AT0P7SP020EQNC-Q1

P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-20V	0.48Ω@-4.5V	-0.78A
	0.67Ω@-2.5V	
	2.2Ω@-1.8V	

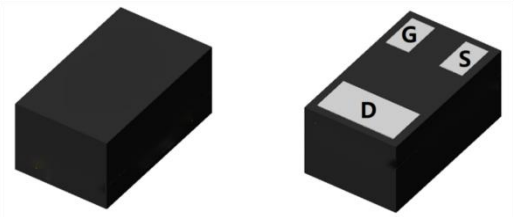
Feature

- Advanced trench technology
- Low On-Resistance
- Low gate threshold voltage
- Low input capacitance
- Fast switching speed
- Suffix "-Q1" for AEC-Q101

Application

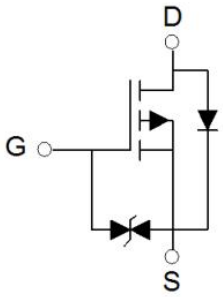
- Battery switch
- DC/DC converter

Package



DFN1006-3L

Circuit diagram



Marking

PA1

Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current[1]	I_D	-0.78	A
Continuous Drain Current[1] (T_A =70℃)	I_D (70℃)	-0.62	A
Pulsed Drain Current (t_p=10μs)	I_{DM}	-4.9	A
Single Pulse Avalanche Energy[3]	E_{AS}	0.5	mJ
Power Dissipation[1]	P_D	0.15	W
Thermal Resistance Junction to Ambient[1]	$R_{\theta JA}$	834	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature Range	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_A=25 °C, 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	-20			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-20V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±4.5V			±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-0.45	-0.6	-1.2	V
Drain-source on-resistance[2]	$R_{DS(on)}$	V_{GS} =-4.5V, I_D =-0.78A		0.4	0.48	Ω
		V_{GS} =-2.5V, I_D =-0.66A		0.6	0.67	
		V_{GS} =-1.8V, I_D =-0.1A		0.75	2.2	
Dynamic characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =-16V, V_{GS} =0V, f =1MHz		76		pF
Output Capacitance	C_{oss}			13		
Reverse Transfer Capacitance	C_{rss}			10		
Total Gate Charge	Q_g	V_{DS} =-16V, V_{GS} =-4.5V I_D =-0.2A		2.6		nC
Gate-Source Charge	Q_{gs}			0.57		
Gate-Drain Charge	Q_{gd}			0.34		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-10V, V_{GS} =-4.5V R_G =3Ω		8		nS
Turn-on rise time	t_r			5.5		
Turn-off delay time	$t_{d(off)}$			30		
Turn-off fall time	t_f			17		
Source-Drain Diode characteristics						
Diode Continuous Current	I_S				-0.78	A
Diode Forward voltage[2]	V_{SD}	V_{GS} =0V, I_S =-0.35A			-1.2	V

Notes:

1) The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.

2) The data tested by pulsed, pulse width ≤300μs, duty cycle ≤2%.

3) The EAS data shows Max. rating. The test condition is V_{DD} =-15V, V_{GS} =-5V, L =0.1mH.

