STH85N15F4-2
STP85N15F4

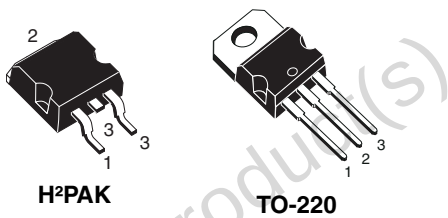
N-channel 150 V, 0.015 Ω, 85 A TO-220, H²PAK STripFET™ DeepGATE™ Power MOSFET

Preliminary data

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D
STH85N15F4-2	150 V	< 18.6 mΩ	85 A
STP85N15F4	150 V	< 19 mΩ	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

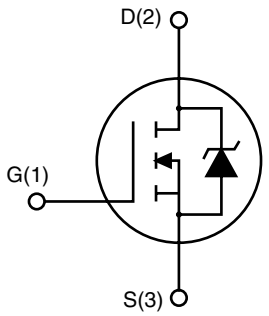


Table 1. Device summary

Order codes	Marking	Package	Packaging
STH85N15F4-2	85N15F4	H²PAK	Tape and reel
STP85N15F4	85N15F4	TO-220	Tube

Contents

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 °C	85	A
I_D	Drain current (continuous) at T_C = 100 °C	60	A
I_{DM} (1)	Drain current (pulsed)	340	A
P_{TOT}	Total dissipation at T_C = 25 °C	300	W
	Derating factor	2.0	W/°C
E_{AS} (2)	Single pulse avalanche energy	TBD	mJ
T_{stg}	Storage temperature	– 55 to 175	°C
T_j	Max. operating junction temperature		

1. Pulse width limited by safe operating area
2. Starting T_j= 25 °C, I_D= 50 A, V_{DD}=25 V

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		TO-220	H²PAK	
$R_{thj\text{-}case}$	Thermal resistance junction-case max	0.5		°C/W
$R_{thj\text{-}pcb}$	Thermal resistance junction-pcb max	--	35 (1)	°C/W
$R_{thj\text{-}a}$	Thermal resistance junction-ambient max	62.5	--	°C/W
T_l	Maximum lead temperature for soldering purpose	300		°C

1. When mounted on 1inch² FR-4 board, 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		150			V
I_{DSS}	Zero gate voltage Drain current (V_{GS} = 0)	V_{DS} = max rating				1	µA
		V_{DS} = max rating, T_C = 125 °C				100	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 = 40 A	TO220		15.5	19	mΩ
			H²PAK		15.0	18.6	

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	-	8320	-	pF
C_{oss}	Output capacitance		-	600	-	pF
C_{rss}	Reverse transfer capacitance		-	230	-	pF
Q_g	Total gate charge	V_{DD} = 80 V, I_D = 85 A, V_{GS} = 10 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
$t_{d(on)}$	Turn-on delay time	V_{DD} = 75 V, I_D = 40 A R_G = 4.7 Ω V_{GS} = 10 V *(see Figure 2)*	-	TBD	-	ns
t_r	Rise time			TBD		ns
$t_{d(off)}$	Turn-off-delay time	V_{DD} = 75 V, I_D = 40 A, R_G = 4.7 Ω, V_{GS} = 10 V *(see Figure 2)*	-	TBD	-	ns
t_f	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 A, V_{GS} = 0	-		TBD	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 85 A, V_{DD} = 25 V di/dt = 100 A/µs, T_j = 150 °C *(see Figure 4)*	-	TBD TBD TBD		ns nC A

