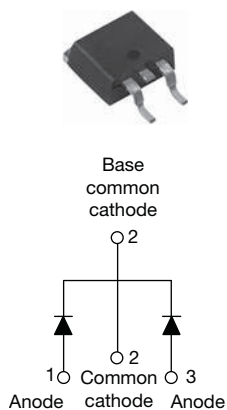
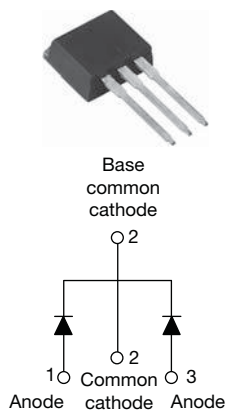


High Performance Schottky Rectifier, 2 x 20 A

TO-263AB (D²PAK)


VS-40CTQ045SPbF

TO-262AA



VS-40CTQ045-1PbF

FEATURES

- 150 °C T_J operation
- Center tap configuration
- 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- 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	45 V
V _F at I _F	0.48 V
I _{RM} max.	115 mA at 125 °C
T _J max.	150 °C
Diode variation	Common cathode
E _{AS}	20

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 μs 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-40CTQ045SPbF VS-40CTQ045-1PbF	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, 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	1240	
		10 ms sine or 6 ms rect. pulse	350	
Non-repetitive avalanche energy per leg	E _{AS}	T _J = 25 °C, I _{AS} = 3 A, L = 4.40 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 x 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	0.53	V
		40 A	0.68	
		20 A	0.48	
		40 A	0.67	
Maximum reverse leakage current per leg See fig. 2	$I_{RM}^{(1)}$	$T_J = 25\text{ }^{\circ}\text{C}$	3	mA
		$T_J = 125\text{ }^{\circ}\text{C}$	115	
Threshold voltage	$V_{F(TO)}$	$T_J = T_J \text{ maximum}$	0.27	V
Forward slope resistance	r_t		8.72	$\text{m}\Omega$
Maximum junction capacitance per leg	C_T	$V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^{\circ}\text{C}$	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		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-263AB (D ² PAK)	40CTQ045S	
		Case style TO-262AA	40CTQ045-1	

