20V N+P-Channel Enhancement Mode MOSFET

Description

The SX10G02LI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

V_{DS} = 20V I_D =12A

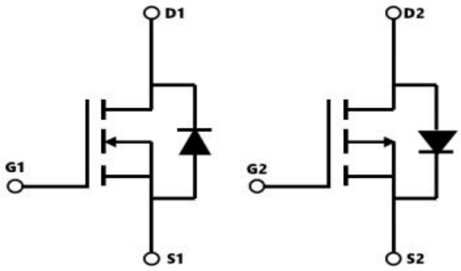
$R_{DS(ON)}$ <20mΩ @ V_{GS}=10V

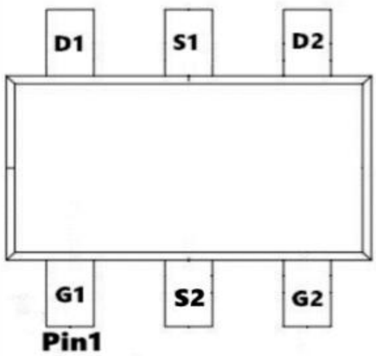
V_{DS} = -20V I_D =-9.8A

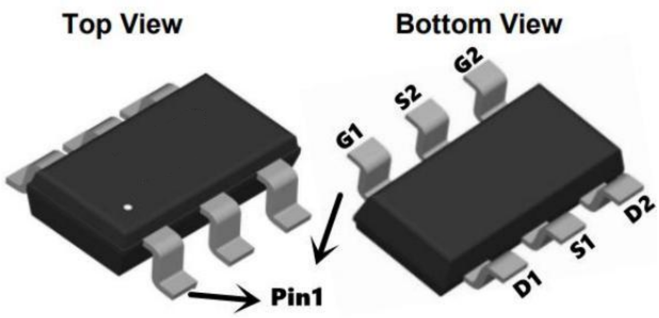
$R_{DS(ON)}$ < 35mΩ @ V_{GS}=-10V

Application

BLDC







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

Symbol	Parameter	N-Ch	P-Ch	Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	12	-9.8	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	6.2	-5.5	A
I_{DM}	Pulsed Drain Current[2]	36	-32	A
EAS	Single Pulse Avalanche Energy[3]	85	78	mJ
P_D@T_A=25℃	Total Power Dissipation[4]	3.5	3.5	W
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	105		℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	50		℃/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20	22		V
△BVDSS/△TJ	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.018	---	V/℃
VGS(th)	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	0.50	0.65	1.0	V
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=7.6A		15	20	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=2.5V, I_D=3.5A		20	35	
IDSS	Zero Gate Voltage Drain Current	V_{DS}=20V,V_{GS}=0V			1	μA
IGSS	Gate-Body Leakage Current	V_{GS}=±10V, V_{DS}=0V			±100	nA
C_{iss}	Input Capacitance	V_{DS}=10V,V_{GS}=0V,f=1MHZ		888		pF
C_{oss}	Output Capacitance			133		
C_{rss}	Reverse Transfer Capacitance			117		
Q_g	Total Gate Charge	V_{GS}=4.5V,V_{DS}=10V,I_D=6.8A		11.05		nC
Q_{gs}	Gate-Source Charge			1.73		
Q_{gd}	Gate-Drain Charge			3.1		
tD(on)	Turn-on Delay Time	V_{GS}=4.5V, V_{DS}=10V, I_D=6.8A R_{GEN}=3Ω		7		ns
t_r	Turn-on Rise Time			46		
tD(off)	Turn-off Delay Time			30		
t_f	Turn-off fall Time			52		
V_{SD}	Diode Forward Voltage	I_S=7.6A,V_{GS}=0V			1.2	V

