

## Automotive N-channel 60 V, 1.6 mΩ typ., 180 A STripFET™ F6 Power MOSFET in H<sup>2</sup>PAK-2 and H<sup>2</sup>PAK-6 packages

Datasheet - production data

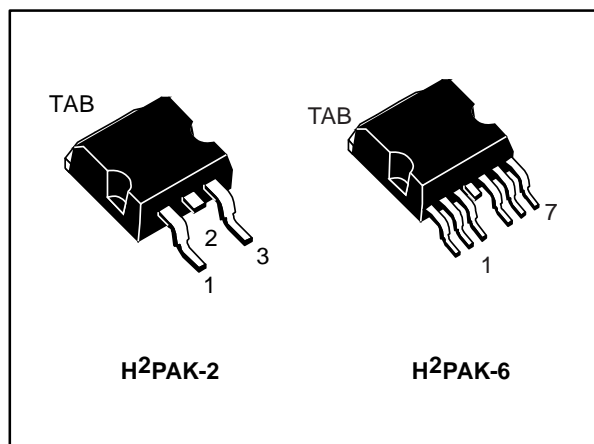
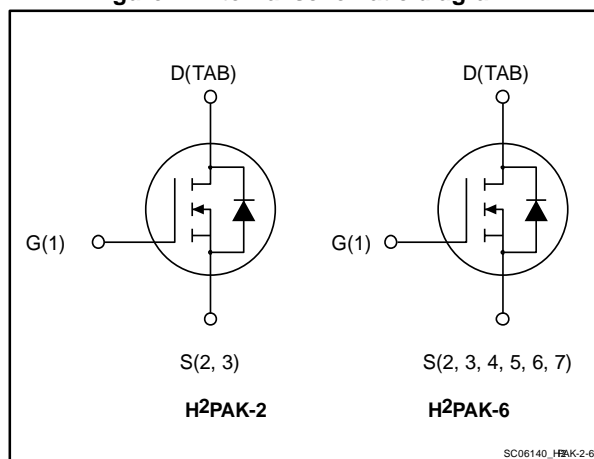


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
STH265N6F6-2AG	60 V	2.1 mΩ	180 A
STH265N6F6-6AG	60 V	2.1 mΩ	180 A

- Designed for automotive applications
- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

### Applications

- Switching applications

### Description

This device is an N-channel Power MOSFET developed using the STripFET™ F6 technology with a new trench gate structure. The resulting Power MOSFET exhibits very low R<sub>DS(on)</sub> in all packages.

Table 1: Device summary

Order code	Marking	Package	Packaging
STH265N6F6-2AG	265N6F6	H <sup>2</sup> PAK-2	Tape and reel
STH265N6F6-6AG	265N6F6	H <sup>2</sup> PAK-6	Tape and reel

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# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source voltage	60	V
V <sub>GS</sub>	Gate-source voltage	± 20	V
I <sub>D</sub> <sup>(1)</sup>	Drain current (continuous) at T <sub>C</sub> = 25 °C	180	A
I <sub>D</sub> <sup>(1)</sup>	Drain current (continuous) at T <sub>C</sub> = 100 °C	180	A
I <sub>DM</sub> <sup>(2)</sup>	Drain current (pulsed)	720	A
P <sub>TOT</sub>	Total dissipation at T <sub>C</sub> = 25 °C	300	W
E <sub>AS</sub>	Single pulse avalanche energy (Starting T <sub>J</sub> = 25 °C, I <sub>D</sub> = 80 A)	720	mJ
	Derating factor	2	W/°C
T <sub>stg</sub>	Storage temperature	- 55 to 175	°C
T <sub>j</sub>	Operating junction temperature		

**Notes:**

<sup>(1)</sup>Current limited by package.

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

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
R <sub>thj-case</sub>	Thermal resistance junction-case max	0.5	°C/W
R <sub>thj-pcb</sub> <sup>(1)</sup>	Thermal resistance junction-pcb max	35	°C/W

**Notes:**

<sup>(1)</sup>When mounted on FR-4 board of 1 inch<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)	I <sub>D</sub> = 250 μA	60			V
I <sub>DSS</sub>	Zero gate voltage drain current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = 60 V			1	μA
		V <sub>DS</sub> = 60 V, T <sub>C</sub> = 125 °C			100	μA
I <sub>GSS</sub>	Gate-body 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		4	V
R <sub>DS(on)</sub>	Static drain-source on-resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 60 A		1.6	2.1	mΩ

