



# GL7N65FA9TD

## Silicon N-Channel Power MOSFET

### General Description

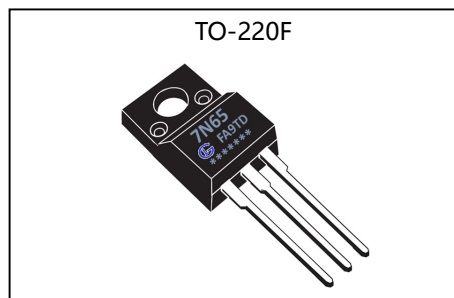
GL7N65FA9TD, the silicon N-channel Enhanced VDMOSFET, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the

avalanche energy. The transistor can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F, which accords with the RoHS standard.

|                        |      |          |
|------------------------|------|----------|
| $V_{DSS}$              | 650  | V        |
| $I_D$                  | 7    | A        |
| $P_D(T_C=25^{\circ}C)$ | 40   | W        |
| $R_{DS(ON).max.}$      | 1.25 | $\Omega$ |

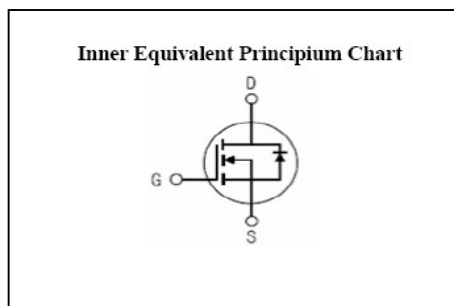
### Features

- Fast Switching
- Low ON Resistance( $R_{dson} \leq 1.25\Omega$ )
- Low Gate Charge (Typical Data:24nC)
- Low Reverse transfer capacitances(Typical:4.5pF)
- 100% Single Pulse avalanche energy Test



### Applications

- Power switch circuit of adaptor and charger



### Absolute (Tc=25°C unless otherwise specified)

| Symbol         | Parameter                                        | Rating          | Units |
|----------------|--------------------------------------------------|-----------------|-------|
| $V_{DSS}$      | Drain-to-Source Voltage                          | 650             | V     |
| $I_D$          | Continuous Drain Current                         | 7               | A     |
|                | Continuous Drain Current $T_C=100^{\circ}C$      | 4.5             | A     |
| $I_{DM}^{a1}$  | Pulsed Drain Current                             | 28              | A     |
| $V_{GS}$       | Gate-to-Source Voltage                           | $\pm 30$        | V     |
| $E_{AS}^{a2}$  | Single Pulse Avalanche Energy                    | 500             | mJ    |
| $E_{AR}^{a1}$  | Avalanche Energy ,Repetitive                     | 54              | mJ    |
| $I_{AR}^{a1}$  | Avalanche Current                                | 3.3             | A     |
| $dv/dt^{a3}$   | Peak Diode Recovery dv/dt                        | 5.0             | V/ns  |
| $P_D$          | Power Dissipation                                | 40              | W     |
|                | Derating Factor above 25°C                       | 0.32            | W/°C  |
| $T_J, T_{stg}$ | Operating Junction and Storage Temperature Range | 150, -55 to 150 | °C    |
| $T_L$          | Maximum Temperature for Soldering                | 300             | °C    |

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



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### Thermal Characteristics

| Symbol          | Parameter                               | Rating | Units |
|-----------------|-----------------------------------------|--------|-------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | 3.13   | °C/ W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 100    | °C/ W |

### Electrical Characteristics (Tc= 25°C unless otherwise specified)

| OFF Characteristics          |                                   |                                              |        |      |      |         |
|------------------------------|-----------------------------------|----------------------------------------------|--------|------|------|---------|
| Symbol                       | Parameter                         | Test Conditions                              | Rating |      |      | Units   |
|                              |                                   |                                              | Min.   | Typ. | Max. |         |
| $V_{DSS}$                    | Drain to Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$                    | 650    | --   | --   | V       |
| $\Delta BV_{DSS}/\Delta T_J$ | Bvdss Temperature Coefficient     | $I_D=250\mu A, \text{Reference } 25^\circ C$ | --     | 0.67 | --   | V/°C    |
| $I_{DSS}$                    | Drain to Source Leakage Current   | $V_{DS}=650V, V_{GS}=0V, T_a=25^\circ C$     | --     | --   | 1.0  | $\mu A$ |
|                              |                                   | $V_{DS}=520V, V_{GS}=0V, T_a=125^\circ C$    | --     | --   | 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 | $V_{GS}=10V, I_D=3.5A$        | --     | --   | 1.25 | $\Omega$ |
| $V_{GS(TH)}$                                | Gate Threshold Voltage        | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.0    | --   | 4.0  | V        |
| $g_{fs}$                                    | Forward Trans conductance     | $V_{DS}=15V, I_D=3.5A$        | --     | 6.5  | --   | S        |
| Pulse width < 380 $\mu$ s; 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>$f=1.0MHz$ | --     | 1080 | --   | pF    |
| $C_{oss}$               | Output Capacitance           |                                       | --     | 93   | --   |       |
| $C_{rss}$               | Reverse Transfer Capacitance |                                       | --     | 37.5 | --   |       |

