




Standard Recovery Diodes, 250 to 320 A (MAGN-A-PAK™ Power Modules)



MAGN-A-PAK™

FEATURES

- High voltage
- Electrically isolated base plate
- 3000 V_{RMS} isolating voltage
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL E78996 approved 
- Lead (Pb)-free
- Designed and qualified for industrial level



RoHS
COMPLIANT

PRODUCT SUMMARY

$I_{F(AV)}$	250 to 320 A
-------------	--------------

DESCRIPTION

This new VSK series of MAGN-A-PAKs™ uses high voltage power diodes in two basic configurations. The semiconductors are electrically isolated from the metal base, allowing common heatsinks and compact assemblies to be built. They can be interconnected to form single phase or three phase bridges and the single diode module can be used in conjunction with the thyristor modules as a freewheel diode. These modules are intended for general purpose applications such as battery chargers, welders and plating equipment and where high voltage and high current are required (motor drives, etc.).

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VSK.250..	VSK.270..	VSK.320..	UNITS
$I_{F(AV)}$		250	270	320	A
	T_C	100	100	100	°C
$I_{F(RMS)}$		393	424	502	A
I_{FSM}	50 Hz	7015	8920	10 110	
	60 Hz	7345	9430	10 580	
I^2t	50 Hz	246	398	511	kA ² s
	60 Hz	225	363	466	
$I^2\sqrt{t}$		2460	3980	5110	kA ² √s
V_{RRM}		400 to 3000			V
T_J		- 40 to 150			°C

VSK.250, VSK.270, VSK.320 Series



Vishay High Power Products Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

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 150 °C mA
VSK.250- VSK.270- VSK.320-	04	400	500	50
	08	800	900	
	12	1200	1300	
	16	1600	1700	
	20	2000	2100	
VSK.270-	30	3000	3100	

FORWARD CONDUCTION								
PARAMETER	SYMBOL	TEST CONDITIONS		VSK.250	VSK.270	VSK.320	UNITS	
Maximum average forward current at case temperature	I _{F(AV)}	180° conduction, half sine wave		250	270	320	A	
				100	100	100	°C	
Maximum RMS forward current	I _{F(RMS)}	As AC switch		393	424	502	A	
Maximum peak, one-cycle forward, non-repetitive surge current	I _{FSM}	t = 10 ms	No voltage reapplied	7015	8920	10 110		
		t = 8.3 ms	100 % V _{RRM} reapplied	7345	9340	10 580		
		t = 10 ms		Sinusoidal half wave, initial T _J = T _J maximum	5900	7500		8500
		t = 8.3 ms			6180	7850		8900
Maximum I ² t for fusing	I ² t	t = 10 ms	No voltage reapplied	246	398	511	kA ² s	
		t = 8.3 ms	100 % V _{RRM} reapplied	225	363	466		
		t = 10 ms		174	281	361		
		t = 8.3 ms		159	257	330		
Maximum I ² √t for fusing	I ² √t	t = 0.1 to 10 ms, no voltage reapplied		2460	3980	5110	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		0.79	0.74	0.69	V	
High level value of threshold voltage	V _{F(TO)2}	(I > π × I _{F(AV)}), T _J = T _J maximum		0.92	0.87	0.86		
Low level forward slope resistance	r _{f1}	(16.7 % × π × I _{F(AV)} < I < π × I _{F(AV)}), T _J = T _J maximum		0.63	0.94	0.59	mΩ	
High level forward slope resistance	r _{f2}	(I > π × I _{F(AV)}), T _J = T _J maximum		0.49	0.81	0.44		
Maximum forward voltage drop	V _{FM}	I _{FM} = π × I _{F(AV)} , T _J = T _J maximum, 180° conduction Average power = V _{F(TO)} × I _{F(AV)} + r _f × (I _{F(RMS)}) ²		1.29	1.48	1.28	V	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse leakage current	I _{RRM}	T _J = 150 °C		50	mA
RMS insulation voltage	V _{INS}	50 Hz, circuit to base, all terminals shorted, t = 1 s		3000	V



VSK.250, VSK.270, VSK.320 Series

Standard Recovery Diodes, 250 to 320 A Vishay High Power Products
(MAGN-A-PAK™ Power Modules)

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES			UNITS
			VSK.250	VSK.270	VSK.320	
Maximum junction operating and storage temperature range	T_J, T_{Stg}		- 40 to 150			°C
Maximum thermal resistance, junction to case per junction	R_{thJC}	DC operation	0.16	0.125		K/W
Maximum resistance, case to heatsink per module	R_{thCS}	Mounting surface flat, smooth and greased	0.035			
Mounting torque $\pm 10\%$ — MAP to heatsink busbar to MAP		A mounting compound is recommended and the torque should be rechecked after a period of about 3 hours to allow for the spread of the compound.	4 to 6			Nm
			8 to 10			
Approximate weight			800			g
			30			oz.

