

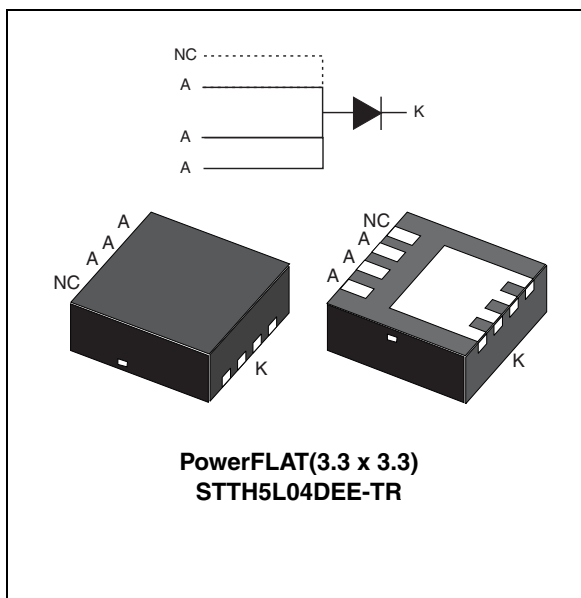
### Features

- 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 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<sup>™</sup>, 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	$T_c = 120\text{ °C}, \delta = 0.5$	5	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 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	
$t_{fr}$	Forward recovery time	$T_j = 25\text{ °C}$	$I_F = 5\text{ A}, V_{FR} = 1.2\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$			110	ns
$V_{FP}$	Forward recovery voltage	$T_j = 25\text{ °C}$		-	2	3	V

Figure 1. Average forward power dissipation versus average forward current

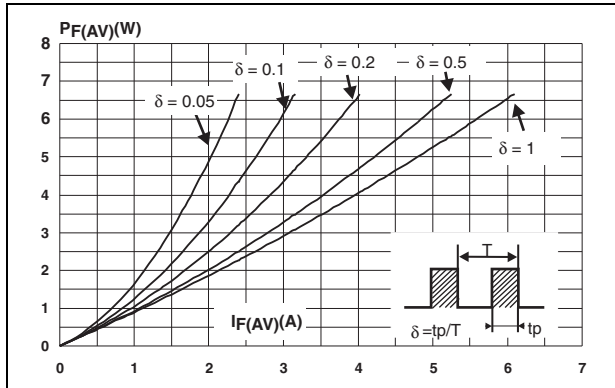


Figure 2. Forward voltage drop versus forward current

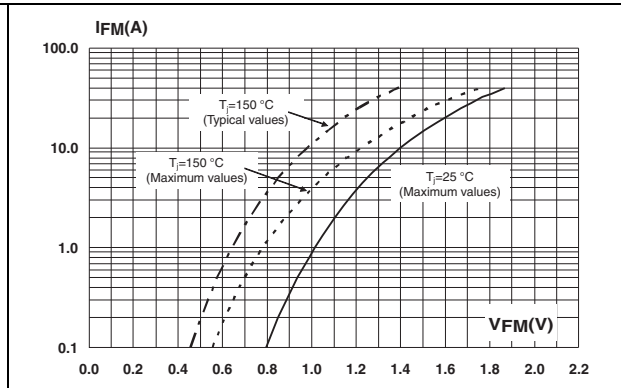


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

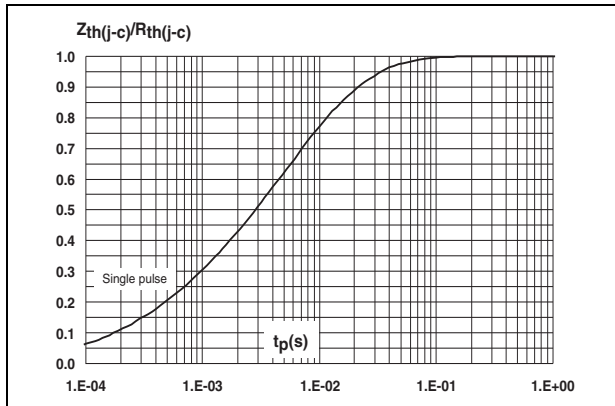


Figure 4. Peak reverse recovery current versus diF/dt (typical values)

