

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	1.8mΩ@10V	180A
	2.8mΩ@4.5V	



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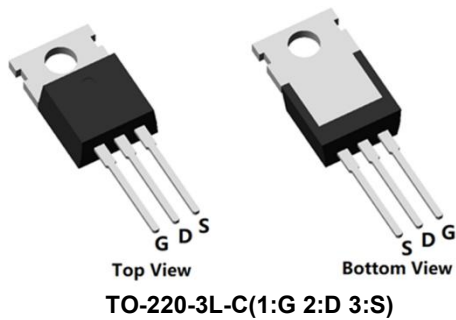
Feature

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

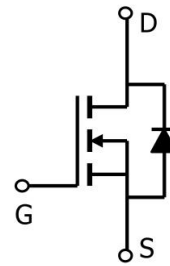
Applications

- Power switching application
- DC-DC Converter
- Power Management

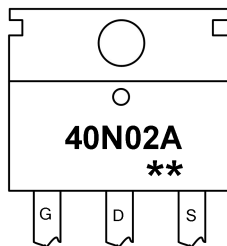
Package



Circuit diagram



Marking



40N02A : Product code
** : Week code

Order Information

Device	Package	Unit/Tube
SP40N02ATQ	TO-220-3L	50

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

Parameter	Symbol	Rating	Unit
Drain source voltage	V_{DS}	40	V
Gate source voltage	V_{GS}	± 20	V
Continuous drain current(Tc=25°C)	I_D	180	A
Continuous drain current(Tc=100°C)	I_D	120	A
Pulsed drain current	I_{DM}	720	A
Single pulsed avalanche energy ¹	E_{AS}	841	mJ
Power dissipation(Tc=25°C)	P_D	246	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.51	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

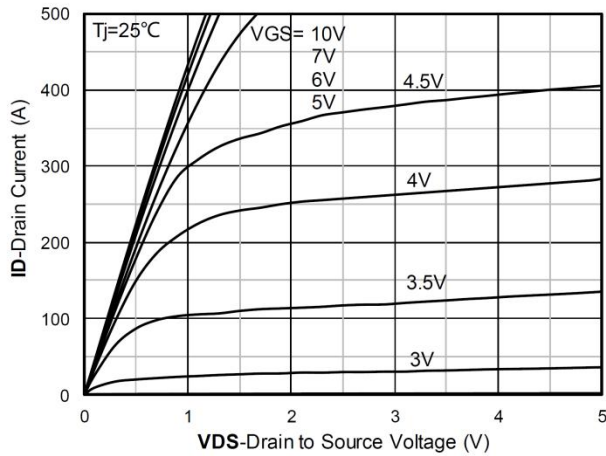
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	40	-	-	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	1.6	2.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=20A	-	1.8	2.8	mΩ
		VGS=4.5V , ID=10A	-	2.8	3.8	
Dynamic characteristics						
Input Capacitance	Ciss	VDS=20V , VGS=0V , f=1MHz	-	10800	-	pF
Output Capacitance	Coss		-	1940	-	
Reverse Transfer Capacitance	Crss		-	760	-	
Switching Characteristics						
Total Gate Charge	Qg	VDS=20V , VGS=10V , ID=30A	-	147	-	nC
Gate-Source Charge	Qgs		-	50	-	
Gate-Drain Charge	Qgd		-	31	-	
Turn-On Delay Time	Td(on)	VDD=20V, VGS=10V , RG=2.7Ω, ID=30A	-	26	-	nS
Rise Time	Tr		-	30	-	
Turn-Off Delay Time	Td(off)		-	59	-	
Fall Time	Tf		-	19	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	180	A
Reverse recover time	Trr	ISD=30A, di/dt=100A/us, Tj=25℃	-	23	-	nS
Reverse recovery charge	Qrr		-	29	-	nC

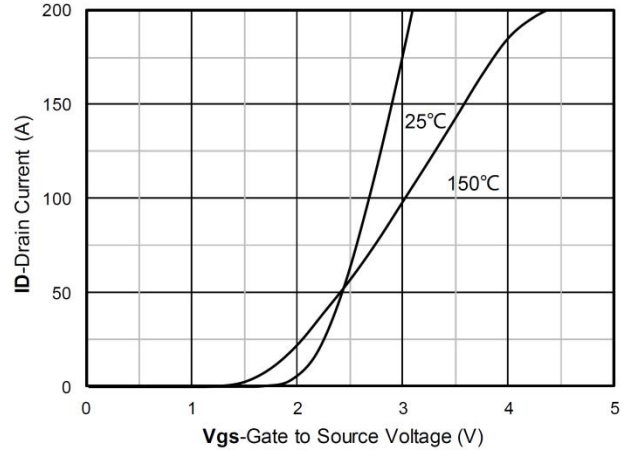
Note:

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

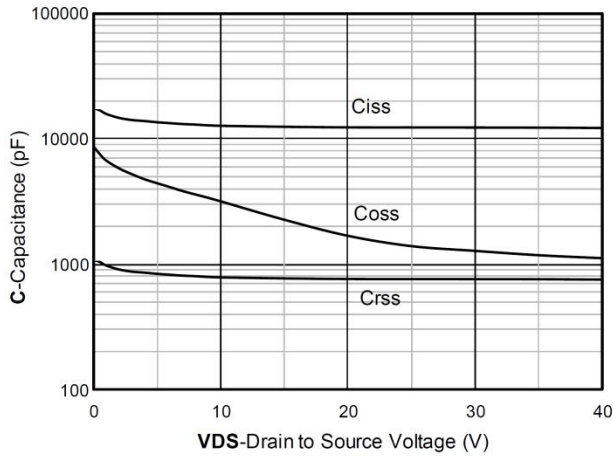
Typical Characteristics



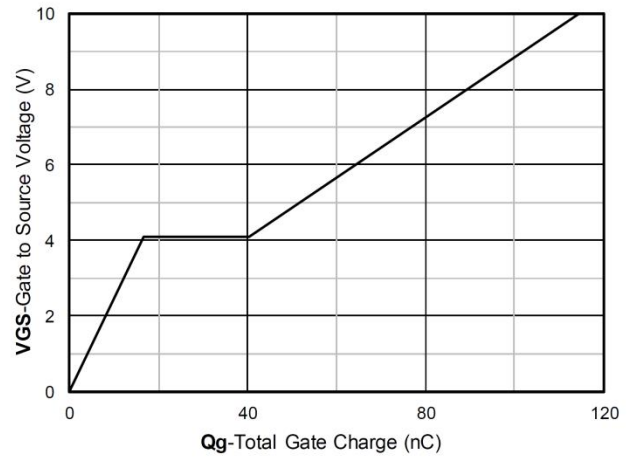
Output Characteristics



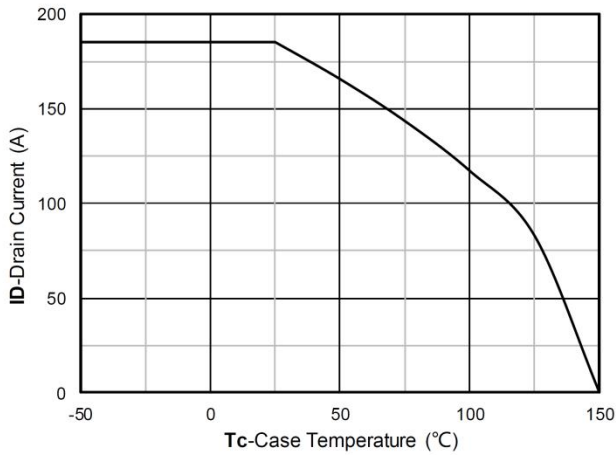
Transfer Characteristics



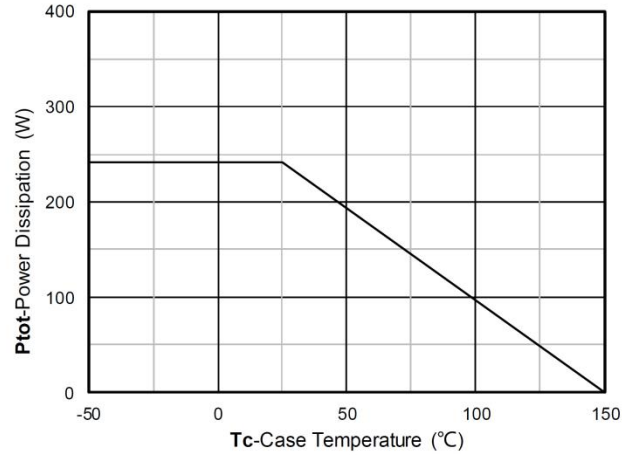
Capacitance Characteristics



