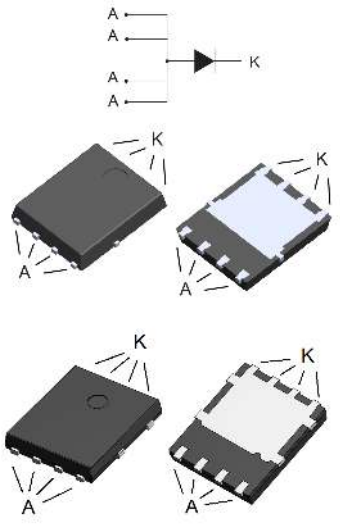
STTH30R02DJF

Datasheet

200 V, 30 A ultrafast recovery diode high efficiency



PowerFLAT 5 x 6
(non-contractual)

Features

- Suited for DC/DC converts
- Low losses
- High T_j
- High surge current capability
- High energy avalanche capability
- Thin package: 1 mm
- ECOPACK2 compliant

Applications

- Switching diode
- SMPS
- DC/DC converter
- Telecom power

Description

High performance diode suited for high frequency DC to DC converters.

Packaged in PowerFLAT 5x6, the STTH30R02DJF is optimized for use in low voltage high frequency inverters.

Product status
STTH30R02DJF

Product summary	
$I_{F(AV)}$	30 A
V_{RRM}	200 V
T_j(max.)	175 °C
V_F(typ.)	0.8 V
t_{rr}(typ.)	27 ns

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		200	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current	T_C = 105 °C, δ = 0.5, square wave	30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	300	A
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Maximum operating junction temperature		175	°C

Table 2. Thermal parameters

Symbol	Parameter	Max. value	Unit
$R_{th(j-c)}$	Junction to case	2.0	°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 = 200 V	-		10	µA
		T_j = 125 °C		-	10	100	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-	1	1.15	V
		T_j = 150 °C		-	0.80	0.95	

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:

$P = 0.77 \times I_{F(AV)} + 0.006\ I_F{}^2{}_{(RMS)}$

Table 4. Recovery characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	T_j = 25 °C	I_F = 1 A, V_R = 30 V, dI_F/dt = 100 A/µs	-	27	35	ns
			I_F = 1 A, V_R = 30 V, dI_F/dt = 50 A/µs	-	38	50	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A, V_{CC} = 160 V, dI_F/dt = -200 A/µs	-	6.0	8.0	A
S_{factor}	Reverse recovery softness factor			-	0.3		-
Q_{rr}	Reverse recovery charges			-	140		nC

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 in a power diode

Table 5. Turn-on switching characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 30 A, V_{FR} = 1.3 V, dI_F/dt = 200 A/µs	-		300	ns
V_{FP}	Forward recovery voltage			-	2.3	3.5	V