**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	-	11800	-	pF
C <sub>OSS</sub>	Output capacitance		-	1235	-	pF
C <sub>RSS</sub>	Reverse transfer capacitance		-	488	-	pF
Q <sub>g</sub>	Total gate charge	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 120 A, V <sub>GS</sub> = 10 V	-	183	-	nC
Q <sub>gs</sub>	Gate-source charge		-	53	-	nC
Q <sub>gd</sub>	Gate-drain charge		-	41	-	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> = 30 V, I <sub>D</sub> = 60 A R <sub>G</sub> = 4.7 Ω, V <sub>GS</sub> = 10 V	-	31	-	ns
t <sub>r</sub>	Rise time		-	165	-	ns
t <sub>d(off)</sub>	Turn-off-delay time		-	144	-	ns
t <sub>f</sub>	Fall time		-	63	-	ns

Table 7: Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current				180	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				720	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 180 \text{ A}, V_{GS} = 0$			1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 120 \text{ A}, V_{DD} = 48 \text{ V}$ $di/dt = 100 \text{ A}/\mu\text{s},$ $T_j = 150 \text{ }^\circ\text{C}$	-	56	-	ns
$Q_{rr}$	Reverse recovery charge		-	116	-	nC
$I_{RRM}$	Reverse recovery current		-	3.8	-	A

**Notes:**

(1) Pulse width limited by safe operating area.

(2) Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

## 2.2 Electrical characteristics (curves)

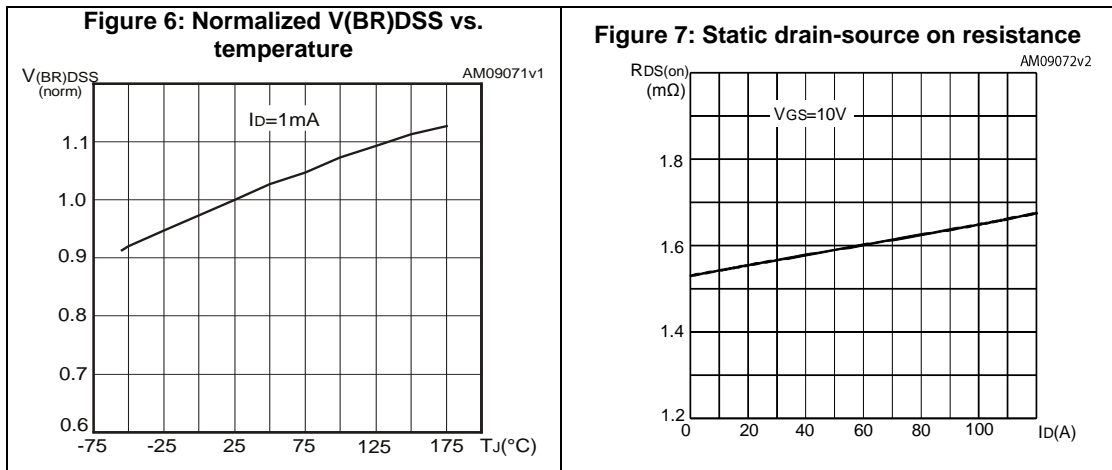
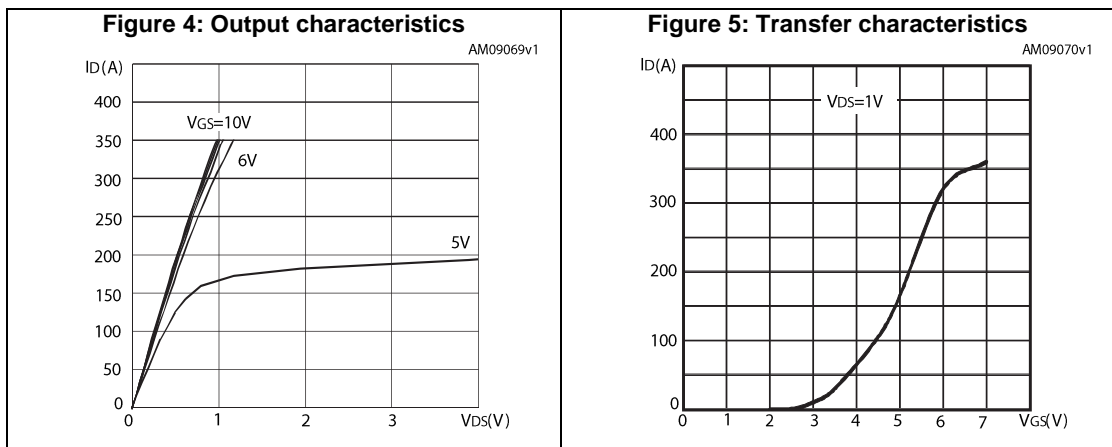
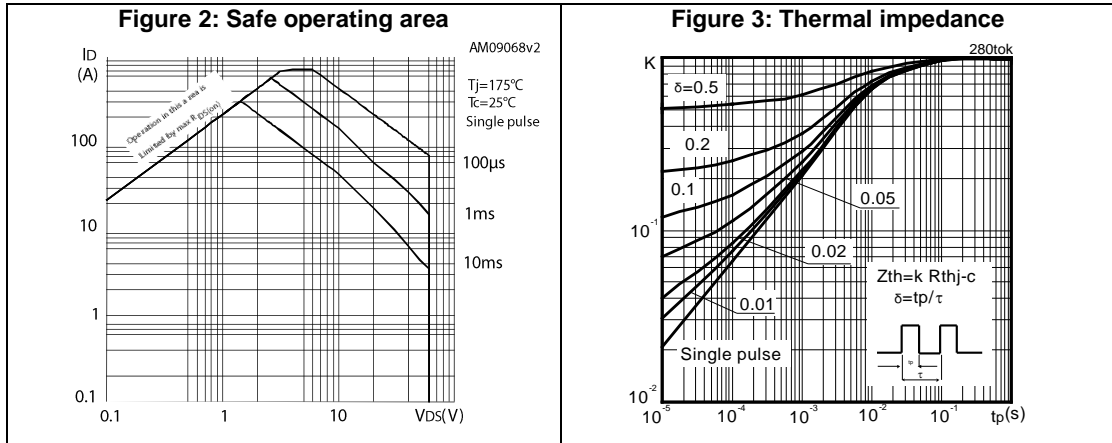


