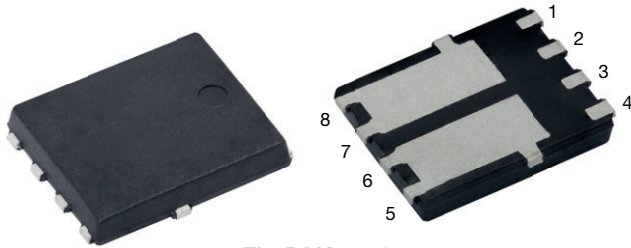
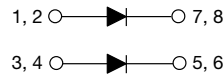


## Hyper Fast Rectifier, 2 x 4 A FRED Pt®



FlatPAK 5 x 6



### FEATURES

- Hyper fast 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 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 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

Base P/N-M3 - halogen-free, RoHS-compliant

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 2 whisker test

PRODUCT SUMMARY	
Package	FlatPAK 5 x 6
$I_{F(AV)}$	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
Diode variation	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 ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	$V_{BR}, V_R$	$I_R = 100\text{ }\mu\text{A}$	200	-	-	V
Forward voltage, per diode	$V_F$	$I_F = 4\text{ A}$	-	0.87	0.96	
		$I_F = 4\text{ A}, T_J = 150\text{ }^{\circ}\text{C}$	-	0.7	0.78	
Reverse leakage current, per diode	$I_R$	$V_R = V_R\text{ rated}$	-	-	2	$\mu\text{A}$
		$T_J = 150\text{ }^{\circ}\text{C}, V_R = V_R\text{ rated}$	-	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	$R_{thJA}^{(1)(2)}$		-	89	103	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction to case, per diode	$R_{thJC}^{(3)}$		-	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

