

• General Description

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

• Features

- 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

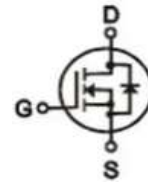
• Ordering Information:

Part NO.	ZMS040N10HC
Marking	ZMS040N10H
Packing Information	TUBE
Basic ordering unit (pcs)	400

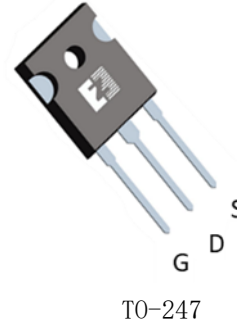
• Absolute Maximum Ratings ($T_C=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$25^\circ\text{C} \leq T_J \leq 175^\circ\text{C}$	100	V
Gate-Source Voltage ^①	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	160	A
	I_D	$T_C=75^\circ\text{C}$	136	A
	I_D	$T_C=100^\circ\text{C}$	118	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu\text{s}$; $T_{mb} = 25^\circ\text{C}$;	640	A
Total Power Dissipation	P_D	$T_C=25^\circ\text{C}$	208	W
Total Power Dissipation	P_D	$T_A=25^\circ\text{C}$	3.5	W
Operating Junction Temperature	T_J		-55 to +175	$^\circ\text{C}$
Storage Temperature	T_{STG}		-55 to +175	$^\circ\text{C}$
Single Pulse Avalanche Energy	E_{AS}	$L=0.1\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	312	mJ
		$L=0.5\text{mH}$, $V_{GS}=10\text{V}$, $R_g=25\Omega$,	562	mJ
ESD Level (HBM)	CLASS 2			

• Product Summary



$V_{DS} = 100\text{V}$
 $R_{DS(ON)} = 4\text{m}\Omega$
 $I_D = 160\text{A}$



•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	RthJC		-	0.6	°C/W
Thermal resistance, junction-ambient	RthJA ^②		-	36	°C/W
Soldering temperature (total time<10s)	Tsold		-	265	°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	2.0	2.7	4.0	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 = 40A		4	5	mΩ
Forward Transconductance	g _{FS}	V _{GS} =5V, I _{SD} = 25A		28		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	Ciss	f = 1MHz, V _{DS} =25V	-	3580	-	pF
Output capacitance	Coss		-	2260	-	
Reverse transfer capacitance	Crss		-	123	-	
Gate Resistance	Rg	f = 1MHz	-	3		Ω
Total gate charge	Qg	V _{DD} = 15V, I _D = 40A, V _{GS} = 10V	-	48	-	nC
Gate - Source charge	Qgs		-	10	-	
Gate - Drain charge	Qgd		-	11	-	
Turn-ON Delay time	t _{D(on)}	V _{GS} =10V, V _{DS} =15V, R _G =3.3Ω, I _D =20A	-	32	-	ns
Turn-ON Rise time	t _r		-	71	-	ns
Turn-Off Delay time	t _{D(off)}		-	56	-	ns
Turn-Off Fall time	t _f		-	19	-	ns
Reverse Recovery Time	t _{RR}	V _{DD} =20V, dI _S /dt = 100A/s, I _S =50A	-	79	-	ns
Reverse Recovery Charge	Q _{RR}		-	170	-	nC

