## ● General Description

The ZM280N06D 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.
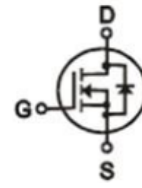
## ● Features

■ 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

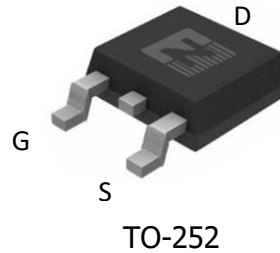■ SMPS 2$^{nd}$ Synchronous Rectifier

■ POL application

■ BLDC Motor driver

## ● Product Summary

$V_{DS}$ =60V

$R_{DS(ON)}$ =28mΩ

$I_D$ =25A

TO-252

## ●Ordering Information:

| Part NO. | ZM280N06D |
|---|---|
| Marking | ZM280N06 |
| Packing Information | REEL TAPE |
| Basic ordering unit (pcs) | 2500 |

## ●Absolute Maximum Ratings （$T_C$ =25℃)

| 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℃ | 25 | A |
|  | $I_D$@TC=75℃ | 19 | A |
|  | $I_D$@TC=100℃ | 15.8 | A |
| Pulsed Drain Current [①] | $I_{DM}$ | 75 | A |
| Total Power Dissipation(TC=25℃) | $P_D$@TC=25℃ | 50 | W |
| Total Power Dissipation(TA=25℃) | $P_D$@TA=25℃ | 1.25 | W |
| Operating Junction Temperature | $T_J$ | -55 to 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55 to 150 | ℃ |
| Single Pulse Avalanche Energy | $E_{AS}$ | 75 | mJ |

●**Thermal resistance**

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal resistance, junction - case | $R_{thJC}$ | - | - | 2.4 | ° C/W |
| Thermal resistance, junction - ambient | $R_{thJA}$ | - | - | 65 | ° 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, $I_D$ =250uA | 60 | | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ =$V_{DS}$, $I_D$ =250uA | 1.2 | 1.8 | 2.5 | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=60V, $V_{GS}$ =0V | | | 1.0 | uA |
| Gate- Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$ =0V | | | ±100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=12A | | 28 | 34 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=6A | | 31 | 40 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ =25V, $I_D$=10A | | 5 | | s |
| Source-drain voltage | $V_{SD}$ | Is=12A | | | 1.28 | V |

●**Electronic Characteristics**

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=25V f = 1MHz | - | 1430 | - | pF |
| Output capacitance | $C_{oss}$ | | - | 160 | - | |
| Reverse transfer capacitance | $C_{rss}$ | | - | 115 | - | |

●**Gate Charge characteristics**($T_a$ = 25℃)

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | $V_{DD}$ = 25V $I_D$ = 5A $V_{GS}$ = 10V | - | 25 | - | nC |
| Gate - Source charge | $Q_{gs}$ | | - | 4 | - | |
| Gate - Drain charge | $Q_{gd}$ | | - | 9 | - | |

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

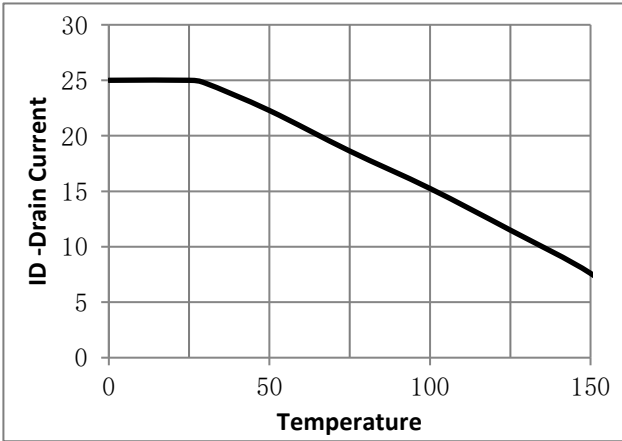Fig.1 Maximum Continuous Drain Current
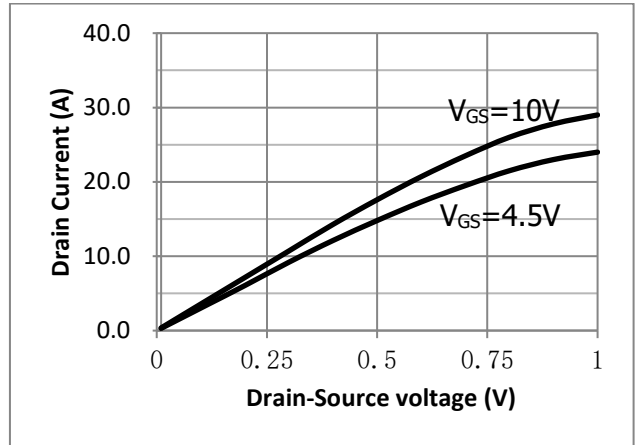


