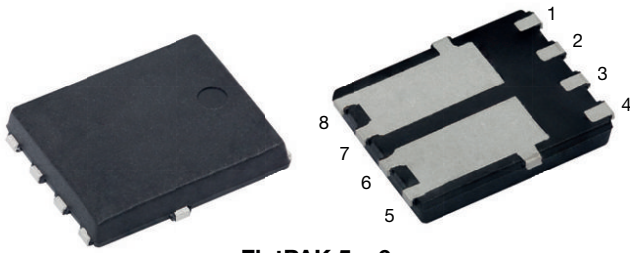
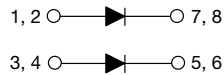


## Hyperfast Rectifier, 2 x 4 A FRED Pt<sup>®</sup>


**FlatPAK 5 x 6**


### FEATURES

- Hyperfast recovery time, reduced  $Q_{rr}$ , and soft recovery
- 175 °C maximum operating junction temperature
- Specific 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### 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, piezo-injection, as high frequency rectifiers, and freewheeling diodes.

The extremely optimized stored charge and low recovery current minimize the switching losses and reduce power dissipation in the switching element.

### MECHANICAL DATA

**Case:** FlatPAK 5 x 6

Molding compound meets UL 94 V-0 flammability rating  
Halogen-free, RoHS-compliant

**Terminals:** matte tin plated leads, solderable per J-STD-002, meets JESD 201 class 2 whisker test

### LINKS TO ADDITIONAL RESOURCES



#### PRIMARY CHARACTERISTICS

$I_{F(AV)}$	2 x 4 A
$V_R$	200 V
$V_F$ at $I_F$	0.7 V
$t_{rr}$ (typ.)	25 ns
$T_J$ max.	175 °C
Package	FlatPAK 5 x 6
Circuit configuration	Separated cathode

#### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	$V_{RRM}$		200	V
Average rectified forward current per device	$I_{F(AV)}$	$T_{Solderpad} = 170\text{ °C}$ , DC	8	A
		$T_{Solderpad} = 169\text{ °C}$ , $D = 0.5$		
Non-repetitive peak surge current per device per diode	$I_{FSM}$	$T_J = 25\text{ °C}$ , 10 ms sinusoidal pulse	173	
			87	
Operating junction and storage temperatures	$T_J, T_{Stg}$		-55 to +175	°C

#### ELECTRICAL SPECIFICATIONS ( $T_J = 25\text{ °C}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\ \mu\text{A}$	200	-	-	V
Forward voltage, per diode	$V_F$	$I_F = 4\text{ A}$	-	0.87	0.96	
		$I_F = 4\text{ A}$ , $T_J = 150\text{ °C}$	-	0.7	0.78	
Reverse leakage current, per diode	$I_R$	$V_R = V_R$ rated	-	-	2	$\mu\text{A}$
		$T_J = 150\text{ °C}$ , $V_R = V_R$ rated	-	7	80	
Junction capacitance	$C_T$	$V_R = 200\text{ V}$	-	19	-	pF



DYNAMIC RECOVERY CHARACTERISTICS ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse recovery time	$t_{rr}$	$I_F = 1.0\text{ A}$ , $dI_F/dt = 50\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$	-	20	-	ns
		$I_F = 0.5\text{ A}$ , $I_R = 1\text{ A}$ , $I_{rr} = 0.25\text{ A}$	-	-	25	
		$T_J = 25\text{ }^\circ\text{C}$	-	17	-	
		$T_J = 125\text{ }^\circ\text{C}$	-	29	-	
Peak recovery current	$I_{RRM}$	$T_J = 25\text{ }^\circ\text{C}$	-	2.1	-	A
		$T_J = 125\text{ }^\circ\text{C}$	-	4	-	
Reverse recovery charge	$Q_{rr}$	$T_J = 25\text{ }^\circ\text{C}$	-	18	-	nC
		$T_J = 125\text{ }^\circ\text{C}$	-	60	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Maximum junction and storage temperature range	$T_J$ , $T_{Stg}$		-55	-	175	$^\circ\text{C}$
Thermal resistance, junction to ambient, per diode	$R_{thJA}$ <sup>(1)(2)</sup>		-	89	103	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to mount, per diode	$R_{thJM}$ <sup>(3)</sup>		-	1.8	2.1	

**Notes**

- (1) The heat generated must be less than the thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{thJA}$   
(2) Free air, mounted or recommended copper pad area; thermal resistance  $R_{thJA}$  - junction to ambient  
(3) Mounted on infinite heatsink

