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Automotive high efficiency ultrafast diode

Datasheet – production data

Features

- High junction temperature
- Combines highest recovery and reverse voltage performance
- Ultrafast, soft and noise-free recovery
- AEC-Q101 qualified

Description

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

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

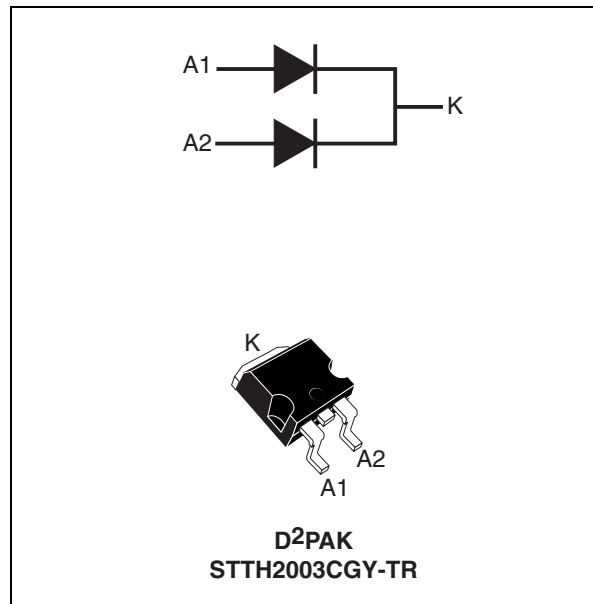


Table 1. Device summary

$I_F(AV)$	2 x 10 A
V_{RRM}	300 V
$T_j(max)$	175 °C
$V_F(max)$	1 V
$t_{rr}(max)$	40 ns

1 Characteristics

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

Symbol	Parameter			Value	Unit
V_{RRM}	Repetitive peak reverse voltage			300	V
$I_{F(RMS)}$	Forward current rms			48	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	$T_c = 140\text{ }^\circ\text{C}$	Per diode Per device	10 20	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal } (T_j = 25\text{ }^\circ\text{C})$		110	A
T_{stg}	Storage temperature range			-65 to + 175	$^\circ\text{C}$
T_j	Operating junction temperature range			-40 to + 175	$^\circ\text{C}$

Table 3. Thermal resistance

Symbol	Parameter		Value (Max.)	Unit
$R_{th(j-c)}$	Junction to case	Per diode	2.5	$^\circ\text{C/W}$
		Total	1.3	

Table 4. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ }^\circ\text{C}$	$V_R = 300\text{ V}$			20	μA
		$T_j = 125\text{ }^\circ\text{C}$			30	300	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 10\text{ A}$			1.25	V
		$T_j = 125\text{ }^\circ\text{C}$			0.85	1	

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 conduction losses use the following equation:

$$P = 0.75 \times I_{F(AV)} + 0.025 I_{F(RMS)}^2$$

Table 5. Recovery characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 0.5\text{ A}, I_{rr} = 0.25\text{ A}$ $I_R = 1\text{ A}$			25	ns
			$I_F = 1\text{ A}, V_R = 30\text{ V}$ $di_F/dt = -50\text{ A}/\mu\text{s}$			40	
t_{fr}	Forward recovery time	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 10\text{ A}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			230	ns
V_{FP}	Peak forward voltage	$T_j = 25\text{ }^\circ\text{C}$	$I_F = 10\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$			3.5	V
I_{RM}	Reverse recovery current	$T_j = 125\text{ }^\circ\text{C}$	$I_F = 10\text{ A}, V_{CC} = 200\text{ V}$ $di_F/dt = 200\text{ A}/\mu\text{s}$			8	A
S factor	Softness factor				0.3	-	

Figure 1. Conduction losses versus average forward current (per diode)

