MLSM
MICROELECTRONICS

MLSK2009P

-20V/-9A P-Channel MOSFET

Features

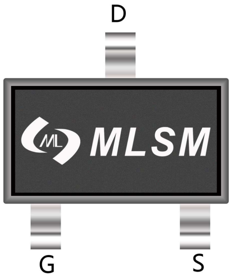
- Trench Power LV MOSFET technology
- High density cell design for Low $R_{DS(ON)}$
- High Speed switching

Product Summary

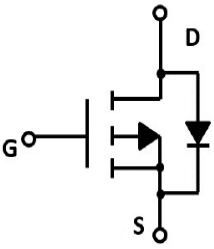
V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
-20V	16mΩ@-4.5V	-9A
	23mΩ@-2.5V	

Application

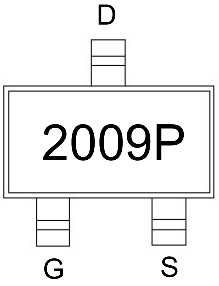
- Battery protection
- Load switch
- Power management



SOT-23-3L top view



Schematic diagram



2009P: Device code

Marking and pin assignment

Pb-Free RoHS Halogen-Free

Absolute Maximum Ratings (TA=25℃unless otherwise noted)				
Symbol	**Parameter**		**Rating**	**Unit**
Common Ratings (TC=25°C Unless Otherwise Noted)				
V_{DS}	Drain-Source Breakdown Voltage		-20	V
V_{GS}	Gate-Source Voltage		±10	V
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-50 to 155	°C
I_S	Diode Continuous Forward Current	Tc=25°C	-9	A
Mounted on Large Heat Sink				
I_{DM}	Pulse Drain Current Tested	Tc=25°C	-42	A
I_D	Continuous Drain Current	Tc=25°C	-9	A
P_D	Maximum Power Dissipation	Tc=25°C	1.3	W
$R_{θJA}$	Thermal Resistance Junction-Ambient		358	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MLSK2009P	SOT-23-3L	2009P	3,000	45,000	180,000	7"reel

Electrical Characteristics (TJ=25℃ unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$BV_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V，I_D=-250μA	-20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V，V_{GS}=0V	--	--	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±10V，V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=-250μA	-0.5	-0.62	-1.2	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V，I_D=-6A	--	13	16	mΩ
		V_{GS}=-2.5V，I_D=-6A	--	16	23	mΩ
		V_{GS}=-1.8V，I_D=-3A	--	22	40	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=-10V，V_{GS}=0V， f=1MHz	--	1374	--	pF
C_{OSS}	Output Capacitance		--	236	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	216	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=-10V，I_D=-6A， V_{GS}=-4.5V	--	73	--	nC
Q_{gs}	Gate Source Charge		--	6.5	--	nC
Q_{gd}	Gate Drain Charge		--	10	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-10V，I_D=-6A， V_{GS}=-10V，R_G=3Ω	--	7	--	nS
t_r	Turn-on Rise Time		--	33	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	130	--	nS
t_f	Turn-Off Fall Time		--	135	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=-6A	--	-0.8	-1.2	V

