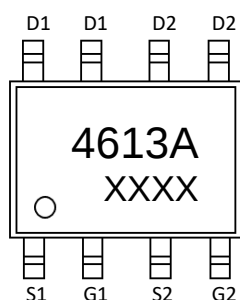


Features

- Trench Power LV MOSFET technology
- High density cell design for Low $R_{DS(ON)}$
- High Speed switching

Application

- Battery protection
- Power management
- Load switch



Marking and pin assignment

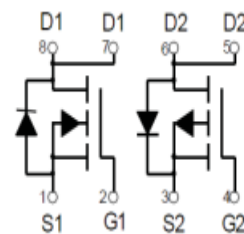
4613A : Device code
XXXX : Code

Product Summary

V_{DS}	$R_{DS(ON)}$ TYP	I_D
30V	20m Ω @10V	7.2A
	30m Ω @4.5V	
-30V	28m Ω @-10V	-6.1A
	45m Ω @-4.5V	



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	30	-30	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	7.2	-6.1	A
	$T_C=25^\circ\text{C}$			

Mounted on Large Heat Sink

I_{DM}	Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	30	-30	A
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	7.2	-6.1	A
P_D	Maximum Power Dissipation	$T_C=25^\circ\text{C}$	2	2	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient		62.5	62.5	°C/W

Ordering Information (Example)

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
MQ4613A	SOP-8	4613A	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	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, 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	--	3.0	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =7.2A	--	20	24	mΩ
		V _{GS} =4.5V, I _D =4.0A	--	30	40	mΩ
Dynamic Electrical Characteristics @ TJ = 25℃ (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	--	522	--	pF
C _{OSS}	Output Capacitance		--	110	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	75	--	pF
Switching Characteristics						
Qg	Total Gate Charge	V _{DS} =15V, I _D =7.2A, V _{GS} =10V	--	11	--	nC
Qgs	Gate Source Charge		--	1.9	--	nC
Qgd	Gate Drain Charge		--	4	--	nC
td(on)	Turn-on Delay Time	V _{DS} =15V, R _L =2.1Ω, V _{GS} =10V, R _G =3Ω	--	4.7	--	nS
tr	Turn-on Rise Time		--	4.9	--	nS
td(off)	Turn-Off Delay Time		--	16.2	--	nS
tf	Turn-Off Fall Time		--	3.5	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	Tj=25℃, Is=7.2A	--	--	1.2	V

P-Ch Electrical Characteristics (T_J=25 °C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
BV _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, 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	--	-3.0	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-6.1A	--	28	37	mΩ
		V _{GS} =-4.5V, I _D =-4.0A	--	45	60	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	--	1040	--	pF
C _{OSS}	Output Capacitance		--	179	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	134	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	V _{DS} =-15V, I _D =-6.1A, V _{GS} =-10V	--	16.8	--	nC
Q _{gs}	Gate Source Charge		--	3.4	--	nC
Q _{gd}	Gate Drain Charge		--	5	--	nC
t _{d(on)}	Turn-on Delay Time	V _{DD} =-15V, I _D =-6.1A, V _{GS} =-10V, R _G =3Ω	--	9	--	nS
t _r	Turn-on Rise Time		--	5.7	--	nS
t _{d(off)}	Turn-Off Delay Time		--	22.7	--	nS
t _f	Turn-Off Fall Time		--	10.2	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	T _J =25°C, I _S =-6.1A	--	--	-1.2	V

