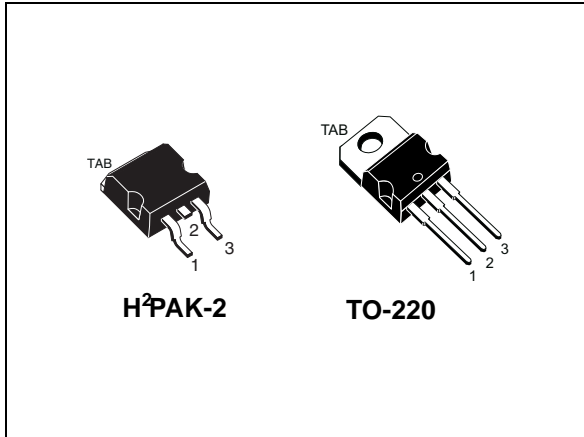


N-channel 100 V, 0.0038 Ω typ., 90 A, STripFET™ VII DeepGATE™ Power MOSFET in H²PAK-2 and TO-220 packages

Datasheet – preliminary data



Features

Order codes	V _{DS}	R _{DS(on)max}	I _D	P _{TOT}
STH150N10F7-2	100V	0.0045 Ω	90 A	250 W
STP150N10F7				

- 100% avalanche tested
- Ultra low on-resistance

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

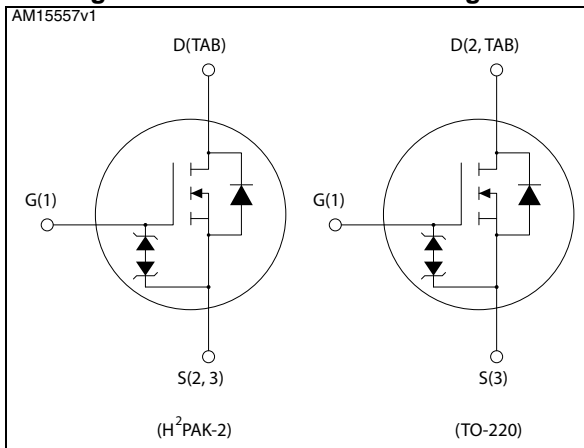


Table 1. Device summary

Order codes	Marking	Package	Packaging
STH150N10F7-2	150N10F7	H ² PAK-2	Tape and reel
STP150N10F7		TO-220	Tube

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		H ² PAK	TO-220	
V _{DS}	Drain-source voltage	100		V
V _{GS}	Gate- source voltage	±20		V
I _D	Drain current (continuous)	90	90	A
I _D	Drain current (continuous) at T _C = 100 °C	90	90	A
I _{DM} ⁽¹⁾	Drain current (pulsed) T _C = 25 °C	360	360	A
P _{TOT}	Total dissipation at T _C = 25 °C	250	250	W
T _J T _{stg}	Operating junction temperature Storage temperature	-55 to 175		°C

1. Pulse width is limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		H ² PAK	TO-220	
R _{thj-pcb} ⁽¹⁾	Thermal resistance junction-pcb max	35		°C/W
R _{thj-case}	Thermal resistance junction-case max	0.75		°C/W
R _{thj-amb}	Thermal resistance junction-ambient max		62.5	°C/W

