



# STD25NF10LA

N-channel 100 V, 0.030  $\Omega$ , 25 A DPAK  
STripFET™ II Power MOSFET

## Features

Order code	V <sub>DSS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STD25NF10LA	100 V	< 0.035 $\Omega$	25 A

- Exceptional dv/dt capability
- 100% avalanche tested
- Logic level device

## Applications

- Switching application
- Automotive

## Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

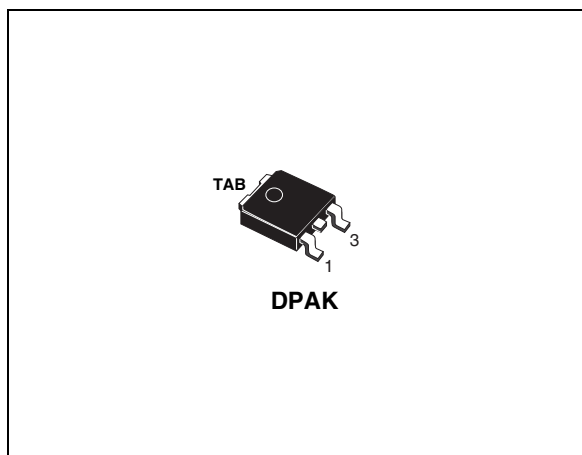


Figure 1. Internal schematic diagram

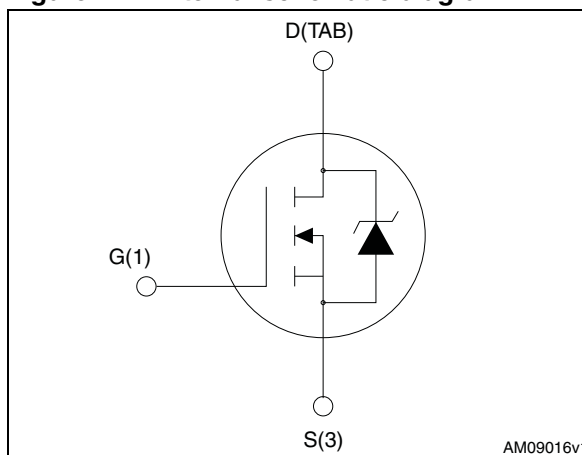


Table 1. Device summary

Order code	Marking	Package	Packaging
STD25NF10LA	D25NF10LA	DPAK	Tape and reel

# Contents

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	100	V
$V_{GS}$	Gate- source voltage	$\pm 16$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	25	A
$I_D$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	21	A
$I_{DM}^{(2)}$	Drain current (pulsed)	100	A
$P_{tot}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	100	W
	Derating Factor	0.67	W/ $^\circ\text{C}$
$dv/dt^{(3)}$	Peak diode recovery avalanche energy	20	V/ns
$E_{AS}^{(4)}$	Single pulse avalanche energy	450	mJ
$T_{stg}$	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.  $I_{SD} \leq 25\text{ A}$ ,  $di/dt \leq 300\text{ A}/\mu\text{s}$ ,  $V_{DD} = V_{(BR)DSS}$ ,  $T_j \leq T_{JMAX}$
4. Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 12.5\text{ A}$ ,  $V_{DD} = 50\text{ V}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
Rthj-case	Thermal resistance junction-case max	1.5	$^\circ\text{C}/\text{W}$
Rthj-pcb	Thermal resistance junction-pcb max <sup>(1)</sup>	50	$^\circ\text{C}/\text{W}$