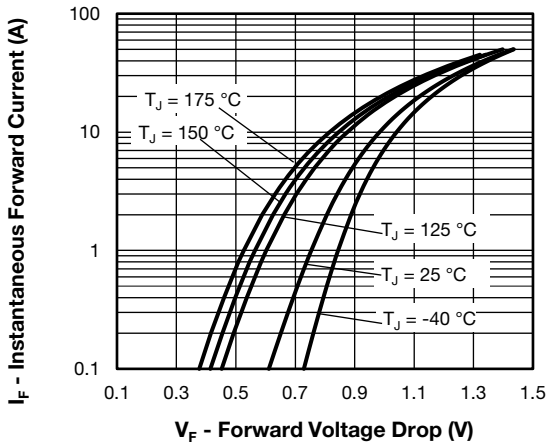


Fig. 1 - Typical Forward Voltage Drop Characteristics

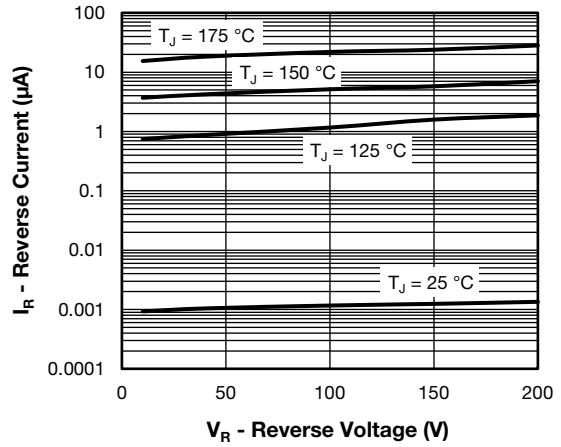


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

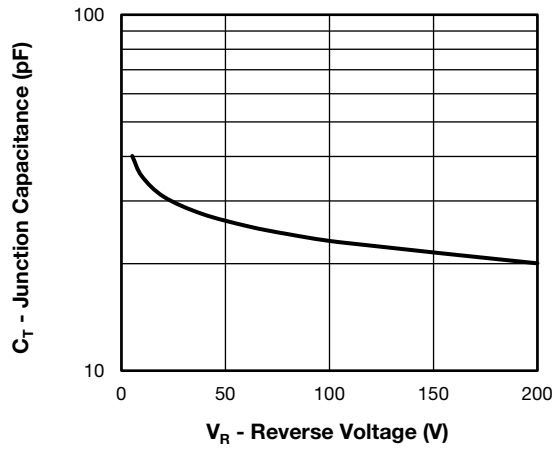


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

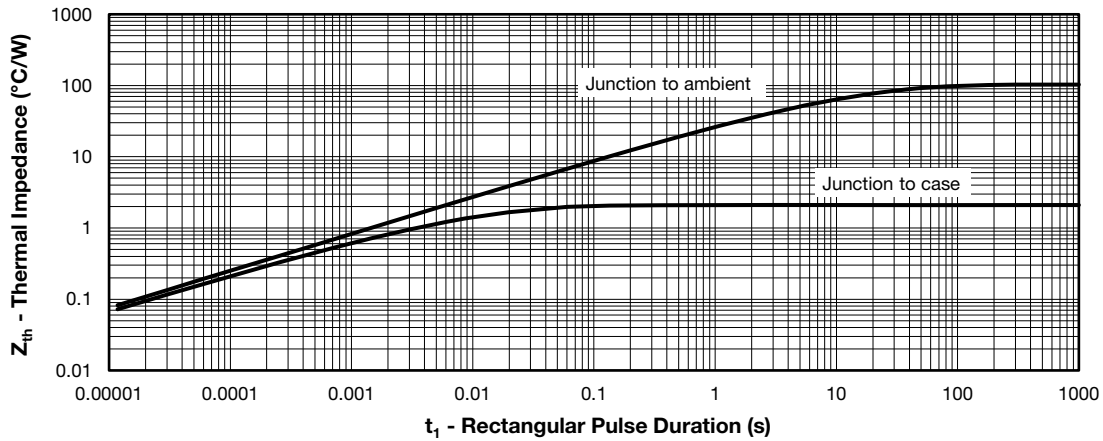


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

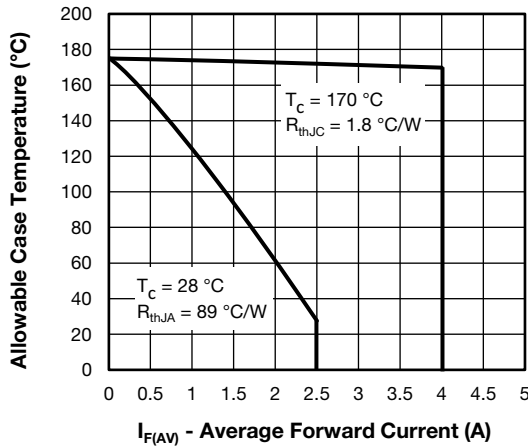


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

