STD100N3LF3

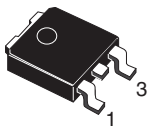
N-channel 30 V, 0.0045 Ω, 80 A, DPAK planar STripFET™ II Power MOSFET

Features

Type	V_{DSSS}	$R_{DS(on)}$	I_D	Pw
STD100N3LF3	30 V	<0.0055 Ω	80 A(1)	110 W

1. Current limited by package

- 100% avalanche tested
- Logic level threshold



DPAK

Applications

- Switching application
  - Automotive

Description

This STripFET™ II Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance providing superior switching performance.

Figure 1. Internal schematic diagram

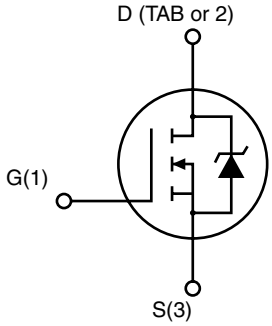


Table 1. Device summary

Order codes	Marking	Package	Packaging
STD100N3LF3	100N3LF3	DPAK	Tape and reel

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

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

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

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	1.36	°C/W
R_{thJA}	Thermal resistance junction-ambient max	100	°C/W
T_l	Maximum lead temperature for soldering purpose	275	°C

Table 4. 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 °C, I_D = I_{AV}, V_{DD} = 24 V)	500	mJ

2 Electrical characteristics

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

Table 5. 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	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125 °C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20 V			±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250 µA	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10 V, I_D = 40 A V_{GS} = 5 V, I_D = 20 A		0.0045 0.008	0.0055 0.01	Ω Ω
		V_{GS} = 10 V, I_D = 40 A @125 °C V_{GS} = 5 V, I_D = 20 A @125 °C		0.0068 0.0146		Ω Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} = 10 V, I_D = 15 A	-	31		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V, f = 1 MHz, V_{GS} = 0	-	2060 728 67		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 24 V, I_D = 80 A V_{GS} = 5 V *Figure 16 on page 9*	-	20 7 7.5	27	nC nC nC
R_G	Gate input resistance	f = 1 MHz gate DC Bias = 0 test signal level = 20 mV open drain	-	1.9		Ω

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

Table 7. Switching times

Symbol	Parameter	Test conditions	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}= 15 V, I_D= 40 A, R_G=4.7Ω, V_{GS}=10 V *Figure 15 on page 9*	-	9 205 31 35	-	ns ns ns ns

Table 8. 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} = 40 A, V_{GS} = 0	-		1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 80 A, di/dt = 100 A/µs, V_{DD} = 25 V, T_J = 150 °C *Figure 17 on page 9*	-	40 40 2		ns µC A

