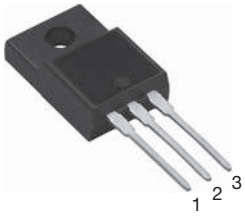
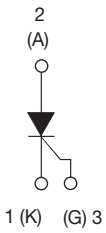
High Voltage Phase Control Thyristor, 16 A



TO-220AB FULL-PAK



FEATURES

- Designed and qualified for industrial level
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- UL E78996 approved
- 125 °C max. operating junction temperature
- Material categorization:
  For definitions of compliance please see www.vishay.com/doc?99912

Pb
e3
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-16TTS..FP... 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.

PRODUCT SUMMARY	
Package	TO-220AB FP
Diode variation	Single SCR
$I_{T(AV)}$	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

OUTPUT CURRENT IN TYPICAL APPLICATIONS			
APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS
Capacitive input filter T_A = 55 °C, T_J = 125 °C, common heatsink of 1 °C/W	13.5	17	A

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	10	A
I_{RMS}		16	
V_{DRM}/V_{RRM}		800/1200	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	Range	- 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-16TTS08FPPbF, VS-16TTS08FP-M3	800	800	10
VS-16TTS12FPPbF, VS-16TTS12FP-M3	1200	1200	

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES TYP.	VALUES MAX.	UNITS
Maximum average on-state current	$I_{T(AV)}$	T_C = 70 °C, 180° conduction, half sine wave	10		A
Maximum RMS on-state current	I_{RMS}		16		A
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied	170		A
		10 ms sine pulse, no voltage reapplied	200		A
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		A^2s
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}	10 A, T_J = 25 °C	1.4		V
On-state slope resistance	r_t	T_J = 125 °C	24.0		mΩ
Threshold voltage	$V_{T(TO)}$	T_J = 125 °C	1.1		V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	T_J = 25 °C, V_R = Rated V_{RRM}/V_{DRM}	0.5		mA
		T_J = 125 °C, V_R = Rated V_{RRM}/V_{DRM}	10		mA
Holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A 16TTS08FP, 16TTS12FP, T_J = 25 °C	-	150	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C	200		mA
Maximum rate of rise of off-state voltage	dV/dt	T_J = T_J max., linear to 80 %, V_{DRM} = R_g - k = 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	W
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 °C	90	mA
		Anode supply = 6 V, resistive load, T_J = 25 °C	60	mA
		Anode supply = 6 V, resistive load, T_J = 125 °C	35	mA
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, T_J = - 10 °C	3.0	V
		Anode supply = 6 V, resistive load, T_J = 25 °C	2.0	V
		Anode supply = 6 V, resistive load, T_J = 125 °C	1.0	V
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = Rated value	0.25	V
Maximum DC gate current not to trigger	I_{GD}		2.0	mA

SWITCHING

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Typical turn-on time	t_{gt}	T_J = 25 °C	0.9	µs
Typical reverse recovery time	t_{rr}	T_J = 125 °C	4	µs
Typical turn-off time	t_q	T_J = 125 °C	110	µs

THERMAL AND 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	2.5	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}		62	
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 FULL-PAK (94/V0)	16TTS08FP	
				16TTS12FP	

