

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	15mΩ@10V	25A
	18mΩ@4.5V	
-40V	23mΩ@-10V	-23A
	32mΩ@-4.5V	



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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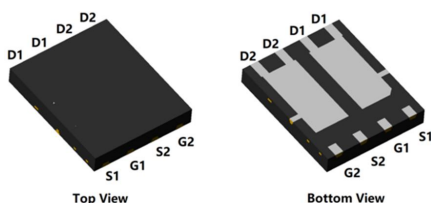
Feature

- Fast switching speed
- Surface mount package
- ROHS Compliant & Halogen-Free
- 100% Single Pulse avalanche energy Test

Applications

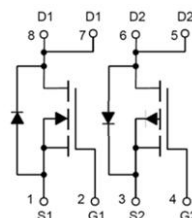
- DC-DC Converters.
- Motor Control.

Package

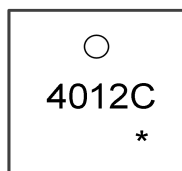


PDFN5X6-8L

Circuit diagram



Marking



4012C
*

:Device Code
:Month Code

Order Information

Device	Package	Unit/Tape
SP4012CNK	PDFN5X6-8L	5000

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

Parameter	Symbol	Rating		Unit
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	25	-23	A
Pulse Drain Current Tested	I_{DM}	100	-92	A
Single pulsed avalanche energy ¹	E_{AS}	29	48	mJ
Power Dissipation (Tc=25°C)	P_D	35		W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	3.6		°C/W
Storage Temperature Range	T_{STG}	-55 to 150		°C
Operating Junction Temperature Range	T_J	-55 to 150		°C

N-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=250uA	40	-	-	V
Drain-Source Leakage Current	IDSS	VDS=32V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =250uA	1.0	1.5	2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS = 10V, ID = 10A	-	15	19	mΩ
		VGS = 4.5V, ID = 8A	-	18	25	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=15V , VGS=0V , f=1MHz	-	1061	-	pF
Output Capacitance	Coss		-	110	-	
Reverse Transfer Capacitance	Crss		-	95	-	
Total Gate Charge	Qg	VDS=15V , VGS=10V , ID=10A	-	23	-	nC
Gate-Source Charge	Qgs		-	6.3	-	
Gate-Drain Charge	Qgd		-	5.3	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=15V VGS=10V , RG=1.5Ω, ID=8A	-	5.5	-	nS
Rise Time	Tr		-	14	-	
Turn-Off Delay Time	Td(off)		-	25	-	
Fall Time	Tf		-	4.6	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	25	A
Reverse recover time	Trr	IS=20A, di/dt=100A/us, Tj=25℃	-	12.5	-	nS
Reverse recovery charge	Qrr		-	9	-	nC

Note:

1. The EAS Test condition is $V_{DD}=20V, V_{GS}=10V, L=0.1mH, R_g=25\Omega$

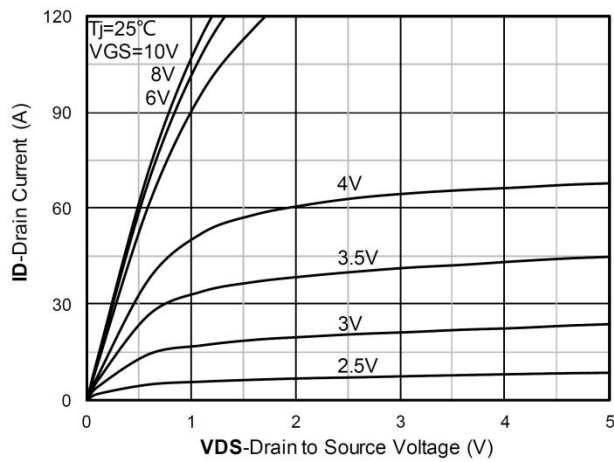
P-Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=-250uA	-40	-	-	V
Drain-Source Leakage Current	Idss	VDS=-32V , VGS=0V , TJ=25℃	-	-	-1	uA
Gate-Source Leakage Current	Igss	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =-250uA	-1.0	-1.5	-2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS =-10V, ID =-5A	-	23	29	mΩ
		VGS =-4.5V, ID =-3A	-	32	43	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=-15V , VGS=0V , f=1MHz	-	1415	-	pF
Output Capacitance	Coss		-	134	-	
Reverse Transfer Capacitance	Crss		-	102	-	
Total Gate Charge	Qg	VDS=-15V , VGS=-10V , ID=-10A	-	23.5	-	nC
Gate-Source Charge	Qgs		-	3.5	-	
Gate-Drain Charge	Qgd		-	3.3	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=-15V VGS=-10V , RG=3Ω, ID=-6A	-	11	-	nS
Rise Time	Tr		-	15.7	-	
Turn-Off Delay Time	Td(off)		-	35	-	
Fall Time	Tf		-	5.5	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=-1A , TJ=25℃	-	-	-1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	-23	A
Reverse recover time	Trr	IS=-15A, di/dt=-100A/us, Tj=25℃	-	28	-	nS
Reverse recovery charge	Qrr		-	36	-	nC

