Description

The SX20G06GD 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 =25A

$R_{DS(ON)}$ < 40mΩ @ V_{GS}=10V

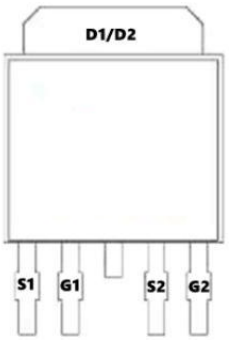
V_{DS} = -60V I_D =-19A

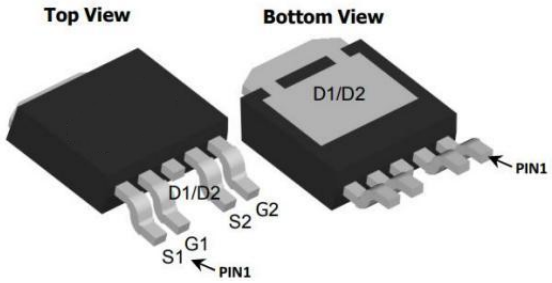
$R_{DS(ON)}$ < 90mΩ @ V_{GS}=-10V

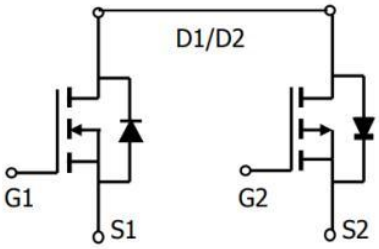
Application

Boost driver

Brushless motor







Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
VDS	Drain-Source Voltage	60	-60	V
VGS	Gate-Source Voltage	±20	±20	V
ID@TC=25℃	Continuous Drain Current, VGS @ 10V1	25	-19	A
ID@TC=100℃	Continuous Drain Current, VGS @ 10V1	14	-8.5	A
IDM	Pulsed Drain Current2	60	-30	A
EAS	Single Pulse Avalanche Energy3	22	29.8	mJ
IAS	Avalanche Current	21	-19	A
PD@TC=25℃	Total Power Dissipation4	50	50	W
TSTG	Storage Temperature Range	-55 to 175	-55 to 175	℃
TJ	Operating Junction Temperature Range	-55 to 175	-55 to 175	℃
RθJA	Thermal Resistance Junction-Ambient 1	62		℃/W
RθJC	Thermal Resistance Junction-Case1	3		℃/W

N-Channel Electrical Characteristics (TJ =25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	65	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.063	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=5A	---	32	40	mΩ
		V_{GS}=4.5V , I_D=4A	---	48	60	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.75	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.24	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=4A	---	28	---	S
Q_g	Total Gate Charge (4.5V)	V_{DS}=48V , V_{GS}=4.5V , I_D=4A	---	19	---	nC
Qgs	Gate-Source Charge		---	2.6	---	
Qgd	Gate-Drain Charge		---	4.1	---	
Td(on)	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω, I_D=4A	---	3	---	ns
T_r	Rise Time		---	34	---	
Td(off)	Turn-Off Delay Time		---	23	---	
T_f	Fall Time		---	6.0	---	
Ciss	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	1027	---	pF
Coss	Output Capacitance		---	65	---	
Crss	Reverse Transfer Capacitance		---	45	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	2.5	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	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 EAS data shows Max. rating . The test condition is V DD =25V,V GS =10V,L=0.1mH,IAS =21A

4、The power dissipation is limited by 150℃ junction temperature

5、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 (TJ =25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	-65	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.03	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-3A	---	70	90	mΩ
		V_{GS}=-4.5V , I_D=-2A	---	88	100	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	1.75	-2.5	V
IDSS	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-3A	---	8.5	---	S
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-48V , V_{GS}=-4.5V , I_D=-3A	---	12.1	---	nC
Qgs	Gate-Source Charge		---	2.2	---	
Qgd	Gate-Drain Charge		---	6.3	---	
Td(on)	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=3.3Ω, I_D=-1A	---	9.2	---	ns
T_r	Rise Time		---	20.1	---	
Td(off)	Turn-Off Delay Time		---	46.7	---	
T_f	Fall Time		---	9.4	---	
Ciss	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1137	---	pF
Coss	Output Capacitance		---	76	---	
Crss	Reverse Transfer Capacitance		---	50	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-2.5	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-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 EAS data shows Max. rating . The test condition is V DD =-25V,V GS =-10V,L=0.1mH,IAS =-19A

