Getting Started with Cinterion® BGS5

User Guide

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User Guide:	**Getting Started with Cinterion® BGS5**
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Contents

0 Document History

New document: "Getting Started with Cinterion® BGS5" Version 01

Chapter	What is new
---	Initial document setup.

1 Introduction

This document describes a ready-to-use development and test environment for the Cinterion® BGS5 SMT module.

The development and test environment comprises the following hardware components

- BGS5 evaluation module
  The BGS5 evaluation module consists of the actual BGS5 SMT module soldered onto a PCB with a board-to-board connector and an U.FL antenna connector. For BGS5 evaluation module board schematics see Chapter 3.
- DSB75 Development Support Board
  The BGS5 evaluation module needs to connect to an adequate host device such as the DSB75. A detailed DSB75 hardware interface description and operating instructions can be found in [3].
- Multi-Adapter R1.
  The Multi-Adapter R1 is used to mount the BGS5 evaluation module to the DSB75. For more information on the Multi-Adapter R1 see [4].

The purpose of this document[1] is to guide you through the process of connecting the hardware, installing the supplied drivers on a Microsoft® Windows XP™, Microsoft® Windows Vista™ or Microsoft® Windows 7 system and getting started with BGS5.

1.1 Related Documents

[1] BGS5 AT Command Set
[2] BGS5 Hardware Interface Description
[3] DSB75 Development Support Board Hardware Interface Description
[4] Multi-Adapter R1 User Guide

1. The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Gemalto M2M wireless module.

2 Getting Started with BGS5

2.1 Technical Requirements for Using BGS5 Modules

- BGS5 evaluation module[2]
- BGS5 USB driver package
- Computer running Windows XP or Windows Vista or Windows 7, USB 2.0 High Speed compatible
- Local administrator privileges on the particular Windows computer to install and uninstall the drivers
- DSB75 Development Support Board (for details see [3])
- Multi-Adapter R1 required for mounting the evaluation module to the DSB75. For a detailed description of the Multi-Adapter R1, including a section on measuring supply current and schematics, see [4]).
  Note: Please note that the Multi-Adapter R1 is a universal DSB75 adapter designed for testing the basic functionality of a variety of Gemalto M2M wireless modules. It is not intended for use as reference environment for type approval.
- Accessories:
  - Small 50 Ohms antenna cable with SMT connector to connect the U-FL connector on the BGS5 evaluation module to the U.FL connector on DSB75 (e.g. a Hirose - Hirose cable such as delivered with each DSB75)
  - External 50 Ohms RF antenna with SMA connector to connect the SMA connector on the DSB75 (e.g. a SMARTEQ MiniMag antenna such as delivered with each DSB75)
  - 9 to 15 Volts power supply applied at the DSB75 for powering up the DSB75 and the connected BG2-E module (not supplied by Gemalto M2M)
  - RS-232 cables for the module's asynchronous serial interfaces ASC0 and ASC1 (not supplied by Gemalto M2M)
  - USB cable with mini-USB plug (not supplied by Gemalto M2M)
- Appropriate application for controlling the module from within a PC's operating system. For Windows, e.g. Windows Hyperterminal

[2] For ordering information see [2].
For BGS5 evaluation module schematics see Appendix: Circuit Diagrams for Evaluation Module Board.

2.2 Connecting the BGS5 Evaluation Module to the DSB75

To properly connect the BGS5 evaluation module and all accessories to the DSB75 please complete the steps listed below.

- Ensure that all jumpers and slide switches on the DSB75 are set to their default positions as show in Figure 1 and in [3].
- Attach the 2x40-pin header (CON9 and CON10) of the Multi-Adapter R1 to the 2x40-pin connector (X101/X202) located on the DSB75. Take gentle care that all pins are aligned correctly, then press down evenly on the adapter until it is firmly seated.
- Plug the BGS5 evaluation module to the 80-pin board-to-board connector located on the Multi-Adapter R1. Module signal lines available on the 2x40-pin header of the adapter (CON9 and CON10) and therefore also connected to the appropriate lines on the DSB75 are listed in a separate section (see Section 2.2.1).
- Use the small antenna cable to connect the U.FL antenna connector on the BGS5 evaluation module to the U.Fl antenna connector of the U.FL-to-SMA adapter (X505) on the DSB75.
- Plug the 50 Ohms RF antenna to the SMA connector (X506) of the DSB75.
- To employ the module's asynchronous serial interfaces ASC0 and/or ASC1, connect the 9-pin SubD connectors on the DSB75 to the Windows computer using the RS-232 cables. Use COM1 (X201) for the first serial interface ASC0 and/or COM2 (X202) for second serial interface ASC1.
- To employ the module's USB interface, connect the mini-USB connector placed on the bottom side of the Multi-Adapter R1 to the Windows computer using the USB cable with mini-USB plug.
- Insert the SIM card into the card holder (X503) located on the component side of the DSB75.
- Make sure that the power supply adapter delivers 12 Volts, and connect the power cables to the red (X400 = BATT+) and black (X401 = Ground) connectors of the DSB75.

The complete setup with the module mounted onto the adapter and the adapter connected to the DSB75 is shown in Figure 2.

After connecting the BGS5 evaluation module to the DSB75 the module can be switched on. The initial startup and possible USB driver installation are described in Section 2.3.