N-Channel Typical Operating Characteristics

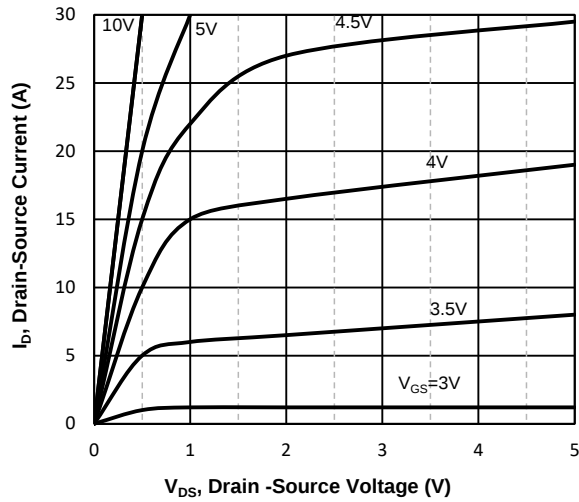


Fig1. Typical Output Characteristics

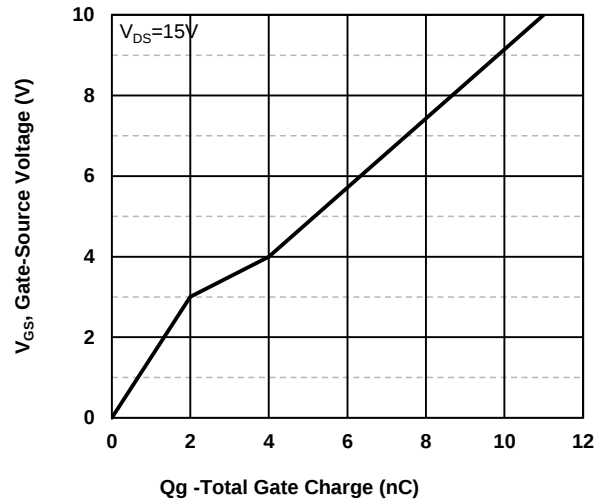


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

