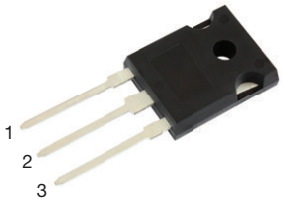
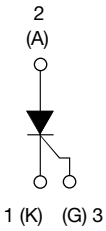
Thyristor High Voltage, Phase Control SCR, 40 A



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

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).

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

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 °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 °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 $T_J = T_J$ 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 ms to 10 ms, no voltage reapplied		17 600	$A^2\sqrt{s}$
Low level value of threshold voltage	$V_{T(TO)1}$	T_J = 125 °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 °C		1.85	V
Maximum rate of rise of turned-on current	di/dt	T_J = 25 °C		100	A/µs
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial T_J = 1 A, I_T = 25 °C		300	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C		350	
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	T_J = 25 °C	V_R = rated V_{RRM}/V_{DRM}	0.5	
		T_J = 125 °C		10	
Maximum rate of rise of off-state voltage 40TPS12A	dv/dt	$T_J = T_J$ maximum, linear to 80 % V_{DRM}, R_g- k = 100 Ω		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 °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 (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-247AD 3L	40TPS12AL	
				40TPS12L	

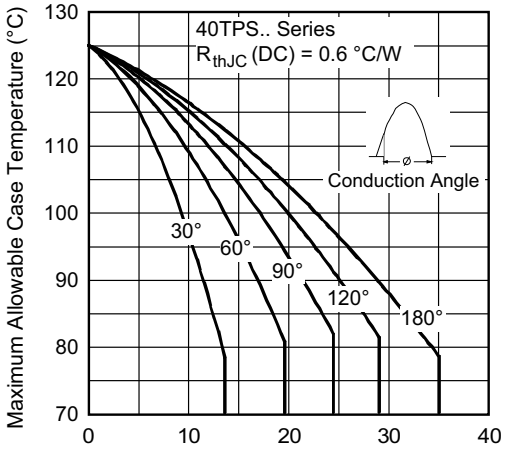


Fig. 1 - Current Rating Characteristics

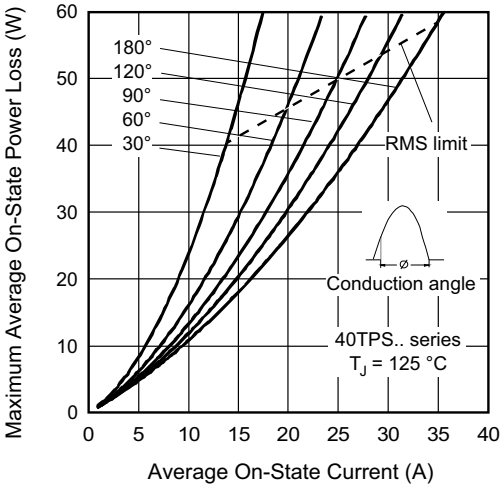


Fig. 3 - On-State Power Loss Characteristics

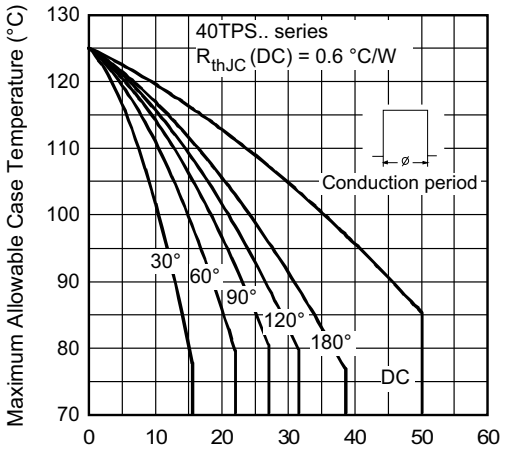


