



STS4DNF30L

Dual N-channel 30 V, 0.039 Ω , 4 A SO-8
STripFET™ Power MOSFET

Features

Type	V _{DSS}	R _{DS(on)} max.	I _D
STS4DNF30L	30 V	< 0.050 Ω	4 A

- Standard outline for easy automated surface mount assembly
- Low threshold drive

Applications

Switching application

Description

The STS4DNF60L is a dual N-channel STripFET™ Power MOSFET realized with the second generation of STMicroelectronics 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.

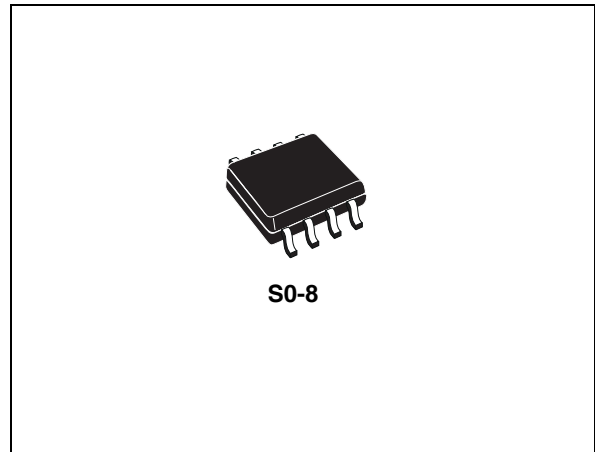


Figure 1. Internal schematic diagram

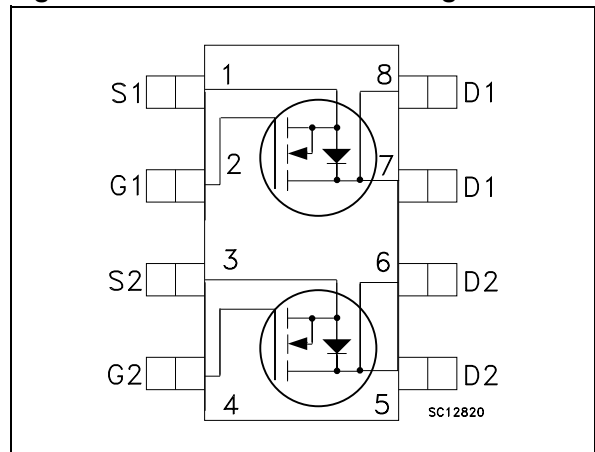


Table 1. Device summary

Order code	Marking	Package	Packaging
STS4DNF30L	4DF30L	SO-8	Tape and reel

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1 Electrical ratings

Table 2. 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	Drain current (continuous) at $T_C = 25^\circ\text{C}$	4	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	2.5	A
$I_{DM}^{(1)}$	Drain current (pulsed)	16	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$ dual operating	2	W

1. Pulse width limited by safe operating area

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-a}^{(1)}$	Thermal resistance junction-ambient max	62.5	$^\circ\text{C/W}$
T_J	Junction temperature	- 55 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature range	150	$^\circ\text{C}$

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

2 Electrical characteristics

($T_{CASE} = 25\text{ °C}$ unless otherwise specified)

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage Drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$ $V_{DS} = \text{Max rating}$, $T_C = 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate-body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 16\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$ $V_{GS} = 4.5\text{ V}$, $I_D = 2\text{ A}$		0.039 0.046	0.050 0.060	Ω Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	330		pF
C_{oss}	Output capacitance			90		pF
C_{rss}	Reverse transfer capacitance			40		pF
Q_g	Total gate charge	$V_{DD} = 24\text{ V}$, $I_D = 4\text{ A}$, $V_{GS} = 10\text{ V}$	-	6.5	9	nC
Q_{gs}	Gate-source charge			3.6		nC
Q_{gd}	Gate-drain charge			2		nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	$V_{DD} = 15\text{ V}$, $I_D = 2\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 13)	-	11 100	-	ns ns
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 15\text{ V}$, $I_D = 2\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 13)	-	25 22	-	ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		4	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		16	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 4\text{ A}$, $V_{GS} = 0$	-		1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 4\text{ A}$, $V_{DD} = 20\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $T_j = 150\text{ }^\circ\text{C}$ (see Figure 15)	-	30 18 1.2		ns nC A

