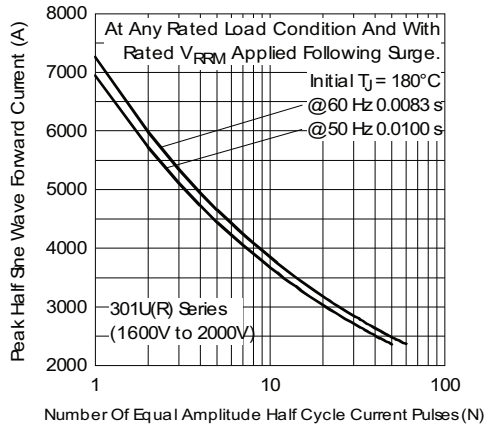


Fig. 8 - Maximum Non-Repetitive Surge Current

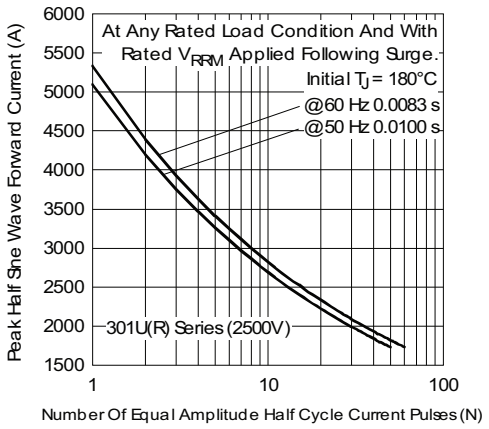


Fig. 10 - Maximum Non-Repetitive Surge Current

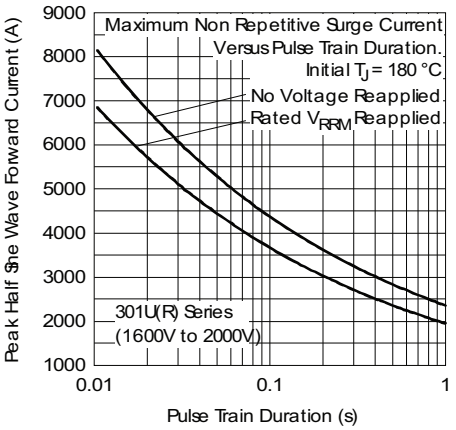


Fig. 9 - Maximum Non-Repetitive Surge Current

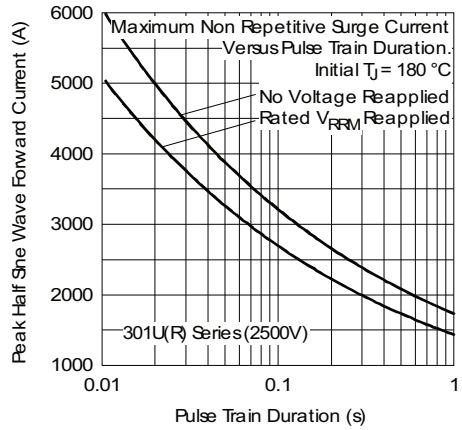


Fig. 11 - Maximum Non-Repetitive Surge Current

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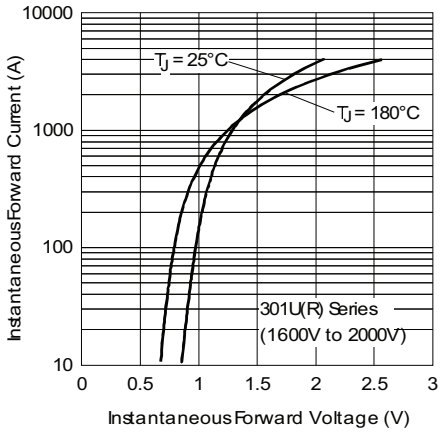