ΔR CONDUCTION PER JUNCTION											
DEVICE	SINUSOIDAL CONDUCTION AT T_J MAXIMUM					RECTANGULAR CONDUCTION AT T_J MAXIMUM					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
	VSK.250-	0.009	0.010	0.014	0.020	0.032	0.007	0.011	0.015	0.021	
VSK.270-	0.008	0.012	0.014	0.020	0.032	0.007	0.011	0.015	0.020	0.033	
VSK.320-	0.008	0.010	0.013	0.020	0.032	0.007	0.011	0.015	0.020	0.033	

Note

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

VSK.250, VSK.270, VSK.320 Series



Vishay High Power Products

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

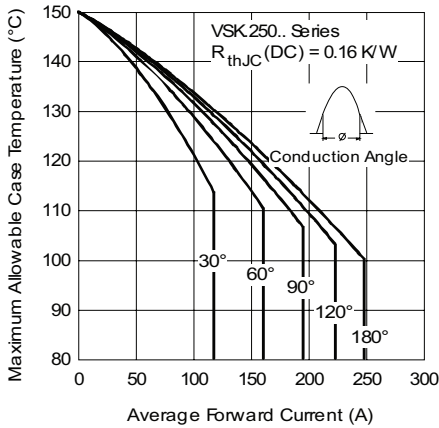


Fig. 1 - Current Ratings Characteristics

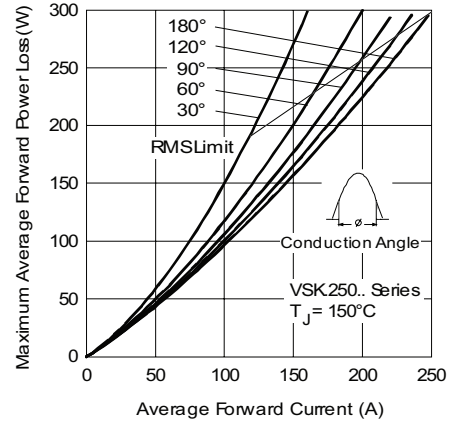


Fig. 3 - Forward Power Loss Characteristics

