

Features

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

Application

- Battery protection
- Load switch
- Power management

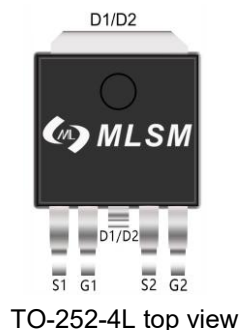
Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
40V	9mΩ@10V	50A
	13mΩ@4.5V	
-40V	9mΩ@-10V	-50A
	13mΩ@-4.5V	

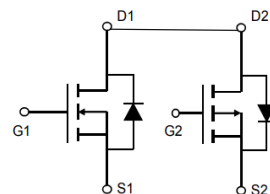


MUPE50A: Device code
XXXX: Code

Marking and pin assignment



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	50	-50	A
	$T_C=25^\circ\text{C}$			

Mounted on Large Heat Sink

I_{DM}	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	200	-200	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	50	-50	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	35	35	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		60	60	°C/W

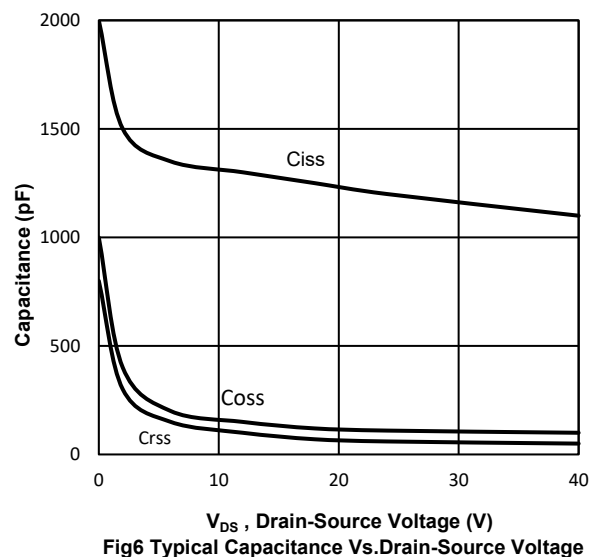
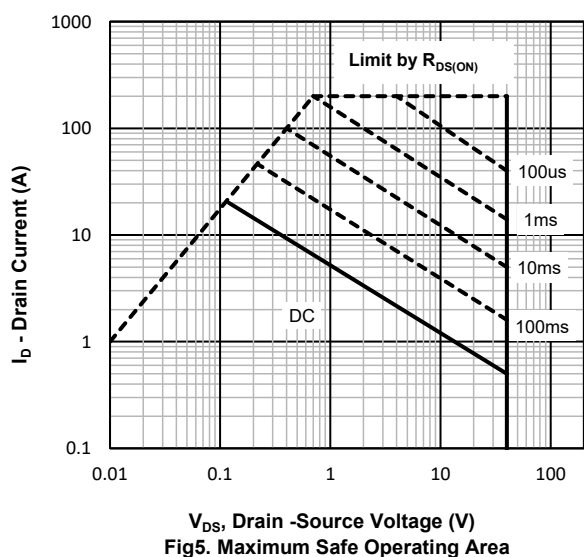
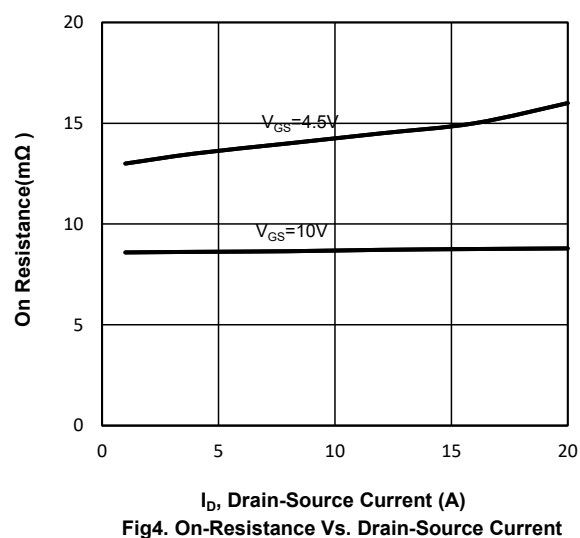
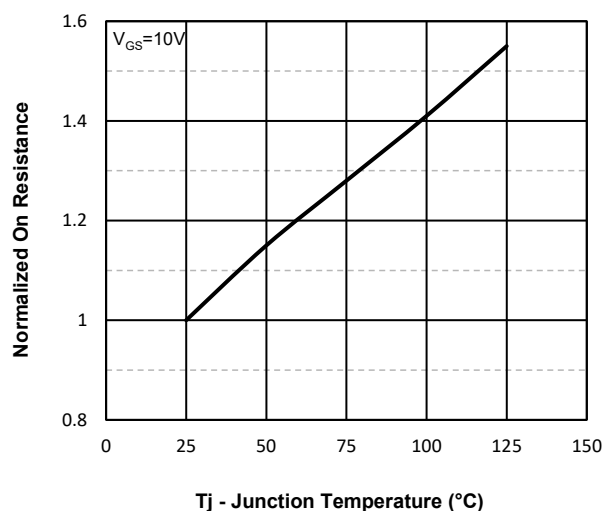
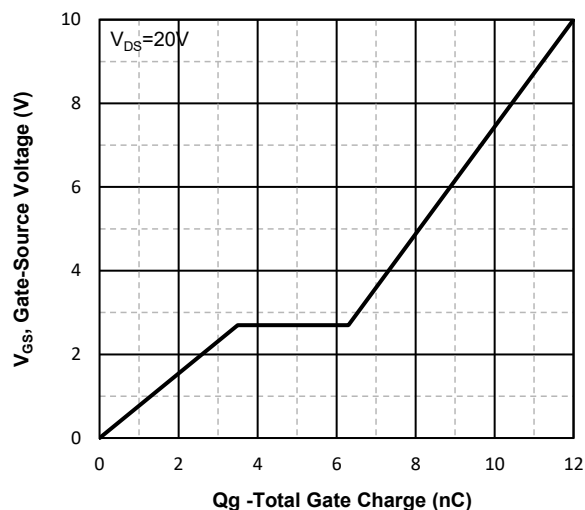
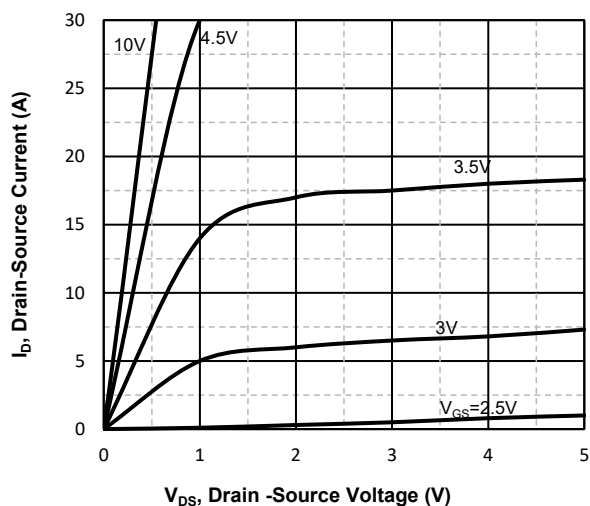
Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MUPE50A	TO-252-4L	MUPE50A	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	--	--	1.0	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	1.4	2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =20A	--	9	14	mΩ
		V _{GS} =4.5V, I _D =10A	--	13	20	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	--	1220	--	pF
C _{OSS}	Output Capacitance		--	115	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	66	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =20V, I _D =10A, V _{GS} =10V	--	10.3	--	nC
