



STH240N75F3-6

N-channel 75 V, 2.6 m Ω , 180 A, H²PAK
STripFET™ III Power MOSFET

Features

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

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

Applications

- Switching application

Description

This device is an N-channel enhancement mode Power MOSFET produced using STMicroelectronics' STripFET™ III technology, which is specifically designed to minimize on-resistance and gate charge to provide superior switching performance.

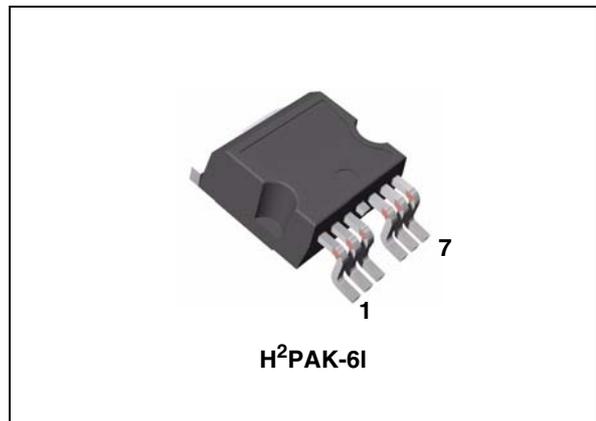


Figure 1. Internal schematic diagram

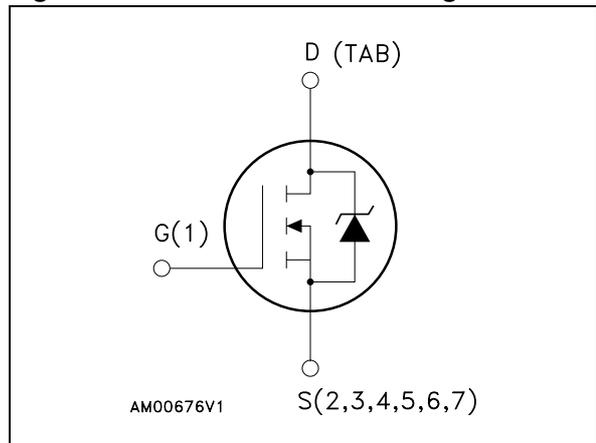


Table 1. Device summary

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

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($v_{gs} = 0$)	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
$P_{TOT}^{(3)}$	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2	W/ $^\circ\text{C}$
$E_{AS}^{(4)}$	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. This value is rated according to R_{thj-c}
4. 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	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	35	$^\circ\text{C}/\text{W}$

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} = Max rating, V _{DS} = Max rating, T _C = 125 °C V _{GS} = 0			10 100	μA μA
I _{GSS}	Gate body leakage current	V _{DS} = ± 20 V, V _{GS} = 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,	-	100	-	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	$V_{DD} = 37.5\text{ V}$, $I_D = 60\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$, <i>(see Figure 13)</i>	-	25	-	ns
t_r	Rise time			70		ns
$t_{d(off)}$	Turn-off delay time	$V_{DD} = 37.5\text{ V}$, $I_D = 60\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$, <i>(see Figure 13)</i>	-	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	$I_{SD} = 90\text{ A}$, $V_{GS} = 0$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 120\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$, $T_j = 150\text{ }^\circ\text{C}$ <i>(see Figure 15)</i>	-	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

