• General Description

It combines trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. It combines one N channel MOSFET and one P channel MOSFET

• Features

■AEC-Q101 Qualified

■Low $R_{DS(ON)}$ to minimize conductive loss

■Dual DIE in one package

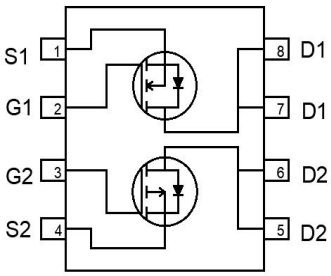
■Low Thermal resistance

•Application

■BLDC Motor driver

■Load switch

• Product Summary



V_{DS1}= 20V

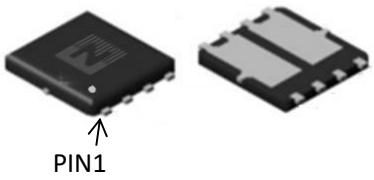
V_{DS2}= -20V

$R_{DS(ON)1}$ = 35mΩ

$R_{DS(ON)2}$ = 65mΩ

I_{D1}= 5.5A

I_{D2}= -4A



DFN3*3

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMCA88201M
Marking	C88201
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

•N Channel Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		20	V
Gate-Source Voltage①	V_{GS}		±12	V
Continuous Drain Current	I_D	T_C=25℃	5.5	A
	I_D	T_C=75℃	6	A
	I_D	T_C=100℃	6	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	16.5	A
Total Power Dissipation	P_D	T_C=25℃	17	W
Total Power Dissipation	P_D	T_A=25℃	2.5	W
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=4.5V, Rg=25Ω,	10	mJ
ESD Level (HBM)	CLASS 1B			

●P Channel Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		-20	V
Gate-Source Voltage②	V_{GS}		±12	V
Continuous Drain Current	I_D	T_C=25℃	-4	A
	I_D	T_C=75℃	4	A
	I_D	T_C=100℃	4	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	-12	A
Total Power Dissipation	P_D	T_C=25℃	17	W
Total Power Dissipation	P_D	T_A=25℃	2.5	W
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=-4.5V, Rg=25Ω,	10	mJ
ESD Level (HBM)	CLASS 1B			

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	8.6	°C/W
Thermal resistance, junction-ambient③	R_{thJA}		-	60	°C/W
Soldering temperature	Tsold		-	260	°C

●N Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	20			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	0.5	0.7	1.2	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 20V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D= 2A		35	55	mΩ
		V_{GS}=4.5V, I_D= 1A		40	65	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 1A		10		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 2A			1.3	V

●N Channel Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=10V	-	471	-	pF
Output capacitance	Coss		-	58	-	
Reverse transfer capacitance	Crss		-	45	-	
Gate Risistance	Rg	f = 1MHz	-	1.8		Ω
Total gate charge	Qg	V_{DD} =10V I_D =1A, V_{GS} =4.5V	-	4.8	-	nC
Gate - Source charge	Qgs		-	1.4	-	
Gate - Drain charge	Qgd		-	2.3	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=4.5V, V_{DS}=10V, R_G =3.3Ω, I_D =1A	-	9	-	ns
Turn-ON Rise time	t_r		-	4.2	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	13	-	ns
Turn-Off Fall time	t_f		-	2.6	-	ns

●P Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =-250uA	-20			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =-250uA	-0.5	-0.7	-1.2	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= -20V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±12V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D= -2A		65	100	mΩ
		V_{GS}=-4.5V, I_D= -1A		85	120	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-5V, I_{SD} = -1A		8		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = -2A			1.3	V

●P Channel Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=-10V	-	495	-	pF
Output capacitance	Coss		-	64	-	
Reverse transfer capacitance	Crss		-	51	-	
Gate Risistance	Rg	f = 1MHz	-	8		Ω
Total gate charge	Qg	V_{DD} = -10V, I_D = -1A, V_{GS} = -10V	-	5.3	-	nC
Gate - Source charge	Qgs		-	1.5	-	
Gate - Drain charge	Qgd		-	2.4	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=-4.5V,V_{DS}=-10V, R_G =3.3Ω, I_D =-1A	-	11	-	ns
Turn-ON Rise time	t_r		-	5.6	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	15	-	ns
Turn-Off Fall time	t_f		-	5.7	-	ns

