

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
20V	25mΩ@4.5V	5A
	35mΩ@2.5V	
-20V	55mΩ@-4.5V	-4A
	65mΩ@-2.5V	



合肥矽普半导体

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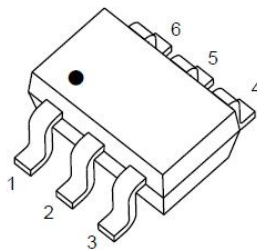
Feature

- High power and current handing capability
- Surface mount package

Application

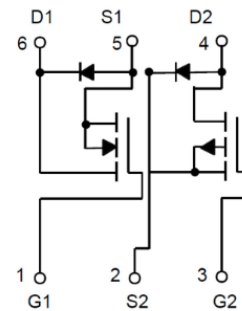
- Battery Switch
- DC/DC Converter

Package

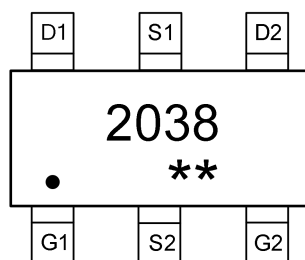


SOT-23-6L

Circuit diagram



Marking



2038
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tape
SP2038CTS	SOT-23-6L	3000

Absolute maximum ratings (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Value		Units
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 12	± 12	V
Continuous Drain Current	I_D	5	-4	A
Pulsed Drain Current	I_{DM}	20	-16	A
Power Dissipation	P_D	1.3		W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	96		°C/W
Storage Temperature Range	T_{STG}	-55 to 150		°C
Operating Junction Temperature Range	T_J	-55 to 150		°C

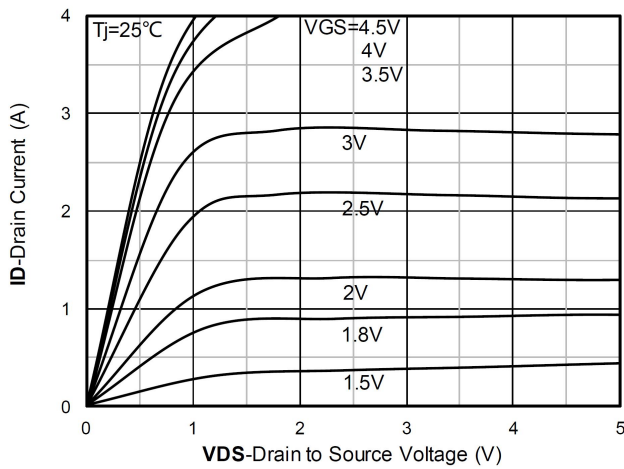
N-Channel Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250μA	20	-	-	V
Drain-Source Leakage Current	IDSS	VDS=16V , VGS=0V	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±12V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VDS=VGS , ID=250μA	0.5	0.7	1.0	V
Static Drain-Source On-Resistance	RDS(on)	VGS=4.5V , ID=4.5A	-	25	38	mΩ
		VGS=2.5V , ID=3.5A	-	35	45	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=10V , VGS=0V , f=1MHz	-	456	-	pF
Output Capacitance	Coss		-	62	-	
Reverse Transfer Capacitance	Crss		-	54	-	
Total Gate Charge	Qg	VDS=10V , VGS=4.5V , ID=2A	-	6	-	nC
Gate-Source Charge	Qgs		-	1	-	
Gate-Drain Charge	Qgd		-	1.4	-	
Switching Characteristics						
Turn-On Delay Time	td(on)	VDD=10V VGS=4.5V , RG=2.7Ω , ID=2A	-	5	-	nS
Turn-On Rise Time	tr		-	13	-	
Turn-Off Delay Time	td(off)		-	65	-	
Turn-Off Fall Time	tf		-	28	-	
Source-Drain Diode characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V

