

● 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

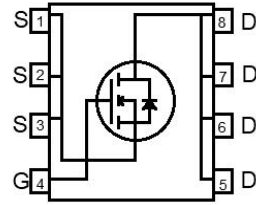
● Ordering Information:

Part NO.	ZMS090N15HN
Marking	ZMS090N15H
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

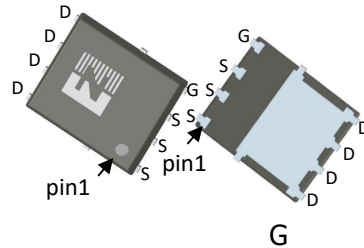
● Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	$V_{DS}$	$25^\circ\text{C} \leq T_j \leq 175^\circ\text{C}$	150	V
Gate-Source Voltage	$V_{GS}$		$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	75	A
	$I_D$	$T_C=75^\circ\text{C}$	63	A
	$I_D$	$T_C=100^\circ\text{C}$	54	A
Pulsed Drain Current	$I_{DM}$	Pulsed; $t_p \leq 10 \mu\text{s}$ ; $T_{mb} = 25^\circ\text{C}$ ;	225	A
Total Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	136	W
Total Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	5.0	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=0.1mH, VGS=10V, Rg=25 $\Omega$ ,	110	mJ
		L=0.5mH, VGS=10V, Rg=25 $\Omega$ ,	253	mJ
ESD Level (HBM)	CLASS 2			

● Product Summary



$V_{DS} = 150\text{V}$   
 $R_{DS(ON)} = 9.4\text{m}\Omega$   
 $I_D = 75\text{A}$



DFN5\*6



**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	RthJC		-	1.1	°C/W
Thermal resistance, junction-ambient	RthJA①		-	30	°C/W
Soldering temperature	Tsold		-	260	°C

**•Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	150			V
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	2.7	4.0	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> = 150V			1.0	uA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V			100	nA
Static Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> = 30A		9.4	11	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>GS</sub> =5V, I <sub>SD</sub> = 10A		20		s
Diode Forward Voltage	V <sub>FSD</sub>	V <sub>GS</sub> =0V, I <sub>SD</sub> = 30A			1.3	V

**•Dynamic characteristics**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V <sub>DS</sub> =25V	-	3320	-	pF
Output capacitance	Coss		-	1204	-	
Reverse transfer capacitance	Crss		-	107	-	
Gate Resistance	Rg	f = 1MHz	-	1.2		Ω
Total gate charge	Qg	V <sub>DD</sub> = 15V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 10V	-	45	-	nC
Gate - Source charge	Qgs		-	16	-	
Gate - Drain charge	Qgd		-	9	-	
Turn-ON Delay time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =20A	-	25	-	ns
Turn-ON Rise time	t <sub>r</sub>		-	20	-	ns
Turn-Off Delay time	t <sub>D(off)</sub>		-	36	-	ns
Turn-Off Fall time	t <sub>f</sub>		-	13	-	ns
Reverse Recovery Time	t <sub>RR</sub>	V <sub>DD</sub> =20V, di <sub>S</sub> /dt =	-	76	-	ns
Reverse Recovery Charge	Q <sub>RR</sub>	100A/us, I <sub>S</sub> =50A	-	120	-	nC