1. When Mounted on 1 inch<sup>2</sup> FR-4 board, 2 oz. of Cu.

## 2 Electrical characteristics

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

**Table 4. On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250 \mu\text{A}$ , $V_{GS} = 0$	100			V
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 100 \text{ V}$ $V_{DS} = 100 \text{ V}$ , $T_C = 125^{\circ}\text{C}$ $V_{GS} = 0$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10 \text{ V}$ , $I_D = 12.5 \text{ A}$ $V_{GS} = 4.5 \text{ V}$ , $I_D = 12.5 \text{ A}$		0.030 0.035	0.035 0.040	$\Omega$ $\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$ , $V_{GS} = 0$	-	1710		pF
$C_{oss}$	Output capacitance			250		pF
$C_{rss}$	Reverse transfer capacitance			110		pF
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50 \text{ V}$ , $I_D = 12.5 \text{ A}$ $R_G = 4.7 \Omega$ , $V_{GS} = 5 \text{ V}$ (see <a href="#">Figure 13</a> )	-	20		ns
$t_r$	Rise time			40		ns
$t_{d(off)}$	Turn-off delay time			58		ns
$t_f$	Fall time			20		ns
$Q_g$	Total gate charge	$V_{DD} = 80 \text{ V}$ , $I_D = 25 \text{ A}$ , $V_{GS} = 5 \text{ V}$ , $R_G = 4.7 \Omega$ (see <a href="#">Figure 14</a> )	-	38	52	nC
$Q_{gs}$	Gate-source charge			8.5		nC
$Q_{gd}$	Gate-drain charge			21		nC

**Table 6. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		25	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		100	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 25 \text{ A}, V_{GS} = 0$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 25 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s},$	-	88		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 50 \text{ V}, T_j = 150 \text{ }^\circ\text{C}$	-	317		nC
$I_{RRM}$	Reverse recovery current	(see <a href="#">Figure 15</a> )	-	7.2		A

