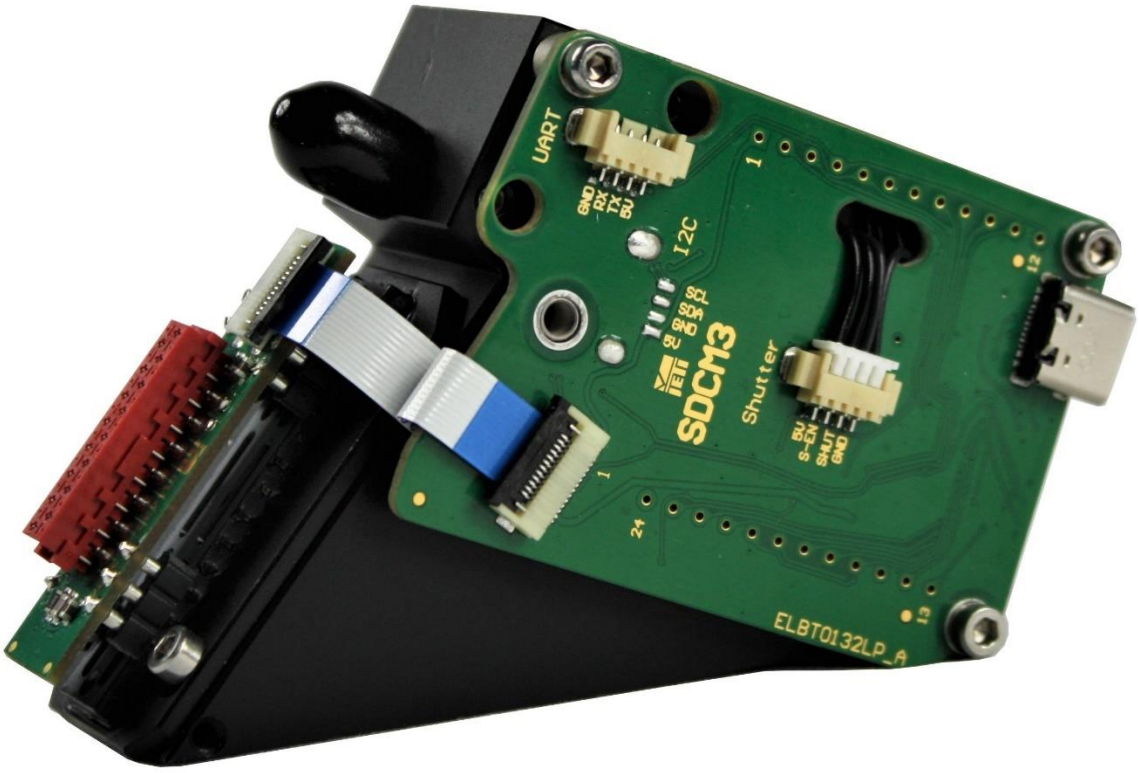
Operating Instructions

JETI Spectrometer

DE50 basic



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1. Introduction

DE50 basic broadband OEM spectrometer is a flat field spectrograph combined with JETI processing electronics for data acquisition and internal calculations. Its miniaturized shape makes it suitable for laboratory as well as industrial use.

DE50 basic covers the wavelength range of ***350*** nm to ***1050*** nm.

Acquisition and analysis of data can be done by the PC software JETI VersaSpec. The connection to the PC works via USB interface (virtual COM port). It is also possible to communicate directly with the instrument via DLLs. Detailed helping information for this application is included on USB flash drive. Furthermore, the instrument can be driven by SCPI-like firmware commands. The command list is also available on the USB flash drive.

PC Requirements:

- Processor (x86/x64) with 1 GHz or faster with 2 or more cores, min. 8 GB RAM
- Graphic resolution: min. 1280 * 720, 32-bit colour depth recommended
- Windows 10/11

Scope of Delivery:

- Device with protection cap
- Operating instructions
- USB flash drive with PC software *JETI VersaSpec*, DLLs, operating instructions and firmware command list
- USB-C to USB-A cable
- Female terminal housing 4p and pre-crimped cables for UART Interface
- Fit protocol

Optionally:

- Shutter Add-On
- Slit substitution: different optical slit
- Add-on PCB for Bluetooth, LAN, Laser and battery support (on request)

2. Security recommendations

Before any operation, please read the following safety precautions to avoid any possible bodily injury and to prevent the device from damage. To avoid any contingent danger, this device has to be used only within the specified ranges.

