



Development Kit User Guide

AirPrime WS Series



SIERRA
WIRELESS

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Contact Information

Sales Desk:	Phone:	1-604-232-1488
	Hours:	8:00 AM to 5:00 PM Pacific Time
	E-mail:	sales@sierrawireless.com
Post:	Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4	
Fax:	1-604-231-1109	
Web:	www.sierrawireless.com	

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Document History

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002	May 10, 2010	Updated Figure 25 Settings for a Differential Microphone on the AirPrime WS Series Development Kit.
		Added section 1.2 Default Soldering Configuration for Jumper Pads.
		Added document [4] AirPrime WISMO228 AT Commands Manual in the list of reference documents.
		Reformatted in the rebranded SWI template.
003	August 20, 2010	Updated Table 1 AirPrime WS Series Development Kit Test Ports.
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Overview

This document describes how the AirPrime WS Series Development Kit integrates with the AirPrime WISMO218 and the AirPrime WISMO228 via the adaptor board, WS Series Socket-Up Board. It discusses the different interfaces within the AirPrime WS Series Development Kit and provides schematics to facilitate the user's understanding and configuration of the development kit for their own use.

The AirPrime WS Series Development Kit is equipment which can be used to develop both software and hardware based on the AirPrime WISMO218 or the AirPrime WISMO228. However, it needs to integrate with the AirPrime WS Series Socket-Up Board to function with the AirPrime WISMO218 or WISMO228.

Refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline for further information about the AirPrime WISMO218 and the AirPrime WISMO228.

1. General Description

This section gives a brief overview of the AirPrime WS Series Development Kit and briefly describes the interfaces and special jumper pads available.

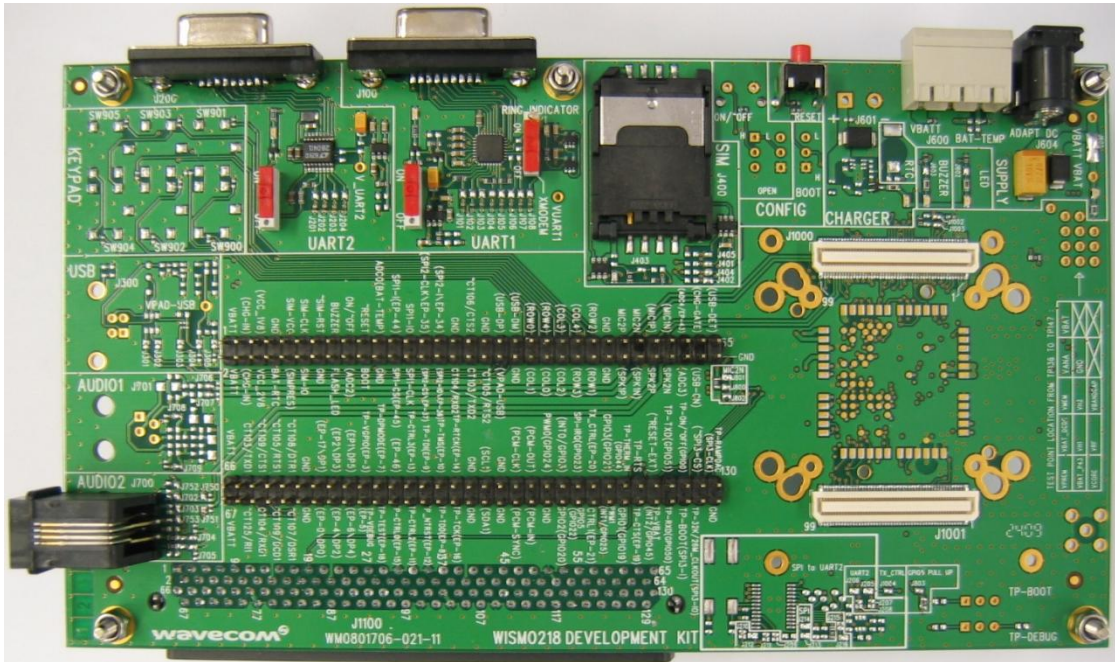


Figure 1. AirPrime WS Series Development Kit

1.1. AirPrime WS Series Development Kit Overview

The AirPrime WS Series Development Kit is used to allow users to create and define applications using the AirPrime WISMO218 or the AirPrime WISMO228.

Interfaces on the AirPrime WS Series Development Kit which are supported by the AirPrime WISMO218 and the AirPrime WISMO228 include:

- 1 external board to board connector and test point (TP) to access all signals for the adaptor board
- Serial link RS232, UART1* with full signals
- Ring Indicator
- UART-SPI interface, UART2 connector*
- SIM* (1.8/3V)
- 1 Audio connector (AUDIO2)
- LEDs for several indications
- Power supply connectors
- RESET Pushbutton

Note: * These signals from the connector side can be electrically disconnected from the AirPrime WISMO218 or the AirPrime WISMO228 if the related jumper pads are dissociated. (Refer to section 1.3 Special Soldering for Jumper Pads.)

1.2. Default Soldering Configuration for Jumper Pads

Refer to the following figures for the default soldering configuration for jumper pads in the AirPrime WS Series Development Kit and Socket-Up Board.

