STB75NH02L

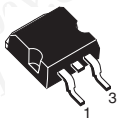
N-Channel 24V - 0.0062Ω - 60A - D²PAK
STripFET™ III Power MOSFET

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STB75NH02L	24V	<0.008Ω	60A (1)

1. Limited by package

- $R_{DS(ON)}$ * Qg industry's benchmark
- Conduction losses reduced
- Switching losses reduced
- Low threshold device

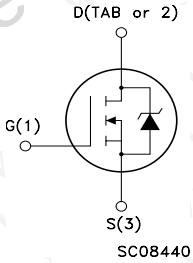


D²PAK

Description

The device utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This is suitable for the most demanding DC-DC converter application where high efficiency is to be achieved.

Internal schematic diagram



Applications

- Switching application

Order codes

Part number	Marking	Package	Packaging
STB75NH02LT4	B75NH02L	D²PAK	Tape & Reel

Contents

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{spike} (1)	Drain-source voltage rating	30	V
V_{DS}	Drain-source voltage (V_{GS} = 0)	24	V
V_{GS}	Gate-source voltage	± 20	V
I_D (2)	Drain current (continuous) at T_C = 25°C	60	A
I_D	Drain current (continuous) at T_C = 100°C	53	A
I_{DM} (3)	Drain current (pulsed)	240	A
P_{TOT} (4)	Total dissipation at T_C = 25°C	80	W
	Derating factor	0.53	W/°C
E_{AS} (5)	Single pulse avalanche energy	360	mJ
T_J T_{stg}	Operating junction temperature storage temperature	-55 to 175	°C

1. Garanted when external Rg = 4.7Ω and $t_f < t_{fmax}$
2. Value limited by wire bonding
3. Pulse width limited by safe operating area
4. This value is rated according to R_{thJC}
5. Starting T_J =25°C, Id = 30A, Vdd = 15V

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	1.88	°C/W
R_{thJA}	Thermal resistance junction-amb max	62.5	°C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

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 = 25 mA, V_{GS}= 0	24			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 20 V, V_{DS} = 20 V,Tc = 125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	1	1.8		V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 30 A V_{GS}= 5 V, I_D= 30 A		0.0062 0.008	0.008 0.014	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	V_{DS} =10V, I_D = 18A		27		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} =15V, f=1 MHz, V_{GS}=0		2050 545 70		pF pF pF
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}=10V, I_D = 60 A V_{GS} =5V *Figure 14*		17 7.7 3.5	22	nC nC nC
R_G	Gate Input Resistance	f=1MHz Gate DC Bias =0 Test Signal Level =20mV Open Drain		1.1		Ω

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

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time rise time	V_{DD}=10 V, I_D=30 A, R_G=4.7Ω, V_{GS}=10V *Figure 15*		12 200		ns ns
$t_{d(off)}$ t_f	Turn-off delay time fall time	V_{DD}=10 V, I_D=30A, R_G=4.7Ω, V_{GS}=10V *Figure 15*		18 25		ns ns

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}	Source-drain current Source-drain current (pulsed)				60 240	A A
V_{SD} (1)	Forward on Voltage	I_{SD} = 30 A, V_{GS} = 0			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD}=60 A, di/dt = 100A/µs, V_{DD}=15 V, T_J=150°C		36 35 3.6		ns µC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

