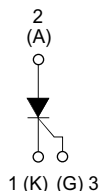


## Phase Control SCR, 10 A



TO-220AB



### DESCRIPTION/FEATURES

The 16TTS..PbF 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.



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 10 A	< 1.4 V
$I_{TSM}$	200 A
$V_{RRM}$	800/1200 V

### OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter $T_A = 55$ °C, $T_J = 125$ °C, common heatsink of 1 °C/W	13.5	17	A

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	10	A
$I_{RMS}$		16	
$V_{DRM}/V_{RRM}$	Range <sup>(1)</sup>	800/1200	V
$I_{TSM}$		200	A
$V_T$	10 A, $T_J = 25$ °C	1.4	V
$dV/dt$		500	V/μs
$dI/dt$		150	A/μs
$T_J$	Range	- 40 to 125	°C

#### Note

<sup>(1)</sup> For higher voltage up to 1600 V contact factory

### VOLTAGE RATINGS

PART NUMBER	$V_{RRM}$ , MAXIMUM PEAK REVERSE VOLTAGE V	$V_{DRM}$ , MAXIMUM PEAK DIRECT VOLTAGE V	$I_{RRM}/I_{DRM}$ AT 125 °C mA
16TTS08PbF	800	800	10
16TTS12PbF	1200	1200	

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

# 16TTS..PbF High Voltage Series

Vishay High Power Products Phase Control SCR, 10 A



ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNITS
				TYP.	MAX.	
Maximum average on-state current	I <sub>T(AV)</sub>	T <sub>C</sub> = 98 °C, 180° conduction, half sine wave		10		A
Maximum RMS on-state current	I <sub>RMS</sub>			16		
Maximum peak, one-cycle, non-repetitive surge current	I <sub>TSM</sub>	10 ms sine pulse, rated V <sub>RRM</sub> applied		170		
		10 ms sine pulse, no voltage reapplied		200		
Maximum I <sup>2</sup> t for fusing	I <sup>2</sup> t	10 ms sine pulse, rated V <sub>RRM</sub> applied		144		A <sup>2</sup> s
		10 ms sine pulse, no voltage reapplied		200		
Maximum I <sup>2</sup> √t for fusing	I <sup>2</sup> √t	t = 0.1 to 10 ms, no voltage reapplied		2000		A <sup>2</sup> √s
Maximum on-state voltage drop	V <sub>TM</sub>	10 A, T <sub>J</sub> = 25 °C		1.4		V
On-state slope resistance	r <sub>t</sub>	T <sub>J</sub> = 125 °C		24.0		mΩ
Threshold voltage	V <sub>T(TO)</sub>			1.1		V
Maximum reverse and direct leakage current	I <sub>RM</sub> /I <sub>DM</sub>	T <sub>J</sub> = 25 °C	V <sub>R</sub> = Rated V <sub>RRM</sub> /V <sub>DRM</sub>	0.5		mA
		T <sub>J</sub> = 125 °C		10		
Holding current	I <sub>H</sub>	Anode supply = 6 V, resistive load, initial I <sub>T</sub> = 1 A 16TTS08PbF, 16TTS12PbF		-	100	
Maximum latching current	I <sub>L</sub>	Anode supply = 6 V, resistive load		200		
Maximum rate of rise of off-state voltage	dV/dt			500		V/μs
Maximum rate of rise of turned-on current	dI/dt			150		A/μs

TRIGGERING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum peak gate power	$P_{GM}$		8.0	W
Maximum average gate power	$P_{G(AV)}$		2.0	
Maximum peak positive gate current	$+I_{GM}$		1.5	A
Maximum peak negative gate voltage	$-V_{GM}$		10	V
Maximum required DC gate current to trigger	$I_{GT}$	Anode supply = 6 V, resistive load, $T_J = -65\text{ }^{\circ}\text{C}$	90	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	60	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	35	
Maximum required DC gate voltage to trigger	$V_{GT}$	Anode supply = 6 V, resistive load, $T_J = -65\text{ }^{\circ}\text{C}$	3.0	V
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	2.0	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	1.0	
Maximum DC gate voltage not to trigger	$V_{GD}$	$T_J = 125\text{ }^{\circ}\text{C}$ , $V_{DRM} = \text{Rated value}$	0.2	mA
Maximum DC gate current not to trigger	$I_{GD}$		2.0	

SWITCHING				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	$t_{gt}$	$T_J = 25\text{ }^{\circ}\text{C}$	0.9	$\mu s$
Typical reverse recovery time	$t_{rr}$	$T_J = 125\text{ }^{\circ}\text{C}$	4	
Typical turn-off time	$t_q$		110	



