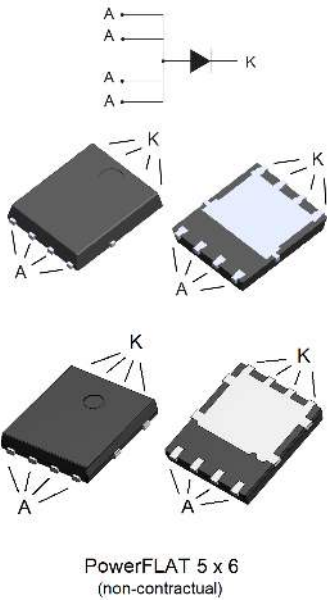


## 300 V, 8 A ultrafast recovery diode high efficiency



### 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 [STTH8R03DJF](#) is optimized for use in low voltage high frequency inverters.

#### Product status

[STTH8R03DJF](#)

#### Product summary

$I_{F(AV)}$	8 A
$V_{RRM}$	300 V
$T_j(\text{max.})$	175 °C
$V_F(\text{typ.})$	0.8 V
$t_{rr}(\text{typ.})$	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 <sub>RRM</sub>	Repetitive peak reverse voltage	300	V
I <sub>F(RMS)</sub>	Forward rms current	45	A
I <sub>F(AV)</sub>	Average forward current	T <sub>C</sub> = 155 °C, δ = 0.5, square wave	8
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	280
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C
T <sub>j</sub>	Maximum operating junction temperature	175	°C

**Table 2. Thermal parameters**

Symbol	Parameter	Max. value	Unit
R <sub>th(j-c)</sub>	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 <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25 °C	V <sub>R</sub> = 300 V	-		40	μA
		T <sub>j</sub> = 125 °C		-	20	200	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 8 A	-	1.08	1.3	V
		T <sub>j</sub> = 125 °C		-	0.8	1.0	

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

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

To evaluate the conduction losses use the following equation:

$$P = 0.84 \times I_{F(AV)} + 0.02 I_{F(RMS)}^2$$

**Table 4. Recovery characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
t <sub>rr</sub>	Reverse recovery time	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 1 A, V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 100 A/μs	-	27	35	ns
		I <sub>F</sub> = 1 A, V <sub>R</sub> = 30 V, dI <sub>F</sub> /dt = 50 A/μs		-	38	50	
I <sub>RM</sub>	Reverse recovery current	T <sub>j</sub> = 125 °C	I <sub>F</sub> = 8 A, V <sub>CC</sub> = 200 V, dI <sub>F</sub> /dt = - 200 A/μs	-	6.0	8.0	A
S <sub>factor</sub>	Reverse recovery softness factor			-	0.3		-
Q <sub>rr</sub>	Reverse recovery charges			-	120		nC

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

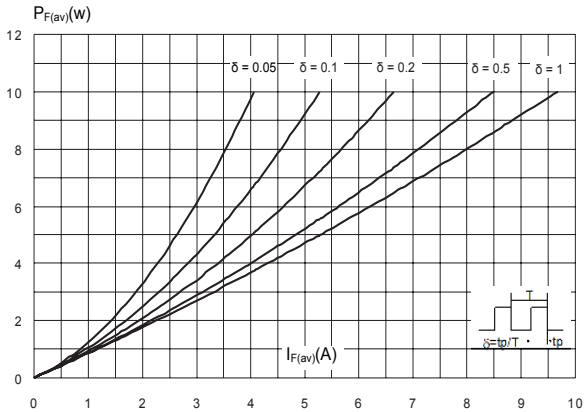
- [AN604](#): Calculation of conduction losses in a power rectifier
- [AN4021](#): Calculation of reverse losses in a power diode

Table 5. Turn-on switching characteristics

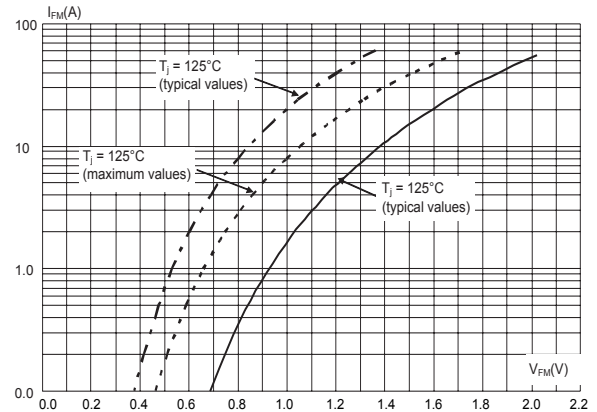
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 8\text{ A}$ , $V_{FR} = 1.5\text{ V}$ , $dI_F/dt = 100\text{ A}/\mu\text{s}$	-		150	ns
$V_{FP}$	Forward recovery voltage			-	2.1	3.2	V

