



STD100N10F7, STF100N10F7, STP100N10F7

N-channel 100 V, 0.0068 Ω typ., 80 A, STripFET™ VII DeepGATE™
Power MOSFET in DPAK, TO-220FP and TO-220 packages

Datasheet — preliminary data

Features

Type	V _{DSS}	R _{DS(on)} max	I _D	P _{TOT}
STD100N10F7	100 V	0.008 Ω	80 A	120 W
STF100N10F7			45 A	30 W
STP100N10F7			80A	150 W

- Ultra low on-resistance
- 100% avalanche tested

Applications

- Switching applications

Description

These devices utilize the 7th generation of design rules of ST's proprietary STripFET™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest R_{DS(on)} in all packages.

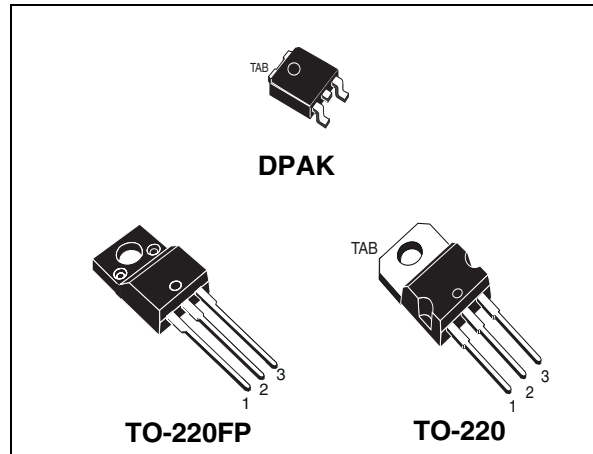
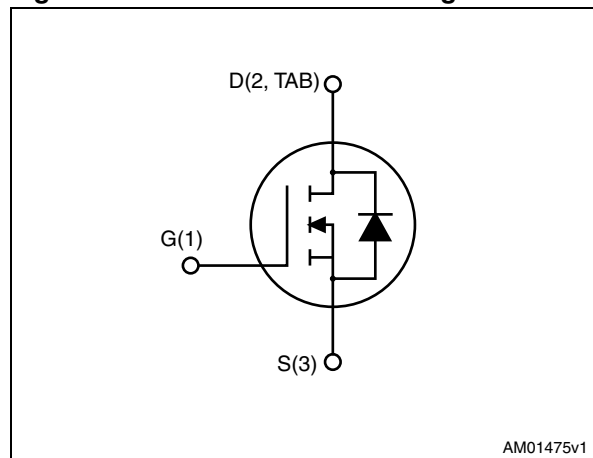


Figure 1. Internal schematic diagram



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Table 1. Device summary

Order codes	Marking	Package	Packaging
STD100N10F7	100N10F7	DPAK	Tape and reel
STF100N10F7		TO-220FP	Tube
STP100N10F7		TO-220	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value			Unit
		DPAK	TO-220FP	TO-220	
V_{DS}	Drain-source voltage	100			V
V_{GS}	Gate-source voltage	± 20			V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	80	45	80	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	65	32	70	A
$I_{DM}^{(2)}$	Drain current (pulsed)	320	180	320	A
$P_{TOT}^{(1)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	120	30	150	W
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 175			$^\circ\text{C}$

1. This value is rated according to R_{thj-c} .
2. Pulse width limited by safe operating area.

Table 3. Thermal resistance

Symbol	Parameter	Value			Unit
		DPAK	TO-220FP	TO-220	
$R_{thj-case}$	Thermal resistance junction-case	1.25	5	1.00	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient		62.50		$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	50			$^\circ\text{C}/\text{W}$

