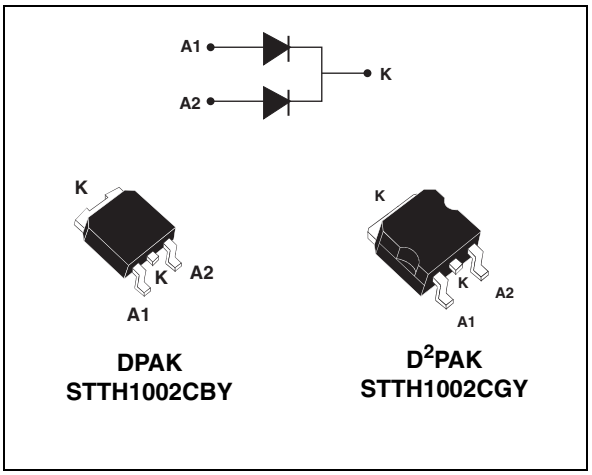
STTH1002C-Y

Automotive high efficiency ultrafast diode

Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery times
- High junction temperature
- Low leakage current
- AEC-Q101 qualified



DPAK
STTH1002CBY

D²PAK
STTH1002CGY

Description

Dual center tap rectifier suited for switch mode power supplies and high frequency DC to DC converters.

Packaged in DPAK and D²PAK, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection for automotive applications.

Table 1. Device summary

Symbol	Value
$I_{F(AV)}$	Up to 2 x 8 A
V_{RRM}	200 V
T_j (max)	175 °C
V_F(typ)	0.78 V
t_{rr} (typ)	20 ns

1 Characteristics

Table 2. Absolute ratings (limiting values, per diode)

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			200	V
$I_{F(RMS)}$	Forward rms current		D^2PAK	20	A
			DPAK	10	
$I_{F(AV)}$	Avarage forward current $\delta = 0.5$	T_c = 155 °C	Per diode	5	A
		T_c = 150 °C	Per device	10	
		T_c = 135 °C	Per diode	8	
		T_c = 125 °C	Per device	16	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		50	A
T_{stg}	Storage temperature range			-65 to + 175	°C
T_j	Operating junction temperature range			-40 to + 175	°C

Table 3. Thermal parameters

Symbol	Parameter		Value (max)	Unit
$R_{th(j-c)}$	Junction to case	Per diode	4.0	°C/W
		Per device	2.5	
$R_{th(j-c)}$	Coupling		1.0	

When the diodes 1 and 2 are used simultaneously:
ΔT_j (diode1) = P(diode1) x $R_{th(j-c)}$ (per diode) + P(diode2) x $R_{th(c)}$

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$			5	µA
		T_j = 125 °C			3	40	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 5 A			1.1	V
		T_j = 25 °C	I_F = 10 A			1.25	
		T_j = 150 °C	I_F = 5 A		0.78	0.89	
		T_j = 150 °C	I_F = 10 A			1.05	

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:
$P = 0.73 \times I_{F(AV)} + 0.032\ I_F{}^2{}_{(RMS)}$

Table 5. Dynamic electrical 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		20	25	ns
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 5 A V_R = 160 V dI_F/dt = 200 A/µs		5.9	7.6	A
t_{fr}	Forward recovery time	T_j = 25 °C	I_F = 5 A dI_F/dt = 100 A/µs V_{FR} = 1.1 x V_{Fmax}			110	ns
V_{FP}	Forward recovery voltage	T_j = 25 °C	I_F = 5 A dI_F/dt = 100 A/µs		2.4		V

Figure 1. Peak current versus duty cycle (per diode)

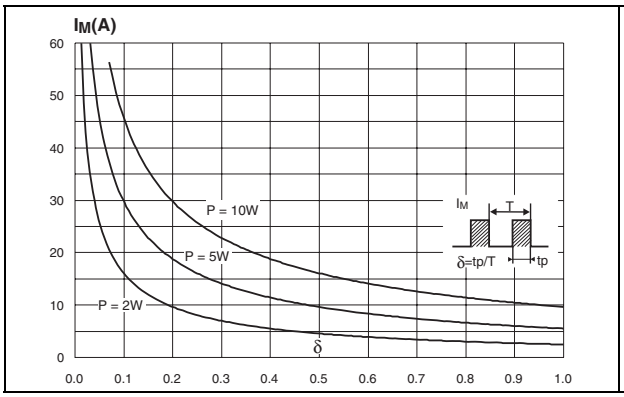


Figure 2. Forward voltage drop versus forward current (typical values, per diode)

