

Automotive-grade N-channel 80 V, 3.3 mΩ typ., 90 A STripFET™ F7 Power MOSFET in a H²PAK-2 package

Datasheet - production data

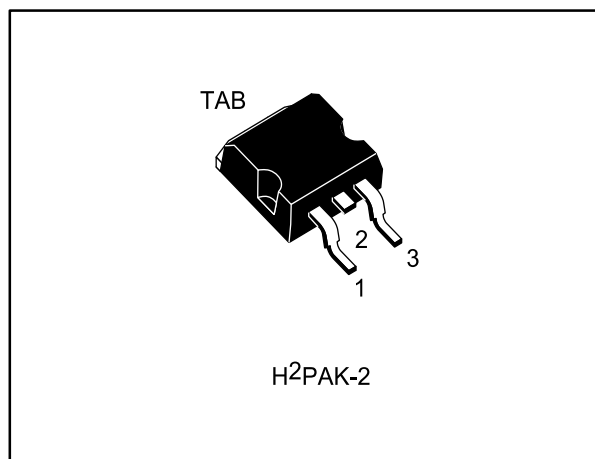
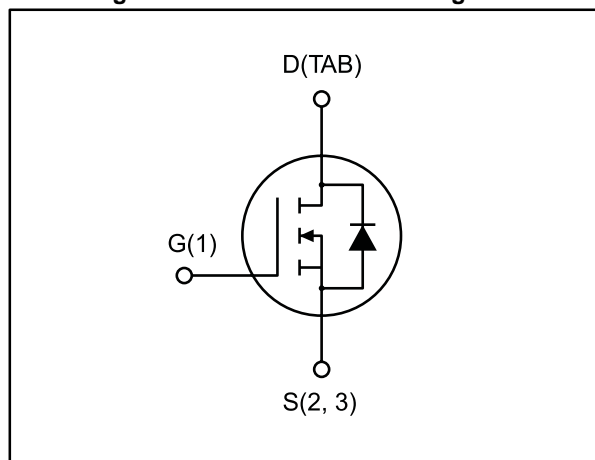


Figure 1: Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)} max.	I _D	P _{TOT}
STH145N8F7-2AG	80 V	4 mΩ	90 A	200 W

- Designed for automotive applications and AEC-Q101 qualified
- Among the lowest R_{DS(on)} on the market
- Excellent figure of merit (FoM)
- Low C_{rss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

This N-channel Power MOSFET utilizes STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

Table 1: Device summary

Order code	Marking	Package	Packaging
STH145N8F7-2AG	145N8F7	H ² PAK-2	Tape and reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
	2.1 Electrical characteristics (curves).....	6
3	Test circuits	8
4	Package information	9
	4.1 H ² PAK-2 package information.....	10
5	Packing information	13
6	Revision history	15

1 Electrical ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	80	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	90 ⁽¹⁾	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	90	A
I_{DM} ⁽²⁾	Drain current (pulsed)	360	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	200	W
E_{AS} ⁽³⁾	Single pulse avalanche energy	515	mJ
T_j	Operating junction temperature	- 55 to 175	$^\circ\text{C}$
T_{stg}	Storage temperature		

Notes:

⁽¹⁾Limited by package

⁽²⁾Pulse width is limited by safe operating area

⁽³⁾Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = 18.5\text{ A}$, $V_{DD} = 50\text{ V}$

Table 3: Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-pcb}$ ⁽¹⁾	Thermal resistance junction-pcb	35	$^\circ\text{C/W}$
$R_{thj-case}$	Thermal resistance junction-case	0.75	$^\circ\text{C/W}$

Notes:

⁽¹⁾When mounted on FR-4 board of 1inch², 2oz Cu

2 Electrical characteristics

(T_{CASE} = 25 ° 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 μA	80			V
I _{DSS}	Zero gate voltage Drain current	V _{GS} = 0, V _{DS} = 80 V			1	μA
		V _{GS} = 0, V _{DS} = 80 V, T _J = 125 ° C			10	μA
I _{GSS}	Gate-source leakage current	V _{DS} = 0, V _{GS} = ± 20 V			± 100	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2.5		4.5	V
R _{DS(on)}	Static drain-source on-resistance	V _{GS} = 10 V, I _D = 45 A		3.3	4	mΩ