4、The power dissipation is limited by 150℃ junction temperature

5、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

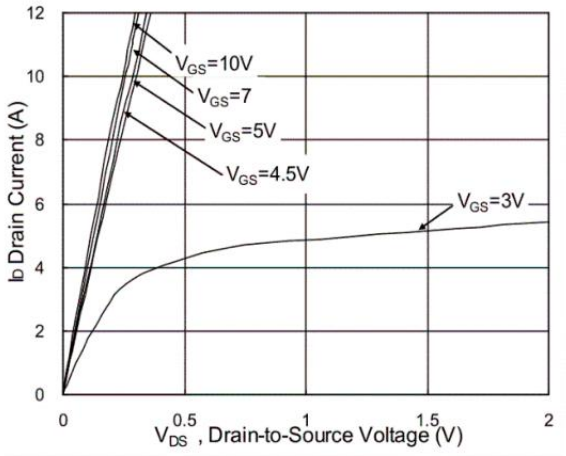


Fig.1 Typical Output Characteristics

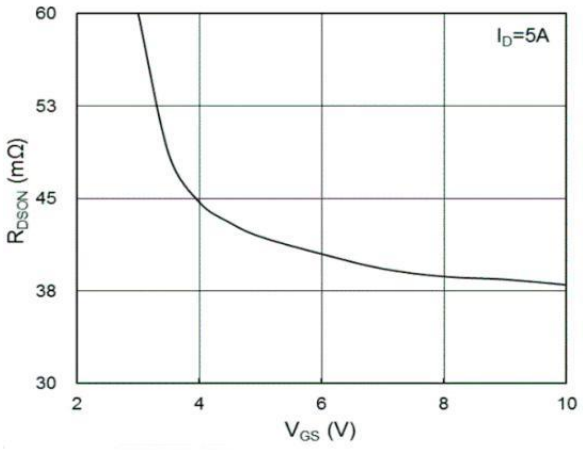


Fig.2 On-Resistance vs. G-S Voltage

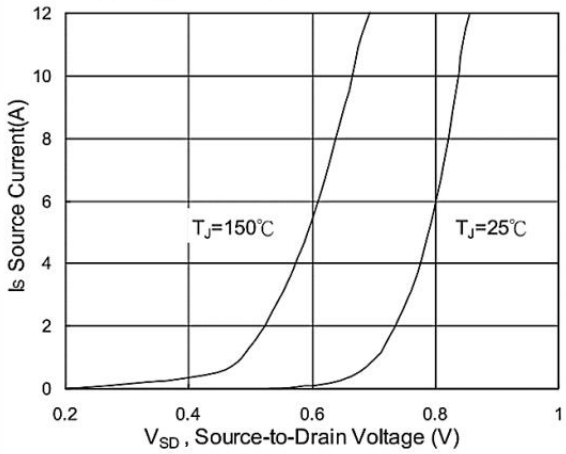


Fig.3 Source Drain Forward Characteristics

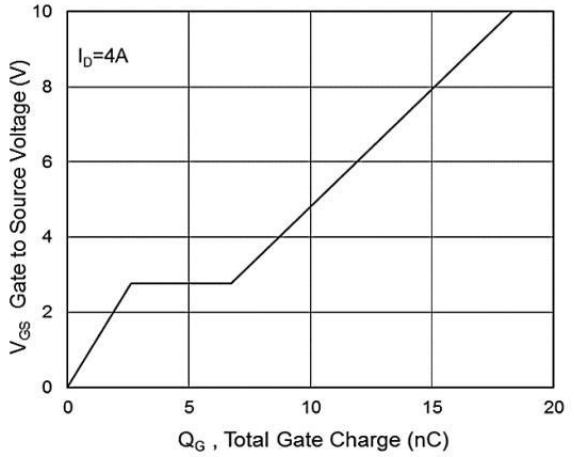


