

# N-Channel Enhancement Mode MOSFET

## 1. Product Information

### 1.1 Features

- ✓ Surface-mounted package
- ✓ MSL1
- ✓ Advanced trench cell design
- ✓ Tj Max 175°C

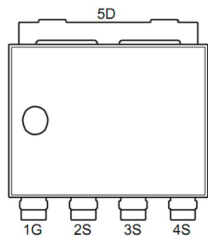
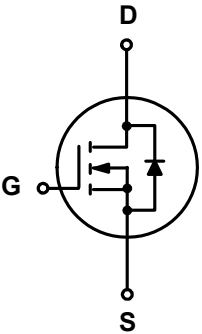
### 1.2 Applications

- ✓ Li-batthey protection
- ✓ DC-DC
- ✓ High power inverter system

### 1.3 Quick reference

- ✓  $BV \geq 60\text{ V}$
- ✓  $P_{tot} \leq 375\text{ W}$
- ✓  $I_D \leq 715\text{ A}$
- ✓  $R_{DS(ON)} \leq 0.45\text{ m}\Omega$  @  $V_{GS} = 10\text{ V}$
- ✓  $R_{DS(ON)} \leq 1.50\text{ m}\Omega$  @  $V_{GS} = 6\text{ V}$

## 2. Pin Description

| Pin   | Description | Simplified Outline                                                                                               | Symbol                                                                                |
|-------|-------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1     | Gate(G)     |  <p>Top View<br/>LFPAK88</p> |  |
| 2,3,4 | Source(S)   |                                                                                                                  |                                                                                       |
| 5     | Drain(D)    |                                                                                                                  |                                                                                       |

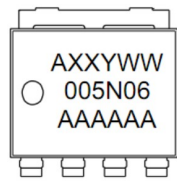
### 3. Limiting Values

| Symbol               | Parameter                               | Conditions                                                | Min | Max      | Unit                 |
|----------------------|-----------------------------------------|-----------------------------------------------------------|-----|----------|----------------------|
| $V_{DS}$             | Drain-Source Voltage                    | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 60       | V                    |
| $V_{GS}$             | Gate-Source Voltage                     | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | $\pm 20$ | V                    |
| $I_{D^{***}}$        | Drain Current ( Silicon limited )       | $T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$  |     | 715      | A                    |
|                      | Drain Current ( DC )                    | $T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$  | -   | 400      | A                    |
|                      |                                         | $T_C = 100\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$ | -   | 400      | A                    |
| $I_{DM}^{***}$       | Drain Current ( Silicon limited )       | $T_C = 25\text{ }^{\circ}\text{C}, V_{GS} = 10\text{ V}$  | -   | 2860     | A                    |
| $P_{tot}$            | Drain power dissipation                 | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 375      | W                    |
| $T_{stg}$            | Storage Temperature                     |                                                           | -55 | 175      | $^{\circ}\text{C}$   |
| $T_J$                | Junction Temperature                    |                                                           | -   | 175      | $^{\circ}\text{C}$   |
| $I_S$                | Continuous-Source Current               | $T_C = 25\text{ }^{\circ}\text{C}$                        | -   | 715      | A                    |
| $E_{AS}$             | Single Pulsed Avalanche Energy          | $V_{DD}=40\text{ V}, L=1.0\text{ mH}$                     | -   | 3042     | mJ                   |
| $R_{\theta JA}^{**}$ | Thermal Resistance- Junction to Ambient |                                                           | -   | 43       | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$      |                                         |                                                           | -   | 0.4      |                      |

Notes :

- \* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$
- \*\* Surface Mounted on  $1\text{ in}^2$  pad area,  $t \leq 10\text{ sec}$
- \*\*\* Limited by bonding wire
- \*\*\*\* Silicon limited

### 4. Marking Information

| Product Name      | Marking                                                                               |
|-------------------|---------------------------------------------------------------------------------------|
| <b>UK005N06L8</b> |  |

### 5. Ordering Code

| Product Name      | Package        | Reel Size | Tape width | Quantity    | Note |
|-------------------|----------------|-----------|------------|-------------|------|
| <b>UK005N06L8</b> | <b>LFPAK88</b> |           |            | <b>2000</b> |      |

