

● General Description

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

● Features

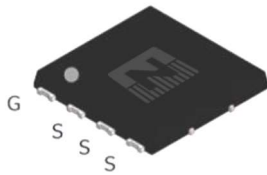
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low thermal resistance
- AEC-Q101 qualified

● Application

- BLDC motor driver
- DC-DC
- Battery protection



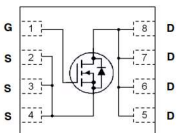
● Product Summary



DFN8\*8

● Ordering Information

Part NO.	ZMSA008N04HG
Marking	ZMS008N04H
Packing information	REEL TAPE
Basic ordering unit (pcs)	2500



$V_{DS}=40V$   
 $R_{DS(ON)}=0.7m\Omega$   
 $I_D=320A$



● Absolute Maximum Ratings ( $T_A=25^\circ C$ , unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	$V_{DS}$		-	40	V
Gate-source voltage <sup>①</sup>	$V_{GS}$		-20	20	V
Continuous drain current	$I_D$	$V_{GS}=10V, T_C=25^\circ C$	-	320	A
	$I_D$	$V_{GS}=10V, T_C=75^\circ C$	-	262	A
	$I_D$	$V_{GS}=10V, T_C=100^\circ C$	-	227	A
Pulsed drain current <sup>①</sup>	$I_{DM}$	Pulsed; $t_p \leq 10 \mu s; T_C = 25^\circ C;$	-	960	A
Total power dissipation	$P_D$	$T_C=25^\circ C$	-	188	W
Total power dissipation	$P_D$	$T_A=25^\circ C$	-	4.3	W
Operating junction temperature	$T_J$		-55	175	$^\circ C$
Storage temperature	$T_{STG}$		-55	175	$^\circ C$
Single pulse avalanche energy	$E_{AS}$	$L=0.1mH, V_{GS}=10V, R_g=25\Omega,$	-	320	mJ
		$L=0.5mH, V_{GS}=10V, R_g=25\Omega,$	-	680	mJ
ESD level (HBM)			CLASS 2		

## ● Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$	-	-	0.8	°C/W
Thermal resistance, junction - ambient <sup>②</sup>	$R_{thJA}$	-	-	35	°C/W
Soldering temperature(total time<10s)	$T_{sold}$	-	-	260	°C

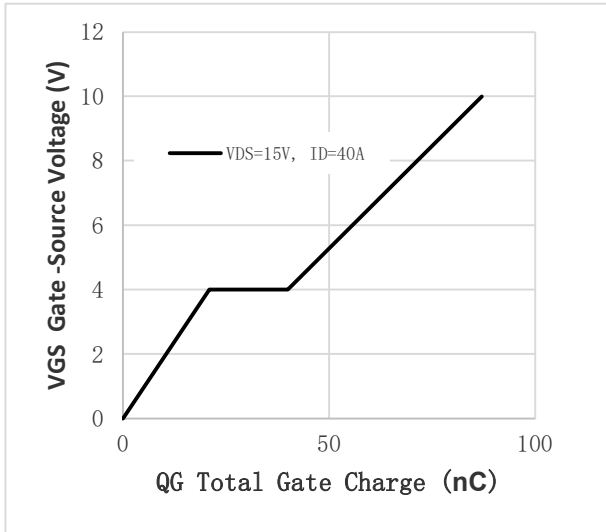
 ● Electronic Characteristics ( $T_j=25^\circ\text{C}$ , unless otherwise specified)

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	2.7	4	V
Drain-source leakage current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=40V$	-	-	1	$\mu A$
Gate- source leakage current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	100	nA
Static drain-source on resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A, T_j=25^\circ\text{C}$	-	0.7	0.95	m $\Omega$
Forward transconductance	$g_{FS}$	$V_{DS}=5V, I_{SD}=10A$	-	30	-	S
Diode forward voltage	$V_{FSD}$	$V_{GS}=0V, I_{SD}=40A$	-	-	1.3	V

