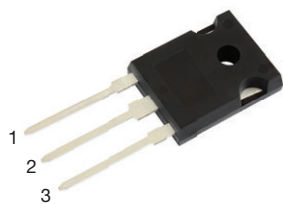
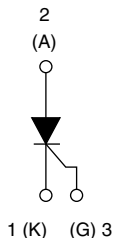


# Thyristor High Voltage, Phase Control SCR, 80 A



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-80TPS12L 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

PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	80 A
$V_{DRM}/V_{RRM}$	1200 V
$V_{TM}(typ.)$	1.18 V
$I_{GT}$	100 mA
$T_J$	-40 °C to +150 °C
Package	TO-247AD 3L
Circuit configuration	Single SCR

## LINKS TO ADDITIONAL RESOURCES



MAJOR RATINGS AND CHARACTERISTICS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}/V_{DRM}$		1200	V
On-state voltage	$V_T$	80 A, $T_J = 125$ °C, typical	1.18	
Average rectified forward current	$I_{T(AV)}$		80	A
Maximum continuous RMS on-state current	$I_{RMS}$		126	
Non-repetitive peak surge current	$I_{TSM}$	$T_J = 150$ °C, 10 ms sine	760	
Maximum rate of rise	$dV/dt$		1000	V/ $\mu$ s
Maximum operating junction and storage temperature range	$T_J, T_{Sig}$		-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-80TPS12LHM3	1200	1300	20

**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	-	80	A
Maximum continuous RMS on-state current as AC switch	$I_{T(RMS)}$		-	126	
Peak, one-cycle non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	-	640	
		10 ms sine pulse, no voltage reapplied	-	760	
$I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	-	2048	$A^2s$
		10 ms sine pulse, no voltage reapplied	-	2890	
$I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied, $T_J = 150\text{ }^{\circ}\text{C}$	-	28 900	$A^2\sqrt{s}$
On-state voltage	$V_T$	80 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.23	1.38	V
		160 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.48	1.68	
		80 A, $T_J = 125\text{ }^{\circ}\text{C}$	1.18	1.26	
		160 A, $T_J = 125\text{ }^{\circ}\text{C}$	1.50	1.62	
Low level value of threshold voltage	$V_{T01}$	$T_J = 150\text{ }^{\circ}\text{C}$	-	0.85	V
High level value of threshold voltage	$V_{T02}$		-	0.96	
Low level value of on-state slope resistance	$r_{t1}$	$T_J = 150\text{ }^{\circ}\text{C}$	-	4.50	$m\Omega$
High level value of on-state slope resistance	$r_{t2}$		-	4.00	
Rate of rise of turned-on current	$di/dt$	$T_J = 150\text{ }^{\circ}\text{C}$ , $V_R < 800\text{ V}$ , $I_T = 80\text{ A}$ , $I_{gt} = 200\text{ mA}$ , $V_{GT} = 2.5\text{ V}$ , $t_r < 100\text{ ns}$ , repetitive	-	200	$A/\mu s$
		$T_J = 150\text{ }^{\circ}\text{C}$ , $V_R < 1000\text{ V}$ , $I_T = 80\text{ A}$ , $I_{gt} = 200\text{ mA}$ , $V_{GT} = 2.5\text{ V}$ , $t_r < 100\text{ ns}$ , non repetitive	-	500	
Holding current	$I_H$	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	-	350	mA
Latching current	$I_L$		-	500	
Reverse and direct leakage current	$I_{RRM}/I_{DRM}$	$T_J = 25\text{ }^{\circ}\text{C}$	25	100	$\mu A$
		$T_J = 125\text{ }^{\circ}\text{C}$	6	35	mA
		$T_J = 150\text{ }^{\circ}\text{C}$	20	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	1.2	
		$T_J = 150\text{ }^{\circ}\text{C}$ 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	110	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	19	40	
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	mA

**SWITCHING**

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Turn-on time	$t_{gt}$	$I_T = 80\text{ A}$ , $V_D = 50\text{ }^{\circ}\text{C}$ $V_{DRM}$ , $I_{gt} = 300\text{ mA}$ , $T_J = 25\text{ }^{\circ}\text{C}$	1.5	-	$\mu s$
Turn-off time	$t_q$	$I_T = 80\text{ A}$ , $V_D = 80\text{ }^{\circ}\text{C}$ $V_{DRM}$ , $dV/dt = 20\text{ V}/\mu s$ , $t_p = 200\text{ }\mu s$ $I_{gt} = 100\text{ mA}$ , $di/dt = 10\text{ A}/\mu s$ , $V_R = 100\text{ V}$ , $T_J = 150\text{ }^{\circ}\text{C}$	70	-	

