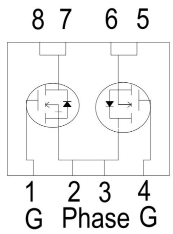
60V N-Channel Power SpeedFET

• General Description

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

• Product Summary



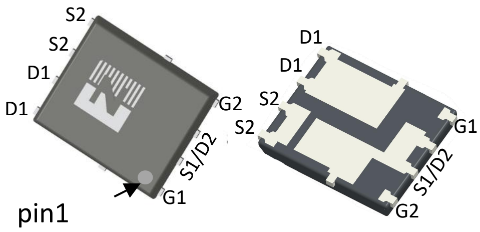
V_{DS}= 60V

$R_{DS(ON)}$ = 6mΩ

I_D= 55A

• Features

- ■AEC-Q101 Qualified
- ■Low $R_{DS(ON)}$ to minimize conductive loss
- ■Low Gate Charge for fast switching
- ■Half-Bridge - N-channel



DFN5*6

•Application

- ■BLDC Motor driver
- ■DC-DC

•Ordering Information:

Part NO.	ZMDA68608NB
Marking	ZMD68608
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		60	V
Gate-Source Voltage①	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	55	A
	I_D	T_C=75℃	45	A
	I_D	T_C=100℃	39	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	220	A
Total Power Dissipation	P_D	T_C=25℃	52	W
Total Power Dissipation	P_D	T_A=25℃	3.3	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}=10V, Rg=25Ω,	61	mJ
		L=0.5mH, V_{GS}=10V, Rg=25Ω,	104	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	2.9	°C/W
Thermal resistance, junction-ambient②	R_{thJA}		-	45	°C/W
Soldering temperature	Tsold		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	60			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	2.0	2.7	3.2	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 60V			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= 14A		6	7.2	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 5A		14		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 14A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	1230	-	pF
Output capacitance	Coss		-	755	-	
Reverse transfer capacitance	Crss		-	51	-	
Gate Risistance	Rg	f = 1MHz	-	0.9		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	12.8	-	nC
Gate - Source charge	Qgs		-	2.8	-	
Gate - Drain charge	Qgd		-	3.9	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	6	-	ns
Turn-ON Rise time	t_r		-	3.5	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	11	-	ns
Turn-Off Fall time	t_f		-	6.5	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	26	-	ns
Reverse Recovery Charge	Q_{RR}		-	16	-	nC

