AT4P7NP020MQPG-Q1

N and P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
20V	65mΩ@4.5V	4.7A
	85mΩ@2.5V	

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-20V	160mΩ@-4.5V	-3.1A
	280mΩ@-2.5V	

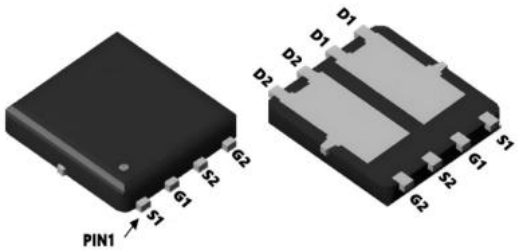
Feature

- Advanced trench technology
- Complementary P + N channel
- Fast switching speed
- Suffix “-Q1” for AEC-Q101

Application

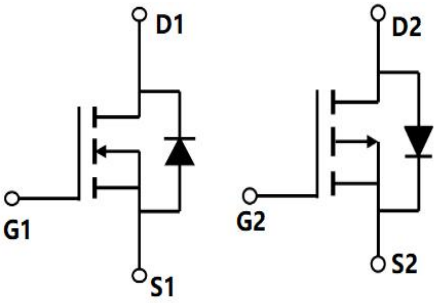
- Synchronous rectification
- Motor control
- Portable equipment application

Package

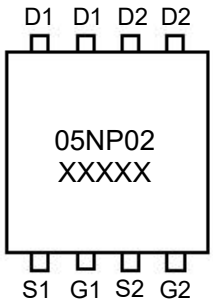


PDFN3*3-8L

Circuit diagram



Marking



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N and P-Channel Enhancement Mode MOSFET

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

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	±12	±12	V
Continuous Drain Current[1)]	I_D	4.7	-3.1	A
Continuous Drain Current[1)] (T_A=70℃)	I_D(70℃)	3.7	-2.5	
Pulsed Drain Current (t_p =10μs)	I_{DM}	20	-15	A
Single Pulse Avalanche Energy[2)]	E_{AS}	2	2	mJ
Power Dissipation[1)]	P_D	2.1	2.1	W
Thermal Resistance Junction to Ambient[1)]	$R_{\theta JC}$	60	60	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	℃

N-CH Electrical characteristics (T_A=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	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} =±12V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	0.5	0.9	1.2	V
Drain-source on-resistance[3)]	$R_{DS(on)}$	V_{GS} =4.5V, I_D =3A			65	mΩ
		V_{GS} =2.5V, I_D =2A			85	
Dynamic characteristics[4)]						
Input Capacitance	C_{iss}	V_{DS} =10V, V_{GS} =0V, f =1MHz		188		pF
Output Capacitance	C_{oss}			28		
Reverse Transfer Capacitance	C_{rss}			22		
Total Gate Charge	Q_g	V_{DS} =10V, V_{GS} =4.5V, I_D =3.6A		3.3		nC
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			0.6		
Turn-on delay time	$t_{d(on)}$	V_{DS} =10V, V_{GS} =4.5V, I_D =1A R_G =6Ω		5		nS
Turn-on rise time	t_r			8.5		
Turn-off delay time	$t_{d(off)}$			11		
Turn-off fall time	t_f			3		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				4.7	A
Diode Forward voltage[3)]	V_{SD}	V_{GS} =0V, I_S =1A			1.2	V

P-CH Electrical characteristics (T_A=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	-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} =±12V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-0.4	-0.6	-1	V
Drain-source on-resistance[3]	$R_{DS(on)}$	V_{GS} =-4.5V, I_D =-1.5A			160	mΩ
		V_{GS} =-2.5V, I_D =-1.1A			280	
Dynamic characteristics[4]						
Input Capacitance	C_{iss}	V_{DS} =-10V, V_{GS} =0V, f =1MHz		199		pF
Output Capacitance	C_{oss}			29		
Reverse Transfer Capacitance	C_{rss}			22		
Total Gate Charge	Q_g	V_{DS} =-16V, V_{GS} =-4.5V I_D =-1.5A		3.5		nC
Gate-Source Charge	Q_{gs}			0.7		
Gate-Drain Charge	Q_{gd}			0.8		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-10V, V_{GS} =-4.5V I_D =-1A, R_G =5Ω		11		nS
Turn-on rise time	t_r			5		
Turn-off delay time	$t_{d(off)}$			20		
Turn-off fall time	t_f			8		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-3.1	A
Diode Forward voltage[3]	V_{SD}	V_{GS} =0V, I_S =-1.5A			-1.1	V

Notes:

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

2) The EAS data shows Max. rating. The test condition is N-Channel: V_{DD} =15V, V_{GS} = 10V, L = 0.1mH; P-Channel: V_{DD} = -15V, V_{GS} = -10V, L = 0.1mH.

