MLSM MICROELECTRONICS

MUPD20A

30V N-Channel and P-Channel MOSFET

Features

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

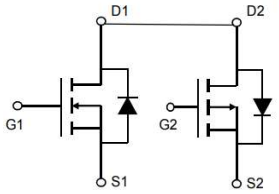
Application

- Battery protection
- Load switch
- Power management

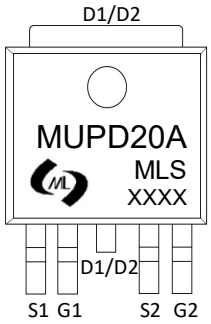
Product Summary

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
30V	25mΩ@10V	20A
	38mΩ@4.5V	
-30V	27mΩ@-10V	-20A
	45mΩ@-4.5V	

TO-252-4L top view



Schematic diagram



Marking and pin assignment

MUPD20A: Device code
XXXX: Code

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		30	-30	V
V_{GS}	Gate-Source Voltage		±20	±20	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	20	-20	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	80	-80	A
I_D	Continuous Drain Current	Tc=25°C	20	-20	A
P_D	Maximum Power Dissipation	Tc=25°C	25	25	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		83	83	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MUPD20A	TO-252-4L	MUPD20A	2,500	5,000	35,000	13"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	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V，V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V，V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=250μA	1.0	1.5	3	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=10V， I_D=20A	--	16	25	mΩ
		V_{GS}=4.5V，I_D=10A	--	28	38	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=15V，V_{GS}=0V， f=1MHz	--	610	--	pF
C_{OSS}	Output Capacitance		--	60	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	50	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=15V，I_D=10A，V_{GS}=10V	--	16	--	nC
Q_{gs}	Gate Source Charge		--	2.4	--	nC
Q_{gd}	Gate Drain Charge		--	2	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=15V，I_D=10A，V_{GS}=10V，R_G=3Ω	--	6	--	nS
t_r	Turn-on Rise Time		--	28	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	16	--	nS
t_f	Turn-Off Fall Time		--	12	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=10A	--	--	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	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V，V_{GS}=0V	--	--	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V，V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}，I_D=-250μA	-1.0	-1.5	-3.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=-10V， I_D=-20A	--	22	27	mΩ
		V_{GS}=-4.5V，I_D=-10A	--	33	45	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{ISS}	Input Capacitance	V_{DS}=-15V，V_{GS}=0V，f=1MHz	--	1200	--	pF
C_{OSS}	Output Capacitance		--	155	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	135	--	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}=-15V，I_D=-10A，V_{GS}=-10V	--	51	--	nC
Q_{gs}	Gate Source Charge		--	10	--	nC
Q_{gd}	Gate Drain Charge		--	8.5	--	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-15V，I_D=-10A，V_{GS}=-10V，R_G=6Ω	--	13	--	nS
t_r	Turn-on Rise Time		--	15	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	200	--	nS
t_f	Turn-Off Fall Time		--	100	--	nS
Source- Drain Diode Characteristics						
V_{SD}	Forward on voltage	Tj=25℃，Is=-10A	--	-0.9	-1.2	V

