

### 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

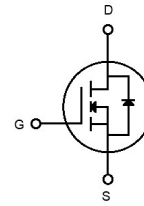
### Ordering Information:

|                           |              |
|---------------------------|--------------|
| Part NO.                  | ZMS011N06HB6 |
| Marking                   | ZMS011N06H   |
| Packing Information       | REEL TAPE    |
| Basic ordering unit (pcs) | 800          |

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

| Parameter                      | Symbol    | Conditions                                                        | Value       | Unit             |
|--------------------------------|-----------|-------------------------------------------------------------------|-------------|------------------|
| Drain-Source Voltage           | $V_{DS}$  |                                                                   | 60          | V                |
| Gate-Source Voltage            | $V_{GS}$  |                                                                   | $\pm 20$    | V                |
| Continuous Drain Current       | $I_D$     | $T_C=25^\circ\text{C}$                                            | 260         | A                |
|                                | $I_D$     | $T_C=75^\circ\text{C}$                                            | 213         | A                |
|                                | $I_D$     | $T_C=100^\circ\text{C}$                                           | 184         | A                |
| Pulsed Drain Current           | $I_{DM}$  | Pulsed; $t_p \leq 10 \mu\text{s}$ ; $T_{mb} = 25^\circ\text{C}$ ; | 780         | A                |
| Total Power Dissipation        | $P_D$     | $T_C=25^\circ\text{C}$                                            | 214         | W                |
| Total Power Dissipation        | $P_D$     | $T_A=25^\circ\text{C}$                                            | 5.0         | 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  | $E_{AS}$  | $L=0.1\text{mH}$ , $V_{GS}=10\text{V}$ , $R_g=25\Omega$ ,         | 240         | mJ               |
|                                |           | $L=0.5\text{mH}$ , $V_{GS}=10\text{V}$ , $R_g=25\Omega$ ,         | 552         | mJ               |
| ESD Level (HBM)                | CLASS 2   |                                                                   |             |                  |

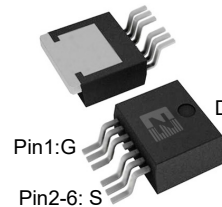
### Product Summary



$$V_{DS} = 60\text{V}$$

$$R_{DS(ON)} = 1.1\text{m}\Omega$$

$$I_D = 260\text{A}$$



TO-263-6



**•Thermal resistance**

| Parameter                            | Symbol         | Min. | Typ. | Max. | Unit |
|--------------------------------------|----------------|------|------|------|------|
| Thermal resistance, junction - case  | $R_{thJC}$     |      | -    | 0.7  | °C/W |
| Thermal resistance, junction-ambient | $R_{thJA}^{①}$ |      | -    | 30   | °C/W |
| Soldering temperature                | $T_{sold}$     |      | -    | 260  | °C   |

**•Electronic Characteristics**

| Parameter                         | Symbol       | Condition                     | Min. | Typ. | Max. | Unit       |
|-----------------------------------|--------------|-------------------------------|------|------|------|------------|
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$     | 60   |      |      | 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      | $I_{DSS}$    | $V_{GS}=0V, V_{DS}=60V$       |      |      | 1.0  | $\mu A$    |
| Gate- Source Leakage Current      | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$   |      |      | 100  | nA         |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=55A$         |      | 1.1  | 1.5  | m $\Omega$ |
| Forward Transconductance          | $g_{FS}$     | $V_{DS}=5V, I_{SD}=10A$       |      | 45   |      | S          |
| Diode Forward Voltage             | $V_{FSD}$    | $V_{GS}=0V, I_{SD}=55A$       |      |      | 1.3  | V          |

