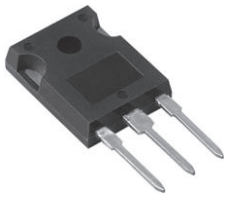
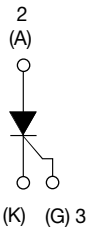
High Voltage Phase Control Thyristor, 40 A



TO-247AC



FEATURES

- Designed and qualified according to JEDEC-JESD47
- Low I_{GT} parts available
- Compliant to RoHS Directive 2002/95/EC
- 125 °C max. operating junction temperature
- Halogen-free according to IEC 61249-2-21 definition (-M3 only)

RoHS COMPLIANT
HALOGEN FREE Available

APPLICATIONS

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

DESCRIPTION

The VS-40TPS... 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 125 °C junction temperature.

PRODUCT SUMMARY	
Package	TO-247AC
Diode variation	Single SCR
$I_{T(AV)}$	35 A
V_{DRM}/V_{RRM}	800 V, 1200 V
V_{TM}	1.45 V
I_{GT}	150 mA
T_J	- 40 °C to 125 °C

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	35	A
I_{RMS}		55	
V_{RRM}/V_{DRM}		800/1200	V
I_{TSM}		500	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-40TPS08APbF, VS-40TPS08A-M3	800	900	10
VS-40TPS08PbF, VS-40TPS08-M3	1200	1300	
VS-40TPS12APbF, VS-40TPS12A-M3	800	900	
VS-40TPS12PbF, VS-40TPS12-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 maximum	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		12 500	$A^2\sqrt{s}$
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			150	mA
Maximum latching current	I_L			300	
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 40TPS08	dV/dt	T_J = T_J maximum, linear to 80 % V_{DRM}, R_g-k = Open		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	4.0	V
		T_J = 25 °C		2.5	
		T_J = 125 °C		1.7	
Maximum required DC gate current to trigger	I_{GT}	T_J = - 40 °C		270	mA
		T_J = 25 °C		150	
		T_J = 125 °C		80	
		T_J = 25 °C, for 40TPS08APbF and 40TPS12APbF		40	
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = Rated value		0.25	V
Maximum DC gate current not to trigger	I_{GD}			6	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 heatsink		R_{thCS}	Mounting surface, smooth and greased	0.2	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-247AC	40TPS08A	
				40TPS12A	
				40TPS08	
				40TPS12	

