

40V N-Channel Power SpeedFET

● 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
- Load Switch

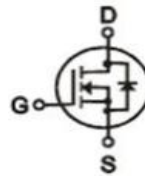
● Ordering Information:

Part NO.	ZMS011N04C
Marking	ZMS011N04
Packing Information	TUBE
Basic ordering unit (pcs)	400

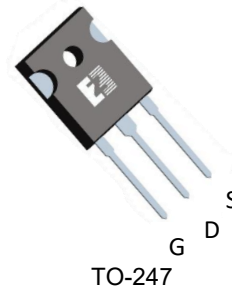
● Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$25^{\circ}C \leq T_J \leq 150^{\circ}C$	40	V
Gate-Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^{\circ}C$	190	A
	I_D	$T_C=75^{\circ}C$	190	A
	I_D	$T_C=100^{\circ}C$	181	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu s$; $T_{mb} = 25^{\circ}C$;	570	A
Total Power Dissipation	P_D	$T_C=25^{\circ}C$	125	W
Total Power Dissipation	P_D	$T_A=25^{\circ}C$	3.6	W
Operating Junction Temperature	T_J		-55 to +150	$^{\circ}C$
Storage Temperature	T_{STG}		-55 to +150	$^{\circ}C$
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25 Ω ,	320	mJ
		L=0.5mH, VGS=10V, Rg=25 Ω ,	680	mJ
ESD Level (HBM)	CLASS 2			

● Product Summary



$V_{DS} = 40V$
 $R_{DS(ON)} = 1.2m\Omega$
 $I_D = 190A$



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	RthJC		-	0.6	°C/W
Thermal resistance, junction-ambient	RthJA		-	35	°C/W
Soldering temperature	Tsold		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.6	1.9	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS}=40V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A$		1.2	1.5	m Ω
		$V_{GS}=4.5V, I_D=30A$		1.8	2.4	m Ω
Forward Transconductance	g_{FS}	$V_{GS}=5V, I_{SD}=10A$		30		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	C_{iss}	$f=1MHz, V_{DS}=25V$	-	6500	-	pF
Output capacitance	C_{oss}		-	1470	-	
Reverse transfer capacitance	C_{rss}		-	76	-	
Gate Resistance	R_g	$f=1MHz$	-	1.6		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=20A, V_{GS}=10V$	-	96	-	nC
Gate - Source charge	Q_{gs}		-	20	-	
Gate - Drain charge	Q_{gd}		-	19	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	16	-	ns
Turn-ON Rise time	t_r		-	11	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	26	-	ns
Turn-Off Fall time	t_f		-	18	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, di_S/dt=100A/s, I_S=50A$	-	66	-	ns
Reverse Recovery Charge	Q_{RR}		-	97	-	nC

