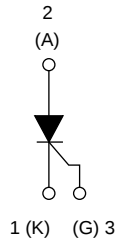


Thyristor High Voltage, Phase Control SCR, 80 A



TO-247AD 3L



FEATURES

- Designed and qualified according to JEDEC®-JESD 47
- 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-80TPS16L 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.

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	80 A
V_{DRM}/V_{RRM}	1600 V
$V_{TM}(typ.)$	1.16 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}		1600	V
On-state voltage	V_T	80 A, $T_J = 125$ °C, typical	1.16	
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}		1000	
Maximum rate of rise	dV/dt		1000	V/ μ 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 125 °C mA
VS-80TPS16L-M3	1600	1700	10

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 113\text{ }^{\circ}\text{C}$, 180° 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	Initial $T_J = T_J$ maximum	-	840	
		10 ms sine pulse, no voltage reapplied		-	1000	
I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied		-	3536	A^2s
		10 ms sine pulse, no voltage reapplied		-	5000	
$I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$, no voltage reapplied, $T_J = 125\text{ }^{\circ}\text{C}$		-	50 000	$A^2\sqrt{s}$
On-state voltage	V_T	80 A , $T_J = 25\text{ }^{\circ}\text{C}$		1.22	1.40	V
		160 A , $T_J = 25\text{ }^{\circ}\text{C}$		1.48	1.66	
		80 A , $T_J = 125\text{ }^{\circ}\text{C}$		1.16	1.24	
		160 A , $T_J = 125\text{ }^{\circ}\text{C}$		1.49	1.62	
Low level value of threshold voltage	V_{T01}	$T_J = 150\text{ }^{\circ}\text{C}$		-	0.80	V
High level value of threshold voltage	V_{T02}			-	0.89	
Low level value of on-state slope resistance	r_{t1}	$T_J = 150\text{ }^{\circ}\text{C}$		-	4.82	$m\Omega$
High level value of on-state slope resistance	r_{t2}			-	4.51	
Rate of rise of turned-on current	di/dt	$T_J = 125\text{ }^{\circ}\text{C}$, $V_R = 1000\text{ V}$, $I_T = 100\text{ A}$, $I_{gt} = 450\text{ mA}$, $V_{GT} = 2.5\text{ V}$		-	500	$A/\mu s$
Holding current	I_H	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$		-	200	mA
Latching current	I_L			-	400	
Reverse and direct leakage current	I_{RRM}/I_{DRM}	$T_J = 25\text{ }^{\circ}\text{C}$		50	200	μA
		$T_J = 125\text{ }^{\circ}\text{C}$		10	60	mA
Rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum, linear to 80 % V_{DRM} , R_g -k = 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}	$T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	-	1.5	
Required DC gate to trigger	I_{GT}	$T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V resistive load	-	100	mA
DC gate voltage not to trigger	V_{GD}	$T_J = 125\text{ }^{\circ}\text{C}$, $V_{DRM} = 80\text{ }%$ rated value	-	0.20	V
DC gate current not to trigger	I_{GD}		-	5	mA

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS	TYP.	MAX.	UNITS
Turn-on time	t_{gt}	$I_T = 80\text{ A}$, $V_D = 50\text{ }%$ V_{DRM} , $I_{gt} = 300\text{ mA}$, $T_J = 25\text{ }^{\circ}\text{C}$	2	-	μs
Turn-off time	t_q	$I_T = 80\text{ A}$, $V_D = 80\text{ }%$ V_{DRM} , $dV/dt = 20\text{ V}/\mu s$, $t_p = 200\text{ }\mu s$, $I_{gt} = 100\text{ mA}$, $di/dt = 10\text{ A}/\mu s$, $V_R = 100\text{ V}$, $T_J = 150\text{ }^{\circ}\text{C}$	150	-	

**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}		-	0.23	°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 (0.21)		g (oz.)
Mounting torque	minimum		6 (5)		kgf · cm (lbf · in)
	maximum		12 (10)		
Marking device		Case style TO-247AD 3L	80TPS16L		