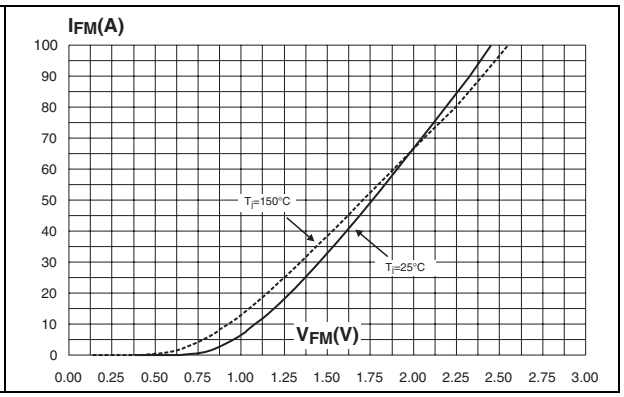


Figure 3. Forward voltage drop versus forward current (maximum values, per diode)

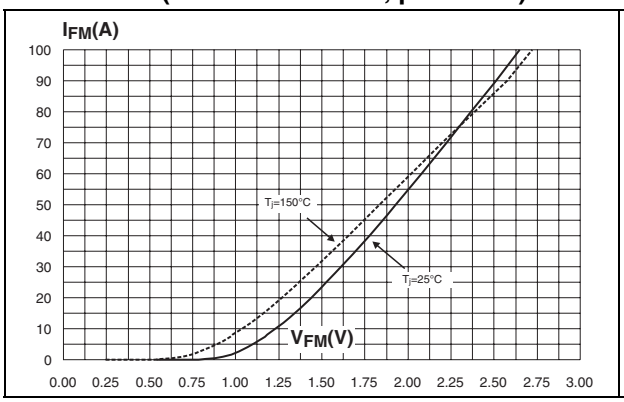


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

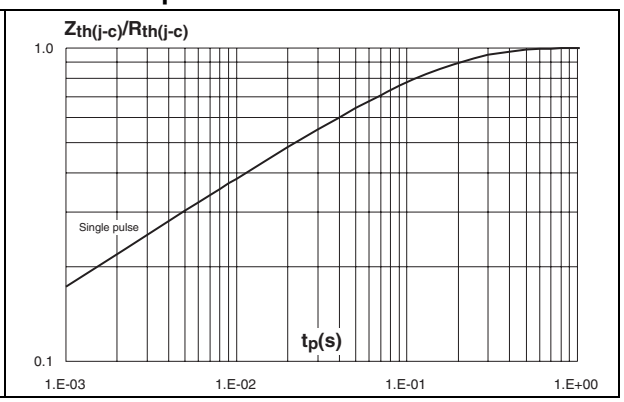


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

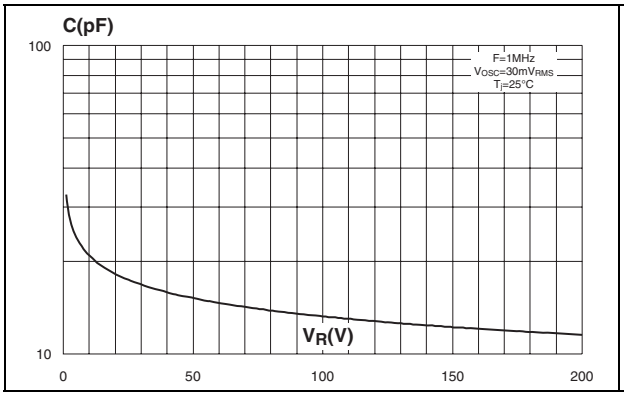


Figure 6. Reverse recovery charges versus dI_F/dt (typical values, per diode)

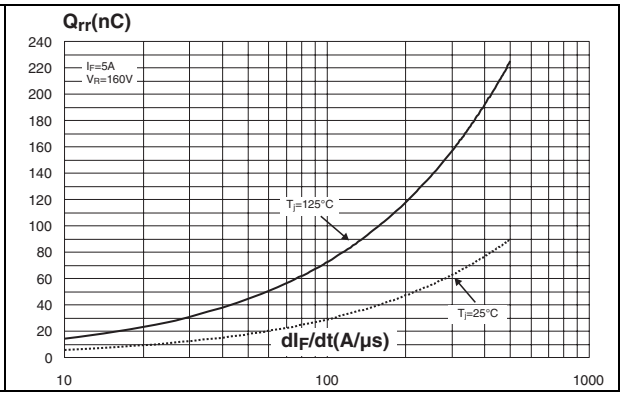


Figure 7. Reverse recovery time versus dI_F/dt (typical values, per diode)

