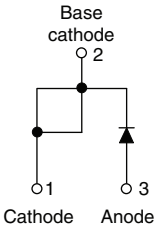
Schottky Rectifier, 15 A



TO-220AC



FEATURES

- 150 °C T_J operation
- Very low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)

Pb-free
e3
RoHS COMPLIANT
HALOGEN FREE Available

DESCRIPTION

The VS-12TQ... Schottky rectifier series has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

PRODUCT SUMMARY	
Package	TO-220AC
$I_{F(AV)}$	15 A
V_R	35 V, 40 V, 45 V
V_F at I_F	0.50 V
I_{RM} max.	70 mA at 125 °C
T_J max.	150 °C
Diode variation	Single die
E_{AS}	16 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	15	A
V_{RRM}	Range	35 to 45	V
I_{FSM}	t_p = 5 µs sine	990	A
V_F	15 A_{pk}, T_J = 125 °C	0.50	V
T_J	Range	- 55 to 150	°C

VOLTAGE RATINGS								
PARAMETER	SYMBOL	VS-12TQ035PbF	VS-12TQ035-N3	VS-12TQ040PbF	VS-12TQ040-N3	VS-12TQ045PbF	VS-12TQ045-N3	UNITS
Maximum DC reverse voltage	V_R	35	35	40	40	45	45	V
Maximum working peak reverse voltage	V_{RWM}							

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	$I_{F(AV)}$	50 % duty cycle at T_C = 120 °C, rectangular waveform		15	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I_{FSM}	5 µs sine or 3 µs rect. pulse	Following any rated load condition and with rated V_{RRM} applied	990	
		10 ms sine or 6 ms rect. pulse		250	
Non-repetitive avalanche energy	E_{AS}	T_J = 25 °C, I_{AS} = 2.4 A, L = 5.5 mH		16	mJ
Repetitive avalanche current	I_{AR}	Current decaying linearly to zero in 1 µs Frequency limited by T_J maximum V_A = 1.5 x V_R typical		2.4	A

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ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	V_{FM} (1)	15 A	T_J = 25 °C	0.56	V
		30 A		0.71	
		15 A	T_J = 125 °C	0.50	
		30 A		0.64	
Maximum reverse leakage current See fig. 2	I_{RM} (1)	T_J = 25 °C	V_R = Rated V_R	1.75	mA
		T_J = 125 °C		70	
Maximum junction capacitance	C_T	V_R = 5 V_{DC} (test signal range 100 kHz to 1 MHz) 25 °C		900	pF
Typical series inductance	L_S	Measured lead to lead 5 mm from package body		8.0	nH
Maximum voltage rate of change	dV/dt	Rated V_R		10 000	V/µs

Note

(1) Pulse width < 300 µs, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range		T_J, T_{Stg}		- 55 to 150	°C
Maximum thermal resistance, junction to case		R_{thJC}	DC operation See fig. 4	2.0	°C/W
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased	0.50	
Approximate weight				2	g
				0.07	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style TO-220AC	12TQ035	
				12TQ040	
				12TQ045	

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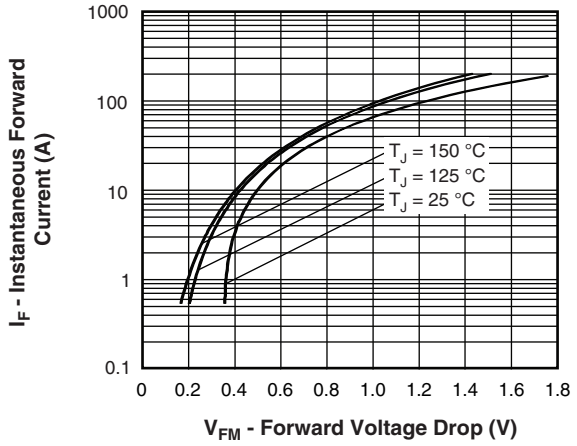


