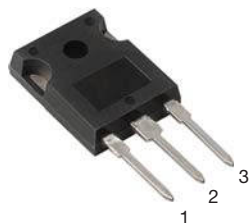
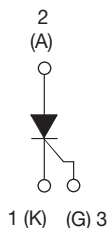


Thyristor High Voltage, Phase Control SCR, 30 A



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



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-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.

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

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, $T_J = 25\text{ °C}$	1.3	V
dV/dt		500	V/ μ s
dI/dt		150	A/ μ s
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	$I_{T(AV)}$	$T_C = 95\text{ }^{\circ}\text{C}$, 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, $T_J = 25\text{ }^{\circ}\text{C}$	1.3	V
On-state slope resistance	r_t	$T_J = 125\text{ }^{\circ}\text{C}$	12	$m\Omega$
Threshold voltage	$V_{T(TO)}$		1.0	V
Maximum reverse and direct leakage current	I_{RM}/I_{DM}	$T_J = 25\text{ }^{\circ}\text{C}$	0.5	mA
		$T_J = 125\text{ }^{\circ}\text{C}$	10	
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial $I_T = 1$ 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	$T_J = T_J$ maximum, 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, $T_J = -10\text{ }^{\circ}\text{C}$	60	mA
		Anode supply = 6 V, resistive load, $T_J = 25\text{ }^{\circ}\text{C}$	45	
		Anode supply = 6 V, resistive load, $T_J = 125\text{ }^{\circ}\text{C}$	20	
Maximum required DC gate voltage to trigger	V_{GT}	Anode supply = 6 V, resistive load, $T_J = -10\text{ }^{\circ}\text{C}$	2.5	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	



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}		40	
Maximum thermal resistance, case to heatsink	R _{thCS}	Mounting surface, smooth and greased	0.2	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-247AC (JEDEC)	30TPS16	