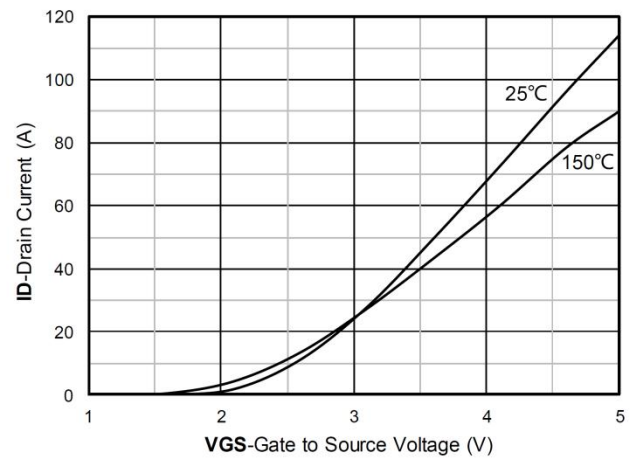
Note:

1. The EAS Test condition is $V_{DD}=-20V$, $V_{GS}=-10V$, $L=0.1mH$, $R_g=25\Omega$

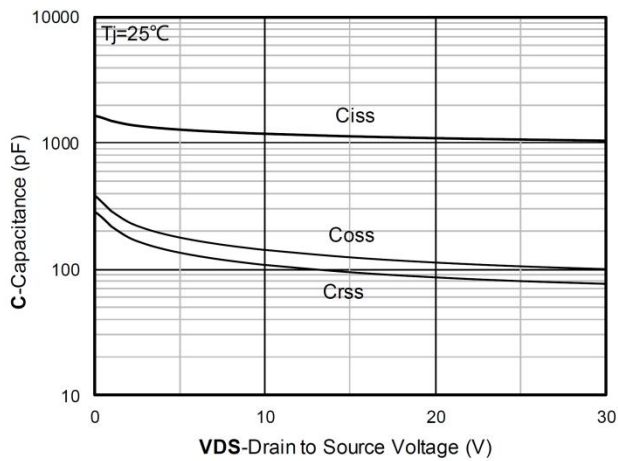
N-Channel Typical Characteristics



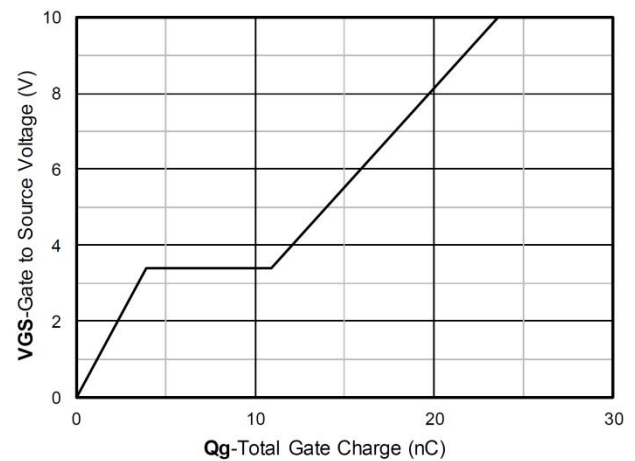
Output Characteristics



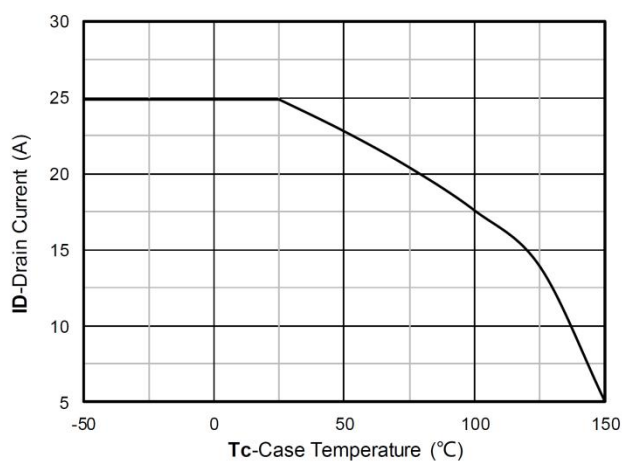
Transfer Characteristics



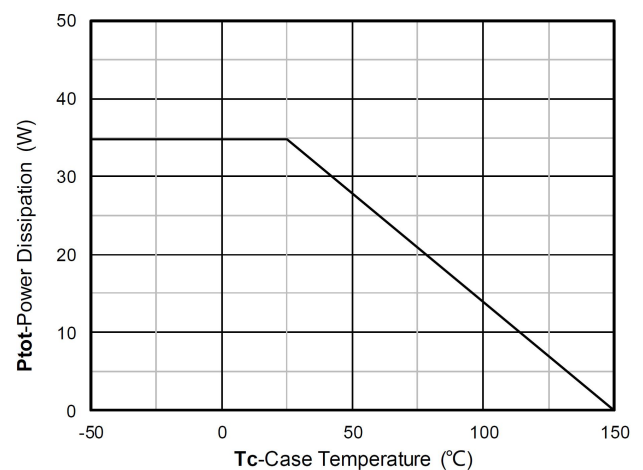
