

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

Datasheet - production data

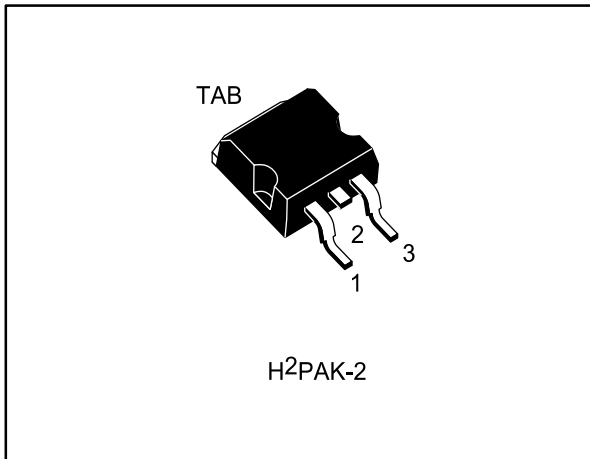
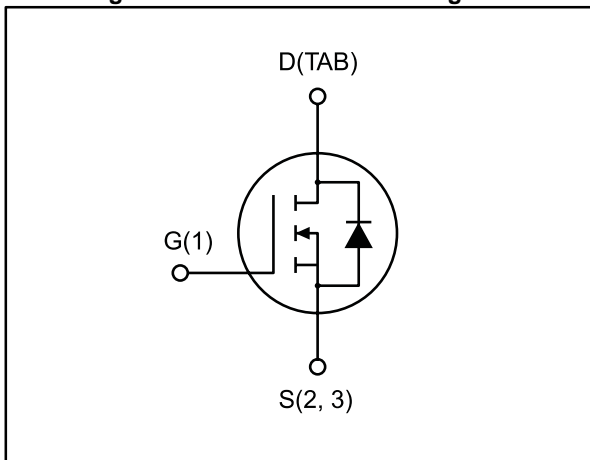


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>	P <sub>TOT</sub>
STH140N8F7-2	80 V	4 mΩ	90 A	200 W

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent figure of merit (FoM)
- Low C<sub>rss</sub>/C<sub>iss</sub> 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
STH140N8F7-2	140N8F7	H2PAK-2	Tape and reel

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# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

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

**Notes:**

<sup>(1)</sup>Limited by package

<sup>(2)</sup>Pulse width is limited by safe operating area

<sup>(3)</sup>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
$R_{thj-pcb}$ <sup>(1)</sup>	Thermal resistance junction-pcb	35	$^\circ\text{C/W}$
$R_{thj-case}$	Thermal resistance junction-case	0.75	$^\circ\text{C/W}$

**Notes:**

<sup>(1)</sup>When mounted on FR-4 board of 1inch<sup>2</sup>, 2oz Cu

## 2 Electrical characteristics

(T<sub>CASE</sub> = 25 ° C unless otherwise specified)

**Table 4: On/off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source breakdown voltage	V <sub>GS</sub> = 0, I <sub>D</sub> = 250 μA	80			V
I <sub>DSS</sub>	Zero gate voltage Drain current	V <sub>GS</sub> = 0, V <sub>DS</sub> = 80 V			1	μA
		V <sub>GS</sub> = 0, V <sub>DS</sub> = 80 V, T <sub>J</sub> = 125 ° C			10	μA
I <sub>GSS</sub>	Gate-source leakage current	V <sub>DS</sub> = 0, V <sub>GS</sub> = ± 20 V			± 100	nA
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5		4.5	V
R <sub>DS(on)</sub>	Static drain-source on-resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 45 A		3.3	4	mΩ

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C <sub>iss</sub>	Input capacitance	V <sub>GS</sub> = 0, V <sub>DS</sub> = 40 V, f = 1 MHz	-	6340	-	pF
C <sub>OSS</sub>	Output capacitance		-	1195	-	pF
C <sub>rSS</sub>	Reverse transfer capacitance		-	105	-	pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 64 A, V <sub>GS</sub> = 10 V	-	96	-	nC
Q <sub>gs</sub>	Gate-source charge		-	30	-	nC
Q <sub>gd</sub>	Gate-drain charge		-	26	-	nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 45 A R <sub>G</sub> = 4.7 Ω, V <sub>GS</sub> = 10 V	-	26	-	ns
t <sub>r</sub>	Rise time		-	51	-	ns
t <sub>d(off)</sub>	Turn-off-delay time		-	82	-	ns
t <sub>f</sub>	Fall time		-	44	-	ns

