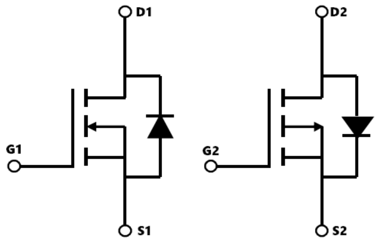
APM
A POWER MICROELECTRONICS

AP4606B

30V N+P-Channel Enhancement Mode MOSFET

Description

The AP4606B 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.



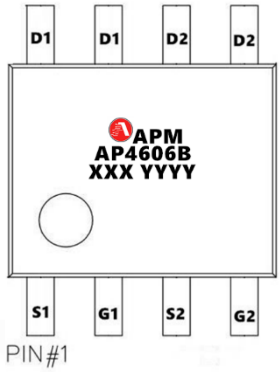
General Features

V_{DS} = 30V I_D =6.8A

$R_{DS(ON)}$ < 28mΩ @ V_{GS}=10V （Type：20mΩ）

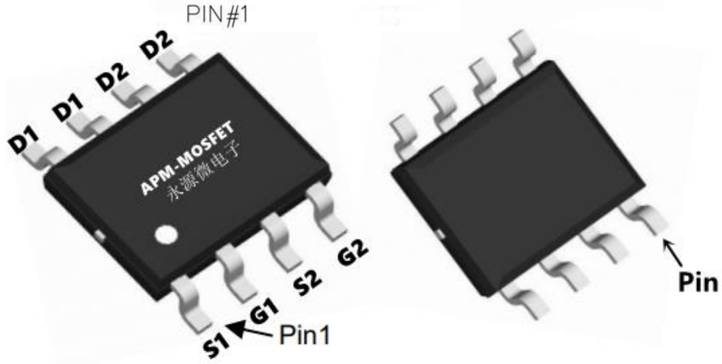
V_{DS} = -30V I_D =-6.1A

$R_{DS(ON)}$ < 50mΩ @ V_{GS}=-10V（Type：42mΩ）



Application

BLDC



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP4606B	SOP-8L	AP4606B XXX YYYY	3000

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

Symbol	Parameter	N-Ch	P-Ch	Units
VDS	Drain-Source Voltage	30	-30	V
VGS	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	6.8	-6.1	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	4.5	-4.1	A
IDM	Pulsed Drain Current[2]	18	-18	A
EAS	Single Pulse Avalanche Energy[3]	22.6	33	mJ
IAS	Avalanche Current	8	-7.5	A
P_D@T_A=25℃	Total Power Dissipation[4]	1.3		W
TSTG	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]	65		℃/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	ID=250μA, VGS=0V	30	-	-	V
IDSS	Zero Gate Voltage Drain Current	VDS=30V, VGS=0V	-	-	1.0	μA
IGSS	Gate-Body Leakage Current	VDS=0V, VGS=±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	1.0	1.5	2.5	V
RDS(ON)	Static Drain-Source ON-Resistance	VGS=10V, ID= 5A	-	20	28	mΩ
		VGS=4.5V, ID=3A	-	30	40	mΩ
Ciss	Input Capacitance	VGS=0V, VDS = 15V, f=1MHz	-	388	-	pF
Coss	Output Capacitance		-	57	-	pF
Crss	Reverse Transfer Capacitance		-	45	-	pF
Qg	Total Gate Charge	VGS=0 to 10V VDS=15V, ID=3A	-	9	-	nC
Qgs	Gate Source Charge		-	1.5	-	nC
Qgd	Gate Drain("Miller") Charge		-	2	-	nC
td(on)	Turn-On DelayTime	VGS=10V, VDD=15V ID= 3A, RGEN=3Ω	-	2	-	ns
tr	Turn-On Rise Time		-	6	-	ns
td(off)	Turn-Off DelayTime		-	61	-	ns
tf	Turn-Off Fall Time		-	34	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
VSD	Drain to Source Diode Forward Voltage	VGS=0V, IS=5A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	IF=3A, di/dt=100A/us	-	6	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2	-	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 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℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	I_D=-250μA, V_{GS}=0V	-30	-	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V	-	-	-1.0	μA
IGSS	Gate-Body Leakage Current	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-1.0	-1.8	-2.5	V
RDS(ON)	Static Drain-Source ON-Resistance(3)	V_{GS}=-10V, I_D=-5A	-	42	50	mΩ
		V_{GS}=-4.5V, I_D=-3A	-	60	75	mΩ
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f= 1MHz	-	540	-	pF
Coss	Output Capacitance		-	75	-	pF
C_{rss}	Reverse Transfer Capacitance		-	57	-	pF
Q_g	Total Gate Charge	V_{GS}=0 to -10V V_{DS}=-15V, I_D=-2A	-	11	-	nC
Q_{gs}	Gate Source Charge		-	2	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	2	-	nC
td(on)	Turn-On DelayTime	V_{GS}=-10V, V_{DD}=-15V I_D=-2A, R_{GEN} =3Ω	-	3	-	ns
t_r	Turn-On Rise Time		-	2	-	ns
td(off)	Turn-Off DelayTime		-	26	-	ns
t_f	Turn-Off Fall Time		-	15	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4.1	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-16	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -4.1A	-	-	-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -2A, di/dt = 100A/us	-	9	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	3	-	nC

