

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
200V	$0.55\Omega@10V$	5A



**合肥矽普半导体**

Siliup Semiconductor Technology Co., Ltd

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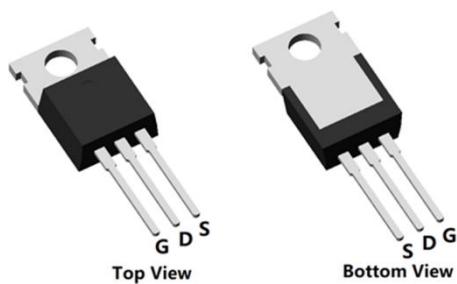
## Feature

- Fast Switching
- Low Gate Charge and  $R_{DS(on)}$
- 100% Single Pulse avalanche energy Test

## Applications

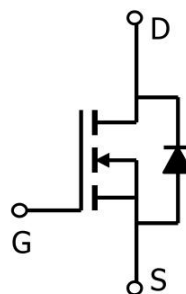
- DC-DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Package

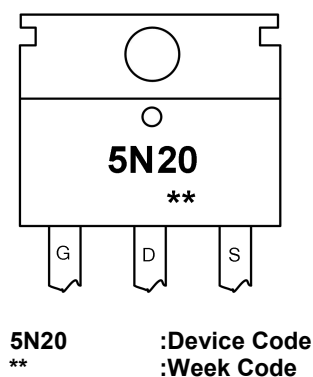


TO-220-3L(1:G 2:D 3:S)

## Circuit diagram



## Marking



## Order Information

Device	Package	Unit/Tube
SP5N20TQ	TO-220-3L	50

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current (Tc=25°C)	$I_D$	5	A
Continuous Drain Current (Tc=100°C)	$I_D$	3.33	A
Pulsed Drain Current	$I_{DM}$	20	A
Single Pulse Avalanche Energy <sup>1</sup>	$E_{AS}$	125	mJ
Power Dissipation (Tc=25°C)	$P_D$	40	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	3.12	°C/W
Storage Temperature Range	$T_{STG}$	-55 to 150	°C
Operating Junction Temperature Range	$T_J$	-55 to 150	°C

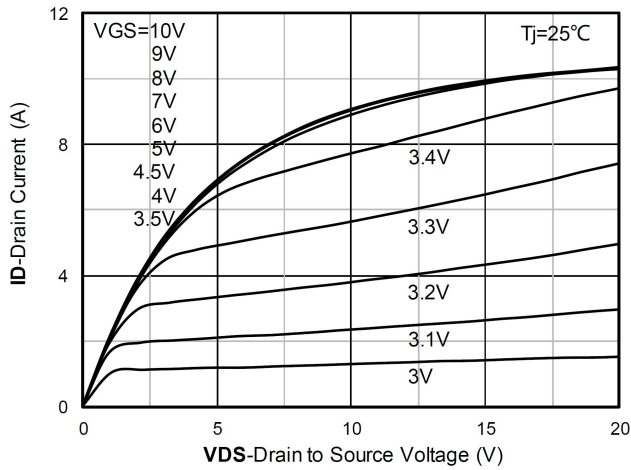
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	ID = 250μA, VGS = 0V	200	-	-	V
Drain Cut-Off Current	IDSS	VDS = 160V, VGS = 0V	-	-	1	μA
Gate Leakage Current	IGSS	VGS = ±30V, VDS = 0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VDS = VGS, ID = 250μA	1.5	2	2.5	V
Drain-Source ON Resistance	RDS(ON)	VGS = 10V, ID = 3A	-	0.55	0.65	Ω
Dynamic Characteristics						
Input Capacitance	Ciss	VDS =25V, VGS = 0V, f = 1.0MHz	-	255	-	pF
Output Capacitance	Coss		-	52	-	
Reverse Transfer Capacitance	Crss		-	8	-	
Total Gate Charge	Qg	VDS=100V , VGS=10V , ID=4.8A	-	7	-	nC
Gate-Source Charge	Qgs		-	2	-	
Gate-Drain Charge	Qgd		-	3	-	
Switching Characteristics						
Turn-On Delay Time	td(on)	VDD=100V , VGS=10V , RG=10Ω, ID=4.8A	-	7	-	nS
Rise Time	tr		-	13	-	
Turn-Off Delay Time	td(off)		-	27	-	
Fall Time	tf		-	11	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	VSD	IS = 1A, VGS = 0V	-	-	1.2	V

