CINTERION
a Gemalto company

Starter Kit B80 User Guide

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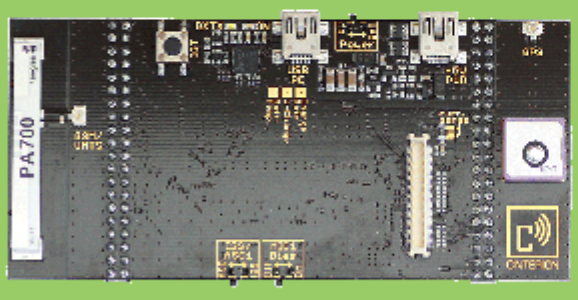

User Guide

User Guide:	**Starter Kit B80 User Guide**
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Contents

0 Document History

New document: "Starter Kit B80 User Guide" Version **01**

Chapter	What is new
---	Initial document setup.

1 Introduction

The Starter Kit B80 is a simple and easy-to-use adapter board designed to quickly test and evaluate basic functionalities of the supported evaluation modules.

The purpose of this document[1] is to guide you through the process of connecting the hardware and getting started with the module evaluation.

Chapter 2 introduces the product concept, including key features and system overview, Chapter 3 gives a short step-by-step guide to connect and power-up the Starter Kit B80 and Chapter 4 describes the Starter Kit's interfaces in some more detail. The Appendix finally contains the Starter Kit's schematics and placement (see Chapter 5).

1.1 Regulatory Compliance Information

The Starter Kit B80 is intended for use only in a laboratory test environment. All persons handling the Starter Kit B80 must be properly trained in electronics and observe good engineering practice standards.

The Starter Kit B80 is a test/development platform and has not been designed to be embedded into other products (referred as "final products").

The Starter Kit B80 is not intended for use as reference environment for type approval.

1.2 Supported Products

This User Guide applies to the following products:
- Cinterion modules with an 80-pin board-to-board connector
- Cinterion modules connected to an evaluation adapter (e.g., 60/80 adapter) with an 80-pin board-to-board connector

1.3 Related Documents

[1] AT Command Set for the appropriate connected Cinterion module
[2] Hardware Interface Description for the appropriate connected Cinterion module
[3] DSB-Mini User Guide

The latest product information and technical documents are ready for download on the Cinterion website or may be obtained from your local dealer or the Cinterion Sales department.

To visit the Cinterion website you can use the following link:
http://www.cinterion.com

[1] The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Cinterion wireless module.

1.4 Ordering Information

Table 1: Starter Kit B80 delivery package

Description	Supplier	Ordering information
Starter Kit B80	Cinterion	Order number: L30960-N0040-A100

1.5 Scope of Delivery

Table 2: Starter Kit B80 delivery package

Quantity	Description
1	Starter Kit B80
1	Hirose antenna cable 60mm, 50 Ohms
1	Hirose antenna cable100mm, 50 Ohms
1	USB A to Mini-USB Y-cable 1m

The modules and adapters for use with the Starter Kit B80 are not included in the scope of delivery.

2 Product Concept

Figure 1 shows the interfaces of the Starter Kit B80.

