

40V N-Channel Power SpeedFET

• General Description

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

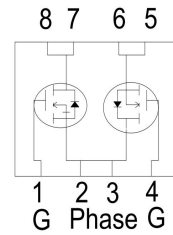
• Features

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

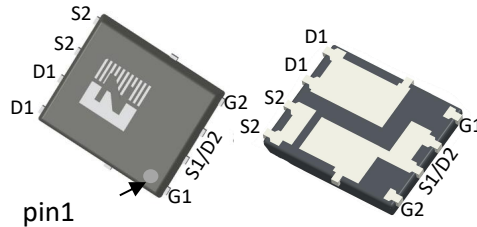
• Application

- BLDC Motor driver
- DC-DC

• Product Summary



$V_{DS} = 40V$
 $R_{DS(ON)} = 2.6m\Omega$
 $I_D = 60A$



DFN5*6



• Ordering Information:

Part NO.	ZMDA68408N
Marking	ZMD68408
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

• Absolute Maximum Ratings ($T_C=25^\circ C$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		40	V
Gate-Source Voltage ^①	V_{GS}		±20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	60	A
	I_D	$T_C=75^\circ C$	60	A
	I_D	$T_C=100^\circ C$	60	A
Pulsed Drain Current	I_{DM}	Pulsed; $t_p \leq 10 \mu s$; $T_{mb} = 25^\circ C$;	240	A
Total Power Dissipation	P_D	$T_C=25^\circ C$	47	W
Total Power Dissipation	P_D	$T_A=25^\circ C$	3.3	W
Operating Junction Temperature	T_J		-55 to +175	°C
Storage Temperature	T_{STG}		-55 to +175	°C
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, $V_{GS}=10V$, $R_g=25\Omega$,	35	mJ
		L=0.5mH, $V_{GS}=10V$, $R_g=25\Omega$,	73.5	mJ
ESD Level (HBM)			CLASS 2	

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	3.2	$^{\circ}C/W$
Thermal resistance, junction-ambient ^②	R_{thJA}		-	45	$^{\circ}C/W$
Soldering temperature	T_{sold}		-	260	$^{\circ}C$

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.0	2.7	3.2	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS} = 0V, V_{DS} = 40V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 24A$		2.6	3.2	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 5V, I_{SD} = 10A$		30		S
Diode Forward Voltage	V_{FSD}	$V_{GS} = 0V, I_{SD} = 24A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f = 1MHz, V_{DS} = 25V$	-	1800	-	pF
Output capacitance	C_{oss}		-	532	-	
Reverse transfer capacitance	C_{rss}		-	28	-	
Gate Resistance	R_g	$f = 1MHz$	-	1.2		Ω
Total gate charge	Q_g	$V_{DD} = 15V, I_D = 20A, V_{GS} = 10V$	-	28	-	nC
Gate - Source charge	Q_{gs}		-	6.3	-	
Gate - Drain charge	Q_{gd}		-	6.8	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS} = 10V, V_{DS} = 15V, R_G = 3.3\Omega, I_D = 20A$	-	6.5	-	ns
Turn-ON Rise time	t_r		-	4	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	16	-	ns
Turn-Off Fall time	t_f		-	7	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD} = 20V, di_S/dt = 100A/\mu s, I_S = 20A$	-	52	-	ns
Reverse Recovery Charge	Q_{RR}		-	26	-	nC

