

## Standard Diodes, 60 A/80 A (ADD-A-PAK Generation 5 Power Modules)



ADD-A-PAK

PRODUCT SUMMARY	
$I_{F(AV)}$	60 A/80 A
Type	Modules - Diode, High Voltage


### MECHANICAL DESCRIPTION

The Generation 5 of ADD-A-PAK module combine the excellent thermal performance obtained by the usage of direct bonded copper substrate with superior mechanical ruggedness, thanks to the insertion of a solid copper baseplate at the bottom side of the device. The Cu baseplate allow an easier mounting on the majority of heatsink with increased tolerance of surface roughness and improve thermal spread.

The Generation 5 of AAP module is manufactured without hard mold, eliminating any possible direct stress on the leads.

The electrical terminals are secured against axial pull-out: they are fixed to the module housing via a click-stop feature already tested and proved as reliable on other Vishay HPP modules.

### FEATURES

- High voltage
- Industrial standard package
- Thick copper baseplate
- UL E78996 approved 
- 3500  $V_{RMS}$  isolating voltage
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for industrial level



RoHS  
COMPLIANT

### BENEFITS

- Up to 1600 V
- Full compatible TO-240AA
- High surge capability
- Easy mounting on heatsink
- $Al_2O_3$  DBC insulator
- Heatsink grounded

### ELECTRICAL DESCRIPTION

These modules are intended for general purpose high voltage applications such as high voltage regulated power supplies, lighting circuits, temperature and motor speed control circuits, UPS and battery charger.

MAJOR RATINGS AND CHARACTERISTICS				
SYMBOL	CHARACTERISTICS	VSK.56	VSK.71	UNITS
$I_{F(AV)}$	100 °C	60	80	A
$I_{F(RMS)}$		94	126	
$I_{FSM}$	50 Hz	1600	1790	
	60 Hz	1680	1870	
$I^2t$	50 Hz	12.89	15.90	kA <sup>2</sup> s
	60 Hz	11.76	14.53	
$I^2\sqrt{t}$		128.9	159	kA <sup>2</sup> √s
$V_{RRM}$	Range	400 to 1600		V
$T_J$		- 40 to 150		°C
$T_{Stg}$				

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## ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS				
TYPE NUMBER	VOLTAGE CODE	V <sub>RRM</sub> , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V <sub>RSM</sub> , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I <sub>RRM</sub> MAXIMUM AT 150 °C mA
VSK.56 VSK.71	04	400	500	10
	06	600	700	
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS		VSK.56	VSK.71	UNITS
Maximum average forward current at case temperature	I <sub>F(AV)</sub>	180° conduction, half sine wave		60	80	A
				100	100	°C
Maximum RMS forward current	I <sub>F(RMS)</sub>	DC at 92 °C case temperature		94	126	A
Maximum peak, one-cycle forward, non-repetitive surge current	I <sub>FSM</sub>	t = 10 ms	No voltage reappplied	1600	1790	
		t = 8.3 ms		1680	1870	
		t = 10 ms	100 % V <sub>RRM</sub> reappplied	1350	1500	
		t = 8.3 ms		1420	1570	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	t = 10 ms	No voltage reappplied	12.89	15.90	kA <sup>2</sup> s
		t = 8.3 ms		11.76	14.53	
		t = 10 ms	100 % V <sub>RRM</sub> reappplied	9.12	11.25	
		t = 8.3 ms		8.32	10.23	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 ms to 10 ms, no voltage reappplied		128.9	159.0	kA <sup>2</sup> √s
Low level value of threshold voltage	V <sub>F(TO)1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum		0.96	0.83	V
High level value of threshold voltage	V <sub>F(TO)2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum		1.03	0.92	
Low level value of forward slope resistance	r <sub>f1</sub>	(16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum		2.81	2.68	mΩ
High level value of forward slope resistance	r <sub>f2</sub>	(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum		2.48	2.40	
Maximum forward voltage drop	V <sub>FM</sub>	I <sub>FM</sub> = π × I <sub>F(AV)</sub> , T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs square wave		1.51	1.50	V

BLOCKING						
PARAMETER	SYMBOL	TEST CONDITIONS		VSK.56	VSK.71	UNITS
Maximum peak reverse leakage current	I <sub>RRM</sub>	T <sub>J</sub> = 150 °C		10		mA
RMS insulation voltage	V <sub>INS</sub>	50 Hz, circuit to base, all terminals shorted		3500 (1 s)		V



