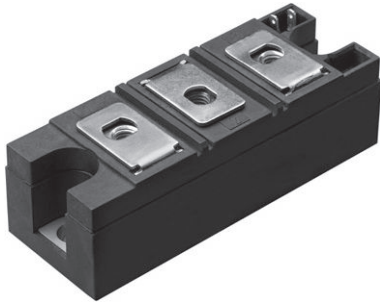



## INT-A-PAK Power Module Thyristor/Diode, 300 A



INT-A-PAK

### FEATURES

- Electrically isolated base plate
- 3000 V<sub>RMS</sub> isolating voltage
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL approved file E78996 
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

$I_{T(AV)}$	300 A
Type	Modules -thyristor, standard
Package	INT-A-PAK

### APPLICATIONS

- Battery chargers
- Welders
- Power converters
- Alternators

### MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{DRM}/V_{RRM}$		800	V
$I_{T(AV)}$	53 °C	300	A
$I_{T(RMS)}$		116	A
$I_{TSM}$	50 Hz	6500	A
	60 Hz	6900	
$I^2t$	50 Hz	214	kA <sup>2</sup> s
	60 Hz	195	
$I^2\sqrt{t}$		2140	kA <sup>2</sup> √s
$T_J$	Range	-40 to +140	°C

### 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
VS-VSKL300/08PbF	800	900	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		300	A
				53	°C
Maximum RMS on-state current	$I_{T(RMS)}$	As AC switch		116	A
Maximum peak, one-cycle on-state, non-repetitive surge current	$I_{TSM}$	t = 10 ms	No voltage reapplied	6600	
		t = 8.3 ms		6900	
		t = 10 ms	100 % $V_{RRM}$ reapplied	5500	
		t = 8.3 ms		5800	
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reapplied	214	kA <sup>2</sup> s
		t = 8.3 ms		195	
		t = 10 ms	100 % $V_{RRM}$ reapplied	151	
		t = 8.3 ms		138	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied		2140	kA <sup>2</sup> √s
Low level value of threshold voltage	$V_{T(TO)1}$	(16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ ), $T_J$ maximum		0.796	V
High level value of threshold voltage	$V_{T(TO)2}$	(I $> \pi \times I_{T(AV)}$ ), $T_J$ maximum		0.868	
Low level value on-state slope resistance	$r_{t1}$	(16.7 % $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$ ), $T_J$ maximum		0.972	mΩ
High level value on-state slope resistance	$r_{t2}$	(I $> \pi \times I_{T(AV)}$ ), $T_J$ maximum		0.88	
Maximum on-state voltage drop	$V_{TM}$	$T_J = 25\text{ °C}$ , $I_{pk} = 500\text{ A}$	SCR	1.35	V
	$V_{FM}$		DIODE	1.20	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Typical delay time	$t_d$	Gate current 1 A, $dI_g/dt = 1\text{ A}/\mu\text{s}$ $V_d = 0.67\% V_{DRM}$ , $T_J = 25\text{ °C}$		1.0	μs
Typical turn-off time	$t_q$	$I_{TM} = 300\text{ A}$ , $T_J = T_J$ maximum, $dI/dt = 20\text{ A}/\mu\text{s}$ , $V_R = 50\text{ V}$ $dV/dt = 20\text{ V}/\mu\text{s}$ , Gate 0 V 100 Ω, $t_p = 500\text{ μs}$		100	

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum critical rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum linear to 67 % rated $V_{DRM}$		500	V/μs
Maximum peak reverse and off-state leakage current	$I_{DRM}$ , $I_{RRM}$	$T_J = T_J$ maximum, rated $V_{DRM}/V_{RRM}$ applied		50	mA
RMS insulation voltage	$V_{INS}$	50 Hz, circuit to base, all terminal shorted, t = 1 s		3000	V



