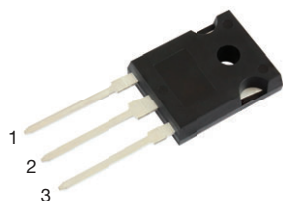
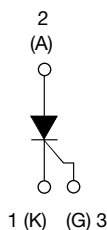


Thyristor High Voltage, Phase Control SCR, 40 A



TO-247AD 3L



FEATURES

- Low I_{GT} parts available
- Designed and qualified according to JEDEC® - JESD 47
- 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



RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	35 A
V_{DRM}/V_{RRM}	1200 V
V_{TM}	1.45 V
I_{GT}	150 mA
T_J	-40 °C to +125 °C
Package	TO-247AD 3L
Circuit configuration	Single SCR

APPLICATIONS

- Typical usage is in input rectification crowbar (soft start) and AC switch in motor control, UPS, welding and battery charge

DESCRIPTION

The VS-40TPS12.. high voltage series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications. AEC-Q101 qualified P/N available (VS-40TPS12LHM3, VS-40TPS12ALHM3).

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	35	A
I_{RMS}		55	
V_{RRM}/V_{DRM}		1200	V
I_{TSM}		600	A
V_T	40 A, $T_J = 25\text{ °C}$	1.45	V
dv/dt		1000	V/μs
di/dt		100	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-40TPS12AL-M3	1200	1300	10
VS-40TPS12L-M3	1200	1300	



ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 79\text{ }^{\circ}\text{C}$, 180° conduction half sine wave		35	A
Maximum continuous RMS on-state current as AC switch	$I_{T(RMS)}$			55	
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied	Initial $T_J = T_J \text{ max.}$	500	
		10 ms sine pulse, no voltage reapplied		600	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied		1250	A^2s
		10 ms sine pulse, no voltage reapplied		1760	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$, no voltage reapplied		17 600	$\text{A}^2\sqrt{\text{s}}$
Low level value of threshold voltage	$V_{T(TO)1}$	$T_J = 125\text{ }^{\circ}\text{C}$		1.02	V
High level value of threshold voltage	$V_{T(TO)2}$			1.23	
Low level value of on-state slope resistance	r_{t1}			9.74	$\text{m}\Omega$
High level value of on-state slope resistance	r_{t2}			7.50	
Maximum peak on-state voltage	V_{TM}	110 A, $T_J = 25\text{ }^{\circ}\text{C}$		1.85	V
Maximum rate of rise of turned-on current	di/dt	$T_J = 25\text{ }^{\circ}\text{C}$		100	$\text{A}/\mu\text{s}$
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial $T_J = 1\text{ A}$, $I_T = 25\text{ }^{\circ}\text{C}$		300	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$		350	
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{rated } V_{RRM}/V_{DRM}$	0.5	
		$T_J = 125\text{ }^{\circ}\text{C}$		10	
Maximum rate of rise of off-state voltage 40TPS12A	dv/dt	$T_J = T_J \text{ maximum, linear to } 80\text{ \% } V_{DRM}$, $R_g - k = 100\text{ }\Omega$		500	$\text{V}/\mu\text{s}$
Maximum rate of rise of off-state voltage 40TPS12				1000	

TRIGGERING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P _{GM}			10	W
Maximum average gate power	P _{G(AV)}			2.5	
Maximum peak gate current	I _{GM}			2.5	A
Maximum peak negative gate voltage	-V _{GM}			10	V
Maximum required DC gate voltage to trigger	V _{GT}	T _J = -40 °C	Anode supply = 6 V resistive load	2.0	V
		T _J = 25 °C		1.7	
		T _J = 125 °C		1.3	
Maximum required DC gate current to trigger	I _{GT}	T _J = -40 °C	Anode supply = 6 V resistive load	200	mA
		T _J = 25 °C		150	
		T _J = 125 °C		80	
		T _J = 25 °C, for 40TPS12A		40	
Maximum DC gate voltage not to trigger for 40TPS12	V _{GD}	T _J = 125 °C, V _{DRM} = rated value		0.25	V
Maximum DC gate current not to trigger for 40TPS12	I _{GD}			6	mA
Maximum DC gate voltage not to trigger for 40TPS12A	V _{GD}	T _J = 125 °C, V _{DRM} = rated value		0.15	V
Maximum DC gate current not to trigger for 40TPS12A	I _{GD}			1	mA



