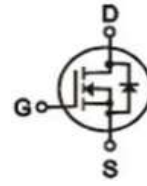


● General Description

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

● Product Summary



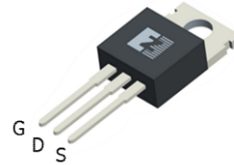
$V_{DS} = 100V$
 $R_{DS(ON)} = 4.8m\Omega$
 $I_D = 117A$

● 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



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

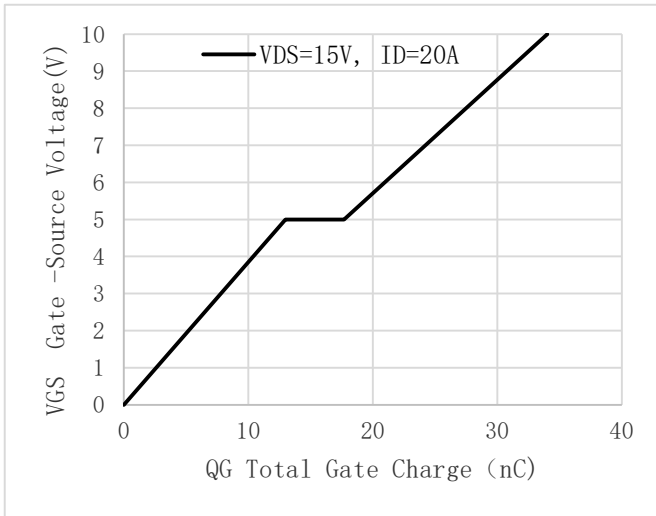


Fig.2 Capacitance Characteristics

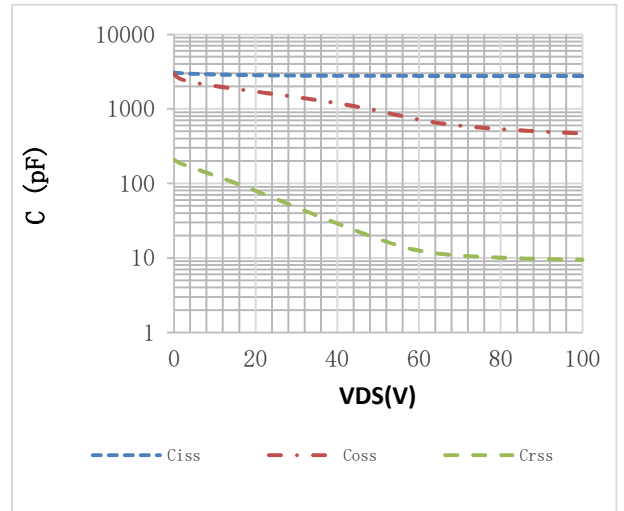


Fig.3 Power Dissipation

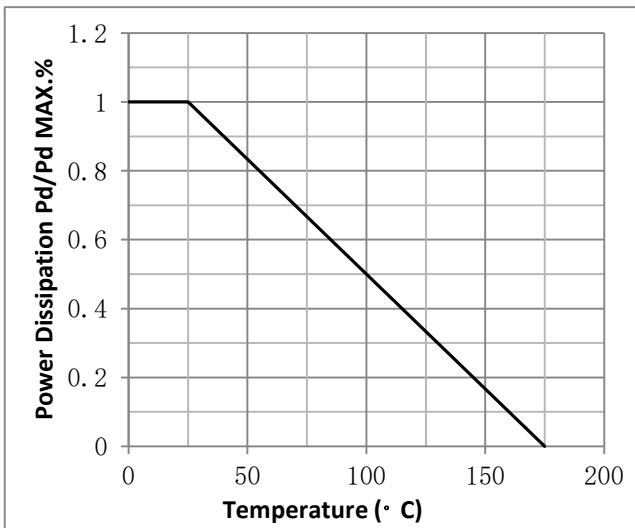


Fig.4 Typical output Characteristics

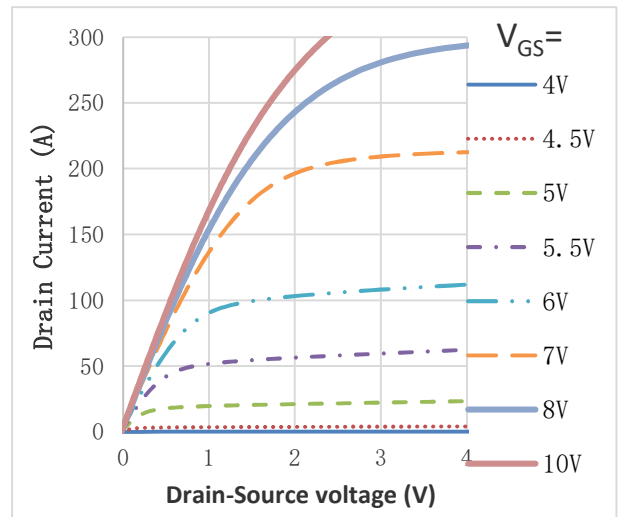


Fig.5 Threshold Voltage V.S Junction Temperature

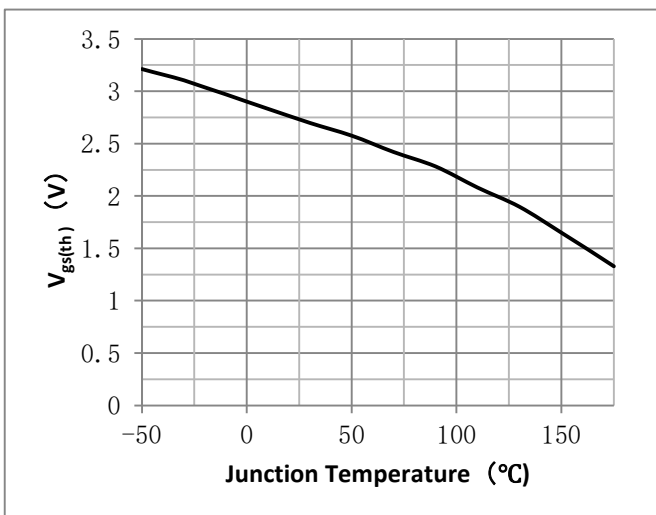


Fig.6 Resistance V.S Drain Current

