

Features

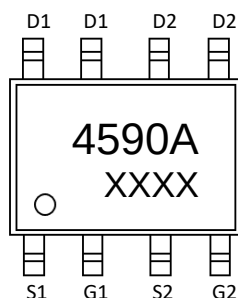
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management

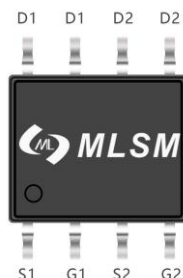
Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
100V	47mΩ@10V	5.6A
	59mΩ@4.5V	
-100V	150mΩ@-10V	-3.4A
	165mΩ@-4.5V	

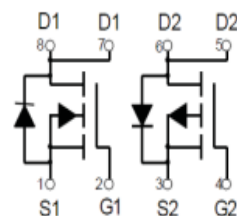


Marking and pin assignment

4590A : Device code
XXXX : Code



SOP-8 top view



Schematic diagram



Pb-Free



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	100	-100	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		A
		5.6	-3.4	

Mounted on Large Heat Sink

I_{DM}	Pulse Drain Current Tested	Tc=25°C		A
		30	-20	
I_D	Continuous Drain Current	Tc=25°C		A
		5.6	-3.4	
P_D	Maximum Power Dissipation	Tc=25°C		W
		3.6	4.2	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	55	55	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MQ4590A	SOP-8	4590A	3,000	6,000	42,000	13"reel



N-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	V _{GS} =0V, I _D =250μA	100	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =100V, 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	1.5	--	2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =2A	--	47	57	mΩ
		V _{GS} =4.5V, I _D =1.5A	--	59	72	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =50V, V _{GS} =0V, f=1MHz	--	360	--	pF
C _{OSS}	Output Capacitance		--	130	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	20	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DD} =50V, I _D =4.5A, V _{GS} =10V	--	7.5	--	nC
Q _{gs}	Gate Source Charge		--	1.2	--	nC
Q _{gd}	Gate Drain Charge		--	2	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =50V, I _D =3.6A, V _{GS} =10V, R _G =1Ω	--	5	--	nS
t _r	Turn-on Rise Time		--	11	--	nS
t _{d(off)}	Turn-Off Delay Time		--	12	--	nS
t _f	Turn-Off Fall Time		--	6	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, Is=5.6A	--	--	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	-100	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-100V, 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	-1.5	--	-2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-2A	--	150	183	mΩ
		V _{GS} =-4.5V, I _D =-1A	--	165	205	mΩ
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =-50V, V _{GS} =0V, f=1MHz	--	1150	--	pF
C _{OSS}	Output Capacitance		--	65	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	40	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =-50V, I _D =-5A, V _{GS} =-4.5V	--	11.6	--	nC
Q _{gs}	Gate Source Charge		--	3.8	--	nC
Q _{gd}	Gate Drain Charge		--	5	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =-50V, I _D =-4A, V _{GS} =-10V, R _G =1Ω	--	7	--	nS
t _r	Turn-on Rise Time		--	11	--	nS
t _{d(off)}	Turn-Off Delay Time		--	65	--	nS
t _f	Turn-Off Fall Time		--	20	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	T _J =25°C, I _S =-3.4A	--	--	-1.2	V



