



## Description

The DMG4407SSS uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



SOP-8

## General Features

$V_{DS} = -30V$   $I_D = -15A$

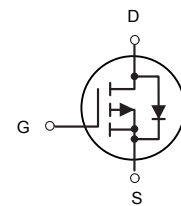
$R_{DS(ON)} < 8.7m\Omega @ V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack  | Brand      | Qty(PCS) |
|------------|-------|------------|----------|
| DMG4407SSS | SOP-8 | HXY MOSFET | 3000     |

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

| Symbol               | Parameter   | Rating     | Units        |
|----------------------|---|------------|--------------|
| $V_{DS}$             | Drain-Source Voltage  | -30        | V            |
| $V_{GS}$             | Gate-Source Voltage   | $\pm 20$   | V            |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$                       | -15        | A            |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^1$                       | -11        | A            |
| $I_{DM}$             | Pulsed Drain Current <sup>2</sup>                                 | -56        | A            |
| EAS                  | Single Pulse Avalanche Energy <sup>3</sup>                        | 151        | mJ           |
| $I_{AS}$             | Avalanche Current   | -55        | A            |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation <sup>4</sup>                              | 1.5        | W            |
| $T_{STG}$            | Storage Temperature Range   | -55 to 150 | $^\circ C$   |
| $T_J$                | Operating Junction Temperature Range                              | -55 to 150 | $^\circ C$   |
| $R_{\theta JA}$      | Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10s$ ) | 40         | $^\circ C/W$ |
|                      | Thermal Resistance Junction-Ambient <sup>1</sup>                  | 75         | $^\circ C/W$ |
| $R_{\theta JC}$      | Thermal Resistance Junction-Case <sup>1</sup>                     | 24         | $^\circ C/W$ |



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

| Symbol                              | Parameter                                      | Conditions   | Min. | Typ.   | Max. | Unit  |
|-------------------------------------|--|--|------|--------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V , I <sub>D</sub> =-250uA                             | -30  | ---    | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient      | Reference to 25°C , I <sub>D</sub> =-1mA                                 | ---  | -0.018 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V , I <sub>D</sub> =-12A                             | ---  | 5.8    | 8.7  | mΩ    |
|                                     |  | V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-10A                            | ---  | 8.5    | 13.5 |       |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         |  | -1.2 | ---    | -2.5 | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA                | ---  | 5.04   | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =-24V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C       | ---  | ---    | -1   | uA    |
|                                     |  | V <sub>DS</sub> =-24V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C       | ---  | ---    | -5   |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V , V <sub>DS</sub> =0V                              | ---  | ---    | ±100 | nA    |
| g <sub>fs</sub>                     | Forward Transconductance                       | V <sub>DS</sub> =-5V , I <sub>D</sub> =-12A                              | ---  | 25     | ---  | S     |
| Q <sub>g</sub>                      | Total Gate Charge (-4.5V)                      |  | ---  | 30     | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             | V <sub>DS</sub> =-15V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-12A    | ---  | 10     | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |  | ---  | 10.4   | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             |  | ---  | 9.4    | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      | V <sub>DD</sub> =-15V , V <sub>GS</sub> =-10V ,<br>R <sub>G</sub> =3.3 , | ---  | 10.2   | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            | I <sub>D</sub> =-1A  | ---  | 117    | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |  | ---  | 24     | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              |  | ---  | 3448   | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             | V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , f=1MHz                     | ---  | 508    | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |  | ---  | 421    | ---  |       |
| I <sub>S</sub>                      | Continuous Source Current <sup>1,5</sup>       |  | ---  | ---    | -14  | A     |
| I <sub>SM</sub>                     | Pulsed Source Current <sup>2,5</sup>           | V <sub>G</sub> =V <sub>D</sub> =0V , Force Current                       | ---  | ---    | -56  | A     |
| V <sub>SD</sub>                     | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V , I <sub>S</sub> =-1A , T <sub>J</sub> =25°C         | ---  | ---    | -1.2 | V     |
| t <sub>rr</sub>                     | Reverse Recovery Time                          | I <sub>F</sub> =-10A , di/dt=100A/μs ,                                   | ---  | 19.4   | ---  | nS    |
| Q <sub>rr</sub>                     | Reverse Recovery Charge                        | T <sub>J</sub> =25°C   | ---  | 9.1    | ---  | nC    |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=-25V,V<sub>GS</sub>=-10V,L=0.1mH,I<sub>AS</sub>=-55A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