Capacitance Characteristics



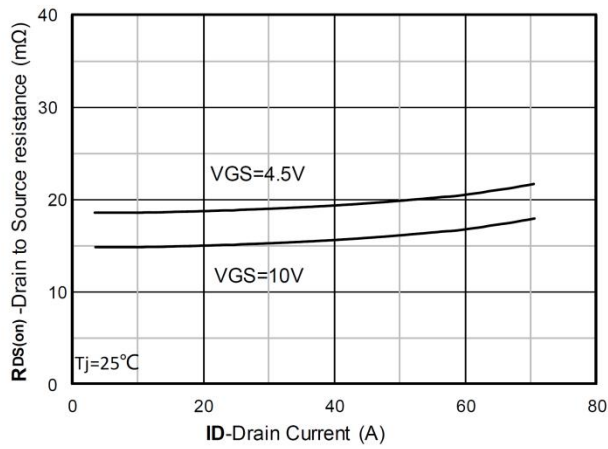
Gate Charge



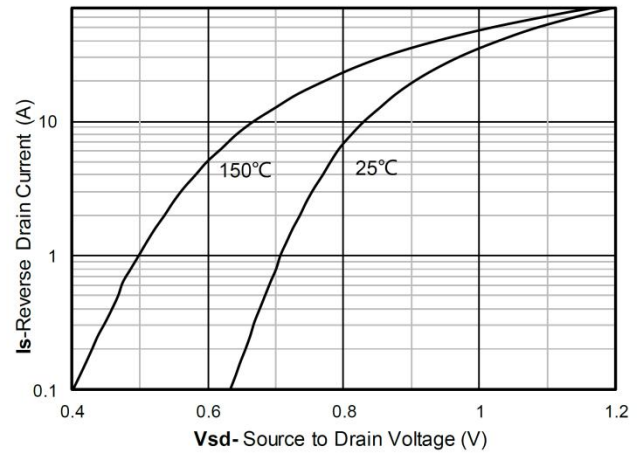
Current dissipation



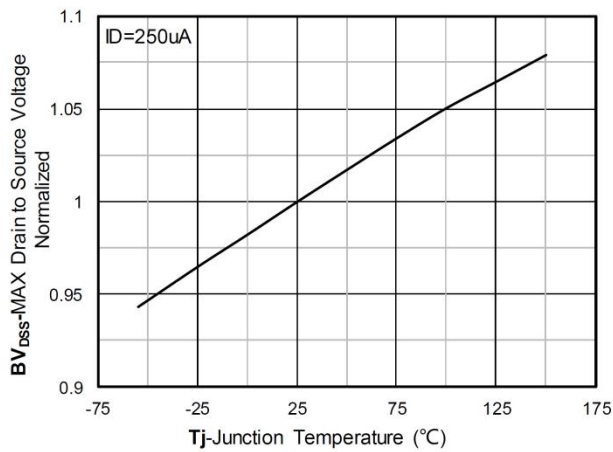
Power dissipation



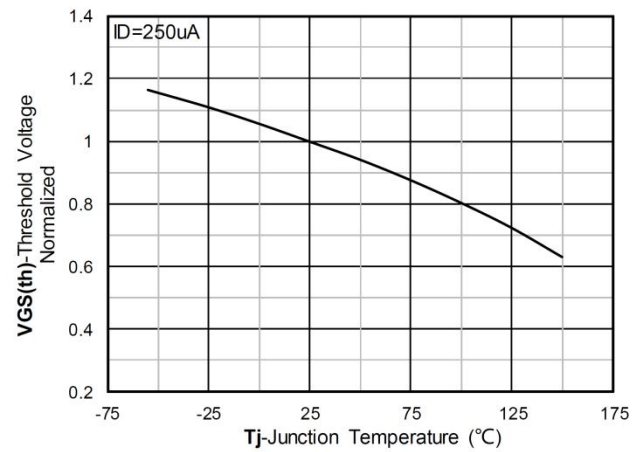
$R_{DS(on)}$ VS Drain Current



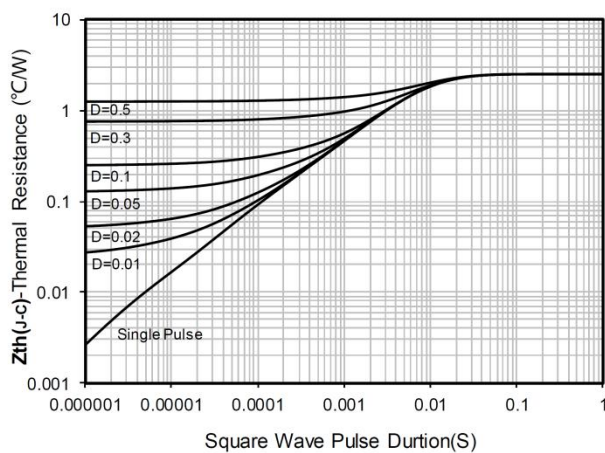
Forward characteristics of reverse diode