Fig.1 Gate-Charge Characteristics

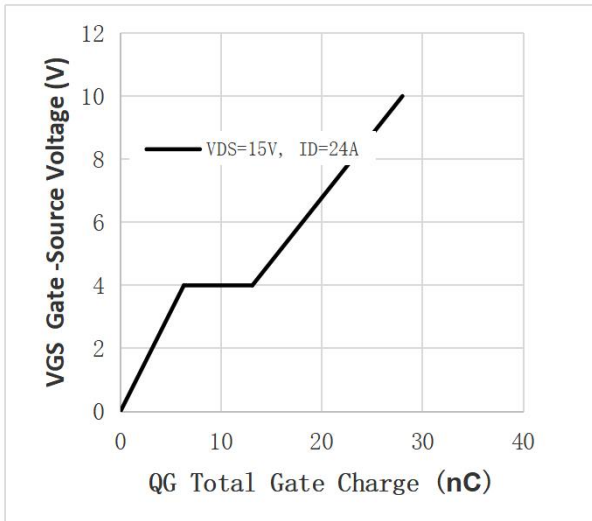


Fig.2 Capacitance Characteristics

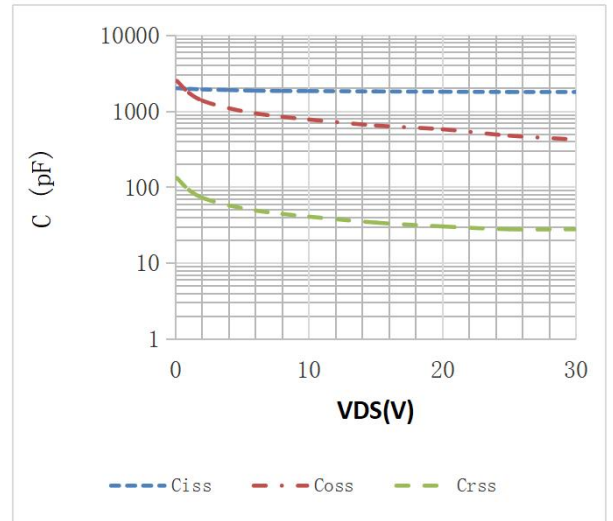


Fig.3 Power Dissipation

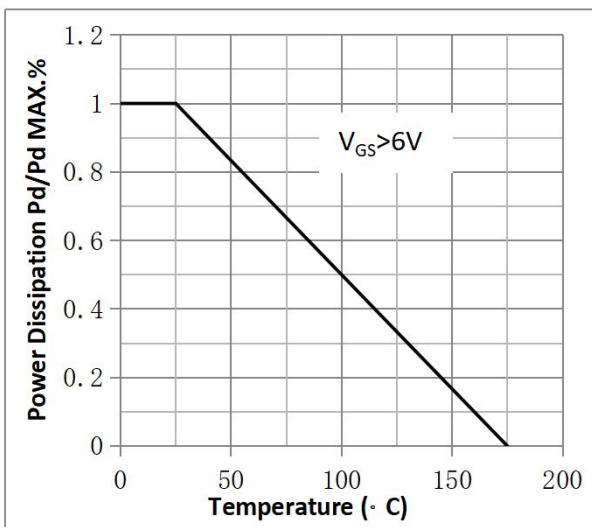


Fig.4 Typical output Characteristics

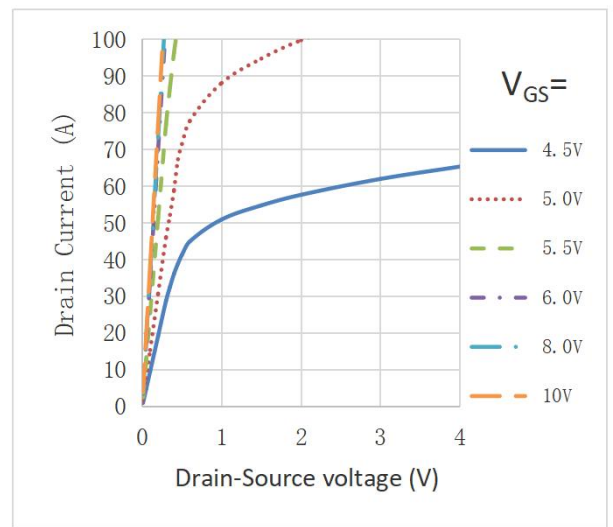


Fig.5 Threshold Voltage V.S Junction Temperature

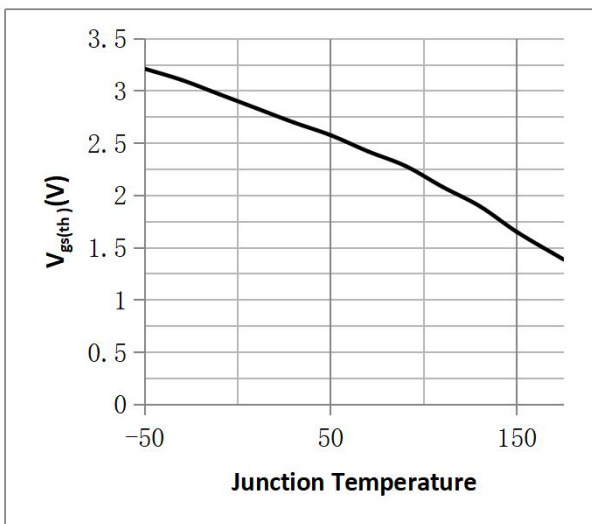


Fig.6 Resistance V.S Drain Current

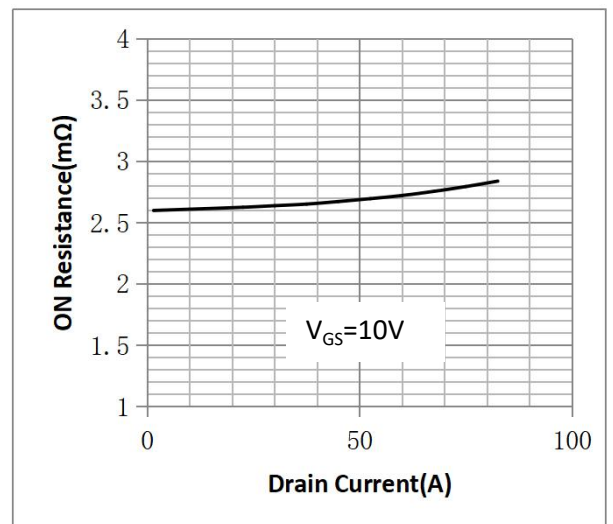


Fig.7 On-Resistance VS Gate Source Voltage