1. Pulse width limited by safe operating area.
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

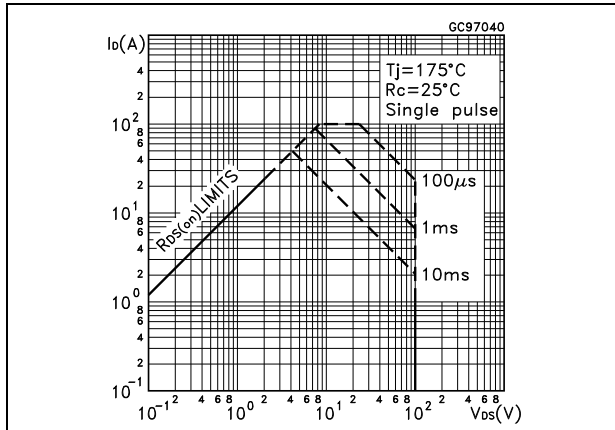


Figure 3. Thermal impedance

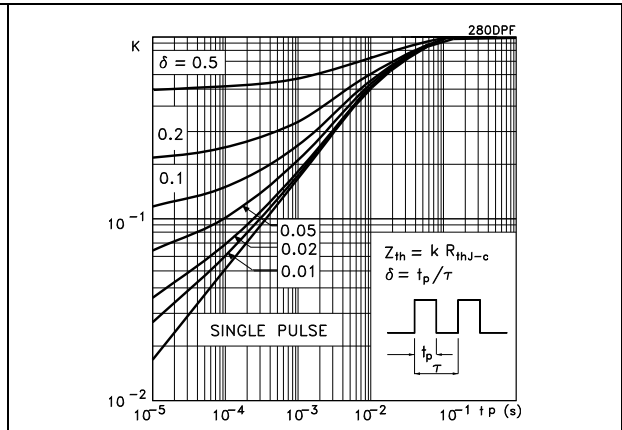


Figure 4. Output characteristics

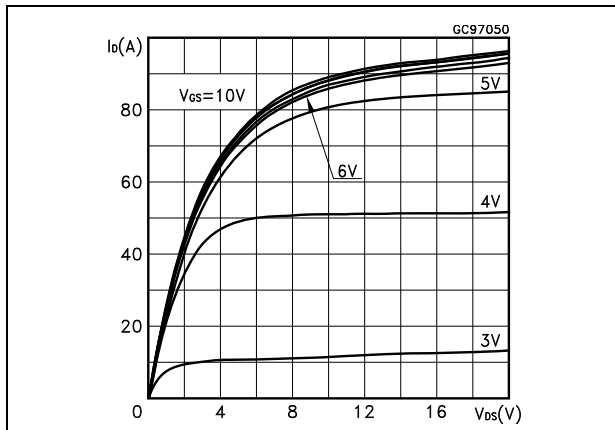


Figure 5. Transfer characteristics

