AAP Gen 7 (TO-240AA)
Power Modules Standard Diodes, 60 A

ADD-A-PAK

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?99912

RoHS COMPLIANT

BENEFITS

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

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	60 A
Type	Modules - diode, high voltage
Package	AAP Gen 7 (TO-240AA)
Circuit configuration	Two diodes doubler circuit, two diodes common cathode, two diodes common anode, single diode

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.

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	VALUES	UNITS
$I_{F(AV)}$		60	A
	T_C	114	°C
$I_{F(RMS)}$		94	A
I_{FSM}	50 Hz	1300	
	60 Hz	1360	
I^2t	50 Hz	8.44	kA^2s
	60 Hz	7.68	
$I^2\sqrt{t}$		84.5	$kA^2\sqrt{s}$
V_{RRM}	Range	400 to 1600	V
T_{Stg}		-40 to +150	°C
T_J		-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} MAXIMUM AT T_J = 150 °C mA
VS-VSK.56	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			VALUES	UNITS
Maximum average forward current at case temperature	$I_{F(AV)}$	180° conduction, half sine wave			60	A
					114	°C
Maximum RMS forward current	$I_{F(RMS)}$				94	A
Maximum peak, one-cycle forward, non-repetitive surge current	I_{FSM}	t = 10 ms	No voltage reapplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	1300	
		t = 8.3 ms			1360	
		t = 10 ms	100 % V_{RRM} reapplied		1090	
		t = 8.3 ms			1140	
Maximum I^2t for fusing	I^2t	t = 10 ms	No voltage reapplied		8.44	kA^2s
		t = 8.3 ms			7.68	
		t = 10 ms	100 % V_{RRM} reapplied		5.97	
		t = 8.3 ms			5.43	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied			84.5	$kA^2\sqrt{s}$
Low level value of threshold voltage	$V_{F(TO)1}$	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.74	V
High level value of threshold voltage	$V_{F(TO)2}$	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			0.86	
Low level value of forward slope resistance	r_{f1}	(16.7 % x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ maximum			3.94	mΩ
High level value of forward slope resistance	r_{f2}	(I > π x $I_{F(AV)}$), $T_J = T_J$ maximum			3.43	
Maximum forward voltage drop	V_{FM}	I_{FM} = π x $I_{F(AV)}$, T_J = 25 °C, t_p = 400 µs square wave			1.6	V

BLOCKING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak reverse leakage current	I_{RRM}	T_J = 150 °C	10	mA
Maximum RMS insulation voltage	V_{INS}	50 Hz	3000 (1 min) 3600 (1 s)	V

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Junction and storage temperature range	T_J, T_{Stg}		-40 to +150	°C
Maximum internal thermal resistance, junction to case per leg	R_{thJC}	DC operation	0.33	°C/W
Typical thermal resistance, case to heat sink per module	R_{thCS}	Mounting surface flat, smooth and greased	0.1	°C/W
Mounting torque ± 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
Mounting torque ± 10 % busbar			3	Nm
Approximate weight			75	g
			2.7	oz.
Case style		JEDEC®	AAP Gen 7 (TO-240AA)	

ΔR CONDUCTION PER JUNCTION											
DEVICES	**SINE HALF WAVE CONDUCTION**					**RECTANGULAR WAVE CONDUCTION**					**UNITS**
	180°	**120°**	**90°**	**60°**	**30°**	**180°**	**120°**	**90°**	**60°**	**30°**	
VSK.56	0.115	0.136	0.173	0.236	0.346	0.09	0.145	0.185	0.243	0.349	°C/W