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THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS	VSK.56	VSK.71	UNITS
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	0.5	0.4	K/W
Typical thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface flat, smooth and greased	0.1		
Mounting torque $\pm 10\%$ to heatsink busbar		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.	5		Nm
			4		
Approximate weight			110		g
			4		oz.
Case style		JEDEC	ADD-A-PAK (TO-240AA)		

$\Delta R$ CONDUCTION PER JUNCTION											
DEVICES	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VSK.56	0.11	0.13	0.16	0.22	0.32	0.09	0.14	0.17	0.23	0.32	°C/W
VSK.71	0.06	0.08	0.11	0.14	0.21	0.06	0.09	0.11	0.15	0.21	

**Note**

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

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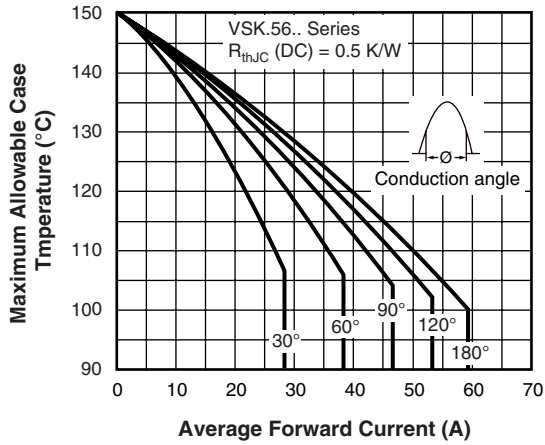


