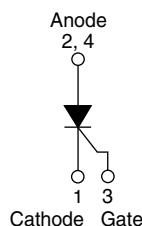


Thyristor Surface Mount, Phase Control SCR, 16 A



D²PAK (TO-263AB)



RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Designed and qualified according JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

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

DESCRIPTION

The VS-25TT16S-M3 of silicon controlled rectifiers is specifically designed for medium power switching and phase control applications. The glass passivation technology used has reliable operation up to 125 °C junction temperature.

PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	16 A
V_{DRM}/V_{RRM}	1600 V
V_{TM}	1.25 V
I_{GT}	45 mA
T_J	-40 to +125 °C
Package	D ² PAK (TO-263AB)
Circuit configuration	Single SCR

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

Note

- $T_A = 55 \text{ }^{\circ}\text{C}$, $T_J = 125 \text{ }^{\circ}\text{C}$, 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}		1600	V
I_{TSM}		350	A
V_T	16 A, $T_J = 25 \text{ }^{\circ}\text{C}$	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-25TT16S-M3	1600	1600	10

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES		UNITS
			TYP.	MAX.	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 93^\circ C$, 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, $T_J = 25^\circ C$	1.25		V
On-state slope resistance	r_t	$T_J = 125^\circ C$	12.0		$m\Omega$
Threshold voltage	$V_{T(TO)}$		1.0		V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25^\circ C$	0.5		mA
		$T_J = 125^\circ C$	10		
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1$ A, $T_J = 25^\circ C$	-	150	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25^\circ C$	200		
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J$ max., linear to 80 %, $V_{DRM} = R_g - k = \text{open}$	500		$V/\mu s$
Maximum rate of rise of turned-on current	dl/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, $T_J = -10^\circ C$	60	mA
		Anode supply = 6 V, resistive load, $T_J = 25^\circ C$	45	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ C$	20	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -10^\circ C$	2.5	V
		Anode supply = 6 V, resistive load, $T_J = 25^\circ C$	2.0	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ C$	1.0	
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 125^\circ C$, $V_{DRM} = \text{rated value}$	0.25	
Maximum DC gate current not to trigger	I_{GD}		2.0	

SWITCHING

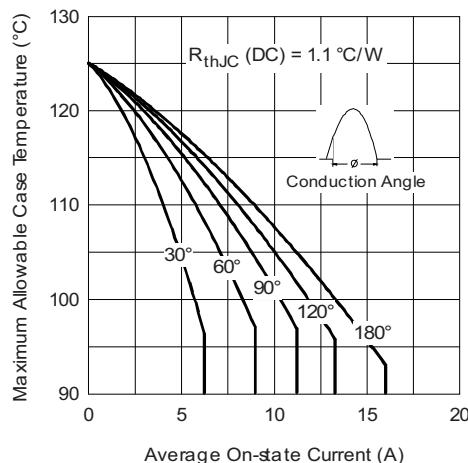
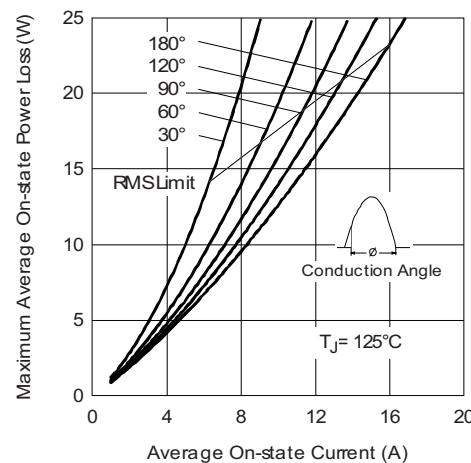
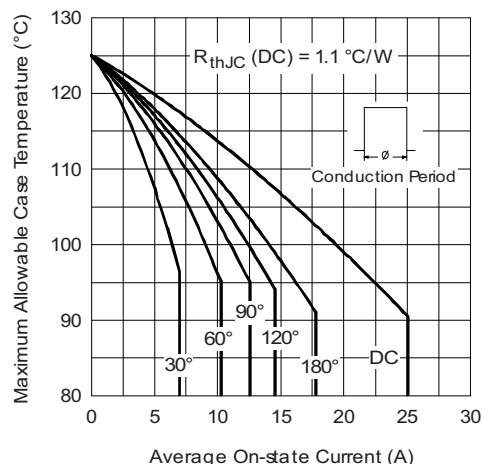
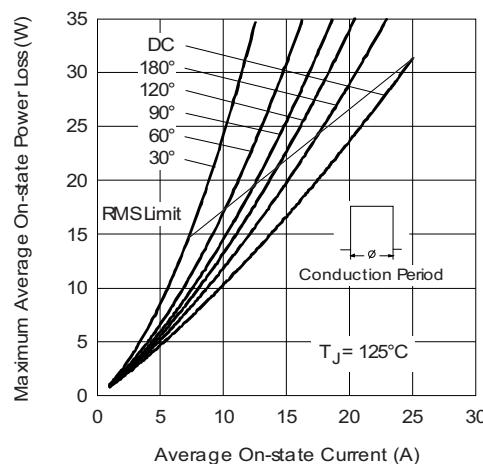
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	t_{gt}	$T_J = 25^\circ C$	0.9	μs
Typical reverse recovery time	t_{rr}		4	
Typical turn-off time	t_q		110	