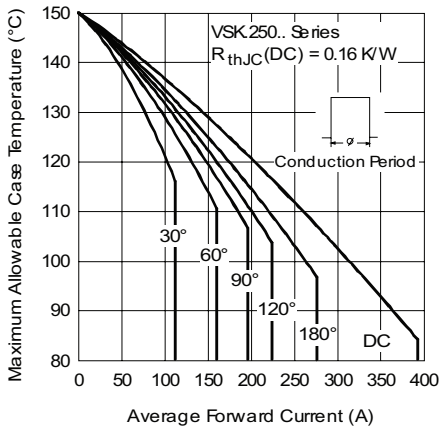


Fig. 2 - Current Ratings Characteristics

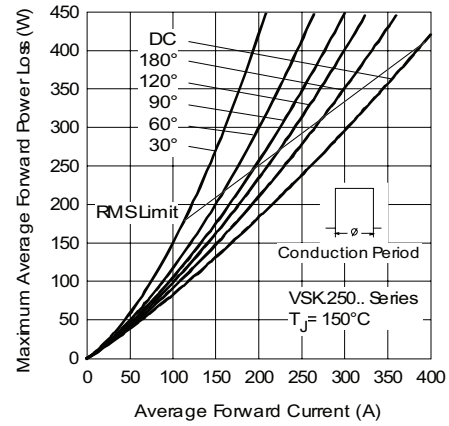


Fig. 4 - Forward Power Loss Characteristics

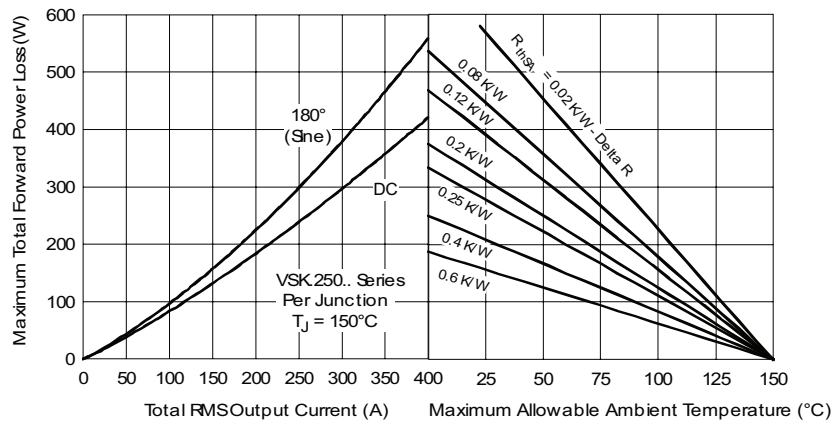


Fig. 5 - Forward Power Loss Characteristics



VSK.250, VSK.270, VSK.320 Series

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

Vishay High Power Products

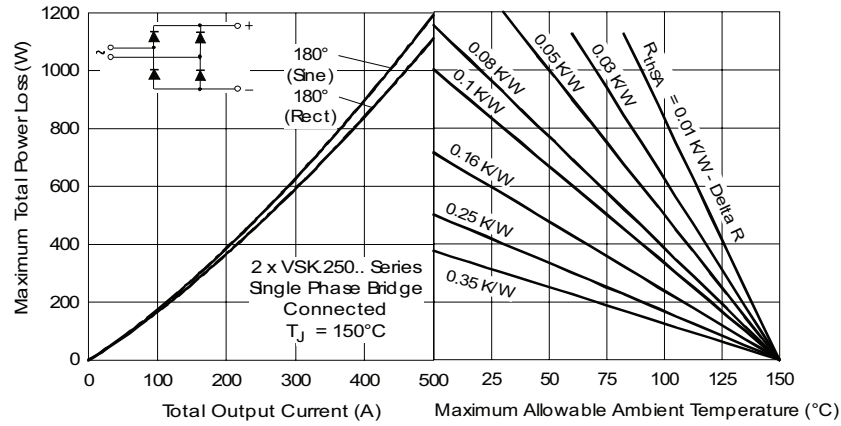


Fig. 6 - Forward Power Loss Characteristics

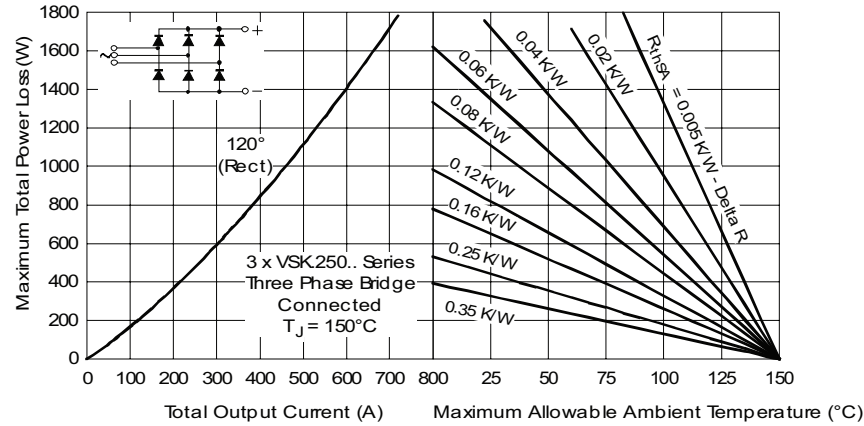


Fig. 7 - Forward Power Loss Characteristics

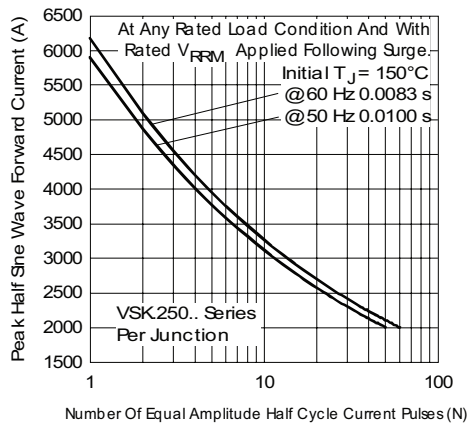


Fig. 8 - Maximum Non-Repetitive Surge Current

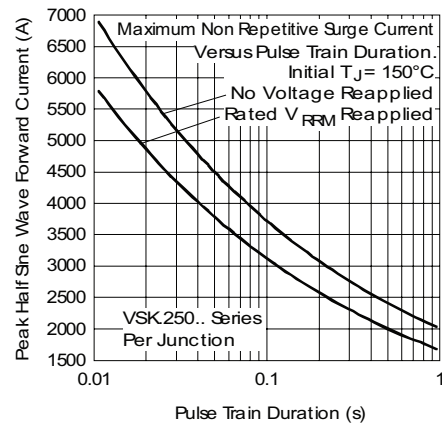


Fig. 9 - Maximum Non-Repetitive Surge Current

VSK.250, VSK.270, VSK.320 Series



