Standard Recovery Diodes, 165 A to 230 A (INT-A-PAK Power Modules)

INT-A-PAK

FEATURES

RoHS
COMPLIANT

- High voltage
- Electrically isolated by DBC ceramic (Al_2O_3)
- 3500 V_{RMS} isolating voltage
- Industrial standard package
- High surge capability
- Glass passivated chips
- Modules uses high voltage power diodes in four basic configurations
- Simple mounting
- UL approved file E78996
- Designed and qualified for multiple level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- DC motor control and drives
- Battery chargers
- Welders
- Power converters

PRODUCT SUMMARY

$I_{F(AV)}$	165 A to 230 A
Type	Modules - Diode, High Voltage
Package	INT-A-PAK
Circuit	Single diode, Two diodes common cathode, Two diodes common cathode, Two diodes doubler circuit

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VSK.166..	VSK.196..	VSK.236..	UNITS
$I_{F(AV)}$		165	195	230	A
	T_C	100	100	100	°C
$I_{F(RMS)}$		260	305	360	A
I_{FSM}	50 Hz	4000	4750	5500	
	60 Hz	4200	4980	5765	
I^2t	50 Hz	80	113	151	kA^2s
	60 Hz	73	103	138	
$I^2\sqrt{t}$		798	1130	1516	$kA^2\sqrt{s}$
V_{RRM}		400 to 1600			V
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} AT 150 °C mA
VS-VSK.166 VS-VSK.196 VS-VSK.236	04	400	500	20
	08	800	900	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

FORWARD CONDUCTION

PARAMETER	SYMBOL	TEST CONDITIONS			VSK.166	VSK.196	VSK.236	UNITS
Maximum average on-state current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			165	195	230	A
					100	100	100	°C
Maximum RMS on-state current	$I_{F(RMS)}$				260	305	360	A
Maximum peak, one-cycle on-state, non-repetitive surge current	I_{FSM}	t = 10 ms	No voltage reapplied	Sine half wave, initial T_J = T_J maximum	4000	4750	5500	
		t = 8.3 ms			4200	4980	5765	
		t = 10 ms	100 % V_{RRM} reapplied		3350	4000	4630	
		t = 8.3 ms			3500	4200	4850	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		80	113	151	kA^2s
		t = 8.3 ms			73	103	138	
		t = 10 ms	100 % V_{RRM} reapplied		56	80	107	
		t = 8.3 ms			52	73	98	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			798	1130	1516	$kA^2\sqrt{s}$
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 maximum			0.73	0.69	0.7	V
High level value of threshold voltage	$V_{F(TO)2}$	$(I > \pi \times I_{F(AV)})$, T_J maximum			0.88	0.78	0.83	
Low level value on-state slope resistance	r_{t1}	$(16.7\ \% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, T_J maximum			1.5	1.3	1.2	mΩ
High level value on-state	r_{t2}	$(I > \pi \times I_{F(AV)})$, T_J maximum			1.26	1.2	1.07	
Maximum forward voltage drop	V_{FM}	$I_{FM} = \pi \times I_{F(AV)}$, T_J = 25 °C, 180° conduction Average power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$			1.43	1.38	1.46	V

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VSK.166	VSK.196	VSK.236	UNITS
Maximum peak reverse and off-state leakage current	I_{RRM}	T_J = 150 °C	20			mA
RMS insulation voltage	V_{INS}	50 Hz, circuit to base, all terminals shorted, t = 1 s	3500			V

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES			UNITS
				VSK.166	VSK.196	VSK.236	
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	0.2	0.16	0.14	K/W
Maximum thermal resistance, case to heatsink per module		R_{thCS}	Mounting surface smooth, flat and greased	0.05			
Mounting torque ± 10 %	IAP 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. Lubricated threads.	4 to 6			Nm
	busbar to IAP						
Approximate weight				200			g
				7.1			oz.
Case style				INT-A-PAK			

ΔR CONDUCTION PER JUNCTION

DEVICES	SINUSOIDAL CONDUCTION AT T_J MAXIMUM					RECTANGULAR CONDUCTION AT T_J MAXIMUM					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VSK.166	0.025	0.03	0.038	0.055	0.089	0.018	0.031	0.041	0.057	0.089	K/W
VSK.196	0.016	0.019	0.024	0.034	0.053	0.012	0.02	0.026	0.035	0.054	
VSK.236	0.009	0.010	0.014	0.018	0.025	0.008	0.012	0.015	0.019	0.025	

