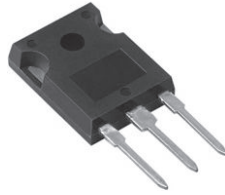
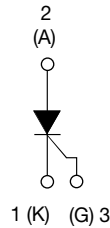




## High Voltage Phase Control Thyristor, 40 A



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, $T_J = 25\text{ °C}$	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
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	$I_{T(AV)}$	$T_C = 79\text{ }^\circ\text{C}$ , 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 $T_J = T_J$ 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 <sup>2</sup> s
		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 <sup>2</sup> √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	$I_H$			150	mA
Maximum latching current	$I_L$			300	
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 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	$V_{GT}$	$T_J = -40\text{ }^\circ\text{C}$	Anode supply = 6 V resistive load	4.0	V
		$T_J = 25\text{ }^\circ\text{C}$		2.5	
		$T_J = 125\text{ }^\circ\text{C}$		1.7	
Maximum required DC gate current to trigger	$I_{GT}$	$T_J = -40\text{ }^\circ\text{C}$		270	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 40TPS08APbF and 40TPS12APbF		40	
Maximum DC gate voltage not to trigger	$V_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , $V_{DRM} = \text{Rated value}$		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

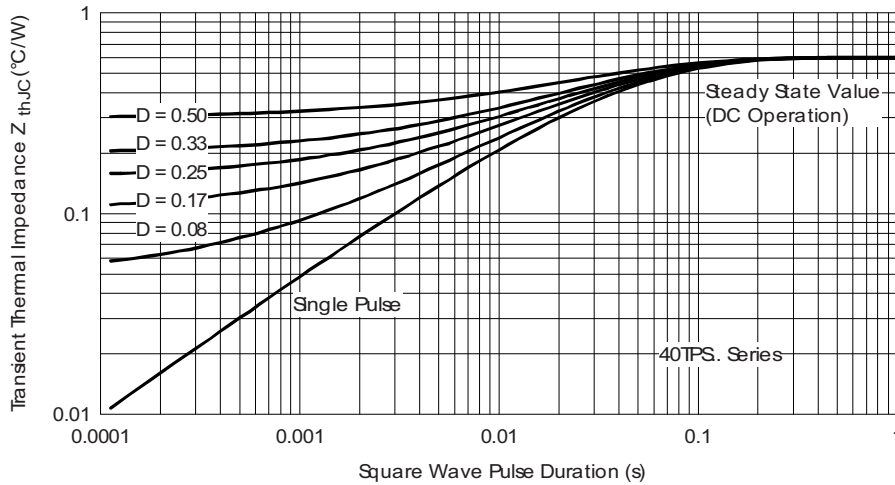


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

**ORDERING INFORMATION TABLE**

Device code	<b>VS-</b>	<b>40</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>12</b>	<b>A</b>	<b>PbF</b>
	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



<b>ORDERING INFORMATION</b> (Example)			
<b>PREFERRED P/N</b>	<b>QUANTITY PER T/R</b>	<b>MINIMUM ORDER QUANTITY</b>	<b>PACKAGING DESCRIPTION</b>
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

<b>LINKS TO RELATED DOCUMENTS</b>		
Dimensions		<a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</a>
Part marking information	TO-247AC PbF	<a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a>
	TO-247AC-M3	<a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a>





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**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**



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- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
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