MLSMPC05

12V N-Channel and P-Channel MOSFET

Features

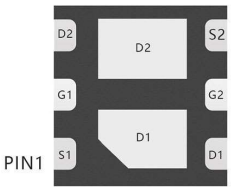
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

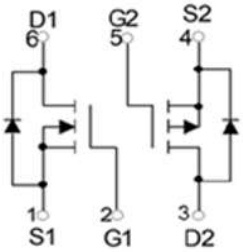
- Battery protection
- Load switch
- Power management

Product Summary

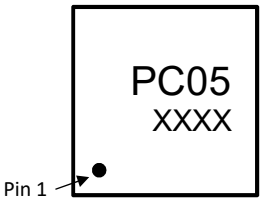
V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
12V	29mΩ@4.5V	4.5A
	34mΩ@2.5V	
-12V	61mΩ@-4.5V	-4.5A
	81mΩ@-2.5V	



DFN2X2-6L view



Schematic diagram



PC05 : Device code
XXXX : Code

Marking and pin assignment

Pb-Free RoHS Halogen-Free

Absolute Maximum Ratings (TA=25℃unless otherwise noted)

Symbol	Parameter		N-Channel	P-Channel	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)					
V_{DS}	Drain-Source Breakdown Voltage		12	-12	V
V_{GS}	Gate-Source Voltage		±8	±8	V
T_J	Maximum Junction Temperature		150	150	°C
T_{STG}	Storage Temperature Range		-55 to 150	-55 to 150	°C
I_S	Diode Continuous Forward Current	Tc=25°C	4.5	-4.5	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	22	-22	A
I_D	Continuous Drain Current	Tc=25°C	4.5	-4.5	A
P_D	Maximum Power Dissipation	Tc=25°C	2	2	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62.5	62.5	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MLSMPC05	DFN2X2-6L	PC05	3,000	45,000	180,000	7"reel

N-Ch 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	12	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=12V，V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±8V，V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=250μA	0.4	--	1.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=4.5V，I_D=4.5A	--	24	29	mΩ
		V_{GS}=2.5V，I_D=3.0A	--	28	34	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=10V，V_{GS}=0V， f=1MHz	--	900	--	pF
C_{OSS}	Output Capacitance		--	162	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	105	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=10V，I_D=4.5A，V_{GS}=4.5V	--	15	--	nC
Q_{gs}	Gate Source Charge		--	1.8	--	nC
Q_{gd}	Gate Drain Charge		--	2.8	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=10V，R_L=1.4Ω，V_{GS}=4.5V，R_G=3Ω	--	4.5	--	nS
t_r	Turn-on Rise Time		--	9.2	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	18.7	--	nS
t_f	Turn-Off Fall Time		--	3.1	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=4.5A	--	--	1.2	V

P-Ch 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	-12	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-12V，V_{GS}=0V	--	--	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±8V，V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=-250μA	-0.4	--	-1	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V，I_D=-4.5A	--	50	61	mΩ
		V_{GS}=-2.5V，I_D=-4.0A	--	66	81	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=-10V，V_{GS}=0V， f=1MHz	--	800	--	pF
C_{OSS}	Output Capacitance		--	131	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	103	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=-10V，I_D=-4.5A，V_{GS}=-4.5V	--	15.5	--	nC
Q_{gs}	Gate Source Charge		--	1.3	--	nC
Q_{gd}	Gate Drain Charge		--	2.9	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-10V，I_D=-5A，V_{GS}=-4.5V，R_G=3Ω	--	4.4	--	nS
t_r	Turn-on Rise Time		--	7.6	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	44	--	nS
t_f	Turn-Off Fall Time		--	13.5	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=-4.5A	--	--	-1.2	V

