

**• General Description**

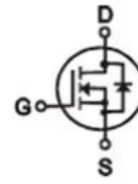
It combines advanced SGT MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

• 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

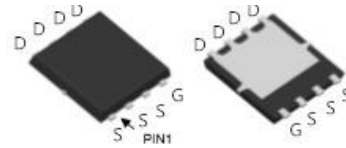
- MB/VGA Vcore
- SMPS 2nd Synchronous Rectifier
- POL application
- BLDC Motor driver

• Product Summary

$V_{DS} = 30V$

$R_{DS(ON)} = 5.1m\Omega$

$I_D = 55A$



DFN5 x 6

• Ordering Information:

| | |
|---------------------------|------------|
| Part NO. | ZMS051N03N |
| Marking | ZMS051N03 |
| Packing Information | REEL TAPE |
| Basic ordering unit (pcs) | 3000 |

• Absolute Maximum Ratings (T_C=25°C)

| Parameter | Symbol | Rating | Unit |
|--------------------------------|-----------------------|------------|------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Continuous Drain Current | $I_D @TC=25^\circ C$ | 55 | A |
| | $I_D @TC=75^\circ C$ | 42 | A |
| | $I_D @TC=100^\circ C$ | 34 | A |
| Pulsed Drain Current ① | I_{DM} | 165 | A |
| Total Power Dissipation | $P_D @TC=25^\circ C$ | 27 | W |
| Total Power Dissipation | $P_D @TA=25^\circ C$ | 2.5 | W |
| Operating Junction Temperature | T_J | -55 to 150 | °C |
| Storage Temperature | T_{STG} | -55 to 150 | °C |
| Single Pulse Avalanche Energy | E_{AS} | 40 | mJ |



•Thermal resistance

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|------------|------|------|------|---------------|
| Thermal resistance, junction - case | R_{thJC} | - | - | 4.5 | $^{\circ}C/W$ |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 50 | $^{\circ}C/W$ |
| Soldering temperature, wave soldering for 10s | T_{sold} | - | - | 265 | $^{\circ}C$ |

•Electronic Characteristics

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|-----------------------------------|--------------|-------------------------------|------|-----|-----------|-----------|
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 30 | | | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.7 | 2.5 | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=30V, V_{GS}=0V$ | | | 1.0 | μA |
| Gate- Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 100 | nA |
| Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=20A$ | | 5.1 | 6.6 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=10A$ | | 6.5 | 8.5 | $m\Omega$ |
| Forward Transconductance | g_{FS} | $V_{DS}=25V, I_D=4A$ | | 5 | | 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} | $f = 1MHz$ | - | 675 | - | pF |
| Output capacitance | C_{oss} | | - | 186 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 16 | - | |

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

| Parameter | Symbol | Condition | Min. | Typ | Max. | Unit |
|----------------------|--------------|---------------------|------|------|------|------|
| Total gate charge | Q_g | $V_{DD} = 15V$ | - | 12 | - | nC |
| Gate - Source charge | Q_{gs} | $I_D = 20A$ | - | 2.6 | - | |
| Gate - Drain charge | Q_{gd} | $V_{GS} = 10V$ | - | 1.4 | - | |
| Turn-ON Delay time | $t_{D(on)}$ | $V_{DD} = 15V$ | | 7.9 | | |
| Turn-ON Rise time | t_r | $I_D = 20A$ | | 6.3 | | |
| Turn-Off Delay time | $t_{D(off)}$ | $V_{GS} = 4.5V$ | | 11.2 | | |
| Turn-Off Fall time | t_f | $R_{G,ext}=2\Omega$ | | 5.9 | | |



| | | | | | |
|------------------------------------|-----|--------------------------|--|----|--|
| Body Diode Reverse Recovery Time | trr | IF=20A, dI/dt=100A/μs | | 12 | |
| Body Diode Reverse Recovery Charge | Qrr | | | 21 | |

