



# Power MOSFETS

## DATASHEET

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**LM30C50NGI3A**

N-Channel  
Enhancement Mode MOSFET

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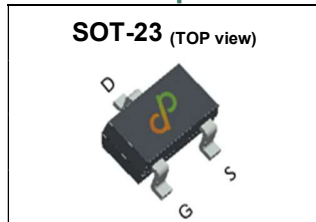
Quality Management Systems

ISO 9001:2015 Certificate

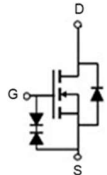
# LM30C50NGI3A

## N-Channel Enhancement Mode MOSFET

### Pin Description



### Symbol



### Product Summary

| Symbol           | N-Channel | Unit |
|------------------|-----------|------|
| $V_{DSS}$        | 30        | V    |
| $R_{DS(ON)-Max}$ | 420       | mΩ   |
| $I_D$            | 0.83      | A    |

### Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- ESD Protection

### Applications

- Portable Equipment
- Battery Powered System
- Load Switch

### Ordering Information

| Orderable Part Number | Package Type | Form        | Shipping       | Marking |
|-----------------------|--------------|-------------|----------------|---------|
| LM30C50NGI3A          | SOT-23       | Tape & Reel | 3000/ Reel(7") | 17□□□   |

Note : □□□□□□ = Lot Code

### Absolute Maximum Ratings (T<sub>J</sub>=25°C Unless Otherwise Noted)

| Symbol                       | Parameter                        |                      | N-Channel  | Unit |
|------------------------------|----------------------------------|----------------------|------------|------|
| V <sub>DSS</sub>             | Drain-Source Voltage             |                      | 30         | V    |
| V <sub>GSS</sub>             | Gate-Source Voltage              |                      | ±12        |      |
| T <sub>J</sub>               | Maximum Junction Temperature     |                      | 150        | °C   |
| T <sub>STG</sub>             | Storage Temperature Range        |                      | -55 to 150 | °C   |
| I <sub>S</sub>               | Diode Continuous Forward Current | T <sub>A</sub> =25°C | 0.6        | A    |
| I <sub>DM</sub> <sup>①</sup> | Pulse Drain Current Tested       | T <sub>A</sub> =25°C | 1.8        | A    |
| I <sub>D</sub>               | Continuous Drain Current         | T <sub>A</sub> =25°C | 0.83       | A    |
|                              |                                  | T <sub>A</sub> =70°C | 0.66       |      |
| P <sub>D</sub>               | Maximum Power Dissipation        | T <sub>A</sub> =25°C | 0.36       | W    |
|                              |                                  | T <sub>A</sub> =70°C | 0.23       |      |
| I <sub>AS</sub> <sup>②</sup> | Avalanche Current, Single pulse  | L=0.1mH              | 1.8        | A    |
| E <sub>AS</sub> <sup>②</sup> | Avalanche Energy, Single pulse   | L=0.1mH              | 0.16       | mJ   |

### Thermal Characteristics

| Symbol             | Parameter                              |              | Rating | Unit |
|--------------------|----------------------------------------|--------------|--------|------|
| R <sub>θJA</sub> ③ | Thermal Resistance-Junction to Ambient | Steady State | 350    | °C/W |

Note ① : Max. current is limited by Bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C

Note ③ : Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

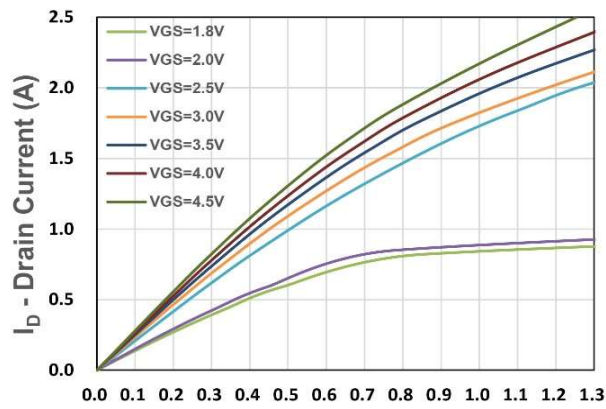
N-Channel Electrical Characteristics (T<sub>J</sub>=25°C Unless Otherwise Noted)