Note

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

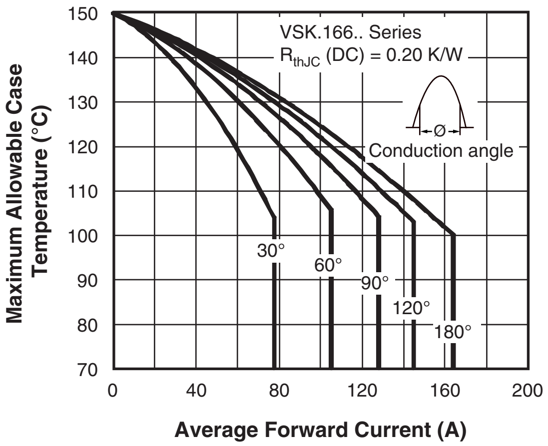


Fig. 1 - Current Ratings Characteristics

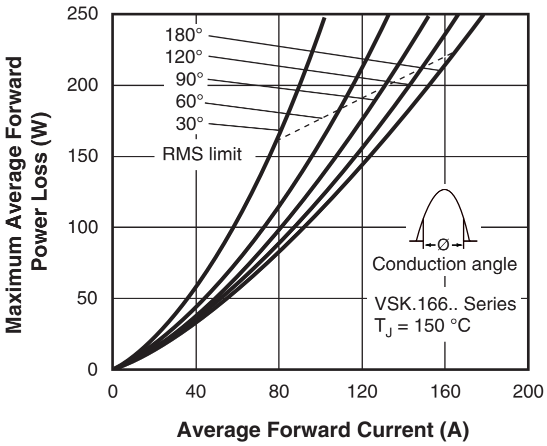


Fig. 3 - On-State Power Loss Characteristics

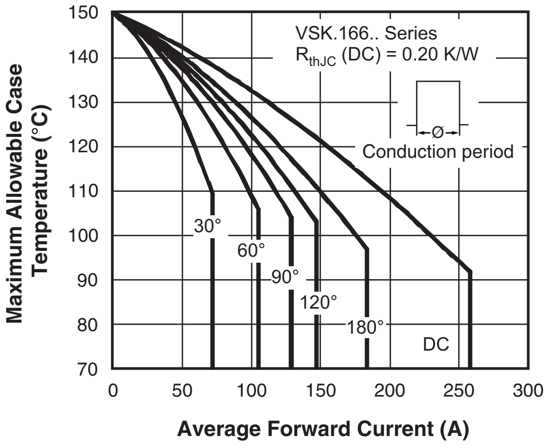


Fig. 2 - Current Ratings Characteristics

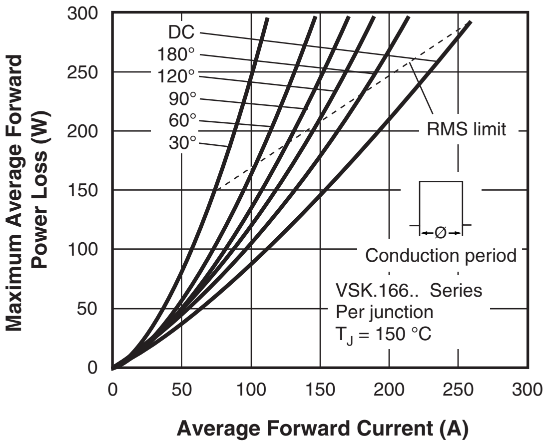


Fig. 4 - On-State Power Loss Characteristics

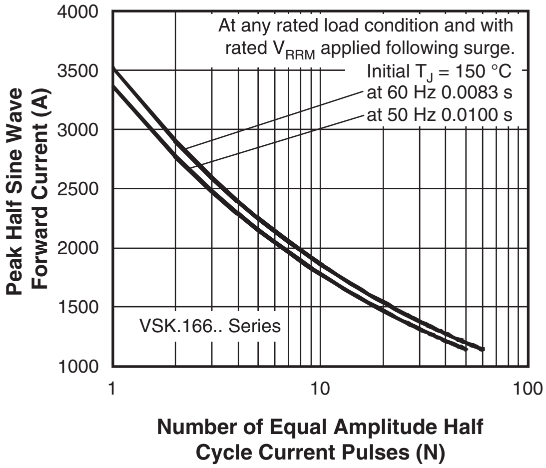


Fig. 5 - Maximum Non-Repetitive Surge Current

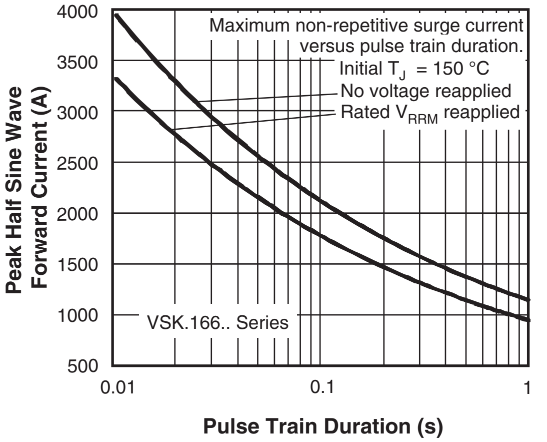


Fig. 6 - Maximum Non-Repetitive Surge Current

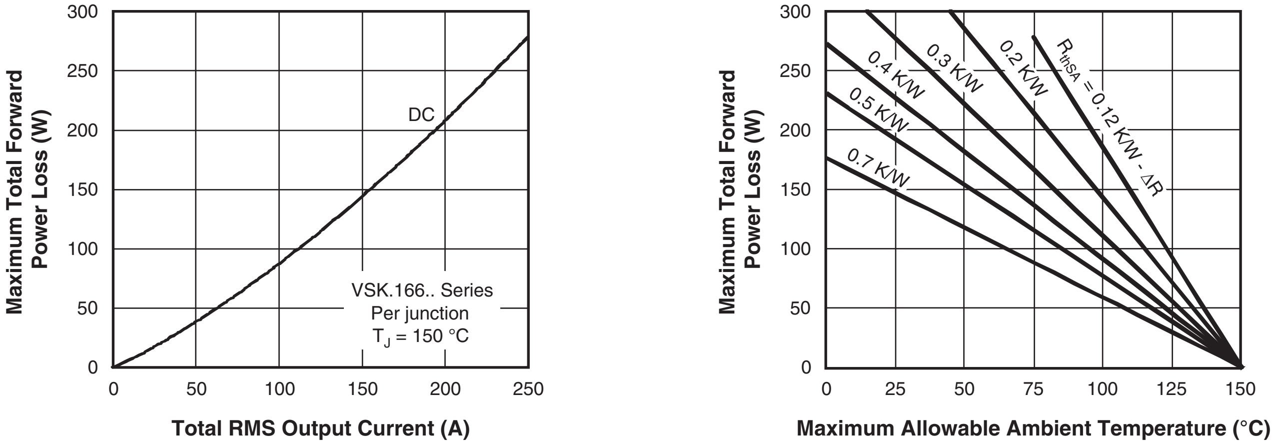


