iC-MB4 EVAL MB4_1D

EVALUATION BOARD DESCRIPTION

preliminary

FUNCTIONAL MODEL; EVAL-BOARD:
This device is for laboratory use only. Due to limited testing and lack of qualification for use under all conditions, long-term performance is not guaranteed. Malfunctions and operating errors may damage the device and the connected circuit; such damage may result in personal injury to the user. Safety goggles are mandatory. All liability and option of return are terminated upon activation of the device.

ORDERING INFORMATION

Type	Order Designation	Description
Evaluation Board	iC-MB4 EVAL MB4_1D	iC-MB4 Evaluation Board Ready-to-operate, accessible by GUI using PC adapter or microcontroller (not included)
Related Parts	(To be ordered separately)	
PC Adapter	iC-MB3 ICSY MB3U-I2C	PC-USB Adapter for BiSS/SSI w. I2C/SPI extension cable Download documentation at www.ichaus.com/tools

BOARD iC-MB4 EVAL MB4_1D

(size 100 mm x 80 mm)

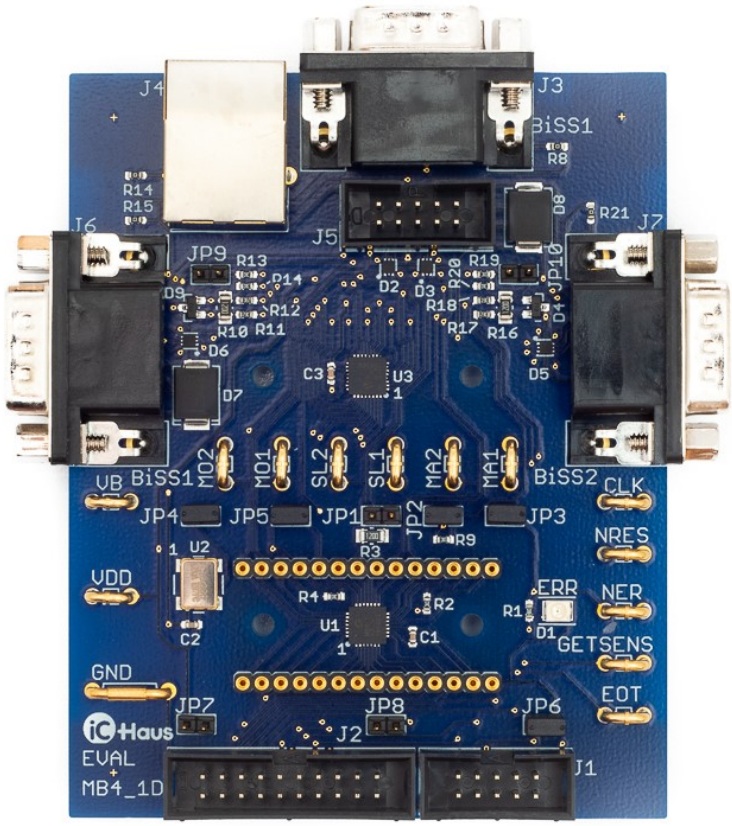

Figure 1: Evaluation board MB4_1D

RELATED PRODUCTS AND DOCUMENTS

- iC-MB4 Documentation + Software GUI for Windows
  → http://www.ichaus.de/MB4
- PC Adapter Documentation
  → https://www.ichaus.de/MB3U-I2C

CONNECTORS AND TERMINALS

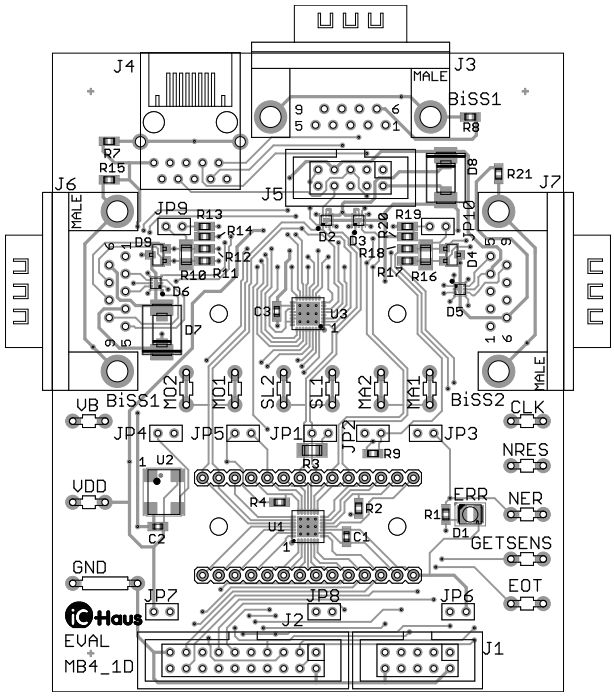

Figure 2: Component side (size 100 mm x 80 mm)

TERMINALS

Left area (top down)

VB — VB BiSS Interface Supply
Only on BiSS interface connector.

