Standard Recovery Diodes, 400 A

TO-244

FEATURES

- Standard rectifier
- Popular series for rough service
- Cathode and anode to base available
- UL approved file E222165
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

TYPICAL APPLICATIONS

- Welders
- Power supplies
- Motor controls
- Battery chargers
- General industrial current rectification

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$ per module	400 A
Type	Modules - diode, high voltage
Package	TO-244
Circuit configuration	Two diodes common anode, two diodes common cathode

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$		400	A
	T_C	133	°C
$I_{F(RMS)}$		628	A
I_{FSM}	50 Hz	2500	
	60 Hz	2620	
I^2t	50 Hz	31	kA^2s
	60 Hz	28	
$I^2\sqrt{t}$		312	$kA^2\sqrt{s}$
V_{RRM}		600	V
T_{Stg}, T_J		-40 to +175	°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 = 175 °C mA
VS-VSMD400.W60	60	600	700	12

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum average forward current at case temperature per leg	$I_{F(AV)}$	180° conduction, half sine wave, 133 °C			200	A
Maximum RMS forward current per leg	$I_{F(RMS)}$	DC at 137 °C case temperature			314	A
Maximum peak, one-cycle forward, non-repetitive surge current per leg	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	2500	
		t = 8.3 ms			2620	
		t = 10 ms	100 % V_{RRM} reapplied		2100	
		t = 8.3 ms			2200	
Maximum I^2t for fusing per leg	I^2t	t = 10 ms	No voltage reapplied		32	kA^2s
		t = 8.3 ms			29	
		t = 10 ms	100 % V_{RRM} reapplied		22	
		t = 8.3 ms			20	
Maximum $I^2\sqrt{t}$ for fusing per leg	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			311	$kA^2\sqrt{s}$
Low level value of threshold voltage per leg	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.73	V
High level value of threshold voltage per leg	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.85	
Low level value of forward slope resistance per leg	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.52	mΩ
High level value of forward slope resistance per leg	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			1.36	
Maximum forward voltage drop per leg	V_{FM}	I_{FM} = 200 A, T_J = 25 °C, t_p = 400 µs square wave			1.31	V

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse leakage current per leg	I_{RRM}	T_J = 175 °C	12	mA
		T_J = 25 °C	200	µA

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	VALUES			UNITS
			MIN.	TYP.	MAX.	
Thermal resistance, junction to case	per leg	R_{thJC}	-	-	0.10	°C/W
	per module		-	-	0.05	
Thermal resistance, case to heatsink per module		R_{thCS}	-	0.10	-	
Weight			-	68	-	g
			-	2.4	-	oz.
Mounting torque			30 (3.4)	-	40 (4.6)	lbf · in (N · m)
Mounting torque center hole			12 (1.4)	-	18 (2.1)	
Terminal torque			30 (3.4)	-	40 (4.6)	
Vertical pull			-	-	80	lbf · in
2” lever pull			-	-	35	
Case style			TO-244			

ΔR CONDUCTION PER JUNCTION

DEVICES	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VSMD400.W60	0.041	0.047	0.060	0.084	0.131	0.029	0.049	0.064	0.087	0.132	°C/W

