● General Description

The ZM023N04NC combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

● Features

■ Advance high cell density Trench technology

■Low $R_{DS(ON)}$ to minimize conductive loss

■Low Gate Charge for fast switching

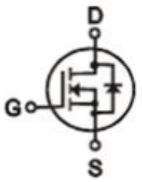
■Low Thermal resistance

●Application

■ Synchronous Rectification for AC-DC/DC-DC converter

■BLDC Motor driver

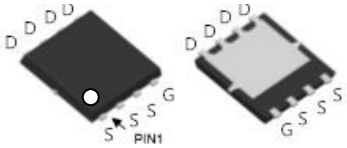
● Product Summary



V_{DS}=40V

$R_{DS(ON)}$ =2.3mΩ

I_D=120A



DFN5 x 6

●Ordering Information:

Part NO.	ZM023N04NC
Marking	ZM023N04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

●Absolute Maximum Ratings (T_C =25℃)

Parameter	**Symbol**	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	$I_{D@}$TC=25℃	120	A
	$I_{D@}$TC=75℃	91	A
	$I_{D@}$TC=100℃	75	A
Pulsed Drain Current ①	I_{DM}	360	A
Total Power Dissipation	P_D@TC=25℃	85	W
Total Power Dissipation	P_D@TA=25℃	3.4	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy (L=0.5mH,VGS=10V,Rg=25Ω,TJ=25	EAS	590	mJ
Single Pulse Avalanche Energy (L=0.1mH,VGS=10V,Rg=25Ω,TJ=25	EAS	308	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	1.5	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	37	°C/W
Soldering temperature, wave soldering for 10s	T_{sold}	-	-	265	°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	1.2		2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=40V, V_{GS} =0V			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=24A		2.3	2.9	mΩ
		V_{GS}=4.5V, I_D=12A		3.2	4.2	mΩ
Forward Transconductance	g_{FS}	V_{DS} =25V, I_D=10A		20		s
Source-drain voltage	V_{SD}	Is=24A			1.28	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V f = 1MHz	-	5340	-	pF
Output capacitance	C_{oss}		-	480	-	
Reverse transfer capacitance	C_{rss}		-	300	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Risistance	Rg	f = 1MHz		1.0		Ω
Total gate charge	Q_g	V_{DD} = 30V I_D = 20A V_{GS} = 10V	-	76	-	nC
Gate - Source charge	Q_{gs}		-	12	-	
Gate - Drain charge	Q_{gd}		-	13	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=15V		12		ns

Turn-ON Rise time	t_r	R_G =3.3Ω, I_D =20A		7		ns
Turn-Off Delay time	$t_{D(off)}$			53		ns
Turn-Off Fall time	t_f			14		ns
Reverse Recovery Time	t_{RR}	VDD = 20 V, dIS/dt = 100 A/s, IS = 30 A		19.3		ns
Charge Time	t_a			10.9		ns
Discharge Time	t_b			8.4		ns
Reverse Recovery Charge	Q_{RR}			9.5		ns

