

• General Description

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

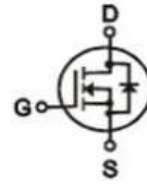
• Features

- 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

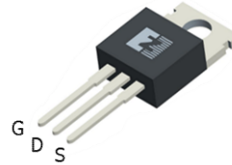
• Product Summary



$$V_{DS} = 100V$$

$$R_{DS(ON)} = 4.8m\Omega$$

$$I_D = 117A$$



TO-220



• Ordering Information:

Part NO.	ZMS039N10HP
Marking	ZMS039N10H
Packing Information	TUBE
Basic ordering unit (pcs)	1000

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

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}		100	V
Gate-Source Voltage	V_{GS}		± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	117	A
	I_D	$T_C=75^\circ C$	96	A
	I_D	$T_C=100^\circ C$	83	A
Pulsed Drain Current ^①	I_{DM}	Pulsed; $t_p \leq 10 \mu s$; $T_{mb} = 25^\circ C$;	468	A
Total Power Dissipation	P_D	$T_C=25^\circ C$	150	W
Total Power Dissipation	P_D	$T_A=25^\circ C$	3.8	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 ,	151	mJ
		L=0.5mH, VGS=10V, Rg=25 Ω ,	272	mJ
ESD Level (HBM)	CLASS 2			

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}		-	1	°C/W
Thermal resistance, junction-ambient	$R_{thJA\oplus}$		-	40	°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}	$V_{GS}=0V, I_D=250\mu A$	100			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}	$V_{GS}=0V, V_{DS}=100V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$		4.8	5.4	m Ω
Forward Transconductance	g_{FS}	$V_{GS}=5V, I_{SD}=5A$		18		S
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V, I_{SD}=20A$			1.3	V

•Dynamic characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$f=1MHz, V_{DS}=25V$	-	2800	-	pF
Output capacitance	C_{oss}		-	1592	-	
Reverse transfer capacitance	C_{rss}		-	65	-	
Gate Resistance	R_g	$f=1MHz$	-	1.9		Ω
Total gate charge	Q_g	$V_{DD}=15V, I_D=20A, V_{GS}=10V$	-	34	-	nC
Gate - Source charge	Q_{gs}		-	13	-	
Gate - Drain charge	Q_{gd}		-	4.7	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=20A$	-	15	-	ns
Turn-ON Rise time	t_r		-	45	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	23	-	ns
Turn-Off Fall time	t_f		-	10	-	ns
Reverse Recovery Time	t_{rr}	$V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=20A$	-	35	-	ns
Reverse Recovery Charge	Q_{rr}		-	45	-	nC