Figure 8: Gate charge vs. gate-source voltage

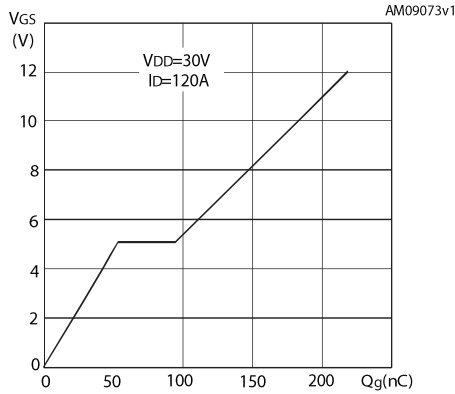


Figure 9: Capacitance variations

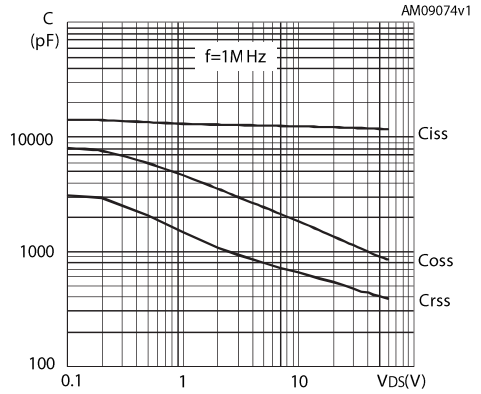


Figure 10: Normalized gate threshold voltage vs. temperature

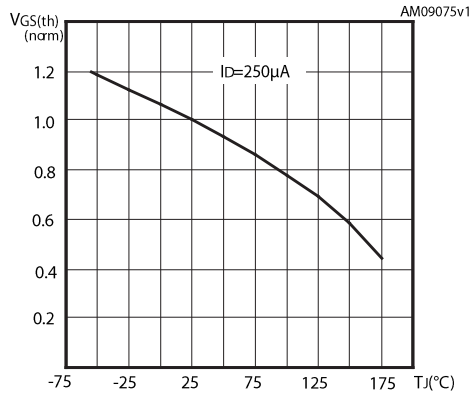


Figure 11: Normalized on resistance vs. temperature

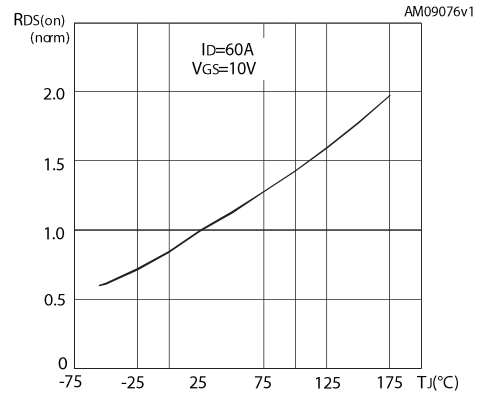
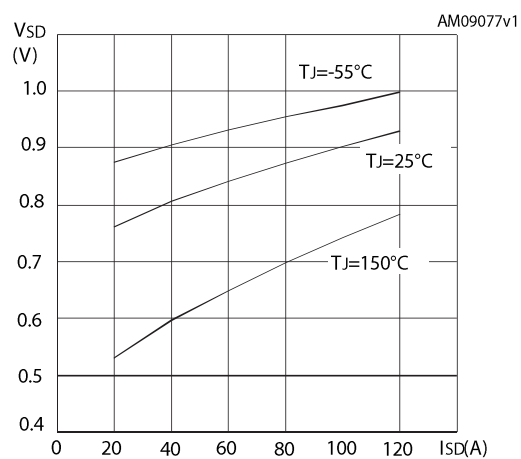