THERMAL AND MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		-40 to +125	°C
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	°C/W
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D ² PAK (TO-263AB)	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. 3 - On-State Power Loss Characteristics

Fig. 2 - Current Rating Characteristics

Fig. 4 - On-State Power Loss Characteristics

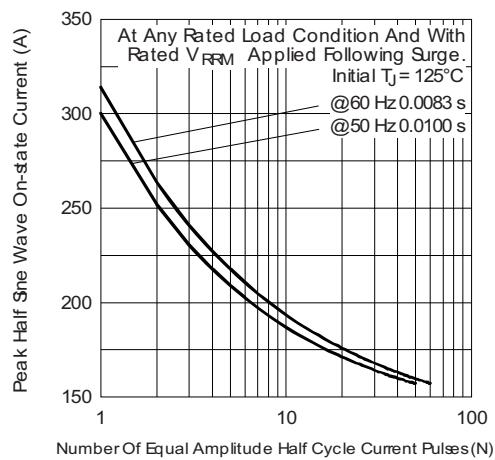


Fig. 5 - Maximum Non-Repetitive Surge Current

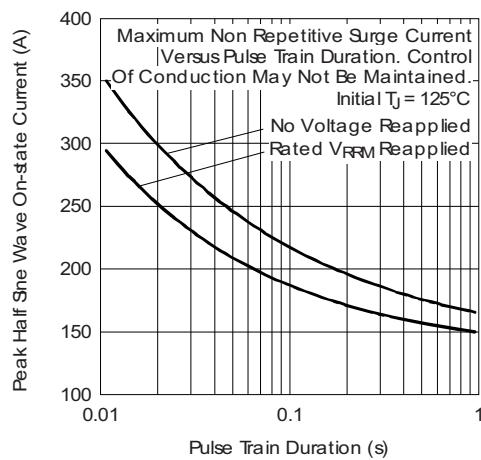


Fig. 6 - Maximum Non-Repetitive Surge Current

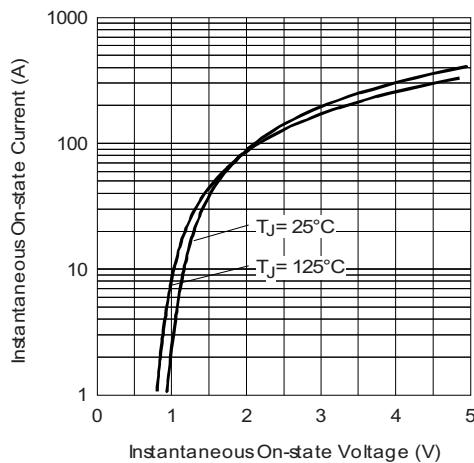


Fig. 7 - On-State Voltage Drop Characteristics

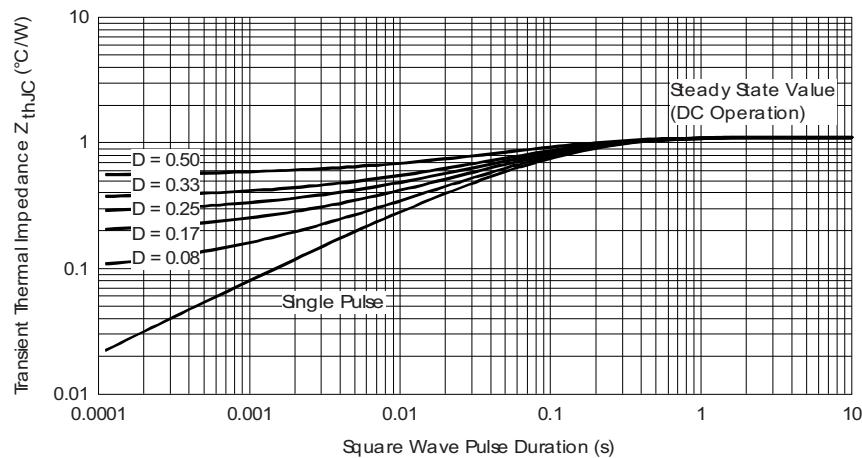


