STS4DNF60L

N-CHANNEL 60V - 0.045 Ω - 4A SO-8
STripFET™ POWER MOSFET

Table 1: General Features

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STS4DNF60L	60 V	<0.055 Ω	4 A

- TYPICAL $R_{DS}(on)$ = 0.045 Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

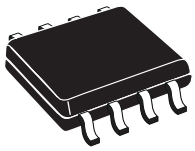
DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronis unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- DC MOTOR DRIVE
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT

Figure 1:Package



SO-8

Figure 2: Internal Schematic Diagram

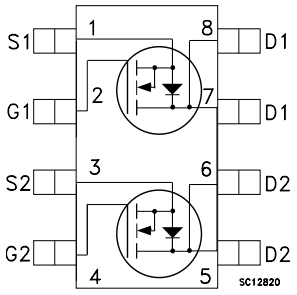


Table 2: Order code

SALES TYPE	MARKING	PACKAGE	PACKAGING
STS4DNF60L	S4DNF60L	SO-8	TAPE & REEL

Table 3: ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	60	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	60	V
V_{GS}	Gate- source Voltage	± 15	V
I_D	Drain Current (continuous) at T_C = 25°C Single Operation Drain Current (continuous) at T_C = 100°C Single Operation	4 2.5	A A
I_{DM}(•)	Drain Current (pulsed)	16	A
P_{tot}	Total Dissipation at T_C = 25°C Dual Operation Total Dissipation at T_C = 25°C Single Operation	2.5 1.6	W W

(•) Pulse width limited by safe operating area.

Table 4: THERMAL DATA

Rthj-amb	(*)Thermal Resistance Junction-ambient	Single Operation Dual Operating	78 62.5	°C/W °C/W
T_j	Thermal Operating Junction-ambient		150	°C
T_{stg}	Storage Temperature		-55 to 150	°C

(*) Mounted on FR-4 board ($t \leq 10$ sec.)

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

Table 5: OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0	60			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} = ± 15 V			±100	nA

Table 6: ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250 µA	1	1.7	2.5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 2 A V_{GS} = 4.5 V I_D = 2 A		0.045 0.050	0.055 0.065	Ω Ω

Table 7: DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS}>$I_{D(on)}$x$R_{DS(on)max}$ I_D = 2 A		7		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		1030 140 40		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)

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} = 30 V I_D = 2.5 A R_G = 4.7 Ω V_{GS} = 4.5 V (Resistive Load, Figure)		15 28		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}= 48V I_D= 4A V_{GS}=4.5V		15 4 4		nC nC nC

Table 9: SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Turn-off Delay Time Fall Time Cross-over Time	V_{clamp} = 48 V I_D = 5 A R_G = 4.7Ω, V_{GS} = 4.5 V (Inductive Load, Figure 5)		15 20 20	25	ns 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)				4 16	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 4 A V_{GS} = 0			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 4 A di/dt = 100A/µs V_{DD} = 20 V T_j = 150°C (see test circuit, Figure 5)		85 85 2		ns nC A

(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(•)Pulse width limited by safe operating area.