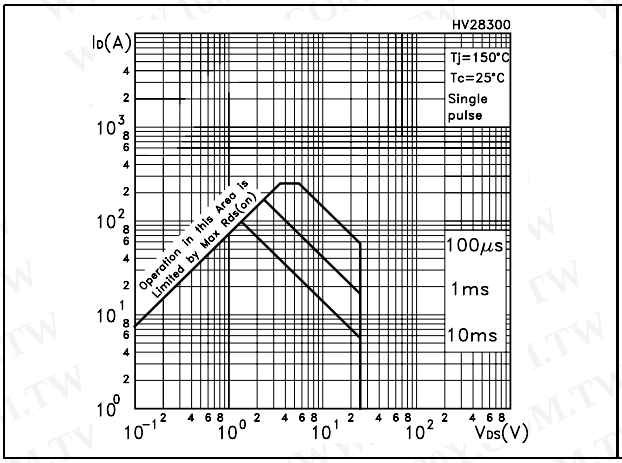


Figure 2. Thermal impedance

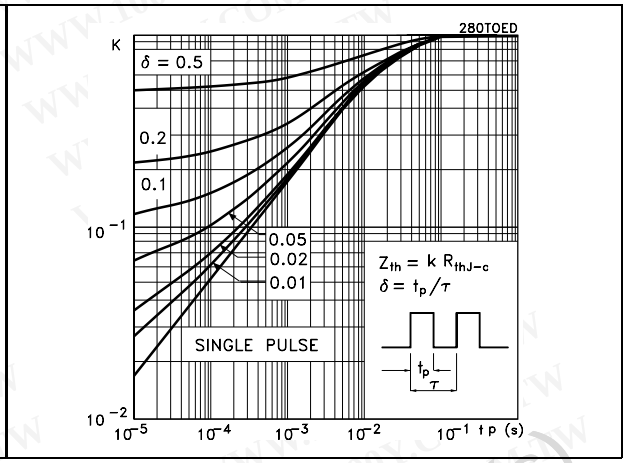


Figure 3. Output characteristics

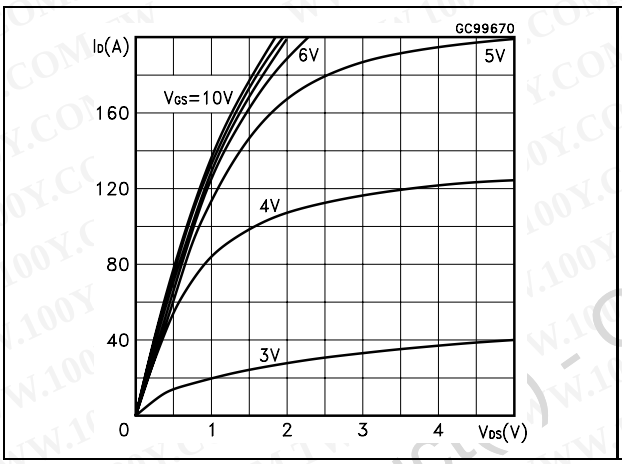


Figure 5. Transfer characteristics

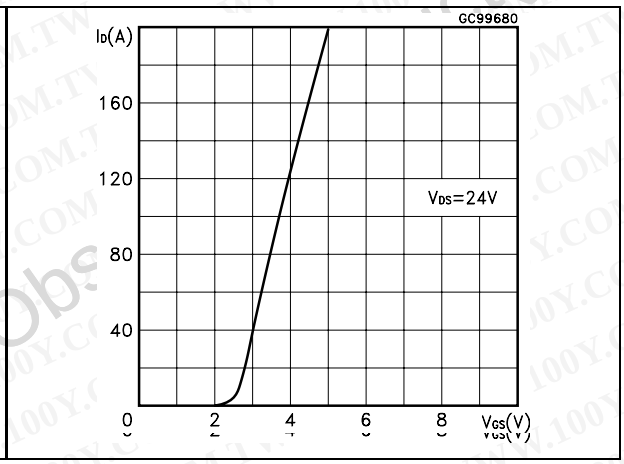


Figure 4. Transconductance