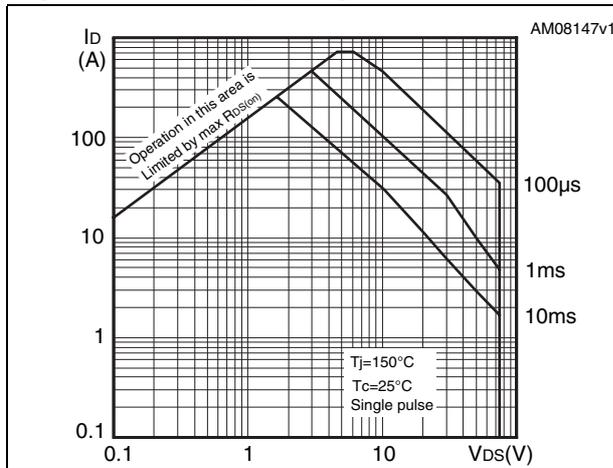


Figure 3. Thermal impedance

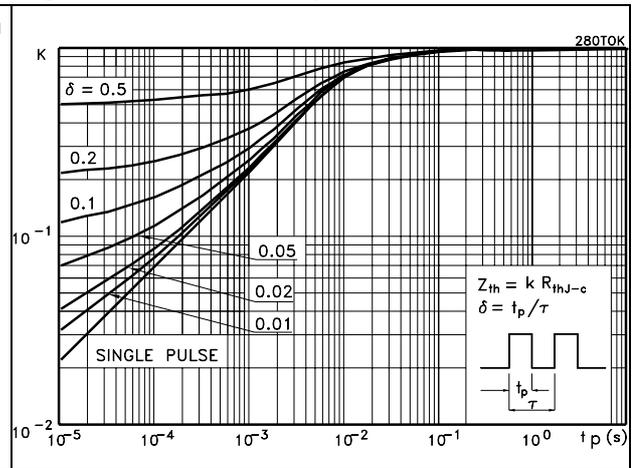


Figure 4. Output characteristics

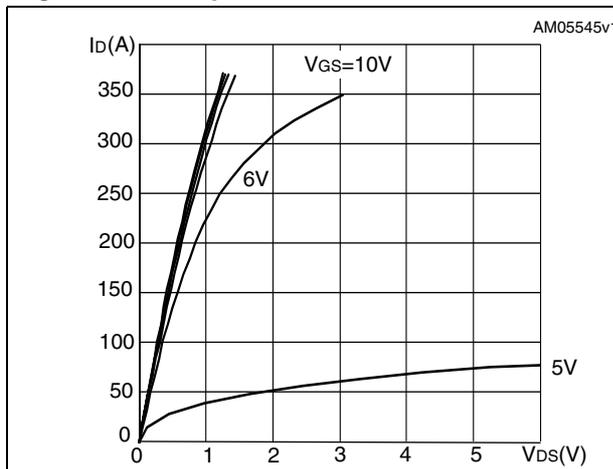


Figure 5. Transfer characteristics

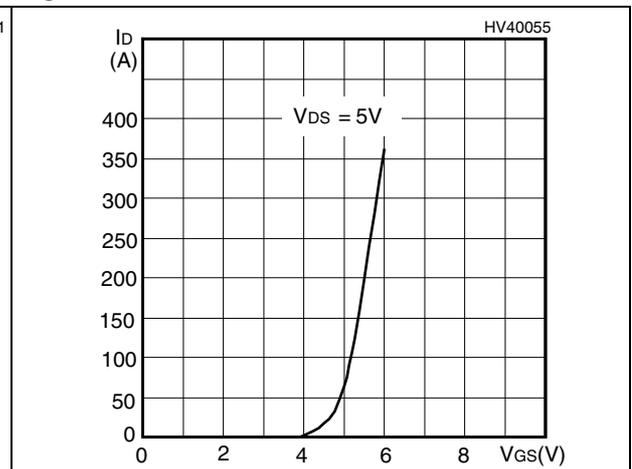


Figure 6. Normalized BV_{DSS} vs temperature

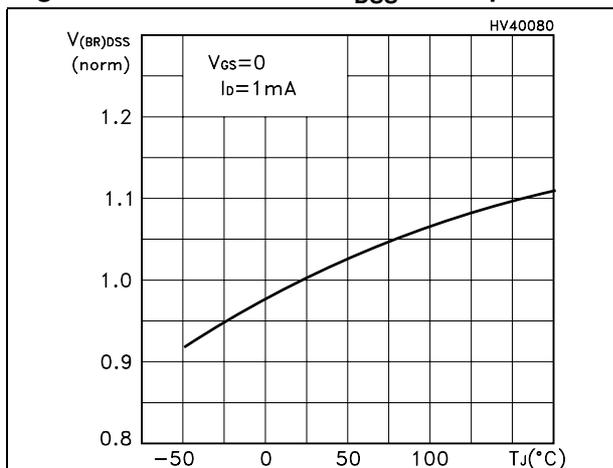


