

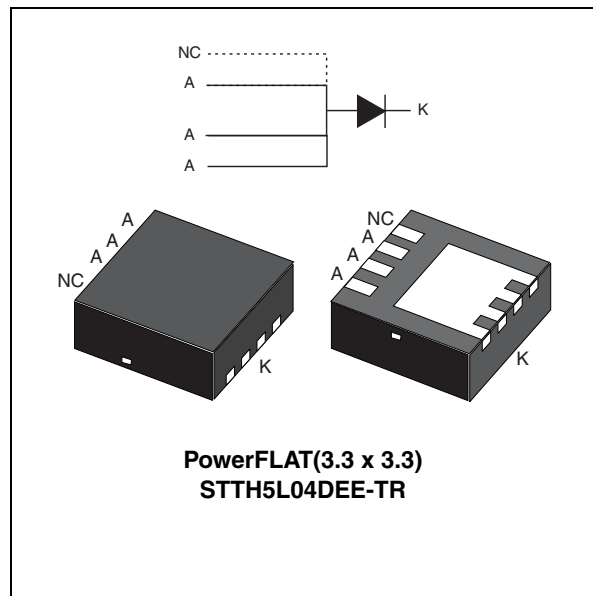
### Features

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

### Description

The STTH5L04 series uses ST's new 400 V planar Pt doping technology. The STTH5L04 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
$I_{F(AV)}$	5 A
$V_{RRM}$	400 V
$T_j$ (max)	150 °C
$V_F$ (typ)	0.85 V
$T_{RR}$ (typ)	35 ns

TM: PowerFLAT is a trademark of STMicroelectronics

# 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	400	V
$I_{F(RMS)}$	Forward rms current	15	A
$I_{F(AV)}$	Average forward current	$T_c = 120\text{ °C}, \delta = 0.5$	A
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10\text{ ms}$ sinusoidal	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 dimension, 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	$T_j = 25\text{ °C}$	-		2.5	$\mu\text{A}$
		$T_j = 125\text{ °C}$	-	2.5	25	$\mu\text{A}$
$V_F^{(2)}$	Forward voltage drop	$T_j = 25\text{ °C}$		1.05	1.25	V
		$T_j = 150\text{ °C}$	-	0.85	1.05	

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:

$$P = 0.85 \times I_{F(AV)} + 0.04 \times I_{F(RMS)}^2$$

**Table 5. Dynamic electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$ $I_F = 5\text{ A}, V_R = 320\text{ V},$ $di_F/dt = -200\text{ A}/\mu\text{s}$	-	8	11	A
$S_{factor}$	Softness factor		-	0.7		
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$ $I_F = 1\text{ A}, V_R = 30\text{ V},$ $di_F/dt = -50\text{ A}/\mu\text{s}$		43	60	ns
			-	35	50	
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$			110	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ °C}$ $I_F = 5\text{ A}, V_{FR} = 1.2\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$	-	2	3	V

