

Description

The SX4G06LI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 60V$ $I_D = 4.2A$

$R_{DS(ON)} < 100m\Omega$ @ $V_{GS} = 10V$

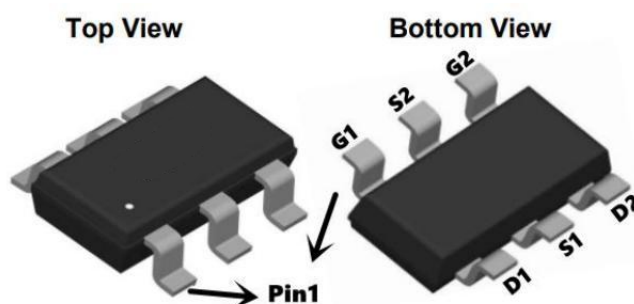
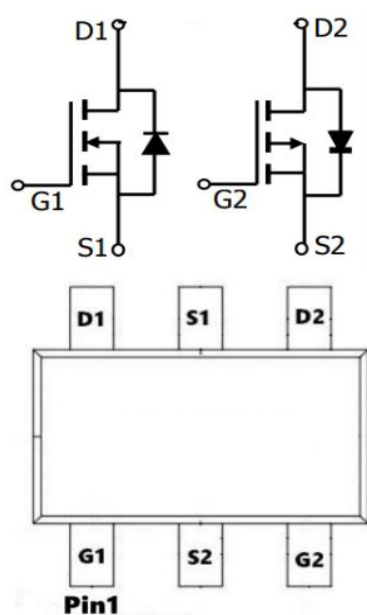
$V_{DS} = -60V$ $I_D = -3.8A$

$R_{DS(ON)} < 200m\Omega$ @ $V_{GS} = -10V$

Application

Boost driver

Brushless motor



Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	4.2	-3.8	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	3.1	-2.1	A
I_{DM}	Pulsed Drain Current ²	21	18.5	A
E_{AS}	Single Pulse Avalanche Energy ³	50	45.3	mJ
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ⁴	42	36	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$

N-Channel Electrical Characteristics (T_J =25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250μA	60	66		V
IDSS	Zero Gate Voltage Drain Current	VDS=60V, VGS=0V			1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V, VDS=0V			±100	nA
		VGS=±10V, VDS=0V			±50	
VGS(th)	Gate Threshold Voltage	VDS= VGS, ID=250μA	1.0	1.3	2.5	V
RDS(ON)	Static Drain-Source On-Resistance	VGS= 10V, ID=3A		75	100	mΩ
		VGS=4.5V, ID=2A		95	120	
Ciss	Input Capacitance	VDS= 10V, VGS=0V, f=1MHZ		409		pF
Coss	Output Capacitance			50		pF
Crss	Reverse Transfer Capacitance			41		pF
Qg	Total Gate Charge	VGS= 10V, VDS=30V, ID=3A		10.27		nC
Qgs	Gate-Source Charge			1.65		nC
Qgd	Gate-Drain Charge			2.11		nC
Qrr	Reverse Recovery Chrage	IF=3A, di/dt= 100A/us		6.99		nC
trr	Reverse Recovery Time			32.6		ns
tD(on)	Turn-on Delay Time	VGS= 10V, VDS=30V, RL=20Ω RGEN=3Ω		3.6		ns
tr	Turn-on Rise Time			17.6		ns
tD(off)	Turn-off Delay Time			13		ns
tf	Turn-off fall Time			23		ns
VSD	Diode Forward Voltage	IS=4A, VGS=0V			1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The power dissipation is limited by 150℃ junction temperature
- 4、The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	-60	-67	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.021	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V , I _D =-1.5A	---	165	200	mΩ
		V _{GS} =-4.5V , I _D =-1A	---	200	250	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.0	1.7	-2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	4.08	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-48V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =-48V , V _{GS} =0V , T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =-5V , I _D =-1.5A	---	5.9	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-20V , V _{GS} =-4.5V , I _D =-1.5A	---	4.6	---	nC
Q _{gs}	Gate-Source Charge		---	1.4	---	
Q _{gd}	Gate-Drain Charge		---	1.62	---	
T _{d(on)}	Turn-On Delay Time	V _{DS} =-15V , V _{GS} =-10V , R _G =3.3Ω, I _D =-1A	---	17.4	---	ns
T _r	Rise Time		---	5.4	---	
T _{d(off)}	Turn-Off Delay Time		---	37.2	---	
T _f	Fall Time		---	2.4	---	
C _{iss}	Input Capacitance	V _{DS} =-15V , V _{GS} =0V , f= 1MHz	---	453	---	pF
C _{oss}	Output Capacitance		---	59	---	
C _{rss}	Reverse Transfer Capacitance		---	38	---	
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V , Force Current	---	---	-1.7	A
I _{SM}	Pulsed Source Current ^{2,4}		---	---	-7	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V , I _S =-1A , T _J =25°C	---	---	-1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Channel Typical Characteristics

