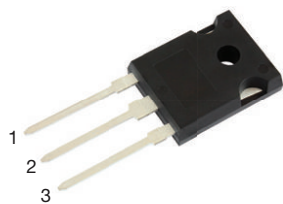
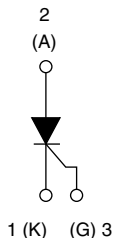


# Thyristor High Voltage, Phase Control SCR, 100 A



TO-247AD 3L



## FEATURES

- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- 150 °C maximum operating junction temperature
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## APPLICATIONS

Typical usage is in input rectification crowbar (soft start) and AC switch motor control, UPS, welding, and battery charge.

## DESCRIPTION

The VS-100TPS12L high voltage series of silicon controlled rectifiers are specifically designed for medium power switching, and phase control applications. The glass passivation technology used, has reliable operation up to 150 °C junction temperature.

## MECHANICAL DATA

**Case:** TO-247AD 3L

Molding compound meets UL 94 V-0 flammability rating

**Terminals:** matte tin plated leads, solderable per J-STD-002

## LINKS TO ADDITIONAL RESOURCES



### PRIMARY CHARACTERISTICS

$I_{T(AV)}$	100 A
$V_{DRM}/V_{RRM}$	1200 V
$V_{TM}$ (typ.)	1.17 V
$I_{GT}$	100 mA
$T_J$	-40 °C to +150 °C
Package	TO-247AD 3L
Circuit configuration	Single SCR

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}/V_{DRM}$		1200	V
On-state voltage	$V_T$	100 A, $T_J = 125$ °C, typical	1.17	
Average rectified forward current	$I_{T(AV)}$		100	A
Maximum continuous RMS on-state current	$I_{RMS}$		157	
Non-repetitive peak surge current	$I_{TSM}$	$T_J = 150$ °C, 10 ms sine	935	
Maximum rate of rise	$dV/dt$		1000	V/ $\mu$ s
Maximum operating junction and storage temperature range	$T_J, T_{Stg}$		-40 to +150	°C

### VOLTAGE RATINGS

PART NUMBER	$V_{RRM}/V_{DRM}$ , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	$V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	TYP. $I_{RRM}/I_{DRM}$ AT 150 °C mA
VS-100TPS12L-M3	1200	1300	28

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 103\text{ }^{\circ}\text{C}$ , $180^{\circ}$ conduction half sine wave	-	100	A
Maximum continuous RMS on-state current as AC switch	$I_{T(RMS)}$		-	157	
Peak, one-cycle non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	-	790	
$I^2t$ for fusing	$I^2t$	10 ms sine pulse, no voltage reapplied	-	935	$A^2s$
		10 ms sine pulse, rated $V_{RRM}$ applied	-	3090	
		10 ms sine pulse, no voltage reapplied	-	4370	
$I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied, $T_J = 150\text{ }^{\circ}\text{C}$	-	43 700	$A^2\sqrt{s}$
On-state voltage	$V_T$	100 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.22	1.37	V
		190 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.45	1.61	
		100 A, $T_J = 125\text{ }^{\circ}\text{C}$	1.17	1.26	
		190 A, $T_J = 125\text{ }^{\circ}\text{C}$	1.47	1.60	
Low level value of threshold voltage	$V_{T01}$	$T_J = 150\text{ }^{\circ}\text{C}$	-	0.82	V
High level value of threshold voltage	$V_{T02}$		-	0.93	
Low level value of on-state slope resistance	$r_{t1}$	$T_J = 150\text{ }^{\circ}\text{C}$	-	3.80	$m\Omega$
High level value of on-state slope resistance	$r_{t2}$		-	3.50	
Rate of rise of turned-on current	$di/dt$	$T_J = 150\text{ }^{\circ}\text{C}$ , $V_R < 800\text{ V}$ , $I_T = 100\text{ A}$ , $I_{gt} = 200\text{ mA}$ , $t_r < 100\text{ ns}$ , repetitive	-	200	$A/\mu s$
Rate of rise of turned-on current	$di/dt$	$T_J = 150\text{ }^{\circ}\text{C}$ , $V_R < 1000\text{ V}$ , $I_T = 100\text{ A}$ , $I_{gt} = 200\text{ mA}$ , $t_r < 100\text{ ns}$ , non repetitive	-	500	$A/\mu s$
Holding current	$I_H$	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	-	300	mA
Latching current	$I_L$		-	500	
Reverse and direct leakage current	$I_{RRM}/I_{DRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	30	100	$\mu A$
		$T_J = 125\text{ }^{\circ}\text{C}$	10	50	mA
		$T_J = 150\text{ }^{\circ}\text{C}$	28	70	
Rate of rise of off-state voltage	$dV/dt$	$T_J = T_J\text{ maximum}$ , linear to 80 % $V_{DRM}$ , $R_{g-k} = \text{open}$	-	1000	$V/\mu s$

