STL100NH3LL

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

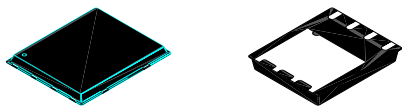
PRODUCT PREVIEW

Table 1: General Features

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STL100NH3LL	30 V	< 0.0035 Ω	25 A (1)

- TYPICAL R_{DS}(on) = 0.0032Ω @ 10V
- IMPROVED DIE-TO-FOOTPRINT RATIO
- VERY LOW PROFILE PACKAGE (1mm MAX)
- VERY LOW THERMAL RESISTANCE
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED

Figure 1: Package

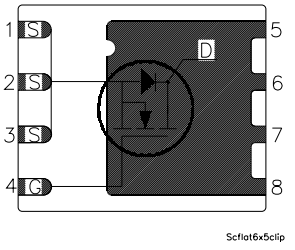


PowerFLAT (6x5)

DESCRIPTION

The STL100NH3LL utilizes the latest advanced design rules of ST's proprietary STripFET™ Technology. This process complete to unique metallization technique realised the most advanced low voltage MOSFET in PowerFLAT(6x5). The Chip-scaled PowerFLAT™ package allows a significant board space saving, still boosting the performance.

Figure 2: Internal Schematic Diagram



APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- SYNCHRONOUS RECTIFICATION

Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STL100NH3LL	L100NH3LL	PowerFLAT™(6x5)	TAPE & REEL

Rev. 4

Table 3: Absolute Maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	30	V
V_{GS}	Gate- source Voltage	±16	V
I_D (2)	Drain Current (continuous) at T_C = 25°C	100	A
I_D	Drain Current (continuous) at T_C = 100°C	15.6	A
I_{DM} (3)	Drain Current (pulsed)	100	A
I_D (1)	Drain Current (continuous) at T_C = 25°C	25	A
P_{TOT} (2)	Total Dissipation at T_C = 25°C	80	W
P_{TOT}(1)	Total Dissipation at T_C = 25°C	4	W
	Derating Factor	0.03	W/°C
T_{stg} T_j	Storage Temperature Operating Junction Temperature Range	-55 to 150	°C

Table 4: Thermal Data

Rthj-$_C$	Thermal Resistance Junction-case (Drain) (Steady State)	1.56	°C/W
Rthj-pcb (4)	Thermal Operating Junction-pcb	31.3	°C/W

Table 5: Avalanche Characteristics

Symbol	Parameter	Max Value	Unit
I_{AV}	Not-Repetitive Avalanche Current (pulse width limited by T_j max)	12.5	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, I_D = I_{AV}, V_{DD} = 24 V)	1.3	J

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)

Table 6: On/Off

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, T_C = 125 °C			1 10	µA µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 16V			±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} = 10V, I_D = 12.5 A V_{GS} = 4.5V, I_D =12.5 A		0.0032 0.004	0.0035 0.005	Ω Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 7: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (5)	Forward Transconductance	V_{DS} = 10 V, I_D=12,5 A		30		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		4450 655 50		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_r	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 15)		18 50 75 8		ns ns ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD} = 15V, I_D = 25 A, V_{GS} = 4.5V (see Figure 17)		30 12.5 10	40	nC nC nC
R_G	Gate Input Resistance	f=1 MHz Gate DC Bias = 0 Test Signal Level = 20mV Open Drain	1	2	3	Ω

Table 8: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (3)	Source-drain Current Source-drain Current (pulsed)				25 100	A A
V_{SD} (4)	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 = 100A/µs V_{DD} = 25 V, T_j = 150°C (see test circuit, Figure 16)		32 34 2.1		ns nC A

Note:

(1)The value is according $R_{thj\text{-}pcb}$
(2)The value is according $R_{thj\text{-}c}$
(3) Pulse width limited by safe operating area.
(4) When mounted on FR-4 board of 1 in^2 , 2oz Cu, t < 10 sec
(5) Pulsed: Pulse duration = 300µs, duty cycle 1.5%

