

### General Description

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

### 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

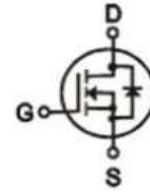
### Ordering Information:

|                           |             |
|---------------------------|-------------|
| Part NO.                  | ZMS100N20HC |
| Marking                   | ZMS100N20H  |
| Packing Information       | TUBE        |
| Basic ordering unit (pcs) | 400         |

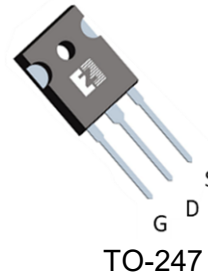
### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ )

| Parameter                         | Symbol    | Conditions                                                        | Value       | Unit             |
|-----------------------------------|-----------|-------------------------------------------------------------------|-------------|------------------|
| Drain-Source Voltage              | $V_{DS}$  |                                                                   | 200         | V                |
| Gate-Source Voltage               | $V_{GS}$  |                                                                   | $\pm 20$    | V                |
| Continuous Drain Current          | $I_D$     | $T_C=25^\circ\text{C}$                                            | 110         | A                |
|                                   | $I_D$     | $T_C=75^\circ\text{C}$                                            | 93          | A                |
|                                   | $I_D$     | $T_C=100^\circ\text{C}$                                           | 80          | A                |
| Pulsed Drain Current <sup>①</sup> | $I_{DM}$  | Pulsed; $t_p \leq 10 \mu\text{s}$ ; $T_{mb} = 25^\circ\text{C}$ ; | 440         | A                |
| Total Power Dissipation           | $P_D$     | $T_C=25^\circ\text{C}$                                            | 333         | 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     | $E_{AS}$  | $L=0.1\text{mH}$ , $V_{GS}=10\text{V}$ , $R_g=25\Omega$ ,         | 540         | mJ               |
|                                   |           | $L=0.5\text{mH}$ , $V_{GS}=10\text{V}$ , $R_g=25\Omega$ ,         | 972         | mJ               |
| ESD Level (HBM)                   | CLASS 2   |                                                                   |             |                  |

### Product Summary



$V_{DS} = 200\text{V}$   
 $R_{DS(ON)} = 9\text{m}\Omega$   
 $I_D = 110\text{A}$



**•Thermal resistance**

| Parameter                              | Symbol       | Min. | Typ. | Max. | Unit |
|----------------------------------------|--------------|------|------|------|------|
| Thermal resistance, junction - case    | $R_{thJC}$   |      | -    | 0.45 | °C/W |
| Thermal resistance, junction-ambient   | $R_{thJA}$ ① |      | -    | 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    | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$     | 200  |      |      | V          |
| Gate Threshold Voltage            | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 2.0  | 3.3  | 4.0  | V          |
| Drain-Source Leakage Current      | $I_{DSS}$    | $V_{GS}=0V, V_{DS}=200V$      |      |      | 1.0  | $\mu A$    |
| Gate- Source Leakage Current      | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$   |      |      | 100  | nA         |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=40A$         |      | 9    | 11   | m $\Omega$ |
| Forward Transconductance          | $g_{FS}$     | $V_{GS}=5V, I_{SD}=20A$       |      | 24   |      | 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            | $C_{iss}$    | $f=1MHz, V_{DS}=100V$                             | -    | 4300 | -    | pF       |
| Output capacitance           | $C_{oss}$    |                                                   | -    | 422  | -    |          |
| Reverse transfer capacitance | $C_{rss}$    |                                                   | -    | 10   | -    |          |
| Gate Resistance              | $R_g$        | $f=1MHz$                                          | -    | 1.3  |      | $\Omega$ |
| Total gate charge            | $Q_g$        | $V_{DD}=100V, I_D=40A, V_{GS}=10V$                | -    | 63   | -    | nC       |
| Gate - Source charge         | $Q_{gs}$     |                                                   | -    | 18   | -    |          |
| Gate - Drain charge          | $Q_{gd}$     |                                                   | -    | 15   | -    |          |
| Turn-ON Delay time           | $t_{D(on)}$  | $V_{GS}=10V, V_{DS}=100V, R_G=3.3\Omega, I_D=20A$ | -    | 15   | -    | ns       |
| Turn-ON Rise time            | $t_r$        |                                                   | -    | 17   | -    | ns       |
| Turn-Off Delay time          | $t_{D(off)}$ |                                                   | -    | 24   | -    | ns       |
| Turn-Off Fall time           | $t_f$        |                                                   | -    | 9    | -    | ns       |
| Reverse Recovery Time        | $t_{RR}$     | $V_{DD}=20V, dI_S/dt=100A/\mu s, I_S=30A$         | -    | 42   | -    | ns       |
| Reverse Recovery Charge      | $Q_{RR}$     |                                                   | -    | 176  | -    | nC       |

