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STS5PF30L

P-channel 30V - 0.045Ω - 5A SO-8
 STripFET™ Power MOSFET

General features

Type	V _{DSS}	R _{DS(on)}	I _D
STS5PF30L	30V	<0.055Ω	5A

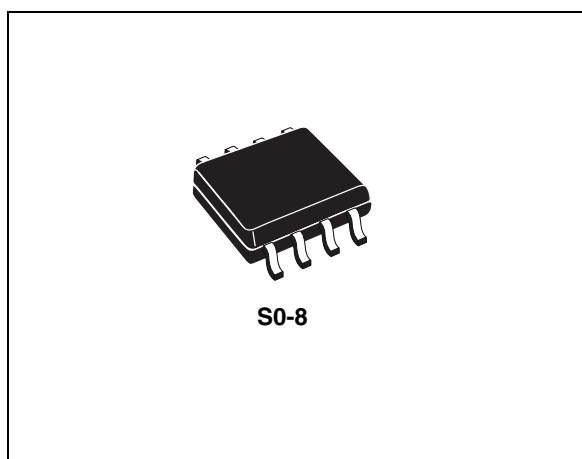
- Conduction losses reduced
- Switching losses reduced
- Low threshold drive
- Standard outline for easy automated surface mount assembly

Description

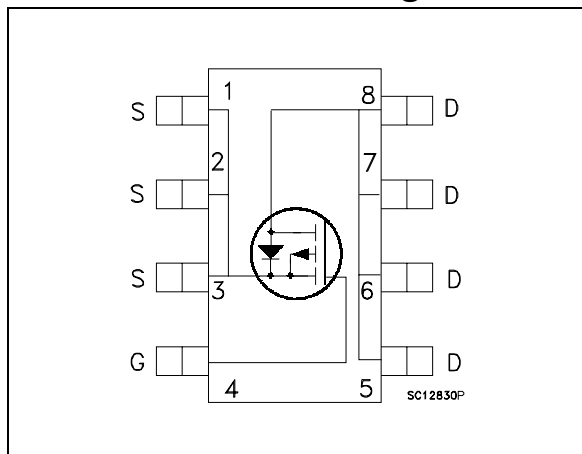
This Power MOSFET is the latest development of STMicroelectronics unique “single feature size™” strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Applications

- Switching application



Internal schematic diagram



Order code

Part number	Marking	Package	Packaging
STS5PF30L	S5PF30L	SO-8	Tape & reel

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1 Electrical ratings

Table 1. 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 $T_C = 25^\circ\text{C}$	5	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	4	A
$I_{DM}^{(1)}$	Drain current (pulsed)	20	A
P_{TOT}	Total dissipation at $T_C = 25^\circ\text{C}$ dual operating	2.5	W
T_J	Junction temperature	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage temperature range	150	$^\circ\text{C}$

1. Pulse width limited by safe operating area

Note: For the p-channel Power MOSFET actual polarity of voltages and current has to be reversed

Table 2. Thermal data

R_{thj-a}	⁽¹⁾ Thermal resistance junction-ambient Max	50	$^\circ\text{C/W}$
T_L	Maximum lead temperature for soldering purpose	300	$^\circ\text{C}$

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

2 Electrical characteristics

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

Table 3. On/off states

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} = ± 16V			±100	nA
V _{GS(th)}	Gate threshold voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.6	2.5	V
R _{DS(on)}	Static drain-source on resistance	V _{GS} = 10V, I _D = 2.5A V _{GS} = 4.5V, I _D = 2.5A		0.045 0.065	0.055 0.075	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g _{fs} ⁽¹⁾	Forward transconductance	V _{DS} = 15V, I _D =2.5A		10		S
C _{iss}	Input capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1350		pF
C _{oss}	Output capacitance			490		pF
C _{rss}	Reverse transfer capacitance			130		pF
Q _g	Total gate charge	V _{DD} = 24V, I _D = 5A, V _{GS} = 5V <i>(see Figure 14)</i>		12.5	16	nC
Q _{gs}	Gate-source charge			5		nC
Q _{gd}	Gate-drain charge			3		nC