Fig.2 Typical output Characteristics



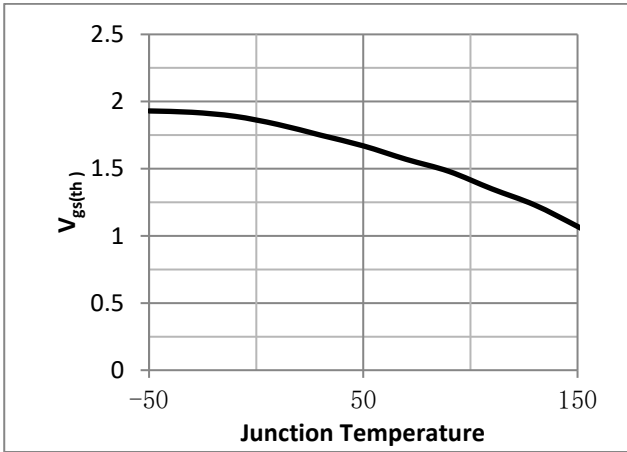Fig.3 Threshold Voltage V.S Junction Temperature
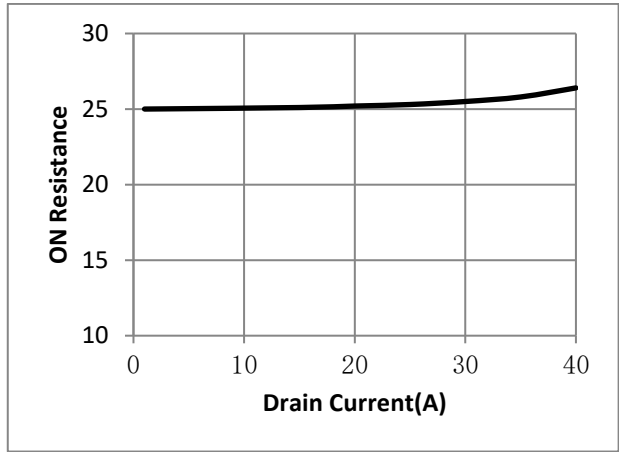


Fig.4 Resistance V.S Drain Current



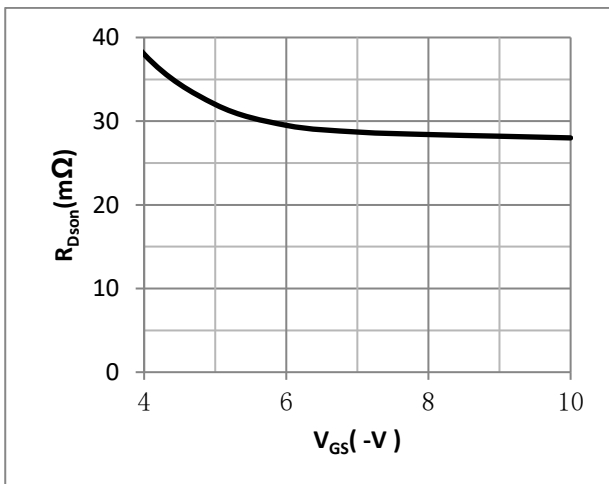Fig.5 On-Resistance VS Gate Source Voltage


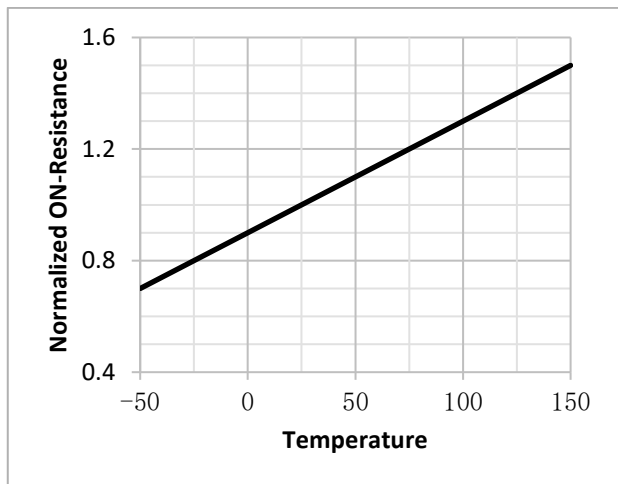
Fig.6 On-Resistance V.S Junction Temperature

