STL80N4LLF3

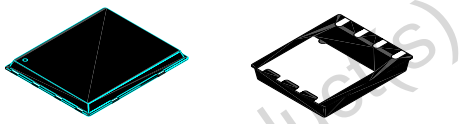
N-channel 40V - 0.0042Ω - 80A - PowerFLAT™ (6x5) STripFET™ Power MOSFET for DC-DC conversion

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STL80N4LLF3	40V	<0.005Ω	20A (1)

1. When mounted on FR-4 board of 1 inch², 2oz Cu, t<10 sec

- Improved die-to-footprint ratio
- Very low profile package (1mm Max)
- Very low thermal resistance
- Conduction losses reduced
- Switching losses reduced

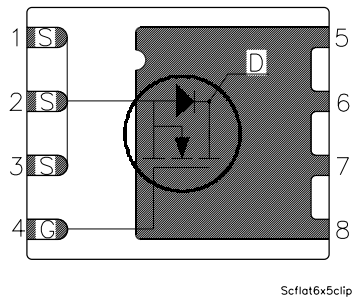


PowerFLAT™(6x5)

Description

This series of product utilizes the latest advanced design rules of ST's proprietary STripFET™ Technology. The resulting Transistor is optimized for low on-Resistance and minimal gate charge. The chip-scaled PowerFLAT™ package allows a significant board space saving, still boosting the performance.

Internal schematic diagram



Applications

- Switching application

Obsolete Product(s) - Obsolete Product(s)

Order codes

Part number	Marking	Package	Packaging
STL80N4LLF3	L80N4LLF3	PowerFLAT™ (6x5)	Tape & reel

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

Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	40	V
V_{GS}	Gate- source voltage	±16	V
V_{GS} (1)	Gate- source voltage	±18	V
I_D (2)	Drain current (continuous) at T_C = 25°C	80	A
I_D (2)	Drain current (continuous) at T_C = 100°C	50	A
I_D (3)	Drain current (continuous) at T_C = 25°C	20	A
I_{DM}(4)	Drain current (pulsed)	80	A
P_{TOT} (2)	Total dissipation at T_C = 25°C	80	W
P_{TOT}(3)	Total dissipation at T_C = 25°C	4	W
	Derating factor (3)	0.03	W/°C
T_{stg} T_j	Storage temperature Operating junction temperature	-55 to 150	°C

1. Guaranteed for test time ≤ 15ms
2. The value is rated according Rthj-c
3. When mounted on FR-4 board of 1 inch², 2oz Cu, t < 10 sec
4. Pulse width limited by safe operating area

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
Rthj-c	Thermal resistance junction-case max	1.56	°C/W
Rthj-pcb (1)	Thermal operating junction-pcb max	31.2	°C/W

1. When mounted on FR-4 board of 1 inch², 2oz Cu, t<10 sec

Obsolete Product(s) Obsolete Product(s)

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	40			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0) V_{DS} = Max rating V_{DS} = Max rating@125 °C				10 100	µA µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ± 16V			±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	1			V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10V, I_D = 10 A V_{GS} = 4.5V, I_D =10 A		0.0042 0.005	0.005 0.007	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		2530 574 29		pF pF pF
R_G	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20mV open drain	1	3	5	Ω
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 32V, I_D = 20 A, V_{GS} = 4.5V *(see Figure 13)*		21.5 6.9 8.2	28	nC nC nC

Obsolete Product(s) - Obsolete Product(s)

Table 5. Switching times

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_r	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 20V, I_D = 10A, R_G= 4.7Ω V_{GS} = 10V *(see Figure 15)*		17 25 62 9		ns ns ns ns

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)				20 80	A A
V_{SD}(2)	Forward on voltage	I_{SD} = 20 A, V_{GS} = 0			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 20A,V_{DD} = 20V di/dt = 100A/µs T_j = 150°C*(see Figure 14)*		43 64 3		ns nC A

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

Obsolete Product(s) - Obsolete Product(s)

