

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	1.1mΩ@10V	185A
	1.3mΩ@4.5V	



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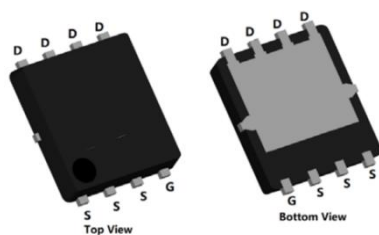
Feature

- Fast Switching
- Low Gate Charge and $R_{DS(on)}$
- Cu-Clip Process
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

Applications

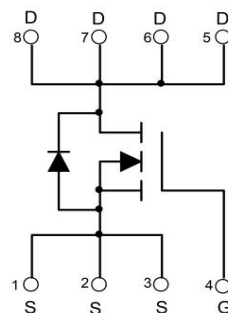
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

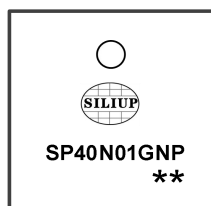


PDFN5X6-8L

Circuit diagram



Marking



SP40N01GNP
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tape
SP40N01GNP	PDFN5X6-8L	5000

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	185	A
Continuous Drain Current (Tc=100°C)	I_D	125	A
Pulsed Drain Current	I_{DM}	740	A
Single Pulse Avalanche Energy ¹	E_{AS}	1089	mJ
Power Dissipation (Tc=25°C)	P_D	142	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.88	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

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

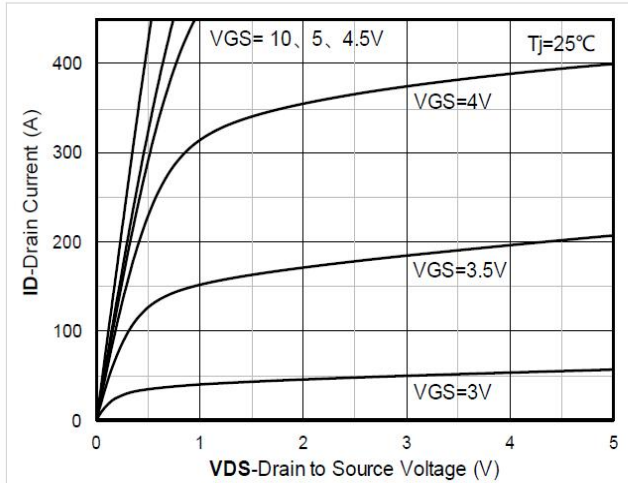
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	40	47	-	V
Drain-Source Leakage Current	IDSS	VDS=32V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =250uA	1	1.7	2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=50A	-	1.1	1.4	mΩ
		VGS=4.5V , ID=50A	-	1.3	2.1	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=20V , VGS=0V , f=1MHz	-	5500	-	pF
Output Capacitance	Coss		-	1850	-	
Reverse Transfer Capacitance	Crss		-	65	-	
Total Gate Charge	Qg	VDS=20V , VGS=10V , ID=50A	-	128	-	nC
Gate-Source Charge	Qgs		-	19	-	
Gate-Drain Charge	Qgd		-	12	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=20V , VGS=10V , RG=1.6Ω, ID=50A	-	13.5	-	nS
Rise Time	Tr		-	8.8	-	
Turn-Off Delay Time	Td(off)		-	52	-	
Fall Time	Tf		-	9.6	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	185	A
Reverse Recovery Time	Trr	IS=50A, di/dt=100A/us, TJ=25℃	-	55	-	nS
Reverse Recovery Charge	Qrr		-	53	-	nC

Note :

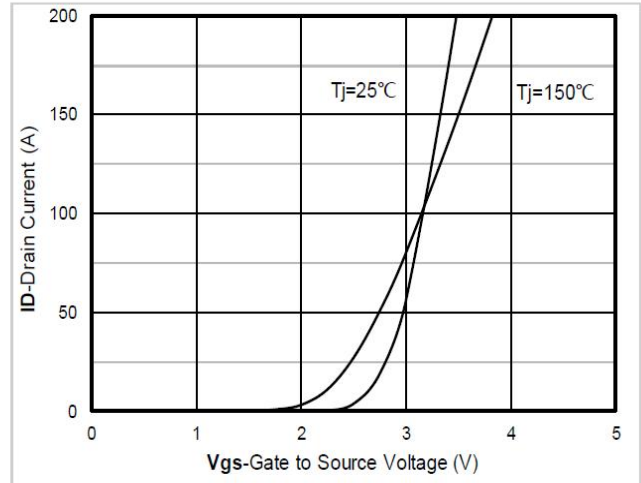
1. The test condition is $V_{DD}=20V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$



