

**• General Description**

The ZM042N04N combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

**• 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**

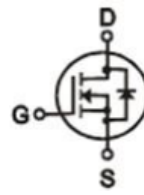
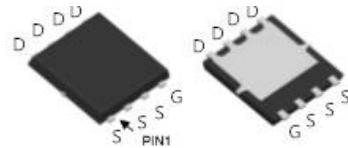
- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

**• Ordering Information:**

|                           |           |
|---------------------------|-----------|
| Part NO.                  | ZM042N04N |
| Marking                   | ZM042N04  |
| Packing Information       | REEL TAPE |
| Basic ordering unit (pcs) | 3000      |

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

| Parameter  | Symbol                       | Rating     | Unit             |
|--|------------------------------|------------|------------------|
| Drain-Source Voltage                             | $V_{DS}$                     | 40         | V                |
| Gate-Source Voltage                              | $V_{GS}$                     | $\pm 20$   | V                |
| Continuous Drain Current                         | $I_{D@TC=25^\circ\text{C}}$  | 90         | A                |
|  | $I_{D@TC=75^\circ\text{C}}$  | 68         | A                |
|  | $I_{D@TC=100^\circ\text{C}}$ | 56         | A                |
| Pulsed Drain Current ①                           | $I_{DM}$                     | 180        | A                |
| Total Power Dissipation( $TC=25^\circ\text{C}$ ) | $P_D@TC=25^\circ\text{C}$    | 70         | W                |
| Total Power Dissipation( $TA=25^\circ\text{C}$ ) | $P_D@TA=25^\circ\text{C}$    | 2.5        | W                |
| Operating Junction Temperature                   | $T_J$                        | -55 to 150 | $^\circ\text{C}$ |
| Storage Temperature                              | $T_{STG}$                    | -55 to 150 | $^\circ\text{C}$ |
| Single Pulse Avalanche Energy                    | $E_{AS}$                     | 280        | mJ               |

**• Product Summary**

 $V_{DS} = 40\text{V}$ 
 $R_{DS(ON)} = 5.5\text{m}\Omega$ 
 $I_D = 90\text{A}$ 


DFN5 x 6

**●Thermal resistance**

| Parameter                                     | Symbol            | Min. | Typ. | Max. | Unit  |
|---|-------------------|------|------|------|-------|
| Thermal resistance, junction - case           | R <sub>thJC</sub> | -    | -    | 1.8  | ° C/W |
| Thermal resistance, junction - ambient        | R <sub>thJA</sub> | -    | -    | 50   | ° C/W |
| Soldering temperature, wave soldering for 10s | T <sub>sold</sub> | -    | -    | 265  | ° C   |

**●Electronic Characteristics**

| Parameter                         | Symbol              | Condition  | Min. | Typ | Max. | Unit |
|-----------------------------------|---------------------|--|------|-----|------|------|
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA               | 40   |     |      | V    |
| Gate Threshold Voltage            | V <sub>GS(TH)</sub> | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA | 1.2  |     | 2.5  | V    |
| Drain-Source Leakage Current      | I <sub>DSS</sub>    | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V                |      |     | 1.0  | uA   |
| Gate- Source Leakage Current      | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V               |      |     | ±100 | nA   |
| Static Drain-source On Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =24A                |      | 5.5 | 7    | mΩ   |
|                                   |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =12A               |      | 8   | 10   | mΩ   |
| Forward Trans conductance         | g <sub>FS</sub>     | V <sub>DS</sub> =25V, I <sub>D</sub> =10A                |      | 12  |      | s    |
| Source-drain voltage              | V <sub>SD</sub>     | I <sub>S</sub> =24A                                      |      | 0.8 | 1.2  | V    |

