

Features

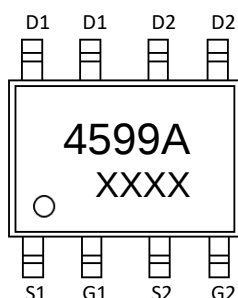
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Battery protection
- Load switch
- Power management

Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
40V	29.5mΩ@10V	6.8A
	35.5mΩ@4.5V	
-40V	37mΩ@-10V	-5.8A
	50mΩ@-4.5V	

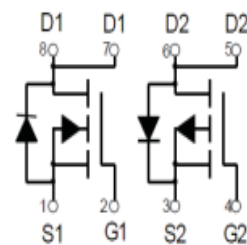


Marking and pin assignment

4599A : Device code
XXXX : Code



SOP-8 top view



Schematic diagram



Halogen-Free

Absolute Maximum Ratings (TA=25°C unless otherwise noted)					
Symbol	Parameter		N-Channel	P-Channel	Unit
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	Tc=25°C	6.8	-5.8	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	20	-20	A
I_D	Continuous Drain Current	Tc=25°C	6.8	-5.8	A
P_D	Maximum Power Dissipation	Tc=25°C	3	3.1	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		64	62.5	°C/W

Ordering Information (Example)						
Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MQ4599A	SOP-8	4599A	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	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	1.5	3.0	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =5A	--	29.5	35.5	mΩ
		V _{GS} =4.5V, I _D =4A	--	35.5	42.5	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1MHz	--	490	--	pF
C _{OSS}	Output Capacitance		--	42	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	33	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =20V, I _D =6.8A, V _{GS} =10V	--	10	--	nC
Q _{gs}	Gate Source Charge		--	1.4	--	nC
Q _{gd}	Gate Drain Charge		--	1.9	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =20V, R _L =2.5Ω, V _{GS} =10V, R _G =3Ω	--	15	--	nS
t _r	Turn-on Rise Time		--	49.5	--	nS
t _{d(off)}	Turn-Off Delay Time		--	19.2	--	nS
t _f	Turn-Off Fall Time		--	11	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, Is=6.8A	--	--	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	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	-1.2	-1.8	-2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-5A	--	37	45	mΩ
		V _{GS} =-4.5V, I _D =-4A	--	50	62	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =-20V, V _{GS} =0V, f=1MHz	--	1150	--	pF
C _{OSS}	Output Capacitance		--	285	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	195	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =-10V, I _D =-5.8A, V _{GS} =-20V	--	18.8	--	nC
Q _{gs}	Gate Source Charge		--	8.2	--	nC
Q _{gd}	Gate Drain Charge		--	10.9	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =-20V, I _D =-5.8A, V _{GS} =-10V, R _G =2.5Ω	--	12	--	nS
t _r	Turn-on Rise Time		--	18	--	nS
t _{d(off)}	Turn-Off Delay Time		--	35	--	nS
t _f	Turn-Off Fall Time		--	26	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, Is=-5.8A	--	--	-1.2	V

