



## STS7PF30L

P-CHANNEL 30V - 0.16Ω - 7A - SO-8  
STripFET™ II Power MOSFET

### General features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STS7PF30L	30V	<0.021Ω	7A

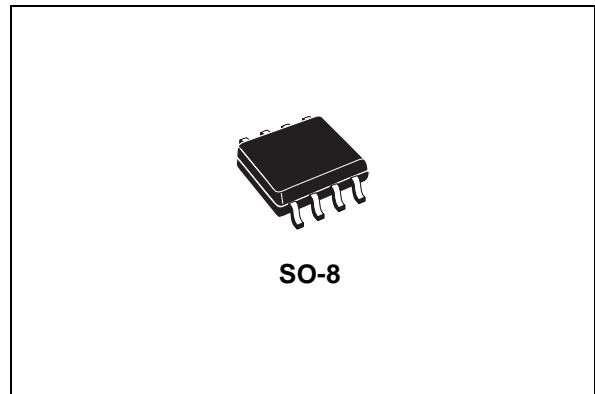
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

### Description

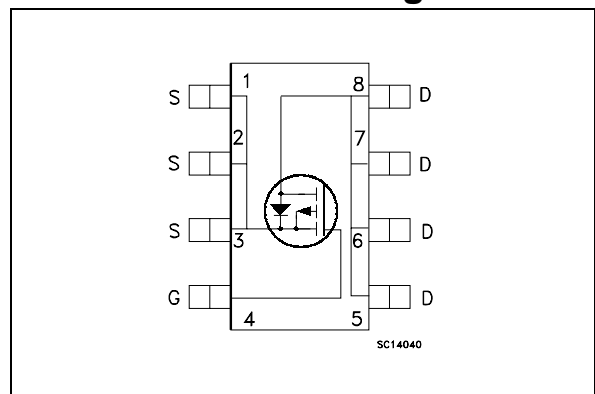
This Power MOSFET is the latest development of STMicroelectronics' unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps, therefore a remarkable manufacturing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

### Applications

- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT.
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT



### Internal schematic diagram



### Order Codes

Sales Type	Marking	Package	Packaging
STS7PF30L	S7PF30L	SO-8	TAPE & REEL

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS} = 0$ )	30	V
$V_{DGR}$	Drain-gate Voltage ( $R_{GS} = 20k\Omega$ )	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	7	A
$I_D$	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	4.4	A
$I_{DM}$ <i>Note 1</i>	Drain Current (pulsed)	28	A
$P_{TOT}$	Total Dissipation at $T_C = 25^\circ\text{C}$	2.5	W

**Table 2. Thermal data**

$R_{thj-amb}$ <i>Note 2</i>	Thermal Resistance Junction-ambient	50	$^\circ\text{C/W}$
$T_j$	Operating Junction Temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$

## 2 Electrical characteristics

(T<sub>J</sub> = 25 °C unless otherwise specified)

**Table 3. On/off states**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating, V <sub>DS</sub> = Max Rating, T <sub>c</sub> = 125°C			1 10	μA μA
I <sub>GSS</sub>	Gate Body Leakage Current (V <sub>DS</sub> = 0)	V <sub>DS</sub> = ± 16V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	1	1.6	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5A V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.5A	0.011 0.016	0.016 0.022	0.021 0.028	Ω Ω

**Table 4. Dynamic**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub> <i>Note 3</i>	Forward Transconductance	V <sub>DS</sub> = 20V, I <sub>D</sub> = 3.5A		16		S
C <sub>iss</sub> C <sub>oss</sub> C <sub>rss</sub>	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V <sub>DS</sub> = 25V, f = 1MHz, V <sub>GS</sub> = 0		2600 523 174		pF pF pF
Q <sub>g</sub> Q <sub>gs</sub> Q <sub>gd</sub>	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V <sub>DD</sub> = 15V, I <sub>D</sub> = 7A, V <sub>GS</sub> = 4.5V		28 8.75 12.35	7	nC nC nC

**Table 5. Switching times**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub> t <sub>r</sub>	Turn-on Delay Time Rise Time	V <sub>DD</sub> = 15V, I <sub>D</sub> = 3.5A R <sub>G</sub> = 4.7Ω, V <sub>GS</sub> = 4.5V, (see Figure 13)		68 54		ns ns
t <sub>d(off)</sub> t <sub>f</sub>	Turn-off Delay Time Fall Time	V <sub>DD</sub> = 15V, I <sub>D</sub> = 3.5A R <sub>G</sub> = 4.7Ω, V <sub>GS</sub> = 4.5V, (see Figure 13)		65 23		ns ns