Fig. 2 - Current Rating Characteristics

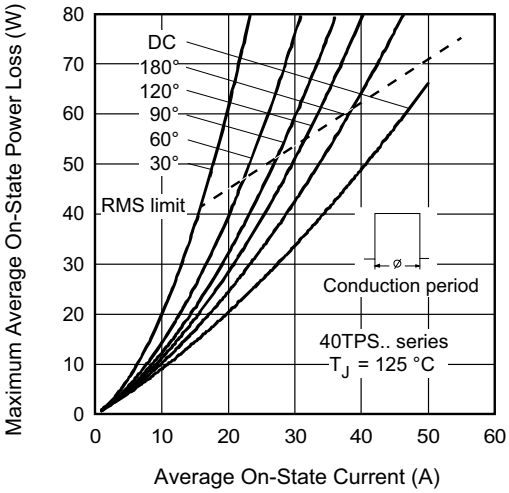


Fig. 4 - On-State Power Loss Characteristics

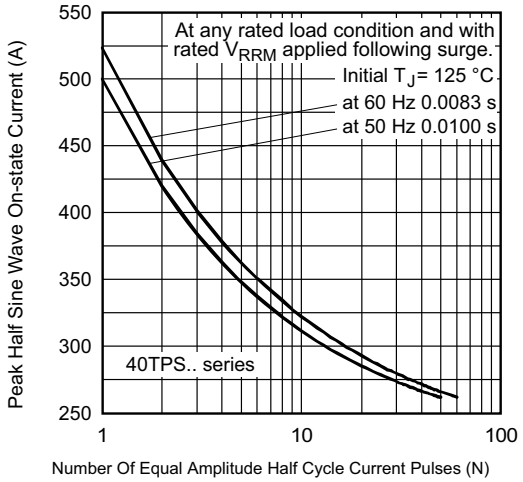


Fig. 5 - Maximum Non-Repetitive Surge Current

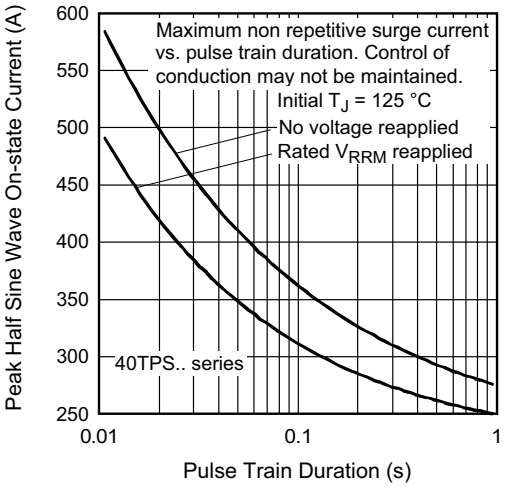


Fig. 6 - Maximum Non-Repetitive Surge Current

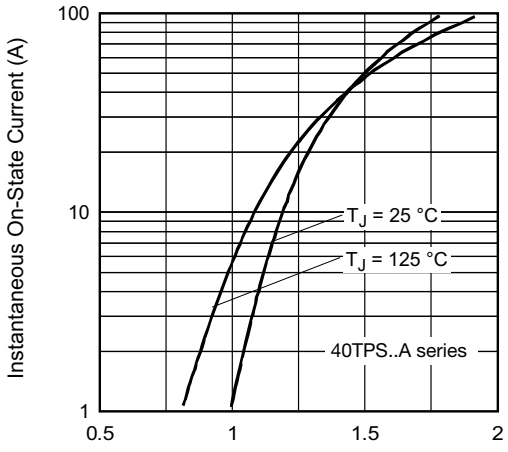


Fig. 7 - On-State Voltage Drop Characteristics

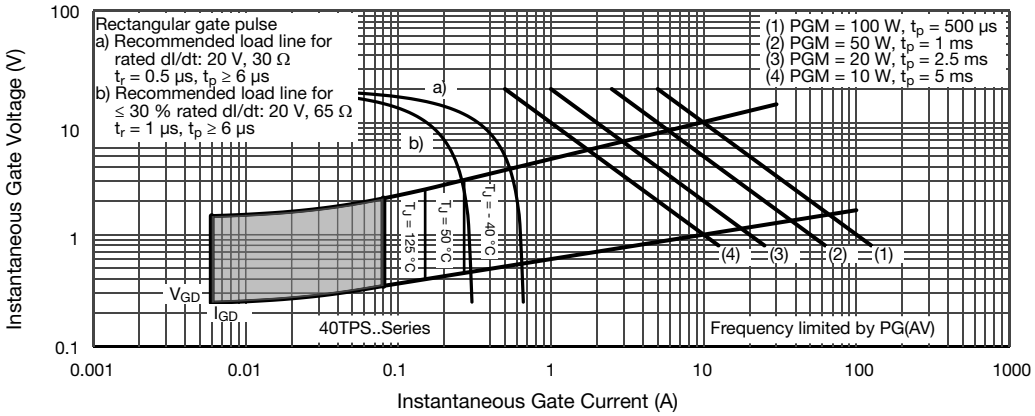


Fig. 8 - Gate Characteristics

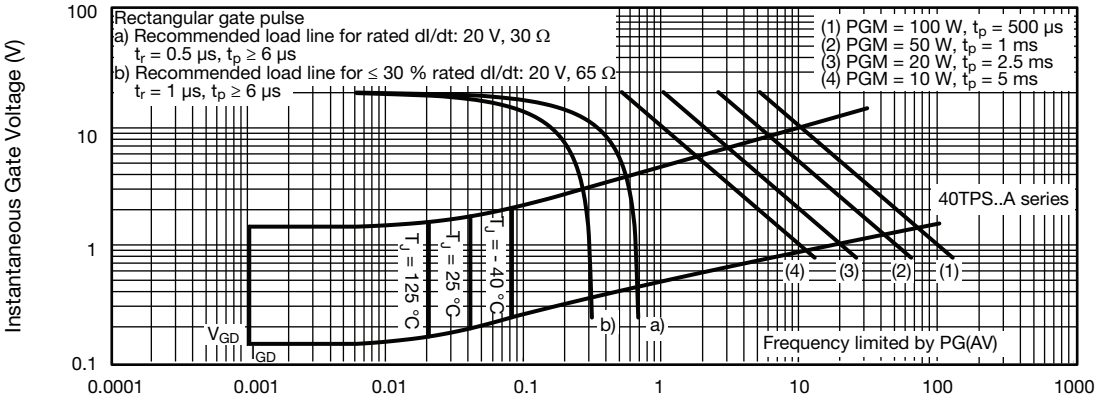


Fig. 9 - Gate Characteristics

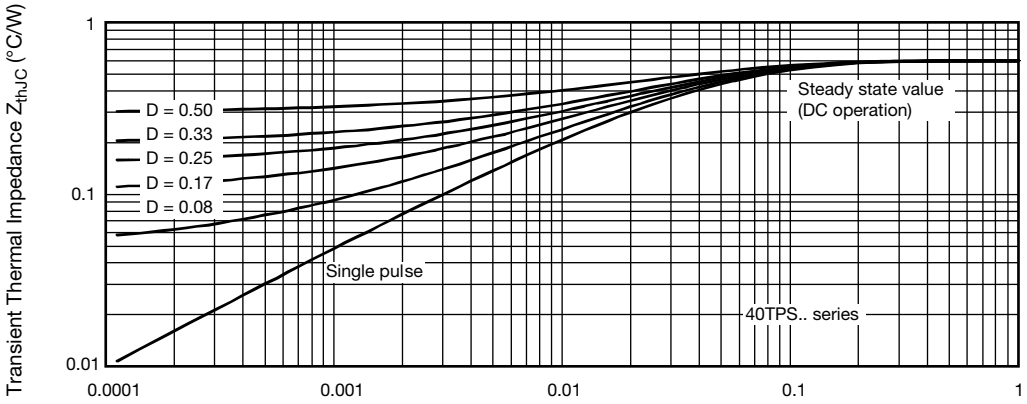
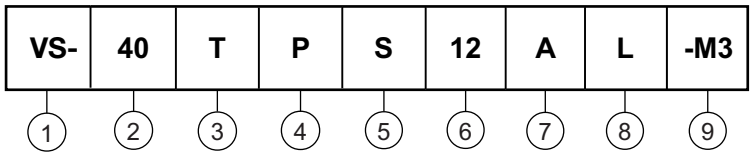


Fig. 10 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code



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

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