



STD95N4LF3

N-channel 40 V, 5.0 mΩ typ., 80 A STripFET™ III Power MOSFET in a DPAK package

Datasheet — production data

Features

Type	V _{DSS}	R _{DS(on)} max	I _D	P _D
STD95N4LF3	40 V	< 6.0 mΩ	80 A ⁽¹⁾	110 W

1. Value limited by wire bonding

- 100% avalanche tested
- Logic level drive

Applications

- Switching application
 - Automotive

Description

This device is an N-channel enhancement mode Power MOSFET produced using STMicroelectronics' STripFET™ III technology, which is specifically designed to minimize on-resistance and gate charge to provide superior switching performance.

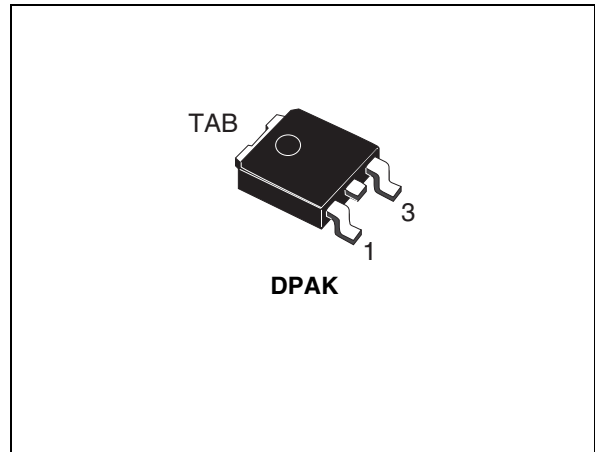


Figure 1. Internal schematic diagram

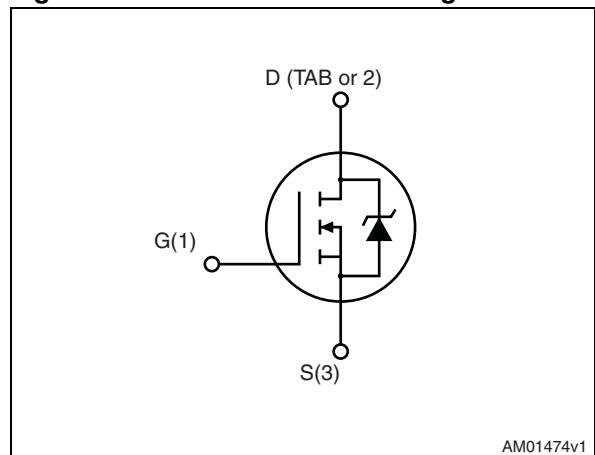


Table 1. Device summary

Order codes	Marking	Package	Packaging
STD95N4LF3	95N4LF3	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	40	V
V_{GS}	Gate-source voltage	± 16	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	80	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	65	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	8	V/ns
$E_{AS}^{(4)}$	Single pulse avalanche energy	400	mJ
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 175	$^{\circ}\text{C}$

- Value limited by wire bonding
- Pulse width limited by safe operating area
- $I_{SD} \leq 80\text{ A}$, $di/dt \leq 40\text{ A}/\mu\text{s}$, $V_{DS} \leq V_{(BR)DSS}$, $T_J \leq T_{JMAX}$
- Starting $T_J = 25\text{ }^{\circ}\text{C}$, $I_D = 40\text{ A}$, $V_{DD} = 35\text{ V}$ [Figure 16](#) and [Figure 17](#)

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1.36	$^{\circ}\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	50	$^{\circ}\text{C}/\text{W}$

- When mounted on 1inch² FR-4 2Oz Cu board

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	40			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 40\text{ V}$ $V_{DS} = 40\text{ V}$, $T_C = 125\text{ °C}$			10 100	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 16\text{ V}$			± 200	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1		2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 40\text{ A}$ $V_{GS} = 5\text{ V}$, $I_D = 40\text{ A}$		5.0	6.0 9.0	$\text{m}\Omega$ $\text{m}\Omega$