1.1 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current

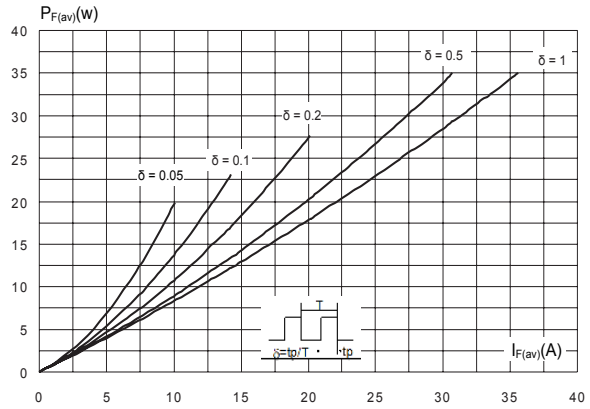


Figure 2. Forward voltage drop versus forward current

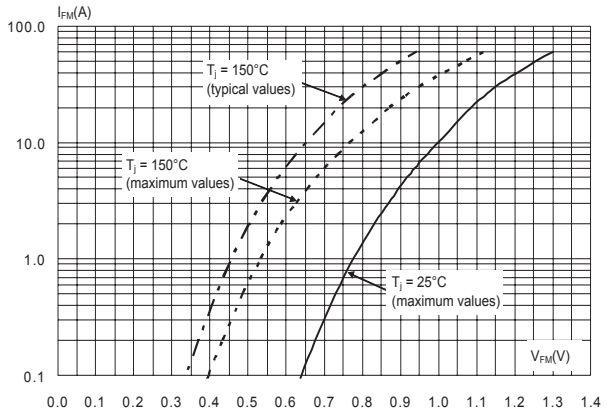


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

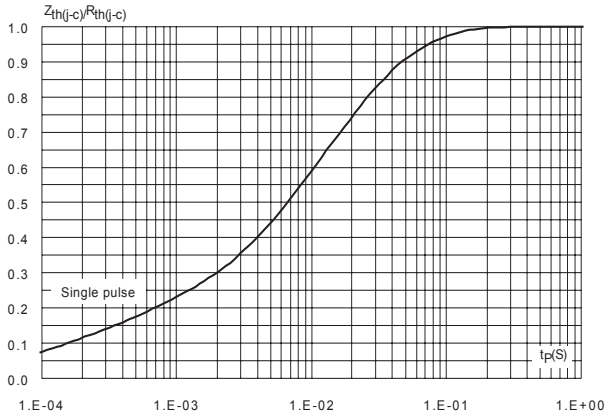


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

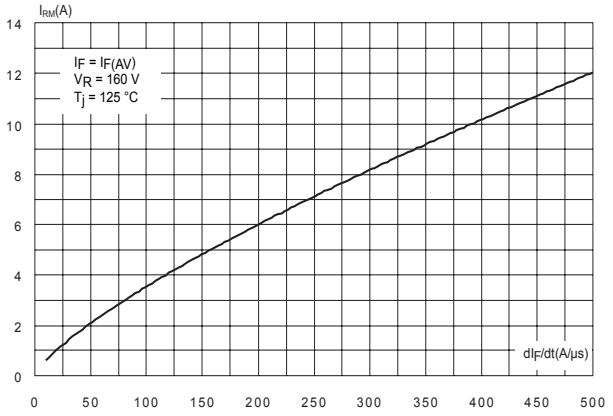


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

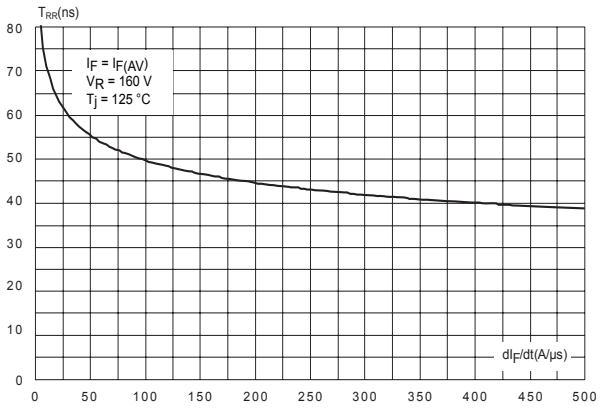


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

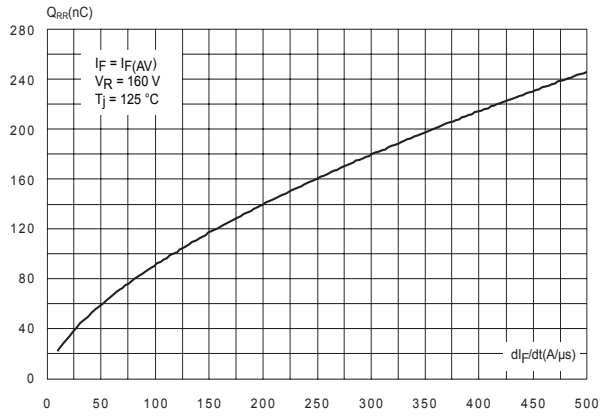


Figure 7. Softness factor versus dI_F/dt (typical values)

