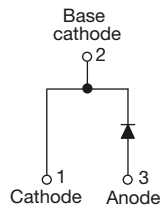




## High Performance Schottky Rectifier, 20 A



TO-220AC 2L



### FEATURES

- 150 °C T<sub>J</sub> operation
- 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
- Meets JESD 201, class 1A whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS  
COMPLIANT  
HALOGEN  
FREE

### LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
I <sub>F(AV)</sub>	20 A
V <sub>R</sub>	35 V, 40 V, 45 V
V <sub>F</sub> at I <sub>F</sub>	0.51 V
I <sub>RM</sub> typ.	105 mA at 125 °C
T <sub>J</sub> max.	150 °C
E <sub>AS</sub>	27 mJ
Package	TO-220AC 2L
Circuit configuration	Single

### DESCRIPTION

The VS-20TQ... 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.

### MECHANICAL DATA

**Case:** TO-220AC 2L

Molding compound meets UL 94-V0 flammability rating

**Terminals:** matte tin plated leads, solderable per J-STD-002

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
I <sub>F(AV)</sub>	Rectangular waveform	20	A
V <sub>RRM</sub>	Range	35 to 45	V
I <sub>FSM</sub>	t <sub>p</sub> = 5 μs sine	1800	A
V <sub>F</sub>	20 A <sub>pk</sub> , T <sub>J</sub> = 125 °C	0.51	V
T <sub>J</sub>	Range	-55 to +150	°C

VOLTAGE RATINGS					
PARAMETER	SYMBOL	VS-20TQ035THN3	VS-20TQ040THN3	VS-20TQ045THN3	UNITS
Maximum DC reverse voltage	V <sub>R</sub>	35	40	45	V
Maximum working peak reverse voltage	V <sub>RWM</sub>				

ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current See fig. 5	I <sub>F(AV)</sub>	50 % duty cycle at T <sub>C</sub> = 116 °C, rectangular waveform		20	A
Maximum peak one cycle non-repetitive surge current See fig. 7	I <sub>FSM</sub>	5 μs sine or 3 μs rect. pulse	Following any rated load condition and with rated V <sub>RRM</sub> applied	1800	
		10 ms sine or 6 ms rect. pulse		400	
Non-repetitive avalanche energy	E <sub>AS</sub>	T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 4 A, L = 3.4 mH		27	mJ
Repetitive avalanche current	I <sub>AR</sub>	Current decaying linearly to zero in 1 μs Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical		4	A



ELECTRICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^\circ\text{C}$	0.57	V
		40 A		0.73	
		20 A	$T_J = 125\text{ }^\circ\text{C}$	0.51	
		40 A		0.67	
Maximum reverse leakage current	$I_{RM}^{(1)}$	$T_J = 25\text{ }^\circ\text{C}$	$V_R = \text{rated } V_R$	2.7	mA
		$T_J = 125\text{ }^\circ\text{C}$		150	
Typical reverse leakage current	$I_{RM}^{(1)}$	$T_J = 125\text{ }^\circ\text{C}$	$V_R = \text{rated } V_R$	105	mA
Maximum junction capacitance	$C_T$	$V_R = 5 V_{DC}$ , (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$		1400	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/ $\mu$ s

**Note**

(1) Pulse width < 300  $\mu$ s, 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	$^\circ\text{C}$
Maximum thermal resistance, junction to case	$R_{thJC}$	DC operation See fig. 4		1.50	$^\circ\text{C/W}$
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 2L		20TQ035TH	
				20TQ040TH	
				20TQ045TH	

