

## STTH60L04W

## Ultrafast high voltage rectifier

### Mian product characteristics

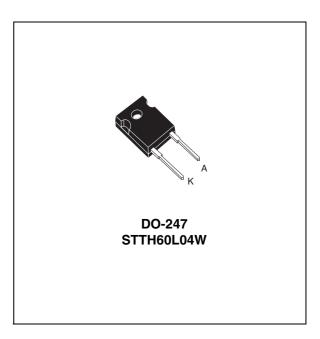
I <sub>F(AV)</sub>	60 A
V <sub>RRM</sub>	400 V
T <sub>j</sub> (max)	175° C
V <sub>F</sub> (typ)	0.83 V
t <sub>rr</sub> (max)	50 ns

#### 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 <sub>RRM</sub>	Repetitive peak reverse voltage			400	٧
I <sub>F(RMS)</sub>	RMS forward current	90	Α		
I <sub>F(AV)</sub>	Average forward current	60	Α		
I <sub>FSM</sub>	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$			600	Α
T <sub>stg</sub>	Storage temperature range			-55 to + 175	° C
T <sub>j</sub>	Maximum operating junction temperature			175	° C

Characteristics STTH60L04W

## 1 Characteristics

Table 2. Thermal resistance

Symbol	Parameter		Value (max).	Unit	
R <sub>th(j-c)</sub>	Junction to case			0.70	°C/W

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Тур	Max.	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage	T <sub>j</sub> = 25° C	V - V			50	^
'R`	current $T_j = 150^{\circ} \text{ C}$ $V_R = V_R$	$V_R = V_{RRM}$		100	1000	μΑ	
V <sub>E</sub> (2)	Forward voltage drop	T <sub>j</sub> = 25° C	I <sub>F</sub> = 60 A			1.2	V
<b>v</b> F(-)	Torward voltage drop	T <sub>j</sub> = 150° C	1F = 00 A		0.83	1.0	V

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

To evaluate the conduction losses use the following equation:

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

Table 4. Dynamic characteristics (per diode)

Symbol	Parameter	Test conditions			Тур	Max	Unit
t <sub>rr</sub>	Reverse recovery	T <sub>i</sub> = 25° C	$I_F = 1 \text{ A}  dI_F/dt = 50 \text{ A/}\mu\text{s}$ $V_R = 30 \text{ V}$		66	90	ns
'rr	time	,	$I_F = 1 \text{ A}  dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_R = 30 \text{ V}$		36	50	2
I <sub>RM</sub>	Carrent		$I_F = 60 \text{ A}$ $V_R = 200 \text{ V}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$			15	Α
S <sub>factor</sub>	Softness factor	T <sub>j</sub> = 125° C	$I_F = 60 \text{ A}$ $V_R = 200 \text{ V}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$		0.4		
t <sub>fr</sub>	Forward recovery time	T <sub>j</sub> = 25° C	$I_F = 60 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}$			600	ns
V <sub>FP</sub>	Forward recovery voltage	T <sub>j</sub> = 25° C	$I_F = 60 \text{ A}$ $dI_F/dt = 200 \text{ A/}\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}$		3.2		٧

<sup>2.</sup> Pulse test:  $t_p$  = 380  $\mu$ s,  $\delta$  < 2%

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

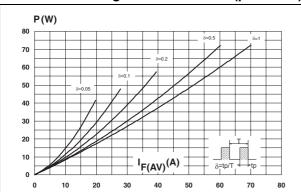


Figure 2. Forward voltage drop versus forward current (per diode)

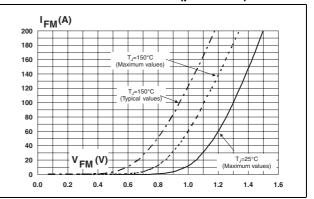


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

 $Z_{th(j-c)}/R_{th(j-c)}$ 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 t<sub>P</sub>(s) 0.0 1.E-04 1.E-03 1.E-02 1.E-01

Figure 4. Peak reverse recovery current versus dl<sub>F</sub>/dt (typical values, per diode)

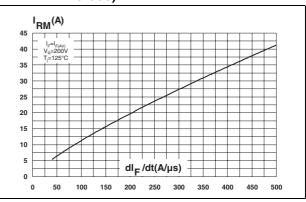


Figure 5. Reverse recovery time versus dl<sub>-</sub>/dt (typical values, per diode)

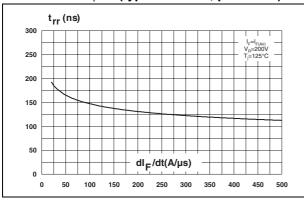
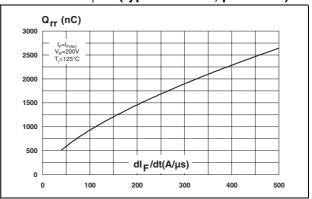


Figure 6. Reverse recovery charges versus dl<sub>F</sub>/dt (typical values, per diode)



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Figure 7. Reverse recovery softness factor versus dl<sub>F</sub>/dt (typical values, per diode)

Figure 8. Relative variations of dynamic parameters versus junction temperature

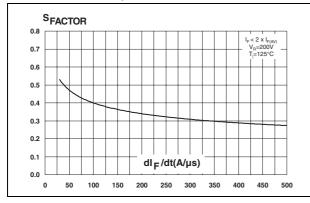
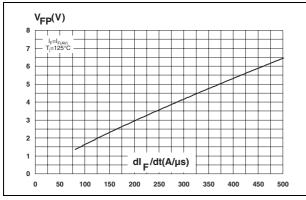


Figure 9. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values, per diode)

Figure 10. Forward recovery time versus dI<sub>F</sub>/dt (typical values, per diode)



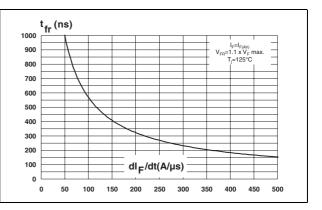
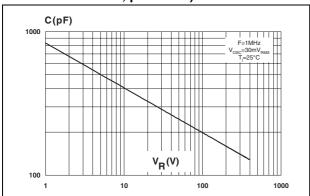


Figure 11. Junction capacitance versus reverse voltage applied (typical values, per diode)



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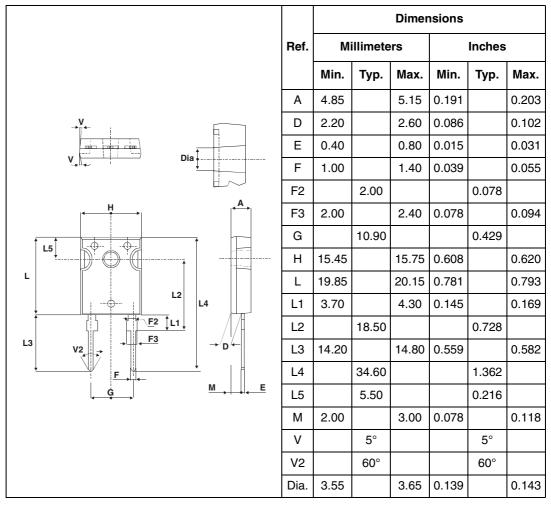
STTH60L04W Package information

### 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



In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

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Ordering information STTH60L04W

# 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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