



# STS7PF30L

P-CHANNEL 30V - 0.016Ω - 7A SO-8

STripFET™ II POWER MOSFET

PRELIMINARY DATA

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

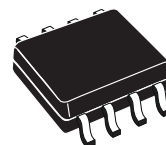
- TYPICAL R<sub>DS(on)</sub> = 0.016Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

## DESCRIPTION

This Power Mosfet is the latest development of ST-Microelectronics 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.

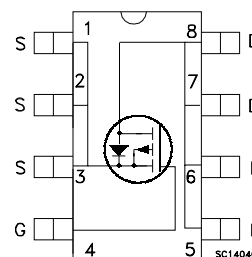
## APPLICATIONS

- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN CELLULAR PHONES



SO-8

## INTERNAL SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

| Symbol           | Parameter                                            | Value | Unit |
|------------------|------------------------------------------------------|-------|------|
| V <sub>DS</sub>  | Drain-source Voltage (V <sub>GS</sub> = 0)           | 30    | V    |
| V <sub>DGR</sub> | Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)         | 30    | V    |
| V <sub>GS</sub>  | Gate- source Voltage                                 | ±20   | V    |
| I <sub>D</sub>   | Drain Current (continuous) at T <sub>C</sub> = 25°C  | 7     | A    |
| I <sub>D</sub>   | Drain Current (continuous) at T <sub>C</sub> = 100°C | 4.4   | A    |
| I <sub>DM</sub>  | Drain Current (pulsed)                               | 28    | A    |
| P <sub>TOT</sub> | Total Dissipation at T <sub>C</sub> = 25°C           | 2.5   | W    |

(●) Pulse width limited by safe operating area

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

## STS7PF30L

### THERMAL DATA

|                  |                                                    |            |      |
|------------------|----------------------------------------------------|------------|------|
| Rthj-amb(#)      | Thermal Resistance Junction-ambient Max            | 50         | °C/W |
| T <sub>j</sub>   | Maximum Lead Temperature For Soldering Purpose Typ | 150        | °C   |
| T <sub>stg</sub> | Storage Temperature                                | -55 to 150 | °C   |

(#) When mounted on 1 inch<sup>2</sup> FR4 Board, 2 oz of Cu and t ≤ 10s

### ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

#### OFF

| Symbol               | Parameter                                             | Test Conditions                                                                       | Min. | Typ. | Max.    | Unit     |
|----------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------|------|------|---------|----------|
| V <sub>(BR)DSS</sub> | Drain-source Breakdown Voltage                        | I <sub>D</sub> = 250 μA, 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<br>V <sub>DS</sub> = Max Rating, T <sub>C</sub> = 125 °C |      |      | 1<br>10 | μA<br>μA |
| I <sub>GSS</sub>     | Gate-body Leakage Current (V <sub>DS</sub> = 0)       | V <sub>GS</sub> = ± 20V                                                               |      |      | ±100    | nA       |

#### ON (1)

| Symbol              | Parameter                         | Test Conditions                                                                               | Min.           | Typ.           | Max.           | Unit   |
|---------------------|-----------------------------------|-----------------------------------------------------------------------------------------------|----------------|----------------|----------------|--------|
| 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> = 10V, I <sub>D</sub> = 3.5A<br>V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.5A | 0.011<br>0.016 | 0.016<br>0.022 | 0.021<br>0.028 | Ω<br>Ω |

#### DYNAMIC

| Symbol           | Parameter                    | Test Conditions                                        | Min. | Typ. | Max. | Unit |
|------------------|------------------------------|--------------------------------------------------------|------|------|------|------|
| g <sub>fs</sub>  | Forward Transconductance     | V <sub>DS</sub> = 10V, I <sub>D</sub> = 3.5A           |      | 16   |      | S    |
| C <sub>iss</sub> | Input Capacitance            | V <sub>DS</sub> = 25 V, f = 1 MHz, V <sub>GS</sub> = 0 |      | 2600 |      | pF   |
| C <sub>oss</sub> | Output Capacitance           |                                                        |      | 523  |      | pF   |
| C <sub>rss</sub> | Reverse Transfer Capacitance |                                                        |      | 174  |      | pF   |