- Avoid using liquid cleaners.
- Avoid touching the electronic circuits.
- Don´t spill liquids of any kind on the device.
- If any mechanical damages on the device are detected, please contact JETI.

3. Driver installation

No manual USB driver installation is necessary when using the USB-Connection. The DE50 basic works with the standard USB driver, which is already integrated in Windows 10 and 11.
This driver is installed automatically when the device is connected to the PC for the first time.

If problems occur you can download the virtual COM port driver from FTDI Ldt. here for the operating system used:
https://ftdichip.com/drivers/vcp-drivers/

3.1. How to open the device manager on Windows 10/ 11

The Windows *Device Manager* shows information about the devices installed on your computer.

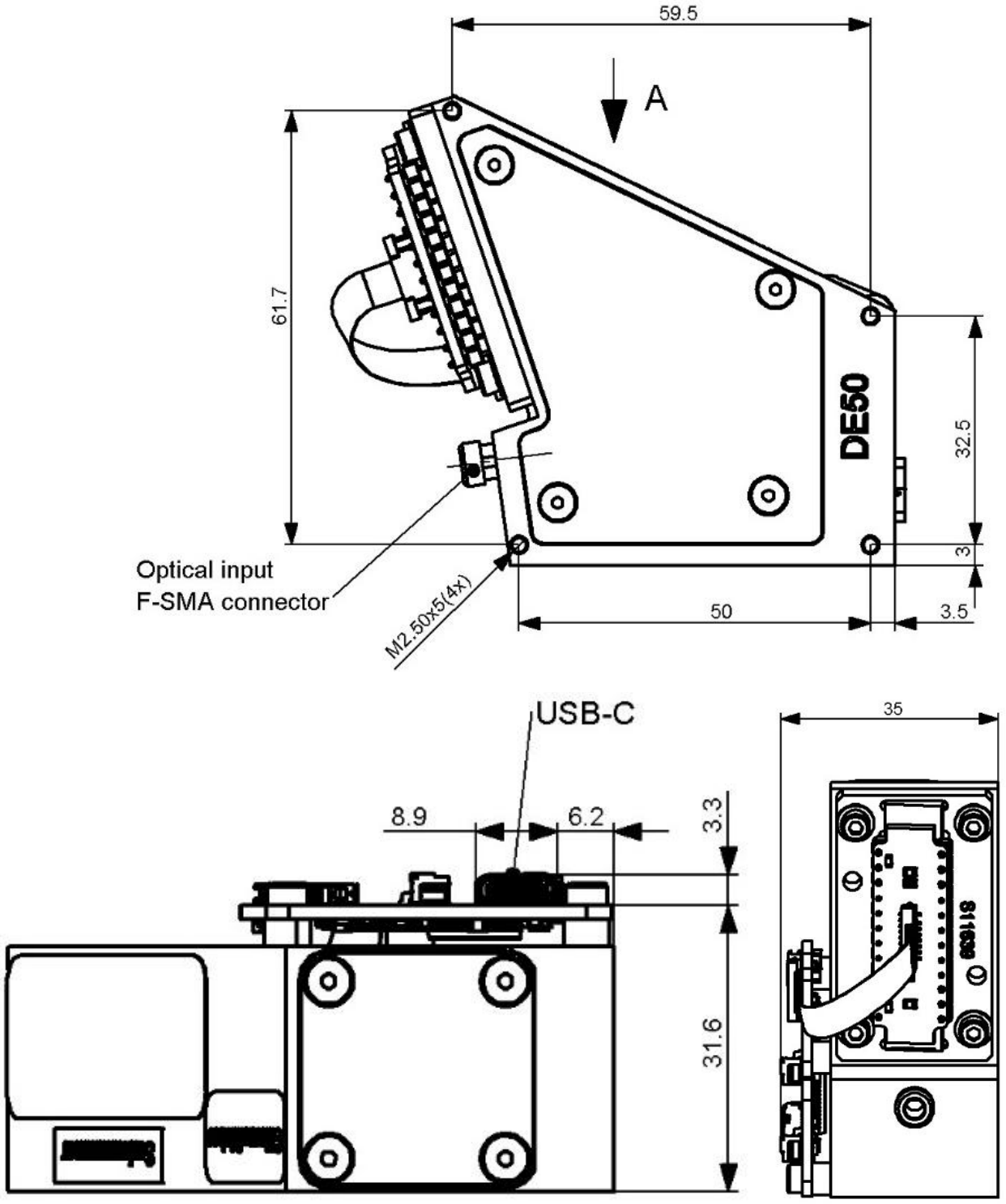
There are several ways to open the *Device Manager*, depending on the Windows version and the settings of Windows. The easiest of them is:

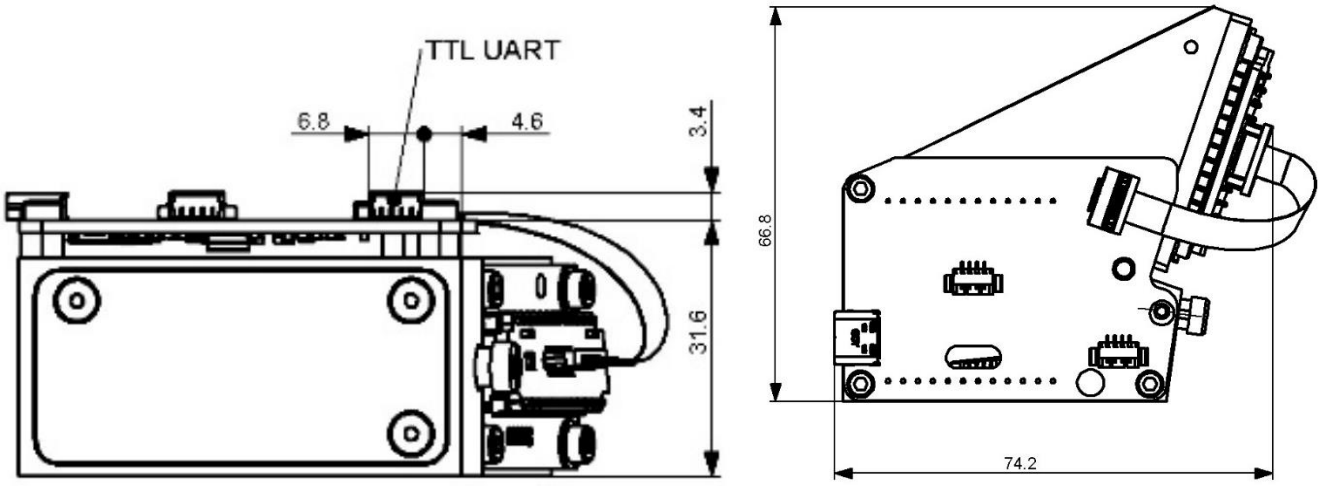
- Find the Start icon in the middle or left end of the taskbar and click on it with the right mouse button.
- In the window that appears, click on the Device Manager entry.