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

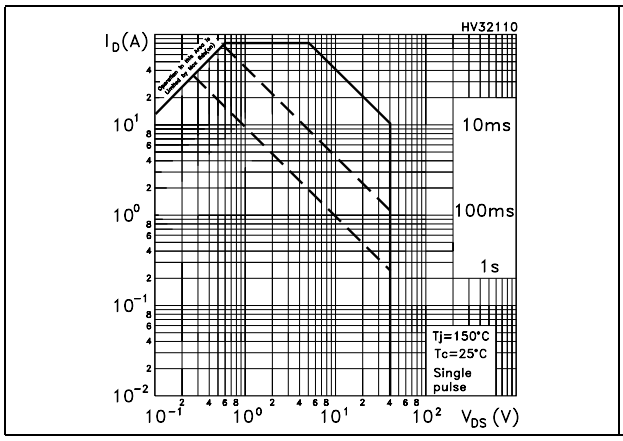


Figure 2. Thermal impedance

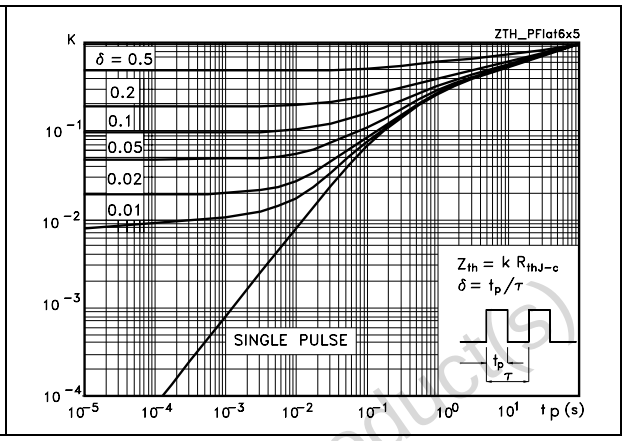


Figure 3. Output characterisics

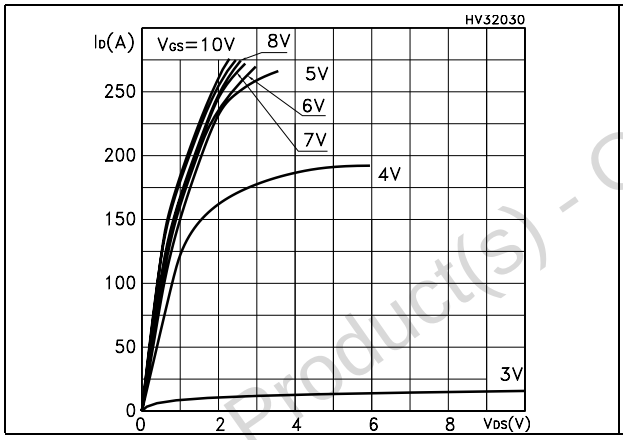


Figure 4. Transfer characteristics

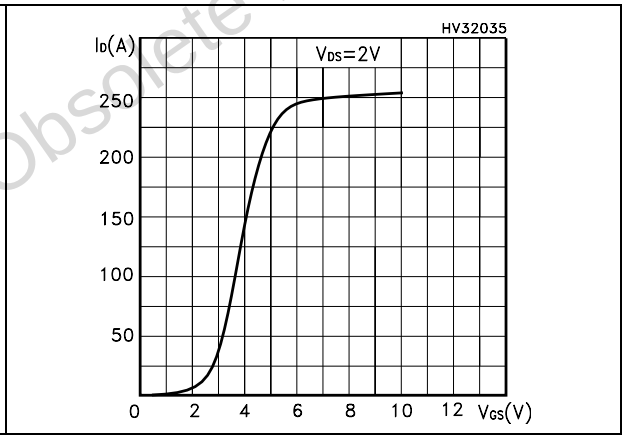


Figure 5. Normalized B_{VDSS} vs temperature

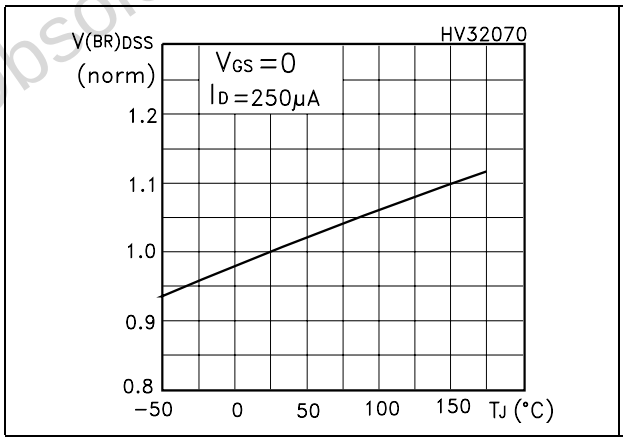
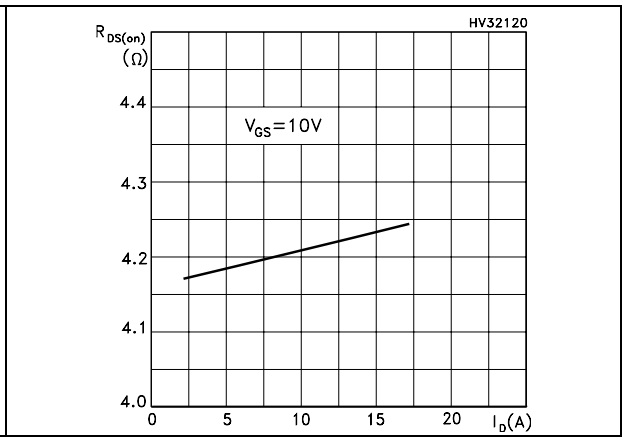


Figure 6. Static drain-source on resistance



Obsolete Product(s) - Obsolete Product(s)

