

STL100NH3LL

N-channel 30 V - 0.0032 Ω - 25 A - PowerFLAT™ (6x5) STripFET™ III Power MOSFET

Features

Туре	V _{DSS}	R _{DS(on)} max	I _D
STL100NH3LL	30 V	<0.0035 Ω	25A ⁽¹⁾

- 1. The value is rated according $R_{thj-pcb}$
- Improved die-to-footprint ratio
- Very low profile package (1 mm max)
- Very low thermal resistance
- Conduction losses reduced
- Switching losses reduced

Application

Switching applications

Description

This series utilizes the last advanced design rules of ST's proprietary STripFET[™] technology. This process complete to unique metallization technique realised the most advanced low voltage Power MOSFET in PowerFLAT[™](6x5). The chipscaled PowerFLAT[™] package allows a significant board space saving, still boosting the performance.

Table 1.	Device summary	/

Order code	Marking	Package	Packaging
STL100NH3LL	L100NH3LL	PowerFLAT™ (6x5)	Tape and reel

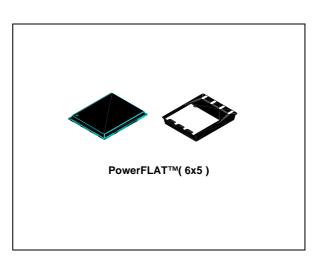
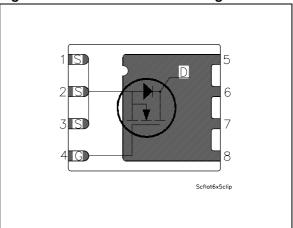


Figure 1. Internal schematic diagram



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1 Electrical ratings

Table 2.	Absolute	maximum	ratings
	Abounde	IIIuAIIIIuIII	raungo

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source voltage (V _{GS} = 0)	30	V
V _{GS} ⁽¹⁾	Gate-source voltage	± 16	V
V _{GS} ⁽²⁾	Gate-source voltage	± 18	V
I _D ⁽³⁾	Drain current (continuous) at T _C = 25 °C	100	А
I _D ⁽³⁾	Drain current (continuous) at T _C = 100 °C	71	А
I _D ⁽⁵⁾	Drain current (continuous) at T _C =100 °C	15.6	А
I _{DM} ⁽⁴⁾	Drain current (pulsed)	100	А
I _D ⁽⁵⁾	Drain current (continuous) at T _C = 25 °C	25	А
P _{TOT} ⁽³⁾	Total dissipation at T_{C} = 25 °C	80	W
P _{TOT} ⁽⁵⁾	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. Continuous mode

2. Guaranteed for test time ≤15ms

3. The value is rated according ${\sf R}_{thj\text{-}c}$

4. Pulse width limited by safe operating area

5. The value is rated according $R_{thj-pcb}$

Table 3.Thermal resistance

Symbol	Parameter	Value	Unit
R _{thj-case}	Thermal resistance junction-case (drain) (steady state)	1.56	°C/W
R _{thj-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 da

Symbol	Parameter	Value	Unit
I _{AV}	Not-repetitive avalanche current	7.5	А
E _{AS}	Single pulse avalanche energy (starting $T_J=25$ °C, $I_D=7.5$ A)	150	mJ



2 Electrical characteristics

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

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{(BR)DSS}	Drain-source breakdown voltage	$I_{D} = 250 \ \mu A, \ V_{GS} = 0$	30			V
I _{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	V _{DS} = Max rating, V _{DS} = Max rating @125 °C			1 10	μΑ μΑ
I _{GSS}	Gate body leakage current (V _{DS} = 0)	V _{GS} = ±16 V			±100	nA
V _{GS(th)}	Gate threshold voltage	V_{DS} = V_{GS} , I_D = 250 μ A	1		2.5	V
R _{DS(on)}	Static drain-source on resistance	V _{GS} = 10 V, I _D = 12.5 A V _{GS} = 4.5 V, I _D = 12.5 A		0.0032 0.004	0.0035 0.005	Ω Ω