Vishay High Power Products

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

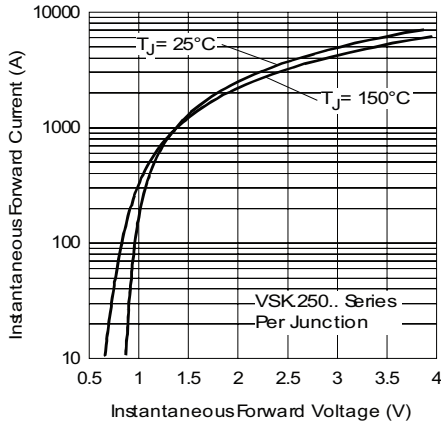


Fig. 10 - Forward Voltage Drop Characteristics

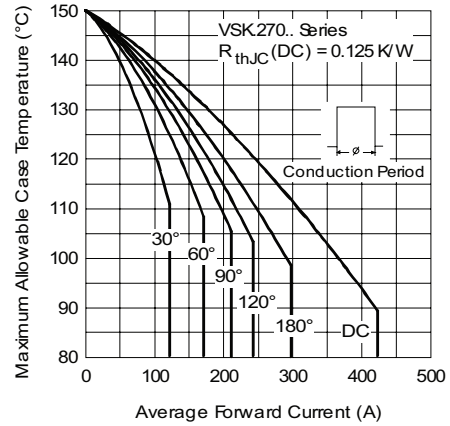


Fig. 13 - Current Ratings Characteristics

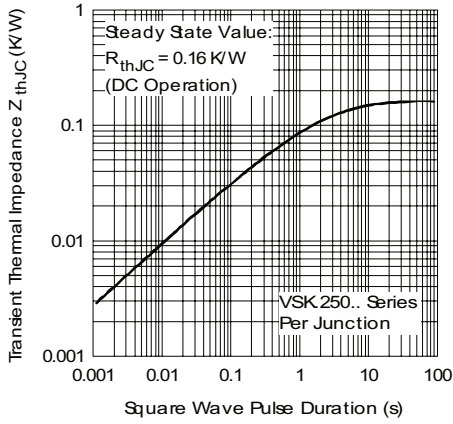


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

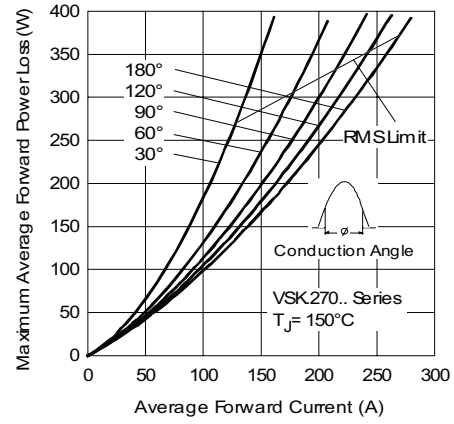


Fig. 14 - Forward Power Loss Characteristics

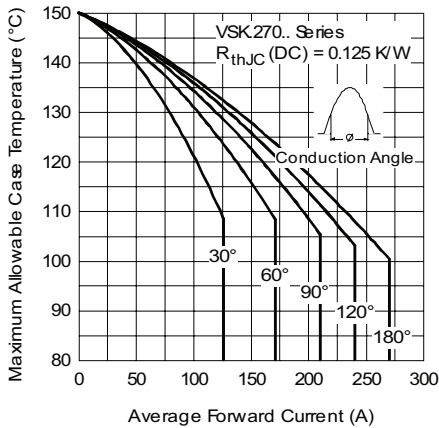


Fig. 12 - Current Ratings Characteristics

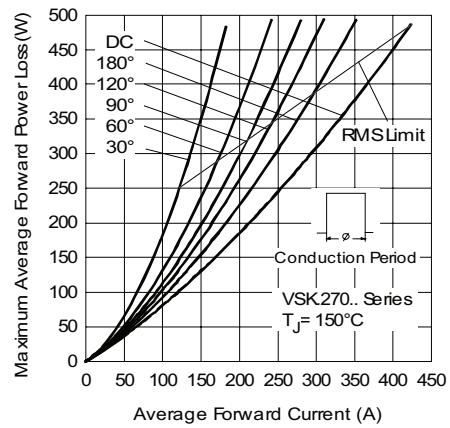


Fig. 15 - Forward Power Loss Characteristics



VSK.250, VSK.270, VSK.320 Series

Standard Recovery Diodes, 250 to 320 A Vishay High Power Products
(MAGN-A-PAK™ Power Modules)