Figure 7. Gate charge vs gate-source voltage

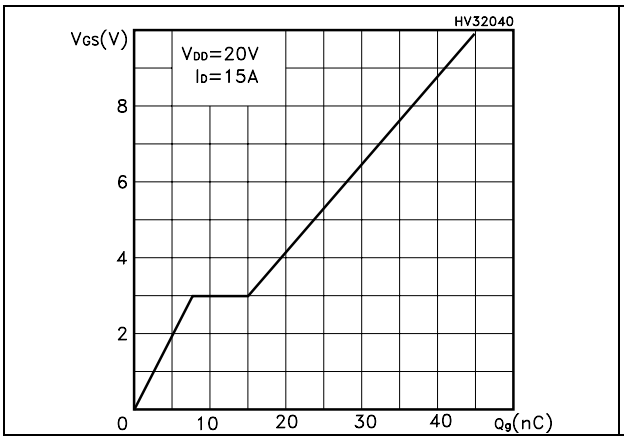


Figure 8. Capacitance variations

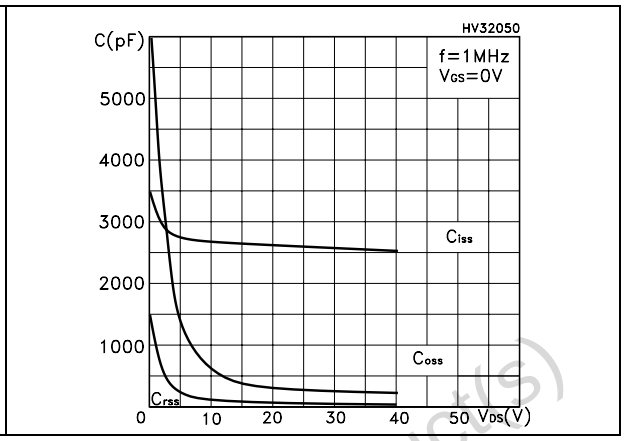


Figure 9. Normalized gate threshold voltage vs temperature

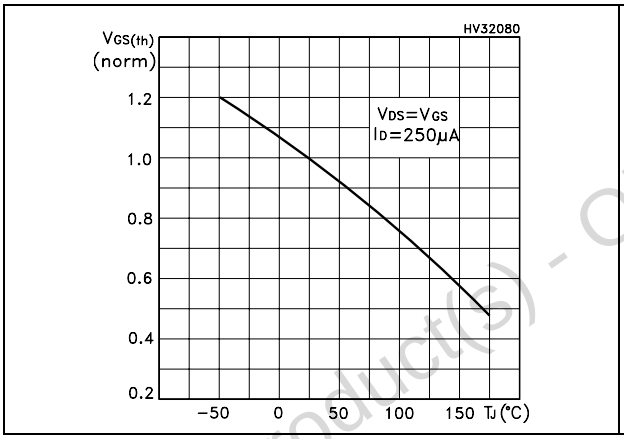


Figure 10. Normalized on resistance vs temperature

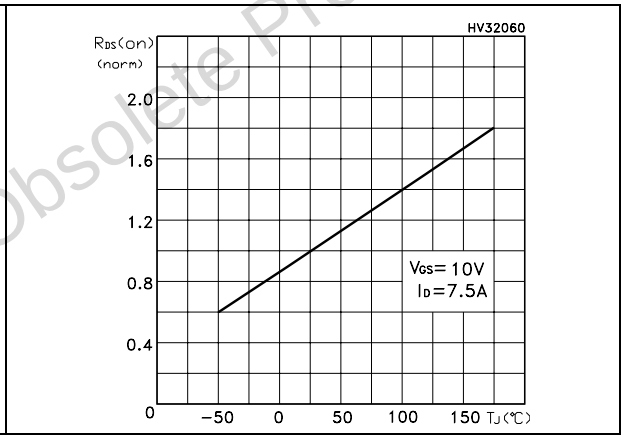
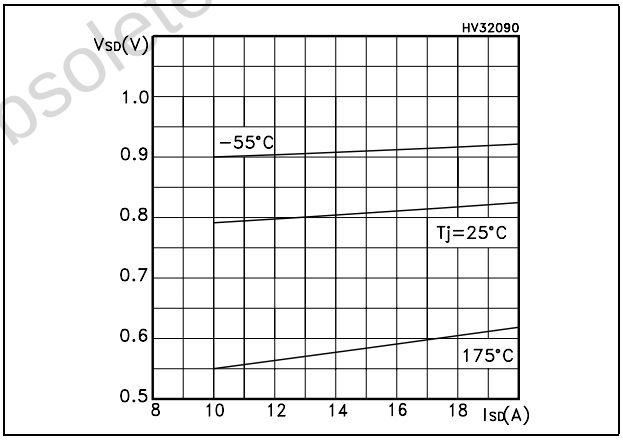


Figure 11. Source-drain diode forward characteristics



Obsolete Product(s) - Obsolete Product(s)

