STSJ100NH3LL

N-CHANNEL 30 V - 0.0032 Ω - 25 A PowerSO-8™ STripFET™ III MOSFET FOR DC-DC CONVERSION

Table 1: General Features

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STSJ100NH3LL	30V	< 0.0035Ω	25A

- TYPICAL R_{DS}(on) = 0.0032Ω @ 10V
- OPTIMAL R_{DS}(on) x Qg TRADE-OFF @ 4.5V
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DEVICE
- IMPROVED JUNCTION-CASE THERMAL RESISTANCE

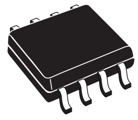
DESCRIPTION

The **STSJ100NH3LL** utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. This process coupled to unique metallization techniques realizes the most advanced low voltage MOSFET in SO-8 ever produced. The exposed slug reduces the R_{thj-c} improving the current capability.

APPLICATIONS

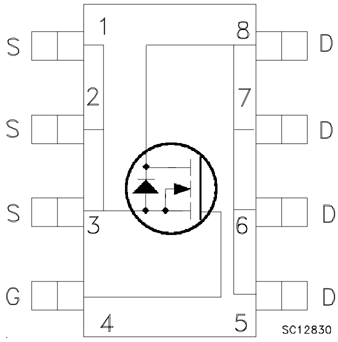
- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY CPU CORE DC/DC CONVERTERS FOR MOBILE PCs

Figure 1: Package



PowerSO-8™

Figure 2: Internal Schematic Diagram



DRAIN CONTACT ALSO ON THE BACKSIDE

Table 2: Order Codes

SALES TYPE	MARKING	PACKAGE	PACKAGING
STSJ100NH3LL	100H3LL-	PowerSO-8	TAPE & REEL

Rev. 5

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(1)	Drain Current (continuous) at T_C = 25°C	25	A
I_D	Drain Current (continuous) at T_C = 100°C	15.6	A
I_{DM}(3)	Drain Current (pulsed)	100	A
P_{tot}(2)	Total Dissipation at T_C = 25°C	70	W
P_{tot}(1)	Total Dissipation at T_C = 25°C	3	W

Table 4: Thermal Data

Rthj-c	Thermal Resistance Junction-case	Max	1.8	°C/W
Rthj-pcb(4)	Thermal Resistance Junction-ambient	Max	42	°C/W
T_j	Maximum Operating Junction Temperature		150	°C
T_{stg}	Storage Temperature		-55 to 150	°C

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 = 250µA, V_{GS} = 0	30			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			10	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 = 250µA	1			V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D = 12.5A		0.0032	0.0035	Ω
		V_{GS} = 4.5V, I_D = 12.5A		0.004	0.005	Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 7: Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (5)	Forward Transconductance	V_{DS}=10V, I_D = 12.5A		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
R_G	Gate Input Resistance	f=1MHz Gate DC Bias = 0 Test Signal Level = 20mV Open Drain	1	2	3	Ω

Table 8: Switching On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{DD} = 15V, I_D = 12.5A R_G = 4.7Ω , V_{GS} = 10V (see Figure 15)		18 50		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}=15V, I_D=25A V_{GS}=4.5V (see Figure 17)		30 12.5 10	40	nC nC nC

Table 9: Switching Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 15V, I_D = 12.5A R_G = 4.7Ω , V_{GS} = 10V (see Figure 15)		75 8		ns ns

Table 10: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}	Source-drain Current Source-drain Current (pulsed)				25 100	A A
V_{SD}(5)	Forward On Voltage	I_{SD} = 25A ,V_{GS} = 0			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 25A, di/dt = 100A/µs V_{DD} = 25V, T_j = 150°C (see Figure 16)		32 34 2.1		ns nC A

Notes

1. This value is noted according to Rthj-pcb
2. This value is noted according to Rthj-c
3. Pulse width limited by safe operating area
4. When Mounted on 1 inch² FR-4 board, 2 oz Cu (t ≤ 10 sec.)
5. Pulsed: pulse duration=300µs, duty cycle 1.5%