## 16TTS..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	1.3	°C/W
Maximum thermal resistance, junction to ambient	R <sub>thJA</sub>		62	
Typical thermal resistance, case to heatsink	R <sub>thCS</sub>	Mounting surface, smooth and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AB	16TTS08	
			16TTS12	

# 16TTS..PbF High Voltage Series

Vishay High Power Products Phase Control SCR, 10 A

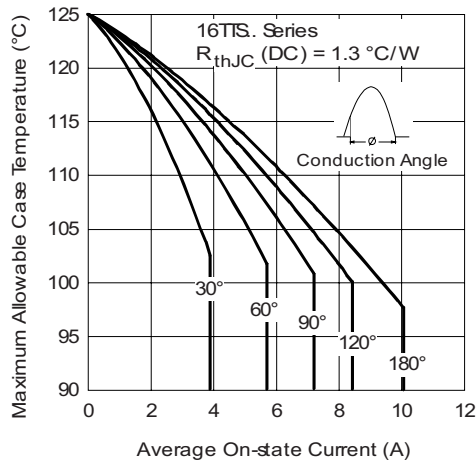


Fig. 1 - Current Rating Characteristics

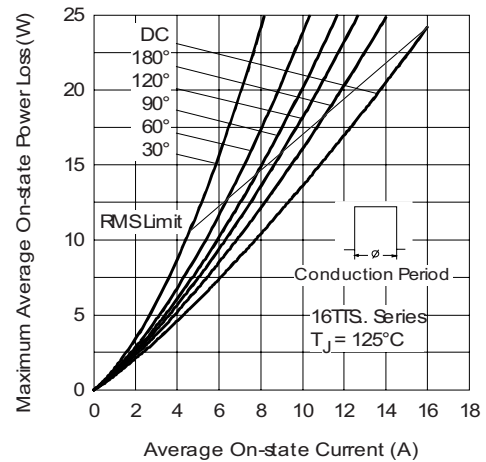


Fig. 4 - On-State Power Loss Characteristics

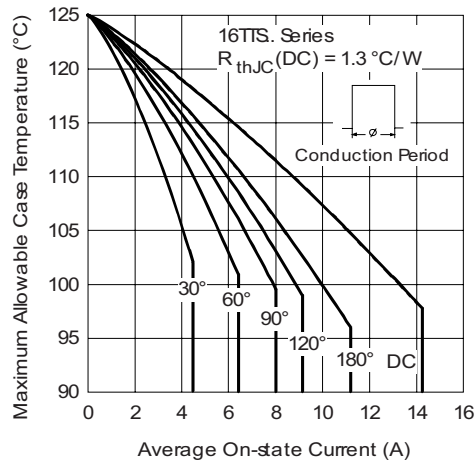


Fig. 2 - Current Rating Characteristics

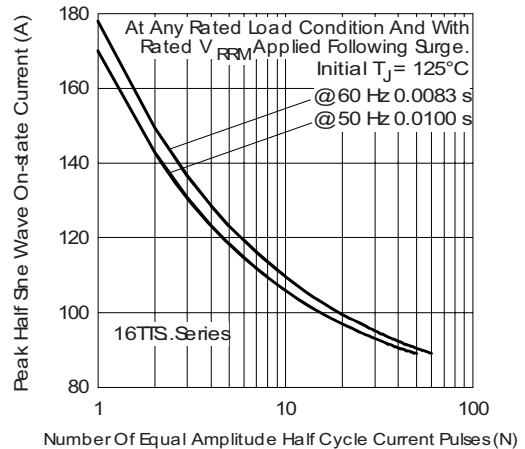


Fig. 5 - Maximum Non-Repetitive Surge Current

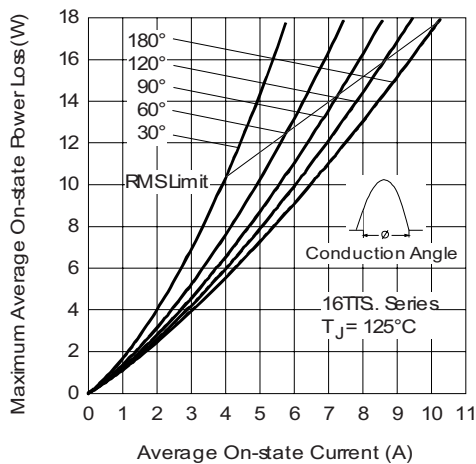


Fig. 3 - On-State Power Loss Characteristics

