

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[STMicroelectronics](#)
[STP40NF10L](#)

For any questions, you can email us directly:

sales@integrated-circuit.com



STP40NF10L

N-channel 100V - 0.028Ω - 40A TO-220
Low gate charge STripFET™ Power MOSFET

General features

Type	V _{DSS}	R _{DS(on)}	I _D
STP40NF10L	100V	<0.033Ω	40A

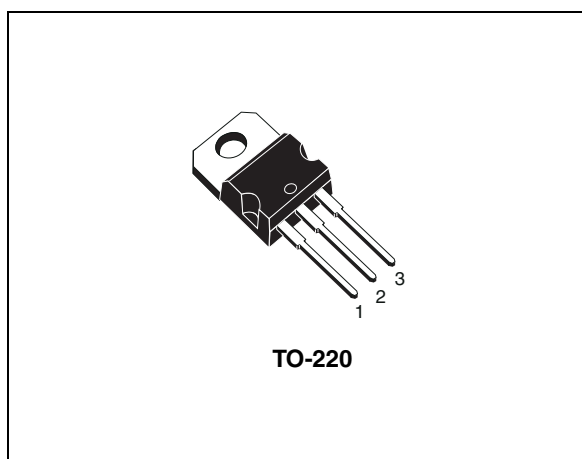
- Exceptional dv/dt capability
- 100% avalanche tested
- Application oriented characterization

Description

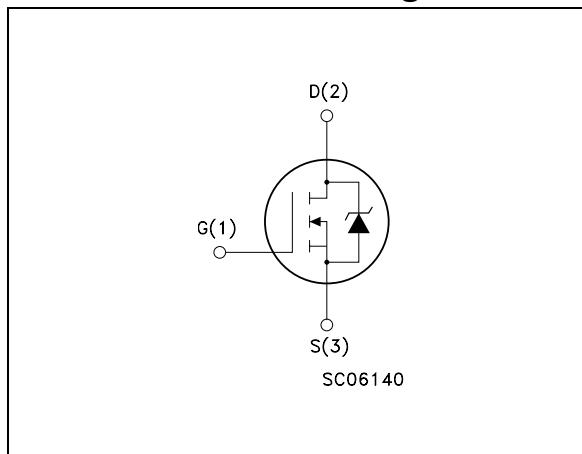
This Power MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters for Telecom and Computer application. It is also intended for any application with low gate charge drive requirements.

Applications

- Switching application



Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STP40NF10L	P40NF10L	TO-220	Tube

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
	2.1 Electrical characteristics (curves)	6
3	Test circuit	8
4	Package mechanical data	9
5	Revision history	11

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($v_{gs} = 0$)	100	V
V_{GS}	Gate- source voltage	± 17	V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$	40	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	25	A
$I_{DM}^{(1)}$	Drain current (pulsed)	160	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$	150	W
	Derating factor	1	W/°C
$E_{AS}^{(2)}$	Single pulse avalanche energy	430	mJ
T_{stg}	Storage temperature	- 65 to 175	°C
T_j	Max. operating junction temperature	175	

1. Pulse width limited by safe operating area

2. Starting $T_j = 25^\circ\text{C}$, $I_D = 20\text{A}$, $V_{DD} = 40\text{V}$

Table 2. Thermal data

$R_{thj-case}$	Thermal resistance junction-case Max	1	°C/W
R_{thj-a}	Thermal resistance junction-ambient Max	62.5	°C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

Electrical characteristics

STP40NF10L

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown voltage	I _D = 250 μA, V _{GS} = 0	100			V
I _{DSS}	Zero gate voltage Drain current (V _{GS} = 0)	V _{DS} = Max rating V _{DS} =Max rating, T _C =125°C			1 10	μA μA
I _{GSS}	Gate-body leakage current (V _{DS} = 0)	V _{GS} = ±17V			±100	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.7	2.5	V
R _{DS(on)}	Static drain-source on resistance	V _{GS} = 10V, I _D = 20A V _{GS} = 5V, I _D = 20A		0.028 0.030	0.033 0.036	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g _{fs} ⁽¹⁾	Forward transconductance	V _{DS} = 15V, I _D =20A		25		S
C _{iss}	Input capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		2300		pF
C _{oss}	Output capacitance			290		pF
C _{rss}	Reverse transfer capacitance			125		pF
Q _g	Total gate charge	V _{DD} = 80V, I _D = 40A, V _{GS} = 5V		46	64	nC
Q _{gs}	Gate-source charge			12		nC
Q _{gd}	Gate-drain charge			22		nC

