

Ultrafast high voltage rectifier

Table 1: 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 & conduction losses

Description

The STTH6004W uses ST 400V technology and is specially suited for use in switching power supplies, welding equipment and industrial applications, as an output rectification diode.

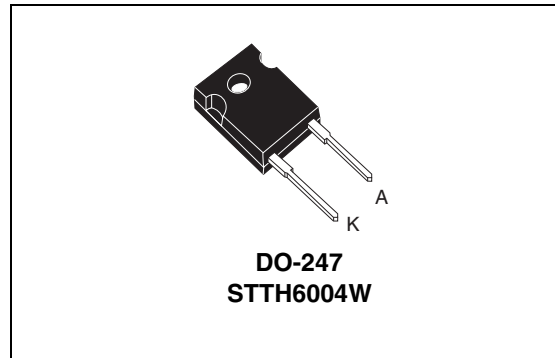


Table 2: Order codes

Part number	Marking
STTH6004W	STTH6004W

Table 3: Absolute ratings (limiting values)

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	$T_c = 125\text{ °C} \quad \delta = 0.5$	60	A
I_{FSM}	Surge non repetitive forward current	$t_p = 10\text{ ms sinusoidal}$	600	A
T_{stg}	Storage temperature range	-65 to + 175	°C	
T_j	Maximum operating junction temperature	175	°C	

STTH6004W

Table 4: Thermal Resistance

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

Table 5: Static electrical characteristics

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

Pulse test: * $t_p = 5\text{ ms}$, $\delta < 2\%$
 ** $t_p = 380\text{ }\mu\text{s}$, $\delta < 2\%$

To evaluate the conduction losses use the following equation: $P = 0.8 \times I_{F(AV)} + 0.0033 I_{F(RMS)}^2$

Table 6: Dynamic characteristics

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

Figure 1: Conduction losses versus average forward current

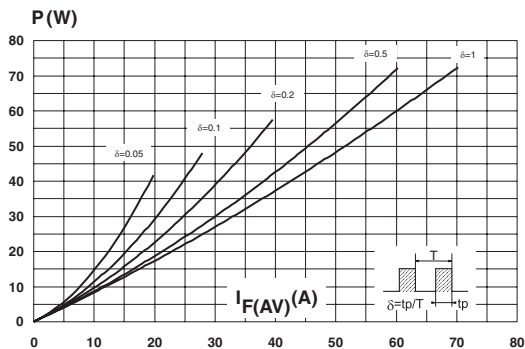


Figure 2: Forward voltage drop versus forward current

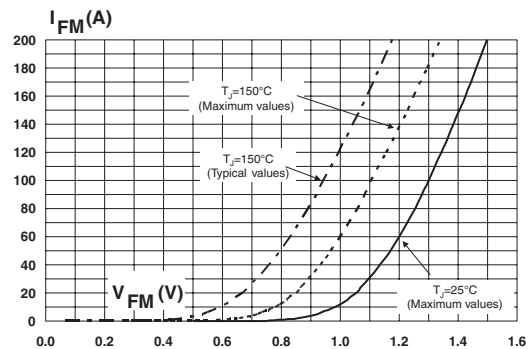


Figure 3: Relative variation of thermal impedance junction to case versus pulse duration

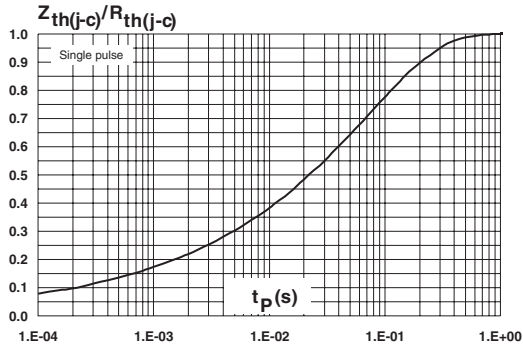


Figure 4: Peak reverse recovery current versus di_F/dt (typical values)

