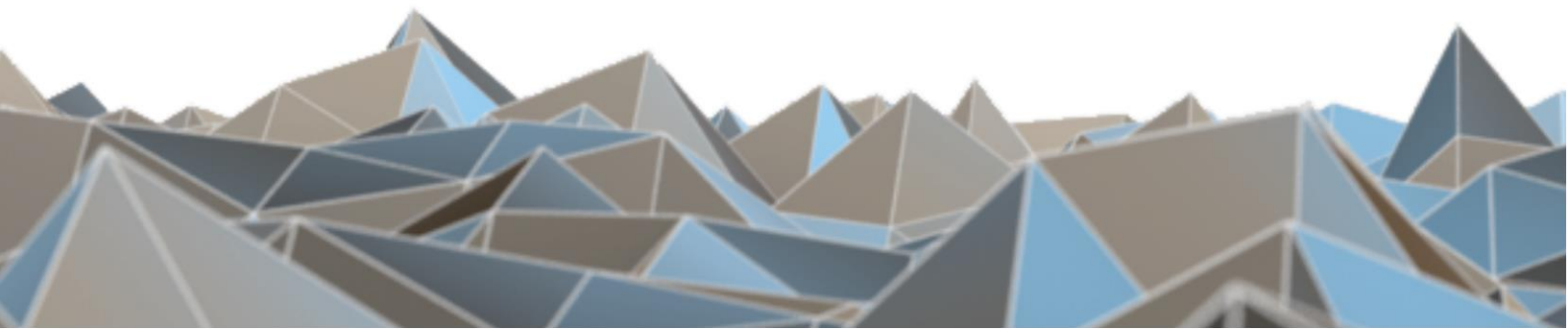


BLUETECHNIX
Embedding Ideas

IF Basic Board

Hardware User Manual

Version 2



Contact

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Information

For further information on technology, delivery terms and conditions and prices please contact Bluetechnix (<http://www.bluetechnix.com>).

Warning

Due to technical requirements components may contain dangerous substances.

1 General Information

This guide applies to the IF Basic Board from Bluetechnix GmbH. Follow this guide chapter by chapter to set up and understand your product.

The document applies to the X-Grade product.

1.1 Symbols Used

This guide makes use of a few symbols and conventions:



Warning

Indicates a situation which, if not avoided, could result in minor or moderate injury and/or property damage or damage to the device.



Caution

Indicates a situation which, if not avoided, may result in minor damage to the device, in malfunction of the device or in data loss.



Note

Notes provide information on special issues related to the device or provide information that will make operation of the device easier.

Procedures

A procedure always starts with a headline

1. The number indicates the step number of a certain procedure you are expected to follow. Steps are numbered sequentially.

This sign ➤ indicates an expected result of your action.

References

 This symbol indicates a cross reference to a different chapter of this manual or to an external document.

1.2 Certification



X-Grade Version

X-Grade version of the products are not intended for sale and have therefore no certifications. The user is responsible for a correct usage in order with federal laws.

2 Introduction

2.1 Overview

The IF Basic Board is a low cost rapid development platform designed to decrease time-to-market of customized applications. It supports Bluetechnix' TIM (sensor) and LIM (illumination) ToF modules. The development board provides all interfaces on dedicated connectors or pinheads.