Fig.1 Gate-Charge Characteristics

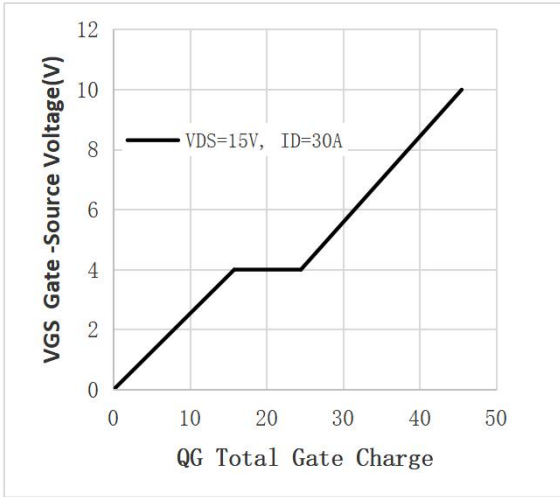


Fig.2 Capacitance Characteristics

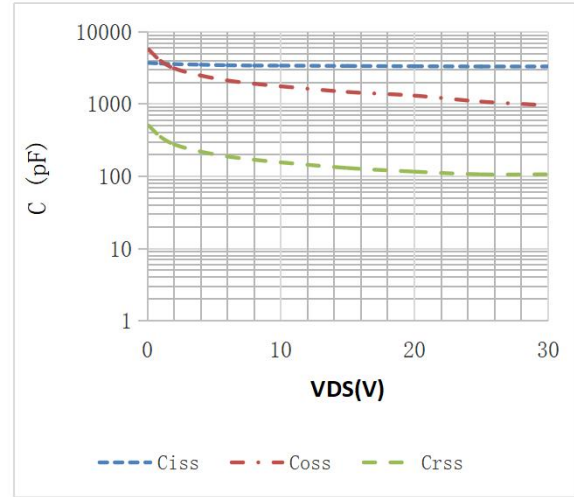


Fig.3 Power Dissipation

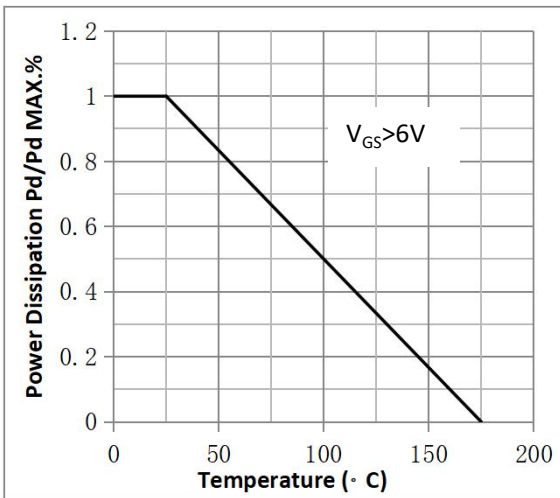


Fig.4 Typical output Characteristics

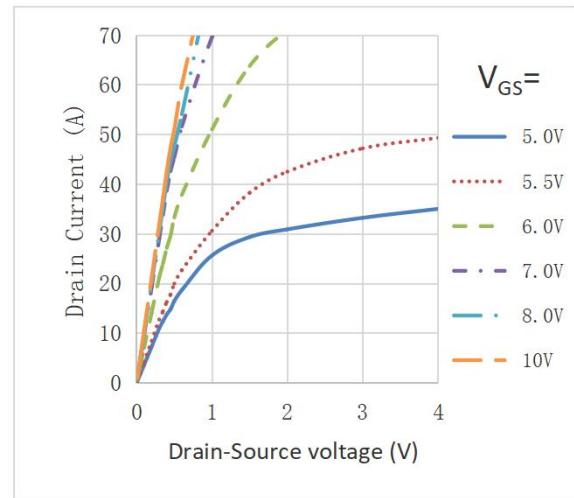


Fig.5 Threshold Voltage V.S Junction Temperature

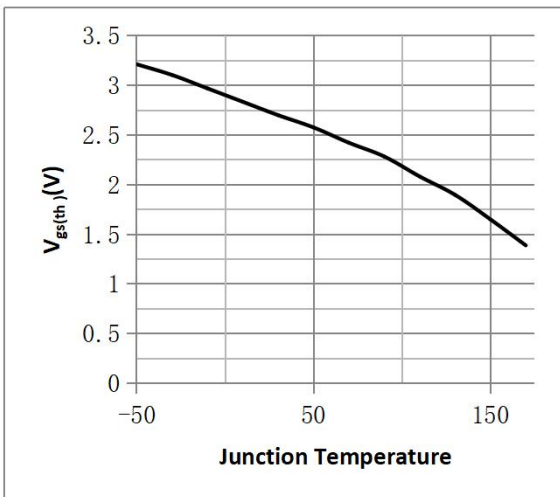


Fig.6 Resistance V.S Drain Current

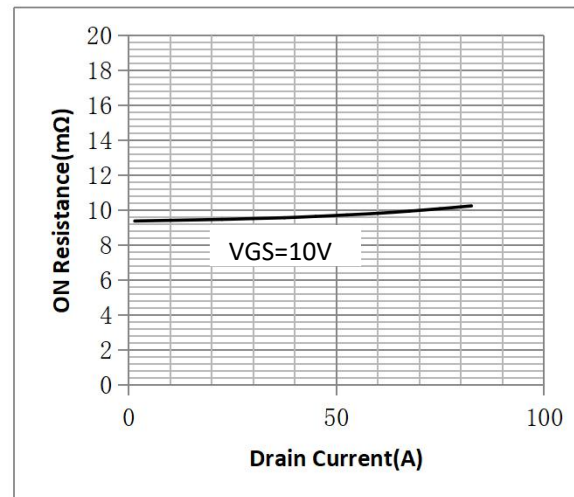