1. When mounted on FR-4 board of 1inch², 2oz Cu, $t < 10\text{ sec}$

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 ($V_{GS}=0$)	$I_D = 250\ \mu\text{A}$	100		-	V
I_{DSS}	Zero gate voltage drain current ($V_{GS}=0$)	$V_{DS} = 100\text{ V}$ $V_{DS} = 100\text{ V}; T_C=125\text{ °C}$			1 100	μA μA
I_{GSS}	Gate body leakage current ($V_{DS}=0$)	$V_{GS} = 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS}=V_{GS}; I_D = 250\ \mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	For DPAK and TO-220 $V_{GS}= 10\text{ V}, I_D= 50\text{ A}$ For TO-220-FP $V_{GS}= 10\text{ V}, I_D= 22.5\text{ A}$		0.0068	0.008	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS}=25\text{ V}, f=1\text{ MHz}, V_{GS}=0$	-	4390	-	pF
C_{oss}	Output capacitance			1300		pF
C_{rss}	Reverse transfer capacitance			100		pF
Q_g	Total gate charge	$V_{DD}=50\text{ V}, I_D = 100\text{ A}$	-	56	-	nC
Q_{gs}	Gate-source charge	$V_{GS}=10\text{ V}$		13		
Q_{gd}	Gate-drain charge	Figure 3		60		

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=50\text{ V}, I_D= 50\text{ A},$ $R_G=4.7\ \Omega, V_{GS}= 10\text{ V}$ Figure 2	-	27	-	ns
t_r	Rise time			40		ns
$t_{d(off)}$	Turn-off delay time			46		ns
t_f	Fall time			16		ns

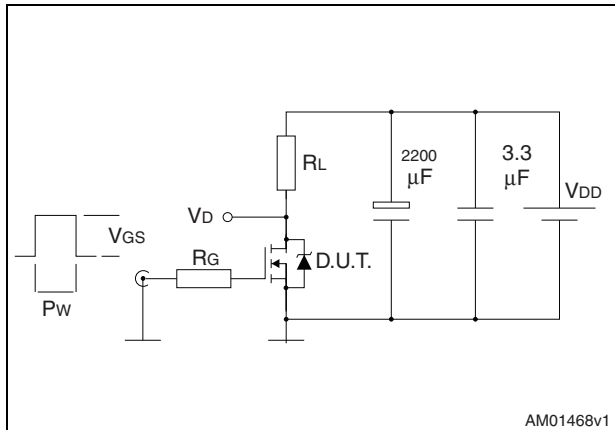
Table 7. Source drain diode

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	$I_{SD} = 80 \text{ A}$, $V_{GS} = 0$	1.2	-	-	V
t_{rr}	Reverse recovery time	$I_{SD} = 80 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $V_{DD} = 80 \text{ V}$, $T_j = 150 \text{ }^\circ\text{C}$	-	TBD	-	ns
Q_{rr}	Reverse recovery charge			TBD		nC
I_{RRM}	Reverse recovery current			TBD		A

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

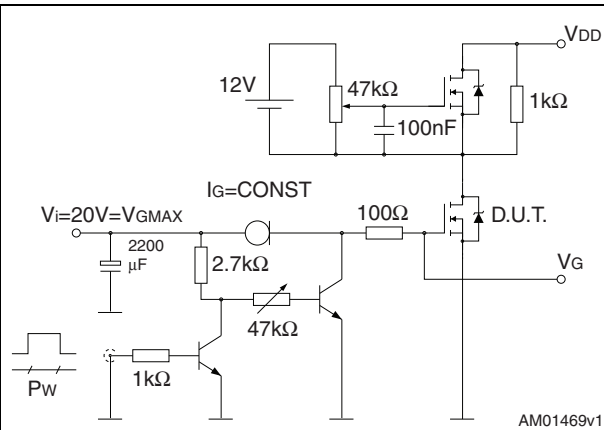
3 Test circuits

Figure 2. Switching times test circuit for resistive load



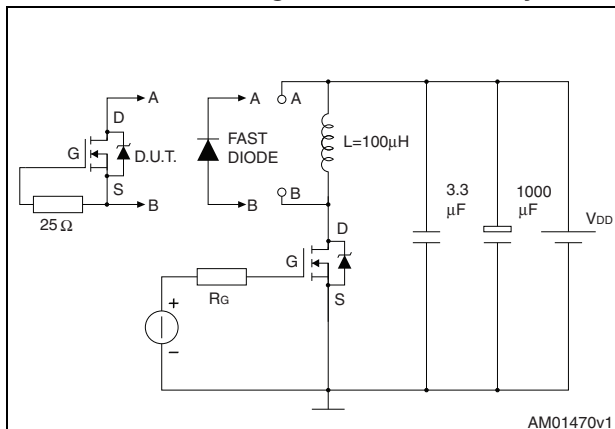
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Figure 3. Gate charge test circuit



