GL5N65FA9

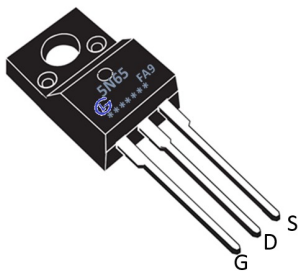
Silicon N-Channel Power MOSFET

$V_{DSS}(T_C=150℃)$	650	V
I_D	5.0	A
$P_D(T_C=25℃)$	30	W
$R_{DS(ON)}$	1.9	Ω

General Description:

GL5N65FA9, 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.

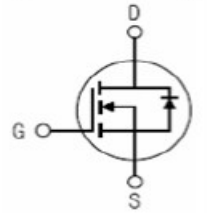
TO-220F



Features:

- Fast Switching
- ESD Improved Capability
- Low ON Resistance(Typical Data:1.9Ω)
- Low Gate Charge (Typical Data:14.5nC)
- Low Reverse transfer capacitances(Typical:8.5pF)
- 100% Single Pulse avalanche energy Test

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	5	A
	Continuous Drain Current T_C=100 °C	3.2	A
I_{DM}[a1]	Pulsed Drain Current	16	A
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}[a2]	Single Pulse Avalanche Energy	150	mJ
E_{AR}[a1]	Avalanche Energy ,Repetitive	30	mJ
I_{AR}[a1]	Avalanche Current	2.5	A
dv/dt[a3]	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	30	W
	Derating Factor above 25°C	0.24	W/℃
T_J, T_{stg}	Operating Junction and Storage Temperature Range	150, −55 to 150	℃
T_L	MaximumTemperature for Soldering	300	℃

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℃	--	--	1.0	μA
		V_{DS}=650V,V_{GS}=0V,T_a=125℃	--	--	250	
$I_{GSS(F)}$	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=2.5A	--	1.9	2.5	Ω
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2.0	--	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=2.5A	--	3.5	--	S
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=25V f=1.0MHz	--	544	--	pF
C_{oss}	Output Capacitance		--	55	--	
C_{rss}	Reverse Transfer Capacitance		--	8.5	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D=5.0A,V_{DD}=325V R_g=12Ω	--	10	--	ns
tr	Rise Time		--	11	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	31	--	
t_f	Fall Time		--	16	--	
Q_g	Total Gate Charge	I_D=5.0A,V_{DD}=325V V_{GS}=10V	--	14.5	--	nC
Q_{gs}	Gate to Source Charge		--	3.0	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	6.0	--	

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=5.0A,V_{GS}=0V	--	--	1.5	V
t_{rr}	Reverse Recovery Time	I_S=5.0A,T_j=25℃	--	465	--	ns
Q_{rr}	Reverse Recovery Charge	dI_F/dt=100A/us,V_{GS}=0V	--	1.7	--	μC
Pulse width tp≤380μs,δ≤2%						

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case	4.17	℃/W
$R_{\theta JA}$	Junction-to-Ambient	100	℃/W

Gate-source Zener diode

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{GSO}	Gate-source breakdown voltage	I_{GS}= ±1mA(Open Drain)	30			V

The built-in back-to-back Zener diodes have specifically been designed to enhance not only the device' s ESD capability, but also to make them safely absorb possible voltage transients that may occasionally be applied from gate to source. In this respect the Zener voltage is appropriate to achieve an efficient and cost-effective intervention to protect the device' s integrity. These integrated Zener diodes thus avoid the usage of external components.

[a1]: Repetitive rating; pulse width limited by maximum junction temperature
[a2]: L=10.0mH, I_D=5.5A, Start T_J=25℃
[a3]: I_{SD} =5A,di/dt≤100A/us,V_{DD}≤$BV_{DS,}$ Start T_J=25℃

Characteristics Curve:

