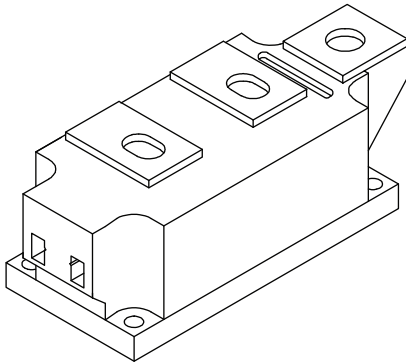


Fast Diodes, 460 A (SUPER MAGN-A-PAK Power Modules)



SUPER MAGN-A-PAK

FEATURES

- High power fast recovery diode series
- High current capability
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- High surge capability
- High voltage ratings up to 2500 V
- Industrial standard package
- UL approved file E78996
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level



RoHS
COMPLIANT

PRODUCT SUMMARY

I _{F(AV)}	460 A
Type	Modules - Diode, Fast

TYPICAL APPLICATIONS

- Snubber for large GTO
- Snubber for large IGBT

MAJOR RATINGS AND CHARACTERISTICS

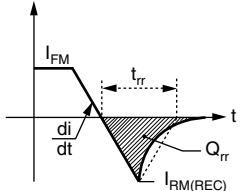
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I _{F(AV)}		460	A
	T _C	82	°C
I _{F(RMS)}		720	A
	T _C	82	°C
I _{FSM}	50 Hz	13 000	A
	60 Hz	13 800	
I ² t	50 Hz	845	kA ² s
	60 Hz	790	
I ² √t		8450	kA ² √s
V _{RRM}	Range	1600 to 2500	V
t _{rr}		4.0	μs
T _{Stg} , T _J	Range	- 40 to 150	°C

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 reappplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	kA
		t = 8.3 ms			
		t = 10 ms	100 % V_{RRM} reappplied		
		t = 8.3 ms			
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reappplied		kA ² s
		t = 8.3 ms			
		t = 10 ms	100 % V_{RRM} reappplied		
		t = 8.3 ms			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reappplied		8450	kA ² √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} (s)	I_{pk} SQUARE PULSE (A)	di/dt (A / s)	V_r (V)	t_{rr} AT 25 % I_{RRM} (s)	Q_{rr} (C)	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	

