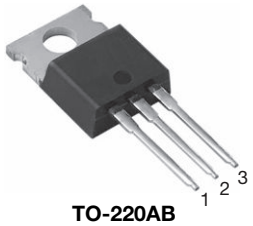
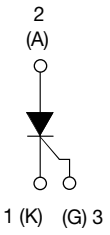
Thyristor High Voltage, Phase Control SCR, 40 A



TO-220AB



FEATURES

- Designed and qualified according to JEDEC-JESD47
- 140 °C max. operating junction temperature
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE Available

APPLICATIONS

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

DESCRIPTION

The VS-40TTS12... 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 140 °C junction temperature.

PRODUCT SUMMARY	
Package	TO-220AB
Diode variation	Single SCR
$I_{T(AV)}$	25 A
V_{DRM}/V_{RRM}	1200 V
V_{TM}	1.6 V
I_{GT}	35 mA
T_J	- 40 °C to 140 °C

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	25	A
I_{RMS}		40	
V_{RRM}/V_{DRM}		1200	V
I_{TSM}		350	A
V_T	T_J = 25 °C	1.6	V
dV/dt		500	V/µs
dI/dt		150	A/µs
T_J		- 40 to 140	°C

VOLTAGE RATINGS			
PART NUMBER	V_{RRM}, MAXIMUM PEAK REVERSE VOLTAGE V	V_{DRM}, MAXIMUM PEAK DIRECT VOLTAGE V	T_J °C
VS-40TTS12PbF, VS-40TTS12-M3	1200	1200	- 25 to 140

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	T_C = 93 °C, 180° conduction half sine wave		25	A
Maximum RMS on-state current	I_{RMS}			40	
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 to 10 ms, no voltage reapplied		6300	$A^2\sqrt{s}$
Maximum on-state voltage	V_{TM}	80 A, T_J = 25 °C		1.6	V
Low level value of on-state slope resistance	r_t	T_J = 140 °C		11.4	mΩ
Low level value of threshold voltage	$V_{T(TO)}$			0.96	V
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	T_J = 25 °C	V_R = Rated V_{RRM}/V_{DRM}	0.5	mA
		T_J = 140 °C		12	
Holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A, T_J = 25 °C		100	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C		200	
Maximum rate of rise of off-state voltage	dV/dt	T_J = T_J max., linear to 80 °C, V_{DRM} = R_g - k = 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 = 25 °C	35	mA
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, T_J = 25 °C	1.3	V
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 140 °C, V_{DRM} = Rated value	0.2	
Maximum DC gate current not to trigger	I_{GD}		1.5	mA

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	t_{gt}	T_J = 25 °C	0.9	µs
Typical reverse recovery time	t_{rr}	T_J = 140 °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 140	°C
Maximum thermal resistance, junction to case		R_{thJC}	DC operation	0.8	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}		60	
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	40TTS12	

