• General Description

It combines advanced 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

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

■Dual DIE in one package

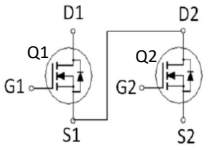
■Low Thermal resistance

•Application

■BLDC Motor driver

■Load switch

• Product Summary



V_{DS1}= 30V

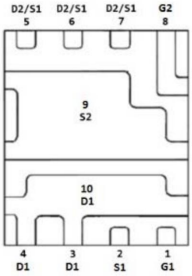
V_{DS2}= 30V

$R_{DS(ON)1}$ = 4mΩ

$R_{DS(ON)2}$ = 1mΩ

I_{D1}= 50A

I_{D2}= 50A



DFN5*6

•Ordering Information:

Part NO.	ZMD68303N
Marking	ZMD68303N
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Q1 Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		30	V
Gate-Source Voltage①	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	50	A
	I_D	T_C=75℃	39	A
	I_D	T_C=100℃	32	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	150	A
Total Power Dissipation	P_D	T_C=25℃	28	W
Total Power Dissipation	P_D	T_A=25℃	2.8	W
Operating Junction Temperature	T_J		-55 to +150	℃
Storage Temperature	T_{STG}		-55 to +150	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25Ω,	40	mJ
		L=0.5mH, VGS=10V, Rg=25Ω,	84	mJ
ESD Level (HBM)	CLASS 1C			

Q2 Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		30	V
Gate-Source Voltage②	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	50	A
	I_D	T_C=75℃	50	A
	I_D	T_C=100℃	50	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	150	A
Total Power Dissipation	P_D	T_C=25℃	28	W
Total Power Dissipation	P_D	T_A=25℃	2.8	W
Operating Junction Temperature	T_J		-55 to +150	℃
Storage Temperature	T_{STG}		-55 to +150	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25Ω,	229	mJ
		L=0.5mH, VGS=10V, Rg=25Ω,	411	mJ
ESD Level (HBM)	CLASS 2			

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	Q1: R_{thJC}		-	4.5	°C/W
	Q1: R_{thJC}			2	
Thermal resistance, junction-ambient③	R_{thJA}		-	45	°C/W
Soldering temperature	Tsold		-	260	°C

•Q1 Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	1.3	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 30V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D= 20A		4	5.2	mΩ
		V_{GS}=4.5V, I_D= 12A		5	7	mΩ
Forward Transconductance	g_{FS}	V_{GS} =5V, I_{SD} = 8A		11		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 20A			1.3	V

•Q1 Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	720	-	pF
Output capacitance	Coss		-	340	-	
Reverse transfer capacitance	Crss		-	25	-	
Gate Risistance	Rg	f = 1MHz	-	1.4		Ω
Total gate charge	Qg	V_{DD} =15V, I_D =20A, V_{GS} =10V	-	9	-	nC
	Qg (4.5v)		-	6.2	-	
Gate - Source charge	Qgs		-	2.3	-	
Gate - Drain charge	Qgd		-	1.8	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	6.5	-	ns
Turn-ON Rise time	t_r		-	5.5	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	5.6	-	ns
Turn-Off Fall time	t_f		-	2.1	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	11	-	ns
Reverse Recovery Charge	Q_{RR}		-	18	-	nC

●Q2 Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =-250uA	30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =-250uA	1.3	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 30V			1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS} = 0V			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D= 20A		1	1.4	mΩ
		V_{GS}=4.5V, I_D= 12A		1	1.69	mΩ
Forward Transconductance	g_{FS}	V_{GS} =5V, I_{SD} = 8A		18		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 20A			1.3	V

●Q2 Channel Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	3493	-	pF
Output capacitance	Coss		-	1347	-	
Reverse transfer capacitance	Crss		-	82	-	
Gate Risistance	Rg	f = 1MHz	-	1.6		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	35	-	nC
	Qg (4.5v)		-	20	-	
Gate - Source charge	Qgs		-	6.8	-	
Gate - Drain charge	Qgd		-	12.1	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	23	-	ns
Turn-ON Rise time	t_r		-	26	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	65	-	ns
Turn-Off Fall time	t_f		-	17	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	65	-	ns
Reverse Recovery Charge	Q_{RR}		-	23	-	nC

