

• 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

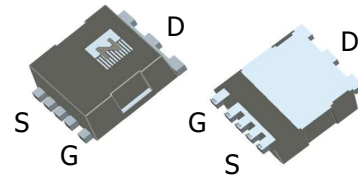
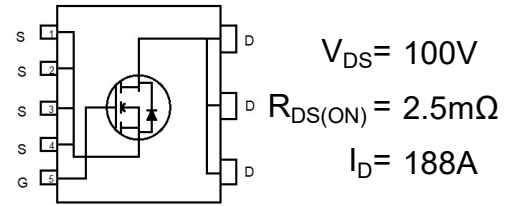
• Ordering Information:

Part NO.	ZMSA030N10HSR
Marking	ZMS030N10H
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2000

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

Parameter	Symbol	Conditions	Value	Unit
Drain-Source Voltage	$V_{DS}$		100	V
Gate-Source Voltage	$V_{GS}$		$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	188	A
	$I_D$	$T_C=75^\circ\text{C}$	154	A
	$I_D$	$T_C=100^\circ\text{C}$	133	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	Pulsed; $t_p \leq 10 \mu\text{s}$ ; $T_{mb} = 25^\circ\text{C}$ ;	752	A
Total Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	231	W
Total Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	3.3	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=0.1mH, VGS=10V, Rg=25 $\Omega$ ,	423	mJ
		L=0.5mH, VGS=10V, Rg=25 $\Omega$ ,	761	mJ
ESD Level (HBM)	CLASS 2			

• Product Summary



sTOLL



**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	$R_{thJC}$		-	0.65	°C/W
Thermal resistance, junction-ambient	$R_{thJA\ominus}$		-	45	°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	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0	2.7	4.0	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=100V$			1.0	$\mu A$
Gate- Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=25A$		2.5	3.1	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{GS}=5V, I_{SD}=5A$		26		S
Diode Forward Voltage	$V_{FSD}$	$V_{GS}=0V, I_{SD}=25A$			1.3	V

**•Dynamic characteristics**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	$C_{iss}$	$f=1MHz, V_{DS}=25V$	-	4760	-	pF
Output capacitance	$C_{oss}$		-	2482	-	
Reverse transfer capacitance	$C_{rss}$		-	243	-	
Gate Resistance	$R_g$	$f=1MHz$	-	0.9		$\Omega$
Total gate charge	$Q_g$	$V_{DD}=15V, I_D=25A, V_{GS}=10V$	-	74.5	-	nC
Gate - Source charge	$Q_{gs}$		-	16.5	-	
Gate - Drain charge	$Q_{gd}$		-	15	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V, R_G=3.3\Omega, I_D=25A$	-	20	-	ns
Turn-ON Rise time	$t_r$		-	10	-	ns
Turn-Off Delay time	$t_{D(off)}$		-	32	-	ns
Turn-Off Fall time	$t_f$		-	21	-	ns
Reverse Recovery Time	$t_{rr}$	$V_{DD}=20V, di_s/dt=100A/\mu s, I_S=50A$	-	75	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	112	-	nC

