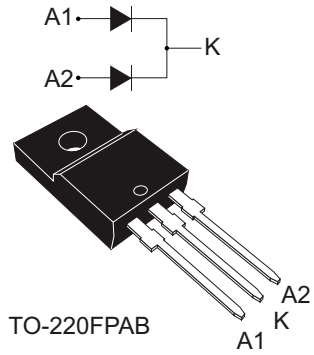
FERD40U50C

Field effect rectifier

Datasheet - production data



Features

- ST advanced rectifier process
- Stable leakage current over reverse voltage
- Reduced leakage current
- Low forward voltage drop
- High frequency operation
- Insulated package: TO-220FPAB
  - Insulating voltage: 2000 V_{RMS} sine

Description

This dual rectifier is based on a proprietary technology that achieved the best in class V_F/I_R for a given silicon surface.

Packaged in TO-220FPAB, this device is intended to be used in rectification and freewheeling operations in switch-mode power supplies.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	2 x 20 A
V_{RRM}	50 V
T_j (max)	+175 °C
V_F(typ)	0.43 V

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode, at 25 °C, unless otherwise specified)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			50	V
$I_{F(RMS)}$	Forward rms current			40	A
$I_{F(AV)}$	Average forward current, δ = 0.5	T_c = 120 °C	Per diode	20	A
		T_c = 90 °C	Per device	40	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		250	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j (1)	Maximum operating junction temperature			175	°C

1. $\frac{dPtot}{dTj} < \frac{1}{Rth(j-a)}$ condition to avoid thermal runaway for a diode on its own heatsink.

Table 3. Thermal resistance

Symbol	Parameter		Value (max)	Unit
$R_{th(j-c)}$	Junction to case	Per diode	4.1	°C/W
		Total	3.3	
$R_{th(c)}$	Coupling		2.4	

When diodes 1 and 2 are used simultaneously:

$T_{j(diode1)} = P_{(diode1)} \times R_{th(j-c)}$(per diode) + $P_{(diode2)} \times R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			0.8	mA
		T_j = 125 °C			30	60	mA
		T_j = 25 °C	V_R = 35 V			460	µA
		T_j = 125 °C			20	40	mA
V_F (2)	Forward voltage drop	T_j = 125 °C	I_F = 5 A		0.25		V
		T_j = 125 °C	I_F = 10 A		0.33		
		T_j = 25 °C	I_F = 15 A		0.41	0.46	
		T_j = 125 °C			0.39	0.43	
		T_j = 25 °C	I_F = 20 A		0.44	0.49	
		T_j = 125 °C			0.43	0.48	

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:

$P = 0.329 \times I_{F(AV)} + 0.007\ I_F{}^2{}_{(RMS)}$

Figure 1. Average forward power dissipation versus average forward current (per diode)

