



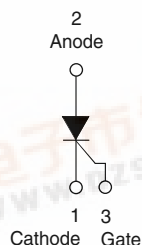
16TTS16SPbF High Voltage Series

Vishay High Power Products

Surface Mountable Phase Control SCR, 16 A



D²PAK



DESCRIPTION/FEATURES

The 16TTS16SPbF 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.

Typical applications are in input rectification (soft start) and these products are designed to be used with Vishay HPP input diodes, switches and output rectifiers which are available in identical package outlines.

This product has been designed and qualified for industrial level and lead (Pb)-free ("PbF" suffix).



RoHS*
COMPLIANT

PRODUCT SUMMARY

V_T at 10 A	< 1.4 V
I_{TSM}	200 A
V_{RRM}	1600 V

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

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	10	A
I_{RMS}		16	
V_{RRM}/V_{DRM}		1600	V
I_{TSM}		200	A
V_T	10 A, $T_J = 25$ °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
16TTS16SPbF	1600	1600	10



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ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES		UNITS
			TYP.	MAX.	
Maximum average on-state current	$I_{T(AV)}$	$T_C = 93\text{ }^{\circ}\text{C}$, 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	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms, no voltage reapplied	2000		A^2/\sqrt{s}
Maximum on-state voltage drop	V_{TM}	16 A, $T_J = 25\text{ }^{\circ}\text{C}$	1.4		V
On-state slope resistance	r_t	$T_J = 125\text{ }^{\circ}\text{C}$	24.0		$m\Omega$
Threshold voltage	$V_{T(TO)}$		1.1		V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25\text{ }^{\circ}\text{C}$	0.5		mA
		$T_J = 125\text{ }^{\circ}\text{C}$			
Holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1\text{ A}$	100	150	
Maximum latching current	I_L	Anode supply = 6 V, resistive load	200		
Maximum rate of rise of off-state voltage	dV/dt		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		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		



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THERMAL - MECHANICAL SPECIFICATIONS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T_J, T_{Stg}		- 40 to 125	°C
Soldering temperature	T_S	For 10 s (1.6 mm from case)	240	
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 (SMD-220)	16TTS16S	

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.

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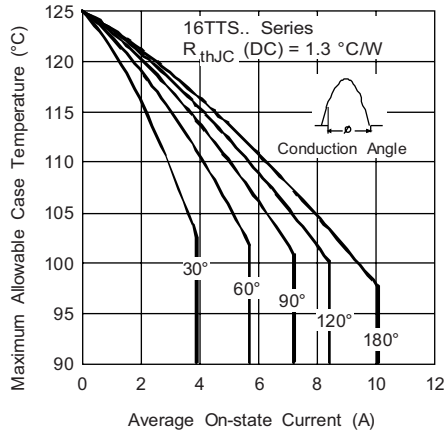