**●Electronic Characteristics**

| Parameter                    | Symbol           | Condition | Min. | Typ  | Max. | Unit |
|------------------------------|------------------|-----------|------|------|------|------|
| Gate Resistance              | R <sub>G</sub>   | f = 1MHz  |      | 3.2  |      | Ω    |
| Input capacitance            | C <sub>iss</sub> |           | -    | 2450 | -    | pF   |
| Output capacitance           | C <sub>oss</sub> |           | -    | 300  | -    |      |
| Reverse transfer capacitance | C <sub>rss</sub> |           | -    | 160  | -    |      |

**●Gate Charge characteristics(T<sub>a</sub> = 25°C)**

| Parameter            | Symbol          | Condition             | Min. | Typ | Max. | Unit |
|----------------------|-----------------|-----------------------|------|-----|------|------|
| Total gate charge    | Q <sub>g</sub>  | V <sub>DD</sub> =25V  | -    | 20  | -    | nC   |
| Gate - Source charge | Q <sub>gs</sub> | I <sub>D</sub> = 8A   | -    | 9   | -    |      |
| Gate - Drain charge  | Q <sub>gd</sub> | V <sub>GS</sub> = 10V | -    | 11  | -    |      |

Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;

Fig.1 Power Dissipation

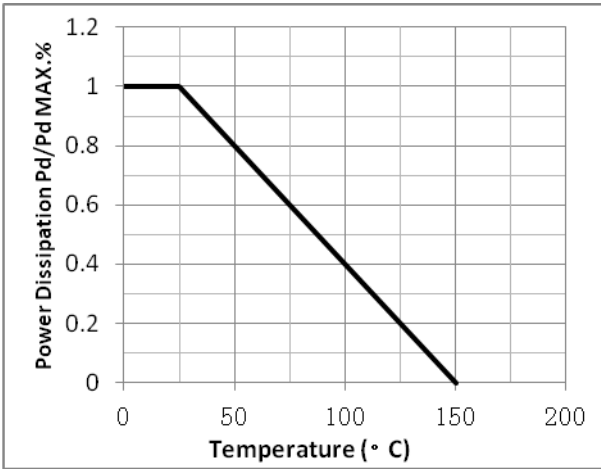


Fig.2 Typical output Characteristics

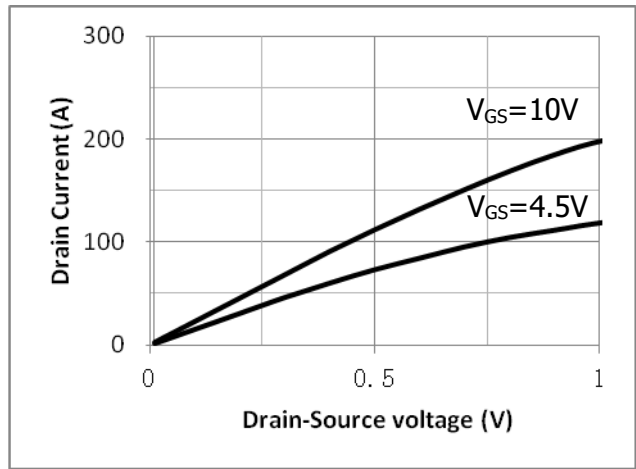


Fig.3 Threshold Voltage V.S Junction Temperature

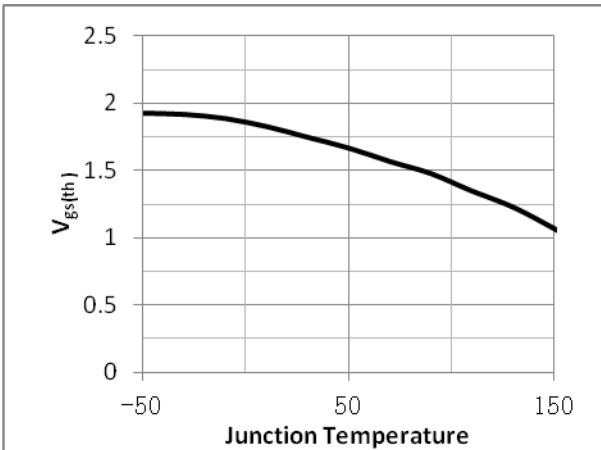


Fig.4 Resistance V.S Drain Current

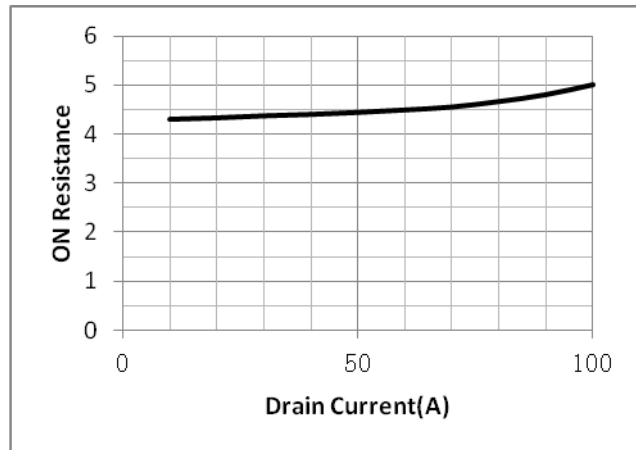


Fig.5 On-Resistance VS Gate Source Voltage

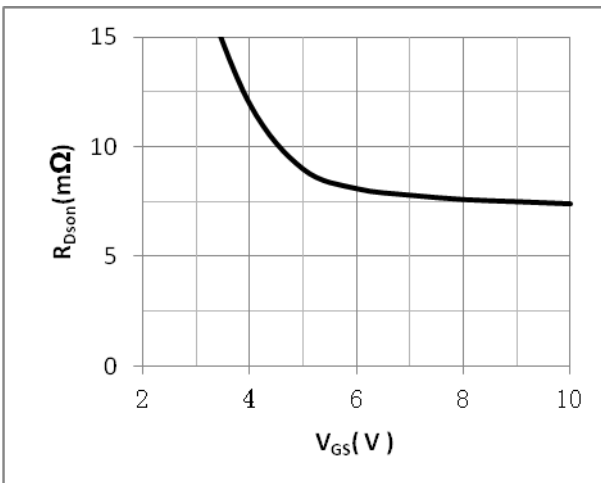


