

### • General Description

The ZM120P04N combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ .

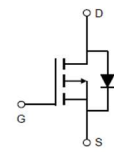
### • Features

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

### • Application

- Load Switches
- DC/DC
- BLDC Motor driver

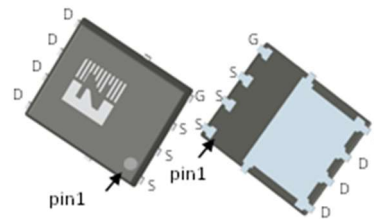
### • Product Summary



$$V_{DS} = -40V$$

$$R_{DS(ON)} = 12.0m\Omega$$

$$I_D = -42A$$



DFN5 x 6

### • Ordering Information:

|                           |           |
|---------------------------|-----------|
| Part NO.                  | ZM120P04N |
| Marking                   | ZM120P04  |
| Packing Information       | REEL TAPE |
| Basic ordering unit (pcs) | 3000      |

### • Absolute Maximum Ratings ( $T_c = 25^\circ C$ )

| Parameter                             | Symbol                 | Rating     | Unit       |
|---------------------------------------|------------------------|------------|------------|
| Drain-Source Voltage                  | $V_{DS}$               | -40        | V          |
| Gate-Source Voltage                   | $V_{GS}$               | $\pm 25$   | V          |
| Continuous Drain Current              | $I_{D@TC=25^\circ C}$  | -42        | A          |
|                                       | $I_{D@TC=75^\circ C}$  | -32        | A          |
|                                       | $I_{D@TC=100^\circ C}$ | -26        | A          |
| Pulsed Drain Current <sup>①</sup>     | $I_{DM}$               | -126       | A          |
| Total Power Dissipation <sup>②</sup>  | $P_D$                  | 18         | W          |
| Total Power Dissipation               | $P_{D@T_A=25^\circ C}$ | 85         | W          |
| Total Power Dissipation               | $P_{D@T_A=25^\circ C}$ | 3.4        | W          |
| Operating Junction Temperature        | $T_J$                  | -55 to 150 | $^\circ C$ |
| Storage Temperature                   | $T_{STG}$              | -55 to 150 | $^\circ C$ |
| Single Pulse Avalanche Energy@L=0.1mH | $E_{AS}$               | 125        | mJ         |

**•Thermal resistance**

| Parameter                                        | Symbol     | Min. | Typ. | Max. | Unit  |
|--------------------------------------------------|------------|------|------|------|-------|
| Thermal resistance, junction - case <sup>②</sup> | $R_{thJC}$ | -    | -    | 1.5  | ° C/W |
| Thermal resistance, junction - ambient           | $R_{thJA}$ | -    | -    | 37   | ° C/W |
| Soldering temperature, wave soldering for 10s    | $T_{sold}$ | -    | -    | 265  | ° C   |

**•Electronic Characteristics**

| Parameter                         | Symbol       | Condition                          | Min. | Typ | Max.      | Unit       |
|-----------------------------------|--------------|------------------------------------|------|-----|-----------|------------|
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS} = 0V, I_D = -250\mu A$     | -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      | $\mu A$    |
| Gate- Source Leakage Current      | $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$    |      |     | $\pm 100$ | nA         |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = -10V, I_D = -15A$        |      | 12  | 16        | m $\Omega$ |
|                                   |              | $V_{GS} = -4.5V, I_D = -10A$       |      | 17  | 21        | m $\Omega$ |
| Forward Transconductance          | $g_{FS}$     | $V_{DS} = -10V, I_D = -5A$         |      | 18  |           | s          |
| Source-drain voltage              | VSD          | $I_S = -15A$                       |      |     | 1.28      | V          |

**•Electronic Characteristics**

| Parameter                    | Symbol    | Condition                                  | Min. | Typ  | Max. | Unit |
|------------------------------|-----------|--------------------------------------------|------|------|------|------|
| Input capacitance            | $C_{iss}$ | $V_{GS} = 0V, V_{DS} = -25V$<br>$f = 1MHz$ | -    | 2750 | -    | pF   |
| Output capacitance           | $C_{oss}$ |                                            | -    | 185  | -    |      |
| Reverse transfer capacitance | $C_{rss}$ |                                            | -    | 135  | -    |      |