N-Channel Typical Operating Characteristics

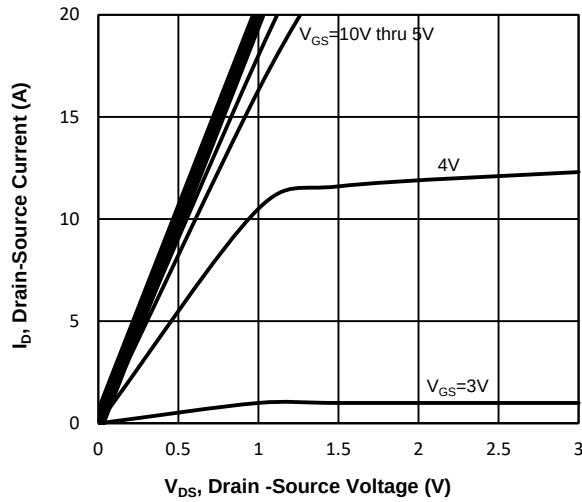


Fig1. Typical Output Characteristics

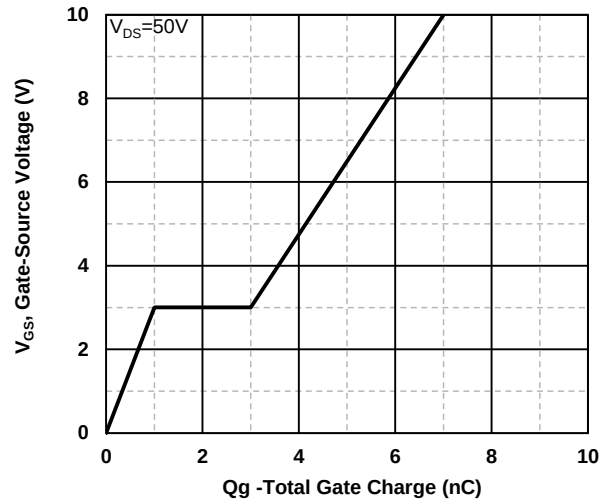


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

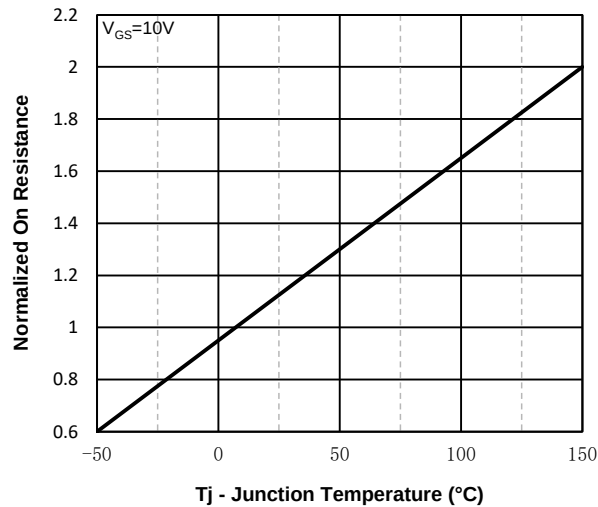


Fig3. Normalized On-Resistance Vs. Temperature

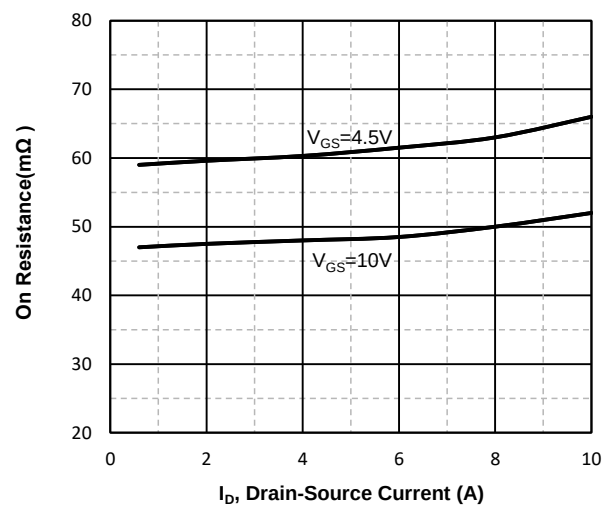


Fig4. On-Resistance Vs. Drain-Source Current

