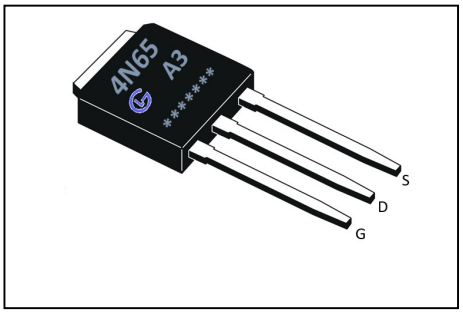
# GL4N65A3

## *GL Silicon N-Channel Power MOSFET*

| | | |
|---|---|---|
| $V_{DSS}$ | 650 | V |
| $I_D$ | 4 | A |
| $P_D$ ($T_C$=25℃) | 75 | W |
| $R_{DS(ON)typ}$ | 2 | Ω |

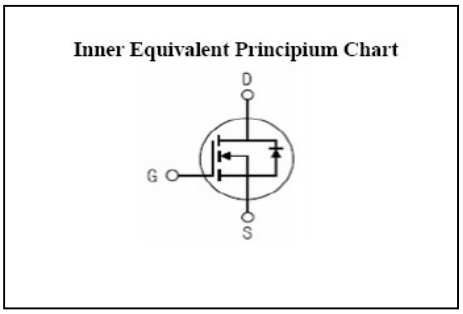



### General Description

GL4N65A3 the silicon N-channel Enhanced VDMOSFETS, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-251, which accords with the RoHS standard.

### Features

- Fast Switching
- Low Gate Charge and Rdson
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test




### Applications

- LED Lighting
- Charger
- Standby Power

### Absolute (Tc=25℃ unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 650 | V |
| $I_D$ | Continuous Drain Current | 4 | A |
| | Continuous Drain Current $T_C$ = 100 °C | 2.5 | A |
| $I_{DM}$ [a1] | Pulsed Drain Current | 16 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±30 | V |
| $E_{AS}$ [a2] | Single Pulse Avalanche Energy | 200 | mJ |
| dv/dt [a3] | Peak Diode Recovery dv/dt | 5.0 | V/ns |
| $P_D$ | Power Dissipation | 75 | W |
| | Derating Factor above 25°C | 0.6 | W/℃ |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature Range | 150, −55 to 150 | ℃ |
| $T_L$ | Maximum Temperature for Soldering | 300 | ℃ |

Caution Stresses greater than those in the "Absolute Maximum Ratings" may cause permanent damage to the device

## Electrical Characteristics (Tc=25℃ unless otherwise specified)

| OFF Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $V_{DSS}$ | Drain to Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 650 | -- | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Bvdss Temperature Coefficient | $I_D$=250uA,Reference25℃ | -- | 0.67 | -- | V/℃ |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$=650V,$V_{GS}$=0V,$T_a$=25℃ | -- | -- | 1 | μA |
| | | $V_{DS}$=520V, $V_{GS}$=0V,$T_a$=125℃ | -- | -- | 100 | |
| $I_{GSS(F)}$ | Gate to Source Forward Leakage | $V_{GS}$=+30V | -- | -- | 100 | nA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}$=-30V | -- | -- | -100 | nA |

| ON Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$=10V,$I_D$=2A | -- | 1.95 | 2.4 | Ω |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2.0 | 3.0 | 4.0 | V |
| Pulse width tp≤300μs,δ≤2% | | | | | | |

| Dynamic Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=15V,$I_D$=2A | -- | 3.5 | -- | S |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V,$V_{DS}$=25V f=1.0MHz | -- | 610 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 53 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 3.5 | -- | |

| Resistive Switching Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $I_D$=4A,$V_{DD}$=325V $R_G$=10Ω | -- | 15 | -- | ns |
| $t_r$ | Rise Time | | -- | 30 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 50 | -- | |
| $t_f$ | Fall Time | | -- | 40 | -- | |
| $Q_g$ | Total Gate Charge | $I_D$=4A,$V_{DD}$=325V $V_{GS}$=10V | -- | 10 | -- | nC |
| $Q_{gs}$ | Gate to Source Charge | | -- | 3.4 | -- | |
| $Q_{gd}$ | Gate to Drain (“Miller”)Charge | | -- | 2.7 | -- | |

| Source-Drain Diode Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $I_S$ | Continuous Source Current (Body Diode) | | -- | -- | 4 | A |
| $I_{SM}$ | Maximum Pulsed Current (Body Diode) | | -- | -- | 16 | A |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=4.0A,$V_{GS}$=0V | -- | -- | 1.5 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=4.0A,$T_j$=25°C | -- | 256 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | $dI_F/dt$=100A/us, | -- | 1200 | -- | uC |
| $I_{RRM}$ | Reverse Recovery Current | $V_{GS}$=0V | -- | 9.4 | -- | A |
| Pulse width tp≤300μs,δ≤2% | | | | | | |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | 1.67 | ℃/W |
| $R_{\theta JA}$ | Junction-to-Ambient | 100 | ℃/W |

