

www.vishay.com

Vishay Semiconductors

COMPLIANT

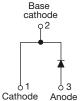
HALOGEN

**FREE** 

## **High Performance Schottky Rectifier, 10 A**



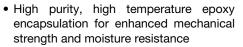


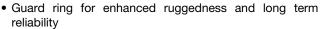


PRIMARY CHARACTERISTICS								
I <sub>F(AV)</sub>	10 A							
V <sub>R</sub>	35 V, 40 V, 45 V							
V <sub>F</sub> at I <sub>F</sub>	0.49 V							
I <sub>RM</sub>	15 mA at 125 °C							
T <sub>J</sub> max.	175 °C							
E <sub>AS</sub>	13 mJ							
Package	TO-220AC 2L							
Circuit configuration	Single							

#### **FEATURES**

- 175 °C T<sub>J</sub> operation
- Low forward voltage drop
- · High frequency operation





- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>

#### **DESCRIPTION**

The VS-10TQ... Schottky rectifier series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

MAJOR RATINGS AND CHARACTERISTICS							
SYMBOL	CHARACTERISTICS	VALUES	UNITS				
I <sub>F(AV)</sub>	Rectangular waveform	10	Α				
V <sub>RRM</sub>		35 to 45	V				
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	1050	Α				
V <sub>F</sub>	10 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.49	V				
TJ	Range	-55 to +175	°C				

VOLTAGE RATINGS									
PARAMETER SYMBOL VS-10TQ035-M3 VS-10TQ040-M3 VS-10TQ045-M3 UNITS									
Maximum DC reverse voltage	$V_R$	35	40	45	V				
Maximum working peak reverse voltage	$V_{RWM}$	33	40	45	V				

ABSOLUTE MAXIMUM RATINGS								
PARAMETER	SYMBOL	TEST COND	VALUES	UNITS				
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 151 °C	10					
Maximum peak one cycle non-repetitive	I <sub>FSM</sub>	5 µs sine or 3 µs rect. pulse	Following any rated load	1050	Α			
surge current See fig. 7		10 ms sine or 6 ms rect. pulse	condition and with rated V <sub>RRM</sub> applied	280				
Non-repetitive avalanche energy	E <sub>AS</sub>	$T_J = 25  ^{\circ}\text{C},  I_{AS} = 2  \text{A},  L = 6.5  \text{mHz}$	13	mJ				
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 $\mu$ s Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical		2	Α			



www.vishay.com

# Vishay Semiconductors

ELECTRICAL SPECIFICATIONS								
PARAMETER	SYMBOL	TEST CO	VALUES	UNITS				
		10 A	T <sub>.1</sub> = 25 °C	0.57	V			
Maximum forward voltage drop	V <sub>FM</sub> <sup>(1)</sup>	20 A	1j=25 C	0.67				
See fig. 1	VFM (1)	10 A	T <sub>.1</sub> = 125 °C	0.49				
		20 A	1J=125 C	0.61	1			
Maximum reverse leakage current	I <sub>RM</sub> <sup>(1)</sup>	T <sub>J</sub> = 25 °C	V <sub>B</sub> = Rated V <sub>B</sub>	2	mA			
See fig. 2		T <sub>J</sub> = 125 °C	v <sub>R</sub> = nateu v <sub>R</sub>	15	IIIA			
Maximum junction capacitance	C <sub>T</sub>	$V_R = 5 V_{DC}$ (test signal ran	V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25 °C		pF			
Typical series inductance	L <sub>S</sub>	Measured lead to lead 5	8.0	nH				
Maximum voltage rate of change	dV/dt	Rated V <sub>R</sub>	10 000	V/µs				

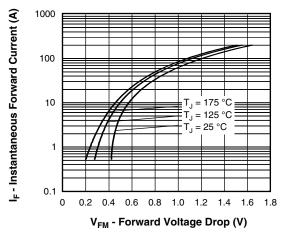
#### Note

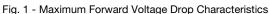
 $<sup>^{(1)}\,</sup>$  Pulse width < 300 µs, duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS								
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS			
Maximum junction and storage temperature range		T <sub>J</sub> , T <sub>Stg</sub>		-55 to +175	°C			
Maximum thermal resistance, junction to case		R <sub>thJC</sub>	DC operation See fig. 4	2.0	°C/W			
Typical thermal resistance, case to heatsink		R <sub>thCS</sub>	Mounting surface, smooth, and greased	0.50	C/VV			
Approximate weight				2	g			
Approximate weight				0.07	OZ.			
Mounting torque	minimum			6 (5)	kgf · cm			
Mounting torque	maximum		12 (1		(lbf • in)			
Marking device			Consistua TO 220AC 21	10TC	Q035			
			Case style TO-220AC 2L	10TC	10TQ045			