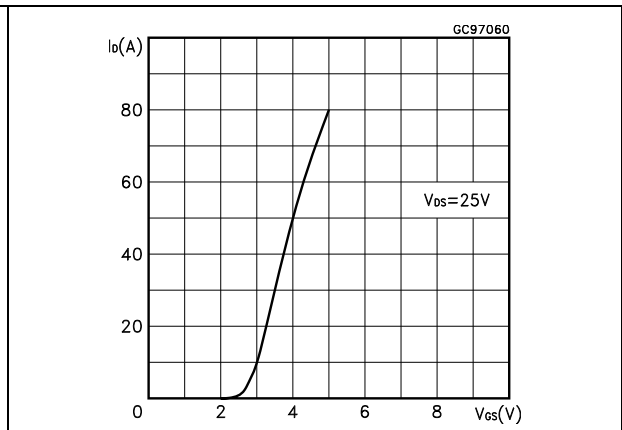


Figure 6. Normalized breakdown voltage vs. temperature

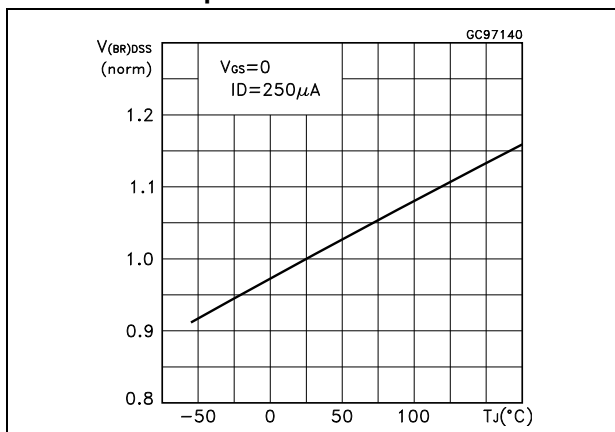


Figure 7. Static drain-source on resistance

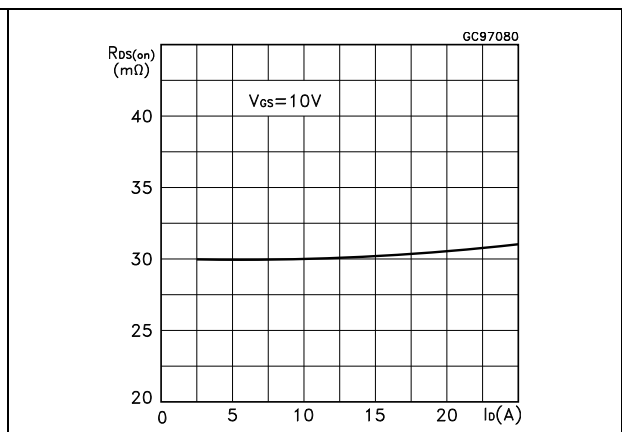


Figure 8. Gate charge vs. gate-source voltage Figure 9. Capacitance variations