Note :
1、The data tested by surface mounted on a 1 inch² 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-Electrical Characteristics (T_J=25℃, unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D= -250μA	-20	-24	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}= -20V, V_{GS}=0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V_{DS}=0V, V_{GS}= ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D= -250μA	-0.4	-0.7	-1.0	V
RDS(on)	Static Drain-Source on-Resistance note2	V_{GS}= -4.5V, I_D= -4.1A	-	28	35	mΩ
RDS(on)	Static Drain-Source on-Resistance note2	V_{GS}= -2.5V, I_D= -3A	-	35	42	mΩ
Ciss	Input Capacitance	V_{DS}= -10V, V_{GS}=0V, f=1.0MHz	-	830	-	pF
Coss	Output Capacitance		-	132	-	pF
Crss	Reverse Transfer Capacitance		-	85	-	pF
Q_g	Total Gate Charge	V_{DS}= -10V, I_D= -2A, V_{GS}= -4.5V	-	8.8	-	nC
Qgs	Gate-Source Charge		-	1.4	-	nC
Qgd	Gate-Drain(“Miller”) Charge		-	1.9	-	nC
td(on)	Turn-on Delay Time	V_{DD}= -10V, I_D= -3.3A, R_G= 1Ω, V_{GEN}= -4.5V	-	10	-	ns
tr	Turn-on Rise Time		-	32	-	ns
td(off)	Turn-off Delay Time		-	50	-	ns
t_f	Turn-off Fall Time		-	51	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4.1	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16	A
VSD	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= -4.1A	-	-	-1.2	V

Note：

1、The data tested by surface mounted on a 1 inch² 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.