3 Test circuit

Figure 12. Switching times test circuit for resistive load

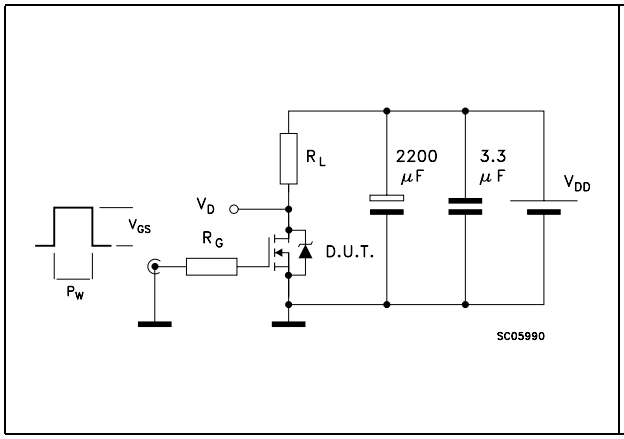


Figure 13. Gate charge test circuit

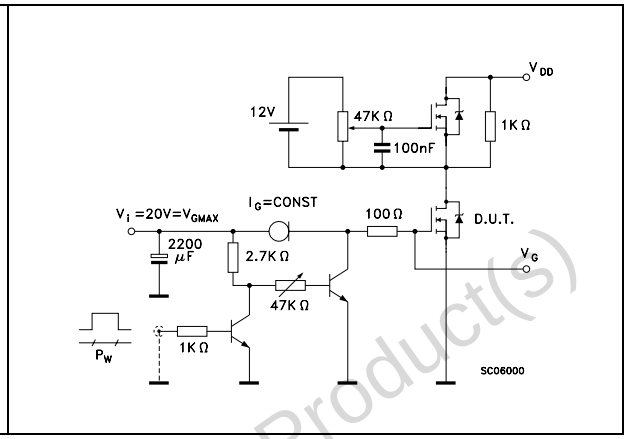


Figure 14. Test circuit for inductive load switching and diode recovery times

