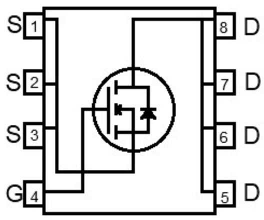
100V N-Channel Power SpeedFET

• General Description

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

• Product Summary



V_{DS}= 100V

$R_{DS(ON)}$ = 22mΩ

I_D= 34A

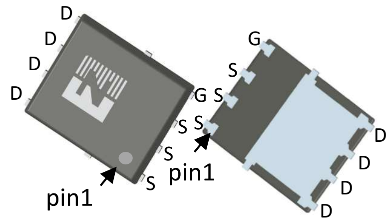
• Features

■AEC-Q101 Qualified

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

■Low Gate Charge for fast switching

■Low Thermal resistance



DFN5*6

•Application

■BLDC Motor driver

■DC-DC

■Load Switch

•Ordering Information:

Part NO.	ZMSA250N10N
Marking	ZMS250N10
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T$_C$=25℃)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		100	V
Gate-Source Voltage①	V_{GS}		±20	V
Continuous Drain Current	I_D	T_C=25℃	34	A
	I_D	T_C=75℃	28	A
	I_D	T_C=100℃	24	A
Pulsed Drain Current	I_{DM}	Pulsed; t_p ≤ 10 μs; T_{mb} = 25 °C;	102	A
Total Power Dissipation	P_D	T_C=25℃	63	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,	18	mJ
		L=0.5mH, V_{GS}=10V, Rg=25Ω,	38	mJ
ESD Level (HBM)			CLASS 1B	

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	2.4	°C/W
Thermal resistance, junction-ambient②	R_{thJA}		-	60	°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 =250uA	100			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}= 100V			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= 9A		22	25	mΩ
		V_{GS}=4.5V, I_D= 6A		32	41	mΩ
Forward Transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A		6		s
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 9A			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=25V	-	550	-	pF
Output capacitance	Coss		-	262	-	
Reverse transfer capacitance	Crss		-	28	-	
Gate Risistance	Rg	f = 1MHz	-	1.3		Ω
Total gate charge	Qg	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	12	-	nC
	Qg (4.5v)		-	6	-	
Gate - Source charge	Qgs		-	3.4	-	
Gate - Drain charge	Qgd		-	1.6	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=10V,V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	8	-	ns
Turn-ON Rise time	t_r		-	6	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	43	-	ns
Turn-Off Fall time	t_f		-	32	-	ns
Reverse Recovery Time	t_{RR}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=20A	-	75	-	ns
Reverse Recovery Charge	Q_{RR}		-	130	-	nC

