# GL1N65L

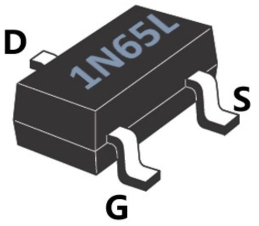
*Silicon N-Channel Power MOSFET*

## General Description

GL1N65L the silicon N-channel Enhanced VDMOSFET, 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 SOT23, which accords with the RoHS standard.

| | | |
|---|---|---|
| $V_{DSS}$ | 650 | V |
| $I_D$ | 0.8 | A |
| $P_D$($T_C$=25℃) | 2.0 | W |
| $R_{DS(ON).TYP.}$ | 13 | Ω |

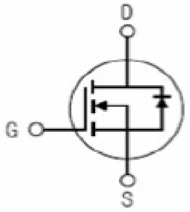
SOT-23



## Features

- Fast Switching
- Low ON Resistance($R_{dson}$≤16Ω)
- Low Gate Charge (Typical Data:6 nC)
- Low Reverse transfer capacitances(Typical:3.5pF)
- Low Vth (Typical:1.0V)

Inner Equivalent Principium Chart



## Applications

- Power switch circuit of adaptor and charger

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 650 | V |
| $I_D$ | Continuous Drain Current | 0.8 | A |
| | Continuous Drain Current $T_C$=100 °C | 0.6 | A |
| $I_{DM}^{a1}$ | Pulsed Drain Current | 3.2 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±25 | V |
| $E_{As}^{a2}$ | Single Pulse Avalanche Energy | 20 | mJ |
| $E_{Ar}^{a1}$ | Avalanche Energy ,Repetitive | 6 | mJ |
| $I_{AR}^{a1}$ | Avalanche Current | 1.1 | A |
| dv/dt$^{a3}$ | Peak Diode Recovery dv/dt | 5.0 | V/ns |
| $P_D$ | Power Dissipation | 2 | 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 | 690 | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Bvdss Temperature Coefficient | $I_D$=250uA,Reference25℃ | -- | 0.51 | -- | 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 | $V_{GS}$=+20V | -- | -- | 100 | nA |
| $I_{GSS(R)}$ | Gate to Source Reverse Leakage | $V_{GS}$=-20V | -- | -- | -100 | nA |

| ON Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$=10V,$I_D$=0.4A | -- | 13.0 | 16 | Ω |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$=4.5V,$I_D$=0.2A | -- | 13.5 | 17 | Ω |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$=3V,$I_D$=0.1A | -- | 14.5 | 18 | Ω |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 0.5 | -- | 1.5 | V |
| $g_{fs}$ | Forward Trans conductance | $V_{DS}$=15V,$I_D$=0.8A | -- | 0.7 | -- | S |
| Pulse width<380μs; duty cycle<2%. | | | | | | |

| Dynamic Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V $V_{DS}$=25V<br>f=1.0MHz | -- | 120 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 12.5 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 3.5 | -- | |

| Resistive Switching Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $I_D$=0.8A,$V_{DD}$=350V<br>$V_{GS}$=10V,$R_g$=4.7Ω | -- | 7.3 | -- | ns |
| $t_r$ | Rise Time | | -- | 6 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 21 | -- | |
| $t_f$ | Fall Time | | -- | 15.5 | -- | |
| $Q_g$ | Total Gate Charge | $I_D$=0.8A,$V_{DD}$=350V<br>$V_{GS}$=10V | -- | 6.0 | -- | nC |
| $Q_{gs}$ | Gate to Source Charge | | -- | 0.68 | -- | |
| $Q_{gd}$ | Gate to Drain ( “Miller” )Charge | | -- | 2.1 | -- | |

**Source-Drain Diode Characteristics**

| Symbol | Parameter | Test Conditions | Rating | | | Units |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $I_{SD}$ | Continuous Source Current (Body Diode) | | -- | -- | 0.8 | A |
| $I_{SM}$ | Maximum Pulsed Current (Body Diode) | | -- | -- | 3.2 | A |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=0.8A,$V_{GS}$=0V | -- | -- | 1.5 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=0.8A,$T_j$=25℃<br>d$I_F$/dt=100A/μs,$V_{GS}$=0V | -- | 374 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 735 | -- | μC |