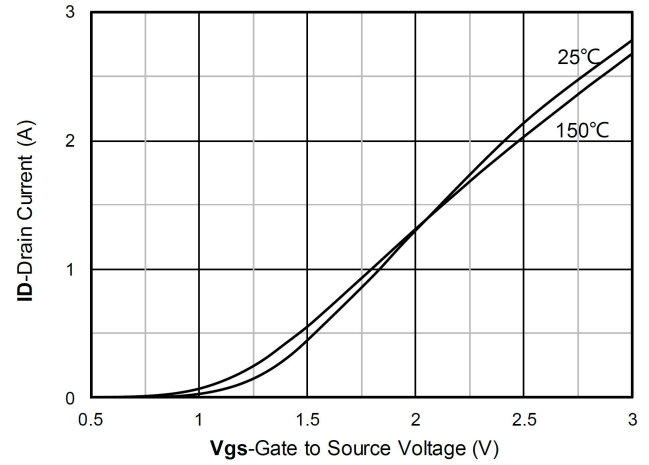
P-Channel Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250μA	-20	-	-	V
Drain-Source Leakage Current	I _{DSS}	VDS=-16V , VGS=0V	-	-	-1	uA
Gate-Source Leakage Current	I _{GSS}	VGS=±12V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	VDS=VGS , ID=-250μA	-0.5	-0.7	-1.0	V
Static Drain-Source On-Resistance	R _{DS(ON)}	VGS=-4.5V , ID=-3A	-	55	80	mΩ
		VGS=-2.5V , ID=-2A	-	65	100	
Dynamic characteristics						
Input Capacitance	C _{iss}	VDS=-10V , VGS=0V , f=1MHz	-	405	-	pF
Output Capacitance	C _{oss}		-	75	-	
Reverse Transfer Capacitance	C _{rss}		-	55	-	
Total Gate Charge	Q _g	VDS=-10V , VGS=-4.5V , ID=-3A	-	5.5	-	nC
Gate-Source Charge	Q _{gs}		-	1.18	-	
Gate-Drain Charge	Q _{gd}		-	1.3	-	
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VDD=-10V VGS=-4.5V , RG=3Ω , ID=-1A	-	6.4	-	nS
Turn-On Rise Time	t _r		-	22	-	
Turn-Off Delay Time	t _{d(off)}		-	35	-	
Turn-Off Fall Time	t _f		-	31	-	
Source-Drain Diode characteristics						
Diode Forward Voltage	V _{SD}	VGS=0V , IS=-1A , TJ=25℃	-	-	-1.2	V