Fig.1 Gate-Charge Characteristics

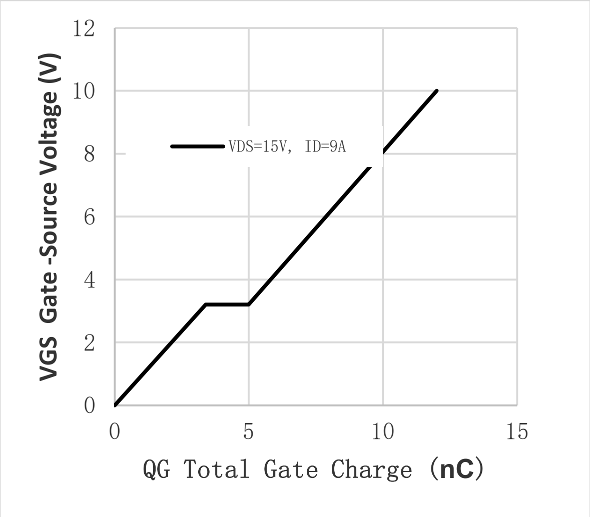


Fig.2 Capacitance Characteristics

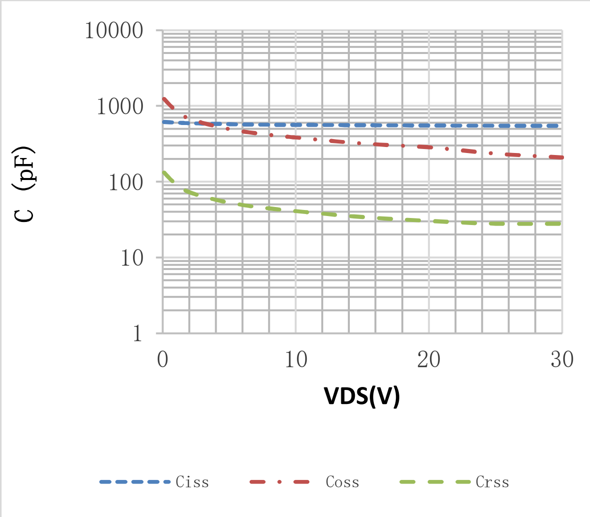


Fig.3 Power Dissipation

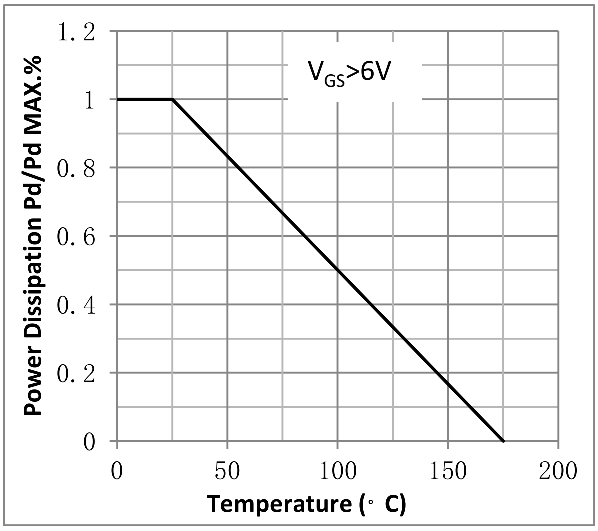


Fig.4 Typical output Characteristics

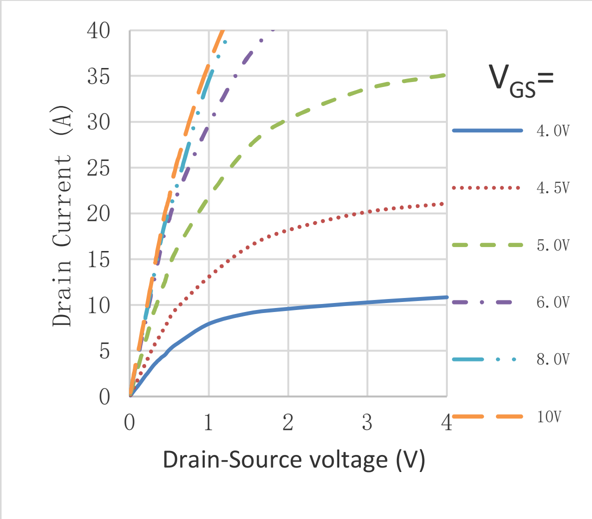


Fig.5 Threshold Voltage V.S Junction Temperature

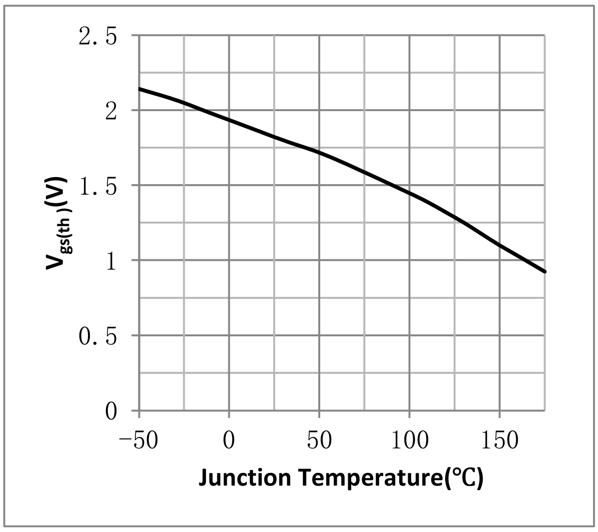


Fig.6 Resistance V.S Drain Current

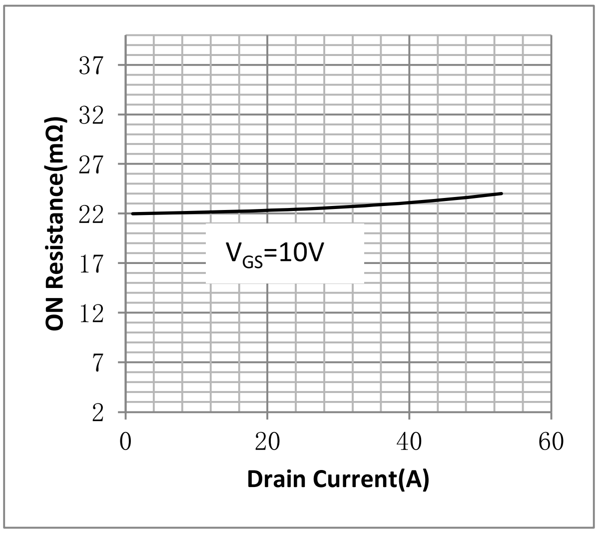


