



# STS12NH3LL

## N-CHANNEL 30 V - 0.008 Ω - 12 A SO-8 ULTRA LOW GATE CHARGE STripFET™ MOSFET

PRODUCT PREVIEW

**Table 1: General Features**

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS12NH3LL	30 V	< 0.0105 Ω	12 A

- TYPICAL R<sub>DS(on)</sub> = 0.008 Ω @ 10V
- OPTIMAL R<sub>DS(on)</sub> x Q<sub>g</sub> TRADE-OFF @ 4.5 V
- SWITCHING LOSSES REDUCED
- LOW THRESHOLD DEVICE
- LOW INPUT CAPACITANCE

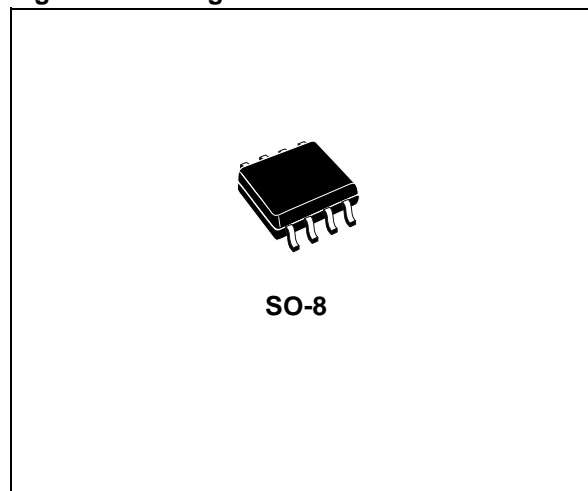
### DESCRIPTION

The STS12NH3LL is based on the latest generation of ST's proprietary "STripFET™" technology. An innovative layout enables the device to also exhibit extremely low gate charge for the most demanding requirements as high-side switch in high-frequency DC-DC converters. It's therefore ideal for high-density converters in Telecom and Computer applications.

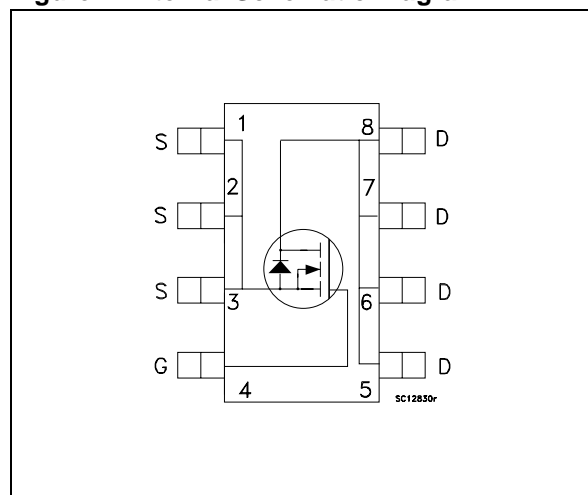
### APPLICATIONS

- HIGH FREQUENCY DC-DC CONVERTERS FOR COMPUTER AND TELECOM

**Figure 1: Package**



**Figure 2: Internal Schematic Diagram**



**Table 2: Order Codes**

Part Number	Marking	Package	Packaging
STS12NH3LL	S12NH3LL	SO-8	TAPE & REEL

Rev. 3

**Table 3: Absolute Maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source Voltage ( $V_{GS} = 0$ )	30	V
$V_{DGR}$	Drain-gate Voltage ( $R_{GS} = 20\text{ k}\Omega$ )	30	V
$V_{GS}$	Gate-source Voltage	$\pm 16$	V
$I_D$	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	12	A
$I_D$	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	7.5	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	48	A
$P_{tot}$	Total Dissipation at $T_C = 25^\circ\text{C}$	2.5	W
$T_{stg}$	Storage Temperature	- 55 to 150	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature		

(•) Pulse width limited by safe operating area

**Table 4: Thermal Data**

Rthj-amb (#)	Thermal Resistance Junction-ambient	50	$^\circ\text{C}/\text{W}$
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(#) When Mounted on 1 inch<sup>2</sup> FR-4 board, 2 oz Cu ( $t \leq 10$  sec.)

