BL1U

BiSS LINE-TO-PC USB Adapter

preliminary

FEATURES

- Hardware implemented *BiSS Line* protocol
- Supported interfaces: *BiSS Line* 2-wire and 4-wire
- USB 2.0 high speed PC interface
- API for Windows: *BiSS* interface DLL
- Fast real-time data communication (12.5 MHz BiSS Line)
- Field capable design: box, field interfaces, USB powered
- Galvanic isolation
- Power supply for external applications:
  10 V supply with up to 80 mA (USB powered),
  7 V . . . 12 V supply with up to 420 mA (externally powered)

APPLICATIONS

- *BiSS Line* application development using iC-BL
- *BiSS Line* debugging using iC-BL

SYSTEM VIEW

DESCRIPTION

BL1U is a high speed *BiSS Line*-to-PC USB adapter intended to evaluate and implement the *BiSS Line* protocol using integrated circuits of iC-Haus. With the protocol converter iC-BL, its corresponding evaluation board and GUI software, data of *BiSS C*, SPI and I2C sensors can be transmitted securely using the robust 2-wire or 4-wire communication. The adapter provides a differential, galvanically isolated *BiSS Line* master interface and is compatible to USB 2.0. Drivers for windows 10 and Linux are provided.

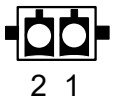
2-Wire/4-Wire BiSS Line Connector:

- *BiSS Line* protocol support
- Built-in RS485 transceivers
- Fixed 12.5 MBit/s data transfer rate, half duplex operation
- Suitable for up to 8 slaves
- Adapter powered via USB or externally
- Connected *BiSS Line* slave devices can be powered via BL1U
  10 V supply with up to 80 mA (USB powered)
  7 V ... 12 V supply with up to 420 mA (externally powered)
- Galvanic isolation
- Drivers available for Microsoft Windows and Linux (x86-64)

Figure 1: iC-BL iCSY BL1U

CONNECTORS

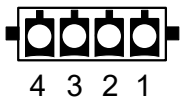
PIN CONFIGURATION
BiSS Line 2-wire interface



PIN FUNCTIONS

No.	Name	Function
1	PL	*BiSS Line* 2-wire positive line PWR + positive communication signal
2	NL	*BiSS Line* 2-wire negative line GND + negative communication signal

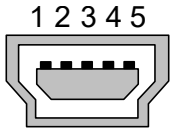
PIN CONFIGURATION
BiSS Line 4-wire interface



PIN FUNCTIONS

No.	Name	Function
1	PWR	*BiSS Line* power supply
2	PL	*BiSS Line* 4-wire positive communication signal
3	NL	*BiSS Line* 4-wire negative communication signal
4	GND	Ground (0 V)

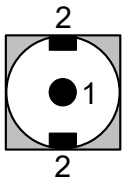
PIN CONFIGURATION
Mini USB



PIN FUNCTIONS

No.	Name	Function
1	VCC	5 V USB supply
2	D-	Data -
3	D+	Data +
4	ID	Identifier: A = GND, B n.c.
5	GND	Ground (0 V)

PIN CONFIGURATION
External power supply socket (5.5 mm x 2.1 mm)



PIN FUNCTIONS

No.	Name	Function
Center Pin	EXT	*BiSS Line* slave power supply input (7 V . . . 12 V)
Ring Contact	GND	Ground (0 V)

ABSOLUTE MAXIMUM RATINGS

These ratings do not imply operating conditions; functional operation is not guaranteed. Beyond these ratings device damage may occur.