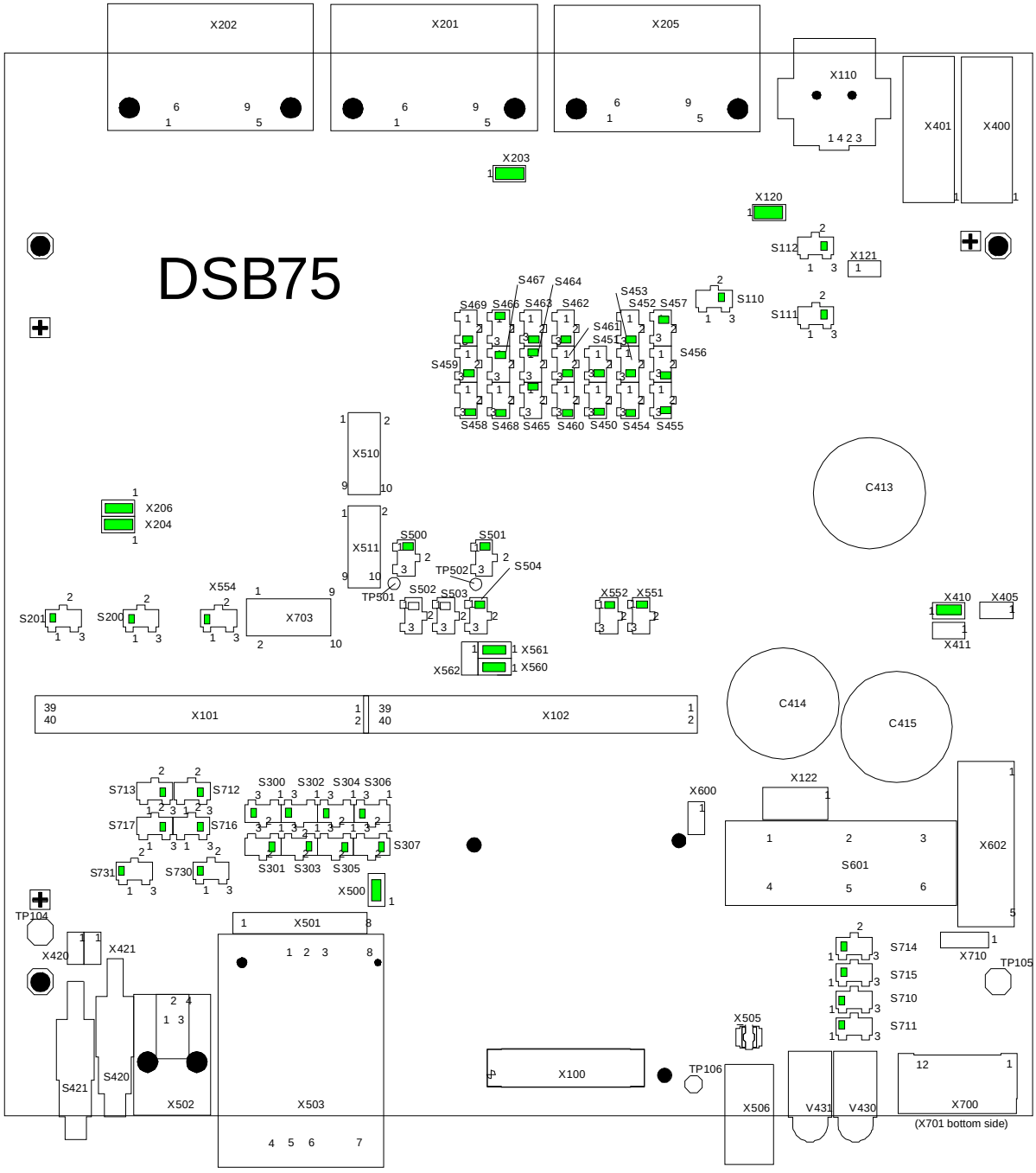


Figure 1: DSB75 configuration

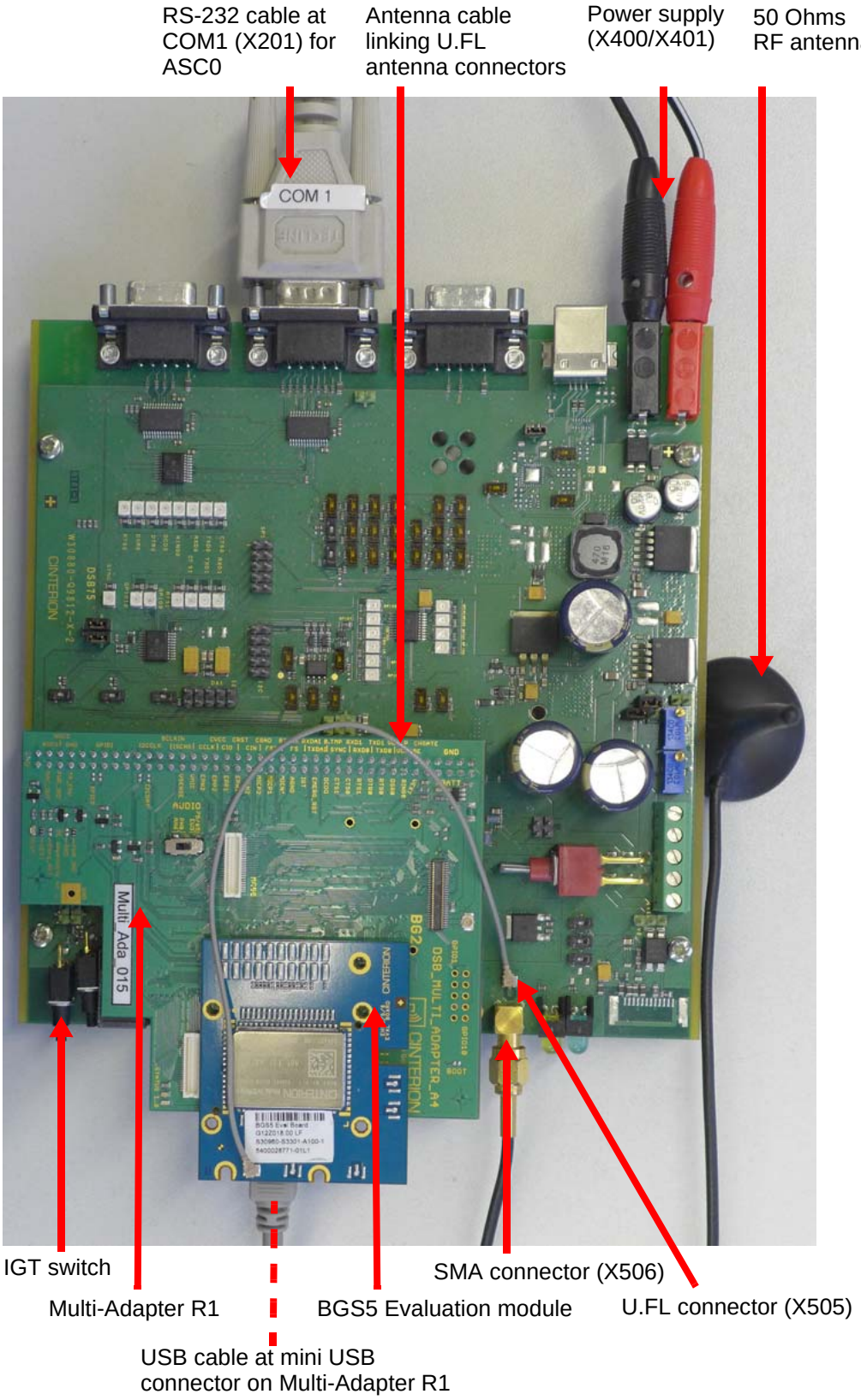


Figure 2: Module mounted onto Multi-Adapter R1 and connected to DSB75

2.2.1 Pin Assignment on 2x40-Pin Header of Multi-Adapter R1

The following table shows the pin assignment on the 2x40-pin connector (CON9 and CON10) of the Multi-Adapter R1. All named pins are 1:1 accessible as test points on the top of the Multi-Adapter. All other pins are either not connected or should not be used. As the DSB75 applies to other Gemalto M2M wireless modules as well, the DSB75 pin names (see [3]) may not always exactly match the names below. GPIOs are either accessible via an assigned functional Multi-Adapter pin (but only in the direction specified for the functional pin, e.g., GPIO24 is accessible via RING0 line, but only as output) or via GPIO interface of the Multi-Adapter or directly at the overlapping solder pads of the adapter‘s land pattern. Also, USB lines are only accessible via the USB interface of the Multi-Adapter. The AUTO_ON (or ON2) line is accessible via the Boot jumper on the Multi-Adapter R1.

Multi-Adapter R1				
GND	1	**CON9**	2	BATT+
GND	3		4	BATT+
GND	5		6	BATT+
GND	7		8	BATT+
GND	9		10	BATT+
	11		12	V180 (VEXT)[1]
	13		14	RING0[2]
VDDLP	15		16	DSR0[2]