• Q1 Channel characteristics curve

Fig.1 Gate-Charge Characteristics

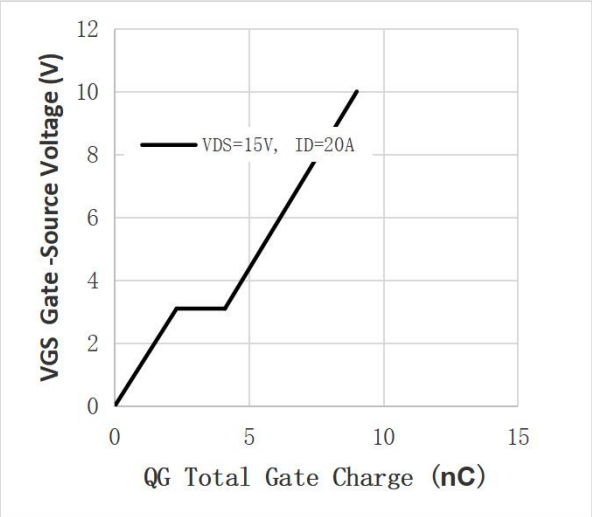


Fig.2 Capacitance Characteristics

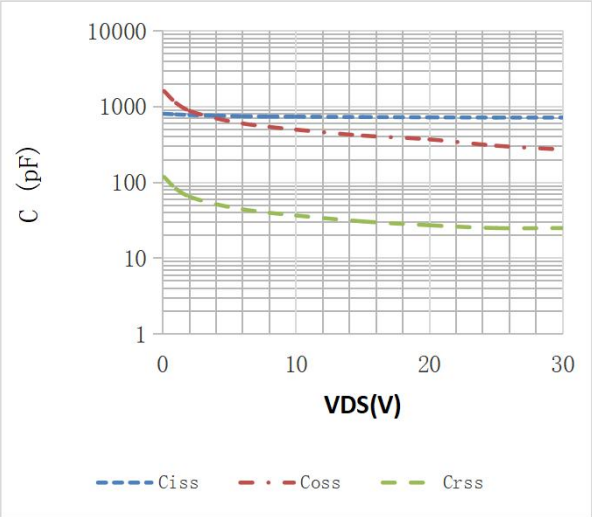


Fig.3 Power Dissipation

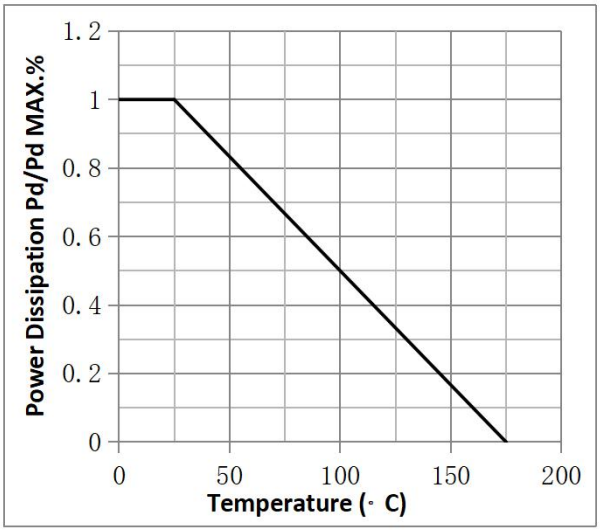


Fig.4 Typical output Characteristics

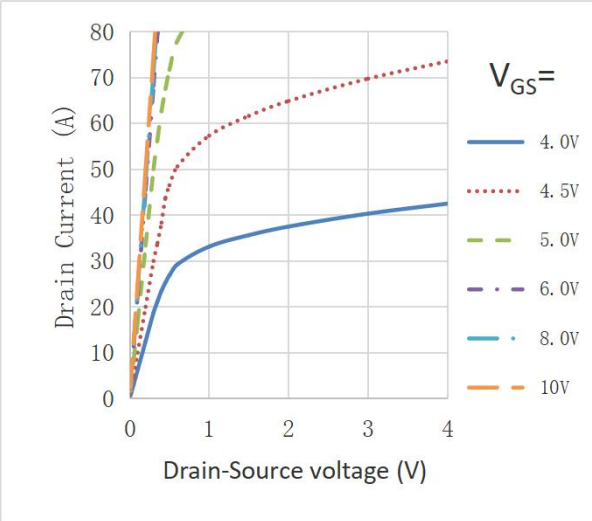


