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STH260N6F6-2

N-channel 60 V, 1.7 mΩ typ., 180 A STripFET™ VI DeepGATE™ Power MOSFET in H²PAK-2 package

Datasheet — production data

Features

Order code	V _{DSS}	R _{DS(on)} max	I _D
STH260N6F6-2	60 V	< 2.4 mΩ	180 A

- Low gate charge
- Very low on-resistance
- High avalanche ruggedness

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest R_{DS(on)} in all packages.

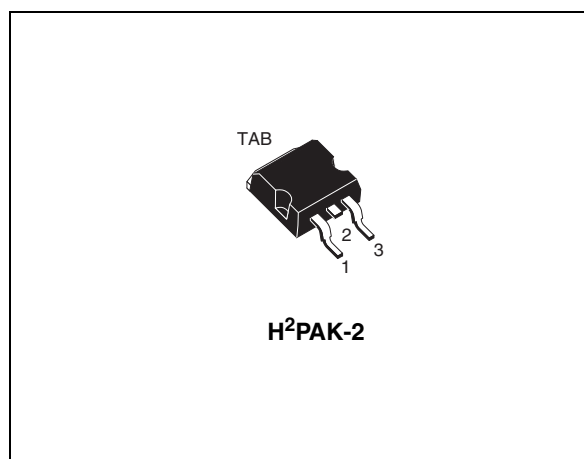


Figure 1. Internal schematic diagram

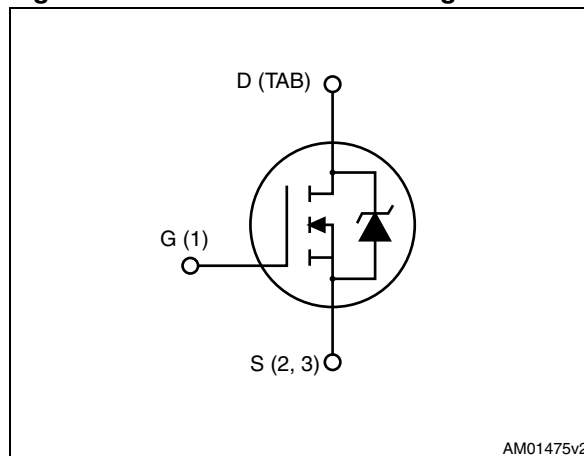


Table 1. Device summary

Order code	Marking	Package	Packaging
STH260N6F6-2	260N6F6	H ² PAK-2	Tape and reel

Contents

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	60	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	180	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	180	A
$I_{DM}^{(1)}$	Drain current (pulsed)	720	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	300	W
	Derating factor	2	W/ $^\circ\text{C}$
T_{stg}	Storage temperature	- 55 to 175	$^\circ\text{C}$
T_j	Operating junction temperature		

1. Current limited by package.

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	$^\circ\text{C}/\text{W}$
T_l	Maximum lead temperature for soldering purpose	300	$^\circ\text{C}$

1. When mounted on FR-4 board of 1 inch², 2 oz Cu.

Electrical characteristics

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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 (V _{GS} = 0)	I _D = 250 μA	60			V
I _{DSS}	Zero gate voltage Drain current (V _{GS} = 0)	V _{DS} = 60 V V _{DS} = 60 V, T _C = 125 °C			1 100	μA μA
I _{GSS}	Gate-body leakage current (V _{DS} = 0)	V _{GS} = ± 20 V			± 100	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 = 60 A		1.7	2.4	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	-	11800	-	pF
C _{oss}	Output capacitance			1235		pF
C _{rss}	Reverse transfer capacitance			488		pF
Q _g	Total gate charge	V _{DD} = 30 V, I _D = 120 A, V _{GS} = 10 V <i>(see Figure 14)</i>	-	183	-	nC
Q _{gs}	Gate-source charge			53		nC
Q _{gd}	Gate-drain charge			41		nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Turn-on delay time	V _{DD} = 30 V, I _D = 60 A R _G = 4.7 Ω V _{GS} = 10 V <i>(see Figure 13)</i>	-	31.4	-	ns
t _r	Rise time			165		ns
t _{d(off)}	Turn-off-delay time			144.4		ns
t _f	Fall time			62.6		ns

