VISHAY VS-E7MH0112-M3 Hyperfast Recovery Rectifiers Owner's Manual

VISHAY VS-E7MH0112-M3 Hyperfast Recovery Rectifiers

Contents

FEATURES

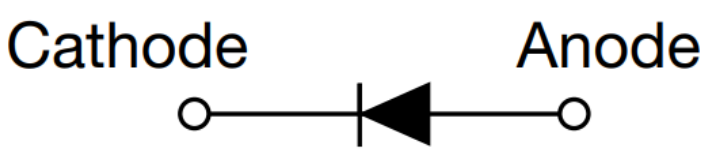
- Hyper fast recovery time, reduced Qrr, and soft recovery

RoHS

HALOGEN

FREE

- 175 °C maximum operating junction temperature
- Specified for output and snubber operation
- Low forward voltage drop
- Low leakage current
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



DESCRIPTION / APPLICATIONS

State of the art hyper fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyper fast recovery time.
The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness, and reliability characteristics.

These devices are intended for use as clamp, snubber and freewheeling diode in a fly back aux power supplies, bootstrap and desaturate for HV MOSFET and IGBT driver, high frequency rectifiers in a cuk and sepic circuit for LED lighting.
Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element.

MECHANICAL DATA

Case: SMA (DO-214AC)
Molding compound meets UL 94 V-0 flammability rating Terminals: matte tin plated leads, solder able per J-STD-002
Polarity: color band denotes cathode end

LINKS TO ADDITIONAL RESOURCES

- 3D Models

- Application Notes

PRIMARY CHARACTERISTICS	
IF(AV)	1 A
VR	1200 V
VF at IF	1.10V
trr	75 ns
Tj max.	175 °C
Package	SMA (DO-214AC)
Circuit configuration	Single

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Peak repetitive reverse voltage	VRRM		1200	V
Average rectified forward current	IFomo	Tsp = 144 °C, D = 0.5	1	A
Non-repetitive peak surge current	IFsm	Tj = 25 °C, 8.3 ms sine pulse	21	
Operating junction and storage temperatures	Tj, TStg		-55 to +175	°C

ELECTRICAL SPECIFICATIONS (T j = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Breakdown voltage, blocking voltage	VBR, VR	IR = 100 pA	1200			V
Forward voltage, per diode	VF	IF = 1 A	–	1.35	1.80	
		IF = 1 A, T, = 125 °C	–	1.17	1.55	
		IF = 1 A, T j = 150 °C	–	1.10	1.44	
Reverse leakage current, per diode	IR	VR = VR rated	–		5	pA
		T j = 150 °C, VR = VA rated	–		50	
Junction capacitance	CT	VR = 1200 V	–	3.5		pF

DYNAMIC RECOVERY CHARACTERISTICS (T_j = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		MIN.	TYP.	MAX.	UNITS
Reverse recovery time	t_{rr}	IF = 0.5 A, IR = 1 A, I_{rr} = 0.25 A				75	ns
		T j = 25 °C	IF = 1 A, dIF/dt = 200 A/ps, VR = 800 V		99		
		T_j = 125 °C			137	–	
Peak recovery current	IRnm	T_j = 25 °C			3.5	–	A
		Tj = 125 °C			4.5	–	
Reverse recovery charge	Q_{rr}	T_j = 25 °C			150	–	nC
		T = 125 °C			286	–	

THERMAL – MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_j, Ts_{tg}		-55		175	
Thermal resistance, junction to mount	RthJM (1)	Device mounted on PCB with2 x 3.5 mm soldering lands		15	18	aCAV
Thermal resistance, junction to ambient	RthJA	Device mounted on PCB with recommended pad size		110		aCAV
Approximate weight			0.07			g
Marking device		Case style SMA (DO-214AG)	1H12			

Note
(1) Thermal resistance junction to mount follows JEDEC® 51-14 transient dual interface test method (TDIM)

