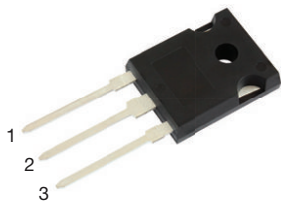
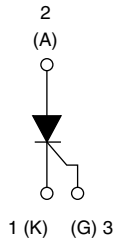


Thyristor High Voltage, Phase Control SCR, 100 A



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



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/μs
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° 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	μA
		$T_J = 125\text{ }^{\circ}\text{C}$	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}	$T_J = 150\text{ }^{\circ}\text{C}$, $V_{DRM} = 80\text{ \% rated value}$	-	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}	$I_T = 100\text{ A}$, $V_D = 50\text{ \% }V_{DRM}$, $I_{gt} = 300\text{ mA}$, $T_J = 25\text{ }^{\circ}\text{C}$	1.8	-	μs
Turn-off time	t_q	$I_T = 100\text{ A}$, $V_D = 80\text{ \% }V_{DRM}$, $dV/dt = 20\text{ V}/\mu s$, $t_p = 200\text{ }\mu s$, $I_{gt} = 100\text{ mA}$, $di/dt = 10\text{ A}/\mu s$, $V_R = 100\text{ V}$, $T_J = 150\text{ }^{\circ}\text{C}$	135	-	

 **ΔR_{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 _J , T _{Stg}		-40	150	°C
Maximum thermal resistance, junction to case	R _{thJC}		-	0.25	°C/W
Maximum thermal resistance, junction to ambient	R _{thJA}		-	40	
Typical thermal resistance, case to heatsink	R _{thCS}	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		