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Electrical characteristics
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} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 120\text{ A}, V_{DD} = 48\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$ $T_j = 150\text{ }^\circ\text{C}$ <i>(see Figure 15)</i>	-	55.6 116 3.8		ns nC A

1. Current limited by package.
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

Electrical characteristics

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2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

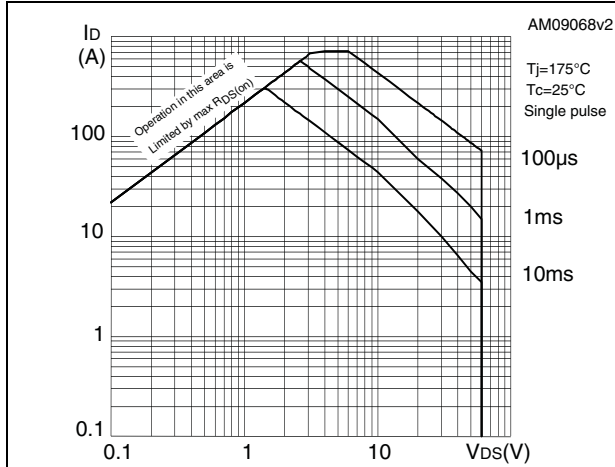


Figure 3. Thermal impedance

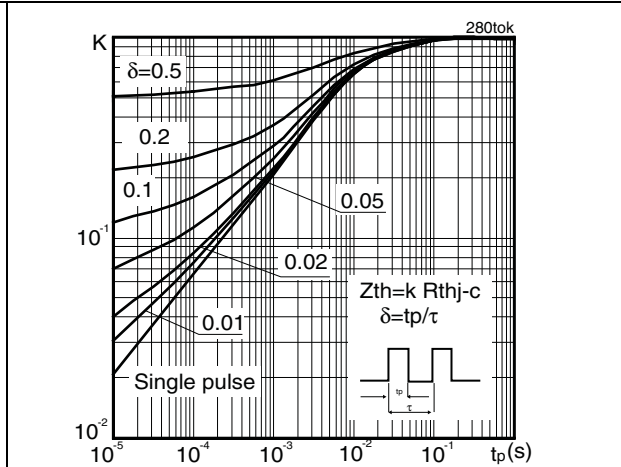


Figure 4. Output characteristics

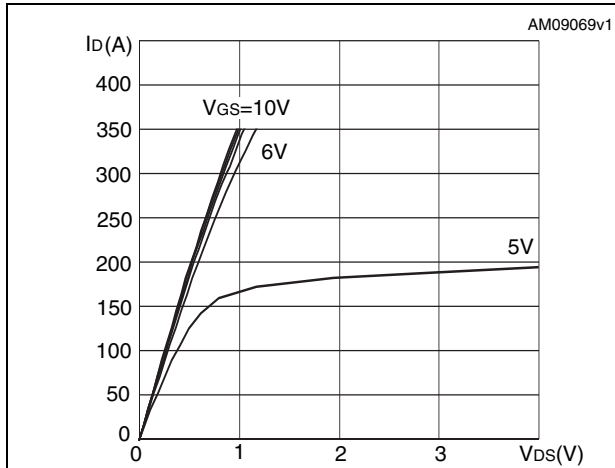


Figure 5. Transfer characteristics

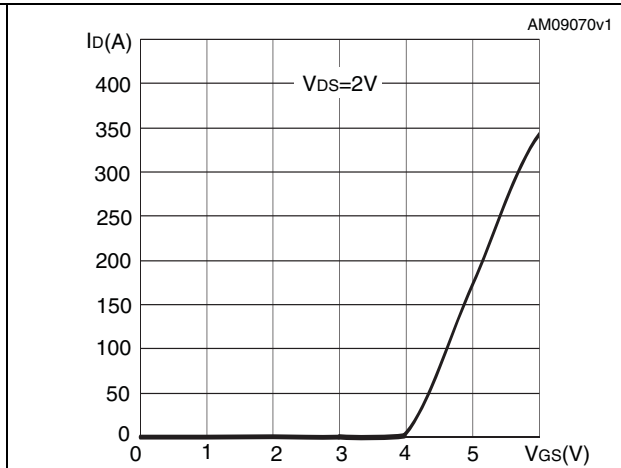


Figure 6. Normalized BVDS vs. temperature

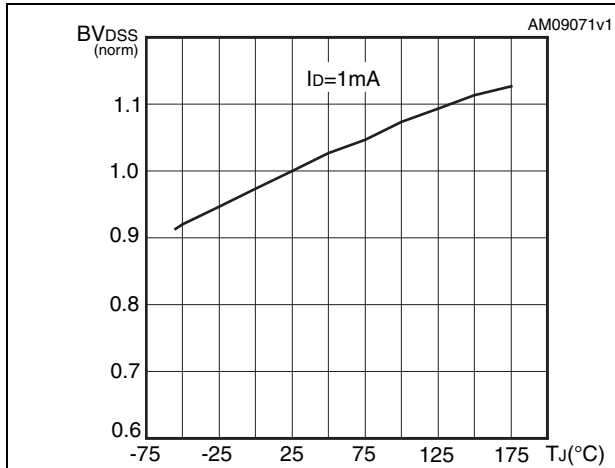
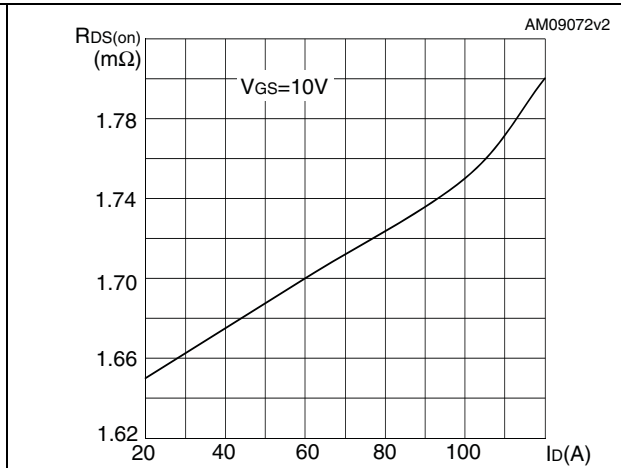