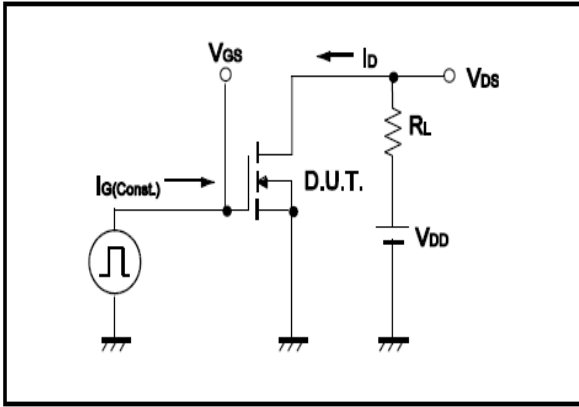Fig.7 Switching Time Measurement Circuit
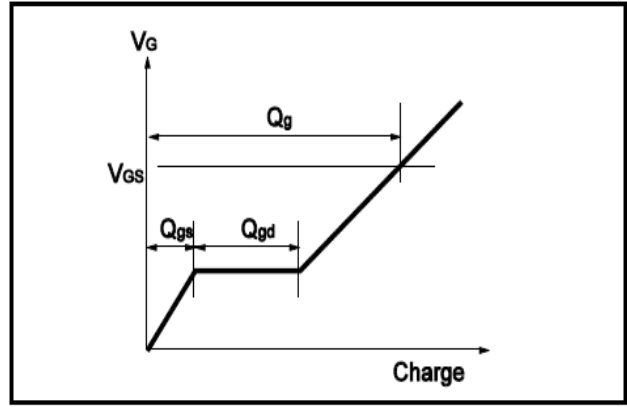
Fig.8 Gate Charge Waveform
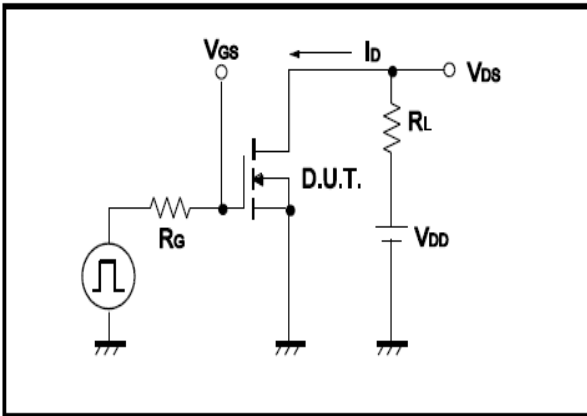
Fig.9 Switching Time Measurement Circuit

Fig.10 Gate Charge Waveform

Fig.11  Avalanche Measurement Circuit

Fig.12  Avalanche Waveform

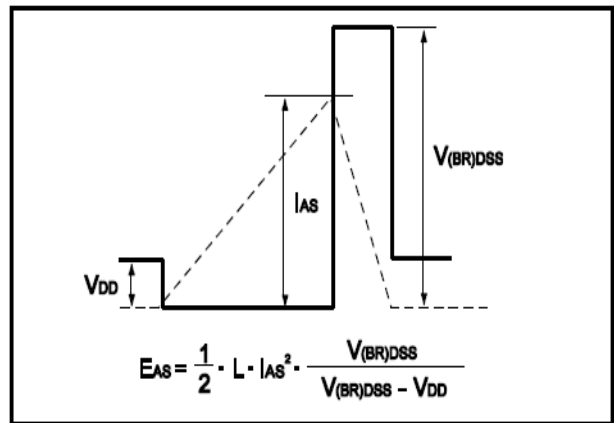$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

●**Dimensions(TO-252)**

Unit：mm

| SYMBOL | min | max | SYMBOL | min | max |
|---|---|---|---|---|---|
| A | 2.10 | 2.50 | B | 0.85 | 1.25 |
| b | 0.50 | 0.80 | b1 | 0.50 | 0.90 |
| b2 | 0.45 | 0.70 | C | 0.45 | 0.70 |
| D | 6.30 | 6.75 | D1 | 5.10 | 5.50 |
| E | 5.30 | 6.30 | e1 | 2.25 | 2.35 |
| L1 | 9.20 | 10.60 | e2 | 4.45 | 4.75 |
| L2 | 0.90 | 1.75 | L3 | 0.60 | 1.10 |
| K | 0.00 | 0.23 | | | |