**•Dynamic characteristics**

| Parameter                    | Symbol       | Condition                                             | Min. | Typ. | Max. | Unit     |
|------------------------------|--------------|-------------------------------------------------------|------|------|------|----------|
| Input capacitance            | $C_{iss}$    | $f=1MHz, V_{DS}=25V$                                  | -    | 7650 | -    | pF       |
| Output capacitance           | $C_{oss}$    |                                                       | -    | 4430 | -    |          |
| Reverse transfer capacitance | $C_{rss}$    |                                                       | -    | 572  | -    |          |
| Gate Resistance              | $R_g$        | $f=1MHz$                                              | -    | 1.6  |      | $\Omega$ |
| Total gate charge            | $Q_g$        | $V_{DD}=15V,$<br>$I_D=55A,$<br>$V_{GS}=10V$           | -    | 142  | -    | nC       |
| Gate - Source charge         | $Q_{gs}$     |                                                       | -    | 42   | -    |          |
| Gate - Drain charge          | $Q_{gd}$     |                                                       | -    | 29   | -    |          |
| Turn-ON Delay time           | $t_{D(on)}$  | $V_{GS}=10V, V_{DS}=15V,$<br>$R_G=3.3\Omega, I_D=20A$ | -    | 30   | -    | ns       |
| Turn-ON Rise time            | $t_r$        |                                                       | -    | 12   | -    | ns       |
| Turn-Off Delay time          | $t_{D(off)}$ |                                                       | -    | 65   | -    | ns       |
| Turn-Off Fall time           | $t_f$        |                                                       | -    | 14   | -    | ns       |
| Reverse Recovery Time        | $t_{rr}$     | $V_{DD}=20V, di_S/dt =$<br>$100A/\mu s, I_S=50A$      | -    | 210  | -    | ns       |
| Reverse Recovery Charge      | $Q_{rr}$     |                                                       | -    | 200  | -    | nC       |

