



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	P _w
STD100N3LF3	30 V	<0.0055 Ω	80 A ⁽¹⁾	110 W

1. Current limited by package

- 100% avalanche tested
- Logic level threshold

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.

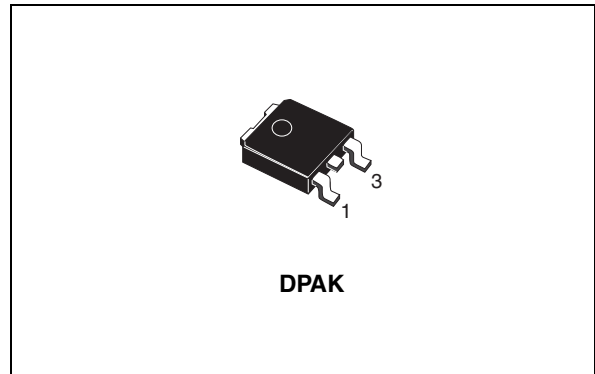


Figure 1. Internal schematic diagram

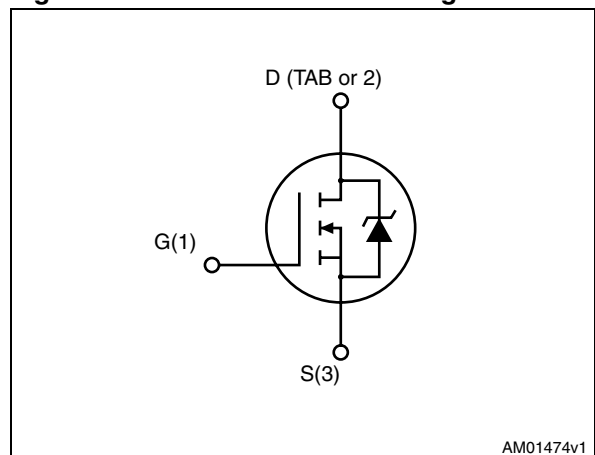


Table 1. Device summary

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

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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 $T_C = 25\text{ }^{\circ}\text{C}$	80	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	70	A
$I_{DM}^{(2)}$	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	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 3. 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 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 $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AV}$, $V_{DD} = 24\text{ V}$)	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		0.0045	0.0055	Ω
		V _{GS} = 5 V, I _D = 20 A		0.008	0.01	Ω
		V _{GS} = 10 V, I _D = 40 A @ 125 °C		0.0068		Ω
		V _{GS} = 5 V, I _D = 20 A @ 125 °C		0.0146		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
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}$, $I_D = 40\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ Figure 15 on page 9	-	9	-	ns
t_r	Rise time			205		ns
$t_{d(off)}$	Turn-off delay time			31		ns
t_f	Fall time			35		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	$I_{SD} = 40\text{ A}$, $V_{GS} = 0$	-		1.3	V
t_{rr}	Reverse recovery time	$I_{SD} = 80\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 25\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$ Figure 17 on page 9	-	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 2. Safe operating area

