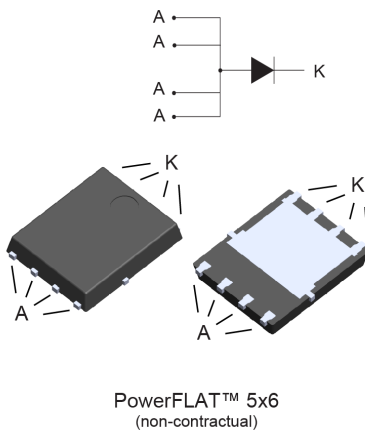


## 50 V, 20 A field effect rectifier



### Features

- ST patented rectifier process
- Stable leakage current over reverse voltage
- Low forward voltage drop
- High frequency operation
- ECOPACK®2 compliant

### Applications

- Set-top box
- Battery charger
- DC / DC converter

### Description

This single rectifier is based on a proprietary technology, enabling to achieve the best in class  $V_F/I_R$  for a given silicon surface.

Packaged in PowerFLAT™ 5x6, the FERD20U50 is optimized for use in rectification and freewheeling operations in switch mode power supplies.

Product status	
FERD20U50	
Product summary	
Symbol	Value
$I_{F(AV)}$	20 A
$V_{RRM}$	50 V
$T_{j(max.)}$	150 °C
$V_{F(typ.)}$	0.44 V

# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C, unless otherwise specified, anode terminals short circuited)**

Symbol	Parameter	Value	Unit	
V <sub>RRM</sub>	Repetitive peak reverse voltage	50	V	
I <sub>F(RMS)</sub>	Forward rms current	45	A	
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$ square wave	T <sub>C</sub> = 115 °C	20	A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	180	A
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>	PowerFlat™ 5x6	+150	°C

1.  $(dP_{tot}/dT_j) < (1/R_{th(j-a)})$  condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameter**

Symbol	Parameter	Max. value	Unit
R <sub>th(j-c)</sub>	Junction to case	2.6	°C/W

For more information, please refer to the following application note :

- AN5046 : Printed circuit board assembly recommendations for STMicroelectronics PowerFLAT™ packages

**Table 3. Static electrical characteristics (anode terminals short circuited)**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = V <sub>RRM</sub>	-	800	μA	
		T <sub>j</sub> = 125 °C		-	30	60	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 10 A	-	0.37	V	
		T <sub>j</sub> = 125 °C		-	0.33		
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 20 A	-	0.45		0.51
		T <sub>j</sub> = 125 °C		-	0.44		

1. Pulse test: t<sub>p</sub> = 5 ms,  $\delta < 2\%$

2. Pulse test: t<sub>p</sub> = 380 μs,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

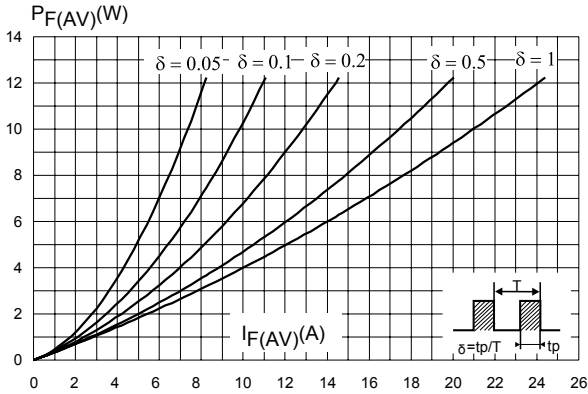
$$P = 0.25 \times I_{F(AV)} + 0.011 \times I_{F(RMS)}^2$$

For more information, please refer to the following application notes related to the power losses :

