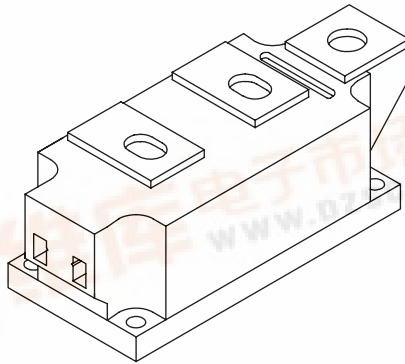




VSKDL450..S20 Series

Vishay High Power Products

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 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 ² s
	60 Hz	790	
$I^2\sqrt{t}$		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	



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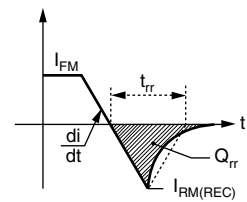
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FORWARD CONDUCTION							
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS	
Maximum average forward current at case temperature	I _{F(AV)}	180° conduction, half sine wave			460	A	
					82	°C	
Maximum RMS forward current	I _{F(RMS)}	180° conduction, half sine wave at T _C = 82 °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	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 ² t for fusing	I ² t	t = 10 ms	No voltage reappplied		845	kA ² s	
		t = 8.3 ms			790		
		t = 10 ms	100 % V _{RRM} reapplied		616		
		t = 8.3 ms			578		
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reappplied			8450	kA ² √s	
Low level value of threshold voltage	V _{F(TO)1}	(16.7 % × π × I _{F(AV)} < I < π × I _{F(AV)}), T _J = T _J maximum			1.16	V	
High level value of threshold voltage	V _{F(TO)2}	(I > π × I _{F(AV)}), T _J = T _J maximum			1.62		
Low level value of forward slope resistance	r _{f1}	(16.7 % × π × I _{F(AV)} < I < π × I _{F(AV)}), T _J = T _J maximum			0.68	mΩ	
High level value of forward slope resistance	r _{f2}	(I > π × I _{F(AV)}), T _J = T _J maximum			0.41		
Maximum forward voltage drop	V _{FM}	I _{pk} = 1800 A, T _J = 25 °C, t _p = 10 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}	$t = 1\text{ s}$	3000	V
Maximum peak reverse and off-state leakage current	I_{RRM}	$T_J = T_J$ maximum, rated V_{RRM} applied	50	mA



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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 busbar to SMAP		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
			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	$T_J = T_J \text{ maximum}$	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

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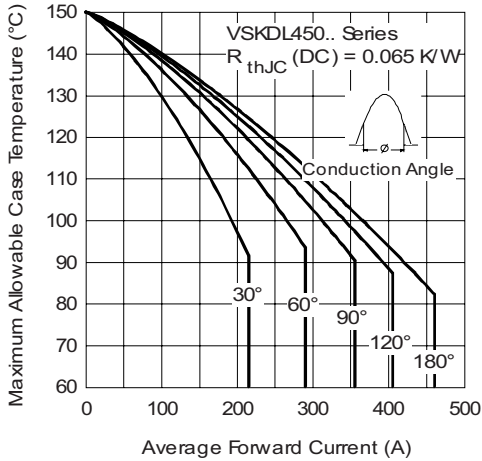


