

### • General Description

The ZM060N06I combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ .

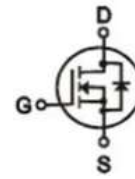
### • Features

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

### • Application

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

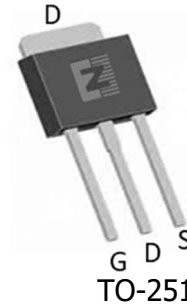
### • Product Summary



$$V_{DS}=60V$$

$$R_{DS(ON)}=6m\Omega$$

$$I_D=70A$$



### • Ordering Information:

|                           |           |
|---------------------------|-----------|
| Part NO.                  | ZM060N06I |
| Marking                   | ZM060N06  |
| Packing Information       | TUBE      |
| Basic ordering unit (pcs) | 3600      |

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

| Parameter                         | Symbol                        | Rating     | Unit             |
|-----------------------------------|-------------------------------|------------|------------------|
| Drain-Source Voltage              | $V_{DS}$                      | 60         | V                |
| Gate-Source Voltage               | $V_{GS}$                      | $\pm 20$   | V                |
| Continuous Drain Current          | $I_{D@T_C=25^\circ\text{C}}$  | 70         | A                |
|                                   | $I_{D@T_C=75^\circ\text{C}}$  | 53.2       | A                |
|                                   | $I_{D@T_C=100^\circ\text{C}}$ | 44.1       | A                |
| Pulsed Drain Current <sup>①</sup> | $I_{DM}$                      | 160        | A                |
| Total Power Dissipation           | $P_{D@T_C=25^\circ\text{C}}$  | 60         | W                |
| Total Power Dissipation           | $P_{D@T_A=25^\circ\text{C}}$  | 2.0        | W                |
| Operating Junction Temperature    | $T_J$                         | -55 to 150 | $^\circ\text{C}$ |
| Storage Temperature               | $T_{STG}$                     | -55 to 150 | $^\circ\text{C}$ |

**•Thermal resistance**

| Parameter                                    | Symbol     | Min. | Typ. | Max. | Unit  |
|----------------------------------------------|------------|------|------|------|-------|
| Thermal resistance, junction - case          | $R_{thJC}$ | -    | -    | 2.1  | ° C/W |
| Thermal resistance, junction - ambient       | $R_{thJA}$ | -    | -    | 62.5 | ° 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       | $\mu A$    |
| Gate- Source Leakage Current      | $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$   |      |     | $\pm 100$ | nA         |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 20A$         |      | 6.0 | 8.0       | m $\Omega$ |
|                                   |              | $V_{GS} = 4.5V, I_D = 10A$        |      | 8.0 | 10.0      | m $\Omega$ |
| Forward Transconductance          | $g_{FS}$     | $V_{DS} = 25V, I_D = 10A$         |      | 28  |           | s          |
| Source-drain voltage              | $V_{SD}$     | $I_S = 20A$                       |      |     | 1.28      | V          |

**•Electronic Characteristics**

| Parameter                    | Symbol    | Condition                        | Min. | Typ  | Max. | Unit |
|------------------------------|-----------|----------------------------------|------|------|------|------|
| Input capacitance            | $C_{iss}$ | f = 1MHz<br>V <sub>DS</sub> =25V | -    | 4200 | -    | pF   |
| Output capacitance           | $C_{oss}$ |                                  | -    | 290  | -    |      |
| Reverse transfer capacitance | $C_{rss}$ |                                  | -    | 130  | -    |      |

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

| Parameter            | Symbol   | Condition                                      | Min. | Typ | Max. | Unit |
|----------------------|----------|------------------------------------------------|------|-----|------|------|
| Total gate charge    | $Q_g$    | $V_{DD} = 25V$<br>$I_D = 8A$<br>$V_{GS} = 10V$ | -    | 56  | -    | nC   |
| Gate - Source charge | $Q_{gs}$ |                                                | -    | 16  | -    |      |
| Gate - Drain charge  | $Q_{gd}$ |                                                | -    | 26  | -    |      |

