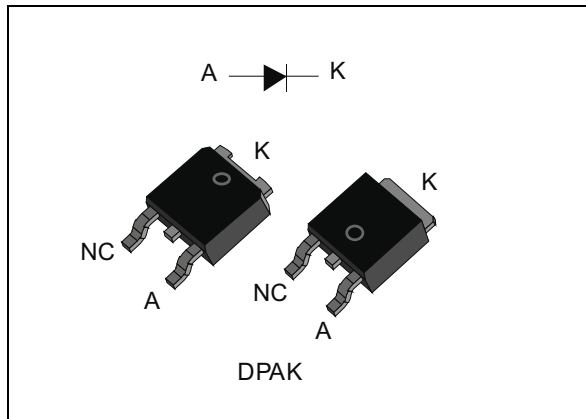


Ultrafast recovery - 1200 V diode

Datasheet - production data



Description

The high quality design of this diode has produced a device with low leakage current, regularly reproducible characteristics and intrinsic ruggedness. These characteristics make it ideal for heavy duty applications that demand long term reliability.

Such demanding applications include industrial power supplies, motor control, and similar mission-critical systems that require rectification and freewheeling. These diodes also fit into auxiliary functions such as snubber, bootstrap, and demagnetization applications.

The improved performance in low leakage current, and therefore thermal runaway guard band, is an immediate competitive advantage for this device.

Features

- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature
- ECOPACK[®]2 compliant component for DPAK on demand

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	3 A
V_{RRM}	1200 V
$T_j(max)$	175 °C
$V_F (typ)$	1.15 V
$t_{rr} (typ)$	55 ns

1 Characteristics

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

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	1200	V
$I_{F(RMS)}$	RMS forward current	6	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$, square wave	$T_c = 150^\circ \text{C}$ 3	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10 \text{ ms sinusoidal}$ 35	A
T_{stg}	Storage temperature range	-65 to + 175	°C
T_j	Maximum operating junction temperature	175	°C

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	3.8	°C/W

Table 4. Static electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ \text{C}$	$V_R = V_{RRM}$		10	μA
		$T_j = 125^\circ \text{C}$		2	100	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ \text{C}$	$I_F = 3 \text{ A}$		2	V
		$T_j = 125^\circ \text{C}$		1.20	1.70	
		$T_j = 150^\circ \text{C}$		1.15	1.65	

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

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

To evaluate the conduction losses use the following equation:

$$P = 1.4 \times I_{F(AV)} + 0.1 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$I_F = 1\text{ A}$, $dI_F/dt = -50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$			115	ns
		$I_F = 1\text{ A}$, $dI_F/dt = -100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$		55	80	
I_{RM}	Reverse recovery current	$I_F = 3\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 600\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$		9.5	14	A
S	Softness factor	$I_F = 3\text{ A}$, $dI_F/dt = -200\text{ A}/\mu\text{s}$, $V_R = 600\text{ V}$, $T_j = 125\text{ }^\circ\text{C}$		2		
t_{fr}	Forward recovery time	$I_F = 3\text{ A}$, $dI_F/dt = 50\text{ A}/\mu\text{s}$, $V_{FR} = 1.5 \times V_{Fmax}$, $T_j = 25\text{ }^\circ\text{C}$			350	ns
V_{FP}	Forward recovery voltage	$I_F = 3\text{ A}$, $dI_F/dt = 50\text{ A}/\mu\text{s}$, $T_j = 25\text{ }^\circ\text{C}$		12		V