Fig.1 Gate-Charge Characteristics

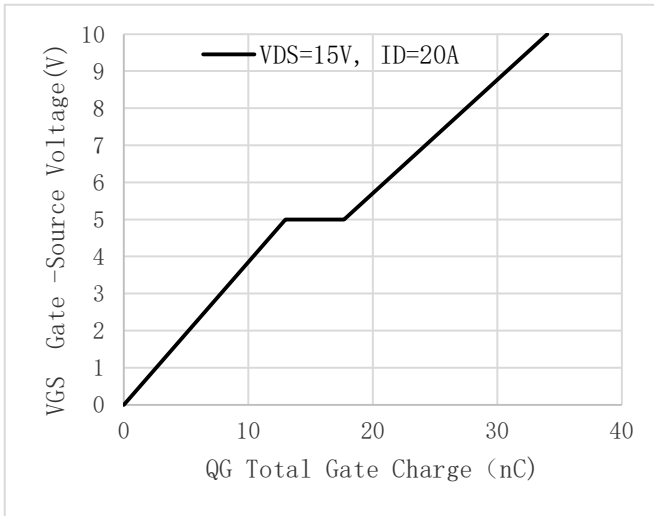


Fig.2 Capacitance Characteristics

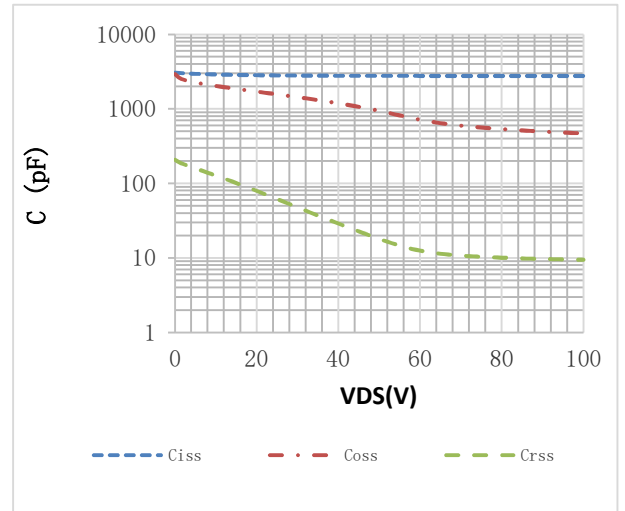


Fig.3 Power Dissipation

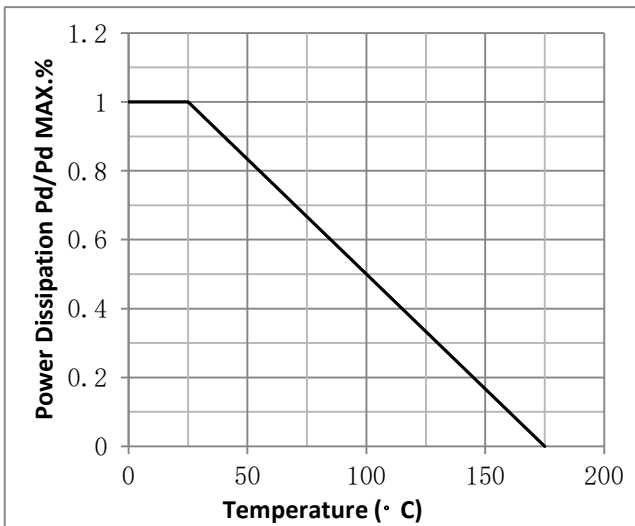


Fig.4 Typical output Characteristics

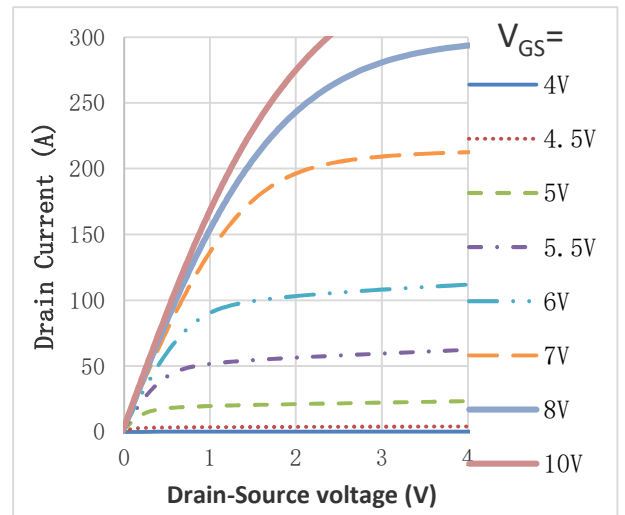


Fig.5 Threshold Voltage V.S Junction Temperature

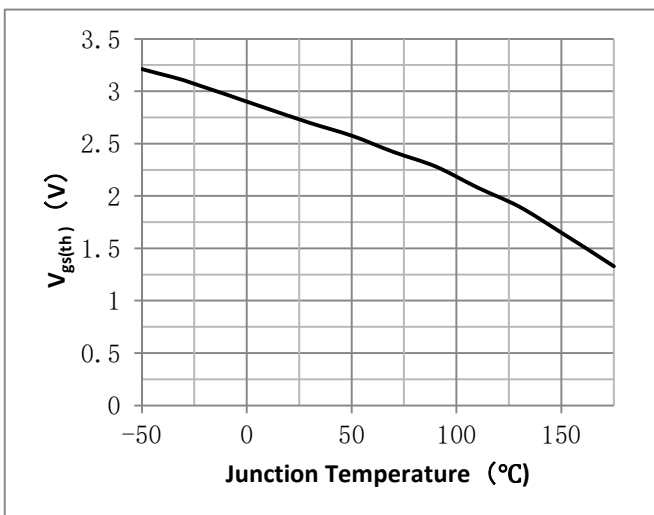


Fig.6 Resistance V.S Drain Current

