

## SOT-227 Single Thyristor Power Module, 160 A, 1200 V



SOT-227


**RoHS**  
COMPLIANT

### FEATURES

- High voltage
- Industrial standard package
- Low thermal resistance
- UL pending
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### BENEFITS

- Excellent thermal performances
- High surge capability
- Easy mounting on heatsink
- Thyristor for line frequency

### APPLICATIONS

Line rectifying 50 Hz / 60 Hz

- Softstart AC motor control
- DC motor control
- Power converter
- AC power control
- Lighting and temperature control

PRIMARY CHARACTERISTICS	
$V_{RRM} / V_{DRM}$	1200 V
$V_{TM}$ (typical) at 150 A, 25 °C	1.3 V
$I_{T(AV)}$ , $T_C = 75$ °C	158 A <sup>(1)</sup>
Package	SOT-227
Circuit	Single thyristor

#### Note

- <sup>(1)</sup> Maximum continuous collector current admitted 100 A to do not exceed the maximum temperature of terminals

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}$	75 °C	158	A
$I_{TSM}$	50 Hz	1390	
	60 Hz	1455	
$I^2t$	50 Hz	9.6	kA <sup>2</sup> s
	60 Hz	8.8	
$I^2\sqrt{t}$		96.6	kA <sup>2</sup> √s
$V_{RRM} / V_{DRM}$		1200	V
$T_{Stg}$		-40 to +125	°C
$T_J$		-40 to +125	

### ELECTRICAL SPECIFICATIONS

VOLTAGE RATINGS			
$V_{RRM}$ , 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
1200	1300	1200	10



ON-STATE CONDUCTION					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current (thyristors)	$I_{T(AV)}$	180° conduction, half sine wave, $T_C = 75\text{ °C}$		158	
Maximum peak, one-cycle non-repetitive on-state	$I_{TSM}$	t = 10 ms	No voltage reappplied	Sinusoidal half wave, initial $T_J = T_J$ maximum	1390
		t = 8.3 ms			1455
		t = 10 ms	100 % $V_{RRM}$ reappplied		1169
		t = 8.3 ms			1224
Maximum $I^2t$ for fusing	$I^2t$	t = 10 ms	No voltage reappplied	Initial $T_J = T_J$ maximum	9.6
		t = 8.3 ms			8.8
		t = 10 ms	100 % $V_{RRM}$ reappplied		6.8
		t = 8.3 ms			6.2
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$ (1)	t = 0.1 ms to 10 ms, no voltage reappplied $T_J = T_J$ maximum		96.6	$kA^2\sqrt{s}$
Maximum value or threshold voltage	$V_{T(TO)}$ (2)	Low level (3)	$T_J = T_J$ maximum	0.82	V
		High level (4)		0.86	
Maximum value of on-state slope resistance	$r_t$ (2)	Low level (3)	$T_J = T_J$ maximum	3.95	mΩ
		High level (4)		3.91	
Maximum peak on-state voltage	$V_{TM}$	$I_{TM} = 150\text{ A}$	$T_J = 25\text{ °C}$	1.45	V
			$T_J = 150\text{ °C}$	1.41	
Maximum non-repetitive rate of rise of turned on current	$di/dt$	$T_J = 25\text{ °C}$ , from 0.67 $V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500\text{ mA}$ , $t_r < 0.5\text{ }\mu s$ , $t_p > 6\text{ }\mu s$		150	A/ $\mu s$
Maximum holding current	$I_H$	$T_J = 25\text{ °C}$ , anode supply = 6 V, resistive load, gate open circuit		250	mA
Maximum latching current	$I_L$	$T_J = 25\text{ °C}$ , anode 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)  $I > \pi \times I_{AV}$

