F501D

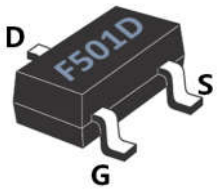
GL Silicon N-Channel Power MOSFET

General Description

F501D the silicon N-channel Depletion mode MOSFETS, is obtained by the self-aligned planar Technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. The package form is SOT-23, which accords with the RoHS and Halogen Free standard.

V_{DSX}	600	V
$I_{DSS\ MIN}$	12	mA
$R_{DS(ON)max}$	700	Ω

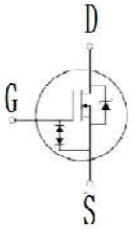
SOT-23



Features

- N-Channel
- ESD improved Capability
- Depletion Mode
- dv/dt rated
- Pb-free lead plating; ROHS compliant
- Halogen Free

Inner Equivalent Priccipium Chart



Absolute (Tc= 25℃ unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DSX}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	0.030	A
	Continuous Drain Current T_C =70 °C	0.024	A
I_{DM}[a1]	Pulsed Drain Current	0.120	A
V_{GS}	Gate-to-Source Voltage	±20	V
dv/dt[a2]	Peak Diode Recovery dv/dt	5.0	V/ns
P_D	Power Dissipation	0.5	W
$V_{ESD(G-S)}$	Gate source ESD (HBM-C= 100pF, R=1.5kΩ)	300	V
T_J, Tstg	Operating Junction and Storage Temperature Range	150, −55 to 150	℃
T_L	Maximum Temperature for Soldering	300	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Units
$R_{\theta JA}$	Junction-to-Ambient	250	℃/W

Electrical Characteristics (Tc=25℃ unless otherwise specified)

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{DSX}	Drain to Source Breakdown Voltage	V_{GS}=-5V, I_D=250μA	600	--	--	V
$I_{D(off)}$	Off-state Drain to Source Current	V_{DS} =600V, V_{GS}= -5V	--	--	0.1	μA
		V_{DS}=480V,V_{GS}=-5V,T_a=125°C	--	--	10	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	V_{GS}=+10V	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	V_{GS}=-10V	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_{DSS}	On-state drain current	V_{GS}=0V, V_{DS} =25V	12	--	--	mA
$R_{DS(ON)}$	Drain-to-Source On-Resistance	V_{GS}=0V,I_D=3mA	--	350	700	Ω
		V_{GS}=10V,I_D=16mA	--	400	800	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = 3V, I_D =8.0μA	-2.7	-1.8	-1.0	V

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g_{fs}	Forward Transconductance	V_{DS}=50V, I_D=0.01A	0.008	0.017	--	S
C_{iss}	Input Capacitance	V_{GS}=-5V,V_{DS}=25V,f=1.0MHz	--	50	--	pF
C_{oss}	Output Capacitance		--	4.53	--	
C_{rss}	Reverse Transfer Capacitance		--	1.08	--	

Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	I_D =0.01A,V_{DD} =300V V_{GS}=-5...7V,R_G =6.0Ω	--	9.9	--	ns
t_r	Rise Time		--	55.8	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	56.4	--	
t_f	Fall Time		--	136	--	
Q_g	Total Gate Charge	I_D=0.01A,V_{DD} =400V V_{GS}=-5V to 5V	--	1.14	--	nC
Q_{gs}	Gate to Source Charge		--	0.5	--	
Q_{gd}	Gate to Drain (“Miller”)Charge		--	0.37	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I_S	Continuous Source Current (Body Diode)	Ta=25°C	--	--	0.025	A
I_{SM}	Maximum Pulsed Current (Body Diode)		--	--	0.100	A
V_{SD}	Diode Forward Voltage	I_F=16mA,V_{GS}=-5V	--	--	1.2	V
t_{rr}	Reverse Recovery Time	I_F=0.01A,T_j=25°C	--	243	--	ns
Q_{rr}	Reverse Recovery Charge	dI_F/dt=100A/us,V_R=300V	--	636	--	nC

Gate-source Zener diode						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{GSO}	Gate-source breakdown voltage	I_{GS}= ±1mA(Open Drain)	20			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.