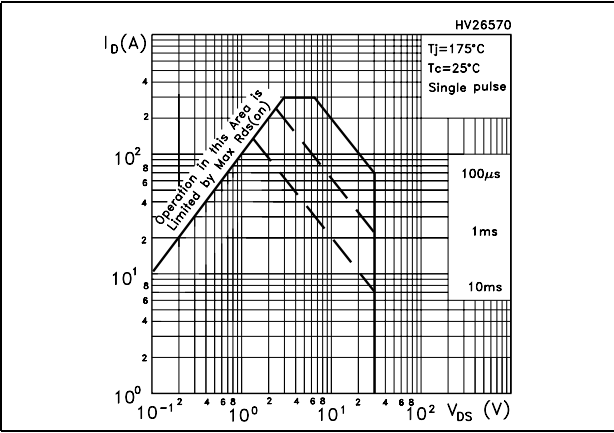


Figure 3. Thermal impedance

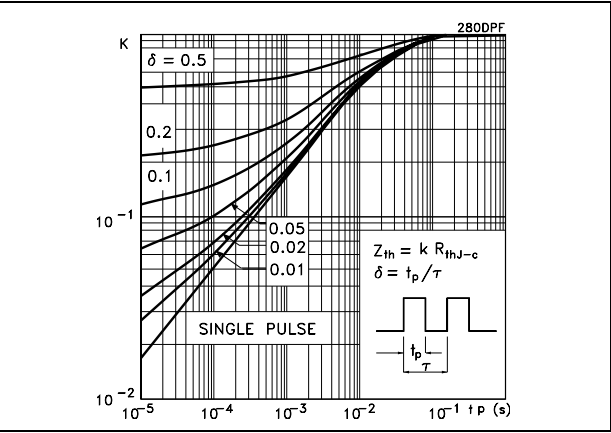


Figure 4. Output characteristics

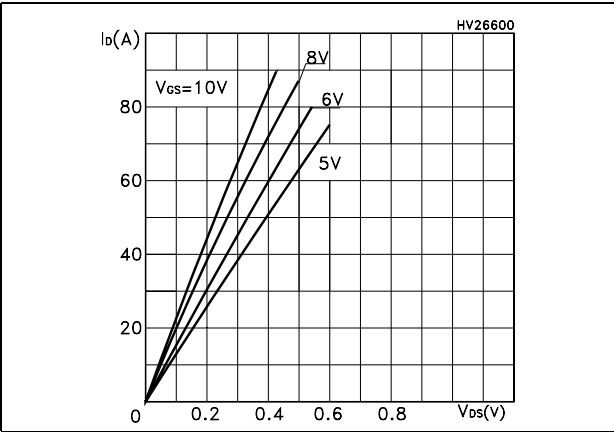


Figure 5. Transfer characteristics

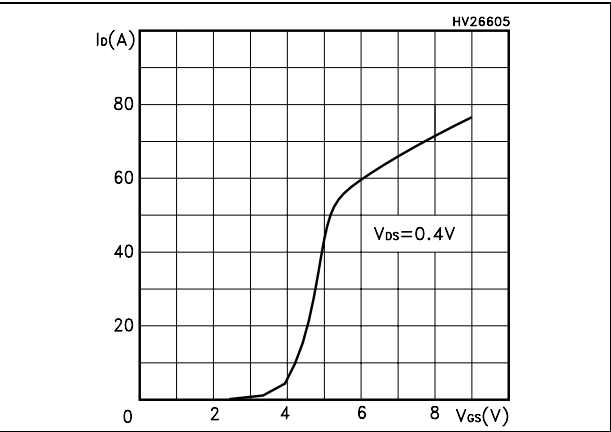


Figure 6. Transconductance

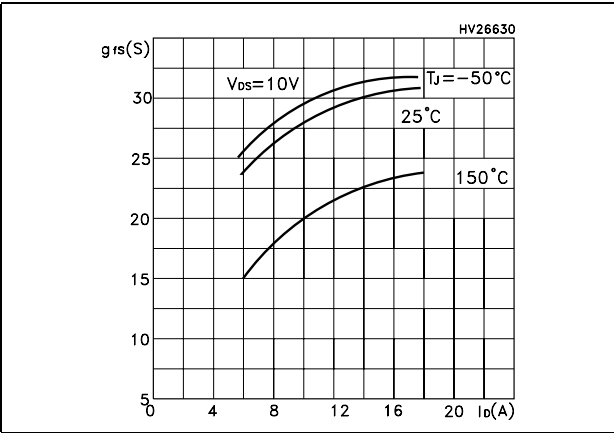