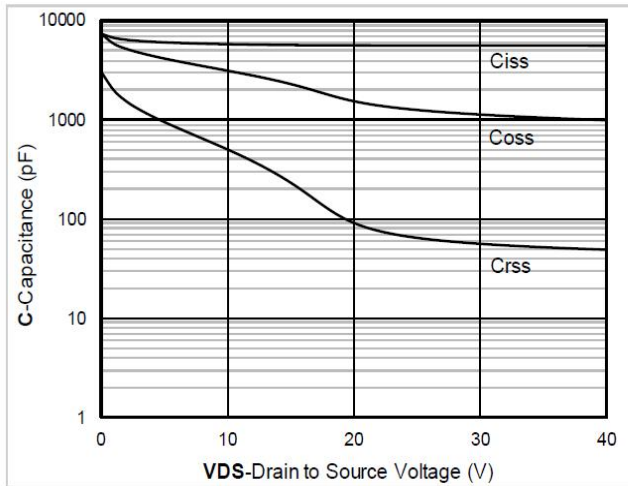
Typical Characteristics



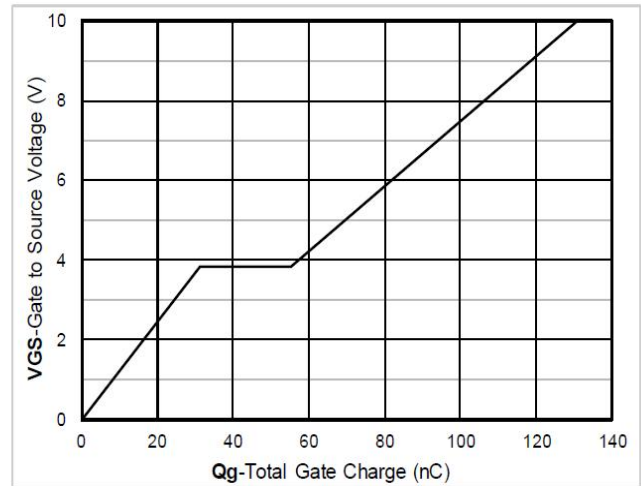
Output Characteristics



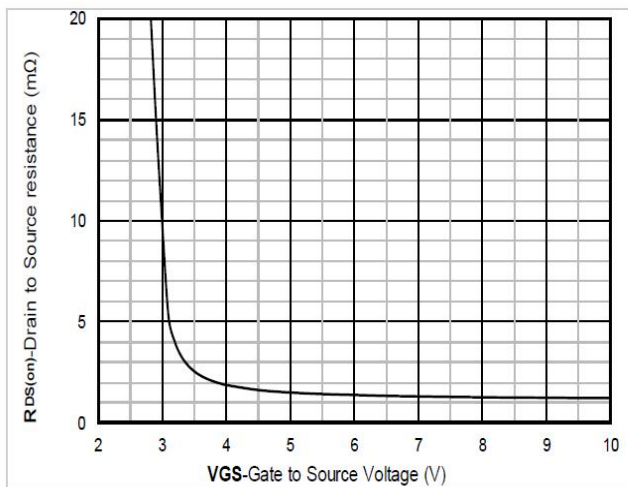
Transfer Characteristics



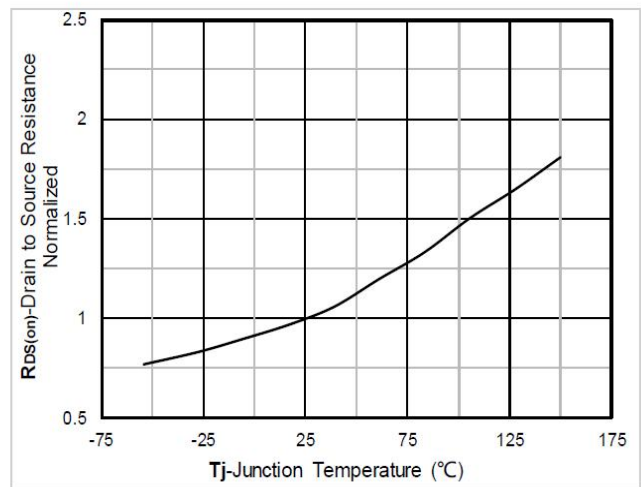
Capacitance Characteristics



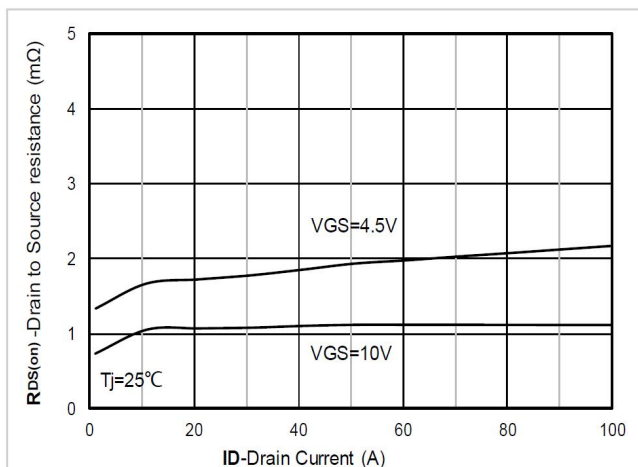