Note

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

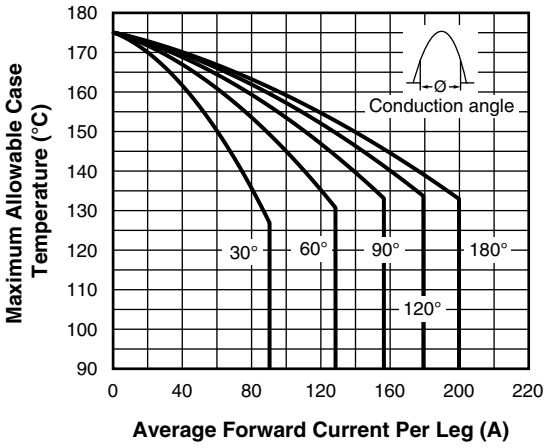


Fig. 1 - Current Ratings Characteristics Per Leg

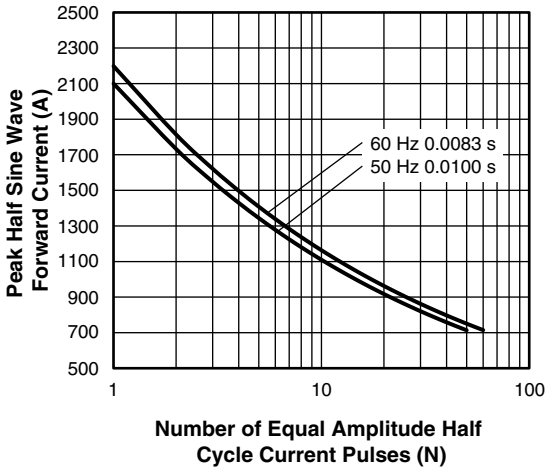


Fig. 3 - Maximum Non-Repetitive Surge Current Per Leg

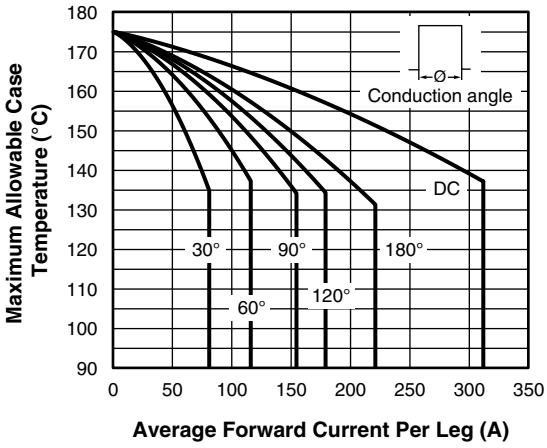


Fig. 2 - Current Ratings Characteristics Per Leg

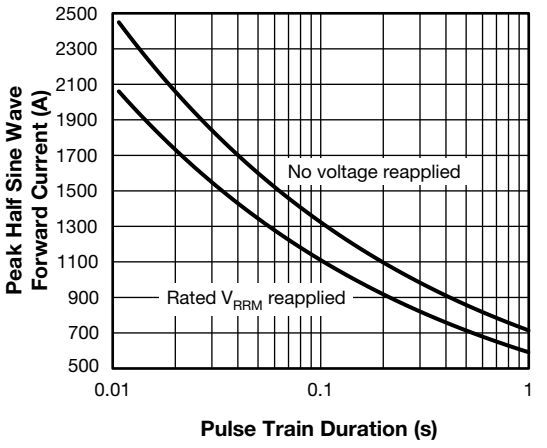


Fig. 4 - Maximum Non-Repetitive Surge Current Per Leg

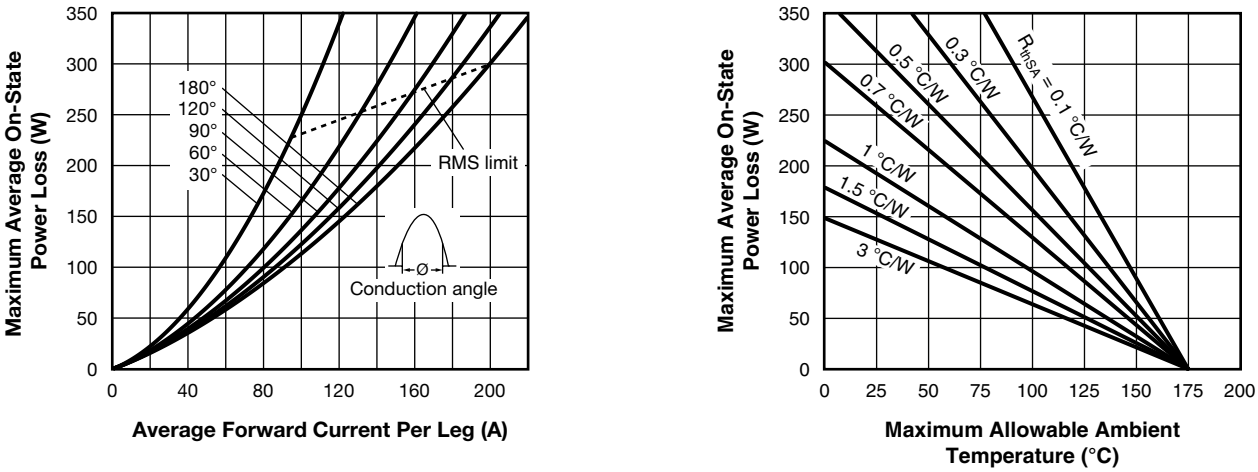


Fig. 5 - Forward Power Loss Characteristics

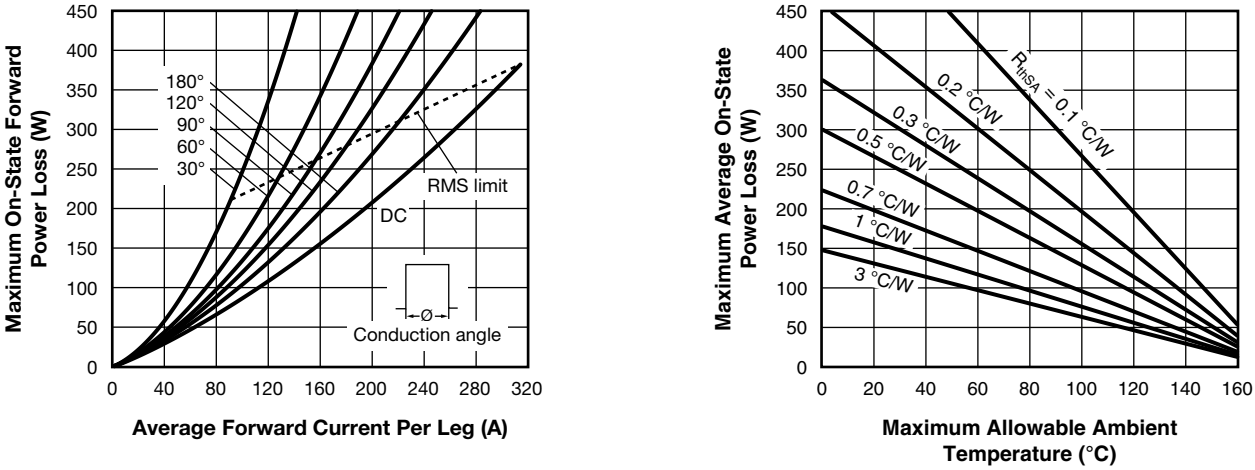


Fig. 6 - Forward Power Loss Characteristics

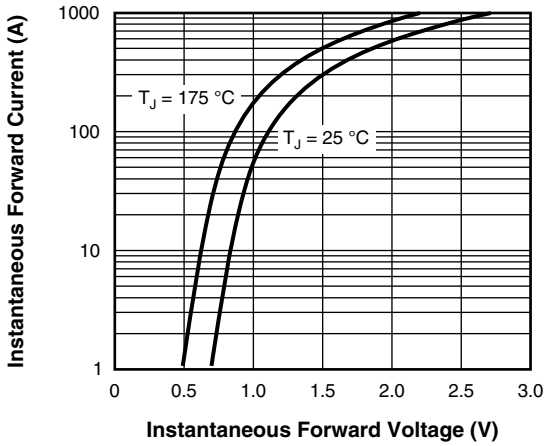


Fig. 7 - Forward Voltage Drop Characteristics Per Leg

