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

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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

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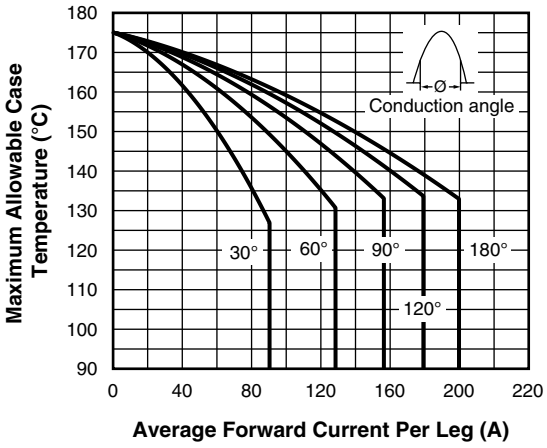


Fig. 1 - Current Ratings Characteristics Per Leg

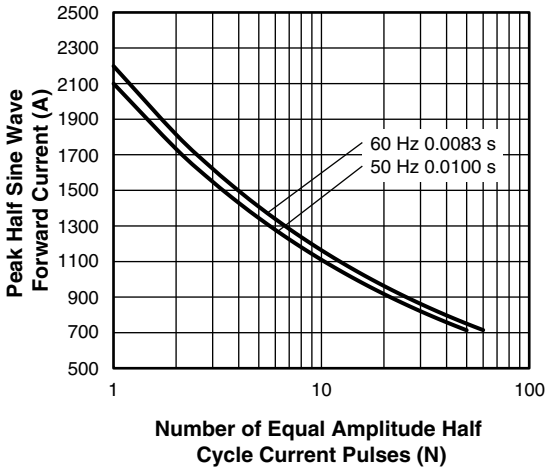


Fig. 3 - Maximum Non-Repetitive Surge Current Per Leg

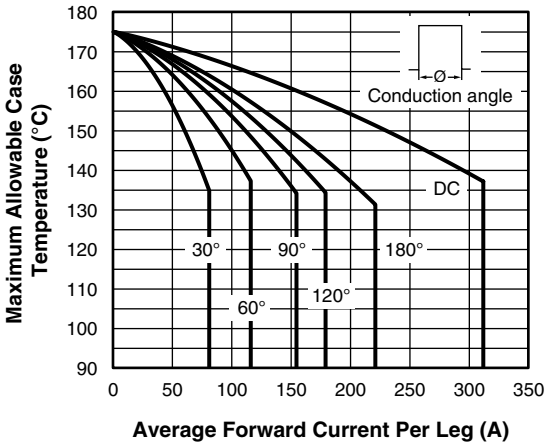


Fig. 2 - Current Ratings Characteristics Per Leg

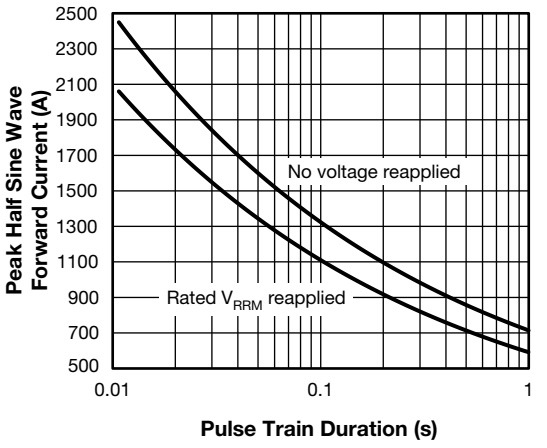


Fig. 4 - Maximum Non-Repetitive Surge Current Per Leg

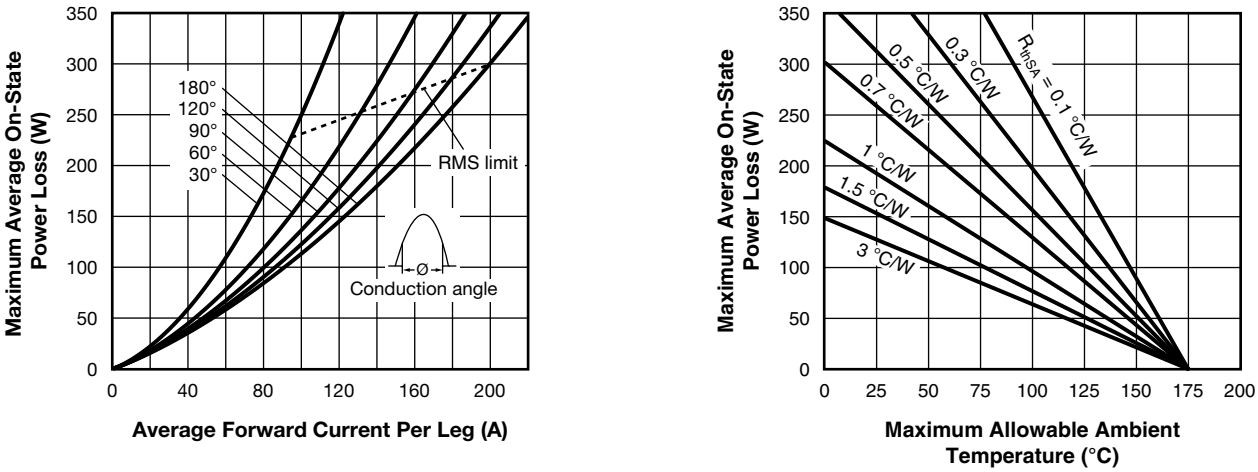


Fig. 5 - Forward Power Loss Characteristics