Fig.7 On-Resistance VS Gate Source Voltage

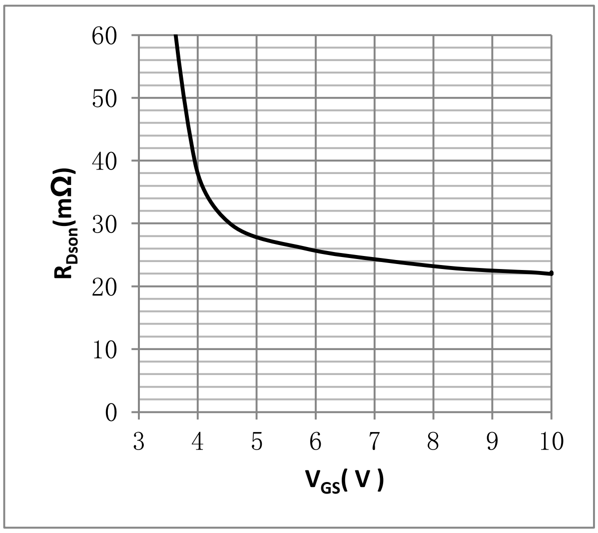


Fig.8 On-Resistance V.S Junction Temperature

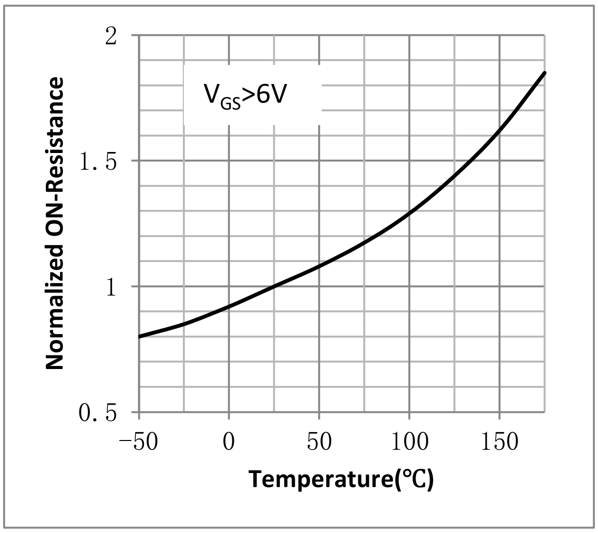


Figure 9. Diode Forward Voltage vs. Current

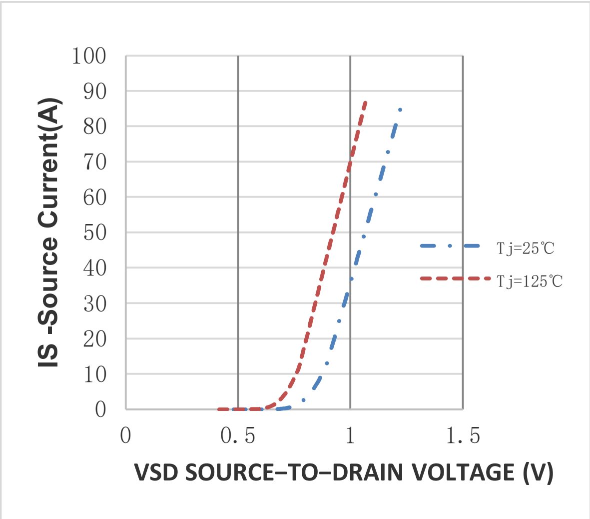


Figure 10. Transfer Characteristics

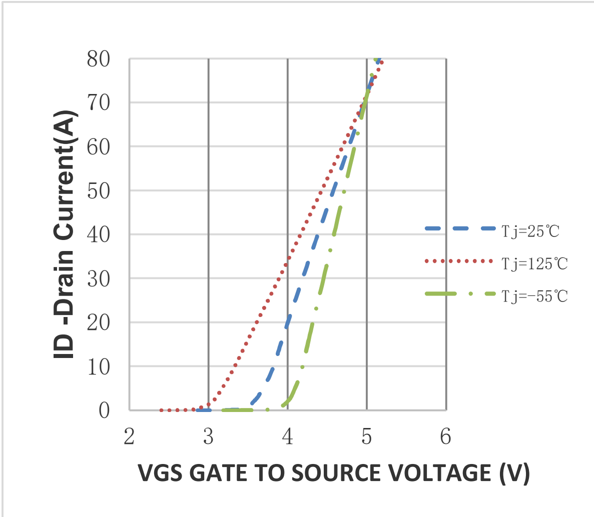


Fig.11 Safe Operating Area

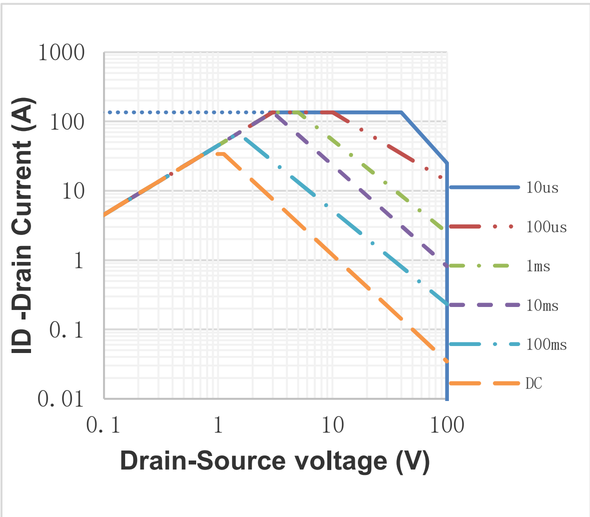
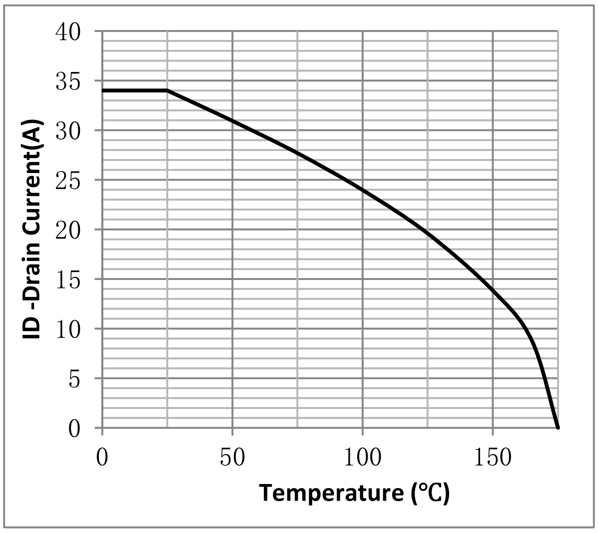
