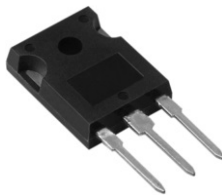




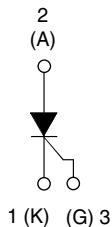
# 40TPS...APbF/40TPS...PbF High Voltage Series

Vishay High Power Products

## Phase Control SCR, 35 A



TO-247AC



### DESCRIPTION/FEATURES

The 40TPS...APbF 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. Low Igt parts available.



RoHS\*  
COMPLIANT

Typical applications are in input rectification (soft start) and these products are designed to be used with Vishay HPP input diodes, switches and output rectifiers which are available in identical package outlines.

This product has been designed and qualified for industrial level and lead (Pb)-free ("PbF" suffix).

### PRODUCT SUMMARY

$V_T$ at 40 A	< 1.45 V
$I_{TSM}$	500 A
$V_{RRM}$	800/1200 V

### 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, $T_J = 25\text{ °C}$	1.45	V
$dV/dt$		1000	V/ $\mu$ s
$dI/dt$		100	A/ $\mu$ 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
40TPS08APbF	800	900	10
40TPS12APbF	1200	1300	
40TPS08PbF	800	900	
40TPS12PbF	1200	1300	

\* Pb containing terminations are not RoHS compliant, exemptions may apply

# 40TPS...APbF/40TPS...PbF High Voltage Series

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ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	I <sub>T(AV)</sub>	T <sub>C</sub> = 79 °C, 180° conduction half sine wave		35	A
Maximum continuous RMS on-state current as AC switch	I <sub>T(RMS)</sub>			55	
Maximum peak, one-cycle non-repetitive surge current	I <sub>TSM</sub>	10 ms sine pulse, rated V <sub>RRM</sub> applied	Initial T <sub>J</sub> = T <sub>J</sub> maximum	500	
		10 ms sine pulse, no voltage reapplied		600	
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	10 ms sine pulse, rated V <sub>RRM</sub> applied		1250	A <sup>2</sup> s
		10 ms sine pulse, no voltage reapplied		1760	
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 to 10 ms, no voltage reapplied		12 500	A <sup>2</sup> √s
Low level value of threshold voltage	V <sub>T(TO)1</sub>	T <sub>J</sub> = 125 °C		1.02	V
High level value of threshold voltage	V <sub>T(TO)2</sub>			1.23	
Low level value of on-state slope resistance	r <sub>t1</sub>			9.74	mΩ
High level value of on-state slope resistance	r <sub>t2</sub>			7.50	
Maximum peak on-state voltage	V <sub>TM</sub>	110 A, T <sub>J</sub> = 25 °C		1.85	V
Maximum rate of rise of turned-on current	di/dt	T <sub>J</sub> = 25 °C		100	A/μs
Maximum holding current	I <sub>H</sub>			150	mA
Maximum latching current	I <sub>L</sub>			300	
Maximum reverse and direct leakage current	I <sub>RRM</sub> /I <sub>DRM</sub>	T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>RRM</sub> /V <sub>DRM</sub>	0.5	
		T <sub>J</sub> = 125 °C		10	
Maximum rate of rise of off-state voltage 40TPS08	dV/dt	T <sub>J</sub> = T <sub>J</sub> maximum, linear to 80 % V <sub>DRM</sub> , R <sub>g</sub> -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 <sub>GM</sub>			10	W
Maximum average gate power	P <sub>G(AV)</sub>			2.5	
Maximum peak gate current	I <sub>GM</sub>			2.5	A
Maximum peak negative gate voltage	- V <sub>GM</sub>			10	V
Maximum required DC gate voltage to trigger	V <sub>GT</sub>	T <sub>J</sub> = - 40 °C	Anode supply = 6 V resistive load	4.0	V
		T <sub>J</sub> = 25 °C		2.5	
		T <sub>J</sub> = 125 °C		1.7	
Maximum required DC gate current to trigger	I <sub>GT</sub>	T <sub>J</sub> = - 40 °C		270	mA
		T <sub>J</sub> = 25 °C		150	
		T <sub>J</sub> = 125 °C		80	
		T <sub>J</sub> = 25 °C, for 40TPS08APbF and 40TPS12APbF		40	
Maximum DC gate voltage not to trigger	V <sub>GD</sub>	T <sub>J</sub> = 125 °C, V <sub>DRM</sub> = Rated value		0.25	V
Maximum DC gate current not to trigger	I <sub>GD</sub>			6	mA



