



# MM560SG15A9H

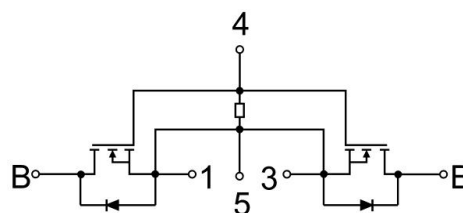
## MOSFET Module

Preliminary Data

### Features:

- Improved Gate, Avalanche and Dynamic  $dv/dt$  Ruggedness
- Excellent Gate Charge and Low On-Resistance  $R_{DS(on)}$
- 100% Avalanche Tested
- Lead-Free Halogen-Free

### Circuit Diagram



### Applications:

- Hard Switched and High Frequency Circuits
- Main And Auxiliary AC Drives

### Absolute Maximum Ratings ( $T_C=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol    | Description                      |                                                            | Values   | Units |
|-----------|----------------------------------|------------------------------------------------------------|----------|-------|
| $V_{DSS}$ | Drain-Source Blocking Voltage    |                                                            | 150      | V     |
| $V_{GSS}$ | Gate-Source Voltage              |                                                            | $\pm 20$ | V     |
| $I_D$     | Continuous Drain Current         | $T_C=25^{\circ}\text{C}$                                   | 560      | A     |
|           |                                  | $T_C=100^{\circ}\text{C}$                                  | 400      | A     |
| $I_{DM}$  | Pulsed Drain Current             | Pulse Width Limited by Max. Junction Temperature           | 2240     | A     |
| $I_S$     | Continuous Source Current(Diode) |                                                            | 560      | A     |
| $I_{SM}$  | Pulsed Source Current(Diode)     | Pulse Width Limited by Max. Junction Temperature           | 2240     | A     |
| $P_D$     | Maximum Power Dissipation        | $T_C=25^{\circ}\text{C}$<br>$T_{Jmax}=175^{\circ}\text{C}$ | 1008     | W     |



## Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol       | Description                       | Conditions                                                    | Min. | Typ. | Max. | Units            |
|--------------|-----------------------------------|---------------------------------------------------------------|------|------|------|------------------|
| $V_{GS(th)}$ | Gate Threshold Voltage            | $I_D=1\text{mA}$ , $V_{DS}=V_{GS}$                            | 2.0  | 3.0  | 4.0  | V                |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $I_D=280\text{A}$ , $V_{GS}=10\text{V}$                       |      | 1.40 | 1.65 | $\text{m}\Omega$ |
| $I_{DSS}$    | Drain-Source Leakage Current      | $V_{DS}=V_{DSS}$ , $V_{GS}=0\text{V}$                         |      |      | 100  | $\mu\text{A}$    |
| $I_{GSS}$    | Gate- Source Leakage Current      | $V_{GS}=V_{GSS}$ , $V_{DS}=0\text{V}$                         |      |      | 30   | $\mu\text{A}$    |
| $C_{iss}$    | Input Capacitance                 | $V_{DS}=75\text{V}$ , $V_{GS}=0\text{V}$ ,<br>$f=1\text{MHz}$ |      | 22.0 |      | nF               |
| $C_{oss}$    | Output Capacitance                |                                                               |      | 2.76 |      | nF               |
| $C_{rss}$    | Reverse Transfer Capacitance      |                                                               |      | 0.10 |      | nF               |

## Switching Characteristics

| Switching Characteristics |                                                      |                                                                                                                   |  |      |      |     |
|---------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--|------|------|-----|
| Q <sub>g</sub>            | Total Gate Charge                                    | I <sub>D</sub> =280A, V <sub>DS</sub> =75V,<br>V <sub>GS</sub> =10V                                               |  | 0.32 |      | μC  |
| Q <sub>gs</sub>           | Gate-Source Charge                                   |                                                                                                                   |  | 0.13 |      | μC  |
| Q <sub>gd</sub>           | Gate-Drain (Miller) Charge                           |                                                                                                                   |  | 0.09 |      | μC  |
| t <sub>d(on)</sub>        | Turn-on Delay Time                                   | V <sub>DS</sub> =75V, I <sub>D</sub> =280A;<br>R <sub>g</sub> =1.2Ω; V <sub>GS</sub> =10V;<br>T <sub>J</sub> =25℃ |  | 28   |      | ns  |
| t <sub>r</sub>            | Rise Time                                            |                                                                                                                   |  | 38   |      | ns  |
| t <sub>d(off)</sub>       | Turn-off Delay Time                                  |                                                                                                                   |  | 50   |      | ns  |
| t <sub>f</sub>            | Fall Time                                            |                                                                                                                   |  | 16   |      | ns  |
| R <sub>θJC</sub>          | MOSFET Thermal Resistance: Junction-to-Case(Per Leg) |                                                                                                                   |  |      | 0.15 | ℃/W |

