

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

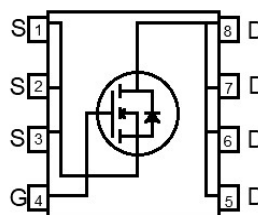
Ordering Information:

Part NO.	ZMS012N06NC
Marking	ZMS012N06
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

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

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$25^\circ\text{C} \leq T_J \leq 150^\circ\text{C}$	60	V
Gate-Source Voltage ^①	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	226	A
	I_D	$T_C=75^\circ\text{C}$	185	A
	I_D	$T_C=100^\circ\text{C}$	160	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	678	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	167	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	4.2	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}	$L=0.1\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	320	mJ
		$L=0.5\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	680	mJ
ESD Level (HBM)	CLASS 2			

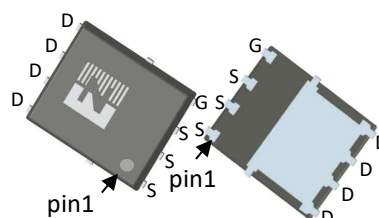
Product Summary



$$V_{DS} = 60\text{V}$$

$$R_{DS(ON)} = 1.2\text{m}\Omega$$

$$I_D = 226\text{A}$$



DFN5*6



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	RthJC		-	0.9	°C/W
Thermal resistance, junction-ambient	RthJA ^②		-	36	°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	60			V
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250uA	1.6	1.9	2.5	V
Drain-Source Leakage Current	I _{DSS}	V _{GS} = 0V, V _{DS} = 60V			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	1.55	mΩ
		V _{GS} = 4.5V, I _D = 30A		1.4	1.9	
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	Ciss	f = 1MHz, V _{DS} = 25V	-	5400	-	pF
Output capacitance	Coss		-	1620	-	
Reverse transfer capacitance	Crss		-	80	-	
Gate Resistance	Rg	f = 1MHz	-	1.6		Ω
Total gate charge	Qg	V _{DD} = 15V, I _D = 40A, V _{GS} = 10V	-	92	-	nC
Gate - Source charge	Qgs		-	12	-	
Gate - Drain charge	Qgd		-	23	-	
Turn-ON Delay time	t _{D(on)}	V _{GS} = 10V, V _{DS} = 15V, R _G = 3.3Ω, I _D = 20A	-	15	-	ns
Turn-ON Rise time	t _r		-	10	-	ns
Turn-Off Delay time	t _{D(off)}		-	26	-	ns
Turn-Off Fall time	t _f		-	17	-	ns
Reverse Recovery Time	t _{rr}	V _{DD} = 20V, dI _S /dt = 100A/s, I _S = 50A	-	48	-	ns
Reverse Recovery Charge	Q _{rr}		-	47	-	nC

