

## N-Channel Enhancement Mode Power MOSFET

## Description

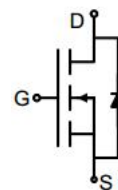
The G30N03D3-BQ uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

## General Features

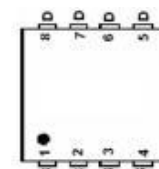
- $V_{DS}$  30V
- $I_D$  (at  $V_{GS} = 10V$ ) 42A
- $R_{DS(ON)}$  (at  $V_{GS} = 10V$ ) < 7m $\Omega$
- $R_{DS(ON)}$  (at  $V_{GS} = 4.5V$ ) < 12m $\Omega$
- 100% Avalanche Tested
- RoHS Compliant

## Application

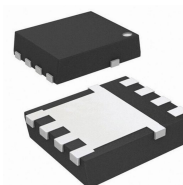
- Power switch
- DC/DC converters



Schematic diagram



pin assignment



DFN3X3-8L

## Ordering Information

| Device      | Package   | Marking | Packaging    |
|-------------|-----------|---------|--------------|
| G30N03D3-BQ | DFN3X3-8L | G30N03  | 5000pcs/Reel |

Absolute Maximum Ratings  $T_C = 25^\circ\text{C}$ , unless otherwise noted

| Parameter                                        | Symbol         | Value      | Unit             |
|--------------------------------------------------|----------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$       | 30         | V                |
| Continuous Drain Current                         | $I_D$          | 42         | A                |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 168        | A                |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V                |
| Power Dissipation                                | $P_D$          | 25         | W                |
| Single pulse avalanche energy (note2)            | $E_{AS}$       | 49         | mJ               |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55 To 150 | $^\circ\text{C}$ |

## Thermal Resistance

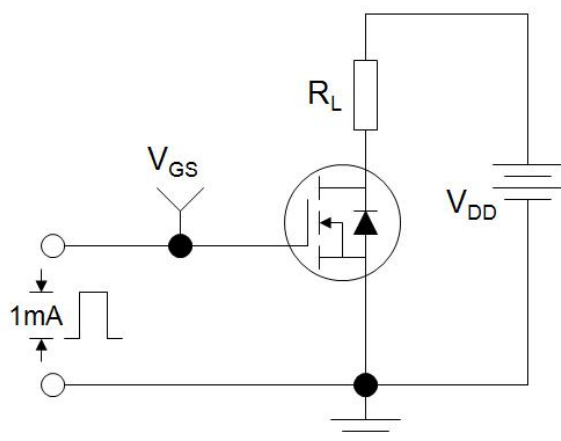
| Parameter                               | Symbol     | Value | Unit               |
|-----------------------------------------|------------|-------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{thJA}$ | 50    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                | $R_{thJC}$ | 5     | $^\circ\text{C/W}$ |