Fig. 12 - Forward Voltage Drop Characteristics

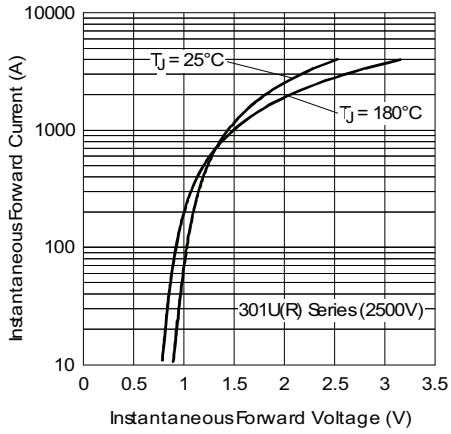


Fig. 13 - Forward Voltage Drop Characteristics

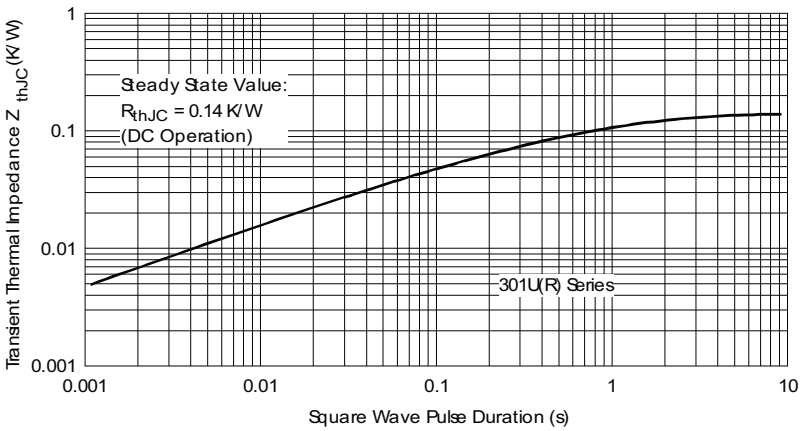


Fig. 14 - Thermal Impedance Z_{thJC} Characteristic

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ORDERING INFORMATION TABLE

Device code

VS-	30	1	U	A	250	P4
1	2	3	4	5	6	7

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 mA, T_J = 25 °C

6 - Voltage code x 10 = V_{RRM} (see Voltage Ratings table)

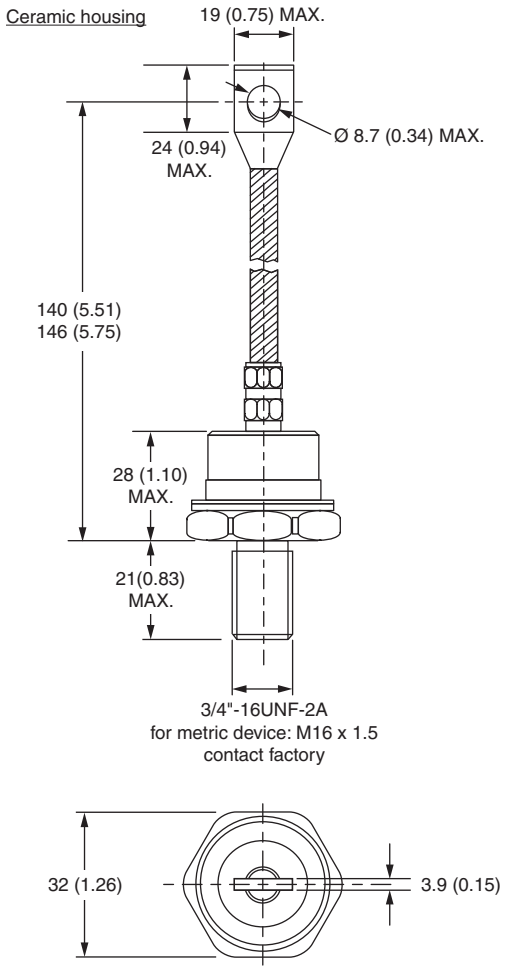
7 - Refer special selection table for applicable parts

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95337

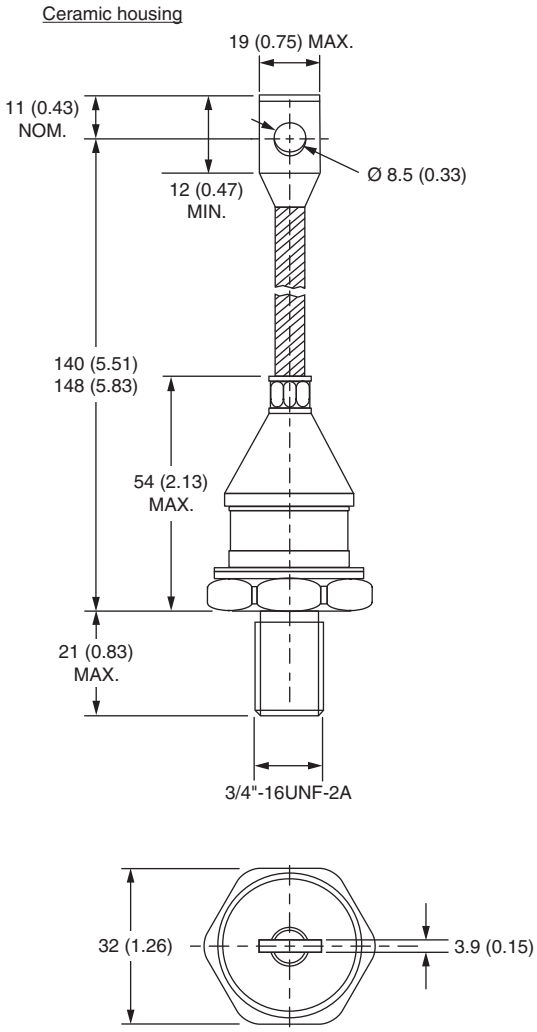
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DO-205AB (DO-9), B-60, B-61, B-41, B-40 for 301U(R), 307U(R), 305U(R) and 309U(R) Series

