



STL8NH3LL

N-CHANNEL 30 V - 0.012 Ω - 8 A PowerFLAT™ ULTRA LOW GATE CHARGE STripFET™ MOSFET

PRELIMINARY DATA

Table 1: General Features

| TYPE | V _{DSS} | R _{DS(on)} | I _D (2) |
|-----------|------------------|---------------------|--------------------|
| STL8NH3LL | 30 V | < 0.015 Ω | 8 A |

- TYPICAL R_{DS(on)} = 0.012 Ω @ 10V
- IMPROVED DIE-TO-FOOTPRINT RATIO
- VERY LOW PROFILE PACKAGE (1mm MAX)
- VERY LOW THERMAL RESISTANCE
- VERY LOW GATE CHARGE
- LOW THRESHOLD DEVICE

DESCRIPTION

This application specific MOSFET is the latest generation of STMicroelectronics unique "STripFET™" technology. The resulting transistor is optimized for low on-resistance and minimal gate charge. The Chip-scaled PowerFLAT™ package allows a significant board space saving, still boosting the performance.

APPLICATIONS

- CONTROL FET IN BUCK CONVERTER

Figure 1: Package

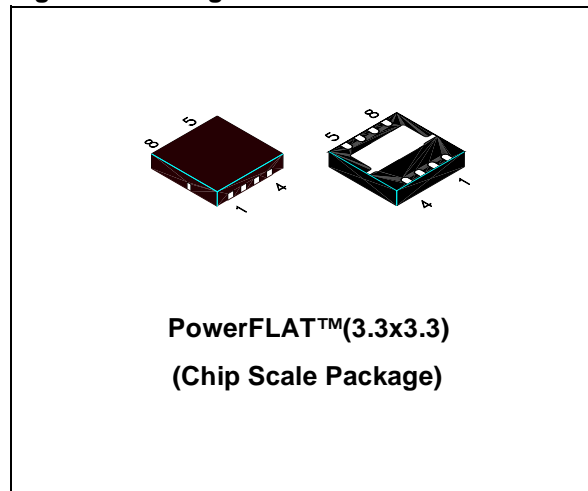


Figure 2: Internal Schematic Diagram

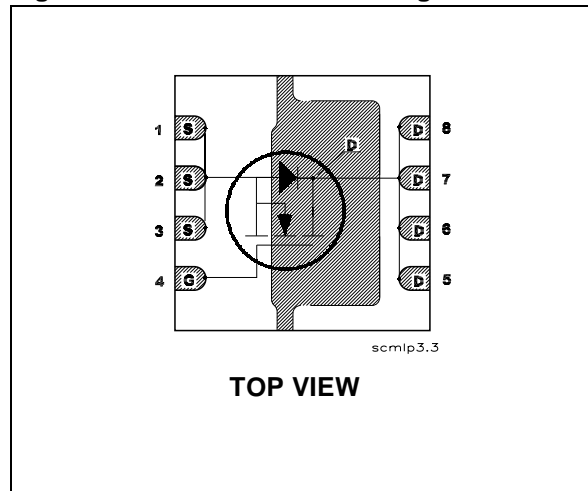


Table 2: Order Codes

| Part Number | Marking | Package | Packaging |
|-------------|---------|----------------------|-------------|
| STL8NH3LL | L8NH3LL | PowerFLAT™ (3.3x3.3) | TAPE & REEL |

Rev 4

Table 3: 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 (1) | Drain Current (continuous) at T _C = 25°C (Steady State) | 8 | A |
| I _D (2) | Drain Current (continuous) at T _C = 100°C (Steady State) | 5 | A |
| I _{DM} (3) | Drain Current (pulsed) | 32 | A |
| P _{TOT} (1) | Total Dissipation at T _C = 25°C | 50 | W |
| P _{TOT} (2) | Total Dissipation at T _C = 25°C (Steady State) | 1.56 | W |
| | Derating Factor (2) | 0.4 | W/°C |
| T _{stg} | Storage Temperature | - 55 to 150 | °C |
| T _j | Max. Operating Junction Temperature | | |

Table 4: Thermal Data

| | | | |
|------------|--------------------------------------|-----|------|
| Rthj-Case | Thermal Resistance Junction-Case Max | 2.5 | °C/W |
| Rthj-a (4) | Thermal Operating Junction-ambient | 80 | °C/W |

ELECTRICAL CHARACTERISTICS (T_{CASE} =25°C UNLESS OTHERWISE SPECIFIED)
Table 5: On /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 |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250 μA | 1 | | 2.5 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V, I _D = 4 A V _{GS} = 4.5 V, I _D = 4 A | | 0.012 0.0135 | 0.015 0.017 | Ω Ω |

Table 6: Dynamic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------|--|------|------|------|------|
| g _{fs} (5) | Forward Transconductance | V _{DS} = 15V, I _D = 4A | | TBD | | S |
| C _{iss} | Input Capacitance | V _{DS} = 25V, f= 1 MHz, V _{GS} = 0 | | 965 | | pF |
| C _{oss} | Output Capacitance | | | 285 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 38 | | pF |

