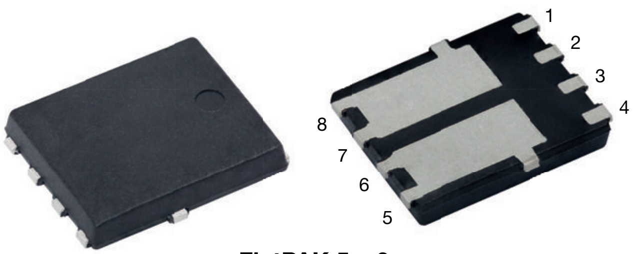
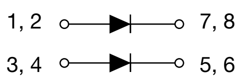
Hyperfast Rectifier, 2 x 3 A FRED Pt®



FlatPAK 5 x 6



LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	2 x 3 A
V_R	200 V
V_F at I_F	0.71 V
t_{rr}	20 ns
T_J max.	175 °C
Package	FlatPAK 5 x 6
Circuit configuration	Separated cathode

FEATURES

- Hyper fast recovery time, reduced Q_{rr}, and soft recovery
- 175 °C maximum operating junction temperature
- Low forward voltage drop
- Low leakage current
- Specific for output and snubber operation
- 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

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, lighting, 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

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 °C, DC	3	
			$T_{Solderpad}$ = 169 °C, D = 0.5		
Non-repetitive peak surge current	per device	I_{FSM}	T_J = 25 °C, 10 ms sinusoidal pulse	147	A
	per diode			70	

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	200	-	-	V
Forward voltage	V_F	I_F = 3 A	-	0.88	0.94	
		I_F = 3 A, T_J = 150 °C	-	0.71	0.74	
Reverse leakage current	I_R	V_R = V_R rated	-	-	2	μA
		T_J = 150 °C, V_R = V_R rated	-	6	40	
Junction capacitance	C_T	V_R = 200 V	-	14	-	pF

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 = 50 A/μs, V_R = 30 V		-	20	-	ns
		I_F = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A		-	-	25	
		T_J = 25 °C	I_F = 3 A dI_F/dt = 200 A/μs V_R = 160 V	-	15	-	
		T_J = 125 °C		-	25	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	2	-	A
		T_J = 125 °C		-	3	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	12	-	nC
		T_J = 125 °C		-	40	-	

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 ambient	R_{thJA} (1)(2)		-	90	103	°C/W
Thermal resistance, junction to mount	R_{thJM} (3)		-	2.3	2.6	

Notes

(1) The heat generated must be less than thermal conductivity from junction to ambient; $dP_D/dT_J < 1 \times R_{thJA}$

(2) Free air, mounted or recommended copper pad area; thermal resistance R_{thJA} - junction to ambient