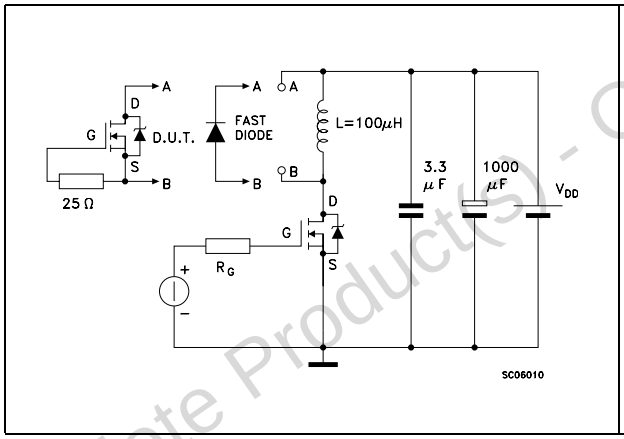


Figure 15. Unclamped inductive load test circuit

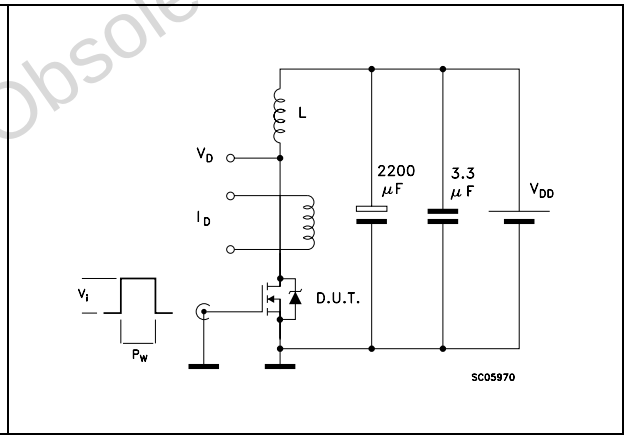


Figure 16. Unclamped inductive waveform

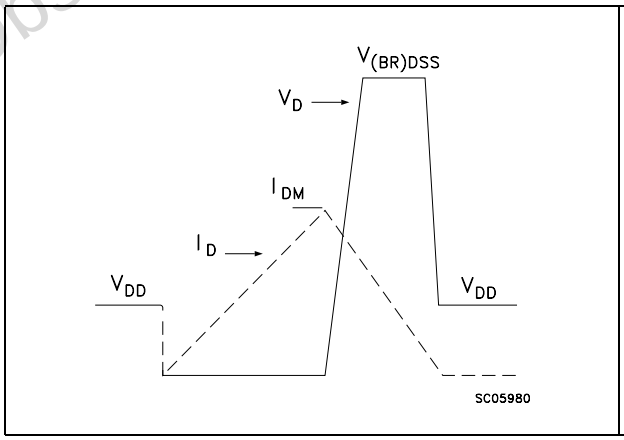
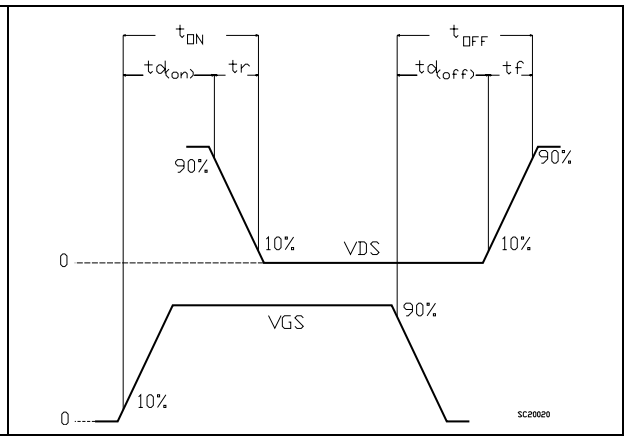


