



STH240N75F3-2, STH240N75F3-6

N-channel 75 V, 2.6 mΩ typ., 180 A STripFET™ III Power MOSFET in H²PAK-2 and H²PAK-6 packages

Datasheet – production data

Features

Order code	V _{DSS}	R _{DS(on)} max.	I _D
STH240N75F3-2	75 V	< 3.0 mΩ	180 A
STH240N75F3-6			

- Conduction losses reduced
- Low profile, very low parasitic inductance

Applications

- Switching application

Description

These devices are N-channel enhancement mode Power MOSFETs produced using STMicroelectronics' STripFET™ III technology, which is specifically designed to minimize on-resistance and gate charge to provide superior switching performance.

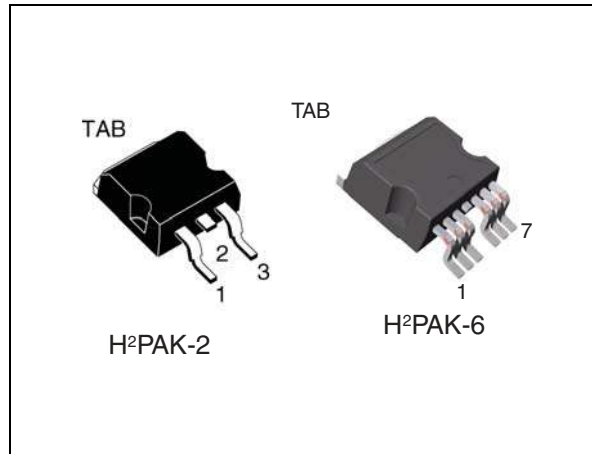


Figure 1. Internal schematic diagram

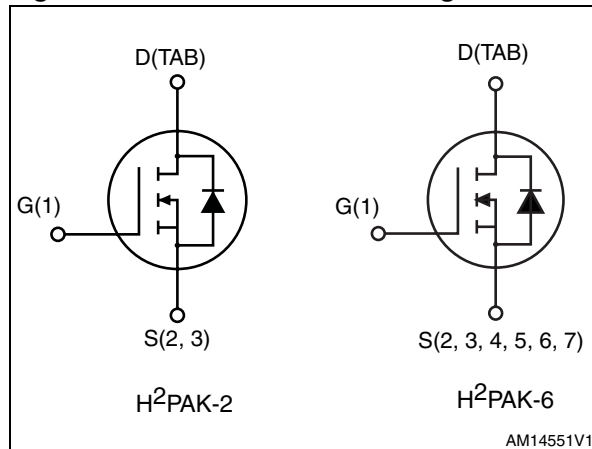


Table 1. Device summary

Order code	Marking	Package	Packaging
STH240N75F3-2	240N75F3	H ² PAK-2	Tape and reel
STH240N75F3-6		H ² PAK-6	

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	75	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	180	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	170	A
$I_{DM}^{(2)}$	Drain current (pulsed)	720	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2	W/ $^\circ\text{C}$
$E_{AS}^{(3)}$	Single pulse avalanche energy	600	mJ
T_{stg}	Storage temperature	-55 to 175	$^\circ\text{C}$
T_j	Operating junction temperature		

1. Current limited by package.
2. Pulse width limited by safe operating area.
3. Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = 60\text{ A}$, $V_{DD} = 15\text{ V}$.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.5	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	35	$^\circ\text{C/W}$

1. When mounted on 1 inch² FR-4 2 oz 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	I _D = 250 μA, V _{GS} = 0	75			V
I _{DSS}	Zero gate voltage drain current	V _{DS} = 75 V, V _{DS} = 75 V, T _C = 125 °C, V _{GS} = 0			10 100	μA μA
I _{GSS}	Gate body leakage current	V _{DS} = ± 20 V, V _{DS} = 0			±200	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	2		4	V
R _{DS(on)}	Static drain-source on-resistance	V _{GS} = 10 V, I _D = 90 A		2.6	3.0	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0	-	6800	-	pF
C _{OSS}	Output capacitance			1100		pF
C _{rss}	Reverse transfer capacitance			50		pF
Q _g	Total gate charge	V _{DD} = 37.5 V, I _D = 120 A,	-	87	-	nC
Q _{gs}	Gate-source charge	V _{GS} = 10 V		30		nC
Q _{gd}	Gate-drain charge	(see Figure 14)		26		nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 37.5 V, I _D = 60 A R _G = 4.7 Ω, V _{GS} = 10 V, (see Figure 13)	-	25	-	ns
t _r	Rise time			70		ns
t _{d(off)}	Turn-off delay time	(see Figure 13)	-	100	-	ns
t _f	Fall time			15		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		180	A
$I_{SD}^{(1)}$	Source-drain current (pulsed)		-		720	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 120\text{ A}, V_{GS} = 0$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 120\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}, T_j = 150\text{ }^\circ\text{C}$ (see Figure 15)	-	80		ns
Q_{rr}	Reverse recovery charge			180		nC
I_{RRM}	Reverse recovery current			4.5		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5%.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