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

Typical Characteristics

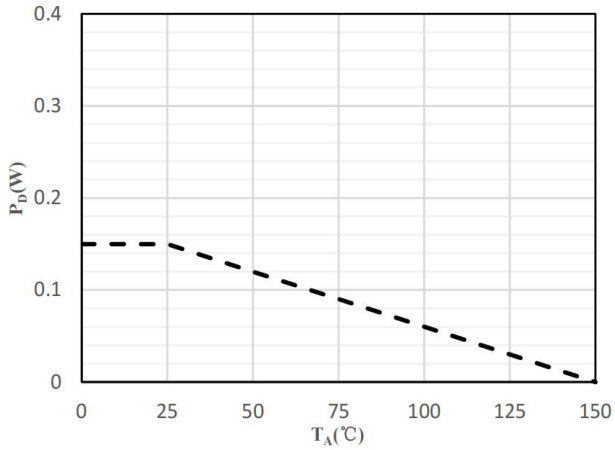


Fig 1 Power Dissipation

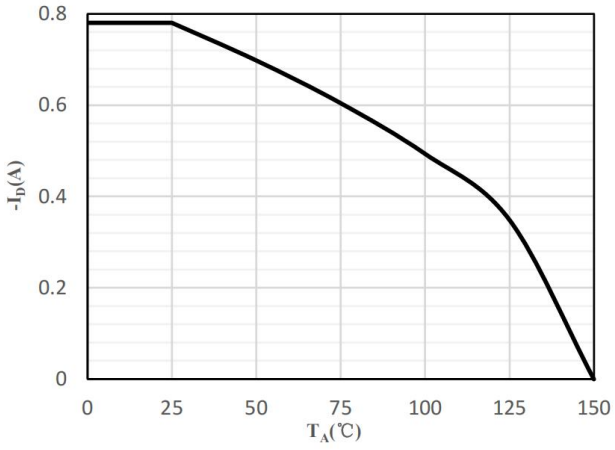


Fig 2 Drain Current

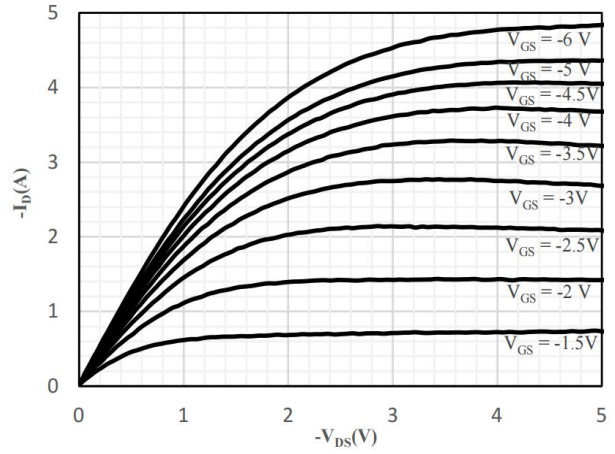


Fig 3 Typical Output Characteristics

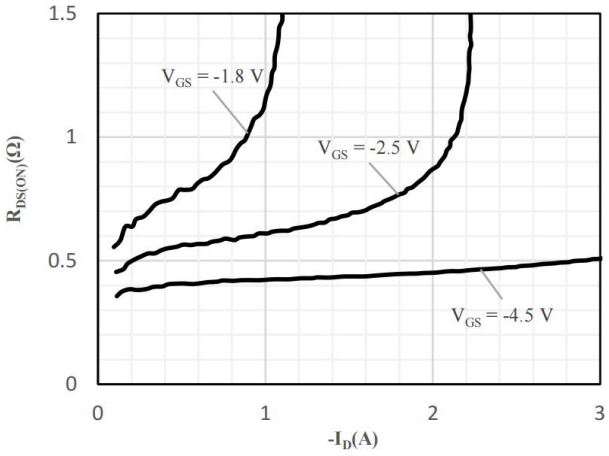


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

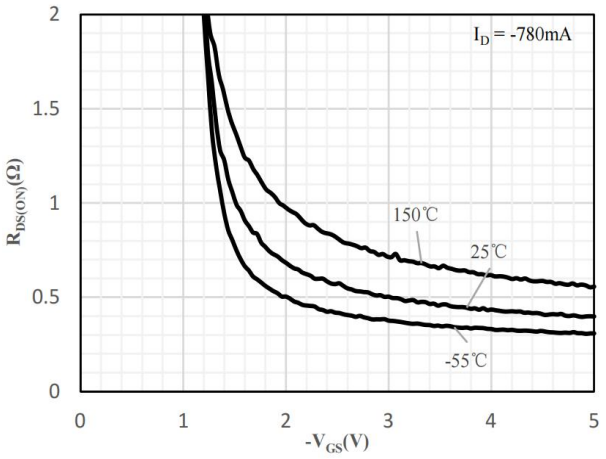


Fig 5 On-Resistance vs. Gate-Source Voltage

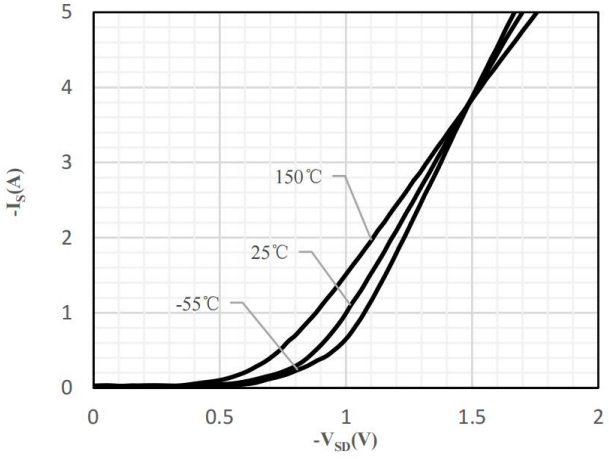


Fig 6 Body-Diode Characteristics

Document ID	Issued Date	Revised Date	Revision	Page.
AS-1151255	2023/12/23	2025/12/15	B	5