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	$P_{GM}$			12	W
Maximum average gate power	$P_{G(AV)}$			3	
Maximum peak gate current	$I_{GM}$			3	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum gate voltage required to trigger	$V_{GT}$	$T_J = -40\text{ °C}$		4.0	
		$T_J = 25\text{ °C}$		2.1	
		$T_J = 125\text{ °C}$		1.7	
Maximum gate current required to trigger	$I_{GT}$	$T_J = -40\text{ °C}$		270	mA
		$T_J = 25\text{ °C}$		150	
		$T_J = 125\text{ °C}$		80	
Maximum gate voltage that will not trigger	$V_{GD}$	$T_J = 150\text{ °C}$ , 80 % $V_{DRM}$ applied		0.2	V
Maximum gate current that will not trigger	$I_{GD}$	$T_J = 150\text{ °C}$ , 80 % $V_{DRM}$ applied		10	mA

BLOCKING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak reverse and off-state leakage current at $V_{RRM}$ , $V_{DRM}$	$I_{RRM}$ , $I_{DRM}$	$T_J = 125\text{ °C}$ , gate open circuit		10	mA
Maximum RMS insulation voltage	$V_{INS}$	50 Hz		2500 (1 min)	V
Maximum critical rate of rise of off-state voltage	$dV/dt$	$T_J = 150\text{ °C}$ , linear to 0.8 $V_{DRM}$		1000	V/ $\mu s$



THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Junction operating temperature range	$T_J$		-40 to +125	$^{\circ}\text{C}$
Storage temperature range	$T_{\text{Stg}}$			
Maximum internal thermal resistance, junction to case per leg	$R_{\text{thJC}}$	DC operation	0.2	$^{\circ}\text{C}/\text{W}$
Typical thermal resistance, case to heat sink per module	$R_{\text{thCS}}$	Mounting surface flat, smooth, and greased	0.1	
Mounting torque $\pm 10\%$		to heat sink busbar	1.3	Nm
Approximate weight			30	g
Case style			SOT-227	

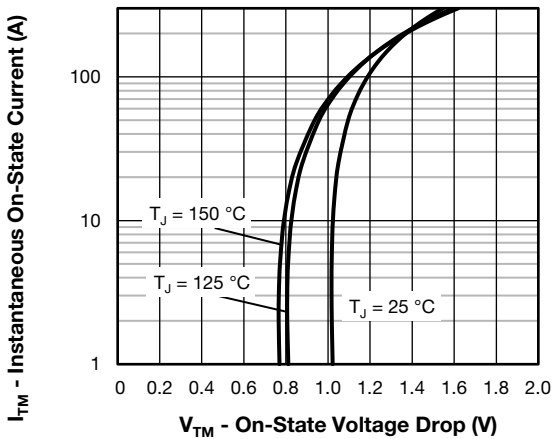


Fig. 1 -  $I_{\text{TM}}$  vs.  $V_{\text{TM}}$  (On-State Voltage Drop Characteristics)

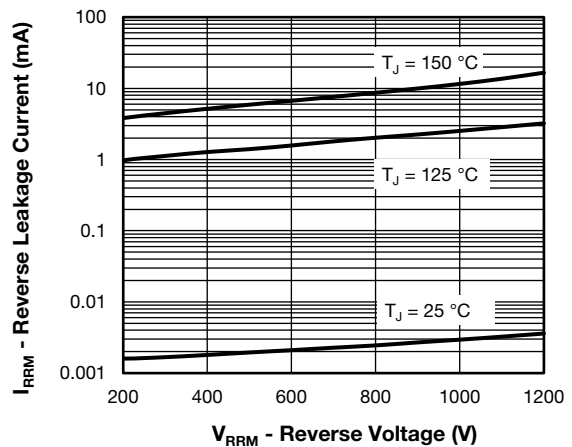


Fig. 3 -  $I_{\text{RRM}}$  vs.  $V_{\text{RRM}}$  (Reverse Leakage Current)

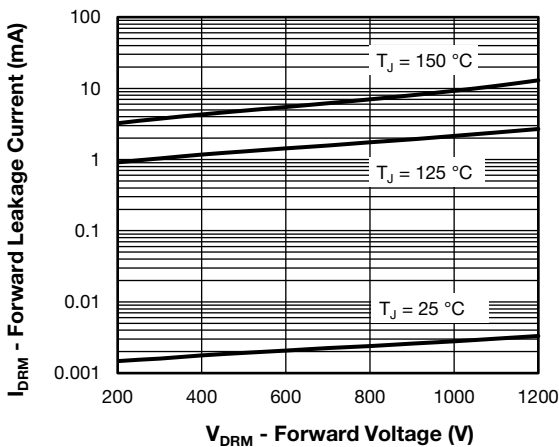


Fig. 2 -  $I_{\text{DRM}}$  vs.  $V_{\text{DRM}}$  (Forward Leakage Current)