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

3 Test circuits

Figure 2. Switching times test circuit for resistive load

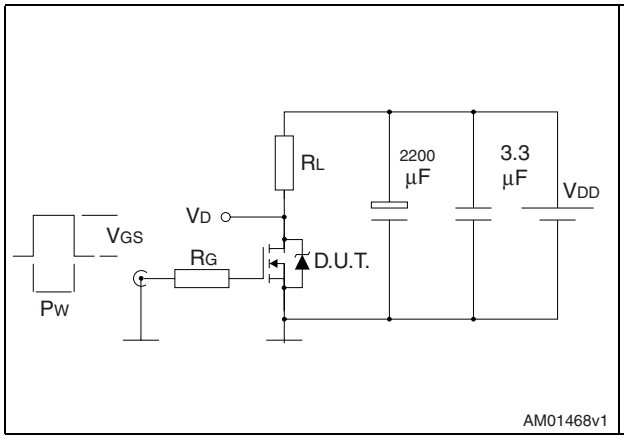


Figure 3. Gate charge test circuit

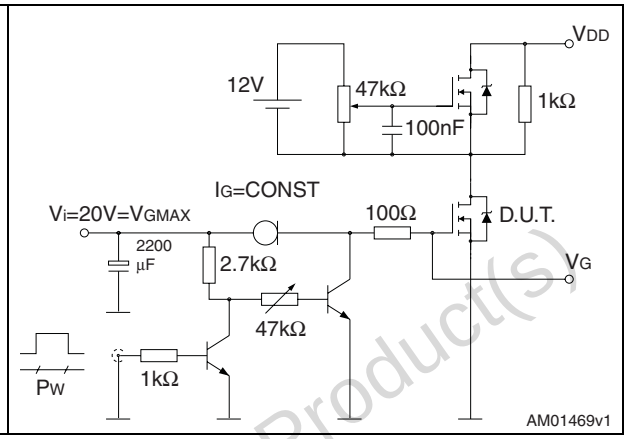


Figure 4. Test circuit for inductive load switching and diode recovery times

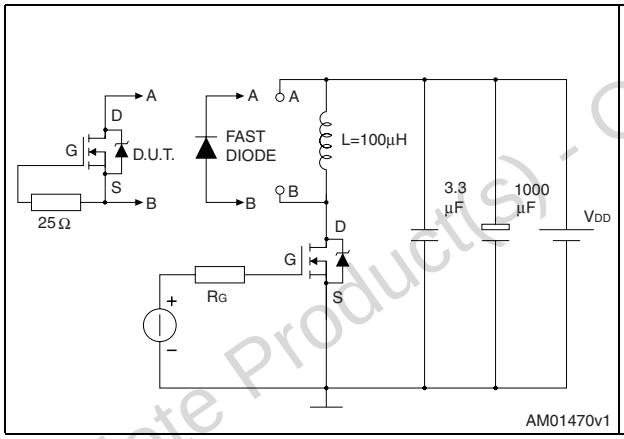


Figure 5. Unclamped inductive load test circuit

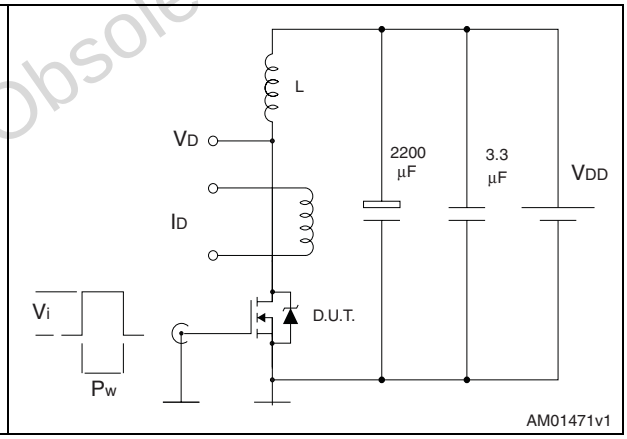


Figure 6. Unclamped inductive waveform

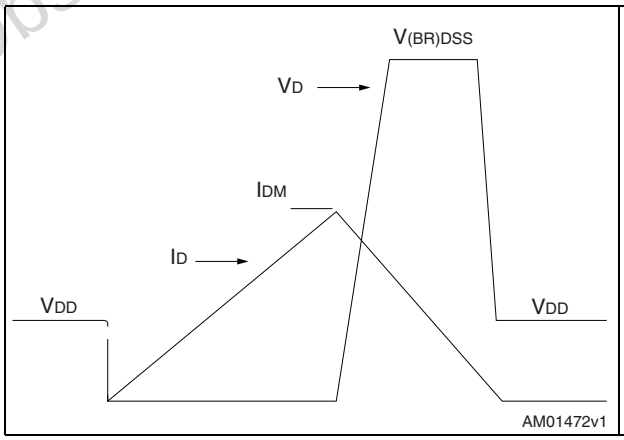
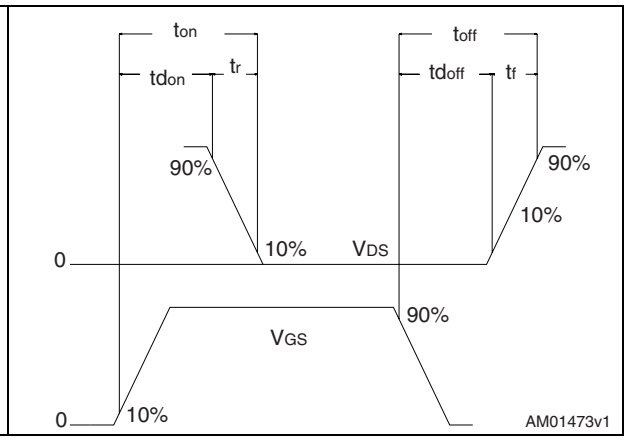


Figure 7. Switching time waveform



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	
∅P	3.75		3.85
Q	2.65		2.95