• N Channel characteristics curve

Fig.1 Gate-Charge Characteristics

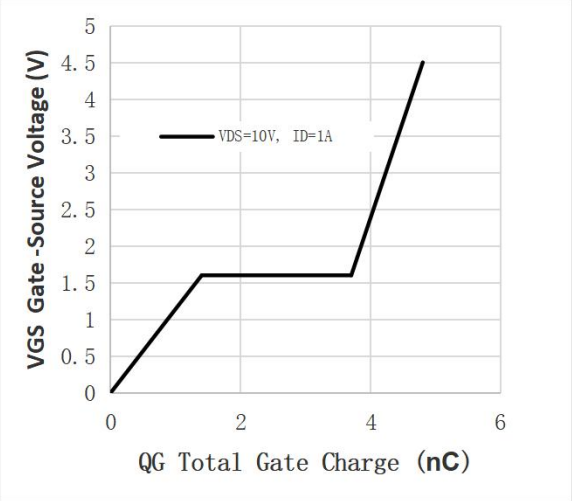


Fig.2 Capacitance Characteristics

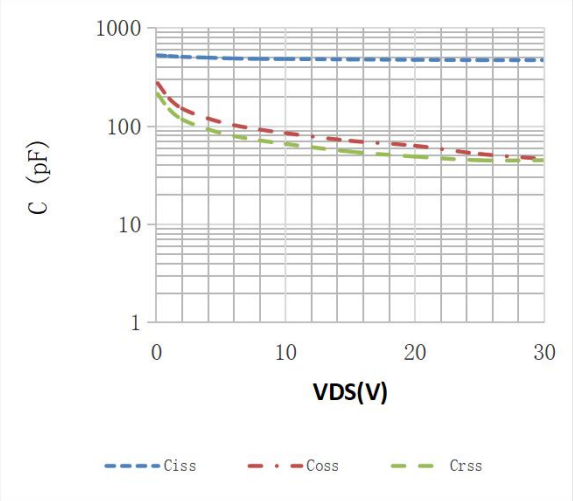


Fig.3 Power Dissipation

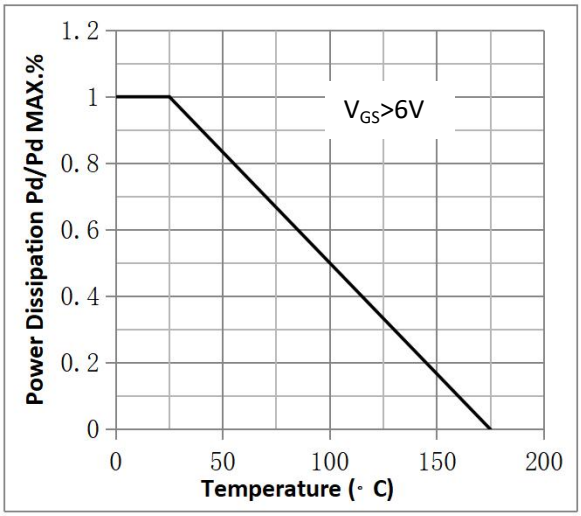


Fig.4 Typical output Characteristics

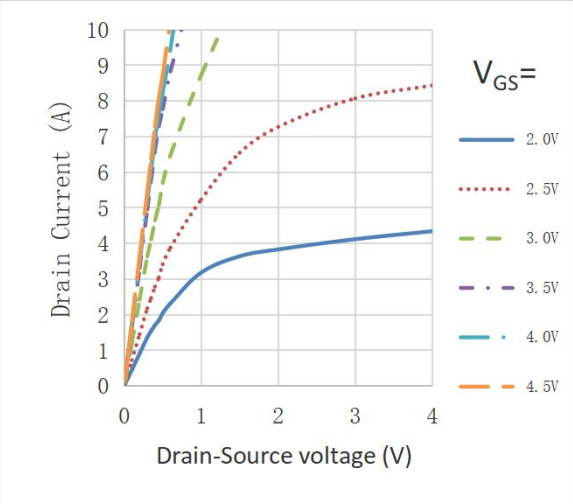