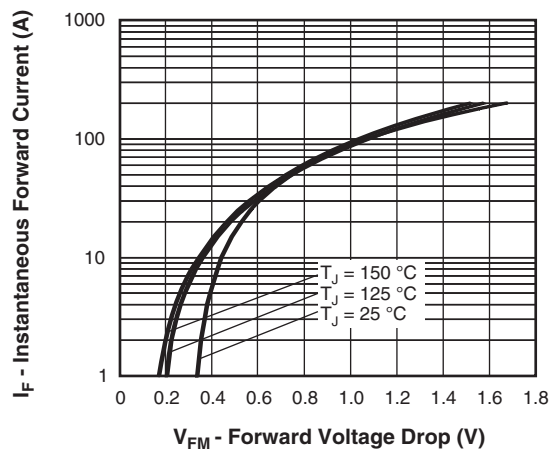


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

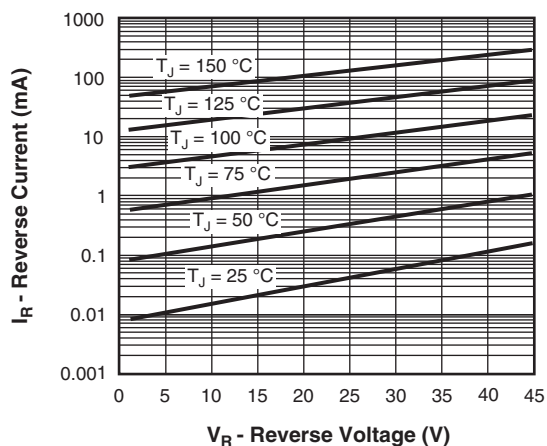


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

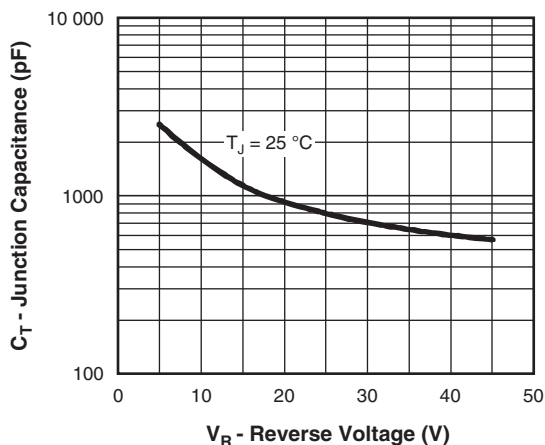


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

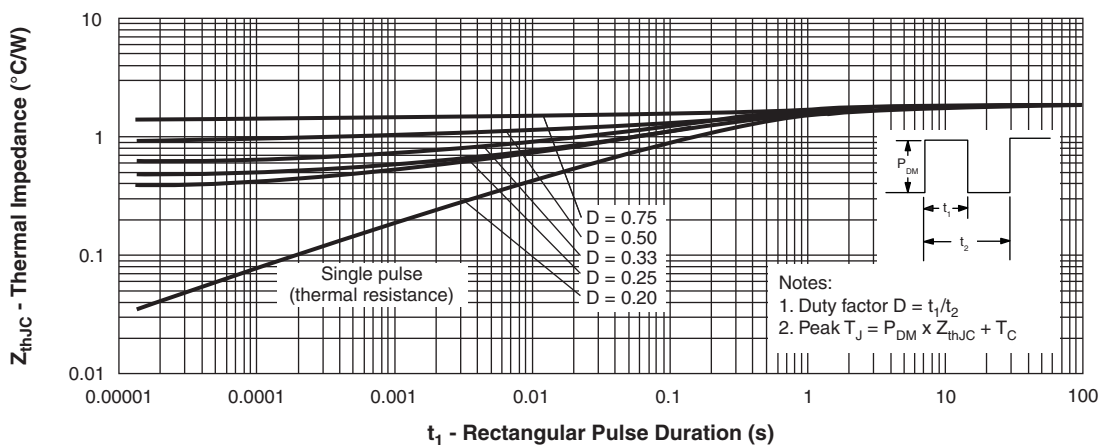


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

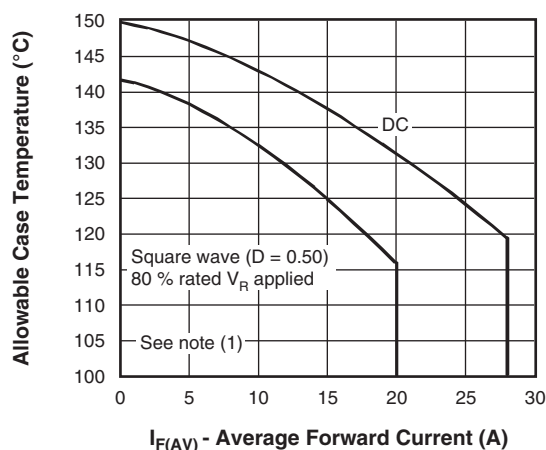


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

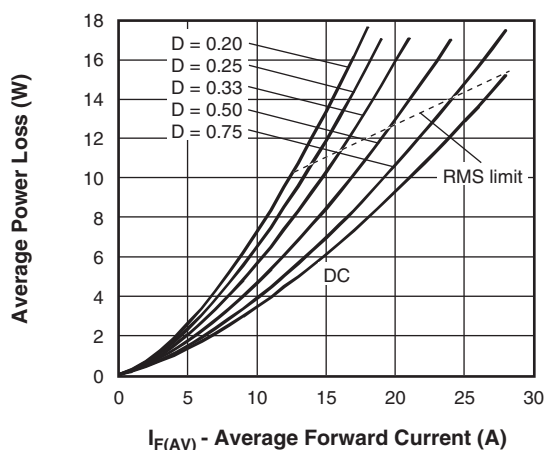


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

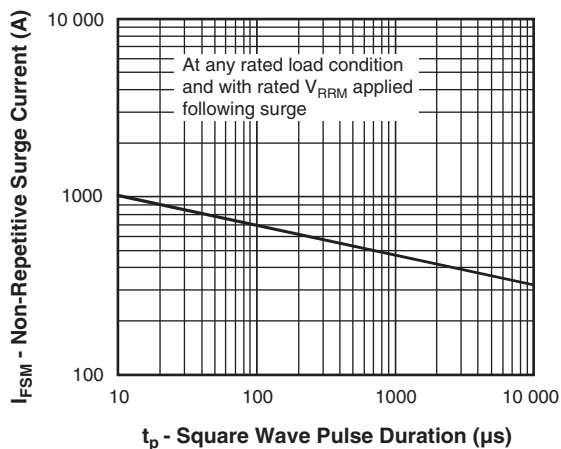


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

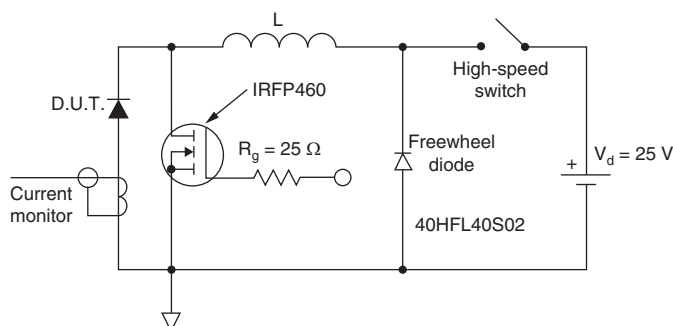


Fig. 8 - Unclamped Inductive Test Circuit

Note

- (1) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;
 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 $V_{R1} = 10$ V