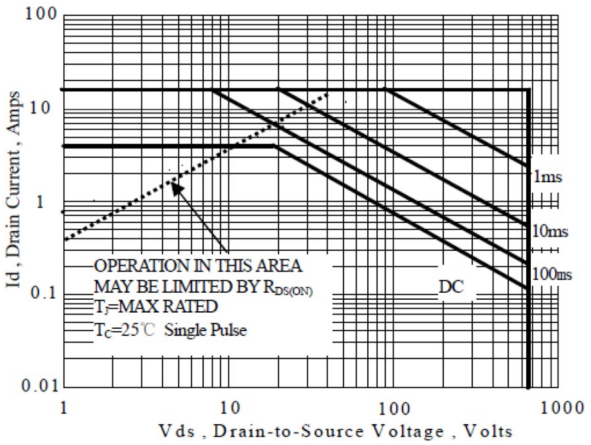


Figure 1 Maximum Forward Bias Safe Operating Area

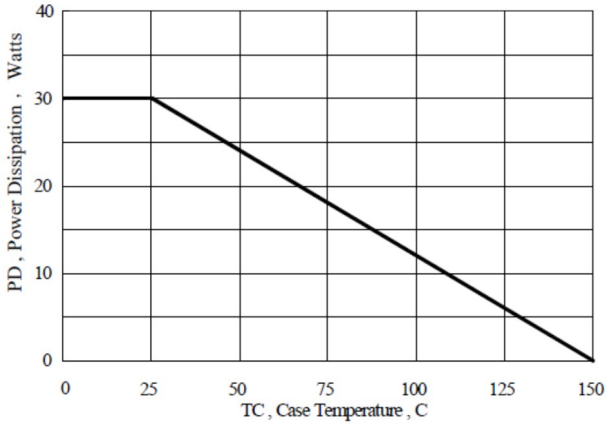


Figure 2 Maximum Power Dissipation vs Case Temperature

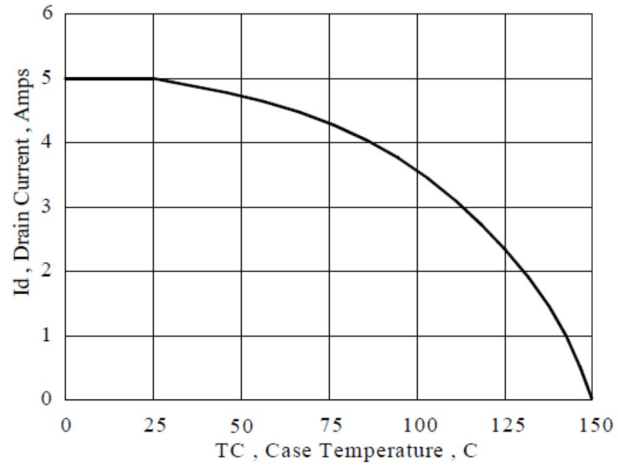


Figure 3 Maximum Continuous Drain Current vs Case Temperature

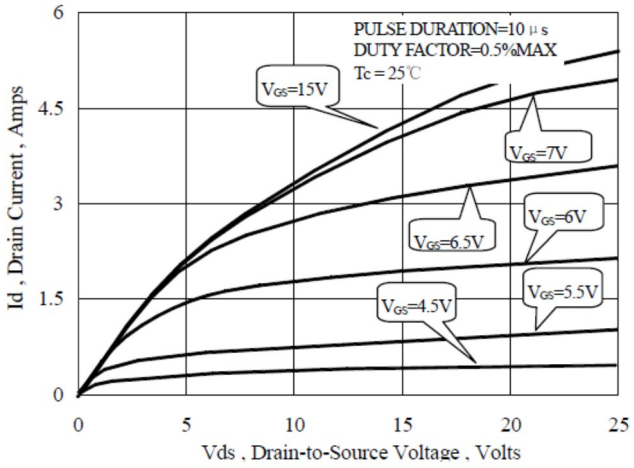


Figure 4 Typical Output Characteristics

