MLSM MICROELECTRONICS

MLS1523KDW

20V N-Channel and P-Channel MOSFET

Features

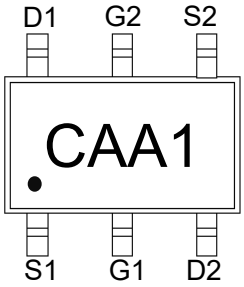
- Surface Mount Package
- Low $R_{DS(on)}$
- Operated at Low Logic Level Gate Drive
- ESD Protected Gate

Application

- Load/ Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

Product Summary

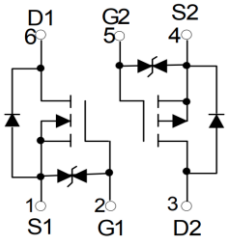
V_{DS}	$R_{DS(ON)}$ TYP	I_D
20V	150mΩ@4.5V	1.5A
	180mΩ@2.5V	
-20V	320mΩ@-4.5V	-1.0A
	520mΩ@-2.5V	



Marking and pin assignment

CAA1: Device code

SOT-363 top view



Schematic diagram

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		20	-20	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	1.5	-1.0	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	5.0	-5.0	A
I_D	Continuous Drain Current	Tc=25°C	1.5	-1.0	A
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		883	883	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MLS15232KDW	SOT-363	CAA1	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	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}=±8V，V_{DS}=0V	--	--	±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=250μA	0.35	0.8	1.2	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=4.5V，I_D=1.2A	--	150	250	mΩ
		V_{GS}=2.5V，I_D=0.96A	--	180	320	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=15V，V_{GS}=0V， f=1MHz	--	73	--	pF
C_{OSS}	Output Capacitance		--	25	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	8	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=10V，I_D=1.2A，V_{GS}=4.5V	--	5	--	nC
Q_{gs}	Gate Source Charge		--	0.3	--	nC
Q_{gd}	Gate Drain Charge		--	0.7	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=10V，I_D=1.2A， R_L=8.3Ω V_{GEN}=4.5V，R_{GEN}=6Ω	--	8	--	nS
t_r	Turn-on Rise Time		--	13	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	25	--	nS
t_f	Turn-Off Fall Time		--	8	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=1.2A，	--	--	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	-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}=±8V，V_{DS}=0V	--	--	±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=-250μA	-0.4	-1.1	-1.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V，I_D=-1.0A	--	320	400	mΩ
		V_{GS}=-2.5V，I_D=-0.5A	--	520	650	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=-15V，V_{GS}=0V， f=1MHz	--	120	--	pF
C_{OSS}	Output Capacitance		--	28	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	25	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DD}=-10V，I_D=-0.8A，V_{GS}=-4.5V	--	4	--	nC
Q_{gs}	Gate Source Charge		--	0.5	--	nC
Q_{gd}	Gate Drain Charge		--	0.9	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-10V，I_D=-0.8A，V_{GEN}=-4.5V，R_{GEN}=6Ω	--	8	--	nS
t_r	Turn-on Rise Time		--	10	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	28	--	nS
t_f	Turn-Off Fall Time		--	13	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=-1A，	--	--	-1.2	V