TXD0[2]	17		18	RTS0[2]
TXD1[2]	19		20	DTR0[2]
RXD0[2]	21		22	RTS1[2]
RXD1[2]	23		24	CTS0[2]
Status LED[2]	25		26	CTS1[2]
	27		28	DCD0[2]
TXDDAI[2]	29		30	EMERG_RST
RXDDAI[2]	31		32	ON (IGT)[3]
TFSDAI[2]	33		34	
SCLK[2]	35		36	
	37		38	
	39		40	
CCIN[2]	1	**CON10**	2	
CCRST[2]	3		4	
CCIO[2]	5		6	
CCVCC[2]	7		8	
CCCLK[2]	9		10	
	11		12	
	13		14	
	15		16	
	17		18	
I2CCLK[2]	19		20	I2CDAT[2]
	21		22	
	23		24	
	25		26	
	27		28	
	29		30	
	31		32	
GND	33		34	
	35		36	(PWR_IND)[4]
ADC1[2]	37		38	
GND	39		40	GND

1. VEXT is a DSB75 adapted voltage derived from V180.
2. The voltage level on this pin is 3V regardless of the the voltage level on the module. The level is adapted to be DSB75 compliant.
3. IGT from DSB75 is inverted on the adapter to the ON signal at the 80-pin board-to-board connector for BGS5.
4. PWR_IND is is realized by a power indication circuit on the adapter as described in [2].

2.3 Startup the Module

After connecting the BGS5 evaluation module to the DSB75 as described in Section 2.2, the module can be switched on.

Note: If the USB interface is to be employed, the USB drivers provided by Gemalto M2M need to be available. Unpack the supplied <product_drivers_<version>.zip file to a folder on the Windows computer. Be sure to use the latest USB driver software supplied by Gemalto M2M.

