



STS9NF30L

N-CHANNEL 30V - 0.015 Ω - 9A SO-8 LOW GATE CHARGE STripFET™ POWER MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STS9NF30L	30 V	< 0.020 Ω	9 A

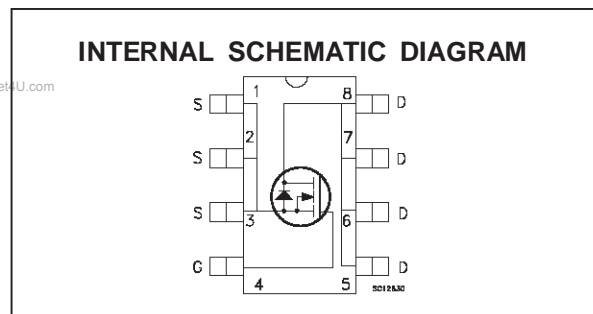
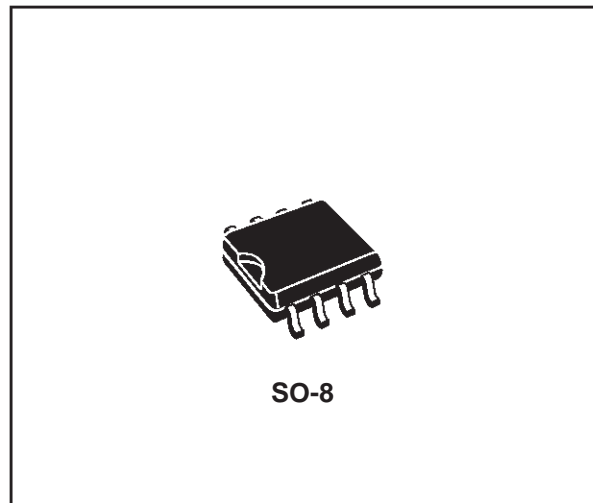
- TYPICAL R_{DS(on)} = 0.018 Ω @ 4.5V
- TYPICAL Q_g = 9 nC @ 4.5V
- OPTIMAL R_{DS(on)} x Q_g TRADE-OFF
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED

DESCRIPTION

This application specific Power Mosfet is the third generation of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows the best trade-off between on-resistance and gate charge. When used as high and low side in buck regulators, it gives the best performance in terms of both conduction and switching losses. This is extremely important for motherboards where fast switching and high efficiency are of paramount importance.

APPLICATIONS

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



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 kΩ)	30	V
V _{GS}	Gate-source Voltage	± 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	9	A
	Drain Current (continuous) at T _c = 100 °C	5.6	A
I _{DM} (●)	Drain Current (pulsed)	36	A
P _{tot}	Total Dissipation at T _c = 25 °C	2.5	W

(●) Pulse width limited by safe operating area

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THERMAL DATA

R _{thj-amb}	(*)Thermal Resistance Junction-ambient	50	°C/W
T _j	Maximum Operating Junction Temperature	150	°C
T _{stg}	Storage Temperature	-65 to 150	°C

(*) Mounted on FR-4 board (t ≤ 10sec)

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

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} = ± 20 V			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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 = 4 A V _{GS} = 4.5 V I _D = 4 A		0.015 0.018	0.020 0.024	Ω Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)max} V _{GS} = 10 V	9			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} I _D = 5.5 A		10		S
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0 V		750 270 60		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15\text{ V}$ $I_D = 4.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, see fig.3)		15		ns
t_r	Rise Time			78		ns
Q_g	Total Gate Charge	$V_{DD} = 24\text{ V}$ $I_D = 9\text{ A}$ $V_{GS} = 4.5\text{ V}$		9	12	nC
Q_{gs}	Gate-Source Charge			3		nC
Q_{gd}	Gate-Drain Charge			5		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off Delay Time	$V_{DD} = 15\text{ V}$ $I_D = 4.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, see fig.3)		38		ns
t_f	Fall Time			23		ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				9	A
$I_{SDM}(\bullet)$	Source-drain Current (pulsed)				36	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 9\text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 9\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_r = 15\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ (see test circuit, fig.5)		50		ns
Q_{rr}	Reverse Recovery Charge			80		nC
I_{RRM}	Reverse Recovery Current			2		A

