

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

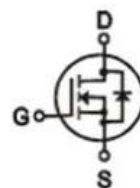
Ordering Information:

Part NO.	ZMS018N04P
Marking	ZMS018N04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	1000

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

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$25^\circ\text{C} \leq T_J \leq 175^\circ\text{C}$	40	V
Gate-Source Voltage ^①	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	161	A
	I_D	$T_C=75^\circ\text{C}$	114	A
	I_D	$T_C=100^\circ\text{C}$	93	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	644	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	114	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	3.6	W
Operating Junction Temperature	T_J		-55 to +175	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55 to +175	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=0.1\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	210	mJ
		$L=0.5\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	483	mJ
ESD Level (HBM)	CLASS 2			

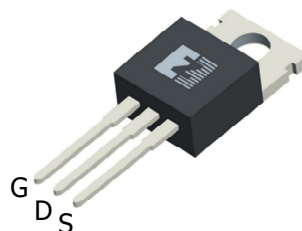
Product Summary



$$V_{DS} = 40\text{V}$$

$$R_{DS(ON)} = 2.3\text{m}\Omega$$

$$I_D = 161\text{A}$$



TO-220



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.1	°C/W
Thermal resistance, junction-ambient	$R_{thJA}^{②}$		-	35	°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}	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.8	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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=24A$		2.3	2.5	m Ω
		$V_{GS}=4.5V, I_D=12A$		2.9	4.5	m Ω
Forward Transconductance	g_{FS}	$V_{GS}=5V, I_{SD}=20A$		22		S
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=24A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	2250	-	pF
Output capacitance	C_{oss}		-	620	-	
Reverse transfer capacitance	C_{rss}		-	46	-	
Gate Resistance	R_g	$f=1MHz$	-	1.6		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=24A, V_{GS}=10V$	-	41	-	nC
Gate - Source charge	Q_{gs}		-	6.5	-	
Gate - Drain charge	Q_{gd}		-	11.8	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	11	-	ns
Turn-ON Rise time	t_r		-	28	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	25	-	ns
Turn-Off Fall time	t_f		-	14	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, di_s/dt=100A/\mu s, I_S=50A$	-	23	-	ns
Reverse Recovery Charge	Q_{RR}		-	25	-	nC