Gate Charge



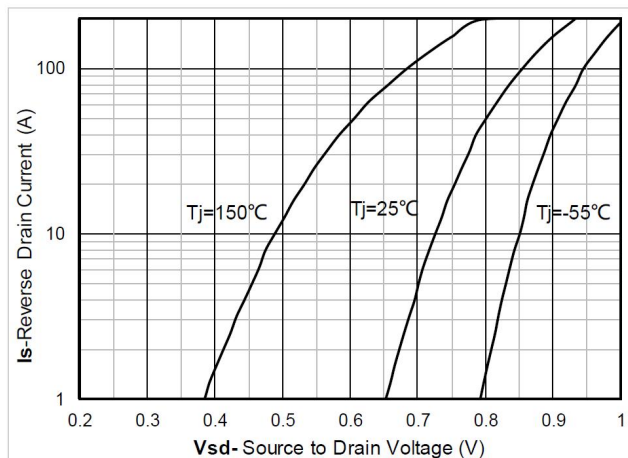
On-Resistance vs Gate to Source Voltage



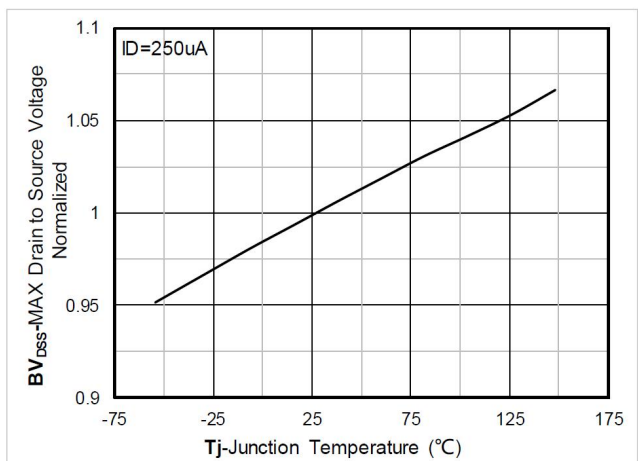
Normalized On-Resistance



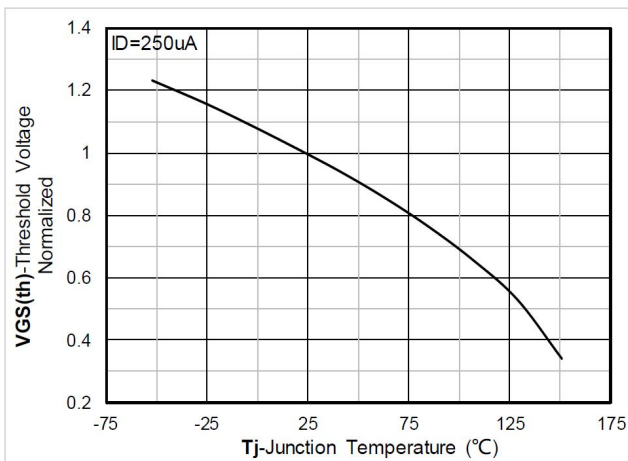
RDS(on) VS Drain Current



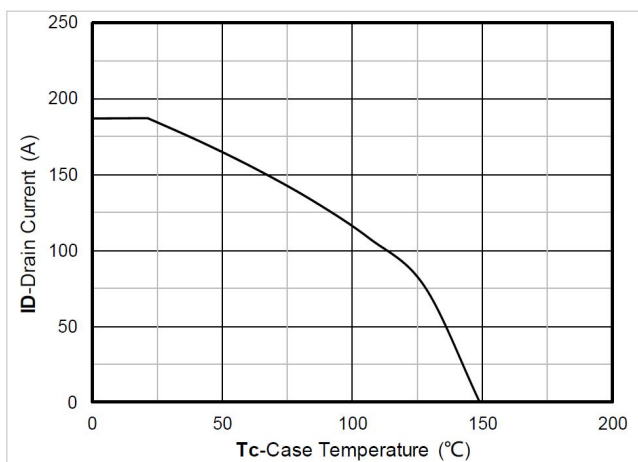
Forward characteristics of reverse diode