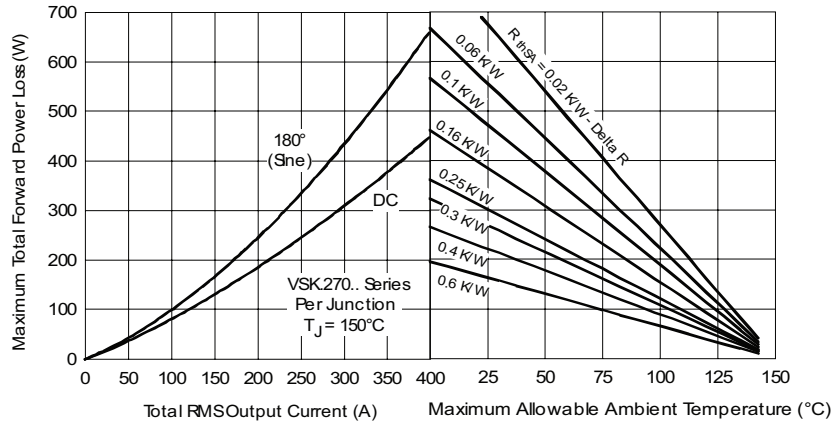


Fig. 16 - Forward Power Loss Characteristics

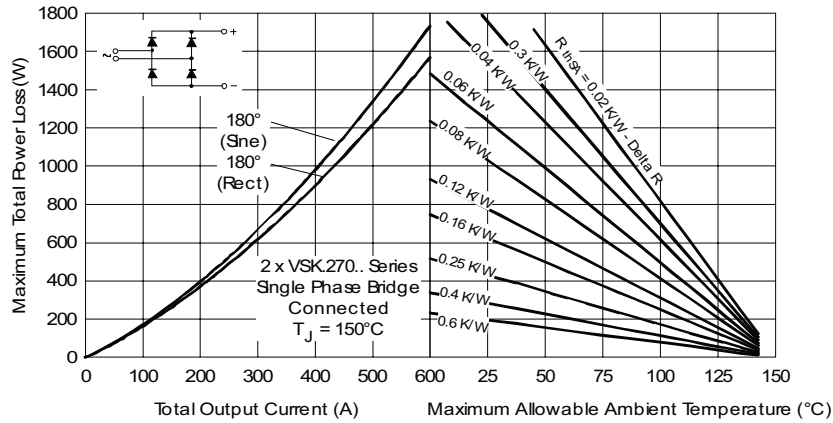


Fig. 17 - Forward Power Loss Characteristics

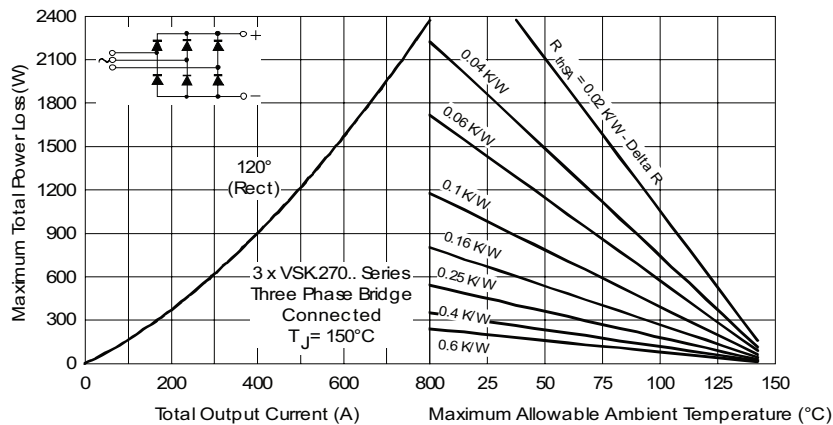


Fig. 18 - Forward Power Loss Characteristics

VSK.250, VSK.270, VSK.320 Series



Vishay High Power Products

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

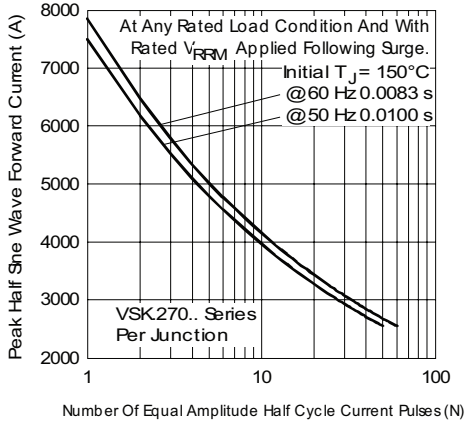


Fig. 19 - Maximum Non-Repetitive Surge Current

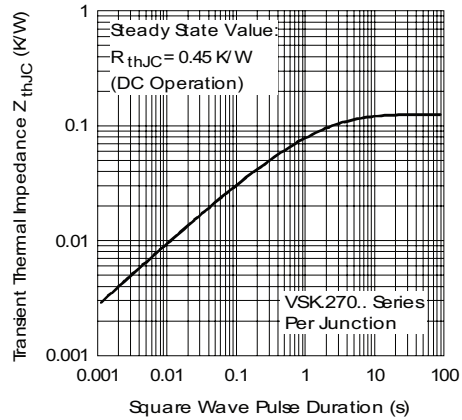


Fig. 22 - Thermal Impedance Z_{thJC} Characteristics

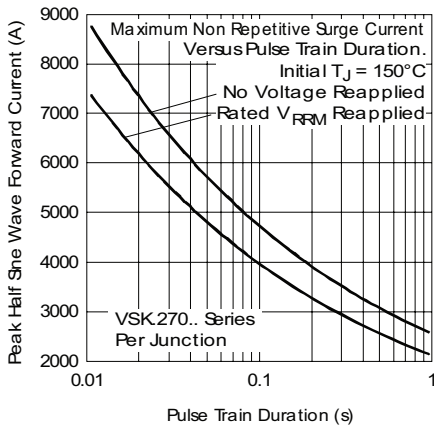