Fig. 1 - Current Ratings Characteristics

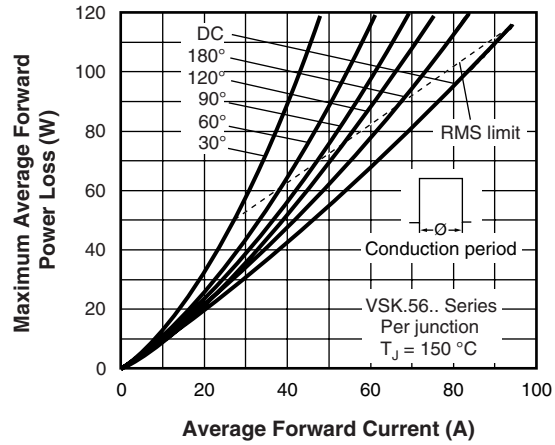


Fig. 4 - Forward Power Loss Characteristics

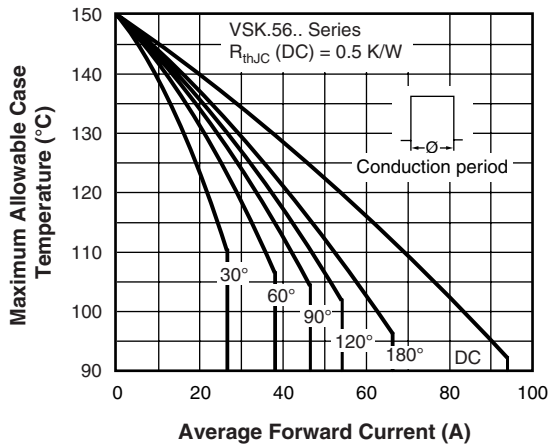


Fig. 2 - Current Ratings Characteristics

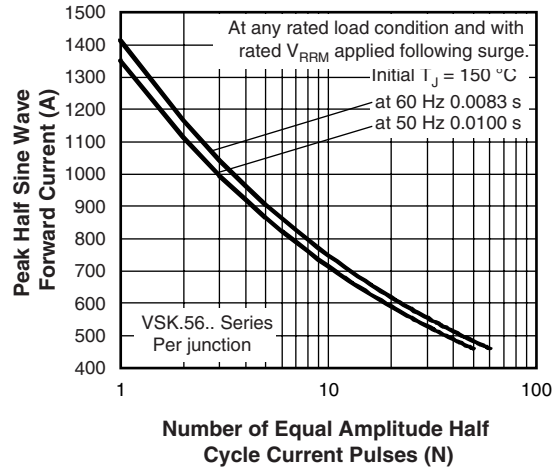


Fig. 5 - Maximum Non-Repetitive Surge Current

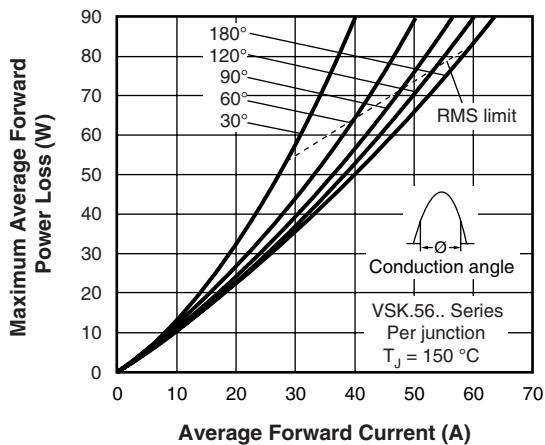


Fig. 3 - Forward Power Loss Characteristics

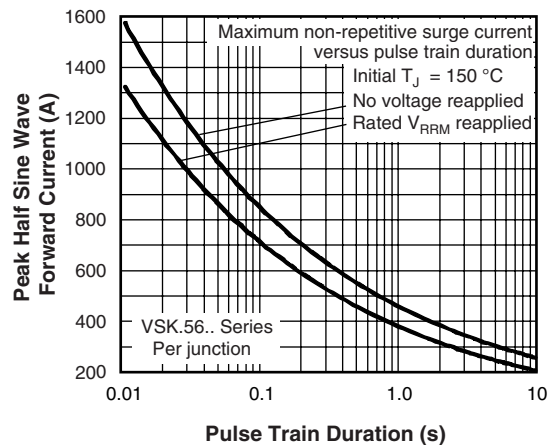


Fig. 6 - Maximum Non-Repetitive Surge Current



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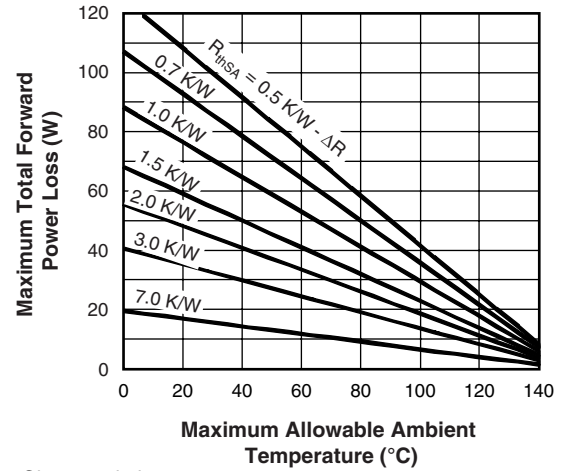
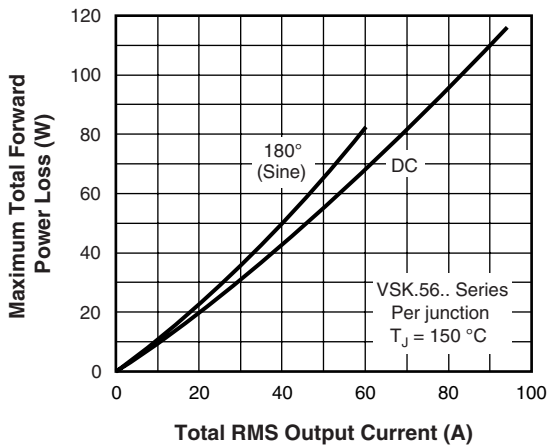


Fig. 7 - Forward Power Loss Characteristics

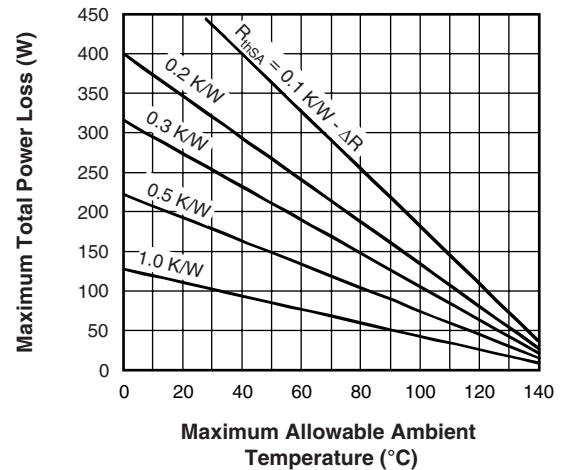
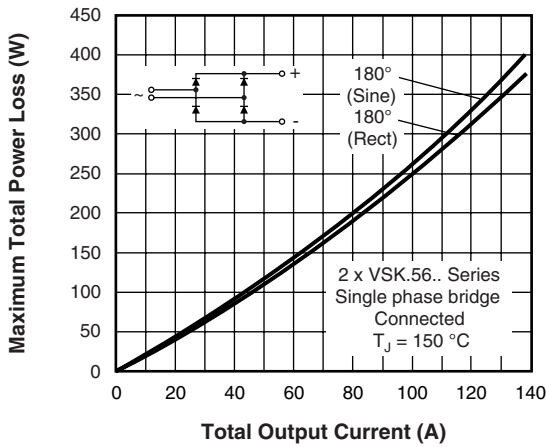


