Description

The SX20G04S 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} =40V I_D =28A

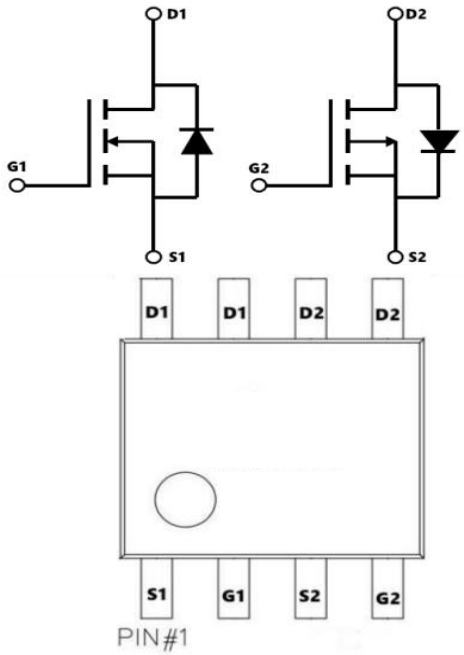
$R_{DS(ON)}$ < 10mΩ @ V_{GS}=10V

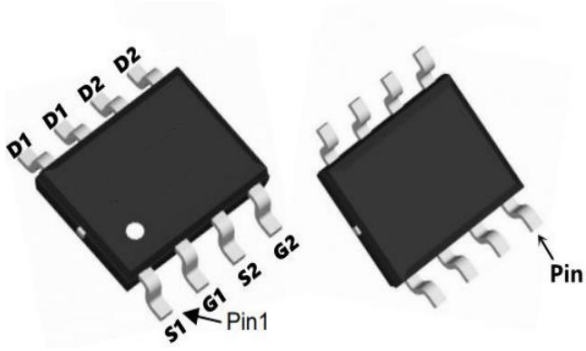
V_{DS} = -40V I_D =-23A

$R_{DS(ON)}$ < 18mΩ @ 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	40	-40	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	28	-23	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	17	-15	A
I_{DM}	Pulsed Drain Current[2]	68	-69	A
EAS	Single Pulse Avalanche Energy[3]	128	185	mJ
P_D@T_C=25℃	Total Power Dissipation[4]	48	51.3	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]	85		℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	2.3		℃/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	40	44	---	V
△BVDSS/△TJ	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.028	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=30A	---	8.0	10	mΩ
		V_{GS}=4.5V , I_D=15A	---	10	16	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.16	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=40V , 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=30A	---	22	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1.7	3.4	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=20V , V_{GS}=10V , I_D=25A	---	37	---	nC
Q_{gs}	Gate-Source Charge		---	6	---	
Q_{gd}	Gate-Drain Charge		---	7	---	
Td(on)	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=1Ω I_D=25A	---	12	---	ns
T_r	Rise Time		---	12	---	
Td(off)	Turn-Off Delay Time		---	38	---	
T_f	Fall Time		---	9	---	
C_{iss}	Input Capacitance	V_{DS}=20V , V_{GS}=0V , f=1MHz	---	2400	---	pF
Coss	Output Capacitance		---	192	---	
Crss	Reverse Transfer Capacitance		---	165	---	
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	50	A
ISM	Pulsed Source Current[2,5]		---	---	200	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V
t_{rr}	Reverse Recovery Time	IF=30A , dI/dt=100A/μs ,T_J=25℃	---	22	---	nS
Q_{rr}	Reverse Recovery Charge		---	11	---	nC