Figure 1. Conduction losses versus average current

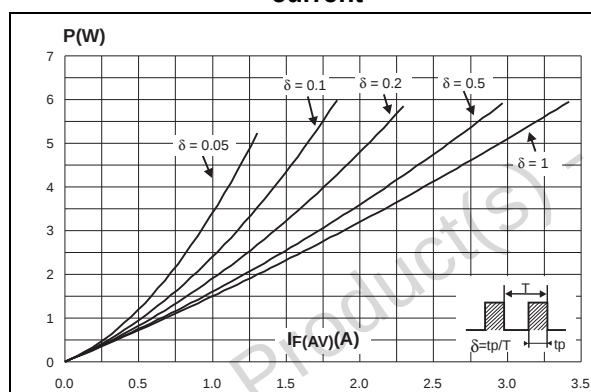


Figure 2. Forward voltage drop versus forward current

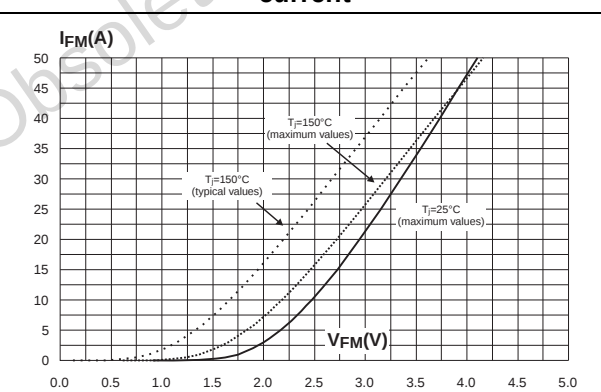


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

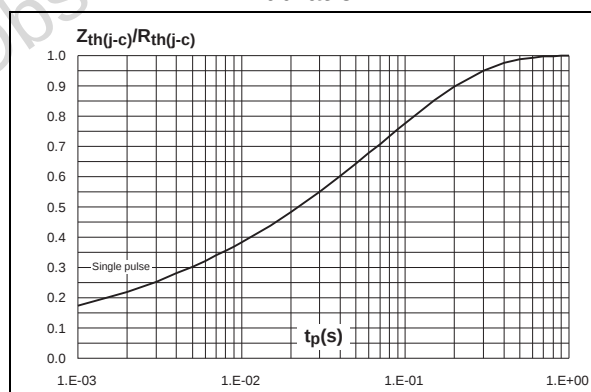


Figure 4. Peak reverse recovery current versus dIF/dt (typical values)

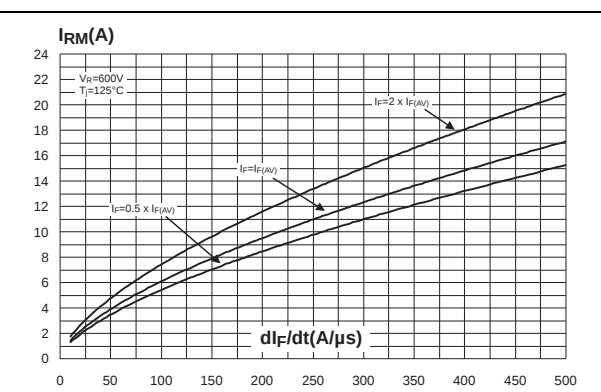


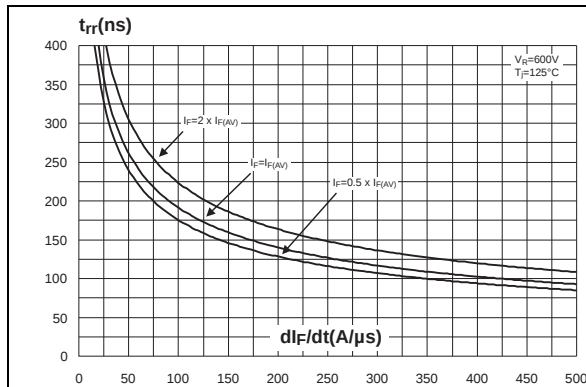
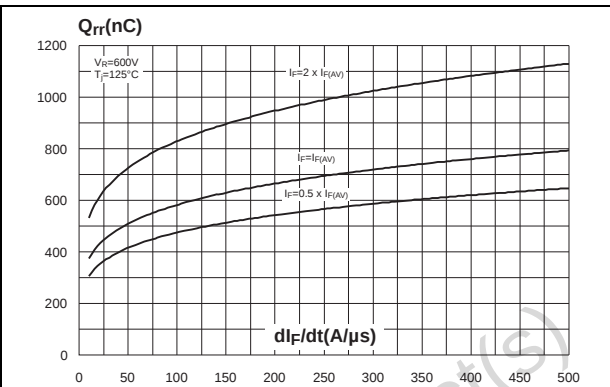
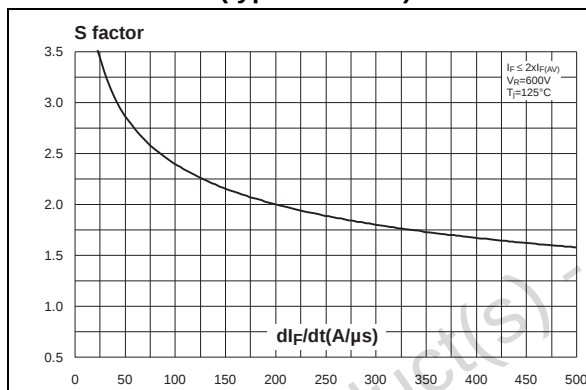
Figure 5. Reverse recovery time versus di_F/dt (typical values)Figure 6. Reverse recovery charges versus di_F/dt (typical values)Figure 7. Softness factor versus di_F/dt (typical values)