| Symbol                               | Parameter                        | Test Conditions                                                                       | Min. | Typ. | Max. | Unit |
|--------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|------|------|------|------|
| Static Electrical Characteristics    |                                  |                                                                                       |      |      |      |      |
| BV <sub>DSS</sub>                    | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250uA                                           | 30   | -    | -    | V    |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                                             | -    | -    | 1    | uA   |
| V <sub>GS(th)</sub>                  | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA                             | 0.6  | 0.95 | 1.3  | V    |
| I <sub>GSS</sub>                     | Gate Leakage Current             | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                            | -    | -    | ±10  | uA   |
| R <sub>DS(ON)</sub> <sup>④</sup>     | Drain-Source On-state Resistance | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =0.5A                                          | -    | 350  | 420  | mΩ   |
|                                      |                                  | V <sub>GS</sub> =2.5V, I <sub>DS</sub> =0.3A                                          | -    | 435  | 565  |      |
|                                      |                                  | V <sub>GS</sub> =1.8V, I <sub>DS</sub> =0.1A                                          | -    | 740  | 850  |      |
| gfs                                  | Forward Transconductance         | V <sub>DS</sub> =5V, I <sub>DS</sub> =0.25A                                           | -    | 5.7  | -    | S    |
| Dynamic Characteristics <sup>⑥</sup> |                                  |                                                                                       |      |      |      |      |
| R <sub>G</sub>                       | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, Freq.=1MHz                                  | -    | 195  | -    | Ω    |
| C <sub>iss</sub>                     | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Freq.=1MHz                                 | -    | 38.2 | -    | pF   |
| C <sub>oss</sub>                     | Output Capacitance               |                                                                                       | -    | 4.8  | -    |      |
| C <sub>rss</sub>                     | Reverse Transfer Capacitance     |                                                                                       | -    | 3.3  | -    |      |
| t <sub>d(ON)</sub>                   | Turn-on Delay Time               | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =1A, R <sub>GEN</sub> =6Ω | -    | 5.4  | -    | nS   |
| t <sub>r</sub>                       | Turn-on Rise Time                |                                                                                       | -    | 20.2 | -    |      |
| t <sub>d(OFF)</sub>                  | Turn-off Delay Time              |                                                                                       | -    | 34.4 | -    |      |
| t <sub>f</sub>                       | Turn-off Fall Time               |                                                                                       | -    | 30.3 | -    |      |
| Q <sub>g</sub>                       | Total Gate Charge                | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =1A                       | -    | 0.86 | -    | nC   |
| Q <sub>gs</sub>                      | Gate-Source Charge               |                                                                                       | -    | 0.29 | -    |      |
| Q <sub>gd</sub>                      | Gate-Drain Charge                |                                                                                       | -    | 0.16 | -    |      |
| Source-Drain Characteristics         |                                  |                                                                                       |      |      |      |      |
| V <sub>SD</sub> <sup>④</sup>         | Diode Forward Voltage            | I <sub>SD</sub> =0.25A, V <sub>GS</sub> =0V                                           | -    | 0.9  | 1.1  | V    |
| t <sub>rr</sub>                      | Reverse Recovery Time            | I <sub>F</sub> =0.25A, V <sub>R</sub> =20V                                            | -    | 24.2 | -    | nS   |
| Q <sub>rr</sub>                      | Reverse Recovery Charge          | dI <sub>F</sub> /dt=100A/μs                                                           | -    | 3.2  | -    | nC   |

Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).

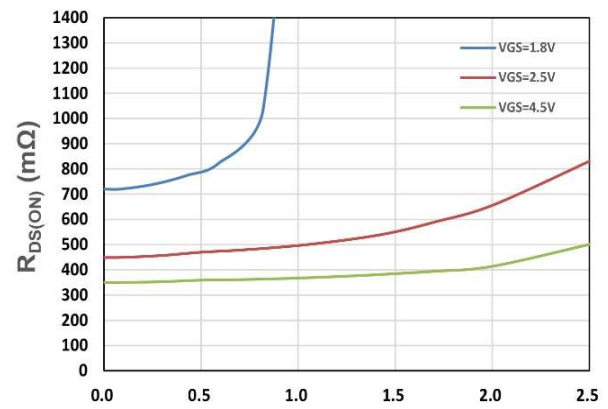
Note ⑤ : Guaranteed by design, not subject to production testing.