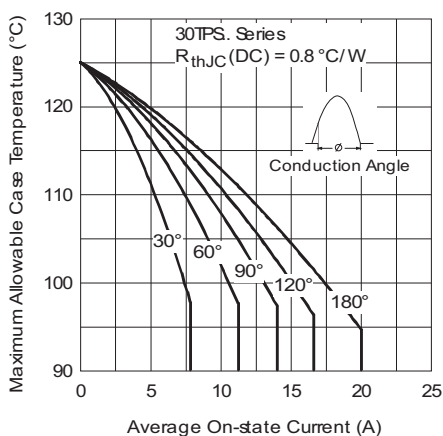


Fig. 1 - Current Rating Characteristics

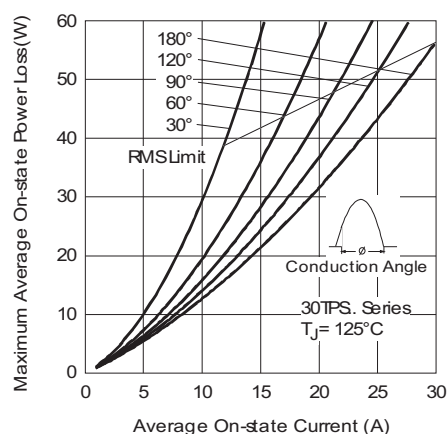


Fig. 3 - On-State Power Loss Characteristics

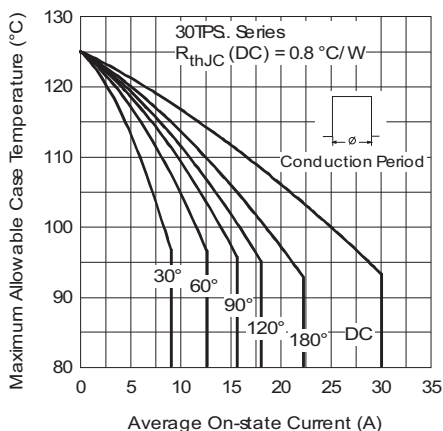


Fig. 2 - Current Rating Characteristics

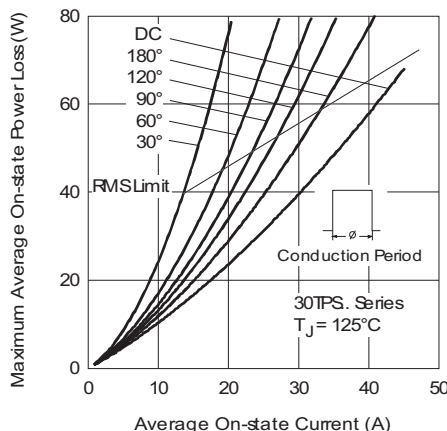


Fig. 4 - On-State Power Loss Characteristics

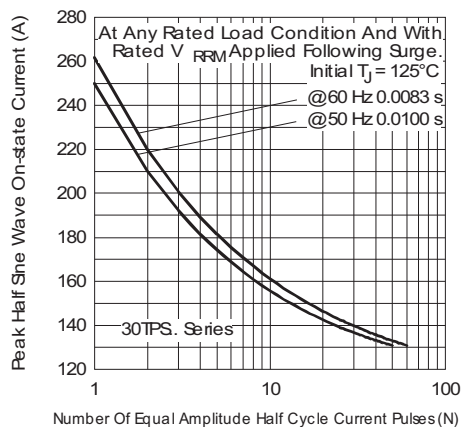


Fig. 5 - Maximum Non-Repetitive Surge Current

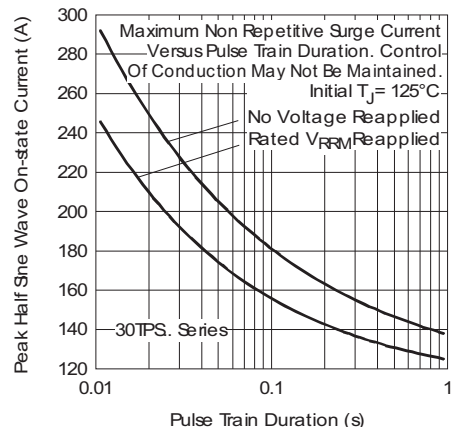


Fig. 6 - Maximum Non-Repetitive Surge Current

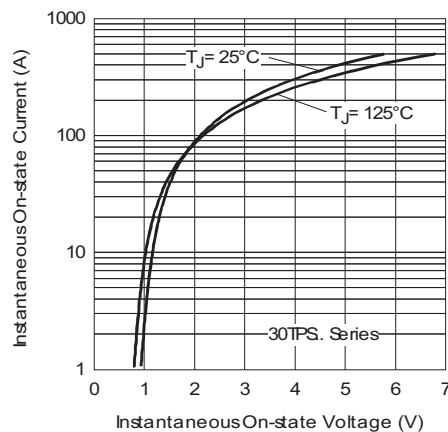
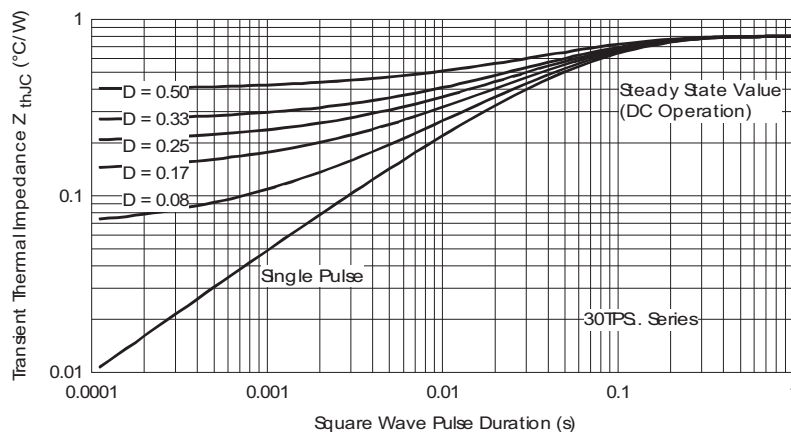