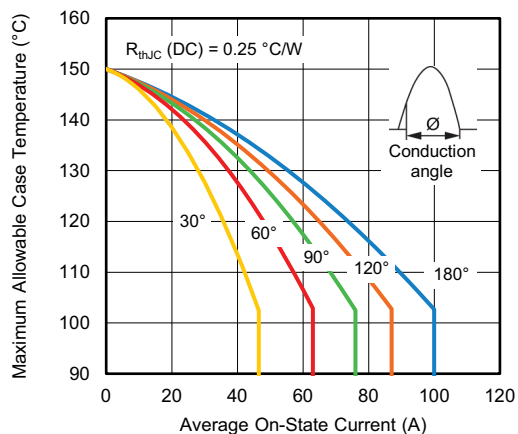


Fig. 1 - Current Rating Characteristics

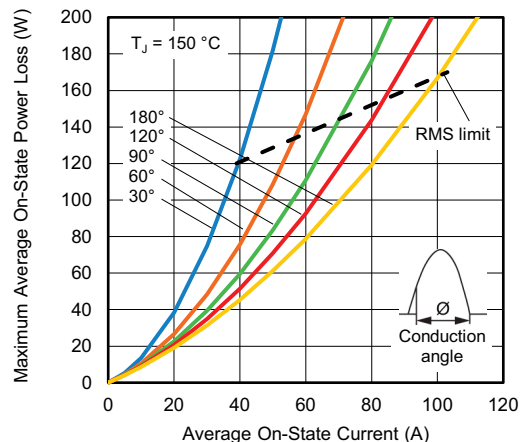


Fig. 3 - On-State Power Loss Characteristics

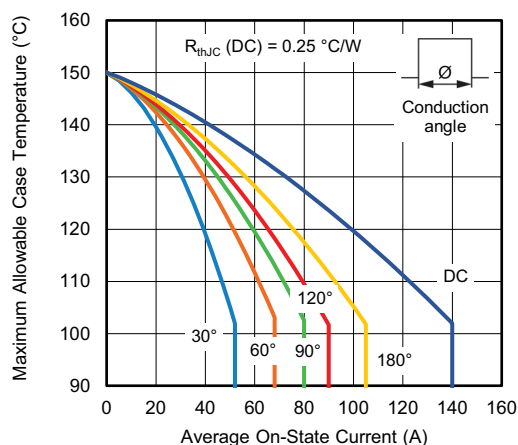


Fig. 2 - Current Rating Characteristics

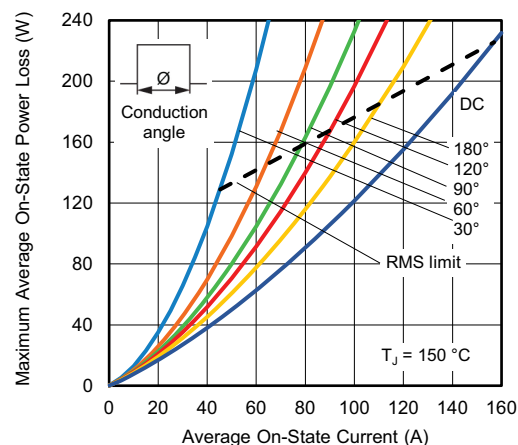


Fig. 4 - On-State Power Loss Characteristic

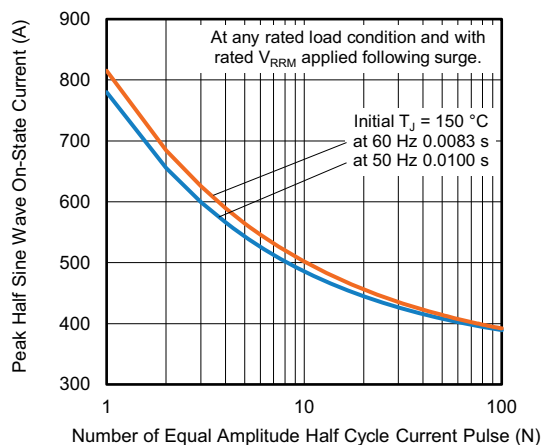


Fig. 5 - Maximum Non-Repetitive Surge Current

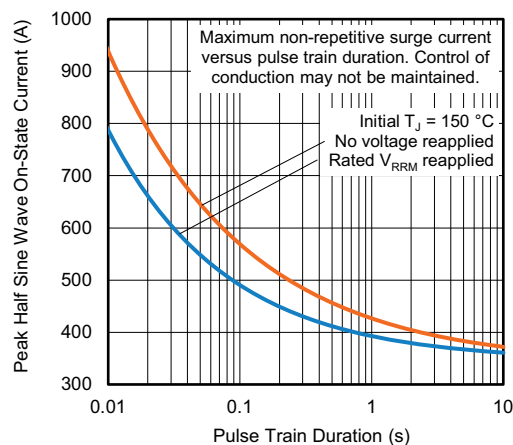


Fig. 6 - Maximum Non-Repetitive Surge Current

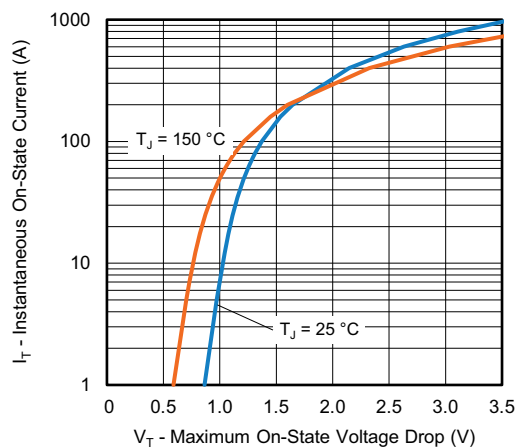
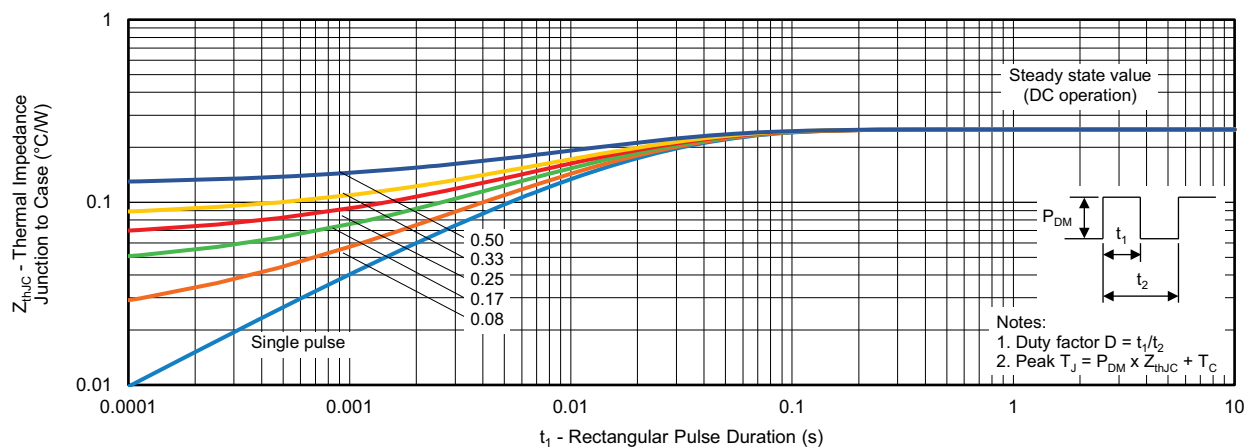