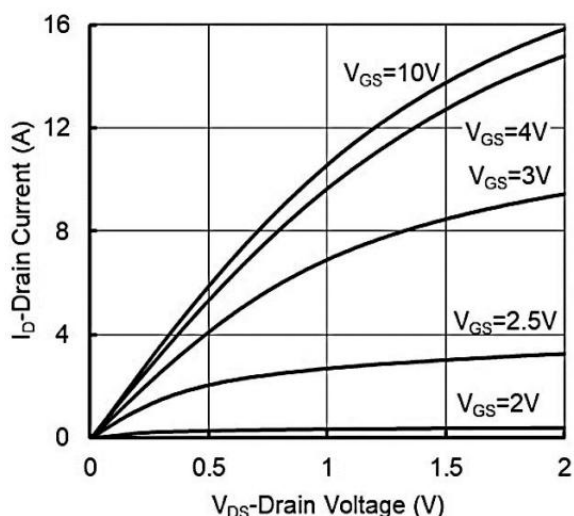


Figure1. Output Characteristics

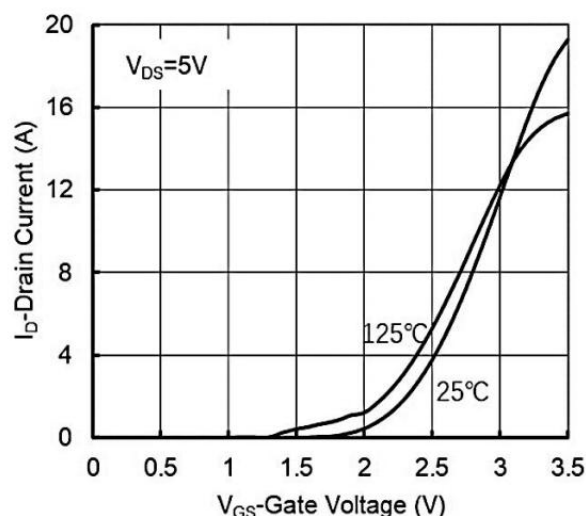


Figure2. Transfer Characteristics

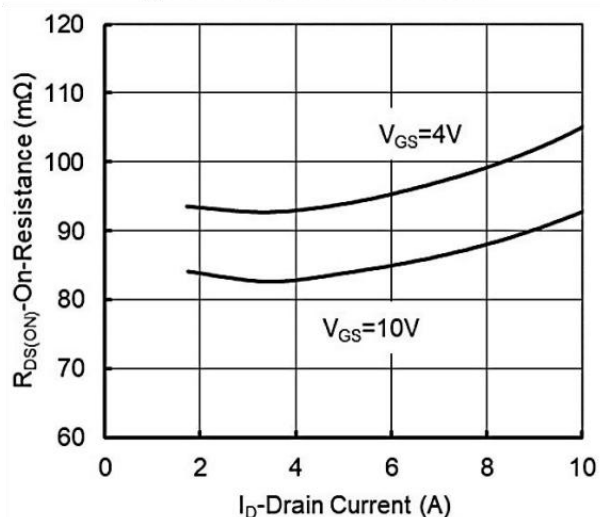


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

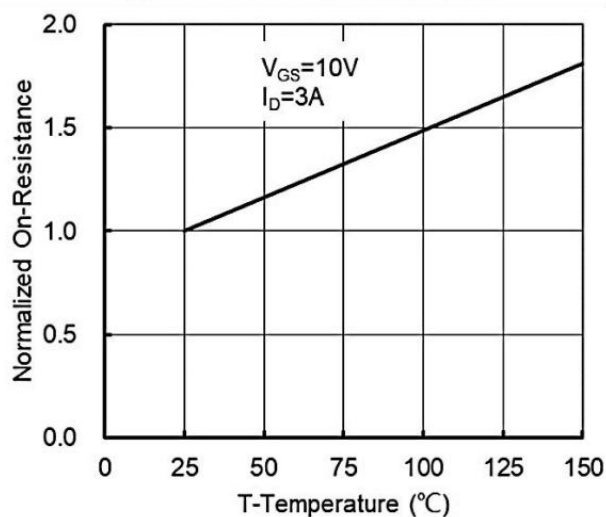


