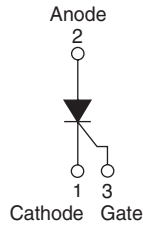


## Surface Mountable Phase Control SCR, 16 A



D<sup>2</sup>PAK



### FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- Designed and qualified for industrial level



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Input rectification (soft start)
- Vishay input diodes, switches and output rectifiers which are available in identical package outlines

### DESCRIPTION

The VS-25TTS...SPbF 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

$V_T$ at 16 A	< 1.25 V
$I_{TSM}$	300 A
$V_{RRM}$	800 V to 1600 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	3.5	5.5	A
Aluminum IMS, $R_{thCA} = 15 \text{ °C/W}$	8.5	13.5	
Aluminum IMS with heatsink, $R_{thCA} = 5 \text{ °C/W}$	16.5	25.0	

#### 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	16	A
$I_{RMS}$		25	
$V_{RRM}/V_{DRM}$		800 to 1600	V
$I_{TSM}$		300	A
$V_T$	16 A, $T_J = 25 \text{ °C}$	1.25	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
VS-25TTS08SPbF	800	800	10
VS-25TTS12SPbF	1200	1200	
VS-25TTS16SPbF	1600	1600	

# VS-25TTS...SPbF High Voltage Series



Vishay Semiconductors

Surface Mountable  
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ABSOLUTE MAXIMUM RATINGS						
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNITS
				TYP.	MAX.	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 93\text{ }^\circ\text{C}$ , 180° conduction half sine wave		16		A
Maximum RMS on-state current	$I_{RMS}$			25		
Maximum peak, one-cycle, non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied		300		
		10 ms sine pulse, no voltage reapplied		350		
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied		450		$A^2s$
		10 ms sine pulse, no voltage reapplied		630		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$ , no voltage reapplied		6300		$A^2\sqrt{s}$
Maximum on-state voltage drop	$V_{TM}$	16 A, $T_J = 25\text{ }^\circ\text{C}$		1.25		V
On-state slope resistance	$r_t$	$T_J = 125\text{ }^\circ\text{C}$		12.0		$m\Omega$
Threshold voltage	$V_{T(TO)}$			1.0		V
Maximum reverse and direct leakage current	$I_{RM}/I_{DM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.5		mA
		$T_J = 125\text{ }^\circ\text{C}$		10		
Holding current	$I_H$	VS-25TTS08, VS-25TTS12	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$	-	100	
		VS-25TTS16		100	150	
Maximum latching current	$I_L$	Anode supply = 6 V, resistive load		200		
Maximum rate of rise of off-state voltage	$dV/dt$			500		$V/\mu s$
Maximum rate of rise of turned-on current	$dI/dt$			150		$A/\mu s$

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, $T_J = -10\text{ }^\circ\text{C}$		60	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$		45	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$		20	
Maximum required DC gate voltage to trigger	$V_{GT}$	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^\circ\text{C}$		2.5	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	$\mu s$
Typical reverse recovery time	$t_{rr}$	$T_J = 125\text{ }^\circ\text{C}$		4	
Typical turn-off time	$t_q$			110	



# VS-25TTS...SPbF 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	1.1	°C/W
Typical thermal resistance, junction to ambient (PCB mount)	$R_{thJA}^{(1)}$		40	
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D <sup>2</sup> PAK (SMD-220)	25TTS08S	
			25TTS12S	
			25TTS16S	