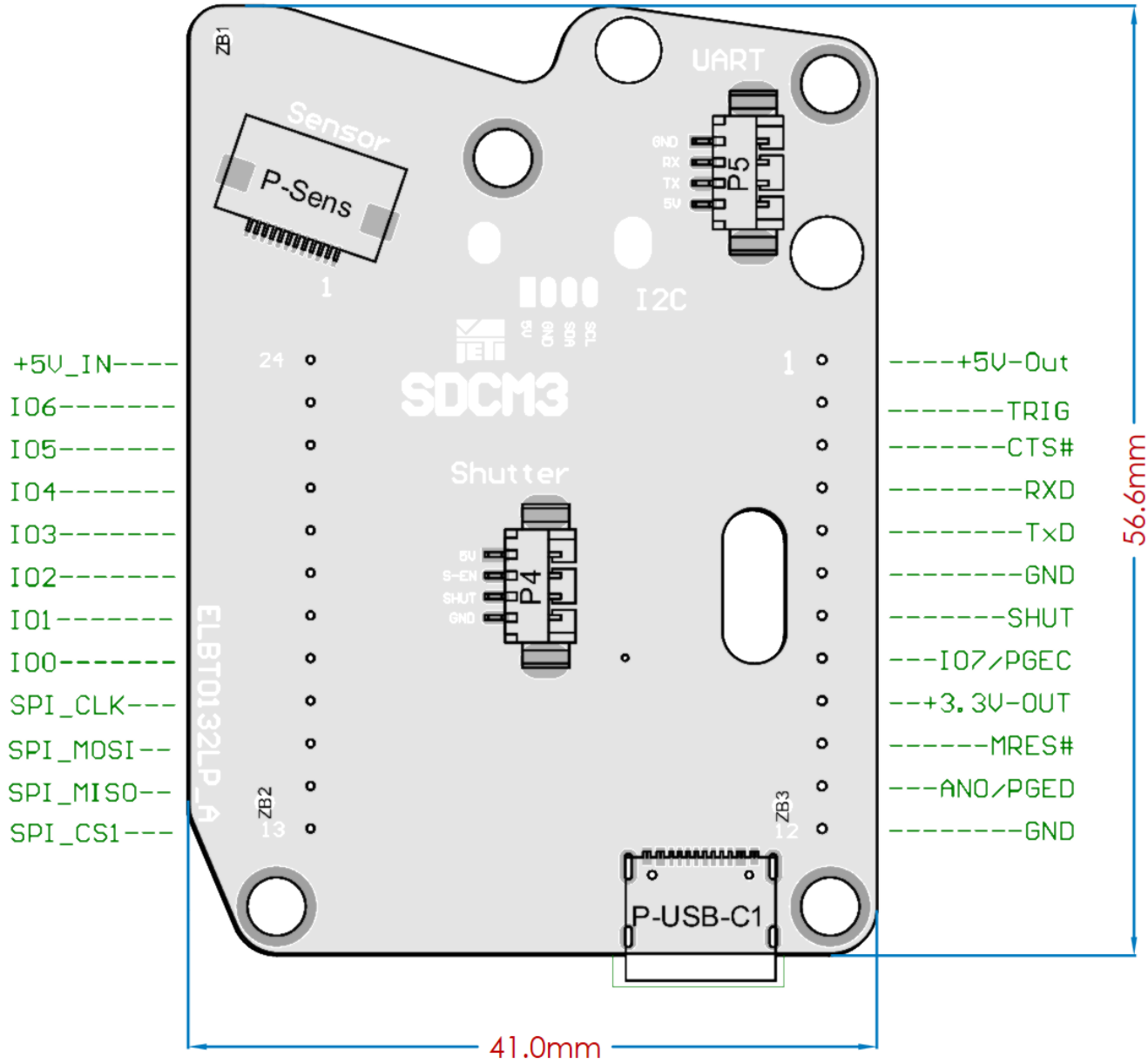
4. Technical data

4.1. Device dimensions

The following drawings show the position of the connectors, the position of the measuring port on the front and the general dimensions of the instrument.







Step-Files available on request.

4.2. Signals

Pin	Name	Signal	Value	Min	Typ	Max	Unit
1	+5V_Out	Output	Voltage	-	+5 V (Vext) or VUSB	5.5	V
			Current	0	50	100(1000)	mA
2	TRIG	Input	Low	0.0	-	0.5	V
			High	2.2	-	5	V
3	CTS#	Output		0	-	5	V
4	RXD	Input	Low	0	-	0.5	V
			High	2.2	-	3.3	V
5	TXD	Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
6	GND	GND	Voltage	-	0	-	V
7	LAMP/SHUT	Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
8	IO7	I/O	Low	0	-	0.5	V
			High	2.2	-	3.3	V
9	+3.3V_Out		Voltage	3.2	3.3	3.4	V
			Current	0	50	100	mA
10	MRES#	Input	Low	0	-	0.5	V
			High	2.2	-	5	V
11	AN0	Analog-In		0	-	3.3	V
12	GND		Voltage	-	0	-	V
13	SPI_CS1#**	Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
14	SPI_MISO**	Input	Low	0	-	0.5	V
			High	2.2	-	5	V
15	SPI_MOSI**	Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
16	SPI_CLK**	I/O / Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
17	IO0	I/O	Low	0	-	0.5	V
			High	2.2	-	3.3 (5)*	V
18	IO1	I/O	Low	0	-	0.5	V
			High	2.2	-	3.3	V
19	IO2	I/O	Low	0	-	0.5	V
			High	2.2	-	3.3 (5)*	V

Pin-Nr.	Name	Signal	Value	Min	Typ	Max	Unit
20	IO3	I/O / Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
21	IO4	I/O	Low	0	-	0.5	V
			High	2.2	-	3.3	V
22	IO5	I/O / Output	Low	0	-	0.5	V
			High	2.2	-	3.3	V
23	IO6	I/O / Analog-In	Low	0	-	0.5	V
			High	2.2	-	3.3	V
24	+5V_IN	Ext. Power	Voltage	4.7	5.0	5.5	V
			Current	-	300	1250	mA

# Denotes a low active signal *5V tolerant Input
**Add-on Board interfaces, not for user-communication.

4.3. Signal Description

Pin 1 +5V_Out

Pin 1 is +5V output from USB power voltage or +5 V external power supply, whichever is higher. Available current depends on Power-source (USB, Battery or external Supply) and requirements of optional modules. Please ask for solutions with more than 100mA.