Figure 7. Static drain-source on resistance

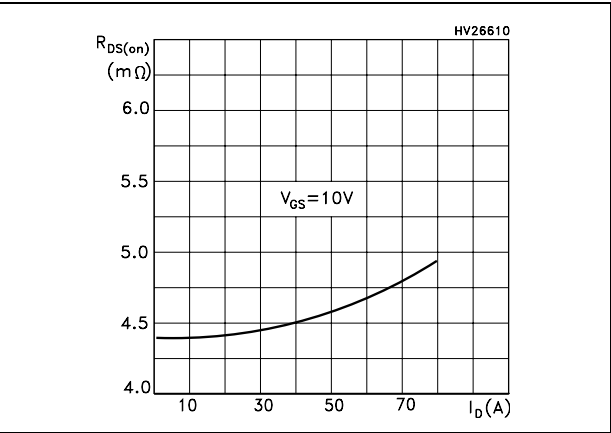


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

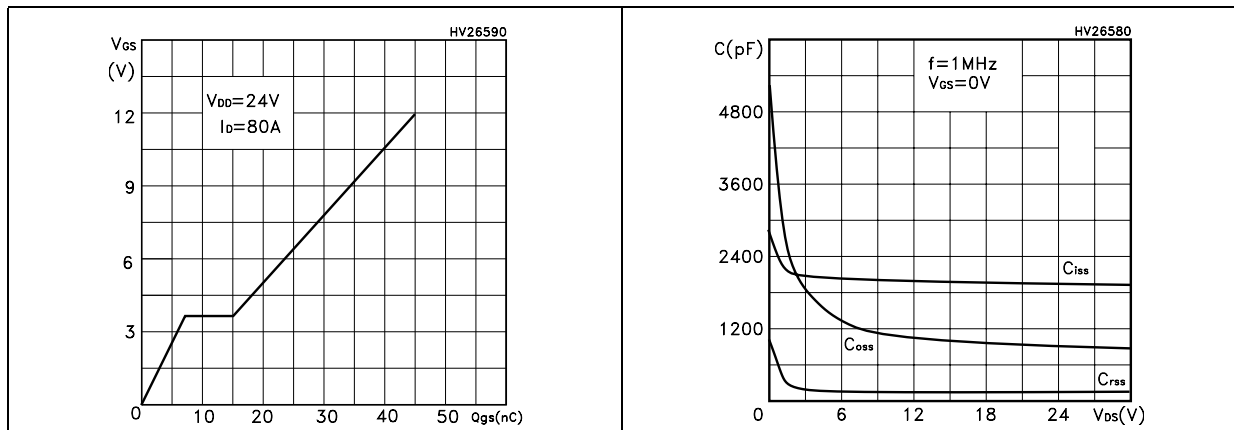
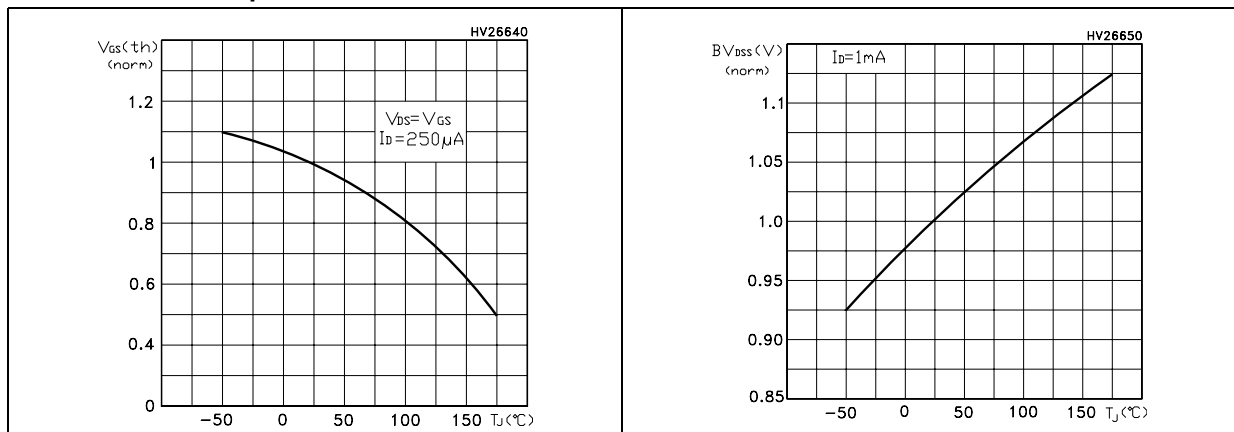
Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized BV_{DSS} vs temperature

