

General Description

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

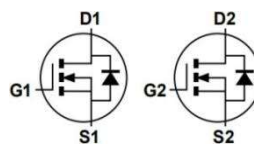
Features

- AEC-Q101 Qualified
- Low $R_{DS(ON)}$ to minimize conductive loss
- High GOX reliability
- Low Thermal resistance

Application

- BLDC Motor driver
- DC-DC
- Battery protection

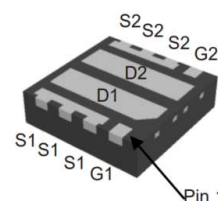
Product Summary



$$V_{DS} = 40V$$

$$R_{DS(ON)} = 18m\Omega$$

$$I_D = 12A$$



DFN3*3



Ordering Information:

Part NO.	ZMDA68405M
Marking	68405
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		40	V
Gate-Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	12	A
	I_D	$T_C=75^\circ\text{C}$	12	A
	I_D	$T_C=100^\circ\text{C}$	11	A
Pulsed Drain Current ^①	I_{DM}	pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	48	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	11	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2.1	W
Operating Junction Temperature	T_J		-55 to +150	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55 to +150	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=0.1\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	20	mJ
ESD Level (HBM)	CLASS 1B			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	11	°C/W
Thermal resistance, junction-ambient ^②	R_{thJA}		-	60	°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}	$V_{GS}=0V, V_{DS}=40V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$		18	25	m Ω
		$V_{GS}=4.5V, I_D=6A$		26.0	35	m Ω
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=10A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	805		pF
Output capacitance	C_{oss}		-	94	-	
Reverse transfer capacitance	C_{rss}		-	58	-	
Gate Resistance	R_g	$f=1MHz$	-	1.6		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=20A, V_{GS}=10V$	-	12	-	nC
Gate - Source charge	Q_{gs}		-	2.8	-	
Gate - Drain charge	Q_{gd}		-	3.1	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	18	-	ns
Turn-ON Rise time	t_r		-	47	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	46	-	ns
Turn-Off Fall time	t_f		-	42	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=50A$	-	28	-	ns
Reverse Recovery Charge	Q_{RR}		-	35	-	nC