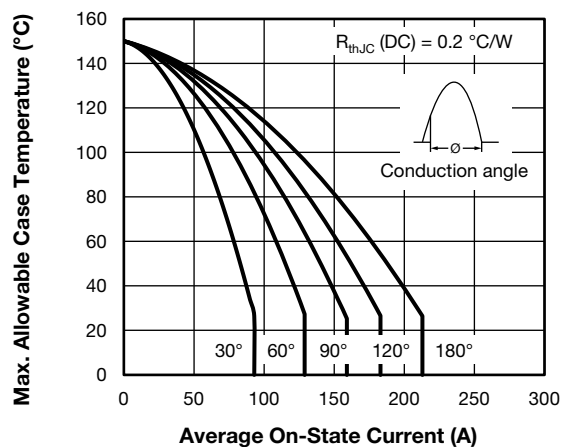


Fig. 4 - Maximum Allowable Case Temperature vs. Average On-State Current (Current Rating Characteristics)

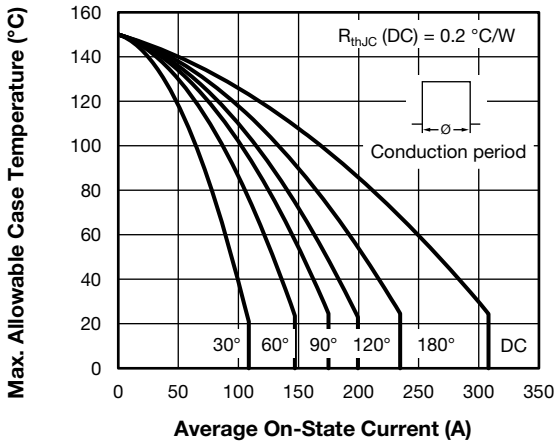


Fig. 5 - Maximum Allowable Case Temperature vs. Average On-State Current (Current Rating Characteristics)

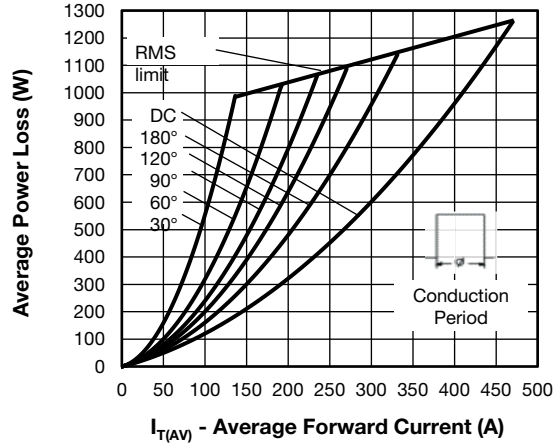


Fig. 7 - Average Power Loss vs. Average Forward Current (Forward Power Loss Characteristics)

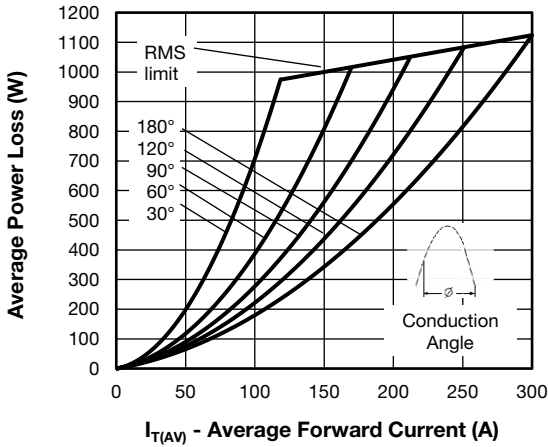


Fig. 6 - Average Power Loss vs. Average Forward Current (Forward Power Loss Characteristics)