Fig. 1 - Current Rating Characteristics

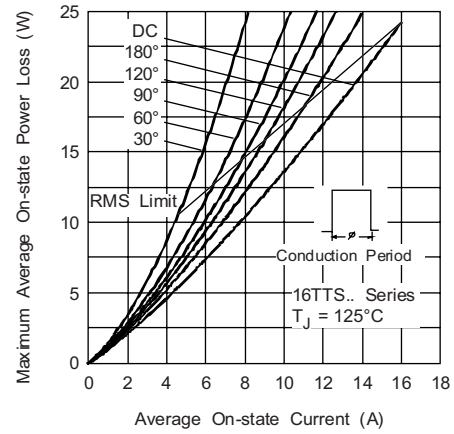


Fig. 4 - On-State Power Loss Characteristics

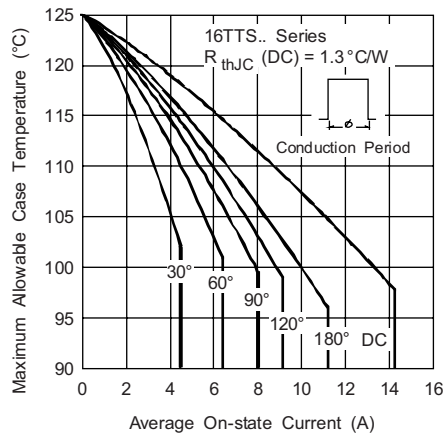


Fig. 2 - Current Rating Characteristics

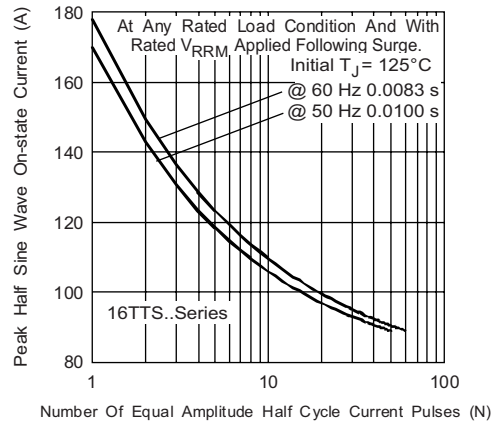


Fig. 5 - Maximum Non-Repetitive Surge Current

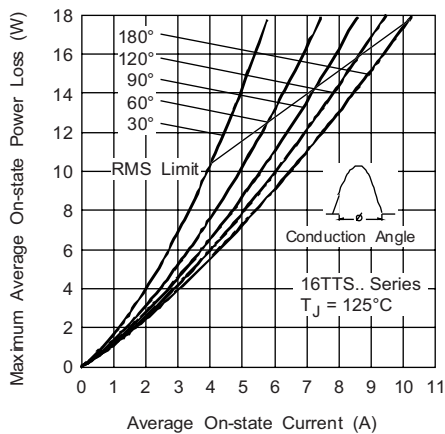


Fig. 3 - On-State Power Loss Characteristics

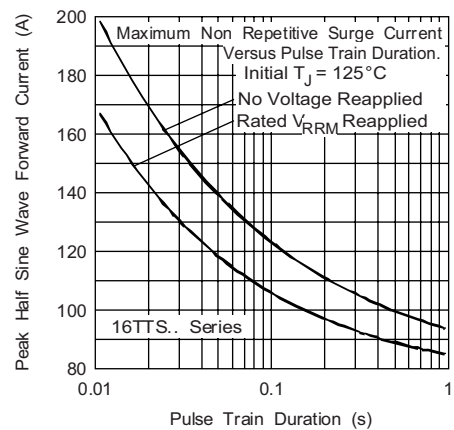


Fig. 6 - Maximum Non-Repetitive Surge Current



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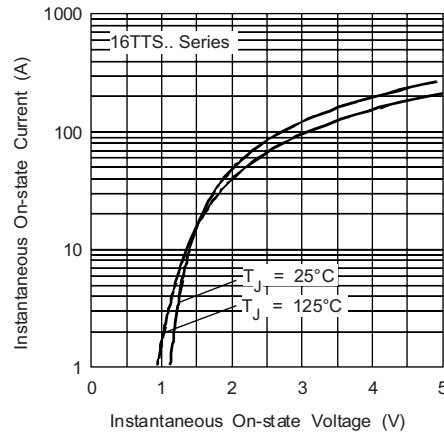


Fig. 7 - On-State Voltage Drop Characteristics

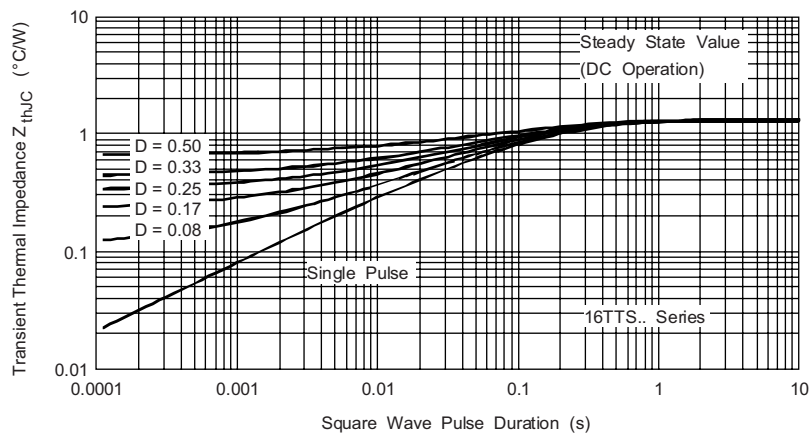


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

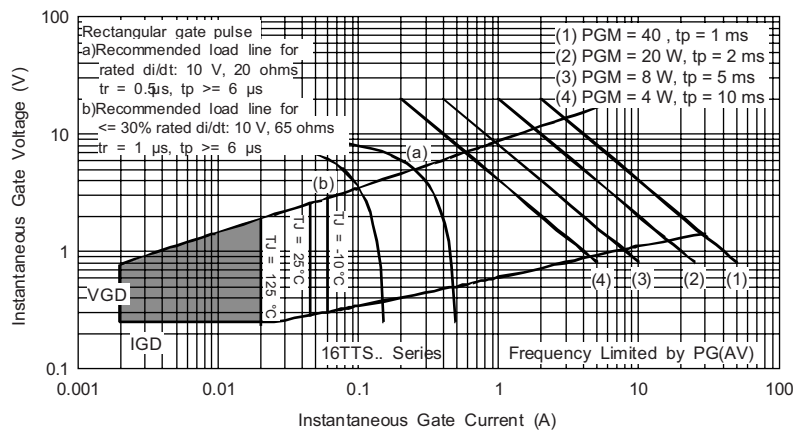


Fig. 9 - Gate Characteristics

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ORDERING INFORMATION TABLE

Device code	16	T	T	S	16	S	TRL	PbF
	①	②	③	④	⑤	⑥	⑦	⑧

- 1** - Current rating
- 2** - Circuit configuration:
T = Single thyristor
- 3** - Package:
T = TO-220AC
- 4** - Type of silicon:
S = Standard recovery rectifier
- 5** - Voltage rating: Voltage code x 100 = V_{RRM} (16 = 1600 V)
- 6** - S = TO-220 D²PAK (SMD-220) version
- 7** -
 - None = Tube
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 8** -
 - None = Standard production
 - PbF = Lead (Pb)-free

LINKS TO RELATED DOCUMENTS	
Dimensions	http://www.vishay.com/doc?95046
Part marking information	http://www.vishay.com/doc?95054
Packaging information	http://www.vishay.com/doc?95032



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