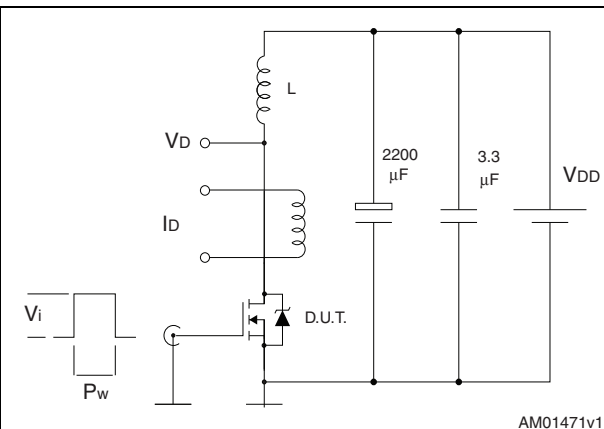
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Figure 4. Test circuit for inductive load switching and diode recovery times



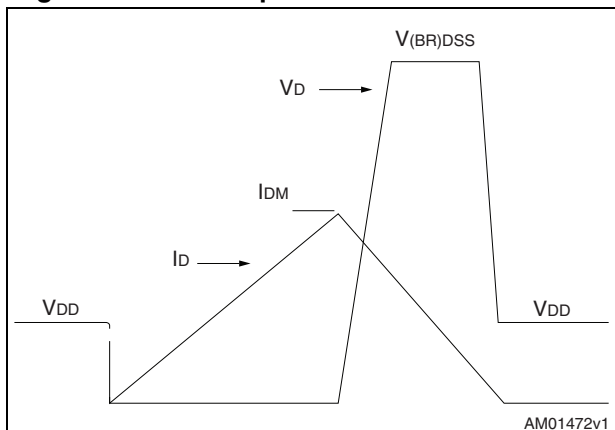
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Figure 5. Unclamped inductive load test circuit



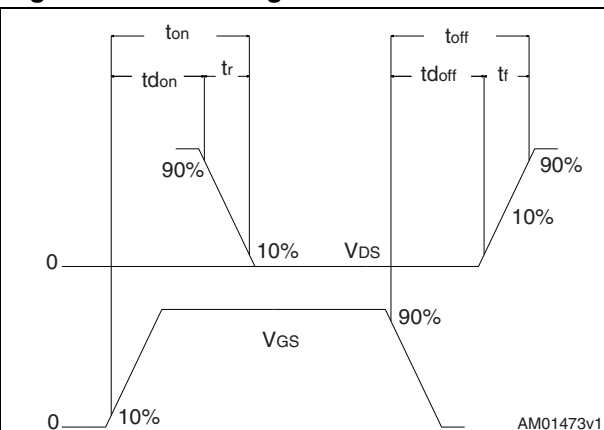
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Figure 6. Unclamped inductive waveform



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Figure 7. Switching time waveform



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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 8. 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	1.00		1.50
(L1)		2.80	
L2		0.80	
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 8. DPAK (TO-252) drawing