Fig.1 Gate-Charge Characteristics

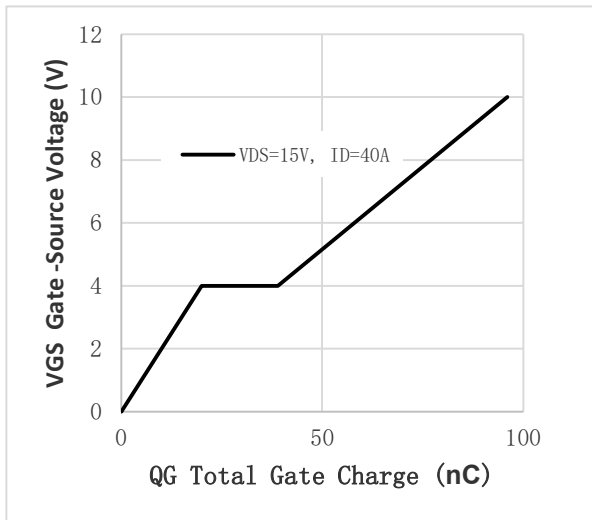


Fig.2 Capacitance Characteristics

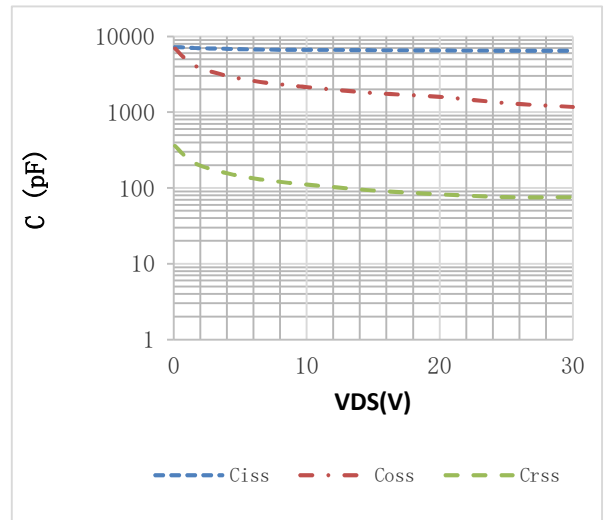


Fig.3 Power Dissipation

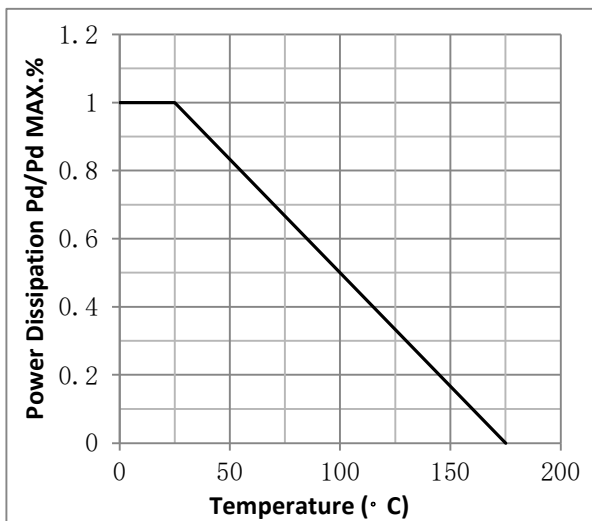


Fig.4 Typical output Characteristics

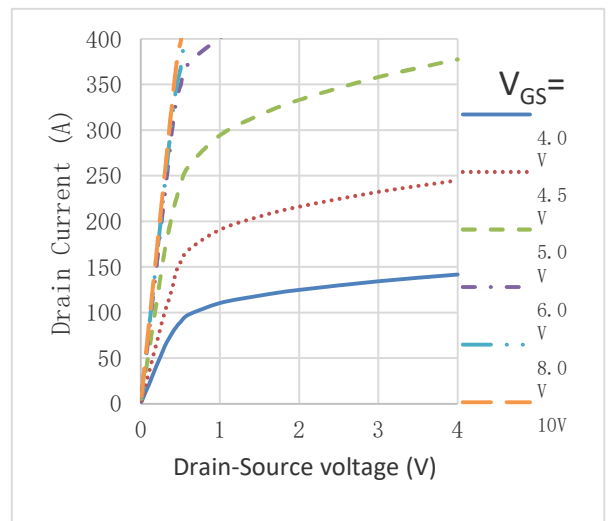


Fig.5 Threshold Voltage V.S Junction Temperature

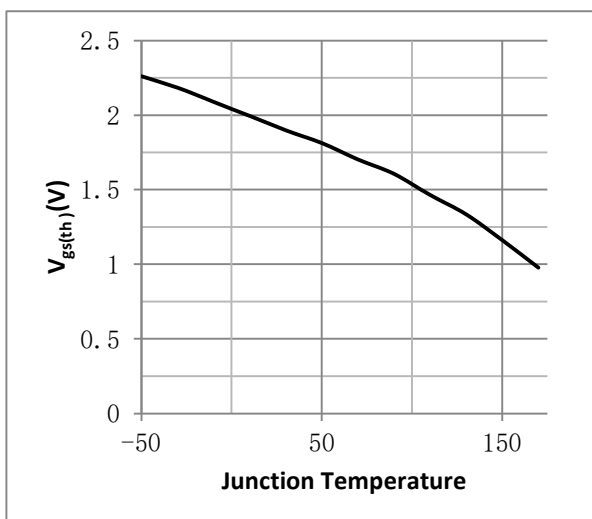