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

Fig.1 Gate-Charge Characteristics

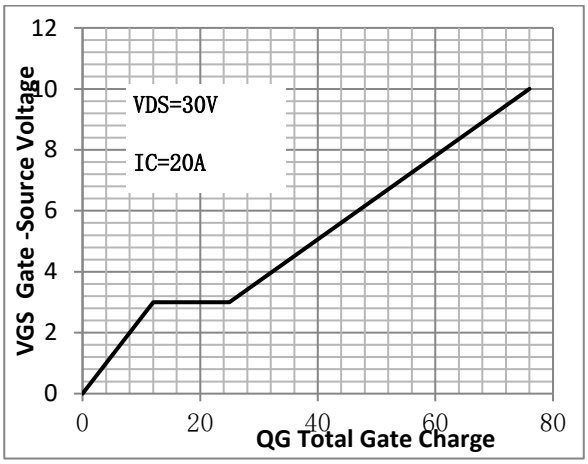


Fig.2 Capacitance Characteristics

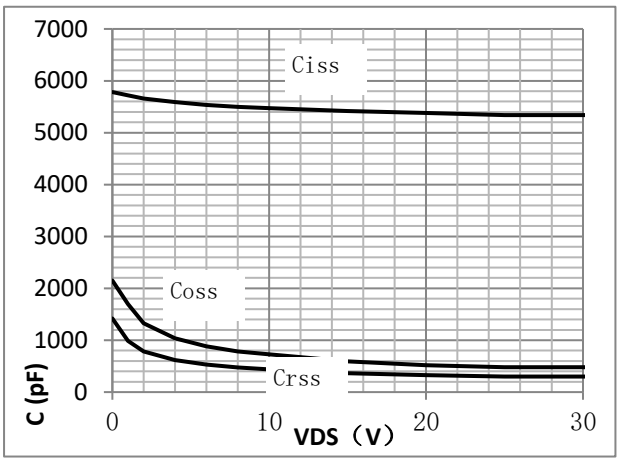


Fig.3 Power Dissipation

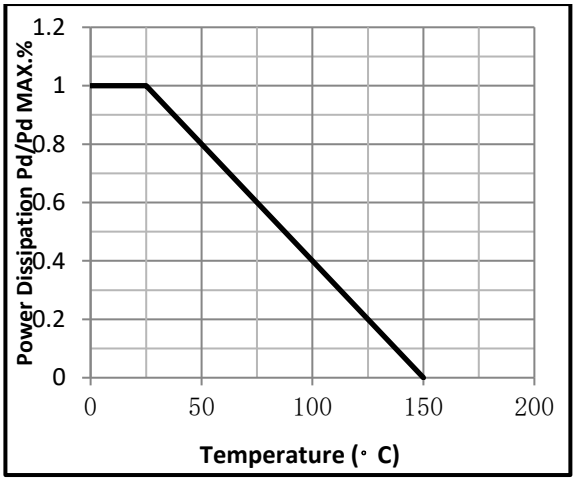


Fig.4 Typical output Characteristics

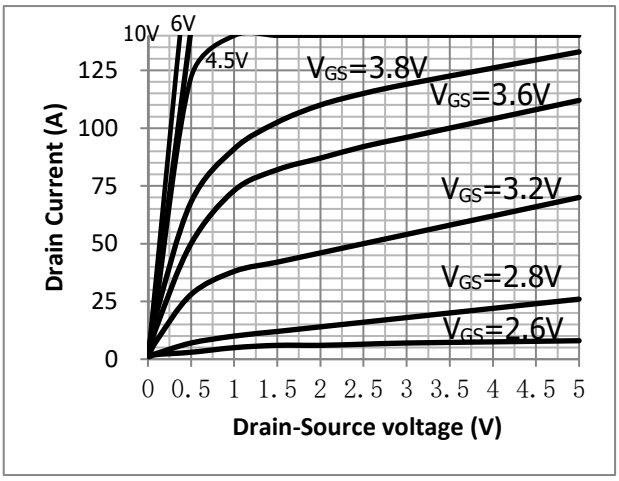