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

Fig. 1: Unclamped Inductive Load Test Circuit

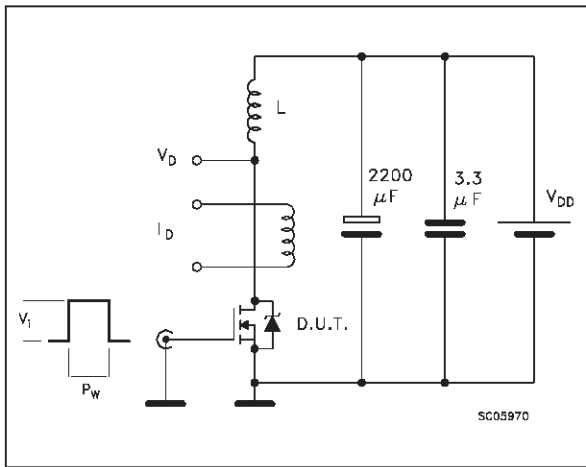


Fig. 2: Unclamped Inductive Waveform

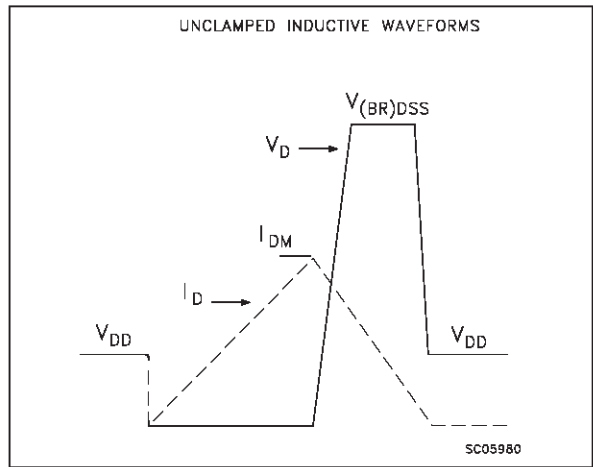


Fig. 3: Switching Times Test Circuits For Resistive Load

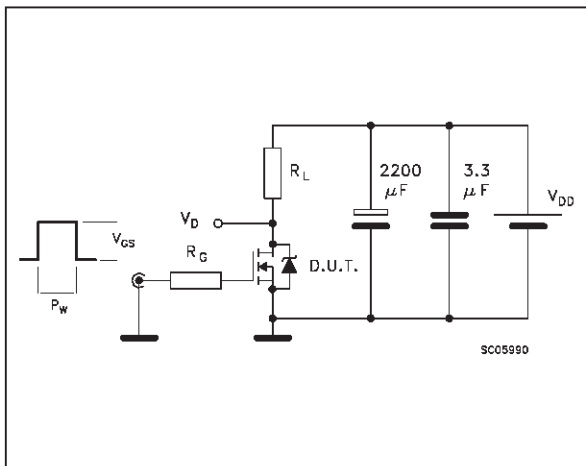


