

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
200V	54mΩ@10V	40A



**合肥矽普半导体**

Siliup Semiconductor Technology Co., Ltd

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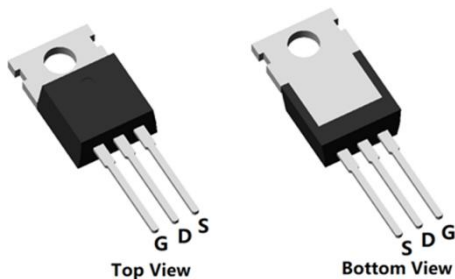
## Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

## Applications

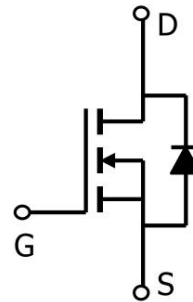
- DC-DC Converter
- Ideal for high-frequency switching and synchronous rectification

## Package

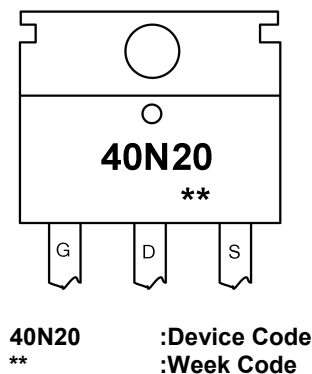


TO-220-3L(1:G 2:D 3:S)

## Circuit diagram



## Marking



## Order Information

Device	Package	Unit/Tape
SP40N20TQ	TO-220-3L	50

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_C=25^\circ\text{C}$ )	$I_D$	40	A
Continuous Drain Current ( $T_C=100^\circ\text{C}$ )	$I_D$	26	A
Pulsed Drain Current	$I_{DM}$	160	A
Single Pulse Avalanche Energy <sup>1</sup>	$E_{AS}$	342	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	230	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.54	$^\circ\text{C/W}$
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^\circ\text{C}$

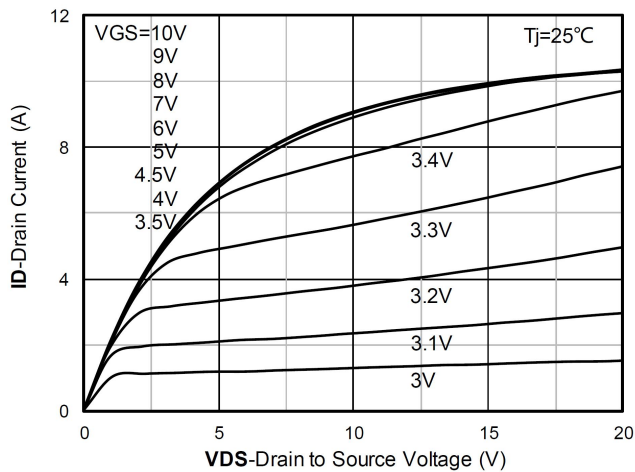
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	VGS=0V , ID=250uA	200	-	-	V
Drain-Source Leakage Current	IDSS	VDS=160V , 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	2	3	4	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=20A	-	54	65	mΩ
Dynamic characteristics						
Input Capacitance	Ciss	VDS=25V , VGS=0V , f=1MHz	-	2580	-	pF
Output Capacitance	Coss		-	383	-	
Reverse Transfer Capacitance	Crss		-	25	-	
Total Gate Charge	Qg	VDS=200V , VGS=10V , ID=45A	-	45	-	nC
Gate-Source Charge	Qgs		-	17	-	
Gate-Drain Charge	Qgd		-	16	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=125V VGS=10V , RG=10Ω, ID=45A	-	33	-	nS
Rise Time	Tr		-	151	-	
Turn-Off Delay Time	Td(off)		-	61	-	
Fall Time	Tf		-	89	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	40	A
Reverse Recovery Time	Trr	IS=20A, di/dt=100A/us, TJ=25℃	-	225	-	nS
Reverse Recovery Charge	Qrr		-	755	-	nC

