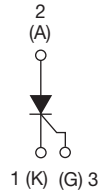


# Thyristor High Voltage, Phase Control SCR, 10 A



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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## APPLICATIONS

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

## DESCRIPTION

The VS-10TTS08... 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

$I_{T(AV)}$	6.5 A
$V_{DRM}/V_{RRM}$	800 V
$V_{TM}$	1.15 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 $T_A = 55\text{ °C}$ , $T_J = 125\text{ °C}$ , common heatsink of $1\text{ °C/W}$	13.5	17	A

### MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	6.5	A
$I_{T(RMS)}$		10	
$V_{RRM}/V_{DRM}$		800	V
$I_{TSM}$		110	A
$V_T$	6.5 A, $T_J = 25\text{ °C}$	1.15	V
dV/dt		150	V/μs
dI/dt		100	A/μs
$T_J$	Range	-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-10TTS08-M3	800	800	1.0



ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	$T_C = 112\text{ }^\circ\text{C}$ , 180° conduction half sine wave		6.5	A
Maximum RMS on-state current	$I_{T(RMS)}$			10	
Maximum peak, one-cycle, non-repetitive surge current	$I_{TSM}$	10 ms sine pulse, rated $V_{RRM}$ applied, $T_J = 125\text{ }^\circ\text{C}$		95	
		10 ms sine pulse, no voltage reapplied, $T_J = 125\text{ }^\circ\text{C}$		110	
Maximum $I^2t$ for fusing	$I^2t$	10 ms sine pulse, rated $V_{RRM}$ applied, $T_J = 125\text{ }^\circ\text{C}$		45	$A^2s$
		10 ms sine pulse, no voltage reapplied, $T_J = 125\text{ }^\circ\text{C}$		64	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to } 10\text{ ms}$ , no voltage reapplied, $T_J = 125\text{ }^\circ\text{C}$		640	$A^2\sqrt{s}$
Maximum on-state voltage drop	$V_{TM}$	6.5 A, $T_J = 25\text{ }^\circ\text{C}$		1.15	V
On-state slope resistance	$r_t$	$T_J = 125\text{ }^\circ\text{C}$		17.3	$m\Omega$
Threshold voltage	$V_{T(TO)}$			0.85	V
Maximum reverse and direct leakage current	$I_{RM}/I_{DM}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.05	mA
		$T_J = 125\text{ }^\circ\text{C}$		1.0	
Typical holding current	$I_H$	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$ , $T_J = 25\text{ }^\circ\text{C}$		30	
Maximum latching current	$I_L$	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$		50	
Maximum rate of rise of off-state voltage	$dV/dt$	$T_J = T_J \text{ max.}$ , linear to 80 %, $V_{DRM} = R_g - k = \text{Open}$		150	$V/\mu s$
Maximum rate of rise of turned-on current	$dI/dt$			100	$A/\mu s$

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, $T_J = -65\text{ }^\circ\text{C}$		20	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$		15	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$		10	
Maximum required DC gate voltage to trigger	$V_{GT}$	Anode supply = 6 V, resistive load, $T_J = -65\text{ }^\circ\text{C}$		1.2	V
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$		1	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$		0.7	
Maximum DC gate voltage not to trigger	$V_{GD}$	$T_J = 125\text{ }^\circ\text{C}$ , $V_{DRM} = \text{Rated value}$		0.2	mA
Maximum DC gate current not to trigger	$I_{GD}$			0.1	

SWITCHING					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Typical turn-on time	$t_{gt}$	$T_J = 25\text{ }^\circ\text{C}$		0.8	$\mu s$
Typical reverse recovery time	$t_{rr}$	$T_J = 125\text{ }^\circ\text{C}$		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	°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 3L	10TTS08	