Fig. 4: Gate Charge test Circuit

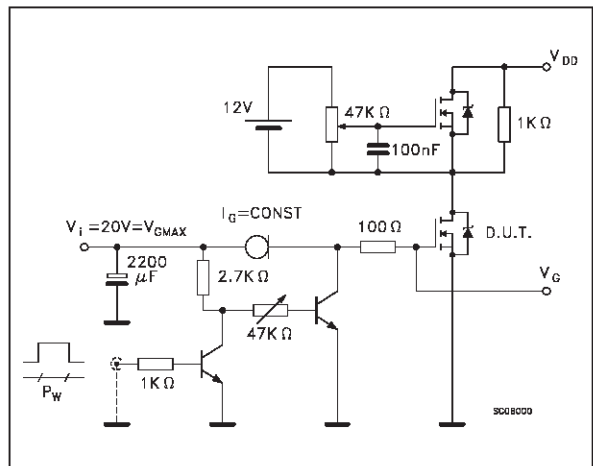
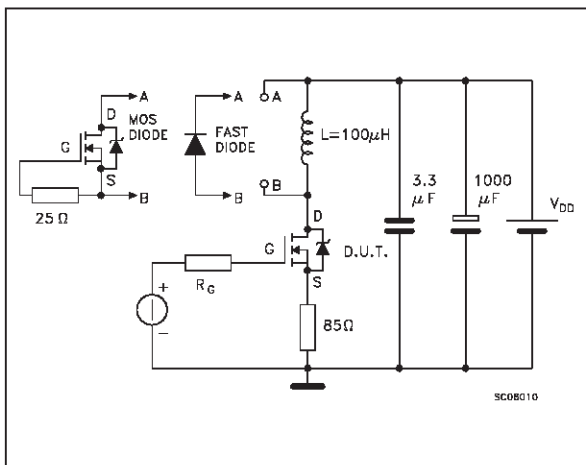
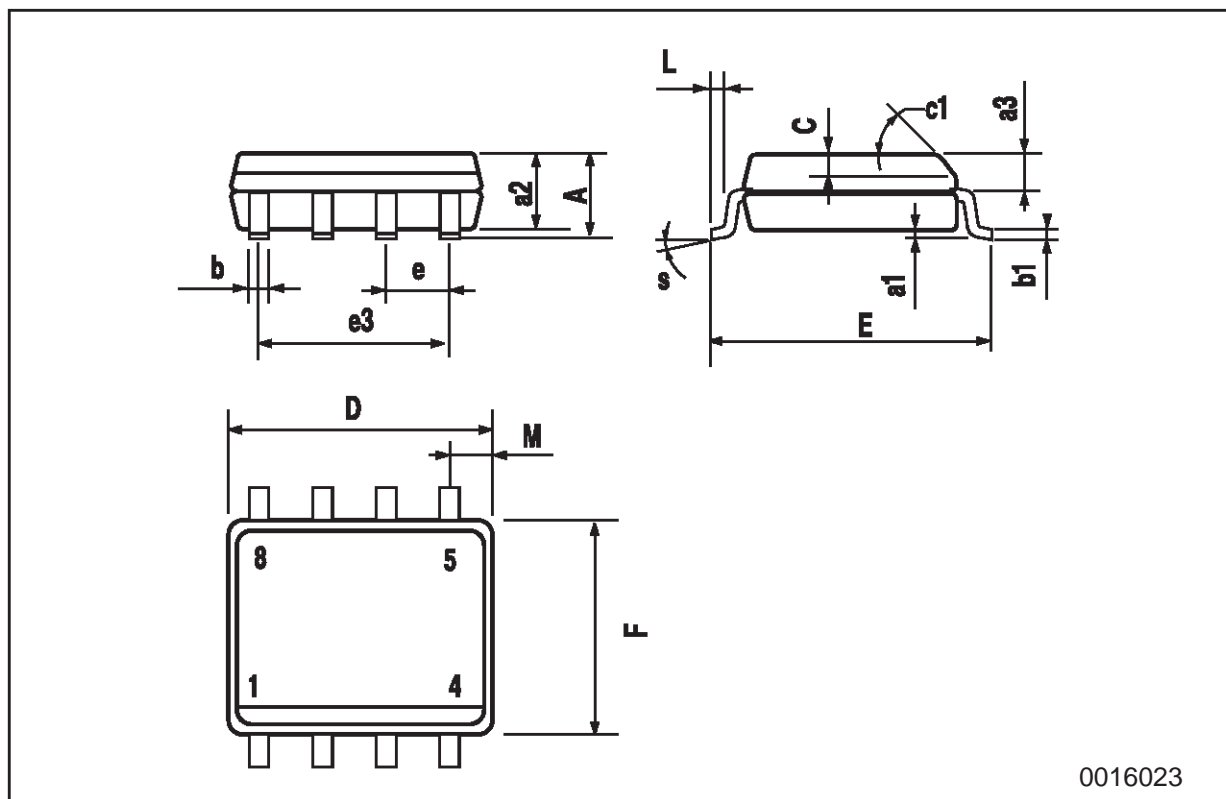


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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.)					



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