Fig.1 Gate-Charge Characteristics

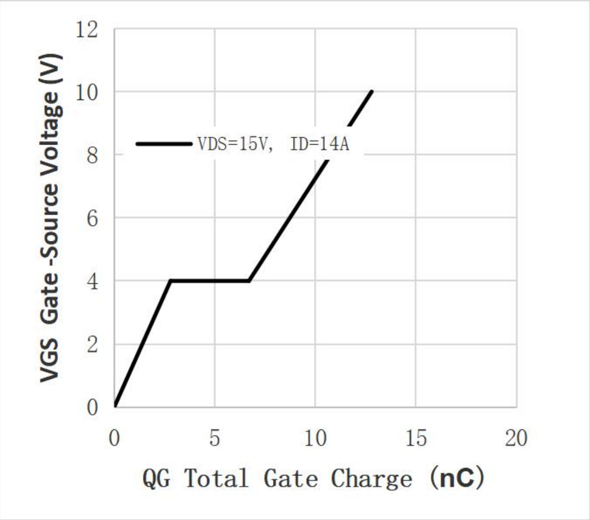


Fig.2 Capacitance Characteristics

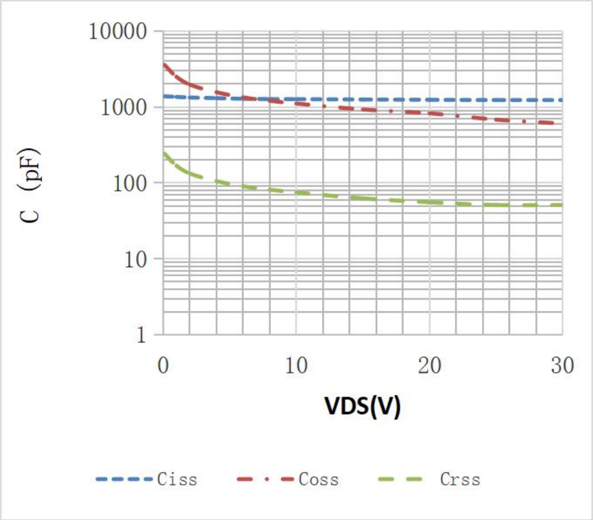


Fig.3 Power Dissipation

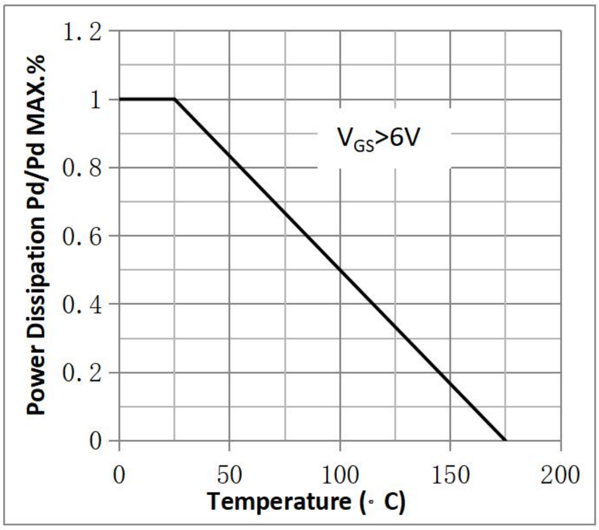


Fig.4 Typical output Characteristics

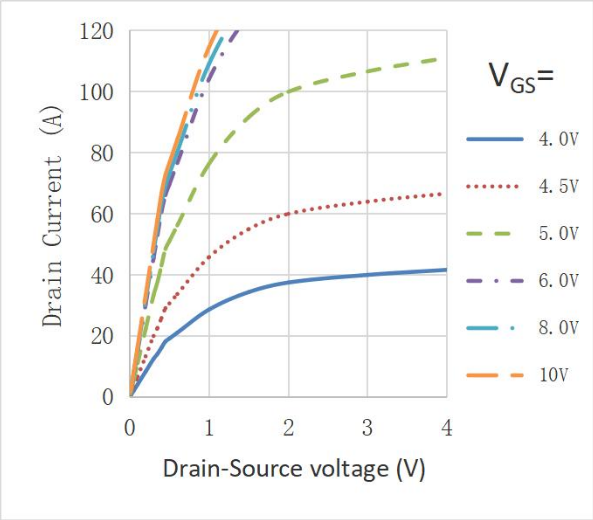


Fig.5 Threshold Voltage V.S Junction Temperature

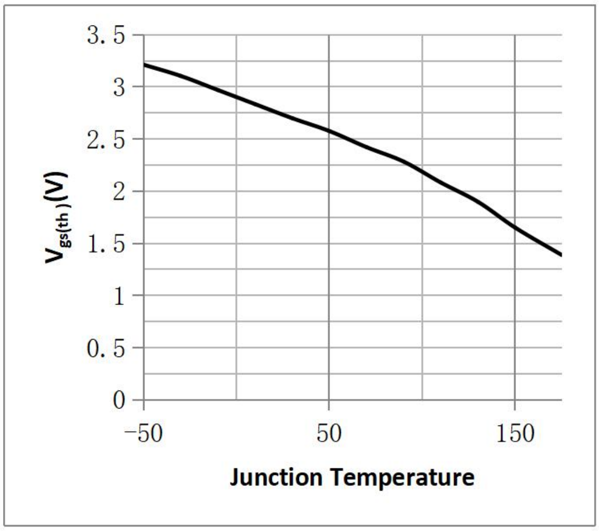


Fig.6 Resistance V.S Drain Current

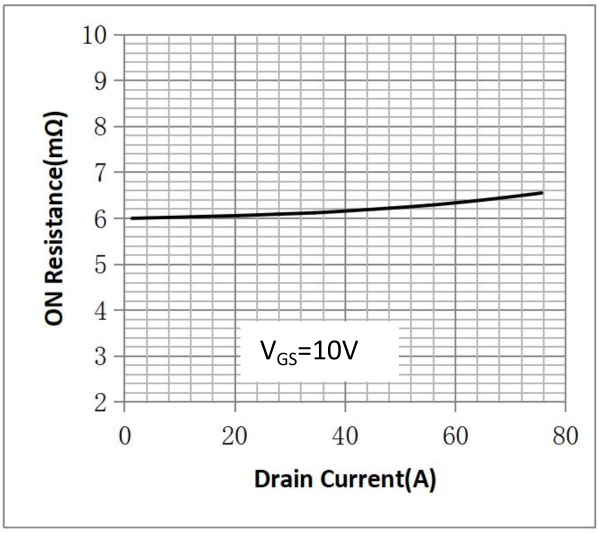


Fig.7 On-Resistance VS Gate Source Voltage

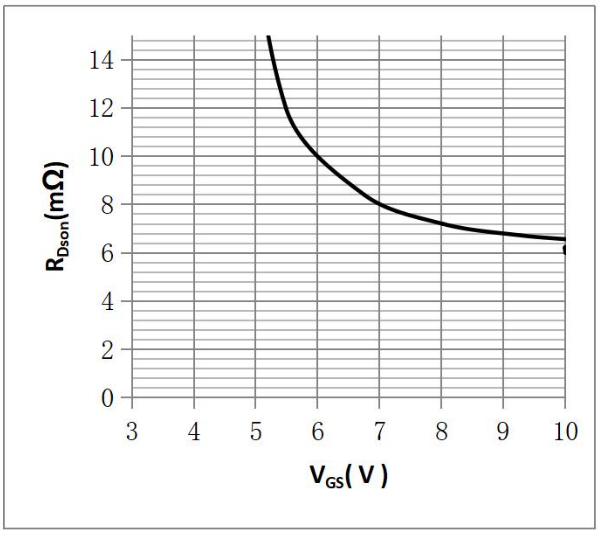


Fig.8 On-Resistance V.S Junction Temperature