Figure 8. Relative variations of dynamic parameters versus junction temperature

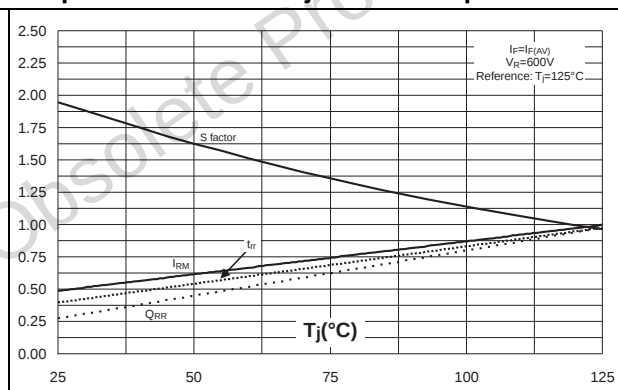
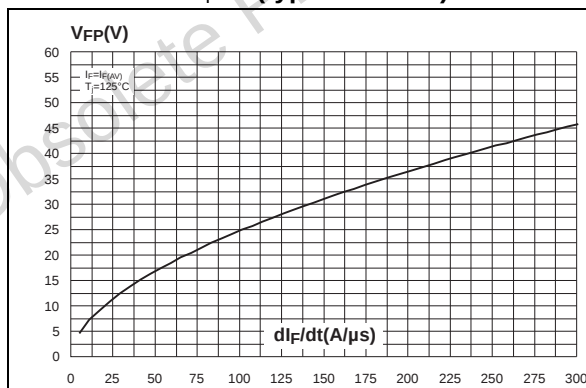
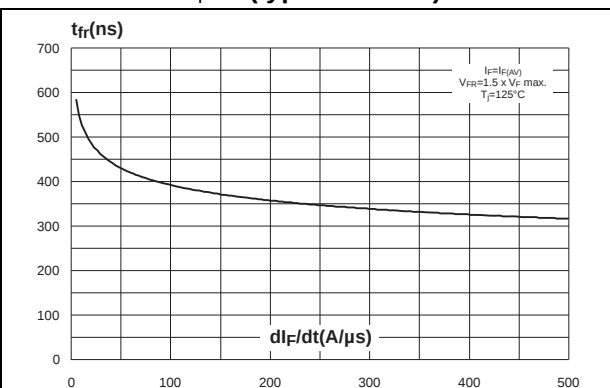
Figure 9. Transient peak forward voltage versus di_F/dt (typical values)Figure 10. Forward recovery time versus di_F/dt (typical values)