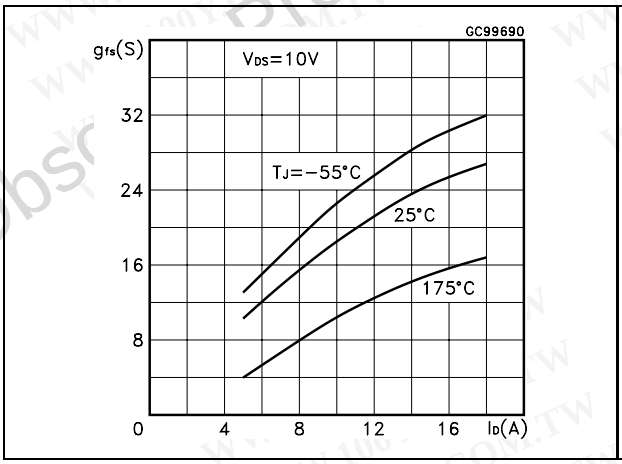


Figure 6. Static drain-source on resistance

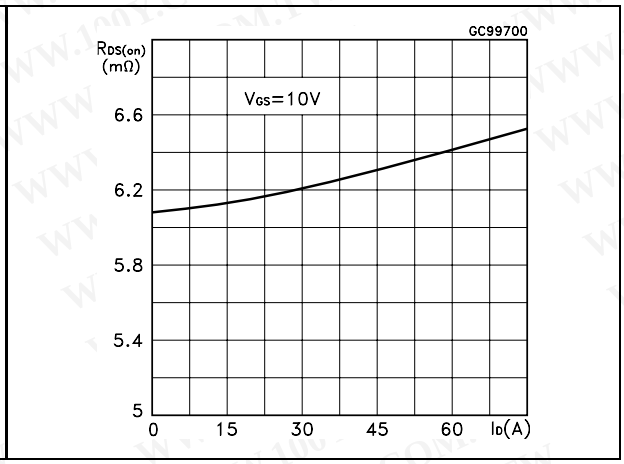


Figure 7. Gate charge vs gate -source voltage

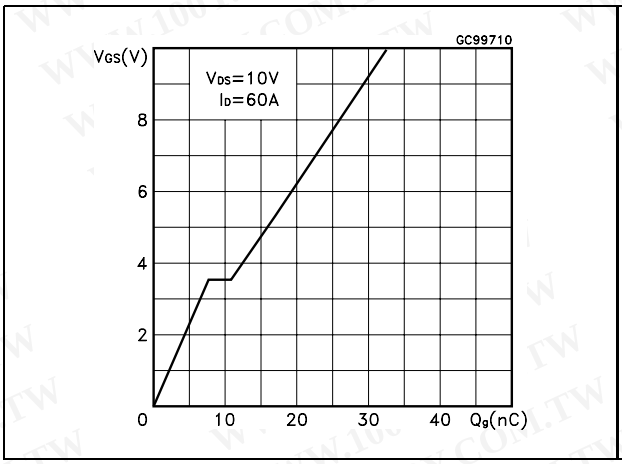


Figure 10. Capacitance variations

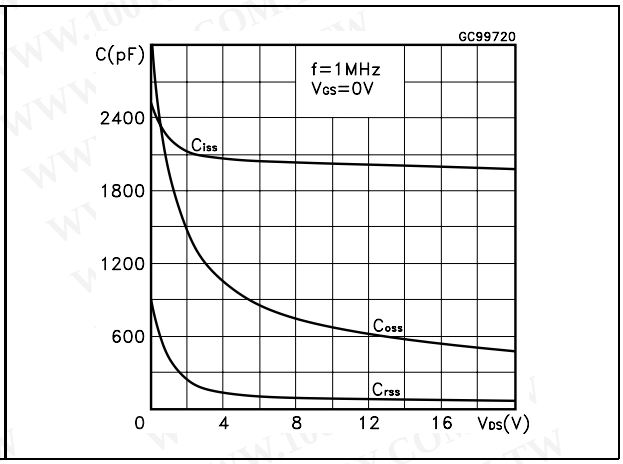