Fig. 7 - On-State Power Loss Characteristics

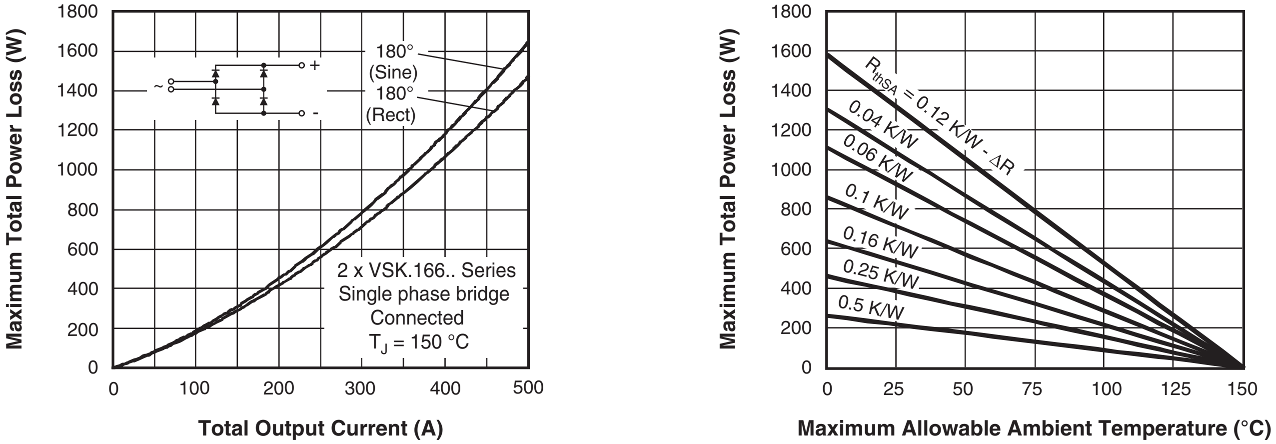


Fig. 8 - On-State Power Loss Characteristics

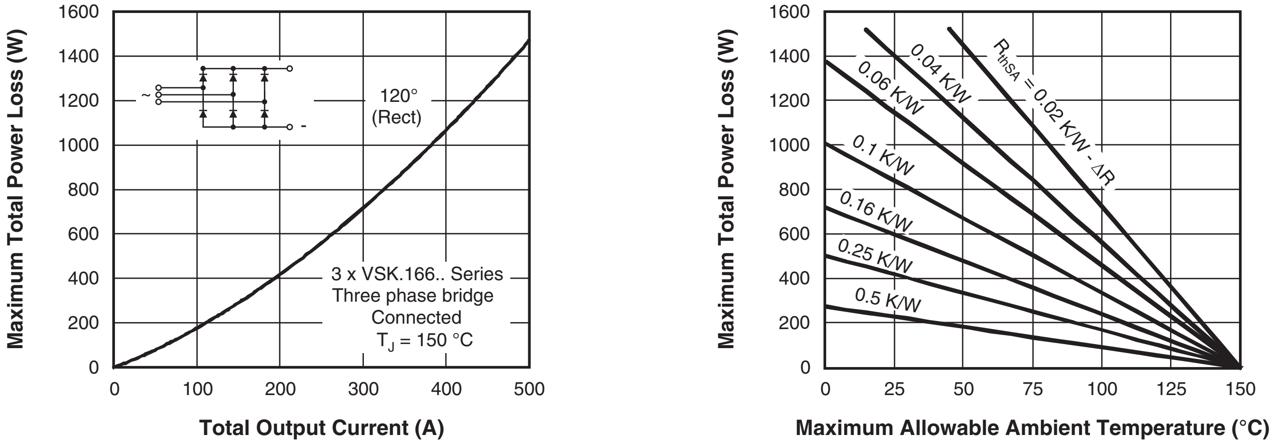


Fig. 9 - On-State Power Loss Characteristics

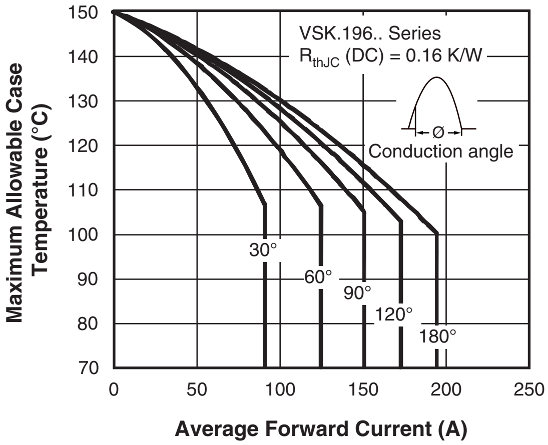


Fig. 10 - Current Ratings Characteristics

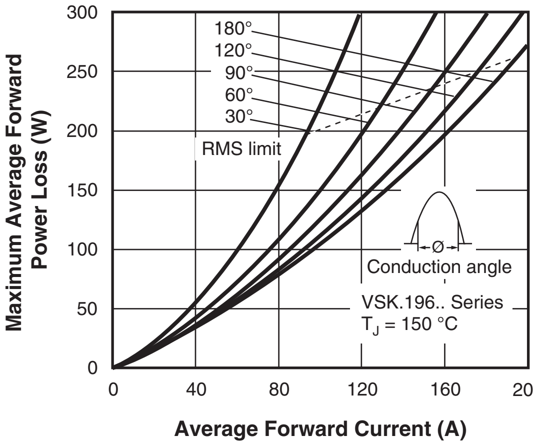


Fig. 12 - On-State Power Loss Characteristics

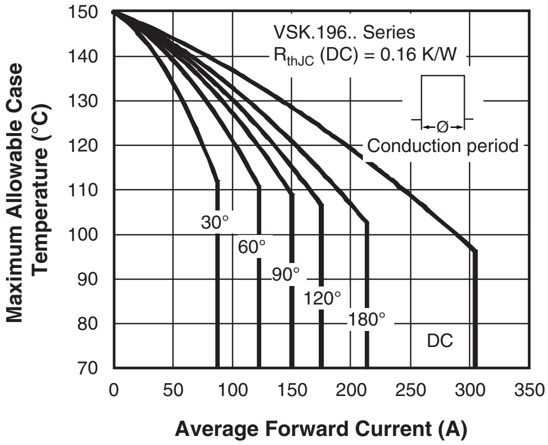


Fig. 11 - Current Ratings Characteristics

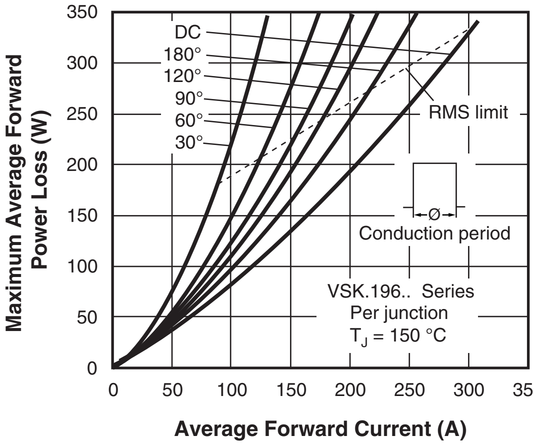


Fig. 13 - On-State Power Loss Characteristics

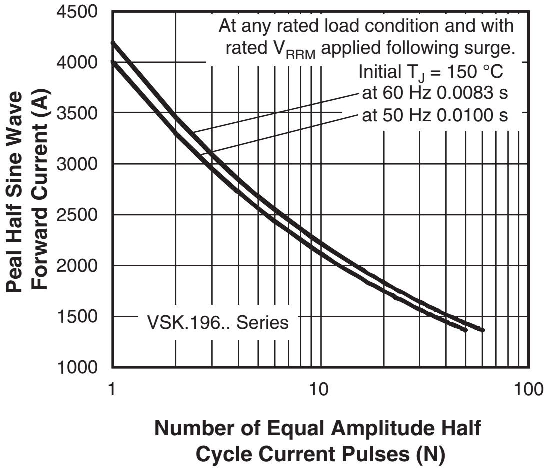