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

| Parameter            | Symbol | Condition                                          | Min. | Typ | Max. | Unit |
|----------------------|--------|----------------------------------------------------|------|-----|------|------|
| Total gate charge    | Qg     | $V_{DD} = -25V$<br>$I_D = -8A$<br>$V_{GS} = -4.5V$ | -    | 30  | -    | nC   |
| Gate - Source charge | Qgs    |                                                    | -    | 9   | -    |      |
| Gate - Drain charge  | Qgd    |                                                    | -    | 15  | -    |      |

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

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Gate-Charge Characteristics

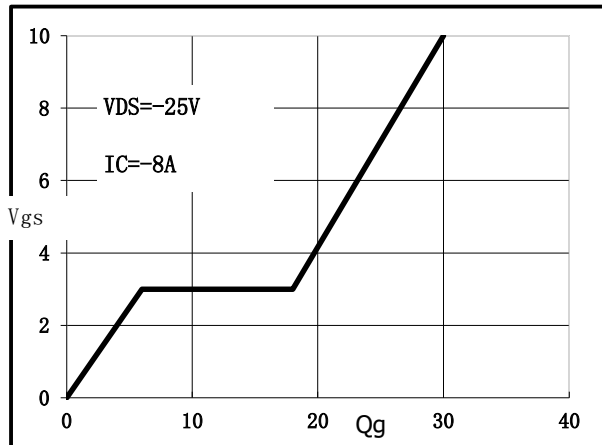


Fig.2 Capacitance Characteristics

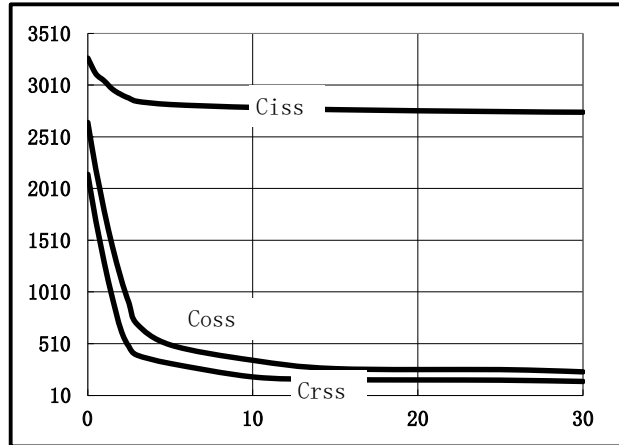


Fig.3 Power Dissipation Derating Curve

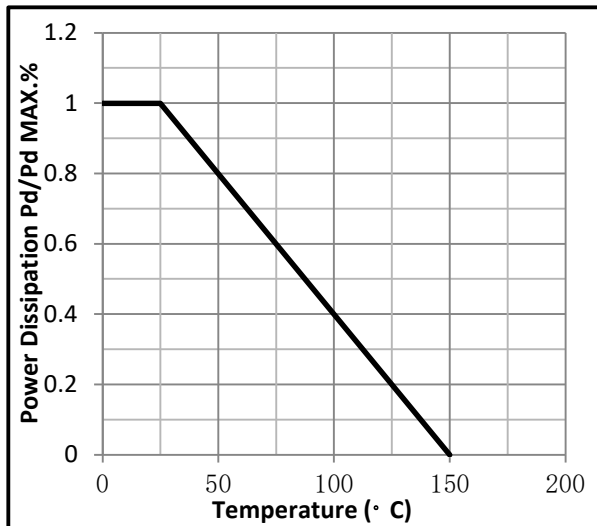


Fig.4 Typical output Characteristics

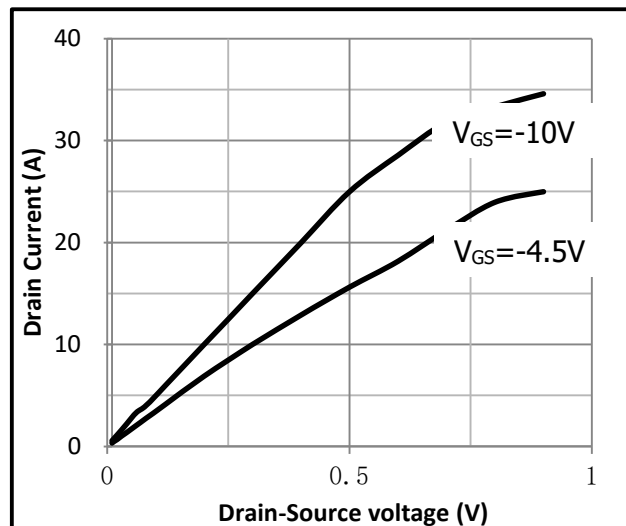


Fig.5 Threshold Voltage V.S Junction Temperature

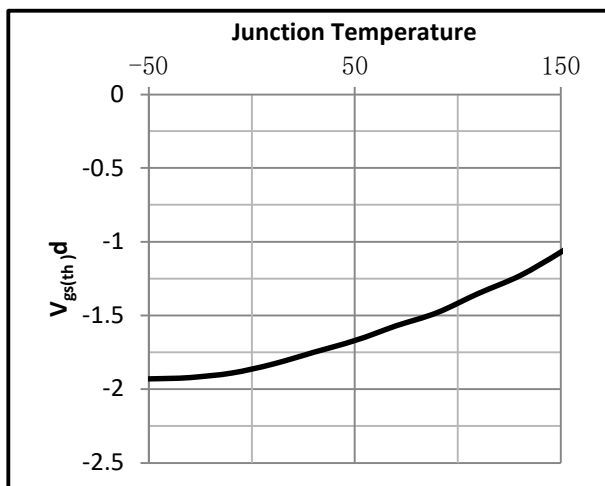


Fig.6 Resistance V.S Drain Current

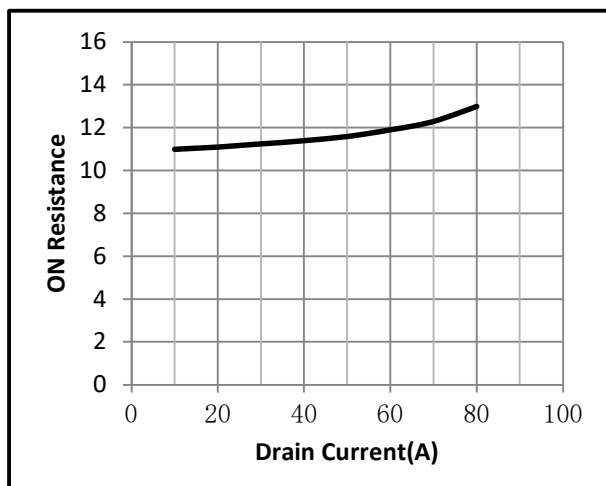