**Table 6. Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-Drain Current				7	A
$I_{SDM}$ <i>Note 1</i>	Source-Drain Current (pulsed)				28	A
$V_{SD}$	Forward On Voltage	$I_{SD} = 7A, V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 7A, di/dt = 100A/\mu s$		40		ns
$Q_{rr}$	Reverse Recovery Charge	$V_{DD} = 15V, T_j = 150^\circ C$		46		nC
$I_{RRM}$	Reverse Recovery Current	(see Figure 15)		2.3		A

(1) Pulse with limited by safe operating area

(2) When mounted on 1inch<sup>2</sup> FR-4 board ( $t \leq 10\mu s$ )

(3) Pulsed: pulse duration = 300 $\mu s$ , duty cycle 1.5%

*Note:* For the P-CHANNEL MOSFET the polarity of voltages and current have to be reversed

## 2.1 Electrical characteristics (curves)

Figure 1. Safe Operating Area

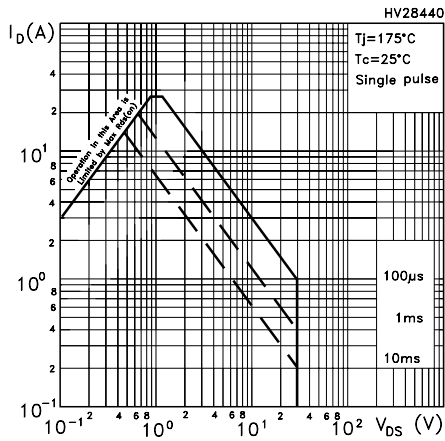


Figure 2. Thermal Impedance