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	2500 560 50		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	$V_{DD} = 20\text{ V}$, $I_D = 40\text{ A}$ $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 13 and Figure 18)	-	7.5 45 45 11		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	$V_{DD} = 20\text{ V}$, $I_D = 80\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 14)	-	50 7 9.5	70	nC nC nC

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}^{(1)}$	Source-drain current Source-drain current (pulsed)		-		80 320	A A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 80\text{ A}$, $V_{GS} = 0$	-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 80\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 20\text{ V}$, $T_j = 150\text{ }^{\circ}\text{C}$ (see Figure 15 and Figure 19)	-	40 55 3		ns nC 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

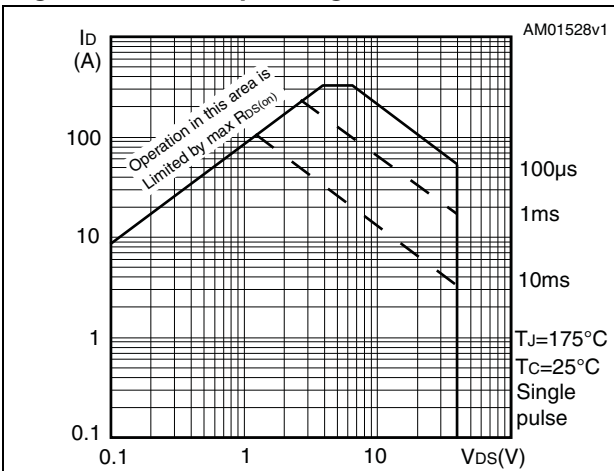


Figure 3. Thermal impedance

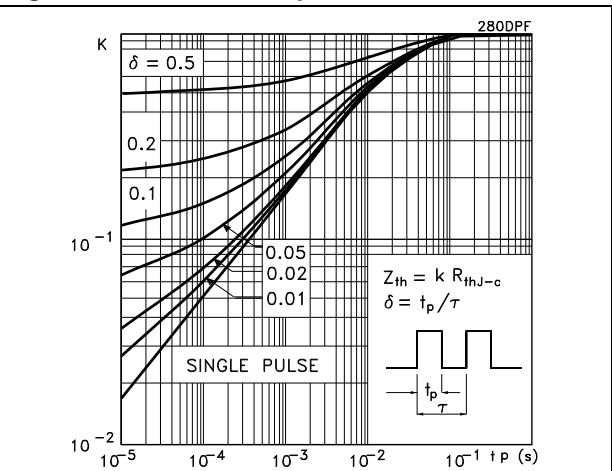


Figure 4. Output characteristics

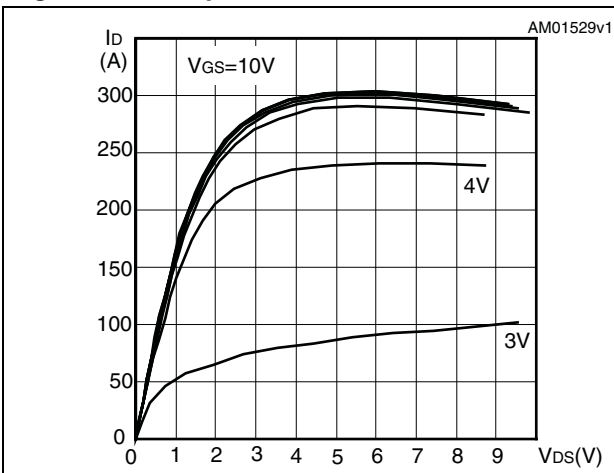


Figure 5. Transfer characteristics

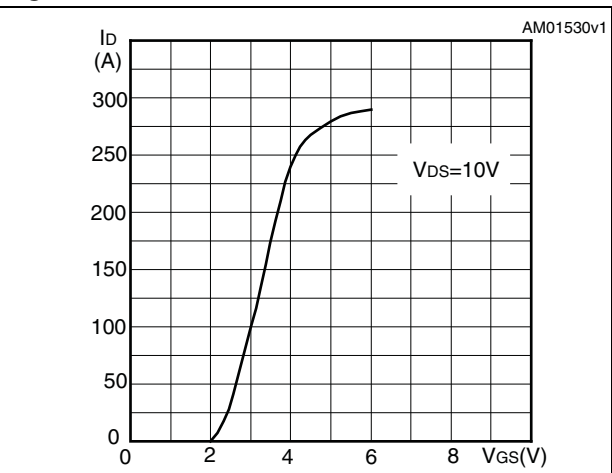