## N-Channel Typical Characteristics



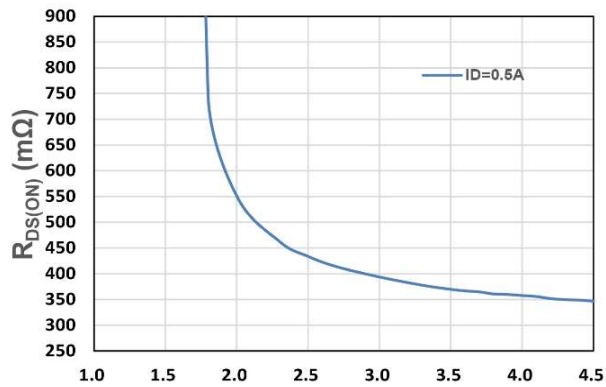
$V_{DS}$  - Drain - Source Voltage (V)

Figure 1. Output Characteristics



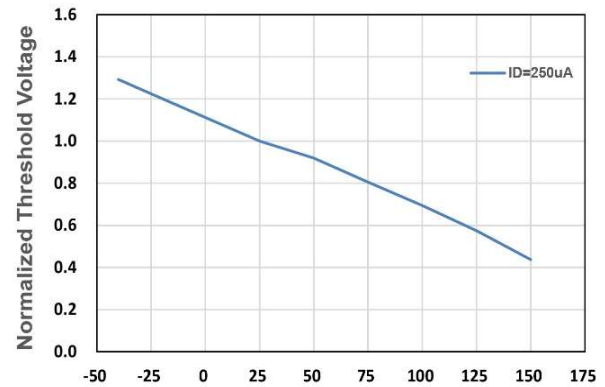
$I_D$ - Drain Current (A)

Figure 2. On-Resistance vs. ID



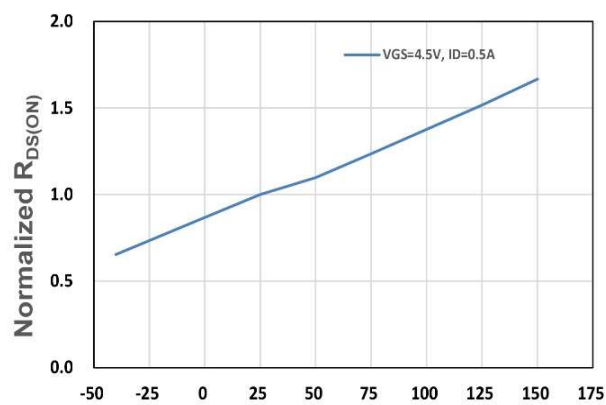
$V_{GS}$  - Gate - Source Voltage (V)

Figure 3. On-Resistance vs. VGS



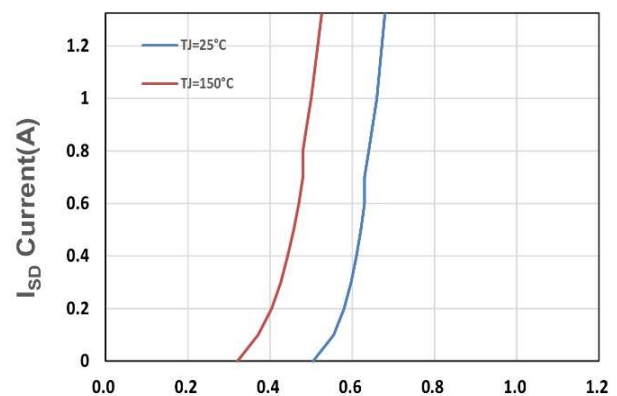
$T_j$ , Junction Temperature( $^{\circ}$ C)

Figure 4. Gate Threshold Voltage



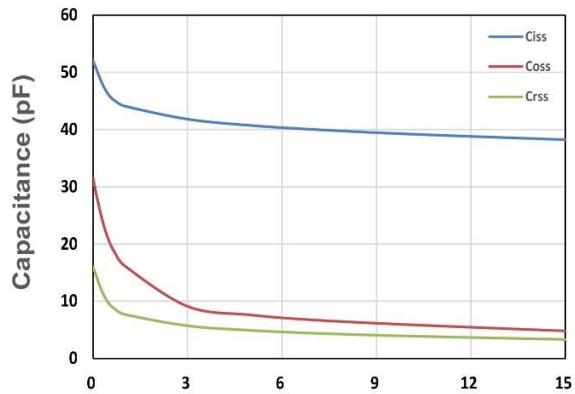
$T_j$ , Junction Temperature( $^{\circ}$ C)