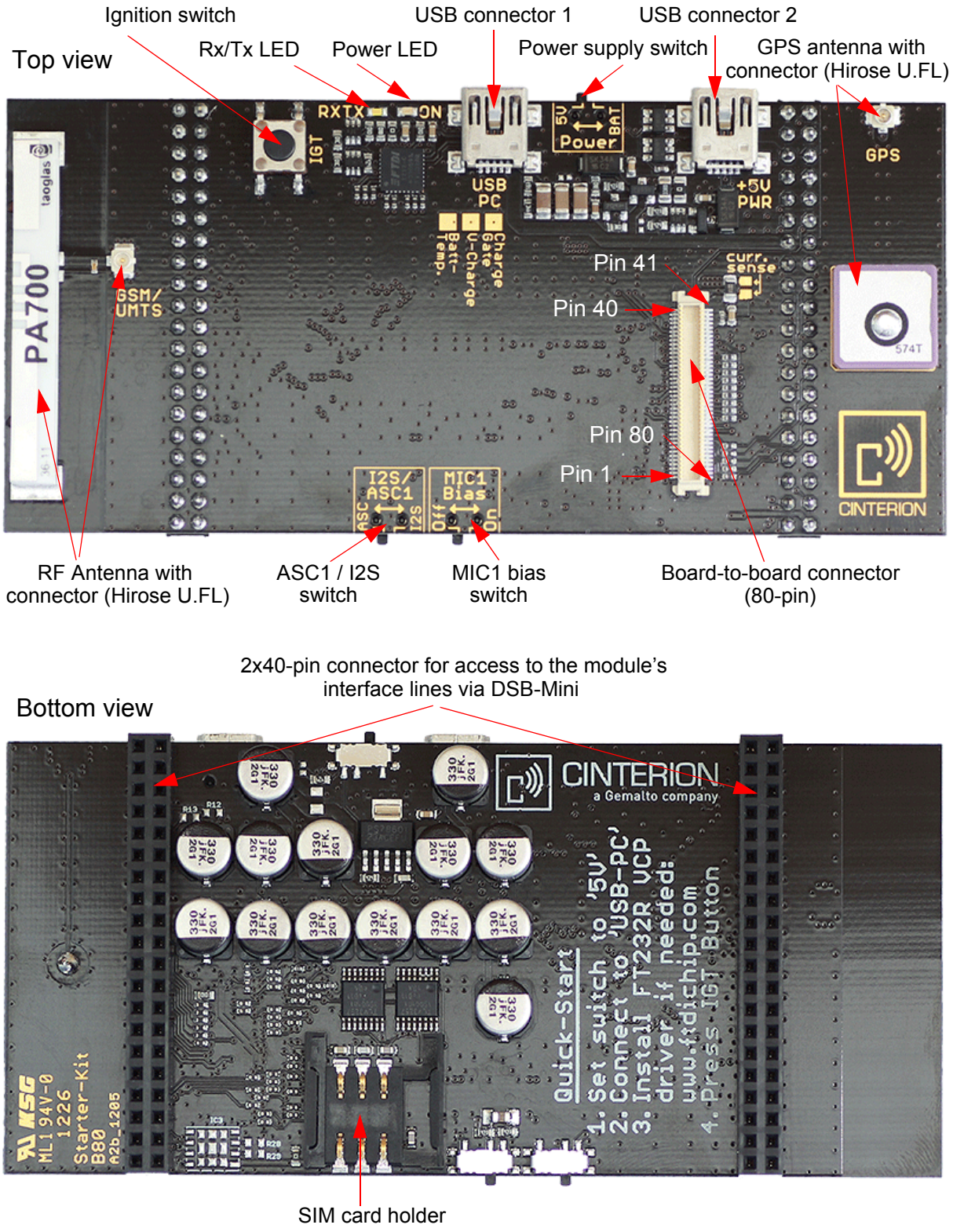

Figure 1: Starter Kit B80 overview

2.1 Key Features at a Glance

Table 3: Key features at a glance

Feature	Implementation
Module interface	Direct connection via 80-pin board to board connector. Supports modules with an 80-pin board-to-board connector as well as modules connected to an evaluation adapter (e.g., 60/80 adapter) with an 80-pin board-to-board connector. For module features please refer to [2].
Power supply	5V via USB interface and / or 5V external supplied through 2x40-pin connector
Antenna interface	Seven band GSM/UMTS RF antenna (Taoglas PA.700.A) On-board GPS patch antenna (Taoglas GP.1575.12.4.A.02)
SIM interface	Supported SIM cards: 3V, 1.8V
Serial interfaces	1 serial interface accessable via USB VCP Maximum baud rate 230,400bps
USB interface	Supported
Signal indication	2 LEDs for On/Off and (virtual) Rx/Tx lines
Signal accessibility	All module signals accessible via 2x40-pin connector
Dimensions	110mm x 50mm (length x width)

2.2 System Overview

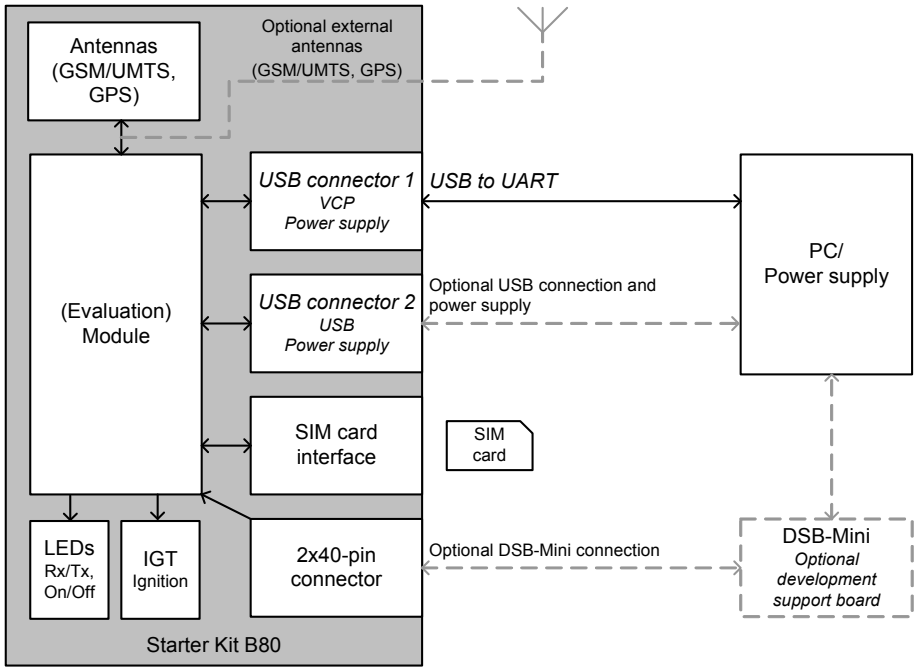

Figure 2: Starter Kit B80 system overview

3 Step-By-Step Startup

To set up the Starter Kit B80 please follow the below step-by-step instructions. The mentioned interfaces - connectors and switches - are illustrated in Chapter 2. A more detailed description of these interfaces can be found in Chapter 4:

- Download and extract the virtual COM port (VCP) driver. The virtual COM port (VCP) driver will cause the Starter Kit B80 - connected to a PC via USB - to appear as an additional COM port available on the PC. For details on the USB-to-UART bridge see Chapter 4.
  The VCP driver can be downloaded free of charge from Future Technology Devices International Ltd. (http://www.ftdichip.com/Drivers/VCP.htm).
- Set the power supply switch to 5V (delivery default).
- Connect the integrated RF antenna (and if need be GPS antenna). Figure 3 shows the antenna connection for a PH8 module mounted onto the board-to-board connector using the module's U.FL connectors. External antennas can also be connected.
- Mount the module onto the Starter Kit B80's 80-pin board-to-board connector.
- Insert the SIM as shown in Figure 3.