**Note**

(1) 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

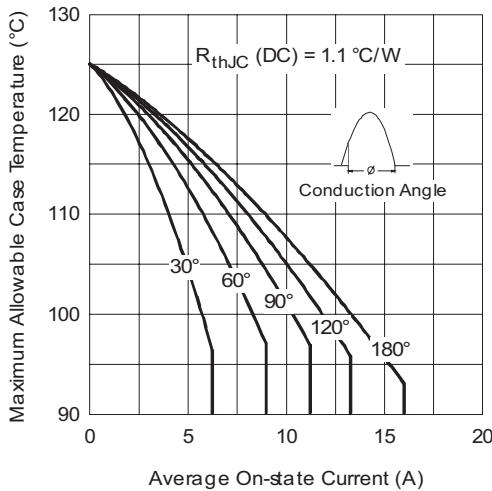


Fig. 1 - Current Rating Characteristics

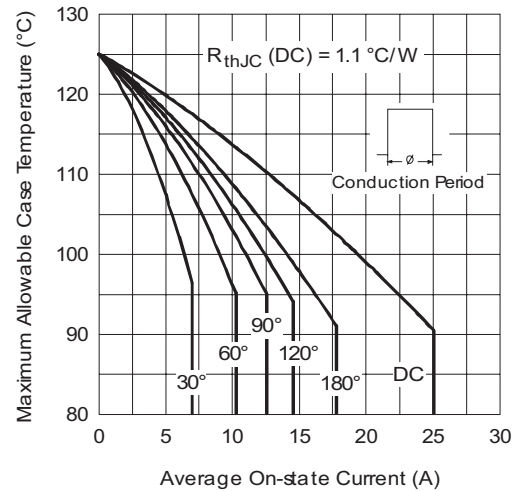


Fig. 2 - Current Rating Characteristics

# VS-25TTS...SPbF High Voltage Series



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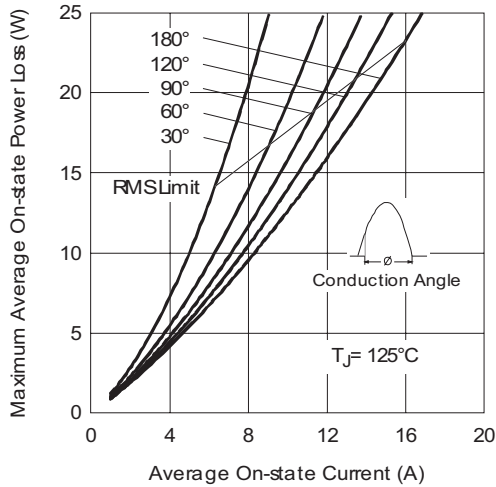