Figure 3: Safe Operating Area

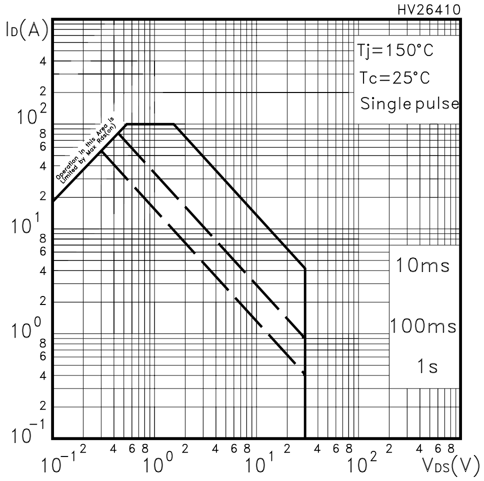


Figure 6: Thermal Impedance

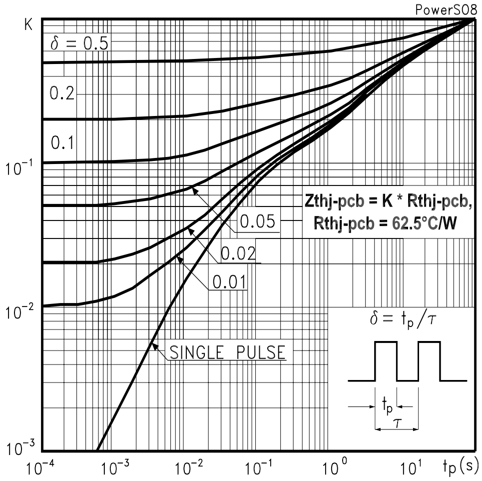


Figure 4: Output Characteristics

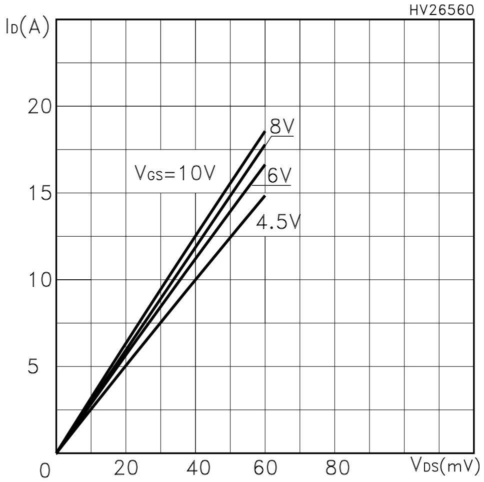


Figure 7: Transfer Characteristics

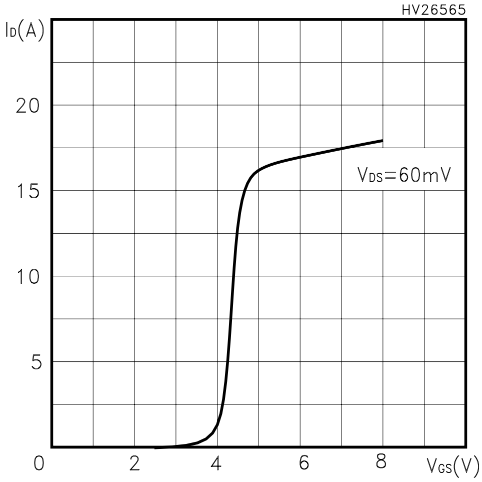


Figure 5: Transconductance

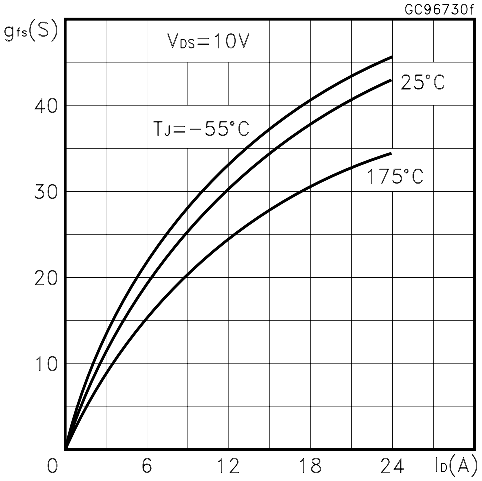


Figure 8: Static Drain-source On Resistance

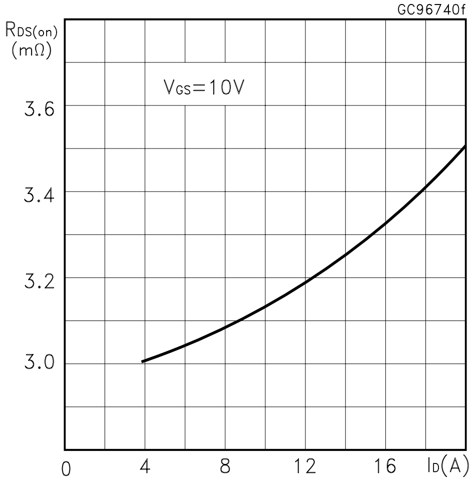