Figure 4: On-Resistance vs. Junction Temperature

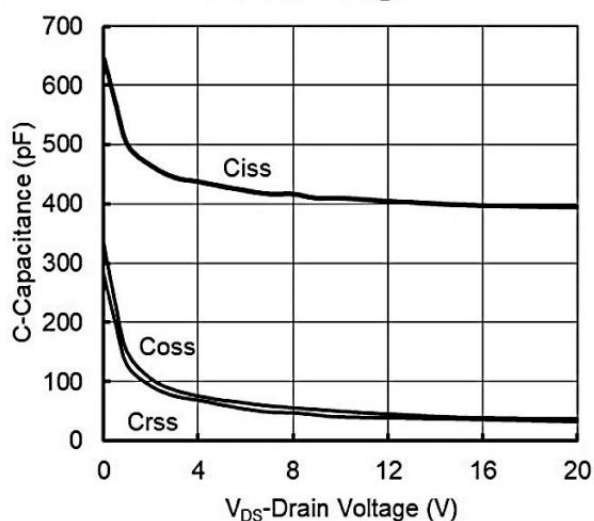


Figure5. Capacitance Characteristics

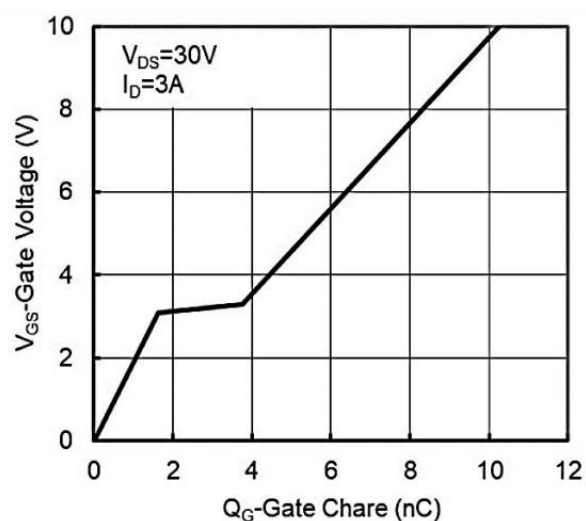


Figure6. Gate Charge

N-Channel Typical Characteristics

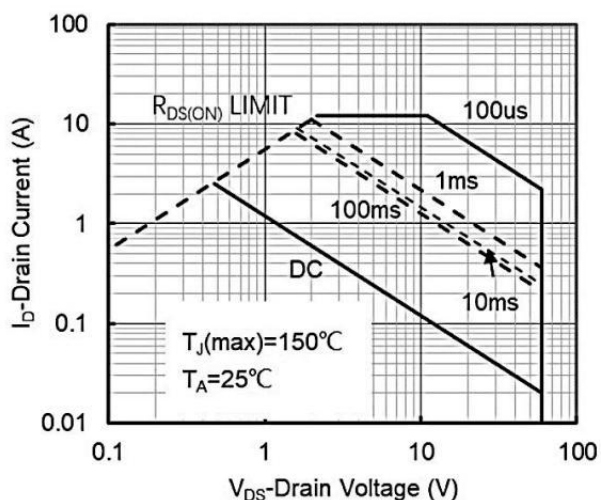


Figure7. Safe Operation Area

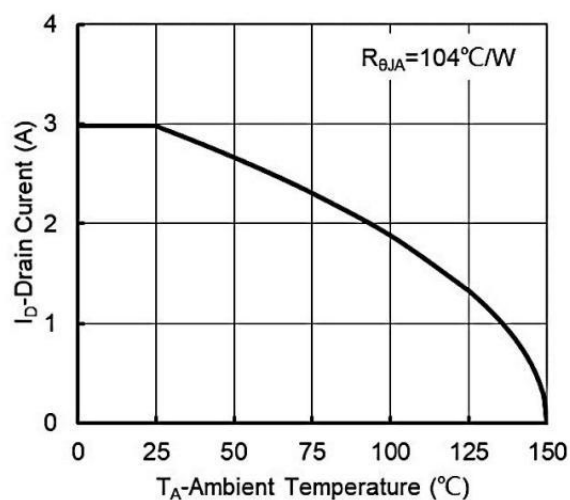