Figure 3: Safe Operating Area

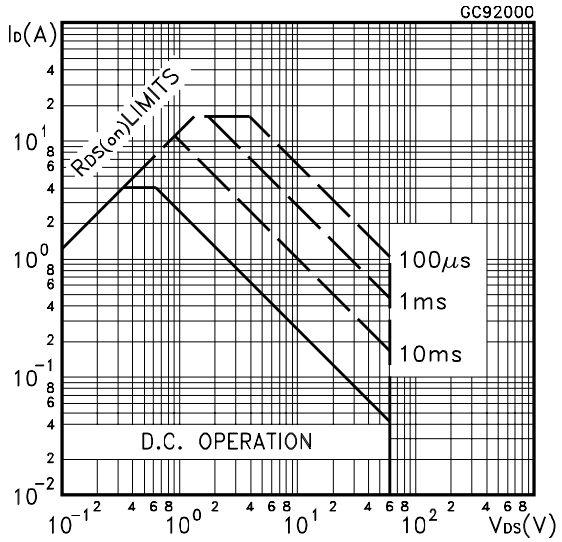


Figure 4: Thermal Impedance

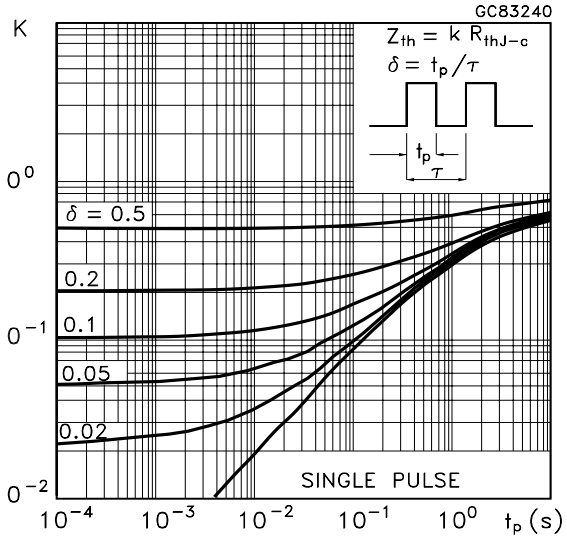


Figure 5: Output Characteristics

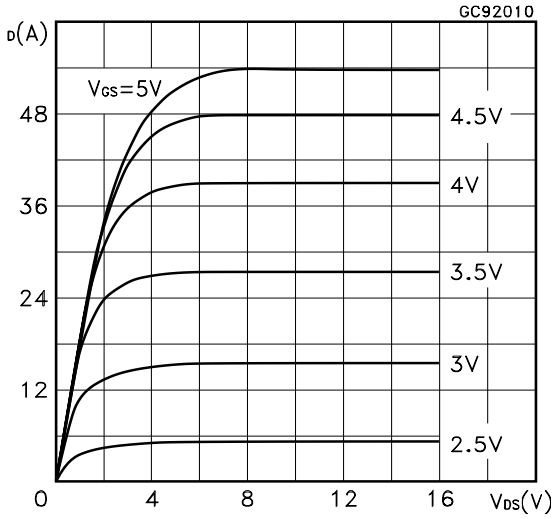


Figure 6: Transfer Characteristics

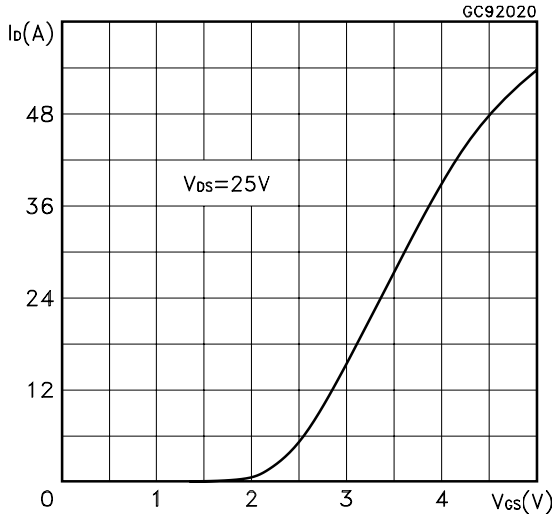


Figure 7: Transconductance

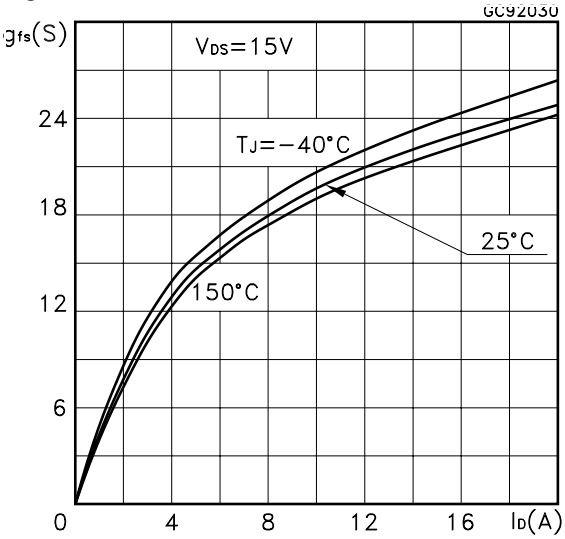