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

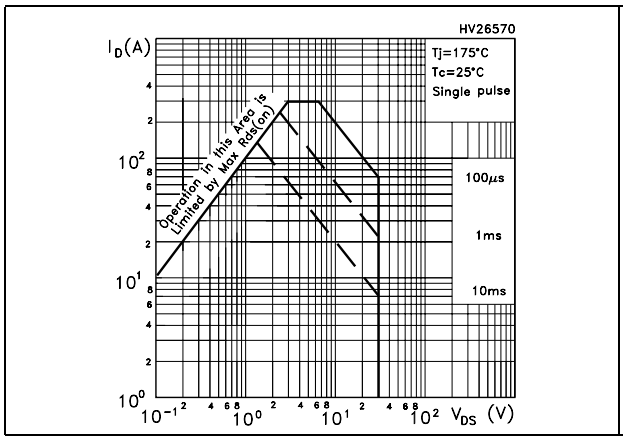


Figure 3. Thermal impedance

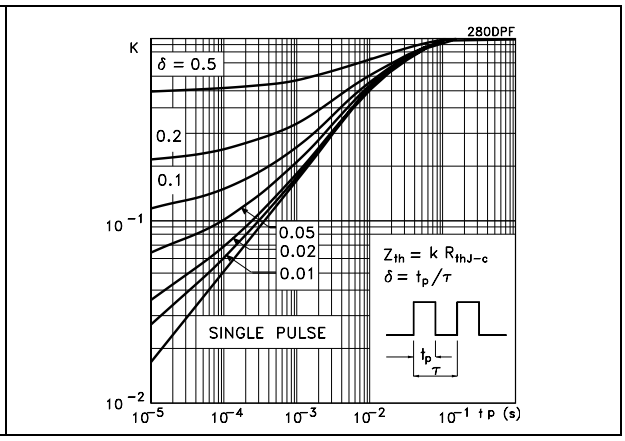


Figure 4. Output characteristics

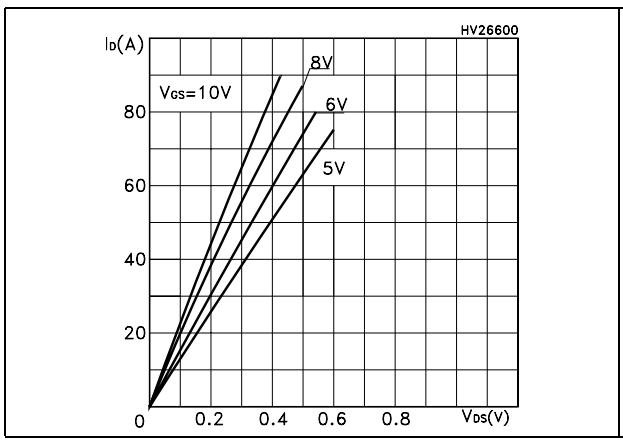


Figure 5. Transfer characteristics

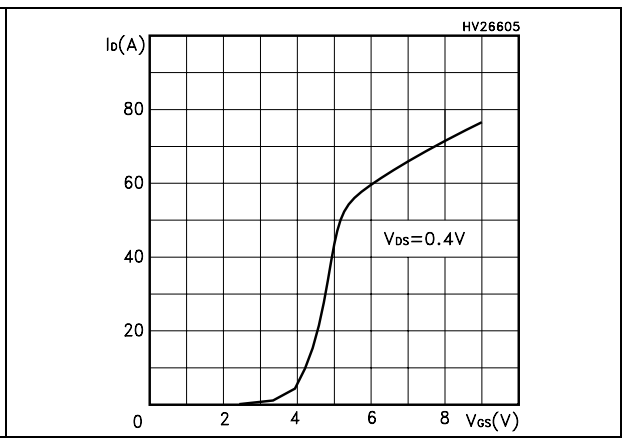


Figure 6. Transconductance