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

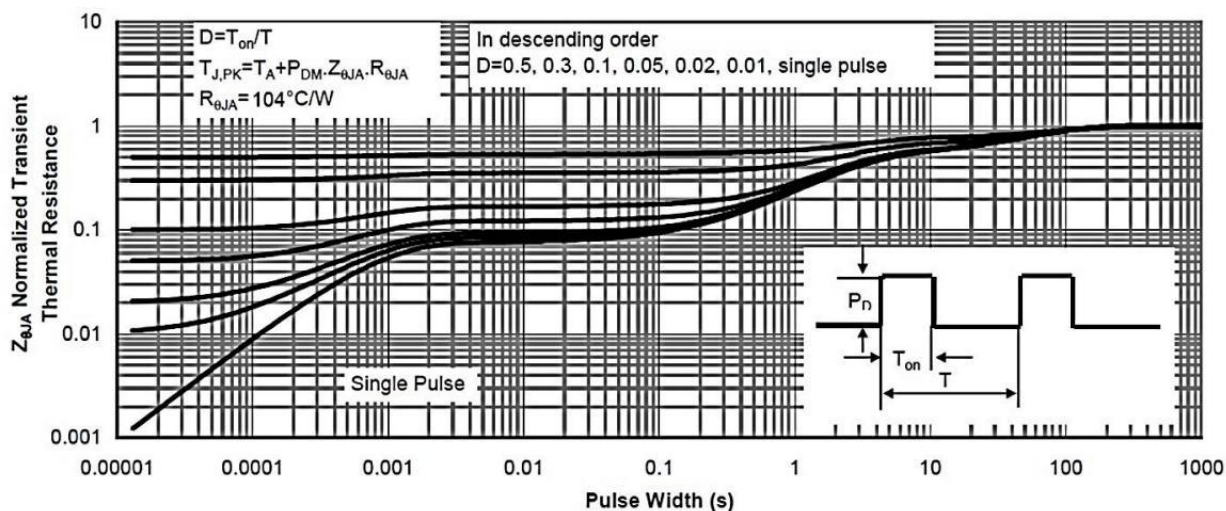


Figure9. Normalized Maximum Transient Thermal Impedance

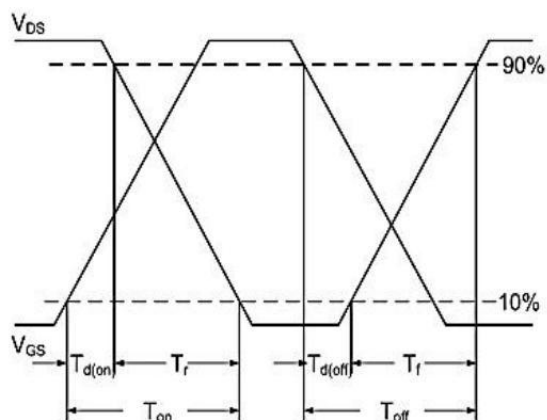


Fig.10 Switching Time Waveform

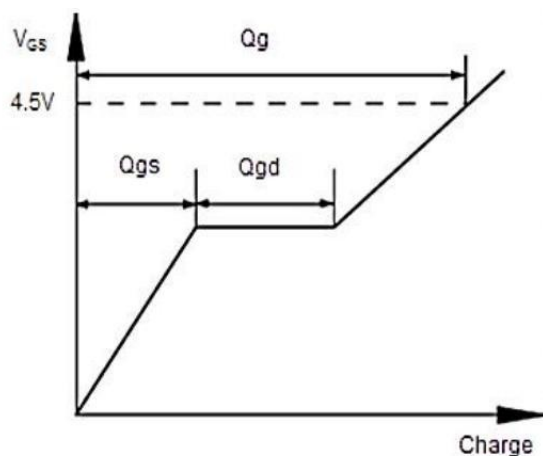


Fig.11 Gate Charge Waveform

