

60V N Channel+P Channel MOSFET

Features

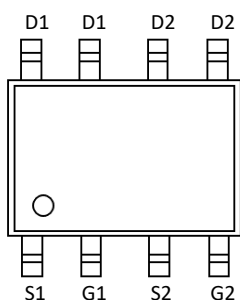
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

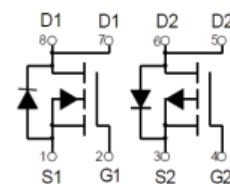
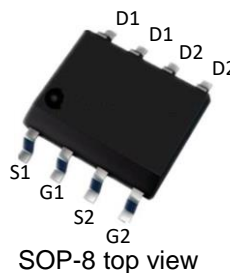
- Battery protection
- Load switch
- Power management

Product Summary

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
60V	90mΩ@10V	4A
	120mΩ@4.5V	
-60V	200mΩ@-10V	-2A
	300mΩ@-4.5V	



Marking and pin assignment



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	60	-60	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	4	-2	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested	Tc=25°C	15	-7	A
I_D	Continuous Drain Current@GS=10V	Tc=25°C	4	-2	A
P_D	Maximum Power Dissipation	Tc=25°C	2	2	W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient>(*1 in2 Pad of 2-oz Copper), Max.)		62.5	62.5	°C/W

N-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	VGS=0V, ID=250μA	60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	VDS=60V, VGS=0V	--	--	1	μA
I _{GSS}	Gate-Body Leakage Current	VGS=±20V, VDS=0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	VDS=VGS, ID=250μA	1	1.5	2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	VGS=10V, ID=3A	--	58	90	mΩ
		VGS=4.5V, ID=2A	--	70	120	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	VDS=30V, VGS=0V, f=1MHz	--	400	--	pF
C _{OSS}	Output Capacitance		--	28	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	23	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	VDS=30V, ID=3A, VGS=10V	--	9	--	nC
Q _{gs}	Gate Source Charge		--	1	--	nC
Q _{gd}	Gate Drain Charge		--	2.5	--	nC
t _{d(on)}	Turn-on Delay Time	VDD=30V, ID=3A, VGS=10V, RG=2.3Ω	--	4	--	nS
t _r	Turn-on Rise Time		--	10	--	nS
t _{d(off)}	Turn-Off Delay Time		--	12.5	--	nS
t _f	Turn-Off Fall Time		--	1.8	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	T _J =25°C, I _S =3A,	--	--	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	VGS=0V, ID=-250μA	-60	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	VDS=-60V, VGS=0V	--	--	-1	μA
I _{GSS}	Gate-Body Leakage Current	VGS=±20V, VDS=0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	VDS=VGS, ID=-250μA	-1	-1.5	-2.5	V
R _{DS(on)}	Drain-Source On-State Resistance	VGS=-10V, ID=-3A	--	160	200	mΩ
		VGS=-4.5V, ID=-2A	--	200	300	mΩ
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{ISS}	Input Capacitance	VDS=-30V, VGS=0V, f=1MHz	--	430	--	pF
C _{OSS}	Output Capacitance		--	33	--	pF
C _{RSS}	Reverse Transfer Capacitance		--	22	--	pF
Switching Characteristics						
Q _g	Total Gate Charge	VDD=-30V, ID=-2A, VGS=-10V	--	8.5	--	nC
Q _{gs}	Gate Source Charge		--	2.1	--	nC
Q _{gd}	Gate Drain Charge		--	1.6	--	nC
t _{d(on)}	Turn-on Delay Time	VDD=-30V, ID=-1A, VGS=-10V, RG=6Ω	--	5.3	--	nS
t _r	Turn-on Rise Time		--	20	--	nS
t _{d(off)}	Turn-Off Delay Time		--	33	--	nS
t _f	Turn-Off Fall Time		--	10	--	nS
Source- Drain Diode Characteristics						
V _{SD}	Forward on voltage	T _J =25°C, I _S =-2A,	--	--	-1.2	V

