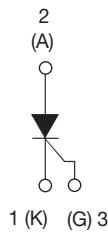


Thyristor High Voltage, Phase Control SCR, 40 A



PRODUCT SUMMARY	
Package	TO-247AC
Diode variation	Single SCR
$I_{T(AV)}$	35 A
V_{DRM}/V_{RRM}	1600 V
V_{TM}	1.45 V
I_{GT}	150 mA
T_J	- 40 °C to 125 °C

FEATURES

- High voltage (up to 1600 V)
- Designed and qualified according to JEDEC-JESD47
- 125 °C max. operating junction temperature
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912


RoHS

COMPLIANT

HALOGEN

FREE

Available

APPLICATIONS

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

DESCRIPTION

The VS-40TPS16... 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.

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	35	A
I_{RMS}		55	
V_{RRM}/V_{DRM}		1600	V
I_{TSM}		500	A
V_T	40 A, $T_J = 25$ °C	1.45	V
dV/dt		1000	V/μs
dl/dt		100	A/μs
T_J		- 40 to 125	°C

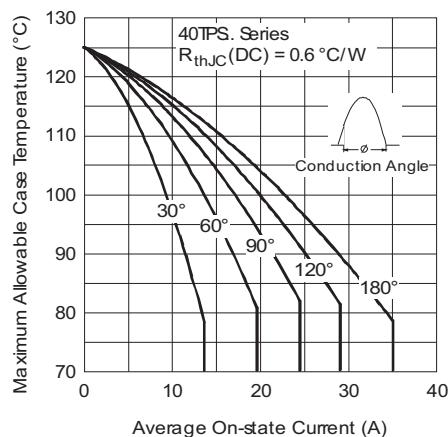
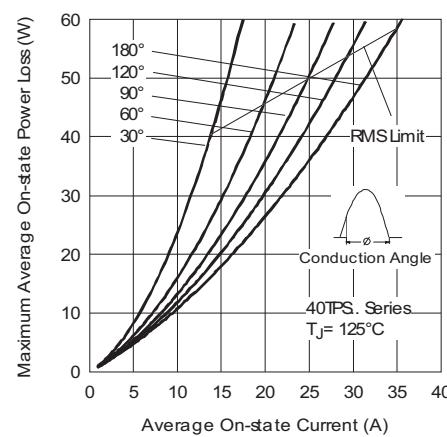
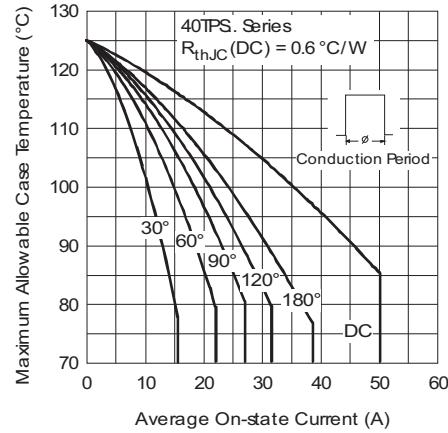
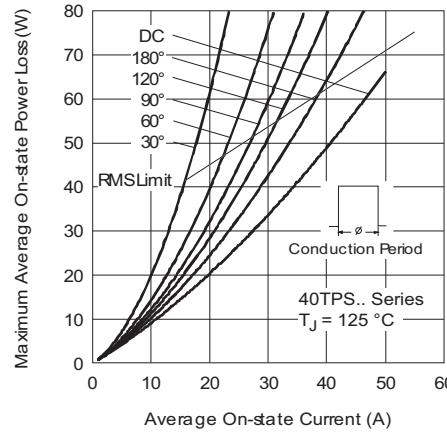
VOLTAGE RATINGS			
PART NUMBER	V_{RRM}/V_{DRM} , MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VS-40TPS16PbF, VS-40TPS16-M3	1600	1700	10

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 79^\circ\text{C}$, 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		420	
		10 ms sine pulse, no voltage reapplied		500	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied		880	A^2s
		10 ms sine pulse, no voltage reapplied		1250	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied		12 500	$\text{A}^2\sqrt{\text{s}}$
Low level value of threshold voltage	$V_{T(TO)1}$	$T_J = 125^\circ\text{C}$		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}	$110 \text{ A}, T_J = 25^\circ\text{C}$		1.85	V
Maximum rate of rise of turned-on current	dI/dt	$T_J = 25^\circ\text{C}$		100	$\text{A}/\mu\text{s}$
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1 \text{ A}, T_J = 25^\circ\text{C}$		200	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25^\circ\text{C}$		300	
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	$T_J = 25^\circ\text{C}$	VR = Rated V_{RRM}/V_{DRM}	0.5	
		$T_J = 125^\circ\text{C}$		10	
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J$ maximum, linear to 80 % V_{DRM} , R_g - k = Open		1000	$\text{V}/\mu\text{s}$