Figure 7. Static drain-source on resistance

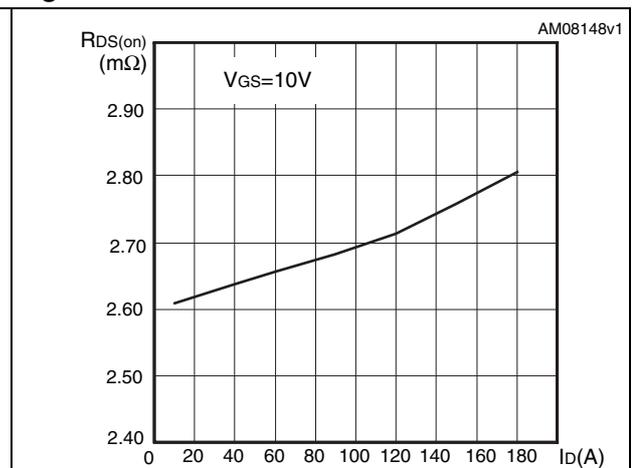


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

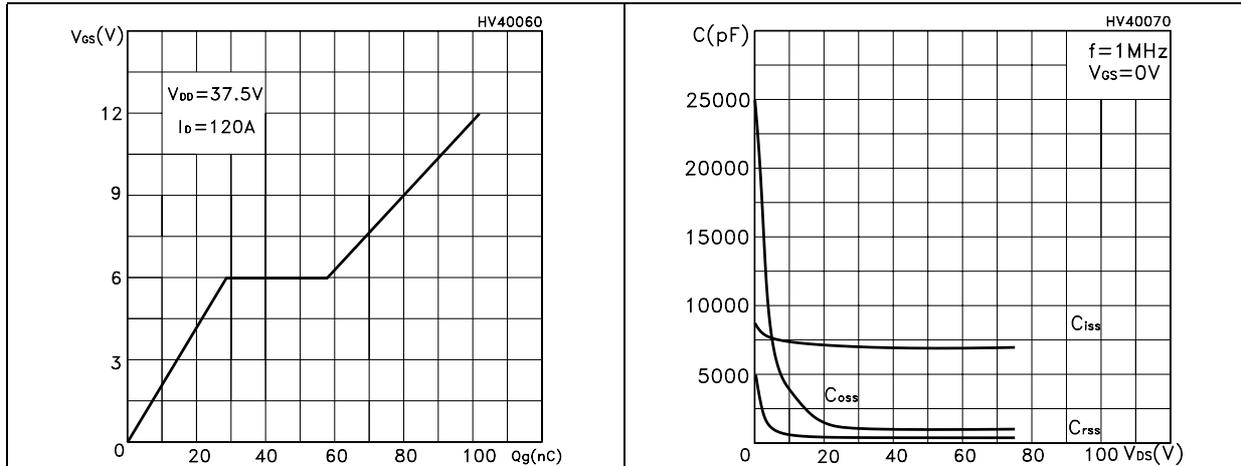


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

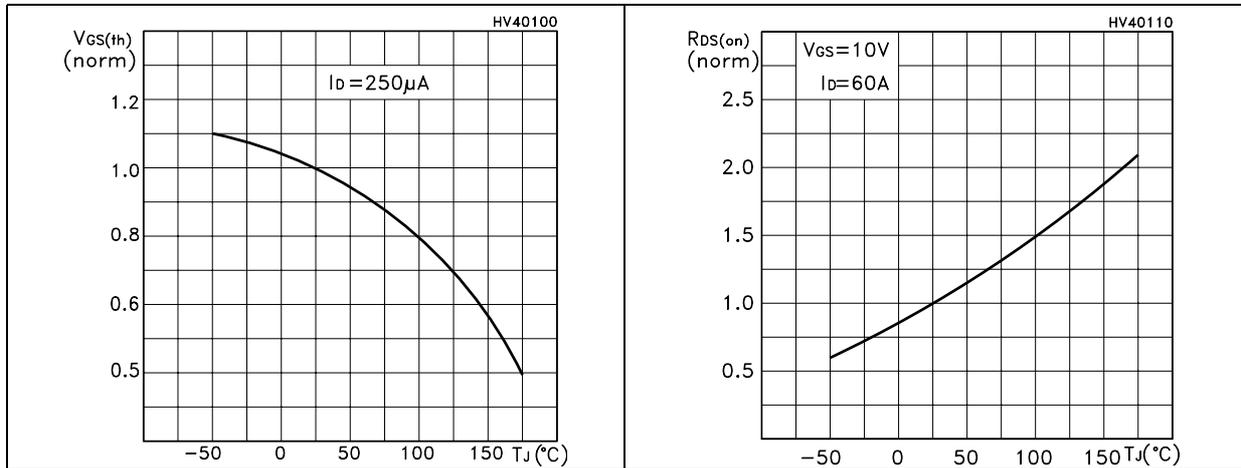
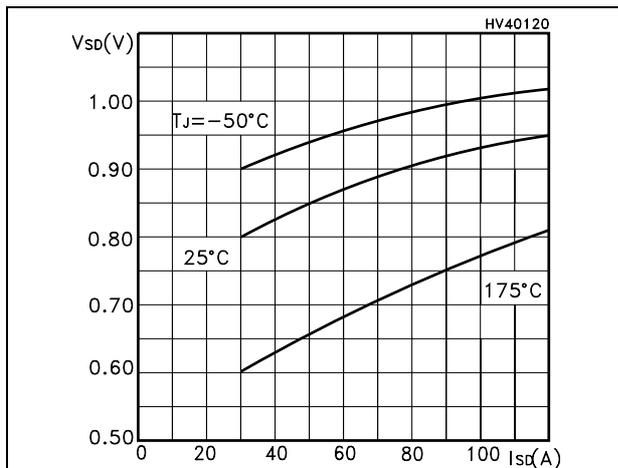