Table 5. On/off states

Table 6. Dynamic

	7 · · ·					
Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
9 _{fs} ⁽¹⁾	Forward transconductance	$V_{DS} = 10 \text{ V}, \text{ I}_{D} = 12.5 \text{ A}$		30		S
C _{iss} C _{oss} C _{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V _{DS} =25 V, f=1 MHz, V _{GS} =0		4450 655 50		pF pF pF
Q _g Q _{gs} Q _{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} =15 V, I_D = 25 A V_{GS} =4.5 V (see Figure 8)		30 12.5 10	40	nC nC nC
R _G	Gate input resistance	f=1 MHz Gate DC Bias = 0 Test signal level = 20 mV open drain	1	2	3	Ω

1. Pulsed: pulse duration=300 µs, duty cycle 1.5%



Symbol	Parameter	Test conditions	Min.	Тур.	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 = 12.5 A, R _G =4.7 Ω , V _{GS} =10 V (see Figure 14)		18 50 75 8		ns ns ns ns

Table 7. Switching times

Table 8. Source drain diode

Symbol	Parameter	Test conditions Min		Тур.	Max	Unit
I _{SD}	Source-drain current				25	А
I _{SDM} ⁽¹⁾	Source-drain current (pulsed)				100	А
V _{SD} ⁽²⁾	Forward on voltage	I _{SD} =25 A, V _{GS} =0			1.3	V
t _{rr} Q _{rr} I _{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I _{SD} =25 A, di/dt = 100 A/μs, V _{DD} =25 V, Tj=150 °C		32 34 2.1		ns nC A

1. Pulse width limited by safe operating area

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



Zth_powerfla

-pcb=K*Rthj -pcb=58.5°C

10²

HV24980

 $I_D(A)$

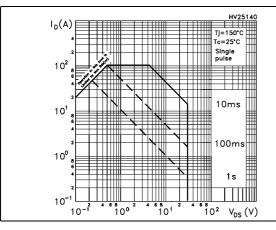
t p (s)

Zthj-Rthj

10¹

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area





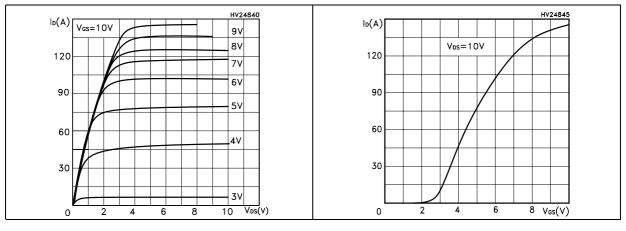


Figure 3.

10

10

10 -

10

Figure 5.

