

Hyperfast Rectifier, 2 A FRED Pt®



LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | | | | |
|----------------------------------|----------------|--|--|--|
| I _{F(AV)} | 2 A | | | |
| V_{R} | 100 V | | | |
| V _F at I _F | 0.75 V | | | |
| t _{rr} | 25 ns | | | |
| T _J max. | 175 °C | | | |
| Package | SMA (DO-214AC) | | | |
| Circuit configuration | Single | | | |

FEATURES

 Hyperfast recovery time, reduced Q_{rr}, and soft recovery



COMPLIANT HALOGEN

FREE

• 175 °C maximum operating junction temperature

- Specified for output and snubber operation
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- 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.vishav.com/doc?99912

DESCRIPTION / APPLICATIONS

State of the art hyperfast recovery rectifiers specifically designed with optimized performance of forward voltage drop and hyperfast 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 in snubber, boost, lighting, as high frequency rectifiers, and freewheeling diodes.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over 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, solderable per

J-STD-002 and JESD 22-B102

Polarity: color band denotes cathode end

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|-----------------------------------|---|-------------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Peak repetitive reverse voltage | V_{RRM} | | 100 | V |
| Average rectified forward current | I _{F(AV)} | T _{Sp} = 138 °C | 2 | Λ |
| Non-repetitive peak surge current | I _{FSM} | T _J = 25 °C, 6 ms square pulse | 50 | A |
| 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. | UNITS |
| Breakdown voltage, blocking voltage | V _{BR} , V _R | I _R = 100 μA | 100 | - | - | ., |
| Forward voltage, per diode | V_{F} | I _F = 2 A | - | 0.88 | 0.95 | V |
| Forward voltage, per diode | VF | I _F = 2 A, T _J = 125 °C | - | 0.75 | 0.82 | |
| Reverse leakage current, per diode I _R | , | 5 | - | - | 2 | |
| | 'R | $T_J = 125 ^{\circ}\text{C}, V_R = V_R \text{rated}$ | - | 0.6 | 8 | μA |
| Junction capacitance | C _T | V _R = 100 V | - | 8.5 | - | pF |

| DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified) | | | | | | | | |
|---|------------------|---|--|------|------|------|-------|----|
| PARAMETER | SYMBOL | TEST CO | NDITIONS | MIN. | TYP. | MAX. | UNITS | |
| | | $I_F = 1 \text{ A, } dI_F/dt = 50 \text{ A/}\mu\text{s, } V_R = 30 \text{ V}$ | | - | 24 | - | | |
| Povorgo rocoveny timo | | I _F = 0.5 A, I _R = 1 A, I _{rr} = 0.25 A | | - | - | 25 | | |
| Reverse recovery time | t _{rr} | L _{rr} | T _J = 25 °C | | - | 16 | - | ns |
| | | T _J = 125 °C | | - | 22 | - | | |
| Peak recovery current | I _{RRM} | T _J = 25 °C | $I_F = 2 A,$ $dI_F/dt = 200 A/\mu s,$ | - | 2 | - | Α | |
| Peak recovery current | | T _J = 125 °C | $V_R = 160 \text{ V}$ | - | 3 | - | _ A | |
| Daviera va carren el como | 0 | T _J = 25 °C | | - | 16 | - | nC | |
| Reverse recovery charge | Q _{rr} | T _J = 125 °C | | - | 30 | - | TIC | |

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | | |
|--|-----------------------------------|---|------|-------|------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNITS |
| Maximum junction and storage temperature range | T _J , T _{Stg} | | -55 | - | 175 | °C |
| Thermal resistance, junction to lead | R _{thJL} | Device mounted on PCB with 2 x 3.5 mm soldering lands | - | 11 | 21 | °C/W |
| Thermal resistance, junction to ambient | R _{thJA} | Device mounted on PCB with recommended pad size | - | - | 125 | °C/W |
| Approximate weight | | | | 0.07 | | g |
| Approximate weight | | | | 0.002 | | oz. |
| Marking device | | Case style SMA (DO-214AC) | | 2 | H1 | |