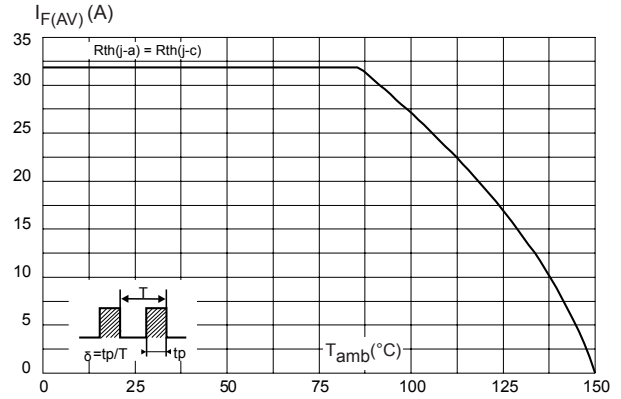
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

### 1.1 Characteristics (curves)

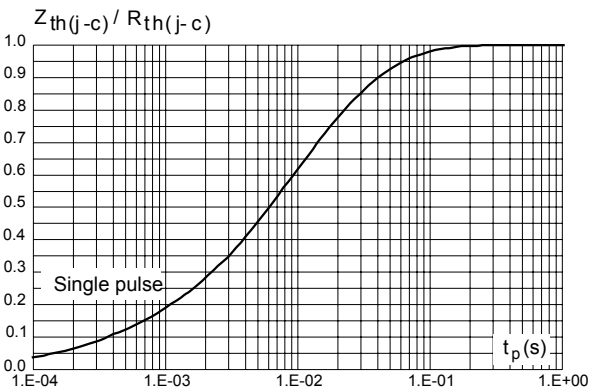
**Figure 1. Average forward power dissipation versus average forward current (anode terminals short circuited)**



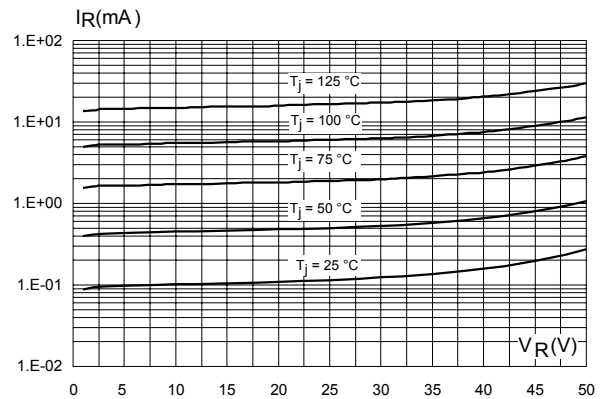
**Figure 2. Average forward current versus ambient temperature ( $\delta = 0.5$ , anode terminals short circuited)**



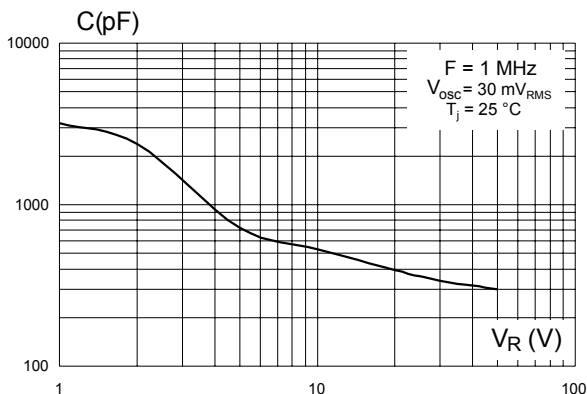
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



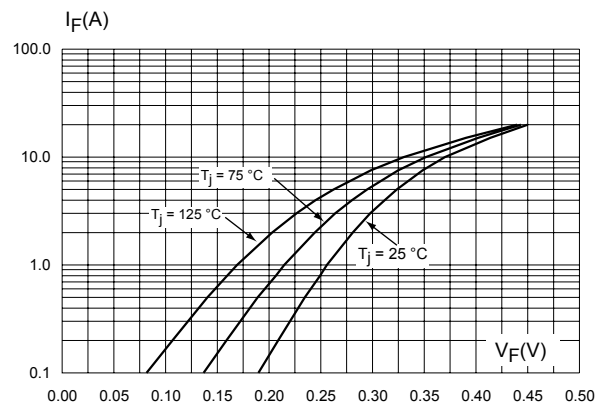
**Figure 4. Reverse leakage current versus reverse voltage applied (typical values)**