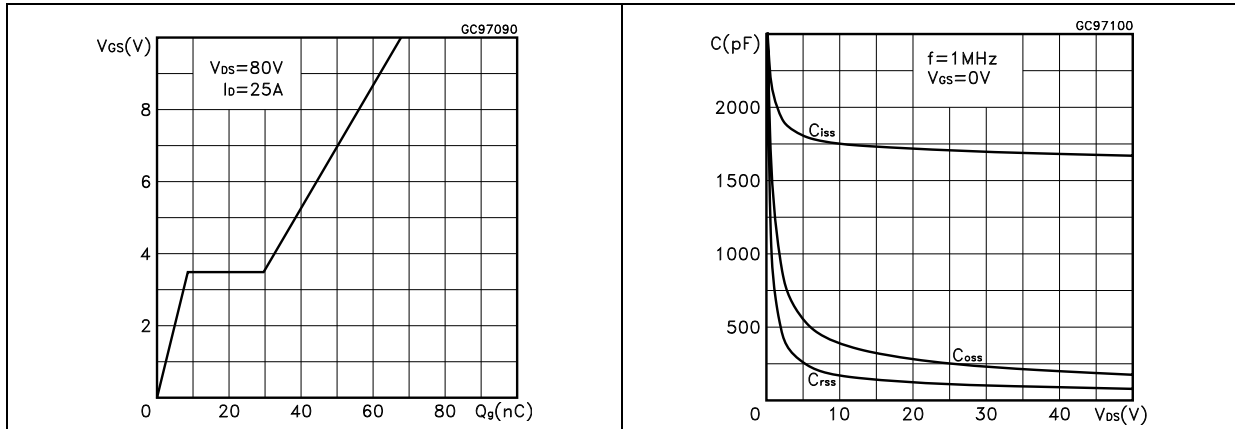


Figure 10. Normalized gate threshold voltage vs. temperature

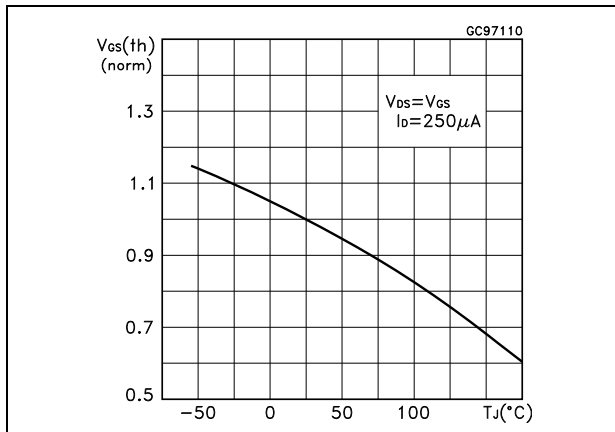


Figure 11. Normalized on resistance vs. temperature

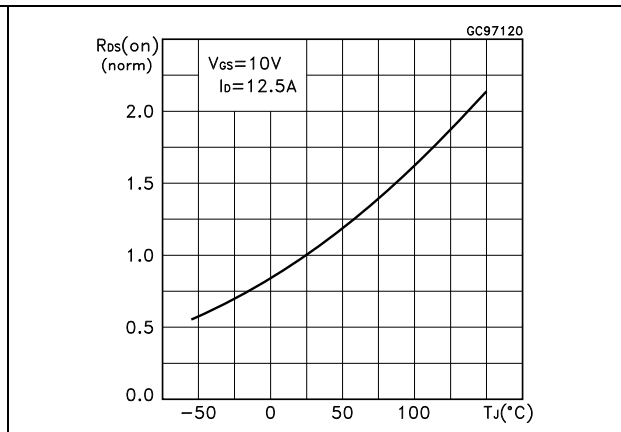
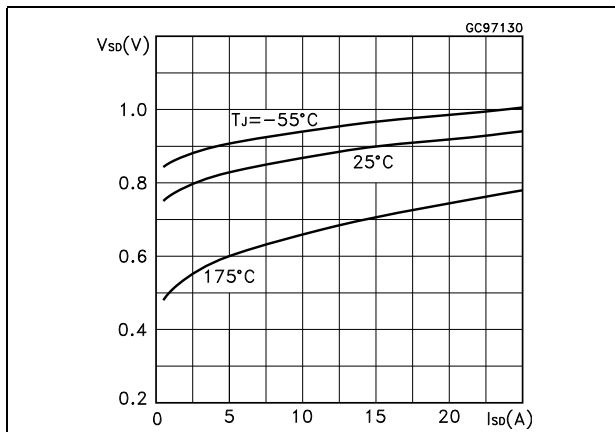
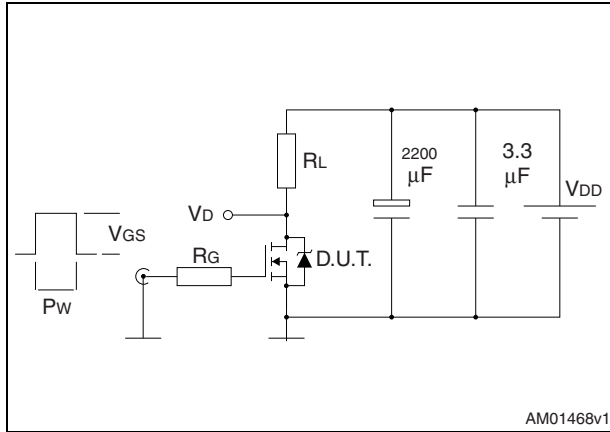


