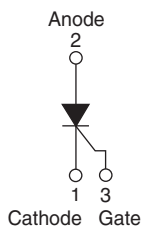


Thyristor, Surface Mount, Phase Control SCR, 16 A


D²PAK


FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according JEDEC-JESD47
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



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

Package	TO-263AB (D ² PAK)
Diode variation	Single SCR
$I_{T(AV)}$	16 A
V_{DRM}/V_{RRM}	800 V, 1200 V
V_{TM}	1.25 V
I_{GT}	45 mA
T_J	- 40 to 125 °C

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, $R_{thCA} = 15$ °C/W	8.5	13.5	
Aluminum IMS with heatsink, $R_{thCA} = 5$ °C/W	16.5	25.0	

Note

- $T_A = 55$ °C, $T_J = 125$ °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 1200	V
I_{TSM}		350	A
V_T	16 A, $T_J = 25$ °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	

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES		UNITS
				TYP.	MAX.	
Maximum average on-state current	I _{T(AV)}	T _C = 93 °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 ² t for fusing	I ² t	10 ms sine pulse, rated V _{RRM} applied		450		A ² s
		10 ms sine pulse, no voltage reapplied		630		
Maximum I ² √t for fusing	I ² √t	t = 0.1 ms to 10 ms, no voltage reapplied		6300		A ² √s
Maximum on-state voltage drop	V _{TM}	16 A, T _J = 25 °C		1.25		V
On-state slope resistance	r _t	T _J = 125 °C		12.0		mΩ
Threshold voltage	V _{T(TO)}			1.0		V
Maximum reverse and direct leakage current	I _{RM} /I _{DM}	T _J = 25 °C	V _R = Rated V _{RRM} /V _{DRM}	0.5		mA
		T _J = 125 °C		10		
Holding current	I _H	VS-25TTS08, VS-25TTS12	Anode supply = 6 V, resistive load, initial I _T = 1 A, T _J = 25 °C	-	150	
Maximum latching current	I _L	Anode supply = 6 V, resistive load, T _J = 25 °C		200		
Maximum rate of rise of off-state voltage	dV/dt	T _J = T _J max., linear to 80 %, V _{DRM} = R _g - k = Open		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 °C	60	mA	
		Anode supply = 6 V, resistive load, T _J = 25 °C	45		
		Anode supply = 6 V, resistive load, T _J = 125 °C	20		
Maximum required DC gate voltage to trigger	V _{GT}	Anode supply = 6 V, resistive load, T _J = - 10 °C	2.5	V	
		Anode supply = 6 V, resistive load, T _J = 25 °C	2.0		
		Anode supply = 6 V, resistive load, T _J = 125 °C	1.0		
Maximum DC gate voltage not to trigger	V _{GD}	T _J = 125 °C, V _{DRM} = Rated value	0.25		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	μs
Typical reverse recovery time	t_{rr}	$T_J = 125\text{ }^{\circ}\text{C}$	4	
Typical turn-off time	t_q		110	

**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)	260	
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	

Note

- (1) When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 μ m) copper 40 °C/W
For recommended footprint and soldering techniques refer to application note #AN-994