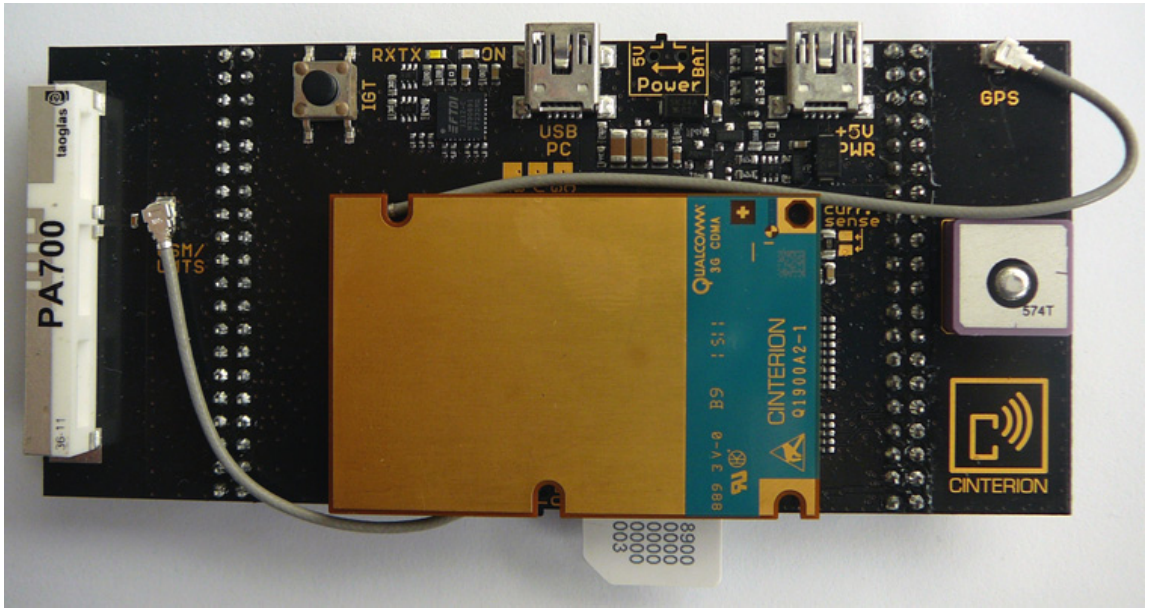

Figure 3: Starter Kit B80 with mounted module and SIM

- Connect the Starter Kit B80's USB connector 1 ("USB-PC") to a PC using the provided USB Y-cable or a standard USB mini cable (USB A to USB Mini-B 5 pin).
- Install the VCP driver software.
  Under Windows the Starter Kit B80 is automatically recognized as a new hardware device and the *Found New Hardware Wizard* opens to help install software for the new device - "FT232 USB UART". Click the box *Installation from a list or specific location box* and navigate to the folder containing the extracted VCP driver files. Follow the on screen instructions.
  Now, the "FT232 USB UART" device is installed as a USB serial port and the *Found New Hardware Wizard* will open again for this new device - "USB Serial Port". Repeat browsing to the folder containing the extracted VCP driver files to install software for the "USB Serial Port". Follow the on screen instructions.
  The newly installed hardware device, i.e., the ASC0 interface of the evaluation module on

the Starter Kit B80, is now available via a "USB Serial Port" in the port list of the Windows Device Manager.

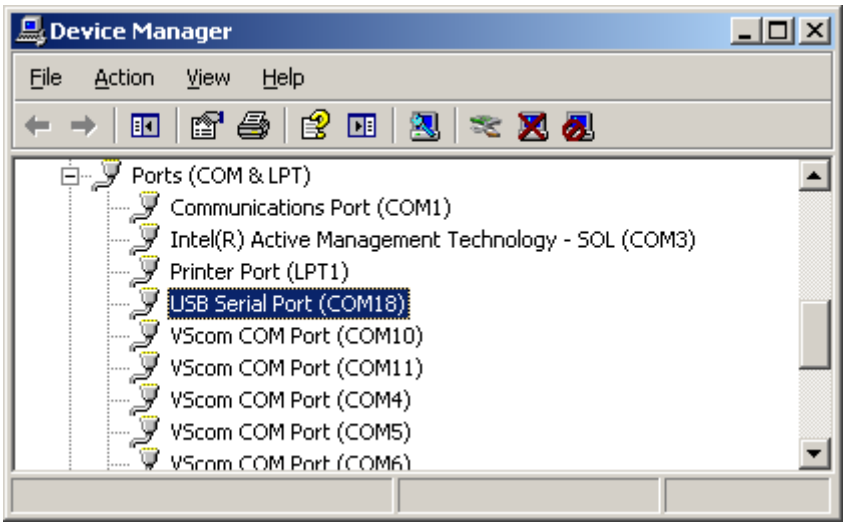

Figure 4: Serial USB Port in Device Manager

It is recommended to change the latency timer for this COM port to 3ms: Right-click on the "USB Serial Port" to open the *Port Properties* window. Select the *Port Settings* tab and press the *Advanced* button to open the window for the *BM options* including latency timer.

- Start a terminal program (e.g. Hyperterminal). Select the COM port assigned to the "USB Serial Port".
  It is recommended to use the following connection settings:

  - Bits per second: 115200
  - Data bits: 8
  - Parity: None
  - Stop bits:1
  - Flow control: Hardware

Figure 5: Connect to USB Serial Port

- Press the *Ignition* button on the Starter Kit B80. A blue LED indicates the On state. The Starter Kit B80 should now be connected.

- Check the mounted evaluation module's release version using the AT command ATI. For a complete AT Command Set description see [1]. This includes AT commands to configure the communication interface.

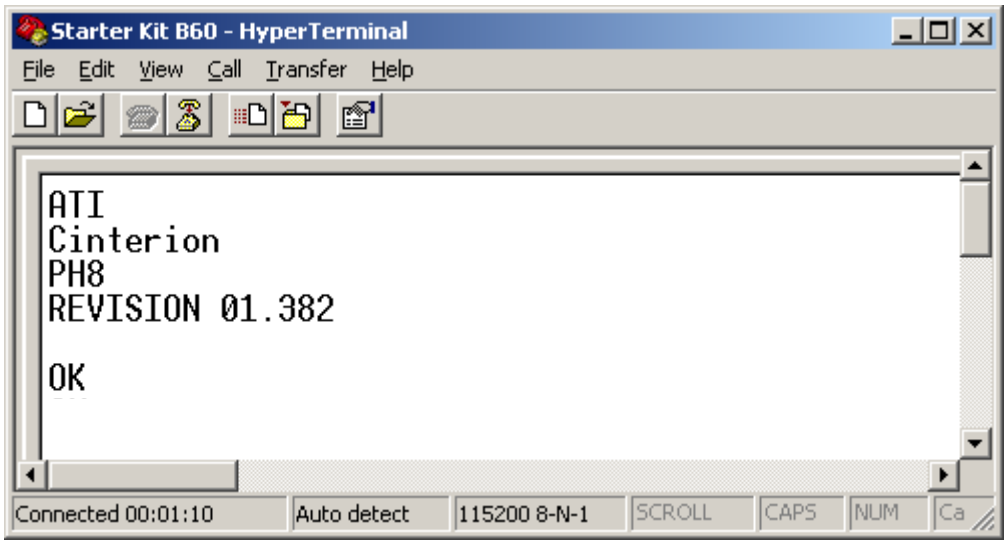

Figure 6: Communication over USB Serial Port

As an alternative to accessing the ASC0 interface lines via USB-to-UART bridge it is also possible to employ the USB connector 2 ("+5V PWR") to communicate with the module. In this case the module connected to the PC is recognized as a USB device and will either automatically install the standard USB drivers integrated in Windows or may require proprietary USB drivers supplied by Cinterion.

Apart from the serial ASC0 interface lines accessible via USB-to-UART bridge and VCP the other signal lines of the evaluation module are also available - by means of the 2x40-pin connector mounted onto an optional development support board, the DSB-Mini. For details on the available lines please refer to Section 4.7.

4 Interface Description

4.1 USB Interface

The Starter Kit B80 features two USB connectors. The first USB connector - labelled "USB PC" - is employed as a USB-to-UART bridge for ASC0 communication (see Section 4.1.1), the second USB connector - labelled "+5V PWR" - may be employed as a direct USB connection to the module as well as an additional module power supply (see Section 4.1.2).