Figure 6. Static drain-source on-resistance

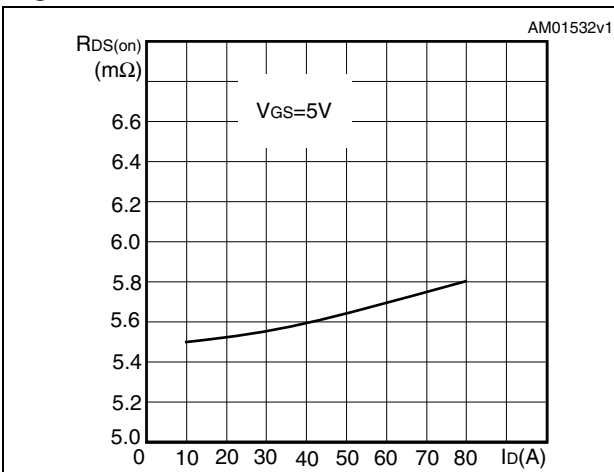


Figure 7. Normalized $B_{V_{DS}}$ vs temperature

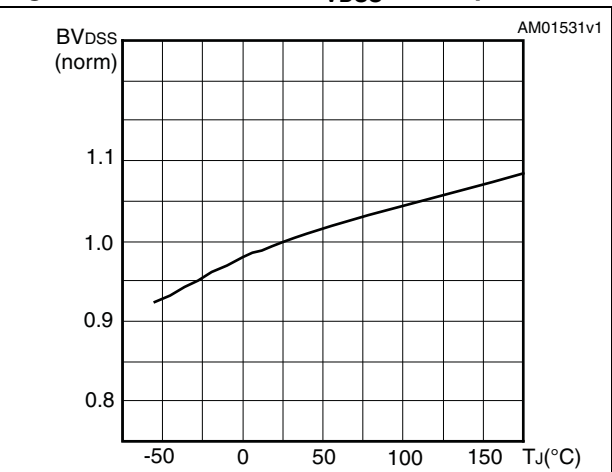


Figure 8. Gate charge vs gate-source voltage

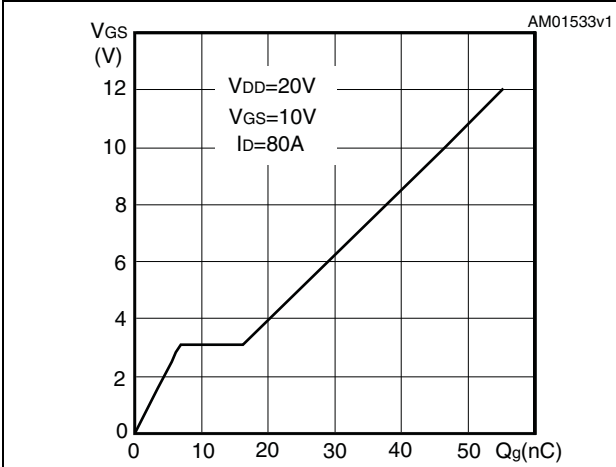


Figure 9. Capacitance variations

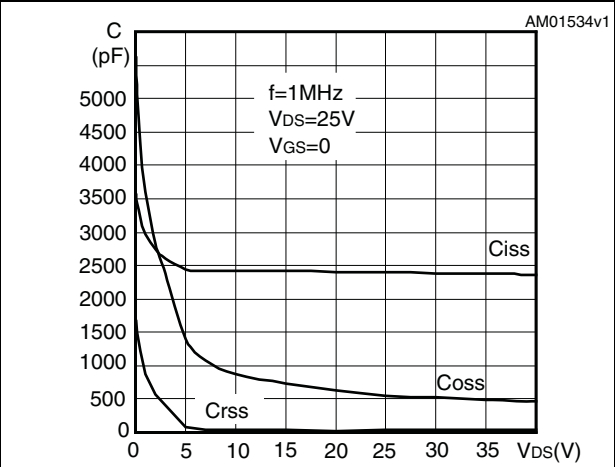


Figure 10. Normalized gate threshold voltage vs temperature

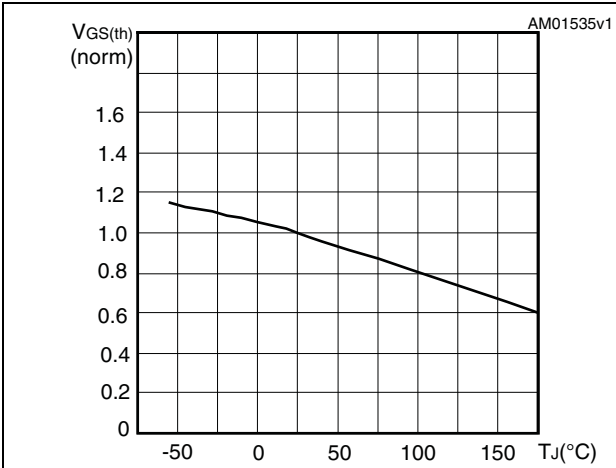


Figure 11. Normalized on resistance vs temperature

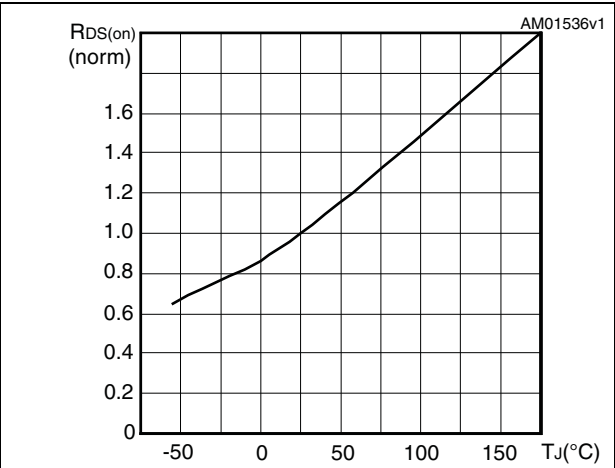
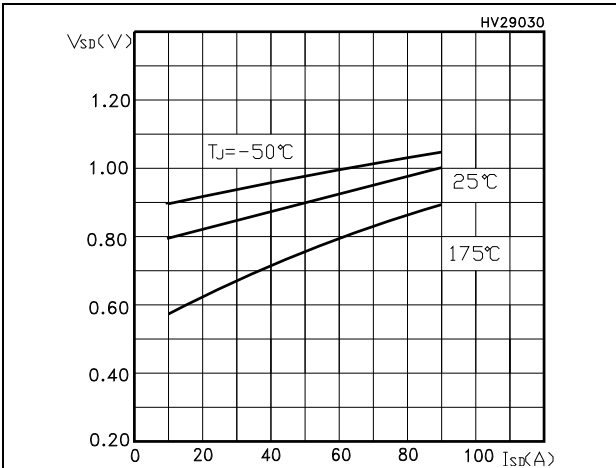


