



**THE DATASHEET OF
STD100N03LT4**





STD100N03L STD100N03L-1

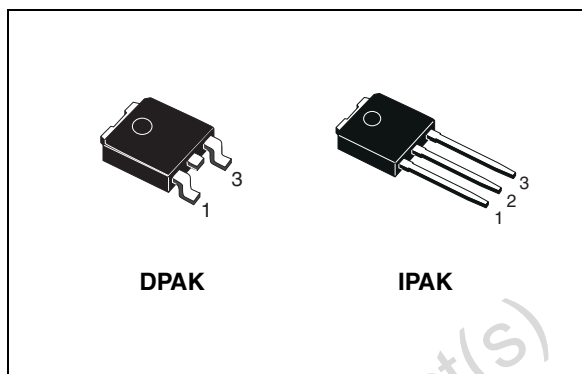
N-channel 30V - 0.0045Ω - 80A - DPAK - IPAK
Planar STripFET™ II Power MOSFET

General features

Type	V _{DSS}	R _{DS(on)}	I _D	P _w
STD100N03L	30 V	<0.0055 Ω	80 A ⁽¹⁾	110 W
STD100N03L-1	30 V	<0.0055 Ω	80 A ⁽¹⁾	110 W

1. Current limited by package

- 100% avalanche tested
- Logic level threshold



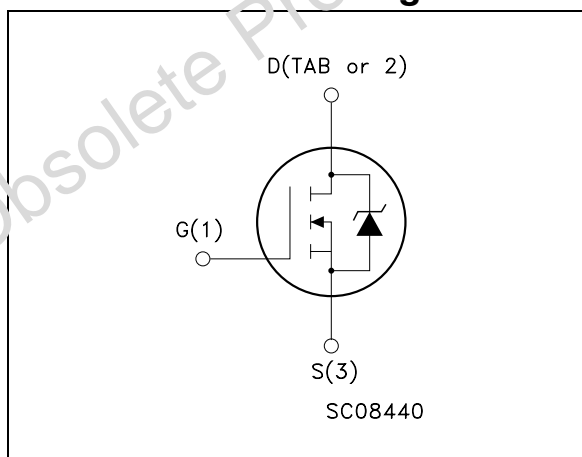
Description

This MOSFET is the latest refinement of STMicroelectronic unique “Single Feature Size™” strippased process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics, low gate charge and less critical alignment steps therefore a remarkable manufacturing reproducibility. This new improved device has been specifically designed for Automotive application and DC-DC converters.

Applications

- Switching application

Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STD100N03LT4	D100N03L	DPAK	Tape & reel
STD100N03L-1	D100N03L-1	IPAK	Tube

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
2.1	Electrical characteristics (curves)	6
3	Test circuit	9
4	Package mechanical data	10
5	Packaging mechanical data	13
6	Revision history	14

Obsolete Product(s) - Obsolete Product(s)

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	30	V
V_{DGR}	Drain-gate voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	80	A
I_D	Drain current (continuous) at $T_C=100^\circ\text{C}$	70	A
$I_{DM}^{(2)}$	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$	110	W
	Derating factor	0.73	W/ $^\circ\text{C}$
$dv/dt^{(3)}$	Peak diode recovery voltage slope	3.9	V/ns
T_{stg}	Storage temperature	-55 to 175	$^\circ\text{C}$
T_J	Max. operating junction temperature		

1. Current limited by package.
2. Pulse width limited by safe operating area
3. $I_{SD} \leq 80\text{A}$, $di/dt \leq 360\text{ A}/\mu\text{s}$, $V_{DS} \leq V_{(BR)DSS}$, $T_J \leq T_{JMAX}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case Max	1.36	$^\circ\text{C}/\text{W}$
R_{thJA}	Thermal resistance junction-ambient Max	100	$^\circ\text{C}/\text{W}$
T_I	Maximum lead temperature for soldering purpose	275	$^\circ\text{C}$

