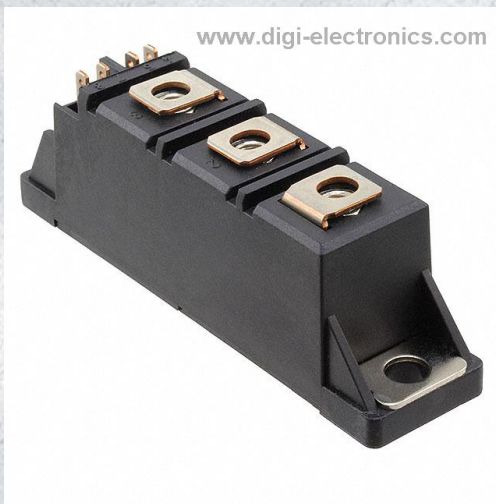


# VS-VSKN41/08 Datasheet



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	VS-VSKN41/08-DG
Manufacturer	<a href="#">Vishay General Semiconductor - Diodes Division</a>
Manufacturer Product Number	VS-VSKN41/08
Description	MODULE THYRISTOR 45A ADD-A-PAK
Detailed Description	SCR Module 800 V 100 A Series Connection - SCR/Diode Chassis Mount ADD-A-PAK (3 + 4)

This model VS-VSKN41/08 is available at DiGi Electronics.

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DiGi is a global authorized distributor of electronic components.

## Purchase and inquiry

Manufacturer Product Number:

VS-VSKN41/08

Series:

-

Structure:

Series Connection - SCR/Diode

Voltage - Off State:

800 V

Current - On State (It (RMS)) (Max):

100 A

Current - Gate Trigger (Igt) (Max):

150 mA

Current - Hold (Ih) (Max):

200 mA

Mounting Type:

Chassis Mount

Base Product Number:

VSKN41

Manufacturer:

Vishay General Semiconductor - Diodes Division

Product Status:

Active

Number of SCRs, Diodes:

1 SCR, 1 Diode

Current - On State (It (AV)) (Max):

45 A

Voltage - Gate Trigger (Vgt) (Max):

2.5 V

Current - Non Rep. Surge 50, 60Hz (I<sub>tsm</sub>):

850A, 890A

Operating Temperature:

-40°C ~ 125°C (Tj)

Package / Case:

ADD-A-PAK (3 + 4)

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.30.0080

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

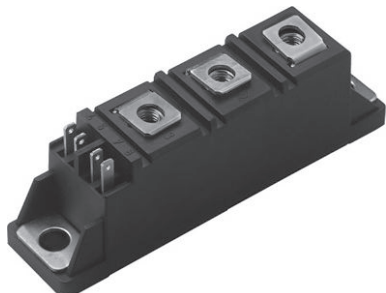
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[www.vishay.com](http://www.vishay.com)

## VS-VSK.41.., VS-VSK.56.. Series

Vishay Semiconductors


### AAP Gen 7 (TO-240AA) Power Modules Thyristor/Diode and Thyristor/Thyristor, 45 A, 60 A



ADD-A-PAK


**RoHS**  
COMPLIANT

#### FEATURES

- High voltage
- Industrial standard package
- Low thermal resistance
- UL approved file E78996 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?999912](http://www.vishay.com/doc?999912)

#### BENEFITS

- Excellent thermal performances obtained by the usage of exposed direct bonded copper substrate
- Up to 1600 V
- High surge capability
- Easy mounting on heatsink

#### 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.

#### PRIMARY CHARACTERISTICS

$I_{T(AV)}$ or $I_{F(AV)}$	45 A, 60 A
Type	Modules - thyristor, standard
Package	AAP Gen 7 (TO-240AA)

#### MECHANICAL DESCRIPTION

The AAP Gen 7 (TO-240AA), new generation of AAP module, combines the excellent thermal performances obtained by the usage of exposed direct bonded copper substrate, with advanced compact simple package solution and simplified internal structure with minimized number of interfaces.

#### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VS-VSK.41	VS-VSK.56	UNITS
$I_{T(AV)}$ or $I_{F(AV)}$	85 °C	45	60	A
$I_{O(RMS)}$	As AC switch	100	135	
$I_{TSM}$ , $I_{FSM}$	50 Hz	850	1200	
	60 Hz	890	1256	
$I^2t$	50 Hz	3.61	7.20	kA <sup>2</sup> s
	60 Hz	3.30	6.57	
$I^2\sqrt{t}$		36.1	72	kA <sup>2</sup> √s
$V_{DRM}/V_{RRM}$	Range	400 to 1600	400 to 1600	V
$T_{Stg}$		-40 to +125		°C
$T_J$		-40 to +125		°C



www.vishay.com

**VS-VSK.41.., VS-VSK.56.. Series**

Vishay Semiconductors

**ELECTRICAL SPECIFICATIONS**

<b>VOLTAGE RATINGS</b>					
TYPE NUMBER	VOLTAGE CODE	$V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	$V_{DRM}$ , MAXIMUM REPETITIVE PEAK OFF-STATE VOLTAGE, GATE OPEN CIRCUIT V	$I_{RRM}$ , $I_{DRM}$ AT 125 °C mA
VS-VSK.41 VS-VSK.56	04	400	500	400	15
	06	600	700	600	
	08	800	900	800	
	10	1000	1100	1000	
	12	1200	1300	1200	
	14	1400	1500	1400	
	16	1600	1700	1600	

