AT120SN040BTC-Q1

N-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
40V	3.1mΩ@10V	120A
	7mΩ@4.5V	

Feature

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Suffix “-Q1” for AEC-Q101

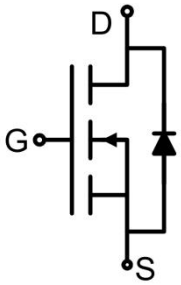
Application

- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

TO-220AB

Circuit diagram



Marking

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Absolute maximum ratings (T_C=25℃,unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	120	A
Continuous Drain Current(T_C =100℃)	I_D(100℃)	85	A
Pulsed Drain Current	I_{DM}	480	A
Power Dissipation	P_D	130	W
Thermal Resistance,Junction-to-Case[1)]	$R_{\theta JC}$	1.15	℃/W
Single pulse avalanche energy[3)]	E_{AS}	1080	mJ
Junction Temperature	T_J	175	℃
Storage Temperature	T_{STG}	-55 ~ +175	℃

Electrical characteristics (T_C=25℃, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =250μA	40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =40V,V_{GS} =0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} =0V			±100	nA
Gate threshold voltage[2)]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1.2	1.9	2.5	V
Drain-source on-resistance[2)]	$R_{DS(on)}$	V_{GS} =10V, I_D =20A		2.6	3.1	mΩ
		V_{GS} =4.5V, I_D =10A		5.5	7.0	
Dynamic characteristics[4)]						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz		5000		pF
Output Capacitance	C_{oss}			898		
Reverse Transfer Capacitance	C_{rss}			351		
Total Gate Charge	Q_g	V_{DS} =20V, V_{GS} =10V, I_D =20A		90		nC
Gate-Source Charge	Q_{gs}			14		
Gate-Drain Charge	Q_{gd}			22		
Turn-on delay time	$t_{d(on)}$	V_{DD} =20V, V_{GS} =10V, I_D =2A, R_L=1Ω, R_G=3Ω		15		nS
Turn-on rise time	t_r			18		
Turn-off delay time	$t_{d(off)}$			52		
Turn-off fall time	t_f			23		
Source-Drain Diode characteristics						
Diode Forward voltage[2)]	V_{SD}	V_{GS} =0V, I_S=20A			1.2	V
Diode Continuous Current[1)]	I_S				120	A
Reverse recover time	T_{rr}	I_F=20A,di/dt=100A/us, T_J =25℃		42		nS
Reverse recovery charge	Q_{rr}			45		nC

Notes:

1) Surface Mounted on FR4 Board, t ≤10 sec.

2) Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤2%.

3) E_{AS} condition : Tj=25℃,V_{DD}=20V,V_G=10V,L=1mH,Rg=25Ω.

4) Guaranteed by design, not subject to production testing.