Figure 8. Normalized gate threshold voltage vs temperatute

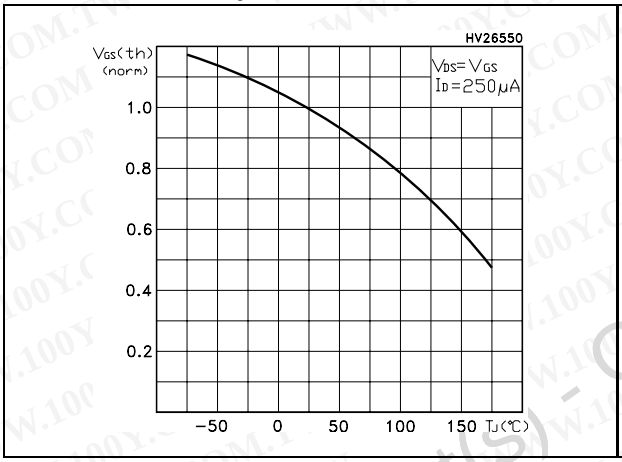


Figure 11. Normalized on resistance vs Temperature

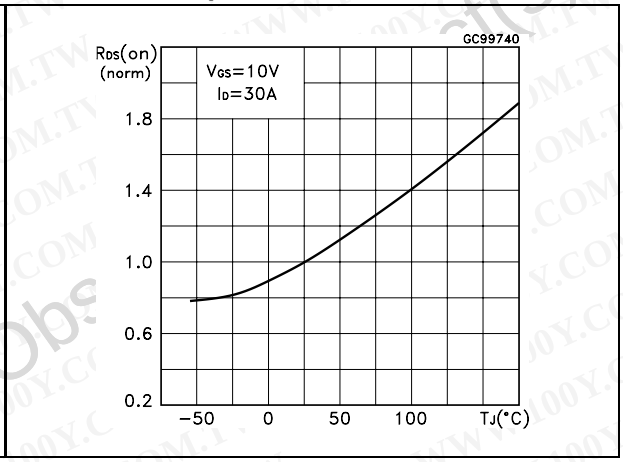


Figure 9. Source-drain diode forward characteristics

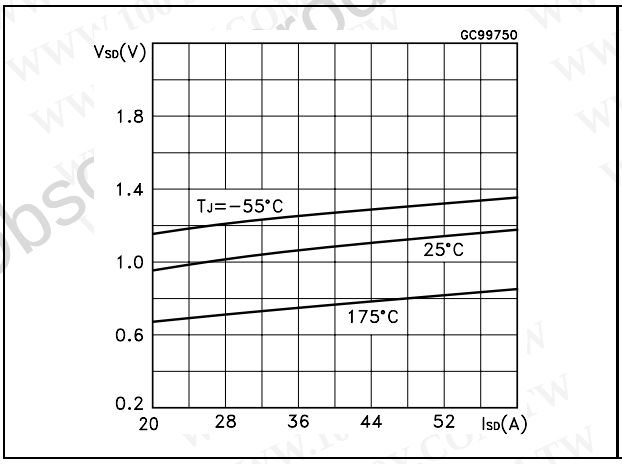
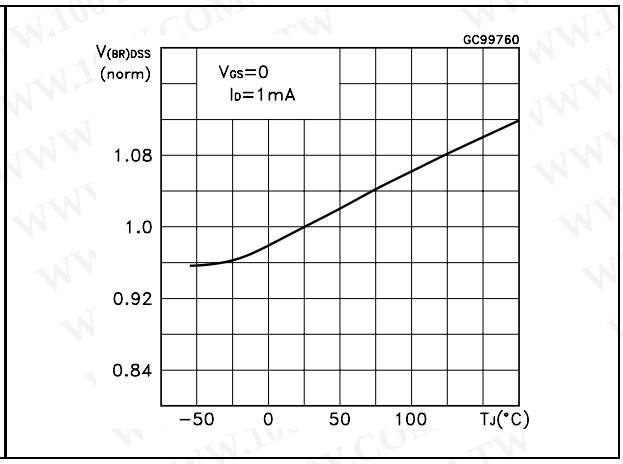


