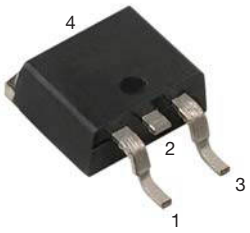
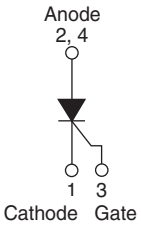
Thyristor, Surface Mount, Phase Control SCR, 16 A



TO-263AB (D^2PAK)



FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according JEDEC®-JESD 47
- 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^2PAK)
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 mm^2

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 TYP.	VALUES MAX.	UNITS
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^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 ms to 10 ms, no voltage reapplied		6300		$A^2\sqrt{s}$
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	
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 °C	0.9	µs
Typical reverse recovery time	t_{rr}	T_J = 125 °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^2PAK (SMD-220)	25TTS08S	
			25TTS12S	

Note

(1) When mounted on 1" square (650 mm^2) 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

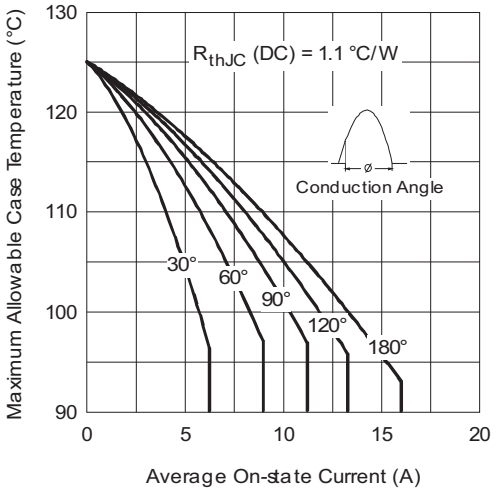


Fig. 1 - Current Rating Characteristics

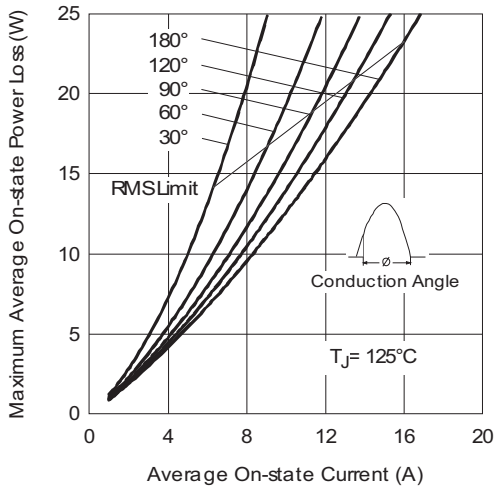


Fig. 3 - On-State Power Loss Characteristics

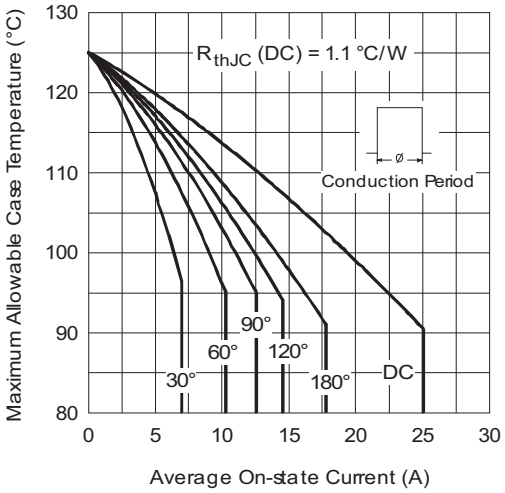


Fig. 2 - Current Rating Characteristics

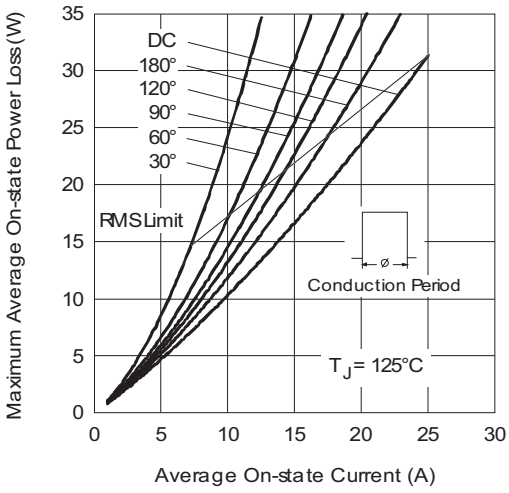


Fig. 4 - On-State Power Loss Characteristics

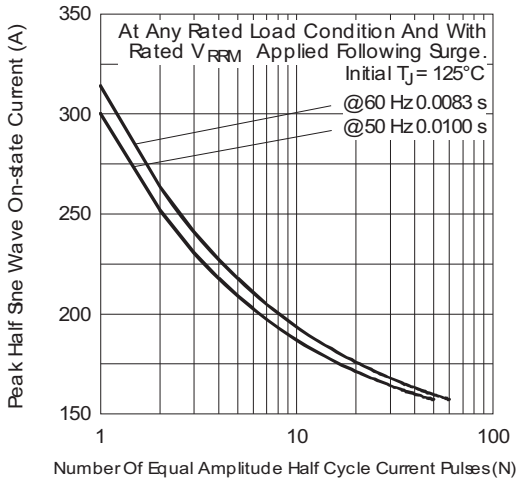


Fig. 5 - Maximum Non-Repetitive Surge Current

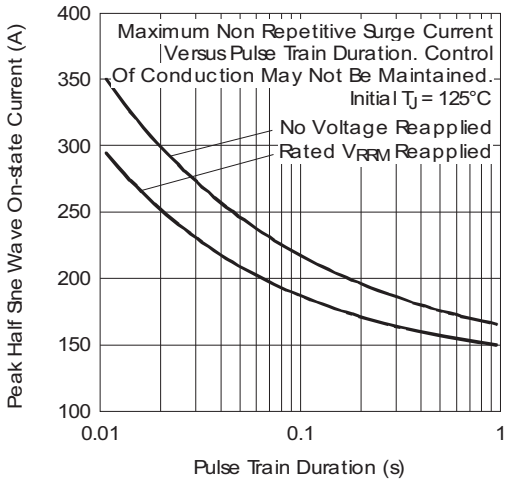


Fig. 6 - Maximum Non-Repetitive Surge Current

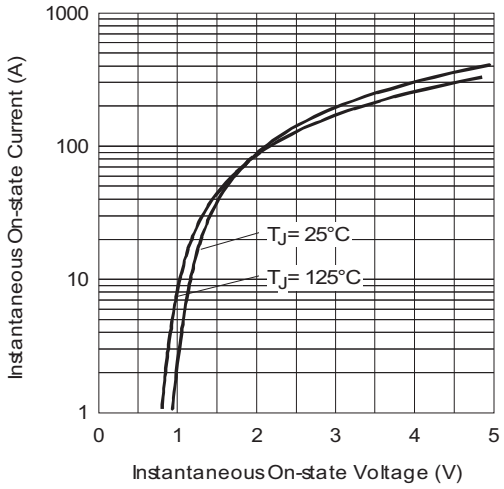


Fig. 7 - On-State Voltage Drop Characteristics

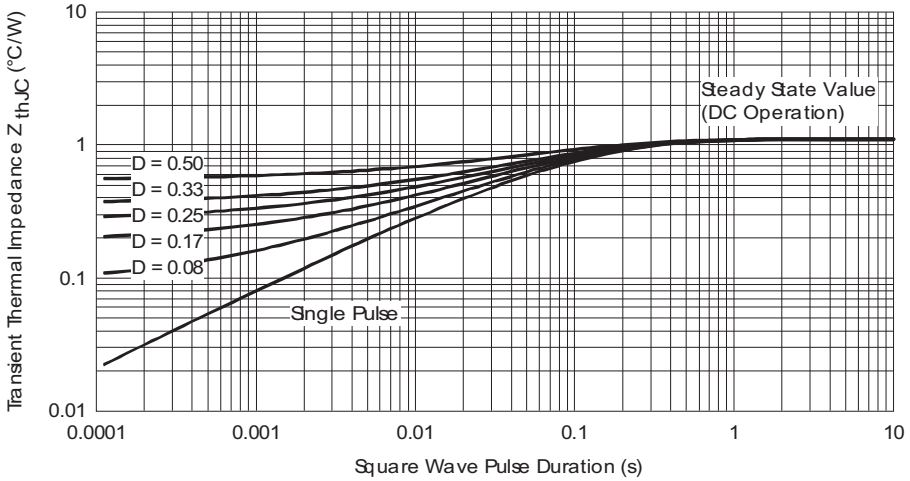


Fig. 8 - Gate Characteristics

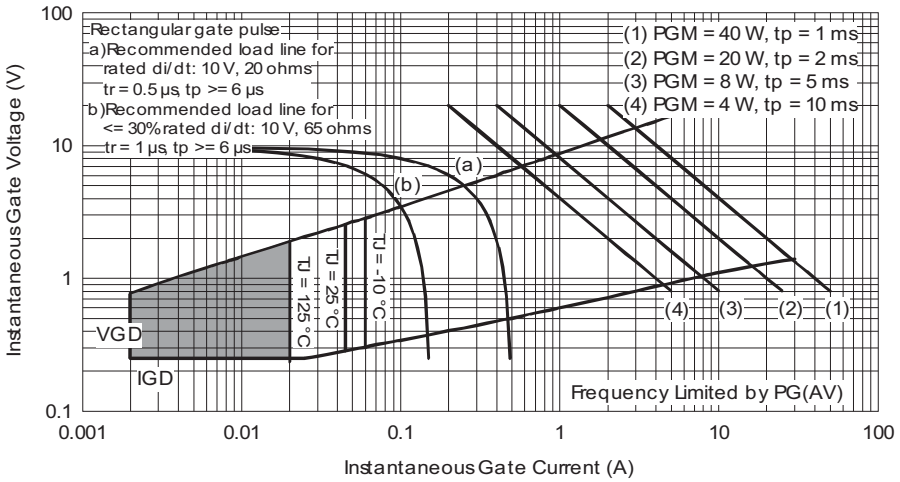


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

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} (08 = 800 V, 12 = 1200 V)

