

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
500V	0.28Ω@10V	20A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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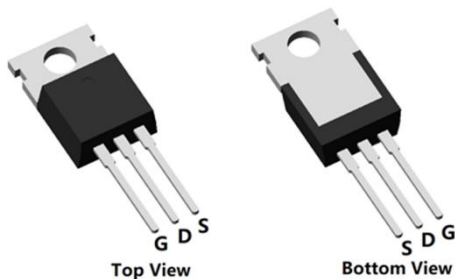
Feature

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

Applications

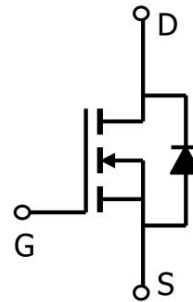
- DC-DC Converter
- Ideal for high-frequency switching and synchronous rectification

Package

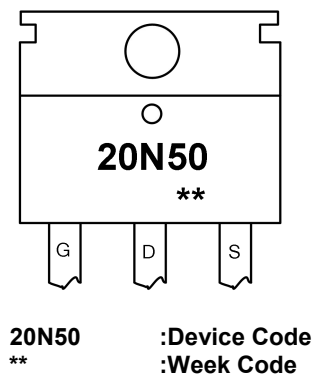


TO-220-3L(1:G 2:D 3:S)

Circuit diagram



Marking



Order Information

Device	Package	Unit/Tape
SP20N50TQ	TO-220-3L	50

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ($T_C=25^\circ\text{C}$)	I_D	20	A
Continuous Drain Current ($T_C=100^\circ\text{C}$)	I_D	13.3	A
Pulsed Drain Current	I_{DM}	80	A
Single Pulse Avalanche Energy ¹	E_{AS}	1620	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	$^\circ\text{C}$

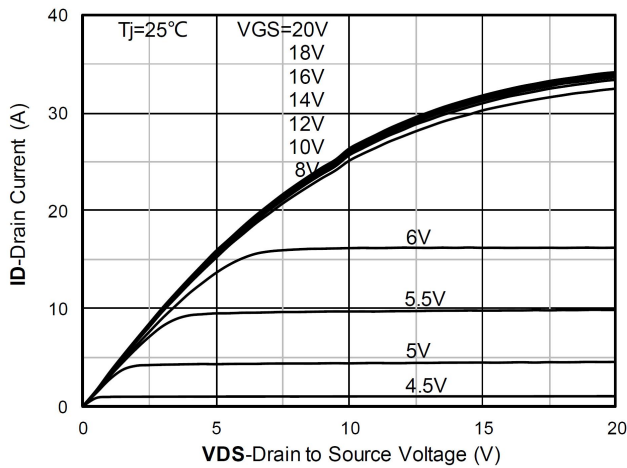
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	500	-	-	V
Drain-Source Leakage Current	IDSS	VDS=400V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±30V , 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=9A	-	0.28	0.35	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=25V , VGS=0V , f=1MHz	-	2825	-	pF
Output Capacitance	Coss		-	280	-	
Reverse Transfer Capacitance	Crss		-	30	-	
Total Gate Charge	Qg	VDS=250V , VGS=10V , ID=20A	-	65	-	nC
Gate-Source Charge	Qgs		-	13	-	
Gate-Drain Charge	Qgd		-	24	-	
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=250V VGS=10V , RG=10Ω, ID=20A	-	35	-	nS
Rise Time	Tr		-	70	-	
Turn-Off Delay Time	Td(off)		-	180	-	
Fall Time	Tf		-	85	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	20	A
Reverse Recovery Time	Trr	IS=20A, di/dt=100A/us, TJ=25℃	-	390	-	nS
Reverse Recovery Charge	Qrr		-	3450	-	nC

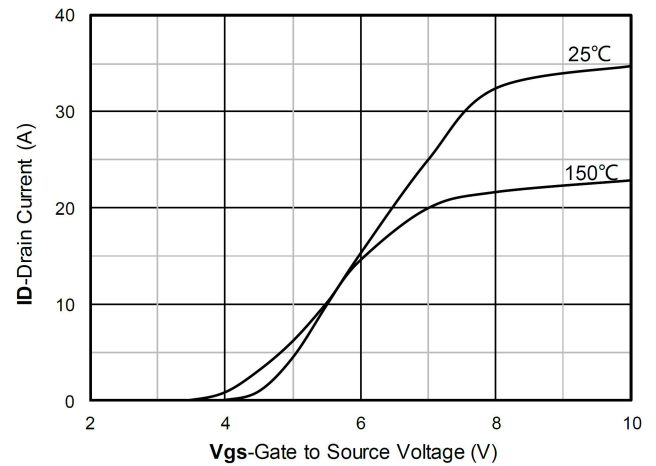
Note :

