

## Ultrafast high voltage rectifier

### Main product characteristics

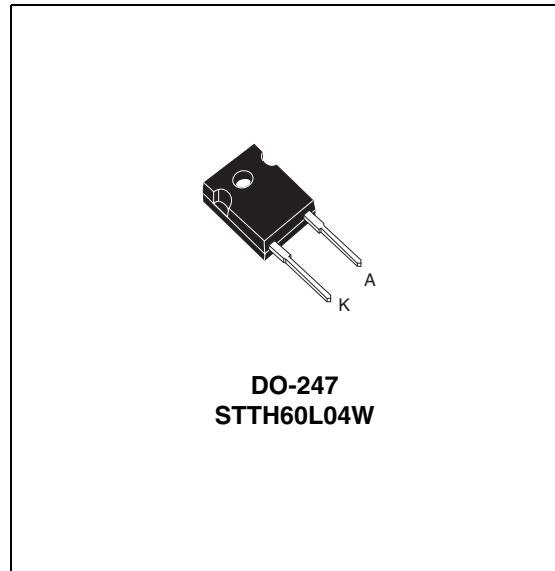
$I_{F(AV)}$	60 A
$V_{RRM}$	400 V
$T_j$ (max)	175° C
$V_F$ (typ)	0.83 V
$t_{rr}$ (max)	50 ns

### Features and benefits

- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduces switching and conduction losses

### Description

The STTH60L04W uses ST 400 V technology and is specially suited for use in switching power supplies, welding equipment, and industrial applications, as an output rectification diode.



### Order codes

Part number	Marking
STTH60L04W	STTH60L04

**Table 1. Absolute ratings (limiting values, per diode)**

Symbol	Parameter			Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage			400	V
$I_{F(RMS)}$	RMS forward current			90	A
$I_{F(AV)}$	Average forward current	$T_c = 90^\circ \text{C}$ $\delta = 0.5$	Per diode	60	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10 \text{ ms}$ sinusoidal		600	A
$T_{stg}$	Storage temperature range			-55 to + 175	° C
$T_j$	Maximum operating junction temperature			175	° C

# 1 Characteristics

**Table 2. Thermal resistance**

Symbol	Parameter			Value (max).	Unit
$R_{th(j-c)}$	Junction to case			0.70	°C/W

**Table 3. Static electrical characteristics (per diode)**

Symbol	Parameter	Test conditions		Min.	Typ	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25^\circ \text{C}$	$V_R = V_{RRM}$			50	$\mu\text{A}$
		$T_j = 150^\circ \text{C}$			100	1000	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25^\circ \text{C}$	$I_F = 60 \text{ A}$			1.2	V
		$T_j = 150^\circ \text{C}$			0.83	1.0	

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

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

To evaluate the conduction losses use the following equation:

$$P = 0.8 \times I_{F(AV)} + 0.0033 I_{F(RMS)}^2$$

**Table 4. Dynamic characteristics (per diode)**

Symbol	Parameter	Test conditions		Min	Typ	Max	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25^\circ \text{C}$	$I_F = 1 \text{ A}$ $di_F/dt = 50 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$		66	90	ns
			$I_F = 1 \text{ A}$ $di_F/dt = 200 \text{ A}/\mu\text{s}$ $V_R = 30 \text{ V}$		36	50	
$I_{RM}$	Reverse recovery current	$T_j = 125^\circ \text{C}$	$I_F = 60 \text{ A}$ $V_R = 200 \text{ V}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$			15	A
$S_{factor}$	Softness factor	$T_j = 125^\circ \text{C}$	$I_F = 60 \text{ A}$ $V_R = 200 \text{ V}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$		0.4		
$t_{fr}$	Forward recovery time	$T_j = 25^\circ \text{C}$	$I_F = 60 \text{ A}$ $di_F/dt = 200 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$			600	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25^\circ \text{C}$	$I_F = 60 \text{ A}$ $di_F/dt = 200 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \times V_{Fmax}$		3.2		V