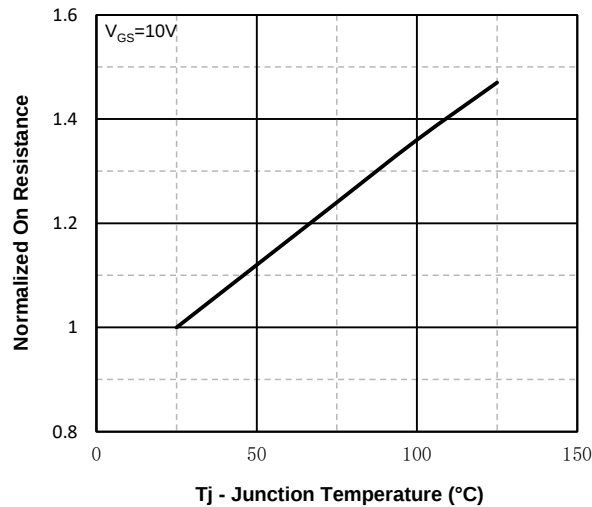


Fig3. Normalized On-Resistance Vs. Temperature

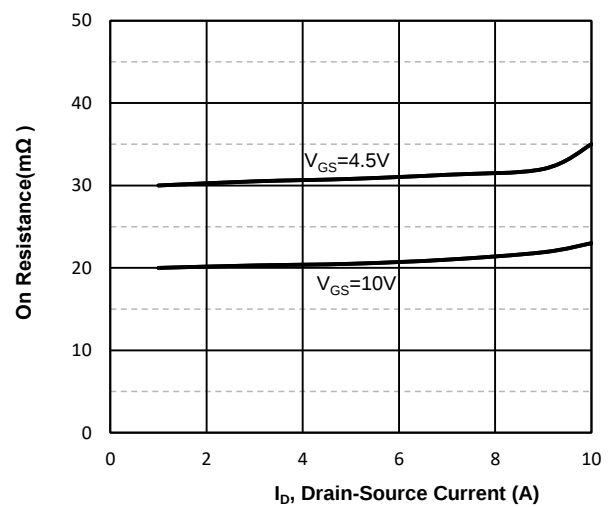


Fig4. On-Resistance Vs. Drain-Source Current

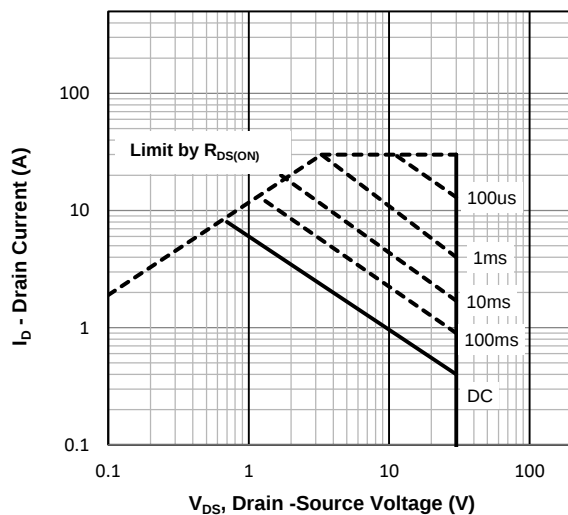


Fig5. Maximum Safe Operating Area