Figure 5. Drain-Source On Resistance



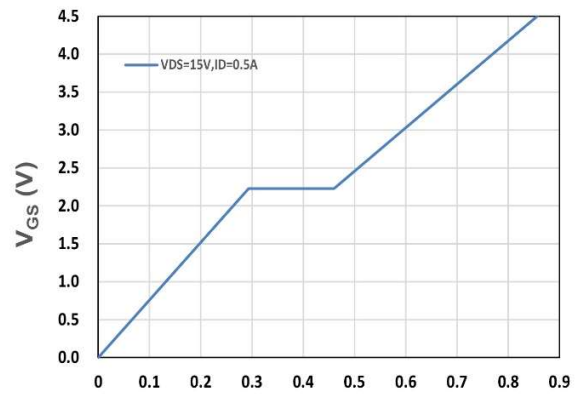
$V_{SD}$ , Source-Drain Voltage(V)

Figure 6. Source-Drain Diode Forward



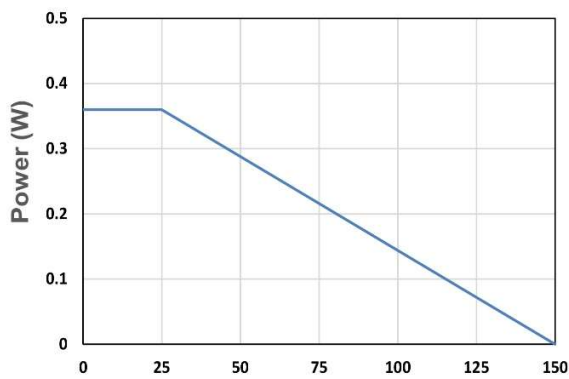
$V_{DS}$  - Drain - Source Voltage (V)

Figure 7. Capacitance



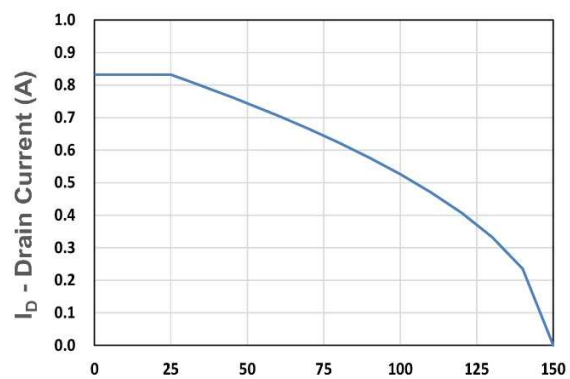
$Q_g$ , Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



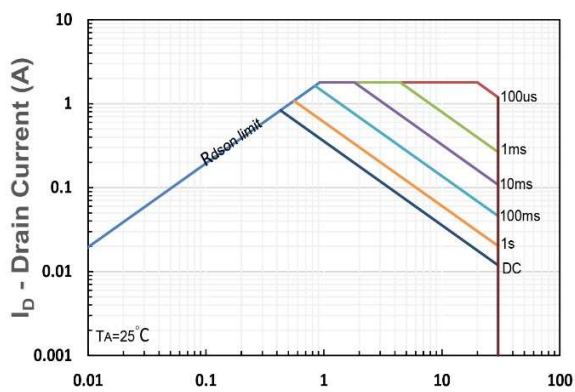
$T_A$  - Ambient Temperature (°C)

Figure 9. Power Dissipation



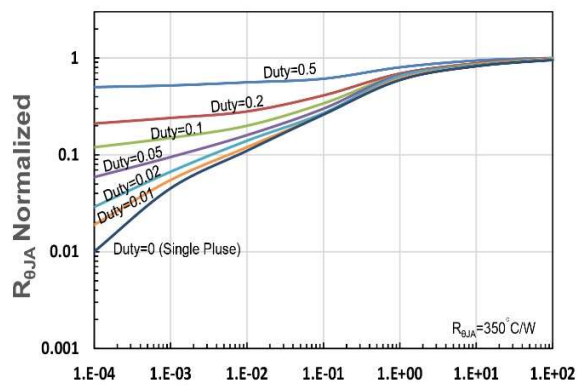
$T_A$  - Ambient Temperature (°C)

Figure 10. Drain Current



$V_{DS}$  - Drain-Source Voltage (V)

Figure 11. Safe Operating Area



$t_1$ , Square Wave Pulse Duration(s)

Figure 12.  $R_{\theta JA}$  Transient Thermal Impedance