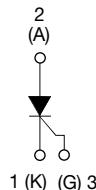


High Voltage Phase Control Thyristor, 12 A



TO-220AB 3L

FEATURES

- Designed and qualified according to JEDEC®-JESD 47
- 125 °C max. operating junction temperature
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Typical usage is in input rectification crowbar (soft start) and AC switch in motor control, UPS, welding, and battery charge.

DESCRIPTION

The VS-12TTS08... 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.

PRIMARY CHARACTERISTICS

$I_{T(AV)}$	8 A
V_{DRM}/V_{RRM}	800 V
V_{TM}	1.2 V
I_{GT}	15 mA
T_J	-40 °C to 125 °C
Package	TO-220AB 3L
Circuit configuration	Single SCR

OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter $T_A = 55^\circ\text{C}$, $T_J = 125^\circ\text{C}$, common heatsink of 1 °C/W	13.5	17	A

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	8	A
$I_{T(RMS)}$		12.5	
V_{DRM}/V_{RRM}		800	V
I_{TSM}		110	A
V_T	8 A, $T_J = 25^\circ\text{C}$	1.2	V
dV/dt		150	V/μs
dl/dt		100	A/μs
T_J	Range	-40 to +125	°C

VOLTAGE RATINGS

PART NUMBER	V_{RRM} , MAXIMUM PEAK VOLTAGE V	V_{DRM} , MAXIMUM PEAK DIRECT VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VS-12TTS08-M3	800	800	1.0

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 108^\circ C$, 180° conduction, half sine wave		8	A	
Maximum RMS on-state current	$I_{T(RMS)}$			12.5		
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied, $T_J = 125^\circ C$		95		
		10 ms sine pulse, no voltage reapplied, $T_J = 125^\circ C$		110		
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied, $T_J = 125^\circ C$		45	A^2s	
		10 ms sine pulse, no voltage reapplied, $T_J = 125^\circ C$		64		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied, $T_J = 125^\circ C$		640	$A^2\sqrt{s}$	
Maximum on-state voltage drop	V_{TM}	8 A, $T_J = 25^\circ C$		1.2	V	
On-state slope resistance	r_t	$T_J = 125^\circ C$		16.2	$m\Omega$	
Threshold voltage	$V_{T(TO)}$			0.87	V	
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25^\circ C$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.05	mA	
		$T_J = 125^\circ C$		1.0		
Typical holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1$ A, $T_J = 25^\circ C$		30		
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		50		
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J \text{ max.}$, linear to 80 °C, $V_{DRM} = R_g - k = \text{Open}$		150	V/μs	
Maximum rate of rise of turned-on current	di/dt			100	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	
Maximum required DC gate current to trigger	I_{GT}	Anode supply = 6 V, resistive load, $T_J = -65^\circ C$		20	mA
		Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		15	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ C$		10	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -65^\circ C$		1.2	V
		Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		1	
		Anode supply = 6 V, resistive load, $T_J = 125^\circ C$		0.7	
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 125^\circ C$, $V_{DRM} = \text{Rated value}$		0.2	
Maximum DC gate current not to trigger	I_{GD}			0.1	

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Typical turn-on time	t_{gt}	$T_J = 25^\circ C$		0.8	μs
Typical reverse recovery time	t_{rr}			3	
Typical turn-off time	t_q			100	

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	1.5	
Maximum thermal resistance, junction to ambient	R_{thJA}		62	°C/W
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 3L	12TT808	