ELECTRICAL CHARACTERISTICS (CONTINUED)

Table 7: Switching On

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------|--------------------|---|------|------|------|------|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 4\text{ A}$ | | 15 | | ns |
| t_r | Rise Time | $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 3) | | 32 | | ns |
| Q_g | Total Gate Charge | $V_{DD} = 15\text{ V}$, $I_D = 8\text{ A}$, $V_{GS} = 4.5\text{ V}$ | | 9 | 12 | nC |
| Q_{gs} | Gate-Source Charge | (see Figure 5) | | 3.7 | | nC |
| Q_{gd} | Gate-Drain Charge | | | 3 | | nC |

Table 8: Switching

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|---------------------|---|------|------|------|------|
| $t_{d(off)}$ | Turn-off-Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 4\text{ A}$, | | 18 | | ns |
| t_f | Fall Time | $R_G = 4.7\Omega$, $V_{GS} = 4.5\text{ V}$ (see Figure 3) | | 8.5 | | ns |

Table 9: Source Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|-------------------------------|--|------|------|------|------|
| I_{SD} | Source-drain Current | | | | 8 | A |
| $I_{SDM(3)}$ | Source-drain Current (pulsed) | | | | 32 | A |
| $V_{SD(5)}$ | Forward On Voltage | $I_{SD} = 8\text{ A}$, $V_{GS} = 0$ | | | 1.3 | V |
| t_{rr} | Reverse Recovery Time | $I_{SD} = 8\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ | | 24 | | ns |
| Q_{rr} | Reverse Recovery Charge | $V_{DD} = 20\text{ V}$, $T_j = 150^\circ\text{C}$ | | 17.4 | | nC |
| I_{RRM} | Reverse Recovery Current | (see Figure 4) | | 1.45 | | A |

(1) The value is rated according R_{thj-c} (2) The value is rated according R_{thj-a}

(3) Pulse width limited by safe operating area.

(4) When mounted on minimum footprint

(5) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

Figure 3: Switching Times Test Circuit For Resistive Load

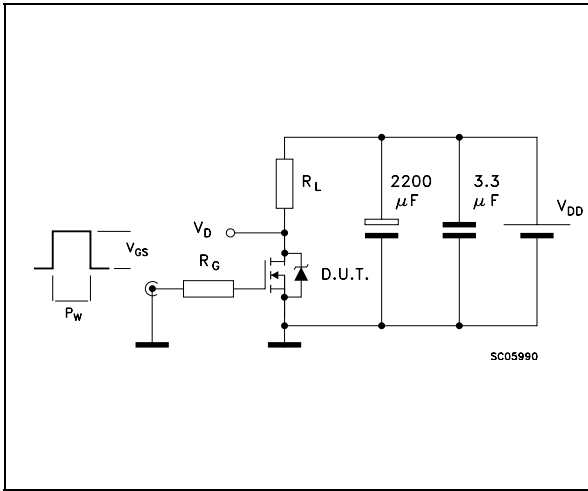


Figure 4: Test Circuit For Diode Recovery Times

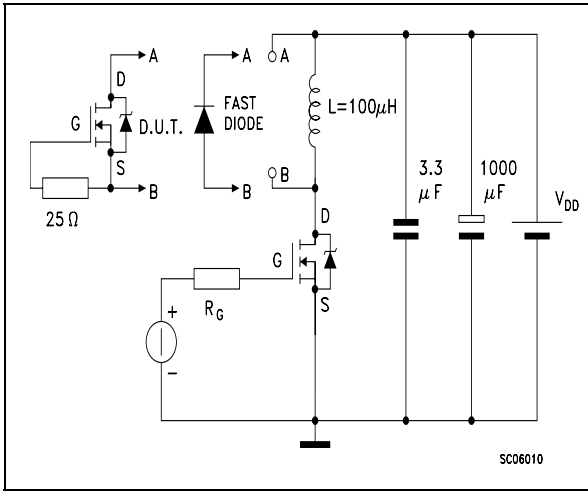
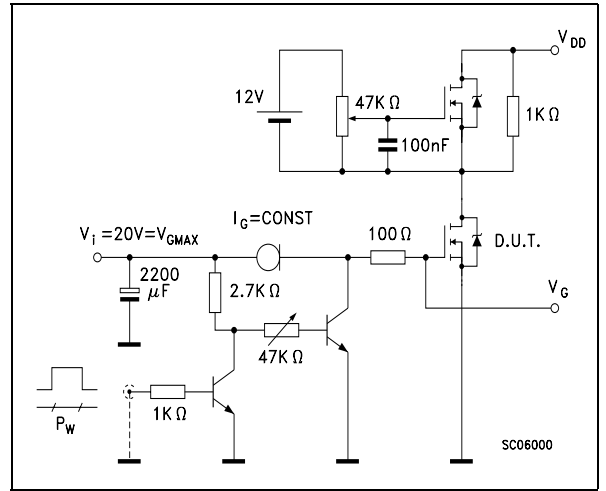