Figure 8: Static Drain-source On Resistance

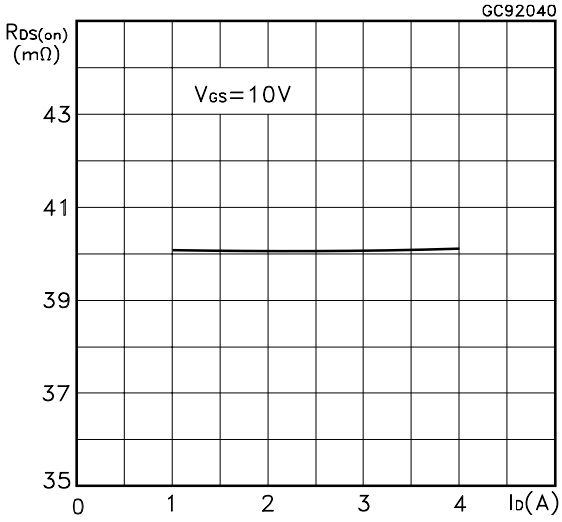


Figure 9: Gate Charge vs Gate-source Voltage

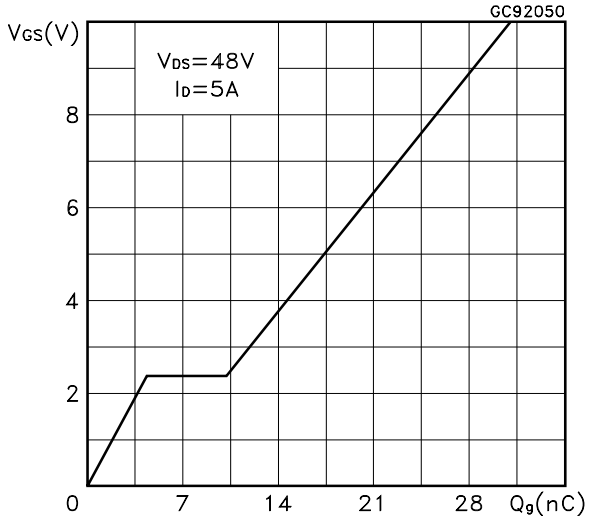


Figure 10: Capacitance Variations

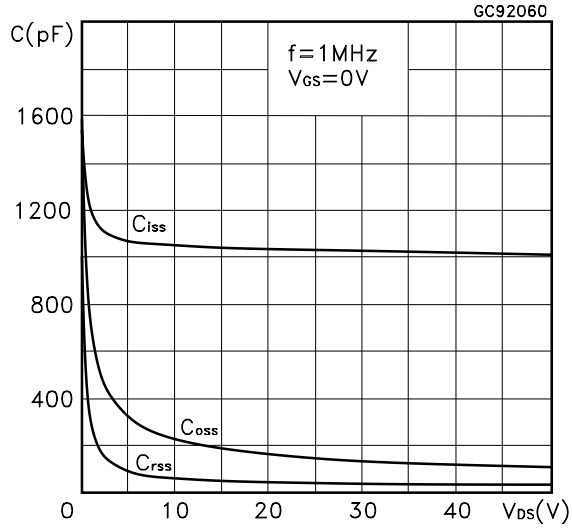


Figure 11: Normalized Gate Threshold Voltage vs Temperature

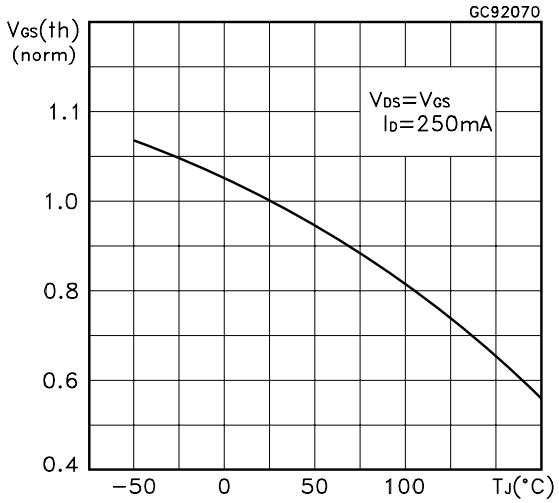