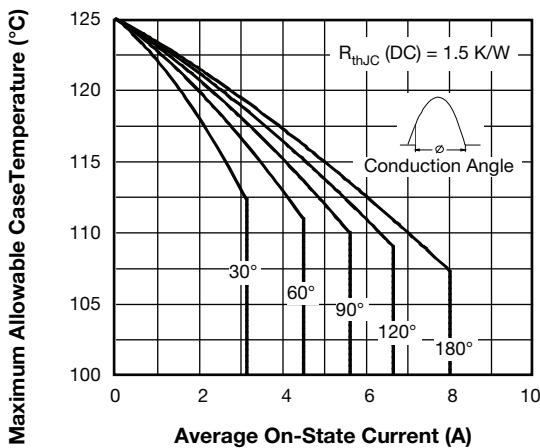


Fig. 1 - Current Ratings Characteristics

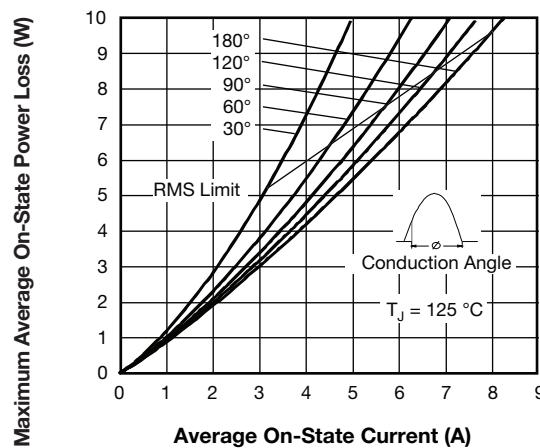


Fig. 3 - On-State Power Loss Characteristics

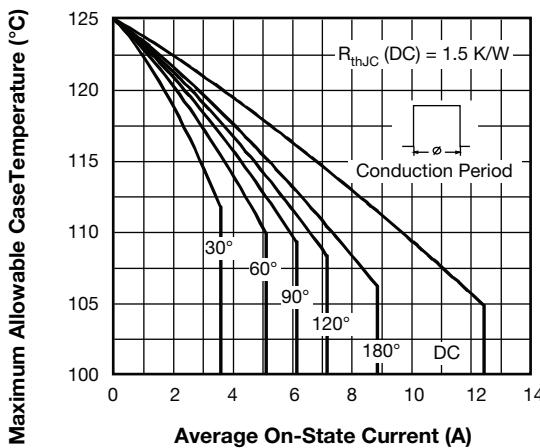


Fig. 2 - Current Ratings Characteristics

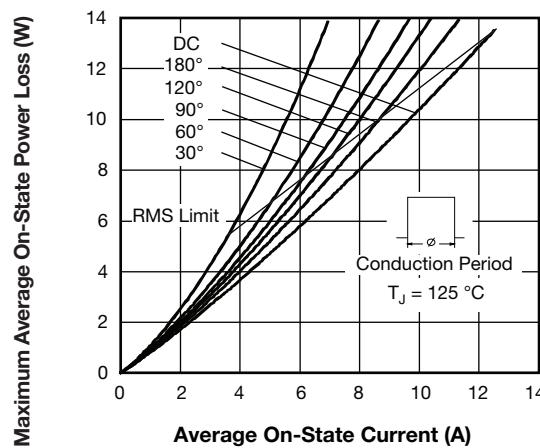


Fig. 4 - On-State Power Loss Characteristics

