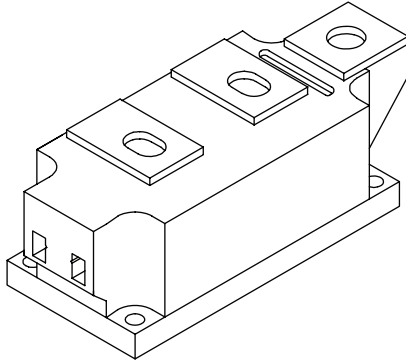


## Fast Diodes, 460 A (SUPER MAGN-A-PAK™ Power Modules)



SUPER MAGN-A-PAK™

**FEATURES**

- High power FAST recovery diode series
- High current capability
- 3000 V<sub>RMS</sub> isolating voltage with non-toxic substrate
- High surge capability
- High voltage ratings up to 2500 V
- Industrial standard package
- UL E78996 approved
- Lead (Pb)-free
- Designed and qualified for industrial level



**RoHS**  
COMPLIANT

**PRODUCT SUMMARY**

$I_{F(AV)}$	460 A
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**TYPICAL APPLICATIONS**

- Snubber for large GTO
- Snubber for large IGBT

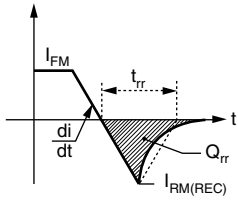
**MAJOR RATINGS AND CHARACTERISTICS**

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$		460	A
	$T_C$	82	°C
$I_{F(RMS)}$		720	A
	$T_C$	82	°C
$I_{FSM}$	50 Hz	13 000	A
	60 Hz	13 800	
$I^2t$	50 Hz	845	kA <sup>2</sup> s
	60 Hz	790	
$I^2\sqrt{t}$		8450	kA <sup>2</sup> √s
$V_{RRM}$	Range	1600 to 2500	V
$t_{rr}$		4.0	μs
$T_{Stg}, T_J$	Range	- 40 to 150	°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 $T_J$ MAXIMUM mA
VSKDL450..S20	16	1600	1700	50
	20	2000	2100	
	25	2500	2600	

FORWARD CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave		460	A
				82	°C
Maximum RMS forward current	$I_{F(RMS)}$	180° conduction, half sine wave at $T_C = 82\text{ °C}$		720	A
Maximum peak, one-cycle forward, non-repetitive surge current	$I_{FSM}$	t = 10 ms	No voltage reapplied	13.0	kA
		t = 8.3 ms		13.8	
		t = 10 ms	100 % $V_{RRM}$ reapplied	11.1	
		t = 8.3 ms		11.8	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	845	kA <sup>2</sup> s
		t = 8.3 ms		790	
		t = 10 ms	100 % $V_{RRM}$ reapplied	616	
		t = 8.3 ms		578	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		8450	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		1.16	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum		1.62	
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		0.68	mΩ
High level value of forward slope resistance	$r_{f2}$	(I > $\pi \times I_{F(AV)}$ ), $T_J = T_J$ maximum		0.41	
Maximum forward voltage drop	$V_{FM}$	$I_{pk} = 1800\text{ A}$ , $T_J = 25\text{ °C}$ , $t_p = 10\text{ ms}$ sine pulse		2.20	V

RECOVERY CHARACTERISTICS								
CODE	MAXIMUM VALUE AT $T_J = 25\text{ °C}$	TEST CONDITIONS			TYPICAL VALUES AT $T_J = 150\text{ °C}$			
	$t_{rr}$ AT 25 % $I_{RRM}$ (μs)	$I_{pk}$ SQUARE PULSE (A)	$di/dt$ (A/μs)	$V_r$ (V)	$t_{rr}$ AT 25 % $I_{RRM}$ (μs)	$Q_{rr}$ (μC)	$I_r$ (A)	
S20	2.0	1000	100	- 50	4	400	180	

BLOCKING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
RMS insulation voltage	$V_{INS}$	t = 1 s	3000	V
Maximum peak reverse and off-state leakage current	$I_{RRM}$	$T_J = T_J$ maximum, rated $V_{RRM}$ applied	50	mA



THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum operating junction and storage temperature range	$T_J, T_{Stg}$		- 40 to 150	°C
Maximum thermal resistance, junction to case per junction	$R_{thJC}$	DC operation	0.065	K/W
Maximum thermal resistance, case to heatsink	$R_{thC-hs}$		0.02	
Mounting torque $\pm 10\%$	SMAP to heatsink	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound.	6 to 8	Nm
	busbar to SMAP		12 to 15	
Approximate weight			1500	g
Case style		See dimensions - link at the end of datasheet	SUPER MAGN-A-PAK	