[a1]: Repetitive rating; pulse width limited by maximum junction temperature

[a2]: L=10.0mH, $I_D$=6.3A, Start $T_J$=25℃

[a3]: $I_{SD}$ =4A,di/dt ≤100A/us,$V_{DD}$≤$BV_{DS}$, Start $T_J$=25℃

## Characteristics Curves

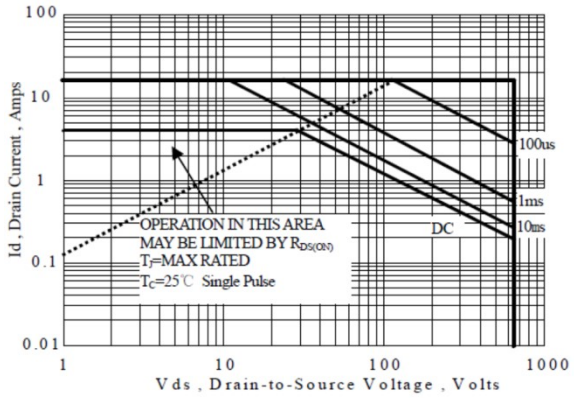



Figure 1 Maximum Forward Bias Safe Operating Area

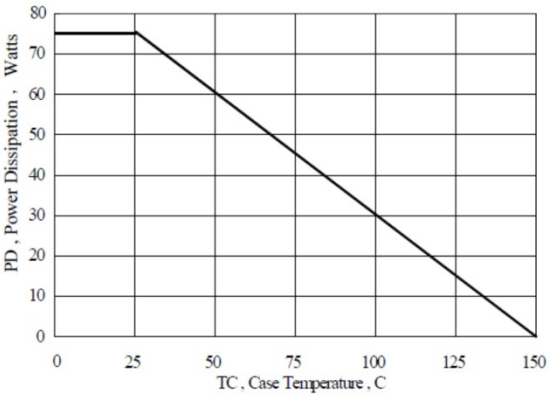



Figure 2 Maximum Power Dissipation vs Case Temperature

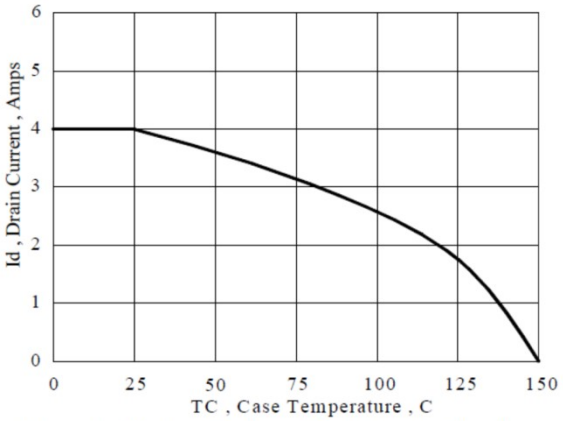



Figure 3 Maximum Continuous Drain Current vs Case Temperature