Fig. 20 - Maximum Non-Repetitive Surge Current

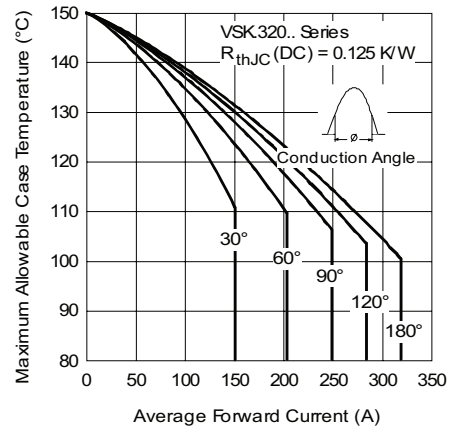


Fig. 23 - Current Ratings Characteristics

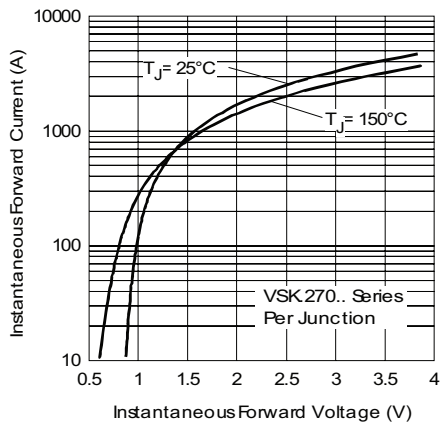


Fig. 21 - Forward Voltage Drop Characteristics

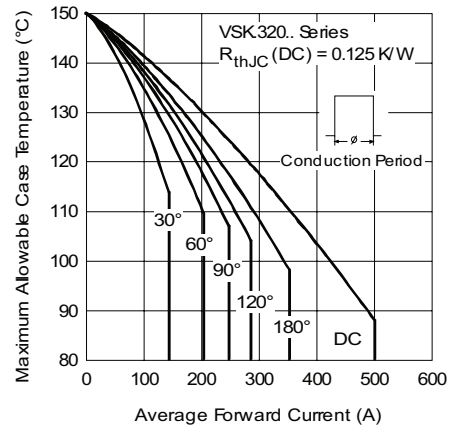


Fig. 24 - Current Ratings Characteristics



VSK.250, VSK.270, VSK.320 Series

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

Vishay High Power Products

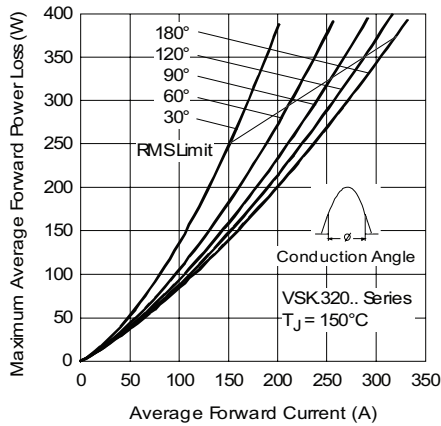


Fig. 25 - Forward Power Loss Characteristics

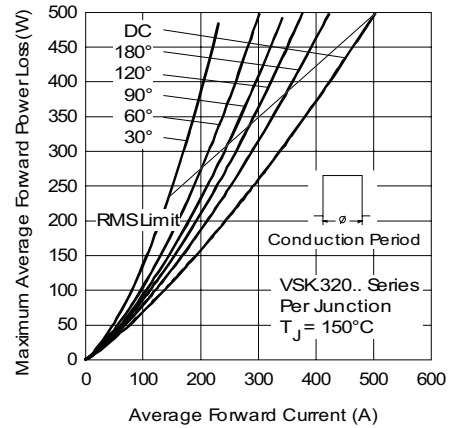


Fig. 26 - Forward Power Loss Characteristics

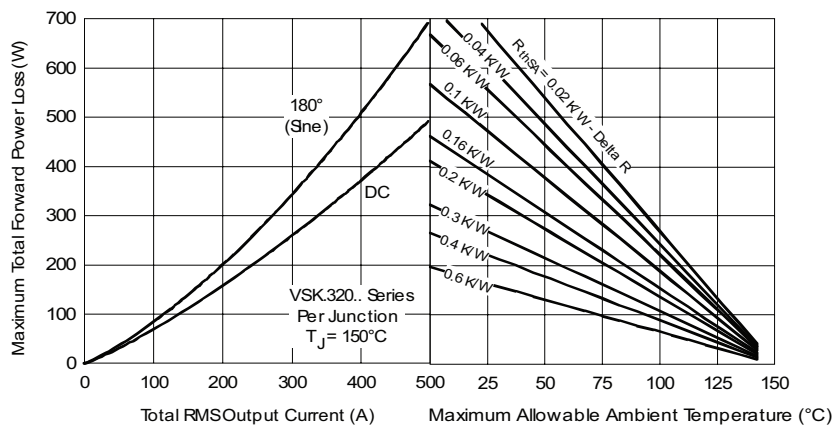