Figure 12: Normalized on Resistance vs Temperature

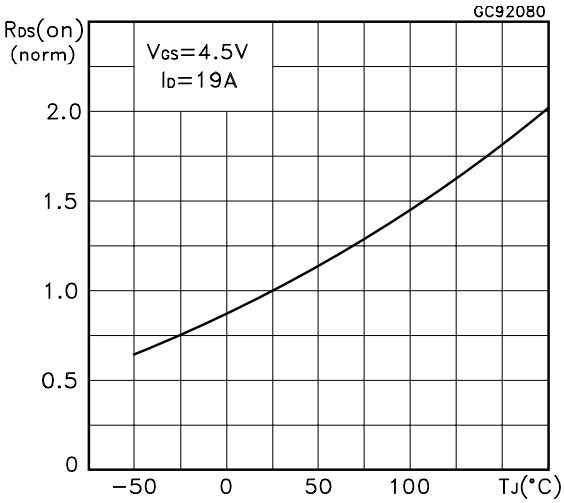


Figure 13: Source-drain Diode Forward Characteristics

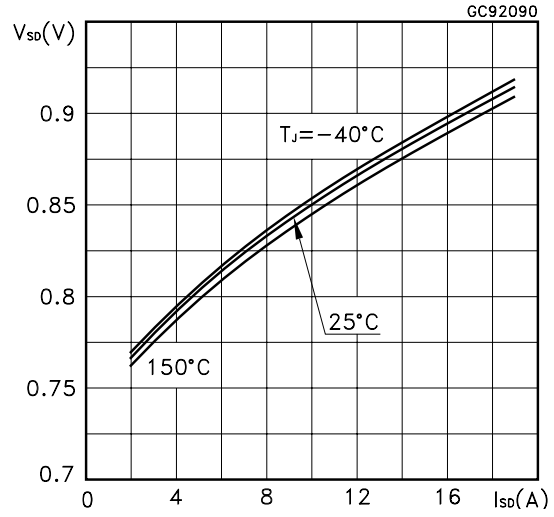


Fig. 15 Switching Times Test Circuits For Resistive Load

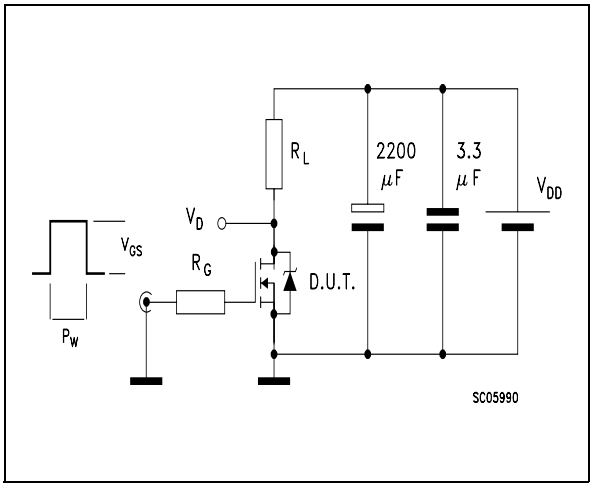


Fig.16: Gate Charge test Circuit

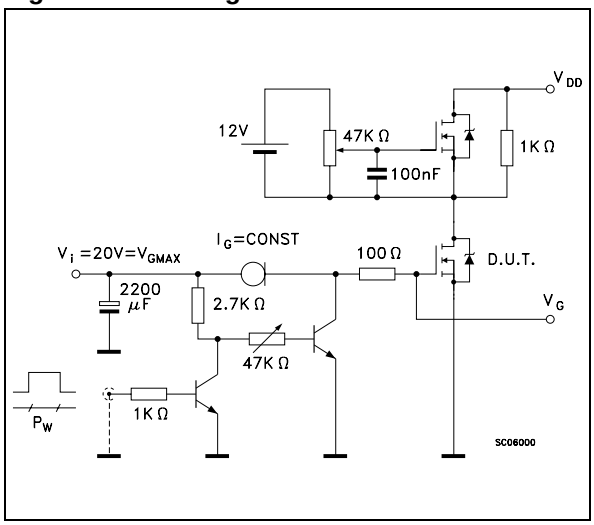
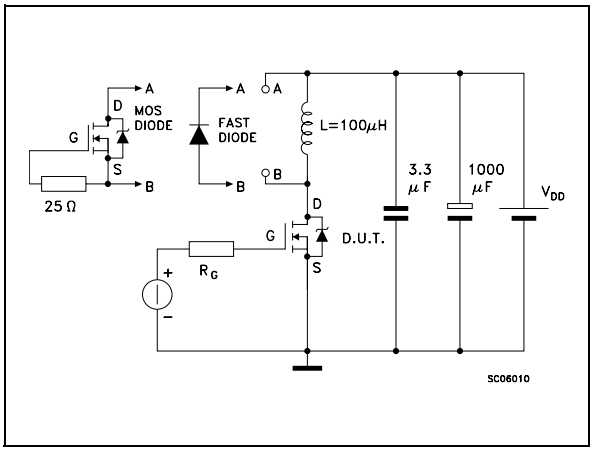