Figure 12: Source-drain diode forward characteristics



### 3 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.



### 3.1 H2PAK-2 mechanical data

Figure 13: H<sup>2</sup>PAK-2 outline

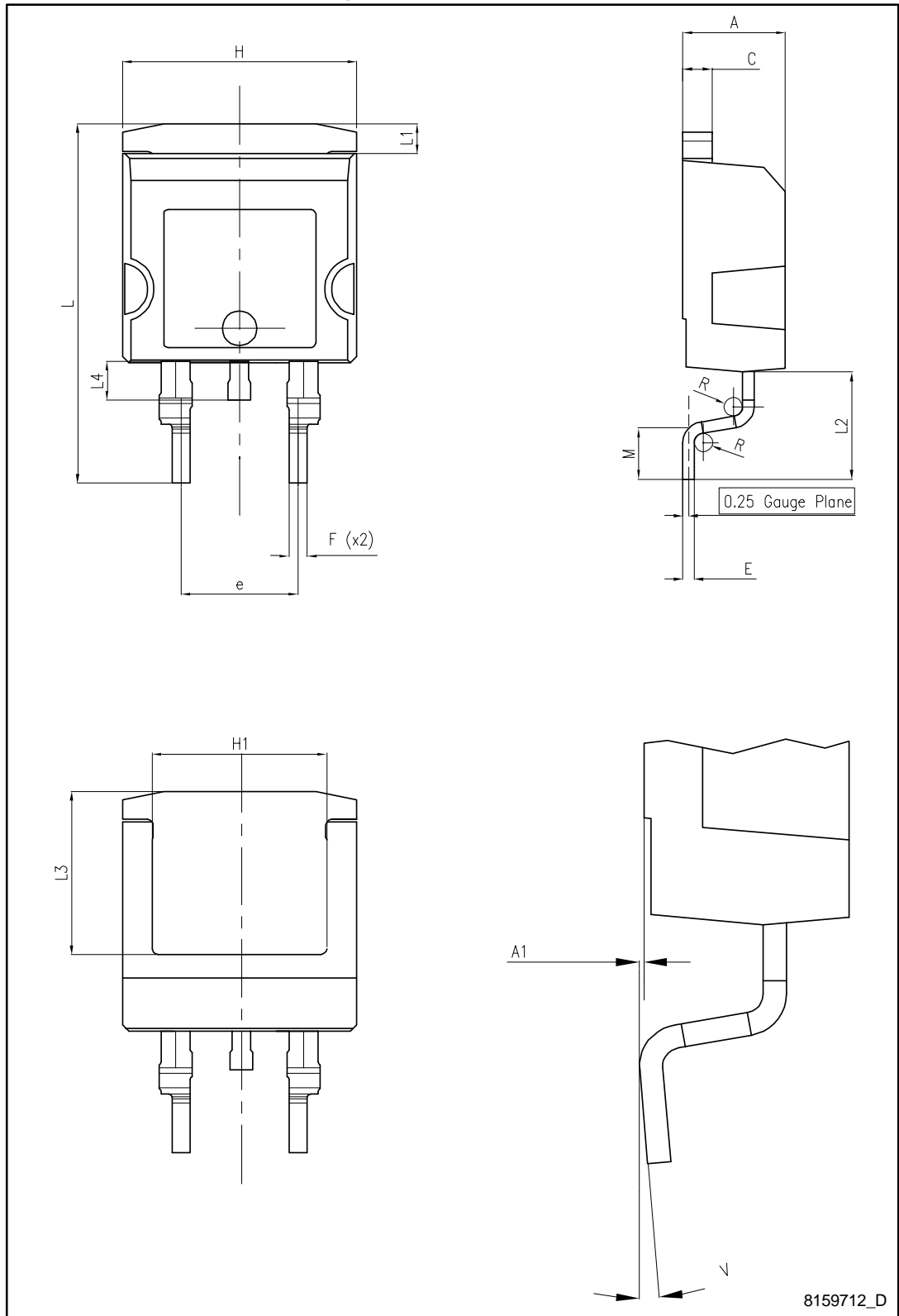
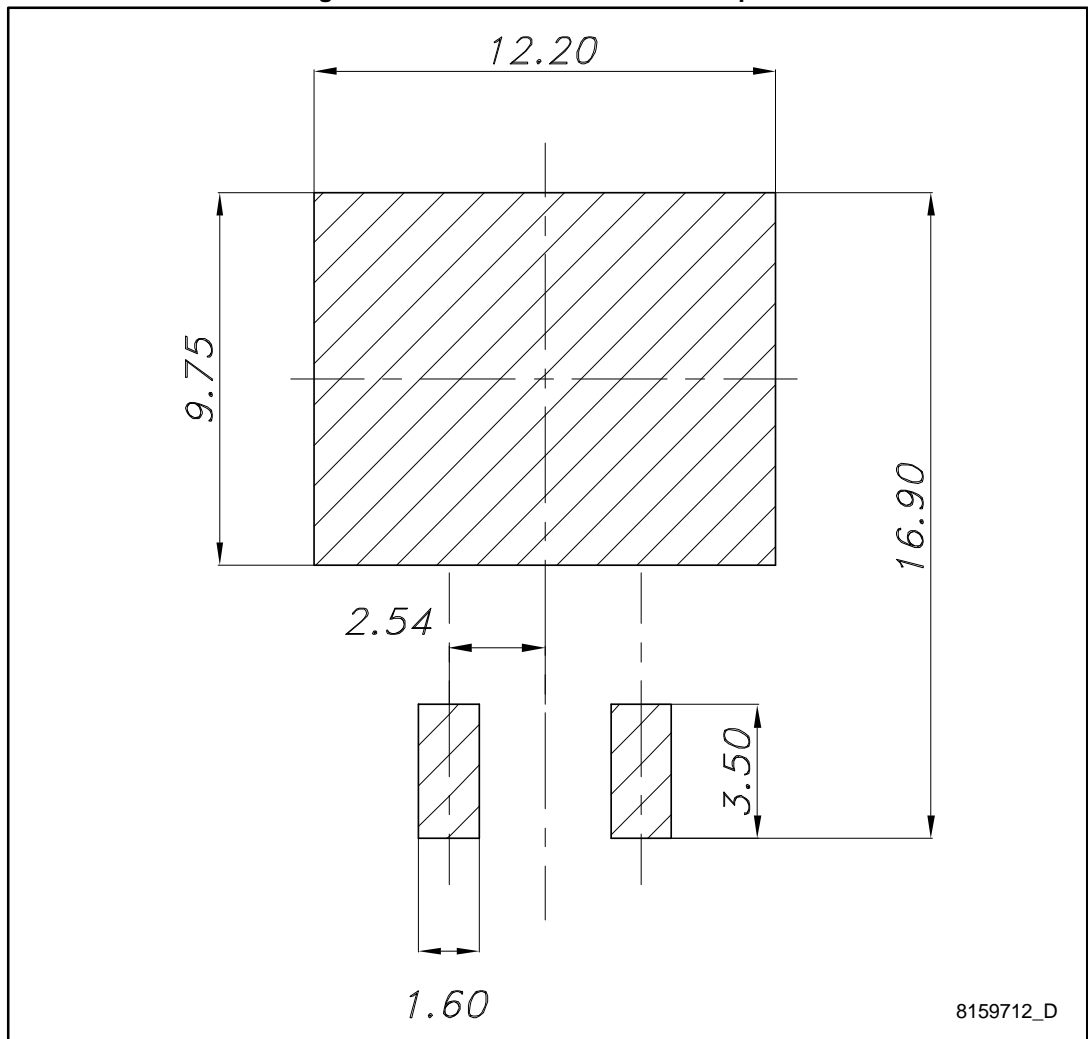