1. Pulse width limited by safe operating area.

2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

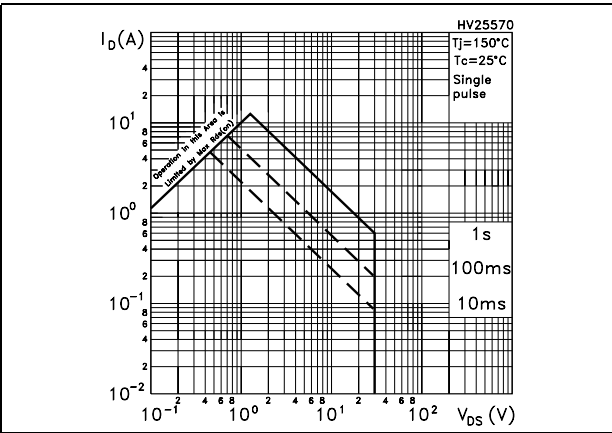


Figure 3. Thermal impedance

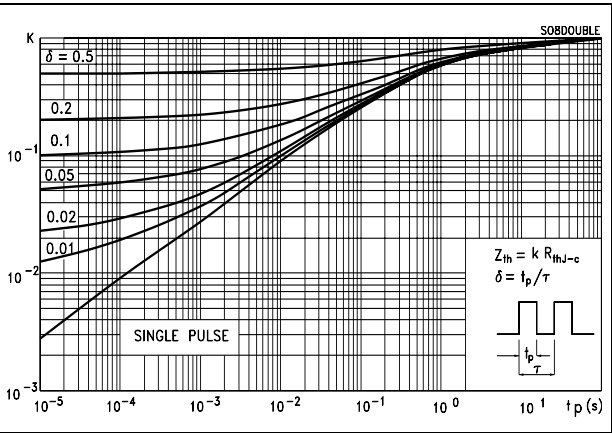


Figure 4. Output characteristics

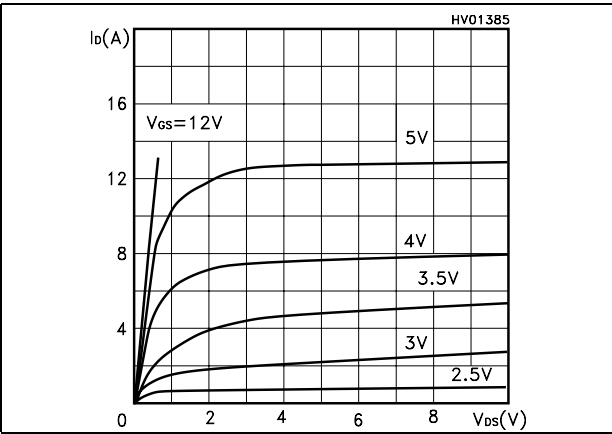


Figure 5. Transfer characteristics

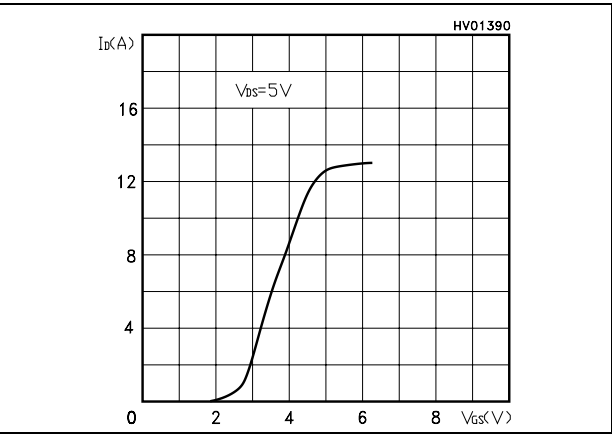


Figure 6. Transconductance

