

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
- Low Gate Charge for fast switching
- Low Thermal resistance

Application

- BLDC Motor driver
- DC-DC
- Battery protection

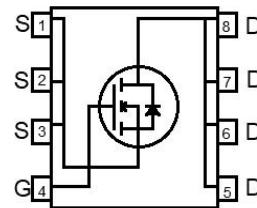
Ordering Information:

Part NO.	ZMSA007N04NC
Marking	ZMS007N04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

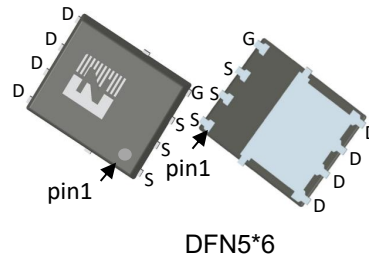
Absolute Maximum Ratings (T_C=25°C)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V _{DS}		40	V
Gate-Source Voltage ^①	V _{GS}		±20	V
Continuous Drain Current	I _D	T _C =25°C	310	A
	I _D	T _C =75°C	253	A
	I _D	T _C =100°C	219	A
Pulsed Drain Current	I _{DM}	Pulsed; t _p ≤ 10 μs; T _{mb} = 25 °C;	930	A
Total Power Dissipation	P _D	T _C =25°C	158	W
Total Power Dissipation	P _D	T _A =25°C	4.2	W
Operating Junction Temperature	T _J		-55 to +175	°C
Storage Temperature	T _{STG}		-55 to +175	°C
Single Pulse Avalanche Energy	E _{AS}	L=0.1mH, V _{GS} =10V, R _g =25Ω,	325	mJ
		L=0.5mH, V _{GS} =10V, R _g =25Ω,	680	mJ
ESD Level (HBM)	CLASS 2			

Product Summary



V_{DS} = 40V
 $R_{DS(ON)}$ = 0.7mΩ
I_D = 310A



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	0.95	°C/W
Thermal resistance, junction-ambient	$R_{thJA}^{②}$		-	36	°C/W
Soldering temperature	T_{sold}		-	260	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.6	1.9	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{GS}=0V, V_{DS}=40V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=40A$		0.7	0.9	m Ω
		$V_{GS}=4.5V, I_D=30A$		1.0	1.8	
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_{SD}=10A$		30		S
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=40A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	5600	-	pF
Output capacitance	C_{oss}		-	1640	-	
Reverse transfer capacitance	C_{rss}		-	98	-	
Gate Resistance	R_g	$f=1MHz$	-	1.6	-	Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=20A, V_{GS}=10V$	-	63	-	nC
Gate - Source charge	Q_{gs}		-	13	-	
Gate - Drain charge	Q_{gd}		-	18	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	16	-	ns
Turn-ON Rise time	t_r		-	11	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	26	-	ns
Turn-Off Fall time	t_f		-	18	-	ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=50A$	-	66	-	ns
Reverse Recovery Charge	Q_{RR}		-	97	-	nC



