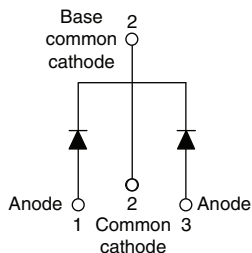


High Performance Schottky Rectifier, 2 x 20 A


TO-220AB


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
- AEC-Q101 qualified, meets JESD 201, class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 20 A
V_R	45 V
V_F at I_F	0.48 V
I_{RM} typ.	105 mA at 125 °C
T_J max.	150 °C
E_{AS}	20 mJ
Package	TO-220AB
Circuit configuration	Common cathode

DESCRIPTION

This center tap Schottky rectifier 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.

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
$I_{F(AV)}$	Rectangular waveform	40	A
V_{RRM}		45	V
I_{FSM}	$t_p = 5 \mu s$ sine	1240	A
V_F	20 A _{pk} , $T_J = 125$ °C (per leg)	0.48	V
T_J	Range	-55 to +150	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-40CTQ045HN3	UNITS
Maximum DC reverse voltage	V_R	45	V
Maximum working peak reverse voltage	V_{RWM}		

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current per leg See fig. 5	$I_{F(AV)}$	50 % duty cycle at $T_C = 116$ °C, rectangular waveform	20 40	A
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I_{FSM}	5 μs sine or 3 μs rect. pulse 10 ms sine or 6 ms rect. pulse	1240 350	
		Following any rated load condition and with rated V_{RRM} applied		
Non-repetitive avalanche energy per leg	E_{AS}	$T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.4$ mH	20	mJ
Repetitive avalanche current per leg	I_{AR}	Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical	3	A

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop per leg See fig. 1	$V_{FM}^{(1)}$	20 A	$T_J = 25\text{ }^{\circ}\text{C}$	0.53	V
		40 A		0.68	
		20 A	$T_J = 125\text{ }^{\circ}\text{C}$	0.48	
		40 A		0.67	
Maximum reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{rated } V_R$	3	mA
		$T_J = 125\text{ }^{\circ}\text{C}$		105	
Typical reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 125\text{ }^{\circ}\text{C}$	$V_R = \text{rated } V_R$	150	mA
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$		0.27	V
Forward slope resistance	r_t			8.72	m Ω
Maximum junction capacitance per leg	C_T	$V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 $^{\circ}\text{C}$		2800	pF
Typical series inductance per leg	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 per leg	R _{thJC}	DC operation	2.0	°C/W
Maximum thermal resistance, junction to case per package			1.0	
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 maximum		6 (5)	kgf · cm (lbf · in)
			12 (10)	
Marking device		Case style TO-220AB	40CTQ045H	