N-Channel Typical Operating Characteristics

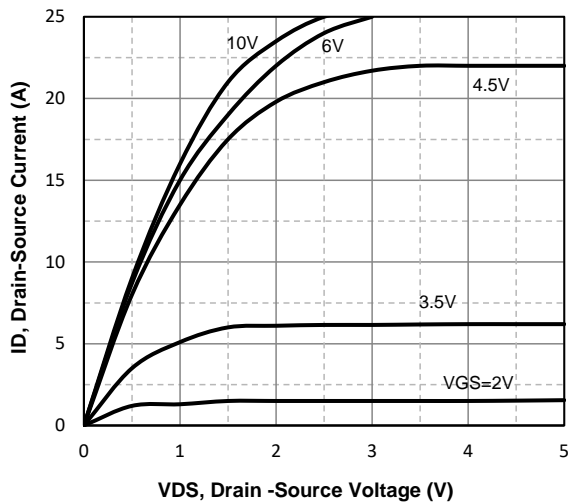


Fig1. Typical Output Characteristics

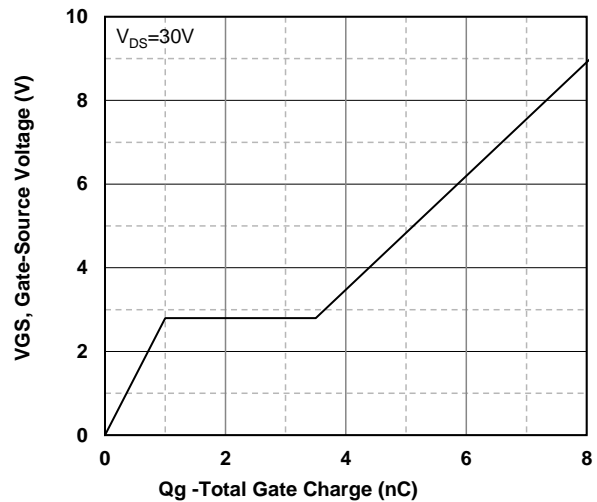


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

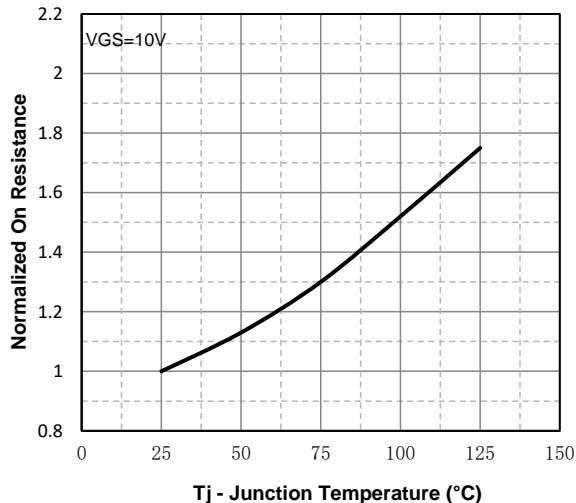


Fig3. Normalized On-Resistance Vs. Temperature

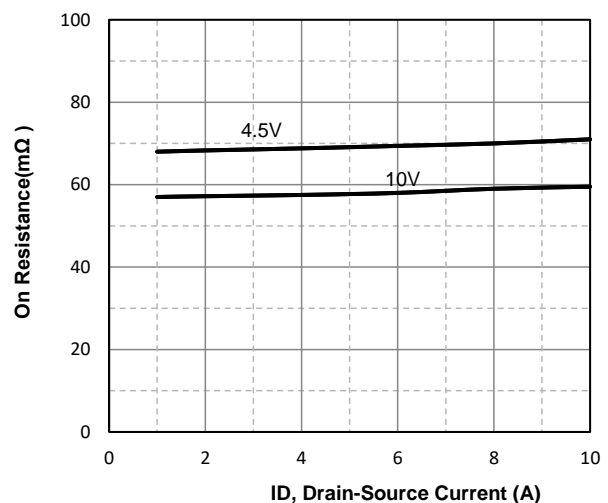


Fig4. On-Resistance Vs. Drain-Source Current

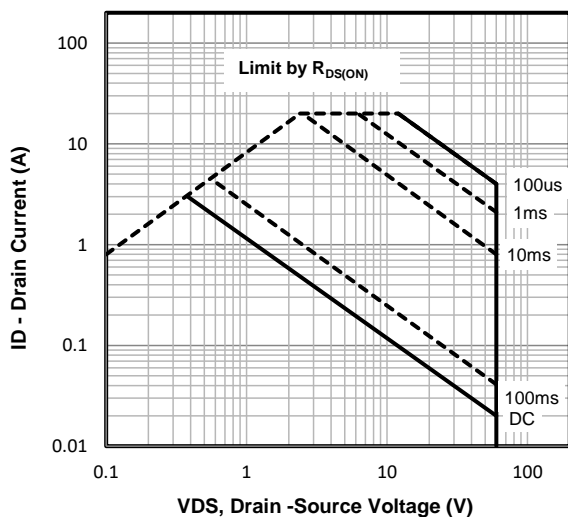


