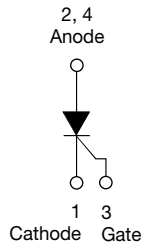




Thyristor High Voltage, Surface Mount Phase Control SCR, 16 A



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



APPLICATIONS

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

DESCRIPTION

The VS-16TTS..S-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}	800 V, 1200 V
V_{TM}	1.4 V
I_{GT}	60 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, $R_{thCA} = 15 \text{ °C/W}$	6.3	9.5	
Aluminum IMS with heatsink, $R_{thCA} = 5 \text{ °C/W}$	14.0	18.5	

Note

- $T_A = 55 \text{ °C}$, $T_J = 125 \text{ °C}$, 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}		800 to 1200	V
I_{TSM}		200	A
V_T	10 A, $T_J = 25 \text{ °C}$	1.4	V
dV/dt		500	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-16TTS08S-M3	800	800	10
VS-16TTS12S-M3	1200	1200	



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 ² s
		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 √s
Maximum on-state voltage drop	V_{TM}	10 A, $T_J = 25\text{ }^\circ\text{C}$	1.4		V
On-state slope resistance	r_t	$T_J = 125\text{ }^\circ\text{C}$	24.0		mΩ
Threshold voltage	$V_{T(TO)}$		1.1		V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25\text{ }^\circ\text{C}$ $V_R = \text{rated } V_{RRM}/V_{DRM}$	0.5		mA
		$T_J = 125\text{ }^\circ\text{C}$	10		
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$	-	150	
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	$T_J = T_J\text{ max. linear to }80\% V_{DRM} = R_g - k = \text{open}$	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, $T_J = -10\text{ }^\circ\text{C}$	90	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$	60	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$	35	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^\circ\text{C}$	3.0	V
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^\circ\text{C}$	2.0	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^\circ\text{C}$	1.0	
Maximum DC gate voltage not to trigger	V_{GD}	$T_J = 125\text{ }^\circ\text{C}$, $V_{DRM} = \text{Rated value}$	0.25	
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)	16TTS08S	
			16TTS12S	