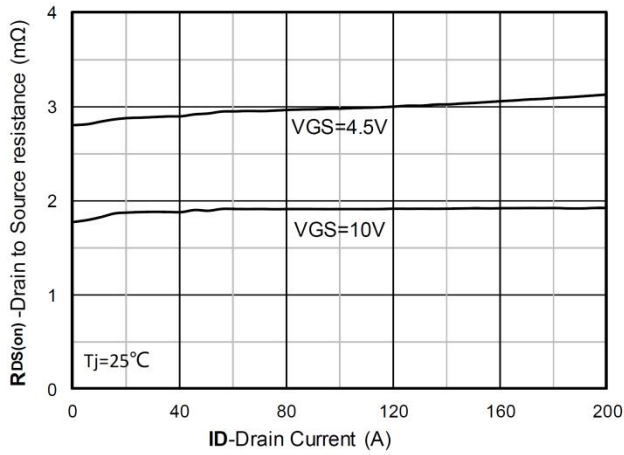
Gate Charge



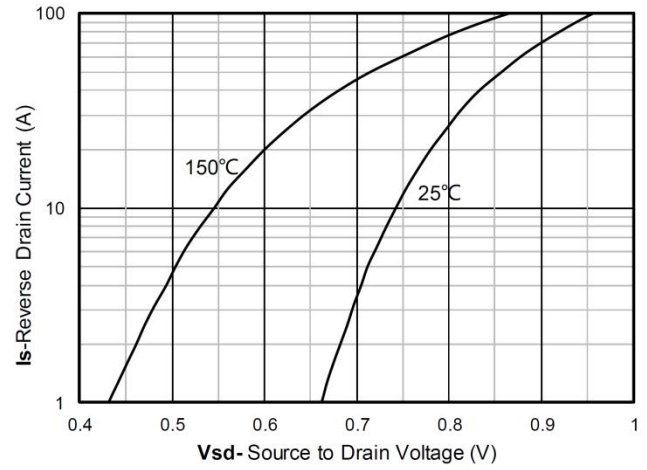
Current dissipation



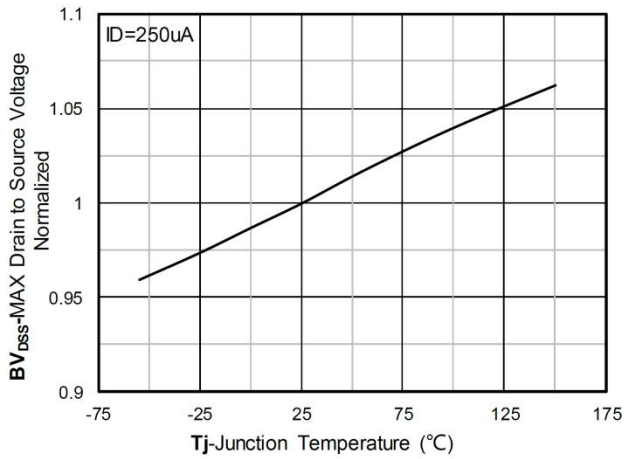
Power dissipation



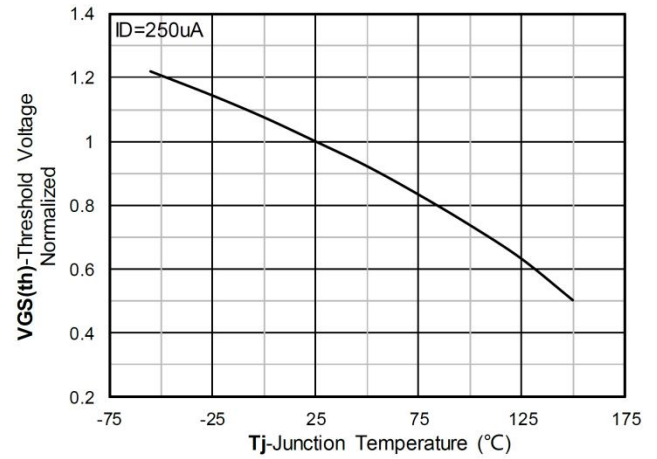
$R_{DS(on)}$ VS Drain Current



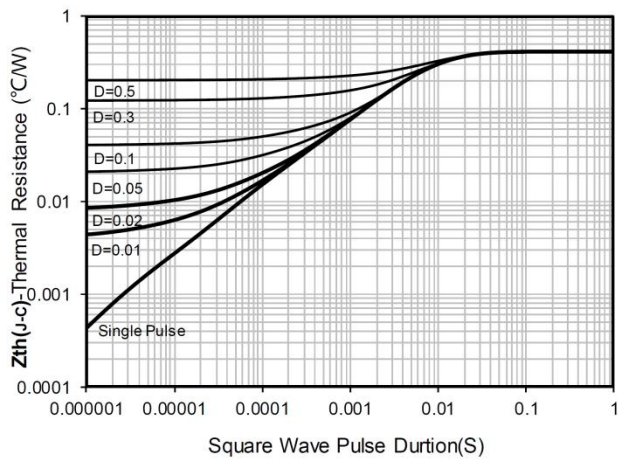
Forward characteristics of reverse diode