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

STS5PF30L
Electrical characteristics
Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	$V_{DD}=15\text{ V}$, $I_D=2.5\text{ A}$, $R_G=4.7\Omega$, $V_{GS}=4.5\text{ V}$ (see Figure 13)		25 35		ns ns
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD}=15\text{ V}$, $I_D=2.5\text{ A}$, $R_G=4.7\Omega$, $V_{GS}=4.5\text{ V}$ (see Figure 13)		125 35		ns ns

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min	Typ.	Max	Unit
I_{SD}	Source-drain current				5	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				20	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 5\text{ A}$, $V_{GS} = 0$			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD} = 5\text{ A}$, $V_{DD} = 15\text{ V}$ $di/dt = 100\text{ A}/\mu\text{s}$, $T_j = 150^\circ\text{C}$ (see Figure 15)		45 36 1.6		ns nC A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300 μs , duty cycle 1.5%

Electrical characteristics

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2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

Figure 2. Thermal impedance

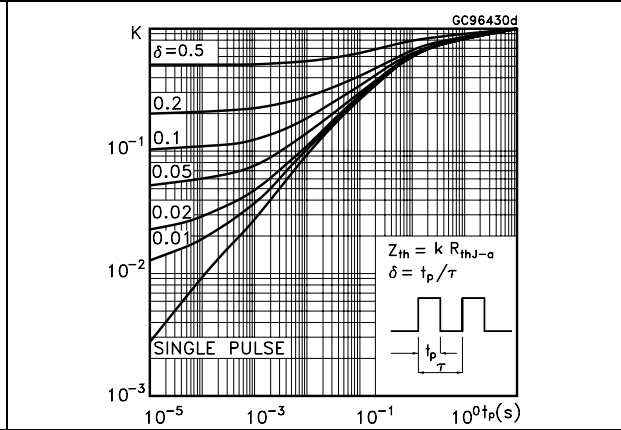
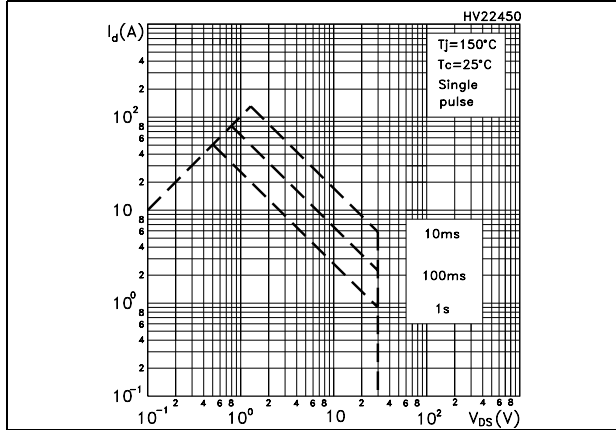