Fig.4 Gate-Charge Characteristics

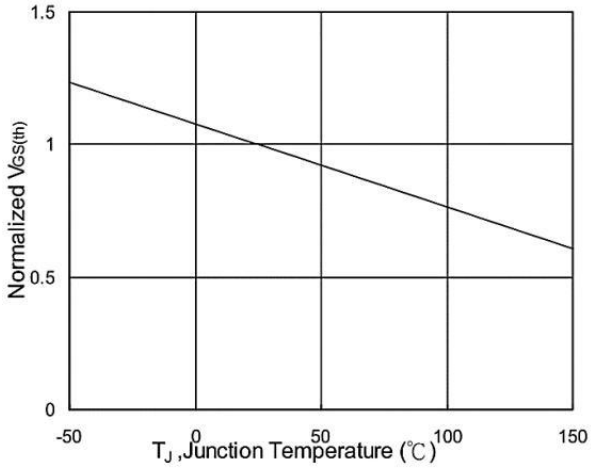


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

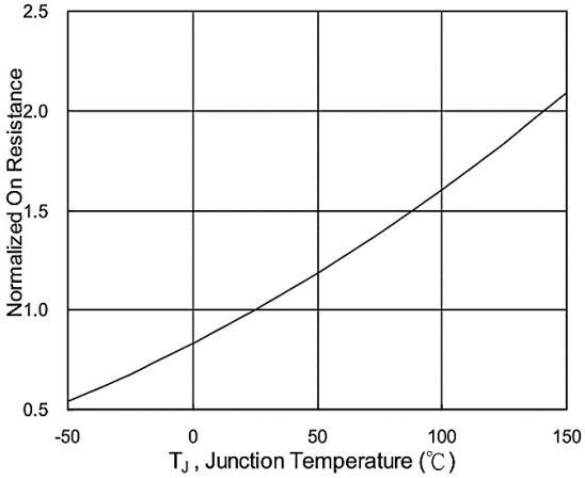


Fig.6 Normalized R_{DSON} vs. T_J

N-Channel Typical Characteristics

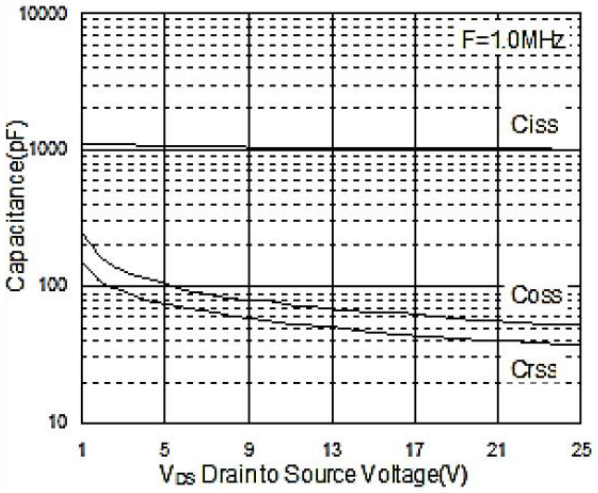


Fig.7 Capacitance

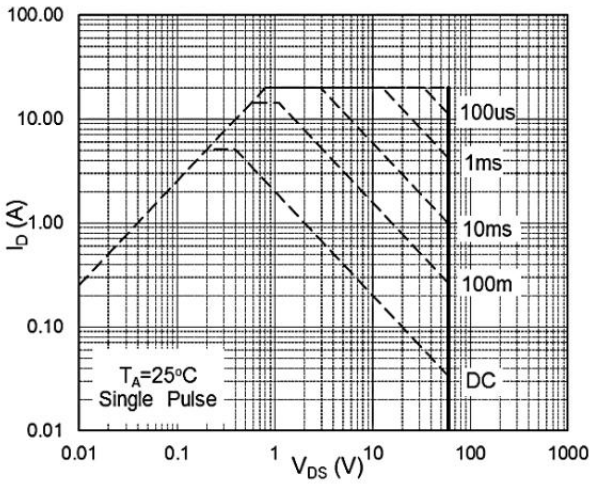


Fig.8 Safe Operating Area

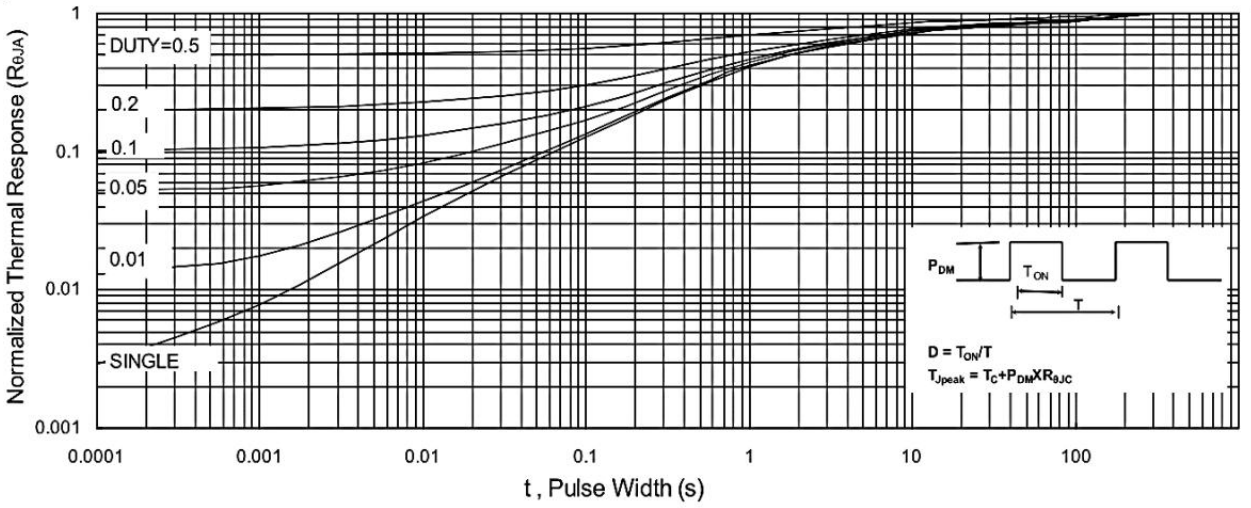