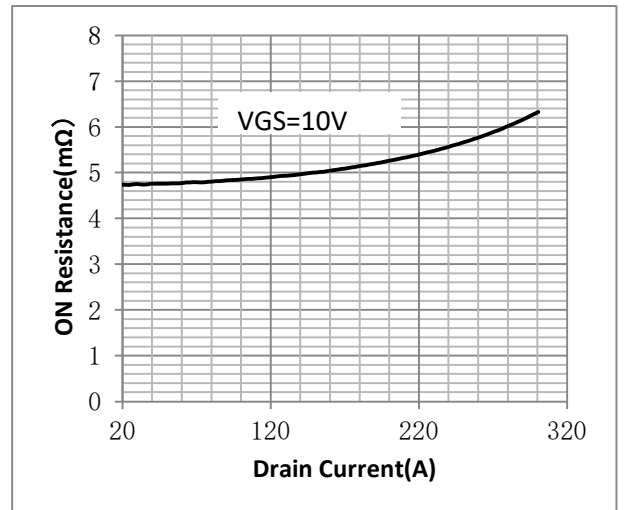


Fig.7 On-Resistance VS Gate Source Voltage

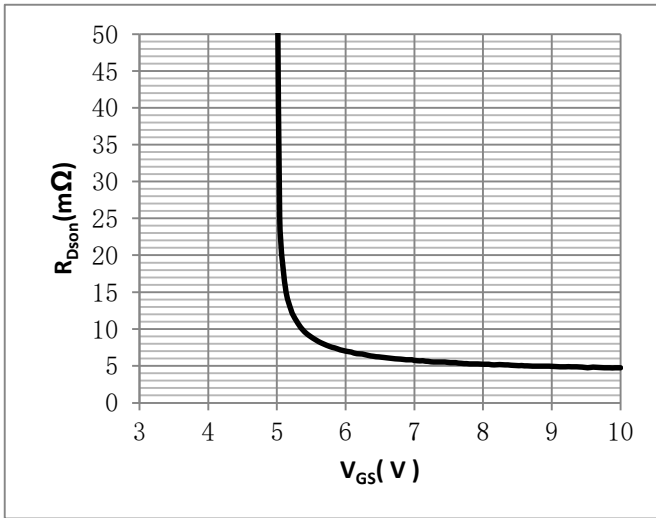


Fig.8 On-Resistance V.S Junction Temperature

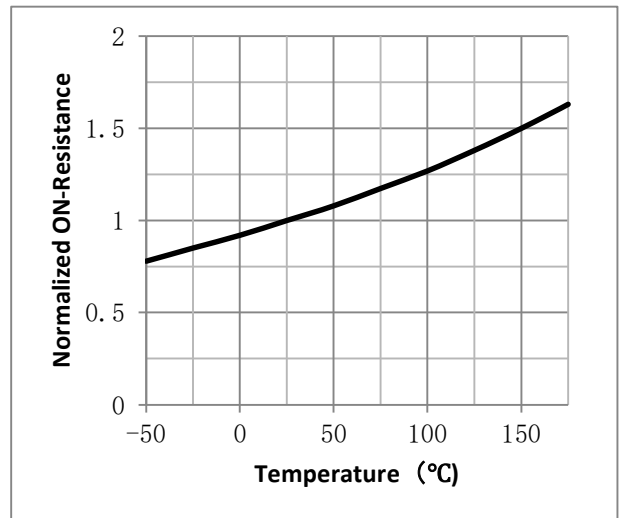


Figure 9. Diode Forward Voltage vs. Current

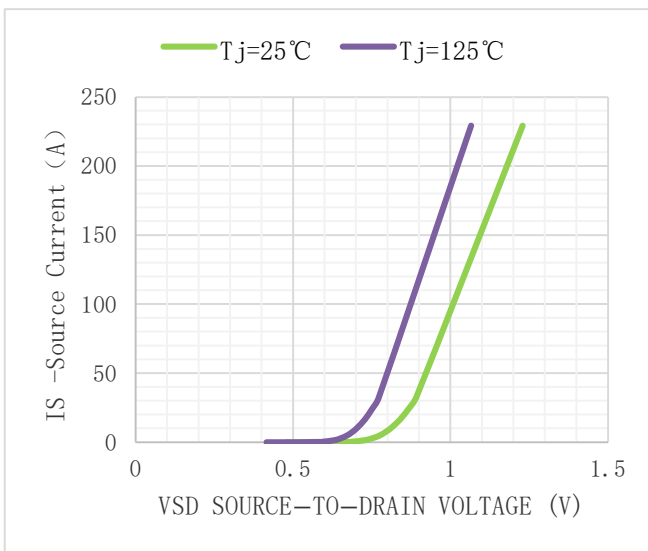


Figure 10. Transfer Characteristics

