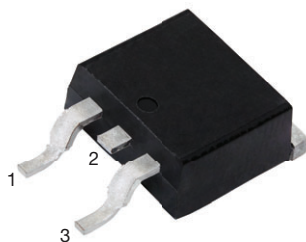
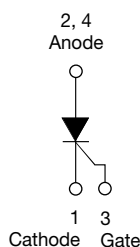


Thyristor High Voltage, Surface Mount Phase Control SCR, 16 A


D²PAK (TO-263AB)


FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- Designed and qualified according JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Input rectification (soft start)
- Vishay input diodes, switches and output rectifiers which are available in identical package outlines

DESCRIPTION

The VS-16TTS12SL-M3 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

$I_{T(AV)}$	10 A
V_{DRM}/V_{RRM}	1200 V
V_{TM}	1.45 V
I_{GT}	80 mA
T_J	-40 °C to 125 °C
Package	D ² PAK (TO-263AB)
Circuit configuration	Single SCR

OUTPUT CURRENT IN TYPICAL APPLICATIONS

APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
NEMA FR-4 or G-10 glass fabric-based epoxy with 4 oz. (140 µm) copper	2.5	3.5	A
Aluminum IMS, $R_{thCA} = 15$ °C/W	6.3	9.5	
Aluminum IMS with heatsink, $R_{thCA} = 5$ °C/W	14.0	18.5	

Note

- $T_A = 55$ °C, $T_J = 125$ °C, footprint 300 mm²

MAJOR RATINGS AND CHARACTERISTICS

PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	10	A
I_{RMS}		16	
V_{RRM}/V_{DRM}		1200	V
I_{TSM}		200	A
V_{TM}	16 A, $T_J = 25$ °C	1.45	V
	32 A, $T_J = 25$ °C	1.60	
dV/dt		1000	V/µs
dI/dt		150	A/µs
T_J		-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-16TTS12SL-M3	1200	1200	15

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES		UNITS
			TYP.	MAX.	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 98\text{ }^{\circ}\text{C}$, 180° conduction, half sine wave	10		A
Maximum RMS on-state current	I_{RMS}		16		
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied	170		
		10 ms sine pulse, no voltage reapplied	200		
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied	144		A^2s
		10 ms sine pulse, no voltage reapplied	200		
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1\text{ ms to }10\text{ ms}$, no voltage reapplied	2000		$A^2\sqrt{s}$
Maximum on-state voltage drop	V_{TM}	16 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.45		V
On-state slope resistance	r_t	$T_J = 125\text{ }^{\circ}\text{C}$	12.9		$m\Omega$
Threshold voltage	$V_{T(TO)}$		1.19		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
		$T_J = 125\text{ }^{\circ}\text{C}$	15		
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$	-	400	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	500		
Maximum rate of rise of off-state voltage	dV/dt	$T_J = T_J\text{ max.}$ linear to 67 % $V_{DRM} = R_g - k = \text{open}$	1000		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, $T_J = -40\text{ }^{\circ}\text{C}$	180	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	80	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	55	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -40\text{ }^{\circ}\text{C}$	1.7	V
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	1.3	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	1.1	
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}		2.0	

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}	$T_J = 125\text{ }^{\circ}\text{C}$	4	
Typical turn-off time	t_q		110	



THERMAL - 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	1.3	°C/W
Typical thermal resistance, junction to ambient	R_{thJA}	PCB mount ⁽¹⁾	40	
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D ² PAK (TO-263AB)	16TTS12S1	

Note

- ⁽¹⁾ When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 µm) copper 40 °C/W.
For recommended footprint and soldering techniques refer to application note #AN-994