Fig. 8 - Gate Characteristics

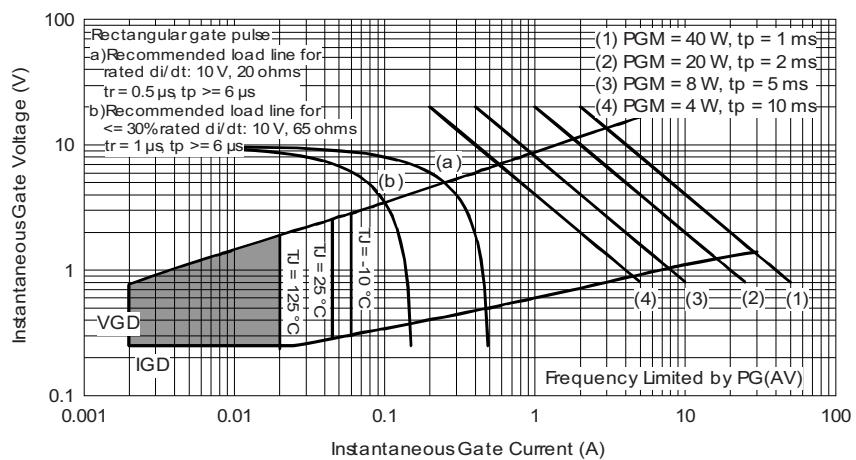


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	25	T	T	S	16	S	TRL	-M3
	(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 = D²PAK (TO-263AB)
- 5** - Type of silicon:
S = standard recovery rectifier
- 6** - Voltage rating: Voltage code x 100 = V_{RRM} — **16 = 1600 V**
- 7** - S = surface mountable
- 8** - • None = tube
• TRL = tape and reel (left oriented)
• TRR = tape and reel (right oriented)
- 9** - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-25TT16S-M3	50	Antistatic plastic tubes
VS-25TT16STR1-M3	800	13" diameter plastic tape and reel
VS-25TT16STRR-M3	800	13" diameter plastic tape and reel