Note :

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

Typical Characteristics

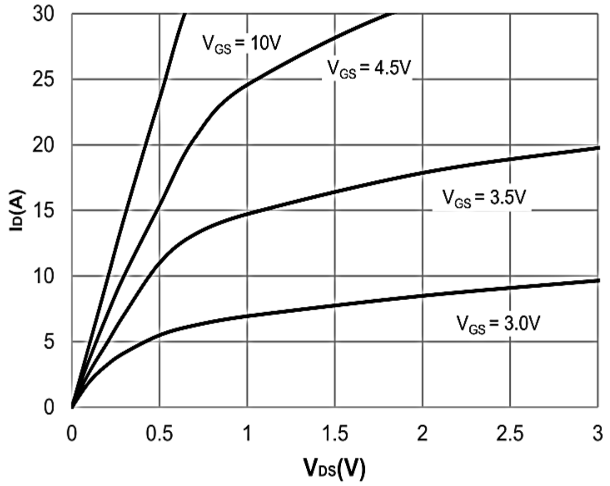


Figure1: Output Characteristics

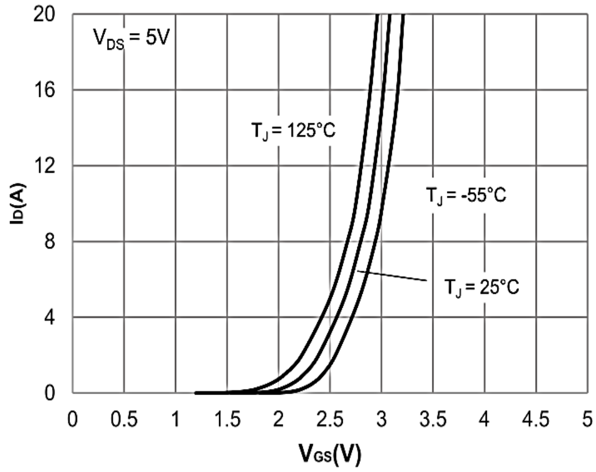


Figure 2: Typical Transfer Characteristics

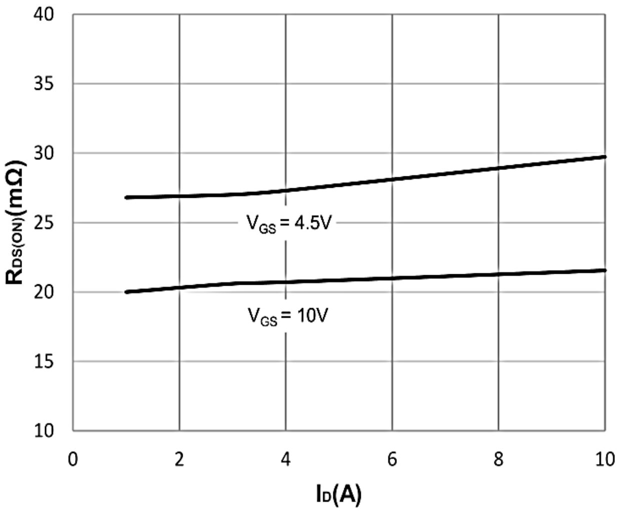


Figure 3:On-resistance vs. Drain Current

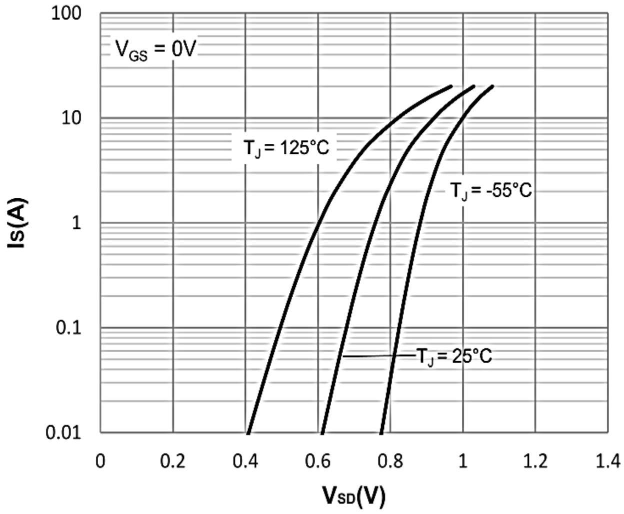