Fig.1 Gate-Charge Characteristics

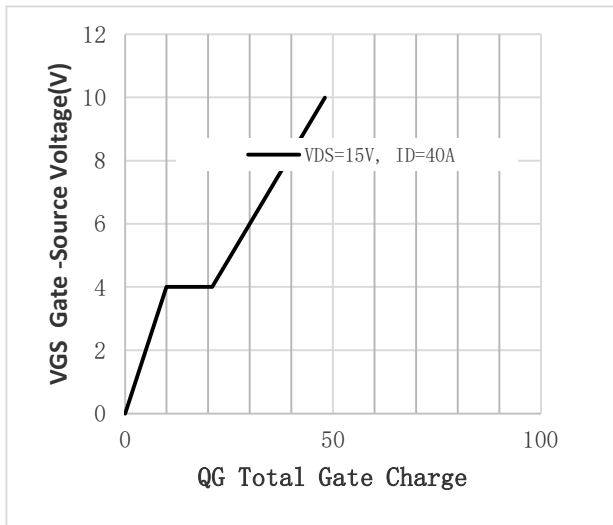


Fig.2 Capacitance Characteristics

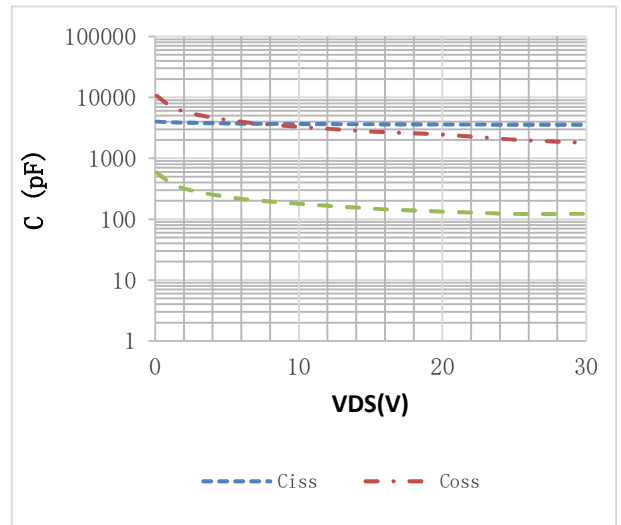


Fig.3 Power Dissipation

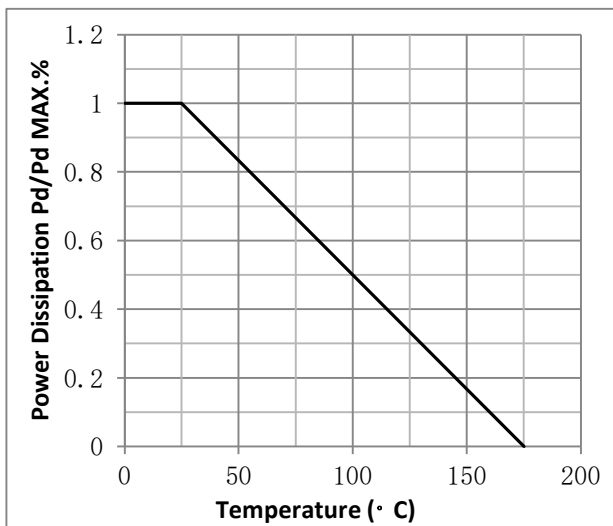


Fig.4 Typical output Characteristics

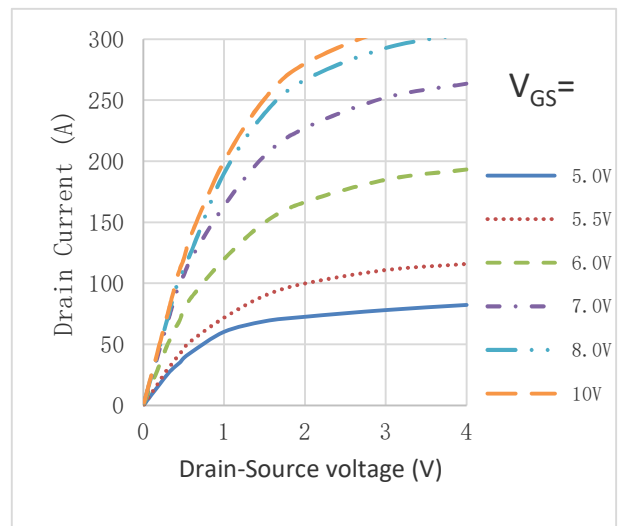


Fig.5 Threshold Voltage V.S Junction Temperature

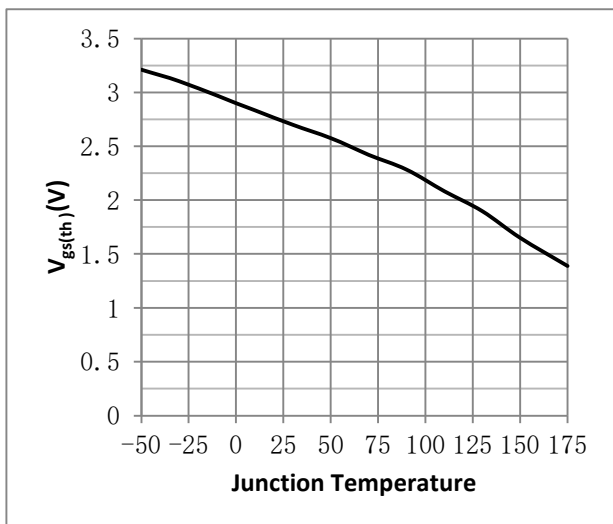


Fig.6 Resistance V.S Drain Current

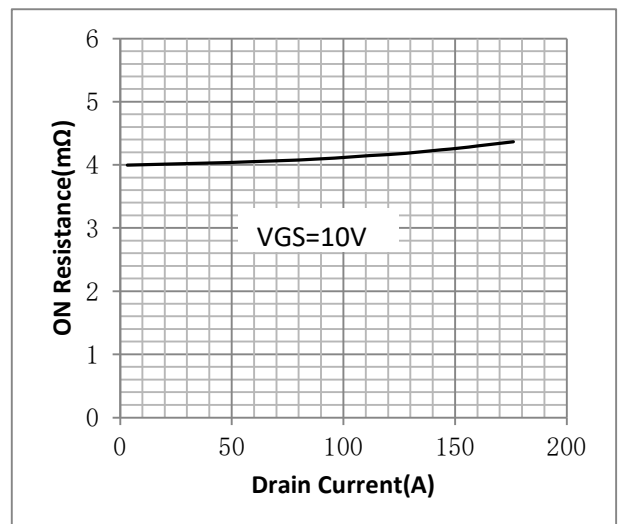


Fig.7 On-Resistance VS Gate Source Voltage