**Table 7: Source drain diode**

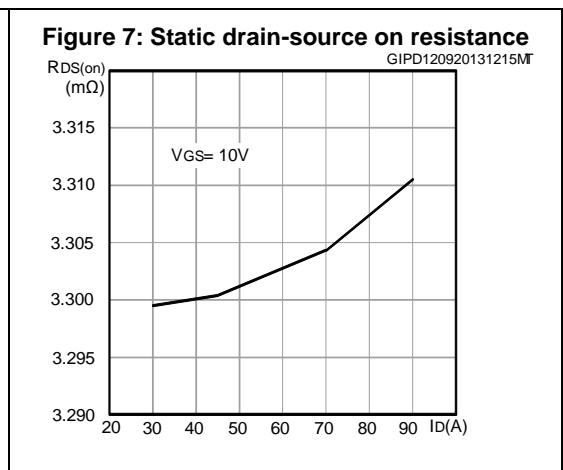
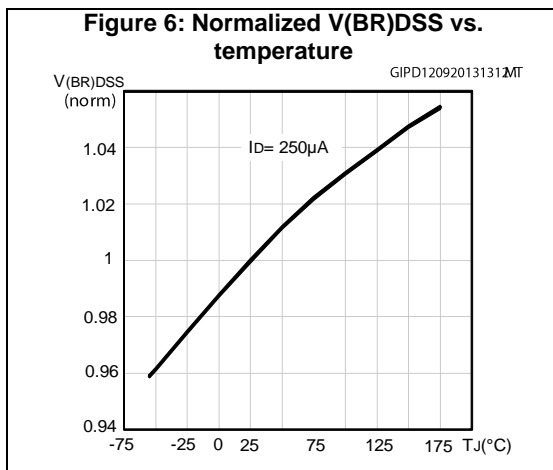
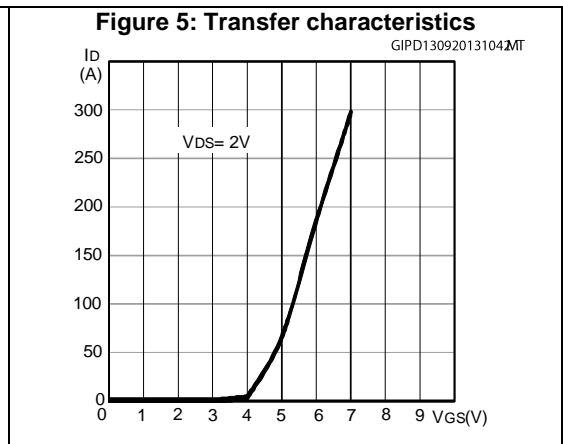
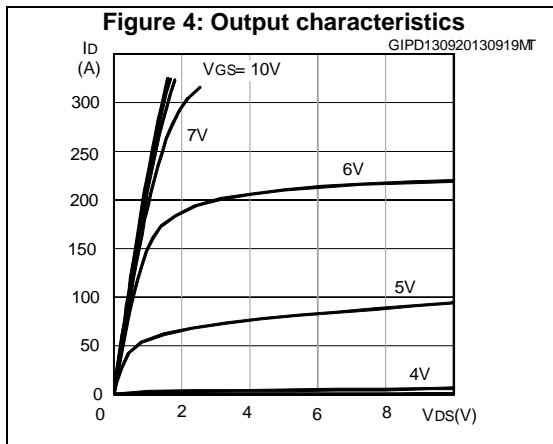
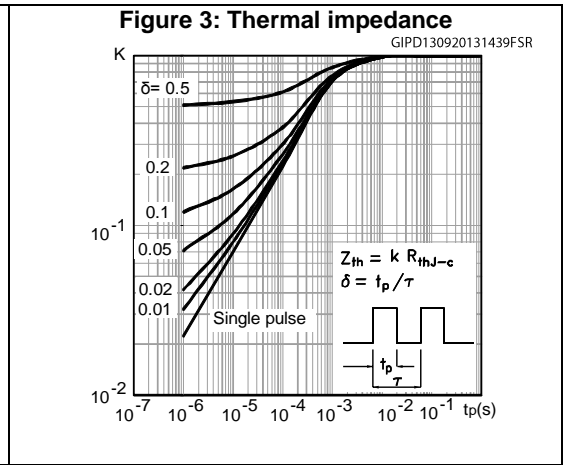
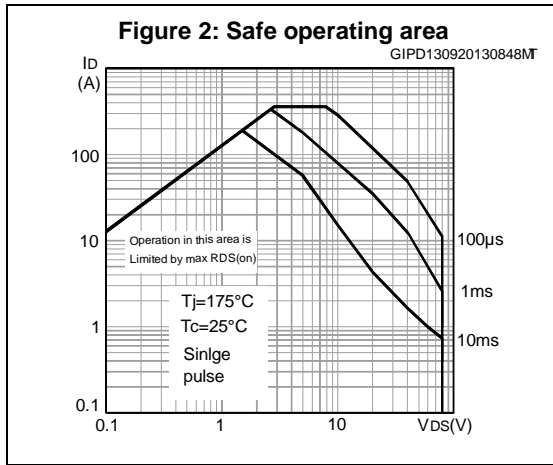
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I <sub>SD</sub>	Source-drain current		-		90	A
I <sub>SDM</sub> <sup>(1)</sup>	Source-drain current (pulsed)		-		360	A
V <sub>SD</sub> <sup>(2)</sup>	Forward on voltage	V <sub>GS</sub> = 0, I <sub>SD</sub> = 90 A	-		1.2	V
t <sub>rr</sub>	Reverse recovery time	I <sub>SD</sub> = 64 A, di/dt = 100 A/μs, V <sub>DD</sub> = 60 V, T <sub>J</sub> = 150 ° C	-	58		ns
Q <sub>rr</sub>	Reverse recovery charge		-	92		nC
I <sub>RRM</sub>	Reverse recovery current		-	3.2		A

