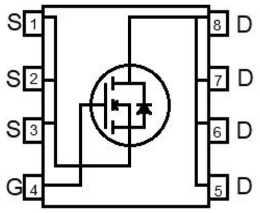
80V N-Channel Power SpeedFET

• General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• Product Summary



V_{DS}= 80V

$R_{DS(ON)}$ = 12mΩ

I_D= 29A

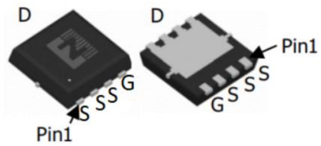
• Features

■AEC-Q101 Qualified

■Low $R_{DS(ON)}$ to minimize conductive loss

■Low Gate Charge for fast switching

■Low Thermal resistance



DFN3*3

•Application

■BLDC Motor driver

■DC-DC

■Load switch

•Ordering Information:

Part NO.	ZMSA120N08M
Marking	120N08
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		80	V
Gate-Source Voltage①	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	29	A
	I_D	T_C=75℃	24	A
	I_D	T_C=100℃	21	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	116	A
Total Power Dissipation	P_D	T_C=25℃	30	W
Total Power Dissipation	P_D	T_A=25℃	2.5	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,	23	mJ
		L=0.5mH, V_{GS}=10V, Rg=25Ω,	44	mJ
ESD Level (HBM)			CLASS 1B	

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	5	°C/W
Thermal resistance, junction-ambient②	R_{thJA}		-	60	°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	80			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}= 80V			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= 16A		12	16	mΩ
		V_{GS}=4.5V, I_D= 12A		18	23	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A		14		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 16A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	1032	-	pF
Output capacitance	Coss		-	750	-	
Reverse transfer capacitance	Crss		-	73	-	
Gate Risistance	Rg	f = 1MHz	-	1.4		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	13	-	nC
	Qg (4.5v)		-	6	-	
Gate - Source charge	Qgs		-	2.8	-	
Gate - Drain charge	Qgd		-	2.6	-	
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		-	40	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	20	-	ns
Turn-Off Fall time	t_f		-	12	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	45	-	ns
Reverse Recovery Charge	Q_{RR}		-	40	-	nC

