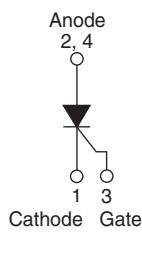


Thyristor, Surface Mount, Phase Control SCR, 16 A



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

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-25TT...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.

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
dl/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-25TT08SPbF	800	800	10
VS-25TT12SPbF	1200	1200	

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	
				TYP.	MAX.
Maximum average on-state current	$I_{T(AV)}$	$T_J = 93^\circ\text{C}$, 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	$\text{A}^2\sqrt{\text{s}}$
Maximum on-state voltage drop	V_{TM}	16 A , $T_J = 25^\circ\text{C}$		1.25	V
On-state slope resistance	r_t	$T_J = 125^\circ\text{C}$		12.0	$\text{m}\Omega$
Threshold voltage	$V_{T(TO)}$			1.0	V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.5	mA
		$T_J = 125^\circ\text{C}$		10	
Holding current	I_H	VS-25TT08, VS-25TT12	Anode supply = 6 V, resistive load, initial $I_T = 1 \text{ A}$, $T_J = 25^\circ\text{C}$	-	150
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25^\circ\text{C}$		200	
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J \text{ max.}$, linear to 80 %, $V_{DRM} = R_g - k = \text{Open}$		500	V/ μ s
Maximum rate of rise of turned-on current	dl/dt			150	A/ μ 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, $T_J = -10^\circ\text{C}$		60	mA
		Anode supply = 6 V, resistive load, $T_J = 25^\circ\text{C}$		45	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ\text{C}$		20	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -10^\circ\text{C}$		2.5	V
		Anode supply = 6 V, resistive load, $T_J = 25^\circ\text{C}$		2.0	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ\text{C}$		1.0	
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 125^\circ\text{C}$, $V_{DRM} = \text{Rated value}$		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}	$T_J = 25^\circ\text{C}$		0.9	μ s
Typical reverse recovery time	t_{rr}	$T_J = 125^\circ\text{C}$		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}	For 10 s (1.6 mm from case)	-40 to +125	°C
Soldering temperature	T_S		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		Case style D ² PAK (SMD-220)	2	g
Marking device			0.07	oz.
			25TT08S	
			25TT12S	