Fig.5 Threshold Voltage V.S Junction Temperature

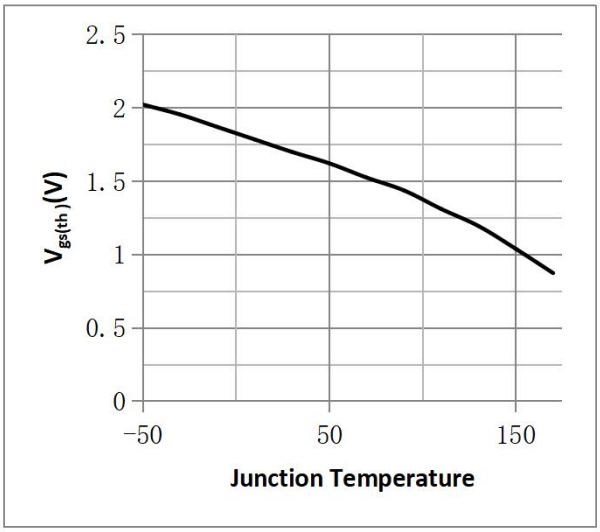


Fig.6 Resistance V.S Drain Current

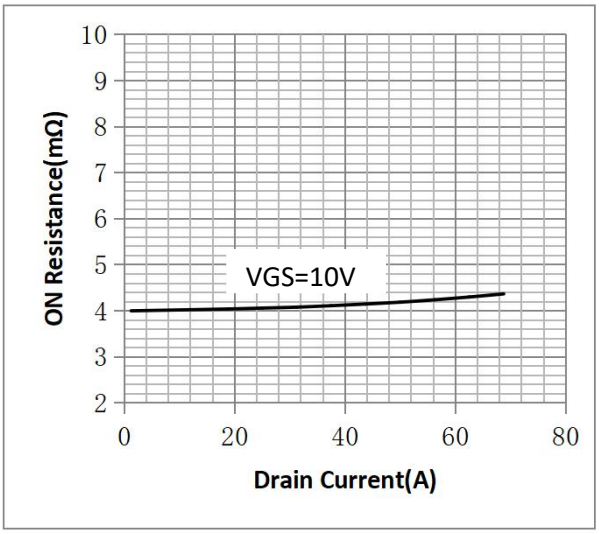


Fig.7 On-Resistance VS Gate Source Voltage

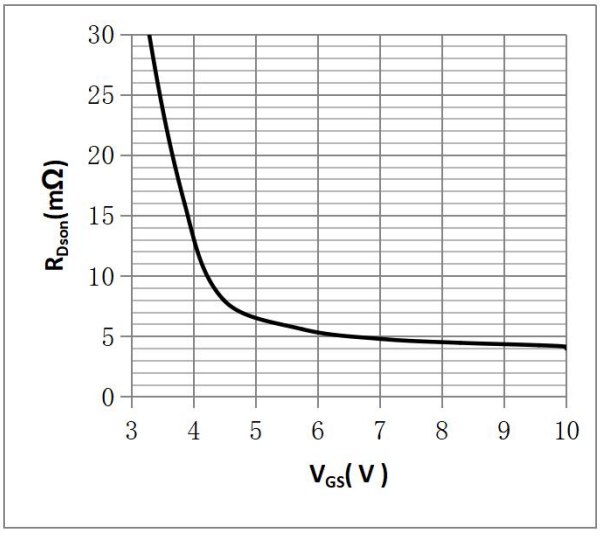


Fig.8 On-Resistance V.S Junction Temperature