Fig.6 On-Resistance V.S Junction Temperature

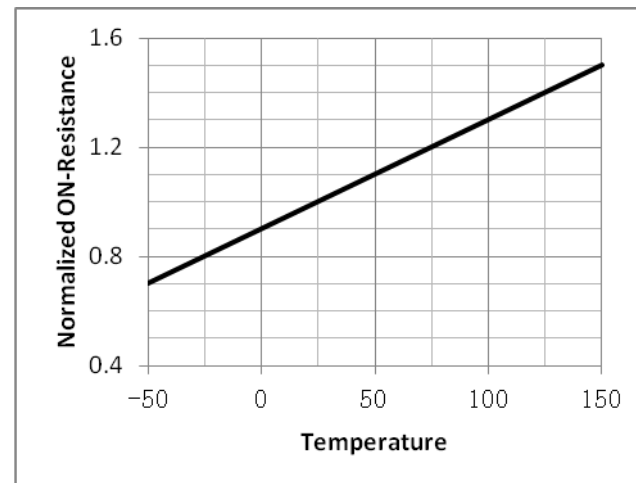


Fig.7 Gate Charge Characteristics

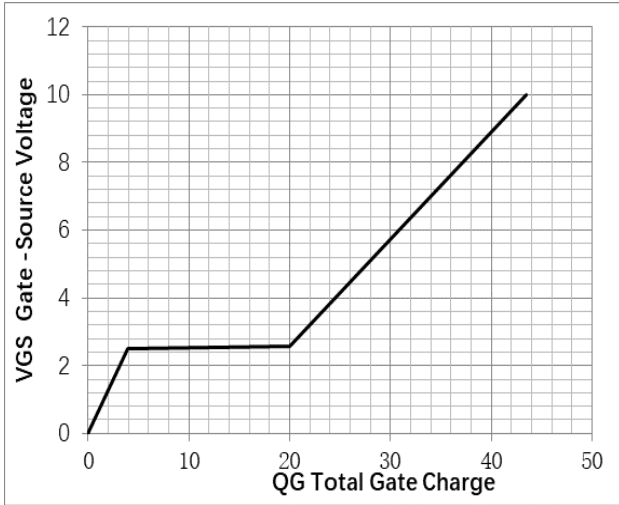


Fig.8 Capacitance vs Vds

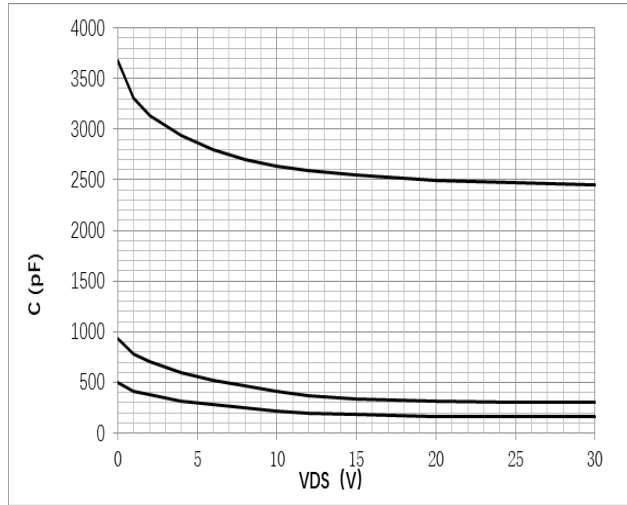


Fig.9 SOA Maximum Safe Operating Area

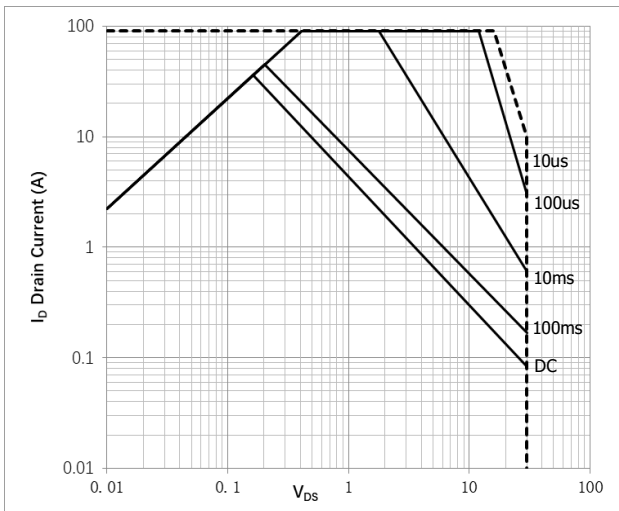


Fig.10 ID-Junction Temperature

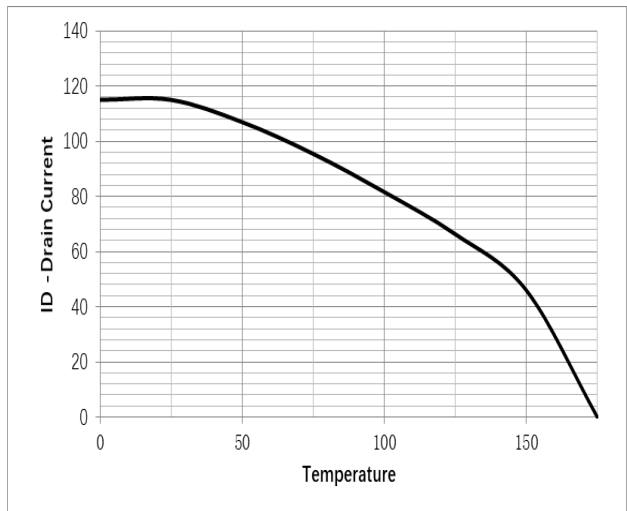


Fig.11 Switching Time Measurement Circuit

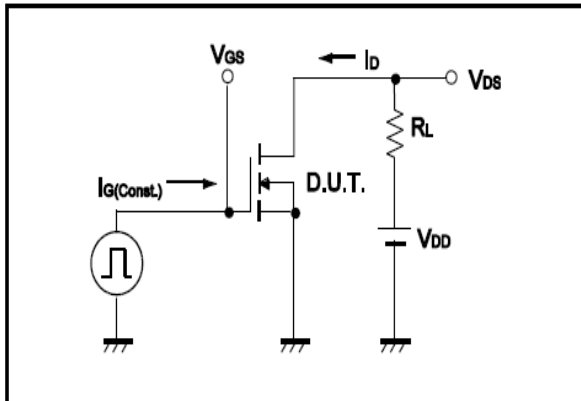


Fig.12 Gate Charge Waveform

