

### General Description

The ZM180P02L 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.

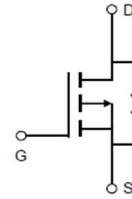
### Features

- 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

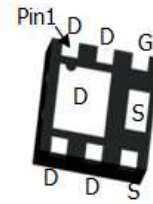
### Product Summary



$$V_{DS} = -20V$$

$$R_{DS(ON)} = 20m\Omega$$

$$I_D = -18A$$



DFN 2 x 2

### Ordering Information:

|                           |           |
|---------------------------|-----------|
| Part NO.                  | ZM180P02L |
| Marking                   | 180P02    |
| Packing Information       | REEL TAPE |
| Basic ordering unit (pcs) | 4000      |

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

| Parameter                                   | Symbol                 | Rating     | Unit       |
|---|------------------------|------------|------------|
| Drain-Source Voltage                        | $V_{DS}$               | -20        | V          |
| Gate-Source Voltage                         | $V_{GS}$               | $\pm 8$    | V          |
| Continuous Drain Current                    | $I_{D@TC=25^\circ C}$  | -18        | A          |
|   | $I_{D@TC=75^\circ C}$  | -13.68     | A          |
|   | $I_{D@TC=100^\circ C}$ | -11.34     | A          |
| Pulsed Drain Current <sup>①</sup>           | $I_{DM}$               | -54        | A          |
| Total Power Dissipation <sup>②</sup>        | $P_D$                  | 18         | W          |
| Total Power Dissipation( $T_A=25^\circ C$ ) | $P_{D@T_A=25^\circ C}$ | 0.9        | W          |
| Operating Junction Temperature              | $T_J$                  | -55 to 150 | $^\circ C$ |
| Storage Temperature                         | $T_{STG}$              | -55 to 150 | $^\circ C$ |
| Single Pulse Avalanche Energy               | $E_{AS}$               | 30         | mJ         |

**•Thermal resistance**

| Parameter  | Symbol            | Min. | Typ. | Max. | Unit  |
|--|-------------------|------|------|------|-------|
| Thermal resistance, junction - case <sup>②</sup> | R <sub>thJC</sub> | -    | -    | 7.0  | ° C/W |
| Thermal resistance, junction - ambient           | R <sub>thJA</sub> | -    | -    | 140  | ° C/W |
| Soldering temperature, wavesoldering 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               | -20  |     |      | V    |
| Gate Threshold Voltage            | V <sub>GS(TH)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250uA | -0.4 |     | -1.0 | V    |
| Drain-Source Leakage Current      | I <sub>DSS</sub>    | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V                |      |     | -1.0 | uA   |
| Gate- Source Leakage Current      | I <sub>GSS</sub>    | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V                 |      |     | ±100 | nA   |
| Static Drain-source On Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -8A               |      | 20  | 25   | mΩ   |
|                                   |                     | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -6A               |      | 26  | 33   | mΩ   |
| Forward Transconductance          | g <sub>FS</sub>     | V <sub>DS</sub> = -5V, I <sub>D</sub> = -5A                 |      | 9   |      | s    |
| Source-drain voltage              | V <sub>SD</sub>     | I <sub>S</sub> = -8A  |      |     | 1.28 | V    |

**•Electronic Characteristics**

| Parameter                    | Symbol           | Condition                          | Min. | Typ  | Max. | Unit |
|------------------------------|------------------|------------------------------------|------|------|------|------|
| Input capacitance            | C <sub>iss</sub> | V <sub>DS</sub> = -15V<br>f = 1MHz | -    | 1200 | -    | pF   |
| Output capacitance           | C <sub>oss</sub> |                                    | -    | 235  | -    |      |
| Reverse transfer capacitance | C <sub>rss</sub> |                                    | -    | 120  | -    |      |

**•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> = -15V  | -    | 12  | -    | nC   |
| Gate - Source charge | Q <sub>gs</sub> | I <sub>D</sub> = -8A    | -    | 4   | -    |      |
| Gate - Drain charge  | Q <sub>gd</sub> | V <sub>GS</sub> = -4.5V | -    | 6   | -    |      |