Fig. 8 - Forward Power Loss Characteristics

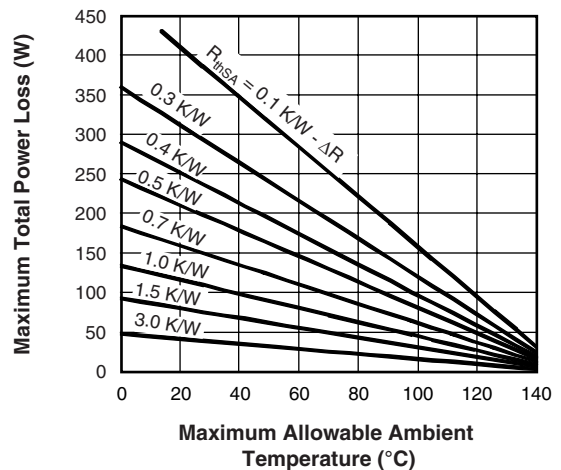
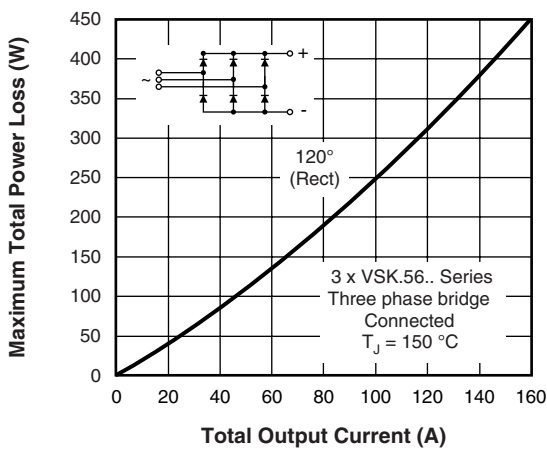


Fig. 9 - Forward Power Loss Characteristics

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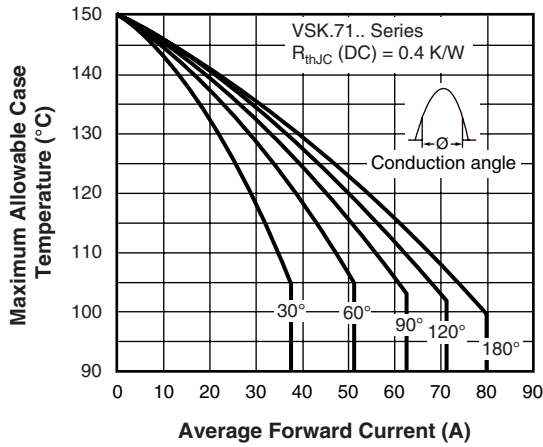


