# Datasheet

## 3300 V Silicon Carbide MOSFET Half-Bridge Module

## Features

- **Electrical features**
- $V_{DSS}$ = 3300 V
- $I_{DN}$ = 1200 A / $I_{DRM}$ = 2400 A
- $T_{vj,op}$ = 175 °C
- Low switching losses
- Low inductive design
- 10 µs short circuit withstand capability
- **Mechanical features**
- High power density
- AlSiC base plate for increased thermal cycling capability
- AlN substrate with low thermal resistance
- High creepage and clearance distances

## Potential Applications

- Traction drives
- High-power converters
- High-frequency switching application
- Wind power and energy storage converters

## Product Validation

- Qualified for industrial applications according to the relevant tests of IEC 60747, 60749 and 60068

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | **3300** | V |
| Continuous Drain Current | $I_{DN}$ | **1200** | A |
| Drain-Source On-Resistance @ 25 °C | $R_{DS(on)}$ | **1.65** | mΩ |
| Isolation Test Voltage | $V_{ISOL}$ | **6.0** | kV |

## Description

The SCM1200B33H is a 3300 V silicon carbide MOSFET half-bridge power module. The module integrates two SiC MOSFET switches with intrinsic body diodes in a low-inductive package with AlSiC base plate, designed for high-power conversion applications.

## Circuit Configuration

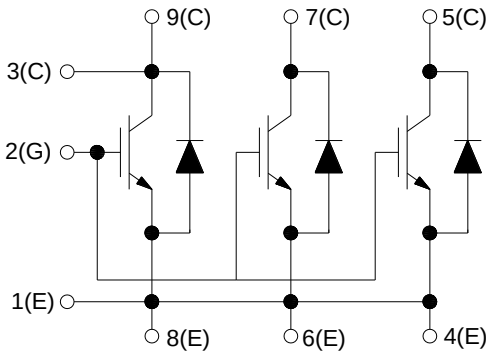



Fig. 1 Circuit configuration

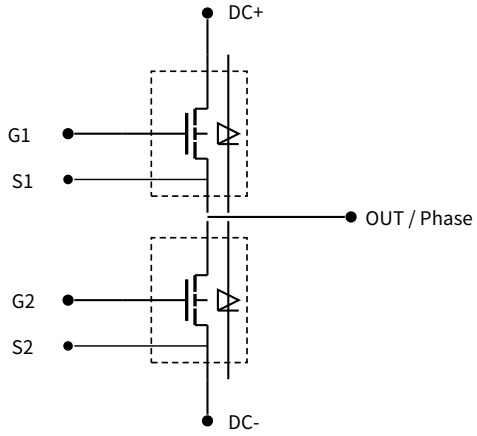



Fig 2. Internal circuit (half-bridge)


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# 1 Package

**Table 1 Insulation coordination**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| Isolation test voltage | VISOL | RMS, f = 50 Hz, t = 1 min | 6.0 | kV |
| Partial discharge | QPD | IEC 1287, V1 = 3500 V, V2 = 2600 V, 50 Hz RMS | 10 | pC |
| Material of module baseplate | | | AlSiC | |
| Internal isolation | | basic insulation (class 1, IEC 61140) | AlN | |
| Storage temperature | Tstg | | -40 ~ 150 | °C |
| Maximum baseplate operation temperature | TBPmax | | 150 | °C |

**Table 2 Creepage and clearance distances**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| Creepage distance, terminal to heatsink | | | 33.0 | mm |
| Creepage distance, terminal to terminal | | | 34.0 | mm |
| Clearance, terminal to heatsink | | | 20.0 | mm |
| Clearance, terminal to terminal | | | 20.0 | mm |
| Comparative tracking index | CTI | | > 600 | |

**Table 3 Thermal and mechanical values**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| Thermal resistance, junction to case | RthJC | per MOSFET | 8.4 | K/kW |
| | | per body diode | 12.8 | K/kW |
| Thermal resistance, case to heatsink | RthCH | per module, mounting torque 5 N・m, thermal grease 1 W/m・K | 6 | K/kW |
| Mounting torque | M | Mounting – M6 | 5 | N・m |
| | | Electrical connections – M4 | 2 | N・m |
| | | Electrical connections – M8 | 10 | N・m |




Figure 3. Module appearance


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## 2 MOSFET

**Table 4 Maximum rated values**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| Drain-source voltage | VDSS | Tvj = 25 °C | 3300 | V |
| Implemented drain current | IDN | | 1200 | A |
| Continuous DC drain current | IDDC | Tvj = 175 °C, VGS = 15 V, TC = 25 °C | 1100 | A |
| Repetitive peak drain current | IDRM | tp limited by Tvjmax | 2400 | A |
| Maximum power dissipation | Ptot | Tvj = 150 °C, TC = 25 °C | 14.8 | kW |
| Short circuit current | ISC | VDS = 2500 V, VGS ⩽ 15 V, tp ⩽ 10 µs, Tvj = 150 °C | 6700 | A |
| Gate-source voltage, max. transient voltage | VGS | D < 0.01 | -10/+23 | V |
| Gate-source voltage, max. static voltage | VGS | | -7/+20 | V |