Figure 12. Source-drain diode forward characteristics



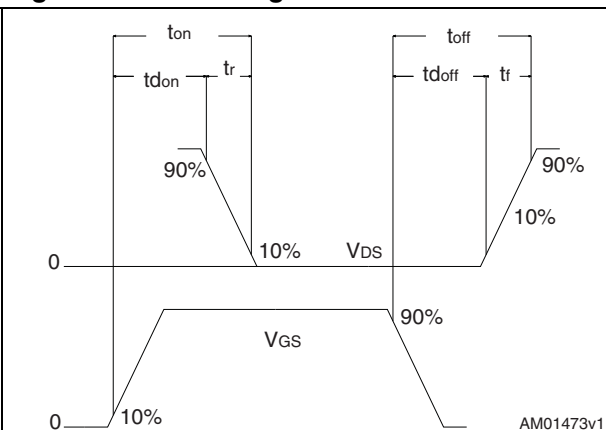
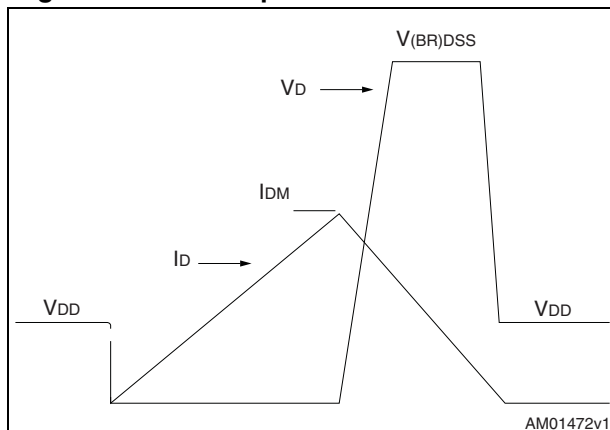
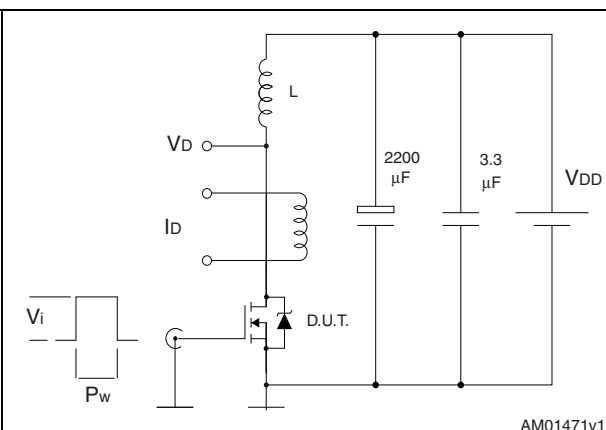
