

• General Description

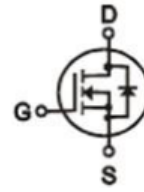
The ZM020N04F combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

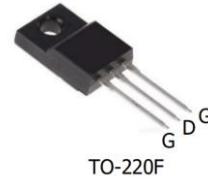
- Synchronous Rectification
- Power Management in Inverter System
- POL application
- BLDC Motor driver

• Product Summary


$V_{DS}=40V$

$R_{DS(ON)} = 2.2m\Omega$

$I_D=130A$


• Ordering Information:

| | |
|---------------------------|-----------|
| Part NO. | ZM020N04F |
| Marking | ZM020N04 |
| Packing Information | Bulk Tube |
| Basic ordering unit (pcs) | 500 |

• Absolute Maximum Ratings (T_C =25°C)

| Parameter | Symbol | Rating | Unit |
|-----------------------------------|----------------------|--------|------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current | $I_D@TC=25^\circ C$ | 130 | A |
| | $I_D@TC=75^\circ C$ | 103 | A |
| | $I_D@TC=100^\circ C$ | 82 | A |
| Pulsed Drain Current ^① | I_{DM} | 420 | A |
| Total Power Dissipation(TC=25°C) | $P_D@TC=25^\circ C$ | 135 | W |
| Total Power Dissipation(TA=25°C) | $P_D@TA=25^\circ C$ | 3 | W |
| Operating Junction Temperature | T_J | 150 | °C |
| Storage Temperature | T_{STG} | 150 | °C |
| Single Pulse Avalanche Energy | E_{AS} | 1245 | mJ |

•Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|------------|------|------|------|---------------|
| Thermal resistance, junction - case | R_{thJC} | - | - | 0.9 | $^{\circ}C/W$ |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 42 | $^{\circ}C/W$ |
| Soldering temperature, wave soldering for 10s | T_{sold} | - | - | 265 | $^{\circ}C$ |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|-----------------------------------|--------------|-----------------------------------|------|-----|------|-----------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS} = 0V, I_D = 250\mu A$ | 40 | | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$ | 1.2 | | 2.5 | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS} = 40V, V_{GS} = 0V$ | | | 1.0 | μA |
| Gate- Source Leakage Current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | 100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 70A$ | | 2.2 | 3 | $m\Omega$ |
| | | $V_{GS} = 4.5V, I_D = 30A$ | | 3 | 4 | $m\Omega$ |
| Diode Forward Voltage | V_{SD} | $I_S = 70A$ | | | 1.28 | V |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|------------------------------|-----------|---|------|------|------|------|
| Input capacitance | C_{iss} | $V_{GS} = 0V$ $V_{DS} = 20V$ $f = 1MHz$ | - | 5580 | - | pF |
| Output capacitance | C_{oss} | | - | 480 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 275 | - | |

•Gate Charge characteristics($T_a = 25^{\circ}C$)

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|----------------------|----------|---|------|-----|------|------|
| Total gate charge | Q_g | $V_{DD} = 20V$ $I_D = 20A$ $V_{GS} = 10V$ | - | 70 | - | nC |
| Gate - Source charge | Q_{gs} | | - | 17 | - | |
| Gate - Drain charge | Q_{gd} | | - | 12 | - | |

Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Fig.1 Gate-Charge Characteristics