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}	$T_J = -40^\circ\text{C}$	Anode supply = 6 V resistive load	4.0	
		$T_J = 25^\circ\text{C}$		2.5	
		$T_J = 125^\circ\text{C}$		1.7	
Maximum required DC gate current to trigger	I_{GT}	$T_J = -40^\circ\text{C}$	Anode supply = 6 V resistive load	270	mA
		$T_J = 25^\circ\text{C}$		150	
		$T_J = 125^\circ\text{C}$		80	
		$T_J = 25^\circ\text{C}$, for 40TPS08A		40	
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 125^\circ\text{C}$, 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	
Maximum thermal resistance, junction to ambient	R_{thJA}		40	°C/W
Maximum thermal resistance, case to heatsink	R_{thCS}	Mounting surface, smooth and greased	0.2	
Approximate weight			6	g
Mounting torque	minimum maximum		0.21	oz.
Marking device		Case style TO-247AC	6 (5) 12 (10)	kgf · cm (lbf · in)
			40TPS16	


Fig. 1 - Current Rating Characteristics

Fig. 3 - On-State Power Loss Characteristics

Fig. 2 - Current Rating Characteristics

Fig. 4 - On-State Power Loss Characteristics

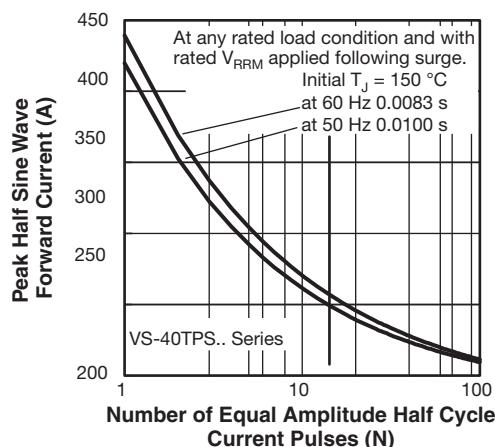


Fig. 5 - Maximum Non-Repetitive Surge Current

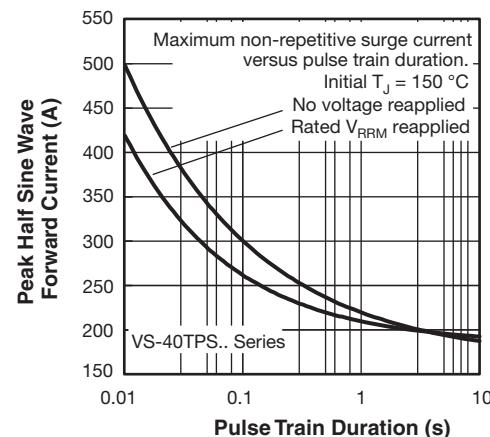


Fig. 6 - Maximum Non-Repetitive Surge Current

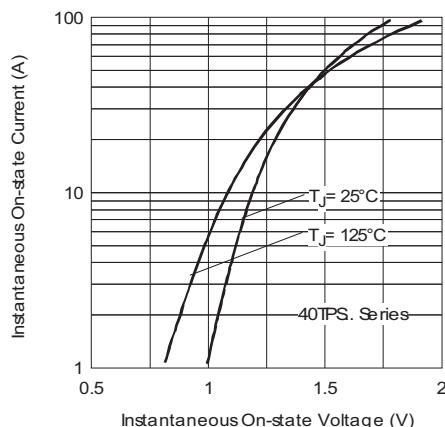


Fig. 7 - On-State Voltage Drop Characteristics

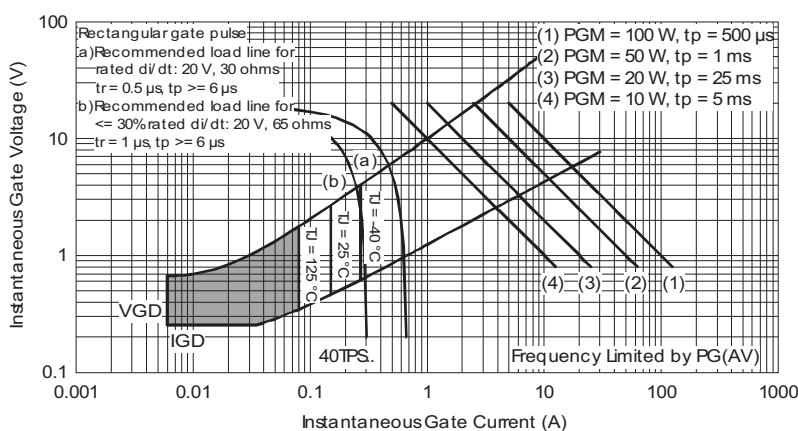