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	0.6	°C/W
Maximum thermal resistance, junction to ambient	R_{thJA}		40	
Maximum thermal resistance, case to heat sink	R_{thCS}	Mounting surface, smooth and greased	0.25	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm
	maximum		12 (10)	(lbf · in)
Marking device		Case style TO-247AD 3L	40TPS12AL	
			40TPS12L	

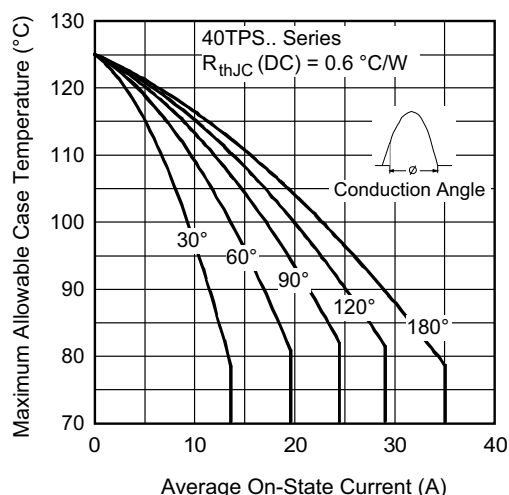


Fig. 1 - Current Rating Characteristics

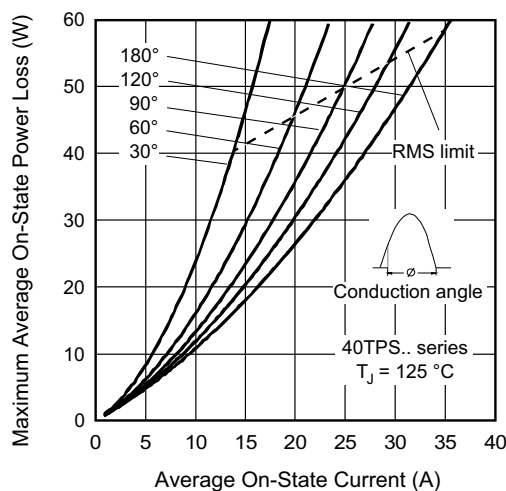


Fig. 3 - On-State Power Loss Characteristics

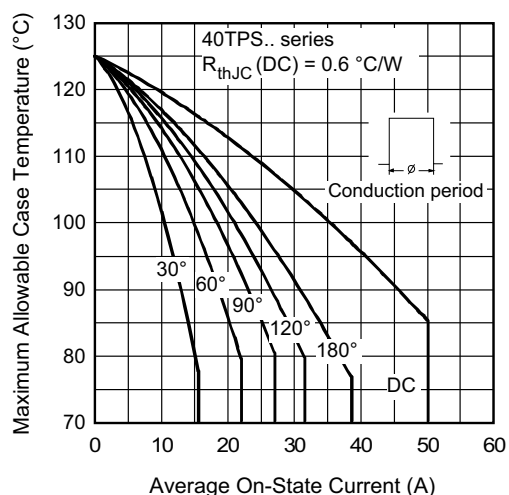


Fig. 2 - Current Rating Characteristics

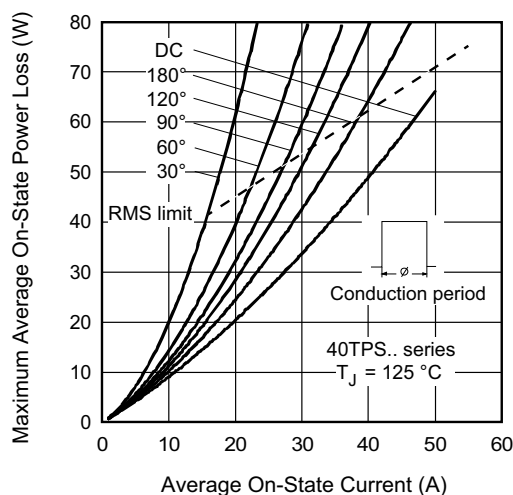


Fig. 4 - On-State Power Loss Characteristics

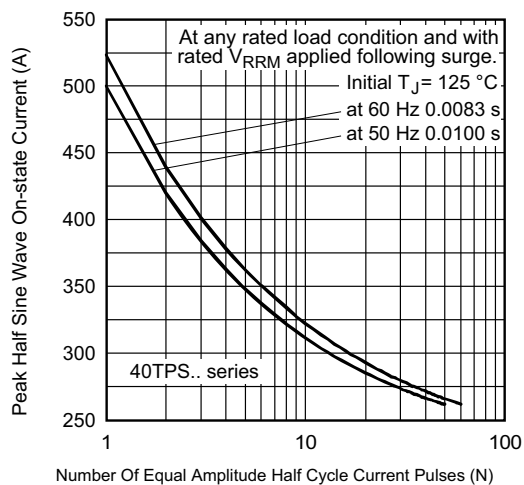


