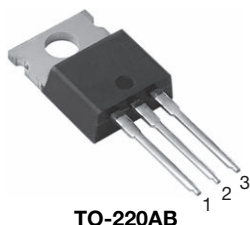
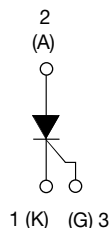


Thyristor High Voltage, Phase Control SCR, 40 A



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?999912



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	$T_J = 25\text{ °C}$	1.6	V
dV/dt		500	V/ μ s
dI/dt		150	A/ μ s
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	$I_{T(AV)}$	$T_C = 93\text{ }^{\circ}\text{C}$, 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 10 ms sine pulse, no voltage reapplied	300 350	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied 10 ms sine pulse, no voltage reapplied	450 630	A^2s
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, $T_J = 25\text{ }^{\circ}\text{C}$	1.6	V
Low level value of on-state slope resistance	r_t	$T_J = 140\text{ }^{\circ}\text{C}$	11.4	$m\Omega$
Low level value of threshold voltage	$V_{T(TO)}$		0.96	V
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	$T_J = 25\text{ }^{\circ}\text{C}$ $T_J = 140\text{ }^{\circ}\text{C}$ $V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.5 12	mA
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1$ A, $T_J = 25\text{ }^{\circ}\text{C}$	100	
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, $T_J = 25\text{ }^{\circ}\text{C}$	35	mA
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	1.3	V
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 140\text{ }^{\circ}\text{C}$, $V_{DRM} = \text{Rated value}$	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}	$T_J = 25\text{ }^{\circ}\text{C}$	0.9	μs
Typical reverse recovery time	t_{rr}	$T_J = 140\text{ }^{\circ}\text{C}$	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 140	$^{\circ}\text{C}$
Maximum thermal resistance, junction to case	R_{thJC}	DC operation	0.8	$^{\circ}\text{C/W}$
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 0.07	g oz.
Mounting torque	minimum maximum		6 (5) 12 (10)	kgf · cm (lbf · in)
Marking device		Case style TO-220AB	40TTS12	

