Ultrafast Soft Recovery Diode, 150 A FRED Pt®

PowerTab®

FEATURES

- Ultrafast recovery time
- 175 °C max. operating junction temperature
- Screw mounting only
- Designed and qualified according to JEDEC®-JESD 47
- PowerTab® package
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

RoHS COMPLIANT

BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION / APPLICATIONS

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems.
The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

PRODUCT SUMMARY	
Package	PowerTab®
$I_{F(AV)}$	150 A
V_R	400 V
V_F at I_F	0.9 V
t_{rr} (typ.)	See recovery table
T_J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS
Cathode to anode voltage	V_R		400	V
Continuous forward current	$I_{F(AV)}$	T_C = 104 °C	150	A
Single pulse forward current	I_{FSM}	T_C = 25 °C	1500	
Maximum repetitive forward current	I_{FRM}	Square wave, 20 kHz	300	
Operating junction and storage temperatures	T_J, T_{Stg}		-55 to +175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Breakdown voltage, blocking voltage	V_{BR}, V_R	I_R = 200 µA	400	-	-	V
Forward voltage	V_F	I_F = 150 A	-	1.07	1.3	
		I_F = 150 A, T_J = 175 °C	-	0.9	1.1	
		I_F = 150 A, T_J = 125 °C	-	0.96	1.17	
Reverse leakage current	I_R	V_R = V_R rated	-	-	50	µA
		T_J = 150 °C, V_R = V_R rated	-	-	4	mA
Junction capacitance	C_T	V_R = 400 V	-	100	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	3.5	-	nH

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 200 A/μs, V_R = 30 V		-	-	60	ns
		T_J = 25 °C	I_F = 150 A V_R = 200 V dI_F/dt = 200 A/μs	-	93	-	
		T_J = 125 °C		-	172	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	11	-	A
		T_J = 125 °C		-	20	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	490	-	nC
		T_J = 125 °C		-	1740	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal resistance, junction to case	R_{thJC}		-	-	0.35	K/W
Thermal resistance, junction to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.2	-	
Weight			-	-	5.02	g
			-	0.18	-	oz.
Mounting torque			1.2 (10)	-	2.4 (20)	N · m (lbf · in)
Marking device		Case style PowerTab®	150EBU04			

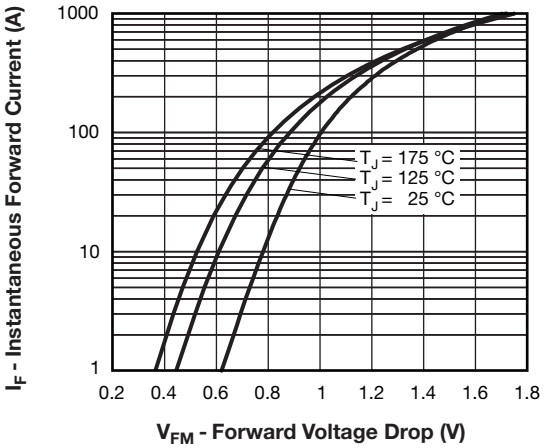

Fig. 1 - Maximum Forward Voltage Drop Characteristics

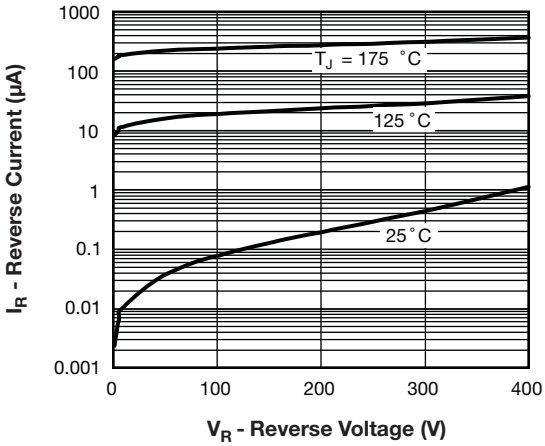

Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

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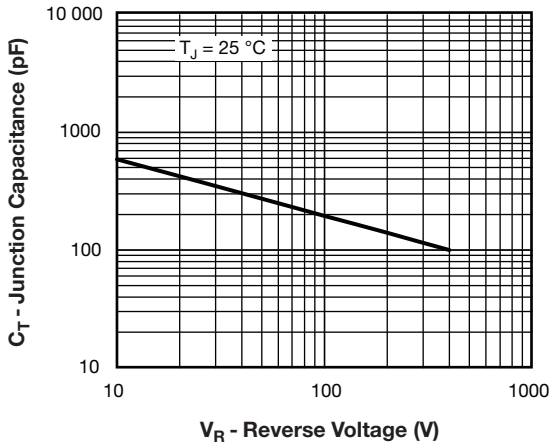

Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

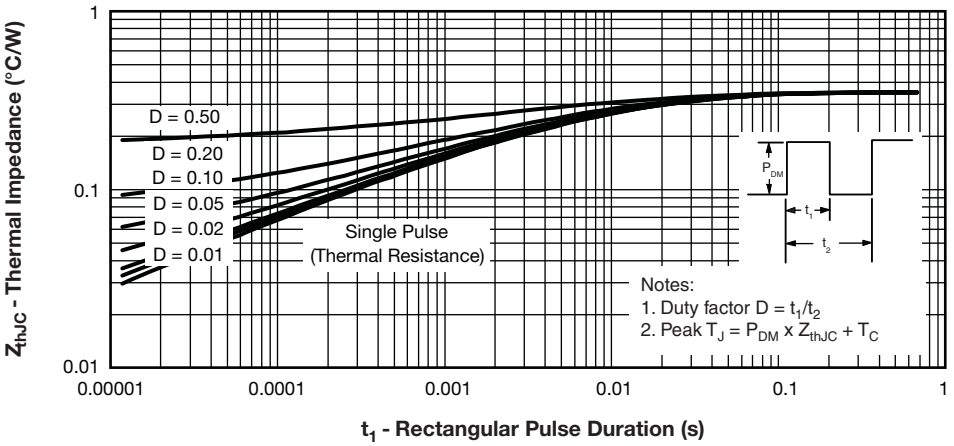

Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

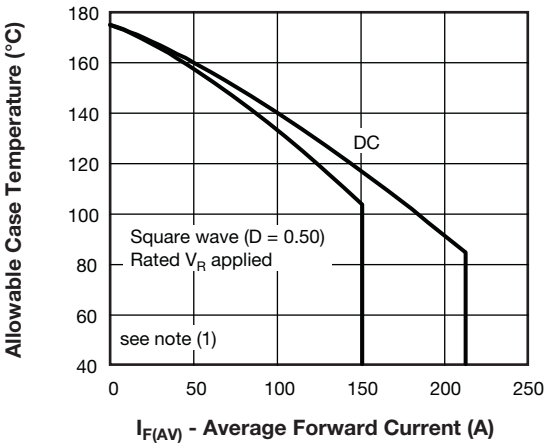

Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

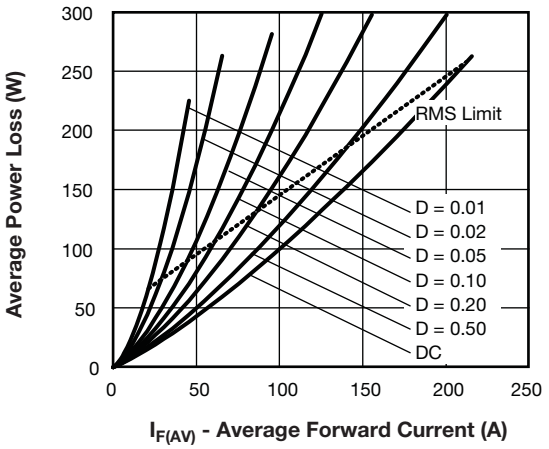

Fig. 6 - Forward Power Loss Characteristics

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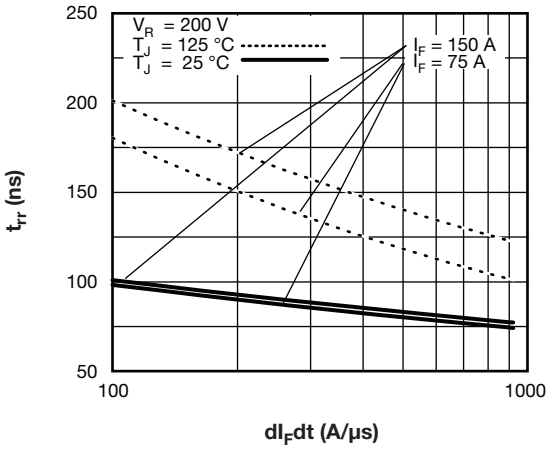

Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

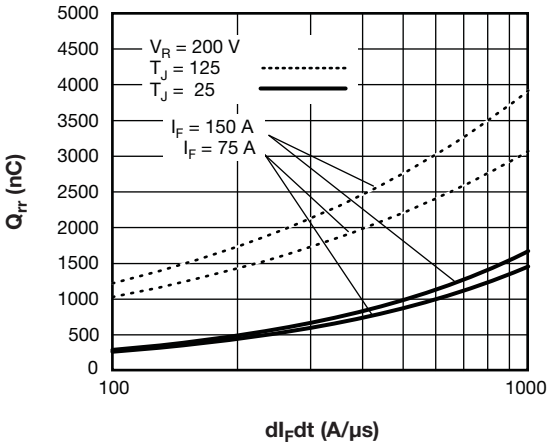

Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

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

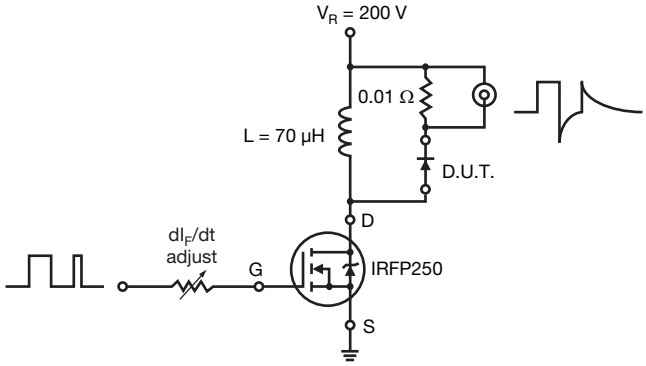

Fig. 9 - Reverse Recovery Parameter Test Circuit

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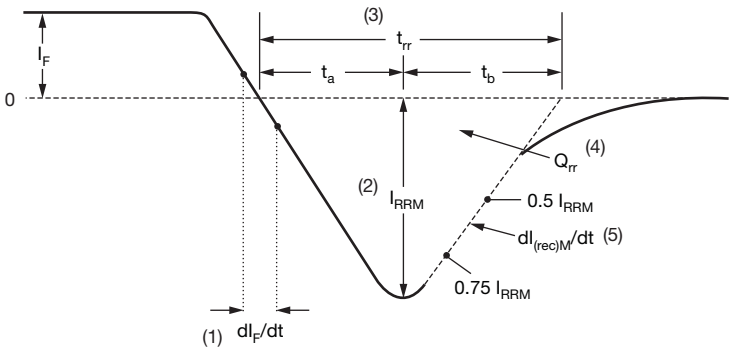

(1) dI_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 10 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code

VS-	150	E	B	U	04
1	2	3	4	5	6

1 - Vishay Semiconductors product
2 - Current rating (150 = 150 A)
3 - Single diode
4 - PowerTab® (ultrafast / hyperfast only)
5 - Ultrafast recovery
6 - Voltage rating (04 = 400 V)

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95240
Part marking information	www.vishay.com/doc?95370
Application note	www.vishay.com/doc?95179
SPICE model	www.vishay.com/doc?95623

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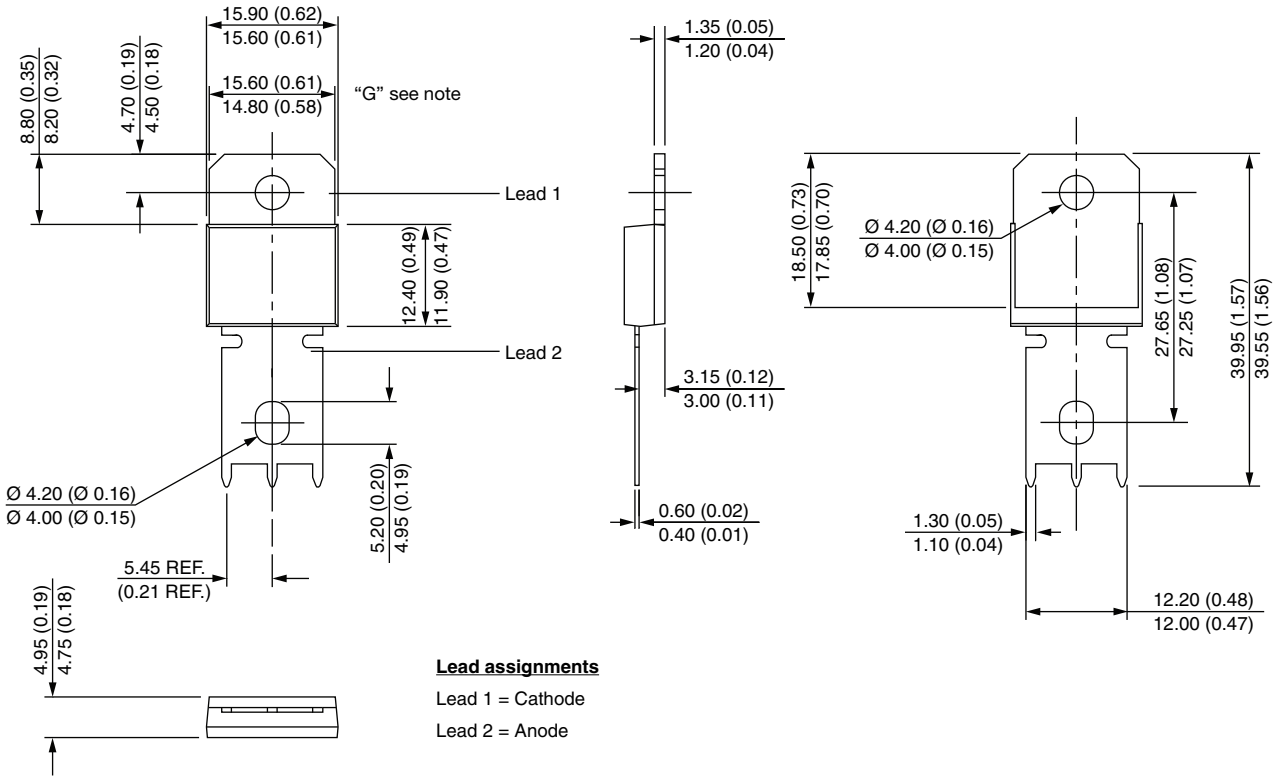
PowerTab®

DIMENSIONS in millimeters (inches)



Lead assignments

Lead 1 = Cathode

Lead 2 = Anode

Note:
Outline conform to JEDEC® TO-275, except for dimension "G" only

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