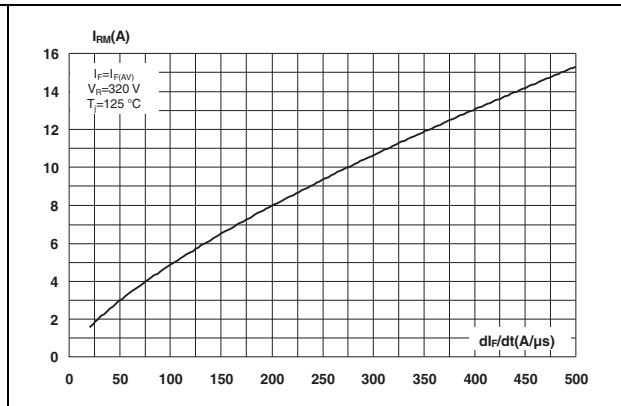


Figure 5. Reverse recovery time versus diF/dt (typical values)

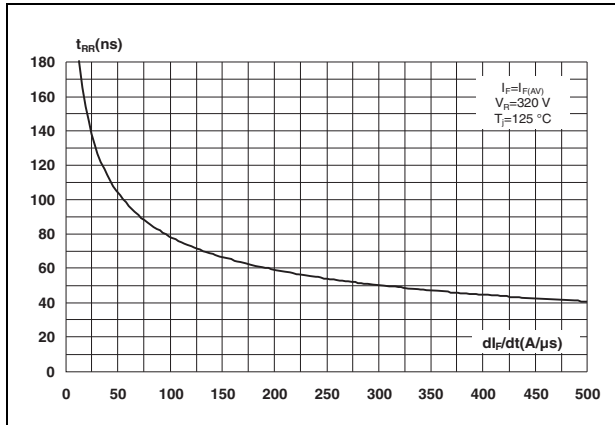


Figure 6. Reverse recovery charges versus diF/dt (typical values)

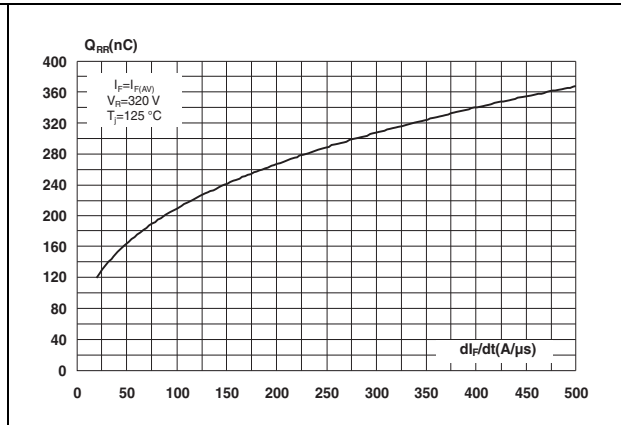


Figure 7. Reverse recovery softness factor versus  $di_F/dt$  (typical values)