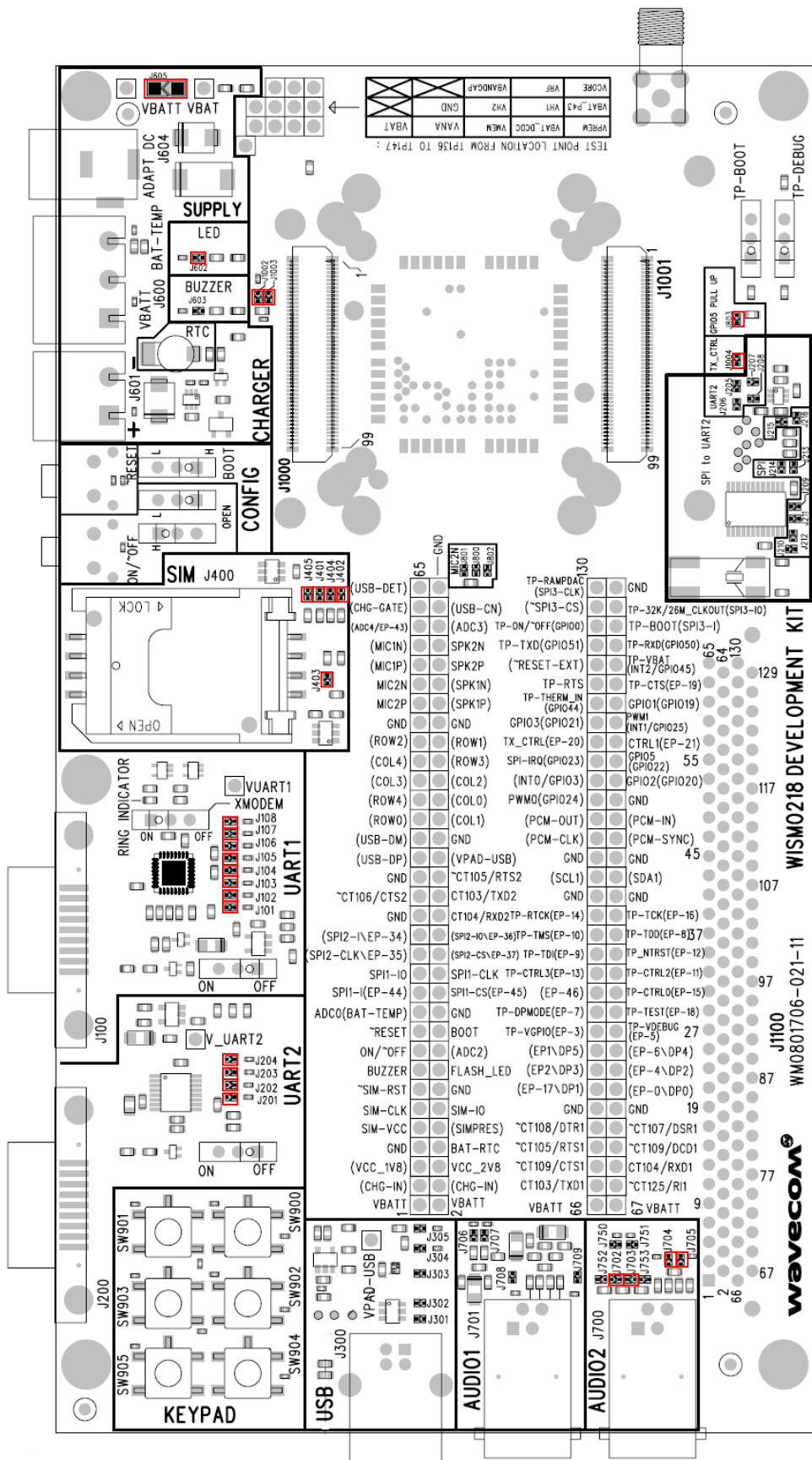


Figure 2. Default Soldering Configuration for the Development Kit

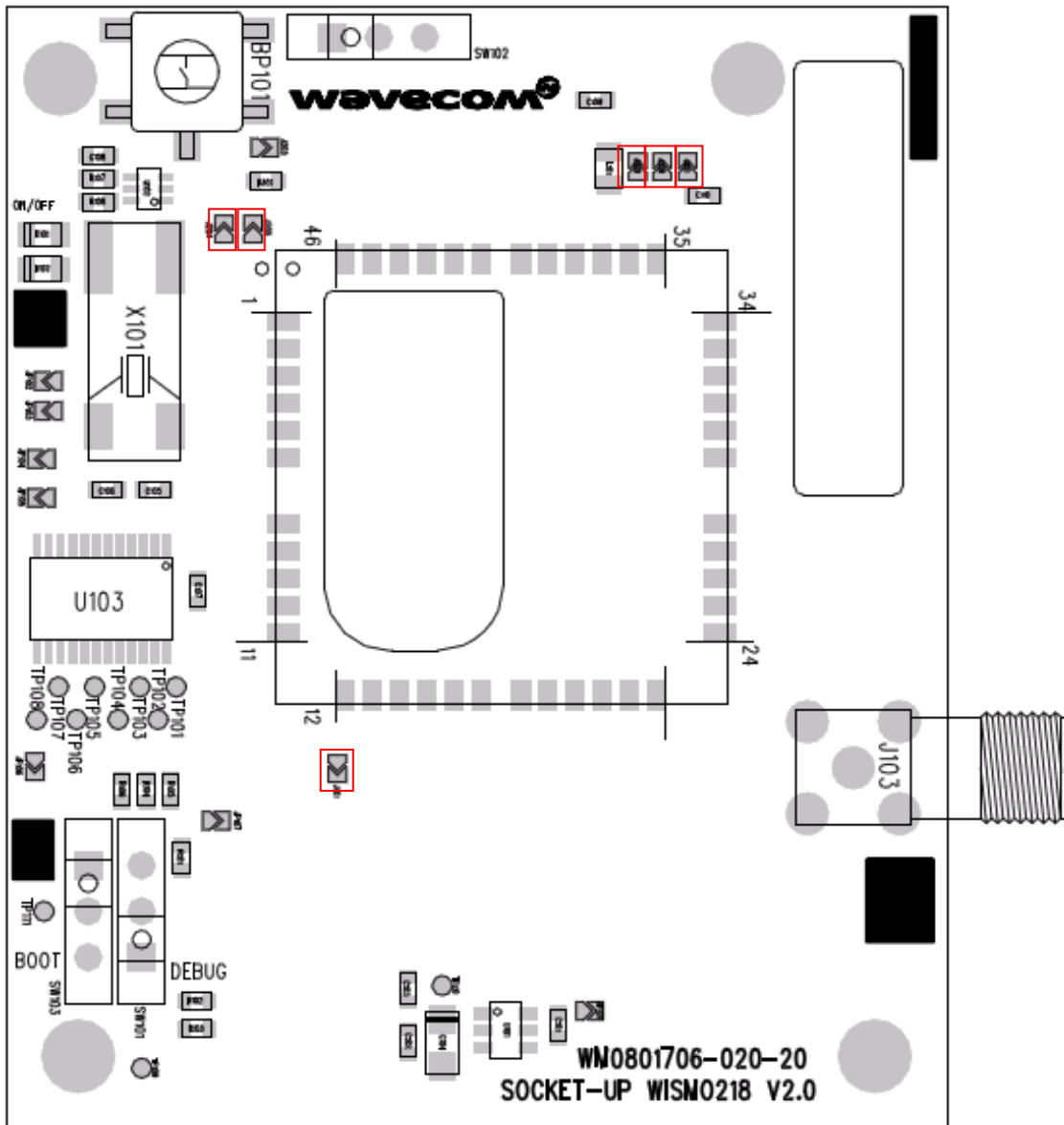


Figure 3. Default Soldering Configuration for the Socket-Up Board

1.3. Special Soldering for Jumper Pads

PCB jumper prints are used for the electrical removal of peripherals from the AirPrime WISMO218 or the AirPrime WISMO228.

To connect signals between the AirPrime WISMO218 or the AirPrime WISMO228 (from J1000 and J1001) and the dedicated connectors on the AirPrime WS Series Development Kit board, solder these PCB jumper prints.

To connect signals between the AirPrime WS Series Socket-Up Board and the external board connector (J1100), it is recommended NOT to solder the PCB prints. Then, a daughter board can be prototyped to connect the AirPrime WS Series Socket-Up Board directly through the board connector (J1100).

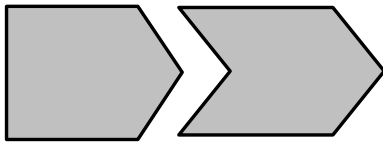


Figure 4. Jumper Solder Pad

The interfaces (or signals) listed below could be electrically removed by dissociating the following PCB jumper prints:

- UART1 (from J101 to J108)
- UART-SPI (UART2 connector, from J201 to J204)
- AUDIO2 (from J702 to J705)
- SIM (from J401 to J405)
- Power supply of the AirPrime WS Series Development Kit interfaces (all components from J605, except the AirPrime WISMO218 or the AirPrime WISMO228. For more information, see section 7 Current Consumption Measurement).
- BUZZ-OUT signal (with J603)
- FLASH-LED signal (with J602)

1.4. RoHS Compliance

The AirPrime WS Series Development Kit board is compliant with RoHS (Restriction of Hazardous Substances in Electrical and Electronic Equipment) Directive 2002/95/EC which sets limits for the use of certain restricted hazardous substances. This directive states that “from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE)”.

Both the AirPrime WISMO218 and the AirPrime WISMO228 are compliant with this directive and are identified by the RoHS logo on their labels.



2. AirPrime WS Series Development Kit

This section provides a schematic of both the top and bottom views of the AirPrime WS Series Development Kit. It shows the locations of the several ports and interfaces available, and lists all available test points.