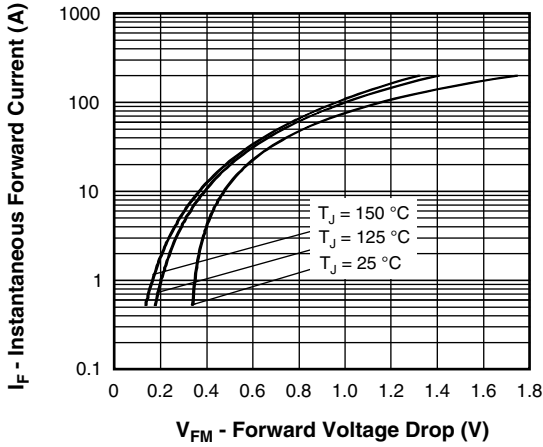


Fig. 1 - Maximum Forward Voltage Drop Characteristics

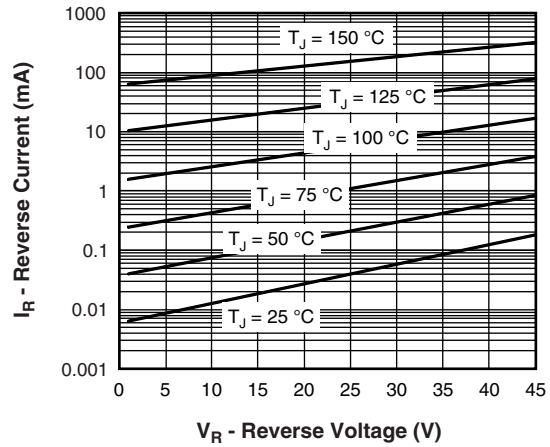


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

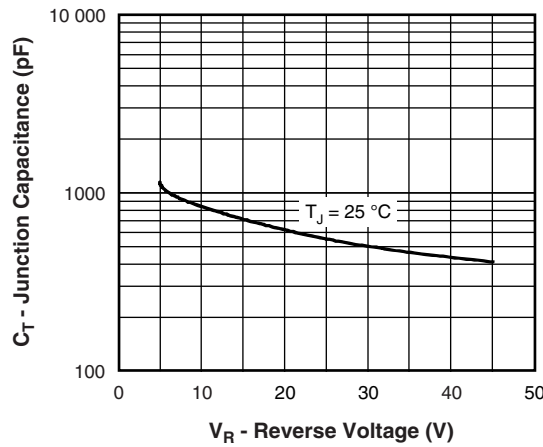


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

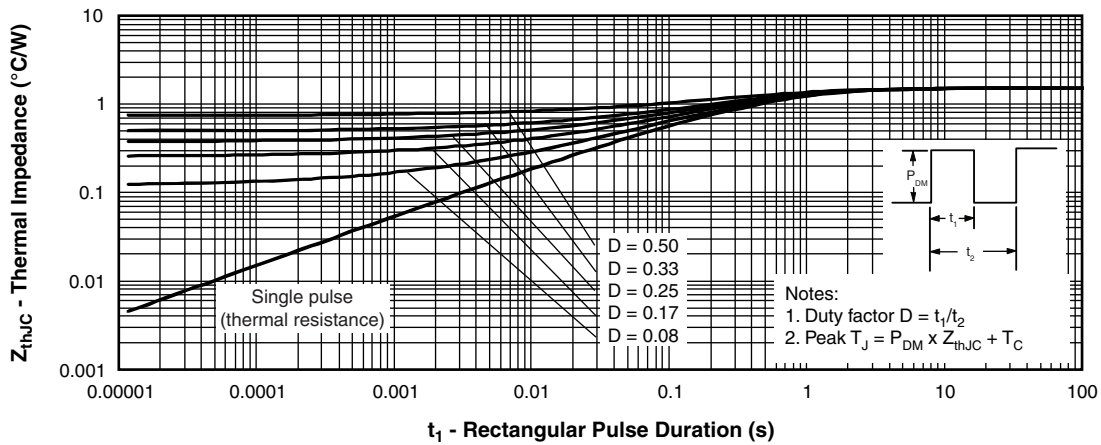


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