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 VDD=36V,VGS =10V,L=0.1mH,IAS =16A
4、The power dissipation is limited by 150℃junction temperature
5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-40	-44	---	V
△BV_{DSS}/△T_J	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.023	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-30A	---	13	18	mΩ
		V_{GS}=-4.5V , I_D=-20A	---	18	25	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=-250uA	-1.0	-1.6	-2.5	V
△$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.74	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-40V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-40V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-20V , V_{GS}=-4.5V , I_D=-12A	---	25	---	nC
Q_{gs}	Gate-Source Charge		---	11	---	
Q_{gd}	Gate-Drain Charge		---	9.5	---	
$T_{d(on)}$	Turn-On Delay Time	VDD =-15V, RL=15Ω ID =-1A, VGEN =-10V, RG =6Ω	---	48	---	ns
T_r	Rise Time		---	24	---	
$T_{d(off)}$	Turn-Off Delay Time		---	88	---	
T_f	Fall Time		---	9.6	---	
C_{iss}	Input Capacitance	V_{DS}=-20V , V_{GS}=0V , f=1MHz	---	2760	---	pF
C_{oss}	Output Capacitance		---	260	---	
C_{rss}	Reverse Transfer Capacitance		---	85	---	
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-40	A
I_{SM}	Pulsed Source Current[2,5]		---	---	-90	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.3	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 EAS data shows Max. rating . The test condition is VDD=-32V,VGS=-10V,L=0.1mH,IAS=-18A

