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# STTH4R06DEE

## Turbo 2 ultrafast recovery diode

Datasheet – production data

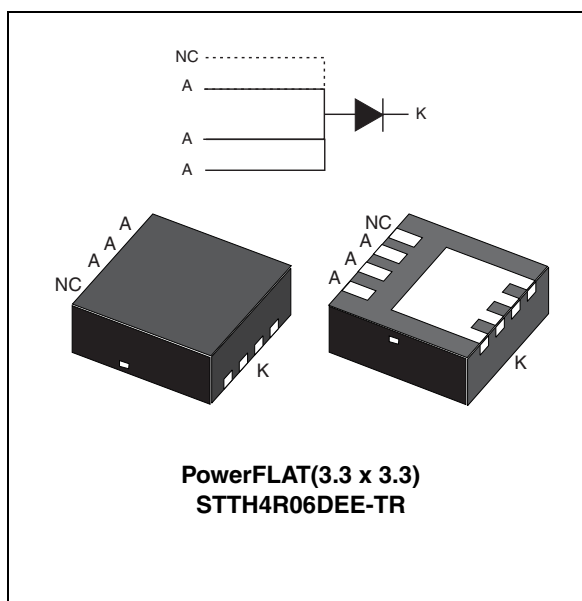
### Features

- Very low switching losses
- High frequency and high pulse current operation
- Low thermal resistance
- High junction temperature
- ECOPACK<sup>®</sup>2 compliant component

### Description

The STTH4R06 series uses ST's new 600 V planar Pt doping technology. The STTH4R06 is specially suited for switching mode base drive and transistor circuits.

Packaged in PowerFLAT<sup>™</sup>, this device is intended for use in low profile applications.



**Table 1. Device summary**

Symbol	Value
$I_{F(AV)}$	4 A
$V_{RRM}$	600 V
$T_j$ (max)	150 °C
$V_F$ (typ)	1.0 V
$T_{RR}$ (typ)	30 ns

TM: PowerFLAT is a trademark of STMicroelectronics

Characteristics

STTH4R06DEE

# 1 Characteristics

**Table 2. Absolute ratings (limiting values  $T_{amb} = 25\text{ °C}$  unless otherwise specified)**

Symbol	Parameter		Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage		600	V
$I_{F(RMS)}$	Forward rms current		15	A
$I_{F(AV)}$	Average forward current	$T_c = 120\text{ °C}, \delta = 0.5$	4	A
$I_{FSM}$	Surge non repetitive forward current	tp = 10 ms sinusoidal	60	A
$T_{stg}$	Storage temperature range		-65 to +150	°C
$T_j$	Maximum operating junction temperature		150	°C

**Table 3. Thermal resistance**

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	Junction to case	4.5	°C/W
$R_{th(j-a)}$	Junction to ambient on printed circuit board (with recommended footprint, copper thickness = 35 $\mu\text{m}$ )	250	°C/W

**Table 4. Static electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_R^{(1)}$	Reverse leakage current	$T_j = 25\text{ °C}$	$V_R = V_{RRM}$	-		3	$\mu\text{A}$
		$T_j = 125\text{ °C}$		-	3	30	$\mu\text{A}$
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$	$I_F = 4\text{ A}$		1.30	1.70	V
		$T_j = 150\text{ °C}$		-	1.0	1.25	

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:

$$P = 1 \times I_{F(AV)} + 0.062 \times I_{F(RMS)}^2$$

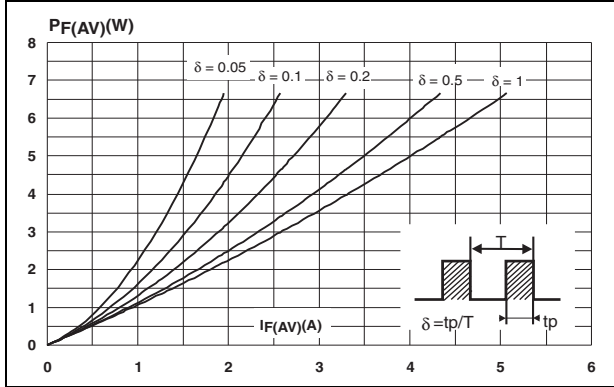
**Table 5. Dynamic electrical characteristics**

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 4\text{ A}, V_R = 400\text{ V},$ $di_F/dt = -200\text{ A}/\mu\text{s}$		5.5	7.5	A
$S_{factor}$	Softness factor				2		
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 1\text{ A}, V_R = 30\text{ V},$ $di_F/dt = -50\text{ A}/\mu\text{s}$		35	50	ns
					30	40	
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 4\text{ A}, V_{FR} = 2\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$			100	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ °C}$			3.5	5	

