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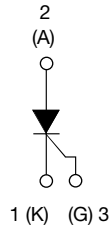
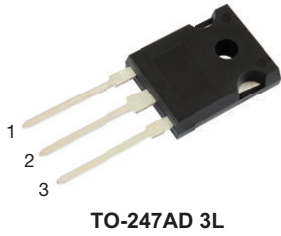
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Thyristor High Voltage, Phase Control SCR, 40 A



FEATURES

- Low I_{GT} parts available
- AEC-Q101 qualified meets JESD 201 class 1A whisker test
- 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

- On-board and off-board EV / HEV battery chargers
- Renewable energy inverters

DESCRIPTION

The VS-40TPS... high voltage series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications.

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/ μ s
di/dt		100	A/ μ s
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-40TPS12ALHM3	1200	1300	10
VS-40TPS12LHM3	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 ² s
		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	A ² √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	mΩ
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	A/μs
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 % V_{DRM} , $R_{g-k} = 100\text{ }^\circ\Omega$		500	V/μs
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}	$T_J = -40\text{ }^\circ\text{C}$	Anode supply = 6 V resistive load	2.0	V
		$T_J = 25\text{ }^\circ\text{C}$		1.7	
		$T_J = 125\text{ }^\circ\text{C}$		1.3	
Maximum required DC gate current to trigger	I_{GT}	$T_J = -40\text{ }^\circ\text{C}$	Anode supply = 6 V resistive load	200	mA
		$T_J = 25\text{ }^\circ\text{C}$		150	
		$T_J = 125\text{ }^\circ\text{C}$		80	
		$T_J = 25\text{ }^\circ\text{C}$, for 40TPS12A		40	
Maximum DC gate voltage not to trigger for 40TPS12	V_{GD}	$T_J = 125\text{ }^\circ\text{C}$, $V_{DRM} = \text{rated value}$		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}	$T_J = 125\text{ }^\circ\text{C}$, $V_{DRM} = \text{rated value}$		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	0.2	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum maximum		6 (5)	kgf · cm (lbf · in)
			12 (10)	
Marking device		Case style TO-247AD 3L	40TPS12ALH	
			40TPS12LH	