$\Delta R_{thJC}$ CONDUCTION				
CONDUCTION ANGLE	SINUSOIDAL CONDUCTION	RECTANGULAR CONDUCTION	TEST CONDITIONS	UNITS
180°	0.009	0.006	$T_J = T_J$ maximum	K/W
120°	0.011	0.011		
90°	0.014	0.015		
60°	0.021	0.022		
30°	0.037	0.038		

**Note**

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

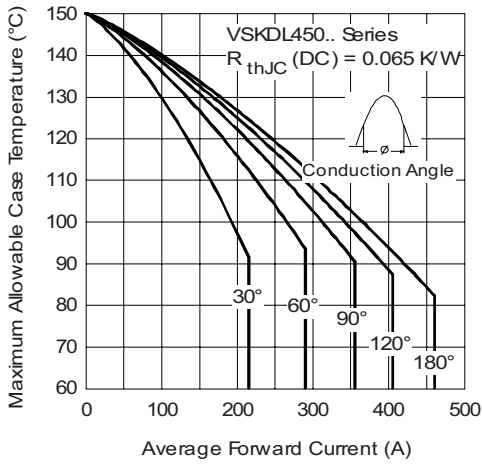


Fig. 1 - Current Ratings Characteristics

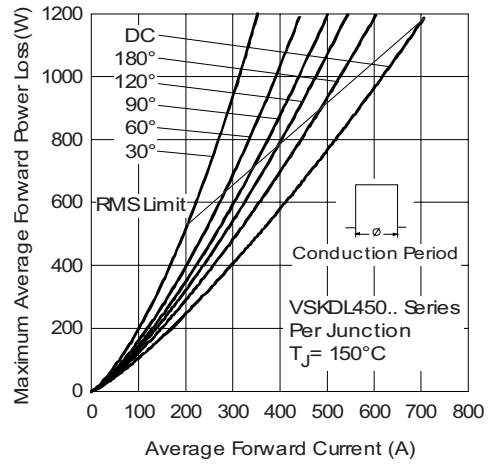


Fig. 4 - Forward Power Loss Characteristics

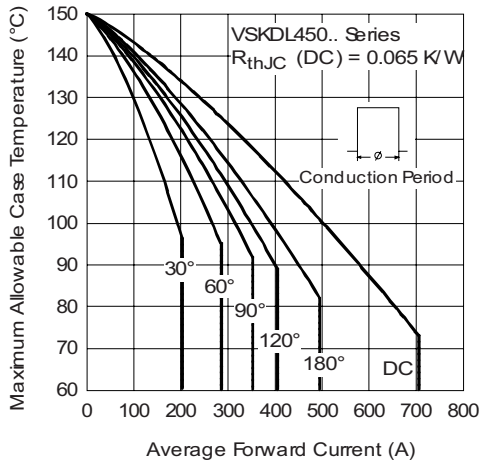


Fig. 2 - Current Ratings Characteristics

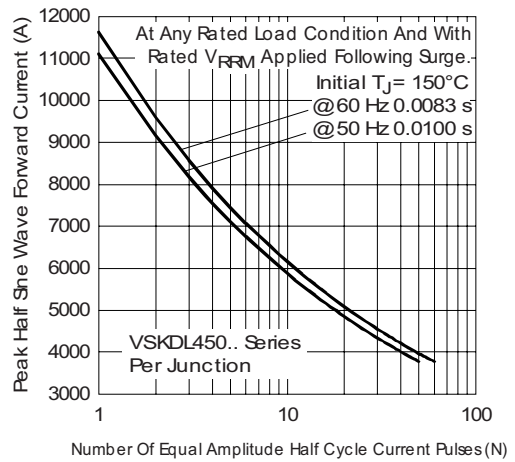


Fig. 5 - Maximum Non-Repetitive Surge Current

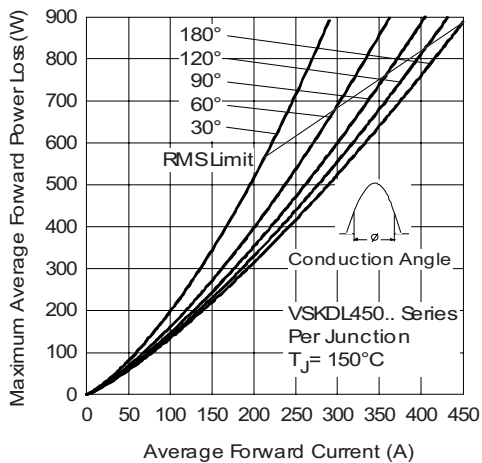


Fig. 3 - Forward Power Loss Characteristics

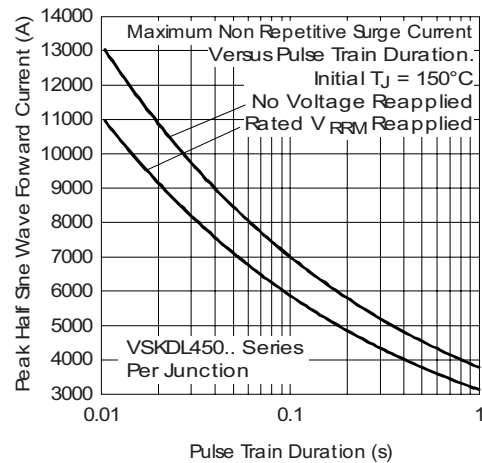


Fig. 6 - Maximum Non-Repetitive Surge Current



Fast Diodes, 460 A  
(SUPER MAGN-A-PAK™ Power Modules)

