• 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

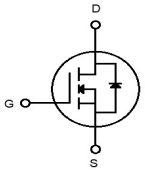
•Application

■BLDC Motor driver

■DC-DC

■Load Switch

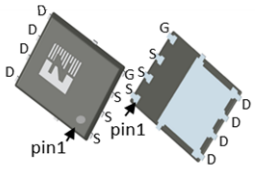
• Product Summary



V_{DS}= 60V

$R_{DS(ON)}$ = 0.75mΩ

I_D= 384A



DFN5*6

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMSA009N06NC
Marking	ZMS009N06
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_A=25°C,unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-Source Voltage	V_{DS}		-	60	V
Gate-Source Voltage①	V_{GS}		-20	20	V
Continuous Drain Current	I_D	V_{GS}=10V,T_C=25℃	-	384	A
	I_D	V_{GS}=10V,T_C=75°C	-	313	A
	I_D	V_{GS}=10V,T_C=100°C	-	271	A
Pulsed Drain Current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C;	-	1536	A
Total Power Dissipation	P_D	T_C=25℃	-	224	W
Total Power Dissipation	P_D	T_A=25℃	-	3.3	W
Operating Junction Temperature	T_J		-55	175	℃
Storage Temperature	T_{STG}		-55	175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=10V, Rg=25Ω,	-	605	mJ
		L=0.3mH, V_{GS}=10V, Rg=25Ω,	-	968	mJ
ESD Level (HBM)	CLASS 2				

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.67	°C/W
Thermal resistance, junction-ambient	R_{thJA} ②	-	-	45	°C/W
Soldering temperature	Tsold	-	-	260	°C

•Electronic Characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	60	-	-	V
Gate Threshold Voltage	$VGS_{(TH)}$	V_{GS}=V_{DS}, I_D=250uA, Tj=25℃	1.2	1.6	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}=60V, Tj=25°C	-	-	1	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=40A, Tj=25°C	-	0.75	0.9	mΩ
		V_{GS}=10V, I_D=40A, Tj=175°C	-	1.3	-	mΩ
		V_{GS}=4.5V, I_D=32A, Tj=25°C	-	1.2	1.5	mΩ
		V_{GS}=4.5V, I_D=32A, Tj=175°C	-	2.0	-	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A	-	53	-	S
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 40A	-	-	1.3	V

•Dynamic characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=30V, V_{GS}=0V	-	6933	-	pF
Output capacitance	Coss		-	2263	-	
Reverse transfer capacitance	Crss		-	179	-	
Gate Risistance	Rg	f = 1MHz	-	1.1	-	Ω
Total gate charge	Qg	V_{DD} = 30V,I_D = 40A, V_{GS} = 10V	-	152	-	nC
Gate - Source charge	Qgs		-	17	-	
Gate - Drain charge	Qgd		-	43	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=30V,R_G =3.3Ω, I_D =40A	-	18	-	ns
Turn-ON Rise time	t_r		-	95	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	102	-	ns
Turn-Off Fall time	t_f		-	131	-	ns
Reverse Recovery Time	t_{rr}	V_{DD}=40V, dI_S/dt = 100A/us, I_S=40A	-	64	-	ns
Reverse Recovery Charge	Q_{rr}		-	85	-	nC