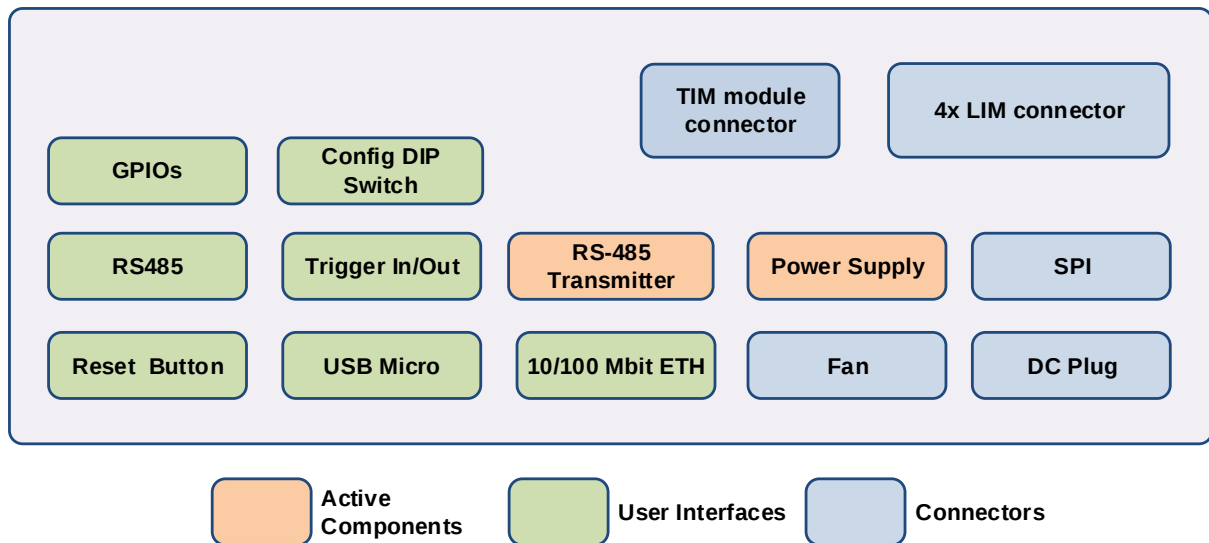


Figure 2-1 Overview of the main components

2.2 Key Features

- Size: 286 x 96,6mm
- 100-Pin TIM Module Connector
- 4 x 20-Pin LIM Module Connector
- RS485 Interface
- USB Micro Interface
- 1 Inputs (with galvanic isolation, up to 50V input voltage)
- 1 Outputs (with galvanic isolation)
- Trigger In/Out
- SPI and Fan interface on pinheads
- 10/100 Mbit Connector
- Configuration DIP Switch
- Reset button
- 18V-30V power supply

Be aware that the support of the interfaces depends on the mounted TIM module. Refer to the documentation of the TIM module to know which interfaces are supported.

2.2.1 Active components

- RS-485 Transceiver (ISL3179)
- Stepdown Converter (MPM3620, LM25116)



3 General Description

The following chapters describes the functions of the board interfaces.

- a LIM Module connectors
- b TIM Module connector
- c Fan interface (connector not populated)
- d SPI interface (connector not populated)
- e Power connector
- f Illumination enable switch
- g Trigger In/Out
- h RS485 interface
- i GPIO connector
- j USB Connector
- k Ethernet connector
- l Boot-mode button
- m Reset button

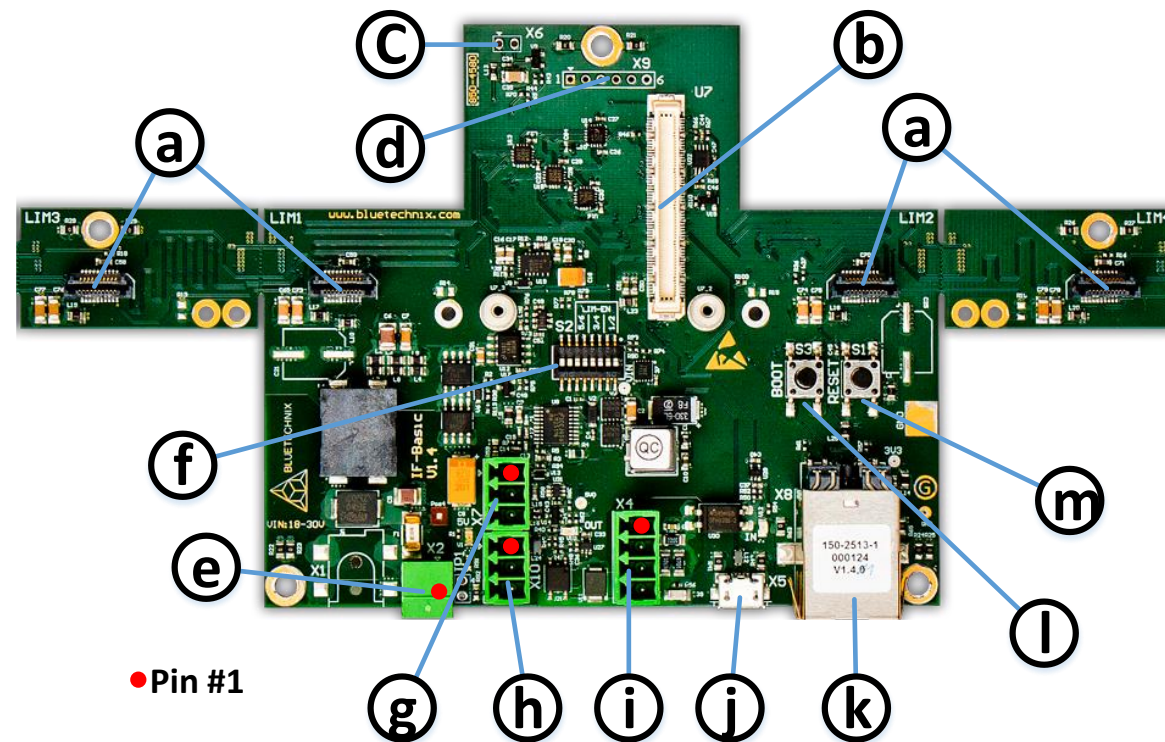


Figure 3-1: Overview

3.1 Functional Description

3.1.1 TIM Module Connector (b)

The IF Basic Board provides a 100 pin connector to connect a TIM module to it **(b)**.