Figure 12. Normalized BVDSS vs temperature



3 Test circuits

Figure 13. Switching times test circuit for resistive load

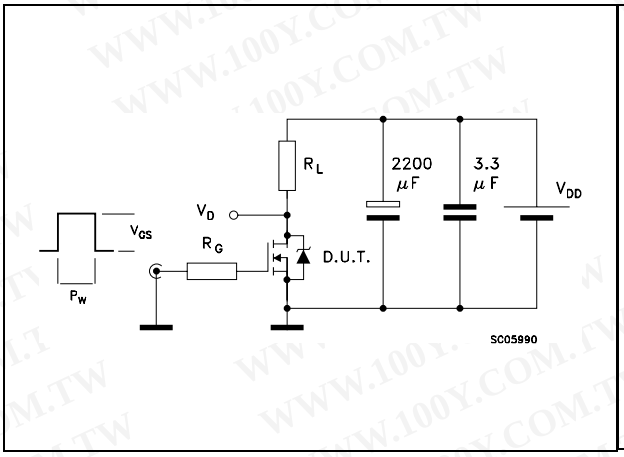


Figure 14. Gate charge test circuit

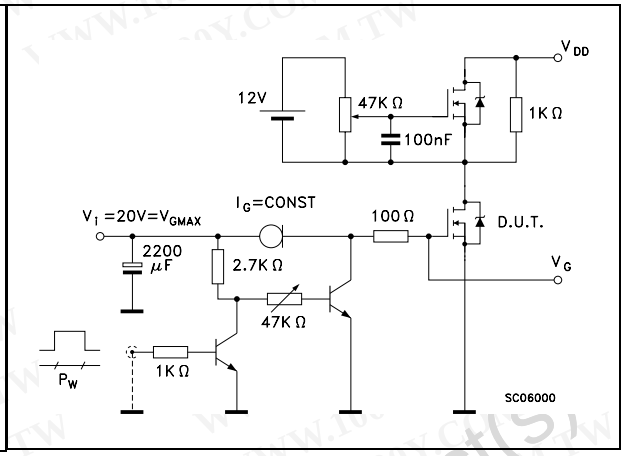


Figure 15. Test circuit for indictive load switching and diode recovery times

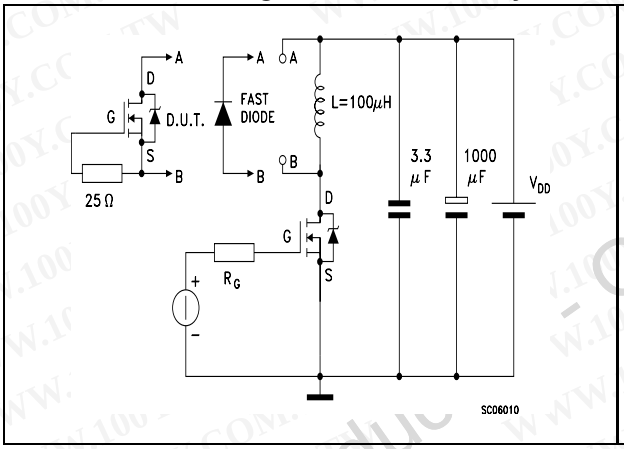


