• General Description

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

• Features

■AEC-Q101 Qualified

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

■High GOX reliability

■Low Thermal resistance

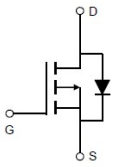
•Application

■BLDC Motor driver

■DC-DC

■Load Switch

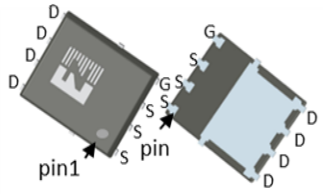
• Product Summary



V_{DS}= -40V

$R_{DS(ON)}$ = 2.6mΩ

I_D= -226A



DFN5*6

RoHS

REACH COMPLIANT

HF

•Ordering Information:

Part NO.	ZMSA023P04N
Marking	ZMS023P04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_C=25°C,unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-Source Voltage	V_{DS}		-	-40	V
Gate-Source Voltage	V_{GS}		-20	20	V
Continuous Drain Current	I_D	VGS=-10V,T_C=25°C	-	-226	A
	I_D	VGS=-10V,T_C=75°C	-	-184	A
	I_D	VGS=-10V,T_C=100°C	-	-160	A
Pulsed Drain Current	I_{DM}	Pulsed; $t_p \leqslant$ 10 μs; T_C = 25 °C;	-	-904	A
Total Power Dissipation	P_D	T_C=25°C	-	254	W
Total Power Dissipation	P_D	T_A=25°C	-	3.3	W
Operating Junction Temperature	T_J		-55	175	℃
Storage Temperature	T_{STG}		-55	175	℃
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, V_{GS}=-10V, Rg=25Ω,	-	500	mJ
		L=0.5mH, V_{GS}=-10V, Rg=25Ω,	-	900	mJ
ESD Level (HBM)	CLASS 2				

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction-case	R_{thJC}	-	-	0.59	°C/W
Thermal resistance, junction-ambient①	R_{thJA}	-	-	45	°C/W
Soldering temperature	Tsold	-	-	260	°C

•Electronic Characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V, I_D = -250uA	-40	-	-	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}=-40V,T_j=25℃	-	-	1.0	uA
		V_{GS}=0V, V_{DS}=-40V,T_j=175°C	-	-	100	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=-15A,T_j=25°C	-	2.6	3.1	mΩ
		V_{GS}=-10V, I_D=-15A,T_j=175°C	-	4.5	-	mΩ
		V_{GS}=-4.5V,I_D=-10A,T_j=25°C	-	4	4.8	mΩ
		V_{GS}=-4.5V,I_D=-10A,T_j=175°C	-	6.6	-	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-5V, I_D = -10A	-	29	-	S
Diode Forward Voltage	V_{FSD}	V_{GS} =0V, I_{SD} = -15A	-	-	-1.3	V

•Dynamic characteristics (Tj=25°C,unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	Ciss	f = 1MHz, V_{DS}=-20V,V_{GS}=0V	-	7425	-	pF
Output capacitance	Coss		-	1808	-	
Reverse transfer capacitance	Crss		-	171	-	
Gate Risistance	Rg	f = 1MHz,V_{GS}=0V	-	6.1	-	Ω
Total gate charge	Qg	V_{DD} = -20V, I_D = -15A, V_{GS} = -10V	-	102	-	nC
	Qg (-4.5V)		-	50	-	
Gate - Source charge	Qgs		-	20	-	
Gate - Drain charge	Qgd		-	13	-	
Turn-ON Delay time	$t_{D(on)}$	V_{GS}=-10V, V_{DS}=-20V, R_G =3.3Ω, I_D =-15A	-	17	-	ns
Turn-ON Rise time	t_r		-	81	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	345	-	ns
Turn-Off Fall time	t_f		-	178	-	ns
Reverse Recovery Time	t_{rr}	V_{DD}=-20V, dI_S/dt = 100A/us, I_S=-15A	-	49	-	ns
Reverse Recovery Charge	Q_{rr}		-	56	-	nC