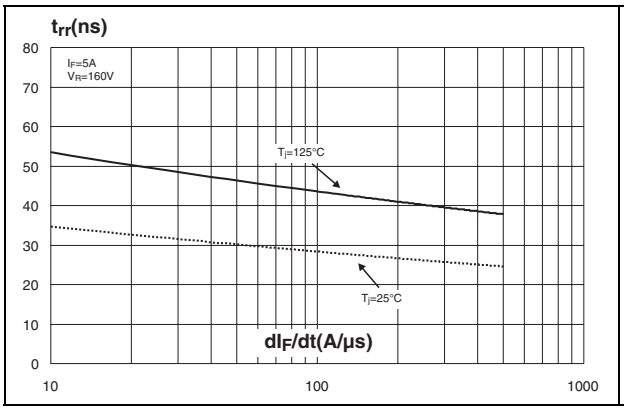


Figure 8. Peak reverse recovery current versus dI_F/dt (typical values, per diode)

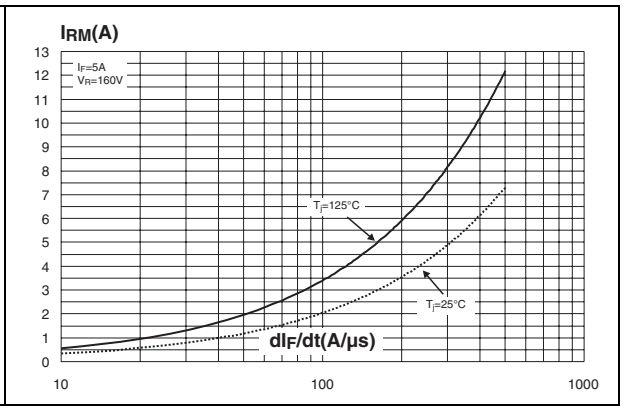


Figure 9. Dynamic parameters versus junction temperature

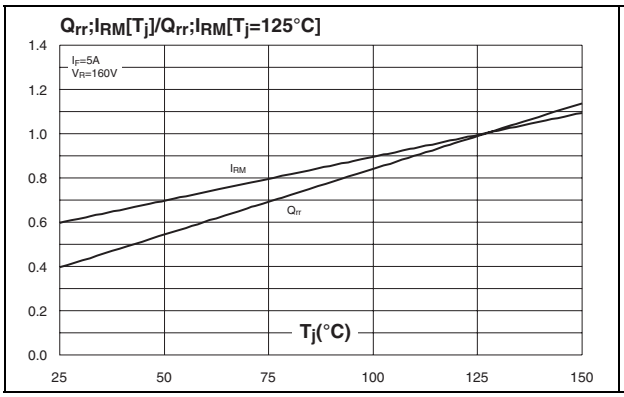


Figure 10. Thermal resistance junction to ambient versus copper surface under tab for D^2PAK

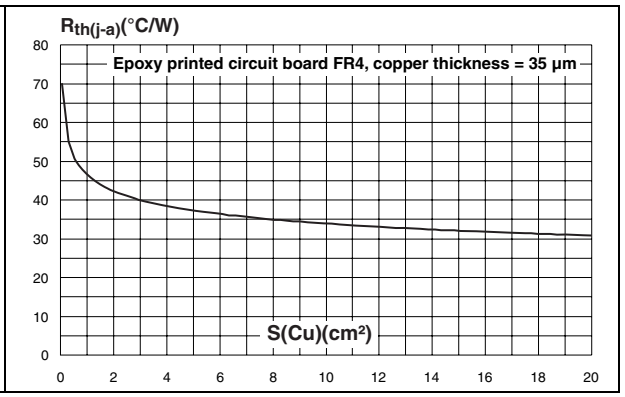
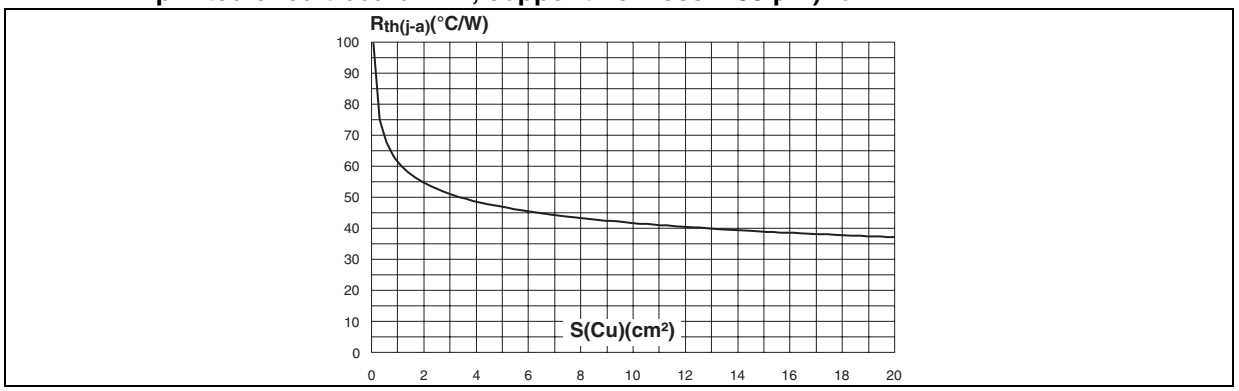