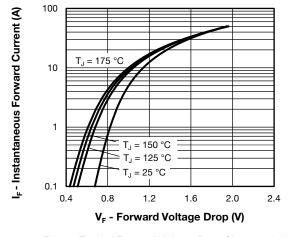


Fig. 1 - Typical Forward Voltage Drop Characteristics

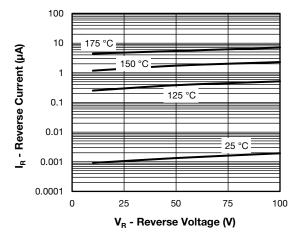


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

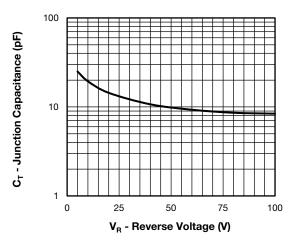
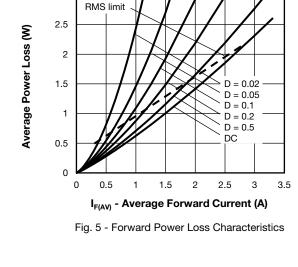


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



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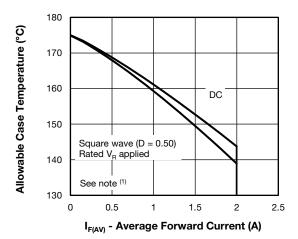


Fig. 4 - Maximum Allowable Case Temperature vs.
Average Forward Current

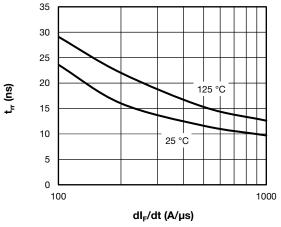


Fig. 6 - Typical Reverse Recovery Time vs. dl_F/dt

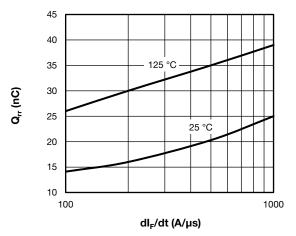
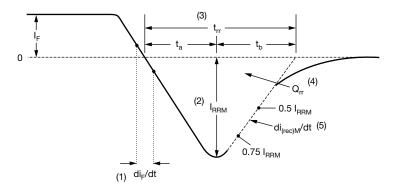


Fig. 7 - Typical Stored Charge vs. dl_F/dt

Note

 $\begin{array}{ll} \text{(1)} & \text{Formula used: } T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}; \\ Pd = \text{forward power loss} = I_{F(AV)} \times V_{FM} \text{ at } (I_{F(AV)}/D) \text{ (see fig. 5)}; \\ Pd_{REV} = \text{inverse power loss} = V_{R1} \times I_R \text{ (1 - D)}; I_R \text{ at } V_{R1} = \text{rated } V_R \\ \end{array}$

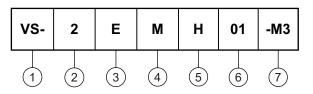


- (1) di_F/dt rate of change of current through zero crossing
- (4) Q_{rr} area under curve defined by t_{rr} and I_{RRM}
- (2) I_{RRM} peak reverse recovery current
- $Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$
- (3) t_{rr} reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.
- (5) di_{(rec)M}/dt peak rate of change of current during t_b portion of t_{rr}

Fig. 8 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code



- 1 Vishay Semiconductors product
- 2 Current rating (2 = 2 A)
- Gircuit configuration:

E = single diode

4 - M = SMA package

5 - Process type,

H = hyperfast recovery

6 - Voltage code (01 = 100 V)

7 - -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-2EMH01-M3/5AT | 7500 | 7500 | 13"diameter plastic tape and reel | | |

| LINKS TO RELATED DOCUMENTS | | | | |
|--|--------------------------|--|--|--|
| Dimensions <u>www.vishay.com/doc?95400</u> | | | | |
| Part marking information | www.vishay.com/doc?95472 | | | |
| Packaging information | www.vishay.com/doc?95404 | | | |
| SPICE model | www.vishay.com/doc?96376 | | | |



SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout





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Vishay

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