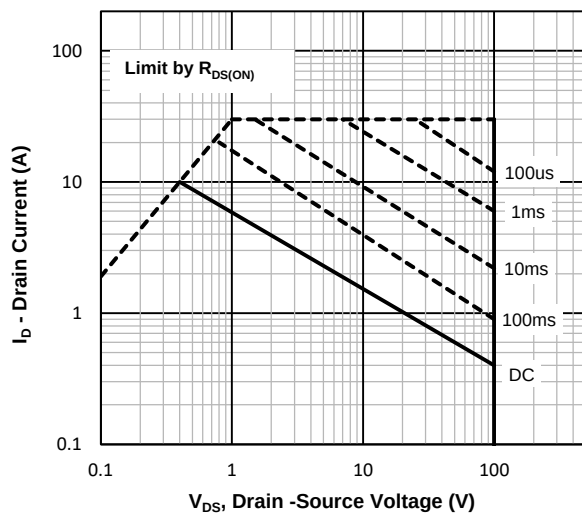


Fig5. Maximum Safe Operating Area

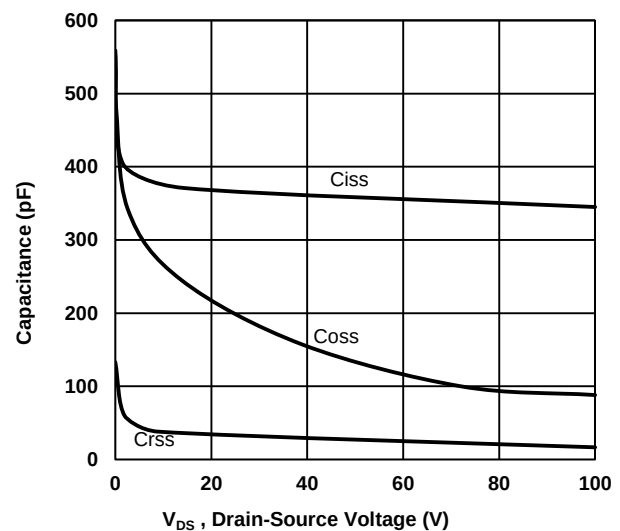


Fig6 Typical Capacitance Vs. Drain-Source Voltage

P-Channel Typical Operating Characteristics

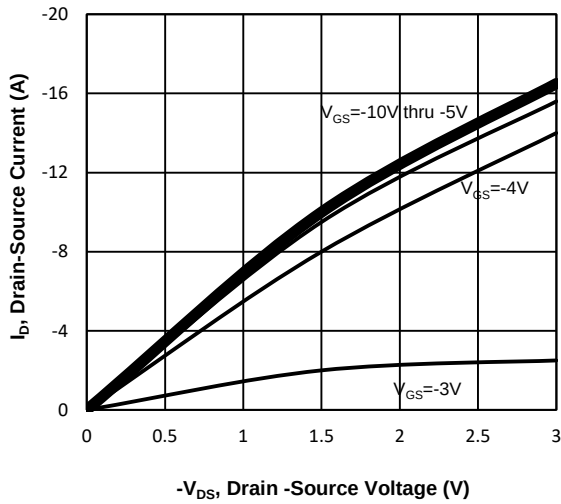


Fig7. Typical Output Characteristics

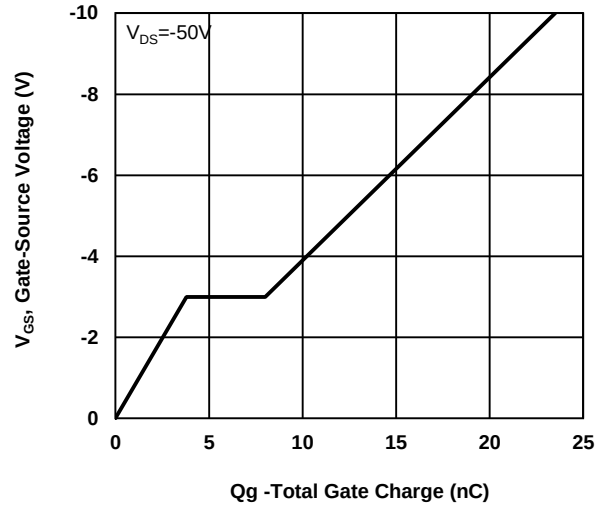