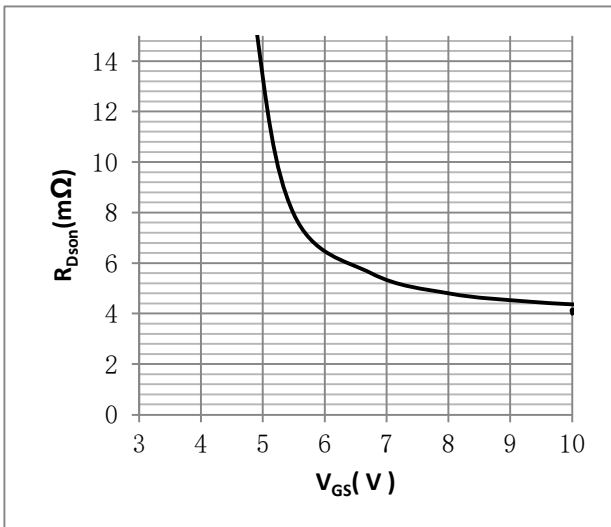


Fig.8 On-Resistance V.S Junction Temperature

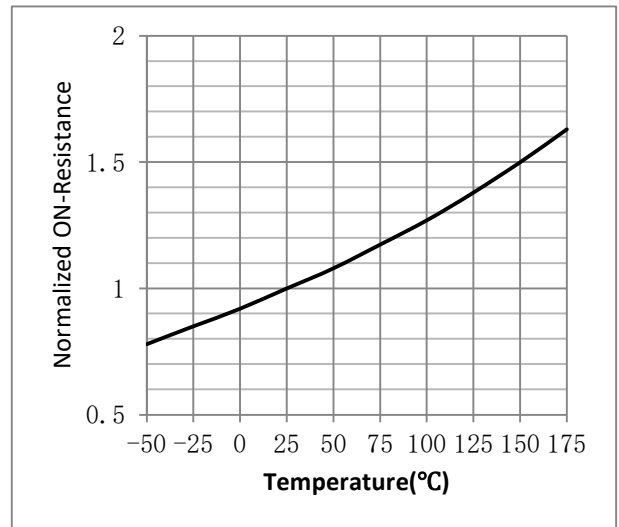


Figure 9. Diode Forward Voltage vs. Current

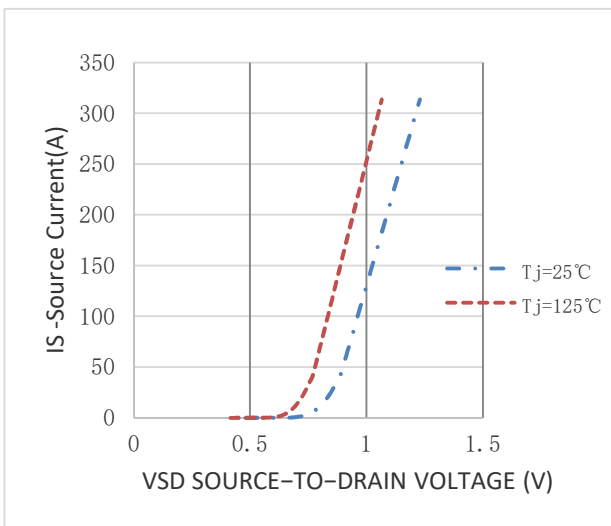


Figure 10. Transfer Characteristics

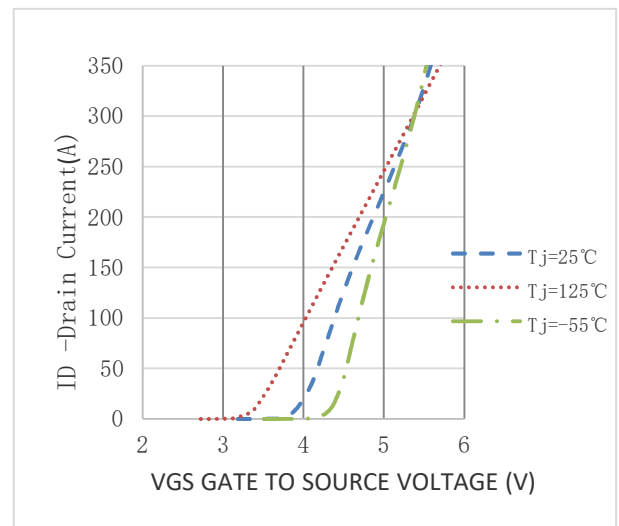


Fig.11 SOA Maximum Safe Operating Area

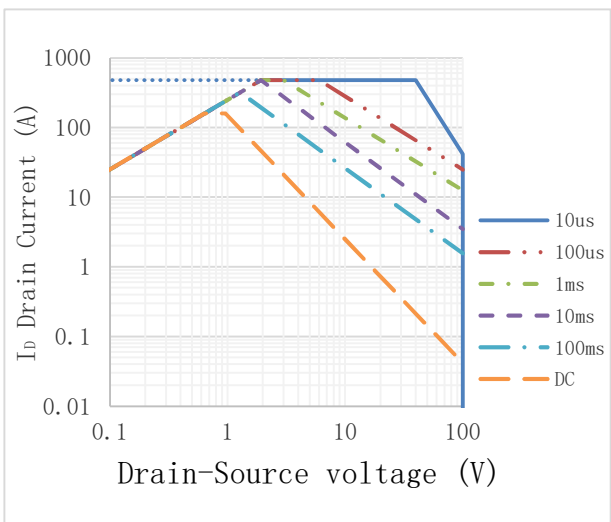
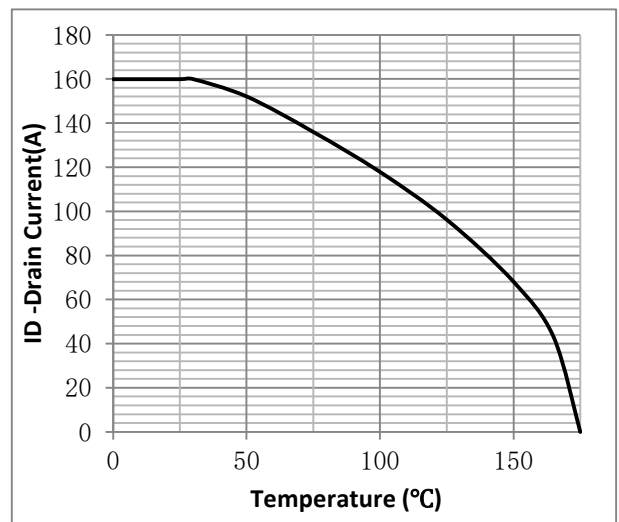
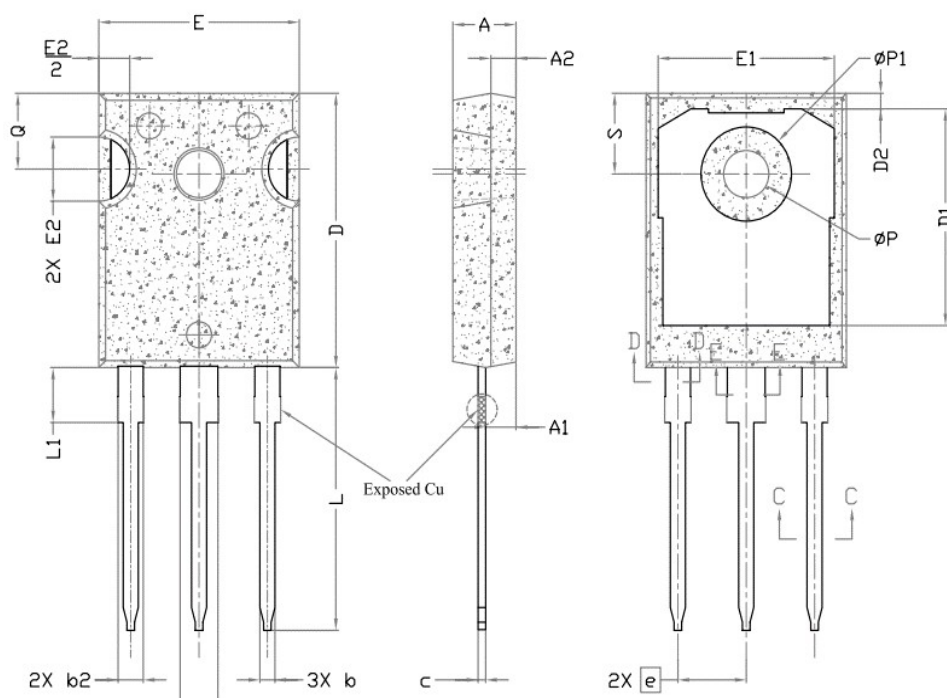


Fig.12 ID vs. Junction Temperature^③



•TO-247 Package Outline