- The EAS test condition is $V_{DD}=50V$, $V_{GS}=10V$, $L=10mH$, $R_G=30m\Omega$

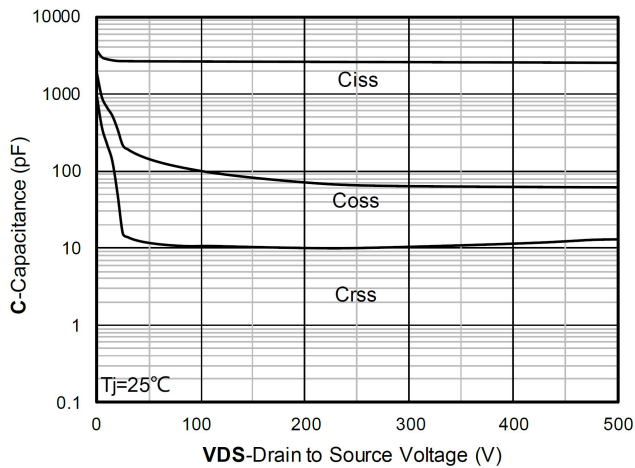
Typical Characteristics



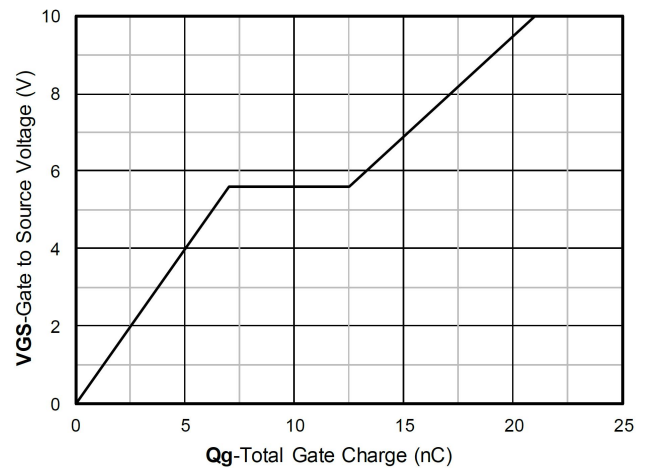
Output Characteristics



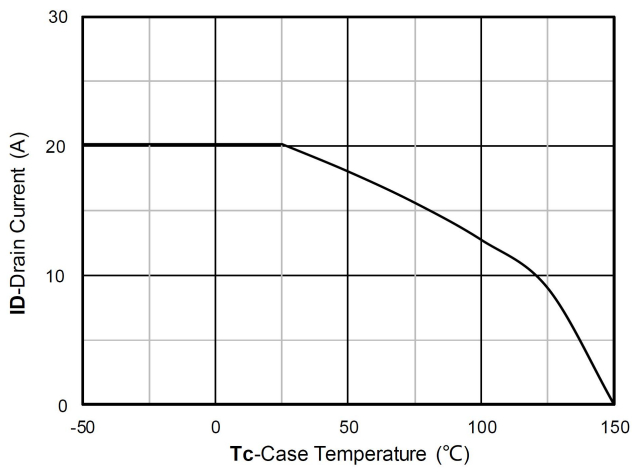
Transfer Characteristics



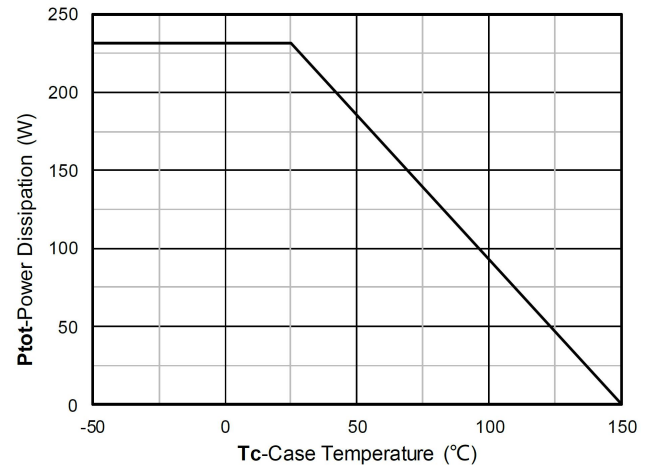