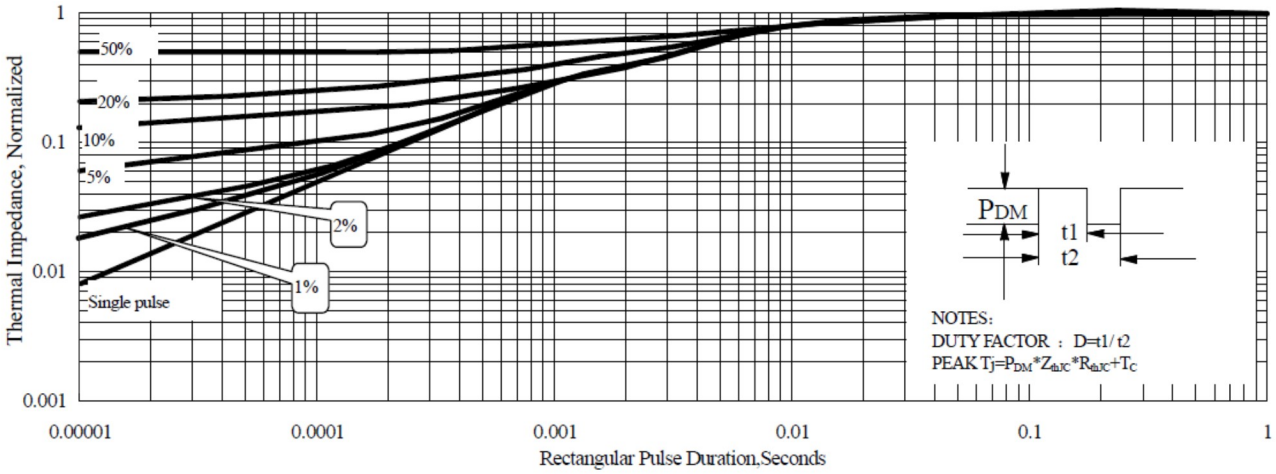


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

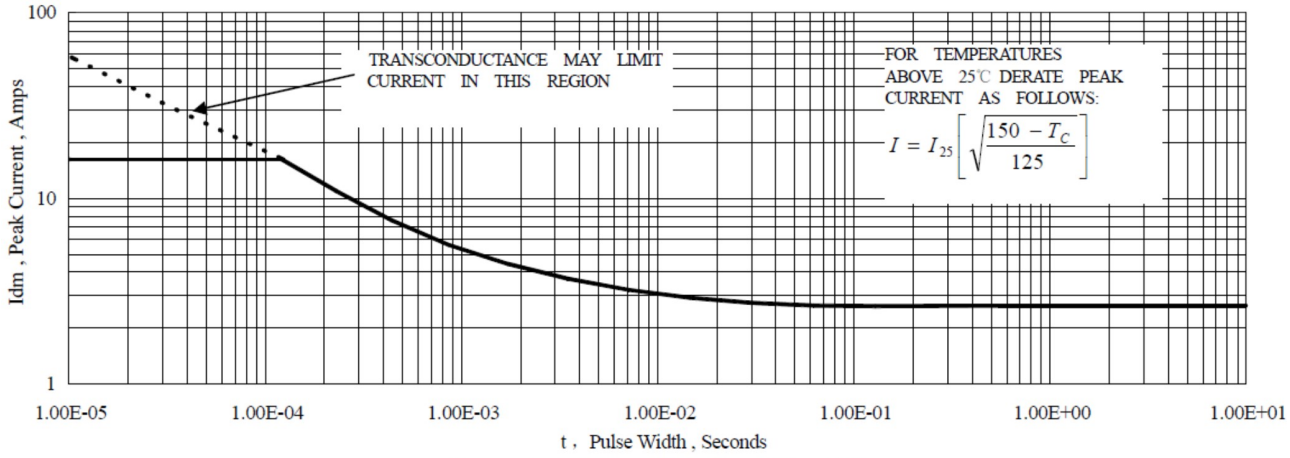


Figure 6 Maximum Peak Current Capability

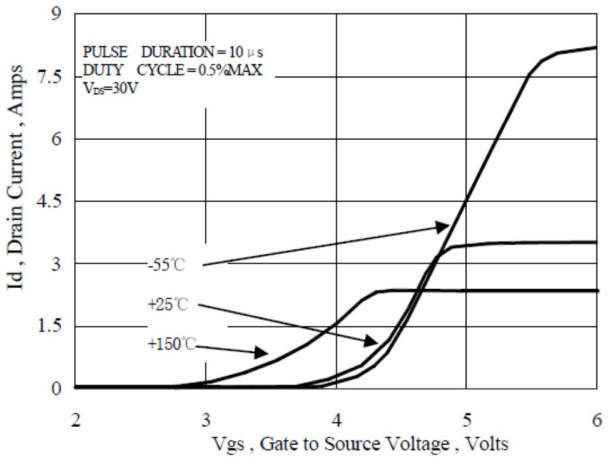


Figure 7 Typical Transfer Characteristics

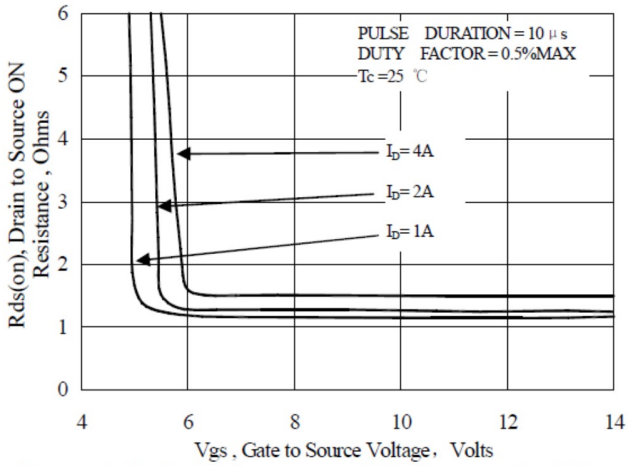


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

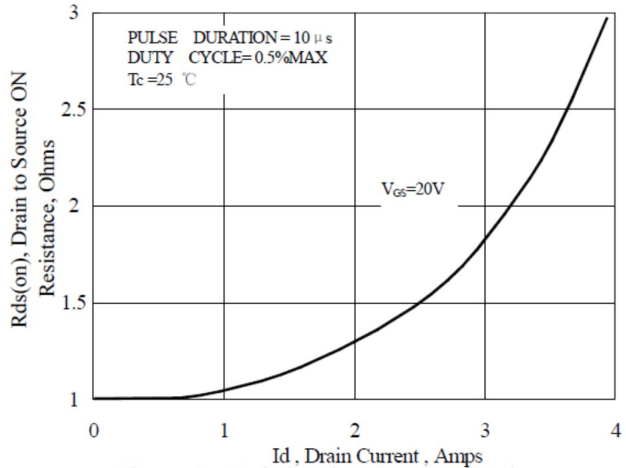