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

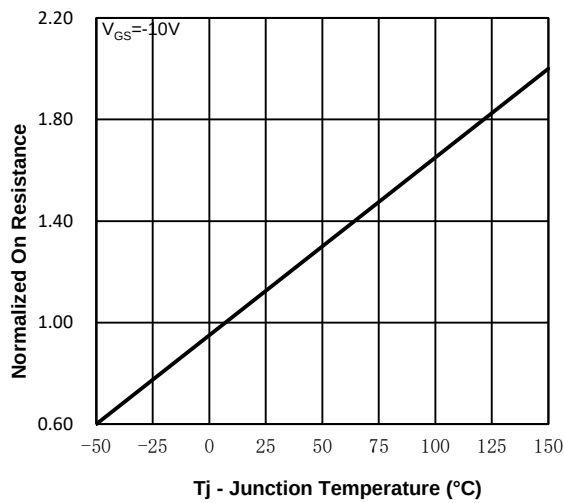


Fig9. Normalized On-Resistance Vs. Temperature

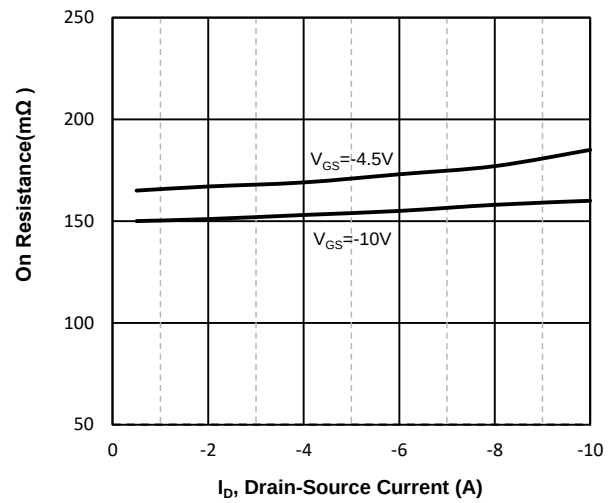


Fig10. On-Resistance Vs. Drain-Source Current

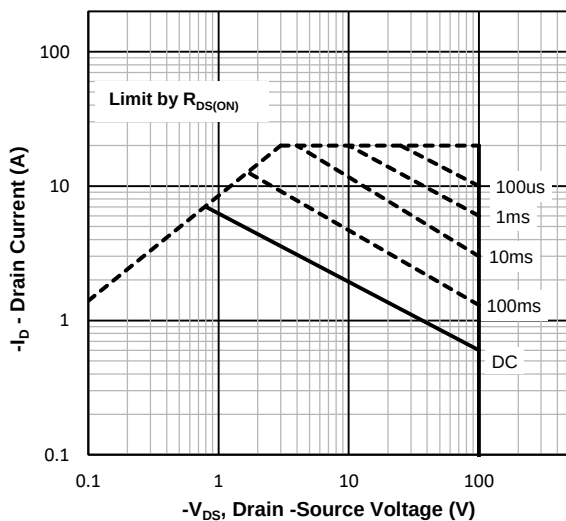


Fig11. Maximum Safe Operating Area

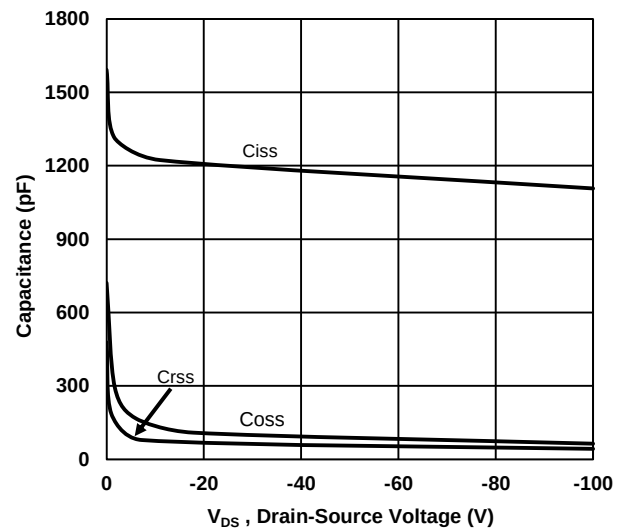
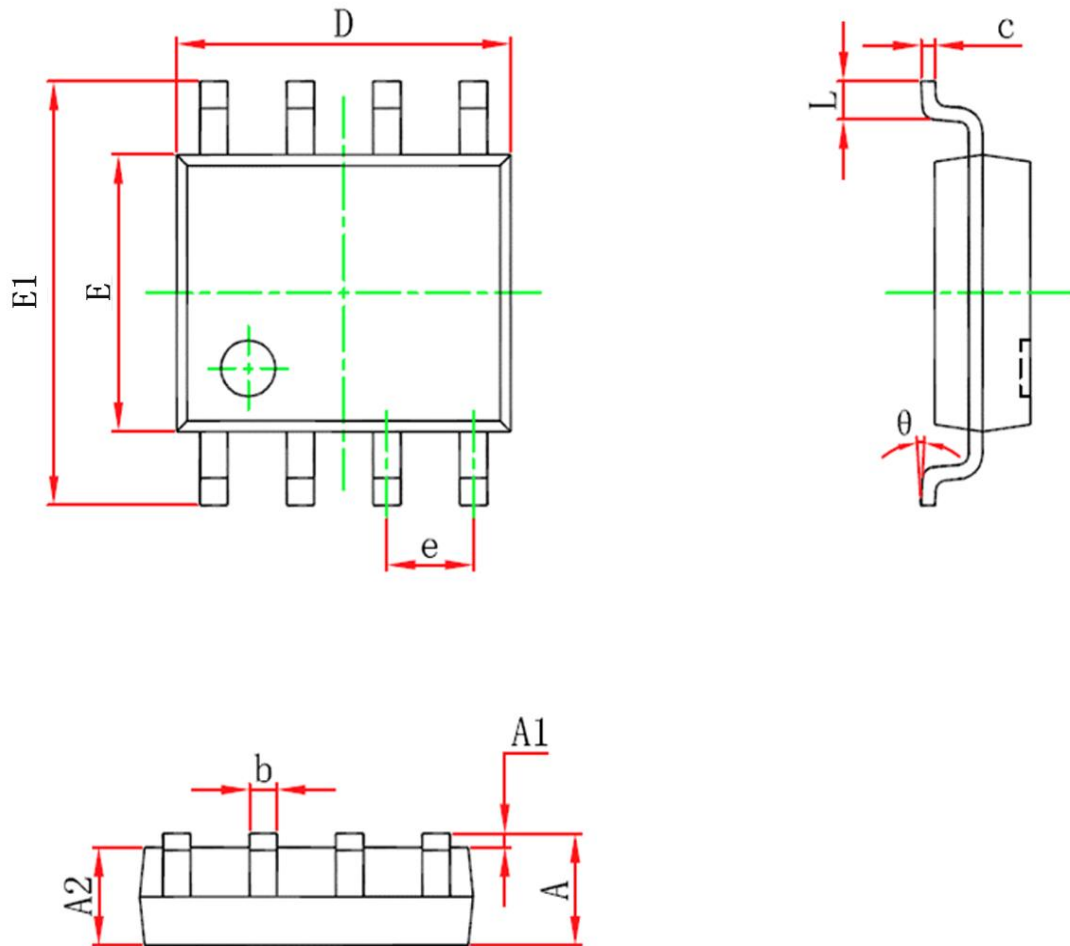


Fig12. Typical Capacitance Vs. Drain-Source Voltage

SOP-8 Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.750	0.057	0.068
A1	0.100	0.250	0.003	0.009
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.012	0.020
c	0.170	0.250	0.006	0.009
D	4.700	5.100	0.185	0.200
e	1.270(BSC)		0.050(BSC)	
E	3.800	4.000	0.149	0.157
E1	5.800	6.200	0.228	0.244
L	0.400	1.270	0.015	0.050
θ	0°	8°	0°	8°