1. Pulsed: Pulse duration = 300 μs, duty cycle 1.5.

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 50V, I _D = 20A R _G = 4.7Ω V _{GS} = 4.5V (see Figure 13)		25		ns
t _r	Rise time			82		ns
t _{d(off)}	Turn-off-delay time	V _{DD} = 50V, I _D = 20A, R _G = 4.7Ω, V _{GS} = 4.5V (see Figure 13)		64		ns
t _f	Fall time			24		ns
t _{d(off)}	Off-voltage Rise Time	V _{clamp} =80V, I _D = 40 A R _G = 4.7Ω, V _{GS} = 4.5V (see Figure 15)		51		ns
t _f	Fall Time			29		ns
t _c	Cross-over time			53		ns

STP40NF10L
Electrical characteristics
Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current				40	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				160	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 40A, V_{GS} = 0$			1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 40A, V_{DD} = 30V$ $di/dt = 100A/\mu s,$ $T_j = 150^\circ C$ (see Figure 15)		110		ns
Q_{rr}	Reverse recovery charge			467		nC
I_{RRM}	Reverse recovery current			8		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

Electrical characteristics

STP40NF10L

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

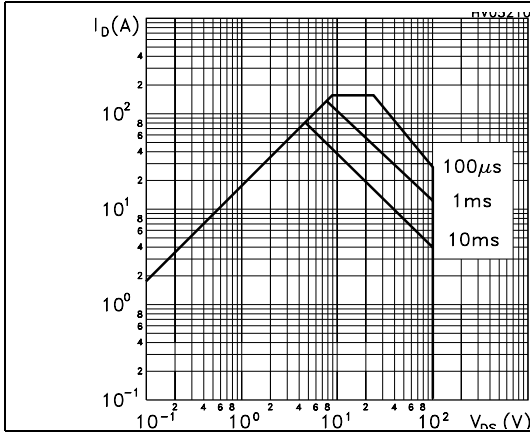


Figure 2. Thermal impedance

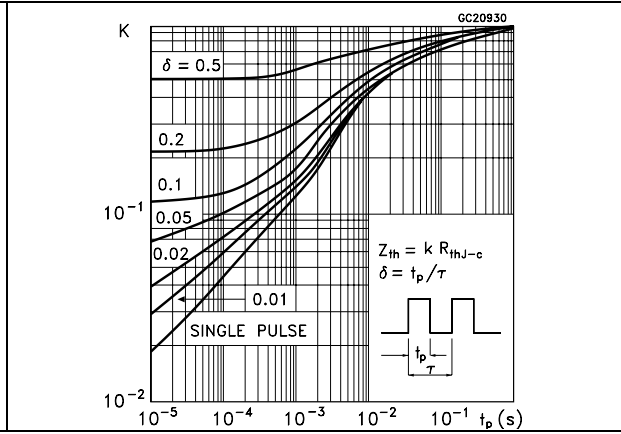


Figure 3. Output characteristics

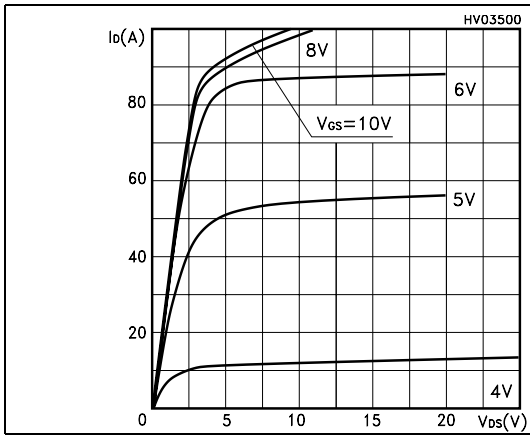


Figure 4. Transfer characteristics

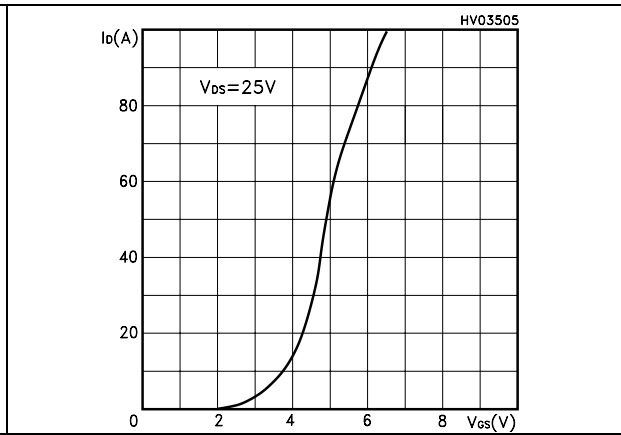


Figure 5. Transconductance

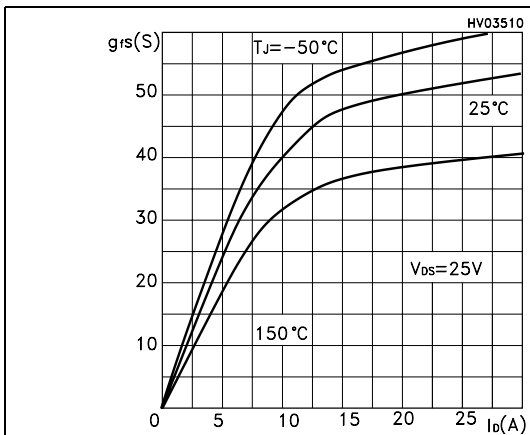
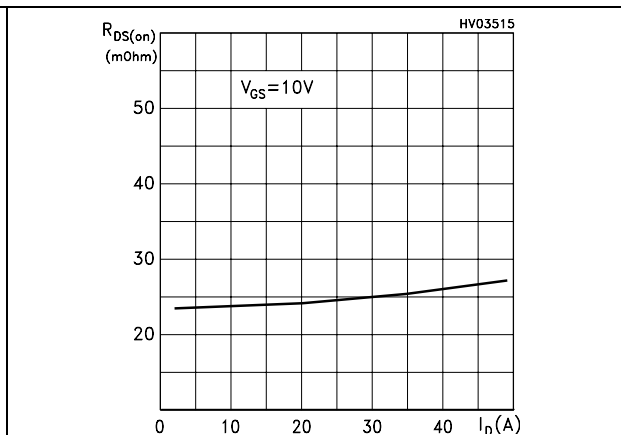


Figure 6. Static drain-source on resistance



STP40NF10L

Electrical characteristics

Figure 7. Gate charge vs. gate-source voltage **Figure 8. Capacitance variations**

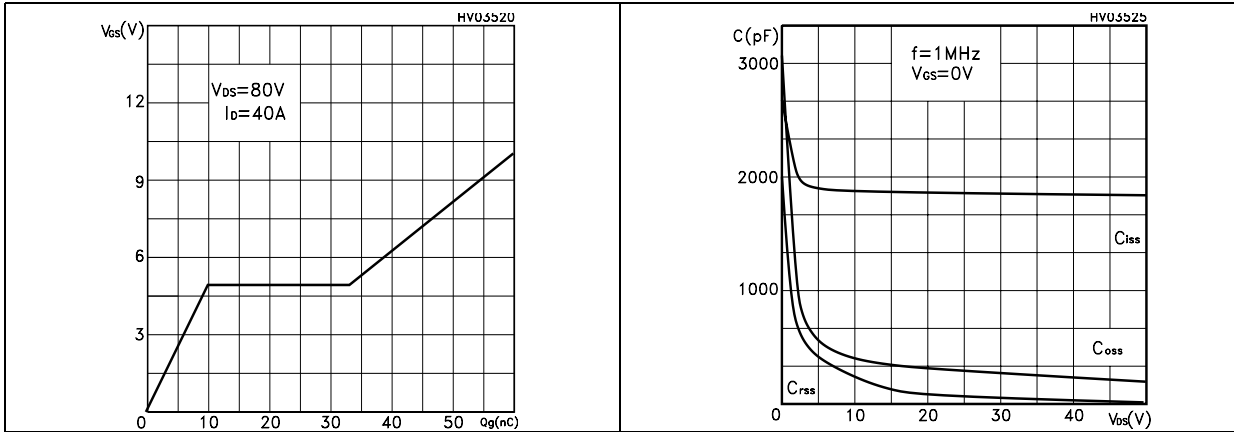


Figure 9. Normalized gate threshold voltage vs. temperature **Figure 10. Normalized on resistance vs. temperature**