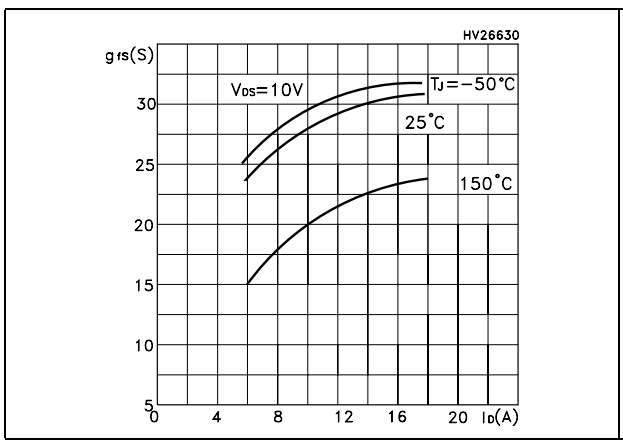


Figure 7. Static drain-source on resistance

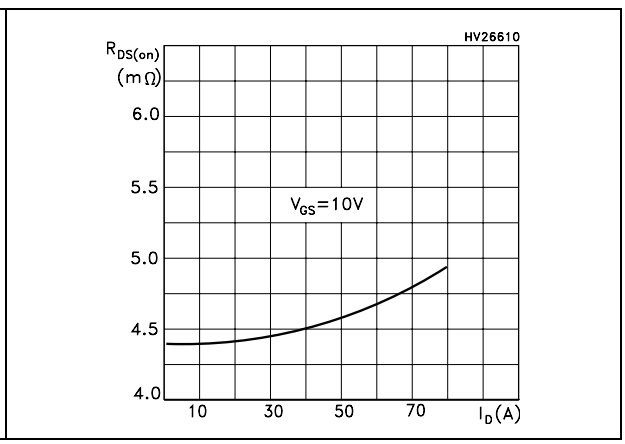


Figure 8. Gate charge vs gate-source voltage

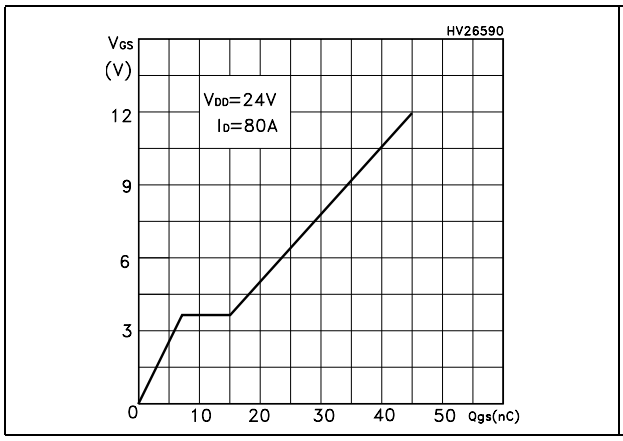


Figure 9. Capacitance variations

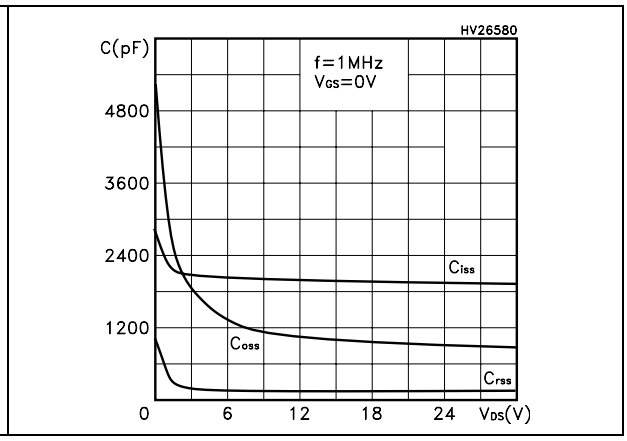


Figure 10. Normalized gate threshold voltage vs temperature

