

Features

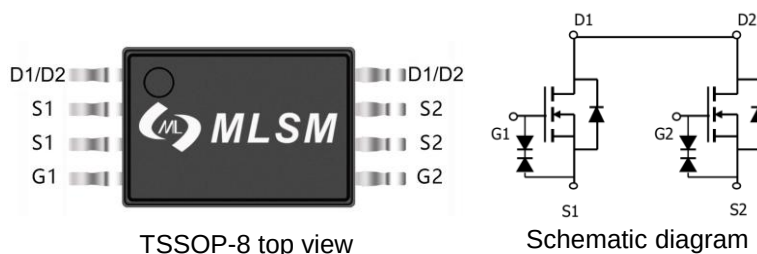
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
20V	7.5mΩ@4.5V	10A
	9.7mΩ@2.5V	

Application

- Battery protection
- Load switch
- Power management



TSSOP-8 top view

Schematic diagram



Marking and Pin assignment



Halogen-Free

Absolute Maximum Ratings (TA=25°C unless otherwise noted)				
Symbol	Parameter		Rating	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)				
V _{DS}	Drain-Source Breakdown Voltage		20	V
V _{GS}	Gate-Source Voltage		±12	V
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-50 to 155	°C
I _S	Diode Continuous Forward Current	Tc=25°C	10	A
Mounted on Large Heat Sink				
I _{DM}	Pulse Drain Current Tested	Tc=25°C	50	A
I _D	Continuous Drain Current	Tc=25°C	10	A
P _D	Maximum Power Dissipation	Tc=25°C	1.4	W
R _{θJA}	Thermal Resistance Junction-to-Ambient		62.5	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MS9004A	TSSOP-8	9004A	3,000	6,000	42,000	13"reel

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	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} =±12V, V _{DS} =0V	--	--	±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.7	0.9	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =3A	--	7.5	9.0	mΩ
		V _{GS} =4.0V, I _D =3A	--	8.0	9.5	mΩ
		V _{GS} =3.8V, I _D =3A	--	8.4	9.8	mΩ
		V _{GS} =3.1V, I _D =3A	--	8.9	10	mΩ
		V _{GS} =2.5V, I _D =3A	--	9.7	12	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	--	660	--	pF
C _{OSS}	Output Capacitance		--	160	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	90	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =10V, I _D =10A, V _{GS} =4.5V	--	8	--	nC
Q _{gs}	Gate Source Charge		--	2.5	--	nC
Q _{gd}	Gate Drain Charge		--	3	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =10V, I _D =10A, V _{GS} =4.5V, R _G =10Ω	--	0.5	--	nS
t _r	Turn-on Rise Time		--	1	--	nS
t _{d(off)}	Turn-Off Delay Time		--	12	--	nS
t _f	Turn-Off Fall Time		--	4	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, Is=10A	--	--	1.2	V