Fig. 17: Test Circuit For Diode Recovery Behaviour



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.)					

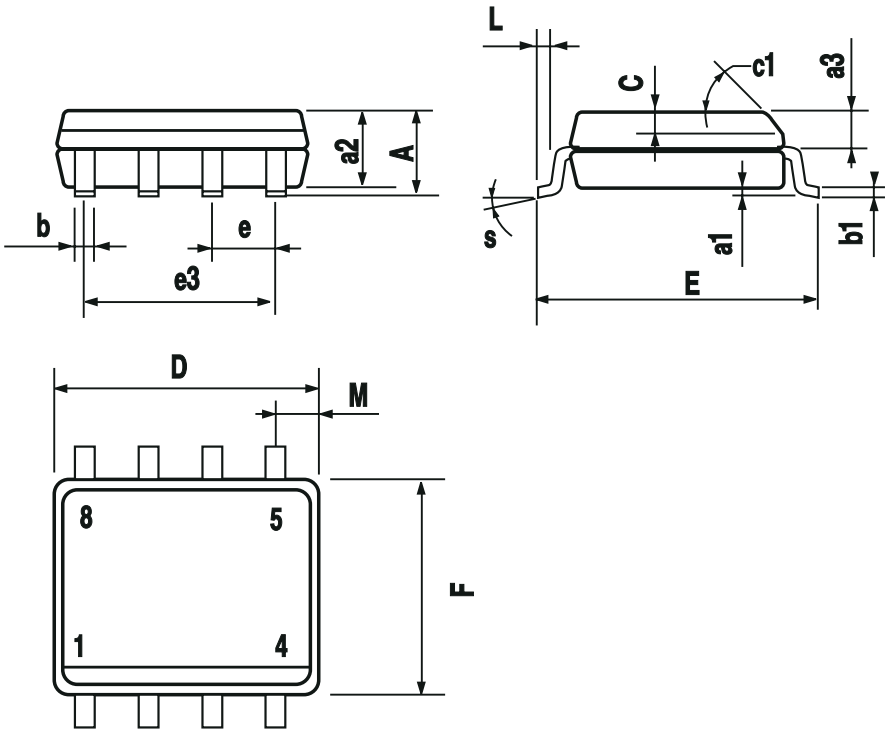


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Table 11:Revision History

Date	Revision	Description of Changes
May 2005	5.0	ADJUSTED TO THE NEW FORMAT

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