

## N-channel 80 V, 4.2 mΩ typ., 110 A STripFET™ F7 Power MOSFET in an H<sup>2</sup>PAK-2 package

Datasheet - production data

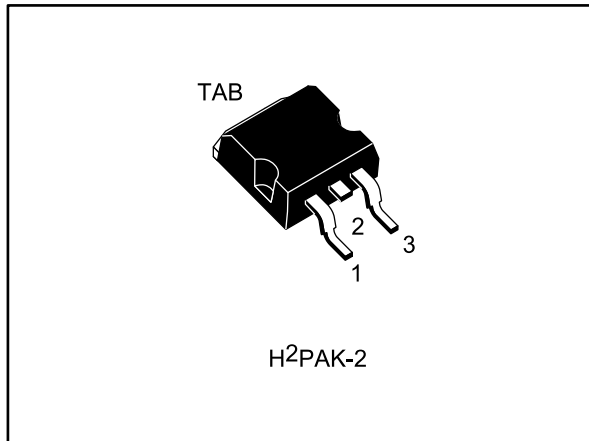


Figure 1: Internal schematic diagram

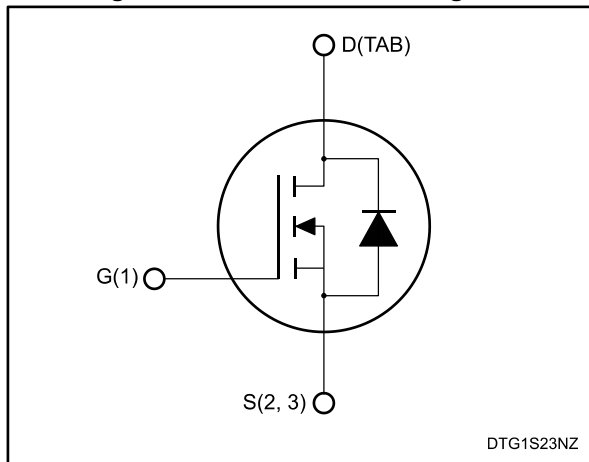


Table 1: Device summary

Order code	Marking	Package	Packaging
STH130N8F7-2	130N8F7	H <sup>2</sup> PAK-2	Tape and reel

### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)max.</sub>	I <sub>D</sub>	P <sub>TOT</sub>
STH130N8F7-2	80 V	5.0 mΩ	110 A	205 W

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- 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.

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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 $T_c = 25\text{ }^\circ\text{C}$	110	A
$I_D$	Drain current (continuous) at $T_c = 100\text{ }^\circ\text{C}$	100	A
$I_{DM}^{(1)}$	Drain current (pulsed)	440	A
$P_{TOT}$	Total dissipation at $T_c = 25\text{ }^\circ\text{C}$	205	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	320	mJ
$T_j$	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		

**Notes:**

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

<sup>(2)</sup>Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 55\text{ A}$ ,  $V_{DD} = 40\text{ V}$

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	0.73	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	35	$^\circ\text{C/W}$

**Notes:**

<sup>(1)</sup>When mounted on FR-4 board of 1inch<sup>2</sup>, 2 oz 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 V, I <sub>D</sub> = 250 μA	80			V
I <sub>DSS</sub>	Zero gate voltage drain current	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 80 V			1	μA
		V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 80 V, T <sub>J</sub> =125 °C <sup>(1)</sup>			100	μA
I <sub>GSS</sub>	Gate-source leakage current	V <sub>DS</sub> = 0 V, 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> = 55 A		4.2	5.0	mΩ

**Notes:**

<sup>(1)</sup>Defined by design, not subject to production test.