| Resistive Switching Characteristics |                     |                                                      |        |      |      |       |
|-------------------------------------|---------------------|------------------------------------------------------|--------|------|------|-------|
| Symbol                              | Parameter           | Test Conditions                                      | Rating |      |      | Units |
|                                     |                     |                                                      | Min.   | Typ. | Max. |       |
| $t_{d(ON)}$                         | Turn-on Delay Time  | $I_D=7A, V_{DD}=325V$<br>$V_{GS}=10V, R_g=9.1\Omega$ | --     | 11   | --   | ns    |
| $t_r$                               | Rise Time           |                                                      | --     | 10   | --   |       |
| $t_{d(OFF)}$                        | Turn-Off Delay Time |                                                      | --     | 36   | --   |       |
| $t_f$                               | Fall Time           |                                                      | --     | 18   | --   |       |
| $Q_g$                               | Total Gate Charge   | $I_D=7A, V_{DD}=325V$                                | --     | 23   | --   | nC    |



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|          |                                  |              |    |   |    |  |
|----------|----------------------------------|--------------|----|---|----|--|
| $Q_{gs}$ | Gate to Source Charge            | $V_{GS}=10V$ | -- | 5 | -- |  |
| $Q_{gd}$ | Gate to Drain ( "Miller" )Charge |              | -- | 8 | -- |  |

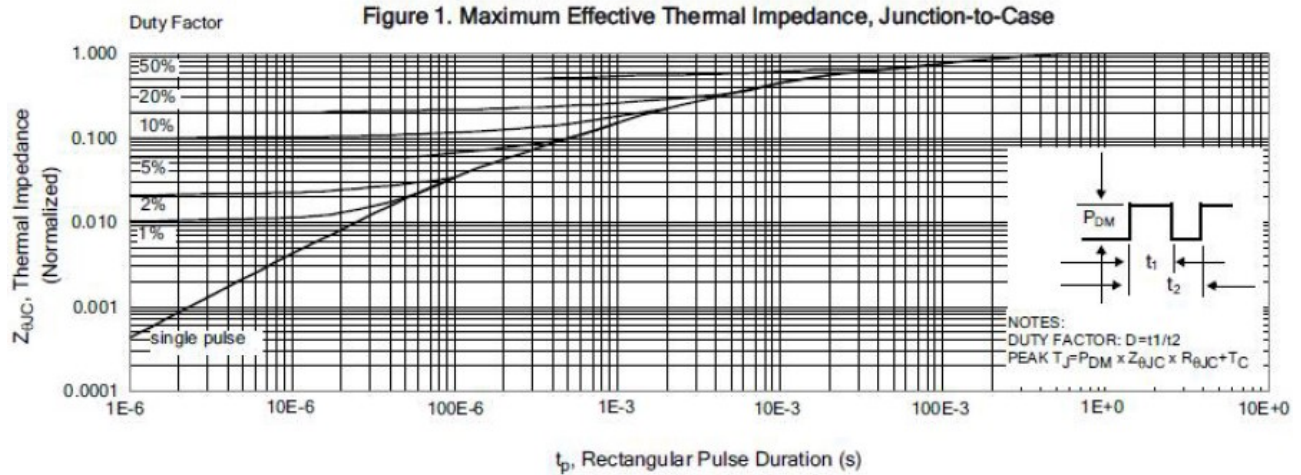
| Source-Drain Diode Characteristics |                                        |                                 |        |      |      |       |
|------------------------------------|----------------------------------------|---------------------------------|--------|------|------|-------|
| Symbol                             | Parameter                              | Test Conditions                 | Rating |      |      | Units |
|                                    |                                        |                                 | Min.   | Typ. | Max. |       |
| $I_{SD}$                           | Continuous Source Current (Body Diode) |                                 | --     | --   | 7    | A     |
| $I_{SM}$                           | Maximum Pulsed Current (Body Diode)    |                                 | --     | --   | 28   | A     |
| $V_{SD}$                           | Diode Forward Voltage                  | $I_S=7A, V_{GS}=0V$             | --     | --   | 1.5  | V     |
| $t_{rr}$                           | Reverse Recovery Time                  | $I_S=7A, T_J=25^{\circ}C$       | --     | 280  | --   | ns    |
| $Q_{rr}$                           | Reverse Recovery Charge                | $di_F/dt=100A/\mu s, V_{GS}=0V$ | --     | 1400 | --   | nC    |