N-Channel Typical Operating Characteristics

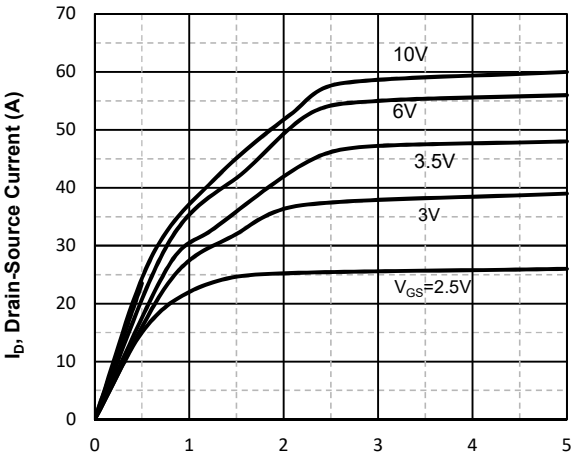


Fig1. Typical Output Characteristics

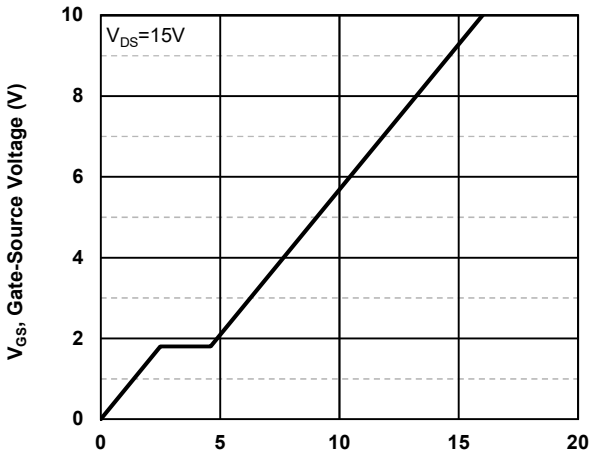


Fig2. Typical Gate Charge Vs.Gate-Source Voltage

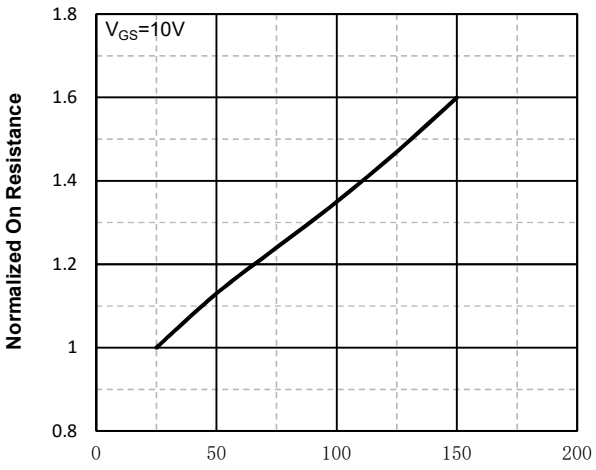


Fig3. Normalized On-Resistance Vs. Temperature

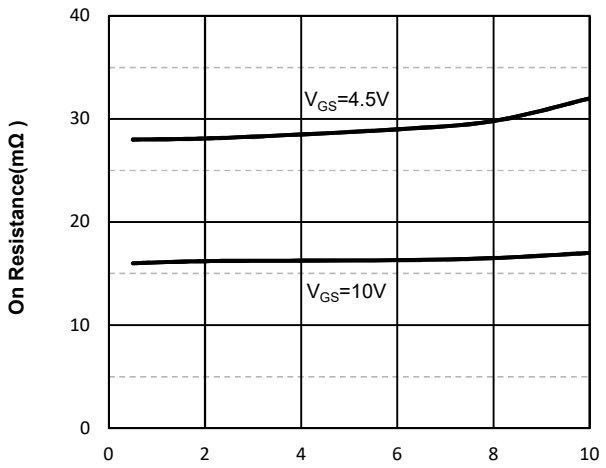


Fig4. On-Resistance Vs. Drain-Source Current

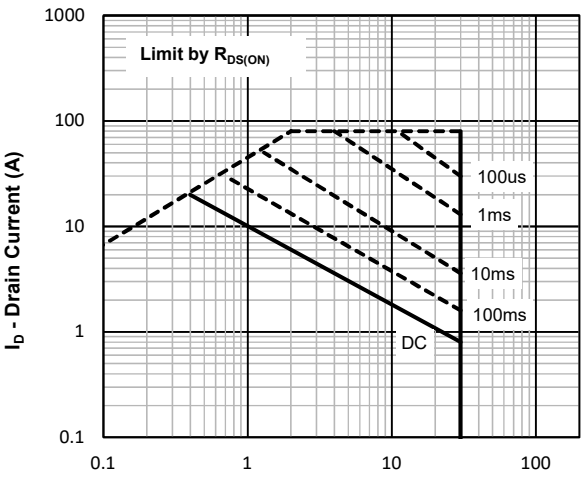


Fig5. Maximum Safe Operating Area

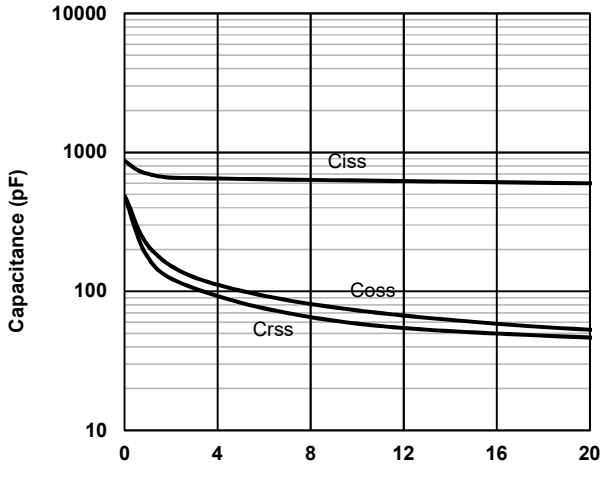


Fig6 Typical Capacitance Vs.Drain-Source Voltage

P-Channel Typical Operating Characteristics