1. When mounted on 1 inch² FR-4 board, 2 oz Cu

2 Electrical characteristics

($T_C = 25\text{ °C}$ 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	$V_{GS} = 0, V_{DS} = 100\ \text{V}$			1	μA
		$V_{GS} = 0, V_{DS} = 100\ \text{V}, T_C = 125\text{ °C}$			100	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	$V_{GS} = 10\ \text{V}, I_D = 45\ \text{A}$		0.0038	0.0045	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 50\ \text{V}, f = 1\ \text{MHz}, V_{GS} = 0$	-	6400	-	pF
C_{oss}	Output capacitance		-	1380	-	pF
C_{rss}	Reverse transfer capacitance		-	23	-	pF
Q_g	Total gate charge	$V_{DD} = 50\ \text{V}, I_D = 90\ \text{A}, V_{GS} = 10\ \text{V}$ (see Figure 3)	-	92	-	nC
Q_{gs}	Gate-source charge		-	TBD	-	nC
Q_{gd}	Gate-drain charge		-	TBD	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\ \text{V}, I_D = 45\ \text{A}, R_G = 4.7\ \Omega, V_{GS} = 10\ \text{V}$ (see Figure 2)	-	TBD	-	ns
t_r	Rise time		-	TBD	-	ns
$t_{d(off)}$	Turn-off delay time		-	TBD	-	ns
t_f	Fall time		-	TBD	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-	-	90	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-	-	360	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 90\text{ A}$, $V_{GS} = 0$	-	-	1.2	V
t_{rr}	Reverse recovery time	$I_{SD} = 90\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 80\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$ (see Figure 4)	-	-		ns
Q_{rr}	Reverse recovery charge		-	-		nC
I_{RRM}	Reverse recovery current		-	-		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

