

• General Description

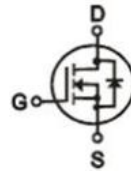
The ZM040N06P combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• 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

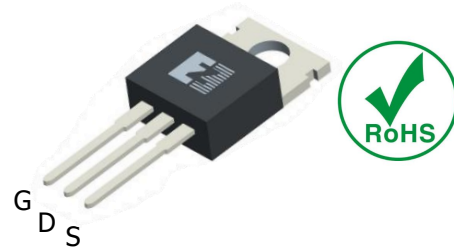
- SMPS 2nd Synchronous Rectifier
- BLDC Motor driver

• Product Summary


$V_{DS} = 60V$

$R_{DS(ON)} = 4m\Omega$

$I_D = 120A$



TO-220

• Ordering Information:

| | |
|---------------------------|-----------|
| Part NO. | ZM040N06P |
| Marking | ZM040N06 |
| Packing Information | Bulk Tube |
| Basic ordering unit (pcs) | 1000 |

• Absolute Maximum Ratings (T_C = 25°C)

| Parameter | Symbol | Rating | Unit |
|-----------------------------------|-------------------------|------------|------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current | $I_{D@TC=25^{\circ}C}$ | 120 | A |
| | $I_{D@TC=75^{\circ}C}$ | 91.2 | A |
| | $I_{D@TC=100^{\circ}C}$ | 75.6 | A |
| Pulsed Drain Current ^① | I_{DM} | 250 | A |
| Total Power Dissipation(TC=25°C) | $P_{D@TC=25^{\circ}C}$ | 120 | W |
| Total Power Dissipation(TA=25°C) | $P_{D@TA=25^{\circ}C}$ | 5 | W |
| Operating Junction Temperature | T_J | -55 to 150 | °C |
| Storage Temperature | T_{STG} | -55 to 150 | °C |

•Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|--|------------|------|------|------|------|
| Thermal resistance, junction - case | R_{thJC} | - | - | 1 | °C/W |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 25 | °C/W |
| Soldering temperature, wavesoldering for 10s | T_{sold} | - | - | 265 | °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 | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\mu A$ | 1.2 | | 2.5 | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS} = 60V, V_{GS} = 0V$ | | | 1.0 | μA |
| Gate- Source Leakage Current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | | | ± 100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 16A$ | | 4 | 6 | m Ω |
| | | $V_{GS} = 4.5V, I_D = 10A$ | | 5.5 | 8 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 25V, I_D = 15A$ | | 32 | | S |
| Source-drain voltage | V_{SD} | $I_S = 16A$ | | | 1.28 | V |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|------------------------------|-----------|----------------------------------|------|------|------|------|
| Input capacitance | C_{iss} | f = 1MHz V _{DS} =25V | - | 6510 | - | pF |
| Output capacitance | C_{oss} | | - | 450 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 200 | - | |

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

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|----------------------|----------|----------------|------|-----|------|------|
| Total gate charge | Q_g | $V_{DD} = 25V$ | - | 54 | - | nC |
| Gate - Source charge | Q_{gs} | $I_D = 25A$ | - | 18 | - | |
| Gate - Drain charge | Q_{gd} | $V_{GS} = 10V$ | - | 21 | - | |