Figure 4: Body Diode Characteristics

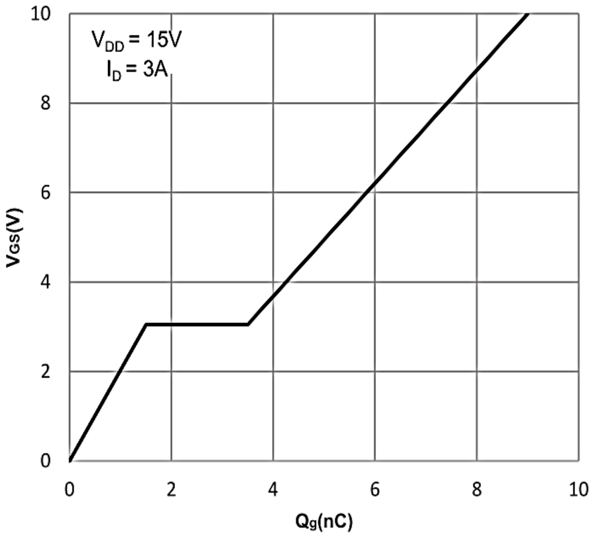


Figure 5: Gate Charge Characteristics

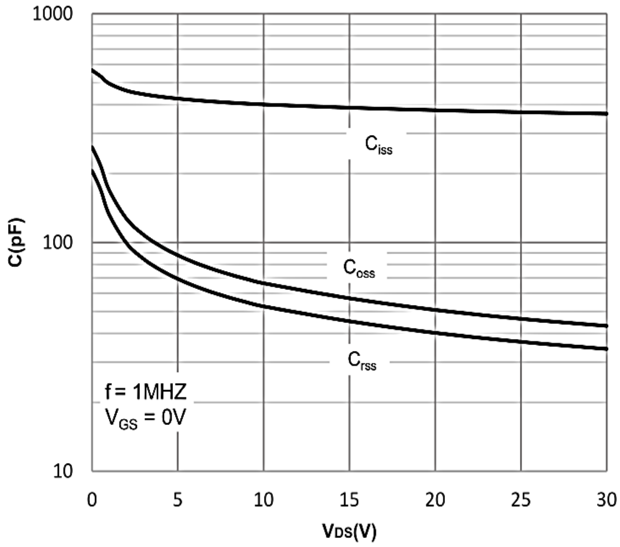


Figure 6: Capacitance Characteristics

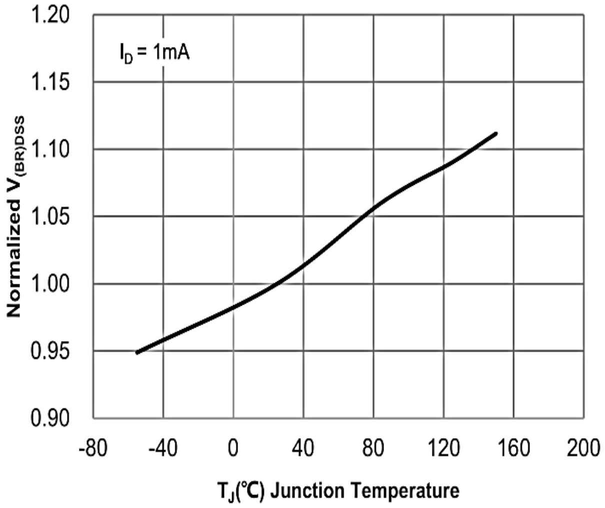


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

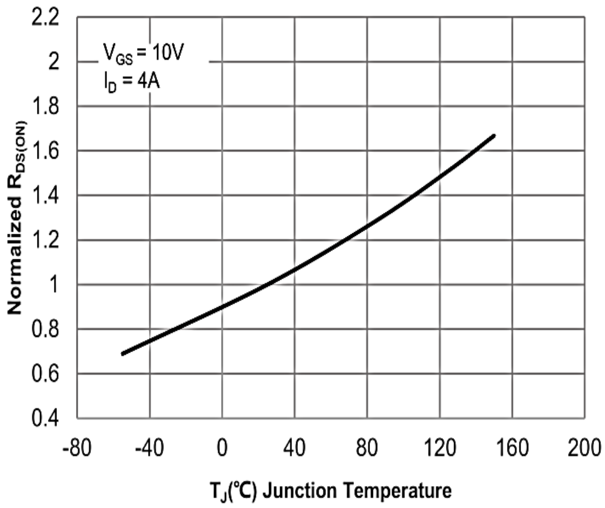


