

## High efficiency ultrafast diode

### Main product characteristics

$I_{F(AV)}$	2 x 30 A
$V_{RRM}$	200 V
$T_j$ (max)	175° C
$V_F$ (typ)	0.75 V
$t_{rr}$ (typ)	22 ns

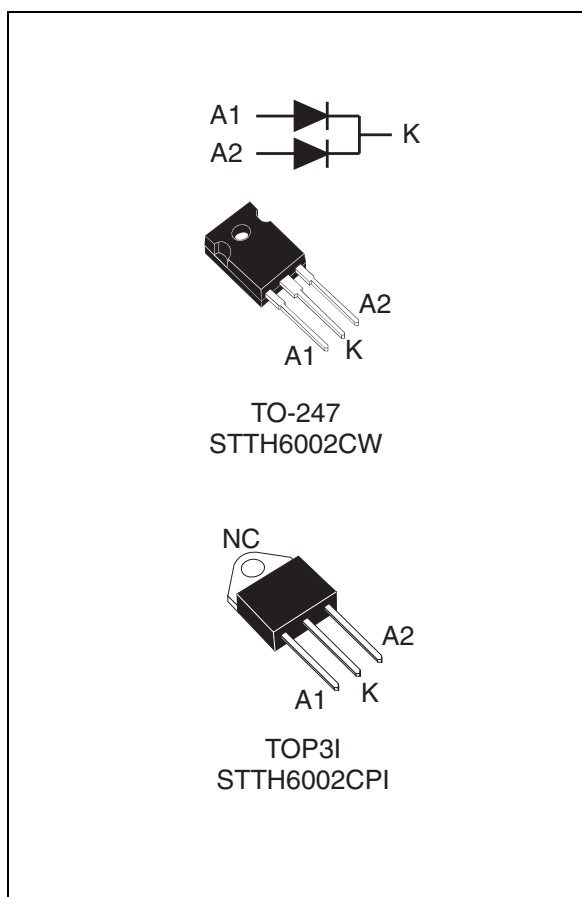
### Features and benefits

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

### Description

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

Packaged in TO-247 and TOP31, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection



### Order codes

Part Number	Marking
STTH6002CW	STTH6002C
STTH6002CPI	STTH6002C

# 1 Characteristics

**Table 1. 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		50	A	
$I_{F(AV)}$	Average forward current, $\delta = 0.5$	TO-247	Per diode $T_c = 140^\circ\text{C}$	30	A
			Per device $T_c = 125^\circ\text{C}$	60	
		TOP3I	Per diode $T_c = 120^\circ\text{C}$	30	
			Per device $T_c = 105^\circ\text{C}$	60	
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ Sinusoidal	330	A	
$T_{stg}$	Storage temperature range		-65 to +175	$^\circ\text{C}$	
$T_j$	Maximum operating junction temperature		175	$^\circ\text{C}$	

**Table 2. Thermal parameters**

Symbol	Parameter		Value	Unit	
$R_{th(j-c)}$	Junction to case	TO-247	Per diode	1.2	$^\circ\text{C/W}$
			Total	0.8	
		TOP3I	Per diode	1.8	
			Total	1.20	
$R_{th(c)}$	Coupling	TO-247	0.4		
		TOP3I	0.6		

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 3. Static electrical characteristics**

Symbol	Parameter	Test conditions		Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ\text{C}$	$V_R = V_{RRM}$		30	$\mu\text{A}$
		$T_j = 125^\circ\text{C}$		30	300	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ\text{C}$	$I_F = 30\text{ A}$		1.05	V
			$I_F = 60\text{ A}$		1.18	
		$T_j = 150^\circ\text{C}$	$I_F = 30\text{ A}$	0.75	0.84	
			$I_F = 60\text{ A}$	0.9	0.99	