 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-80TPS16L-M3	0.031	0.036	0.040	0.042	0.044	0.028	0.036	0.038	0.040	0.042	°C/W

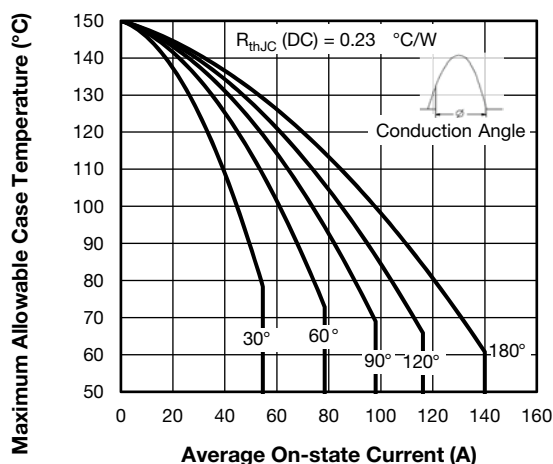


Fig. 1 - Current Rating Characteristics

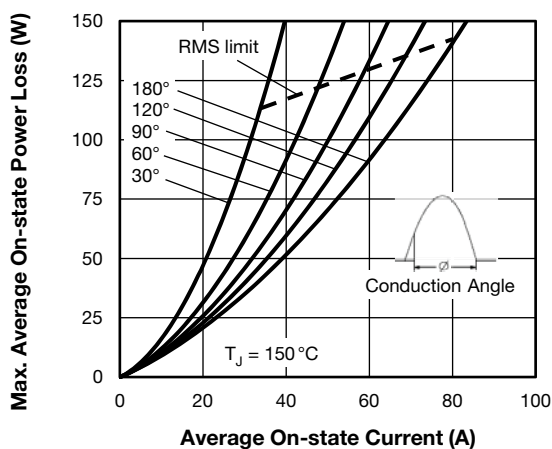


Fig. 3 - On-State Power Loss Characteristics

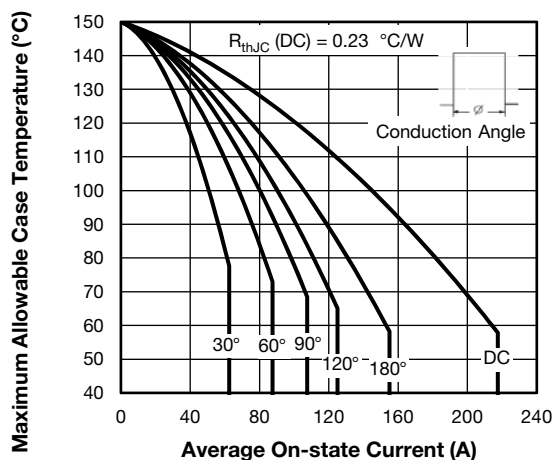


Fig. 2 - Current Rating Characteristics