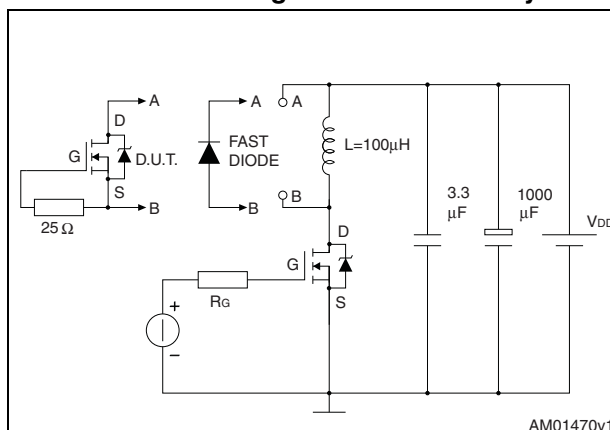
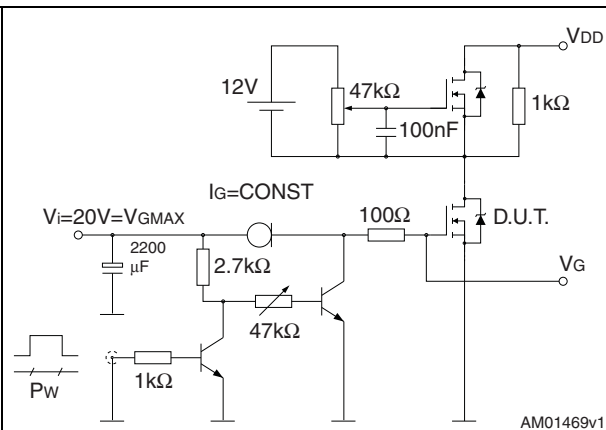
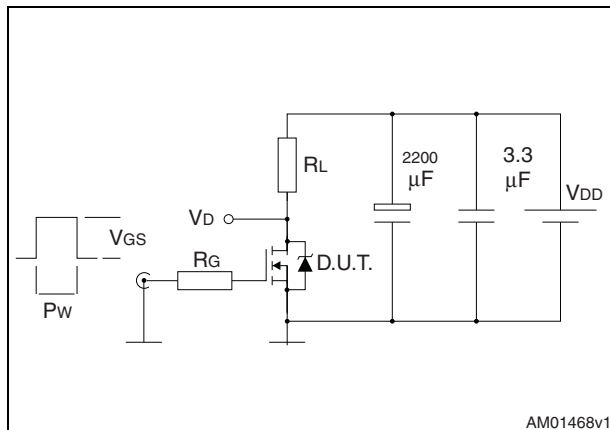
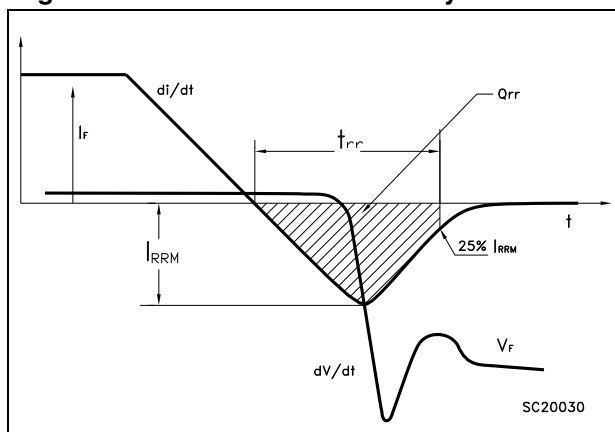