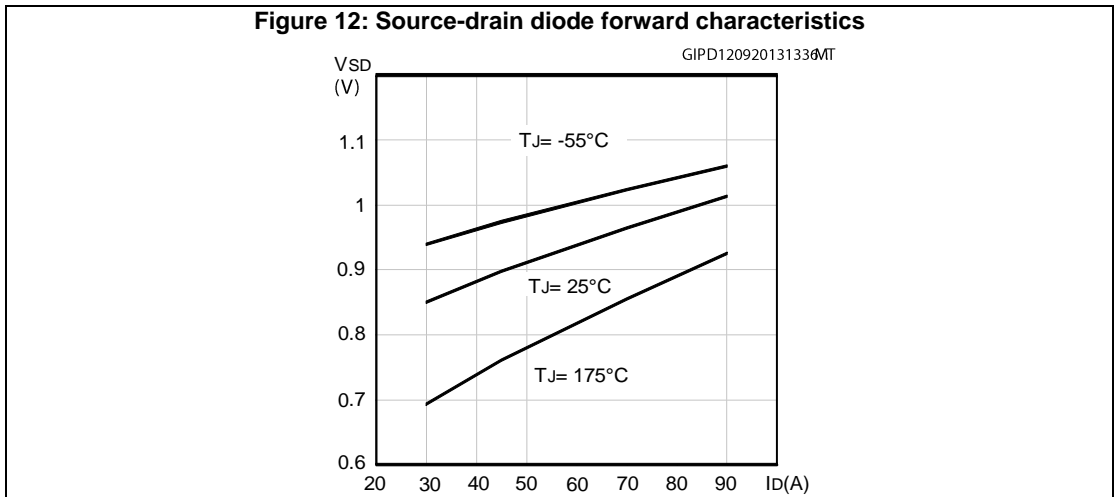
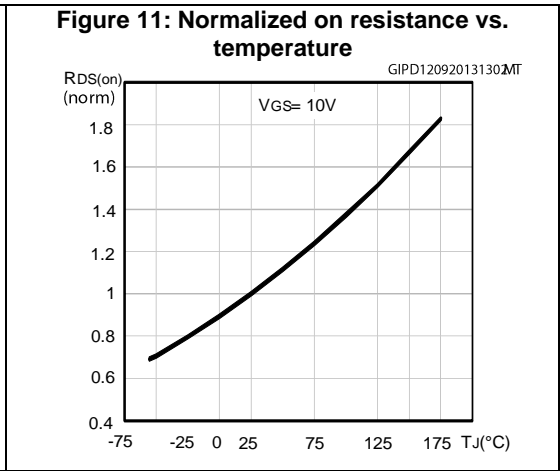
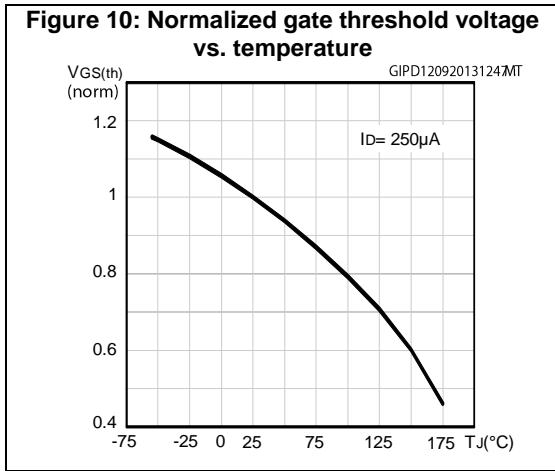
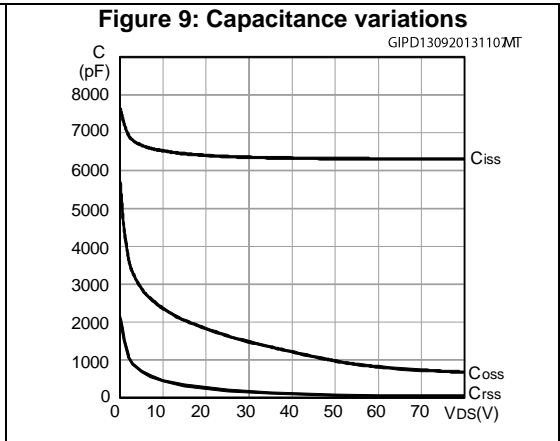
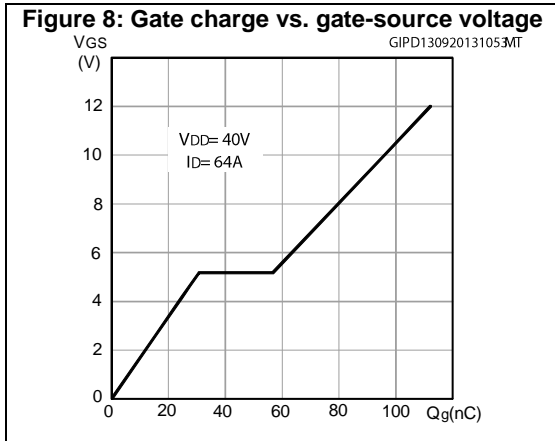
**Notes:**