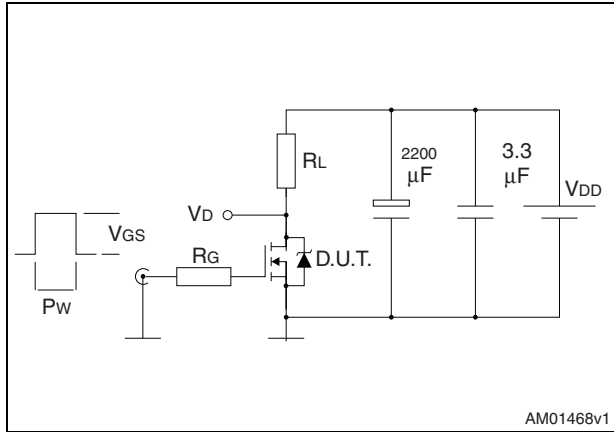


Figure 3. Gate charge test circuit

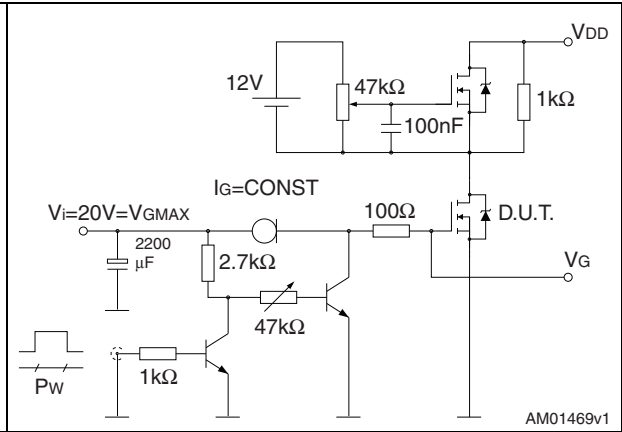


Figure 4. Test circuit for inductive load switching and diode recovery times

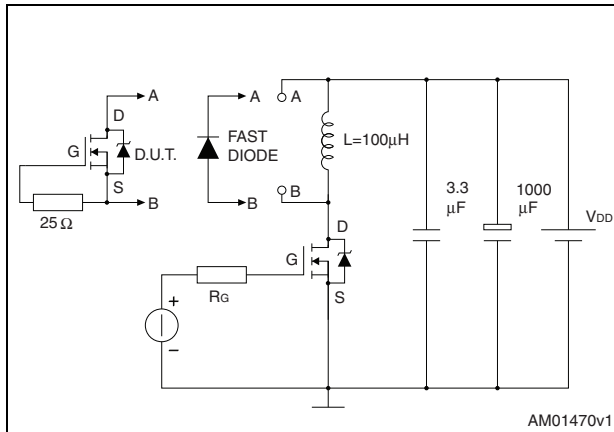


Figure 5. Unclamped inductive load test circuit

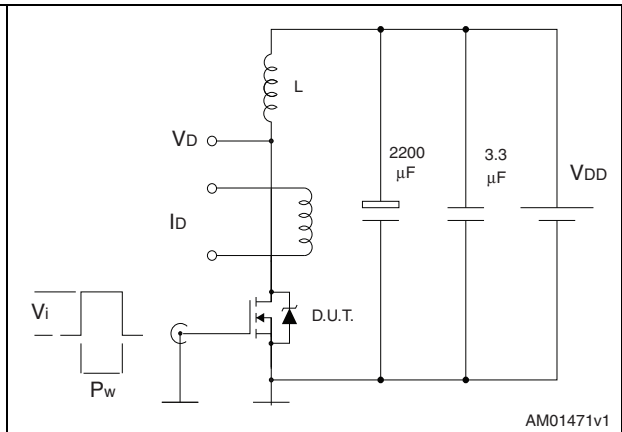


Figure 6. Unclamped inductive waveform

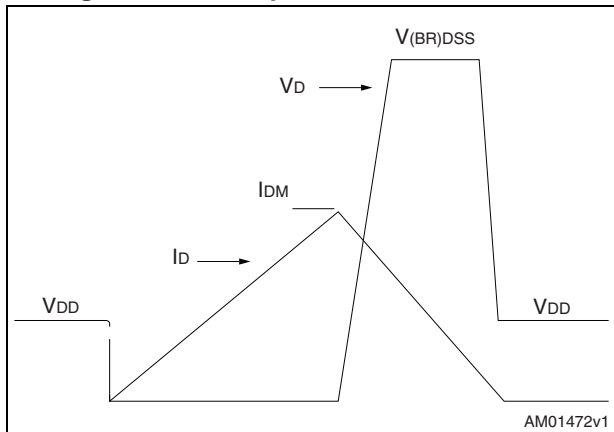
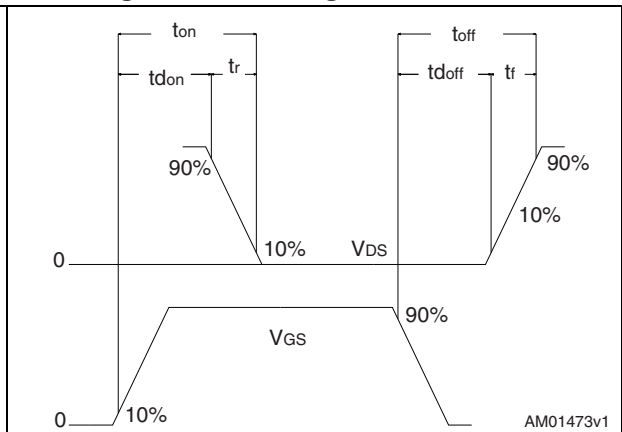


Figure 7. Switching time waveform



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. ECOPACK[®] is an ST trademark.

Table 8. H²PAK-2 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.80
A1	0.03		0.20
C	1.17		1.37
e	4.98		5.18
E	0.50		0.90
F	0.78		0.85
H	10.00		10.40
H1	7.40		7.80
L	15.30		15.80
L1	1.27		1.40
L2	4.93		5.23
L3	6.85		7.25
L4	1.5		1.7
M	2.6		2.9
R	0.20		0.60
V	0°		8°