Fig.9 Normalized Maximum Transient Thermal Impedance

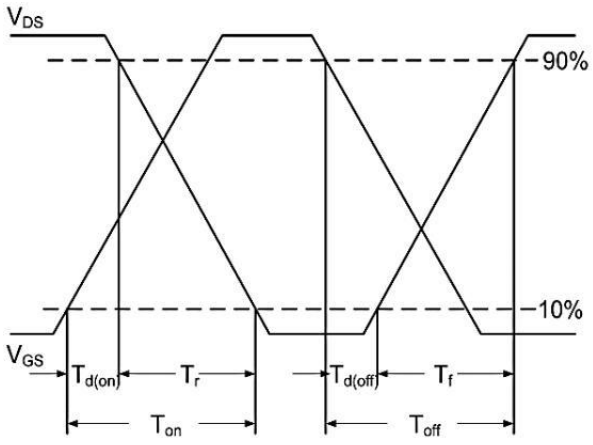


Fig.10 Switching Time Waveform

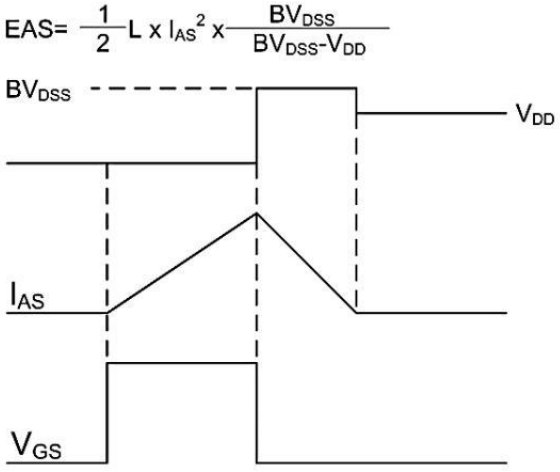


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

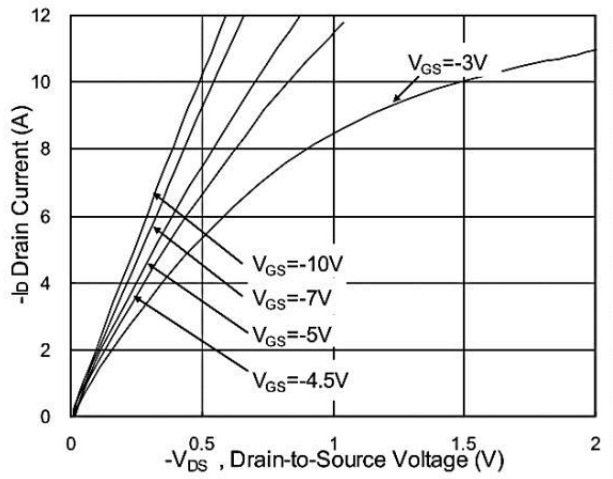


Fig.1 Typical Output Characteristics

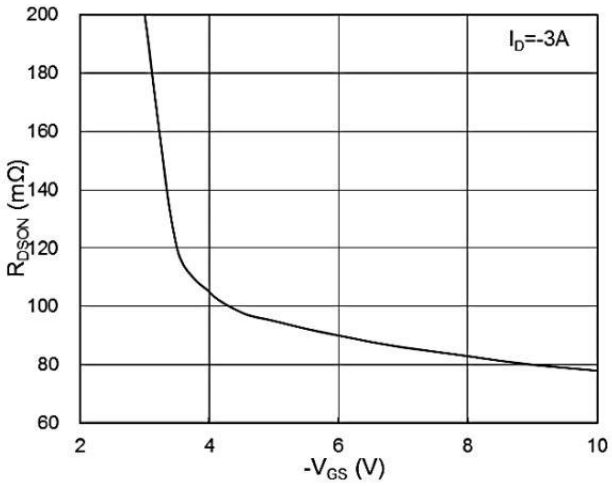


Fig.2 On-Resistance vs. G-S Voltage

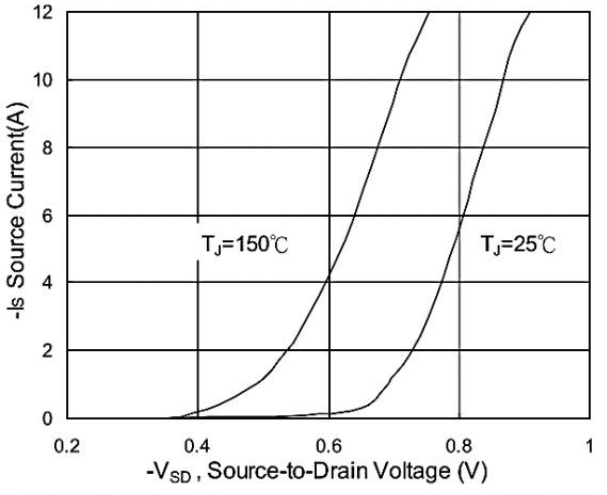


