STD36NH02L

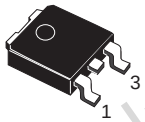
N-channel 24V - 0.011Ω - 30A - DPAK
STripFET™ III Power MOSFET

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STD36NH02L	24V	<0.0145Ω	30A (1)

1. Guaranteed when external Rg=4.7Ω and $t_f < t_{fmax}$

- $R_{DS(on)} * Q_g$ industry's benchmark
- Conduction losses reduced
- Switching losses reduced

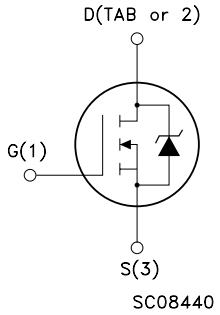


TO-252

Description

This series of products utilizes the last 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
STD36NH02L	D36NH02L	DPAK	Tape & reel

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

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 Packaging mechanical data 11

6 Revision history 12

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

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	30	A
I_D	Drain Current (continuous) at T_C=100°C	30	A
I_{DM}(3)	Drain Current (pulsed)	120	A
P_{TOT}	Total Dissipation at T_C = 25°C	45	W
	Derating Factor	0.27	W/°C
E_{AS} (4)	Single pulse avalanche energy	200	mJ
T_J T_{stg}	Operating Junction Temperature Storage Temperature	-55 to 175	°C

1. Guaranteed 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. Starting Tj=25°C, I_D=19A, V_{DD}=18V

Table 2. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case Max	3.33	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient Max	100	°C/W
T_l	Maximum lead temperature for soldering purpose	275	°C

Obsolete Product(s) - Obsolete Product(s)
Obsolete Product(s) - Obsolete Product(s)

2 Electrical characteristics

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

Table 3. On/off states

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1mA, V_{GS}= 0	24			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 20V, V_{DS} = 20V @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 = 250µA	1	1.8	2.5	V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS}= 10V, I_D= 15A V_{GS}= 5V, I_D= 15A		0.011 0.013	0.0145 0.026	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test condictions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} =10V, I_D = 15A		18		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output Capacitance Reverse transfer capacitance	V_{DS} =15V, f=1 MHz, V_{GS}=0		860 255 45		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	0.44V ≤ V_{DD} ≤ 10V, I_D = 30A, V_{GS} =10V (see Figure 14)		15.5 4.1 1.7	20	nC nC nC
Q_{OSS} (2)	Output charge	V_{DS}=16V, V_{GS}=0		6		ns
R_G	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20mV open drain		3		Ω

1. Pulsed: pulse duration=300µs, duty cycle 1.5%
2. Q_{oss} = C_{oss}*Δ V_{IN}, C_{oss} = C_{gd}+C_{ds}

Obsolete Product(s) - Obsolete Product(s)

Table 5. Switching times

Symbol	Parameter	Test condictions	Min	Typ.	Max	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD}=10V, I_D= 15A, R_G=4.7Ω, V_{GS}=10V (see Figure 13)		8 70 22 15		ns ns ns ns

Table 6. Source drain diode

Symbol	Parameter	Test condictions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current				30	A
I_{SDM}(1)	Source-drain current (pulsed)				120	A
V_{SD}(2)	Forward on voltage	I_{SD} = 15A, V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 30A,di/dt = 100A/µs, V_{DD}=15V, Tj=150°C (see Figure 15)		24 16 1.3		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)
Obsolete Product(s) - Obsolete Product(s)