**TRIGGERING**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Peak gate power	$P_{GM}$	10 ms sine pulse, no voltage reapplied	-	10	W
Average gate power	$P_{G(AV)}$		-	2.5	
Peak gate current	$I_{GM}$		-	2.5	A
Peak negative gate voltage	$-V_{GM}$		-	10	V
Required DC gate voltage to trigger	$V_{GT}$	$T_J = -40\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	1.2	1.7	
		$T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	1.0	1.5	
		$T_J = 125\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	0.7	1.3	
		$T_J = 150\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	0.6	1.1	
Required DC gate to trigger	$I_{GT}$	$T_J = -40\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	80	150	mA
		$T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	60	100	
		$T_J = 125\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	25	50	
		$T_J = 150\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	17	35	
DC gate voltage not to trigger	$V_{GD}$	$T_J = 150\text{ }^{\circ}\text{C}$ , $V_{DRM} = 80\text{ }^{\circ}\text{C}$ rated value	-	0.20	V
DC gate current not to trigger	$I_{GD}$		-	3.0	mA

**SWITCHING**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Turn-on time	$t_{gt}$	$I_T = 100\text{ A}$ , $V_D = 50\text{ }^{\circ}\text{C}$ $V_{DRM}$ , $I_{gt} = 300\text{ mA}$ , $T_J = 25\text{ }^{\circ}\text{C}$	1.8	-	$\mu s$
Turn-off time	$t_q$	$I_T = 100\text{ A}$ , $V_D = 80\text{ }^{\circ}\text{C}$ $V_{DRM}$ , $dV/dt = 20\text{ V}/\mu s$ , $t_p = 200\text{ }\mu s$ , $I_{gt} = 100\text{ mA}$ , $di/dt = 10\text{ A}/\mu s$ , $V_R = 100\text{ V}$ , $T_J = 150\text{ }^{\circ}\text{C}$	135	-	

 **$\Delta R_{thJ-HS}$  CONDUCTION PER JUNCTION**

DEVICE	SINE HALF-WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VS-100TPS12L-M3	0.032	0.047	0.042	0.044	0.046	0.030	0.039	0.041	0.044	0.046	°C/W

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	MAX.	UNITS
Maximum operating junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		-40	150	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>		-	0.25	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		-	40	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth, and greased	0.20		
Approximate weight			6		g
Mounting torque	minimum		6 (5)		kgf · cm (lbf · in)
	maximum		12 (10)		
Marking device		Case style TO-247AD 3L	100TPS12LH		