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

4) Guaranteed by design, not subject to production.

N-Channel Typical Characteristics

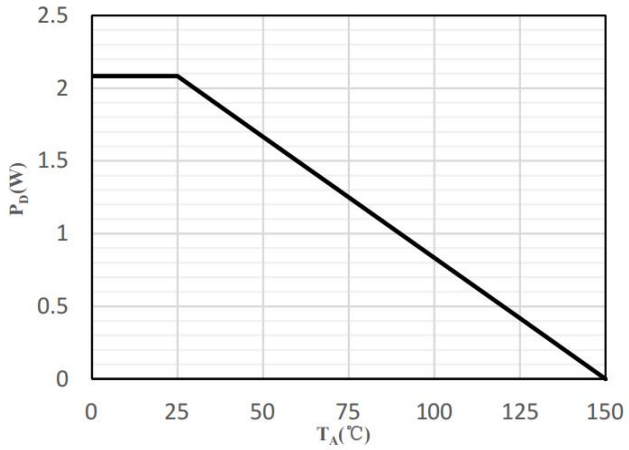

Fig 1 Power Dissipation

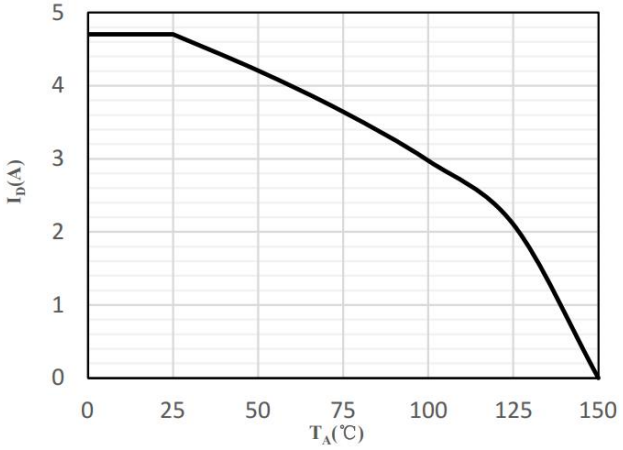

Fig 2 Drain Current

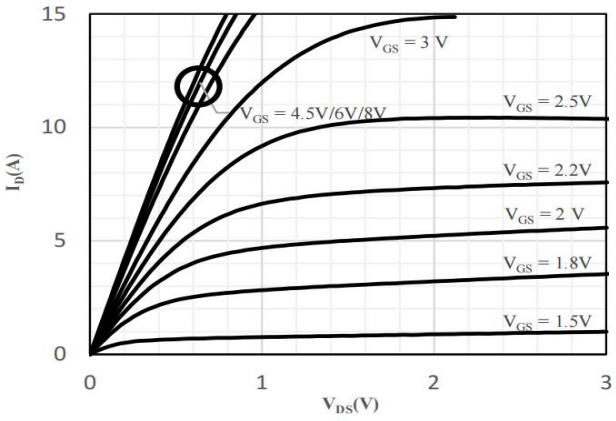

Fig 3 Typical Output Characteristics

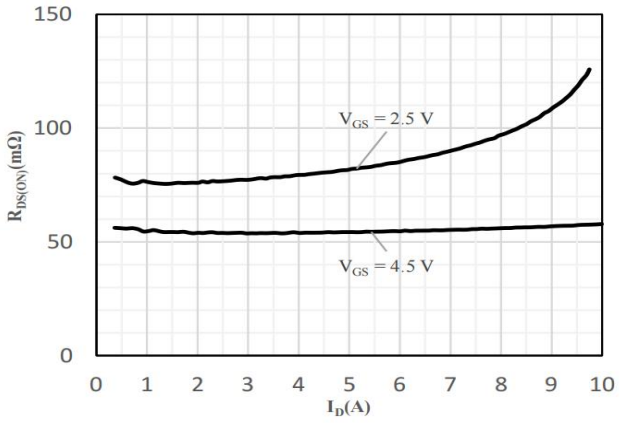

Fig 4 On-Resistance vs. Drain Current and Gate Voltage

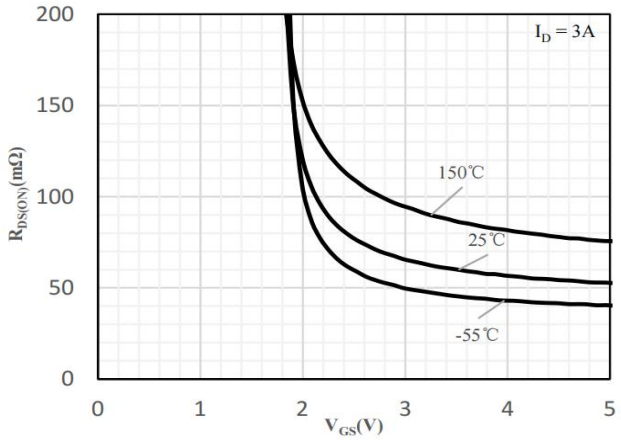

Fig 5 On-Resistance vs. Gate-Source Voltage

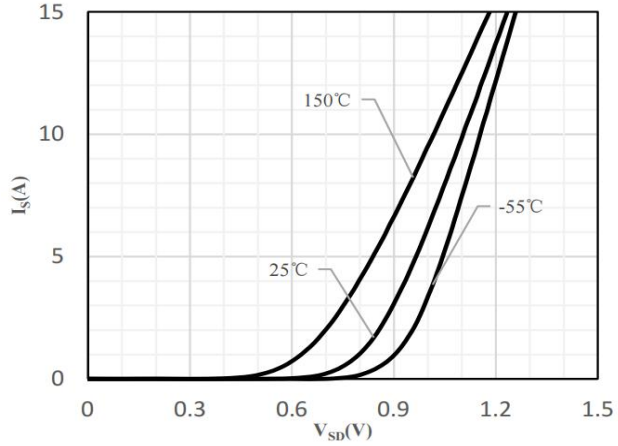

Fig 6 Body-Diode Characteristics

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N-Channel Typical Characteristics