Figure 7. Static drain-source on-resistance



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Electrical characteristics

Figure 8. Gate charge vs. gate-source voltage

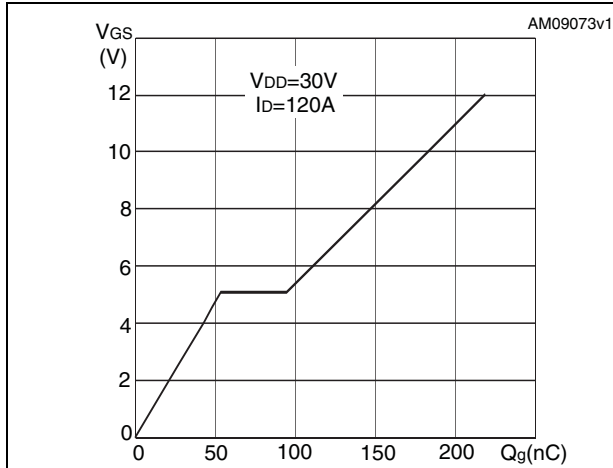


Figure 9. Capacitance variations

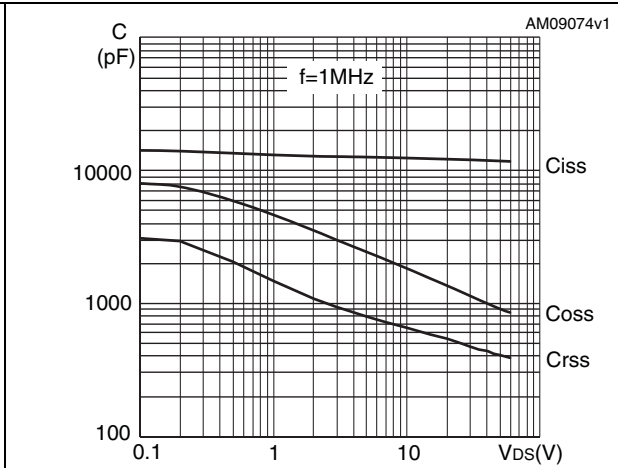


Figure 10. Normalized gate threshold voltage vs. temperature

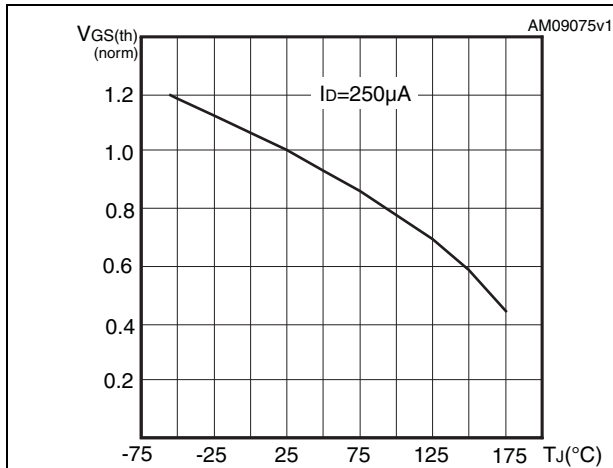


Figure 11. Normalized on-resistance vs. temperature

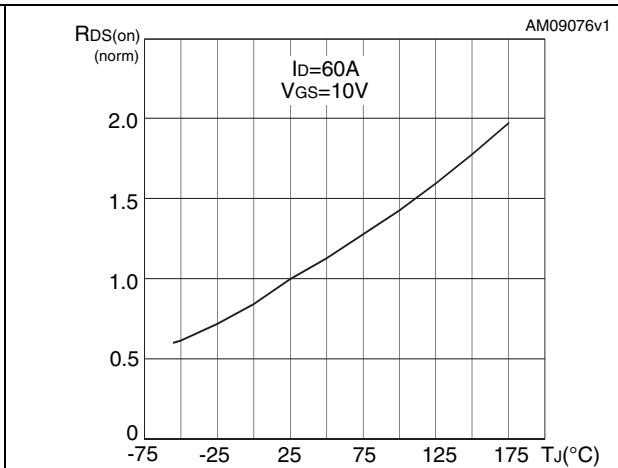
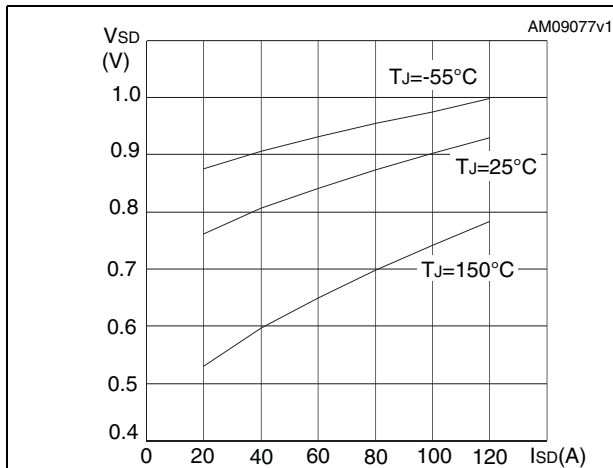