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

Fig.1 Gate-Charge Characteristics

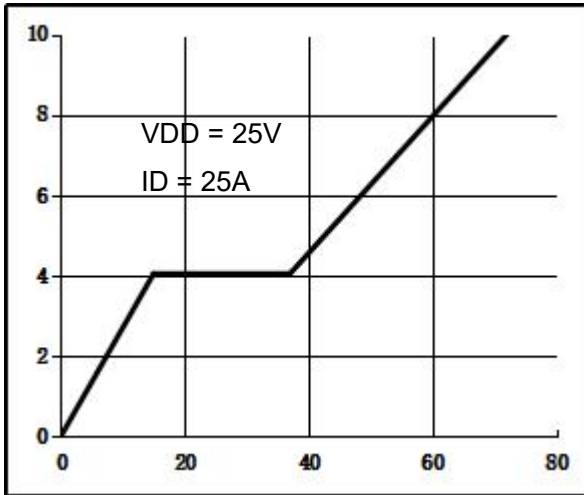


Fig.2 Capacitance Characteristics

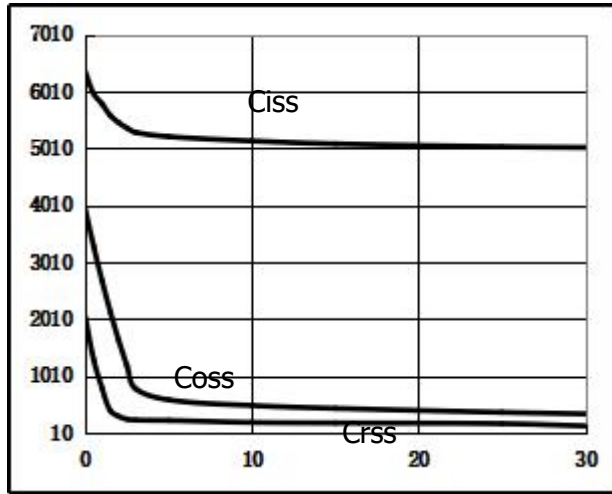


Fig.3 Power Dissipation

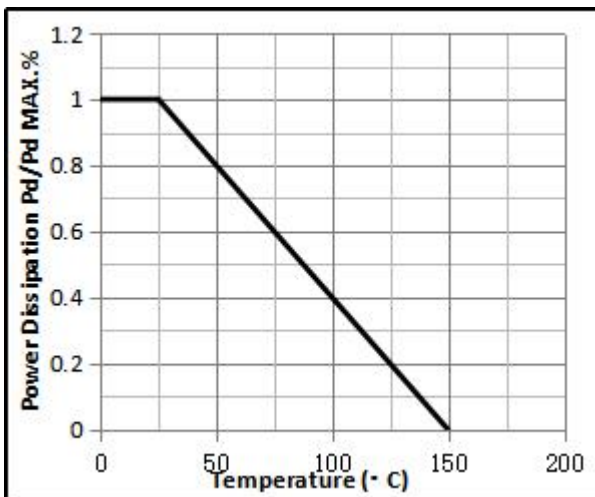


Fig.4 Typical output Characteristics

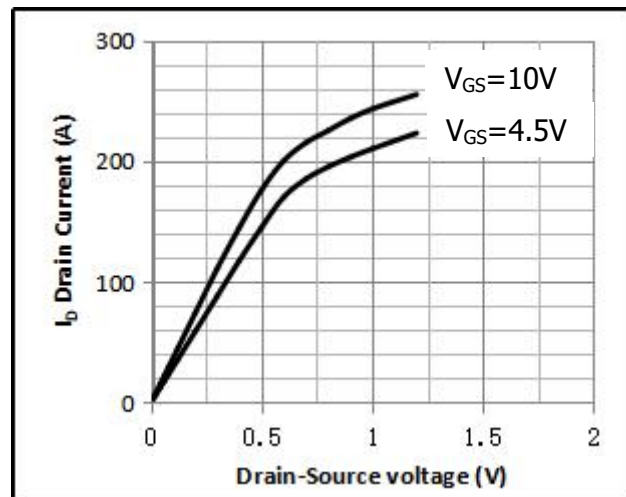