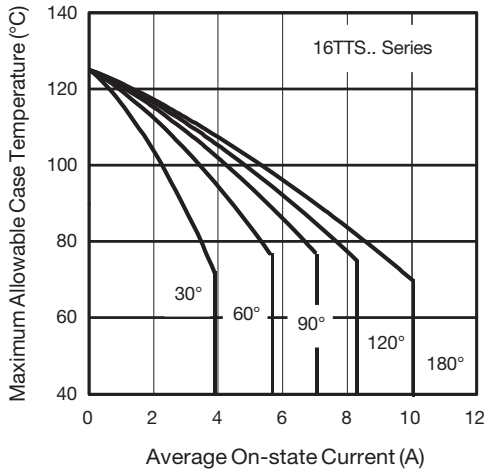


Fig. 1 - Current Rating Characteristics

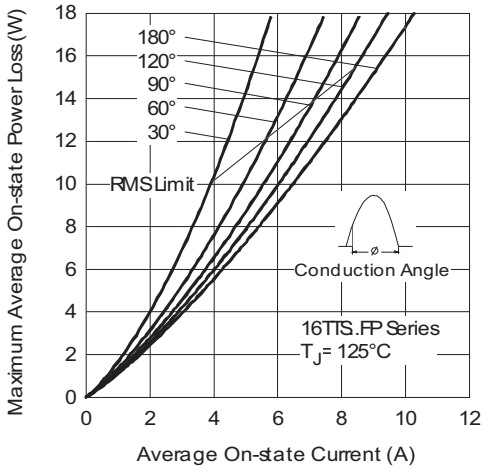


Fig. 3 - On-State Power Loss Characteristics

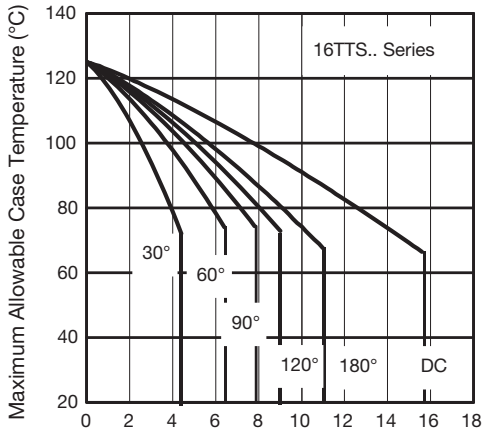


Fig. 2 - Current Rating Characteristics

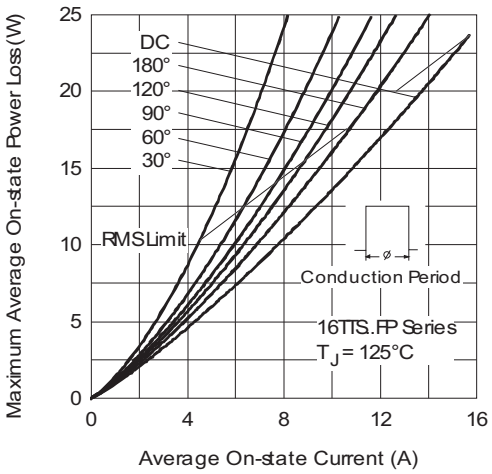


Fig. 4 - On-State Power Loss Characteristics

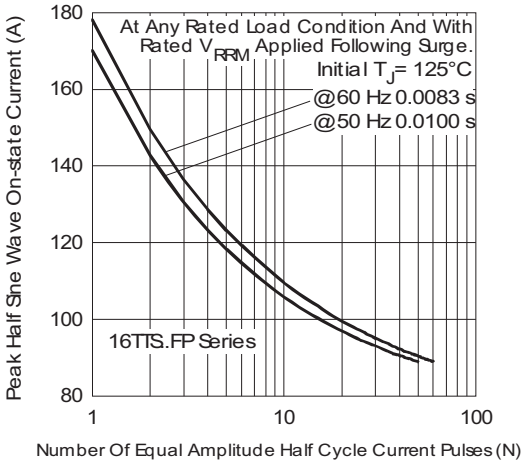


Fig. 5 - Maximum Non-Repetitive Surge Current

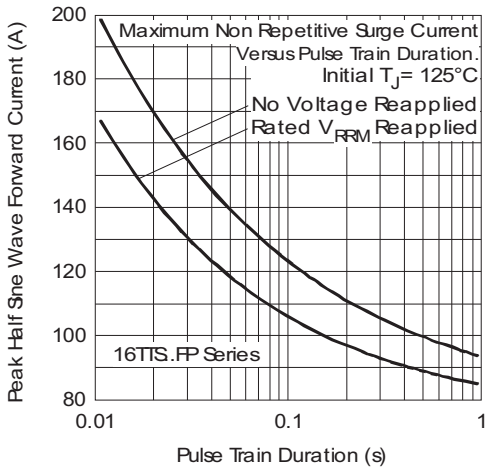


Fig. 6 - Maximum Non-Repetitive Surge Current

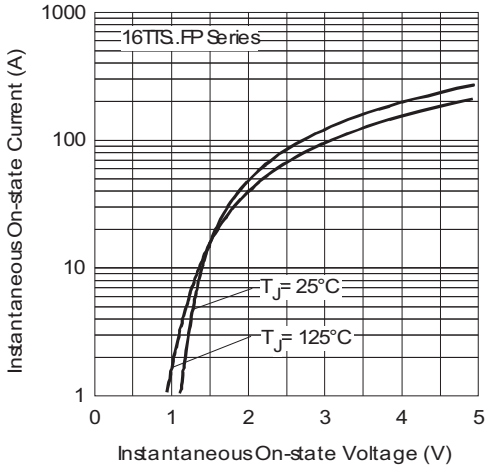