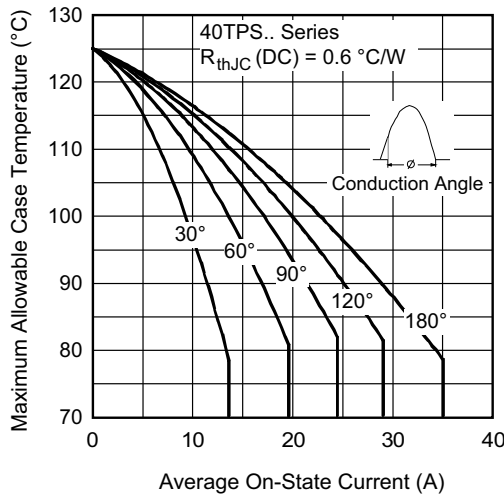


Fig. 1 - Current Rating Characteristics

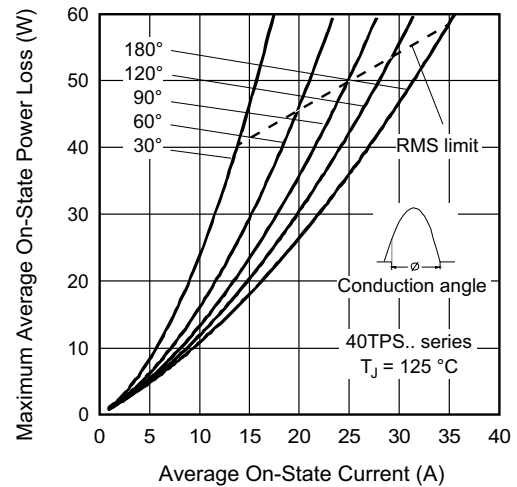


Fig. 3 - On-State Power Loss Characteristics

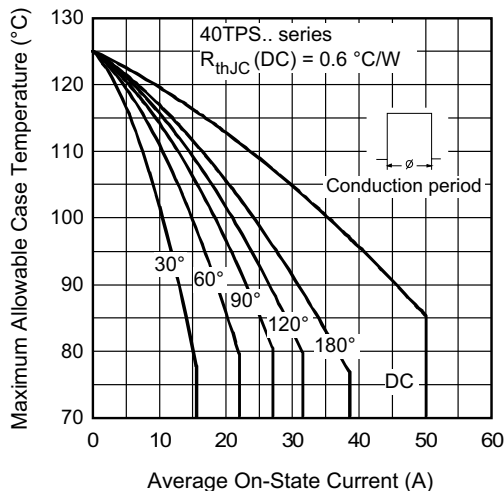


Fig. 2 - Current Rating Characteristics

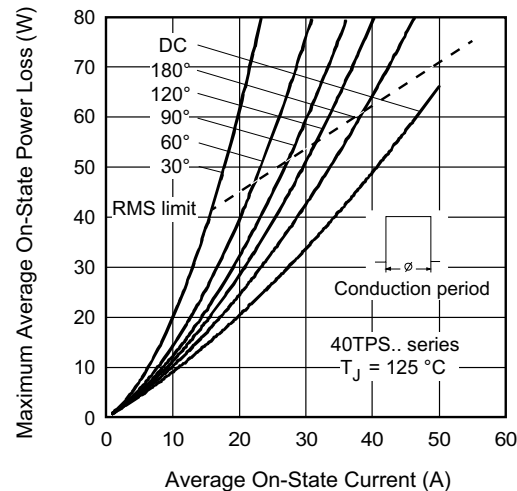


Fig. 4 - On-State Power Loss Characteristics

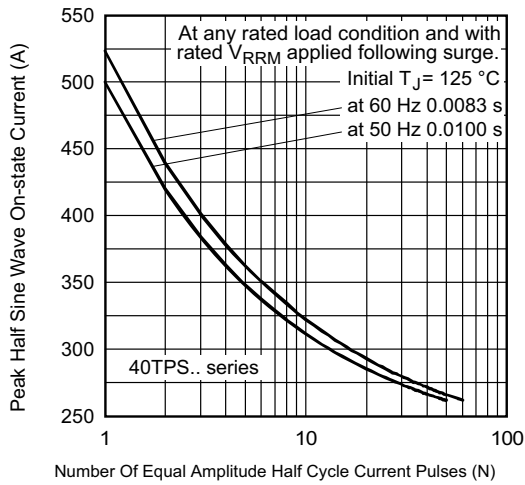


Fig. 5 - Maximum Non-Repetitive Surge Current

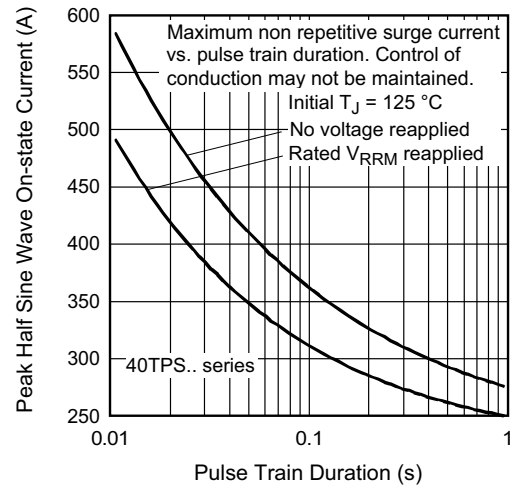


Fig. 6 - Maximum Non-Repetitive Surge Current

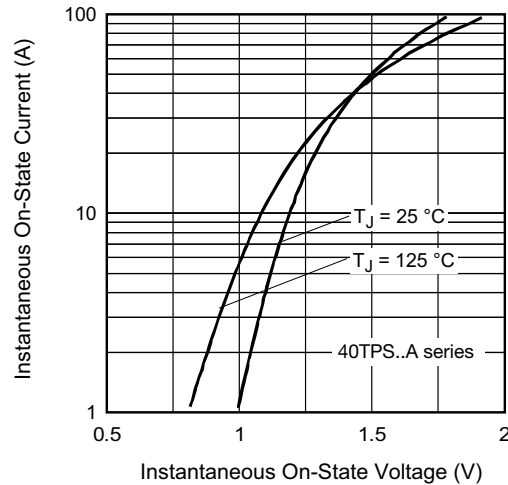


Fig. 7 - On-State Voltage Drop Characteristics

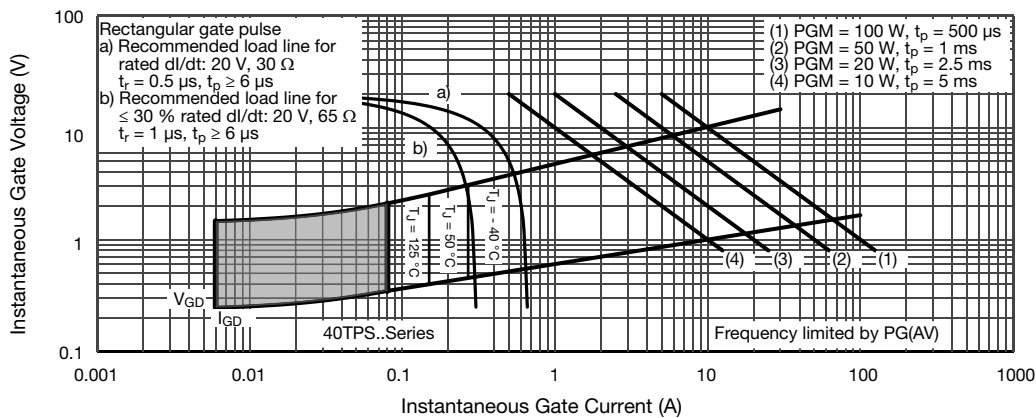


Fig. 8 - Gate Characteristics