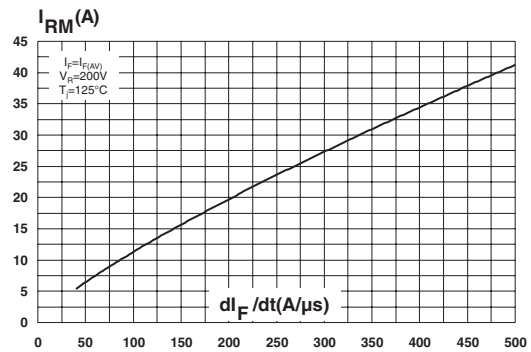


Figure 5: Reverse recovery time versus di_F/dt (typical values)

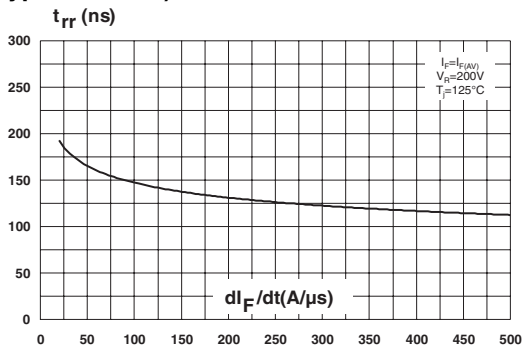


Figure 6: Reverse recovery charges versus di_F/dt (typical values)

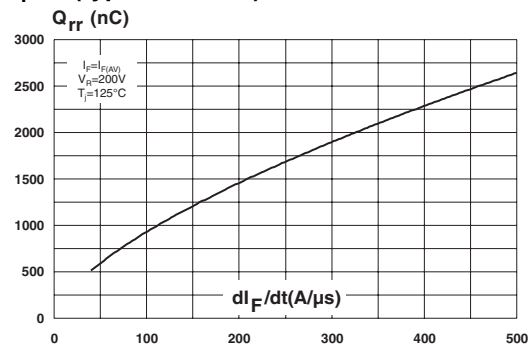


Figure 7: Reverse recovery softness factor versus di_F/dt (typical values)

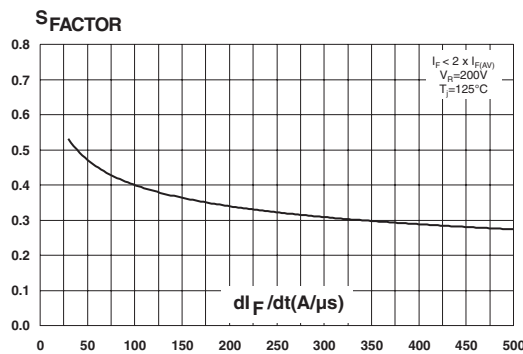


Figure 8: Relative variations of dynamic parameters versus junction temperature

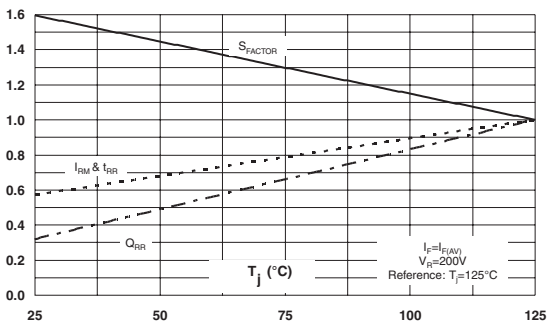


Figure 9: Transient peak forward voltage versus di_F/dt (typical values)

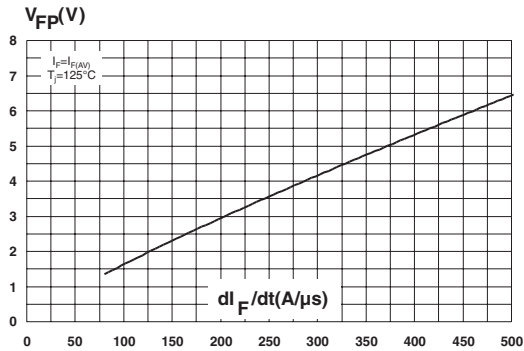


Figure 10: Forward recovery time versus di_F/dt (typical values)