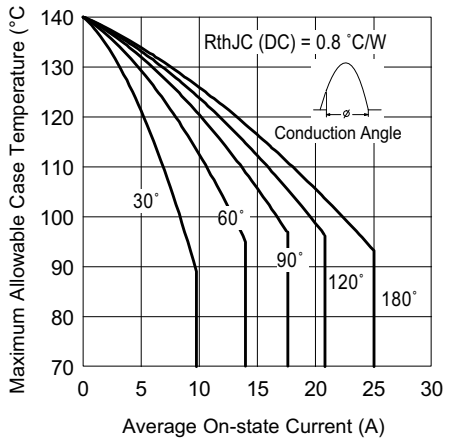


Fig. 1 - Current Rating Characteristics

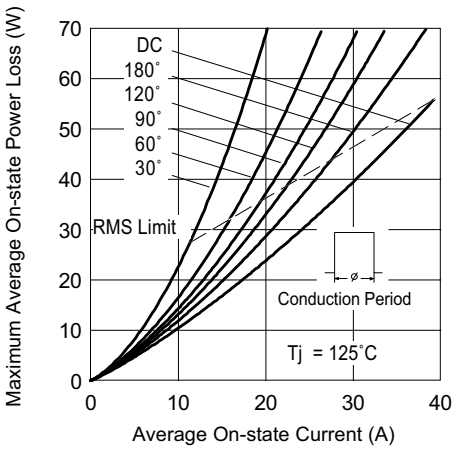


Fig. 4 - On-State Power Loss Characteristics

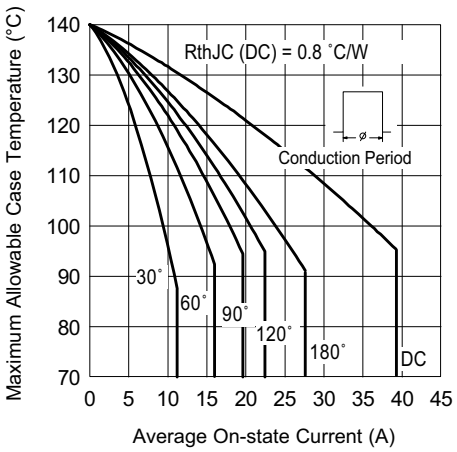


Fig. 2 - Current Rating Characteristics

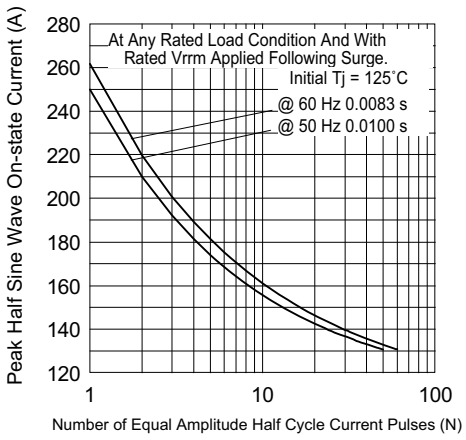


Fig. 5 - Maximum Non-Repetitive Surge Current

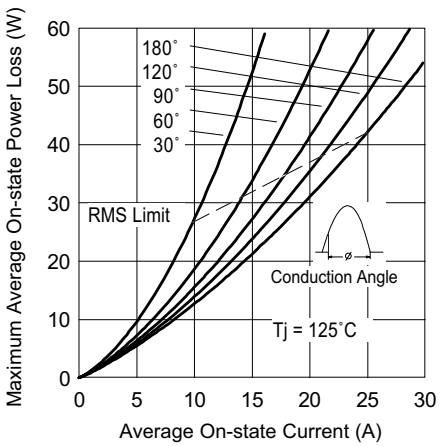


Fig. 3 - On-State Power Loss Characteristics

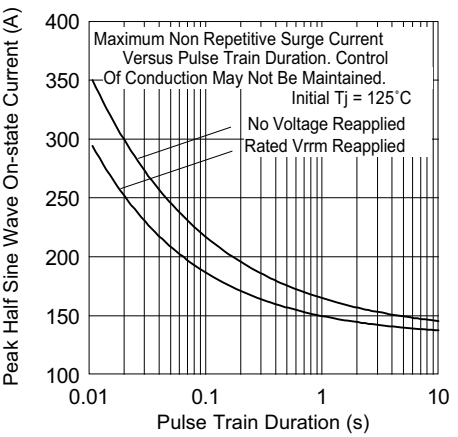


Fig. 6 - Maximum Non-Repetitive Surge Current

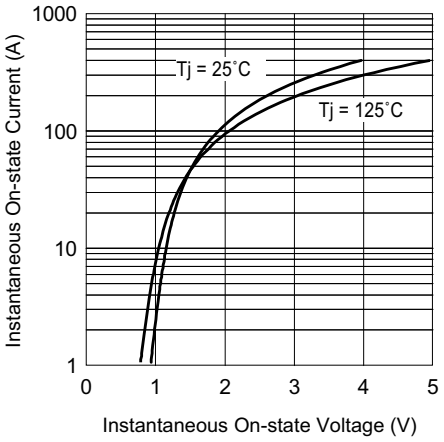


Fig. 7 - On-State Voltage Drop Characteristics

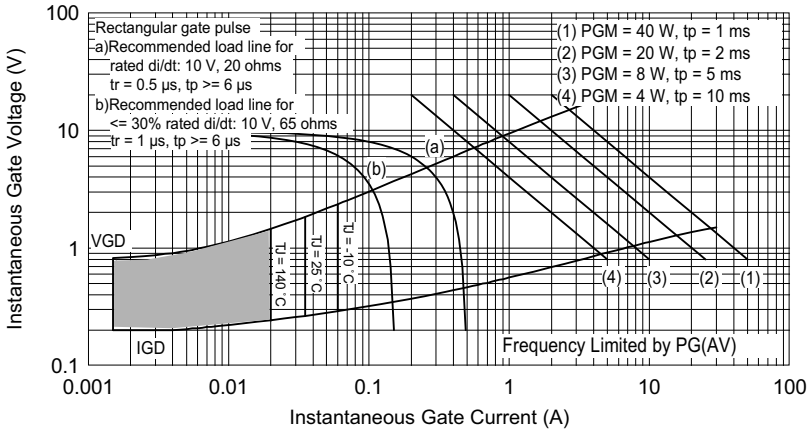


Fig. 8 - Gate Characteristics

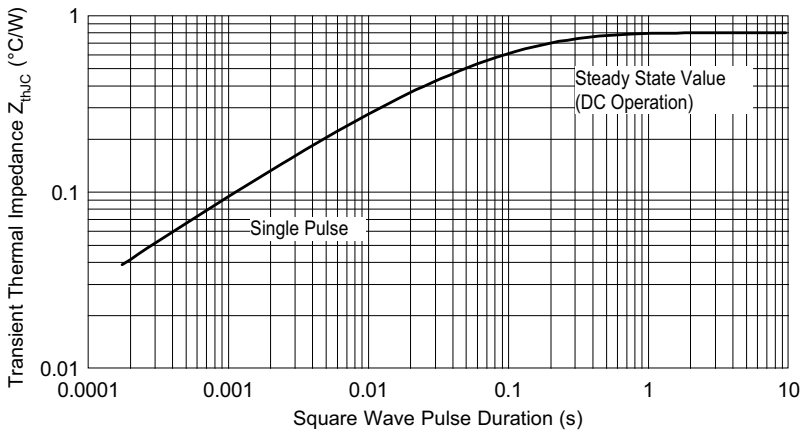


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	40	T	T	S	12	PbF
1	2	3	4	5	6	7

1 - Vishay Semiconductors product

2 - Current rating, RMS value

3 - Circuit configuration:
T = Single thyristor

4 - Package:
T = TO-220

5 - Type of silicon:
S = Standard recovery rectifier

6 - Voltage rating (12 = 1200 V)

7 - Environmental digit:
PbF = Lead (Pb)-free and RoHS compliant
-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-40TTS12PbF	50	1000	Antistatic plastic tubes
VS-40TTS12-M3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95222
Part marking information	TO-220AB PbF	www.vishay.com/doc?95225
	TO-220AB -M3	www.vishay.com/doc?95028

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