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

5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

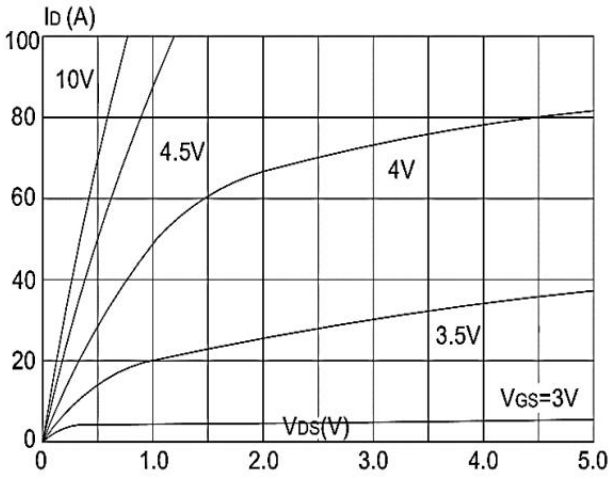


Figure1: Output Characteristics

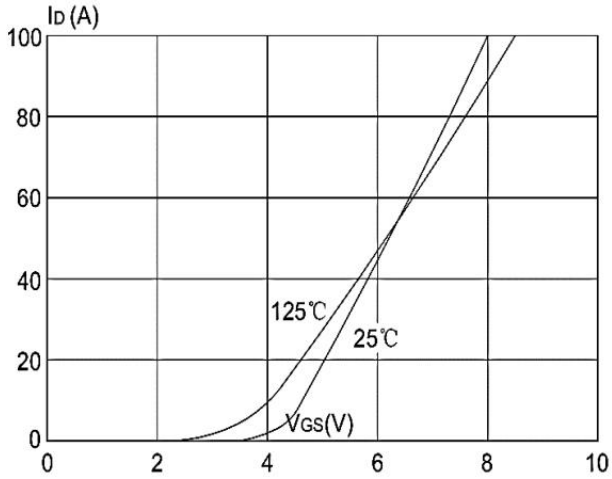


Figure 2: Typical Transfer Characteristics

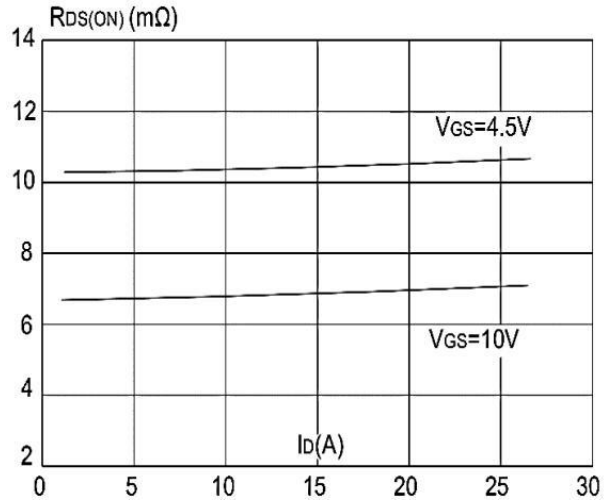


Figure 3:On-resistance vs. Drain Current

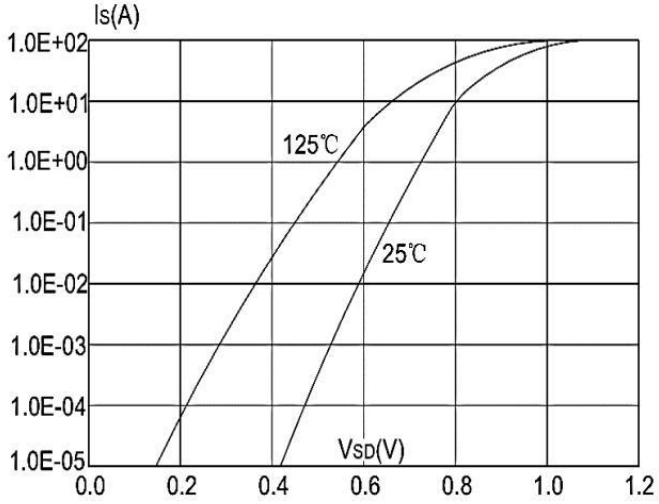