Fig.1 Gate-Charge Characteristics

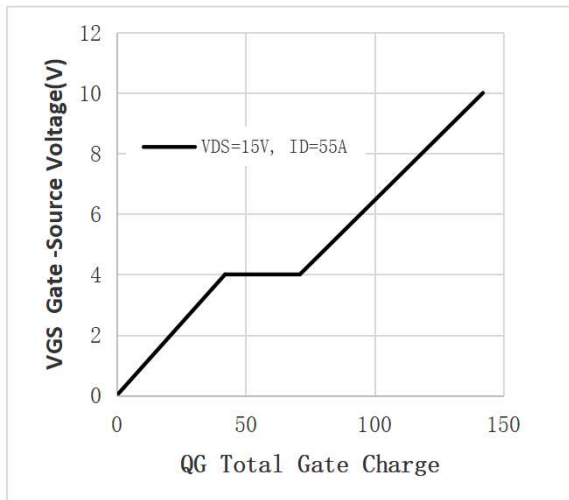


Fig.2 Capacitance Characteristics

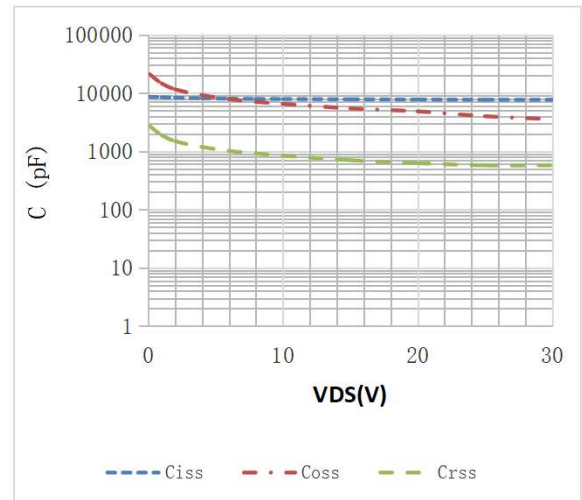


Fig.3 Power Dissipation

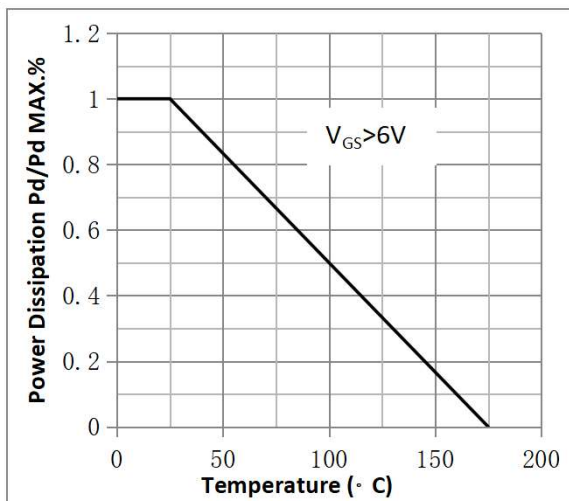


Fig.4 Typical output Characteristics

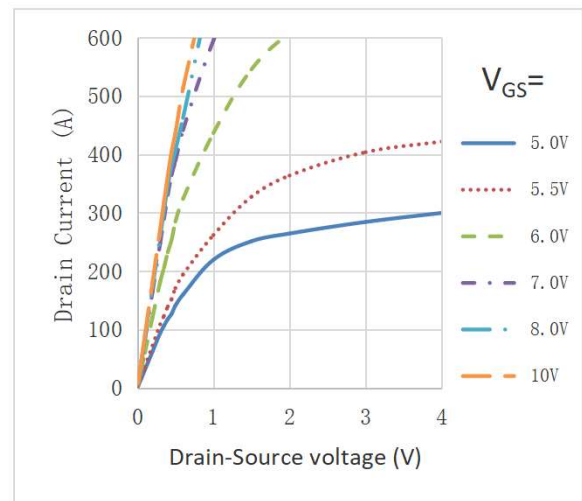


Fig.5 Threshold Voltage V.S Junction Temperature

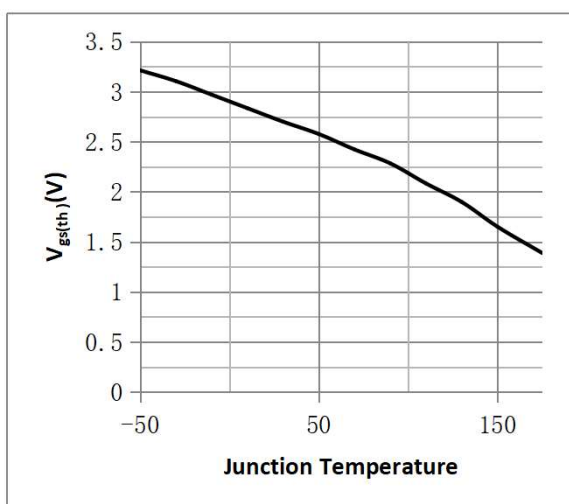


Fig.6 Resistance V.S Drain Current

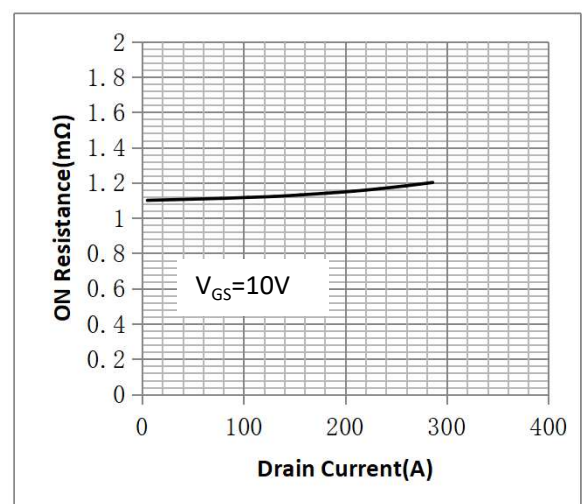