**ELECTRICAL CHARACTERISTICS (CONTINUED)****SWITCHING ON(2)**

| Symbol      | Parameter          | Test Conditions                                                | Min. | Typ. | Max. | Unit |
|-------------|--------------------|----------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 15V, I_D = 3.5A$                                     |      | 68   |      | ns   |
| $t_r$       | Rise Time          | $R_G = 4.7\Omega, V_{GS} = 4.5V$<br>(Resistive Load, Figure 3) |      | 54   |      | ns   |
| $Q_g$       | Total Gate Charge  | $V_{DD} = 15V, I_D = 7A,$<br>$V_{GS} = 4.5V$                   |      | 28   | 38   | nC   |
| $Q_{gs}$    | Gate-Source Charge |                                                                |      | 8.8  |      | nC   |
| $Q_{gd}$    | Gate-Drain Charge  |                                                                |      | 12   |      | nC   |

**SWITCHING OFF(2)**

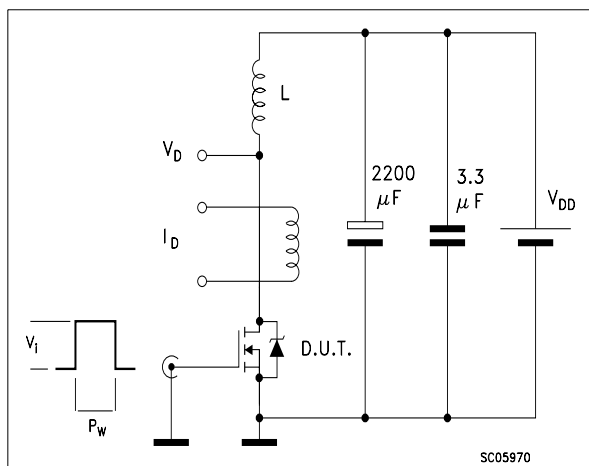
| Symbol       | Parameter           | Test Conditions                                                | Min. | Typ. | Max. | Unit |
|--------------|---------------------|----------------------------------------------------------------|------|------|------|------|
| $t_{d(off)}$ | Turn-off-Delay Time | $V_{DD} = 15V, I_D = 3.5A,$                                    |      | 65   |      | ns   |
| $t_f$        | Fall Time           | $R_G = 4.7\Omega, V_{GS} = 4.5V$<br>(Resistive Load, Figure 3) |      | 23   |      | ns   |

**SOURCE DRAIN DIODE (2)**

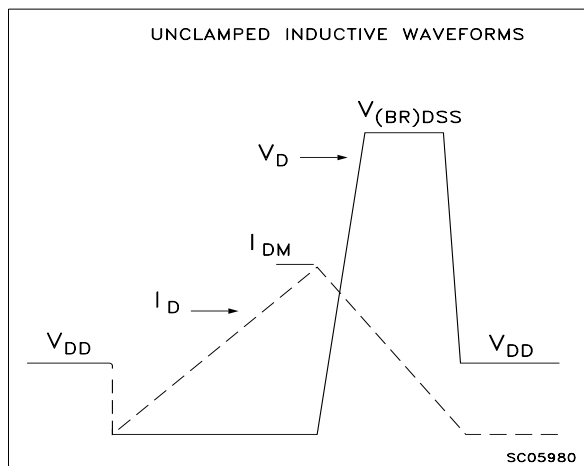
| Symbol        | Parameter                     | Test Conditions                    | Min. | Typ. | Max. | Unit |
|---------------|-------------------------------|------------------------------------|------|------|------|------|
| $I_{SD}$      | Source-drain Current          |                                    |      |      | 7    | A    |
| $I_{SDM} (1)$ | Source-drain Current (pulsed) |                                    |      |      | 28   | A    |
| $V_{SD} (2)$  | 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       | $V_{DD} = 24V, T_j = 150^\circ C$  |      | 46   |      | nC   |
| $I_{RRM}$     | Reverse Recovery Current      | (see test circuit, Figure 5)       |      | 2.3  |      | A    |

Note: 1. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.  
 2. Pulse width limited by safe operating area.