**ELECTRICAL CHARACTERISTICS ( $T_{CASE} = 25^\circ\text{C}$  UNLESS OTHERWISE SPECIFIED)**

**Table 5: On /Off**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu\text{A}$ , $V_{GS} = 0$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ , $T_C = 125^\circ\text{C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body Leakage Current ( $V_{DS} = 0$ )	$V_{GS} = \pm 16\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	1			V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 6\text{ A}$ $V_{GS} = 4.5\text{ V}$ , $I_D = 6\text{ A}$		0.008 0.010	0.0105 0.013	$\Omega$ $\Omega$

**Table 6: Dynamic**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}(1)$	Forward Transconductance	$V_{DS} = 15\text{ V}$ , $I_D = 6\text{ A}$		TBD		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$		965		pF
$C_{oss}$	Output Capacitance			285		pF
$C_{rSS}$	Reverse Transfer Capacitance			38		pF

## ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 7: Switching On

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15\text{ V}$ , $I_D = 6\text{ A}$		15		ns
$t_r$	Rise Time	$R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{ V}$ (see Figure 3)		32		ns
$Q_g$	Total Gate Charge	$V_{DD} = 15\text{ V}$ , $I_D = 12\text{ A}$ , $V_{GS} = 4.5\text{ V}$ (see Figure 5)		9	12	nC
$Q_{gs}$	Gate-Source Charge			3.7		nC
$Q_{gd}$	Gate-Drain Charge			3		nC

Table 8: Switching Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15\text{ V}$ , $I_D = 6\text{ A}$ ,		18		ns
$t_f$	Fall Time	$R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{ V}$ (see Figure 3)		8.5		ns

Table 9: Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				12	A
$I_{SDM}(2)$	Source-drain Current (pulsed)				48	A
$V_{SD}$	Forward On Voltage	$I_{SD} = 12\text{ A}$ , $V_{GS} = 0$			1.3	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 12\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		24		ns
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 20\text{ V}$ , $T_j = 150^\circ\text{C}$ (see Figure 4)		17.4		nC
$I_{RRM}$	Reverse Recovery Current			1.45		A