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

Fig.1 Power Dissipation

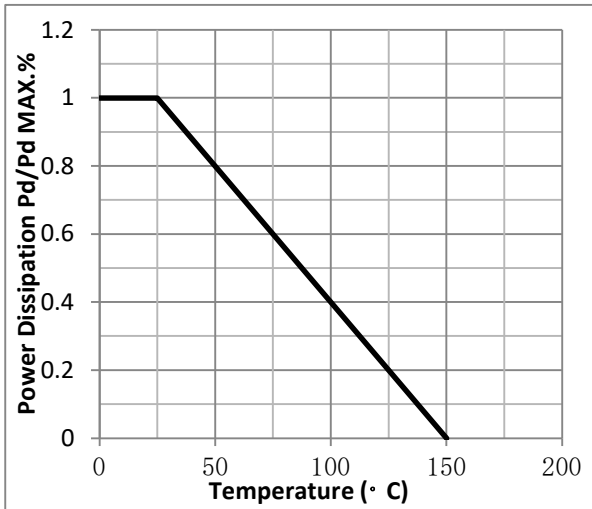


Fig.2 Typical output Characteristics

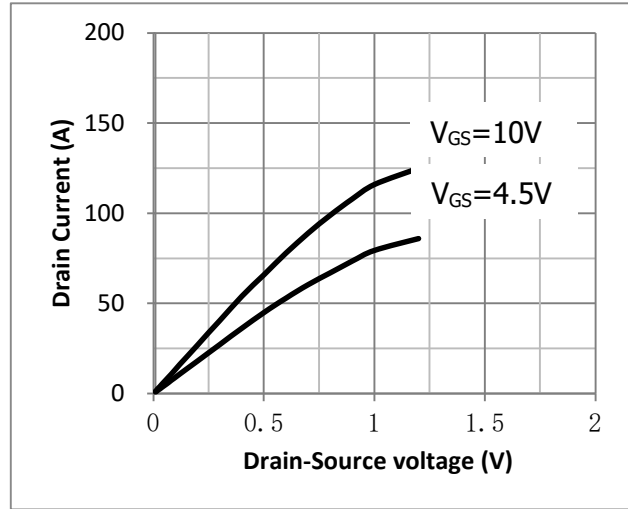


Fig.3 Threshold Voltage V.S Junction Temperature

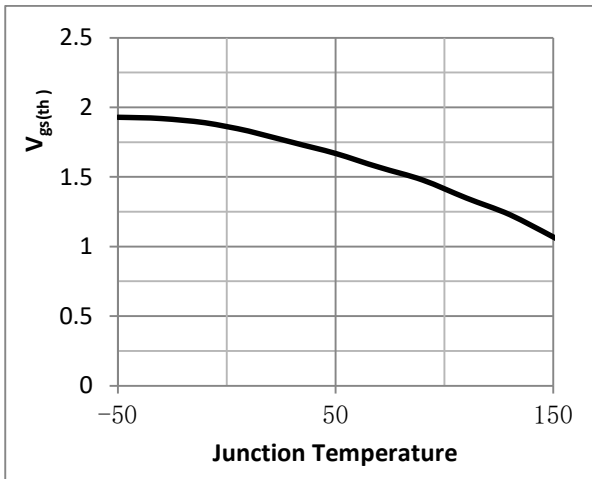


Fig.4 Resistance V.S Drain Current

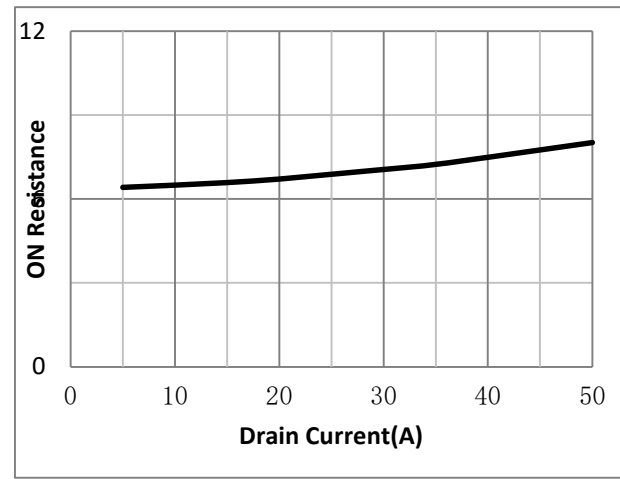


Fig.5 On-Resistance VS Gate Source Voltage

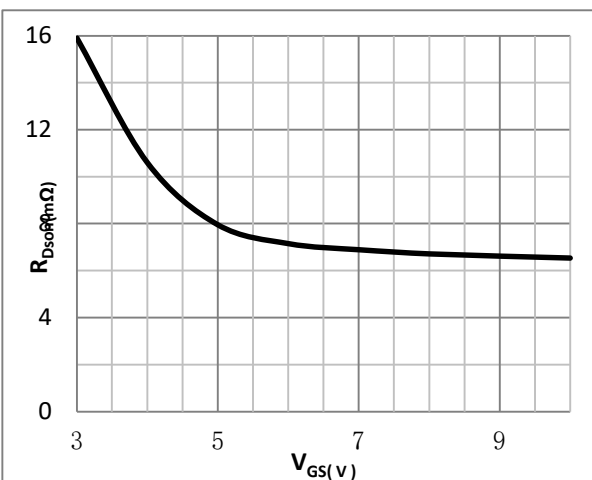


Fig.6 On-Resistance V.S Junction Temperature