4.1.1 USB-PC Connection

Over the first USB connector ("USB PC") the Starter Kit B80 features a USB to 8-line UART bridge in order to connect the module via USB Virtual COM Port (VCP) to a PC. All available module data rates up to 230,400bps are supported.

A specific VCP driver, available from Future Technology Devices International Ltd. (http://www.ftdichip.com/Drivers/VCP.htm), needs to be installed and configured on the PC side.

If the Starter Kit B80 operates standalone, i.e., without being connected via the 2x40-pin connector to an external application, this VCP is always active to bridge the ASC0 lines over USB.

However, the module's ASC0 signals are at the same time also wired to the 2x40-pin connector (see Section 4.7). In case the Starter Kit B80 is mounted on the optional DSB-Mini, the VCP is deactivated (reset) automatically - the USB-to-UART bridge releases the ASC0 signal lines so the serial communication can be continued through the 2x40pin connector.

The module's ASC1 signal lines are only connected to the 2x40-pin connector and are not usable while the VCP is active in standalone operation mode.

4.1.2 USB Data Connection and Power Supply

The second USB connector ("+5V PWR") provides a direct USB data connection as well as serving as an additional power supply.

To employ the USB data connection appropriate USB drivers will have to be installed on the connected PC. These may be the standard USB drivers integrated in Windows or proprietary USB drivers supplied by Cinterion. Please ask Cinterion for details.

Through the first USB connector described in Section 4.1.1 the Starter Kit B80 is supplied with 5V and max. 500mA. In addition, the second USB connector serves as a further power supply in case of increased power consumption during GPRS Class 10 data transfer and/or frail supplies (e.g., long cables).

4.2 Board-to-Board Connector

The modules are mounted to the Starter Kit B80 via the 80-pin board-to-board connector as shown in Figure 3.

4.3 Status LEDs

The Starter Kit B80 features two status LEDs indicating the evaluation module's power on/off state ("ON"; blue) as well as the current data transfer state ("RXTX"; white).

4.4 SIM Card Holder

The Starter Kit B80 has a card holder on its bottom side for a SIM to be inserted. The SIM card holder supports normal card operation, but does not support the SIM card detection functionality. The evaluation module's card detection line is connected to the 2x40-pin connector only in order to support card detection on the optional DSB-Mini.

4.4.1 Component SIM Card

The Starter Kit B80 provides a land pattern for an optional use of a component UICC (SIM/USIM/MIM). The component SIM will have to be soldered manually and can then be used instead of SIM cards inserted into the SIM card holder.

Depending on the manufacturer and package of the employed UICC, pin 6 or pin 7 is used as I/O line. Thus, it is necessary to place a 0Ohm resistor either for R28 or R29. Please refer to the package specification of the UICC for details.

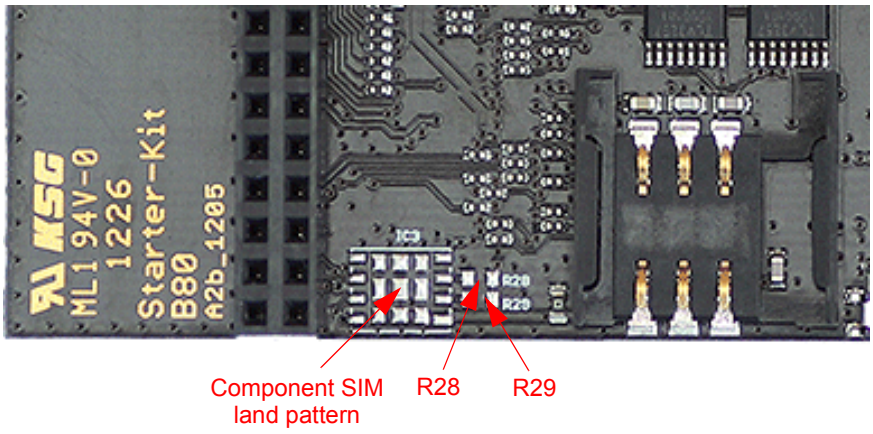

Figure 7: Component SIM card

4.5 Antenna Connectors

The Starter Kit B80 features two antenna connectors - for the RF antenna see Section 4.5.1, for the GPS antenna see Section 4.5.2.

4.5.1 RF Antenna

The Starter Kit B80 has an on-board septa-band antenna for 2G, 3G and 4G use (aka LTE/ GSM/CDMA/DCS/PCS/WCDMA/UMTS/HSDPA/GPRS/EDGE) that can be connected to the module using the enclosed 60mm Hirose U.FL cable. For more information on the integrated RF antenna (PA.700A) please refer to (http://www.taoglas.com/).

Please note that the RF antenna may be detuned somehow, if largish ground planes are placed directly beneath. In such a case, it is possible to connect an external antenna to the Starter Kit B80 via the Hirose U-FL connector. An external antenna might be useful, if the Starter Kit B80 is mounted onto the optional DSB-Mini and the antenna performance is to be evaluated.

4.5.2 GPS Antenna

The Starter Kit B80 has an on-board GPS Patch antenna that can be connected to the module using the enclosed 100mm Hirose U.FL cable.

However, any other GPS antenna can be connected directly to the module. The connector does not provide any DC supply for active GPS antennas.

4.6 Switches

4.6.1 Ignition

The *Ignition* button ("IGT") is used to switch on the evaluation module plugged onto the Starter Kit B80.

To switch the module off the AT comand AT^SMSO should be used. Alternatively, the USB power supply can be unplugged. Note that some Terminal programs (e.g., ZOC) will not notice that the USB cable was unplugged. In this case the Terminal program has to be restarted.

4.6.2 Power Supply Switch

The Starter Kit B80 has a switch to select the power supply path:

- 5V (default)
  The 5V power supply path collects the supply from the USB interfaces on the Starter Kit B80 and the 5V supply from the 2x40-pin connector.
  A post LDO regulates the module's operating voltage down to 3.8V.
- Battery
  The battery power supply path provides a direct power source on the 2x40pin connector without additional circuitry except the switch resistance (~20mΩ).

If the Starter Kit B80 operates standalone, the switch must be set to "5V" to supply the module through the 5V power supply path.

Only if the Starter Kit B80 is mounted onto the optional DSB-Mini and the module is supplied by an external battery connected to the DSB-Mini, must the switch be set to "BAT".