Figure 8. H²PAK-2 drawing

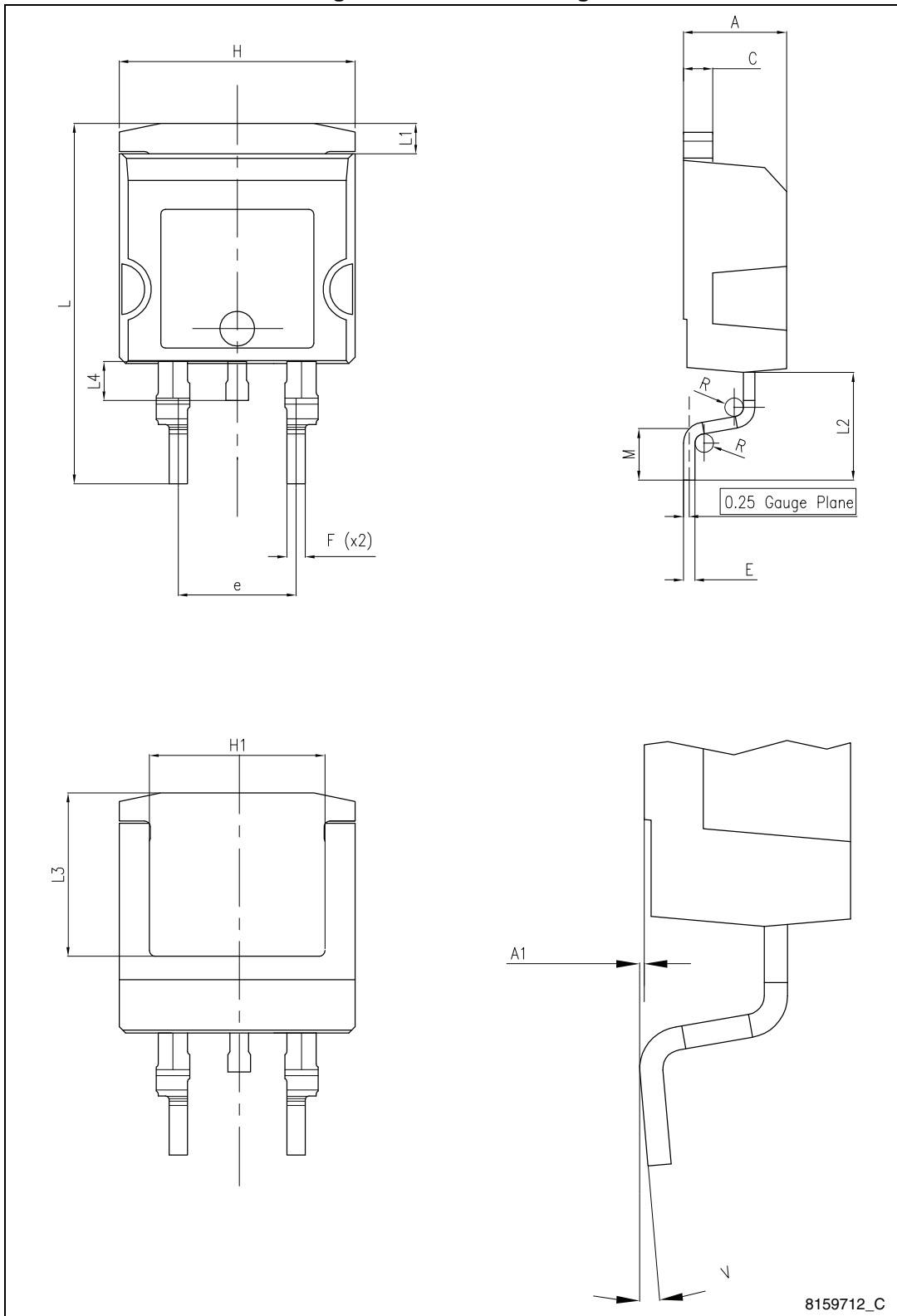