Fig.5 Threshold Voltage V.S Junction Temperature

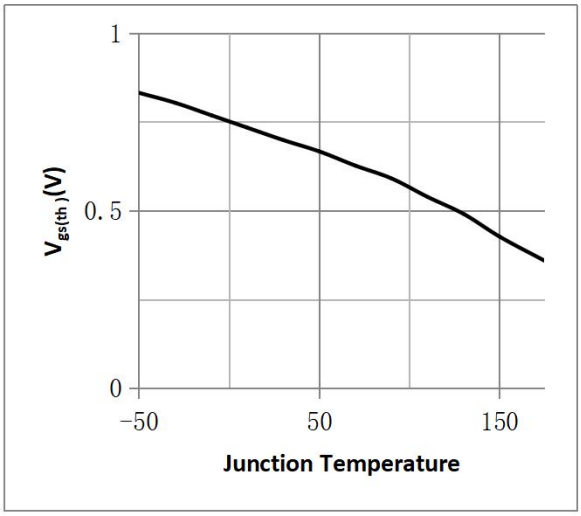


Fig.6 Resistance V.S Drain Current

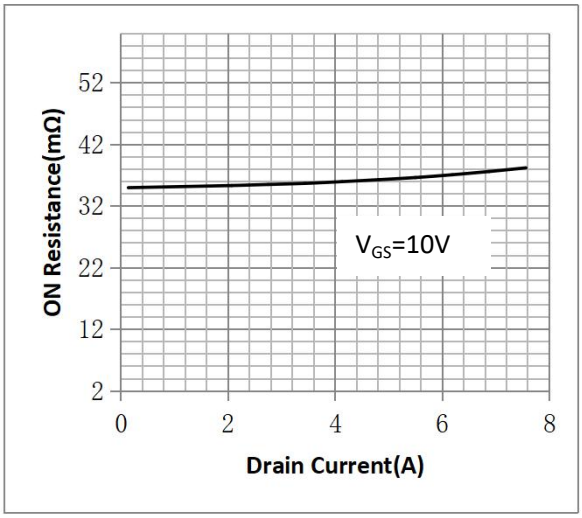


Fig.7 On-Resistance VS Gate Source Voltage

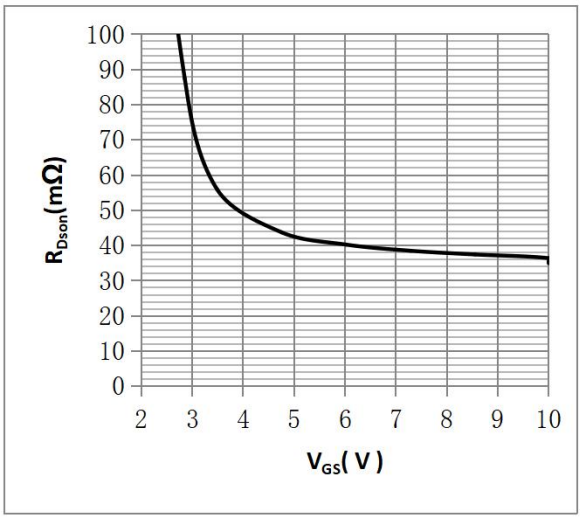


Fig.8 On-Resistance V.S Junction Temperature