Fig.1 Gate-Charge Characteristics

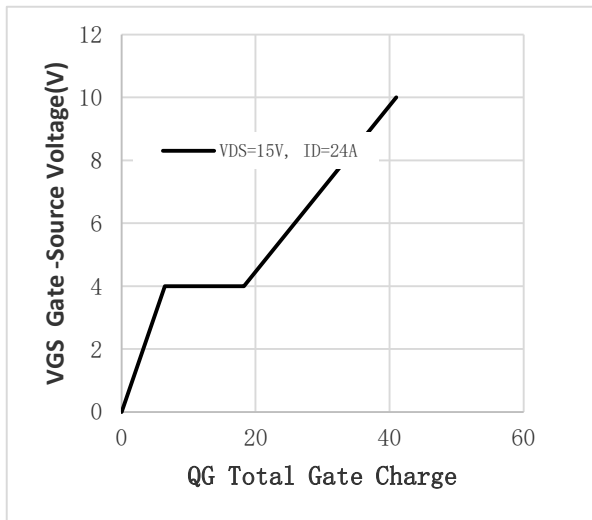


Fig.2 Capacitance Characteristics

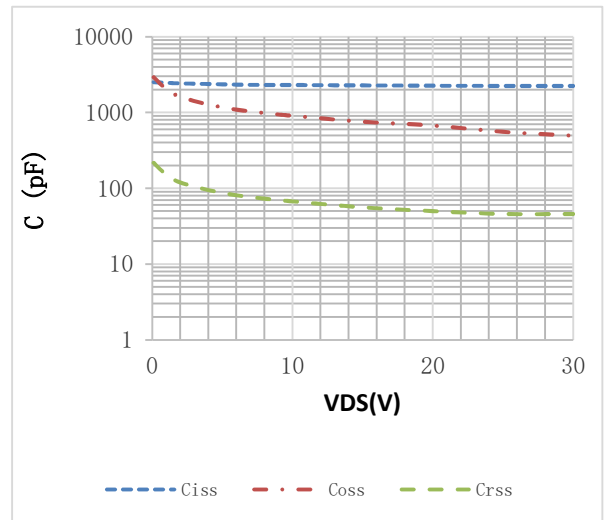


Fig.3 Power Dissipation

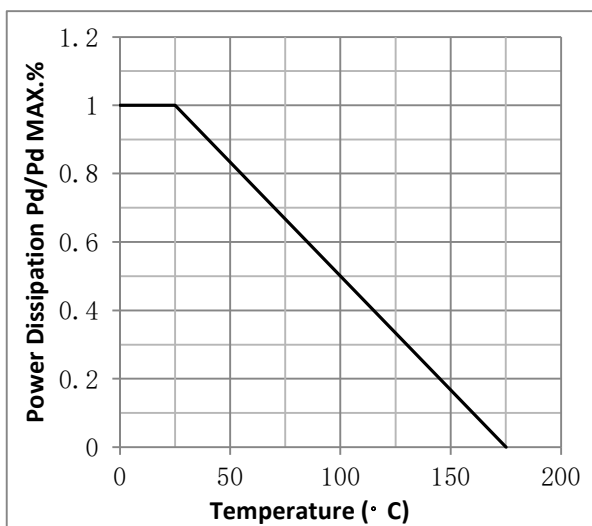


Fig.4 Typical output Characteristics

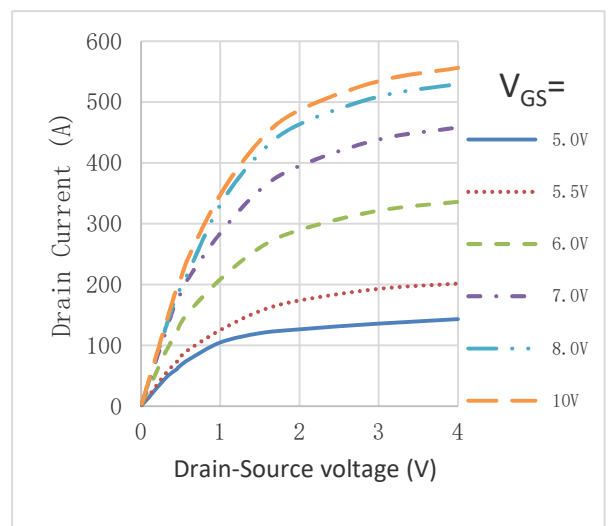


Fig.5 Threshold Voltage V.S Junction Temperature

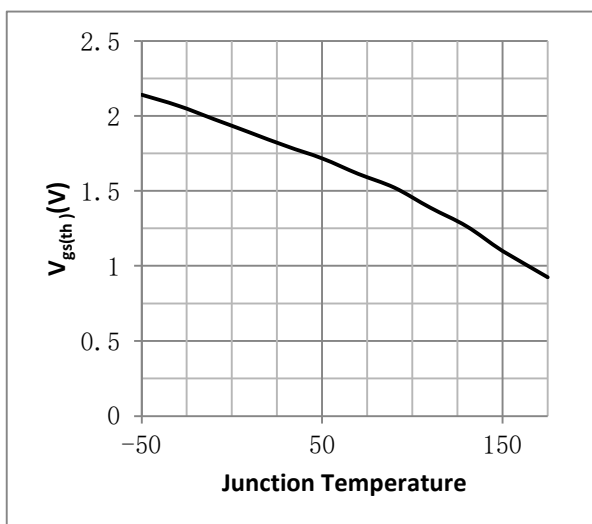