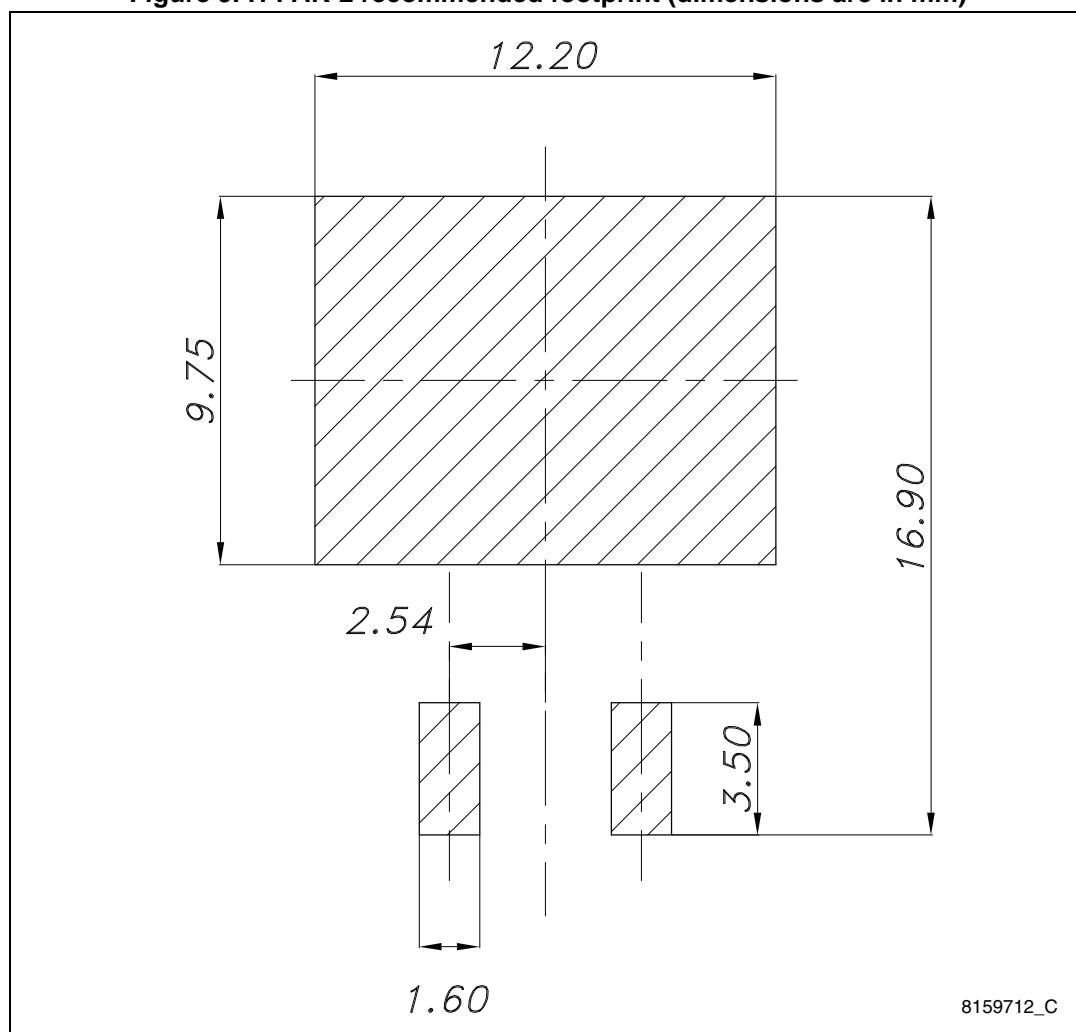