| Specifications T <sub>J</sub> = 25°C, unless otherwise noted |                      |                                                                          |       |      |      |      |
|--------------------------------------------------------------|----------------------|--------------------------------------------------------------------------|-------|------|------|------|
| Parameter                                                    | Symbol               | Test Conditions                                                          | Value |      |      | Unit |
|                                                              |                      |                                                                          | Min.  | Typ. | Max. |      |
| Static Parameters                                            |                      |                                                                          |       |      |      |      |
| Drain-Source Breakdown Voltage                               | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                             | 30    | --   | --   | V    |
| Zero Gate Voltage Drain Current                              | I <sub>DSS</sub>     | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V                              | --    | --   | 1    | μA   |
| Gate-Source Leakage                                          | I <sub>GSS</sub>     | V <sub>GS</sub> = ±20V                                                   | --    | --   | ±100 | nA   |
| Gate-Source Threshold Voltage                                | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA               | 1.0   | 1.7  | 2.5  | V    |
| Drain-Source On-Resistance                                   | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                              | --    | 5.0  | 7.0  | mΩ   |
|                                                              |                      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 15A                             | --    | 7.5  | 12   |      |
| Forward Transconductance                                     | g <sub>FS</sub>      | V <sub>GS</sub> = 5V, I <sub>D</sub> = 20A                               | --    | 40   | --   | S    |
| Dynamic Parameters                                           |                      |                                                                          |       |      |      |      |
| Input Capacitance                                            | C <sub>iss</sub>     | V <sub>GS</sub> = 0V,<br>V <sub>DS</sub> = 15V,<br>f = 1.0MHz            | --    | 1260 | --   | pF   |
| Output Capacitance                                           | C <sub>oss</sub>     |                                                                          | --    | 230  | --   |      |
| Reverse Transfer Capacitance                                 | C <sub>rss</sub>     |                                                                          | --    | 185  | --   |      |
| Total Gate Charge                                            | Q <sub>g</sub>       | V <sub>DD</sub> = 15V,<br>I <sub>D</sub> = 20A,<br>V <sub>GS</sub> = 10V | --    | 13   | --   | nC   |
| Gate-Source Charge                                           | Q <sub>gs</sub>      |                                                                          | --    | 2.2  | --   |      |
| Gate-Drain Charge                                            | Q <sub>gd</sub>      |                                                                          | --    | 2.6  | --   |      |
| Turn-on Delay Time                                           | t <sub>d(on)</sub>   | V <sub>DD</sub> = 15V,<br>I <sub>D</sub> = 20A,<br>R <sub>G</sub> = 3Ω   | --    | 5    | --   | ns   |
| Turn-on Rise Time                                            | t <sub>r</sub>       |                                                                          | --    | 3    | --   |      |
| Turn-off Delay Time                                          | t <sub>d(off)</sub>  |                                                                          | --    | 20   | --   |      |
| Turn-off Fall Time                                           | t <sub>f</sub>       |                                                                          | --    | 3    | --   |      |
| Drain-Source Body Diode Characteristics                      |                      |                                                                          |       |      |      |      |
| Continuous Body Diode Current                                | I <sub>S</sub>       | T <sub>C</sub> = 25°C                                                    | --    | --   | 42   | A    |
| Body Diode Voltage                                           | V <sub>SD</sub>      | T <sub>J</sub> = 25°C, I <sub>SD</sub> = 20A, V <sub>GS</sub> = 0V       | --    | --   | 1.2  | V    |
| Reverse Recovery Charge                                      | Q <sub>rr</sub>      | I <sub>F</sub> = 20A, V <sub>GS</sub> = 0V<br>di/dt=500A/us              | --    | 15.2 | --   | nC   |
| Reverse Recovery Time                                        | T <sub>rr</sub>      |                                                                          | --    | 12.6 | --   | ns   |

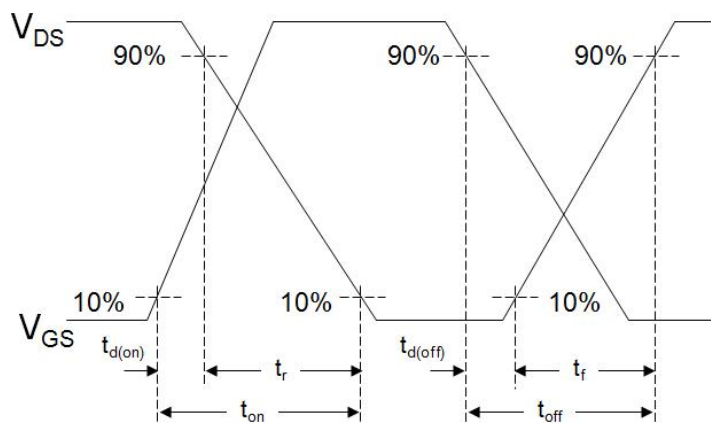
## Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition :  $T_J = 25^\circ\text{C}, V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$
3. Identical low side and high side switch with identical  $R_G$

