

Datasheet

3300 V Silicon Carbide MOSFET Half-Bridge Module

Features

• Electrical features

- $V_{DSS} = 3300\text{ V}$
- $I_{DN} = 1200\text{ A} / I_{DRM} = 2400\text{ A}$
- $T_{vj,op} = 175\text{ }^{\circ}\text{C}$
- 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

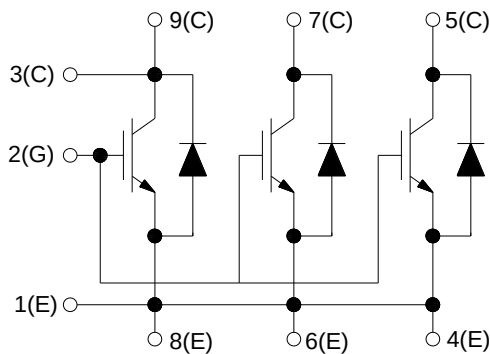


Fig. 1 Circuit configuration

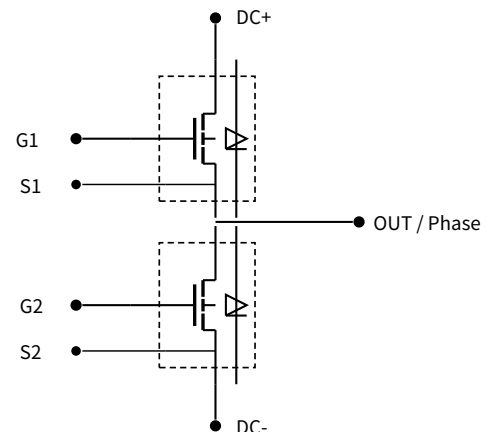


Fig. 2. Internal circuit (half-bridge)

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

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

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 ² t-value	I ² t	VDS = 0 V, tp = 10 ms, Tvj = 150 °C	720	kA ² s

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	

5 Package Outline

All dimensions in mm.

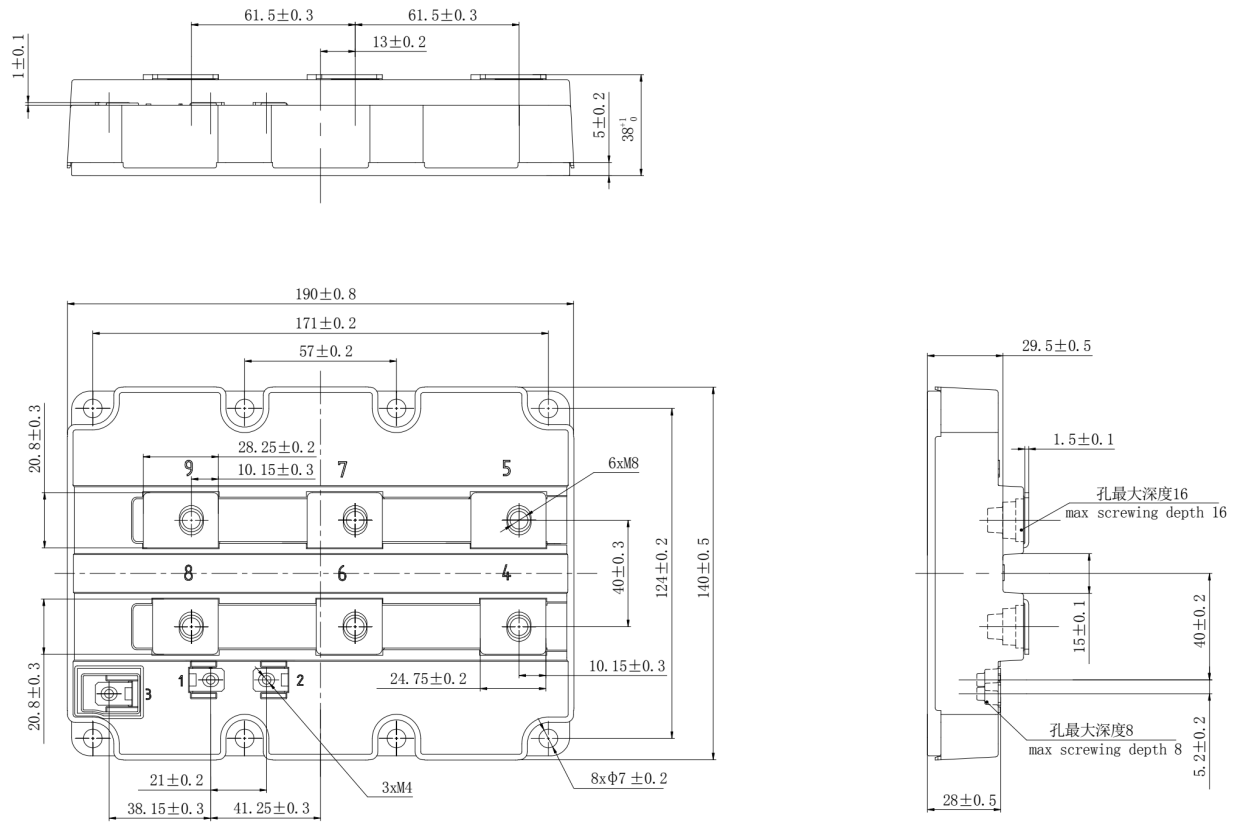


Figure 4. Package outline

Revision History

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

Disclaimer

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