

## Automotive ultrafast recovery diode

Datasheet – production data

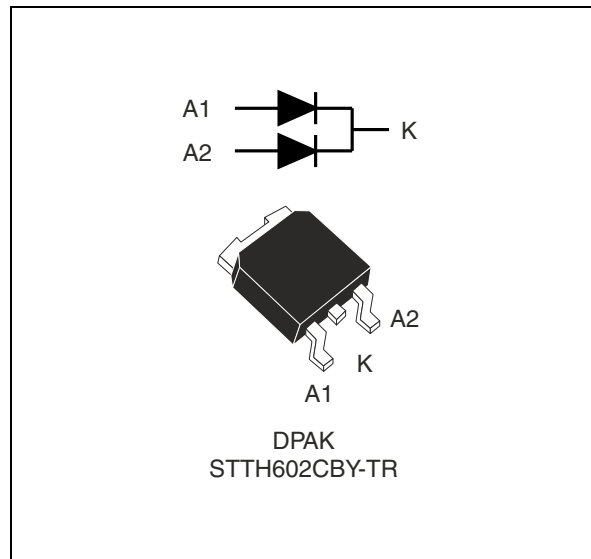
### Features

- Suited for SMPS
- Low losses
- Low forward and reverse recovery time
- High surge current capability
- High junction temperature

### Description

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

Packaged in DPAK, 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 3 A
$V_{RRM}$	200 V
$T_j$ (max)	175° C
$V_F$ (typ)	0.80 V
$t_{rr}$ (typ)	14 ns

# 1 Characteristics

**Table 2. Absolute ratings (limiting values at  $T_j = 25^\circ\text{C}$ , unless otherwise specified)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		200	V
$I_{F(RMS)}$	RMS forward current		11	A
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	Per diode $T_c = 160^\circ\text{C}$	3	A
		Per device $T_c = 155^\circ\text{C}$	6	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ Sinusoidal	60	A
$T_{stg}$	Storage temperature range		-65 to + 175	$^\circ\text{C}$
$T_j$	Operating junction temperature		-40 to + 175	$^\circ\text{C}$

**Table 3. Thermal parameters**

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	5	$^\circ\text{C/W}$
		Per device	3.0	
$R_{th(c)}$	Coupling	Per diode	1	
		Per diode	3	

When the two diodes 1 and 2 are used simultaneously:

$$\Delta T_j(\text{diode 1}) = P(\text{diode 1}) \times R_{th(j-c)} (\text{Per diode}) + P(\text{diode 2}) \times R_{th(c)}$$

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		3	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$		3	30	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 3\text{ A}$	0.98	1.1	V
		$T_j = 150^\circ\text{C}$		0.8	0.95	
		$T_j = 25^\circ\text{C}$	$I_F = 6\text{ A}$	1.1	1.25	
		$T_j = 150^\circ\text{C}$		0.9	1.05	

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:

$$P = 0.85 \times I_{F(AV)} + 0.033 I_{F(RMS)}^2$$

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1 \text{ A}$ , $di_F/dt = -100 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$ , $T_j = 25 \text{ }^\circ\text{C}$		14	20	ns
		$I_F = 1 \text{ A}$ , $di_F/dt = -50 \text{ A}/\mu\text{s}$ , $V_R = 30 \text{ V}$ , $T_j = 25 \text{ }^\circ\text{C}$		21	30	
$I_{RM}$	Reverse recovery current	$I_F = 3 \text{ A}$ , $di_F/dt = 200 \text{ A}/\mu\text{s}$ , $V_R = 160 \text{ V}$ , $T_j = 125 \text{ }^\circ\text{C}$		4	5.5	A
$t_{fr}$	Forward recovery time	$I_F = 3 \text{ A}$ , $di_F/dt = 200 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25 \text{ }^\circ\text{C}$		24		ns
$V_{FP}$	Forward recovery voltage	$I_F = 3 \text{ A}$ , $di_F/dt = 200 \text{ A}/\mu\text{s}$ , $T_j = 25 \text{ }^\circ\text{C}$		3.7		V

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

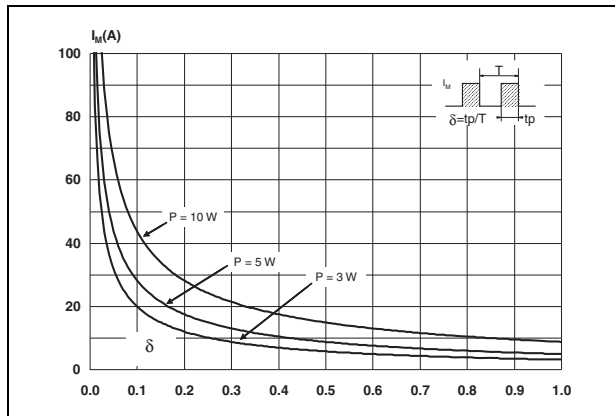


Figure 3. Forward voltage drop versus forward current (maximum values per diode)