Capacitance Characteristics



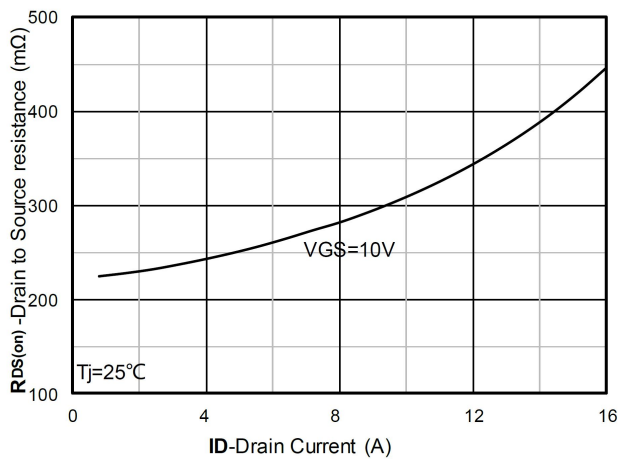
Gate Charge



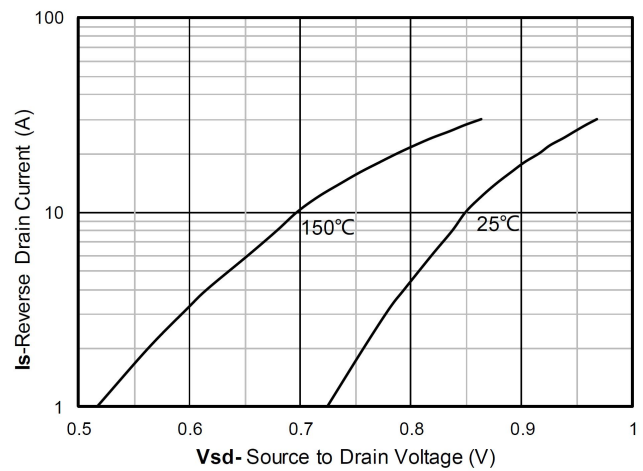
Current dissipation



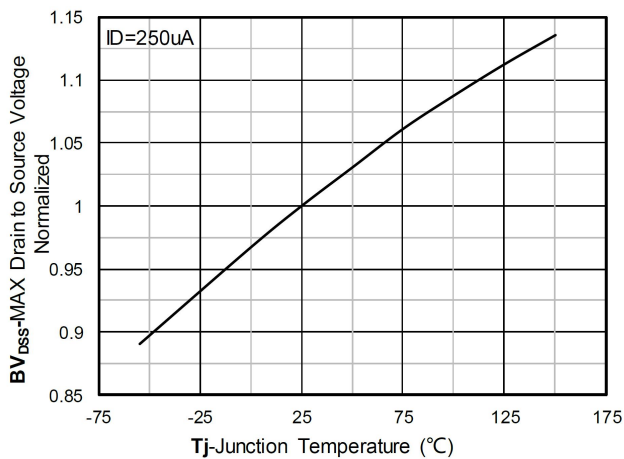
Power dissipation



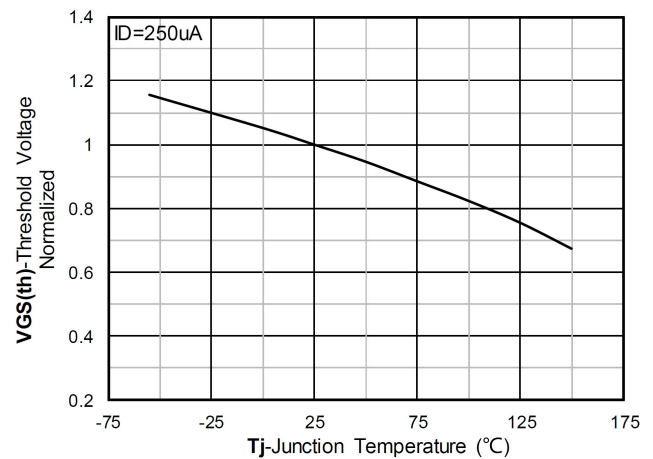
RDS(on) VS Drain Current



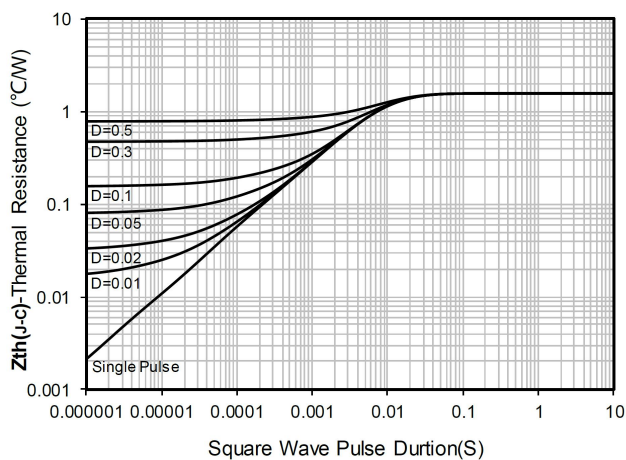