**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>		-	0.31	°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 (0.21)		g (oz.)
Mounting torque	minimum		6 (5)		kgf · cm (lbf · in)
	maximum		12 (10)		
Marking device		Case style TO-247AD 3L	80TPS12LH		

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

DEVICE	SINE HALF-WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VS-80TPS12LHM3	0.042	0.047	0.054	0.057	0.059	0.038	0.049	0.051	0.054	0.057	°C/W

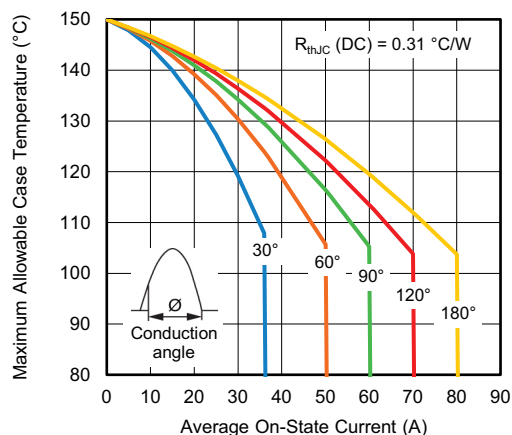


Fig. 1 - Current Rating Characteristics

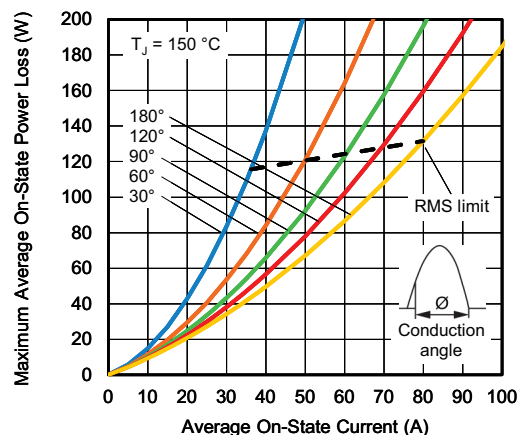


Fig. 3 - On-State Power Loss Characteristics

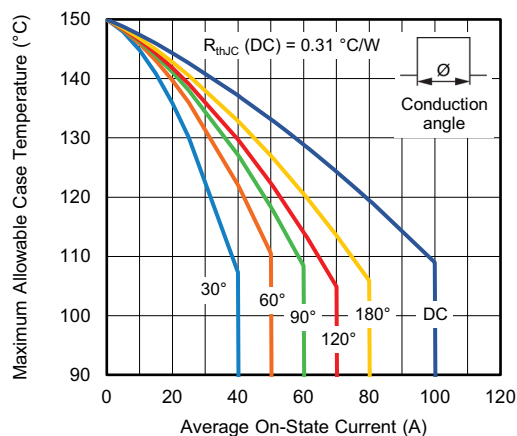


Fig. 2 - Current Rating Characteristics