Figure 17. Unclamped inductive load test circuit

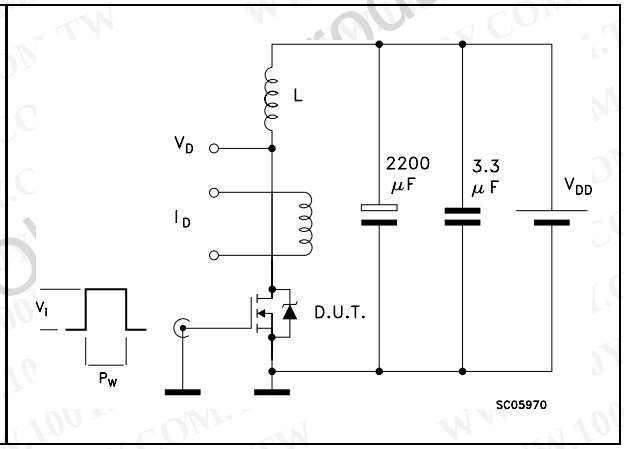
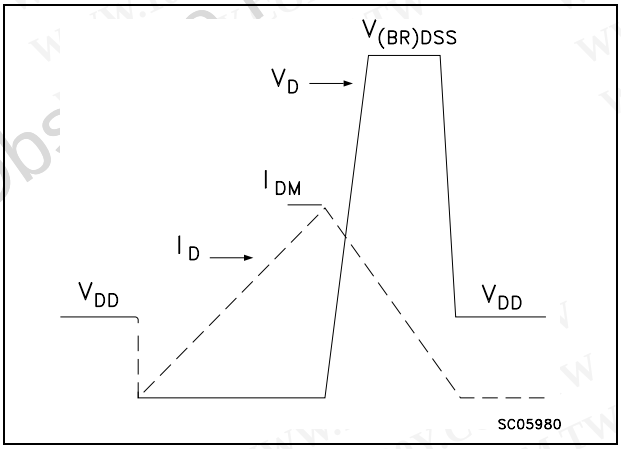


Figure 16. Unclamped inductive waveform

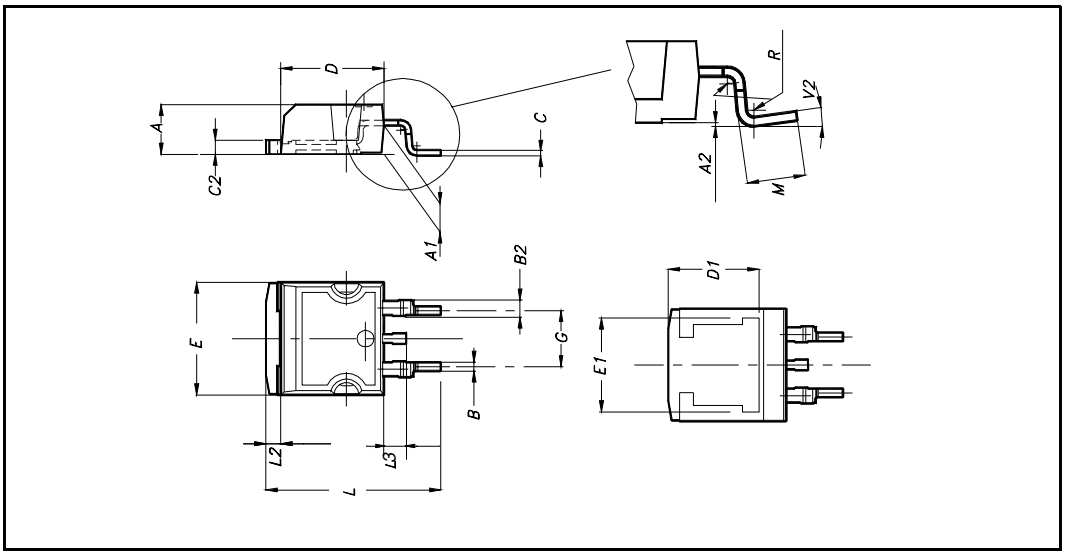


4 Package mechanical data

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

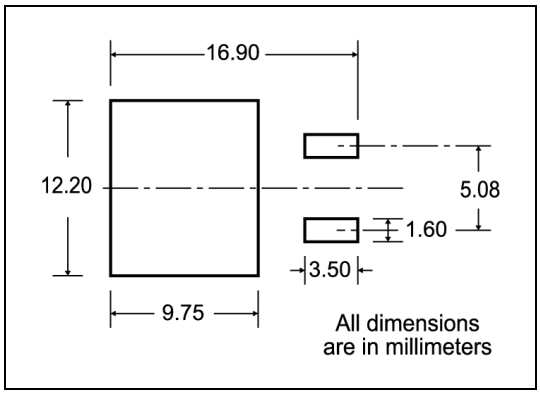
D²PAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0º		4º			

