● 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

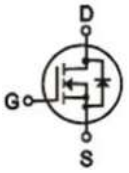
●Application

■BLDC Motor driver

■DC-DC

■Battery protection

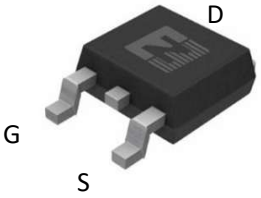
● Product Summary



V_{DS}= 60V

$R_{DS(ON)}$ = 5.2mΩ

I_D= 76A



TO-252

RoHS

REACH COMPLIANT

HF

●Ordering Information:

Part NO.	ZMS052N06D
Marking	ZMS052N06
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

●Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		60	V
Gate-Source Voltage	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	76	A
	I_D	T_C=75℃	61	A
	I_D	T_C=100℃	52	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	304	A
Total Power Dissipation	P_D	T_C=25℃	71	W
Total Power Dissipation	P_D	T_A=25℃	2.4	W
Operating Junction Temperature	T_J		-55 to +175	℃
Storage Temperature	T_{STG}		-55 to +175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=10V, Rg=25Ω,	61	mJ
		L=0.5mH, V_{GS}=10V, Rg=25Ω,	128	mJ
ESD Level (HBM)	CLASS 2			

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	2.1	°C/W
Thermal resistance, junction-ambient①	R_{thJA}		-	62.5	°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	1.3	1.8	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= 12A		5.2	6.5	mΩ
		V_{GS}=4.5V, I_D= 10A		6.8	8.5	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A		16		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 12A			1.3	V

●Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	1720	-	pF
Output capacitance	Coss		-	960	-	
Reverse transfer capacitance	Crss		-	91	-	
Gate Risistance	Rg	f = 1MHz	-	1.4		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	29	-	nC
	Qg (4.5v)		-	14	-	
Gate - Source charge	Qgs		-	4.4	-	
Gate - Drain charge	Qgd		-	7.3	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	16	-	ns
Turn-ON Rise time	t_r		-	17	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	28	-	ns
Turn-Off Fall time	t_f		-	15	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	21	-	ns
Reverse Recovery Charge	Q_{RR}		-	20	-	nC

