Ultrafast recovery - 1200 V diode

Main product characteristics

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

Features and benefits

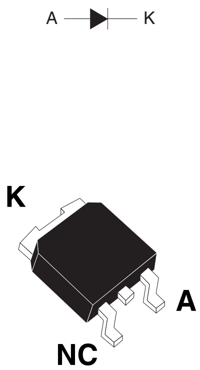
- Ultrafast, soft recovery
- Very low conduction and switching losses
- High frequency and/or high pulsed current operation
- High reverse voltage capability
- High junction temperature

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.



DPAK
STTH312B

Order codes

Part Number	Marking
STTH312B	STTH312B
STTH312B-TR	STTH312B

1 Characteristics

Table 1. Absolute ratings (limiting values at 25° C, unless otherwise specified)

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, $\delta = 0.5$		$T_c = 150°$ C	3	A
I_{FRM}	Repetitive peak forward current	$t_p = 5$ µs, F = 5 kHz square		35	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10$ ms Sinusoidal		35	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Maximum operating junction temperature			175	°C

Table 2. Thermal parameter

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

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
I_R(1)	Reverse leakage current	$T_j = 25°$ C	$V_R = V_{RRM}$			10	µA
		$T_j = 125°$ C			2	100	
V_F(2)	Forward voltage drop	$T_j = 25°$ C	$I_F = 3$ A			2	V
		$T_j = 125°$ C			1.20	1.7	
		$T_j = 150°$ C			1.15	1.65	

1. Pulse test: $t_p = 5$ ms, $\delta < 2$ %
2. Pulse test: $t_p = 380$ µs, $\delta < 2$ %

To evaluate the conduction losses use the following equation: $P = 1.4 \times I_{F(AV)} + 0.1\, I_F{}^2{}_{(RMS)}$

Table 4. Dynamic characteristics

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

Figure 1. Conduction losses versus average current

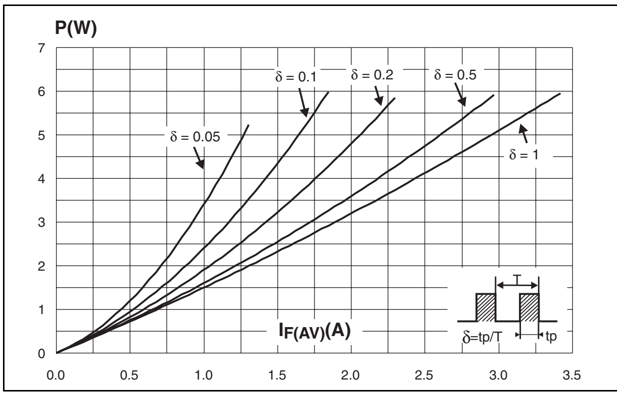


Figure 2. Forward voltage drop versus forward current

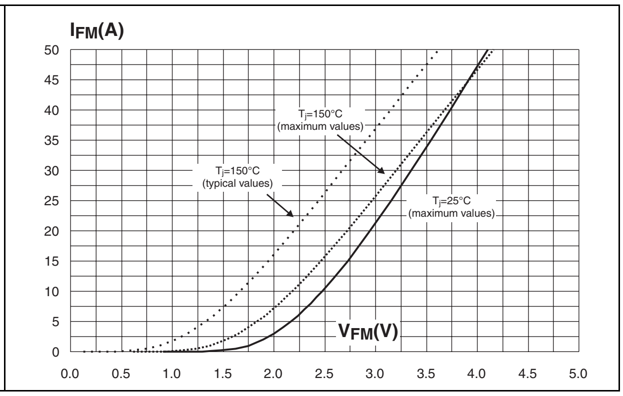


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

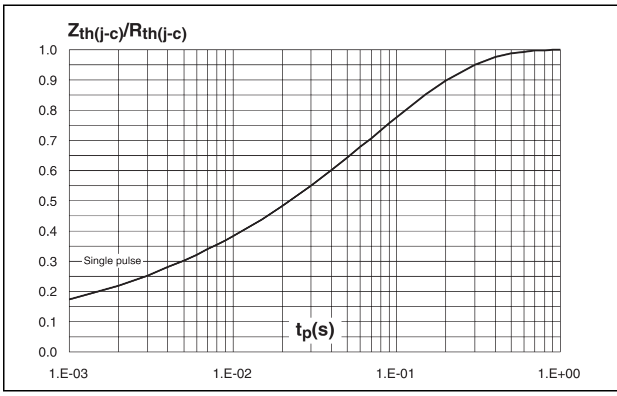


Figure 4. Peak reverse recovery current versus dI_F/dt (typical values)