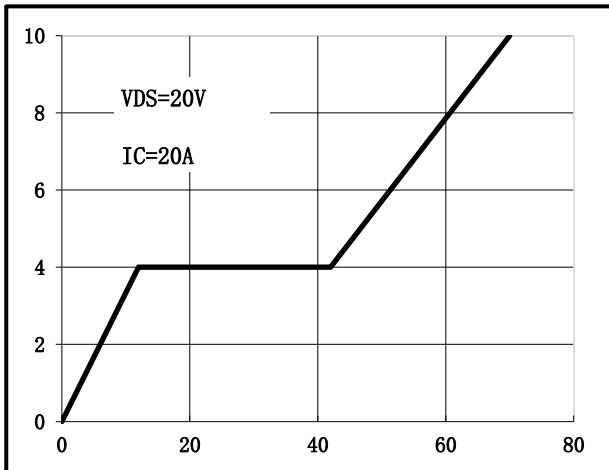


Fig.2 Capacitance Characteristics

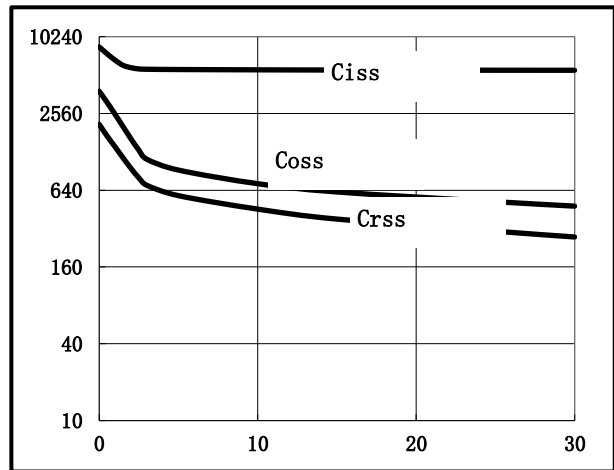


Fig.3 Power Dissipation

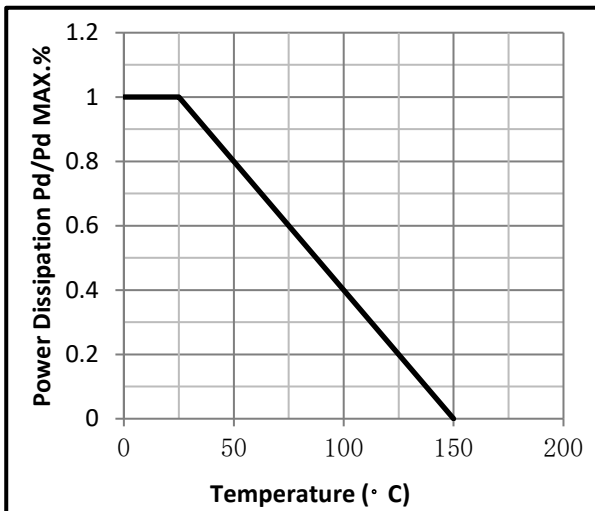


Fig.4 Typical output Characteristics

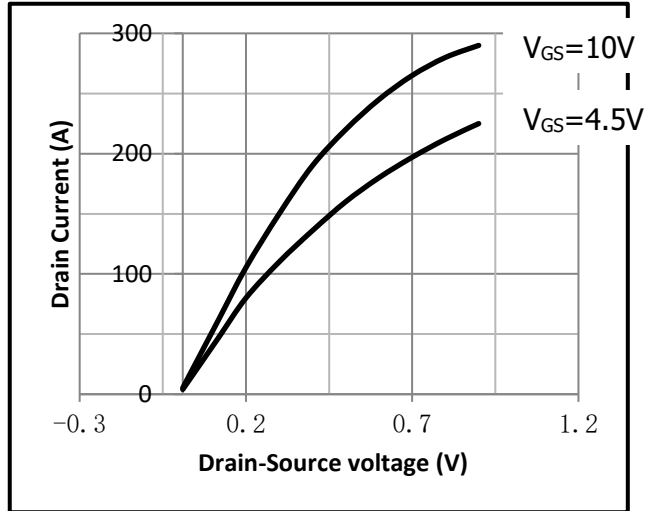


Fig.5 Threshold Voltage V.S Junction Temperature

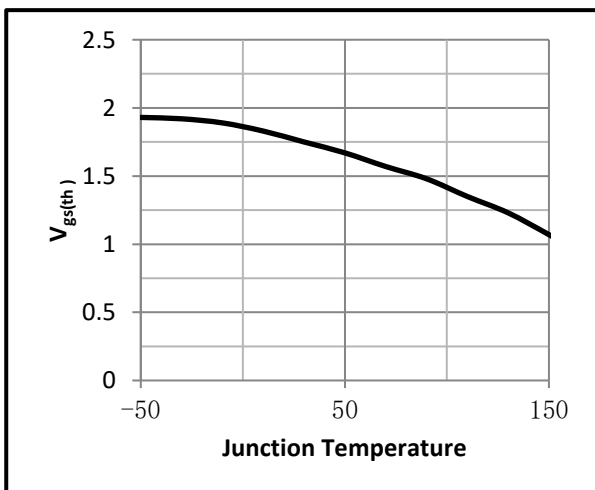


Fig.6 Resistance V.S Drain Current

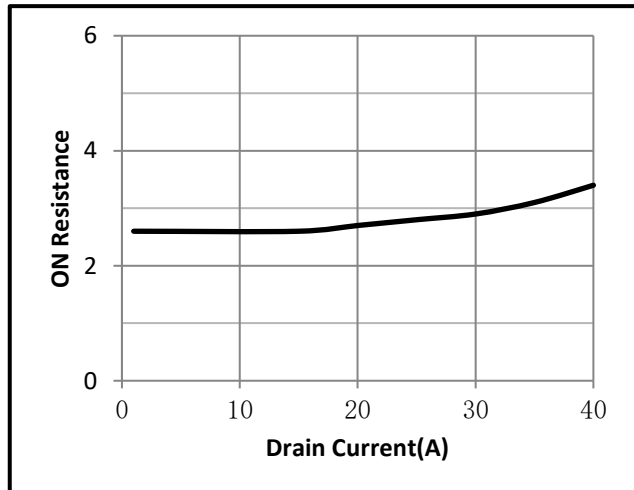


Fig.7 On-Resistance VS Gate Source Voltage