## 6. Electrical Characteristics (T<sub>A</sub> = 25 °C Unless Otherwise Noted)

| Symbol                                   | Parameter                      | Conditions                                                                                                                    | Min | Typ   | Max  | Unit |
|------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----|-------|------|------|
| Static Characteristics                   |                                |                                                                                                                               |     |       |      |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage | V <sub>GS</sub> = 0 V, I <sub>DS</sub> = 250 μA                                                                               | 60  | -     | -    | V    |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage         | V <sub>GS</sub> = 0 V, I <sub>DS</sub> = 250 μA                                                                               | 2   | -     | 4    | V    |
| I <sub>DSS</sub>                         | Drain Leakage Current          | V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V                                                                                 | -   | -     | 1    | μA   |
| I <sub>GSS</sub>                         | Gate Leakage Current           | V <sub>GS</sub> = 0 V, V <sub>GS</sub> = ± 20 V                                                                               | -   | -     | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>a</sup>         | On-State Resistance            | V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 50 A                                                                                | -   | 0.40  | 0.45 | mΩ   |
|                                          |                                | V <sub>GS</sub> = 6 V, I <sub>DS</sub> = 30 A                                                                                 | -   | 1.13  | 1.50 |      |
| Diode Characteristics                    |                                |                                                                                                                               |     |       |      |      |
| V <sub>SD</sub> <sup>a</sup>             | Diode Forward Voltage          | I <sub>SD</sub> = 50 A, V <sub>GS</sub> = 0 V                                                                                 | -   | -     | 1.3  | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time          | I <sub>DS</sub> = 50 A, V <sub>GS</sub> = 0 V<br>dI <sub>SD</sub> /dt = 100 A/μs                                              | -   | 67    | -    | nS   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge        |                                                                                                                               | -   | 77    | -    | nC   |
| Dynamic Characteristics <sup>b</sup>     |                                |                                                                                                                               |     |       |      |      |
| C <sub>iss</sub>                         | Input Capacitance              | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V<br>Frequency = 1 MHz                                                            | -   | 12933 | -    | pF   |
| C <sub>oss</sub>                         | Output Capacitance             |                                                                                                                               | -   | 5236  | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance   |                                                                                                                               | -   | 201   | -    |      |
| t <sub>d(on)</sub>                       | Turn-on Delay Time             | V <sub>DS</sub> = 20 V, V <sub>GEN</sub> = 10 V,<br>R <sub>G</sub> = 3.9 Ω, R <sub>L</sub> = 0.4 Ω,<br>I <sub>DS</sub> = 50 A | -   | 36    | -    | nS   |
| t <sub>r</sub>                           | Turn-on Rise Time              |                                                                                                                               | -   | 168   | -    |      |
| t <sub>d(off)</sub>                      | Turn-off Delay Time            |                                                                                                                               | -   | 156   | -    |      |
| t <sub>f</sub>                           | Turn-off Fall Time             |                                                                                                                               | -   | 159   | -    |      |
| Gate Charge Characteristics <sup>b</sup> |                                |                                                                                                                               |     |       |      |      |
| Q <sub>g</sub>                           | Total Gate Charge              | V <sub>DS</sub> = 20 V, V <sub>GS</sub> = 10 V,<br>I <sub>DS</sub> = 50 A                                                     | -   | 216   | -    | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge             |                                                                                                                               | -   | 69    | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge              |                                                                                                                               | -   | 46    | -    |      |

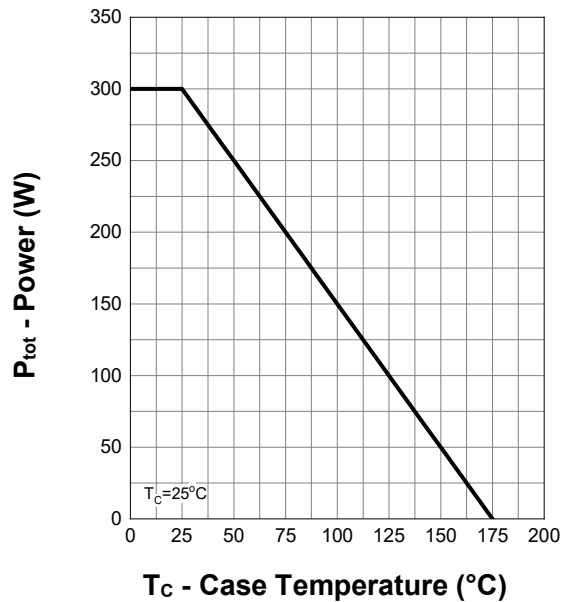
Notes :