Fig.1 Gate-Charge Characteristics

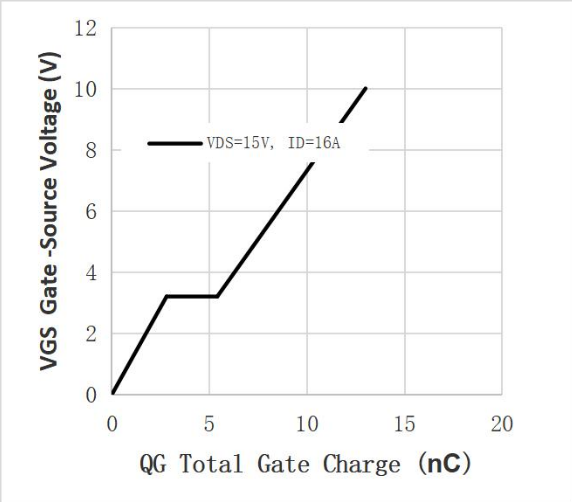


Fig.2 Capacitance Characteristics

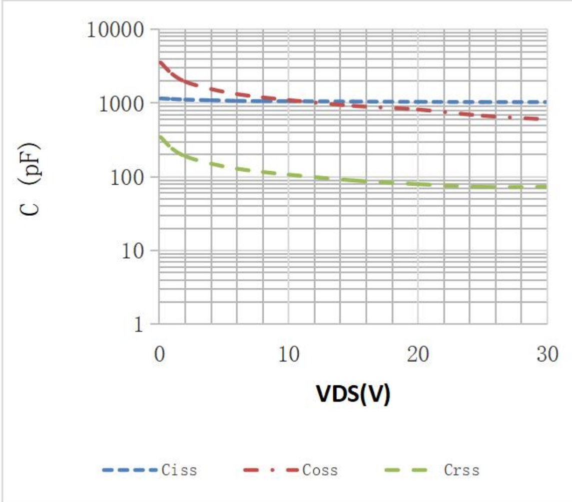


Fig.3 Power Dissipation

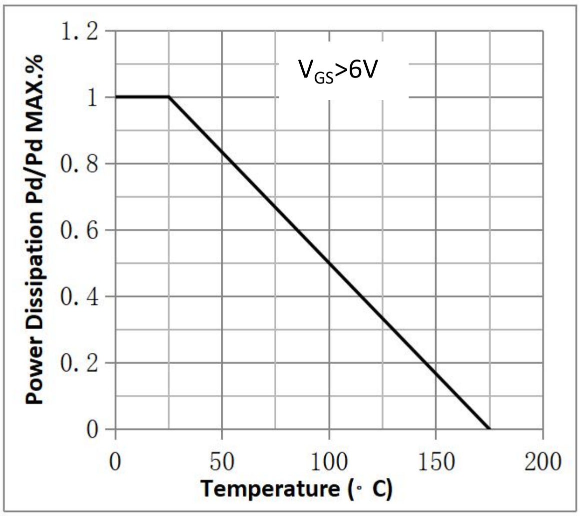


Fig.4 Typical output Characteristics

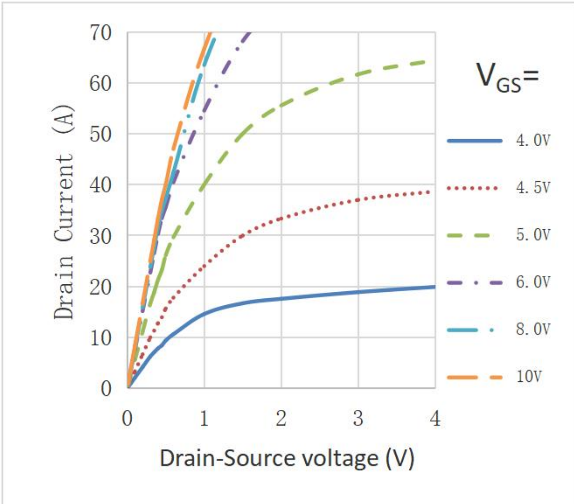


Fig.5 Threshold Voltage V.S Junction Temperature

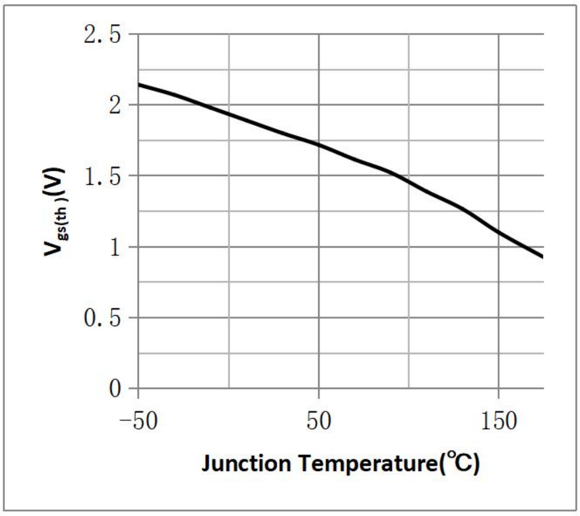


Fig.6 Resistance V.S Drain Current

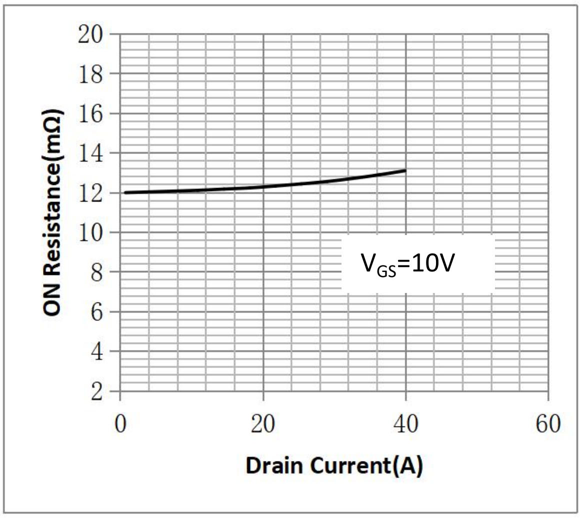


Fig.7 On-Resistance VS Gate Source Voltage

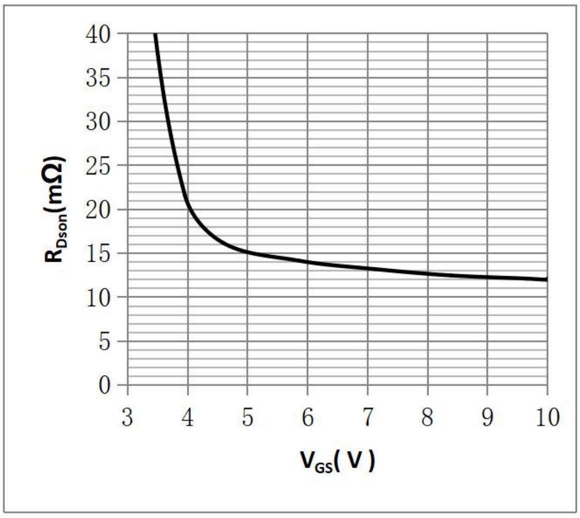