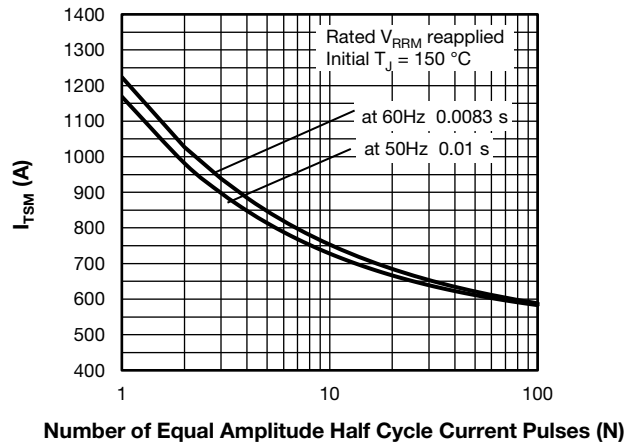


Fig. 8 -  $I_{TSM}$  vs. N (Non-Repetitive peak Forward Surge Current vs. Number Pulses)

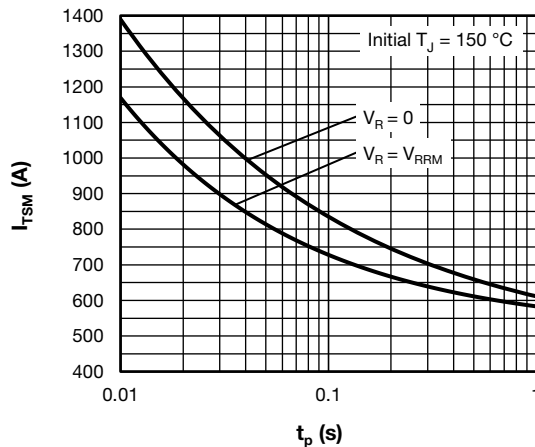
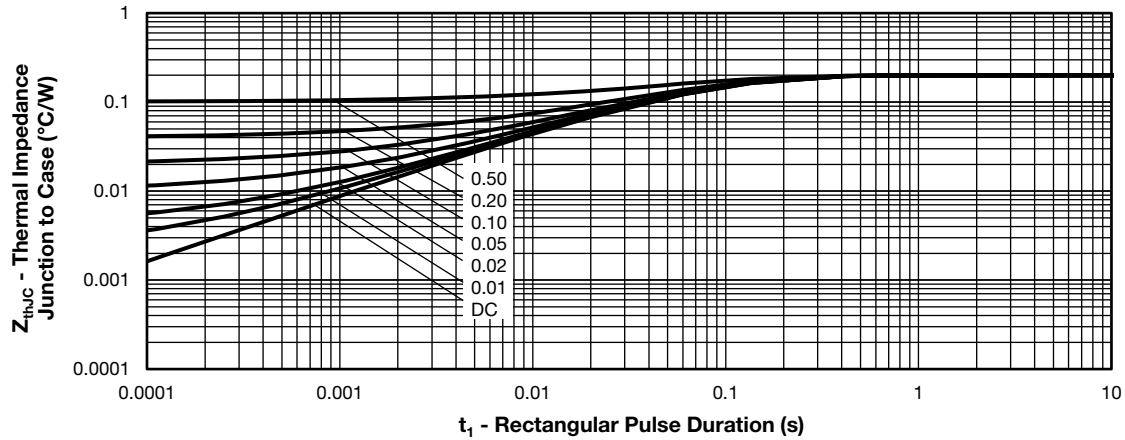


Fig. 9 -  $I_{TSM}$  vs.  $t_p$  (Non-Repetitive peak Forward Surge Current vs. Pulse Duration)


 Fig. 10 -  $Z_{thJC}$  Thermal Impedance Junction to Case vs.  $t_1$  Rectangular Pulse Duration (Maximum Thermal Impedance  $Z_{thJC}$  Characteristics)