## 40TPS...APbF/40TPS...PbF High Voltage Series

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THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T <sub>J</sub> , T <sub>Stg</sub>		- 40 to 125	°C
Maximum thermal resistance, junction to case	R <sub>thJC</sub>	DC operation	0.6	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		40	
Maximum thermal resistance, case to heatsink	R <sub>thCS</sub>	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	

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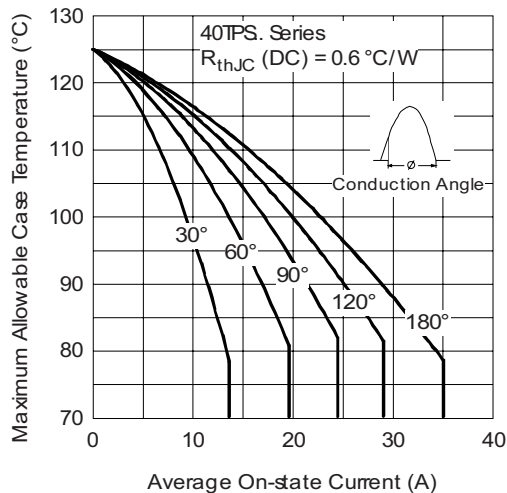


Fig. 1 - Current Rating Characteristics

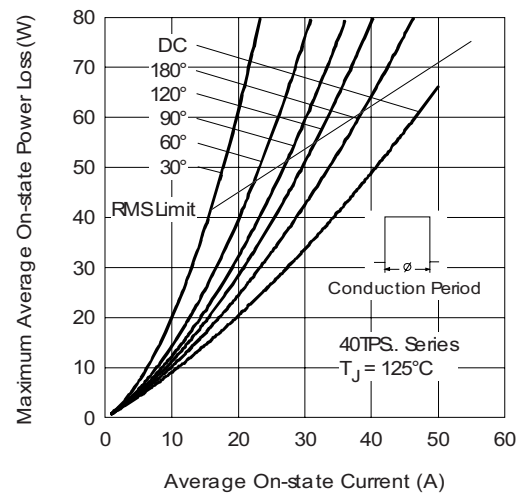


Fig. 4 - On-State Power Loss Characteristics

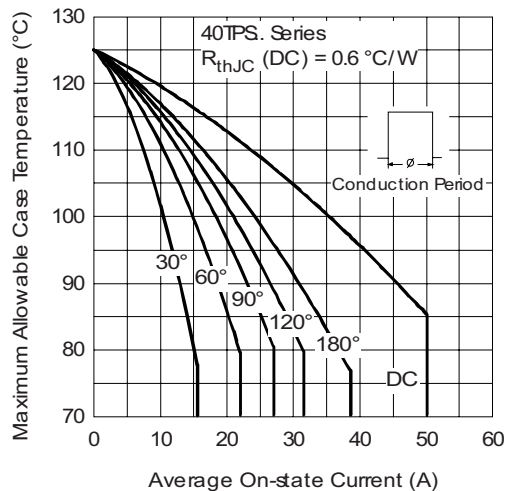


Fig. 2 - Current Rating Characteristics

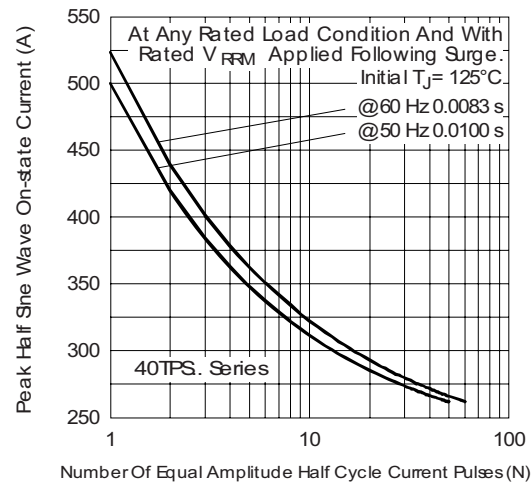


Fig. 5 - Maximum Non-Repetitive Surge Current

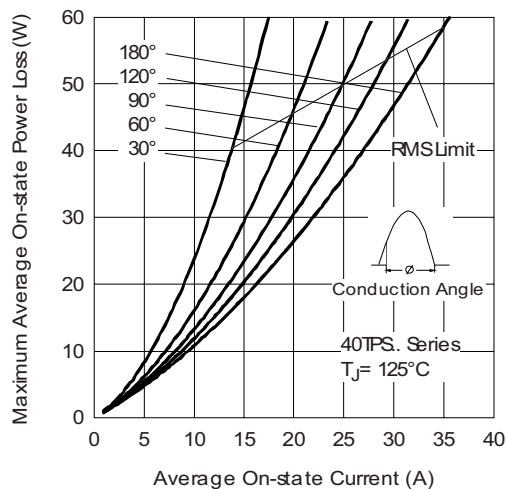


Fig. 3 - On-State Power Loss Characteristics

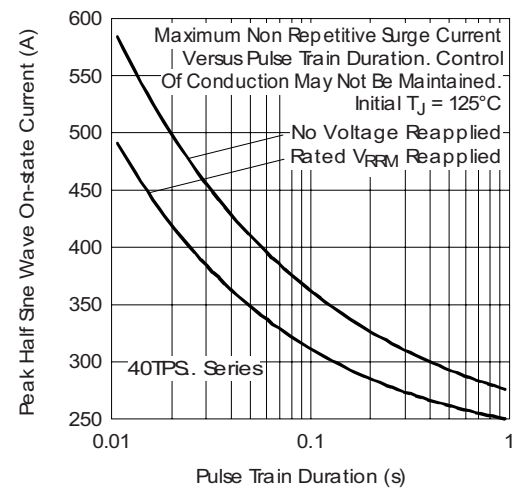


Fig. 6 - Maximum Non-Repetitive Surge Current



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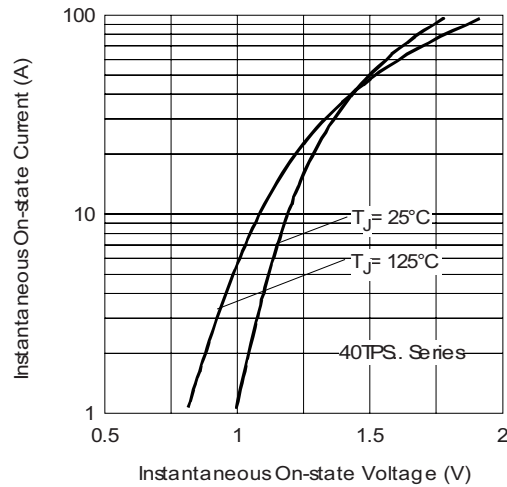