## Thermal Characteristics

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 62.5 | ℃/ W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 70 | ℃/ W |

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

a2: L=10mH, $I_D$=2A, Start $T_J$=25℃

a3: $I_{SD}$=0.8A,di/dt ≤100A/us,$V_{DD}$≤$BV_{DS}$, Start $T_J$=25℃

## Characteristics Curve

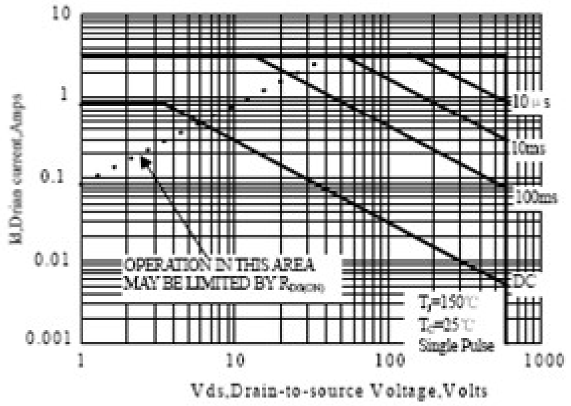


Figure 1 Maximum Forward Bias Safe Operating Area

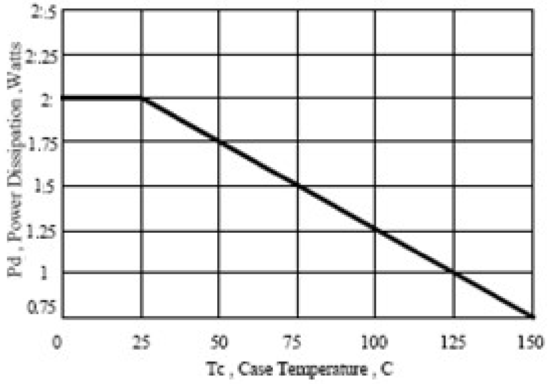