Typical Operating Characteristics

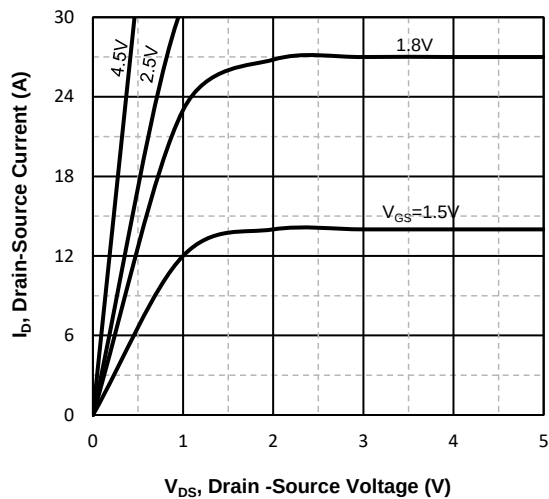


Fig1. Typical Output Characteristics

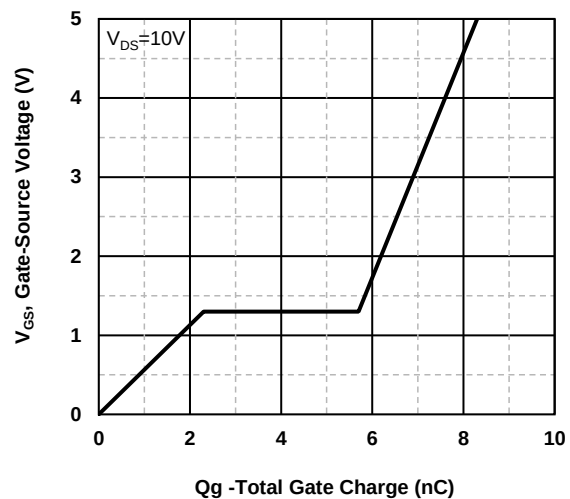


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

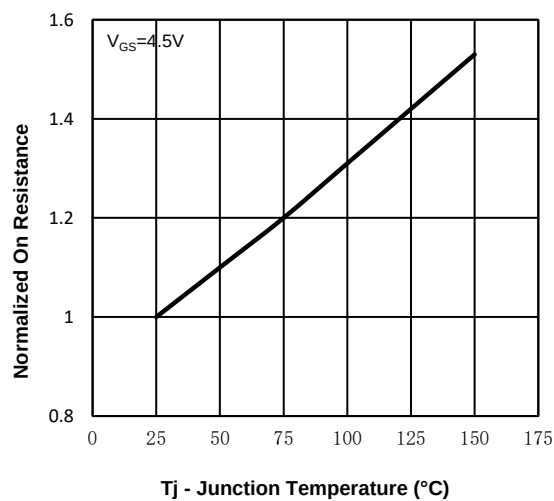


Fig3. Normalized On-Resistance Vs. Temperature

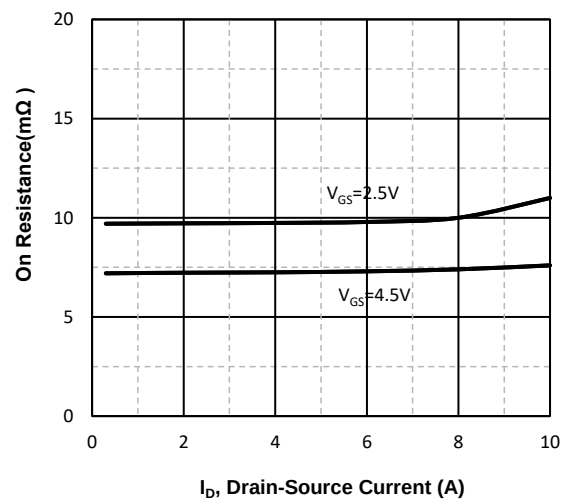


Fig4. On-Resistance Vs. Drain-Source Current

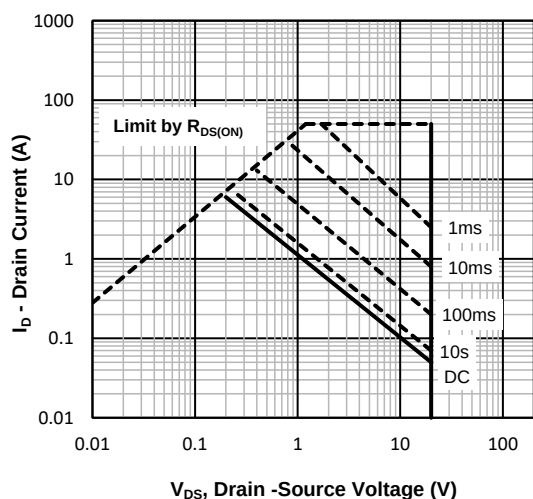


Fig5. Maximum Safe Operating Area

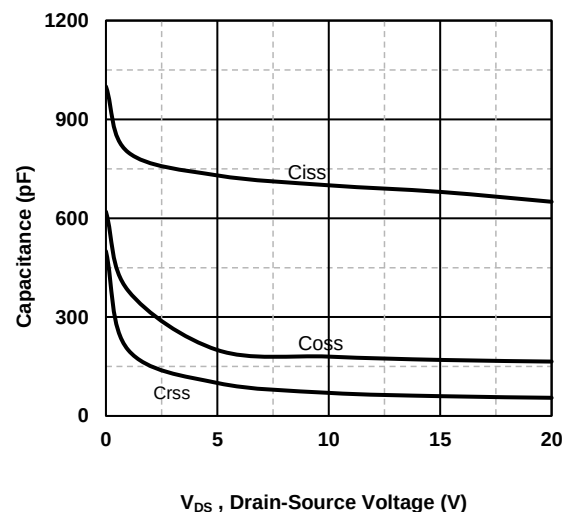
