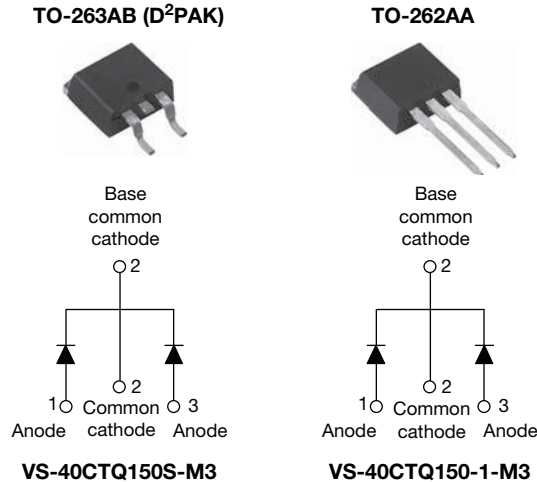


High Performance Schottky Rectifier, 2 x 20 A



FEATURES

- Very low forward voltage drop
- 175 °C T_J operation
- Center tap TO-220 package
- 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 MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Designed and qualified according to JEDEC®-JESD47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

Package	TO-263AB (D ² PAK), TO-262AA
I _{F(AV)}	2 x 20 A
V _R	150 V
V _F at I _F	0.71 V
I _{RM}	15 mA at 125 °C
T _J max.	175 °C
Diode variation	Common cathode
E _{AS}	1 mJ

DESCRIPTION

The VS-40CTQ... 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 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 _{F(AV)}	Rectangular waveform	40	A
V _{RRM}		150	V
I _{FSM}	t _p = 5 μs sine	1500	A
V _F	20 A _{pk} , T _J = 125 °C (per leg)	0.71	V
T _J		-55 to +175	°C

VOLTAGE RATINGS

PARAMETER	SYMBOL	VS-40CTQ150S-M3 VS-40CTQ150-1-M3	UNITS
Maximum DC reverse voltage	V _R	150	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 = 140 °C, rectangular waveform	20	A
			40	
Maximum peak one cycle non-repetitive surge current per leg See fig. 7	I _{FSM}	5 μs sine or 3 μs rect. pulse	1500	A
		10 ms sine or 6 ms rect. pulse	250	
Non-repetitive avalanche energy per leg	E _{AS}	T _J = 25 °C, I _{AS} = 1.5 A, L = 0.9 mH	1.0	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 x V _R typical	1.5	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 °C	0.93	V
		40 A		1.16	
		20 A	T _J = 125 °C	0.71	
		40 A		0.85	
Maximum reverse leakage current per leg See fig. 2	I _{RM} ⁽¹⁾	T _J = 25 °C	V _R = Rated V _R	50	µA
		T _J = 125 °C		15	mA
Maximum junction capacitance per leg	C _T	V _R = 5 V _{DC} (test signal range 100 kHz to 1 MHz), 25 °C		450	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 +175	°C
Maximum thermal resistance, junction to case per leg	R _{thJC}	DC operation See fig. 4		1.5	°C/W
Maximum thermal resistance, junction to case per package		DC operation		0.75	
Typical thermal resistance, case to heatsink	R _{thCS}	Mounting surface, smooth and greased		0.5	
Approximate weight				2	g
				0.07	oz.
Mounting torque	minimum		Non-lubricated threads	6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device		Case style D ² PAK		40CTQ150S	
		Case style TO-262		40CTQ150-1	