Fig. 5 - Maximum Non-Repetitive Surge Current

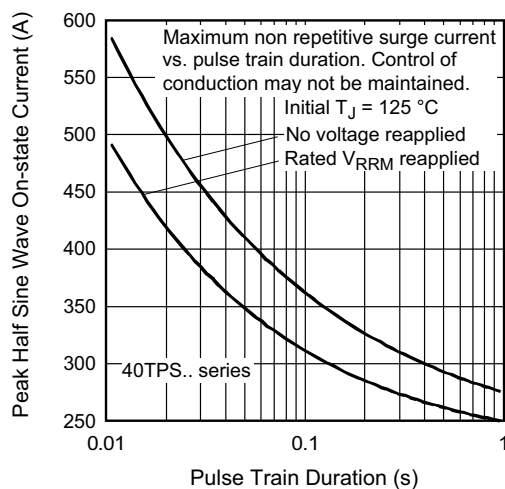


Fig. 6 - Maximum Non-Repetitive Surge Current

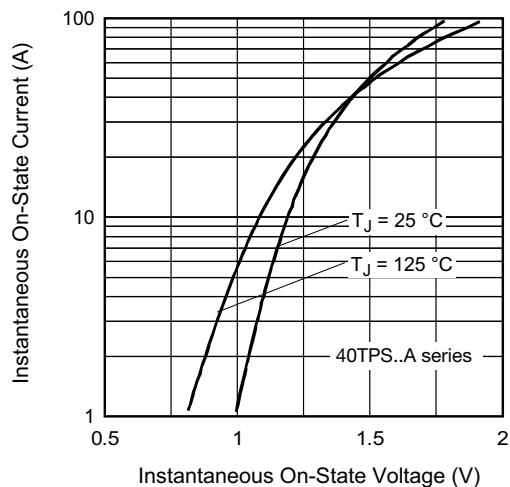


Fig. 7 - On-State Voltage Drop Characteristics

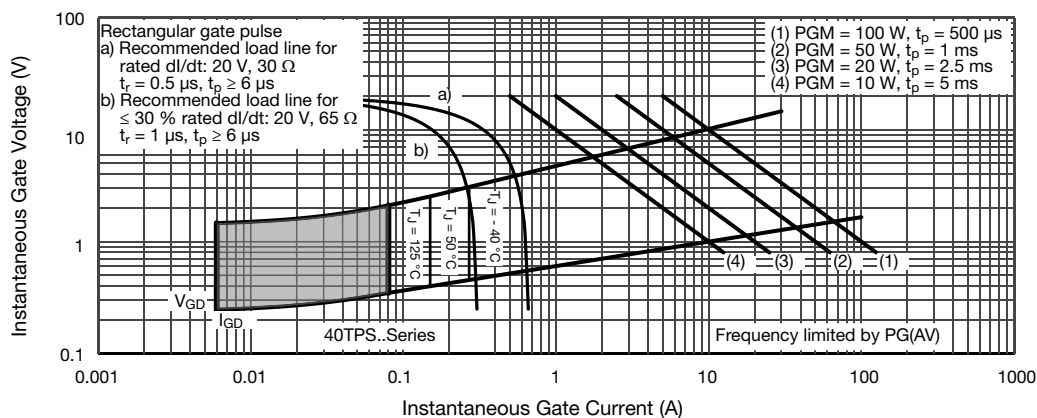


Fig. 8 - Gate Characteristics

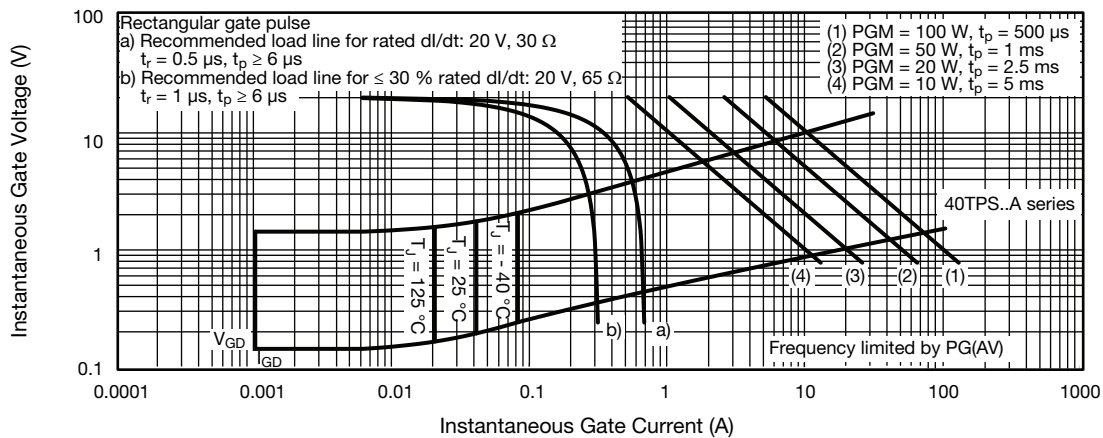
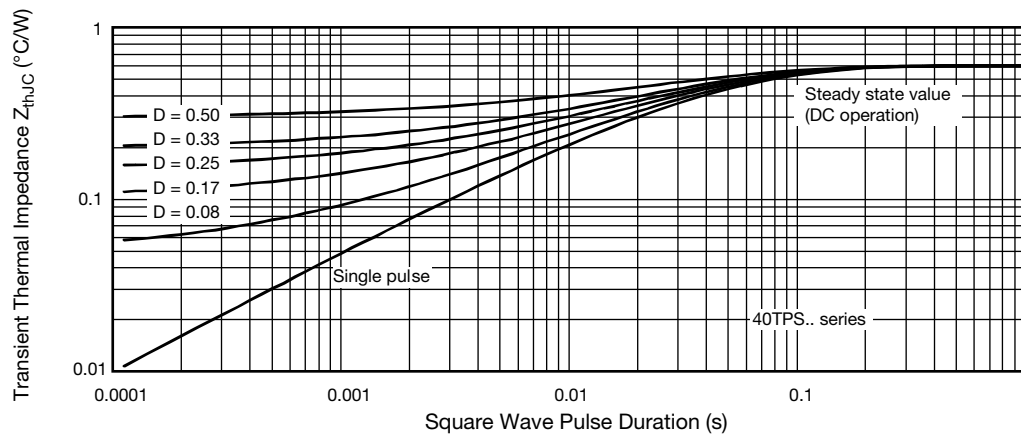