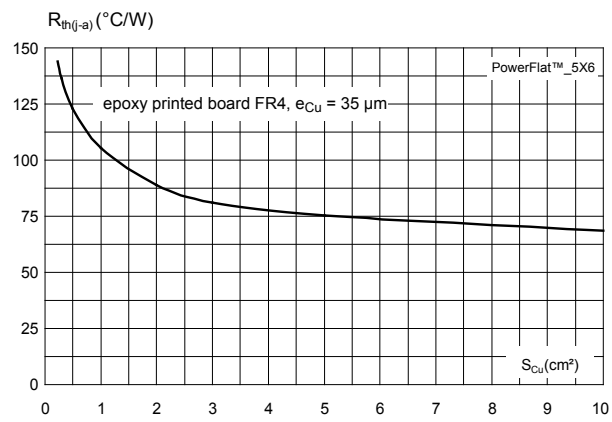
**Figure 5. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 6. Forward voltage drop versus forward current (typical values, anode terminals short circuited)**



**Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values)**



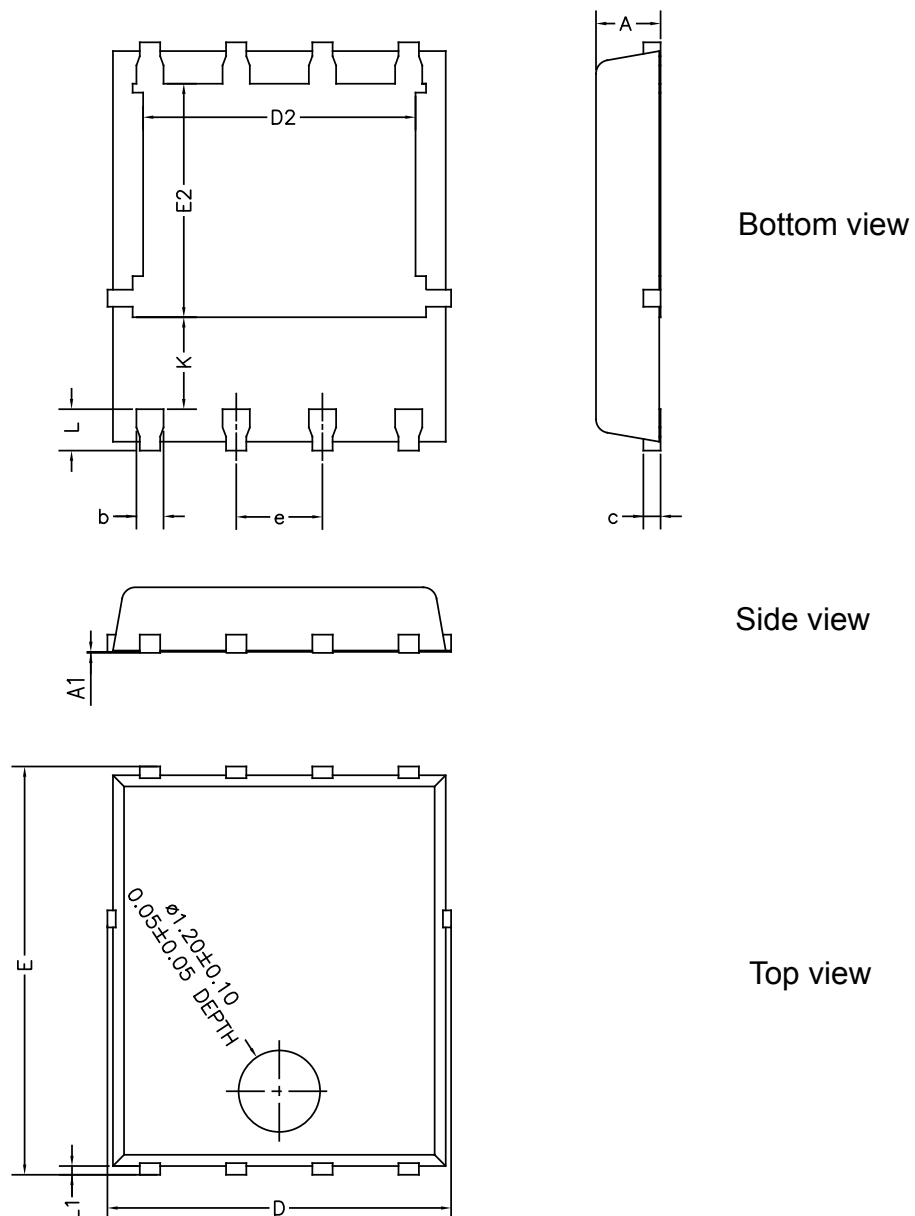
## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK®** packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