Fig. 10 - Current Ratings Characteristics

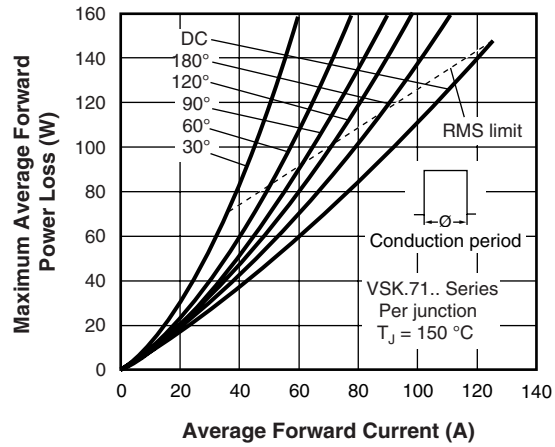


Fig. 13 - Forward Power Loss Characteristics

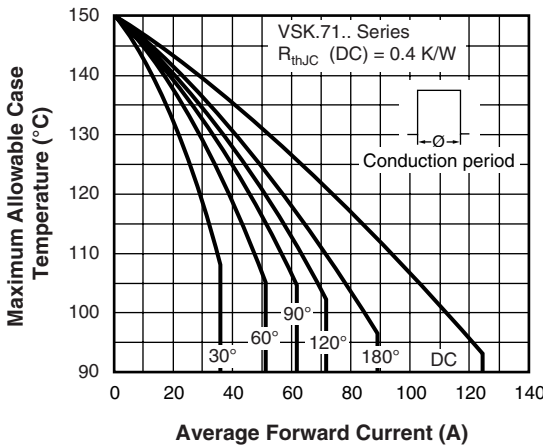


Fig. 11 - Current Ratings Characteristics

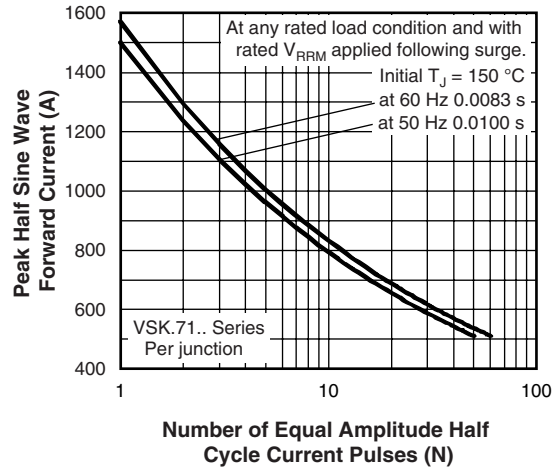


Fig. 14 - Maximum Non-Repetitive Surge Current

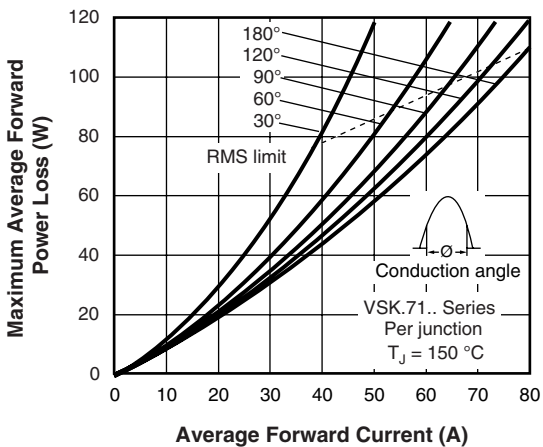


Fig. 12 - Forward Power Loss Characteristics

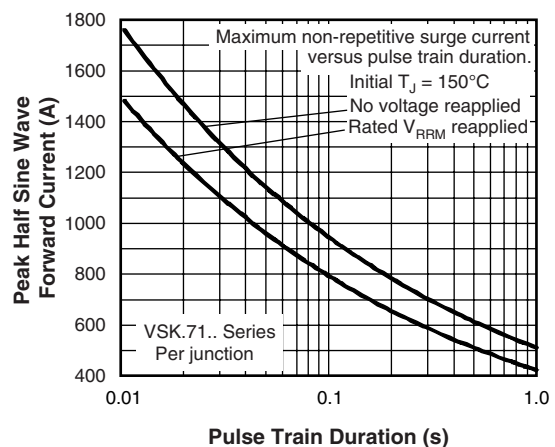


Fig. 15 - Maximum Non-Repetitive Surge Current



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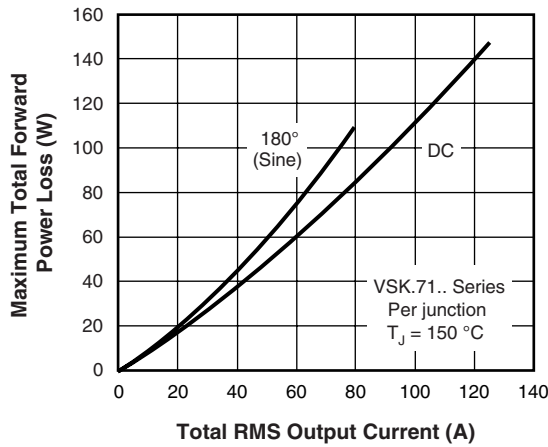