Figure 4: Body Diode Characteristics

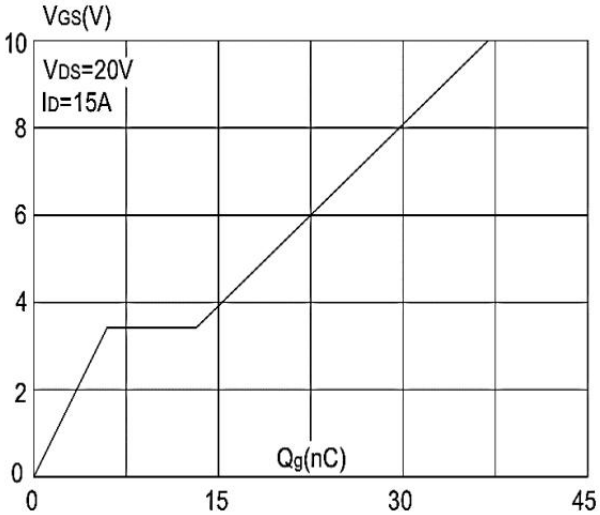


Figure 5: Gate Charge Characteristics

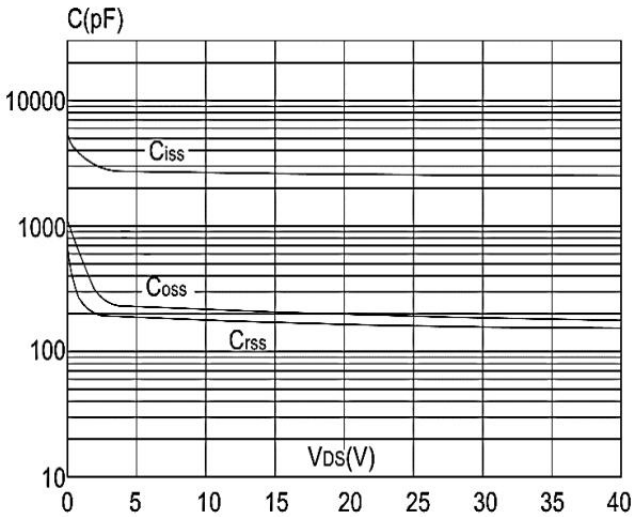


Figure 6: Capacitance Characteristics

N-Typical Characteristics

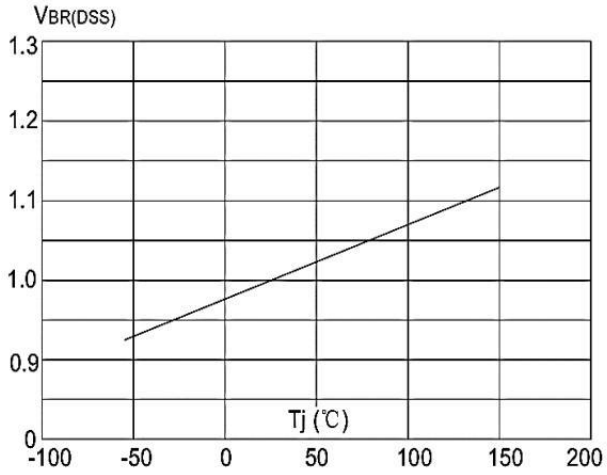


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

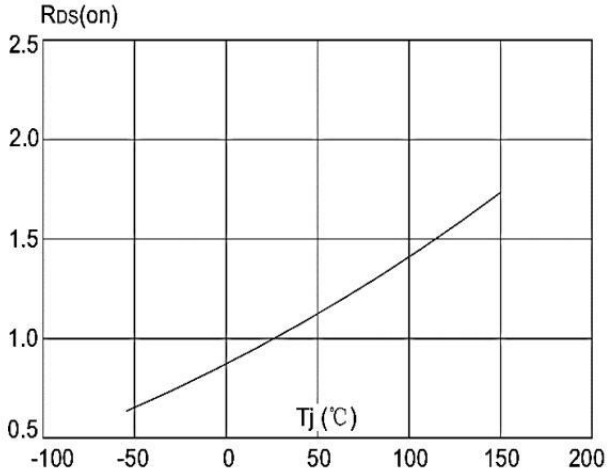


Figure 8: Normalized on Resistance vs Junction Temperature

