



STS4DNF30L

DUAL N-CHANNEL 30V - 0.039Ω - 4A SO-8 STripFET™ POWER MOSFET

PRELIMINARY DATA

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|------------|------------------|---------------------|----------------|
| STS4DNF30L | 30 V | < 0.050 Ω | 4 A |

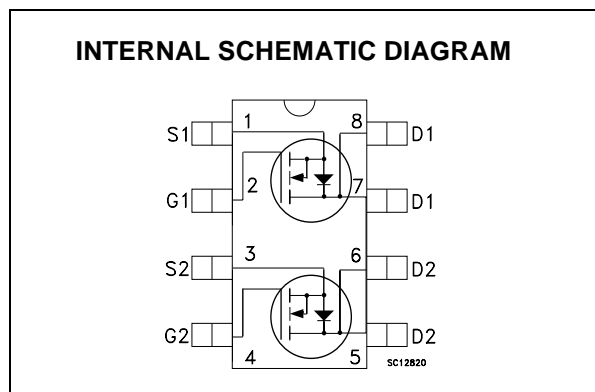
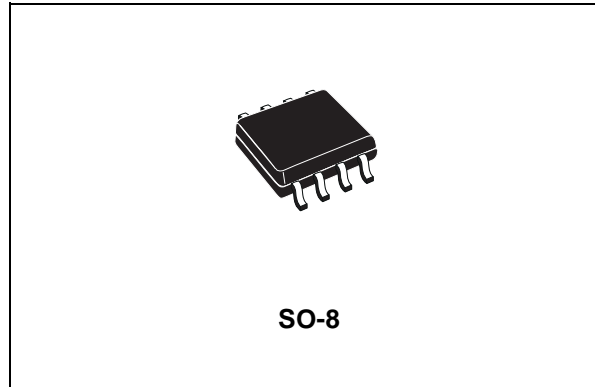
- TYPICAL R_{DS(on)} = 0.039 Ω
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY
- LOW THRESHOLD DRIVE

DESCRIPTION

This Power MOSFET is 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.

APPLICATIONS

- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT
- POWER MANAGEMENT IN CELLULAR PHONES
- DC MOTOR DRIVE



MOSFET ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|---|-------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 30 | V |
| V _{DGR} | Drain-gate Voltage (R _{GS} = 20 kΩ) | 30 | V |
| V _{GS} | Gate- source Voltage | ± 16 | V |
| I _D | Drain Current (continuous) at T _C = 25°C | 4 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 2.5 | A |
| I _{DM} (●) | Drain Current (pulsed) | 16 | A |
| P _{TOT} | Total Dissipation at T _C = 25°C Dual Operation | 2 | W |

(●) Pulse width limited by safe operating area.

STS4DNF30L

THERMAL DATA

| | | | |
|------------------|--|------------|------|
| Rthj-amb | (*)Thermal Resistance Junction-ambient Max | 62.5 | °C/W |
| T _{stg} | Storage Temperature Range | -55 to 150 | °C |
| T _J | Junction Temperature (*) Mounted on FR-4 board (t ≤ 10sec) | 150 | °C |

MOSFET ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED) OFF

| 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} = ± 16 V | | | ±100 | nA |

ON (1)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|---|------|----------------|----------------|--------|
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250μA | 1 | | | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10V, I _D = 2 A V _{GS} = 4.5V, I _D = 2 A | | 0.039 0.046 | 0.050 0.060 | Ω Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|---|------|------|------|------|
| g _{fs} (1) | Forward Transconductance | V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 2 A | 1 | 3 | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25V, f = 1 MHz, V _{GS} = 0 | | 330 | | pF |
| C _{oss} | Output Capacitance | | | 90 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 40 | | pF |

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------|--------------------|--|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 2\text{ A}$ $R_G = 4.7\Omega$ $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3) | | 11 | | ns |
| t_r | Rise Time | | | 100 | | ns |
| 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 |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|-----------------------|--|------|------|------|------|
| $t_{d(off)}$ | Turn-off Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 2\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 3) | | 25 | | ns |
| t_f | Fall Time | | | 22 | | ns |
| $t_{r(Voff)}$ | Off-Voltage Rise Time | $V_{DD} = 24\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see test circuit, Figure 5) | | 22 | | ns |
| t_f | Fall Time | | | 55 | | ns |
| t_c | Cross-over Time | | | 75 | | ns |

SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|-------------------------------|---|------|------|------|------|
| I_{SD} | Source-drain Current | | | | 4 | A |
| $I_{SDM(2)}$ | Source-drain Current (pulsed) | | | | 16 | A |
| $V_{SD(1)}$ | Forward On Voltage | $I_{SD} = 4\text{ A}$, $V_{GS} = 0$ | | | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 4\text{ A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{DD} = 20\text{ V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5) | | 30 | | ns |
| Q_{rr} | Reverse Recovery Charge | | | 18 | | nC |
| I_{RRM} | Reverse Recovery Current | | | 1.2 | | A |

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

Fig. 1: Unclamped Inductive Load Test Circuit

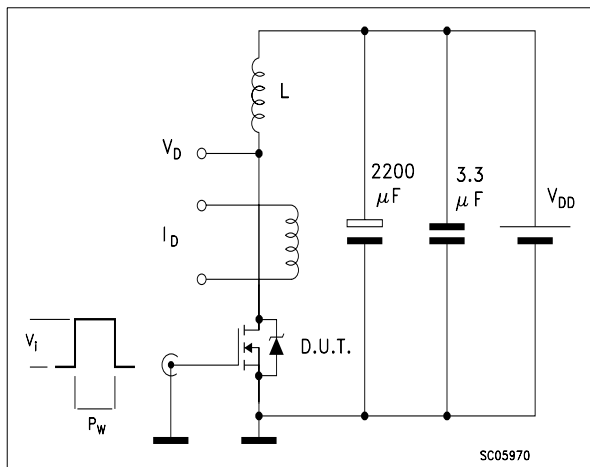


Fig. 2: Unclamped Inductive Waveform

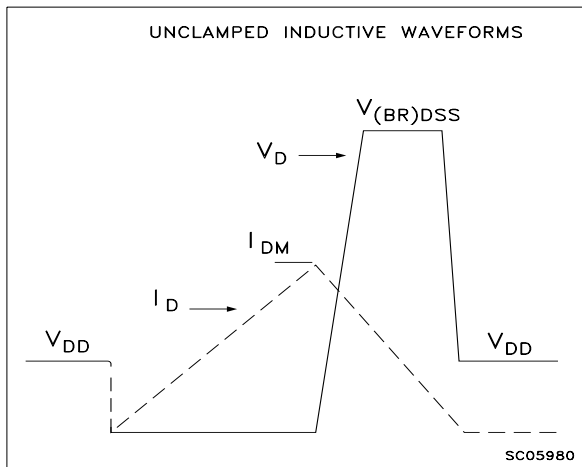


Fig. 3: Switching Times Test Circuits For Resistive Load

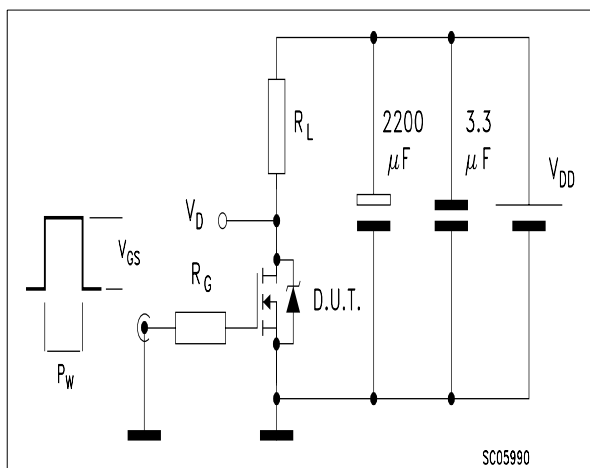


Fig. 4: Gate Charge test Circuit

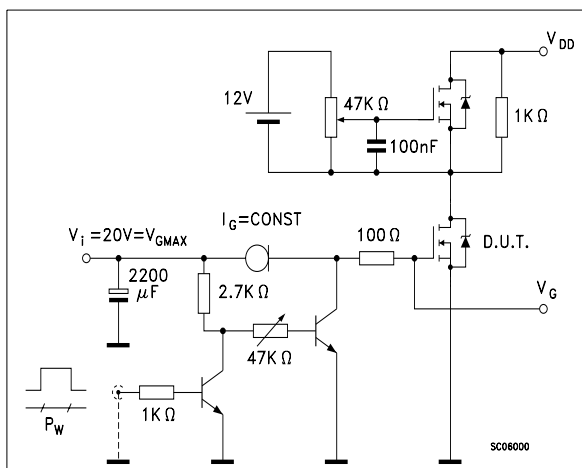
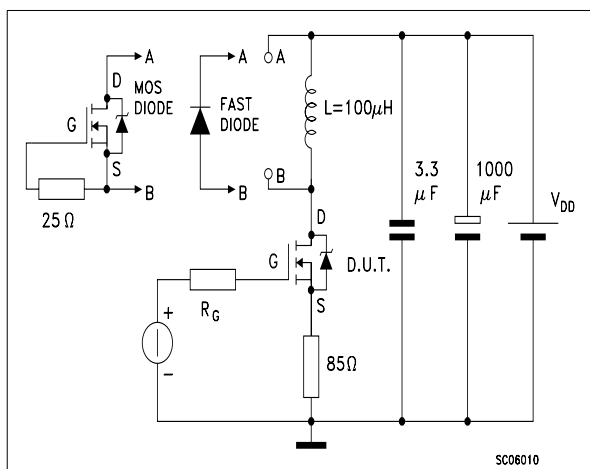
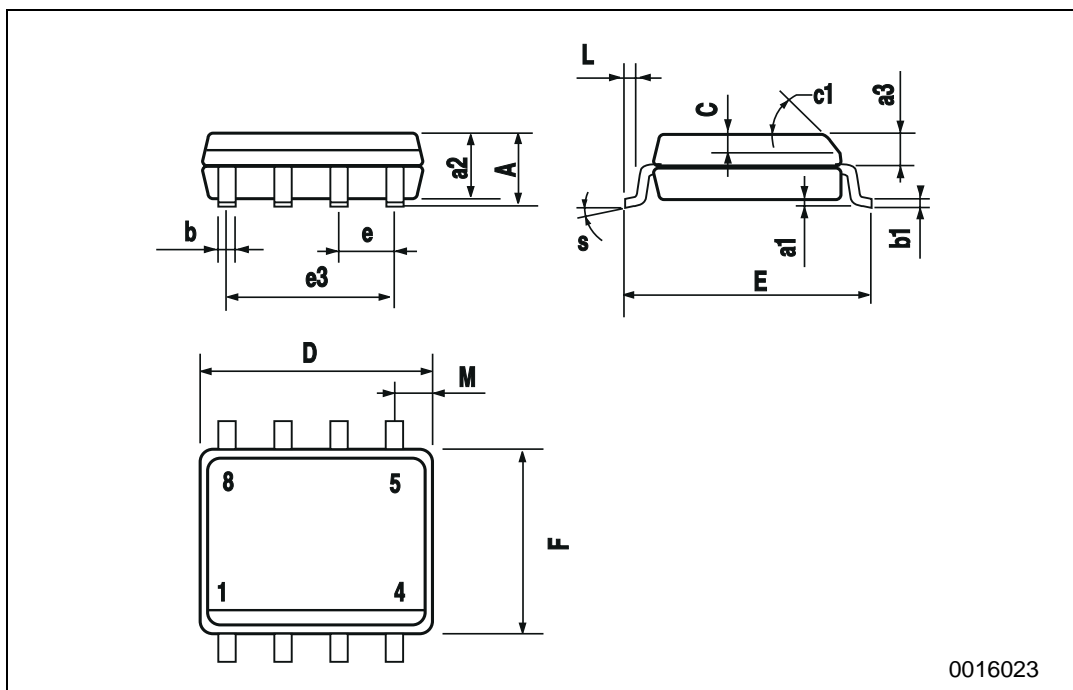


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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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