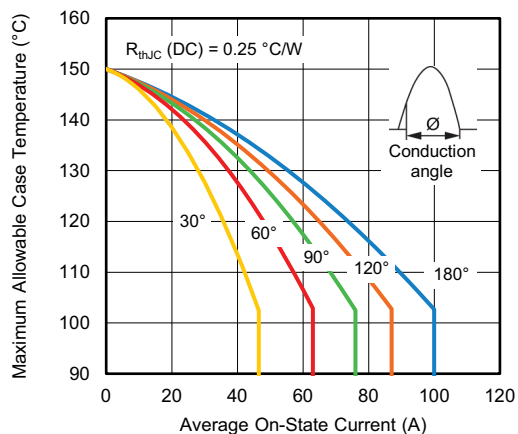


Fig. 1 - Current Rating Characteristics

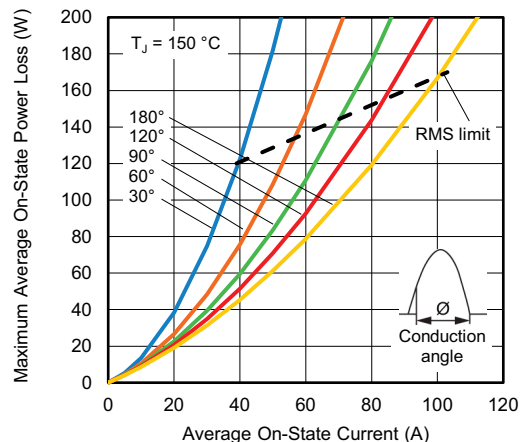


Fig. 3 - On-State Power Loss Characteristics

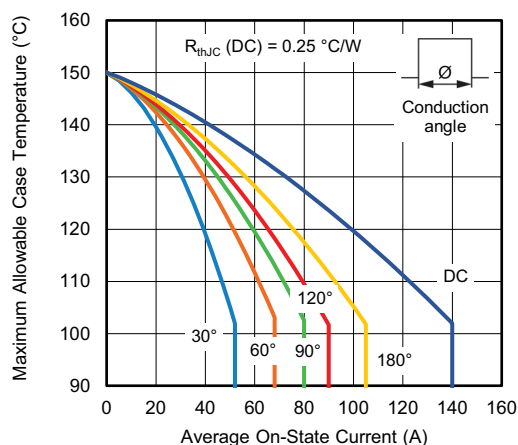


Fig. 2 - Current Rating Characteristics

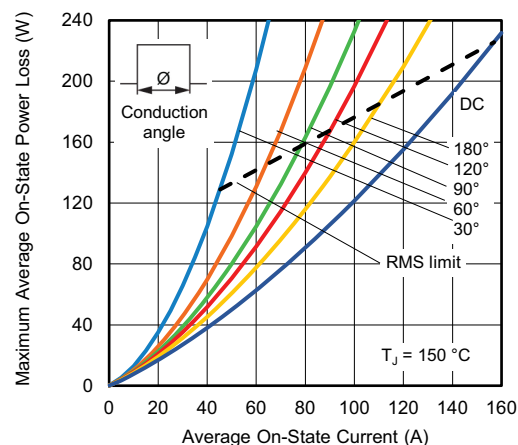


Fig. 4 - On-State Power Loss Characteristic

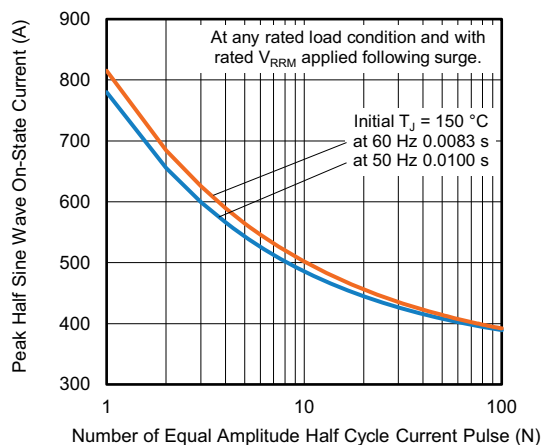


Fig. 5 - Maximum Non-Repetitive Surge Current

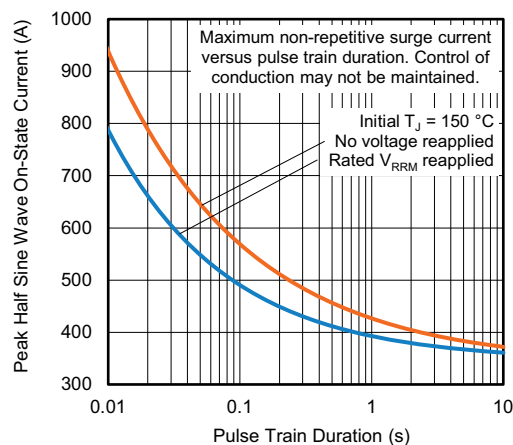


Fig. 6 - Maximum Non-Repetitive Surge Current

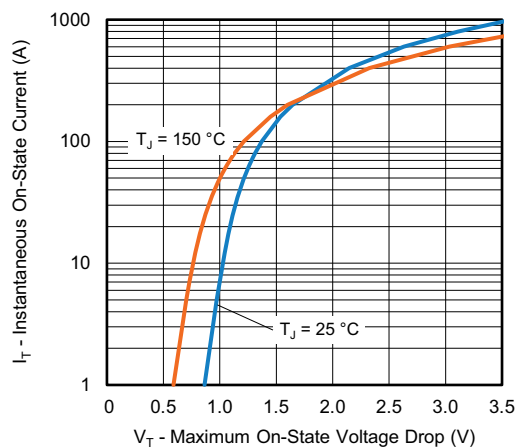
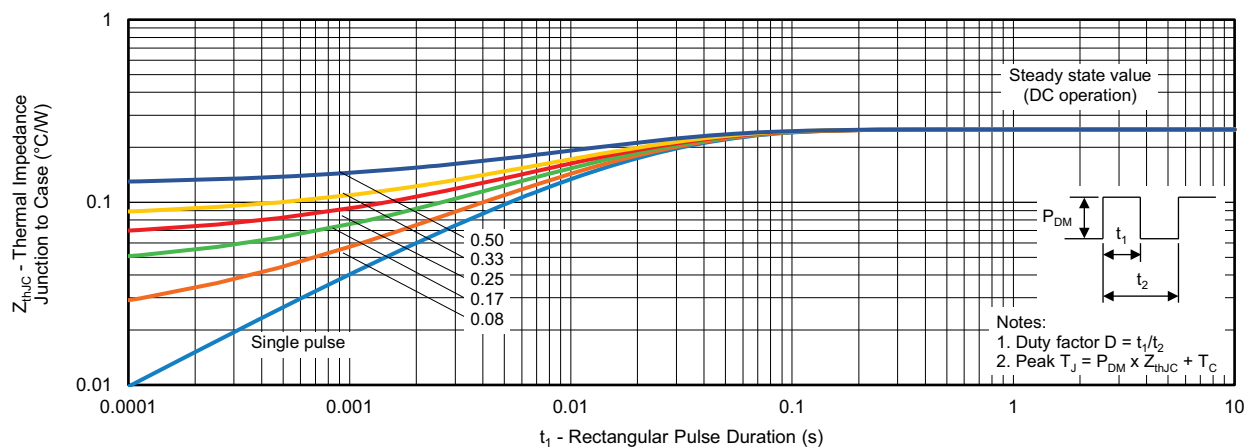


Fig. 7 - On-State Voltage Drop Characteristics


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>100</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>12</b>	<b>L</b>	<b>H</b>	<b>M3</b>
	1	2	3	4	5	6	7	8	9

- |          |   |  |
|----------|---|--|
| <b>1</b> | - | Vishay Semiconductors product                                      |
| <b>2</b> | - | Current code (100 = 100 A)   |
| <b>3</b> | - | Circuit configuration:<br>T = thyristor                            |
| <b>4</b> | - | P = TO-247 package   |
| <b>5</b> | - | Type of silicon:<br>S = standard recovery rectifier                |
| <b>6</b> | - | Voltage code (12 = 1200 V)   |
| <b>7</b> | - | Package L = long lead  |
| <b>8</b> | - | H = AEC-Q101 qualified   |
| <b>9</b> | - | M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free |

**ORDERING INFORMATION** (example)

PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-100TPS12LHM3	25	500	Antistatic plastic tubes

**LINKS TO RELATED DOCUMENTS**

Dimensions	<a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a>
Part marking information	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>

# TO-247AD 3L

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

## Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4



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