<b>ON-STATE CONDUCTION</b>							
PARAMETER	SYMBOL	TEST CONDITIONS			VSK.41	VSK.56	UNITS
Maximum average on-state current (thyristors)	$I_{T(AV)}$	180° conduction, half sine wave, $T_C = 85\text{ °C}$			45	60	
Maximum average forward current (diodes)	$I_{F(AV)}$						
Maximum continuous RMS on-state current, as AC switch	$I_{O(RMS)}$				100	135	A
Maximum peak, one-cycle non-repetitive on-state or forward current	$I_{TSM}$ or $I_{FSM}$	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	850	1200	
		t = 8.3 ms			890	1256	
		t = 10 ms	100 % $V_{RRM}$ reapplied		715	1000	
		t = 8.3 ms			750	1056	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	Initial $T_J = T_J$ maximum	3.61	7.20	kA <sup>2</sup> s
		t = 8.3 ms			3.30	6.57	
		t = 10 ms	100 % $V_{RRM}$ reapplied		2.56	5.10	
		t = 8.3 ms			2.33	4.56	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$ (1)	t = 0.1 ms to 10 ms, no voltage reapplied $T_J = T_J$ maximum			36.1	72	kA <sup>2</sup> √s
Maximum value or threshold voltage	$V_{T(TO)}$ (2)	Low level (3)	$T_J = T_J$ maximum		1.08	0.91	V
		High level (4)			1.12	1.02	
Maximum value of on-state slope resistance	$r_t$ (2)	Low level (3)	$T_J = T_J$ maximum		4.7	4.27	mΩ
		High level (4)			4.5	3.77	
Maximum peak on-state or forward voltage	$V_{TM}$	$I_{TM} = \pi \times I_{T(AV)}$	$T_J = 25\text{ °C}$		1.81	1.7	V
	$V_{FM}$	$I_{FM} = \pi \times I_{F(AV)}$					
Maximum non-repetitive rate of rise of turned on current	$di/dt$	$T_J = 25\text{ °C}$ , from 0.67 $V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500\text{ mA}$ , $t_r < 0.5\text{ }\mu\text{s}$ , $t_p > 6\text{ }\mu\text{s}$			150		A/μs
Maximum holding current	$I_H$	$T_J = 25\text{ °C}$ , anode supply = 6 V, resistive load, gate open circuit			200		mA
Maximum latching current	$I_L$	$T_J = 25\text{ °C}$ , anode supply = 6 V, resistive load			400	400	

**Notes**

- (1)  $I^2t$  for time  $t_x = I^2\sqrt{t} \times \sqrt{t_x}$   
(2) Average power =  $V_{T(TO)} \times I_{T(AV)} + r_t \times (I_{T(RMS)})^2$   
(3)  $16.7\% \times \pi \times I_{AV} < I < \pi \times I_{AV}$   
(4)  $I > \pi \times I_{AV}$



TRIGGERING						
PARAMETER	SYMBOL	TEST CONDITIONS		VS-VSK.41	VS-VSK.56	UNITS
Maximum peak gate power	$P_{GM}$			10		W
Maximum average gate power	$P_{G(AV)}$			2.5		
Maximum peak gate current	$I_{GM}$			2.5		A
Maximum peak negative gate voltage	$-V_{GM}$			10		V
Maximum gate voltage required to trigger	$V_{GT}$	$T_J = -40\text{ }^\circ\text{C}$	Anode supply = 6 V resistive load	4.0		
		$T_J = 25\text{ }^\circ\text{C}$		2.5		
		$T_J = 125\text{ }^\circ\text{C}$		1.7		
Maximum gate current required to trigger	$I_{GT}$	$T_J = -40\text{ }^\circ\text{C}$	Anode supply = 6 V resistive load	270		mA
		$T_J = 25\text{ }^\circ\text{C}$		150		
		$T_J = 125\text{ }^\circ\text{C}$		80		
Maximum gate voltage that will not trigger	$V_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , rated $V_{DRM}$ applied		0.25		V
Maximum gate current that will not trigger	$I_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , rated $V_{DRM}$ applied		6		mA