Fig.5 Threshold Voltage V.S Junction Temperature

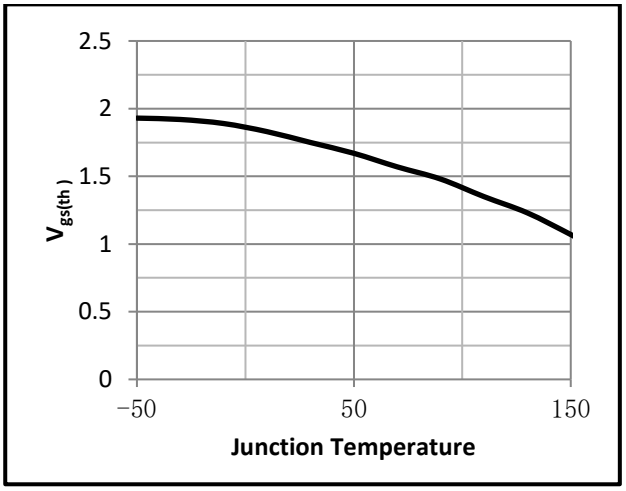


Fig.6 Resistance V.S Drain Current

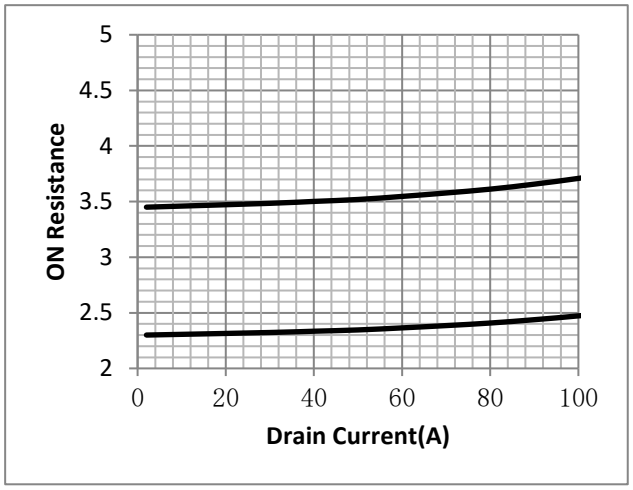


Fig.7 On-Resistance VS Gate Source Voltage

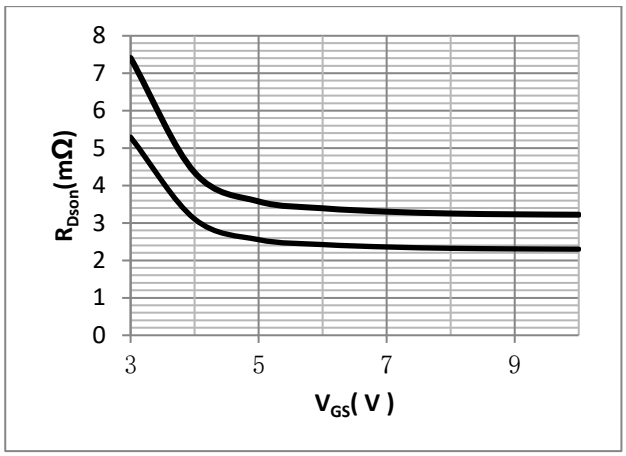


Fig.8 On-Resistance V.S Junction Temperature

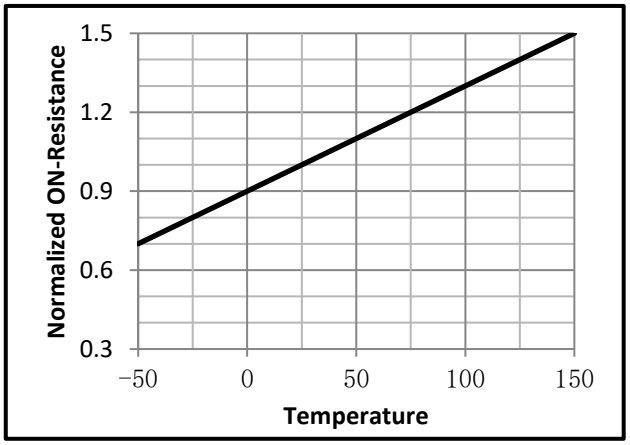


Figure 9. Diode Forward Voltage vs. Current