Figure 3: Safe Operating Area

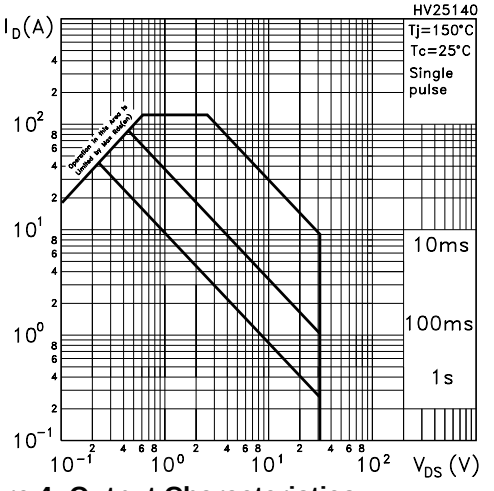


Figure 4: Output Characteristics

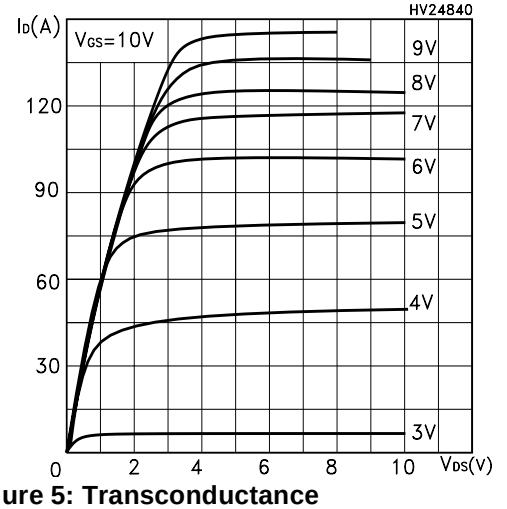


Figure 5: Transconductance

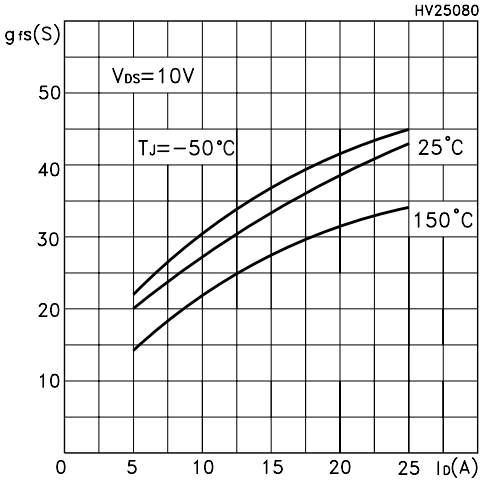


Figure 6: Thermal Impedance

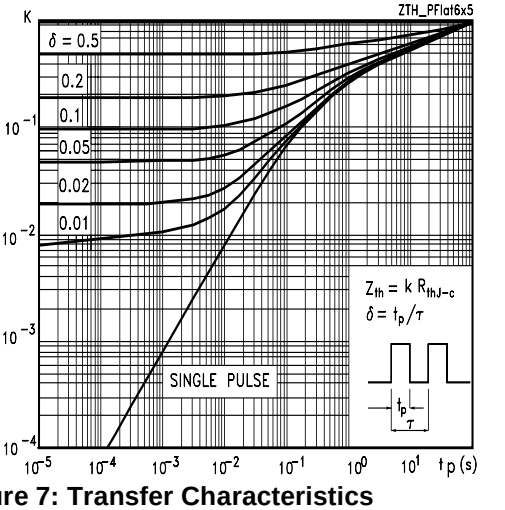


Figure 7: Transfer Characteristics

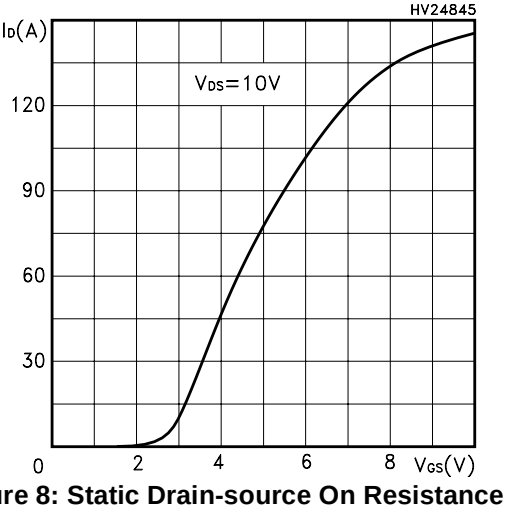


Figure 8: Static Drain-source On Resistance

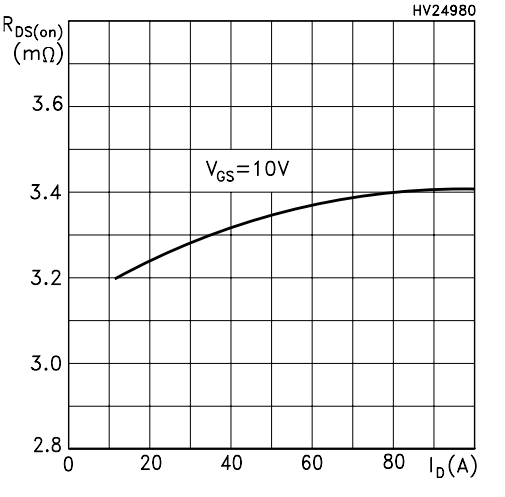


