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AAP Gen 7 (TO-240AA) Power Modules Thyristor/Diode and Thyristor/Thyristor, 95 A



ADD-A-PAK

PRIMARY CHARACTERISTICS					
I _{T(AV)} or I _{F(AV)} 95 A					
Туре	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.

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

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.

MAJOR RATINGS AND CHARACTERISTICS						
SYMBOL	CHARACTERISTICS	VALUES	UNITS			
I _{T(AV)} or I _{F(AV)}	85 °C	95				
I _{O(RMS)}	As AC switch	210	Α			
I _{TSM} ,	50 Hz	2000	A			
I _{FSM}	60 Hz	2094				
12t	50 Hz	20	kA ² s			
1-1	60 Hz	18.26	KA-S			
l ² √t		200	kA²√s			
V _{RRM}	Range	400 to 1600	V			
T _{Stg}		-40 to +125	°C			
T _J		-40 to +125	°C			

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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	V _{DRM} , MAXIMUM REPETITIVE PEAK OFF-STATE VOLTAGE, GATE OPEN CIRCUIT V	I _{RRM,} I _{DRM} AT 125 °C mA		
	04	400	500	400			
	06	600	700	600			
	08	800	900	800			
VS-VSK.91	10	1000	1100	1000	15		
	12	1200	1300	1200			
	14	1400	1500	1400			
	16	1600	1700	1600			

ON-STATE CONDUCTION						
PARAMETER	SYMBOL	TEST CONDITIONS			VALUES	UNITS
Maximum average on-state current (thyristors)	I _{T(AV)}	180° conduction	180° conduction, half sine wave,			
Maximum average forward current (diodes)	I _{F(AV)}	T _C = 85 °C	$T_C = 85$ °C			
Maximum continuous RMS on-state current, as AC switch	I _{O(RMS)}		or or I _(RMS)			Α
		t = 10 ms	No voltage		2000	
Maximum peak, one-cycle non-repetitive	I _{TSM}	t = 8.3 ms	reapplied	Sinusoidal half wave,	2094	
on-state or forward current	or I _{FSM}	t = 10 ms	100 % V _{RRM}	initial $T_J = T_J$ maximum	1682	
	1 Olvi	t = 8.3 ms	reapplied	. 0 0	1760	
		t = 10 ms	No voltage		20	- kA ² s
Maximum I ² t for fusing	l ² t	t = 8.3 ms	reapplied		18.26	
	1-1	t = 10 ms	100 % V _{RRM}	Initial $T_J = T_J$ maximum	14.14	
		t = 8.3 ms	reapplied		12.91	
Maximum I²√t for fusing	I ² √t ⁽¹⁾		$t = 0.1$ ms to 10 ms, no voltage reapplied $T_J = T_J$ maximum			kA²√s
Manifestoria de la contra dela contra de la contra del contra de la contra del contra d	V (2)	Low level (3)	Low level ⁽³⁾ High level ⁽⁴⁾ T _J = T _J maximum		0.97	.,
Maximum value or threshold voltage	V _{T(TO)} (2)	High level (4)			1.1	V
Maximum value of on-state	(2)	Low level (3)	T T		2.76	0
slope resistance	r _t ⁽²⁾	High level (4)	$T_J = T_J$ maximum		2.38	mΩ
Manifestore and a second section of	V_{TM}	$I_{TM} = \pi \times I_{T(AV)}$			1.70	
Maximum peak on-state or forward voltage	V _{FM}	$I_{FM} = \pi \times I_{F(AV)}$	1 _J = 25 °C		1.73	V
Maximum non-repetitive rate of rise of turned on current	dl/dt	$T_J = 25$ °C, from 0.67 V_{DRM} , $I_{TM} = \pi \times I_{T(AV)}$, $I_g = 500$ mA, $t_r < 0.5$ μ s, $t_p > 6$ μ s			150	A/µs
Maximum holding current	I _H	T _J = 25 °C, anode supply = 6 V, resistive load, gate open circuit			250	mA
Maximum latching current	ΙL	T _J = 25 °C, and	ode supply = 6 \	V, resistive load	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 %} $\times \pi \times I_{AV} < I < \pi \times I_{AV}$