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

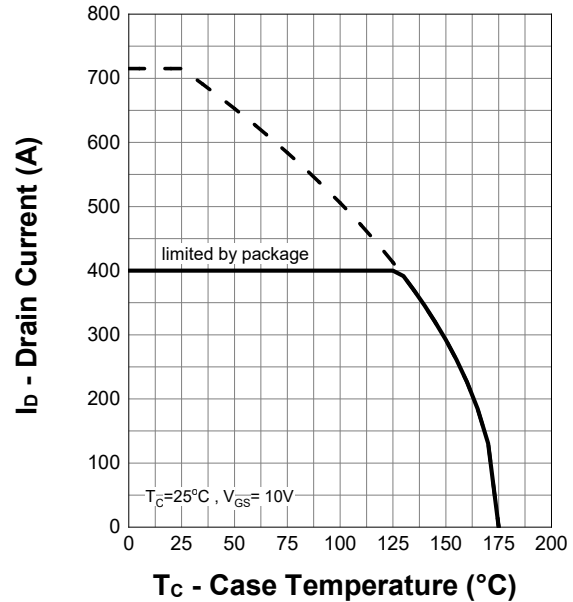
b : Guaranteed by design, not subject to production testing

## 7. Typical Characteristics

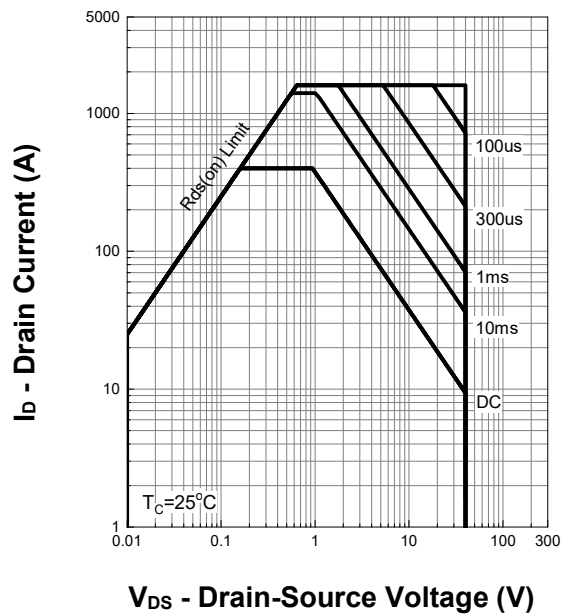
Power Capability