N-Channel Typical Operating Characteristics

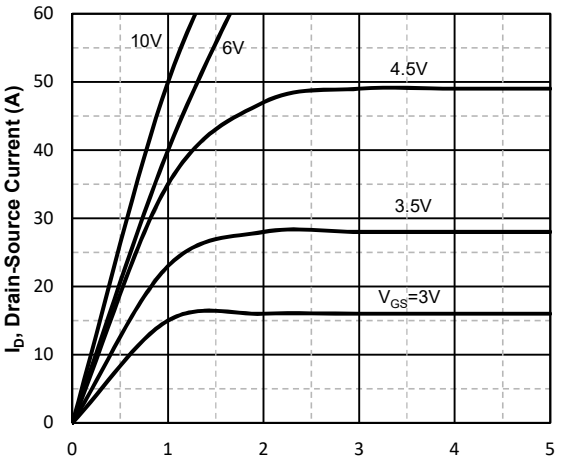


Fig1. Typical Output Characteristics

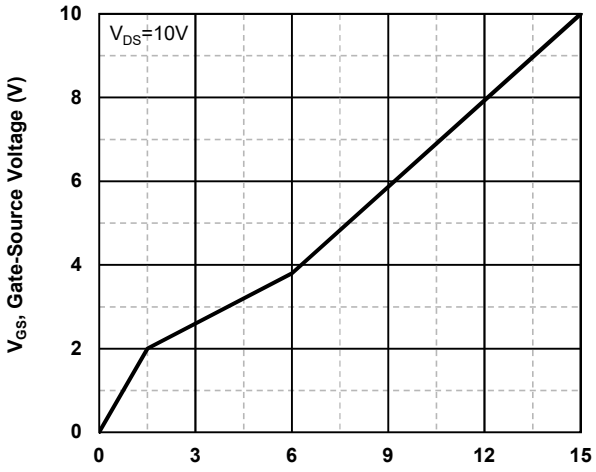


Fig2. Typical Gate Charge Vs.Gate-Source Voltage

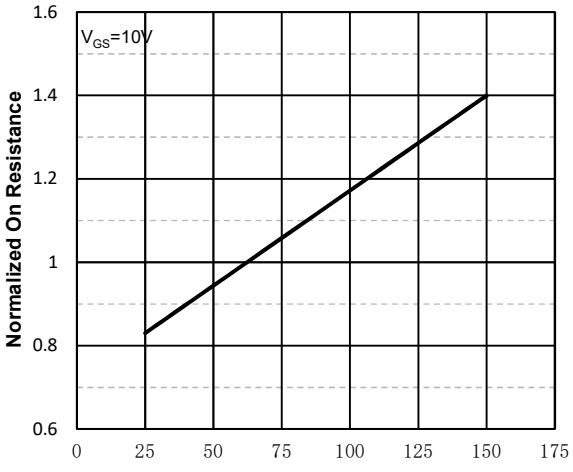


Fig3. Normalized On-Resistance Vs. Temperature

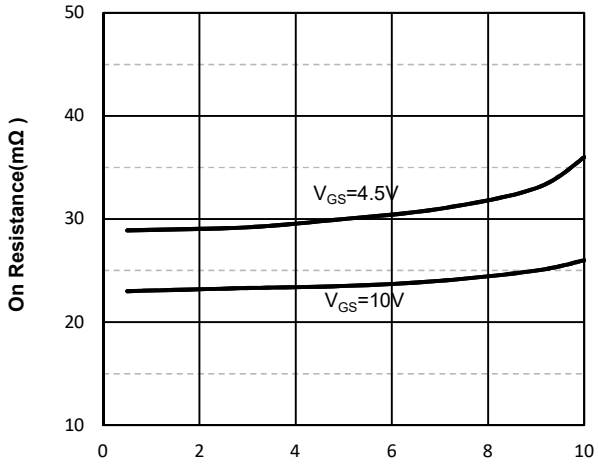


Fig4. On-Resistance Vs. Drain-Source Current

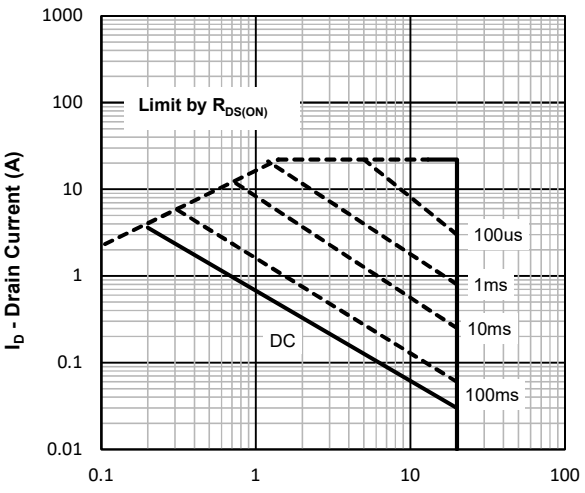