P-Channel Typical Characteristic

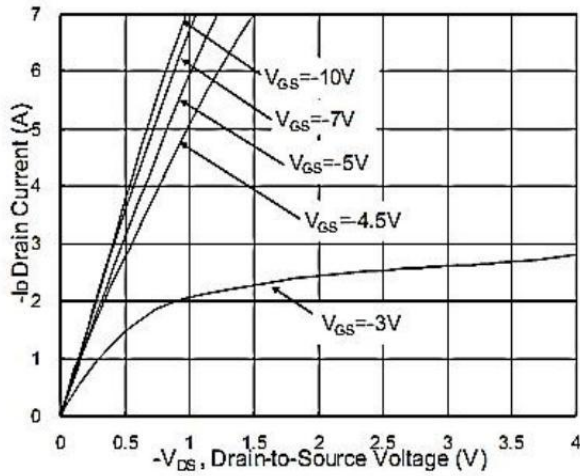


Fig.1 Typical Output Characteristics

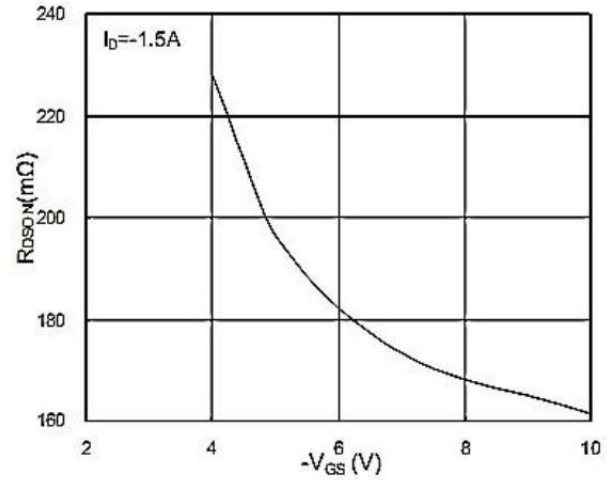


Fig.2 On-Resistance v.s Gate-Source

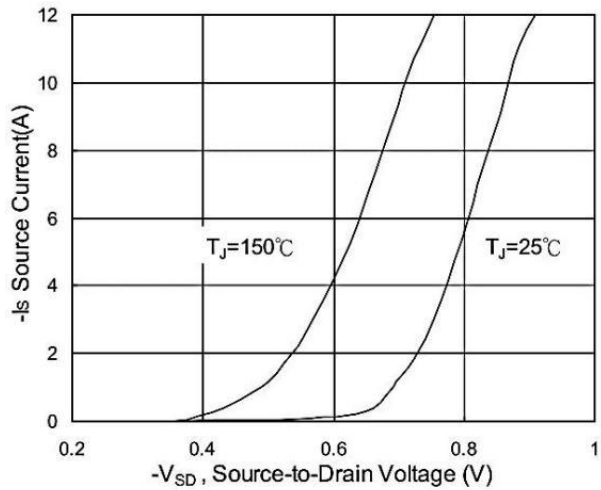


Fig.3 Forward Characteristics of Reverse

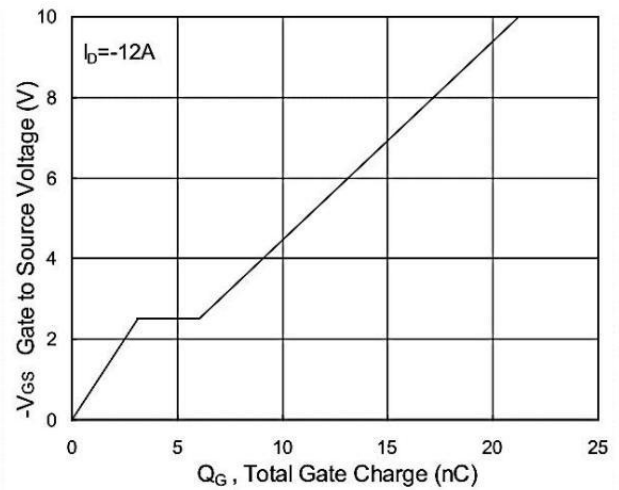


