

Features

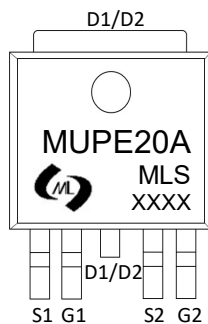
- High power and current handling capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management

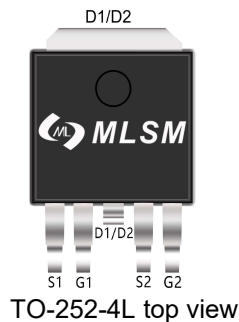
Product Summary

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
40V	28mΩ@10V	20A
	40mΩ@4.5V	
-40V	40mΩ@-10V	-20A
	50mΩ@-4.5V	

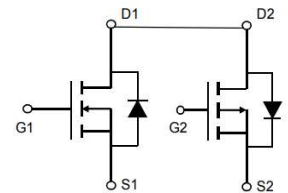


Marking and pin assignment

MUPE20A: Device code
XXXX: Code



TO-252-4L top view



Schematic diagram



Halogen-Free

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Unit
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Common Ratings (TC=25°C Unless Otherwise Noted)

V_{DS}	Drain-Source Breakdown Voltage	40	-40	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	20	-20	A
	$T_c=25^\circ\text{C}$			

Mounted on Large Heat Sink

I_{DM}	Pulse Drain Current Tested	$T_c=25^\circ\text{C}$	80	-80	A
I_D	Continuous Drain Current	$T_c=25^\circ\text{C}$	20	-20	A
P_D	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	35	35	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		73	73	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MUPE20A	TO-252-4L	MUPE20A	2,500	5,000	35,000	13"reel



N-CH Electrical Characteristics (TJ=25°C 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	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, 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	--	3	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =20A	--	20	28	mΩ
		V _{GS} =4.5V, I _D =10A	--	30	40	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	--	920	--	pF
C _{OSS}	Output Capacitance		--	76	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	59	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =10V, I _D =10A, V _{GS} =10V	--	7.7	--	nC
Q _{gs}	Gate Source Charge		--	2	--	nC
Q _{gd}	Gate Drain Charge		--	3	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DS} =20V, I _D =10A, V _{GS} =10V, R _G =6Ω	--	4.8	--	nS
t _r	Turn-on Rise Time		--	3	--	nS
t _{d(off)}	Turn-Off Delay Time		--	23	--	nS
t _f	Turn-Off Fall Time		--	7	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25°C, Is=10A	--	--	1.2	V



P-CH Electrical Characteristics (TJ=25°C 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	-60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, 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	-1.8	-3.0	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-20A	--	30	40	mΩ
		V _{GS} =-4.5V, I _D =-10A	--	38	50	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =-20V, V _{GS} =0V, f=1MHz	--	920	--	pF
C _{OSS}	Output Capacitance		--	90	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	78	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =-20V, I _D =-10A, V _{GS} =-4.5V	--	10	--	nC
Q _{gs}	Gate Source Charge		--	5	--	nC
Q _{gd}	Gate Drain Charge		--	4.3	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =-12V, I _D =-10A, V _{GS} =-10V, R _G =3.3Ω	--	35.5	--	nS
t _r	Turn-on Rise Time		--	56	--	nS
t _{d(off)}	Turn-Off Delay Time		--	15.5	--	nS
t _f	Turn-Off Fall Time		--	8.2	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25°C, Is=-10A	--	--	-1.2	V