Table 8: H<sup>2</sup>PAK-2 mechanical data

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



8159712\_D

### 3.2 H<sup>2</sup>PAK-6 package information

Figure 15: H<sup>2</sup>PAK-6 outline

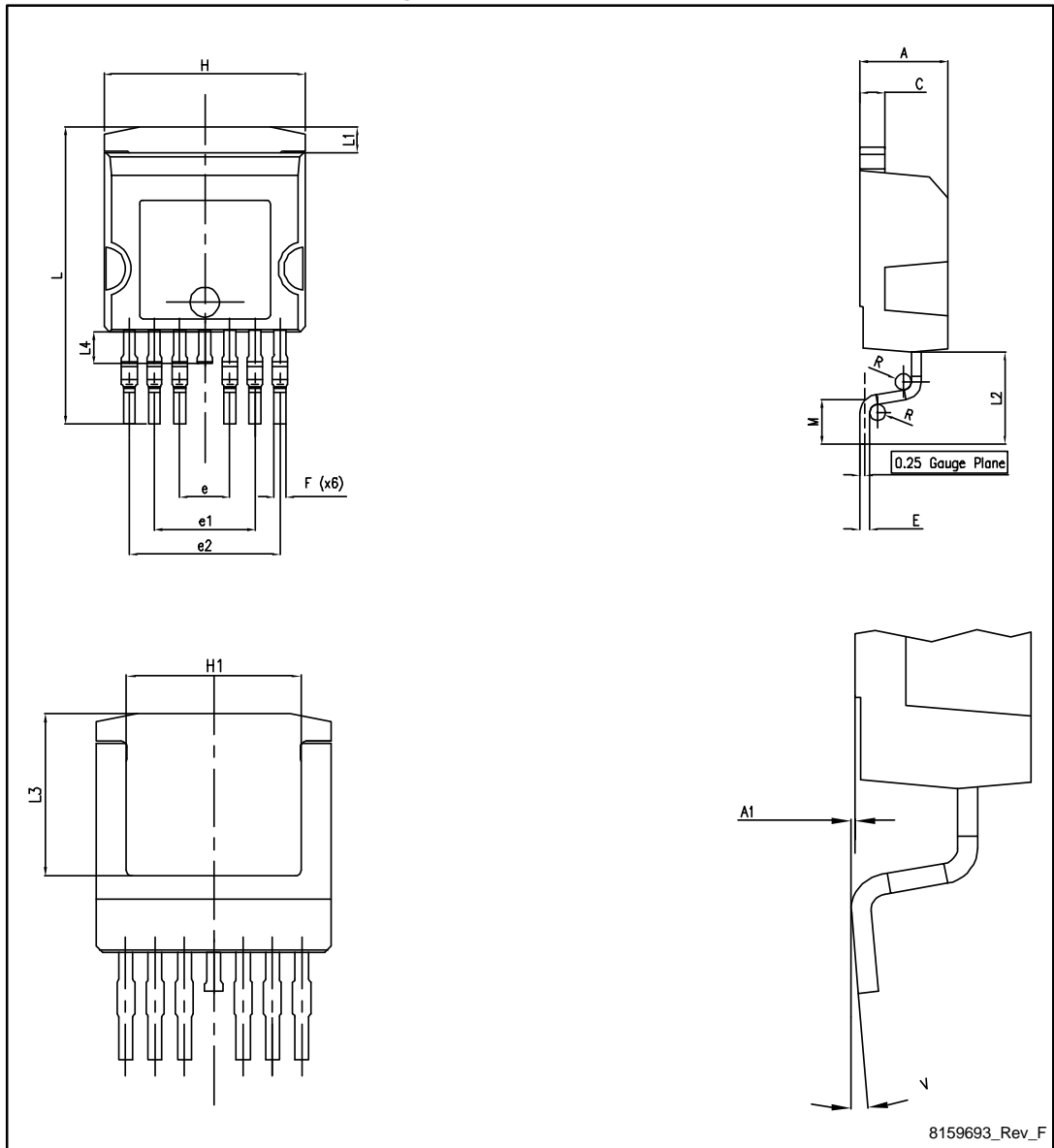
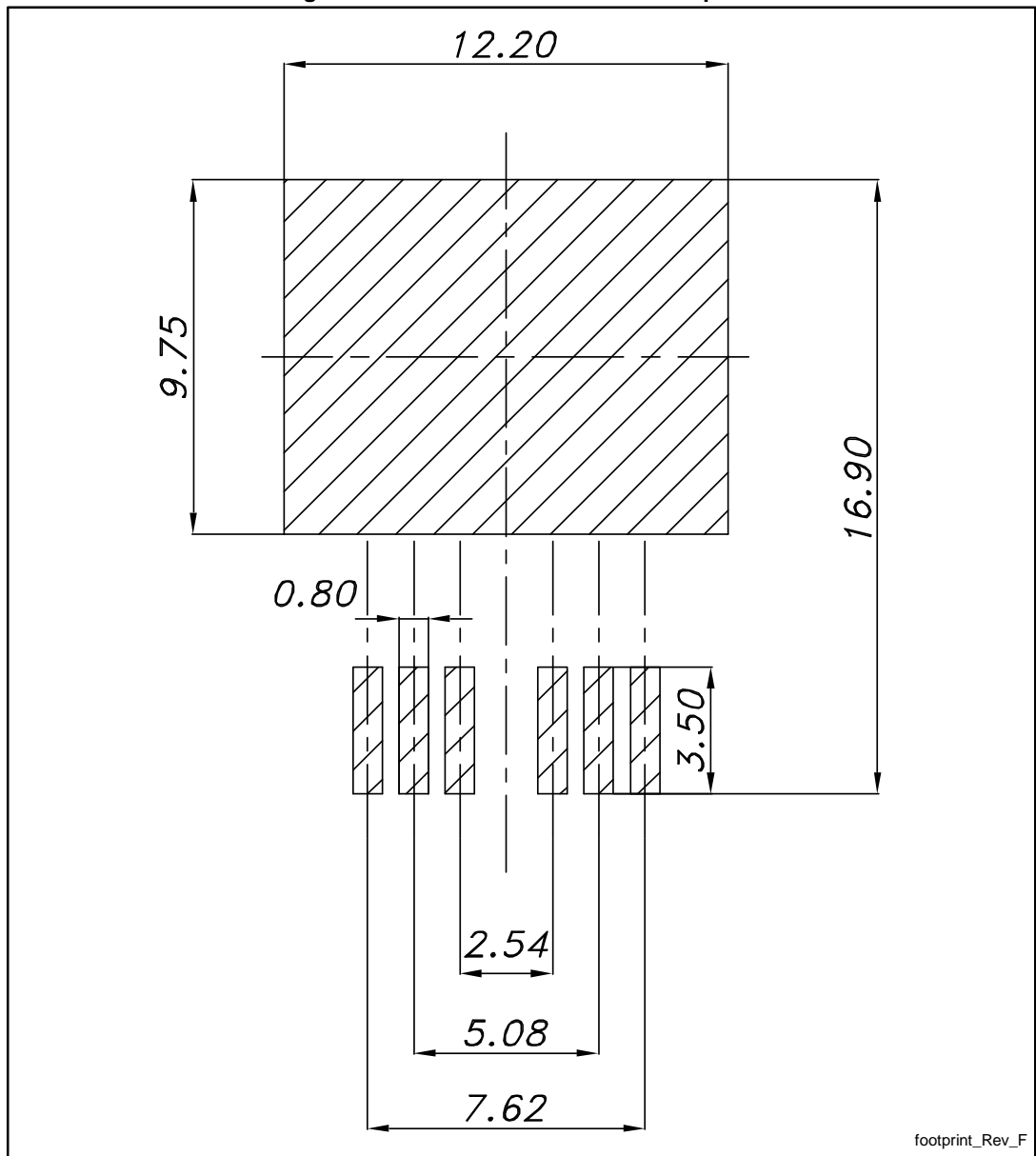