Fig.7 On-Resistance VS Gate Source Voltage

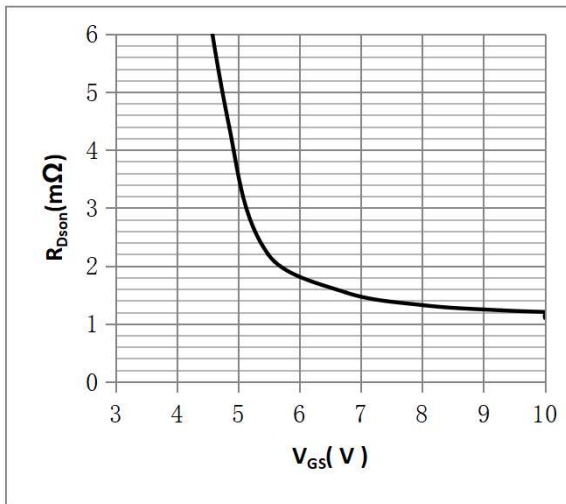


Fig.8 On-Resistance V.S Junction Temperature

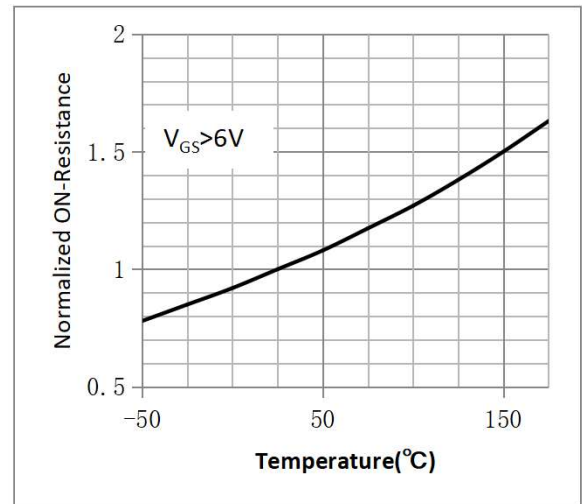


Figure 9. Diode Forward Voltage vs. Current

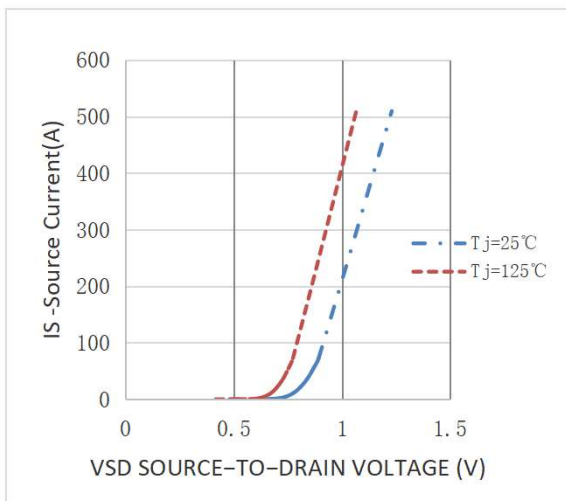


Figure 10. Transfer Characteristics

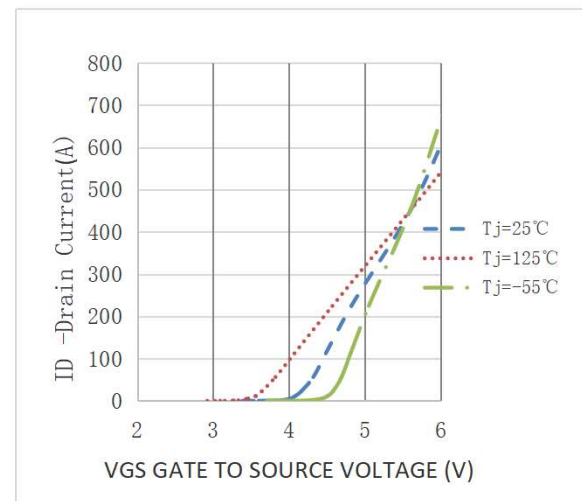


Fig.11 Safe Operating Area

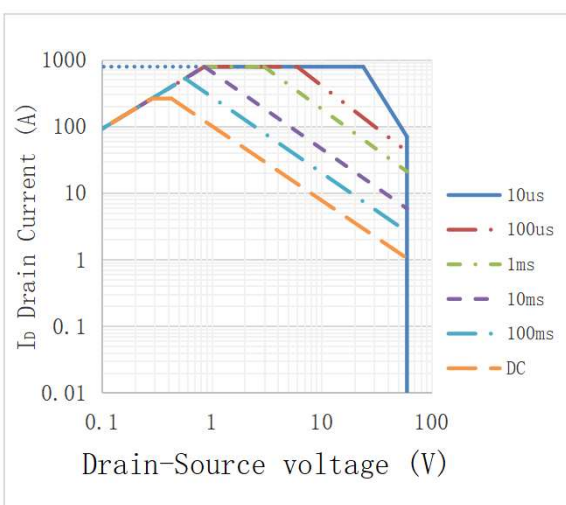
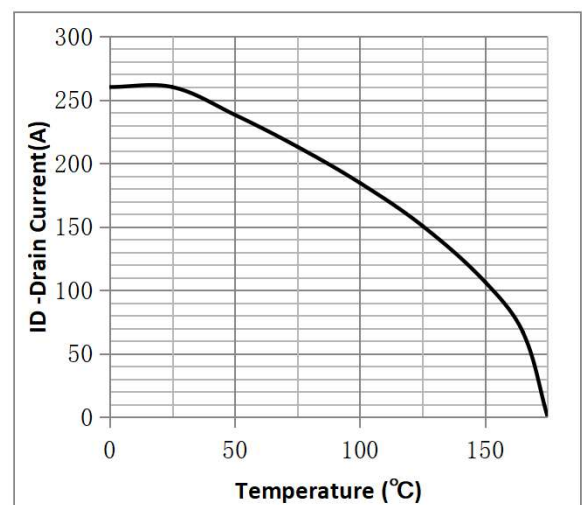
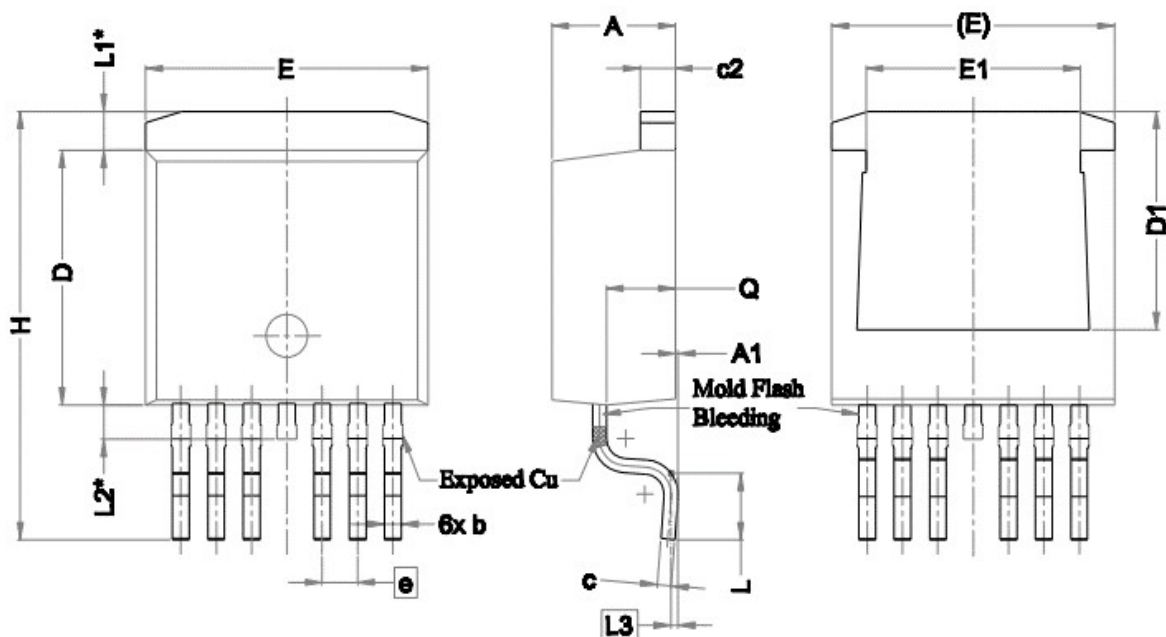


