• 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

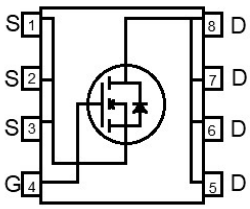
•Application

■BLDC Motor driver

■DC-DC

■Load Switch

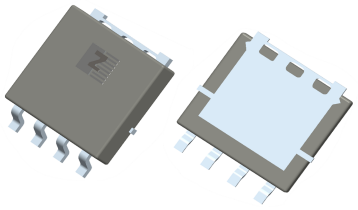
• Product Summary



V_{DS}= 40V

$R_{DS(ON)}$ = 2.4mΩ

I_D= 144A



LFPAK

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMSA022N04HLF
Marking	022N04H
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_C=25℃)

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℃	144	A
	I_D	T_C=75℃	117	A
	I_D	T_C=100℃	102	A
Pulsed Drain Current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	576	A
Total Power Dissipation	P_D	T_C=25℃	125	W
Total Power Dissipation	P_D	T_A=25℃	3.0	W
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25Ω,	99	mJ
		L=0.5mH, VGS=10V, Rg=25Ω,	178	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.2	°C/W
Thermal resistance, junction-ambient	$R_{thJA①}$		-	50	°C/W
Soldering temperature（total time<10s)	Tsold		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =250uA	2	2.7	4	V
Drain-Source Leakage Current	I_{DSS}	V_{GS}=0V, V_{DS}= 40V			1.0	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= 30A		2.4	3	mΩ
Forward Transconductance	g_{FS}	V_{GS} =5V, I_{SD} = 5A		15		S
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 30A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	1826	-	pF
Output capacitance	Coss		-	556	-	
Reverse transfer capacitance	Crss		-	36	-	
Gate Risistance	Rg	f = 1MHz	-	1.1		Ω
Total gate charge	Qg	V_{DD} = 15V,I_D = 30A, V_{GS} = 10V	-	29.4	-	nC
Gate - Source charge	Qgs		-	7.7	-	
Gate - Drain charge	Qgd		-	7.8	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	14	-	ns
Turn-ON Rise time	t_r		-	48	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	28	-	ns
Turn-Off Fall time	t_f		-	7	-	ns
Reverse Recovery Time	t_{rr}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	48	-	ns
Reverse Recovery Charge	Q_{rr}		-	45	-	nC