Fig. 1 - Current Ratings Characteristics

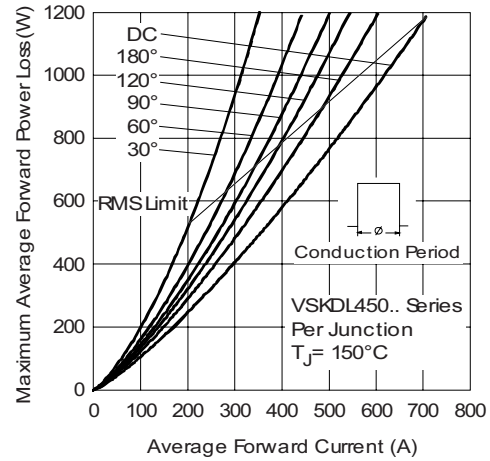


Fig. 4 - Forward Power Loss Characteristics

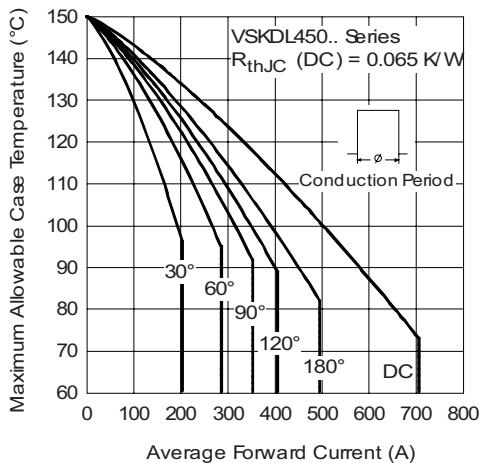


Fig. 2 - Current Ratings Characteristics

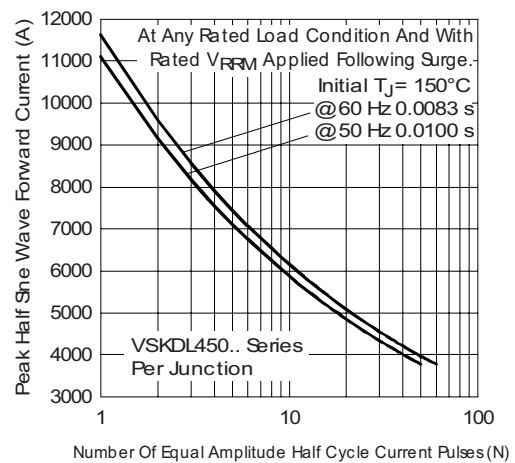