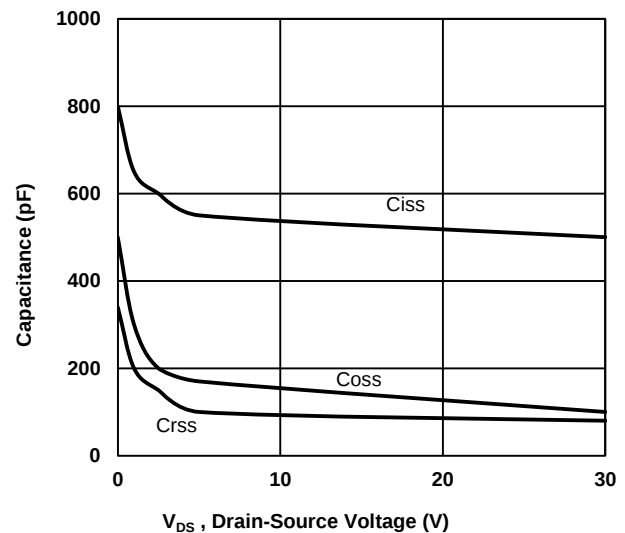
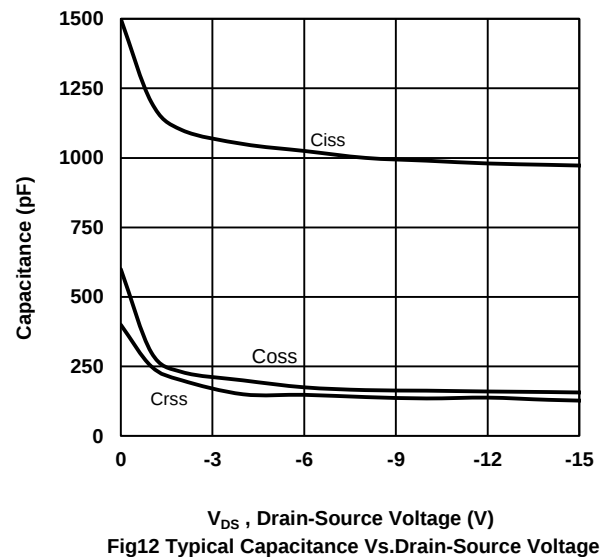
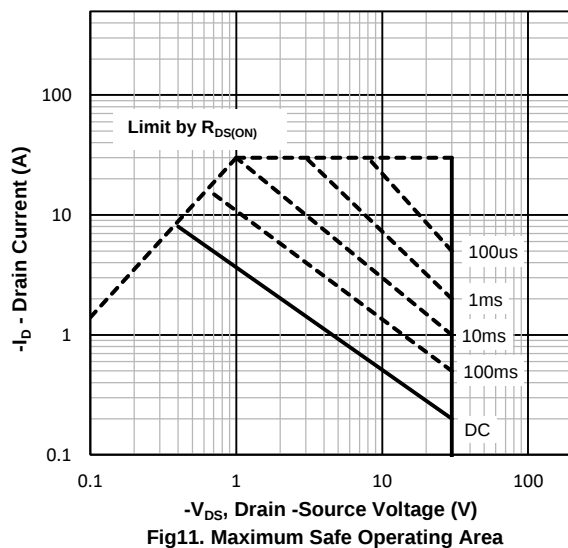
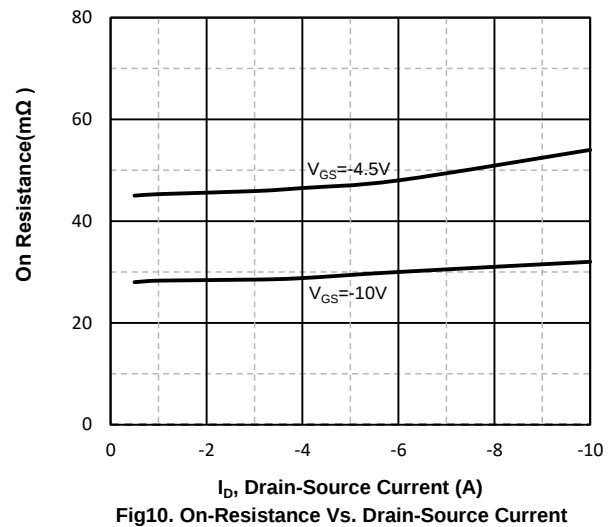
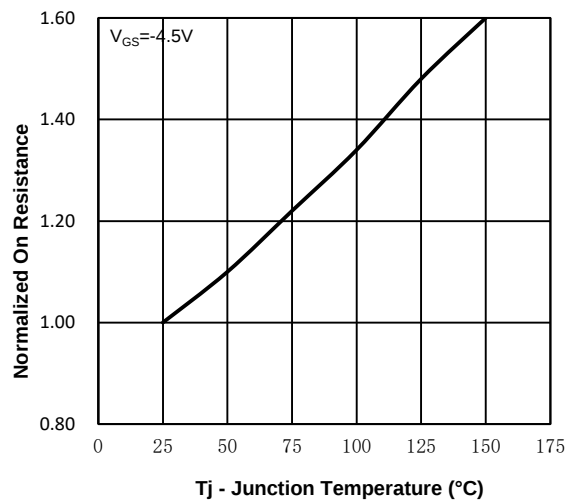
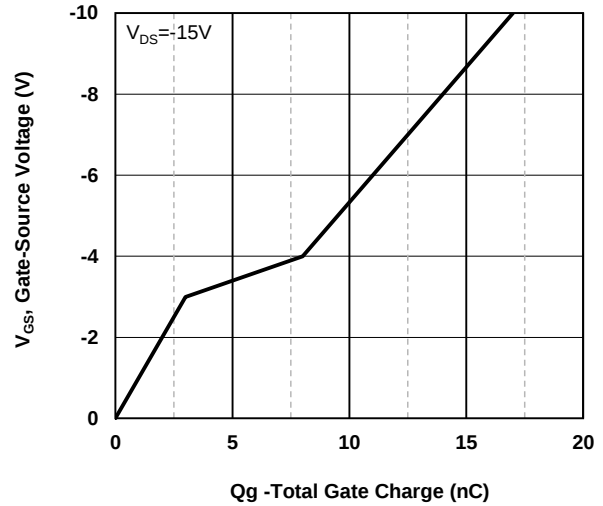