2.1. AirPrime WS Series Development Kit Top View

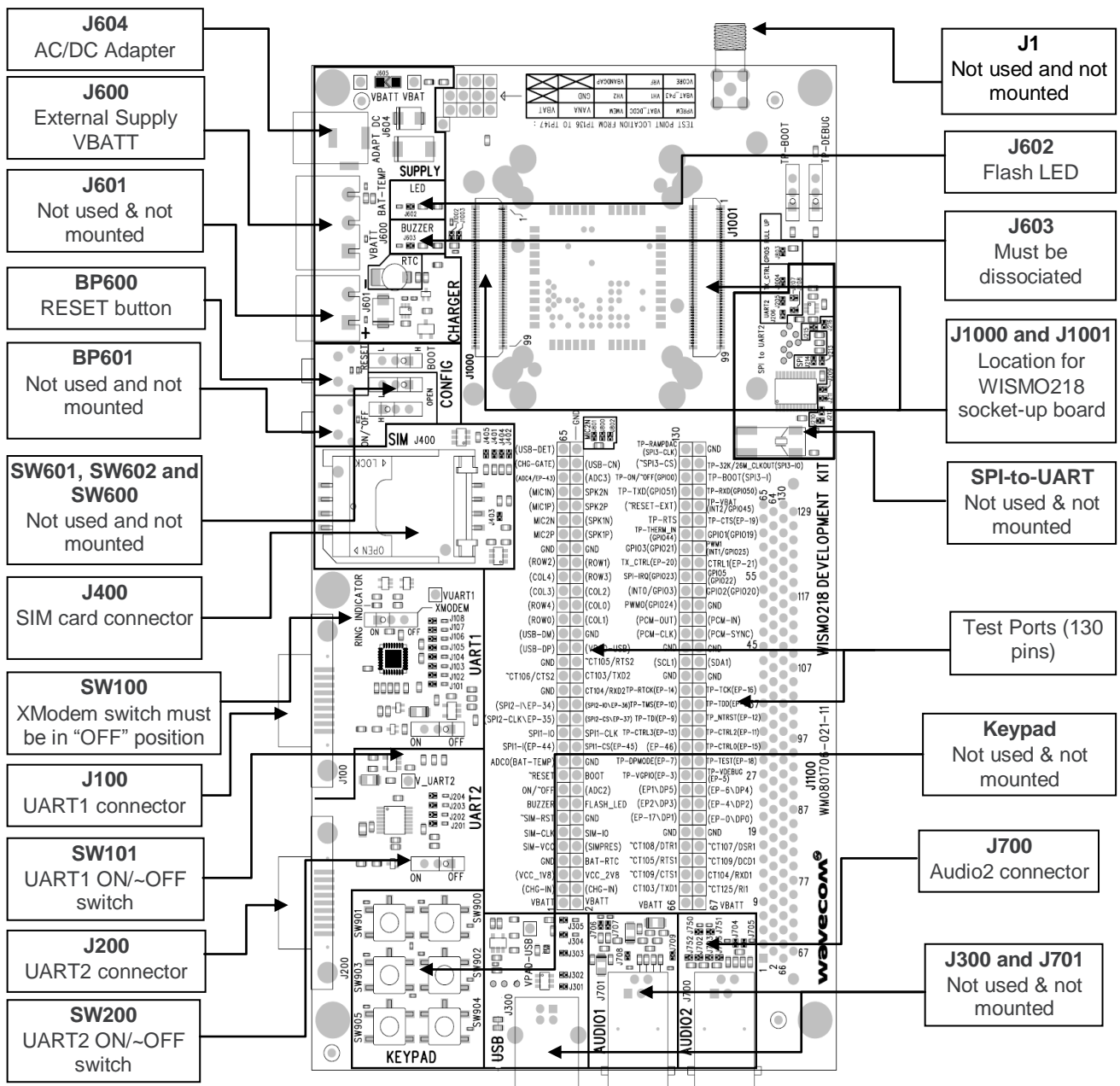


Figure 5. AirPrime WS Series Development Kit (Top View)

2.2. AirPrime WS Series Development Kit Bottom View

The J1101 connector can be used as a daughter board interface when implementing with the AirPrime WISMO218 or the AirPrime WISMO228. Please refer to document [5] AirPrime WMP100 Embedded Module Development Kit User Guide for the pin assignments of this external board connector.

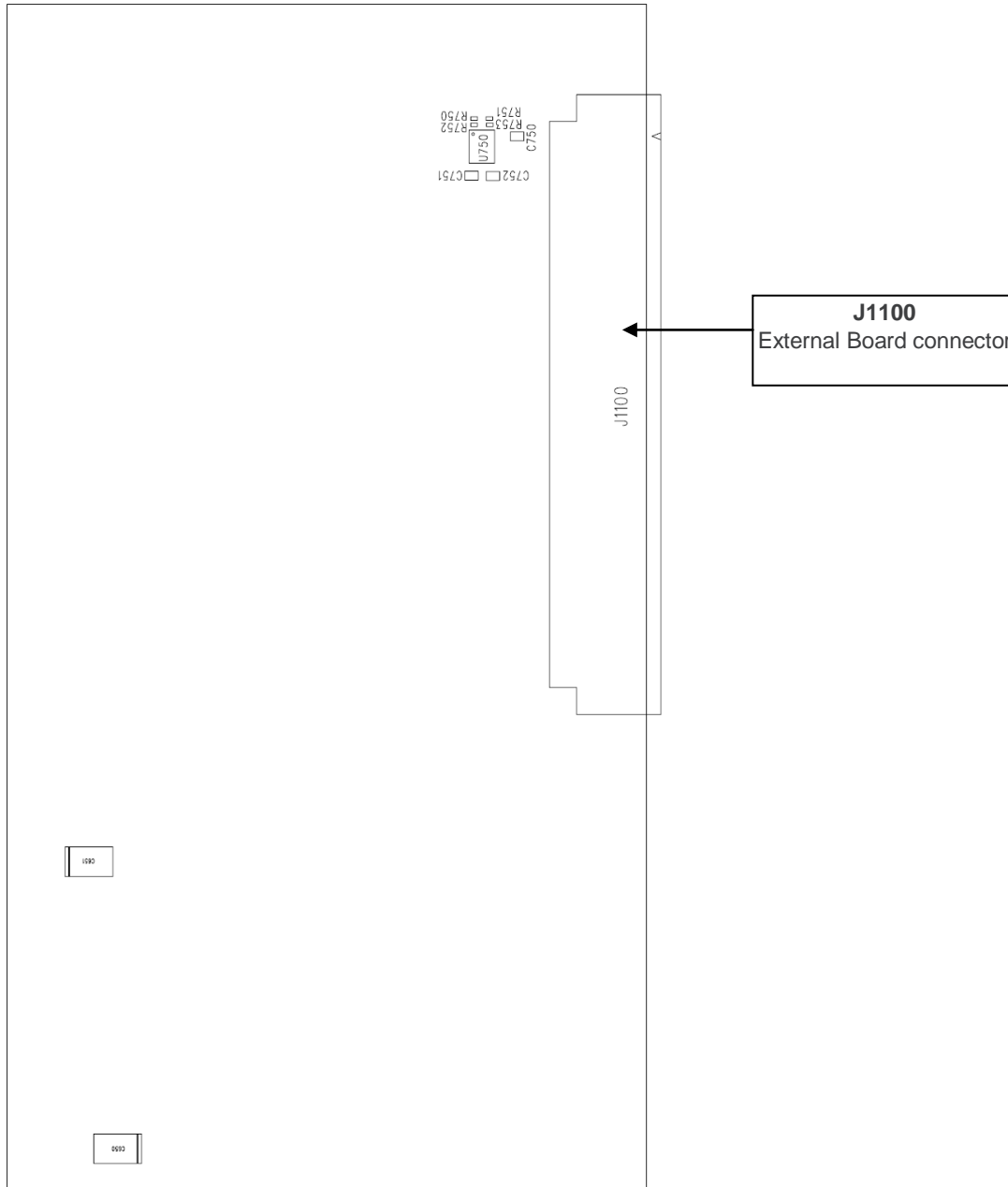


Figure 6. AirPrime WS Series Development Kit (Bottom View)

2.3. Test Ports Available on the AirPrime WS Series Development Kit

There are a total of 130 test ports available in the AirPrime WS Series Development Kit. The following table lists the test ports and their corresponding AirPrime WS Series pins.