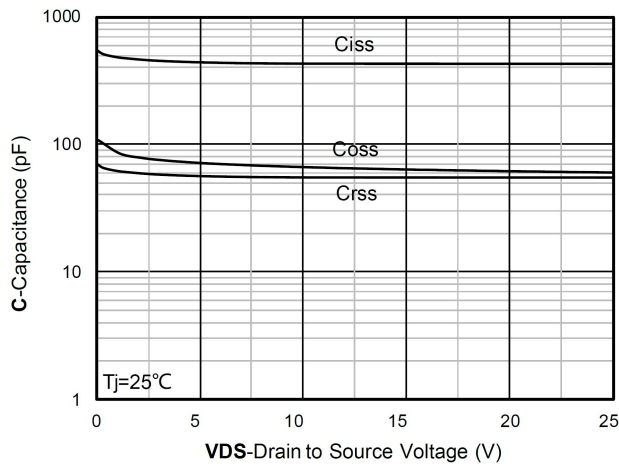
N-Channel Typical Characteristics



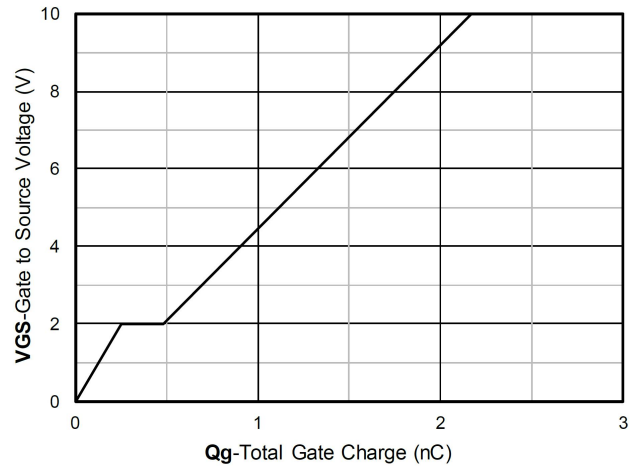
Output Characteristics



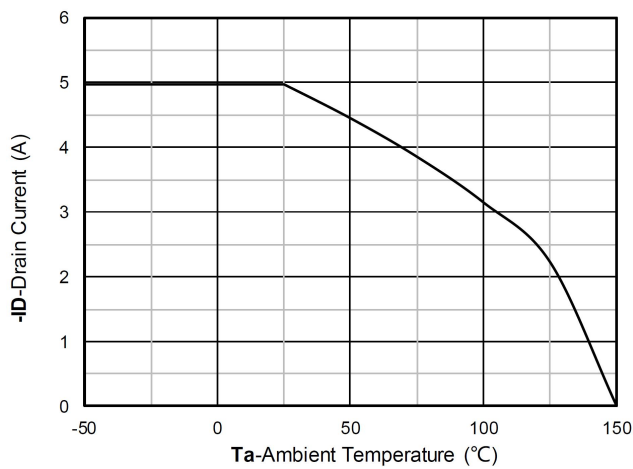
Transfer Characteristics



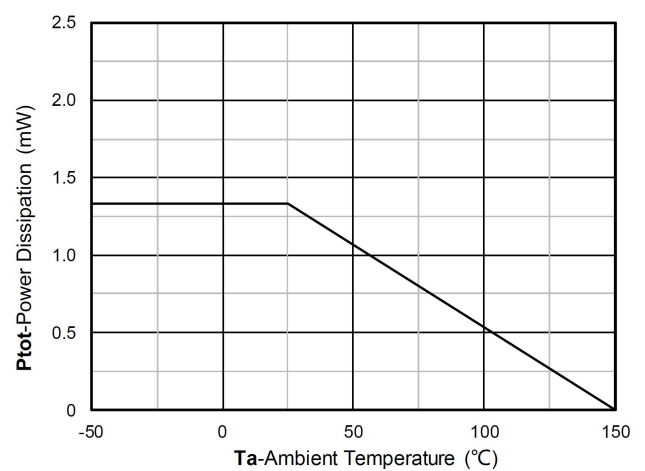
Capacitance Characteristics



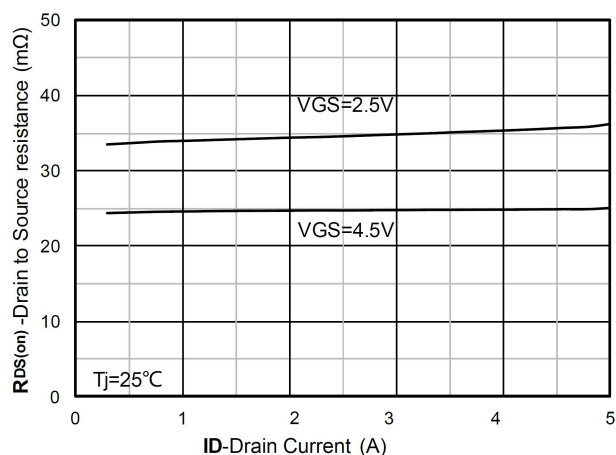