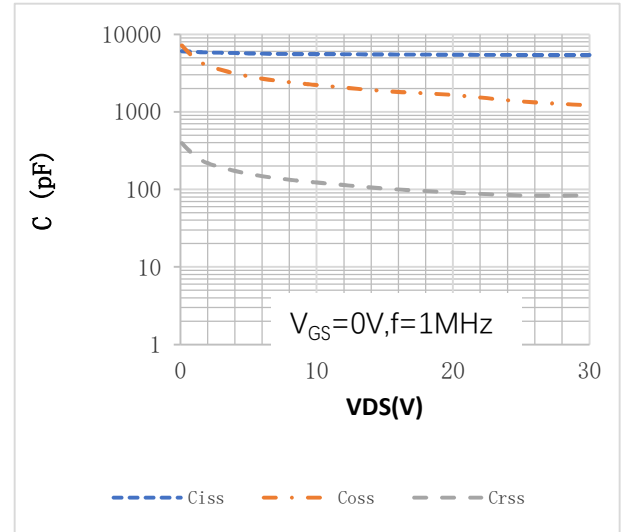
 ● Dynamic Characteristics ( $T_j=25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	$C_{iss}$	$f=1\text{MHz}, V_{DS}=25V, V_{GS}=0V$	-	5430	-	pF
Output capacitance	$C_{oss}$		-	1520	-	pF
Reverse transfer capacitance	$C_{rss}$		-	84	-	pF
Gate resistance	$R_g$	$f=1\text{MHz}$	-	1.6	-	$\Omega$
Total gate charge	$Q_g$	$V_{DD}=15V, I_D=20A, V_{GS}=10V$	-	87	-	nC
Gate-source charge	$Q_{gs}$		-	21	-	nC
Gate-drain charge	$Q_{gd}$		-	19	-	nC
Turn-on delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	15	-	ns
Turn-on rise time	$t_r$		-	10	-	ns
Turn-off delay time	$t_{D(off)}$		-	26	-	ns
Turn-off fall time	$t_f$		-	17	-	ns
Reverse recovery time	$t_{rr}$		$V_{DD}=20V, di/dt=100A/\mu s,$	-	65	-
Reverse recovery charge	$Q_{rr}$	$I_S=50A$	-	95	-	nC

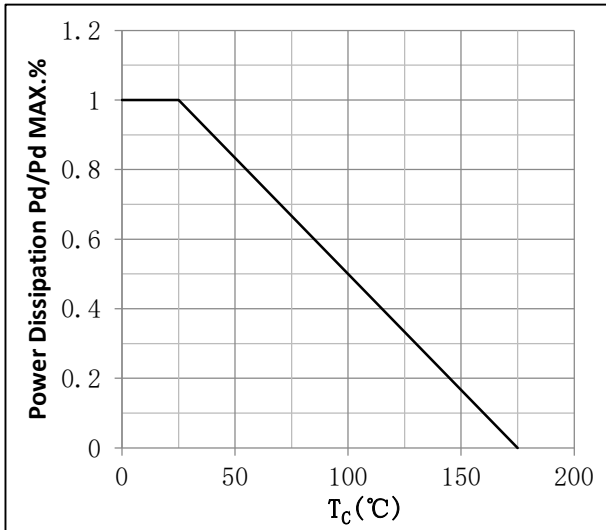
● Fig.1 Gate-source voltage as a function of gate charge; Typical values;  $T_j=25^\circ\text{C}$



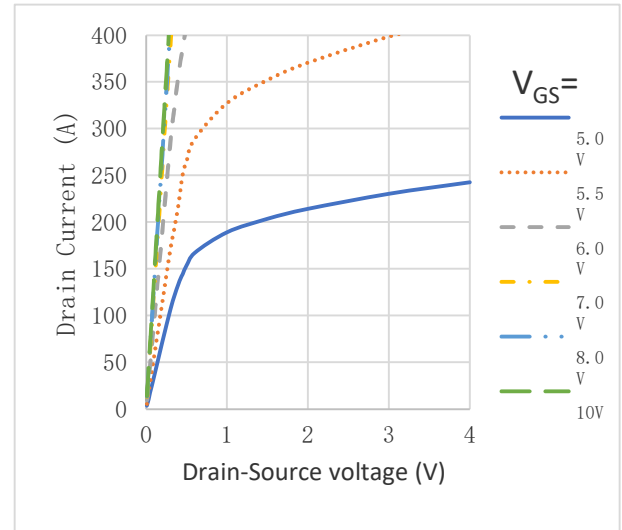
● Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values;  $T_j=25^\circ\text{C}$