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C <sub>iss</sub>	Input capacitance	V <sub>DS</sub> = 25 V, f = 1 MHz, V <sub>GS</sub> = 0 V	-	4500	-	pF
C <sub>oss</sub>	Output capacitance		-	1100	-	pF
C <sub>rss</sub>	Reverse transfer capacitance		-	110	-	pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 40 V, I <sub>D</sub> = 110 A, V <sub>GS</sub> = 0 to 10 V <i>Figure 14: "Test circuit for gate charge behavior"</i>	-	60	-	nC
Q <sub>gs</sub>	Gate-source charge		-	25	-	nC
Q <sub>gd</sub>	Gate-drain charge		-	15	-	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> = 55 A, R <sub>G</sub> = 4.7 Ω, V <sub>GS</sub> = 10 V <i>Figure 13: "Test circuit for resistive load switching times" and Figure 18: "Switching time waveform"</i>	-	140	-	ns
t <sub>r</sub>	Rise time		-	210	-	ns
t <sub>d(off)</sub>	Turn-off-delay time		-	190	-	ns
t <sub>f</sub>	Fall time		-	120	-	ns

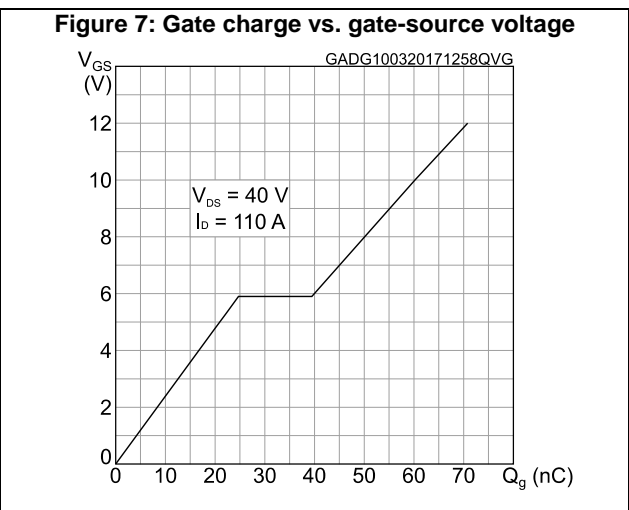
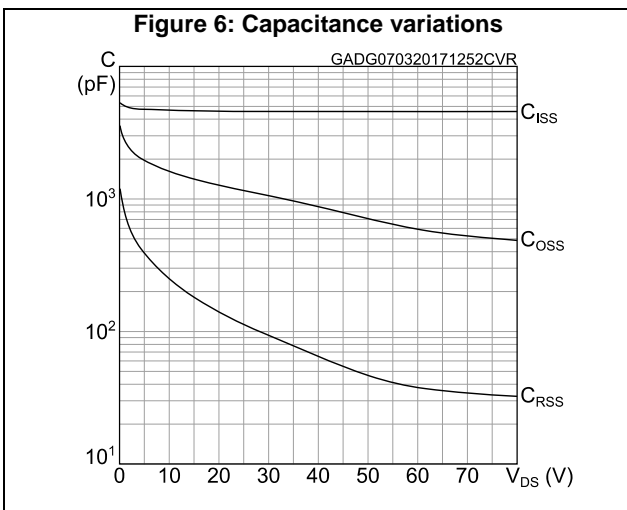
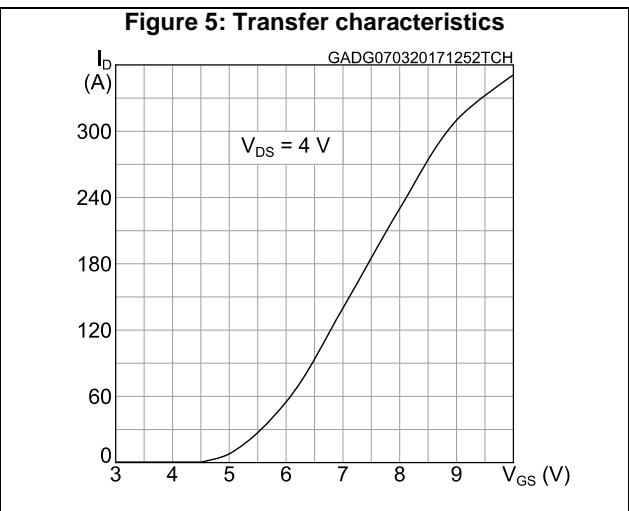
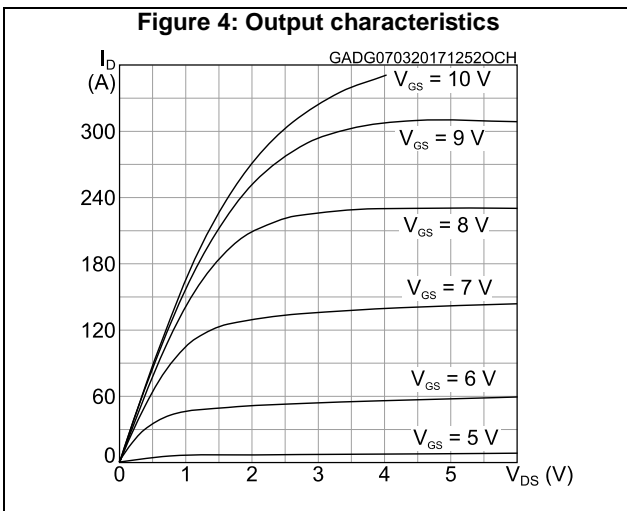
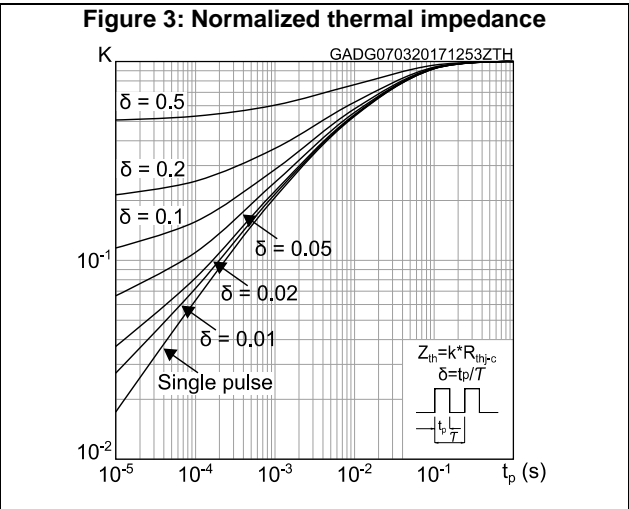
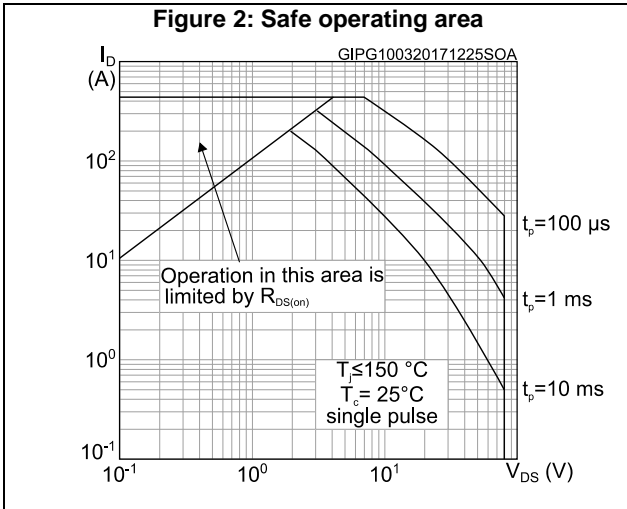
Table 7: Source drain diode