Fig.8 On-Resistance V.S Junction Temperature

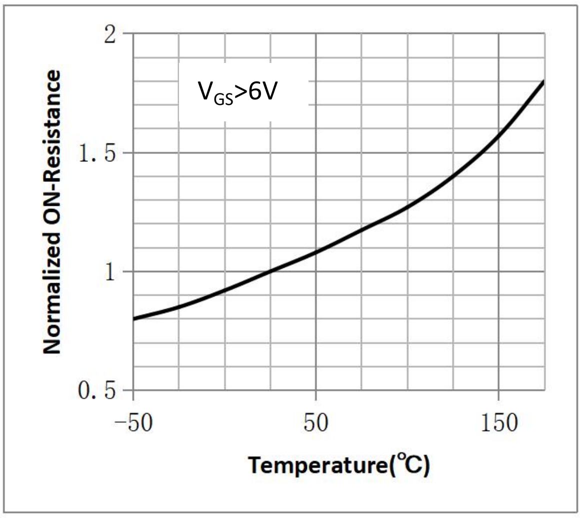


Figure 9. Diode Forward Voltage vs. Current

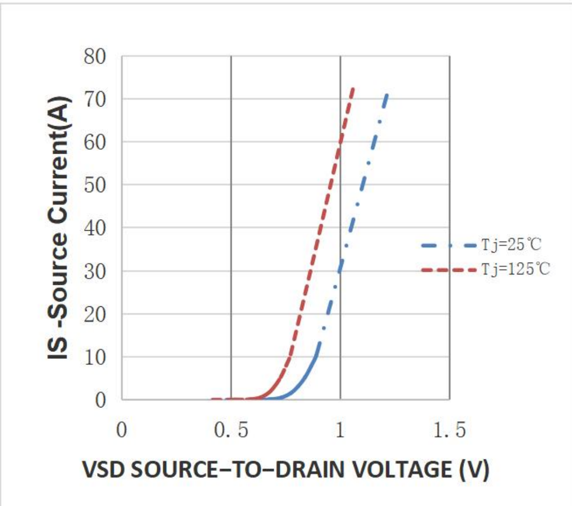


Figure 10. Transfer Characteristics

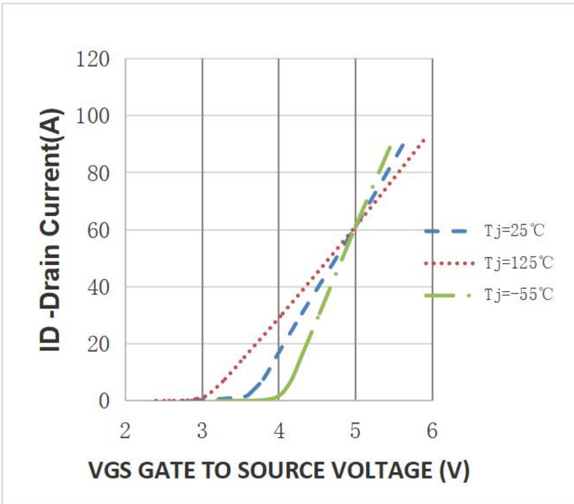


Fig.11 Safe Operating Area

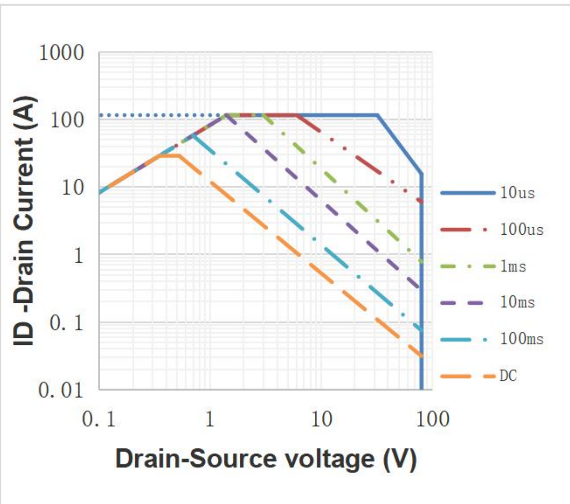
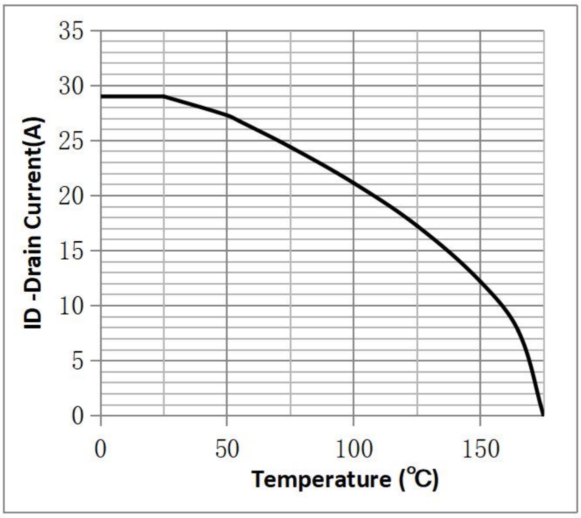
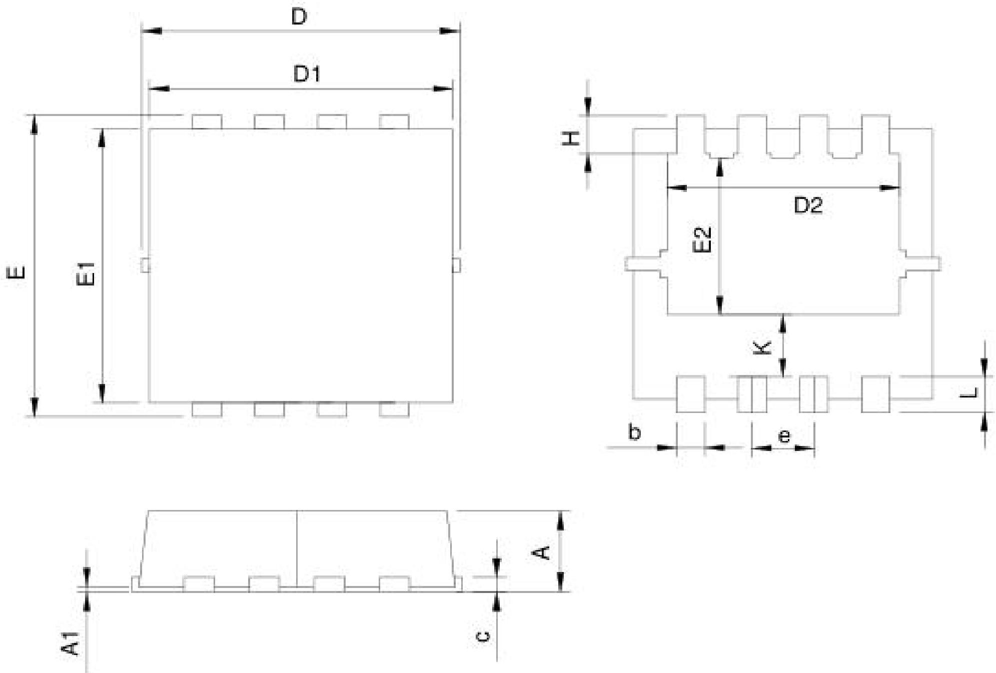


Fig.12 ID vs. Case Temperature③

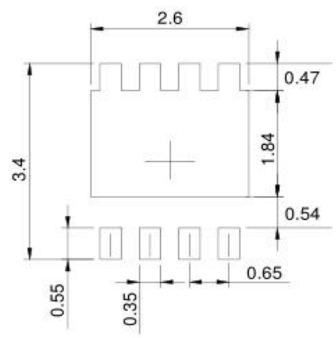


●DFN3*3 Package Outline



SYMBOL	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

RECOMMENDED LAND PATTERN



UNIT: mm

Note:

① Pulse : VGS=+20V/-20V, Duty cycle=50%,Tj=175℃, t=1000 hours; For DC ， the following test conditions can be passed: VGS=+20V/-10V, Tj=175℃, t=1000 hours；

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

③Practically the current will be limited by PCB, thermal design and operating temperature. VGS=10V.

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Revision History

Version	Date	Change
A	2022.2.10	
B	2022.10.10	1.Add Reach,HF figure
C	2023.12.20	1.ID, Rthjc modified