Vishay High Power Products

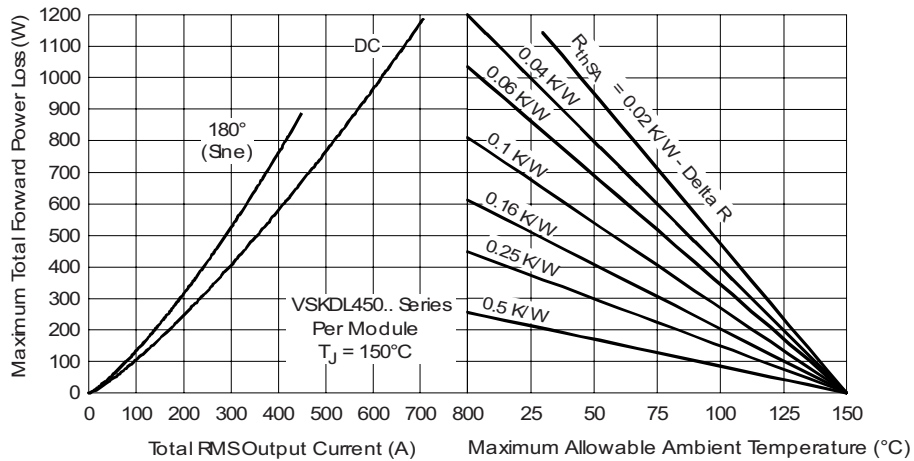


Fig. 7 - Forward Power Loss Characteristics

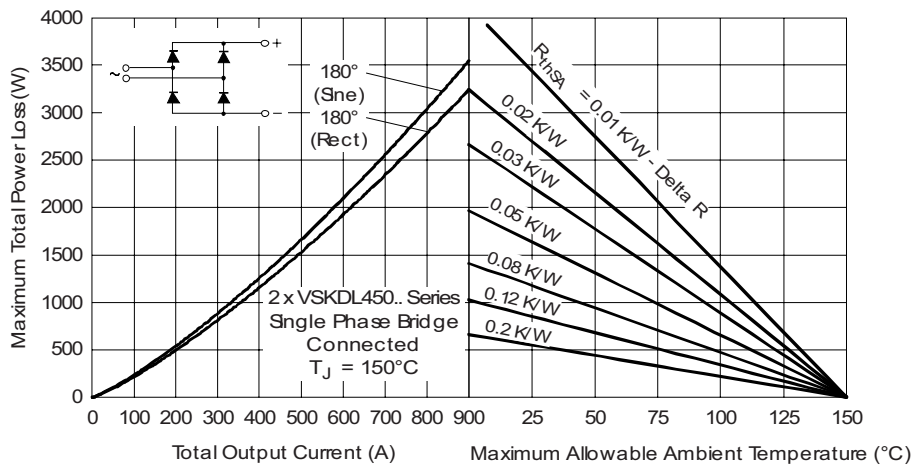


Fig. 8 - Forward Power Loss Characteristics

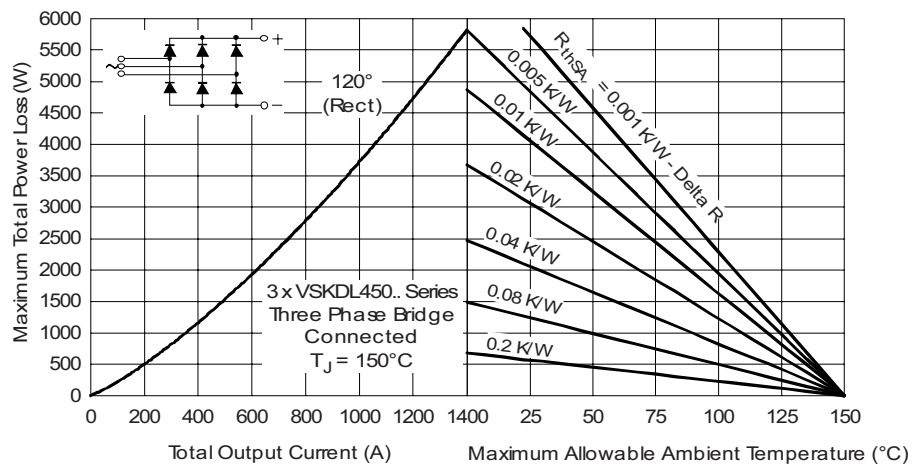
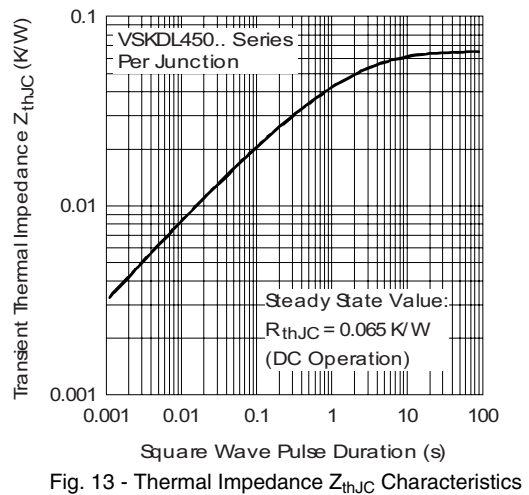
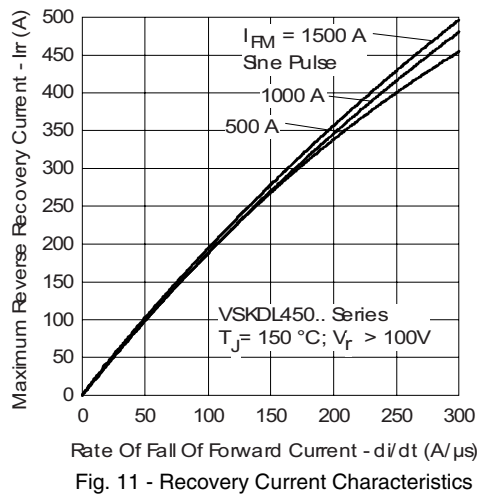
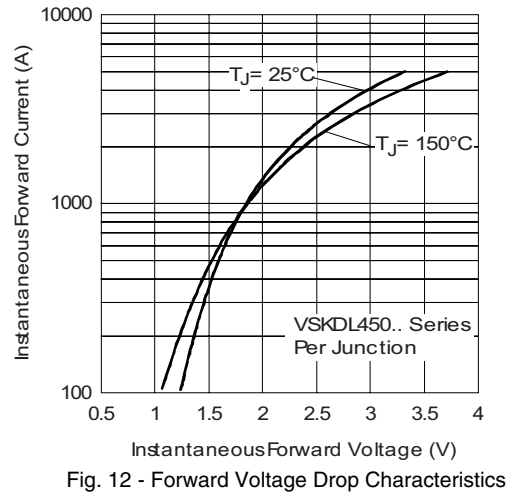
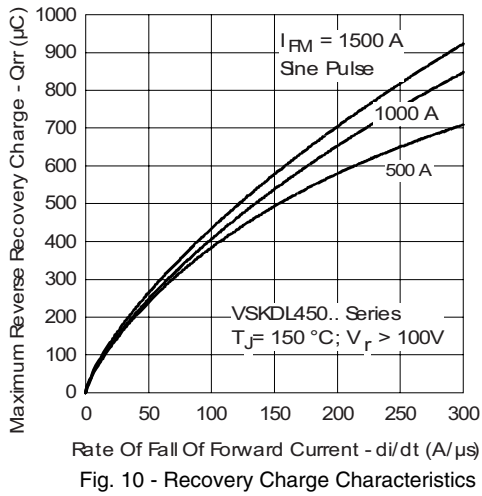


Fig. 9 - Forward Power Loss Characteristics



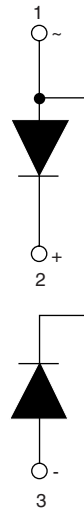


## ORDERING INFORMATION TABLE

Device code	<b>VSK</b>	<b>D</b>	<b>L</b>	<b>450</b>	<b>-</b>	<b>25</b>	<b>S20</b>
	①	②	③	④		⑤	⑥

- 1** - Module type
- 2** - Circuit configuration D = 2 diodes in series
- 3** - Fast recovery
- 4** - Current rating
- 5** - Voltage code x 100 =  $V_{RRM}$  (see Voltage Ratings table)
- 6** -  $t_{rr}$  code (see Recovery Characteristics table)

## CIRCUIT CONFIGURATION



### LINKS TO RELATED DOCUMENTS

Dimensions

<http://www.vishay.com/doc?95088>



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