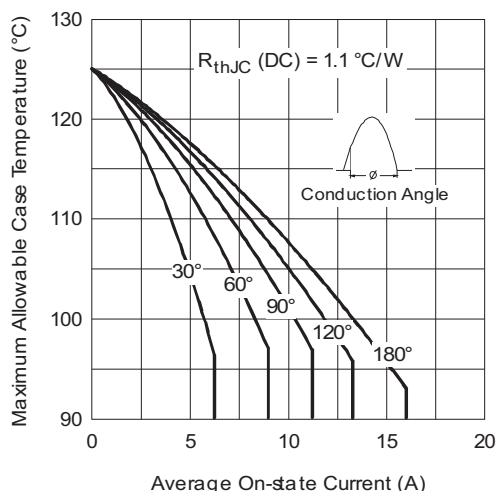


Fig. 1 - Current Rating Characteristics

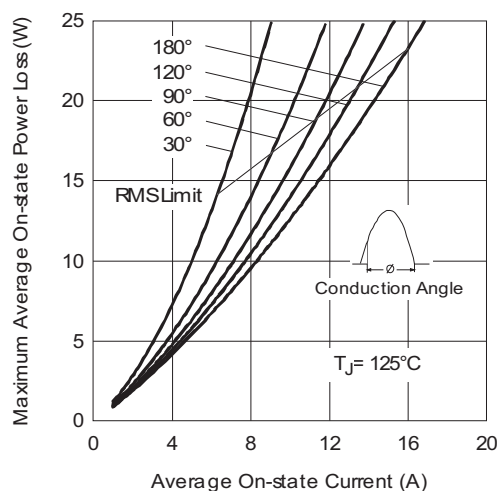


Fig. 3 - On-State Power Loss Characteristics

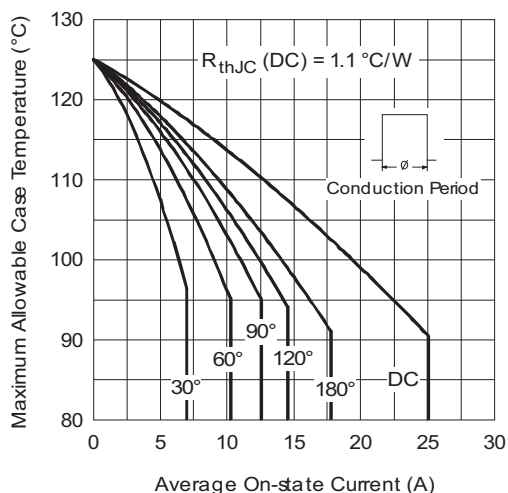


Fig. 2 - Current Rating Characteristics

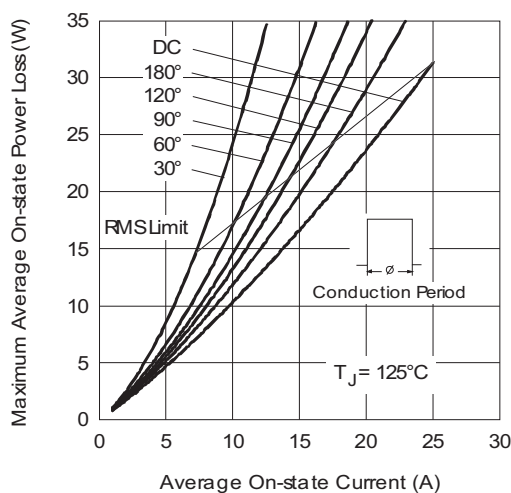


Fig. 4 - On-State Power Loss Characteristics

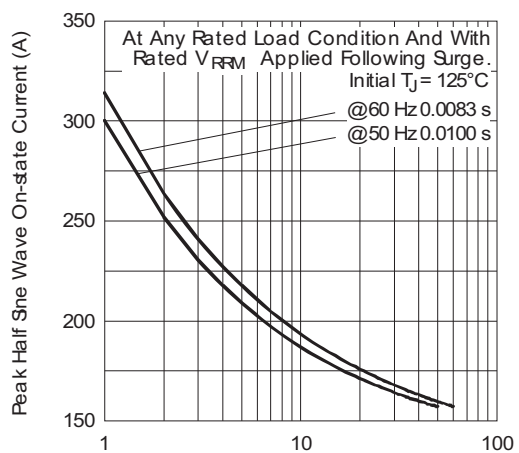


Fig. 5 - Maximum Non-Repetitive Surge Current

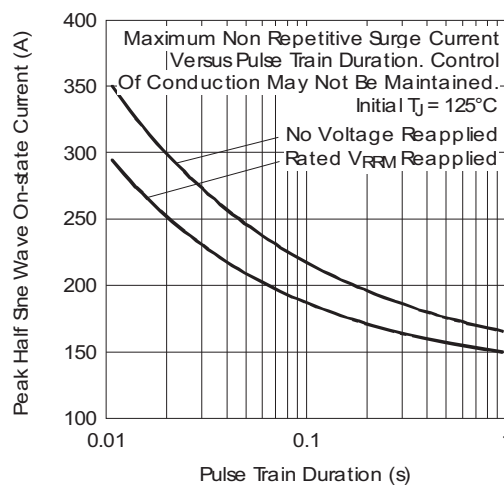


Fig. 6 - Maximum Non-Repetitive Surge Current