VDD — +5 V Supply Voltage Input (typ. 75 mA)
Connected to PC adapter if jumper JP6 is closed.

GND — 0 V Ground

Center area (left to right)

MO2 — BiSS Data Line Output Channel 2
MO1 — BiSS Data Line Output
SL2 — BiSS Data Line Input Channel 2
SL1 — BiSS Data Line Input
MA2 — BiSS Clock Line Output Channel 2
MA1 — BiSS Clock Line Output
Signals at MO2, SL2 and MA2 either form a second physical BiSS channel or are the inverted signals MO1, SL1 and MA1 for iC-MB4's internal differential line driver.

Right area (top down)

CLK — 20 MHz clock input
NRES — Reset input (low active)
NER — Error input/output (low active)
GETSENS — Get Sensor data input (high active, static)
EOT — End-of-Transmission output (high active)

CONNECTORS

J1 — iC-MB4 host interface SPI1
SPI interface connector to MB3U-I2C or microcontroller.

J2 — iC-MB4 host interface
Connector to all host interface pins.

Direct Connection to iC-MB4

J3 — BiSS Ch. 1 (D-Sub, RS422)
J4 — BiSS Ch. 1 (RJ45, RS422)
J5 — BiSS Ch. 1+2 (RM2x5)
J3, J4 and J5 enable direct connections between a BiSS slave and iC-MB4.

Connection to iC-MB4 through iC-HF

J6 — BiSS Ch. 1 (D-Sub, RS422)
J7 — BiSS Ch. 2 (D-Sub, RS422)
J6 and J7 enable connections between a BiSS slave and iC-MB4 via onboard line driver iC-HF.

LEDS

D1 — Error LED (red)
Connected to pin ERR of iC-MB4.

PINOUT OF CONNECTORS

J1: iC-MB4 signals

10-pin Connector - male

PIN	Name	Function
1	ALE	SPI Clock Input
2	GND	Ground
3	n.c.	Not Connected
4	VDD	+3 V . . . +5.5 V Supply Voltage
5	EOT	End-Of-Transmission Output
6	NER	Error Message Input/Output
7	MOSI	SPI Serial Data Input
8	NCS	SPI Chip Select Input
9	MISO	SPI Serial Data Output
10	GND	Ground

J2: iC-MB4 signals

20-pin Connector - male

PIN	Name	Function
1	VDD	+3 V . . . +5.5 V Supply Voltage
2	GND	Ground
3	INT_NMOT	Comm. Mode Select Input
4	CFGSPI	S/P Mode Select Input
5	NWR_E	Read Input
6	NRD_RNW	Write Input
7	NCS	SPI Chip Select Input
8	ALE	SPI Clock Input
9	DB0	SPI Serial Data Input
10	DB1	SPI Serial Data Output
11	DB1	Data Bus Input/Output
12	DB2	Data Bus Input/Output
13	DB4	SPI2 Chip Select Input
14	DB5	SPI2 Clock Input
15	DB6	SPI2 Serial Data Input
16	DB7	SPI2 Serial Data Output
17	EOT	End-Of-Transmission Output
18	GETSENS	Sensor Data Request Input
19	GND	Ground
20	VDD	+3 V . . . +5.5 V Supply Voltage

J3: BiSS Channel 1

9-pin Connector -SUB-D9 - male

PIN	Name	Function
1	VB	VB output
2	MAO	BiSS Clock Line Output
3	NMAO	BiSS Clock Line Output
4	VDD	+3 V . . . +5.5 V Supply Voltage
5	NSLO	BiSS Data Line Output
6	GND	Ground
7	SL	BiSS Data Line Input
8	NSL	BiSS Data Line Input
9	SLO	BiSS Data Line Output

J4: BiSS Channel 1

10-pin Connector -RJ45 - male

PIN	Name	Function
1	SL	BiSS Data Line Input
2	NSL	BiSS Data Line Input
3	MAO	BiSS Clock Line Output
4	SLO	BiSS Data Line Output
5	NSLO	BiSS Data Line Output
6	NMAO	BiSS Clock Line Output
7	VB	VB output
8	GND	Ground
9	SLO	BiSS Data Line Output
A	VB1	VB1 output
B	GND1	Ground1
S	GND	Ground
S1	GND	Ground