**Table 5 Recommended values**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| On-state gate voltage | VGS(on) | | 15 ⋯ 18 | V |
| Off-state gate voltage | VGS(off) | | -5 | V |

**Table 6 Characteristic values (based on batch measurement)**

| Parameter | Symbol | Note or test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-source on-state resistance | RDS(on) | ID = 800 A, VGS = 18 V, Tvj = 25 °C | | 1.65 | 1.75 | mΩ |
| | | ID = 800 A, VGS = 18 V, Tvj = 150 °C | | 5.0 | | mΩ |
| Gate threshold voltage | VGS(th) | ID = 400 mA, VDS = VGS, Tvj = 25 °C | 2.7 | 2.9 | 3.1 | V |
| | | ID = 400 mA, VDS = VGS, Tvj = 150 °C | | 2.2 | | V |
| Drain-source leakage current | IDSS | VDS = 3300 V, Tvj = 25 °C | | 0.31 | 0.4 | mA |
| | | VDS = 3300 V, Tvj = 150 °C | | 2.2 | 3.0 | mA |
| Gate-source leakage current | IGSS | VDS = 0 V, VGS = +22 V, Tvj = 25 °C | | 2 | 900 | nA |
| | | VDS = 0 V, VGS = +22 V, Tvj = 150 °C | | 90 | 400 | nA |
| Temperature under switching conditions | Tvj op | | -40 | | 175 | °C |

**Table 7 Dynamic characteristic values (reference)**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| Input capacitance | Ciss | VDS = 25 V, VGS = 0 V, f = 100 kHz | 158 | nF |
| Reverse transfer capacitance | Crss | VDS = 25 V, VGS = 0 V, f = 100 kHz | 3.7 | nF |
| Gate charge | Qg | VGS = ±15 V | 14 | µC |
| Module stray inductance | Ls | | 5 | nH |
| Module lead resistance, terminal to chip | RCC'+EE' | | 140 | µΩ |

**Table 8 Switching characteristic values (reference)**

Test conditions: ID = 1500 A, VDS = 1800 V, VGS = ±15 V, RG(on) = 1.0 Ω, RG(off) = 1.5 Ω, CGE = 330 nF, LS = 180 nH.

| Parameter | Symbol | Tvj = 25 °C | Tvj = 125 °C | Tvj = 150 °C | Unit |
|---|---|---|---|---|---|
| Turn-on delay time | td(on) | 550 | 585 | 585 | ns |
| Rise time | tr | 355 | 363 | 370 | ns |
| Turn-on energy loss | Eon | 1360 | 1730 | 2000 | mJ |
| Turn-off delay time | td(off) | 2450 | 2530 | 2550 | ns |
| Fall time | tf | 1300 | 2050 | 2260 | ns |
| Turn-off energy loss | Eoff | 2365 | 2930 | 3100 | mJ |


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# 3 Body Diode (MOSFET)

**Table 9 Maximum rated values**

| Parameter | Symbol | Note or test condition | Value | Unit |
|---|---|---|---|---|
| DC body diode forward current | ISD | Tvj = 175 °C, VGS = -5 V | 1200 | A |
| Repetitive peak forward current | IFRM | tp = 1 ms | 2400 | A |
| $I^2t$-value | $I^2t$ | VDS = 0 V, tp = 10 ms, Tvj = 150 °C | 720 | $kA^2s$ |

**Table 10 Characteristic values (based on batch measurement)**

| Parameter | Symbol | Note or test condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Forward voltage | VSD | ISD = 800 A, Tvj = 25 °C | | 1.78 | 1.85 | V |
| | | ISD = 800 A, Tvj = 150 °C | | 2.98 | | V |

**Table 11 Reverse recovery characteristic values (reference)**

Test conditions: IF = 1500 A, VDS = 1800 V, -diF/dt = 3700 A/µs.

| Parameter | Symbol | Tvj = 25 °C | Tvj = 125 °C | Tvj = 150 °C | Unit |
|---|---|---|---|---|---|
| Recovered charge | Qrr | 1130 | 1700 | 1950 | µC |
| Peak reverse recovery current | Irr | 1460 | 1580 | 1660 | A |
| Reverse recovery energy | Erec | 1490 | 2310 | 2700 | mJ |

# 4 Appendix: Batch Test Data

Static test results of production samples (Lot 26MHT8015, tested 11.Sep. 2026). Values below are the averages of the tested samples (4 pcs at 25 °C, 5 pcs at high temperature). High-temperature data measured at TC ≈ 153 ~ 160 °C.

