# STL100N6LF6

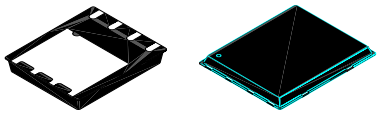
## N-channel 60 V, 0.0038 Ω, 22 A, PowerFLAT™(5x6) STripFET™ VI DeepGATE™ Power MOSFET

**Preliminary data**

## Features

| Type | $V_{DSS}$ | $R_{DS(on)}$ max | $I_D$ |
|---|---|---|---|
| STL100N6LF6 | 60 V | < 0.0045 Ω | 22 A |

- Low gate charge
- Very low on-resistance
- High avalance ruggedeness



**PowerFLAT™(5x6)**

## Application

- Switching applications

## Description

This STripFET™ DeepGATE™ Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance, with a new gate structure, providing superior switching performance.

**Figure 1. Internal schematic diagram**

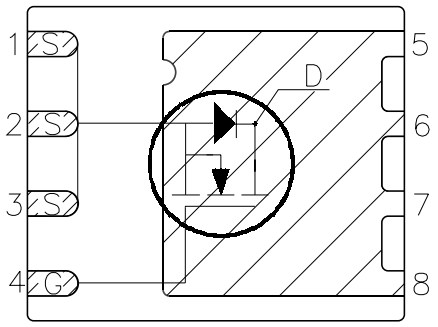



**Table 1. Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| STL100N6LF6 | 100N6LF6 | PowerFLAT™ (5x6) | Tape and reel |

# Contents

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source voltage ($V_{GS}$ = 0) | 60 | V |
| $V_{GS}$ | Gate-source voltage | ± 20 | V |
| $I_D$ (1) | Drain current (continuous) at $T_C$ = 25 °C | 100 | A |
| $I_D$ (2) | Drain current (continuous) at $T_C$ = 25 °C | 22 | A |
| $I_D$ (2) | Drain current (continuous) at $T_C$=100 °C | 14 | A |
| $I_{DM}$ (3) | Drain current (pulsed) | 88 | A |
| $P_{TOT}$ (1) | Total dissipation at $T_C$ = 25 °C | 80 | W |
| $P_{TOT}$ (2) | Total dissipation at $T_C$ = 25 °C | 4 | W |
| $T_{stg}$ | Storage temperature | - 55 to 150 | °C |
| $T_j$ | Operating junction temperature | | |

1. The value is rated according to $R_{thj\text{-}c}$
2. The value is rated according to $R_{thj\text{-}pcb}$
3. Pulse width limited by safe operating area

**Table 3. Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thj\text{-}pcb}$ (1) | Thermal resistance junction-pcb max | 31.3 | °C/W |
| $R_{thj\text{-}case}$ | Thermal resistance junction-case (drain) (steady state) max. | 1.56 | °C/W |

1. When mounted on FR-4 board of 1 inch², 2 oz Cu, t < 10 sec

**Table 4. Avalanche characteristics**

| Symbol | Parameter | Max value | Unit |
|---|---|---|---|
| $I_{AS}$ | Avalanche current, repetitive or not-repetitive (pulse width limited by $T_j$ max) | TBD | A |
| $E_{AS}$ | Single pulse avalanche energy (starting $T_j$ = 25 °C, $I_D$ = $I_{AS}$, $V_{DD}$ = 50 V) | TBD | mJ |

# 2 Electrical characteristics

($T_J$ = 25 °C unless otherwise specified)

**Table 5. On/off states**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $I_D$ = 1 mA, $V_{GS}$= 0 | 60 | | | V |
| $I_{DSS}$ | Zero gate voltage drain current ($V_{GS}$ = 0) | $V_{DS}$ = 60 V,<br>$V_{DS}$ = 60 V, @125 °C | | | 1<br>10 | µA<br>µA |
| $I_{GSS}$ | Gate body leakage current ($V_{DS}$ = 0) | $V_{GS}$ = ±20 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, $I_D$= 11 A | | 0.0038 | 0.0045 | Ω |
| | | $V_{GS}$= 4.5 V, $I_D$= 11 A | | 0.006 | 0.0072 | Ω |

**Table 6. Dynamic**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input capacitance<br>Output capacitance<br>Reverse transfer capacitance | $V_{DS}$ =25 V, f = 1 MHz,<br>$V_{GS}$ = 0 | - | 8900<br>650<br>360 | - | pF<br>pF<br>pF |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total gate charge<br>Gate-source charge<br>Gate-drain charge | $V_{DD}$ = 30 V, $I_D$ = 22 A<br>$V_{GS}$ =10 V<br>(see *Figure 3*) | - | 130<br>TBD<br>TBD | - | nC<br>nC<br>nC |
| $R_g$ | Gate input resistance | f=1 MHz Gate DC Bias=0<br>test signal level=20 mV<br>open drain | - | TBD | - | Ω |