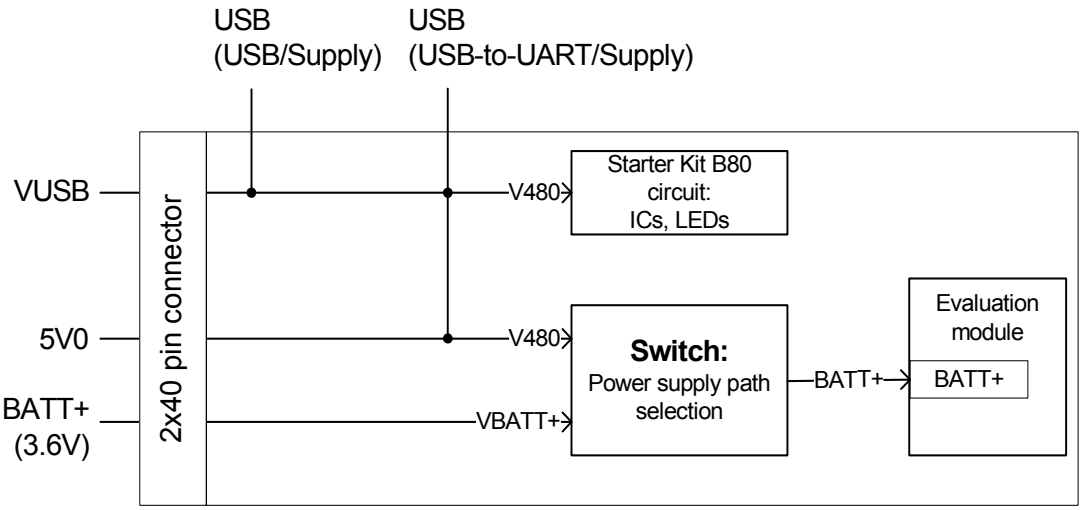

Figure 8: Power supply path selection

4.6.3 I²S/ASC1 Switch

Some modules do not have a serial ASC1 interface, but feature an I²S digital audio interface instead that uses the ASC1 signal lines (e.g., PH8).

By default, the "I2S/ASC1" switch is set to "ASC1". It configures the ASC1 signals to be available on the ASC1 pins of the 2x40-pin-connector and the digital audio (DAI/PCM) signals to be available on the DAI/PCM pins of the 2x40-pin-connector. The I²S interface is then not available.

Alternatively, the switch can be set to "I2S". It then configures the I²S signals to be available on the DAI/PCM pins of the 2x40-pin-connector and to cut off the DAI/PCM signals instead.

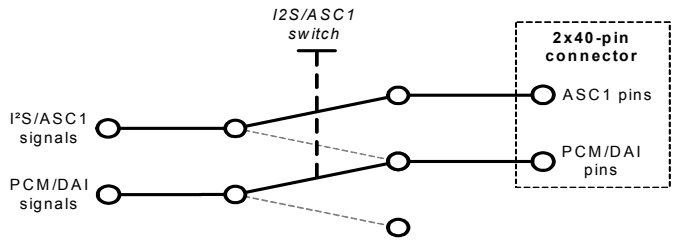

Figure 9: I2S/ASC1 switch

Table 4: I2S/ASC1 switch

		"I2S/ASC1" switch position			
		"ASC1"		**"I2S"**	
2x40-pin connector		**Module signals on 80-pin board-to-board connector**			
Name	**No.**	**No.**	**Signal Name**	**No.**	**Signal Name**
DA0	40	26	DAI0 / PCM_DOUT	26	DAI0 / PCM_DOUT
DA1	39	25	DAI1 / PCM_DIN / I2S_DIN	25	DAI1 / PCM_DIN / I2S_DIN
DA2	38	24	DAI2 / PCM_SYNC / I2S_WSIN	24	DAI2 / PCM_SYNC / I2S_WSIN
DA3	37	23	DAI3 / PCM_CLK / I2S_WSIN	23	DAI3 / PCM_CLK / I2S_WSIN
DA4	4	22	DAI4 / n/c	53	CTS1 / I2S_SCLKOUT
DA5	3	13	DAI5 / n/c	51	RTS1 / I2S_WSOUT
DA6	2	15	DAI6 / n/c	31	TXD1 / I2S_DOUT
DA7	1	-	-	29	RXD1 / I2S_MCLKOUT
		Note that the signal names may vary between different module products.			

This switch has no impact, if the Starter Kit B80 is operated standalone, as neither ASC1 nor I²S is then supported.

4.6.4 MIC1 Bias Switch

The MIC1 Bias switch enables a microphone bias voltage on the microphone path of the first analog audio interface to optimize audio quality. This switch may be set to "On" for MC75i, TC65i, TC65i-X, TC63i, BGS3, EES3, EGS3, EGS5, EGS5-X modules only.

If the Starter Kit B80 is operated standalone this switch has no impact. This is because the Starter Kit B80 itself does not provide an audio interface.

4.7 2x40-Pin Connector

All relevant module signals are accessible by means of the 2x40-pin connector. The 2x40-pin connector comprises Connector A and Connector B as shown in Figure 10. The 2x40-pin connector also serves a few additional signals for operation control between the Starter Kit B80 and an optional development support board (DSB-Mini) as well as for additional power supply.