Note

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

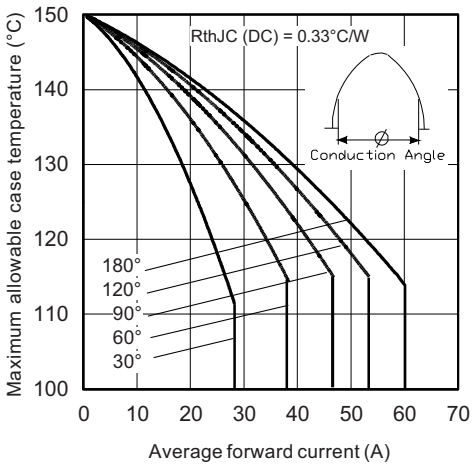


Fig. 1 - Current Ratings Characteristics

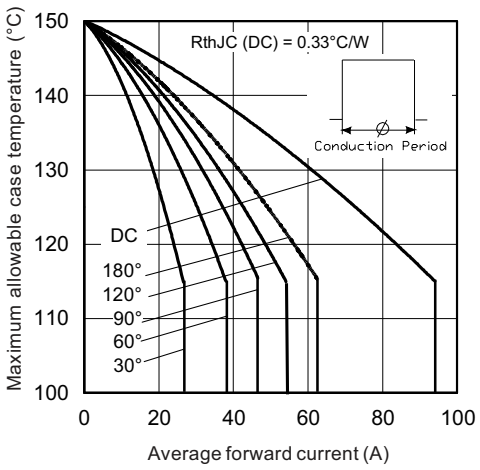


Fig. 2 - Current Ratings Characteristics

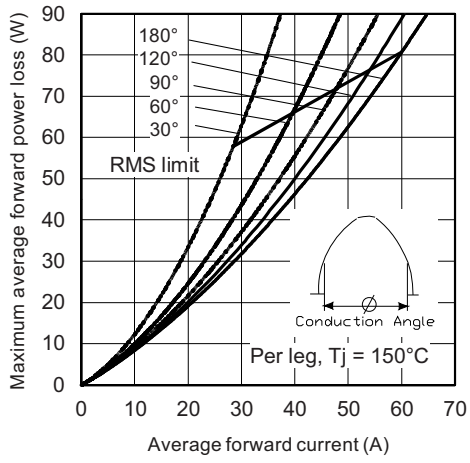


Fig. 3 - Forward Power Loss Characteristics

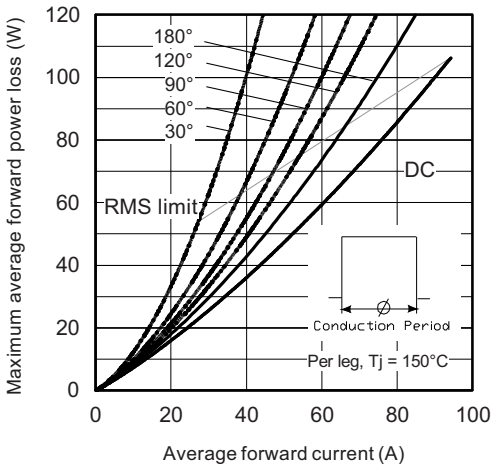


Fig. 4 - Forward Power Loss Characteristics

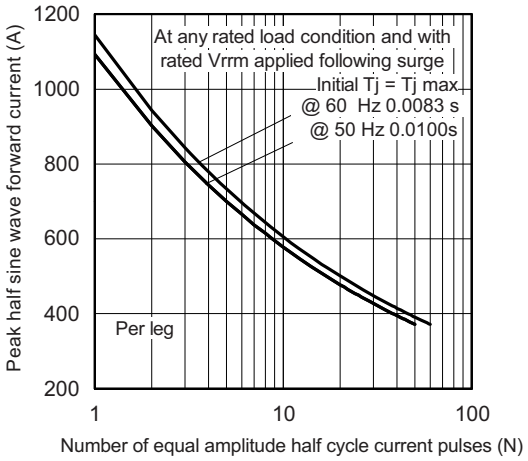


Fig. 5 - Maximum Non-Repetitive Surge Current

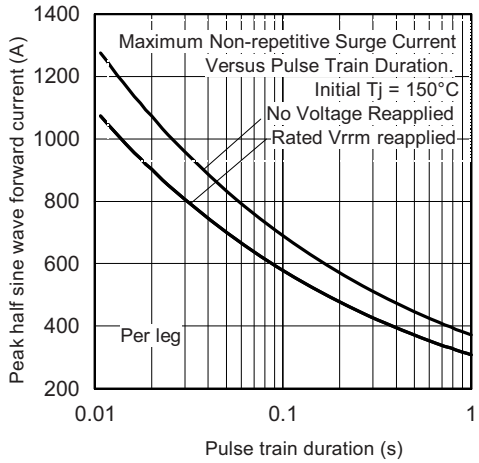


Fig. 6 - Maximum Non-Repetitive Surge Current