Fig.1 Gate-Charge Characteristics

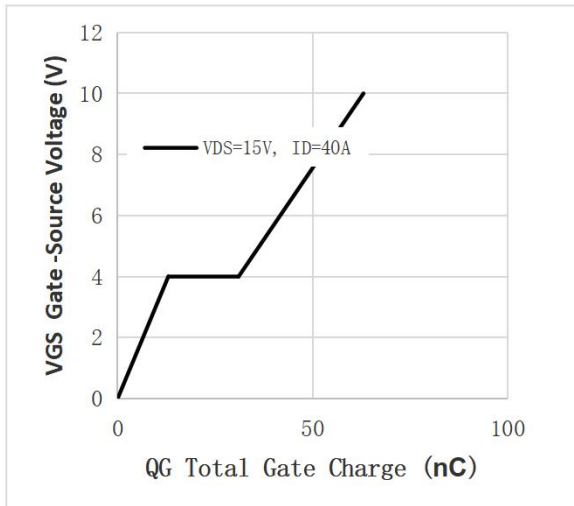


Fig.2 Capacitance Characteristics

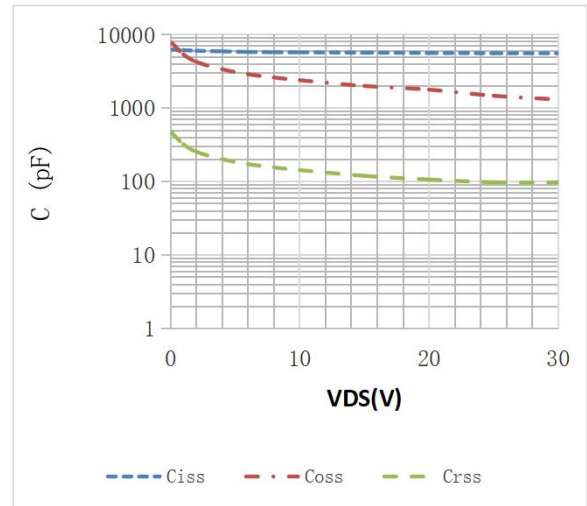


Fig.3 Power Dissipation

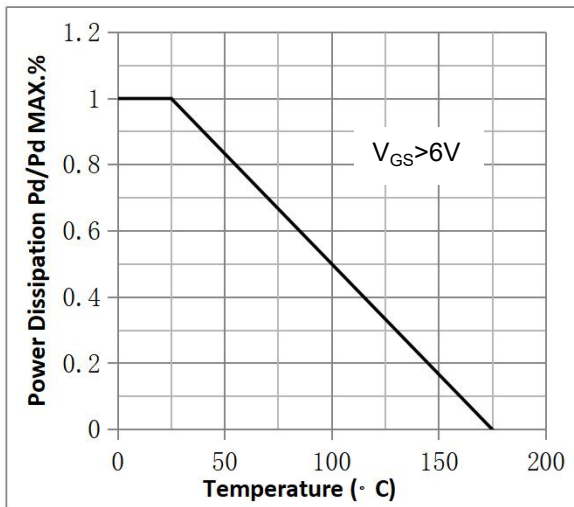


Fig.4 Typical output Characteristics

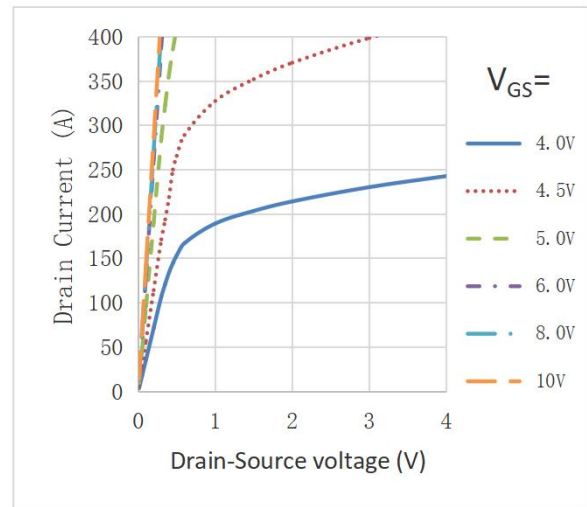


Fig.5 Threshold Voltage V.S Junction Temperature

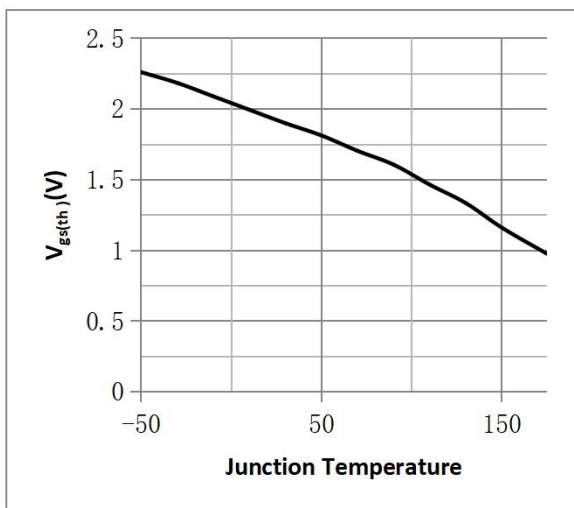