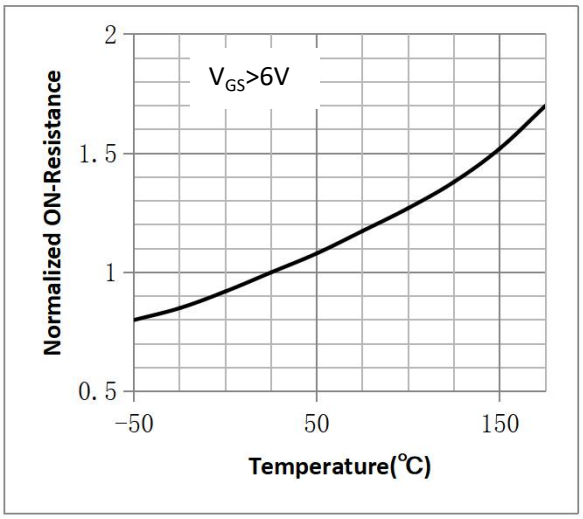


Figure 9. Diode Forward Voltage vs. Current

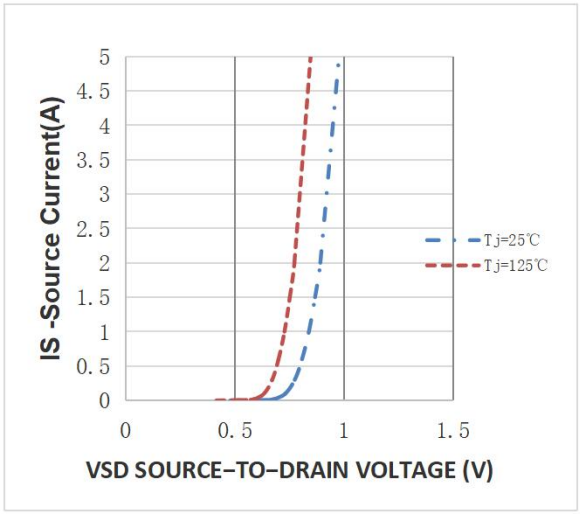


Figure 10. Transfer Characteristics

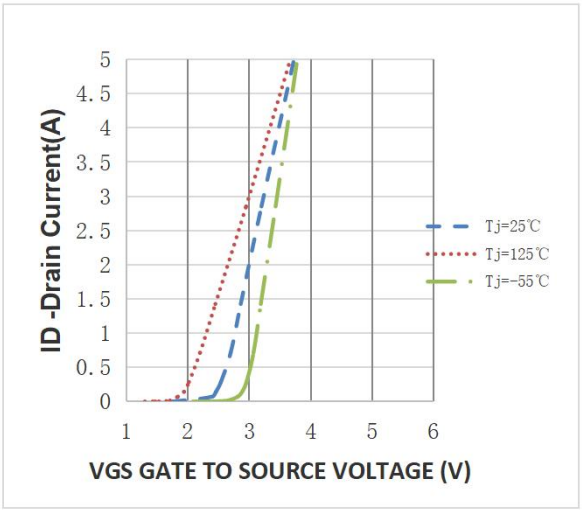


Fig.11 Safe Operating Area

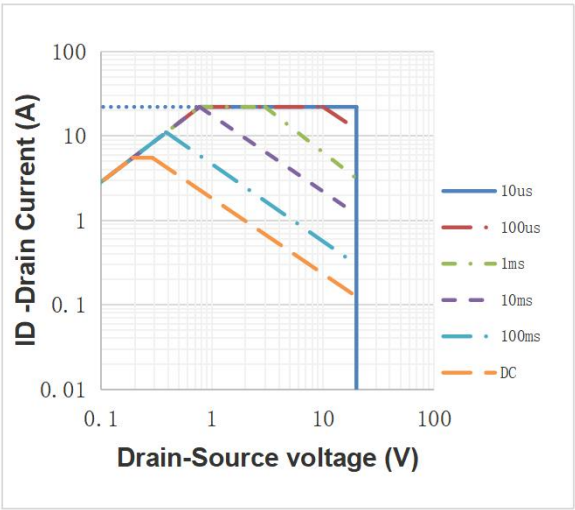
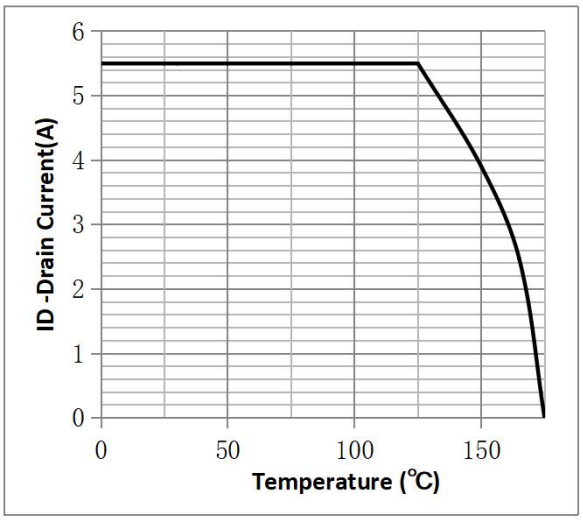