N-Channel Typical Operating Characteristics

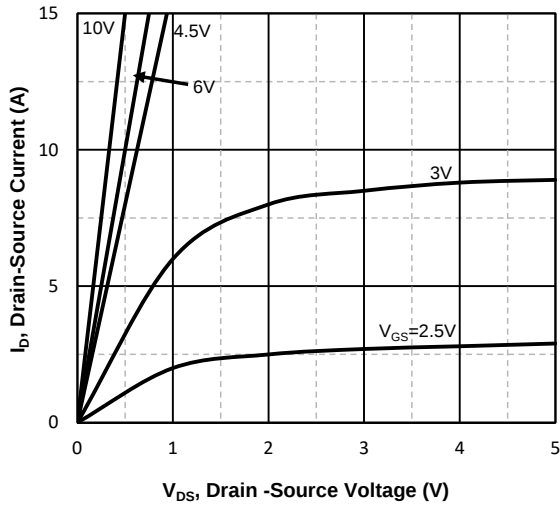


Fig1. Typical Output Characteristics

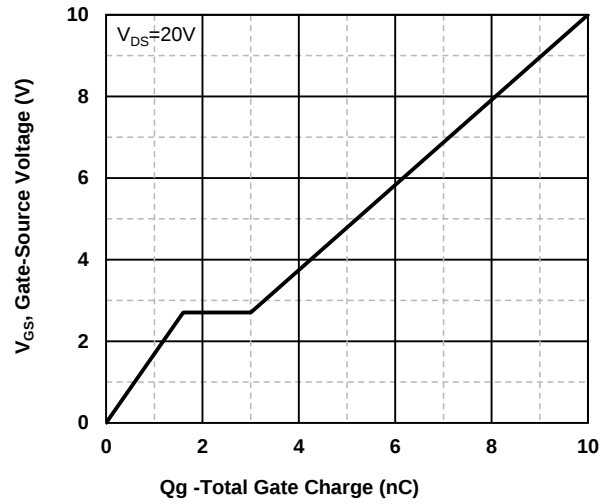


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

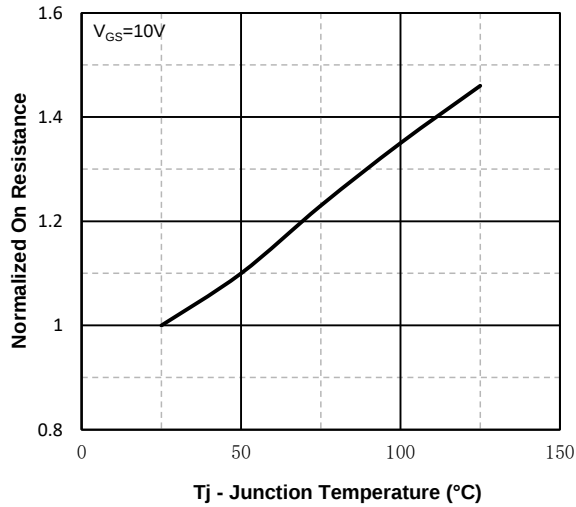


Fig3. Normalized On-Resistance Vs. Temperature

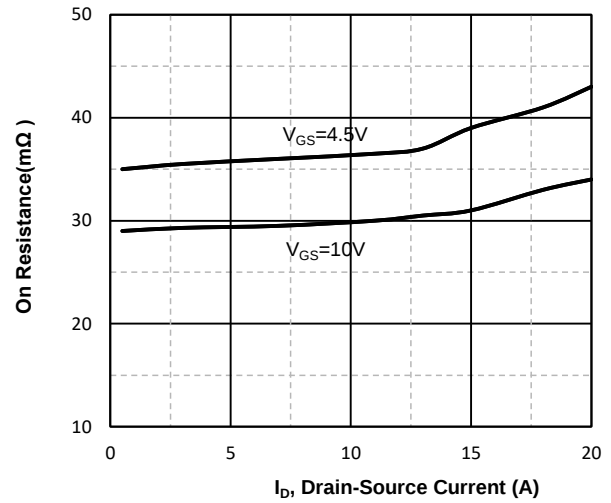


Fig4. On-Resistance Vs. Drain-Source Current