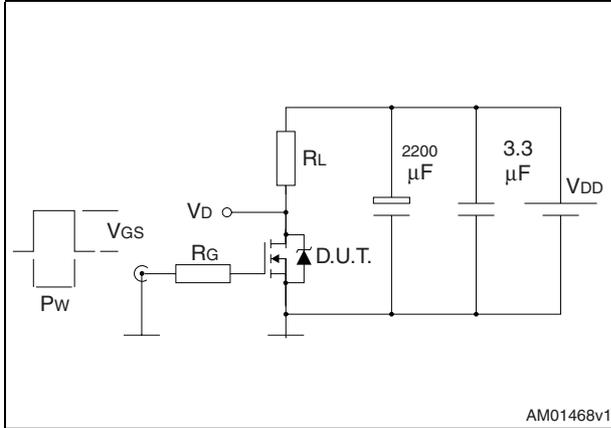


Figure 12. Source-drain diode forward characteristics



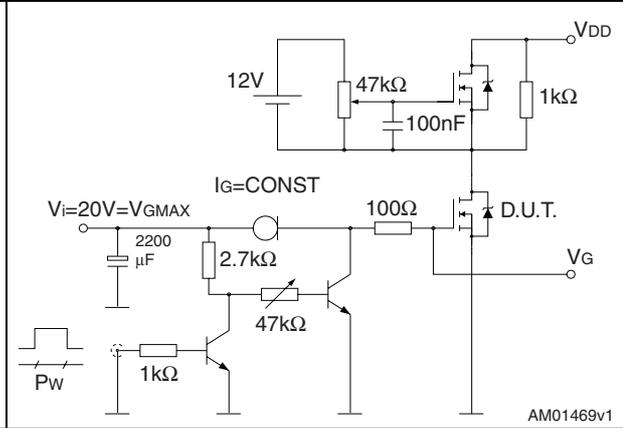
3 Test circuits

Figure 13. Switching times test circuit for resistive load



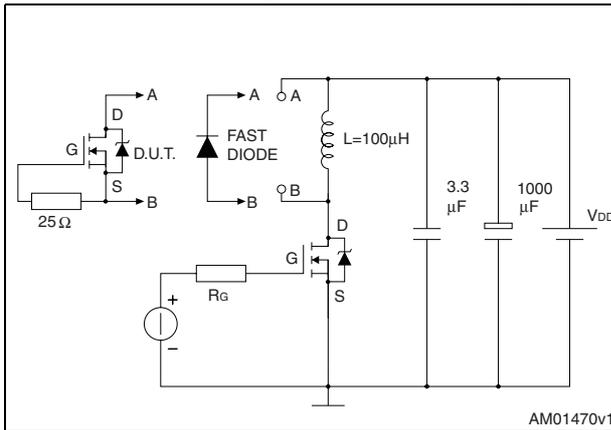
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Figure 14. Gate charge test circuit