Forward characteristics of reverse diode



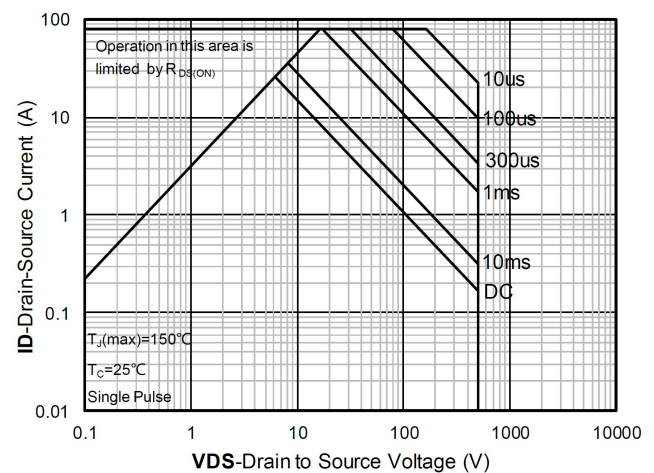
Normalized breakdown voltage



Normalized Threshold voltage

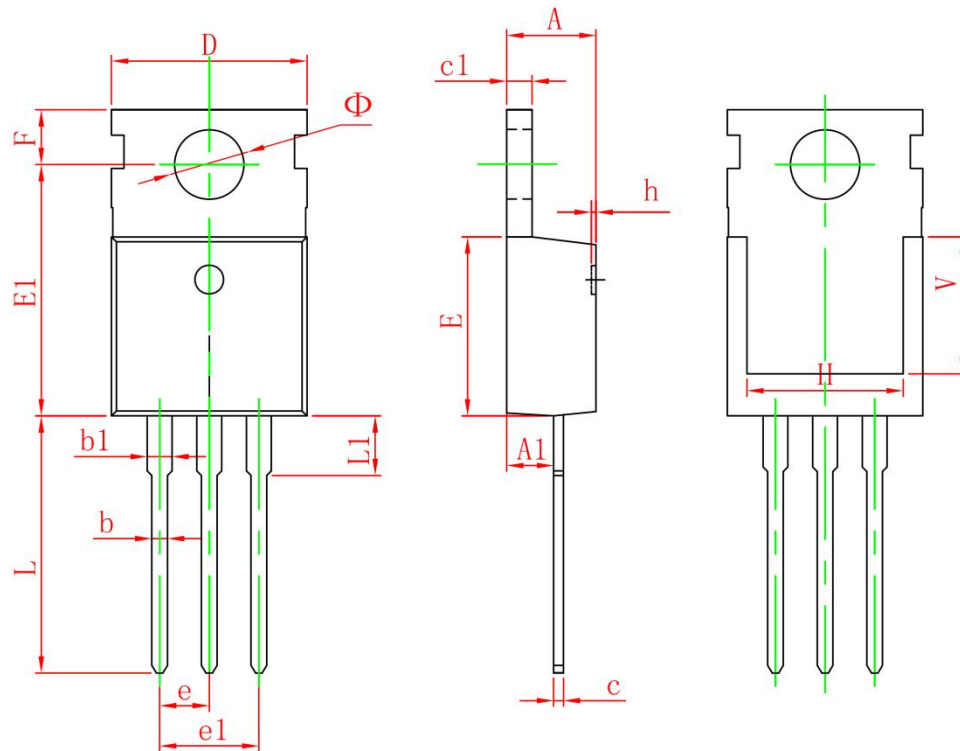


Maximum Transient Thermal Impedance



Safe Operation Area

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