Figure 12. Source-drain diode forward characteristics



3 Test circuits

Figure 13. Switching times test circuit for resistive load

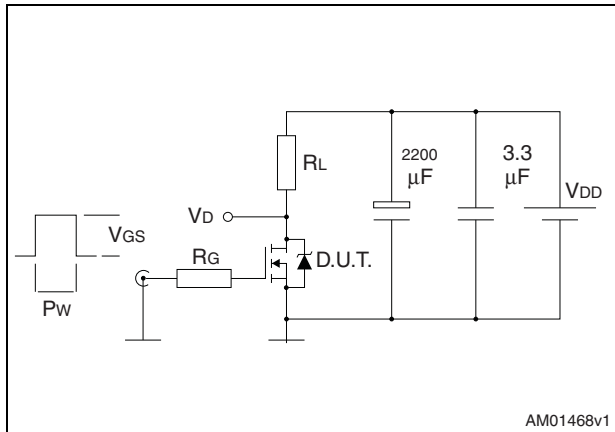


Figure 14. Gate charge test circuit

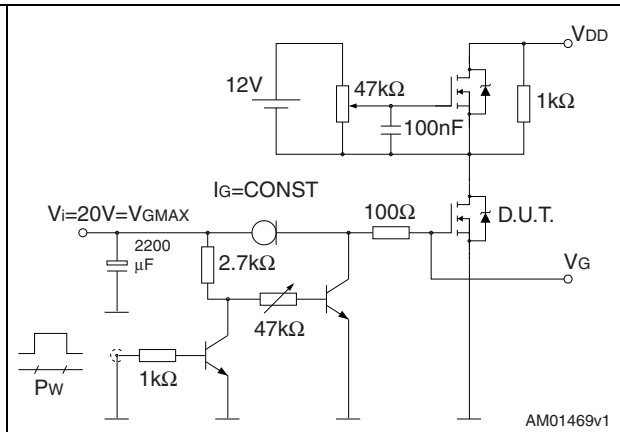


Figure 15. Test circuit for inductive load switching and diode recovery times

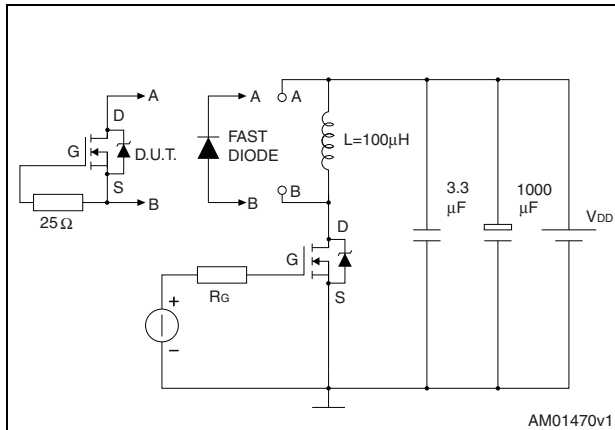


Figure 16. Unclamped inductive load test circuit

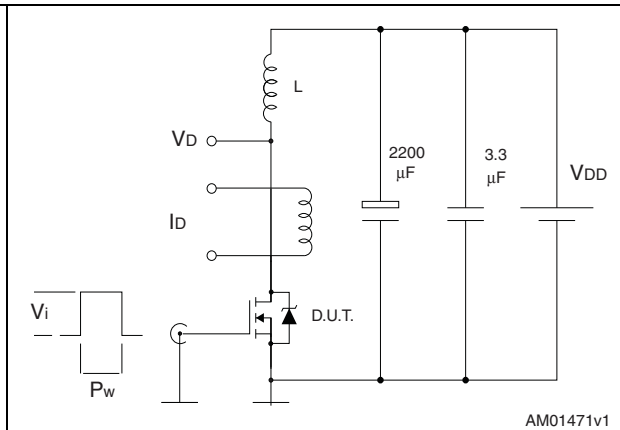


Figure 17. Unclamped inductive waveform

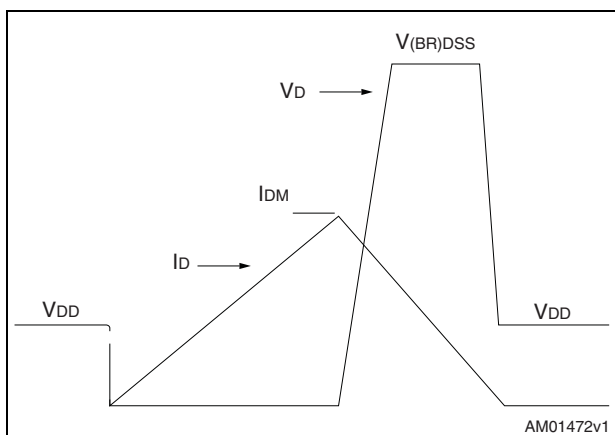
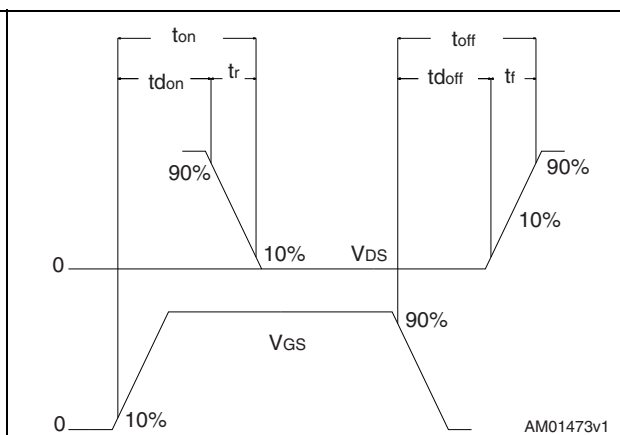