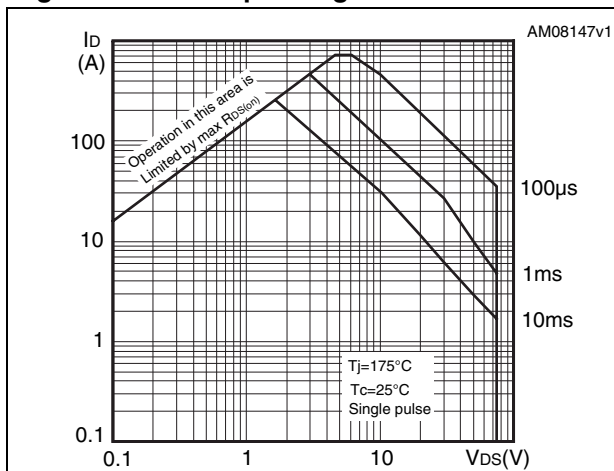


Figure 3. Thermal impedance

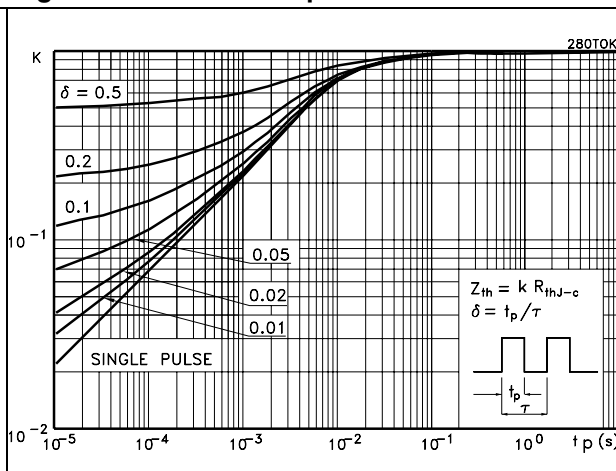


Figure 4. Output characteristics

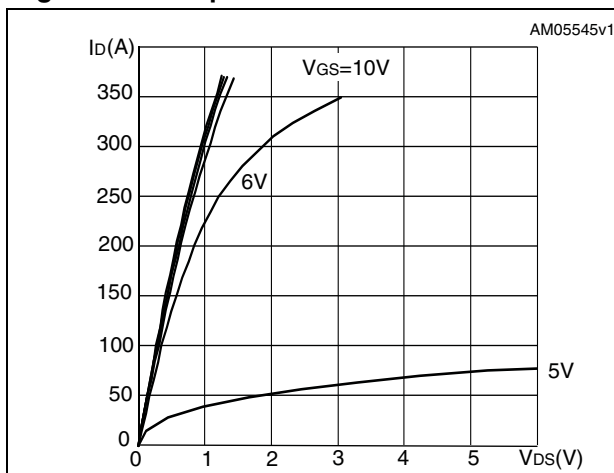


Figure 5. Transfer characteristics

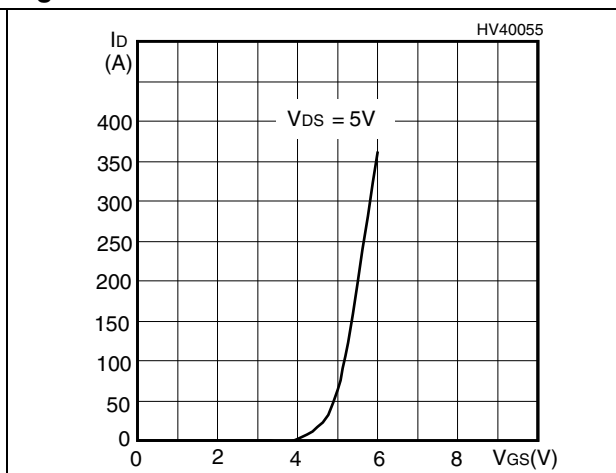


Figure 6. Normalized BV_{DSS} vs temperature