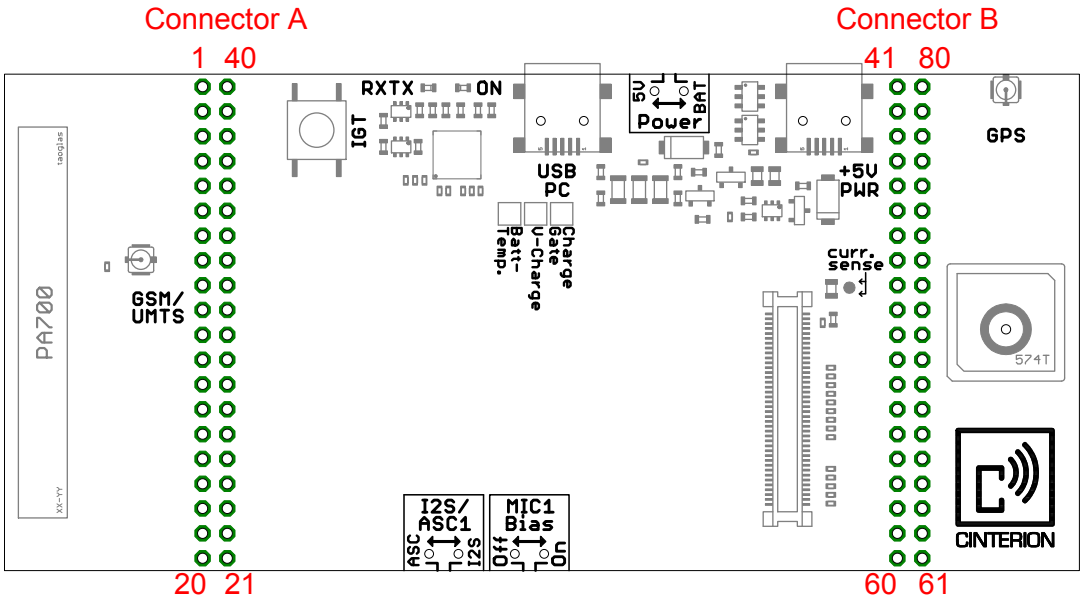

Figure 10: Two 40-pin connectors on Starter Kit B80 top view

The following Table 5 maps module signals, i.e., pins of the 80-pin board-to-board connector to the 2x40-pin connector for the Starter Kit B80 default setup. Because different modules may have different naming conventions and signal functions, the signal names given in Table 5 for the 2x40-pin connector may vary, but the modules' pin numbers on the 80-pin board-to-board-connector are non-variable. The pin numbers should therefore be used if consulting the Hardware Interface Description ([2]) for a specific module. Please note that the default mapping changes with the setting of the "I2S/ASC1" switch as described in Section 4.6.3. Also note that in some cases two 2x40 connector pins are mapped to just one 80-pin connector pin - where simultaneous usage of these interface pins is not possible anyway.

Table 5: Pin mapping 2x40-pin connector to 80-pin board-to-board connector

Signal number on 80-pin board-to-board connector							Signal number on 80-pin board-to-board connector					
No.	**Connector A**				**No.**		**No.**	**Connector B**				**No.**
-	DA7	1	40	DA0	26		BATT+	BATT+	41	80	BATT+	BATT+
15	DA6	2	39	DA1	25		GND	GND	42	79	GND.DETECT	Control
13	DA5	3	38	DA2	24		57	AGND	43	78	GND	GND
22	DA4	4	37	DA3	23		68	USB_DN	44	77	VUSB	12
7	SPI_DI	5	36	SPI_CLK	11		69	USB_DP	45	76	VEXT1	46
70	SPI_DO	6	35	SPI_CS	75		46	VEXT2	46	75	3V0	-
70	I2CDAT	7	34	I2CCLK	11		Supply	5V0	47	74	VMIC	66
-	N/C	8	33	DCD0	54		63	EPP1	48	73	EPN1	62
55	EMERG_ RST	9	32	CTS1	53		64	EPP2	49	72	EPN2	65
29	RXD1	10	31	CTS0	52		59	MICP1	50	71	MICN1	58
30	RXD0	11	30	RTS1	51		60	MICP2	51	70	MICN2	61
31	TXD1	12	29	DTR0	50		63	TTY_EP	52	69	TTY_MIC	59
32	TXD0	13	28	RTS0	49		5	GPIO10	53	68	GPIO1	71
2	ADC1	14	27	DSR0	48		76	GPIO9	54	67	GPIO2	72
3	ADC2	15	26	RING0	47		6	GPIO8	55	66	GPIO3	73
79	DAC	16	25	STATUS2	-		8	GPIO7	56	65	GPIO4	74
28	SYNC	17	24	VDDLP	33		9	GPIO6	57	64	GPIO5	10
78	PWR_IND	18	23	IGT	56		16	CCCLK	58	63	CCRST	19
GND	GND	19	22	GND	GND		18	CCIO	59	62	CCIN	20
GND	GND	20	21	GND	GND		17	VSIM	60	61	CCGND	21

Legend (80-pin board-to-board connector number):

-: Not connected.

GND: GND pins of the board-to-board connector.

BATT+: Battery power supply input from DSB-Mini. Only relevant if supply switch is set to "BAT".

Control: Control signal from DSB-Mini.

Supply: Main power supply for Starter Kit B80, if supply switch is set to "5V". Power is supplied via USB interface either from Starter Kit B80 or from DSB-Mini.