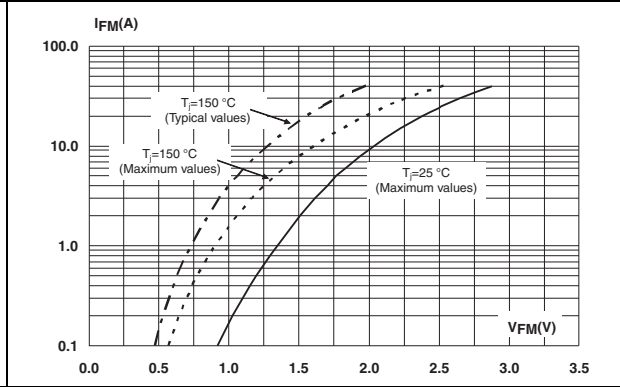
**STTH4R06DEE**

**Characteristics**

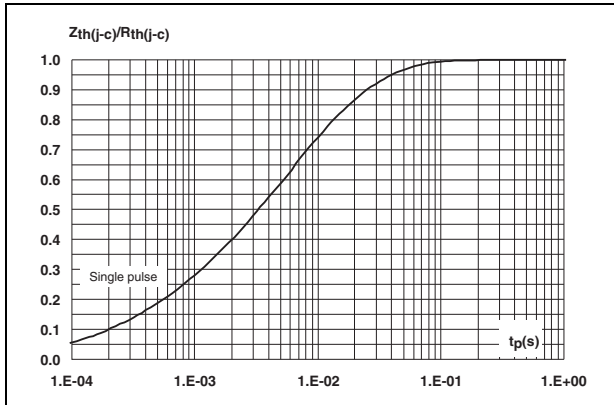
**Figure 1. Average forward power dissipation versus average forward current**



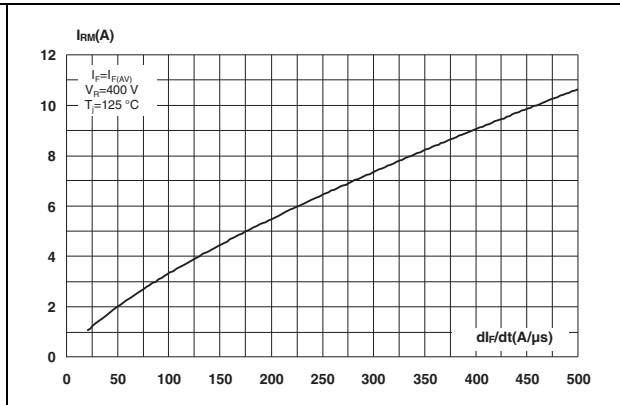
**Figure 2. Forward voltage drop versus forward current**



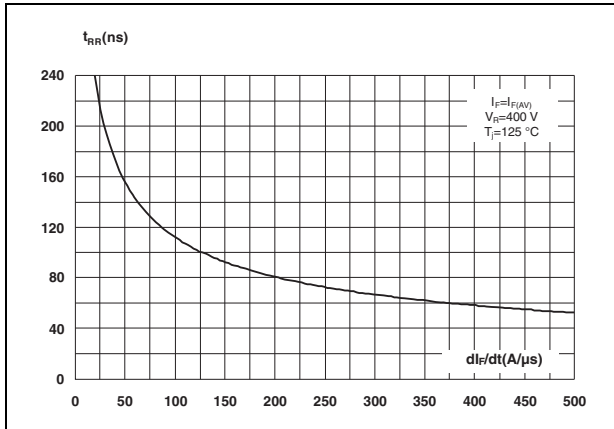
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



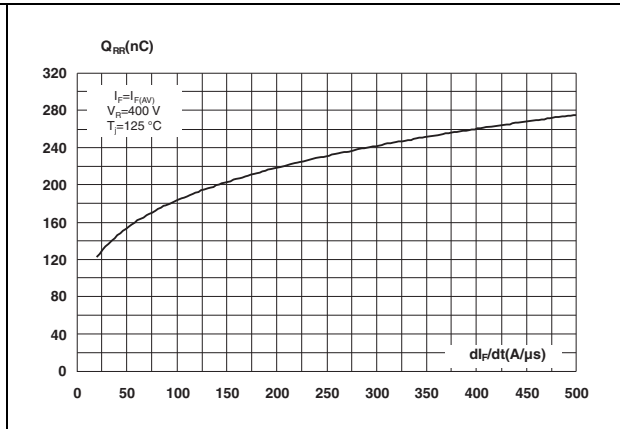
**Figure 4. Peak reverse recovery current versus diF/dt (typical values)**