Fig. 14 - Maximum Non-Repetitive Surge Current

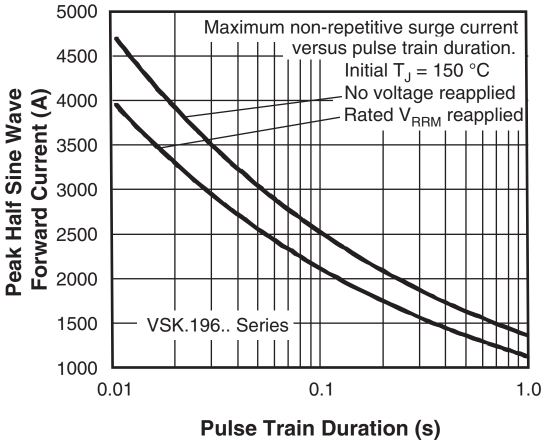


Fig. 15 - Maximum Non-Repetitive Surge Current

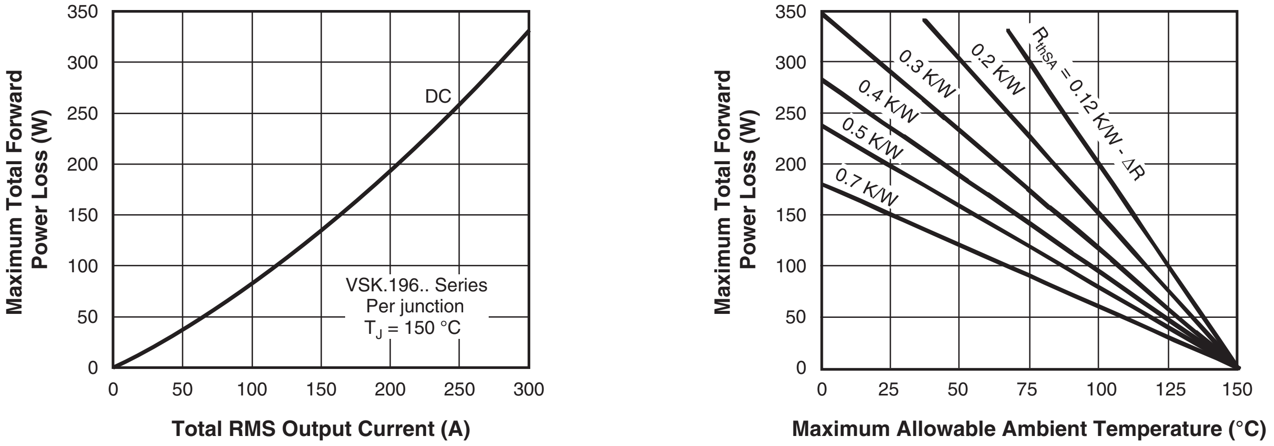


Fig. 16 - On-State Power Loss Characteristics

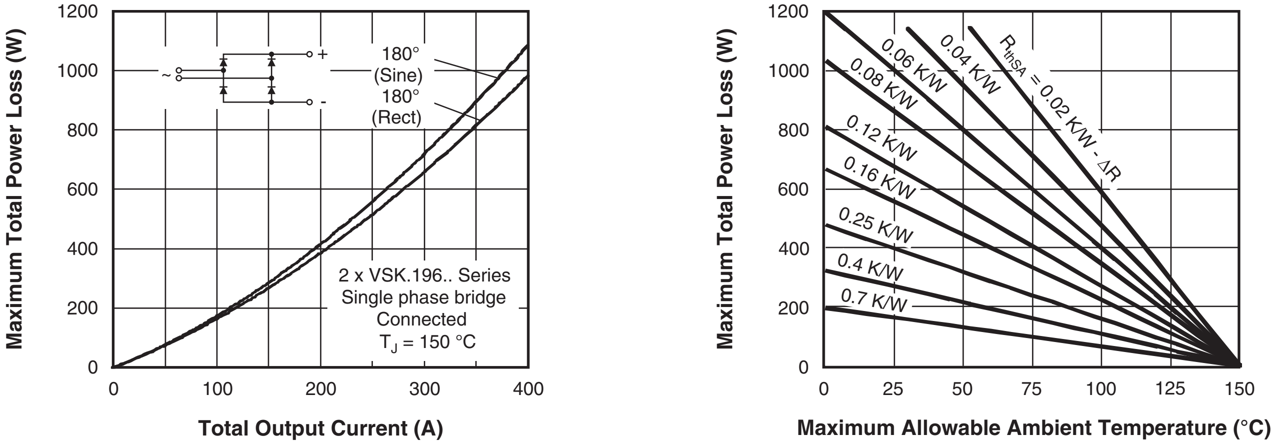


Fig. 17 - On-State Power Loss Characteristics

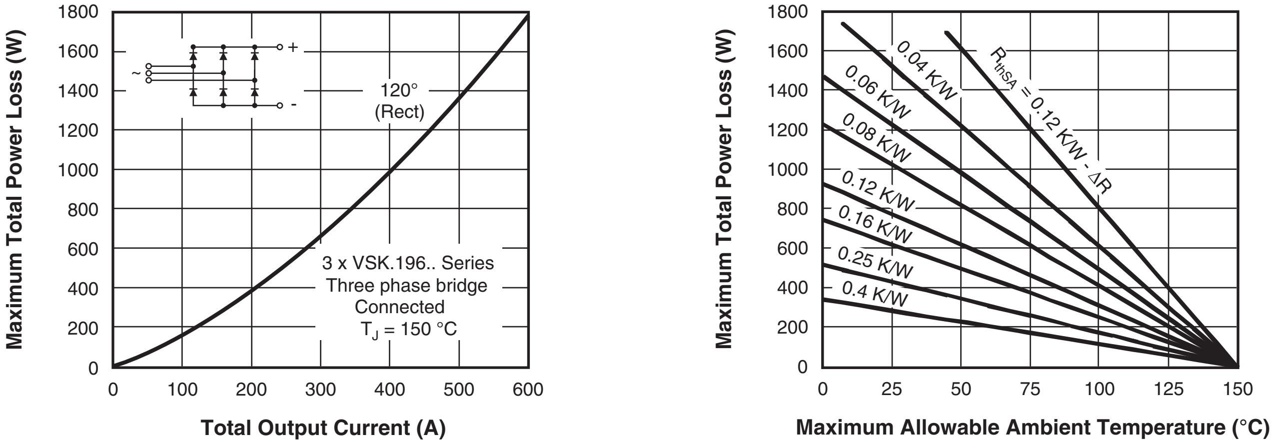


Fig. 18 - On-State Power Loss Characteristics

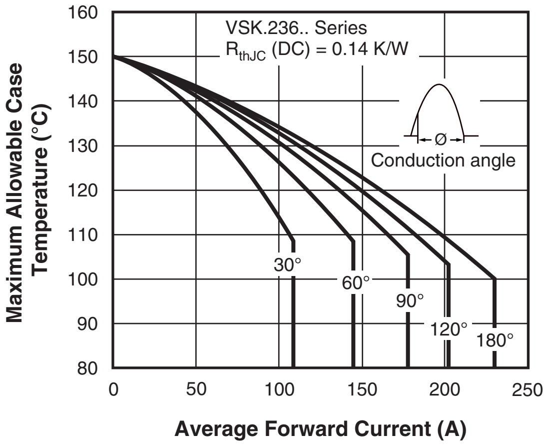


Fig. 19 - Current Ratings Characteristics

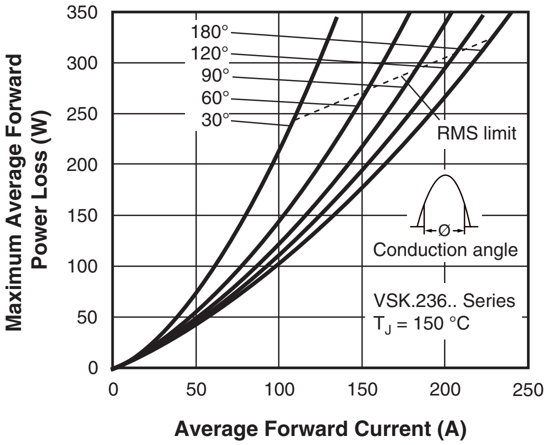


Fig. 21 - On-State Power Loss Characteristics

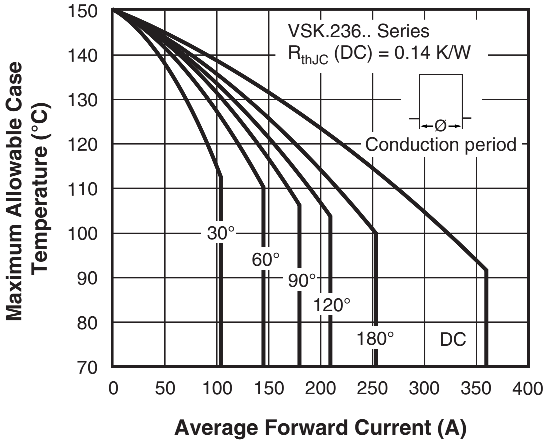