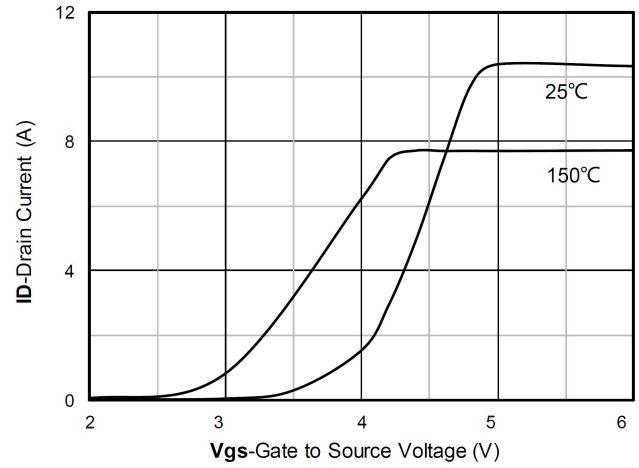
**Note :**

- The test condition is  $V_{DD} = 50V, V_{GS} = 10V, L = 10mH, R_G = 25\Omega$ ;

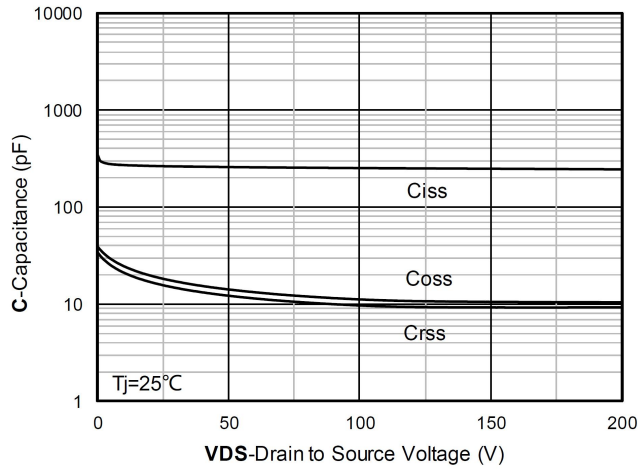
## Typical Characteristics



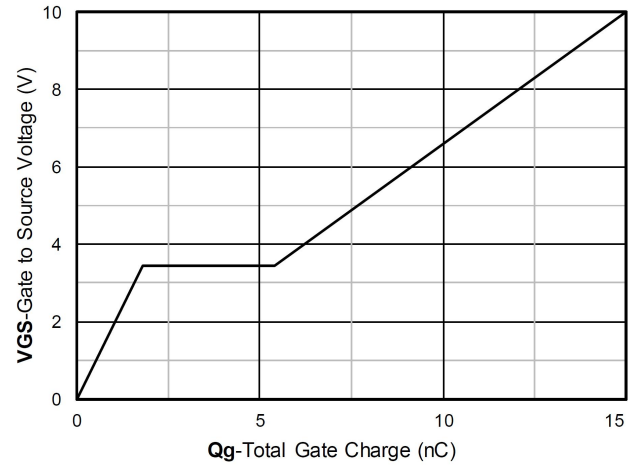
Output Characteristics



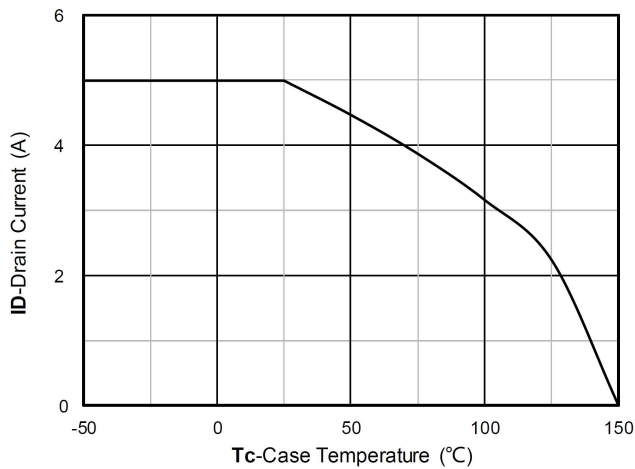
Transfer Characteristics



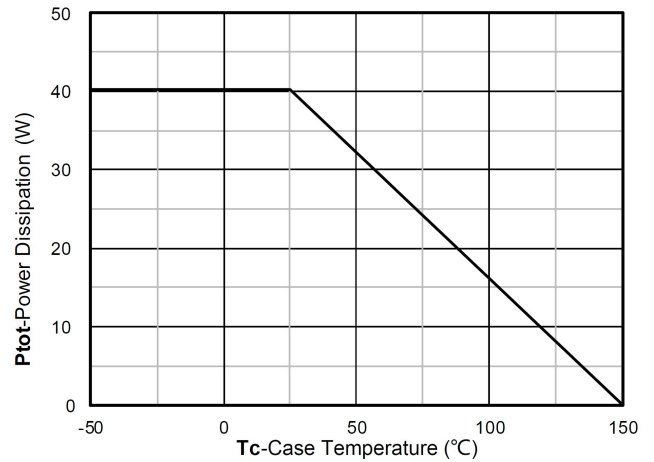
