STL90N3LLH6

N-channel 30 V, 0.0028 Ω, 24 A PowerFLAT™ (6x5) STripFET™ VI DeepGATE™ Power MOSFET

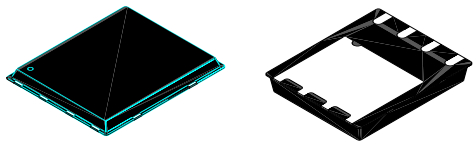
Preliminary data

Features

Type	V_{DSS}	$R_{DS(on)}$ max	I_D
STL90N3LLH6	30 V	0.004 Ω	24 A (1)

1. The value is rated according $R_{thj\text{-}pcb}$

- $R_{DS(on)}$ * Q_g industry benchmark
- Extremely low on-resistance $R_{DS(on)}$
- High avalanche ruggedness
- Low gate drive power losses
- Very low switching gate charge



PowerFLAT™ (6x5)

Application

- Switching applications

Description

This product utilizes the 6th generation of design rules of ST's proprietary STripFET™ technology, with a new gate structure.The resulting Power MOSFET exhibits the lowest $R_{DS(on)}$ in a standard package, that makes it suitable for the most demanding DC-DC converter applications, where high power density has to be achieved.

Figure 1. Internal schematic diagram

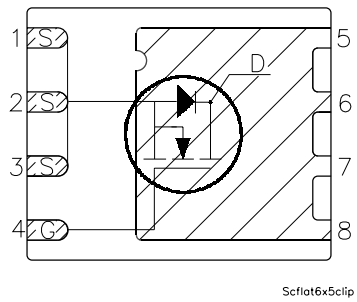


Table 1. Device summary

Order code	Marking	Package	Packaging
STL90N3LLH6	90N3LLH6	PowerFLAT™ (6x5)	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	30	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	90	A
I_D (1)	Drain current (continuous) at T_C = 100 °C	56.2	A
I_D (2)	Drain current (continuous) at T_C = 25 °C	24	A
I_D (2)	Drain current (continuous) at T_C=100 °C	15	A
I_{DM} (3)	Drain current (pulsed)	96	A
P_{TOT} (1)	Total dissipation at T_C = 25 °C	60	W
P_{TOT} (2)	Total dissipation at T_C = 25 °C	4	W
	Derating factor	0.03	W/°C
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 150	°C

1. The value is rated according $R_{thj\text{-}c}$
2. The value is rated according $R_{thj\text{-}pcb}$
3. Pulse width limited by safe operating area

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case (drain) (steady state)	2.08	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-ambient	31.3	°C/W

1. When mounted on FR-4 board of 1inch², 2oz Cu, t < 10 sec

Table 4. Avalanche data

Symbol	Parameter	Value	Unit
I_{AV}	Not-repetitive avalanche current, (pulse width limited by Tj Max)	TBD	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AV} , V_{DD} = 24 V)	TBD	mJ

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified)

Table 5. 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	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125 °C			1 10	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	1			V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10 V, I_D= 12 A V_{GS}= 4.5 V, I_D= 12 A		0.0028 0.0052	0.004 0.006	Ω Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25 V, f=1 MHz, V_{GS}=0		1850 TBD TBD		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=15 V, I_D = 24 A V_{GS} =4.5 V *(see Figure 3)*		15 TBD TBD		nC nC nC
R_G	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20 mV open drain		TBD		Ω

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD}=15 V, I_D= 12 A, R_G=4.7 Ω, V_{GS}=10 V *(see Figure 2)*		TBD TBD TBD TBD		ns ns ns ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current				24	A
I_{SDM}(1)	Source-drain current (pulsed)				96	A
V_{SD}(2)	Forward on voltage	I_{SD} = 24 A, V_{GS}=0			1.1	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 12 A, di/dt = 100 A/µs, V_{DD}=25 V		TBD TBD TBD		ns nC A