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

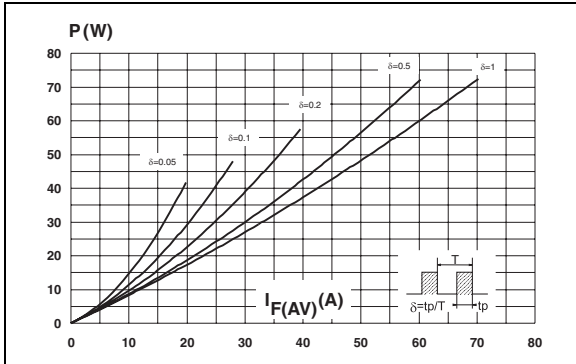


Figure 2. Forward voltage drop versus forward current (per diode)

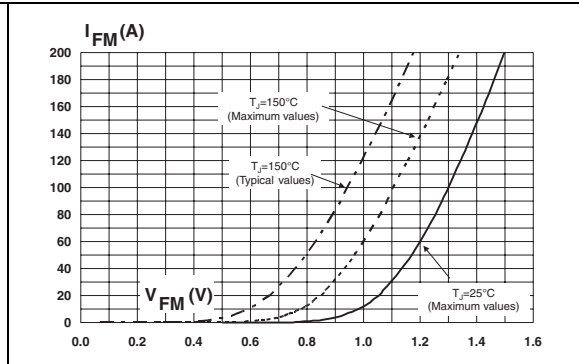


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

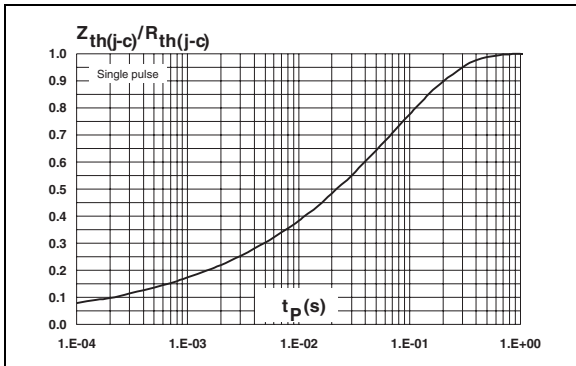


Figure 4. Peak reverse recovery current versus di\_F/dt (typical values, per diode)

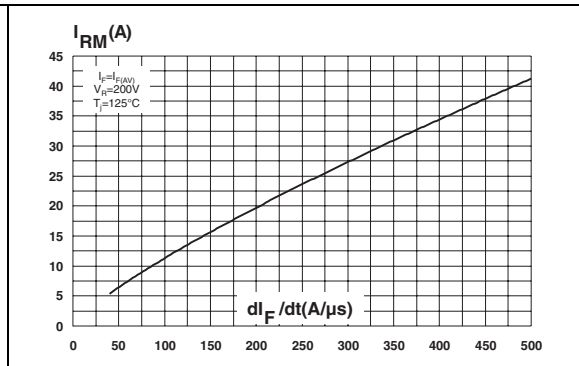


Figure 5. Reverse recovery time versus di\_F/dt (typical values, per diode)

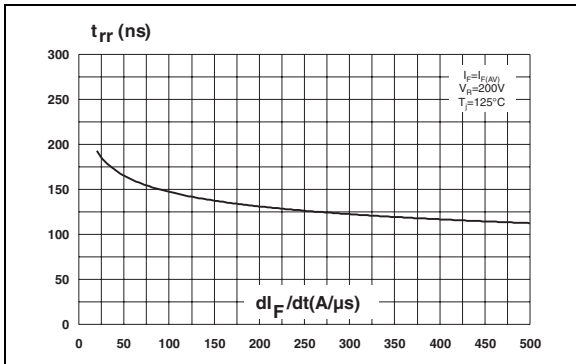
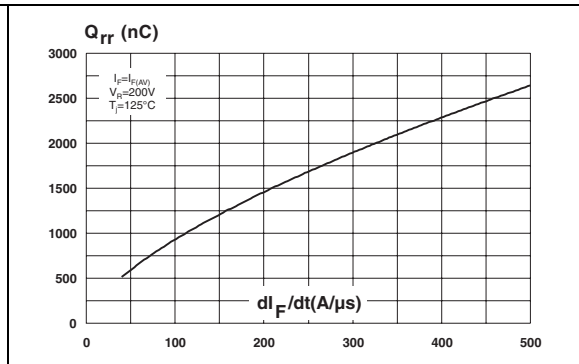
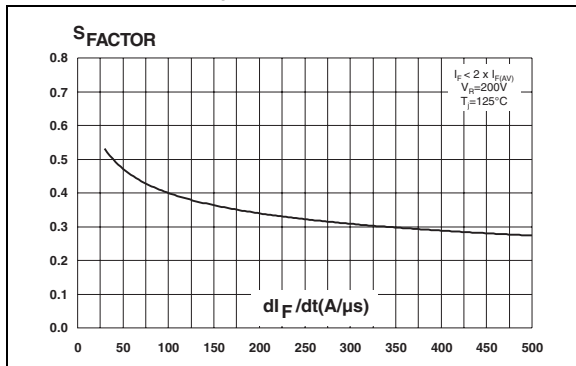