Table 9: H<sup>2</sup>PAK-6 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.80
A1	0.03		0.20
C	1.17		1.37
e	2.34		2.74
e1	4.88		5.28
e2	7.42		7.82
E	0.45		0.60
F	0.50		0.70
H	10.00		10.40
H1	7.40		7.80
L	14.75		15.25
L1	1.27		1.40
L2	4.35		4.95
L3	6.85		7.25
L4	1.5		1.75
M	1.90		2.50
R	0.20		0.60
V	0°		8°

Figure 16: H<sup>2</sup>PAK-6 recommended footprint



footprint\_Rev\_F



Dimensions are in mm.

# 4 Packaging information

Figure 17: Tape outline

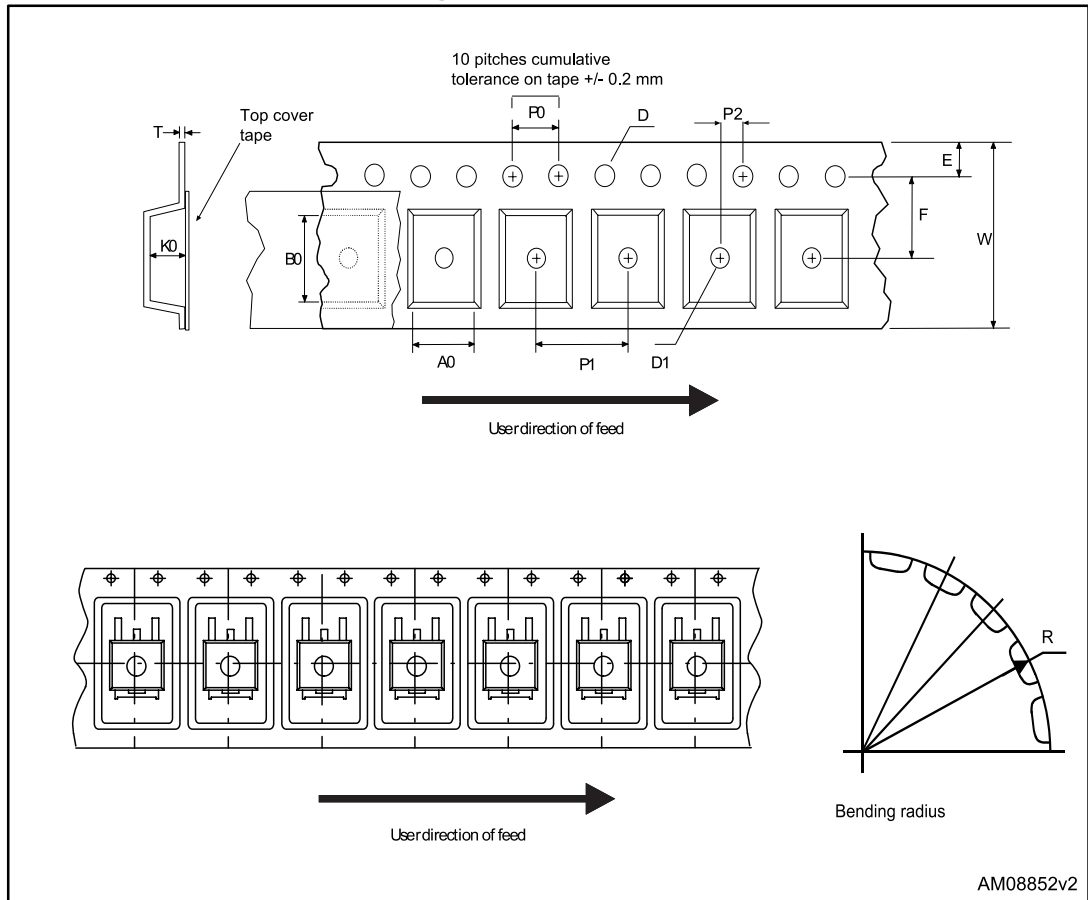


Figure 18: Reel outline

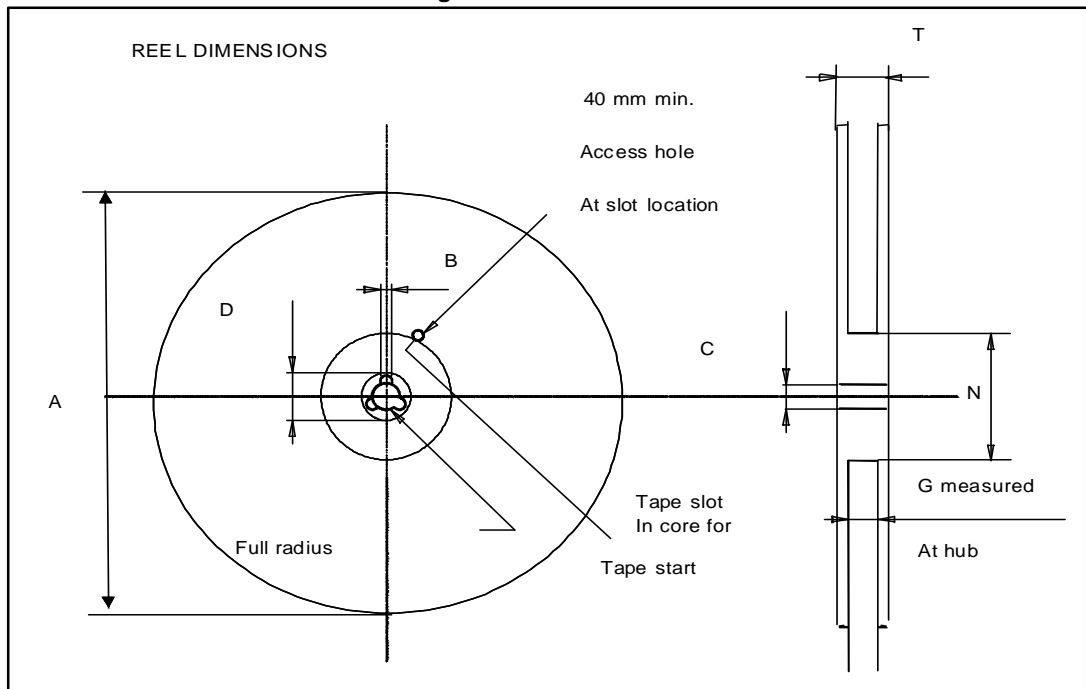


Table 10: Tape and reel mechanical data

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 11: Document revision history

Date	Revision	Changes
13-Oct-2014	1	First release.
18-Dec-2014	2	Document status promoted from preliminary to production data.

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