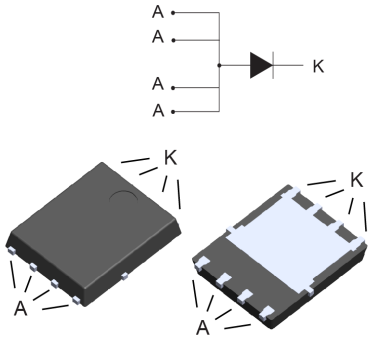
FERD20U50

Datasheet

50 V, 20 A field effect rectifier



PowerFLAT™ 5x6
(non-contractual)

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_{RRM}	Repetitive peak reverse voltage		50	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current, δ = 0.5 square wave	T_C = 115 °C	20	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	180	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature(1)	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
$R_{th(j-c)}$	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_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-		800	µA
		T_j = 125 °C		-	30	60	mA
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	0.37		V
		T_j = 125 °C		-	0.33		
		T_j = 25 °C	I_F = 20 A	-	0.45	0.51	
		T_j = 125 °C		-	0.44		

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

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

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)

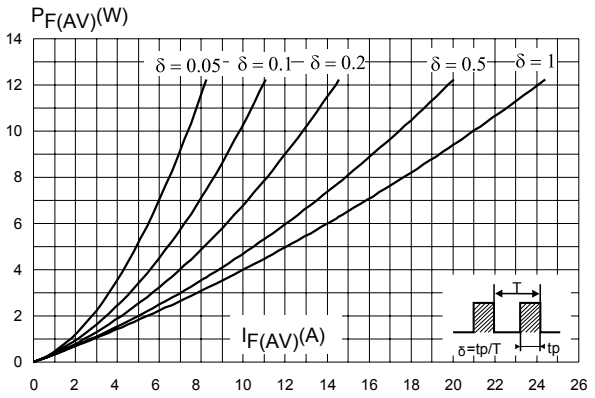


Figure 2. Average forward current versus ambient temperature (δ = 0.5, anode terminals short circuited)

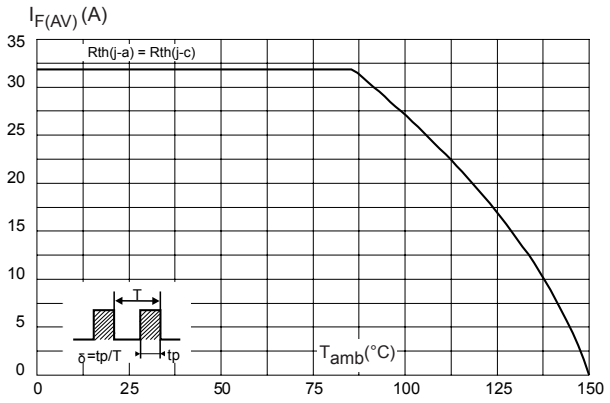


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

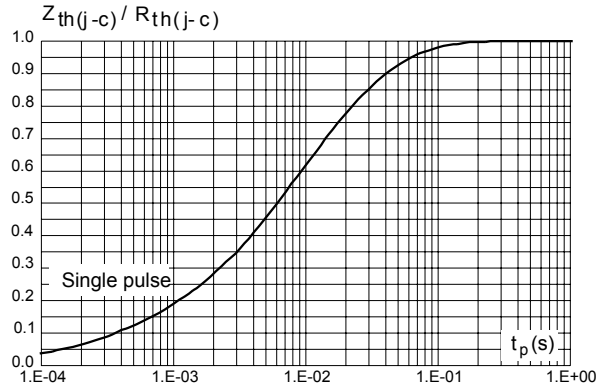


Figure 4. Reverse leakage current versus reverse voltage applied (typical values)