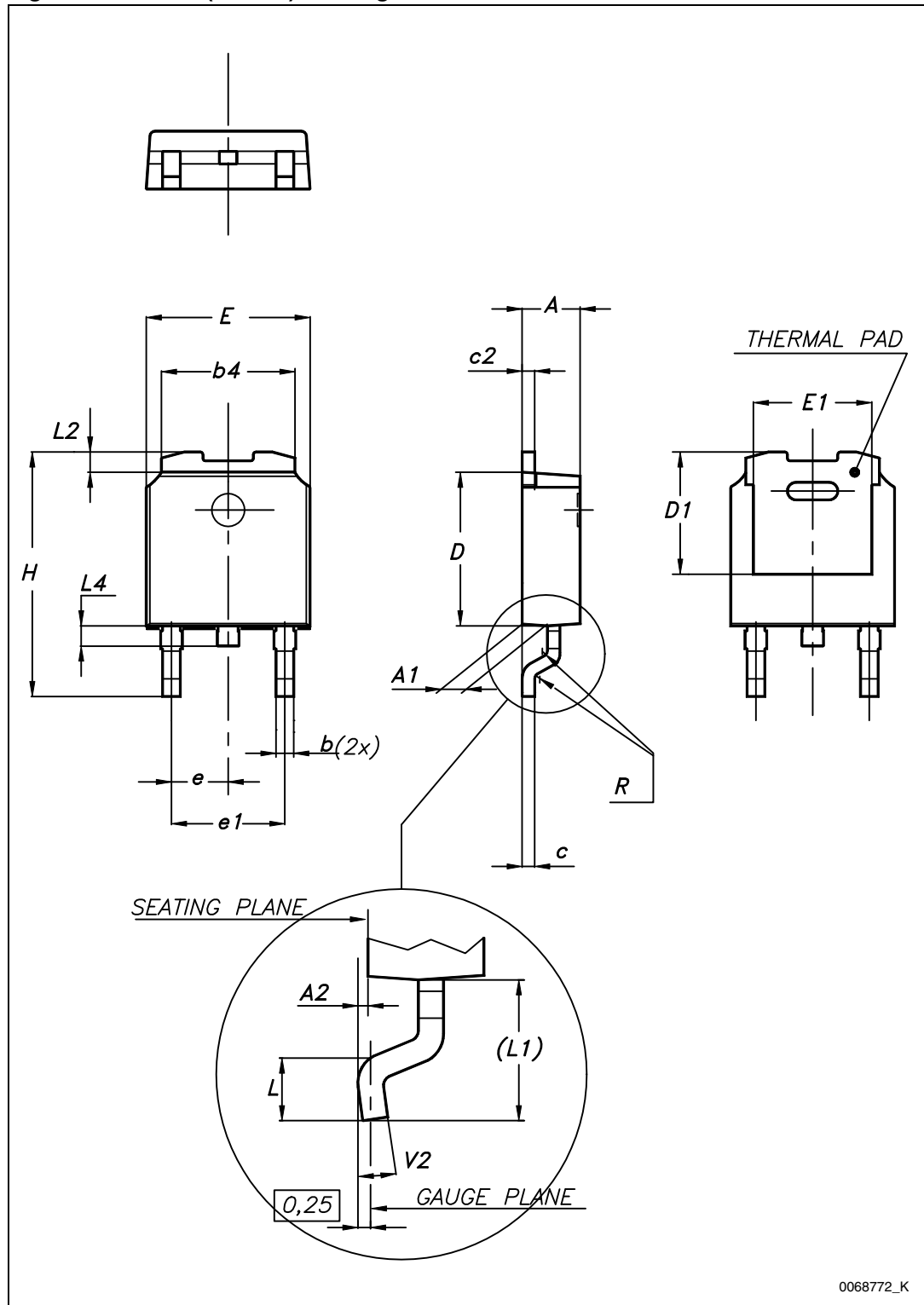