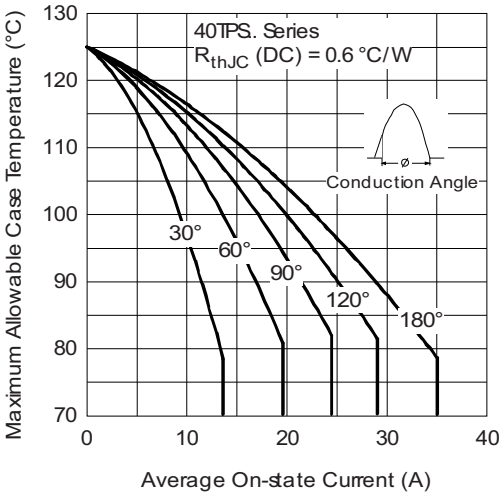


Fig. 1 - Current Rating Characteristics

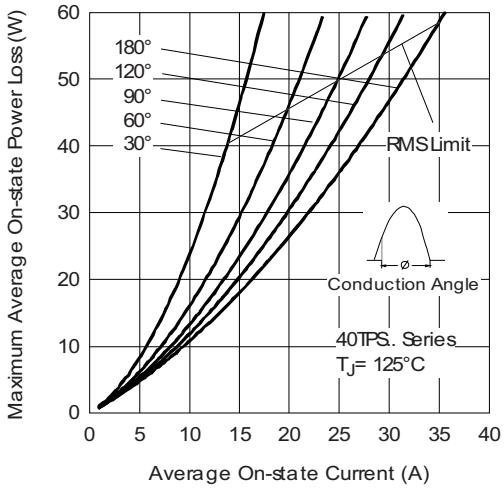


Fig. 3 - On-State Power Loss Characteristics

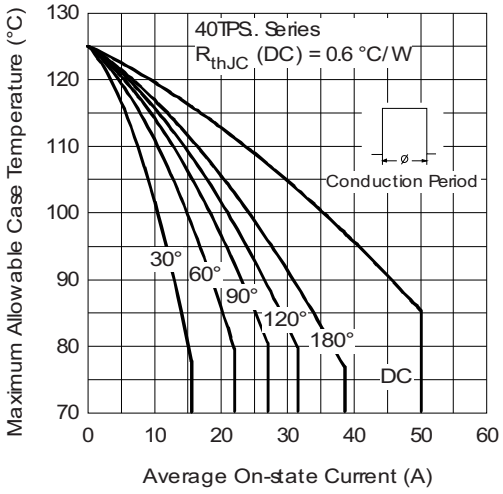


Fig. 2 - Current Rating Characteristics

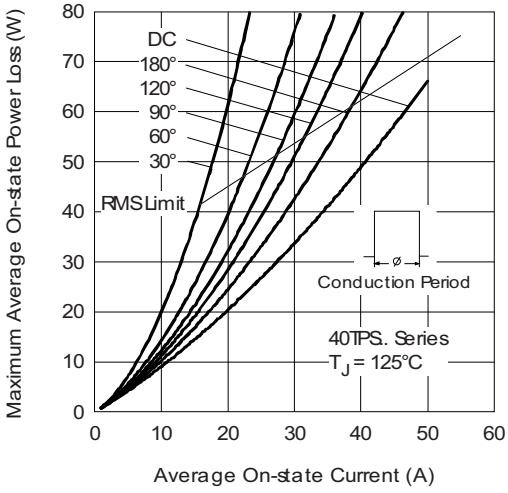


Fig. 4 - On-State Power Loss Characteristics

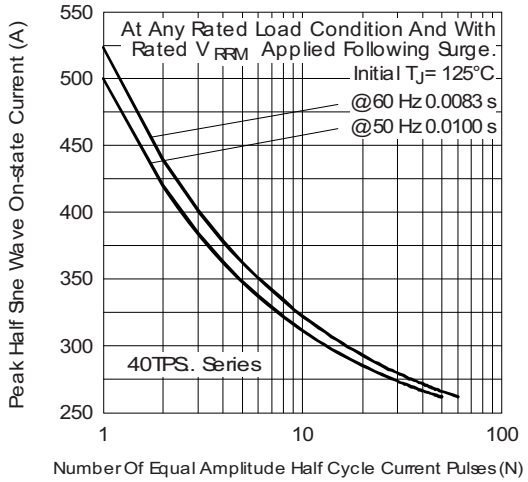


Fig. 5 - Maximum Non-Repetitive Surge Current