Fig. 20 - Current Ratings Characteristics

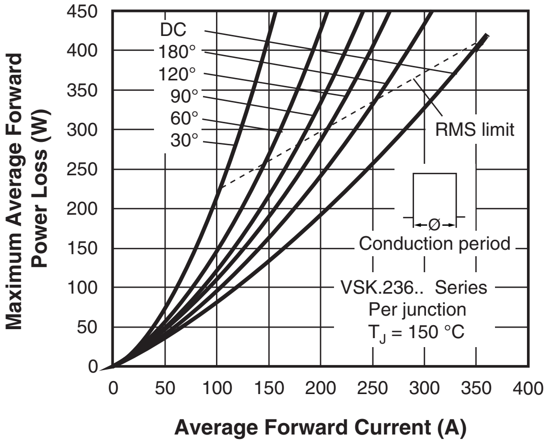


Fig. 22 - On-State Power Loss Characteristics

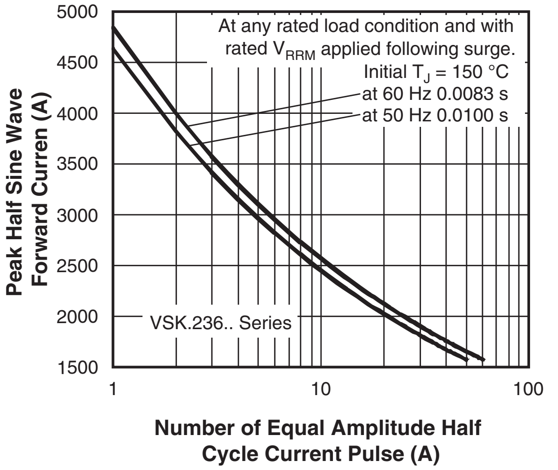


Fig. 23 - Maximum Non-Repetitive Surge Current

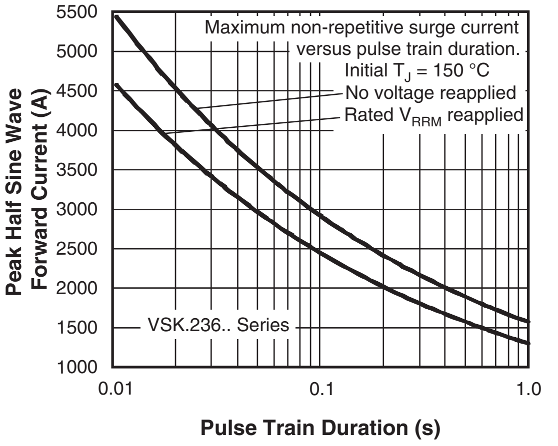


Fig. 24 - Maximum Non-Repetitive Surge Current

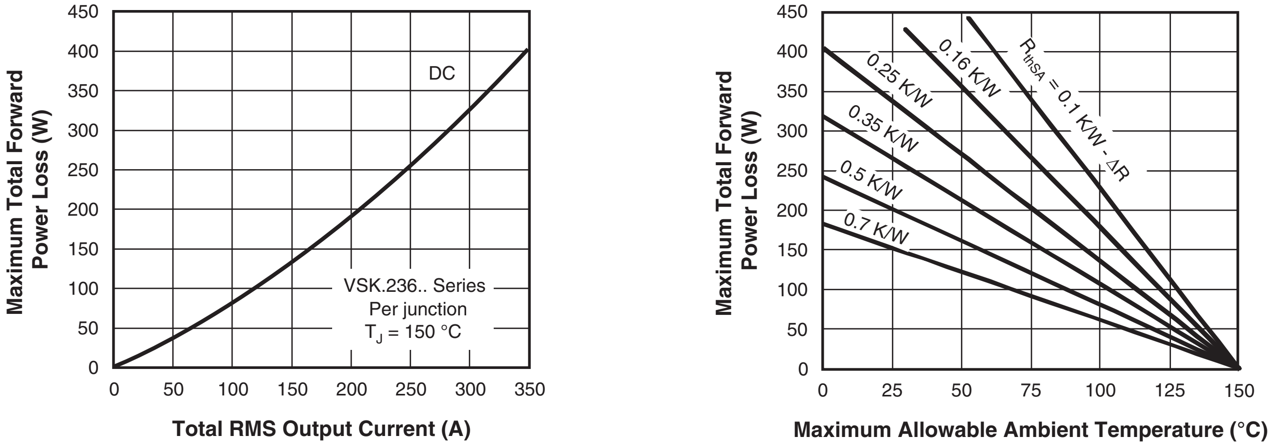


Fig. 25 - On-State Power Loss Characteristics

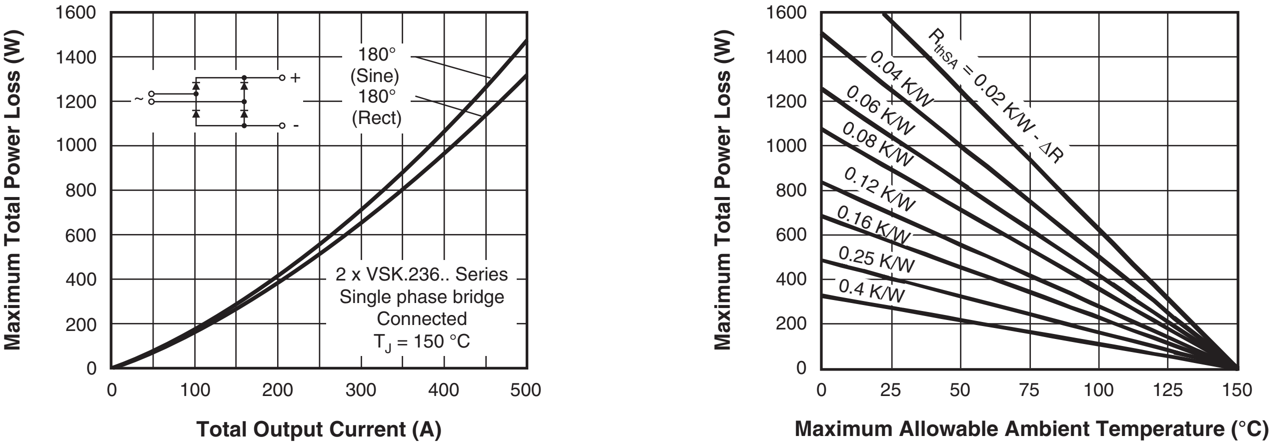


Fig. 26 - On-State Power Loss Characteristics

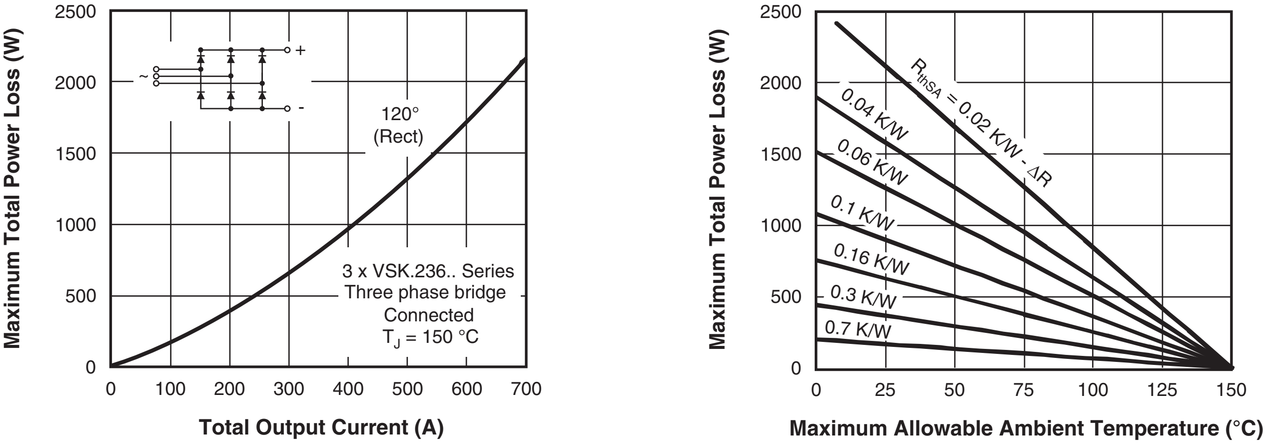


Fig. 27 - On-State Power Loss Characteristics

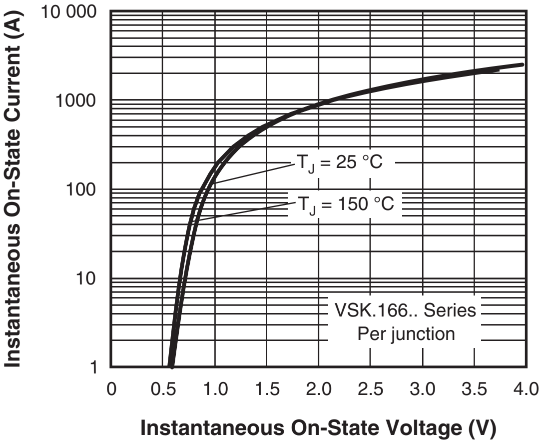