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

Fig.1 Power Dissipation

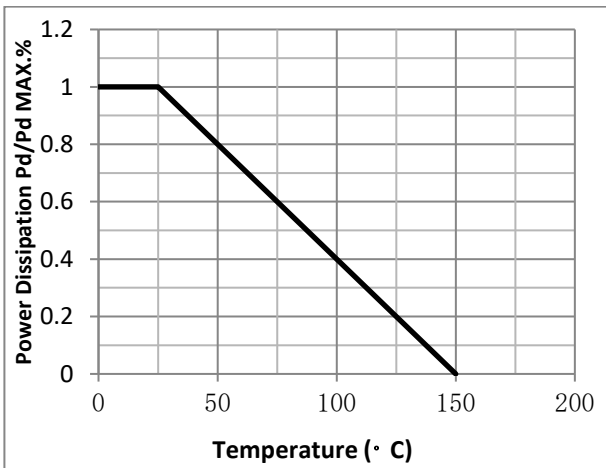


Fig.2 Typical output Characteristics

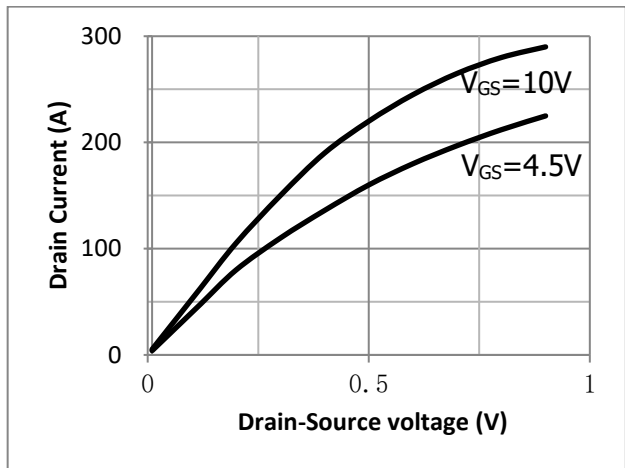


Fig.3 Threshold Voltage V.S Junction Temperature

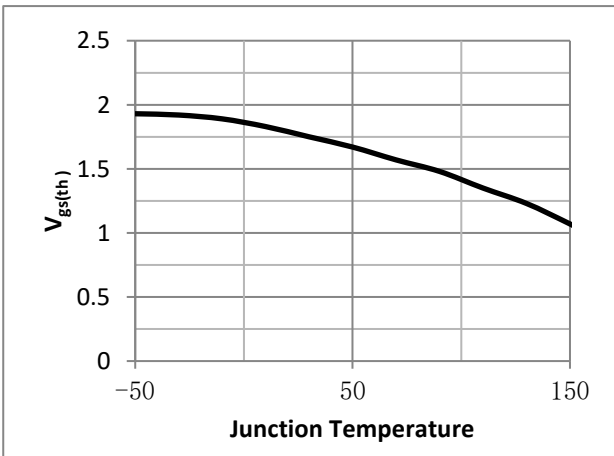


Fig.4 Resistance V.S Drain Current

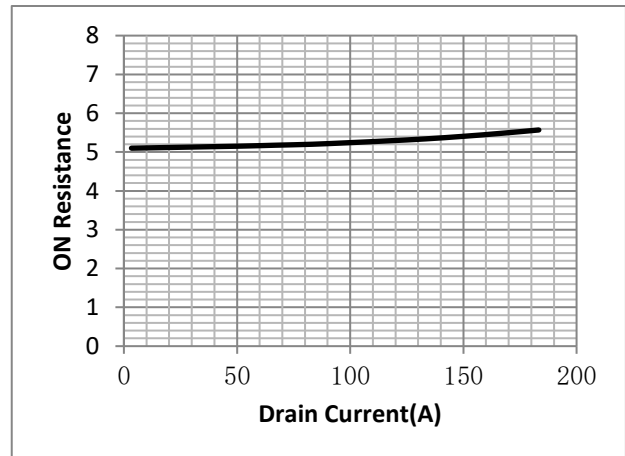