Fig5. Maximum Safe Operating Area

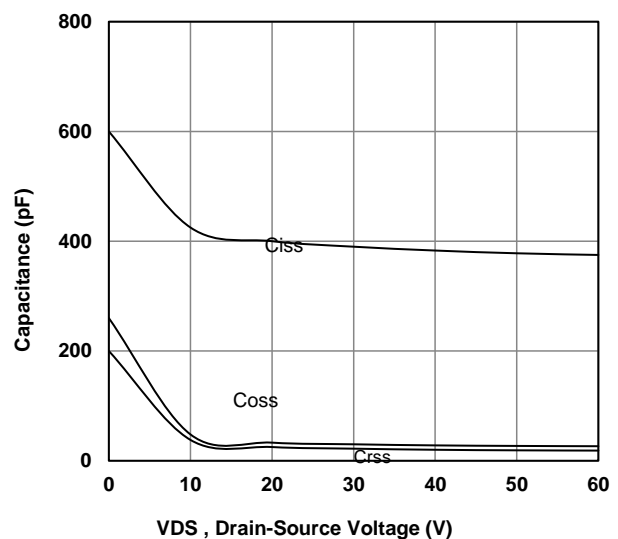


Fig6. Typical Capacitance Vs. Drain-Source Voltage

P-Channel Typical Operating Characteristics

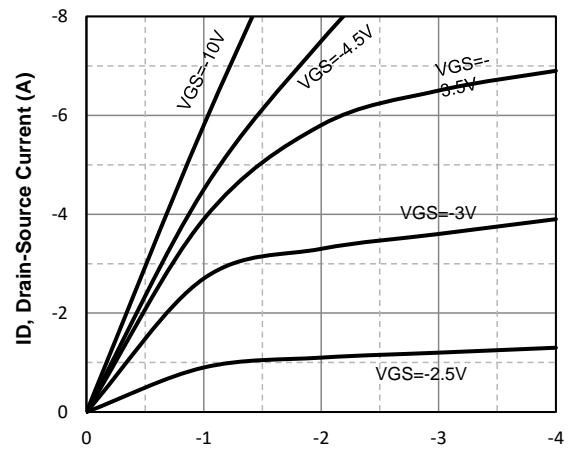


Fig1. Typical Output Characteristics

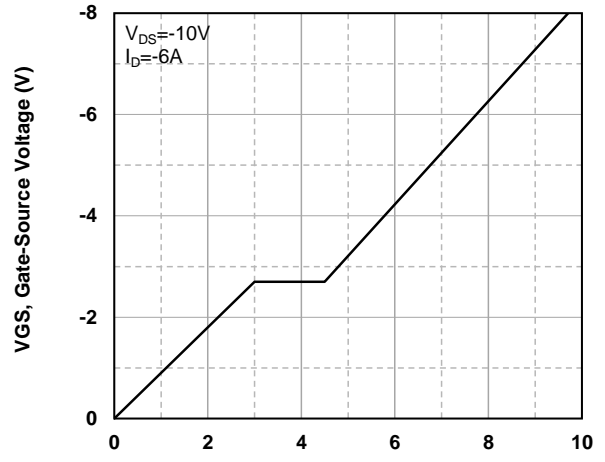


Fig2. Typical Gate Charge Vs. Gate-Source Voltage

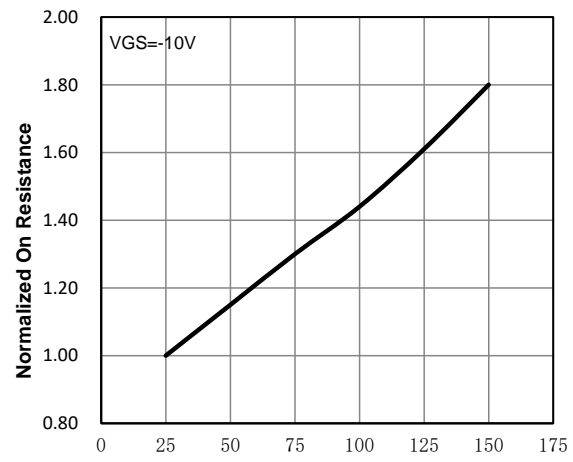


Fig3. Normalized On-Resistance Vs. Temperature