Figure 8: Normalized on Resistance vs Junction Temperature

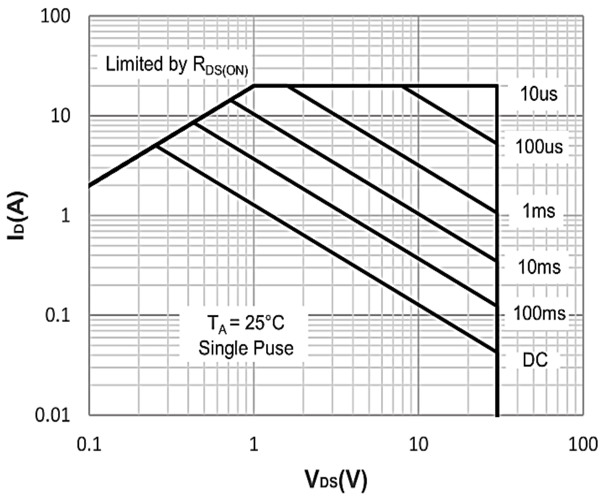


Figure 9: Maximum Safe Operating Area vs. Case Temperature

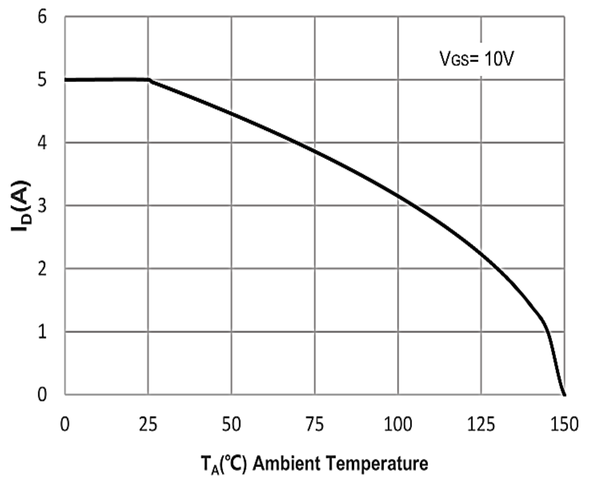


Figure 10: Maximum Continuous Drain Current

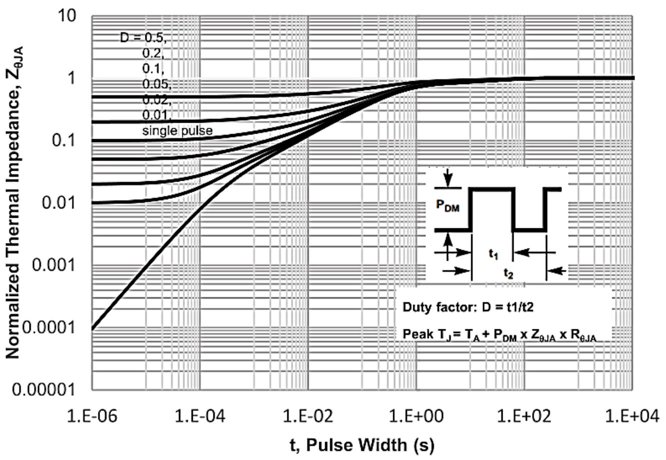


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ca

P-Channel Typical Characteristics