Fig.6 Resistance V.S Drain Current

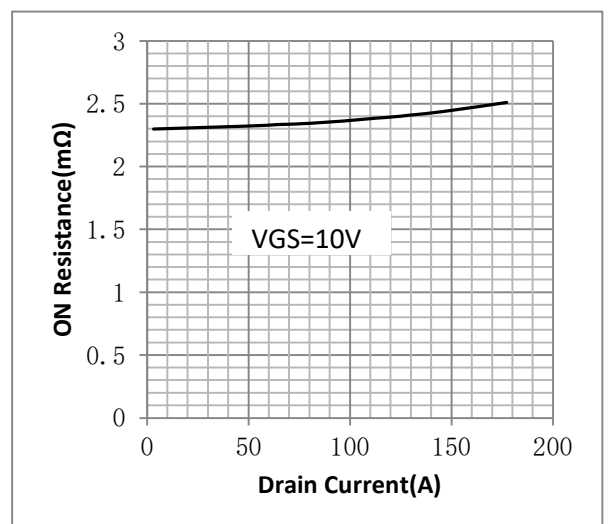


Fig.7 On-Resistance VS Gate Source Voltage

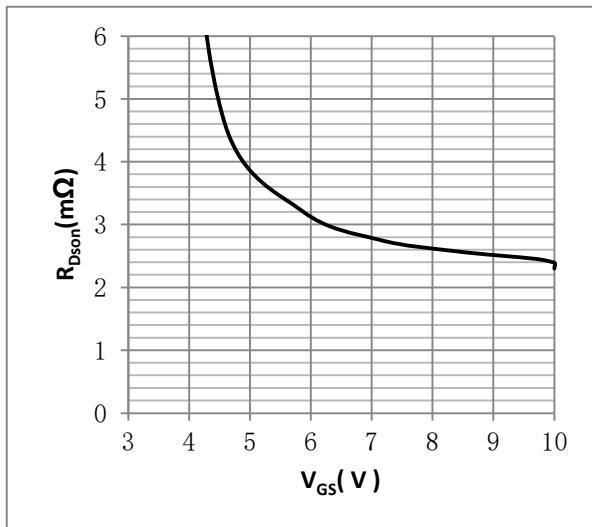


Fig.8 On-Resistance V.S Junction Temperature

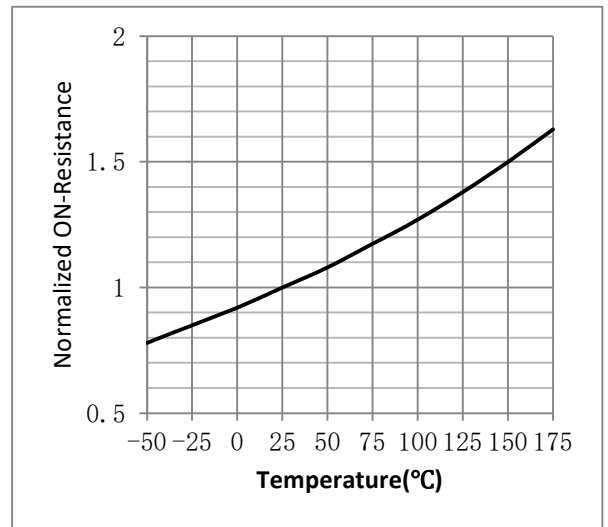


Figure 9. Diode Forward Voltage vs. Current

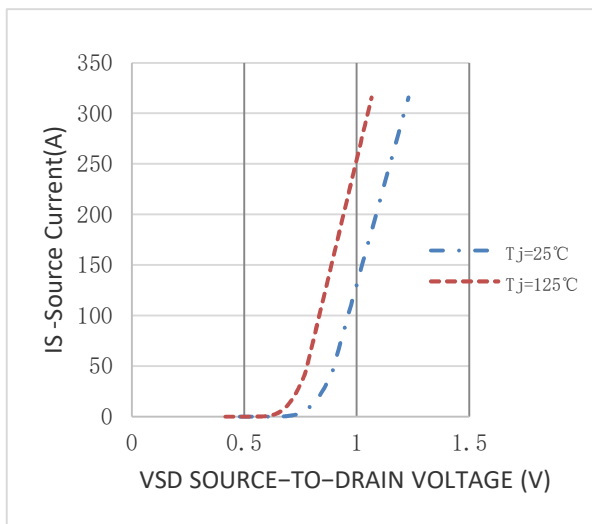


Figure 10. Transfer Characteristics