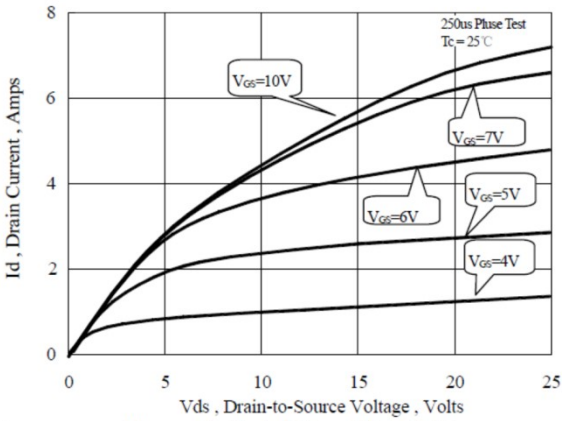



Figure 4 Typical Output Characteristics

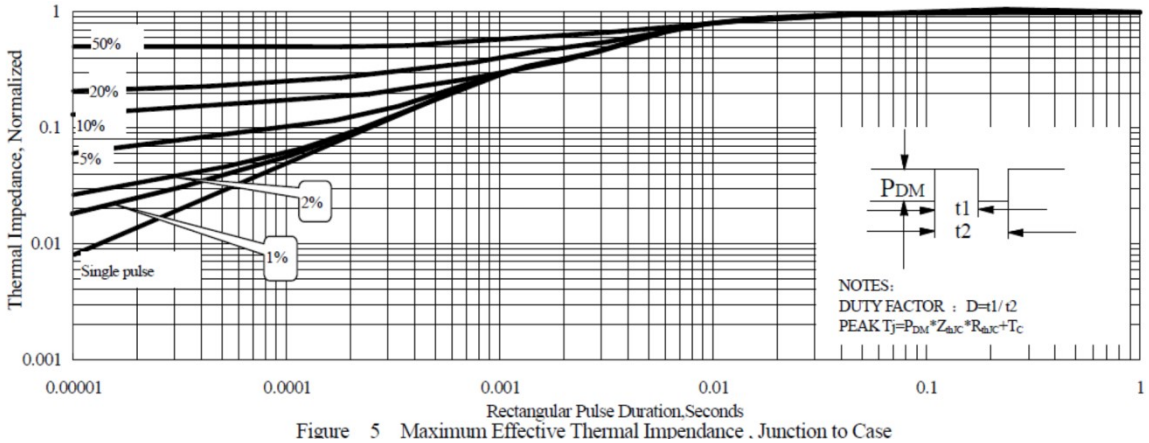



Figure 5 Maximum Effective Thermal Impendance , Junction to Case

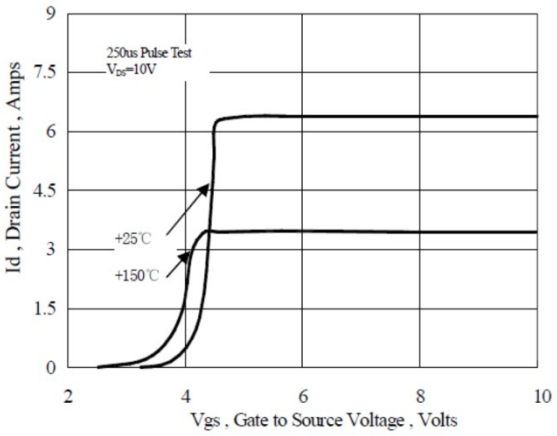



Figure 6 Typical Transfer Characteristics

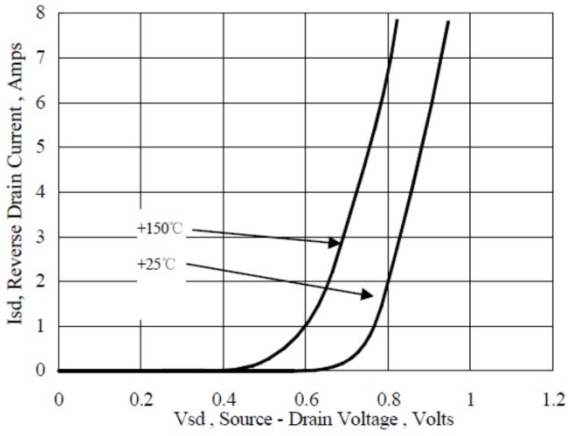



Figure 7 Typical Body Diode Transfer Characteristics

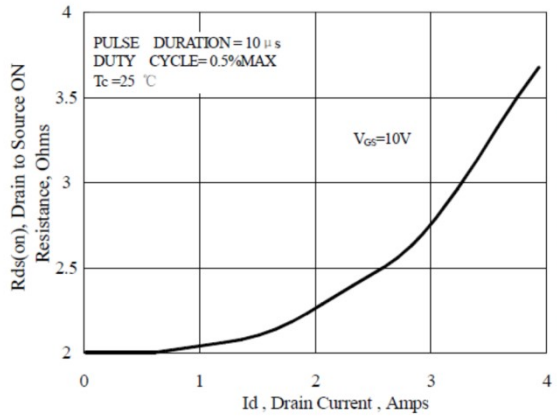



Figure 8 Typical Drain to Source ON Resistance vs Drain Current