Q _{gs}	Gate Source Charge		--	1.8	--	nC
Q _{gd}	Gate Drain Charge		--	2.3	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, R _L =2.5Ω, V _{GS} =10V, R _G =3Ω	--	4	--	nS
t _r	Turn-on Rise Time		--	18	--	nS
t _{d(off)}	Turn-Off Delay Time		--	14	--	nS
t _f	Turn-Off Fall Time		--	20	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25°C, 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℃ (unless otherwise stated)						
BV(BR)DSS	Drain-Source Breakdown Voltage	VGS=0V, ID=-250μA	-40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-40V, VGS=0V	--	--	-1.0	μA
IGSS	Gate-Body Leakage Current	VGS=±20V, VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=-250μA	-1.0	-1.5	-2.5	V
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-20A	--	9	14	mΩ
		VGS=-4.5V, ID=-10A	--	13	18	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
CISS	Input Capacitance	VDS=-20V, VGS=0V, f=1MHz	--	2500	--	pF
COSS	Output Capacitance		--	220	--	pF
CRSS	Reverse Transfer Capacitance		--	180	--	pF
Switching Characteristics						
Qg	Total Gate Charge	VDD=-20V, ID=-10A, VGS=-10V	--	18.8	--	nC
Qgs	Gate Source Charge		--	8.2	--	nC
Qgd	Gate Drain Charge		--	10.9	--	nC
td(on)	Turn-on Delay Time	VDD=-20V, ID=-10A, VGS=-10V, RG=2.5Ω	--	12	--	nS
tr	Turn-on Rise Time		--	18	--	nS
td(off)	Turn-Off Delay Time		--	35	--	nS
tf	Turn-Off Fall Time		--	26	--	nS
Source- Drain Diode Characteristics						
VSD	Forward on voltage	TJ=25℃, IS=-10A	--	--	-1.2	V