Fig.1 Gate-source voltage as a function of gate charge;Typical values;Tj=25°C

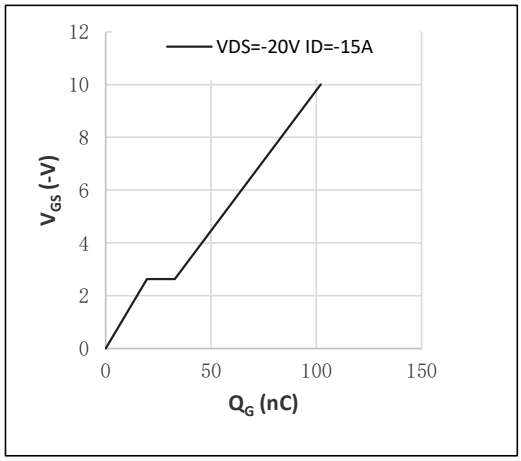


Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage;Typical values;Tj=25°C

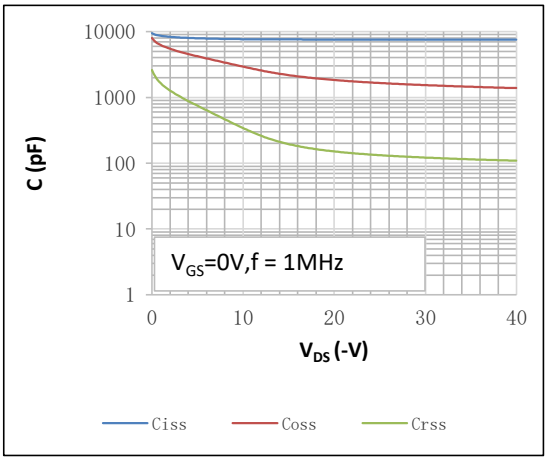


Fig.3 Output characteristics: drain current as a function of drain-source voltage;Typical values; Tj=25°C

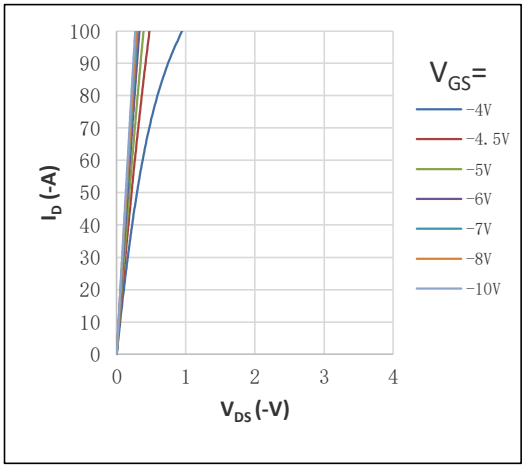


Fig.4 Output characteristics: drain current as a function of drain-source voltage;Typical values:Expanded curve;Tj=25°C

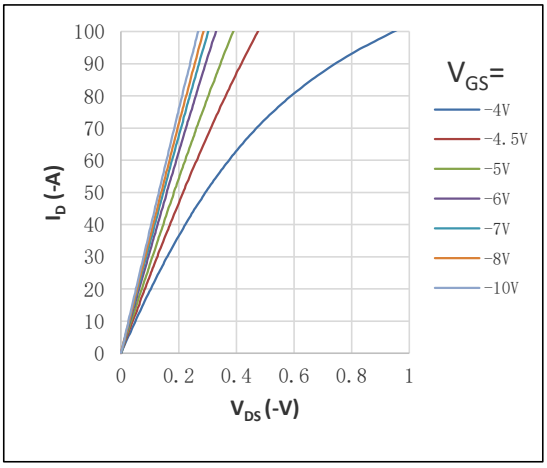


Fig.5 Gate-source threshold voltage as a function of junction temperature;Typical values