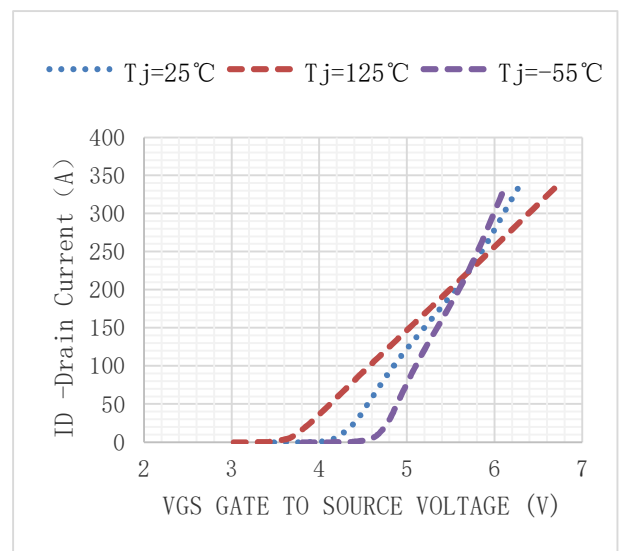


Fig.11 SOA Maximum Safe Operating Area

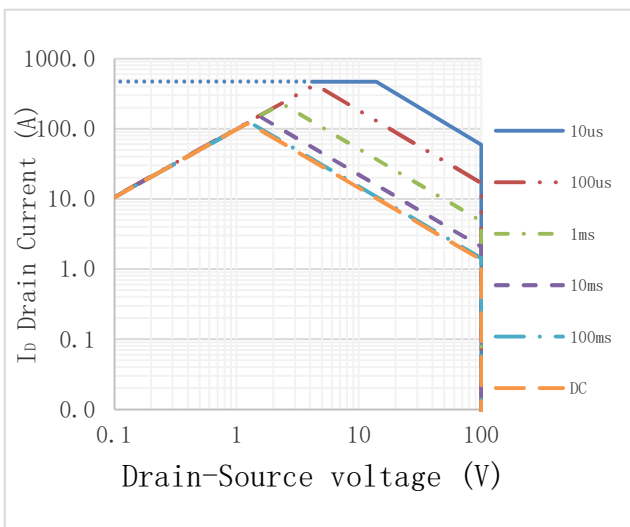
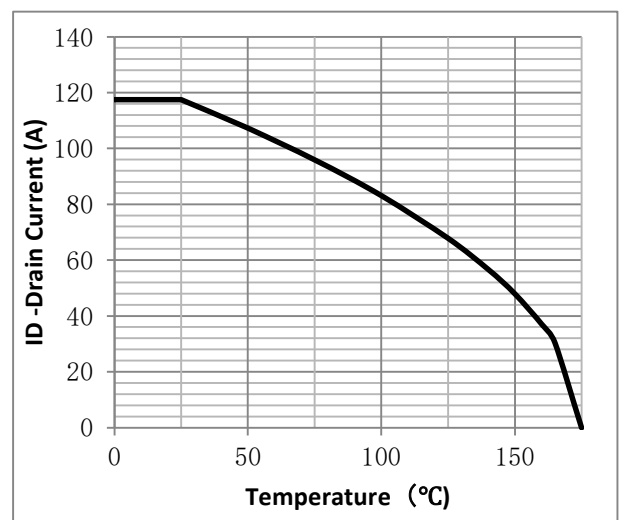
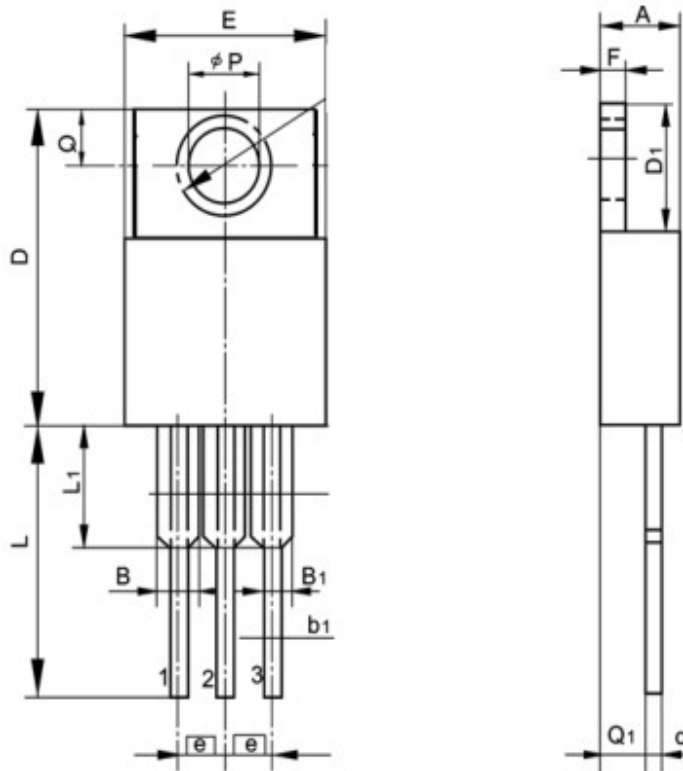


Fig.12 ID vs. Junction Temperature



•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 |
| | | |
| | | |
| | | |
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