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

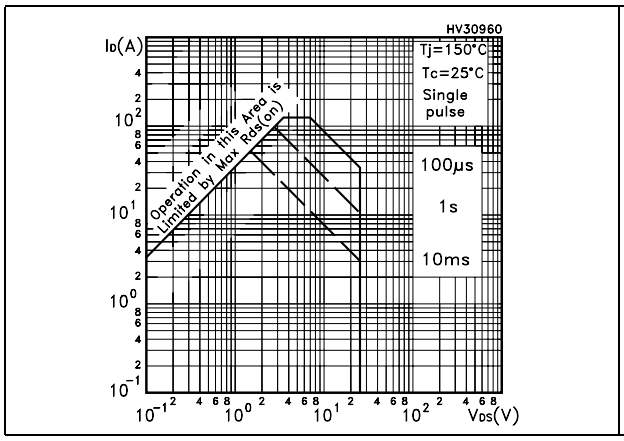


Figure 2. Thermal impedance

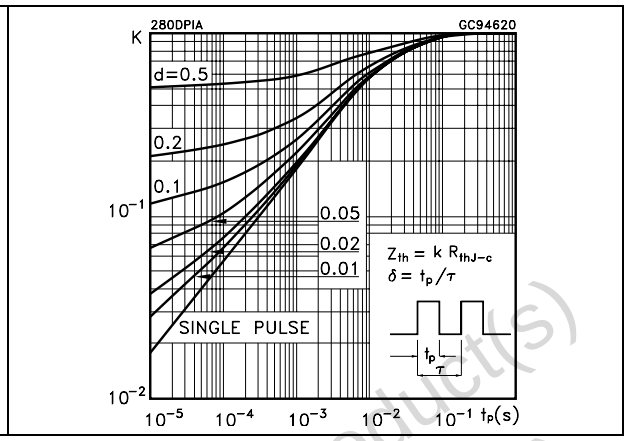


Figure 3. Output characterisics

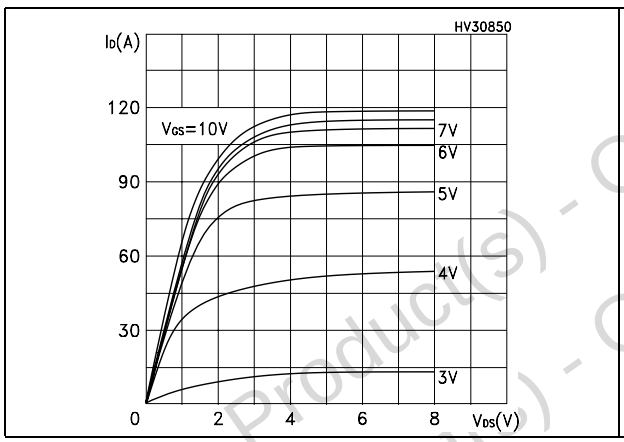


Figure 4. Transfer characteristics

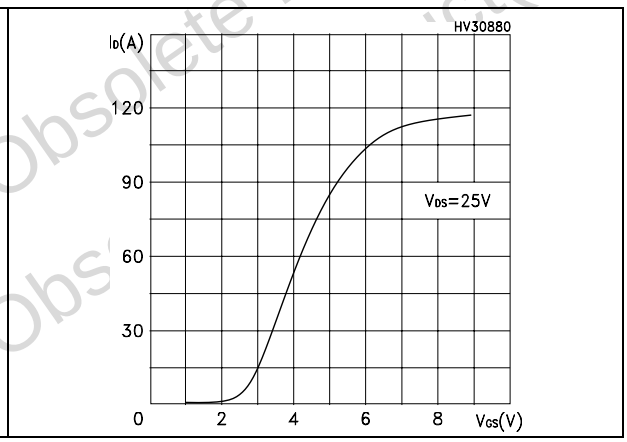


Figure 5. Transconductance

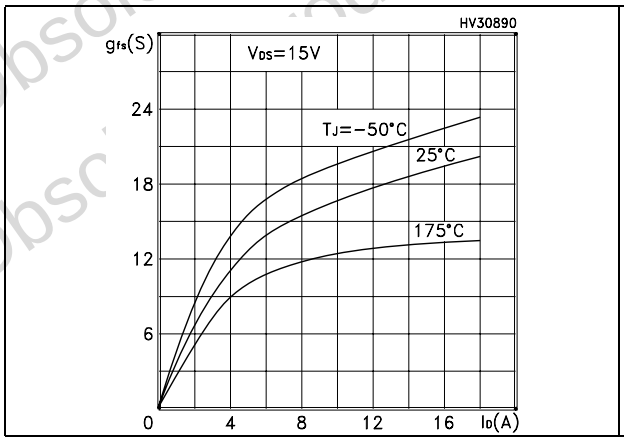
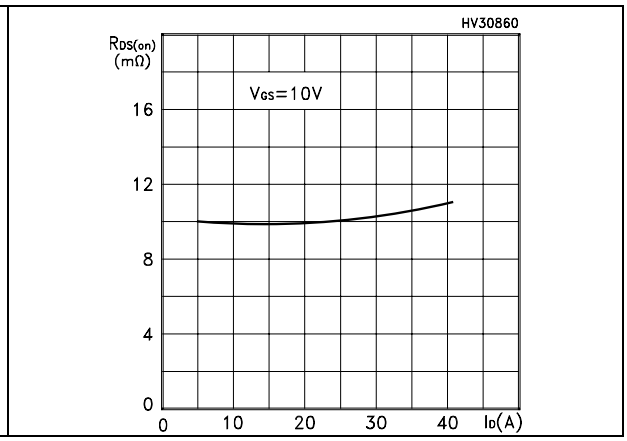