Fig.4 Gate-Charge Characteristics

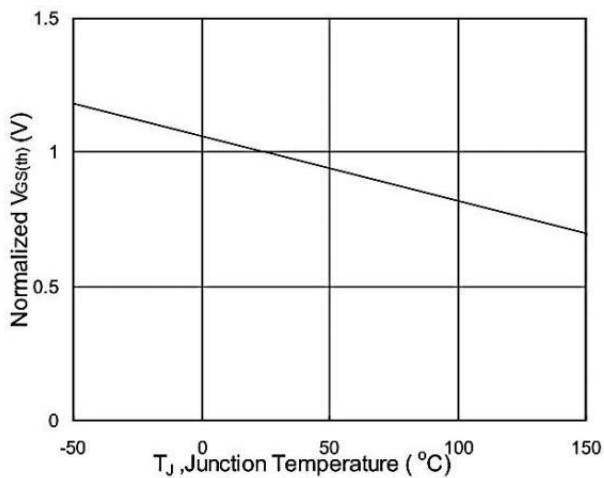


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

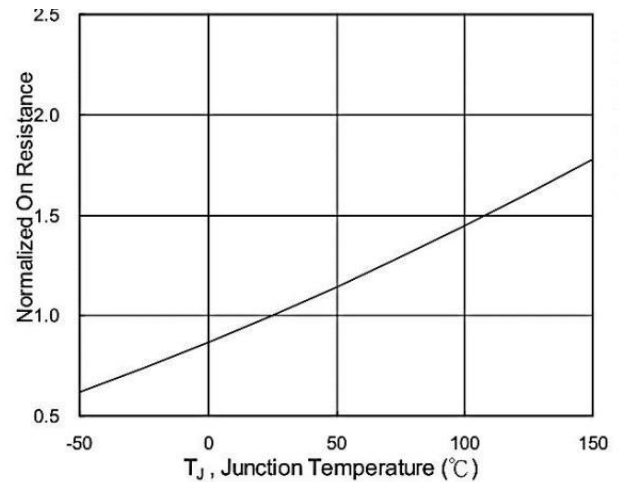


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

P-Channel Typical Characteristic

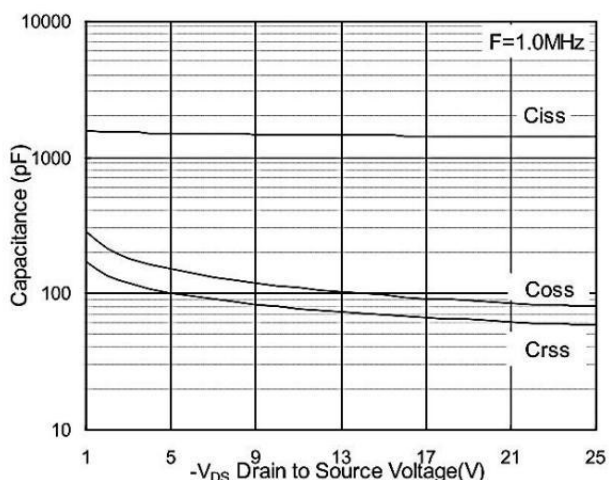