N-Channel Typical Operating Characteristics

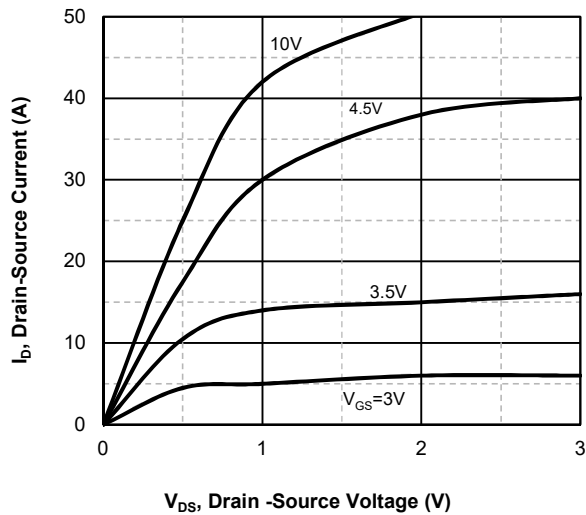


Fig1. Typical Output Characteristics

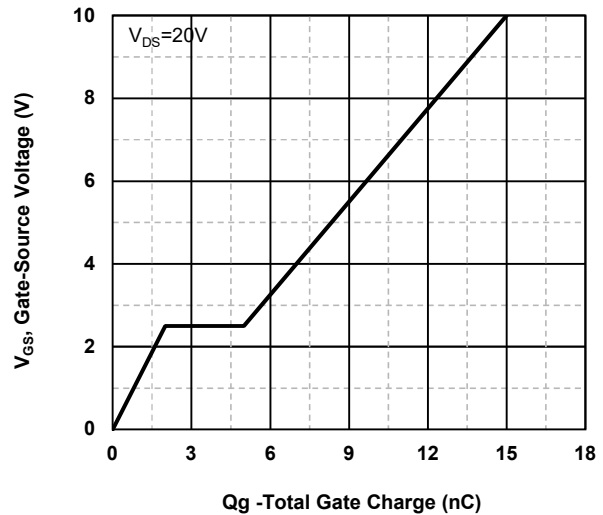


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

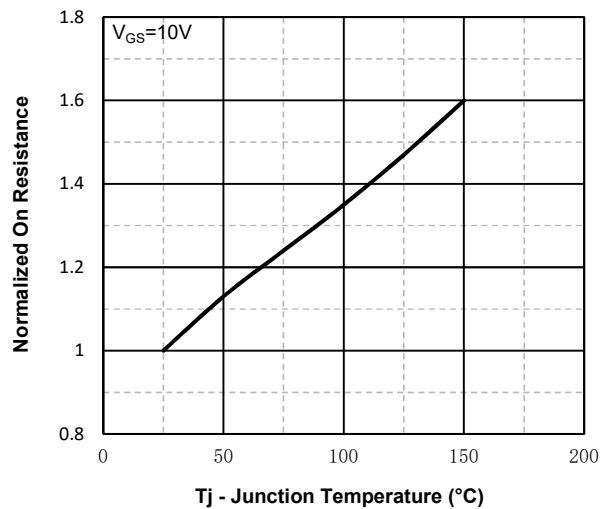


Fig3. Normalized On-Resistance Vs. Temperature