Fig5. Maximum Safe Operating Area

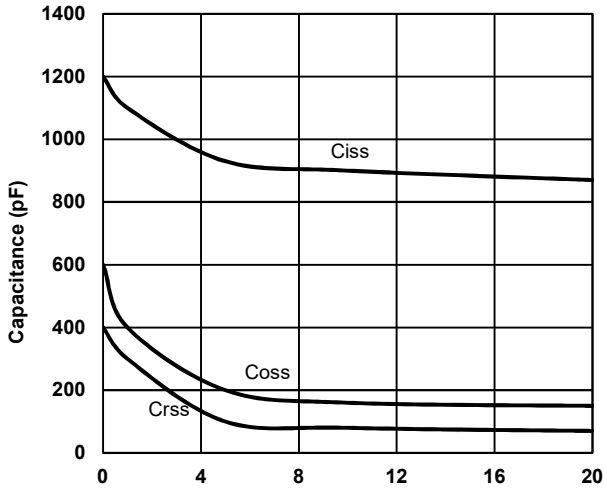
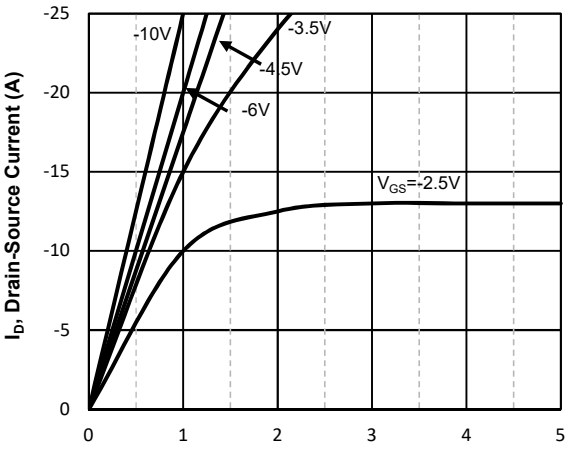
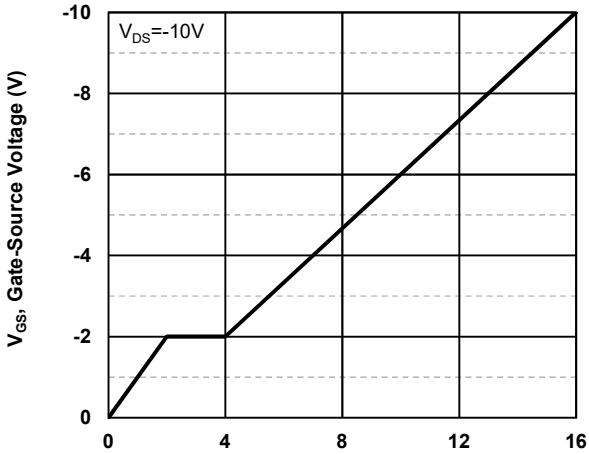


Fig6 Typical Capacitance Vs.Drain-Source Voltage

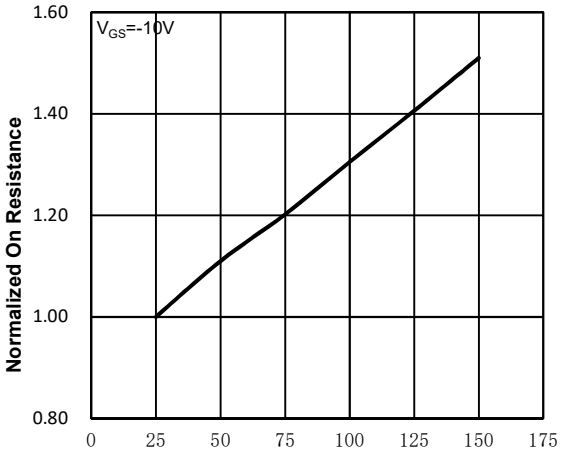
P-Channel Typical Operating Characteristics



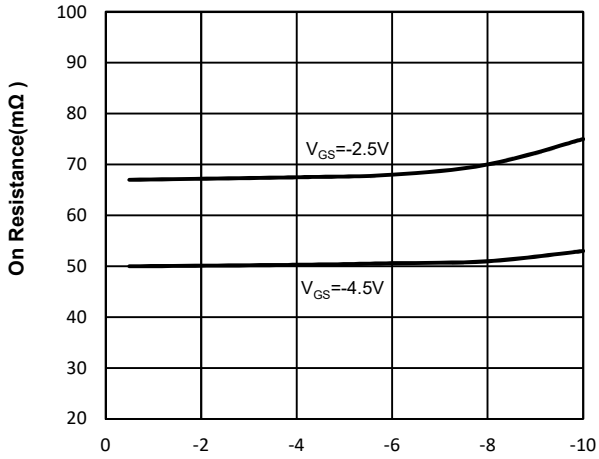
$-V_{DS}$, Drain -Source Voltage (V)
Fig7. Typical Output Characteristics