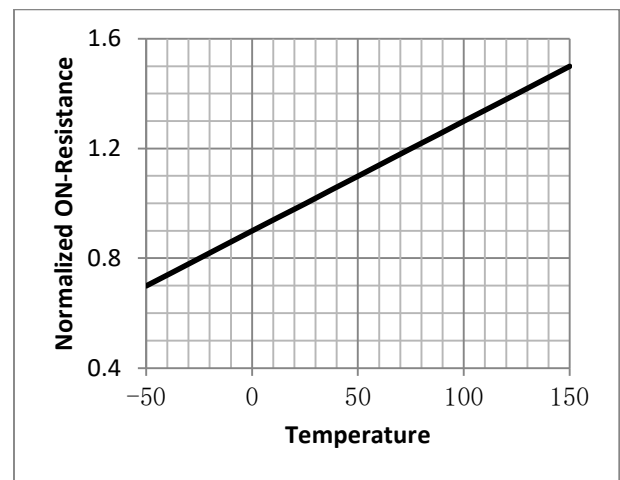


Fig.7 Gate Charge Measurement Circuit

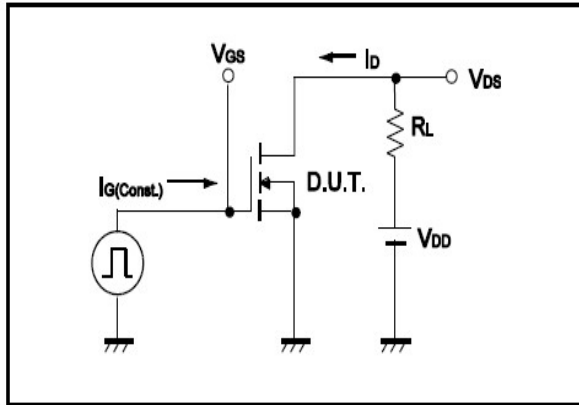


Fig.8 Gate Charge Waveform

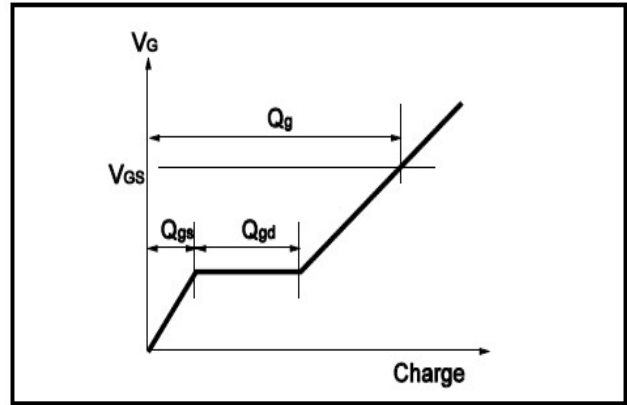


Fig.9 Switching Time Measurement Circuit

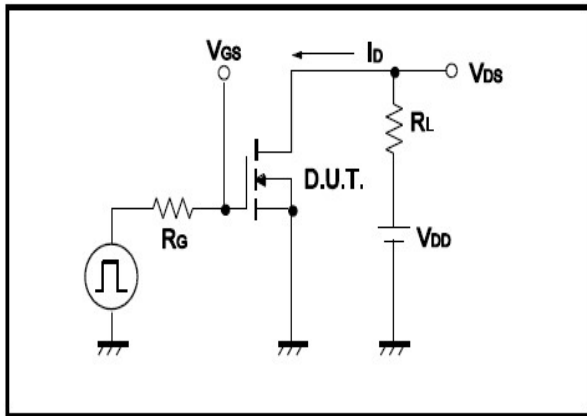


Fig.10 Switching Time Waveform

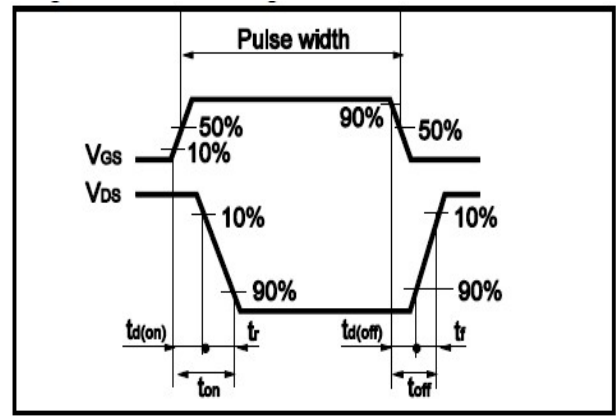


Fig.11 Avalanche Measurement Circuit

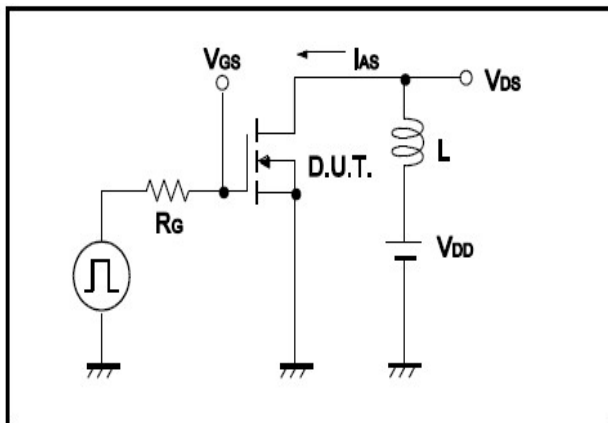
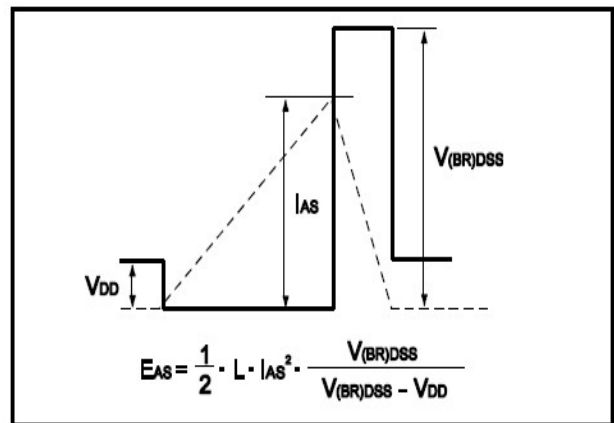


Fig.12 Avalanche Waveform





●Dimensions (TO-251)

Unit: mm

| SYMBOL | min  | max  | SYMBOL | min  | max  |
|--------|------|------|--------|------|------|
| A      | 2.10 | 2.50 | D      | 6.35 | 6.80 |
| A1     | 0.95 | 1.30 | D1     | 5.10 | 5.50 |
| B      | 0.80 | 1.25 | E      | 5.30 | 6.30 |
| b      | 0.50 | 0.80 | e      | 2.24 | 2.35 |
| b1     | 0.70 | 0.90 | E1     | 4.43 | 4.73 |
| c      | 0.45 | 0.60 | L      | 7.00 | 9.40 |
| c1     | 0.45 | 0.60 |        |      |      |