(3) Mounted on infinite heatsink

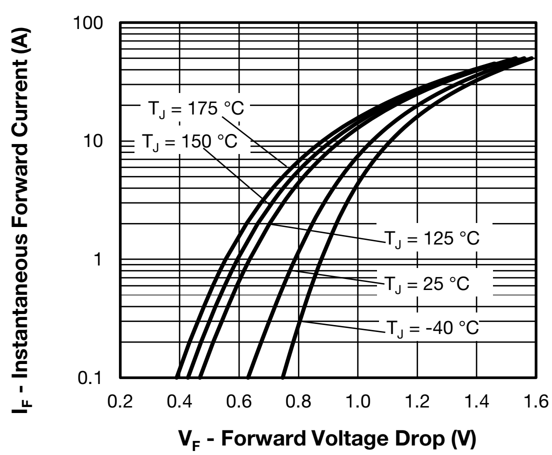


Fig. 1 - Typical Forward Voltage Drop Characteristics

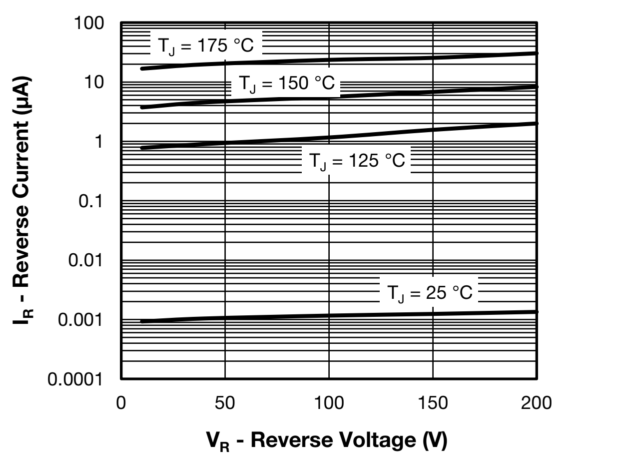


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

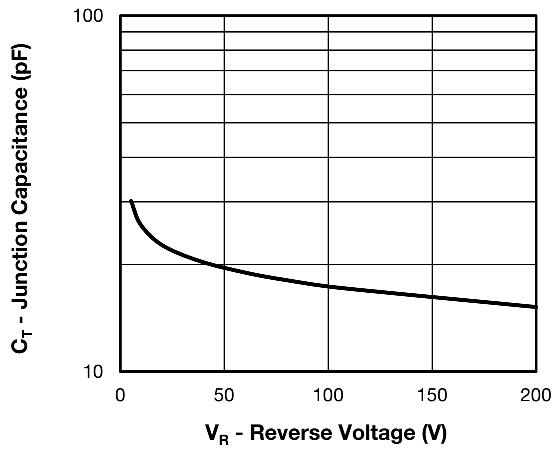


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

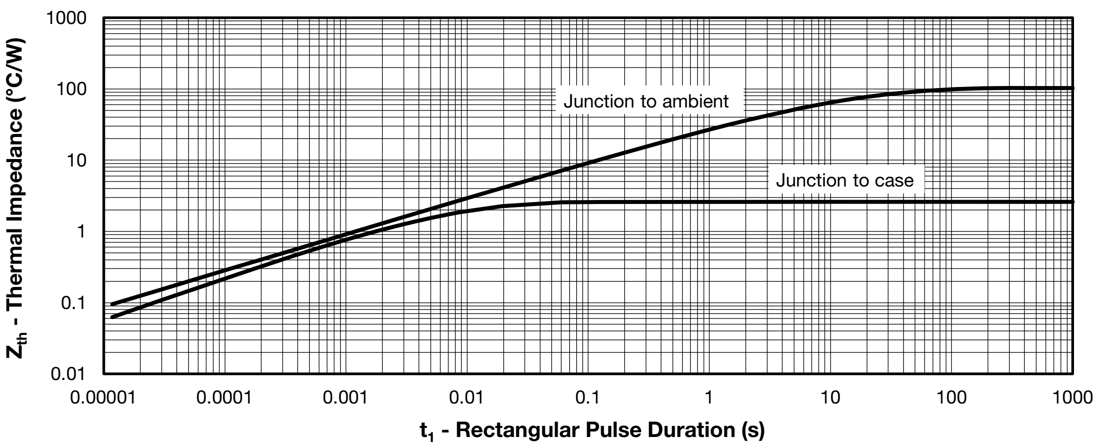


Fig. 4 - Maximum Thermal Impedance Z_{th} Characteristics

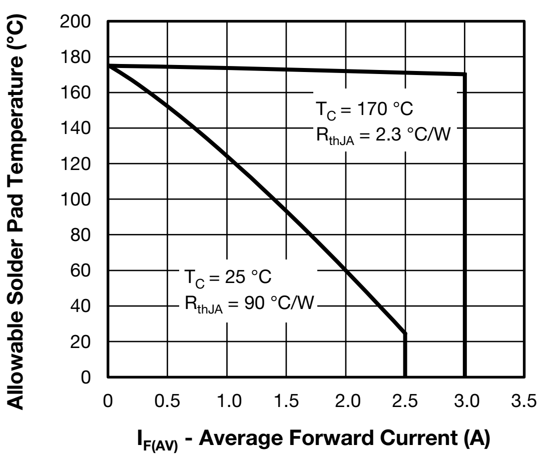


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

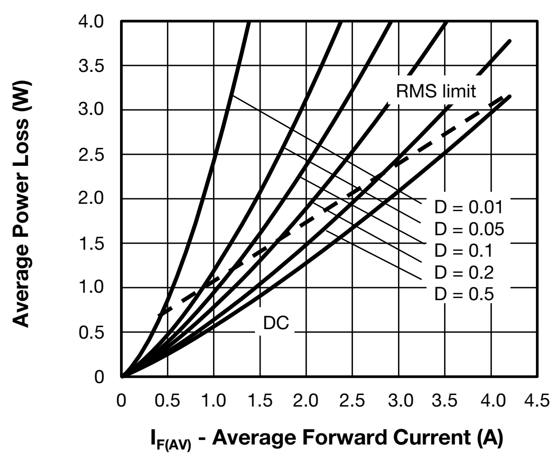


Fig. 6 - Forward Power Loss Characteristics

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

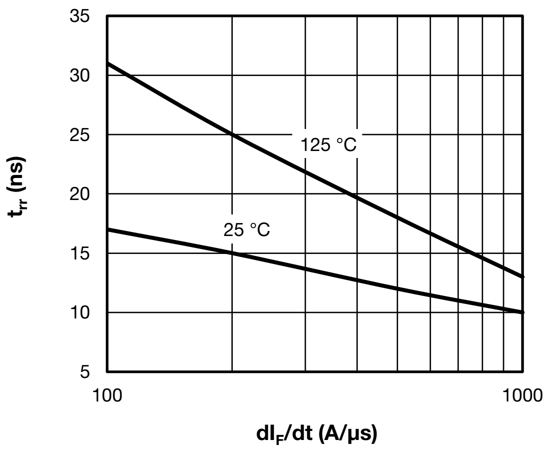


Fig. 7 - Typical Reverse Recovery vs. dI_F/dt

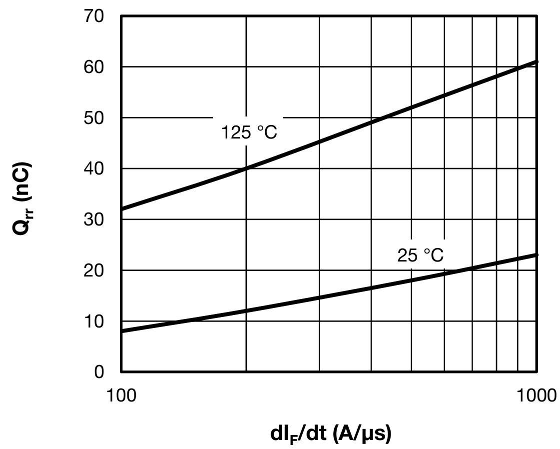
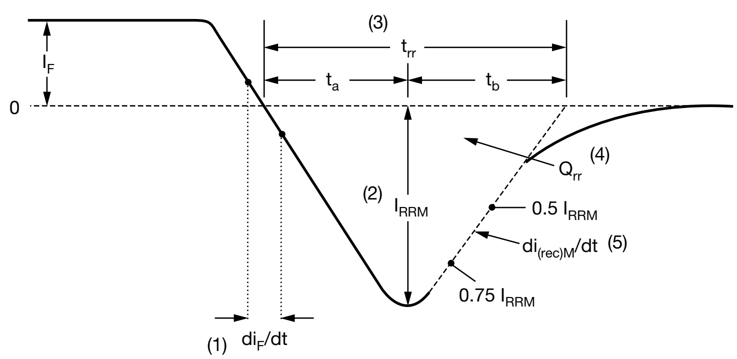


Fig. 8 - Typical Stored Charge vs. dI_F/dt



