

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 ² s
	60 Hz	28	
$I^2\sqrt{t}$		312	kA ² √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	2500	
		t = 8.3 ms	No voltage reapplied	2620	
		t = 10 ms	100 % V_{RRM} reapplied	2100	
		t = 8.3 ms	100 % V_{RRM} reapplied	2200	
Maximum I^2t for fusing per leg	I^2t	t = 10 ms	No voltage reapplied	32	kA ² s
		t = 8.3 ms	No voltage reapplied	29	
		t = 10 ms	100 % V_{RRM} reapplied	22	
		t = 8.3 ms	100 % V_{RRM} reapplied	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 √s
Low level value of threshold voltage per leg	$V_{F(TO)1}$	$(16.7 \% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ maximum		0.73	V
High level value of threshold voltage per leg	$V_{F(TO)2}$	$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ maximum		0.85	
Low level value of forward slope resistance per leg	r_{f1}	$(16.7 \% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, $T_J = T_J$ maximum		1.52	mΩ
High level value of forward slope resistance per leg	r_{f2}	$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ 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 per module	R_{thJC}	-	-	0.10	°C/W
		-	-	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

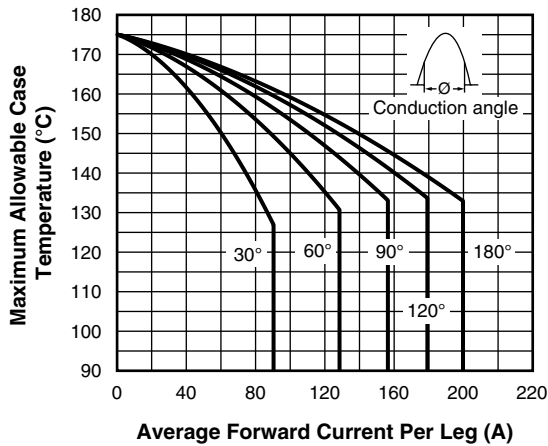


Fig. 1 - Current Ratings Characteristics Per Leg

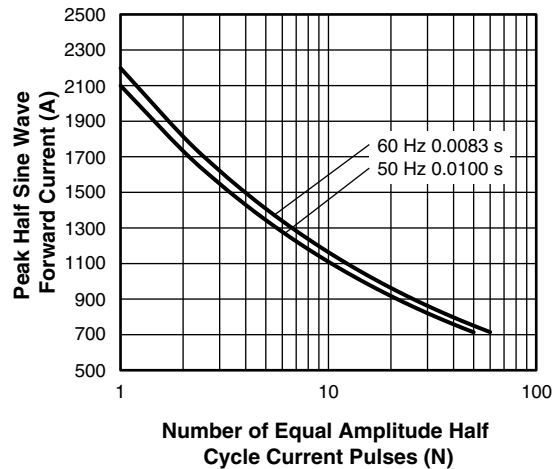


Fig. 3 - Maximum Non-Repetitive Surge Current Per Leg

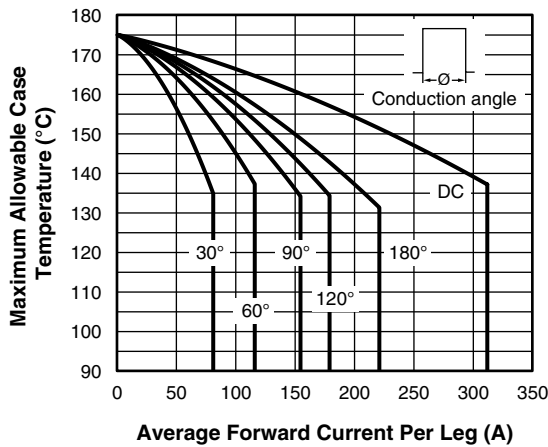


Fig. 2 - Current Ratings Characteristics Per Leg

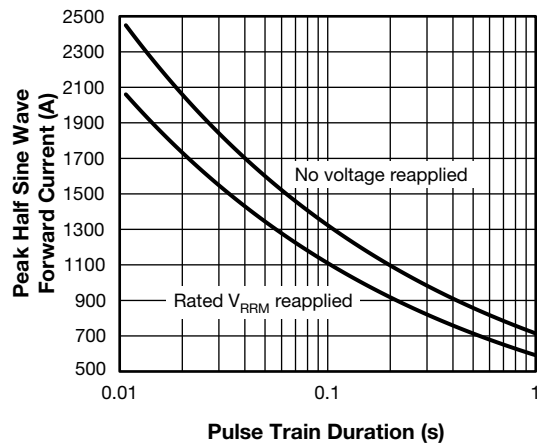


Fig. 4 - Maximum Non-Repetitive Surge Current Per Leg

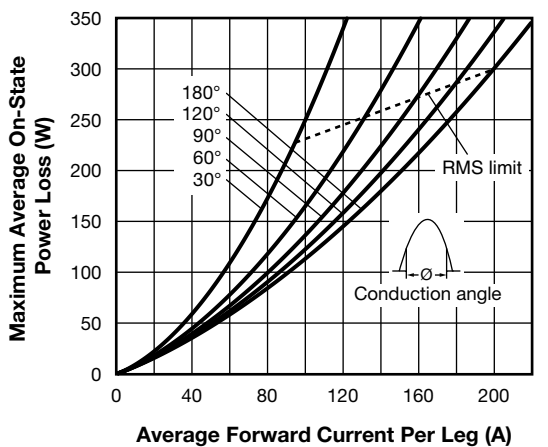
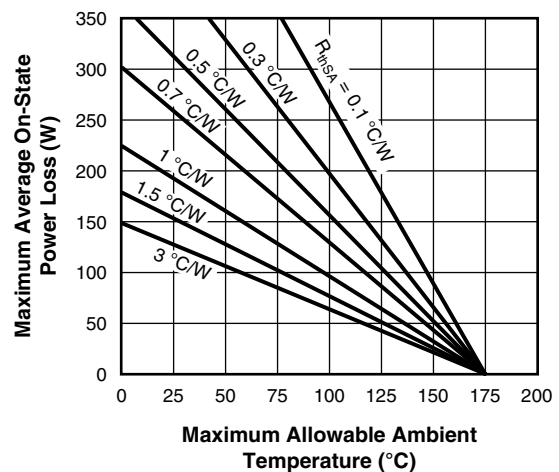


Fig. 5 - Forward Power Loss Characteristics



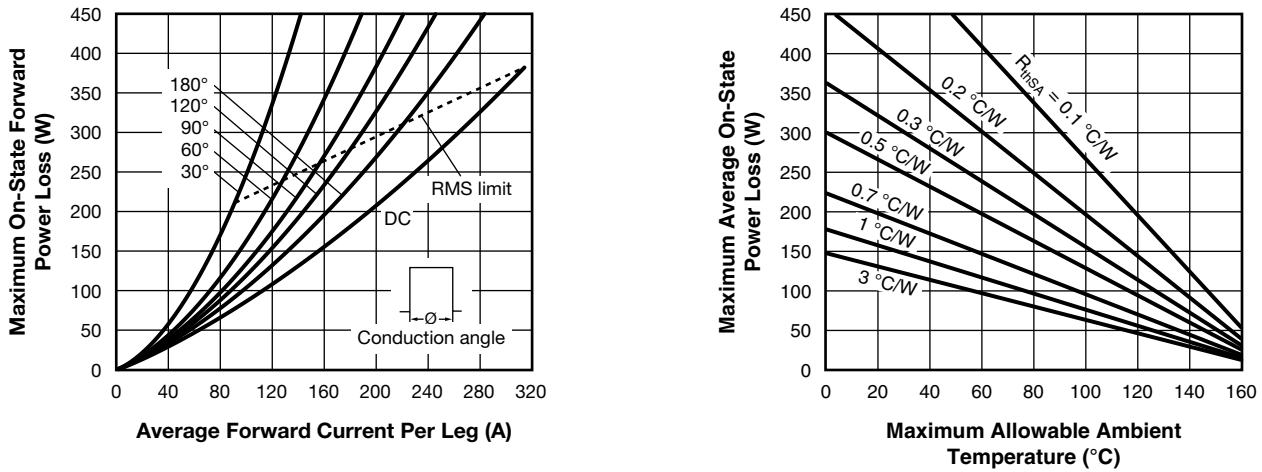


Fig. 6 - Forward Power Loss Characteristics

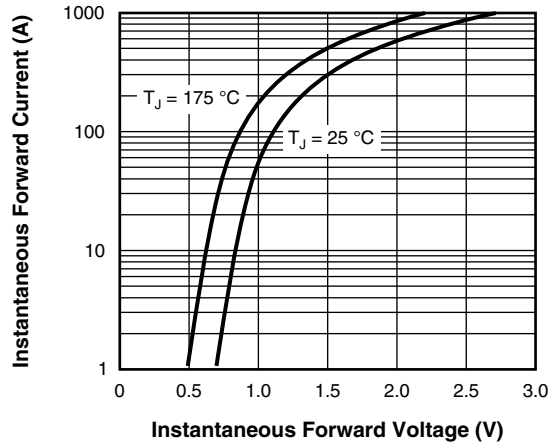


Fig. 7 - Forward Voltage Drop Characteristics Per Leg

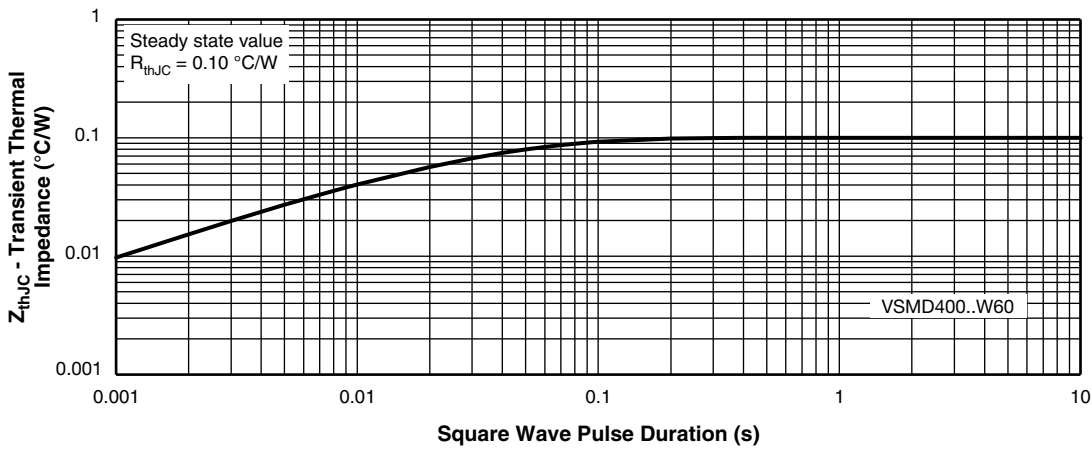


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics Per Leg



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



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