<sup>(1)</sup>Pulse width is limited by safe operating area

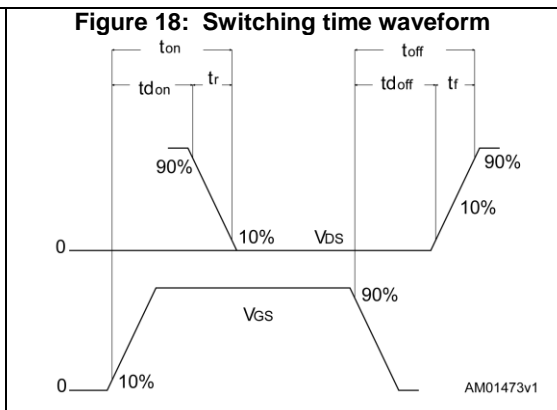
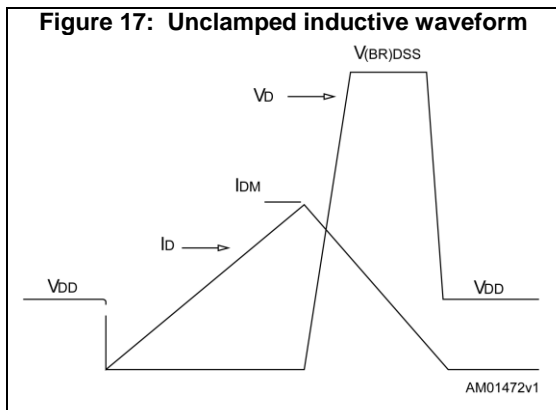
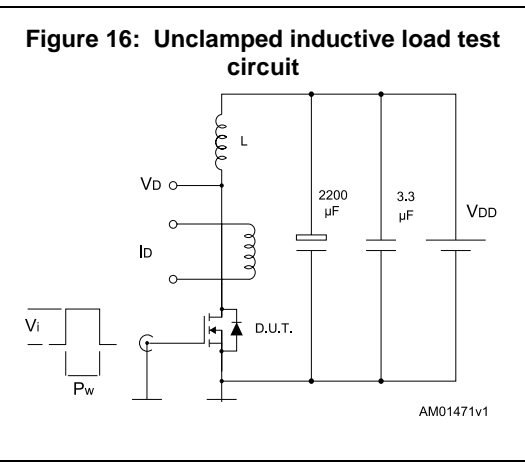
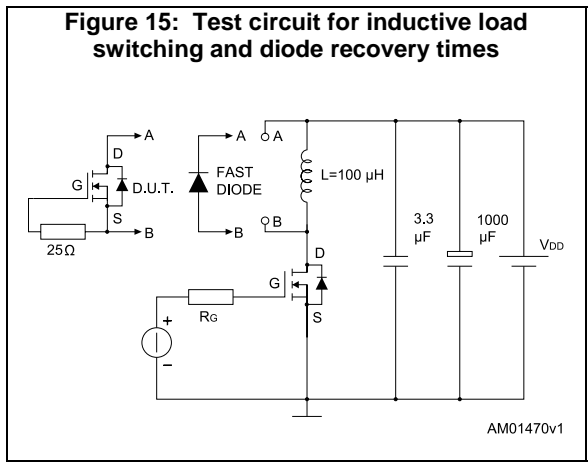
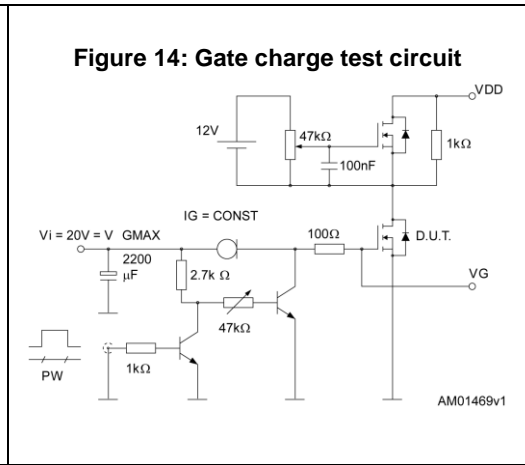
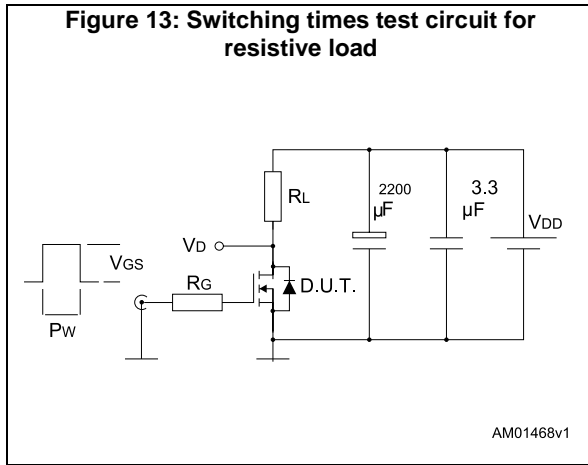
<sup>(2)</sup>Pulse test: pulse duration = 300 μ s, duty cycle 1.5%