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

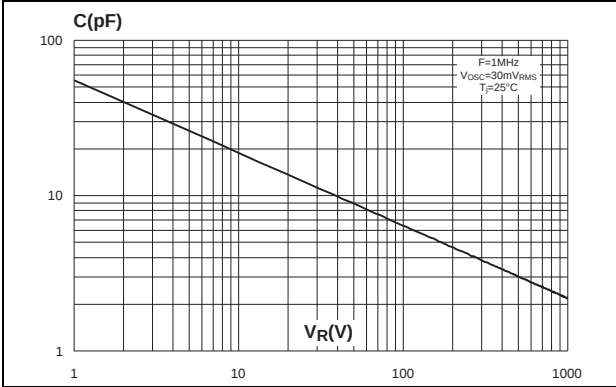
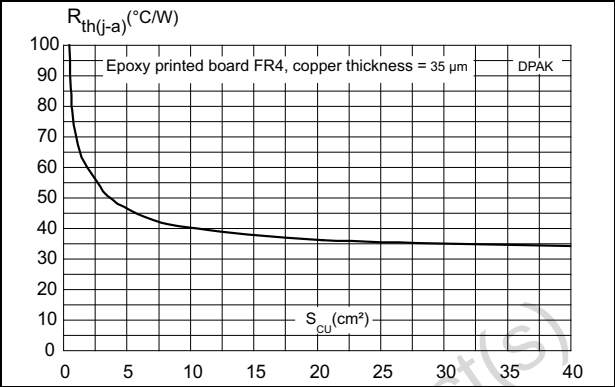


Figure 12. Thermal resistance junction to ambient versus copper surface under tab