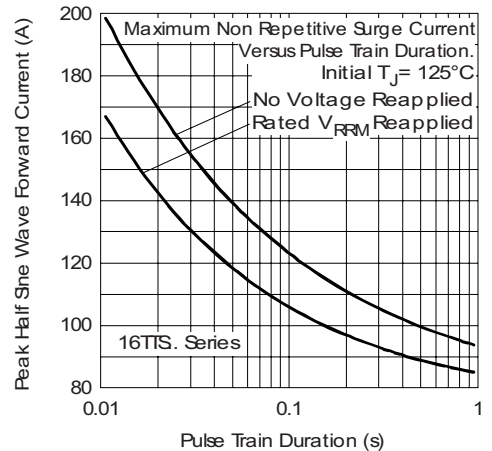


Fig. 6 - Maximum Non-Repetitive Surge Current



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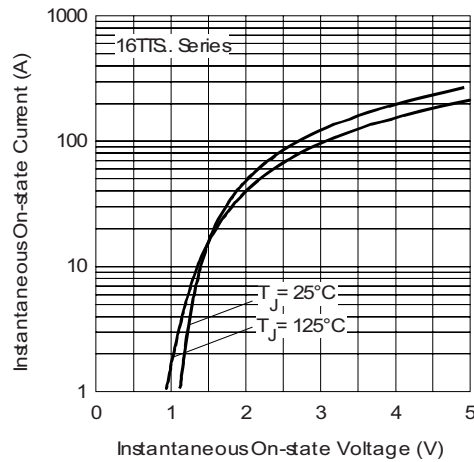


Fig. 7 - On-State Voltage Drop Characteristics

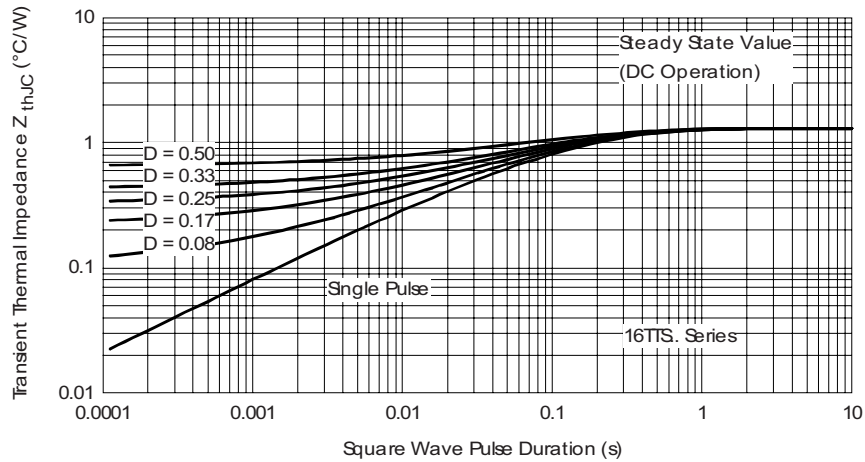


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

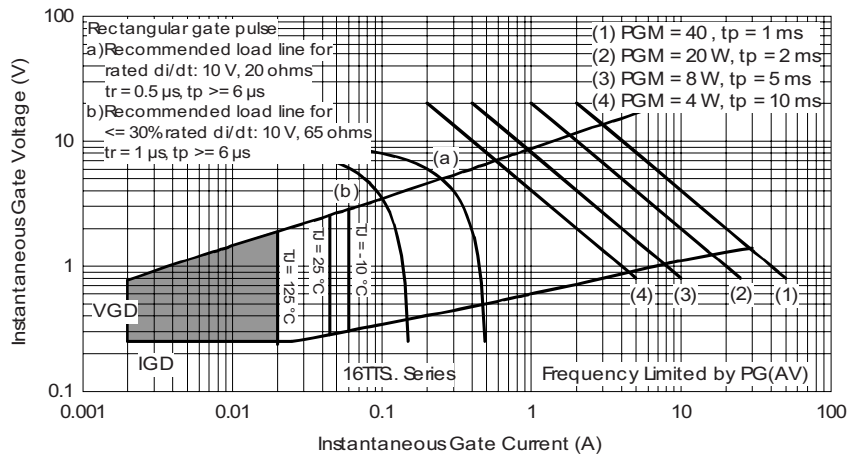


Fig. 9 - Gate Characteristics

# 16TTS..PbF High Voltage Series

Vishay High Power Products Phase Control SCR, 10 A



## ORDERING INFORMATION TABLE

Device code	16	T	T	S	12	PbF
	①	②	③	④	⑤	⑥
①	-	Current rating				
②	-	Circuit configuration:				
		T = Single thyristor				
③	-	Package:				
		T = TO-220AB				
④	-	Type of silicon:				
		S = Converter grade				
⑤	-	Voltage code x 100 = $V_{RRM}$				
⑥	-	• None = Standard production				
		• PbF = Lead (Pb)-free				