Fig.1 Gate-Charge Characteristics

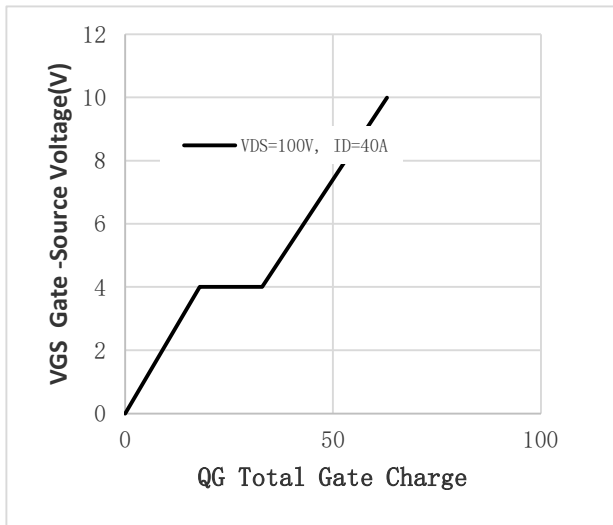


Fig.2 Capacitance Characteristics

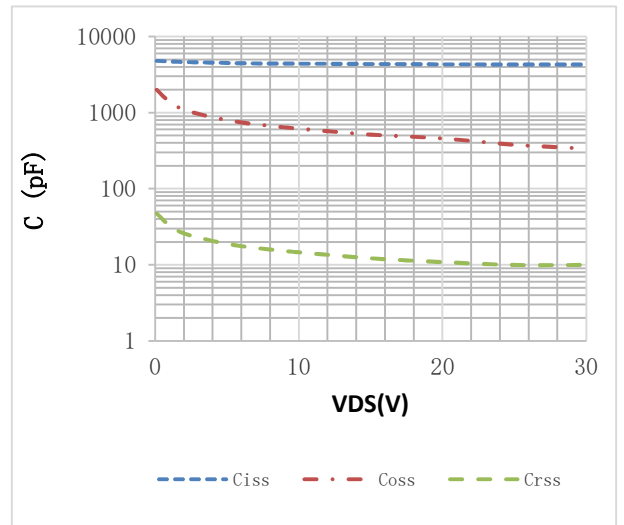


Fig.3 Power Dissipation

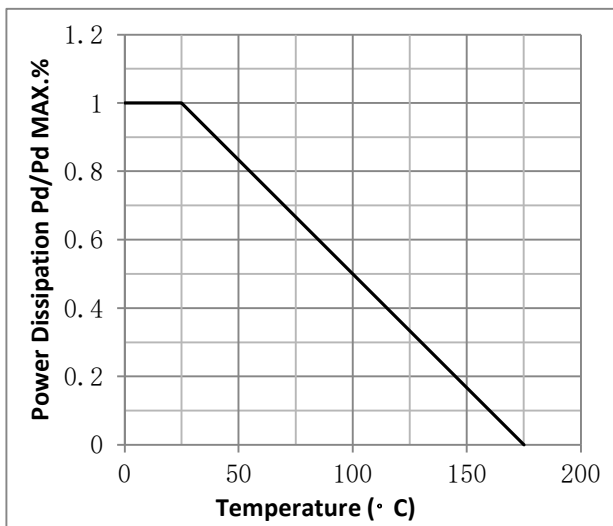


Fig.4 Typical output Characteristics

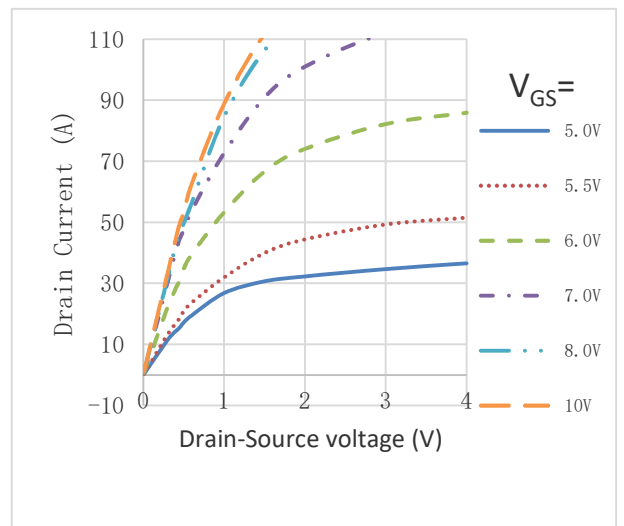


Fig.5 Threshold Voltage V.S Junction Temperature

