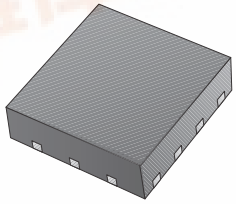
# STL28NF3LL

## N-CHANNEL 30V - 0.0055Ω - 28A PowerFLAT™ LOW GATE CHARGE STripFET™ MOSFET

**PRELIMINARY DATA**

| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STL28NF3LL | 30 V | < 0.0065 Ω | 28 A |

- TYPICAL $R_{DS}(on)$ = 0.0055Ω
- IMPROVED DIE-TO-FOOTPRINT RATIO
- VERY LOW PROFILE PACKAGE

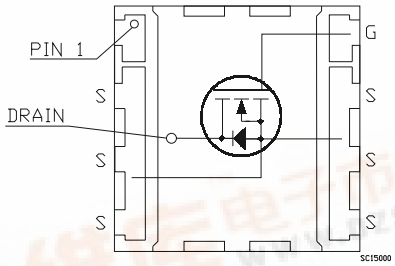


**PowerFLAT™(5x5)**
**(Chip Scale Package)**

### DESCRIPTION

This Power MOSFET is the second generation of STMicroelectronics unique "STripFET™" technology. The resulting transistor shows extremely low on-resistance and minimal gate charge. The new PowerFLAT™ package allows a significant reduction in board space without compromising performance.

### INTERNAL SCHEMATIC DIAGRAM




### APPLICATIONS

- DC-DC CONVERTERS

### 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 (continuos) at $T_C$ = 25°C<br>Drain Current (continuos) at $T_C$ = 100°C | 28<br>17.5 | A<br>A |
| $I_{DM}$ (•) | Drain Current (pulsed) | 112 | A |
| $P_{TOT}$ | Total Dissipation at $T_C$ = 25°C | 80 | W |
| | Derating Factor | 0.64 | W/°C |
| $E_{AS}$ (1) | Single Pulse Avalanche Energy | 2 | J |
| $T_{stg}$ | Storage Temperature | –55 to 150 | °C |
| $T_j$ | Max. Operating Junction Temperature | | |

(•) Pulse width limited by safe operating area
(#) Limited by Wire Bonding

(1) Starting $T_j$ = 25°C, $I_D$ = 14A, $V_{DD}$ = 18V

## THERMAL DATA

| | | | |
|---|---|---|---|
| Rthj-case | Thermal Resistance Junction-case Max | 1.56 | °C/W |
| Rthj-pcb (#) | Thermal Resistance Junction-ambient Max | 31.2 | °C/W |

(*) When mounted on 1inch² FR4 Board, 2oz of Cu, t ≤ 10 sec.

## 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 | | | 1 | µA |
| | | $V_{DS}$ = Max Rating, $T_C$ = 125 °C | | | 10 | µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ± 16V | | | ±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 | $V_{GS}$ = 10 V, $I_D$ = 14 A | | 0.0055 | 0.0065 | Ω |
| | | $V_{GS}$ = 4.5 V, $I_D$ = 14A | | 0.0065 | 0.0095 | Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (1) | Forward Transconductance | $V_{DS}$ = 15 V, $I_D$ = 14 A | | 32 | | S |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, f = 1 MHz, $V_{GS}$ = 0 | | 2780 | | pF |
| $C_{oss}$ | Output Capacitance | | | 890 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 195 | | pF |

**ELECTRICAL CHARACTERISTICS** (CONTINUED)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}$ = 15 V, $I_D$ = 14 A | | 25 | | ns |
| $t_r$ | Rise Time | $R_G$ = 4.7Ω $V_{GS}$ = 4.5V (see test circuit, Figure 3) | | 82 | | ns |
| $Q_g$ | Total Gate Charge | $V_{DD}$ = 15 V, $I_D$ = 28 A, | | 32 | 43 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{GS}$ = 5 V | | 13 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 18 | | nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(off)}$ | Turn-off-Delay Time | $V_{DD}$ = 15 V, $I_D$ = 14 A, | | 42 | | ns |
| $t_f$ | Fall Time | $R_G$ = 4.7Ω, $V_{GS}$ = 4.5 V (see test circuit, Figure 3) | | 35 | | ns |

SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Source-drain Current | | | | 28 | A |
| $I_{SDM}$ (2) | Source-drain Current (pulsed) | | | | 112 | A |
| $V_{SD}$ (1) | Forward On Voltage | $I_{SD}$ = 28 A, $V_{GS}$ = 0 | | | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$ = 28 A, di/dt = 100A/µs, | | 50 | | ns |
| $Q_{rr}$ | Reverse Recovery | $V_{DD}$ = 25 V, $T_j$ = 150°C | | 82 | | nC |
| $I_{RRM}$ | ChargeReverse Recovery Current | (see test circuit, Figure 5) | | 3.3 | | 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