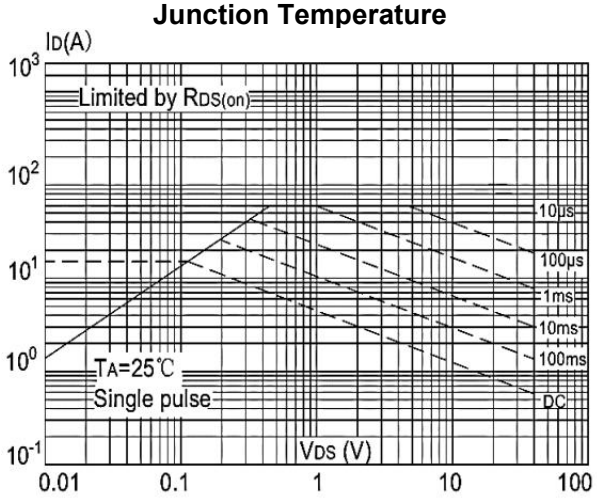


Figure 9: Maximum Safe Operating Area vs. Case Temperature

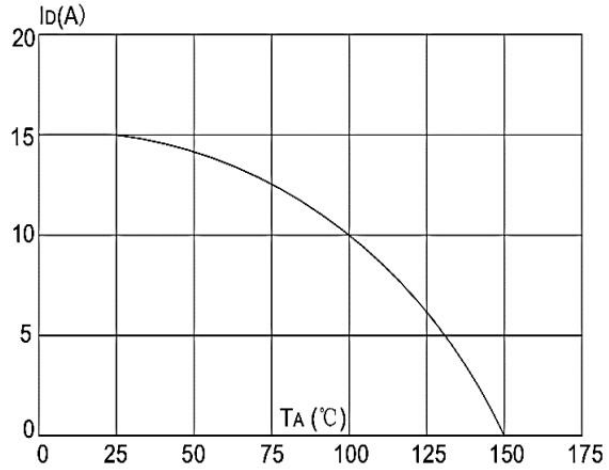


Figure 10: Maximum Continuous Drain Current

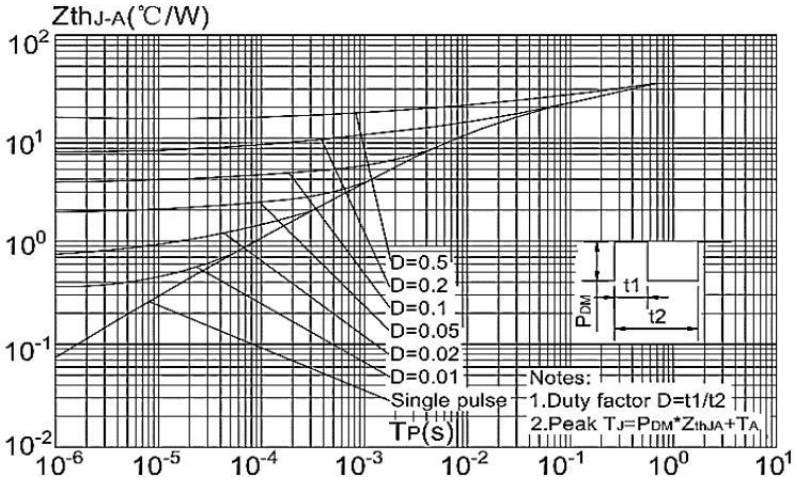


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Typical Characteristics

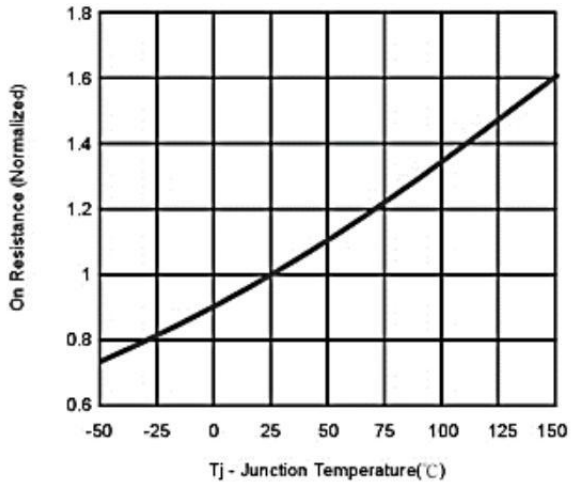


Figure.1 On Resistance Vs Junction Temperature

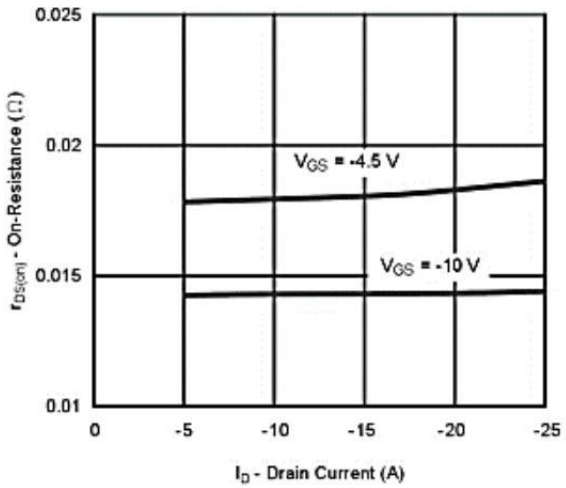