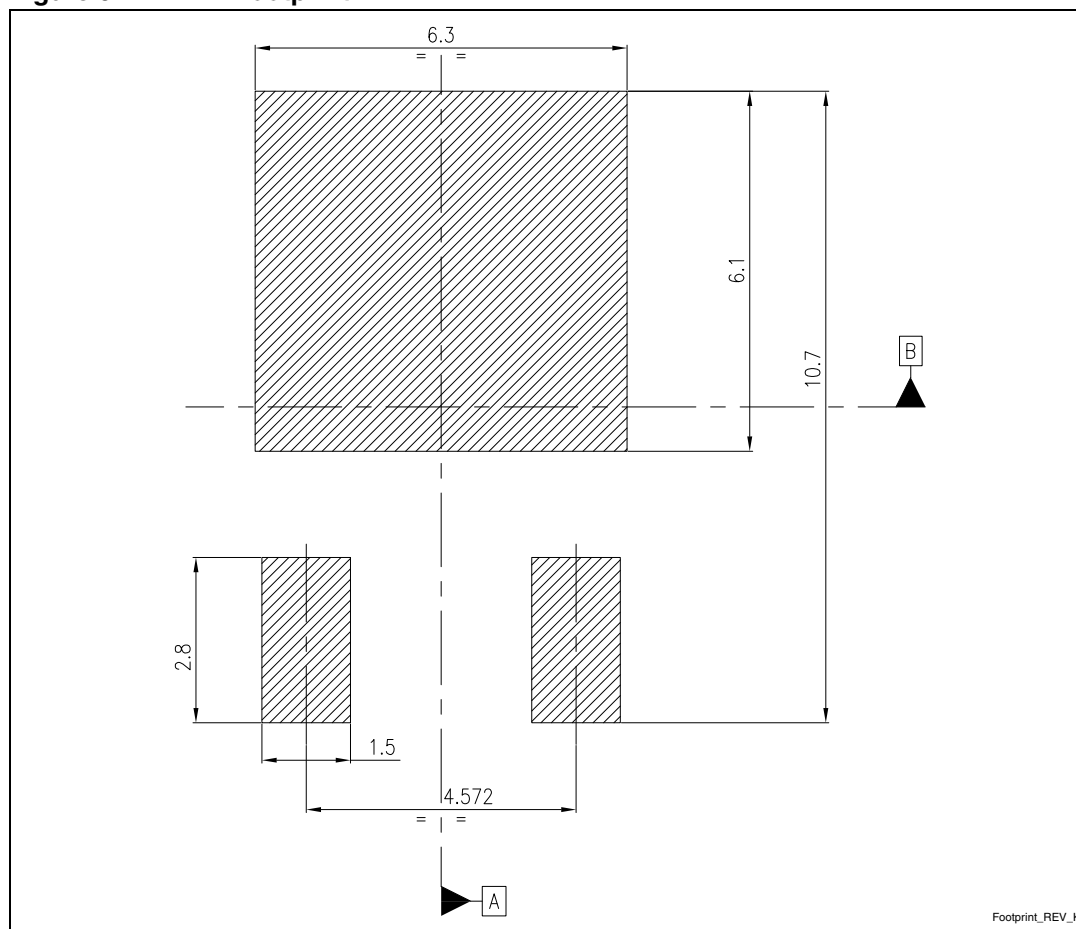