N-Channel Typical Operating Characteristics



P-Channel Typical Operating Characteristics

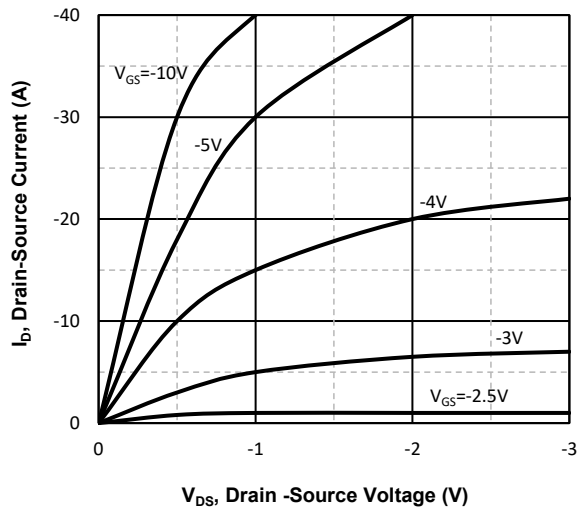


Fig7. Typical Output Characteristics

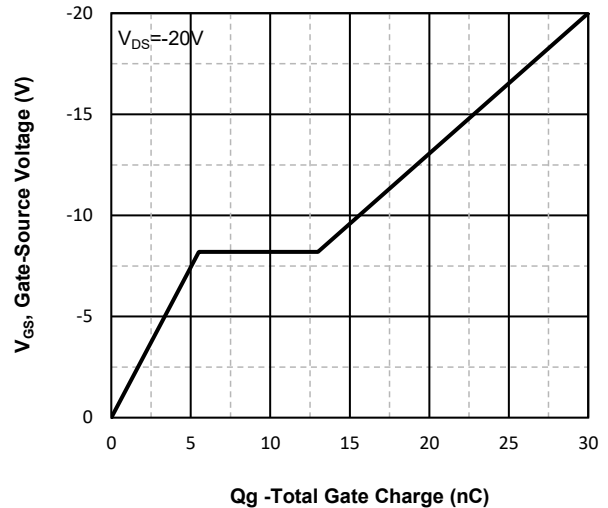


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