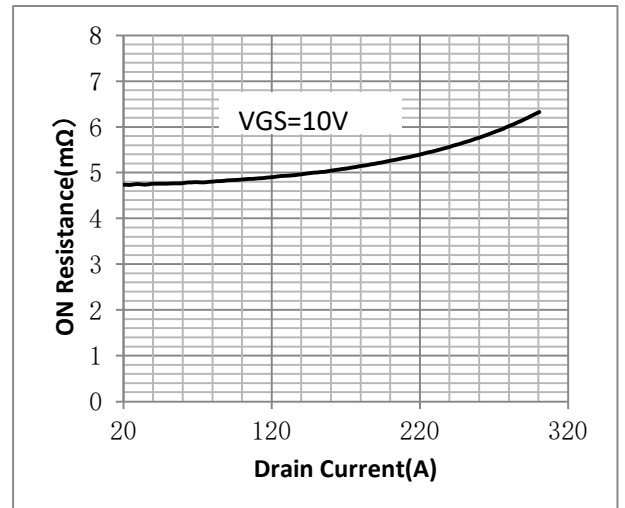


Fig.7 On-Resistance VS Gate Source Voltage

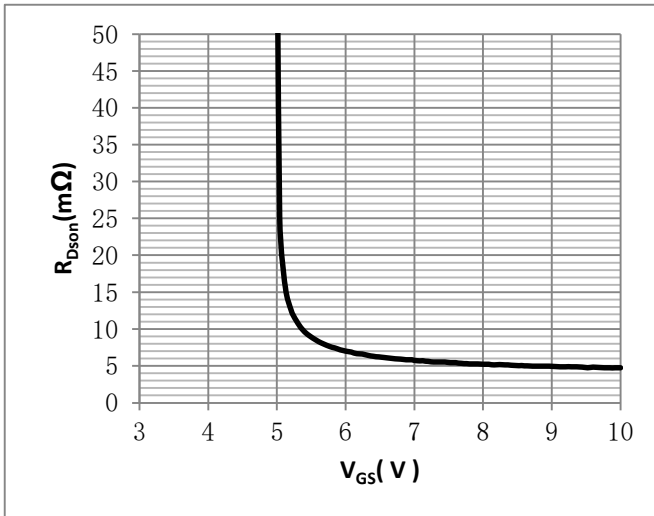


Fig.8 On-Resistance V.S Junction Temperature

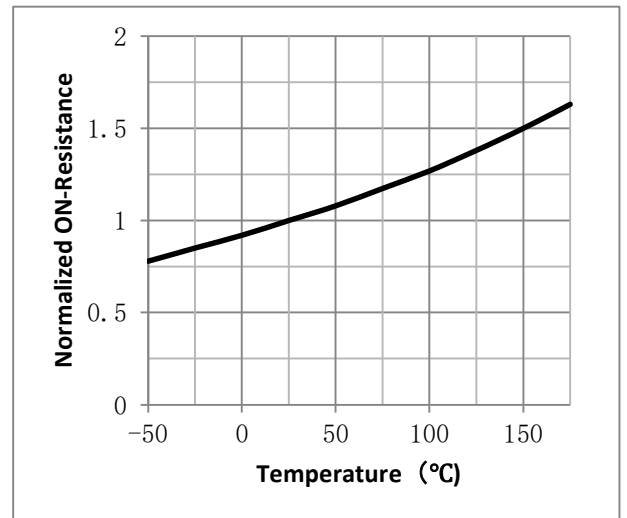


Figure 9. Diode Forward Voltage vs. Current

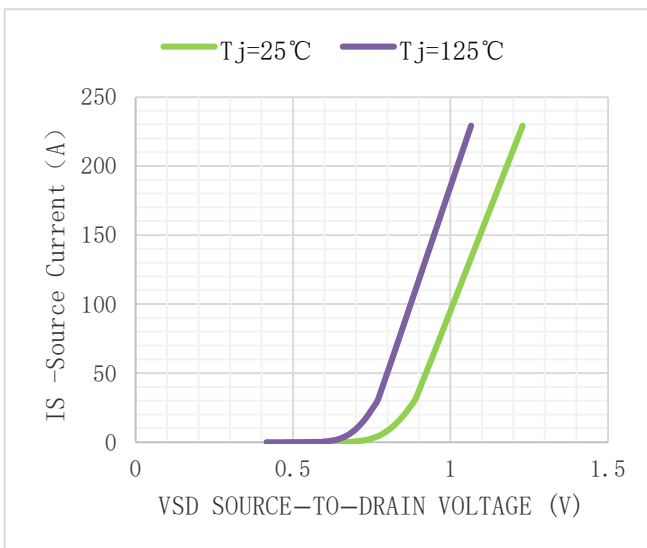


Figure 10. Transfer Characteristics

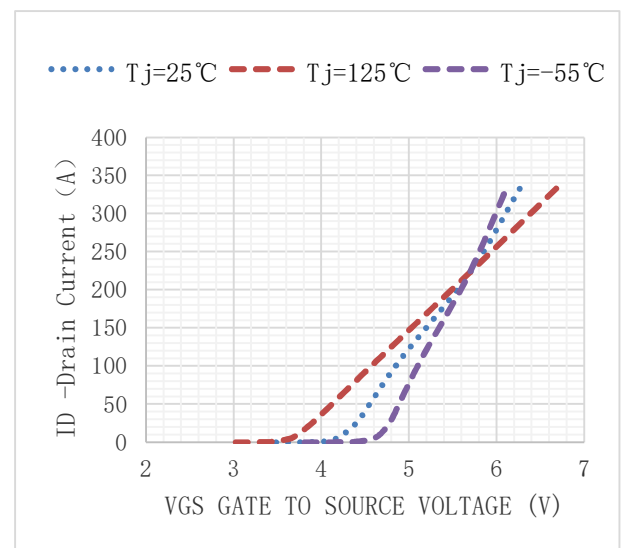


Fig.11 SOA Maximum Safe Operating Area

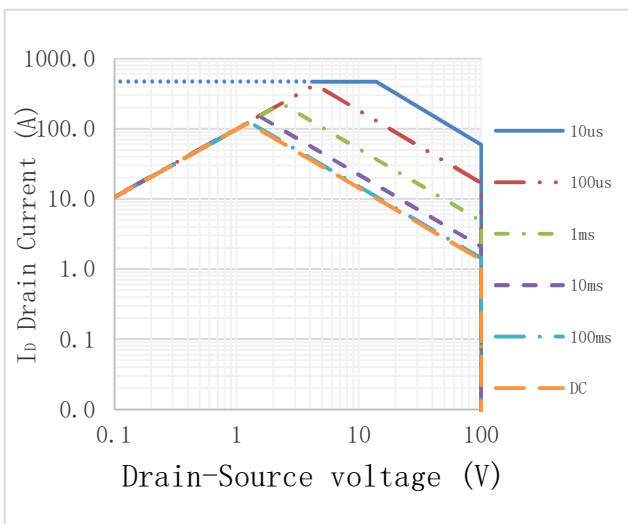