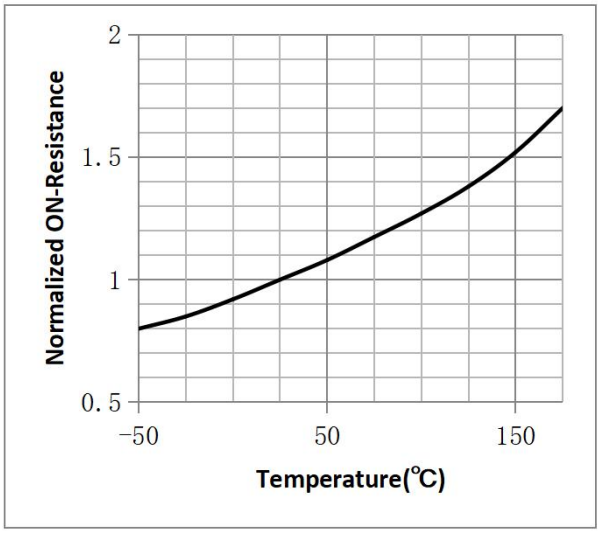


Figure 9. Diode Forward Voltage vs. Current

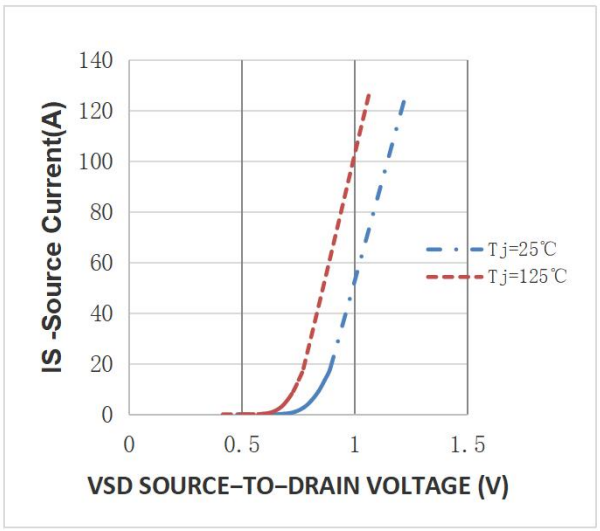


Figure 10. Transfer Characteristics

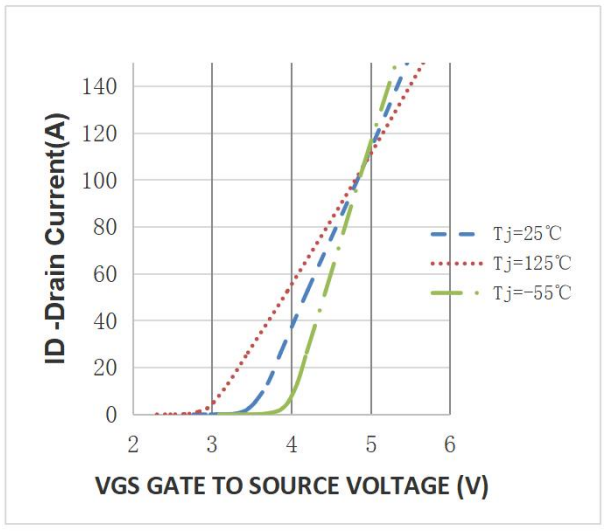


Fig.11 SOA Maximum Safe Operating Area

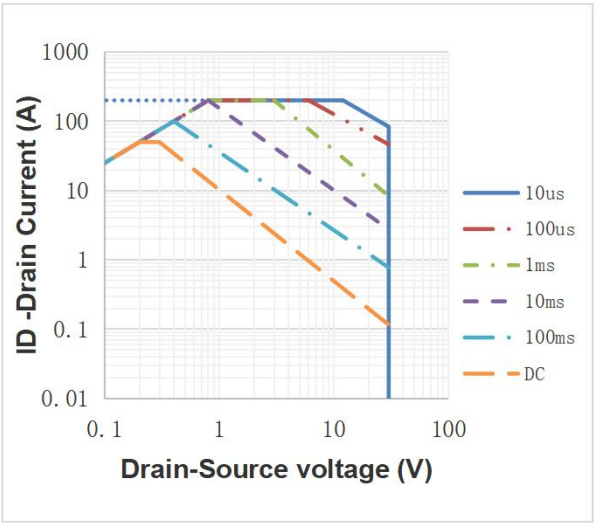
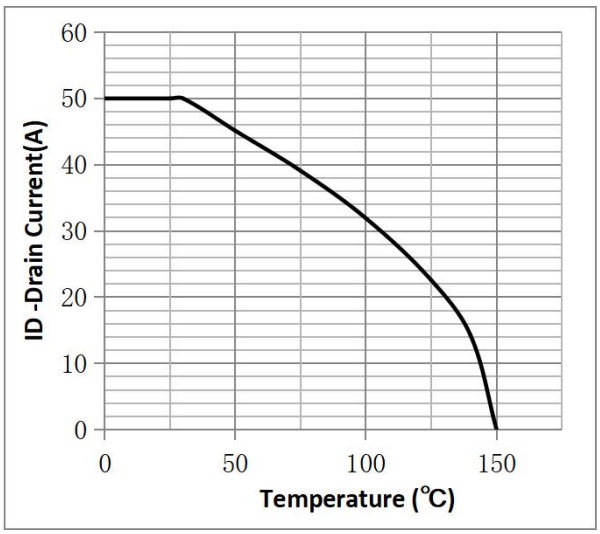