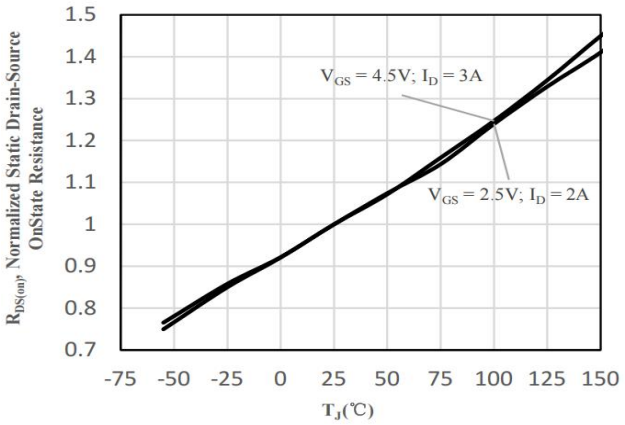

Fig 7 Normalized On-Resistance vs. Junction Temperature

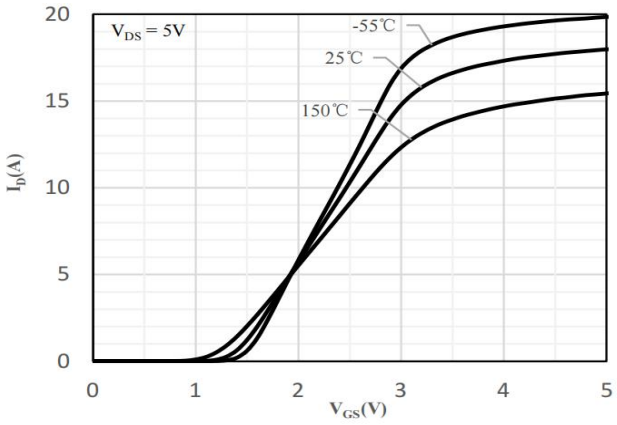

Fig 8 Transfer Characteristics

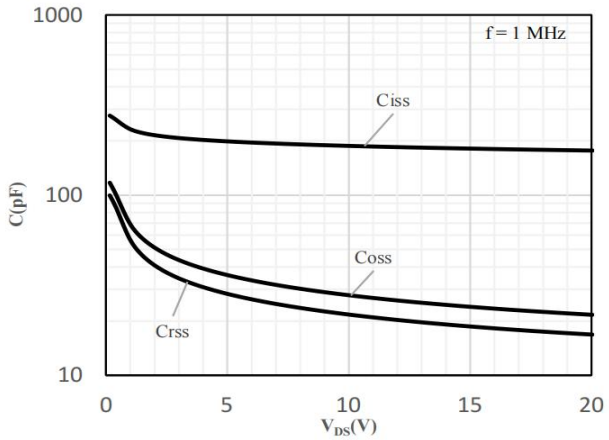

Fig 9 Capacitance Characteristics

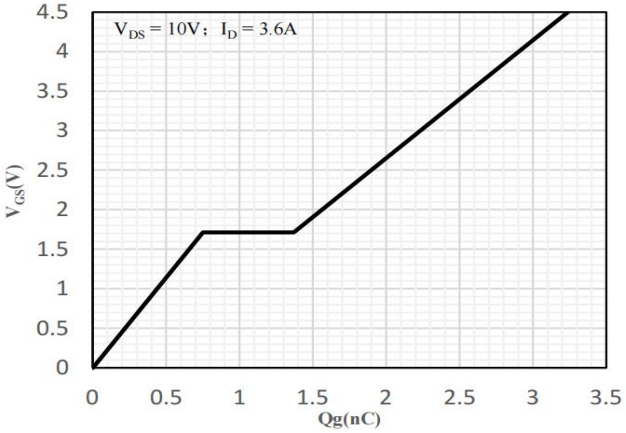

Fig 10 Gate-Charge Characteristics

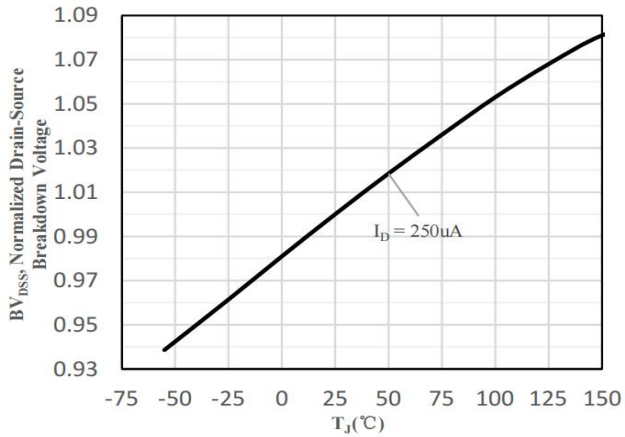

Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

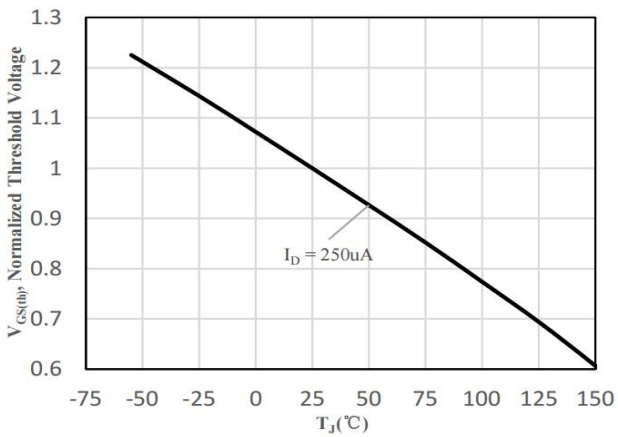

Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

P- Channel Typical Characteristics

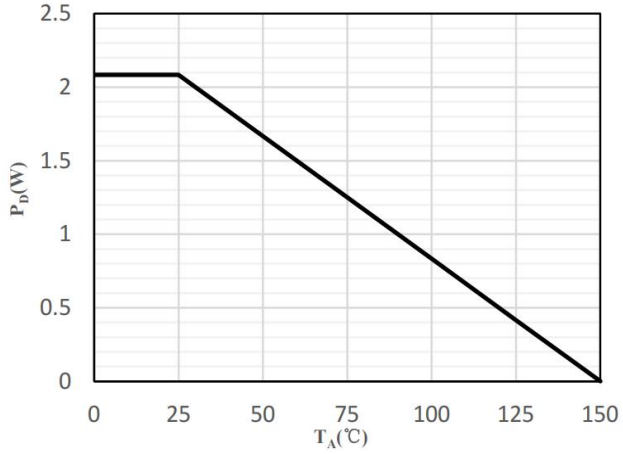

Fig 1 Power Dissipation

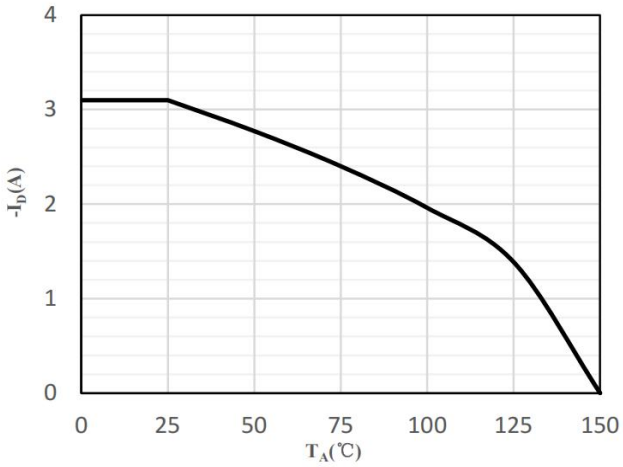

Fig 2 Drain Current

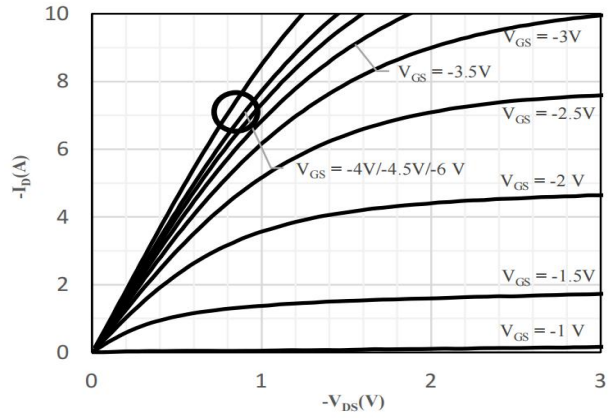