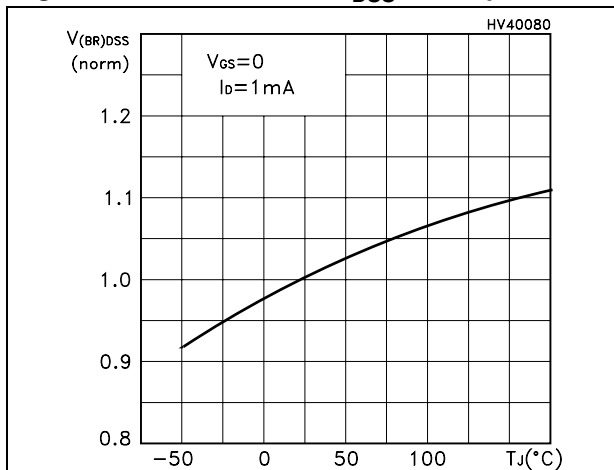


Figure 7. Static drain-source on-resistance

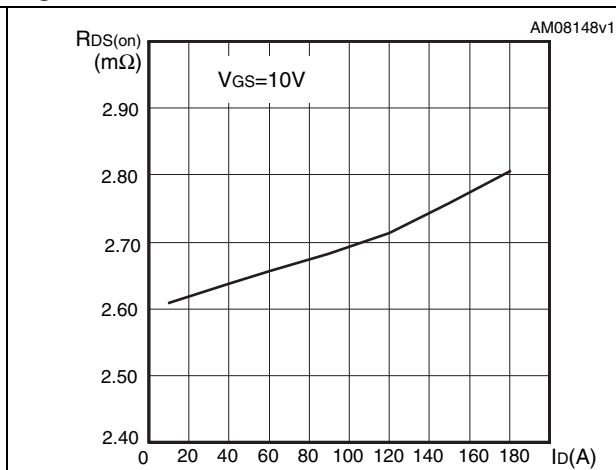


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

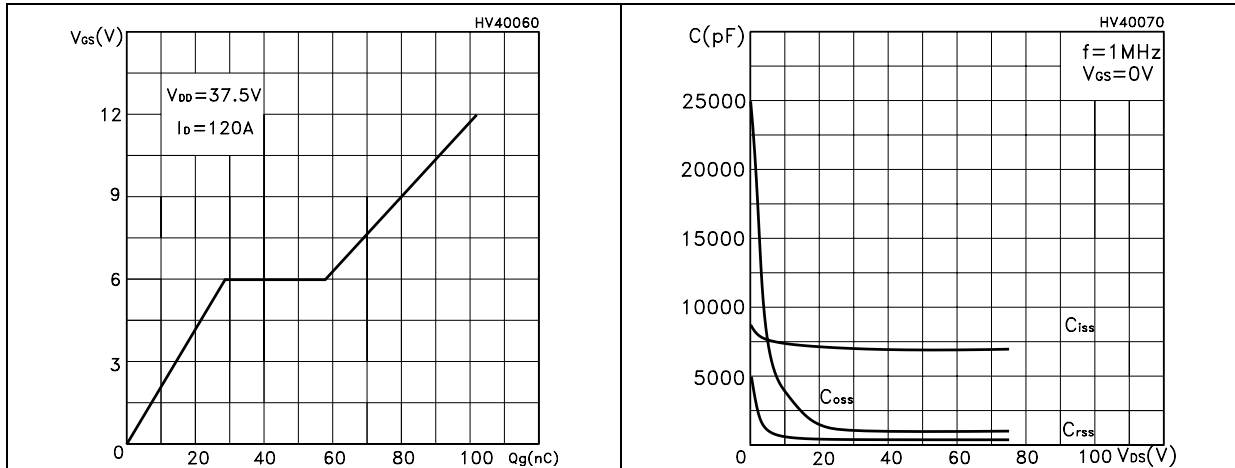


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on-resistance vs temperature