Fig.1 Gate-source voltage as a function of gate charge;Typical values;Tj=25°C

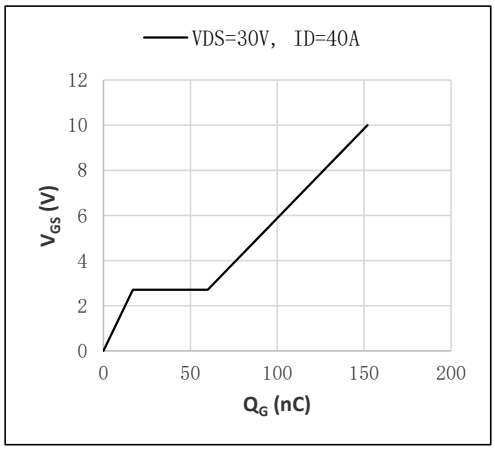


Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage;Typical values;Tj=25°C

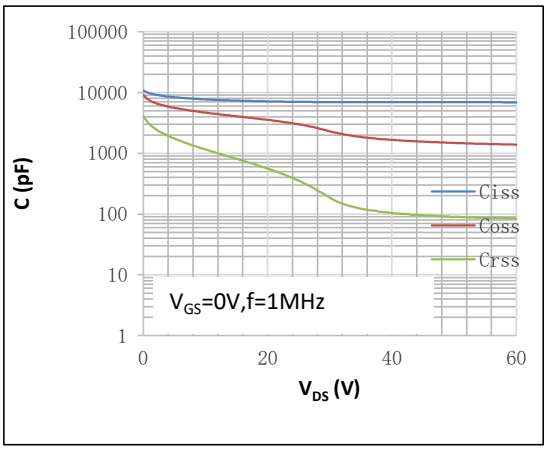


Fig.3 Output characteristics: drain current as a function of drain-source voltage;Typical values; Tj=25°C

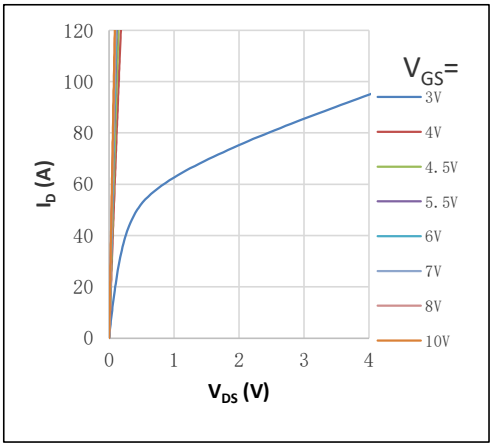


Fig.4 Output characteristics: drain current as a function of drain-source voltage;Typical values:Expanded curve;Tj=25°C

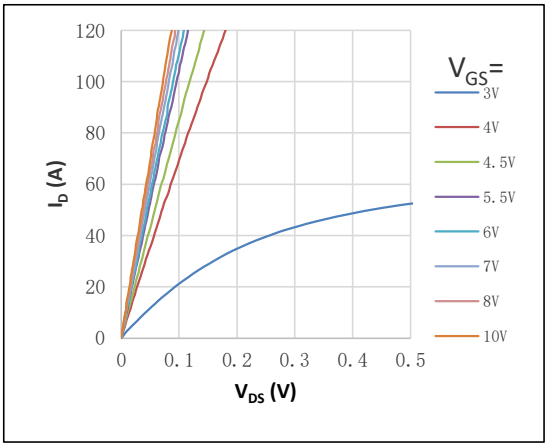


Fig.5 Gate-source threshold voltage as a function of junction temperature;Typical values

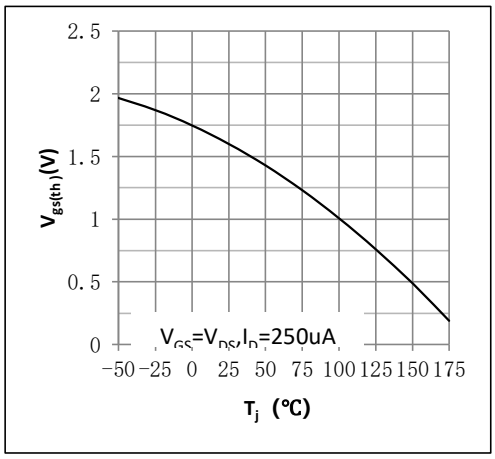


Fig.6 Drain-source on-state resistance as a function of drain current;Typical values;Tj=25°C

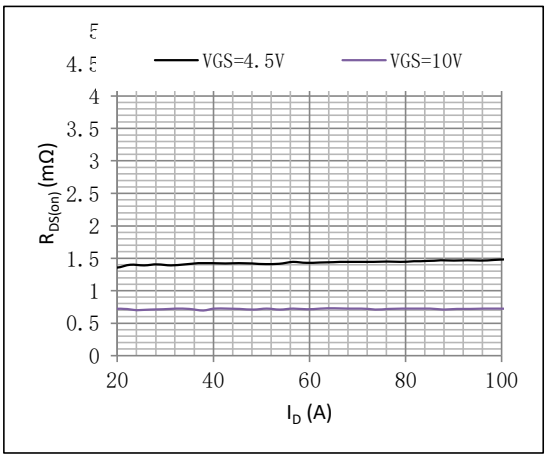


Fig.7 Drain-source on-state resistance as a function of gate-source voltage;Typical values