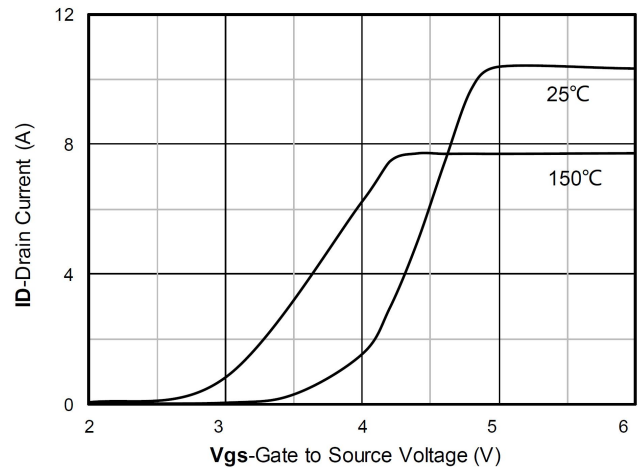
**Note :**

- The EAS test condition is  $V_{DD}=75V, V_{GS}=10V, L=0.5mH, R_G=25m\Omega$

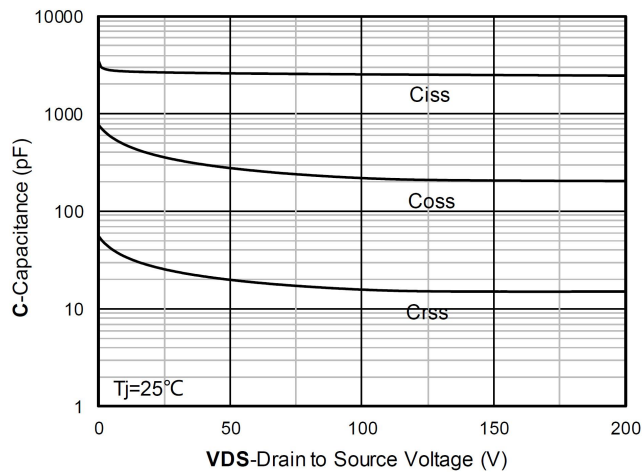
## Typical Characteristics



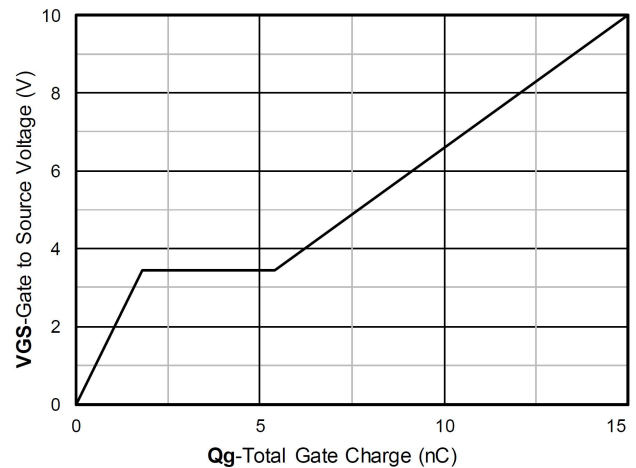
Output Characteristics



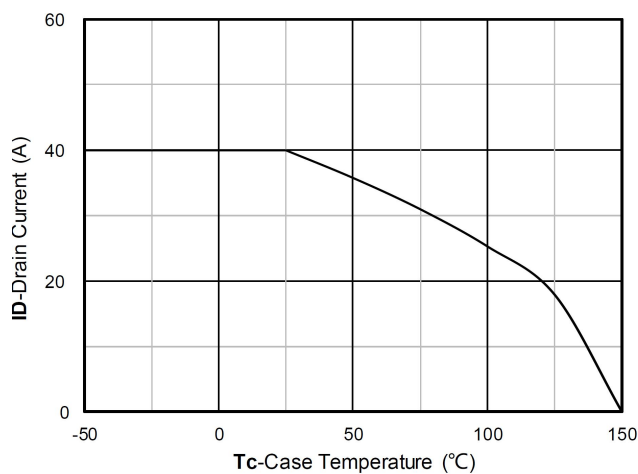
Transfer Characteristics



