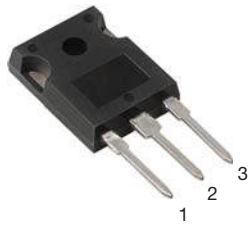
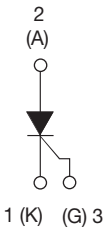
Thyristor High Voltage, Phase Control SCR, 30 A



TO-247AC



FEATURES

- High voltage (up to 1600 V)
- Designed and qualified according to JEDEC®-JESD47
- 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

PRODUCT SUMMARY	
Package	TO-247AC
Diode variation	Single SCR
$I_{T(AV)}$	20 A
V_{DRM}/V_{RRM}	1600 V
V_{TM}	1.3 V
I_{GT}	45 mA
T_J	-40 °C to 125 °C

APPLICATIONS

- Typical usage is in input rectification crowbar (soft start) and AC switch in motor control, UPS, welding and battery charge

DESCRIPTION

The VS-30TPS16... 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.

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	20	A
I_{RMS}		30	
V_{RRM}/V_{DRM}		1600	V
I_{TSM}		300	A
V_T	20 A, T_J = 25 °C	1.3	V
dV/dt		500	V/µs
dI/dt		150	A/µs
T_J		-40 to 125	°C

VOLTAGE RATINGS			
PART NUMBER	V_{RRM}/V_{DRM}, MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VS-30TPS16PbF, VS-30TPS16-M3	1600	1700	10

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**VALUES**	**UNITS**
Maximum average on-state current	$I_{T(AV)}$	T_C = 95 °C, 180° conduction half sine wave		20	A
Maximum RMS on-state current	I_{RMS}			30	
Maximum peak, one-cycle, non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied		250	
		10 ms sine pulse, no voltage reapplied		300	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied		310	A^2s
		10 ms sine pulse, no voltage reapplied		442	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 to 10 ms, no voltage reapplied		4420	$A^2\sqrt{s}$
Maximum on-state voltage drop	V_{TM}	20 A, T_J = 25 °C		1.3	V
On-state slope resistance	r_t	T_J = 125 °C		12	mΩ
Threshold voltage	$V_{T(TO)}$			1.0	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		10	
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A, T_J = 25 °C		150	
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C		200	
Maximum rate of rise of off-state voltage	dV/dt	T_J = T_J maximum, 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	
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	60	mA
		Anode supply = 6 V, resistive load, T_J = 25 °C	45	
		Anode supply = 6 V, resistive load, T_J = 125 °C	20	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, T_J = - 10 °C	2.5	V
		Anode supply = 6 V, resistive load, T_J = 25 °C	2.0	
		Anode supply = 6 V, resistive load, T_J = 125 °C	1.0	
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = Rated value	0.25	
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	
Typical turn-off time	t_q		110	

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	0.8	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}	DC operation	40	°C/W
Maximum thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased	0.2	°C/W
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	kgf · cm (lbf · in)
Marking device			Case style TO-247AC (JEDEC)	30TPS16	

