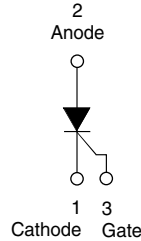


## Surface Mountable Phase Control SCR, 16 A



D<sup>2</sup>PAK



### DESCRIPTION/FEATURES

The 16TTS..S 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.

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.

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
NEMA FR-4 or G10 glass fabric-based epoxy with 4 oz. (140 μm) copper	2.5	3.5	A
Aluminum IMS, $R_{thCA} = 15 \text{ °C/W}$	6.3	9.5	
Aluminum IMS with heatsink, $R_{thCA} = 5 \text{ °C/W}$	14.0	18.5	

**Note**

- $T_A = 55 \text{ °C}$ ,  $T_J = 125 \text{ °C}$ , footprint 300 mm<sup>2</sup>

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

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
16TTS08S	800	800	10
16TTS12S	1200	1200	

# 16TTS..S High Voltage Series



Vishay High Power Products Surface Mountable Phase Control SCR, 16 A

ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES		UNITS	
			TYP.	MAX.		
Maximum average on-state current	$I_{T(AV)}$	$T_C = 98\text{ }^\circ\text{C}$ , 180° conduction, half sine wave	10		A	
Maximum RMS on-state current	$I_{RMS}$		16			
Maximum peak, one-cycle, non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied	170			
		10 ms sine pulse, no voltage reapplied	200			
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied	144		A <sup>2</sup> s	
		10 ms sine pulse, no voltage reapplied	200			
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	2000		A <sup>2</sup> √s	
Maximum on-state voltage drop	$V_{TM}$	10 A, $T_J = 25\text{ }^\circ\text{C}$	1.4		V	
On-state slope resistance	$r_t$	$T_J = 125\text{ }^\circ\text{C}$	24.0		mΩ	
Threshold voltage	$V_{T(TO)}$		1.1		V	
Maximum reverse and direct leakage current	$I_{RM}/I_{DM}$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	$T_J = 25\text{ }^\circ\text{C}$	0.5		mA
			$T_J = 125\text{ }^\circ\text{C}$	10		
Holding current	$I_H$	Anode supply = 6 V, resistive load, initial $I_T = 1$ A	-	100		
Maximum latching current	$I_L$	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, $T_J = -10\text{ }^\circ\text{C}$	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, $T_J = -10\text{ }^\circ\text{C}$	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	$V_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , $V_{DRM} = \text{Rated value}$	0.25		
Maximum DC gate current not to trigger	$I_{GD}$		2.0		mA

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



# 16TTS..S High Voltage Series

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THERMAL AND MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$		- 40 to 125	°C
Soldering temperature	$T_S$	For 10 s (1.6 mm from case)	240	
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation	1.3	°C/W
Typical thermal resistance, junction to ambient	$R_{thJA}$	PCB mount <sup>(1)</sup>	40	
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D <sup>2</sup> PAK (SMD-220)	16TTS08S	
			16TTS12S	

**Note**

<sup>(1)</sup> When mounted on 1" square (650 mm<sup>2</sup>) PCB of FR-4 or G-10 material 4 oz. (140 μm) copper 40 °C/W.  
For recommended footprint and soldering techniques refer to application note #AN-994.

