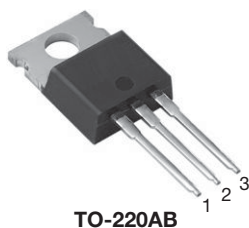
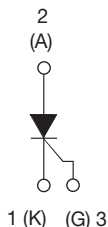


Thyristor High Voltage, Phase Control SCR, 25 A



TO-220AB



FEATURES

- Easy control peak current at charger power up to reduce passive / electromechanical components
- Meets JESD 201 class 1A whisker test
- Flexible solution for reliable AC power rectification
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- On-board and off-board EV/HEV battery chargers
- Renewable energy inverters

DESCRIPTION

The VS-25TTS12HM3 high voltage series of silicon controlled rectifiers are specifically designed for medium power switching and phase control applications.

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	16 A
V_{DRM}/V_{RRM}	1200 V
V_{TM}	1.25 V
I_{GT}	45 mA
T_J	-40 °C to +125 °C
Package	TO-220AB
Circuit configuration	Single SCR

OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter $T_A = 55$ °C, $T_J = 125$ °C, common heatsink of 1 °C/W	18	22	A

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	16	A
I_{RMS}		25	
V_{RRM}/V_{DRM}		1200	V
I_{TSM}		320	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-25TTS12HM3	1200	1200	10

**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 10 ms sine pulse, no voltage reapplied	270 320		
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied 10 ms sine pulse, no voltage reapplied	365 515		A^2s
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	5152		$A^2\sqrt{s}$
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}	$T_J = 25\text{ }^{\circ}\text{C}$ $T_J = 125\text{ }^{\circ}\text{C}$	$V_R = \text{rated } V_{RRM}/V_{DRM}$		mA
			0.5		
			10		
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$	-	150	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	200		
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_{J\text{ max.}}$, linear to $80\text{ }^{\circ}\text{C}$, $V_{DRM} = R_g - k = \text{open}$	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, $T_J = -10\text{ }^{\circ}\text{C}$ Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	60 45 20	mA
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^{\circ}\text{C}$ Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$ Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	2.5 2.0 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	V
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
Maximum thermal resistance, junction to case	R _{thJC}	DC operation	1.1	°C/W
Maximum thermal resistance, junction to ambient	R _{thJA}		62	
Typical thermal resistance, case to heatsink	R _{thCS}	Mounting surface, smooth and greased	0.5	
Approximate weight			2	g
			0.07	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-220AB	25TTS12H	