### Gate Charge Test Circuit



### Switch Time Test Circuit

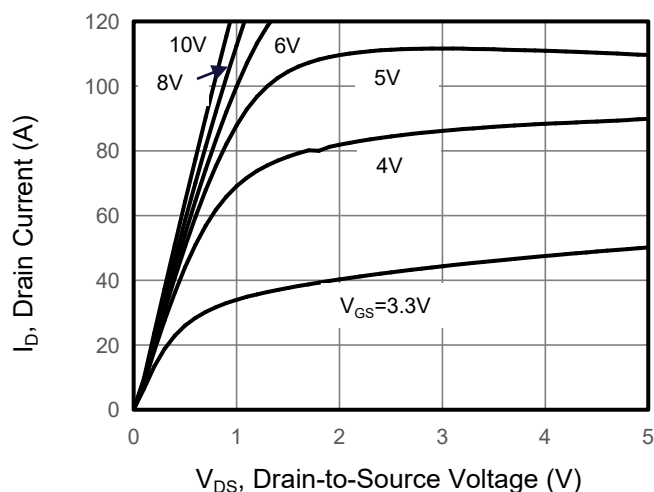


### EAS Test Circuit

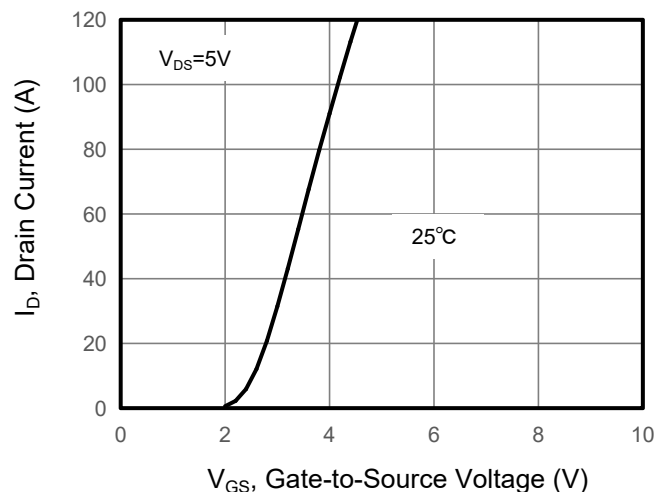


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

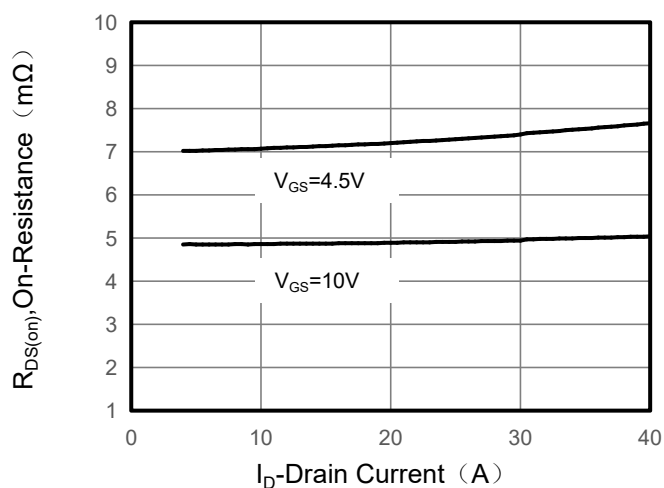
**Figure 1. Output Characteristics**



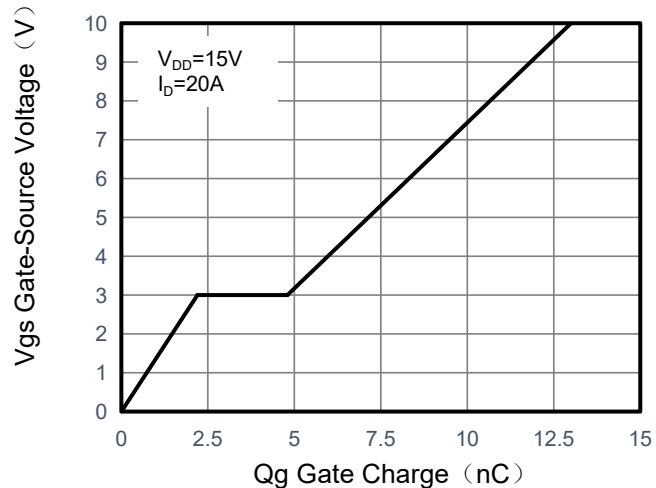
**Figure 2. Transfer Characteristics**



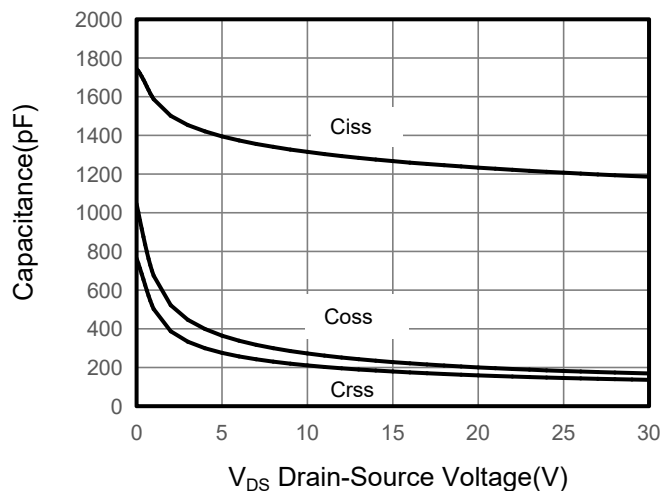
**Figure 3. Drain Source On Resistance**