Fig.12 ID vs. Case Temperature④



●Q2 Channel characteristics curve

Fig.1 Gate-Charge Characteristics

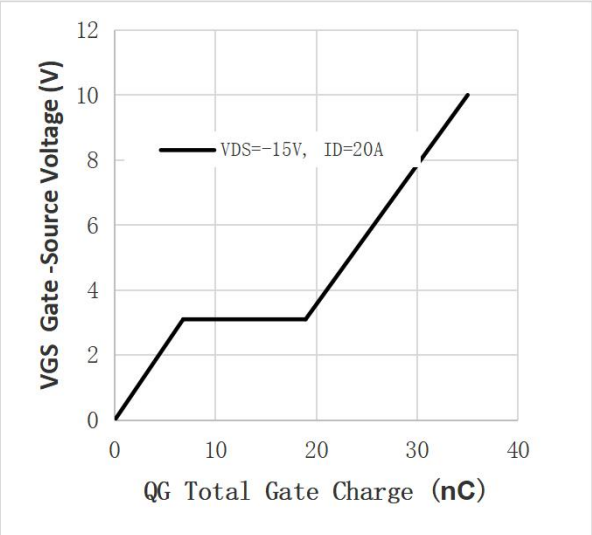


Fig.2 Capacitance Characteristics

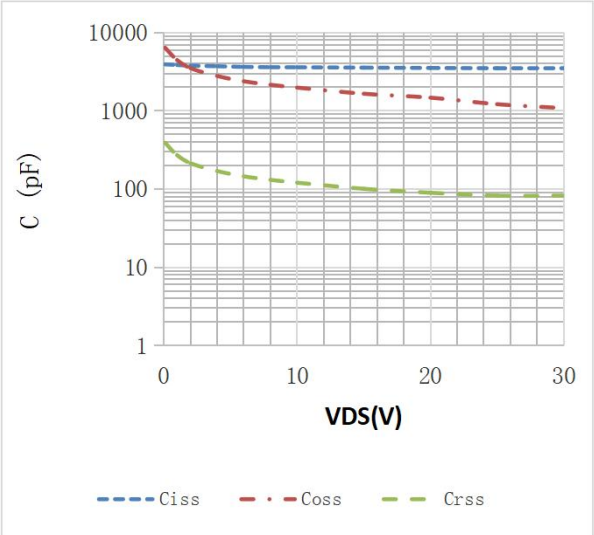


Fig.3 Power Dissipation

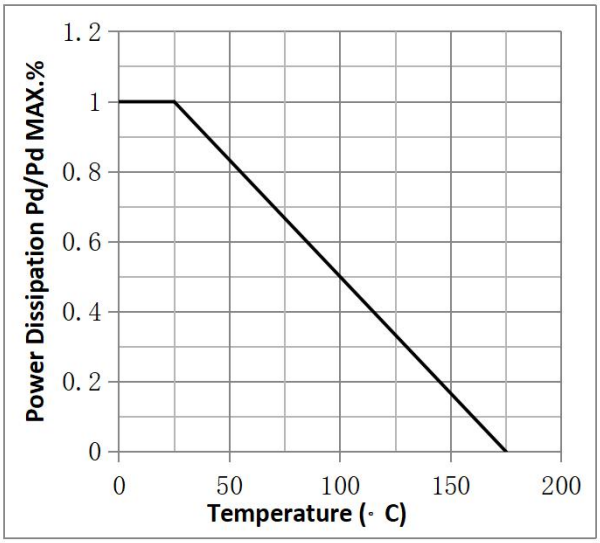


Fig.4 Typical output Characteristics

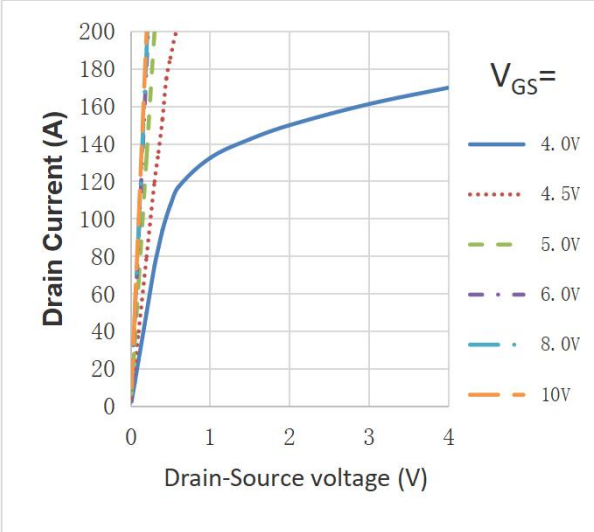


Fig.5 Threshold Voltage V.S Junction Temperature

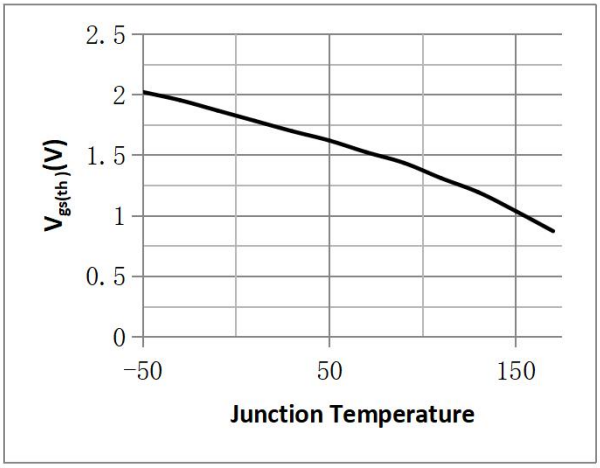


Fig.6 Resistance V.S Drain Current

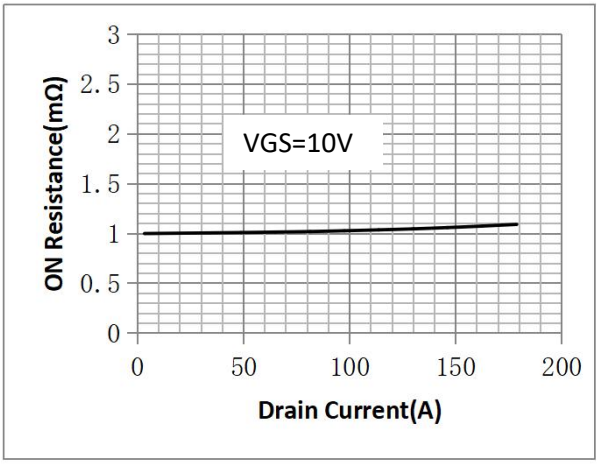