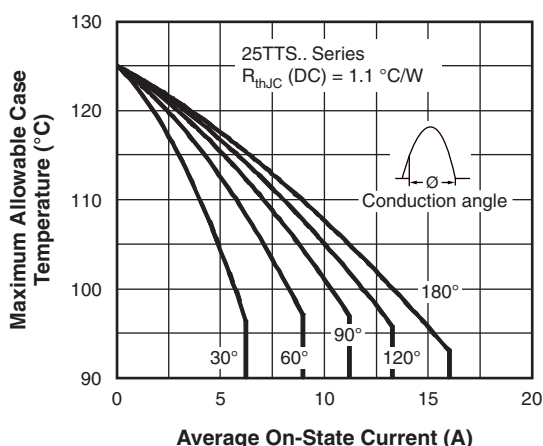


Fig. 1 - Current Rating Characteristics

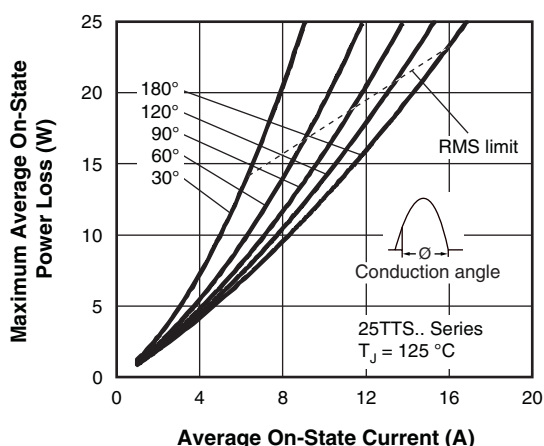


Fig. 3 - On-State Power Loss Characteristics

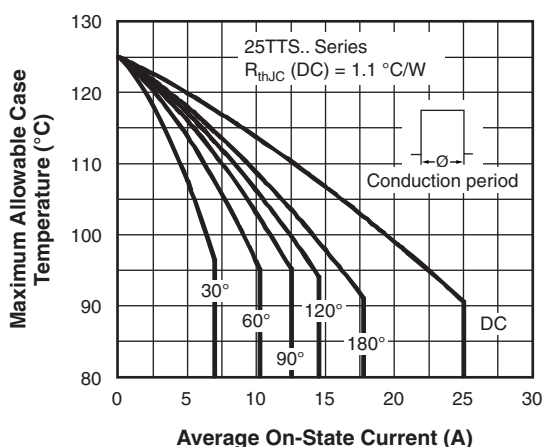


Fig. 2 - Current Rating Characteristics

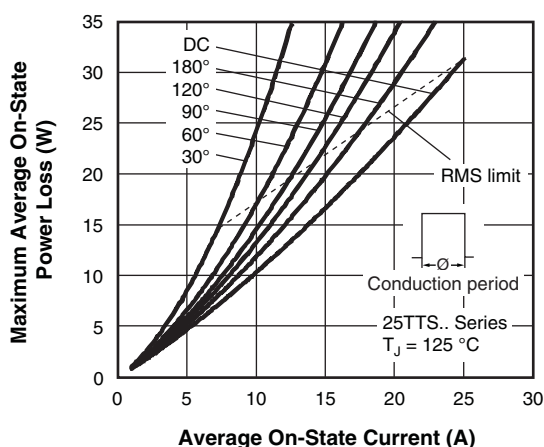


Fig. 4 - On-State Power Loss Characteristics

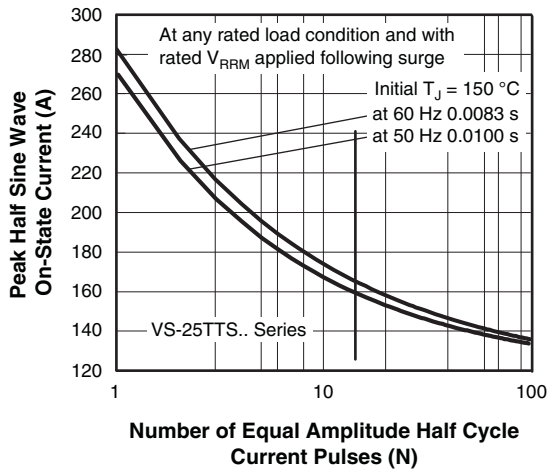


Fig. 5 - Maximum Non-Repetitive Surge Current