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input capacitance	V _{GS} = 0, V _{DS} = 40 V, f = 1 MHz	-	6340	-	pF
C _{oss}	Output capacitance		-	1195	-	pF
C _{rss}	Reverse transfer capacitance		-	105	-	pF
Q _g	Total gate charge	V _{DD} = 40 V, I _D = 64 A, V _{GS} = 10 V	-	96	-	nC
Q _{gs}	Gate-source charge		-	30	-	nC
Q _{gd}	Gate-drain charge		-	26	-	nC

Table 6: Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 40 V, I _D = 45 A R _G = 4.7 Ω, V _{GS} = 10 V	-	26	-	ns
t _r	Rise time		-	51	-	ns
t _{d(off)}	Turn-off-delay time		-	82	-	ns
t _f	Fall time		-	44	-	ns

Table 7: Source drain diode

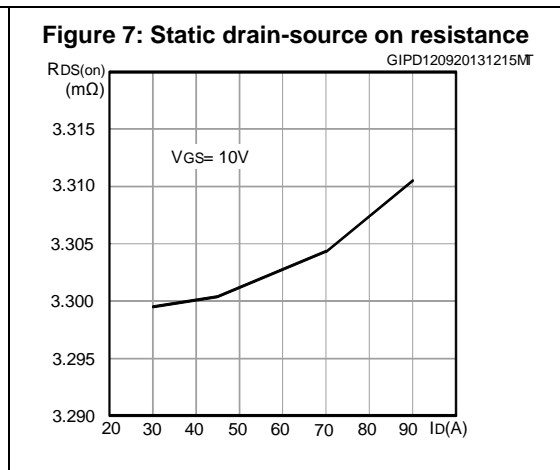
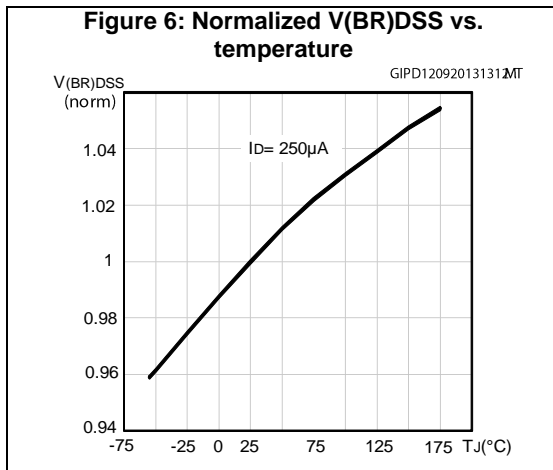
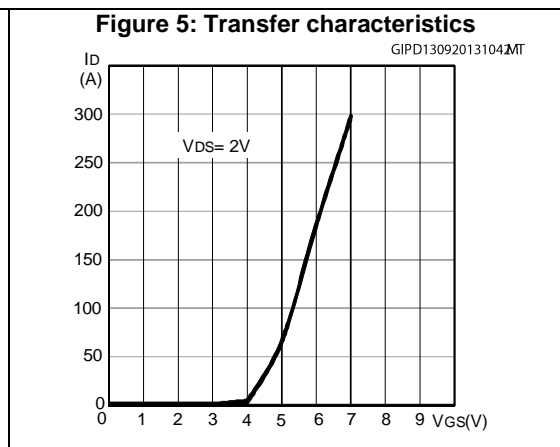
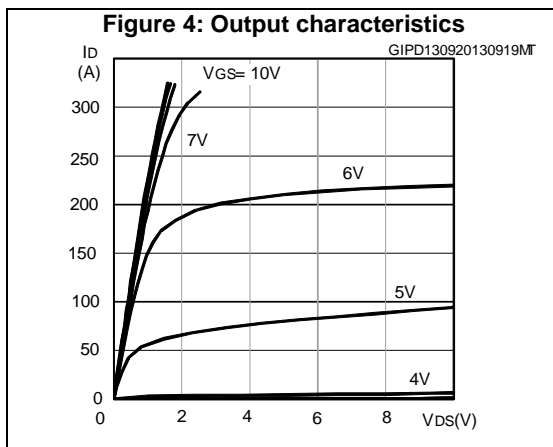
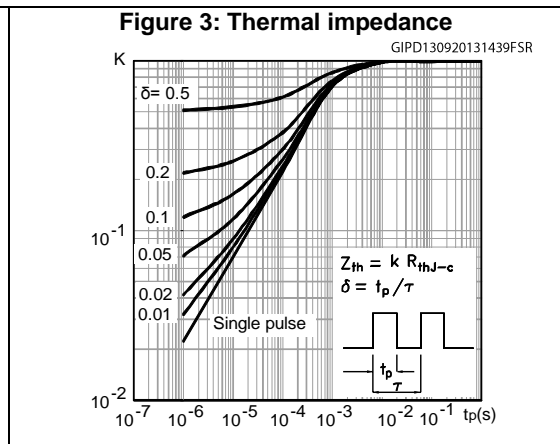
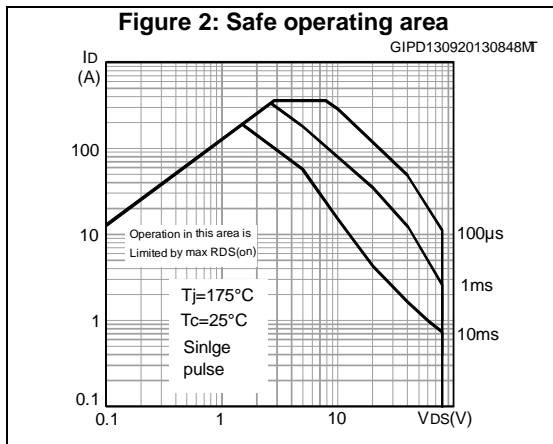
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		90	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		360	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS} = 0, I_{SD} = 90 \text{ A}$	-		1.2	V
t_{rr}	Reverse recovery time	$I_{SD} = 64 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s},$	-	58		ns
Q_{rr}	Reverse recovery charge	$V_{DD} = 60 \text{ V}$	-	92		nC
I_{RRM}	Reverse recovery current	$T_j = 150 \text{ }^\circ\text{C}$	-	3.2		A