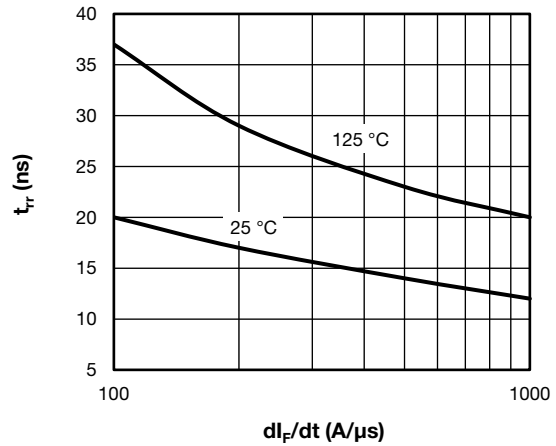


Fig. 7 - Typical Reverse Recovery Time vs.  $di_F/dt$

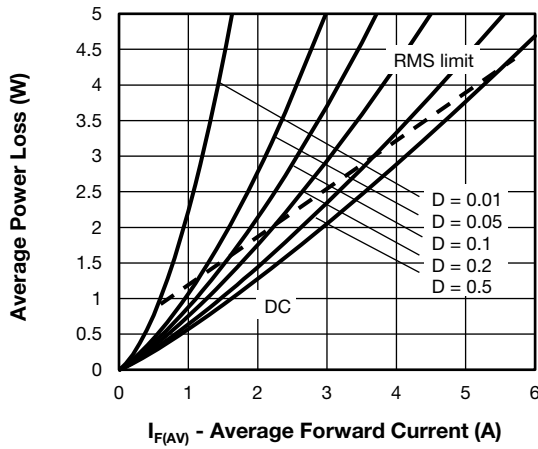


Fig. 6 - Forward Power Loss Characteristics

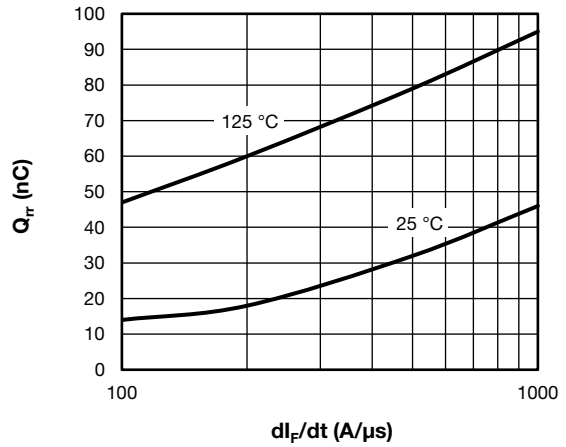
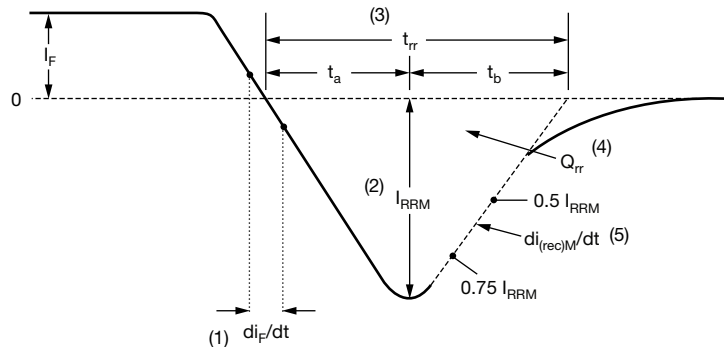


Fig. 8 - Typical Stored Charge vs.  $di_F/dt$



- (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  $I_{RRM}$

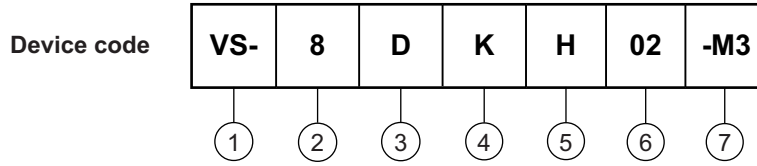
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