Fig. 3 - On-State Power Loss Characteristics

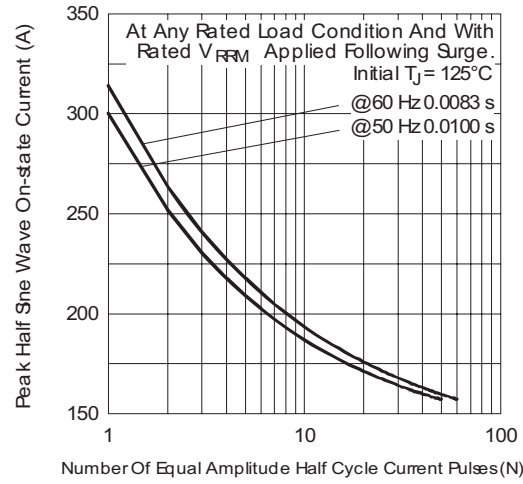


Fig. 5 - Maximum Non-Repetitive Surge Current

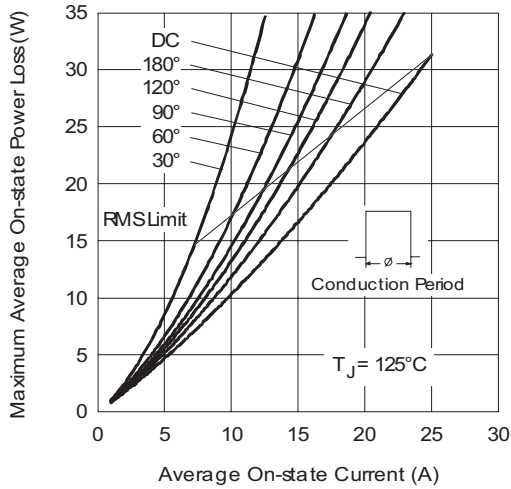


Fig. 4 - On-State Power Loss Characteristics

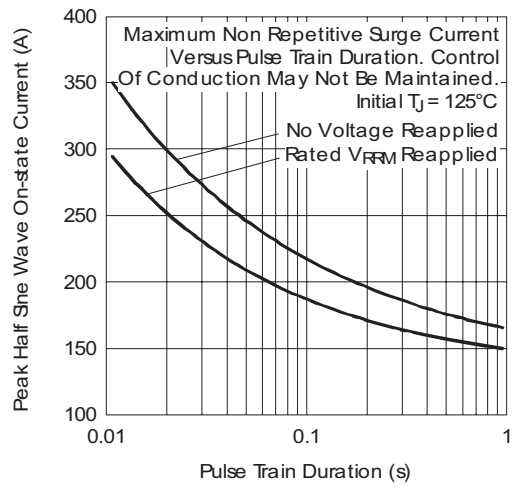


Fig. 6 - Maximum Non-Repetitive Surge Current

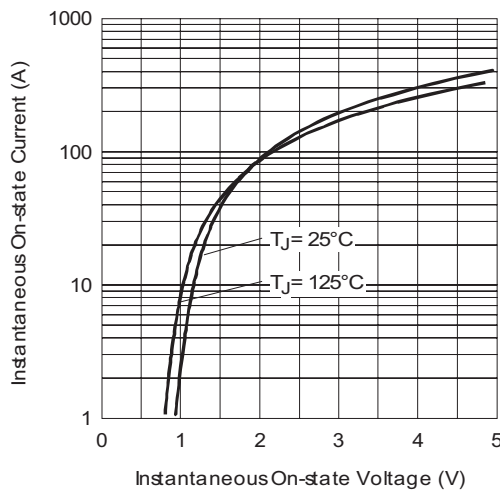


Fig. 7 - On-State Voltage Drop Characteristics



# VS-25TTS...SPbF High Voltage Series

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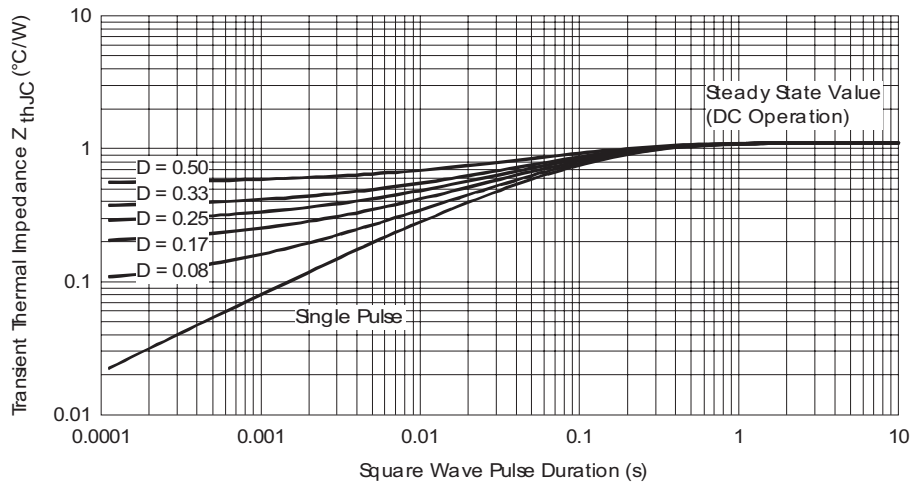


Fig. 8 - Gate Characteristics

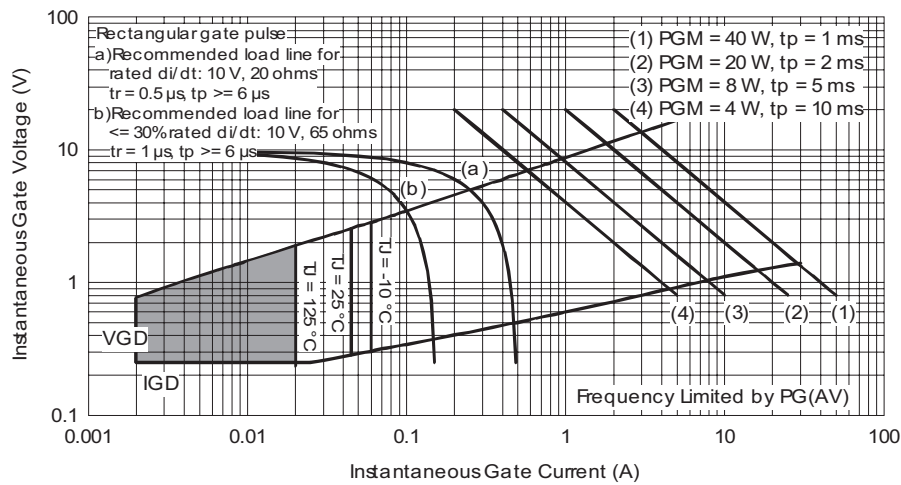


Fig. 9 - Thermal Impedance  $Z_{thJC}$  Characteristics

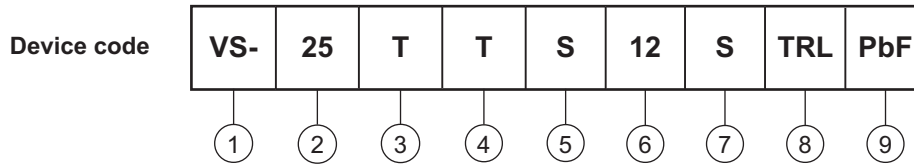
# VS-25TTS...SPbF High Voltage Series



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Surface Mountable  
Phase Control SCR, 16 A

## ORDERING INFORMATION TABLE



- 1** - HPP product suffix
- 2** - Current rating (25 = 25 A)
- 3** - Circuit configuration:  
T = Single thyristor
- 4** - Package:  
T = TO-220AC
- 5** - Type of silicon:  
S = Standard recovery rectifier
- 6** - Voltage rating: Voltage code x 100 =  $V_{RRM}$ 

08 = 800 V
12 = 1200 V
16 = 1600 V
- 7** - S = TO-220 D<sup>2</sup>PAK (SMD-220) version
- 8** -
  - None = Tube
  - TRL = Tape and reel (left oriented)
  - TRR = Tape and reel (right oriented)
- 9** - PbF = Lead (Pb)-free

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



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