Pin 2 TRIG

Measurement trigger input, programmable active slope, should be debounced. Internally pulled up to 3.3 V using 10 kΩ resistor.

Pin 3 CTS#

Clear To Send Input. Handshake signal for UART Communication. Used on SDCM3_6 Piggy for Bluetooth-Module.

Pin 4 RXD

LV-TTL (3.3 V) UART serial communication input signal RXD. Communication protocol is startbit, 8 bit data, no parity, 1 stopbit (8N1), no handshake. The baudrate is determined by the baudrate parameter. Used on SDCM3_6 Piggy for Bluetooth-Module.

Pin 5 TXD

LV-TTL (3.3 V) UART serial communication output signal TXD. Communication protocol is startbit, 8 bit data, no parity, 1 stopbit (8N1), no handshake. The baudrate is determined by the baudrate parameter. Same signal as used for the USB-Serial Bridge TXD and used on SDCM3_6 Piggy for Bluetooth-Module.

Pin 6 GND

Ground reference level. Recommended to be used as reference level of LV-TTL UART communication signals.

Pin 7 LAMP/SHUT

LV-TTL lamp output. Can be used to control external light source or shutter. This signal is programmable in active polarity by the parameter lamppol (0/1). It will be active before the scan of the line array for the time determined by scan delay parameter and during the light- or darkscan. In case of using a flash lamp as a light source, the shut/lamp signal can be used to trigger a flash lamp. Flash lamp burst mode (several flashes in programmable intervals and pulse length) can be also controlled by this signal.

Pin 8 IO7

User Programmable General Purpose Input Output Pin. Used on SDCM3_6 Piggy to enable the piezo driven shutter.

Pin 9 +3.3 V OUT

Output of the 3.3 V processor and digital circuits regulated supply voltage. Up to 100 mA can be drawn from this voltage to provide power to external electronics with low power consumption.

Pin 10 MRES#

Master Reset input, active low, internally pulled up to 3.3 V via 10 kΩ resistor. This pin can be used to reset the whole electronics. Leave it unconnected, if not used.

Pin 11 AN0

Analog input 0 for the processors 10 bit ADC (3.3 V full scale), used on SDCM3_6 Piggy to measure battery voltage.

Pin 12 GND

Ground reference level for power supply and analog or digital I/O.

Pin 13 SPI_CS1#/BT_Connect

For internal use only

Pin 14 SPI_MISO

For internal use only

Pin 15 SPI_MOSI

For internal use only

Pin 16 SPI_CLK

For internal use only

Pin 17 IO0 / EN_Battery#

User Programmable 5V tolerant General Purpose Input Output Pin.
This GPIO-Pin is configured as an output on SDCM3_6 Piggy-Board to control battery-driven power supply when this module is assembled.

Pin 18 IO1 / PWM_Laser

User Programmable General Purpose Input Output Pin.
This GPIO-Pin can be configured to control the 5V switching- and PWM-Output on the SDCM3_6 Piggy board for periphery control with up to 150mA (e.g. LED, Laser, DC-Motor, …). Custom specific use as current source with up to 500mA for diode control on request.

Pin 19 IO2 / INT_Key#

User Programmable, 5V tolerant General Purpose Input Output Pin.
This GPIO-Pin is configured as low-active key-interrupt input on battery powered SDCM3_6 Piggy-Boards using an additional hold circuit. This way the SW-Signal on the SW/TRIG-Connector can be used with the following logic:

SW=low & Device off: Device on
SW=low < 2 sec: Laser on/off
SW=low ≥ 2sec: Device off

Pin 20 IO3 / EN_Charge#

User Programmable General Purpose Input Output Pin.

This GPIO-Pin is configured as low-active charge enable output for battery charge control via MCU on SDCM3_6 Piggy-Board when battery module is assembled

Pin 21 IO4 / INT_LCD# / RES_LAN#

User Programmable General Purpose Input Output Pin.

This GPIO-Pin is configured as low-active output to reset the LAN-Interface-Module or Interrupt Input to detect movements on LCD-Screen whichever is assembled on SDCM3_6 Piggy-Board.