Fig. 8 - Gate Characteristics

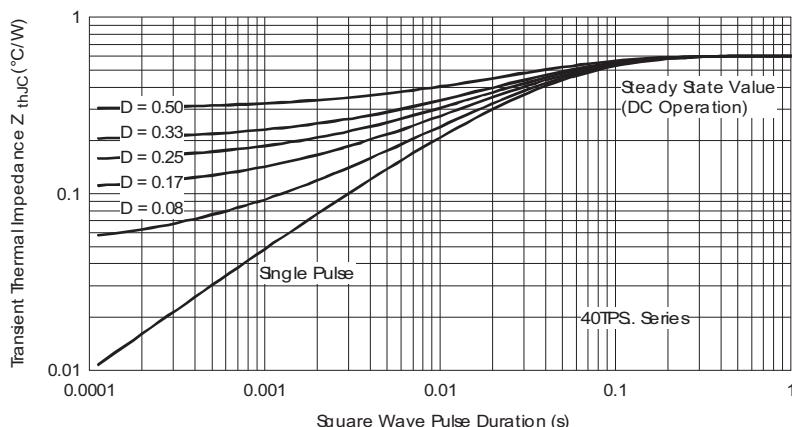


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

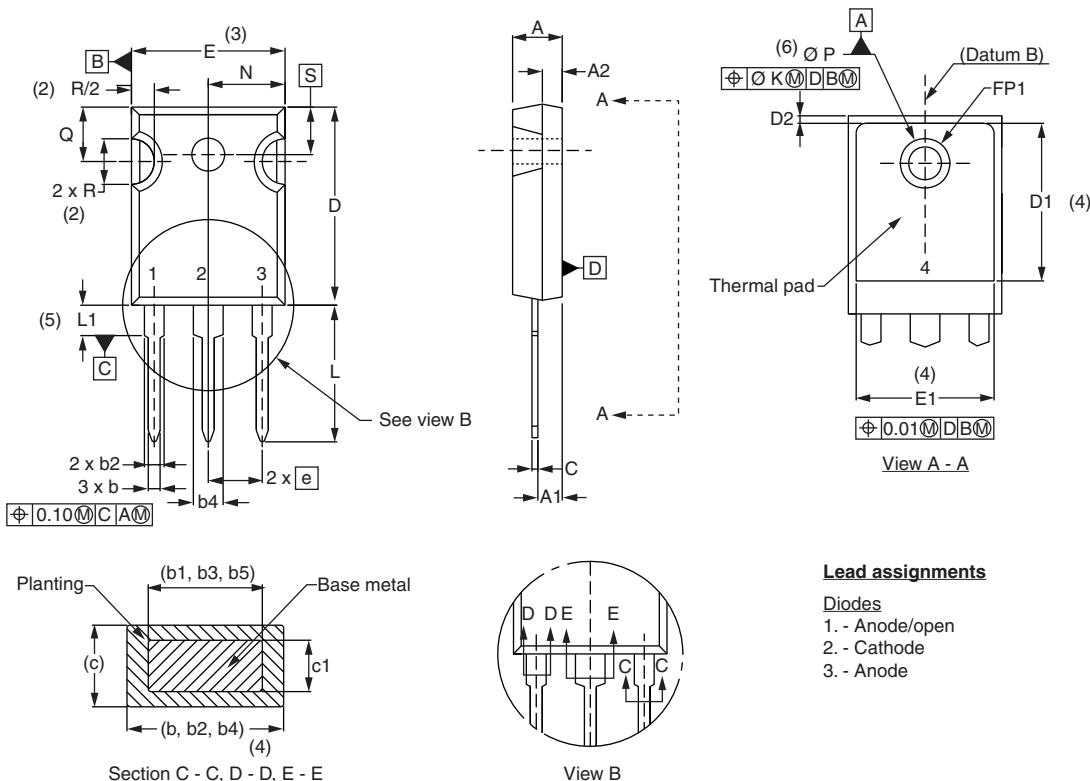
Device code	VS-	40	T	P	S	16	PbF
	1	2	3	4	5	6	7

- 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 rating (16 = 1600 V)
- 7** - 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-40TPS16PbF	25	500	Antistatic plastic tubes
VS-40TPS16-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



Symbol	Millimeters		Inches		Notes		Symbol	Millimeters		Inches		Notes
	Min.	Max.	Min.	Max.				Min.	Max.	Min.	Max.	
A	4.65	5.31	0.183	0.209			D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102			E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098			E1	13.72	-	0.540	-	
b	0.99	1.40	0.039	0.055			e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053			FK	2.54		0.010		
b2	1.65	2.39	0.065	0.094			L	14.20	16.10	0.559	0.634	
b3	1.65	2.37	0.065	0.094			L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135			N	7.62 BSC		0.3		
b5	2.59	3.38	0.102	0.133			ΦP	3.56	3.66	0.14	0.144	
c	0.38	0.86	0.015	0.034			ΦP1	-	6.98	-	0.275	
c1	0.38	0.76	0.015	0.030			Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3		R	4.52	5.49	1.78	0.216	
D1	13.08	-	0.515	-	4		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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