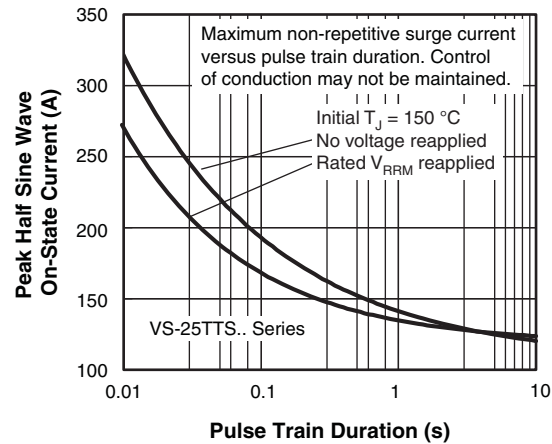


Fig. 6 - Maximum Non-Repetitive Surge Current

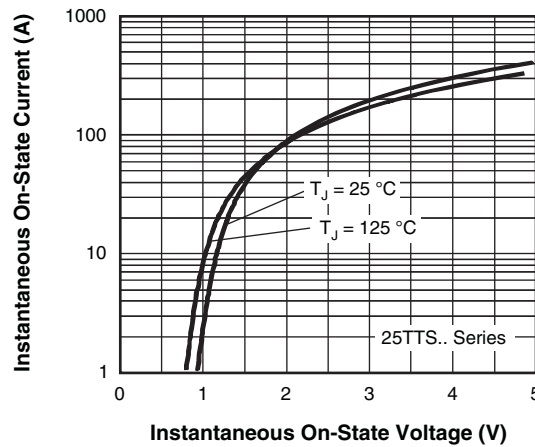


Fig. 7 - On-State Voltage Drop Characteristics

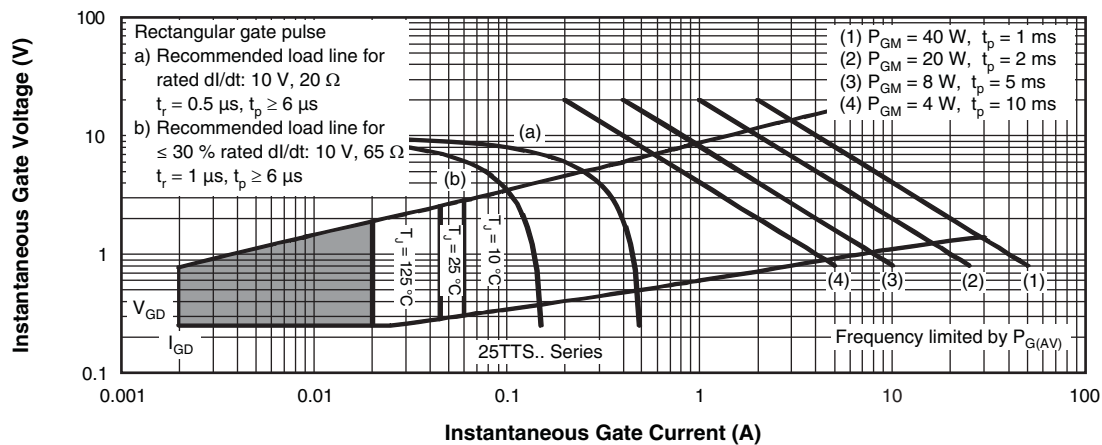


Fig. 8 - Gate Characteristics

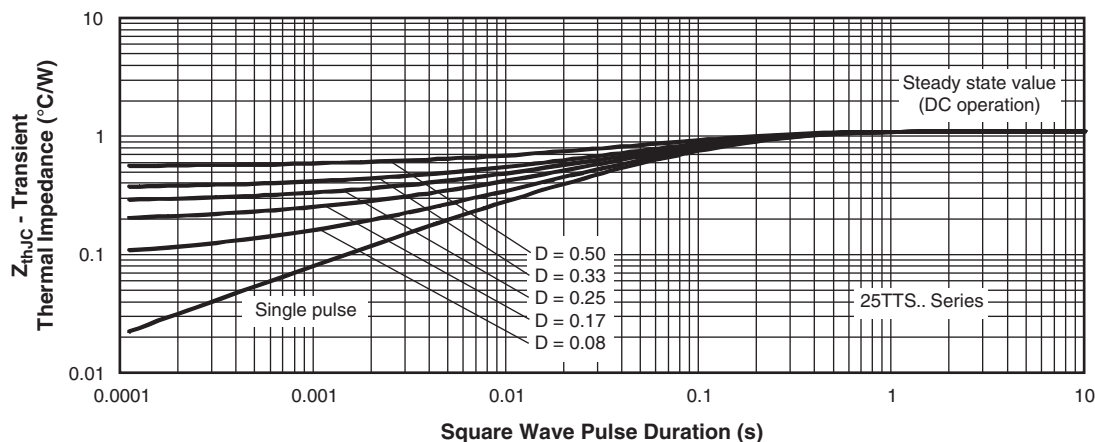


Fig. 9 - Thermal Impedance $Z_{th,JC}$ Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	25	T	T	S	12	H	M3
1	2	3	4	5	6	7	8