TRIGGERING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	$P_{GM}$	$T_J = T_J$ maximum, $t_p \leq 5$ ms	10.0	W
Maximum average gate power	$P_{G(AV)}$	$T_J = T_J$ maximum, $f = 50$ Hz, $d\% = 50$	2.0	
Maximum peak positive gate current	$I_{GM}$	$T_J = T_J$ maximum, $t_p \leq 5$ ms	3.0	A
Maximum required DC gate voltage to trigger	$V_{GT}$	$T_J = 25$ °C Anode supply: 12 V resistive load	3	V
Maximum required DC gate current to trigger	$I_{GT}$		200	mA
Maximum holding current	$I_H$		600	
Maximum peak positive gate voltage	$+V_{GM}$	$T_J = T_J$ maximum, $t_p \leq 5$ ms	20	V
Maximum peak negative gate voltage	$-V_{GM}$		5.0	
DC gate voltage not to trigger	$V_{GD}$	$T_J = T_J$ maximum Maximum gate current/voltage not to trigger is the maximum value which will not trigger any unit with rated $V_{DRM}$ anode to cathode applied	0.30	V
DC gate current not to trigger	$I_{GD}$		10	mA
Maximum non-repetitive rate of rise of turned-on current	$di/dt$	Gate drive 20 V, 20 $\Omega$ , $t_r \leq 1$ $\mu$ s $T_J = T_J$ maximum, anode voltage $\leq 80\%$ $V_{DRM}$	1000	A/ $\mu$ s

THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction operating temperature range	$T_J$		-40 to +140	°C
Maximum storage temperature range	$T_{Stg}$		-40 to +150	
Maximum thermal resistance, junction to case per junction	$R_{thJC}$	DC operation	0.19	K/W
Maximum thermal resistance, case to heatsink per module	$R_{thCS}$	Mounting surface smooth, flat and greased	0.035	
Mounting torque $\pm 10\%$	IAP to heatsink busbar to IAP	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
Approximate weight			500	g
			17.8	oz.
Case style			INT-A-PAK	

$\Delta R$ 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°	
VSKL300	0.019	0.022	0.028	0.041	0.068	0.013	0.023	0.031	0.043	0.069	K/W