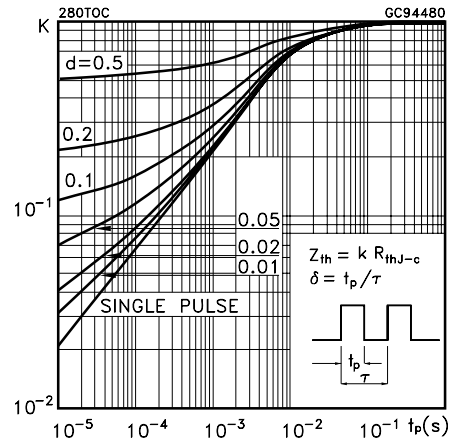


Figure 3. Output Characteristics

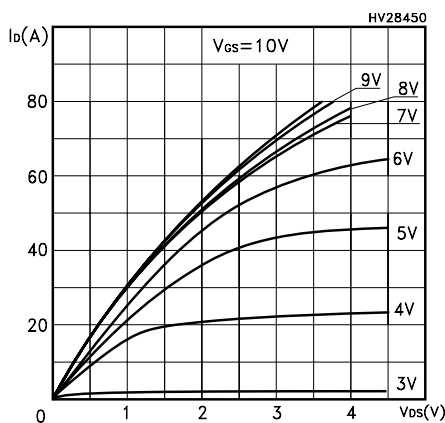


Figure 4. Transfer Characteristics

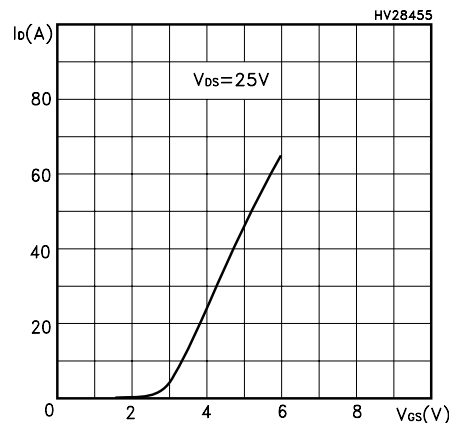


Figure 5. Transconductance

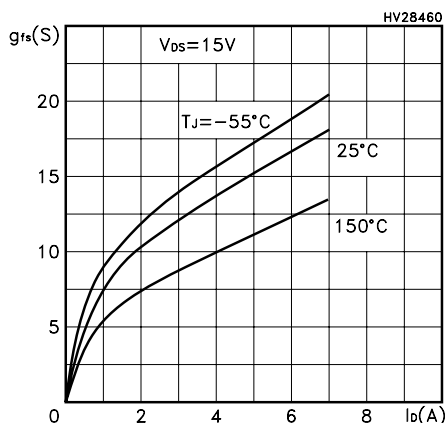


Figure 6. Static Drain-Source on Resistance

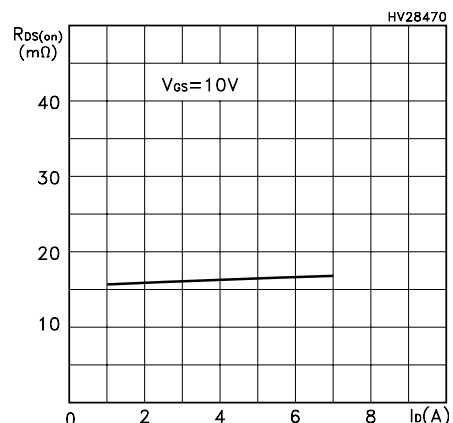


Figure 7. Gate Charge vs Gate-Source Voltage Figure 8. Capacitance Variations

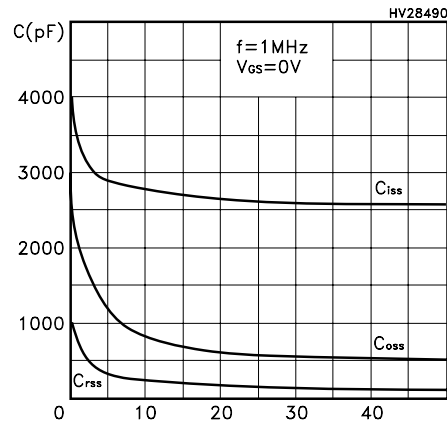
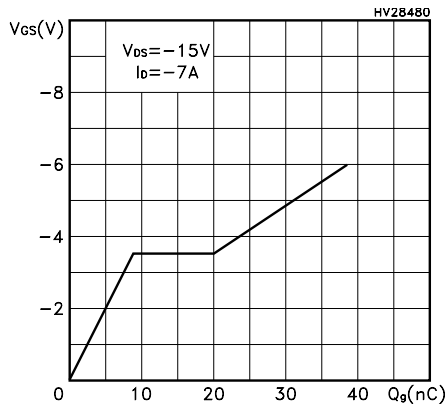


Figure 9. Normalized Gate Threshold Voltage vs Temperature Figure 10. Normalized on Resistance vs Temperature

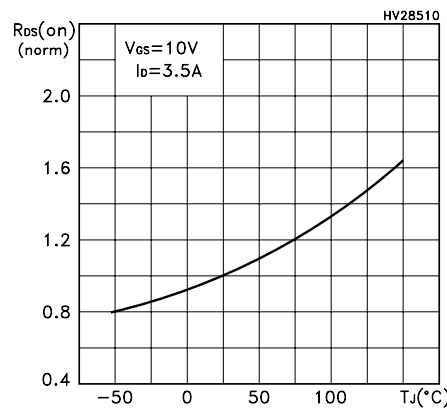
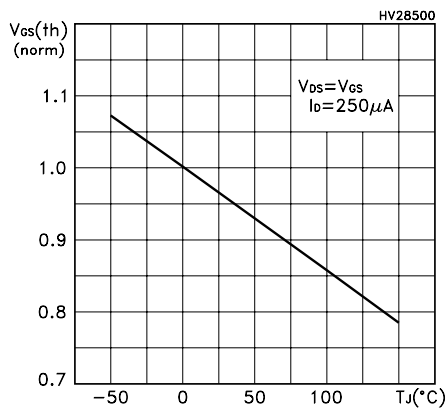


Figure 11. Source-Drain Diode Forward Characteristics

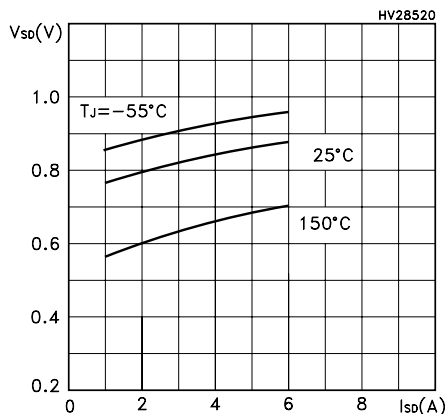
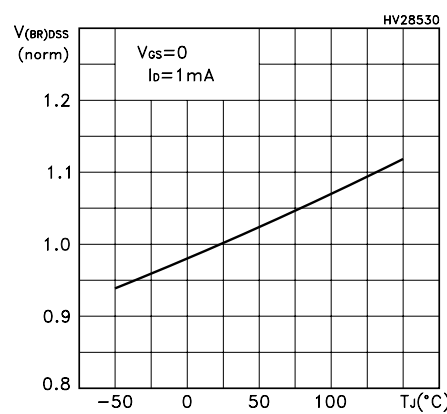