Figure 12. Source-drain diode forward characteristics

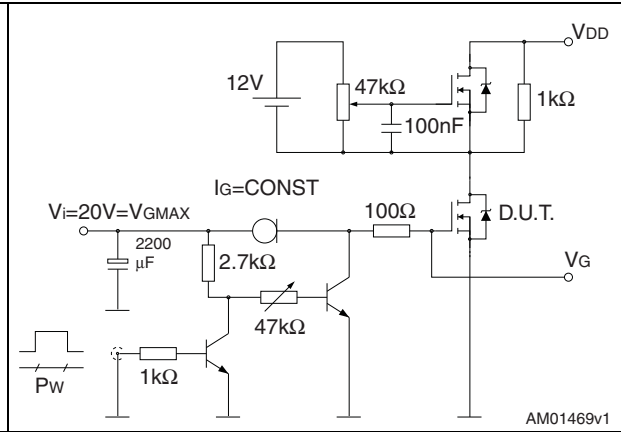


### 3 Test circuit

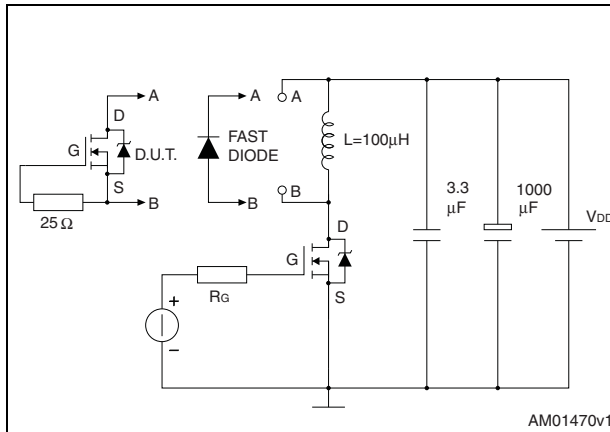
**Figure 13. Switching times test circuit for resistive load**



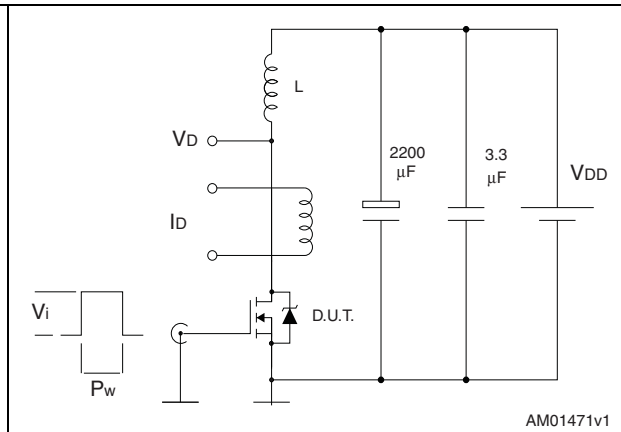
**Figure 14. Gate charge test circuit**



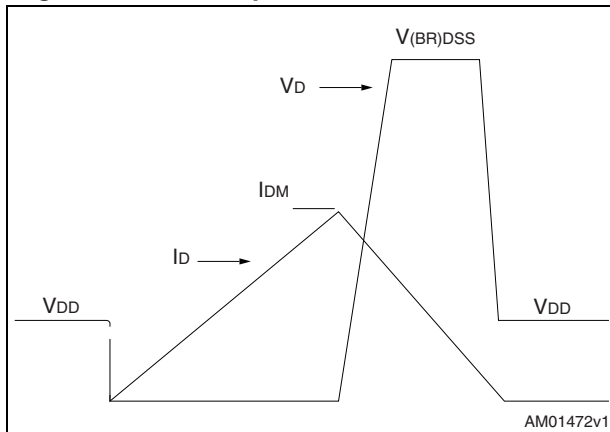
**Figure 15. Test circuit for inductive load switching and diode recovery times**