Fig. 27 - Forward Power Loss Characteristics

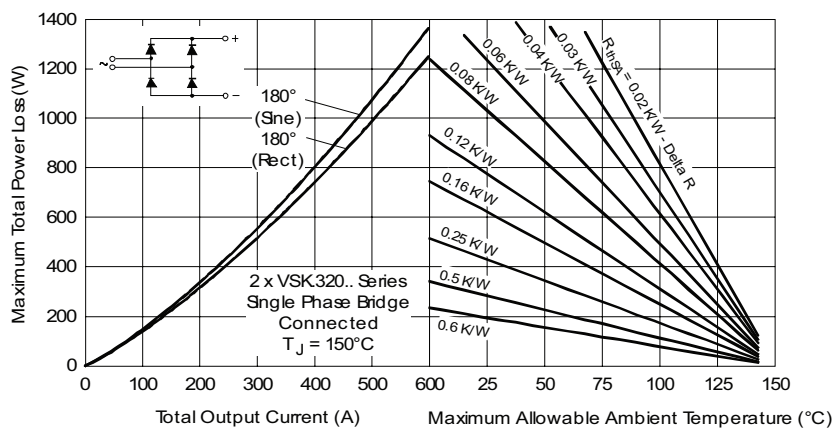


Fig. 28 - Forward Power Loss Characteristics

VSK.250, VSK.270, VSK.320 Series



Vishay High Power Products

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

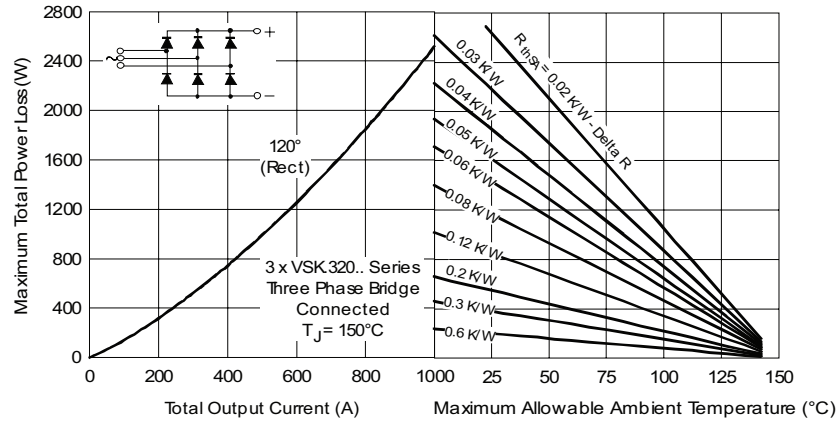


Fig. 29 - Forward Power Loss Characteristics

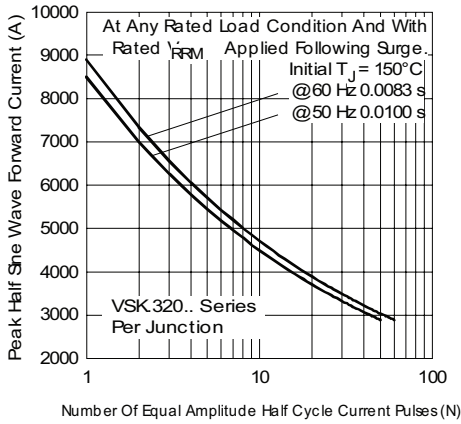


Fig. 30 - Maximum Non-Repetitive Surge Current

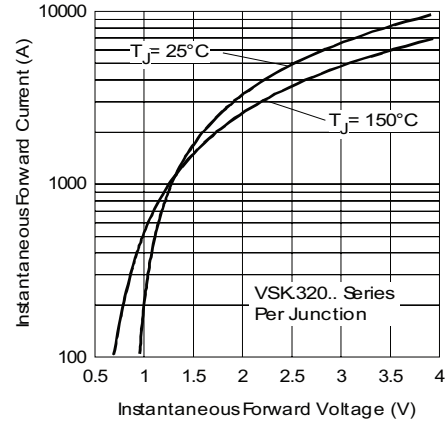


Fig. 32 - Forward Voltage Drop Characteristics

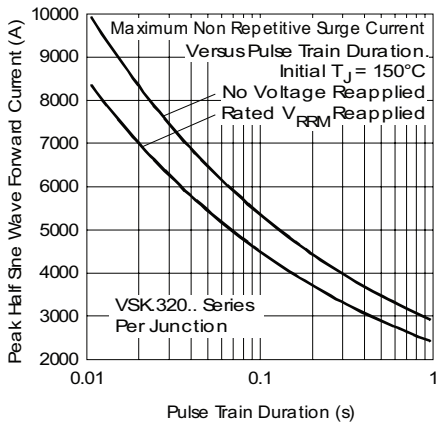


Fig. 31 - Maximum Non-Repetitive Surge Current

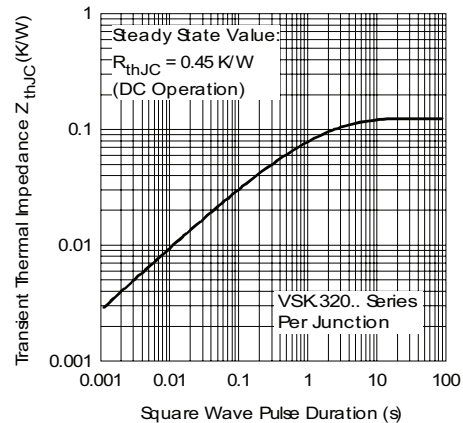


