

Thyristor/Thyristor, 150 A (New INT-A-PAK Power Module)



New INT-A-PAK

FEATURES

- Electrically isolated by DBC ceramic (Al_2O_3)
- 3500 V_{RMS} isolating voltage
- Industrial standard package
- High surge capability
- Glass passivated chips
- Simple mounting
- UL approved file E78996
- Compliant to RoHS directive 2002/95/EC
- Designed and qualified for multiple level



RoHS
COMPLIANT

PRODUCT SUMMARY

$I_{T(AV)}$	150 A
-------------	-------

APPLICATIONS

- Battery charges
- Welders
- Power converters

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}$	85 °C	150	A
$I_{T(RMS)}$		330	A
I_{TSM}	50 Hz	4000	
	60 Hz	4200	
I^2t	50 Hz	80	kA^2s
	60 Hz	73	
$I^2\sqrt{t}$		800	$kA^2\sqrt{s}$
V_{RRM}		400	V
T_{Stg}	Range	- 40 to 150	°C
T_J	Range	- 40 to 125	

ELECTRICAL SPECIFICATIONS
VOLTAGE RATINGS

TYPE NUMBER	V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	V_{RSM}/V_{DSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VSKT152/04PbF	400	500	50

ON-STATE CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current at case temperature	$I_{T(AV)}$	180° conduction half sine wave		150	A
				85	°C
Maximum RMS on-state current	$I_{T(RMS)}$	As AC switch		330	A
Maximum peak, one-cycle on-state, non-repetitive surge current	I_{TSM}	t = 10 ms	No voltage reapplied	4000	
		t = 8.3 ms	No voltage reapplied	4200	
		t = 10 ms	100 % V_{RRM} reapplied	3350	
		t = 8.3 ms	100 % V_{RRM} reapplied	3500	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied	80	kA ² s
		t = 8.3 ms	No voltage reapplied	73	
		t = 10 ms	100 % V_{RRM} reapplied	56	
		t = 8.3 ms	100 % V_{RRM} reapplied	51	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied		800	kA ² √s
Value of threshold voltage	$V_{T(TO)}$	T _J maximum		0.82	V
On-state slope resistance	r_t			1.44	mΩ
Maximum on-state voltage drop	V_{TM}	$I_{pk} = \pi \times I_{T(AV)}$, T _J = 25 °C		1.48	V
Maximum holding current	I_H	T _J = 25 °C, anode supply = 6 V, resistive load, gate open circuit		200	mA
Maximum latching current	I_L	T _J = 25 °C, anode supply = 6 V, resistive load		400	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Typical delay time	t_{gd}	T _J = 25 °C	Gate current = 1 A, $di_g/dt = 1 \text{ A}/\mu\text{s}$ $V_d = 0.67 \% V_{DRM}$	1	μs
Typical rise time	t_{gr}			2	
Typical turn-off time	t_q	I _{TM} = 300 A, - $di/dt = 15 \text{ A}/\mu\text{s}$; T _J = T _J maximum V _R = 50 V; $dV/dt = 20 \text{ V}/\mu\text{s}$; gate 0 V, 100 Ω		50 to 200	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse and off-state leakage current	I_{RRM} , I_{DRM}	T _J = 125 °C		50	mA
RMS insulation voltage	V_{INS}	50 Hz, circuit to base, all terminals shorted, t = 1 s		3500	V
Critical rate of rise of off-state voltage	dV/dt	T _J = T _J maximum, exponential to 67 % rated V_{DRM}		1000	V/μs



Thyristor/Thyristor, 150 A Vishay High Power Products
(New INT-A-PAK Power Module)

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P_{GM}	$t_p \leq 5$ ms, $T_J = T_J$ maximum		12	W
Maximum average gate power	$P_{G(AV)}$	$f = 50$ Hz, $T_J = T_J$ maximum		3	
Maximum peak gate current	I_{GM}	$t_p \leq 5$ ms, $T_J = T_J$ maximum		3	A
Maximum peak negative gate voltage	$-V_{GT}$			10	V
Maximum required DC gate voltage to trigger	V_{GT}	$T_J = -40$ °C	Anode supply = 6 V, resistive load; $R_a = 1$ Ω	4	
		$T_J = 25$ °C		2.5	
		$T_J = T_J$ maximum		1.7	
Maximum required DC gate current to trigger	I_{GT}	$T_J = -40$ °C		270	mA
		$T_J = 25$ °C		150	
		$T_J = T_J$ maximum		80	
Maximum gate voltage that will not trigger	V_{GD}	$T_J = T_J$ maximum, rated V_{DRM} applied		0.3	V
Maximum gate current that will not trigger	I_{GD}			10	mA
Maximum rate of rise of turned-on current	di/dt	$T_J = T_J$ maximum, $I_{TM} = 400$ A rated V_{DRM} applied		300	A/μs