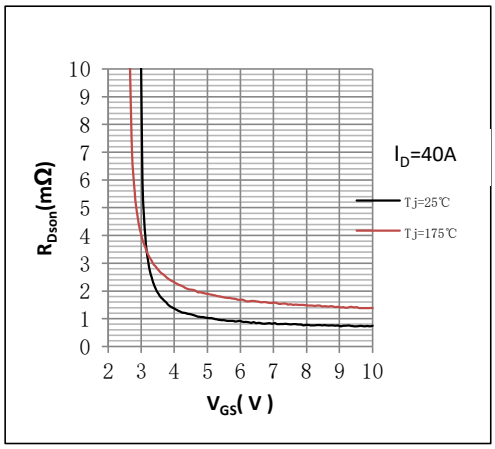


Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature;Typical values
Normalized On-Resistance=RDSon/RDSon(25℃)

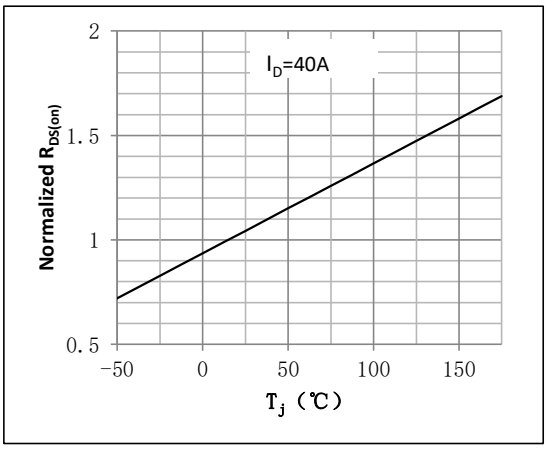


Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage ;Typical values

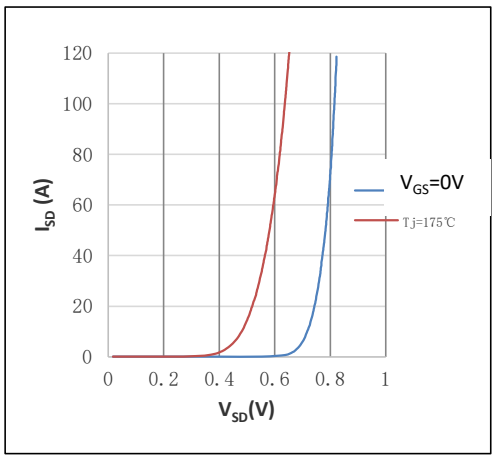


Figure 10. Transfer characteristics: drain current as a function of gate-source voltage;Typical values

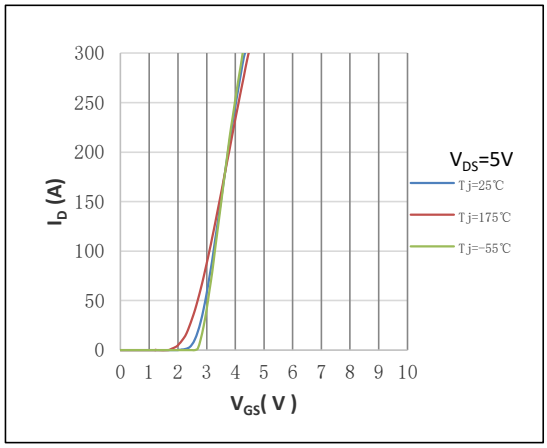


Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage;Calculative values

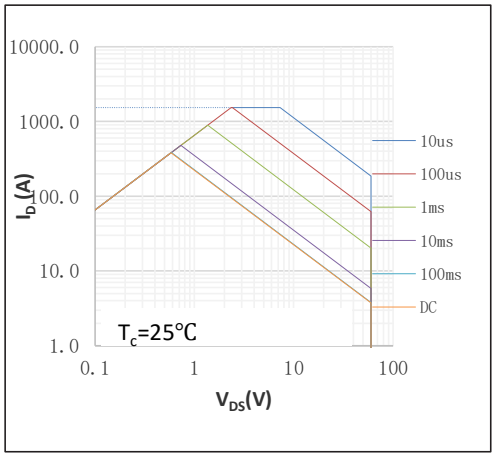


Fig.12 Continuous drain current as a function of case temperature[3];Calculative values