Capacitance Characteristics



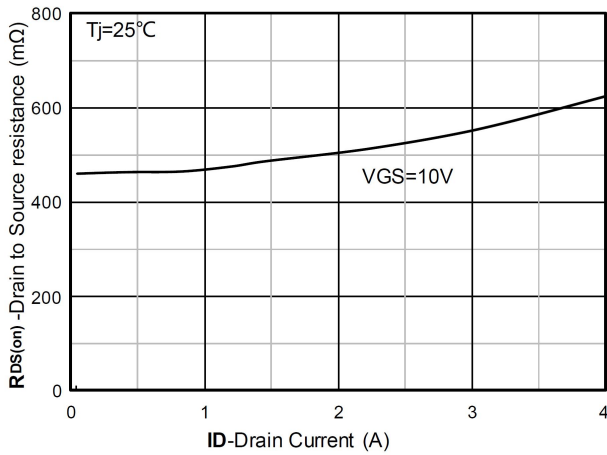
Gate Charge



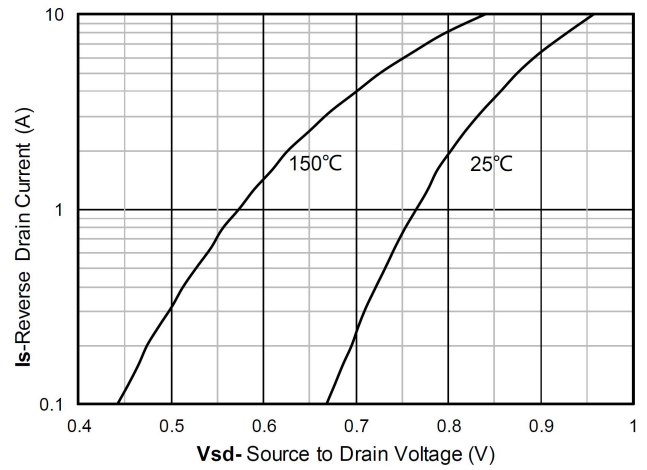
Current dissipation



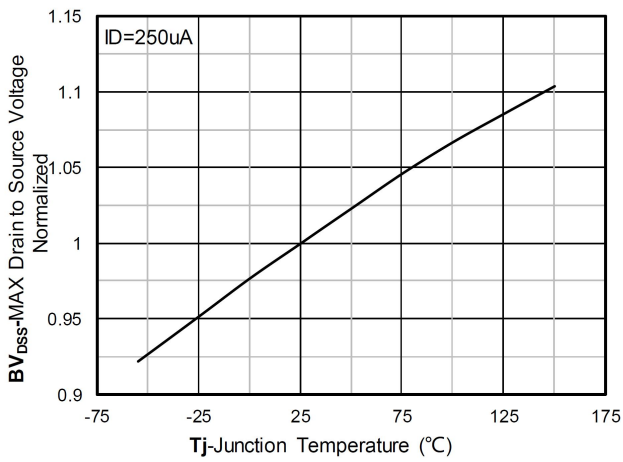
Power dissipation



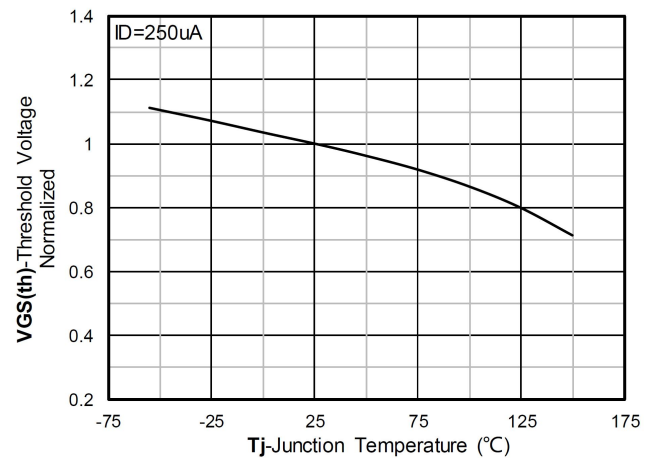
$R_{DS(on)}$  VS Drain Current



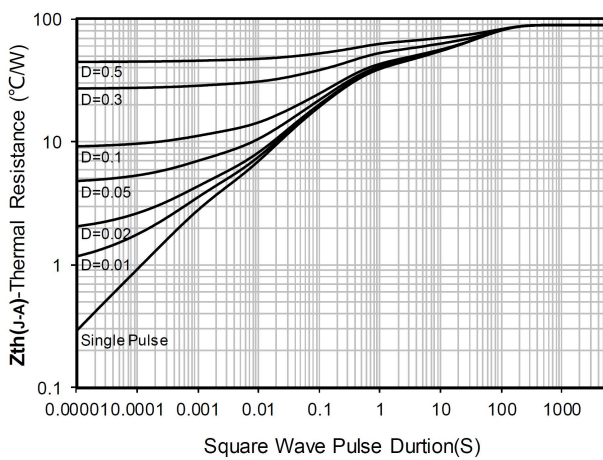
Forward characteristics of reverse diode



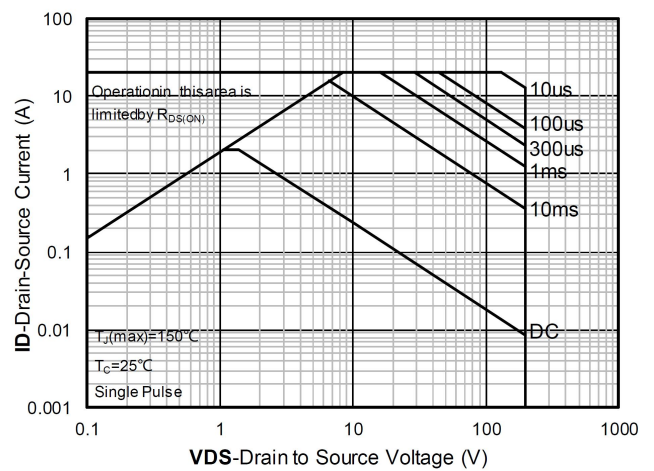