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

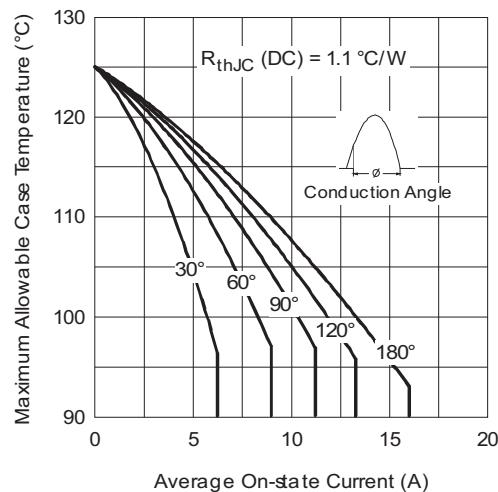


Fig. 1 - Current Rating Characteristics

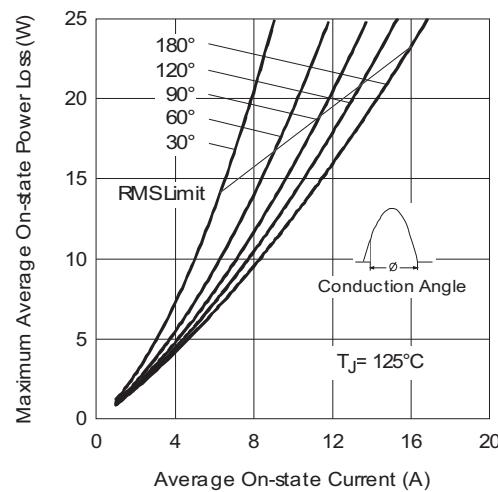


Fig. 3 - On-State Power Loss Characteristics

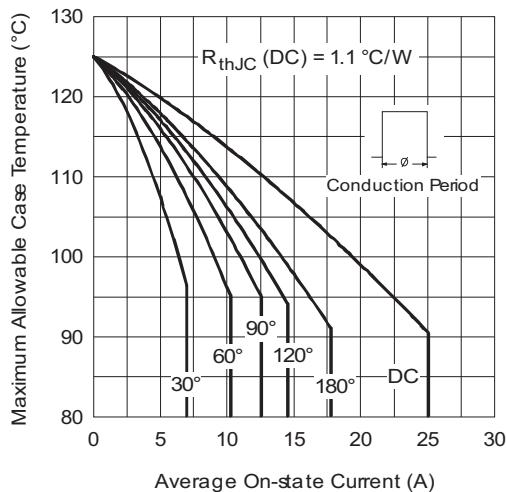


Fig. 2 - Current Rating Characteristics

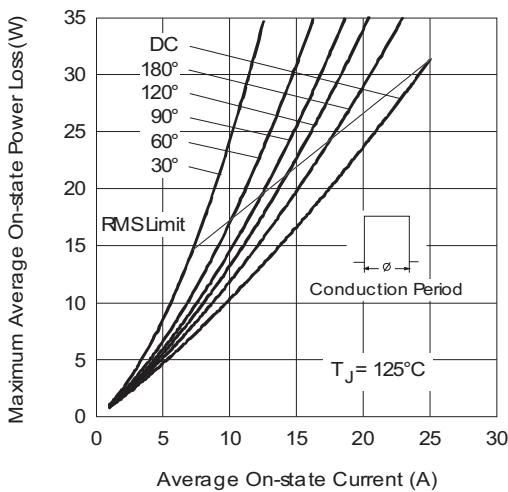
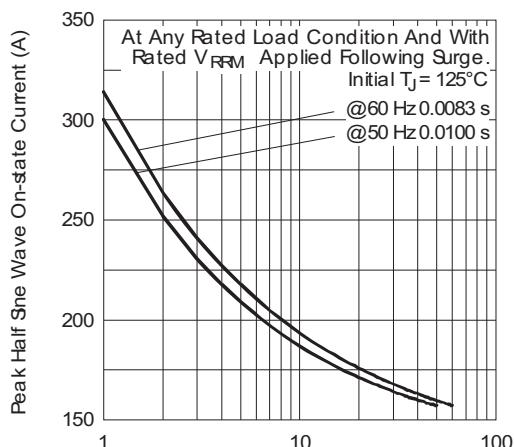
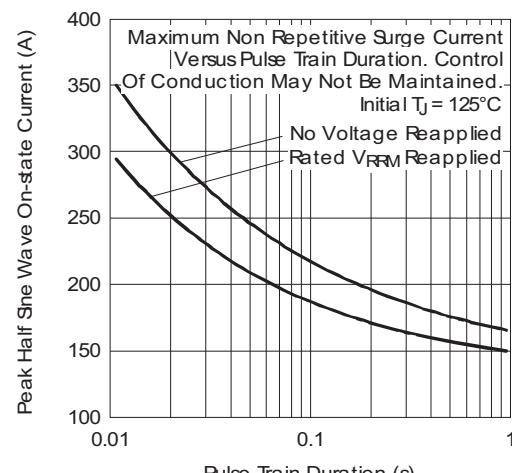


Fig. 4 - On-State Power Loss Characteristics



Number Of Equal Amplitude Half Cycle Current Pulses(N)

Fig. 5 - Maximum Non-Repetitive Surge Current



Pulse Train Duration (s)

