

General Description

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

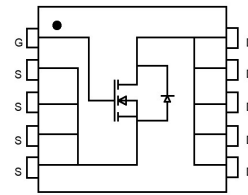
Features

- AEC-Q101 Qualified
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

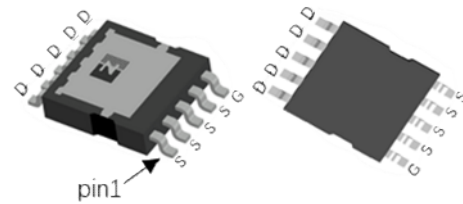
Application

- BLDC Motor driver
- DC-DC
- Load Switch

Product Summary



$V_{DS} = 40V$
 $R_{DS(ON)} = 1.9m\Omega$
 $I_D = 158A$



TCPAK5x7



Ordering Information:

Part NO.	ZMSA016N04HTNC
Marking	16N04H
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

Absolute Maximum Ratings ($T_C=25^\circ C$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		40	V
Gate-Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	158	A
	I_D	$T_C=75^\circ C$	129	A
	I_D	$T_C=100^\circ C$	111	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu s$; $T_{mb} = 25^\circ C$;	632	A
Total Power Dissipation	P_D	$T_C=25^\circ C$	125	W
Total Power Dissipation	P_D	$T_A=25^\circ C$	5.0	W
Operating Junction Temperature	T_J		-55 to +175	$^\circ C$
Storage Temperature	T_{STG}		-55 to +175	$^\circ C$
Single Pulse Avalanche Energy	E_{AS}	L=0.1mH, VGS=10V, Rg=25 Ω ,	146	mJ
		L=0.5mH, VGS=10V, Rg=25 Ω ,	262	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1.2	°C/W
Thermal resistance, junction-ambient	$R_{thJA\oplus}$		-	30	°C/W
Soldering temperature (total time<10s)	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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	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	$R_{DS(ON)}$	$V_{GS}=10V, I_D=24A$		1.9	2.5	m Ω
Forward Transconductance	g_{FS}	$V_{GS}=5V, I_{SD}=5A$		19		S
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=24A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	2206	-	pF
Output capacitance	C_{oss}		-	686	-	
Reverse transfer capacitance	C_{rss}		-	29	-	
Gate Resistance	R_g	$f=1MHz$	-	1.9		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=24A, V_{GS}=10V$	-	33.5	-	nC
Gate - Source charge	Q_{gs}		-	10	-	
Gate - Drain charge	Q_{gd}		-	8.5	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	10	-	ns
Turn-ON Rise time	t_r		-	49	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	25	-	ns
Turn-Off Fall time	t_f		-	6	-	ns
Reverse Recovery Time	t_{rr}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=20A$	-	42	-	ns
Reverse Recovery Charge	Q_{rr}		-	41	-	nC