## 2.1 Electrical characteristics (curves)





### 3 Test circuit



## 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.



### 4.1 H2PAK-2 mechanical data

Figure 19: H<sup>2</sup>PAK-2 leads drawing

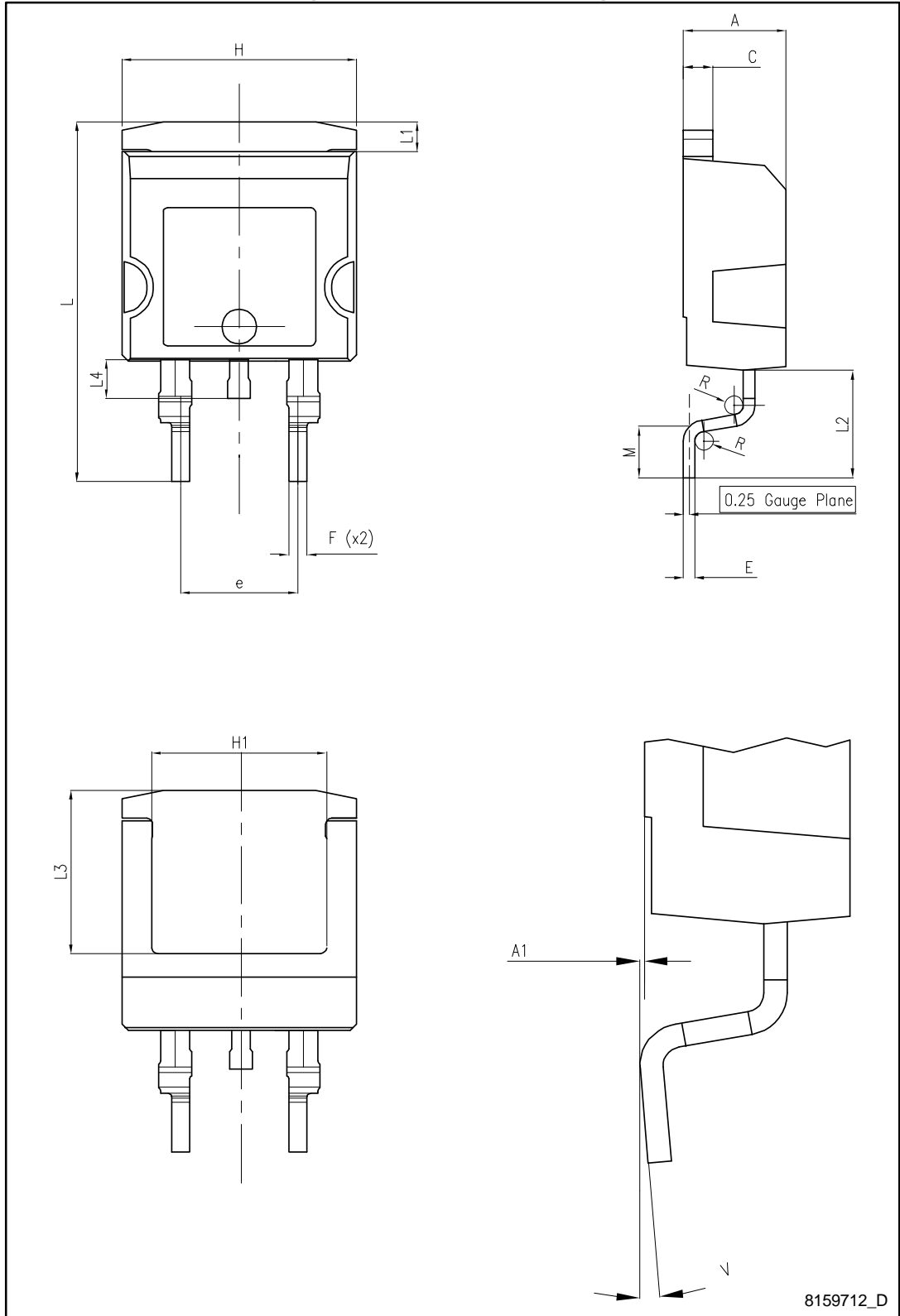
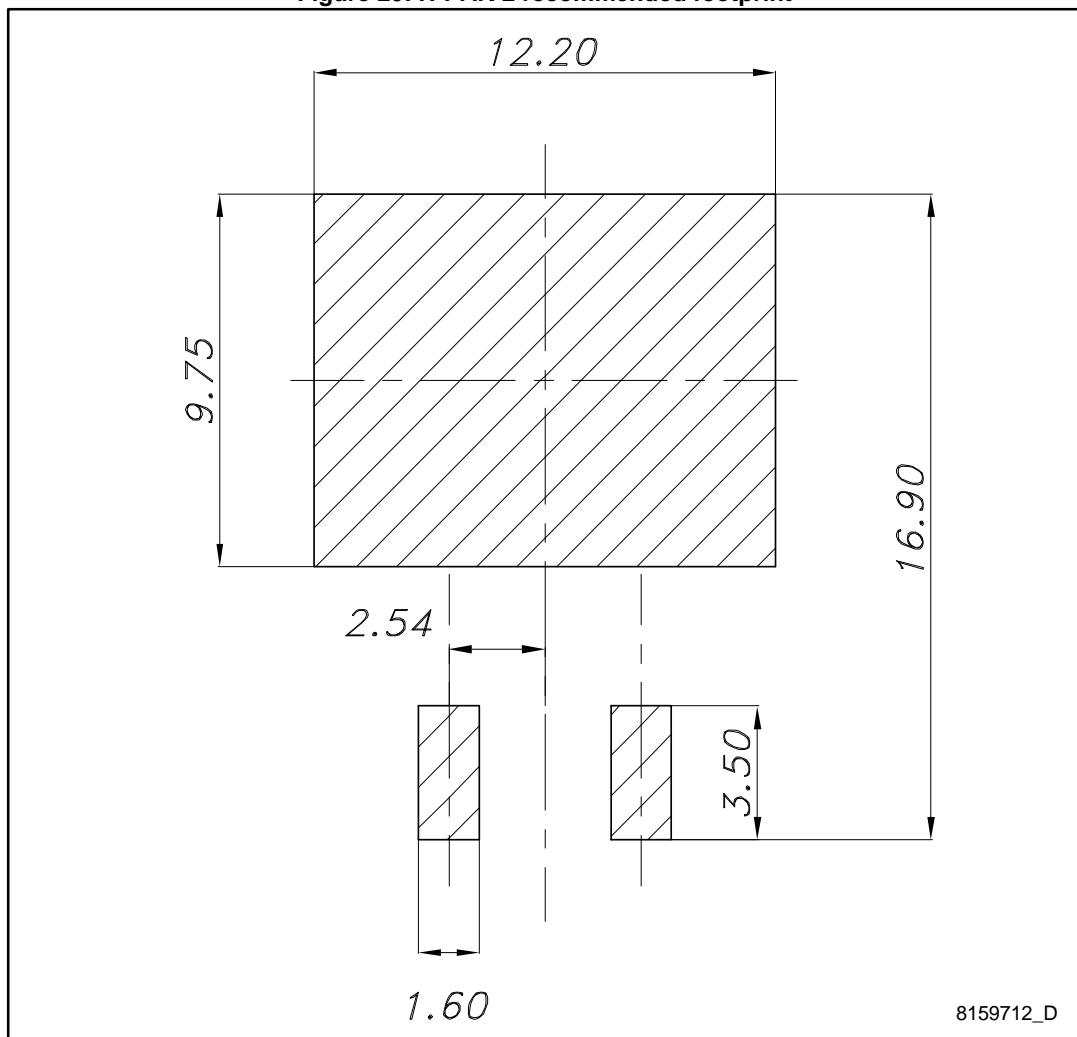