Fig. 5 - Maximum Non-Repetitive Surge Current

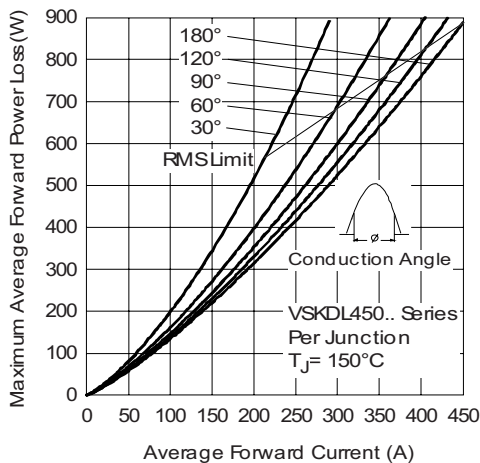


Fig. 3 - Forward Power Loss Characteristics

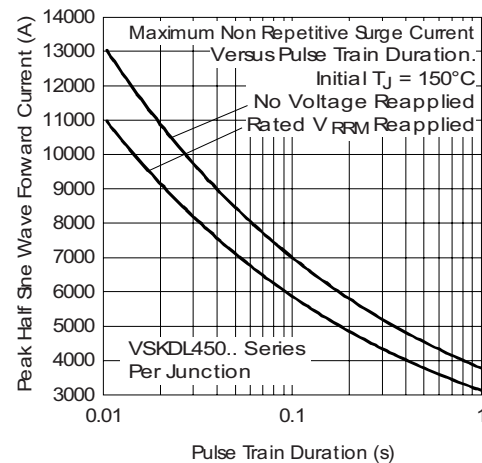
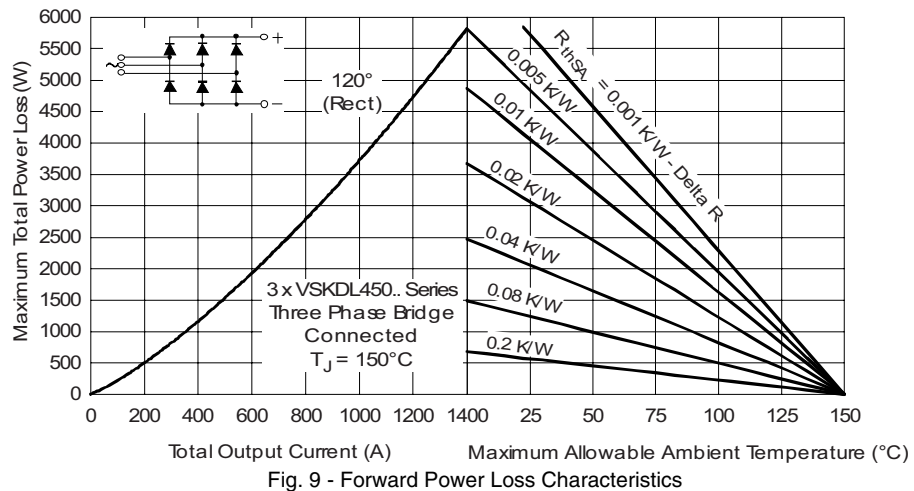
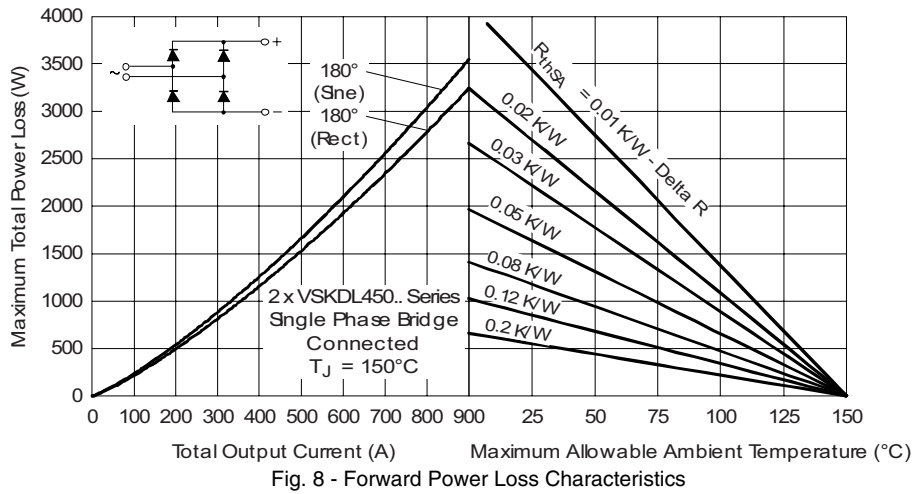
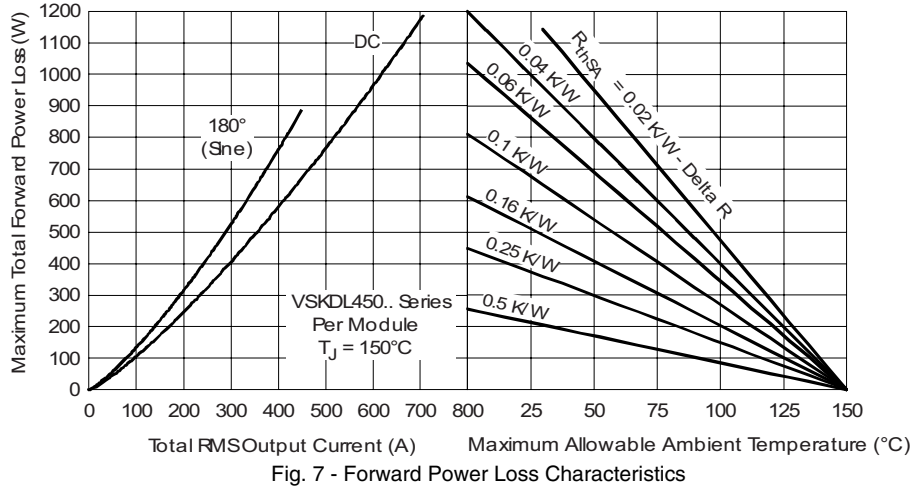