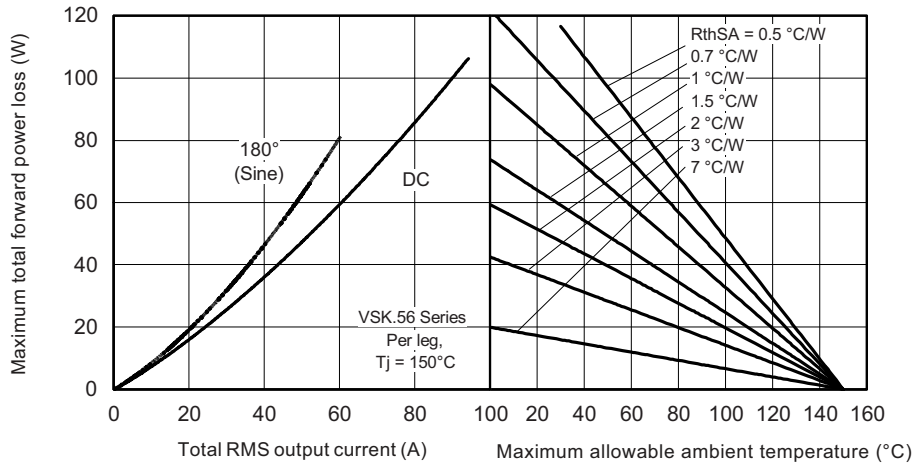


Fig. 7 - Forward Power Loss Characteristics

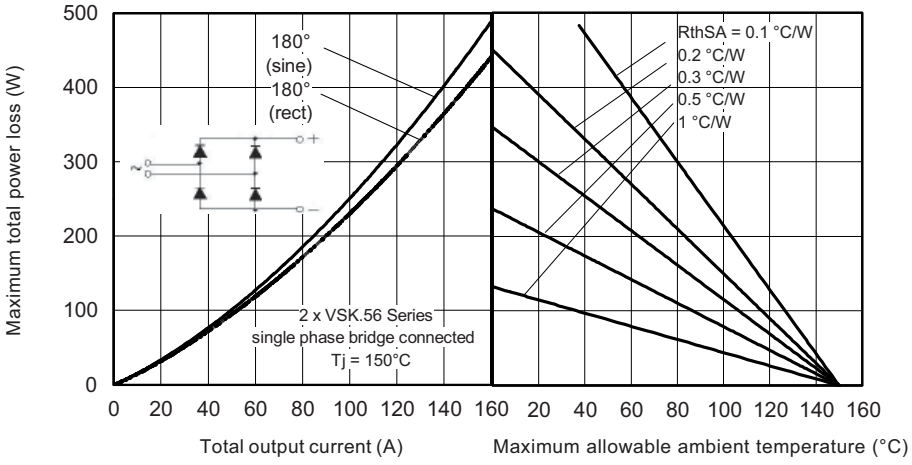


Fig. 8 - Forward Power Loss Characteristics

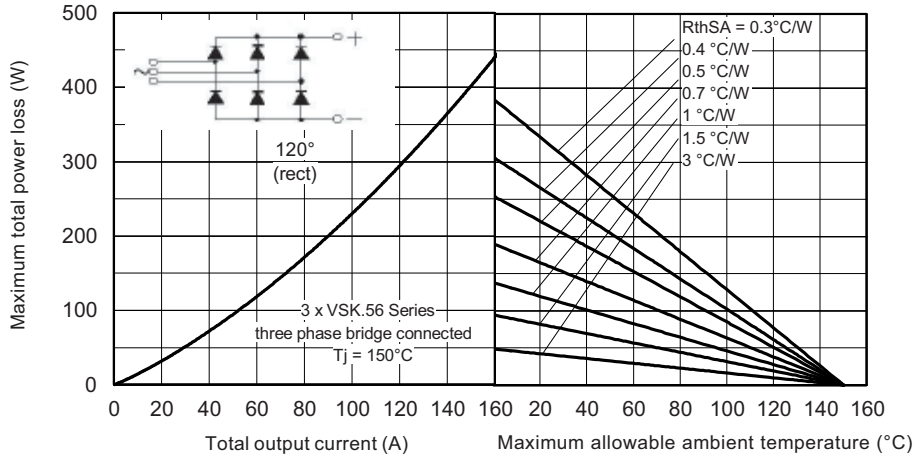


Fig. 9 - Forward Power Loss Characteristics

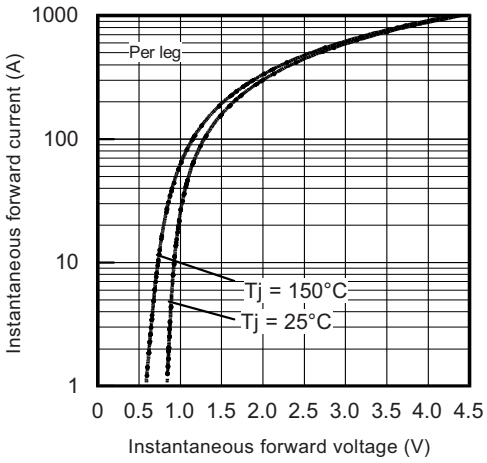


Fig. 10 - Forward Voltage Characteristics

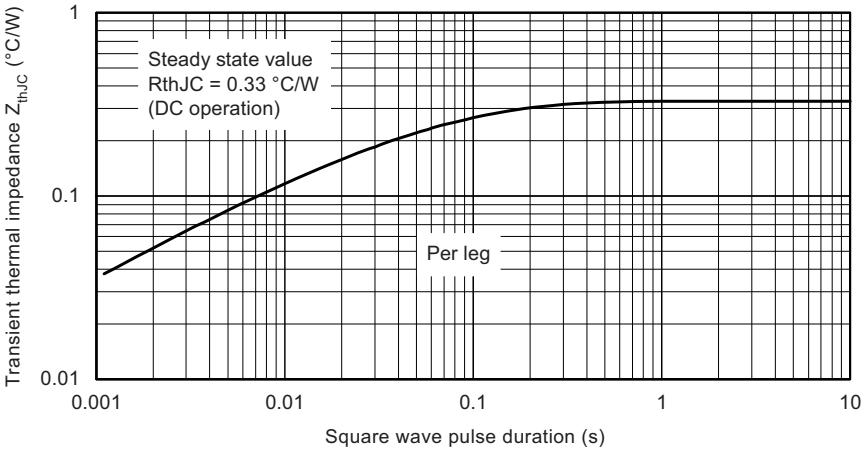


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

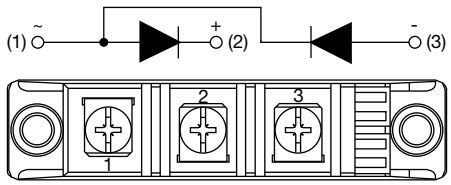
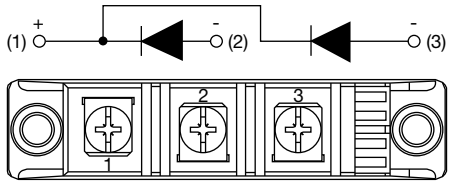
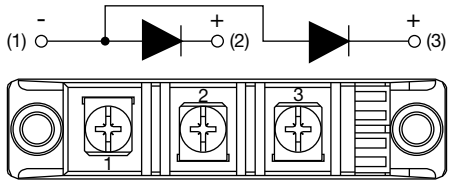
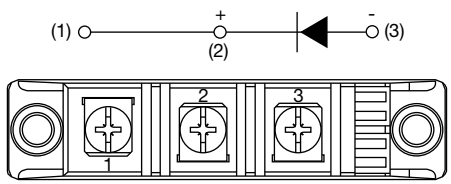