### Typical Characteristics

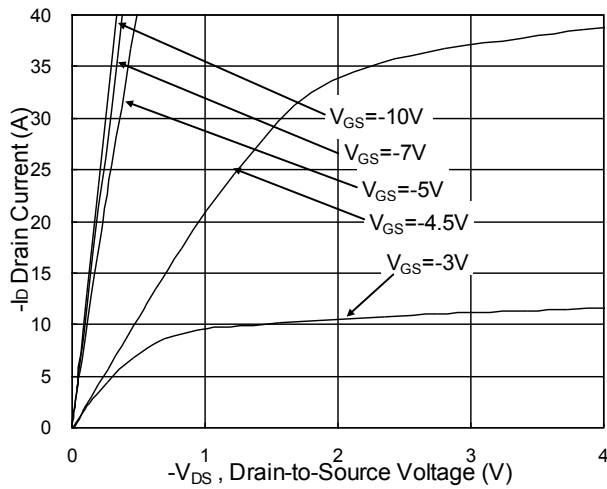


Fig.1 Typical Output Characteristics

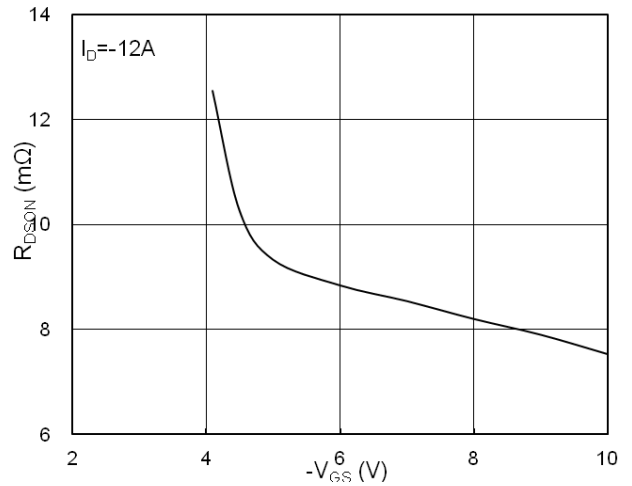


Fig.2 On-Resistance v.s Gate-Source

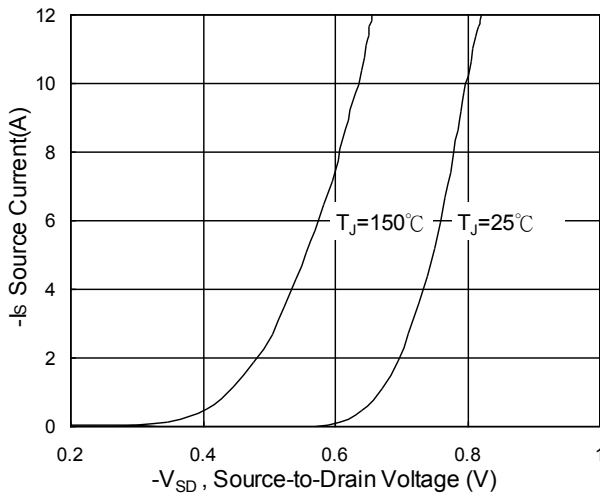


Fig.3 Forward Characteristics Of Reverse

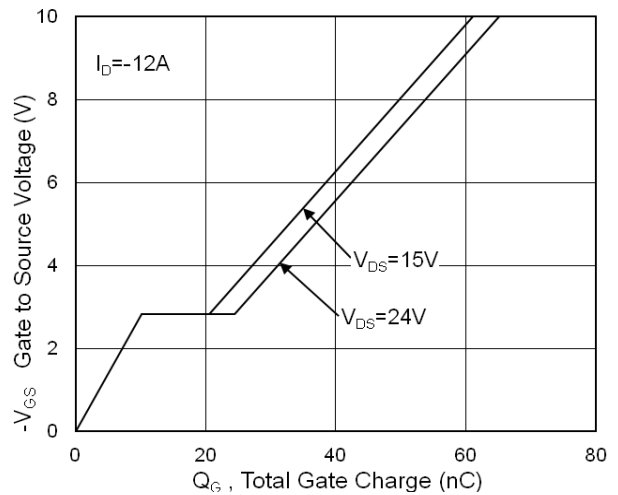


Fig.4 Gate-Charge Characteristics

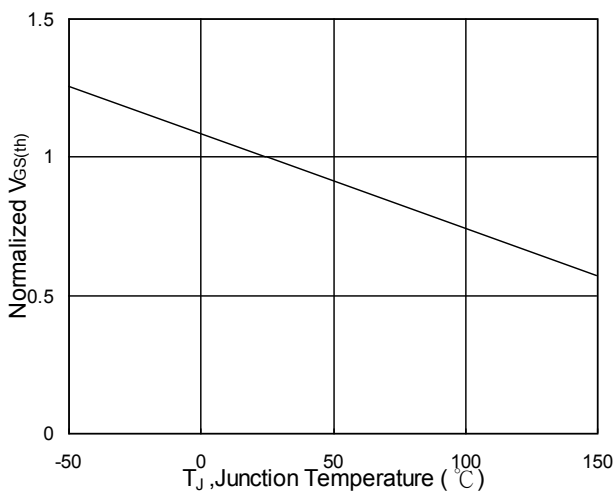


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

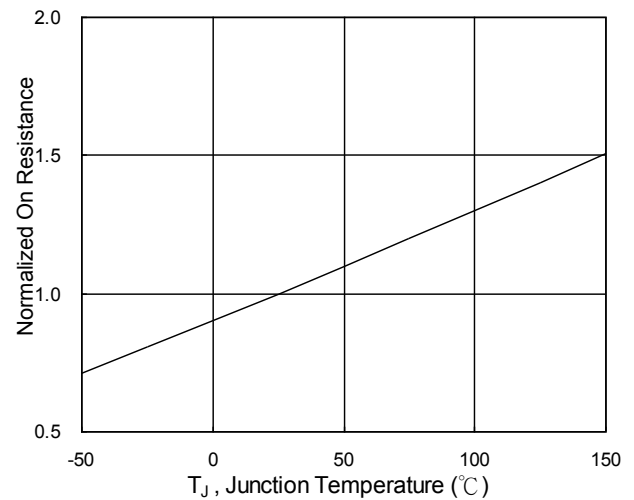