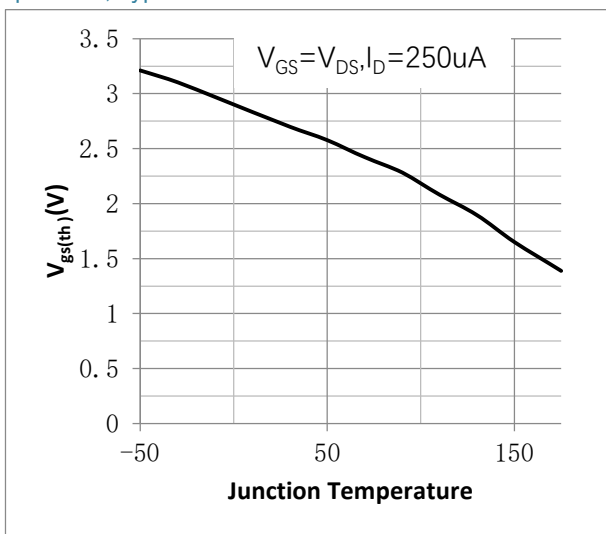
● Fig.3 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =  $P_d/P_d(25^\circ\text{C})$



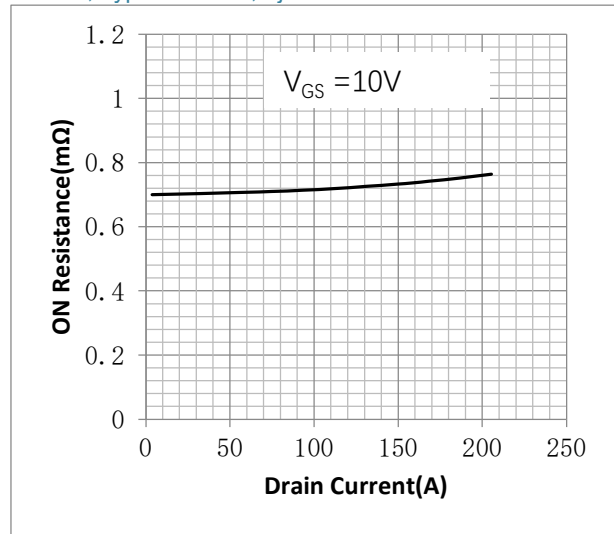
● Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values;  $T_j=25^\circ\text{C}$



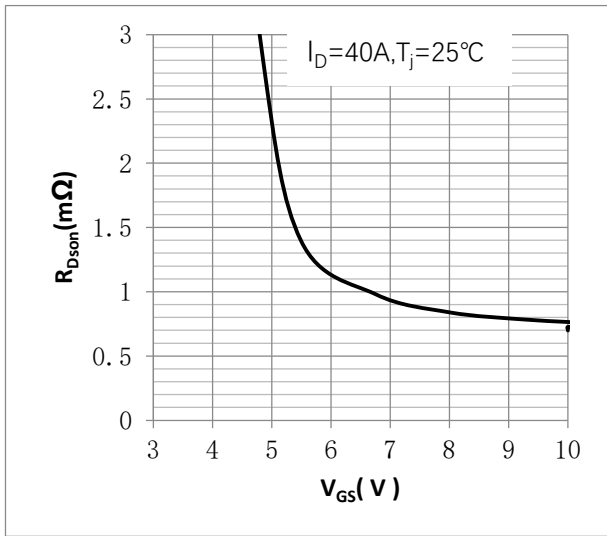
● Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



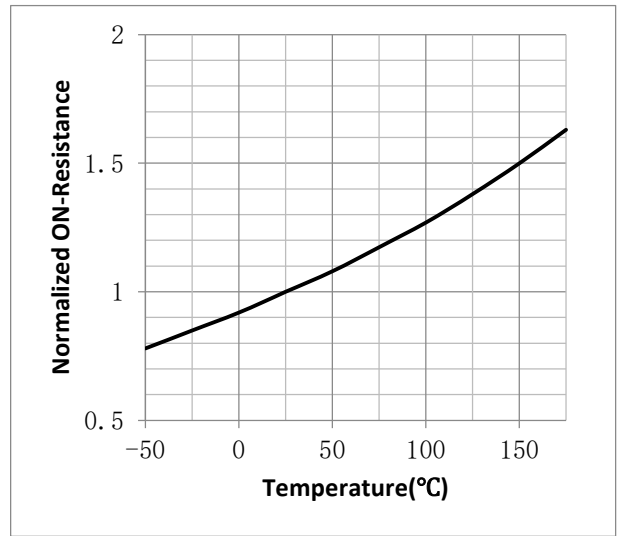
● Fig.6 Drain-source on-state resistance as a function of drain current; Typical values;  $T_j=25^\circ\text{C}$