 $^{^{(4)}~}I>\pi~x~I_{AV}$

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TRIGGERING					
PARAMETER	SYMBOL	TEST CO	NDITIONS	VALUES	UNITS
Maximum peak gate power	P _{GM}			12	W
Maximum average gate power	P _{G(AV)}			3.0	VV
Maximum peak gate current	I _{GM}			3.0	Α
Maximum peak negative gate voltage	- V _{GM}			10	
		T _J = -40 °C	Anode supply = 6 V resistive load	4.0	V
Maximum gate voltage required to trigger	V_{GT}	T _J = 25 °C		2.5	
		T _J = 125 °C		1.7	
		T _J = -40 °C		270	
Maximum gate current required to trigger	I _{GT}	T _J = 25 °C	Anode supply = 6 V resistive load	150	mA
		T _J = 125 °C	Tesistive load	80	
Maximum gate voltage that will not trigger	V_{GD}	T _J = 125 °C, rated V _{DRM} applied		0.25	V
Maximum gate current that will not trigger	I_{GD}	T _J = 125 °C, rated V _{DRM} applied		6	mA

BLOCKING								
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS				
Maximum peak reverse and off-state leakage current at V _{RRM} , V _{DRM}	I _{RRM,} I _{DRM}	T _J = 125 °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	$T_J = 125$ °C, linear to 0.67 V_{DRM}	1000	V/µs				

THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER		SYMBOL	SYMBOL TEST CONDITIONS		UNITS
Junction operating and storage temperature range		T _J , T _{Stg}		-40 to +125	°C
Maximum internal thermal resistance, junction to case per leg		R _{thJC}	DC operation	0.22	°C/W
Typical thermal resistance, case to heatsink per module		R _{thCS}	Mounting surface flat, smooth and greased	0.1	C/VV
Mounting torque + 10 %	to heatsink		A mounting compound is recommended and the torque should be rechecked after a period of	4	Nm
Mounting torque ± 10 % busbar			3 hours to allow for the spread of the compound.	3	NIII
Approximate weight				75	g
Approximate weight				2.7	oz.
Case style			JEDEC®	AAP Gen 7	(TO-240AA)

AR CONDUCTION PER JUNCTION											
DEVICES	\$	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION				LINUTO
DEVICES	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	UNITS
VSK.91	0.04	0.048	0.063	0.085	0.125	0.033	0.052	0.067	0.088	0.127	°C/W

Note

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

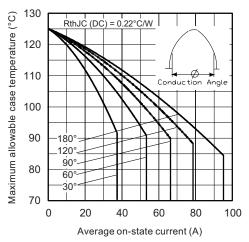


Fig. 1 - Current Ratings Characteristics

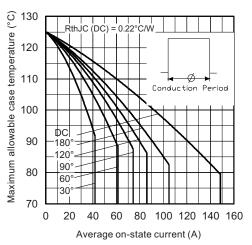


Fig. 2 - Current Ratings Characteristics

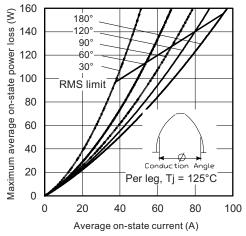


Fig. 3 - On-State Power Loss Characteristics

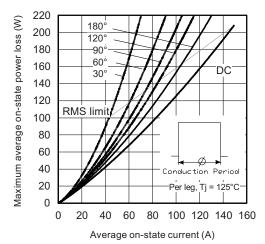
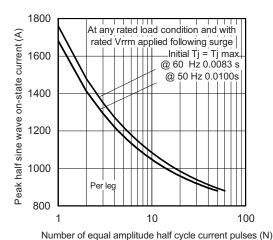