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

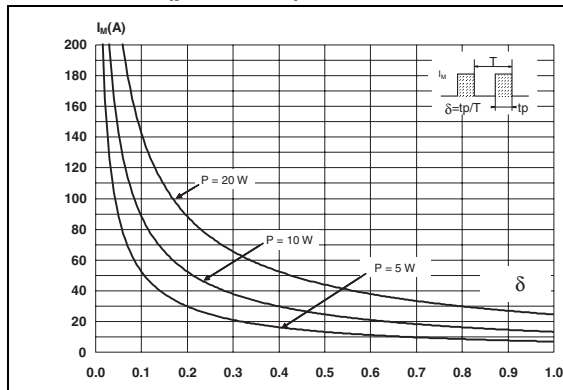
To evaluate the conduction losses use the following equation:

$$P = 0.69 \times I_{F(AV)} + 0.005 I_{F(RMS)}^2$$

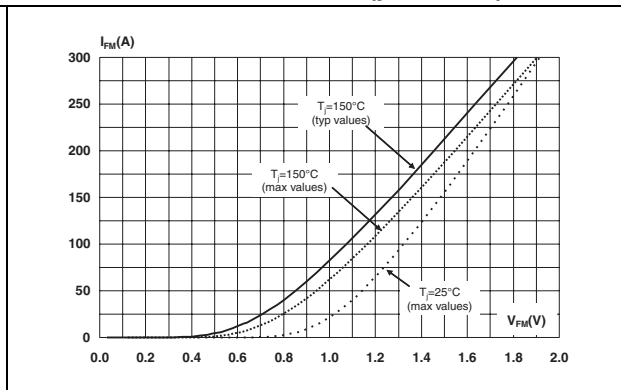
**Table 4. Dynamic characteristics**

Symbol	Parameter	Test conditions	Typ	Max.	Unit
$t_{rr}$	Reverse recovery time	$I_F = 1\text{ A}$ , $dI_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 30\text{ V}$ , $T_j = 25^\circ\text{C}$	22	27	ns
$I_{RM}$	Reverse recovery current	$I_F = 30\text{ A}$ , $dI_F/dt = 200\text{ A}/\mu\text{s}$ , $V_R = 160\text{ V}$ , $T_j = 125^\circ\text{C}$	7.6	9.5	A
$t_{fr}$	Forward recovery time	$I_F = 30\text{ A}$ , $dI_F/dt = 200\text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$ , $T_j = 25^\circ\text{C}$		220	ns
$V_{FP}$	Forward recovery voltage	$I_F = 30\text{ A}$ , $dI_F/dt = 200\text{ A}/\mu\text{s}$ , $T_j = 25^\circ\text{C}$	2.5		V

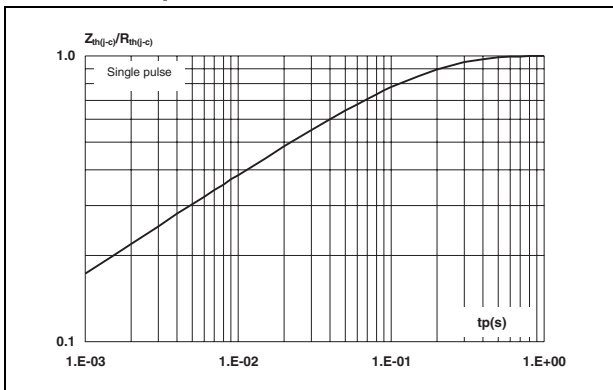
**Figure 1. Peak current versus duty cycle (per diode)**



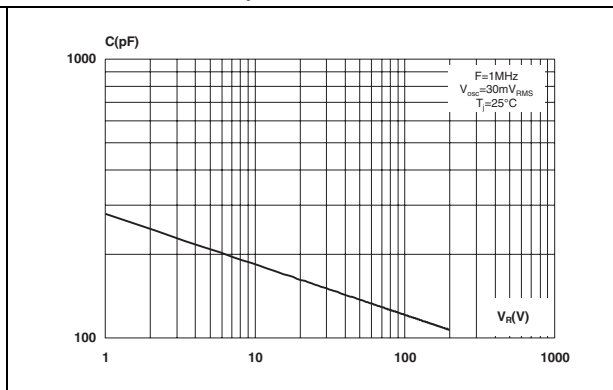
**Figure 2. Forward voltage drop versus forward current (per diode)**