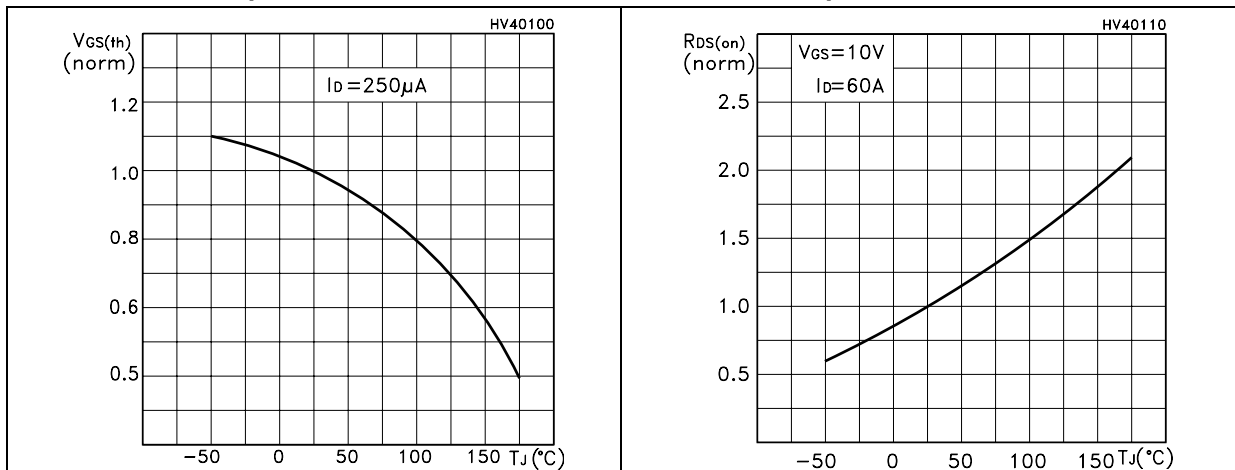
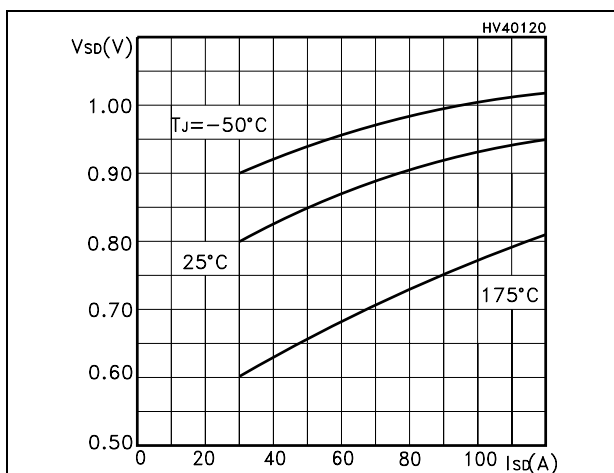
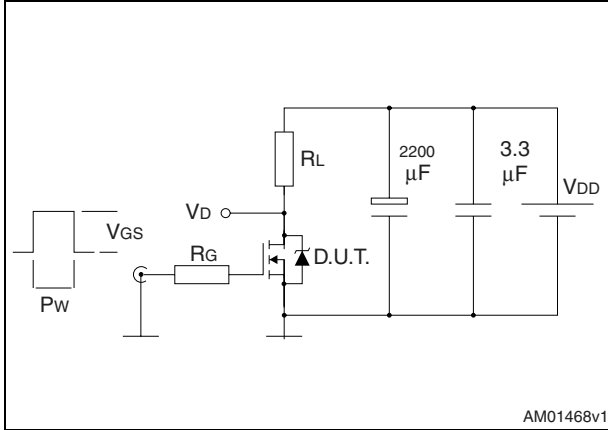


Figure 12. Source-drain diode forward characteristics



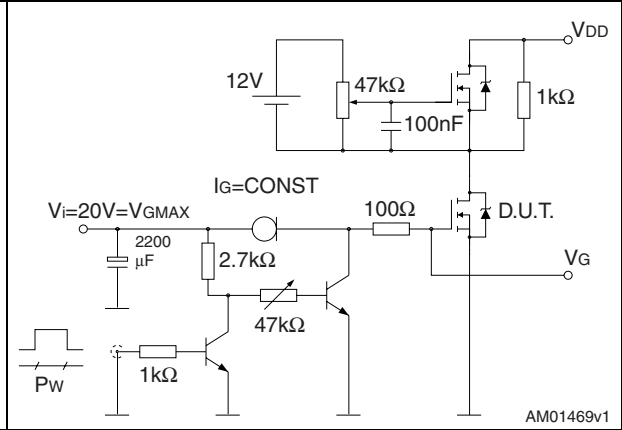
3 Test circuits

Figure 13. Switching times test circuit for resistive load



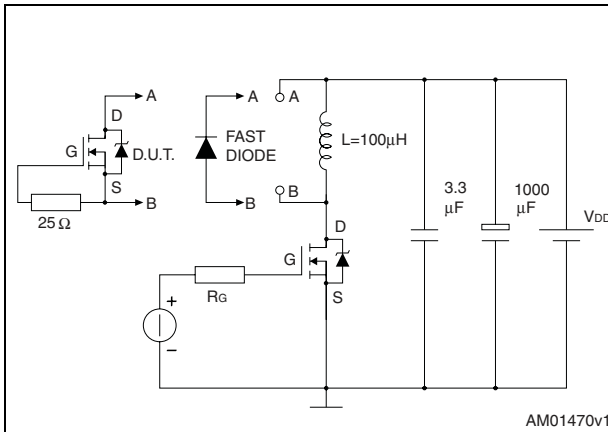
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Figure 14. Gate charge test circuit



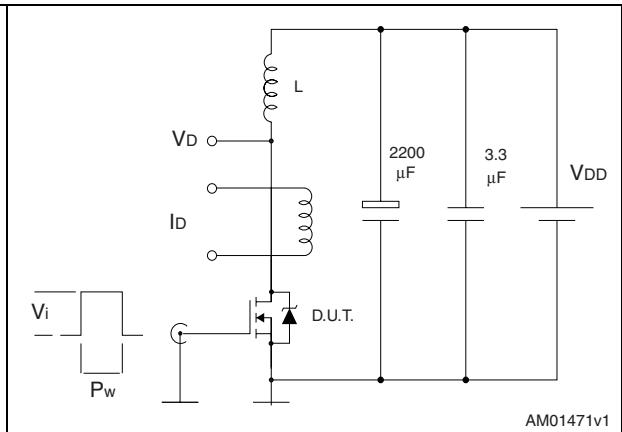
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Figure 15. Test circuit for inductive load switching and diode recovery times