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4.83	5.02	5.21	
A1	2.29	2.41	2.55	
A2	1.50	2.00	2.49	
b	1.12	1.20	1.33	
b1	1.12	1.20	1.28	
b2	1.91	2.00	2.39	6
b3	1.91	2.00	2.34	
b4	2.87	3.00	3.22	6, 8
b5	2.87	3.00	3.18	
c	0.55	0.60	0.69	6
c1	0.55	0.60	0.65	
D	20.80	20.95	21.10	4
D1	16.25	16.55	17.65	5
D2	0.51	1.19	1.35	
E	15.75	15.94	16.13	4
E1	13.46	14.02	14.16	5
E2	4.32	4.91	5.49	3
e	5.44BSC			
L	19.81	20.07	20.32	
L1	4.10	4.19	4.40	6
ØP	3.56	3.61	3.65	7
ØP1	7.19REF.			
Q	5.39	5.79	6.20	
S	6.04	6.17	6.30	

Note:

- ① Pulse : $V_{GS}=+20V/-20V$, Duty cycle=50%, $T_j=175^{\circ}C$, $t=1000$ hours; For DC , the following test conditions can be passed: $V_{GS}=+20V/-10V$, $T_j=175^{\circ}C$, $t=1000$ 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. $V_{GS}=10V$.

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Revision History

Version	Date	Change
A	2021. 1. 6	New
B	2022. 10. 11	1. Fig. 1~Fig11 modify 2. Idm corrected 3. Add Reach, HF figure 4. modify as "total time<10s)"
C	2024. 5. 20	Package information modify