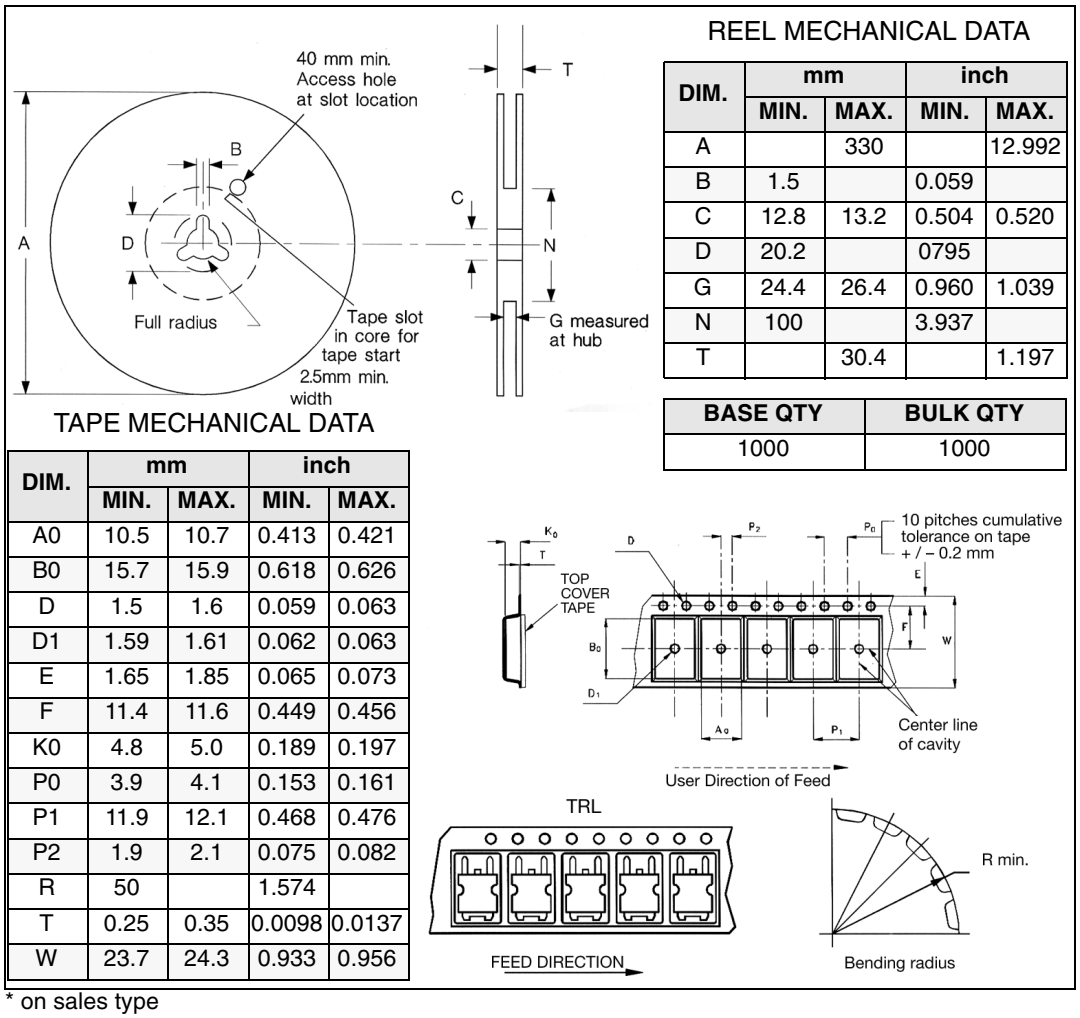


5 Packing mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT



REEL MECHANICAL DATA

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		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956

* on sales type

6 Revision history

Table 7. Revision history

Date	Revision	Changes
24-Oct-2005	1	Preliminary version
15-Mar-2006	2	Complete version
22-Jul-2006	3	New template, no content change

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.

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