Figure 9. H²PAK-2 recommended footprint (dimensions are in mm)

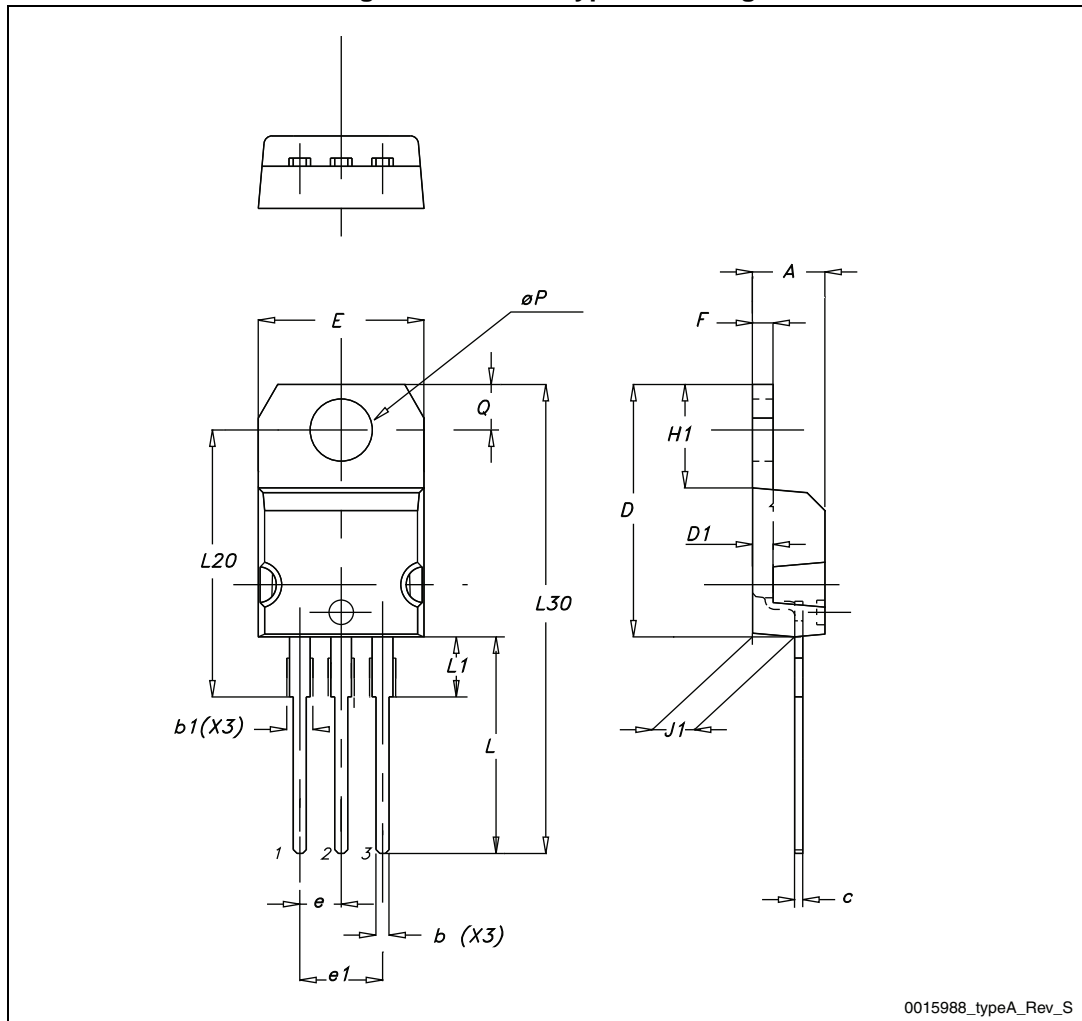


8159712_C

Table 9. 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 10. TO-220 type A drawing



5 Packaging mechanical data

Table 10. H²PAK-2 tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	10.5	10.7	A		330
B0	15.7	15.9	B	1.5	
D	1.5	1.6	C	12.8	13.2
D1	1.59	1.61	D	20.2	
E	1.65	1.85	G	24.4	26.4
F	11.4	11.6	N	100	
K0	4.8	5.0	T		30.4
P0	3.9	4.1			
P1	11.9	12.1	Base qty		1000
P2	1.9	2.1	Bulk qty		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