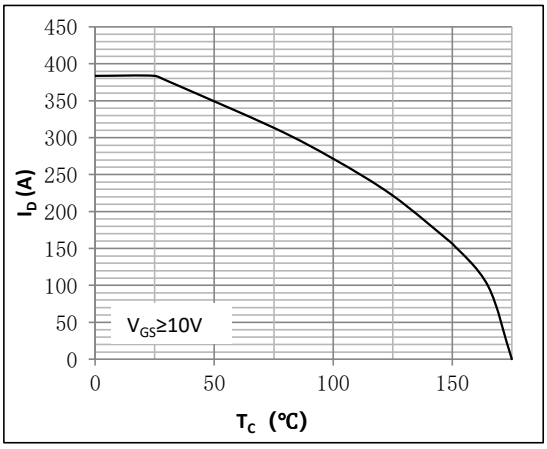


Fig.13 Drain-source breakdown voltage as a function of junction temperature;Typical values
Normalized BVDSS=BVDSS/BVDSS(25°C)

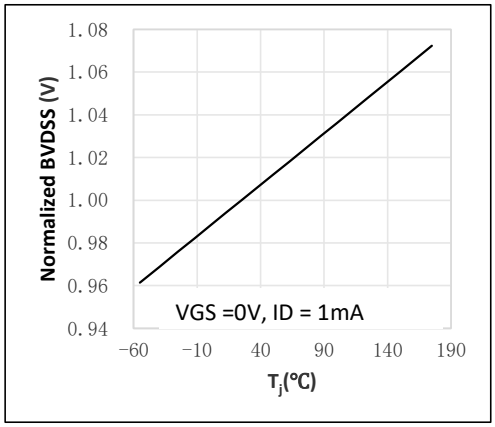


Fig.14 Normalized total power dissipation as a function of case temperature;Calculative values
Normalized Power Dissipation=Pd/Pd(25°C)