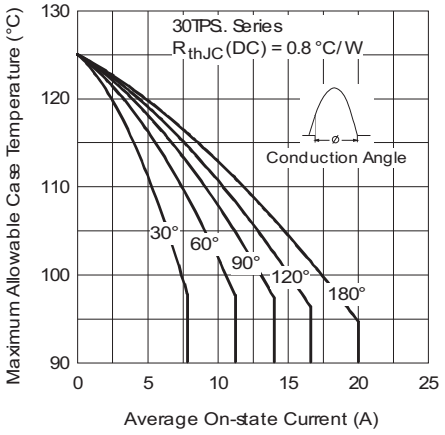


Fig. 1 - Current Rating Characteristics

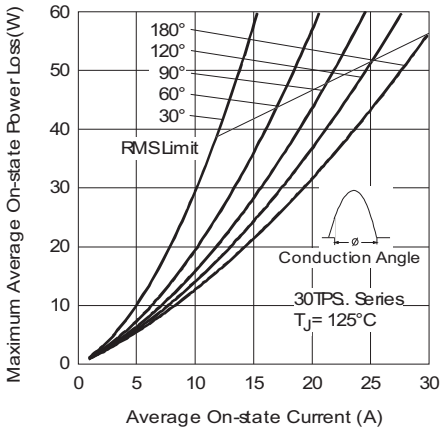


Fig. 3 - On-State Power Loss Characteristics

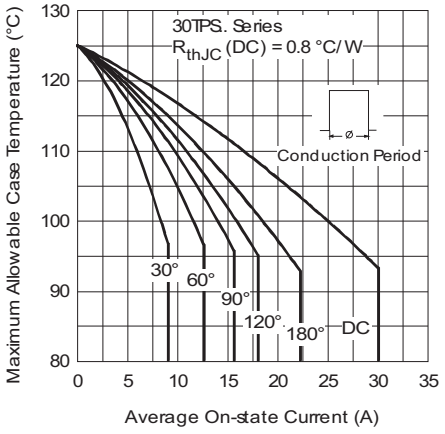


Fig. 2 - Current Rating Characteristics

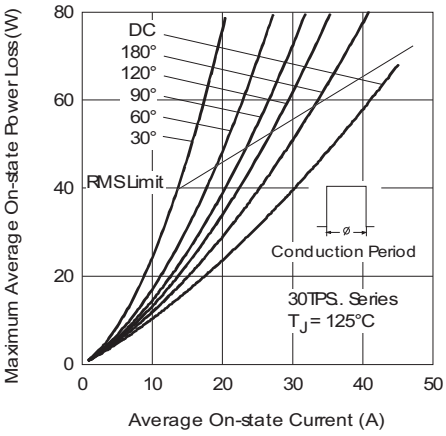


Fig. 4 - On-State Power Loss Characteristics

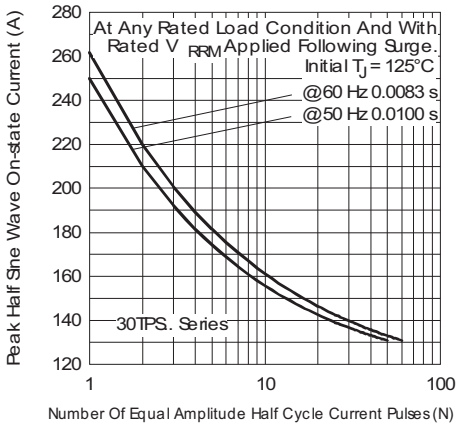


Fig. 5 - Maximum Non-Repetitive Surge Current

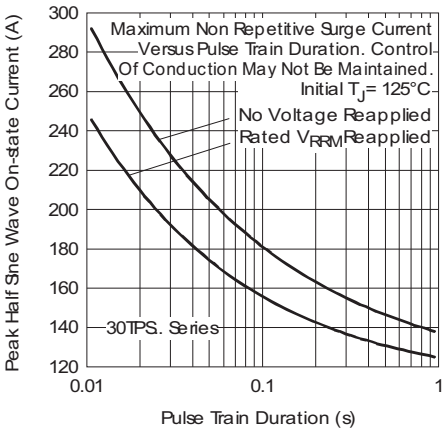


Fig. 6 - Maximum Non-Repetitive Surge Current

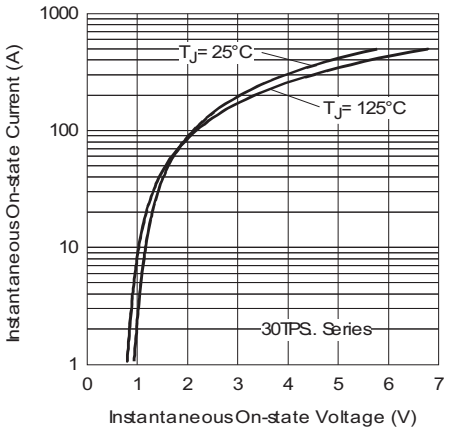


Fig. 7 - On-State Voltage Drop Characteristics

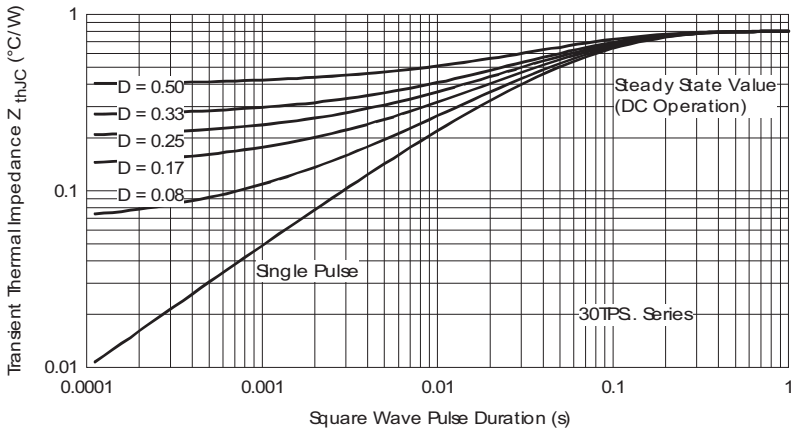


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