Fig.1 Gate-Charge Characteristics

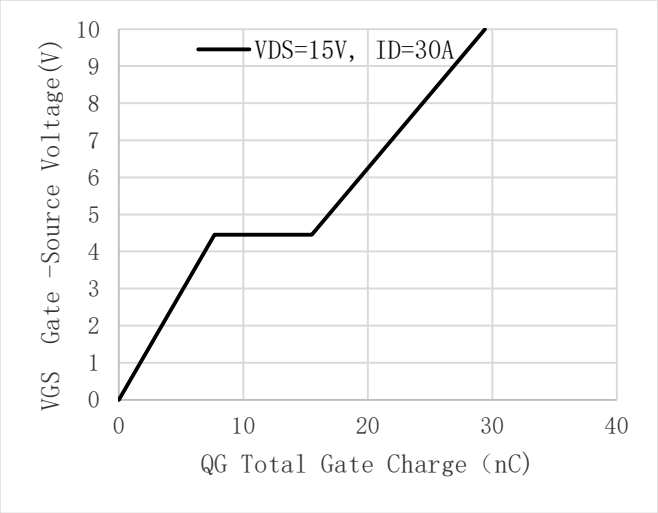


Fig.2 Capacitance Characteristics

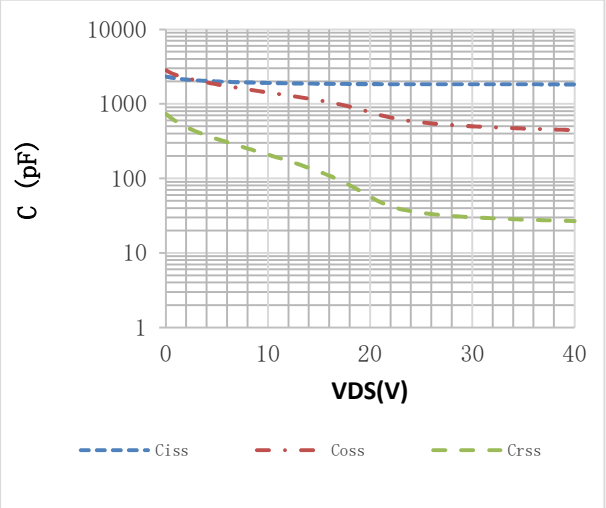


Fig.3 Power Dissipation

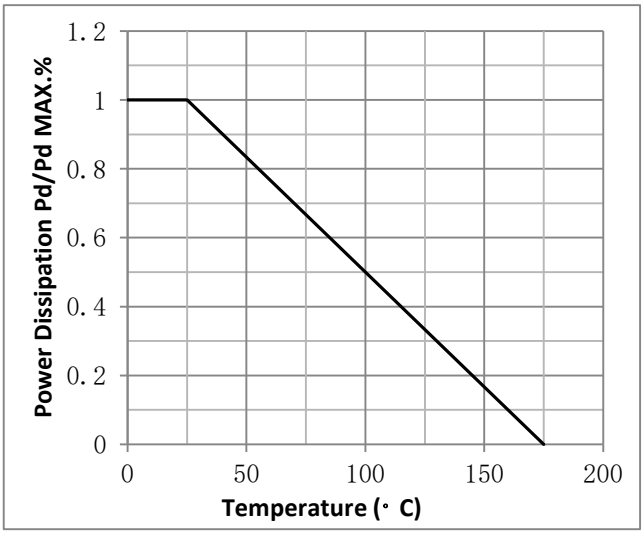


Fig.4 Typical output Characteristics

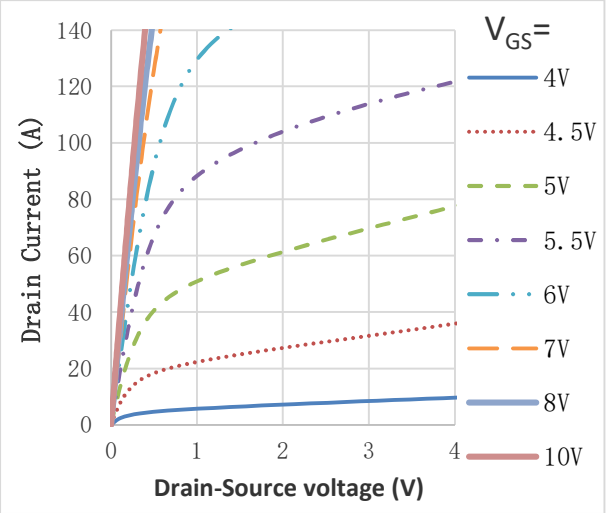


Fig.5 Threshold Voltage V.S Junction Temperature

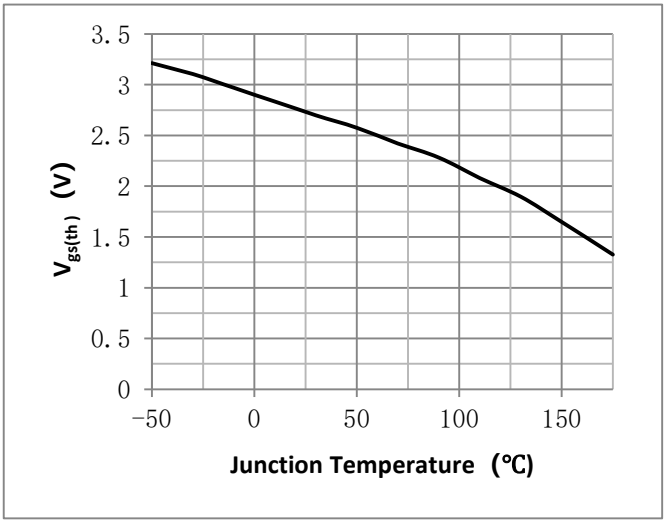


Fig.6 Resistance V.S Drain Current