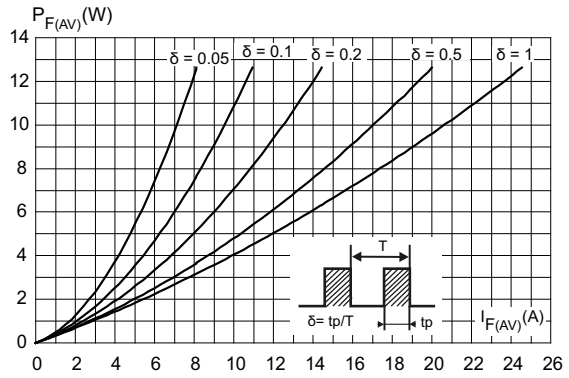


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

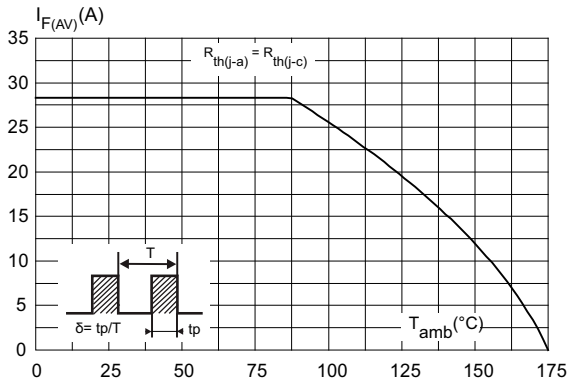


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

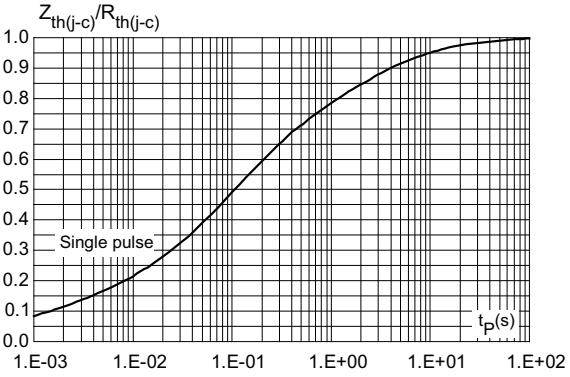


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

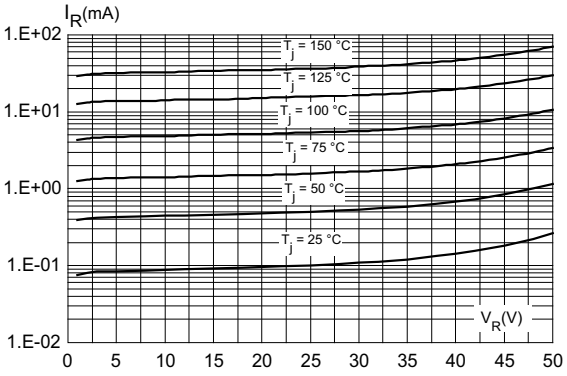


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

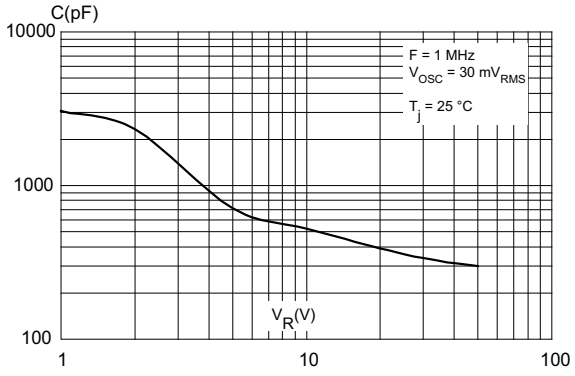


Figure 6. Forward voltage drop versus forward current (typical values, per diode)

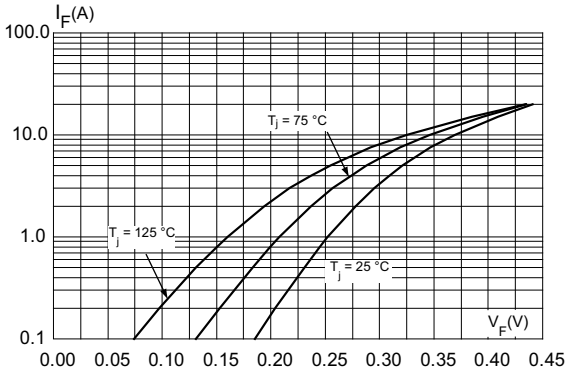
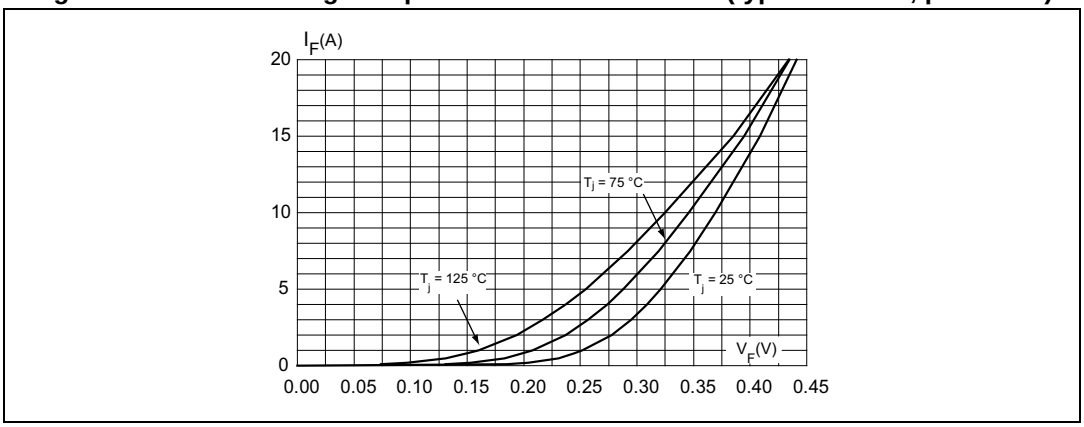


Figure 7. Forward voltage drop versus forward current (typical values, per diode)



2 Package information

- Epoxy meets UL94, V0
- Recommended torque value for TO-220FPAB: 0.55 N.m
- Maximum torque value for TO-220FPAB: 0.7 N.m

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 TO-220FPAB package information