Figure 3. Output characteristics

Figure 4. Transfer characteristics

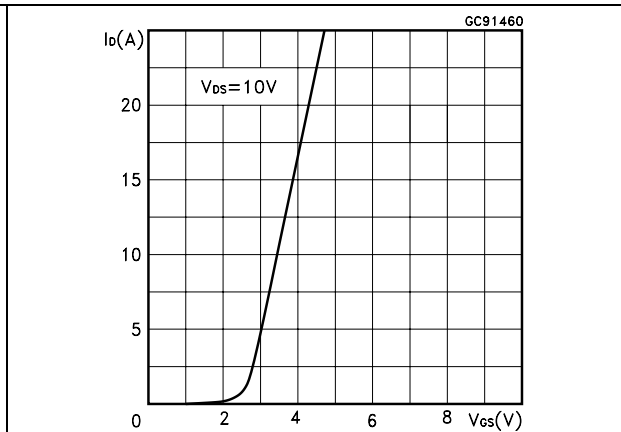
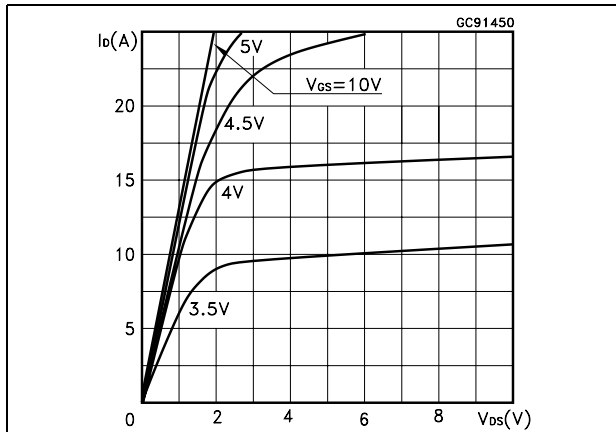
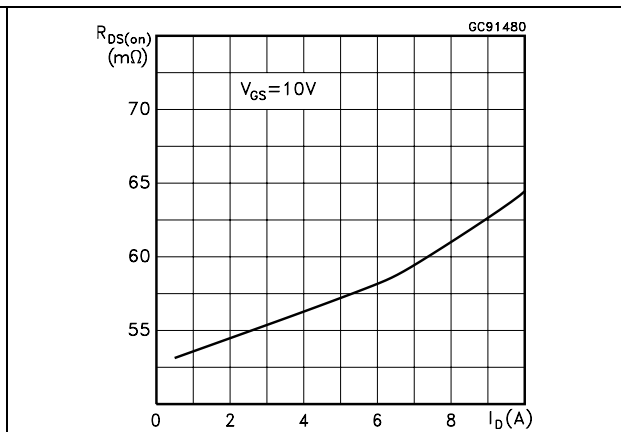
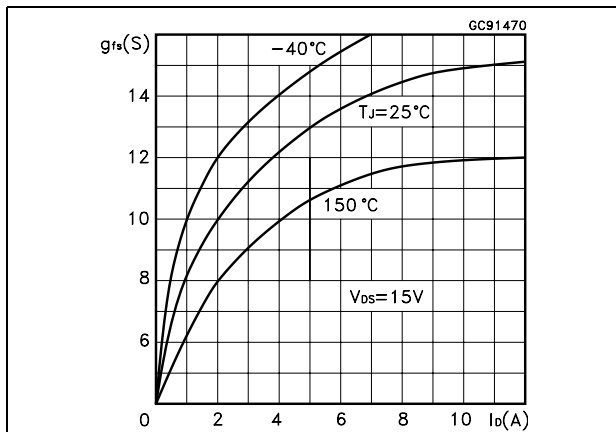


Figure 5. Transconductance

Figure 6. Static drain-source on resistance



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Electrical characteristics

Figure 7. Gate charge vs gate-source voltage **Figure 8. Capacitance variations**

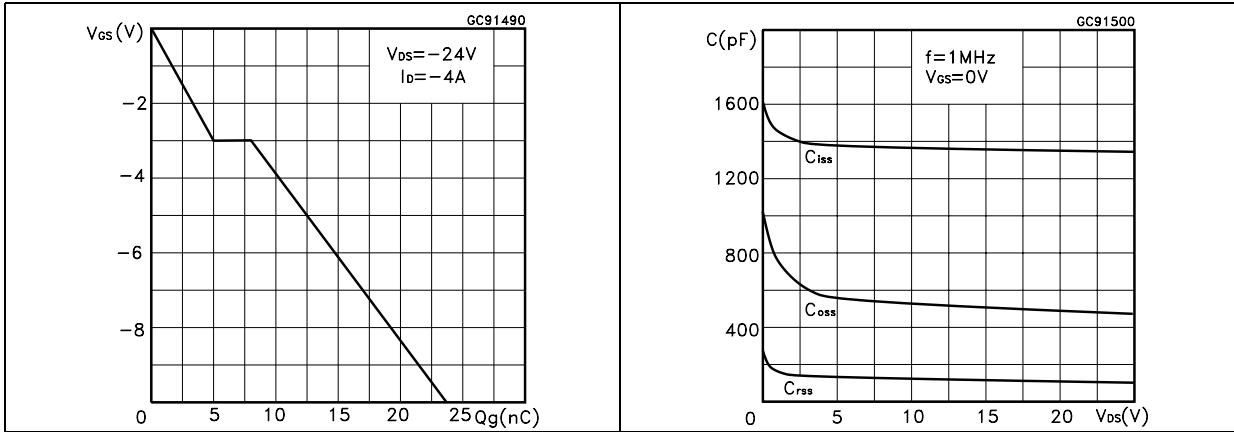


Figure 9. Normalized gate threshold voltage vs temperature **Figure 10. Normalized on resistance vs temperature**