Fig. 33 - Thermal Impedance $Z_{\theta JC}$ Characteristics



VSK.250, VSK.270, VSK.320 Series

Standard Recovery Diodes, 250 to 320 A
(MAGN-A-PAK™ Power Modules)

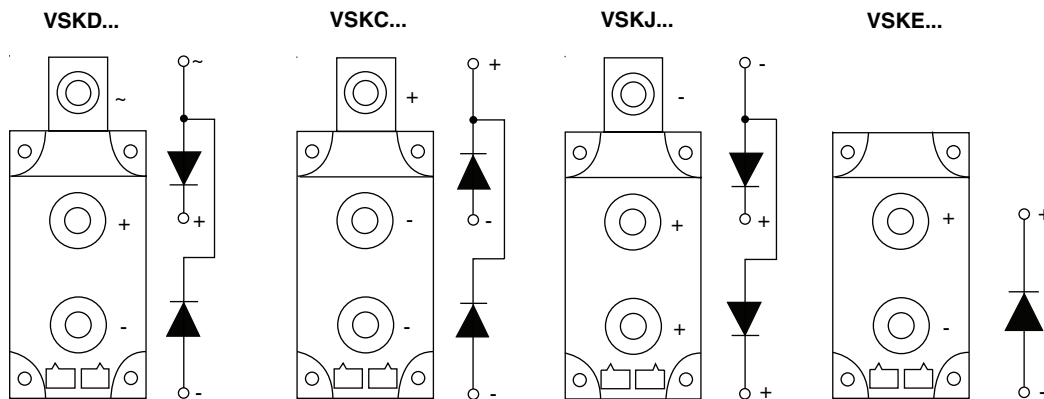
Vishay High Power Products

ORDERING INFORMATION TABLE

Device code	VSK	D	320	-	24
	①	②	③		④

- 1** - Module type
- 2** - Circuit configuration
- 3** - Current rating: $I_{F(AV)}$ rounded
- 4** - Voltage code $\times 100 = V_{RRM}$ (see Voltage Ratings table)

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

Dimensions

<http://www.vishay.com/doc?95086>



Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.