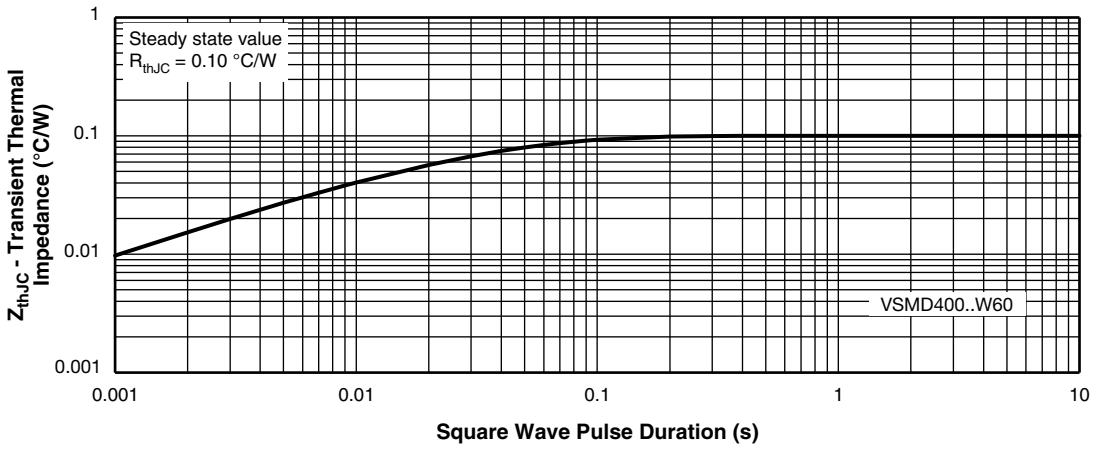


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics Per Leg

ORDERING INFORMATION TABLE

Device code

VS-VS	MD	400	C	W	60
1	2	3	4	5	6

1 - Vishay Semiconductors product

2 - MD = standard recovery diode

3 - Current rating (400 = 400 A)

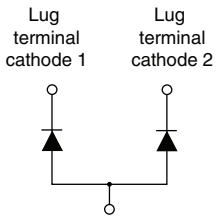
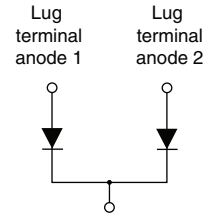
4 - Circuit configuration:

- C = two diodes common cathode
- A = two diodes common anode

5 - Type of device:

W = TO-244 not isolated

6 - Voltage rating (60 = 600 V)

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Two diodes common anode	A	
Two diodes common cathode	C	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95021

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.