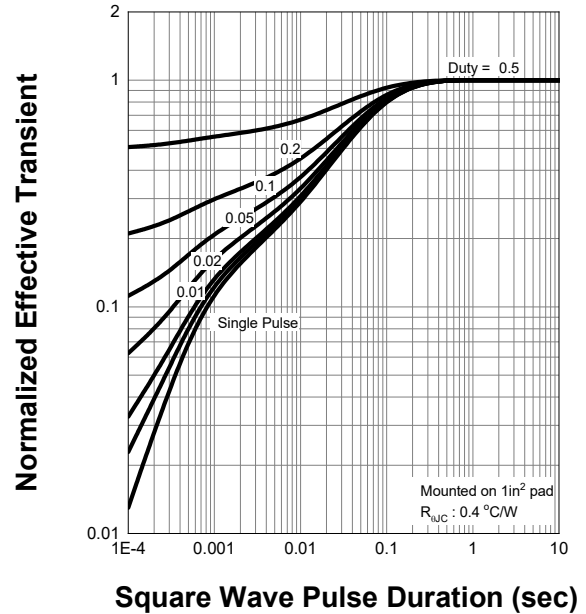
Current Capability



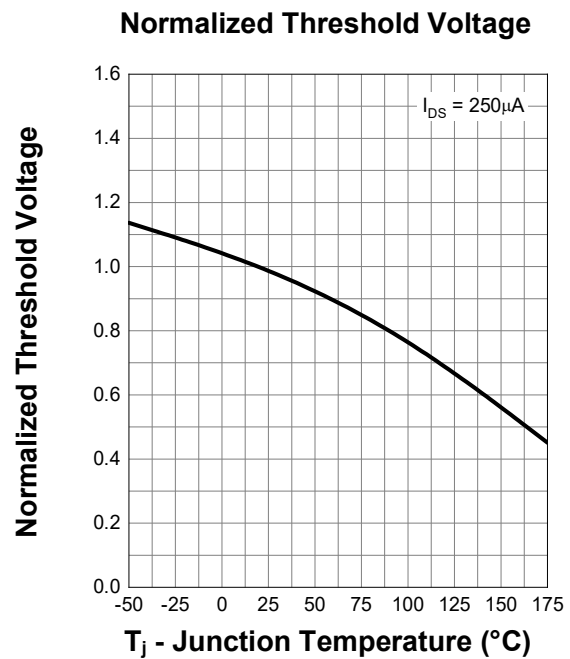
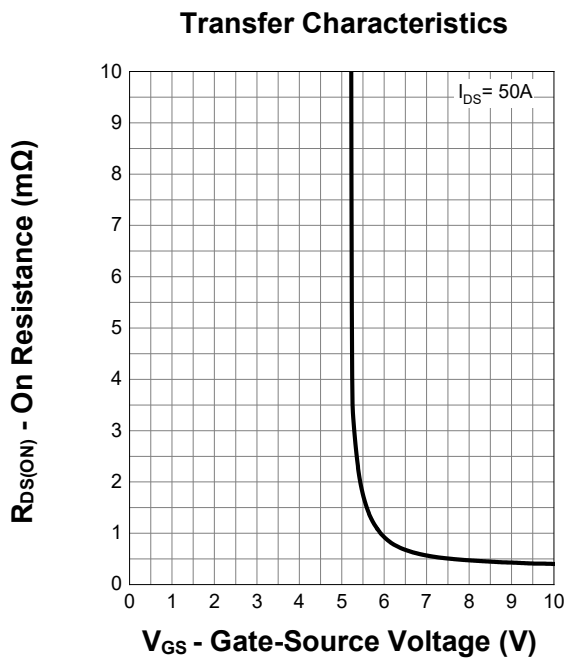
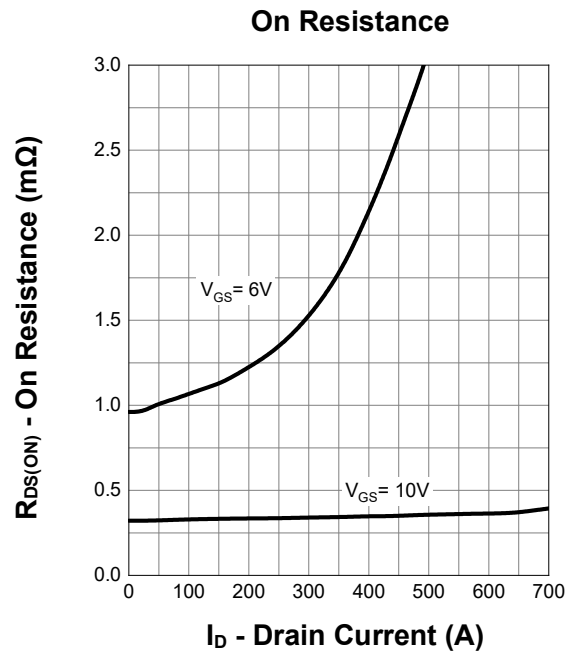
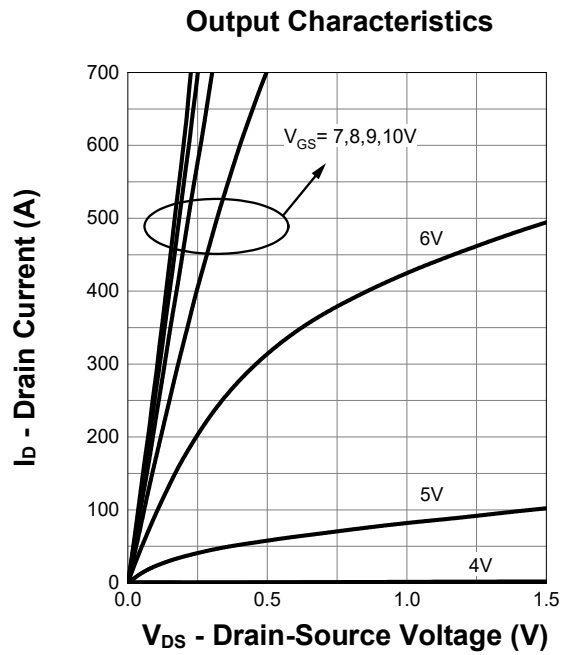
Safe Operating Area