Fig. 7 - On-State Voltage Drop Characteristics

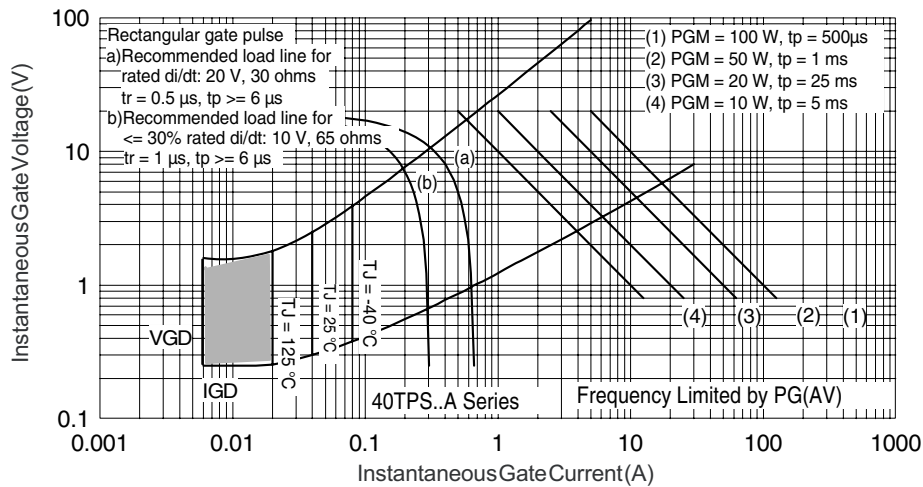


Fig. 8 - Gate Characteristics

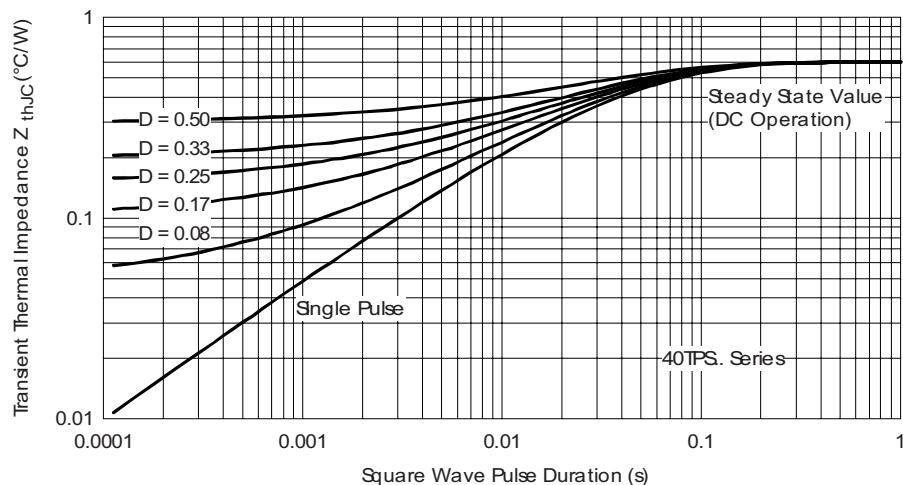


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

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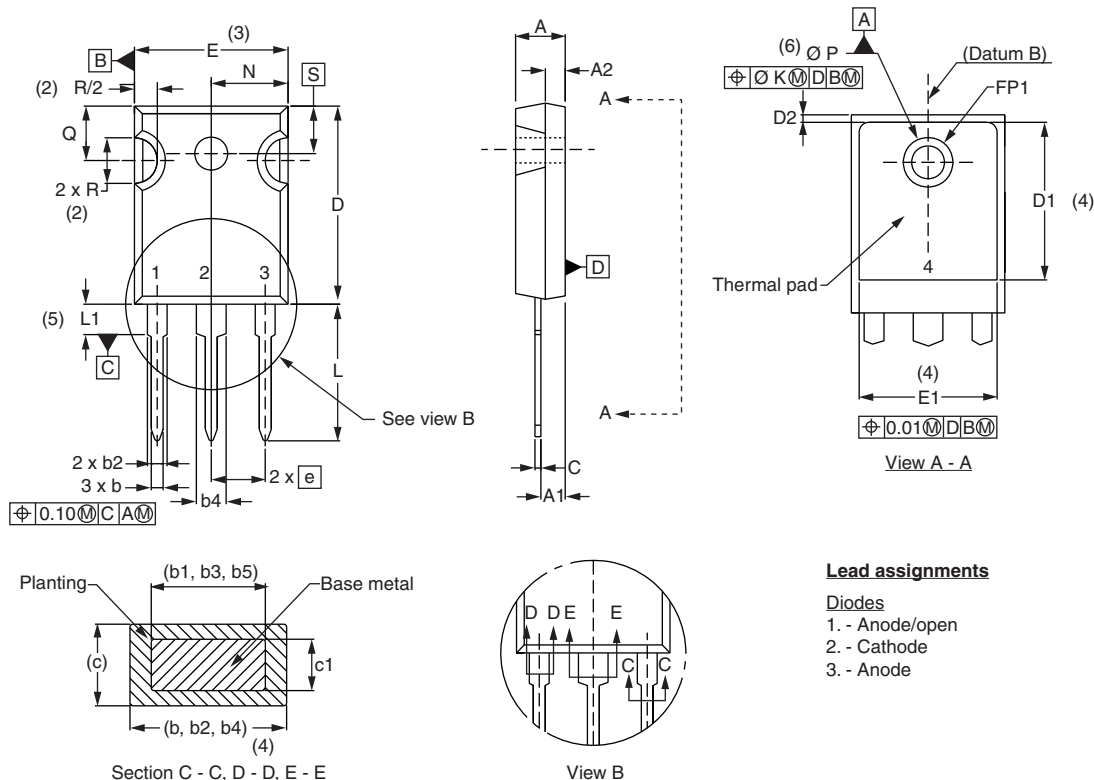
## ORDERING INFORMATION TABLE

Device code	40	T	P	S	12	A	PbF
	①	②	③	④	⑤	⑥	⑦
	1	-	Current rating (40 = 40 A)				
	2	-	Circuit configuration:				
			T = Thyristor				
	3	-	Package:				
			P = TO-247				
	4	-	Type of silicon:				
			S = Standard recovery rectifier				
	5	-	Voltage ratings				08 = 800 V 12 = 1200 V
	6	-	• A = Low Igt selection 40 mA maximum				
			• None = Standard Igt selection				
	7	-	• None = Standard production				
			• PbF = Lead (Pb)-free				

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a>
Part marking information	<a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a>



**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		
$\Phi P$	3.56	3.66	0.14	0.144	
$\Phi P1$	-	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)  $\Phi P$  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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