Figure 18. Switching time waveform



4 Package mechanical data

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Package mechanical data

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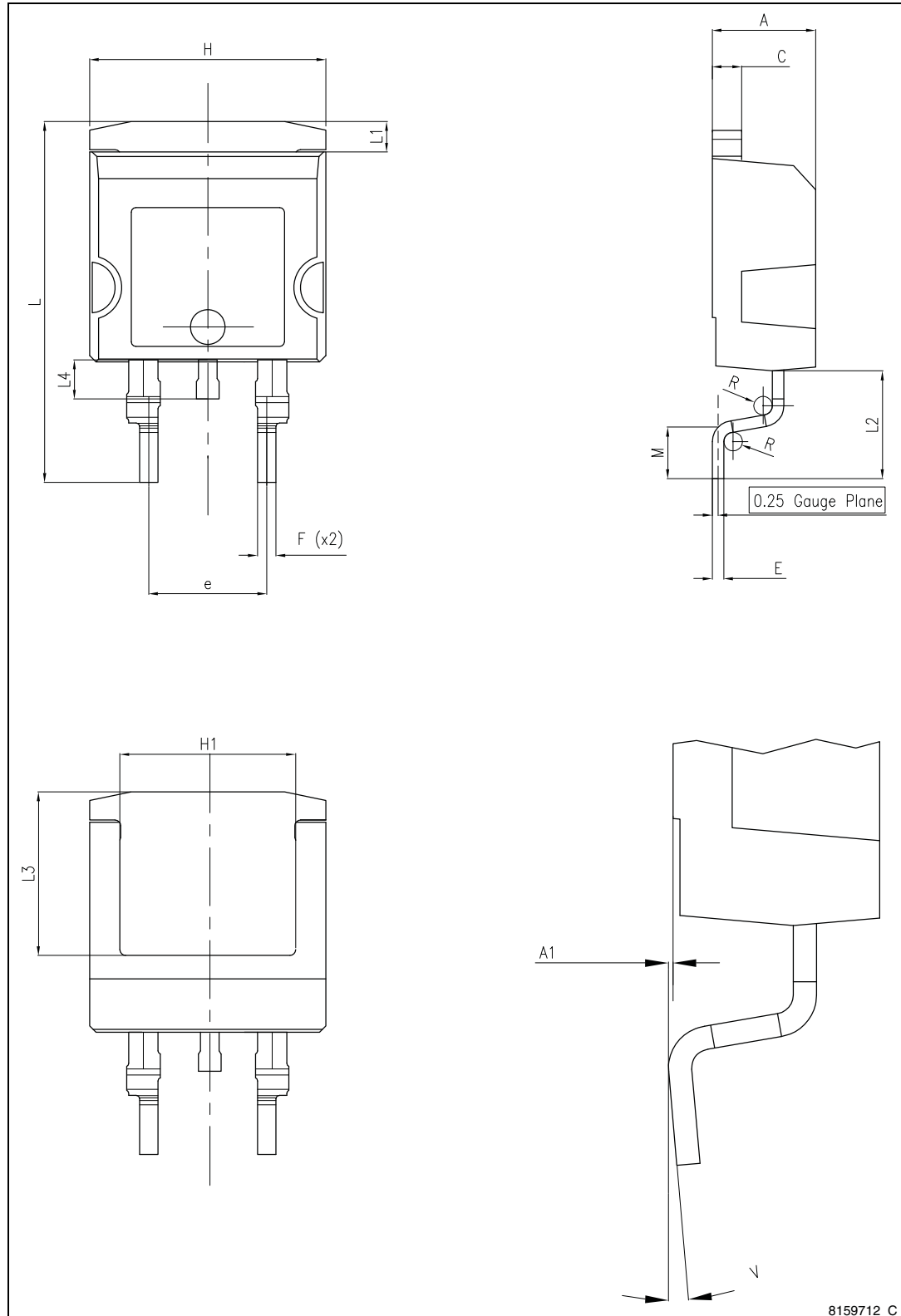
Table 8. H²PAK 2 leads mechanical data