Figure 8. TO-220FPAB package outline

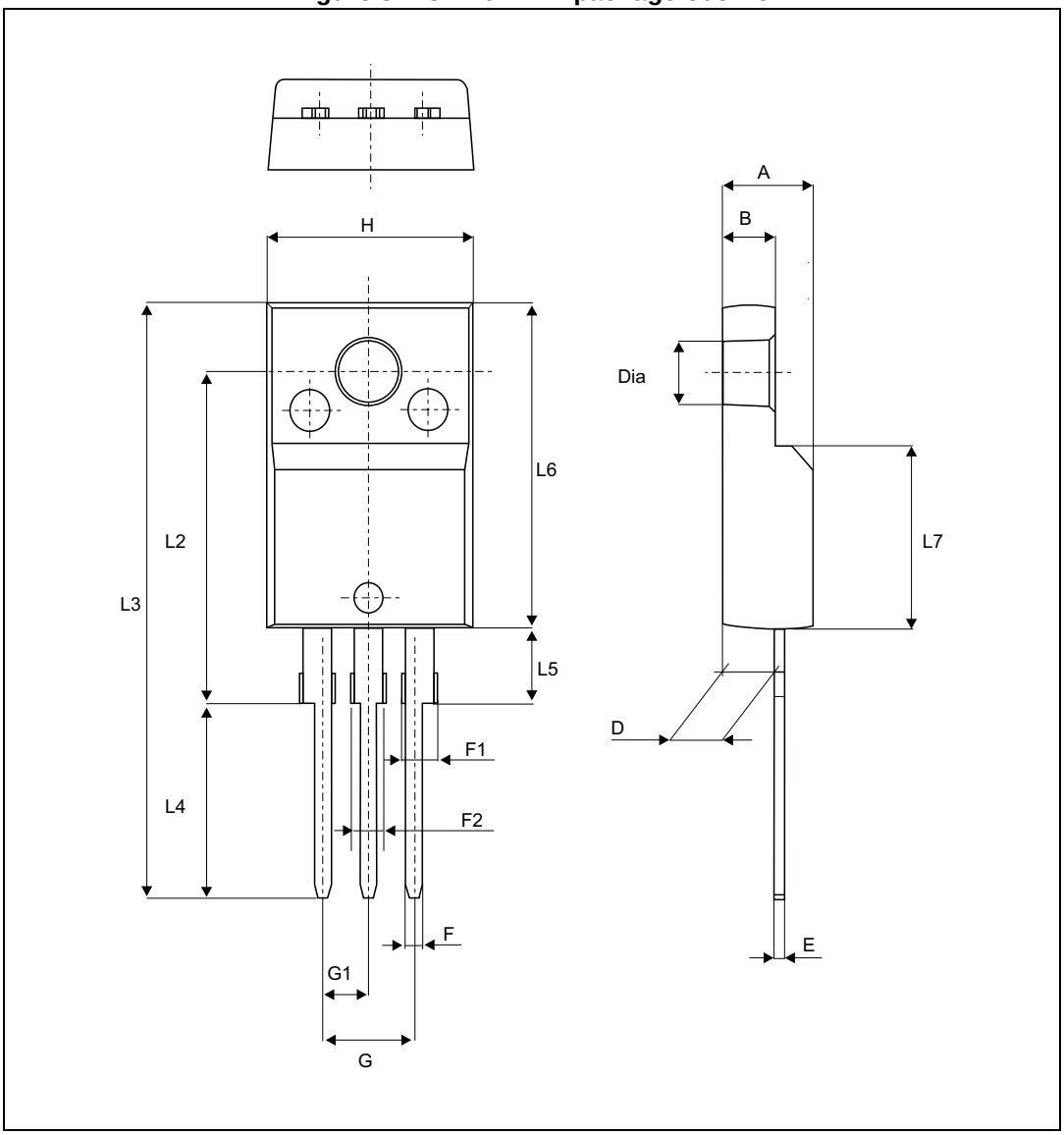


Table 5. T0-220FPAB package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.018		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.70	0.045		0.067
F2	1.15		1.70	0.045		0.067
G	4.95		5.20	0.195		0.205
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2	16 Typ.			0.63 Typ.		
L3	28.6		30.6	1.126		1.205
L4	9.8		10.6	0.386		0.417
L5	2.9		3.6	0.114		0.142
L6	15.9		16.4	0.626		0.646
L7	9.00		9.30	0.354		0.366
Dia.	3.00		3.20	0.118		0.126

3 Ordering information

Table 6. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
FERD40U50CFP	FERD40U50CFP	TO-220FPAB	1.9 g	50	Tube

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
17-Jun-2015	1	Initial release.

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