Gate Charge



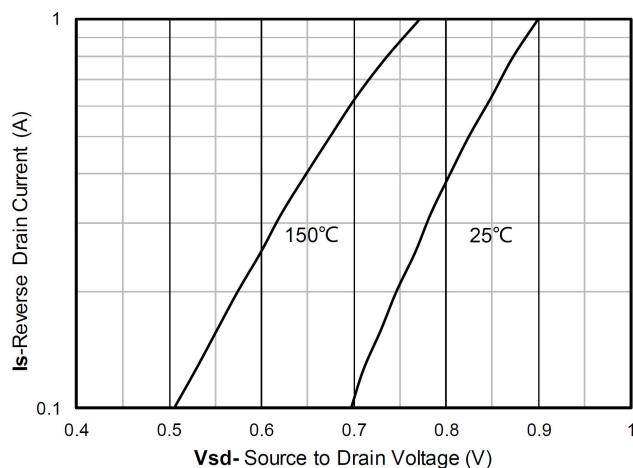
Current dissipation



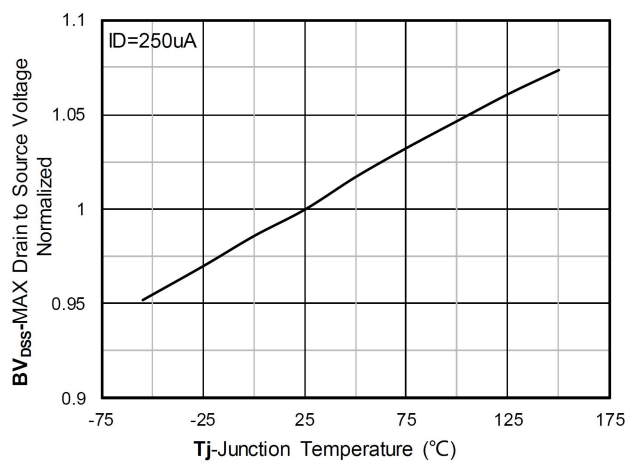
Power dissipation



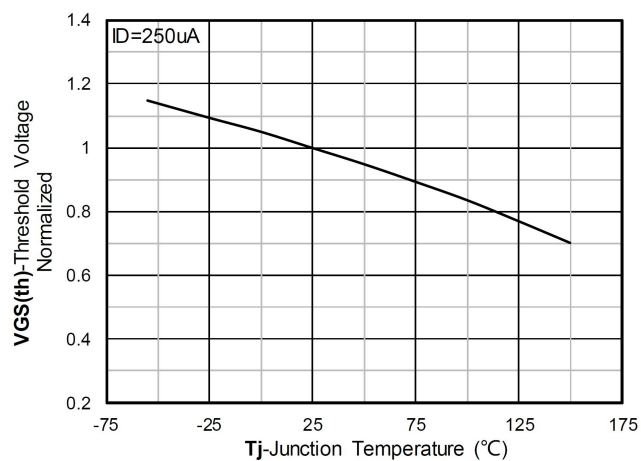
$R_{DS(on)}$ VS Drain Current



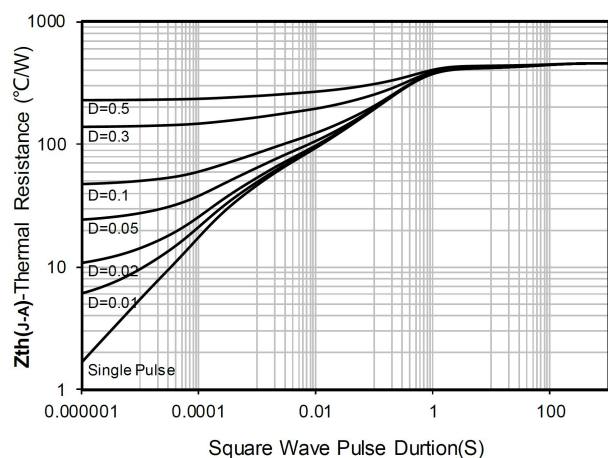
Forward characteristics of reverse diode