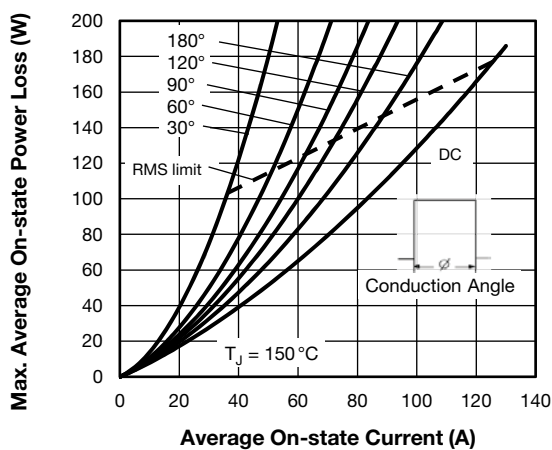


Fig. 4 - On-State Power Loss Characteristics

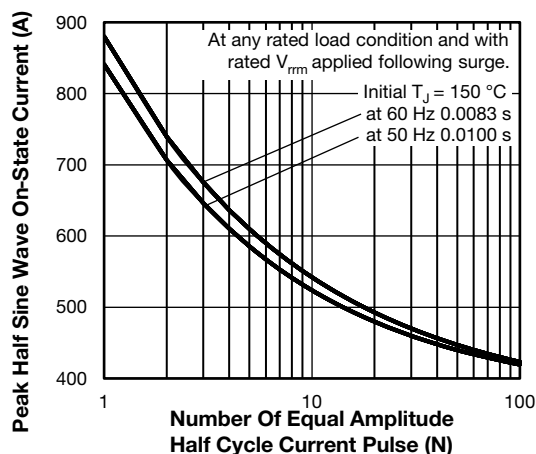


Fig. 5 - Maximum Non-Repetitive Surge Current

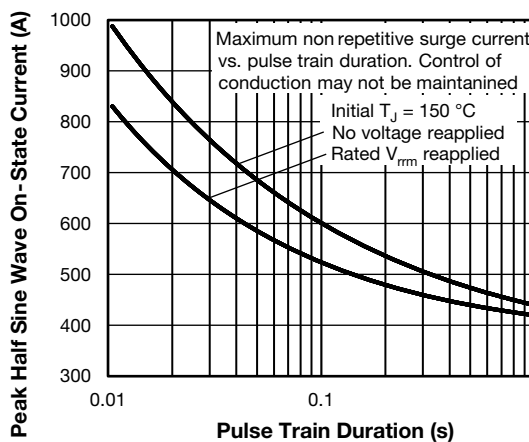


Fig. 6 - Maximum Non-Repetitive Surge Current

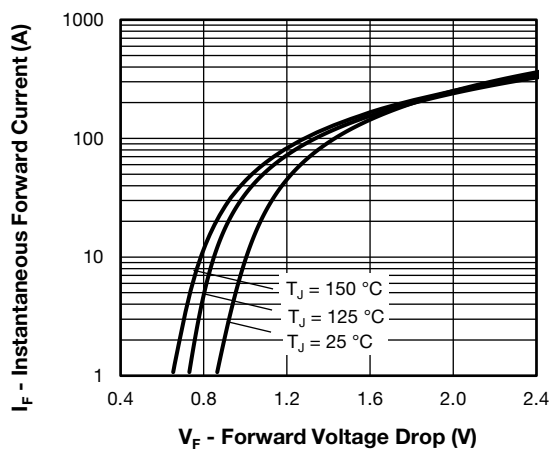
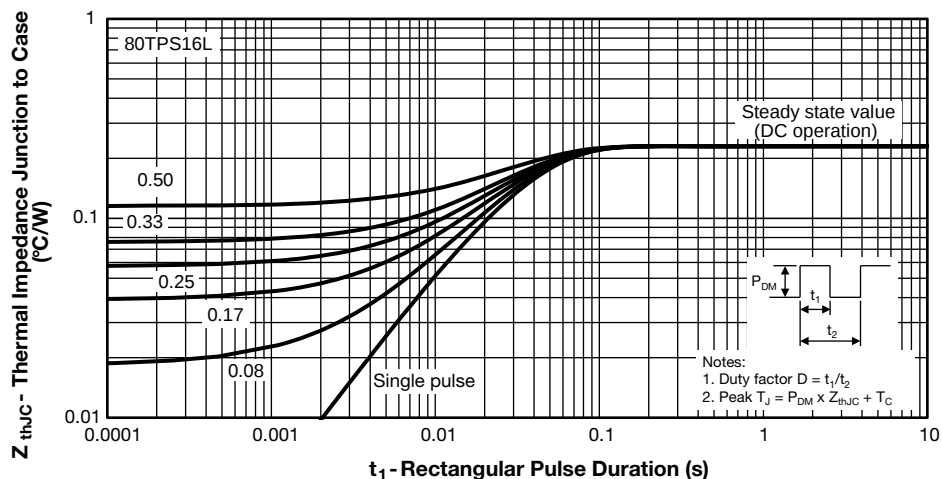