Fig. 7 - On-State Voltage Drop Characteristics


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics



ORDERING INFORMATION TABLE

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

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

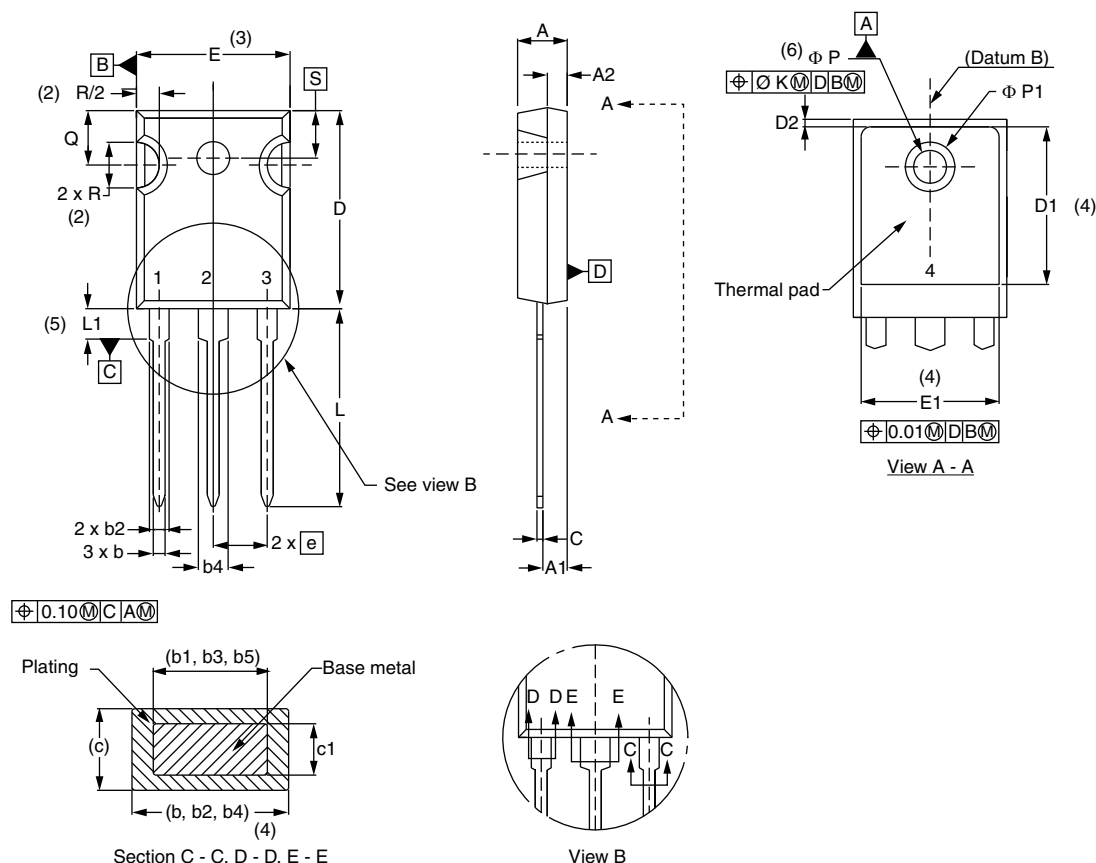
ORDERING INFORMATION (example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-100TPS12LHM3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95626
Part marking information	www.vishay.com/doc?95007



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

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
ϕK	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
ϕP	3.56	3.66	0.14	0.144	
$\phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

- Dimensioning and tolerancing per ASME Y14.5M-1994
- Contour of slot optional
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
- Lead finish uncontrolled in L1
- ϕP 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")
- 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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