

## **STTH60R04**

## Ultrafast recovery diode

### Main product characteristics

I <sub>F(AV)</sub>	60 A
V <sub>RRM</sub>	400 V
Tj	175° C
V <sub>F</sub> (typ)	0.95 V
t <sub>rr (typ)</sub>	31 ns

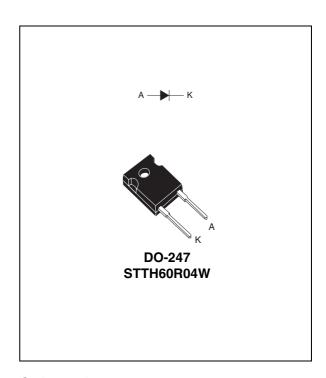
#### Features and benefits

- Very low switching losses
- High frequency and/or high pulsed current operation
- High junction temperature

#### **Description**

The STTH60R04 series uses ST's new 400 V planar Pt doping technology. The STTH60R04 is specially suited for switching mode base drive and transistor circuits.

Available in a through-the-hole package, this device is intended for use in low voltage, high frequency inverters, free wheeling and polarity protection.



#### **Order codes**

Part Number	Marking		
STTH60R04W	STTH60R04W		

Table 1. Absolute ratings (limiting values at 25° C, unless otherwise specified)

Symbol	Parameter				Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage			400	V
V <sub>RSM</sub>	Non repetitive peak reverse voltage			400	٧
I <sub>F(RMS)</sub>	RMS forward current			100	Α
I <sub>F(AV)</sub>	Average forward current, $\delta = 0.5$ $T_c = 110^{\circ}  C$		60	Α	
I <sub>FRM</sub>	Repetitive peak forward current $t_p = 5 \mu s F = 1 \text{ kHz square}$			375	Α
I <sub>FSM</sub>	Surge non repetitive forward current $t_p = 10 \text{ ms Sinusoidal}$		650	Α	
T <sub>stg</sub>	Storage temperature range			-65 to +175	° C
T <sub>j</sub>	Operating junction temperature range			-40 to +175	° C

Characteristics STTH60R04

## 1 Characteristics

Table 2. Thermal parameters

Symbol	Parameter	Value	Unit
R <sub>th(j-c)</sub>	Junction to case	0.7	°C/W

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min	Тур	Max	Unit
I <sub>R</sub> <sup>(1)</sup>	Reverse leakage current	T <sub>j</sub> = 25° C	V- <b>-</b> V			60	μA
'R`	IR' / neverse leakage current	T <sub>j</sub> = 125° C	$V_R = V_{RRM}$		60	600	μΑ
		T <sub>j</sub> = 25° C				1.5	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 100° C	I <sub>F</sub> = 60 A		1.05	1.3	٧
		T <sub>j</sub> = 150° C			0.95	1.2	

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

To evaluate the conduction losses use the following equation:

 $P = 0.9 \times I_{F(AV)} + 0.005 \times I_{F^{2}(RMS)}$ 

Table 4. Dynamic characteristics

Symbol	Parameter	Test conditions	Min	Тур	Max	Unit
		$I_F = 1 \text{ A, } dI_F/dt = -50 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$			80	
t <sub>rr</sub>	Reverse recovery time	$I_F = 1 \text{ A, } dI_F/dt = -100 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		40	55	ns
		$I_F = 1 \text{ A, } dI_F/dt = -200 \text{ A/}\mu\text{s,}$ $V_R = 30 \text{ V, } T_j = 25^{\circ} \text{ C}$		31	45	
I <sub>RM</sub>	Reverse recovery current	$I_F = 60 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s}, \ V_R = 320 \text{ V}, T_j = 125^{\circ} \text{ C}$		11	16	Α
S	Softness factor	$I_F = 60 \text{ A}, dI_F/dt = -200 \text{ A/}\mu\text{s}, \ V_R = 320 \text{ V}, T_j = 125^{\circ} \text{ C}$		0.4		
t <sub>fr</sub>	Forward recovery time	$I_F = 60 \text{ A}, dI_F/dt = 100 \text{ A}/\mu\text{s}$ $V_{FR} = 1.1 \text{ x } V_{Fmax}, T_j = 25^{\circ} \text{ C}$		800		ns
V <sub>FP</sub>	Forward recovery voltage	$I_F = 60 \text{ A}$ $dI_F/dt = 100 \text{ A/}\mu\text{s}$ $T_j = 25^{\circ} \text{ C}$		3.2		V