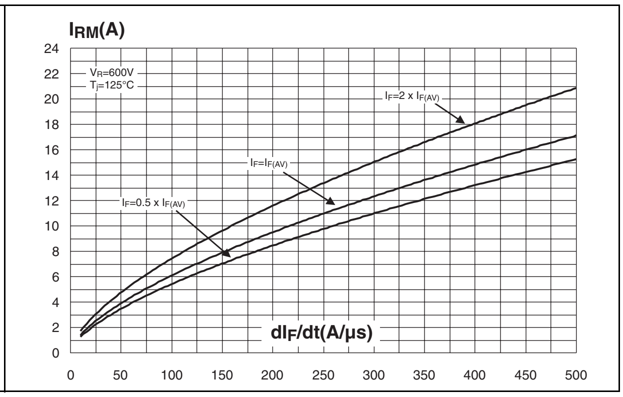


Figure 5. Reverse recovery time versus dI_F/dt (typical values)

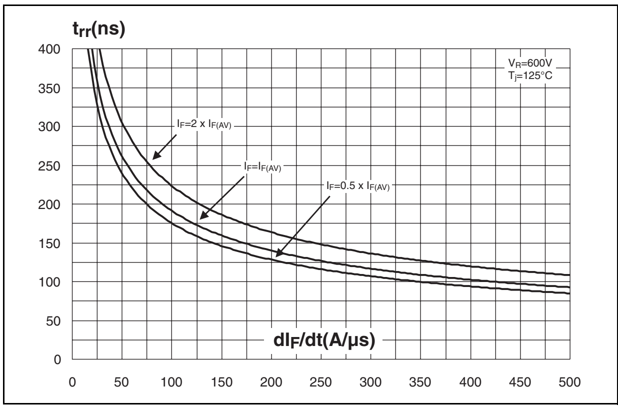


Figure 6. Reverse recovery charges versus dI_F/dt (typical values)

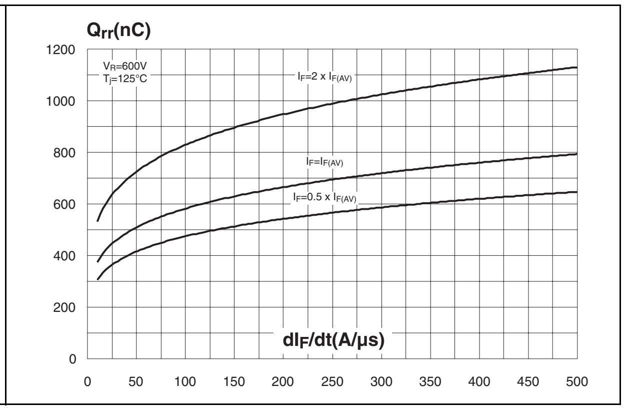


Figure 7. Softness factor versus dI_F/dt (typical values)

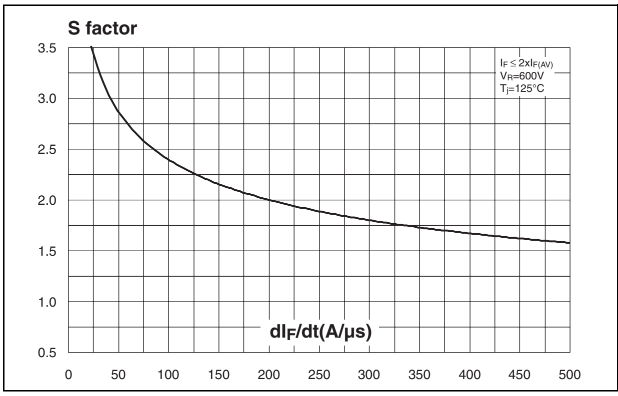


Figure 8. Relative variations of dynamic parameters versus junction temperature

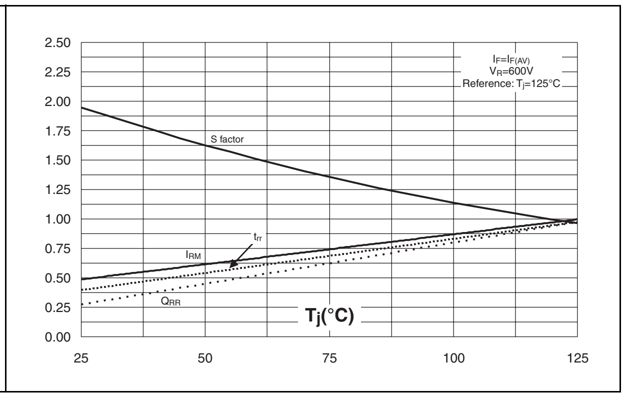


Figure 9. Transient peak forward voltage versus dI_F/dt (typical values)

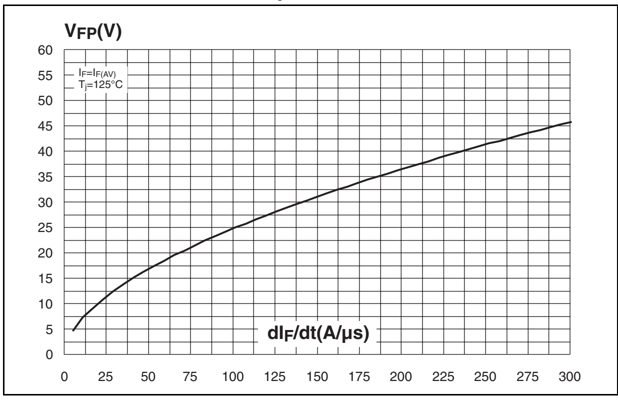


Figure 10. Forward recovery time versus dI_F/dt (typical values)