**Figure 5. Reverse recovery time versus diF/dt (typical values)**



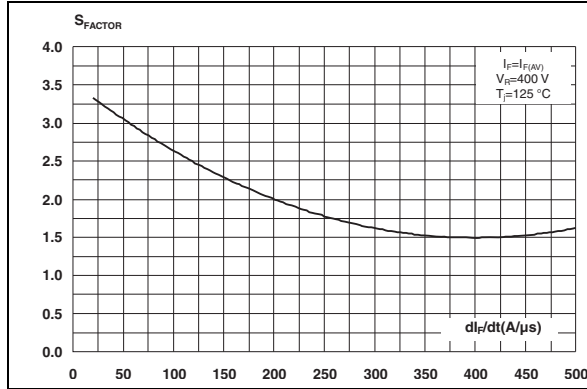
**Figure 6. Reverse recovery charges versus diF/dt (typical values)**



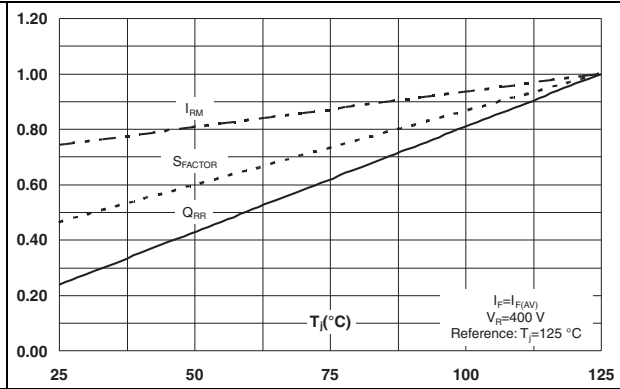
**Characteristics**

**STTH4R06DEE**

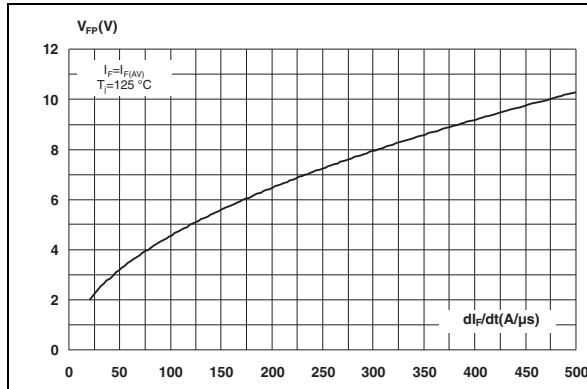
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



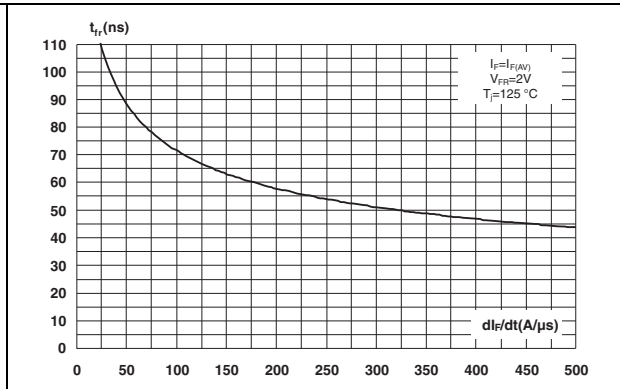
**Figure 8. Relative variation of dynamic parameters versus junction temperature**



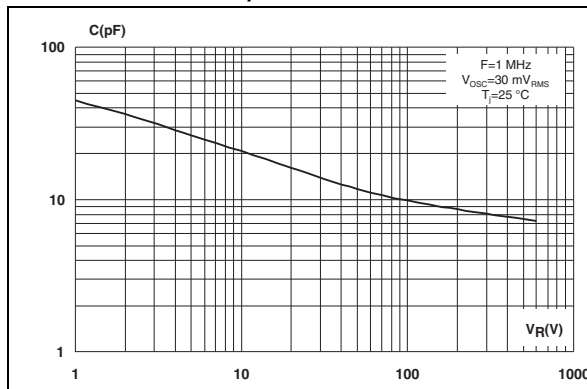
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



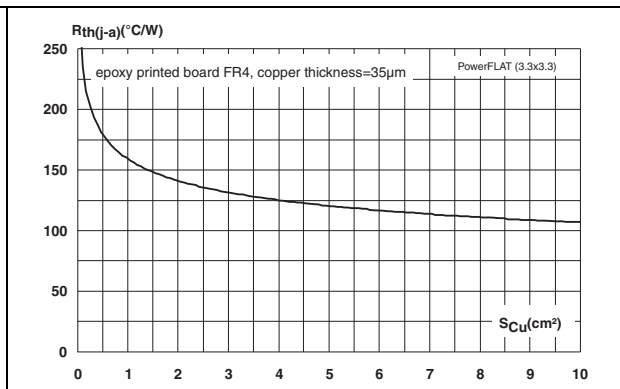
**Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)**