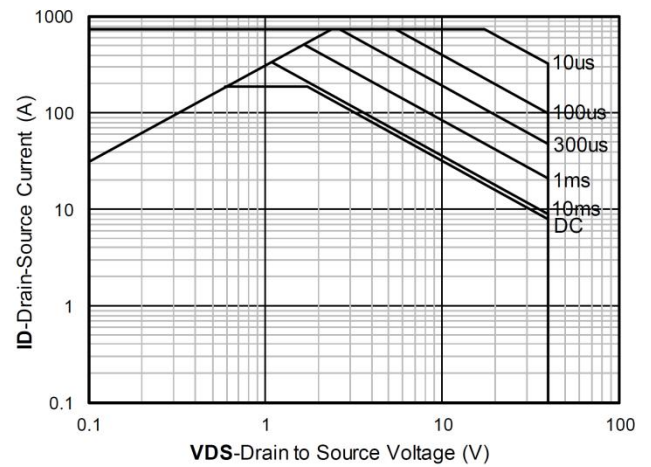
Normalized breakdown voltage



Normalized Threshold voltage

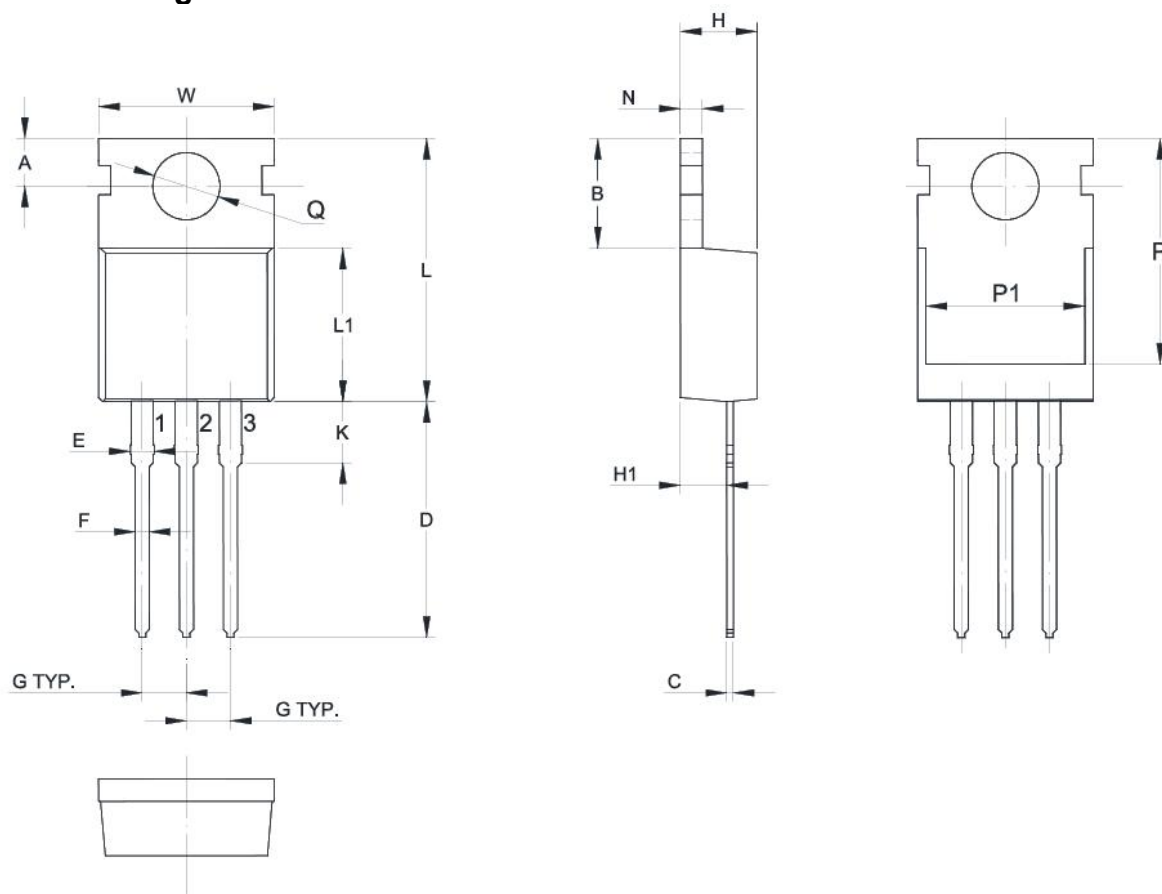


Maximum Transient Thermal Impedance



Safe Operation Area

TO-220-3L Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	2.700	2.900
B	6.400	6.800
C	0.300	0.700
D	11	15
E	1.1	1.5
F	0.7	0.9
G	2.54TYP	
W	9.8	10.2
H	4.3	4.7
H1	2.2	2.5
K	2.7	3.1
L	14.8	16.8
L1	9.0	9.4
N	1.2	1.4
P	12.7	13.3
P1	7.6	8.2
Q	3.5	3.7

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