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Not-repetitive avalanche current (pulse width limited by T_J max)	40	A
E_{AS}	Single pulsed avalanche energy (starting $T_J = 25^\circ\text{C}$, $I_D = I_{AV}$, $V_{DD} = 24\text{V}$)	500	mJ

2 Electrical characteristics

($T_{CASE}=25^{\circ}C$ unless otherwise specified)

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\mu A, V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating},$ $V_{DS} = \text{Max rating} @ 125^{\circ}C$			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20V$			± 200	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10V, I_D = 40A$		0.0045	0.0055	Ω
		$V_{GS} = 5V, I_D = 20A$		0.008	0.01	Ω
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10V,$ $I_D = 40A @ 125^{\circ}C$		0.0068		Ω
		$V_{GS} = 5V,$ $I_D = 20A @ 125^{\circ}C$		0.0146		Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} = 10V, I_D = 15A$		31		S
C_{iss}	Input capacitance	$V_{DS} = 25V, f = 1MHz,$ $V_{GS} = 0$		2060		pF
C_{oss}	Output capacitance			728		pF
C_{rss}	Reverse transfer capacitance			67		pF
Q_g	Total gate charge	$V_{DD} = 24V, I_D = 80A$		20	27	nC
Q_{gs}	Gate-source charge	$V_{GS} = 5V$		7		nC
Q_{gd}	Gate-drain charge	Figure 15 on page 9		7.5		nC
R_G	Gate input resistance	$f = 1MHz$ gate DC Bias = 0 Test signal level = 20mV Open drain		1.9		Ω

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

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15V, I_D = 40A,$ $R_G = 4.7\Omega, V_{GS} = 10V$ <i>Figure 14 on page 9</i>		9		ns
t_r	Rise time			205		ns
$t_{d(off)}$	Turn-off delay time			31		ns
t_f	Fall time			35		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current				80	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				320	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 40A, V_{GS} = 0$			1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 80A,$ $di/dt = 100A/\mu s,$ $V_{DD} = 25V, T_J = 150^\circ C$ <i>Figure 16 on page 9</i>		40		ns
Q_{rr}	Reverse recovery charge			40		μC
I_{RRM}	Reverse recovery current			2		A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