Characteristics Curve

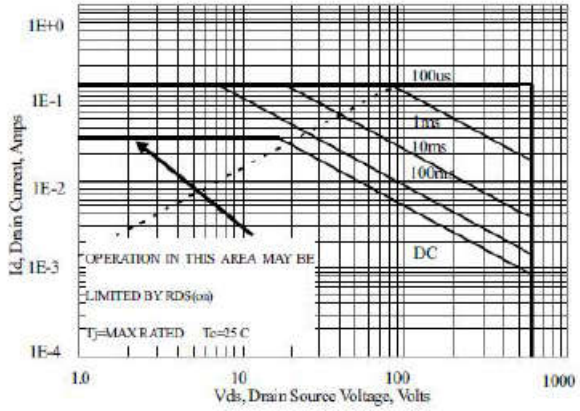


Figure 1 Maximum Forward Bias Safe Operating Area

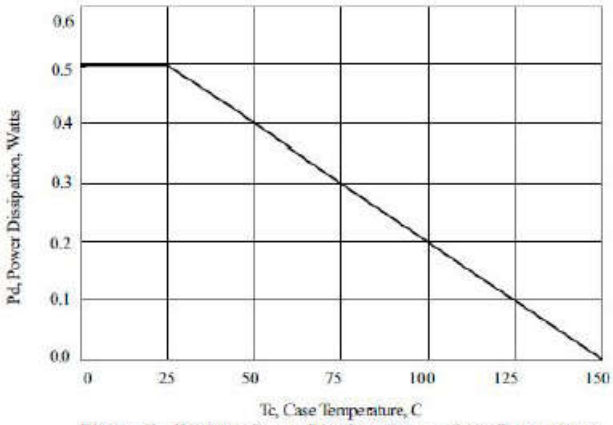


Figure 2 Maximum Power Dissipation vs Case Temperature

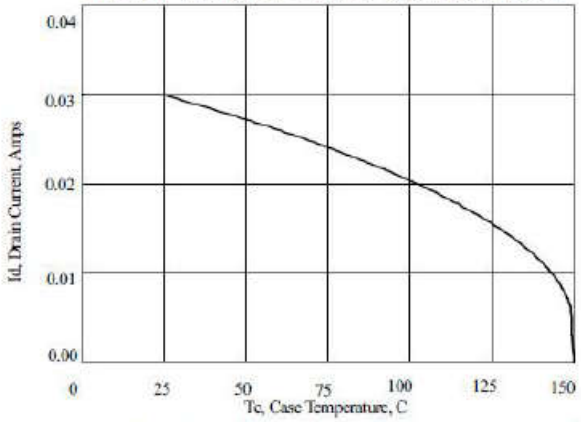


Figure 3 Maximum Continuous Drain Current vs Case Temperature

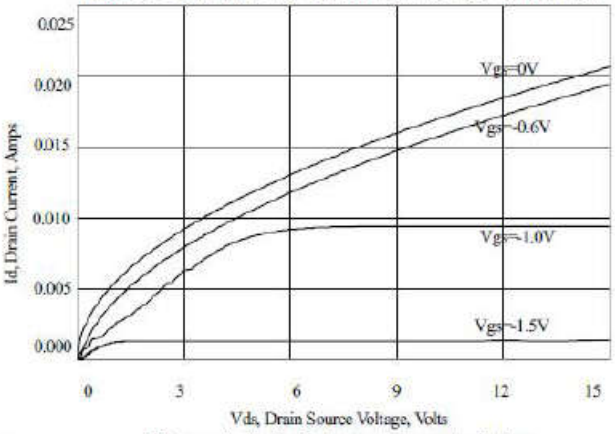


Figure 4 Typical Output Characteristics