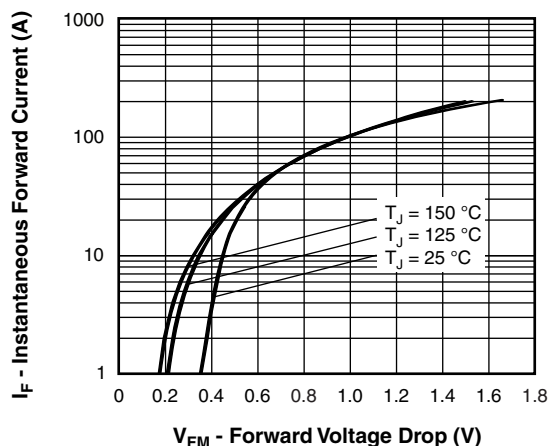


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

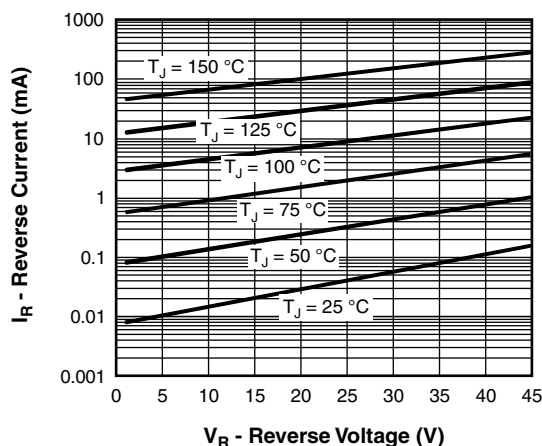


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

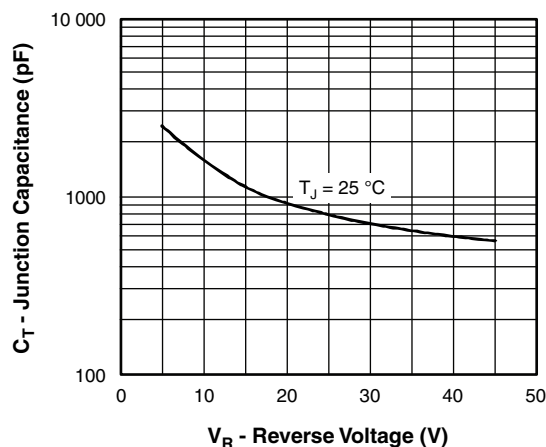
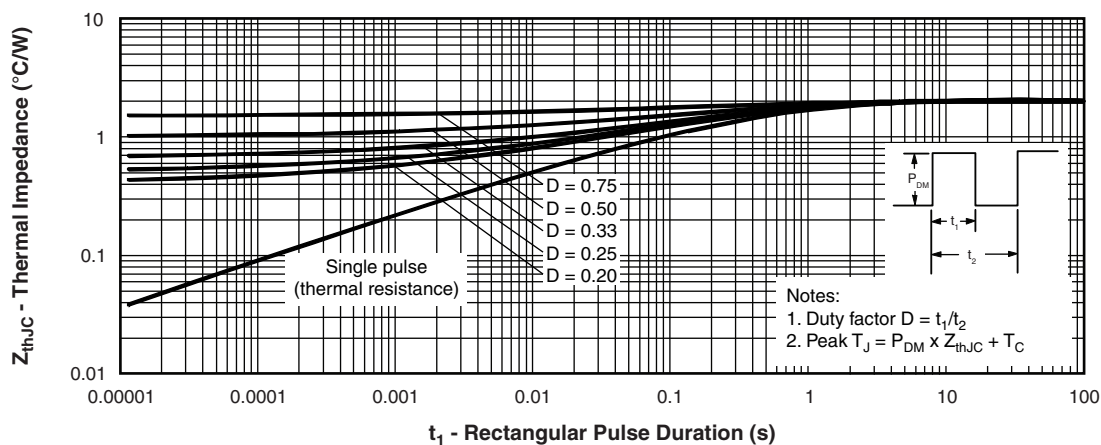


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

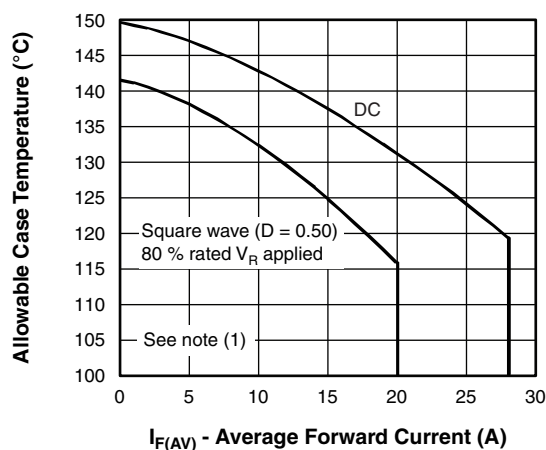


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

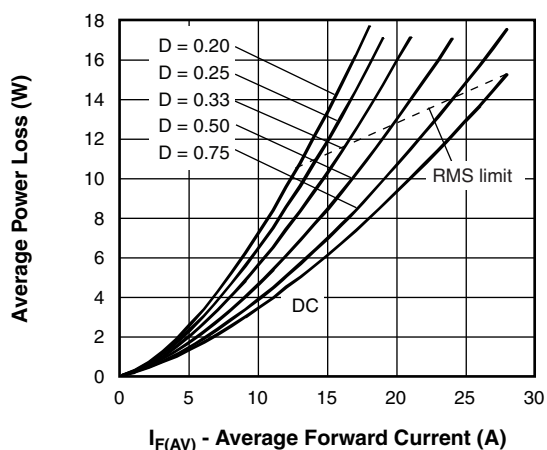


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

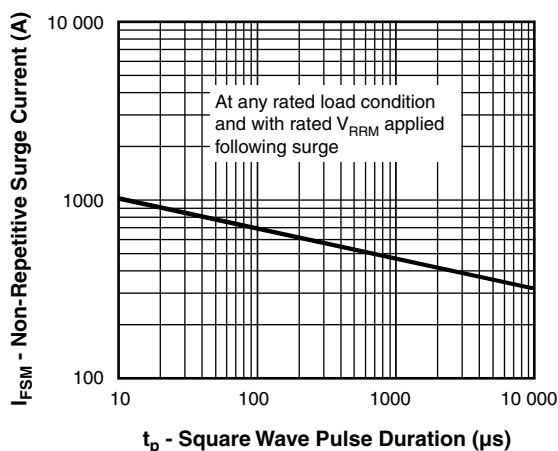


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

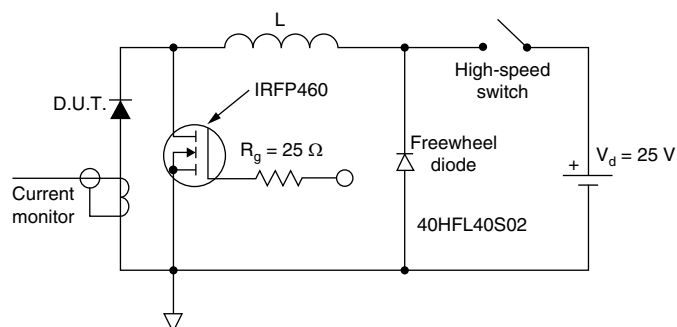


Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$;
 P_d = forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
 P_{dREV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 10$ V

**ORDERING INFORMATION TABLE**

Device code	VS-	40	C	T	Q	045	H	N3
	1	2	3	4	5	6	7	8

- | | | |
|----------|---|--|
| 1 | - | Vishay Semiconductors product |
| 2 | - | Current rating (40 = 40 A) |
| 3 | - | Circuit configuration:
C = Common cathode |
| 4 | - | Package:
T = TO-220 |
| 5 | - | Schottky "Q" series |
| 6 | - | Voltage rating (045 = 45 V) |
| 7 | - | H = AEC-Q101 qualified |
| 8 | - | Environmental digit
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-40CTQ045HN3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS

Dimensions	www.vishay.com/doc?95222
Part marking information	www.vishay.com/doc?95028



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