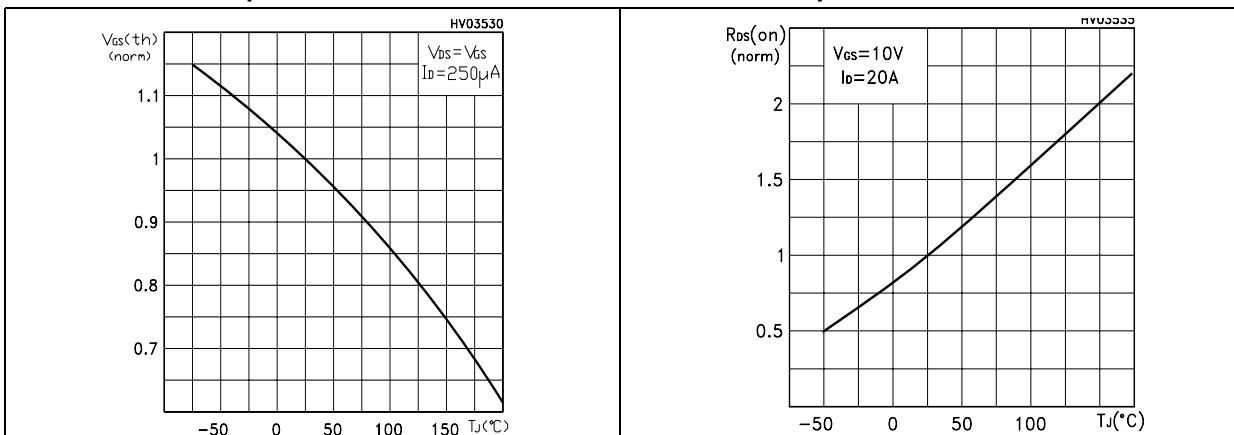
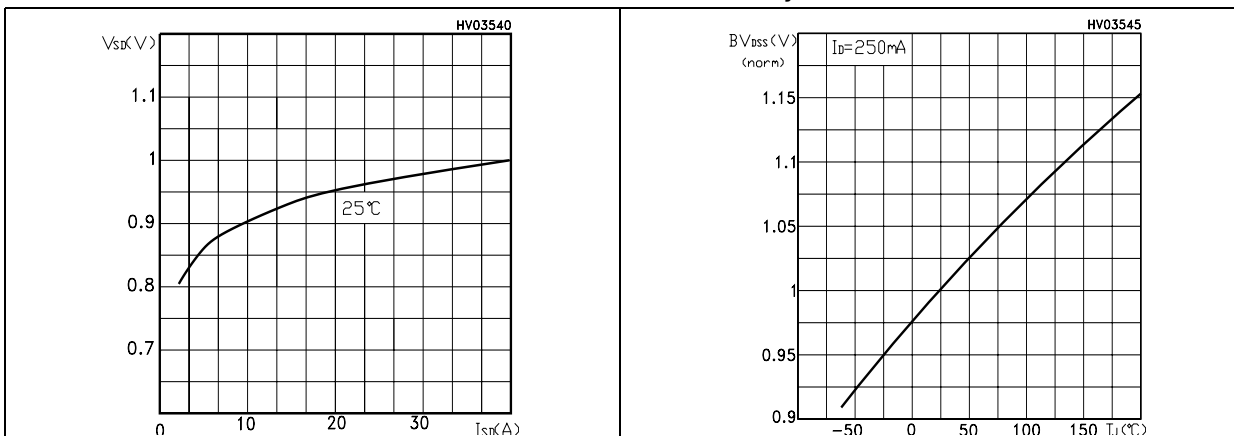