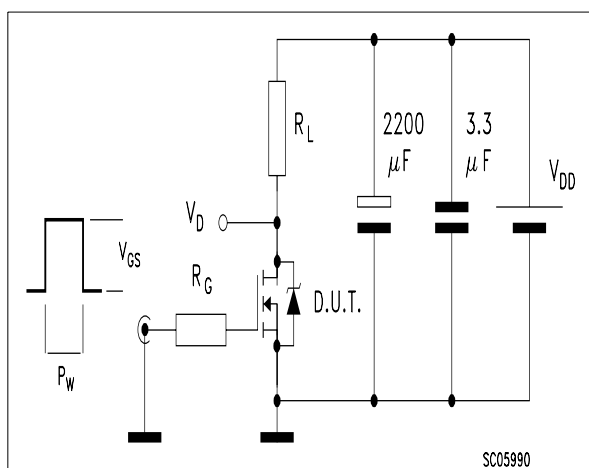
**Fig. 1: Unclamped Inductive Load Test Circuit**



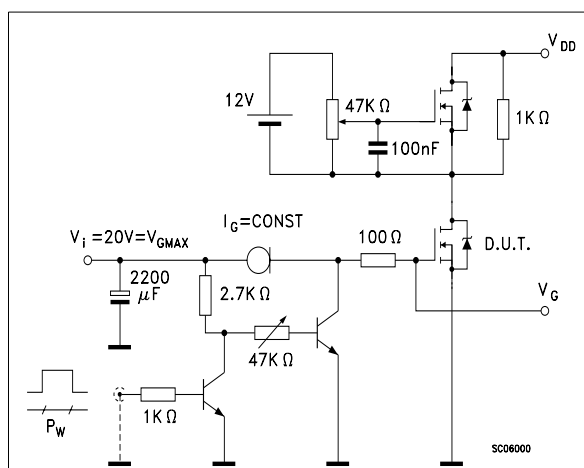
**Fig. 2: Unclamped Inductive Waveform**



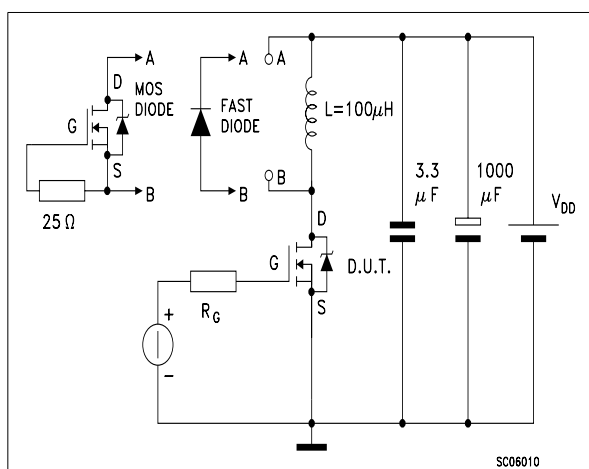
**Fig. 3: Switching Times Test Circuit For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

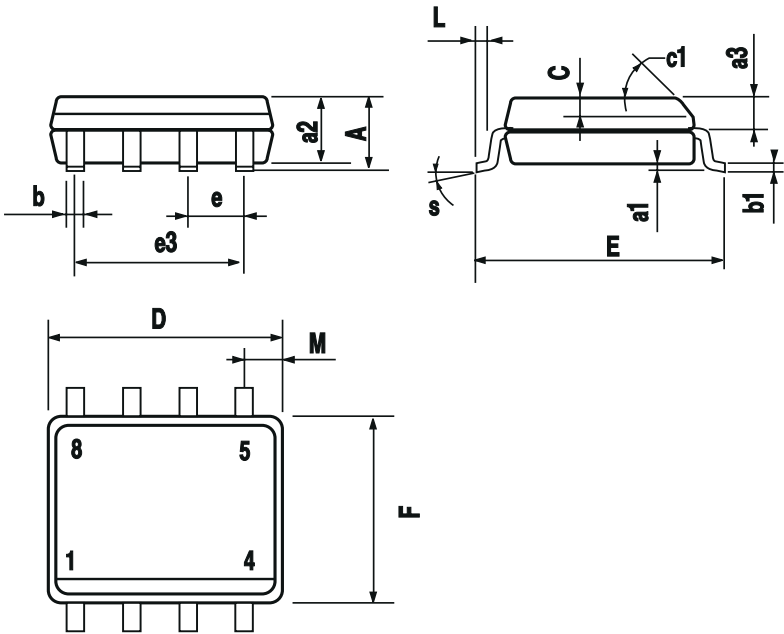


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



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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