Typical Characteristics

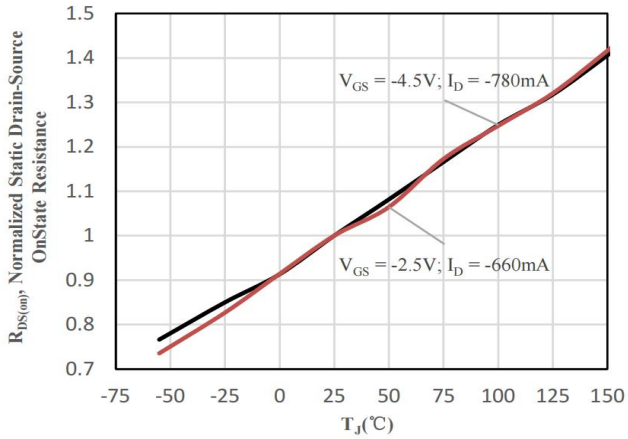


Fig 7 Normalized On-Resistance vs. Junction Temperature

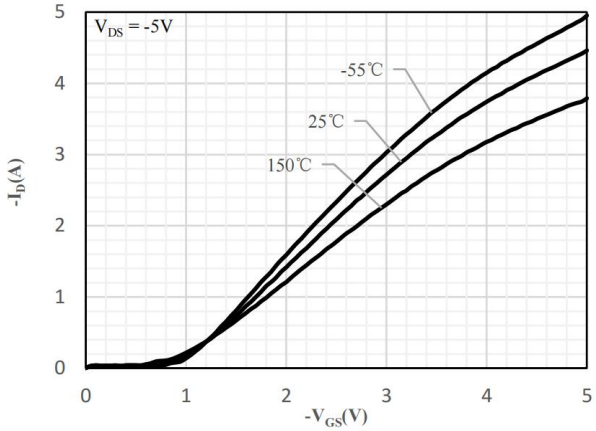


Fig 8 Transfer Characteristics

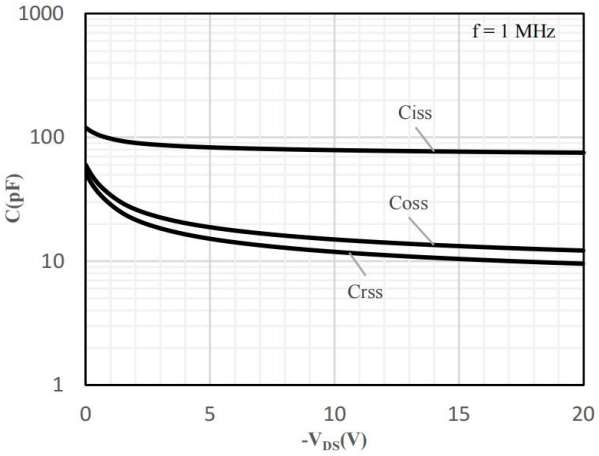


Fig 9 Capacitance Characteristics

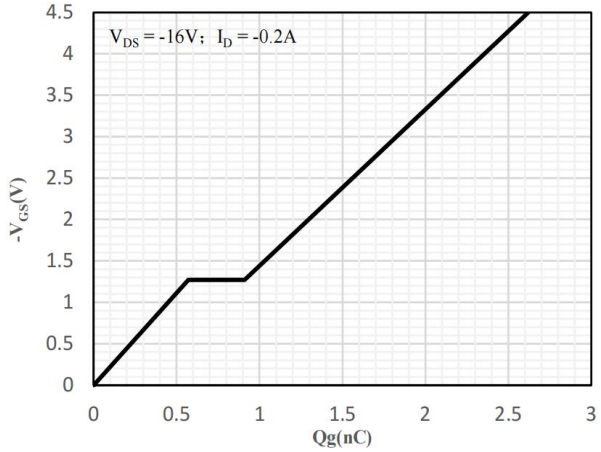


Fig 10 Gate-Charge Characteristics

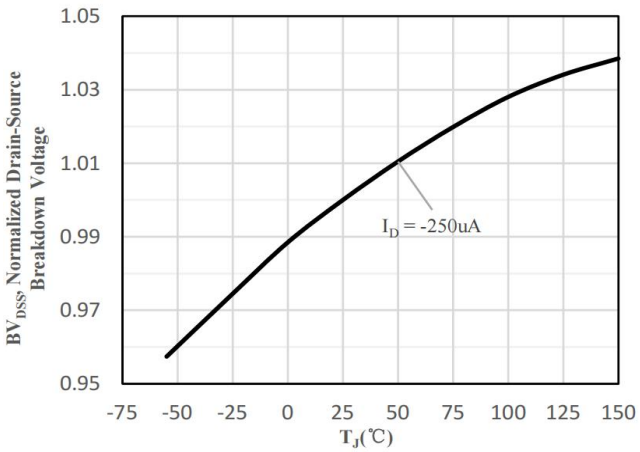


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