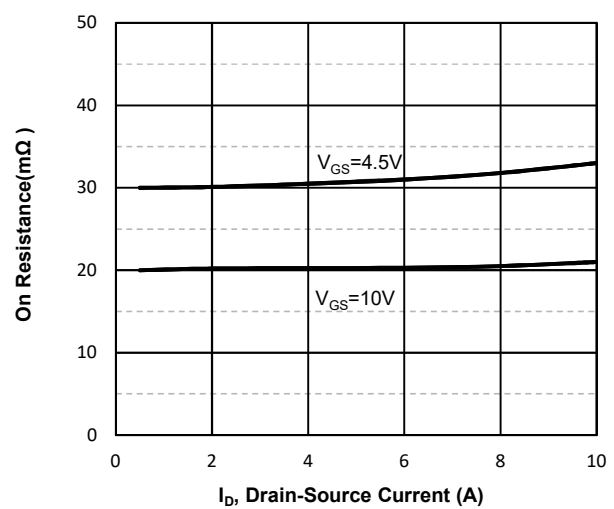


Fig4. On-Resistance Vs. Drain-Source Current

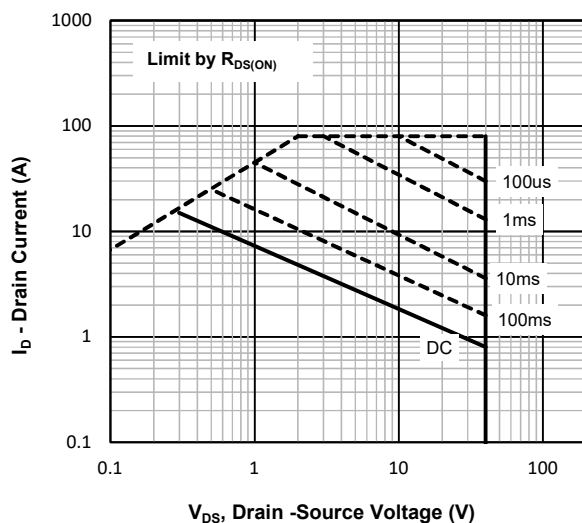


Fig5. Maximum Safe Operating Area

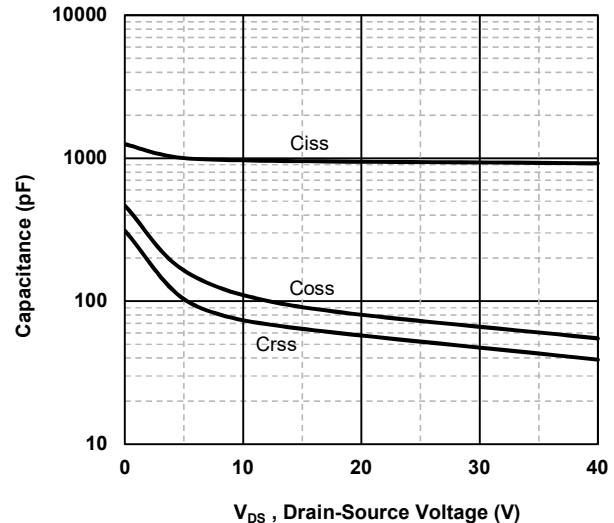
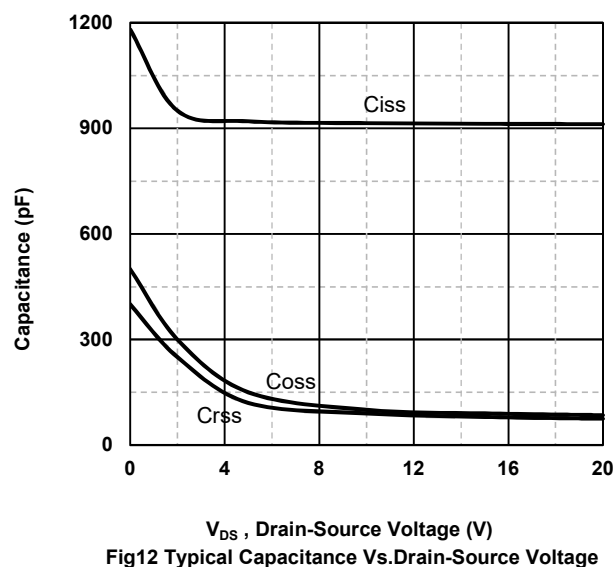
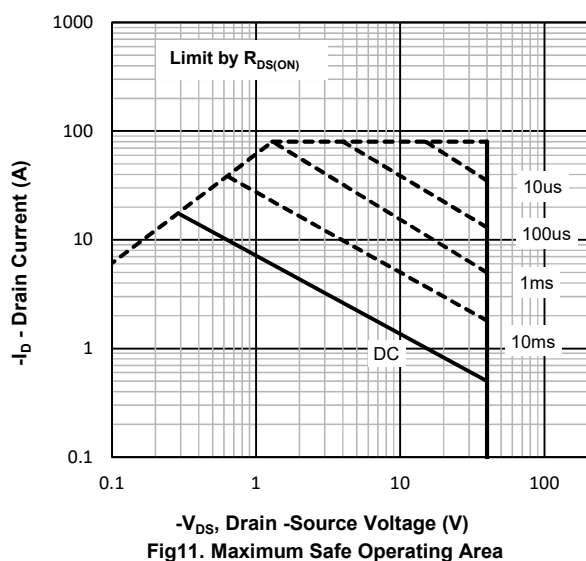
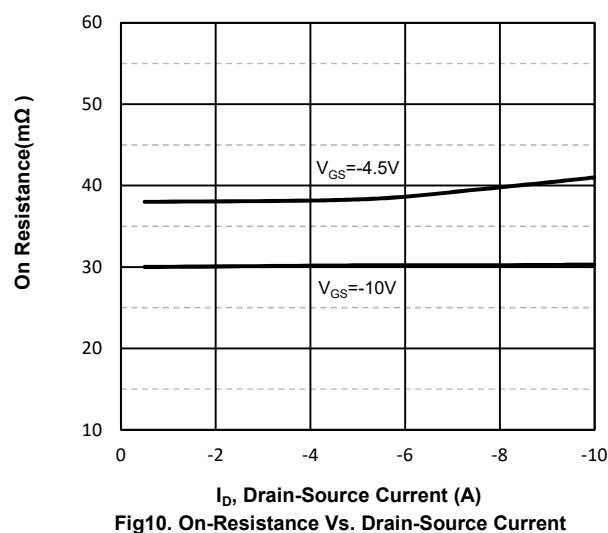
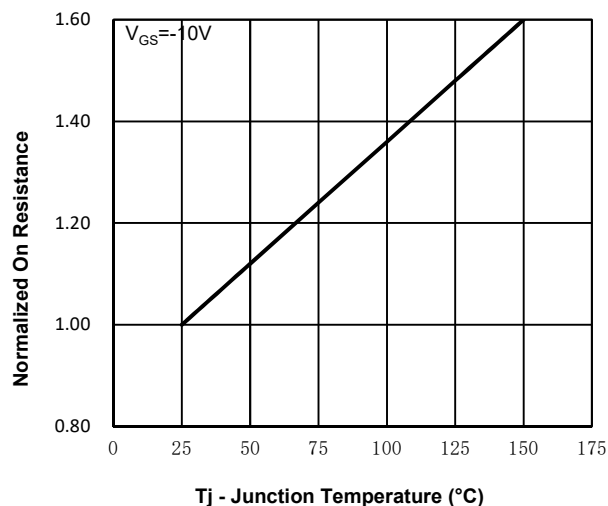