Figure 12. Normalized Breakdown Voltage vs Temperature



### 3 Test Circuits

Figure 13. Switching Times Test Circuit For Resistive Load

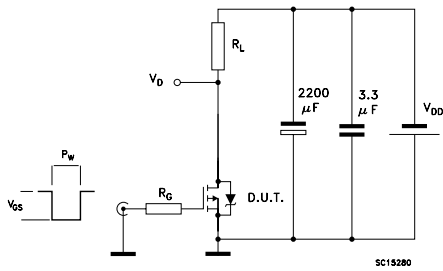


Figure 14. Gate Charge Test Circuit

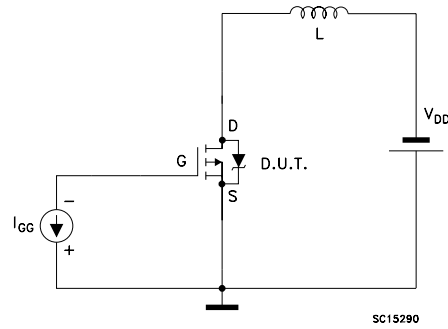
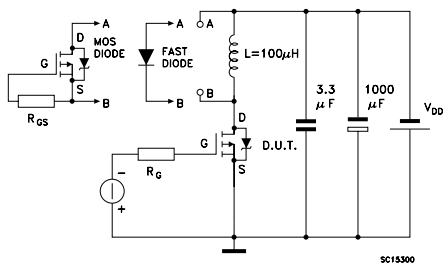


Figure 15. Test Circuit For Inductive Load Switching and Diode Recovery Times



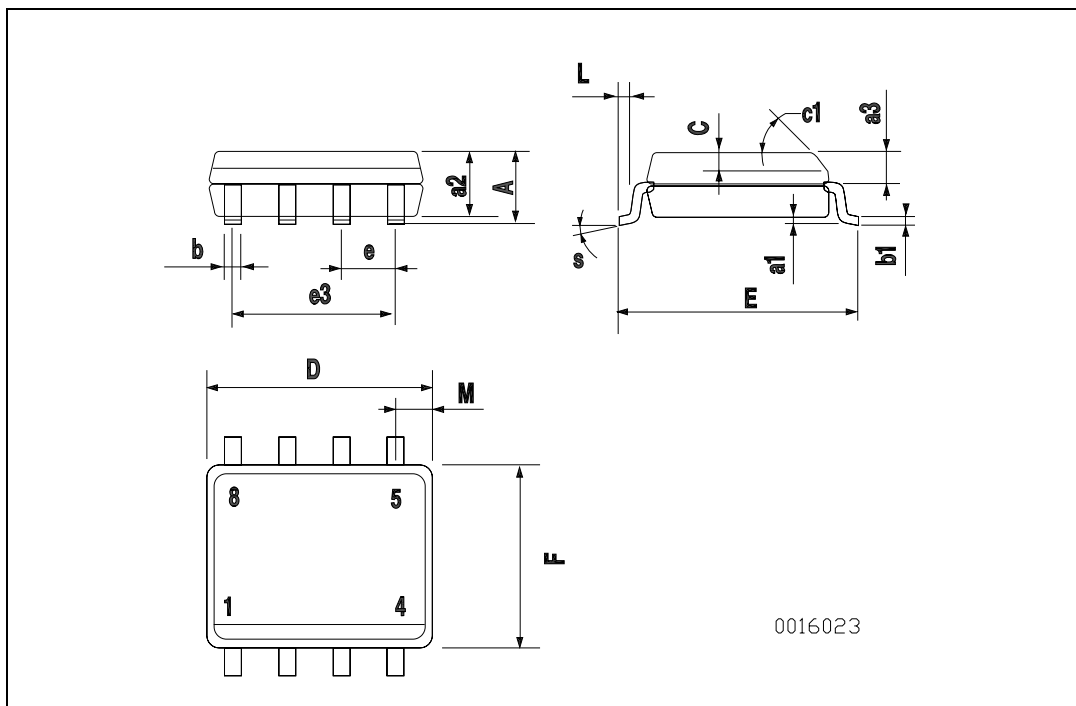
## 4 Package Mechanical Data

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](http://www.st.com)



**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

Date	Revision	Changes
13-Dec-2003	1	First Issue
25-Jun-2004	2	Preliminary Data
18-Jan-2005	3	Modified value on table 5
29-Sep-2005	4	Complete version
09-Nov-2005	5	New template

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