Fig. 16 - Forward Power Loss Characteristics

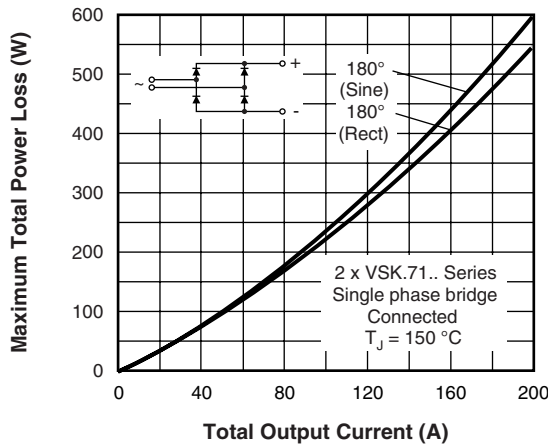
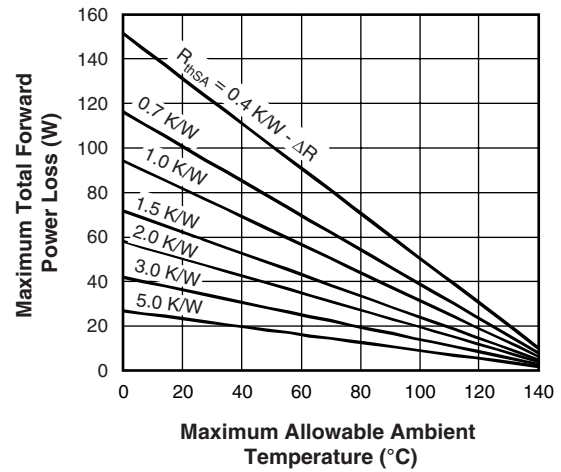


Fig. 17 - Forward Power Loss Characteristics

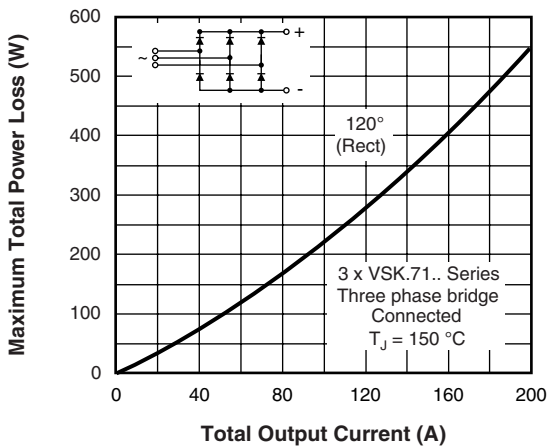
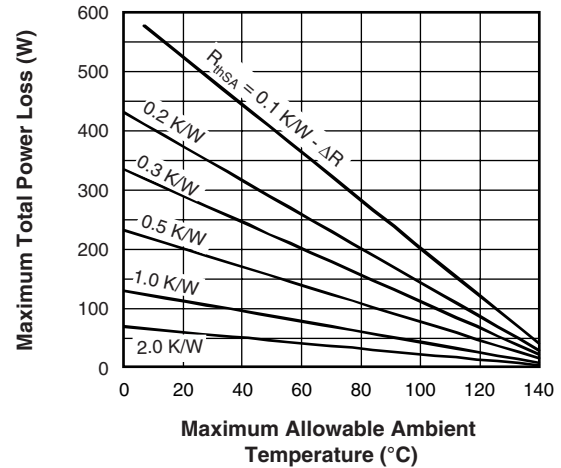
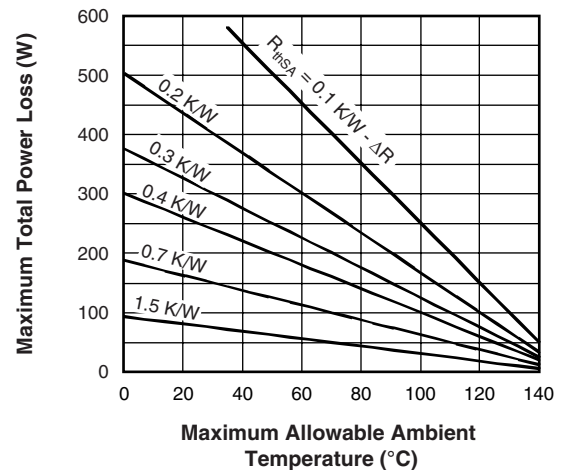