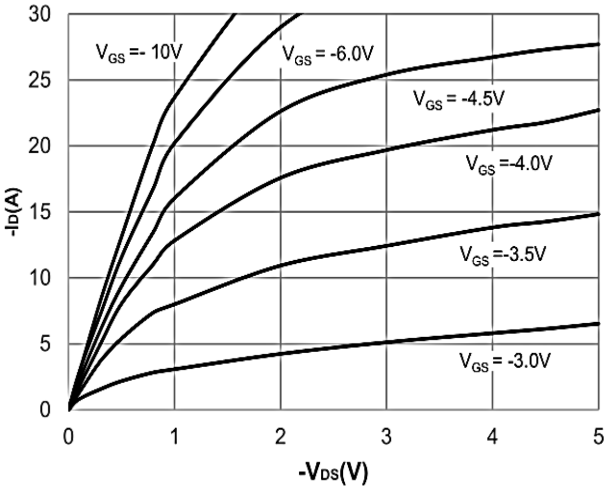


Figure1: Output Characteristics

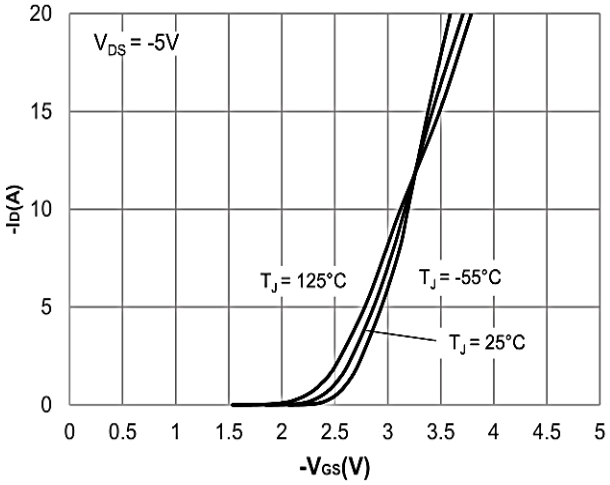


Figure 2: Typical Transfer Characteristics

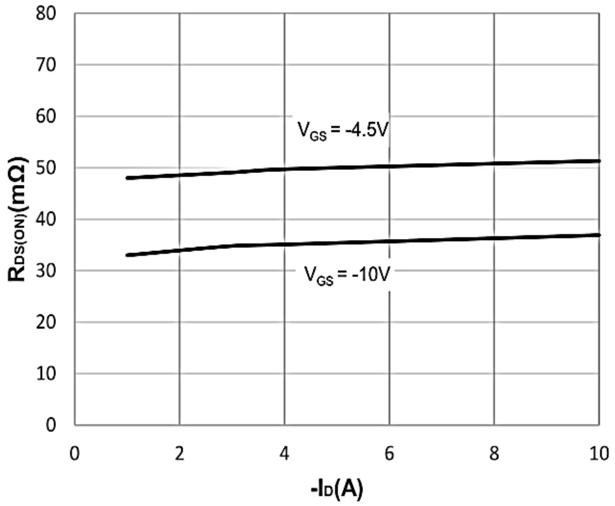


Figure 3:On-resistance vs. Drain Current

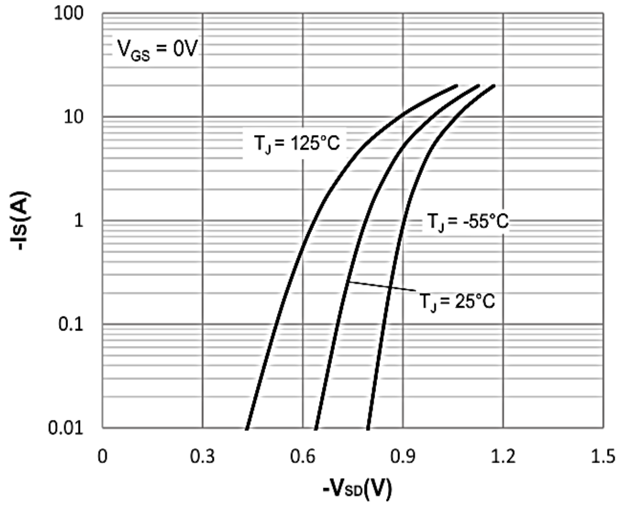


Figure 4: Body Diode Characteristics

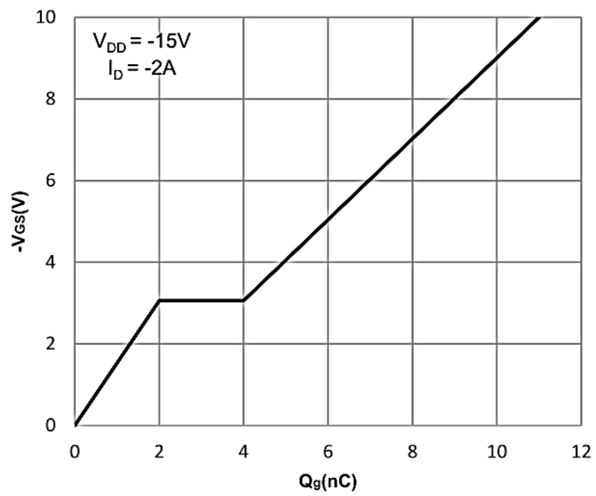