Fig 3 Typical Output Characteristics

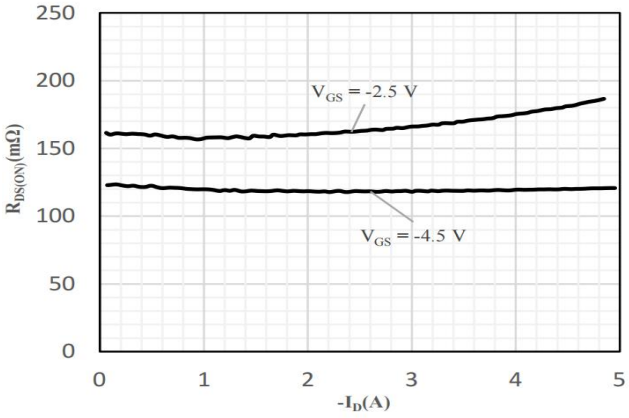

Fig 4 On-Resistance vs. Drain Current and Gate Voltage

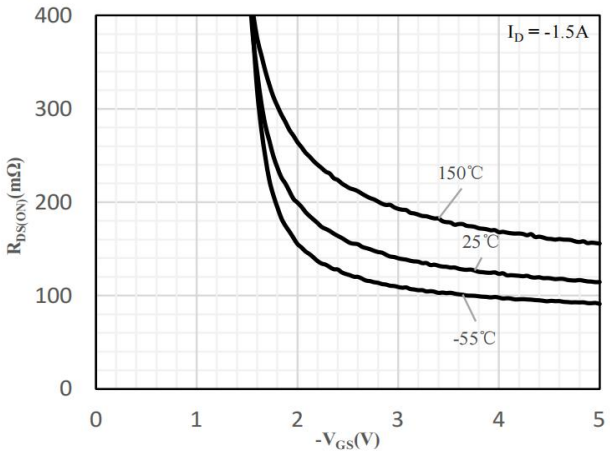

Fig 5 On-Resistance vs. Gate-Source Voltage

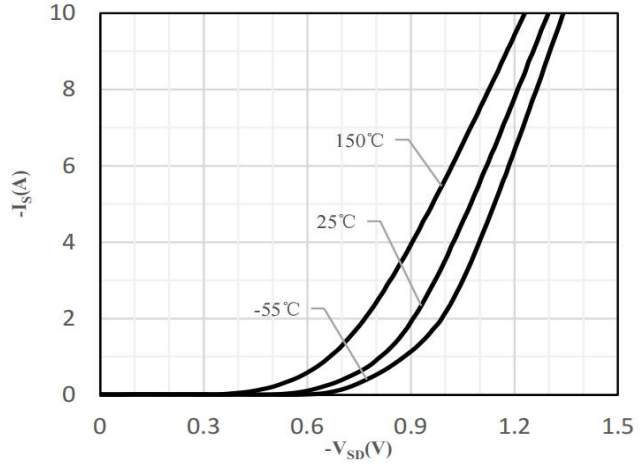

Fig 6 Body-Diode Characteristics

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P- Channel Typical Characteristics

