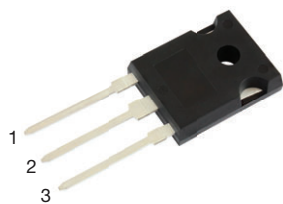
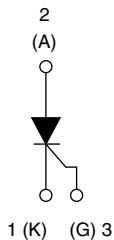


Thyristor High Voltage, Phase Control SCR, 80 A



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-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



3D Models

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/ μ 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-80TPS12L-M3	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° 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 ² s
		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 √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	mΩ
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/μs
		$T_J = 150\text{ }^{\circ}\text{C}$, $V_R < 1000\text{ V}$, $I_T = 80\text{ A}$, $I_{gt} = 200\text{ mA}$, $V_{GT} = 2.5\text{ V}$, $t_r < 100\text{ ns}$, 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	μA
		$T_J = 125\text{ }^{\circ}\text{C}$	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/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}	$T_J = -40\text{ }^{\circ}\text{C}$ 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	-	μs
Turn-off time	t_q	$I_T = 80\text{ A}$, $V_D = 80\text{ }^{\circ}\text{C}$ V_{DRM} , $dV/dt = 20\text{ V/μs}$, $t_p = 200\text{ μs}$ $I_{gt} = 100\text{ mA}$, $di/dt = 10\text{ A/μs}$, $V_R = 100\text{ V}$, $T_J = 150\text{ }^{\circ}\text{C}$	70	-	

**THERMAL AND MECHANICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	MAX.	UNITS
Maximum operating junction and storage temperature range	T _J , T _{Stg}		-40	150	°C
Maximum thermal resistance, junction to case	R _{thJC}		-	0.31	°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	80TPS12L		

 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-80TPS12L-M3	0.042	0.047	0.054	0.057	0.059	0.038	0.049	0.051	0.054	0.057	°C/W