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



**Figure 12. Thermal resistance junction to ambient versus copper surface under tab**



## 2 Package information

- Epoxy meets UL94,V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 13. PowerFLAT (3.3 x 3.3) dimensions (definitions)

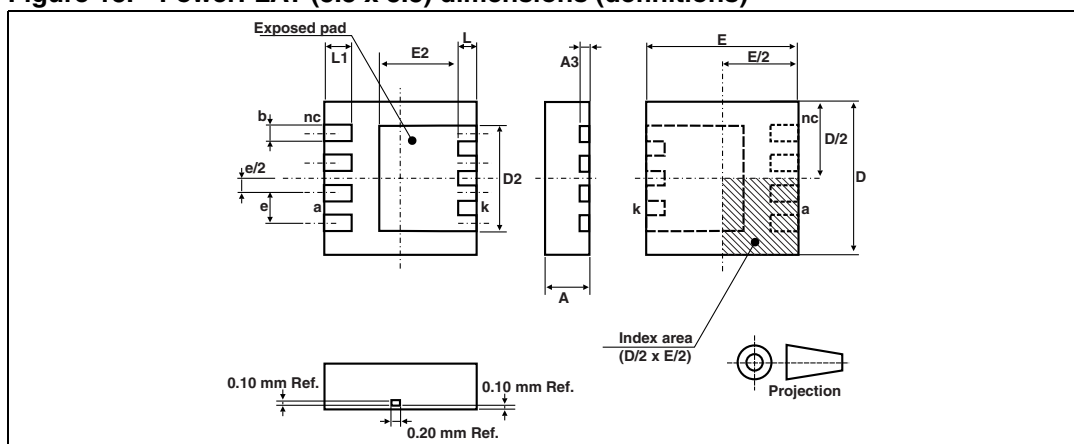


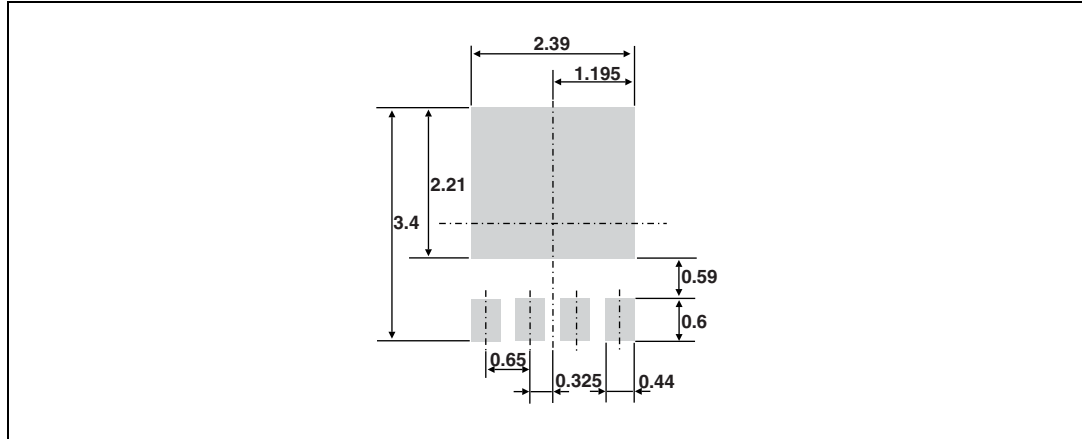
Table 6. PowerFLAT (3.3 x 3.3) dimensions (values)

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.95		1.0	0.037		0.039
A3		0.2			0.008	
b	0.29	0.34	0.39	0.011	0.013	0.015
D	3.20	3.30	3.40	0.126	0.130	0.134
D2	2.24	2.29	2.34	0.088	0.090	0.092
E	3.20	3.30	3.40	0.126	0.130	0.134
E2	1.66	1.71	1.76	0.065	0.067	0.069
e		0.65			0.026	
L		0.40			0.016	
L1	0.45	0.50	0.55	0.018	0.20	0.22

Package information

STTH4R06DEE

Figure 14. Footprint (dimensions in mm)



STTH4R06DEE

Ordering information

### 3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH4R06DEE-TR	TH4R06	PowerFLAT (3.3 x 3.3)	34 mg	3000	Tape and reel 13" reel

### 4 Revision history

Table 8. Document revision history

Date	Revision	Changes
11-Sep-2012	1	First issue.



## STTH4R06DEE

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