Table 1. AirPrime WS Series Development Kit Test Ports

Note: Pins marked as N/A (Not Applicable or Not Assigned) are shaded in light gray.

Test Port	Test Point and Serigraphy	Corresponding WISMO218 and WISMO228 Pin	Remarks
1	VBATT	VBATT	
2	VBATT	VBATT	
3	(CHG-IN)	N/A	
4	(CHG-IN)	N/A	
5	(VCC_1V8)	N/A	
6	VCC_2V8	VCC_2V8	
7	GND	GND	
8	BAT_RTC	BAT-RTC	
9	SIM-VCC	SIM-VCC	This test point works only when R1126 is soldered with a 0Ω resistor.
10	(SIMPRES)	N/A	
11	SIM-CLK	SIM-CLK	This test point works only when R1124 is soldered with a 0Ω resistor.
12	SIM-IO	SIM-IO	This test point works only when R1123 is soldered with a 0Ω resistor.
13	~SIM-RST	~SIM-RST	This test point works only when R1122 is soldered with a 0Ω resistor.
14	GND	GND	
15	BUZZER	BUZZER	
16	FLASH-LED	TX_CTRL	
17	ON/~OFF	ON/~OFF	
18	(ADC2)	N/A	
19	~RESET	~RESET	
20	BOOT	N/A	
21	ADC0(BAT-TEMP)	AUX_ADC0	
22	GND	GND	
23	SPI1-I(EP-44)	SPI-IO	
24	SPI1-CS(EP-45)	~SPI-CS	
25	SPI1-IO	SPI-O	
26	SPI1-CLK	SPI-CLK	
27	(SPI2-CLK\EP-35)	N/A	
28	(SPI2-CS\EP-37)	N/A	
29	(SPI2-I\EP-34)	N/A	
30	(SPI2-IO\EP-36)	N/A	
31	GND	GND	

Test Port	Test Point and Serigraphy	Corresponding WISMO218 and WISMO228 Pin	Remarks
32	CT104/RXD2	N/A	
33	~CT106/CTS2	N/A	
34	CT103/TXD2	N/A	
35	GND	GND	
36	~CT105/RTS2	N/A	
37	(USB-DP)	N/A	
38	(VPAD-USB)	N/A	
39	(USB-DN)	N/A	
40	GND	GND	
41	(ROW0)	N/A	
42	(COL1)	N/A	
43	(ROW4)	N/A	
44	(COL0)	N/A	
45	(COL2)	N/A	
46	(COL3/)	N/A	
47	(COL4)	N/A	
48	(ROW3)	N/A	
49	(ROW2)	N/A	
50	(ROW1)	N/A	
51	GND	GND	
52	GND	GND	
53	MIC2P	MICP	
54	(SPK1P)	N/A	
55	MIC2N	MICN	
56	(SPK1N)	N/A	
57	(MIC1P)	N/A	
58	SPK2P	SPKP	
59	(MIC1N)	N/A	
60	SPK2N	SPKN	
61	(ADC4/EP-43)	N/A	
62	(ADC3)	N/A	
63	(CHG-GATE)	N/A	
64	(USB-CN)	N/A	
65	(USB-DET)	N/A	
66	VBATT	VBATT	
67	VBATT	VBATT	
68	CT103/TXD1	CT103/TXD	
69	~CT125/RI1	~CT125/RI	
70	~CT109/CTS1	~CT106/CTS	
71	CT104/RXD1	CT104/RXD	
72	~CT105/RTS1	~CT105/RTS	
73	~CT109/DCD1	~CT109/DCD	

Test Port	Test Point and Serigraphy	Corresponding WISMO218 and WISMO228 Pin	Remarks
74	~CT108/DTR1	~CT108/DTR	
75	~CT107/DSR1	~CT107/DSR	
76	GND	GND	
77	GND	GND	
78	(EP-17\DP1)	N/A	
79	(EP-0\DP0)	N/A	
80	(EP2\DP3)	N/A	
81	(EP-4\DP2)	N/A	
82	(EP1\DP5)	N/A	
83	(EP-6\DP4)	N/A	
84	TP-VGPIO(EP-3)	N/A	
85	TP-VDEBUG(EP-5)	N/A	
86	TP-DPMODE(EP-7)	N/A	
87	TP-TEST(EP-18)	N/A	
88	(EP-46)	N/A	
89	TP-CTRL0(EP-15)	N/A	
90	TP-CTRL3(EP-13)	N/A	
91	TP-CTRL2(EP-11)	N/A	
92	TP-TDI(EP-9)	N/A	
93	TP_NTRST(EP-12)	N/A	
94	TP-TMS(EP-10)	N/A	
95	TP-TDD(EP-8)	N/A	
96	TP-RTCK(EP-14)	N/A	
97	TP-TCK(EP-16)	N/A	
98	GND	GND	
99	GND	GND	
100	(SCL1)	N/A	
101	(SDA1)	N/A	
102	GND	GND	
103	GND	GND	
104	(PCM-CLK)	N/A	
105	(PCM-SYNC)	N/A	
106	(PCM-OUT)	N/A	
107	(PCM-IN)	N/A	
108	PWM0(GPIO24)	PWM0	
109	GND	GND	
110	(INT0/GPIO3)	N/A	
111	GPIO2(GPIO20)	WISMO_READY	
112	SPI-IRQ(GPIO23)	SPI-IRQ	
113	GPIO5(GPIO22)	GPIO5	
114	TX-CTRL(EP-20)	TX_CTRL	
115	CTRL1(EP-21)	N/A	