## 1.1 Characteristics (curves)

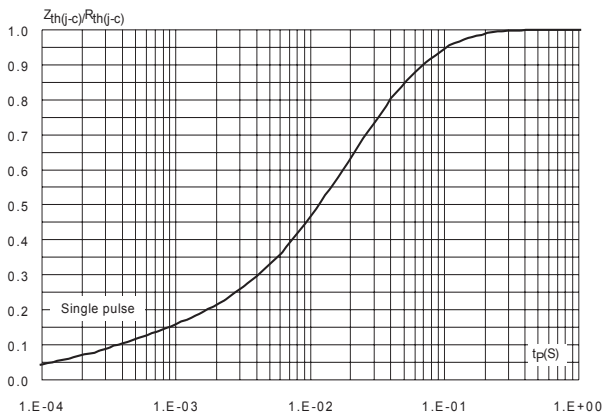
**Figure 1. Average forward power dissipation versus average forward current**



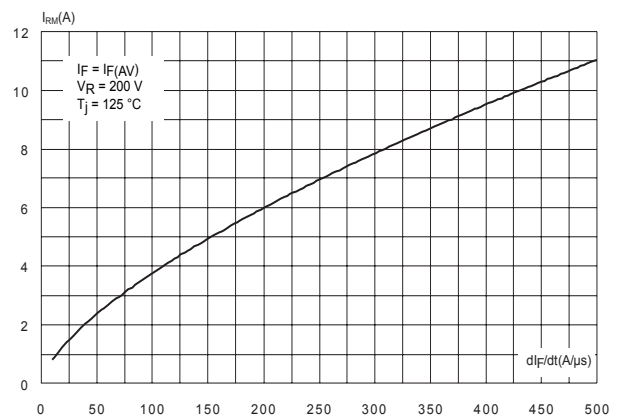
**Figure 2. Forward voltage drop versus forward current**



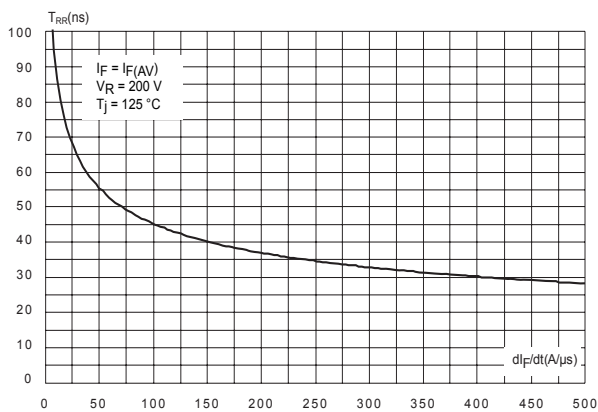
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



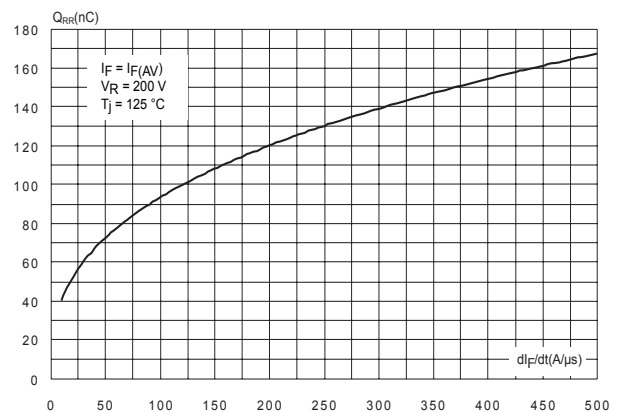
**Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



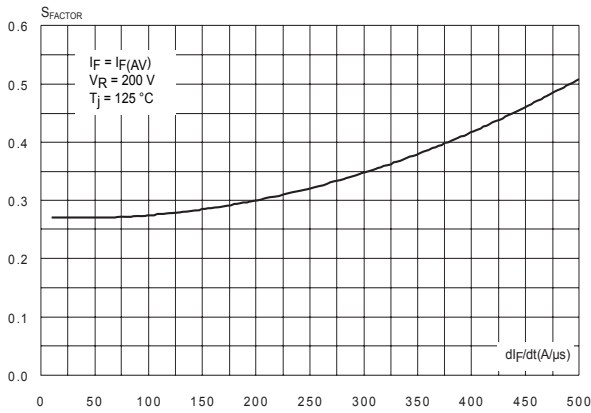
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)**