**Table 7. Switching times**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | Turn-on delay time<br>Rise time<br>Turn-off delay time<br>Fall time | $V_{DD}$= 30 V, $I_D$= 11 A,<br>$R_G$=4.7 Ω, $V_{GS}$=10 V<br>(see *Figure 2*) | - | TBD<br>TBD<br>TBD<br>TBD | - | ns<br>ns<br>ns<br>ns |

**Table 8. Source drain diode**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Source-drain current | | - | | 22 | A |
| $I_{SDM}$ (1) | Source-drain current (pulsed) | | - | | 84 | A |
| $V_{SD}$ (2) | Forward on voltage | $I_{SD}$ = 22 A, $V_{GS}$ = 0 | - | | 1.3 | V |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse recovery time<br>Reverse recovery charge<br>Reverse recovery current | $I_{SD}$ = 22 A,<br>di/dt = 100 A/µs,<br>$V_{DD}$= 30 V, $T_J$ = 150 °C<br>(see *Figure 4*) | - | TBD<br>TBD<br>TBD | | ns<br>nC<br>A |

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

# 3 Test circuits

**Figure 2. Switching times test circuit for resistive load**

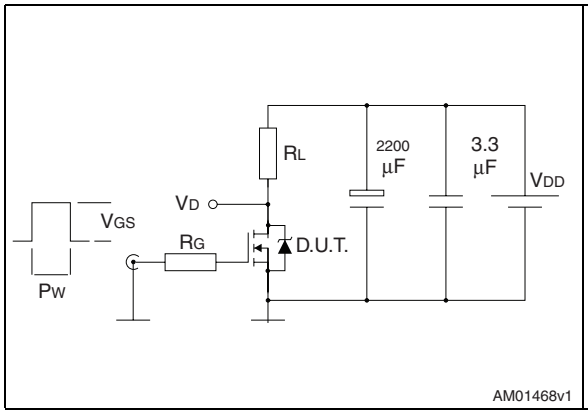



**Figure 3. Gate charge test circuit**

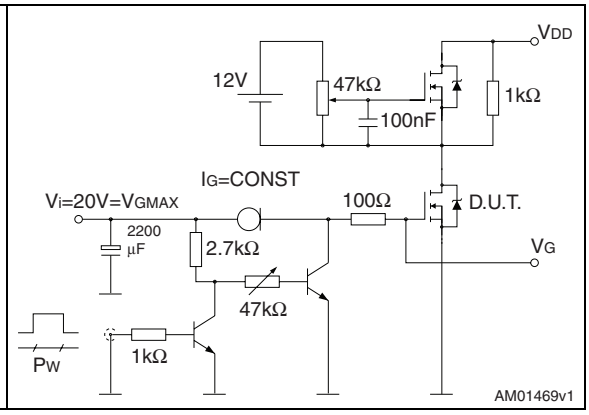