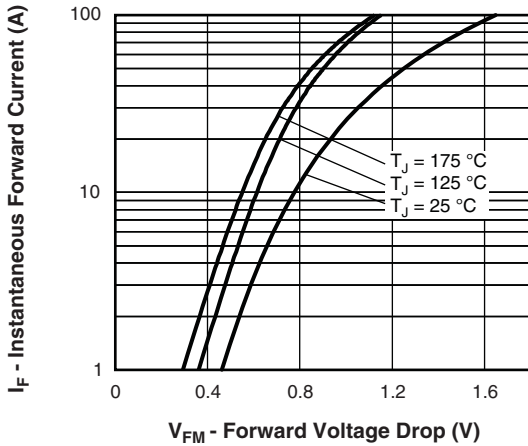


Fig. 1 - Maximum Forward Voltage Drop Characteristics

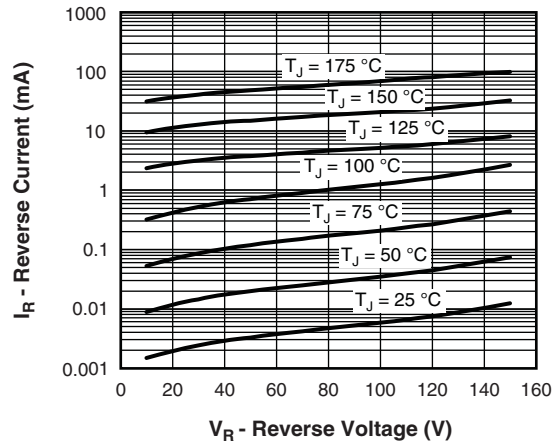


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

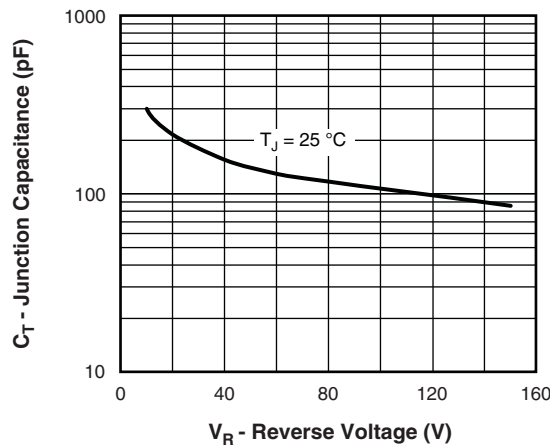


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

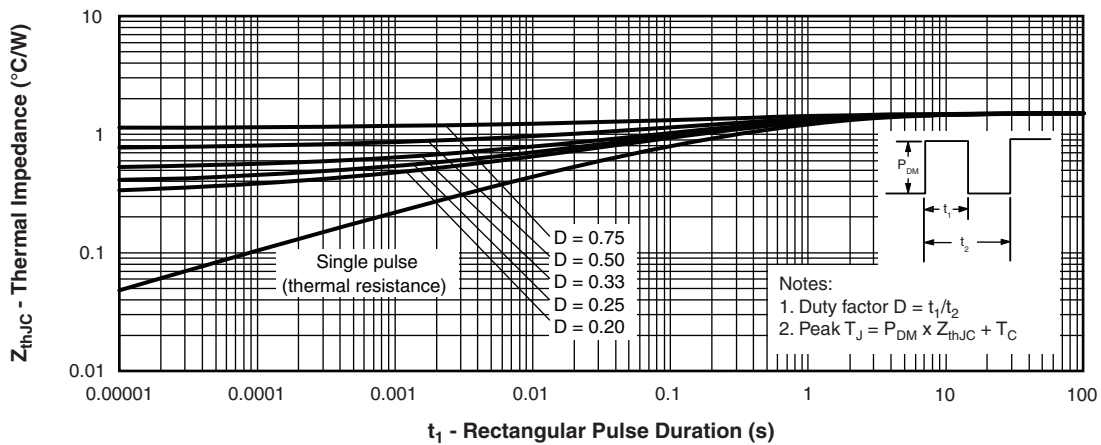


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

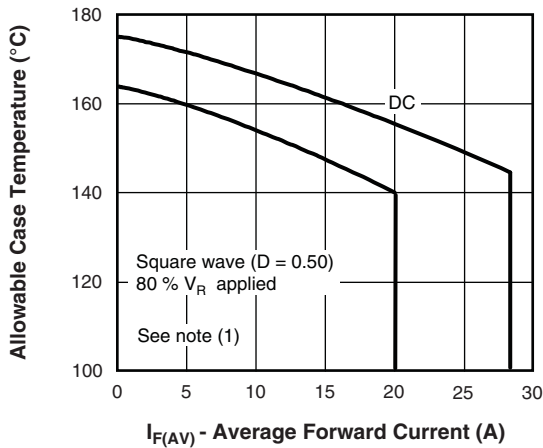


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

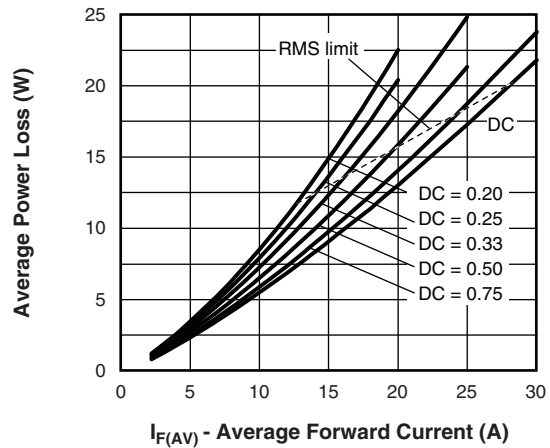


Fig. 6 - Forward Power Loss Characteristics

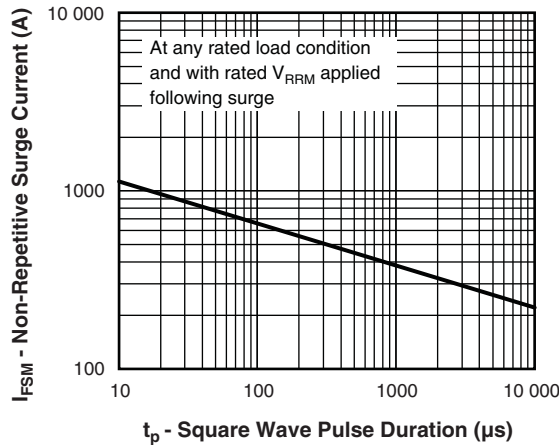


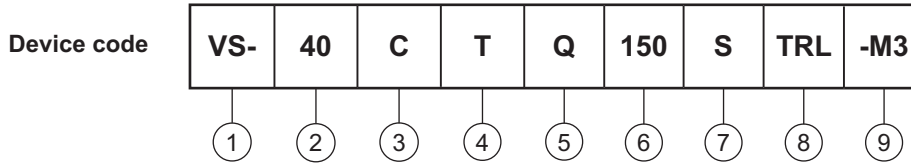
Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
- P_d = Forward power loss = $I_{F(AV)} \times V_{FM}$ at $(I_{F(AV)}/D)$ (see fig. 6);
- $P_{d_{REV}}$ = Inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at $V_{R1} = 80\% V_R$ applied



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (40 A)
- 3** - Circuit configuration:
C = common cathode
- 4** - T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage rating (150 = 150 V)
- 7** -
 - S = D²PAK
 - -1 = TO-262
- 8** -
 - None = tube (50 pieces)
 - TRL = tape and reel (left oriented - for D²PAK only)
 - TRR = tape and reel (right oriented - for D²PAK only)
- 9** - -M3 = halogen-free, RoHS-compliant and termination lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-40CTQ150S-M3	50	1000	Antistatic plastic tubes
VS-40CTQ150STRL-M3	800	800	13" diameter reel
VS-40CTQ150STRR-M3	800	800	13" diameter reel
VS-40CTQ150-1-M3	50	1000	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions	TO-263AB (D ² PAK)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	TO-263AB (D ² PAK)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information		www.vishay.com/doc?95032
SPIICE model		www.vishay.com/doc?95434

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC[®] outline D²PAK (SMD-220)



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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 outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC[®] outline TO-263AB

TO-262

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.56	3.71	0.140	0.146	

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Controlling dimension: inches
- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline



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