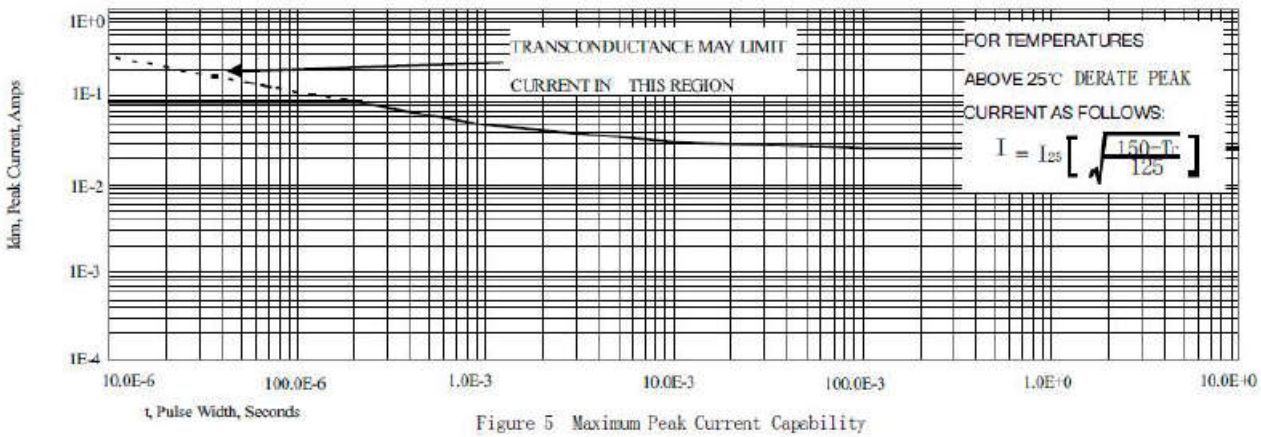


Figure 5 Maximum Peak Current Capability

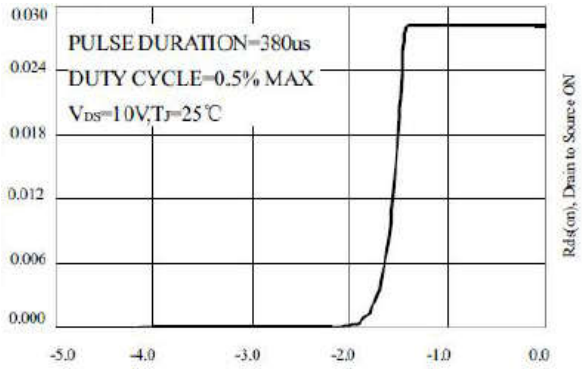


Figure 6 Typical Transfer Characteristics

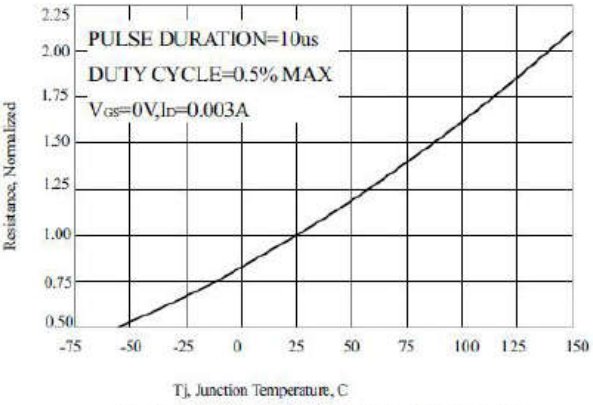


Figure 7 Typical Drain to Source ON Resistance vs Junction Temperature

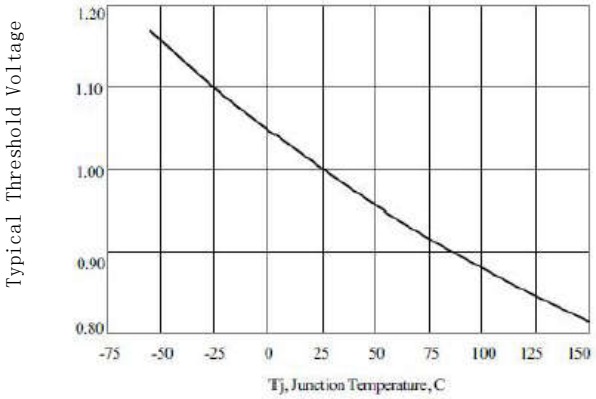


Figure 8 Typical Threshold Voltage vs Junction Temperature