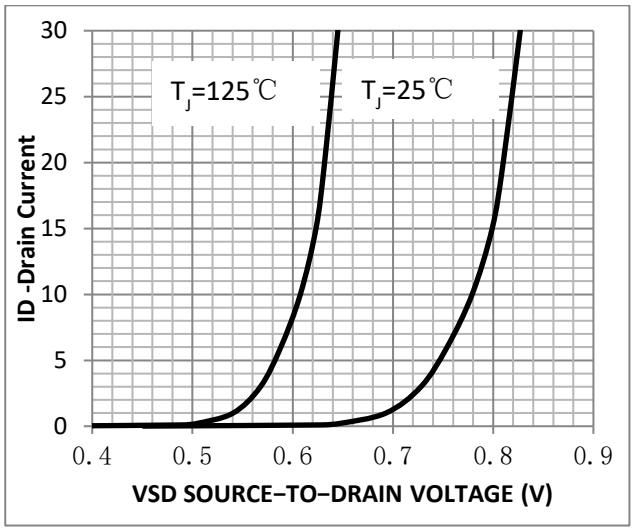


Figure 10. Transfer Characteristics

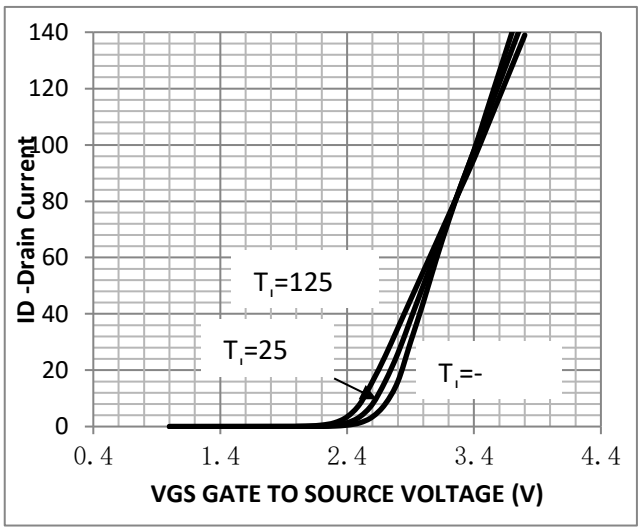


Fig.11 SOA Maximum Safe Operating Area

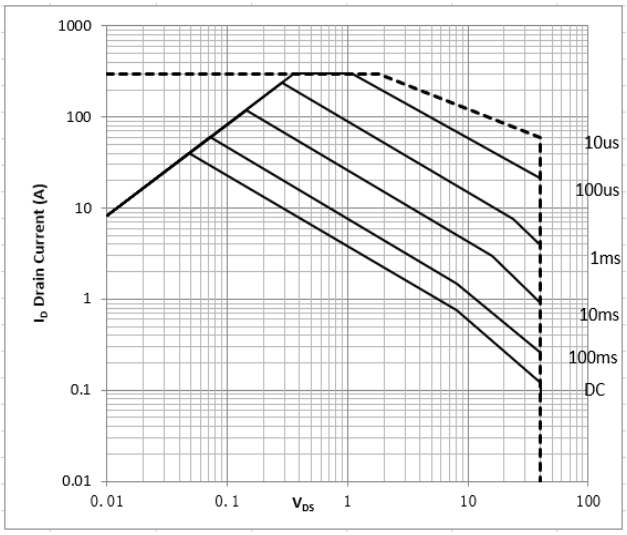


Fig.12 ID vs. Junction Temperature

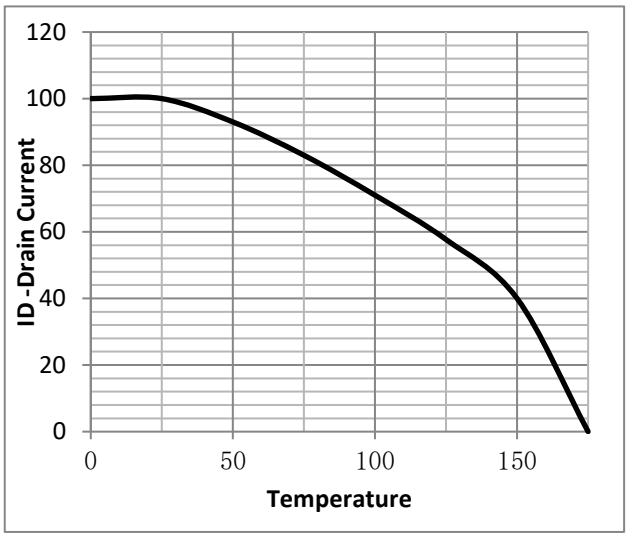


Fig.9 Switching Time Measurement Circuit

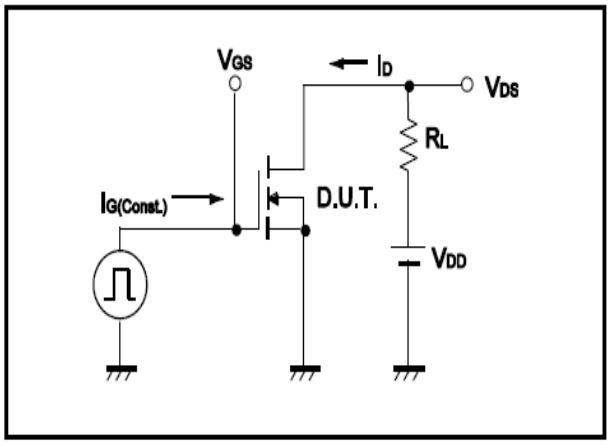