Figure 6. Static drain-source on resistance



Obsolete Product(s) - Obsolete Product(s)

Figure 7. Gate charge vs gate-source voltage

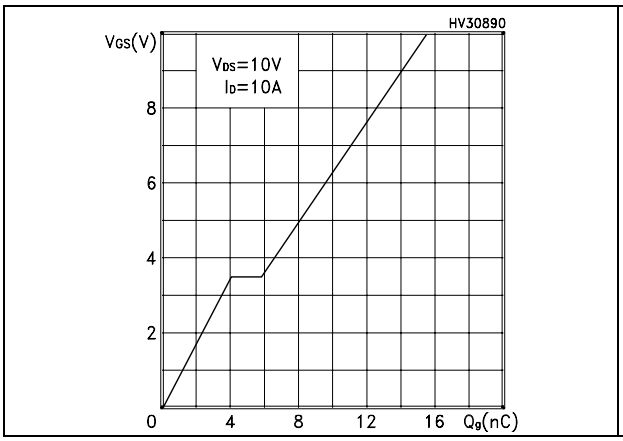


Figure 8. Capacitance variations

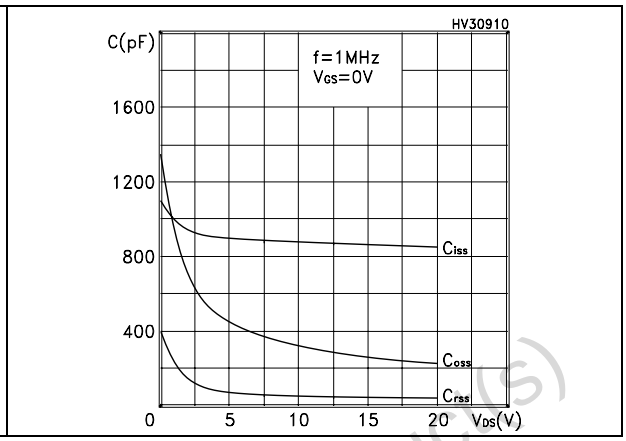


Figure 9. Normalized gate threshold voltage vs temperature

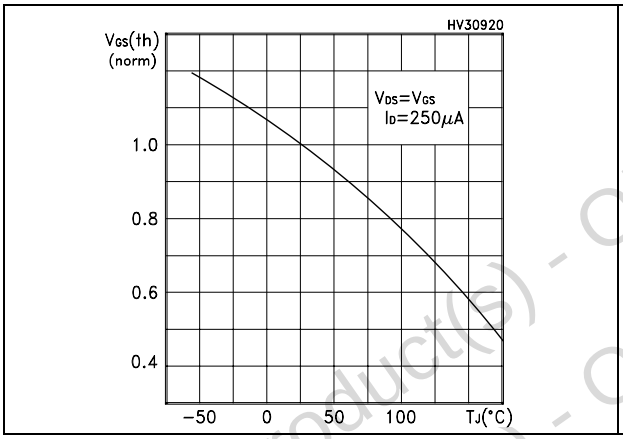