Typical Characteristics

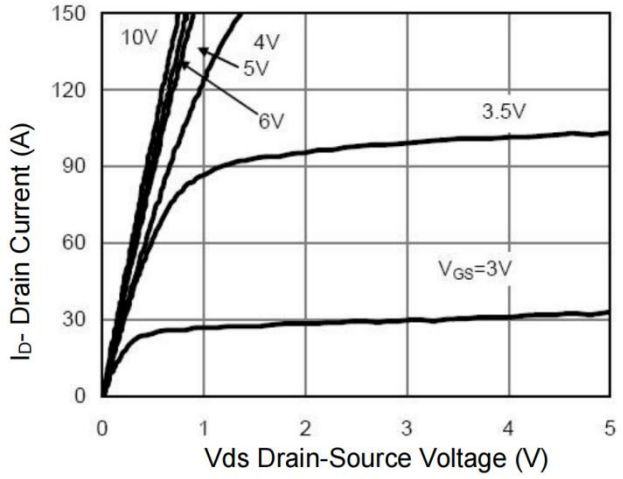


Figure 1 Output Characteristics

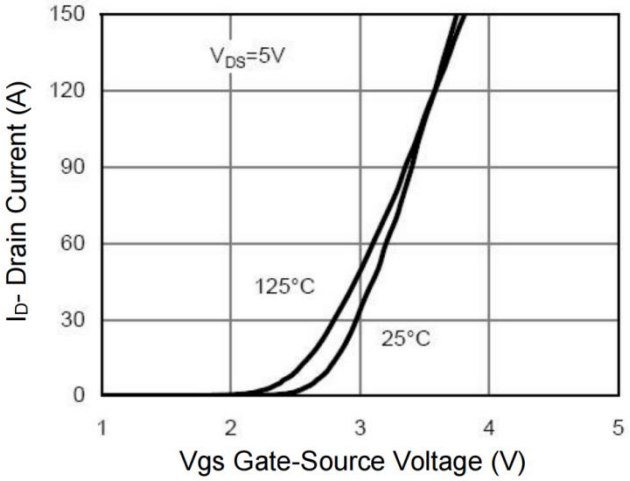


Figure 2 Transfer Characteristics

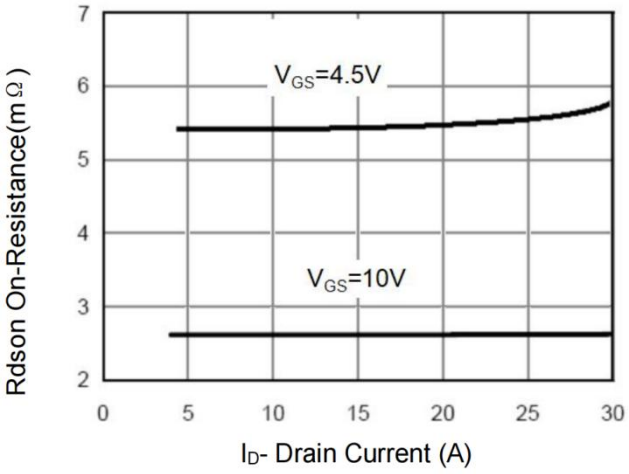


Figure 3 Rdson- Drain Current

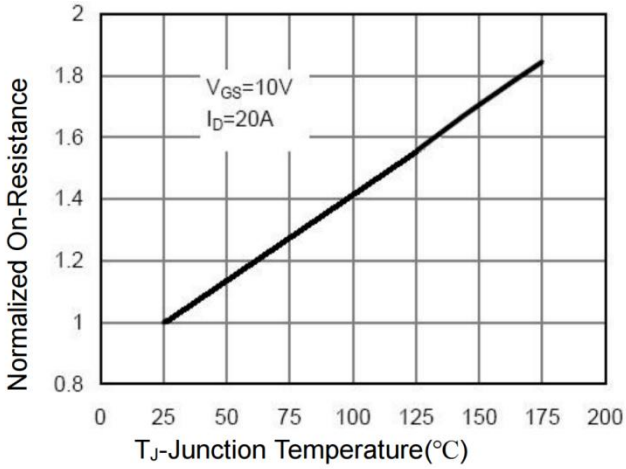


Figure 4 Rdson-JunctionTemperature

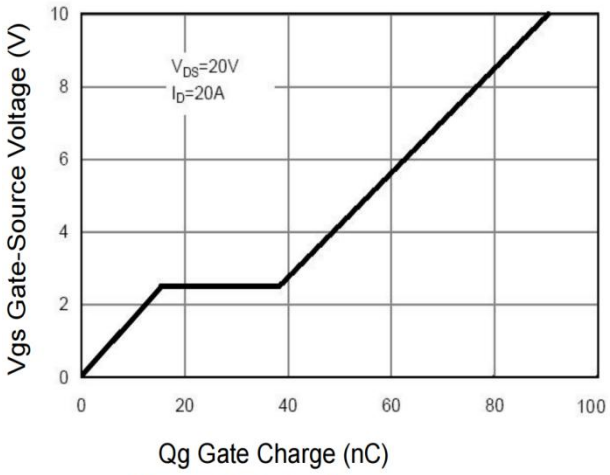