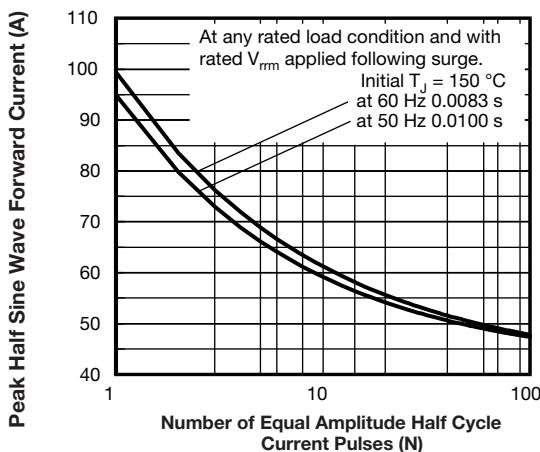


Fig. 5 - Maximum Non-Repetitive Surge Current

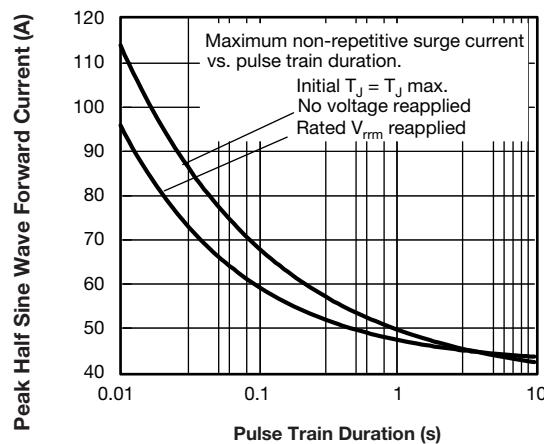


Fig. 6 - Maximum Non-Repetitive Surge Current

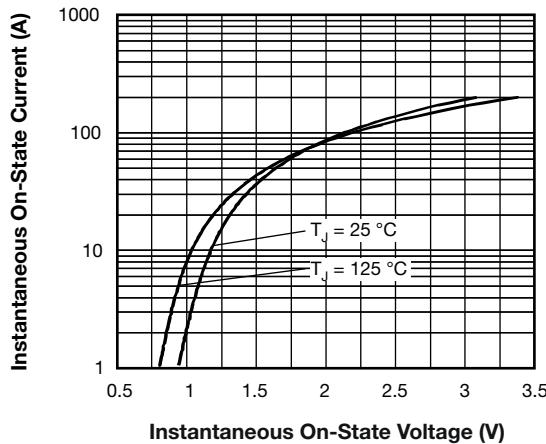


Fig. 7 - On-State Voltage Drop Characteristics

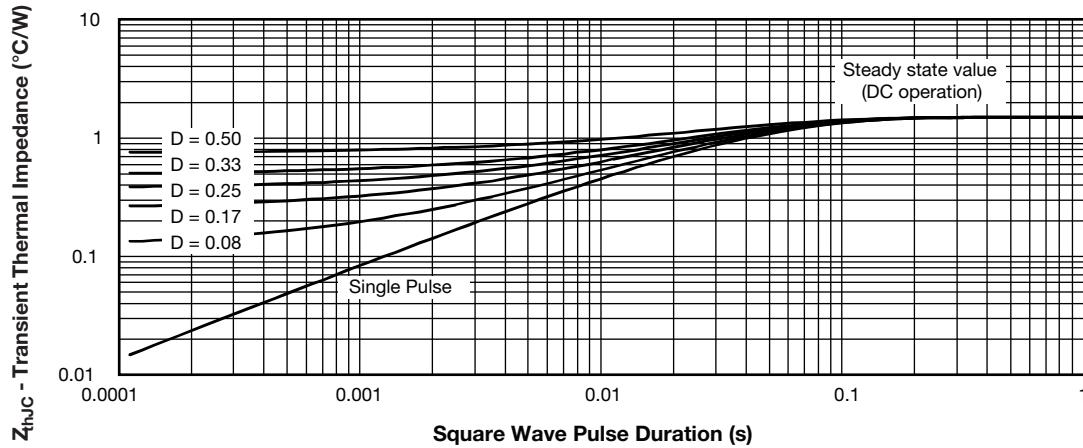
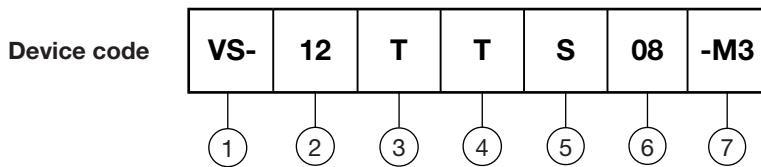