Fig.1 Gate-Charge Characteristics

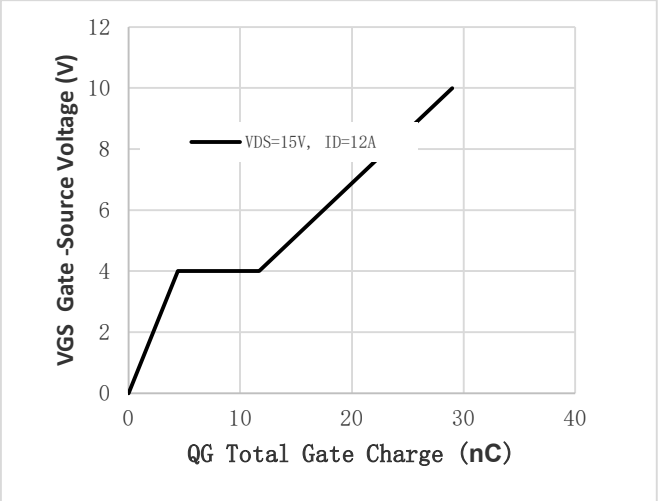


Fig.2 Capacitance Characteristics

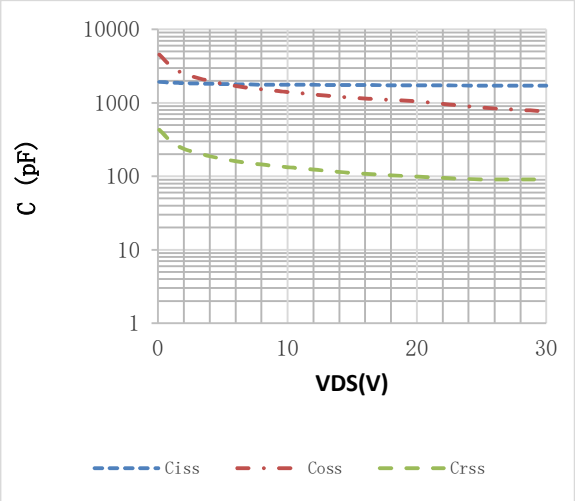


Fig.3 Power Dissipation

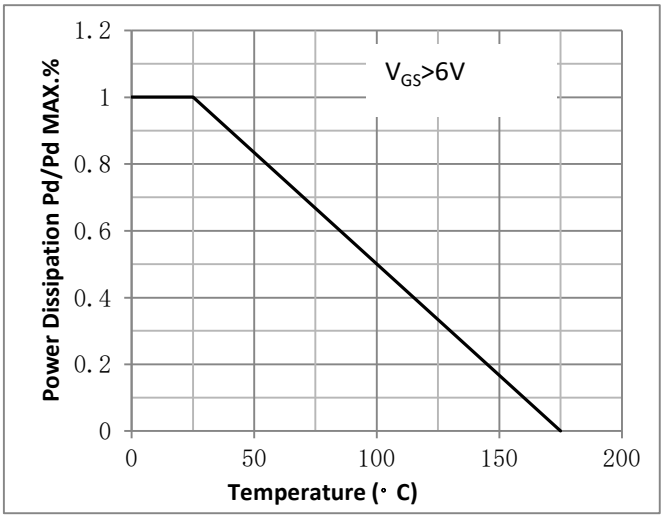


Fig.4 Typical output Characteristics

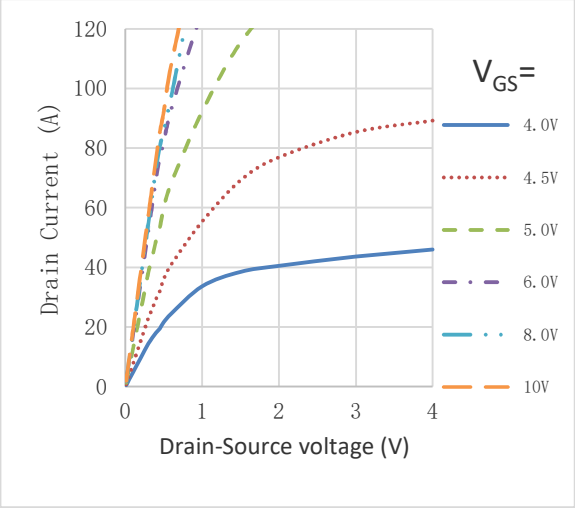


Fig.5 Threshold Voltage V.S Junction Temperature

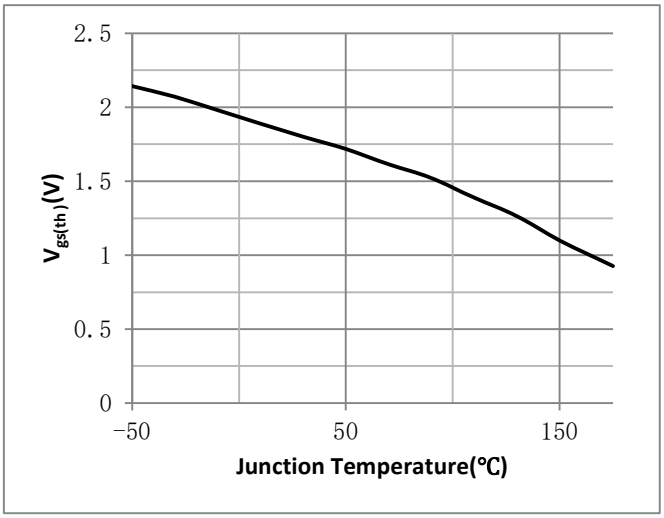


Fig.6 Resistance V.S Drain Current

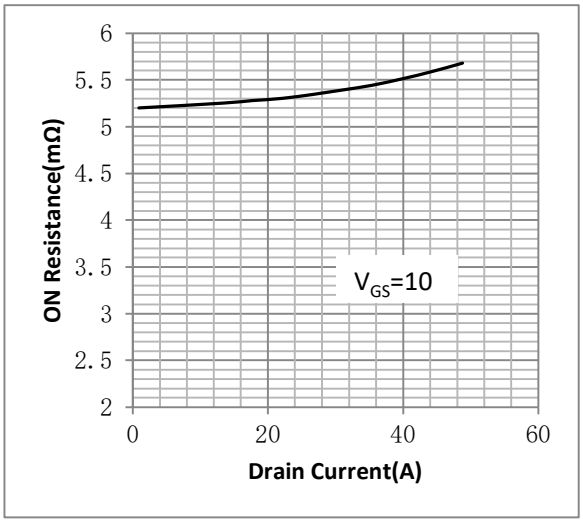


Fig.7 On-Resistance VS Gate Source Voltage