BLOCKING						
PARAMETER	SYMBOL	TEST CONDITIONS		VS-VSK.41	VS-VSK.56	UNITS
Maximum peak reverse and off-state leakage current at $V_{RRM}$ , $V_{DRM}$	$I_{RRM}$ , $I_{DRM}$	$T_J = 125\text{ }^\circ\text{C}$ , gate open circuit		15		mA
Maximum RMS insulation voltage	$V_{INS}$	50 Hz		3000 (1 min) 3600 (1 s)		V
Maximum critical rate of rise of off-state voltage	$dV/dt$	$T_J = 125\text{ }^\circ\text{C}$ , linear to $0.67 V_{DRM}$		1000		V/ $\mu\text{s}$

THERMAL AND MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		VS-VSK.41	VS-VSK.56	UNITS
Junction operating and storage temperature range	$T_J$ , $T_{Stg}$			-40 to +125		$^\circ\text{C}$
Maximum internal thermal resistance, junction to case per leg	$R_{thJC}$	DC operation		0.44	0.35	$^\circ\text{C/W}$
Typical thermal resistance, case to heatsink per module	$R_{thCS}$	Mounting surface flat, smooth and greased		0.1		
Mounting torque $\pm 10\%$	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.		4		Nm
	busbar			3		
Approximate weight					75	g
					2.7	oz.
Case style			JEDEC <sup>®</sup>		AAP Gen 7 (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.41..	0.110	0.131	0.17	0.23	0.342	0.085	0.138	0.177	0.235	0.345	$^\circ\text{C/W}$
VSK.56..	0.088	0.104	0.134	0.184	0.273	0.07	0.111	0.143	0.189	0.275	

**Note**

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



# VS-VSK.41., VS-VSK.56.. Series

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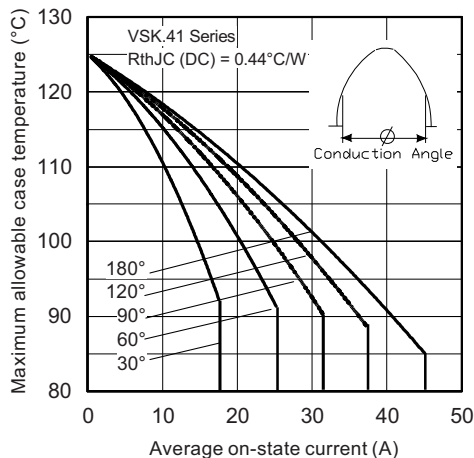