Figure 12. Normalized on resistance vs temperature

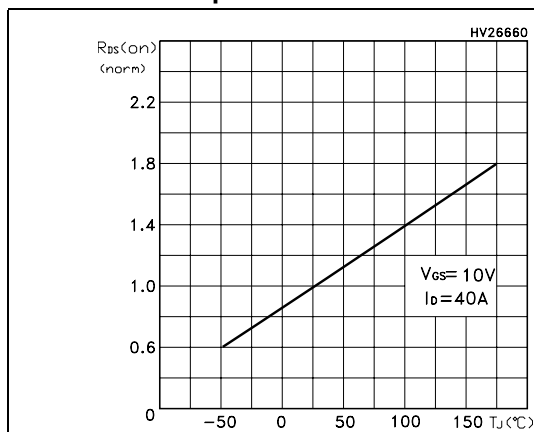


Figure 13. Source-drain diode forward characteristics

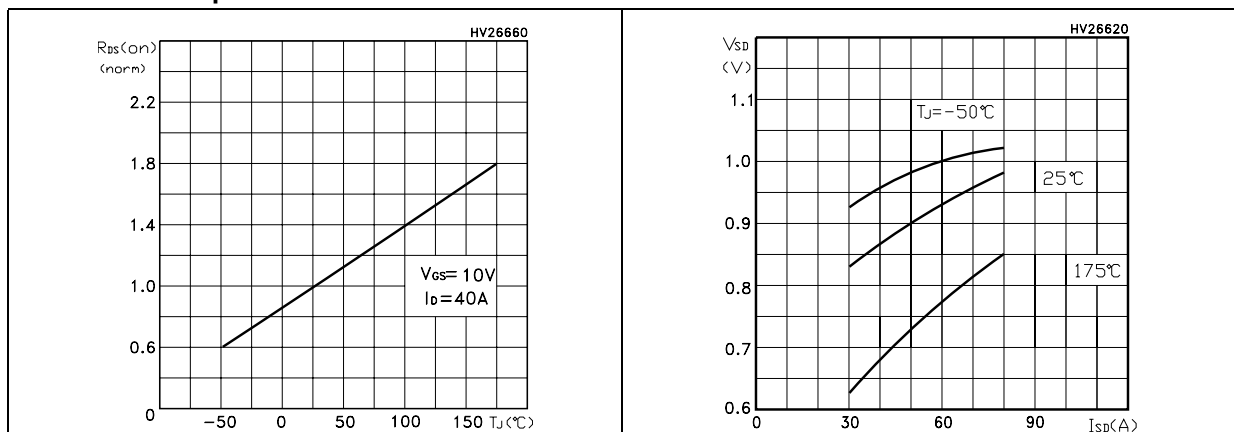
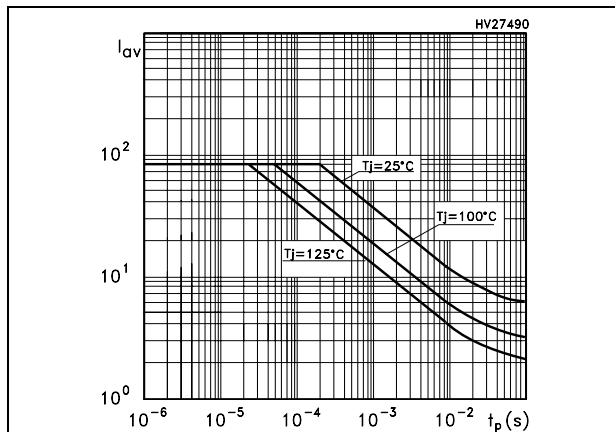


