

Ultrafast recovery diode high efficiency

Datasheet – production data

Features

- Suited for DC/DC converts
- Low losses
- High T_j
- High surge current capability
- High energy avalanche capability
- 1 mm package thickness
- ECOPACK[®]2 compliant component

Description

High performance diode suited for high frequency DC to DC converters. Packaged in PowerFLAT[™] 5x6, this device is intended for use in low voltage high frequency inverters.

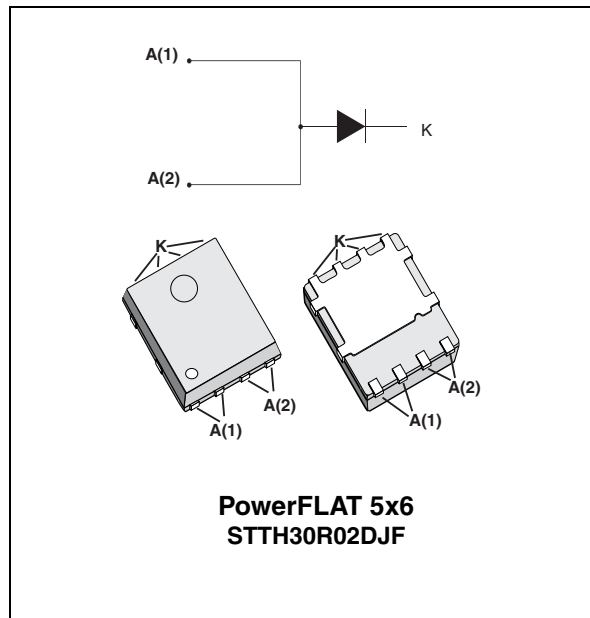


Table 1. Device summary

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

TM: PowerFLAT is a trademark of STMicroelectronics

1 Characteristics

Table 2. Absolute ratings (limiting values with 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	$T_c = 105\text{ }^\circ\text{C}$ $\delta = 0.5$	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	A
T_{stg}	Storage temperature range	-65 to + 175	$^\circ\text{C}$
T_j	Maximum operating junction temperature	175	$^\circ\text{C}$

Table 3. Thermal parameter

Symbol	Parameter	Maximum	Unit
$R_{th(j-c)}$	Junction to case	2.0	$^\circ\text{C/W}$

Table 4. Static electrical characteristics (anode terminals short-circuited)

Symbol	Parameter	Test conditions	Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$			10	μA
		$T_j = 125\text{ }^\circ\text{C}$			10	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 30\text{ A}$	1	1.15	V
		$T_j = 150\text{ }^\circ\text{C}$		0.80	0.95	

1. Pulse test: $t_p = 5\text{ ms}$, $\delta < 2\%$

2. Pulse test: $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the maximum conduction losses use the following equation:

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

Table 5. Recovery characteristics

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

Table 6. Turn-on switching characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
t_{fr}	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 30\text{ A}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.3\text{ V}$			300	ns
V_{FP}	Forward recovery voltage				2.3	3.5	V

Figure 1. Average forward power dissipation versus average forward current **Figure 2. Forward voltage drop versus forward current**