www.vishay.com

Vishay Semiconductors





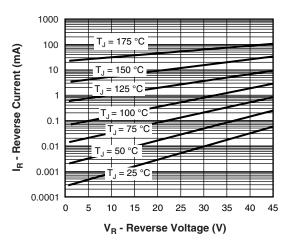


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

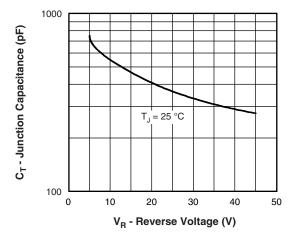


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

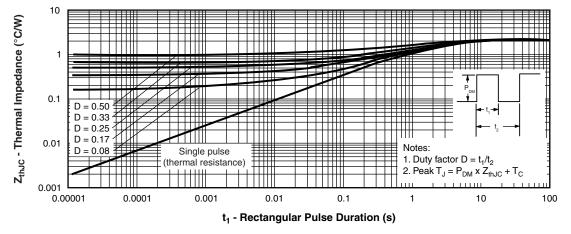


Fig. 4 - Maximum Thermal Impedance Z<sub>thJC</sub> Characteristics

www.vishay.com

Vishay Semiconductors

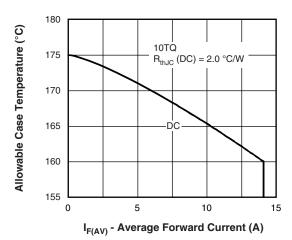


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

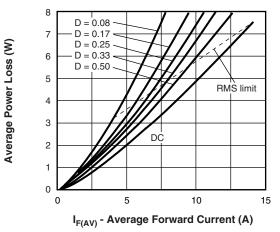


Fig. 6 - Forward Power Loss Characteristics

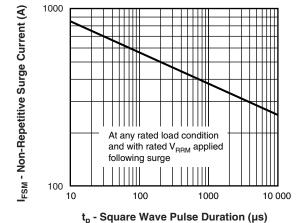


Fig. 7 - Maximum Non-Repetitive Surge Current

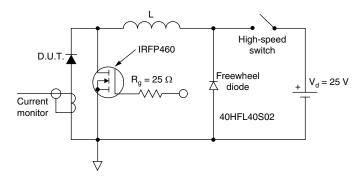
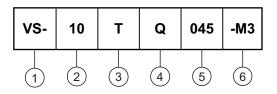


Fig. 8 - Unclamped Inductive Test Circuit

Vishay Semiconductors

### **ORDERING INFORMATION TABLE**

Device code



1 - Vishay Semiconductors product

2 - Current rating (10 = 10 A)

- Package:

T = TO-220

4 - Schottky "Q" series

035 = 35 V

5 - Voltage ratings

040 = 40 V045 = 45 V

6 - Environmental digit

-M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)								
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION						
VS-10TQ035-M3	50	Antistatic plastic tubes						
VS-10TQ040-M3	50	Antistatic plastic tubes						
VS-10TQ045-M3	50	Antistatic plastic tubes						

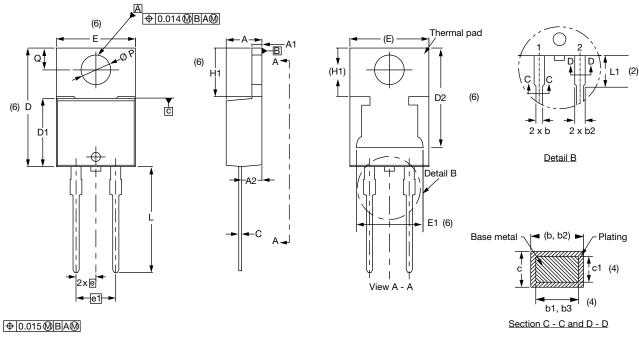
LINKS TO RELATED DOCUMENTS							
Dimensions <u>www.vishay.com/doc?96156</u>							
Part marking information	www.vishay.com/doc?95391						



## Vishay Semiconductors

### **TO-220AC 2L**

### **DIMENSIONS** in millimeters and inches



Lead tip

Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIN	IETERS	INC	HES	NOTES	NOTES	SYMBOL	MILLIM	IETERS	INC	HES	NOTES
STMBOL	MIN.	MAX.	MIN.	MAX.	NOTES		STWIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.25	4.65	0.167	0.183			D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055			E	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			е	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4		e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068			H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4		L	13.52	14.02	0.532	0.552	
С	0.36	0.61	0.014	0.024			L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4		ØΡ	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3		Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355							•	

#### 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 dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2



### **Legal Disclaimer Notice**

Vishay

### **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.