Figure 2 Maximum Power Dissipation vs Case Temperature

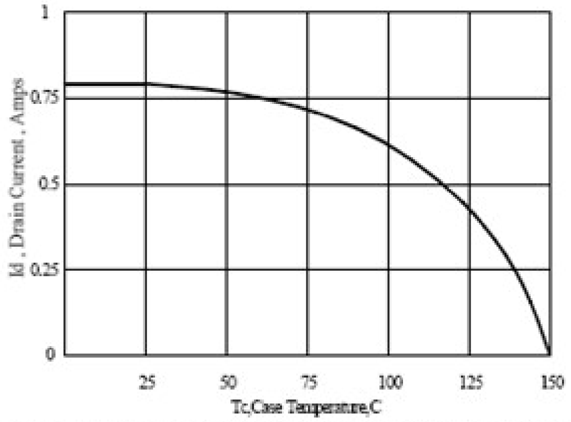


Figure 3 Maximum Continuous Drain Current vs Case Temperature

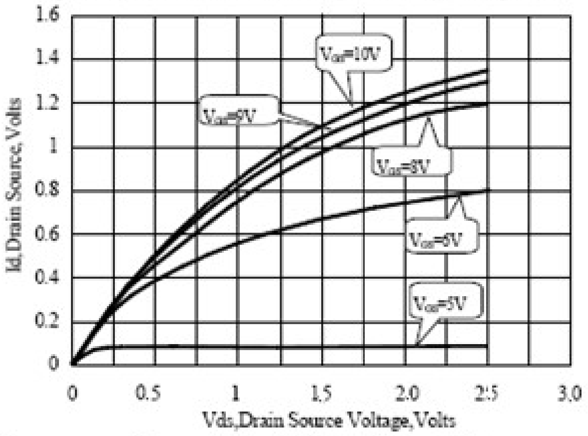


Figure 4 Typical Output Characteristics

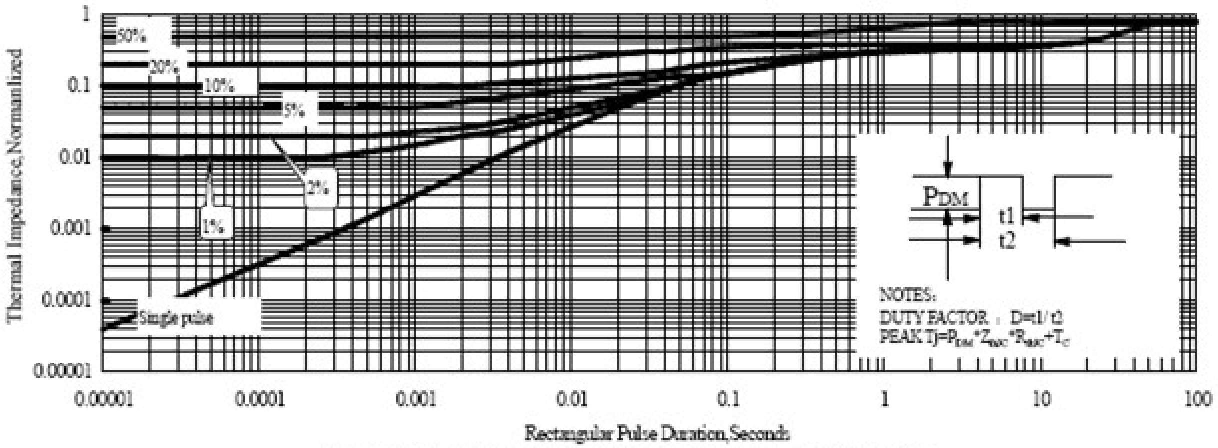


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

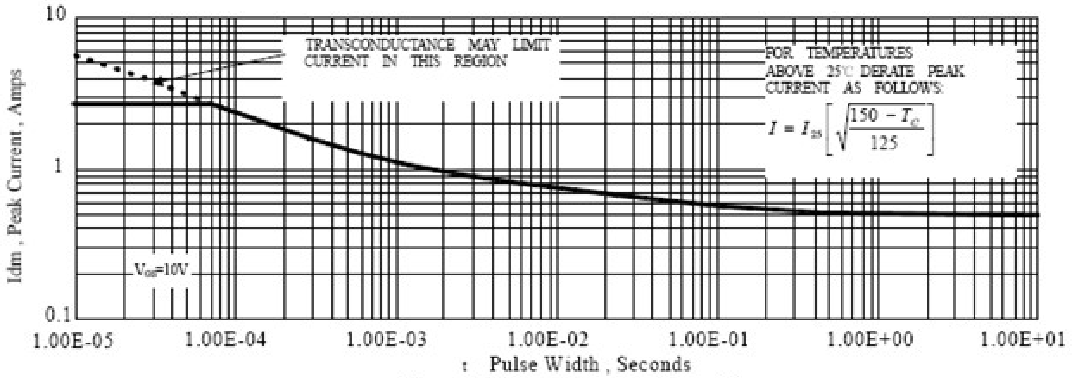


Figure 6 Maximum Peak Current Capability

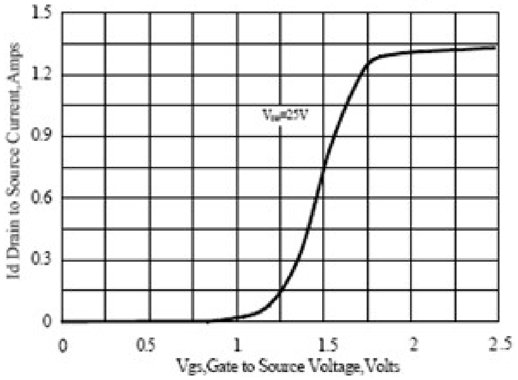