Figure 10. Normalized on resistance vs temperature

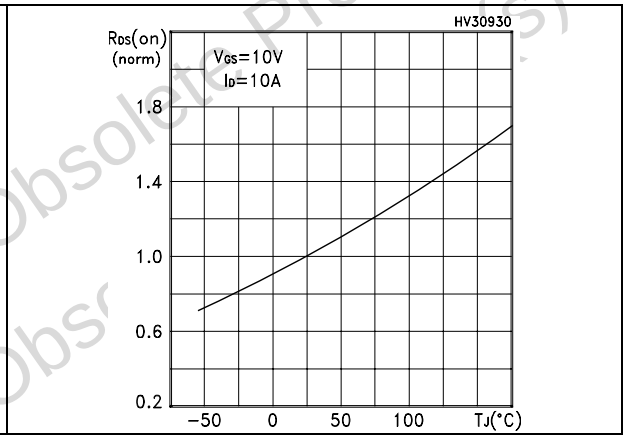


Figure 11. Source-drain diode forward characteristics

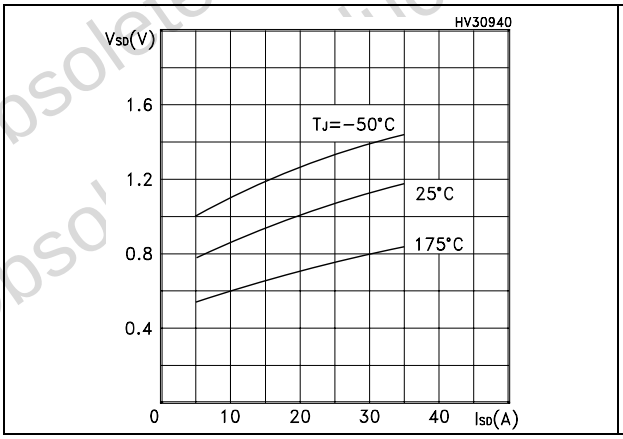
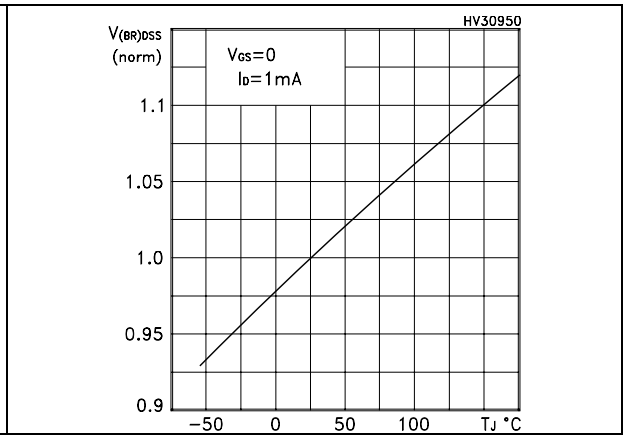


Figure 12. Normalized B_{VDSS} vs temperature



Obsolete Product(s) - Obsolete Product(s)