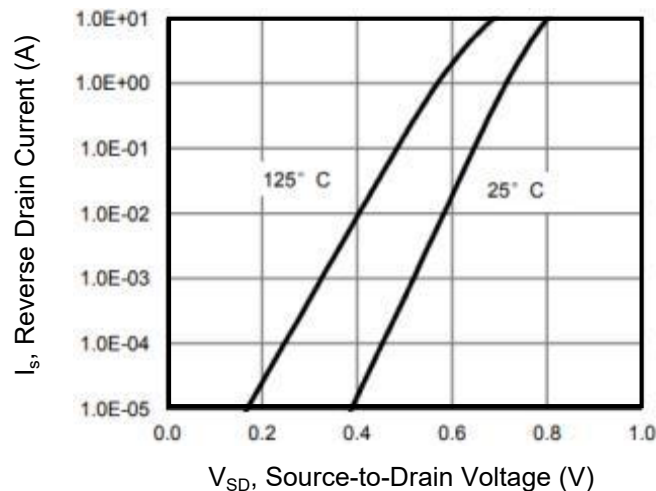
**Figure 4. Gate Charge**



**Figure 5. Capacitance**

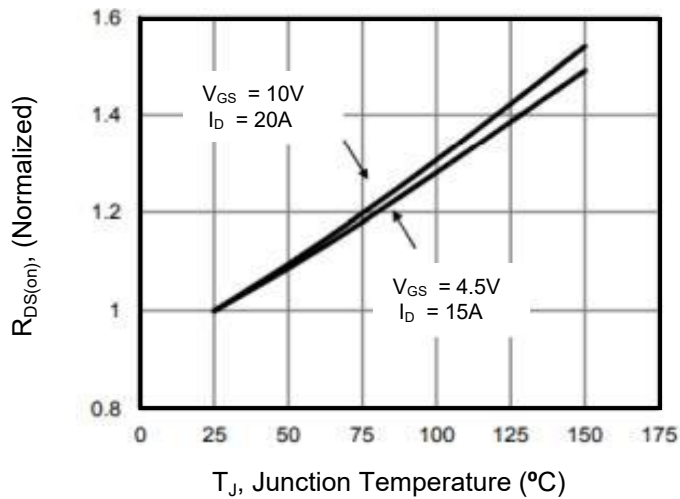


**Figure 6. Source-Drain Diode Forward**