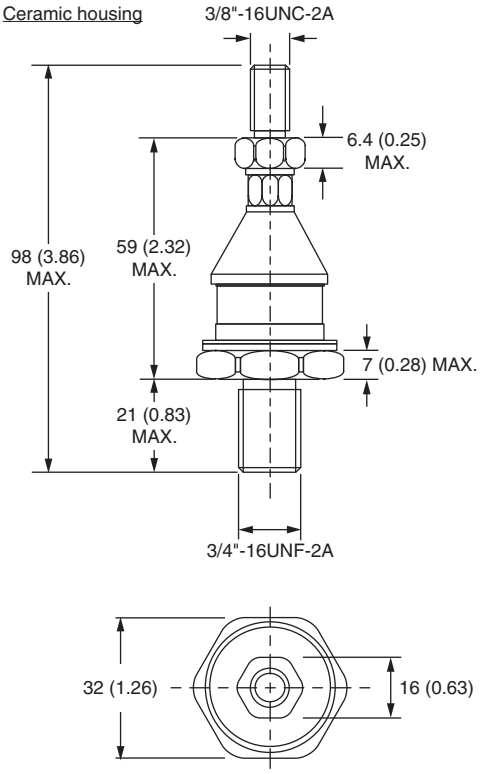
DIMENSIONS FOR 301U(R) SERIES - DO-205AB (DO-9) in millimeters (inches)



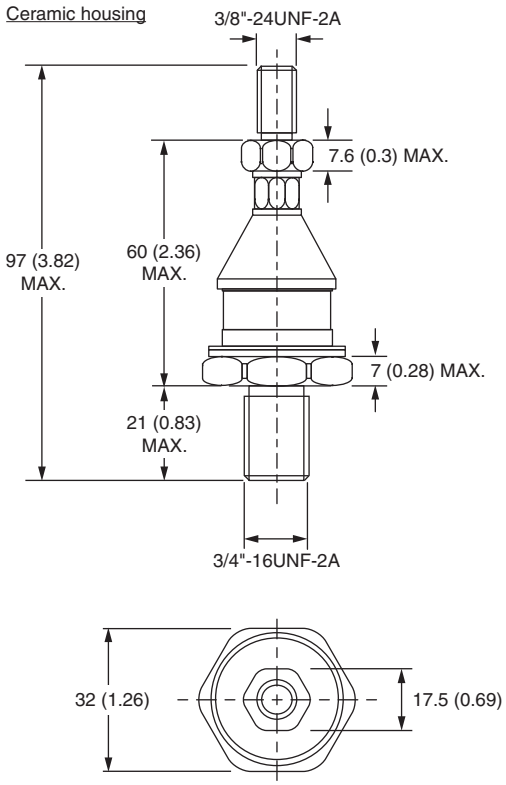
DIMENSIONS FOR 307U(R) SERIES - B-60 in millimeters (inches)



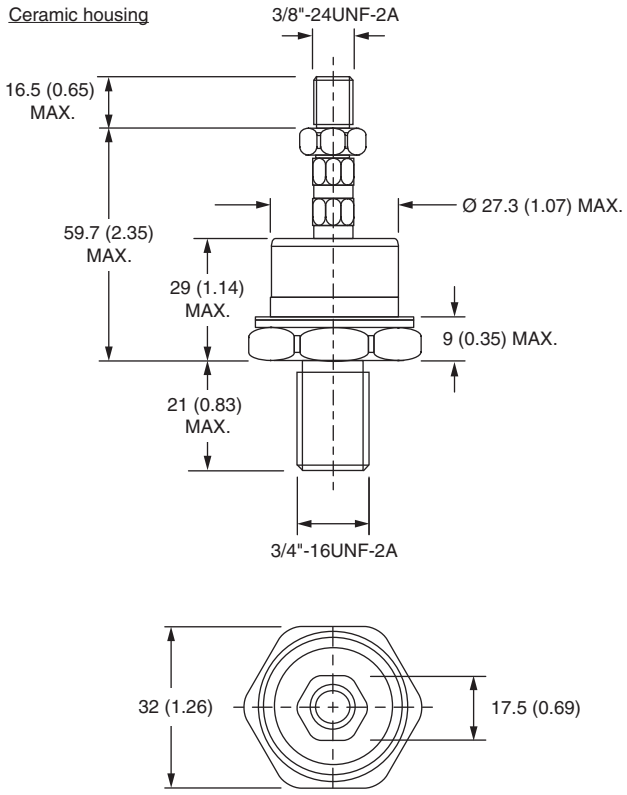
DIMENSIONS FOR 305U(R) SERIES - B-61 in millimeters (inches)



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



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



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