Fig.5 On-Resistance VS Gate Source Voltage

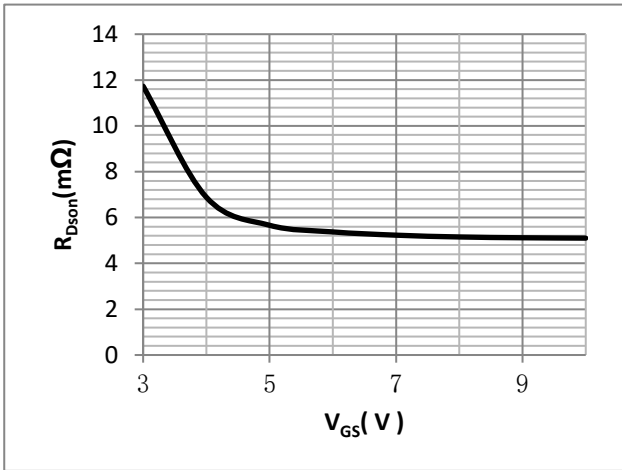


Fig.6 On-Resistance V.S Junction Temperature

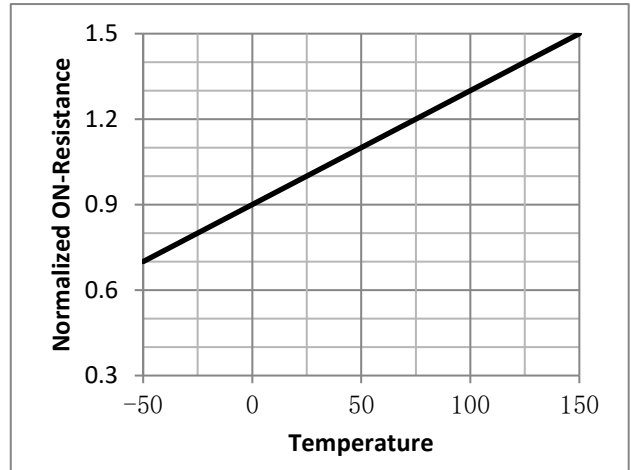


Fig.7 Gate Charge Characteristics

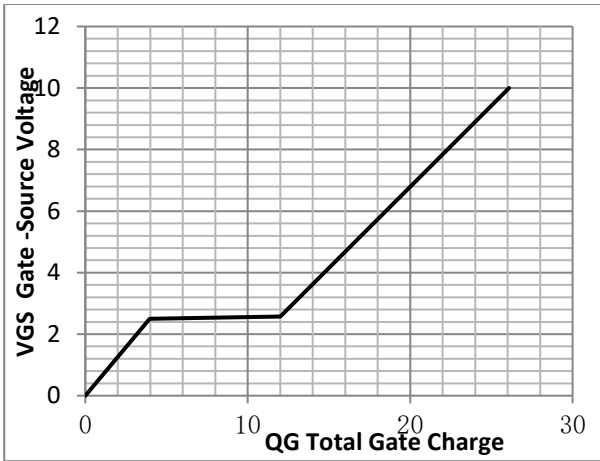


Fig.8 Capacitance vs Vds

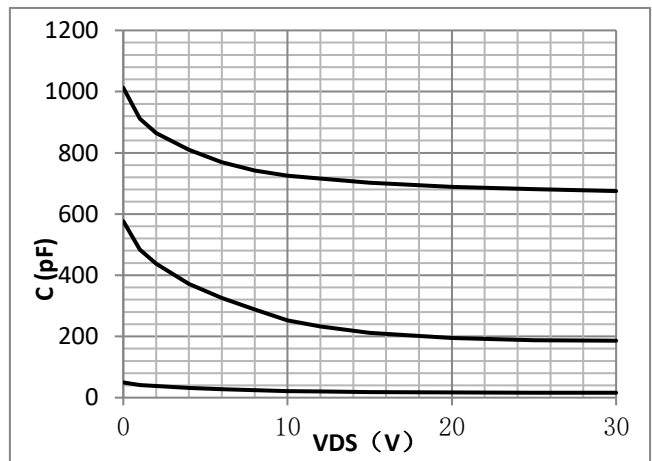


Fig.9 SOA Maximum Safe Operating Area