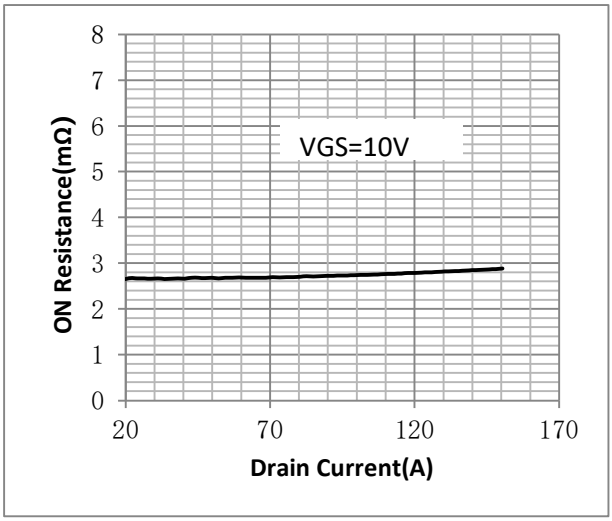


Fig.7 On-Resistance VS Gate Source Voltage

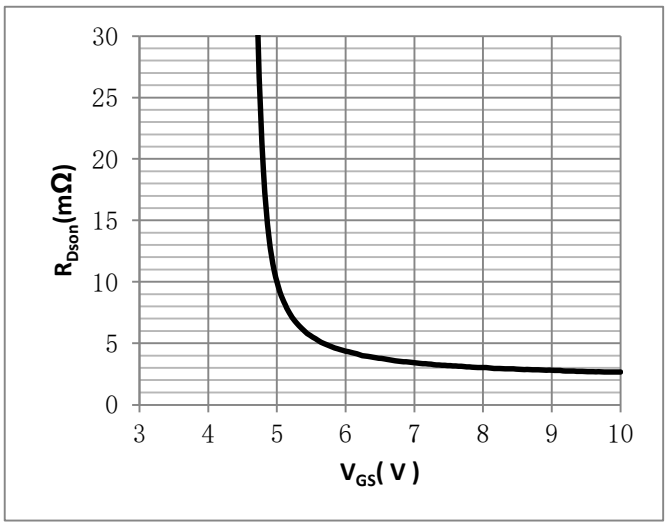


Fig.8 On-Resistance V.S Junction Temperature

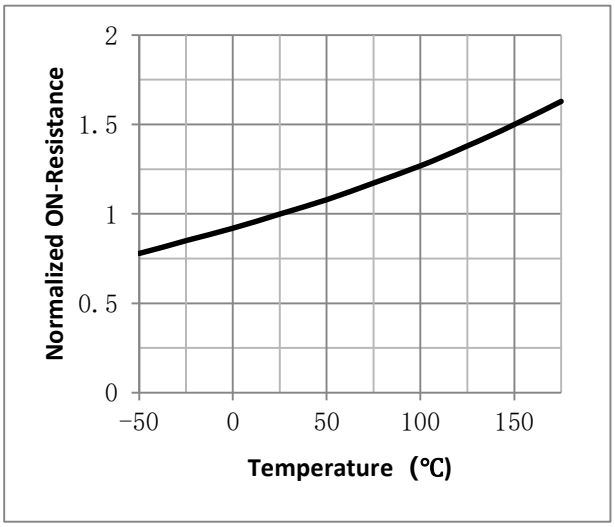


Figure 9. Diode Forward Voltage vs. Current

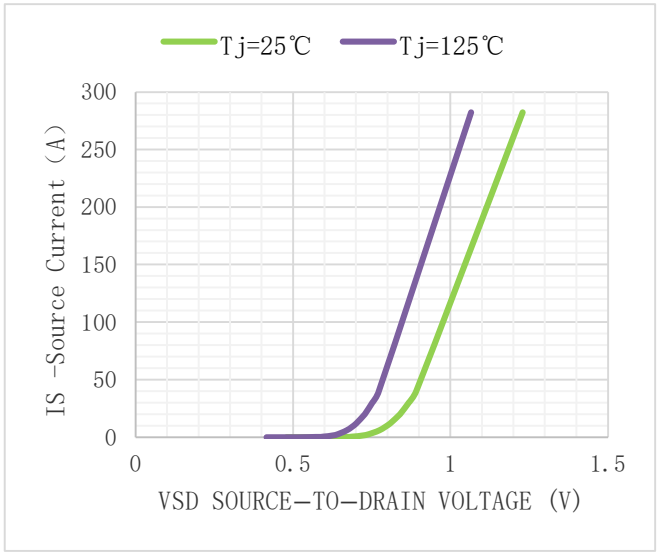


Figure 10. Transfer Characteristics

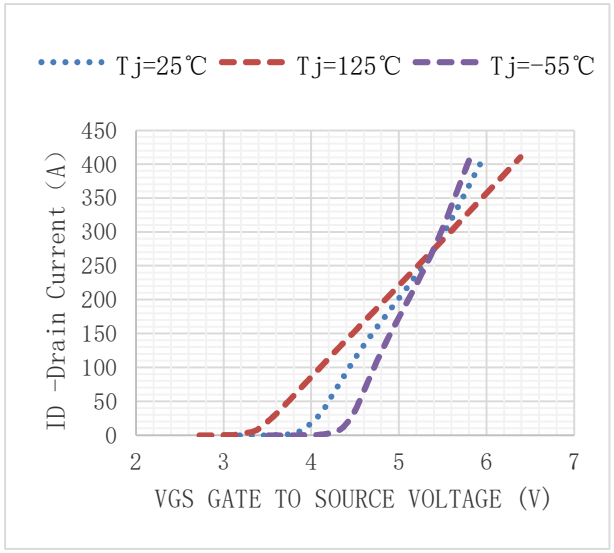