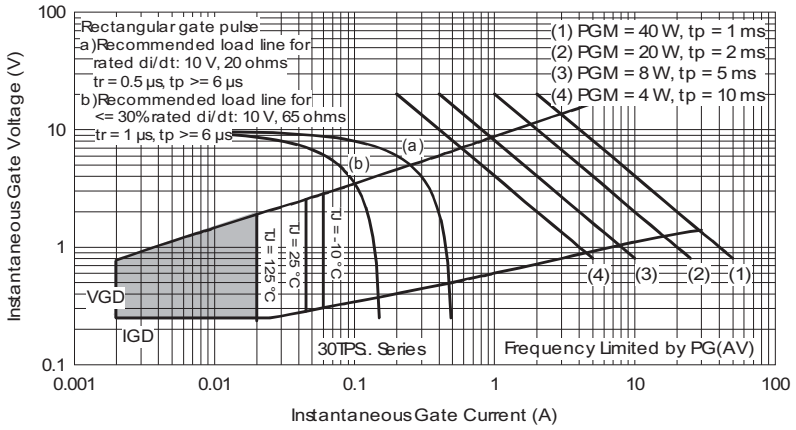


Fig. 9 - Gate Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	30	T	P	S	16	PbF
	1	2	3	4	5	6	7

1 - Vishay Semiconductors product

2 - Current rating (30 = 30 A)

3 - Circuit configuration:
T = Thyristor

4 - Package:
P = TO-247

5 - Type of silicon:
S = Standard recovery rectifier

6 - Voltage rating (16 = 1600 V)

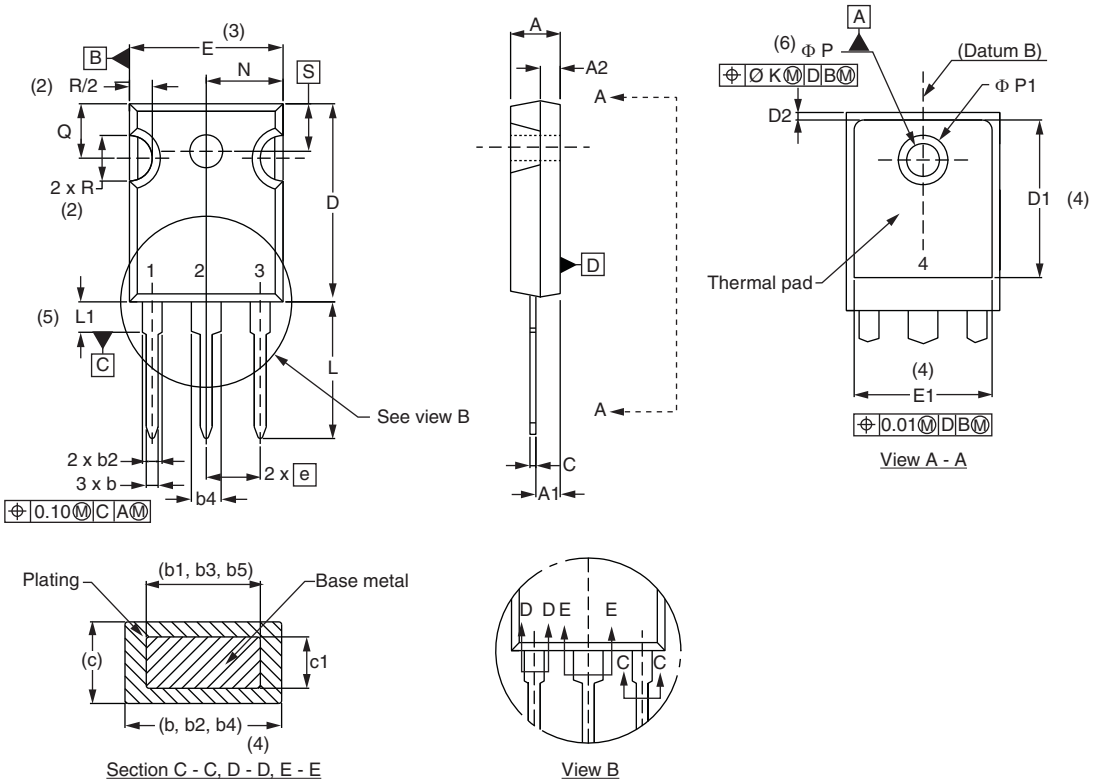
7 - Environmental digit:
PbF = Lead (Pb)-free and RoHS compliant
-M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-30TPS16PbF	25	500	Antistatic plastic tubes
VS-30TPS16-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95542
Part marking information	TO-247AC PbF	www.vishay.com/doc?95226
	TO-247AC -M3	www.vishay.com/doc?95007