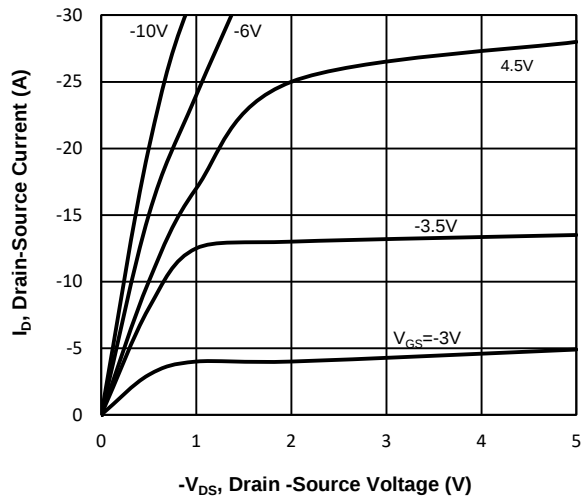
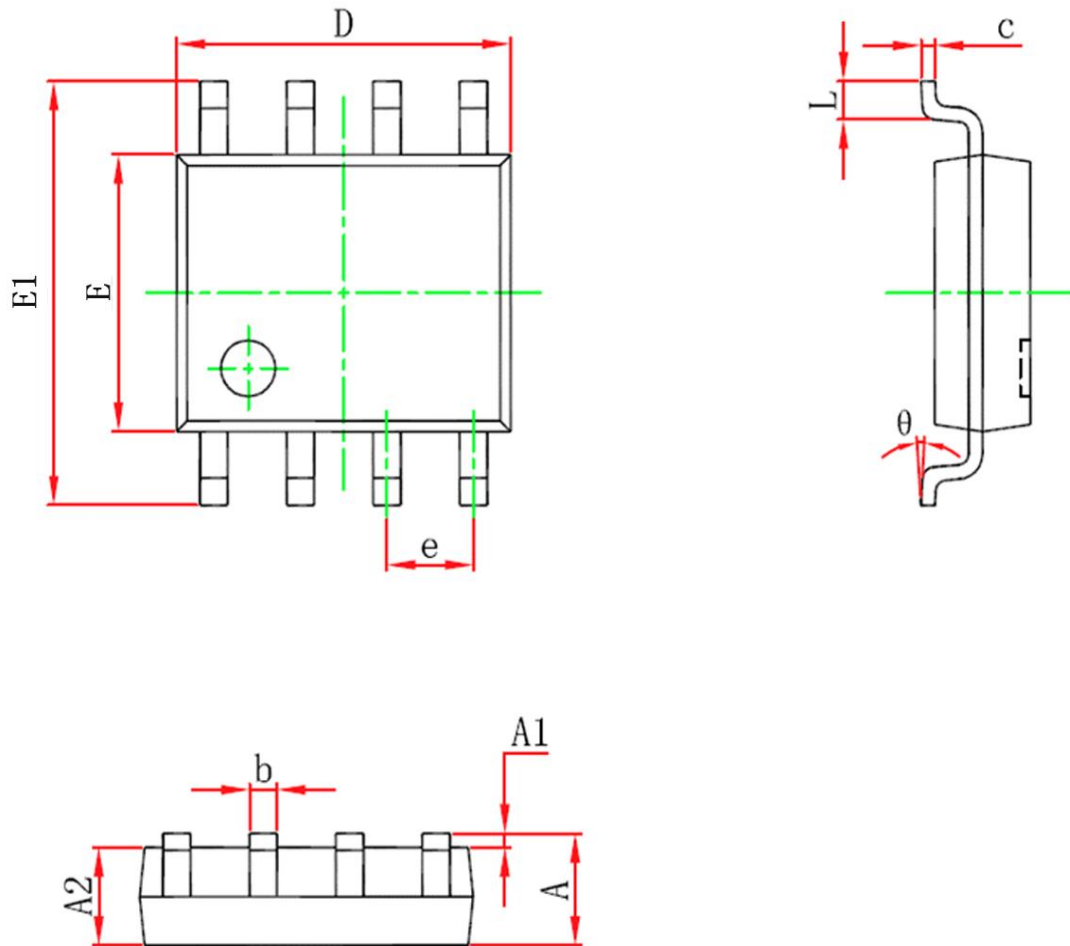


Fig6. Typical Capacitance Vs. Drain-Source Voltage

P-Channel Typical Operating Characteristics



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°