Fig.3 Source Drain Forward Characteristics

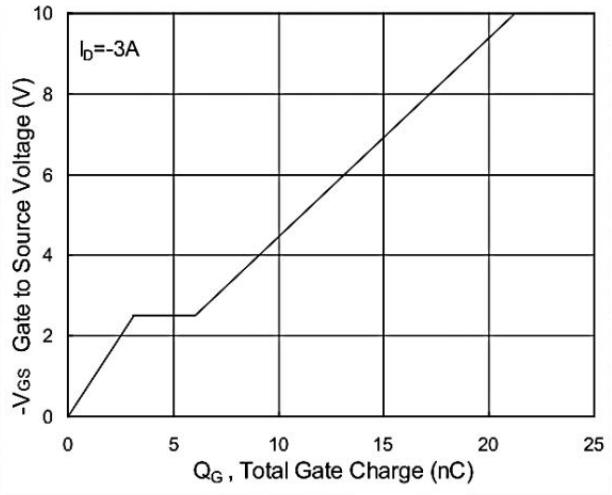


Fig.4 Gate-Charge Characteristics

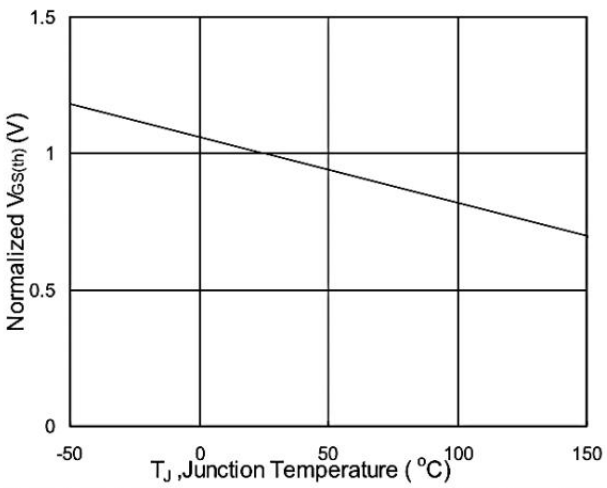


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

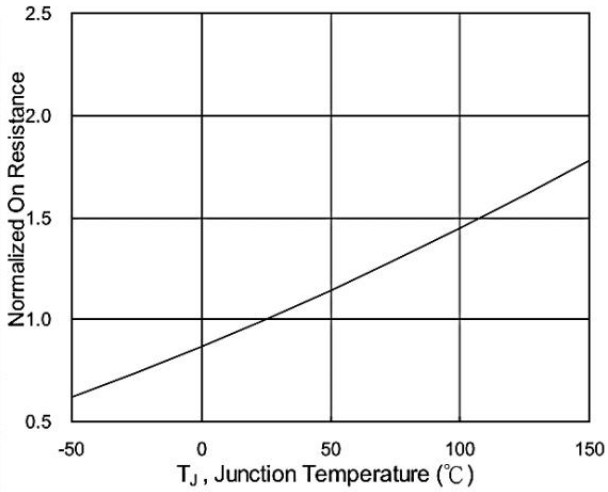


Fig.6 Normalized R_{DSON} vs. T_J

P-Channel Typical Characteristics

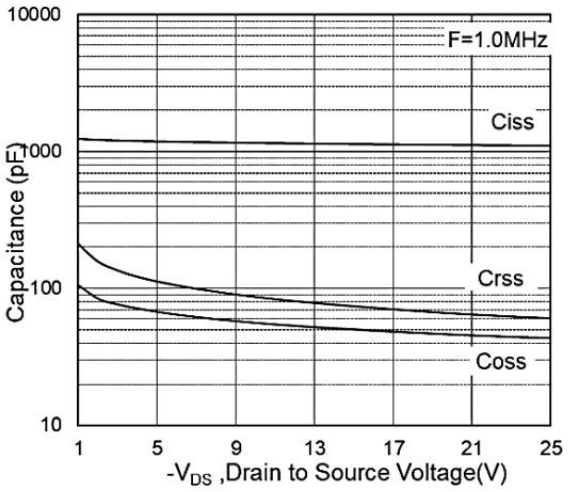


Fig.7 Capacitance