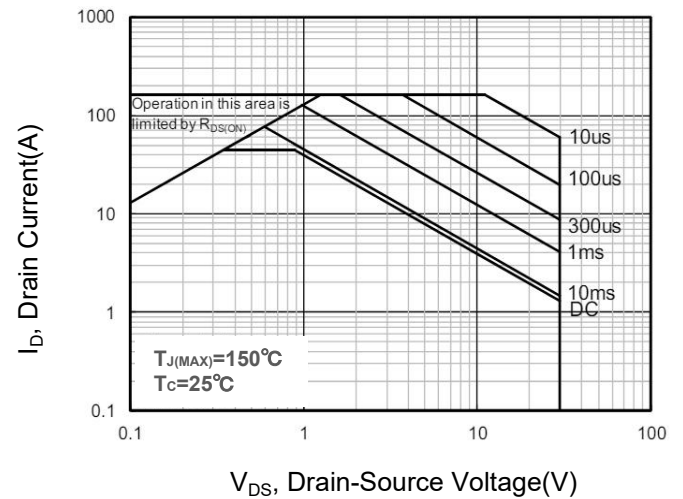


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

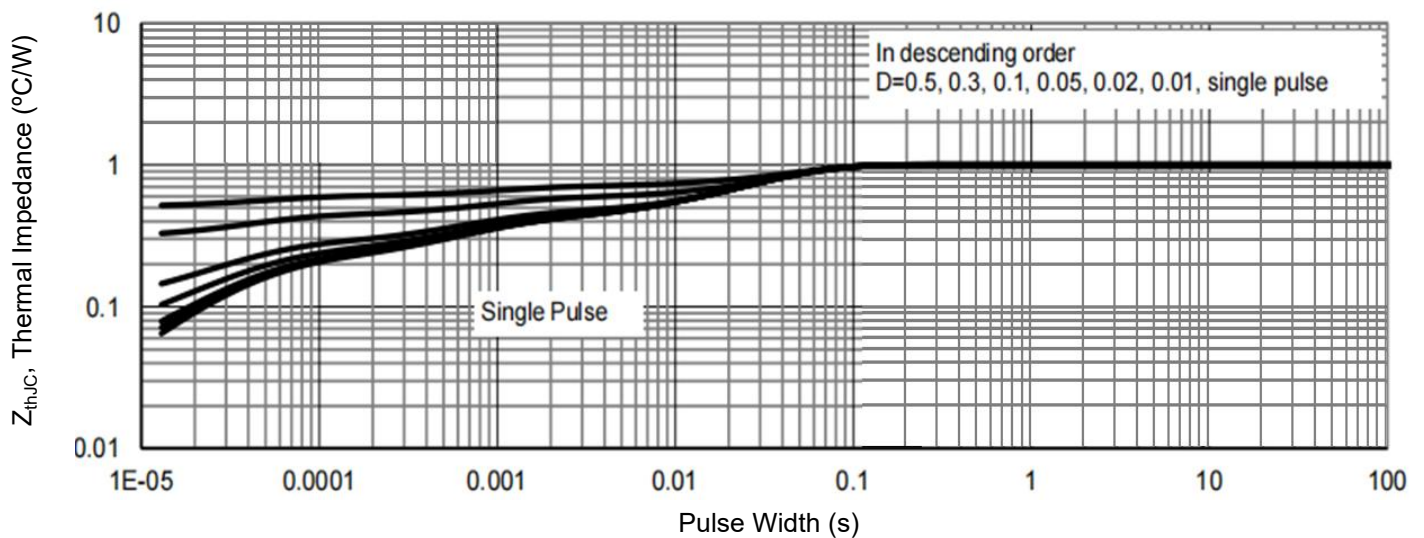
**Figure 7. Drain-Source On-Resistance**