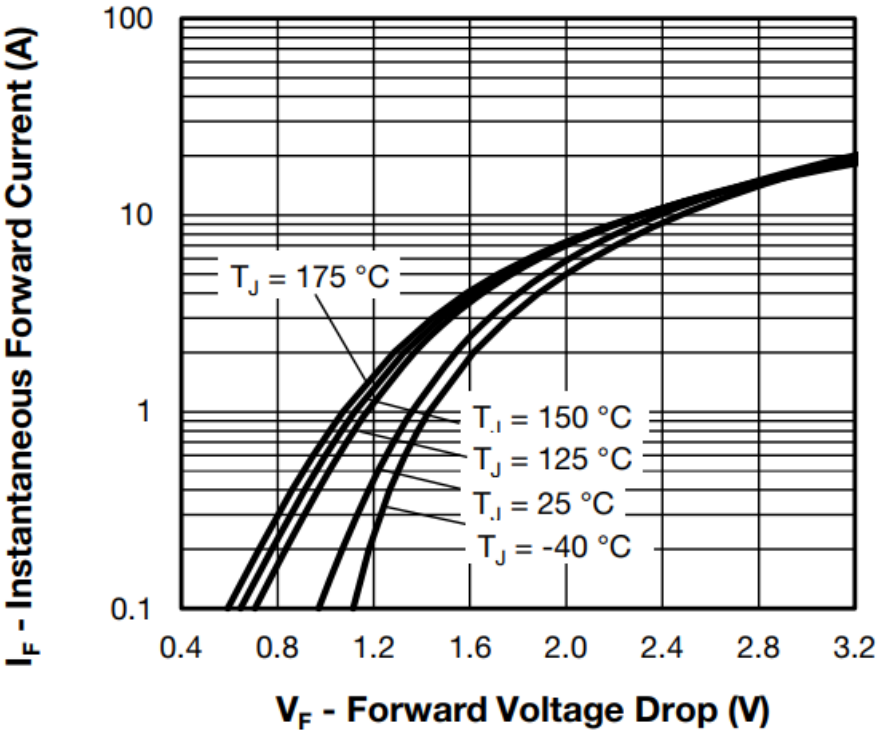


Fig. 1 - Typical Forward Voltage Drop Characteristics

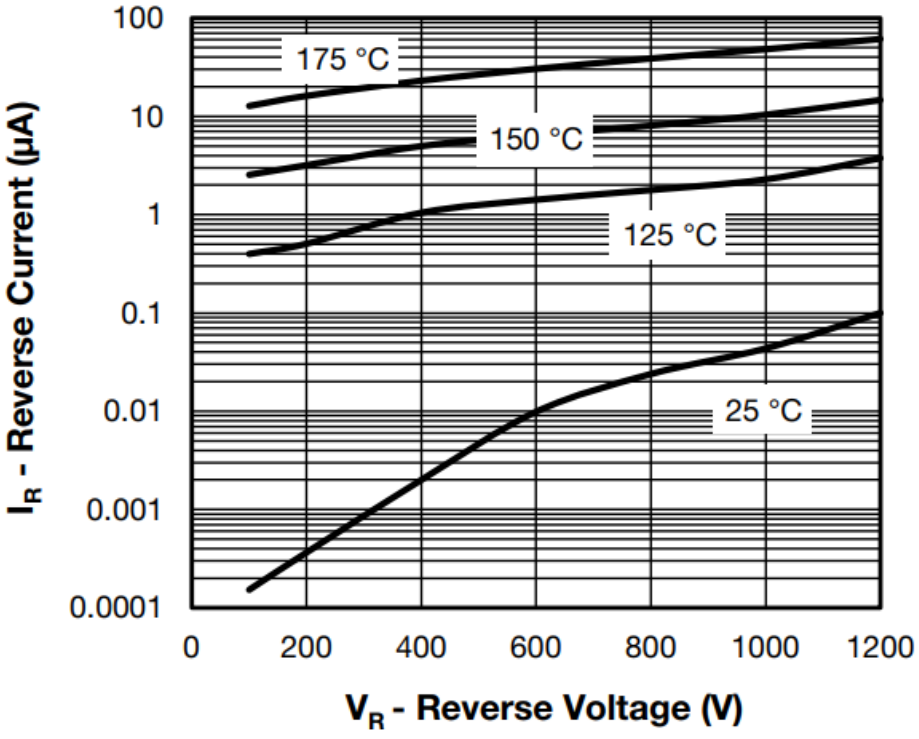


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

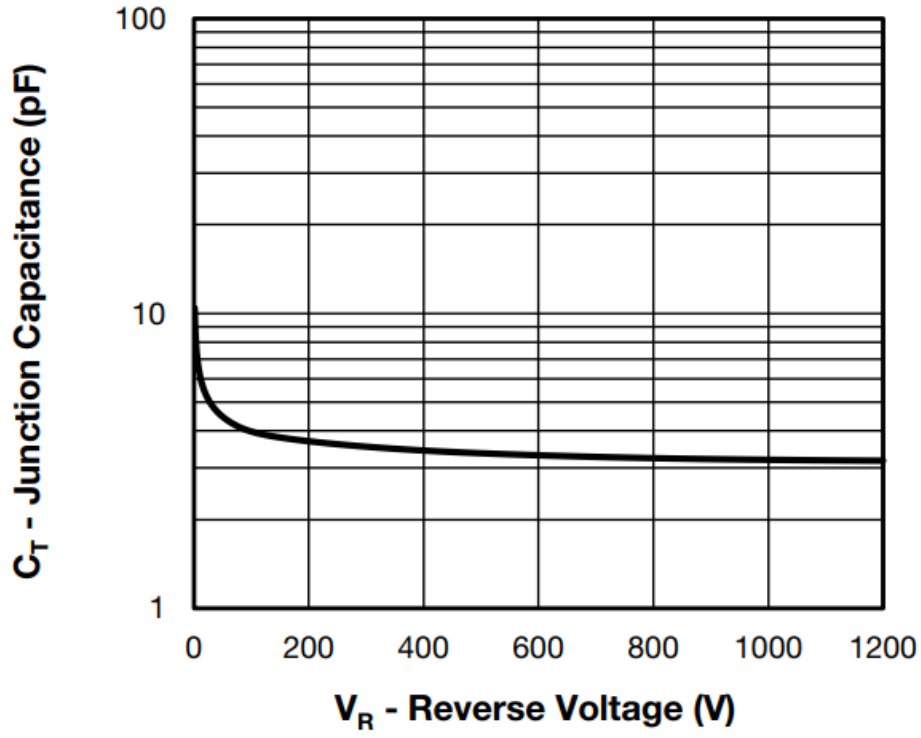