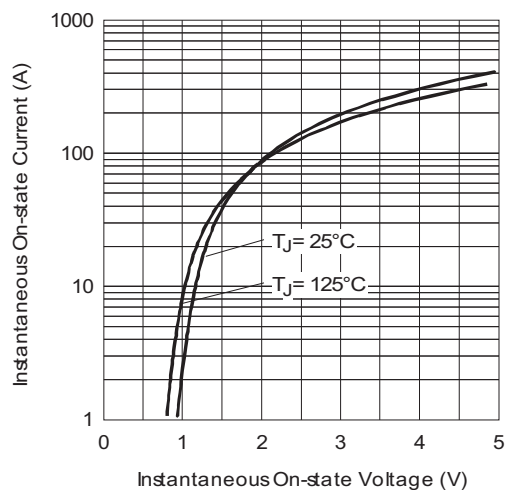


Fig. 7 - On-State Voltage Drop Characteristics

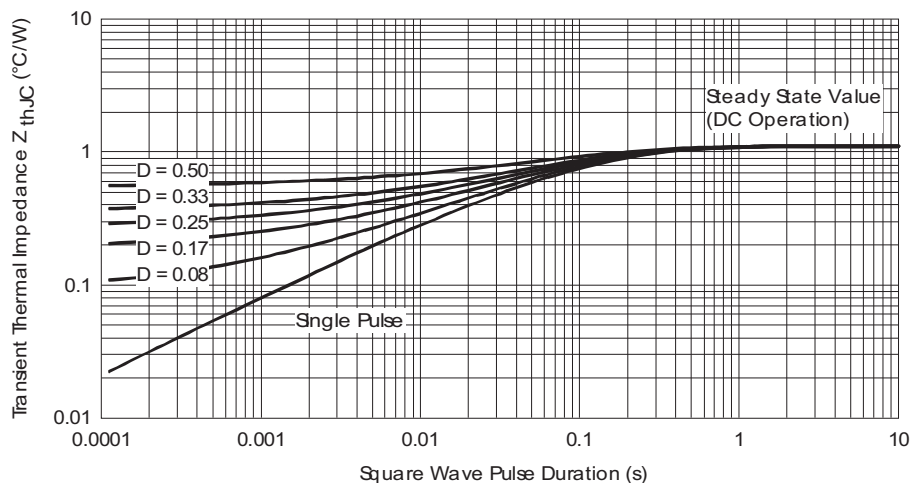
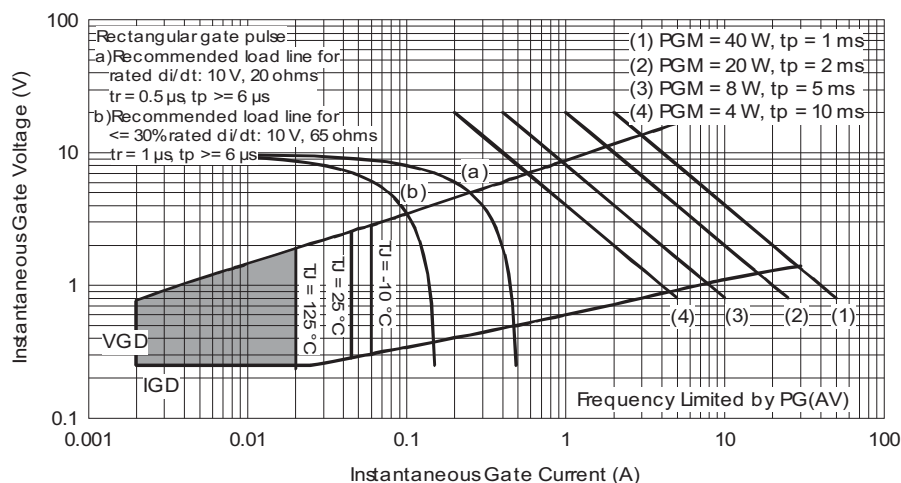


Fig. 8 - Gate Characteristics


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	25	T	T	S	12	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
①	Vishay Semiconductors product								
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 D ² PAK (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