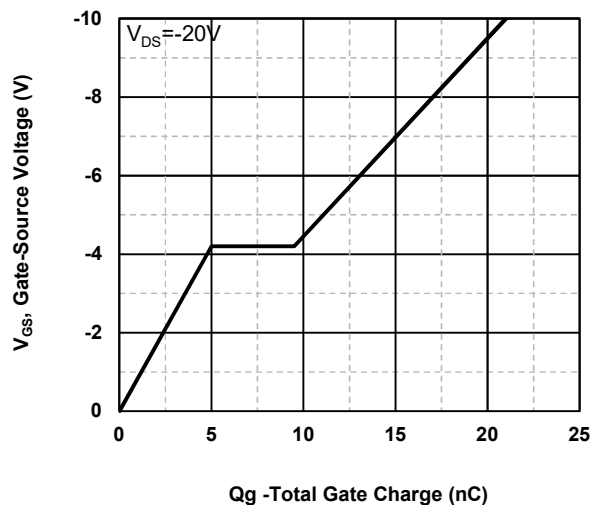
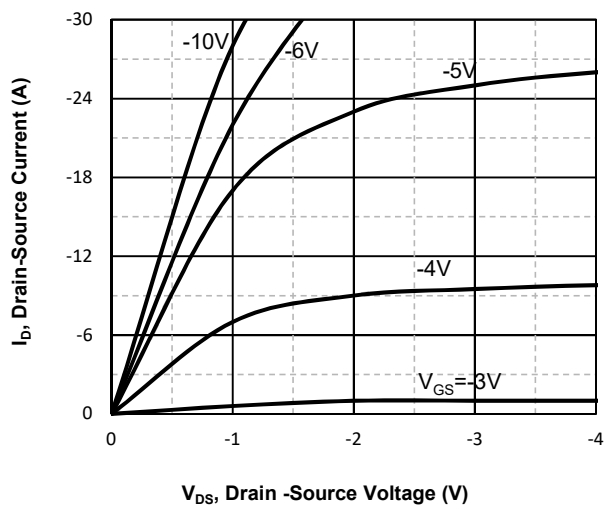
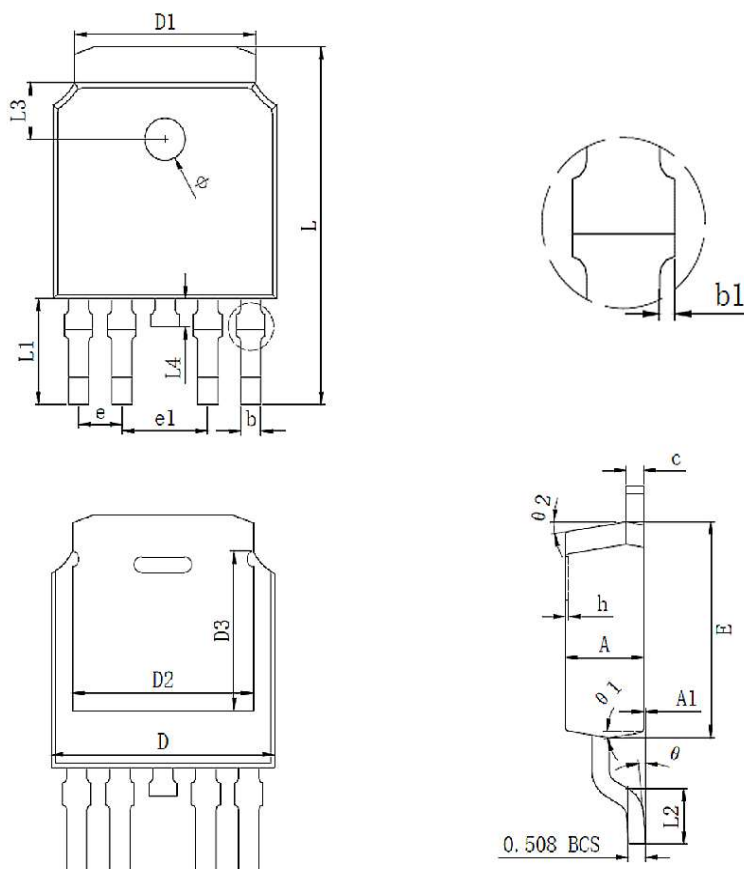


Fig6. Typical Capacitance Vs. Drain-Source Voltage

P-Channel Typical Operating Characteristics



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°
θ_1	9°(TYP)		9°(TYP)	
θ_2	9°(TYP)		9°(TYP)	