Figure 17. Switching time waveform



Obsolete Product(s) - Obsolete Product(s)

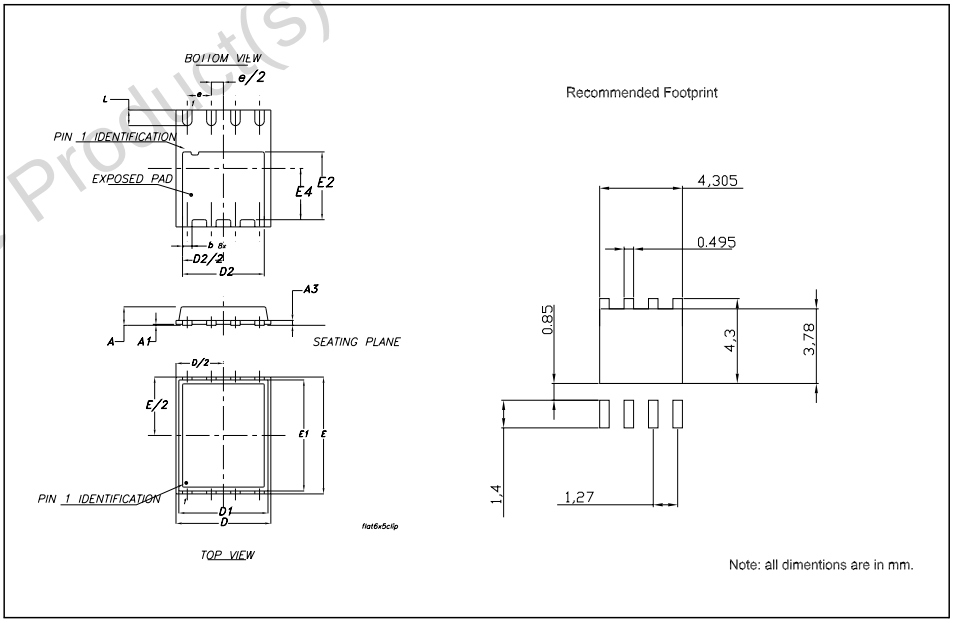
4 Package mechanical data

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*

Obsolete Product(s) - Obsolete Product(s)

PowerFLAT™ (6x5) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	0.80	0.83	0.93	0.031	0.032	0.036
A1		0.02	0.05		0.0007	0.0019
A3		0.20			0.007	
b	0.35	0.40	0.47	0.013	0.015	0.018
D		5.00			0.196	
D1		4.75			0.187	
D2	4.15	4.20	4.25	0.163	0.165	0.167
E		6.00			0.236	
E1		5.75			0.226	
E2	3.43	3.48	3.53	0.135	0.137	0.139
E4	2.58	2.63	2.68		0.103	0.105
e		1.27			0.050	
L	0.70	0.80	0.90	0.027	0.031	0.035



Obsolete Product(s) - Obsolete Product(s)

5 Revision history

Table 7. Revision history

Date	Revision	Changes
13-May-2005	1	First release.
20-Jun-2005	2	Updated mechanical data
22-Jun-2005	3	New R_G value on *Table 6*
04-Jan-2006	4	New footprint
06-Jun-2006	5	Complete version
04-Sep-2006	6	New template, no content change
22-Nov-2006	7	Corrected part number

Obsolete Product(s) - Obsolete Product(s)

Obsolete Product(s) - Obsolete Product(s)

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.

© 2006 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