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

STTH60R04 Characteristics

Figure 1. Conduction losses versus average current

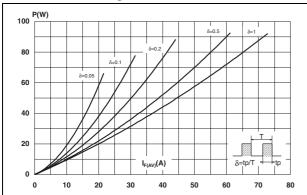


Figure 2. Forward voltage drop versus forward current

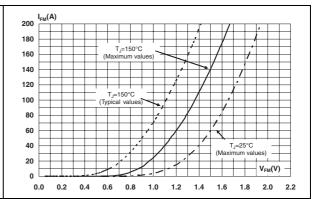
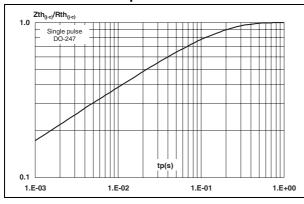


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

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



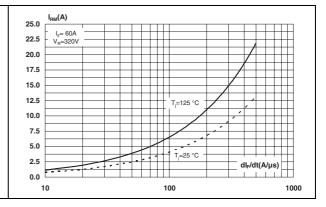


Figure 5. Reverse recovery time versus dl<sub>F</sub>/dt (typical values)

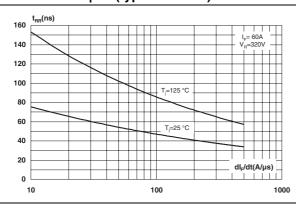
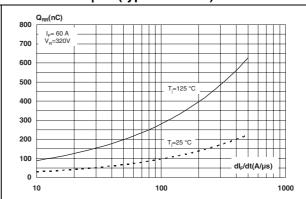


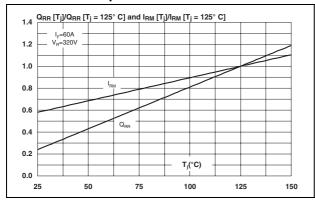
Figure 6. Reverse recovery charges versus dl<sub>F</sub>/dt (typical values)



Characteristics STTH60R04

Figure 7. Relative variations of dynamic parameters versus junction temperature

Figure 8. Transient peak forward voltage versus dl<sub>F</sub>/dt (typical values)



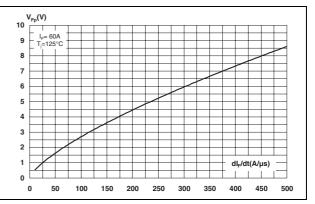
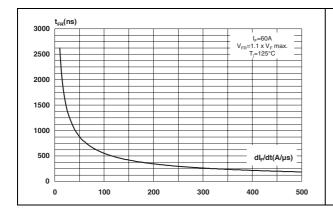
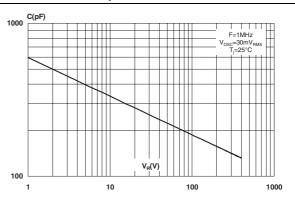


Figure 9. Forward recovery time versus  $dI_F/dt$  Figure 10. Junc (typical values)

Junction capacitance versus reverse voltage applied (typical values)





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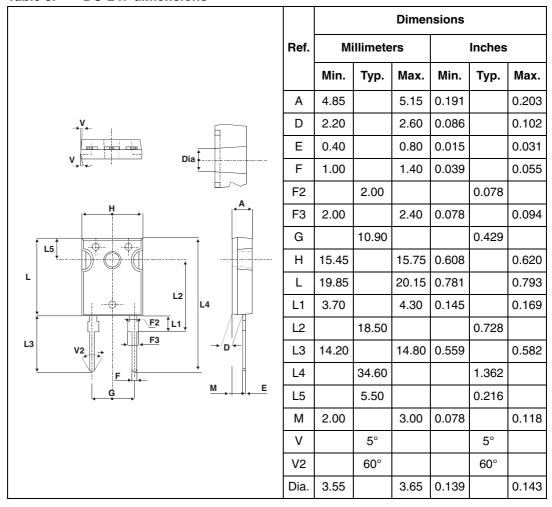
STTH60R04 Package information

## 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 STTH60R04

# 3 Ordering information

Part Number	Marking	Package	Weight	Base qty	Delivery mode
STTH60R04W	STTH60R04W	DO-247	4.40 g	30	Tube

# 4 Revision history

Date	Revision	Description of Changes
31-Mar-2007	1	First issue

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