Figure 7 Typical Transfer Characteristics

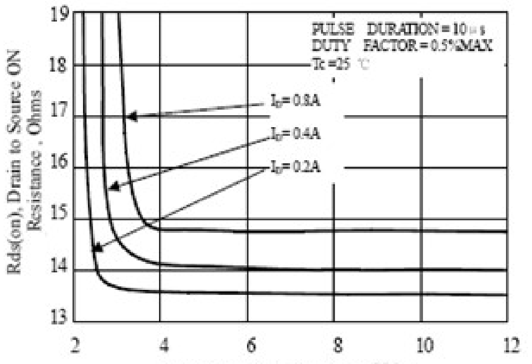


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

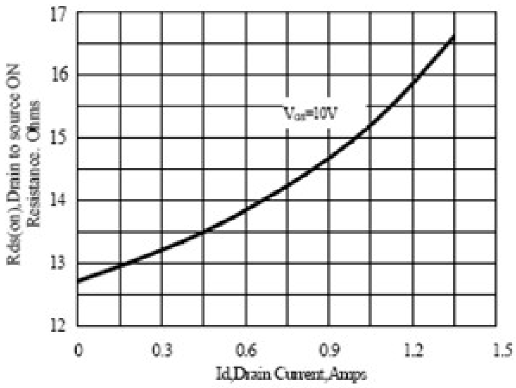


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

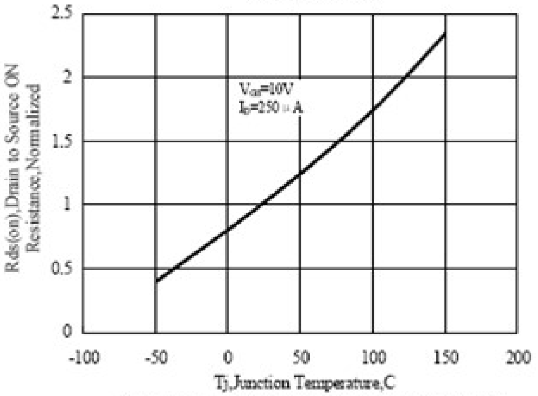


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

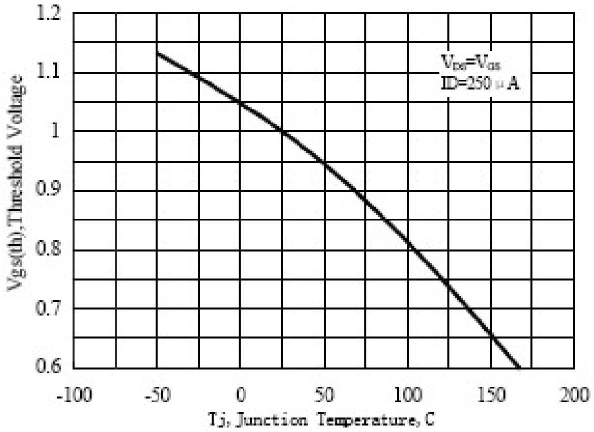


Figure 11 Typical Theshold Voltage vs Junction Temperature

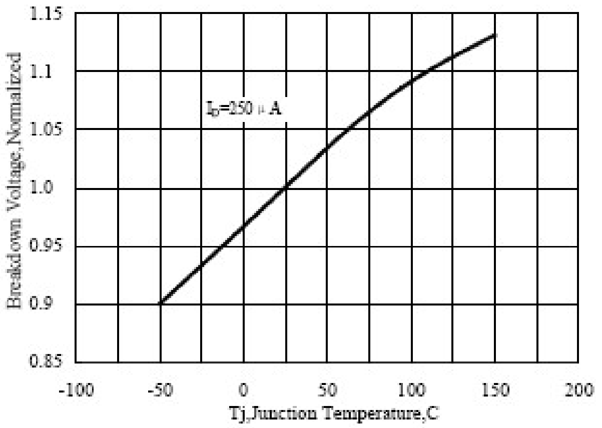