N-Channel Typical Characteristics

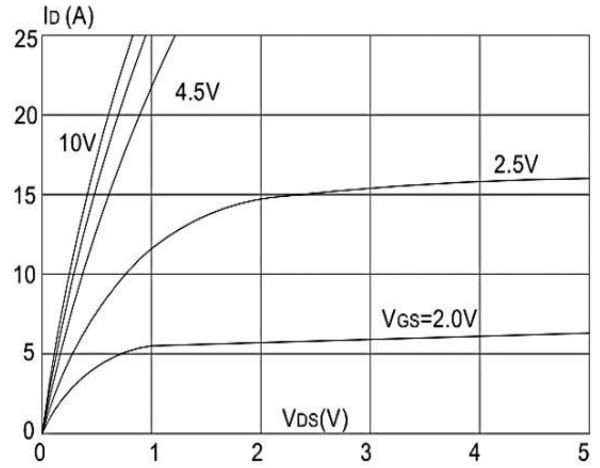


Figure1: Output Characteristics

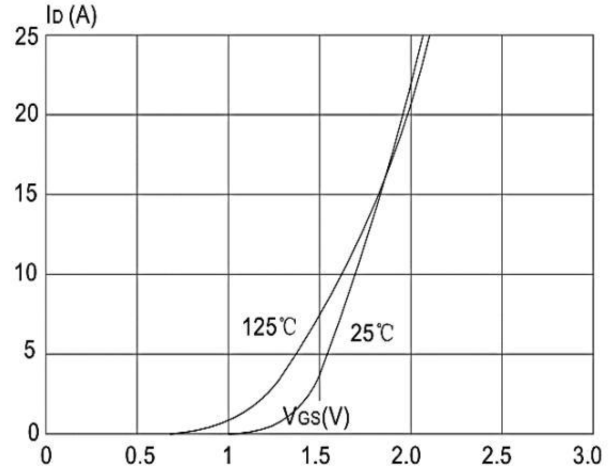


Figure 2: Typical Transfer Characteristics

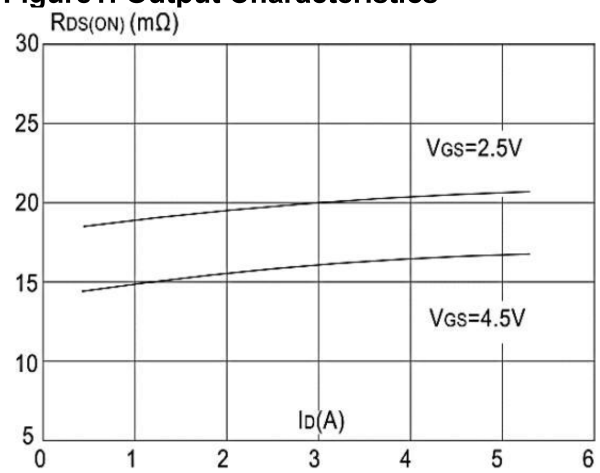


Figure 3:On-resistance vs. Drain Current

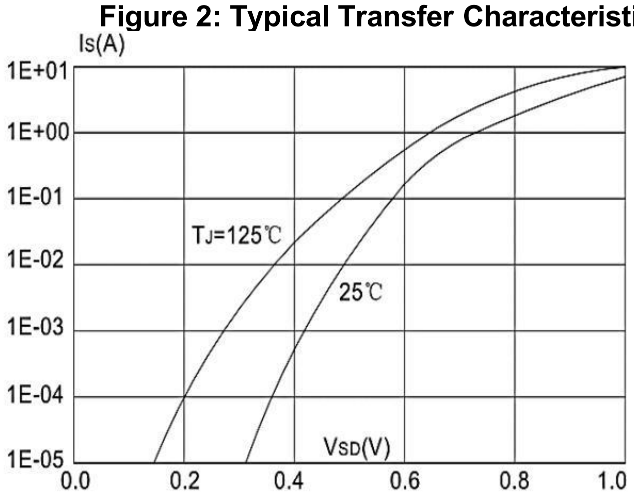


Figure 4: Body Diode Characteristics

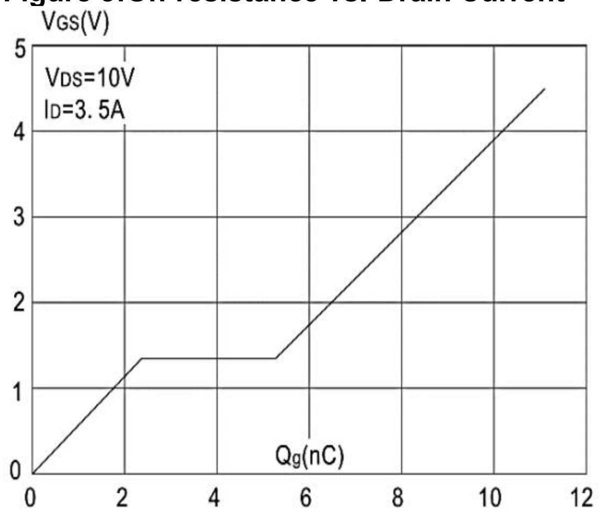


Figure 5: Gate Charge Characteristics

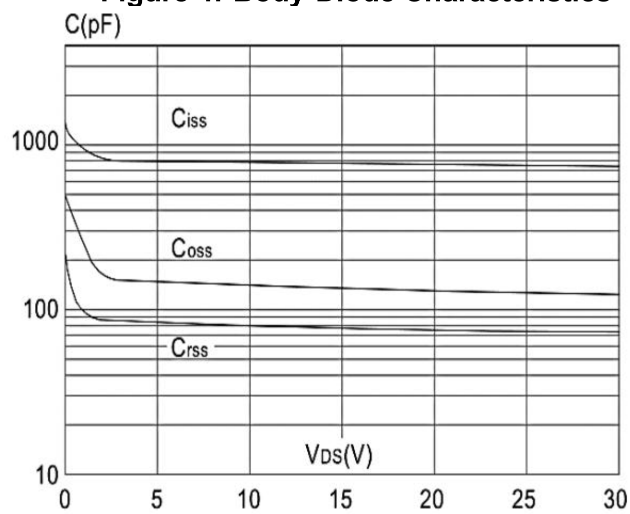


Figure 6: Capacitance Characteristics