- Press the ignition switch S421 on the DSB75. The ignition switch is located on the component side of the DSB75 as shown in Figure 2.
- If the USB cable was plugged as described above, and the USB drivers provided by Gemalto M2M were not yet installed on the computer, you will be prompted to install them:
  - On Windows XP and Windows Vista, the installation will start by displaying the "Found New Hardware Wizard".
  - On Windows 7, wait a few seconds until all USB devices show up as "Cinterion Wireless Module Modem" and "Cinterion Wireless Module Port" in the Windows Device Manager. Then right-click each device, select the option "Update Driver Software...".
  - In either case, cancel any Windows instructions to update the software automatically. For each USB device take care to browse to the folder containing the unzipped driver software.

  After successful USB driver installation the installed USB devices are listed in the Windows Device Manager under "Modems" and "Ports (COM & LPT)" as shown in Figure 3. With BGS5 the devices enumerated as Cinterion BGx USB Modem and Cinterion BGx USB Com Port1 are accessible as AT command instances.

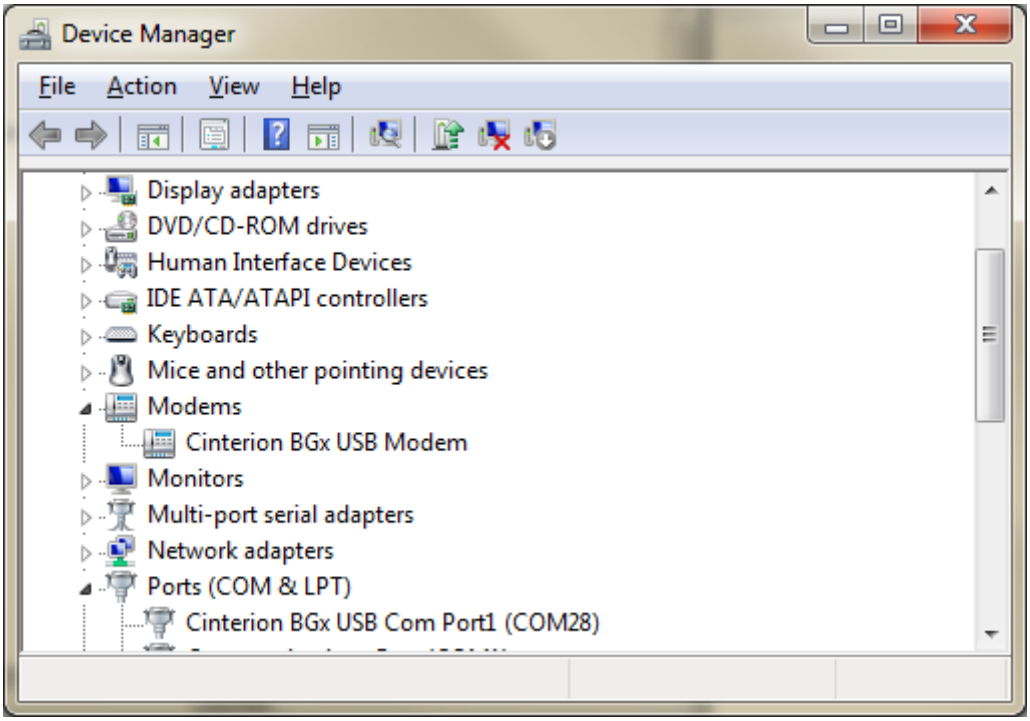


Figure 3: Installed USB devices

- To connect to the BGS5 evaluation module via USB interface, check the properties of the enumerated USB devices for the configured COM ports, for example the "Cinterion BGx USB Modem", call a terminal program on the PC and connect to the configured COM port. Type the AT command ATI to display module identification information.

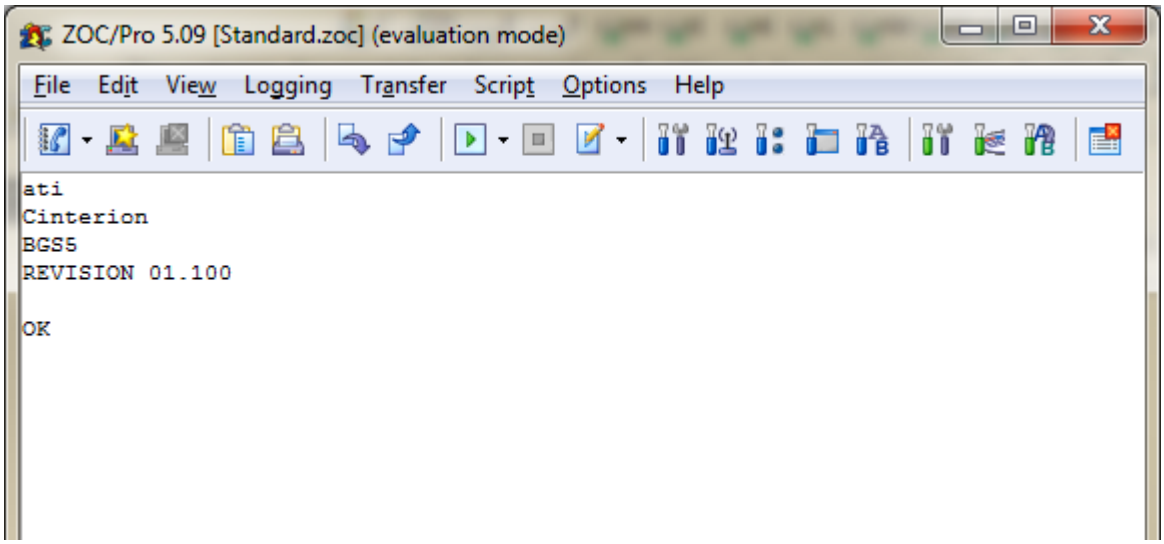


Figure 4: Connection via USB interface (USB modem)