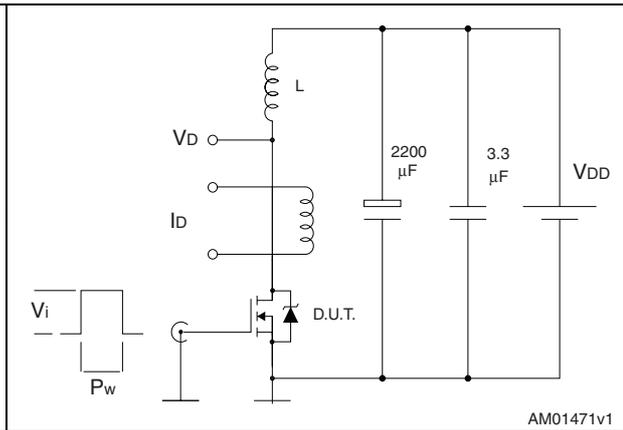
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Figure 15. Test circuit for inductive load switching and diode recovery times



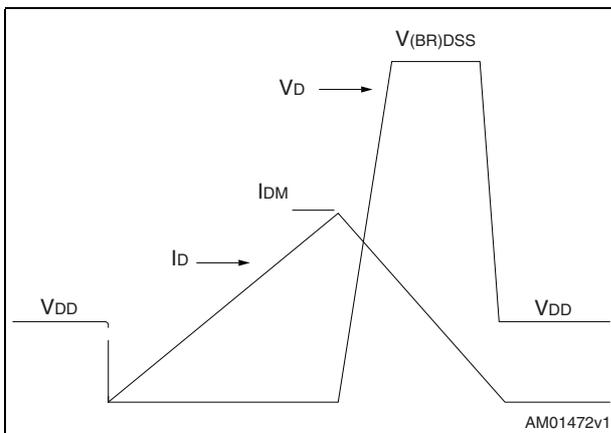
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Figure 16. Unclamped inductive load test circuit



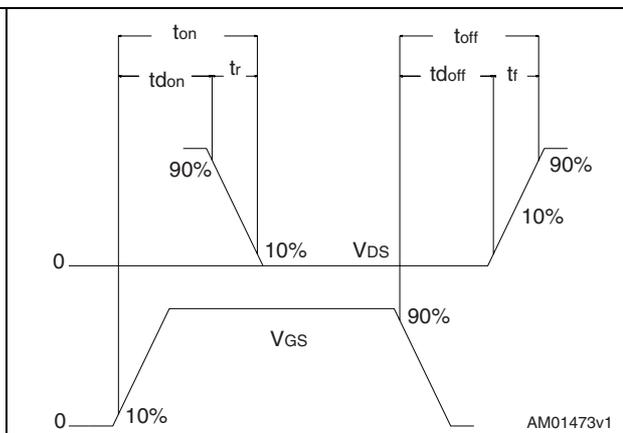
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