N-Ch Typical Operating Characteristics

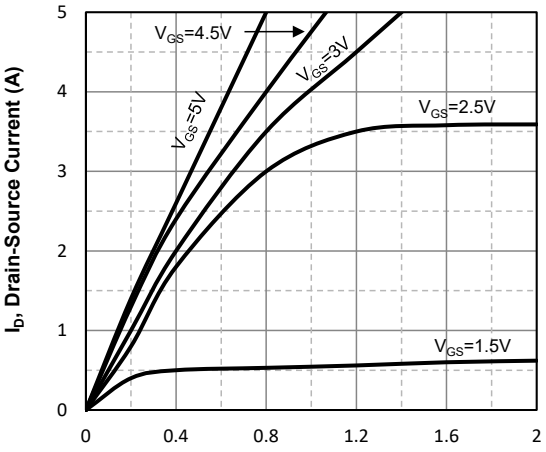


Fig1. Typical Output Characteristics

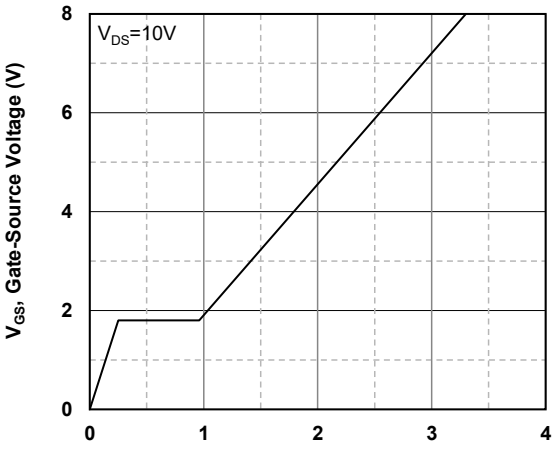


Fig2. Typical Gate Charge Vs.Gate-Source Voltag

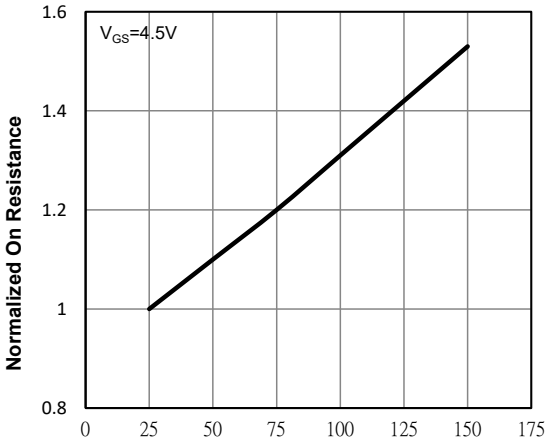


Fig3. Normalized On-Resistance Vs. Temperature

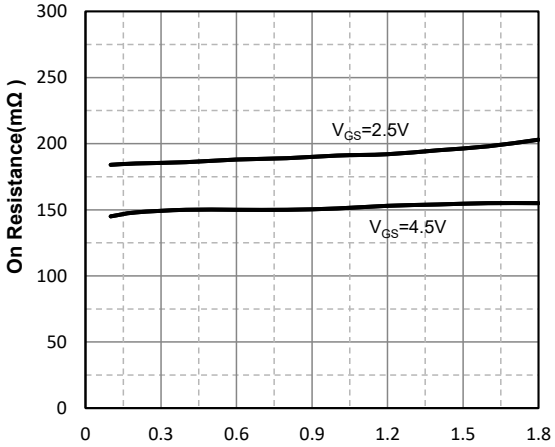


Fig4. On-Resistance Vs. Drain-Source Current

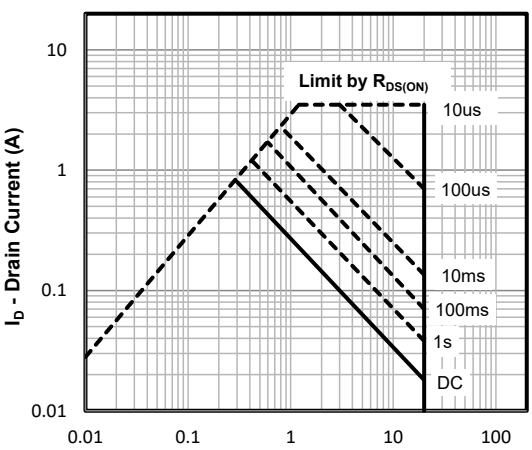


Fig5. Maximum Safe Operating Area