Fig.7 On-Resistance VS Gate Source Voltage

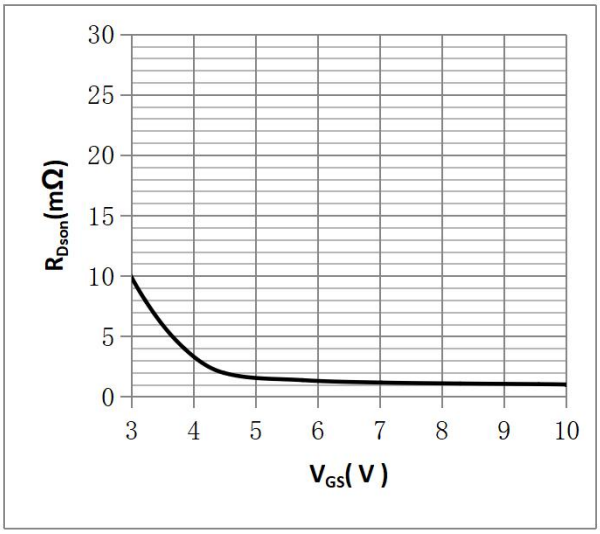


Fig.8 On-Resistance V.S Junction Temperature

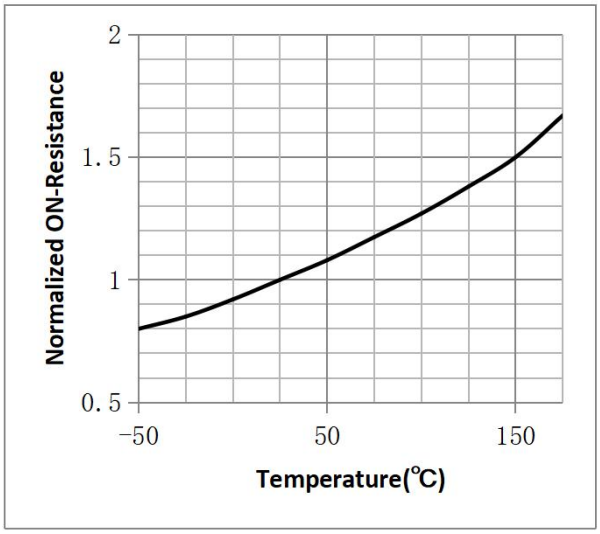


Figure 9. Diode Forward Voltage vs. Current

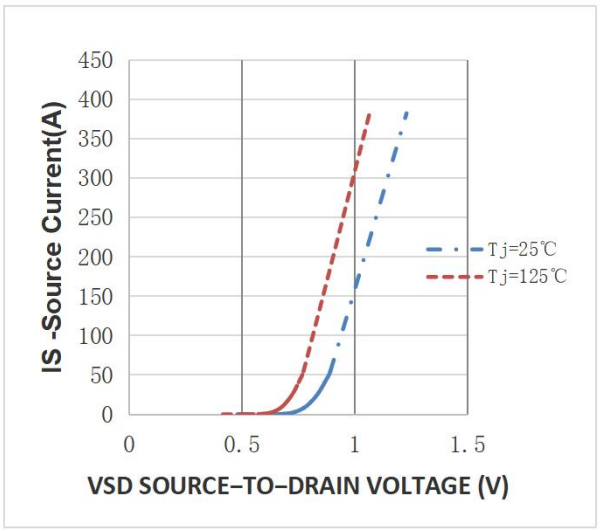


Figure 10. Transfer Characteristics

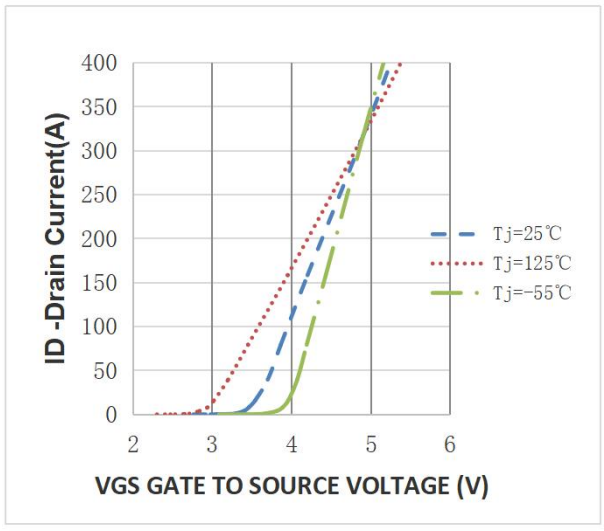


Fig.11 SOA Maximum Safe Operating Area

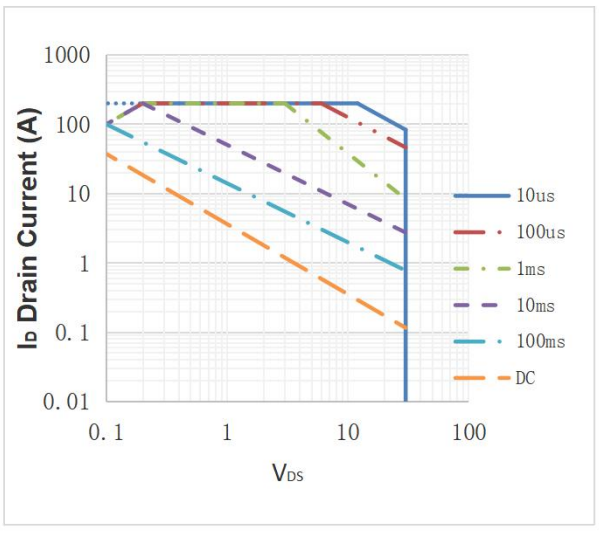
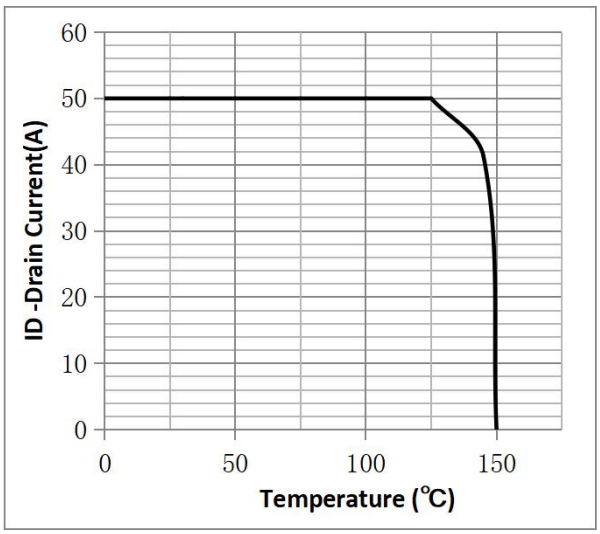
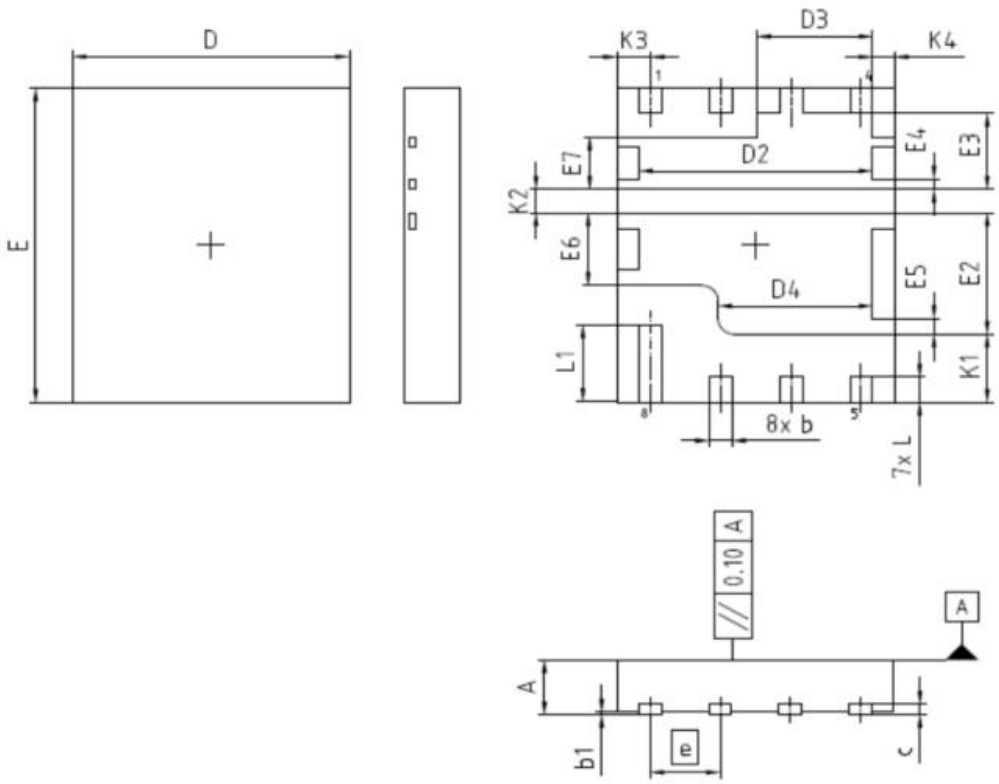


Fig.12 ID vs. Case Temperature④