N-Channel Typical Characteristics

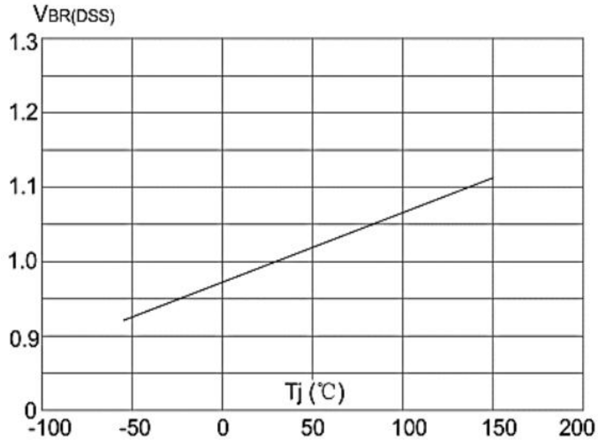


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

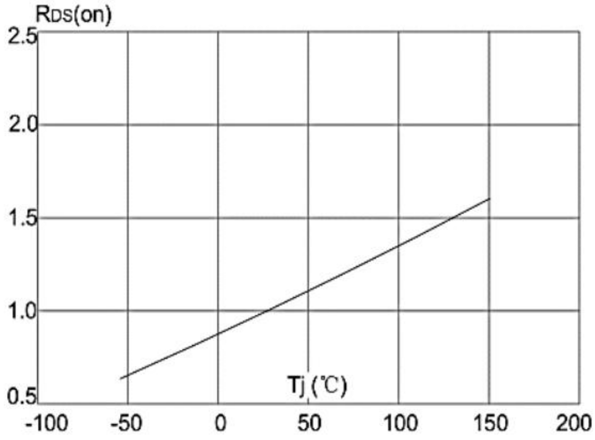


Figure 8: Normalized on Resistance vs Junction Temperature

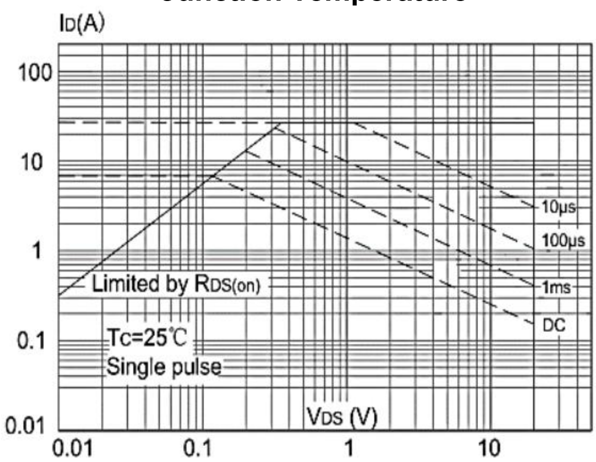


Figure 9: Maximum Safe Operating Area vs. Case Temperature

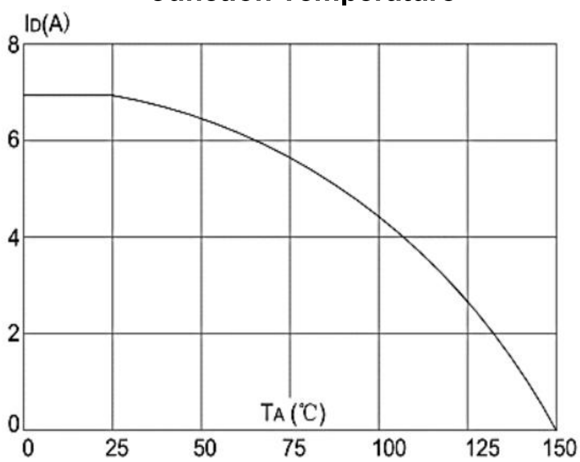


Figure 10: Maximum Continuous Drain Current

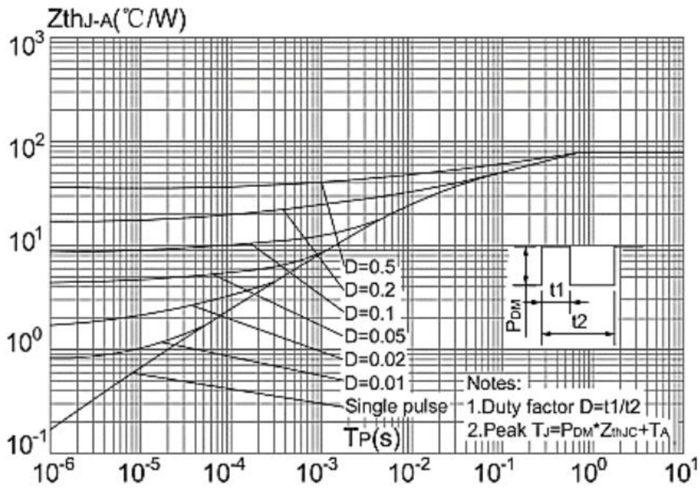


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Channel Typical Characteristics

