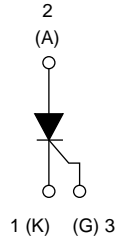


## Thyristor High Voltage, Phase Control SCR, 80 A



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](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-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/ $\mu$ 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 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 <sup>2</sup> s
		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 <sup>2</sup> √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	mΩ
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/μs
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/μs

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	$t_q$	$I_T = 80\text{ A}$ , $V_D = 80\text{ }%$ $V_{DRM}$ , $dV/dt = 20\text{ V}/\mu\text{s}$ , $t_p = 200\text{ } \mu\text{s}$ , $I_{gt} = 100\text{ mA}$ , $di/dt = 10\text{ A}/\mu\text{s}$ , $V_R = 100\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$		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		

$\Delta R_{thJ-HS}$ CONDUCTION PER JUNCTION											
DEVICE	SINE HALF-WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VS-80TPS16L-M3	0.031	0.036	0.040	0.042	0.044	0.028	0.036	0.038	0.040	0.042	°C/W

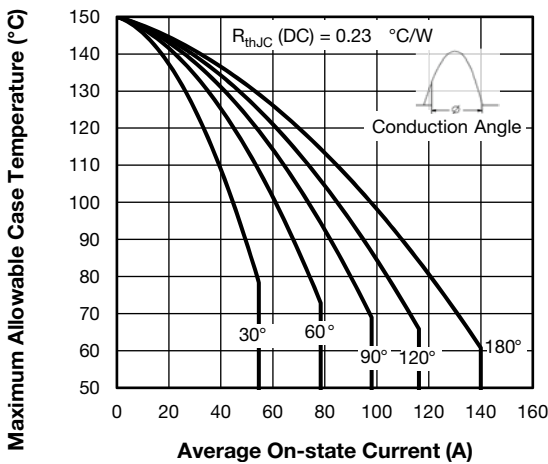


Fig. 1 - Current Rating Characteristics

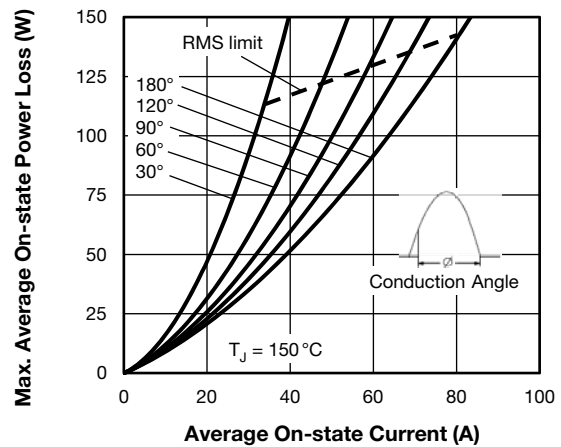


Fig. 3 - On-State Power Loss Characteristics

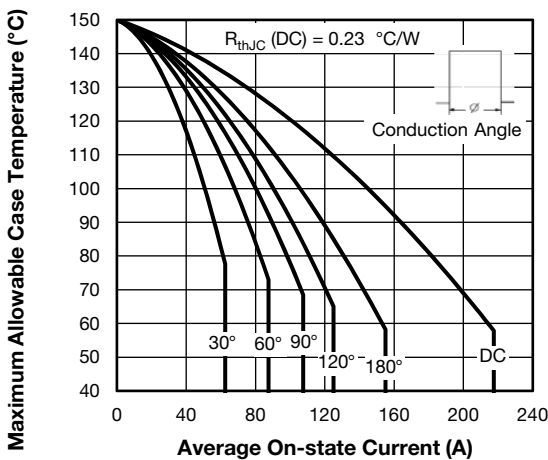


Fig. 2 - Current Rating Characteristics

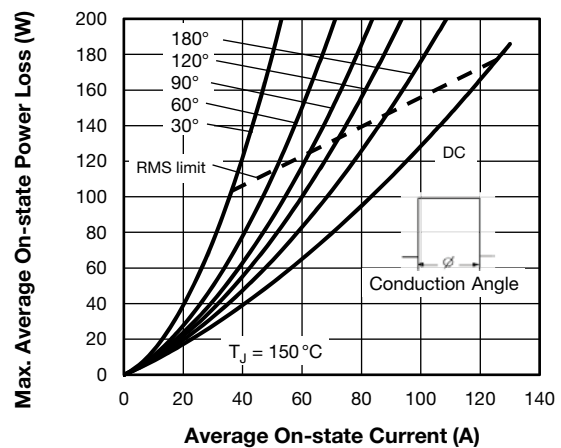


Fig. 4 - On-State Power Loss Characteristics

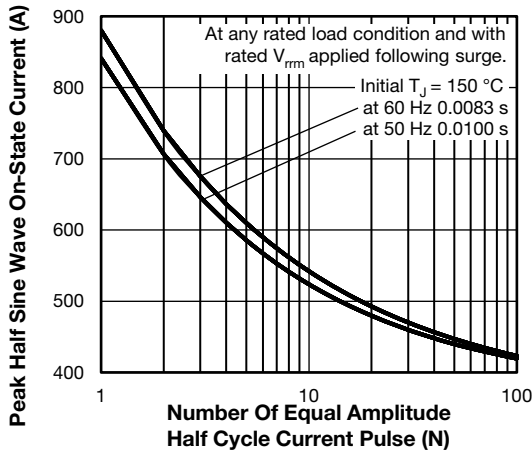


Fig. 5 - Maximum Non-Repetitive Surge Current

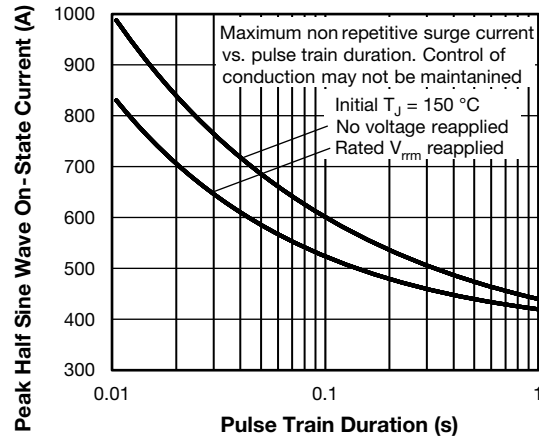


Fig. 6 - Maximum Non-Repetitive Surge Current

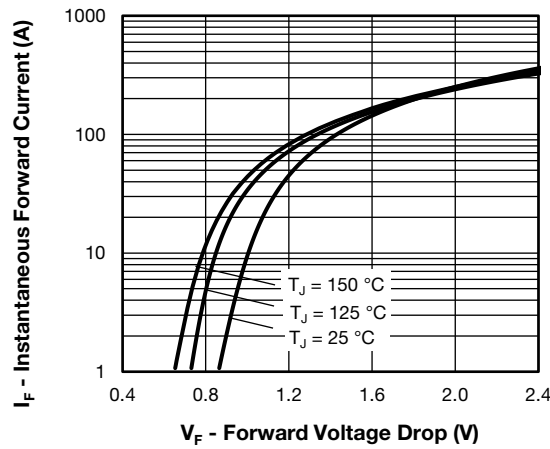


Fig. 7 - On-State Voltage Drop Characteristics

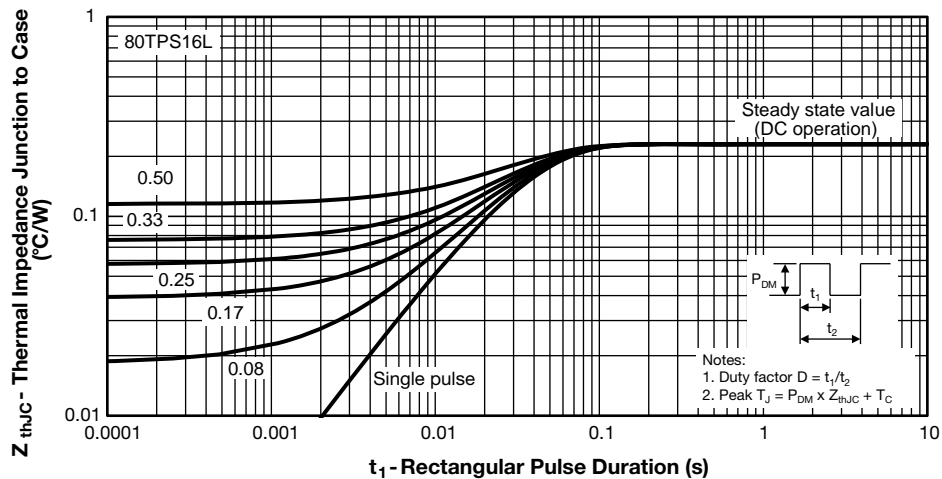
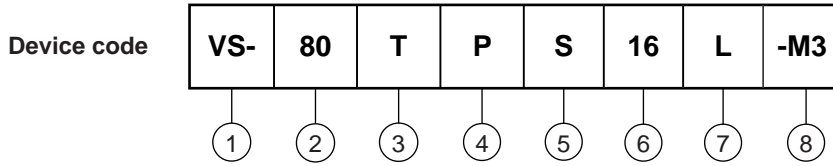


Fig. 8 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics



ORDERING INFORMATION TABLE



- 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	<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	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**

- 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
- 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")
- 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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