Figure 9: Gate Charge vs Gate-source Voltage

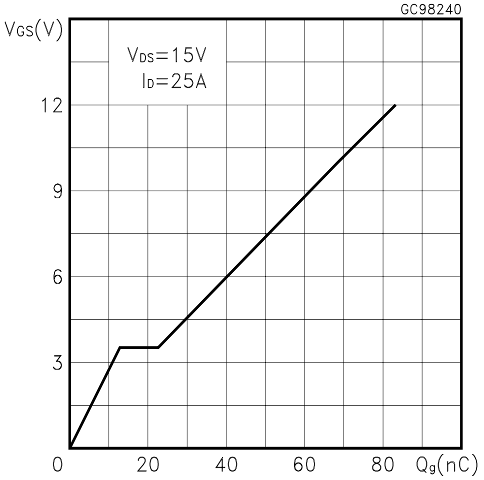


Figure 10: Normalized Gate Thereshold Voltage vs Temperature

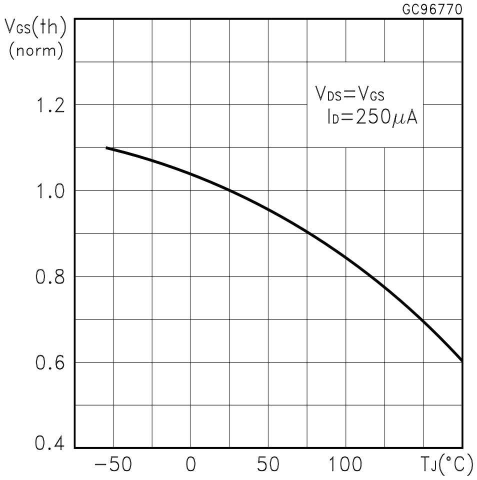


Figure 11: Normalized On Resistance vs Temperature

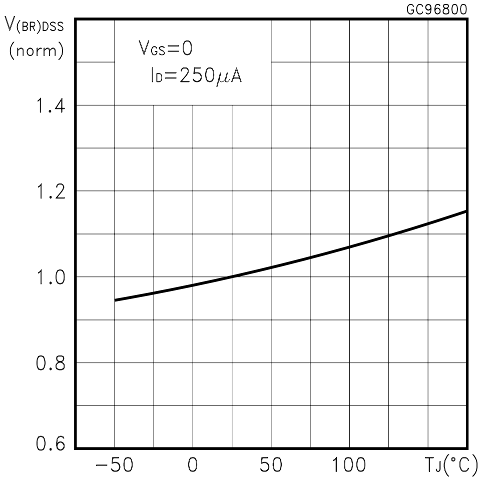


Figure 12: Capacitance Variations

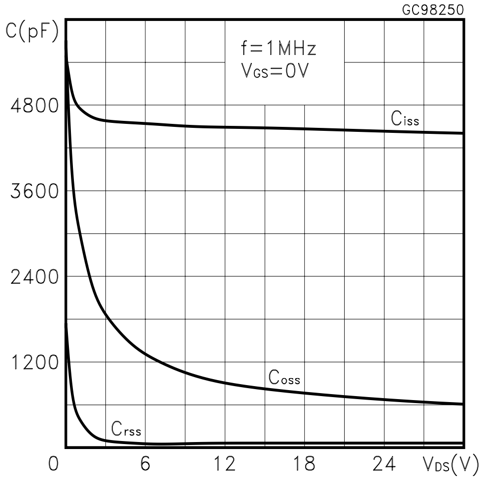


Figure 13: Normalized BVDSS vs Temperature

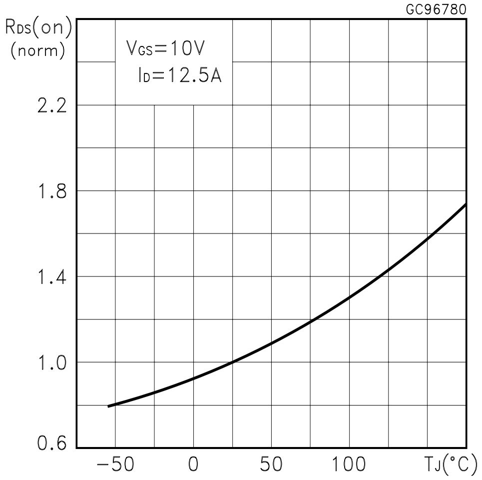


Figure 14: Source-Drain Diode Forward Characteristics