Figure 9. DPAK footprint (a)

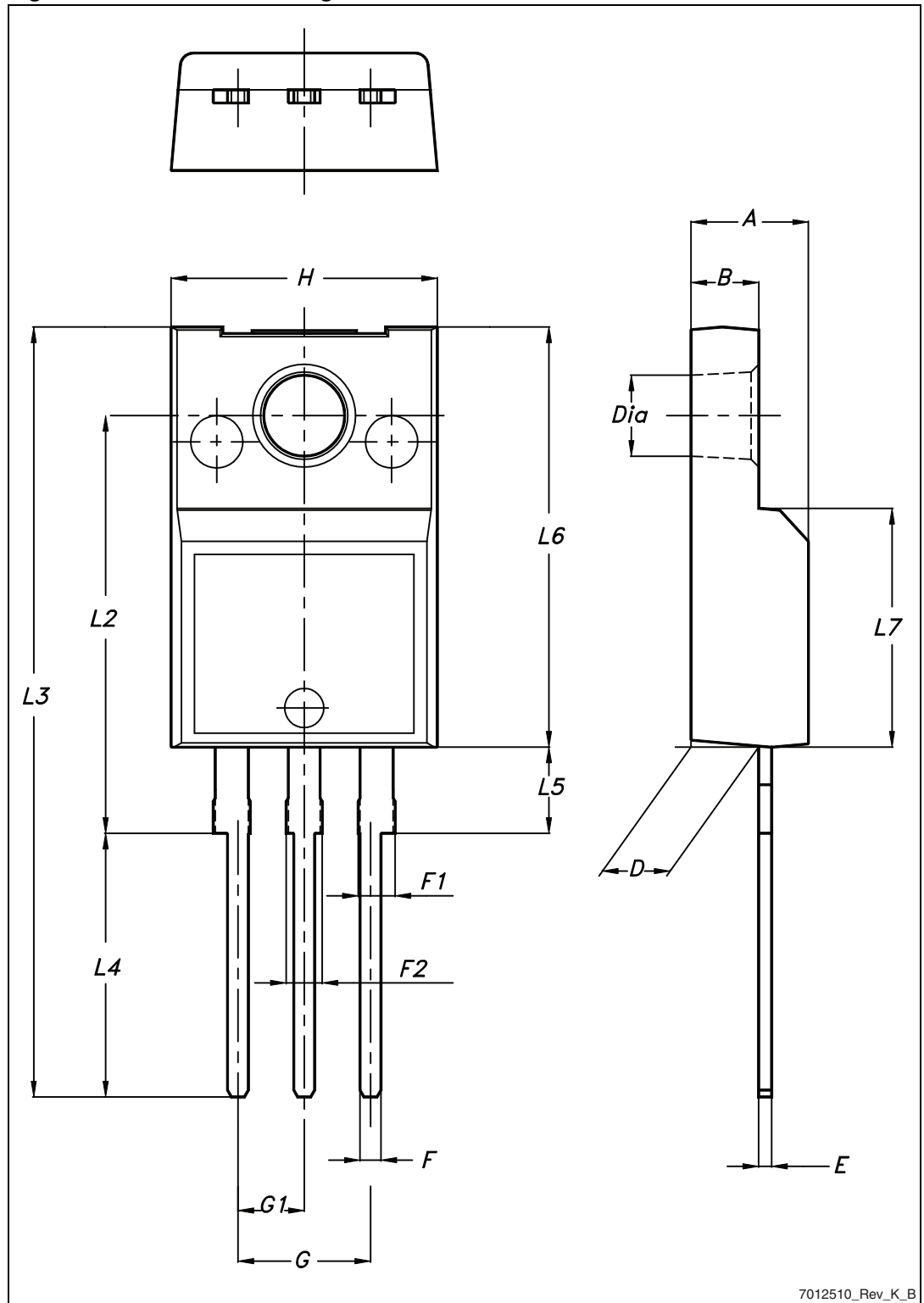


a. All dimensions are in millimeters

Table 9. TO-220FP mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

Figure 10. TO-220FP drawing

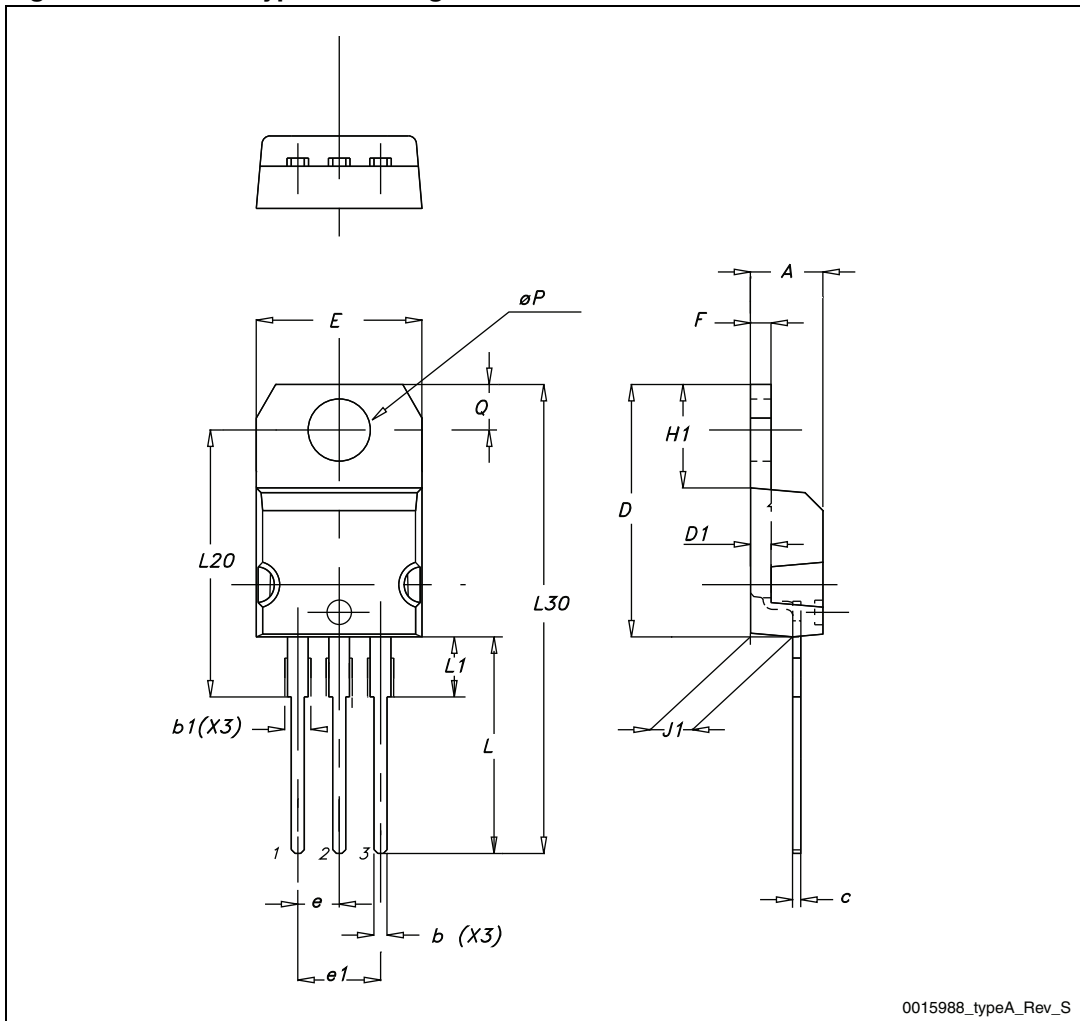


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Table 10. TO-220 type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

Figure 11. TO-220 type A drawing



5 Packaging mechanical data

Table 11. 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 12. Tape for DPAK (TO-252)