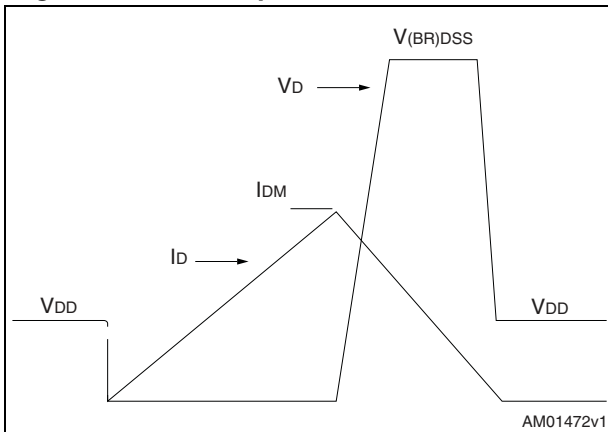
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Figure 16. Unclamped inductive load test circuit



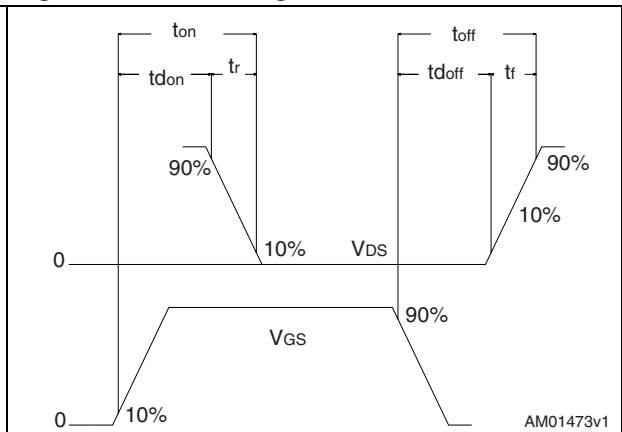
AM01471v1