Figure 5: Gate Charge Characteristics

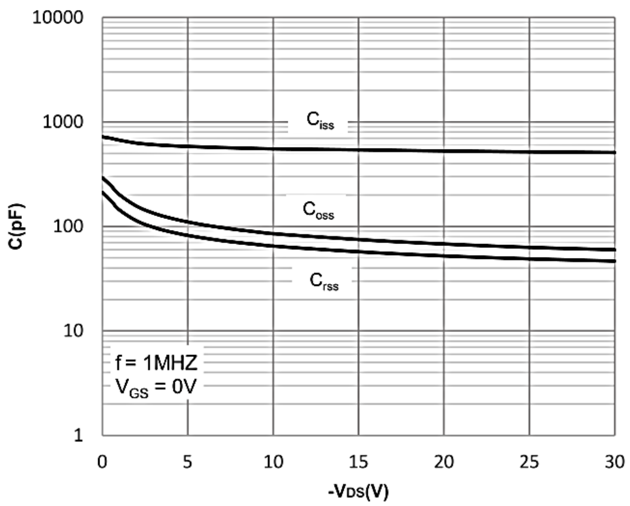


Figure 6: Capacitance Characteristics

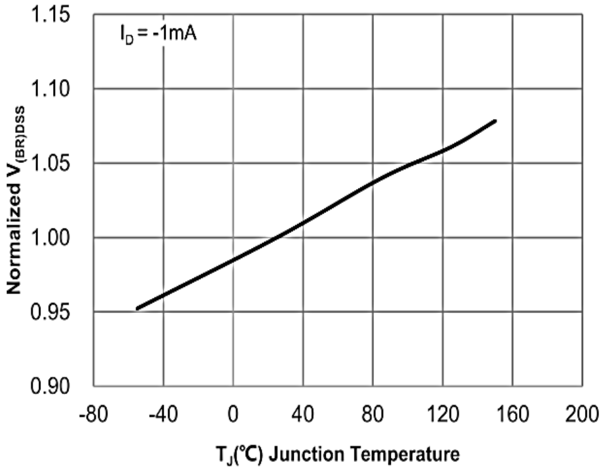


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

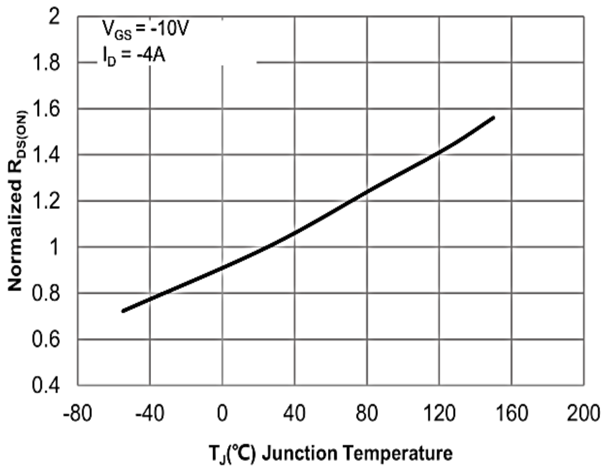


Figure 8: Normalized on Resistance vs Junction Temperature

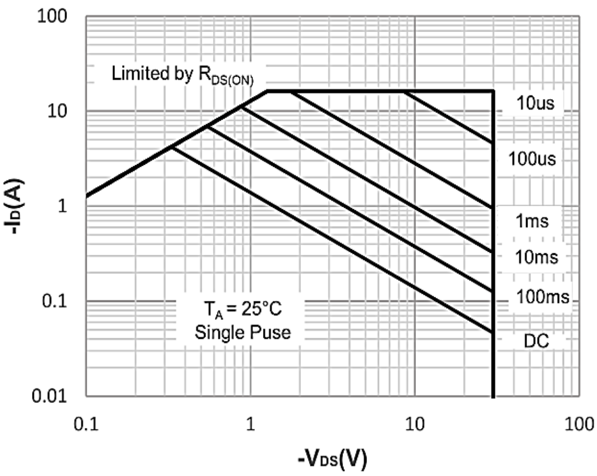