5 Appendix: Schematics and Placement

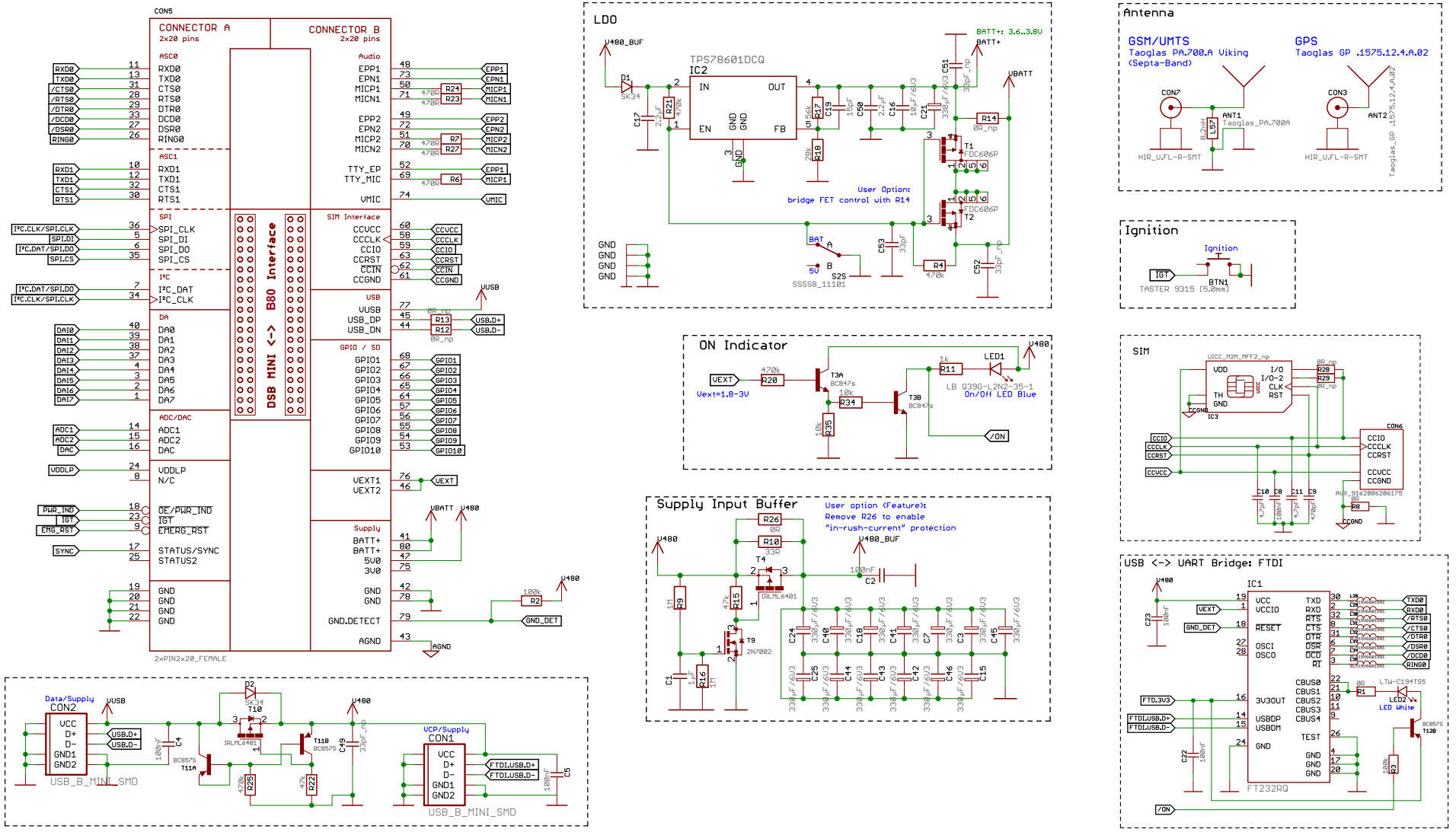

Figure 11: Schematics, Page 1

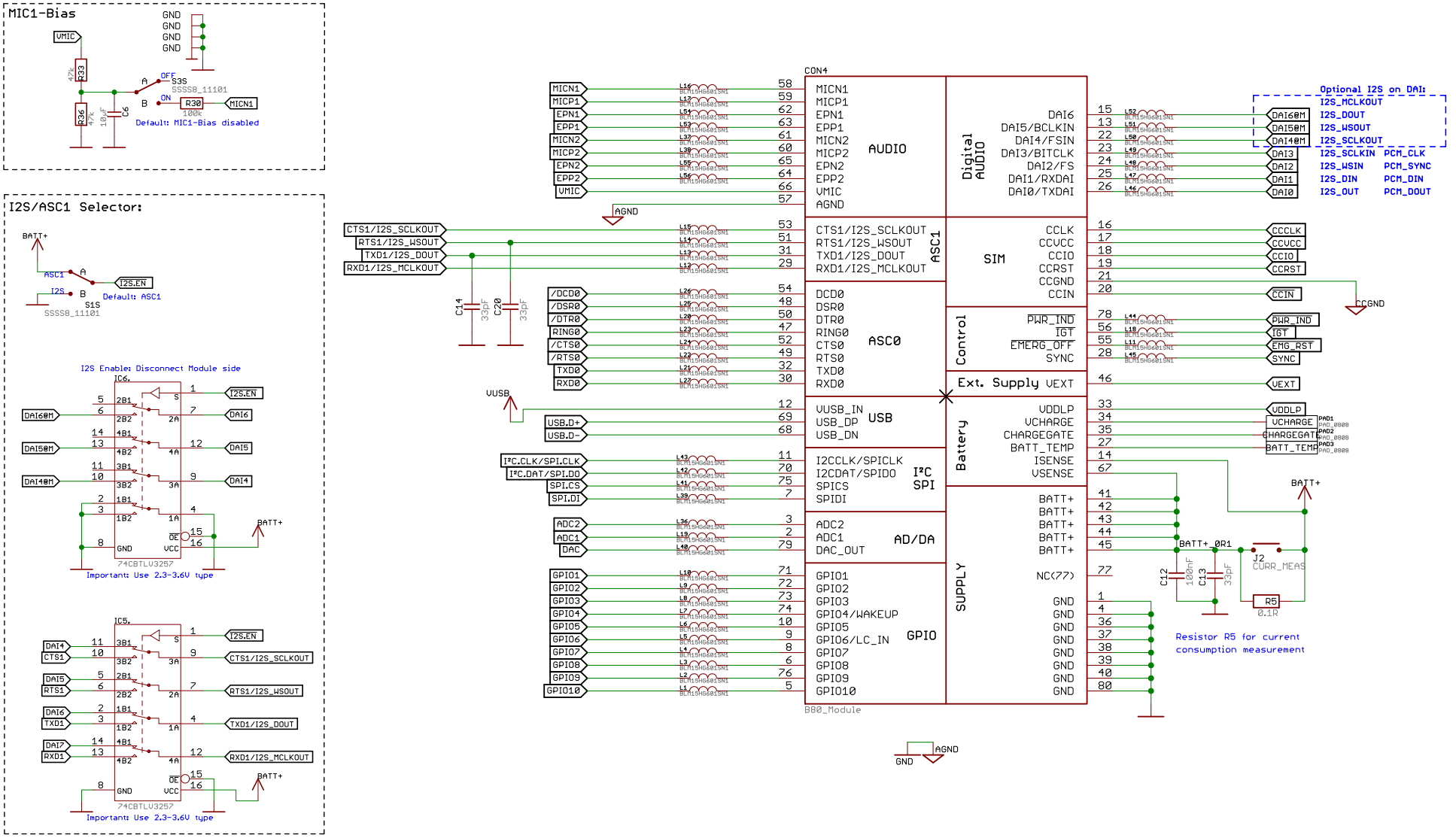

Figure 12: Schematics, Page 2