Fig. 4 - On-State Power Loss Characteristics





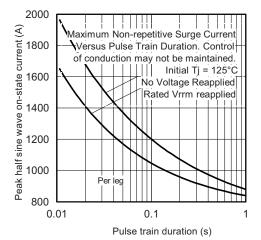


Fig. 6 - Maximum Non-Repetitive Surge Current

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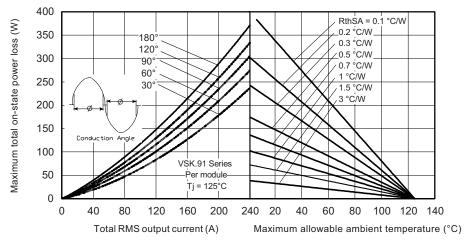


Fig. 7 - On-State Power Loss Characteristics

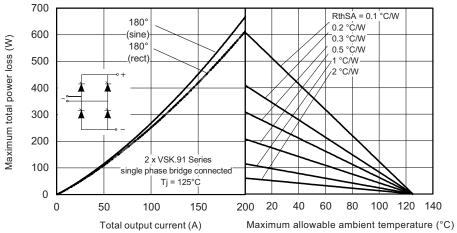


Fig. 8 - On-State Power Loss Characteristics

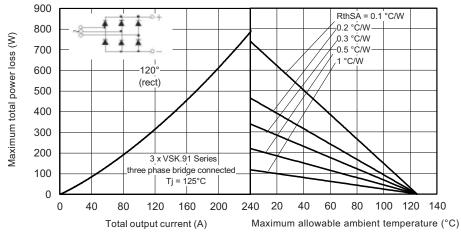


Fig. 9 - On-State Power Loss Characteristics

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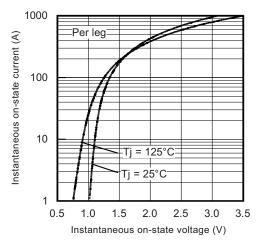


Fig. 10 - On-State Voltage Drop Characteristics

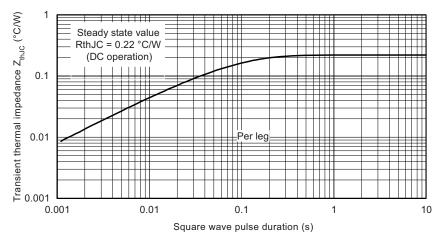


Fig. 11 - Thermal Impedance Z_{thJC} Characteristics

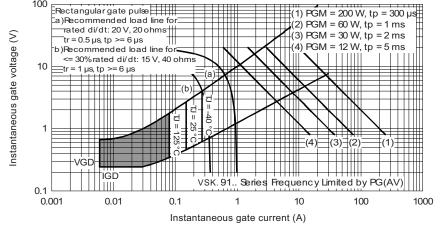


Fig. 12 - Gate Characteristics

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ORDERING INFORMATION TABLE

1 - Vishay Semiconductors product

2 - Module type

- Circuit configuration (see Circuit Configuration table)

Current code (95 A)

5 - Voltage code (see Voltage Ratings table)

Note

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

CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Two SCRs doubler circuit	Т	VSKT (2) (3) (3) (4) (5) (7) (6) (7) (6)
SCR/diode doubler circuit, positive control	н	VSKH 1
SCR/diode doubler circuit, negative control	L	VSKL 1 2 G2 (7) (6)
SCR/diode common anodes	N	VSKN 1

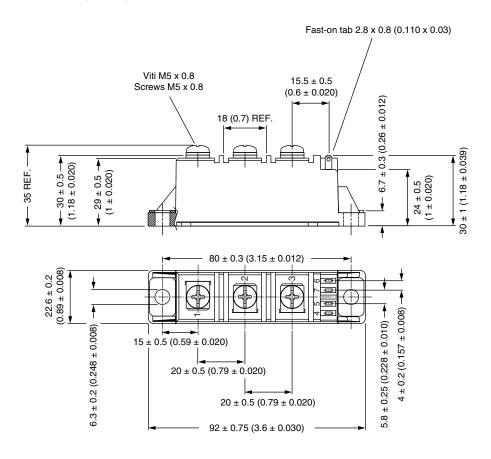
LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?95368			



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ADD-A-PAK Generation VII - Thyristor

DIMENSIONS in millimeters (inches)





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