Fig.1 Gate-Charge Characteristics

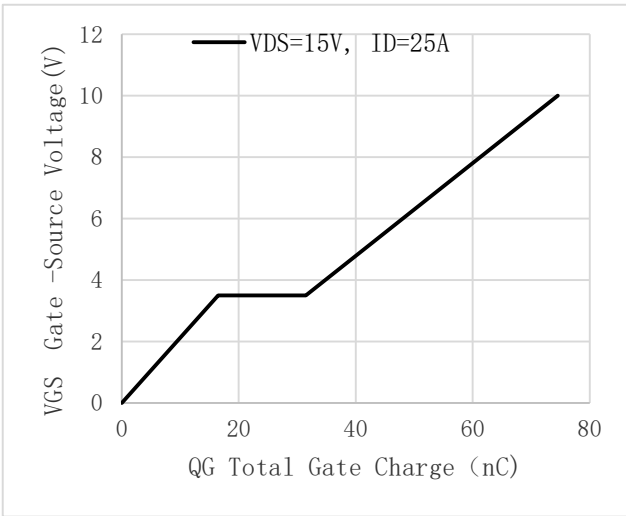


Fig.2 Capacitance Characteristics

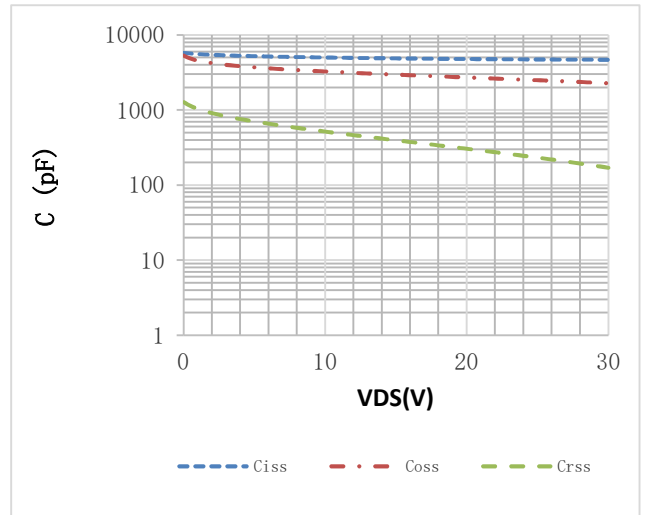


Fig.3 Power Dissipation

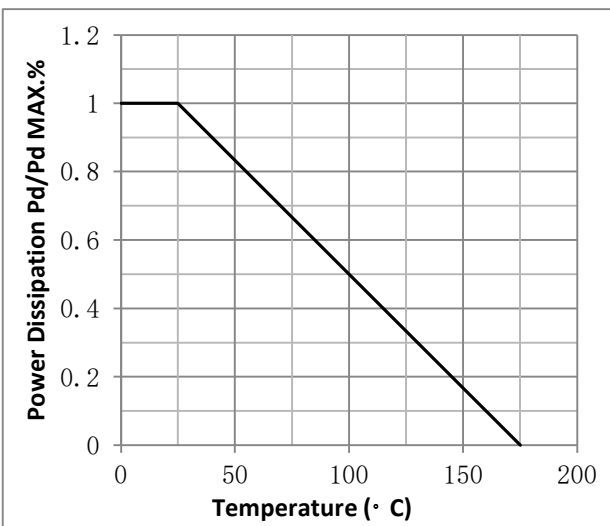


Fig.4 Typical output Characteristics

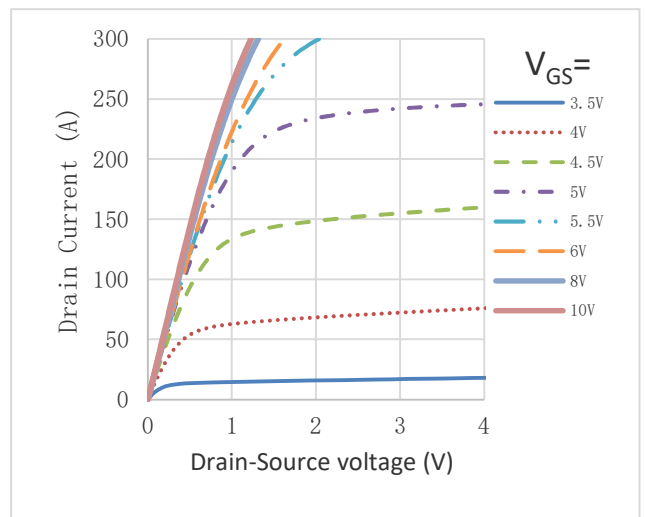


Fig.5 Threshold Voltage V.S Junction Temperature

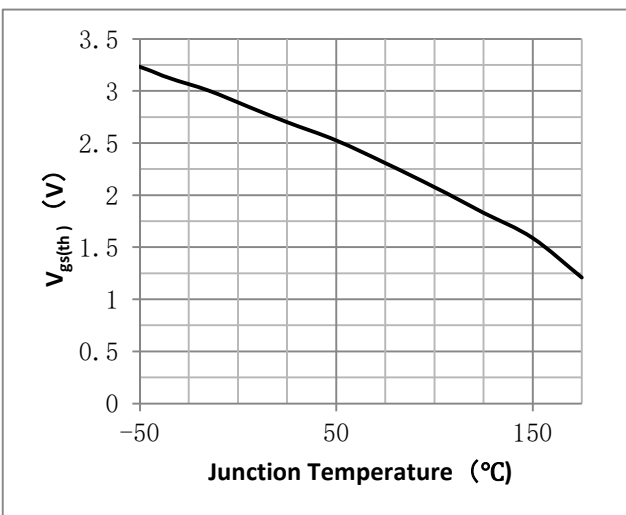


Fig.6 Resistance V.S Drain Current

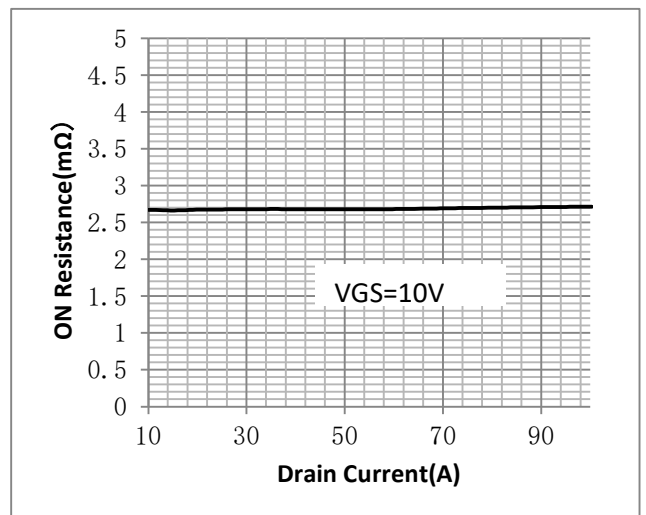