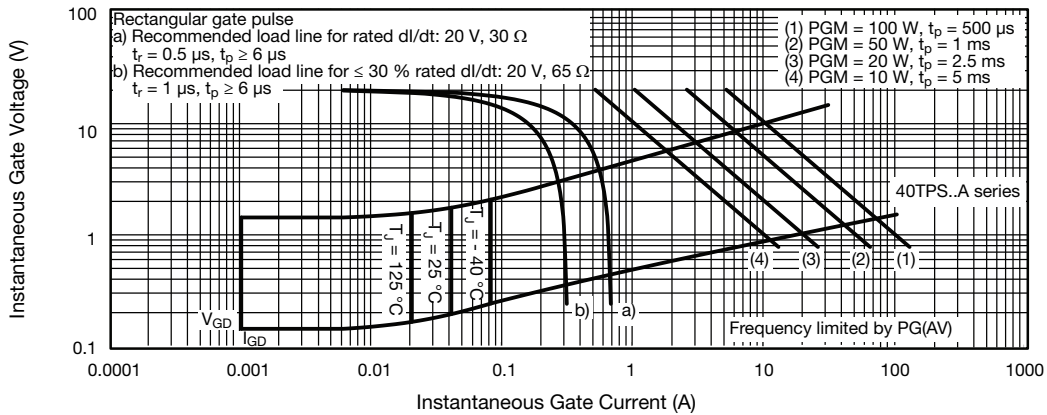


Fig. 9 - Gate Characteristics

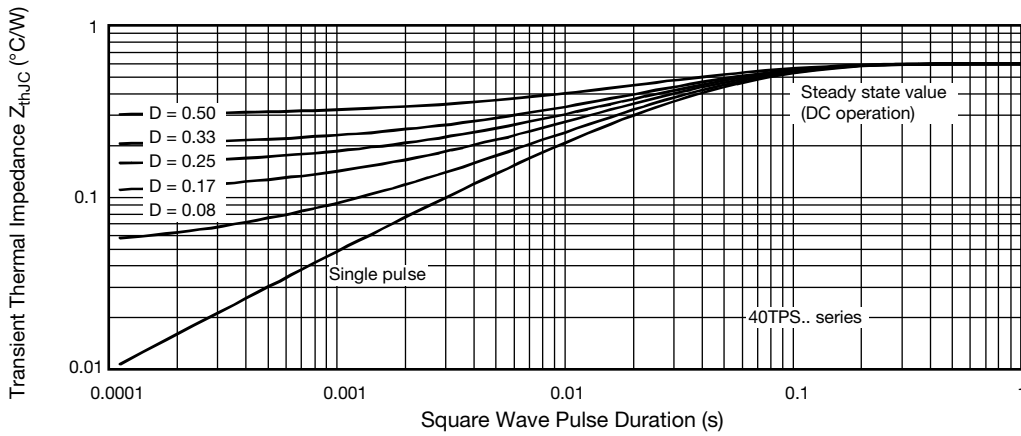


Fig. 10 - Thermal Impedance Z_{thJC} Characteristics



ORDERING INFORMATION TABLE

Device code	VS-	40	T	P	S	12	A	L	H	M3	
	1	2	3	4	5	6	7	8	9	10	
	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	-	<ul style="list-style-type: none"> A = Low Igt selection 40 mA maximum None = standard Igt selection 								
	8	-	L = long leads								
	9	-	H = AEC-Q101 qualified								
	10	-	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-40TPS12ALHM3	25	500	Antistatic plastic tubes
VS-40TPS12LHM3	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



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