**Note**

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

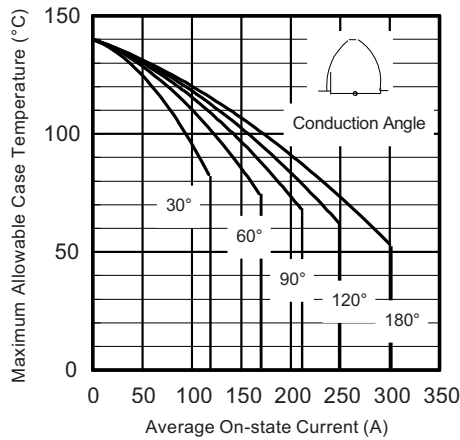


Fig. 1 - Current Ratings Characteristics

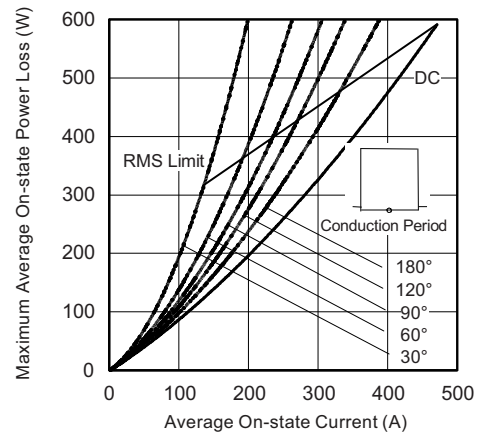


Fig. 4 - On-State Power Loss Characteristics

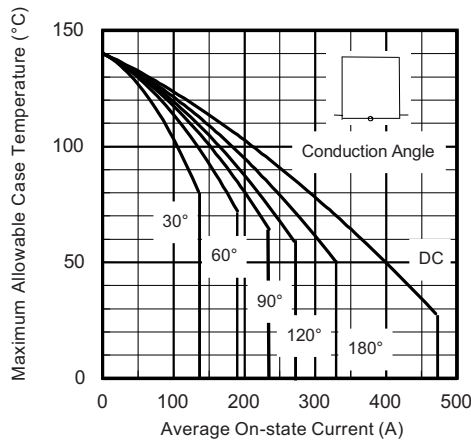


Fig. 2 - Current Ratings Characteristics

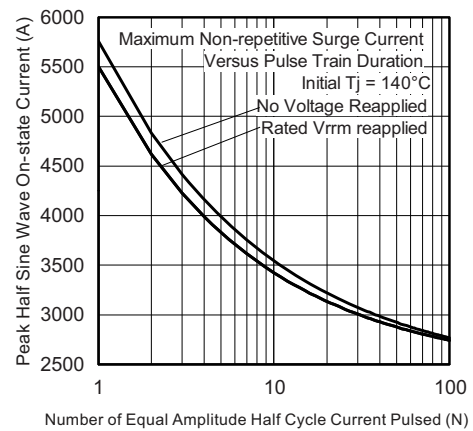


Fig. 5 - Maximum Non-Repetitive Surge Current

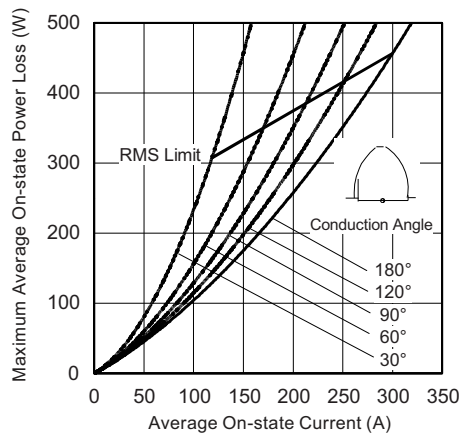


Fig. 3 - On-State Power Loss Characteristics

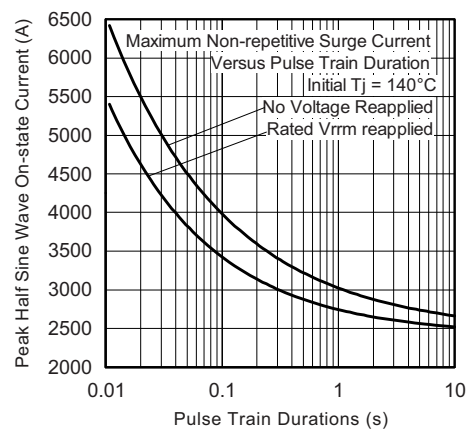


Fig. 6 - Maximum Non-Repetitive Surge Current

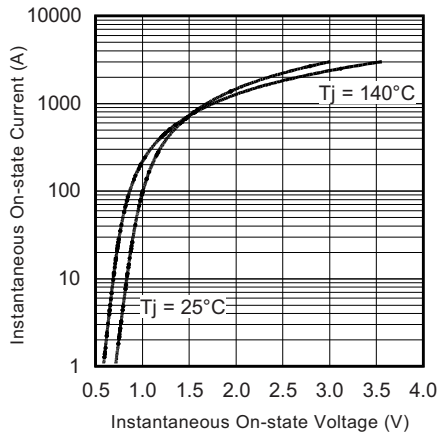


Fig. 7 - On-State Voltage Drop Characteristics (SCR)

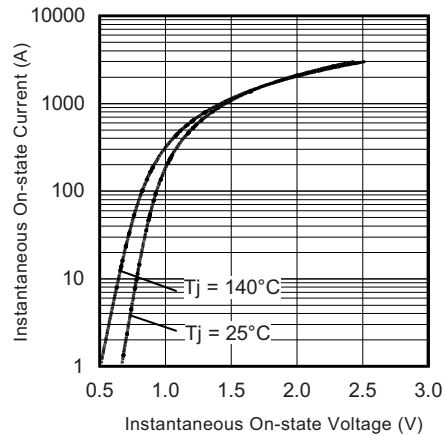


Fig. 8 - On-State Voltage Drop Characteristics (Diode)