Fig. 18 - Forward Power Loss Characteristics



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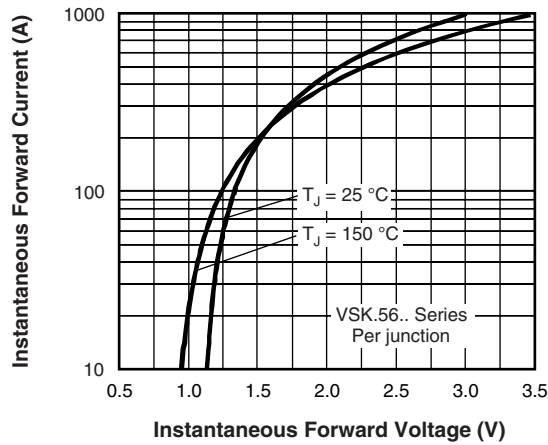


Fig. 19 - Forward Voltage Drop Characteristics

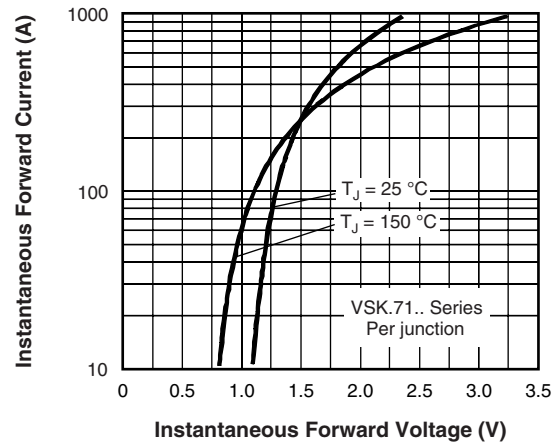


Fig. 20 - Forward Voltage Drop Characteristics

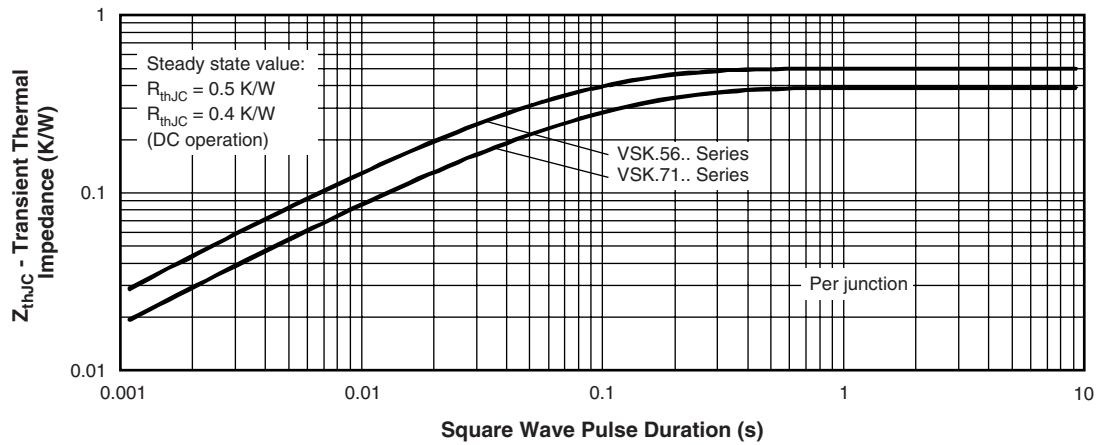


Fig. 21 - Thermal Impedance  $Z_{thJC}$  Characteristics

## ORDERING INFORMATION TABLE

Device code	<b>VSK</b>	<b>D</b>	<b>71</b>	<b>/</b>	<b>16</b>	<b>P</b>
	①	②	③		④	⑤

- 1** - Module type
- 2** - Circuit configuration (see Circuit Configuration table)
- 3** - Current code
- 4** - Voltage code (see Voltage Ratings table)
- 5** - P = Lead (Pb)-free

### Note

- To order the optional hardware go to [www.vishay.com/doc?95172](http://www.vishay.com/doc?95172)





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CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two diodes doubler circuit	D	<p><b>VSKD...</b></p>
Two diodes common cathodes	C	<p><b>VSKC...</b></p>
Two diodes common anodes	J	<p><b>VSKJ...</b></p>
Single diode	E	<p><b>VSKE...</b></p>

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95015">www.vishay.com/doc?95015</a>



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