Figure 5: Gate Charge Test Circuit



PowerFLAT™ (3.3x3.3) MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-------|------|-------|--------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 0.80 | 0.90 | 1.00 | 0.031 | 0.035 | 0.039 |
| A1 | | 0.02 | 0.05 | | 0.0007 | 0.0019 |
| A3 | | 0.20 | | | 0.007 | |
| b | 0.23 | 0.30 | 0.38 | 0.009 | 0.011 | 0.015 |
| C | | 0.328 | | | 0.012 | |
| C1 | | 0.12 | | | 0.004 | |
| D | | 3.30 | | | 0.13 | |
| D2 | 2.50 | 2.65 | 2.75 | 0.098 | 0.104 | 0.108 |
| E | | 3.30 | | | 0.13 | |
| E2 | 1.25 | 1.40 | 1.50 | 0.049 | 0.055 | 0.059 |
| F | | 1.325 | | | 0.052 | |
| F1 | | 0.975 | | | 0.038 | |
| e | | 0.65 | | | 0.025 | |
| L | 0.30 | | 0.50 | 0.011 | | 0.019 |

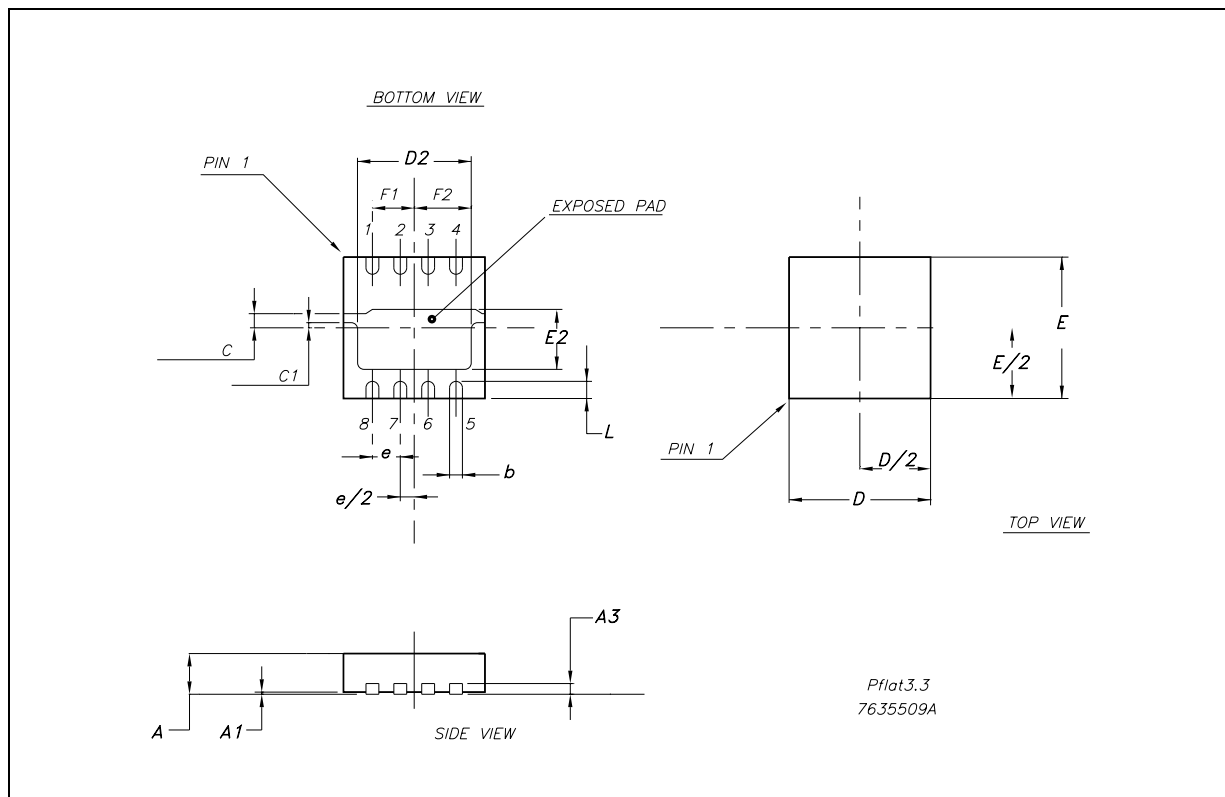


Table 10: Revision History

| Date | Revision | Description of Changes |
|--------------|-----------------|-------------------------------|
| 21-July-2004 | 1 | First Release. |
| 05-Oct-2004 | 2 | Values changed |
| 19-Oct-2004 | 3 | New value inserted |
| 22-Nov-2004 | 4 | Document updated |

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