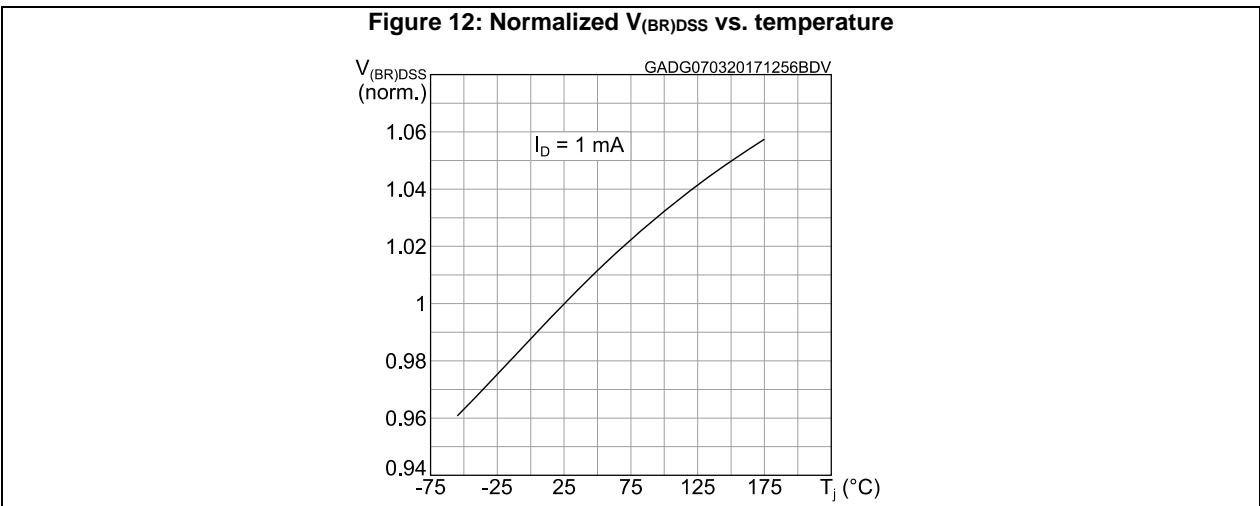
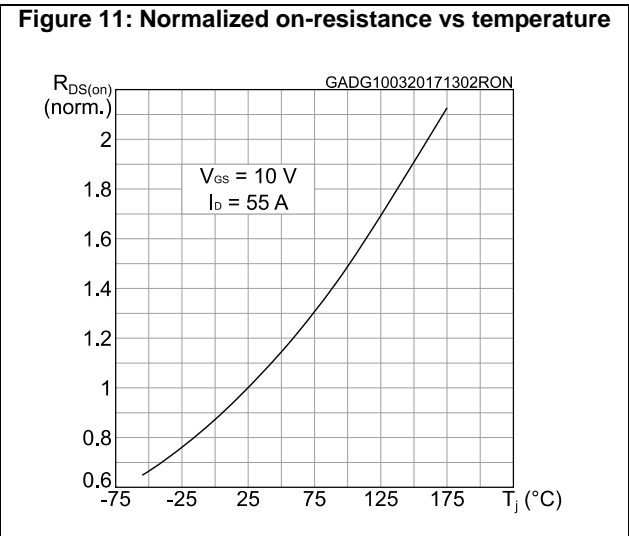
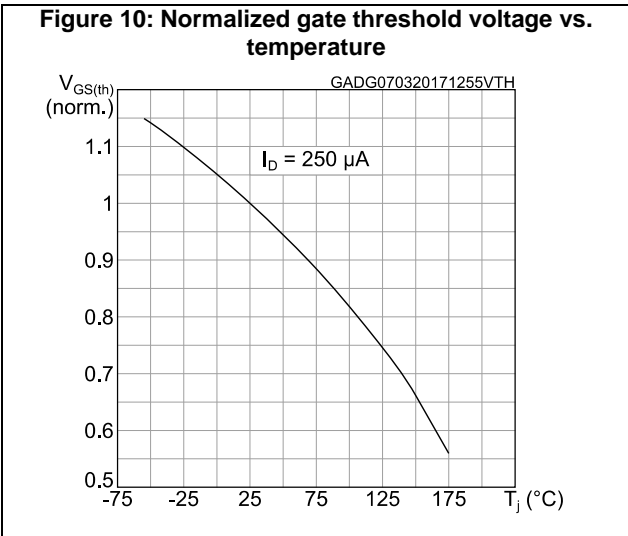
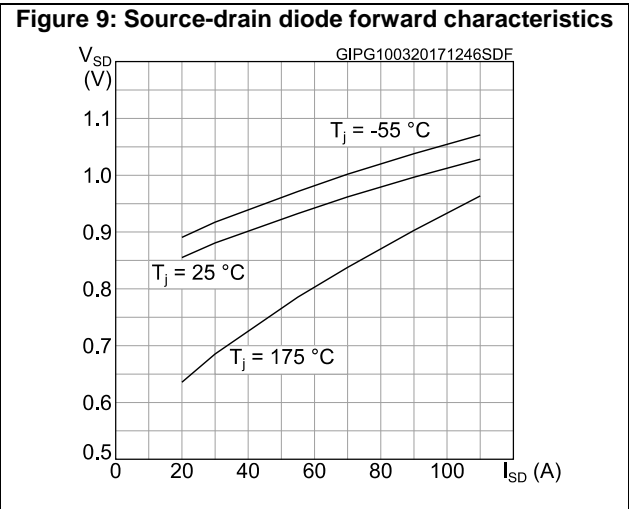
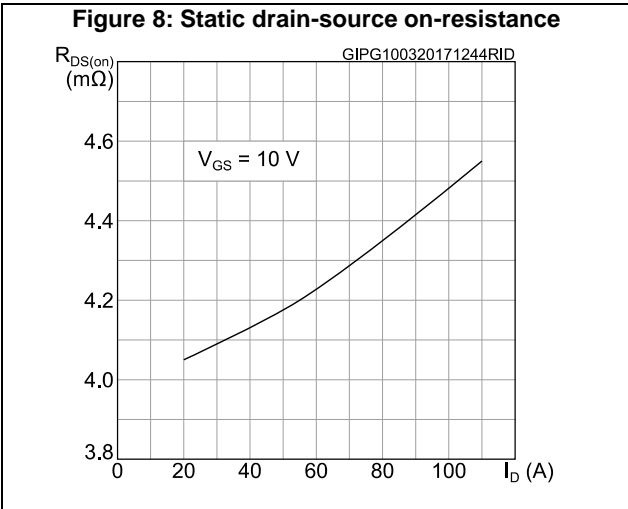
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}$ (1)	Forward on voltage	$I_{SD}= 110\text{ A}$ , $V_{GS}= 0\text{ V}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD}= 110\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD}= 80\text{ V}$ , $T_j= 150\text{ }^\circ\text{C}$ <i>Figure 15: "Test circuit for inductive load switching and diode recovery times"</i>	-	45		ns
$Q_{rr}$	Reverse recovery charge		-	54		nC
$I_{RRM}$	Reverse recovery current		-	2.5		A