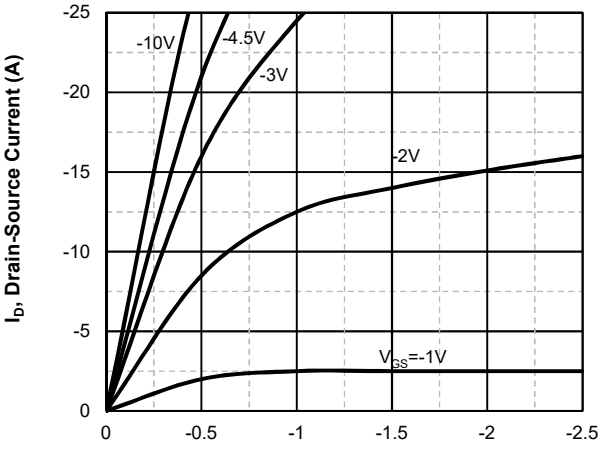


Fig7. Typical Output Characteristics

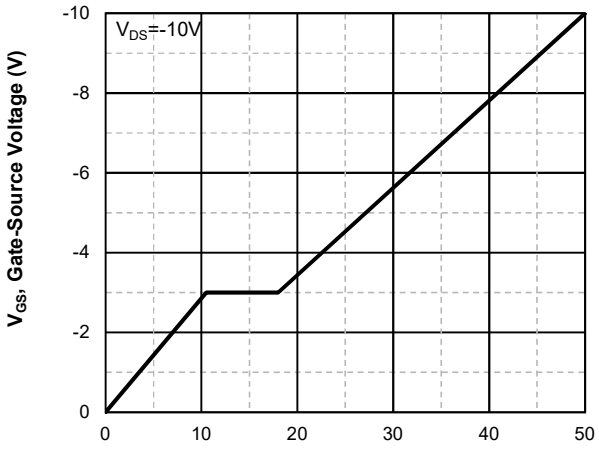


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

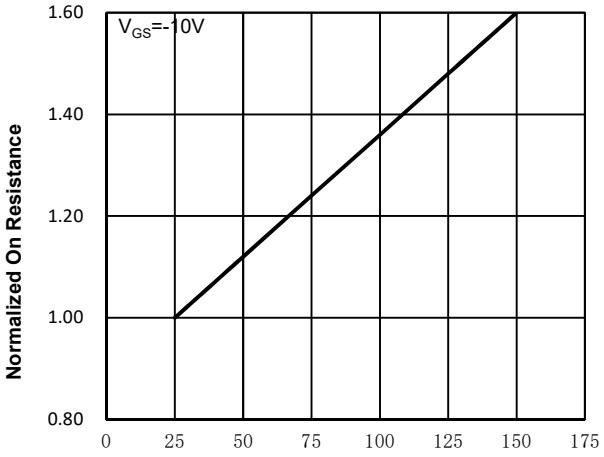


Fig9. Normalized On-Resistance Vs. Temperature

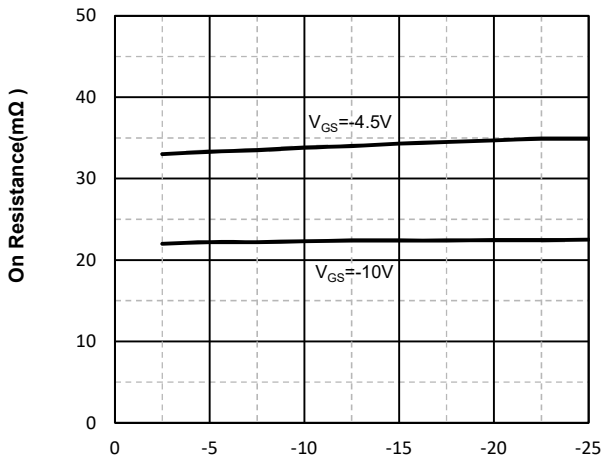


Fig10. On-Resistance Vs. Drain-Source Current

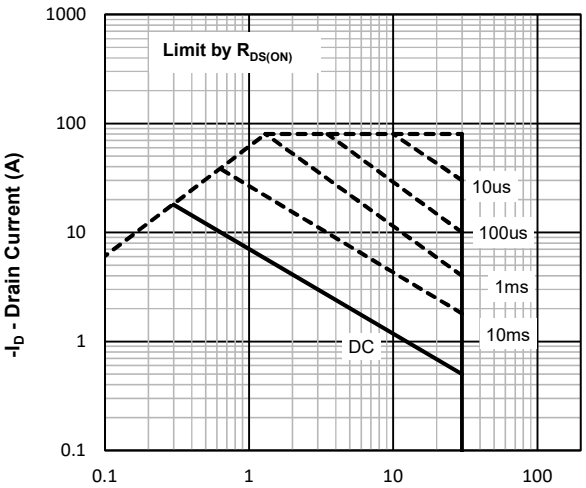


Fig11. Maximum Safe Operating Area

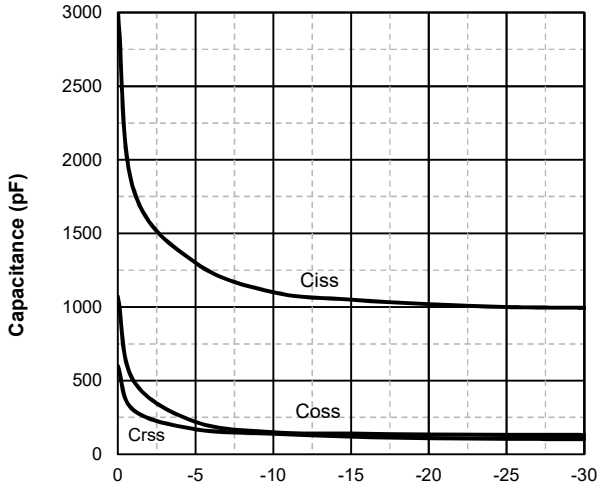
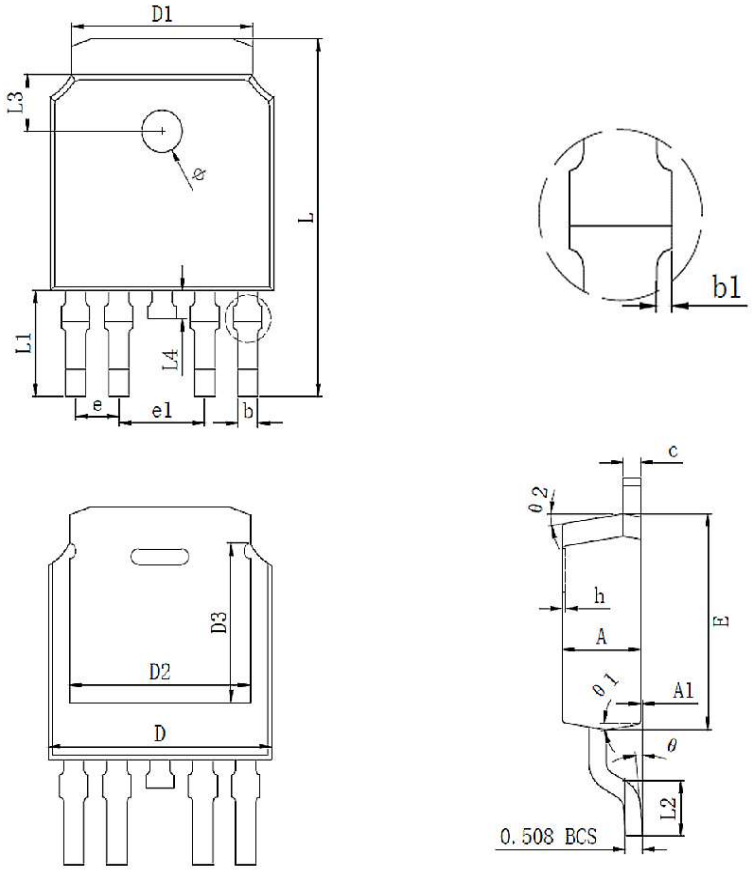


Fig12 Typical Capacitance Vs.Drain-Source Voltage

TO-252-4L Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.550	0.650	0.022	0.026
b1	0.000	0.120	0.000	0.005
b2	0.250	0.350	0.010	0.014
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.334(REF)		0.210(REF)	
D2	5.346(REF)		0.210(REF)	
D3	4.490(REF)		0.177(REF)	
E	6.000	6.200	0.236	0.244
e	1.270(TYP)		0.050(TYP)	
e1	2.540(TYP)		0.100(TYP)	
h	0.000	0.200	0.000	0.008
L	9.900	10.300	0.390	0.406
L1	2.988(REF)		0.117(REF)	
L2	1.400	1.700	0.055	0.067
L3	1.600(REF)		0.063(REF)	
L4	0.700	0.900	0.028	0.035
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
θ1	9°(TYP)		9°(TYP)	
θ2	9°(TYP)		9°(TYP)	