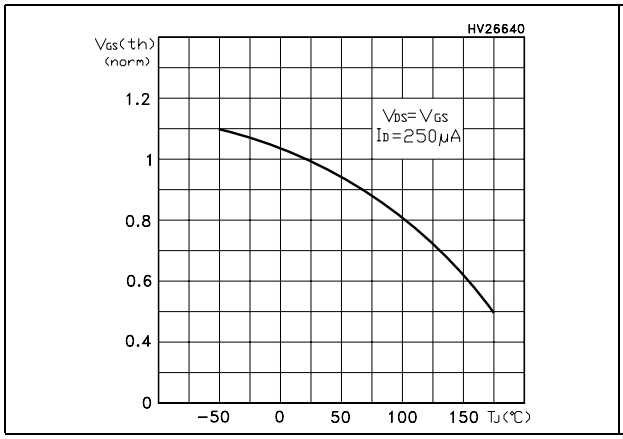


Figure 11. Normalized BV_{DSS} vs temperature

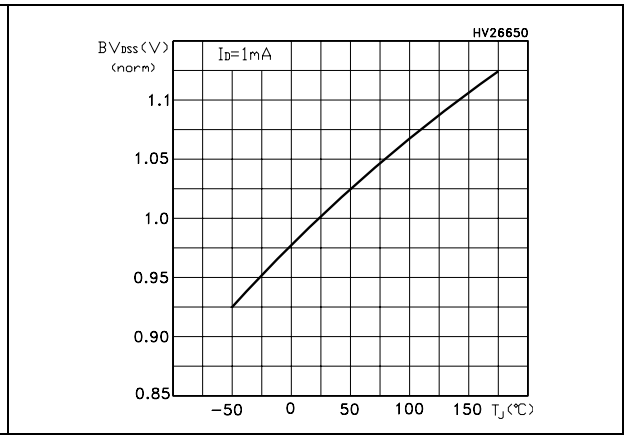


Figure 12. Normalized on resistance vs temperature

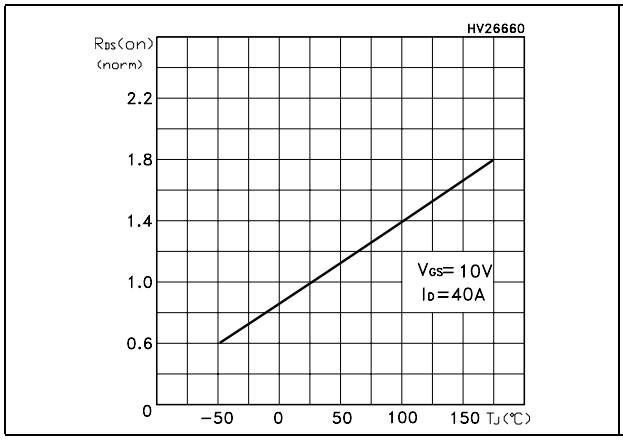


Figure 13. Source-drain diode forward characteristics

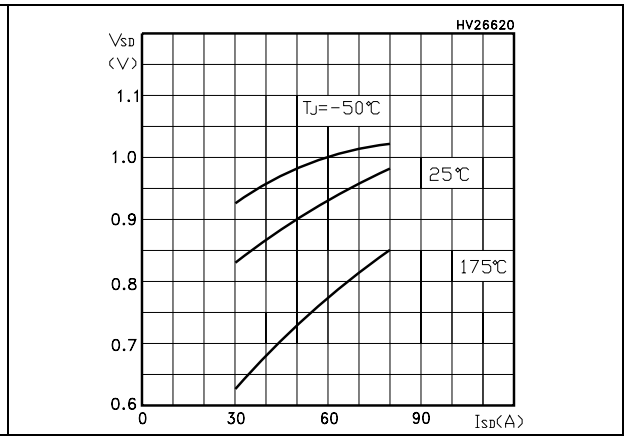
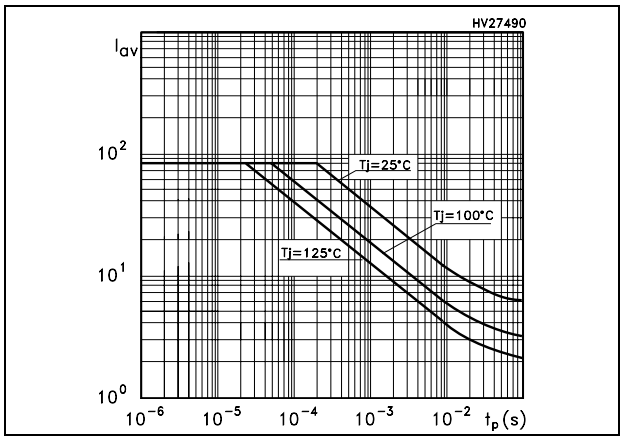