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

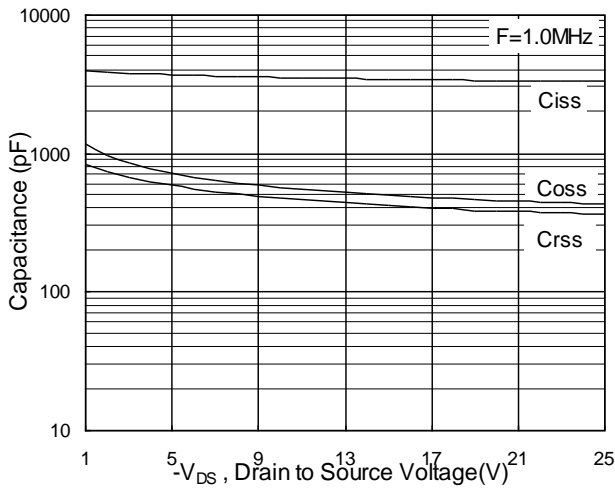


Fig.7 Capacitance

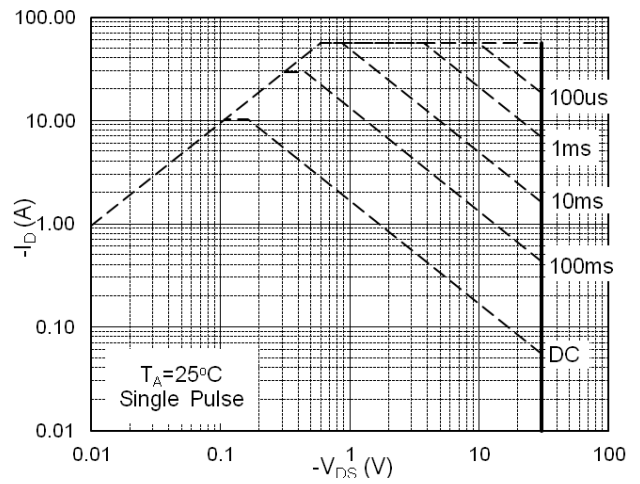


Fig.8 Safe Operating Area

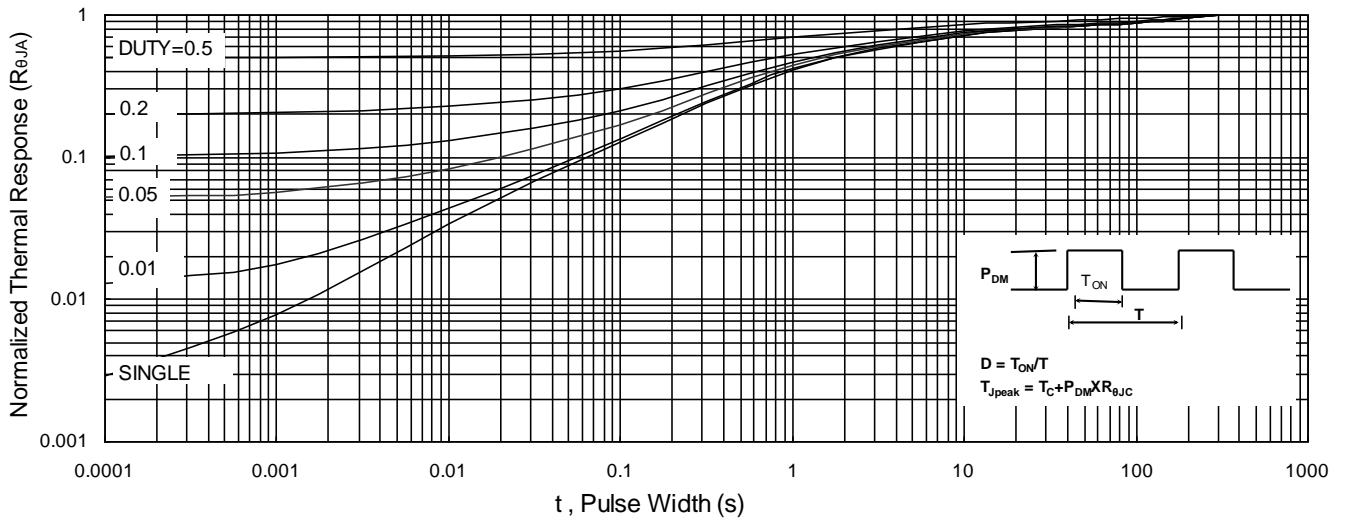


Fig.9 Normalized Maximum Transient Thermal Impedance

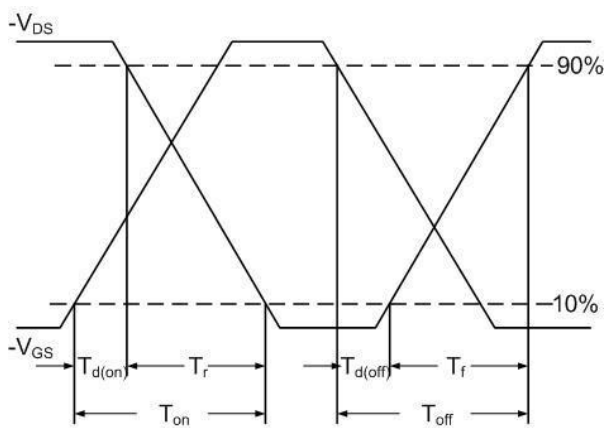


Fig.10 Switching Time Waveform

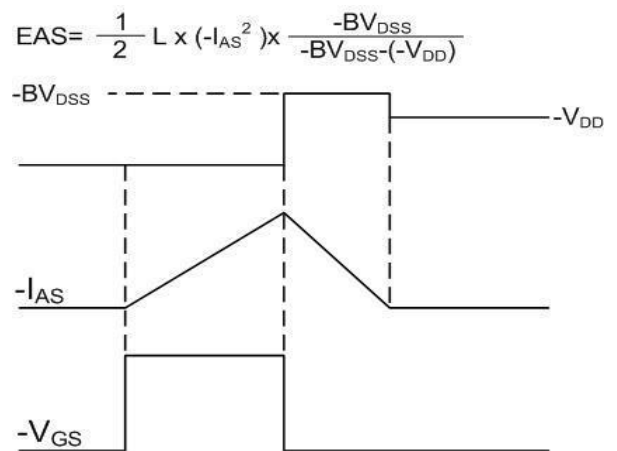


Fig.11 Unclamped Inductive Switching Waveform



### SOP-8 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.007                | 0.010 |
| D      | 4.800                     | 5.000 | 0.189                | 0.197 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| E      | 5.800                     | 6.200 | 0.228                | 0.244 |
| E1     | 3.800                     | 4.000 | 0.150                | 0.157 |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.



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