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

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

Fig.1 Power Dissipation Derating Curve

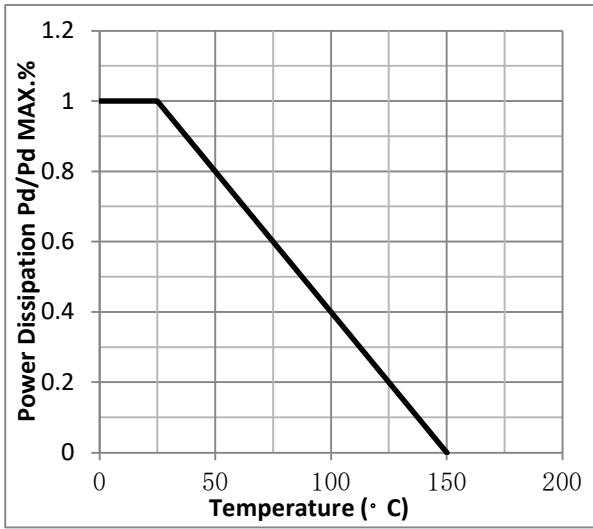


Fig.2 Typical output Characteristics

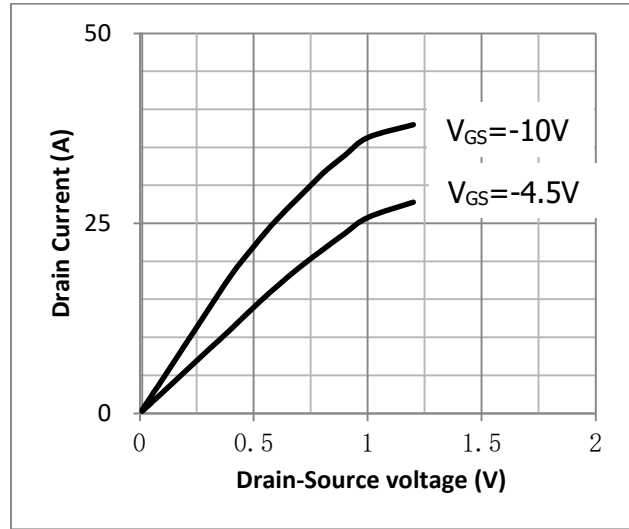


Fig.3 Threshold Voltage V.S Junction Temperature

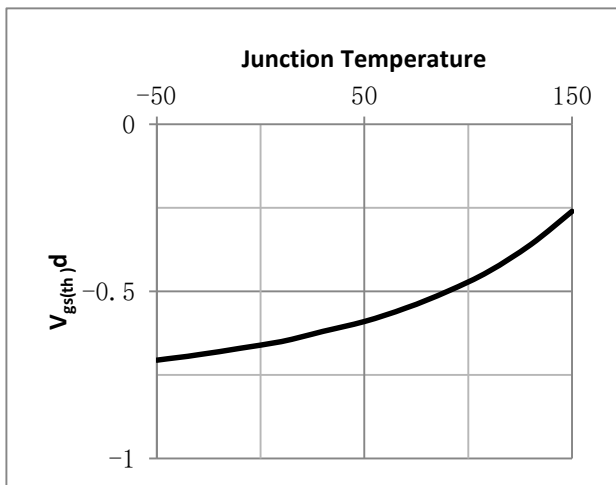


Fig.4 Resistance V.S Drain Current

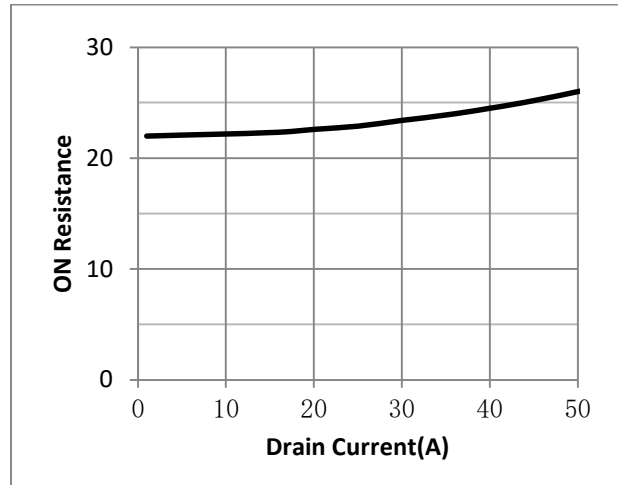


Fig.5 On-Resistance VS Gate Source Voltage

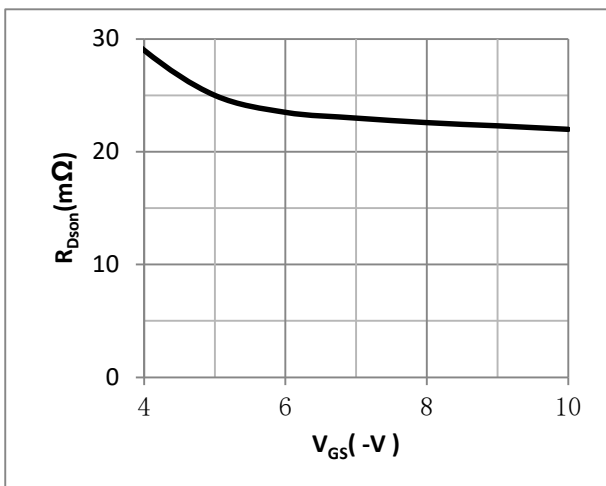


Fig.6 On-Resistance V.S Junction Temperature

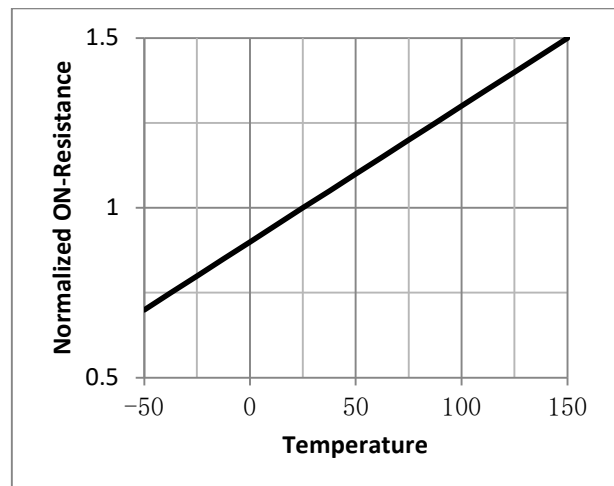