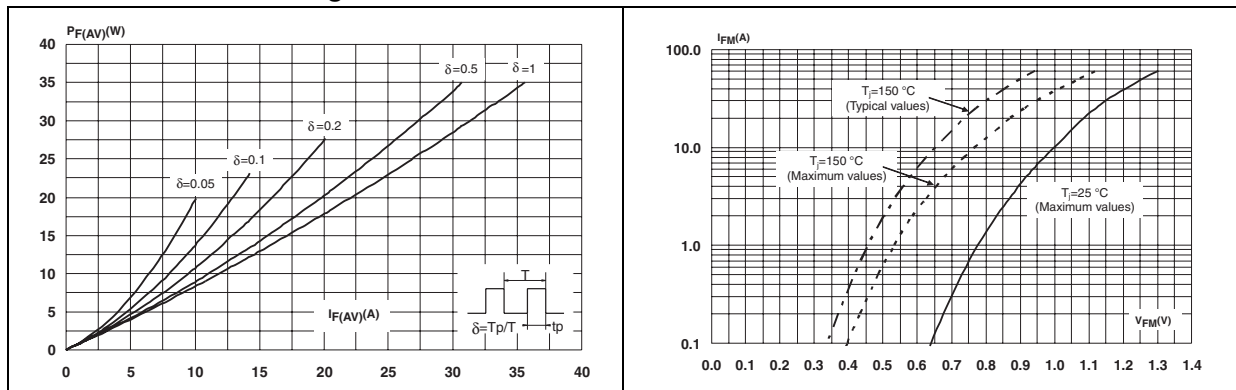


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

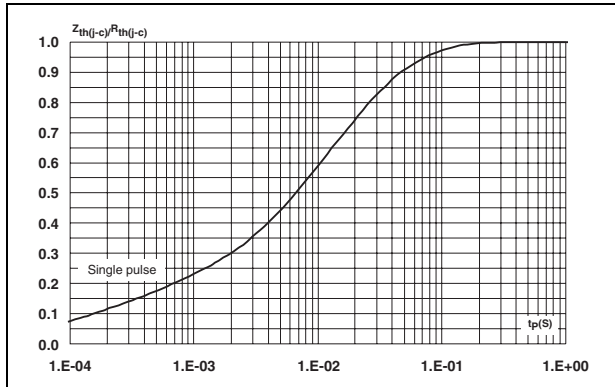


Figure 4. Peak reverse recovery current versus di_F/dt (typical values)

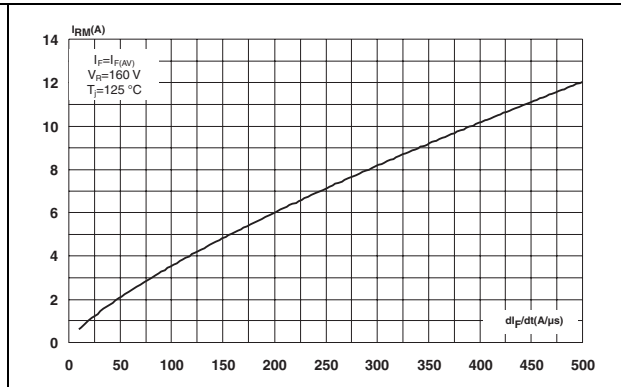


Figure 5. Reverse recovery time versus di_F/dt (typical values)

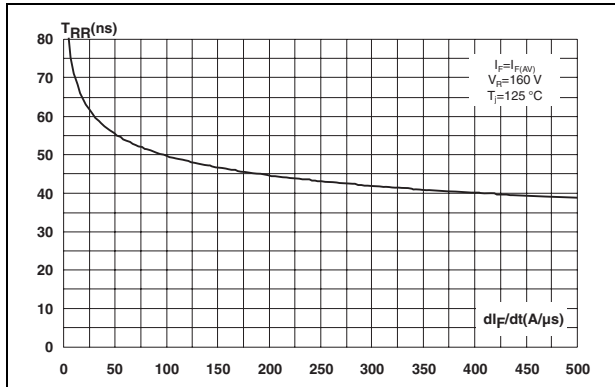


Figure 6. Reverse recovery charges versus di_F/dt (typical values)

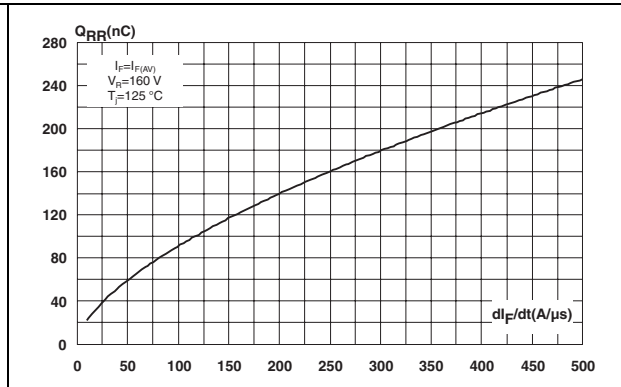


Figure 7. Softness factor versus di_F/dt (typical values)