(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

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

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

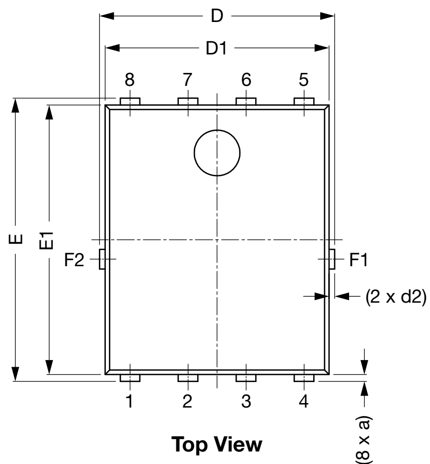
ORDERING INFORMATION (Example)

PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	PACKAGING DESCRIPTION
VS-6DKH02-M3/H	0.10	H	1500	7"diameter plastic tape and reel
VS-6DKH02-M3/I	0.10	I	6000	13"diameter plastic tape and reel

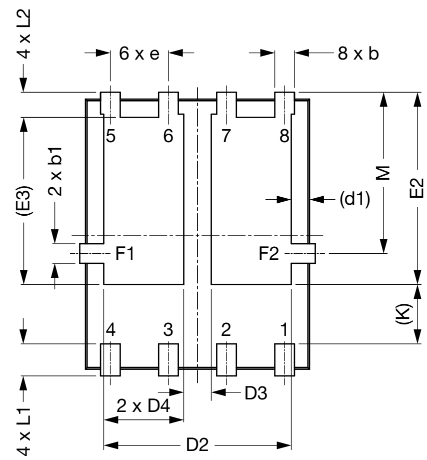
LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?96056
Part marking information	www.vishay.com/doc?96059
Packaging information	www.vishay.com/doc?88869
SPICE model	www.vishay.com/doc?96882

FlatPAK 5 x 6 (Dual)

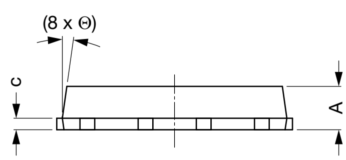
DIMENSIONS in inches (millimeters)



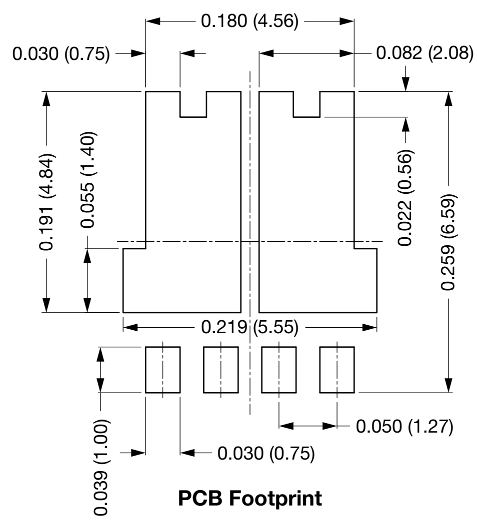
Top View



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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