Pin 22 IO5 / CS_LCD# / CS_LAN#

User Programmable General Purpose Input Output Pin.

This GPIO-Pin is configured as low-active ChipSelect output for SPI connected LAN-Module or LC-Display on SDCM3_6 Piggy-Board when it is assembled

Pin 23 IO6 / BT_Vers

User Programmable General Purpose Input Output Pin.

This GPIO-Pin is configured as pull-down input to detect the assembled Bluetooth-module on SDCM3_6 Piggy-Board. High decodes a microchip “RN4x-Module”, low stand for older versions like Panasonics “PAN1322”.

Pin 24 +5V_IN

Optional +5 V power supply Input.

SDCM3_6 Piggy-Board can generate 5V on PIN 24 from Battery (1.5-5.5V) or external 7-28V power supply.

USB power supply and +5 V external power supply are possible in parallel. The higher voltage of both will be used internal due to the automatic switch over.

4.4. Interfaces

4.4.1. Full Speed 2.0 USB Interface

The USB communication port can be used for powering the SDCM3 electronics, provided it's connected to an active USB hub capable to draw up to 500 mA current at 4.4V - 5.25V.

Configuration with higher current need should be external powered.

The USB 2.0 Full Speed communication internally uses a serial bridge device FTD230XQ for the connection. The corresponding virtual COM port driver from FTDI Ldt. can be obtained here for the operating system used:
https://ftdichip.com/drivers/vcp-drivers/

The following transmission speeds are possible:

3 000 000 bit/s (factory setting),

921 600 bit/s,

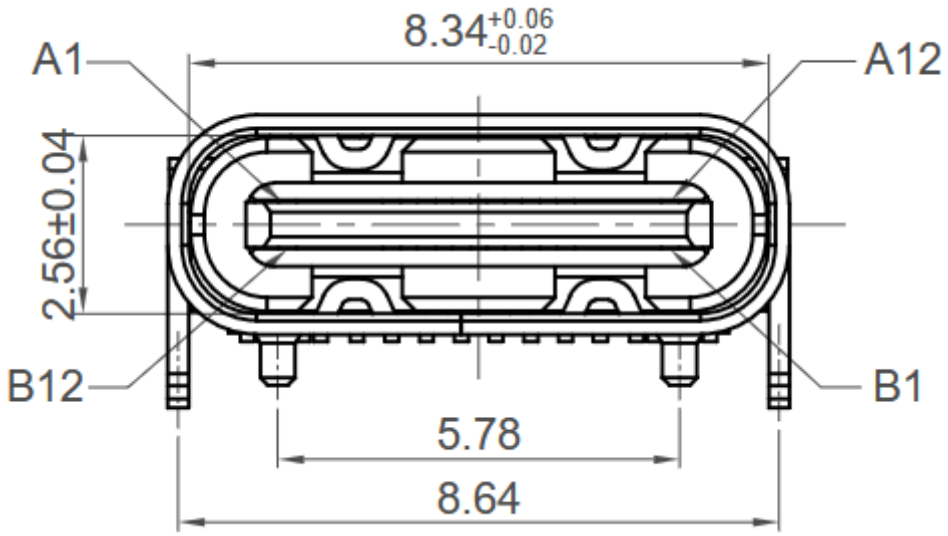
230 400 bit/s,

115 200 bit/s,

38 400 bit/s.

The protocol settings are 8N1 (1 startbit, 8 bit, no parity, 1 stopbit) and no handshake.
Users program or the OS must provide sufficient communication queue memory in case of huge amount of data to be transmitted at once.

USB Pinout

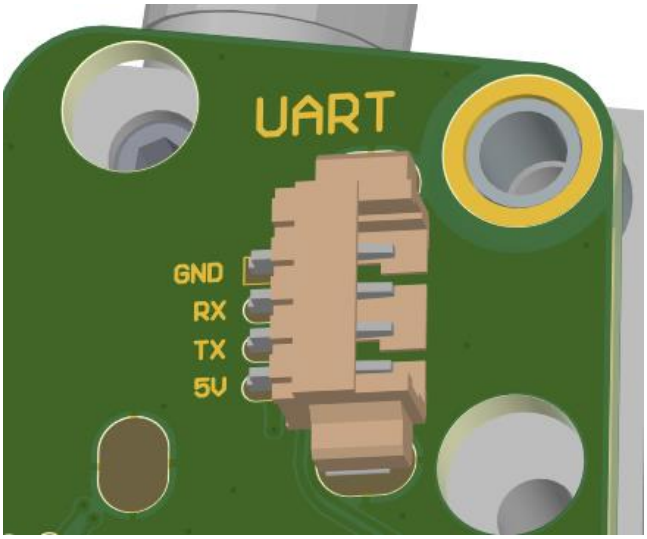


The connector used is a USB 2.0 Type C receptacle with SMT and THT components for maximum stability.