Fig. 9 - Gate Characteristics


Fig. 10 - Thermal Impedance Z_{thJC} Characteristics

**ORDERING INFORMATION TABLE**

Device code	VS-	40	T	P	S	12	A	L	-M3
	1	2	3	4	5	6	7	8	9
1	- Vishay Semiconductors product								
2	- Current rating (40 = 40 A)								
3	- Circuit configuration: T = thyristor								
4	- Package: P = TO-247								
5	- Type of silicon: S = standard recovery rectifier								
6	- Voltage ratings 12 = 1200 V								
7	- • A = Low Igt selection 40 mA maximum • None = standard Igt selection								
8	- L = long leads								
9	- Environmental digit: -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free								

ORDERING INFORMATION (Example)

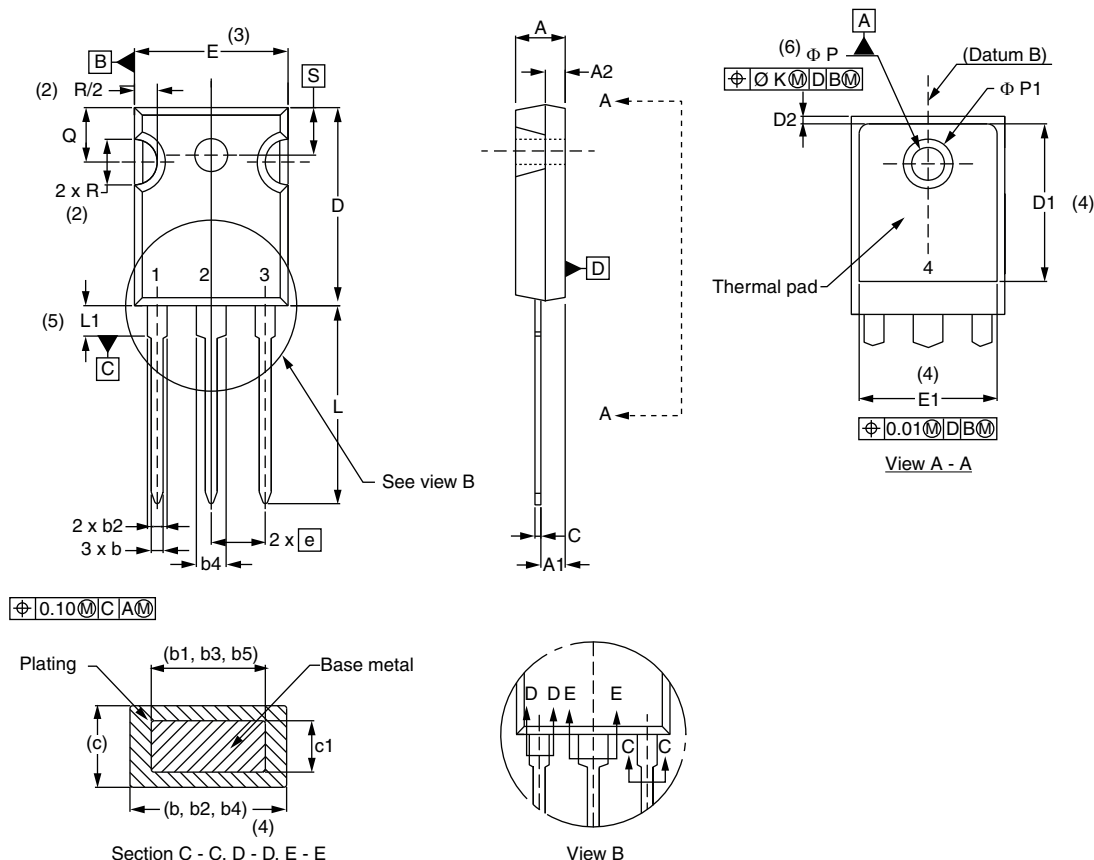
PREFERRED P/N	QUANTITY PER TUBE	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-40TPS12AL-M3	25	500	Antistatic plastic tubes
VS-40TPS12L-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS

Dimensions	TO-247AD 3L	www.vishay.com/doc?95626
Part marking information	TO-247AD 3L	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		
Ø K	0.254		0.010		
L	19.81	20.32	0.780	0.800	
L1	3.71	4.29	0.146	0.169	
Ø P	3.56	3.66	0.14	0.144	
Ø 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
- 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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