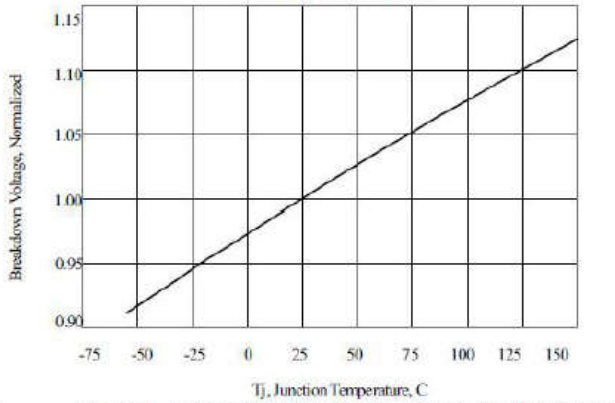


Figure 9 Typical Breakdown Voltage vs Junction Temperature

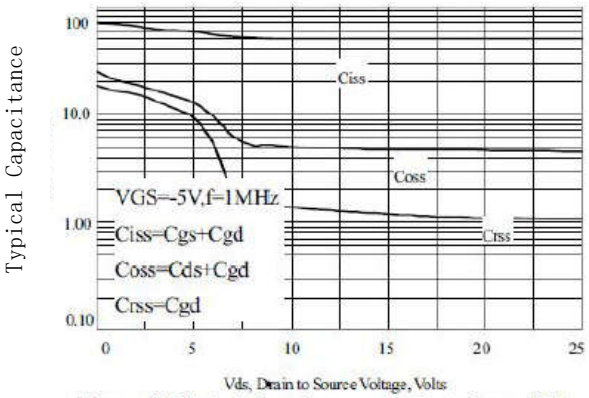


Figure 10 Typical Capacitance vs Drain to Source Voltage

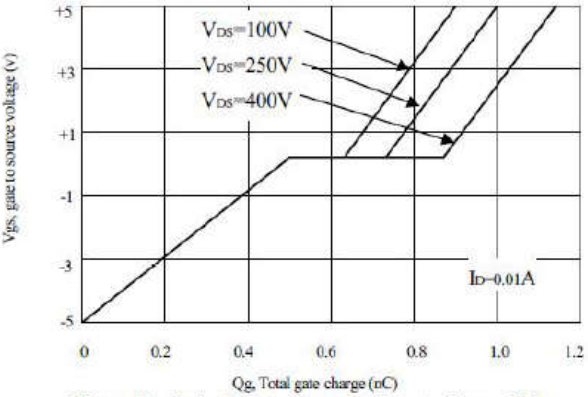


Figure 11 Typical Gate Charge vs Gate to Source Voltage

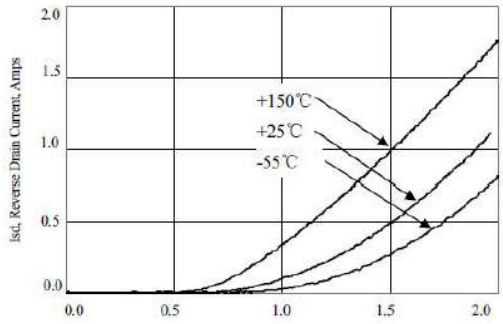


Figure 12 Typical Body Diode Transfer Characteristics