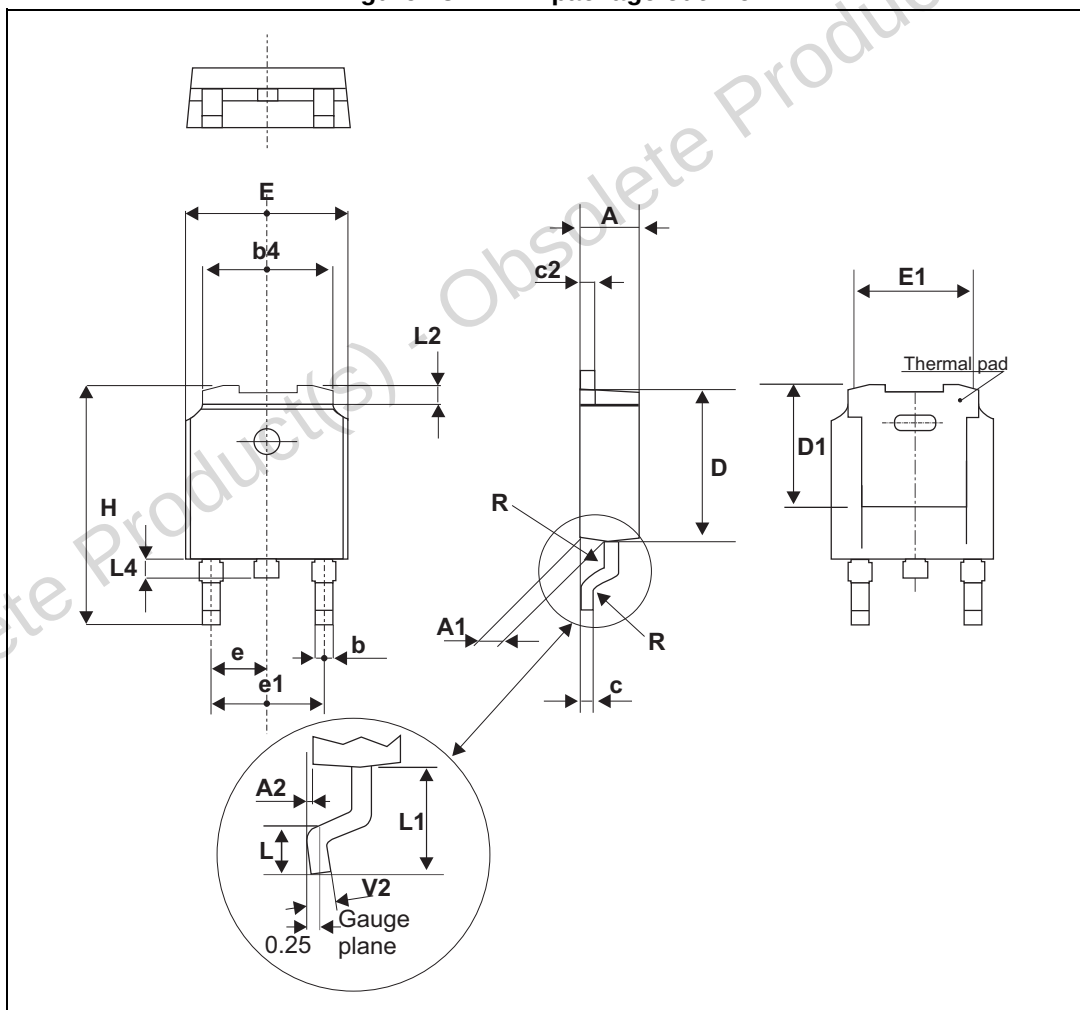
2 Package information

- 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.

2.1 DPAK package information

Figure 13. DPAK package outline

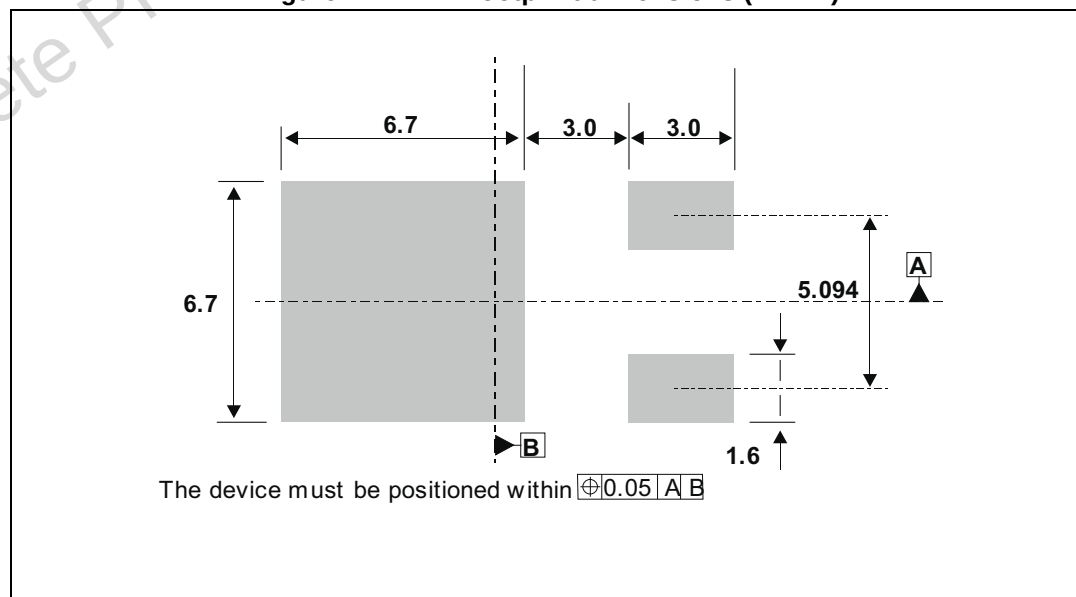


Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 6. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.085		0.094
A1	0.90		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.01
b	0.64		0.90	0.025		0.035
b4	4.95		5.46	0.195		0.215
c	0.46		0.61	0.018		0.024
c2	0.46		0.60	0.018		0.024
D	5.97		6.22	0.235		0.245
D1	5.10			0.201		
E	6.35		6.73	0.250		0.265
E1	4.32			0.170		
e1	4.4		4.7	0.173		0.185
H	9.35		10.40	0.368		0.407
L	1.0		1.78	0.039		0.070
L2			1.27			0.05
L4	0.6		1.02	0.024		0.040
V2	0°		8°	0°		8°

Figure 14. DPAK footprint dimensions (in mm)



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH312B-TR	STTH312B	DPAK	320 mg	2500	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
02-Mar-2006	1	First issue.
24-Apr-2015	2	Updated DPAK package information and reformatted to current standard.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved