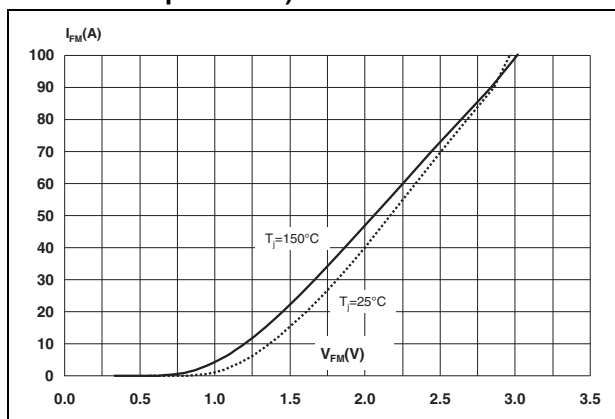


Figure 2. Forward voltage drop versus forward current (typical values per diode)

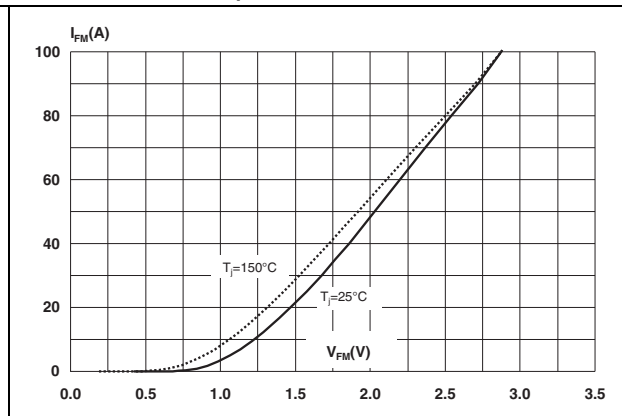
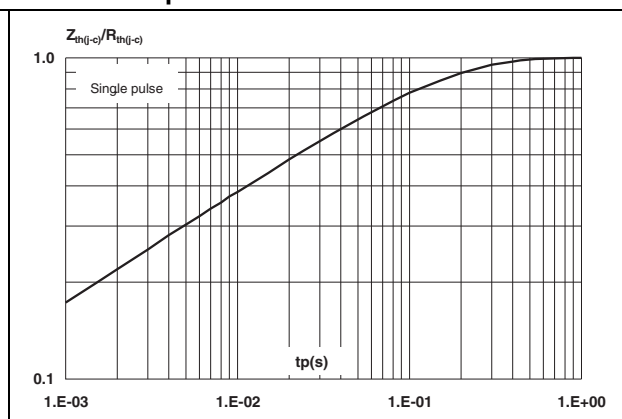
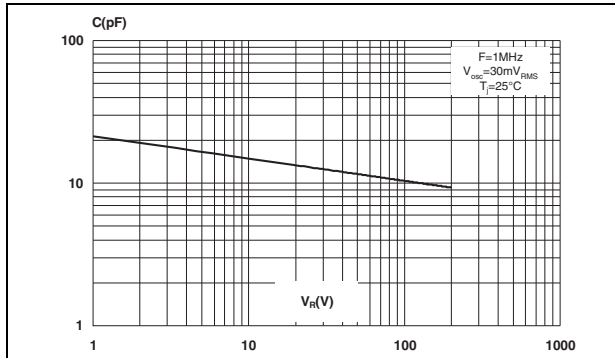


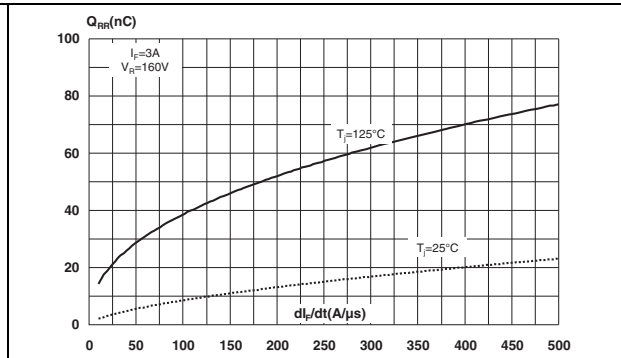
Figure 4. Relative variation of thermal impedance junction to case versus pulse duration