**Notes:**

(1)Pulse test: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.1 Electrical characteristics (curves)





### 3 Test circuits

**Figure 13: Test circuit for resistive load switching times**



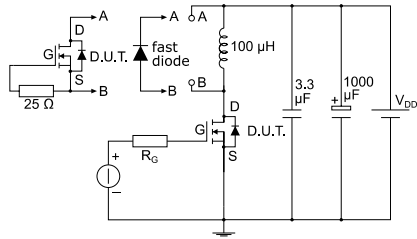
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**Figure 14: Test circuit for gate charge behavior**



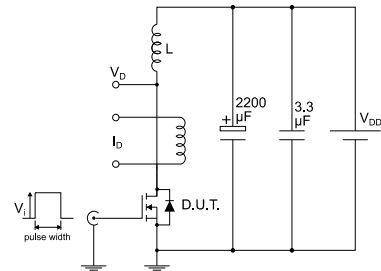
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**Figure 15: Test circuit for inductive load switching and diode recovery times**



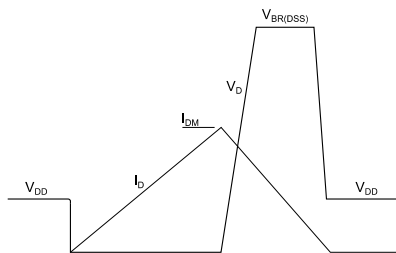
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**Figure 16: Unclamped inductive load test circuit**



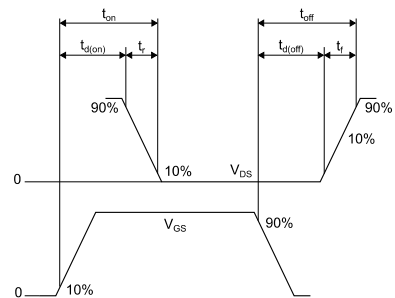
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**Figure 17: Unclamped inductive waveform**



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**Figure 18: Switching time waveform**



AM01473v1



## 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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 H<sup>2</sup>PAK-2 package information