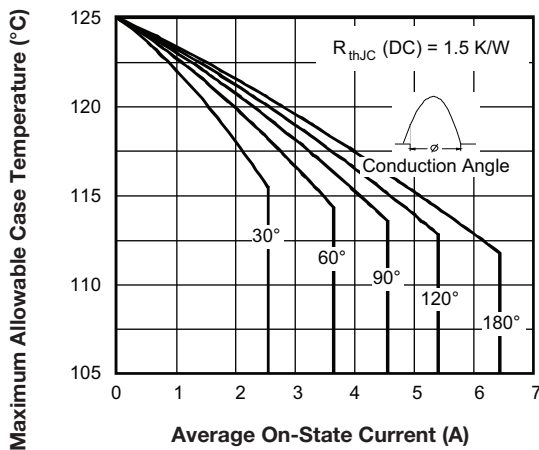


Fig. 1 - Current Rating Characteristics

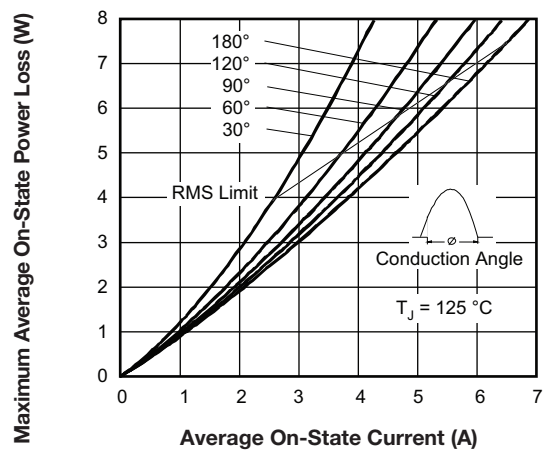


Fig. 3 - On-State Power Loss Characteristics

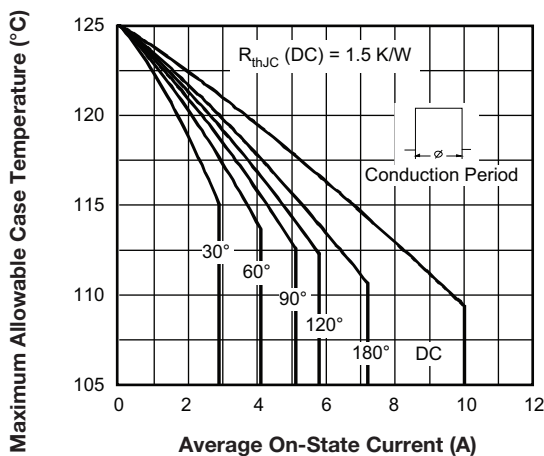


Fig. 2 - Current Rating Characteristic

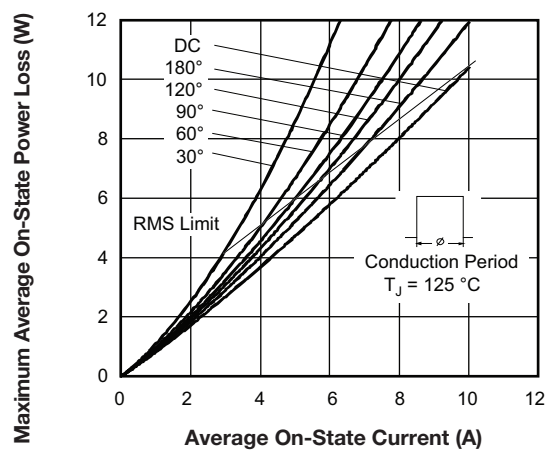


Fig. 4 - On-State Power Loss Characteristics