**Table 12 Static parameters @ Tvj = 25 °C (average of 4 pcs)**

| Parameter | Test condition | Unit | Average |
|---|---|---|---|
| VGS(th) | ID = 400 mA, VDS = VGS | V | 2.892 |
| IGSS (+) | VGS = +22 V | nA | 0.93 |
| IGSS (-) | VGS = -8 V | nA | -0.40 |
| IDSS | VDS = 3300 V | µA | 310 |
| RDS(on) | ID = 800 A, VGS = 18 V | mΩ | 1.65 |
| VSD | ISD = 800 A | V | 1.776 |

**Table 13 Static parameters @ TC ≈ 150 °C (average of 5 pcs)**

| Parameter | Test condition | Unit | Average |
|---|---|---|---|
| VGS(th) | ID = 400 mA, VDS = VGS | V | 2.17 |
| IGSS (+) | VGS = +22 V | nA | 38 |
| IDSS | VDS = 3300 V | mA | 2.15 |
| RDS(on) | ID = 794 A, VGS = 18 V | mΩ | 5.03 |
| VSD | ISD = 794 A | V | 2.975 |

**Table 14 AC isolation test (f = 50 Hz, t = 1 min, average of 4 pcs)**

| Item | Average | Unit |
|---|---|---|
| Test voltage | 6.02 | kV |
| Leakage current | 2.58 | mA |
| Result | Pass | |


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## 5 Package Outline

All dimensions in mm.

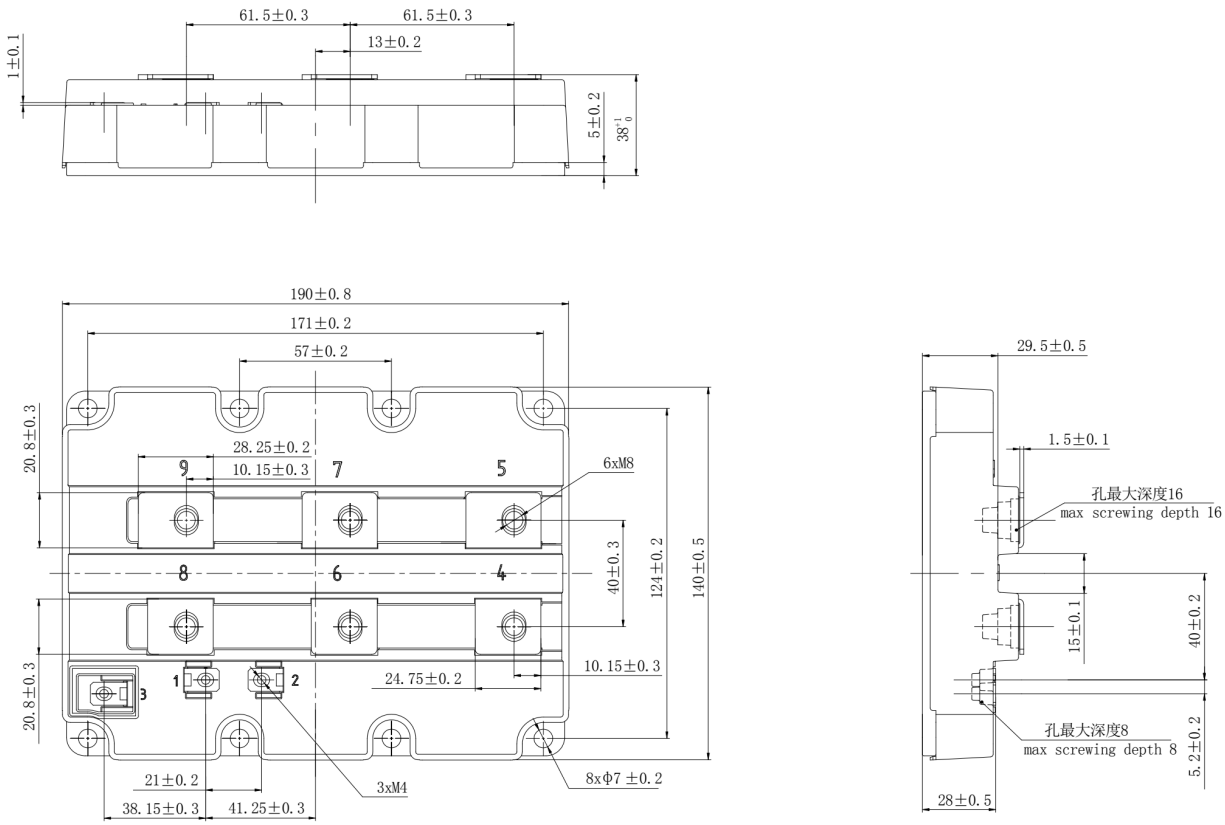



Figure 4. Package outline

## Revision History

| Revision | Date of Release | Description of Changes |
|---|---|---|
| V1.0 | 12.Oct. 2025 | Initial release |

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