Figure 14. Allowable Iav vs time in avalanche



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 circuits

Figure 15. Switching times test circuit for resistive load

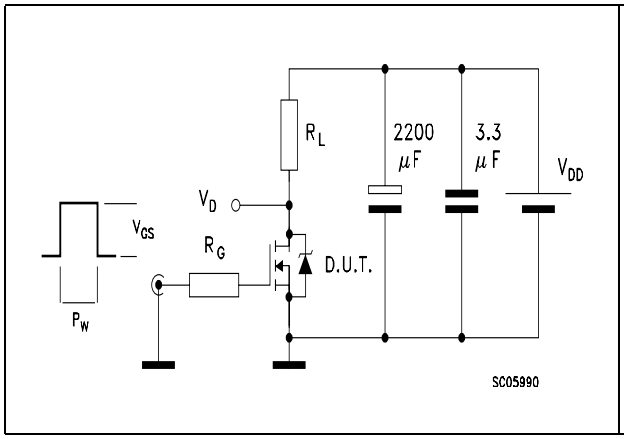


Figure 16. Gate charge test circuit

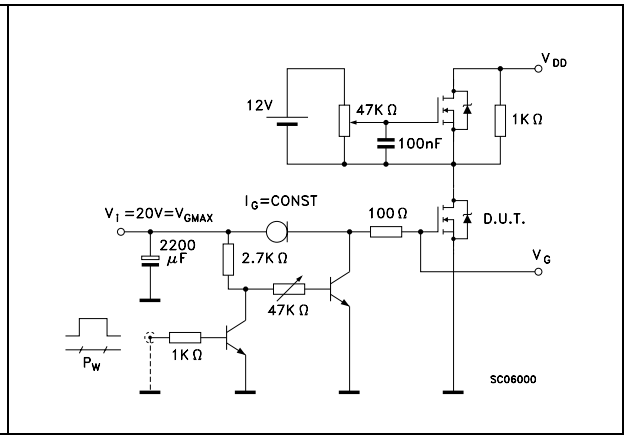
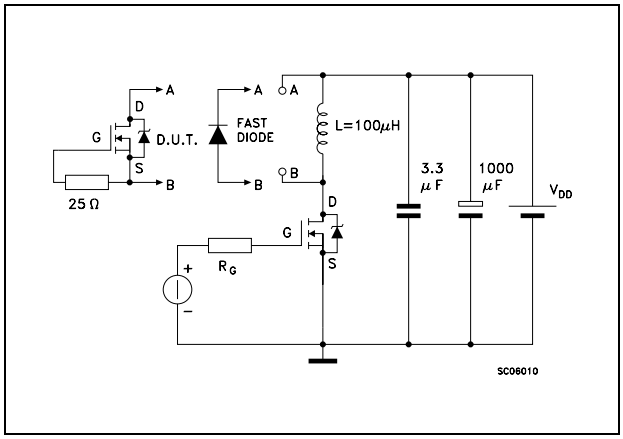