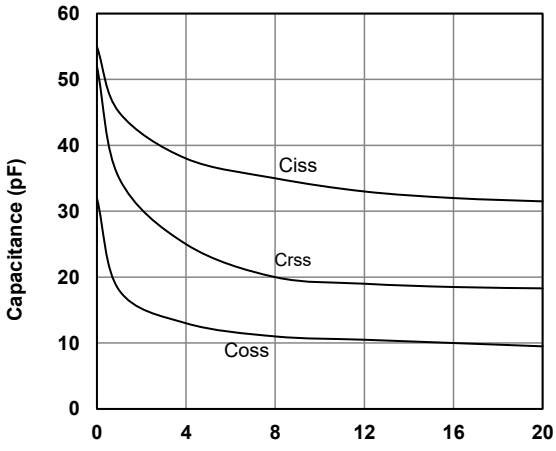
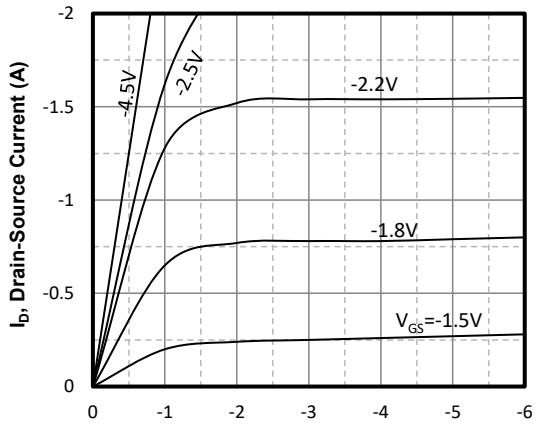
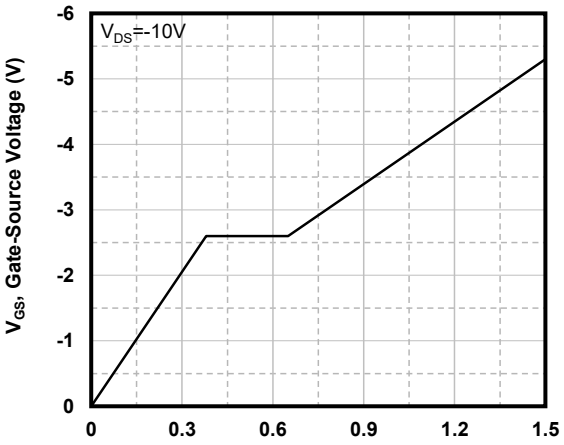


Fig6 Typical Capacitance Vs.Drain-Source

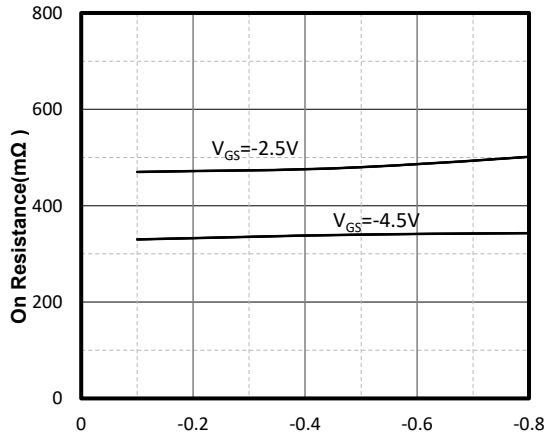
P-Ch Typical Operating Characteristics



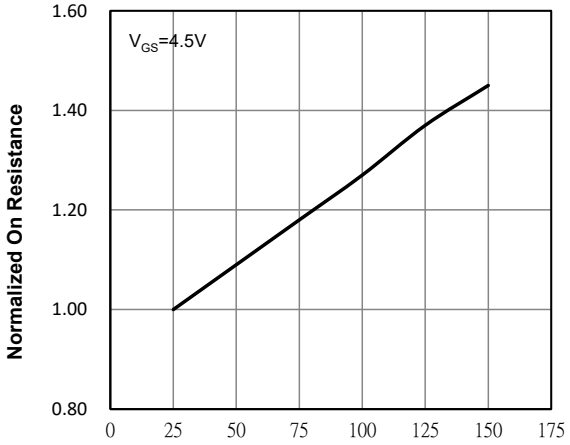
VDS, Drain -Source Voltage (V)
Fig7. Typical Output Characteristics



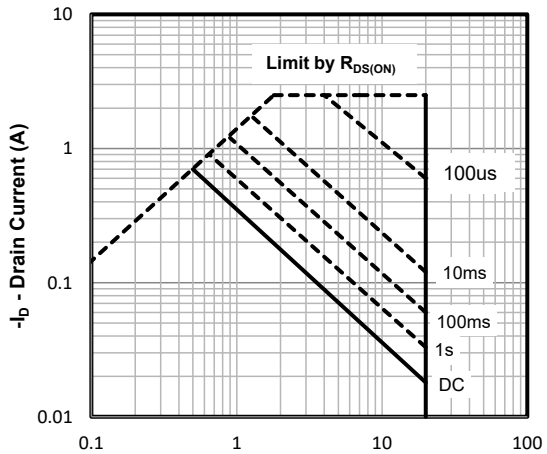
Qg -Total Gate Charge (nC)
Fig8. Typical Gate Charge Vs.Gate-Source Voltage