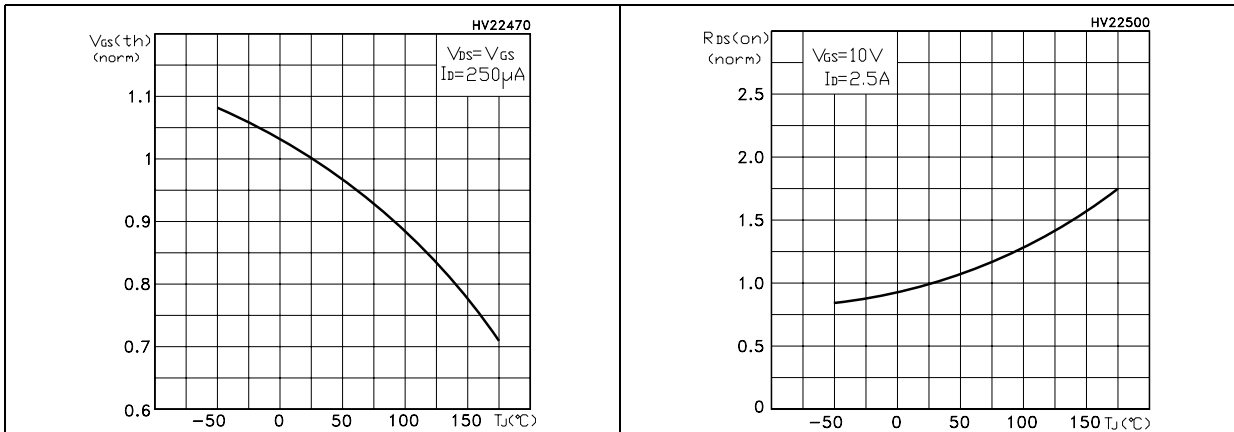
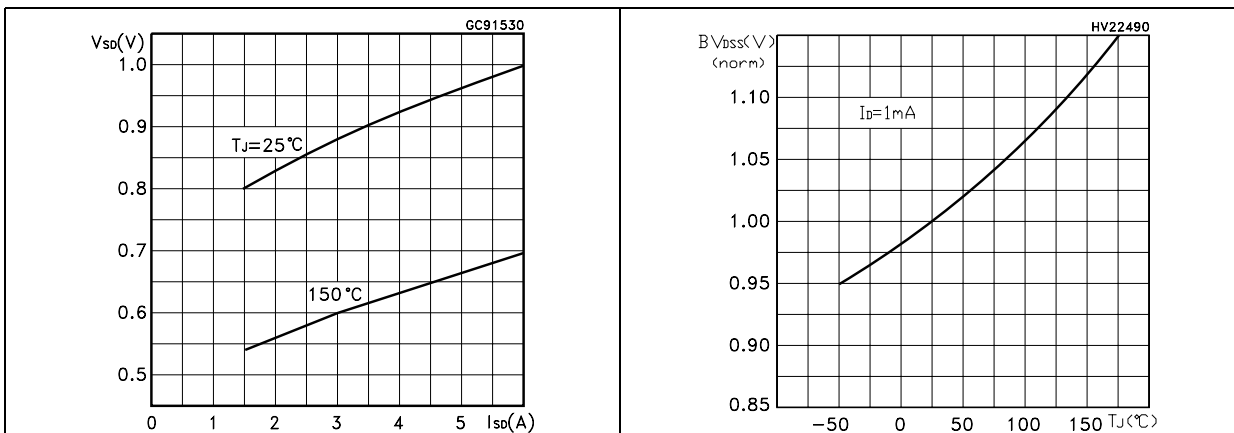


Figure 11. Source-drain diode forward characteristics **Figure 12. Normalized BV_{DSS} vs temperature**