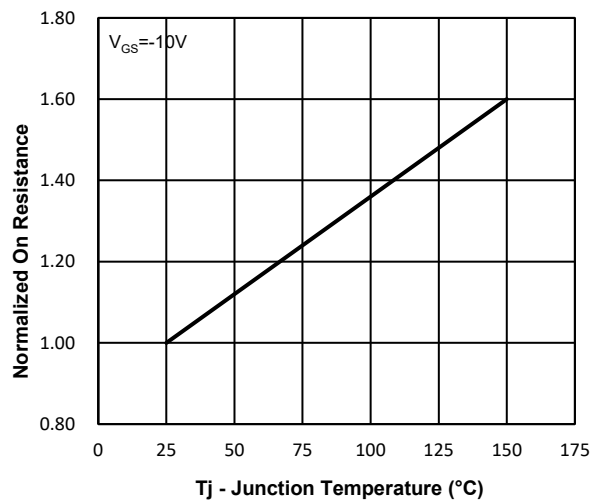


Fig9. Normalized On-Resistance Vs. Temperature

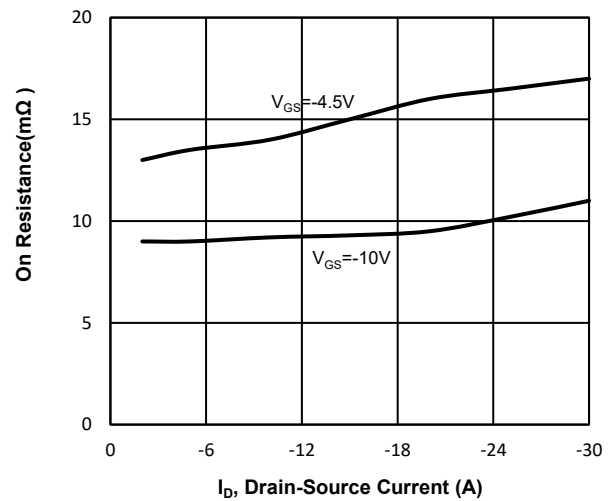


Fig10. On-Resistance Vs. Drain-Source Current

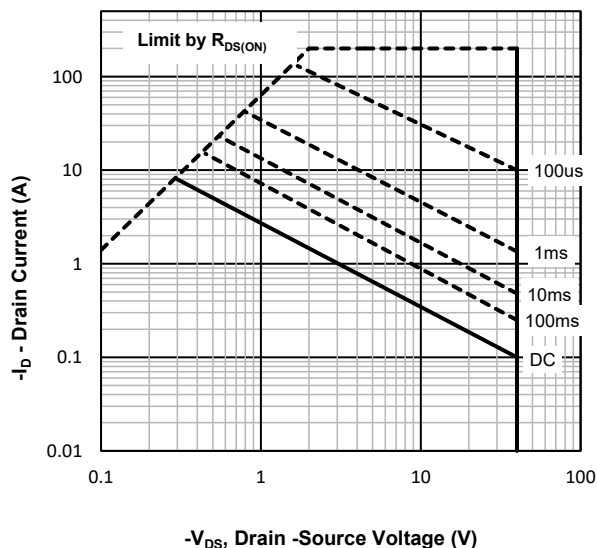


Fig11. Maximum Safe Operating Area

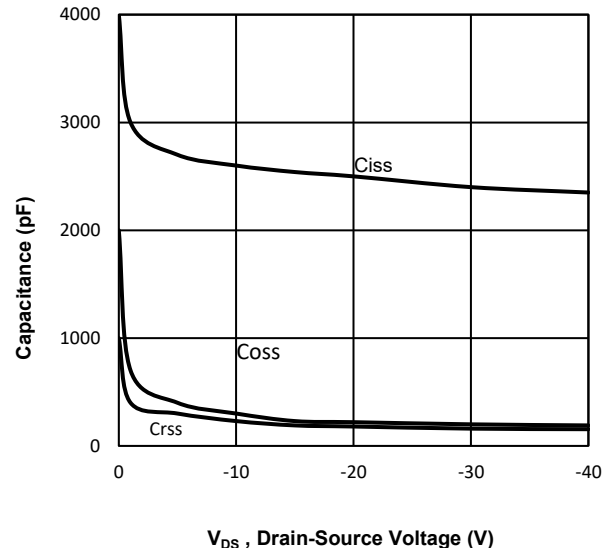