Typical Operating Characteristics

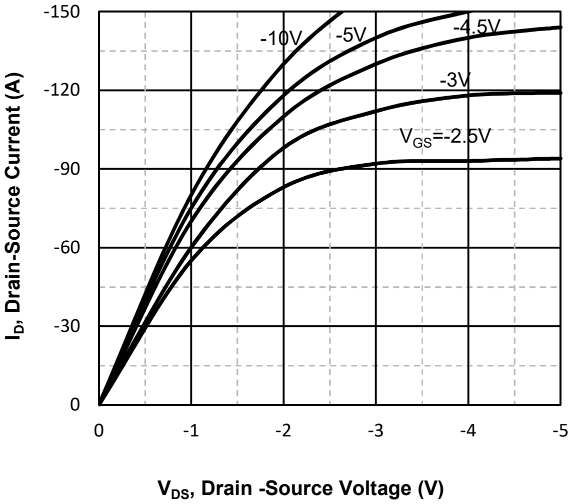


Fig1. Typical Output Characteristics

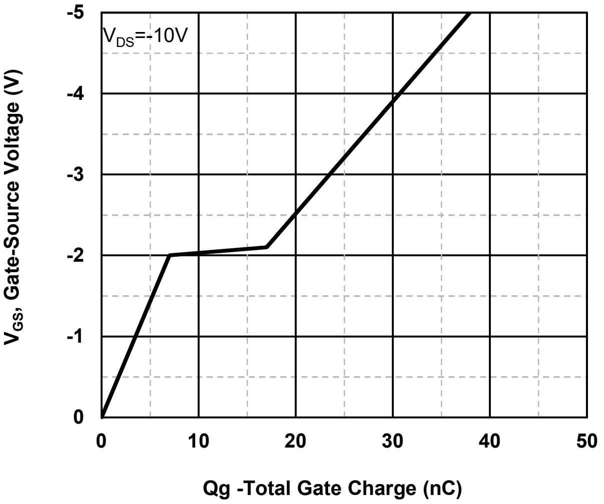


Fig2. Typical Gate Charge Vs.Gate-Source Voltage

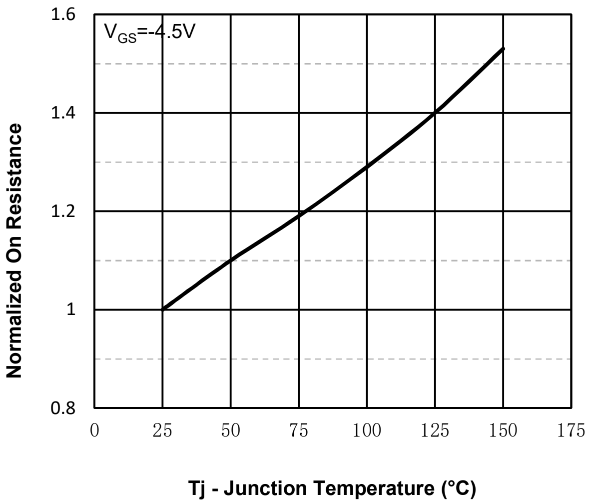


Fig3. Normalized On-Resistance Vs. Temperature

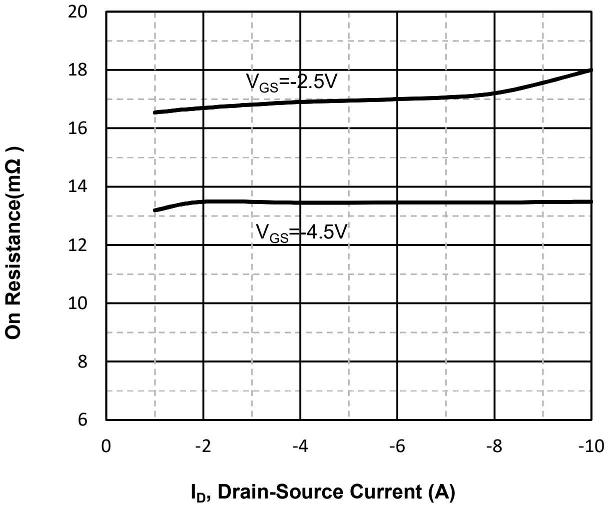


Fig4. On-Resistance Vs. Drain-Source Current

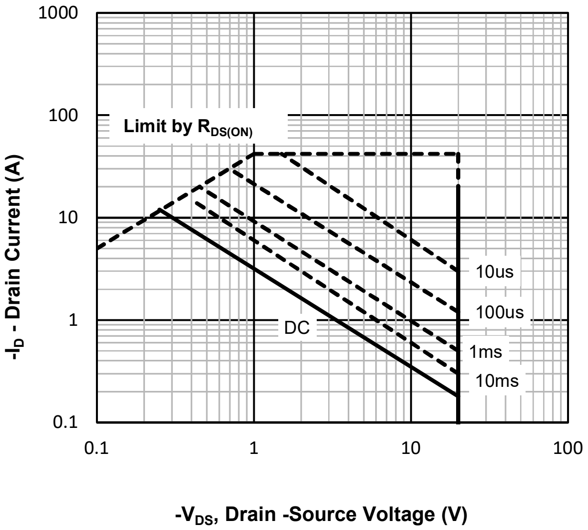


Fig5. Maximum Safe Operating Area

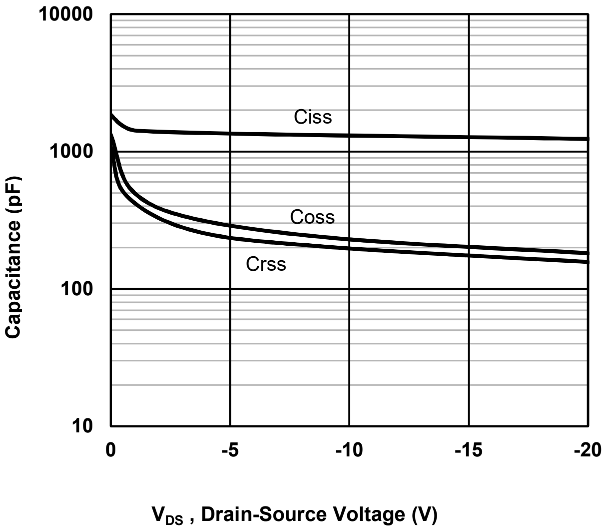
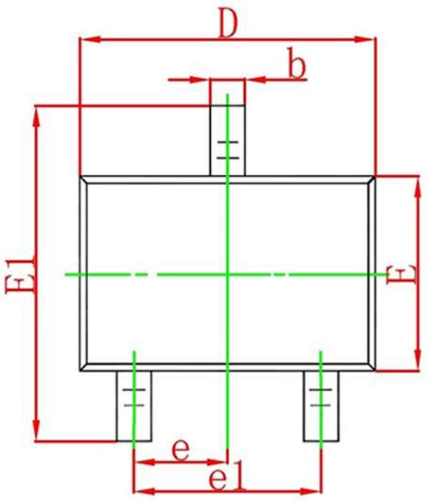
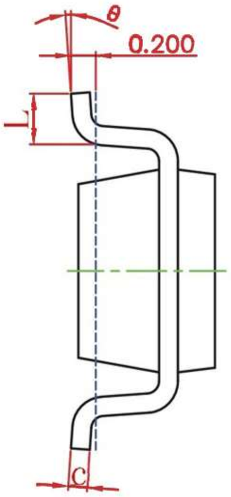
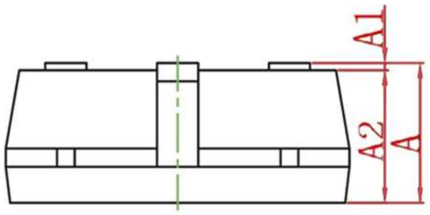


Fig6 Typical Capacitance Vs.Drain-Source Voltage

SOT-23-3L Package information







Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.042	0.050
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.042	0.046
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.112	0.120
E	1.500	1.700	0.060	0.068
E1	2.650	2.950	0.106	0.118
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°