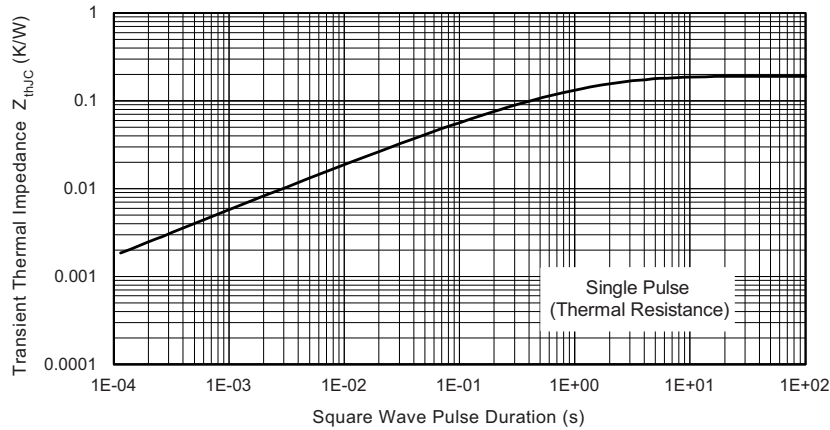


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-VS</b>	<b>KL</b>	<b>300</b>	<b>08</b>	<b>PbF</b>
	①	②	③	④	⑤
	<b>1</b>	-	Vishay Semiconductors product		
	<b>2</b>	-	Circuit configuration		
	<b>3</b>	-	Current rating (300 = 300 A)		
	<b>4</b>	-	Voltage rating (08 = 800 V)		
	<b>5</b>	-	PbF = Lead (Pb)-free		

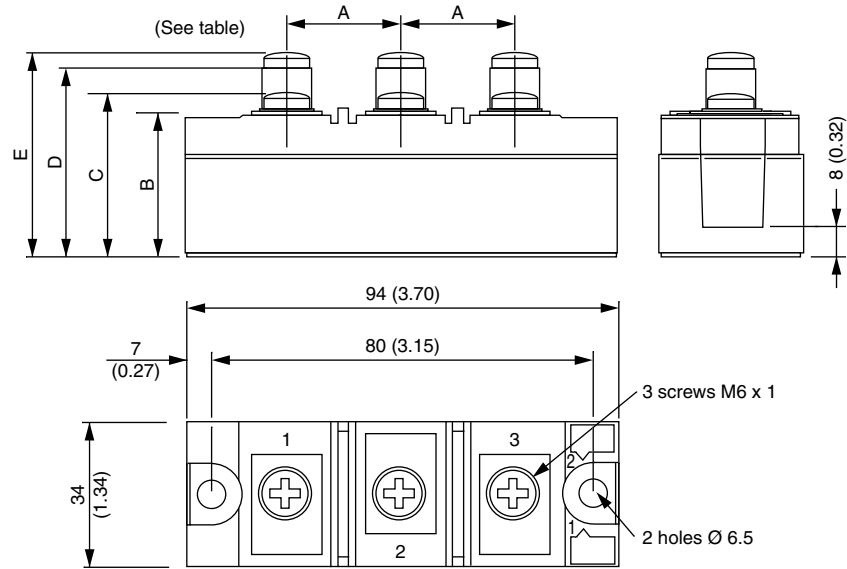


CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
SCR/diode doubler circuit, negative control	L	

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95010">www.vishay.com/doc?95010</a>

## INT-A-PAK Diode

**DIMENSIONS** in millimeters (inches)



A	B	C	D	E
23 (0.91)	30 (1.18)	36 (1.42)	-	-



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