- To connect to the BGS5 evaluation module via asynchronous serial interface, for example ASC0, check for the port that is connected to the DSB75's COM1 X201 via RS-232 cable, call a terminal program on the PC and connect to the BGS5 evaluation module using the following initial settings:
  - Bits per seconds: 115200
  - Data bits: 8
  - Parity: None
  - Stop bits:1
  - Flow control: Hardware

  Type the AT command ATI to display module identification information.

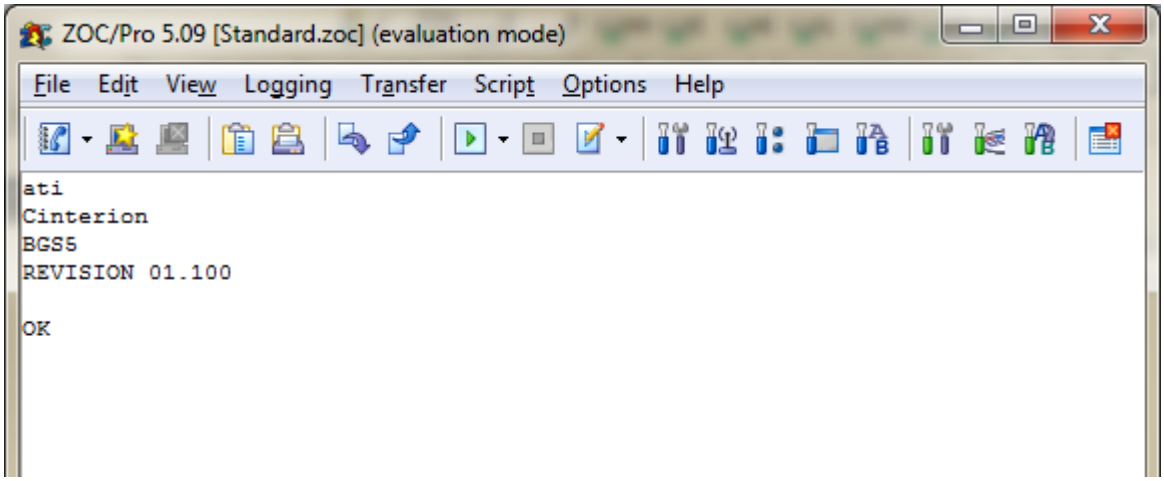
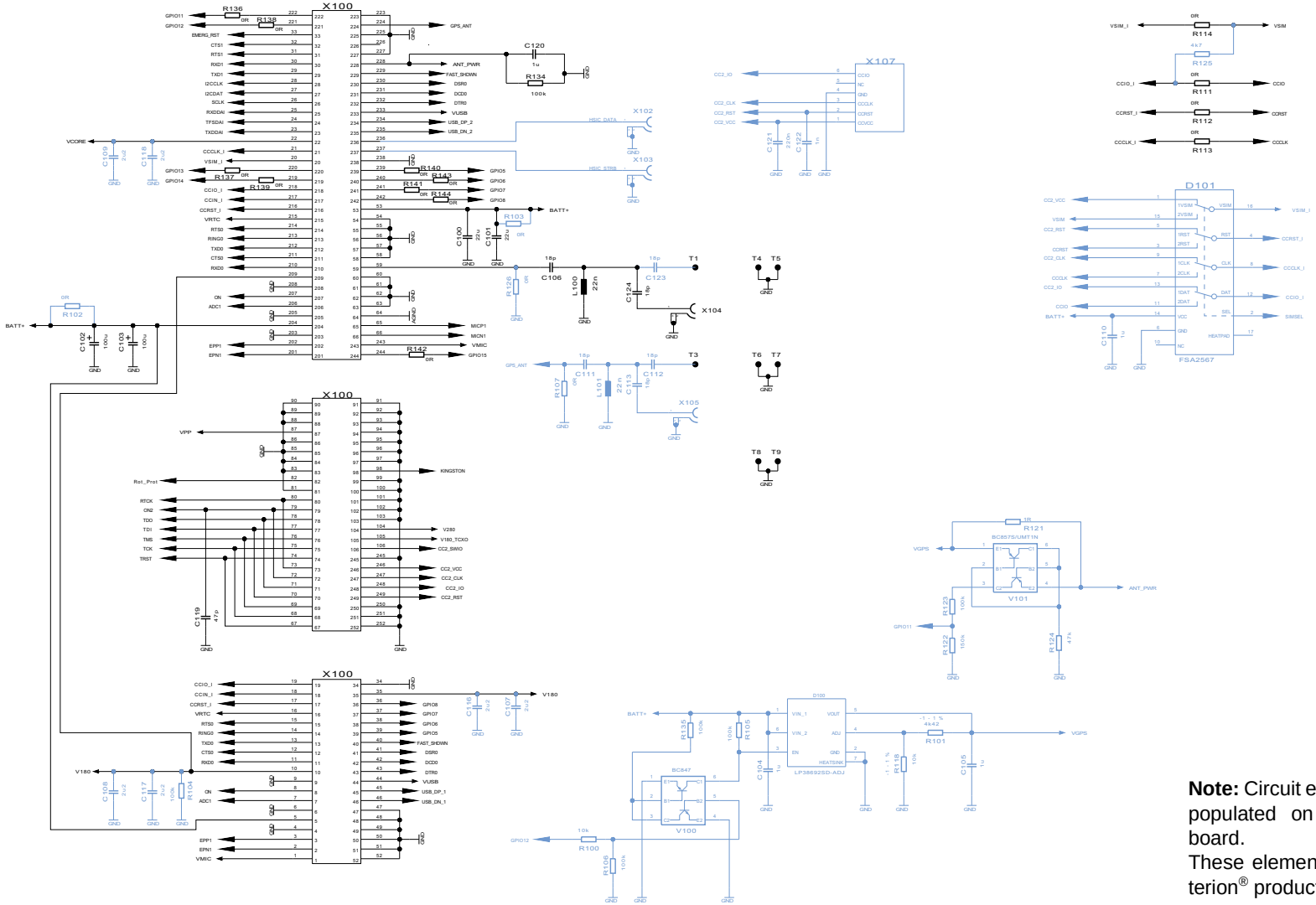