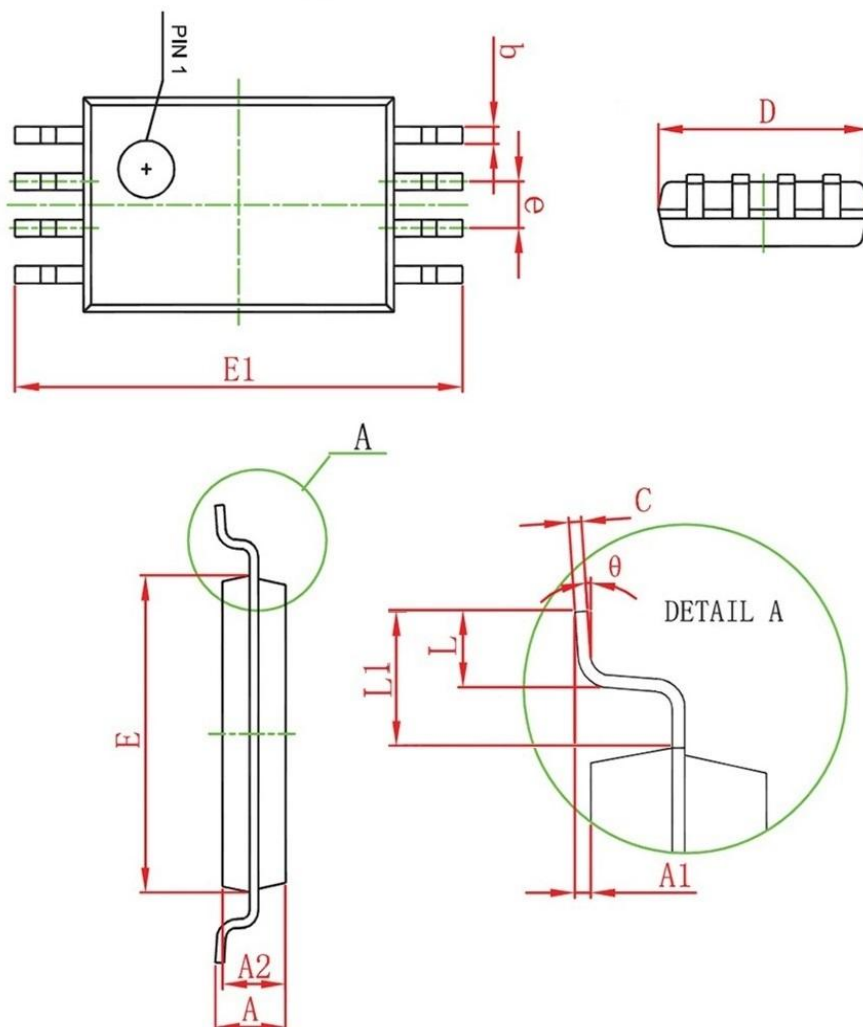


Fig6 Typical Capacitance Vs. Drain-Source

TSSOP-8 Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions in Inches	
	Min	Max	Min	Max
A	1.000	1.200	0.039	0.047
A1	0.020	0.180	0.000	0.007
A2	0.900	1.100	0.035	0.043
b	0.170	0.270	0.006	0.010
c	0.122	0.132	0.004	0.005
D	2.870	3.070	0.112	0.120
e	0.65BSC		0.025BSC	
E	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.259
L	0.400	0.800	0.015	0.031
L1	1.00BSC		0.039BSC	
Ø1	0.500	0.700	0.001	0.027
θ	0°	10°	0°	10°