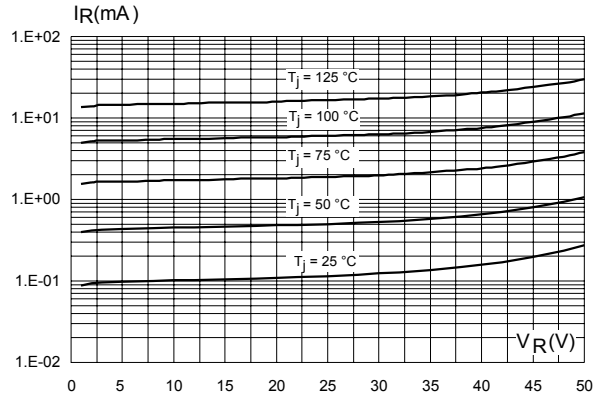


Figure 5. Junction capacitance versus reverse voltage applied (typical values)

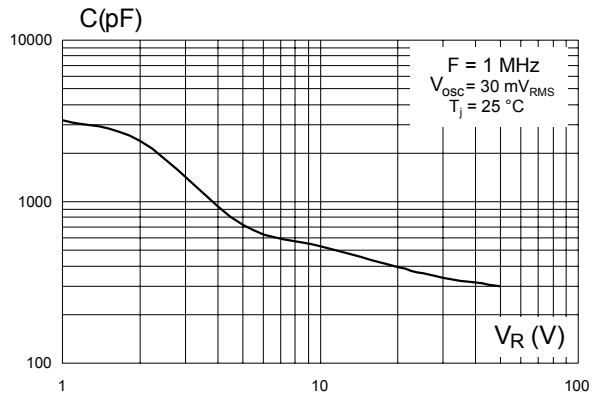


Figure 6. Forward voltage drop versus forward current (typical values, anode terminals short circuited)

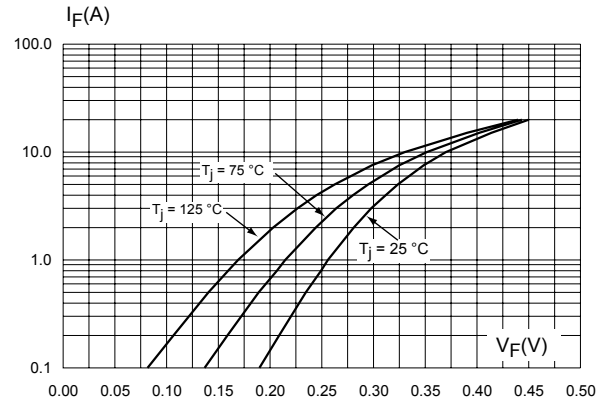
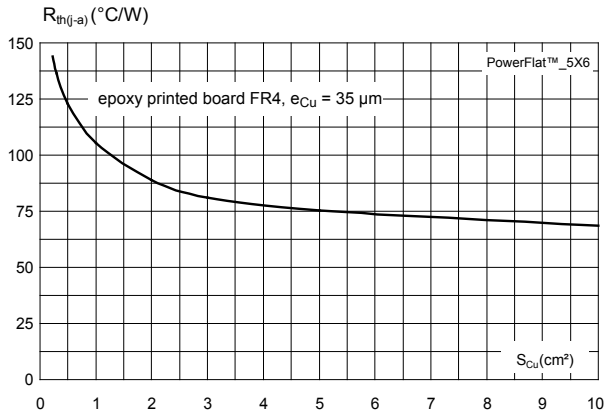


Figure 7. Thermal resistance junction to ambient versus copper surface under tab (typical values)



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. 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)