# 16TTS..S High Voltage Series



Vishay High Power Products Surface Mountable Phase Control SCR, 16 A

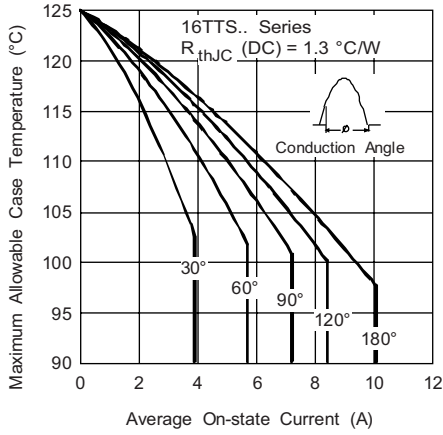


Fig. 1 - Current Rating Characteristics

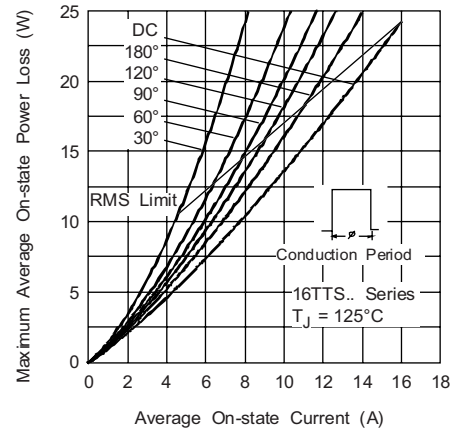


Fig. 4 - On-State Power Loss Characteristics

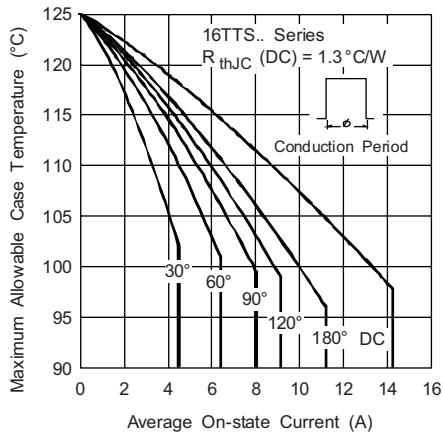


Fig. 2 - Current Rating Characteristics

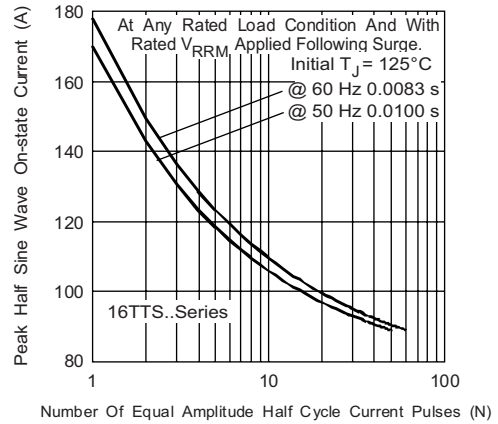


Fig. 5 - Maximum Non-Repetitive Surge Current

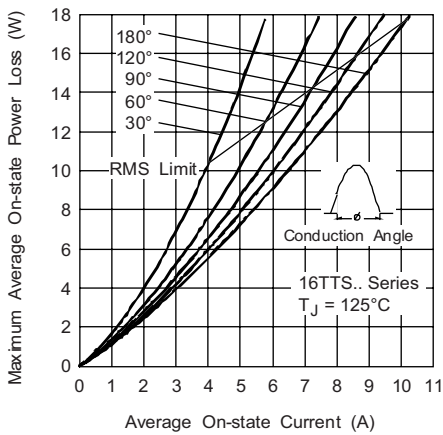


Fig. 3 - On-State Power Loss Characteristics

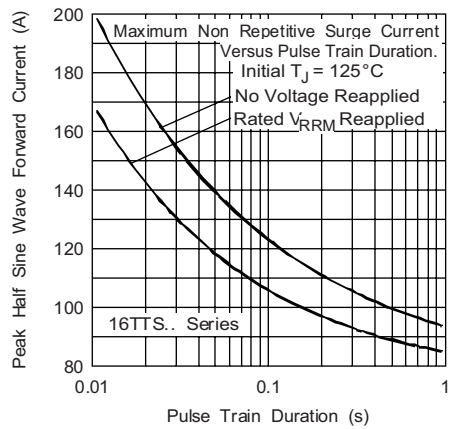


Fig. 6 - Maximum Non-Repetitive Surge Current



# 16TTS..S High Voltage Series

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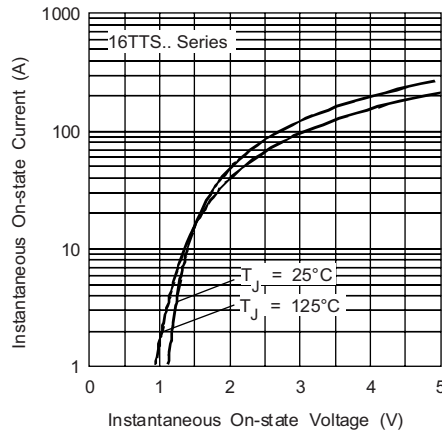