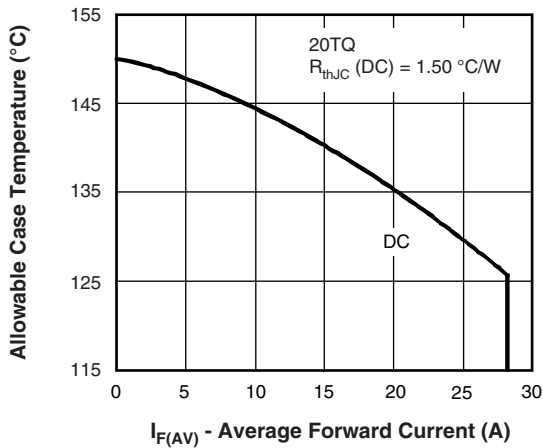


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

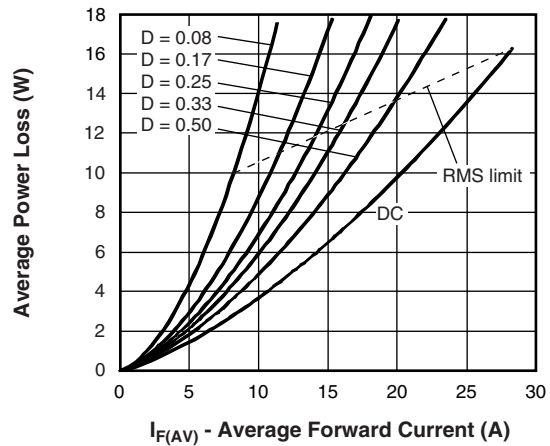


Fig. 6 - Forward Power Loss Characteristics

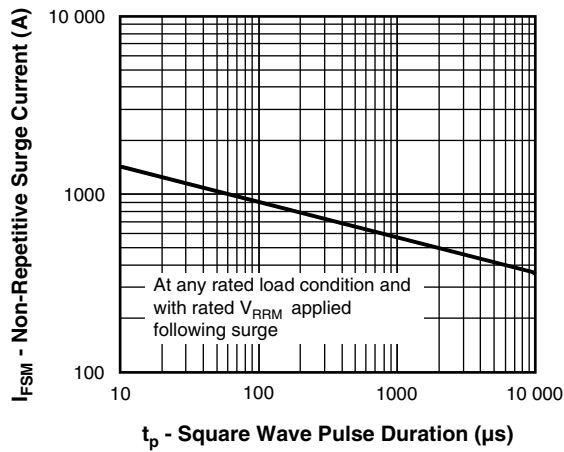


Fig. 7 - Maximum Non-Repetitive Surge Current

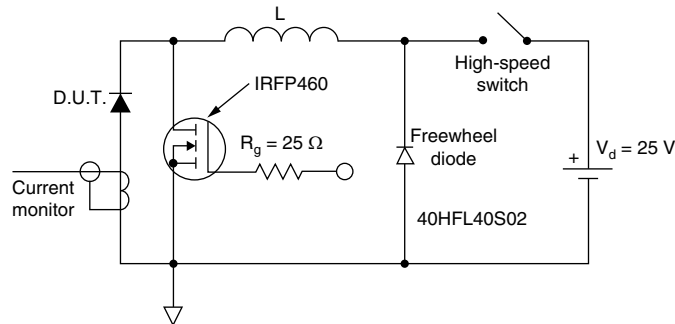
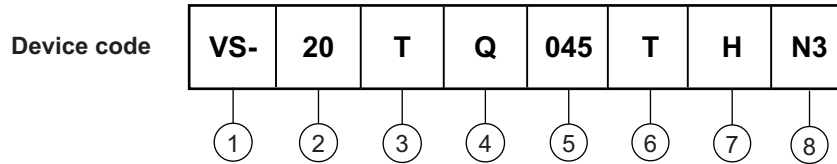