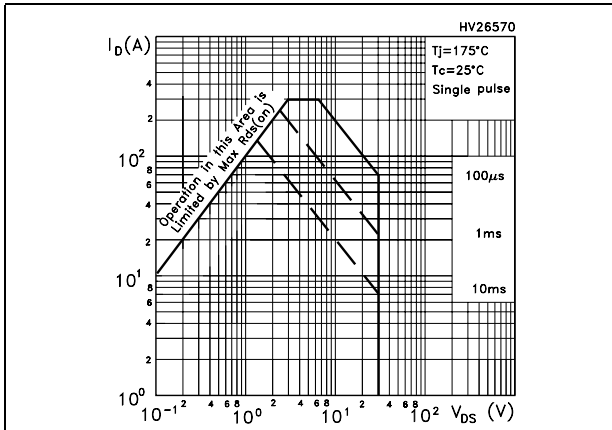


Figure 2. Thermal impedance

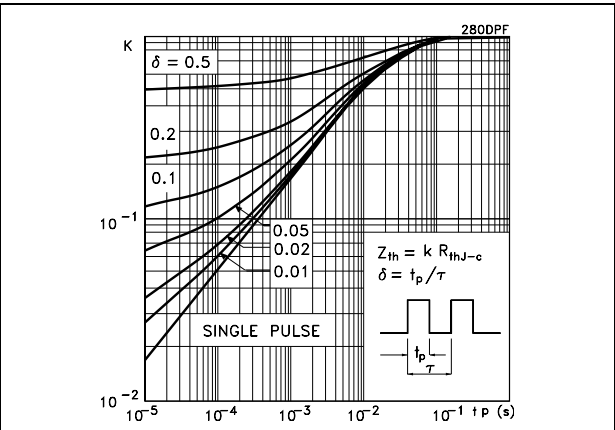


Figure 3. Output characteristics

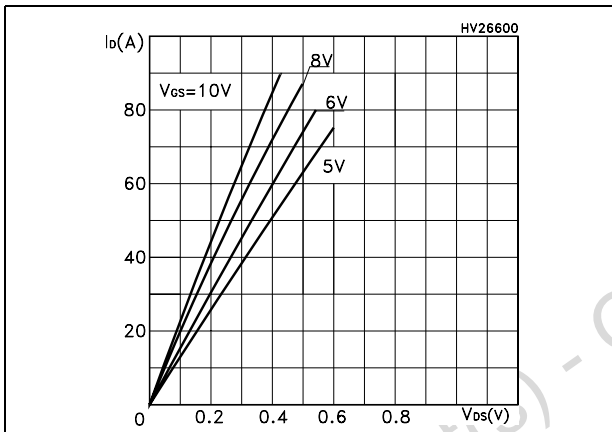


Figure 4. Transfer characteristics

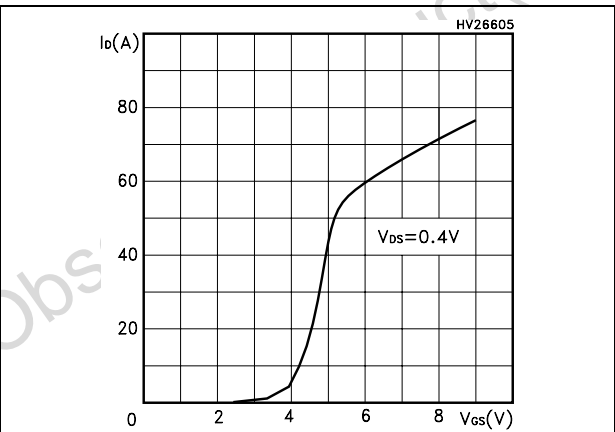


Figure 5. Transconductance

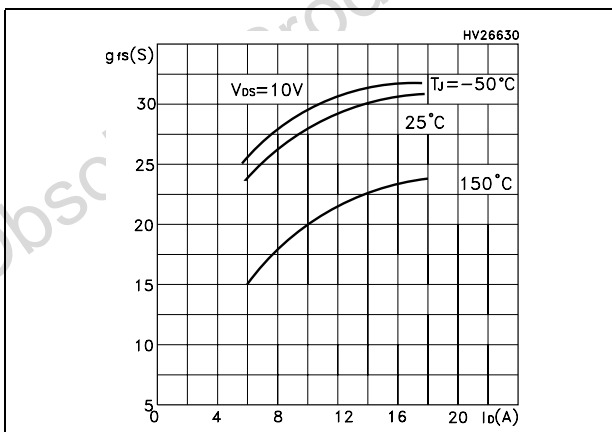


Figure 6. Static drain-source on resistance