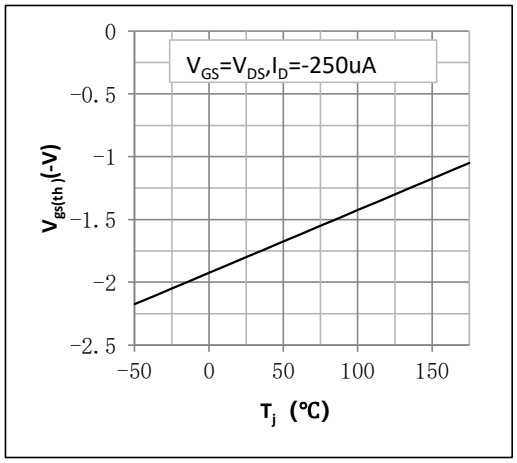


Fig.6 Drain-source on-state resistance as a function of drain current;Typical values;Tj=25 °C

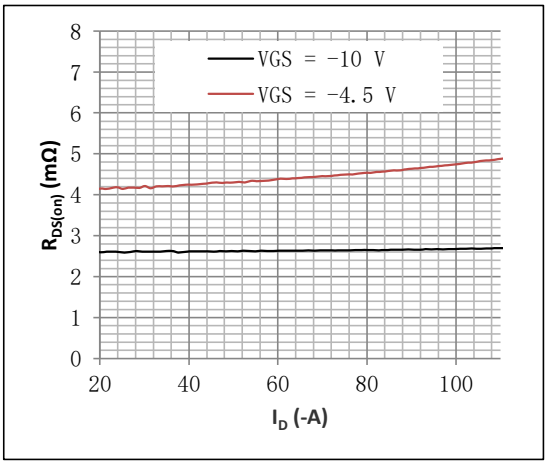


Fig.7 Drain-source on-state resistance as a function of gate-source voltage;Typical values

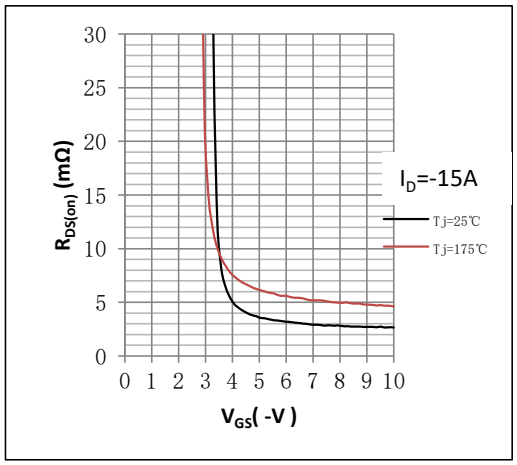


Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature;Typical values
Normalized On-Resistance=RDSon/RDSon(25 ℃)