Normalized breakdown voltage



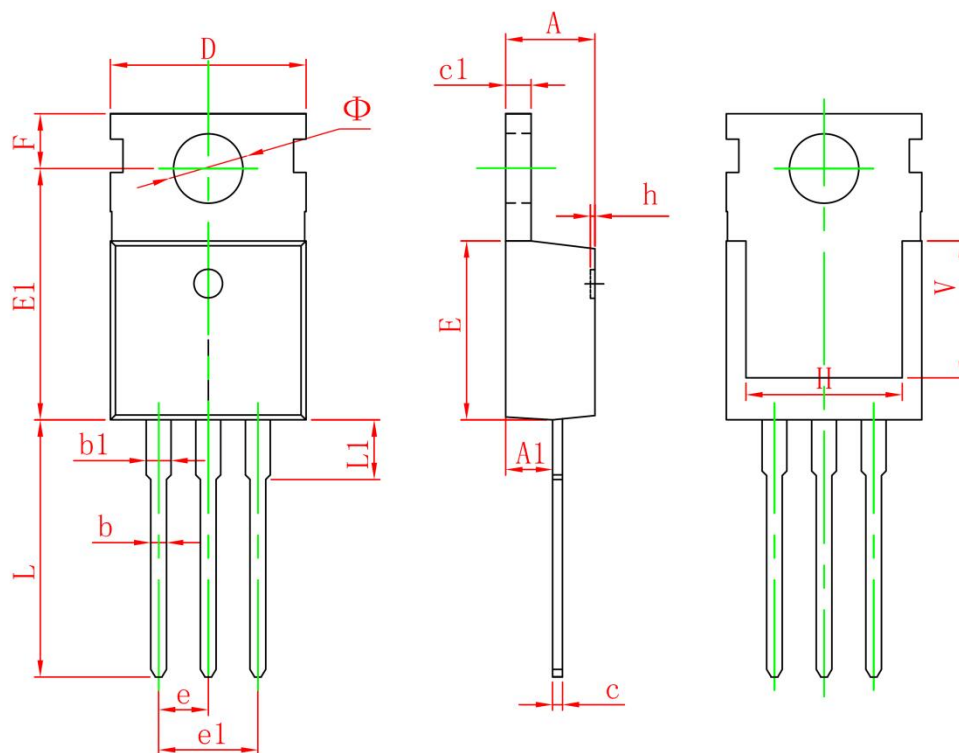
Normalized Threshold voltage



Maximum Transient Thermal Impedance



Safe Operation Area

**TO-220-3L-C Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.950	9.750	0.352	0.384
E1	12.650	13.050	0.498	0.514
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	6.900 REF.		0.276 REF.	
$\Phi$	3.400	3.800	0.134	0.150