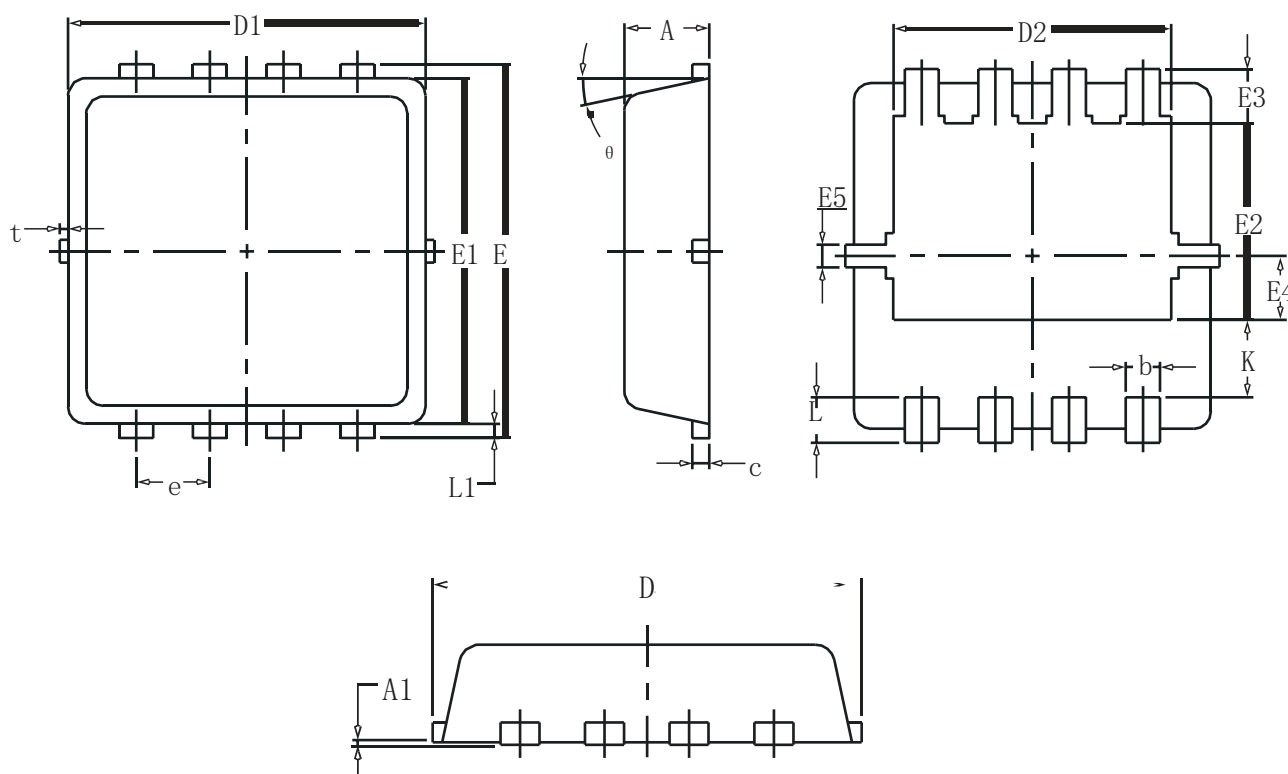
**Figure 8. Safe Operation Area**



**Figure 9. Normalized Maximum Transient Thermal Impedance**



## DFN3x3-8L Package Information



| SYMBOL   | COMMON |       |      |
|----------|--------|-------|------|
|          | MM     |       |      |
|          | MIN    | NOM   | MAX  |
| A        | 0.70   | 0.75  | 0.85 |
| A1       | -      | -     | 0.05 |
| b        | 0.20   | 0.30  | 0.40 |
| c        | 0.10   | 0.152 | 0.25 |
| D        | 3.15   | 3.30  | 3.45 |
| D1       | 3.00   | 3.15  | 3.25 |
| D2       | 2.29   | 2.45  | 2.65 |
| E        | 3.15   | 3.30  | 3.45 |
| E1       | 2.90   | 3.05  | 3.20 |
| E2       | 1.54   | 1.74  | 1.94 |
| E3       | 0.28   | 0.48  | 0.65 |
| E4       | 0.37   | 0.57  | 0.77 |
| E5       | 0.10   | 0.20  | 0.30 |
| e        | 0.60   | 0.65  | 0.70 |
| K        | 0.59   | 0.69  | 0.89 |
| L        | 0.30   | 0.40  | 0.50 |
| L1       | 0.06   | 0.125 | 0.20 |
| t        | 0      | 0.075 | 0.13 |
| $\theta$ | 10°    | 12°   | 14°  |