Fig.6 Resistance V.S Drain Current

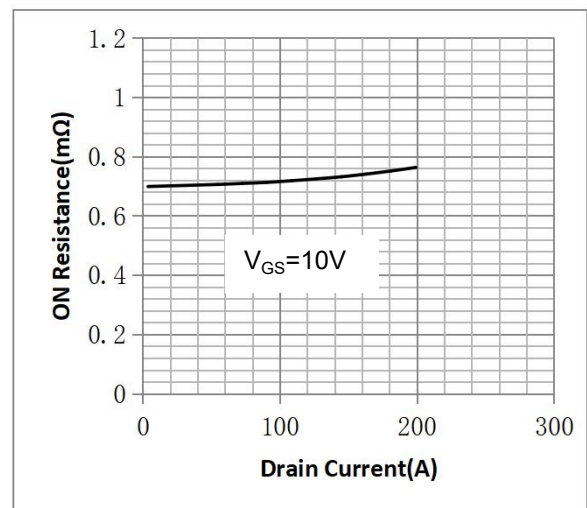


Fig.7 On-Resistance VS Gate Source Voltage

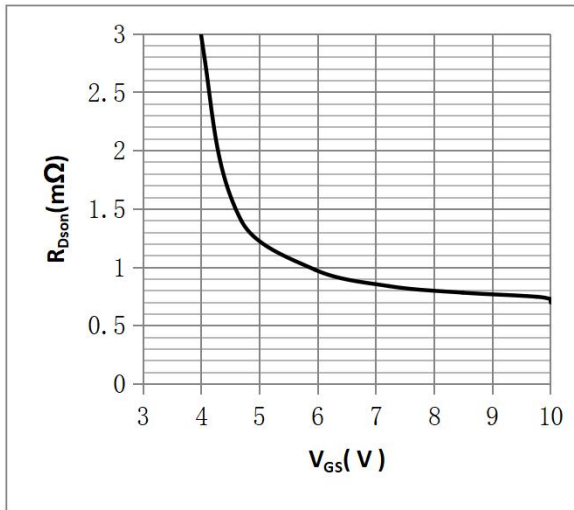


Fig.8 On-Resistance V.S Junction Temperature

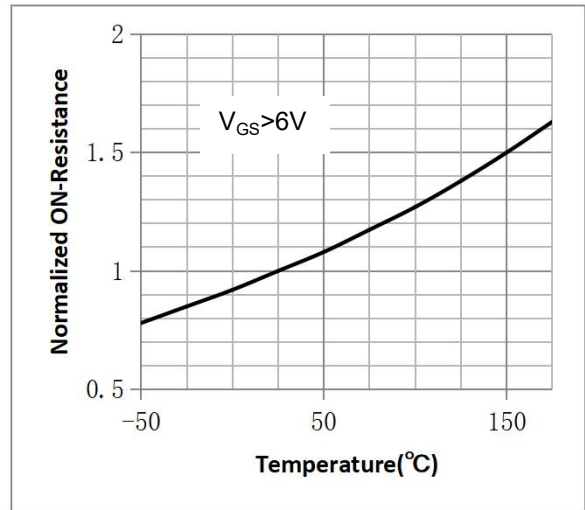


Figure 9. Diode Forward Voltage vs. Current

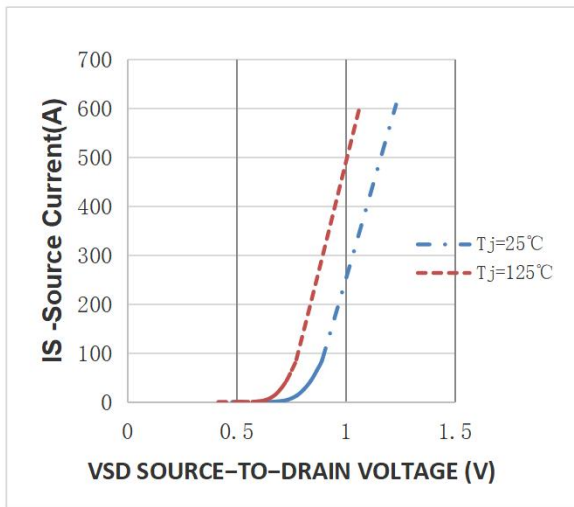


Figure 10. Transfer Characteristics