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

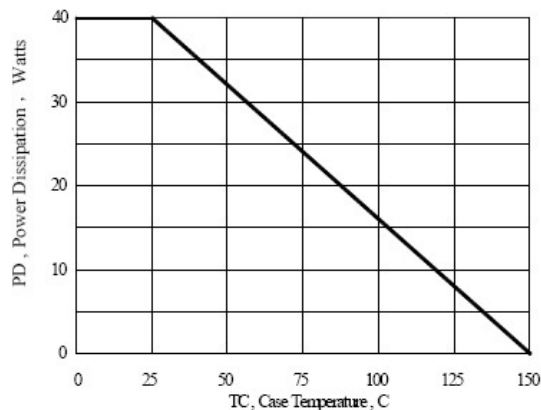
a2:  $L=10mH$ ,  $I_D=10.3A$ , Start  $T_J=25^{\circ}C$

a3:  $I_{SD}=7A, di/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}$ , Start  $T_J=25^{\circ}C$

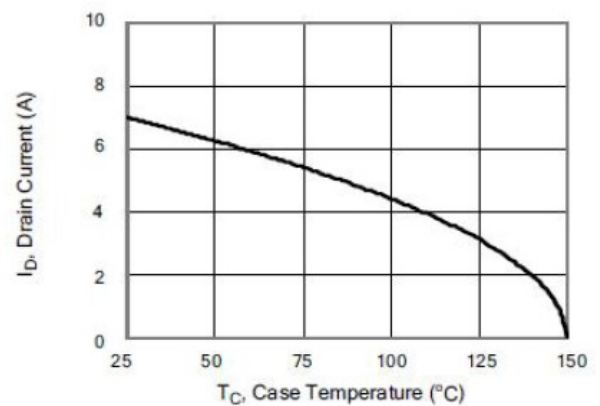
### Characteristics Curves



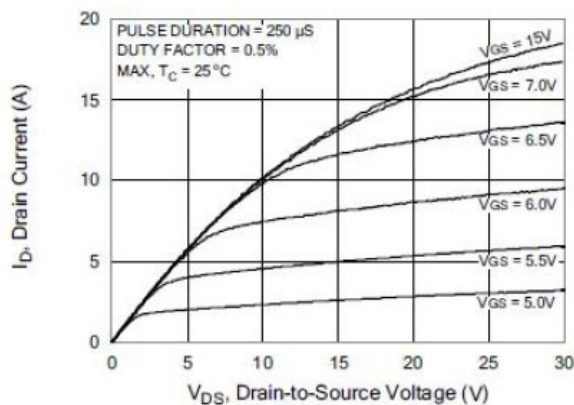
**Figure 2. Maximum Power Dissipation vs Case Temperature**