Figure 5 Gate Charge

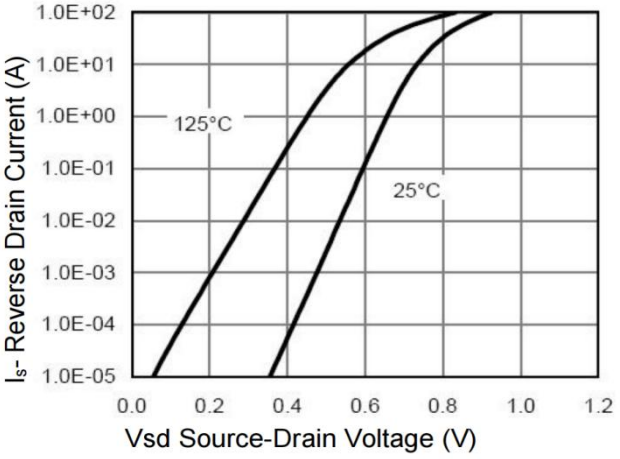


Figure 6 Source- Drain Diode Forward

Typical Characteristics

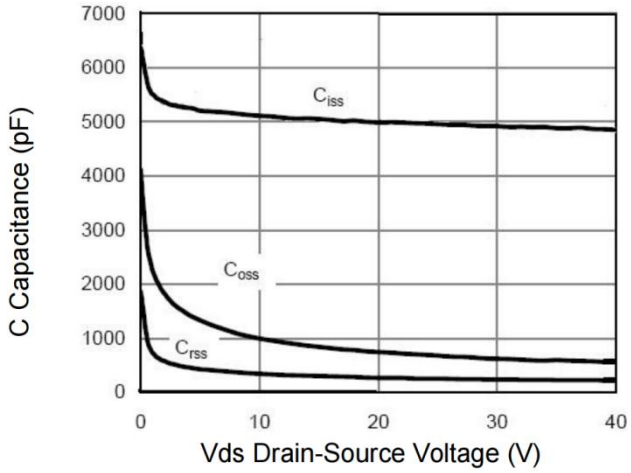


Figure 7 Capacitance vs Vds

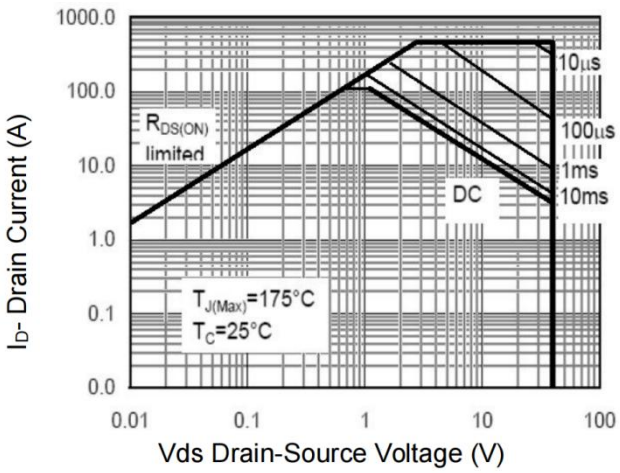


Figure 8 Safe Operation Area

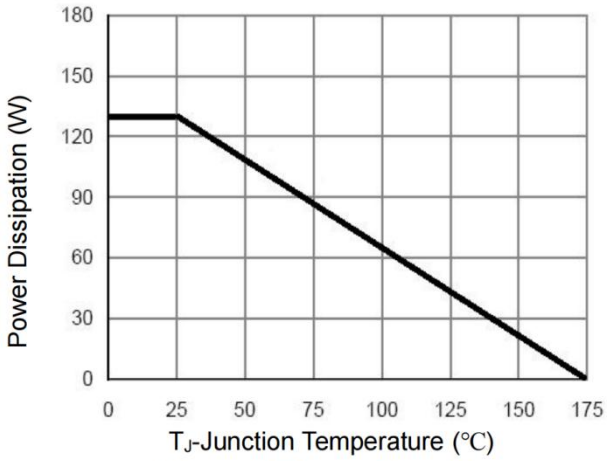


Figure 9 Power De-rating

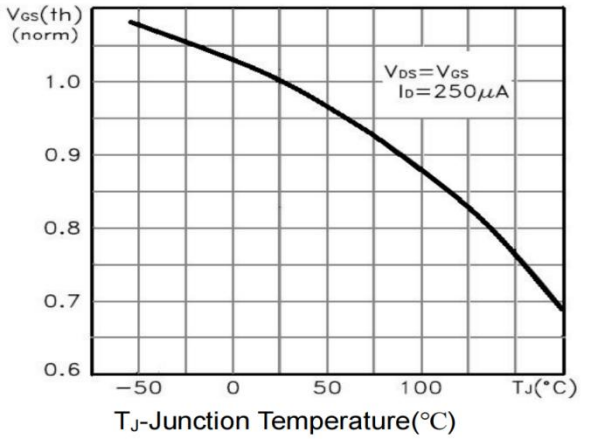