Fig. 8 - Unclamped Inductive Test Circuit



## ORDERING INFORMATION TABLE



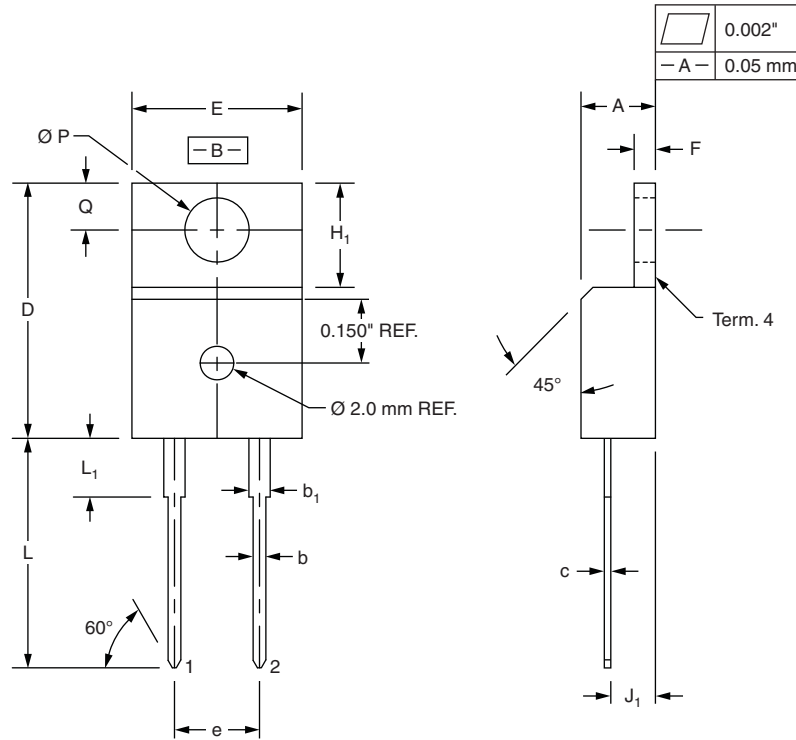
- 1** - Vishay Semiconductors product
  - 2** - Current rating (20 = 20 A)
  - 3** - Package:  
T = TO-220
  - 4** - Schottky "Q" series
  - 5** - Voltage ratings
  - 6** - • None = TO-220AB  
• T = True 2 pin TO-220
  - 7** - H = AEC-Q101 qualified
  - 8** - Environmental digit  
N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free
- |            |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-20TQ035THN3	50	1000	Antistatic plastic tube
VS-20TQ040THN3	50	1000	Antistatic plastic tube
VS-20TQ045THN3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?95259">www.vishay.com/doc?95259</a>
Part marking information	<a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a>
SPIICE model	<a href="http://www.vishay.com/doc?96917">www.vishay.com/doc?96917</a>

### True 2 Pin TO-220

**DIMENSIONS** in millimeters and inches



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.32	4.57	0.170	0.180
b	0.71	0.91	0.028	0.036
b <sub>1</sub>	1.15	1.39	0.045	0.055
c	0.36	0.53	0.014	0.021
D	14.99	15.49	0.590	0.610
E	10.04	10.41	0.395	0.410
e	5.08 BSC		0.200 BSC	
F	1.22	1.37	0.048	0.054
H <sub>1</sub>	5.97	6.47	0.235	0.255
J <sub>1</sub>	2.54	2.79	0.100	0.110
L	13.47	13.97	0.530	0.550
L <sub>1</sub> <sup>(1)</sup>	3.31	3.81	0.130	0.150
Ø P	3.79	3.88	0.149	0.153
Q	2.60	2.84	0.102	0.112

**Notes**

<sup>(1)</sup> Lead dimension and finish uncontrolled in L<sub>1</sub>

- These dimensions are within allowable dimensions of JEDEC TO-220AB rev. J outline dated 3-24-87
- Controlling dimension: Inch



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