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

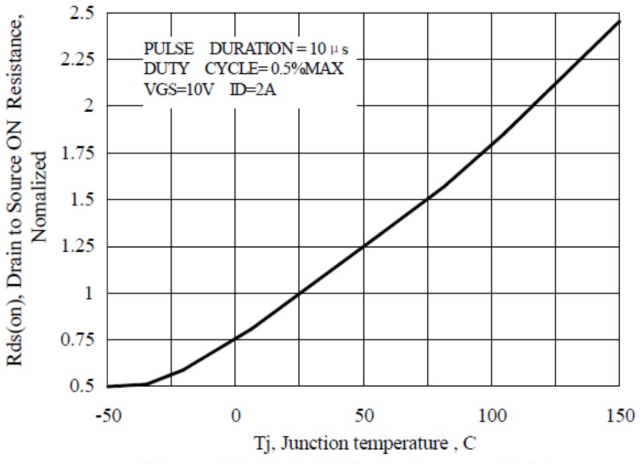


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

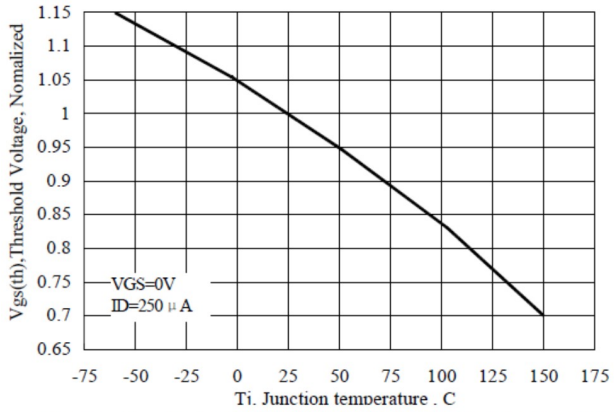


Figure 11 Typical Theshold Voltage vs Junction Temperature

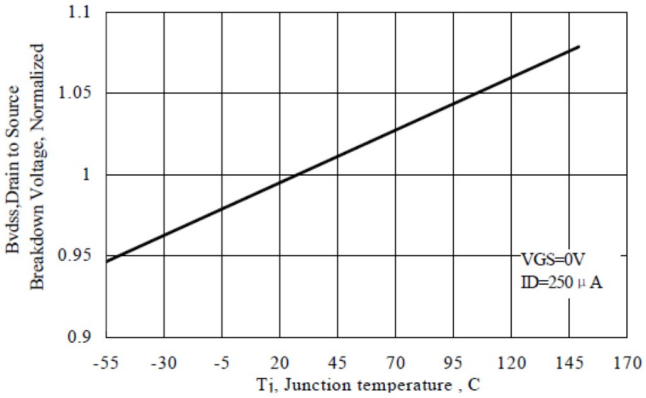


Figure 12 Typical Breakdown Voltage vs Junction Temperature