Fig.1 Gate-Charge Characteristics

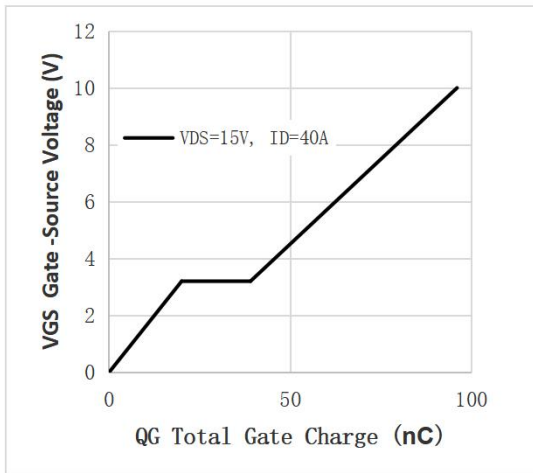


Fig.2 Capacitance Characteristics

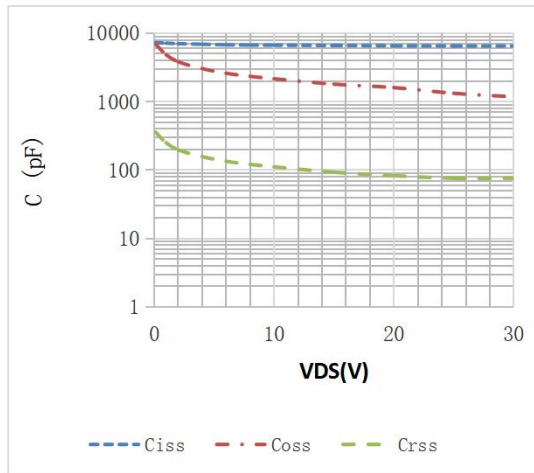


Fig.3 Power Dissipation

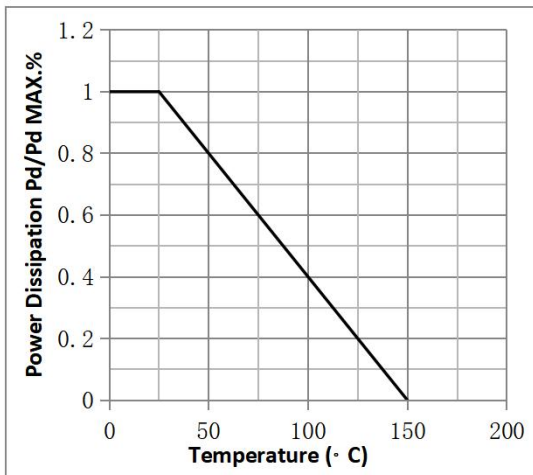


Fig.4 Typical output Characteristics

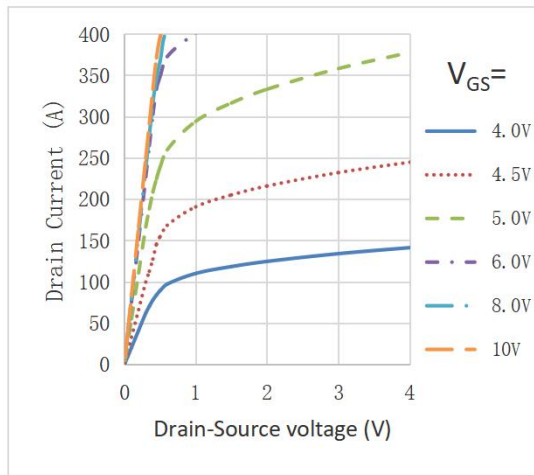


Fig.5 Threshold Voltage V.S Junction Temperature

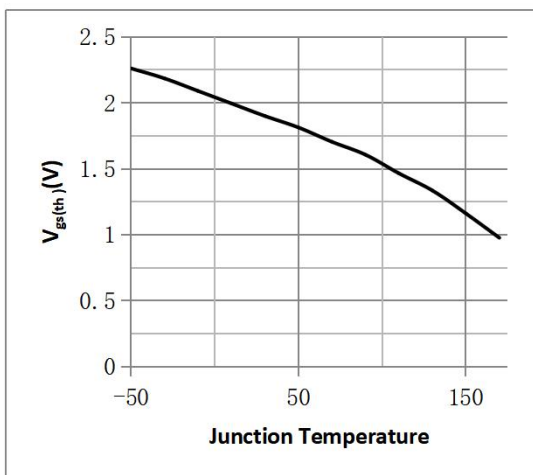


Fig.6 Resistance V.S Drain Current

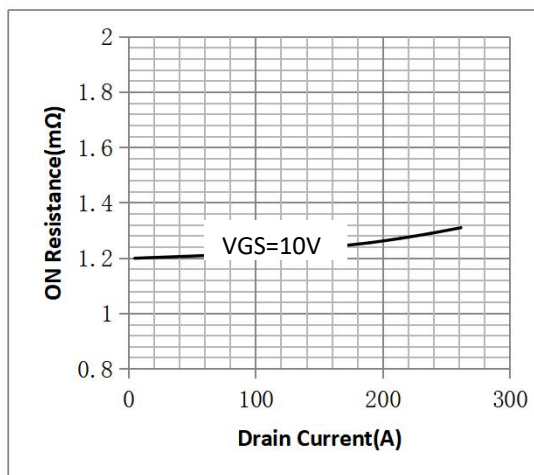


Fig.7 On-Resistance VS Gate Source Voltage

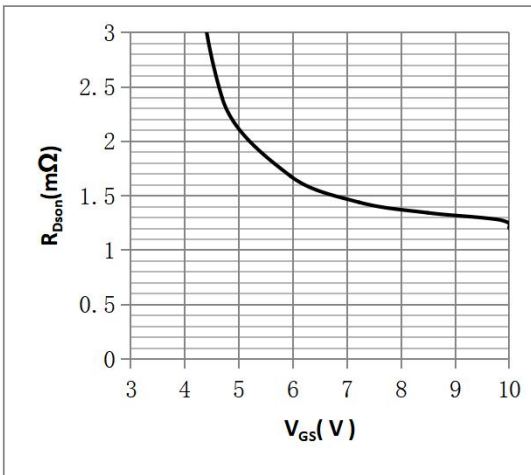