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

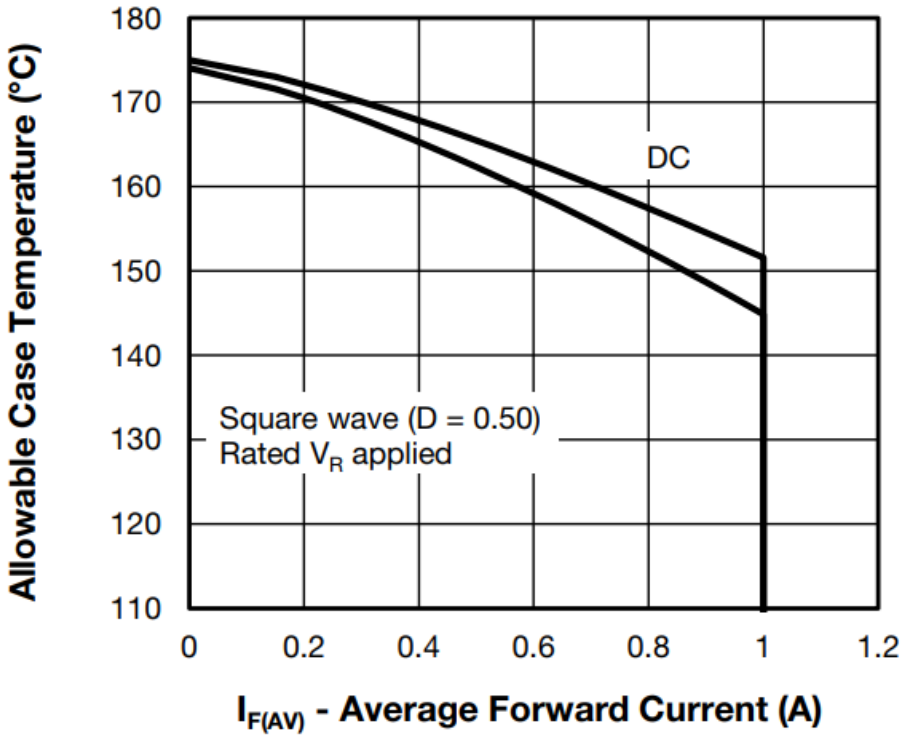


Fig. 4 - Maximum Allowable Case Temperature vs.
Average Forward Current

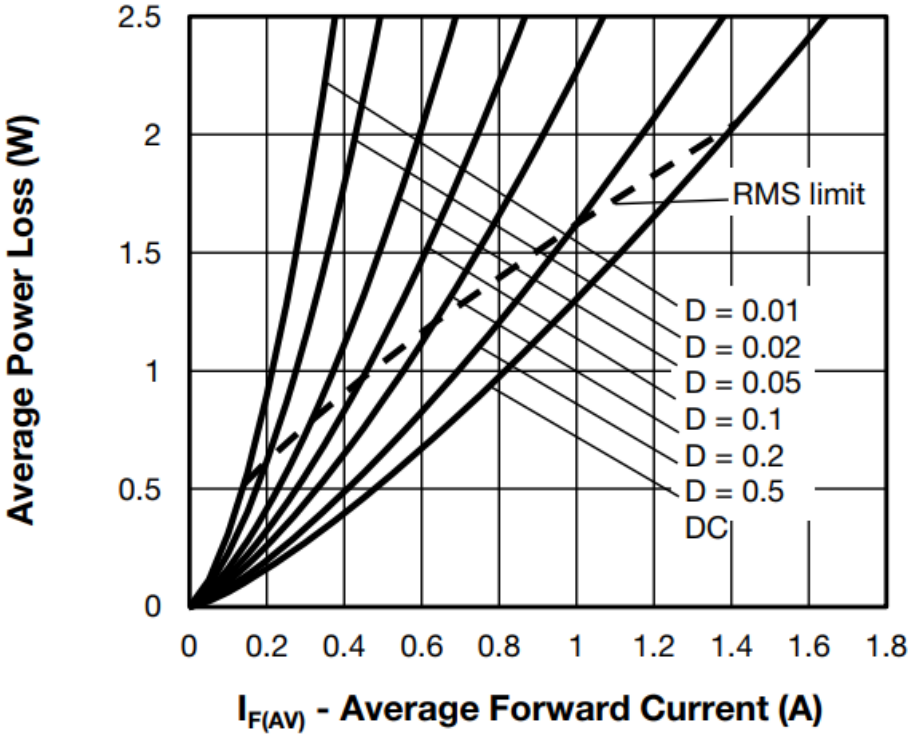