Figure 14. Allowable I_{AV} vs time in avalanche

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 circuits

Figure 15. Switching times test circuit for resistive load

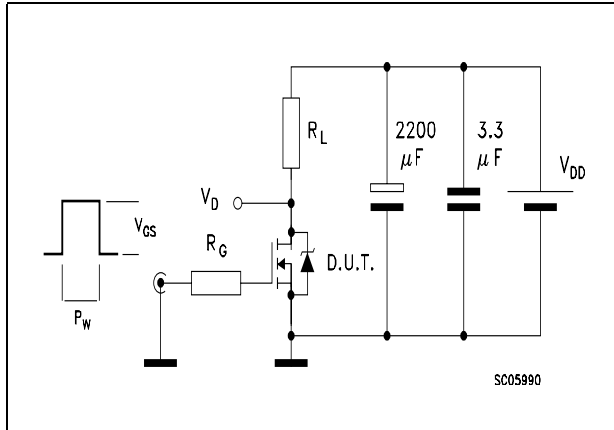


Figure 16. Gate charge test circuit

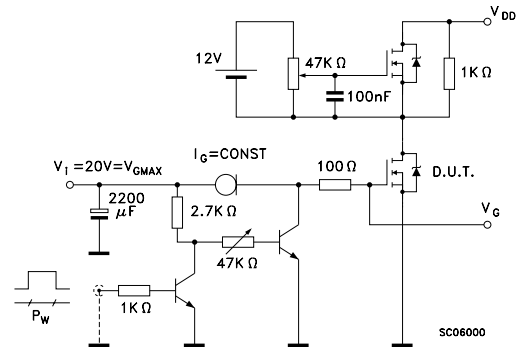
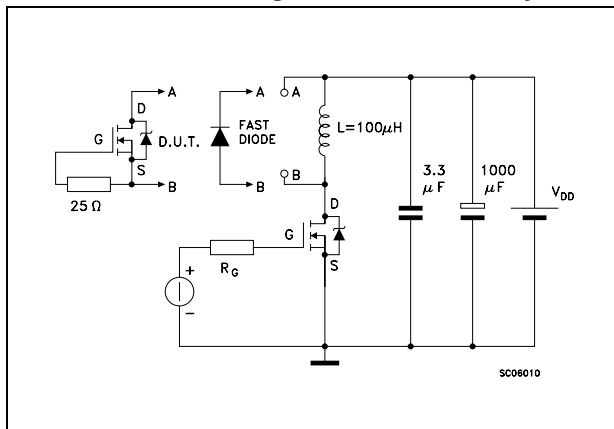


Figure 17. Test circuit for inductive load switching and diode recovery times

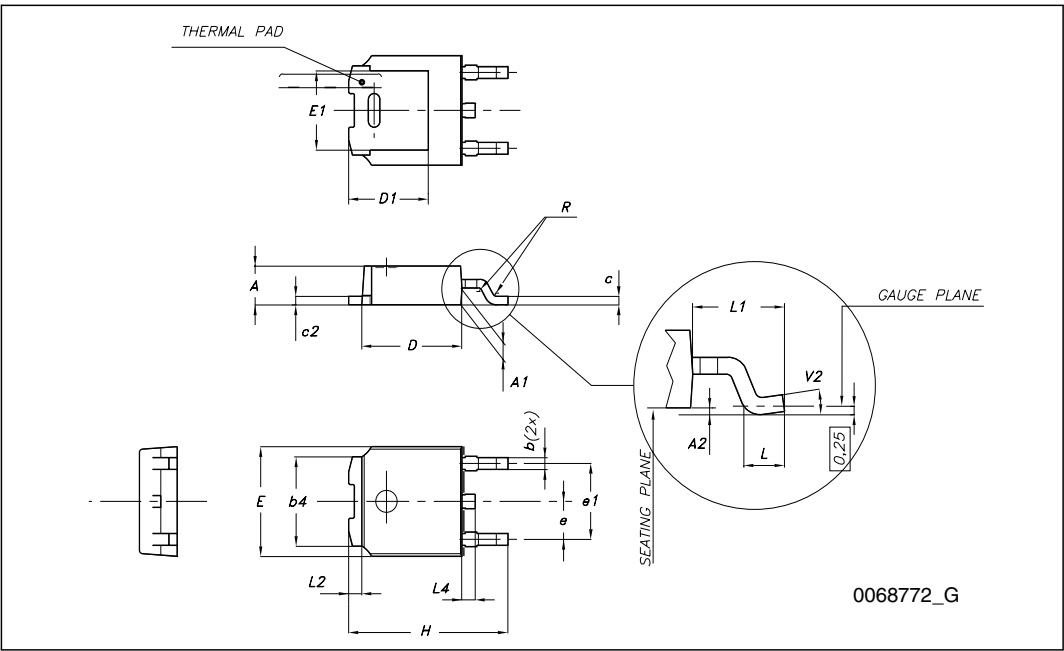


4 **Package mechanical data**

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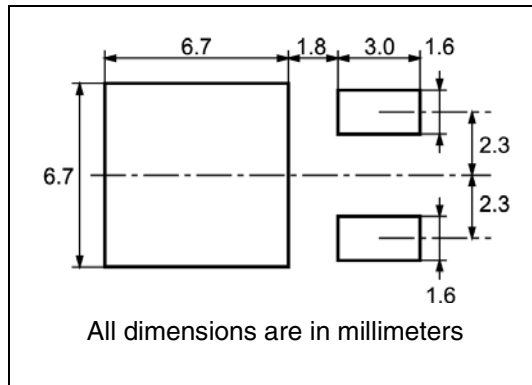
TO-252 (DPAK) mechanical data