Figure 9: Gate Charge vs Gate-source Voltage

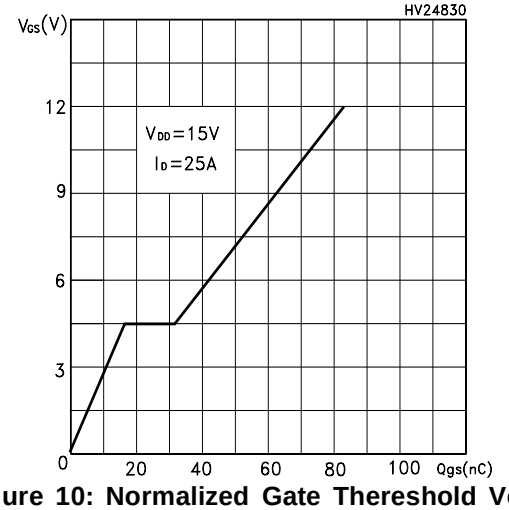


Figure 10: Normalized Gate Thereshold Voltage vs Temperature

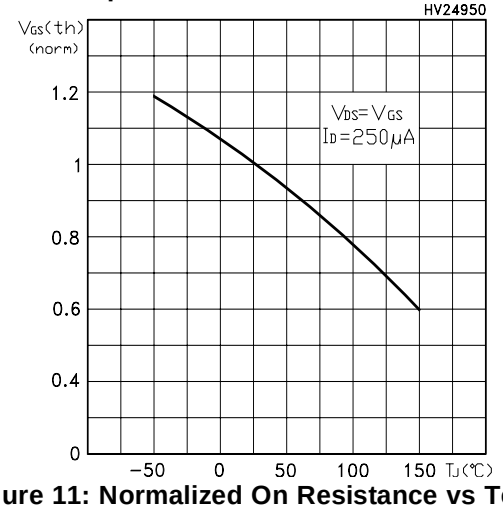


Figure 11: Normalized On Resistance vs Temperature

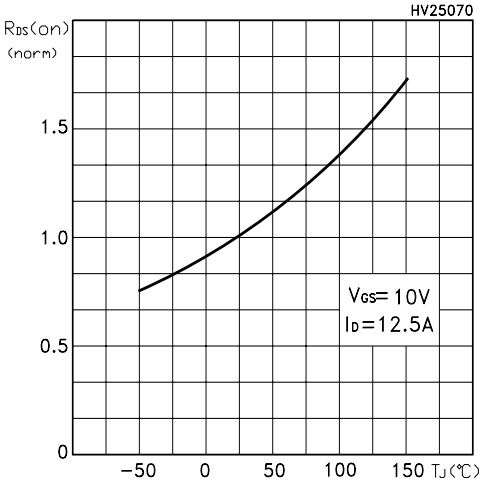


Figure 12: Capacitance Variations

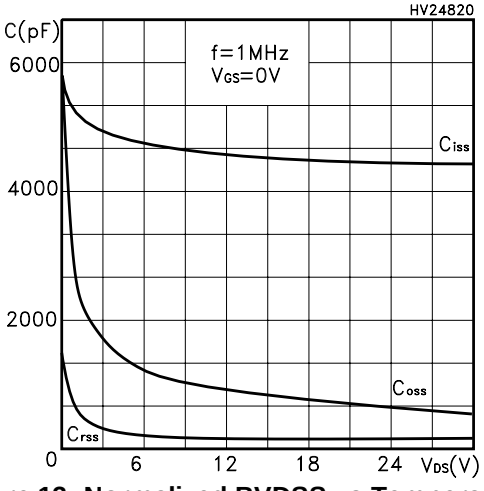


Figure 13: Normalized BVDSS vs Temperature

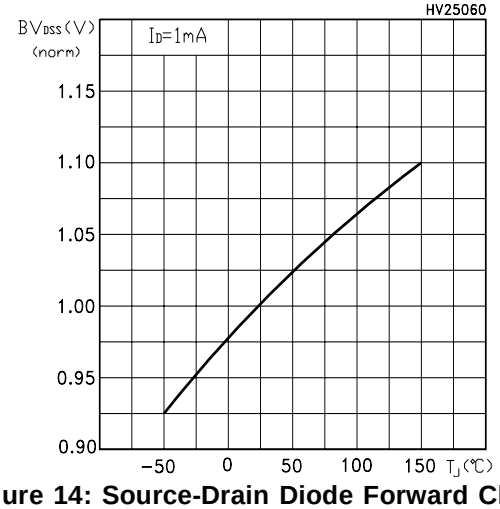


Figure 14: Source-Drain Diode Forward Characteristics