TO-247

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
Ø K	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

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

(2) Contour of slot optional

(3) 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 outermost extremes of the plastic body

(4) Thermal pad contour optional with dimensions D1 and E1

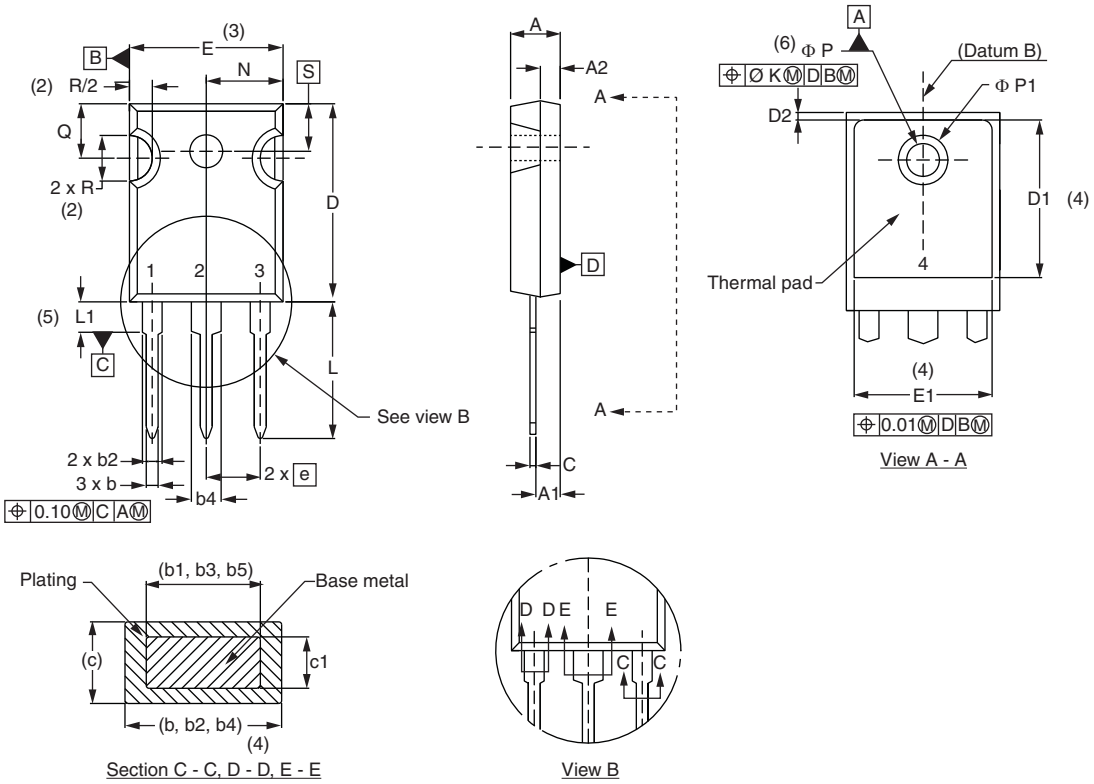
(5) Lead finish uncontrolled in L1

(6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")

(7) Outline conforms to JEDEC® outline TO-247 with exception of dimension c

TO-247 - 50 mils L/F

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES		SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.				MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209			D2	0.51	1.35	0.020	0.053	
A1	2.21	2.59	0.087	0.102			E	15.29	15.87	0.602	0.625	3
A2	1.17	1.37	0.046	0.054			E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055			e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053			Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094			L	14.20	16.10	0.559	0.634	
b3	1.65	2.34	0.065	0.092			L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135			N	7.62 BSC		0.3		
b5	2.59	3.38	0.102	0.133			Ø P	3.56	3.66	0.14	0.144	
c	0.38	0.89	0.015	0.035			Ø P1	-	7.39	-	0.291	
c1	0.38	0.84	0.015	0.033			Q	5.31	5.69	0.209	0.224	
D	19.71	20.70	0.776	0.815	3		R	4.52	5.49	0.178	0.216	
D1	13.08	-	0.515	-	4		S	5.51 BSC		0.217 BSC		

Notes

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