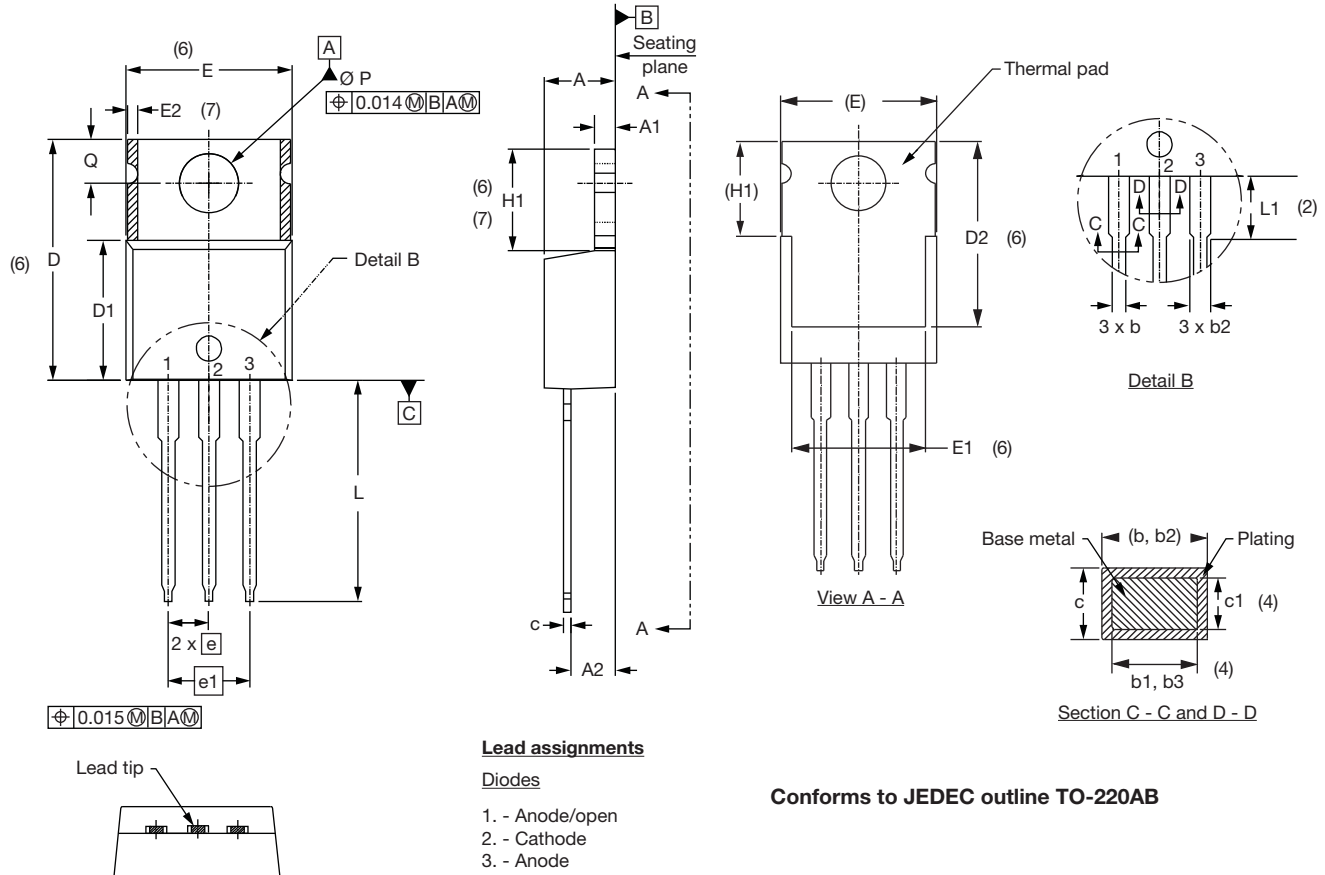
08 = 800 V  
12 = 1200 V

Note: For higher voltage up to 1600 V contact factory

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95222">http://www.vishay.com/doc?95222</a>
Part marking information	<a href="http://www.vishay.com/doc?95225">http://www.vishay.com/doc?95225</a>

### TO-220AB

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° to 93°		90° to 93°		

#### Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 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) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline



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