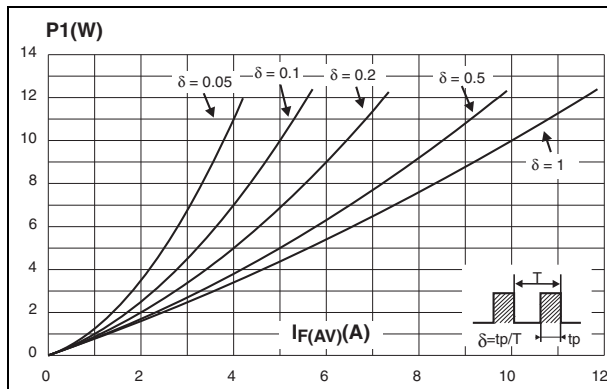


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

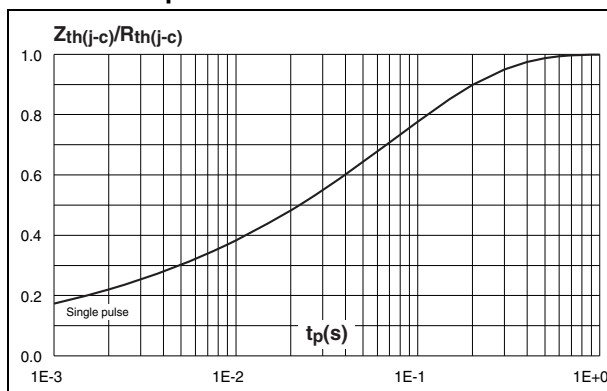


Figure 2. Forward voltage drop versus forward current (maximum values, per diode)

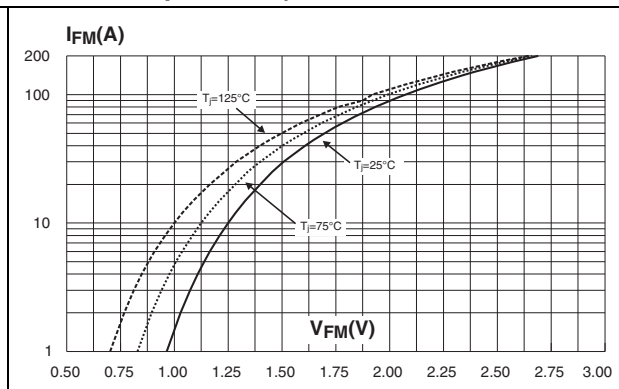


Figure 4. Peak reverse recovery current versus di/dt (90% confidence, per diode)

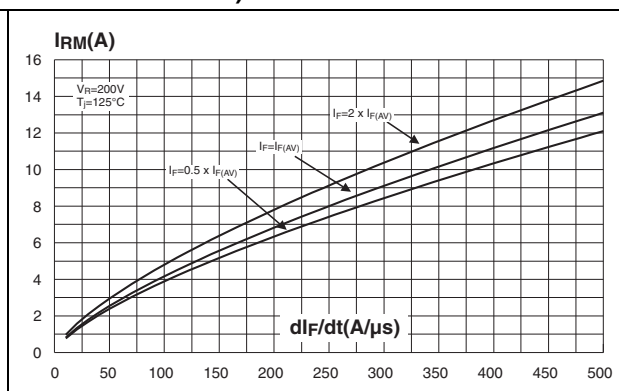


Figure 5. Reverse recovery time versus di_F/dt (90% confidence, per diode)

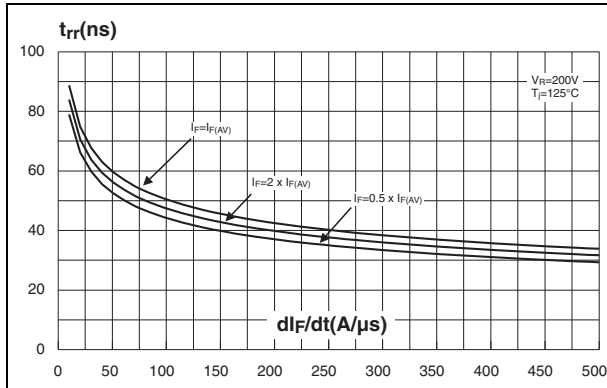


Figure 6. Softness factor (t_b/t_a) versus di_F/dt (typical values, per diode)

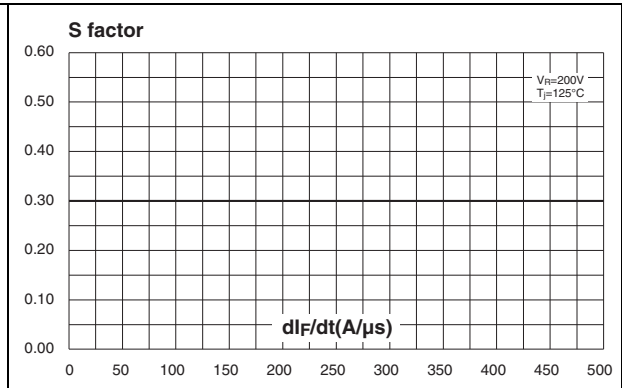


Figure 7. Relative variation of dynamic parameters versus junction temperature (reference: $T_j = 125^\circ C$)