Figure.2：On-Resistance Vs.Drain Current

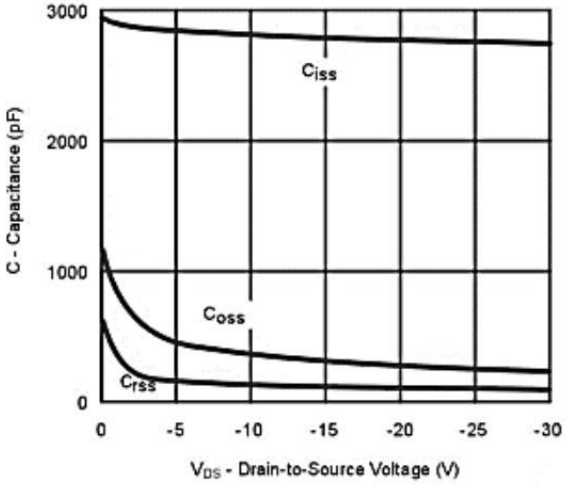


Figure.3： Capacitance

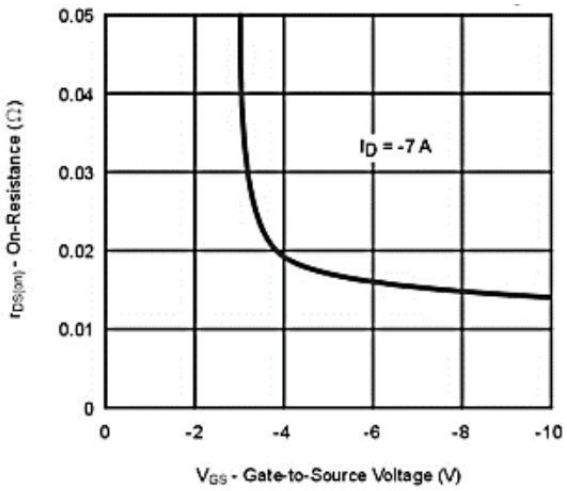


Figure.4：On-Resistance Vs. Gate-to-Sourece Voltage

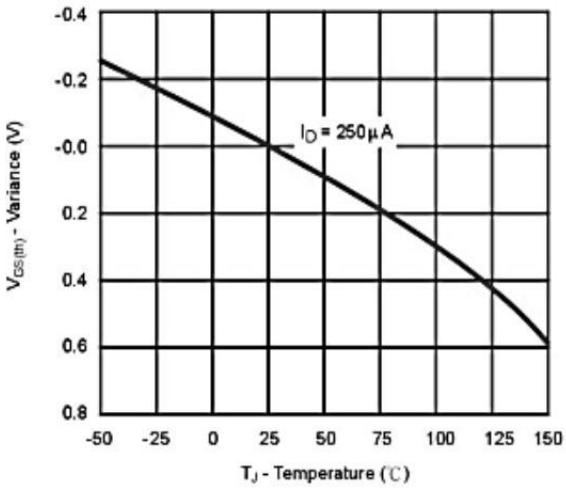


Figure.5：Threshold Voltage

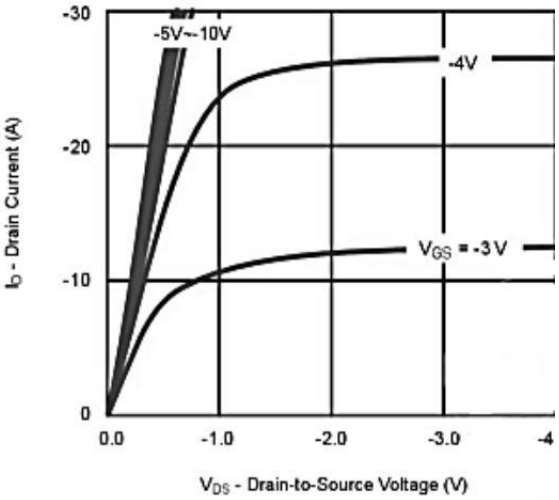


Figure.6：On-Region Characteristics

P-Typical Characteristics

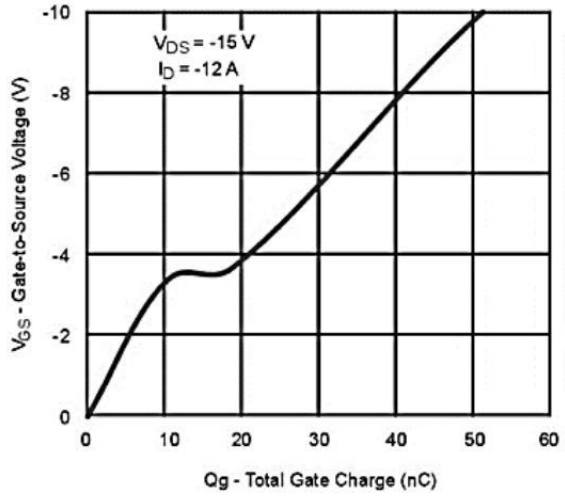