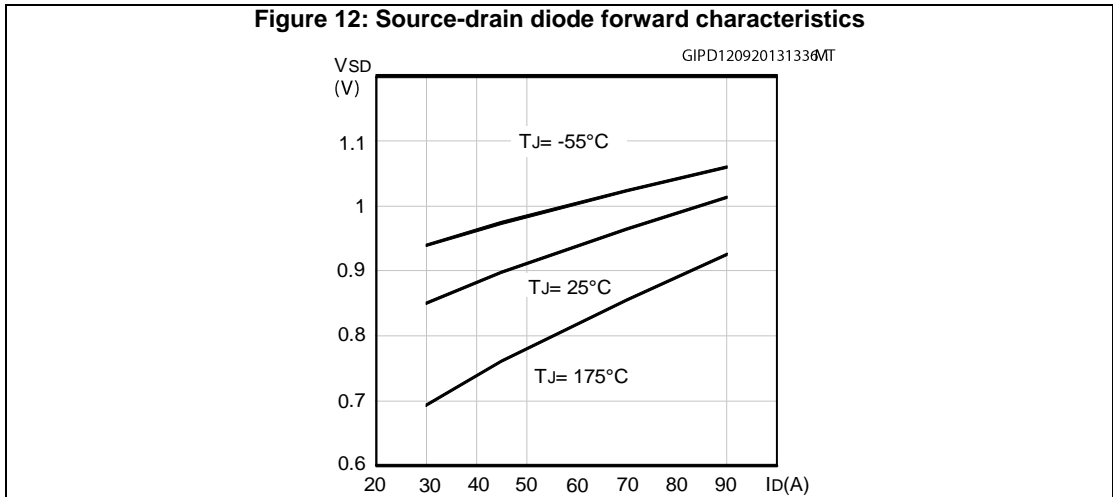
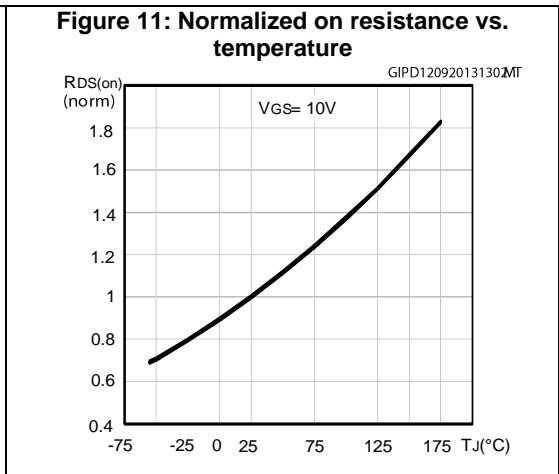
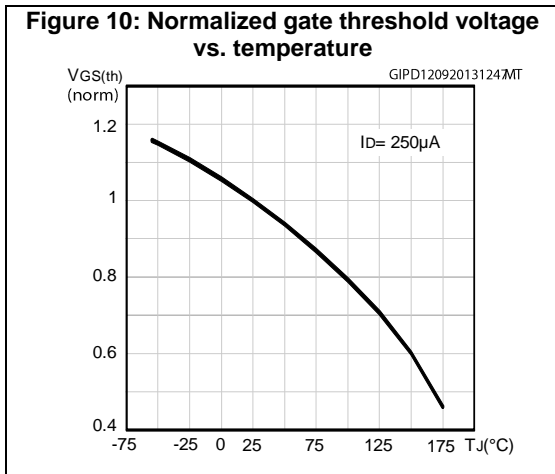
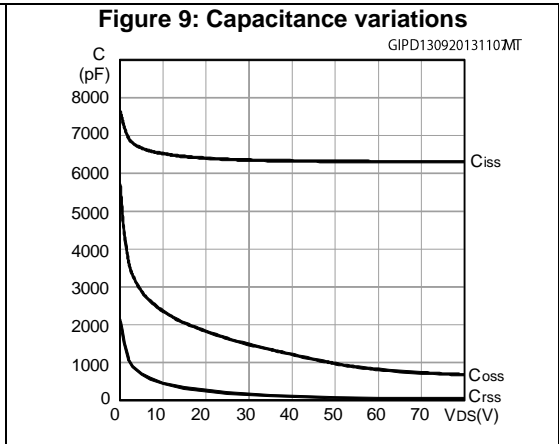
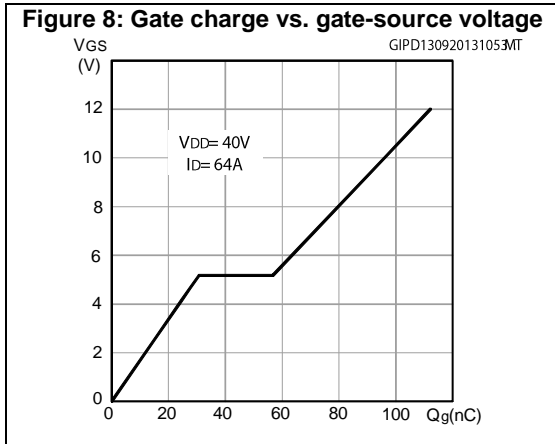
Notes:

(1)Pulse width is limited by safe operating area

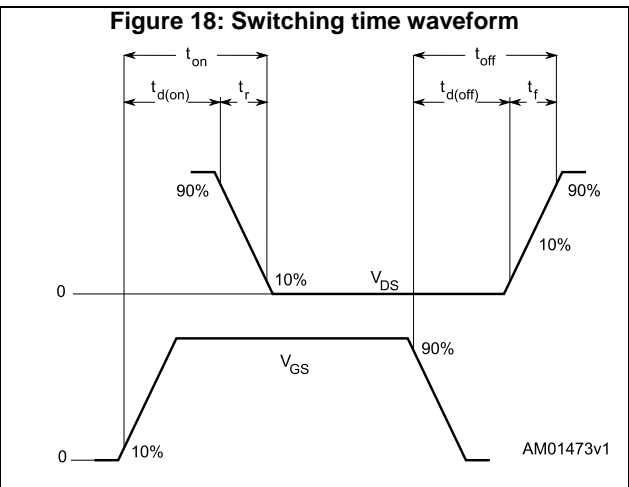
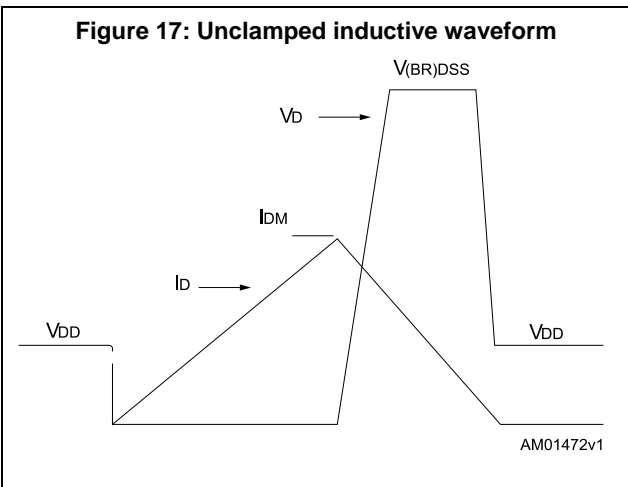
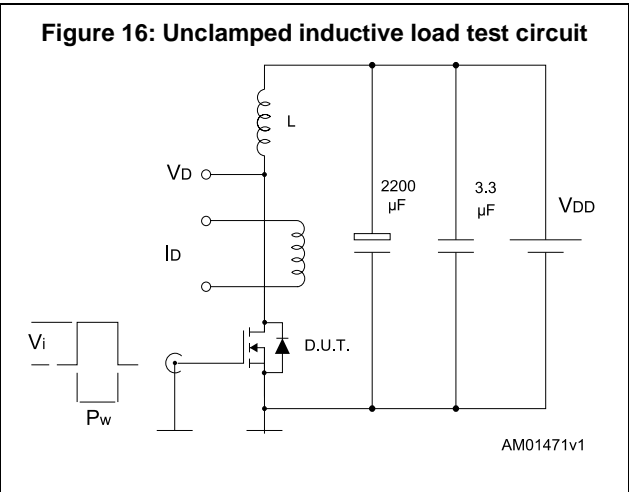
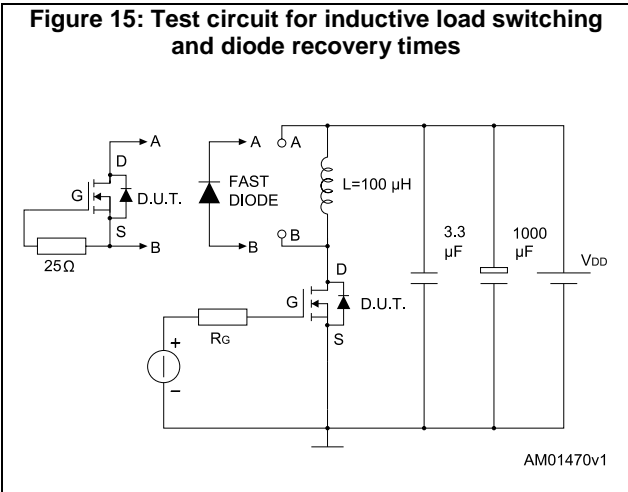
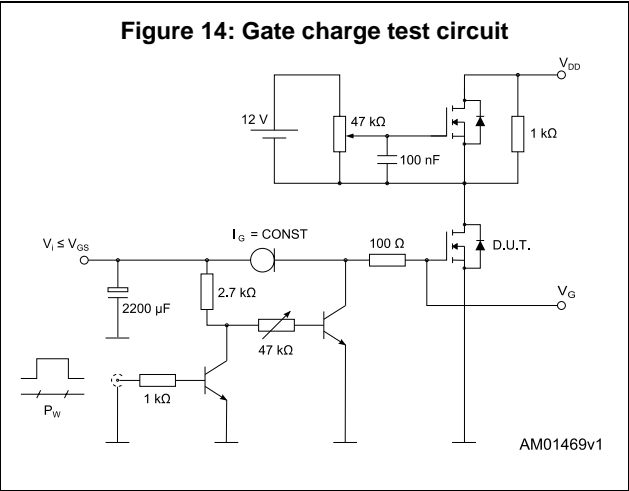
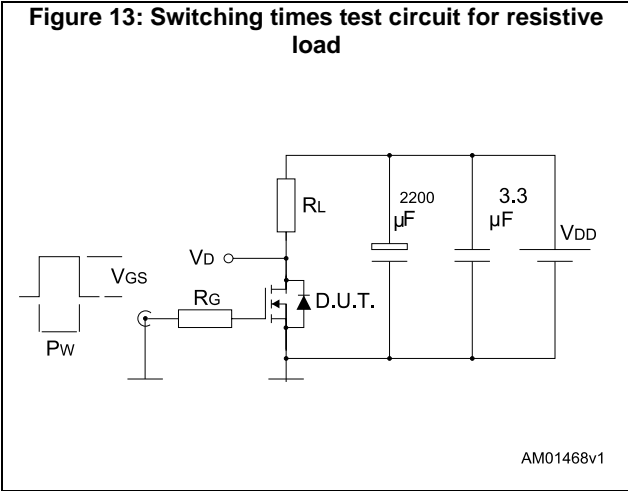
(2)Pulse test: pulse duration = 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)





3 Test circuits



4 Package information

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.