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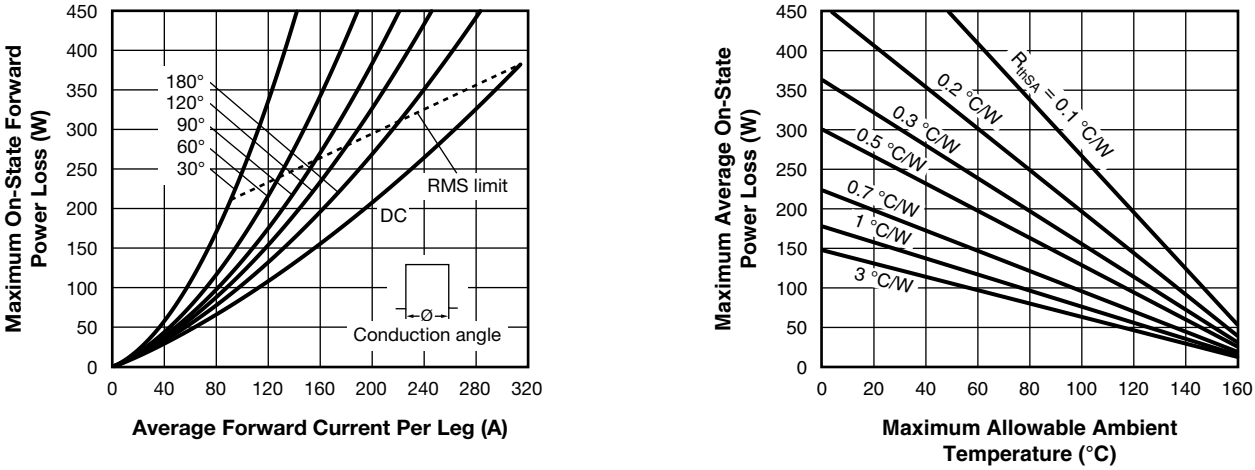


Fig. 6 - Forward Power Loss Characteristics

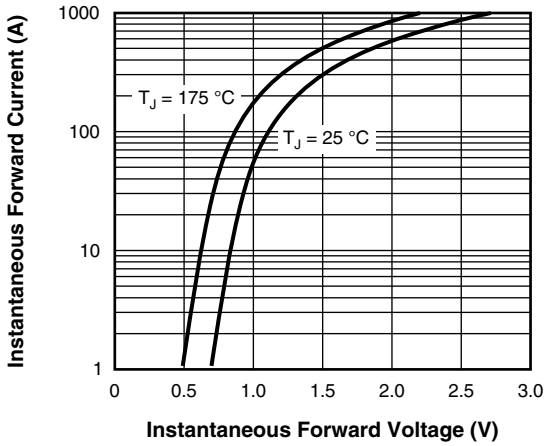


Fig. 7 - Forward Voltage Drop Characteristics Per Leg

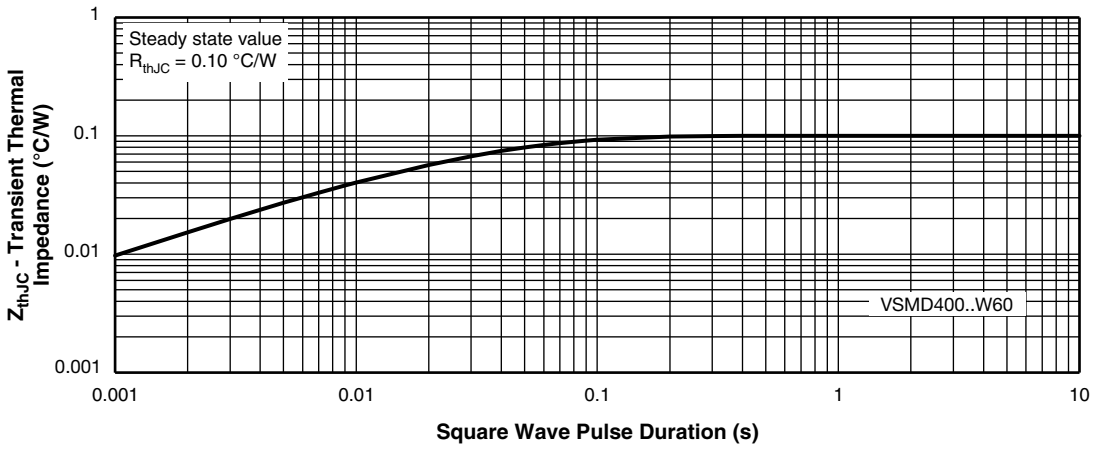


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics Per Leg

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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)

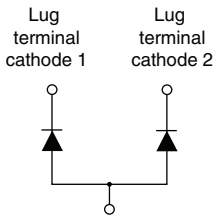
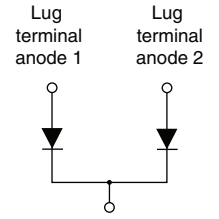
4 - Circuit configuration:

- 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

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