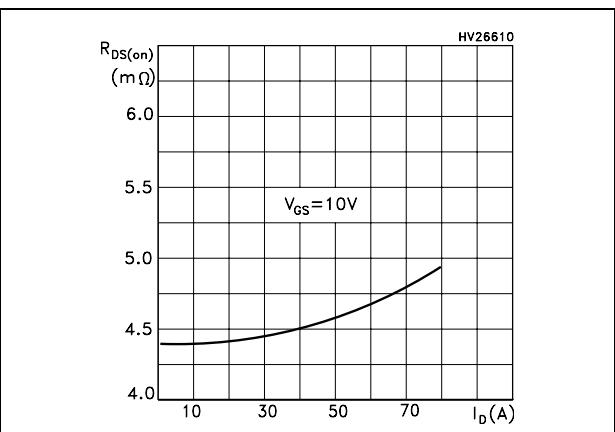


Figure 7. Gate charge vs gate-source voltage Figure 8. Capacitance variations

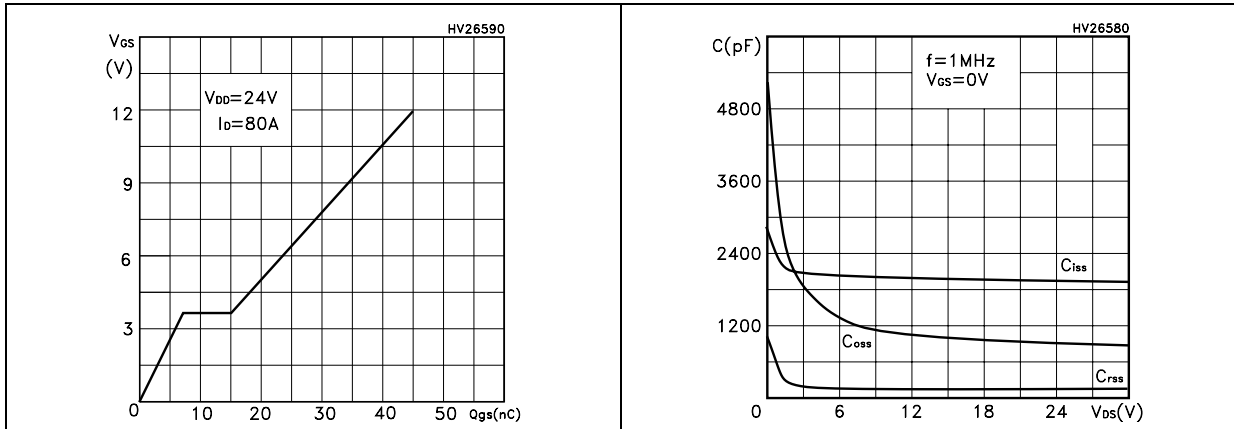


Figure 9. Normalized gate threshold voltage vs temperature Figure 10. Normalized BVDSS vs temperature

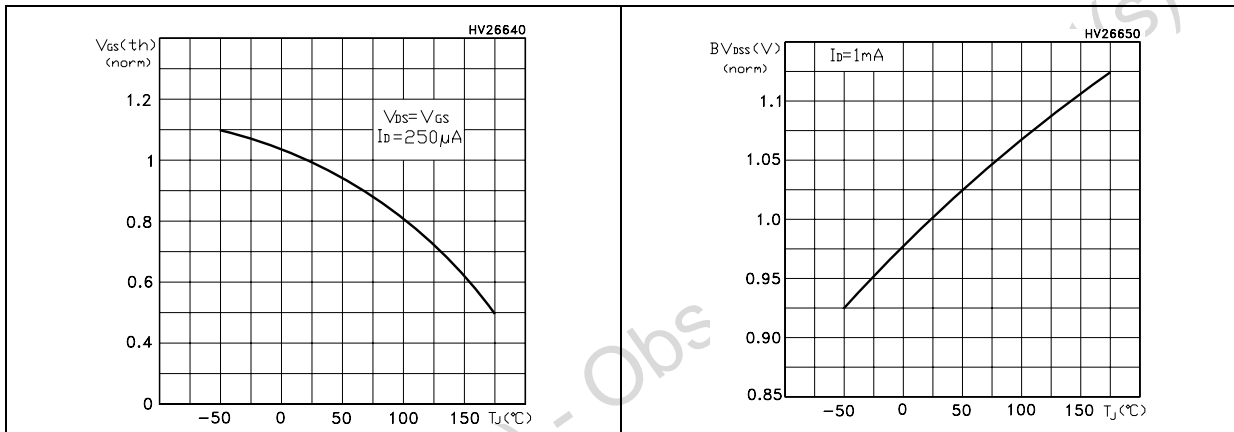


Figure 11. Normalized on resistance vs temperature Figure 12. Source-drain diode forward characteristics