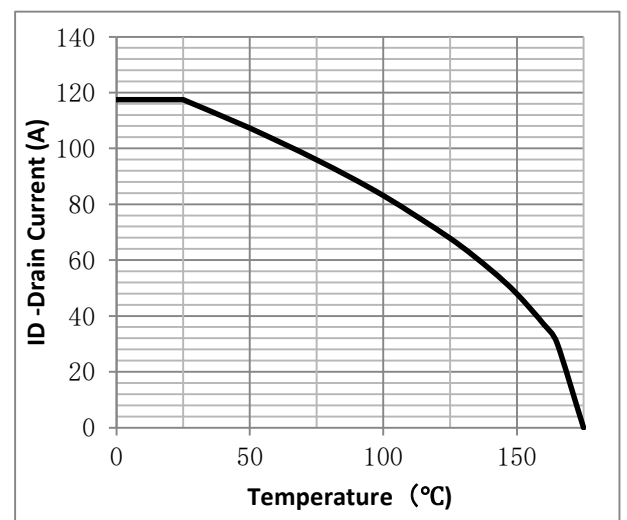
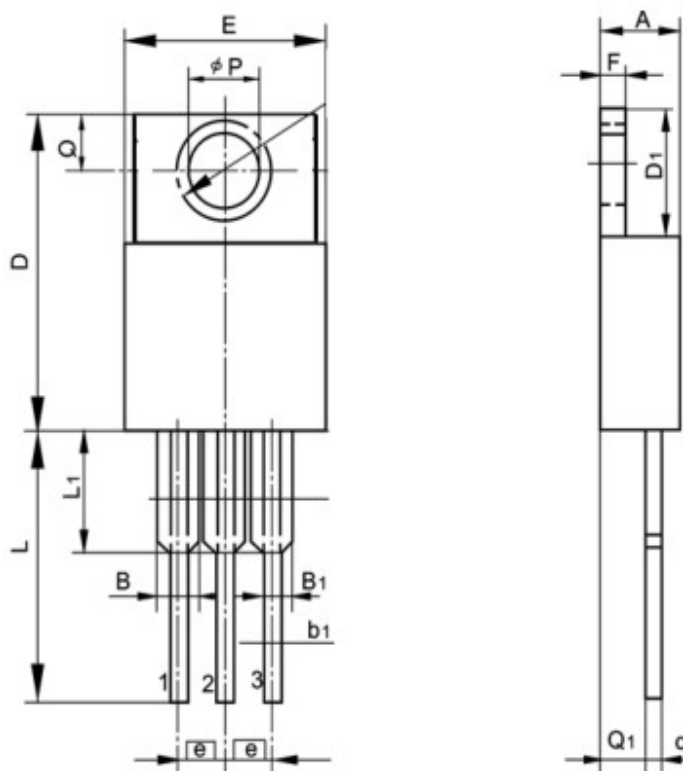


Fig.12 I_D vs. Junction Temperature②



•TO-220 Package Outline

SYMBOL	min	nom	max	SYMBOL	min	nom	max
A	4.00		4.80	E	9.90		10.70
B	1.20		1.50	e		2.54	
B1	1.00		1.40	F	1.10		1.45
b1	0.65		1.00	L	12.50		14.50
c	0.35		0.75	L1	3.00	3.50	4.00
D	15.00		16.50	Q	2.50		3.00
D1	5.90		6.90	Q1	2.00		3.00



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	2024/9/6	New