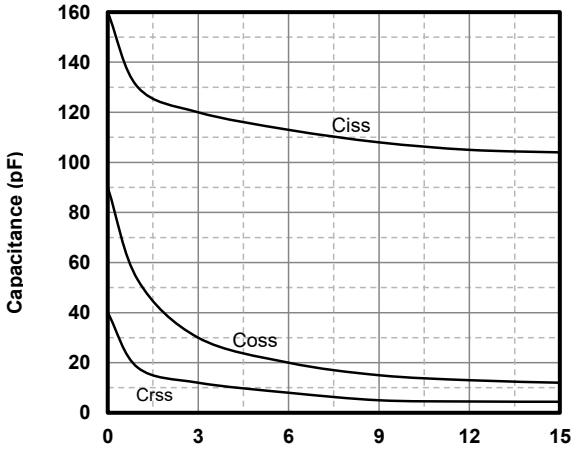
I_D, Drain-Source Current (A)
Fig9. Drain-Source on Resistance



Tj - Junction Temperature (°C)
Fig10. Normalized On-Resistance Vs. Temperature

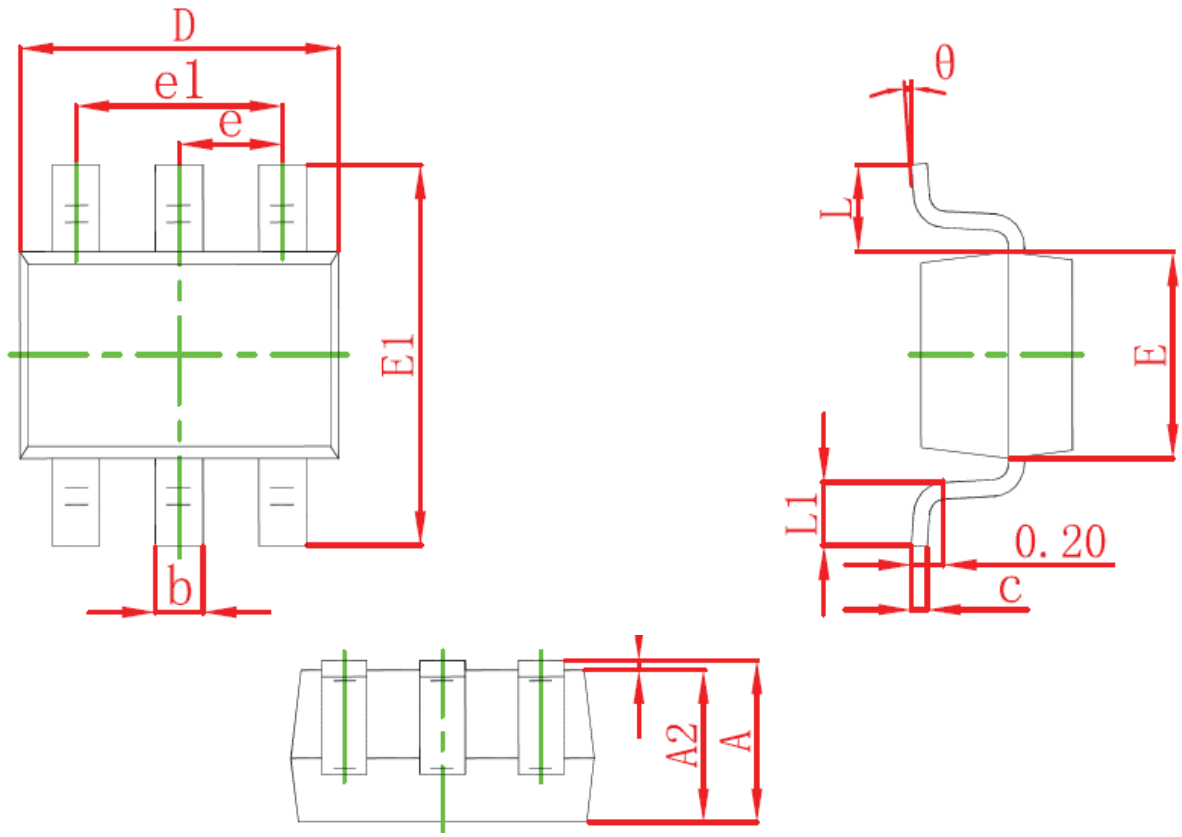


$-V_{DS}$, Drain -Source Voltage (V)
Fig11. Maximum Safe Operating Area



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

SOT-363 Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.100	0.150	0.004	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.400	0.085	0.094
e	0.650TYP		0.026TYP	
e1	1.200	1.400	0.047	0.055
L	0.525REF		0.021REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°