Fig. 6 - Maximum Non-Repetitive Surge Current

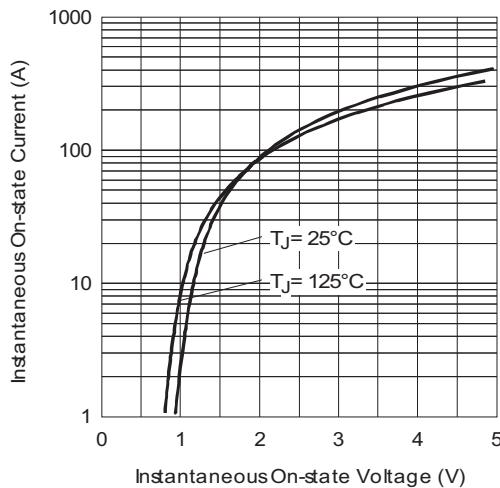


Fig. 7 - On-State Voltage Drop Characteristics

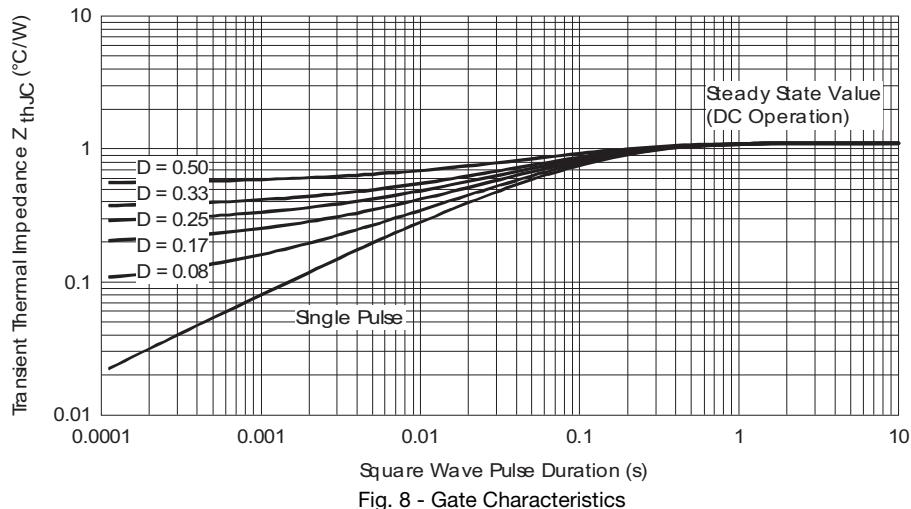
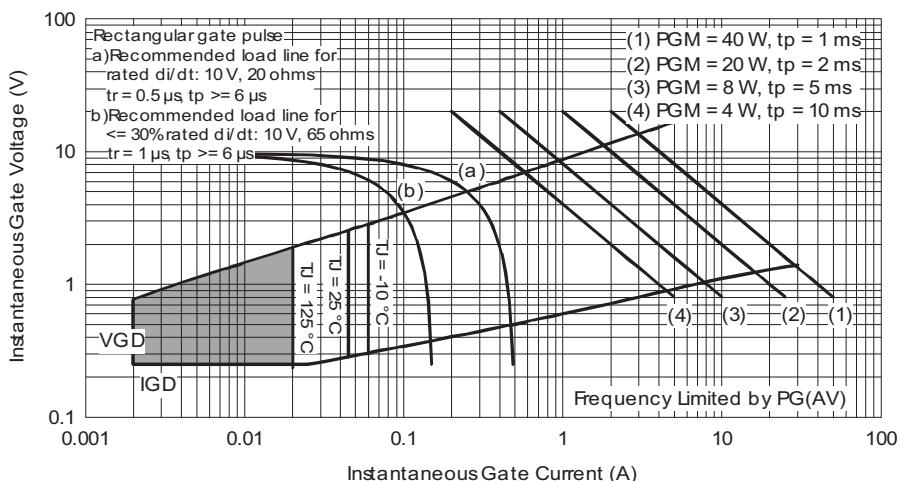


Fig. 8 - Gate Characteristics


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 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							

ORDERING INFORMATION (Example)

PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-25TT08SPbF	50	1000	Antistatic plastic tubes
VS-25TT08STRRPbF	800	800	13" diameter reel
VS-25TT08STRLPbF	800	800	13" diameter reel
VS-25TT12SPbF	50	1000	Antistatic plastic tubes
VS-25TT12STRRPbF	800	800	13" diameter reel
VS-25TT12STRLPbF	800	800	13" diameter reel