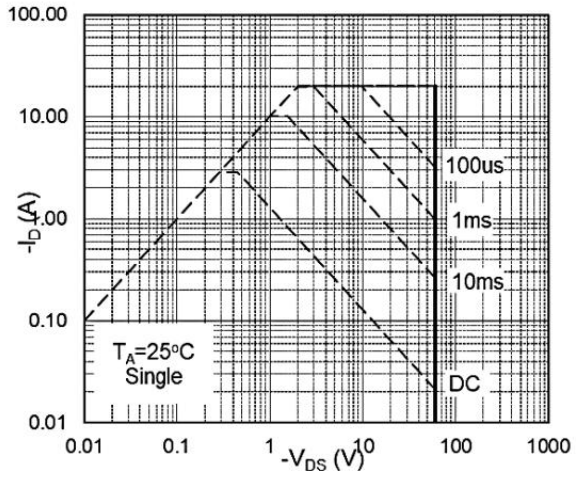


Fig.8 Safe Operating Area

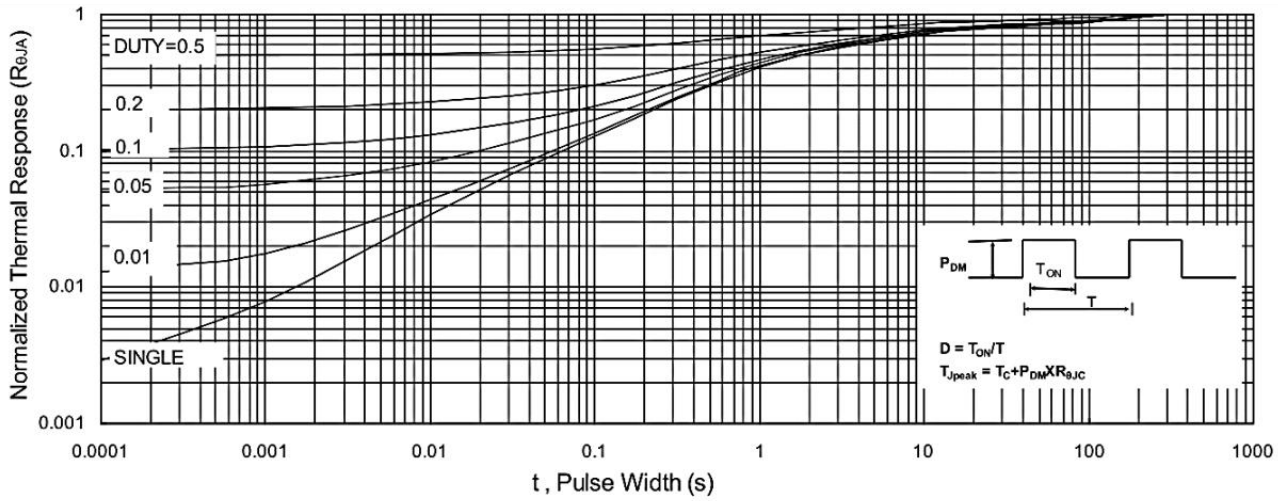


Fig.9 Normalized Maximum Transient Thermal Impedance

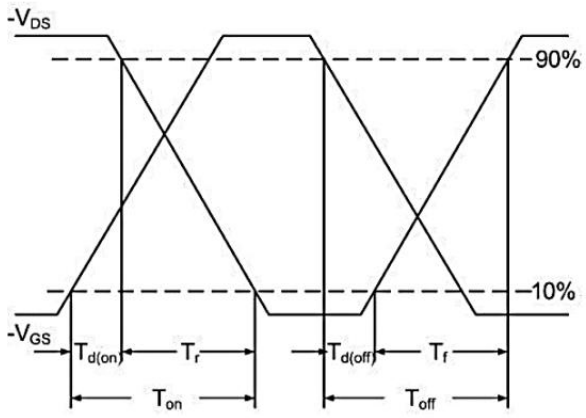


Fig.10 Switching Time Waveform

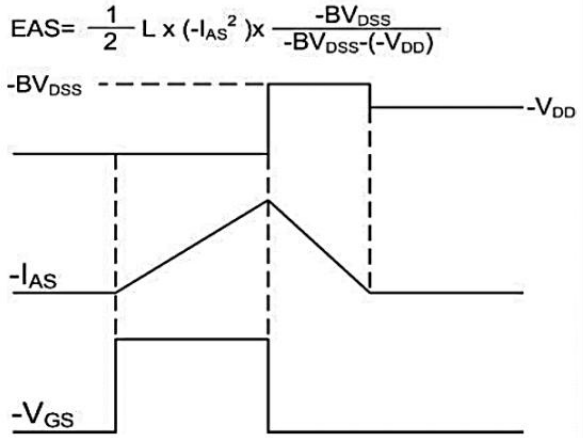
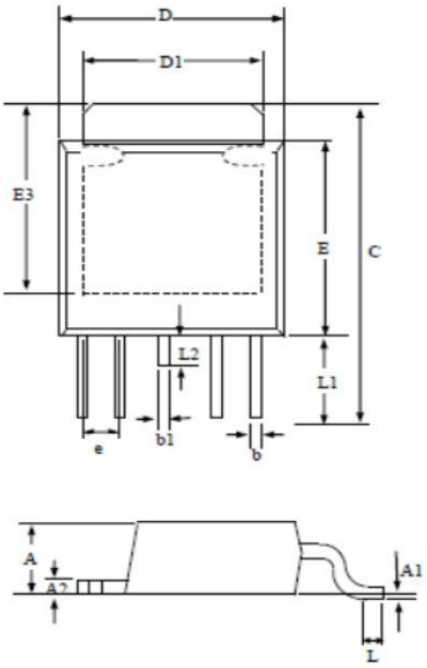


Fig.11 Unclamped Inductive Waveform

Package Mechanical Data:TO-252-4L



SYMBOLS	Millimeters		
	MIN	NOM	MAX
D	6.30	6.55	6.80
D1	4.80	5.35	5.90
C	9.30	9.75	10.20
E	5.30	5.80	6.30
E3	4.50	5.15	5.80
L	0.90	1.35	1.80
L1	2.00	2.53	3.05
L2	0.50	0.85	1.20
b	0.30	0.50	0.70
b1	0.40	0.60	0.80
A	2.10	2.30	2.50
A2	0.40	0.53	0.65
A1	0.00	0.10	0.20
e	1.20	1.30	1.40

1.All Dimensions Are in Millimeters.
2.Dimension Does Not Include Mold Protrusions.

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-4L		2500