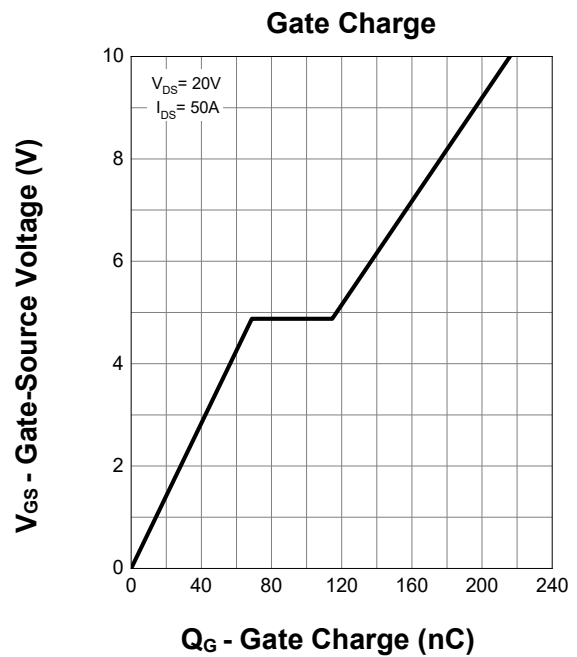
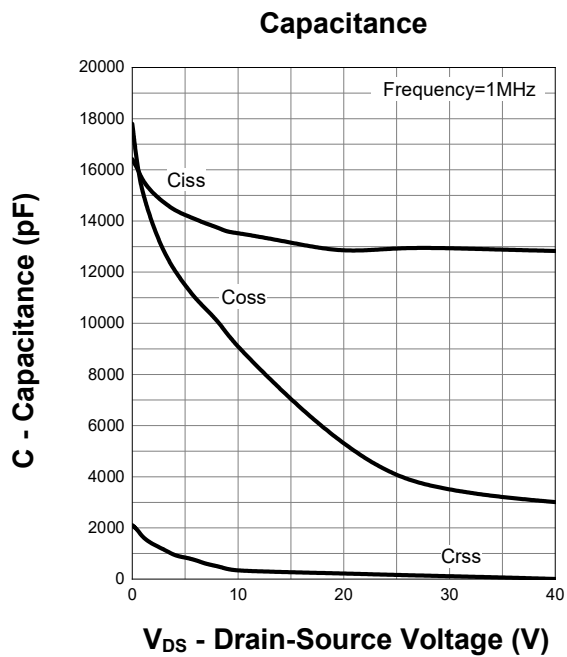
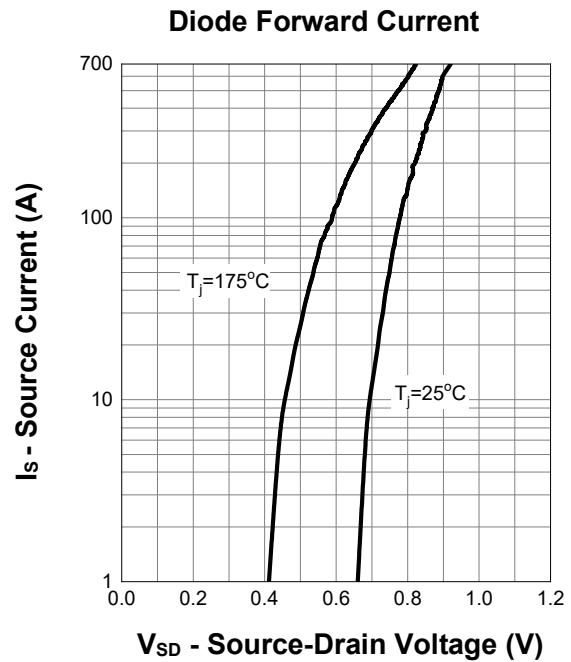
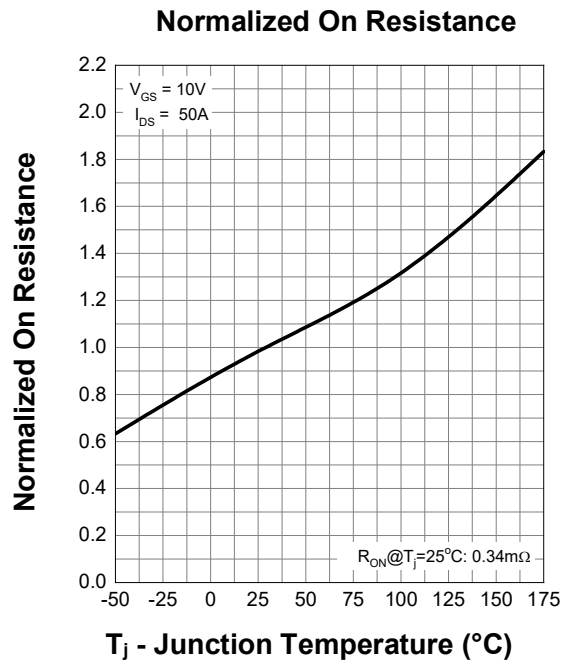
Transient Thermal Impedance



## 7. Typical Characteristics (cont.)



## 7. Typical Characteristics (cont.)



## 8. Package Dimensions

### LFPK88 Package