Figure 11. Source-drain diode forward characteristics **Figure 12. Normalized breakdown voltage vs. t_j**



Test circuit

STP40NF10L

3 Test circuit

Figure 13. Switching times test circuit for resistive load

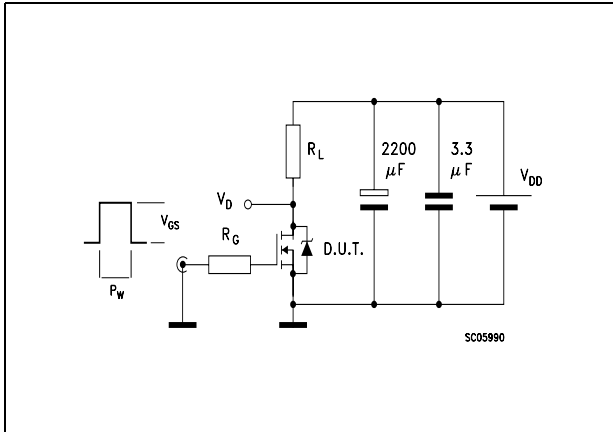


Figure 14. Gate charge test circuit

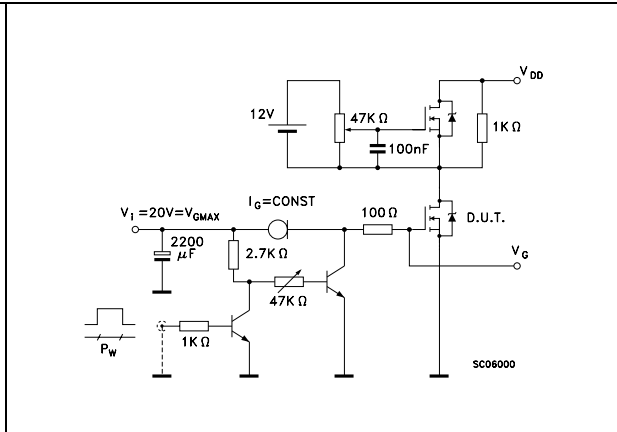


Figure 15. Test circuit for inductive load switching and diode recovery times

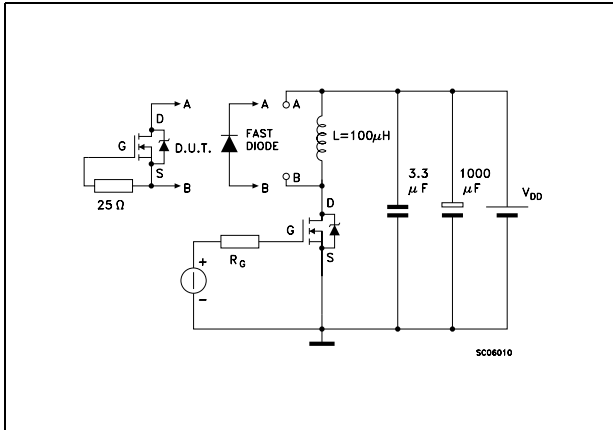


Figure 16. Unclamped Inductive load test circuit

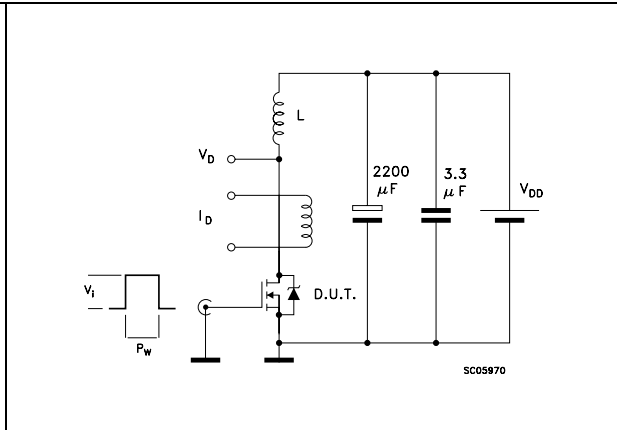


Figure 17. Unclamped inductive waveform

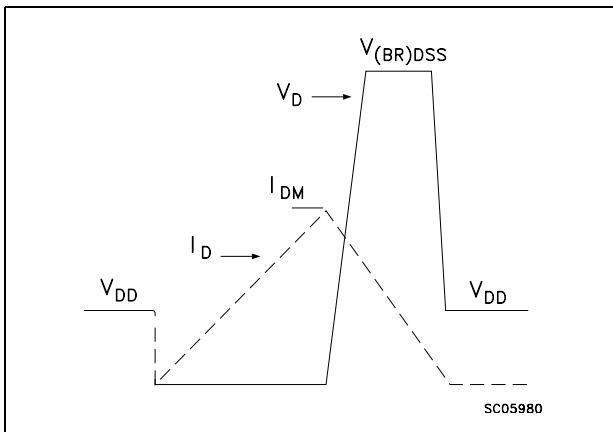
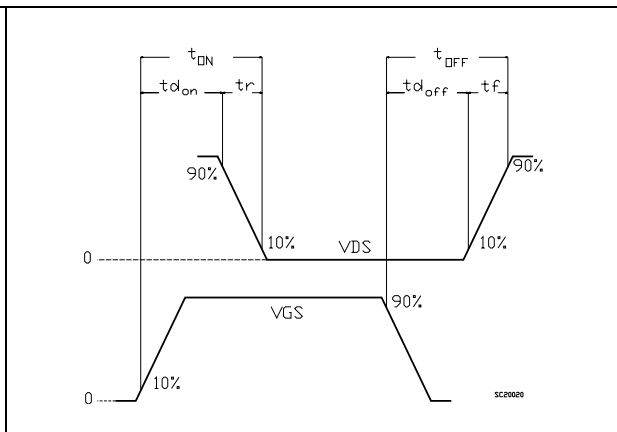


Figure 18. Switching time waveform