Item No.	Symbol	Parameter	Conditions	Min.	Max.	Unit
G001	VUSB	USB Power Supply	In accordance to the USB specification; depends on USB host supply of adapter and cabling		5.5	V
G002	I(VUSB)	Maximum Current Consumption from USB	In accordance to the USB specification		500	mA
G003	VEXT	External Power Supply Input	External power supply from socket connector	-0.3	13	V
G004	I(VEXT)	Maximum Current Consumption from External Power Supply Input			500	mA
G005	VGI	Galvanic Isolation	VGI = V(GND_USB) - V(GND_BiSS) Humidity 5% non condensating, 20°C, isolated surface		±500	V
G006	Vout()	Output Voltage at PWR	No reverse supply permitted	-0.3	13	V
G007	Vd()	ESD Susceptibility at all pins	HBM 100 pF discharged through 1.5 kΩ		2	kV

THERMAL DATA

Item No.	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
T01	Ta	Operating Ambient Temperature Range		0		50	°C
T02	RH	Relative Humidity	non condensating	5		95	%
T03	Ts	Storage Temperature		0		50	°C

All voltages are referenced to ground unless otherwise stated.
All currents flowing into the device pins are positive; all currents flowing out of the device pins are negative.

ELECTRICAL CHARACTERISTICS

Operating conditions: VUSB = 4.5...5.5 V, T = 0 . . . 50 °C, all voltages referenced to ground, unless otherwise noted.

Item No.	Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
External Power Supply Input (EXT)							
101	VEXT	External Power Supply Input Voltage from Socket Connector		7		12	V
102	I(VEXT)	Maximum Current Consumption from External Socket Connector				500	mA
BiSS LINE 2-WIRE INTERFACE - Field Inputs (PL, NL)							
201	Vin()diff	Differential Input Voltage at PL and NL	Vin()diff = Vin(PL) - Vin(NL)	-5.8		5.8	V
202	fin	Communication Frequency	50% duty cycle		12.5		MHz
203	Rin	Input Termination between PL and NL			120		Ω
BiSS LINE 2-WIRE INTERFACE - Field Outputs (PL, NL)							
301	Vout()	Output Voltage at PL		4		15	V
302	Vout()	Output Voltage at NL		-3		3	V
303	Iout()	Output Current at PL	USB power supply External power supply (see Elec. Char. 101)			80 420	mA mA
304	$Vout()diff_{dc}$	Differential DC Output Voltage at PL and NL	USB power supply External power supply (see Elec. Char. 101)		10	 VEXT	V V
305	$Vout()diff_{ac}$	Differential AC Output Voltage at PL and NL.	Differential Output Voltage at PL and NL without offset $Vout()diff_{dc}$	1.5	2.5	5.5	V
306	fout	Communication Frequency	50% duty cycle		12.5		MHz
BiSS LINE 4-WIRE INTERFACE - Field RS-485 Input (PL, NL)							
401	Vin()	Input Voltage at PL and NL		-3.5		8.5	V
402	Vin()diff	Differential Input Voltage at PL and NL	Vin()diff = Vin(PL) - Vin(NL)	-5.8		5.8	V
403	fin	Communication Frequency	50% duty cycle		12.5		MHz
404	Rin	Input Termination between PL and NL			120		Ω
BiSS LINE 4-WIRE INTERFACE - Field RS-485 Outputs (PL, NL)							
501	Vout()	Output Voltage at PL and NL		0		5.5	V
502	$Vout()diff_{dc}$	Differential DC Output Voltage at PL and NL			GND		V
503	$Vout()diff_{ac}$	Differential AC Output Voltage at PL and NL	Differential Output Voltage at PL and NL without offset $Vout()diff_{dc}$	1.5	2.5	5.5	V
504	fout	Communication Frequency	50% duty cycle		12.5		MHz
BiSS LINE 4-WIRE INTERFACE - Field Power Supply Output (PWR)							
601	Vout()	Output Voltage at PWR	USB power supply External power supply (see Elec. Char. 101)		10	 VEXT	V V
602	Iout()	Output Current at PWR	no load on PL and NL; USB power supply External power supply (see Elec. Char. 101)			 80 420	 mA mA