Fig. 1 - Current Ratings Characteristics

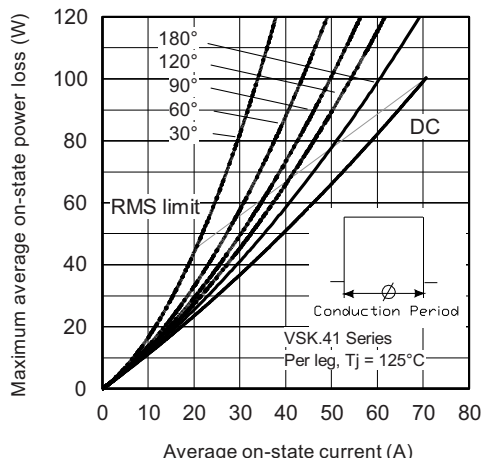


Fig. 4 - On-State Power Loss Characteristics

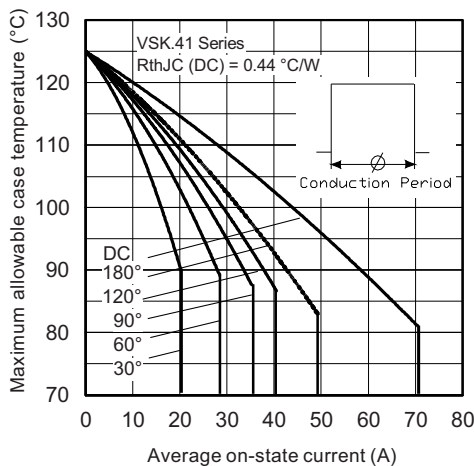


Fig. 2 - Current Ratings Characteristics

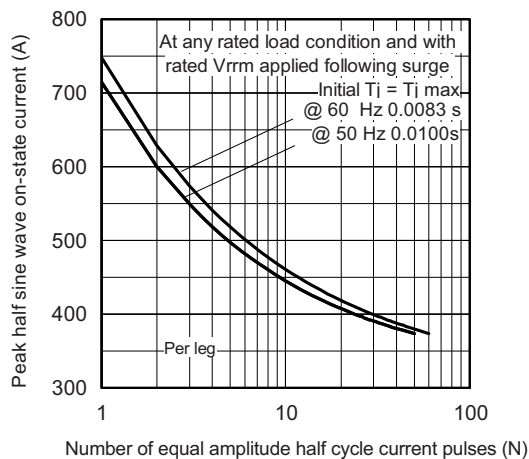


Fig. 5 - Maximum Non-Repetitive Surge Current

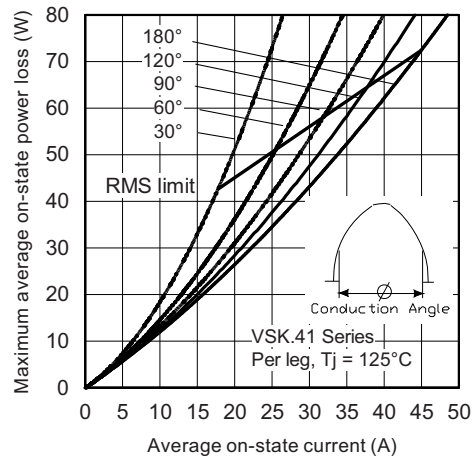


Fig. 3 - On-State Power Loss Characteristics

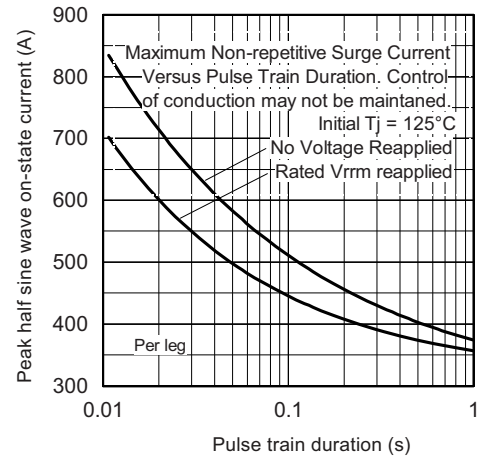


Fig. 6 - Maximum Non-Repetitive Surge Current



# VS-VSK.41., VS-VSK.56.. Series

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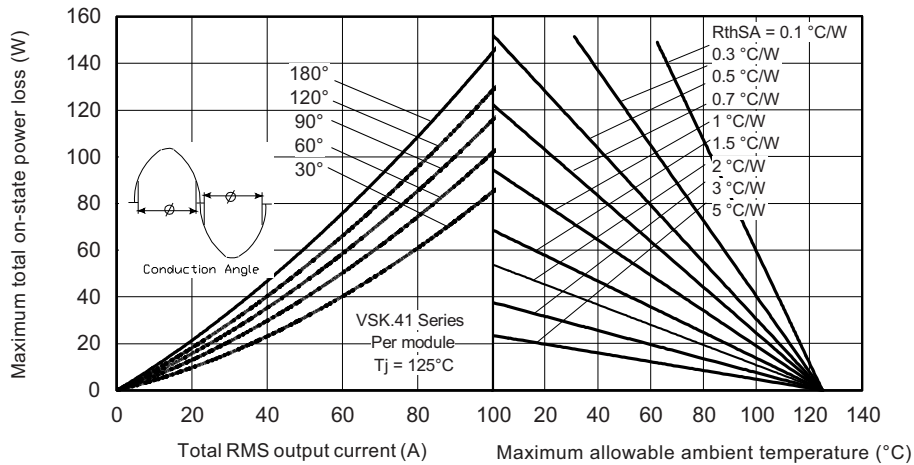