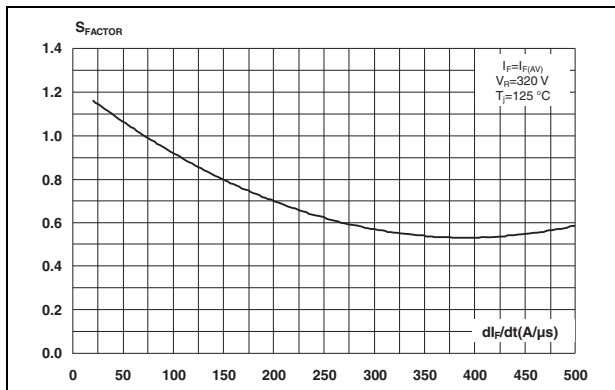


Figure 8. Relative variation of dynamic parameters versus junction temperature

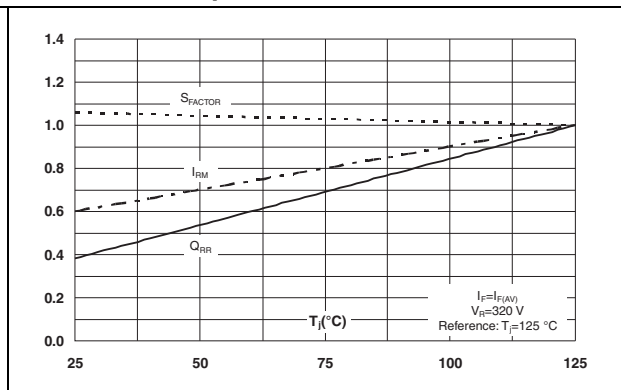


Figure 9. Transient peak forward voltage versus  $di_F/dt$  (typical values)

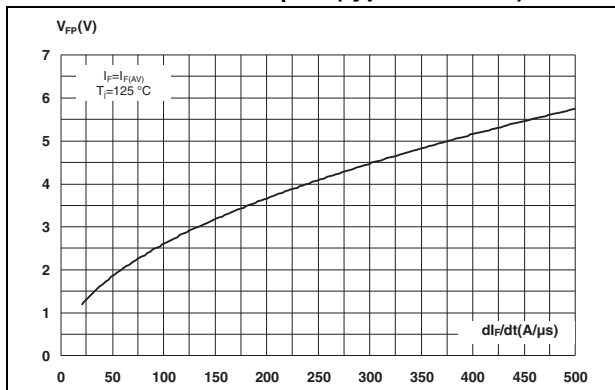


Figure 10. Forward recovery time versus  $di_F/dt$  (typical values)

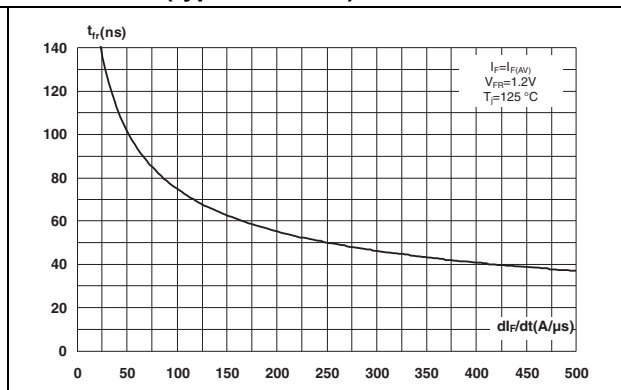


Figure 11. Junction capacitance versus reverse voltage applied (typical values)

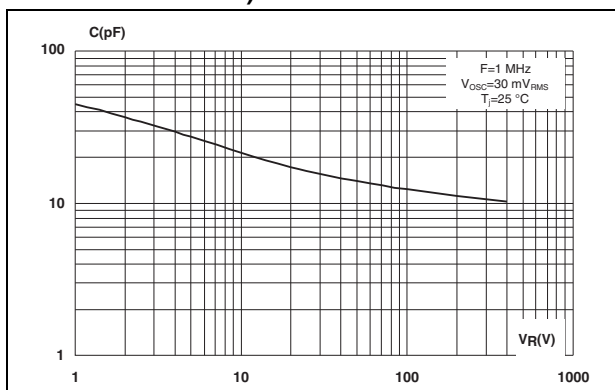
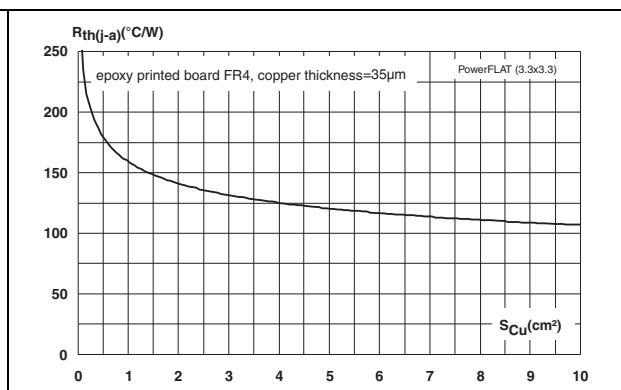