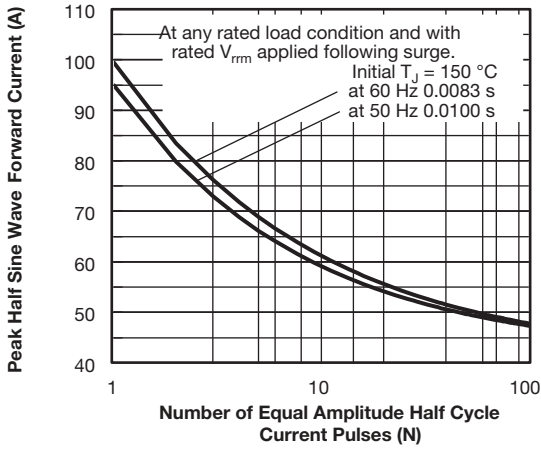


Fig. 5 - Maximum Non-Repetitive Surge Current

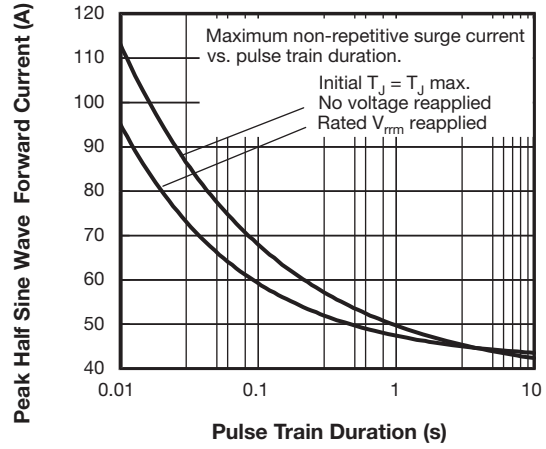


Fig. 6 - Maximum Non-Repetitive Surge Current

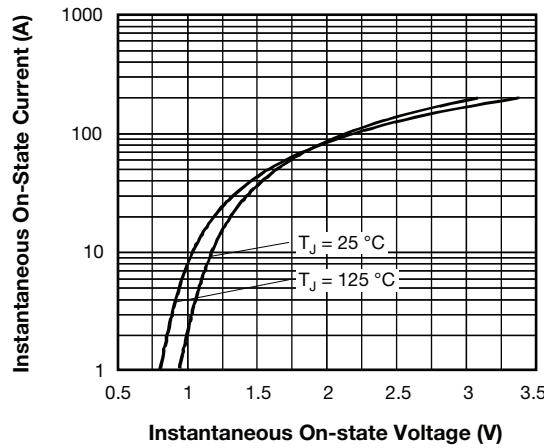


Fig. 7 - On-State Voltage Drop Characteristics

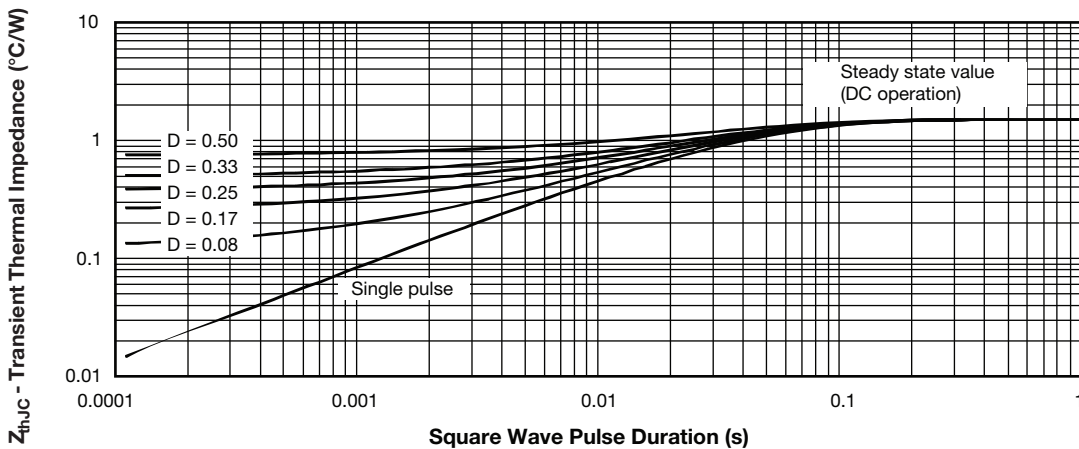
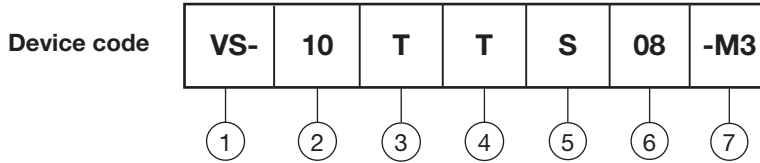