Fig.7 On-Resistance VS Gate Source Voltage

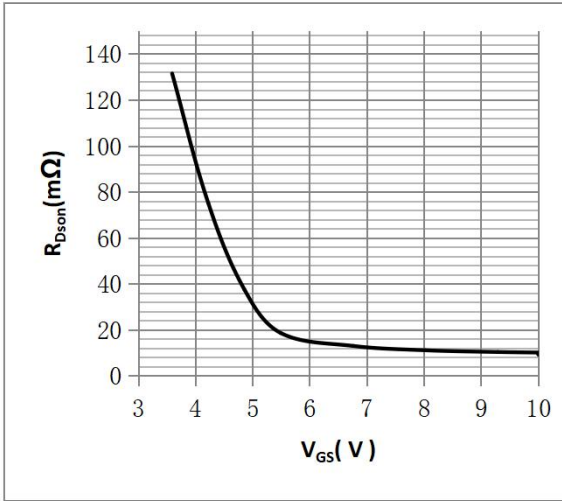


Fig.8 On-Resistance V.S Junction Temperature

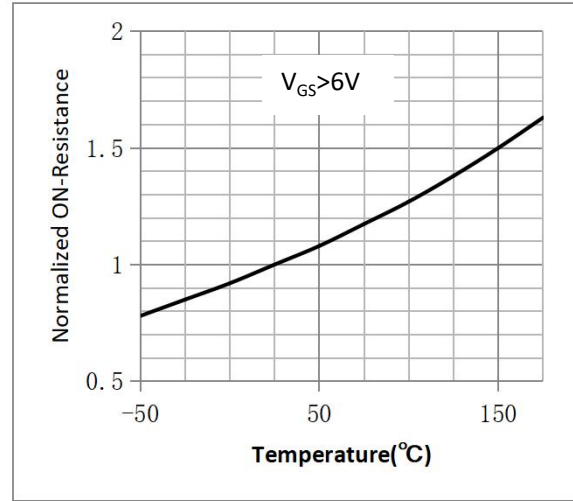


Figure 9. Diode Forward Voltage vs. Current

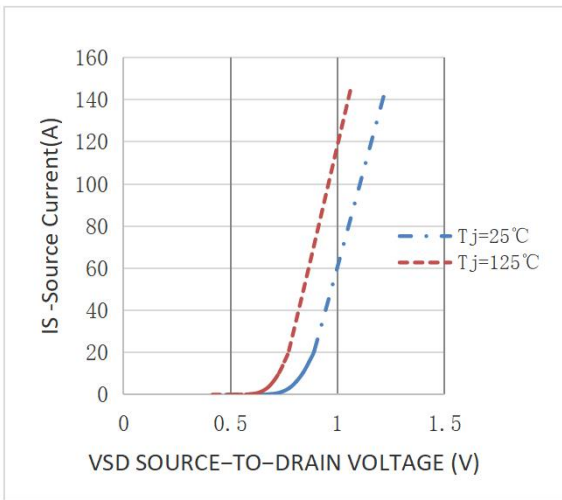


Figure 10. Transfer Characteristics

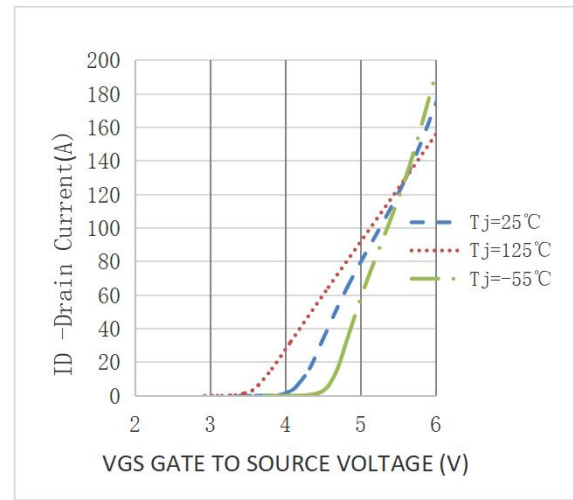


Fig.11 SOA Maximum Safe Operating Area

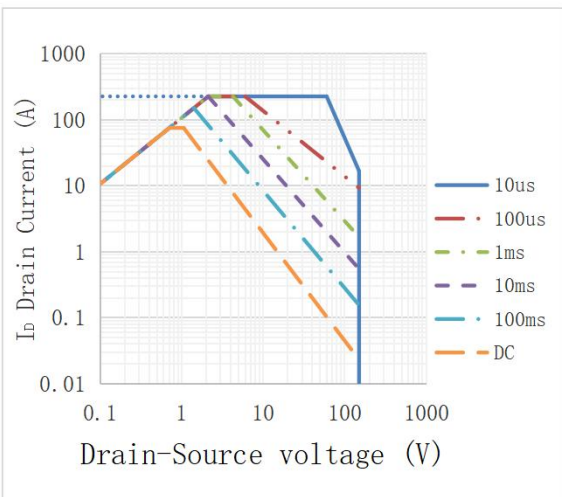
