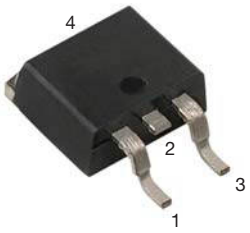
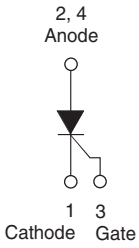
Thyristor High Voltage Surface Mount Phase Control SCR, 10 A



TO-263AB (D^2PAK)



FEATURES

- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb e3 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-10TTS08SPbF 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-263AB (D^2PAK)
Diode variation	Single SCR
$I_{T(AV)}$	6.5 A
V_{DRM}/V_{RRM}	800 V
V_{TM}	< 1.15 V
I_{GT}	15 mA
T_J	-40 to +125 °C

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 mm^2

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	6.5	A
I_{RMS}		10	
V_{RRM}/V_{DRM}		800	V
I_{TSM}		110	A
V_T	6.5 A, T_J = 25 °C	1.15	V
dV/dt		150	V/µs
dI/dt		100	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-10TTS08SPbF	800	800	1.0

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ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Maximum average on-state current	$I_{T(AV)}$	T_C = 112 °C, 180° conduction half sine wave	6.5	A
Maximum RMS on-state current	$I_{T(RMS)}$		10	
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied, T_J = 125 °C	95	
		10 ms sine pulse, no voltage reapplied, T_J = 125 °C	110	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied, T_J = 125 °C	45	A^2s
		10 ms sine pulse, no voltage reapplied, T_J = 125 °C	64	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied, T_J = 125 °C	640	$A^2\sqrt{s}$
Maximum on-state voltage drop	V_{TM}	6.5 A, T_J = 25 °C	1.15	V
On-state slope resistance	r_t	T_J = 125 °C	17.3	mΩ
Threshold voltage	$V_{T(TO)}$		0.85	V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	T_J = 25 °C, V_R = Rated V_{RRM}/V_{DRM}	0.05	mA
		T_J = 125 °C, V_R = Rated V_{RRM}/V_{DRM}	1.0	
Typical holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A, T_J = 25 °C	30	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C	50	
Maximum rate of rise of off-state voltage	dV/dt	T_J = T_J max., linear to 80 %, V_{DRM} = R_g - k = Open		V/µs
Maximum rate of rise of turned-on current	dI/dt		100	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 = - 65 °C	20	mA
		Anode supply = 6 V, resistive load, T_J = 25 °C	15	
		Anode supply = 6 V, resistive load, T_J = 125 °C	10	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, T_J = - 65 °C	1.2	V
		Anode supply = 6 V, resistive load, T_J = 25 °C	1	
		Anode supply = 6 V, resistive load, T_J = 125 °C	0.7	
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = Rated value	0.2	
Maximum DC gate current not to trigger	I_{GD}		0.1	mA

SWITCHING				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Typical turn-on time	t_{gt}	T_J = 25 °C	0.8	µs
Typical reverse recovery time	t_{rr}	T_J = 125 °C	3	
Typical turn-off time	t_q		100	

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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)	260	
Maximum thermal resistance, junction to case	R_{thJC}	DC operation	1.5	°C/W
Typical thermal resistance, junction to ambient (PCB mount)	R_{thJA} (1)		40	
Approximate weight			2	g
			0.07	oz.
Marking device		Case style D^2PAK (SMD-220)	10TTS08S	

Note

(1) When mounted on 1" square (650 mm^2) 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

