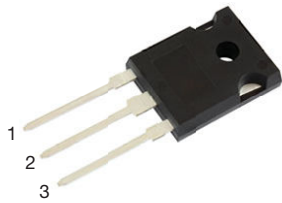
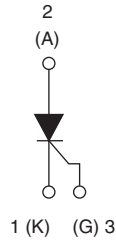


## Thyristor High Voltage, Phase Control SCR, 30 A



TO-247AD 3L



### FEATURES

- AEC-Q101 qualified
- Meets JESD 201 class 1A whisker test
- Flexible solution for reliable AC power rectification
- Easy control peak current at charger power up to reduce passive / electromechanical components
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

### APPLICATIONS

- On-board and off-board EV / HEV battery chargers
- Renewable energy inverters

### DESCRIPTION

The VS-30TPS12LHM3 high voltage series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications.

PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	20 A
$V_{DRM}/V_{RRM}$	1200 V
$V_{TM}$	1.3 V
$I_{GT}$	45 mA
$T_J$	-40 °C to 125 °C
Package	TO-247AD 3L
Circuit configuration	Single SCR

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	20	A
$I_{RMS}$		30	
$V_{RRM}/V_{DRM}$		1200	V
$I_{TSM}$		300	A
$V_T$	20 A, $T_J = 25\text{ °C}$	1.3	V
dv/dt		500	V/μs
di/dt		150	A/μs
$T_J$		-40 to +125	°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	$I_{RRM} / I_{DRM}$ AT 125 °C mA
VS-30TPS12LHM3	1200	1300	10



<b>ABSOLUTE MAXIMUM RATINGS</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 95\text{ }^\circ\text{C}$ , 180° conduction half sine wave	20	A
Maximum RMS on-state current	$I_{RMS}$		30	
Maximum peak, one-cycle non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	250	
		10 ms sine pulse, no voltage reapplied	300	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	310	$A^2s$
		10 ms sine pulse, no voltage reapplied	442	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied	4420	$A^2\sqrt{s}$
Maximum on-state voltage drop	$V_{TM}$	20 A, $T_J = 25\text{ }^\circ\text{C}$	1.3	V
On-state slope resistance	$r_t$	$T_J = 125\text{ }^\circ\text{C}$	12	$m\Omega$
Threshold voltage	$V_{T(TO)}$		1.0	V
Maximum reverse and direct leakage current	$I_{RM}/I_{DM}$	$V_R = \text{rated } V_{RRM} / V_{DRM}$	$T_J = 25\text{ }^\circ\text{C}$	0.5
			$T_J = 125\text{ }^\circ\text{C}$	10
Maximum holding current	$I_H$	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$ , $T_J = 25\text{ }^\circ\text{C}$	150	mA
Maximum latching current	$I_L$	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$	200	
Maximum rate of rise of off-state voltage	$dV/dt$	$T_J = T_J \text{ maximum}$ , linear to 80 % $V_{DRM}$ , $R_g\text{-k} = \text{open}$	500	V/ $\mu s$
Maximum rate of rise of turned-on current	$dI/dt$		150	A/ $\mu s$

<b>TRIGGERING</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	$P_{GM}$		8.0	W
Maximum average gate power	$P_{G(AV)}$		2.0	
Maximum peak positive gate current	$+I_{GM}$		1.5	A
Maximum peak negative gate voltage	$-V_{GM}$		10	V
Maximum required DC gate current to trigger	$I_{GT}$	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^\circ\text{C}$	60	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$	45	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$	20	
Maximum required DC gate voltage to trigger	$V_{GT}$	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^\circ\text{C}$	2.5	V
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$	2.0	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$	1.0	
Maximum DC gate voltage not to trigger	$V_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , $V_{DRM} = \text{rated value}$	0.25	
Maximum DC gate current not to trigger	$I_{GD}$		2.0	mA

<b>SWITCHING</b>				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	$t_{gt}$	$T_J = 25\text{ }^\circ\text{C}$	0.9	$\mu s$
Typical reverse recovery time	$t_{rr}$	$T_J = 125\text{ }^\circ\text{C}$	4	
Typical turn-off time	$t_q$		110	



THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		-40 to 125	°C
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	0.8	°C/W
Maximum thermal resistance, junction to ambient	$R_{thJA}$		40	
Maximum thermal resistance, case to heatsink	$R_{thCS}$	Mounting surface, smooth and greased	0.2	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-247AD 3L	30TPS12LH	