3 Test circuit

Figure 13. Switching times test circuit for resistive load

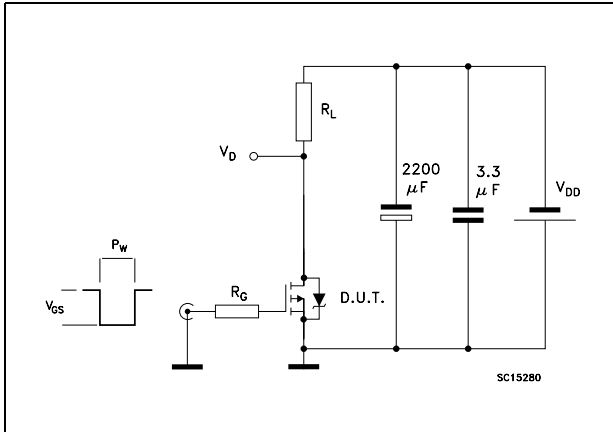


Figure 14. Gate charge test circuit

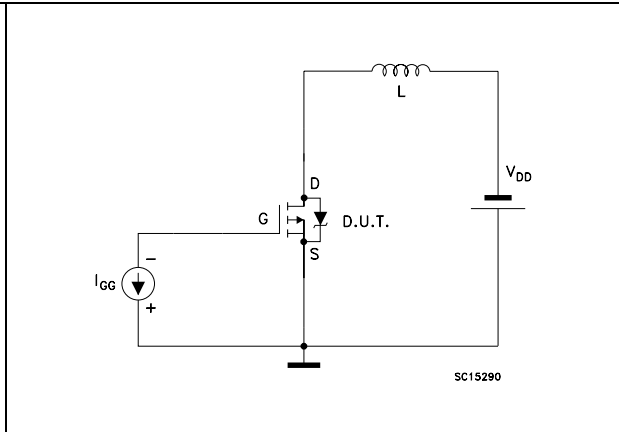
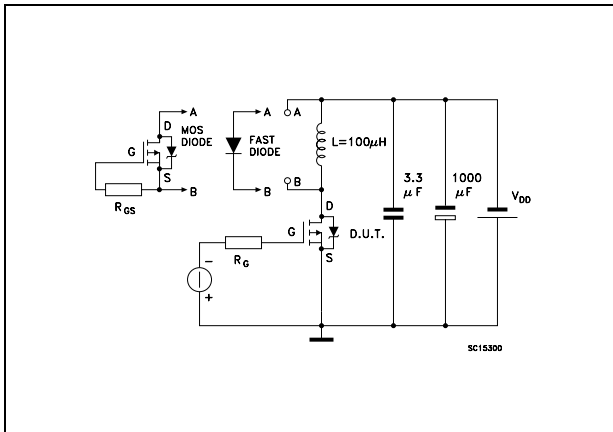


Figure 15. Test circuit for diode recovery behavior



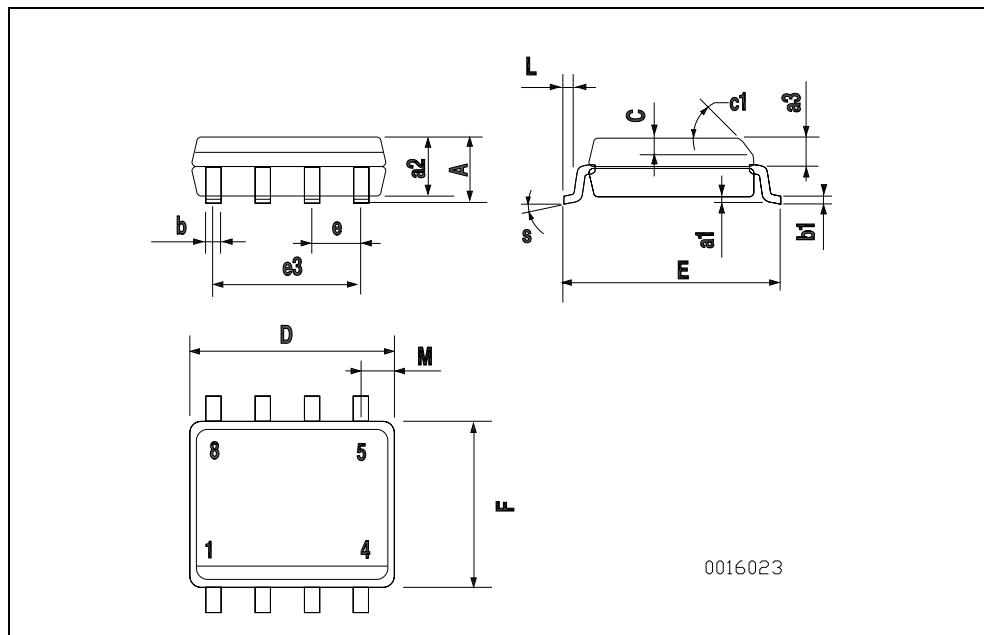
4 Package mechanical data

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

Package mechanical data

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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 7. Revision history

Date	Revision	Changes
06-Feb-2007	4	The document has been reformatted

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