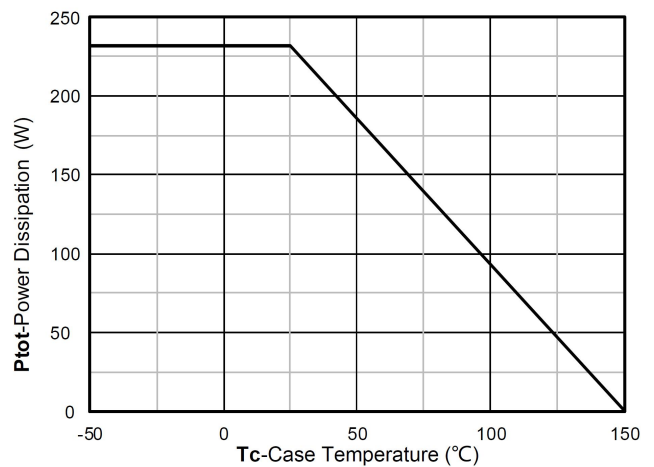
Capacitance Characteristics



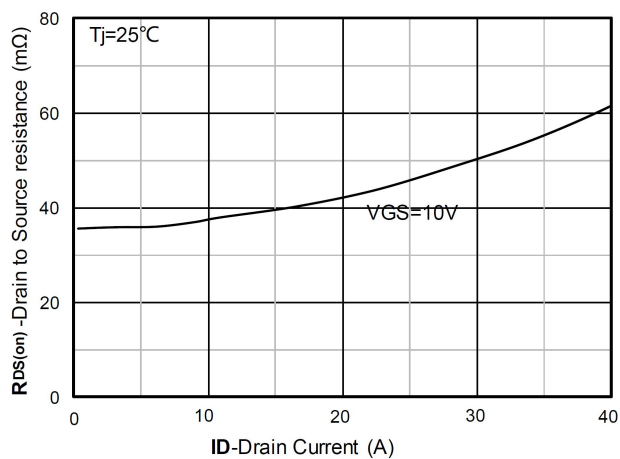
Gate Charge



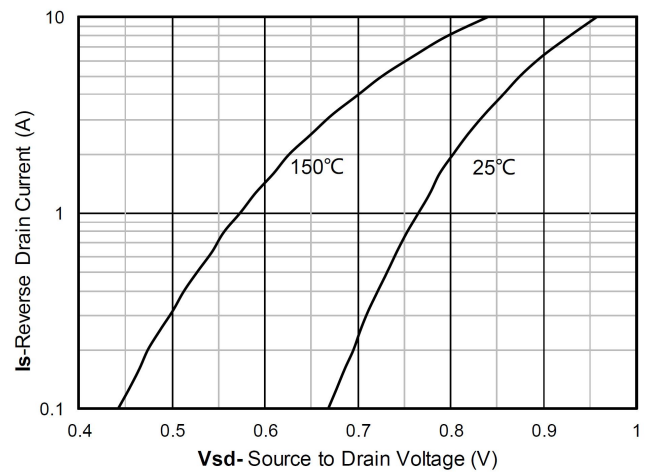
Current dissipation



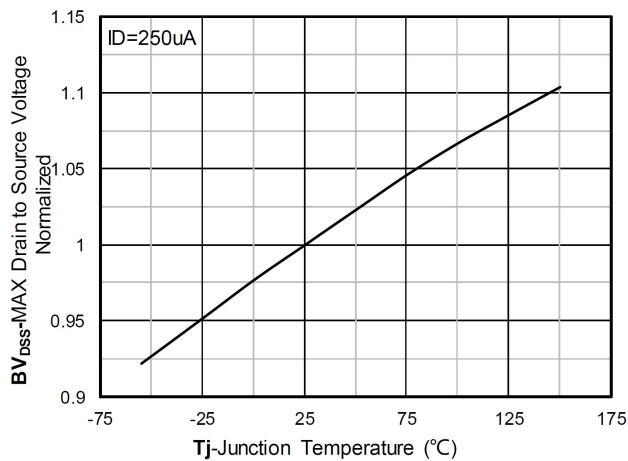
Power dissipation



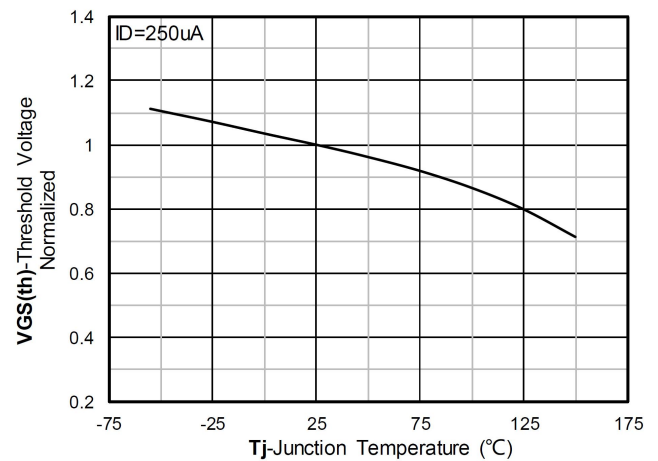
$R_{DS(on)}$  VS Drain Current



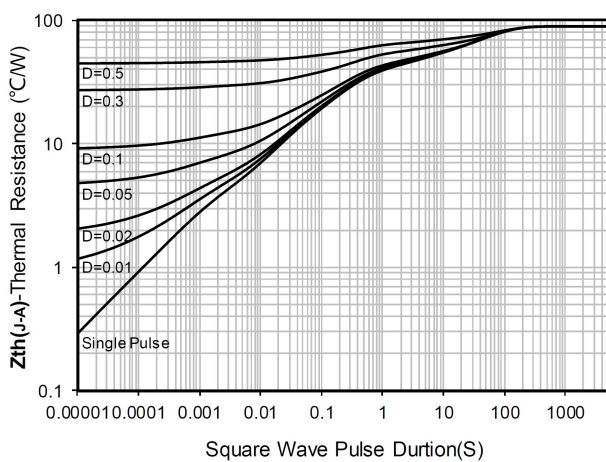