Fig.7 On-Resistance VS Gate Source Voltage

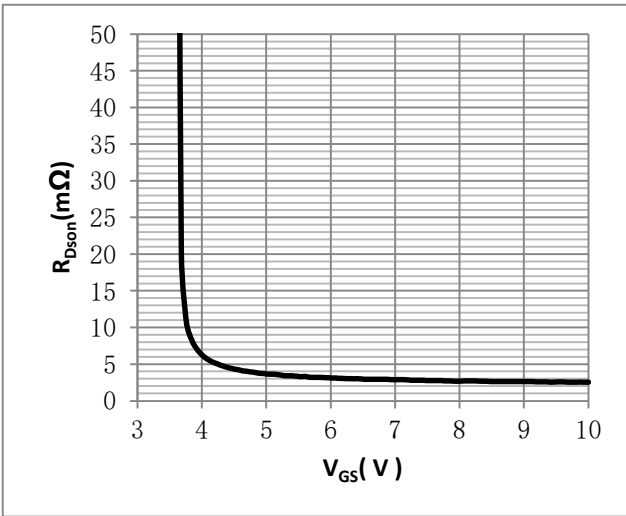


Fig.8 On-Resistance V.S Junction Temperature

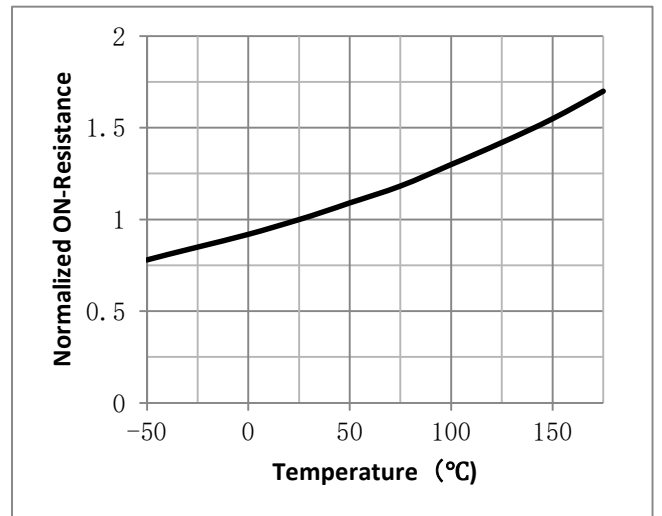


Figure 9. Diode Forward Voltage vs. Current

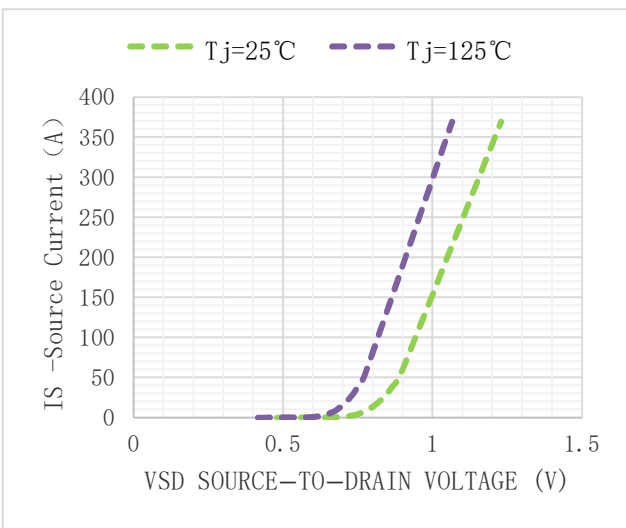


Figure 10. Transfer Characteristics

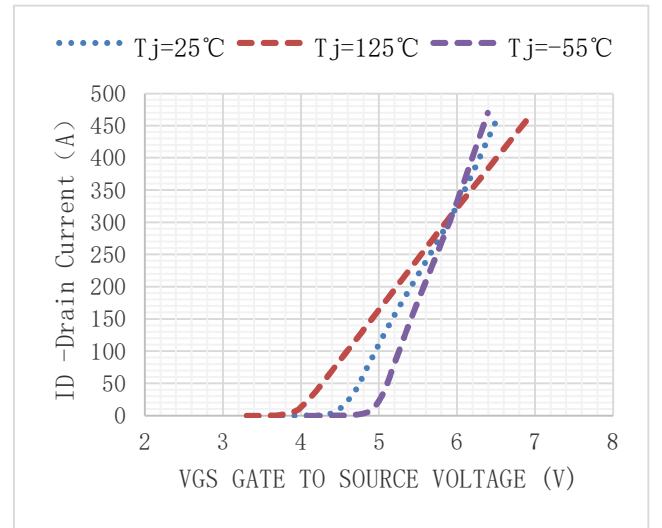


Fig.11 SOA Maximum Safe Operating Area

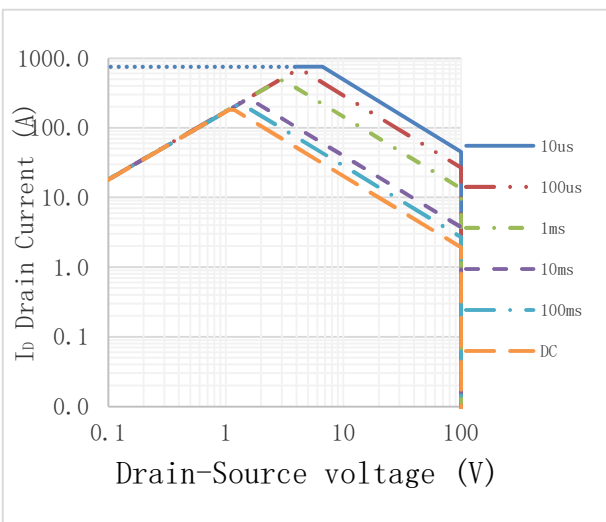
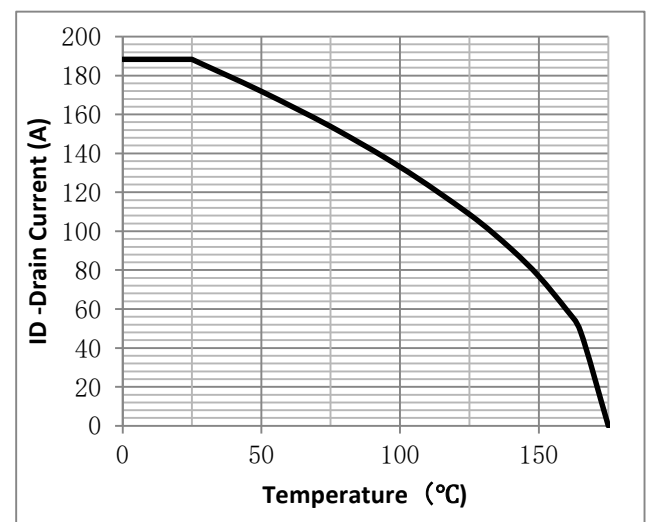