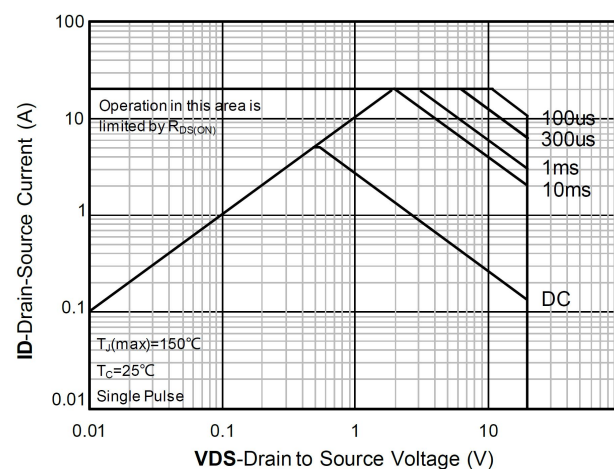
Normalized breakdown voltage



Normalized Threshold voltage

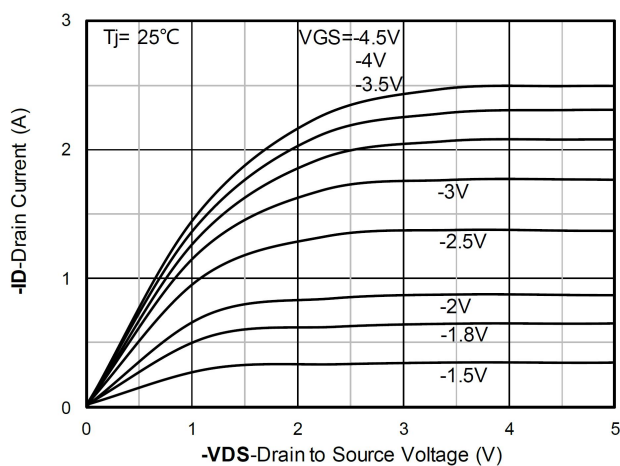


Maximum Transient Thermal Impedance

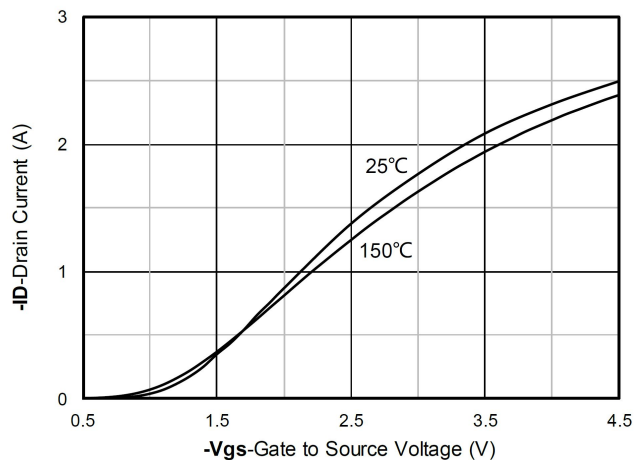


Safe Operation Area

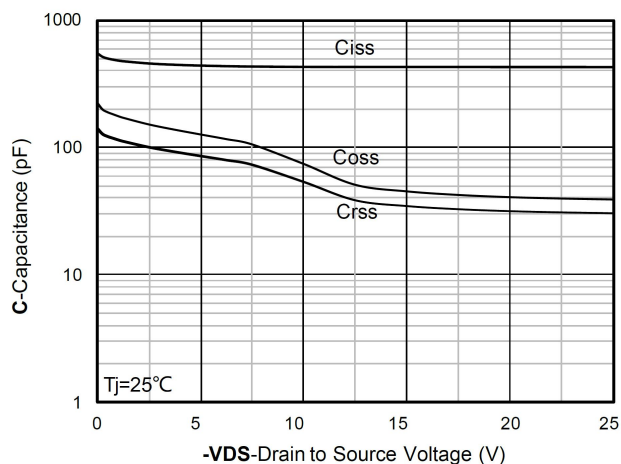