Figure 1. Average forward power dissipation versus average forward current

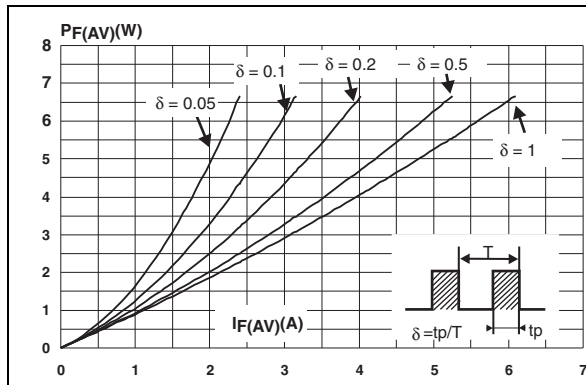


Figure 2. Forward voltage drop versus forward current

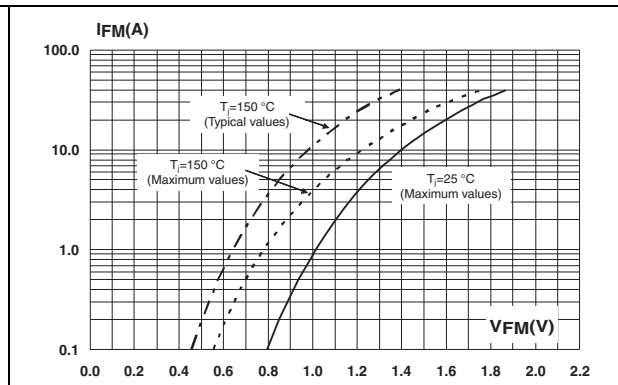
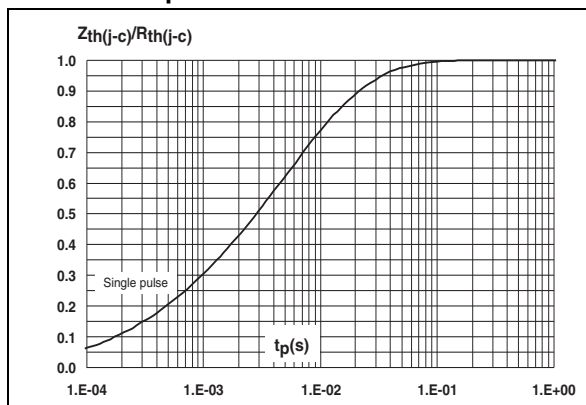
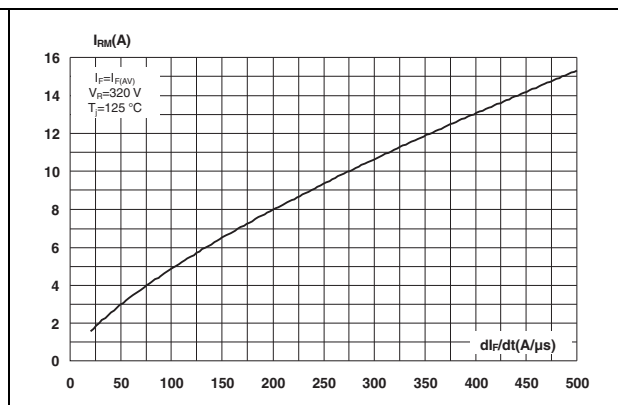
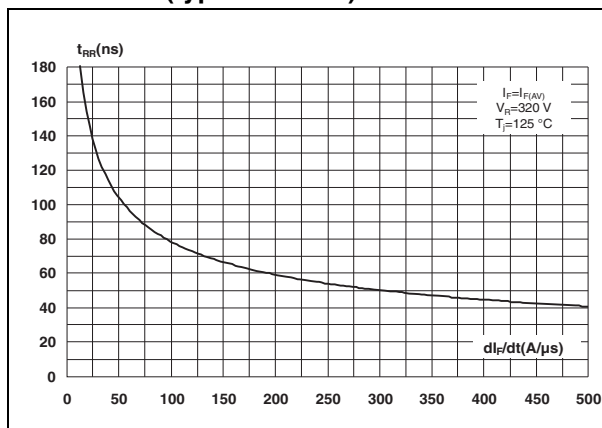
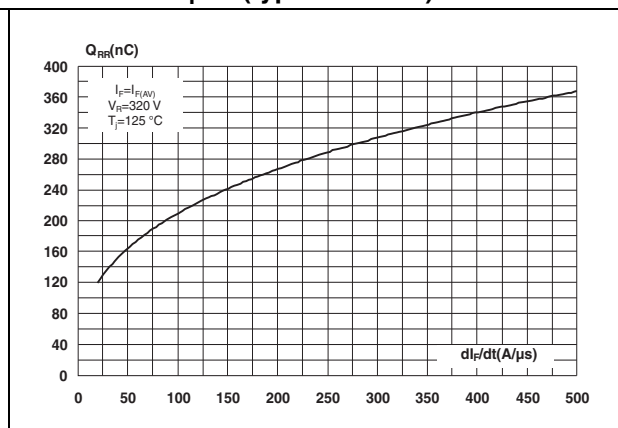
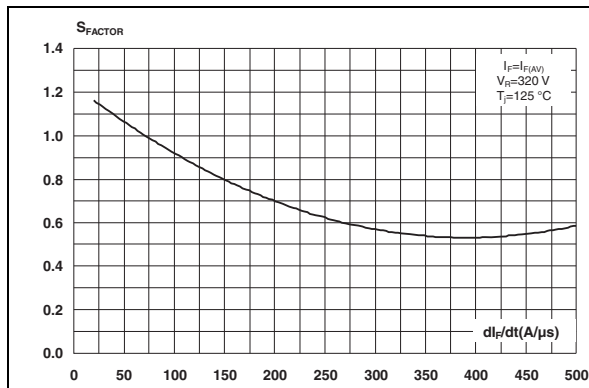