Fig. 7 - On-State Power Loss Characteristics

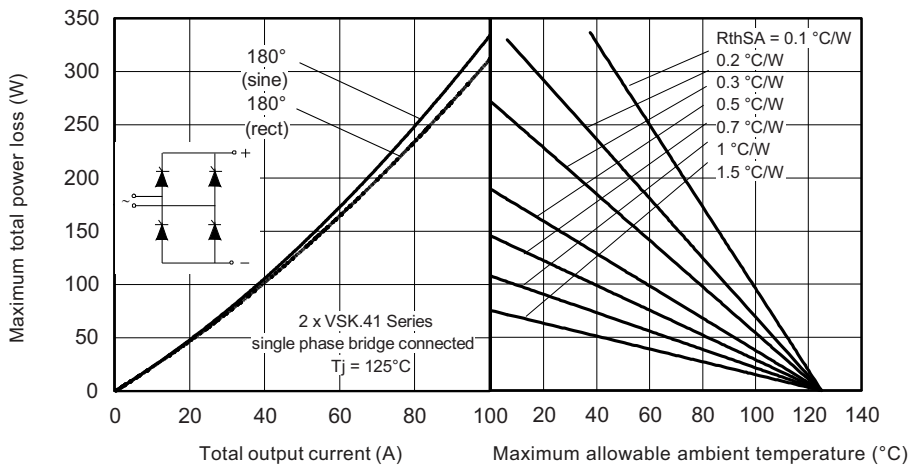


Fig. 8 - On-State Power Loss Characteristics

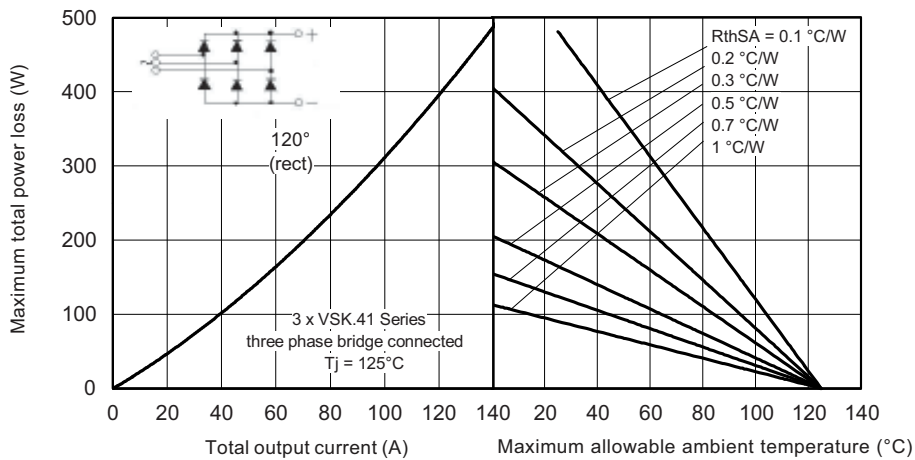


Fig. 9 - On-State Power Loss Characteristics



# VS-VSK.41., VS-VSK.56.. Series

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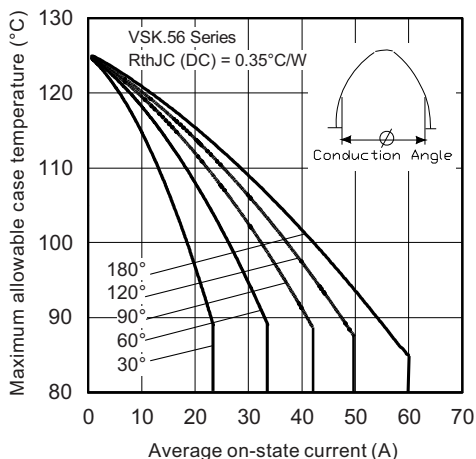