Fig.7 Capacitance

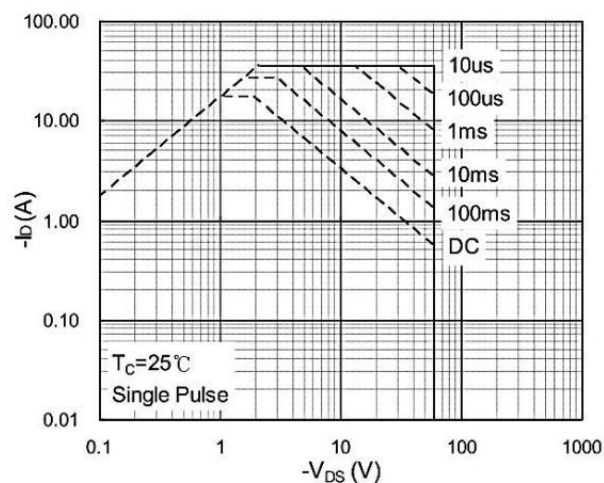


Fig.8 Safe Operating Area

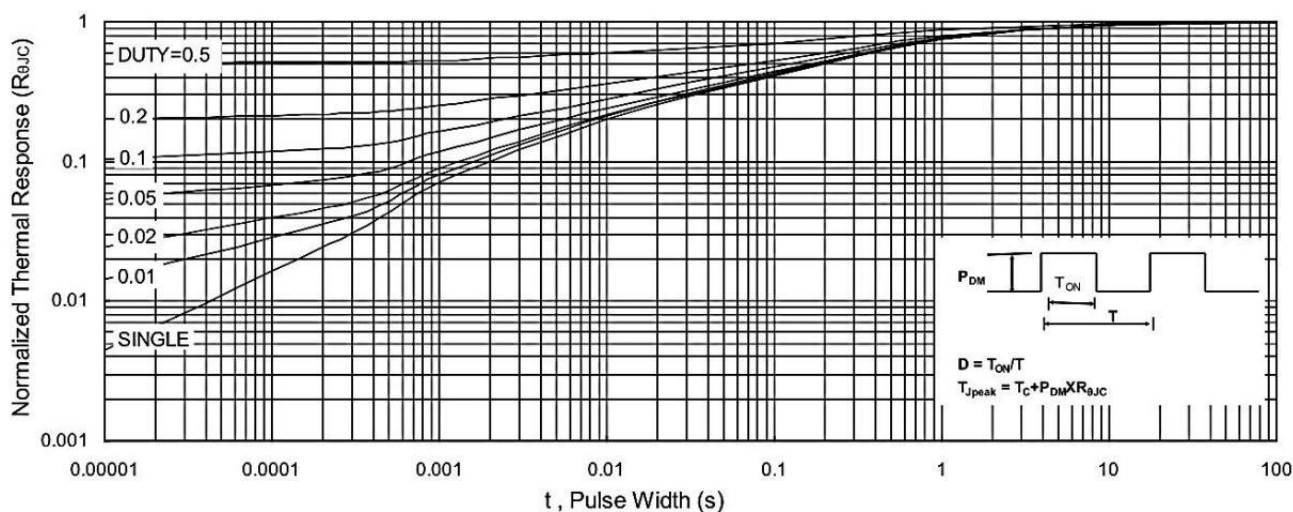


Fig.9 Normalized Maximum Transient Thermal Impedance

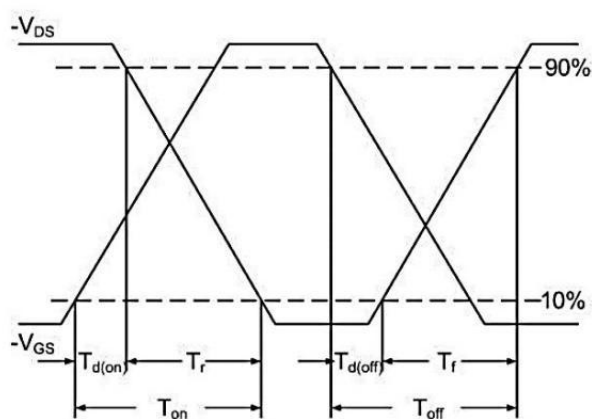


Fig.10 Switching Time Waveform

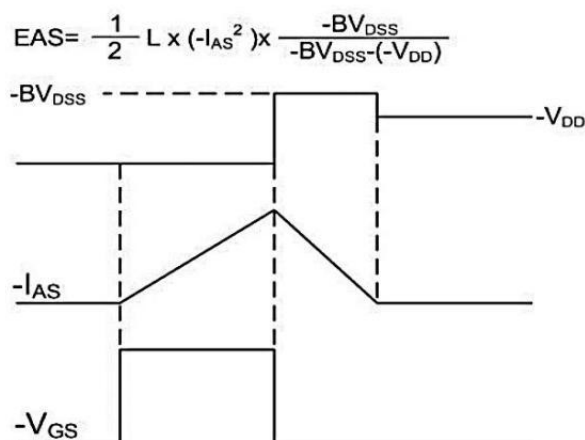