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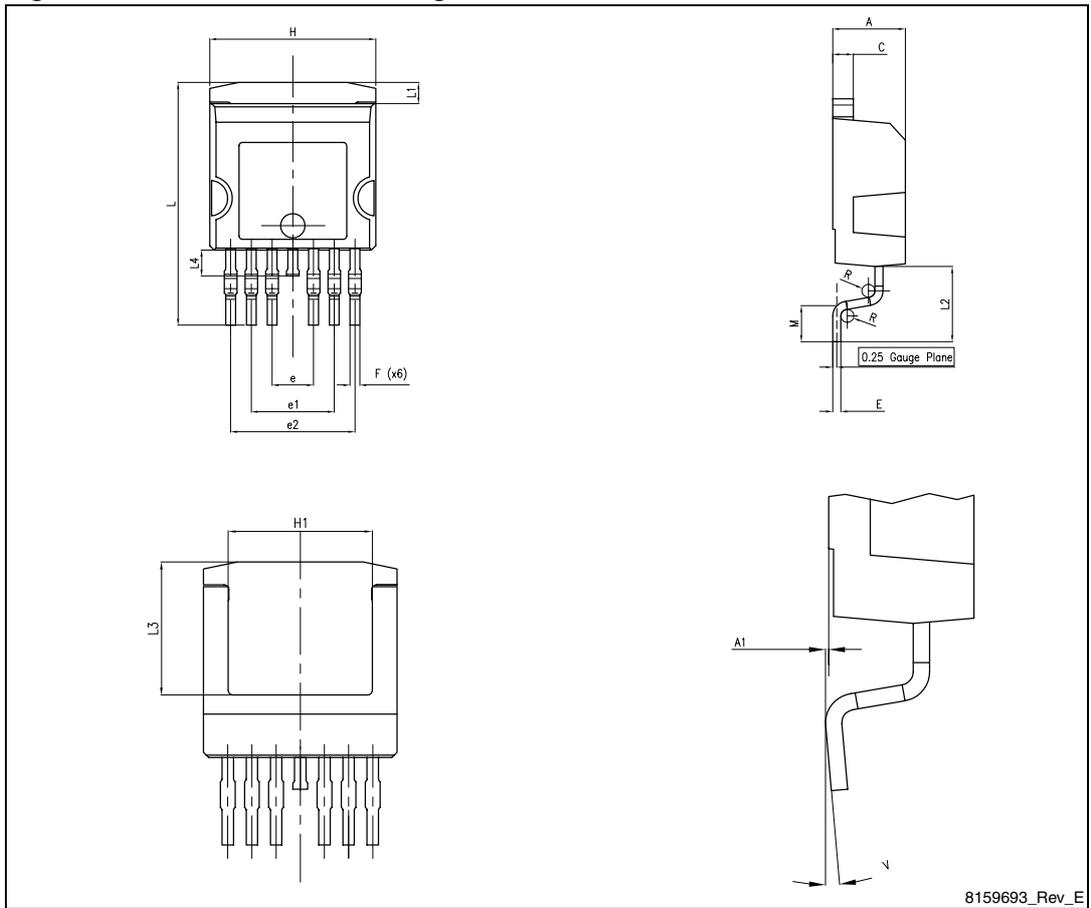
4 Package mechanical data