Fig.11 SOA Maximum Safe Operating Area

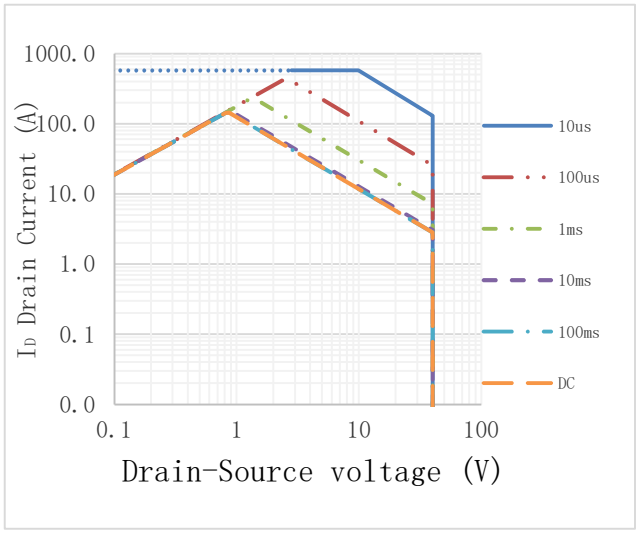
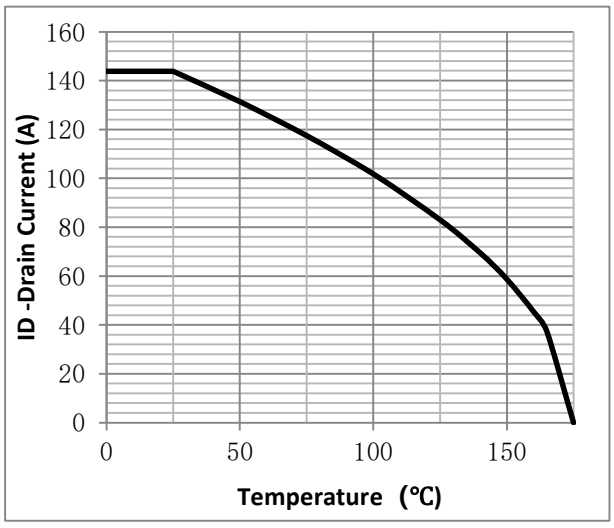
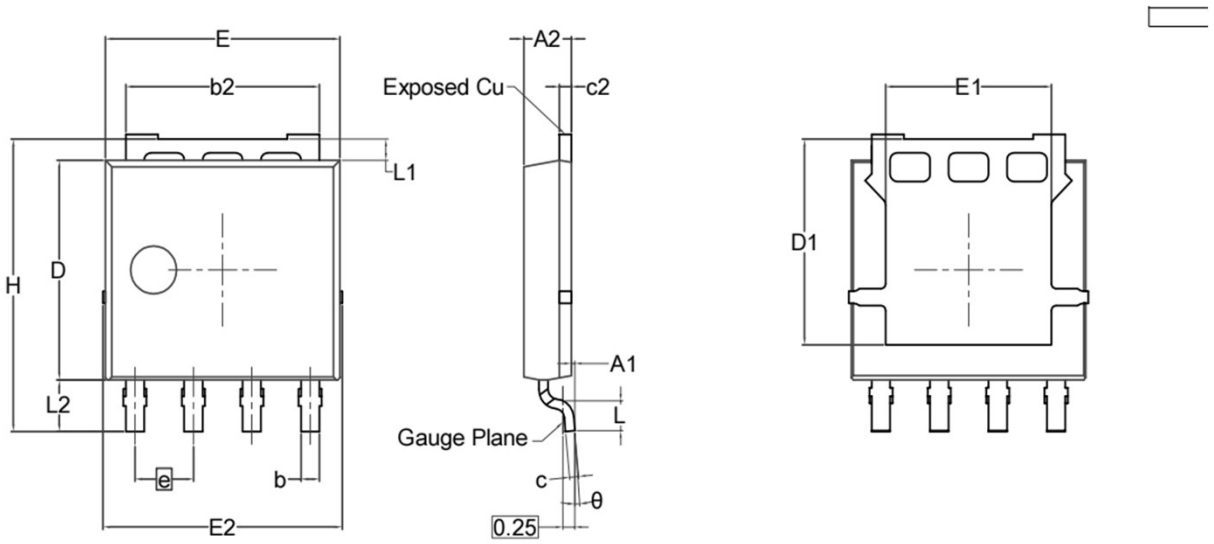
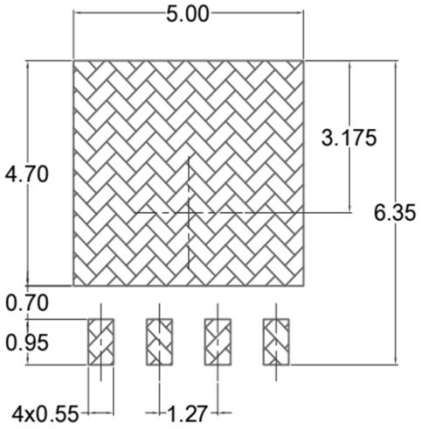


Fig.12 ID vs. Junction Temperature②



●LFPAK Package Outline





Land Pattern (Only for Reference)

SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	1.00	---	1.30
A2	0.98	1.03	1.10
A1	0.00	---	0.15
b	0.35	0.42	0.50
b2	4.02	4.23	4.41
c	0.19	0.22	0.25
c2	0.24	0.27	0.30
D	4.45	4.58	4.70
D1	---	---	4.45
E	4.95	5.13	5.30
E1	3.50	---	3.70
E2	---	---	5.30
e	1.27 BSC.		
H	5.95	---	6.20
L	0.40	0.65	0.85
L1	0.27	---	0.57
L2	0.80	---	1.30
θ	0°	---	8°

Note:

① Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate；

②Practically 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	2024/11/1	New
B	2025/2/24	Correct marking information.