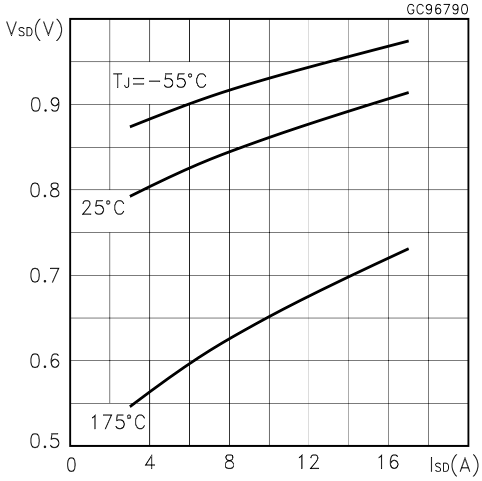
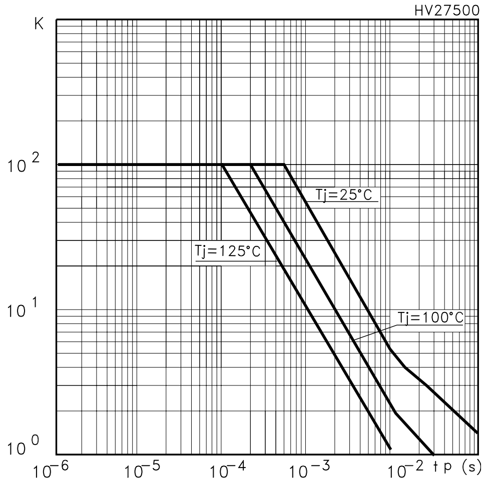


Table 11: Allowable Iav vs. Time in Avalanche



The previous curve gives the single pulse safe operating area for unclamped inductive loads, under the following conditions:

$P_{D(AVE)} = 0.5 * (1.3 * BV_{DSS} * I_{AV})$

$E_{AS(AR)} = P_{D(AVE)} * t_{AV}$

Where:

I_{AV} is the Allowable Current in Avalanche

$P_{D(AVE)}$ is the Average Power Dissipation in Avalanche (Single Pulse)