Fig.1 Gate-Charge Characteristics

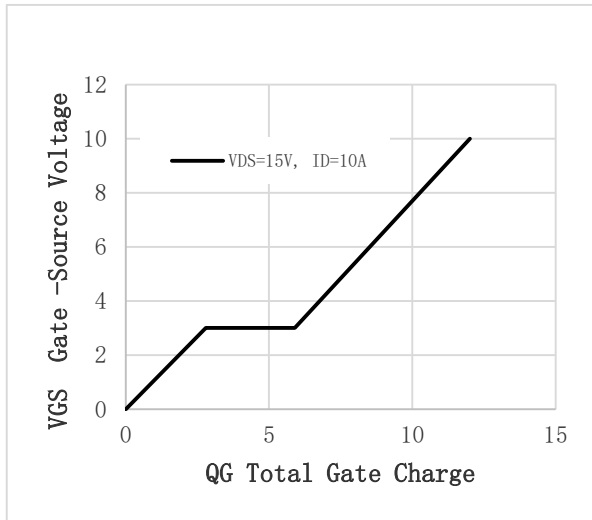


Fig.2 Capacitance Characteristics

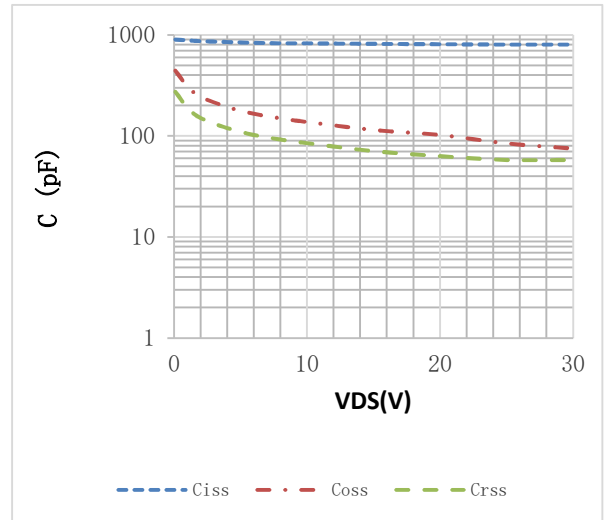


Fig.3 Power Dissipation

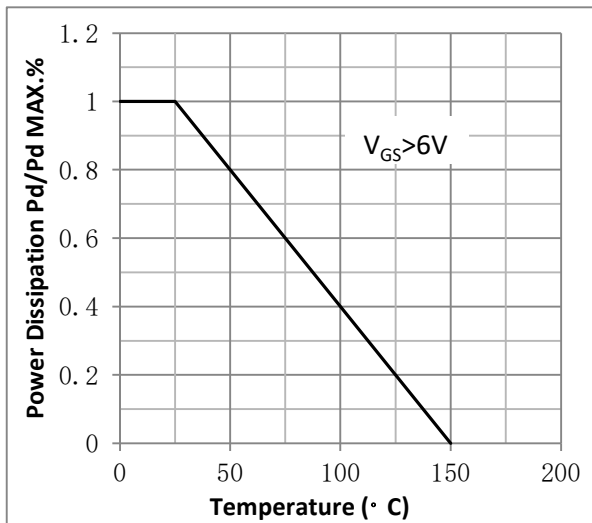


Fig.4 Typical output Characteristics

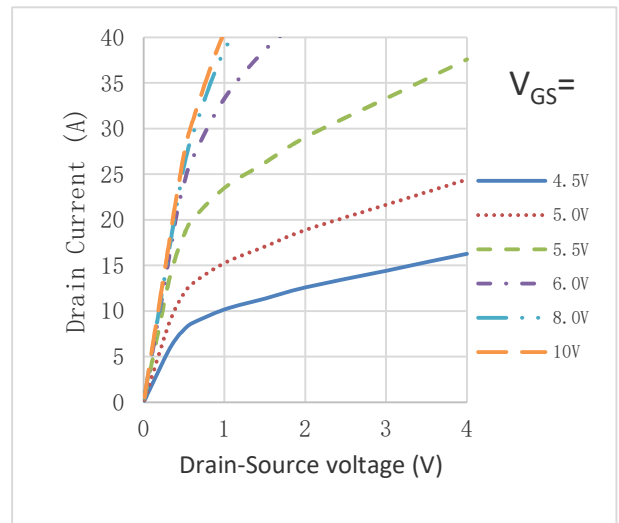


Fig.5 Threshold Voltage V.S Junction Temperature

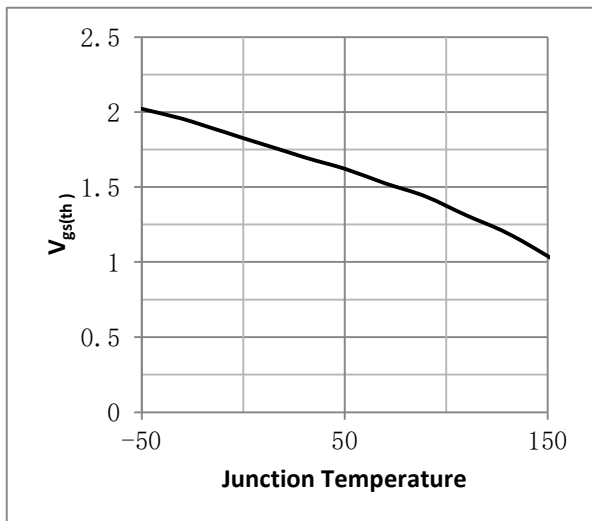


Fig.6 Resistance V.S Drain Current

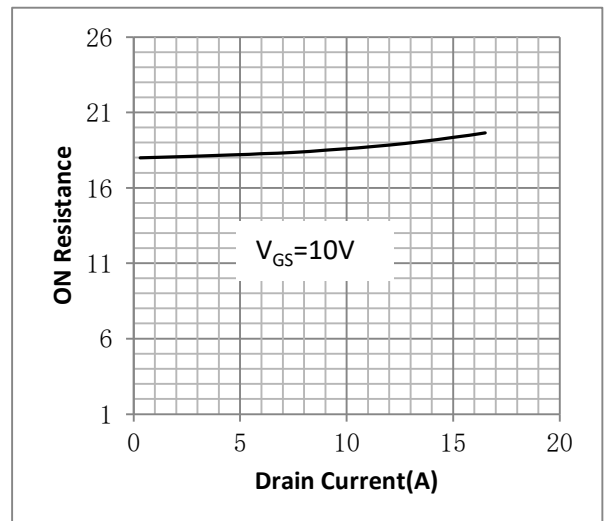


Fig.7 On-Resistance VS Gate Source Voltage

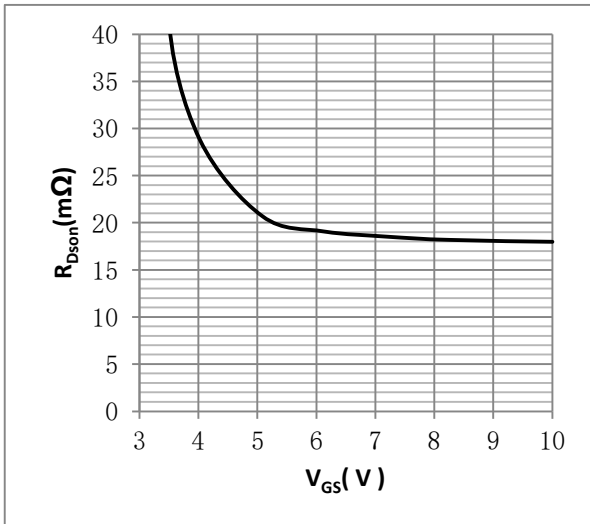