 10^{-3}

0.2

0.05

h

Thermal impedance

10⁰

Transfer characteristics

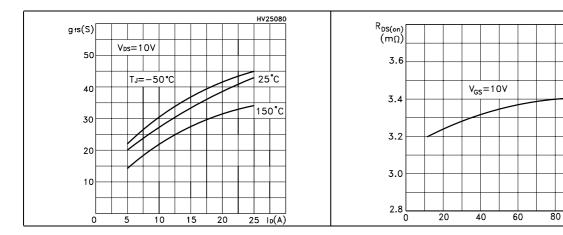
SINGLE PULSE

10-

 10^{-2}









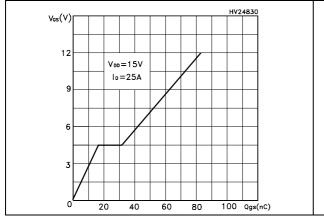


Figure 10. Normalized gate threshold voltage vs temperature

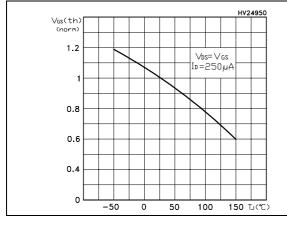


Figure 12. Source-drain diode forward characteristics

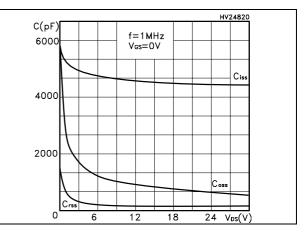


Figure 11. Normalized on resistance vs temperature

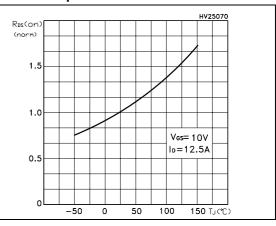


Figure 13. Normalized B_{VDSS} vs temperature

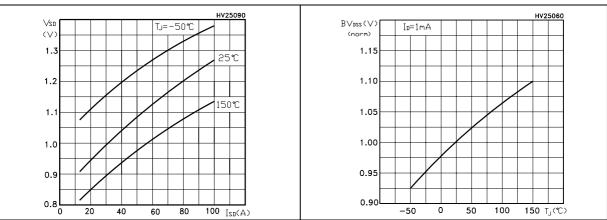


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations



3 Test circuit

Figure 14. Switching times test circuit for resistive load

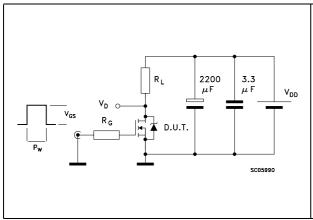
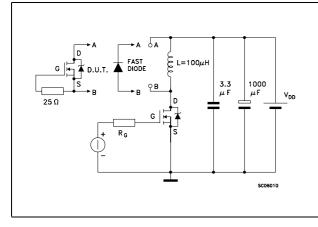
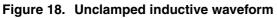


Figure 16. Test circuit for inductive load switching and diode recovery times





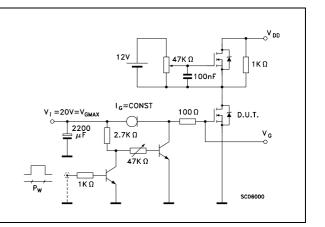
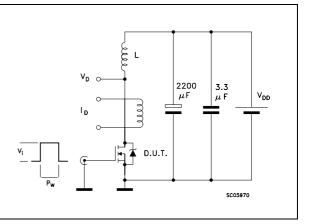


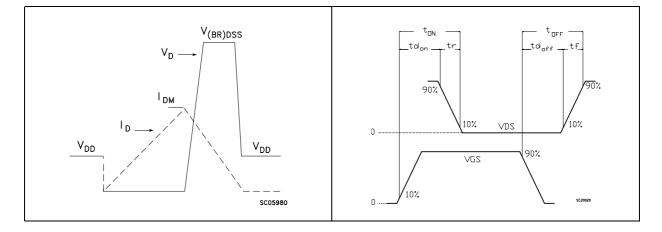
Figure 15. Gate charge test circuit

Figure 17. Unclamped inductive load test circuit



57

Figure 19. Switching time waveform

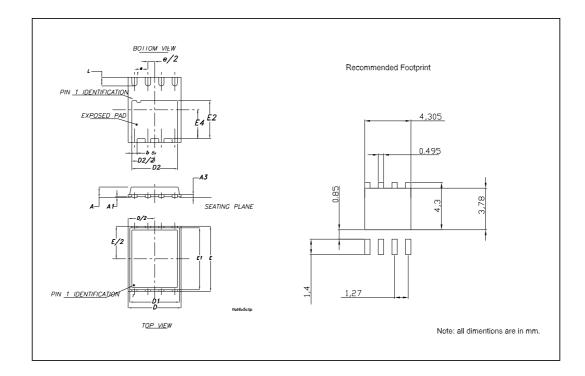


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com



PowerFLAT™ (6x5) MECHANICAL DATA							
DIM	mm.			inch			
DIM.	MIN.	ТҮР	MAX.	MIN.	TYP.	MAX.	
А	0.80	0.83	0.93	0.031	0.032	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	
е		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
18-Apr-2005	1	First Release
20-Jun-2005	2	Updated mechanical data
22-Jun-2005	3	New Rg value on Table 7
10-Oct-2005	4	Inserted ecopack indication
09-Jan-2006	5	New footprint
08-Mar-2006	6	New template
29-Jun-2006	7	Modified curves, see Figure 2 and Figure 3
04-Sep-2006	8	The document has been reformatted, no content change
04-Jan-2007	9	New updated on Table 2
10-Dec-2007	10	Updated data on Table 4: Avalanche data
20-Mar-2008	11	New V _{GS} max. value inserted on <i>Table 4: Avalanche data</i>

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