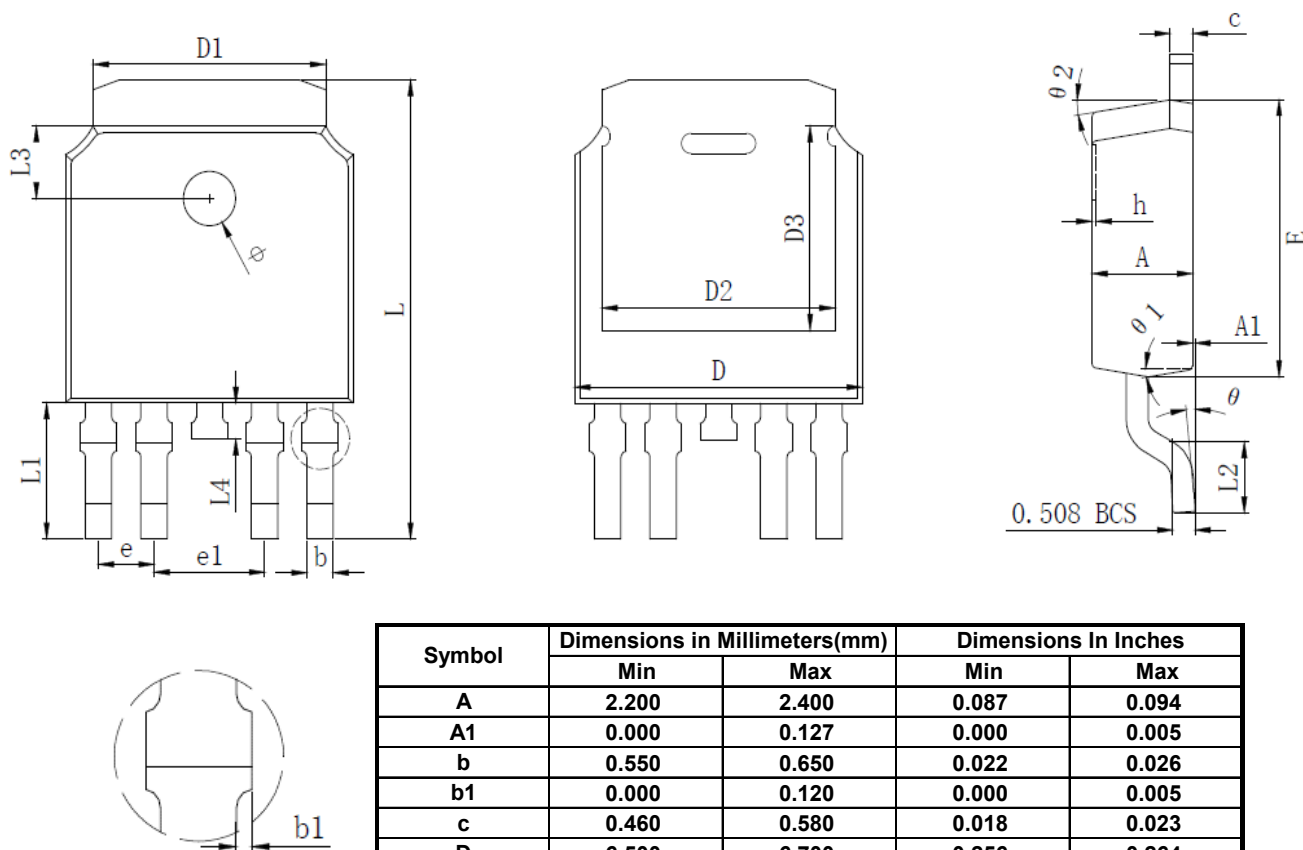


Fig12. Typical Capacitance Vs. Drain-Source Voltage

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
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°
$\theta 1$	9°(TYP)		9°(TYP)	
$\theta 2$	9°(TYP)		9°(TYP)	