Fig.1 Gate-Charge Characteristics

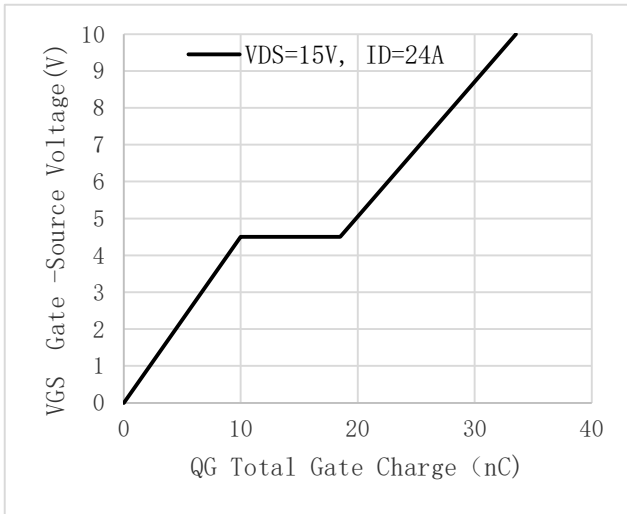


Fig.2 Capacitance Characteristics

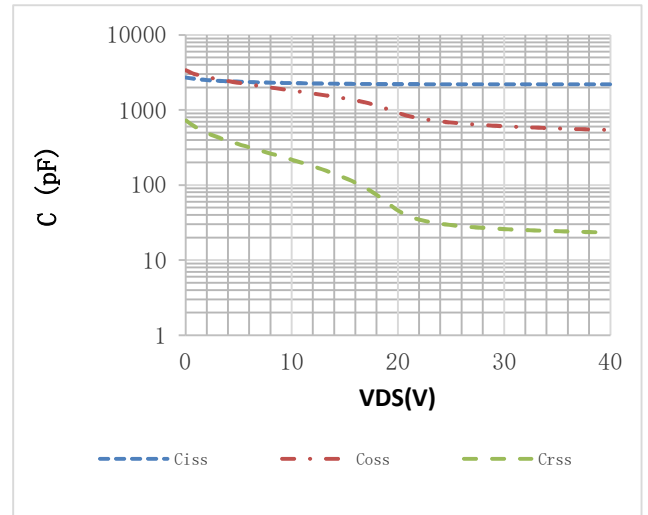


Fig.3 Power Dissipation

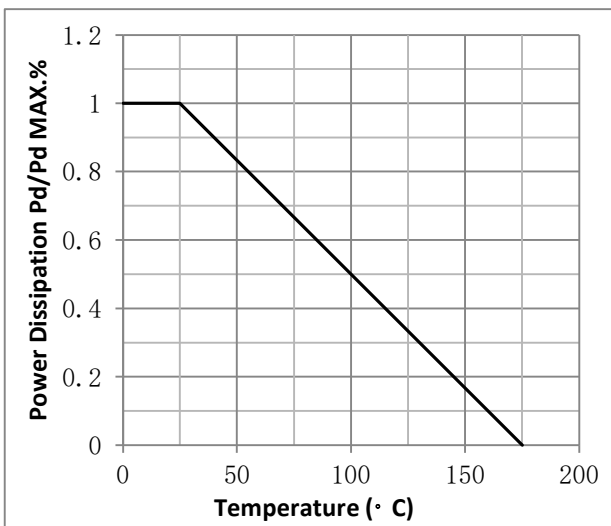


Fig.4 Typical output Characteristics

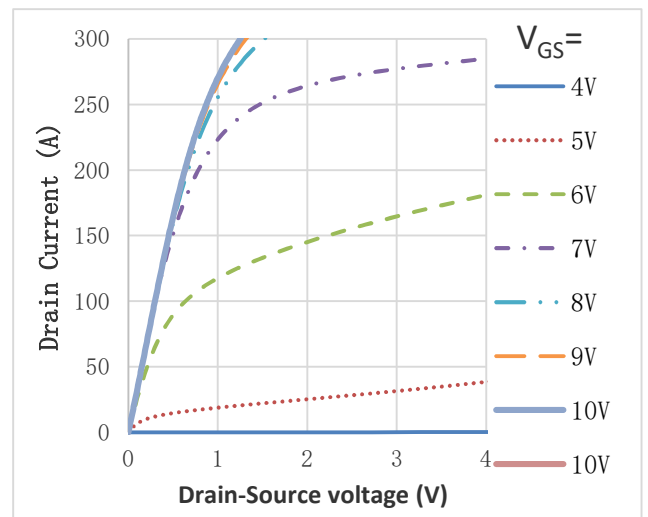


Fig.5 Threshold Voltage V.S Junction Temperature

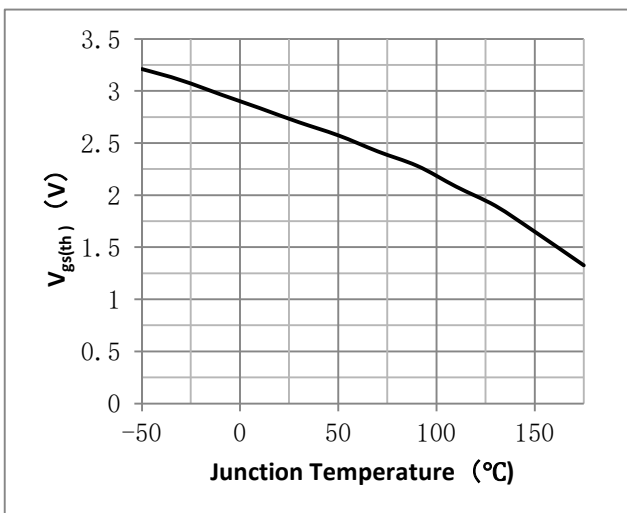


Fig.6 Resistance V.S Drain Current