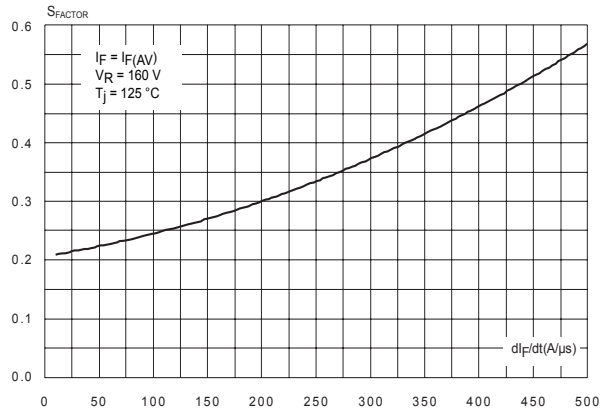


Figure 8. Relative variations of dynamic parameters versus junction temperature

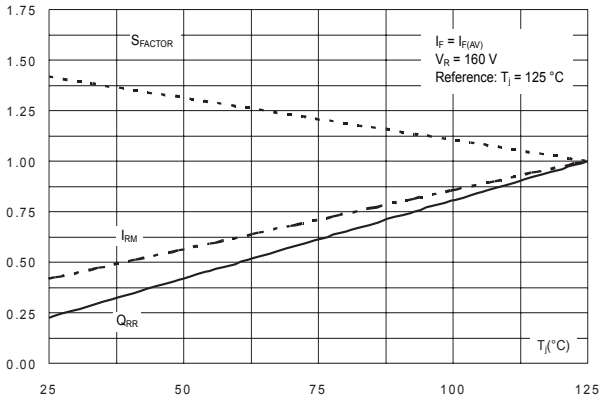


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

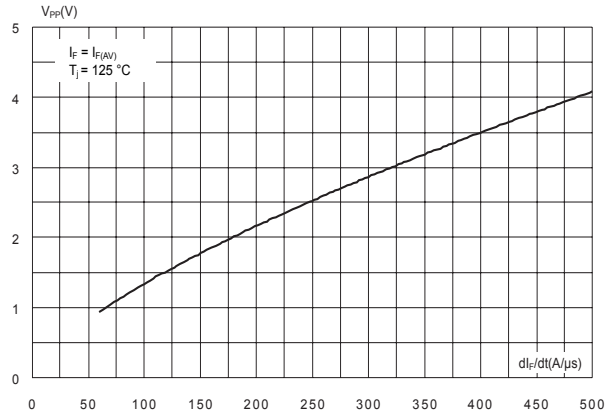


Figure 10. Forward recovery time versus dI_F/dt (typical values)

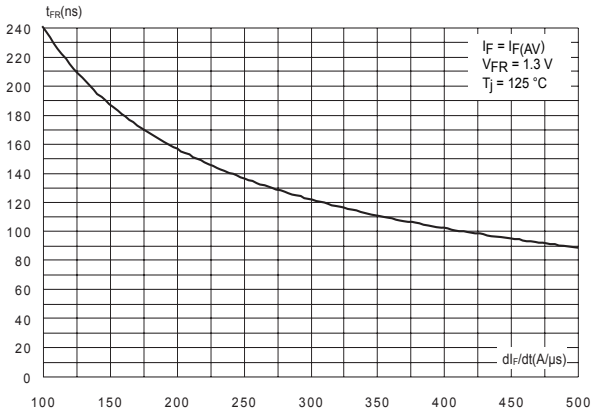


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

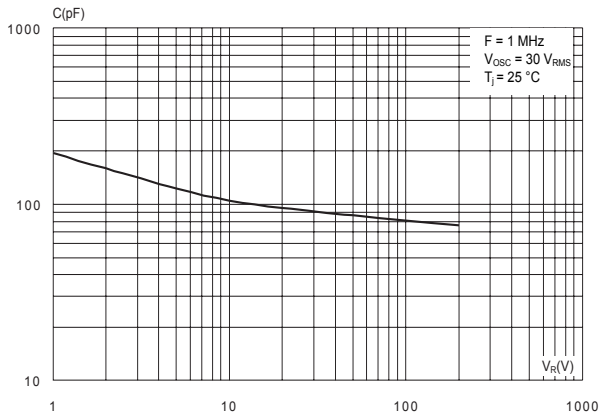
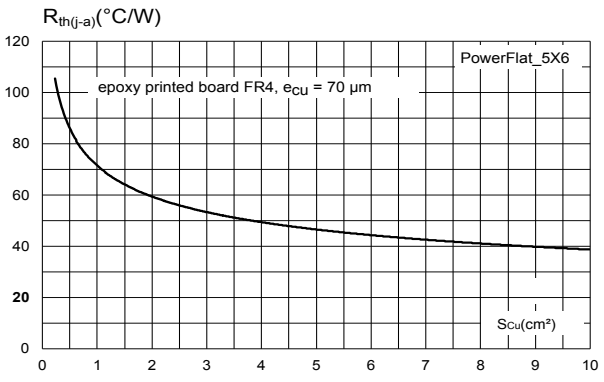