Fig.10 Gate Charge Waveform

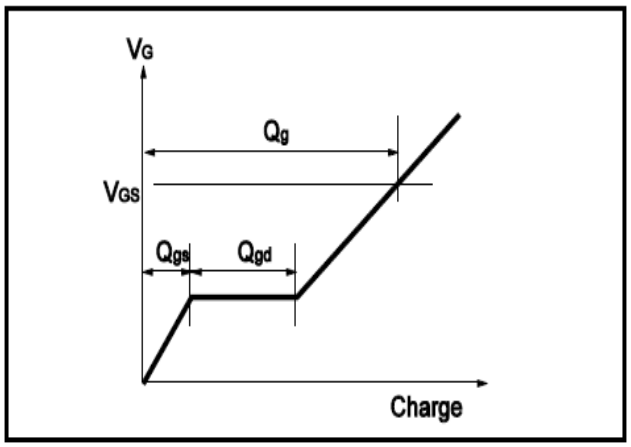


Fig.11Switching Time Measurement Circuit

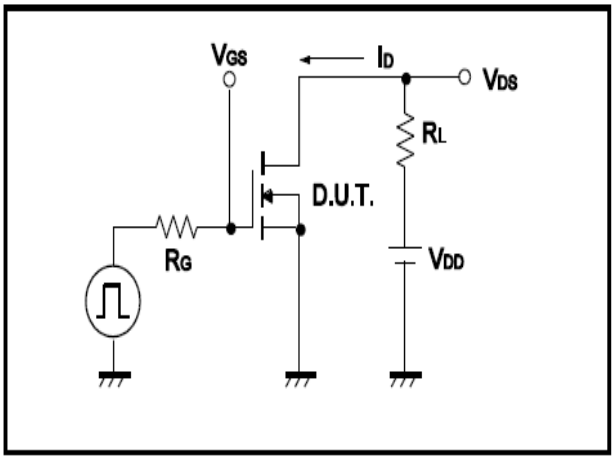
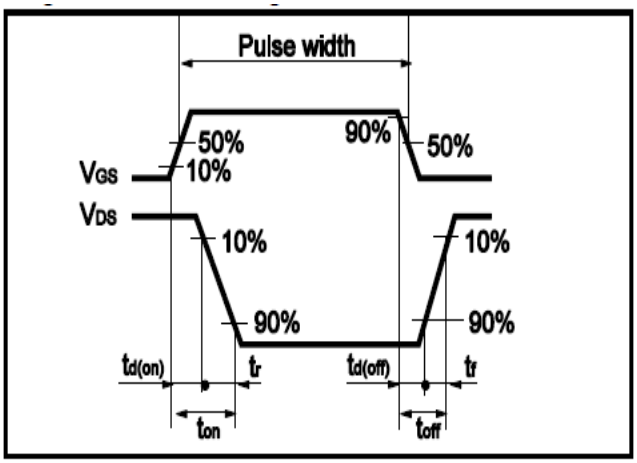
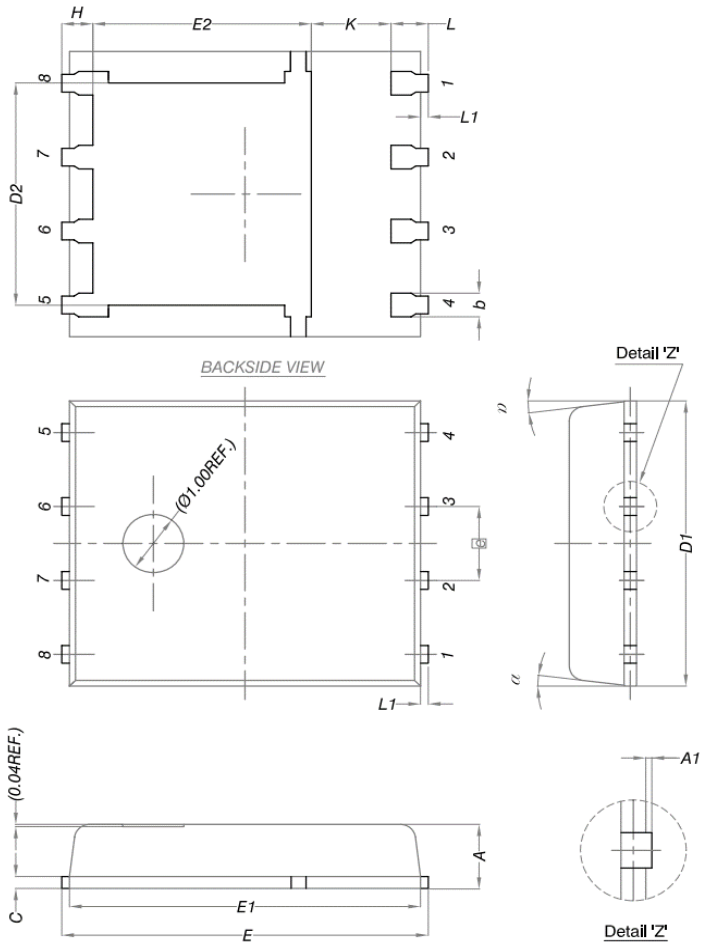


Fig.12 Gate Charge Waveform



●Dimensions（DFN5×6）

Unit：mm



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°