Fig. 6 - Maximum Non-Repetitive Surge Current



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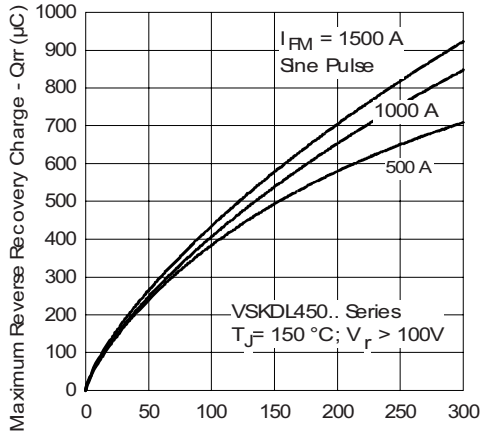


Fig. 10 - Recovery Charge Characteristics

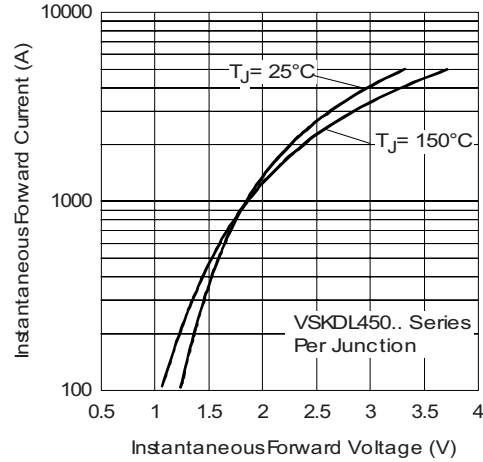


Fig. 12 - Forward Voltage Drop Characteristics

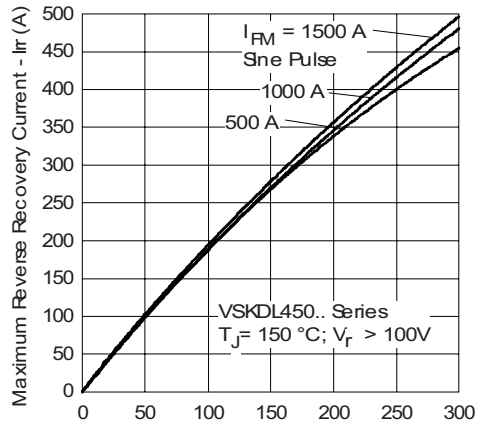


Fig. 11 - Recovery Current Characteristics

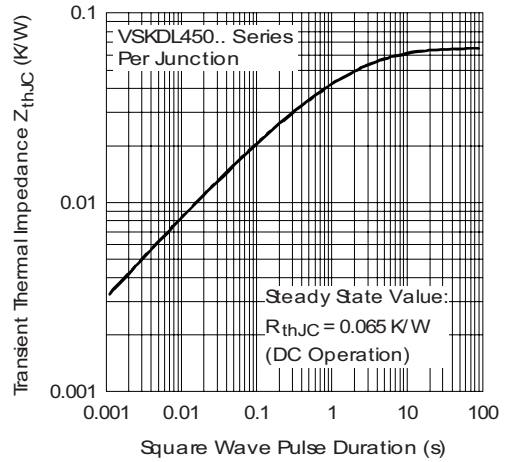


Fig. 13 - Thermal Impedance Z_{thJC} Characteristics



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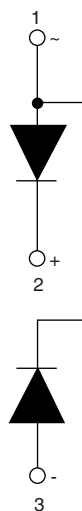
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ORDERING INFORMATION TABLE

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
- 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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