Figure 3: Switching Times Test Circuit For Resistive Load

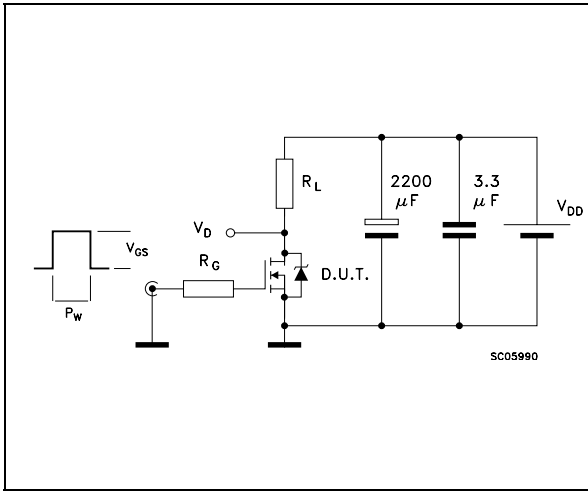


Figure 4: Test Circuit For Diode Recovery Times

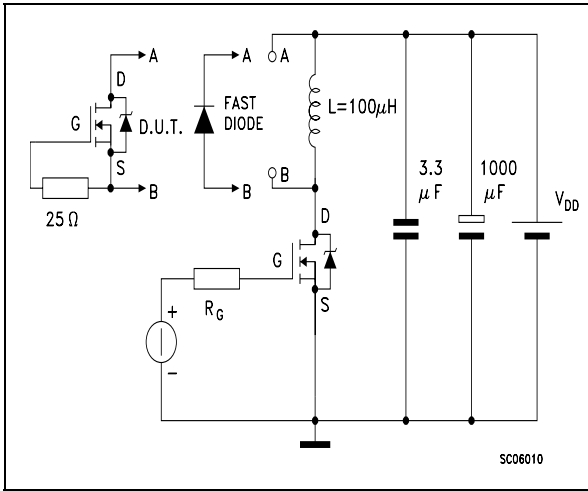
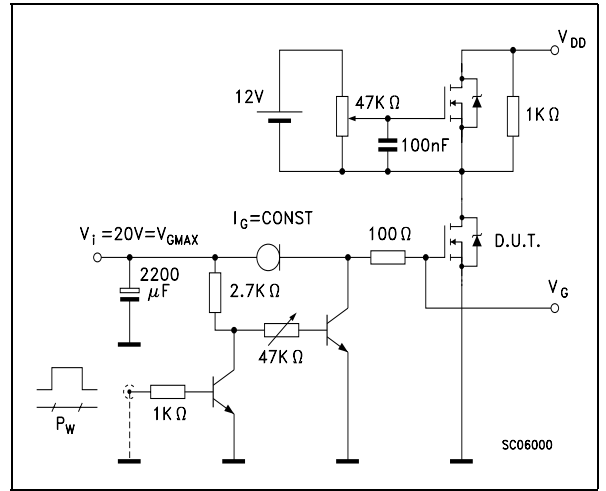
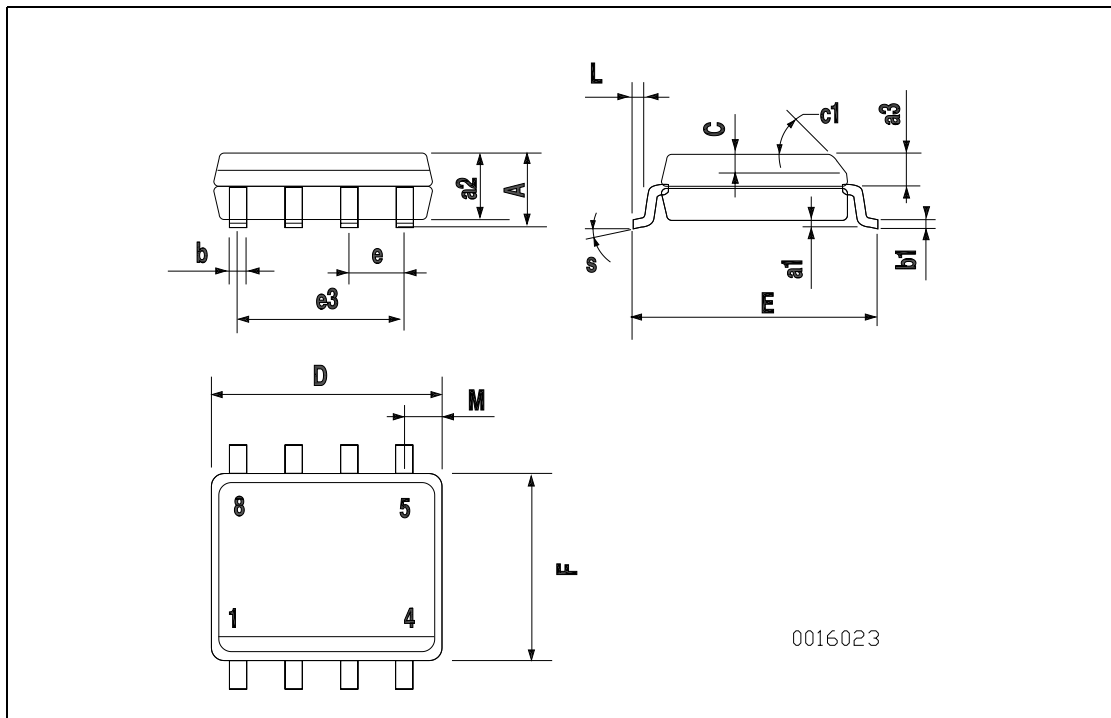


Figure 5: Gate Charge Test Circuit



**SO-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	
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 10: Revision History**

<b>Date</b>	<b>Revision</b>	<b>Description of Changes</b>
21-July-2004	3	The Rds(on) value changed (see table5). New stylesheet

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