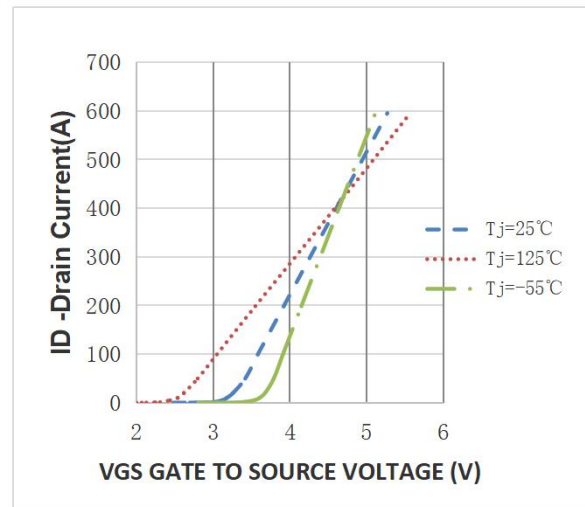


Fig.11 Safe Operating Area

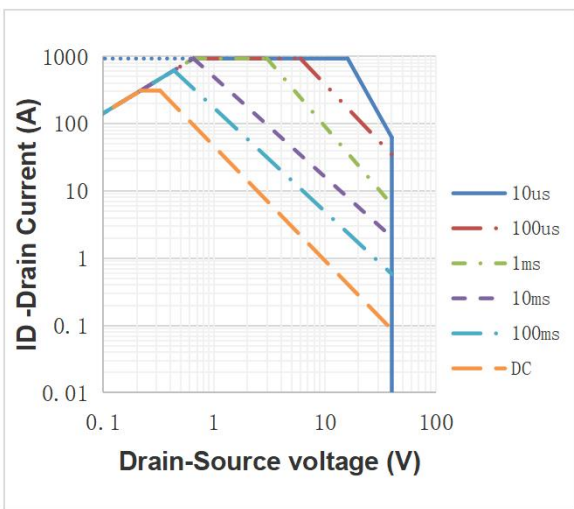
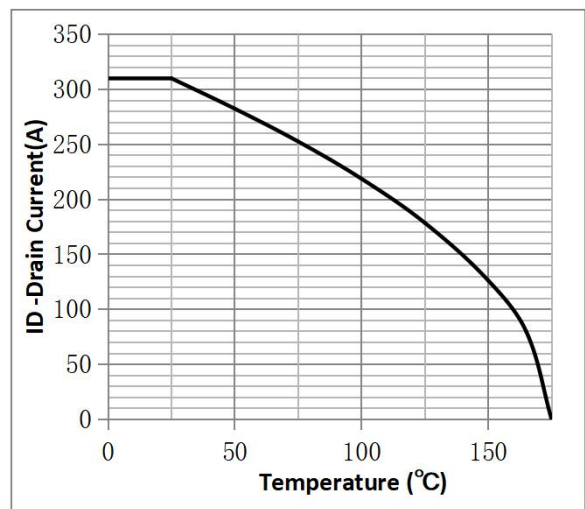
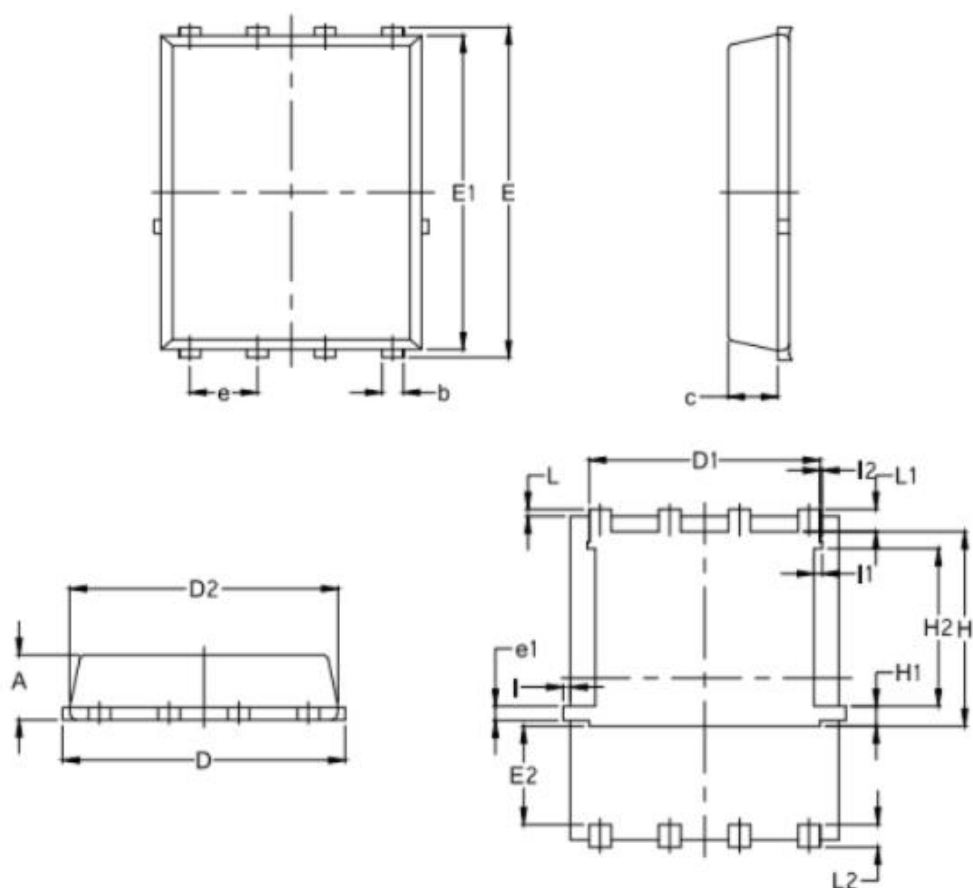


Fig.12 I_D vs. Case Temperature^③



•DFN5*6 Package Outline



DIM	MILLIMETERS		
	MIN.	MOM.	MAX.
A	0.90	1.00	1.10
b	0.34	0.41	0.48
c	0.82	0.89	0.97
D	4.80	5.10	5.40
D1	4.10	4.20	4.31
D2	4.80	4.90	5.00
E	5.95	6.05	6.15
E1	5.65	5.75	5.85
E2	1.10		-
e	1.27 BSC		
L	0.05	0.15	0.25
L1	0.38	0.44	0.50
L2	0.38	0.44	0.50
H	3.30	3.40	3.50
I	-		0.18
I1	-		0.15
I2	-		0.038
H1	0.33	0.34	0.35
H2	2.75	2.80	2.85
e1	0.25 BSC		

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

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Revision History

Version	Date	Change
A0	2024.4.11	