t_{AV} isthe Time in Avalanche

Figure 15: Switching Times Test Circuit For Resistive Load

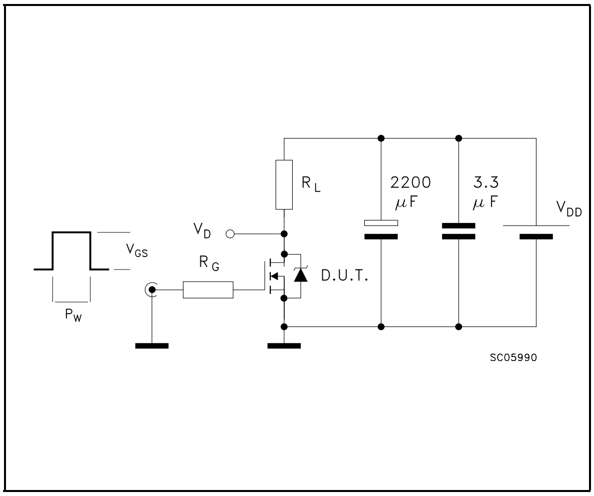


Figure 16: Test Circuit For Diode Recovery Times

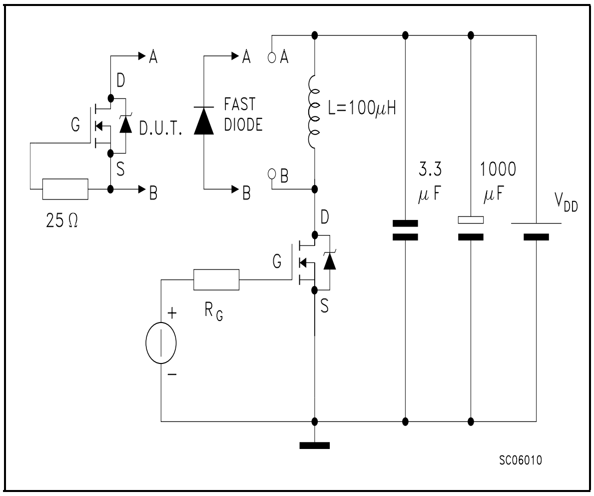
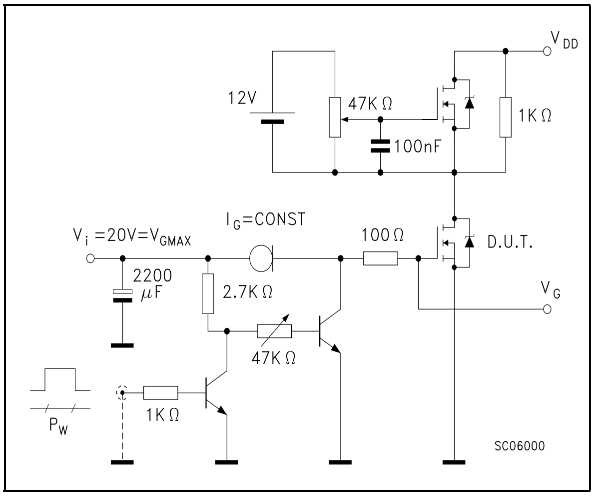


Figure 17: Gate Charge Test Circuit



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

PowerSO-8™ MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45° (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
e4		2.79			0.110	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8° (max.)					

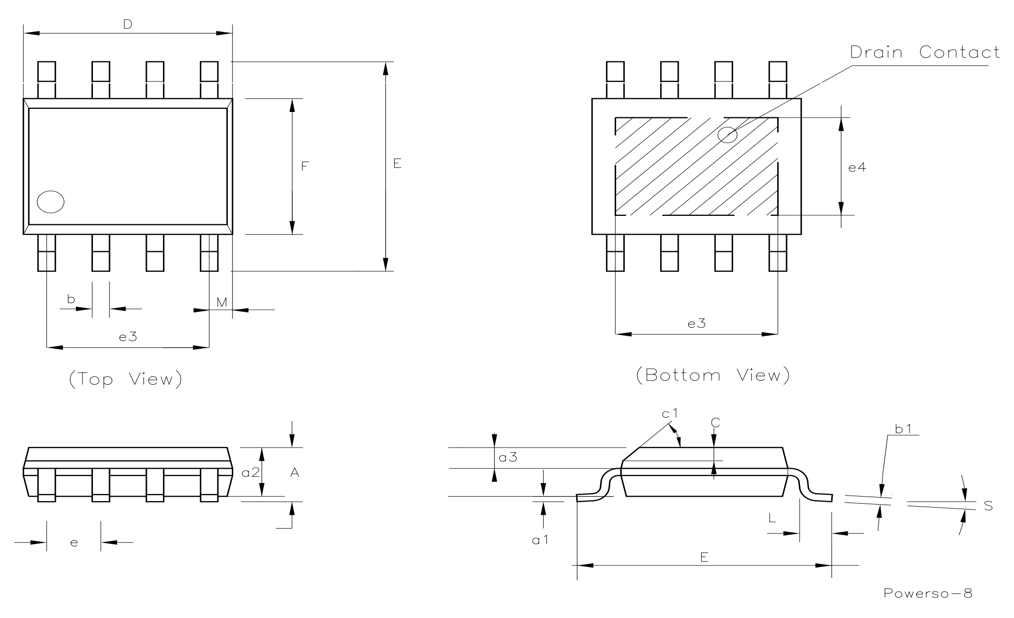


Table 12: Revision History

Date	Revision	Description of Changes
14-Sep-2004	2	Preliminary Data.
23-May-2005	3	New values on table 5
29-Jun-2005	4	New R_G value on table 6
16-Nov-2005	5	Complete version

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