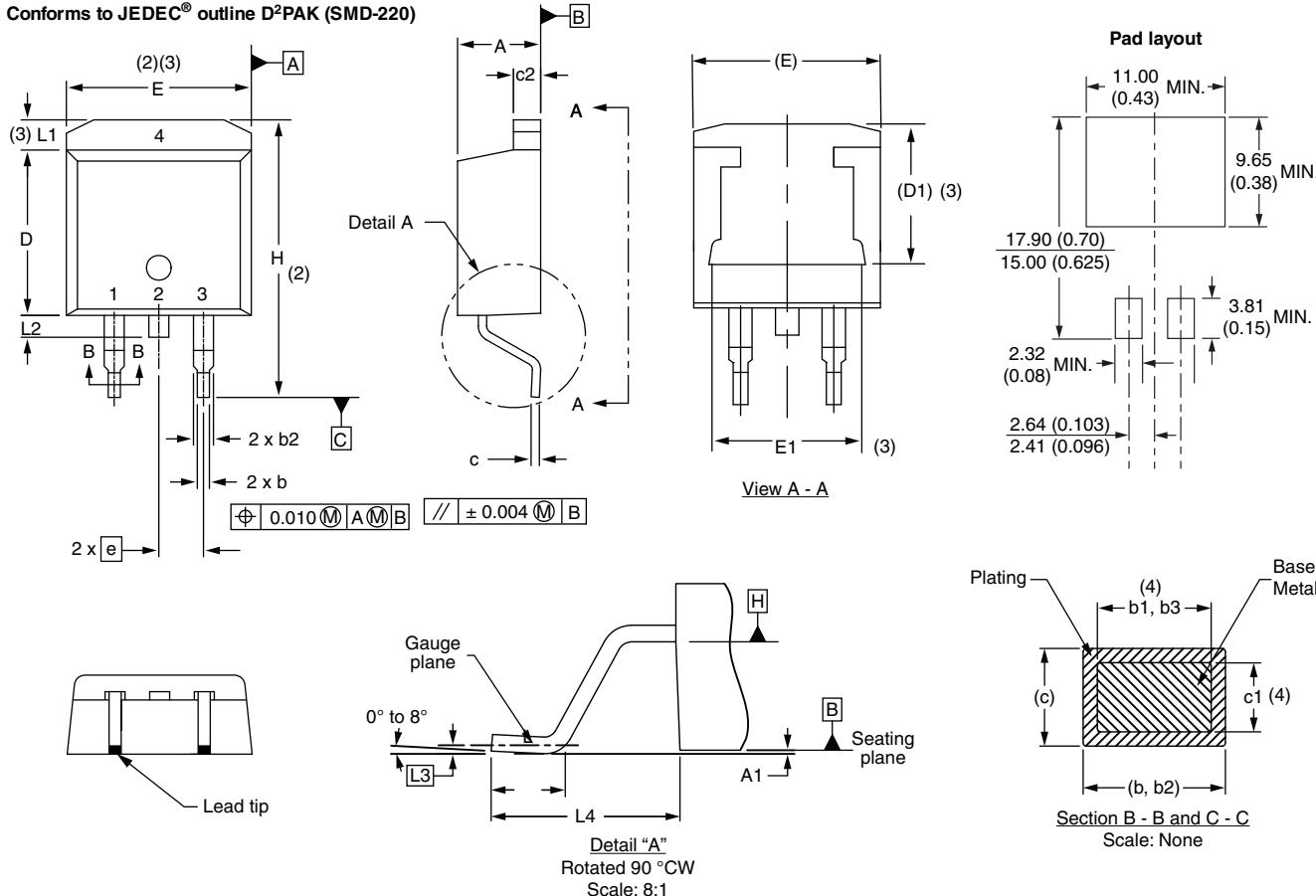
LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?96164
Part marking information	www.vishay.com/doc?95444
Packaging information	www.vishay.com/doc?96424

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

- (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: inches
- (7) Outline conforms to JEDEC® outline TO-263AB

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