3 Test circuit

Figure 13. Switching times test circuit for resistive load

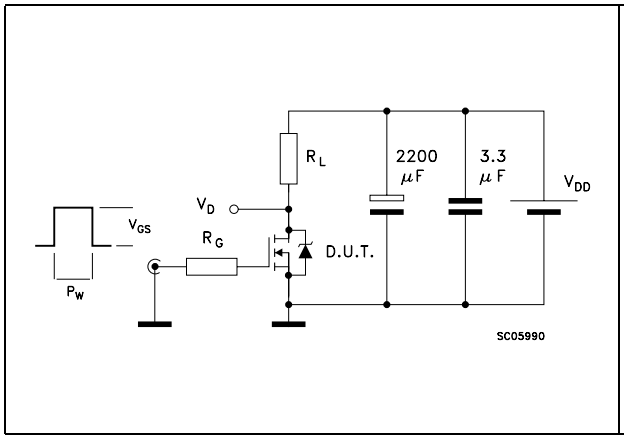


Figure 14. Gate charge test circuit

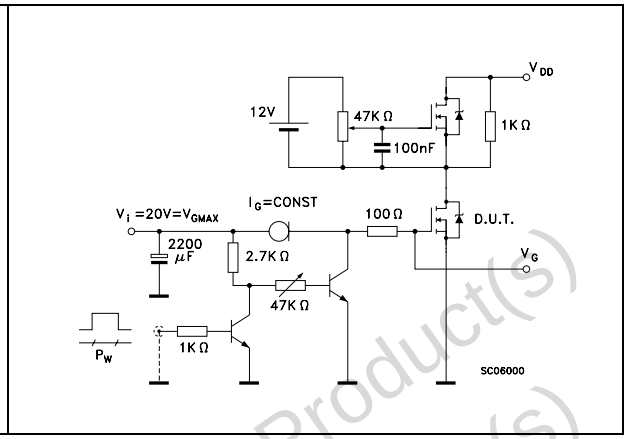


Figure 15. Test circuit for inductive load switching and diode recovery times

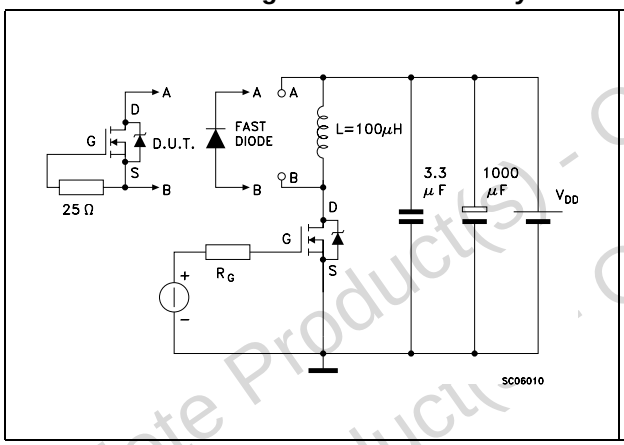


Figure 16. Unclamped inductive load test circuit

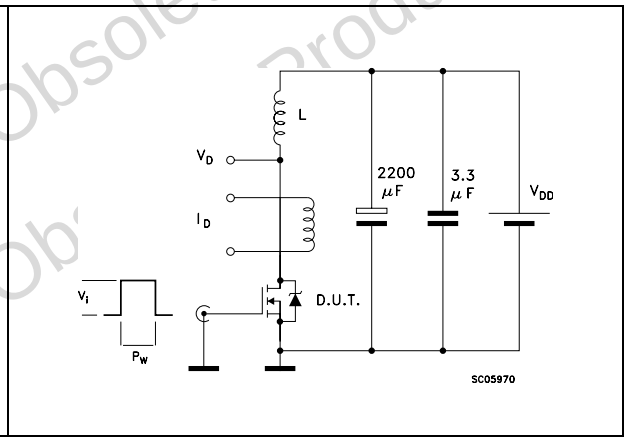


Figure 17. Unclamped inductive waveform

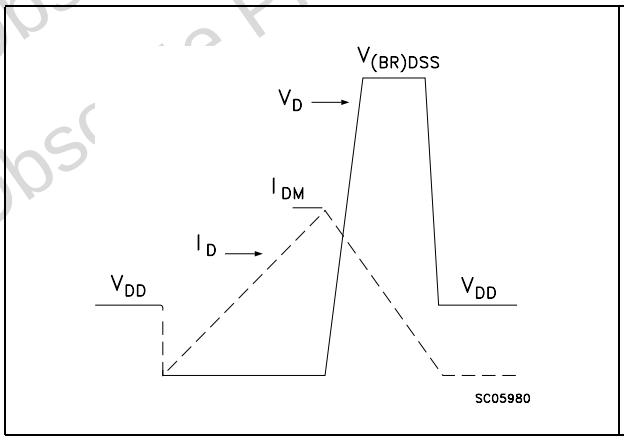
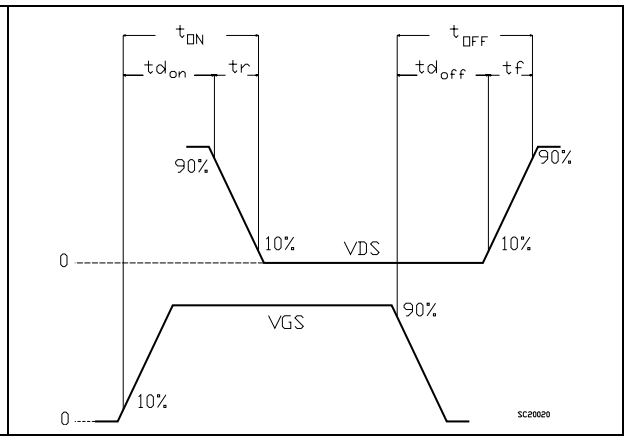