Fig.5 Threshold Voltage V.S Junction Temperature

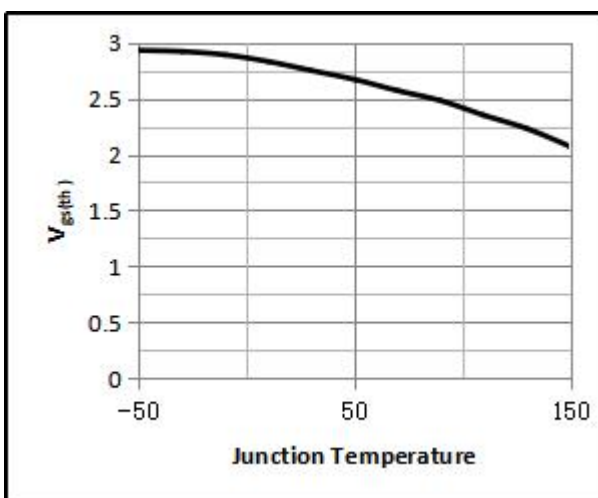


Fig.6 Resistance V.S Drain Current

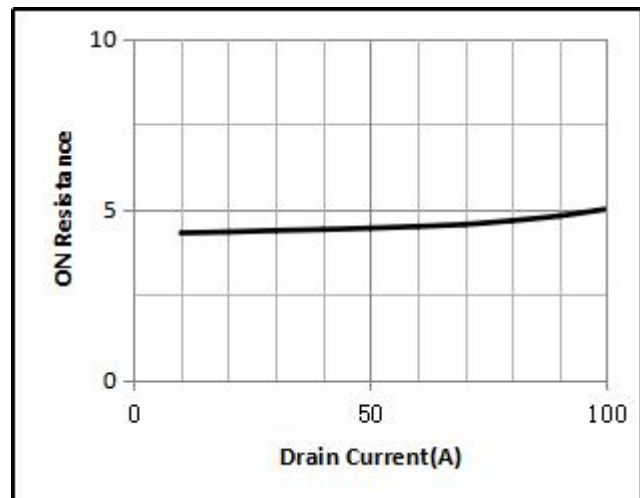


Fig.7 On-Resistance VS Gate Source Voltage

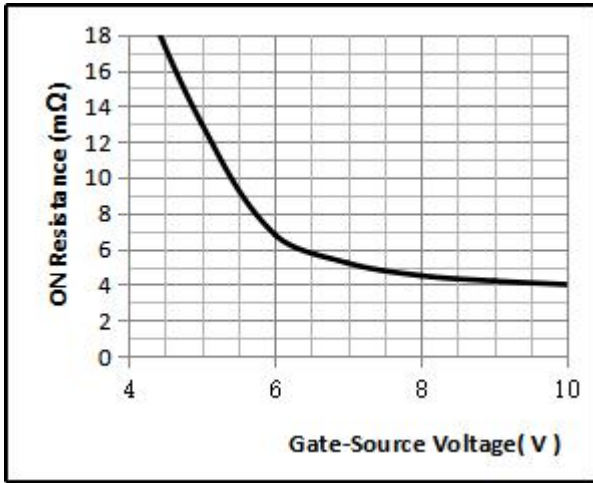


Fig.8 On-Resistance V.S Junction Temperature

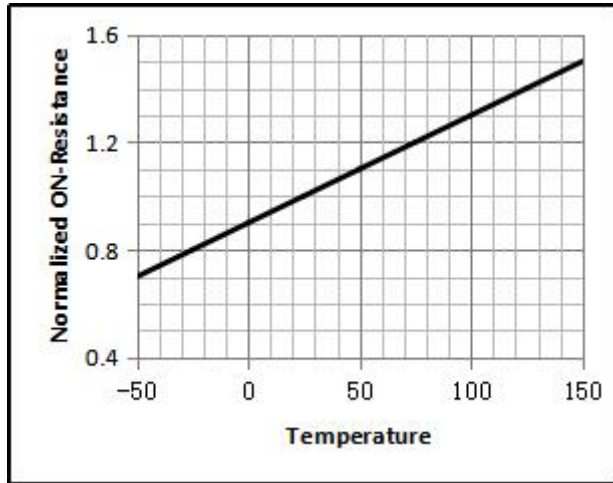


Fig.9 Switching Time Measurement Circuit