Fig. 1 - Maximum Forward Voltage Drop Characteristics

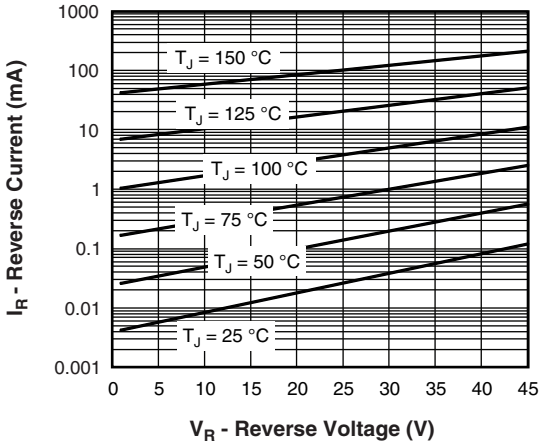


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

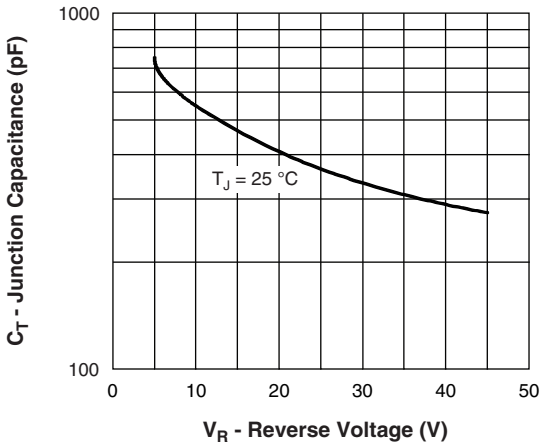


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

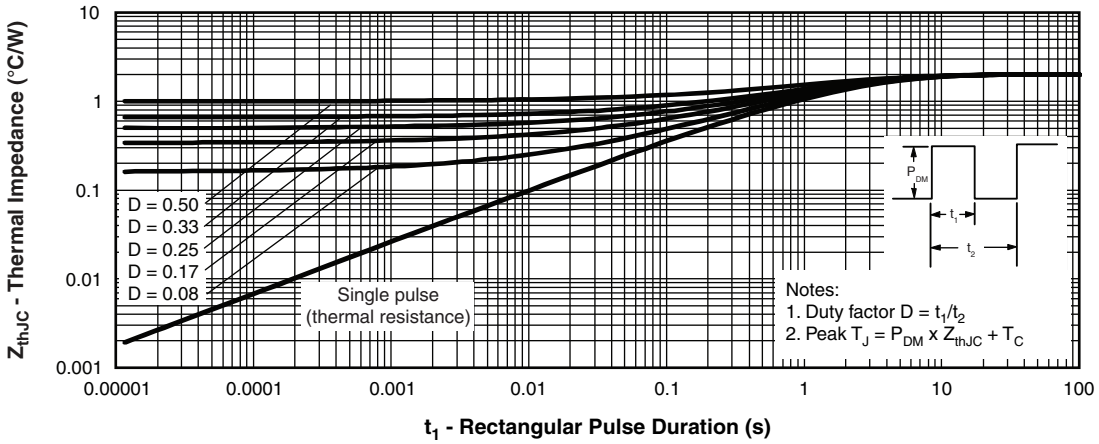


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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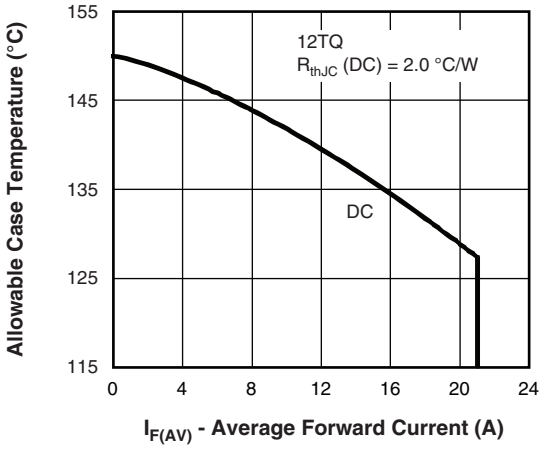