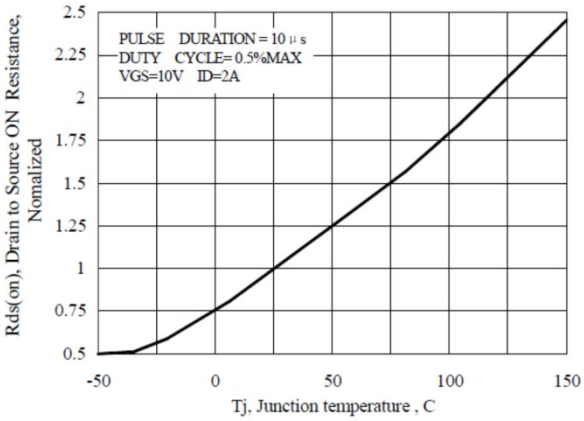



Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

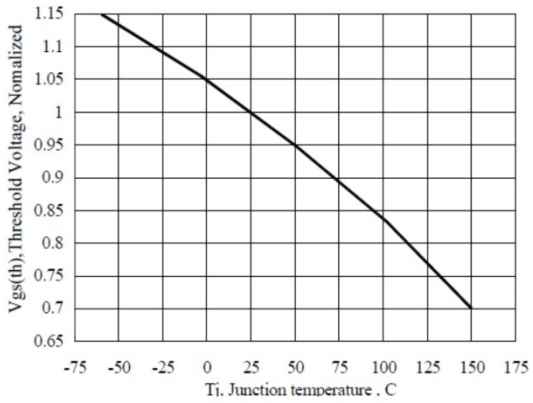



Figure 10 Typical Theshold Voltage vs Junction Temperature

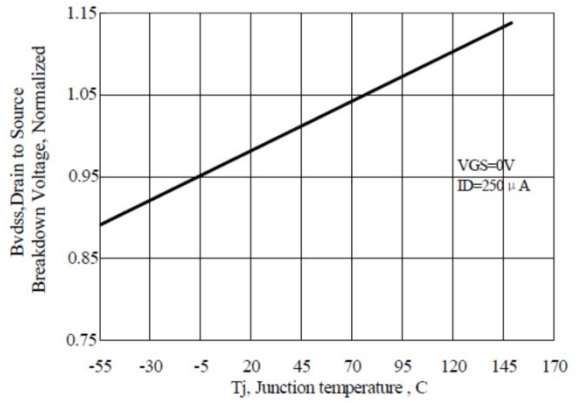



Figure 11 Typical Breakdown Voltage vs Junction Temperature

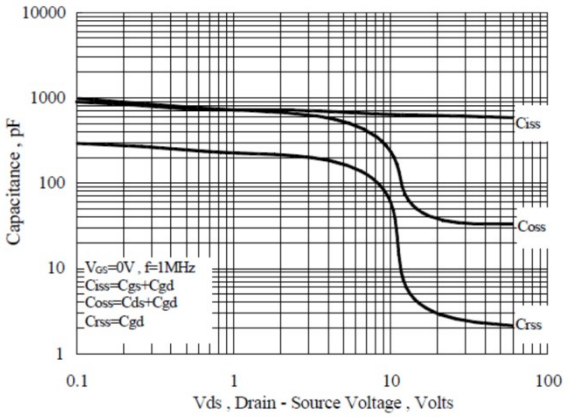



Figure 12 Typical Capacitance vs Drain to Source Voltage

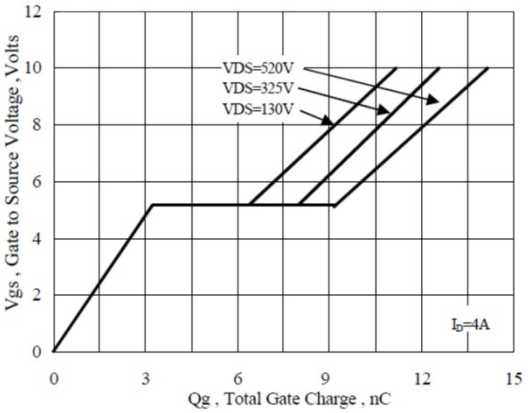



Figure 13 Typical Gate Charge vs Gate to Source Voltage