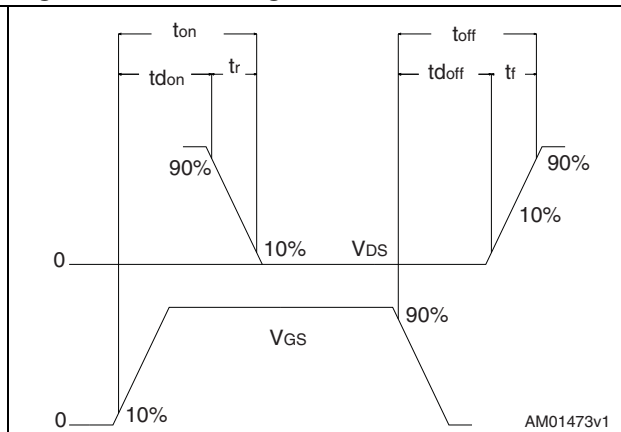
**Figure 16. Unclamped Inductive load test circuit**



**Figure 17. Unclamped inductive waveform**



**Figure 18. Switching time waveform**





## 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](http://www.st.com). ECOPACK is an ST trademark.

Table 7. DPAK (TO-252) 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		1.50
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°

Figure 19. DPAK (TO-252) drawing

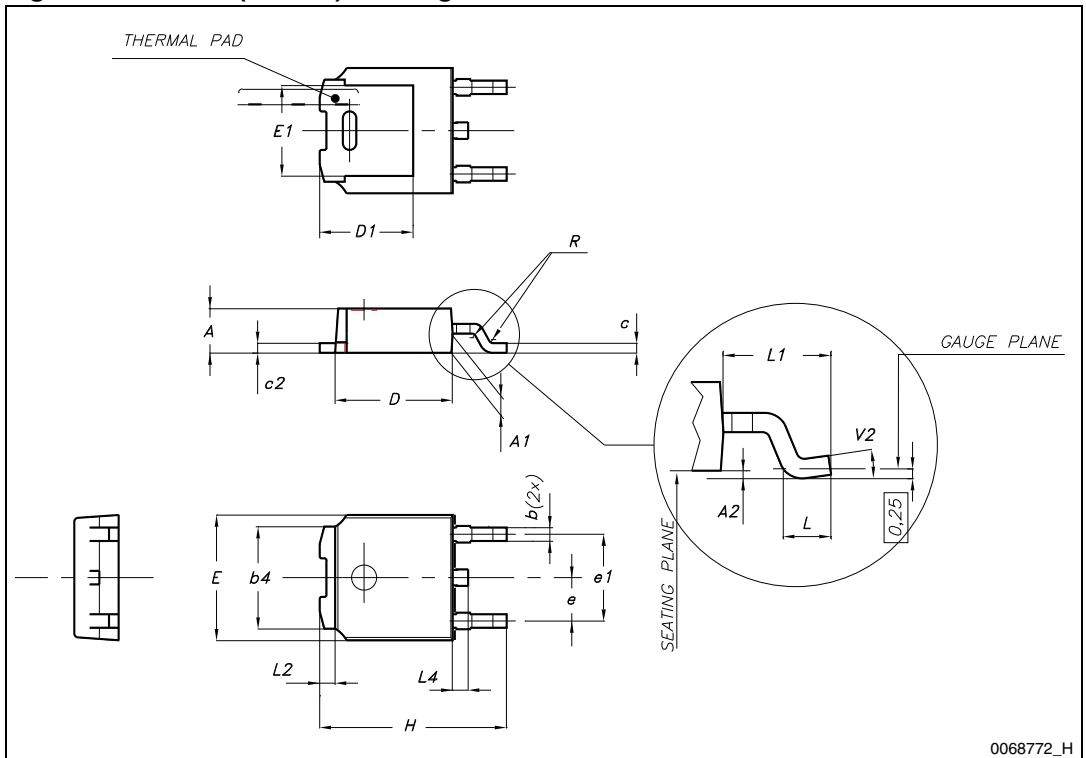
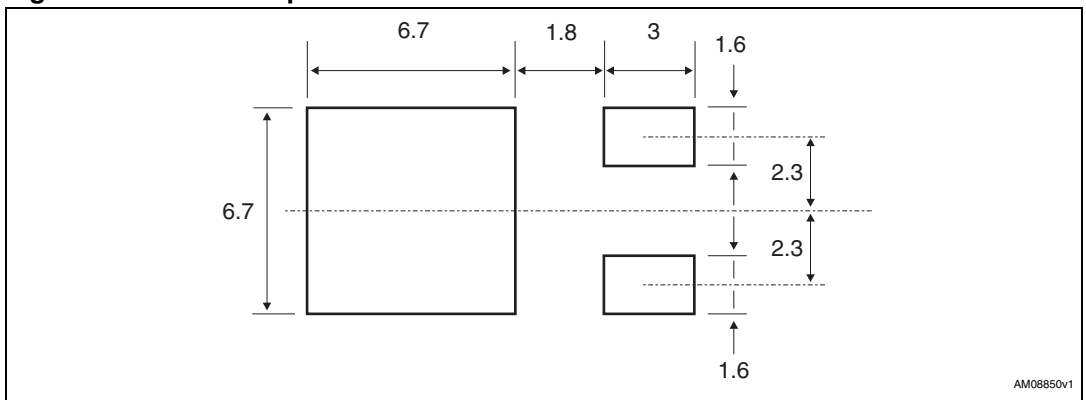