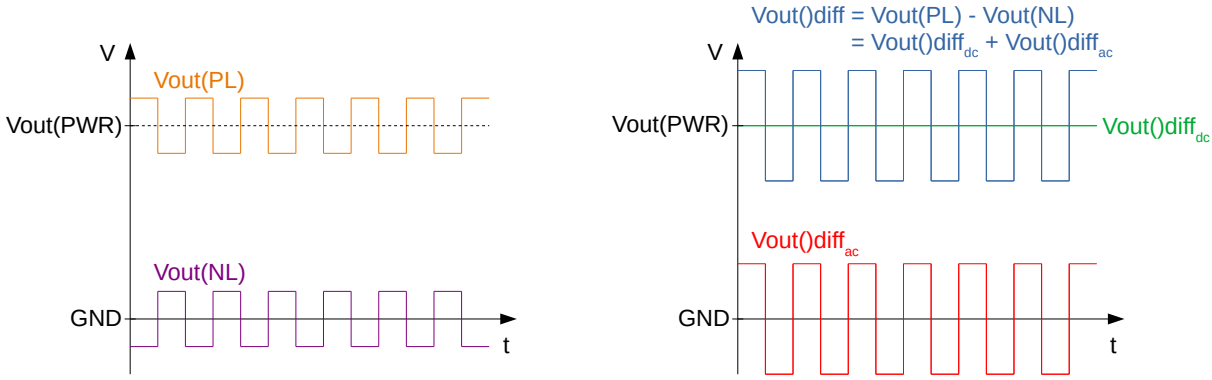


Figure 2: Single-ended (left) and differential output voltages (right) at 2-wire interface.

Figure 3: Single-ended (left) and differential output voltages (right) at 4-wire interface.

GALVANIC ISOLATION

BL1U provides PWR, GND and the *BiSS Line* signals PL and NL with both a 2-wire and a 4-wire interface. The BL1U field GND is galvanically isolated from the host (USB) GND. Thus, the communication is independent from ground loops and potential differences.

Note:
BL1U is galvanically isolated. A common GND potential (field and host) is not required.

POWER SUPPLY IN 2-WIRE AND 4-WIRE CONFIGURATION

The *BiSS Line* supply voltage PWR, GND, and the communication signals PL and NL are dedicated pins in the 4-wire configuration.
In a 2-wire configuration, the positive communication signal is modulated onto PWR and the result output at pin PL. Equally, the negative communication signal is modulated onto GND level and the result output at pin NL.

After allocation and initialization of the BL1U adapter, the PWR output voltage can be configured by software. The PWR output voltage can either be USB powered, externally powerered, or disabled.

Note:
BL1U is protected against reverse power supply into PWR. If the current consumption of the connected *BiSS Line* slaves is above specification, an external power supply is required.

BiSS LINE MASTER IP IMPLEMENTATION

The BL1U is based on the *BiSS Line* Master IP core. This implementation is suitable for connecting up to 8 *BiSS Line* slave devices to the adapter. *BiSS Line* uses a fixed 12.5 MHz half duplex RS485 communication. The BL1U has an internal data buffer which is located between the *BiSS Line* Master IP and the USB IP. The data is transferred block-wise to the PC for analysis, documentation, data processing, etc.

Note:
A precompiled netlist of the *BiSS Line* Master IP core is available on request. The IP core is suitable for own *BiSS Line* Master implementations in an FPGA. For further information contact iC-Haus GmbH.

SENSOR SUPPLY THROUGH USB

When using the USB power supply, the output voltage and current at PWR depend on the connected PC, USB port and USB cable. In critical applications regarding sensor supply voltage and high sensor current consumption the USB cable may cause a crucial voltage drop. Since the USB current capability is also limited, an external power supply is recommended.

Note:
In critical applications it is recommended

- to reduce the USB cable length,
- to select a high quality USB cable with sufficient current capability,
- and to use an external power supply.

PCB AND CABLE CONNECTORS

To simplify start-up with BL1U the appropriate printed-circuit board connectors for a 2-wire and a 4-wire *BiSS Line* cable to interface the adapter are enclosed in the evaluation box.