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

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (8 = 8 A)
- 3** - Circuit configuration:  
D = separated cathode
- 4** - K = FlatPAK package
- 5** - Process type,  
H = hyper fast recovery
- 6** - Voltage code (02 = 200 V)
- 8** - -M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

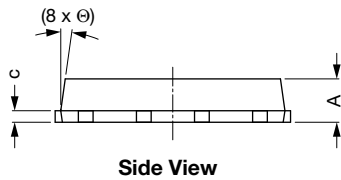
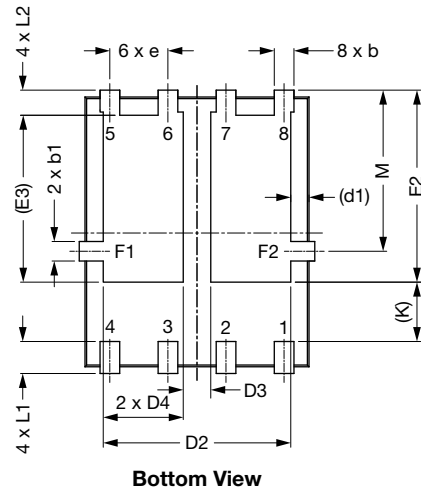
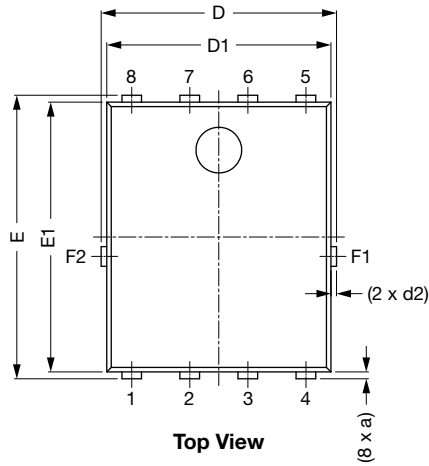
ORDERING INFORMATION (example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-8DKH02-M3/H	0.10	H	1500	7" diameter plastic tape and reel
VS-8DKH02-M3/I	0.10	I	6000	13" diameter plastic tape and reel

LINKS TO RELATED DOCUMENTS	
Dimensions	<a href="http://www.vishay.com/doc?96056">www.vishay.com/doc?96056</a>
Part marking information	<a href="http://www.vishay.com/doc?96059">www.vishay.com/doc?96059</a>
Packaging information	<a href="http://www.vishay.com/doc?88869">www.vishay.com/doc?88869</a>



### FlatPAK 5 x 6 (Dual)

**DIMENSIONS** in inches (millimeters)



DIM.	INCHES			MILLIMETERS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.035	0.039	0.043	0.89	0.99	1.09
(a)	-	0.006	-	-	0.15	-
b	0.013	0.017	0.020	0.32	0.43	0.52
b1	0.013	0.017	0.020	0.32	0.43	0.52
c	0.008	-	0.014	0.20	-	0.35
D	0.197	0.203	0.209	5.00	5.15	5.30
D1	0.189	0.193	0.197	4.80	4.90	5.00
D2	0.154	0.161	0.169	3.90	4.10	4.30
D3	0.020	0.024	0.031	0.50	0.60	0.80
D4	0.063	0.069	0.075	1.60	1.75	1.90
(d1)	-	0.016	-	-	0.40	-
(d2)	-	0.005	-	-	0.125	-
E	0.238	0.244	0.250	6.05	6.20	6.35



DIM.	INCHES			MILLIMETERS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
E1	0.228	0.232	0.236	5.80	5.90	6.00
E2	0.157	0.165	0.173	4.00	4.20	4.40
(E3)	-	0.144	-	-	3.65	-
e	0.050 BSC			1.27 BSC		
(K)	0.039	-	-	1.00	-	-
L1	0.019	-	0.043	0.48	-	1.10
L2	0.012	-	0.031	0.30	-	0.80
M	0.128	0.138	0.148	3.25	3.50	3.75
Θ	0°	-	10°	0°	-	10°

**Notes**

- Dimensioning and tolerancing per ASME Y14.5-2009
- Dimensions D1 and E1 do not include mold flash or gate burrs
- Dimension (XX) means reference only



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