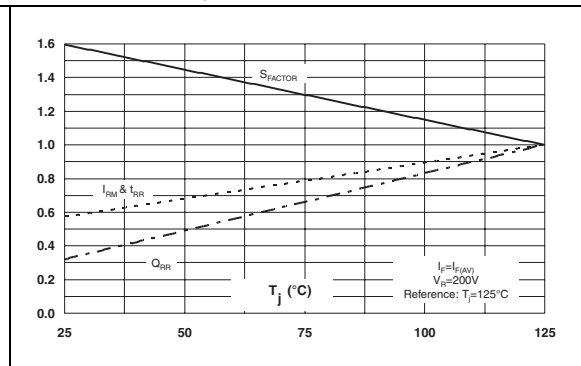
Figure 6. Reverse recovery charges versus di\_F/dt (typical values, per diode)



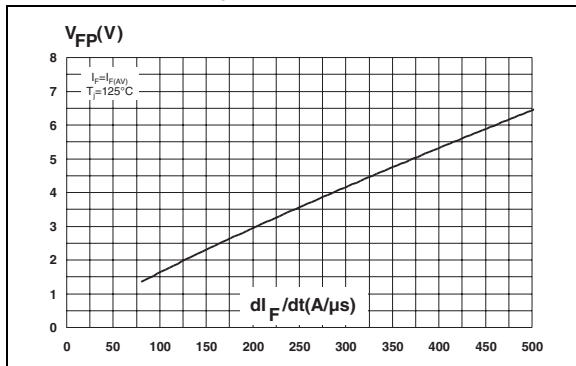
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values, per diode)**



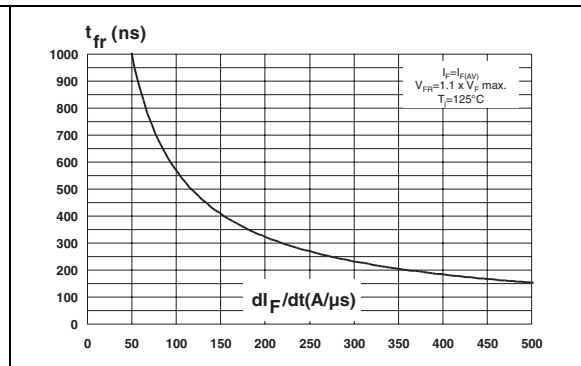
**Figure 8. Relative variations of dynamic parameters versus junction temperature**



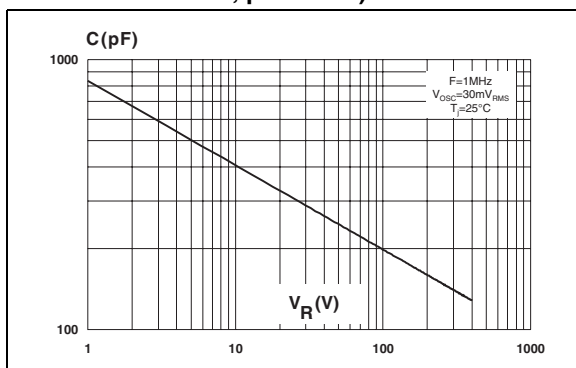
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values, per diode)**



**Figure 10. Forward recovery time versus  $di_F/dt$  (typical values, per diode)**



**Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)**



## 2 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. DO-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
F2		2.00			0.078	
F3	2.00		2.40	0.078		0.094
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

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### 3 Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH60L04W	STTH60L04W	DO-247	4.4 g	30	Tube

### 4 Revision history

Date	Revision	Description of Changes
26-Oct-2006	1	First issue

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