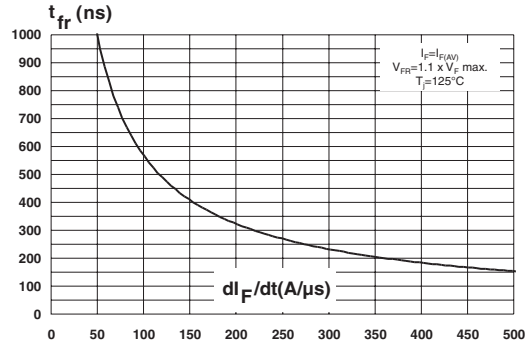


Figure 11: Junction capacitance versus reverse voltage applied (typical values)

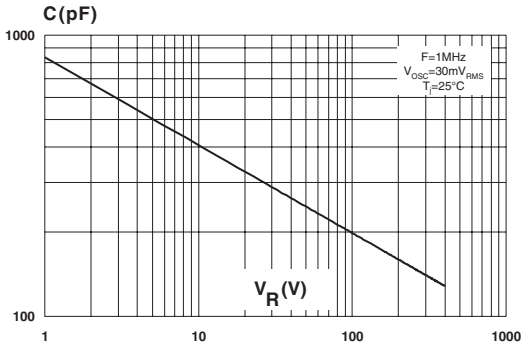
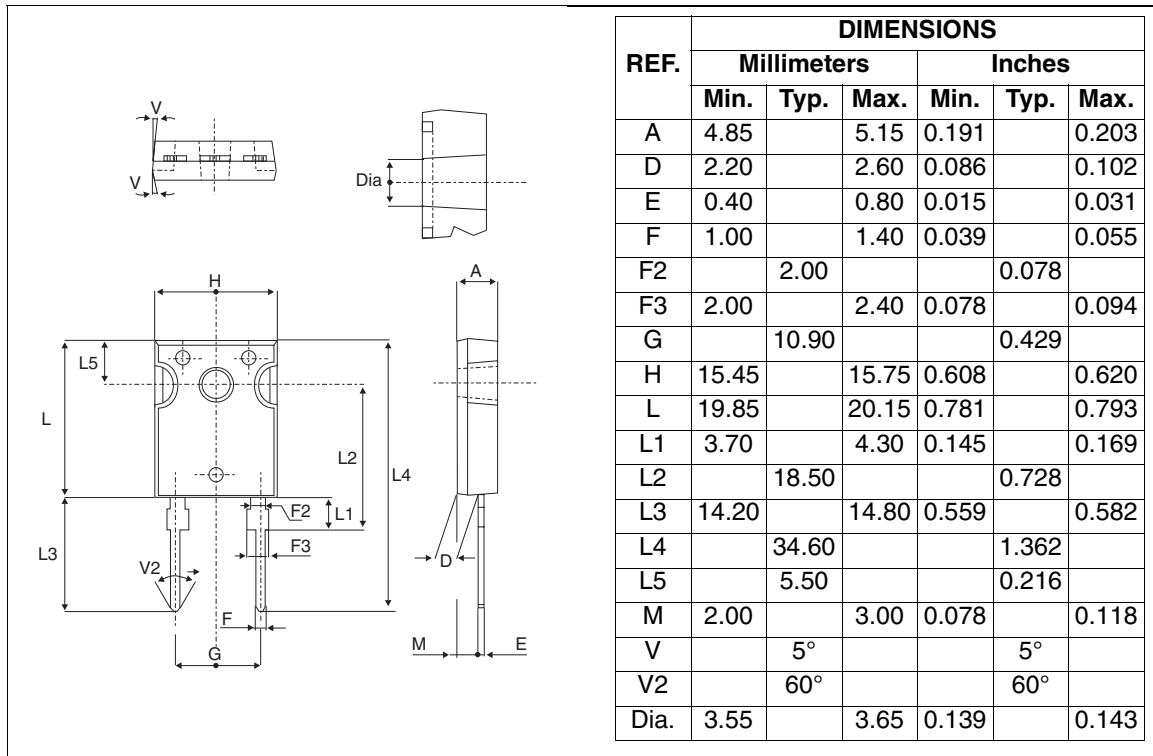


Figure 12: DO-247 Package mechanical data



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.

Table 7: Ordering information

Ordering type	Marking	Package	Weight	Base qty	Delivery mode
STTH6004W	STTH6004W	DO-247	4.40 g	30	Tube

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 Nm.
- Maximum torque value: 1.0 Nm.

Table 8: Revision history

Date	Revision	Description of Changes
18-Oct-2005	1	First issue

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