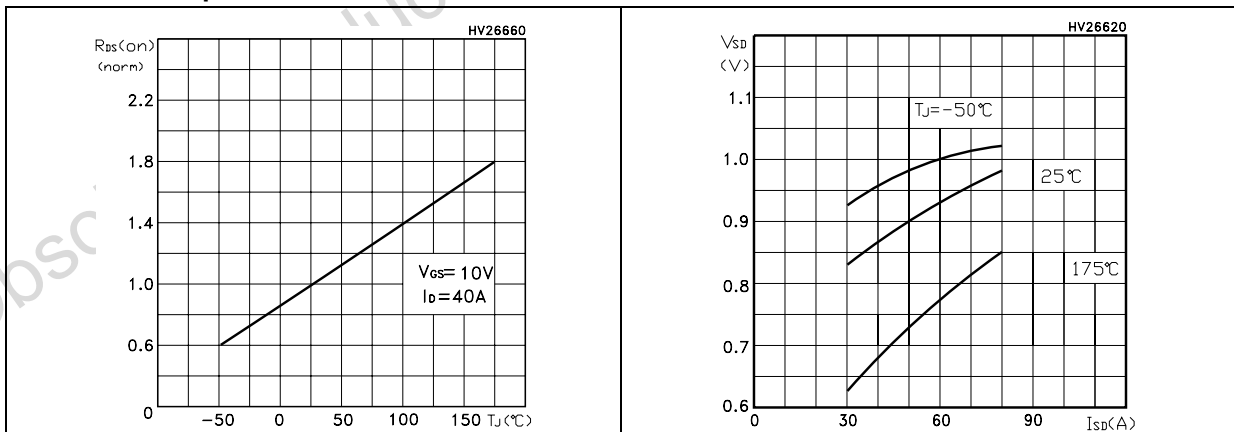
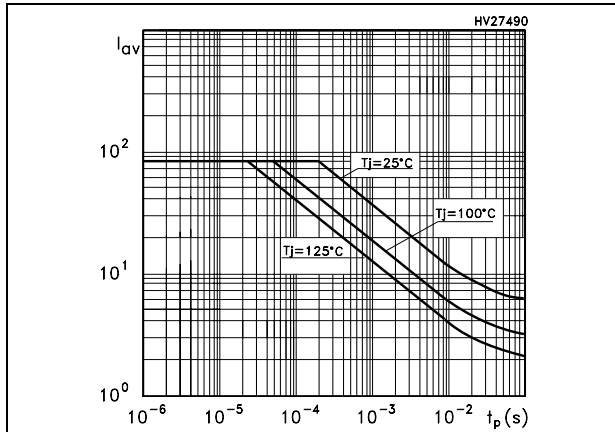


Figure 13. Allowable I_{AV} vs time in avalanche



The previous curve gives the single pulse safe operating area for unclamped inductive loads, under the following conditions:

$$P_{D(AVE)} = 0.5 * (1.3 * BV_{DSS} * I_{AV})$$

$$E_{AS(AR)} = P_{D(AVE)} * t_{AV}$$

Where:

I_{AV} is the Allowable Current in Avalanche

$P_{D(AVE)}$ is the Average Power Dissipation in Avalanche (Single Pulse)