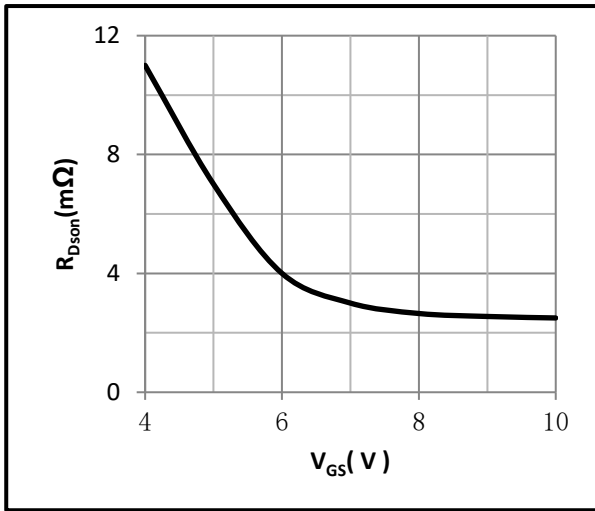


Fig.8 On-Resistance V.S Junction Temperature

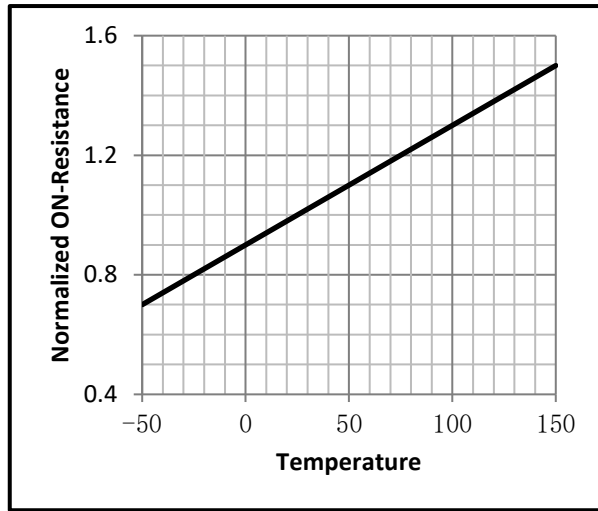


Fig.9 Switching Time Measurement Circuit

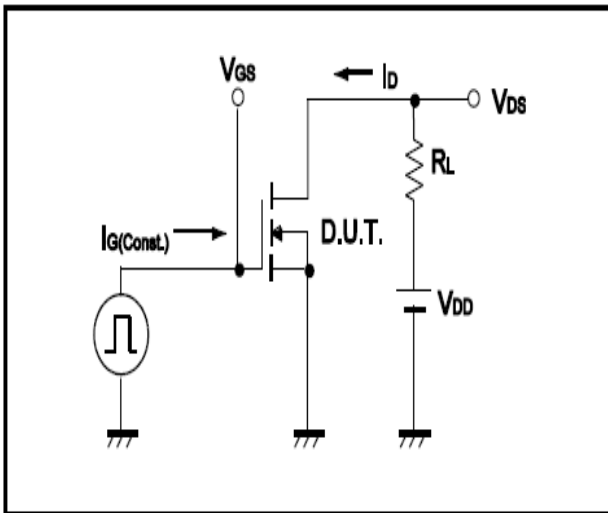


Fig.10 Gate Charge Waveform

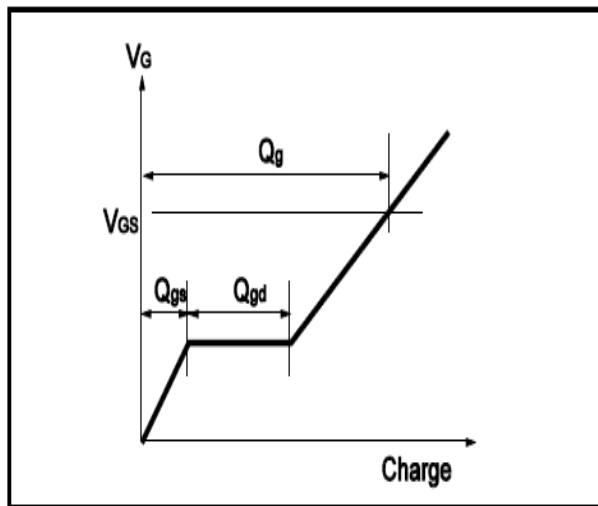


Fig.11 Switching Time Measurement Circuit

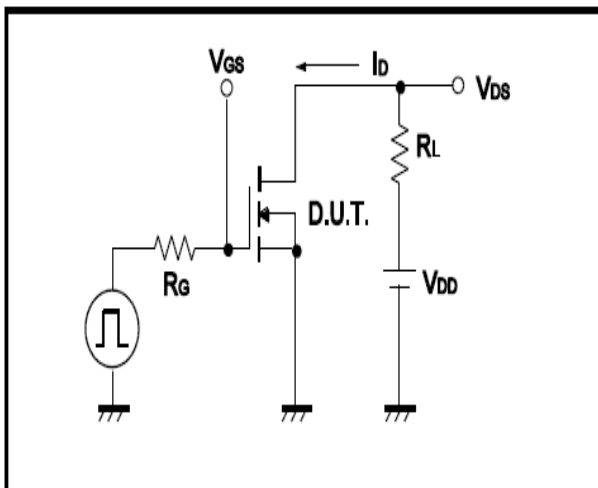
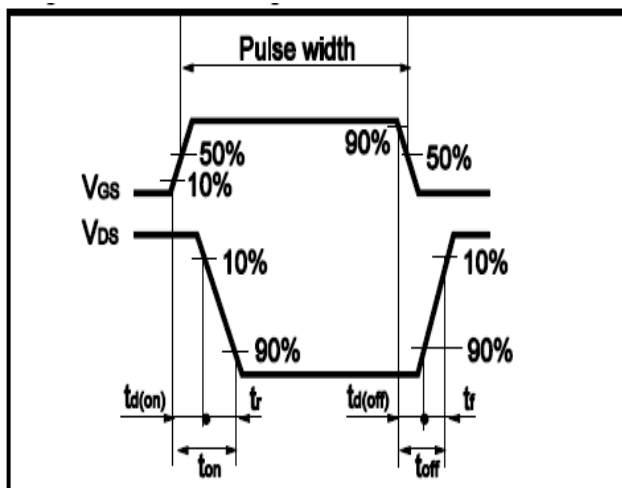


Fig.12 Gate Charge Waveform



Dimensions (TO-220F)

Unit: mm

| SYMBOL | min | nom | max | SYMBOL | min | nom | max |
|--------|-------|-------|-------|--------|------|------|------|
| C | 4.50 | 4.70 | 4.90 | b1 | 2.90 | 3.40 | 3.90 |
| c | 0.40 | 0.50 | 0.6 | a | 1.08 | 1.28 | 1.48 |
| A | 9.96 | 10.16 | 10.36 | a1 | 0.70 | 0.80 | 0.9 |
| B | 15.67 | 15.87 | 16.07 | E | 2.34 | 2.54 | 2.74 |
| B1 | 3.30 | 3.40 | 3.50 | E1 | 2.34 | 2.54 | 2.74 |
| R | 3.08 | 3.18 | 3.28 | C1 | 2.34 | 2.54 | 2.74 |
| b | 12.48 | 12.98 | 13.48 | C2 | 2.56 | 2.76 | 2.96 |
| | | | | | | | |