Test Port	Test Point and Serigraphy	Corresponding WISMO218 and WISMO228 Pin	Remarks
116	GPIO3(GPIO21)	GPIO3	
117	PWM1(INT1/GPIO25)	PWM1	
118	TP-THERM_IN(GPIO44)	N/A	
119	GPIO1(GPIO19)	GPIO1	
120	TP-RTS	N/A	
121	TP-CTS(EP-19)	N/A	
122	(~RESET-EXT)	N/A	
123	TP-VBAT(INT2/GPIO45)	N/A	
124	TP-TXD(GPIO51)	N/A	
125	TP-RXD(GPIO50)	N/A	
126	TP-ON/~OFF(GPIO0)	N/A	
127	TP-BOOT(SPI3-1)	N/A	
128	(~SPI3-CS)	N/A	
129	TP-32K/26M_CLKOUT(SPI3-IO)	N/A	
130	TP-RAMPDAC(SPI3-CLK)	N/A	



3. AirPrime WS Series Socket-Up Board

Both the AirPrime WISMO218 and the AirPrime WISMO228 can't be directly connected onto the AirPrime WS Series Development Kit. An adaptor board, the AirPrime WS Series Socket-Up Board, must be used as an interface between the modules and development kit.

Refer to section 12 Appendix for further information about the implementation of both the AirPrime WS Series Development Kit and the AirPrime WS Series Socket-Up Board.

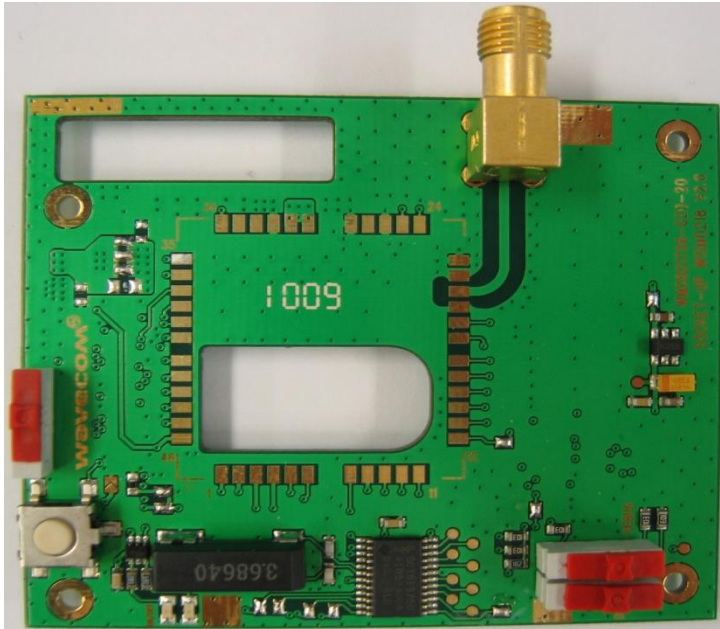


Figure 7. AirPrime WS Series Socket-Up Board

3.1. AirPrime WS Series Socket-Up Board Top View

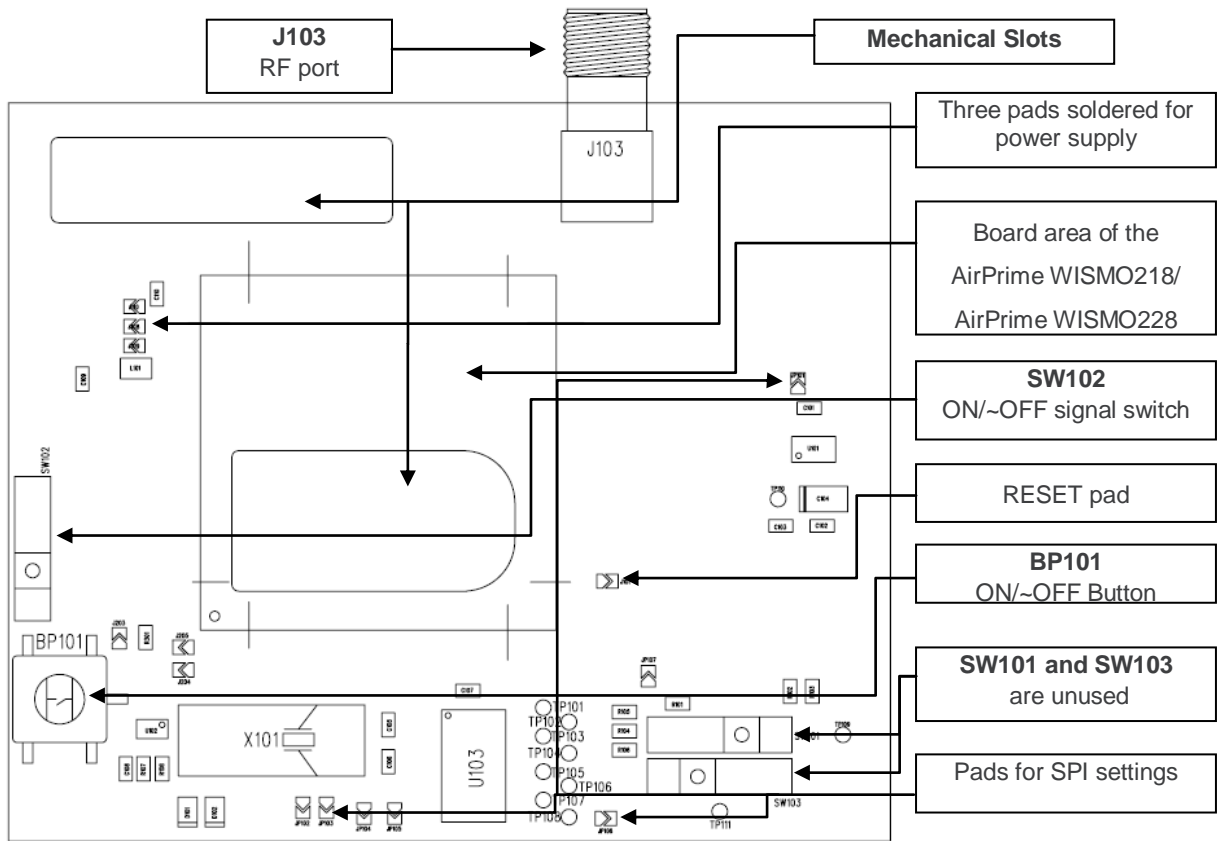


Figure 8. AirPrime WS Series Socket-Up Board (Top View)