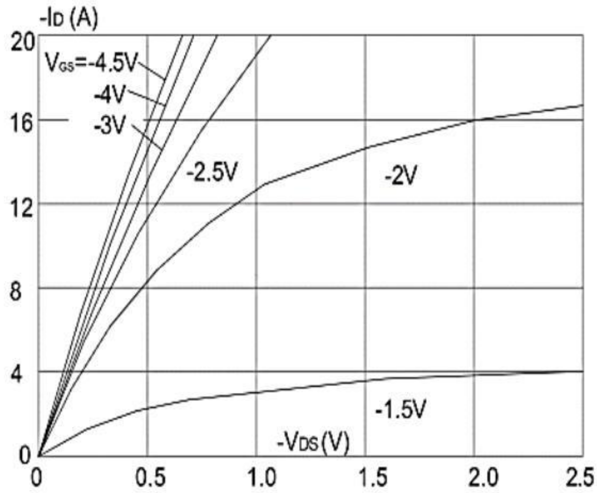


Figure1: Output Characteristics

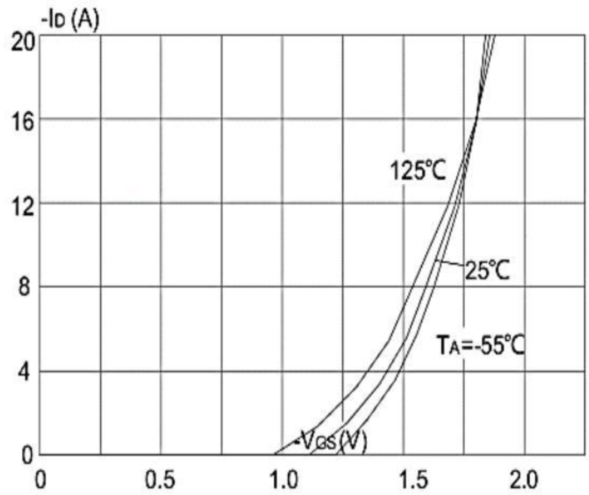


Figure 2: Typical Transfer Characteristics

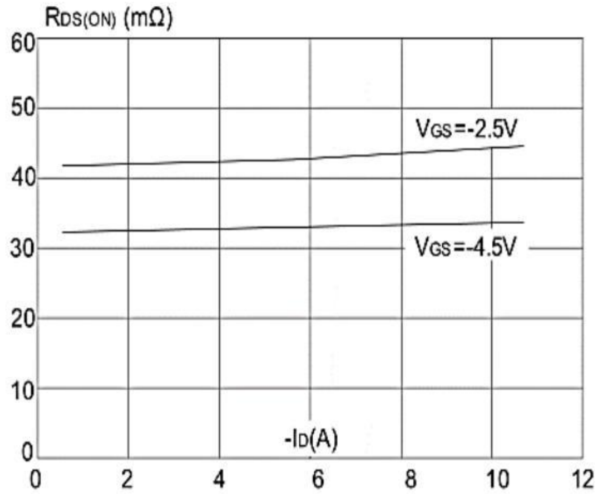


Figure 3:On-resistance vs. Drain Current

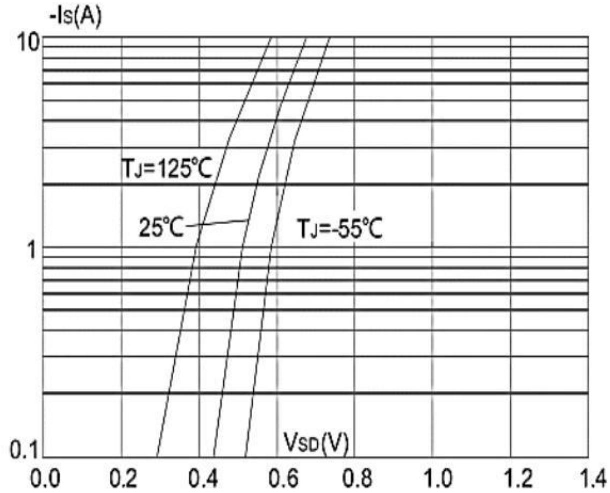


Figure 4: Body Diode Characteristics

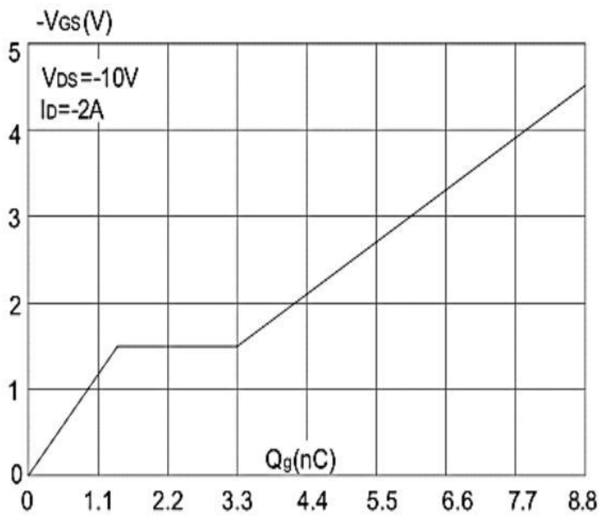