USB Signals

Pin	Signal	Mating Sequence	Pin	Signal	Mating Sequence
A1	GND	First	B12	GND	First
A4	VBUS	First	B9	VBUS	First
A5	CC1	Second	B8	SBU2	Second
A6	Dp1	Second	B7	Dn2	Second
A7	Dn1	Second	B6	Dp2	Second
A8	SBU1	Second	B5	CC2	Second
A9	VBUS	First	B4	VBUS	First
A12	GND	First	B1	GND	First
SHELL		GND	SHELL		GND

4.4.2. LV TTL UART Interface



The LV TTL UART interface provides an easy-to-use serial interface for direct communication with embedded hosts with low hardware and software requirements for other serial interfaces.

The following transmission speeds are pre-defined:

3 000 000 bit/s (factory setting),

921 600 bit/s,

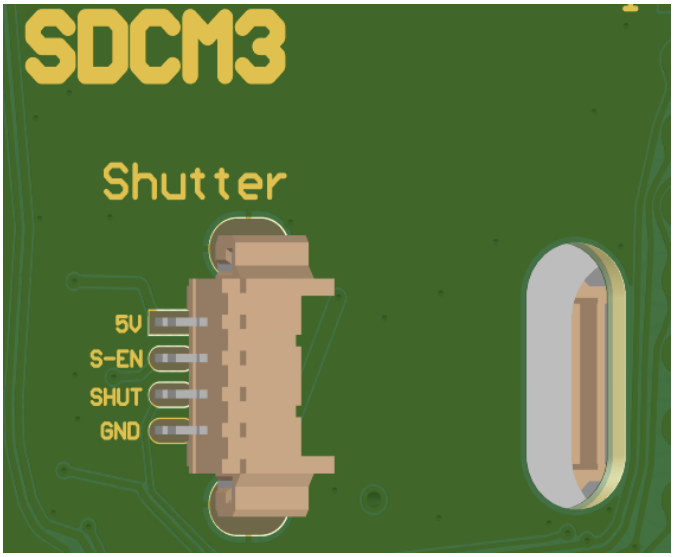
230 400 bit/s,

115 200 bit/s,

38 400 bit/s.

The protocol settings are 8N1 (1 startbit, 8 bit, no parity, 1 stopbit) and no handshake.
Up to 25Mbps is possible on request.

4.4.3. Shutter/ Lamp Interface



The SDCM3 Electronics supports firmware generated Shutter/Lamp output signals for control of peripherical hardware with the following pinout. Please refer to "Operating_Instructions_Firmware_SPECFIRM.pdf" for more information's.

The connector is a 4pin WR-WTB 653104131822 SMD component with 1.25mm pitch from Würth Elektronik. The pin assignment is printed on the circuit board, as shown in the picture on the left.

If the spectrometer is delivered with a mechanical shutter, this interface is used for its operation.

Pin-Nr.	Description	Signal	Level	Min	Typ	Max	Unit
1	GND	Power GND	Voltage	-	0	-	V
2	Shutter/Lamp Output	LAMP/SHUT	Low	0	-	0.4	V
			High	2.4	3.3	3.5	
3	Shutter enable Output	SHUT_EN	Low	0	-	0.4	V
			High	2.4	3.3	3.5	
4	+5V_Out	VPower (OUT)	Voltage	4.5	5	5.5	V

4.5. Power Supply

4.5.1. USB-powered

The USB communication port can be used for powering the SDCM3 electronics, provided it's connected to an active USB hub capable to draw up to 500 mA current at 4.4V - 5.25V.

Passive USB hubs do not provide sufficient power. In this case, the electronics must be powered externally.

The OR gated low drop out power circuitry switches automatically over to USB powering or external power, which voltage is ever higher.

4.6. Firmware Update Feature

The firmware implemented bootloader allows infield updates of the firmware using the serial interfaces. For proper operation, it is recommended to use only the USB-Interface.