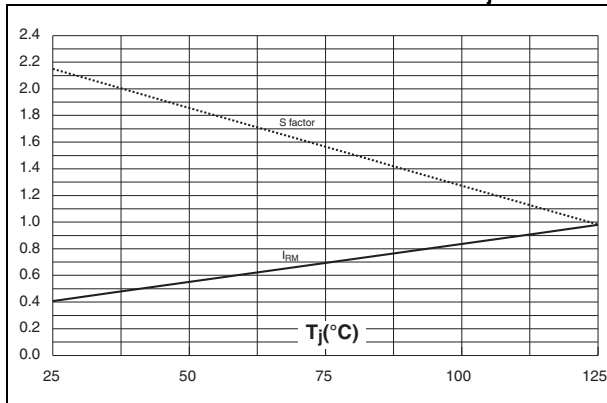


Figure 8. Forward recovery time versus di_F/dt (90% confidence, per diode)

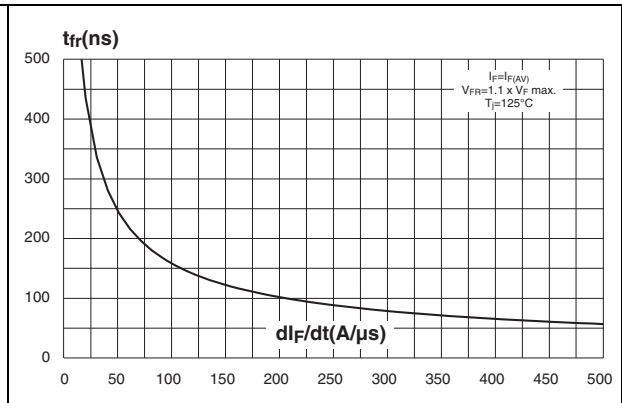


Figure 9. Thermal resistance, junction to ambient, versus copper surface under tab

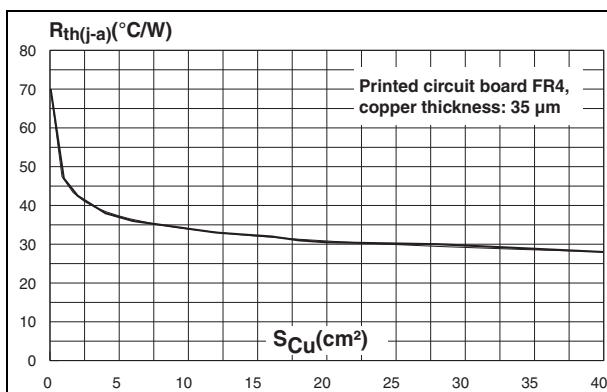
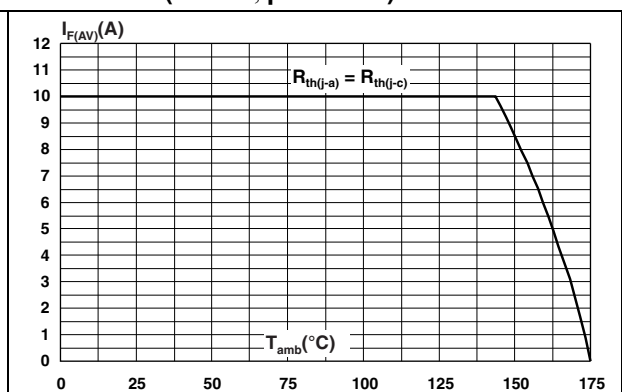


Figure 10. Average forward current versus ambient temperature ($\delta = 0.5$, per diode)



2 Package information

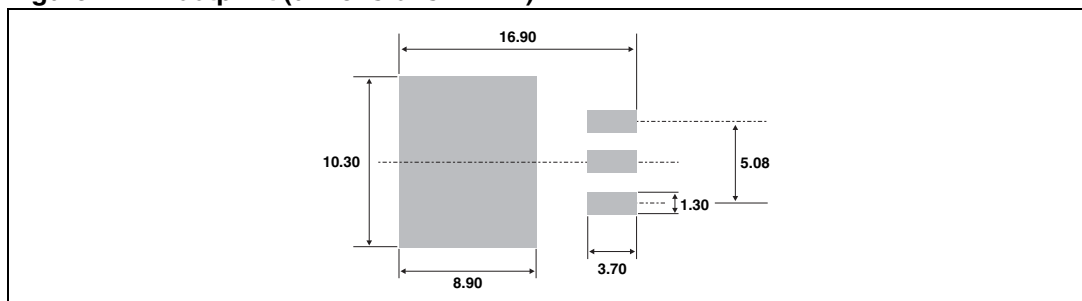
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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 6. 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 11. Footprint (dimensions in mm)



3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH2003CGY-TR	STTH2003CGY	D ² PAK	1.48 g	1000	Tape and reel

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Oct-2012	1	Initial release.

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