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



**Figure 4. Typical Output Characteristics**



**Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**

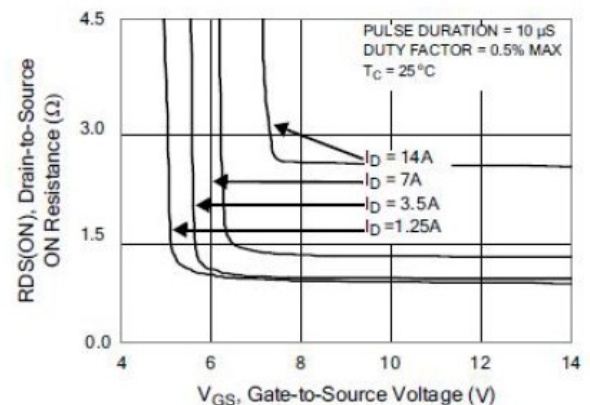


Figure 6. Maximum Peak Current Capability

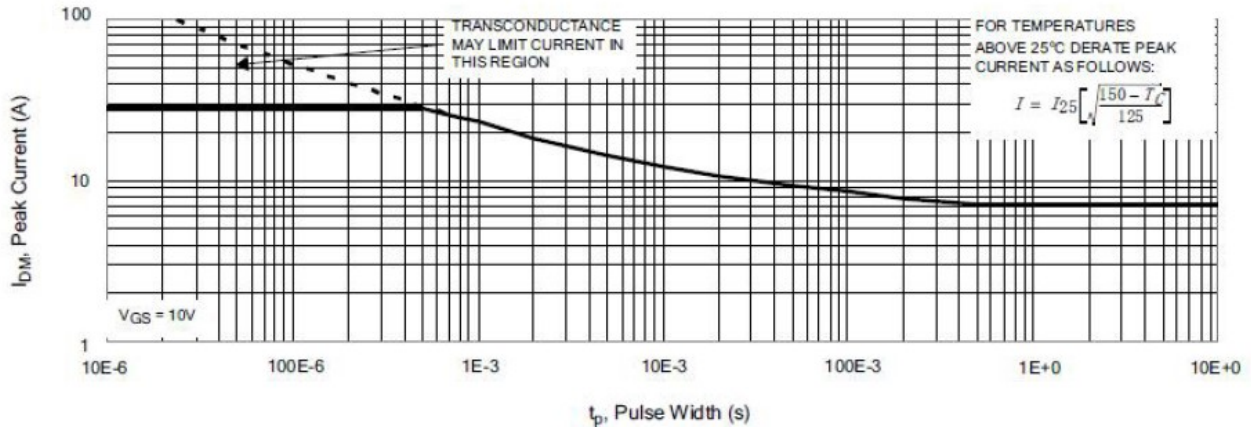


Figure 7. Typical Transfer Characteristics

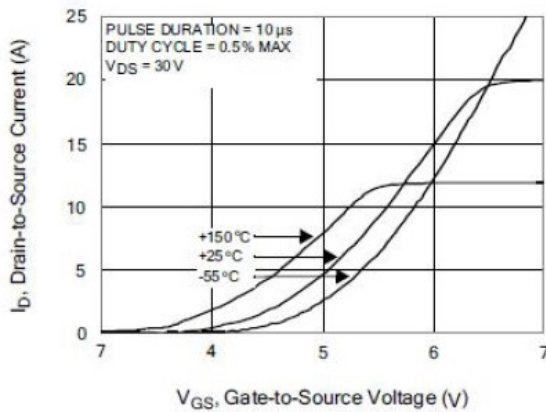


Figure 8. Unclamped Inductive Switching Capability

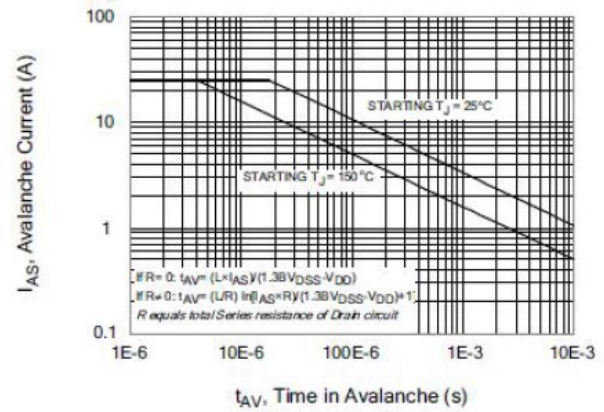


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

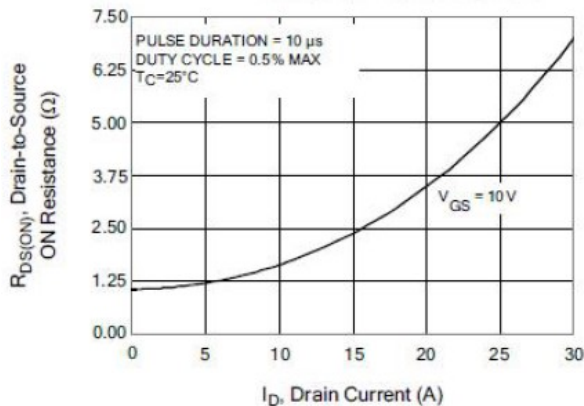
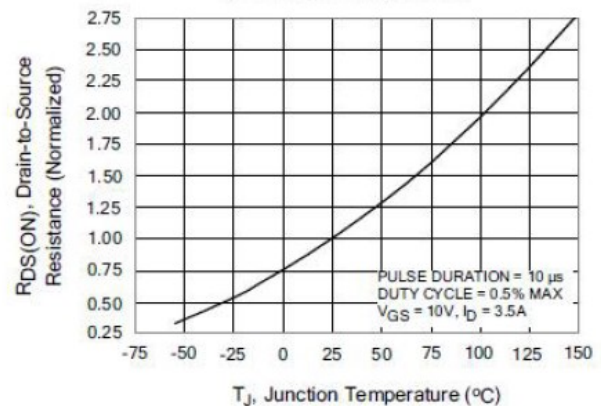