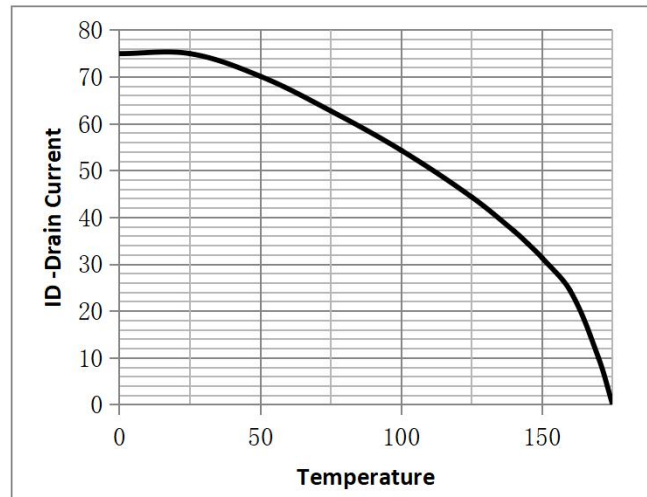
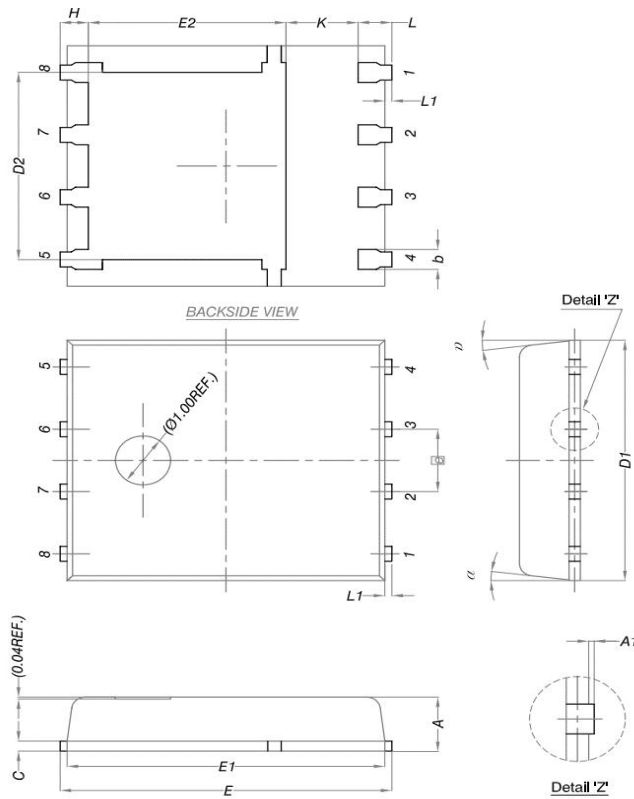


Fig.12  $I_D$  vs. Case Temperature<sup>②</sup>



•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 Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ② 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	2021.9.6	
B	2022.11.5	1.Add Reach, HF figure, 2.ID modify
C	2023.11.25	Correct Tj, ID curve, Rdon, Rthjc
D	2024.5.6	Correct RDSON and ID
E	2024.8.13	Dynamic characteristics modified