**ORDERING INFORMATION TABLE**

Device code	VS-	40	C	T	Q	045	S	TRL	PbF
	1	2	3	4	5	6	7	8	9

- | | | |
|----------|---|--|
| 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 (045 = 45 V) |
| 7 | - | • S = D ² PAK
• -1 = TO-262 |
| 8 | - | • None = tube (50 pieces)
• TRL = tape and reel (left oriented - for D ² PAK only)
• TRR = tape and reel (right oriented - for D ² PAK only) |
| 9 | - | PbF = lead (Pb)-free |

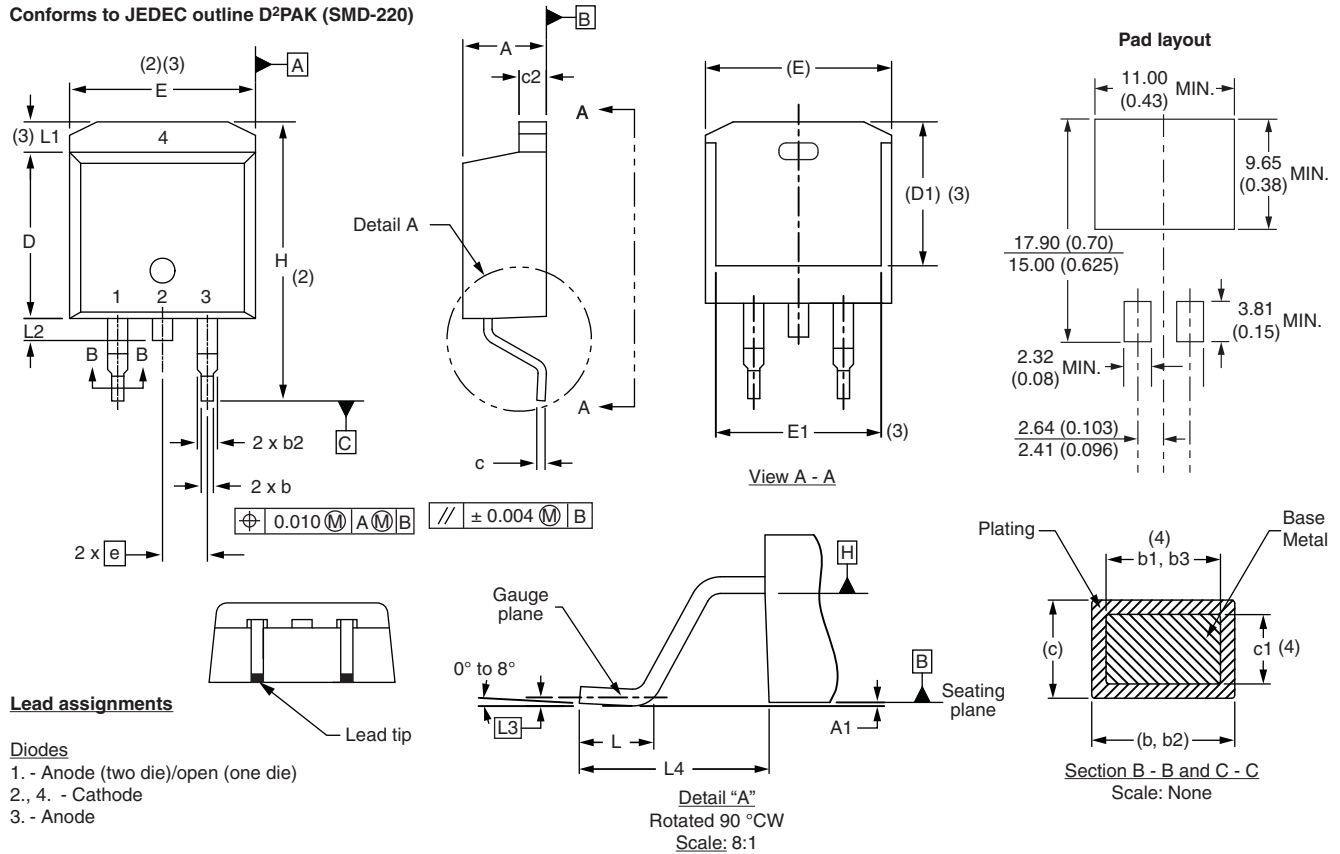
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER REEL	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-40CTQ045SPBF	50	1000	Antistatic plastic tubes
VS-40CTQ045STRRPBF	800	800	13" diameter plastic tape and reel
VS-40CTQ045STRLPBF	800	800	13" diameter plastic tape and reel
VS-40CTQ045-1PBF	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		www.vishay.com/doc?95008
Packaging information		www.vishay.com/doc?95032