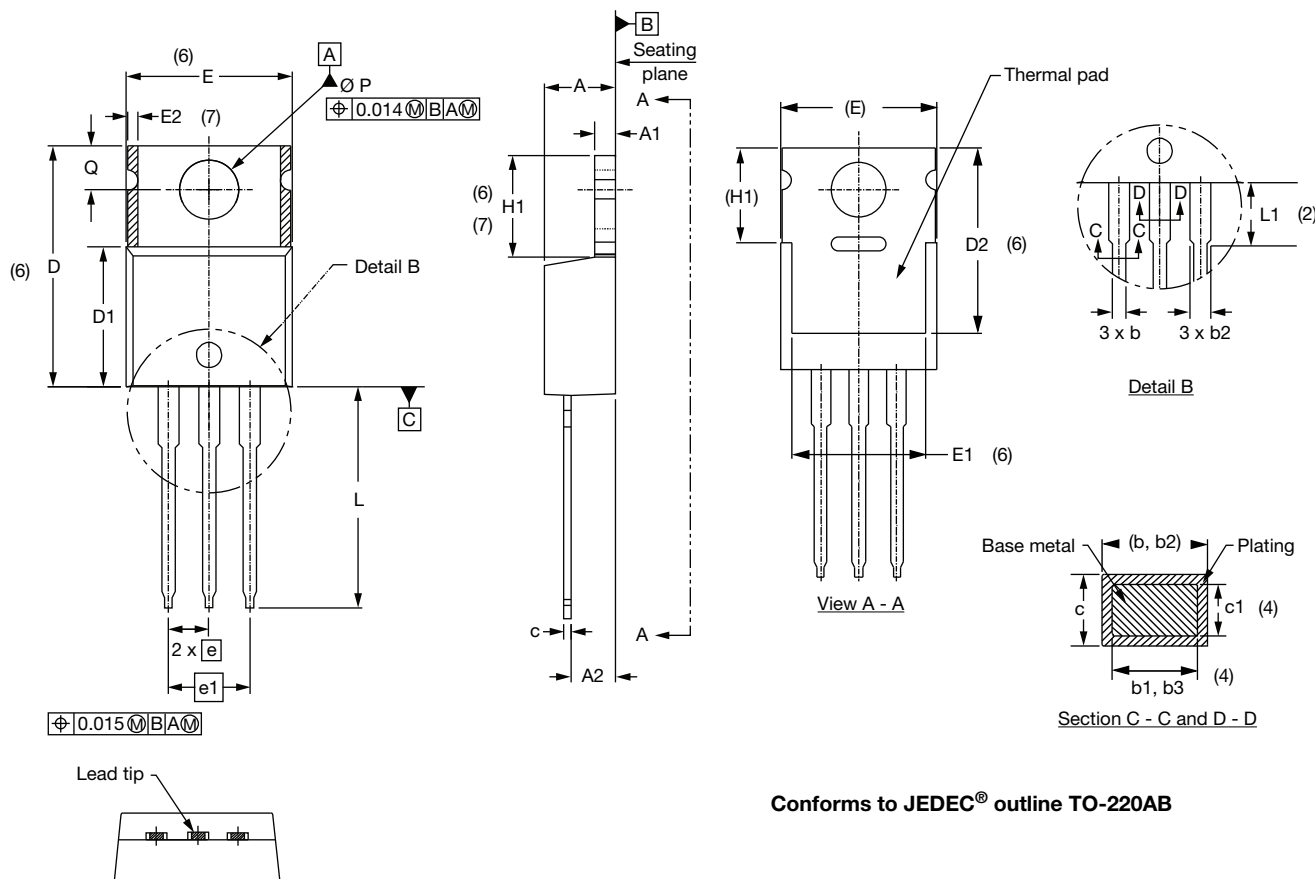
- 1 - Vishay Semiconductors product
- 2 - Current rating (25 = 25 A)
- 3 - Circuit configuration:
T = single thyristor
- 4 - Package:
T = TO-220AB
- 5 - Type of silicon:
S = standard recovery rectifier
- 6 - Voltage rating ————— 12 = 1200 V
- 7 - H = AEC-Q101 qualified
- 8 - Environmental digit:
M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-25TTS12HM3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95222
Part marking information	www.vishay.com/doc?95028

TO-220AB

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.			
A	4.25	4.65	0.167	0.183			D2	11.68	12.88	0.460	0.507	6
A1	1.14	1.40	0.045	0.055			E	10.11	10.51	0.398	0.414	3, 6
A2	2.56	2.92	0.101	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			E2	-	0.76	-	0.030	7
b1	0.38	0.97	0.015	0.038	4		e	2.41	2.67	0.095	0.105	
b2	1.20	1.73	0.047	0.068			e1	4.88	5.28	0.192	0.208	
b3	1.14	1.73	0.045	0.068	4		H1	5.84	6.86	0.230	0.270	6, 7
c	0.36	0.61	0.014	0.024			L	13.52	14.02	0.532	0.552	
c1	0.36	0.56	0.014	0.022	4		L1	3.32	3.82	0.131	0.150	2
D	14.85	15.25	0.585	0.600	3		Ø P	3.54	3.73	0.139	0.147	
D1	8.38	9.02	0.330	0.355			Q	2.60	3.00	0.102	0.118	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1 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 outermost extremes of the plastic body
- (4) Dimension b1, b3 and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimensions E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC® TO-220, except A2 (maximum) and D2 (minimum) where dimensions are derived from the actual package outline



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