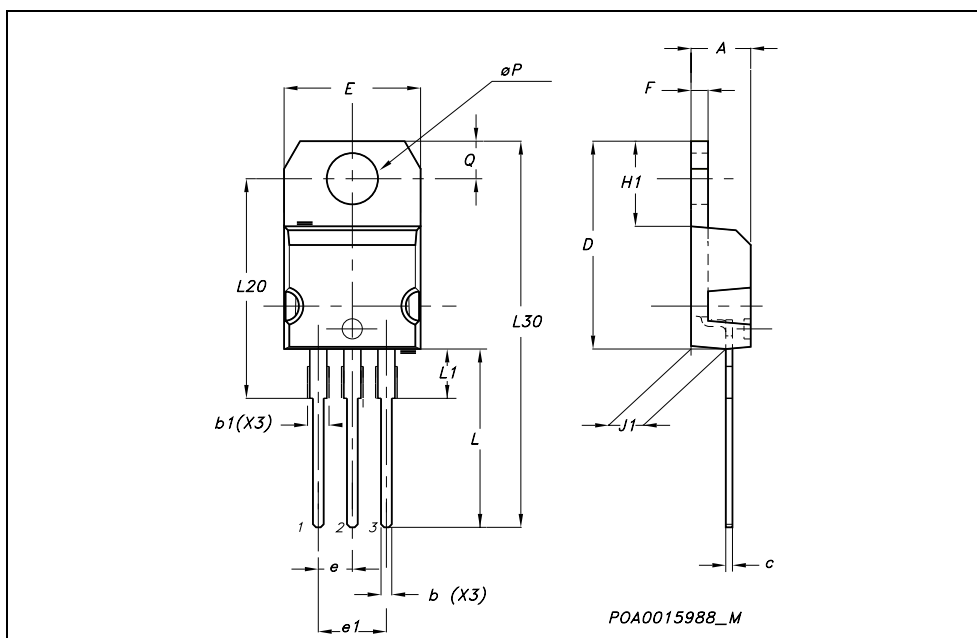
4 Package mechanical data

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

Package mechanical data

STP40NF10L

TO-220 MECHANICAL DATA						
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



5 Revision history

Table 7. Revision history

Date	Revision	Changes
09-Sep-2004	1	First version.
17-Aug-2006	2	The document has been reformatted.
31-Jan-2007	3	Typo mistake on Table 1 .

STP40NF10L

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 AN AUTHORIZED ST REPRESENTATIVE, 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.

© 2007 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 - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com