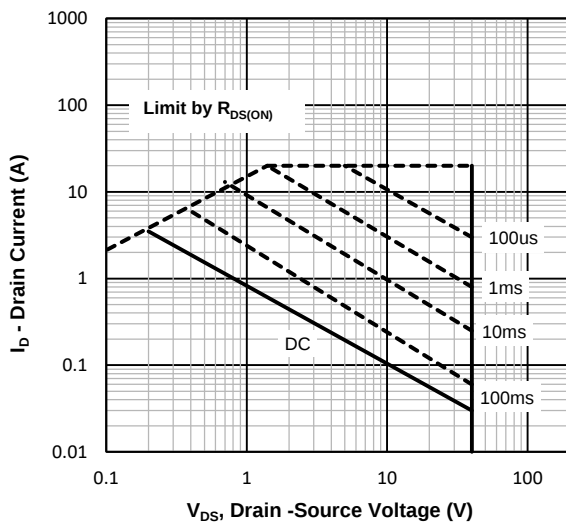


Fig5. Maximum Safe Operating Area

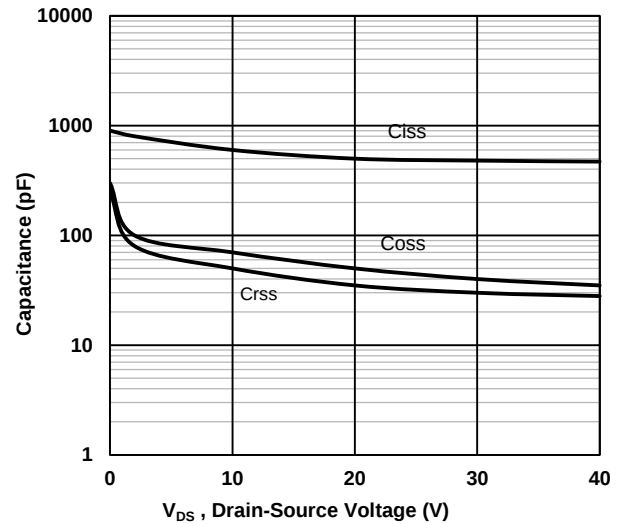


Fig6 Typical Capacitance Vs. Drain-Source Voltage

P-Channel Typical Operating Characteristics

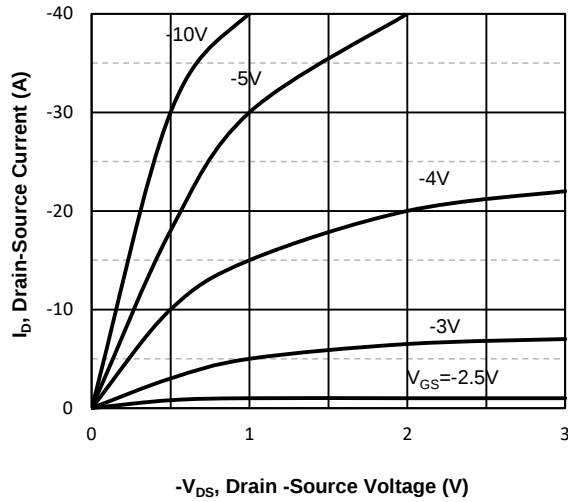


Fig7. Typical Output Characteristics

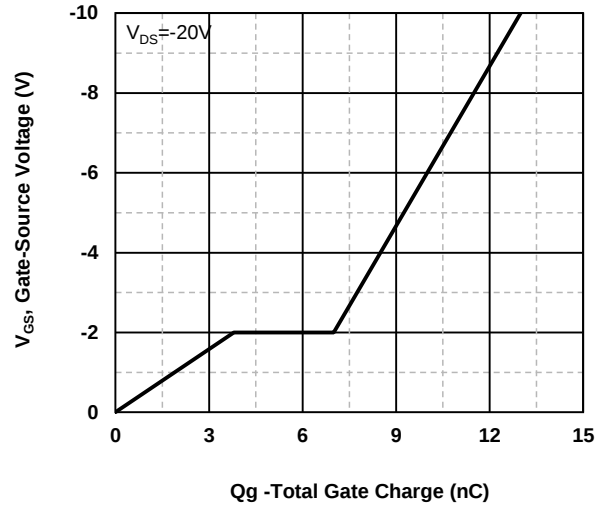


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

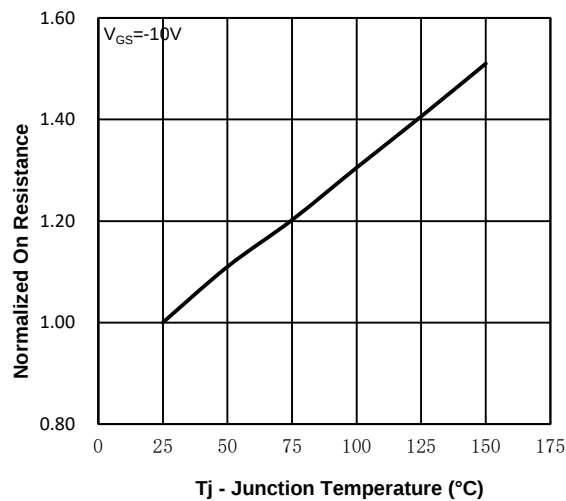