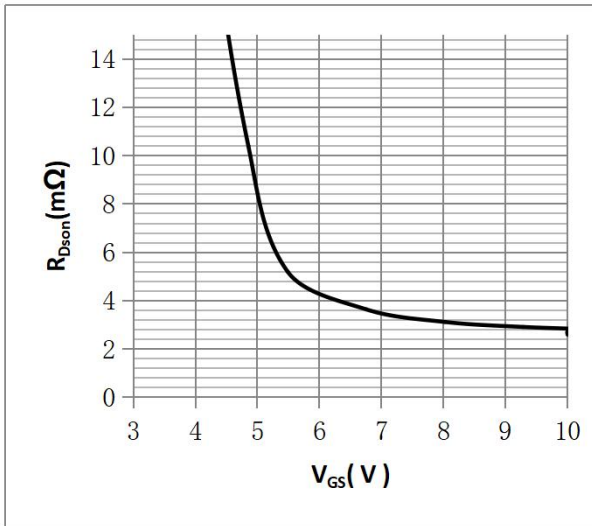


Fig.8 On-Resistance V.S Junction Temperature

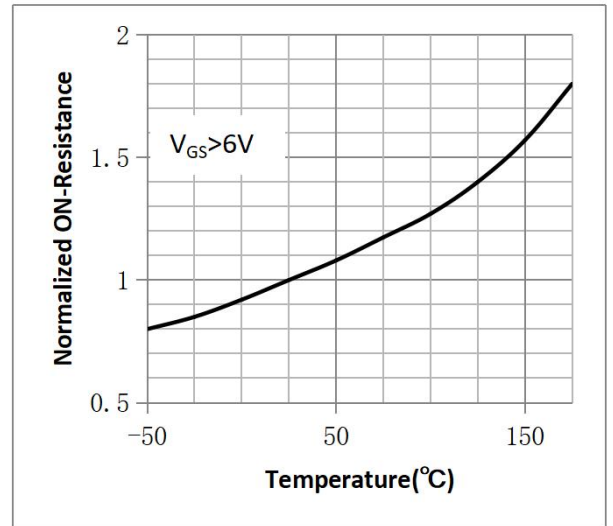


Figure 9. Diode Forward Voltage vs. Current

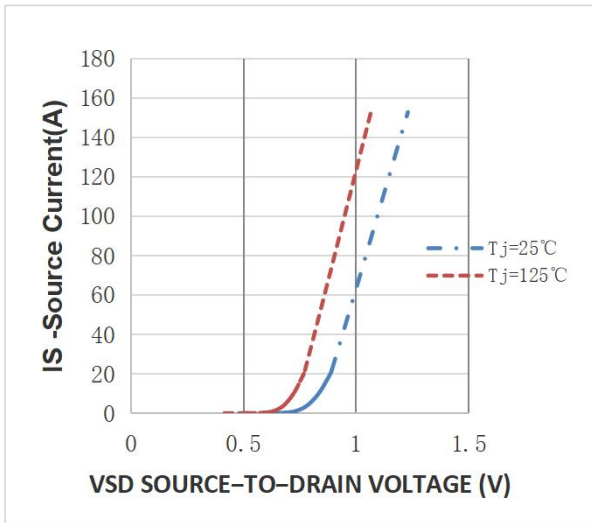


Figure 10. Transfer Characteristics

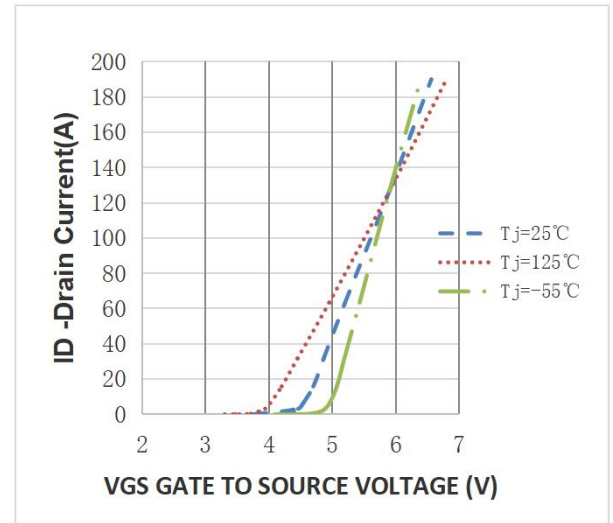


Fig.11 Safe Operating Area

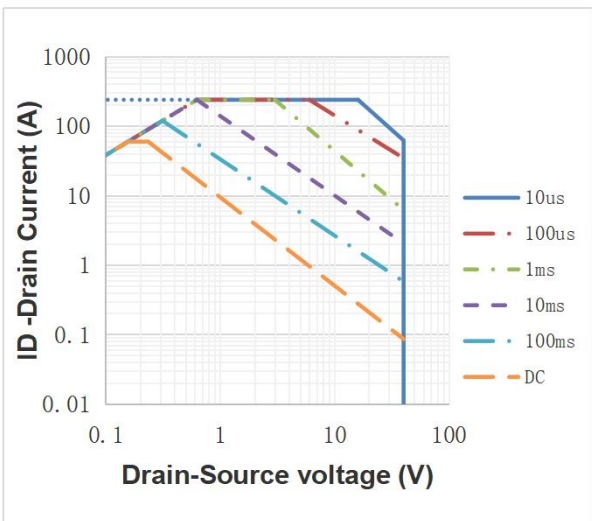
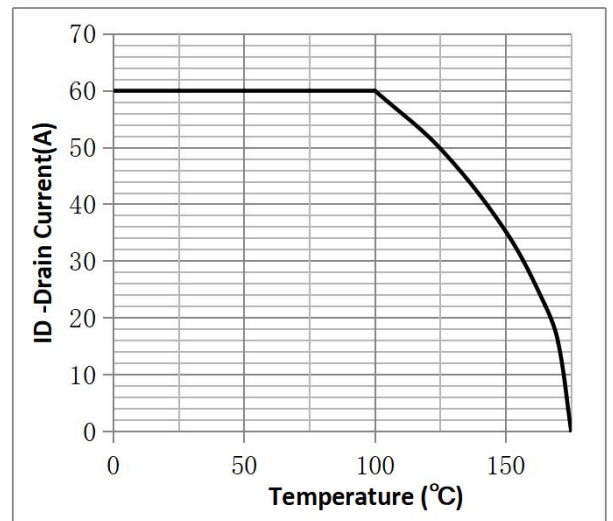
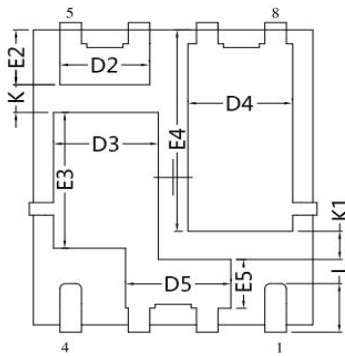
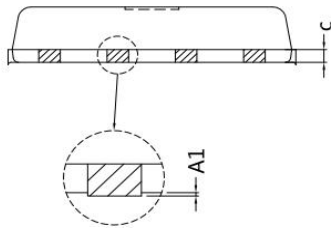
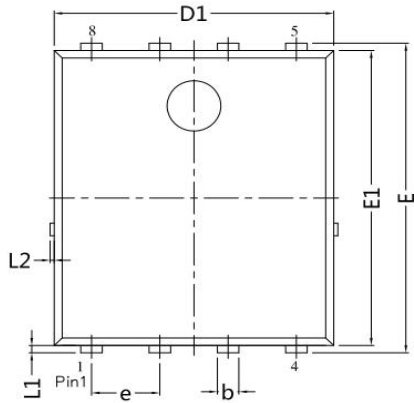


Fig.12 ID vs. Case Temperature^③



•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 : $V_{GS}=+20V/-20V$, Duty cycle=50%, $T_j=175^{\circ}C$, $t=1000$ hours; For DC , the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=175^{\circ}C$, $t=1000$ hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ③ Practically the current will be limited by PCB, thermal design and operating temperature. $V_{GS}=10V$.

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Revision History

Version	Date	Change
A	2023.6.20	NEW
B	2023.7.6	Supplementary dynamic parameters