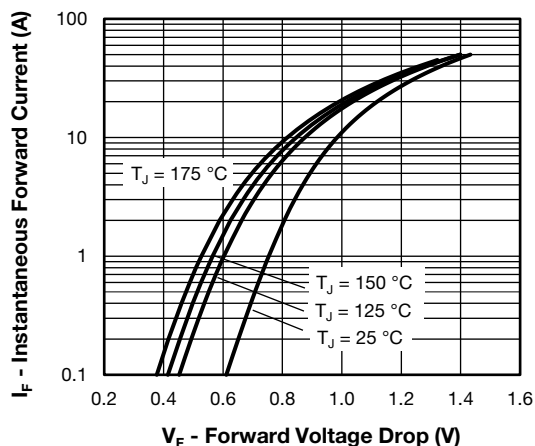


Fig. 1 - Typical Forward Voltage Drop Characteristics

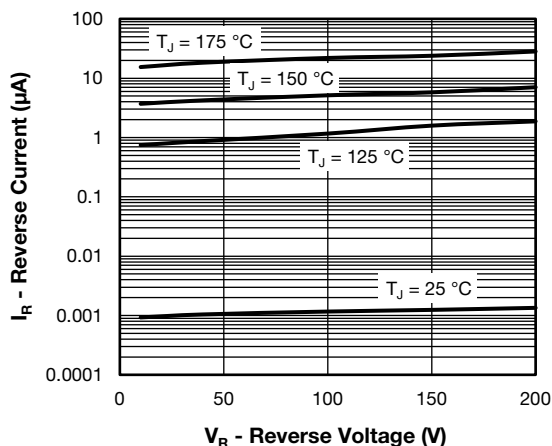


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

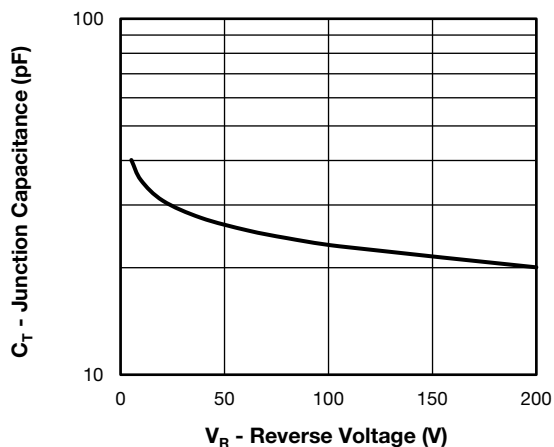
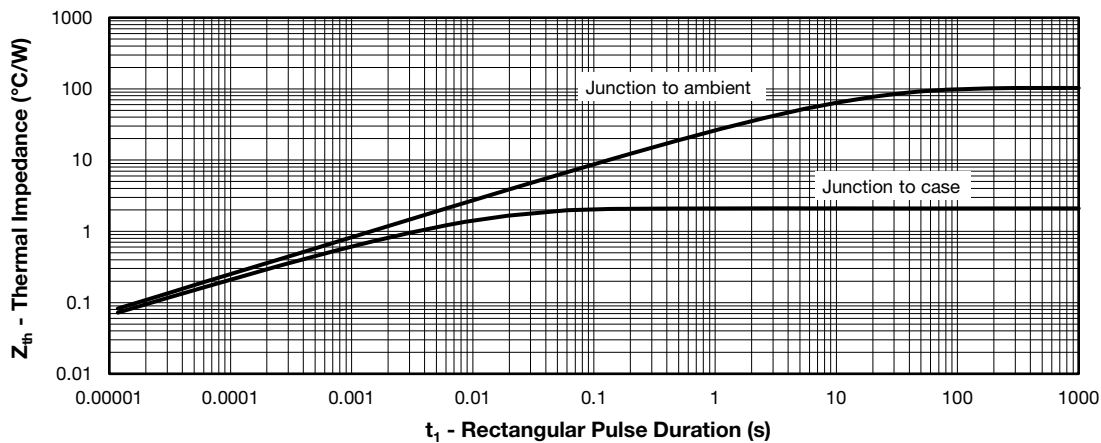