Figure 5: Connection via ASC0 interface

For a complete AT Command Set description see [1]. This includes AT commands to configure the communication interfaces.

3 Appendix: Circuit Diagrams for Evaluation Module Board



Note: Circuit elements marked blue are not (yet) populated on the BGS5 evaluation module board.
These elements are applicable for further Cinterion® products only.

Figure 6: Schematic sheet 1

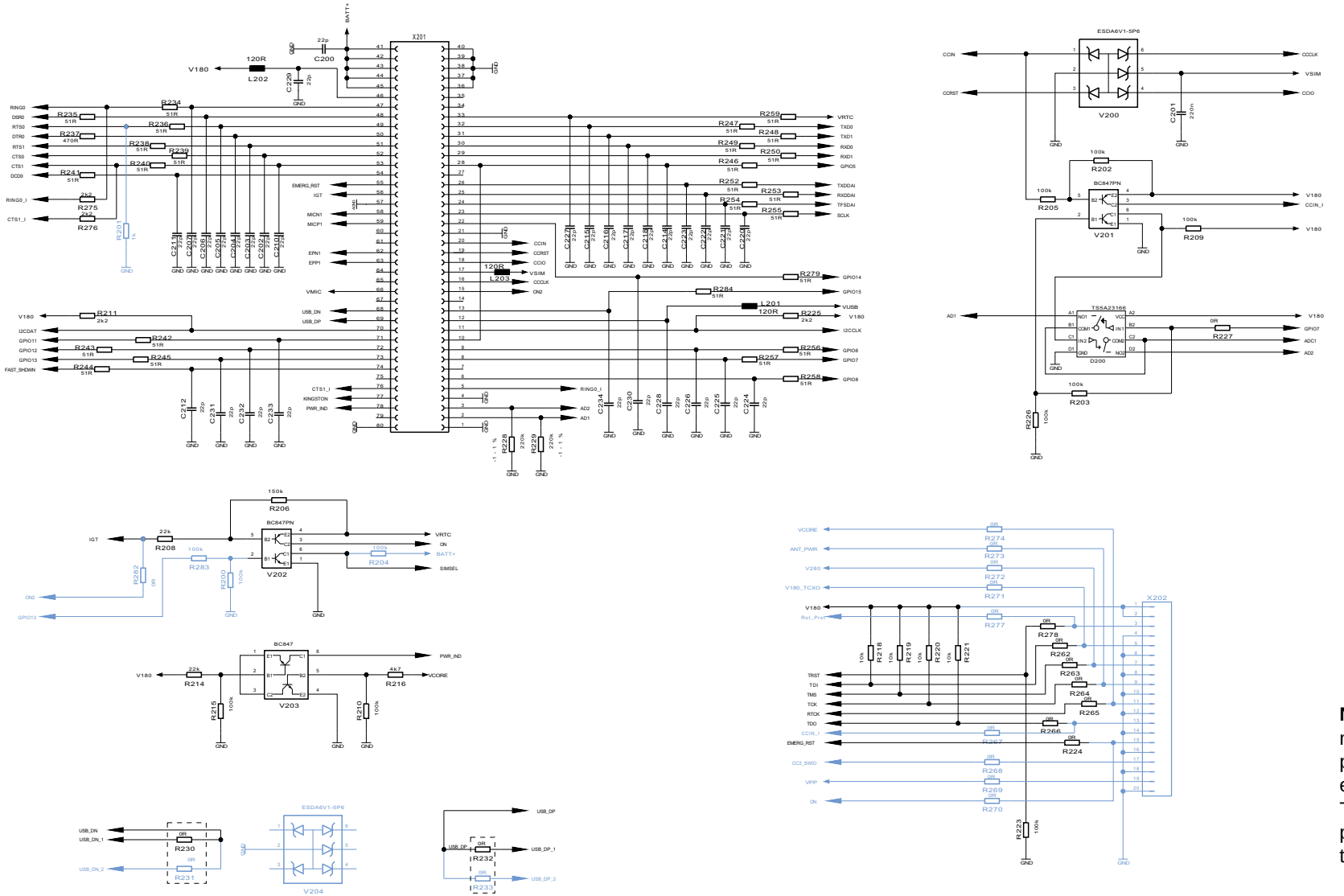
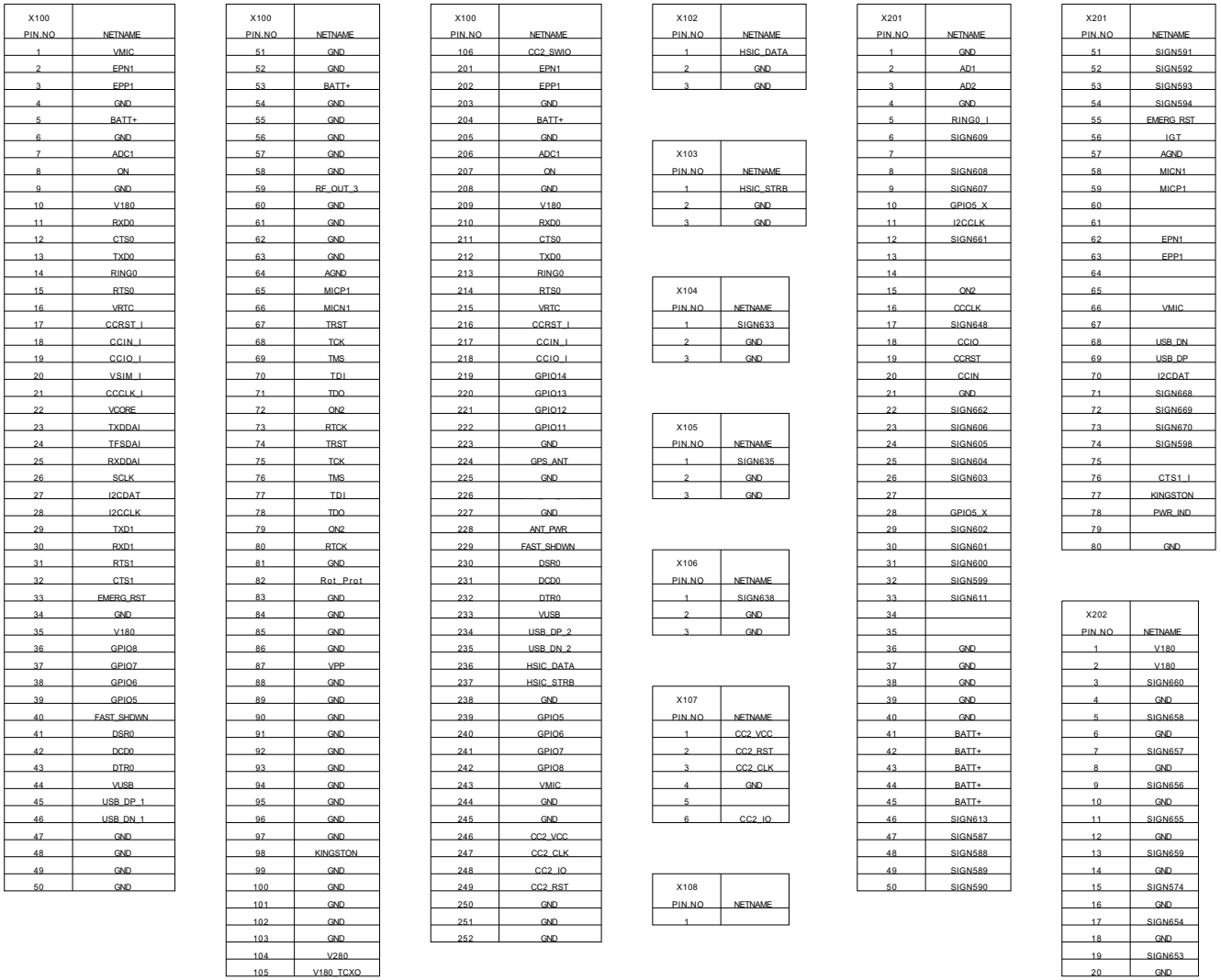


Figure 7: Schematic sheet 2

Note: Circuit elements marked blue are not (yet) populated on the BGS5 evaluation module board. These elements are applicable for further Cinterion® products only.



X100 PIN.NO	NETNAME
1	VMIC
2	EPN1
3	EPP1
4	GND
5	BATT+
6	GND
7	ADC1
8	ON
9	GND
10	V180
11	RXD0
12	CTS0
13	TXD0
14	RING0
15	RTS0
16	VRTC
17	CCRST_I
18	CCIN_I
19	CCIO_I
20	VSIM_I
21	CCCLK_I
22	VCORE
23	TXDDAI
24	TFSDAI
25	RXDDAI
26	SCLK
27	I2CDAT
28	I2CCLK
29	TXD1
30	RXD1
31	RTS1
32	CTS1
33	EMERG_RST
34	GND
35	V180
36	GPIO8
37	GPIO7
38	GPIO6
39	GPIO5
40	FAST_SHDWN
41	DSR0
42	DCD0
43	DTR0
44	VUSB
45	USB_DP_1
46	USB_DN_1
47	GND
48	GND
49	GND
50	GND