Fig. 7 - On-State Voltage Drop Characteristics


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

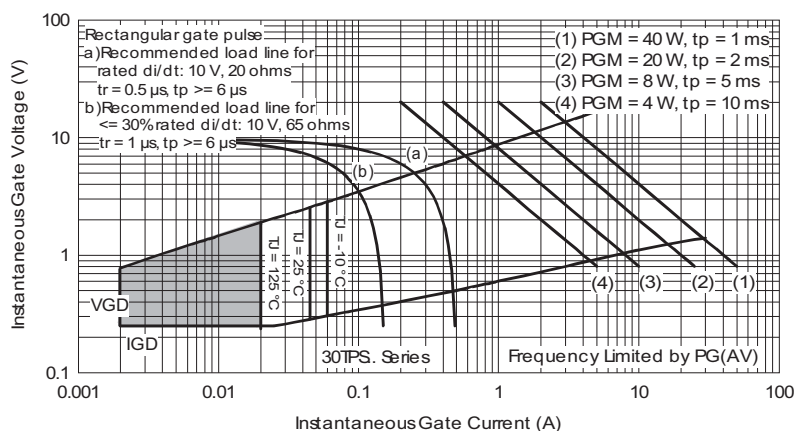


Fig. 9 - Gate Characteristics

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

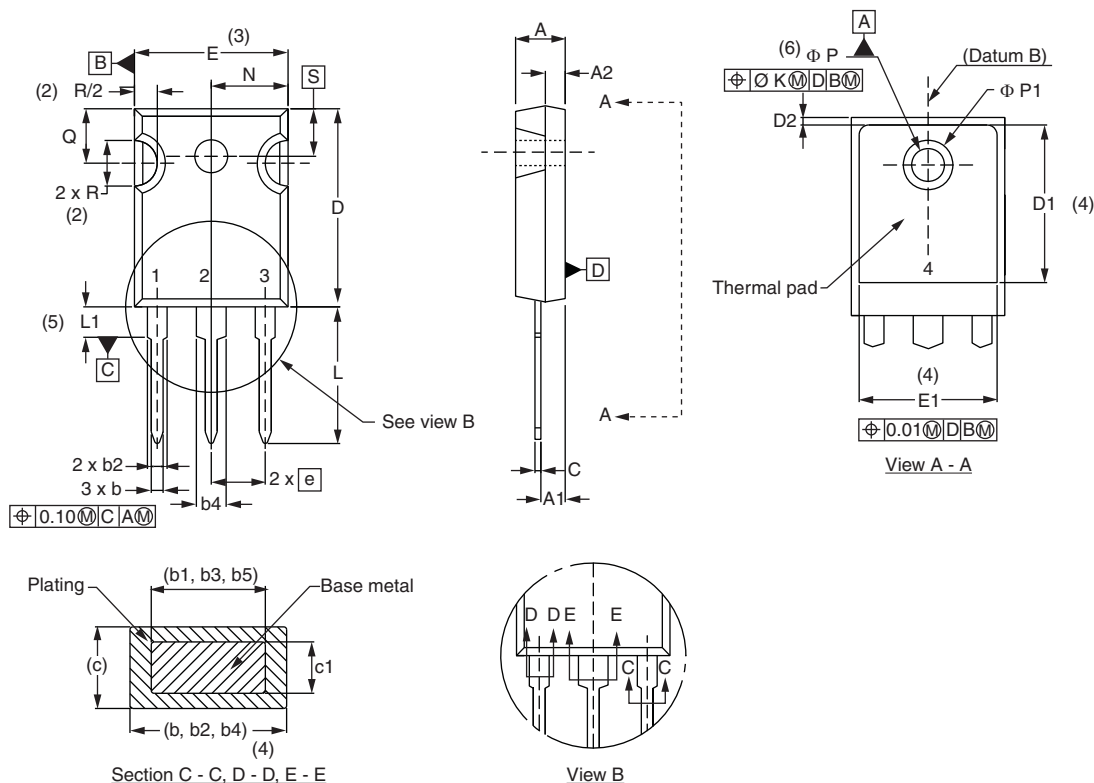
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-30TPS16PbF	25	500	Antistatic plastic tubes
VS-30TPS16-M3	25	500	Antistatic plastic tubes

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
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.17	1.37	0.046	0.054	
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	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		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	-	7.39	-	0.291	
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
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- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension c and Q



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