Fig. 28 - On-State Voltage Drop Characteristics

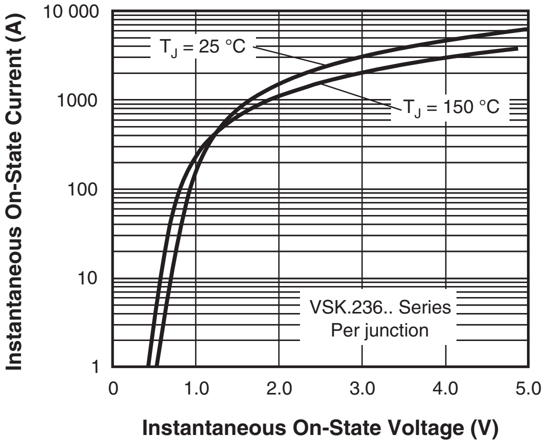


Fig. 30 - On-State Voltage Drop Characteristics

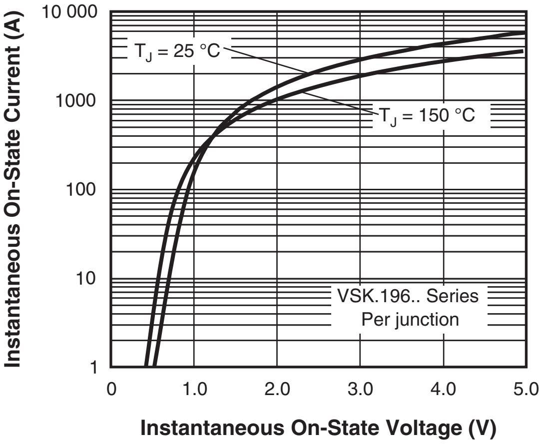


Fig. 29 - On-State Voltage Drop Characteristics

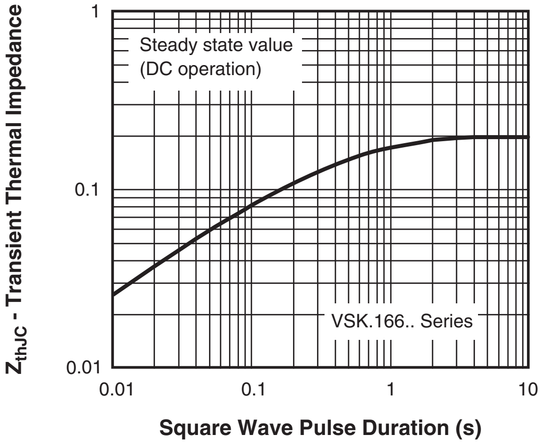


Fig. 31 - Thermal Impedance Z_{thJC} Characteristics

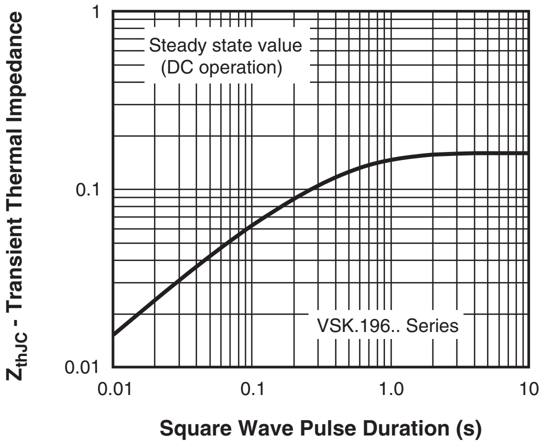


Fig. 32 - Thermal Impedance Z_{thJC} Characteristics

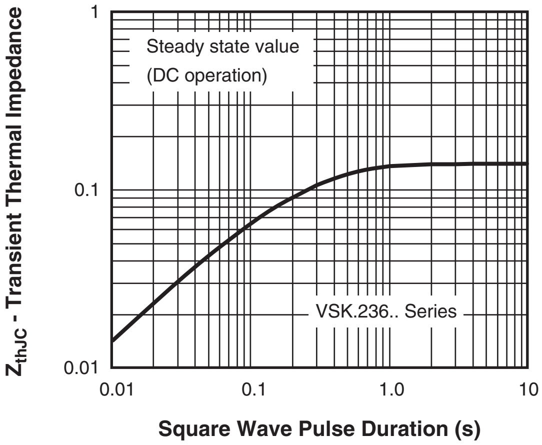


Fig. 33 - Thermal Impedance Z_{thJC} Characteristics

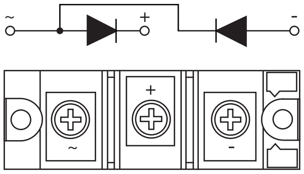
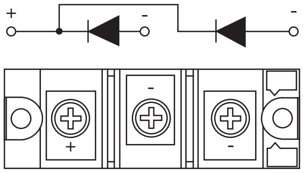