Fig. 7 - On-State Voltage Drop Characteristics

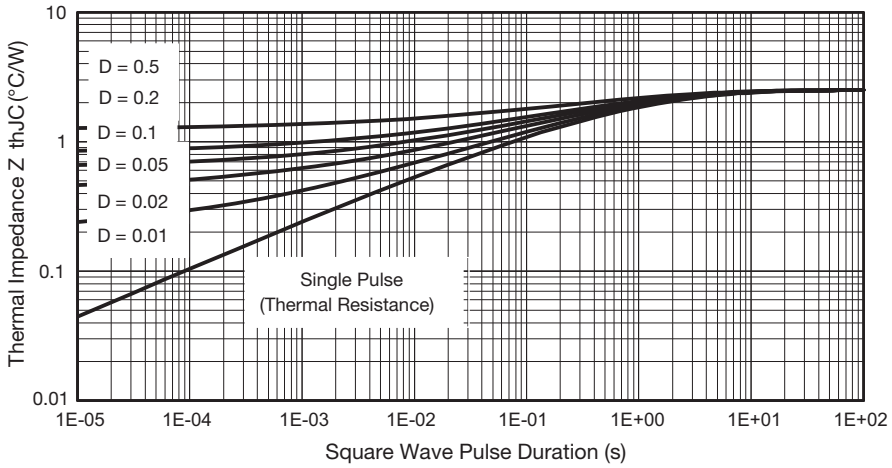


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

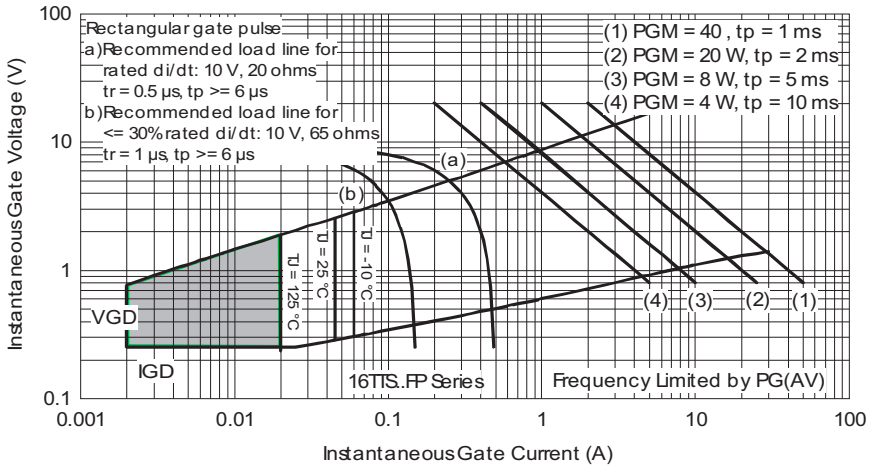


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code

VS-	16	T	T	S	12	FP	PbF
1	2	3	4	5	6	7	8

1 - Vishay Semiconductors product

2 - Current rating, RMS value

3 - Circuit configuration:
T = Single thyristor

4 - Package:
T = TO-220AB

5 - Type of silicon:
S = Converter grade

6 - Voltage code x 100 = V_{RRM} (08 = 800 V, 12 = 1200 V)