J5: BiSS Channel 1

10-pin Connector - male

PIN	Name	Function
1	VB	VB output
2	GND	Ground
3	MAO	BiSS Clock Line Output
4	SL	BiSS Data Line Input
5	NMAO	BiSS Clock Line Output
6	NSL	BiSS Data Line Input
7	VDD	+3 V . . . +5.5 V Supply Voltage
8	SLO	BiSS Data Line Output
9	NSLO	BiSS Data Line Output

J6: BiSS Channel 1

9-pin Connector -SUB-D9 - male

PIN	Name	Function
1	VB	VB output
2	MAO	BiSS Clock Line Output
3	NMAO	BiSS Clock Line Output
4	VDD	+3 V . . . +5.5 V Supply Voltage
5	NSLO	BiSS Data Line Output
6	GND	Ground
7	SL	BiSS Data Line Input
8	NSL	BiSS Data Line Input
9	SLO	BiSS Data Line Output

J7: BiSS Channel 2

9-pin Connector -SUB-D9 - male

PIN	Name	Function
1	VB	VB output
2	MAO	BiSS Clock Line Output
3	NMAO	BiSS Clock Line Output
4	VDD	+3 V . . . +5.5 V Supply Voltage
5	NSLO	BiSS Data Line Output
6	GND	Ground
7	SL	BiSS Data Line Input
8	NSL	BiSS Data Line Input
9	SLO	BiSS Data Line Output

JUMPER DESCRIPTION

OVERVIEW

JP1	Termination Resistor (120Ω)
JP2	Output Enable at J6 and J7
JP3	iC-HF and iC-MB4 error connection
JP4	Internal/External Oscillator Selector
JP5	Serial/Parallel Microcontroller Selector
JP6	VDD Supply through J1 pin 4
JP7	VDD Supply through J2 pin 20
JP8	VDD Supply through J2 pin 1
JP9	Single-ended/Differential Selector J6
JP10	Single-ended/Differential Selector J7

Jumper JP1	Function
Closed	Enables termination resistor (120Ω) between iC-MB4's data input pins SL1 and SL2_NSL1.
Open	No termination on iC-MB4's data input pins SL1 and SL2_NSL1.

Jumper JP2	Function
Closed	Output enabled on RS422 line driver iC-HF (Connectors J6 and J7).
Open	Output disabled on RS422 line driver iC-HF (Connectors J6 and J7).

Jumper JP3	Function
Closed	NER input/output of iC-MB4 connected to error output NERR of RS422 line driver iC-HF.
Open	NER input/output of iC-MB4 not connected to NERR of RS422 line driver iC-HF.

Jumper JP4	Function
Closed	Use external 20 MHz oscillator.
Open	Use internal 20 MHz oscillator.

Jumper JP5	Function
Closed	Use serial microcontroller interface (SPI) (Pin CFGSPI=1).
Open	Use parallel microcontroller interface (Pin CFGSPI=0).

Jumper JP6	Function
Closed	VDD supply through J1 pin 4.
Open	No VDD supply through J1 pin 4.

Jumper JP7	Function
Closed	VDD supply through J2 pin 20.
Open	No VDD supply through J2 pin 20.

Jumper JP8	Function
Closed	VDD supply through J2 pin 1.
Open	No VDD supply through J2 pin 1.

Jumper JP9	Function
Closed	VDD/2 at J6 pin 8 (NSL) for single-ended data input signal at J6 pin 7 (SL).
Open	Differential data line input signals at J6 pin 7 (SL) and pin 8 (NSL).

Jumper JP10	Function
Closed	VDD/2 at J7 pin 8 (NSL) for single-ended data input signal at J7 pin 7 (SL).
Open	Differential data line input signals at J7 pin 7 (SL) and pin 8 (NSL).

