

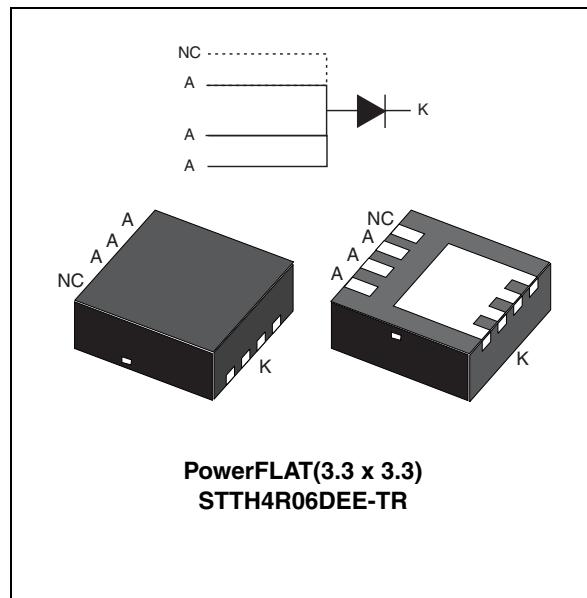
## Features

- Very low switching losses
- High frequency and high pulse current operation
- Low thermal resistance
- High junction temperature
- ECOPACK®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™, 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

# 1 Characteristics

**Table 2. Absolute ratings (limiting values  $T_{amb} = 25^{\circ}C$  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	4	A
$I_{FSM}$	Surge non repetitive forward current $t_p = 10 \text{ ms sinusoidal}$	60	A
$T_{stg}$	Storage temperature range	-65 to +150	$^{\circ}\text{C}$
$T_j$	Maximum operating junction temperature	150	$^{\circ}\text{C}$

**Table 3. Thermal resistance**

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

**Table 4. Static electrical characteristics**

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

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

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

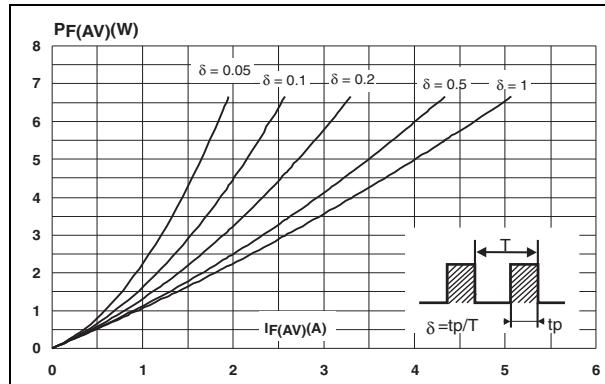
To evaluate the conduction losses use the following equation:

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

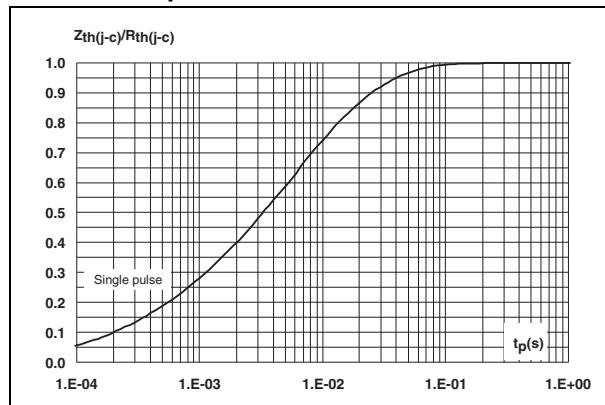
**Table 5. Dynamic electrical characteristics**

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

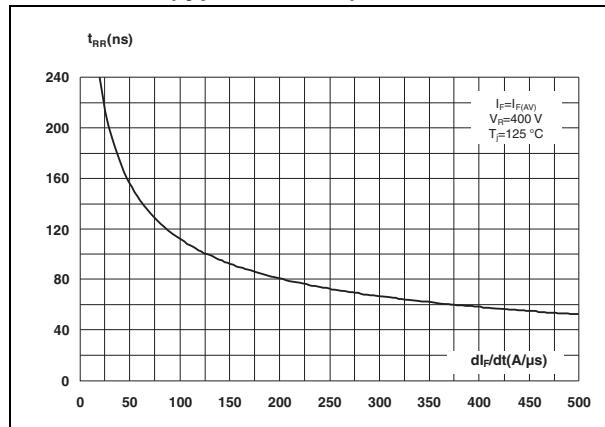
**Figure 1. Average forward power dissipation versus average forward current**



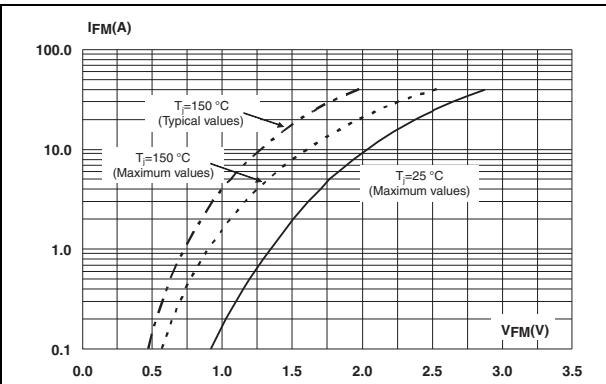
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