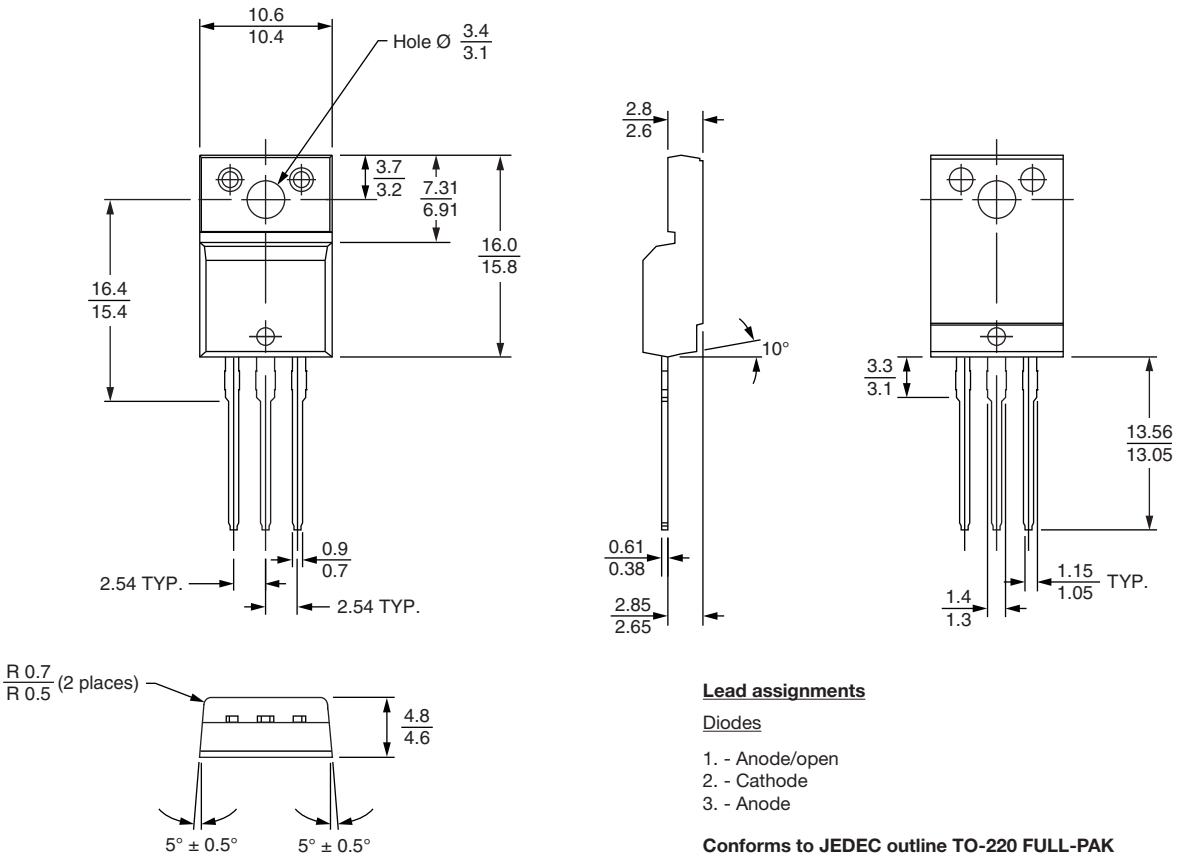
7 - FULL-PAK

8 - 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-16TTS08FPPbF	50	1000	Antistatic plastic tubes
VS-16TTS08FP-M3	50	1000	Antistatic plastic tubes
VS-16TTS12FPPbF	50	1000	Antistatic plastic tubes
VS-16TTS12FP-M3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95072
Part marking information	TO-220FP PbF	www.vishay.com/doc?95069
	TO-220FP -M3	www.vishay.com/doc?95456

DIMENSIONS in millimeters



Lead assignments

Diodes

1. - Anode/open
2. - Cathode
3. - Anode

Conforms to JEDEC outline TO-220 FULL-PAK

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