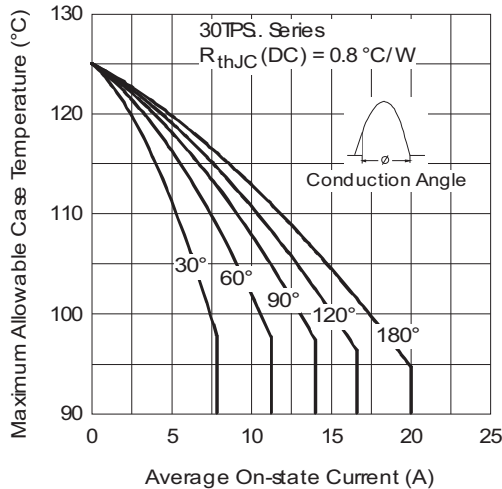


Fig. 1 - Current Rating Characteristics

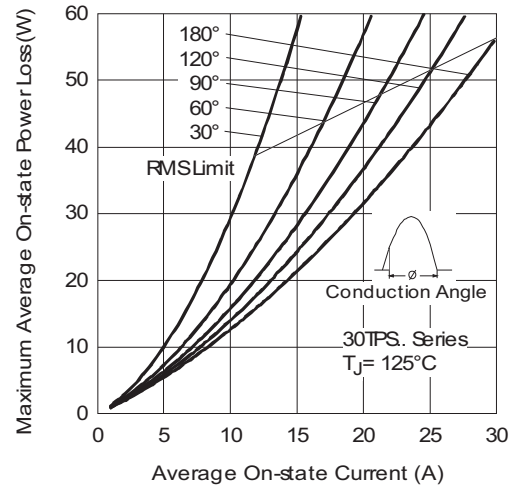


Fig. 3 - On-State Power Loss Characteristics

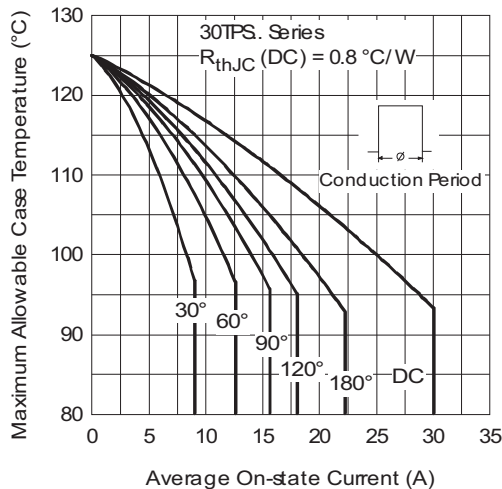


Fig. 2 - Current Rating Characteristics

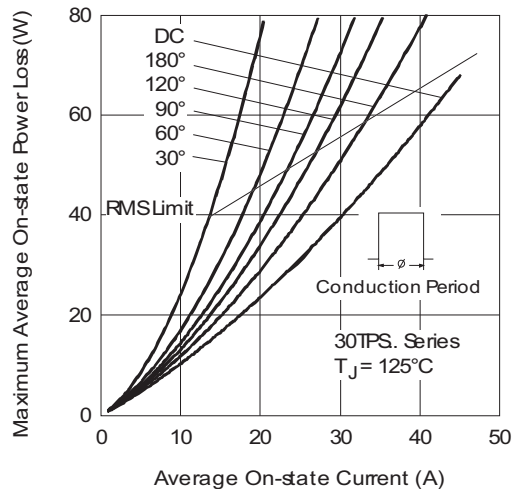


Fig. 4 - On-State Power Loss Characteristics

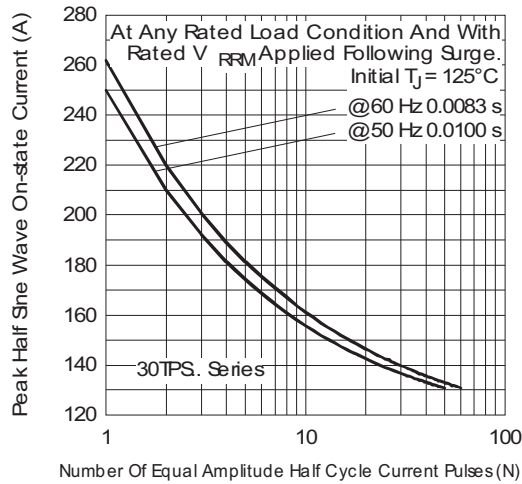


Fig. 5 - Maximum Non-Repetitive Surge Current

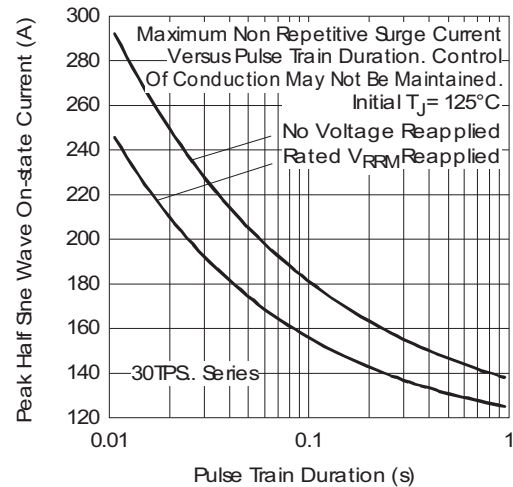


Fig. 6 - Maximum Non-Repetitive Surge Current

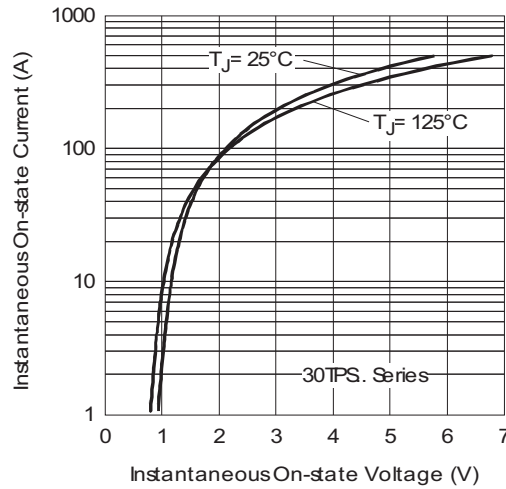


Fig. 7 - On-State Voltage Drop Characteristics

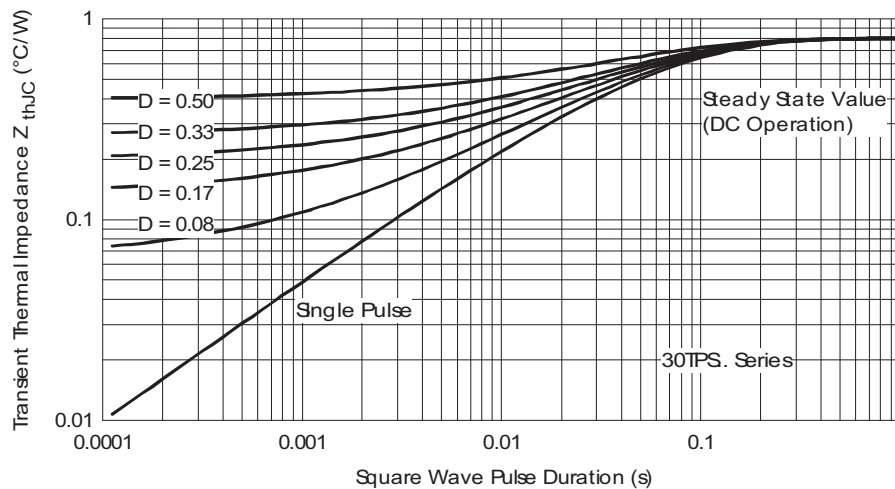


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

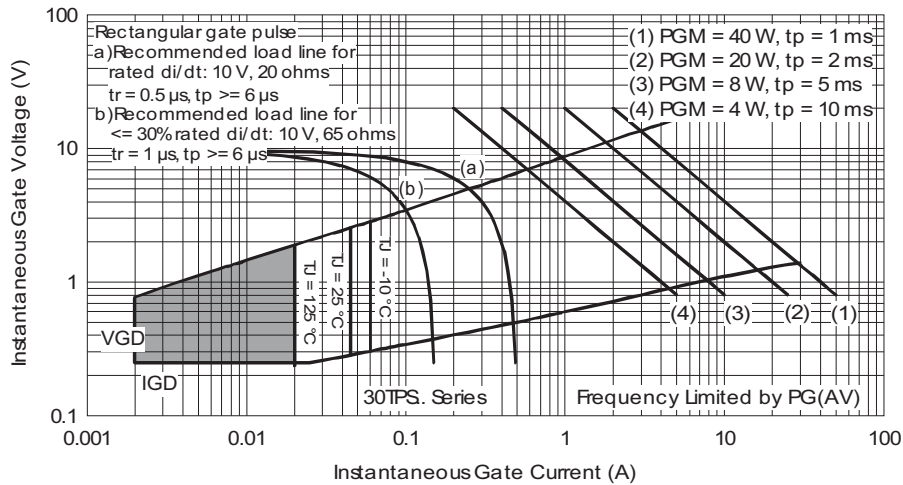


Fig. 9 - Gate Characteristics

### ORDERING INFORMATION TABLE

Device code	<b>VS-</b>	<b>30</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

- 1** - Vishay Semiconductors product
- 2** - Current rating (30 = 30 A)
- 3** - Circuit configuration:  
T = Thyristor
- 4** - P = TO-247 package
- 5** - Type of silicon:  
S = Standard recovery rectifier
- 6** - Voltage code x 100 =  $V_{RRM}$  ——— **12 = 1200 V**
- 7** - Package L = long lead
- 8** - H = AEC-Q101 qualified
- 9** - Environmental digit:  
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-30TPS12LHM3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-247AD 3L	<a href="http://www.vishay.com/doc?95626">www.vishay.com/doc?95626</a>
Part marking information	TO-247AD 3L	<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	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094		L	19.81	20.32	0.780	0.800	
b3	1.65	2.34	0.065	0.092		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133		Ø P1	-	6.98	-	0.275	
c	0.38	0.89	0.015	0.035		Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033		R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3	S	5.51 BSC		0.217 BSC		
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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