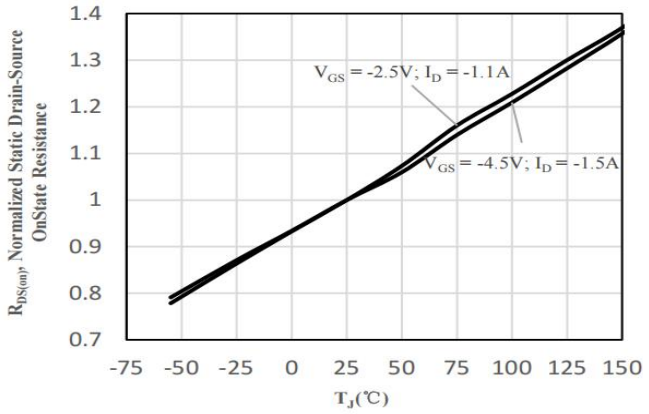


Fig 7 Normalized On-Resistance vs. Junction Temperature

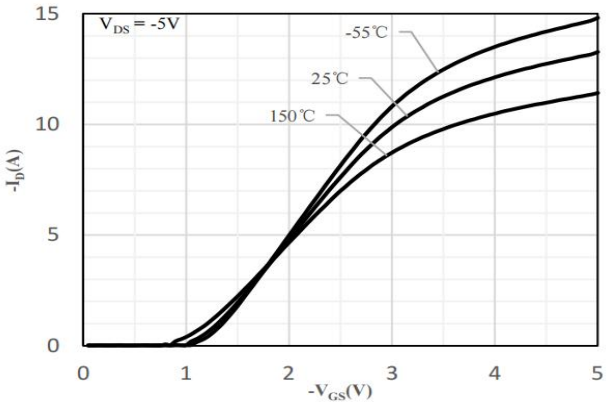


Fig 8 Transfer Characteristics

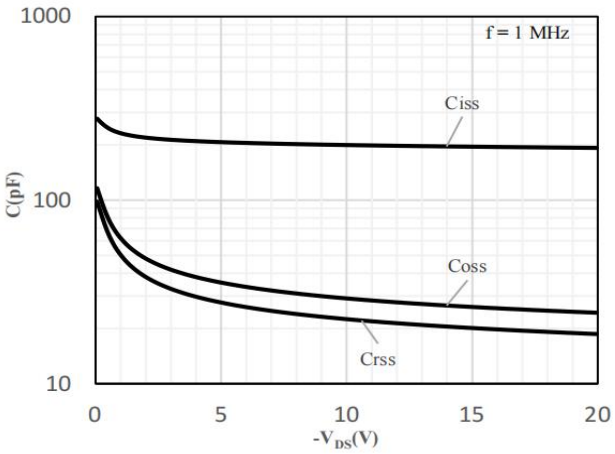


Fig 9 Capacitance Characteristics

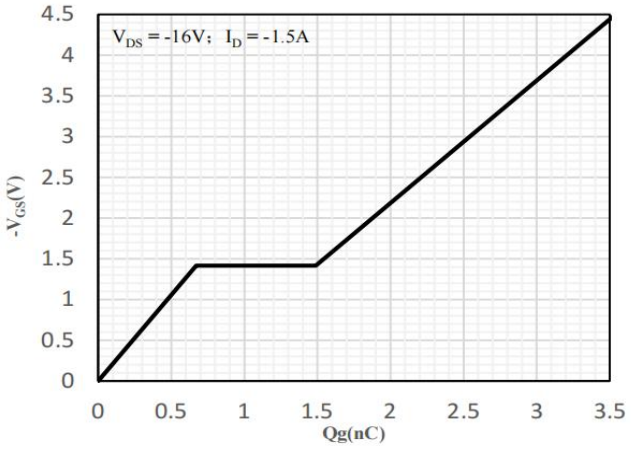


Fig 10 Gate-Charge Characteristics

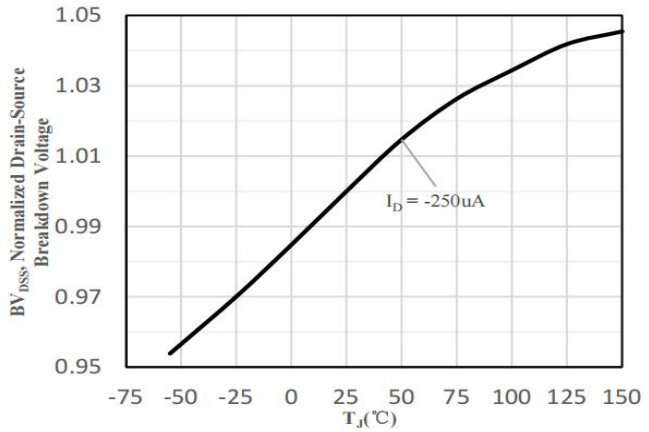


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

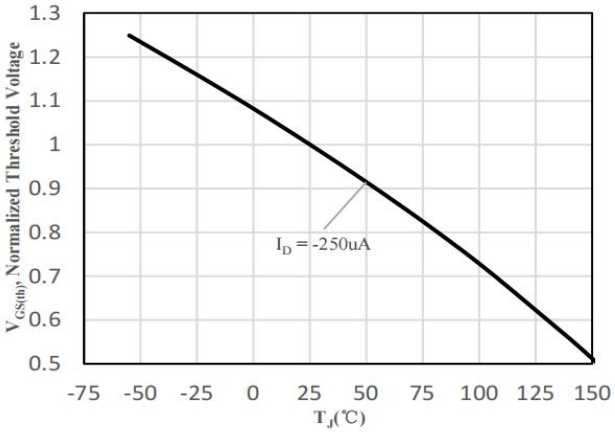
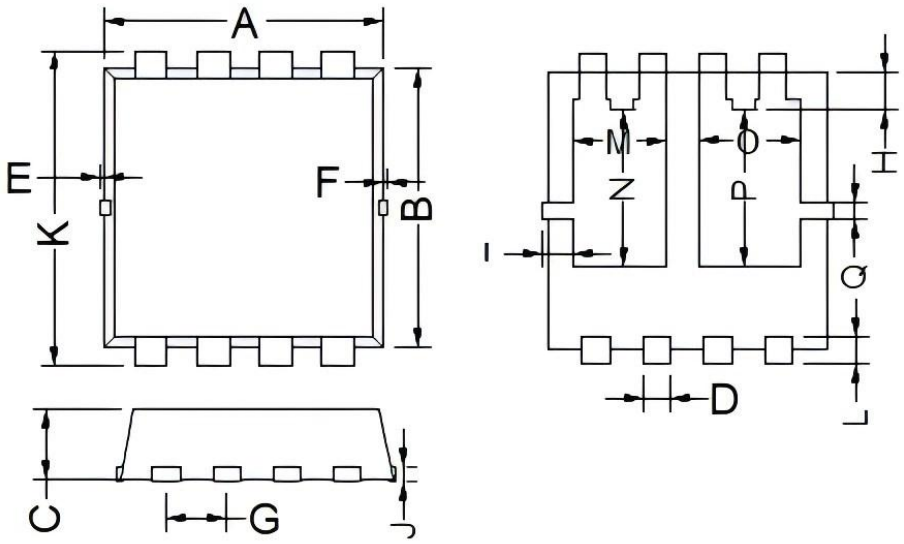


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

PDFN3*3-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.900	3.100	0.114	0.122
B	2.900	3.100	0.114	0.122
C	0.550	0.750	0.022	0.030
D	0.200	0.400	0.008	0.016
E	0.000	0.200	0.000	0.008
F	0.000	0.200	0.000	0.008
G	0.550	0.750	0.022	0.030
H	0.200	0.400	0.008	0.016
I	0.200	0.400	0.008	0.016
J	0.100	0.200	0.004	0.008
K	3.150	3.450	0.124	0.136
L	0.250	0.450	0.010	0.018
M/O	0.900	1.200	0.035	0.047
N/P	1.650	1.850	0.065	0.073
Q	0.100	0.300	0.004	0.012