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction operating temperature range	T_J			- 40 to 125	°C
Maximum storage temperature range	T_{Stg}			- 40 to 150	
Maximum thermal resistance, junction to case per junction	R_{thJC}	DC operation		0.18	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	
		7.1	oz.		
Case style		New 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°	
VSKT152/04PbF	0.007	0.010	0.013	0.016	0.017	0.009	0.012	0.014	0.016	0.017	K/W

Note

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

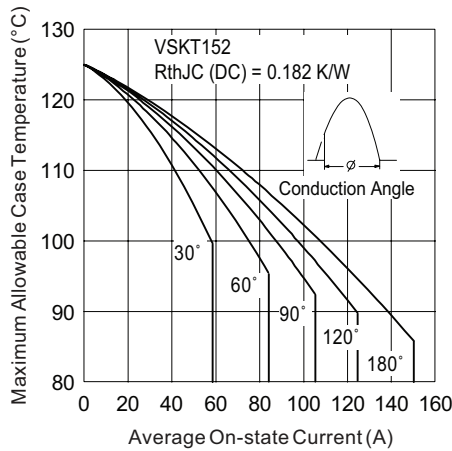


Fig. 1 - Current Ratings Characteristics

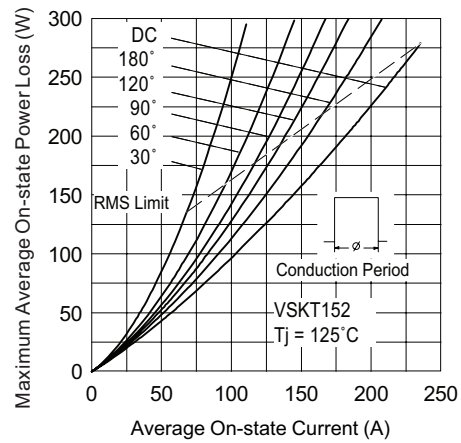


Fig. 4 - Forward Power Loss Characteristics

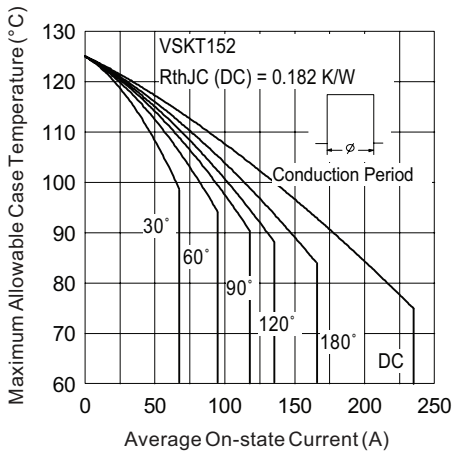


Fig. 2 - Current Ratings Characteristics

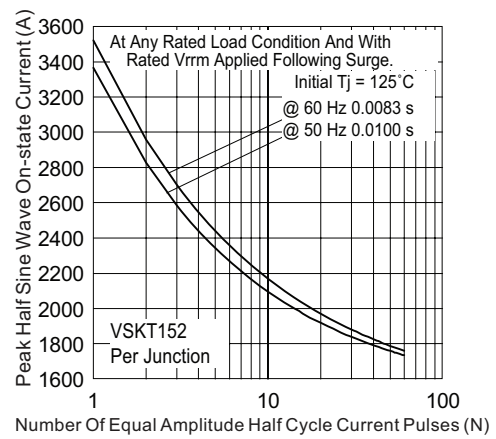


Fig. 5 - Maximum Non-Repetitive Surge Current

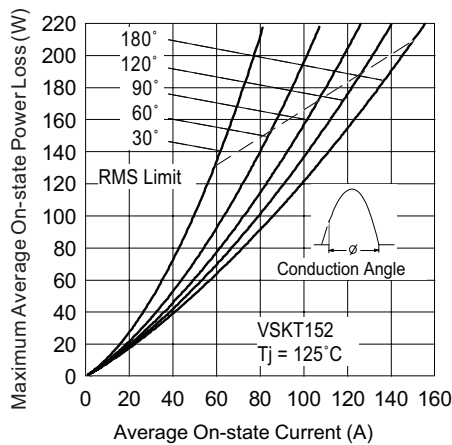


Fig. 3 - Forward Power Loss Characteristics

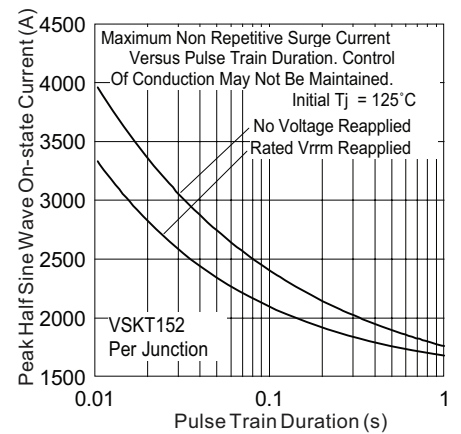


Fig. 6 - Maximum Non-Repetitive Surge Current

Thyristor/Thyristor, 150 A Vishay High Power Products
(New INT-A-PAK Power Module)