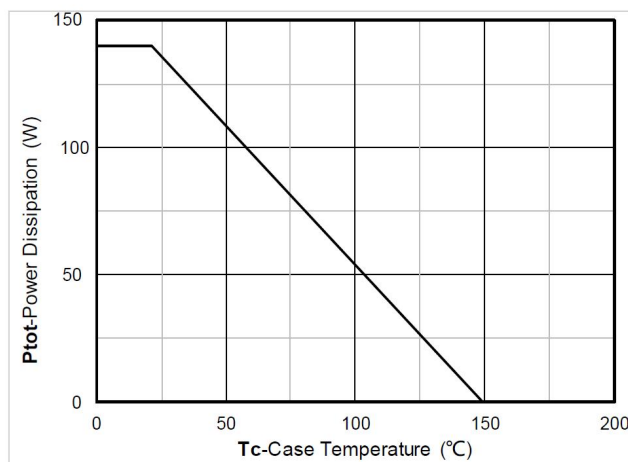
Normalized breakdown voltage



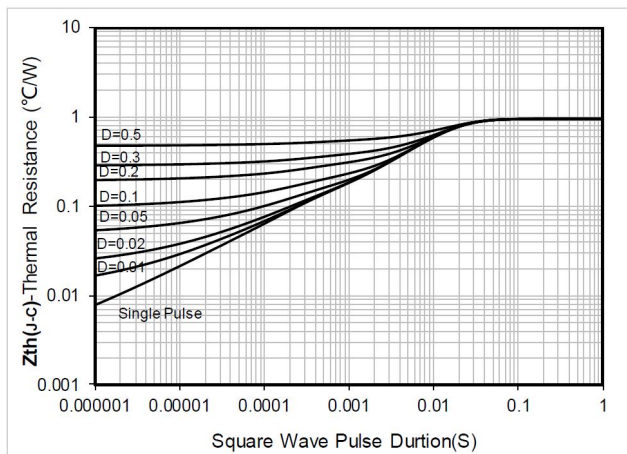
Normalized Threshold voltage



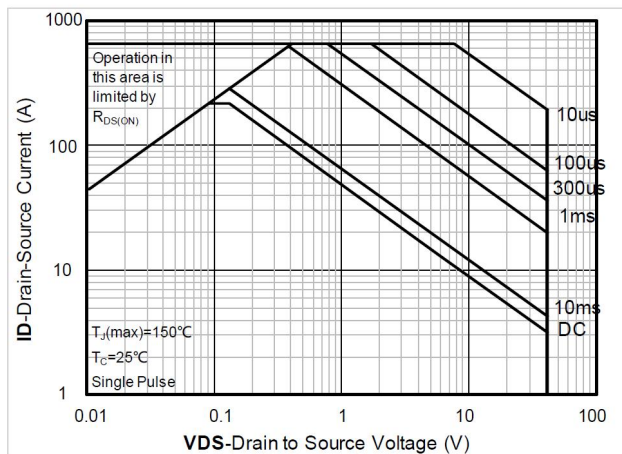
Current dissipation



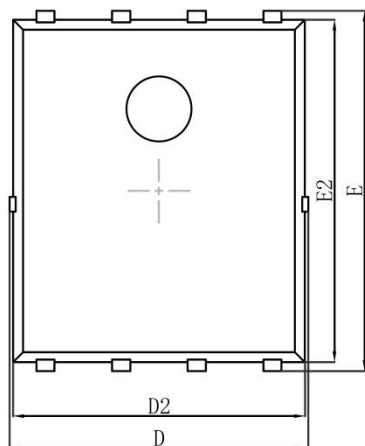
Power dissipation



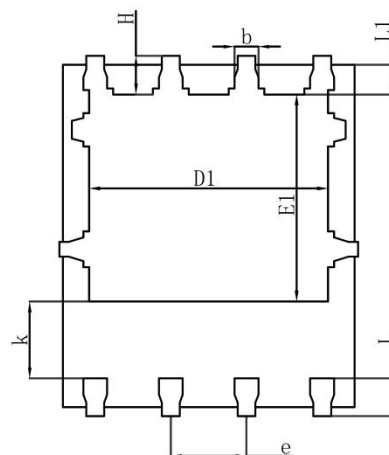
Maximum Transient Thermal Impedance



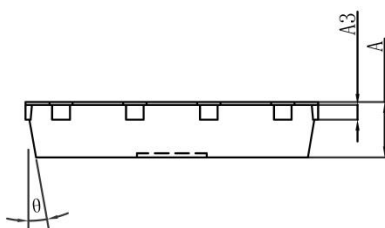
Safe Operation Area

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	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	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°