ΔR_{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

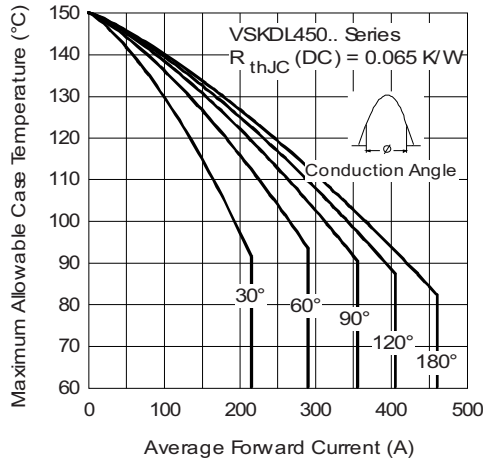


Fig. 1 - Current Ratings Characteristics

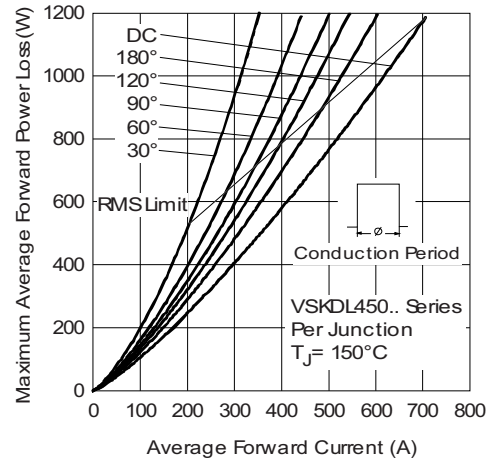


Fig. 4 - Forward Power Loss Characteristics

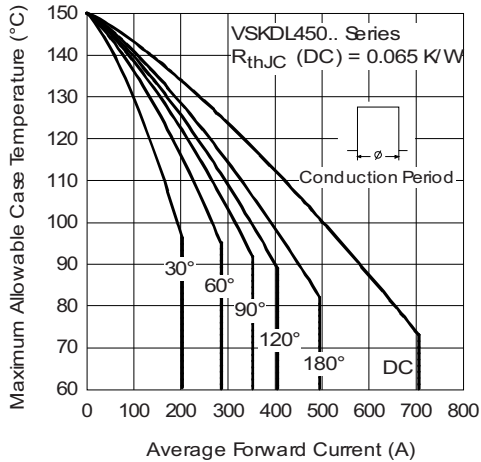


Fig. 2 - Current Ratings Characteristics

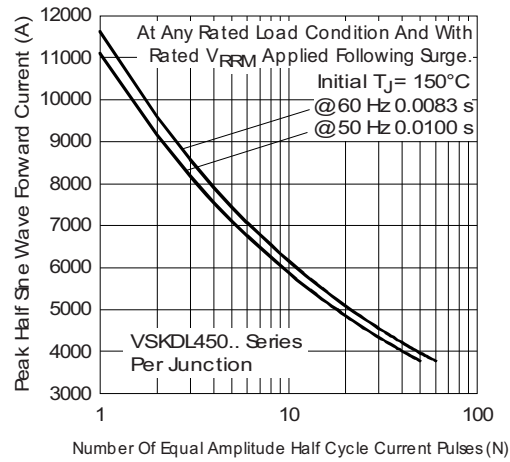


Fig. 5 - Maximum Non-Repetitive Surge Current

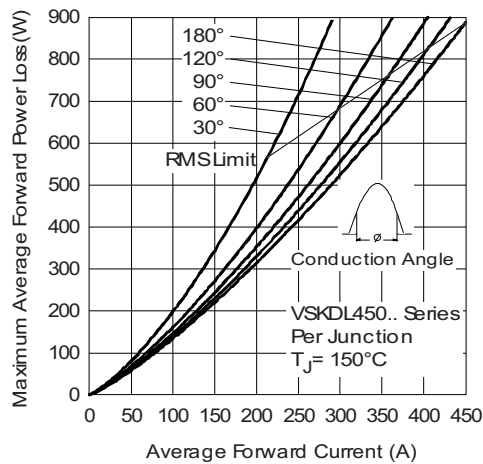


Fig. 3 - Forward Power Loss Characteristics

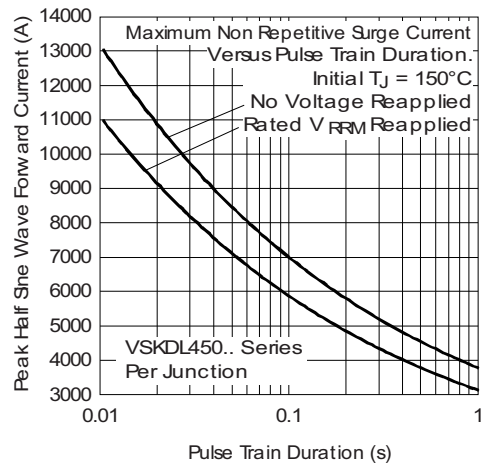


Fig. 6 - Maximum Non-Repetitive Surge Current



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Vishay Semiconductors