3.2. AirPrime WS Series Socket-Up Board Bottom View

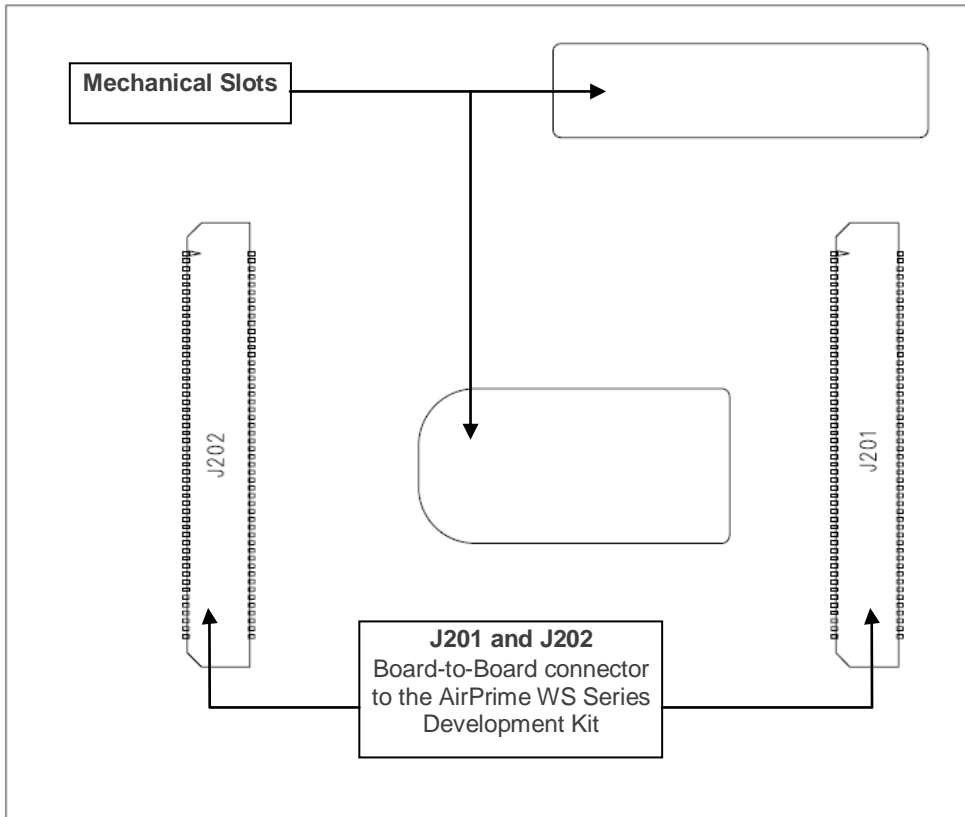


Figure 9. AirPrime WS Series Socket-Up Board (Bottom View)



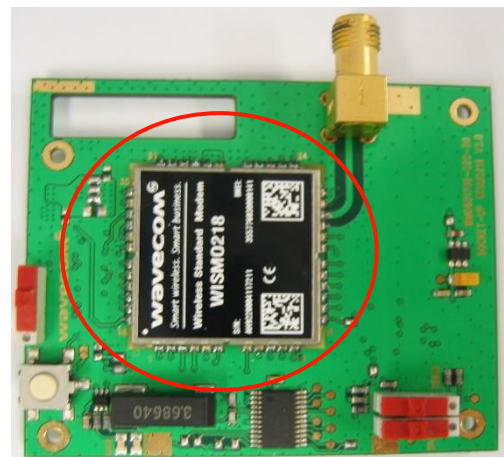
4. Setting Up the AirPrime WS Series Development Kit

The following section describes how the AirPrime WS Series Development Kit and the AirPrime WS Series Socket-Up Board are setup. It also briefly describes how communication tests are done to ensure that the AirPrime WISMO218 or the AirPrime WISMO228 has been properly connected.

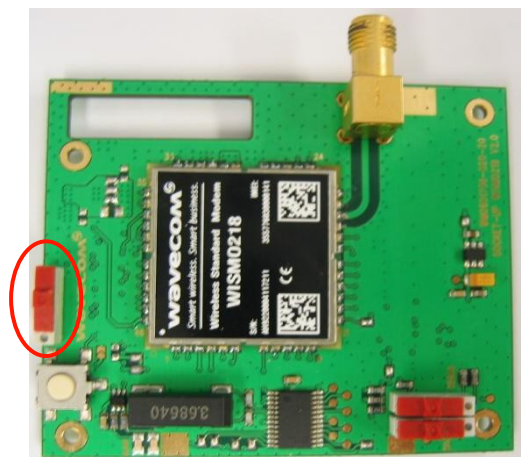
4.1. Setting Up the AirPrime WS Series Development Kit

Prepare the AirPrime WS Series Development Kit and the AirPrime WS Series Socket-Up Board by following these instructions step by step.

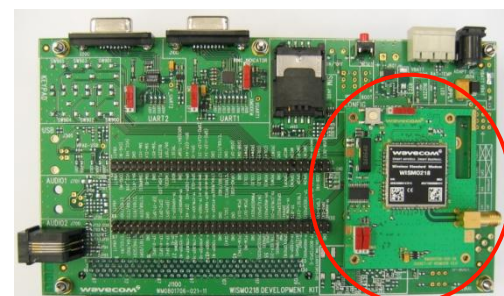
1. Solder the AirPrime WISMO218 or the AirPrime WISMO228 onto the AirPrime WS Series Socket-Up Board.