Fig. 10 - Current Ratings Characteristics

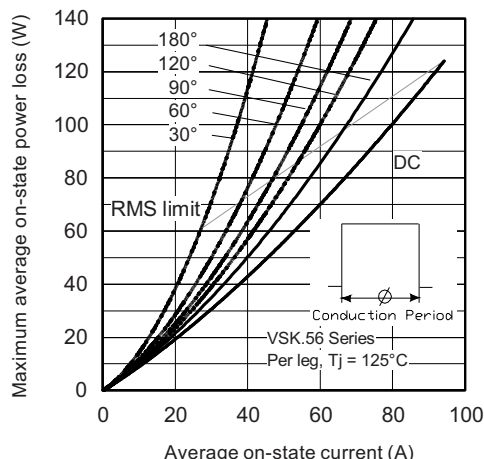


Fig. 13 - On-State Power Loss Characteristics

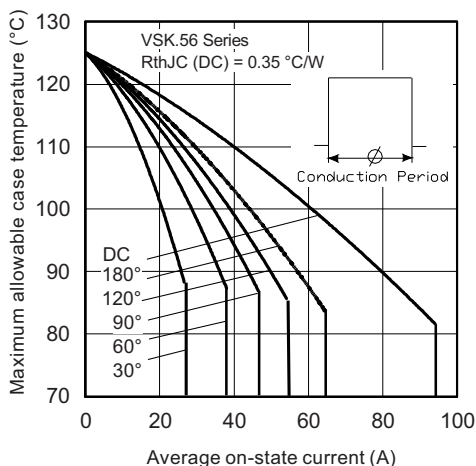


Fig. 11 - Current Ratings Characteristics

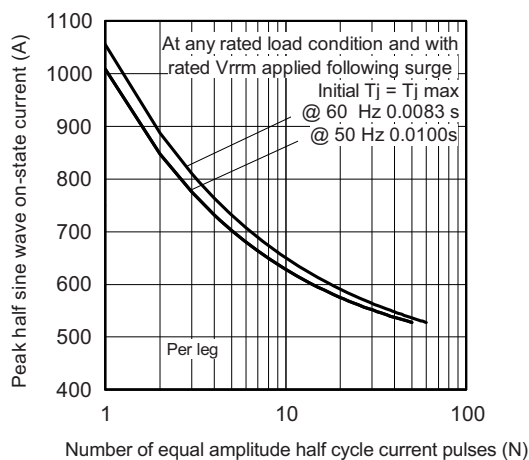


Fig. 14 - Maximum Non-Repetitive Surge Current

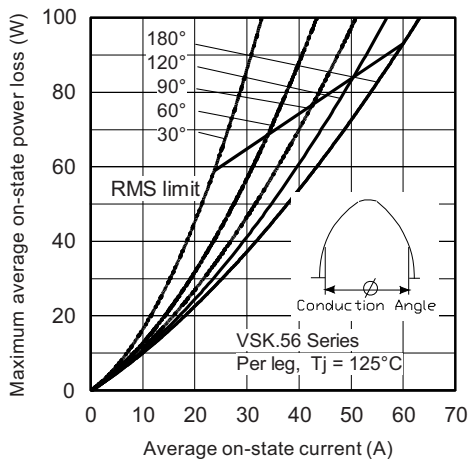


Fig. 12 - On-State Power Loss Characteristics

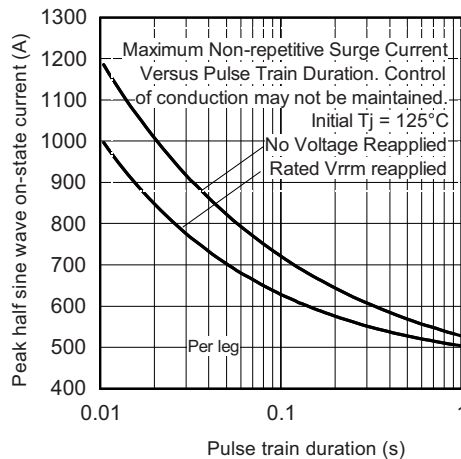


Fig. 15 - Maximum Non-Repetitive Surge Current



# VS-VSK.41., VS-VSK.56.. Series

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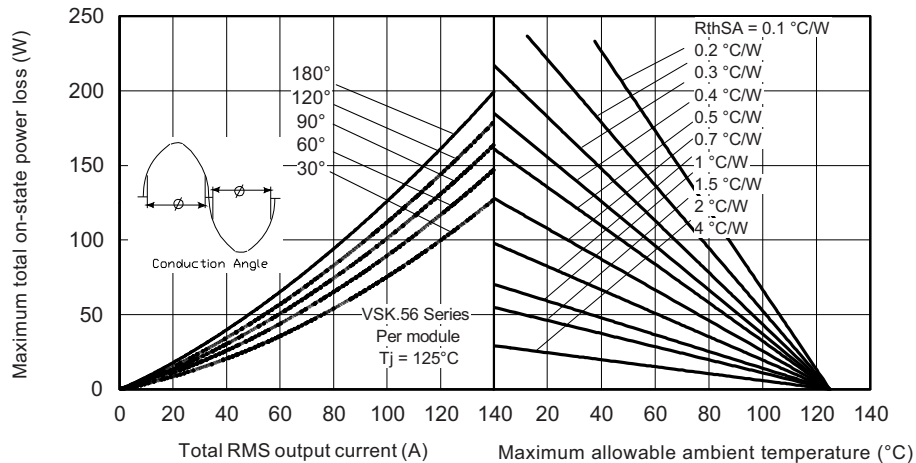