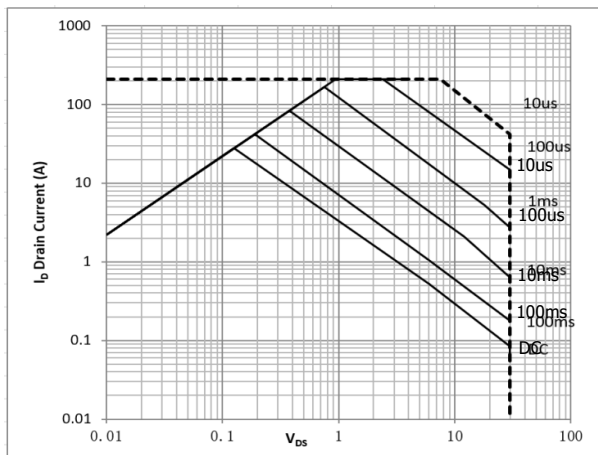


Fig.10 I_D -Junction Temperature

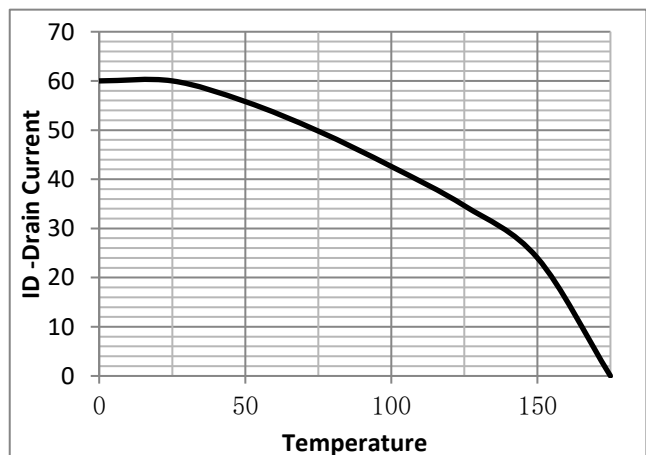


Fig.11 Switching Time Measurement Circuit

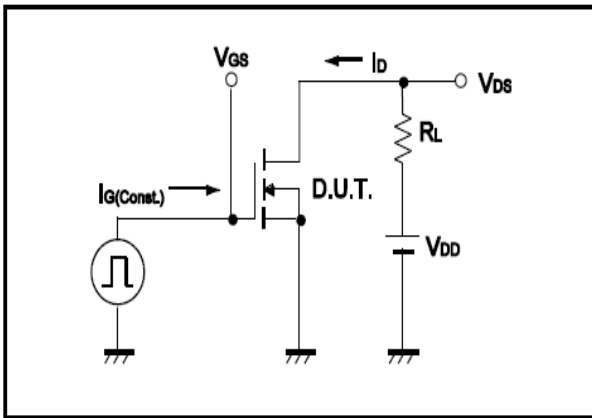


Fig.12 Gate Charge Waveform

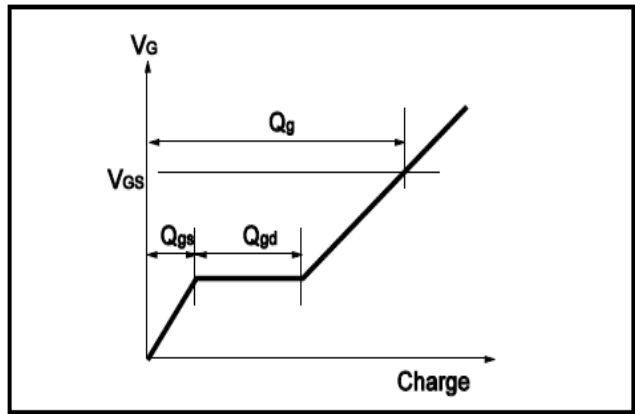


Fig.13 Resistive Switching Test Circuit

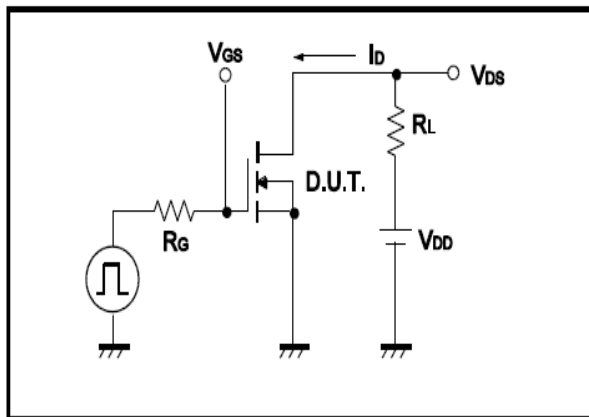