Fig. 5 - Forward Power Loss Characteristics

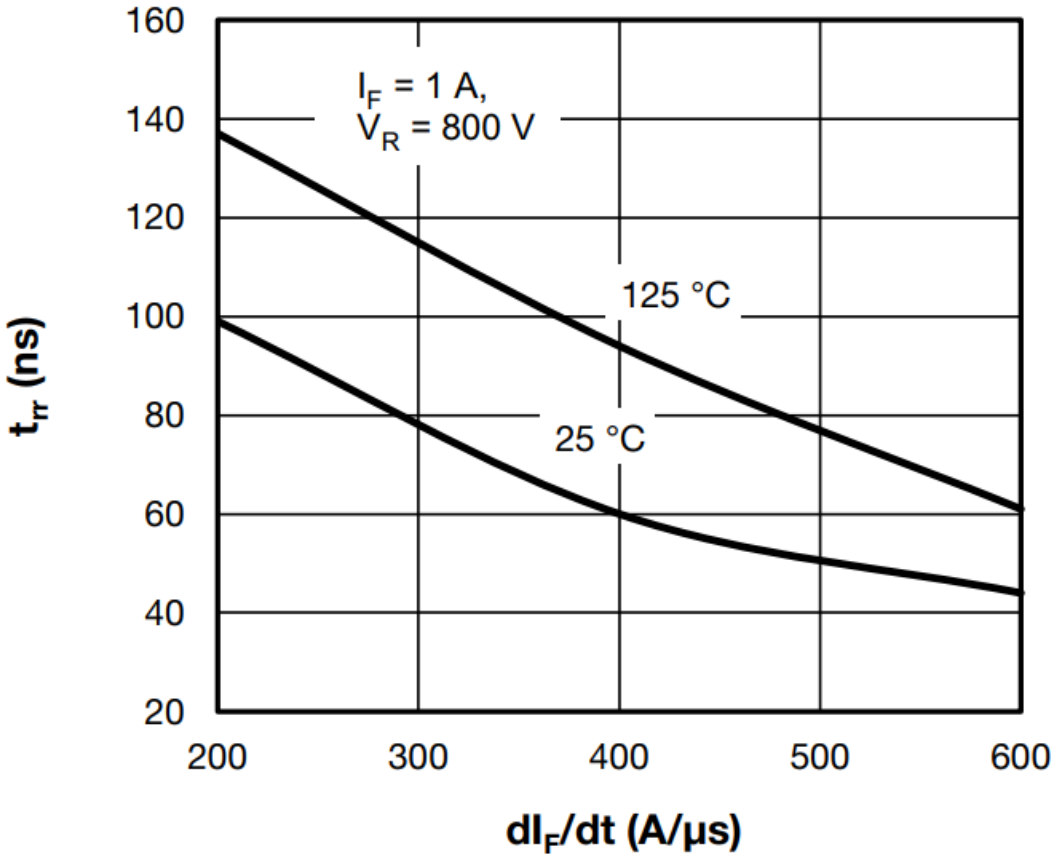


Fig. 6 - Typical Reverse Recovery Time vs. dI_F/dt

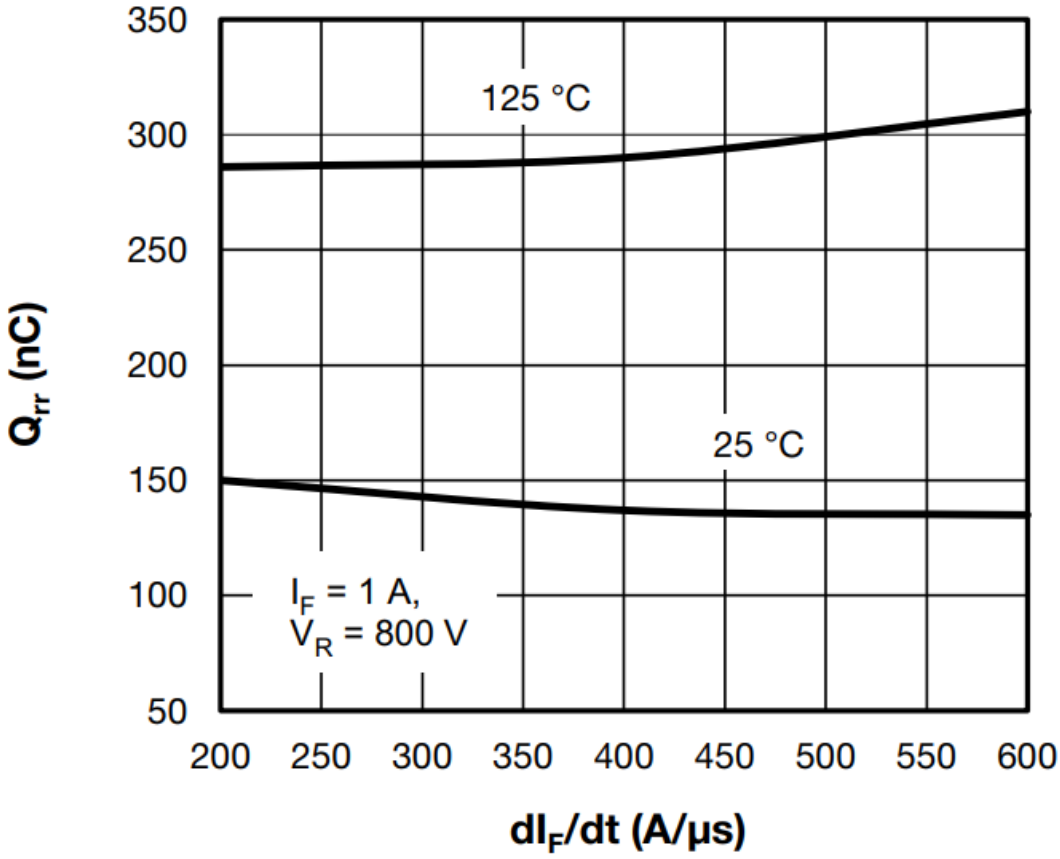


Fig. 7 - Typical Stored Charge vs. dI_F/dt

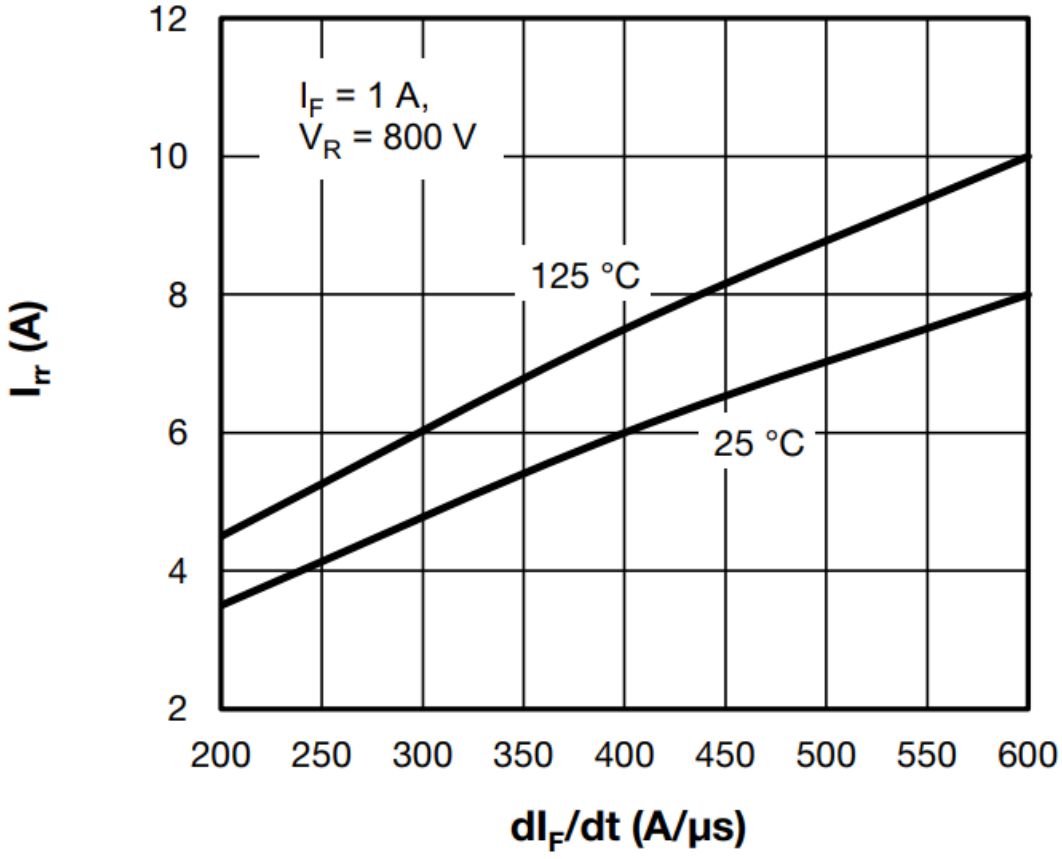


Fig. 8 - I_{rr} (A) vs. dI_F/dt

Note

(1) Formula used: TC = TJ – (Pd + PdREV) x RthJC;
Pd = forward power loss = IF(AV) x VFM at (IF(AV)/D) (see **fig**. 5);
PdREV = inverse power loss = VR1 x IR (1 – D); IR at VR1 = rated V

