

40V N-Channel Power MOSFET

• **General Description**

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

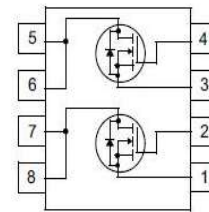
• **Features**

- AEC-Q101 Qualified
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• **Application**

- BLDC Motor driver
- DC-DC
- Battery protection

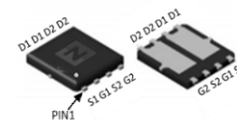
• **Product Summary**



$$V_{DS} = 40V$$

$$R_{DS(ON)} = 13m\Omega$$

$$I_D = 21A$$



DFN3*3

• **Ordering Information:**

Part NO.	ZMDA68403M
Marking	68403
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

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

Parameter	Symbol	Conditions	Min.		Max.	Unit
Drain-Source Voltage	V_{DS}	$25^\circ C < T_J < 175^\circ C$	40			V
Gate-Source Voltage	V_{GS}	Pulsed ^①	-20		20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$			21	A
	I_D	$T_C=75^\circ C$			17	A
	I_D	$T_C=100^\circ C$			15	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p < 10 \mu s$; $T_{mb} = 25^\circ C$			63	A
Total Power Dissipation	P_D	$T_C=25^\circ C$			18	W
Total Power Dissipation	P_D	$T_A=25^\circ C$			2.1	W
Operating Junction Temperature	T_J		-55		175	$^\circ C$
Storage Temperature	T_{STG}		-55		175	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	$L=0.1mH$, $V_{GS}=10V$, $R_g=25\Omega$,			24	mJ
ESD Level (HBM)			CLASS 1C			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	8.4	°C/W
Thermal resistance, junction-ambient	$R_{thJA}^{②}$		-	70	°C/W
Soldering temperature	T_{sold}		-	260	°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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.3	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS}=40V$			1	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=8A$		13	18	m Ω
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=8A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	1190		pF
Output capacitance	C_{oss}		-	52	-	
Reverse transfer capacitance	C_{rss}		-	29	-	
Gate Resistance	R_g	$f=1MHz$	-	2		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=10A$ $V_{GS}=10V$	-	20	-	nC
Gate - Source charge	Q_{gs}		-	3.3	-	
Gate - Drain charge	Q_{gd}		-	3.6	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=10A$	-	19	-	ns
Turn-ON Rise time	t_r		-	45	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	46	-	ns
Turn-Off Fall time	t_f		-	42	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=10A$	-	21	-	ns
Reverse Recovery Charge	Q_{RR}		-	16	-	nC