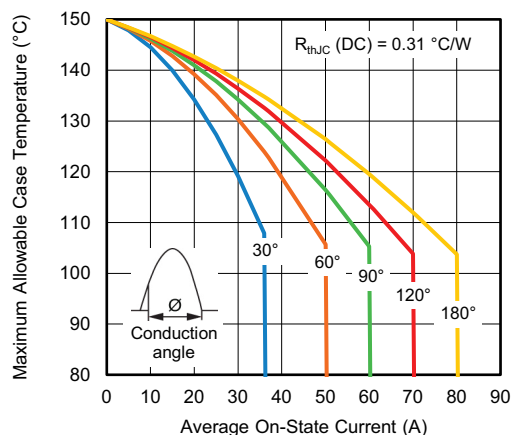


Fig. 1 - Current Rating Characteristics

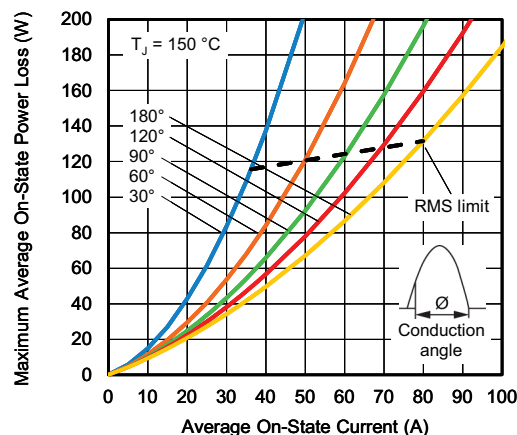


Fig. 3 - On-State Power Loss Characteristics

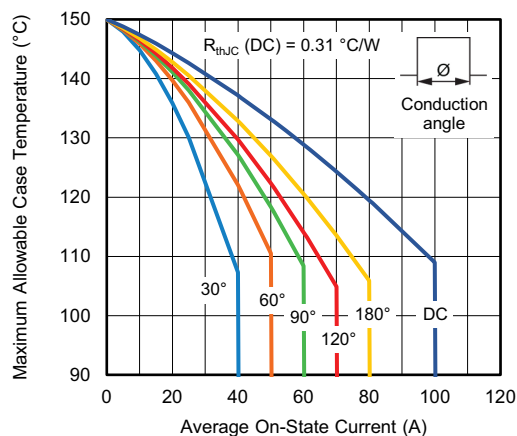


Fig. 2 - Current Rating Characteristics

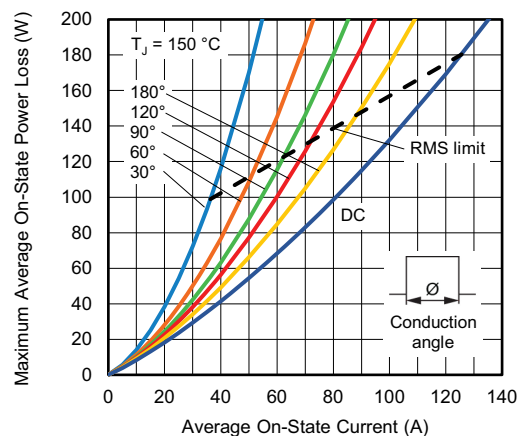


Fig. 4 - On-State Power Loss Characteristics

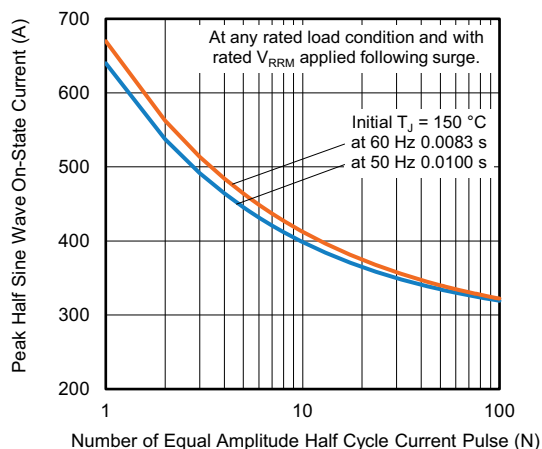


Fig. 5 - Maximum Non-Repetitive Surge Current

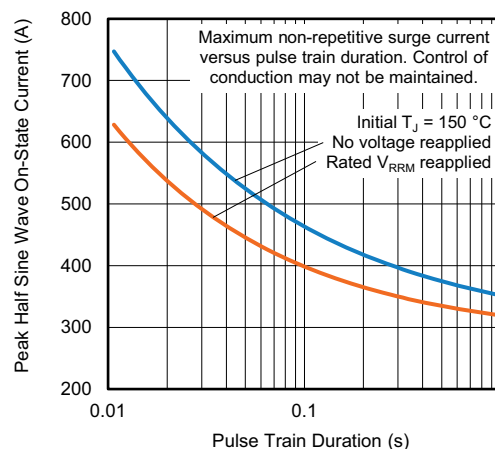


Fig. 6 - Maximum Non-Repetitive Surge Current

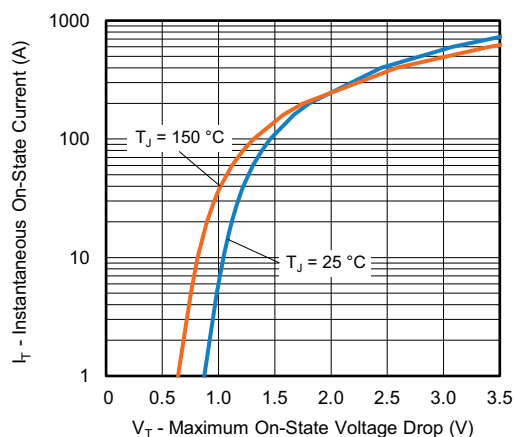
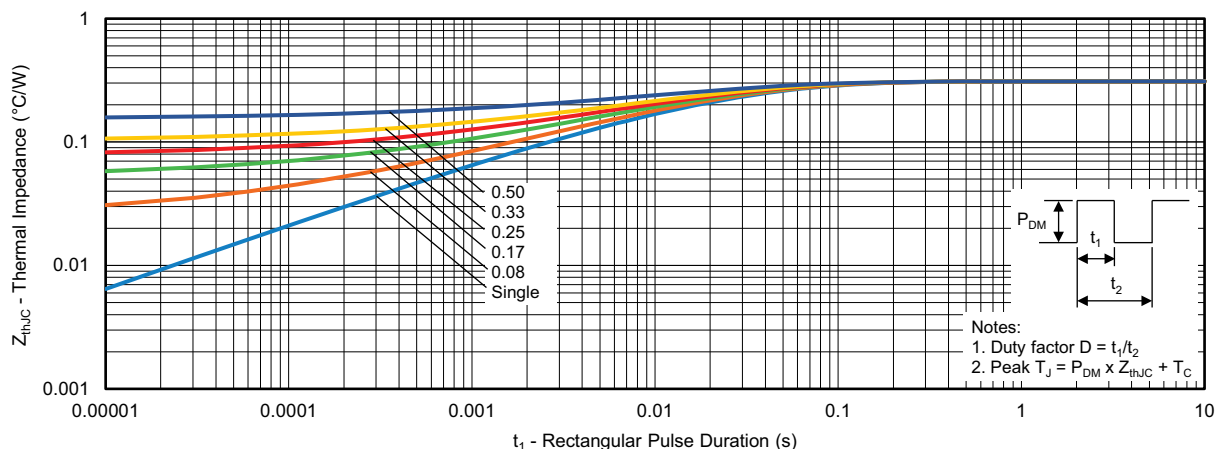


Fig. 7 - On-State Voltage Drop Characteristics


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

**ORDERING INFORMATION TABLE**

Device code	VS-	80	T	P	S	12	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 (12 = 1200 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-80TPS12L-M3	25	500	Antistatic plastic tubes

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



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