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

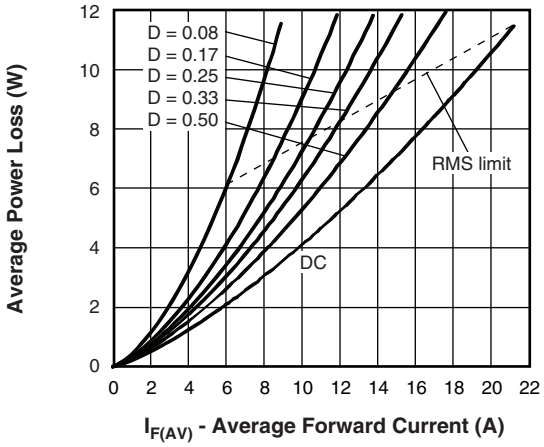


Fig. 6 - Forward Power Loss Characteristics

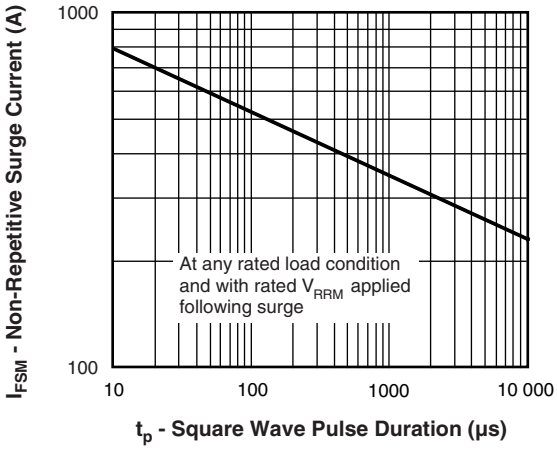


Fig. 7 - Maximum Non-Repetitive Surge Current

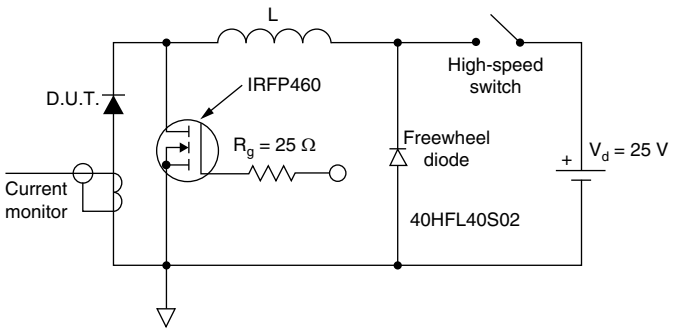


Fig. 8 - Unclamped Inductive Test Circuit

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ORDERING INFORMATION TABLE

Device code

VS-	12	T	Q	045	PbF
1	2	3	4	5	6

1 - Vishay Semiconductors product

2 - Current rating (15 A)

3 - Package:
T = TO-220

4 - Schottky "Q" series

5 - Voltage ratings
035 = 35 V
040 = 40 V
045 = 45 V

6 - Environmental digit
- PbF = Lead (Pb)-free and RoHS compliant
- -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