Fig.8 On-Resistance V.S Junction Temperature

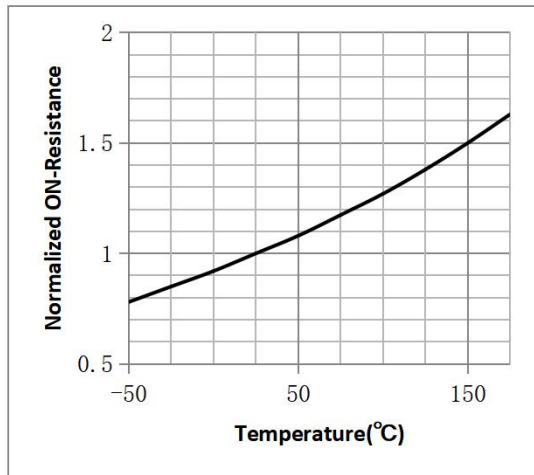


Figure 9. Diode Forward Voltage vs. Current

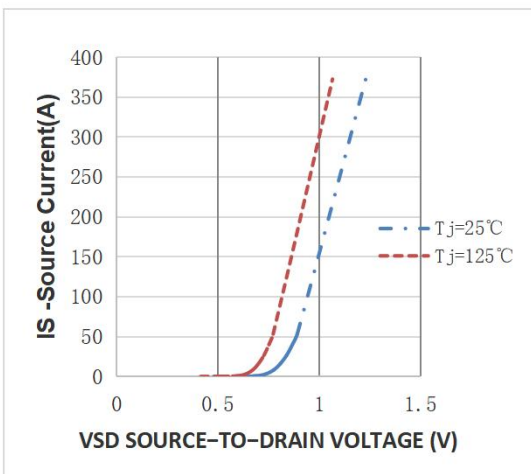


Figure 10. Transfer Characteristics

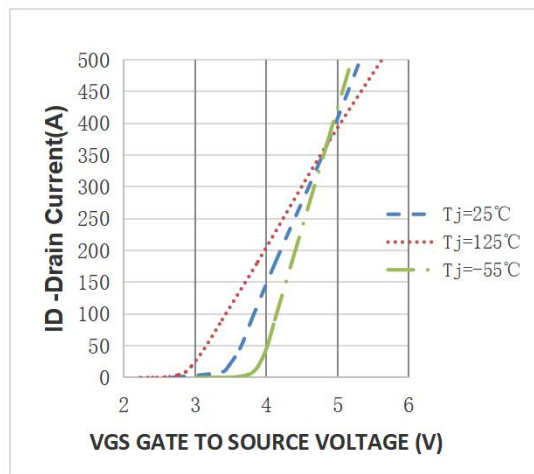


Fig.11 SOA Maximum Safe Operating Area

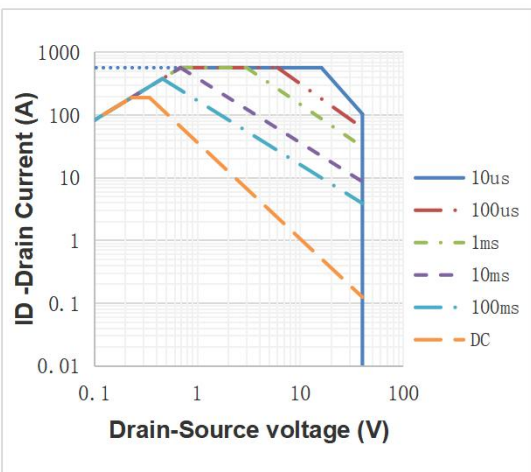
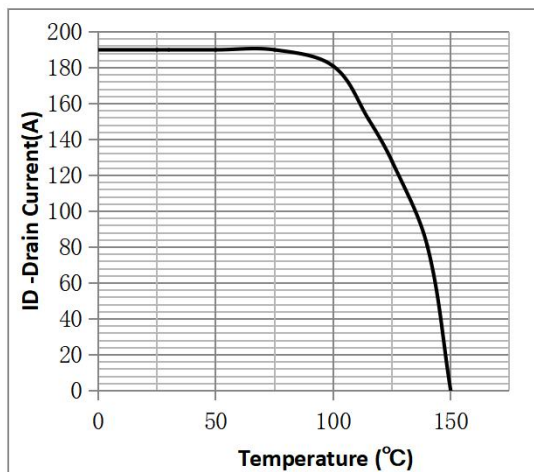
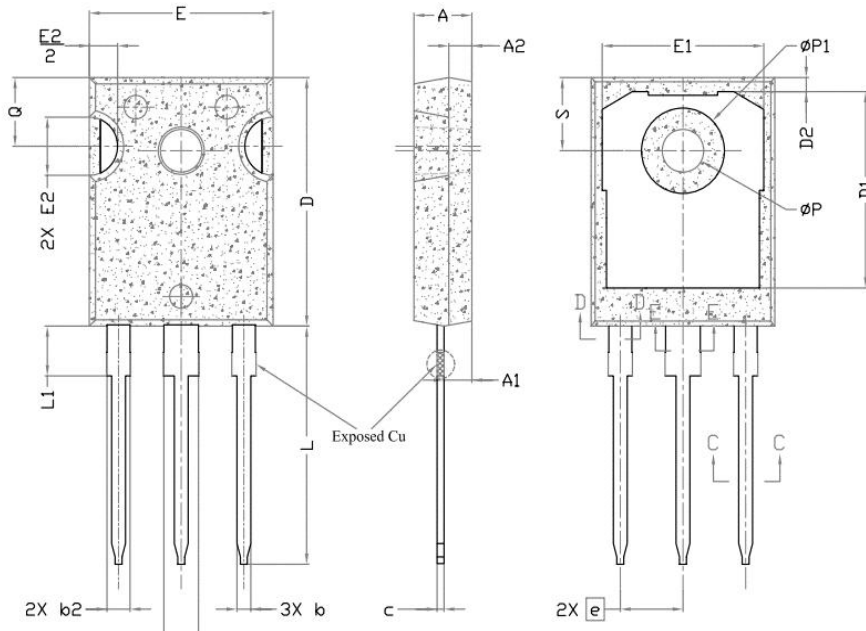


Fig.12 I_D vs. Junction Temperature^①



•TO-247 Package Outline



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.50	2.00	2.49	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6, 8
b5	2.87	3.00	3.18	
c	0.55	0.60	0.69	6
c1	0.55	0.60	0.65	
D	20.80	20.95	21.10	4
D1	16.25	16.55	17.65	5
D2	0.51	1.19	1.35	
E	15.75	15.94	16.13	4
E1	13.46	14.02	14.16	5
E2	4.32	4.91	5.49	3
e	5,44BSC			
L	19.81	20.07	20.32	
L1	4.10	4.19	4.40	6
∅P	3.56	3.61	3.65	7
∅P1	7.19REF.			
Q	5.39	5.79	6.20	
S	6.04	6.17	6.30	

Note:

① Practically the current will be limited by PCB, thermal design and operating temperature. VGS=10V.

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Revision History

Version	Date	Change
A	2022.11.20	
B	2024.5.10	Correct Basic ordering unit