BiSS Line interface connector at BL1U:

- 2-wire:
  Phoenix Contact IMC 1,5/ 2-G-3,5 RN P20 THR
  (Art. No. 1830566)
- 4-wire:
  Phoenix Contact IMC 1,5/ 4-G-3,5 RN P20 THR
  (Art. No. 1830582)

Enclosed printed-circuit board connector for BiSS Line cable:

- 2-wire:
  Phoenix Contact IFMC 1,5/ 2-ST-3,5-RF
  (Art. No. 1844219)
- 4-wire:
  Phoenix Contact IFMC 1,5/ 4-ST-3,5-RF
  (Art. No. 1844235)

To supply BL1U with an external laboratory power supply a DC Adapter is enclosed in the evaluation box.

BiSS LINE SOFTWARE

- Software GUI (with/without LabVIEW™ RTE)
  → BL_1SO_gui_rte
  → BL_1SO_gui

The iC-BL Software GUI built with LabVIEW™ requires the LabVIEW™ Run-Time Engine (RTE). The RTE must be installed only once, hence there are two download links available.

EU DECLARATION OF CONFORMITY

EU Konformitätserklärung
EU Declaration of Conformity

1.	Gerätetyp/Produkt *Apparatus model/Product*	USB 2.0 <–> BiSSLine Adapter / BL1U
2.	Name und Anschrift des Herstellers *Name and address of the manufacturer*	Gottinger Instruments GmbH Ilzleite 34 94034 Passau Germany
3.	Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. *This declaration of conformity is issued under the sole responsibility of the manufacturer.*	
4.	Gegenstand der Erklärung *Object of the declaration*	BL1U

5. Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union. *The object of the declaration described above is in conformity with the relevant Union harmonisation legislation.*

RICHTLINIE 2014/30/EU DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 26. Februar 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit

DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

6. Angabe der einschlägigen harmonisierten Normen, die zugrunde gelegt wurden, einschließlich des Datums der Norm, oder Angabe anderer technischer Spezifikationen, für die die Konformität erklärt wird, einschließlich des Datums der Spezifikation:
References to the relevant harmonised standards used, including the date of the standard, or references to the other technical specifications, including the date of the specification, in relation to which conformity is declared:

DIN EN 55032:2016-02; VDE 0878-32:2016-02 Elektromagnetische Verträglichkeit von Multimediageräten und -einrichtungen - Anforderungen an die Störaussendung (CISPR 32:2015); Deutsche Fassung EN 55032:2015

DIN EN 55035:2018-04;VDE 0878-35:2018-04 Elektromagnetische Verträglichkeit von Multimediageräten - Anforderungen zur Störfestigkeit (CISPR 35:2016, modifiziert); Deutsche Fassung EN 55035:2017

7.	Nicht zutreffend. *No applicable.*	
8.	Zusatzangaben *Additional information*	--
	Unterzeichnet für und im Namen von: *Signed for and on behalf of:*	Gottinger Instruments GmbH Ilzleite 34 94034 Passau Germany
	Ort und Datum der Ausstellung: *Place and date of issue*	Passau, 30.November 2021
	Name und Funktion *name, function*	Reinhard Gottinger, CEO

Figure 4: EU Declaration of Conformity

REVISION HISTORY

Rel.	Rel. Date*	Chapter	Modification	Page
A1	2022-03-28	All	Initial Release	all

Rel.	Rel. Date*	Chapter	Modification	Page
A2	2024-01-17	DESCRIPTION	Updated description and added top view figure	2
		CONNECTORS	Updated pin configuration pictures	3
		BiSS LINE SOFTWARE	Updated links	8

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

ORDERING INFORMATION

Type	Package	Options	Order Designation
BL1U	Size approx. 69 mm x 22 mm x 100 mm Aluminium blue anodized	The box includes: - BL1U, - Cable USB (Type A ↔ Mini B), - 2-wire PCB connector: Phoenix Contact IFMC 1,5/ 2-ST-3,5-RF (Item No. 1844219), - 4-wire PCB connector: Phoenix Contact IFMC 1,5/ 4-ST-3,5-RF (Item No. 1844235), - DC Adapter: Delock 5.5 x 2.1 mm male (Item No. 65523)	iC-BL iCSY BL1U

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E-Mail: dispo@ichaus.com

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