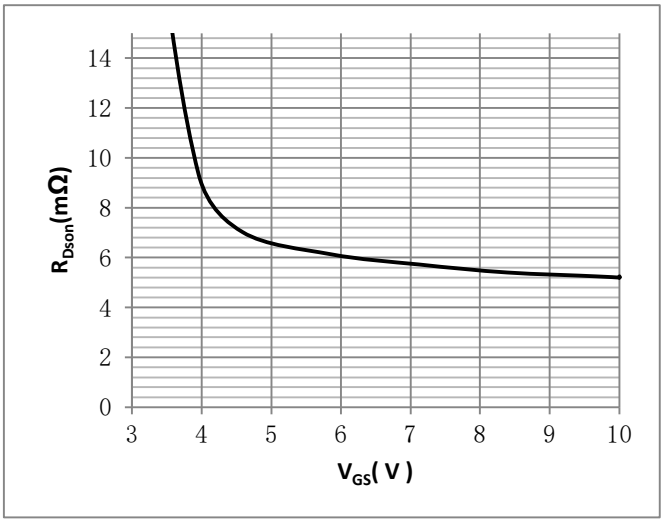


Fig.8 On-Resistance V.S Junction Temperature

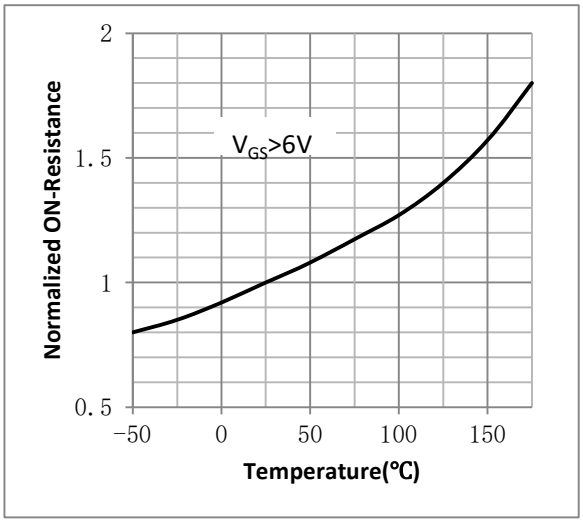


Figure 9. Diode Forward Voltage vs. Current

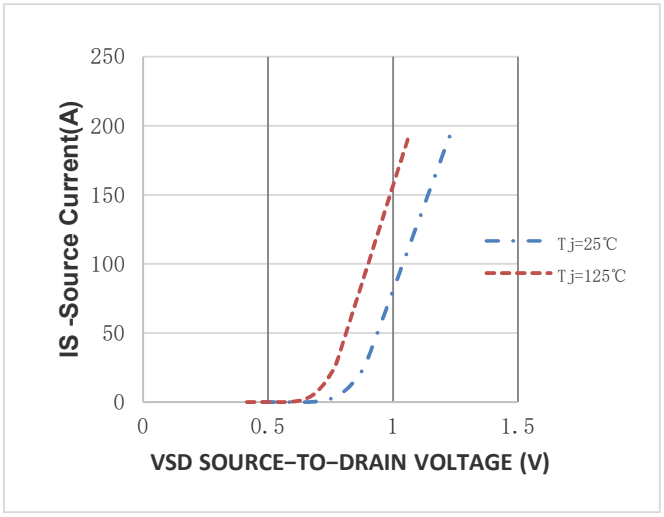


Figure 10. Transfer Characteristics

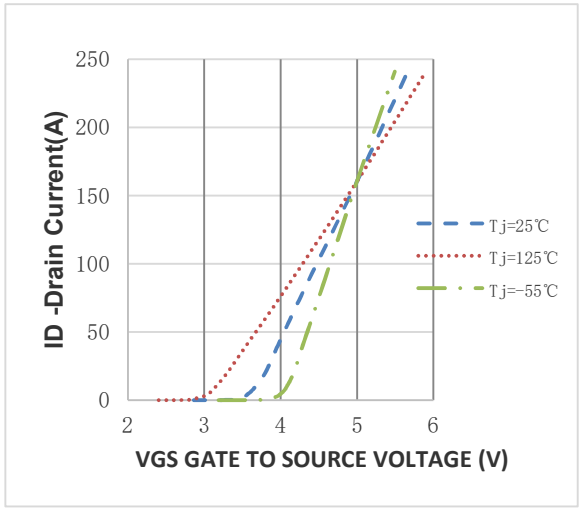


Fig.11 Safe Operating Area

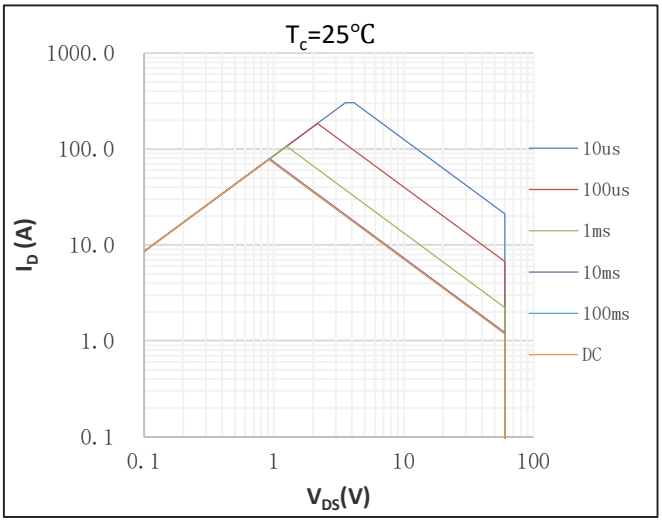
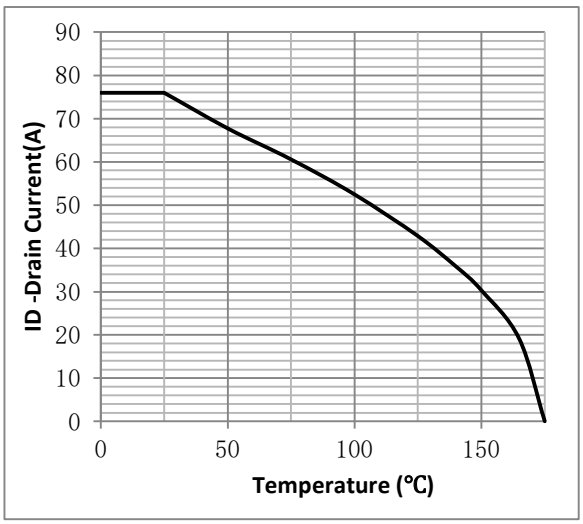
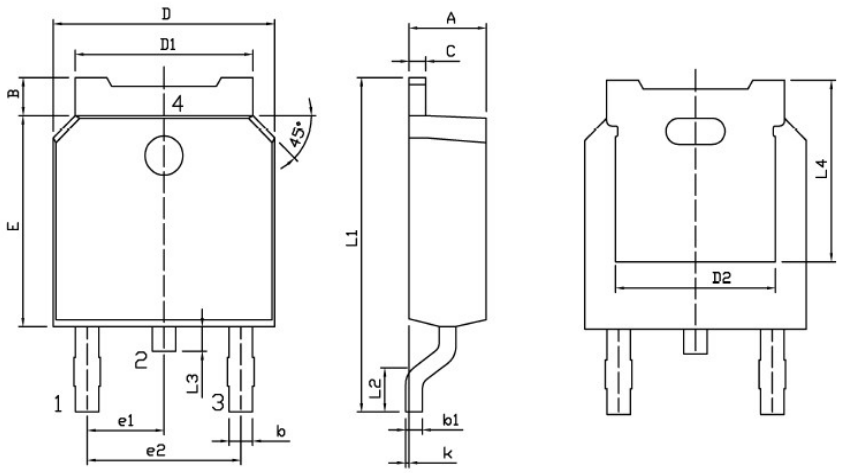


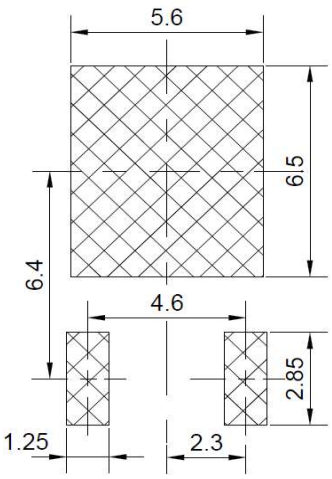
Fig.12 ID vs. Junction Temperature②



●TO-252 Package Outline



Land Pattern
(Only for Reference)



Dimensions In Millimeters					
Symbol	MIN	MAX	Symbol	MIN	MAX
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.70	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.85	10.35
C	0.45	0.55	L2	1.70	2.00
D	6.45	6.75	L3	0.60	0.90
D1	5.10	5.50	L4	5.05	
D2	4.85		k	0.00	0.10

Note:

① Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate；

②Practically 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	2019.1.10	
B	2022.1.7	1.Add Qg(4.5V)
C	2026.2.28	Update Tjmax to 175°C