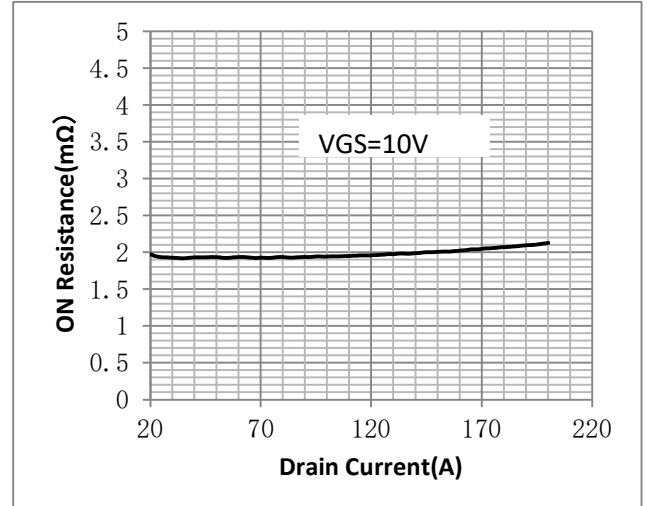


Fig.7 On-Resistance VS Gate Source Voltage

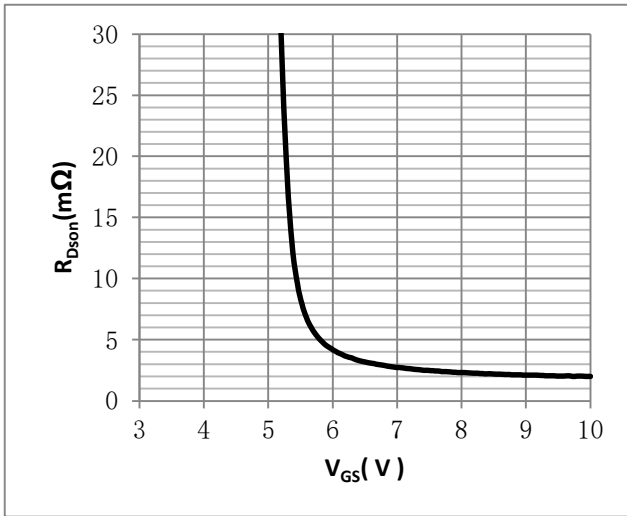


Fig.8 On-Resistance V.S Junction Temperature

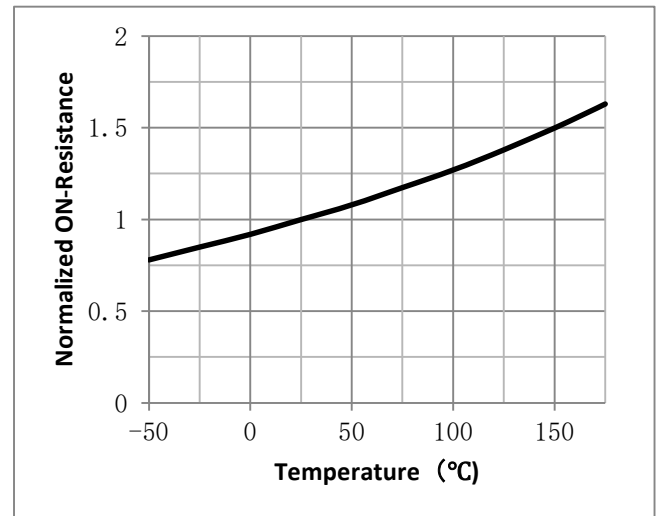


Figure 9. Diode Forward Voltage vs. Current

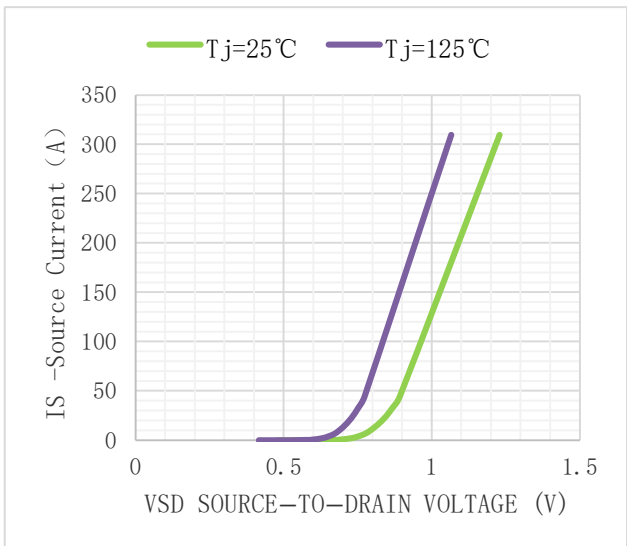


Figure 10. Transfer Characteristics

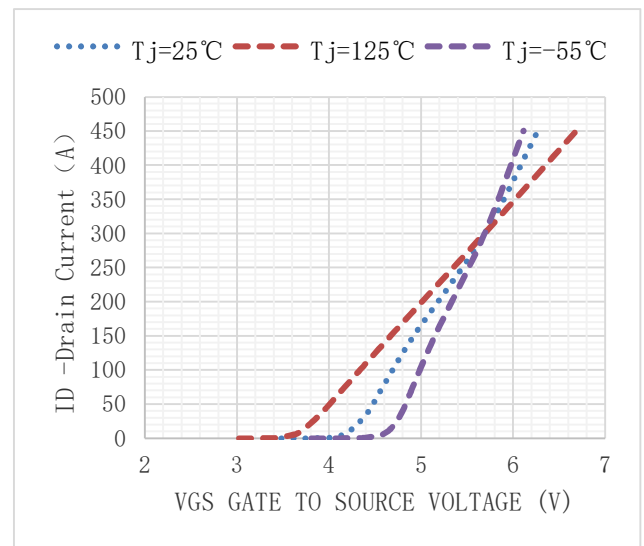


Fig.11 SOA Maximum Safe Operating Area