4.1 H²PAK-2 package information

Figure 19: H²PAK-2 package outline

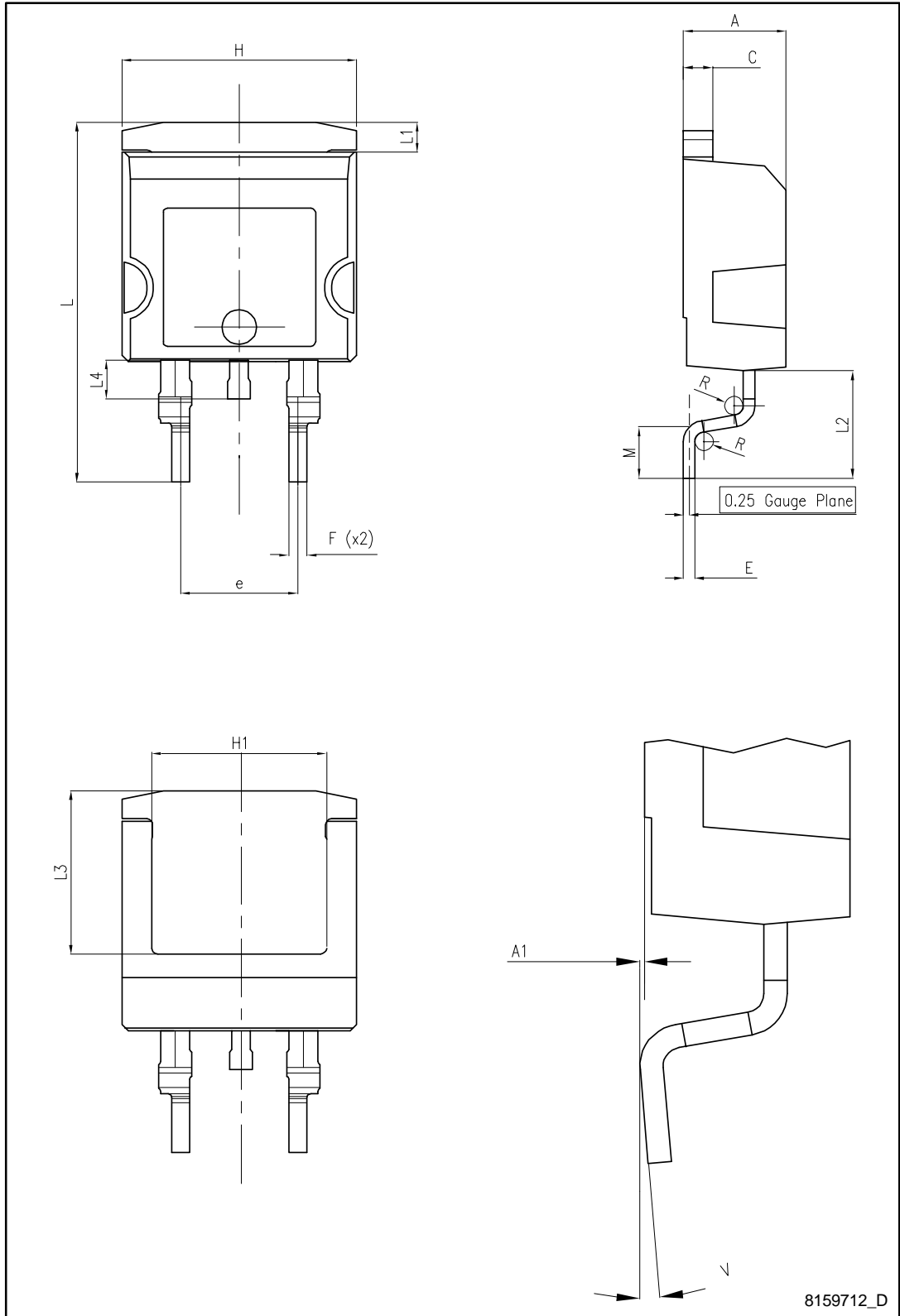
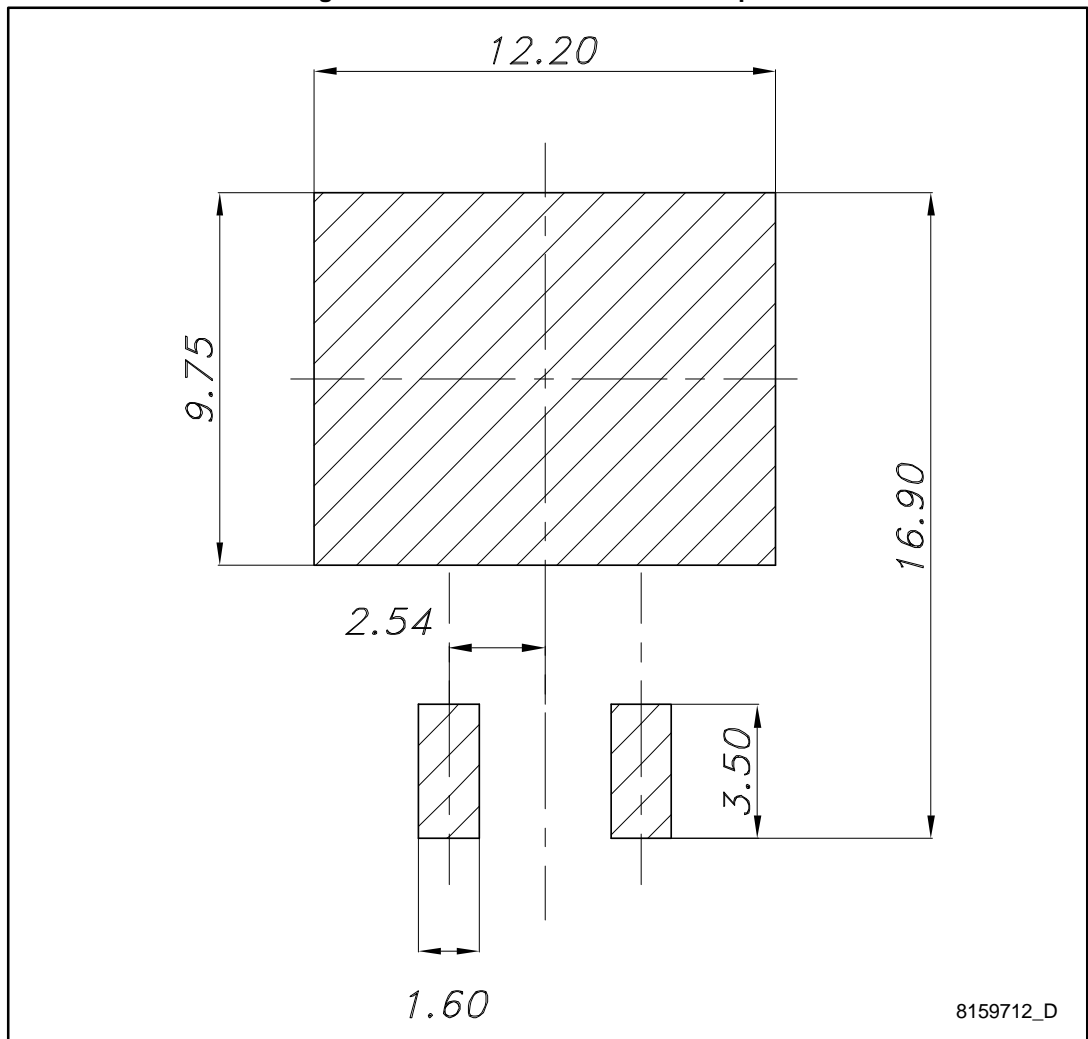