Fig. 16 - On-State Power Loss Characteristics

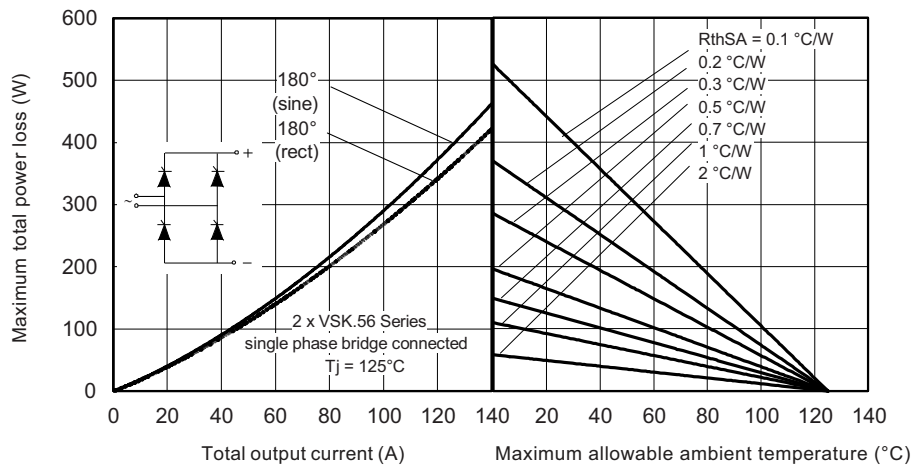


Fig. 17 - On-State Power Loss Characteristics

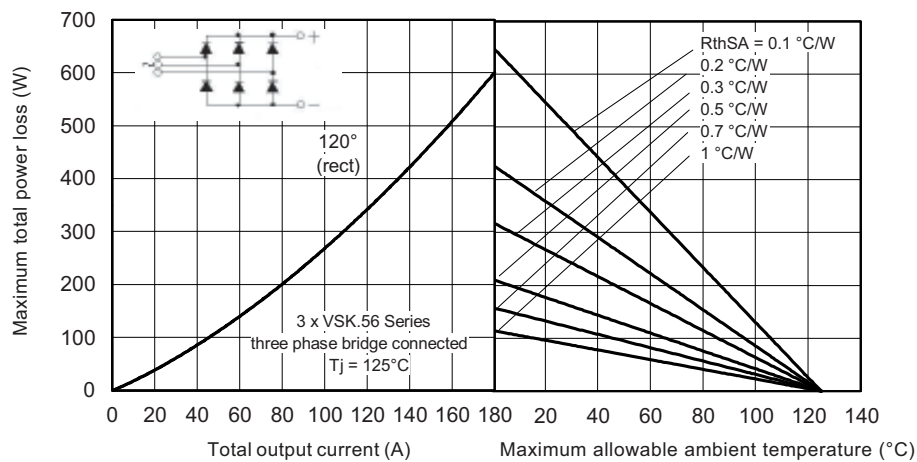


Fig. 18 - On-State Power Loss Characteristics



# VS-VSK.41., VS-VSK.56.. Series

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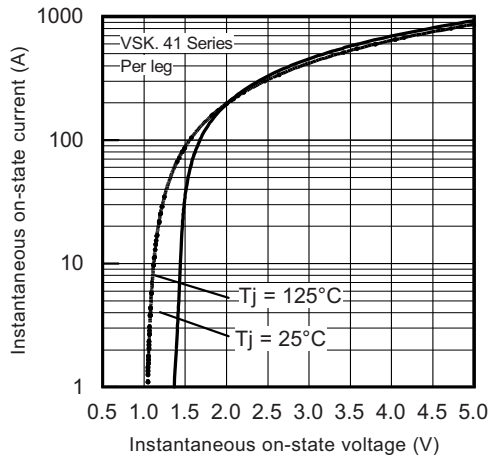