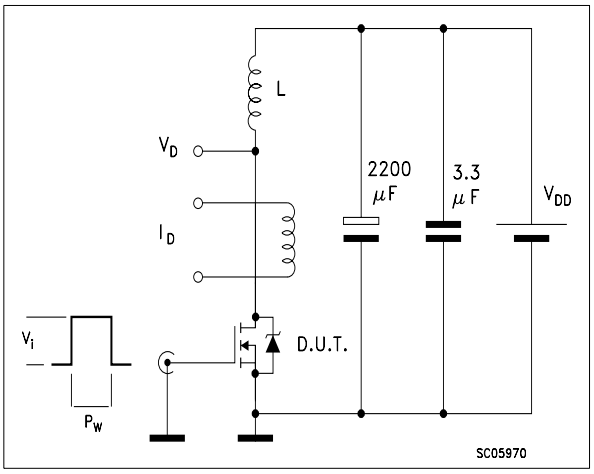



**Fig. 2:** Unclamped Inductive Waveform

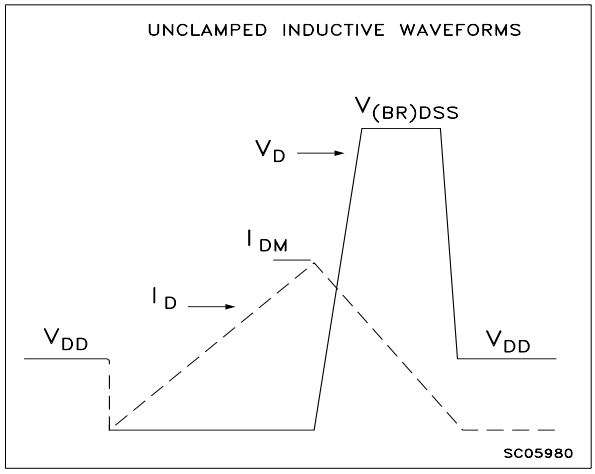



**Fig. 3:** Switching Times Test Circuit For Resistive Load

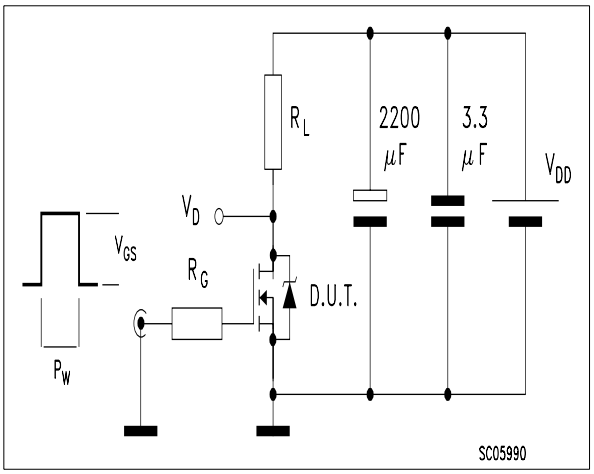



**Fig. 4:** Gate Charge test Circuit

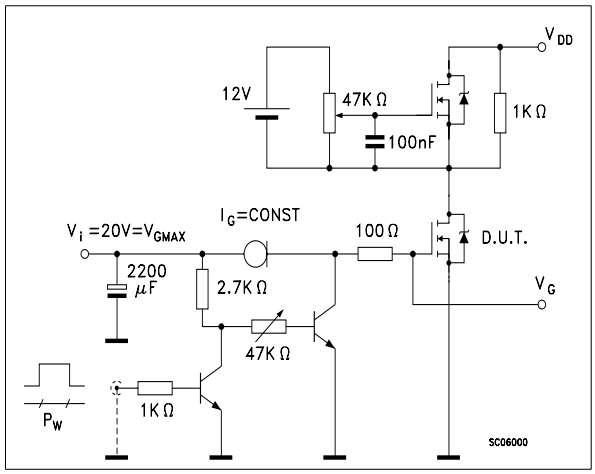
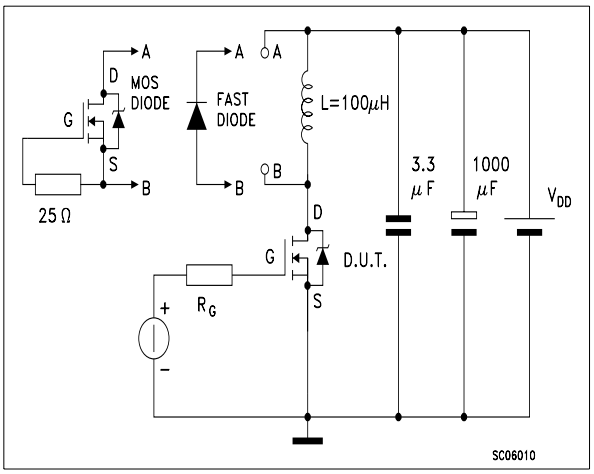



**Fig. 5:** Test Circuit For Inductive Load Switching And Diode Recovery Times



## PowerFLAT™(5x5) MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | 0.90 | 1.00 | | 0.035 | 0.039 |
| A1 | | 0.02 | 0.05 | | 0.001 | 0.002 |
| b | 0.43 | 0.51 | 0.58 | 0.017 | 0.020 | 0.023 |
| c | 0.33 | 0.41 | 0.48 | 0.013 | 0.016 | 0.019 |
| D | | 5.00 | | | 0.197 | |
| E | | 5.00 | | | 0.197 | |
| E2 | 3.10 | 3.18 | 3.25 | 0.122 | 0.125 | 0.128 |
| e | | 1.27 | | | 0.050 | |