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 °

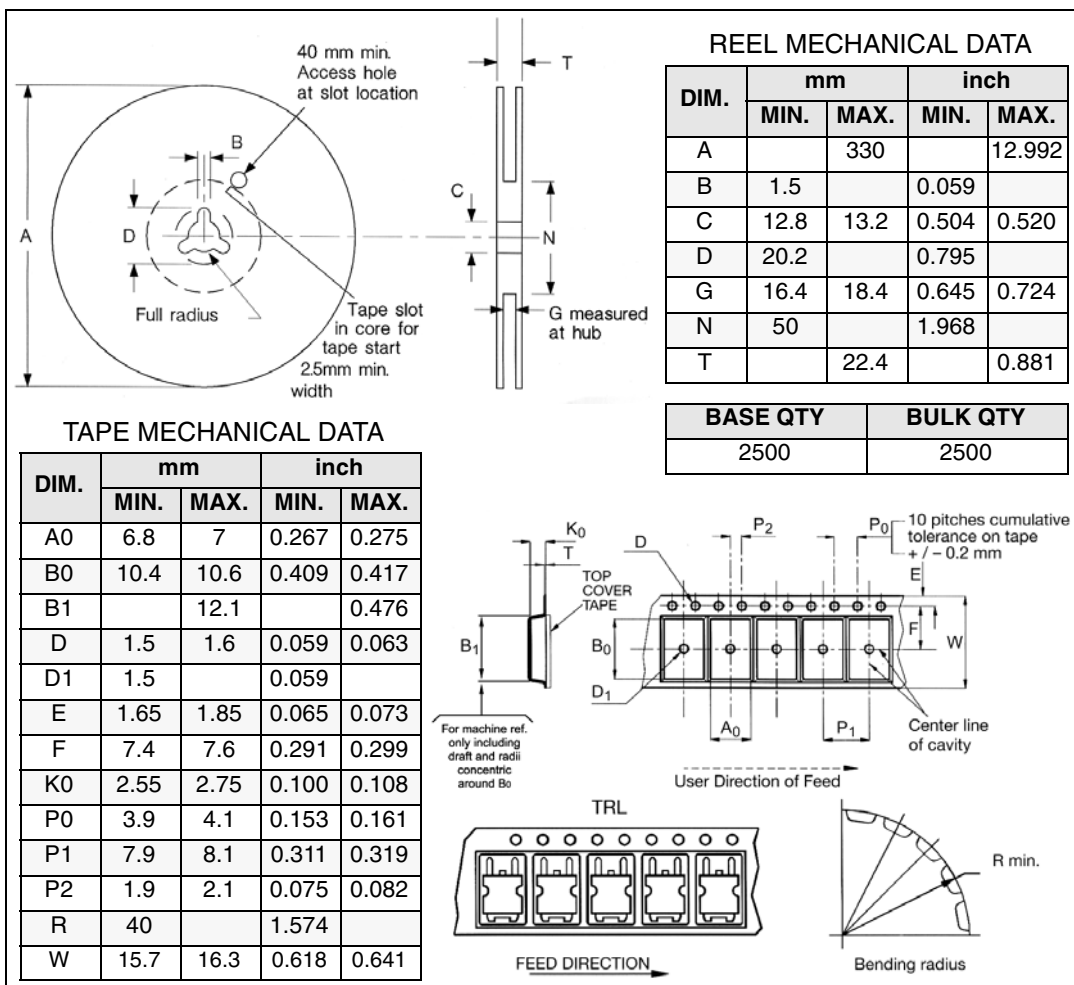


Packaging mechanical data

DPAK FOOTPRINT



TAPE AND REEL SHIPMENT



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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