Figure 17. Unclamped inductive waveform



AM01472v1

Figure 18. Switching time waveform



AM01473v1

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 19. H²PAK-2 drawing

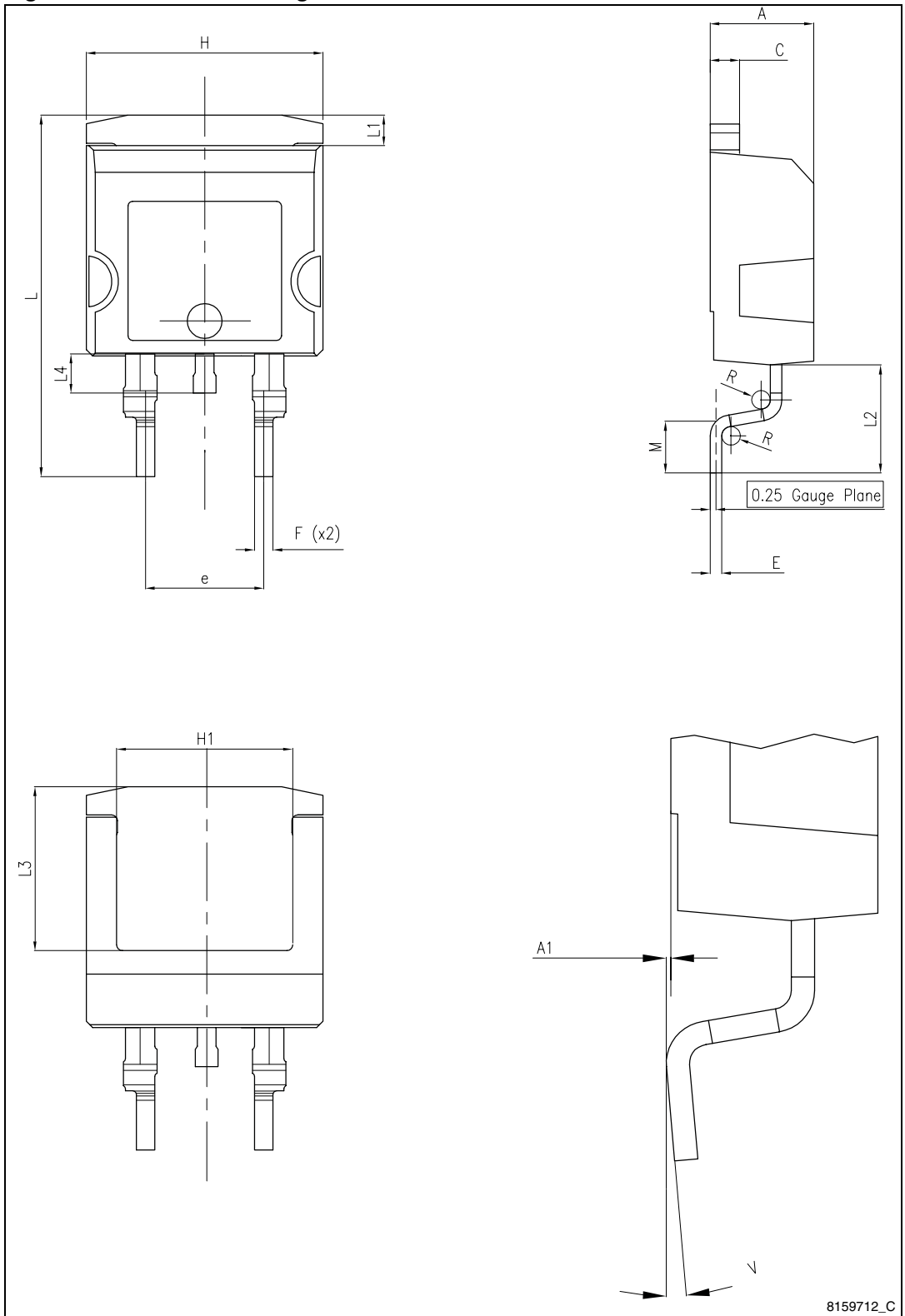