Figure 5: Gate Charge Characteristics

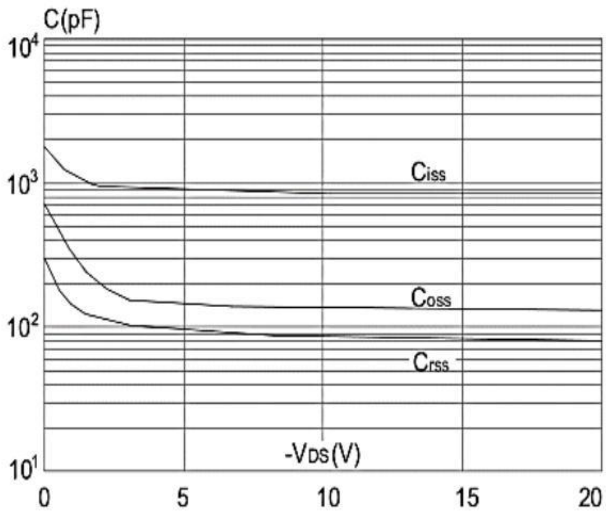


Figure 6: Capacitance Characteristics

P-Channel Typical Characteristics

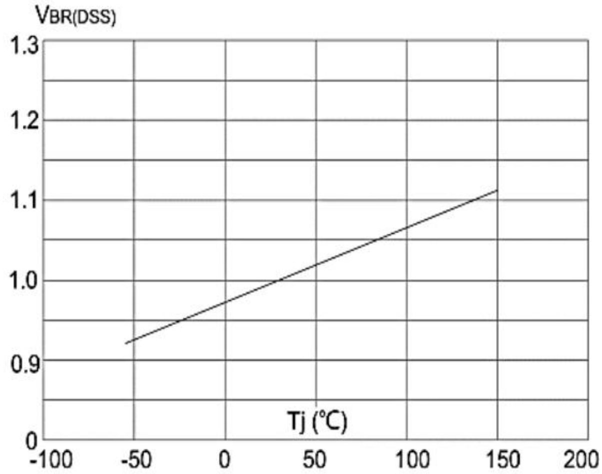


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

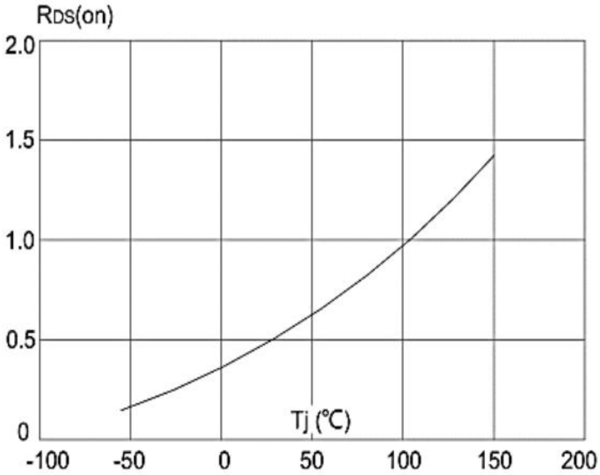


Figure 8: Normalized on Resistance vs. Junction Temperature