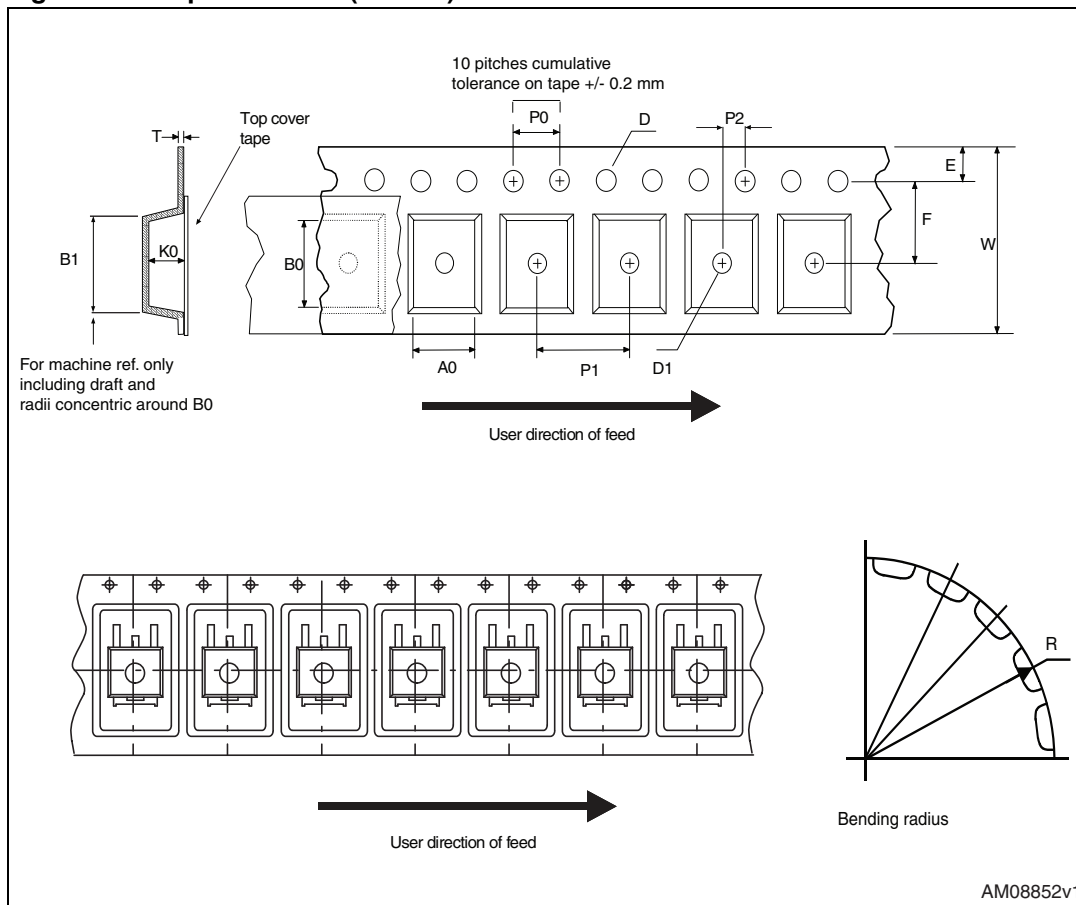
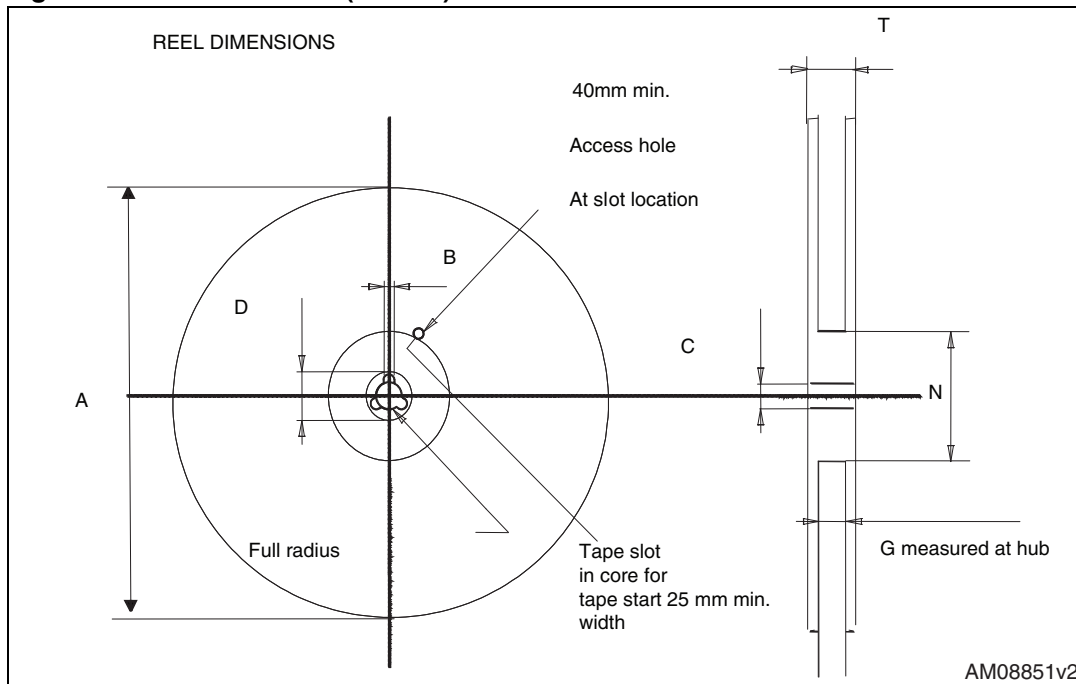


Figure 13. Reel for DPAK (TO-252)



6 Revision history

Table 12. Document revision history

Date	Revision	Changes
05-Oct-2012	1	First release.
07-Feb-2013	2	<ul style="list-style-type: none">– Inserted device in TO-220FP.– Updated title and features on the cover page, Table 1: Device summary, Table 2: Absolute maximum ratings, Table 3: Thermal resistance and Table 4: On/off states accordingly.– Updated Table 5: Dynamic, Table 6: Switching times, Table 7: Source drain diode and Section 4: Package mechanical data.– Added Section 5: Packaging mechanical data.

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