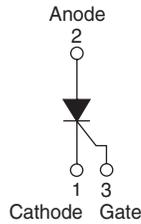


Surface Mountable Phase Control SCR, 16 A



D²PAK



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 mm²

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



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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	μs
Typical reverse recovery time	t_{rr}	$T_J = 125\text{ }^\circ\text{C}$		4	
Typical turn-off time	t_q			110	



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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 ² PAK (SMD-220)	25TTS08S	
			25TTS12S	
			25TTS16S	

Note

(1) When mounted on 1" square (650 mm²) 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

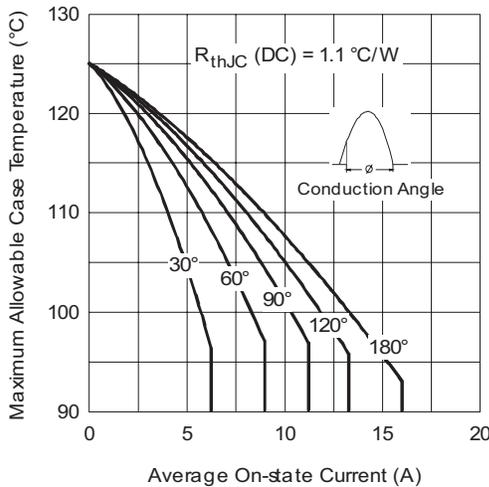


Fig. 1 - Current Rating Characteristics

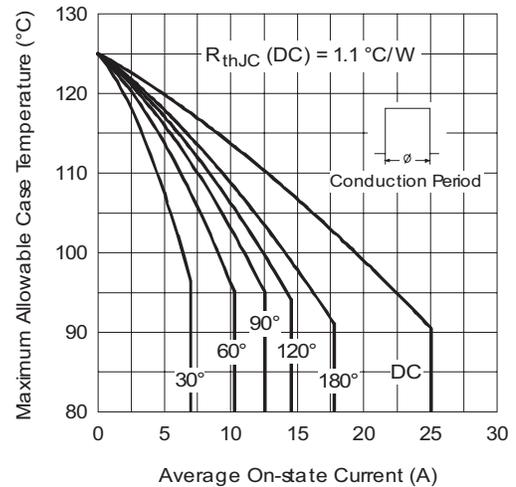


Fig. 2 - Current Rating Characteristics

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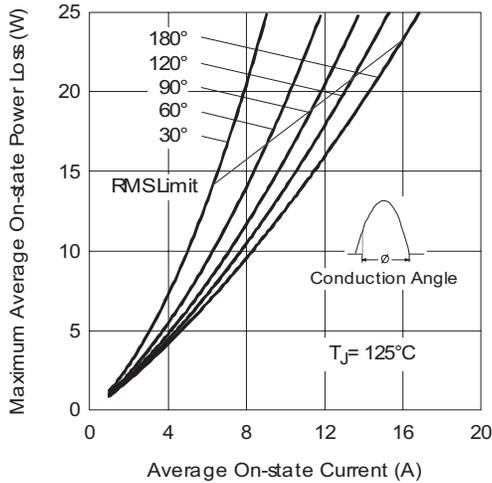