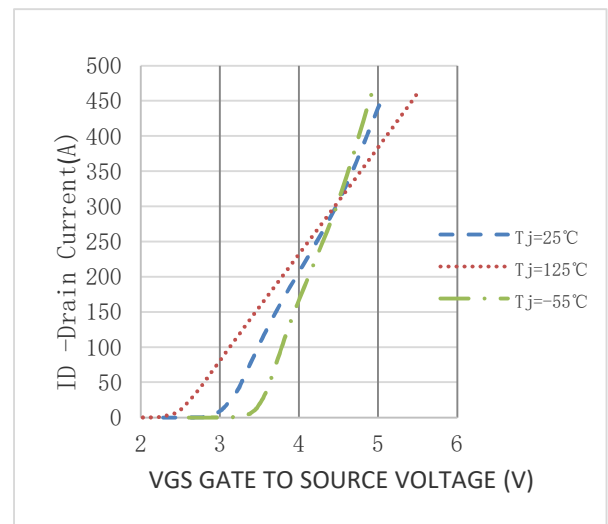


Fig.11 SOA Maximum Safe Operating Area

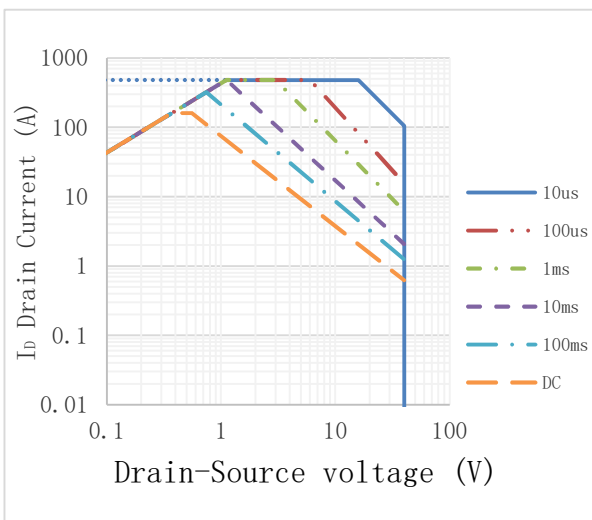
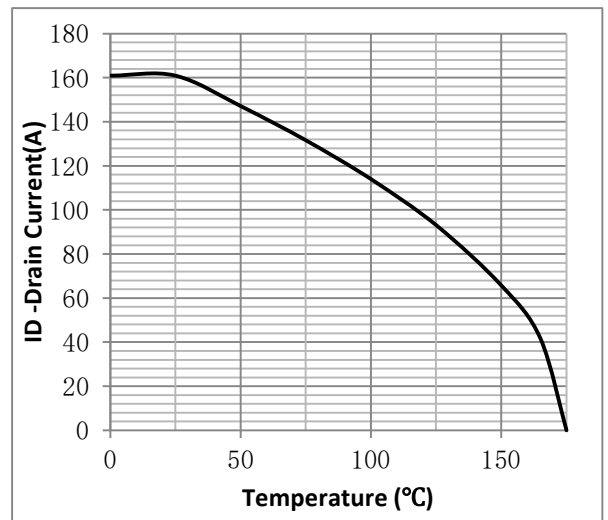
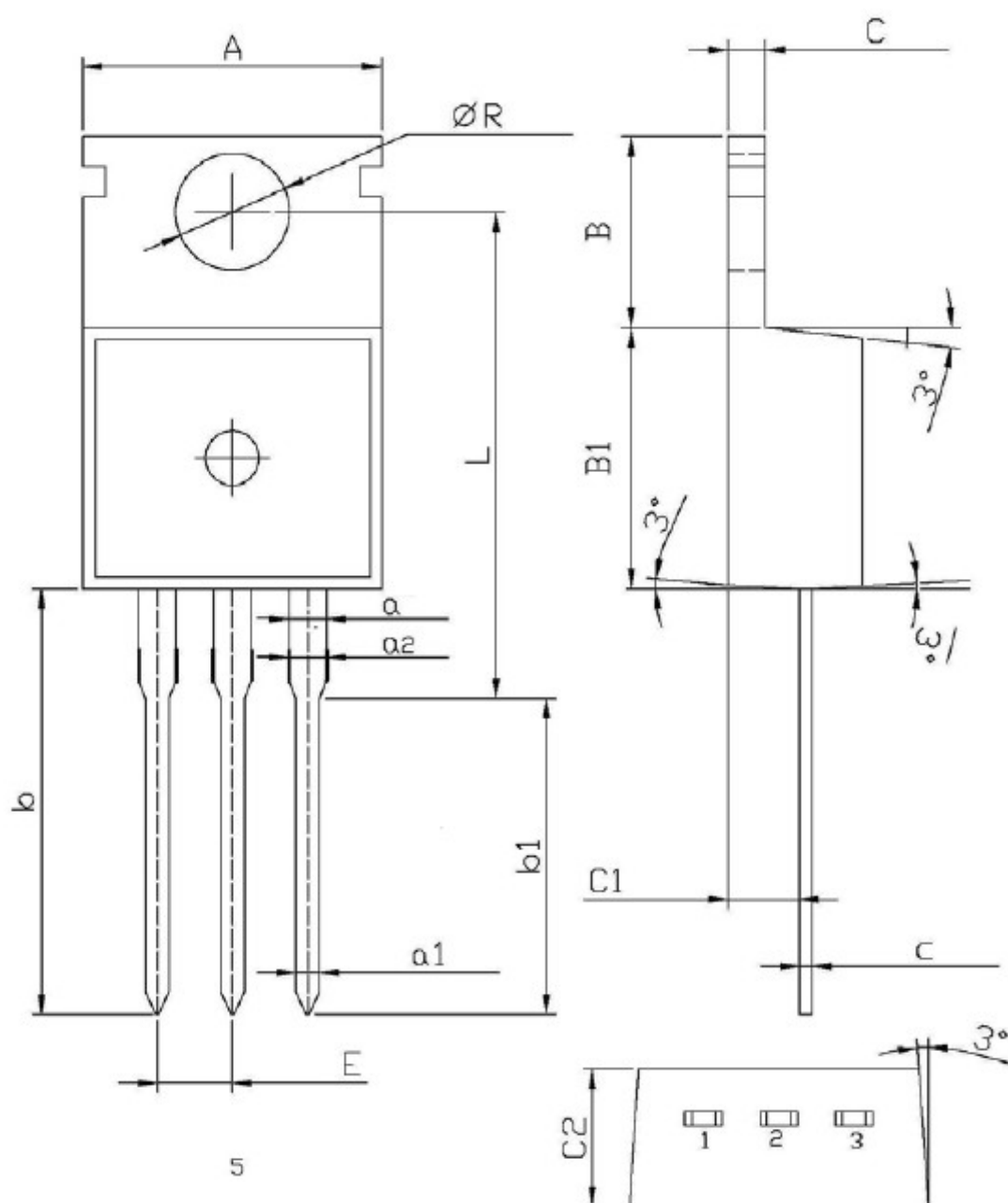


Fig.12 ID vs. Junction Temperature^③



•TO-220 Package Outline



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	9.8	10.2	C	1.2	1.4
R	3.56	3.64	B	6.3	6.7
L	15.7	16.1	B1	9.0	9.4
b	12.6	13.6	C1	2.2	2.6
b1	9.6	10.6	a1	0.7	0.9
a	1.22	1.32	c	0.4	0.6
E	2.34	2.74	C2	4.3	4.7
a2	1.25	1.45			

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	2021. 1. 6	New
B	2021. 3. 21	Add Reach, HF figure
C	2023. 11. 25	1. Use new version. 2. Modify Fig1-12. 3. Modify Tj. 4. Add dynamic characteristics
D	2023. 12. 7	Correct BVDSS
E	2024. 4. 12	Correct Rdson
F	2024. 7. 15	Correct Rdson
G	2026. 6. 5	Update POD