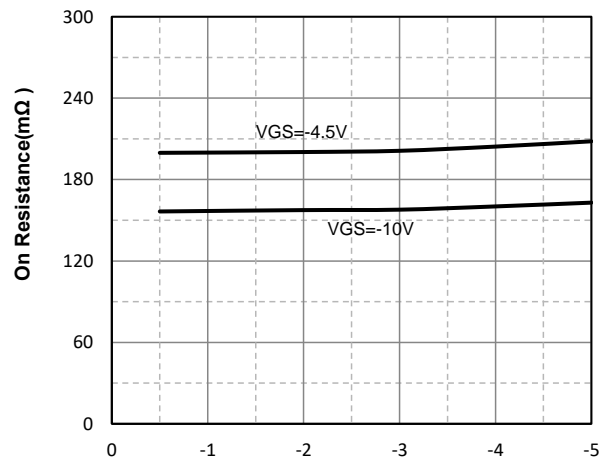


Fig4. On-Resistance Vs. Drain-Source Current

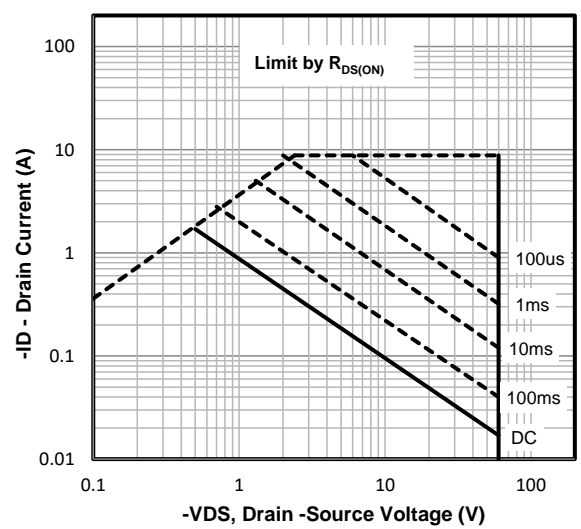


Fig5. Maximum Safe Operating Area

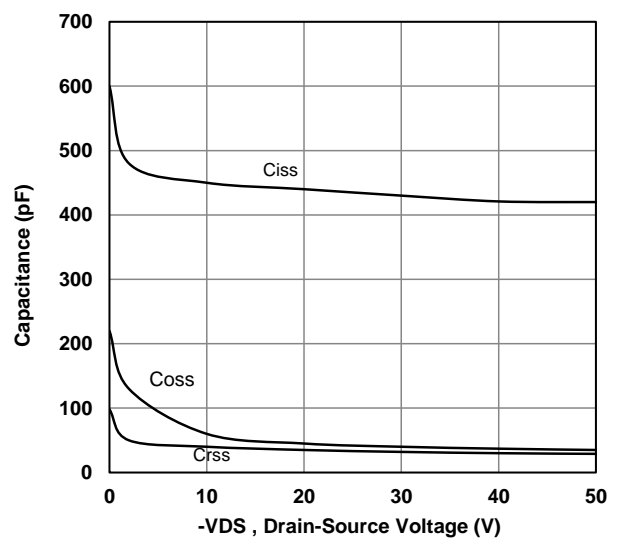
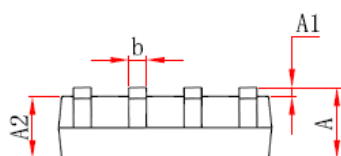
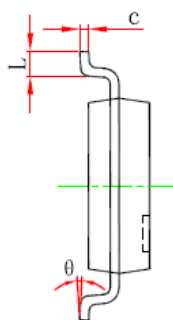
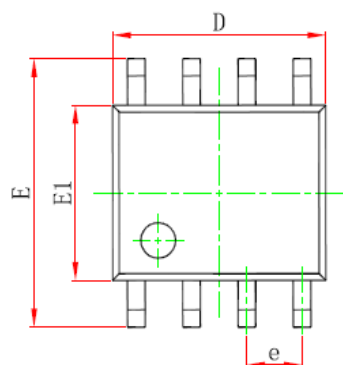


Fig6. Typical Capacitance Vs. Drain-Source Voltage

SOP-8 Package information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°