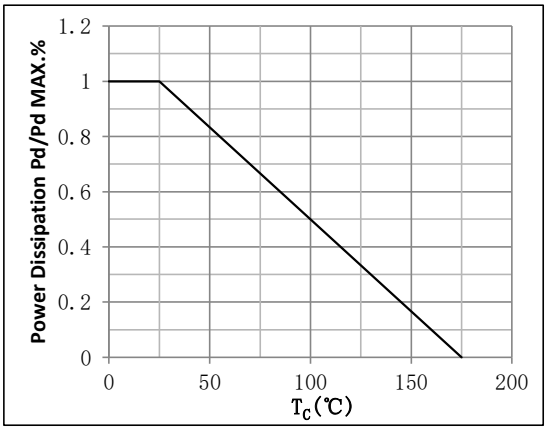
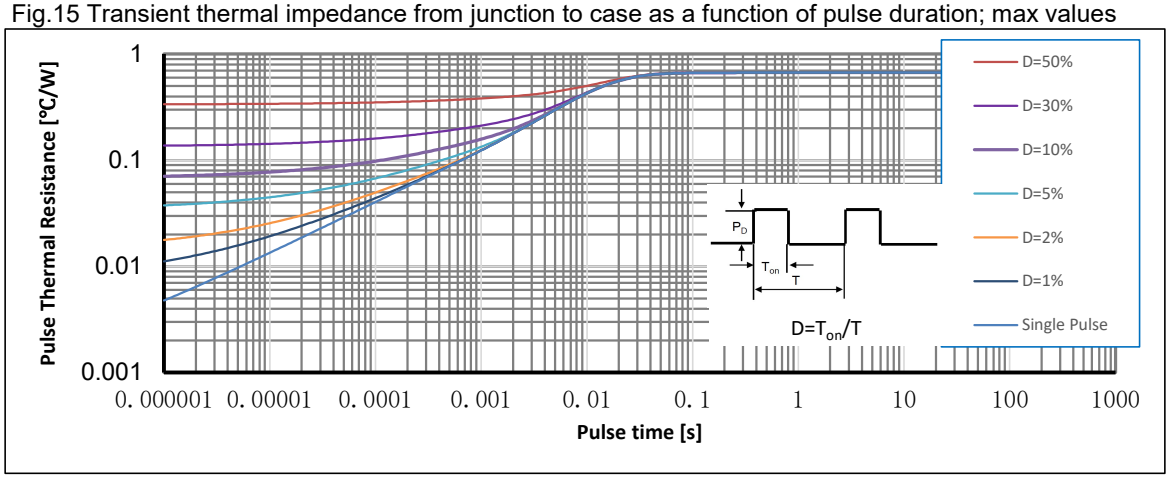
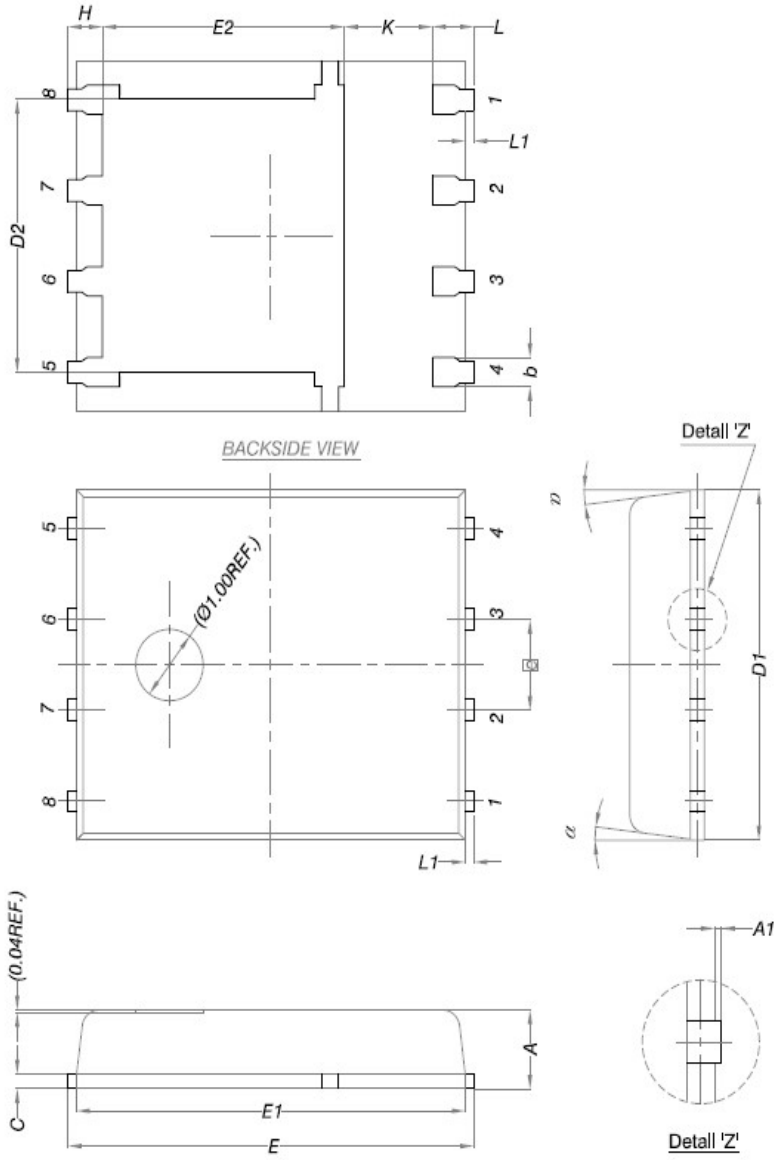


Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



●DFN5*6 Package Outline



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

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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Version	Date	Change
Preliminary	2024/11/12	New