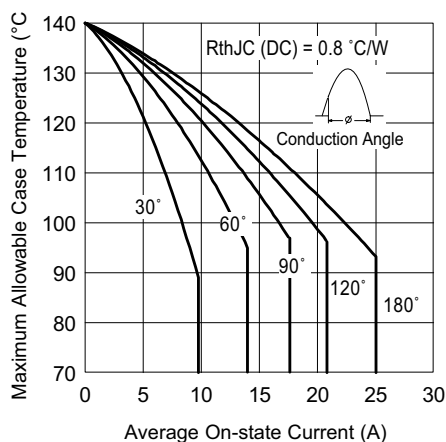


Fig. 1 - Current Rating Characteristics

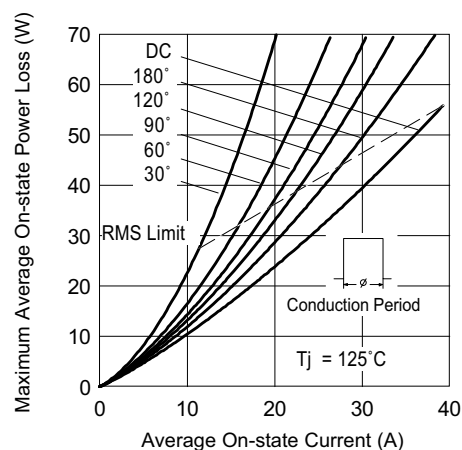


Fig. 4 - On-State Power Loss Characteristics

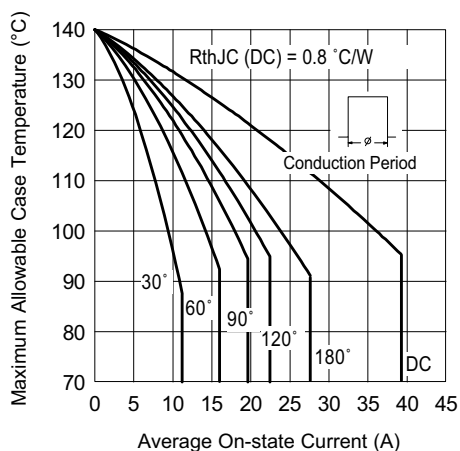


Fig. 2 - Current Rating Characteristics

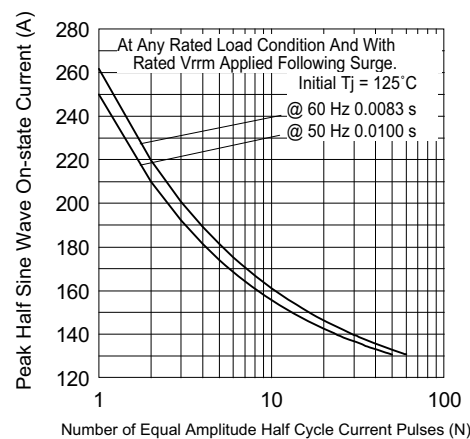


Fig. 5 - Maximum Non-Repetitive Surge Current

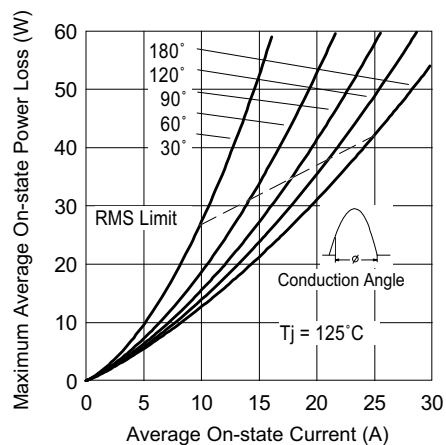


Fig. 3 - On-State Power Loss Characteristics

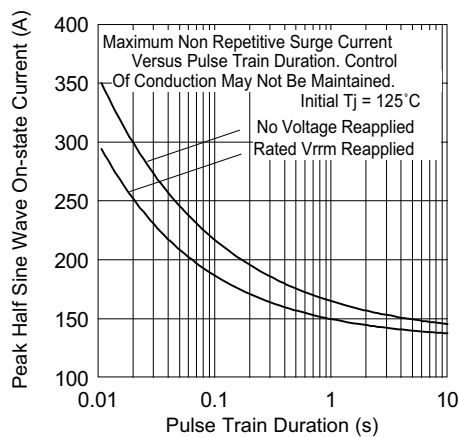


Fig. 6 - Maximum Non-Repetitive Surge Current

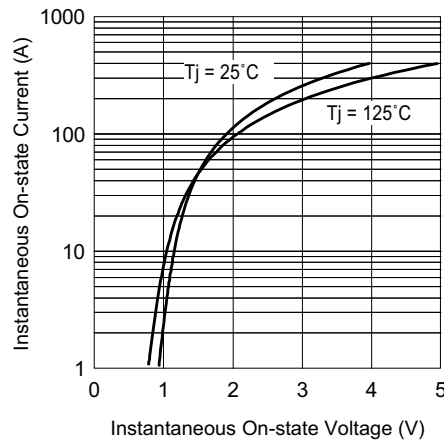


Fig. 7 - On-State Voltage Drop Characteristics

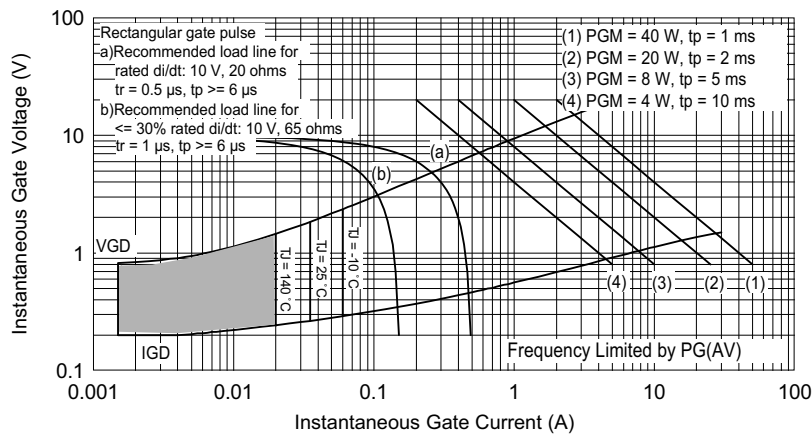
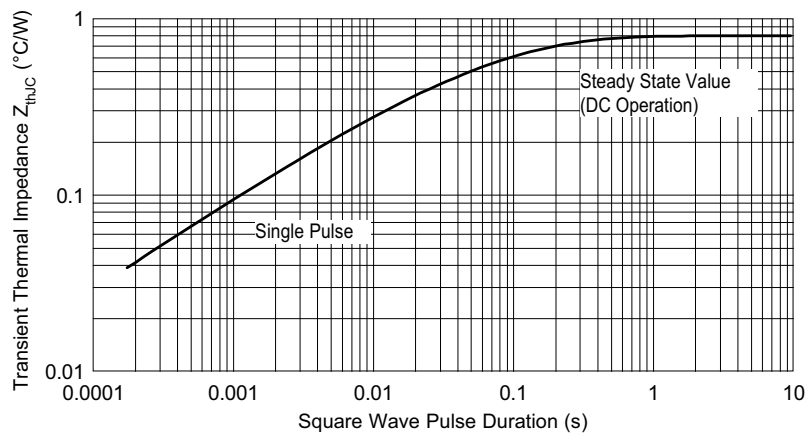


Fig. 8 - Gate Characteristics


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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