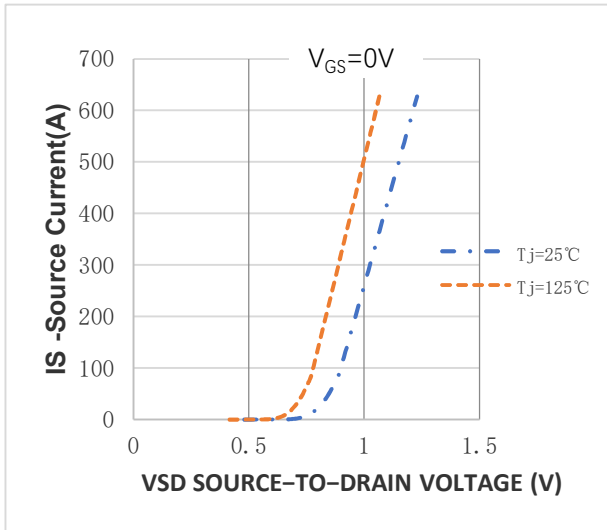
● Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



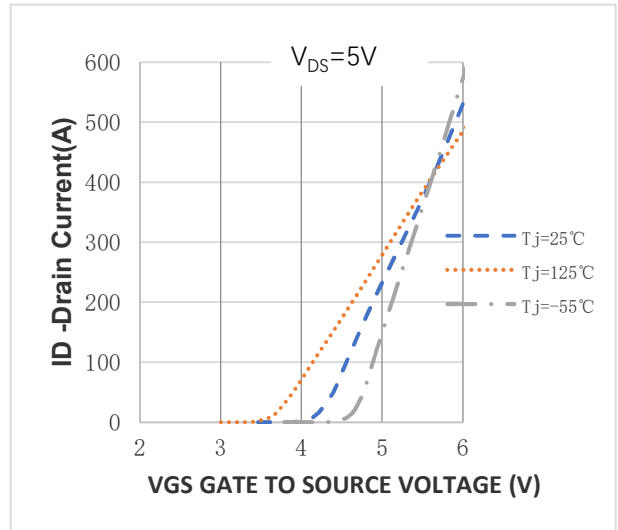
● Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance= $R_{DS(on)}/R_{DS(on)}(25^\circ C)$



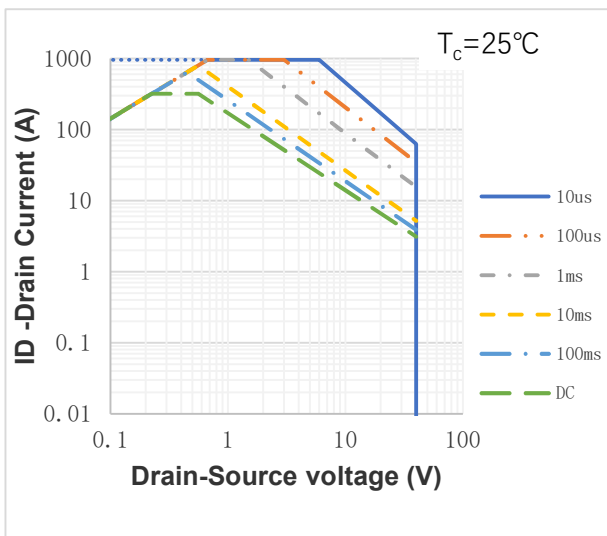
● Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



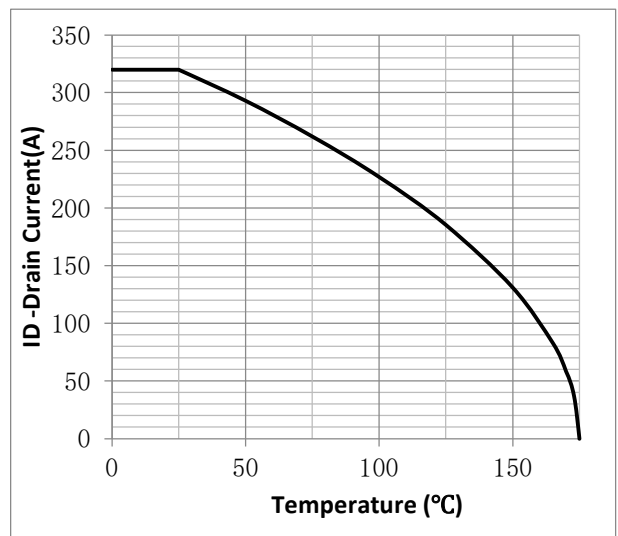
● Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