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 6 leads mechanical data

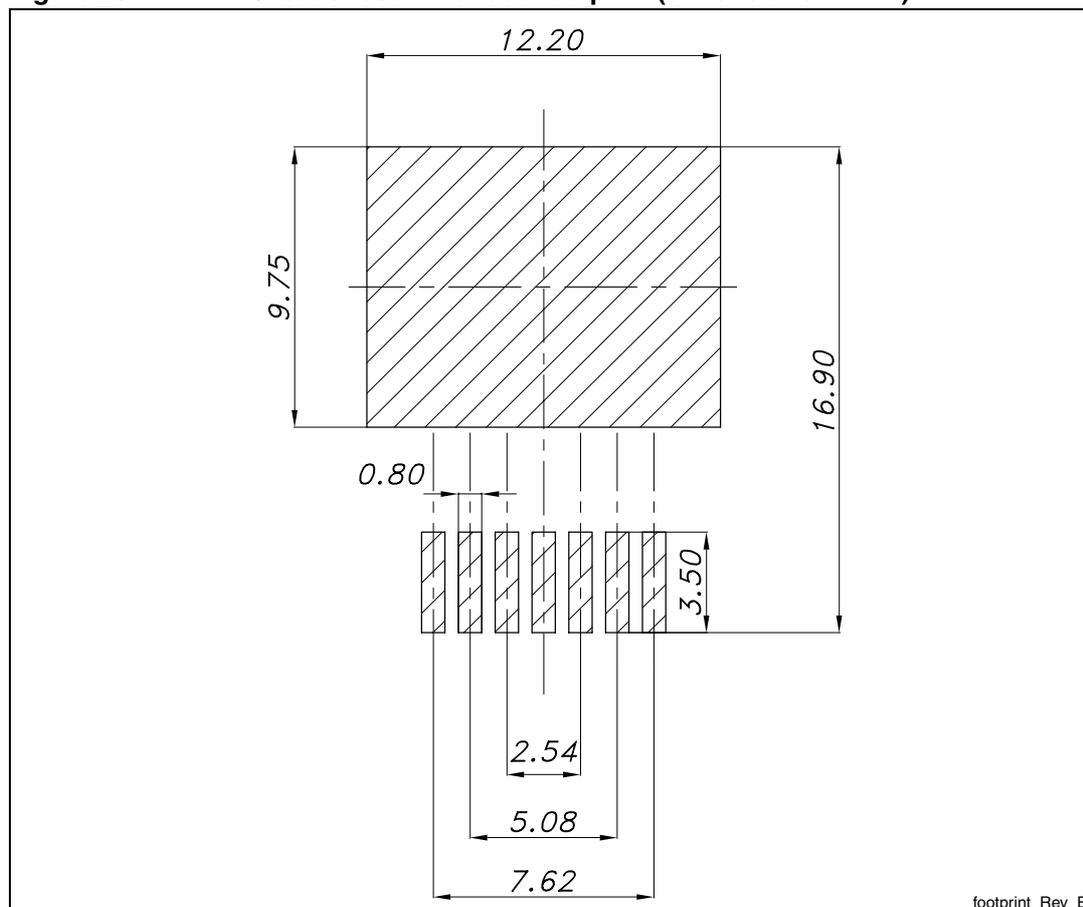
Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.80
A1	0.03		0.20
C	1.17		1.37
e	2.34		2.74
e1	4.88		5.28
e2	7.42		7.82
E	0.45		0.60
F	0.50		0.70
H	10.00		10.40
H1	7.40		7.80
L	14.75		15.25
L1	1.27		1.40
L2	4.35		4.95
L3	6.85		7.25
L4	1.5		1.75
M	1.90		2.50
R	0.20		0.60
V	0°		8°

Figure 19. H²PAK 6 leads drawing



8159693_Rev_E

Figure 20. H²PAK 6 leads recommended footprint (dimensions in mm)



5 Packaging mechanical data

Table 9. H²PAK 2 leads 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 21. Tape