Fig.1 Gate-Charge Characteristics

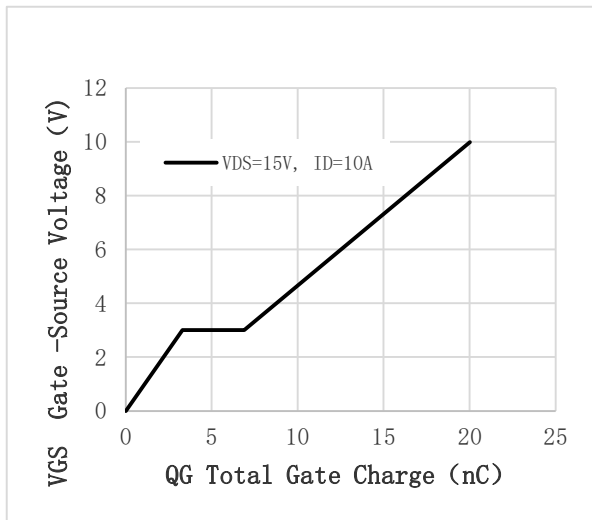


Fig.2 Capacitance Characteristics

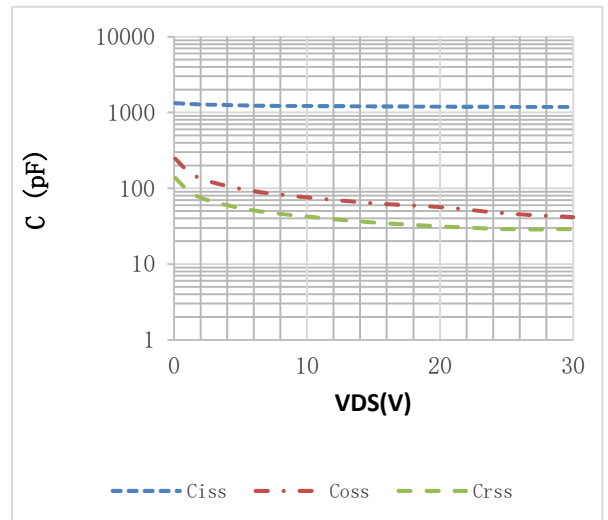


Fig.3 Power Dissipation

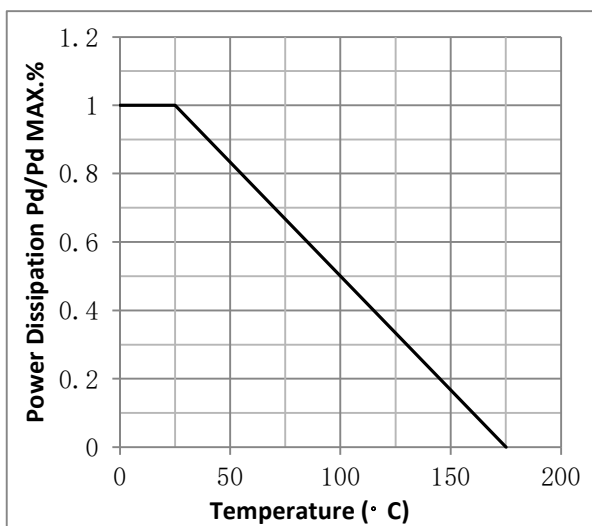


Fig.4 Typical output Characteristics

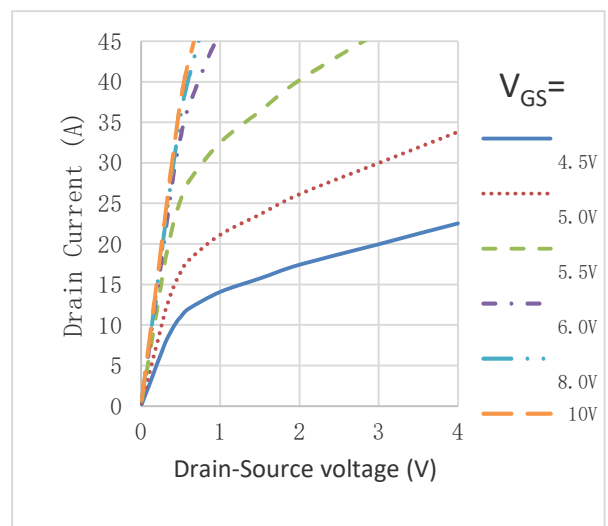


Fig.5 Threshold Voltage V.S Junction Temperature

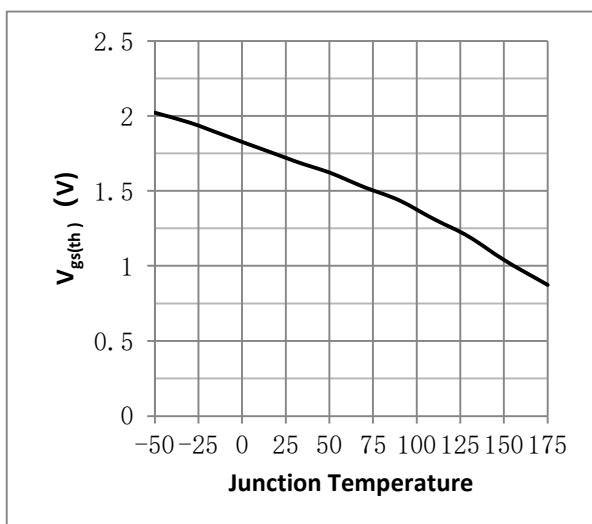