Figure 19: H<sup>2</sup>PAK-2 package outline

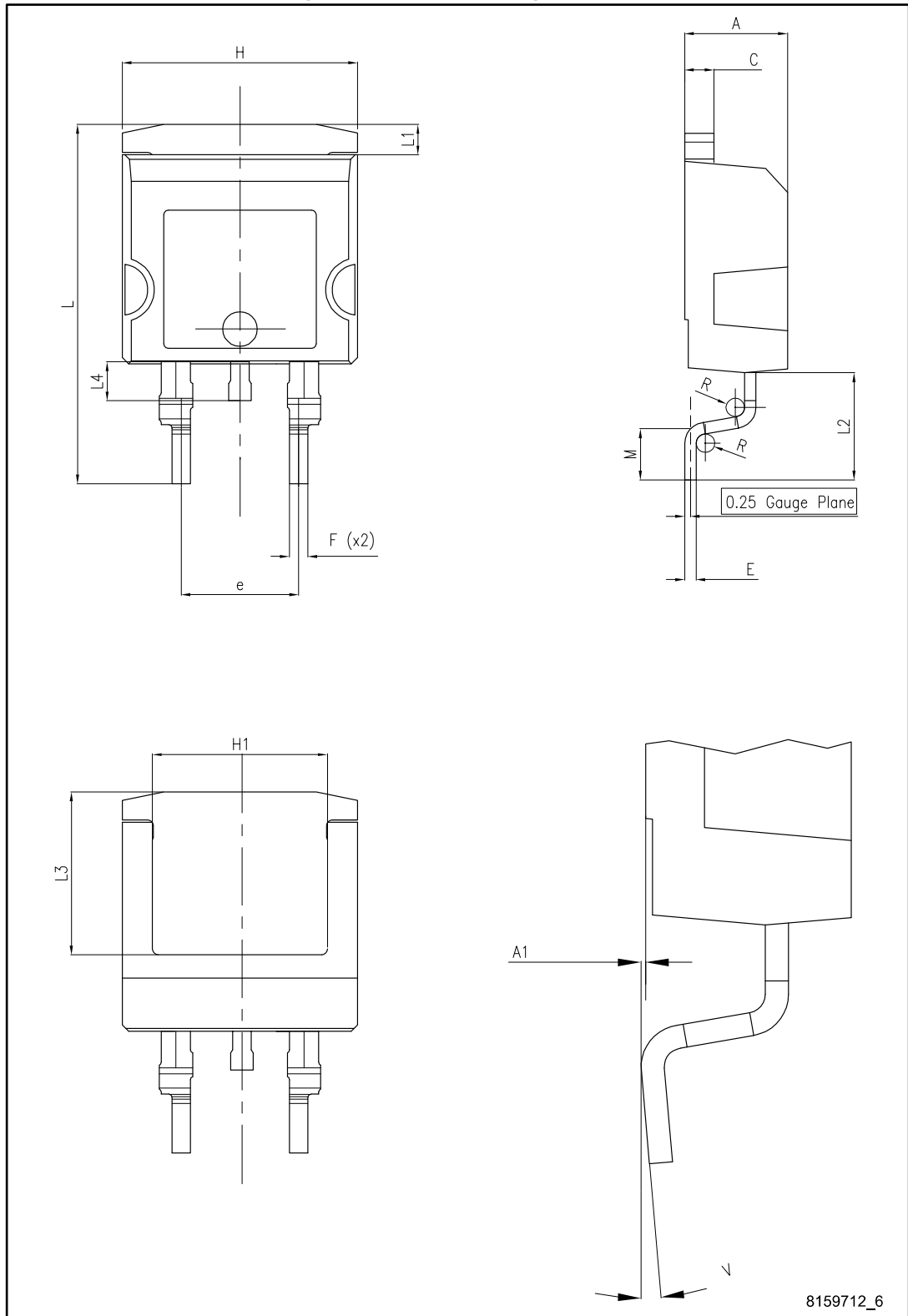
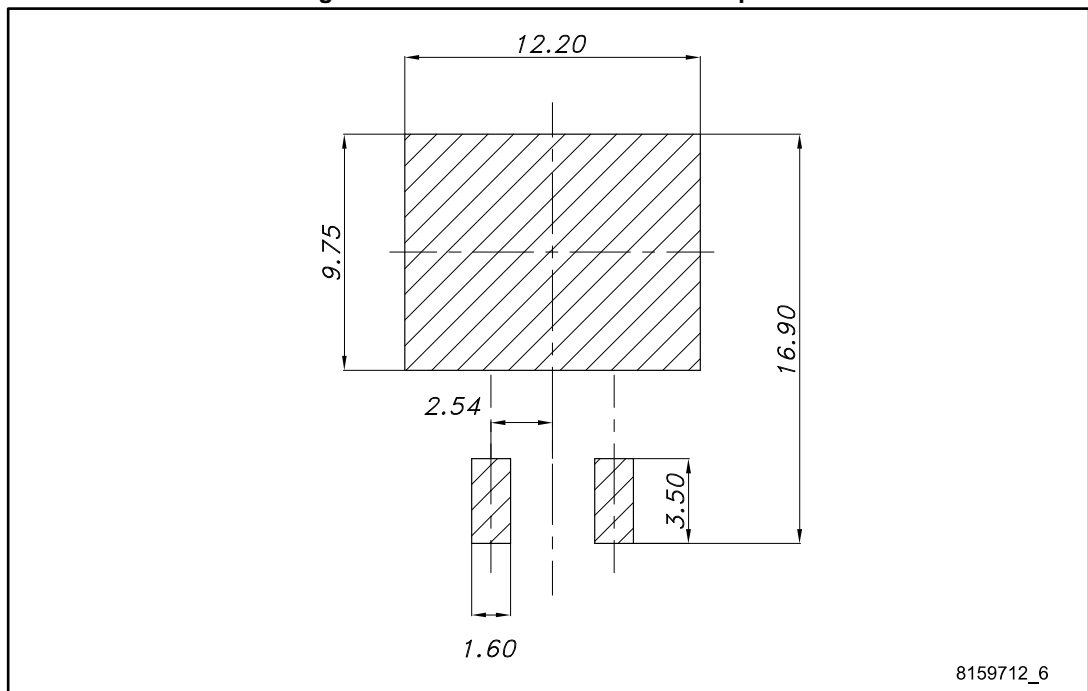