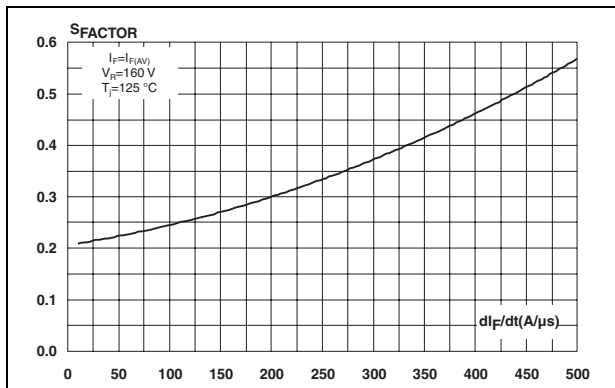


Figure 8. Relative variations of dynamic parameters versus junction temperature

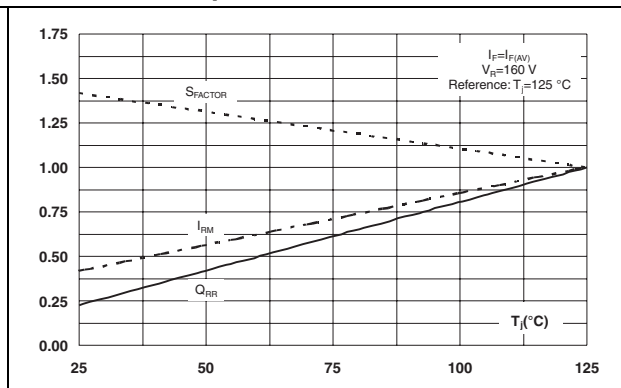


Figure 9. Transient peak forward voltage versus di_F/dt (typical values)

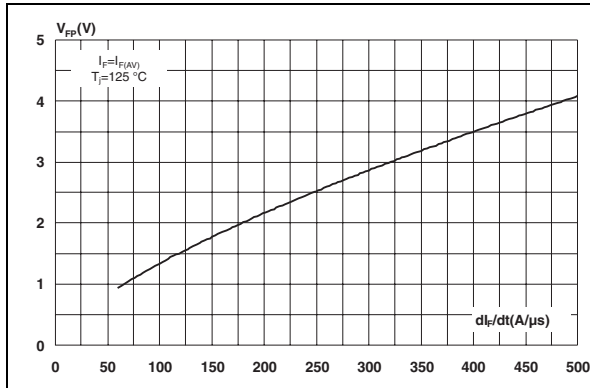


Figure 10. Forward recovery time versus di_F/dt (typical values)

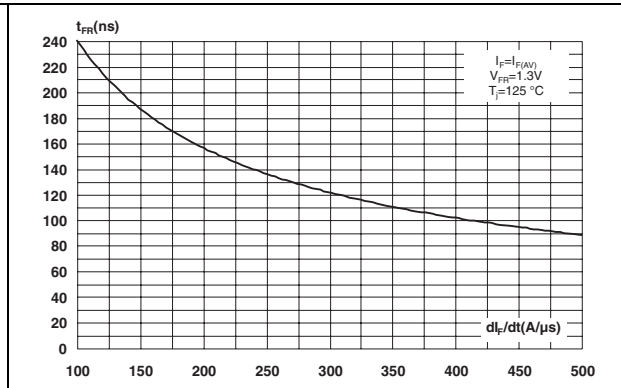


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

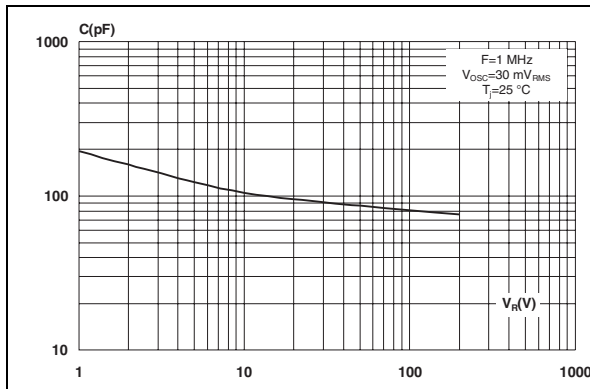
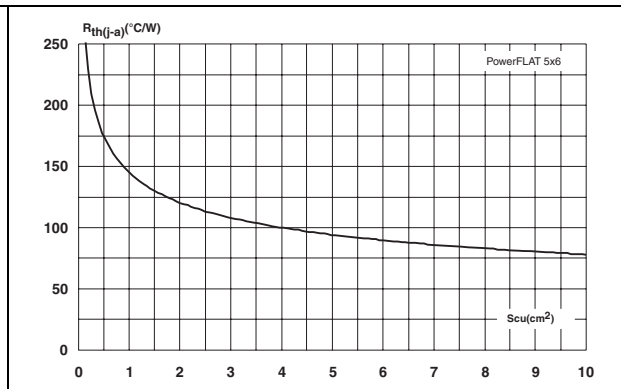


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



2 Package information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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.