**ORDERING INFORMATION TABLE**

Device code	VS-	T	A	160	S	A	120
	①	②	③	④	⑤	⑥	⑦

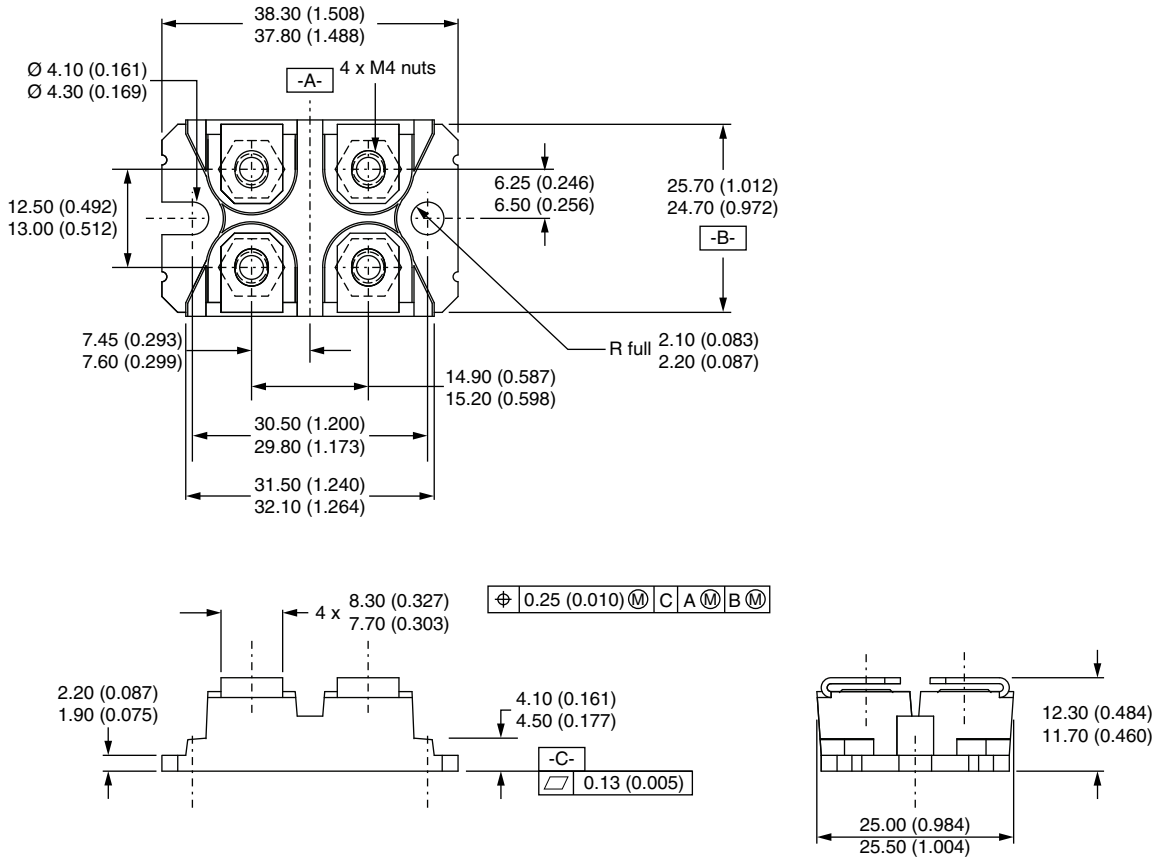
- 1** - Vishay Semiconductors product
- 2** - Thyristor dice
- 3** - Present silicon generation
- 4** - Rating current
- 5** - Single thyristor
- 6** - Isolated SOT-227
- 7** - Voltage rating 120 = 1200 V

CIRCUIT CONFIGURATION		
CIRCUIT DESCRIPTION	CIRCUIT CONFIGURATION CODE	CIRCUIT DRAWING
Single thyristor	S	<p style="text-align: center;">Lead Assignment</p>

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95423">www.vishay.com/doc?95423</a>
Packaging information	<a href="http://www.vishay.com/doc?95425">www.vishay.com/doc?95425</a>



**DIMENSIONS** in millimeters (inches): **SOT-227 Gen 2**



**Note**

- Controlling dimension: millimeter



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