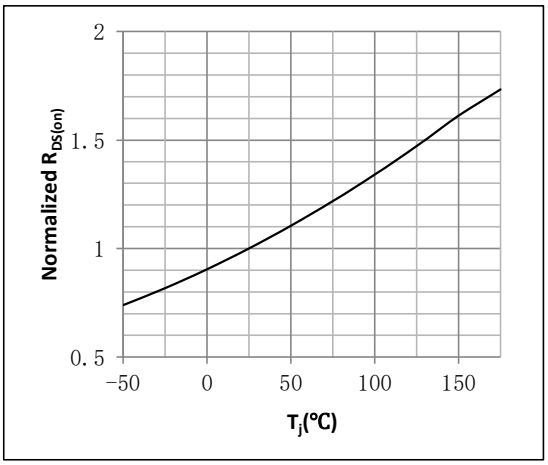


Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage ;Typical values

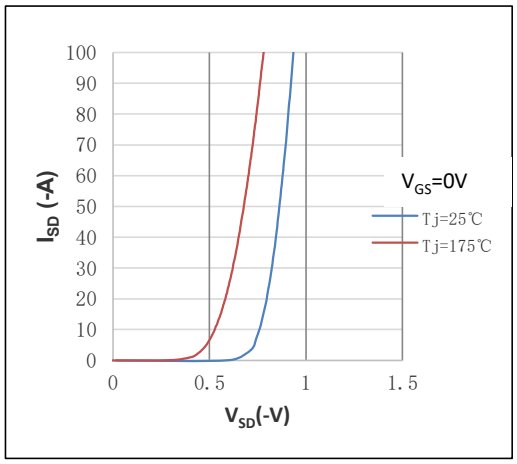


Figure 10. Transfer characteristics: drain current as a function of gate-source voltage;Typical values

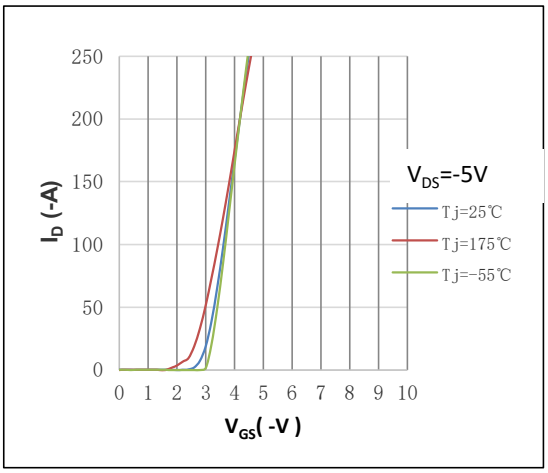


Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage;Calculative values

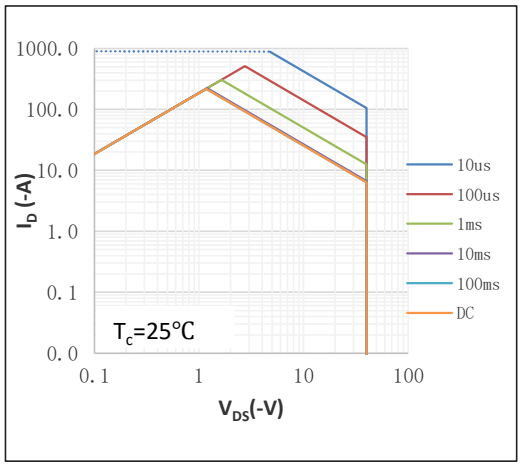


Fig.12 Continuous drain current as a function of case temperaturease③ ;Calculative values

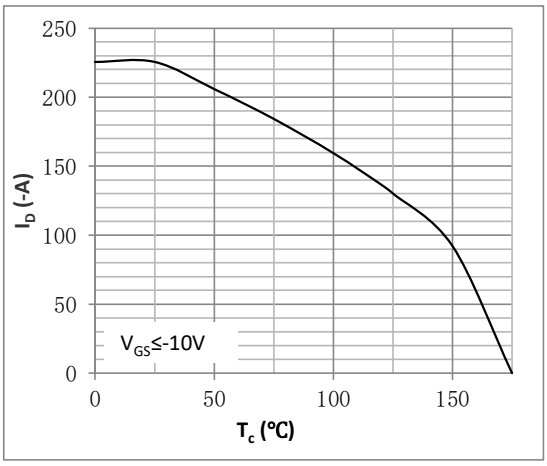


Fig.13 Drain-source breakdown voltage as a function of junction temperature;Typical values Normalized BVDSS=BVDSS/BVDSS(25°C)