●DFN5*6 Package Outline



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
b	0.31	0.51	0.012	0.020
b1	0.00	0.05	0.000	0.002
c	0.10	0.30	0.004	0.012
D	4.90	5.10	0.193	0.201
D2	4.12	4.32	0.162	0.170
D3	1.99	2.19	0.078	0.086
D4	2.69	2.89	0.106	0.114
E	5.90	6.10	0.232	0.240
E2	2.22	2.42	0.087	0.095
E3	1.35	1.55	0.053	0.061
E4	0.10	0.30	0.004	0.012
E5	0.20	0.40	0.008	0.016
E6	1.29	1.49	0.051	0.059
E7	0.90	1.10	0.035	0.043
e	1.27 (BSC)		0.05 (BSC)	
N	8		8	
L	0.38	0.58	0.015	0.023
L1	1.38	1.58	0.054	0.062
K1	1.20	1.40	0.047	0.055
K2	0.35	0.55	0.014	0.022
K3	0.50	0.70	0.020	0.028
K4	0.29	0.49	0.011	0.019

Note:

① Pulse : VGS=+20V/-20V, Duty cycle=50%,Tj=150℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=+20V/-10V, Tj=150℃, t=1000 hours；

② Pulse : VGS=+20V/-20V, Duty cycle=50%,Tj=150℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=-20V/+10V, Tj=150℃, 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=10V (N channel)/-10V(P channel).

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Revision History

Version	Date	Change
A	2023.7.16	NEW