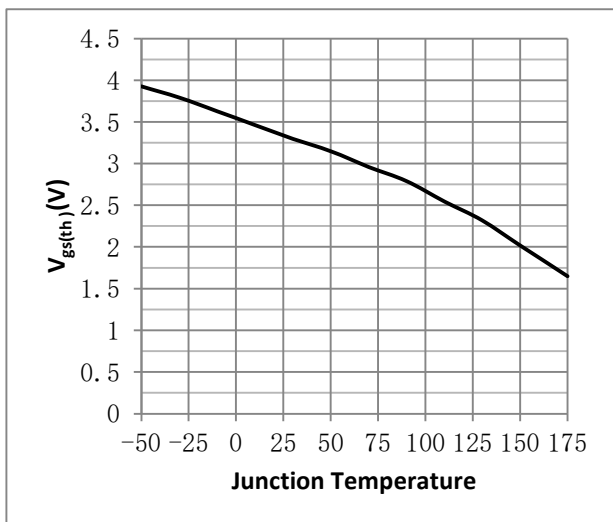


Fig.6 Resistance V.S Drain Current

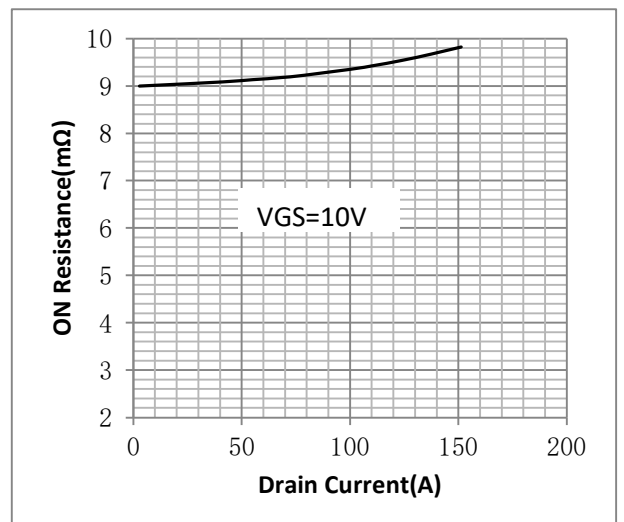


Fig.7 On-Resistance VS Gate Source Voltage

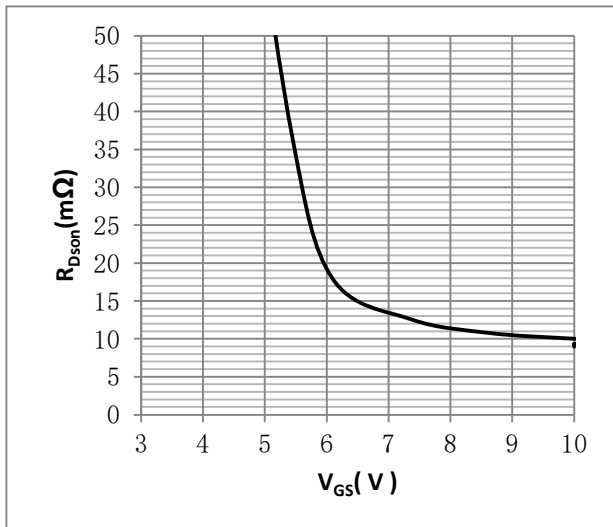


Fig.8 On-Resistance V.S Junction Temperature

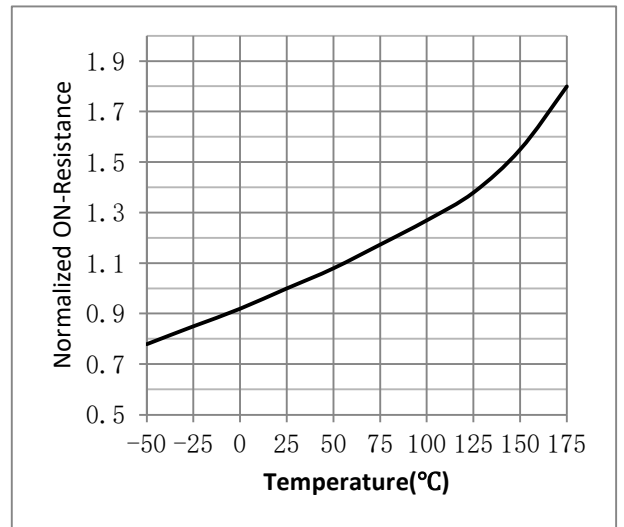


Figure 9. Diode Forward Voltage vs. Current