Figure 19. Diode reverse recovery waveform



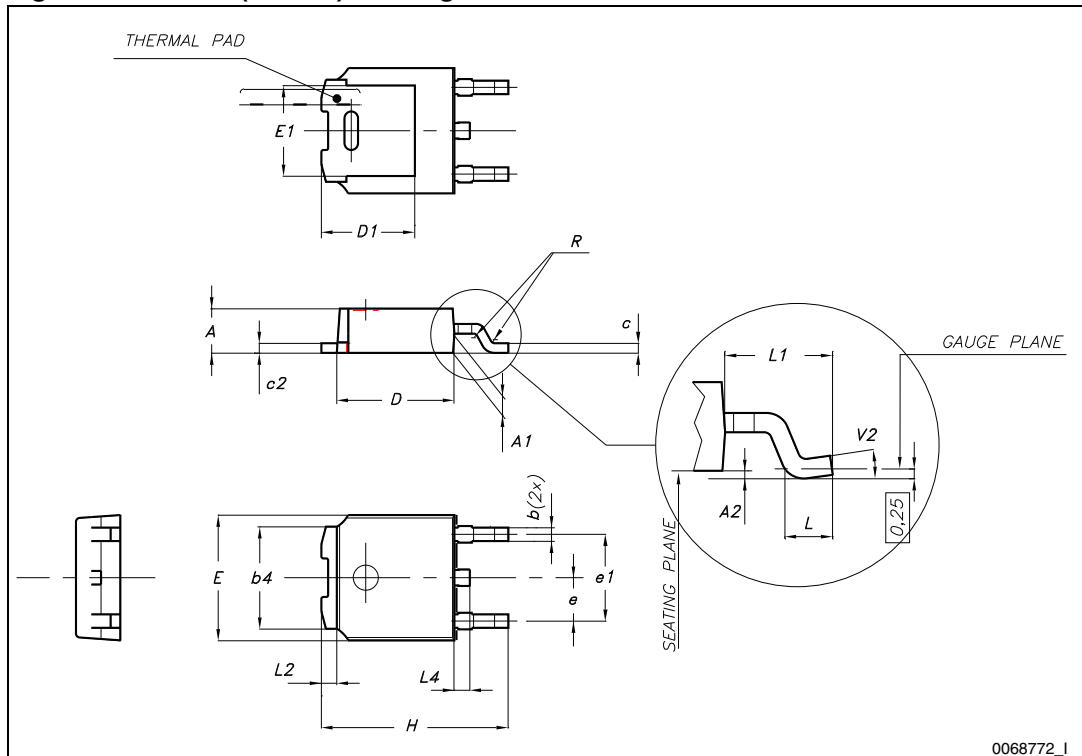
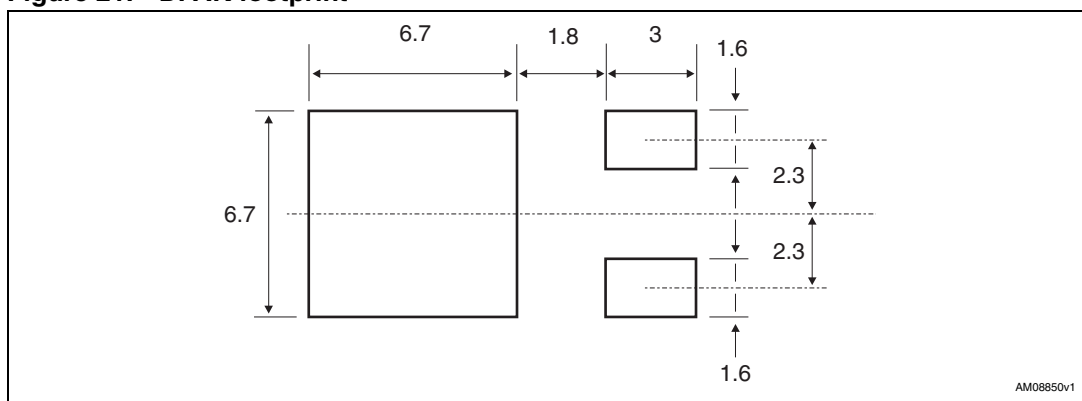
4 Package mechanical data