Table 9. H²PAK-6 mechanical data

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 21. H²PAK-6 drawing

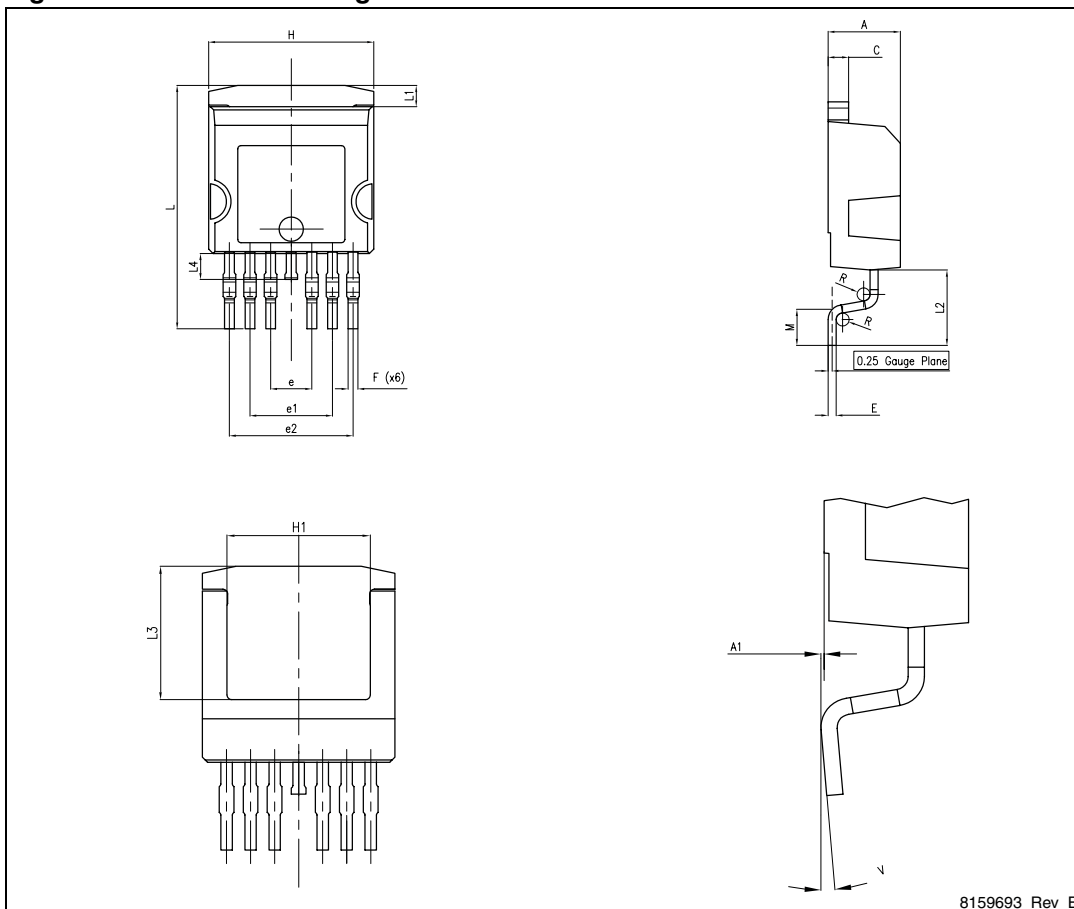
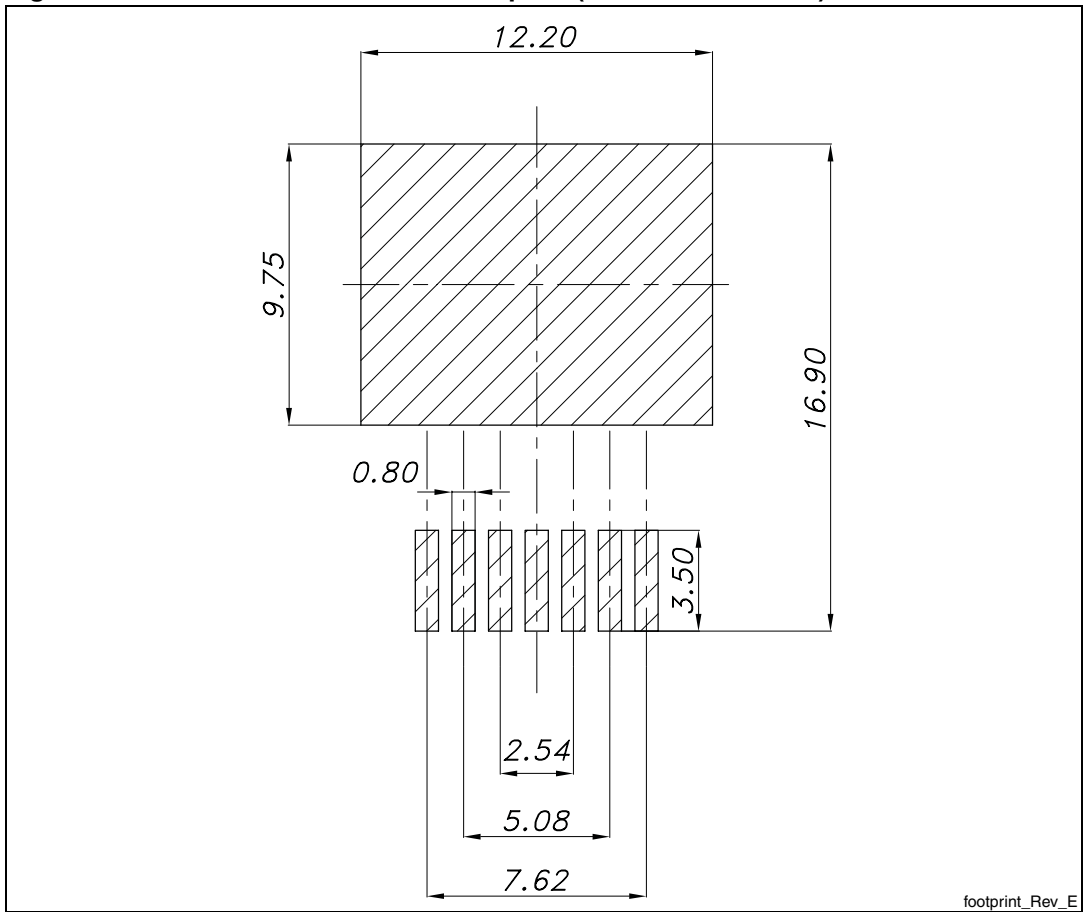