t_{AV} is the Time in Avalanche

3 Test circuit

Figure 14. Switching times test circuit for resistive load

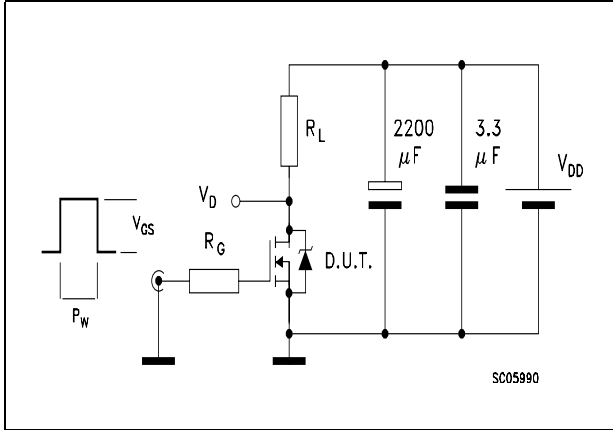


Figure 15. Gate charge test circuit

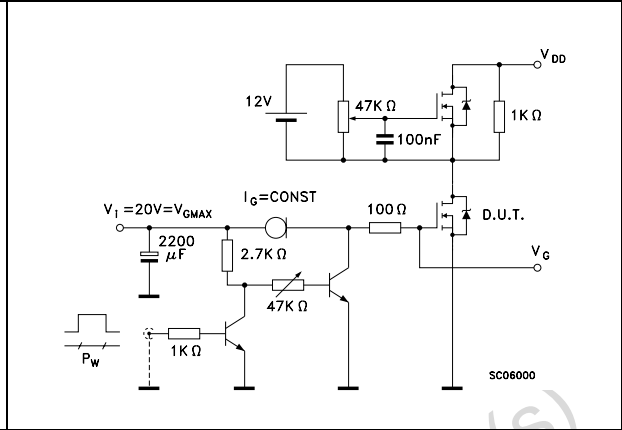
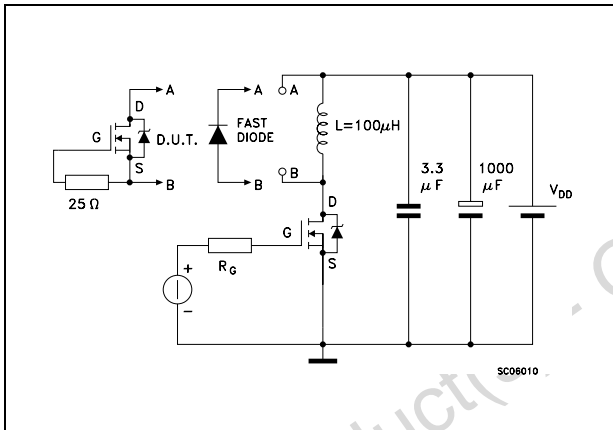


Figure 16. Test circuit for inductive load switching and diode recovery times



Obsolete Product(s)

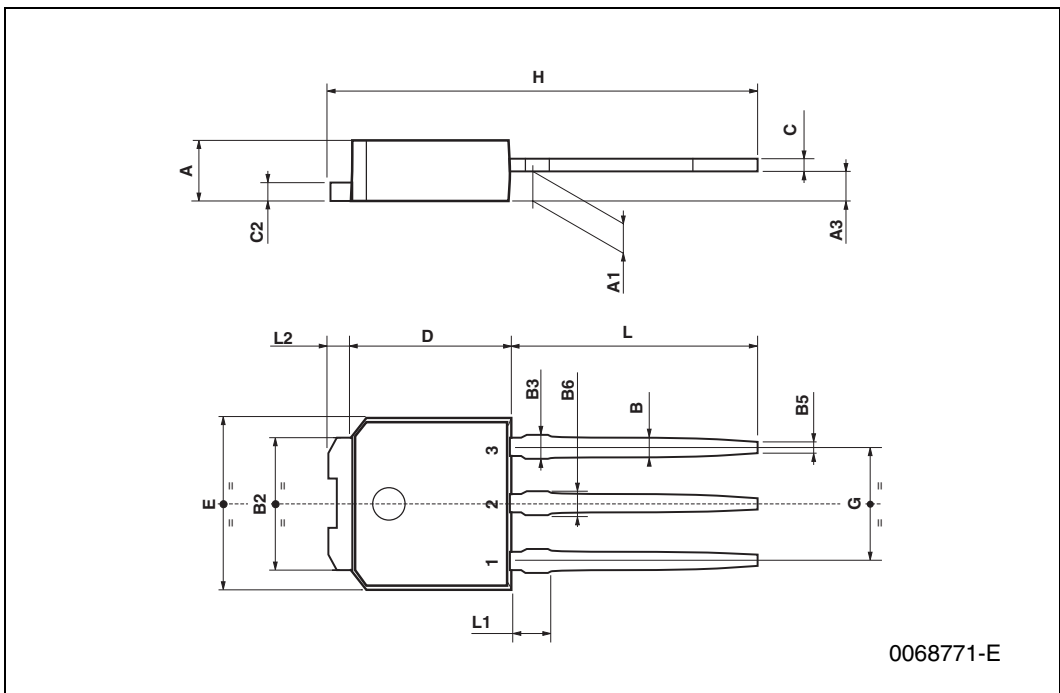
4 Package mechanical data

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)