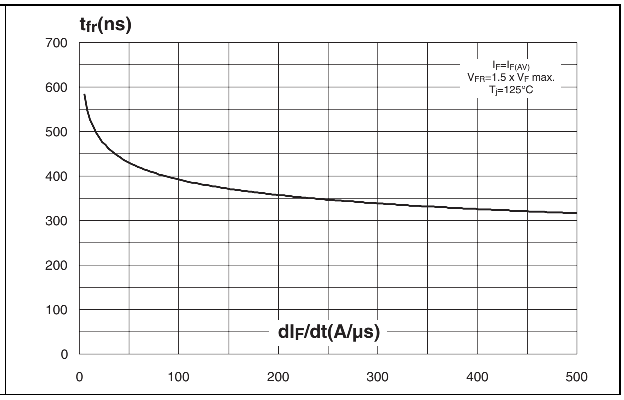


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

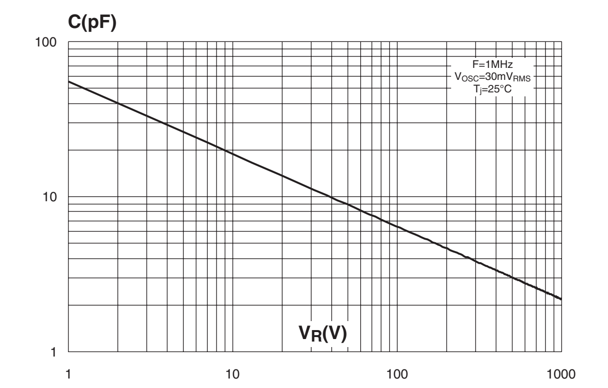
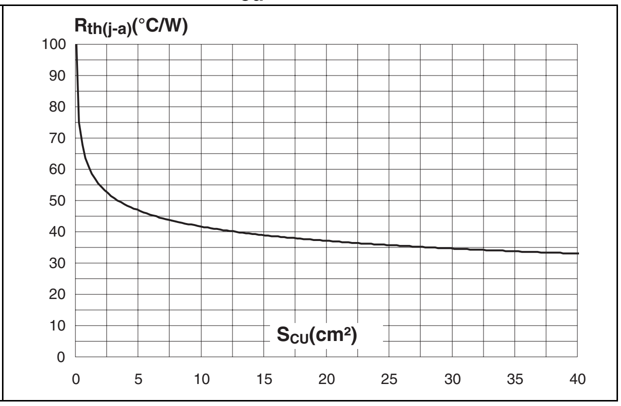


Figure 12. Thermal resistance junction to ambient versus copper surface under tab (printed circuit board FR4, e_{cu} = 35 µm)

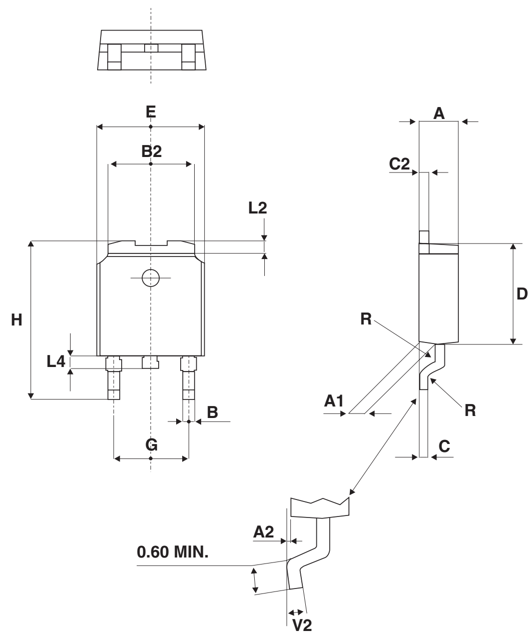


2 Package mechanical data

Epoxy meets UL94, V0

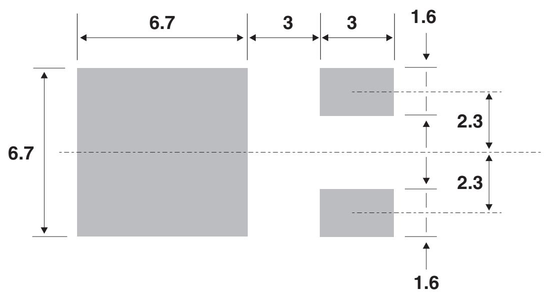
Cooling method: by conduction (C)

Table 5. DPAK dimensions



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
V2	0°	8°	0°	8°

Figure 13. DPAK footprint (dimensions in mm)



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH312B	STTH312B	DPAK	0.30 g	75	Tube
STTH312B-TR	STTH312B	DPAK	0.30 g	2500	Tape & reel

4 Revision history

Date	Revision	Description of Changes
02-Mar-2006	1	First issue.