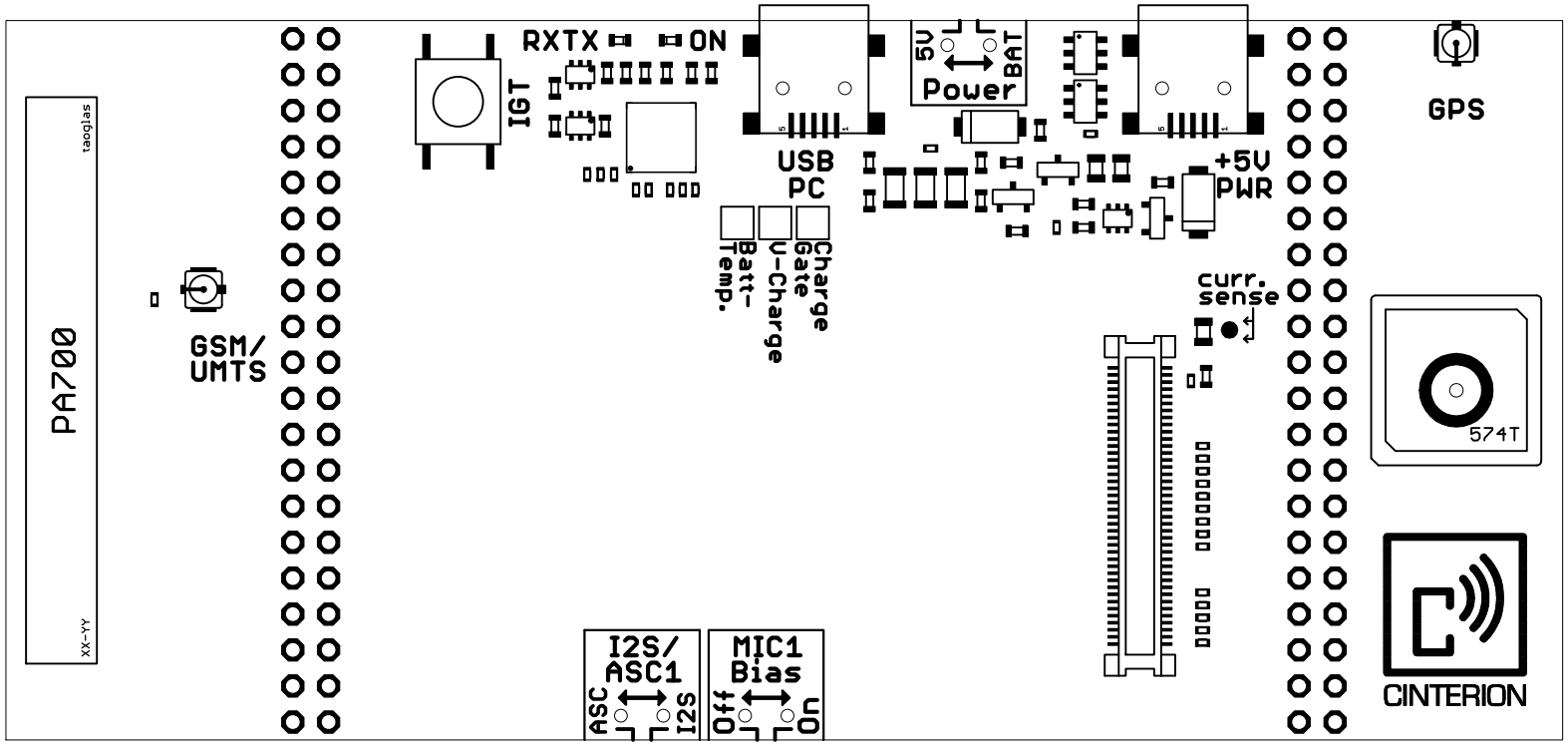

Figure 13: Placement, Page 1 (top)

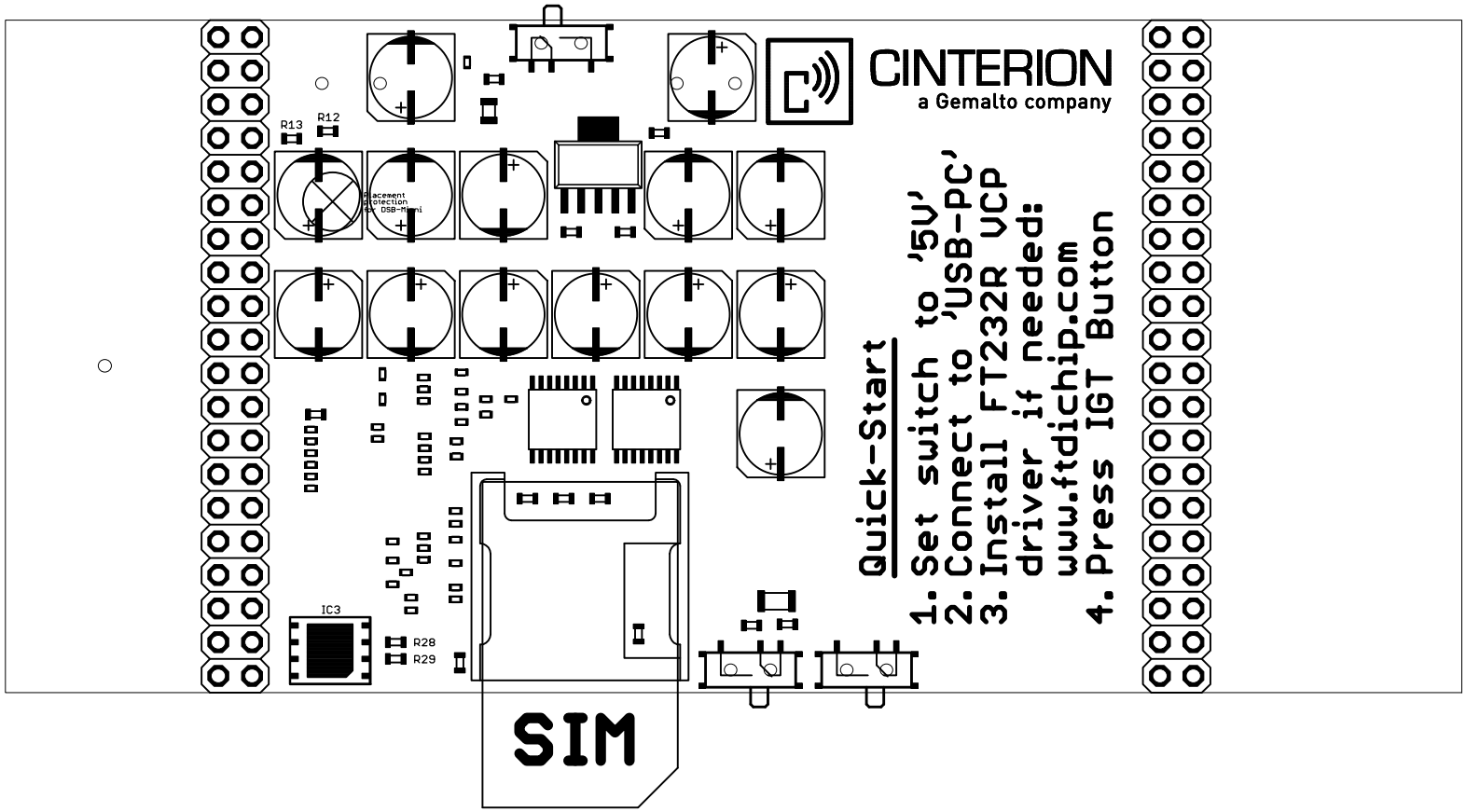

Figure 14: Placement, Page 2 (bottom)