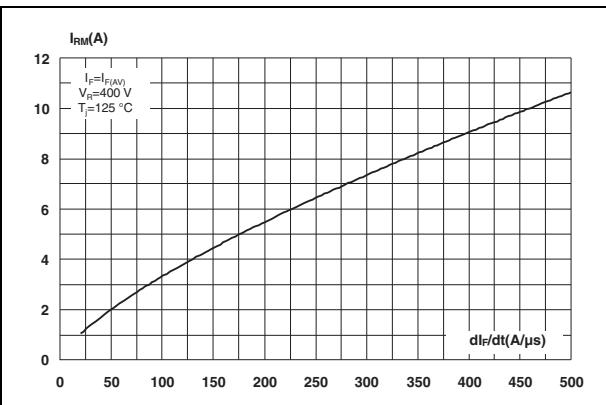
**Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)**



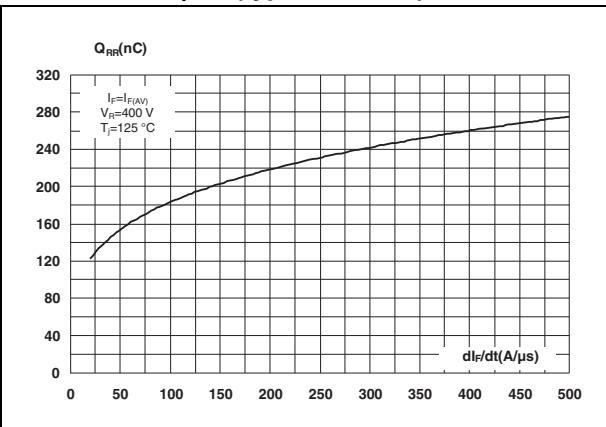
**Figure 2. Forward voltage drop versus forward current**



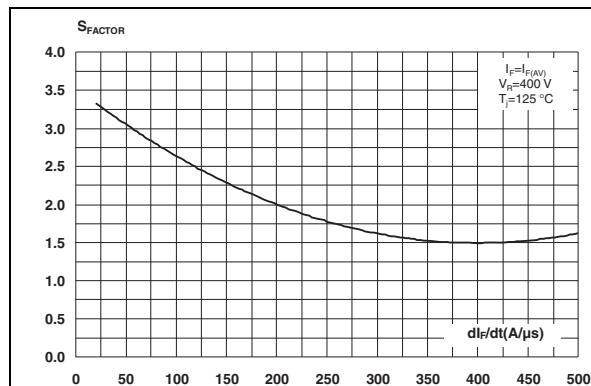
**Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



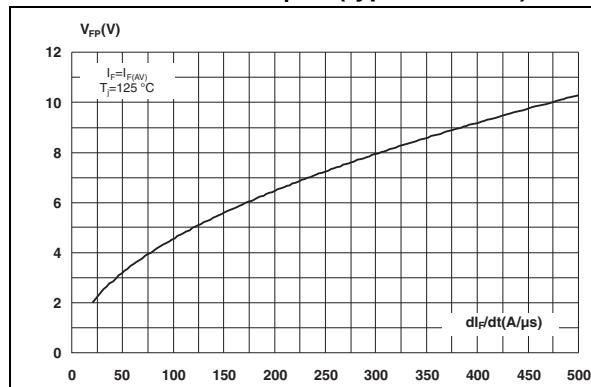
**Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)**



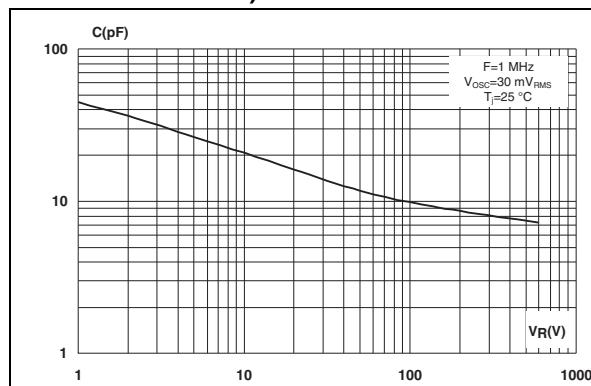
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



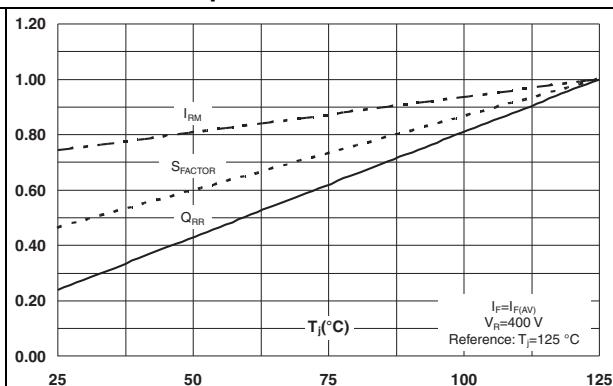
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