Fig. 3 - On-State Power Loss Characteristics

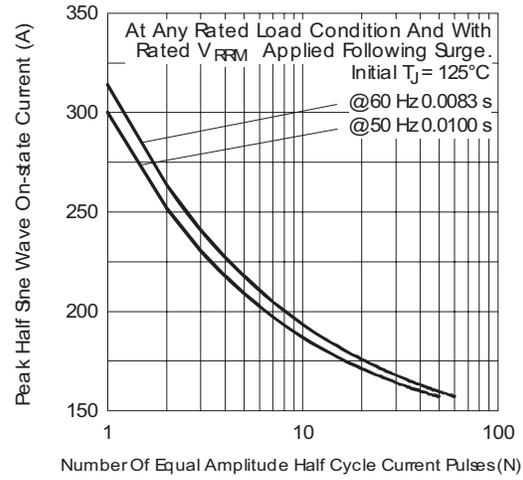


Fig. 5 - Maximum Non-Repetitive Surge Current

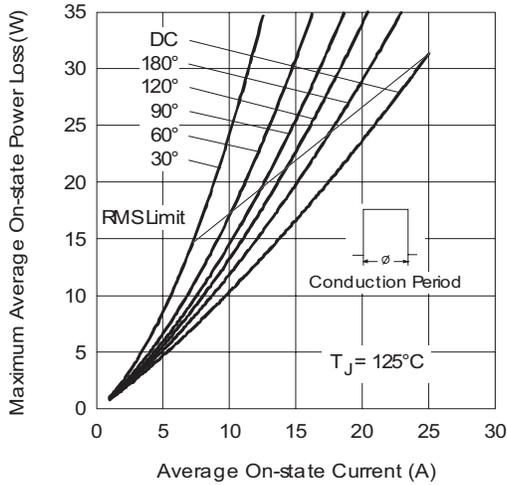


Fig. 4 - On-State Power Loss Characteristics

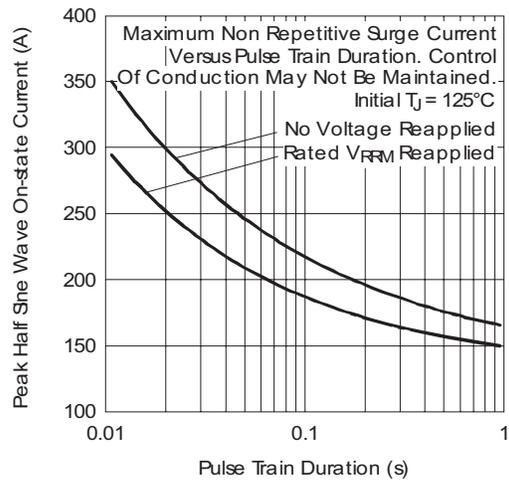


Fig. 6 - Maximum Non-Repetitive Surge Current

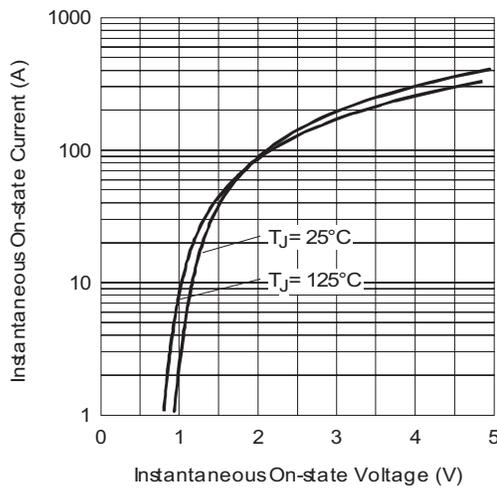


Fig. 7 - On-State Voltage Drop Characteristics



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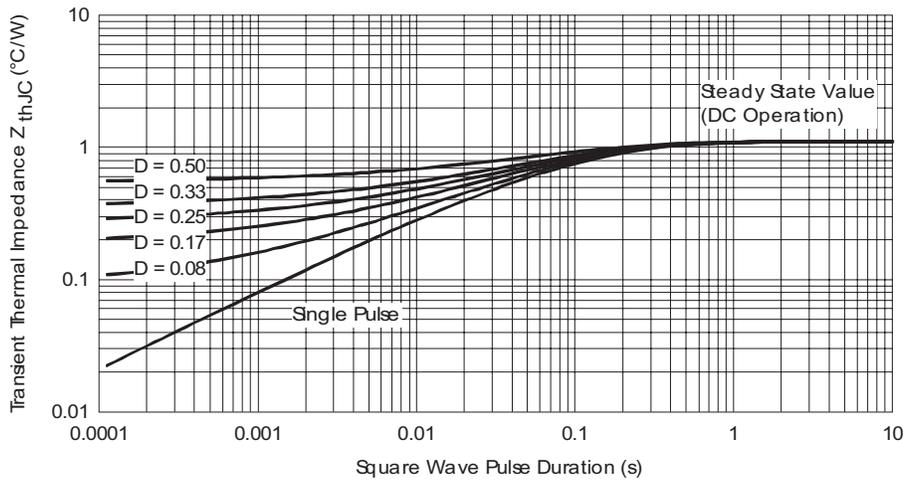