Fig. 19 - On-State Voltage Drop Characteristics

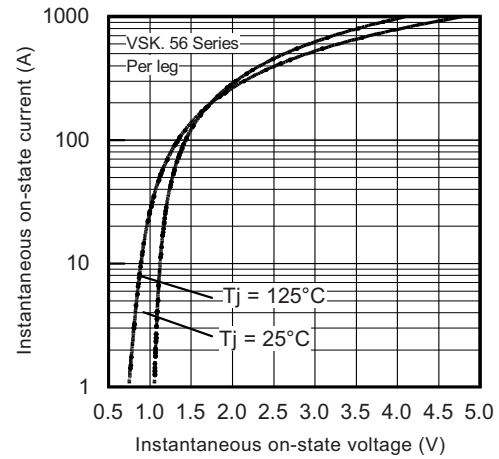


Fig. 20 - On-State Voltage Drop Characteristics

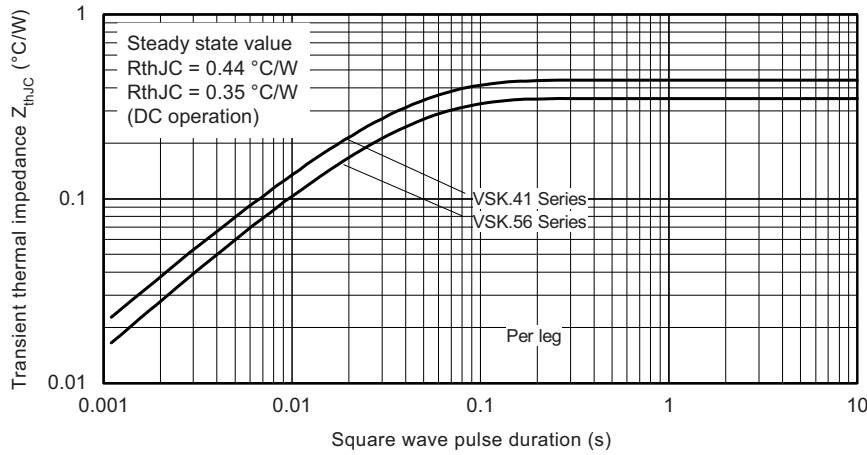


Fig. 21 - Thermal Impedance  $Z_{thJC}$  Characteristics

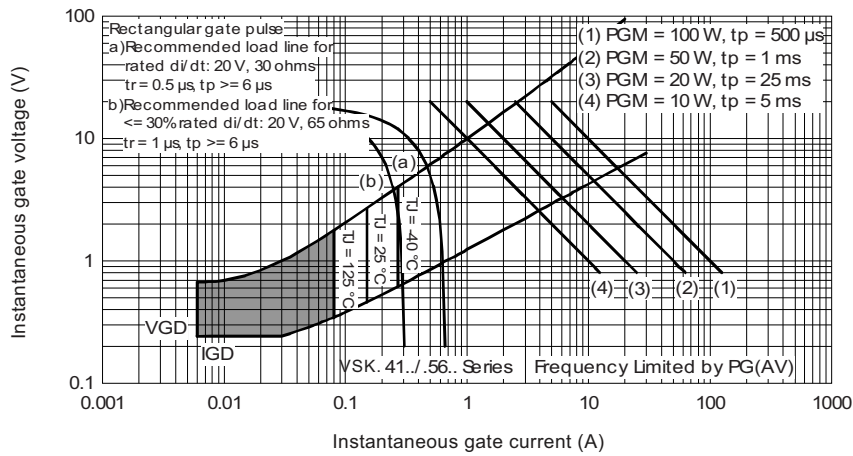


Fig. 22 - Gate Characteristics



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# VS-VSK.41.., VS-VSK.56.. Series

Vishay Semiconductors

## ORDERING INFORMATION TABLE

Device code	<b>VS-VS</b>	<b>K</b>	<b>T</b>	<b>56</b>	<b>/</b>	<b>16</b>
	①	②	③	④		⑤
	1	-	Vishay Semiconductors product			
	2	-	Module type			
	3	-	Circuit configuration (see Circuit configuration table)			
	4	-	Current code		41 = 45 A	
	5	-	Voltage code (see Voltage Ratings table)		56 = 60 A	

**Note**

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

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two SCRs doubler circuit	T	
SCR/diode doubler circuit, positive control	H	
SCR/diode doubler circuit, negative control	L	
SCR/diode common anodes	N	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95368">www.vishay.com/doc?95368</a>

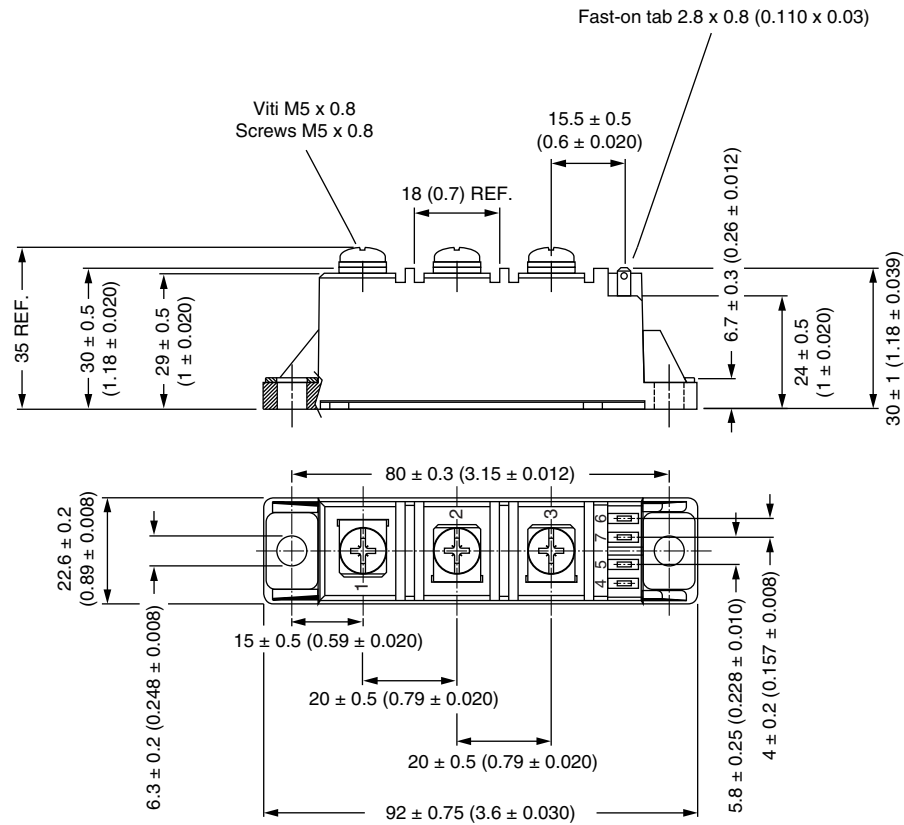


# Outline Dimensions

Vishay Semiconductors

## ADD-A-PAK Generation VII - Thyristor

**DIMENSIONS** in millimeters (inches)





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