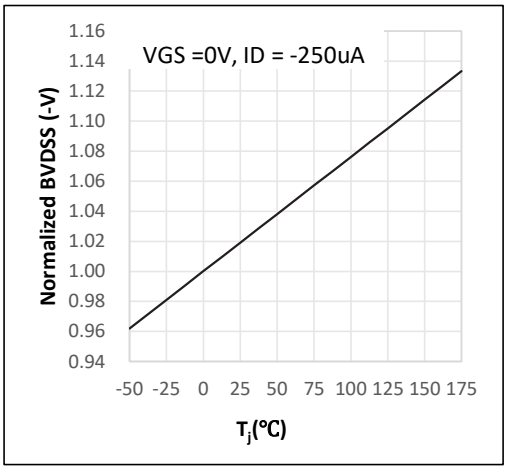


Fig.14 Normalized total power dissipation as a function of case temperature;Calculative values Normalized Power Dissipation= Pd/Pd(25°C)

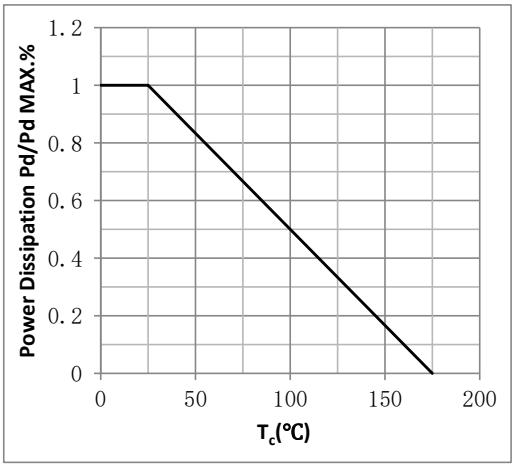
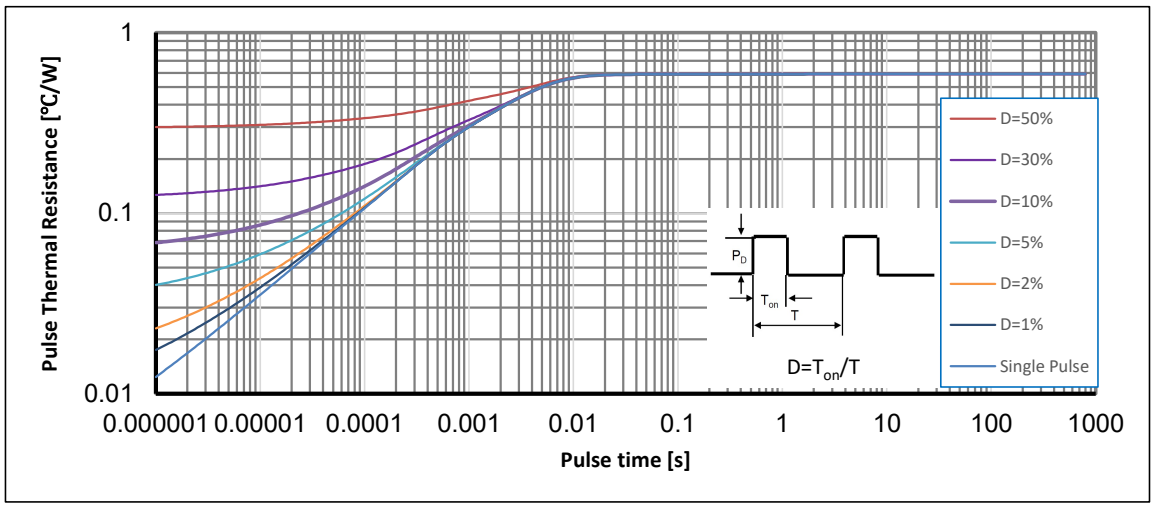
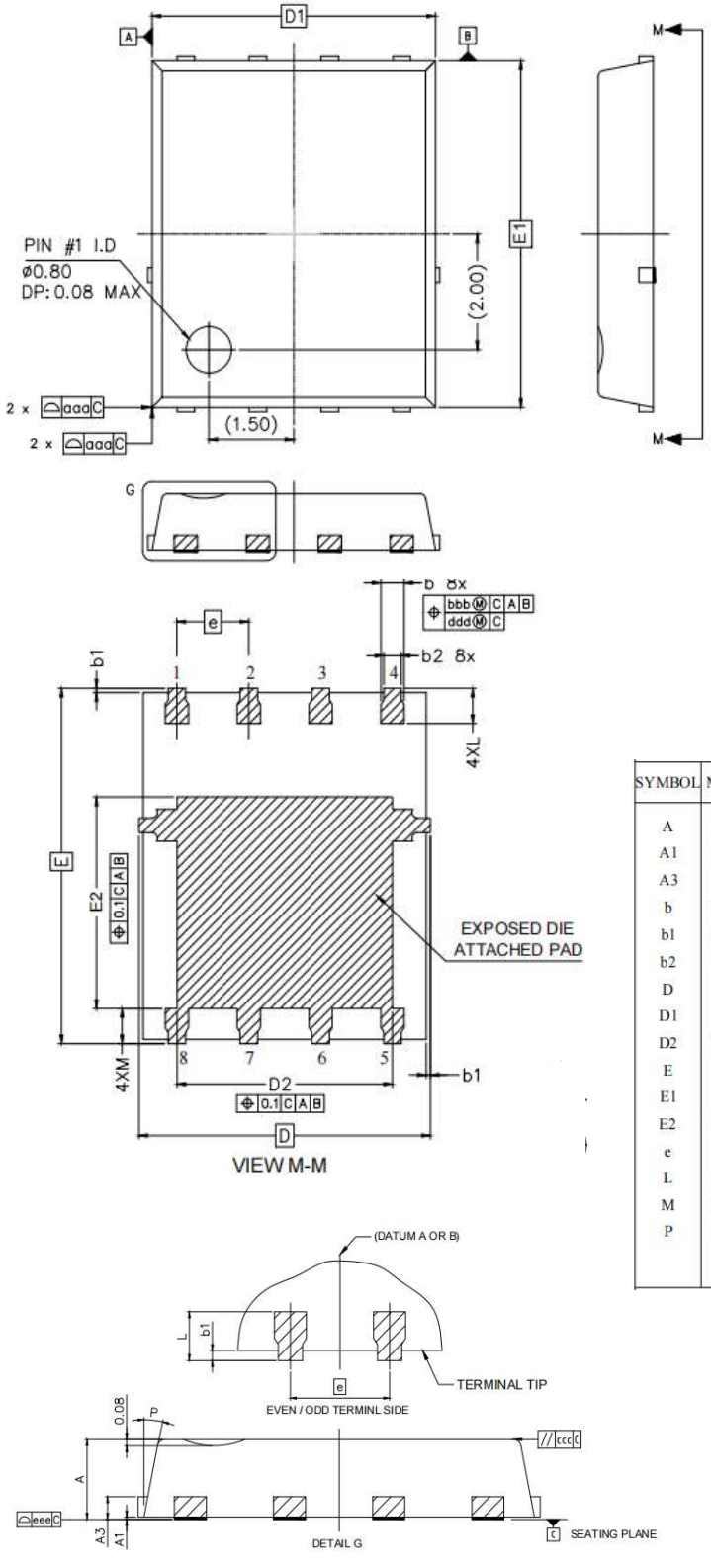


Fig.15 Transient thermal impedance from junction to case as a function of pulse duration; max values



●DFN5*6 Package Outline



SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	0.95	1.05	aaa	0.10	
A1	0.00	0.05	bbb	0.10	
A3	0.25 REF		ccc	0.10	
b	0.31	0.51	ddd	0.05	
b1	0.03	0.13	eee	0.08	
b2	0.21	0.41			
D	5.15 BSC				
D1	5.00 BSC				
D2	3.70	3.90			
E	6.15 BSC				
E1	6.00 BSC				
E2	3.56	3.76			
e	1.27 BSC				
L	0.51	0.71			
M	0.51	0.71			
P	10°	12°			

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. VGS=-10V.

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Revision History

Version	Date	Change
A	2025/4/8	New