Table 8: H<sup>2</sup>PAK-2 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.70
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



8159712\_6

### 4.2 H<sup>2</sup>PAK-2 packing information

Figure 21: Tape outline

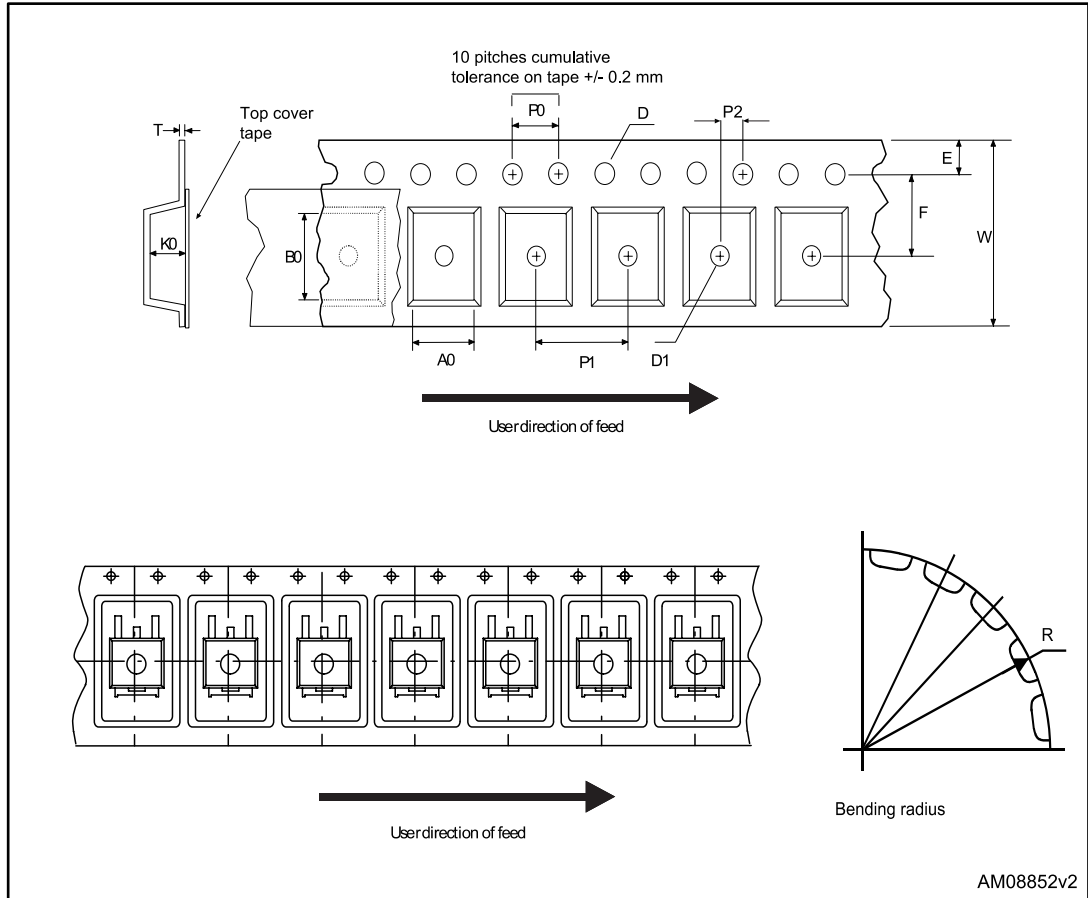


Figure 22: Reel outline

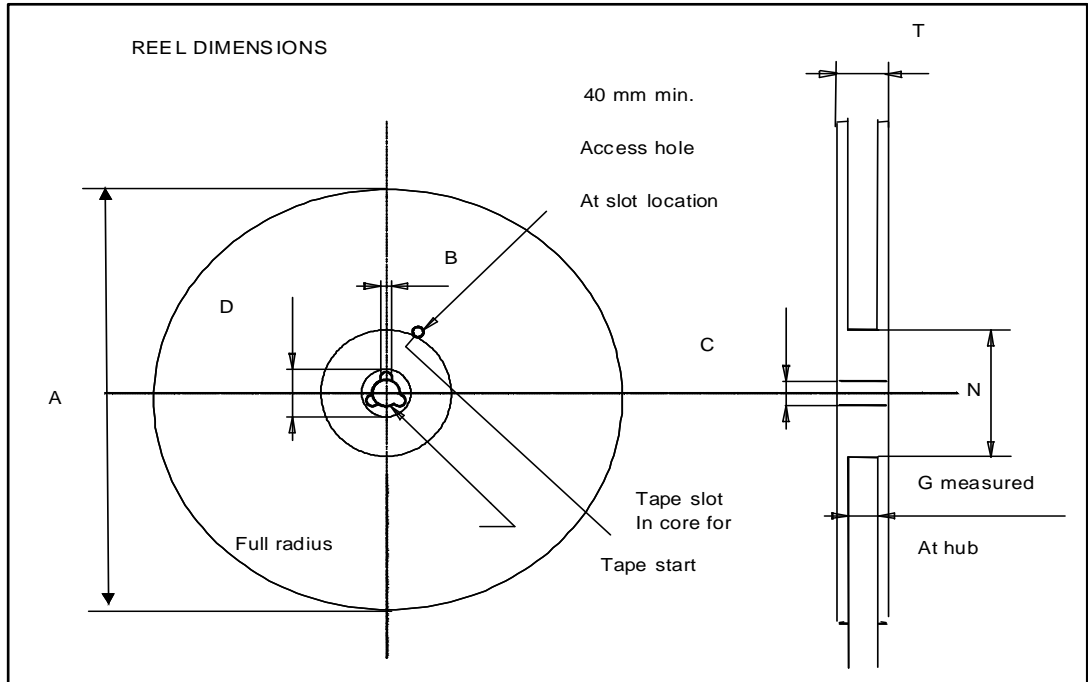


Table 9: Tape and reel mechanical data

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			

## 5 Revision history

Table 10: Document revision history

Date	Revision	Changes
10-Dec-2014	1	First release.
13-Mar-2017	2	Datasheet promoted from preliminary data to production data. Modified features table on cover page. Modified <i>Table 2: "Absolute maximum ratings"</i> , <i>Table 3: "Thermal data"</i> , <i>Table 4: "On/off states"</i> , <i>Table 5: "Dynamic"</i> , <i>Table 6: "Switching times"</i> and <i>Table 7: "Source drain diode"</i> . Added <i>Section 2.1: "Electrical characteristics (curves)"</i> Minor text changes.

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