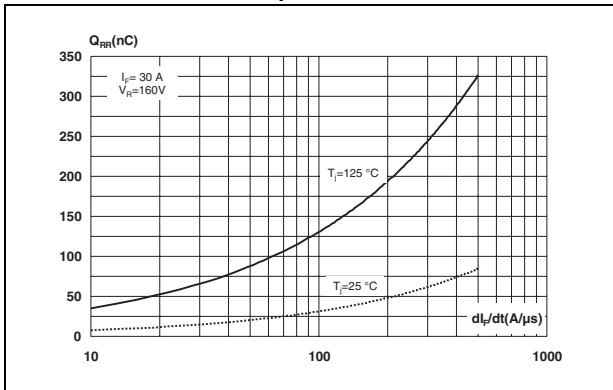
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



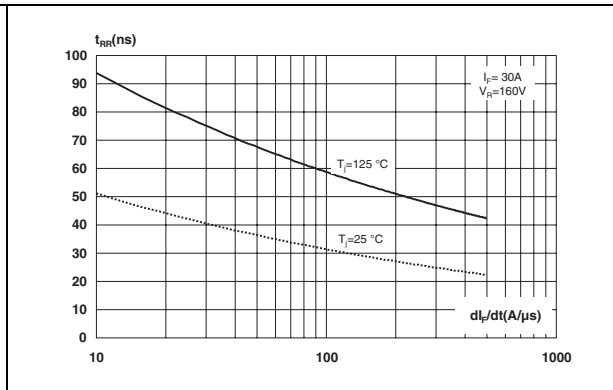
**Figure 4. Junction capacitance versus reverse applied voltage (typical values)**



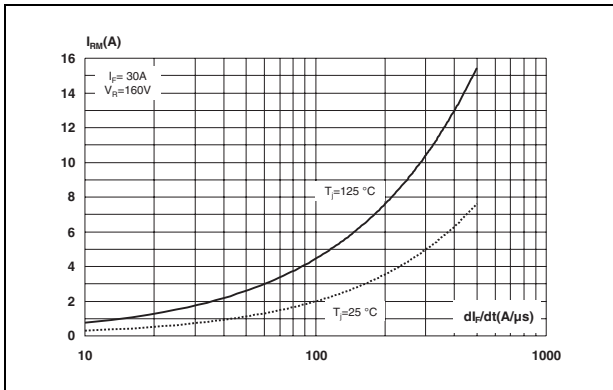
**Figure 5. Reverse recovery charges versus  $di_F/dt$  (typical values)**



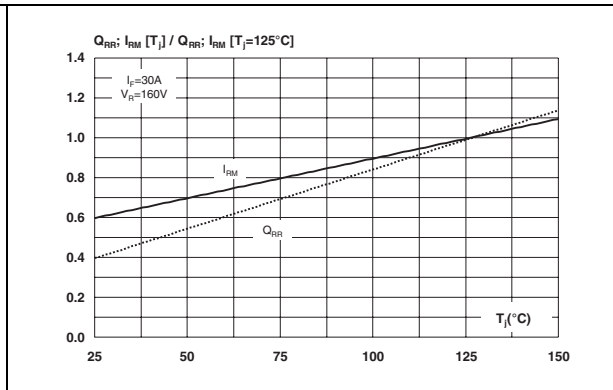
**Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)**