Fig.7 Gate Charge Measurement Circuit

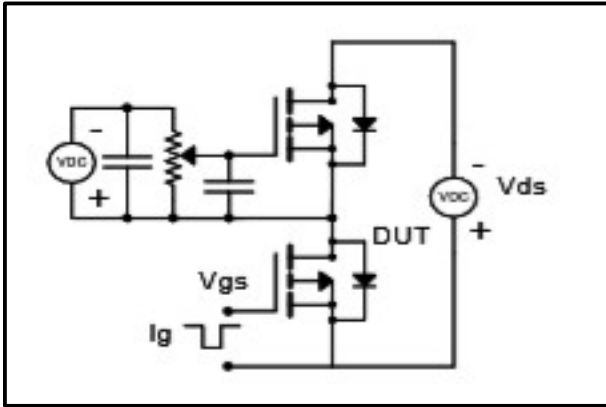


Fig.8 Gate Charge Waveform

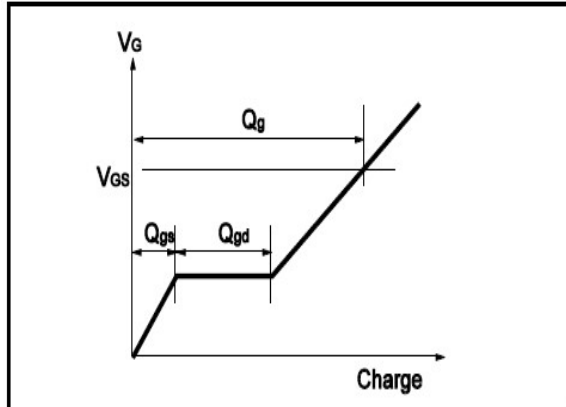


Fig.9 Switching Time Measurement Circuit

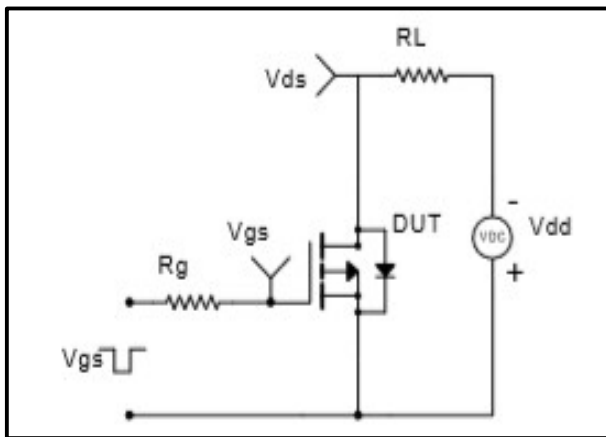


Fig.10 Switching Time Waveform

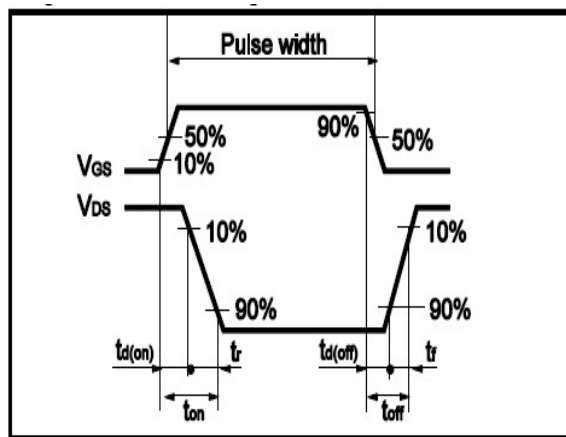


Fig.11 Avalanche Measurement Circuit

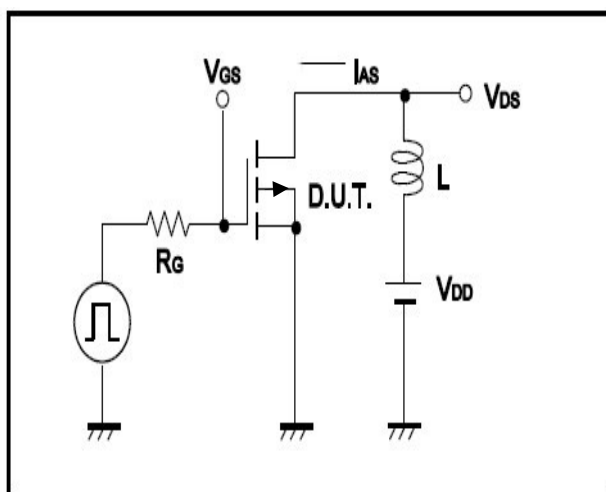
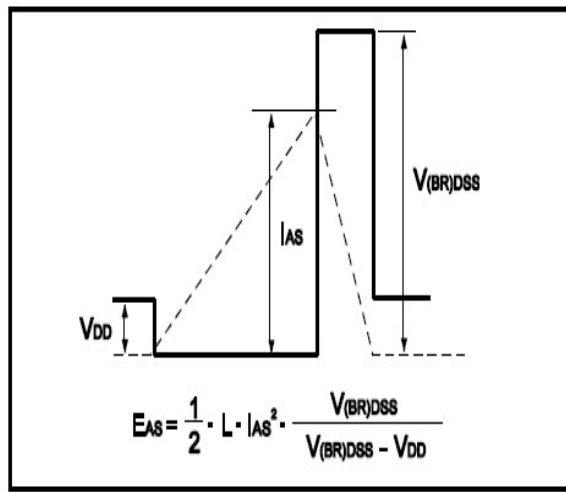
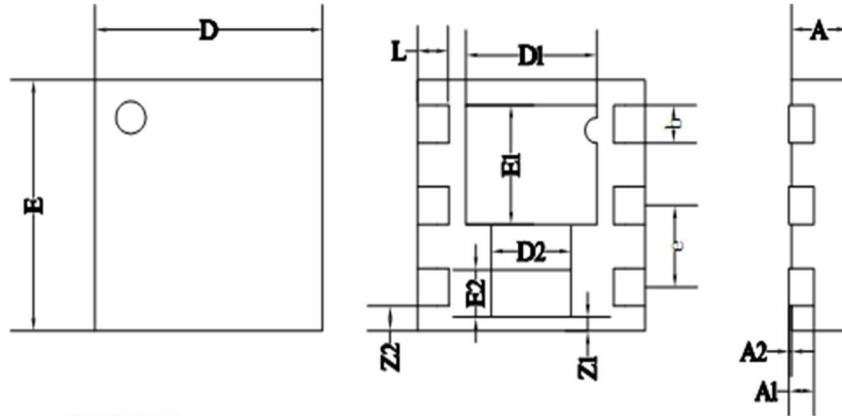


Fig.12 Avalanche Waveform



•Dimensions(DFN2\*2)

Unit: mm



NOTE:  
 All dimensions are in mm

|           | MIN     | NOM   | MAX   |
|-----------|---------|-------|-------|
| <b>D</b>  | 1.95    | 2.00  | 2.05  |
| <b>E</b>  | 1.95    | 2.00  | 2.05  |
| <b>D1</b> | 1.10    | 1.15  | 1.20  |
| <b>E1</b> | 0.90    | 0.95  | 1.00  |
| <b>D2</b> | 0.65    | 0.70  | 0.75  |
| <b>E2</b> | 0.33    | 0.38  | 0.43  |
| <b>L</b>  | 0.225   | 0.275 | 0.325 |
| <b>b</b>  | 0.25    | 0.30  | 0.35  |
| <b>e</b>  | 0.65BSC |       |       |
| <b>A</b>  | 0.45    | 0.50  | 0.55  |
| <b>A1</b> | 0.20REF |       |       |
| <b>A2</b> | 0.00    | -     | 0.05  |
| <b>Z1</b> | 0.06    | 0.11  | 0.16  |
| <b>Z2</b> | 0.15    | 0.20  | 0.25  |