Figure 18. Switching time waveform



Obsolete Product(s) - Obsolete Product(s)

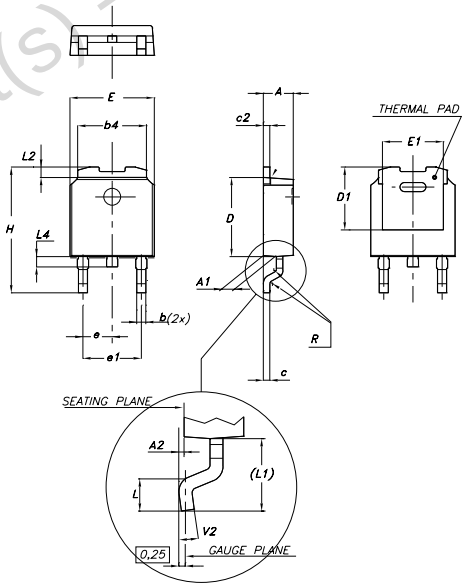
4 Package mechanical data

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)
Obsolete Product(s) - Obsolete Product(s)

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°

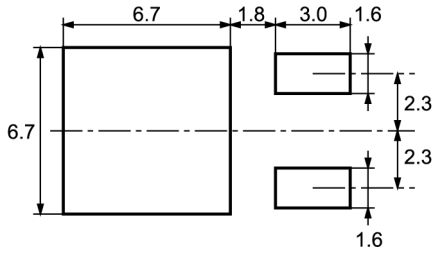


0068772-F

Obsolete Product(s) - Obsolete Product(s)

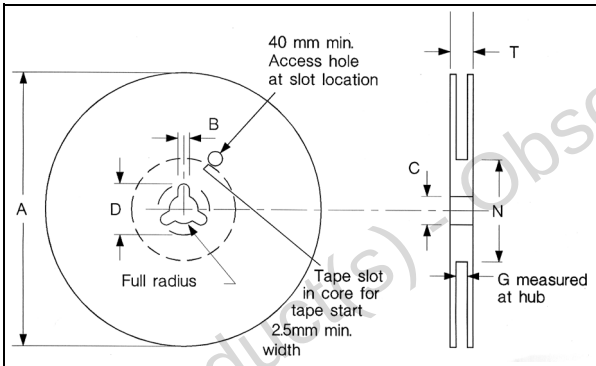
5 Packaging mechanical data

DPAK FOOTPRINT



All dimensions are in millimeters

TAPE AND REEL SHIPMENT



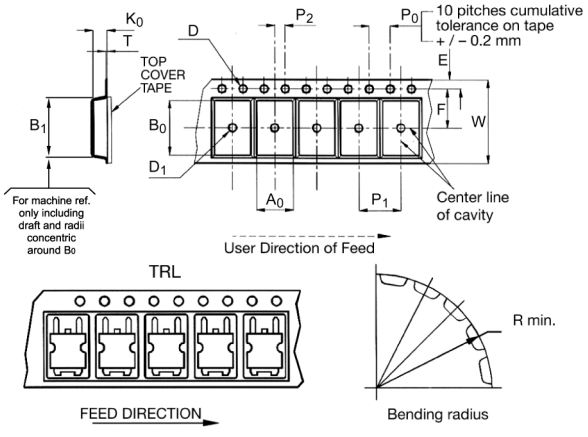
REEL MECHANICAL DATA

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		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

TAPE MECHANICAL DATA

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



Obsolete Product(s) - Obsolete Product(s)

6 Revision history

Table 7. Revision history

Date	Revision	Changes
27-Apr-2006	1	First Release

Obsolete Product(s) - Obsolete Product(s)
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 AUTHORIZE REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, 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.

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