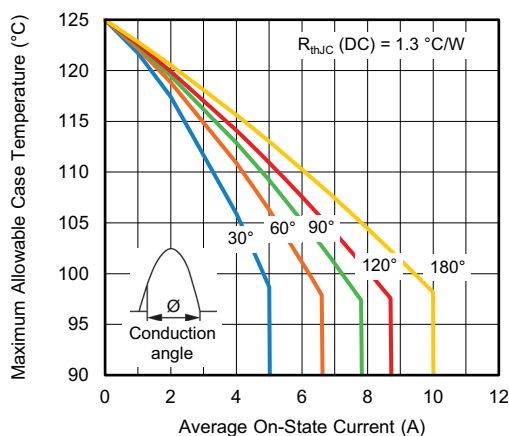


Fig. 1 - Current Rating Characteristics

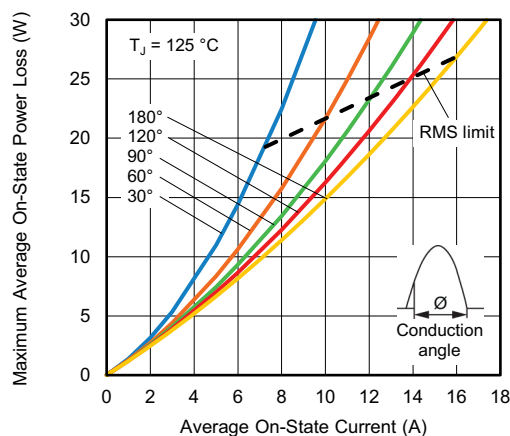


Fig. 3 - On-State Power Loss Characteristics

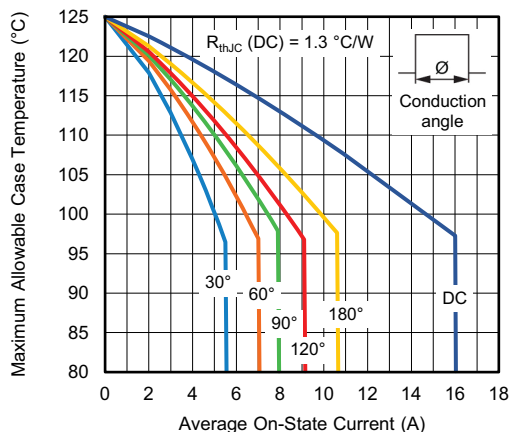


Fig. 2 - Current Rating Characteristics

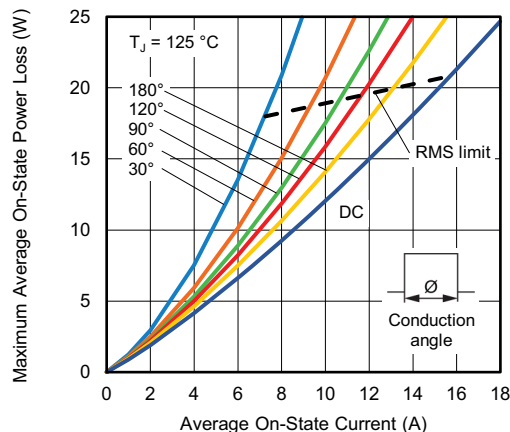


Fig. 4 - On-State Power Loss Characteristics

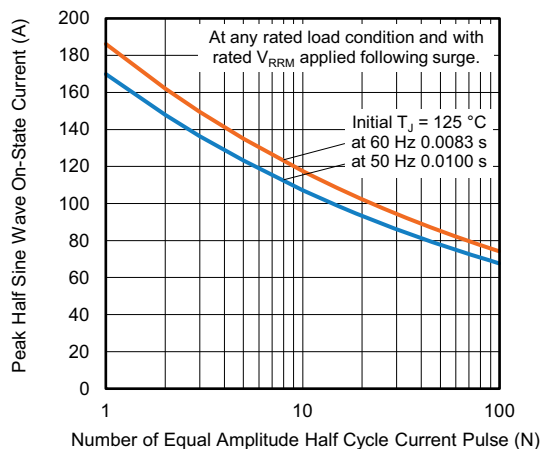


Fig. 5 - Maximum Non-Repetitive Surge Current

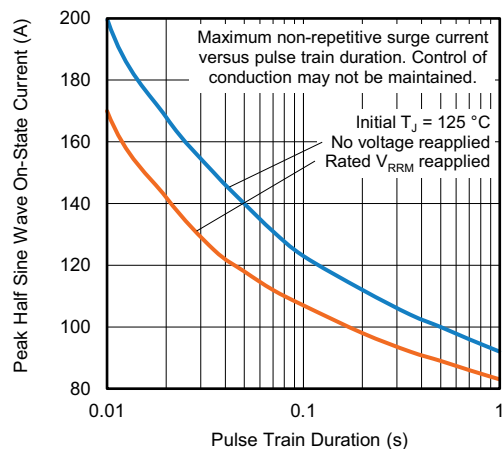


Fig. 6 - Maximum Non-Repetitive Surge Current

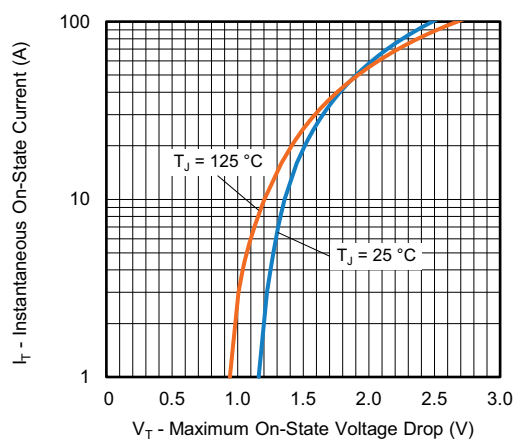
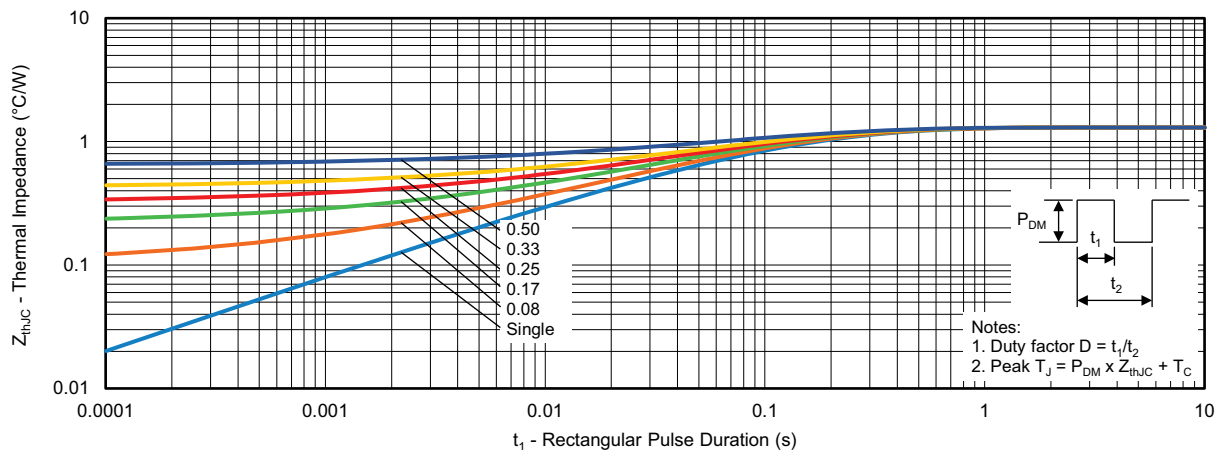


Fig. 7 - On-State Voltage Drop Characteristics


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

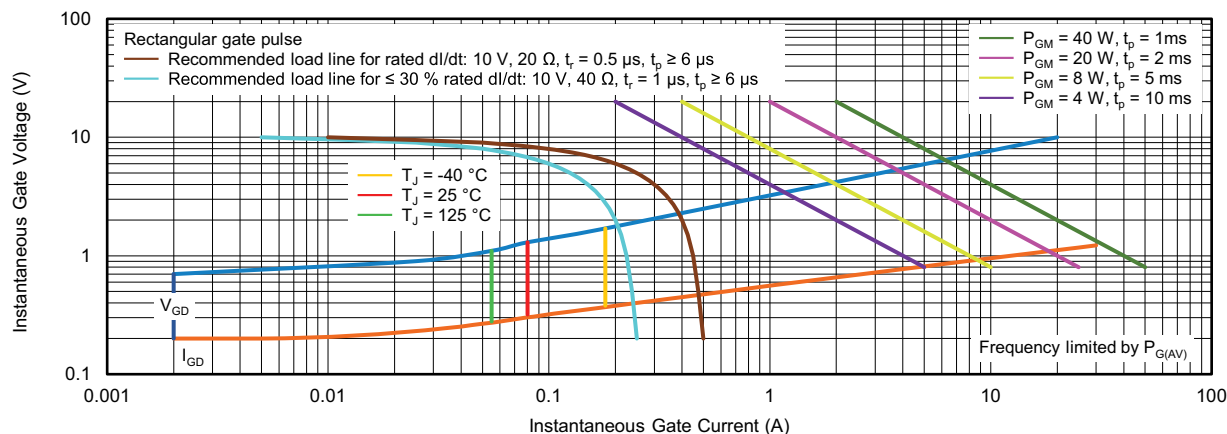


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	16	T	T	S	12	S	L	-M3
1	2	3	4	5	6	7	8	9

- 1 - Vishay Semiconductors product
- 2 - Current rating
- 3 - Circuit configuration:
T = single thyristor
- 4 - Package:
T = D²PAK (TO-263AB)
- 5 - Type of silicon:
S = standard recovery rectifier
- 6 - Voltage rating: voltage code x 100 = V_{RRM} — 12 = 1200 V
- 7 - S = surface mountable
- 8 - • None = tube
• L = tape and reel (left oriented), for different orientation contact factory
- 9 - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-16TTS12SL-M3	800	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?96164
Part marking information	www.vishay.com/doc?95444
Packaging information	www.vishay.com/doc?96424



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