CIRCUIT SCHEMATIC

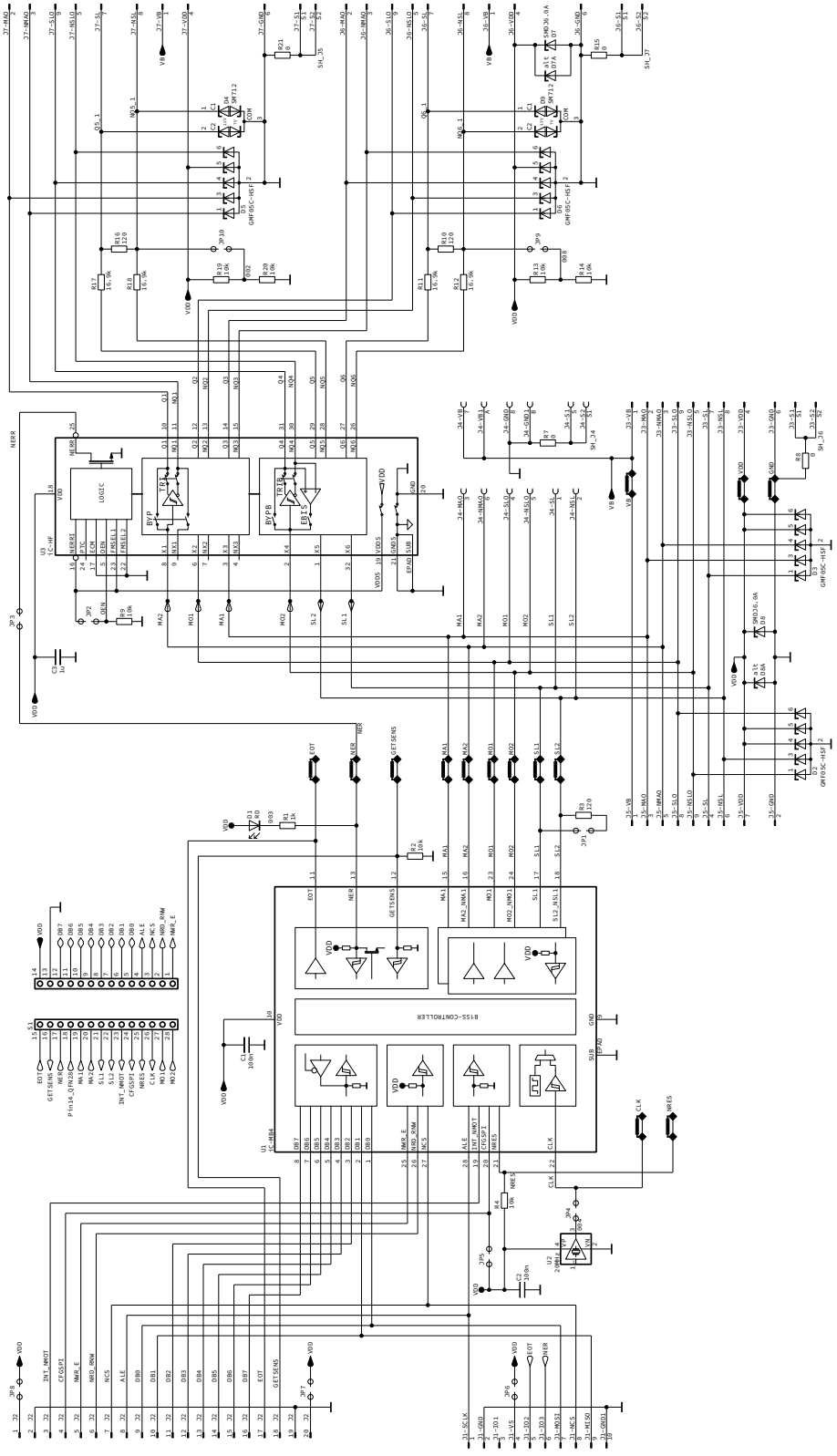

Figure 3: Circuit diagram

BOARD LAYOUT

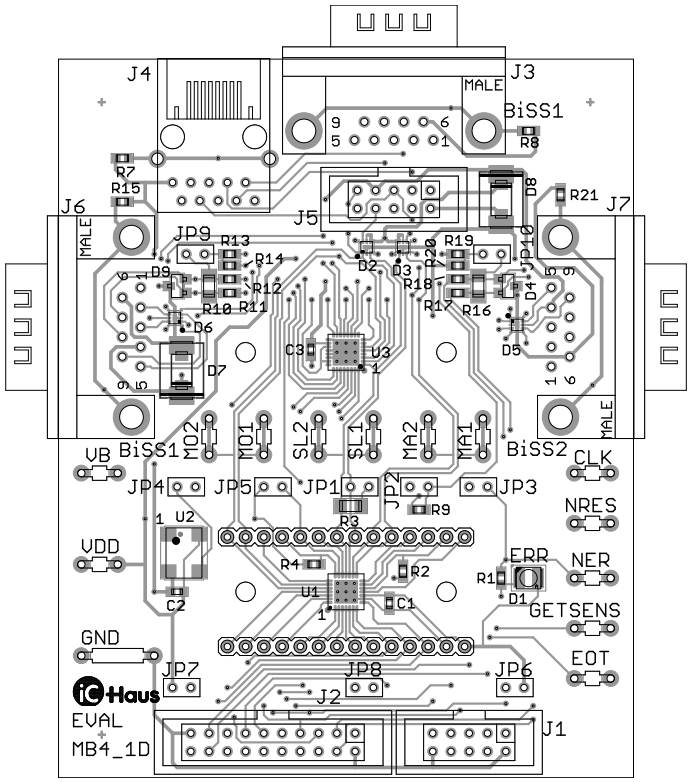

Figure 4: Board MB4_1DZ (top side)

