• 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

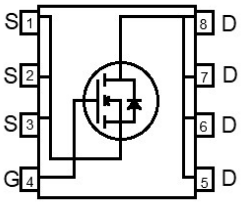
•Application

■BLDC Motor driver

■DC-DC

■Battery protection

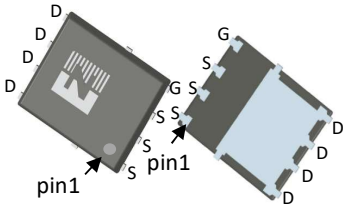
• Product Summary



V_{DS}= 40V

$R_{DS(ON)}$ = 1.2mΩ

I_D= 245A



DFN5*6

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMS012N04HNC
Marking	ZMS012N04H
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℃	245	A
	I_D	T_C=75℃	191	A
	I_D	T_C=100℃	156	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	735	A
Total Power Dissipation	P_D	T_C=25℃	89	W
Total Power Dissipation	P_D	T_A=25℃	2.8	W
Operating Junction Temperature	T_J		-55 to +150	℃
Storage Temperature	T_{STG}		-55 to +150	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=10V, Rg=25Ω,	263	mJ
		L=0.5mH, V_{GS}=10V, Rg=25Ω,	473	mJ
ESD Level (HBM)	CLASS 2			

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.4	°C/W
Thermal resistance, junction-ambient①	R_{thJA}		-	45	°C/W
Soldering temperature	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	2.0	2.7	4.0	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= 40A		1.2	1.4	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A		15		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 40A			1.3	V

●Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	3310	-	pF
Output capacitance	Coss		-	853	-	
Reverse transfer capacitance	Crss		-	47	-	
Gate Risistance	Rg	f = 1MHz	-	1.9		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 40A, V_{GS} = 10V	-	49	-	nC
Gate - Source charge	Qgs		-	11.6	-	
Gate - Drain charge	Qgd		-	11.9	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	10	-	ns
Turn-ON Rise time	t_r		-	9	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	16	-	ns
Turn-Off Fall time	t_f		-	12	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=50A	-	52	-	ns
Reverse Recovery Charge	Q_{RR}		-	61	-	nC