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

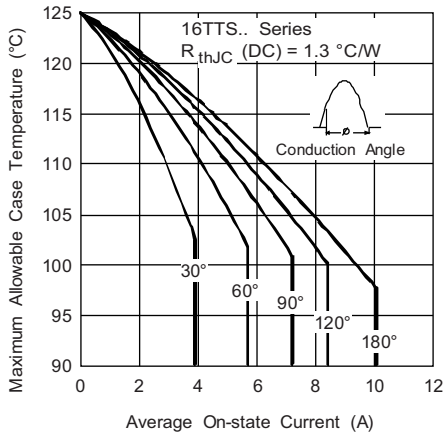


Fig. 1 - Current Rating Characteristics

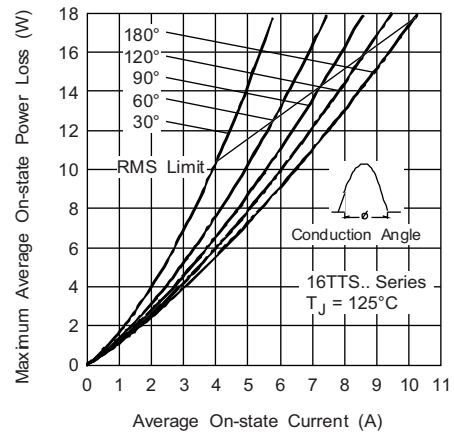


Fig. 3 - On-State Power Loss Characteristics

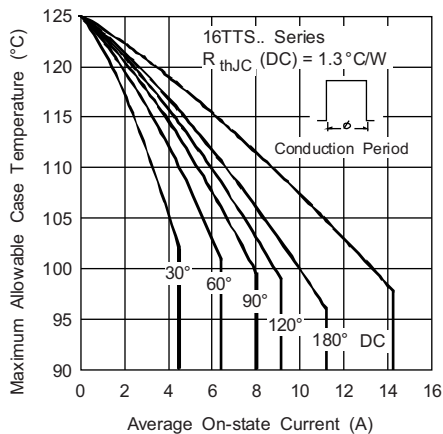


Fig. 2 - Current Rating Characteristics

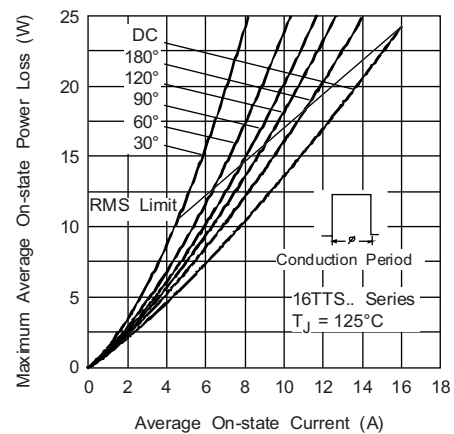


Fig. 4 - On-State Power Loss Characteristics

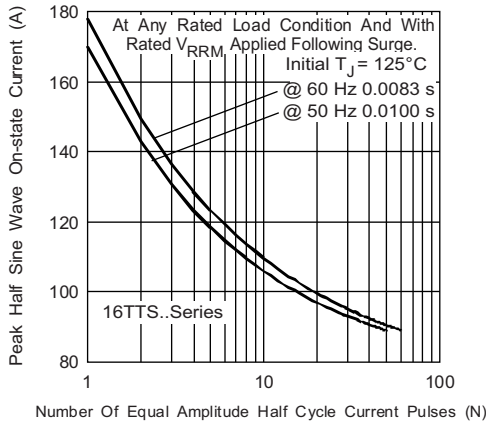


Fig. 5 - Maximum Non-Repetitive Surge Current

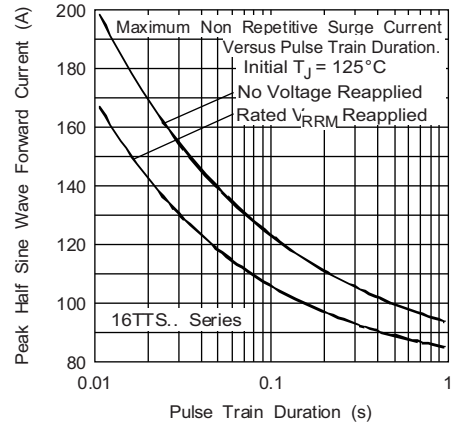


Fig. 6 - Maximum Non-Repetitive Surge Current

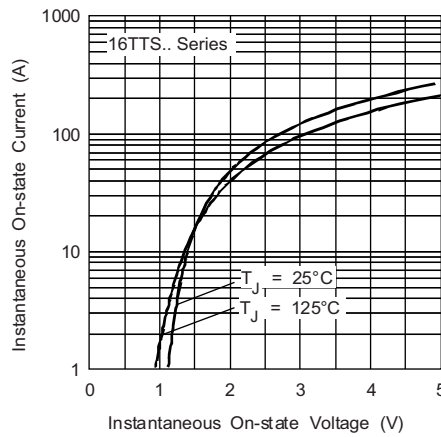


Fig. 7 - On-State Voltage Drop Characteristics

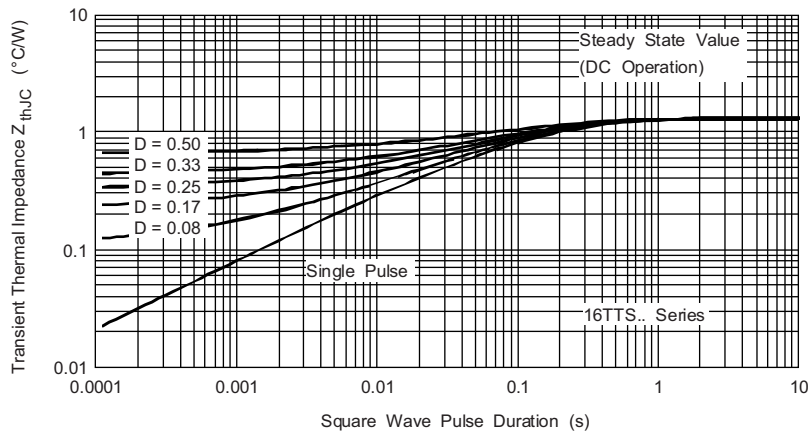


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

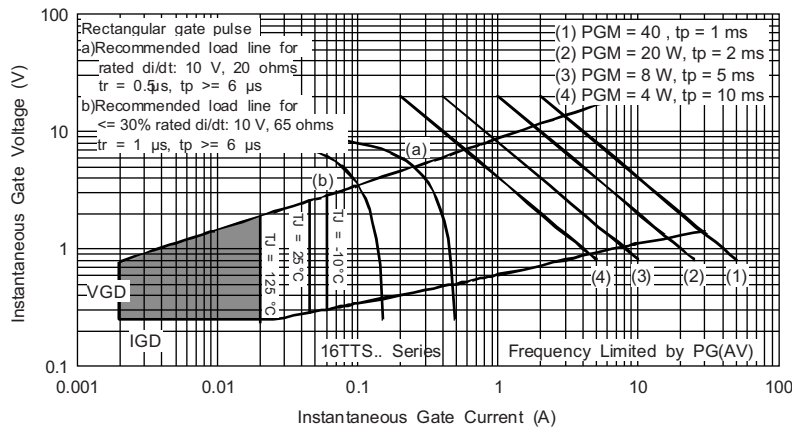


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	16	T	T	S	12	S	TRL	-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}

08 = 800 V
12 = 1200 V
- 7** - S = surface mountable
- 8** -
 - None = tube
 - TRL = tape and reel (left oriented)
 - TRR = tape and reel (right oriented)
- 9** - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION
VS-16TTS08S-M3	50	Antistatic plastic tubes
VS-16TTS08STRL-M3	800	13" diameter plastic tape and reel
VS-16TTS08STRR-M3	800	13" diameter plastic tape and reel
VS-16TTS12S-M3	50	Antistatic plastic tubes
VS-16TTS12STRL-M3	800	13" diameter plastic tape and reel
VS-16TTS12STRR-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
SPICE model	www.vishay.com/doc?96772



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