**Figure 4. Test circuit for inductive load switching and diode recovery times**

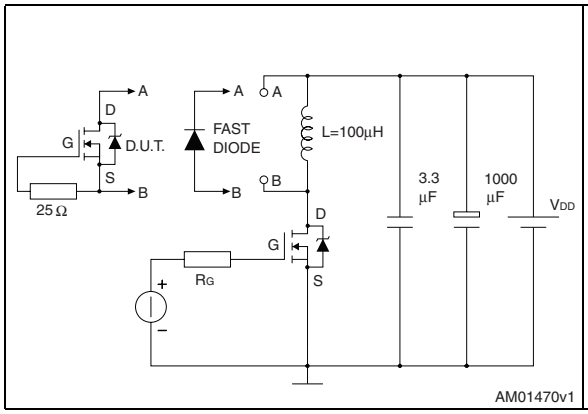



**Figure 5. Unclamped inductive load test circuit**

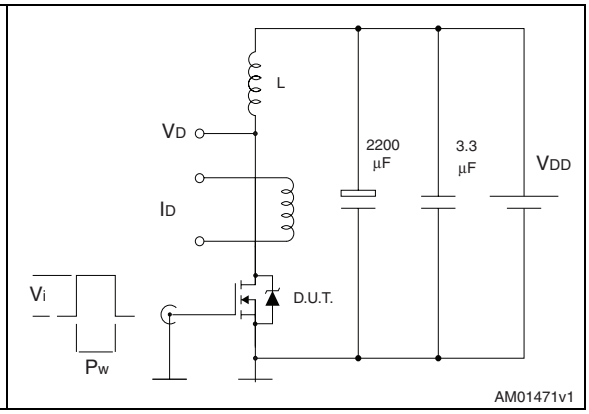



**Figure 6. Unclamped inductive waveform**

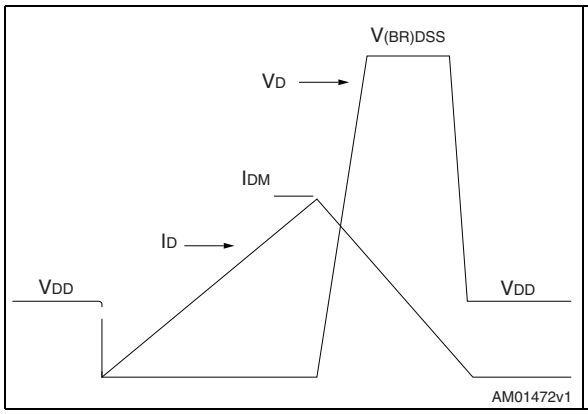
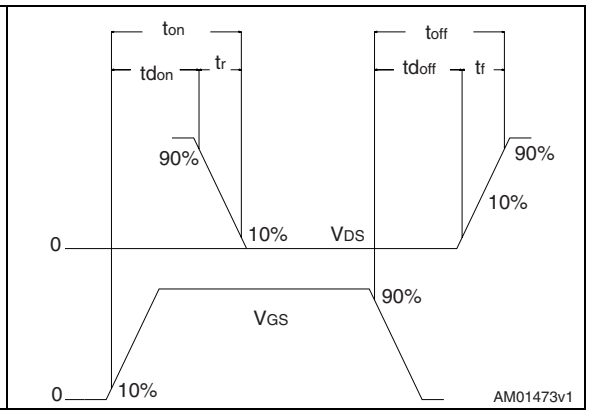



**Figure 7. Switching time waveform**



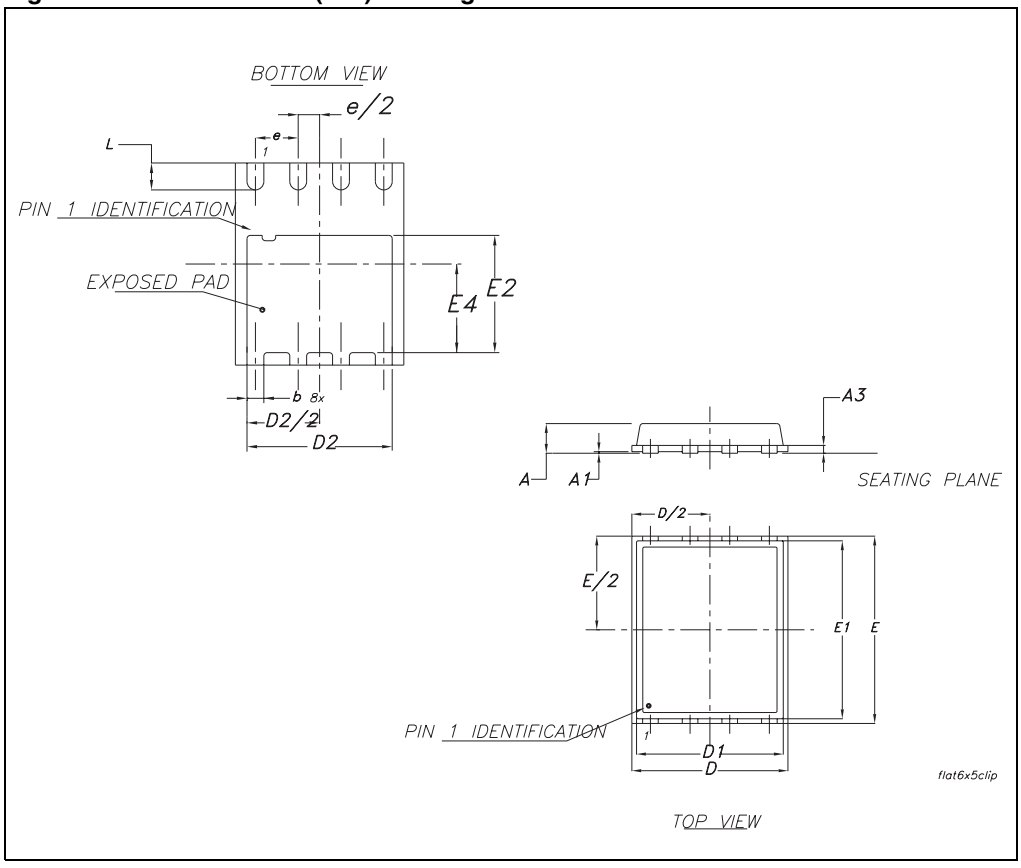
# 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

**Table 9. PowerFLAT™ (5x6) mechanical data**

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 0.80 | 0.83 | 0.93 |
| A1 | | 0.02 | 0.05 |
| A3 | | 0.20 | |
| b | 0.35 | 0.40 | 0.47 |
| D | | 5.00 | |
| D1 | | 4.75 | |
| D2 | 4.15 | 4.20 | 4.25 |
| E | | 6.00 | |
| E1 | | 5.75 | |
| E2 | 3.43 | 3.48 | 3.53 |
| E4 | 2.58 | 2.63 | 2.68 |
| e | | 1.27 | |
| L | 0.70 | 0.80 | 0.90 |

**Figure 8. PowerFLAT™ (5x6) drawing**



# 5 Revision history

Table 10. Document revision history

| Date | Revision | Changes |
|---|---|---|
| 24-Feb-2011 | 1 | First release |

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