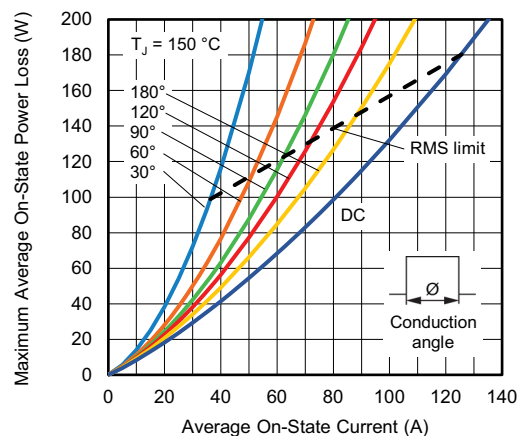


Fig. 4 - On-State Power Loss Characteristics

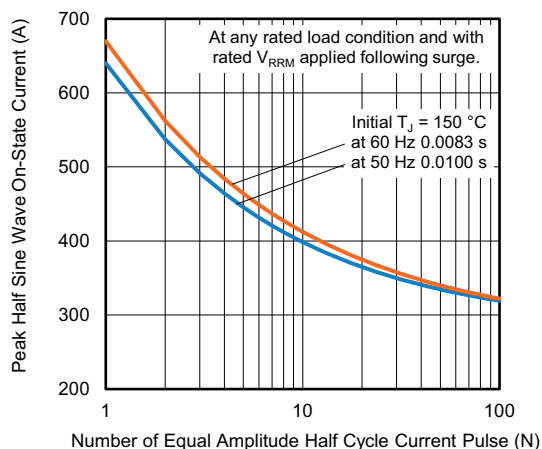


Fig. 5 - Maximum Non-Repetitive Surge Current

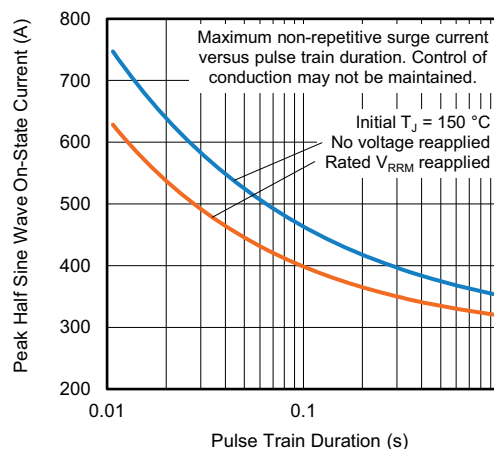


Fig. 6 - Maximum Non-Repetitive Surge Current

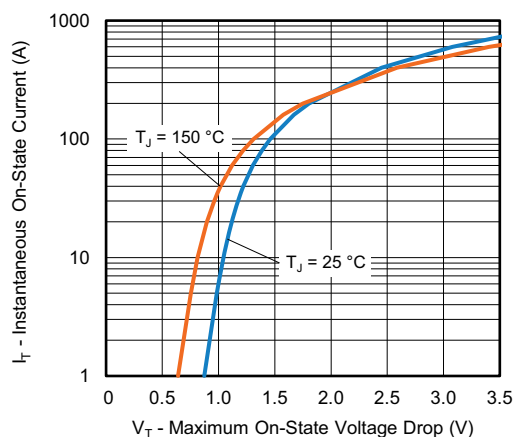
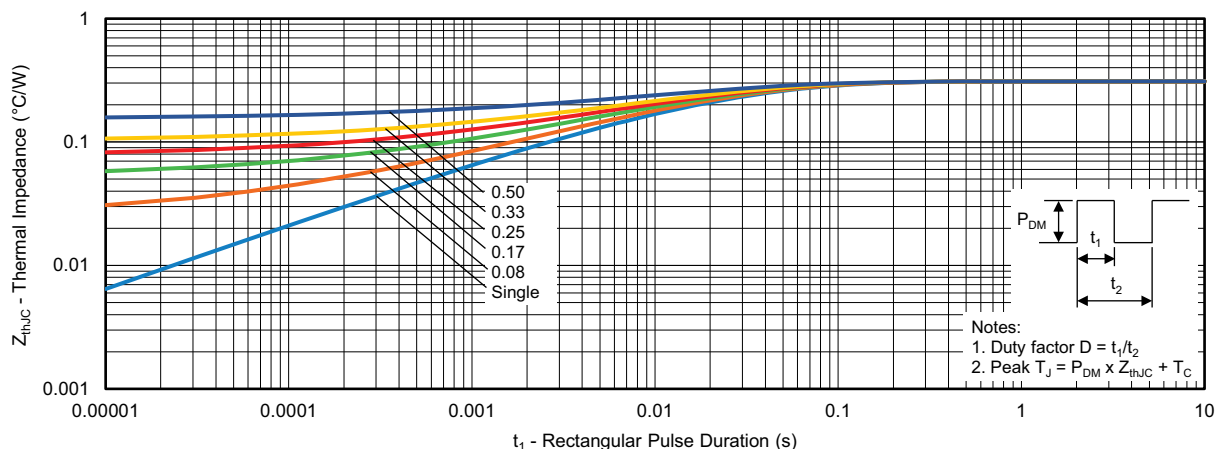


Fig. 7 - On-State Voltage Drop Characteristics


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

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>80</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 (80 = 80 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-80TPS12LHM3	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>



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