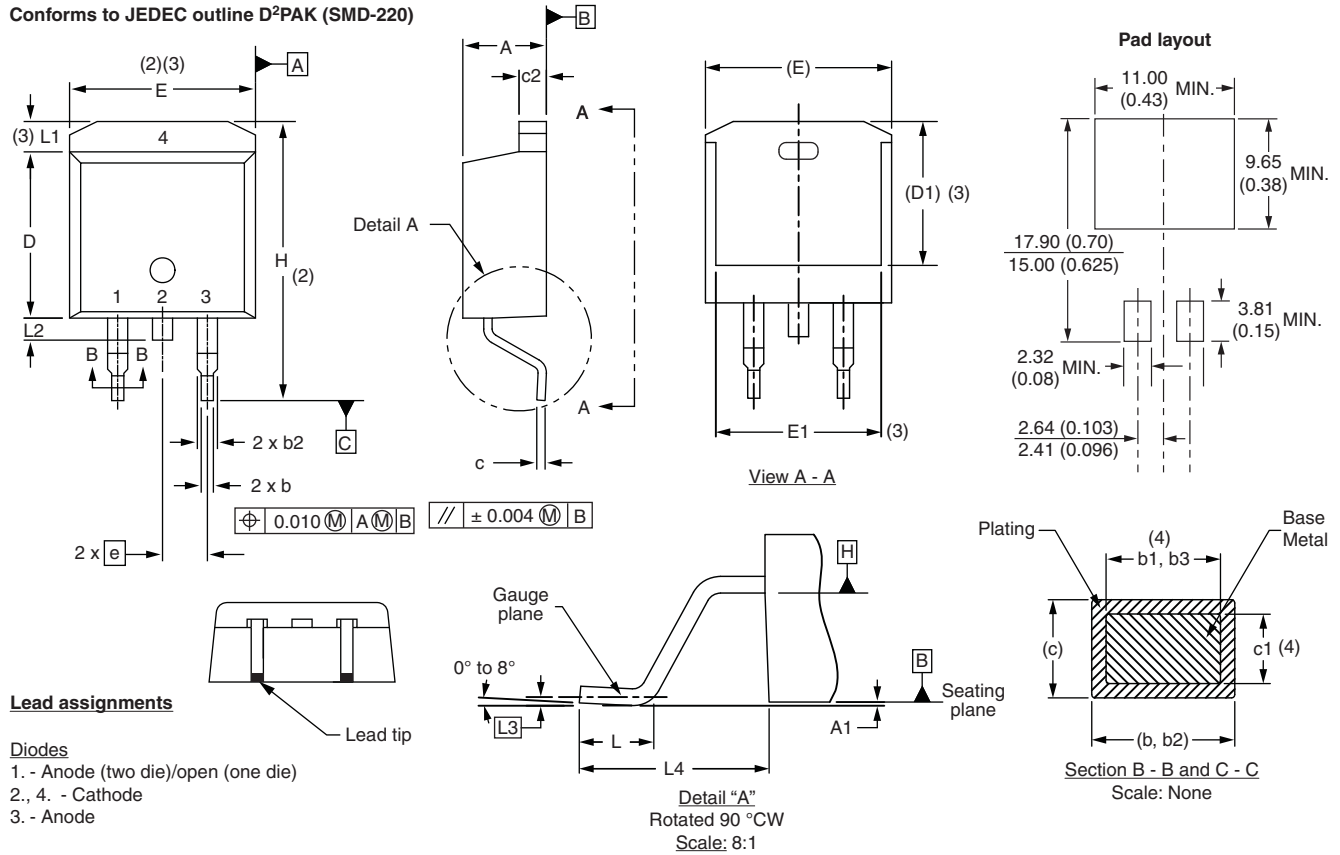
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-25TTS08SPbF	50	1000	Antistatic plastic tubes
VS-25TTS08STRPbF	800	800	13" diameter reel
VS-25TTS08STRLPbF	800	800	13" diameter reel
VS-25TTS12SPbF	50	1000	Antistatic plastic tubes
VS-25TTS12STRPbF	800	800	13" diameter reel
VS-25TTS12STRLPbF	800	800	13" diameter reel

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
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	0.00	0.254	0.000	0.010	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
H	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) 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
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC outline TO-263AB



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