Fig.12 ID vs. Case Temperature④



•p Channel characteristics curve

Fig.1 Gate-Charge Characteristics

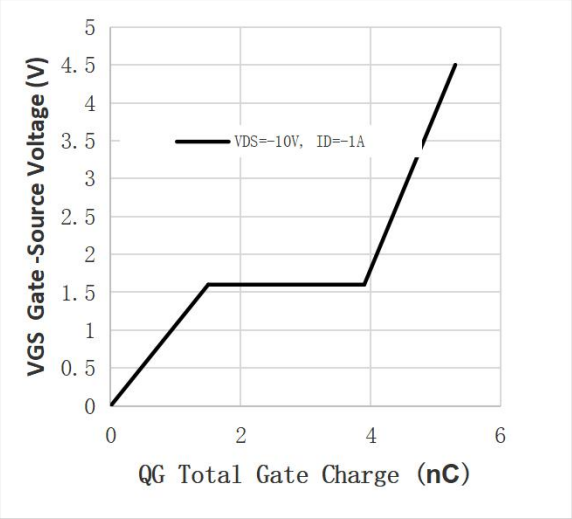


Fig.2 Capacitance Characteristics

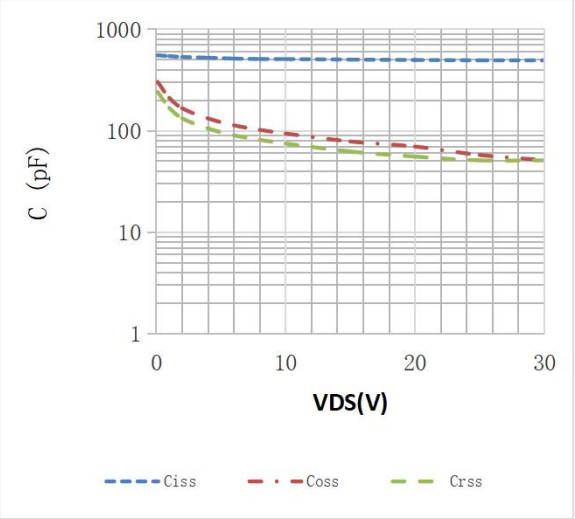


Fig.3 Power Dissipation

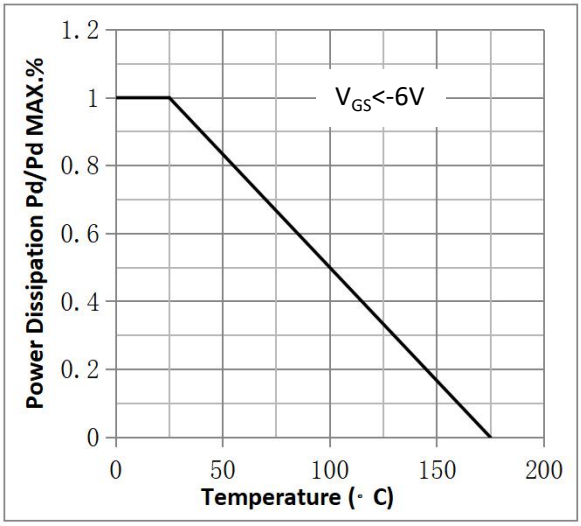


Fig.4 Typical output Characteristics

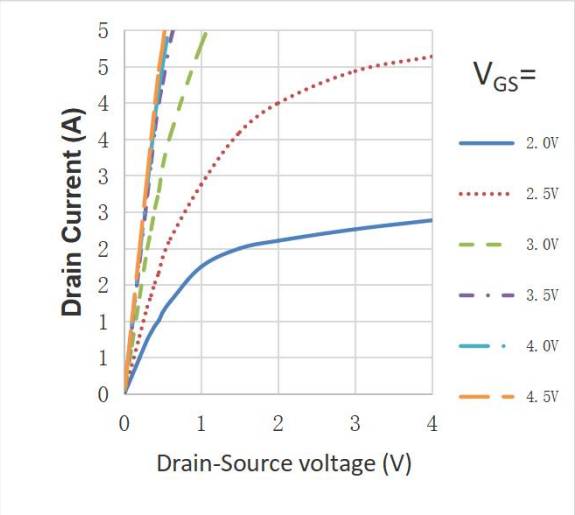


Fig.5 Threshold Voltage V.S Junction Temperature

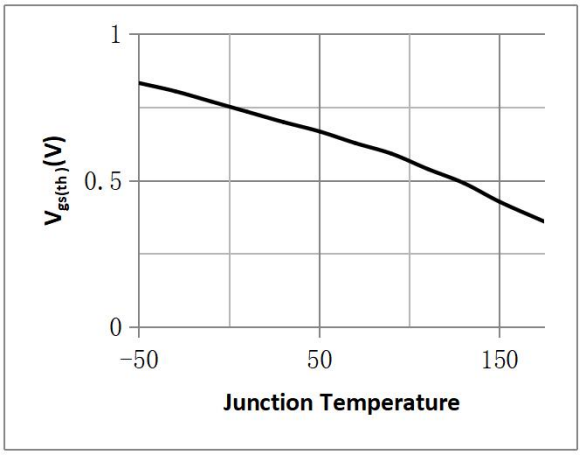


Fig.6 Resistance V.S Drain Current

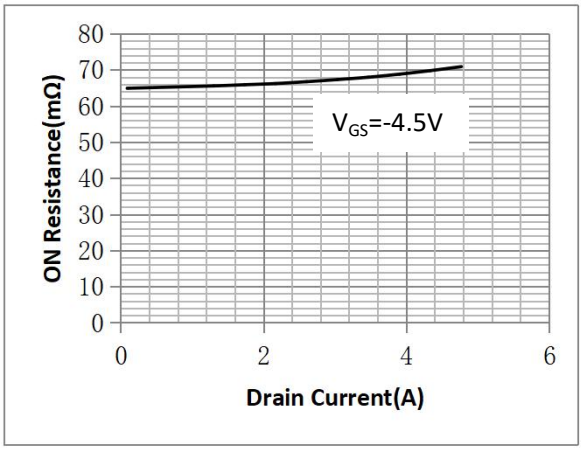