P-Channel Typical Characteristics



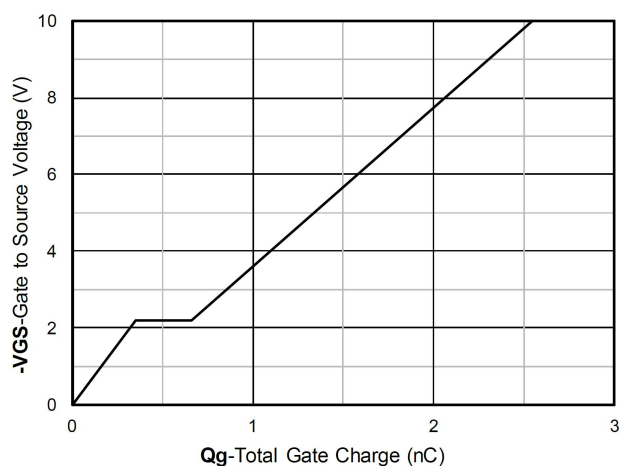
Output Characteristics



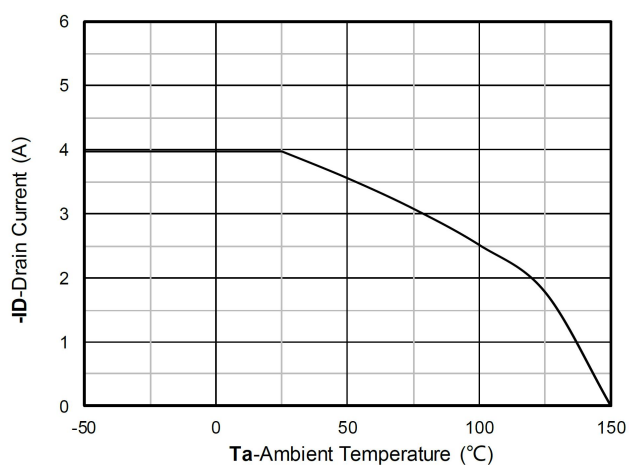
Transfer Characteristics



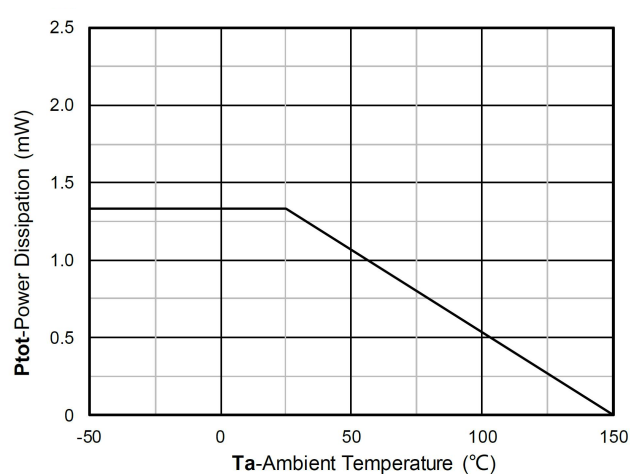
Capacitance Characteristics



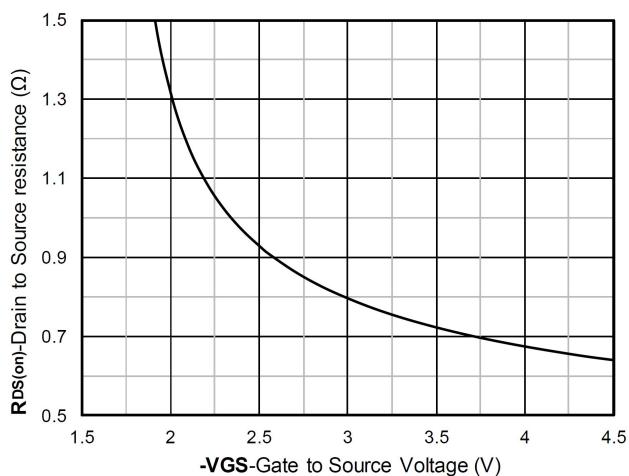
Gate Charge