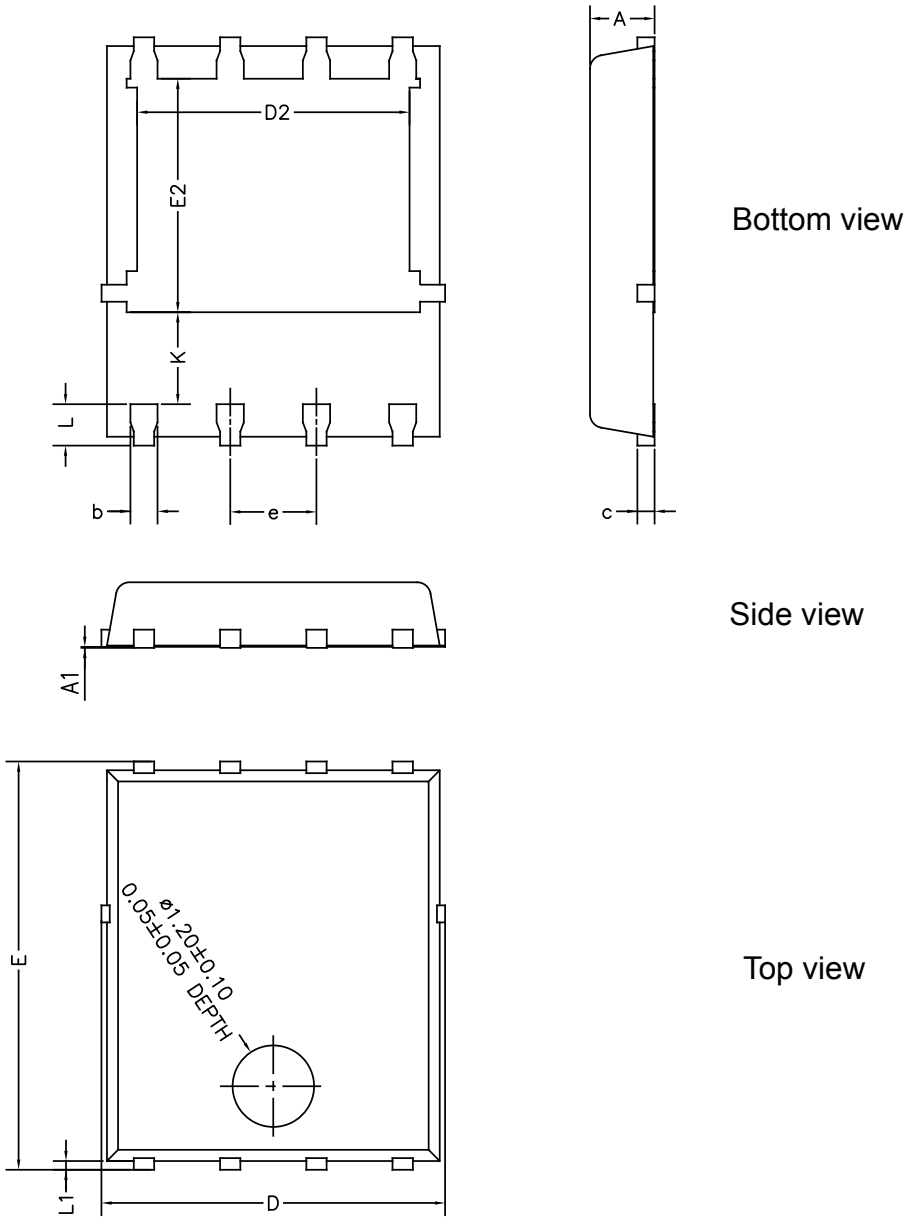
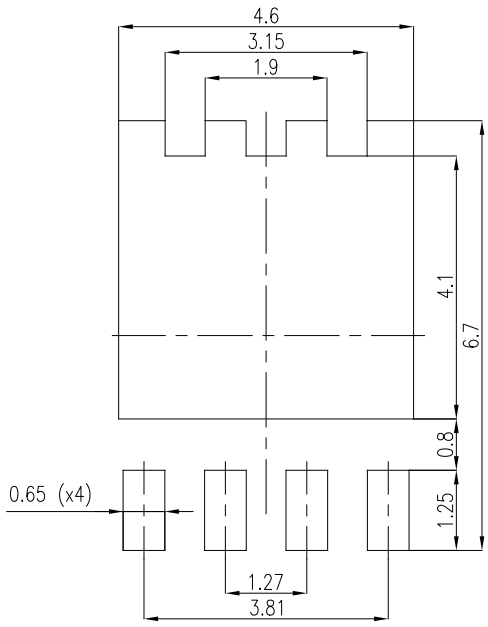


Table 4. **PowerFLAT™ 5x6 mechanical data**

Dimensions						
Ref	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 Section Cover image and Section 2.1 PowerFLAT™ 5x6 package information. Added Section Applications.
05-Feb-2019	5	Updated Figure 8. PowerFLAT™ 5x6 package outline (non-contractual) and Table 4. PowerFLAT™ 5x6 mechanical data.