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°

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Package mechanical data

Figure 19. H²PAK 2 leads drawing

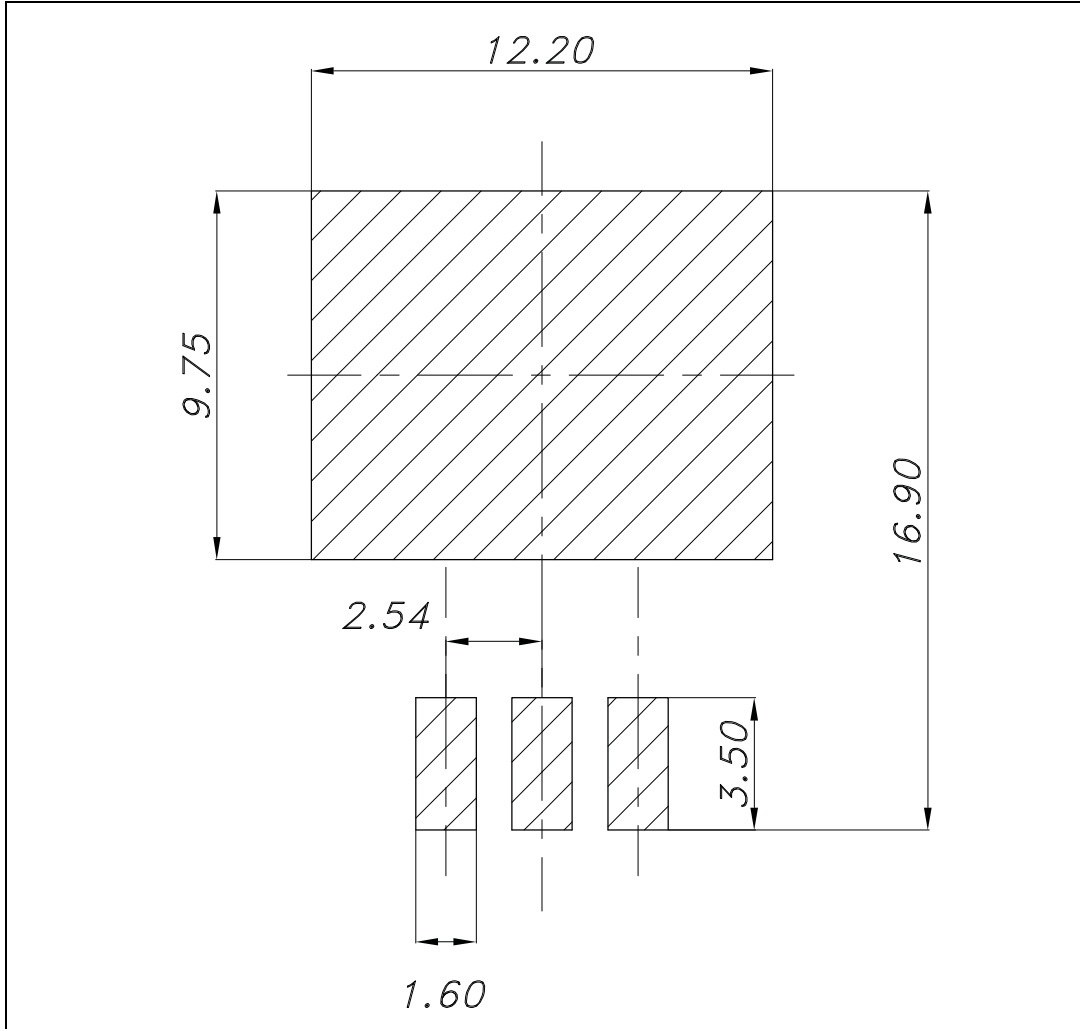


8159712_C

Package mechanical data

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Figure 20. H²PAK 2 recommended footprint



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
31-May-2011	1	First release.
25-Aug-2011	2	Updated mechanical data.
01-Feb-2012	3	Updated Table 2: Absolute maximum ratings . Minor text changes.
06-Jul-2012	4	Section 2.1: Electrical characteristics (curves) has been added.

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