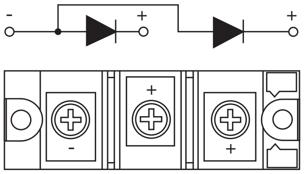
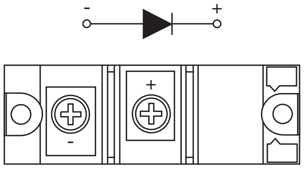
ORDERING INFORMATION TABLE

Device code	VS-VS	KD	236	16	PbF
	①	②	③	④	⑤

1 - Vishay Semiconductors product
2 - Circuit configuration
3 - Current rating: $I_{F(AV)}$
4 - Voltage code x 100 = V_{RRM}
5 - PbF = Lead (Pb)-free

Note

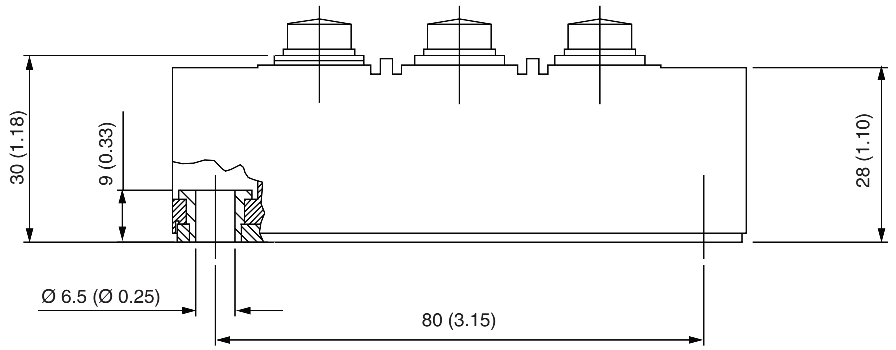
- To order the optional hardware go to www.vishay.com/doc?95172

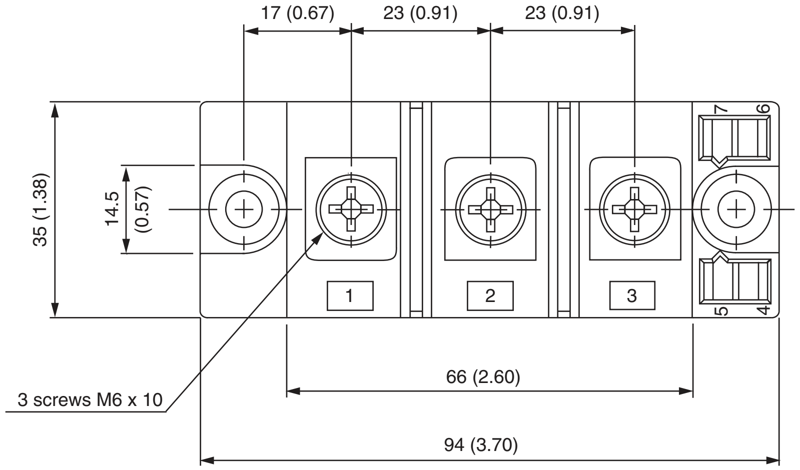
CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	**CIRCUIT CONFIGURATION CODE**	**CIRCUIT DRAWING**
Two diodes doubler circuit	D	**VSKD...** 
Two diodes common cathodes	C	**VSKC...** 
Two diodes common anodes	J	**VSKJ...** 
Single diode	E	**VSKE...** 

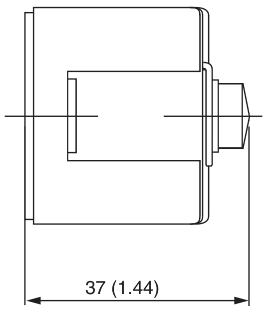
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95254

INT-A-PAK DBC

DIMENSIONS in millimeters (inches)







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Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001
Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации

Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

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Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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