Fig.6 Resistance V.S Drain Current

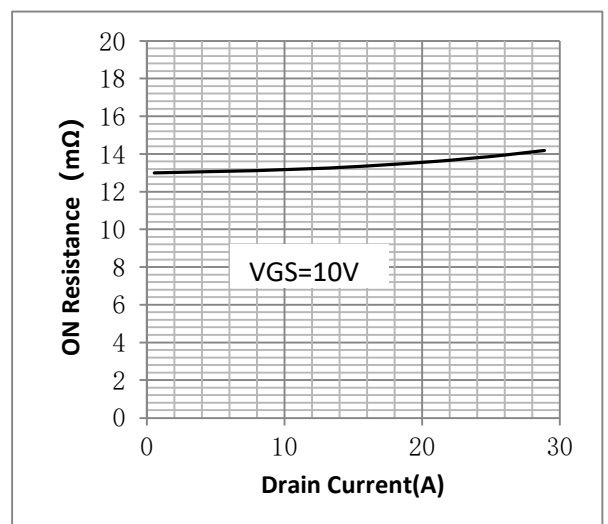


Fig.7 On-Resistance VS Gate Source Voltage

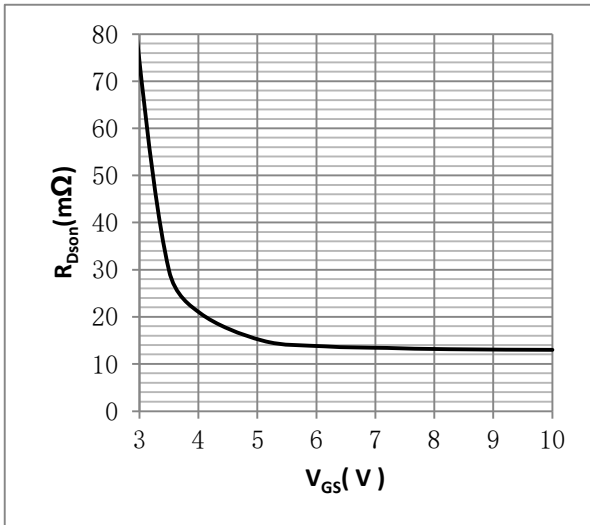


Fig.8 On-Resistance V.S Junction Temperature

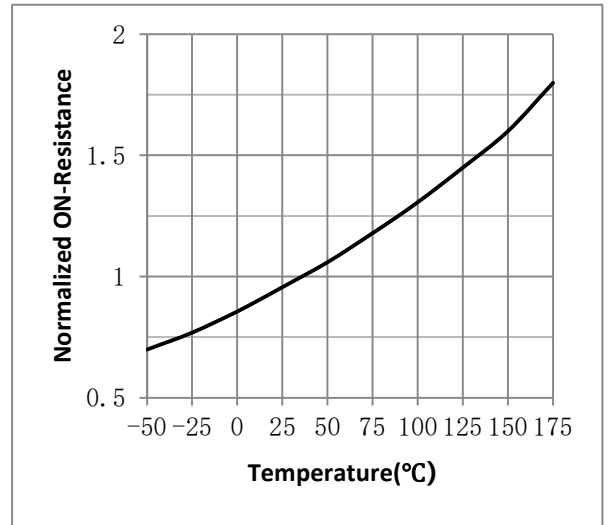


Figure 9. Diode Forward Voltage vs. Current

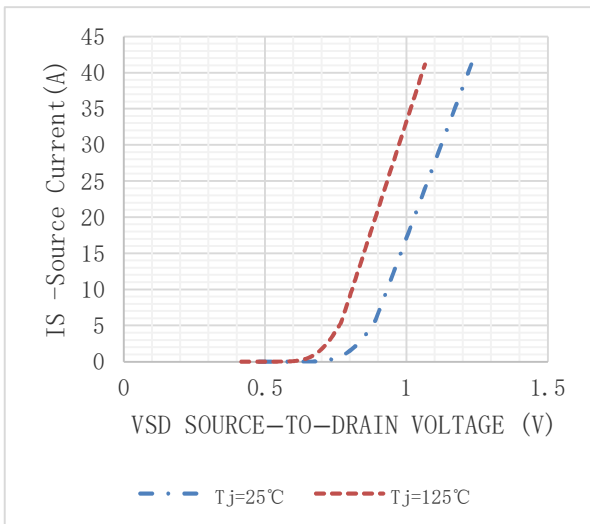


Figure 10. Transfer Characteristics