## Electrical Characteristics of Body Diode ( $T_J=25^{\circ}\text{C}$ unless otherwise specified)

| Symbol   | Description             | Conditions                                               |                          | Min. | Typ. | Max. | Units         |
|----------|-------------------------|----------------------------------------------------------|--------------------------|------|------|------|---------------|
| $V_{SD}$ | Forward Voltage         | $I_S=280\text{A}$ , $V_{GS}=0\text{V}$                   | $T_J=25^{\circ}\text{C}$ |      | 0.9  | 1.2  | V             |
| $t_{rr}$ | Reverse Recovery Time   | $I_S=280\text{A}$ ,<br>$di/dt=210\text{A}/\mu\text{s}$ , | $T_J=25^{\circ}\text{C}$ |      | 145  |      | ns            |
| $Q_{rr}$ | Reverse Recovery Charge |                                                          | $T_J=25^{\circ}\text{C}$ |      | 2.00 |      | $\mu\text{C}$ |

## Module Internal Resistance Characteristics

| Symbol | Description             | Conditions                                  | Min. | Typ. | Max. | Units                         |
|--------|-------------------------|---------------------------------------------|------|------|------|-------------------------------|
| R      | R Value                 |                                             |      | 1    |      | $\text{M}\Omega$              |
| $t_c$  | Temperature Coefficient | $20^{\circ}\text{C}\sim 60^{\circ}\text{C}$ | -100 |      | +100 | $\text{ppm}/^{\circ}\text{C}$ |



## Module

| Symbol             | Description                                        |                    | Min.                           | Typ. | Max. | Units |
|--------------------|----------------------------------------------------|--------------------|--------------------------------|------|------|-------|
| V <sub>iso</sub>   | Isolation Voltage<br>(All Terminals Shorted)       | AC 50Hz, RMS, 1min | 2500                           |      |      | V     |
| Internal Isolation |                                                    |                    | Al <sub>2</sub> O <sub>3</sub> |      |      |       |
| T <sub>Jmax</sub>  | Maximum Junction Temperature                       |                    |                                |      | 175  | °C    |
| T <sub>JOP</sub>   | Operating Junction Temperature Range               |                    | -40                            |      | +150 | °C    |
| T <sub>stg</sub>   | Storage Temperature Range                          |                    | -40                            |      | +125 | °C    |
| CTI                | Comparative Tracking Index                         |                    | 200                            |      |      |       |
| R <sub>θCS</sub>   | Case-to-Sink Thermally (Conductive Grease Applied) |                    |                                |      | 0.12 | °C/W  |
| T                  | Power Terminal Screw:M5                            |                    | 3.0                            |      | 5.0  | N·m   |
| T                  | Mounting Screw:M6                                  |                    | 4.0                            |      | 6.0  | N·m   |
| G                  | Weight                                             |                    |                                | 93   |      | g     |

## Ordering Information Table

|             |    |     |    |    |    |   |
|-------------|----|-----|----|----|----|---|
| Device code | MM | 560 | SG | 15 | A9 | H |
|             | ①  | ②   | ③  | ④  | ⑤  | ⑥ |

- ① - MOSFET Module
- ② - Rated Current (560=560A)
- ③ - Circuit Configuration (Single Switch)
- ④ - Rated Voltage (15=150V)
- ⑤ - Package Type
- ⑥ - Test Level (Pass the Important Reliability Test-Industrial Grade)

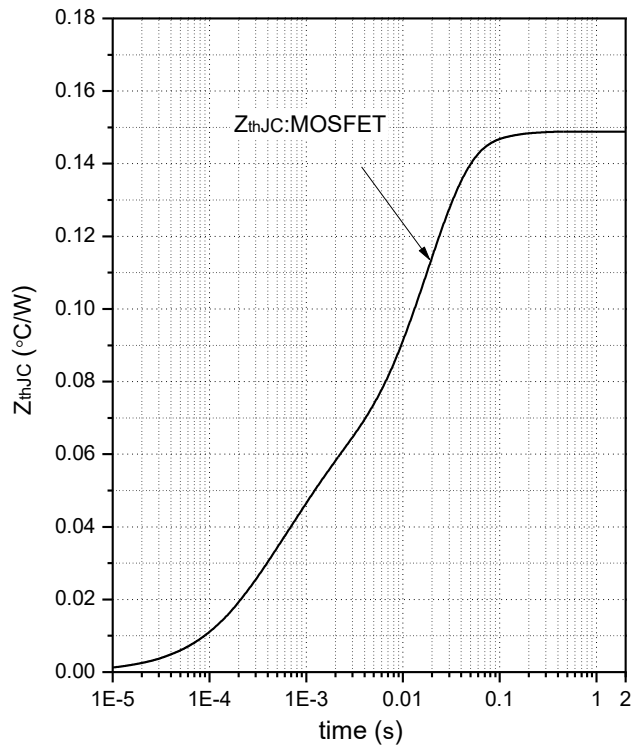


Fig.1 Transient Thermal Impedance





| Revision | Notes                            |
|----------|----------------------------------|
| 01       | Initial Release                  |
| 02       | Update Electrical Characteristic |

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