For further information see Hardware User Manual of TIM Module.

3.1.2 LIM Module Connector (a)

The IF Basic Board provides up to six 20 pin connector to connect LIM modules to it **(a)**.

For further information see Hardware User Manual of LIM Module.

3.1.3 Power Supply (e)

The IF Basic Board must be powered by an external 18V-30V power supply connected to power connector **(e)**.

Pin assignment of the power connector:

Pin #1: +18V-30V, Pin#2: GND

3.1.4 FAN Interface (c)

A fan PWM interface (controlled by the TIM module) is available on two solder pads **(c)**. (2.54mm pitch)

3.1.5 USB Connector (j)

A USB Connector **(j)** is available on the IF-Basic board.



Note

The USB Interface is not supported by every TIM module. Please refer to the corresponding TIM Hardware User Manual.

3.1.6 Reset Button (Factory default reset) (m)

A Reset button (m) is available on the Interface Board. A short press onto the switch results in a normal System Reset. Pressing the switch for longer than 5 seconds resets the firmware settings back to the factory default settings.

3.1.7 Boot Mode Button (l)

By keeping the Boot Mode Button pressed while resetting the board, some TIM modules can be forced to enter in a bootloader mode. Refer to the TIM user manuals for a detailed description.

The functionality of this interface depends on the mounted TIM.

3.1.8 Trigger Interface (g)

The IF Basic Board provides a trigger interface **(g)**.

Pin	Function
1	GND
2	Trigger In
3	Trigger Out

The functionality of this interface depends on the mounted TIM.

3.1.9 GPIOs (i)

One galvanic isolated input and one galvanic isolated output are available on the IF Basic Board. The current status of the GPIOs are shown by Status LEDs (IN, OUT).

Pin	Function
1	Input1
2	Input2
3	Output1
4	Output2



Warning

Do not exceed the maximum allowed voltages and currents. (see 4.1.1)

3.1.10 SPI (d)

The SPI interface of the TIM module is available on pinheads **(d)**.

The functionality of this interface depends on the mounted TIM.

3.1.11 RS485 (h)

A RS485 interface is available on the IF Basic Board. The 120R termination resistor can be activated by shorting jumper **(n)**.

Pin	Function
1	RS485_B
2	RS485_A
3	GND

The functionality of this pins depends on the mounted TIM.

3.1.12 Configuration Switch (f)

Switch No.	Switch Position	Commend
1 or 2	ON	Modulation signal to LIM1 and LIM2 enabled
1 and 2	OFF	Modulation signal to LIM1 and LIM2 disabled
3 or 4	ON	Modulation signal to LIM3 and LIM4 enabled
3 and 4	OFF	Modulation signal to LIM3 and LIM4 disabled
5 to 8	ON/OFF	No function

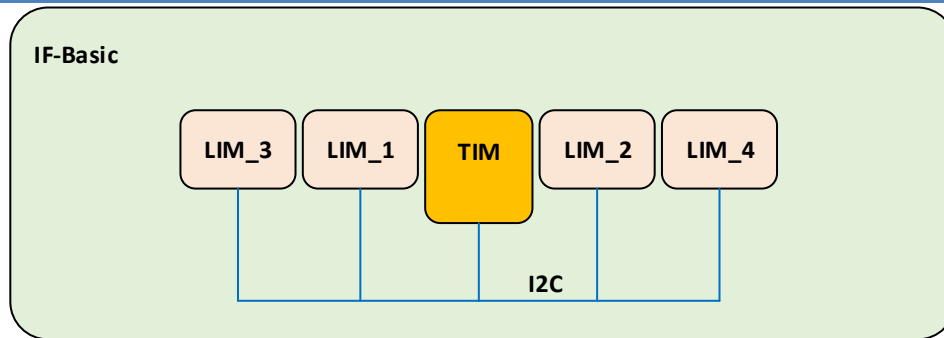


Figure 3-2: Default LIM address settings



Warning

Enable the modulation signals only if the corresponding LIM module is connected to the IF Basic board.

3.1.13 Ethernet Connector (k)

A 10/100Mbit Ethernet connector **(k)** is available on the IF-Basic board.



