

## Automotive high efficiency ultrafast diode

Datasheet – production data

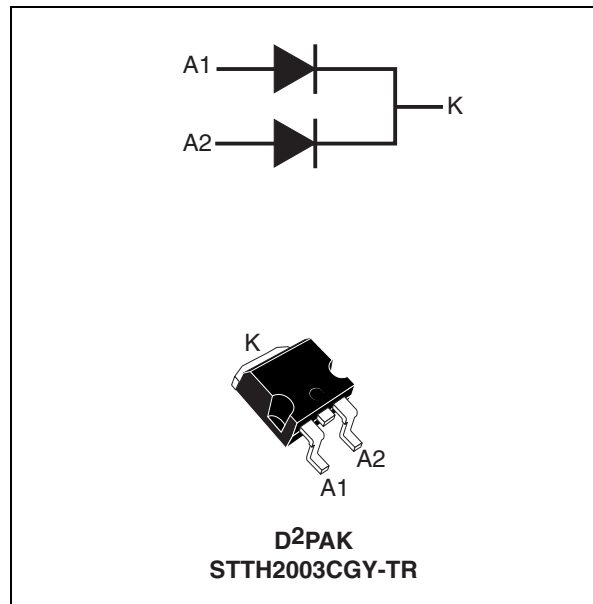
### Features

- 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 D<sup>2</sup>PAK, 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	$\mu\text{A}$
		$T_j = 125\text{ }^\circ\text{C}$			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:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

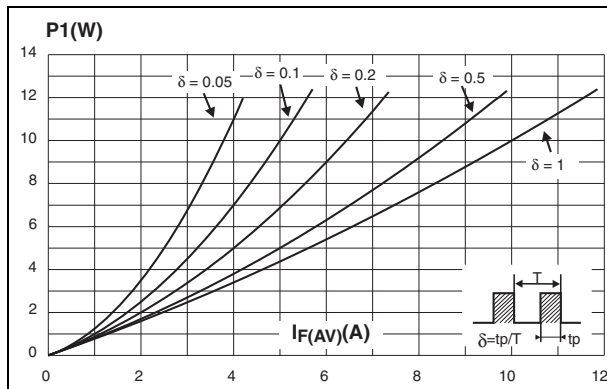
To evaluate the conduction losses use the following equation:

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

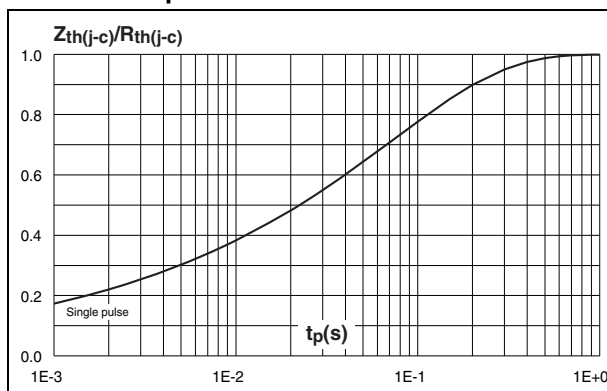
**Table 5. Recovery characteristics**

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	-	

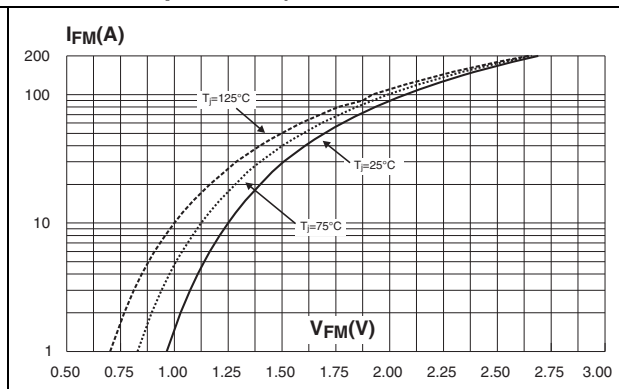
**Figure 1. Conduction losses versus average forward current (per diode)**



**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)**

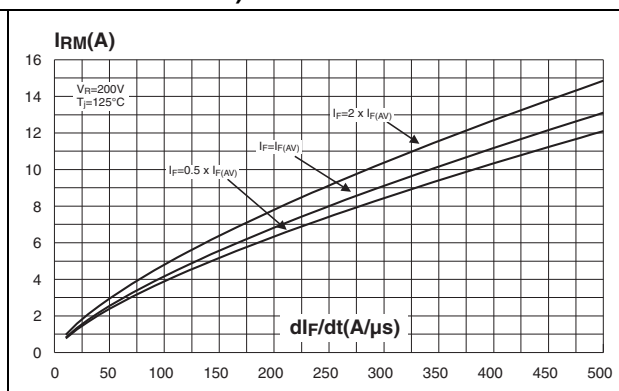


Figure 5. Reverse recovery time versus  $di_F/dt$  (90% confidence, per diode)

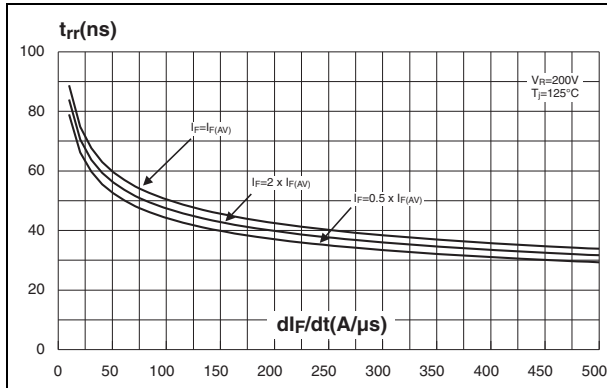


Figure 6. Softness factor ( $t_b/t_a$ ) versus  $di_F/dt$  (typical values, per diode)

