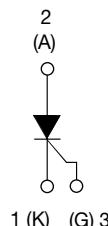


Thyristor High Voltage, Phase Control SCR, 40 A



PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	25 A
V_{DRM}/V_{RRM}	1200 V
V_{TM}	1.6 V
I_{GT}	35 mA
T_J	-40 °C to 140 °C
Package	TO-220AB 3L
Circuit configuration	Single SCR

FEATURES

- Designed and qualified according to JEDEC®-JESD 47
- 140 °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-40TT12... 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.

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
dl/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-40TT12-M3	1200	1200	-25 to +140

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 93^\circ C$, 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}	$80 A, T_J = 25^\circ C$		1.6	V	
Low level value of on-state slope resistance	r_t	$T_J = 140^\circ C$		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}	$T_J = 25^\circ C$	$V_R = \text{Rated } V_{RRM}/V_{DRM}$	0.5	mA	
		$T_J = 140^\circ C$		12		
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1 A$, $T_J = 25^\circ C$		100	mA	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		200		
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J \text{ max.}, \text{linear to } 80^\circ C, V_{DRM} = R_g - k = \text{Open}$		500	V/ μ s	
Maximum rate of rise of turned-on current	di/dt			150	A/ μ s	

TRIGGERING

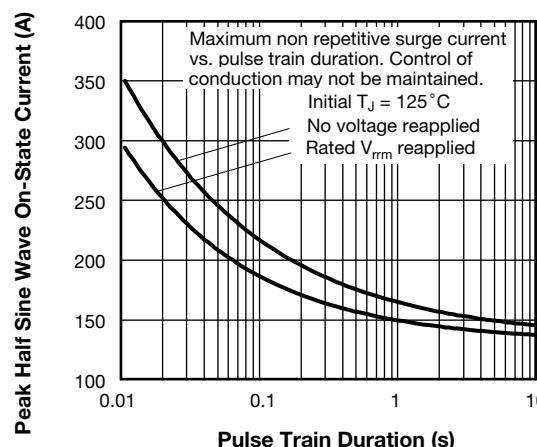
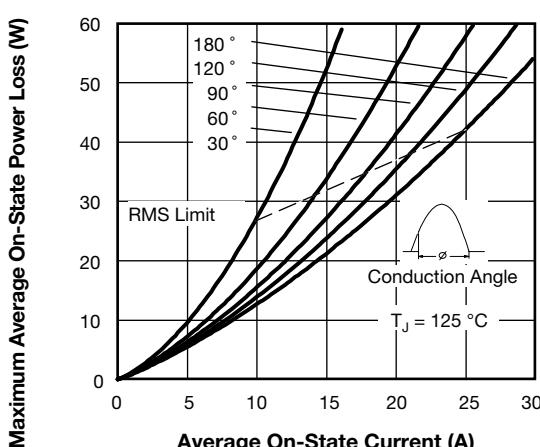
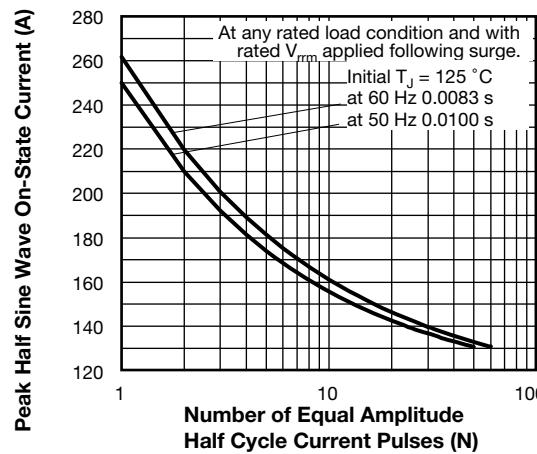
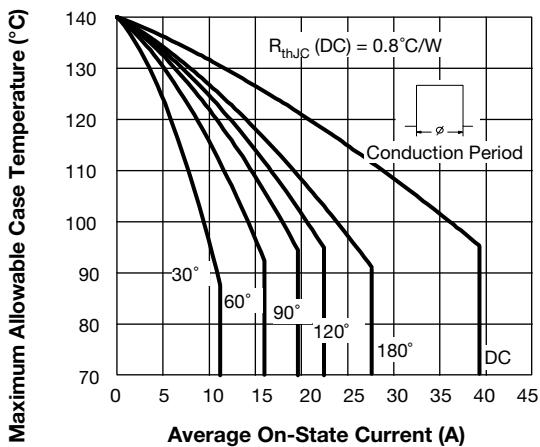
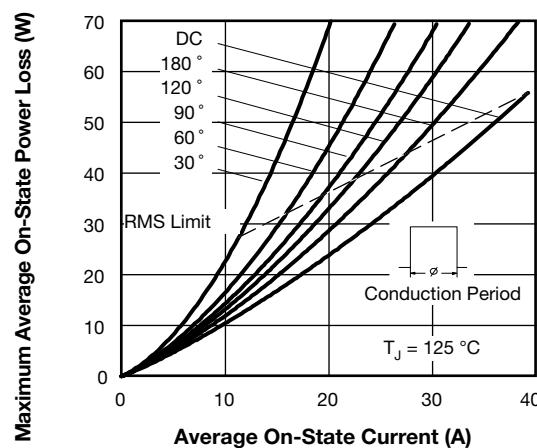
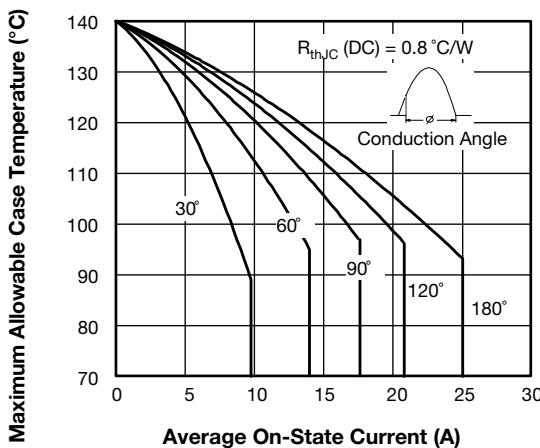
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P_{GM}			8.0	W
Maximum average gate power	$P_{G(AV)}$			2.0	
Maximum peak positive gate current	$+I_{GM}$			1.5	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum required DC gate current to trigger	I_{GT}	Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		35	mA
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = 25^\circ C$		1.3	V
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 140^\circ C, V_{DRM} = \text{Rated value}$		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}	$T_J = 25^\circ C$		0.9	μ s
Typical reverse recovery time	t_{rr}	$T_J = 140^\circ C$		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 3L		40TT12	