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE


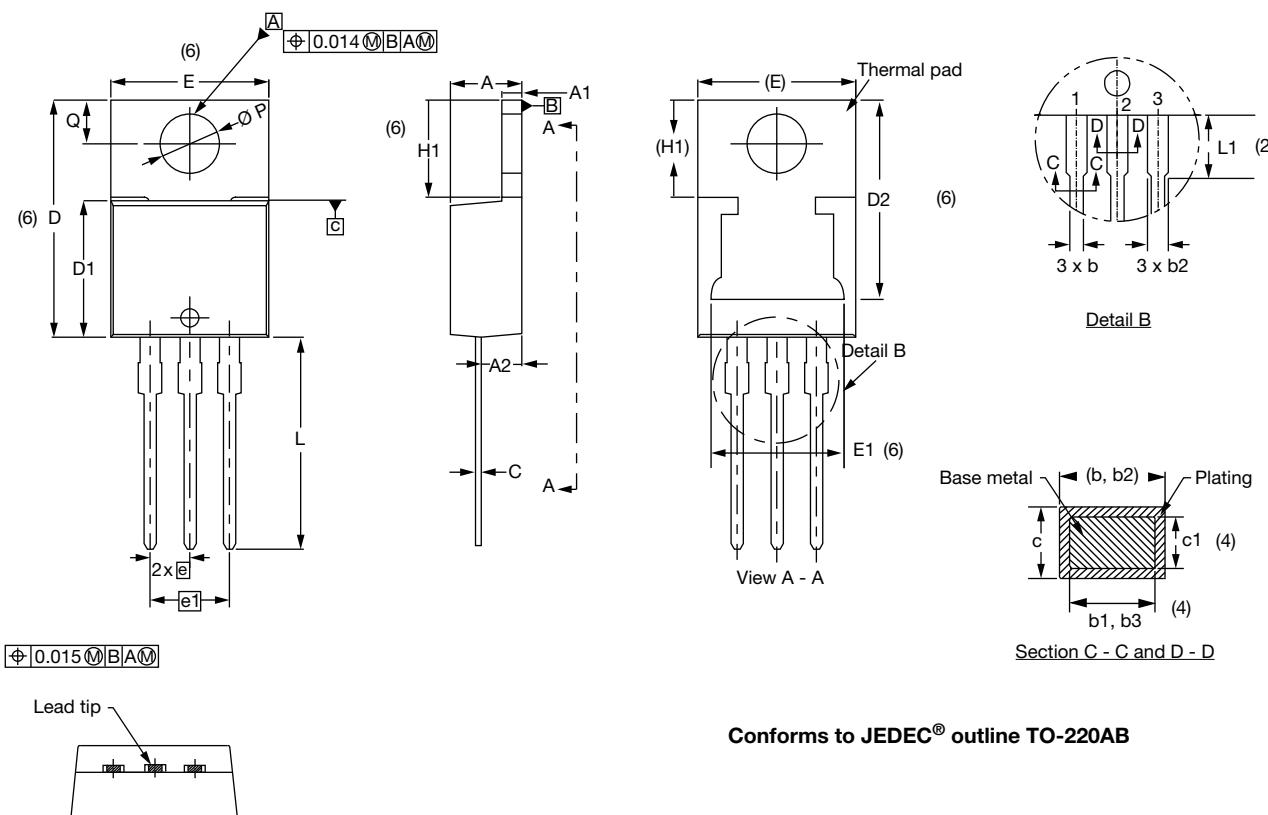
- [1]** - Vishay Semiconductors product
- [2]** - Current ratings (12 = 12.5 A)
- [3]** - Circuit configuration:
T = single thyristor
- [4]** - Package:
T = TO-220
- [5]** - Type of silicon
S = standard recovery rectifier
- [6]** - Voltage rating (08 = 800 V)
- [7]** - Environmental digit:
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-12TT808-M3	50	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96154
Part marking information	www.vishay.com/doc?95028

TO-220AB 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183			D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055			E	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			e	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4		e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068			H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4		L	13.52	14.02	0.532	0.552	
c	0.36	0.61	0.014	0.024			L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4		$\emptyset P$	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3		Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355								

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) Outline conforms to JEDEC® TO-220, except D2

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