Figure 11. Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness = 35 µm) for DPAK

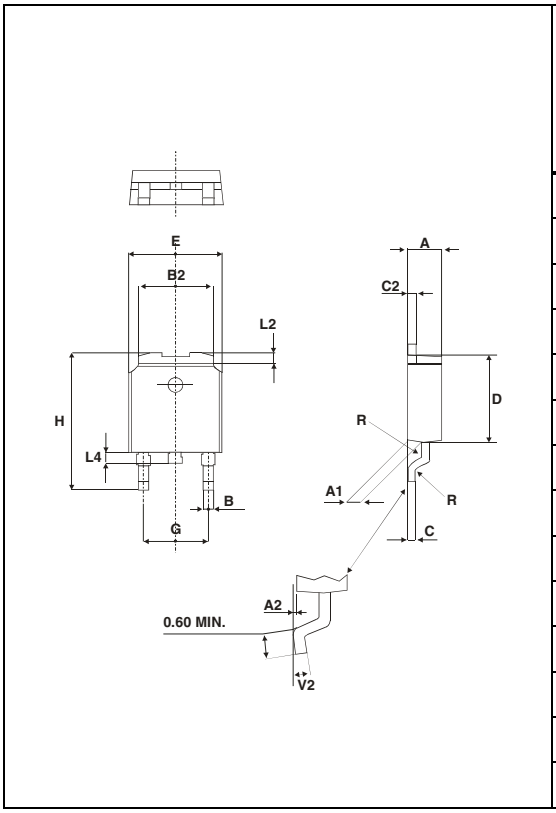


2 Package mechanical data

- Epoxy meets UL94, V0
- Cooling method: by conduction (method 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 6. 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 12. Footprint (dimensions in mm)

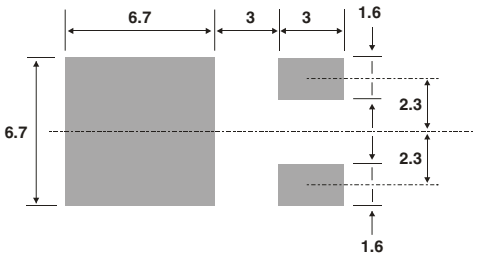
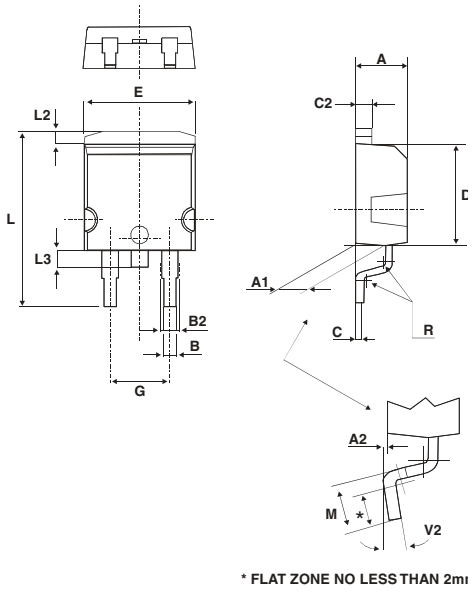
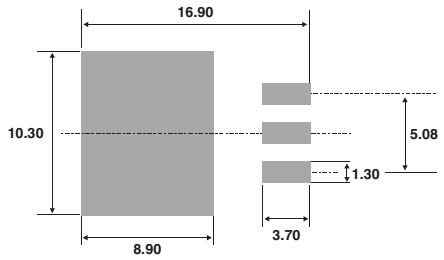


Table 7. D²PAK dimensions



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.49	2.69	0.098	0.106
A2	0.03	0.23	0.001	0.009
B	0.70	0.93	0.027	0.037
B2	1.14	1.70	0.045	0.067
C	0.45	0.60	0.017	0.024
C2	1.23	1.36	0.048	0.054
D	8.95	9.35	0.352	0.368
E	10.00	10.40	0.393	0.409
G	4.88	5.28	0.192	0.208
L	15.00	15.85	0.590	0.624
L2	1.27	1.40	0.050	0.055
L3	1.40	1.75	0.055	0.069
M	2.40	3.20	0.094	0.126
R	0.40 typ.		0.016 typ.	
V2	0°	8°	0°	8°

Figure 13. Footprint (dimensions in mm)



3 Ordering information

Table 8. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH1002CBY-TR	STTH1002CY	DPAK	0.3 g	2500	Tape and reel
STTH1002CGY-TR	STTH1002CGY	D^2PAK	1.48 g	1000	

4 Revision history

Table 9. Document revision history

Date	Revision	Changes
21-Oct-2010	1	First issue.
03-Nov-2011	2	Updated *Table 7* and *Table 8.*

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