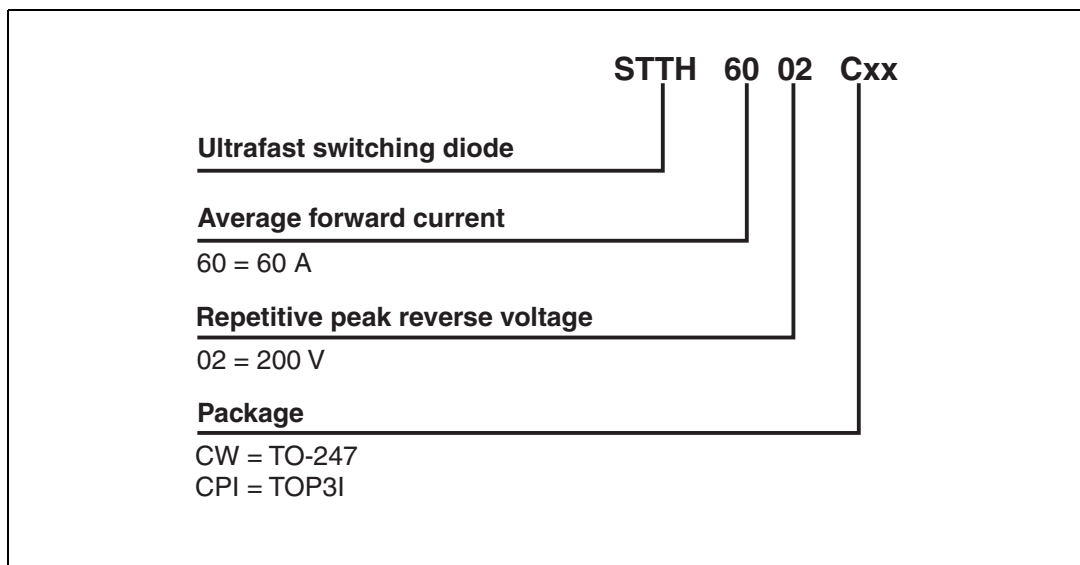
**Figure 7. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



**Figure 8. Dynamic parameters versus junction temperature**



## 2 Ordering information scheme



### 3 Package information

Epoxy meets UL94, V0

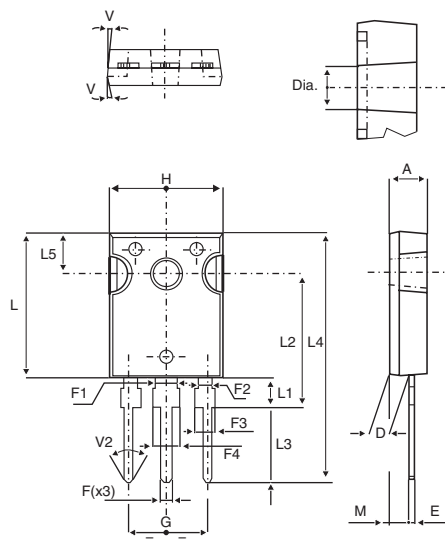
Cooling method: by conduction (C)

Recommended torque value: 0.8 Nm

Maximum torque value: 1.0 Nm

**Table 5. TO-247 Dimensions**

REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ	Max.	Min.	Typ	Max.
A	4.85		5.15	0.191		0.203
D	2.20		2.60	0.086		0.102
E	0.40		0.80	0.015		0.031
F	1.00		1.40	0.039		0.055
F1		3.00			0.118	
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
F4	3.00		3.40	0.118		0.133
G		10.90			0.429	
H	15.45		15.75	0.608		0.620
L	19.85		20.15	0.781		0.793
L1	3.70		4.30	0.145		0.169
L2		18.50			0.728	
L3	14.20		14.80	0.559		0.582
L4		34.60			1.362	
L5		5.50			0.216	
M	2.00		3.00	0.078		0.118
V		5°			5°	
V2		60°			60°	
Dia.	3.55		3.65	0.139		0.143



**Table 6. TOP3I dimensions**

REF	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.4	4.6	0.173	0.181
B	1.45	1.55	0.057	0.061
C	14.35	15.60	0.565	0.614
D	0.5	0.7	0.020	0.028
E	2.7	2.9	0.106	0.114
F	15.8	16.5	0.622	0.650
G	20.4	21.1	0.815	0.831
H	15.1	15.5	0.594	0.610
J	5.4	5.65	0.213	0.222
K	3.4	3.65	0.134	0.144
ØL	4.08	4.17	0.161	0.164
P	1.20	1.40	0.047	0.055
R	4.60 Typ.		0.181 Typ.	

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## 4 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH6002CW	STTH6002C	TO-247	4.46 g	30	Tube
STTH6002CPI	STTH6002C	TOP3I	4.7 g	30	Tube

## 5 Revision history

Date	Revision	Description of Changes
Feb-2004	1	First issue
05-Apr-2006	2	Reformatted to current template. Package TOP3I added.



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