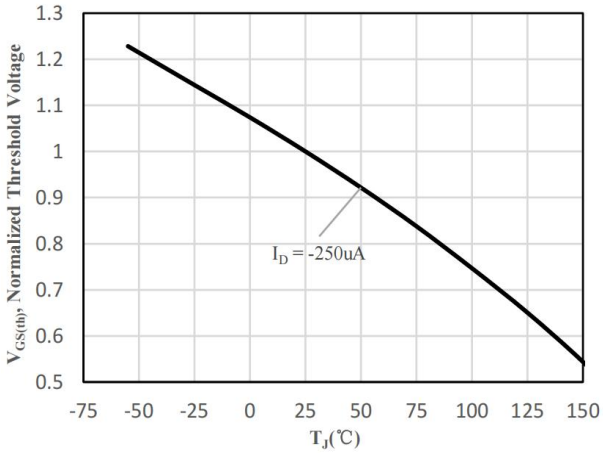
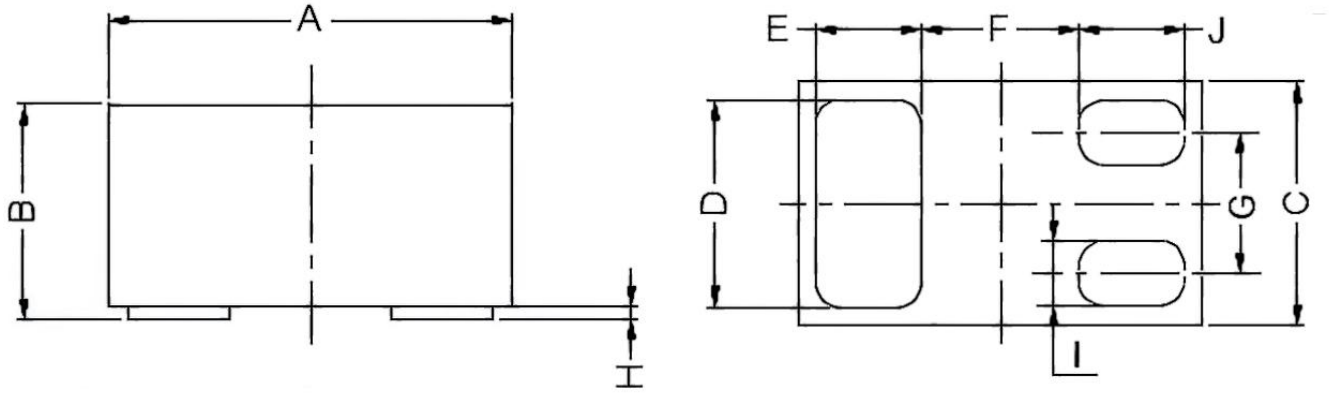


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

DFN1006-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.950	1.075	0.037	0.042
B	0.470	0.530	0.019	0.021
C	0.550	0.675	0.022	0.027
D	0.450	0.550	0.018	0.022
E/J	0.200	0.300	0.008	0.012
F	0.400 BSC		0.016 BSC	
G	0.350 BSC		0.014 BSC	
H	0.000	0.050	0.000	0.002
I	0.100	0.200	0.004	0.008