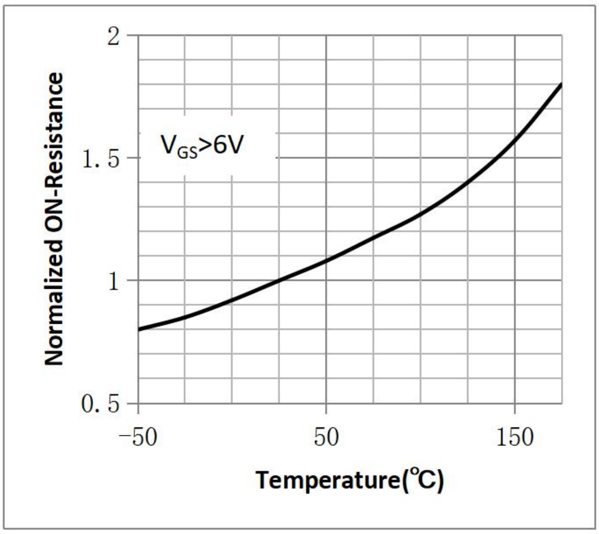


Figure 9. Diode Forward Voltage vs. Current

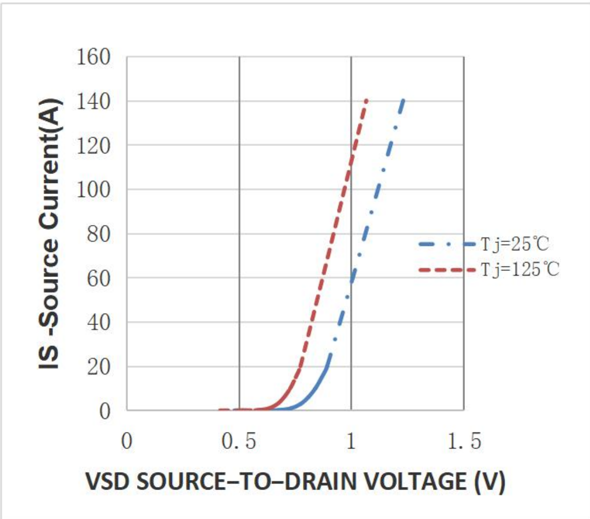


Figure 10. Transfer Characteristics

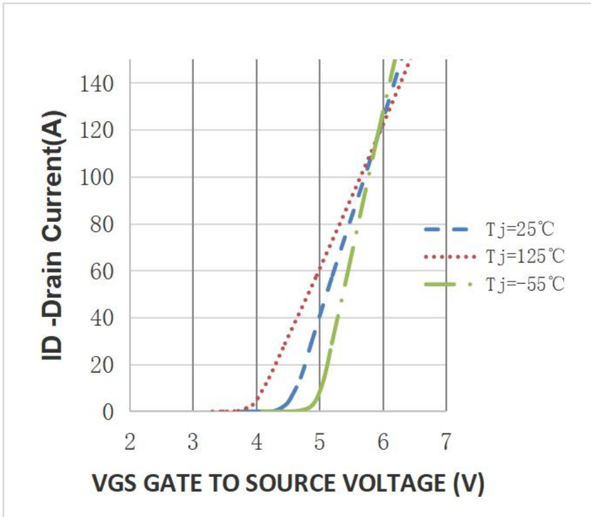


Fig.11 Safe Operating Area

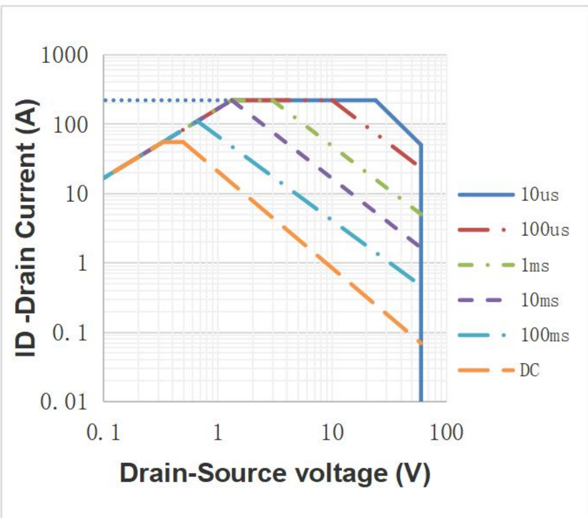
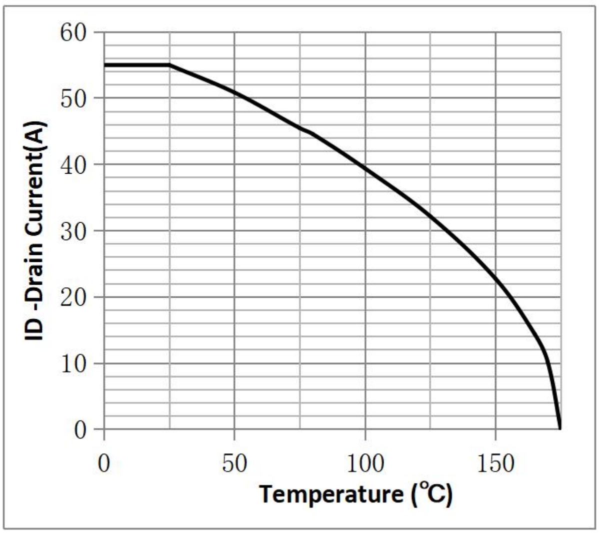
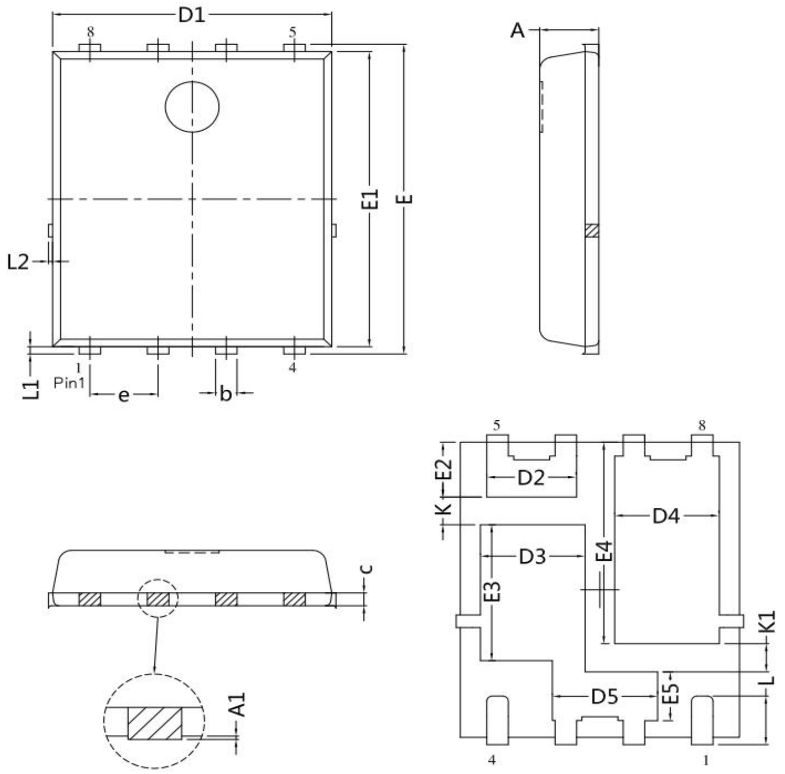


Fig.12 ID vs. Case Temperature③



●**DFN5*6 Package Outline**



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.00	1.10	1.20
A1	0	---	0.05
b	0.30	0.40	0.50
c	0.20	0.25	0.30
D1	5.10	5.20	5.30
D2	1.52	1.67	1.82
D3	1.78	1.95	2.10
D4	1.78	1.95	2.10
D5	1.81	1.96	2.11
E	6.00	6.15	6.30
E1	5.76	5.86	5.96
E2	0.94	1.09	1.24
E3	2.55	2.70	2.85
E4	3.85	4.0	4.15
E5	0.82	0.97	1.12
e	1.27 BSC		
L	0.90	0.96	1.06
L1	0.05	0.15	0.25
L2	0.02	0.08	0.15
K	0.55	---	---
K1	0.56	---	---

Note:

① Pulse : VGS=+20V/-20V, Duty cycle=50%,Tj=175℃, t=1000 hours; For DC， the following test conditions can be passed: VGS=+20V/-10V, Tj=175℃, t=1000 hours；

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

③Practically the current will be limited by PCB, thermal design and operating temperature. VGS=10V.

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Revision History

Version	Date	Change
A	2024.6.30	