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

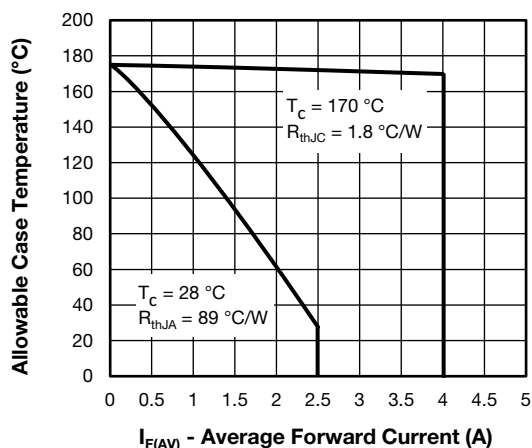


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

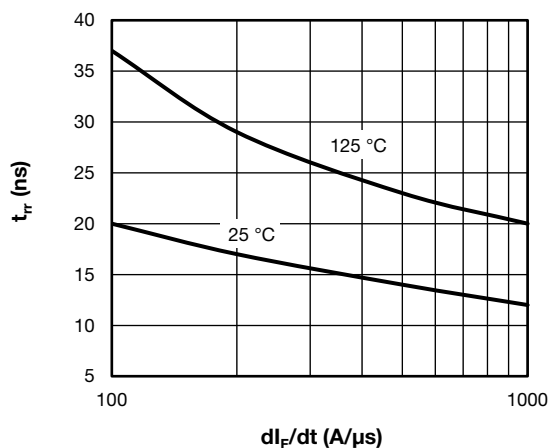


Fig. 7 - Typical Reverse Recovery Time vs.  $dI_F/dt$

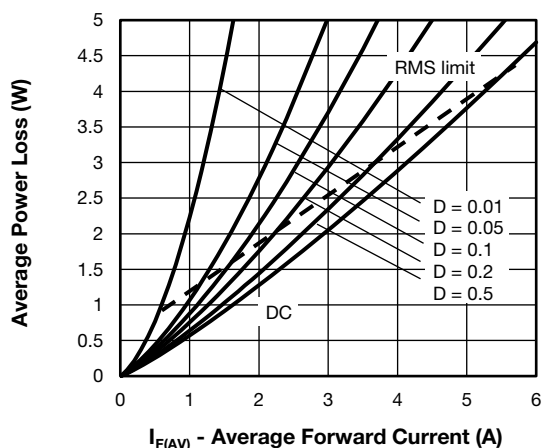


Fig. 6 - Forward Power Loss Characteristics

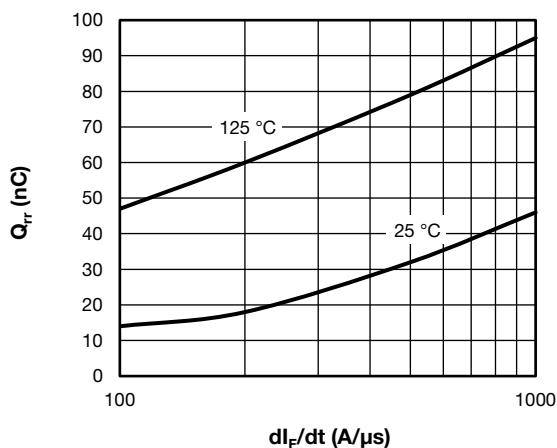


Fig. 8 - Typical Stored Charge vs.  $dI_F/dt$

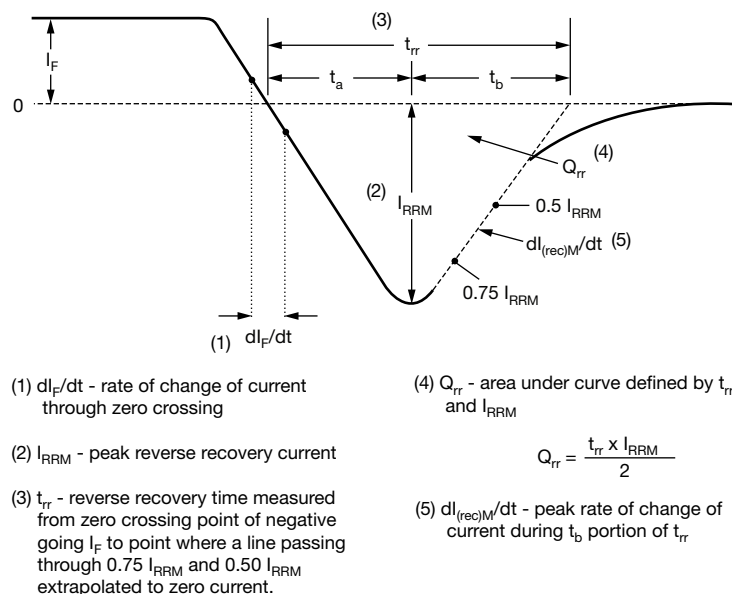


Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code	VS-	8	D	K	H	02	-M3
	1	2	3	4	5	6	7

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

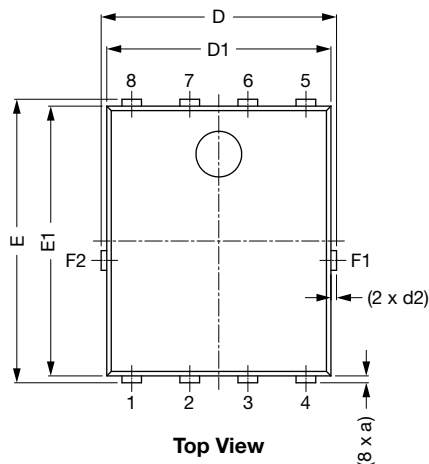
ORDERING INFORMATION (example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-8DKH02-M3/H	0.10	H	1500	7" diameter plastic tape and reel
VS-8DKH02-M3/I	0.10	I	6000	13" diameter plastic tape and reel

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>

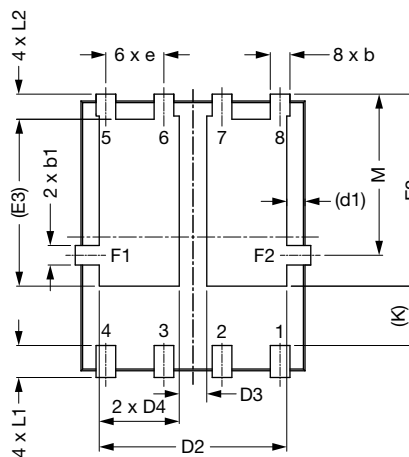


## FlatPAK 5 x 6 (Dual)

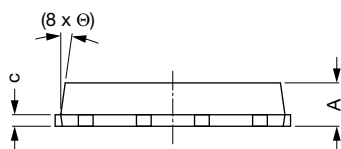
**DIMENSIONS** in inches (millimeters)



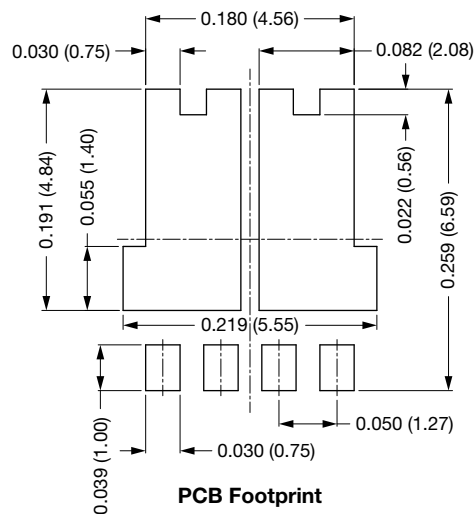
Top View



Bottom View



Side View



PCB Footprint

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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