



STH85N15F4-2 STP85N15F4

N-channel 150 V, 0.015 Ω , 85 A TO-220, H²PAK
STripFET™ DeepGATE™ Power MOSFET

Preliminary data

Features

Type	V _{DSS}	R _{DS(on)} max	I _D
STH85N15F4-2	150 V	< 18.6 m Ω	85 A
STP85N15F4	150 V	< 19 m Ω	85 A

- Extremely low on-resistance R_{DS(on)}
- 100% avalanche tested

Application

- Switching applications

Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performance.

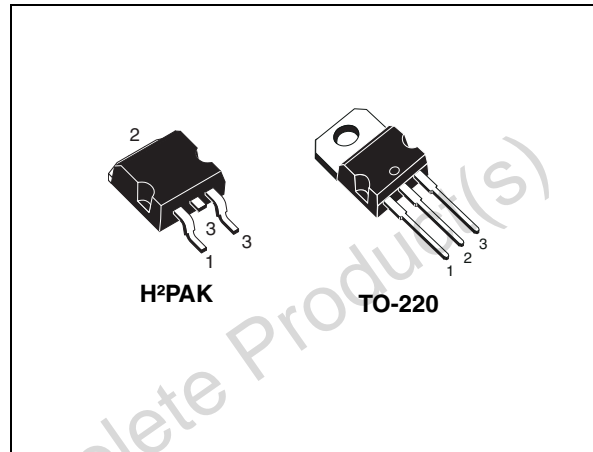
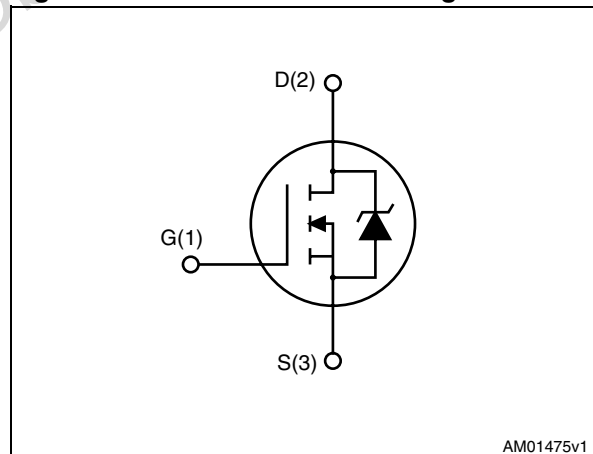


Figure 1. Internal schematic diagram



AM01475v1

Table 1. Device summary

Order codes	Marking	Package	Packaging
STH85N15F4-2	85N15F4	H ² PAK	Tape and reel
STP85N15F4	85N15F4	TO-220	Tube

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Obsolete Product(s) - Obsolete Product(s)



1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS} = 0$)	150	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^{\circ}\text{C}$	85	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	60	A
$I_{DM}^{(1)}$	Drain current (pulsed)	340	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	300	W
	Derating factor	2.0	W/ $^{\circ}\text{C}$
$E_{AS}^{(2)}$	Single pulse avalanche energy	TBD	mJ
T_{stg}	Storage temperature	- 55 to 175	$^{\circ}\text{C}$
T_j	Max. operating junction temperature		

1. Pulse width limited by safe operating area

2. Starting $T_j = 25\text{ }^{\circ}\text{C}$, $I_D = 50\text{ A}$, $V_{DD} = 25\text{ V}$

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-220	H ² PAK	
$R_{thj-case}$	Thermal resistance junction-case max	0.5		$^{\circ}\text{C/W}$
$R_{thj-pcb}$	Thermal resistance junction-pcb max	--	35 ⁽¹⁾	$^{\circ}\text{C/W}$
R_{thj-a}	Thermal resistance junction-ambient max	62.5	--	$^{\circ}\text{C/W}$
T_l	Maximum lead temperature for soldering purpose	300		$^{\circ}\text{C}$

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

2 Electrical characteristics

($T_{CASE} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	150			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = \text{max rating}$			1	μA
		$V_{DS} = \text{max rating}$, $T_C = 125\text{ }^{\circ}\text{C}$			100	μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 40\text{ A}$	TO220	15.5	19	m Ω
			H ² PAK	15.0	18.6	

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	8320	-	pF
C_{oss}	Output capacitance		-	600	-	pF
C_{rss}	Reverse transfer capacitance		-	230	-	pF
Q_g	Total gate charge	$V_{DD} = 80\text{ V}$, $I_D = 85\text{ A}$, $V_{GS} = 10\text{ V}$ (see Figure 3)	-	140	-	nC
Q_{gs}	Gate-source charge		-	TBD	-	nC
Q_{gd}	Gate-drain charge		-	TBD	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time	$V_{DD} = 75\text{ V}$, $I_D = 40\text{ A}$ $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2)	-	TBD	-	ns
	Rise time			TBD		ns
$t_{d(off)}$ t_f	Turn-off-delay time	$V_{DD} = 75\text{ V}$, $I_D = 40\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 2)	-	TBD	-	ns
	Fall time			TBD		ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD}	Source-drain current		-		85	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		340	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 85\text{ A}$, $V_{GS} = 0$	-		TBD	V
t_{rr}	Reverse recovery time	$I_{SD} = 85\text{ A}$, $V_{DD} = 25\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $T_j = 150\text{ }^{\circ}\text{C}$ (see Figure 4)	-	TBD		ns
Q_{rr}	Reverse recovery charge			TBD		nC
I_{RRM}	Reverse recovery current			TBD		A