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

3 Test circuits

Figure 2. Switching times test circuit for resistive load

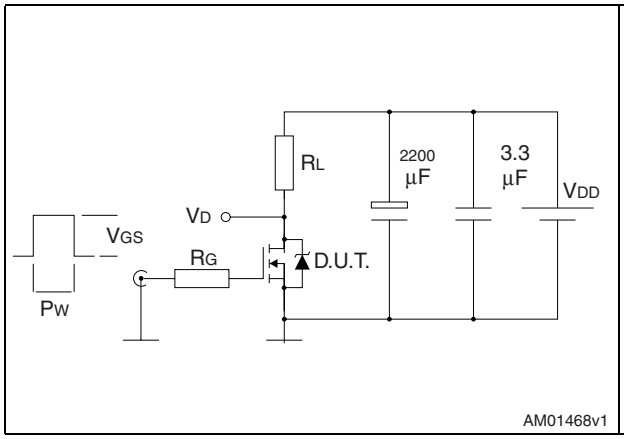


Figure 3. Gate charge test circuit

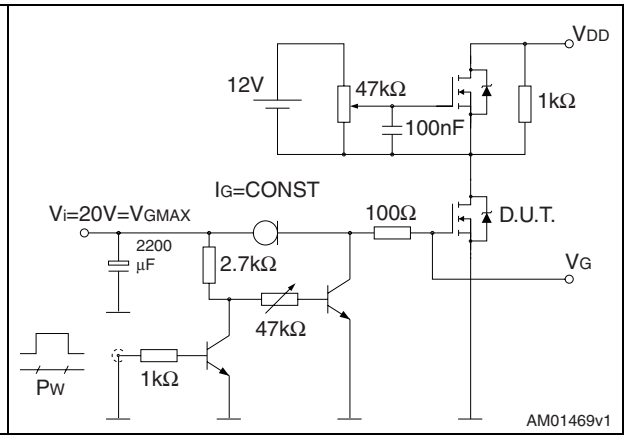


Figure 4. Test circuit for inductive load switching and diode recovery times

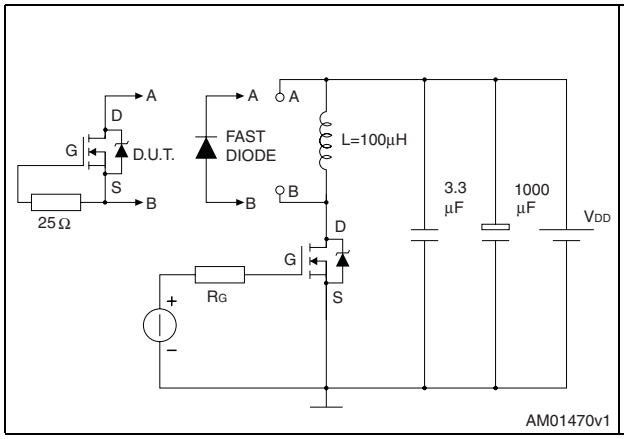


Figure 5. Unclamped inductive load test circuit

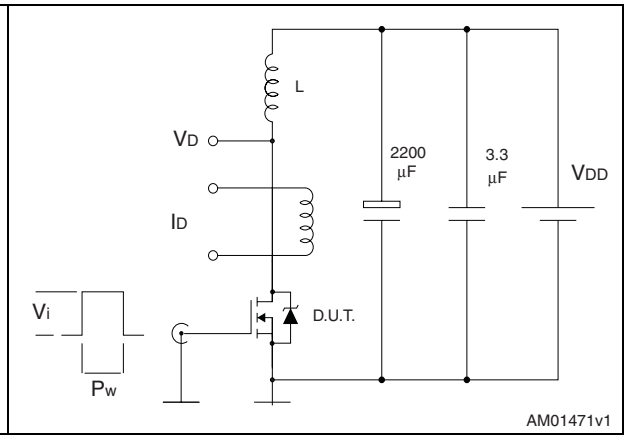


Figure 6. Unclamped inductive waveform

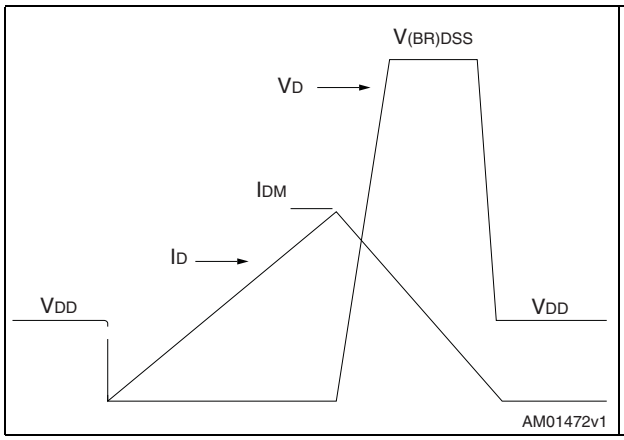
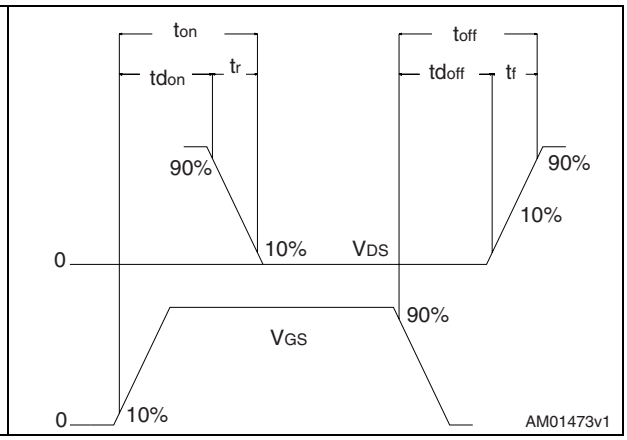


Figure 7. Switching time waveform

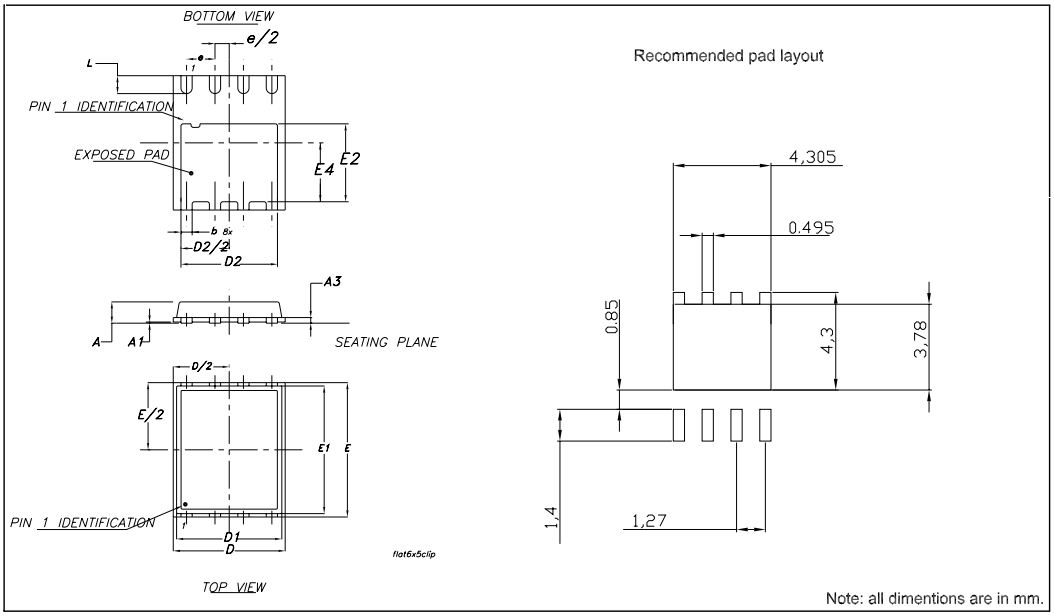


4 Package mechanical data

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.

PowerFLAT™(6x5) mechanical data

DIM.	mm.			inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.83	0.93	0.031	0.32	0.036
A1		0.02	0.05		0.0007	0.0019
A3		0.20			0.007	
b	0.35	0.40	0.47	0.013	0.015	0.018
D		5.00			0.196	
D1		4.75			0.187	
D2	4.15	4.20	4.25	0.163	0.165	0.167
E		6.00			0.236	
E1		5.75			0.226	
E2	3.43	3.48	3.53	0.135	0.137	0.139
E4	2.58	2.63	2.68		0.103	0.105
e		1.27			0.050	
L	0.70	0.80	0.90	0.027	0.031	0.035



5 Revision history

Table 9. Document revision history

Date	Revision	Changes
10-Apr-2009	1	First release

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