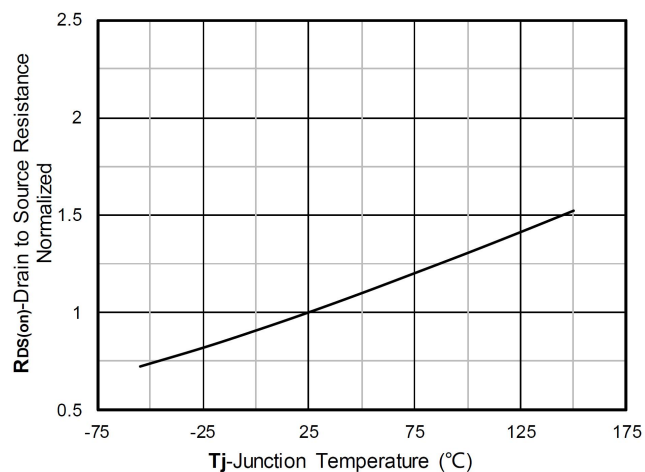
Current dissipation



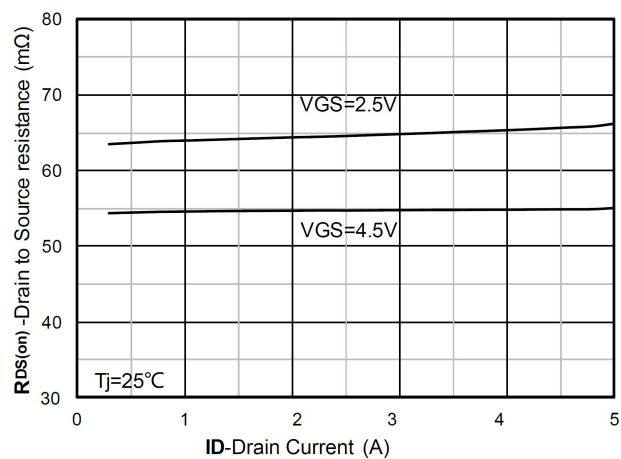
Power dissipation



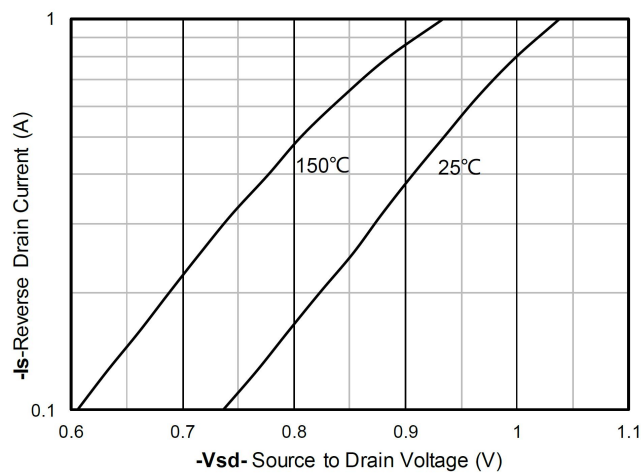
On-Resistance vs Gate to Source Voltage



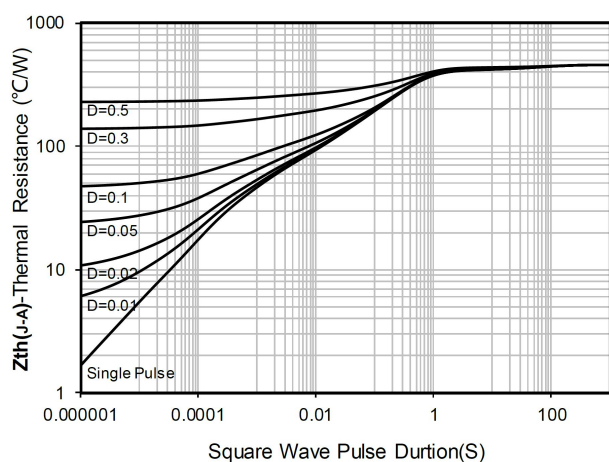
Normalized On-Resistance