Fig.7 On-Resistance VS Gate Source Voltage

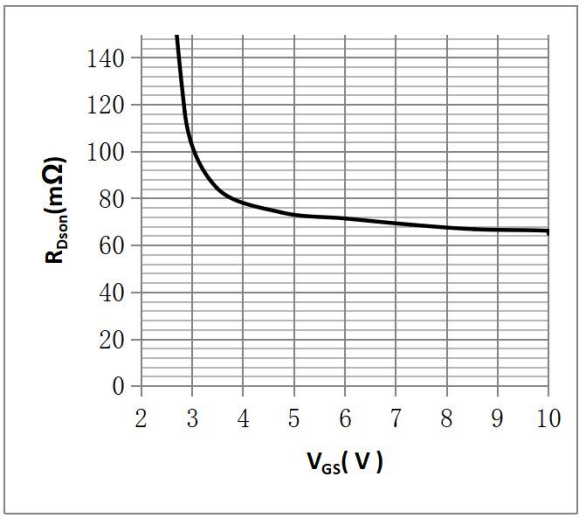


Fig.8 On-Resistance V.S Junction Temperature

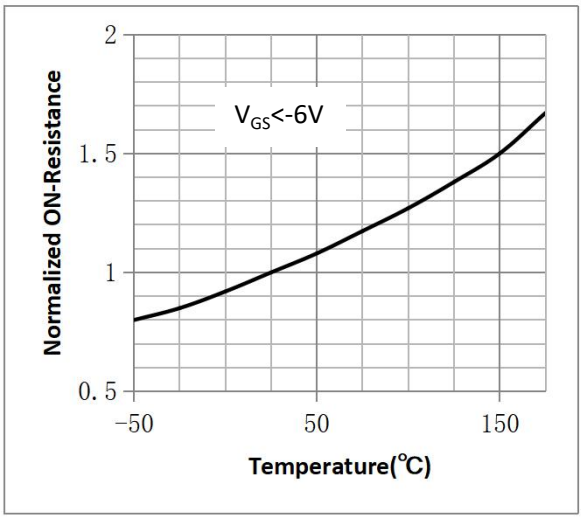


Figure 9. Diode Forward Voltage vs. Current

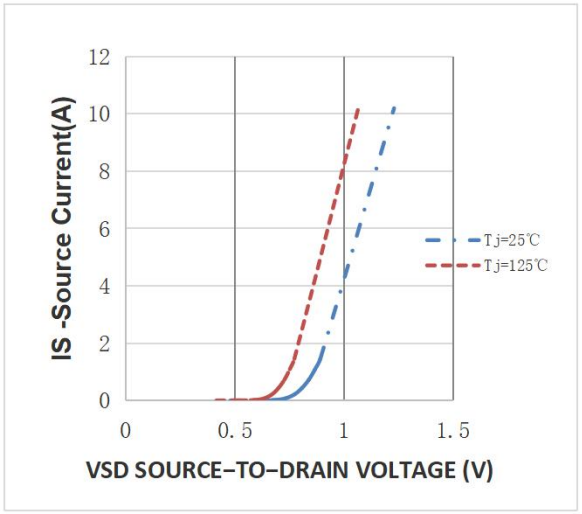


Figure 10. Transfer Characteristics

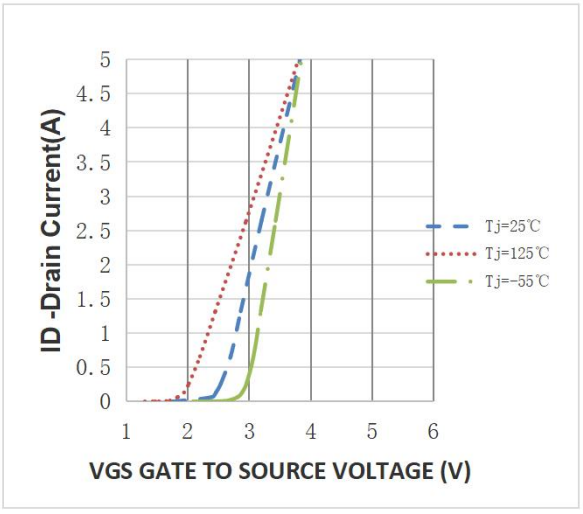


Fig.11 Safe Operating Area

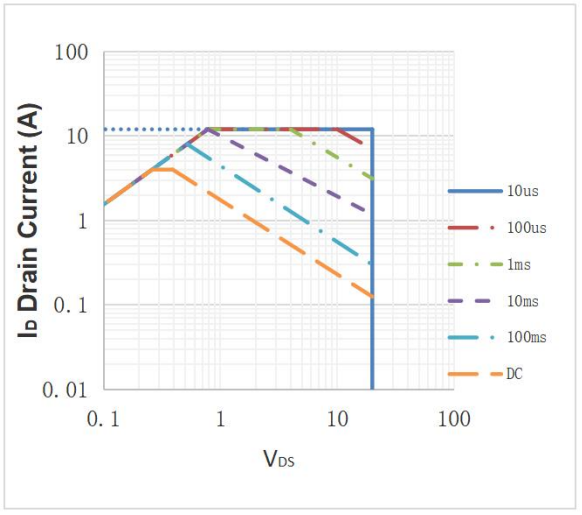
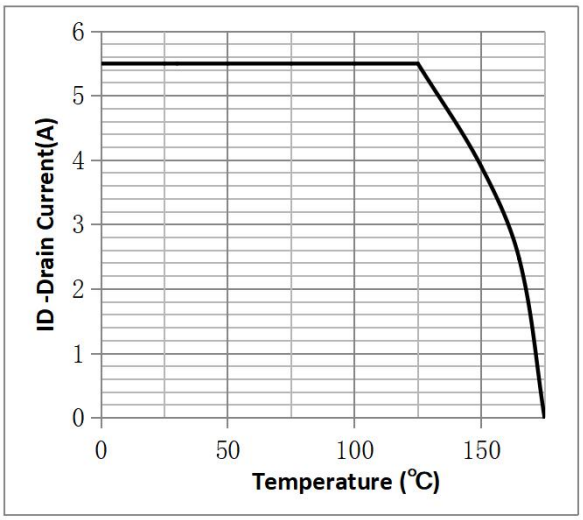
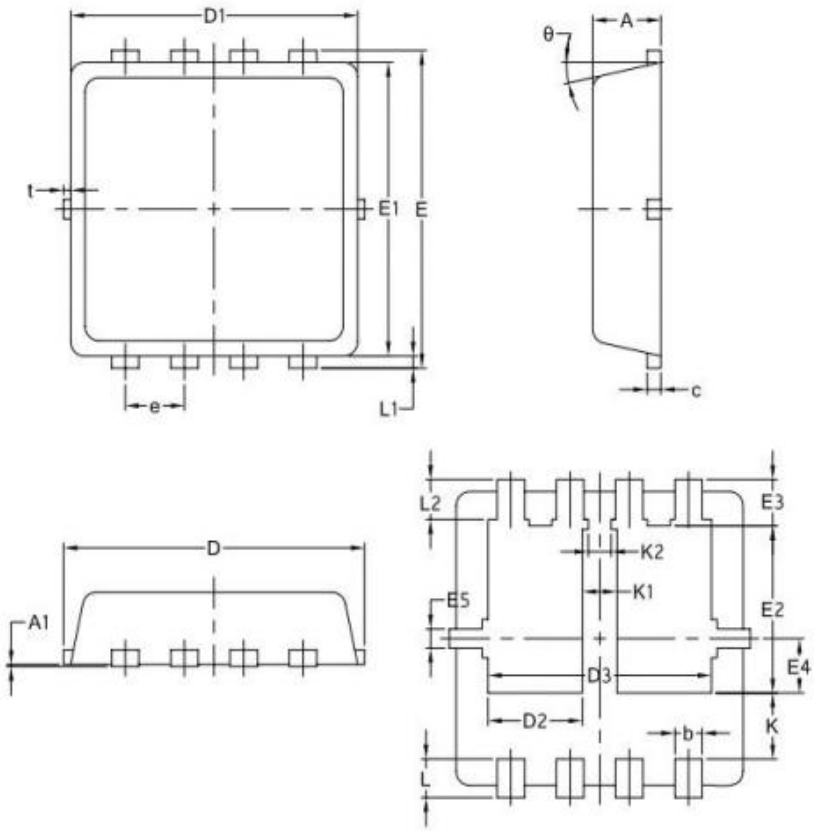


Fig.12 ID vs. Case Temperature④



●DFN3*3 Package Outline



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.25	0.30	0.39
c	0.14	0.152	0.20
D	3.20	3.30	3.45
D1	3.05	3.15	3.25
D2	0.84	1.04	1.24
D3	2.30	2.45	2.60
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.60	1.74	1.90
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.50	0.69	0.80
K1	0.30	0.38	0.53
K2	0.15	0.25	0.35
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
L2	0.27	0.42	0.57
t	0	0.075	0.13
θ	10°	12°	14°

Note:

① Pulse : VGS=+12V/-12V, Duty cycle=50%,Tj=175℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=+12V/-6V, Tj=175℃, t=1000 hours；

② Pulse : VGS=+12V/-12V, Duty cycle=50%,Tj=175℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=-12V/+6V, Tj=175℃, t=1000 hours；

③ Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate；

④ Practically the current will be limited by PCB, thermal design and operating temperature. VGS=4.5V (N channel)/-4.5V(P channel).

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Revision History

Version	Date	Change
A	2023.11.16	NEW