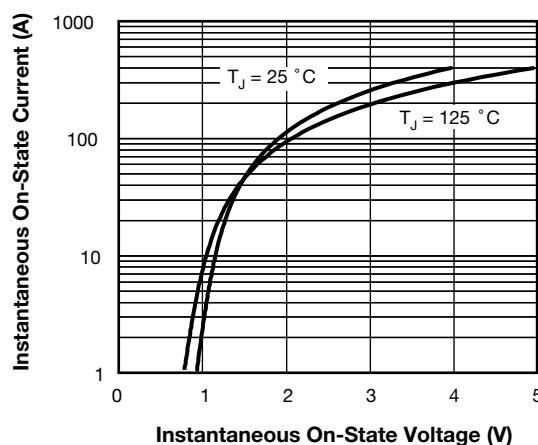


Fig. 7 - On-State Voltage Drop Characteristics

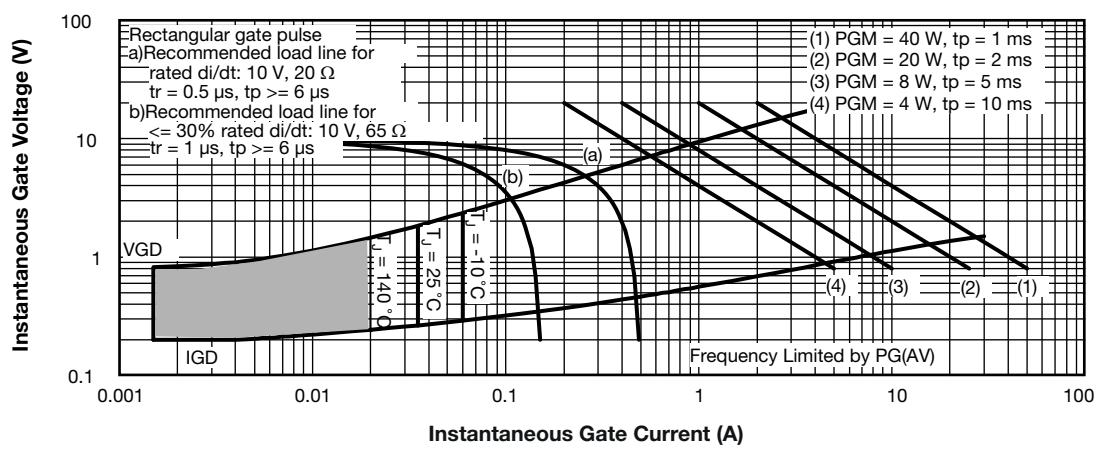


Fig. 8 - Gate Characteristics

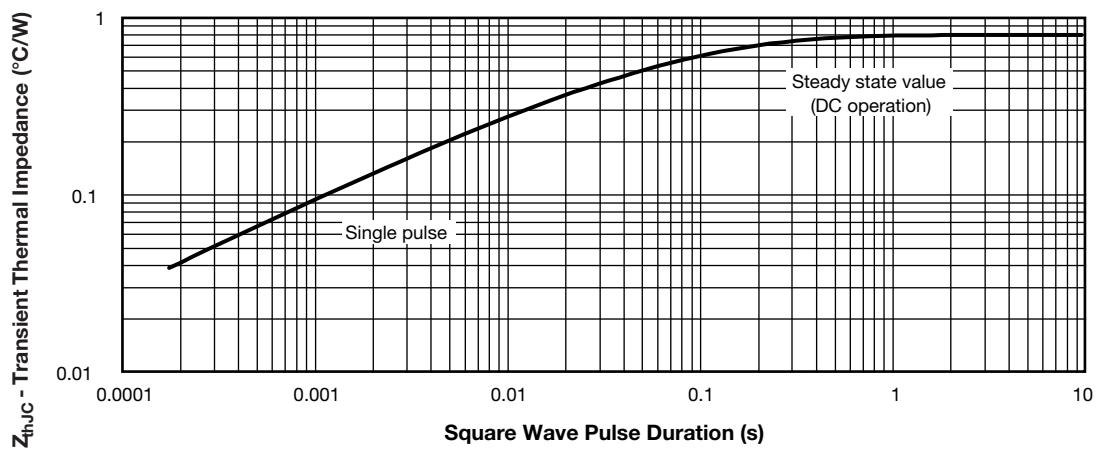
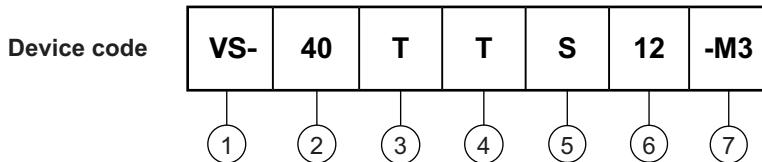


Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE


- 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:
-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

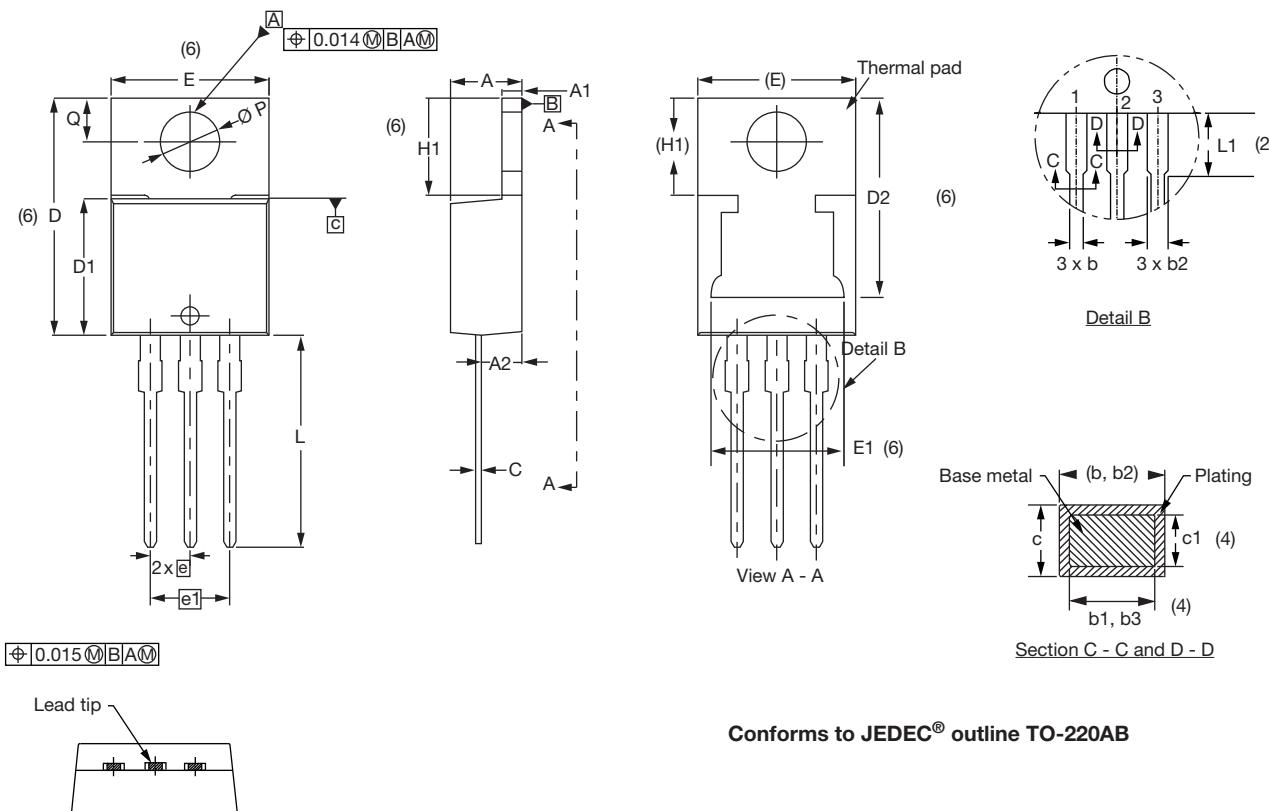
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-40TTS12-M3	50	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?96154
Part marking information	www.vishay.com/doc?95028

3L TO-220AB

DIMENSIONS in millimeters and inches



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	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
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

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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