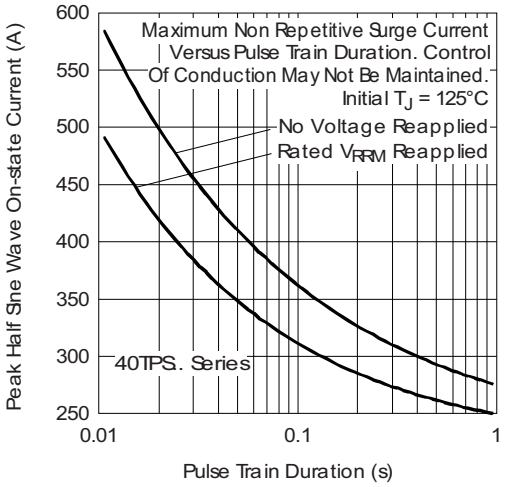


Fig. 6 - Maximum Non-Repetitive Surge Current

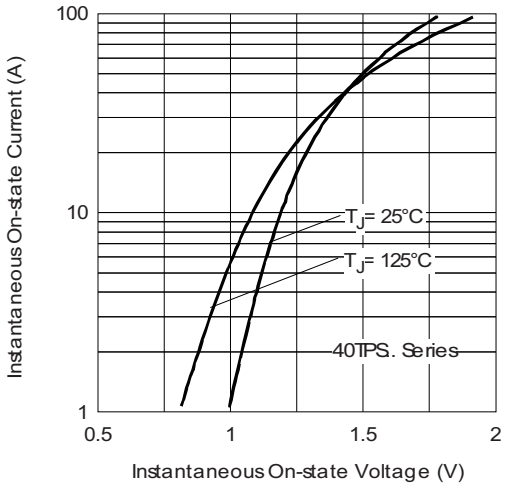


Fig. 7 - On-State Voltage Drop Characteristics

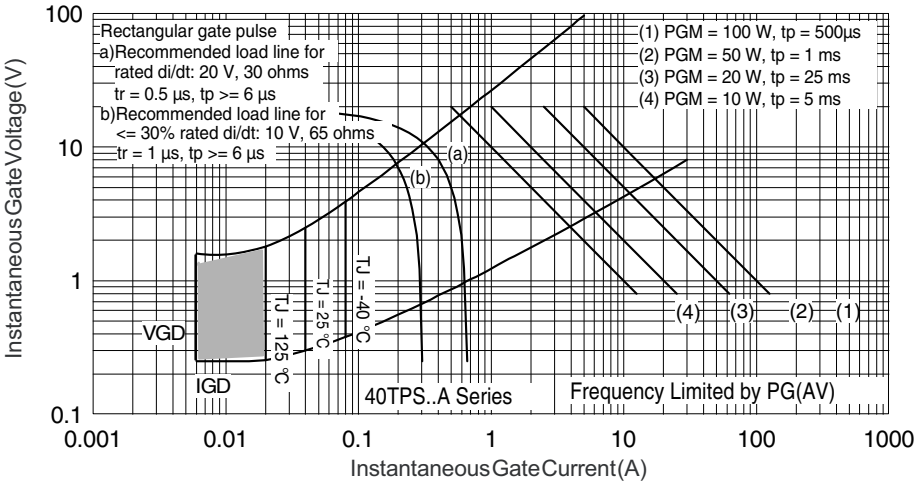


Fig. 8 - Gate Characteristics

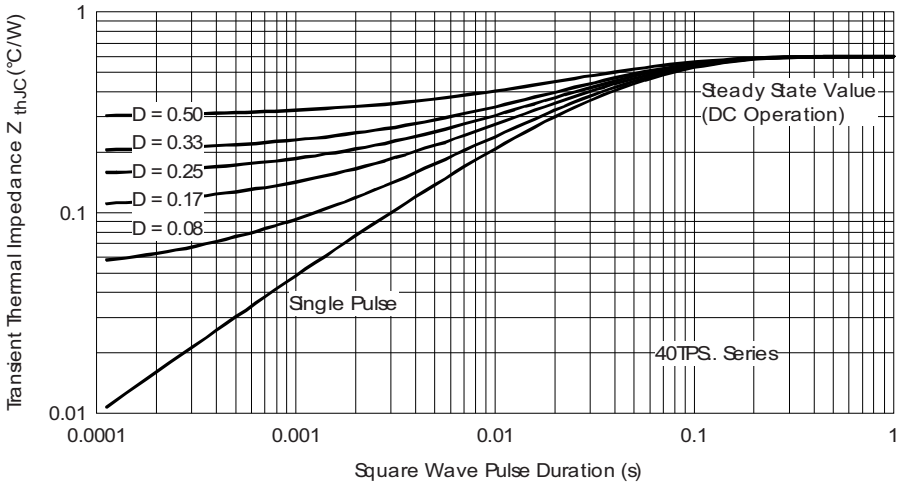


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	40	T	P	S	12	A	PbF
1	2	3	4	5	6	7	8

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 (08 = 800 V, 12 = 1200 V)