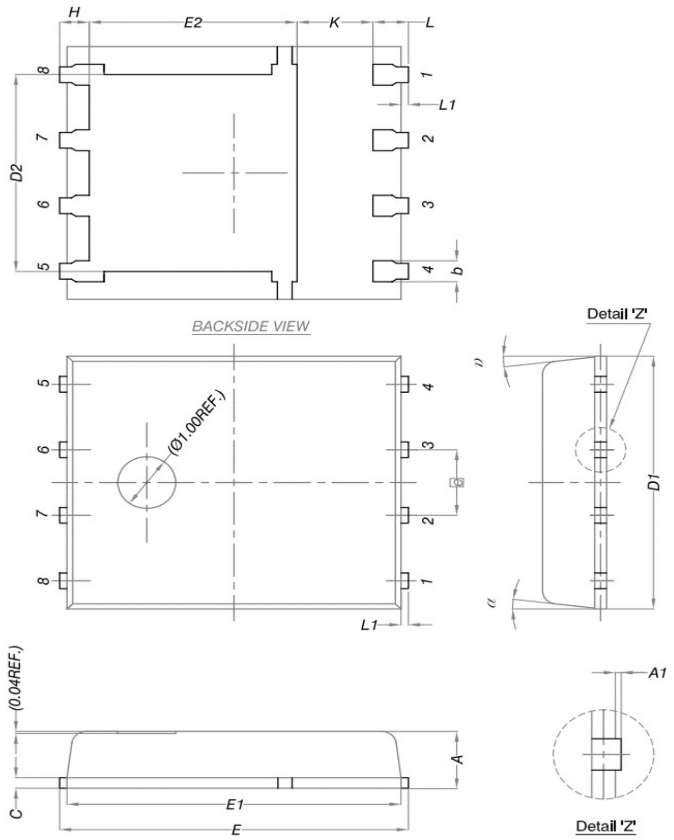


Fig.12 ID vs. Case Temperature[③]



●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 : 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. V_{GS}=10V.

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Revision History

Version	Date	Change
A	2022.1.10	
B	2022.5.7	1.Add note 1
C	2022.9.20	1.Add Reach,HF figure,2.Fig1~12 modify 3.Add It is suitable for
D	2025.2.25	Modify RDSON,ID.