1. Pulse width limited by safe operating area.

2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

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. TO-220 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

Figure 8. TO-220 drawing

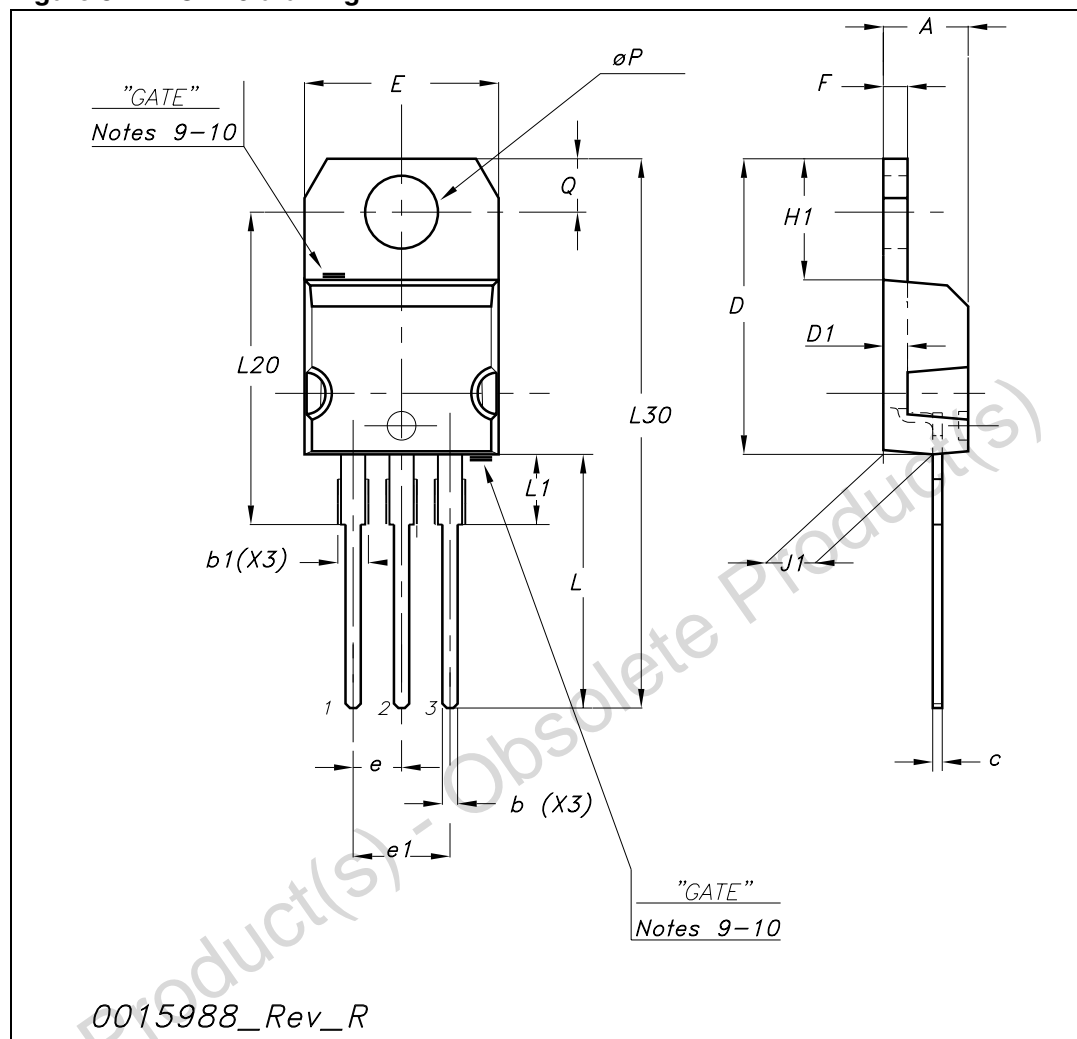


Table 9. H²PAK 2 leads mechanical data

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	7.171	-	7.971
L	15.30	-	15.80
L1	1.27	-	1.40
L2	4.93	-	5.23
L3	7.45	-	7.85
L4	1.5	-	1.7
M	2.6	-	2.9
R	0.20	-	0.60
V	0°	-	8°