X100 PIN.NO	NETNAME
51	GND
52	GND
53	BATT+
54	GND
55	GND
56	GND
57	GND
58	GND
59	RF_OUT_3
60	GND
61	GND
62	GND
63	GND
64	AGND
65	MICP1
66	MICN1
67	TRST
68	TCK
69	TMS
70	TDI
71	TDO
72	ON2
73	RTCK
74	TRST
75	TCK
76	TMS
77	TDI
78	TDO
79	ON2
80	RTCK
81	GND
82	Rst_Prot
83	GND
84	GND
85	GND
86	GND
87	VPP
88	GND
89	GND
90	GND
91	GND
92	GND
93	GND
94	GND
95	GND
96	GND
97	GND
98	KINGSTON
99	GND
100	GND
101	GND
102	GND
103	GND
104	V280
105	V180_TCXO

X100 PIN.NO	NETNAME
106	CC2_SWIO
201	EPN1
202	EPP1
203	GND
204	BATT+
205	GND
206	ADC1
207	ON
208	GND
209	V180
210	RXD0
211	CTS0
212	TXD0
213	RING0
214	RTS0
215	VRTC
216	CCRST_I
217	CCIN_I
218	CCIO_I
219	GPIO14
220	GPIO13
221	GPIO12
222	GPIO11
223	GND
224	GPS_ANT
225	GND
226	
227	GND
228	ANT_PWR
229	FAST_SHDWN
230	DSR0
231	DCD0
232	DTR0
233	VUSB
234	USB_DP_2
235	USB_DN_2
236	HSIC_DATA
237	HSIC_STRB
238	GND
239	GPIO5
240	GPIO6
241	GPIO7
242	GPIO8
243	VMIC
244	GND
245	GND
246	CC2_VCC
247	CC2_CLK
248	CC2_IO
249	CC2_RST
250	GND
251	GND
252	GND

X102 PIN.NO	NETNAME
1	HSIC_DATA
2	GND
3	GND

X103 PIN.NO	NETNAME
1	HSIC_STRB
2	GND
3	GND

X104 PIN.NO	NETNAME
1	SIGN633
2	GND
3	GND

X105 PIN.NO	NETNAME
1	SIGN635
2	GND
3	GND

X106 PIN.NO	NETNAME
1	SIGN638
2	GND
3	GND

X107 PIN.NO	NETNAME
1	CC2_VCC
2	CC2_RST
3	CC2_CLK
4	GND
5	
6	CC2_IO

X108 PIN.NO	NETNAME
1	

X201 PIN.NO	NETNAME
1	GND
2	AD1
3	AD2
4	GND
5	RING0_I
6	SIGN609
7	
8	SIGN608
9	SIGN607
10	GPIO5_X
11	I2CCLK
12	SIGN661
13	
14	
15	ON2
16	CCCLK
17	SIGN648
18	CCIO
19	CCRST
20	CCIN
21	GND
22	SIGN662
23	SIGN606
24	SIGN605
25	SIGN604
26	SIGN603
27	
28	GPIO5_X
29	SIGN602
30	SIGN601
31	SIGN600
32	SIGN599
33	SIGN611
34	
35	
36	GND
37	GND
38	GND
39	GND
40	GND
41	BATT+
42	BATT+
43	BATT+
44	BATT+
45	BATT+
46	SIGN613
47	SIGN587
48	SIGN588
49	SIGN589
50	SIGN590

X201 PIN.NO	NETNAME
51	SIGN591
52	SIGN592
53	SIGN593
54	SIGN594
55	EMERG_RST
56	IGT
57	AGND
58	MICN1
59	MICP1
60	
61	
62	EPN1
63	EPP1
64	
65	
66	VMIC
67	
68	USB_DN
69	USB_DP
70	I2CDAT
71	SIGN668
72	SIGN669
73	SIGN670
74	SIGN598
75	
76	CTS1_I
77	KINGSTON
78	PWR_IND
79	
80	GND

X202 PIN.NO	NETNAME
1	V180
2	V180
3	SIGN660
4	GND
5	SIGN658
6	GND
7	SIGN657
8	GND
9	SIGN656
10	GND
11	SIGN655
12	GND
13	SIGN659
14	GND
15	SIGN574
16	GND
17	SIGN654
18	GND
19	SIGN653
20	GND

Note: Not all PIN NOs are usable on an BGS5 evaluation module board.
These PIN NOs are applicable for further Cinterion® products only. For assigned pads please refer to [2] (the ON2 pad is also called AUTO_ON).

Figure 8: Schematic sheet 3

About Gemalto

Gemalto (Euronext NL0000400653 GTO) is the world leader in digital security with 2011 annual revenues of €2 billion and more than 10,000 employees operating out of 74 offices and 14 Research & Development centers, located in 43 countries.

We are at the heart of the rapidly evolving digital society. Billions of people worldwide increasingly want the freedom to communicate, travel, shop, bank, entertain and work - anytime, everywhere - in ways that are enjoyable and safe. Gemalto delivers on their expanding needs for personal mobile services, payment security, authenticated cloud access, identity and privacy protection, eHealthcare and eGovernment efficiency, convenient ticketing and dependable machine-to-machine (M2M) applications.

Gemalto develops secure embedded software and secure products which we design and personalize. Our platforms and services manage these secure products, the confidential data they contain and the trusted end-user services they enable. Our inovations enable our clients to offer trusted and convenient digital services to billions of individuals.

Gemalto thrives with the growing number of people using its solutions to interact with the digital and wireless world.

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