Fig. 8 - Gate Characteristics

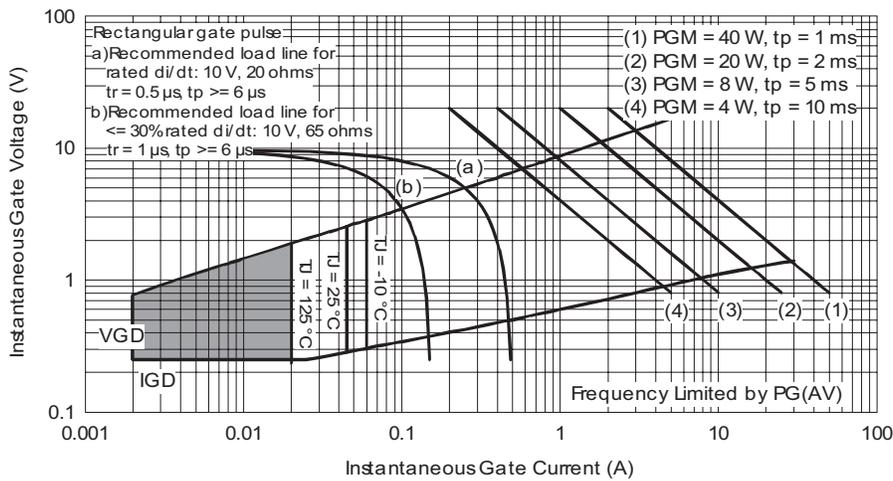


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

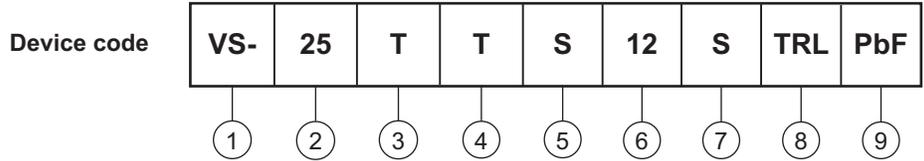
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ORDERING INFORMATION TABLE



- 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}
- 7** - S = TO-220 D²PAK (SMD-220) version
- 8** -
 - None = Tube
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 9** - PbF = Lead (Pb)-free

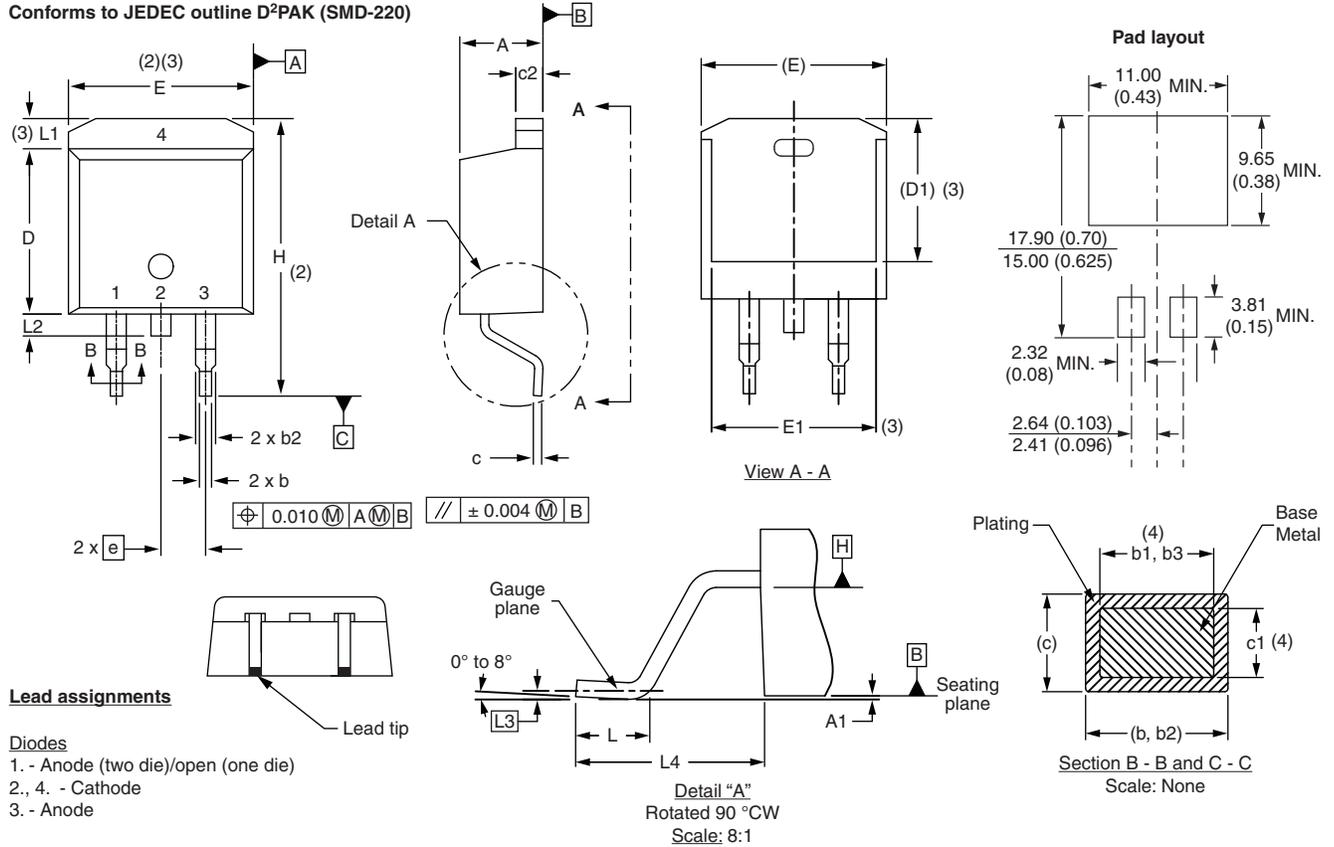
08 = 800 V
12 = 1200 V
16 = 1600 V

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95046
Part marking information	www.vishay.com/doc?95054
Packaging information	www.vishay.com/doc?95032

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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 outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC outline TO-263AB



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