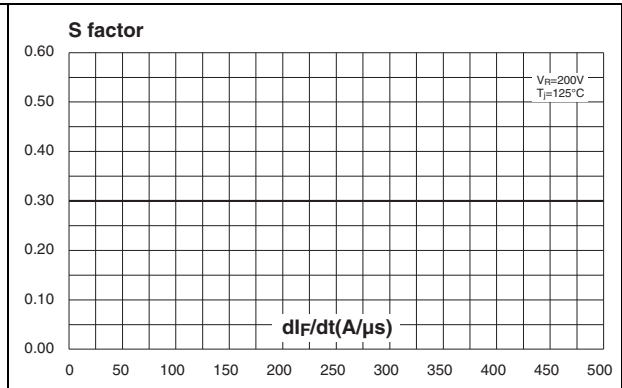


Figure 7. Relative variation of dynamic parameters versus junction temperature (reference:  $T_j = 125^\circ C$ )

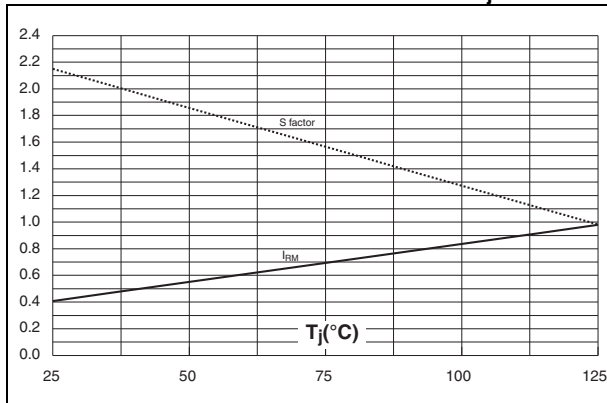


Figure 8. Forward recovery time versus  $di_F/dt$  (90% confidence, per diode)

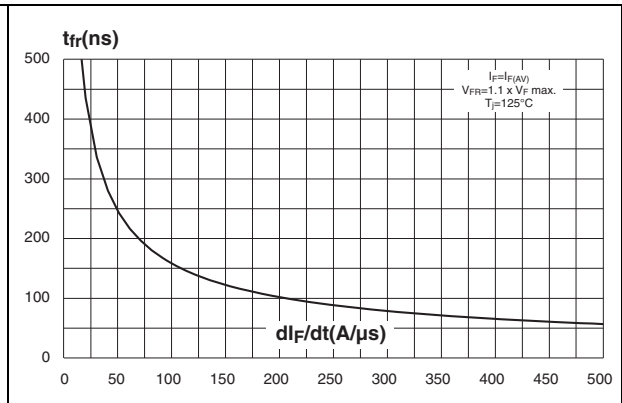


Figure 9. Thermal resistance, junction to ambient, versus copper surface under tab

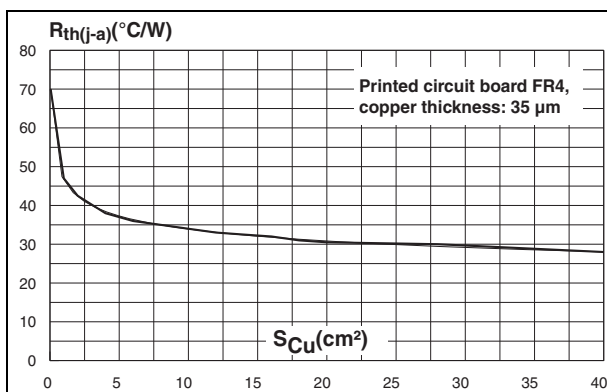
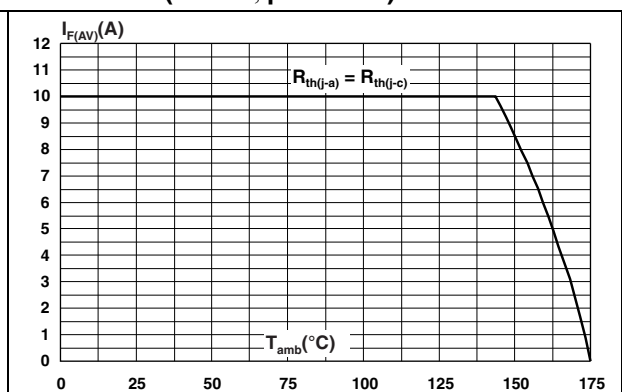


Figure 10. Average forward current versus ambient temperature ( $\delta = 0.5$ , per diode)



## 2 Package information

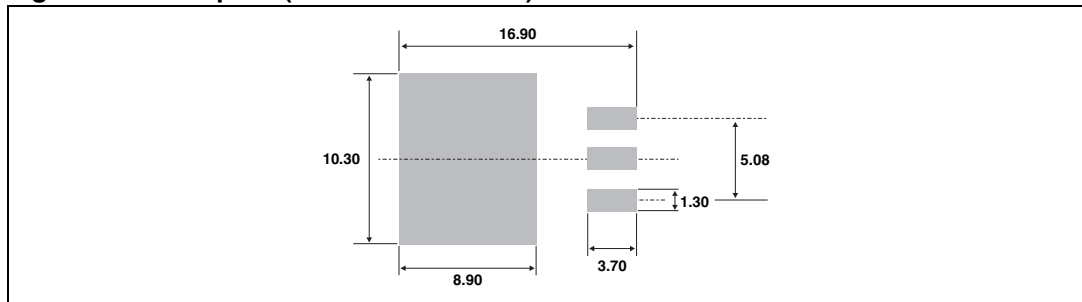
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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**Table 6. D<sup>2</sup>PAK 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 <sup>2</sup> 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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