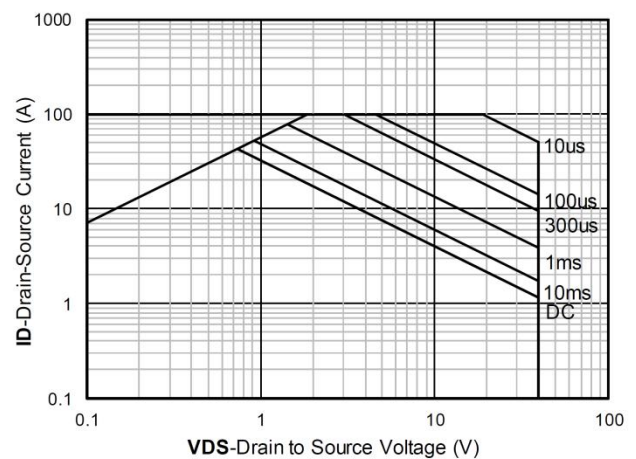
Normalized breakdown voltage



Normalized Threshold voltage

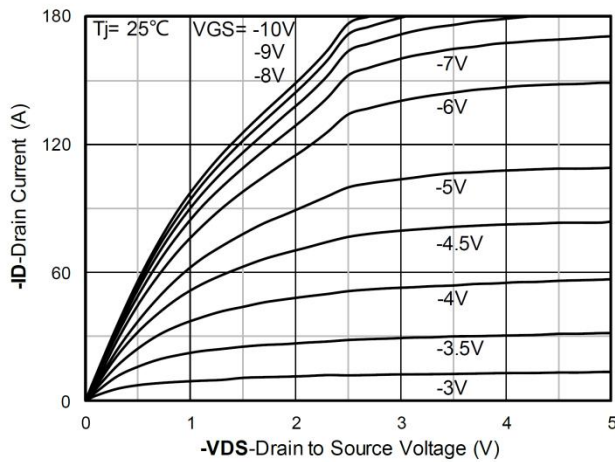


Maximum Transient Thermal Impedance

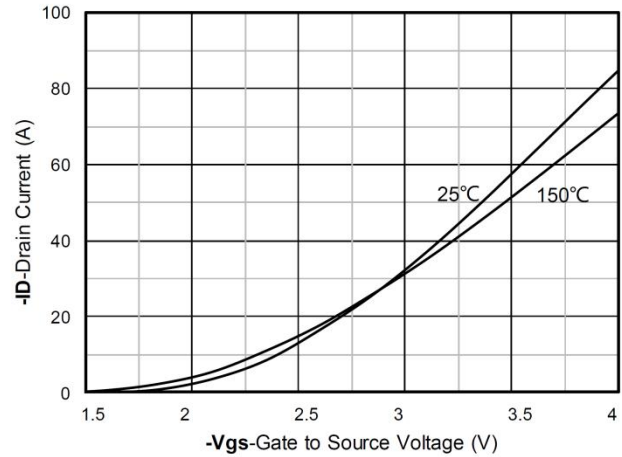


Safe Operation Area

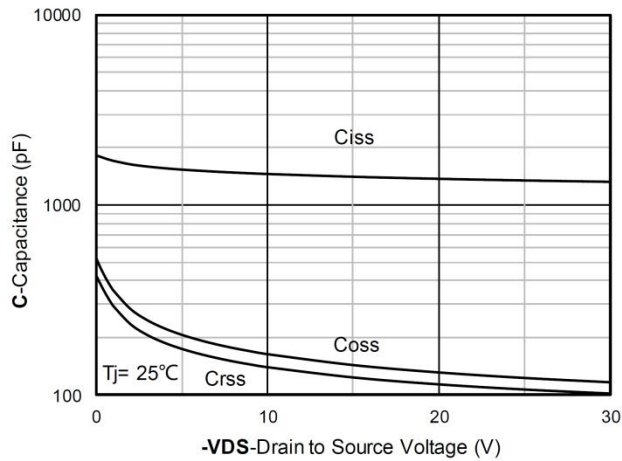
P-Channel Typical Characteristics