Figure 20. DPAK footprint<sup>(a)</sup>



a. All dimensions are in millimeters

## 5 Packing mechanical data

**Table 8. DPAK (TO-252) tape and reel mechanical data**

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1	Base qty.		2500
P1	7.9	8.1	Bulk qty.		2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 21. Tape for DPAK (TO-252)

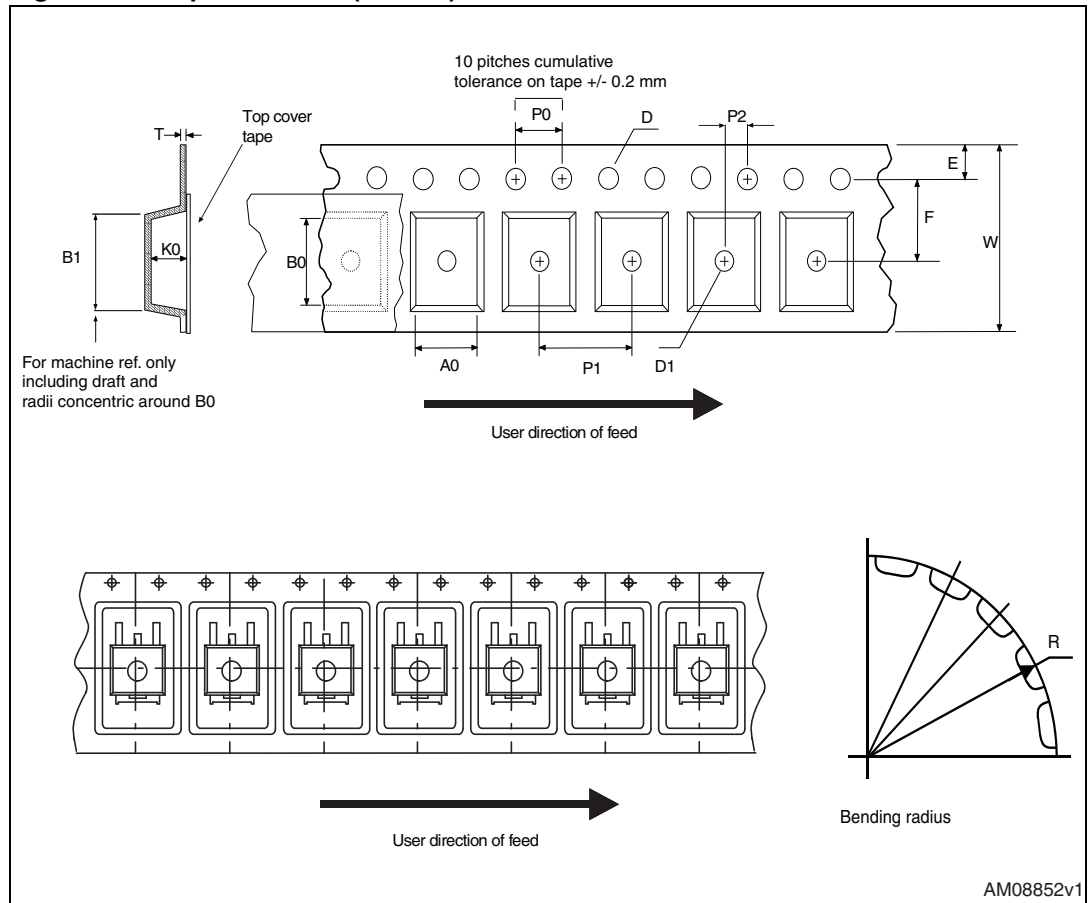
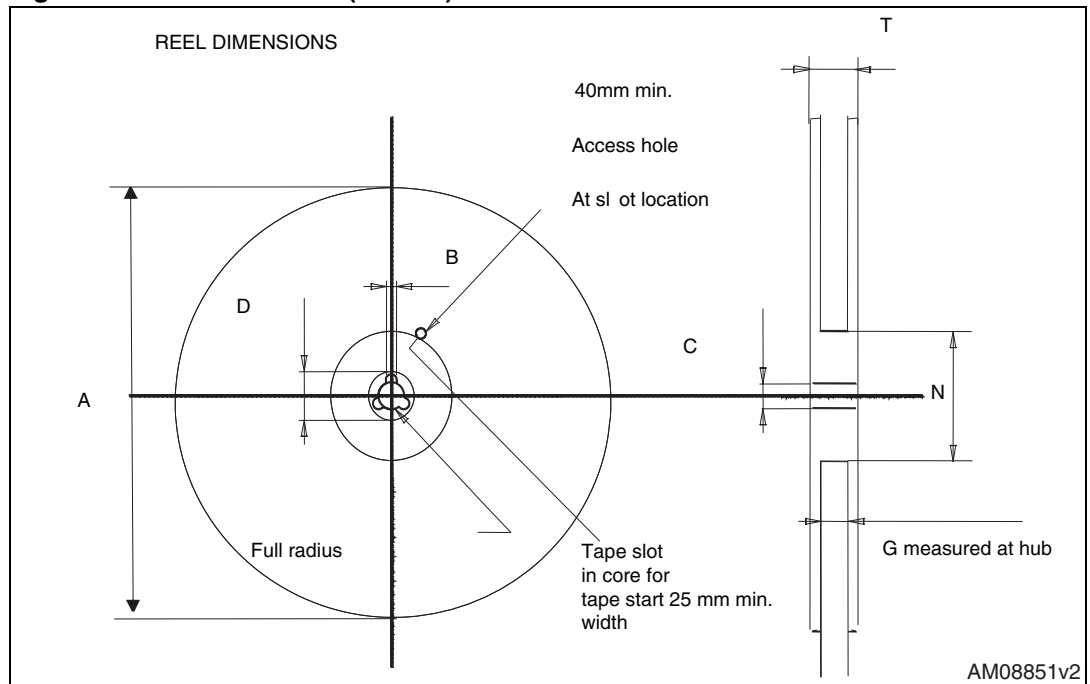


Figure 22. Reel for DPAK (TO-252)



## 6 Revision history

**Table 9. Revision history**

Date	Revision	Changes
05-Oct-2011	1	First release.

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