Forward characteristics of reverse diode



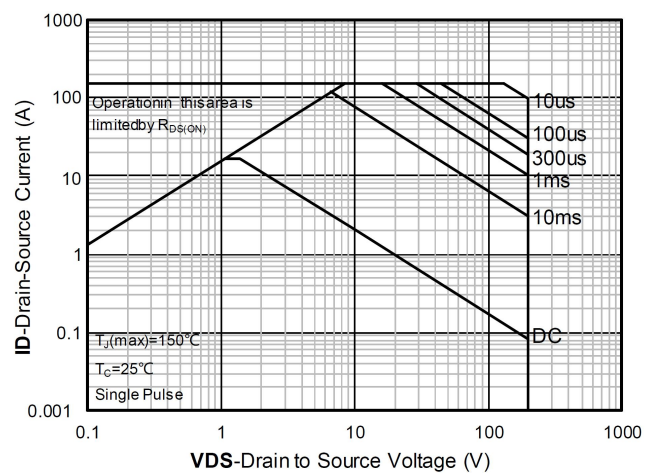
Normalized breakdown voltage



Normalized Threshold voltage

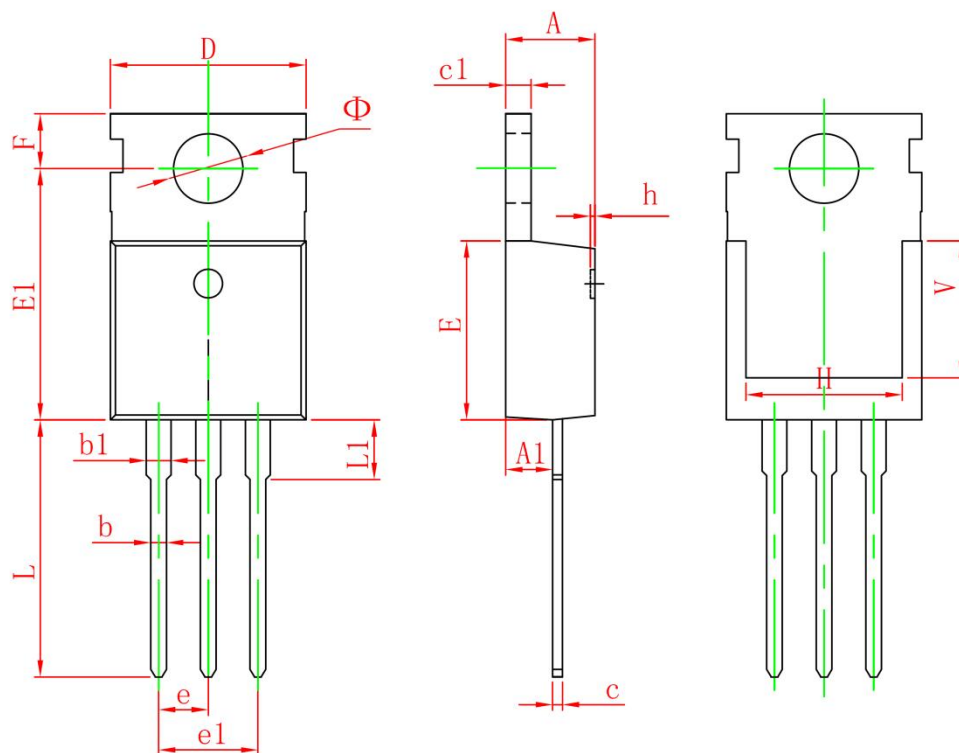


Maximum Transient Thermal Impedance



Safe Operation Area

# TO-220-3L 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.	
Φ	3.400	3.800	0.134	0.150