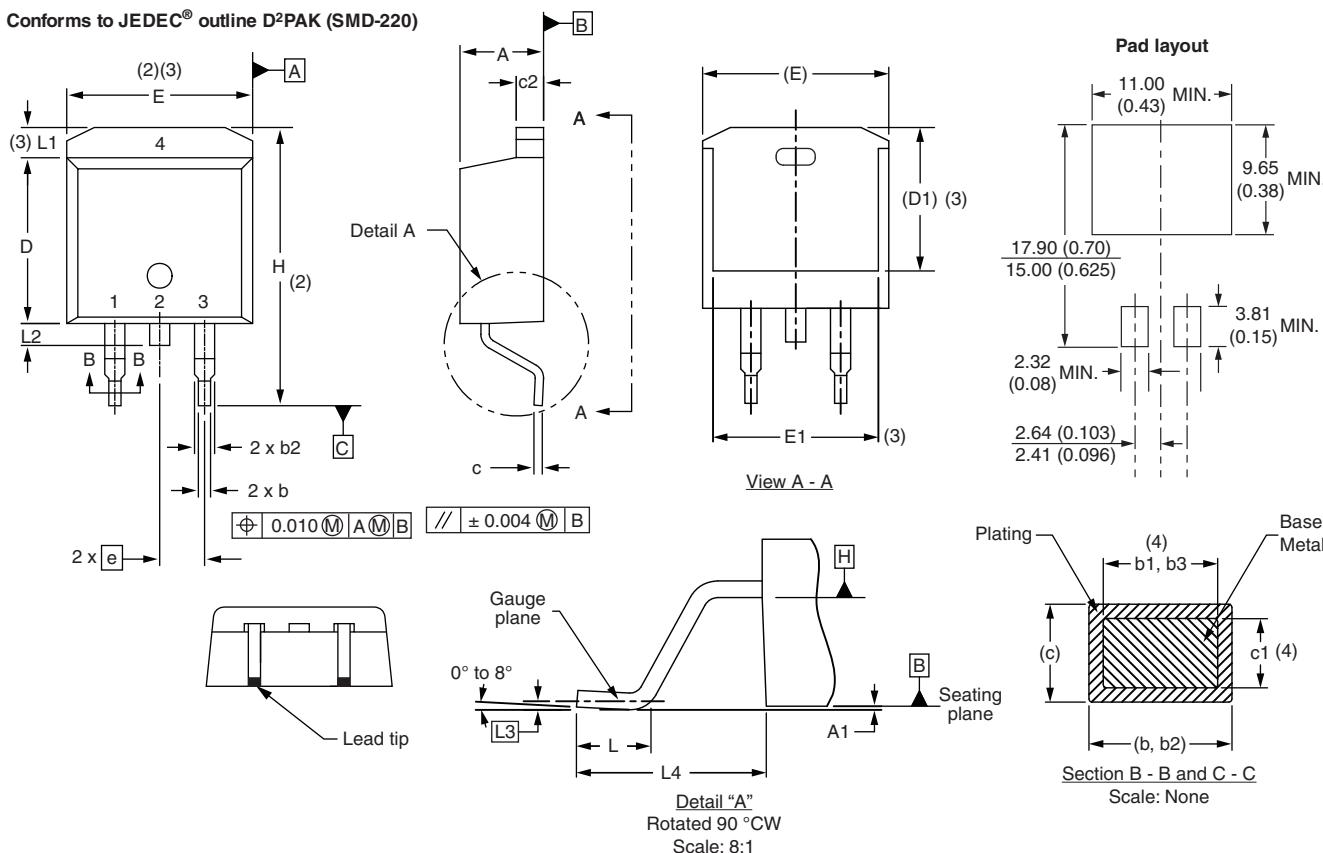
LINKS TO RELATED DOCUMENTS

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		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

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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