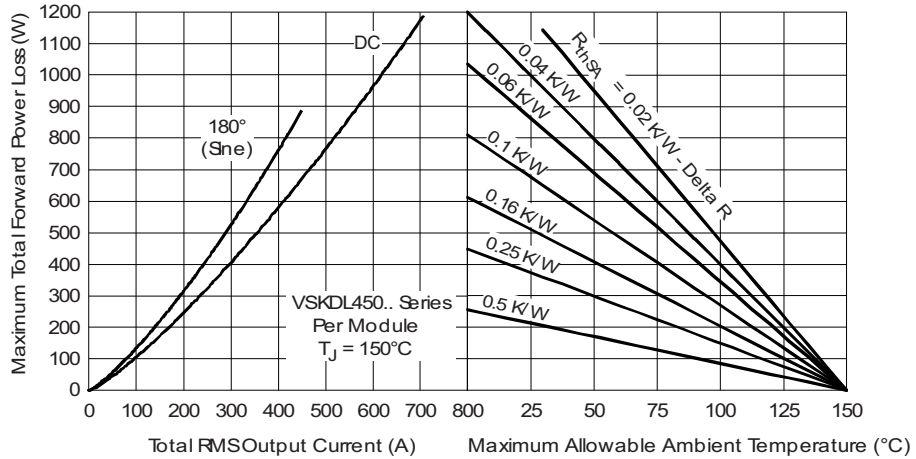


Fig. 7 - Forward Power Loss Characteristics

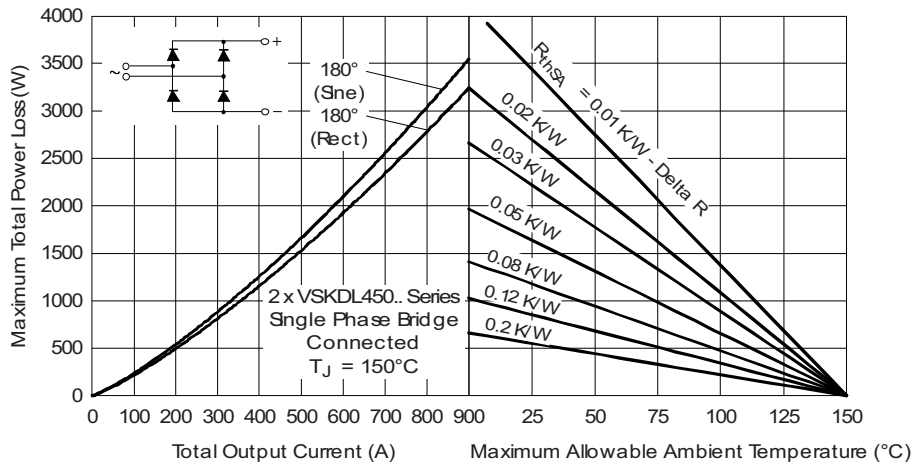


Fig. 8 - Forward Power Loss Characteristics

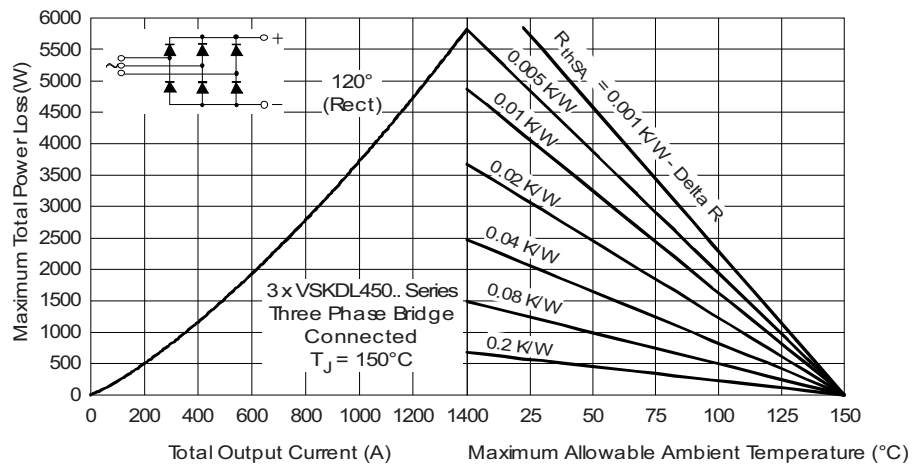


Fig. 9 - Forward Power Loss Characteristics

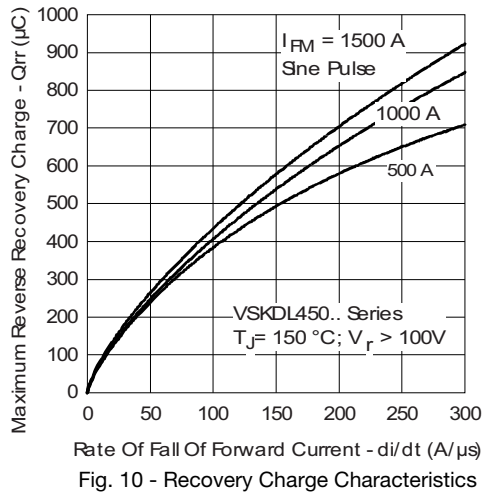


Fig. 10 - Recovery Charge Characteristics

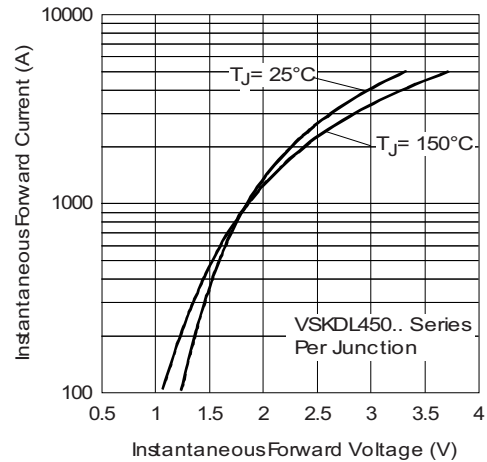


Fig. 12 - Forward Voltage Drop Characteristics

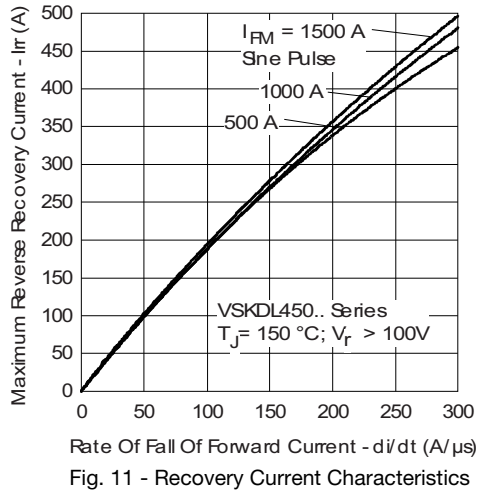


Fig. 11 - Recovery Current Characteristics

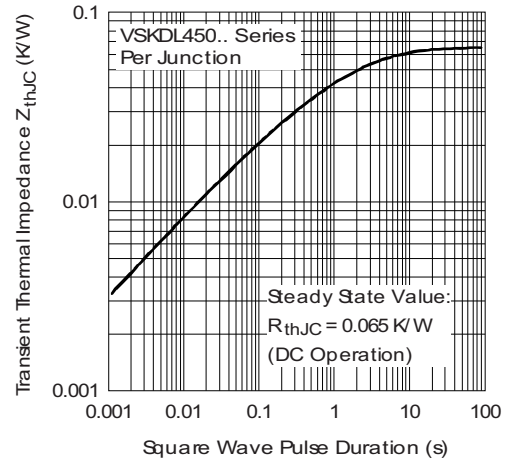


Fig. 13 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VSK	D	L	450	-	25	S20
	①	②	③	④		⑤	⑥

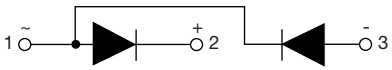