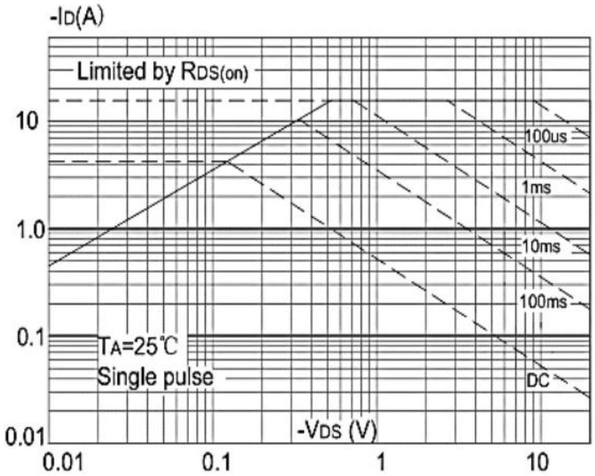


Figure 9: Maximum Safe Operating Area

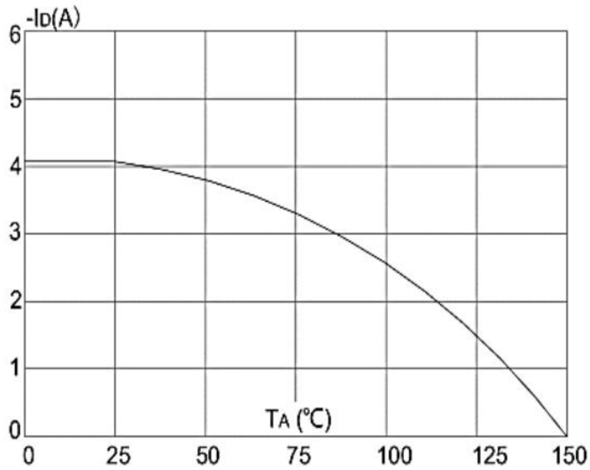


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

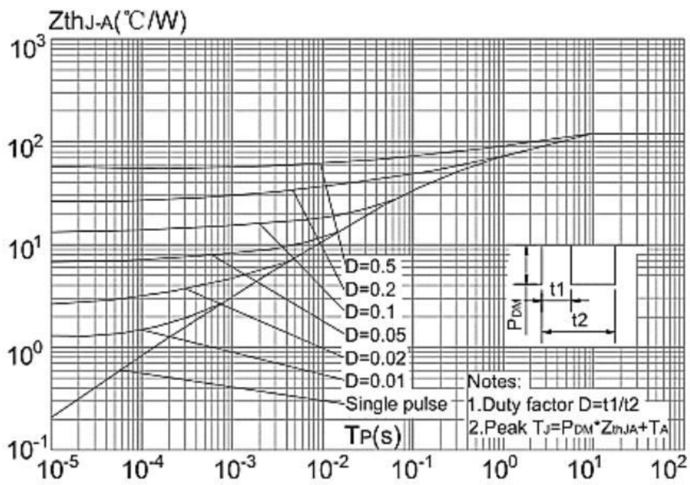
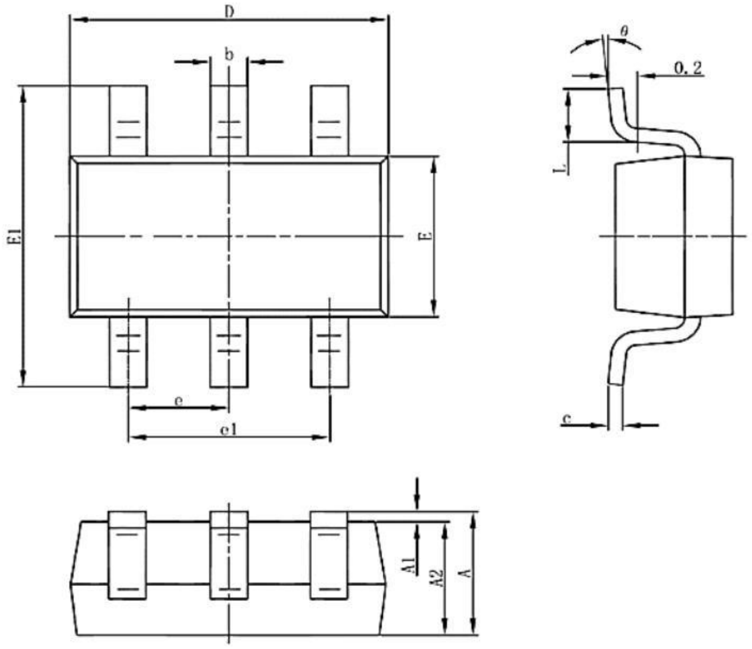


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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