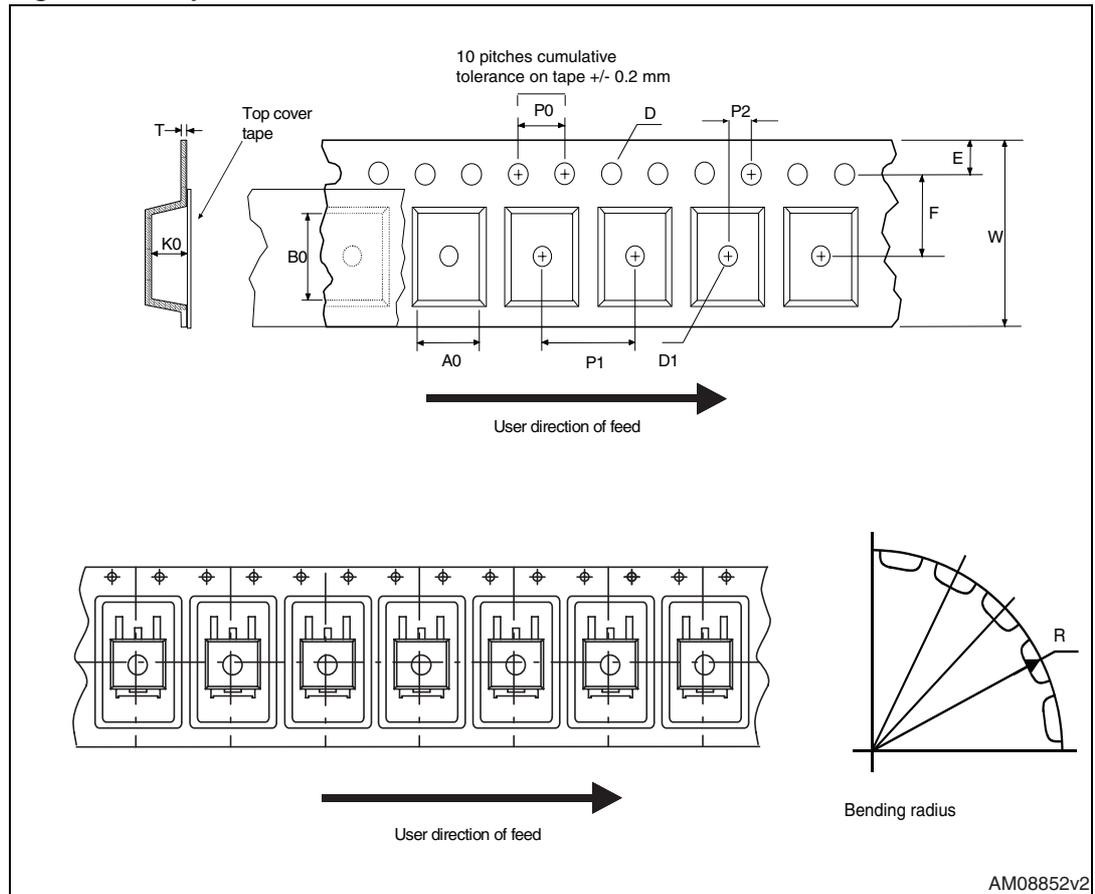
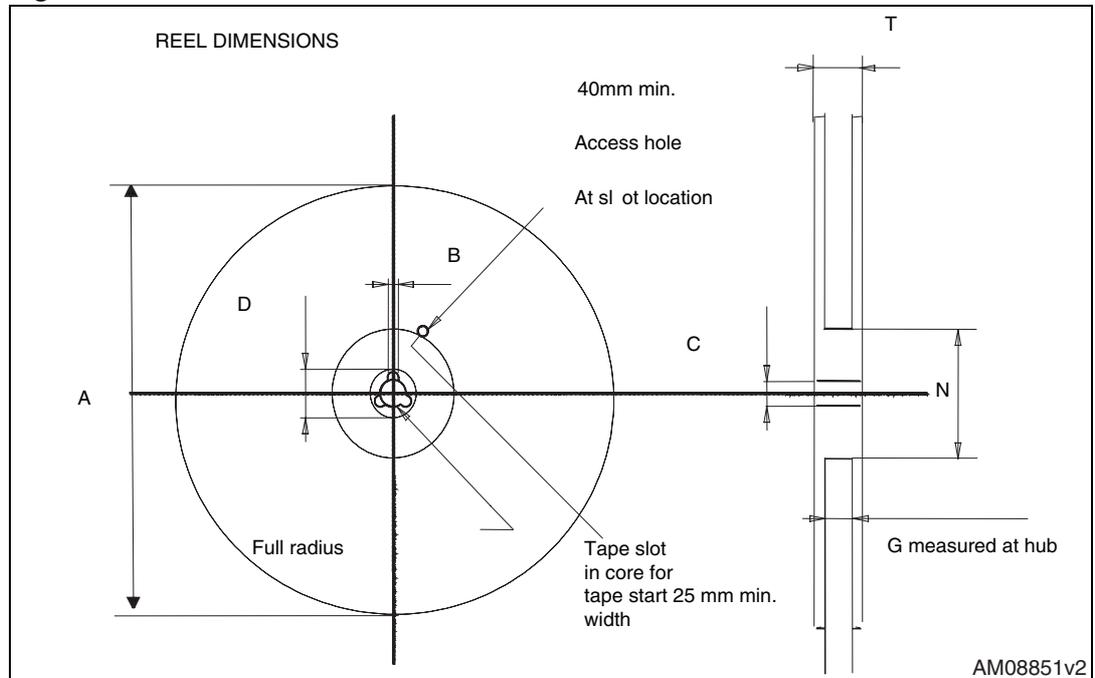


Figure 22. Reel



6 Revision history

Table 10. Document revision history

Date	Revision	Changes
19-Oct-2011	1	Initial release.

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