For the necessary tool “SFProg” or if you have any questions concerning technical problems, please contact the JETI-support: support@jeti.com

5. Declarations

5.1. CE – Declaration of conformity

We:

JETI Technische Instrumente GmbH
Göschwitzer Straße 48
D-07745 Jena

declare that the product series

Spectrometer

DE50 basic

to which this declaration relates is in conformity with the requirements of following documents:

- EU Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- EU Low Voltage Devices (LVD) Directive 2014/35/EU

EU Harmonised standards:

- EN 61326-1 (2018-09)
- EN 55011 (2017-03) class B
- EN 61000-4-2 (2009-12); EN 61000-4-3 (2011-04)
- EN 61000-4-4 (2013-04); EN 61000-4-6 (2014-08)
- EN 61010-1 (2020-03)
- EN 50581 (2013-02)

The CE sign confirms the conformity of the product with the standards and directives mentioned above.

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Jena, February 11, 2025

5.2. Declaration of UKCA conformity

We:

JETI Technische Instrumente GmbH
Göschwitzer Straße 48
D-07745 Jena

declare that the product series

Spectrometer

DE50 basic

placed on the market by the Company and its subsidiaries are compliant with Electromagnetic Compatibility Regulations 2016 (S:I: 2016/1091) and following documents.

EU Harmonised standards:

- EN 61326-1 (2018-09)
- EN 55011 (2017-03)
- EN 61000-4-2 (2009-12); EN 61000-4-3 (2011-04)
- EN 61000-4-4 (2013-04); EN 61000-4-6 (2014-08)
- EN 61010-1 (2020-03)

The UK CA sign confirms the conformity of the product with the standards and directives mentioned above.

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Fax: +49 (0)3641 232 92 01

Jena, February 11, 2025

5.3. Certificate of warranty

Certificate of warranty for

Model: Spectrometer
Type: DE50 basic

JETI Technische Instrumente GmbH (referred to as JETI) hereby warrants this equipment as follows:

If any part of this unit (except as described below) fails due to poor workmanship or material (determined by JETI) within TWO (2) years from date of delivery, that part will be exchanged at no charge.

This warranty is valid only when the unit is installed and adjusted according to factory specifications and serviced by competent authorized personnel.

JETI does not assume responsibility for any of the following, all of which are excluded from the coverage of this warranty:

- Damage due to ordinary wear and tear, abusive use, or lack of proper maintenance
- Damage due to harsh mechanical shock, e.g. falling to the floor
- Loss or damage due to adverse environmental conditions or acts of God
- Loss of wages or income due to repair, replacement, malfunction or damage

Warranty becomes void if serial number is removed or defaced, or the instrument was opened by the customer.

If a defect appears which the customer feel is covered by this warranty, a written notice describing the defect must be sent to JETI's office at the current address of record.

Upon receipt of customers written report of a defect, if the defective items are covered by this warranty, JETI will repair or replace it at no charge to the customer, within 30 days after receipt of the returned unit (provided there are no labor problems or materials shortages to cause delays). The choice between repair and replacement shall be determined by JETI based on actual conditions or circumstances. JETI reserves the right to substitute new and improved equipment or parts at any time. The obligation to replace defective parts does not require replacement of the complete unit.

NO OTHER WARRANTY EXPRESSED OR IMPLIED IS APPLICABLE TO THIS UNIT.

This warranty shall be in effect for a period of 24 months, beginning one week after the date of delivery.

5.4. License Agreement

License Agreement for JETI Technische Instrumente GmbH Software Products

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JETI hereby grants to you a non-exclusive license to use one copy of the delivered JETI software program (the 'software') on a single computer according to the following items:

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JETI warrants that for a period of ninety (90) days from the date of acquisition the software, if operated as directed, will substantially achieve the functionality described in the documentation. JETI does not warrant however that your use of the software will be uninterrupted or that the operation of the software will be error-free or secure. JETI also warrants that the media containing the software, if provided by JETI, is free from defects in material and workmanship and will so remain for ninety (90) days from the date you acquire the software.

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This limited warranty gives you specific legal rights.

Your remedies:
JETI's sole liability for a breach of this warranty is to be in JETI's sole discretion:

- to replace your defective media; or
- to advise you how to achieve substantially the same functionality with the software as described in the documentation through a procedure different from that set forth in the documentation; or
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6. Service

Please contact in case of any question or technical problem:

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February 11, 2024