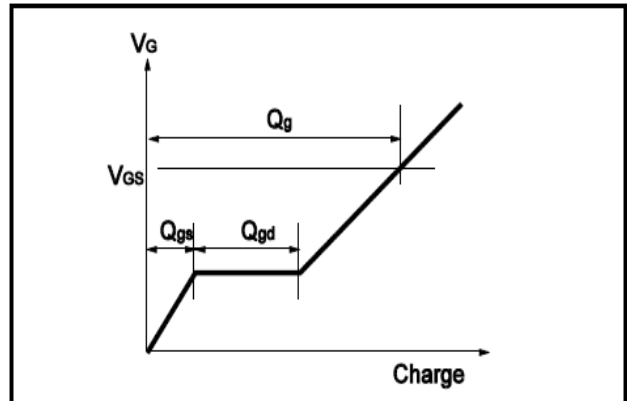


Fig.13 Resistive Switching Test Circuit

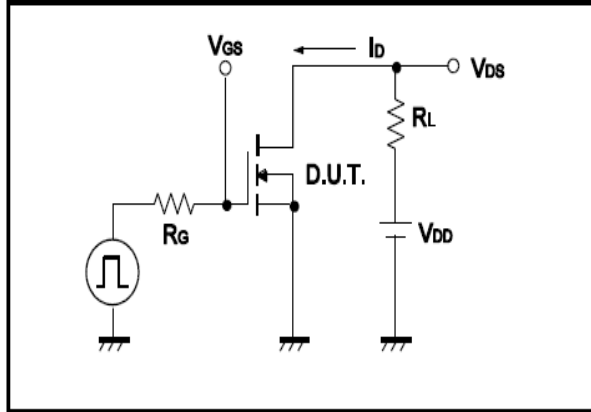


Fig.14 Resistive Switching Test Waveform

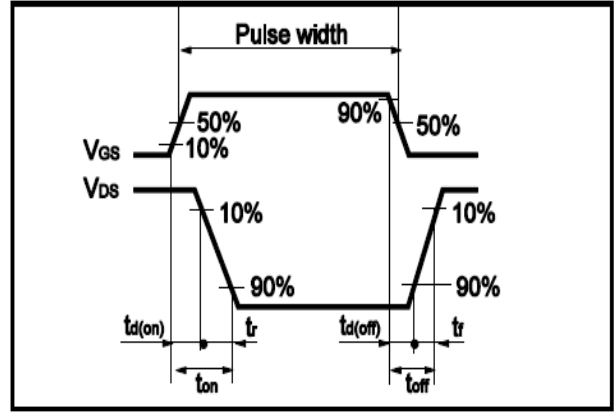


Fig.15 Avalanche Measurement Circuit

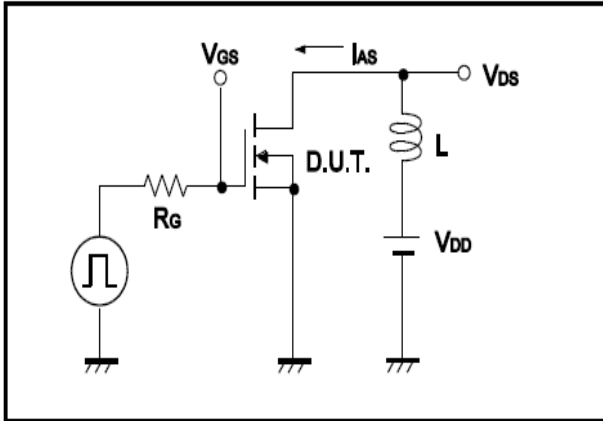
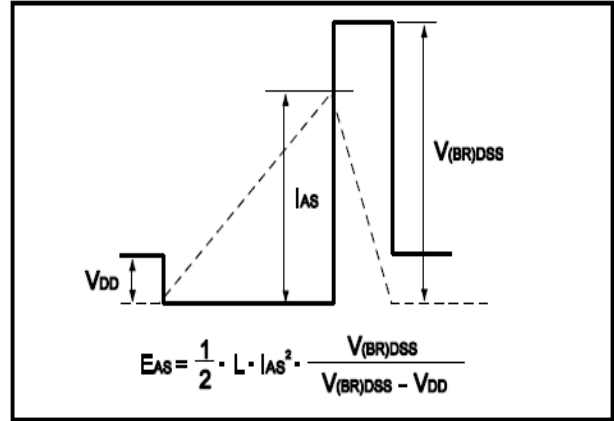


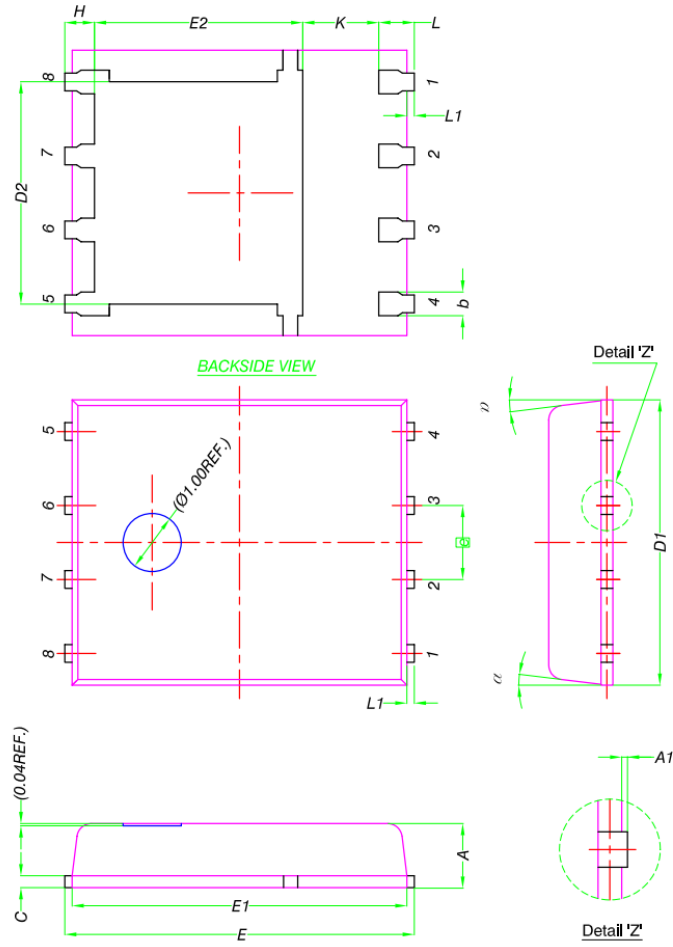
Fig.16 Avalanche Waveform





•Dimensions (DFN5x6)

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 |
| $\alpha$ | 0°          | -    | 12°  |