Figure 17. Test circuit for inductive load switching and diode recovery times

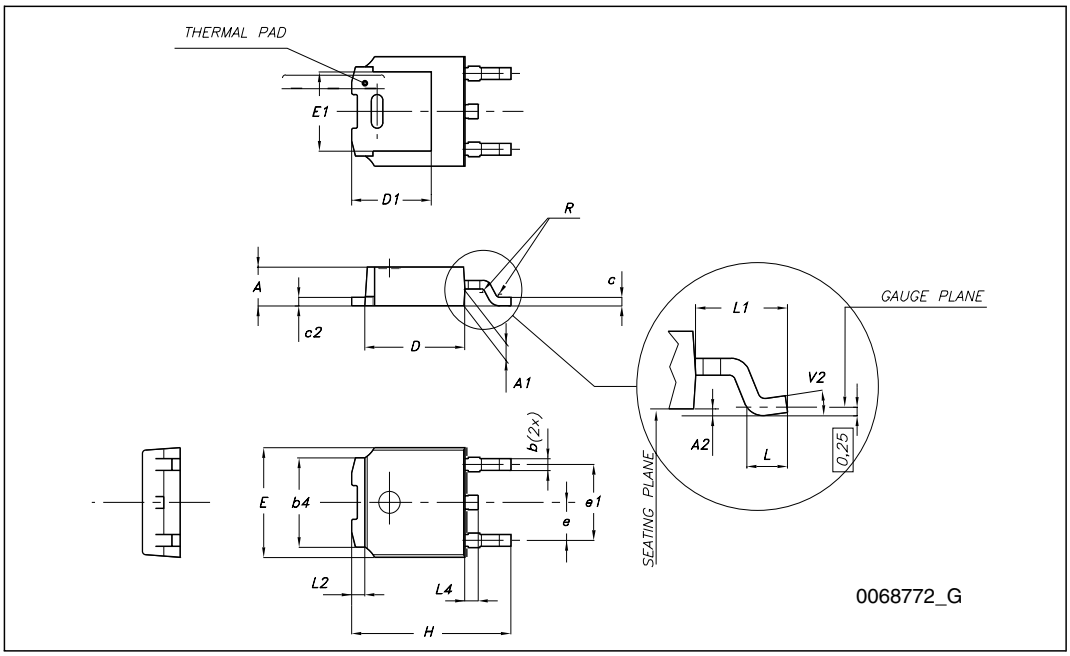


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

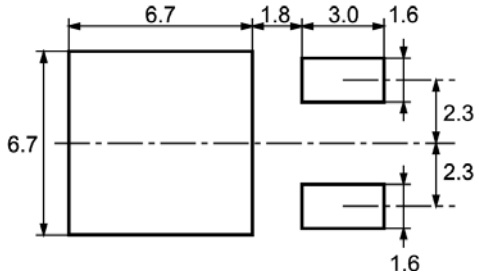
TO-252 (DPAK) mechanical data

DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0 °		8 °



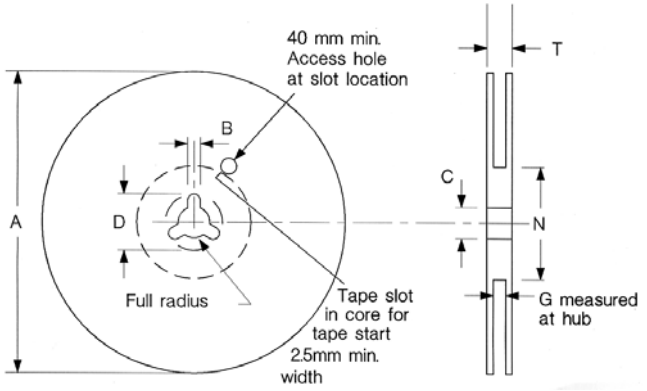
5 Packaging mechanical data

DPAK FOOTPRINT



All dimensions are in millimeters

TAPE AND REEL SHIPMENT



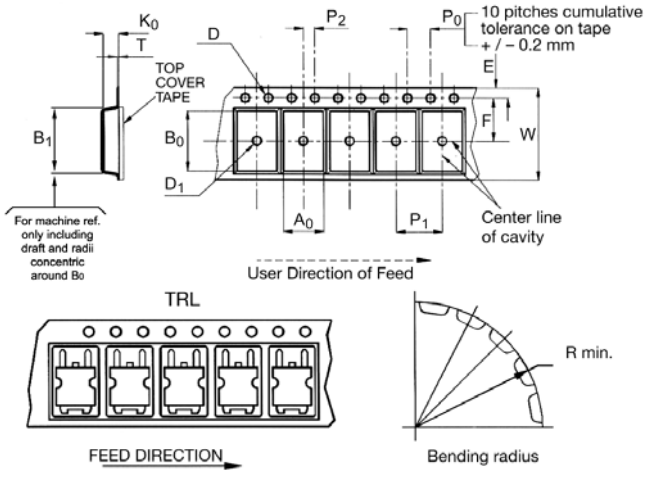
REEL MECHANICAL DATA

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



6 Revision history

Table 9. Document revision history

Date	Revision	Changes
07-Feb-2006	1	Initial release.
07-May-2009	2	Added $V_{GS(th)}$ max value in *Table 5: On/off states*
09-Nov-2009	3	Added V_{GS} parameter in *Table 2: Absolute maximum ratings*

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