Table 8: H<sup>2</sup>PAK-2 leads mechanical data

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: H<sup>2</sup>PAK-2 recommended footprint



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## 5 Packaging mechanical data

Figure 21: Tape

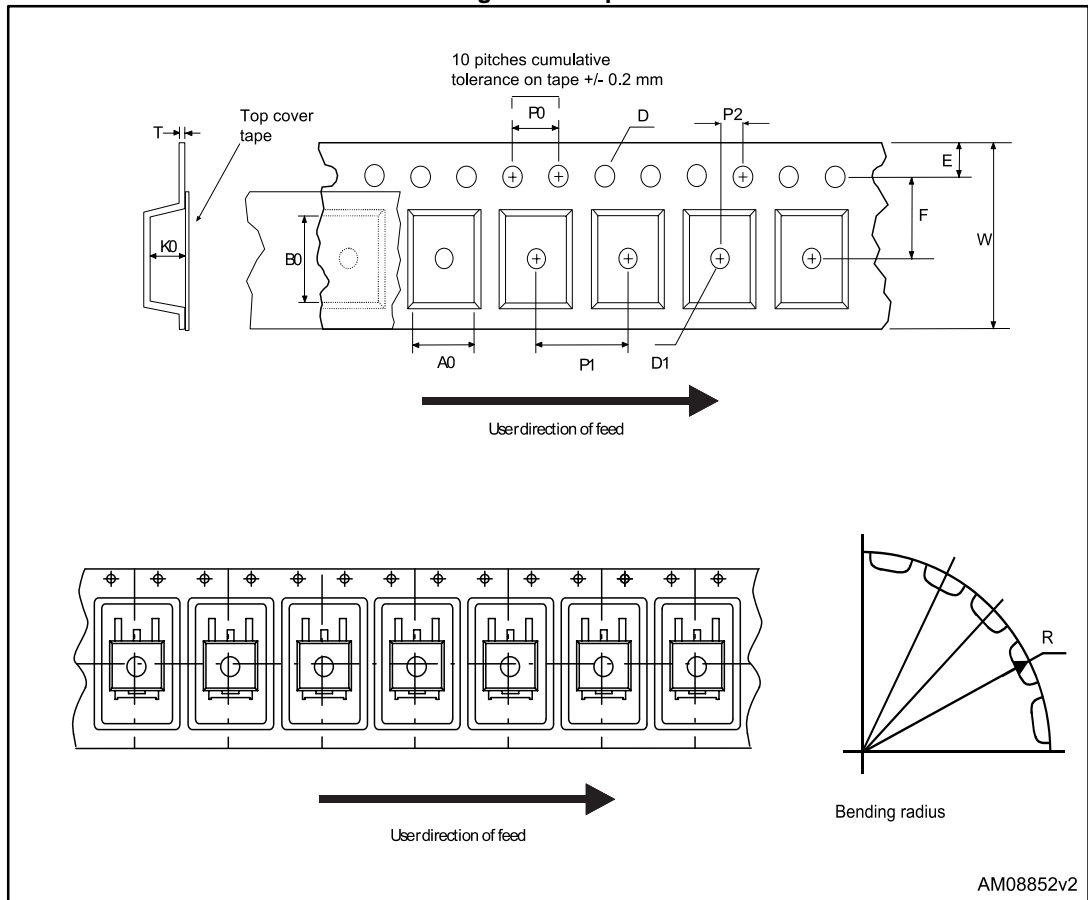


Figure 22: Reel

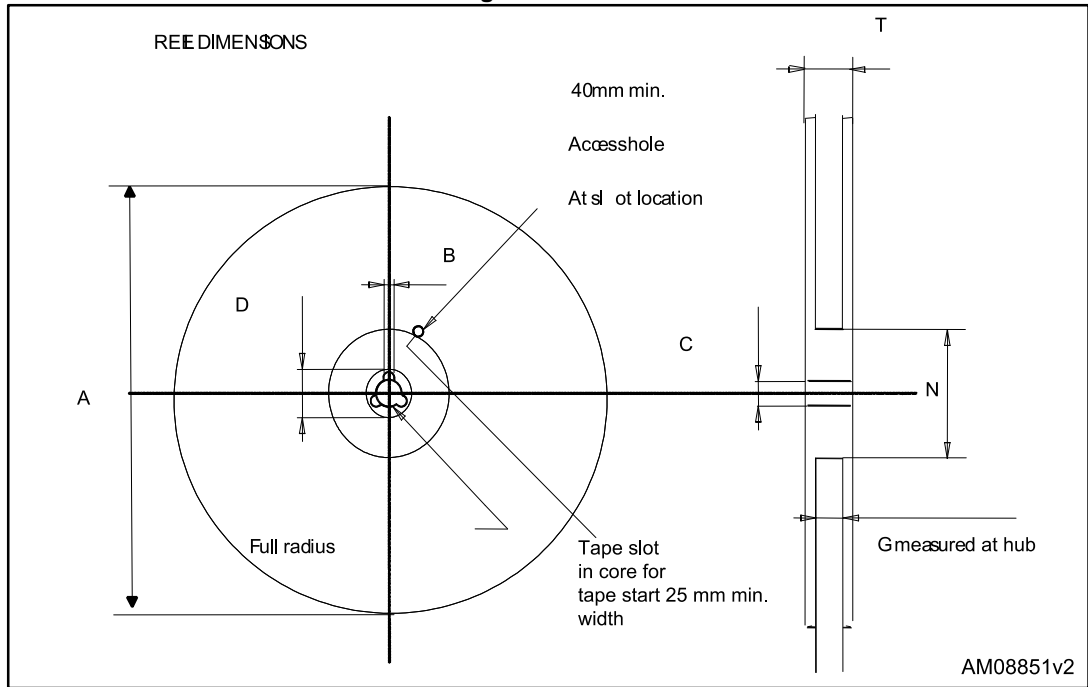


Table 9: Tape and reel mechanical data

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

## 6 Revision history

Table 10: Document revision history

Date	Revision	Changes
25-Aug-2014	1	First release. Part numbers STF140N8F7 and STP140N8F7 previously included in the datasheet DocID023888.
10-Oct-2014	2	Updated <a href="#">Figure 3: "Thermal impedance"</a>

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