Figure 8. TO-220 drawing

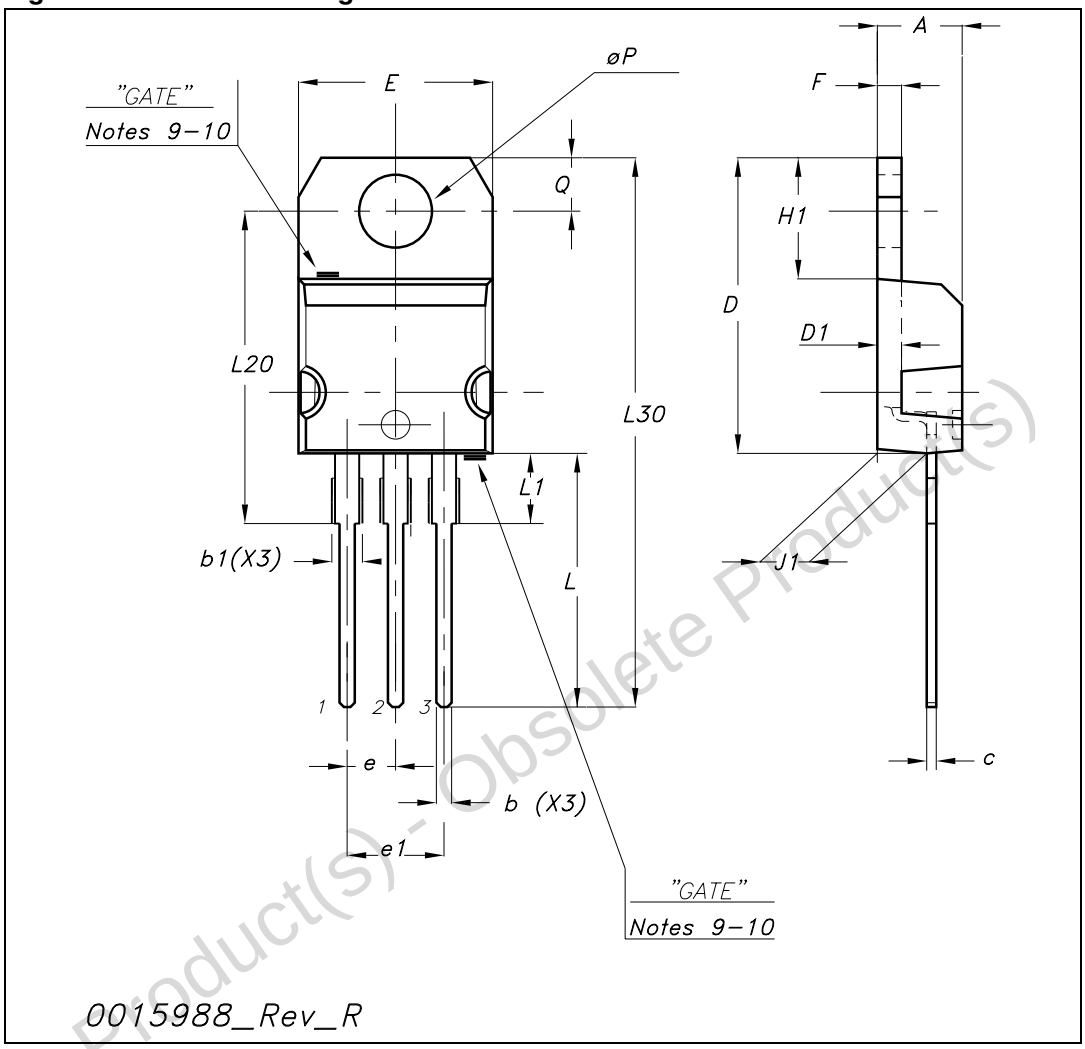


Table 9. H²PAK 2 leads mechanical data

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

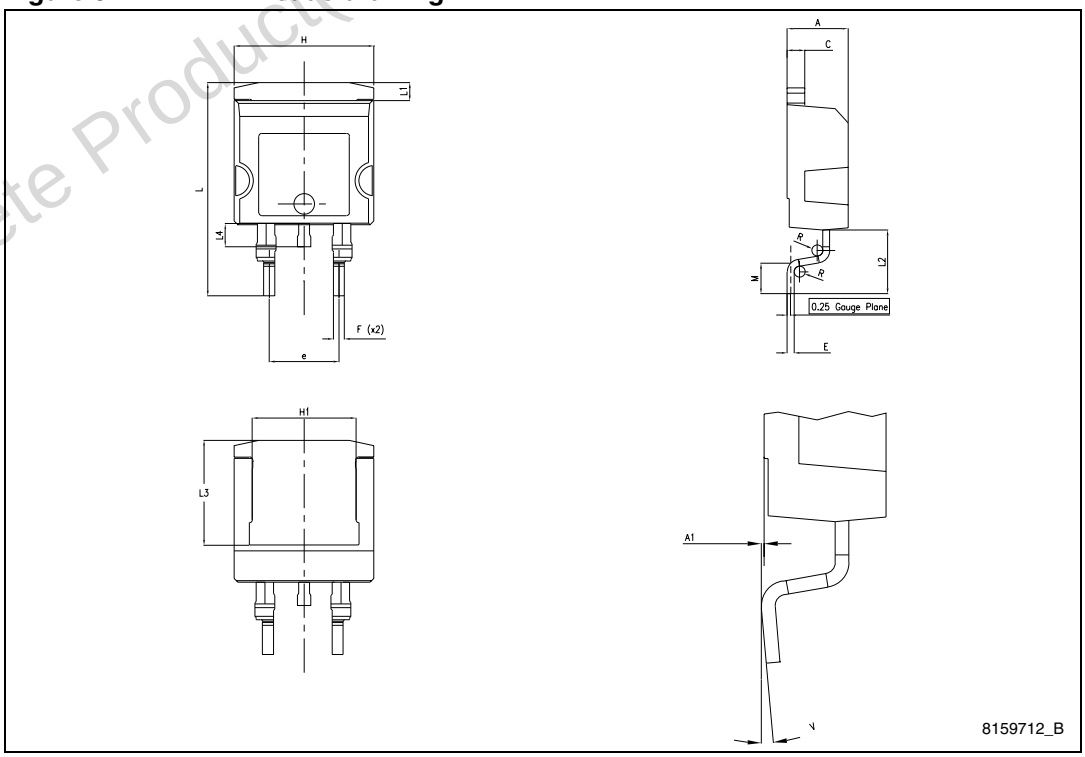
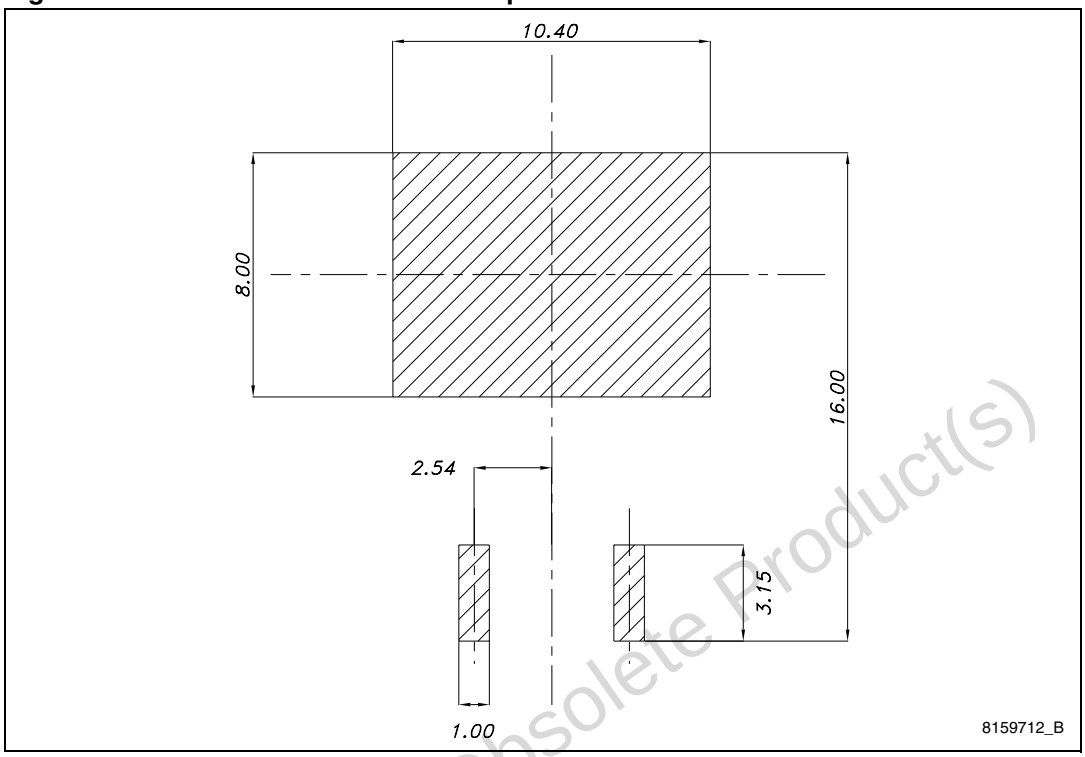


Figure 10. H²PAK 2 recommended footprint



5 Revision history

Table 10. Document revision history

Date	Revision	Changes
12-Jan-2009	1	First release
03-Jul-2009	2	Substituted D²PAK with H²PAK
07-Jul-2009	3	Status promoted from target specification to preliminary data