Table 7. PowerFLAT 5x6 dimensions

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80		1.00	0.031		0.039
A1	0.02		0.05	0.001		0.002
A2		0.25			0.010	
b	0.30		0.50	0.012		0.020
D		5.20			0.205	
D2	4.11		4.31	0.162		0.170
e		1.27			0.050	
E		6.15			0.242	
E2	3.50		3.70	0.138		0.146
L	0.50		0.80	0.020		0.031
K	1.275		1.575	0.050		0.062

Figure 13. Footprint (dimensions in mm)

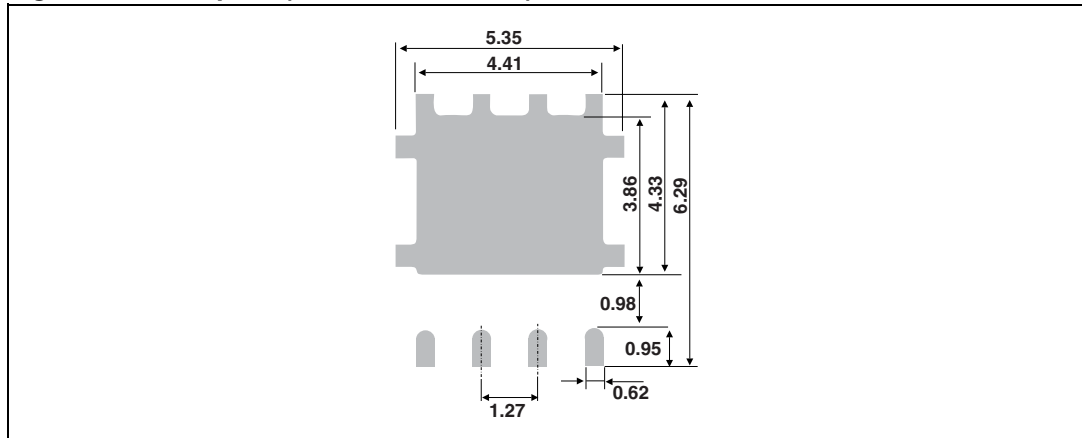
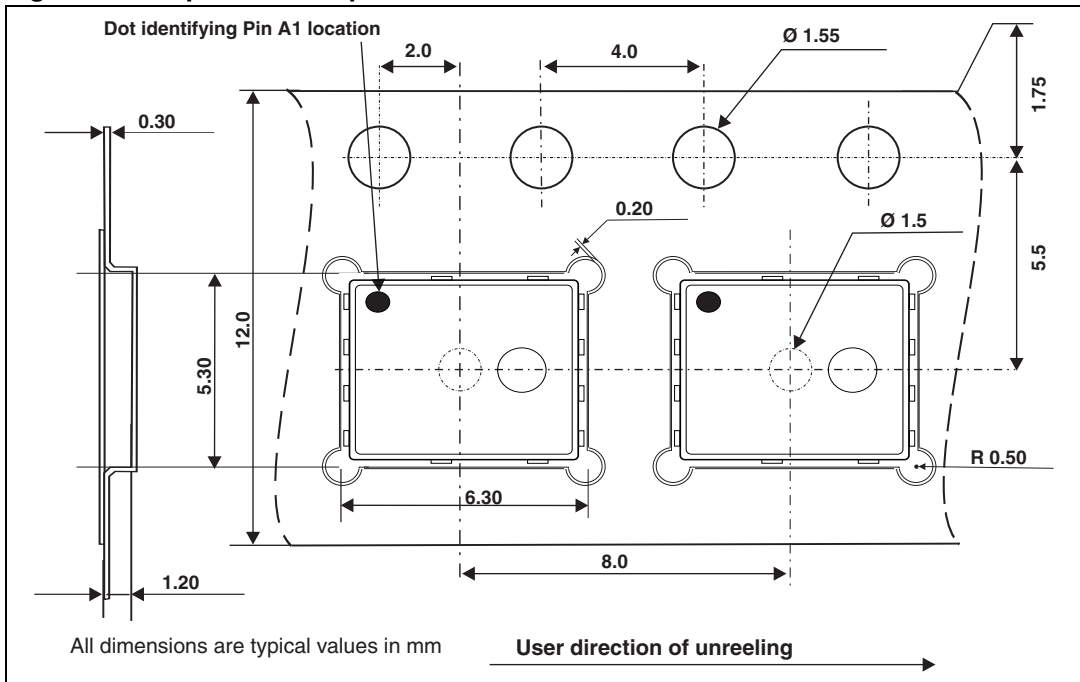


Figure 14. Tape and reel specifications



3 Ordering information

Table 8. Other information

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

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
16-Mar-2012	1	First issue.

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