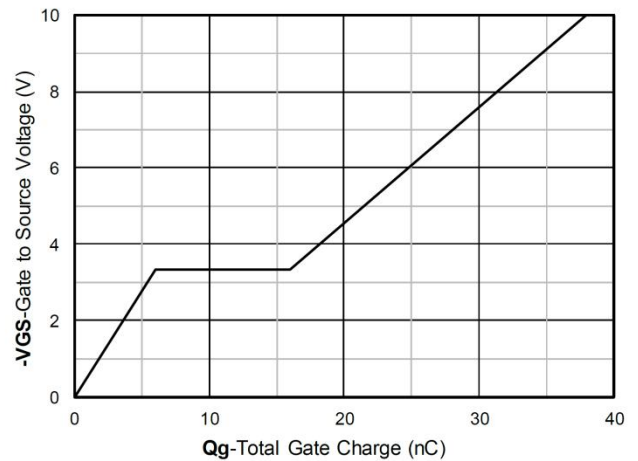
Output Characteristics



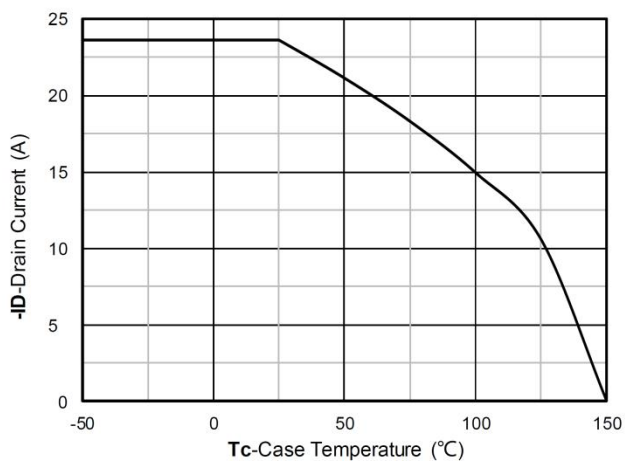
Transfer Characteristics



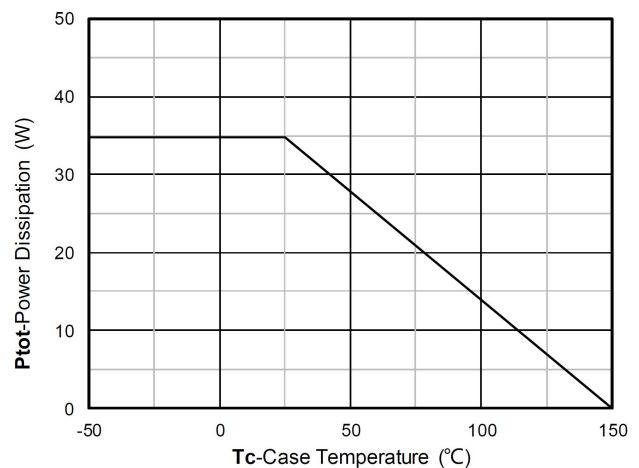
Capacitance Characteristics



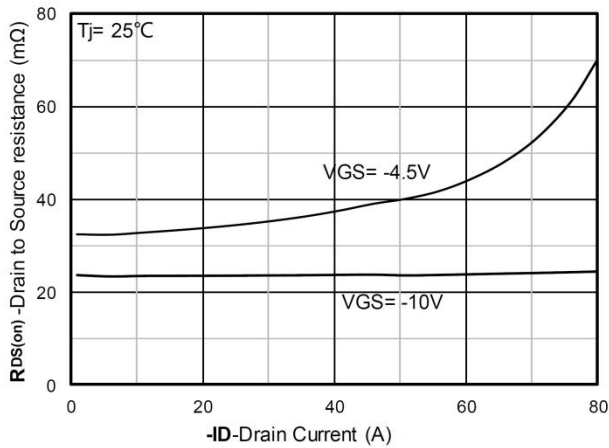
Gate Charge



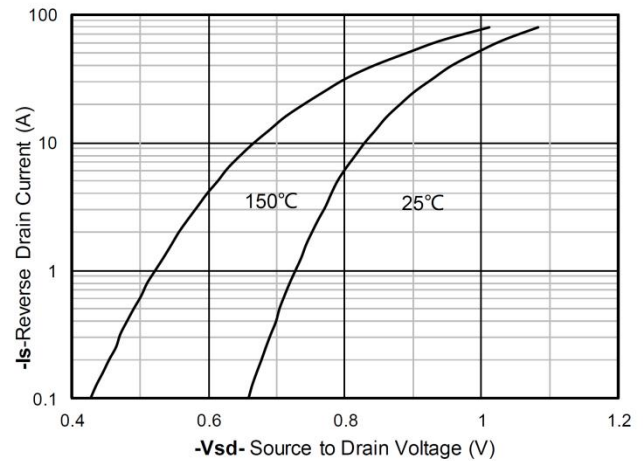
Current dissipation