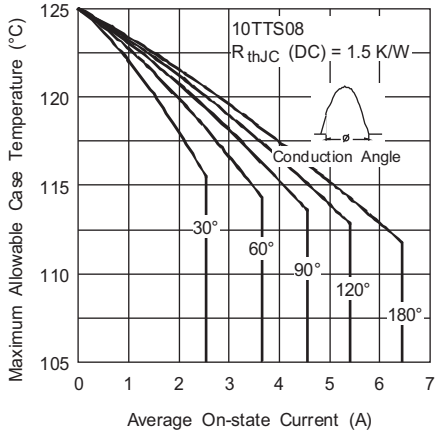

Fig. 1 - Current Rating Characteristics

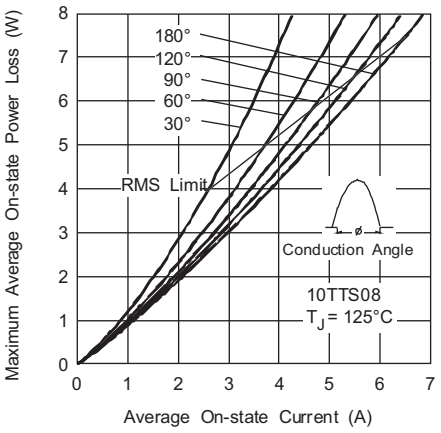

Fig. 3 - On-State Power Loss Characteristics

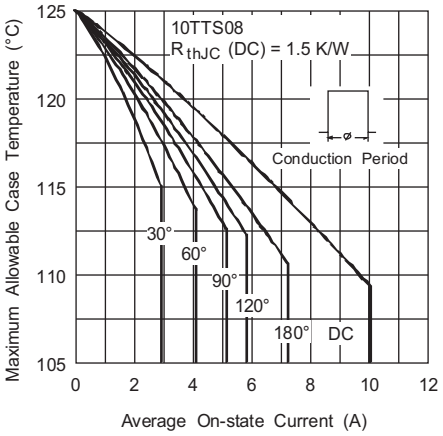

Fig. 2 - Current Rating Characteristics

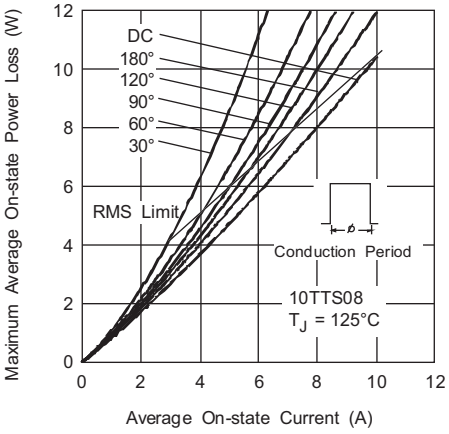

Fig. 4 - On-State Power Loss Characteristics

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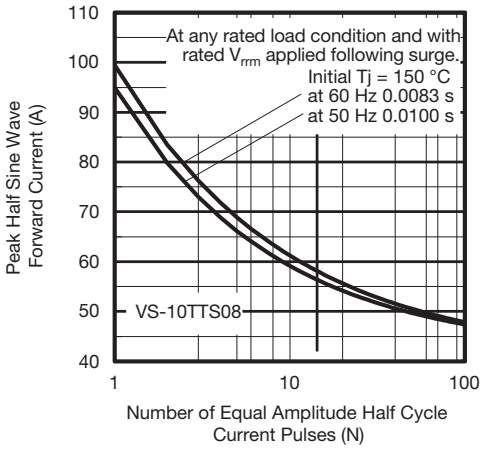

Fig. 5 - Maximum Non-Repetitive Surge Current

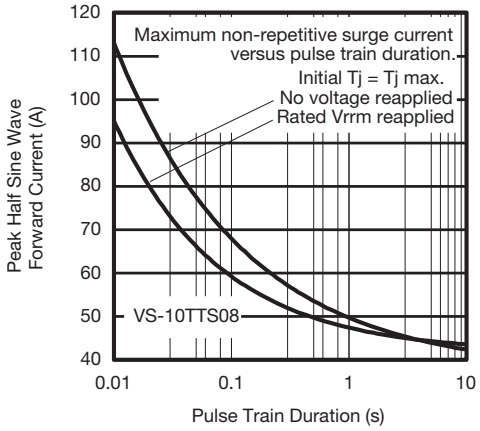

Fig. 6 - Maximum Non-Repetitive Surge Current

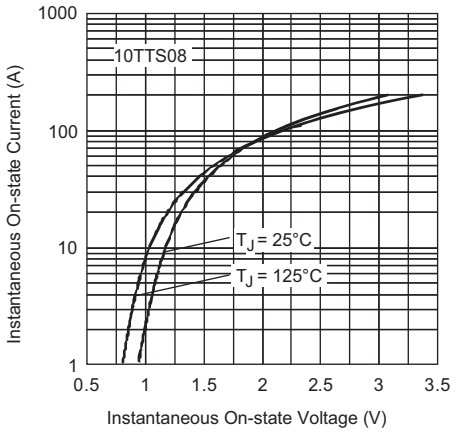

Fig. 7 - On-State Voltage Drop Characteristics

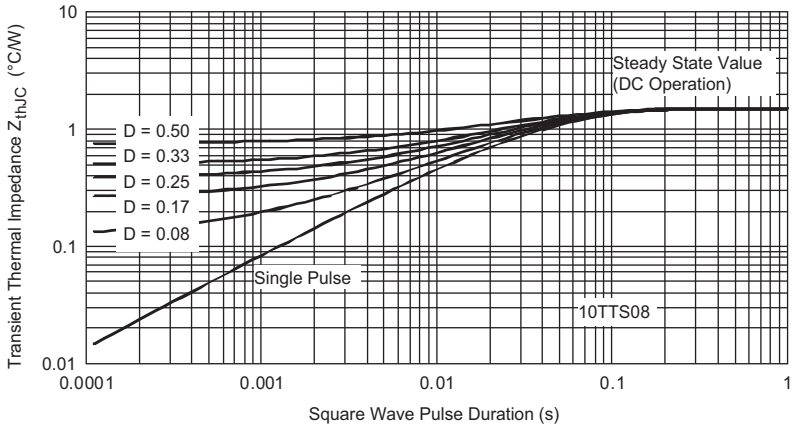

Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

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ORDERING INFORMATION TABLE

Device code

VS-	10	T	T	S	08	S	TRL	PbF
1	2	3	4	5	6	7	8	9

1 - Vishay Semiconductors product

2 - Current rating, RMS value

3 - Circuit configuration:
T = single thyristor

4 - Package:
T = TO-220AC

5 - Type of silicon:
S = converter grade

6 - Voltage code x 100 = V_{RRM}

7 - S = TO-220 D^2PAK (SMD-220) version

8 - Tape and reel option:
- TRL = tape and reel (left oriented)
- TRR = tape and reel (right oriented)