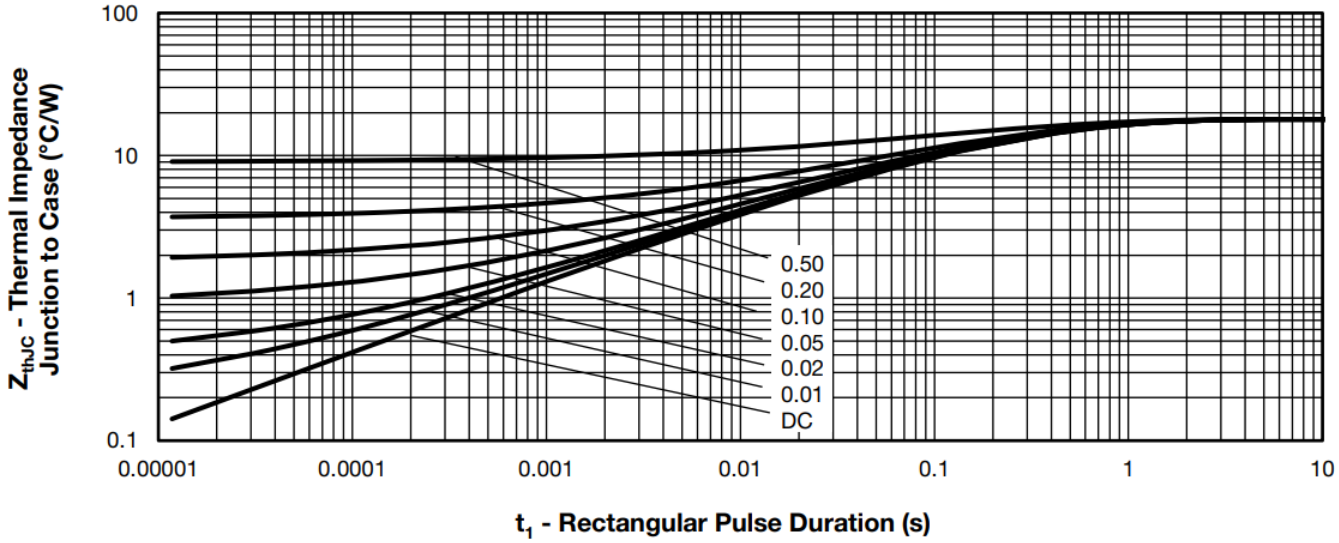


Fig. 9 - Transient Thermal Impedance, Junction to Case

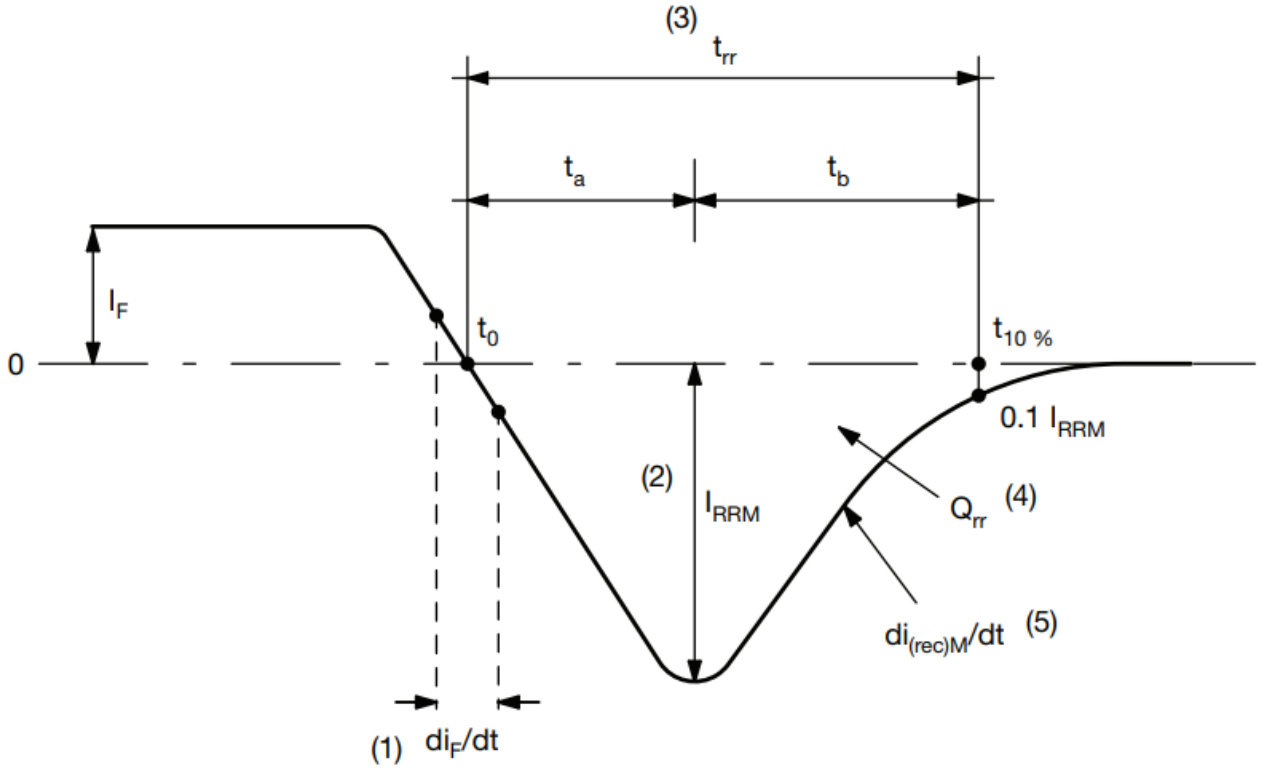


Fig. 10 - Reverse Recovery Waveform and Definitions

Notes

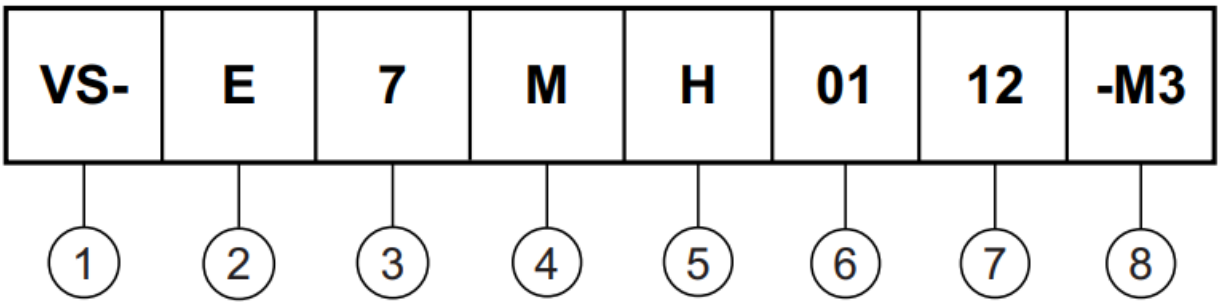
1. diF/dt – rate of change of current through zero crossing
2. IRRM – peak reverse recovery current
3. trr – reverse recovery time measured from t0, crossing point of negative going IF, to point t10%, 0.1 IRRM
4. Qrr – area under curve defined by t0 and t10 %

$$Q_{rr} = \int_{t_0}^{t_{10\ \%}} I(t)dt$$

5. di(rec)M/dt – peak rate of change of current during tb portion of trr

ORDERING INFORMATION TABLE

Device code



1 – Vishay Semiconductors product

2 – Circuit configuration: **E** = single diode

3 – 7 = FRED generation 7

4 – M = SMA package

5 – Process type, **H** = hyperfast recovery

6 – Current rating (01 = 1 A)