Note

The Ethernet Interface is not supported by every TIM module. Please refer to the corresponding TIM Hardware User Manual.

4 Specifications

4.1 Electrical Specifications

4.1.1 Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
V_{IN}	Power supply voltage	18	24	30	V
$P^{1)}$	Power consumption			200	mW
V_{OC}	Allowed level on open collector output pins	5		50	V
I_o	Output current on output pins	-200		200	mA
V_GPIO_{IH}	High level input voltage	2.5		50	V
V_GPIO_{IL}	Low level input voltage	0		2.4	V
$V_Trigger_{IH}$	High level input voltage Trigger In	10		30	V
$V_Trigger_{IL}$	Low level input voltage Trigger IN	0		5	V
T_{OP}	Operating temperature on PCB	-20		65	°C
Φ_{AMB}	Relative ambient humidity (non condensing)	0		90	%

Table 4.1: Electrical characteristics

Note 1) Average power consumption without any TIM- and LIM-Module plugged in.

4.1.2 Absolute Maximum Ratings

Stressing the device above the rating listed in the absolute maximum ratings table may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or any other conditions greater than those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min	Max	Unit
V_{IN}	Power supply voltage	-0.3	30	V
P_{TOT}	Maximum power consumption		TBD	W
T_{AMB}	Ambient temperature	-20	65	°C
T_{STO}	Storage temperature	-55	125	°C
Φ_{AMB}	Relative ambient humidity	0	90	%

Table 4.2: Absolute maximum ratings

4.1.3 ESD Sensitivity



ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

5 Connector Description

5.1 TIM Module connector

Pin #	Type	Level	Signal name	Description
1	I	3V3	ISM.nDE	ISM Output enable
2	O	3V3	ISM.D11	ISM Data Bit 11 (MSB)
3	O	3V3	ISM.D10	ISM Data Bit 10
4	O	3V3	ISM.D9	ISM Data Bit 9
5	O	3V3	ISM.D8	ISM Data Bit 8
6	PWR		GND	Ground
7	O	3V3	ISM.D7	ISM Data Bit 7
8	O	3V3	ISM.D6	ISM Data Bit 6
9	O	3V3	ISM.D5	ISM Data Bit 5
10	O	3V3	ISM.D4	ISM Data Bit 4
11	PWR		GND	Ground
12	-		Reserved	
13	O	3V3	ISM.D3	ISM Data Bit 3
14	O	3V3	ISM.D2	ISM Data Bit 2
15	O	3V3	ISM.D1	ISM Data Bit 1
16	O	3V3	ISM.D0	ISM Data Bit 0 (LSB)
17	O	3V3	ISM.STROBE	ISM Strobe signal, used as Trigger Out
18	I	3V3	ISM.TRIGGER	ISM Trigger In signal
19	O	3V3	ISM.HSYNC	ISM Frame valid (HSYNC)
20	O	3V3	ISM.VSYNC	ISM Line valid (VSYNC)
21	O	3V3	ISM.PCLK	ISM Pixel clock
22	PWR		GND	Ground
23	-		Reserved	
24	I	3V3	ISM.SDA	ISM Configuration bus data signal
25	I	3V3	ISM.SCL	ISM Configuration bus clock signal
26	I	3V3	ISM.nRESET	ISM Reset signal
27	I	3V3	FACT.RESET	Register Map will be reset to factory default (low active)
28	I	3V3	ISM.SADDR	ISM Slave address
29	PWR		GND	Ground
30				Not used
31				Not used
32	PWR		GND	
33				Not used
34				Not used
35	PWR		GND	
36				Not used
37				Not used
38	PWR		GND	
39				Not used
40				Not used
41	PWR		GND	
42				Not used
43				Not used