### 2.1 PowerFLAT™ 5x6 package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)

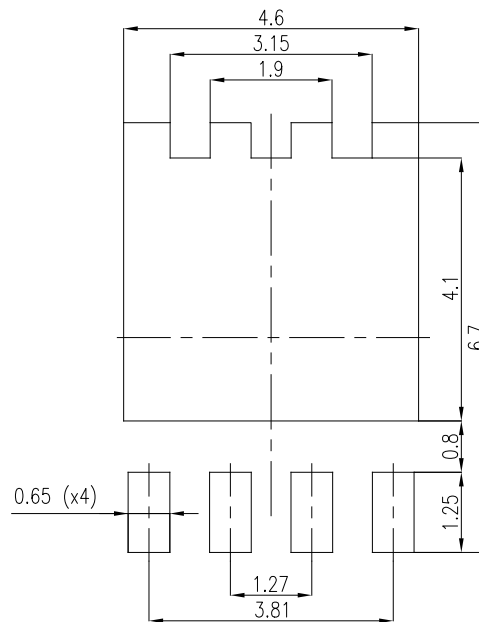
**Figure 8. PowerFLAT™ 5x6 package outline (non-contractual)**



**Table 4. PowerFLAT™ 5x6 mechanical data**

Ref	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80		1.00	0.031		0.039
A1	0.00		0.05	0.000		0.002
b	0.30		0.50	0.01		0.02
c		0.25			0.010	
D	4.80		5.40	0.189		0.212
D2	3.91		4.45	0.154		0.175
e		1.27			0.050	
E	5.90		6.35	0.232		0.250
E2	3.34		3.70	0.138		0.146
L	0.50		0.80	0.020		0.031
K	1.10		1.575	0.015		0.023
L1	0.05	0.15	0.25	0.002	0.006	0.009

**Figure 9. PowerFLAT™ 5x6 recommended footprint (dimensions are in mm)**



### 3 Ordering information

**Table 5. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
FERD20U50DJF-TR	FD20 U50	PowerFLAT™ 5x6	95 mg	3000	Tape and reel

## Revision history

**Table 6. Document revision history**

Date	Version	Changes
25-Mar-2014	1	Initial release.
06-Jun-2014	2	Updated RPN
06-Aug-2015	3	Updated Table 2 and reformatted to current standard.
09-Nov-2018	4	Updated <a href="#">Section Cover image</a> and <a href="#">Section 2.1 PowerFLAT™ 5x6 package information</a> . Added <a href="#">Section Applications</a> .
05-Feb-2019	5	Updated <a href="#">Figure 8. PowerFLAT™ 5x6 package outline (non-contractual)</a> and <a href="#">Table 4. PowerFLAT™ 5x6 mechanical data</a> .



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