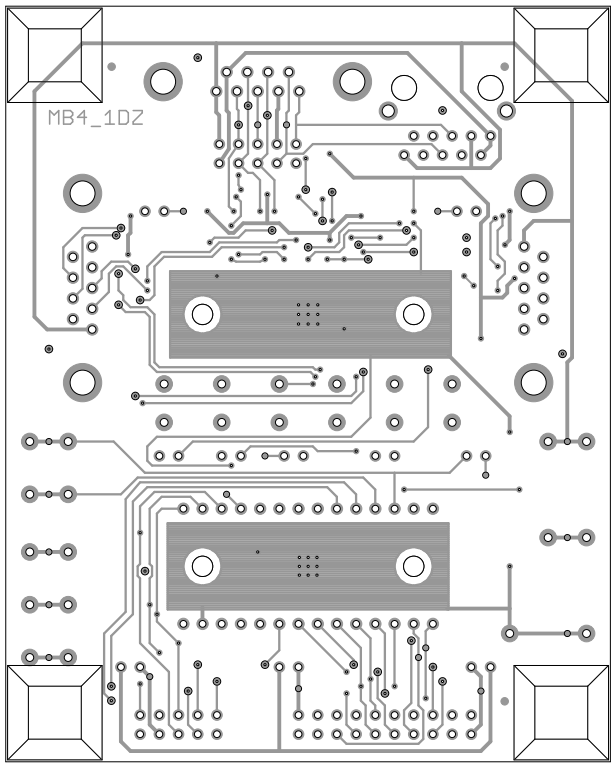

Figure 5: Board MB4_1DZ (bottom side)

ASSEMBLY PART LIST

Components	Typical Value	Comment
C1, C2	100 nF	CSMD0603
C3	1 µF	CSMD0603
D1	LED_PLCC	LED Red
D2, D3, D5, D6	GMF05C-HSF	VISHAY_LLP75-6L
D4	SM712	SOT23
D7	SMDJ6.0A	DO213AB
GND	LBA04G	TESTCLAMP_400
J1, J5	WSL 10 MALE	Connector 2x5-pole
J2	WSL 20 MALE	Connector 2x10-pole
J4	RJ45_10	Connector 8+2-pole
J3, J6, J7	D_SUB9_MALE_RH	Connector 9-pole SUBD
JP1 . . . 10	SLLP10972G	Connector 2x1-pole
R1	1 kΩ	RSMD0603
R11, R12, R17, R18	16.9 KΩ	RSMD0603
R3, R10, R16	120 Ω	RSMD1206
R2, R4, R9, R13, R14, R19, R20	10 KΩ	RSMD0603
R7, R8, R15, R21	0 Ω	RSMD0603
S1	Socket 14x1-Pin	2 X_S14X1 DIL28_2X_S14X1 (MK0114G)
U1	iC-MB4	iC-MB4 QFN28 5x5
U2	20 MHz Quartz	OSC4_SMD_7X5 SMD-Oscillator 20 MHz 50 ppm 5V 7 mm x 5 mm
U3	iC-HF	iC-HF QFN32 5x5
VB, VDD, MA1, MA2, MO1, MO2, NER, MRES, SL1, SL2, EOT, GETSENS, CLK	LBA02G	TESTCLAMP_200

REVISION HISTORY

Rel.	Rel. Date*	Chapter	Modification	Page
A1	2014-04-28		initial version	

Rel.	Rel. Date*	Chapter	Modification	Page
A2	2015-07-07		BiSS BUA added	1
		BOARD MB4_1D	MB3U-I2C supplies via JP6 not JP3	1

Rel.	Rel. Date*	Chapter	Modification	Page
A3	2021-11-30	ORDERING INFORMATION	Removed BUA note.	1
		BOARD iC-MB4 EVAL MB4_1D	Added chapter and top view picture of Added chapter MB4_1D.	1
		CONNECTORS AND TERMINALS	Updated layout. Reordered and updated TERMINALS and CONNECTORS.	2
		CIRCUIT SCHEMATIC	Updated schematic.	5
		JUMPER DESCRIPTION	Updated jumper description and added default jumper setting.	4
		BOARD LAYOUT	Added chapter	6
		ASSEMBLY PART LIST	Updated assembly part list.	7

* Release Date format: *YYYY-MM-DD*