Fig.1 Gate-Charge Characteristics

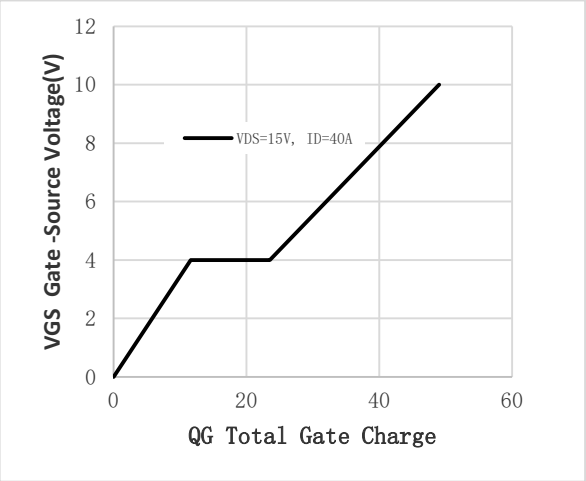


Fig.2 Capacitance Characteristics

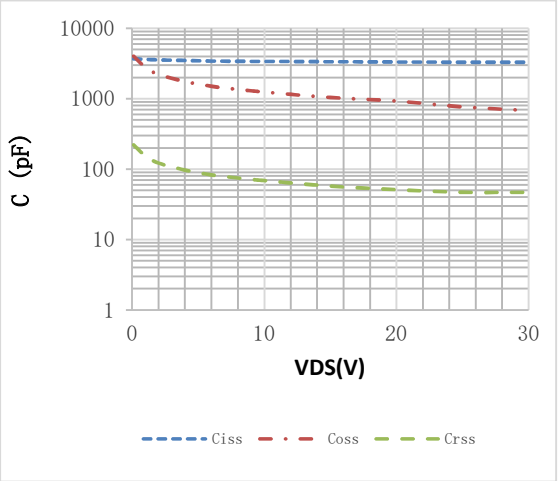


Fig.3 Power Dissipation

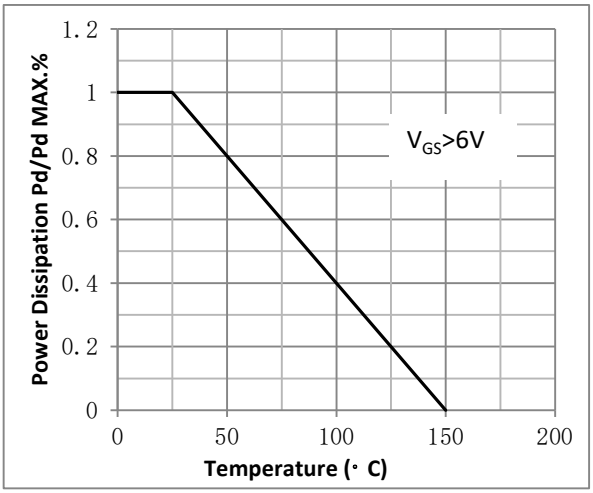


Fig.4 Typical output Characteristics

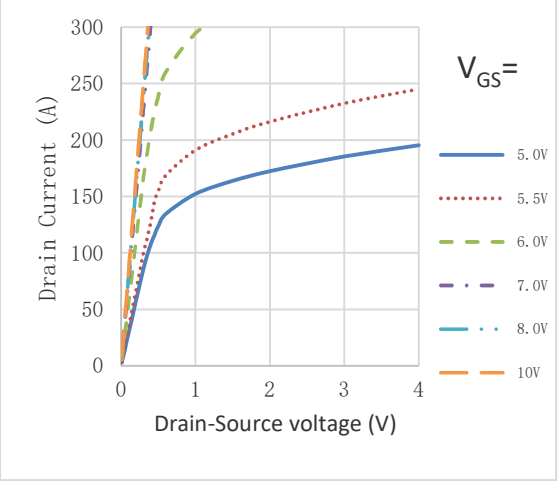


Fig.5 Threshold Voltage V.S Junction Temperature

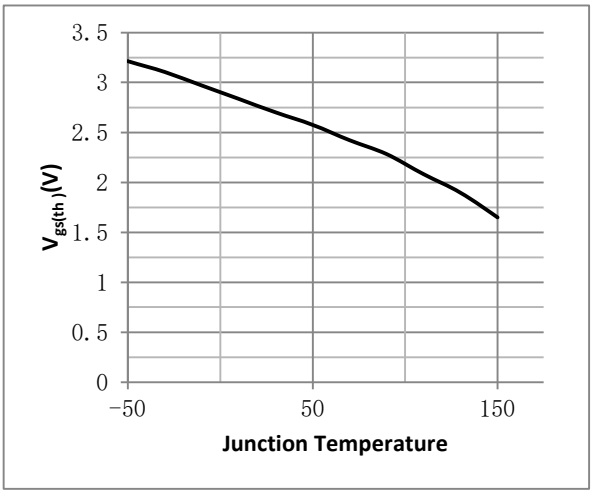


Fig.6 Resistance V.S Drain Current

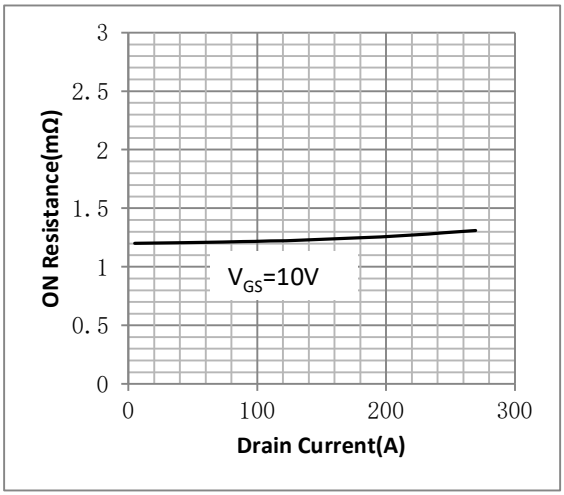


Fig.7 On-Resistance VS Gate Source Voltage