Fig.6 Resistance V.S Drain Current

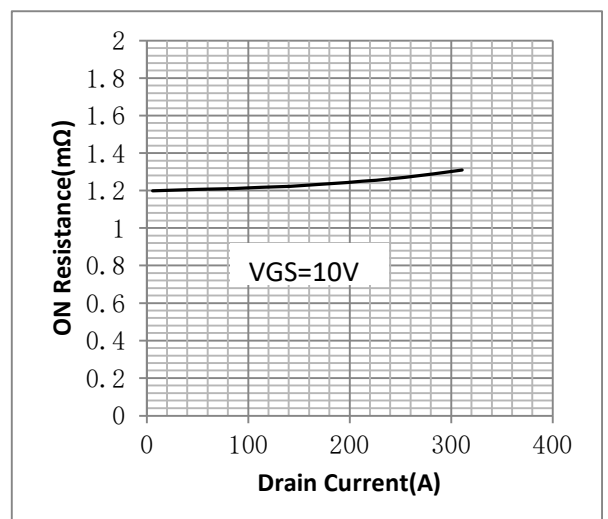


Fig.7 On-Resistance VS Gate Source Voltage

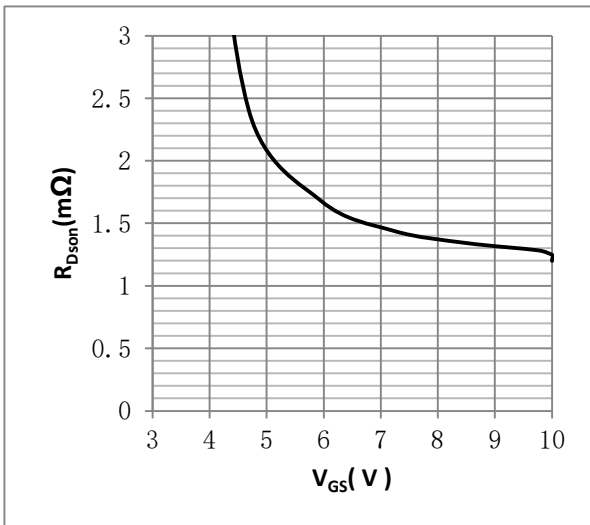


Fig.8 On-Resistance V.S Junction Temperature

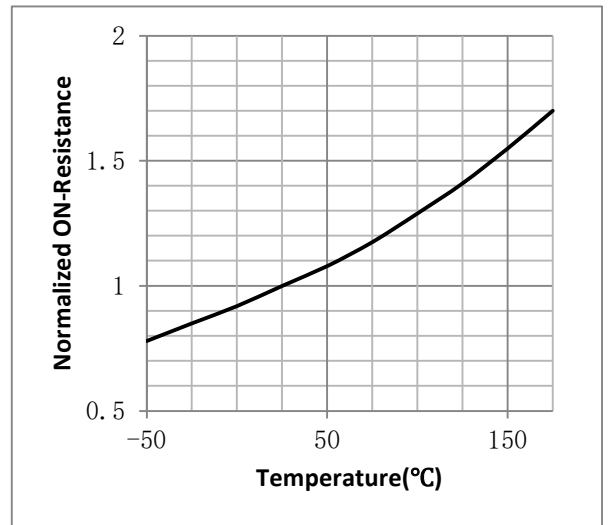


Figure 9. Diode Forward Voltage vs. Current

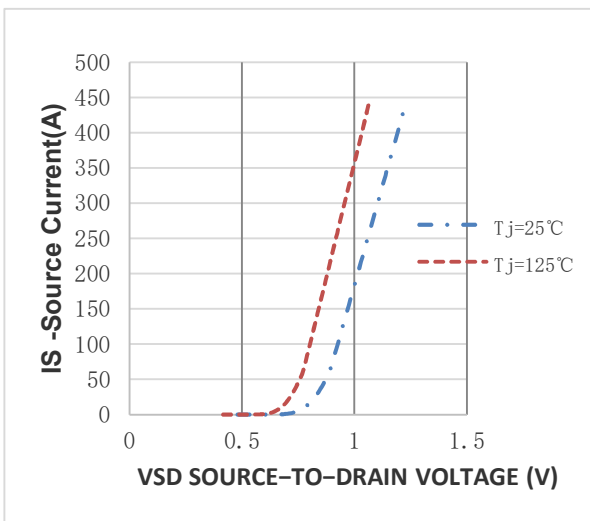


Figure 10. Transfer Characteristics

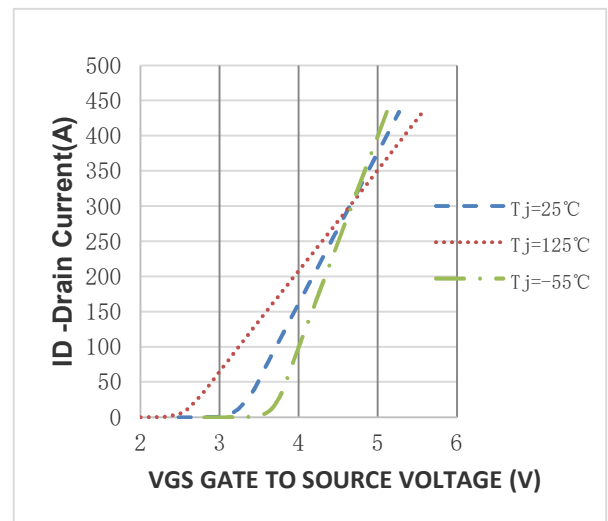