Fig.8 On-Resistance V.S Junction Temperature

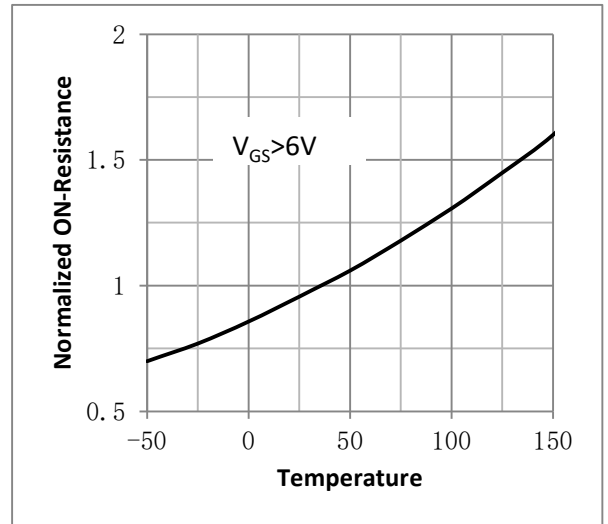


Figure 9. Diode Forward Voltage vs. Current

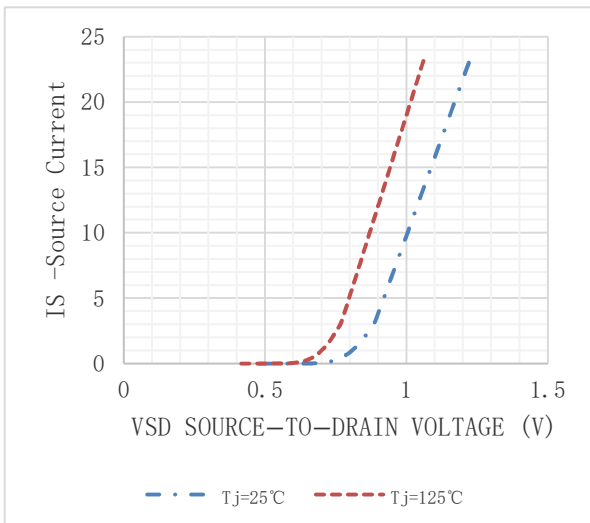


Figure 10. Transfer Characteristics

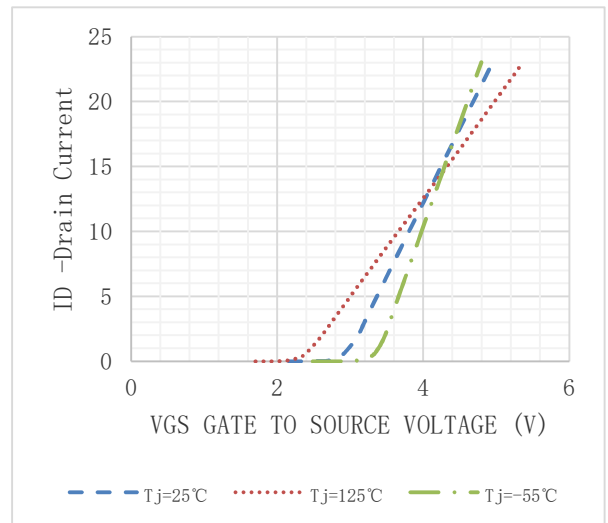


Fig.11 Safe Operating Area

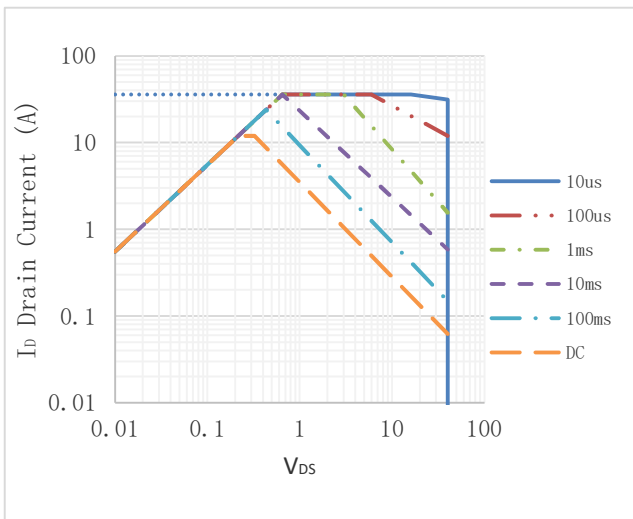
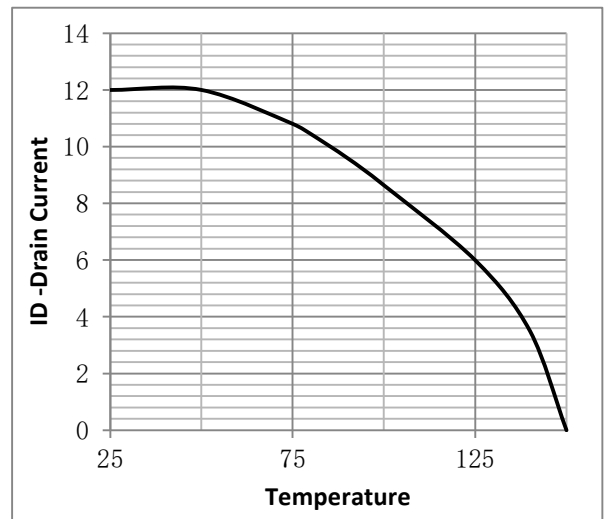
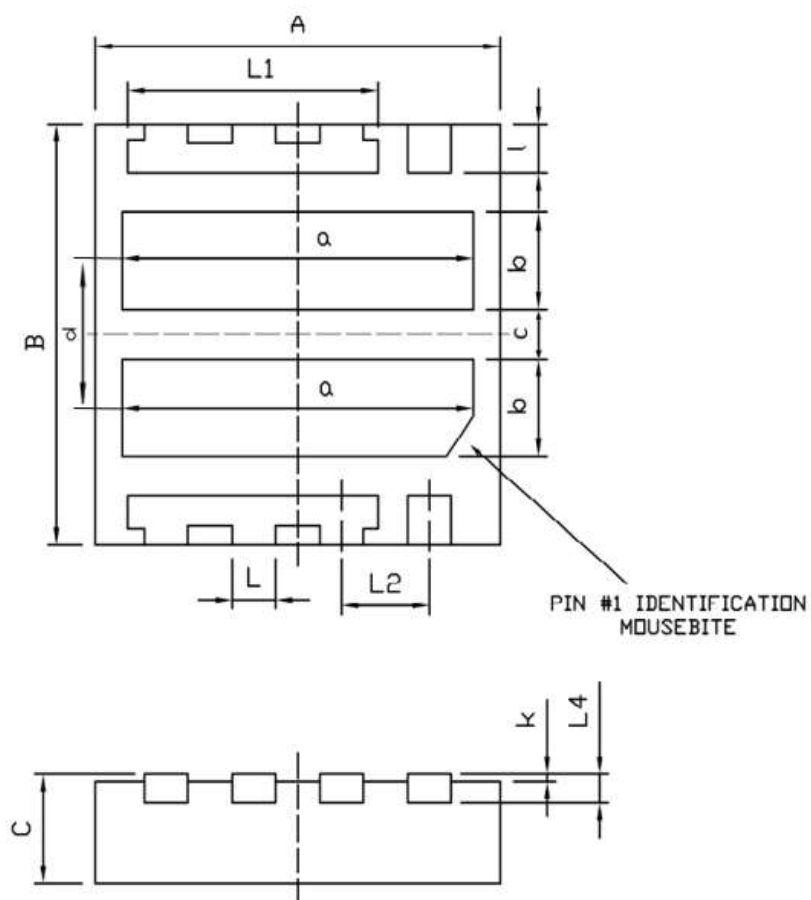


Fig.12 ID vs. Junction Temperature



•DFN3*3 Package Outline



Dimensions In Millimeterer			
Symbol	MIN	TYP	MAX
A	2.95	3.00	3.05
B	2.95	3.00	3.05
C	0.70	0.75	0.80
L	0.27	0.32	0.37
L1	-	1.875	-
L2	-	0.65	-
L4	-	0.203	-
a	2.50	2.60	2.70
b	0.59	0.69	0.79
k	0.00	-	0.05
l	0.30	0.35	0.40
c	-	0.36	-
d	-	1.05	-

Note:

- ① Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$, Accumulation time ≤ 50 hours; For DC , the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=150^{\circ}\text{C}$, $t=1000$ hours;
- ② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

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Revision History

Version	Date	Change
A	2021.7.10	
B	2022.9.5	1.Add Reach,HF figure,2.ID modify
C	2025.9.4	Add dimension c and d in POD.