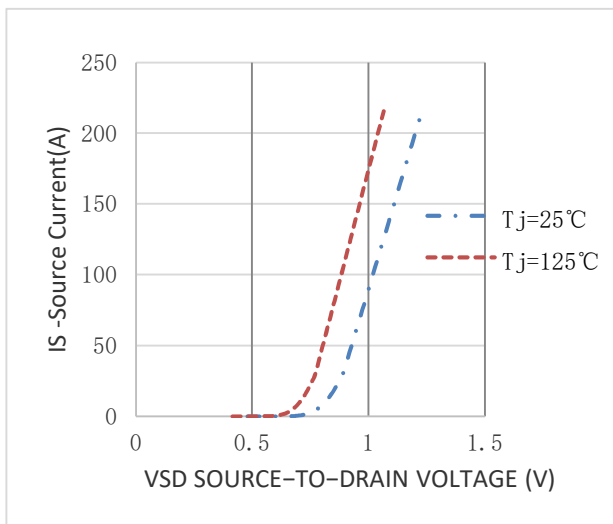


Figure 10. Transfer Characteristics

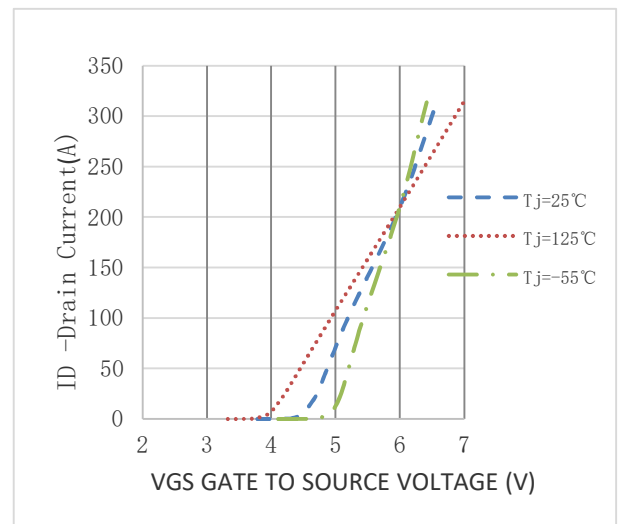


Fig.11 SOA Maximum Safe Operating Area

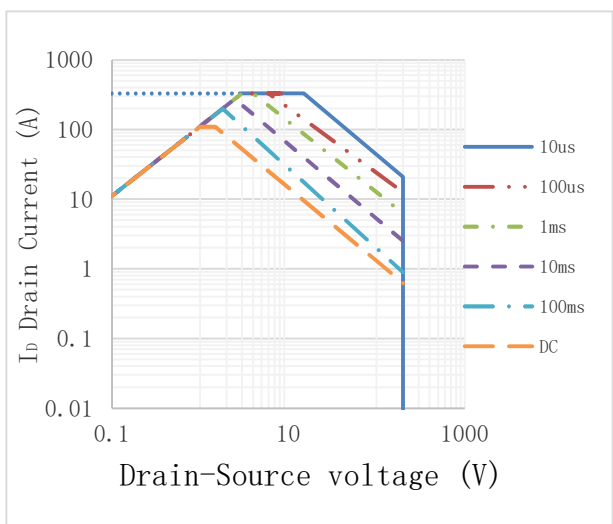
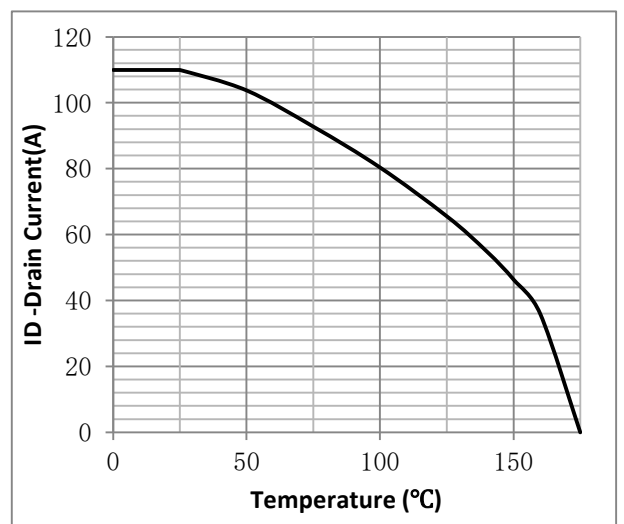
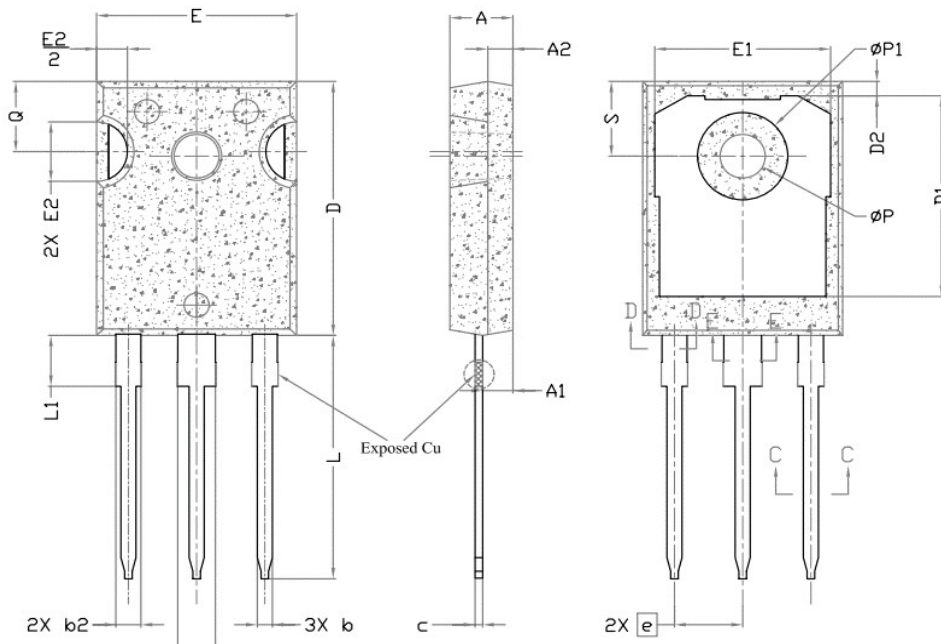


Fig.12  $I_D$  vs. Junction Temperature



•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 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. 5. 10 | New    |
|         |             |        |
|         |             |        |
|         |             |        |
|         |             |        |
|         |             |        |
|         |             |        |
|         |             |        |