Fig9. Normalized On-Resistance Vs. Temperature

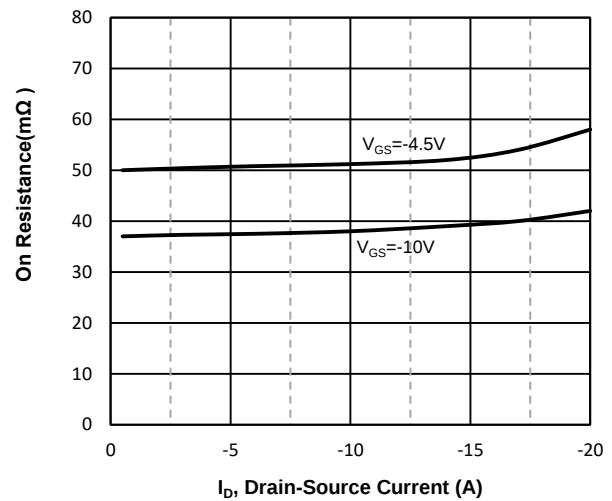


Fig10. On-Resistance Vs. Drain-Source Current

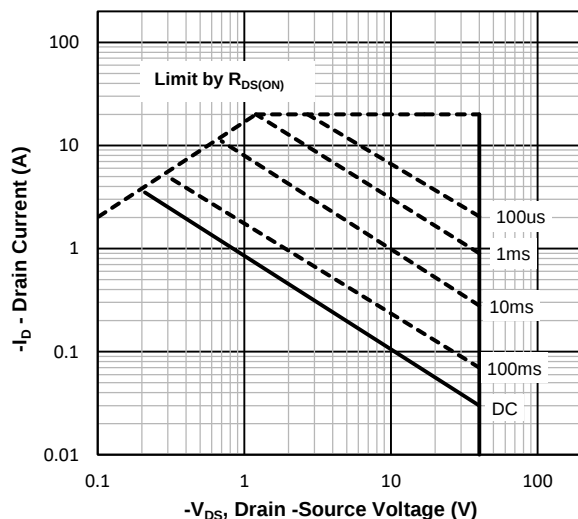


Fig11. Maximum Safe Operating Area

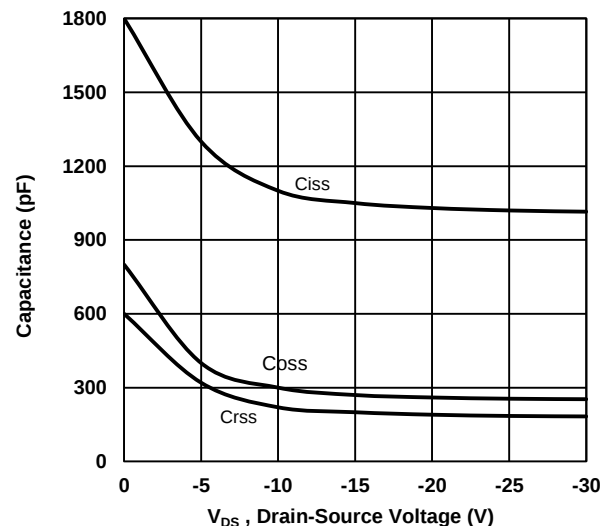
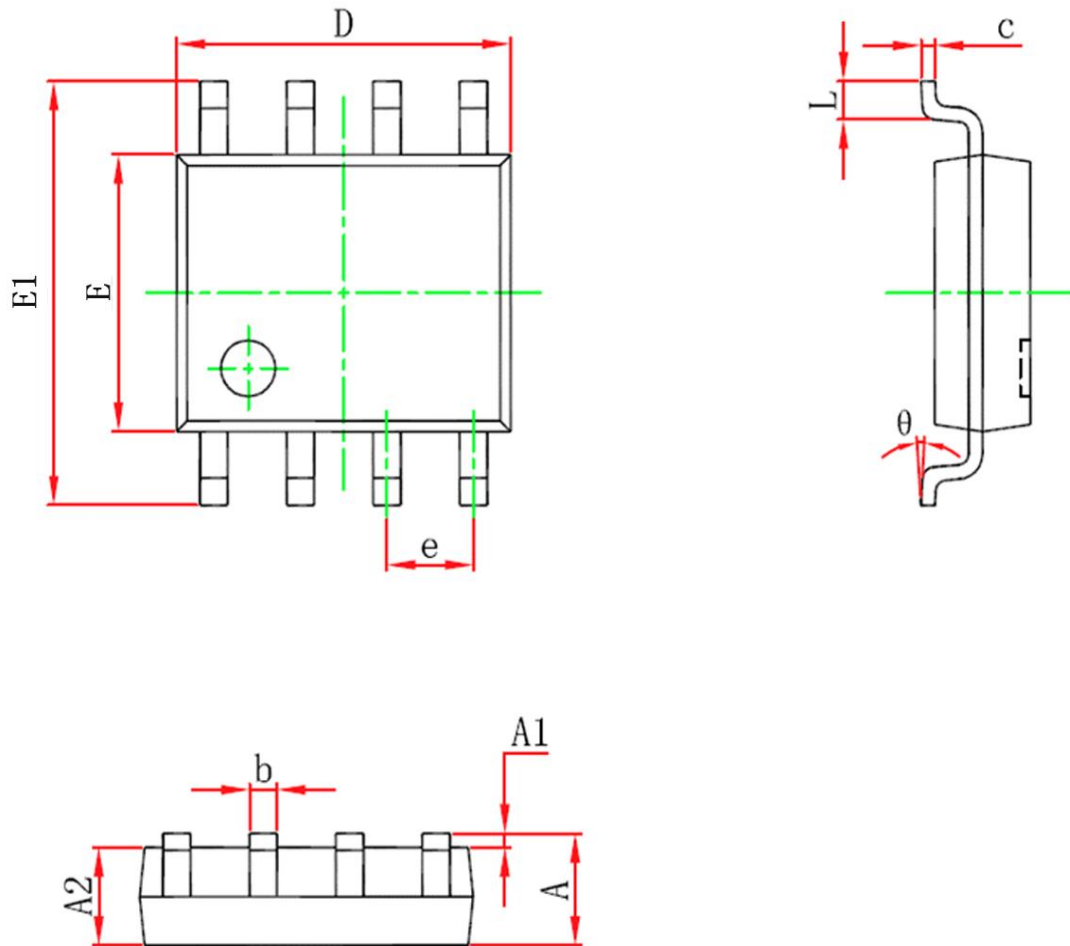


Fig12 Typical Capacitance Vs. Drain-Source Voltage

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°