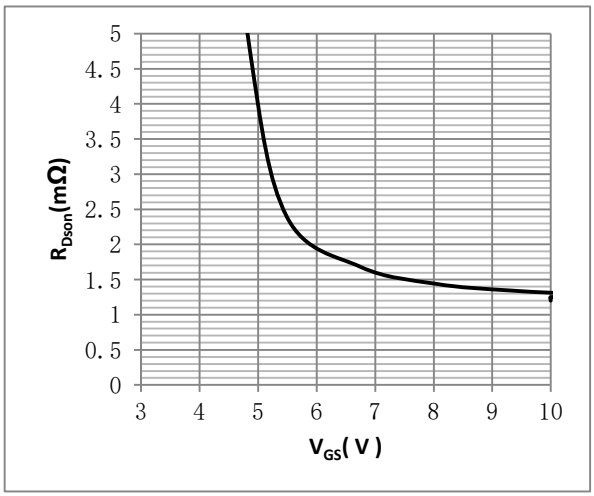


Fig.8 On-Resistance V.S Junction Temperature

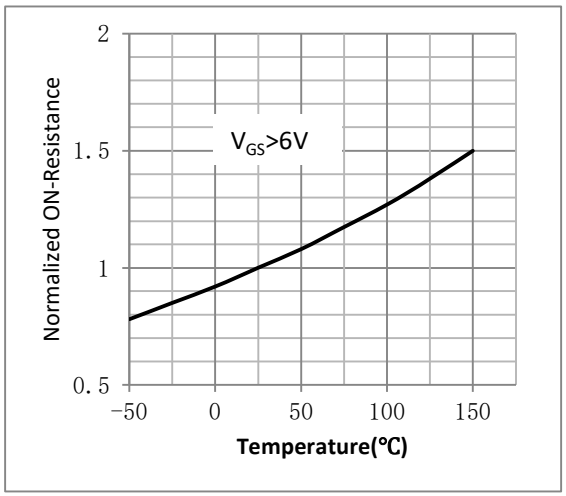


Figure 9. Diode Forward Voltage vs. Current

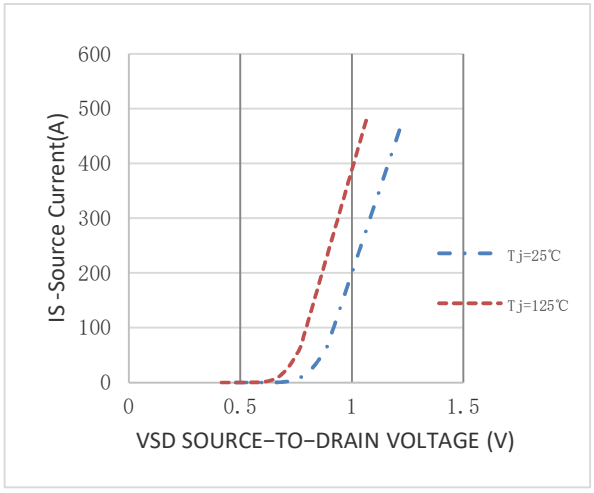


Figure 10. Transfer Characteristics

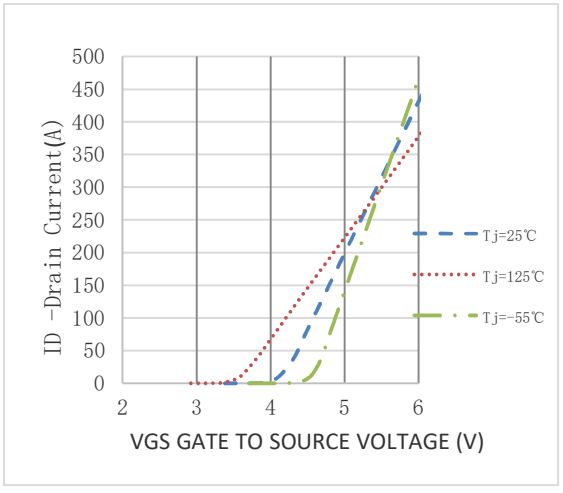


Fig.11 Safe Operating Area

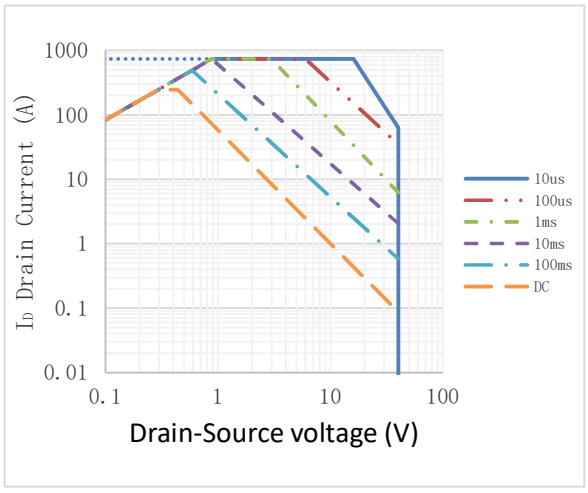
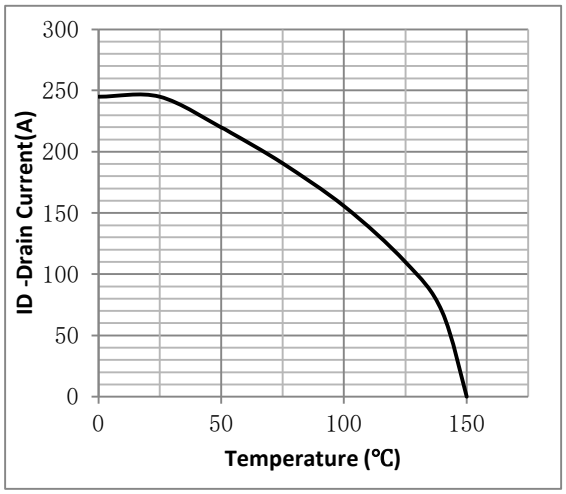
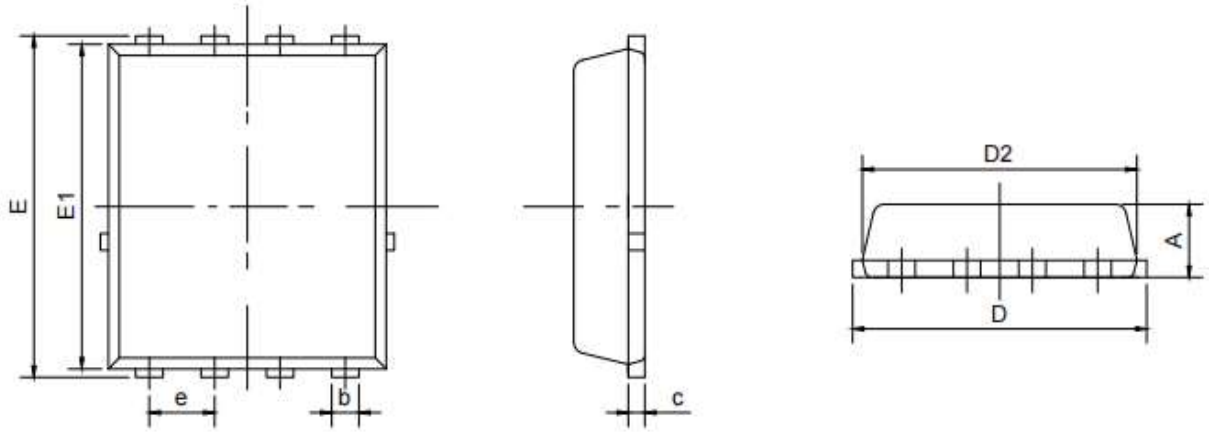
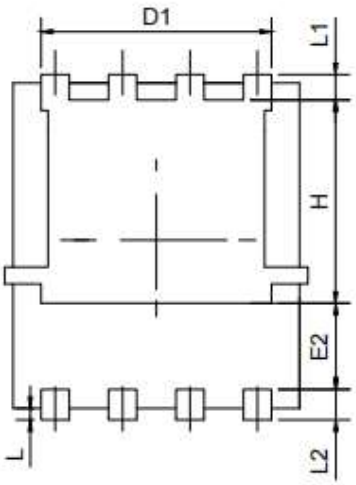


Fig.12 ID vs. Junction Temperature②