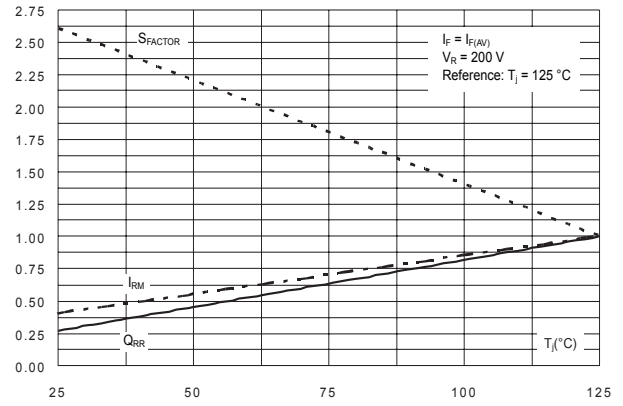
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



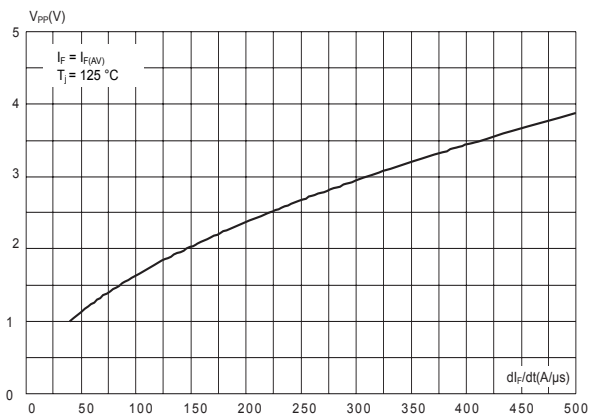
**Figure 7. Softness factor versus  $dl_F/dt$  (typical values)**



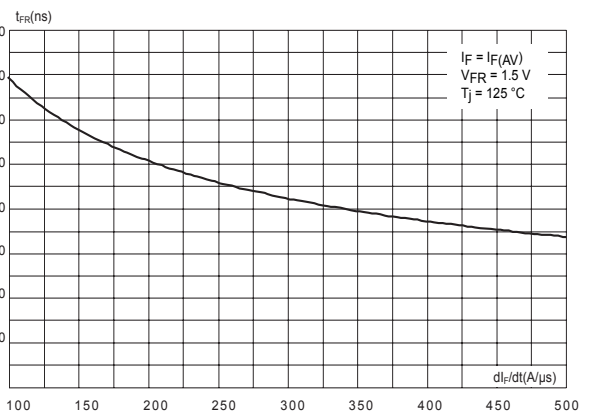
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



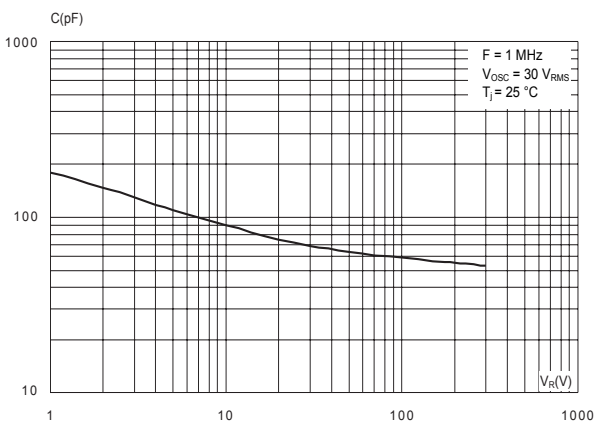
**Figure 9. Transient peak forward voltage versus  $dl_F/dt$  (typical values)**



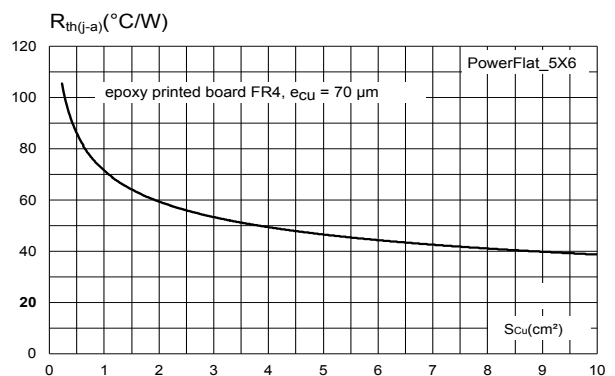
**Figure 10. Forward recovery time versus  $dl_F/dt$  (typical values)**