Figure.7：Gate Charge

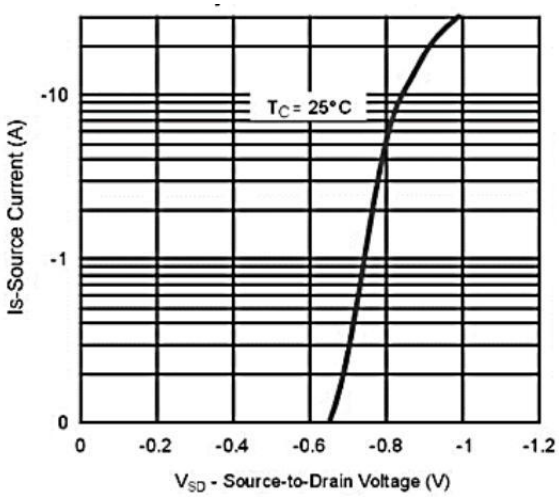


Figure.8：Body-diode Characteristice

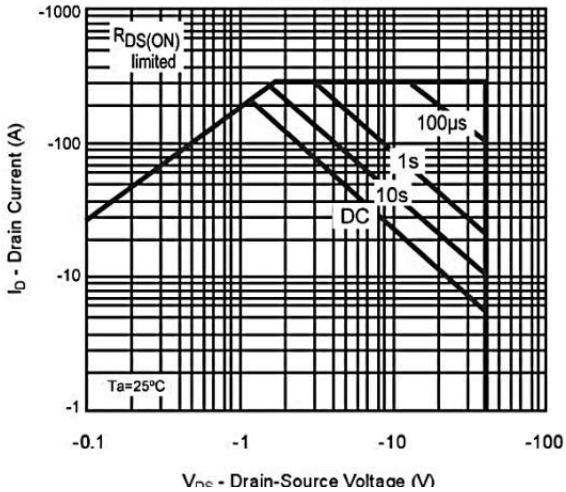


Figure.9：Safe Operating Area

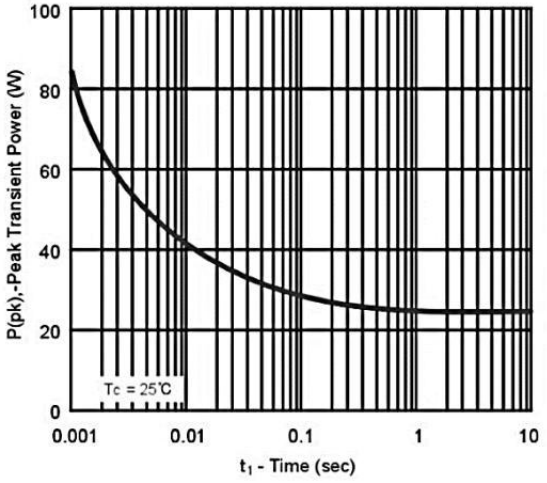


Figure.10：Single Pluse Maximum Power Dissipation

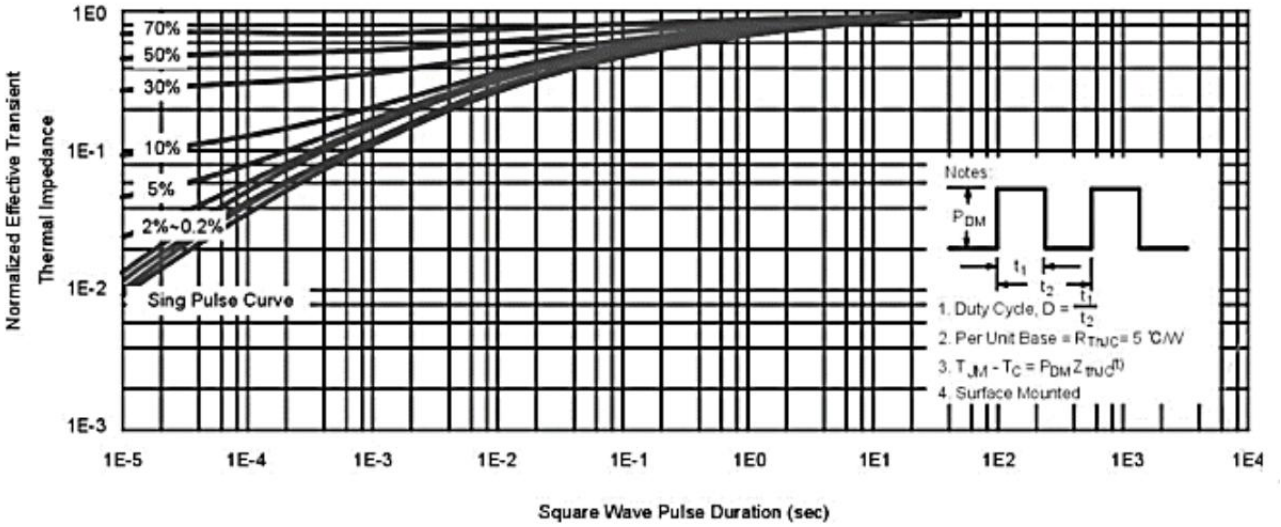
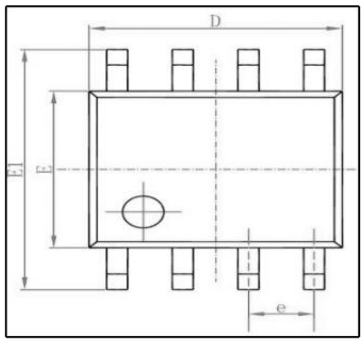
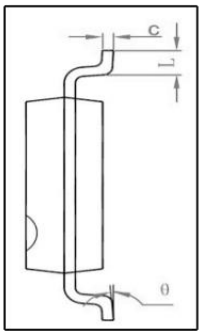