Figure 22. H²PAK-6 recommended footprint (dimensions in mm)

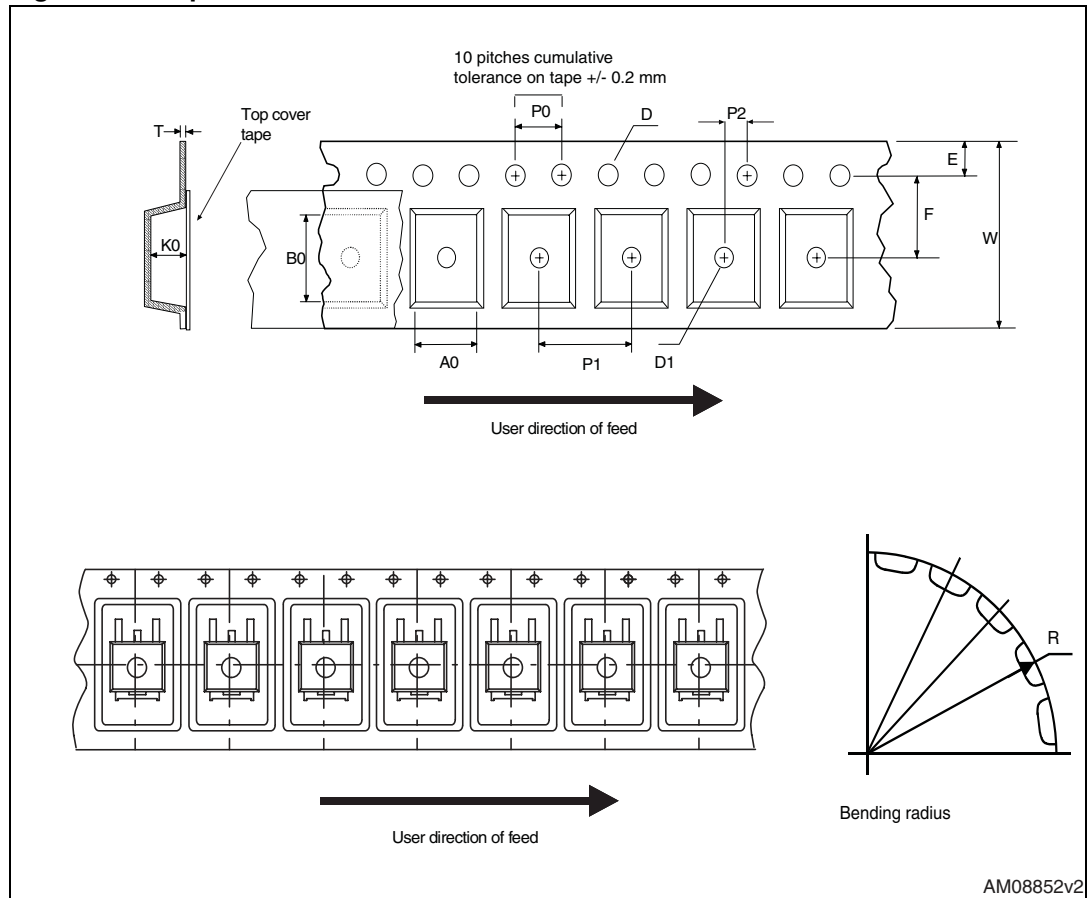


5 Packaging mechanical data

Table 10. H²PAK-2 and H²PAK-6 tape and reel mechanical data

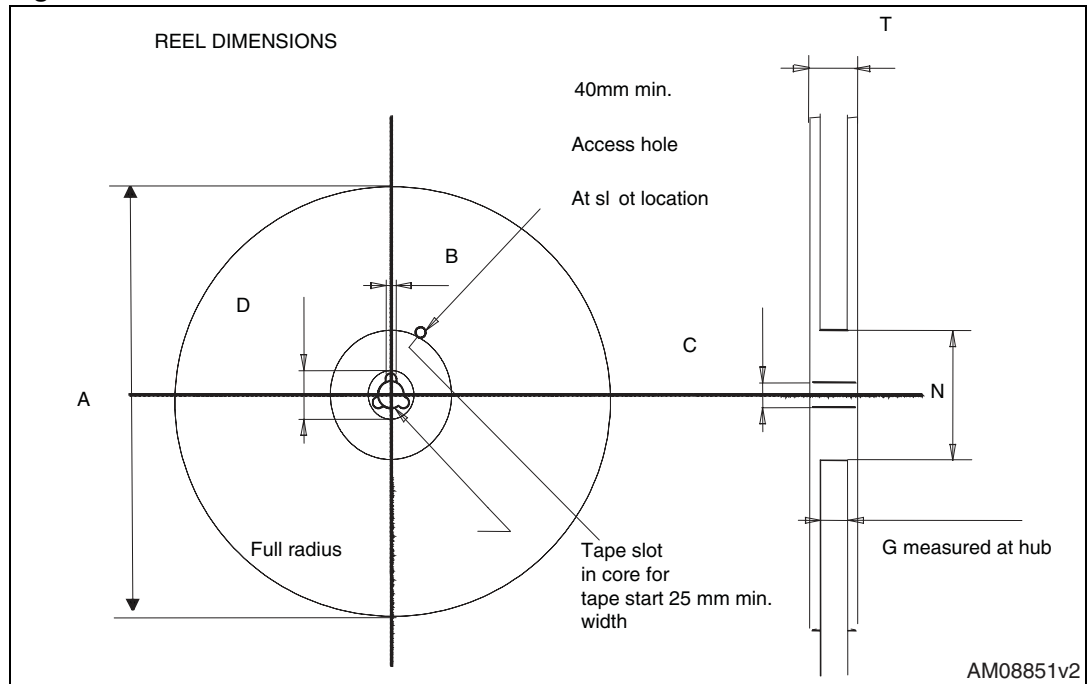
Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	10.5	10.7	A		330
B0	15.7	15.9	B	1.5	
D	1.5	1.6	C	12.8	13.2
D1	1.59	1.61	D	20.2	
E	1.65	1.85	G	24.4	26.4
F	11.4	11.6	N	100	
K0	4.8	5.0	T		30.4
P0	3.9	4.1			
P1	11.9	12.1	Base qty		1000
P2	1.9	2.1	Bulk qty		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

Figure 23. Tape



AM08852v2

Figure 24. Reel



AM08851v2

6 Revision history

Table 11. Document revision history

Date	Revision	Changes
19-Oct-2011	1	Initial release.
02-Jul-2012	2	Added new device in H ² PAK-2. <i>Table 1: Device summary</i> has been modified accordingly. <i>Table 8: H²PAK-2 mechanical data, Figure 19: H²PAK-2 drawing and Figure 20: H²PAK-2 recommended footprint (dimensions in mm)</i> have been added. Minor text changes.

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