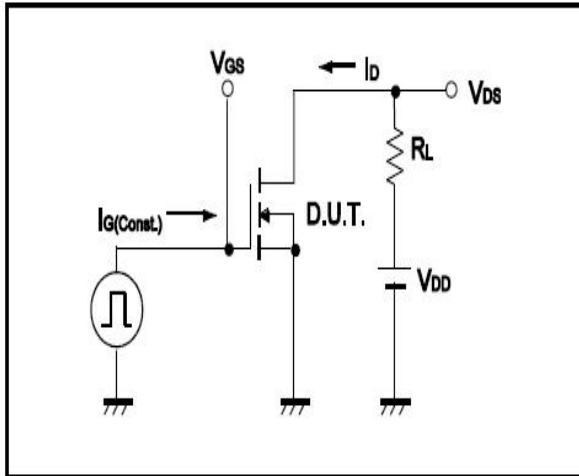


Fig.10 Gate Charge Waveform

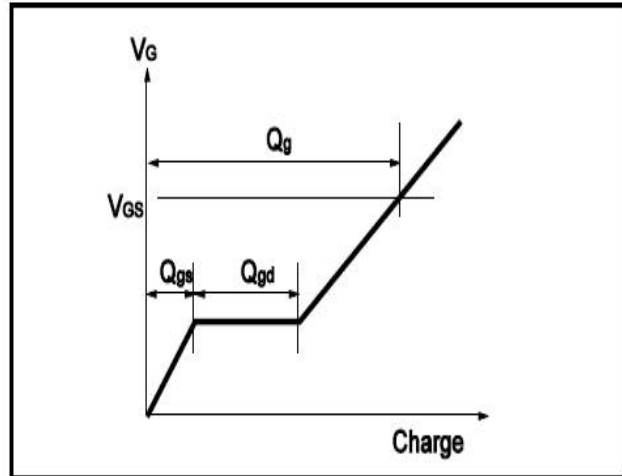


Fig.11 Switching Time Measurement Circuit

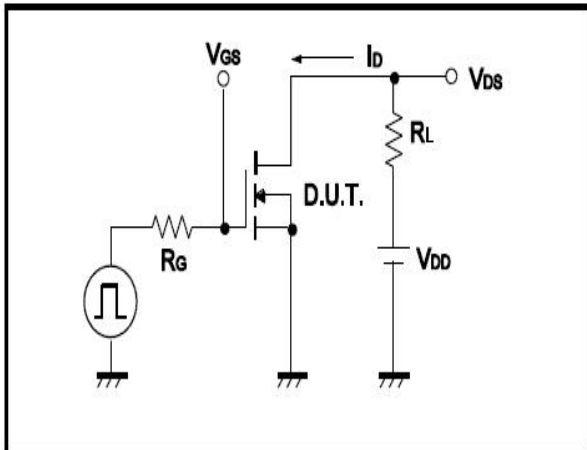
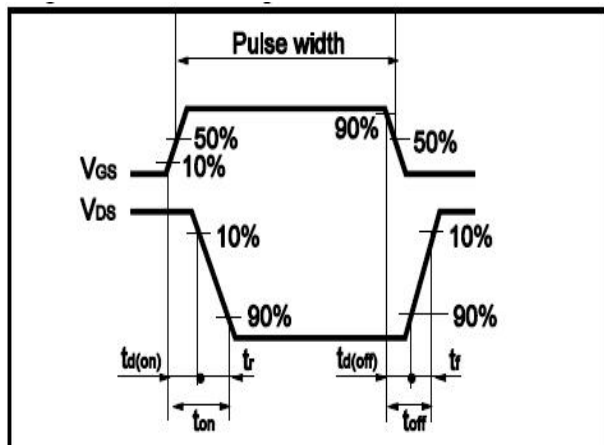


Fig.12 Gate Charge Waveform



•Dimensions (TO-220)

Unit: mm

| 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 |
| | | | | ϕP | 3.60 | | 3.90 |