7 - S = TO-220 D^2PAK (SMD-220) version

8 - • None = tube
• TRL = tape and reel (left oriented)
• TRR = tape and reel (right oriented)

9 - PbF = lead (Pb)-free

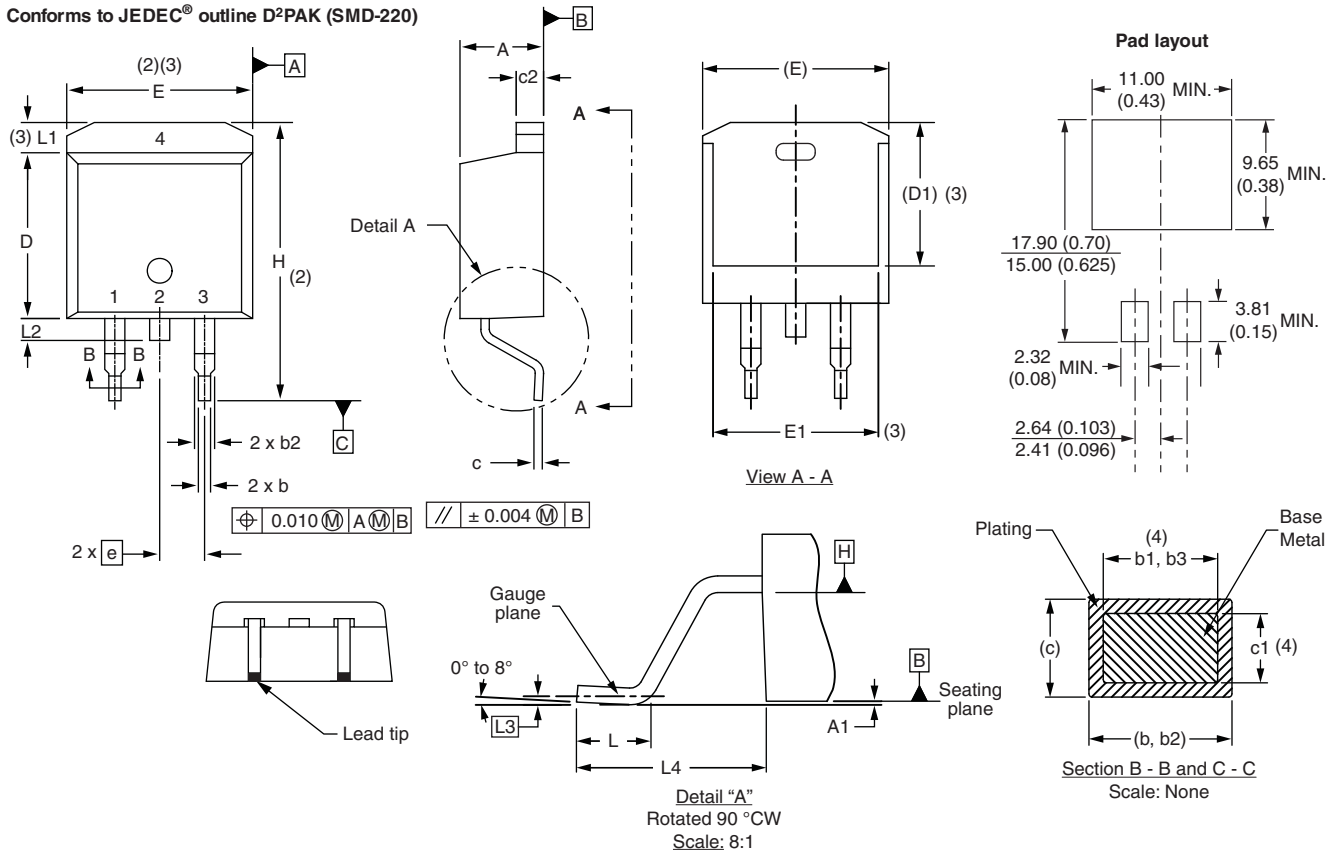
ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-25TTS08SPbF	50	1000	Antistatic plastic tubes
VS-25TTS08STRRPbF	800	800	13" diameter reel
VS-25TTS08STRLPbF	800	800	13" diameter reel
VS-25TTS12SPbF	50	1000	Antistatic plastic tubes
VS-25TTS12STRRPbF	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



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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