9 - PbF = lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-10TTS08SPbF	50	1000	Antistatic plastic tubes
VS-10TTS08STRRPbF	800	800	13" diameter reel
VS-10TTS08STRLPbF	800	800	13" diameter reel

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

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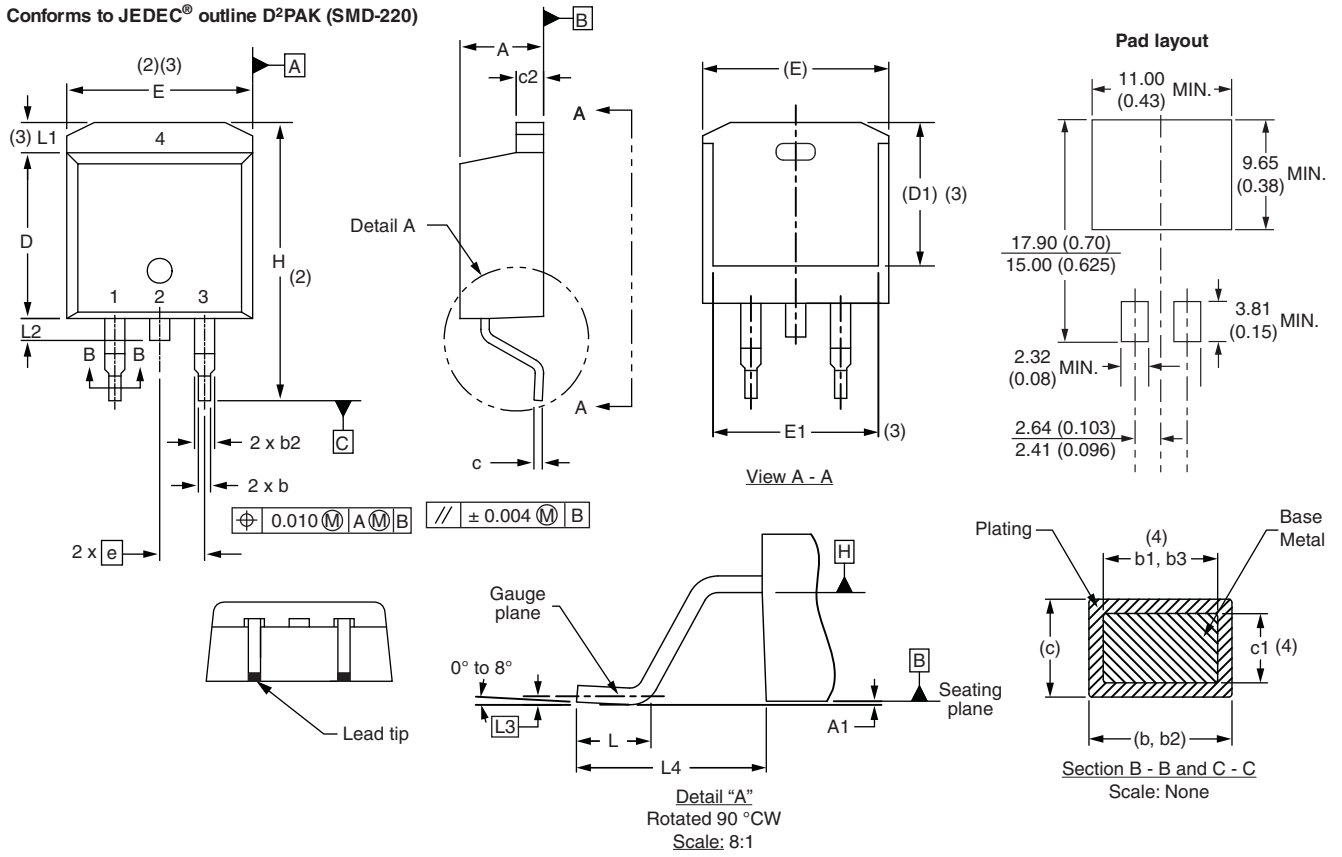
D²PAK

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

(1) Dimensioning and tolerancing per ASME Y14.5 M-1994

(2) Dimension D 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 outmost extremes of the plastic body

(3) Thermal pad contour optional within dimension E, L1, D1 and E1

(4) Dimension b1 and c1 apply to base metal only

(5) Datum A and B to be determined at datum plane H

(6) Controlling dimension: inch

(7) Outline conforms to JEDEC® outline TO-263AB

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Телефон: 8 (812) 309-75-97 (многоканальный)
Факс: 8 (812) 320-03-32
Электронная почта: ocean@oceanchips.ru
Web: http://oceanchips.ru/
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А