Fig.14 Resistive Switching Test Waveform

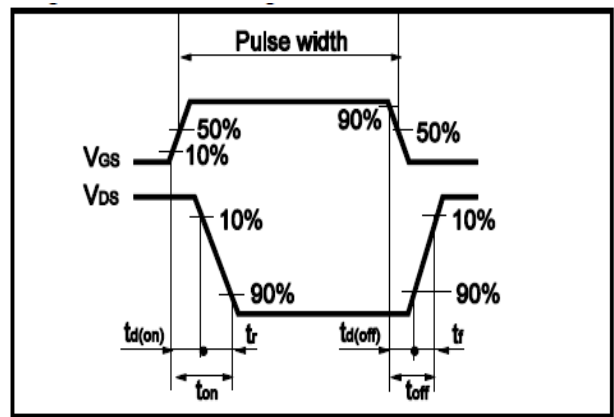


Fig.15 Avalanche Measurement Circuit

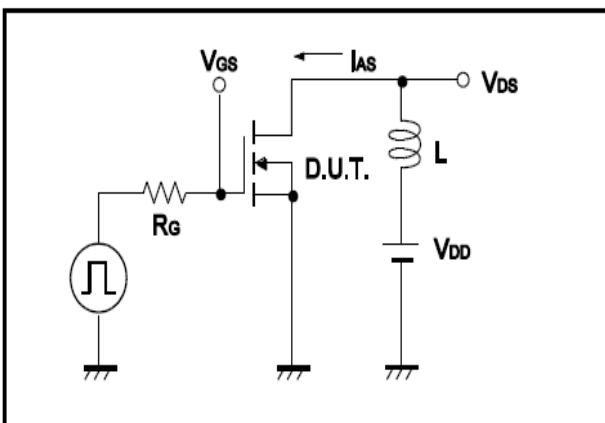
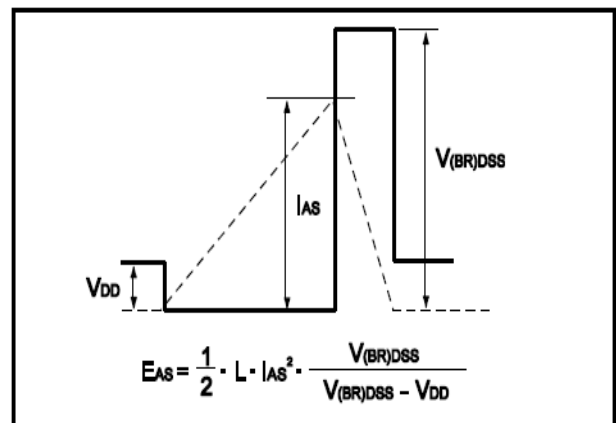


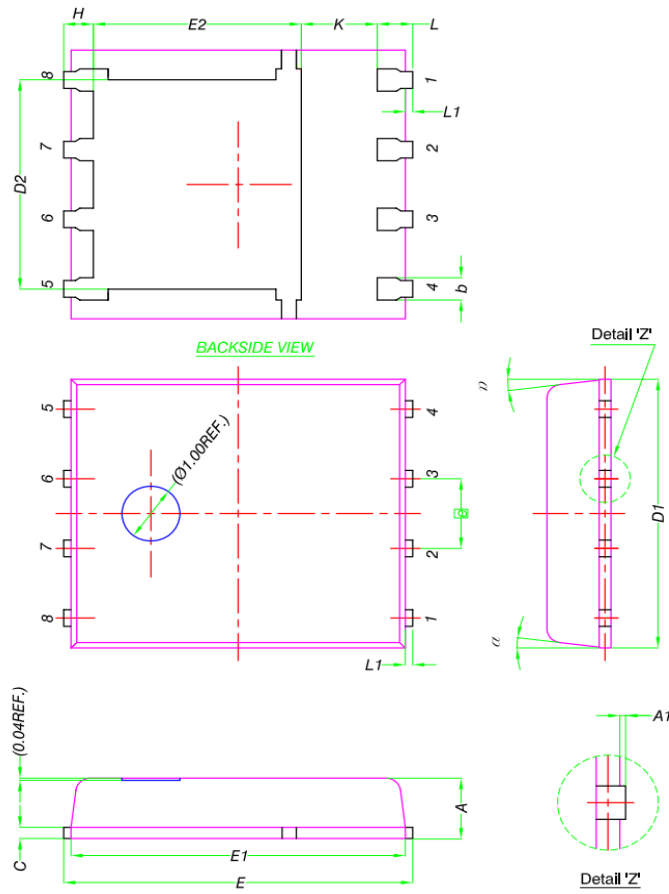
Fig.16 Avalanche Waveform





•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 |
| α | 0° | - | 12° |