Figure 12 Typical Breakdown Voltage vs Junction Temperature

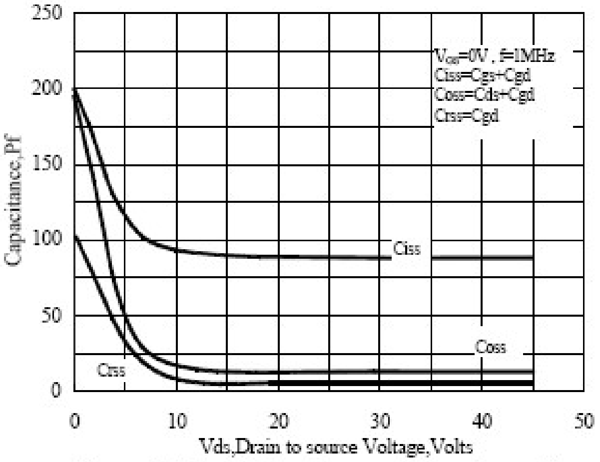


Figure 13 Typical Capacitance vs Drain to Source Voltage

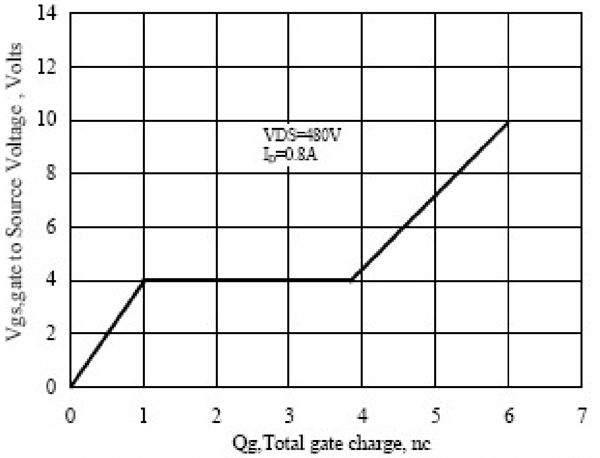


Figure 14 Typical Gate Charge vs Gate to Source Voltage

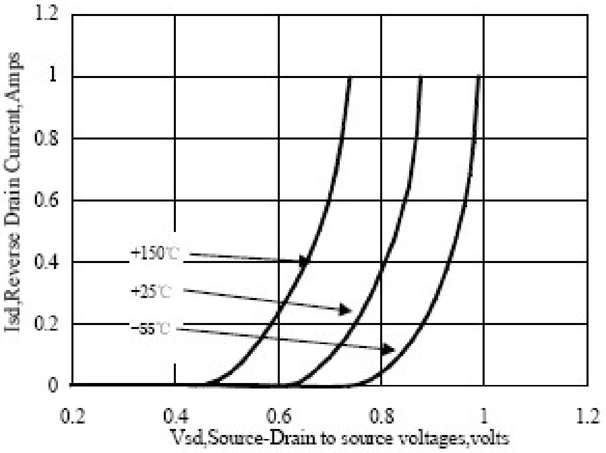


Figure 15 Typical Body Diode Transfer Characteristics

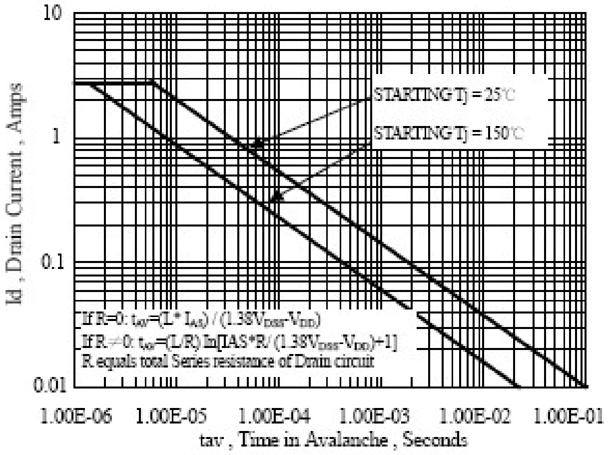


Figure 16 Unclamped Inductive Switching Capability