Table 8: H²PAK-2 mechanical data

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 20: H²PAK-2 recommended footprint



8159712_D

5 Packing information

Figure 21: Tape outline

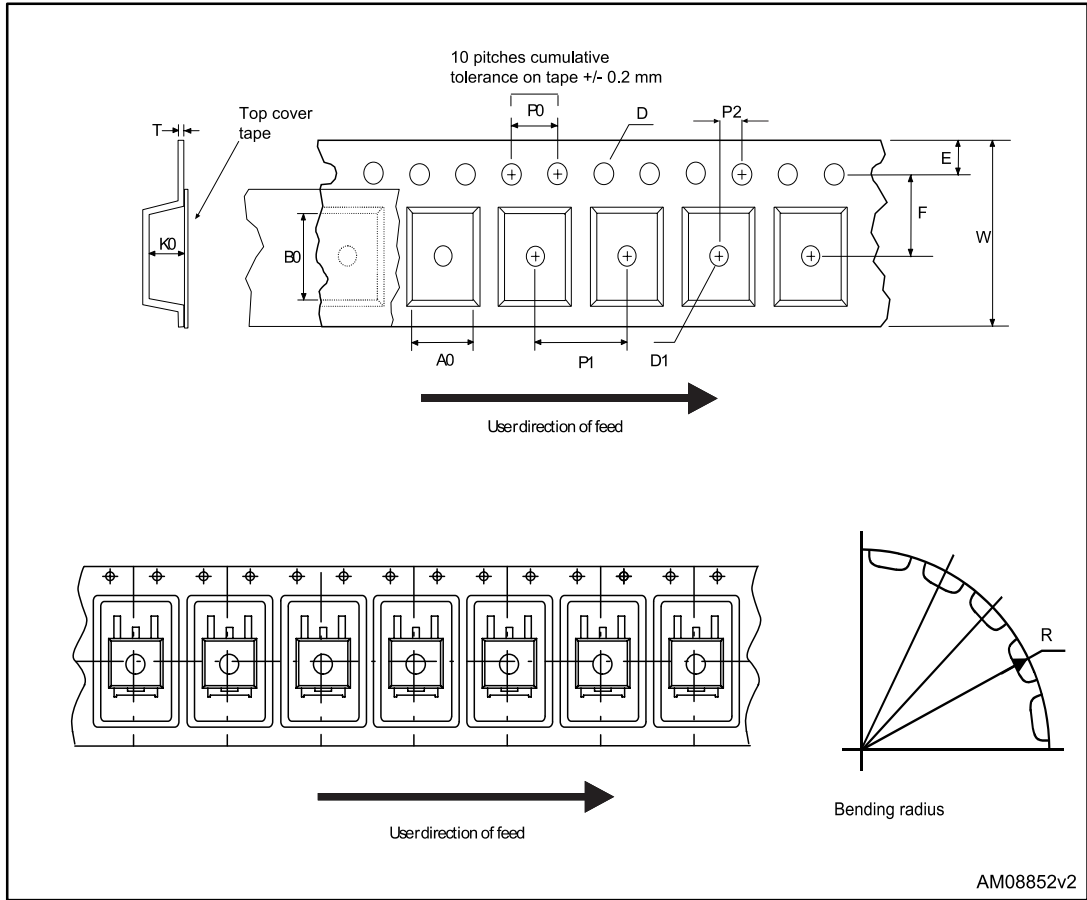


Figure 22: Reel outline

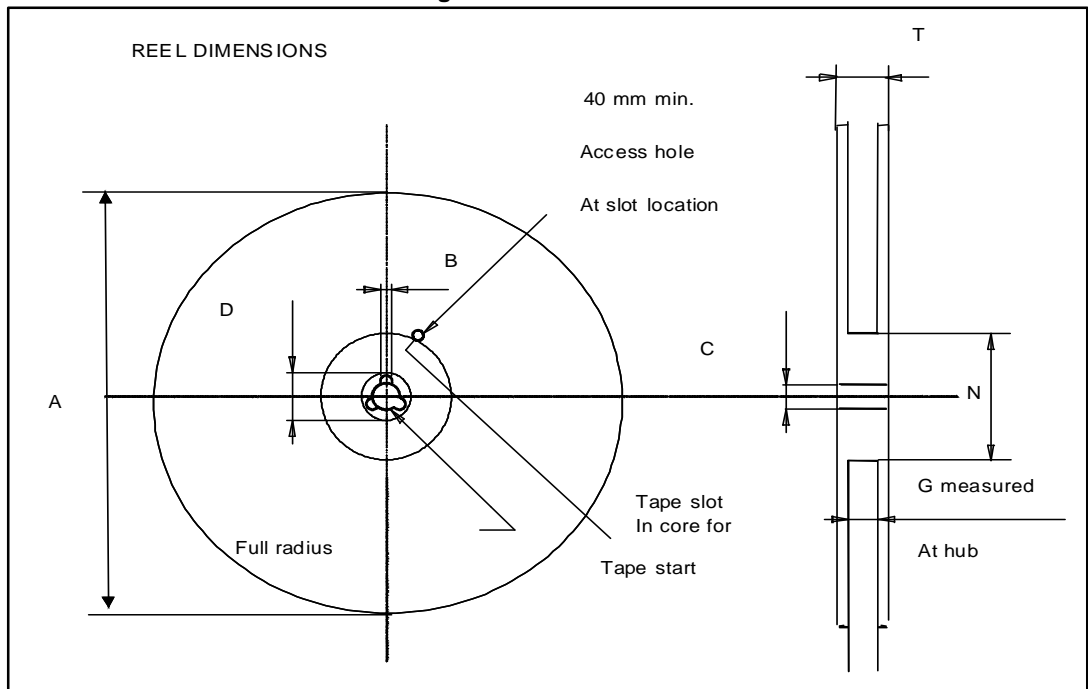


Table 9: Tape and reel mechanical data

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 quantity		1000
P2	1.9	2.1	Bulk quantity		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

6 Revision history

Table 10: Document revision history

Date	Revision	Changes
05-Jun-2015	1	First release.

IMPORTANT NOTICE – PLEASE READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2015 STMicroelectronics – All rights reserved

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STH145N8F7-2AG](#)