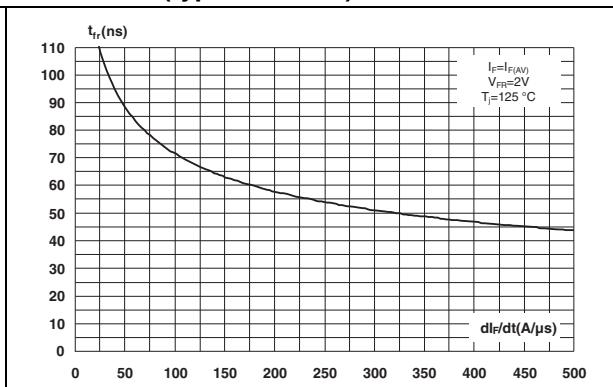
**Figure 11. Junction capacitance versus reverse voltage applied (typical values)**



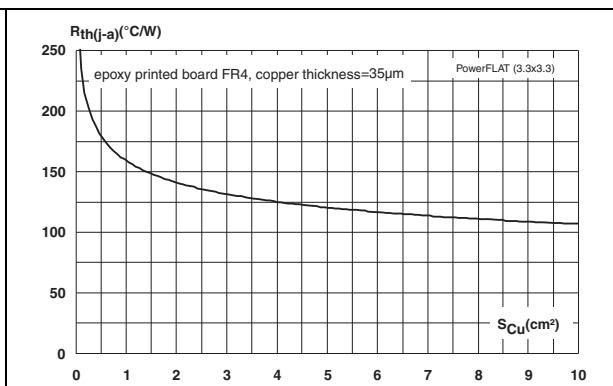
**Figure 8. Relative variation of dynamic parameters versus junction temperature**



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



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

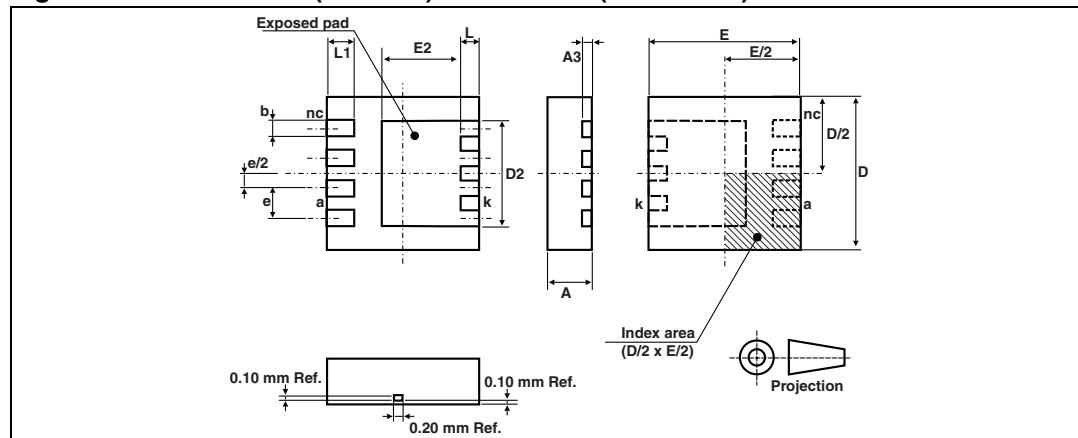


## 2 Package information

- Epoxy meets UL94,V0
- Lead-free package

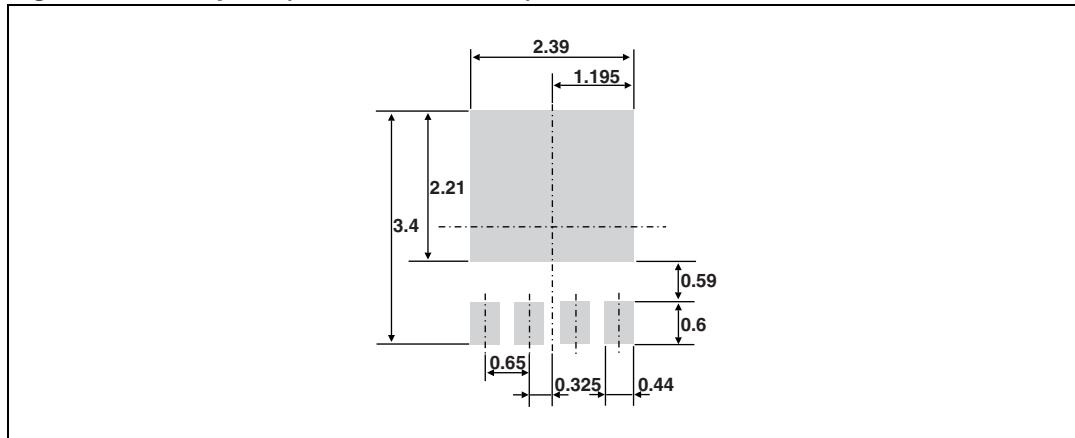
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

**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

**Figure 14. Footprint (dimensions in mm)**

### 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.

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