Fig. 7 - On-State Voltage Drop Characteristics


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

**ORDERING INFORMATION TABLE**

Device code	VS-	80	T	P	S	16	L	-M3
	1	2	3	4	5	6	7	8

- | | |
|----------|---|
| 1 | - Vishay Semiconductors product |
| 2 | - Current code (80 = 80 A) |
| 3 | - Circuit configuration:
T = thyristor |
| 4 | - P = TO-247 package |
| 5 | - Type of silicon:
S = standard recovery rectifier |
| 6 | - Voltage code (16 = 1600 V) |
| 7 | - Package L = long lead |
| 8 | - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free |

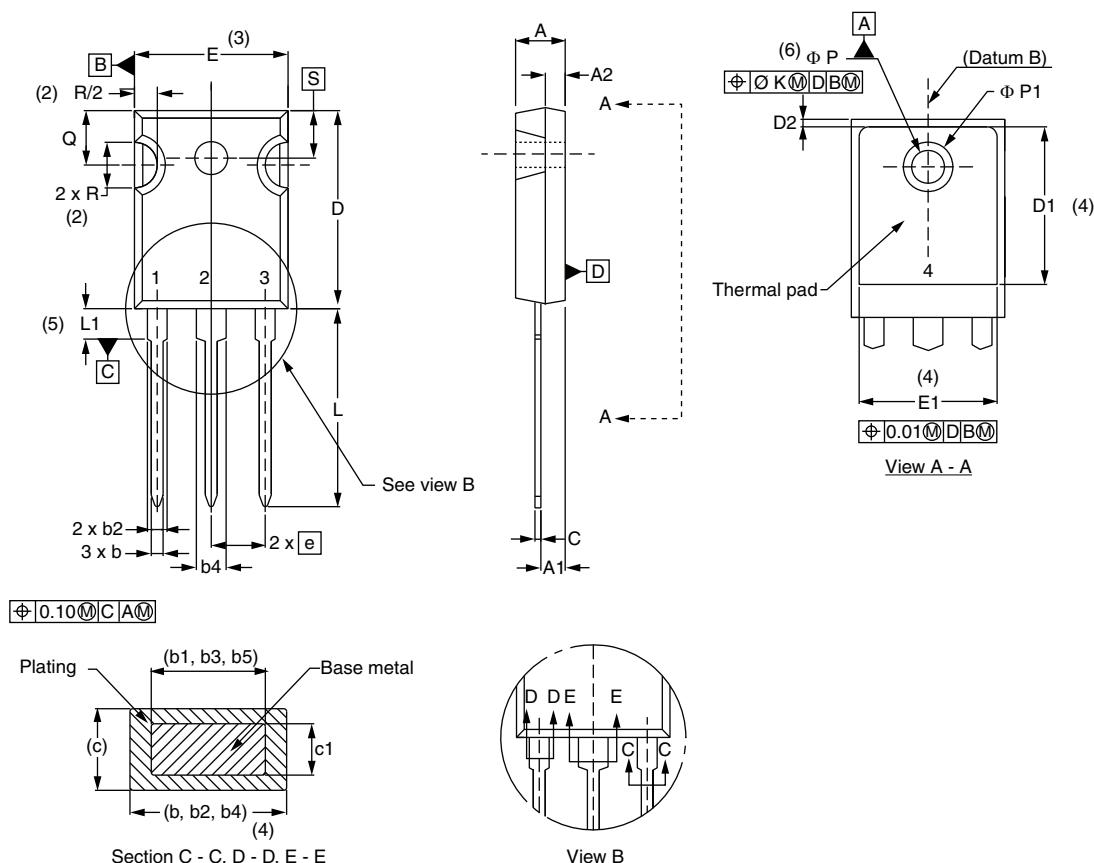
ORDERING INFORMATION (example)			
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-80TPS16L-M3	25	500	Antistatic plastic tubes

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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