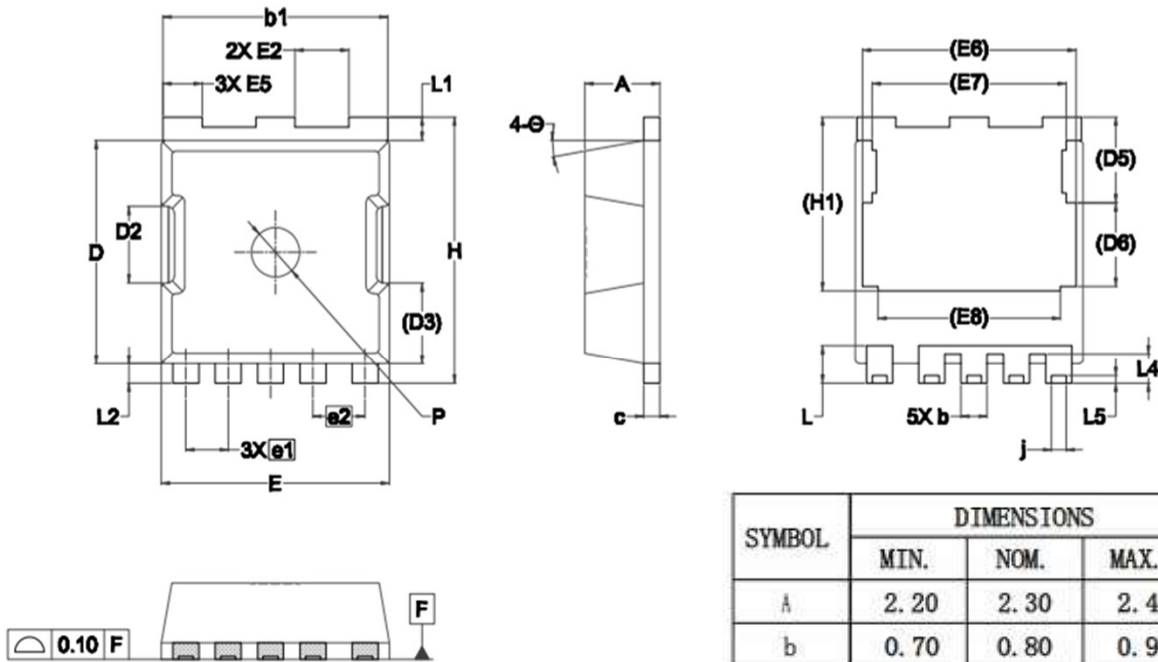


Fig.12 ID vs. Junction Temperature



•sTOLL Package Outline



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	6.80	6.90	7.00
c	0.40	0.50	0.60
D	6.60	6.70	6.80
D2	2.20	2.30	2.40
D3	2.43REF.		
D5	2.57REF.		
D6	2.50REF.		
E	6.90	7.00	7.10
E2	1.55	1.65	1.75
E5	1.10	1.20	1.30
E6	6.56REF.		
E7	5.96REF.		
E8	5.60REF.		
e1	1.20	1.30	1.40
e2	1.50	1.60	1.70
H	7.80	8.00	8.20
H1	5.20REF.		
L	1.05	1.15	1.25
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L4	0.80	0.90	1.00
L5	0.135	0.235	0.335
j	0.42	0.45	0.50
p	1.40	1.50	1.60
e	8.50*	—	11.50*

**Note:**

- ① Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ , Accumulation time  $\leq 50$  hours; For DC, the following test conditions can be passed:  $V_{GS} = +20V/-10V$ ,  $T_j = 175^\circ\text{C}$ ,  $t = 1000$  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	2024. 7. 3	New
B	2024. 8. 15	Update Rg, Cg, Qg and characteristics chart