Fig.11 SOA Maximum Safe Operating Area

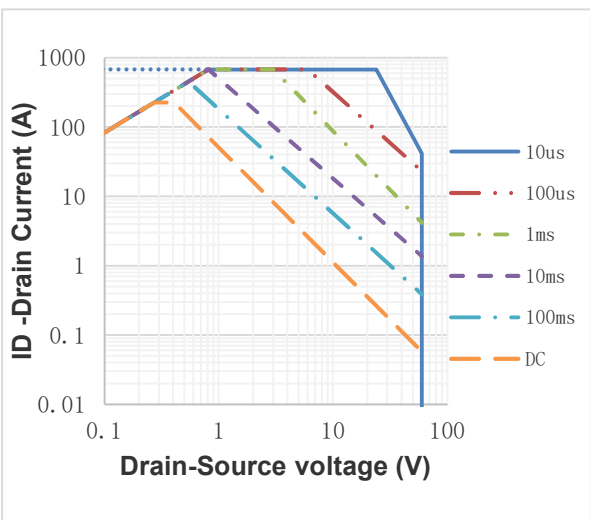
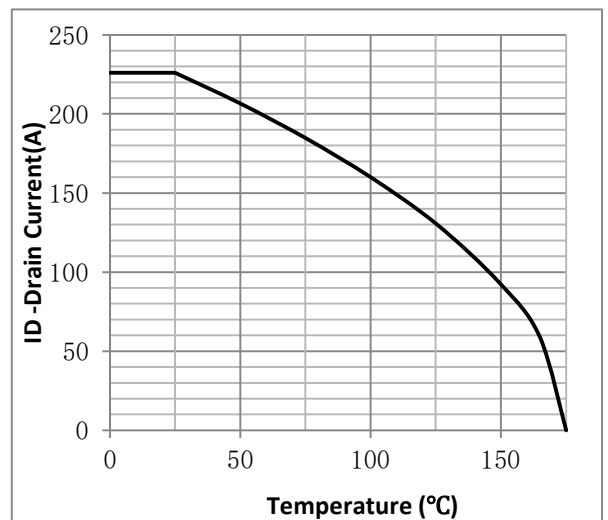
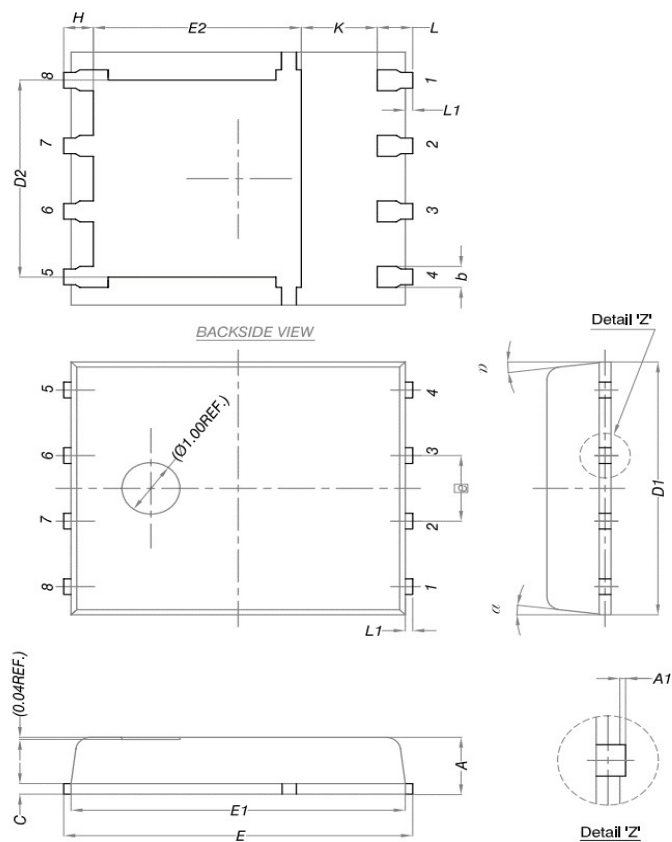


Fig.12 I_D vs. Junction Temperature^③



•DFN5*6 Package Outline



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°

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	2022. 12. 15	
B	2023. 2. 20	1. Add Dynamic characteristic tf, tr etc.