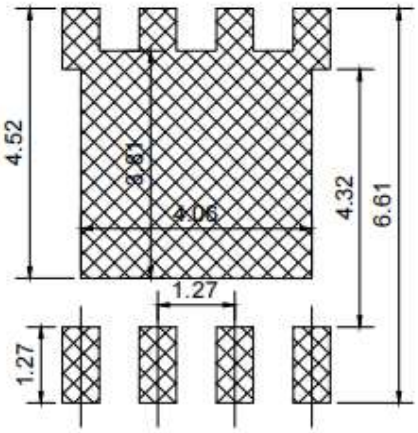


●DFN5*6 Package Outline





Land Pattern
(Only for Reference)



SYMBOLS	COMMON	
	UNIT: mm	
	MIN.	MAX.
A	0.90	1.17
b	0.30	0.51
c	0.15	0.35
D	4.80	5.40
D1	4.00	4.40
D2	4.80	5.00
E	5.90	6.25
E1	5.65	5.85
E2	1.10	-
e	1.27BSC	
L	0.05	0.25
L1	0.28	0.65
L2	0.38	0.71
H	3.30	3.90

Note:

①Device 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	2022.1.6	
B	2023.2.26	1.Add Dynamic characteristic tf，tr etc.
C	2023.9.5	1.Add Reach,HF figure,2.ID modify
D	2024.2.28	Rdson modfied