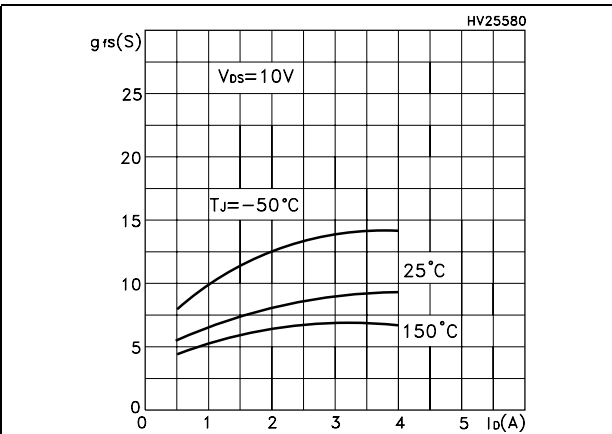


Figure 7. Static drain-source on resistance

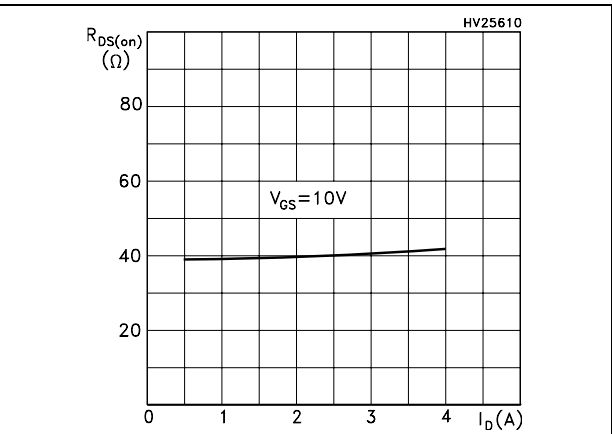


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

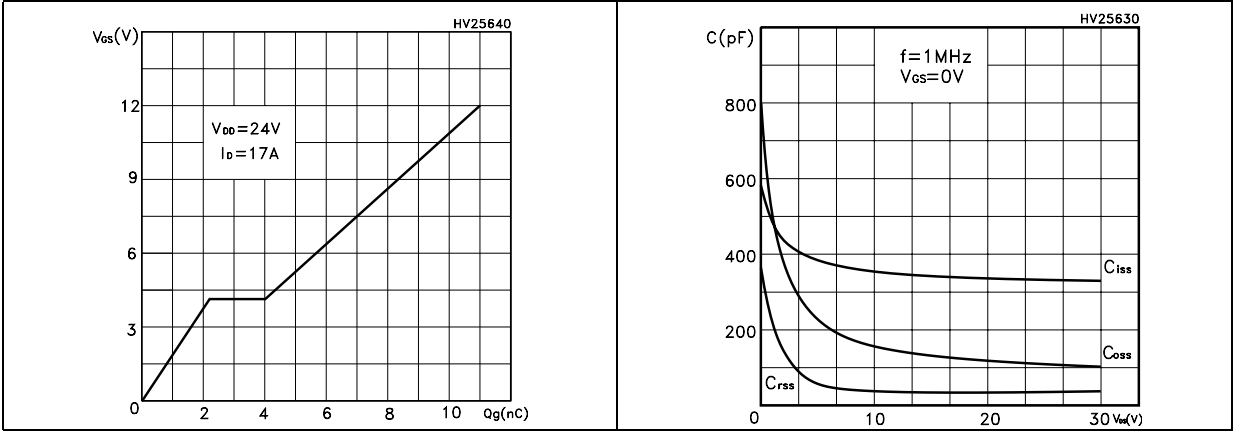


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

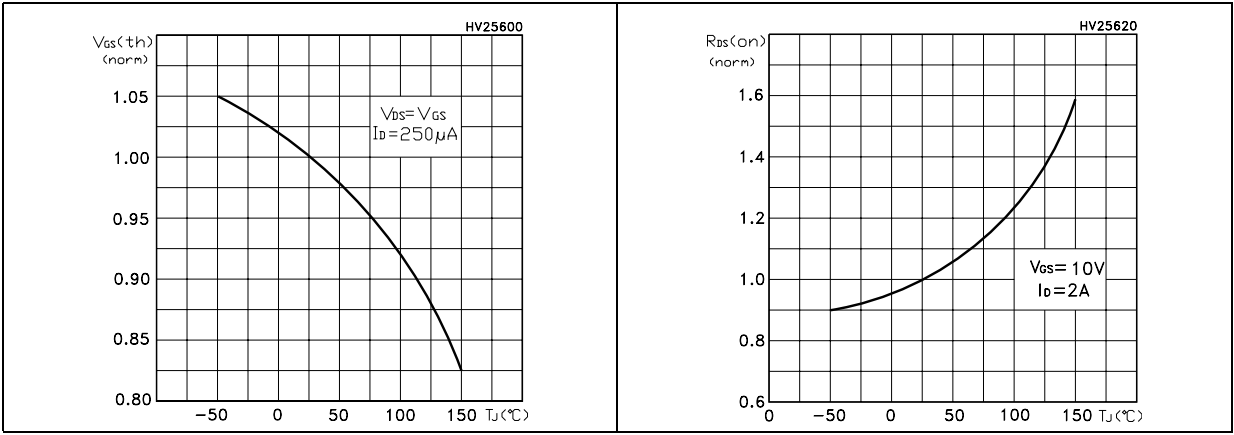
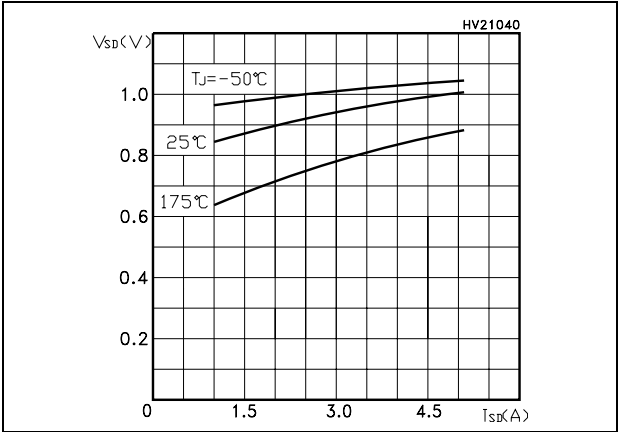


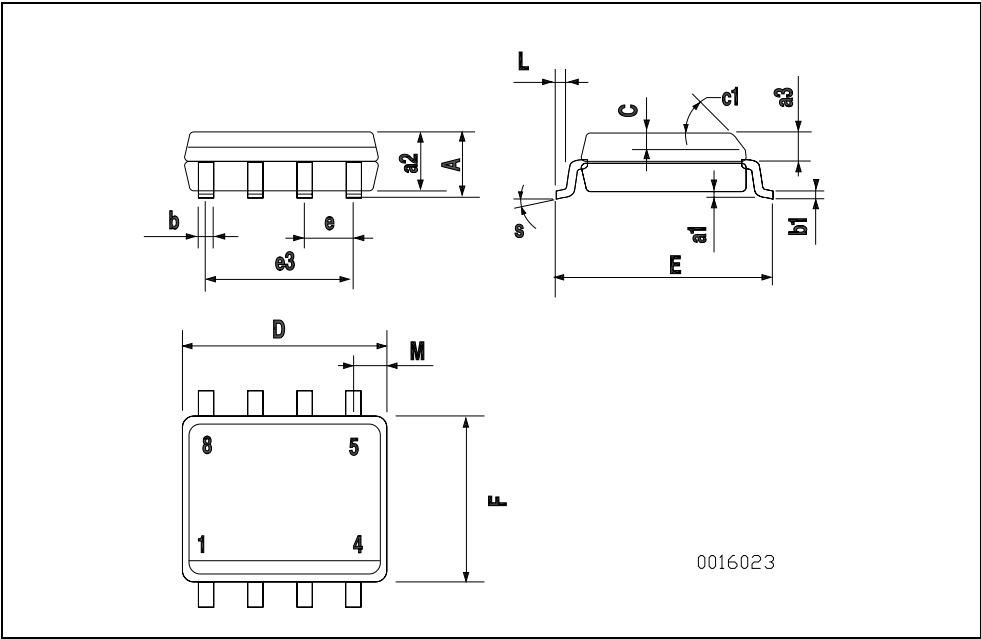
Figure 12. Source-drain diode forward characteristics



4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

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.)					



5 Revision history

Table 8. Revision history

Date	Revision	Changes
11-Sep-2006	1	First version
15-Nov-2006	2	The document has been reformatted
17-Jun-2010	3	Marking in Table 1: Device summary has been corrected

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