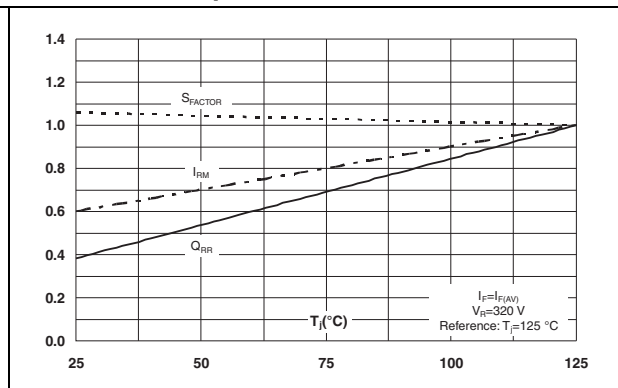
Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

Figure 4. Peak reverse recovery current versus  $di_F/dt$  (typical values)Figure 5. Reverse recovery time versus  $di_F/dt$  (typical values)Figure 6. Reverse recovery charges versus  $di_F/dt$  (typical values)

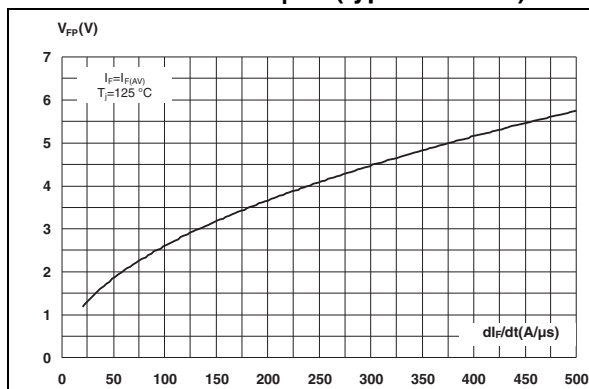
**Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



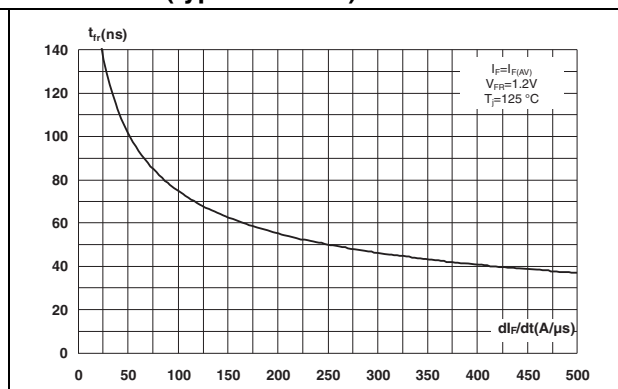
**Figure 8. Relative variation of dynamic parameters versus junction temperature**



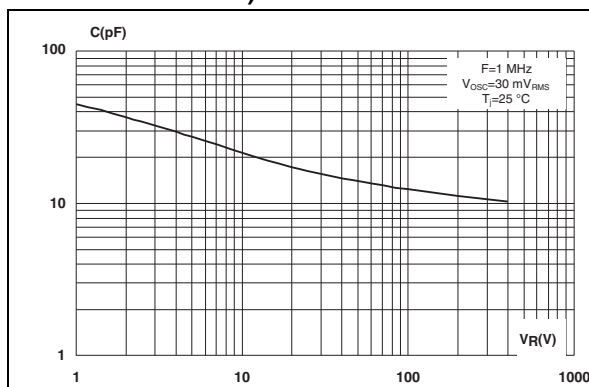
**Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)**