- 1** - Module type
- 2** - Circuit configuration:
D = 2 diodes in series (see Circuit Configuration table)
- 3** - Fast recovery
- 4** - Current rating
- 5** - Voltage code x 100 = V_{RRM} (see Voltage Ratings table)
- 6** - t_{rr} code (see Recovery Characteristics table)



VSKDL450 Series

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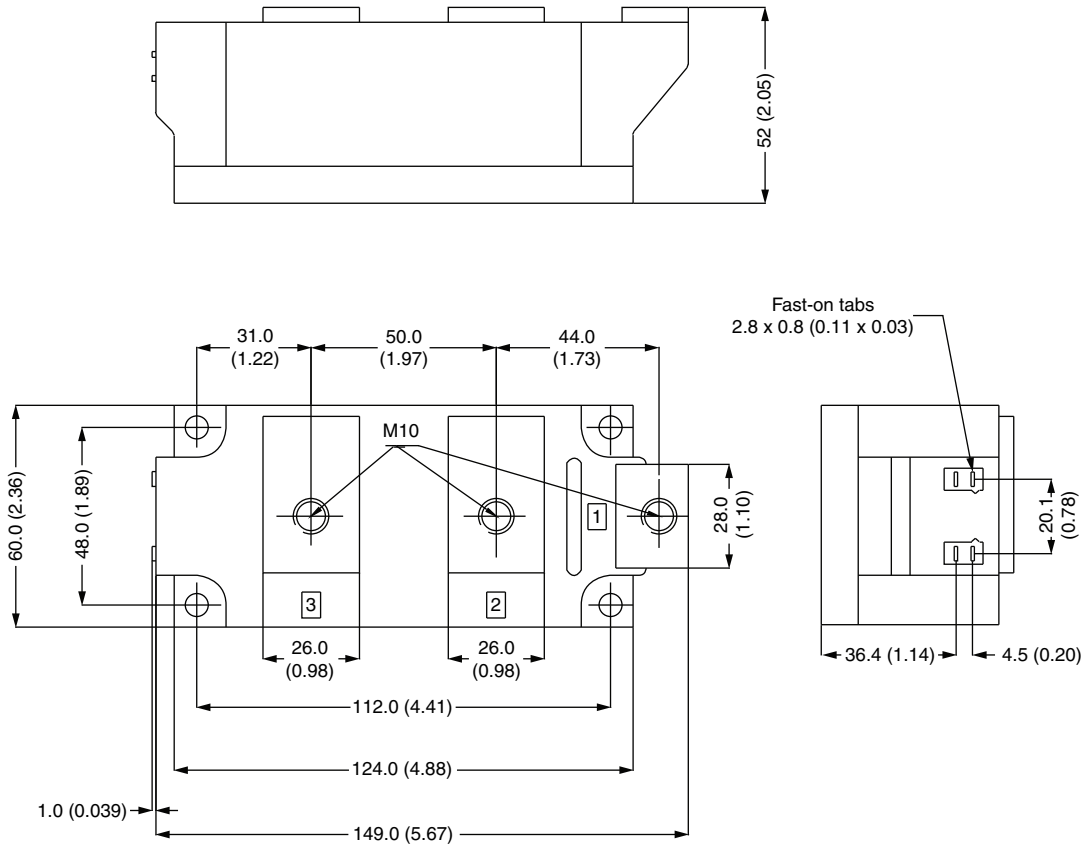
Vishay Semiconductors

CIRCUIT CONFIGURATION		
CIRCUIT	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	D	

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95088

Super MAGN-A-PAK Diode

DIMENSIONS in millimeters (inches)





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