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



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



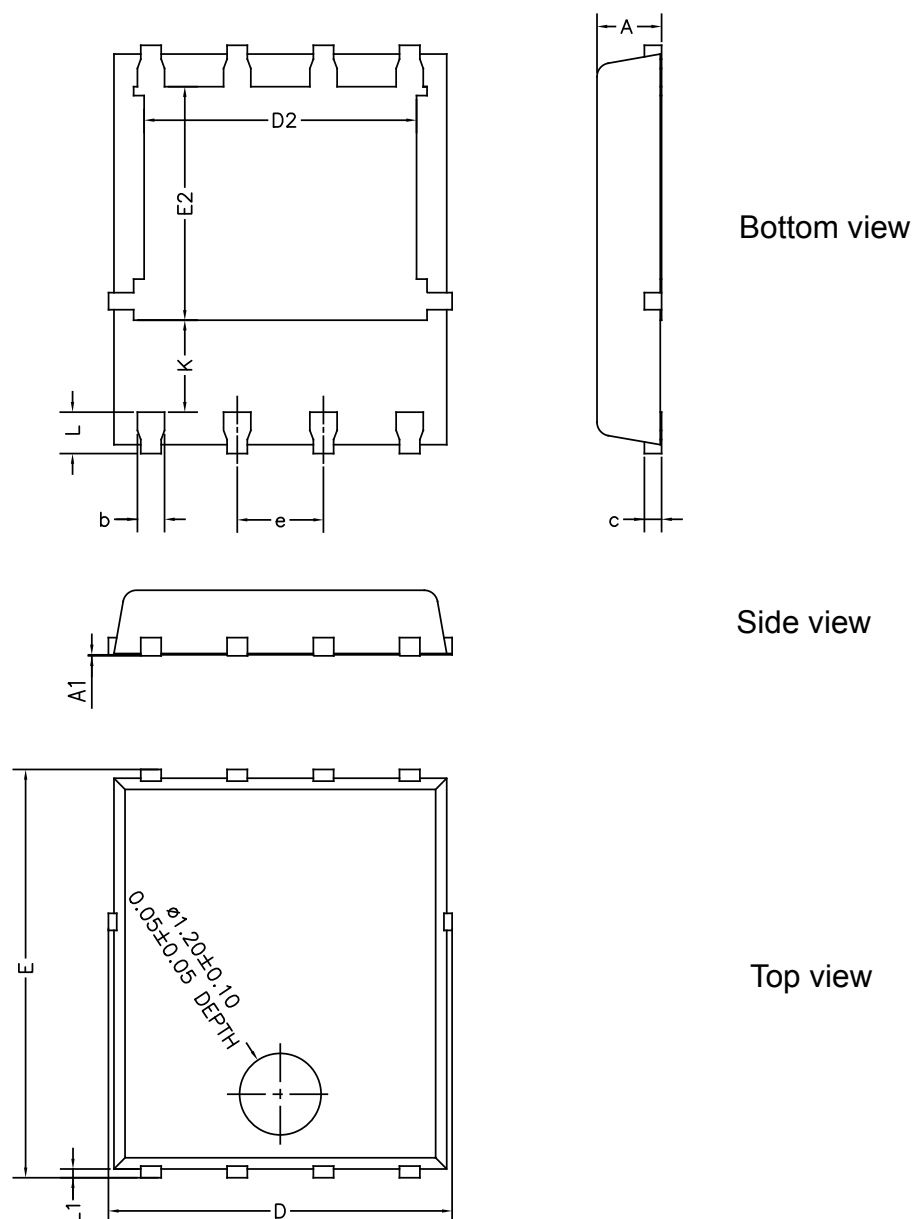
## 2 Package information

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](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)

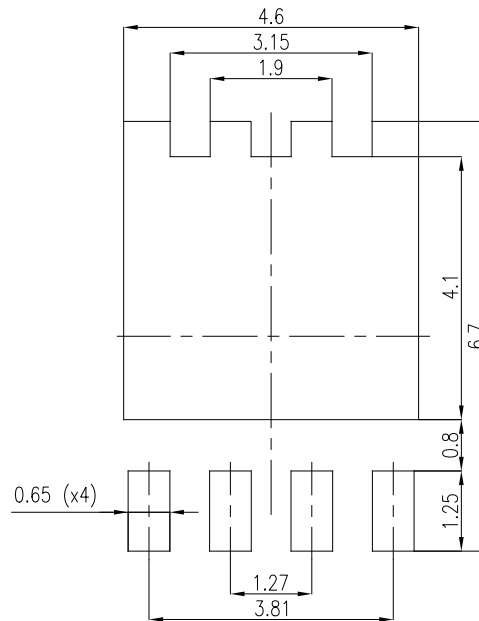
**Figure 13. PowerFLAT 5x6 package outline (non-contractual)**



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

**Table 6. PowerFLAT 5x6 mechanical data**

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 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
STTH8R03DJF-TR	TH8R 03	PowerFLAT 5x6	0.095 g	3000	Tape and reel



## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
16-May-2012	1	First issue.
08-Feb-2023	2	Updated <a href="#">Section Cover image</a> and <a href="#">Section 2.1 PowerFLAT 5x6 package information</a> . Added <a href="#">Section Applications</a> .

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