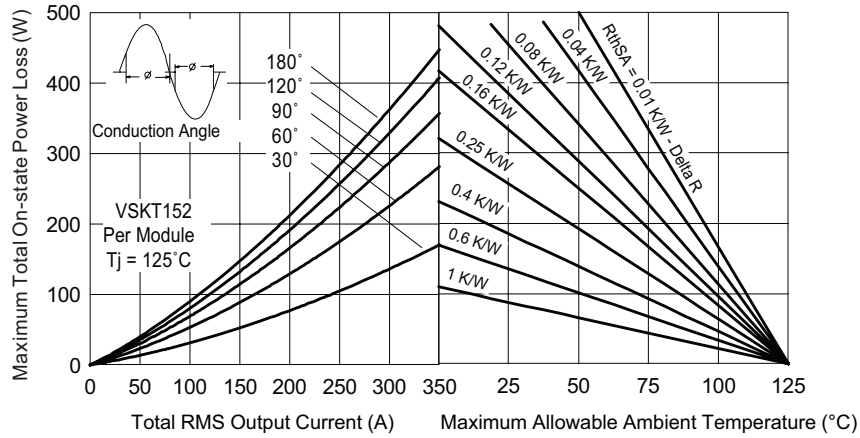


Fig. 7 - On-State Power Loss Characteristics

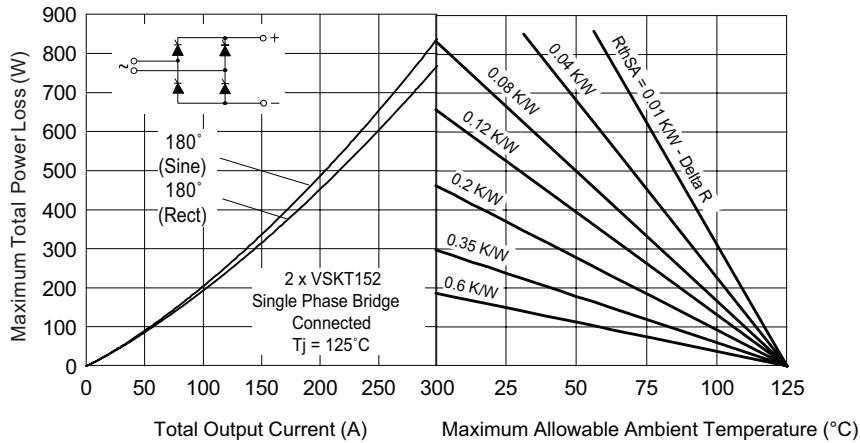


Fig. 8 - On-State Power Loss Characteristics

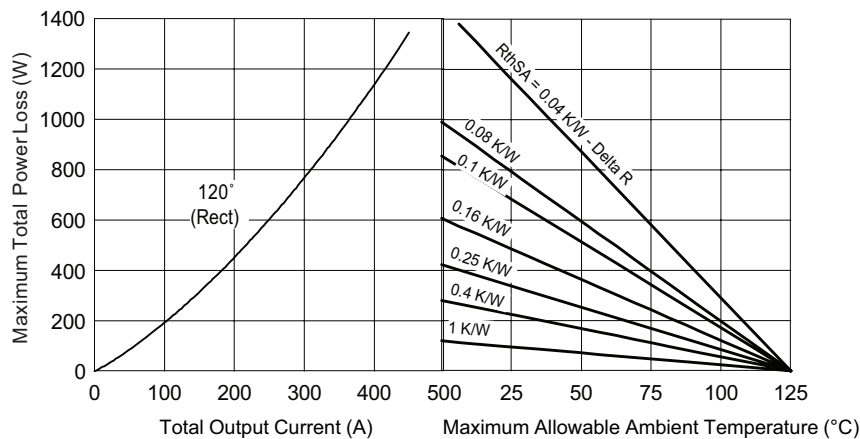


Fig. 9 - On-State Power Loss Characteristics

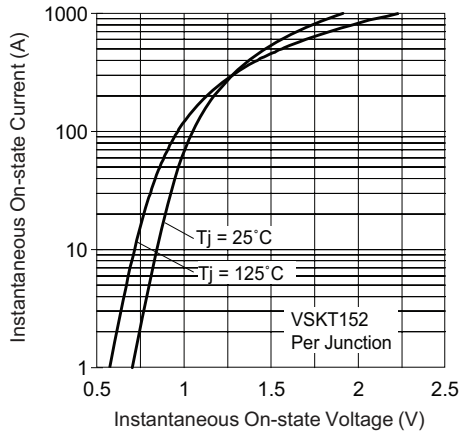


Fig. 10 - On-State Voltage Drop Characteristics

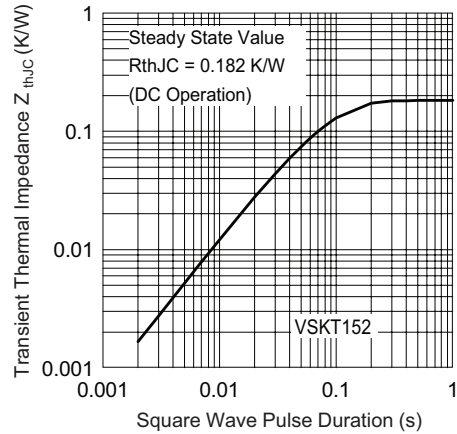


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

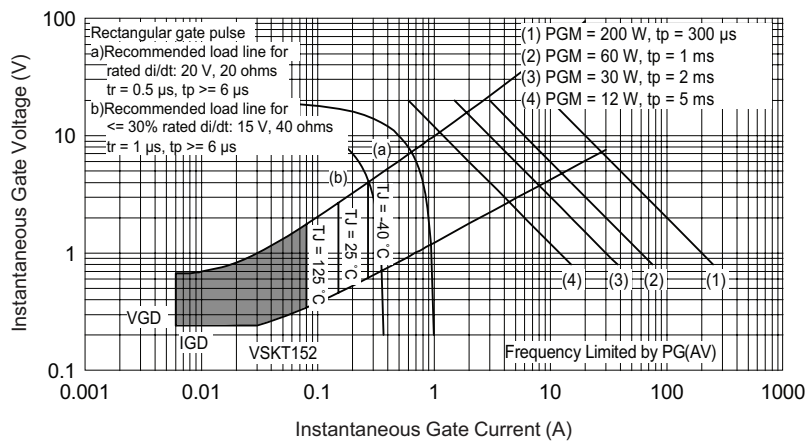


Fig. 12 - Gate Characteristics

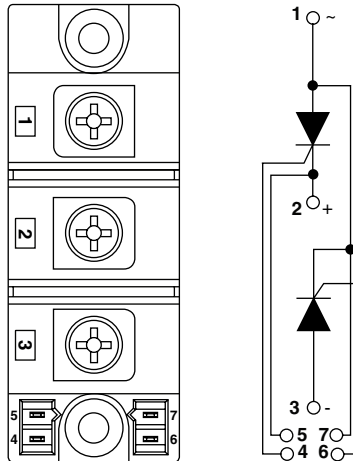
ORDERING INFORMATION TABLE

Device code	VSK	T	152	/	04	PbF
	①	②	③		④	⑤
	1	-	Module type			
	2	-	Circuit configuration:			
			T = Two SCR doubler configuration			
	3	-	Current rating			
	4	-	Voltage rating (04 = 400 V)			
	5	-	PbF = Lead (Pb)-free			

Note

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

CIRCUIT CONFIGURATION



LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?9506Z
------------	------------------------------------------------------------------------



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.