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



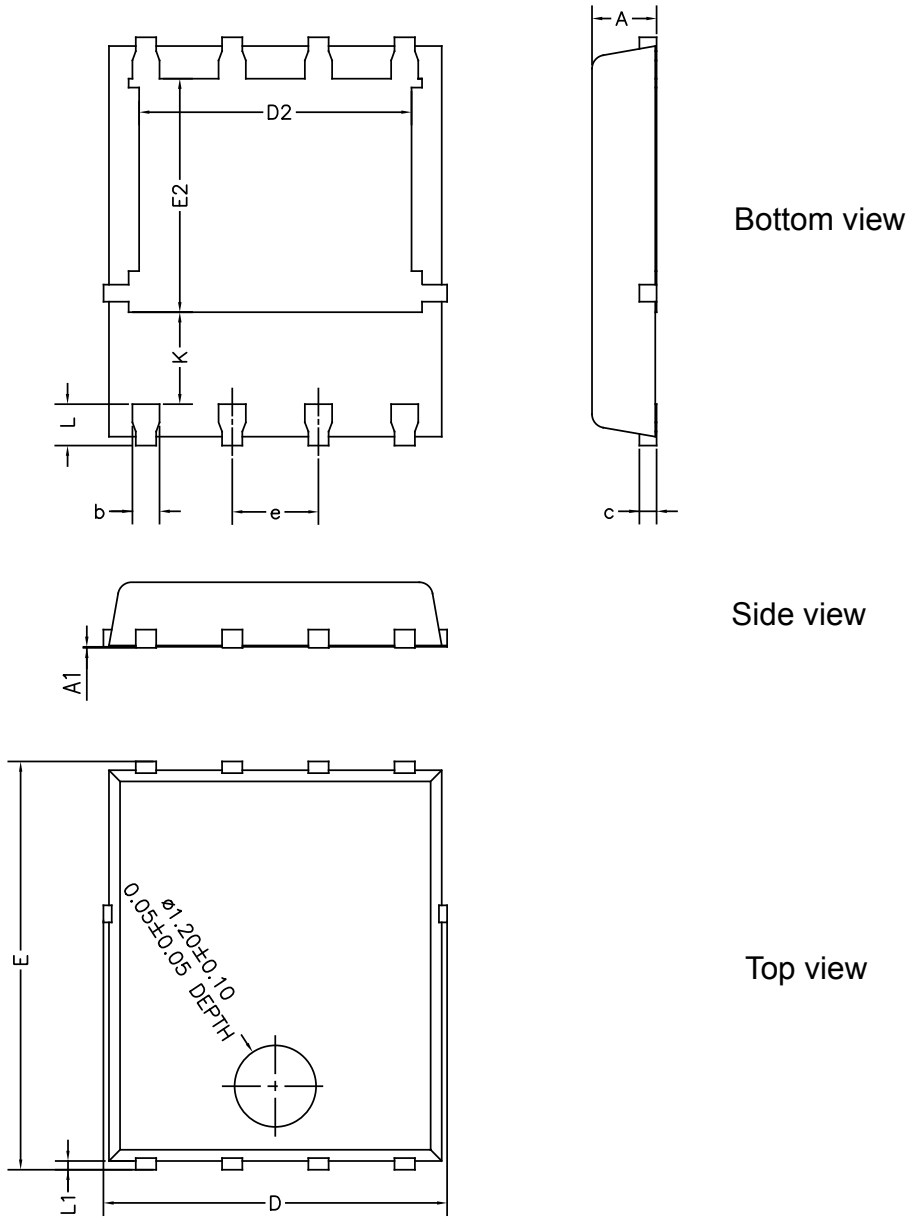
2 Package information

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 13. PowerFLAT 5x6 package outline (non-contractual)

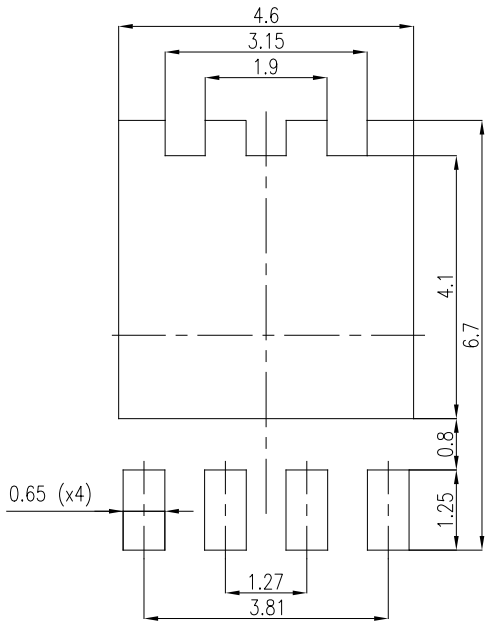


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. 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 14. PowerFLAT 5x6 recommended footprint (dimensions are in mm)



Note: For packing information, please refer to TN1173.

3 Ordering information

Table 7. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30R02DJF-TR	TH30R 02	PowerFLAT 5x6	0.095 g	3000	Tape and reel

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
16-Mars-2012	1	First issue.
08-Feb-2023	2	Updated Section Cover image and Section 2.1 PowerFLAT 5x6 package information. Added Section Applications.