Figure 12. Thermal resistance junction to ambient versus copper surface under tab

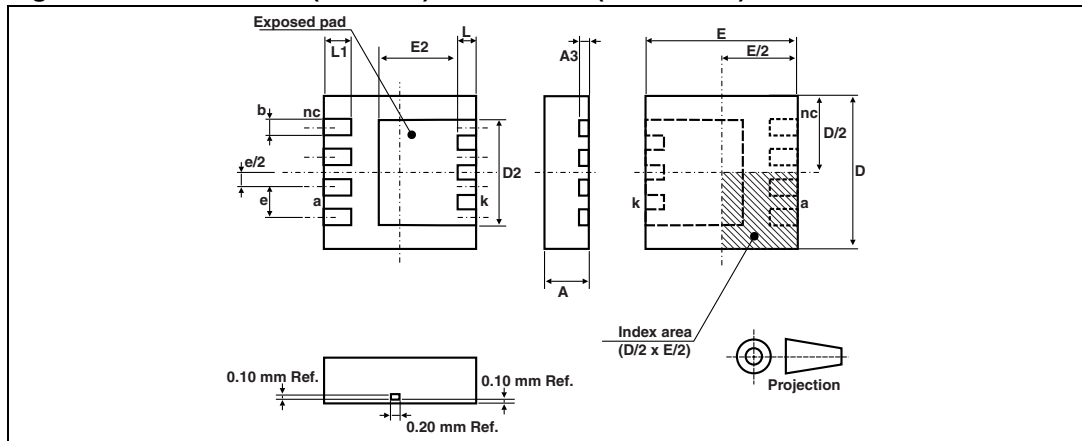


## 2 Package information

- Epoxy meets UL94,V0
- Lead-free package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® 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.

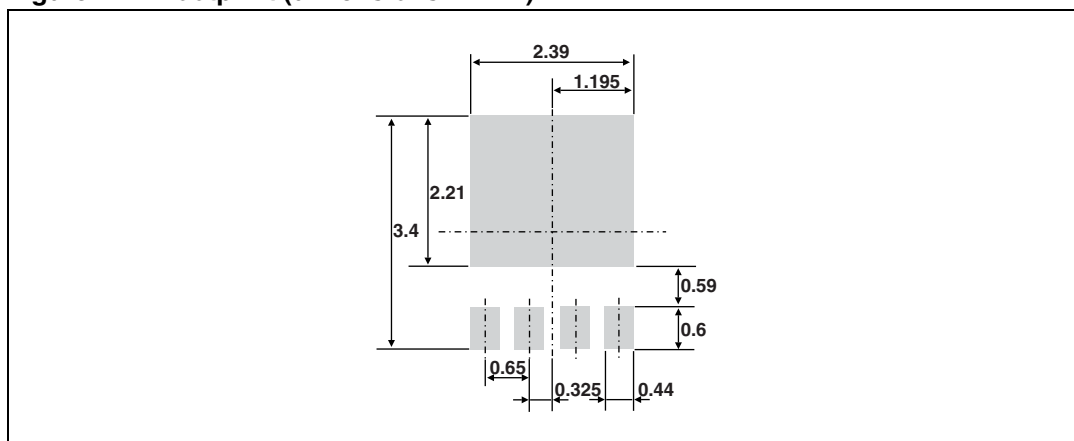
**Figure 13. PowerFLAT (3.3 x 3.3) dimensions (definitions)**



**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
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.

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STTH5L04DEE-TR](#)