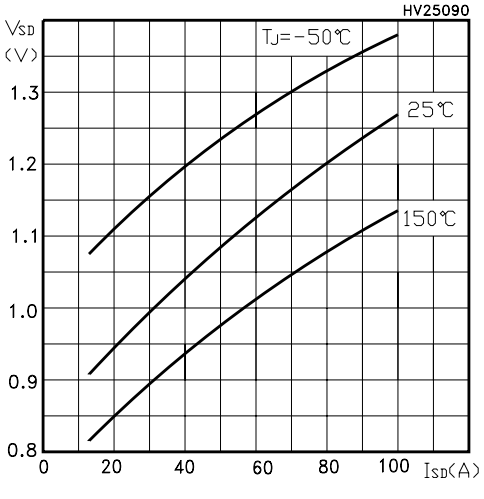


Figure 15: Switching Times Test Circuit For Resistive Load

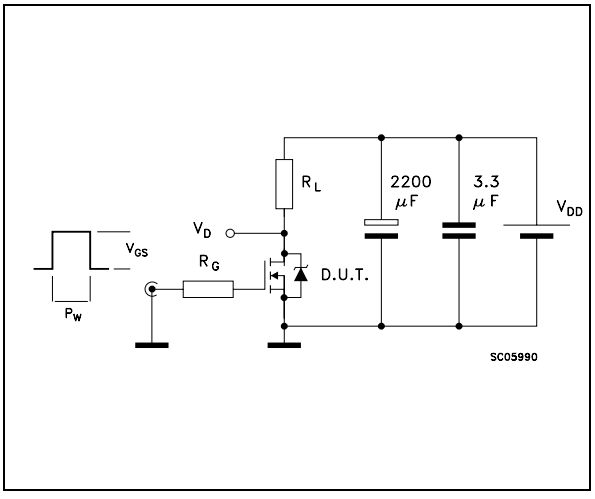


Figure 16: Test Circuit For Inductive Load Switching and Diode Recovery Times

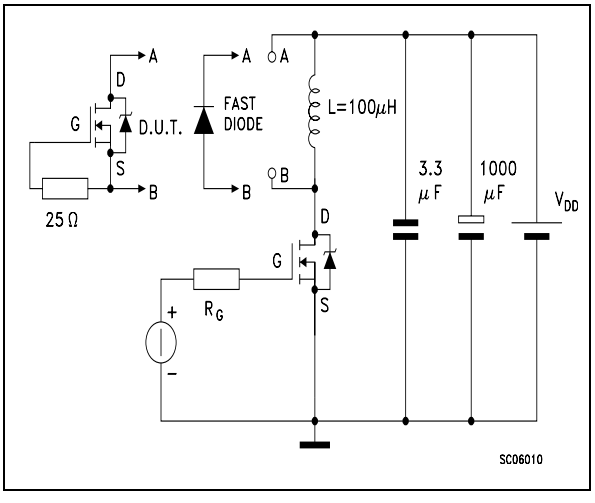
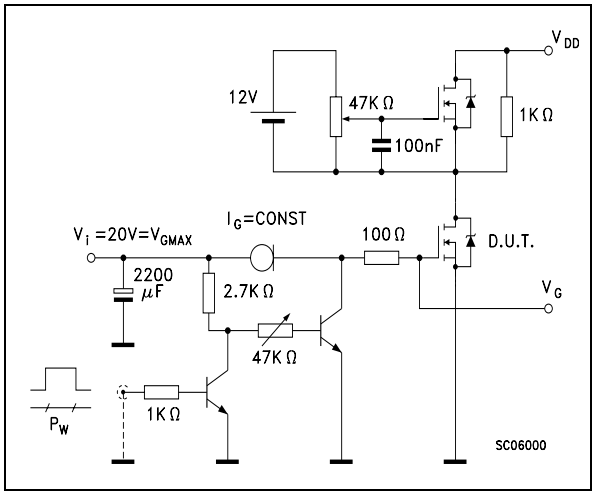


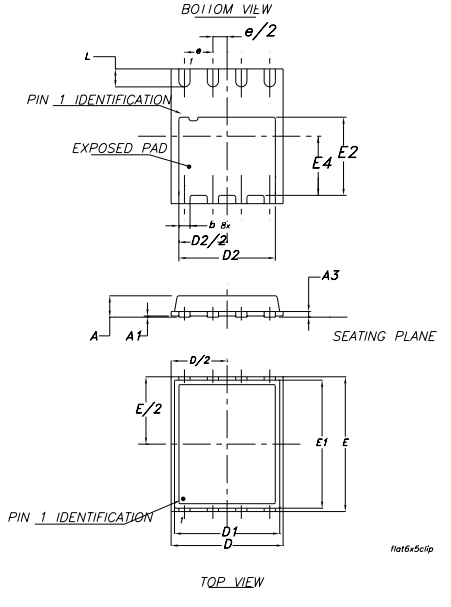
Figure 17: Gate Charge Test Circuit

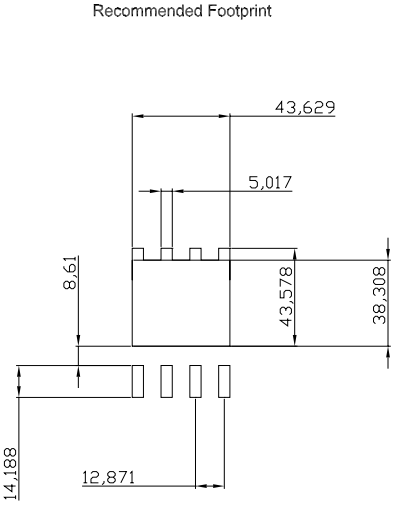


In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings 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		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	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
e		1.27			0.050	
L	0.70	0.80	0.90	0.027	0.031	0.035





Note: all dimentions are in mm.

Table 9: Revision History

Date	Revision	Description of Changes
18-Apr-2005	1	First release
20-Jun-2005	2	Updated mechanical data
22-Jun-2005	3	New R_G value on table 6
10-Oct-2005	4	Inserted Ecopack indication