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. 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		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°

Figure 20. DPAK (TO-252) drawing

Figure 21. DPAK footprint^(a)

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 22. Tape for DPAK (TO-252)

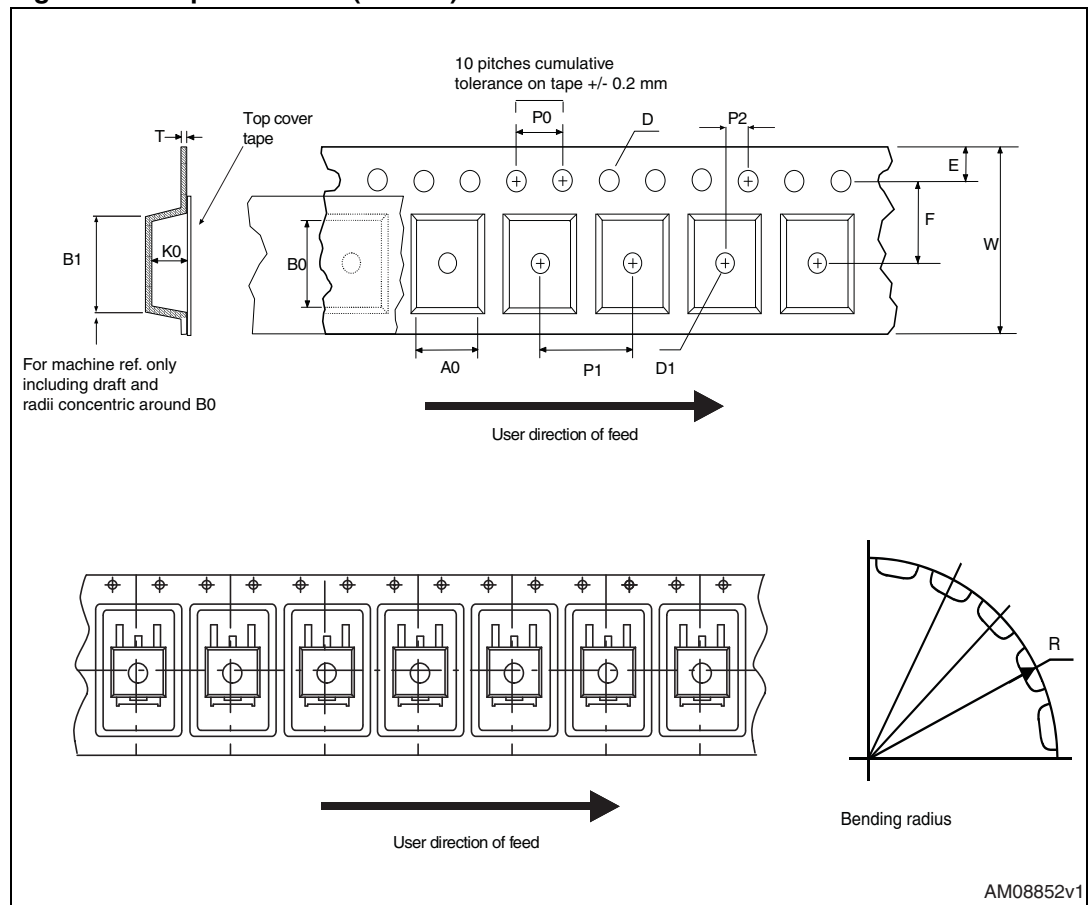
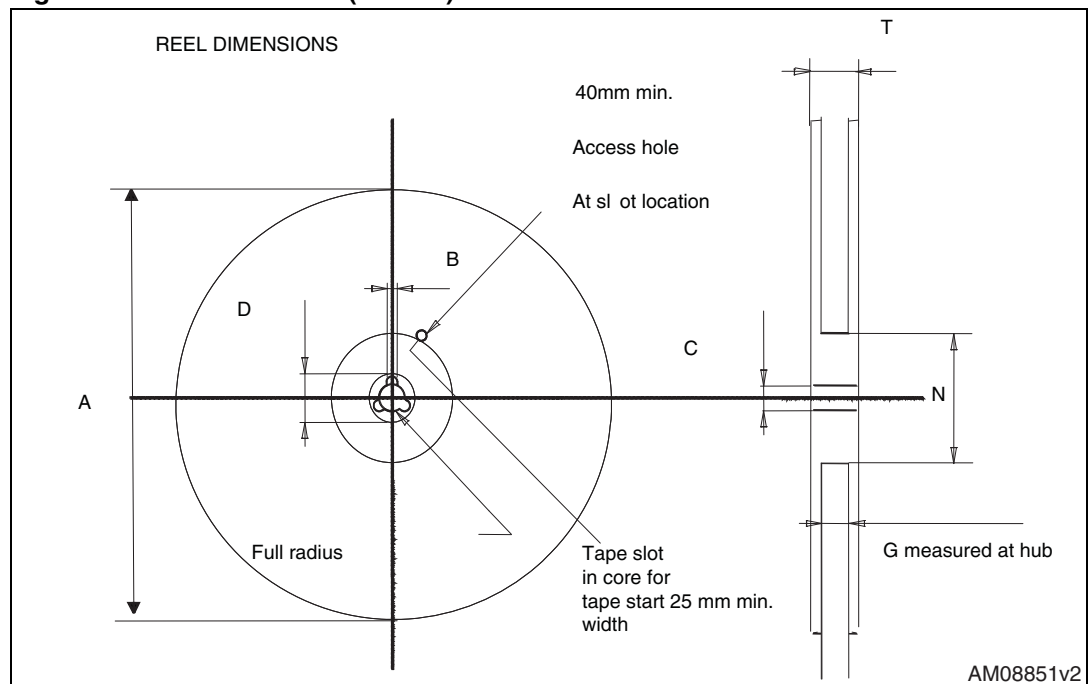


Figure 23. Reel for DPAK (TO-252)



6 Revision history

Table 9. Document revision history

Date	Revision	Changes
11-Feb-2009	1	First release
23-Jul-2009	2	Marking on device summary has been corrected.
13-Jul-2012	3	Updated title on the cover page. Minor text changes. Updated Section 4: Package mechanical data and Section 5: Packing mechanical data .

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