Figure 11. Tape

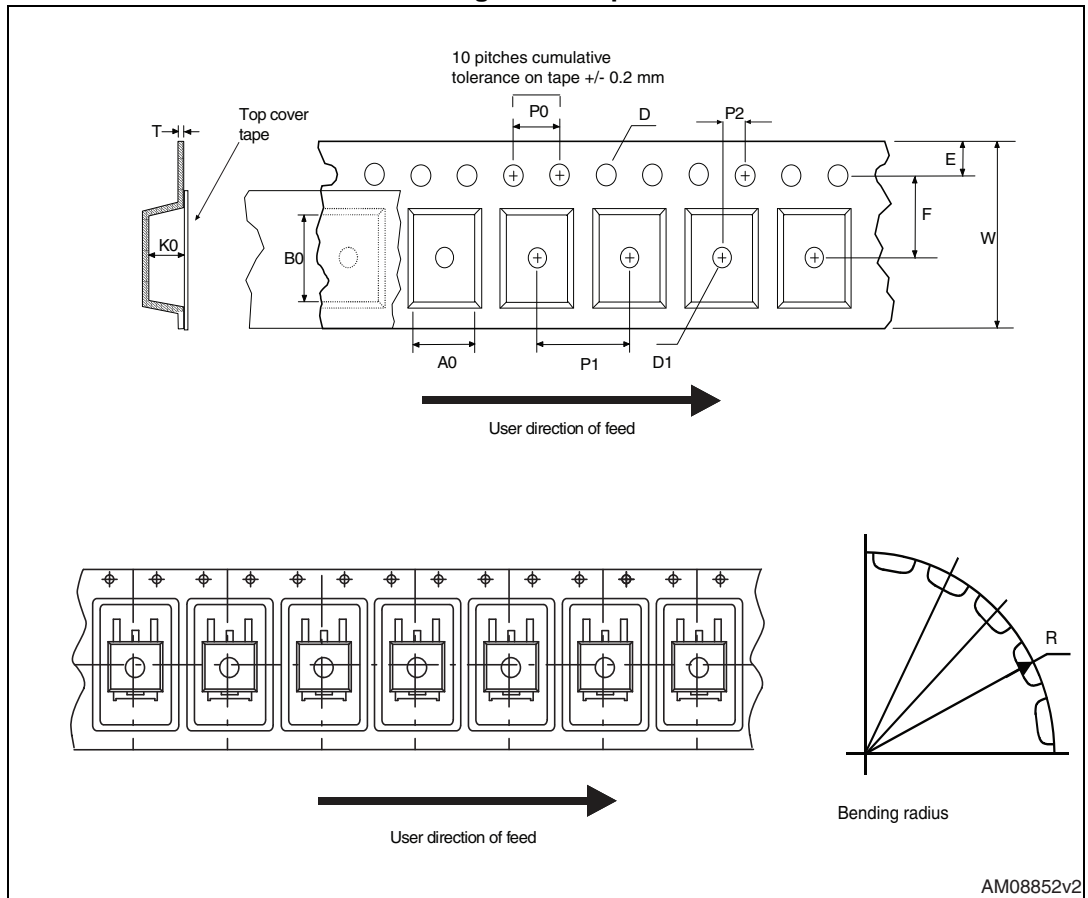
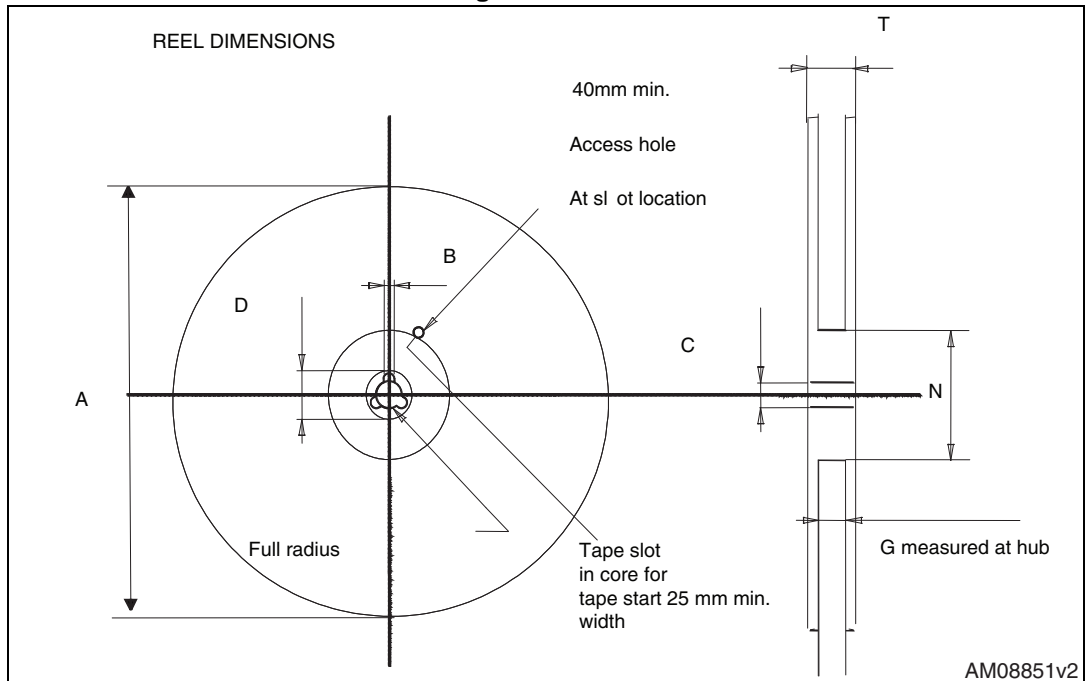


Figure 12. Reel



6 Revision history

Table 11. Document revision history

Date	Revision	Changes
16-Apr-2013	1	First release.

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