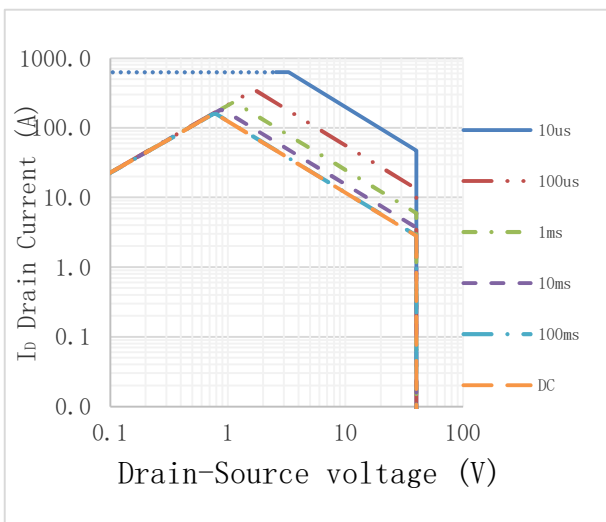
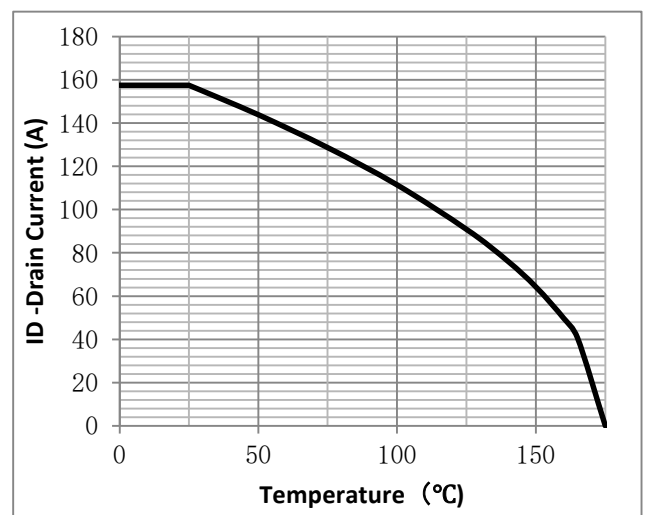
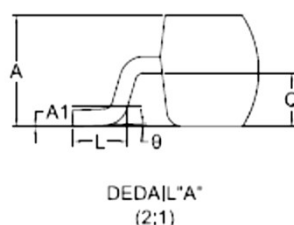
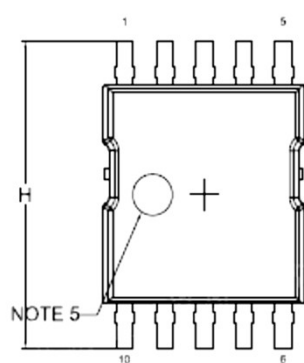
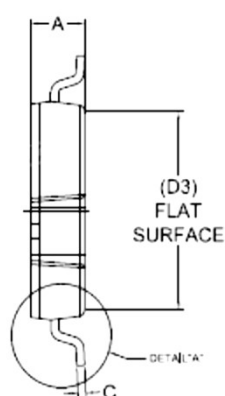
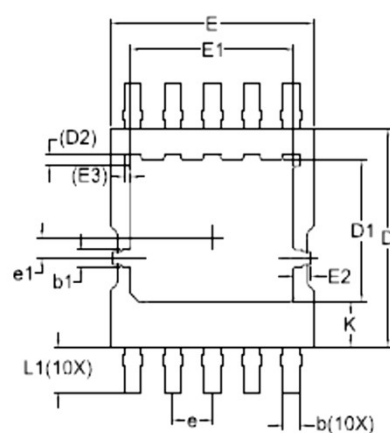


Fig.12 ID vs. Junction Temperature



•TCPAK5x7 Package Outline



MILLIMETERS			
DIM	MIN	NOM	MAX
A	1,25	1,35	1,45
A1	-0,05	0	0,075
b	0,36	0,41	0,46
b1	0,30	0,40	0,50
c	0,16	0,20	0,26
D	5,20	5,30	5,40
D1	3,35	3,45	3,55
D2	0,29 REF		
D3	4,82 REF		
E	5,00	5,10	5,20
E1	4,02	4,12	4,22
E2	0,30	0,44	0,50
E3	0,14 REF		
e	1,00 BSC		
e1	0,50 BSC		
K	1,00	1,10	1,20
H	7,30	7,50	7,70
L	0,49	0,69	0,89
L1	0,90	1,10	1,30
Q	0,60	0,65	0,70
θ	0°	2,5°	5°

Note:

- ① Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;
- ② Practically 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	2024/8/26	New