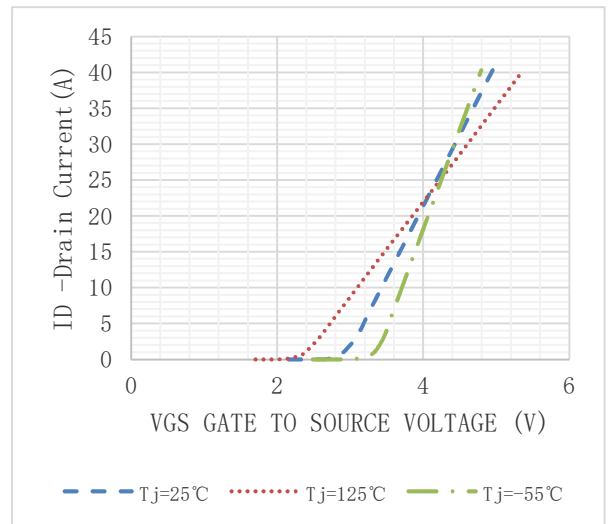


Fig.11 SOA Maximum Safe Operating Area

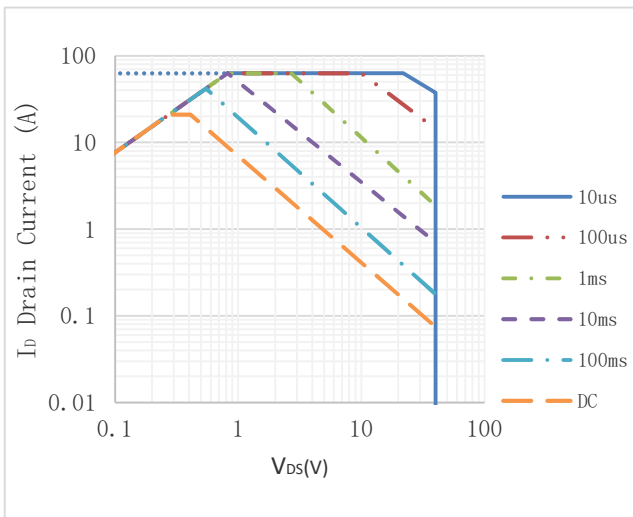
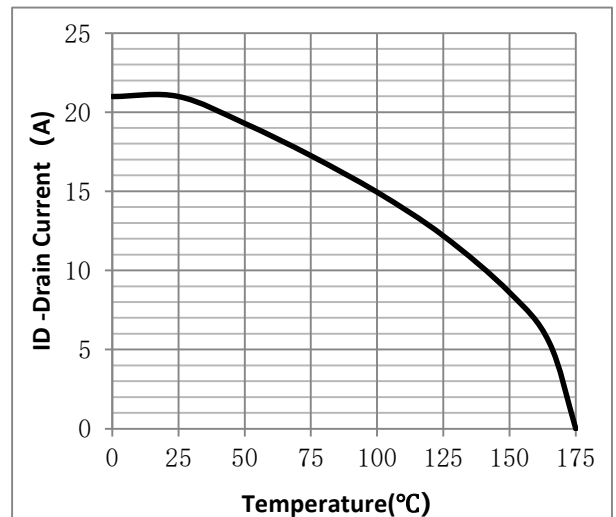
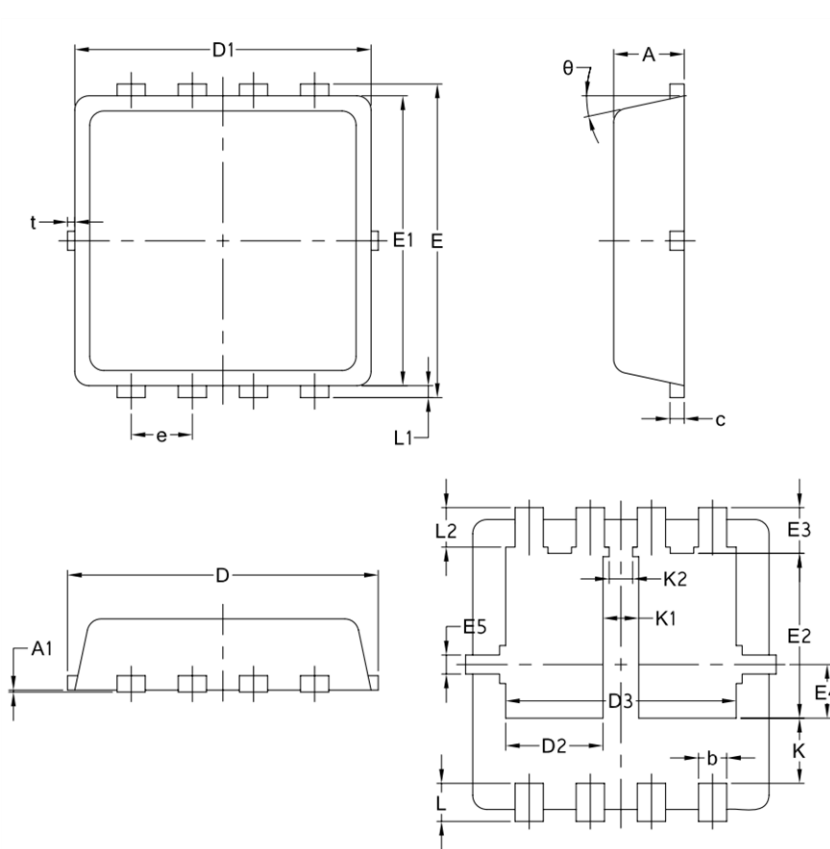


Fig.12 ID vs. Junction Temperature



•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 Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

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