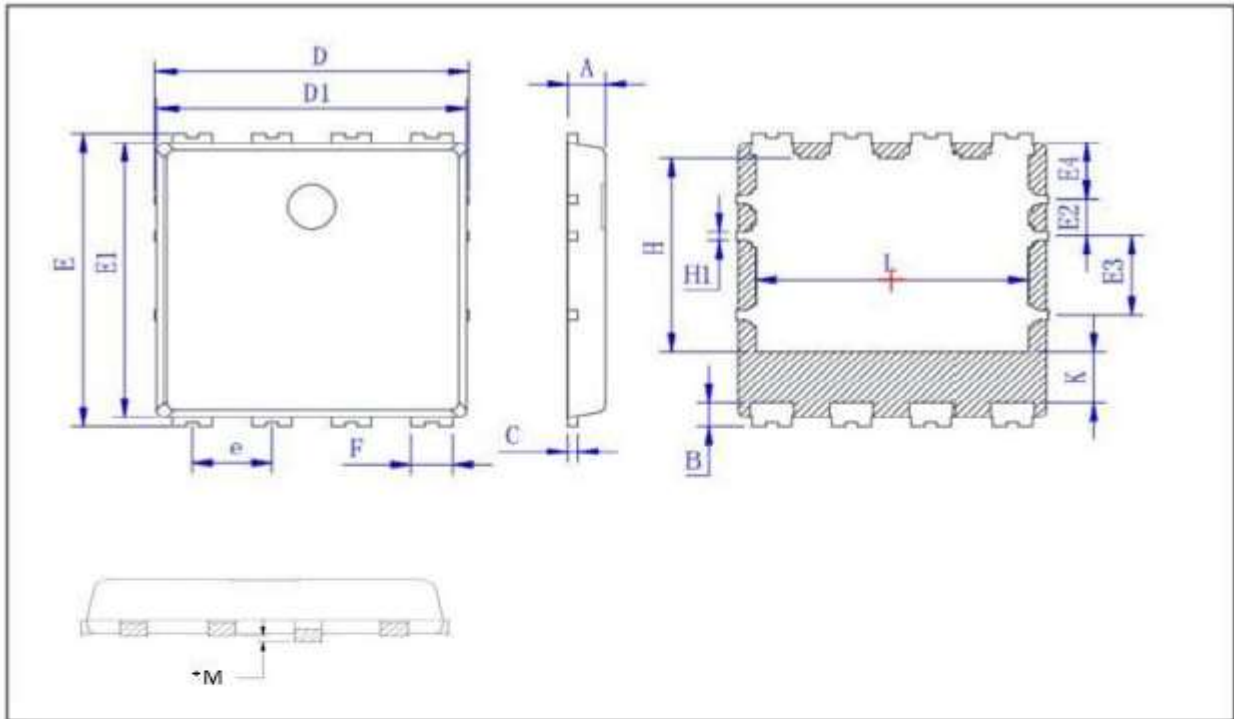
● Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



● Fig.12 Continuous drain current as a function of case temperature<sup>3</sup>; Calculative values



## ● Package Outline



Symbol	Min	Typ	Max
A	0.90	0.95	1.00
B	0.50	0.60	0.70
C	0.254 TYP		
D	7.70	7.80	7.90
D1	7.60	7.70	7.80
E	7.90	8.00	8.10
E1	7.40	7.50	7.60
E2	0.90	1.00	1.10
E3	2.06	2.16	2.26
E4	1.45	1.55	1.65
e	2.0 TYP		
F	1.00 TYP		
H	5.15	5.30	5.40
H1	0.20	0.25	0.35
L	6.60	6.80	6.90
K	1.20		
*M			0.05

## ● 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	2022/12/15	New
B	2025/8/27	1. Apply new datasheet format. 2. Add dimension *M in POD.