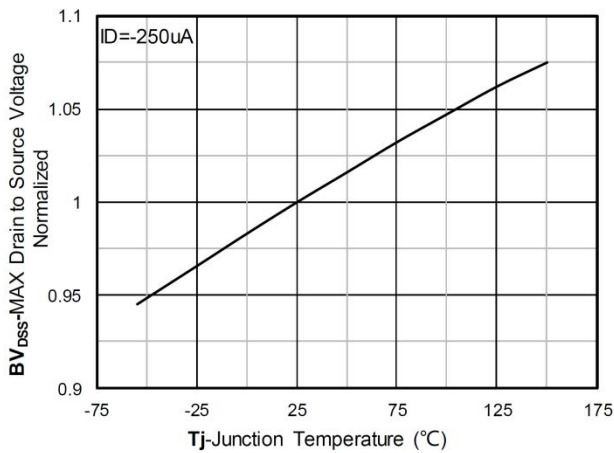
Power dissipation



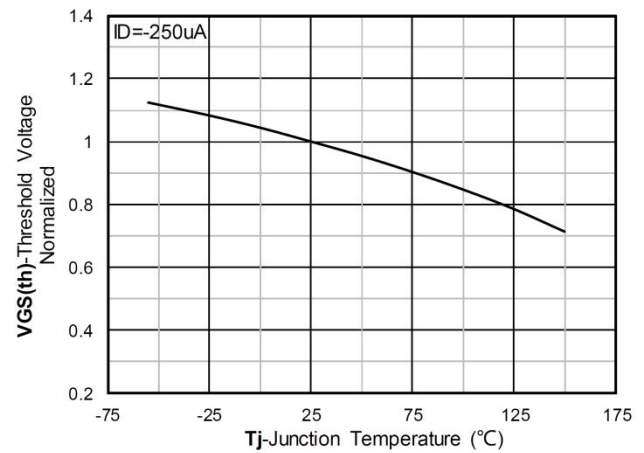
RDS(on) VS Drain Current



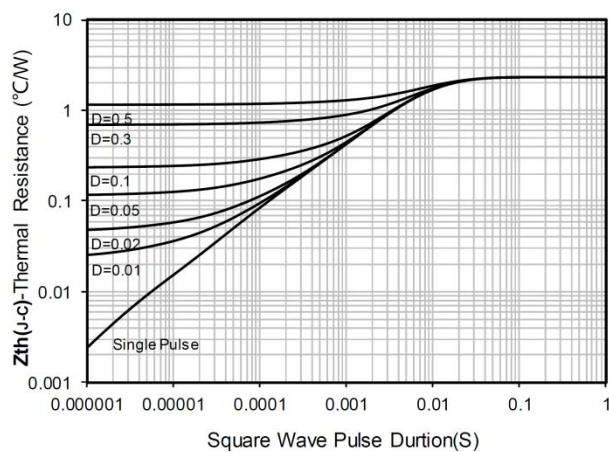
Forward characteristics of reverse diode



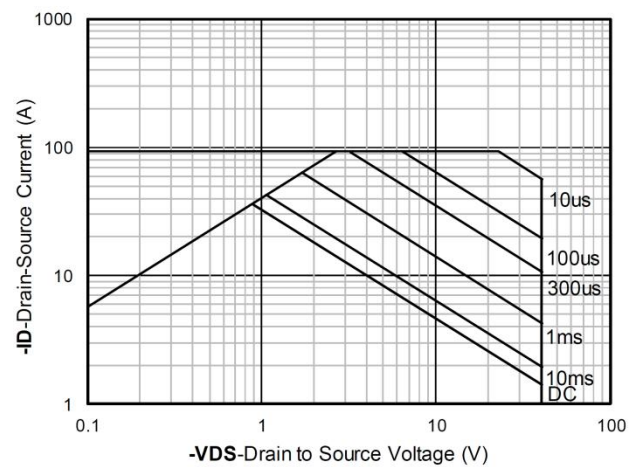
Normalized breakdown voltage



Normalized Threshold voltage



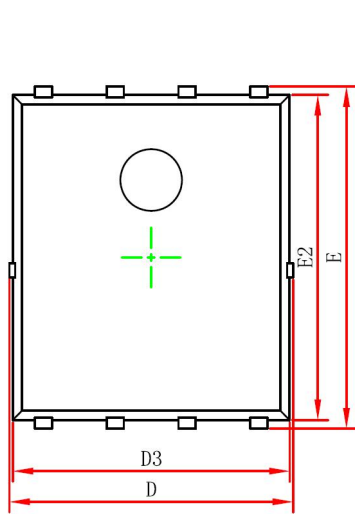
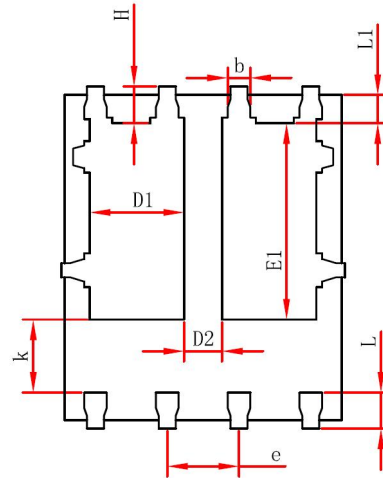
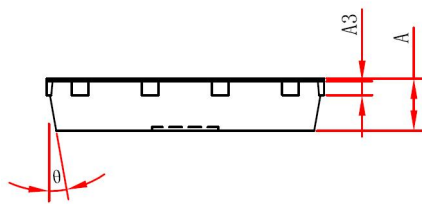
Maximum Transient Thermal Impedance



Safe Operation Area



PDFN5X6-8L Package Information

Top View
[顶视图]Bottom View
[背视图]Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254 REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°