Fig.7 On-Resistance VS Gate Source Voltage

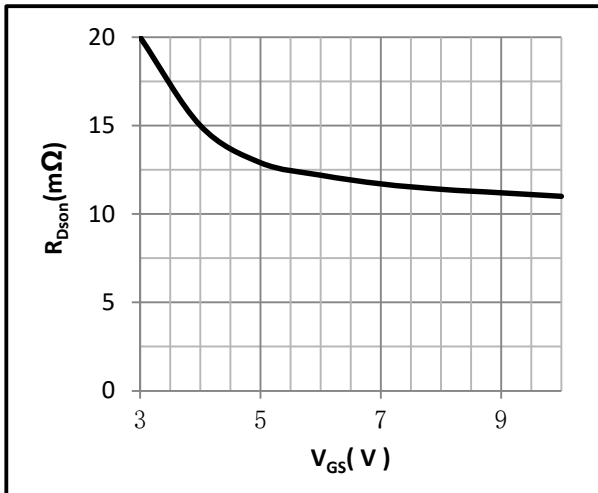


Fig.8 On-Resistance V.S Junction Temperature

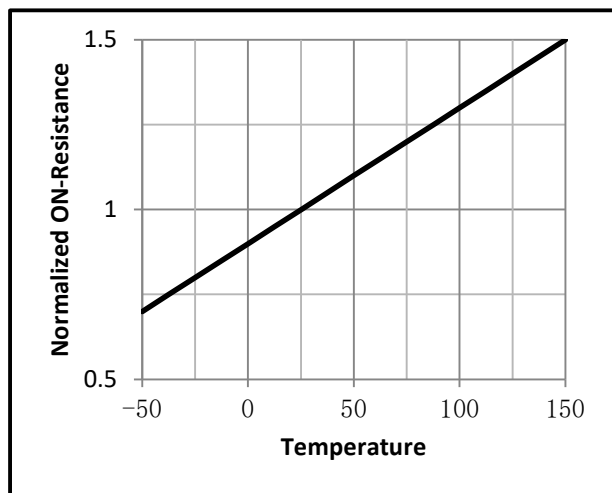


Fig.9 Gate Charge Measurement Circuit

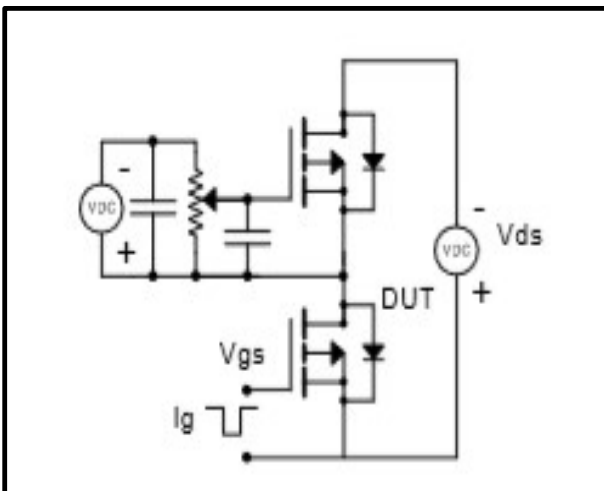


Fig.10 Gate Charge Waveform

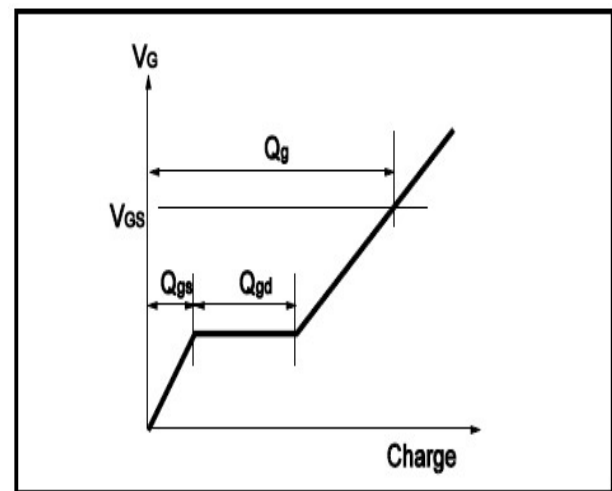


Fig.11 Switching Time Measurement Circuit

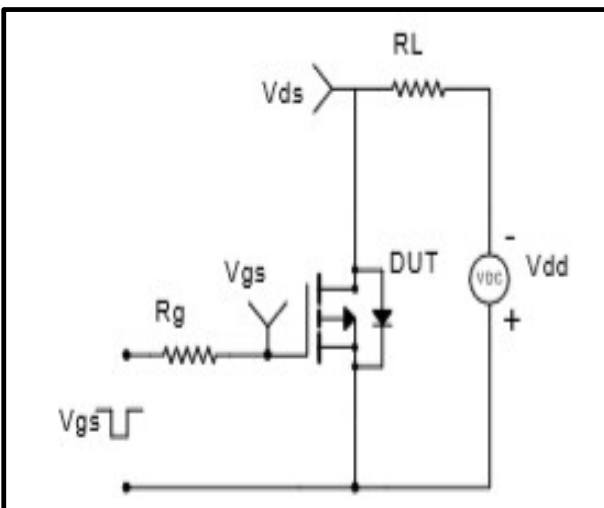
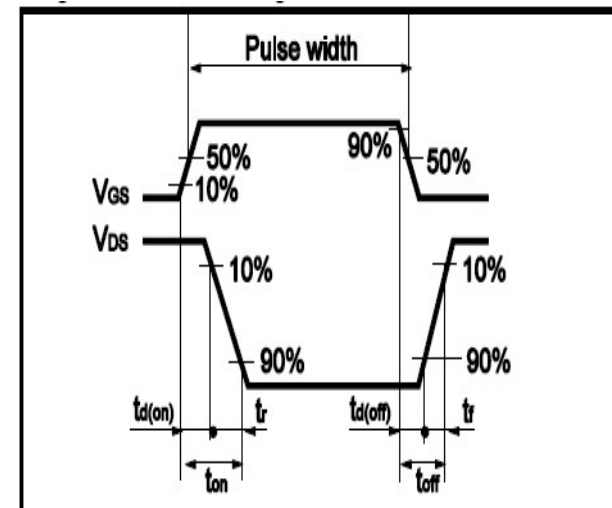
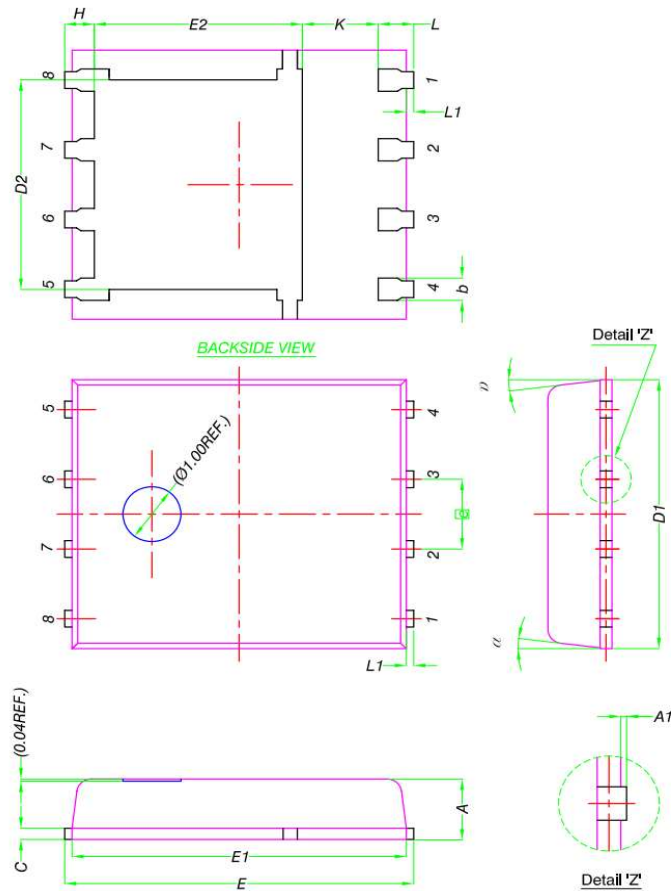


Fig.12 Switching Time Waveform



**•Dimensions (DFN5×6)**

Unit: mm



| DIM. | MILLIMETERS |      |      |
|------|-------------|------|------|
|      | MIN.        | NOM. | MAX. |
| A    | 0.90        | 1.00 | 1.10 |
| A1   | 0           | -    | 0.05 |
| b    | 0.33        | 0.41 | 0.51 |
| C    | 0.20        | 0.25 | 0.30 |
| D1   | 4.80        | 4.90 | 5.00 |
| D2   | 3.61        | 3.81 | 3.96 |
| E    | 5.90        | 6.00 | 6.10 |
| E1   | 5.70        | 5.75 | 5.80 |
| E2   | 3.38        | 3.58 | 3.78 |
| e    | 1.27 BSC    |      |      |
| H    | 0.41        | 0.51 | 0.61 |
| K    | 1.10        | -    | -    |
| L    | 0.51        | 0.61 | 0.71 |
| L1   | 0.06        | 0.13 | 0.20 |
| α    | 0°          | -    | 12°  |