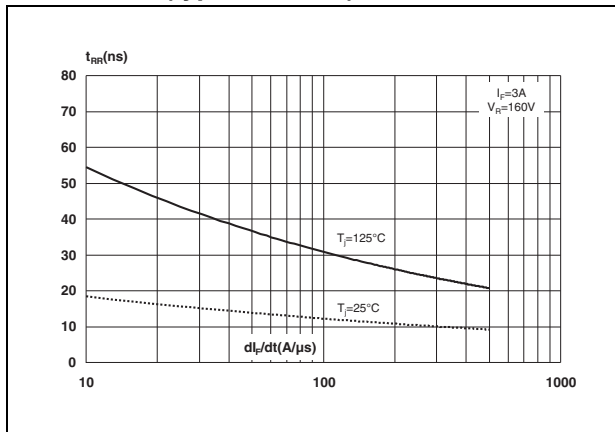
**Figure 5. Junction capacitance versus reverse applied voltage (typical values per diode)**



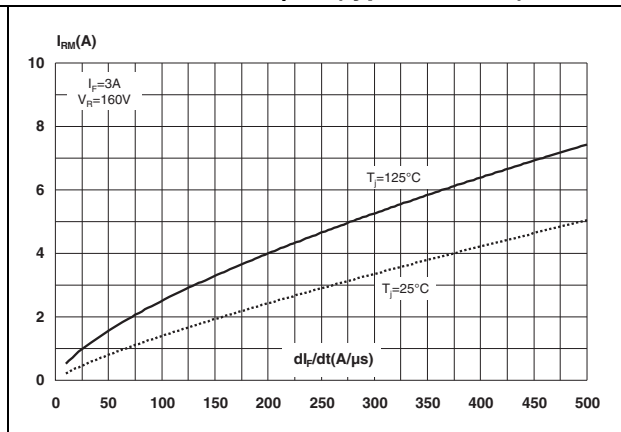
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



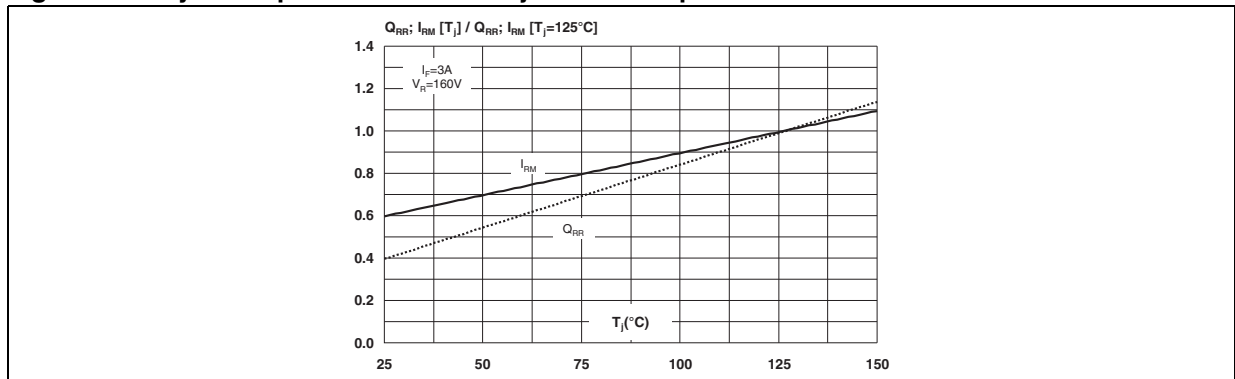
**Figure 7. Reverse recovery time versus  $di_F/dt$  (typical values)**



**Figure 8. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



**Figure 9. Dynamic parameters versus junction temperature**



## 2 Package information

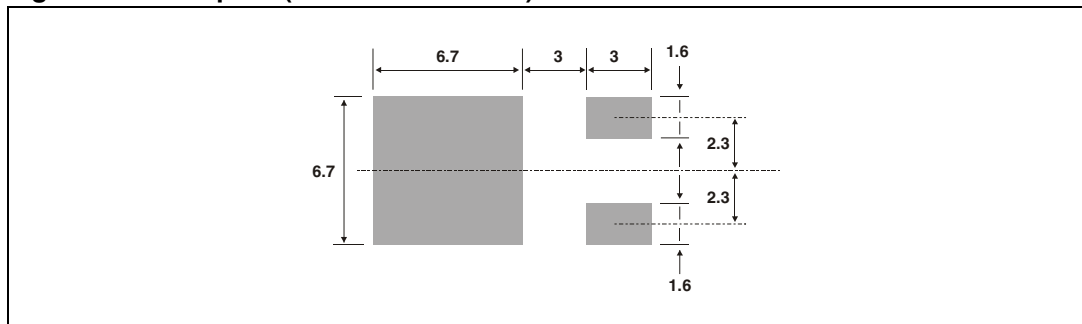
- Epoxy meets UL94, V0
- Cooling method: by conduction (C)

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**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 10. Footprint (dimensions in mm)**



### 3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH602CBY-TR	STTH602CBY	DPAK	0.30 g	2500	Tape and Reel

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
24-Oct-2012	1	First issue.

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