Figure 10 $V_{GS(th)}$ vs Junction Temperature

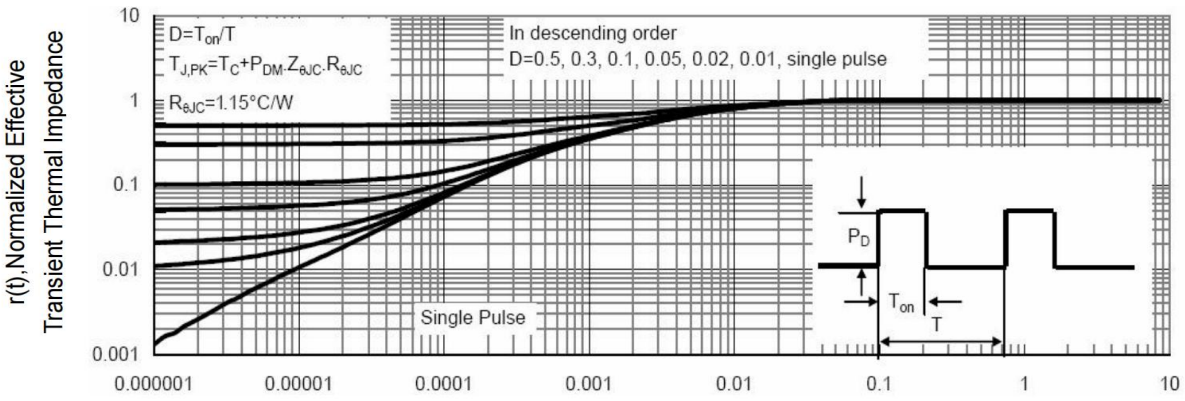
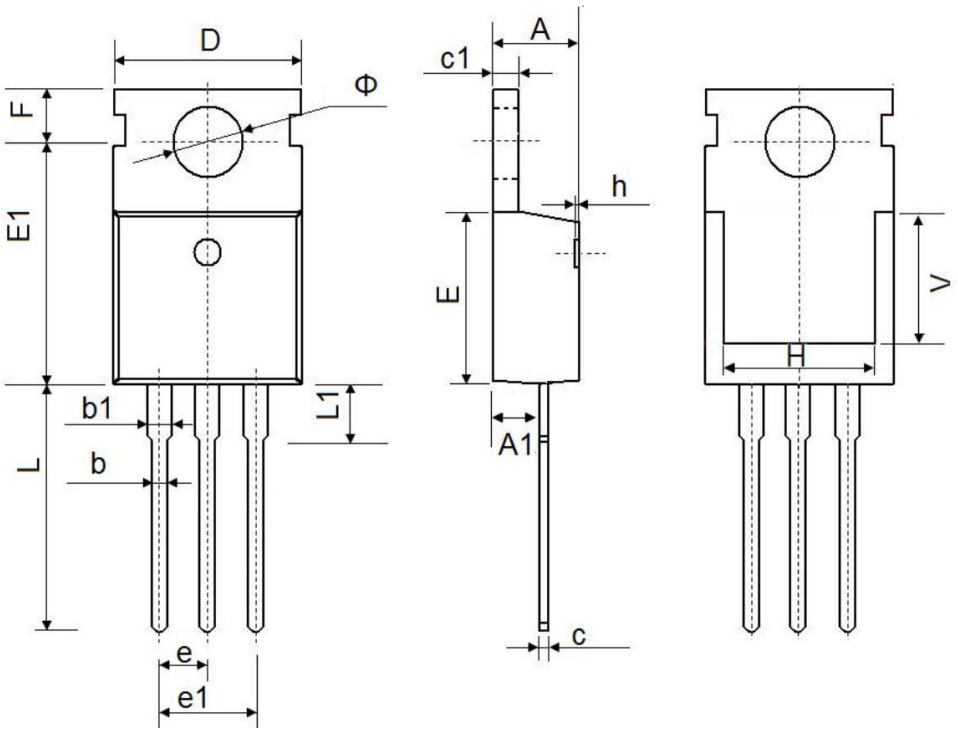


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220AB 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	12.950	0.498	0.510
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	7.500 REF.		0.295 REF.	
ϕ	3.400	3.800	0.134	0.150