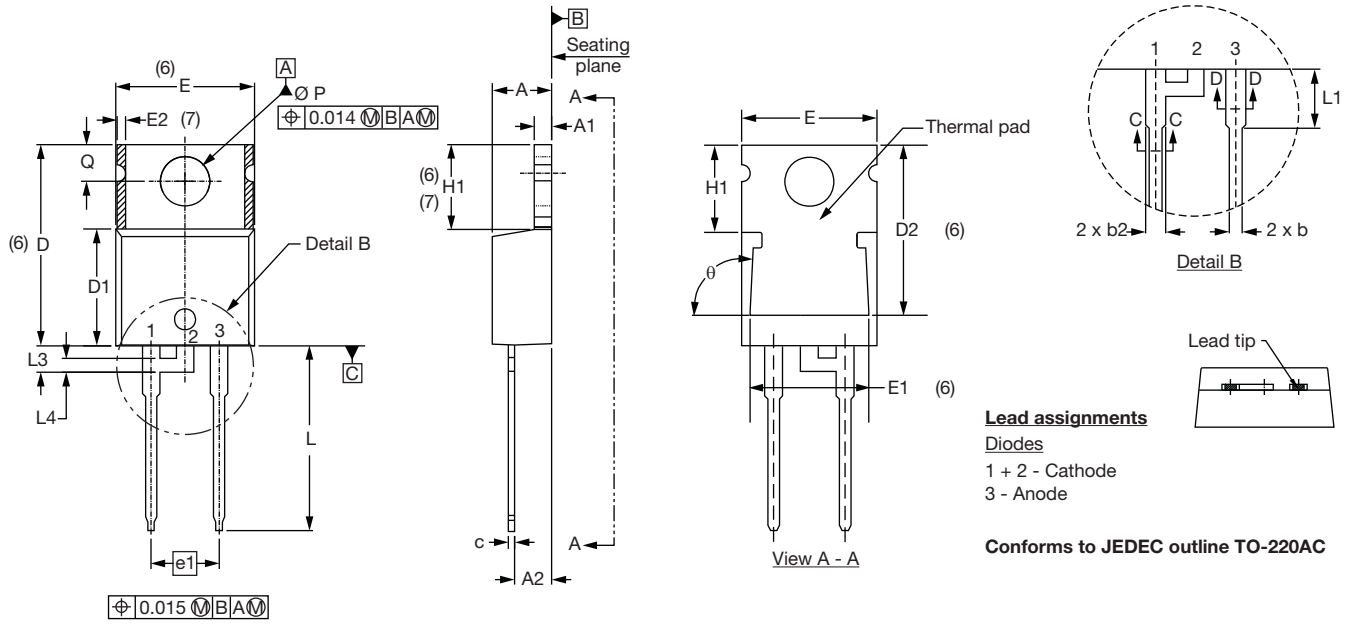
ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-12TQ035PbF	50	1000	Antistatic plastic tube
VS-12TQ035-N3	50	1000	Antistatic plastic tube
VS-12TQ040PbF	50	1000	Antistatic plastic tube
VS-12TQ040-N3	50	1000	Antistatic plastic tube
VS-12TQ045PbF	50	1000	Antistatic plastic tube
VS-12TQ045-N3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95221
Part marking information	TO-220AC PbF	www.vishay.com/doc?95224
	TO-220AC -N3	www.vishay.com/doc?95068

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TO-220AC

DIMENSIONS in millimeters and inches



Lead assignments
Diodes
1 + 2 - Cathode
3 - Anode

Conforms to JEDEC outline TO-220AC

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.25	4.65	0.167	0.183	
A1	1.14	1.40	0.045	0.055	
A2	2.56	2.92	0.101	0.115	
b	0.69	1.01	0.027	0.040	
b1	0.38	0.97	0.015	0.038	4
b2	1.20	1.73	0.047	0.068	
b3	1.14	1.73	0.045	0.068	4
c	0.36	0.61	0.014	0.024	
c1	0.36	0.56	0.014	0.022	4
D	14.85	15.25	0.585	0.600	3
D1	8.38	9.02	0.330	0.355	
D2	11.68	12.88	0.460	0.507	6
E	10.11	10.51	0.398	0.414	3, 6

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
E1	6.86	8.89	0.270	0.350	6
E2	-	0.76	-	0.030	7
e	2.41	2.67	0.095	0.105	
e1	4.88	5.28	0.192	0.208	
H1	6.09	6.48	0.240	0.255	6, 7
L	13.52	14.02	0.532	0.552	
L1	3.32	3.82	0.131	0.150	2
L3	1.78	2.13	0.070	0.084	
L4	0.76	1.27	0.030	0.050	2
Ø P	3.54	3.73	0.139	0.147	
Q	2.60	3.00	0.102	0.118	
θ	90° to 93°		90° to 93°		

Notes

(1) Dimensioning and tolerancing as per ASME Y14.5M-1994
(2) Lead dimension and finish uncontrolled in L1
(3) Dimension D, D1 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) Dimension b1, b3 and c1 apply to base metal only
(5) Controlling dimension: inches
(6) Thermal pad contour optional within dimensions E, H1, D2 and E1
(7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
(8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline

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