Pin #	Type	Level	Signal name	Description
44	I/O	3V3	I2CM2.SDA	I2C Secondary Master Data Signal
45	I/O	3V3	I2CM2.SCL	I2C Secondary Master Clock Signal
46	I	3V3	UART.RX	UART Receive
47	O	3V3	UART.TX	UART Transmit
48				Not used
49				Not used
50	O	3V3	LED.EN	LED Enable
51	O	3V3	LED.SMOD	LIM Single ended mod signal
52	I/O	3V3	LED.IO1	LIM Single-wire communication bus 1
53	PWR		GND	Ground
54				Not used
55				Not used
56	PWR		GND	Ground
57	I/O	3V3	GPIO.3	GPIO 3
58	I/O	3V3	GPIO.2	GPIO 2
59	I/O	3V3	GPIO.1	GPIO 1
60	I/O	3V3	LED.IO2	LIM Single-wire communication bus 2
61	O	3V3	GETH.LED2	Ethernet Link LED
62	O	3V3	GETH.LED1	Ethernet Activity LED
63	PWR		GND	Ground
64	I/O	3V3	GETH.TXR_X_A_N	Ethernet differential pair A (100Mbit TX_N)
65	I/O	3V3	GETH.TXR_X_A_P	Ethernet differential pair A (100Mbit TX_P)
66	I/O	3V3	GETH.TXR_X_B_N	Ethernet differential pair B (100Mbit RX_N)
67	I/O	3V3	GETH.TXR_X_B_P	Ethernet differential pair B (100Mbit RX_P)
68	PWR		GND	
69				Not used
70				Not used
71	PWR		GND	
72				Not used
73				Not used
74				Not used
75				Not used
76	I/O	3V3	SPI.SCLK	SPI Clock signal
77	I/O	3V3	SPI.SIO0	SPI Data 0
78	I/O	3V3	SPI.SIO1	SPI Data 1
79	I/O	3V3	SPI.nCS	SPI Chip select
80	O	3V3	PWM.OUT	Fan PWM Output
81	-		Reserved	
82	-		Reserved	
83	PWR		GND	Ground
84				Not used
85				Not used
86				Not used
87				Not used
88	PWR		GND	Ground
89	I/O	3V0	USB.D_N	USB Data differential pair
90	I/O	3V0	USB.D_P	USB Data differential pair
91				Not used

Pin #	Type	Level	Signal name	Description
92				Not used
93	I/O	3V3	I2CM1.SCL	I2C Primary Master Clock Signal
94	I/O	3V3	I2CM1.SDA	I2C Primary Master Data Signal
95	PWR		GND	Ground
96	PWR		GND	Ground
97	PWR	5V0	VIN	Voltage input
98	PWR	5V0	VIN	Voltage input
99	PWR	5V0	VIN	Voltage input
100	PWR	5V0	VIN	Voltage input
101	PWR		GND	Ground
102	PWR		GND	Ground
103	PWR		GND	Ground
104	PWR		GND	Ground
105	PWR		GND	Ground
106	PWR		GND	Ground
107	PWR		GND	Ground
108	PWR		GND	Ground
109	PWR		GND	Ground
110	PWR		GND	Ground

Table 5.1 Pin-out of the TIM module connector

5.2 LIM Module connector

The following table shows the pin-out of the 20-pin LIM Module connector:

Pin #	Type	Signal name	Description
1	PWR	PGND	Power Ground
2	PWR	VIN	Input Voltage
3	PWR	PGND	Power Ground
4	PWR	VIN	Input Voltage
5	PWR	PGND	Power Ground
6	PWR	VIN	Input Voltage
7	PWR	PGND	Power Ground
8	PWR	VIN	Input Voltage
9	PWR	PGND	Power Ground
10	PWR	VIN	Input Voltage
11	O	PWM	FAN PWM Output
12	I	SADDR0	Slave address pin 0
13	I	SADDR1	Slave address pin 1
14	I/O	OWIRE	1-Wire communication interface
15	PWR	3V3	3V3 Power supply
16	I	LED_MOD_N	LVDS Mod light signal N
17		I/O	I2C.SDA
18	I	LED_MOD_P	LVDS Mod light signal P
19	I	I2C.SCL	I2C Clock
20	I	LP.Enable	LED Power Enable

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7 Support

7.1 General Support

General support for products can be found at Bluetechnix' support site <http://support.bluetechnix.at>

8 Product History

8.1 Version Information

Version	Information
1.1.0	First release
1.2.0	Additional temperature sensor for better compensation results
1.4.0	Design limited to 4 LIMS New clock distribution, (better thermal behavior, no offset if some LIMs are disabled) LIMs can only be pairwise enabled/disabled

Table 8.1: Overview IF Basic Board product changes

8.2 Anomalies

Version	Date	Description
V1.1, V1.2	2015 10 23	Distance offset changes depending on how many LIMs are enabled

Table 8.2 – Product anomalies

9 Document Revision History

Version	Date	Document Revision
1	2015 03 23	First release V1.0 of the Document
2	2016 05 03	Changes for hardware revision V1.4

Table 9.1: Revision history

10 List of Abbreviations

Abbreviation	Description
ESD	Electrostatic Discharge
GPIO	General Purpose Input Output
I	Input
I²C	Inter-Integrated Circuit
I/O	Input/Output
MTBF	Mean Time Between Failure
NC	Not Connected
O	Output
PWR	Power
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus

Table 10.1: List of abbreviations

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