7 – Voltage code (12 = 1200 V)

8 – M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER REEL**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-E7MH0112-M3/1	7500	7500	13″diameter plastic tape and reel

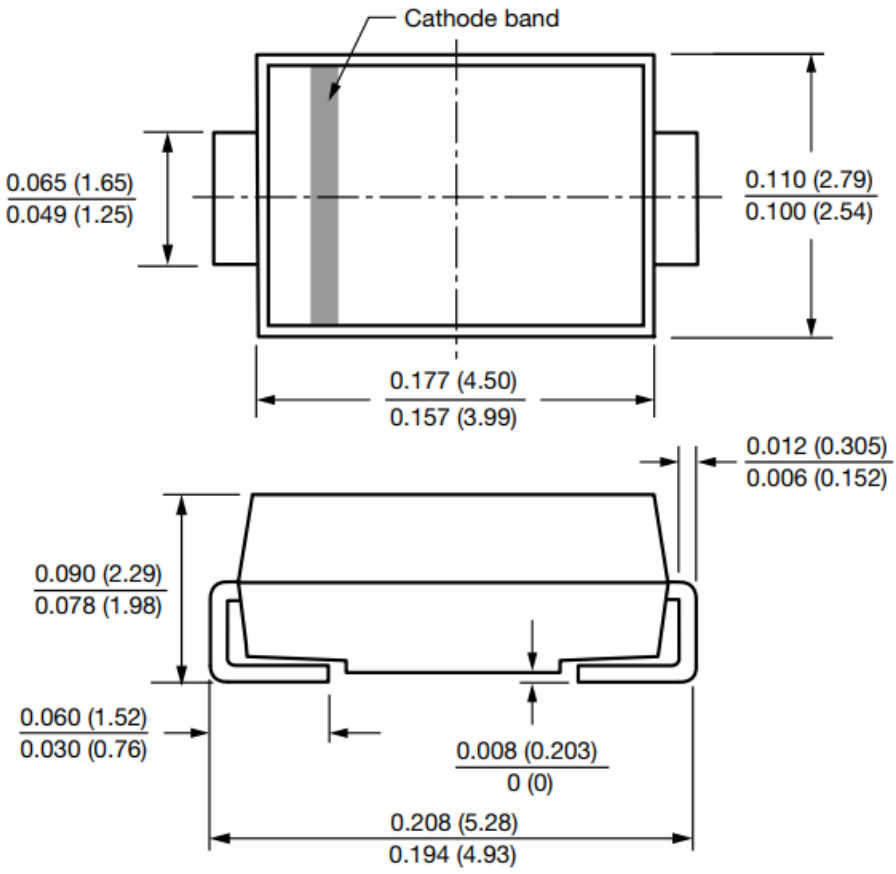
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95400
Part marking information	www.vishay.com/doc?95472
Packaging information	www.vishay.com/doc?95404
SPICE model	www.vishay.com/doc?97060

DIMENSIONS

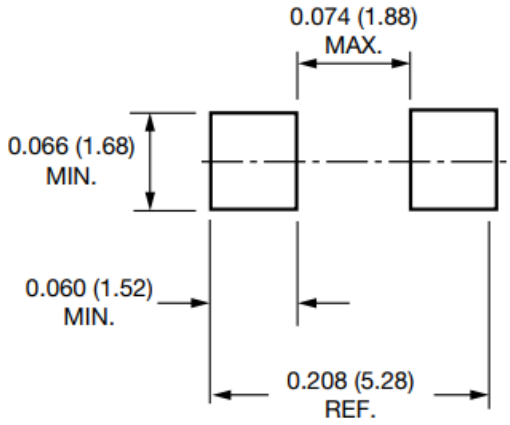
SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout



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Documents / Resources

	VISHAY VS-E7MH0112-M3 Hyperfast Recovery Rectifiers [pdf] Owner's Manual VS-E7MH0112-M3 Hyperfast Recovery Rectifiers, VS-E7MH0112-M3, Hyperfast Recovery Rectifiers, Recovery Rectifiers, Rectifiers

References

- Vishay Intertechnology: Passives & Discrete Semiconductors
- vishay.com/doc?32571
- vishay.com/doc?87401
- User Manual