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature





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Figure 11. Typical Breakdown Voltage vs Junction Temperature

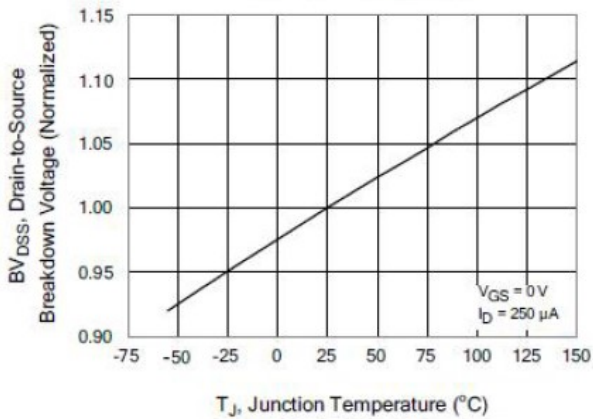


Figure 12. Typical Threshold Voltage vs Junction Temperature

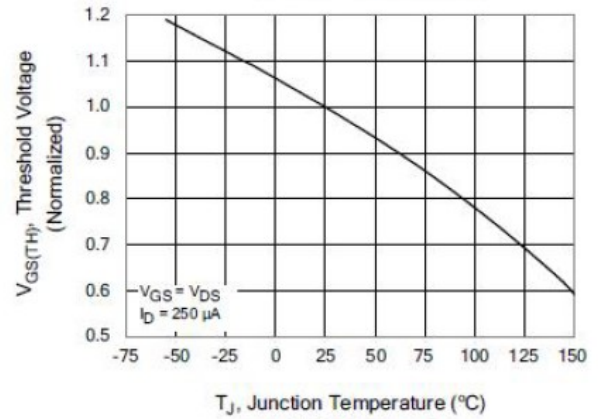


Figure 13. Maximum Forward Bias Safe Operating Area

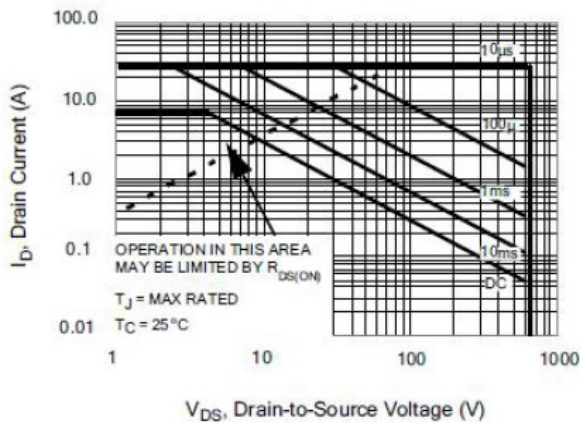


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

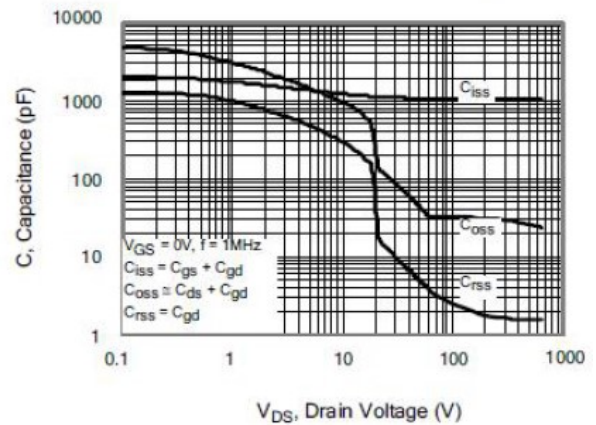


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

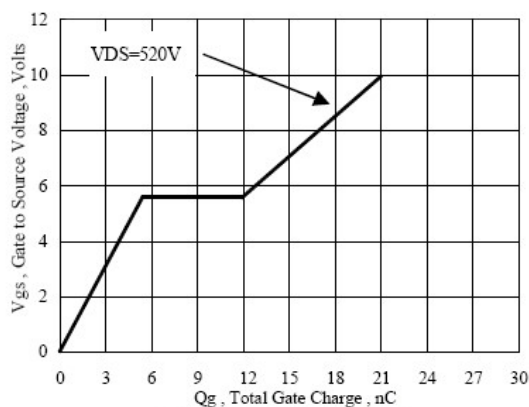


Figure 16. Typical Body Diode Transfer Characteristics