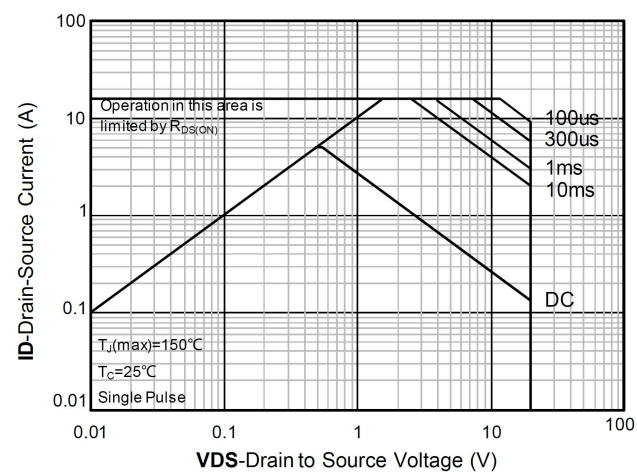
$R_{DS(on)}$ VS Drain Current



Forward characteristics of reverse diode

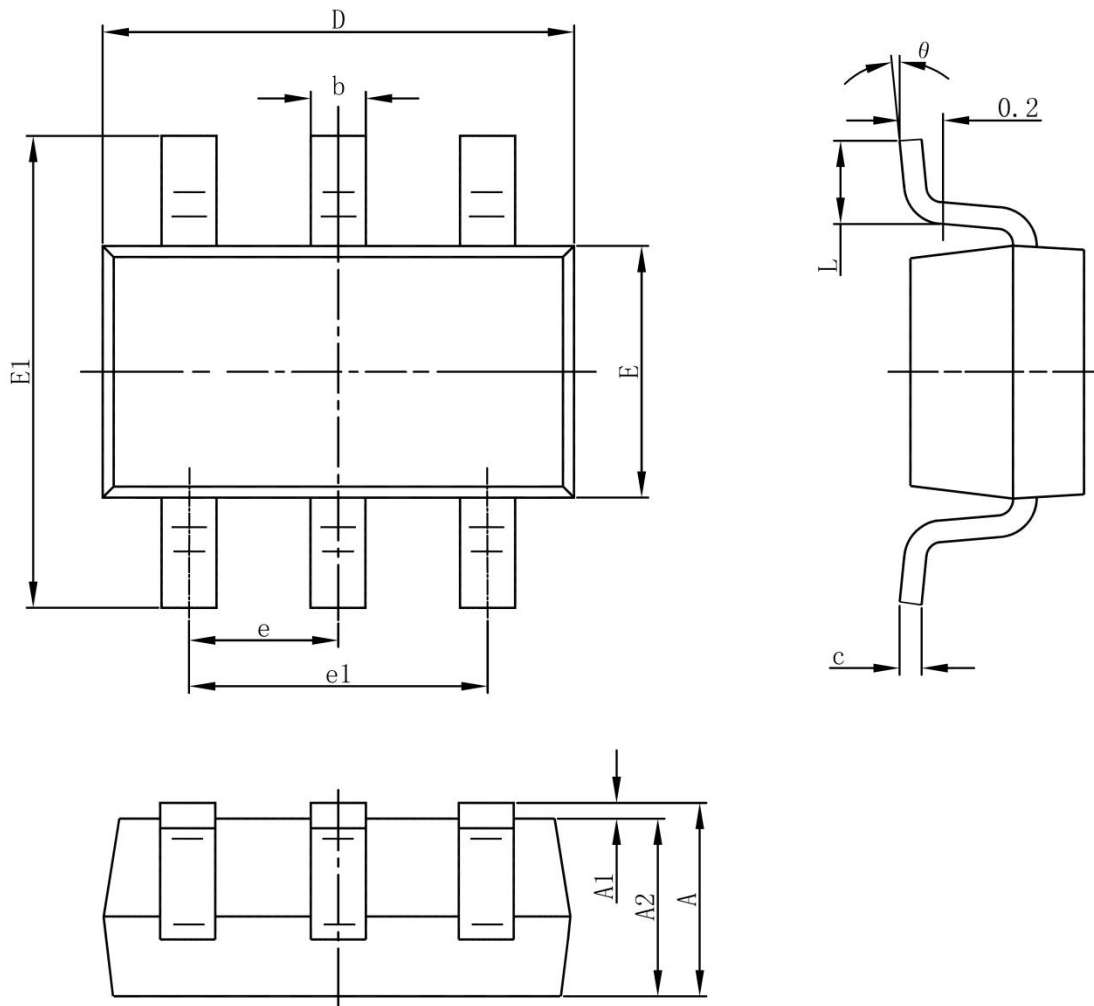


Maximum Transient Thermal Impedance



Safe Operation Area

SOT-23-6L Package Information



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°