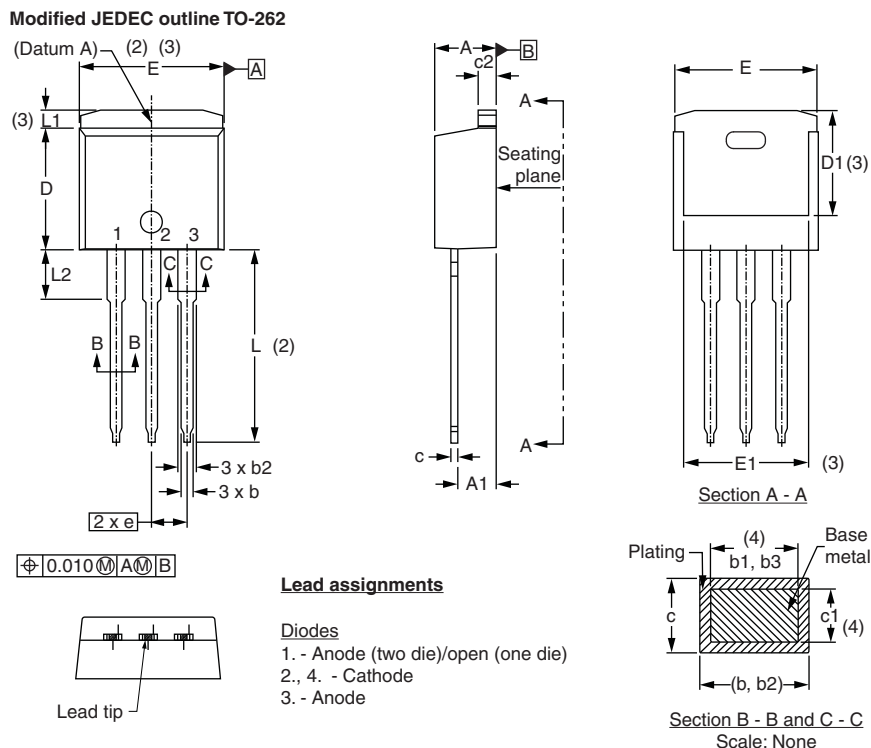
D²PAK, TO-262

DIMENSIONS - D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



DIMENSIONS - TO-262 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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