ORDERING INFORMATION TABLE

Device code	VS-VS	K	D	56	/	16
	1	2	3	4		5

- 1 - Vishay Semiconductors product
- 2 - Module type
- 3 - Circuit configuration (see Circuit Configuration table)
- 4 - Current code (60 A)
- 5 - Voltage code (see Voltage Ratings table)

Note

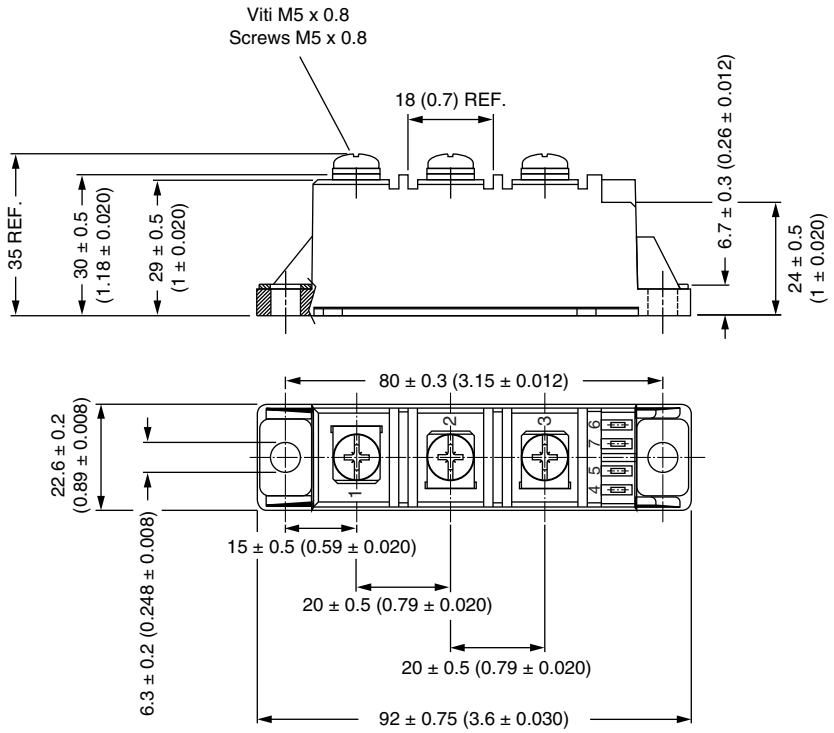
- To order the optional hardware go to www.vishay.com/doc?95172

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

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95369

ADD-A-PAK Generation VII - Diode

DIMENSIONS in millimeters (inches)



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