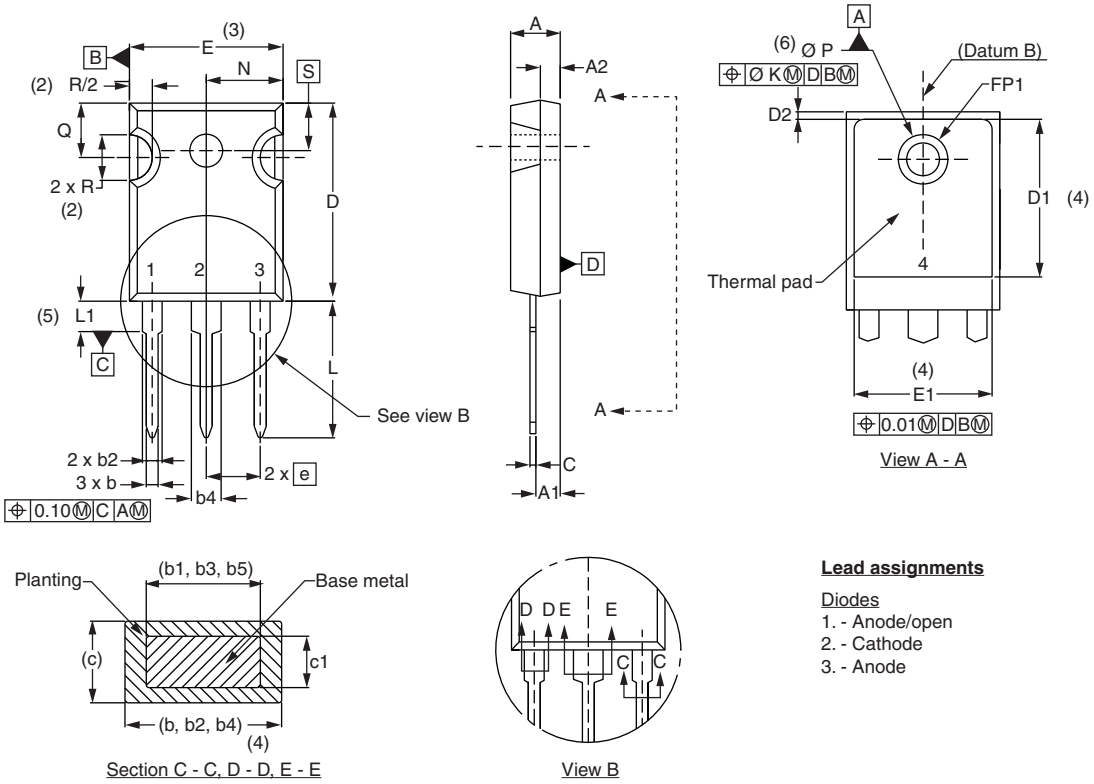
7 - • A = Low Igt selection 40 mA maximum
• None = Standard Igt selection

8 - Environmental digit:
PbF = Lead (Pb)-free and RoHS compliant
-M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-40TPS08APbF	25	500	Antistatic plastic tubes
VS-40TPS08A-M3	25	500	Antistatic plastic tubes
VS-40TPS08PbF	25	500	Antistatic plastic tubes
VS-40TPS08-M3	25	500	Antistatic plastic tubes
VS-40TPS12APbF	25	500	Antistatic plastic tubes
VS-40TPS12A-M3	25	500	Antistatic plastic tubes
VS-40TPS12PbF	25	500	Antistatic plastic tubes
VS-40TPS12-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95223
Part marking information	TO-247AC PbF	www.vishay.com/doc?95226
	TO-247AC-M3	www.vishay.com/doc?95007

DIMENSIONS in millimeters and inches



Lead assignments

Diodes
1. - Anode/open
2. - Cathode
3. - Anode

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	2.37	0.065	0.094	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.86	0.015	0.034	
c1	0.38	0.76	0.015	0.030	
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	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
FK	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
ΦP	3.56	3.66	0.14	0.144	
ΦP1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	1.78	0.216	
S	5.51 BSC		0.217 BSC		

Notes

(1) Dimensioning and tolerancing per ASME Y14.5M-1994
(2) Contour of slot optional
(3) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
(4) Thermal pad contour optional with dimensions D1 and E1
(5) Lead finish uncontrolled in L1
(6) 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")
(7) Outline conforms to JEDEC outline TO-247 with exception of dimension c

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