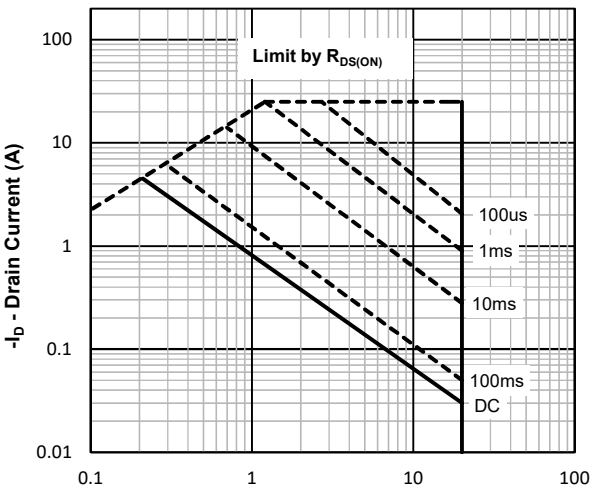
Qg -Total Gate Charge (nC)
Fig8. Typical Gate Charge Vs.Gate-Source Voltage



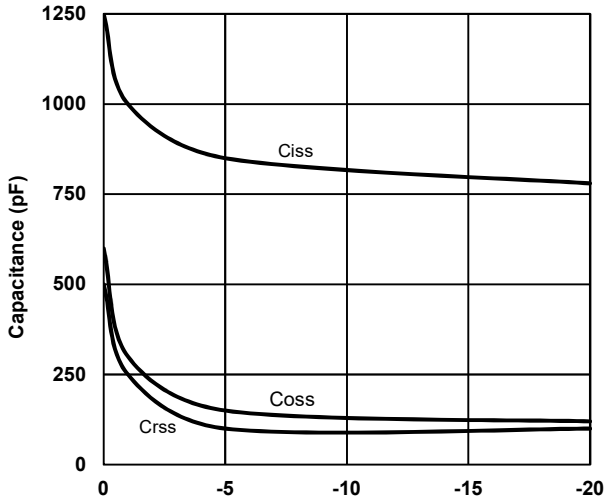
Tj - Junction Temperature (°C)
Fig9. Normalized On-Resistance Vs. Temperature



I_D, Drain-Source Current (A)
Fig10. On-Resistance Vs. Drain-Source Current

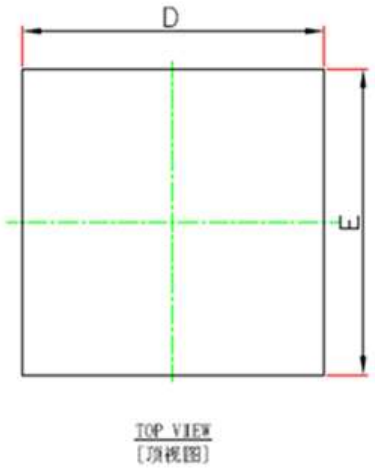


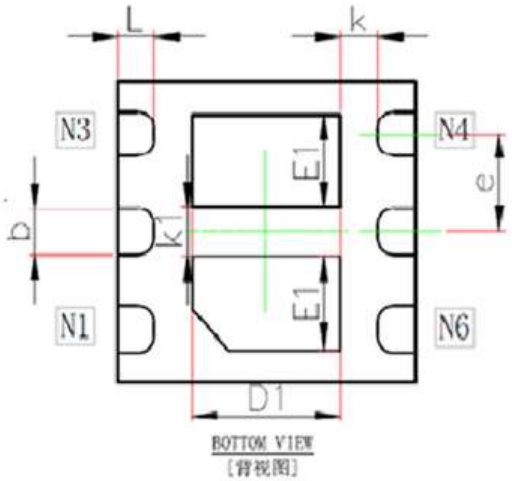
$-V_{DS}$, Drain -Source Voltage (V)
Fig11. Maximum Safe Operating Area

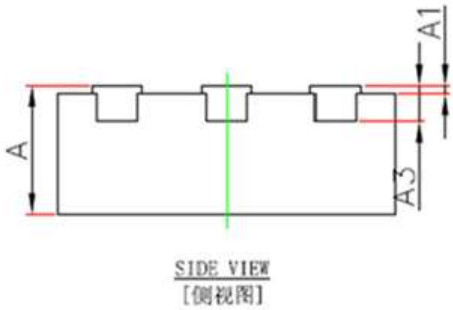


V_{DS} , Drain-Source Voltage (V)
Fig12 Typical Capacitance Vs.Drain-Source Voltage

DFN2X2-6L Package information







Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	0.600	0.700	0.024	0.027
A1	0.000	0.050	0.000	0.001
A3	0.203REF		0.007REF	
b	0.230	0.330	0.009	0.012
D	1.924	2.076	0.075	0.081
E	1.924	2.076	0.075	0.081
e	0.650TYP		0.025TYP	
L	0.224	0.376	0.008	0.014
k	0.200	-	0.007	-
E1	0.520	0.720	0.020	0.028
D1	0.800	1.000	0.031	0.039
K1	0.320TYP		0.012TYP	