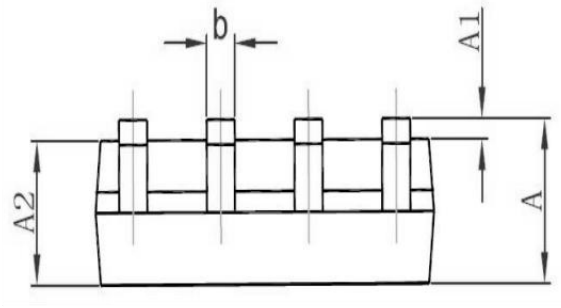


Figure.11： Normalized Maximum Transient Thermal Impedance

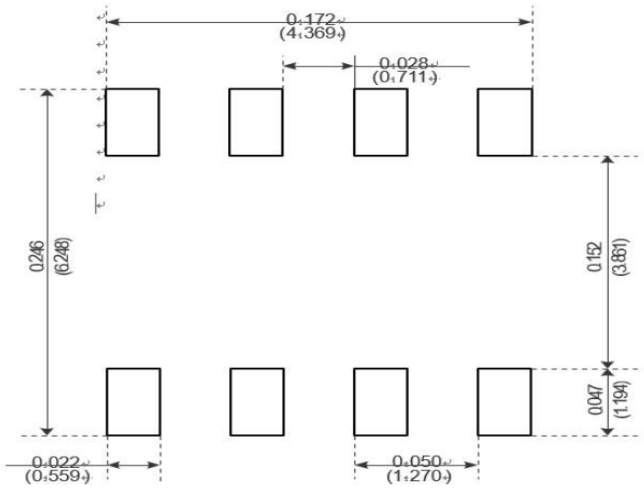
Package Mechanical Data-SOP-8L







Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	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	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Recommended Minimum Pads

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	SOP-8L		3000