Fig. 7 - On-State Voltage Drop Characteristics

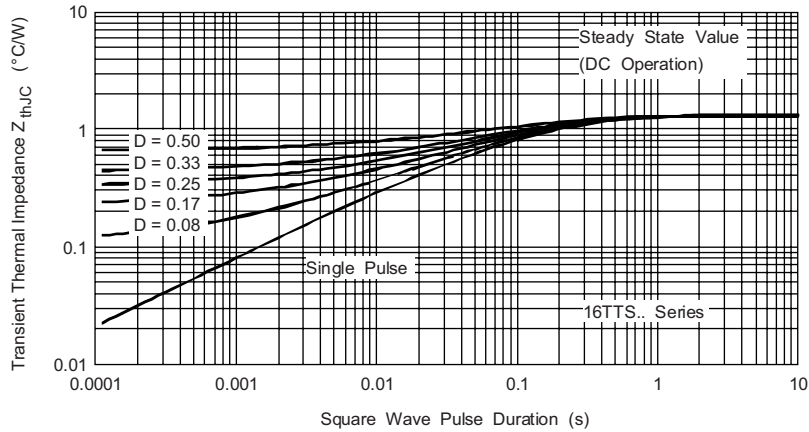


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

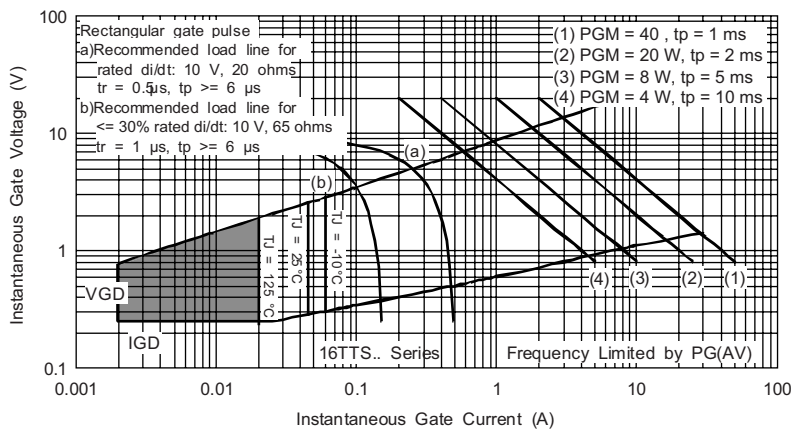


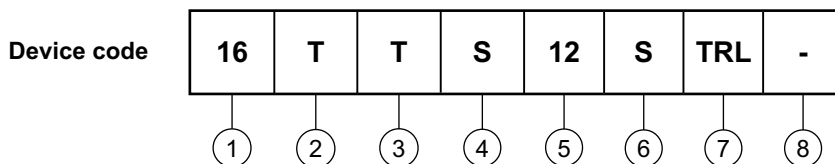
Fig. 9 - Gate Characteristics

# 16TTS..S High Voltage Series



Vishay High Power Products Surface Mountable Phase Control SCR, 16 A

## ORDERING INFORMATION TABLE



- 1** - Current rating
- 2** - Circuit configuration:  
T = Single thyristor
- 3** - Package:  
T = TO-220AC
- 4** - Type of silicon:  
S = Standard recovery rectifier
- 5** - Voltage rating: Voltage code x 100 =  $V_{RRM}$  — 

08 = 800 V
12 = 1200 V
- 6** - S = TO-220 D<sup>2</sup>PAK (SMD-220) version
- 7** -
  - None = Tube
  - TRL = Tape and reel (left oriented)
  - TRR = Tape and reel (right oriented)
- 8** -
  - None = Standard production
  - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95046">http://www.vishay.com/doc?95046</a>
Part marking information	<a href="http://www.vishay.com/doc?95054">http://www.vishay.com/doc?95054</a>
Packaging information	<a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a>



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