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics



ORDERING INFORMATION TABLE



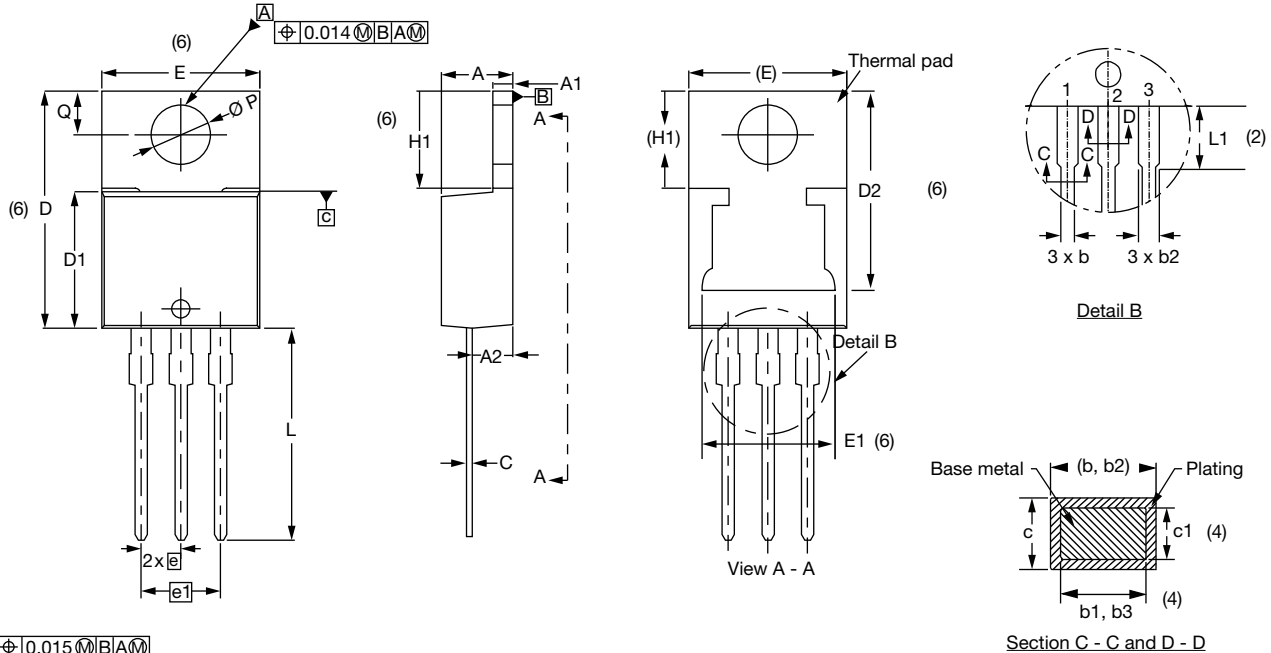
- 1** - Vishay Semiconductors product
- 2** - Current rating
- 3** - Circuit configuration:  
T = single thyristor
- 4** - Package:  
T = TO-220AB
- 5** - Type of silicon:  
S = converter grade
- 6** - Voltage code x 100 =  $V_{RRM}$
- 7** - Environmental digit:  
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-10TTS08-M3	50	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96154">www.vishay.com/doc?96154</a>
Part marking information	<a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a>

### TO-220AB 3L

**DIMENSIONS** in millimeters and inches



Conforms to JEDEC® outline TO-220AB

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.50	2.92	0.098	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.35	0.585	0.604	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	13.30	0.460	0.524	6, 7
E	10.11	10.51	0.398	0.414	3, 6
E1	6.86	8.89	0.270	0.350	6
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
Ø P	3.54	3.91	0.139	0.154	
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) Outline conforms to JEDEC® TO-220, except D2



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