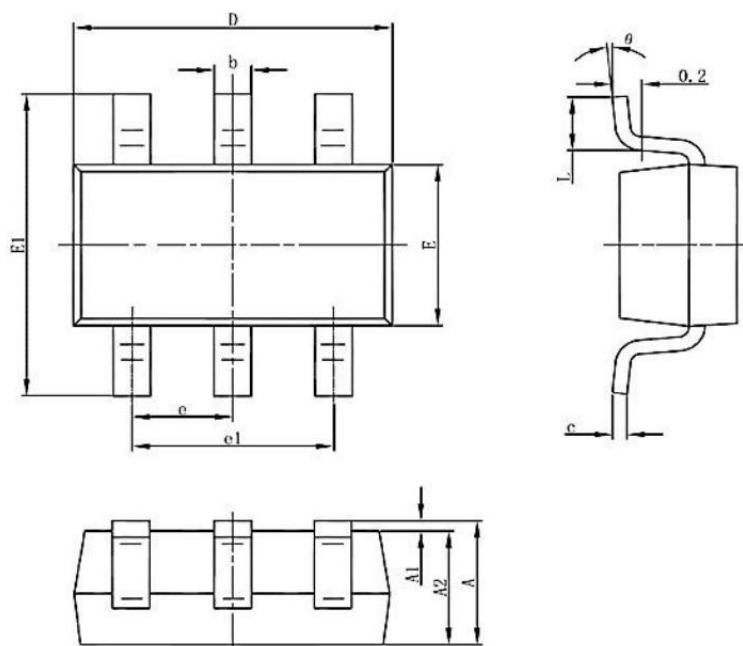


Fig.11 Unclamped Inductive Waveform

MOSFET Package Mechanical Data-SOT23-6-Double



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 (BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0	8	0	8

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	SOT23-6L		3000