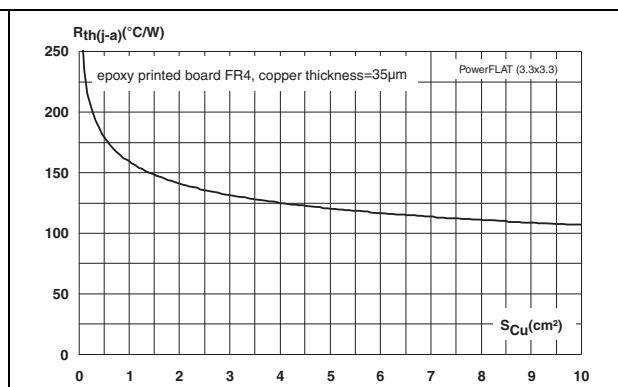
**Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)**



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



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

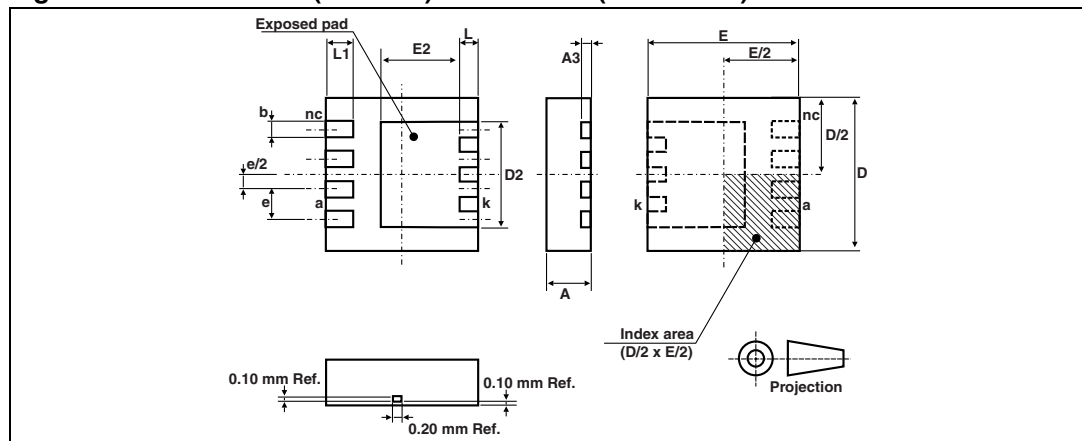


## 2 Package information

- 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.

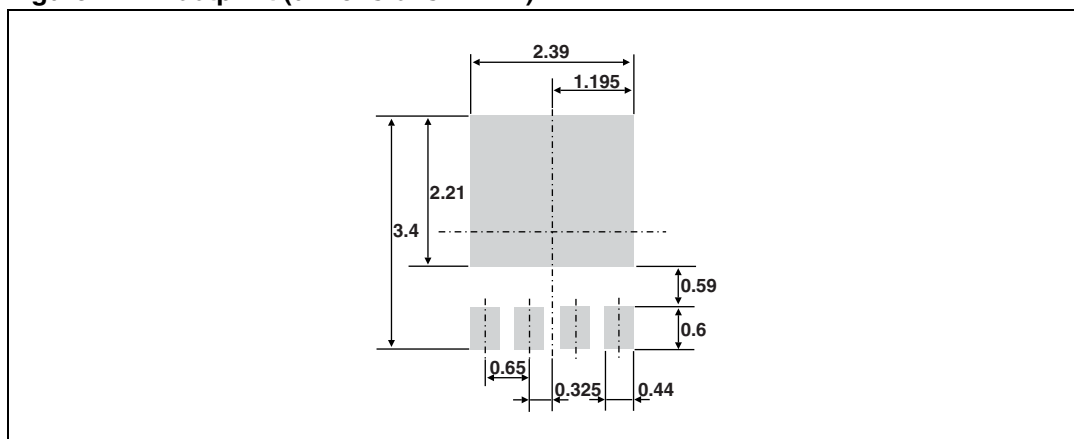
**Figure 13. PowerFLAT (3.3 x 3.3) dimensions (definitions)**



**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

Figure 14. Footprint (dimensions in mm)



### 3 Ordering information

Table 7. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
STTH5L04DEE-TR	TH5L04	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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