TO-251 (IPAK) MECHANICAL DATA

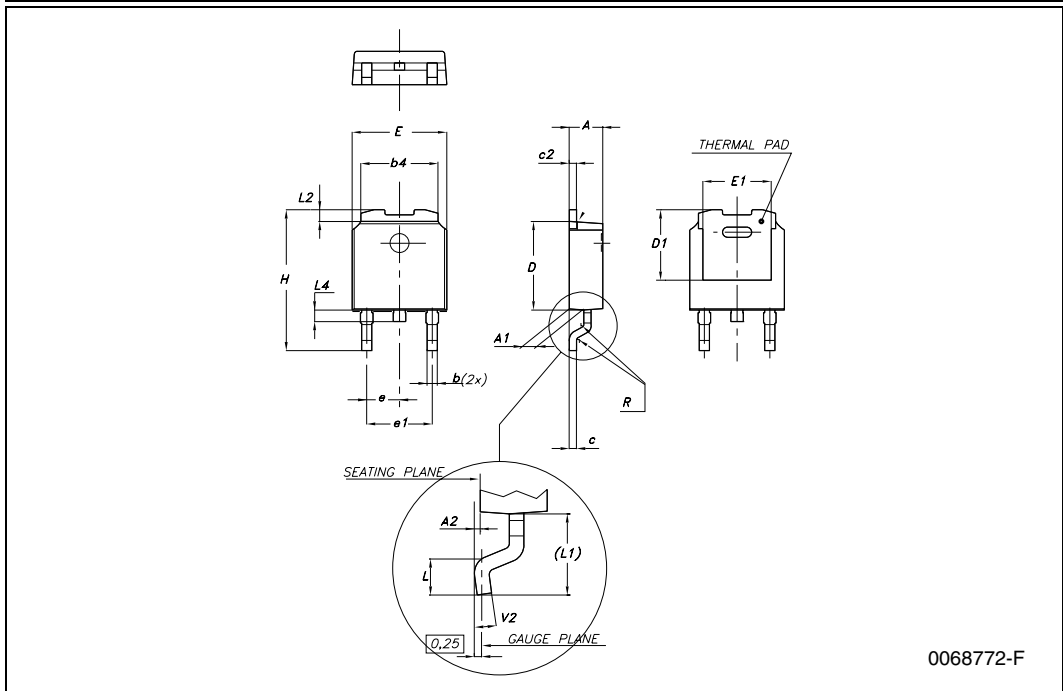
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



Obsole

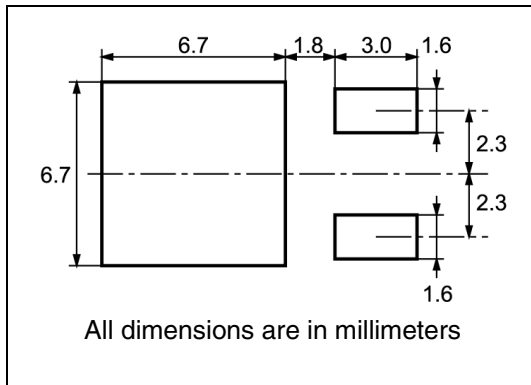
DPAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°



5 Packaging mechanical data

DPAK FOOTPRINT



TAPE AND REEL SHIPMENT

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY		BULK QTY	
2500		2500	

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

6 Revision history

Table 8. Revision history

Date	Revision	Changes
15-Sep-2005	1	Initial release.
14-Sep-2005	2	Value changed on <i>Figure 1</i>
08-Aug-2006	3	New template, no content change

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

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

-  [View STD100N03LT4](#) on WIN SOURCE
-  [STMicroelectronics](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management