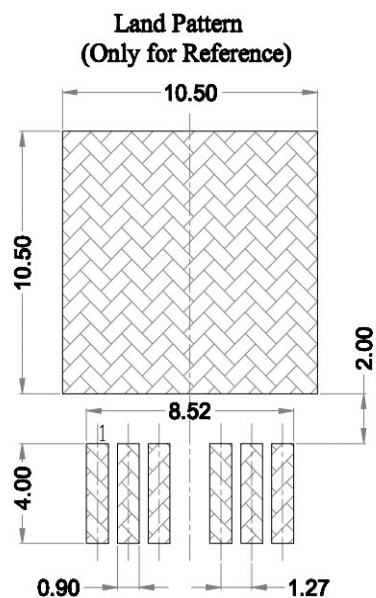
Fig.12 ID vs. Case Temperature<sup>②</sup>



•TO-263-6 Package Outline



| SYMBOL | DIMENSIONS |       |       |
|--------|------------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |
| A      | 4.24       | 4.44  | 4.64  |
| A1     | 0.00       | 0.10  | 0.25  |
| b      | 0.50       | 0.60  | 0.70  |
| c      | 0.40       | 0.50  | 0.60  |
| c2     | 1.15       | 1.27  | 1.40  |
| D      | 8.82       | 8.92  | 9.02  |
| D1     | 6.86       | 7.65  | —     |
| E      | 9.96       | 10.16 | 10.36 |
| E1     | 6.89       | 7.77  | 7.89  |
| e      | 1.27 BSC   |       |       |
| H      | 14.61      | 15.00 | 15.88 |
| L      | 1.78       | 2.32  | 2.79  |
| L1     | 1.36 REF.  |       |       |
| L2     | 1.20 REF.  |       |       |
| L3     | 0.25 BSC   |       |       |
| Q      | 2.30       | 2.48  | 2.70  |



**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. VGS=10V.

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Revision History

| Version | Date       | Change                                  |
|---------|------------|-----------------------------------------|
| A       | 2021.12.6  |                                         |
| B       | 2022.9.5   | 1.Add Reach,HF figure,2.ID curve modify |
| C       | 2023.12.28 | Correct SOA                             |
|         |            |                                         |
|         |            |                                         |
|         |            |                                         |
|         |            |                                         |
|         |            |                                         |