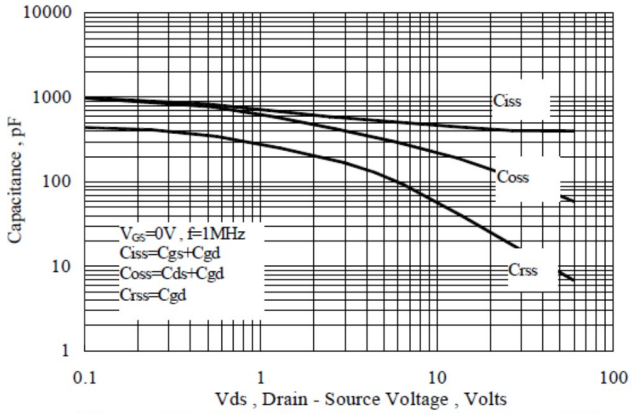


Figure 13 Typical Capacitance vs Drain to Source Voltage

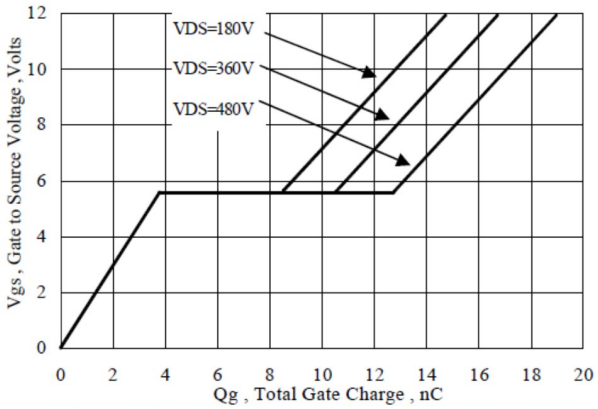


Figure 14 Typical Gate Charge vs Gate to Source Voltage

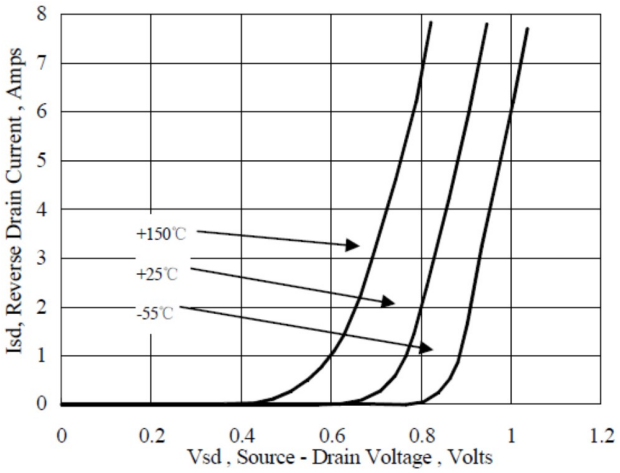


Figure 15 Typical Body Diode Transfer Characteristics

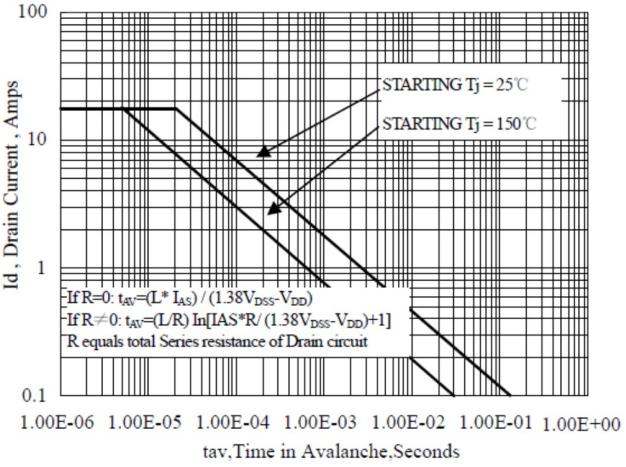


Figure 16 Unclamped Inductive Switching Capability