Figure 9: Maximum Safe Operating Area vs. Case Temperature

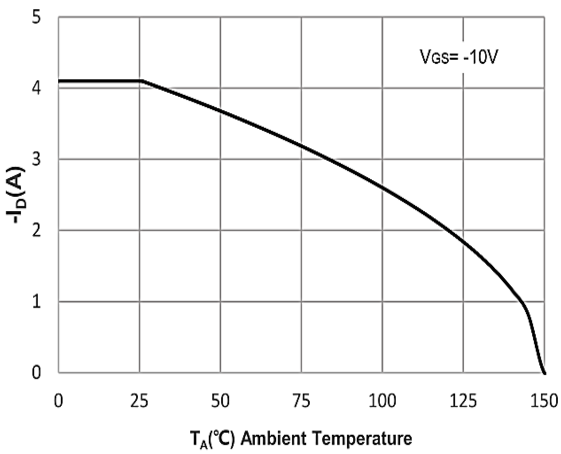


Figure 10: Maximum Continuous Drain Current

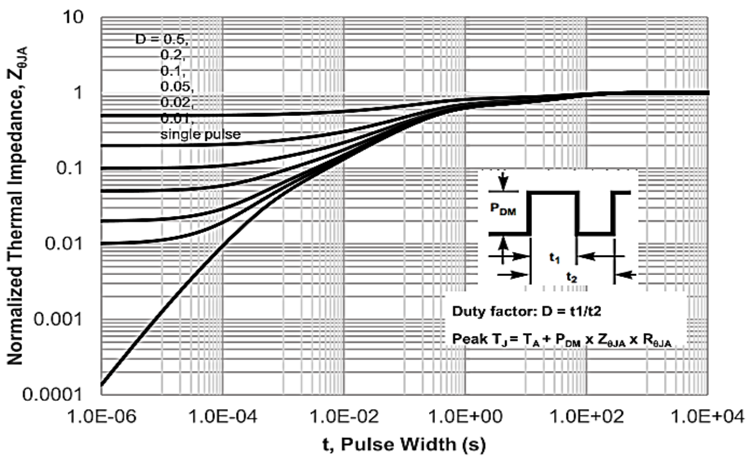
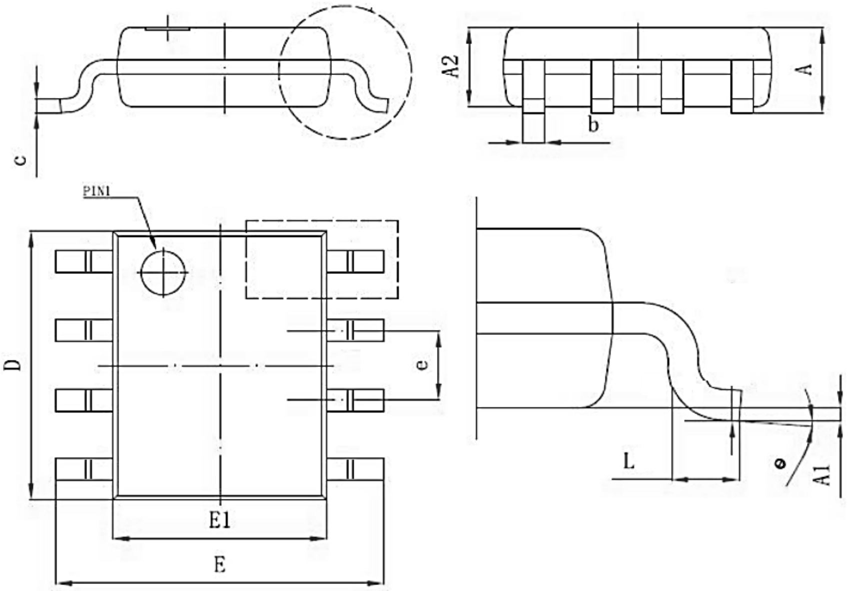


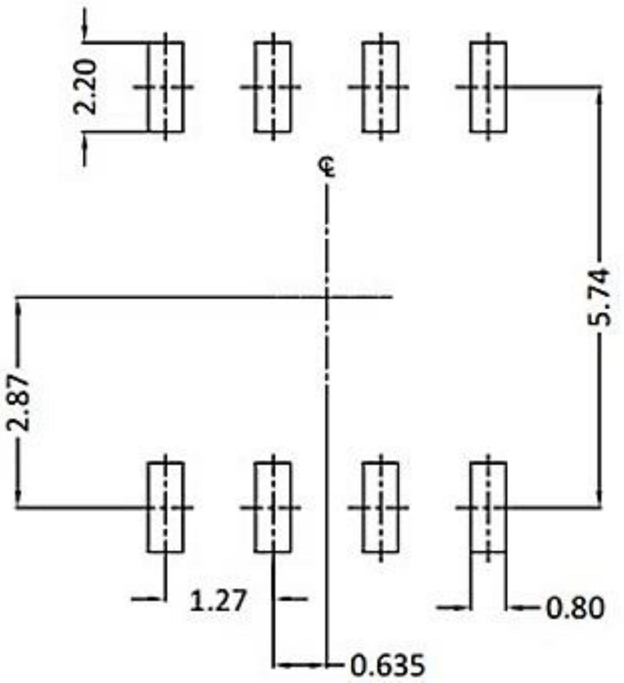
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ca

Package Mechanical Data-SOP-8L



Symbol	Dim in mm		
	Min	Typ	Max
A	1.35	1.55	1.75
A1	0.02	0.15	0.25
A2	1.425	1.45	1.475
b	0.3	0.4	0.5
c	0.15	0.2	0.25
D	4.8	5	5.2
E	5.8	6	6.2
E1	3.8	4	4.2
e	1.27BSC		
L	0.4		1.27
θ	0°		8°

Recommended Minimum Pads



Dimensions in （mm）

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Edition	Date	Change
REV1.0	2022/12/10	Initial release
REV1.1	2024/3/1	Reduce RDS(on)