Figure 9. H²PAK 2 leads drawing

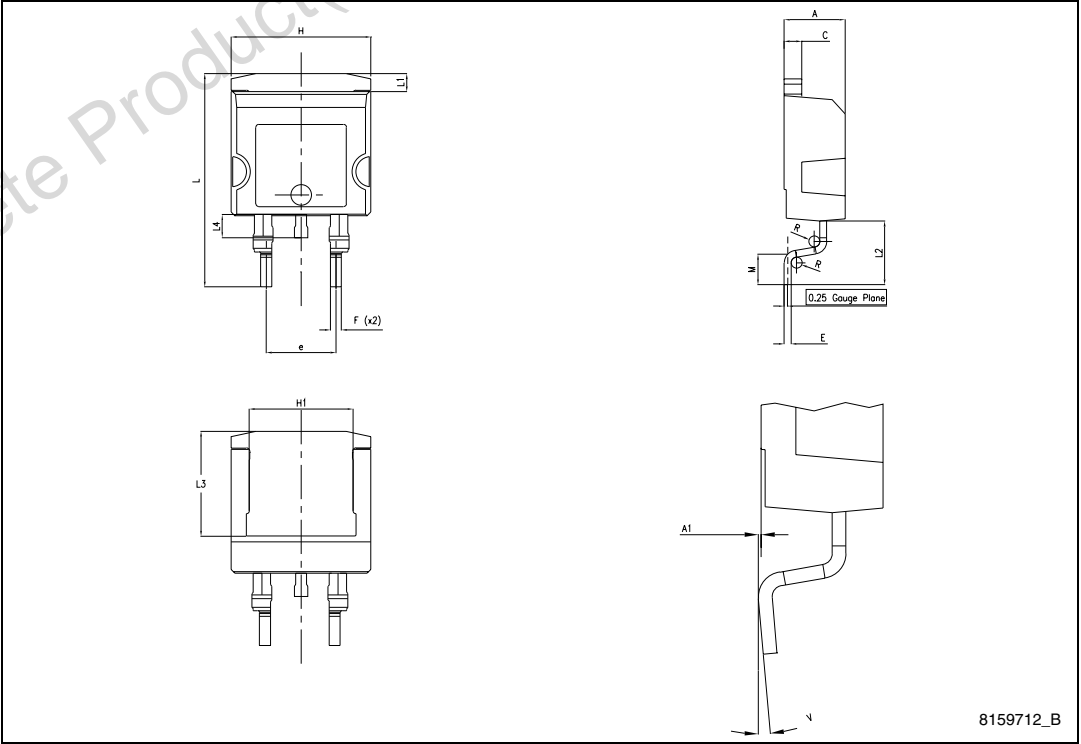
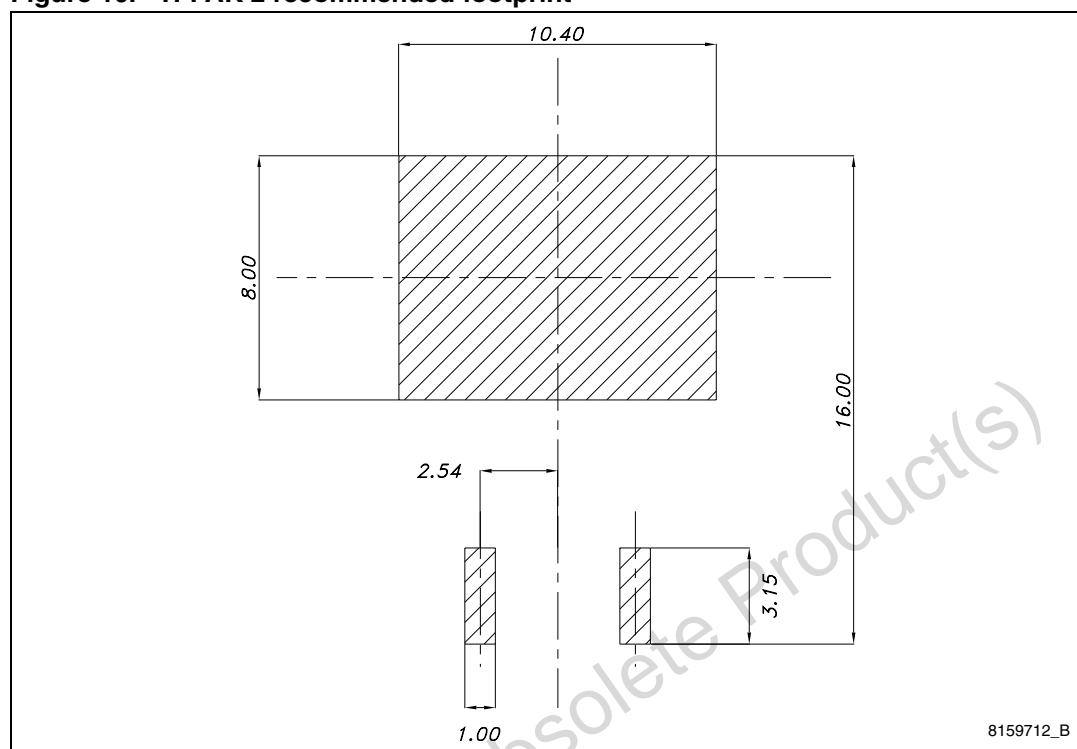


Figure 10. H²PAK 2 recommended footprint

5 Revision history

Table 10. Document revision history

Date	Revision	Changes
12-Jan-2009	1	First release
03-Jul-2009	2	Substituted D ² PAK with H ² PAK
07-Jul-2009	3	Status promoted from target specification to preliminary data

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