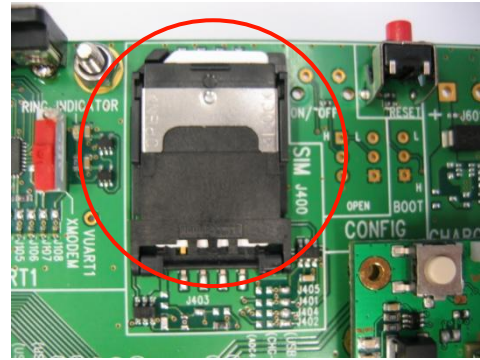
2. Turn SW102 to the "OFF" position.



3. Plug the AirPrime WS Series Socket-Up Board on the AirPrime WS Series Development Kit.

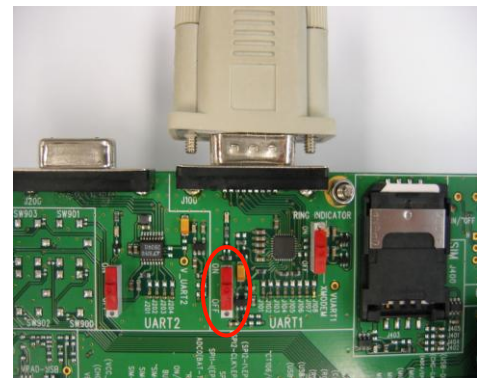


4. Insert a SIM card into the SIM card holder, J400 (if communications is required).

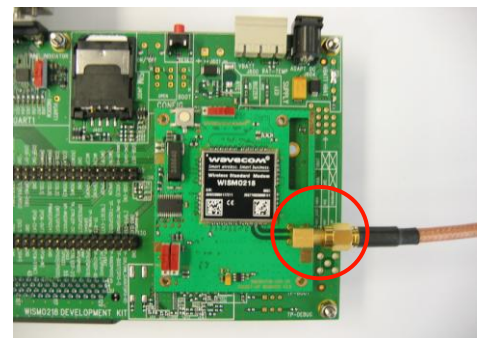


5. All jumper pads are soldered by default. (Refer to section 1.2 Default Soldering Configuration for Jumper Pads for more information.) Retain these default settings.
6. Connect the RS232 cable between the PC port and J100 of the AirPrime WS Series Development Kit and make sure that SW101 is in the "ON" position.

Note: Baud rate by default is 115200 kbps, 8, N, 1.



7. If communications is required, connect the J103 SMA connector to an external antenna or a Radio Communication Tester using a coaxial cable.

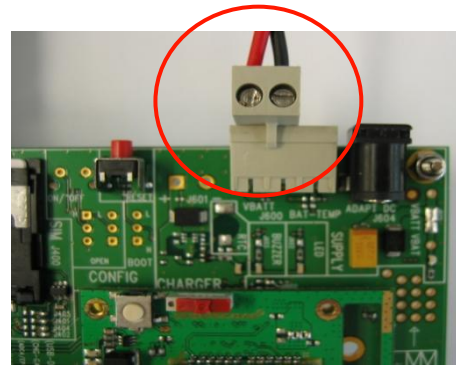


8. If audio communications is required, connect the handset to the Main Audio connector, J700.



4.2. Power Supply

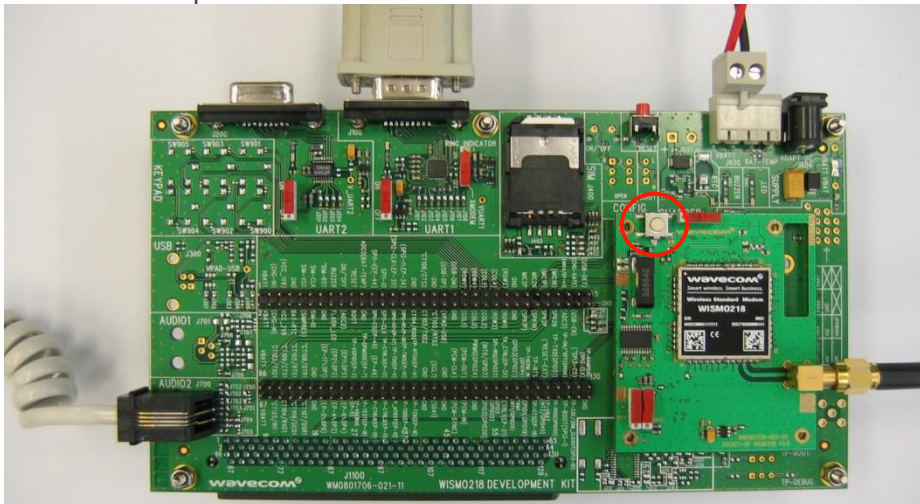
Plug in the AC/DC power supply provided in the J604 connector, or to an external DC power supply at 4V/2A (J600).



4.3. Communications Test

To perform a communications test after setting-up the AirPrime WS Series Development Kit with the AirPrime WISMO218 or the AirPrime WISMO228, do the following:

1. Press BP101 to power ON the AirPrime WISMO218 or the AirPrime WISMO228.



2. Using a PC terminal emulator, send the following command on a serial port to communicate with the AirPrime WISMO218 or the AirPrime WISMO228:

AT

3. When communications is established between the PC and the AirPrime WISMO218 or the AirPrime WISMO228, the command above sends the message "OK" as a reply. Verify that the message is displayed in the terminal emulator window.

Refer to documents [3] AirPrime WISMO218 AT Commands Manual and [4] AirPrime WISMO228 AT Commands Manual for more information about using AT commands to communicate between a PC and the AirPrime WS Series Socket-Up Board.

5. Interfaces/Peripherals

This section describes the different interfaces/peripherals that are available in the AirPrime WS Series Development Kit.

5.1. Power Supplies

Two power supply sources are available on the AirPrime WS Series Development Kit:

- DC external supply (via J600)
- AC/DC adapter (via J604)

These power supplies are protected against electrostatic discharge (ESDs) and voltage or current transient surges by ESD diodes or varistors.

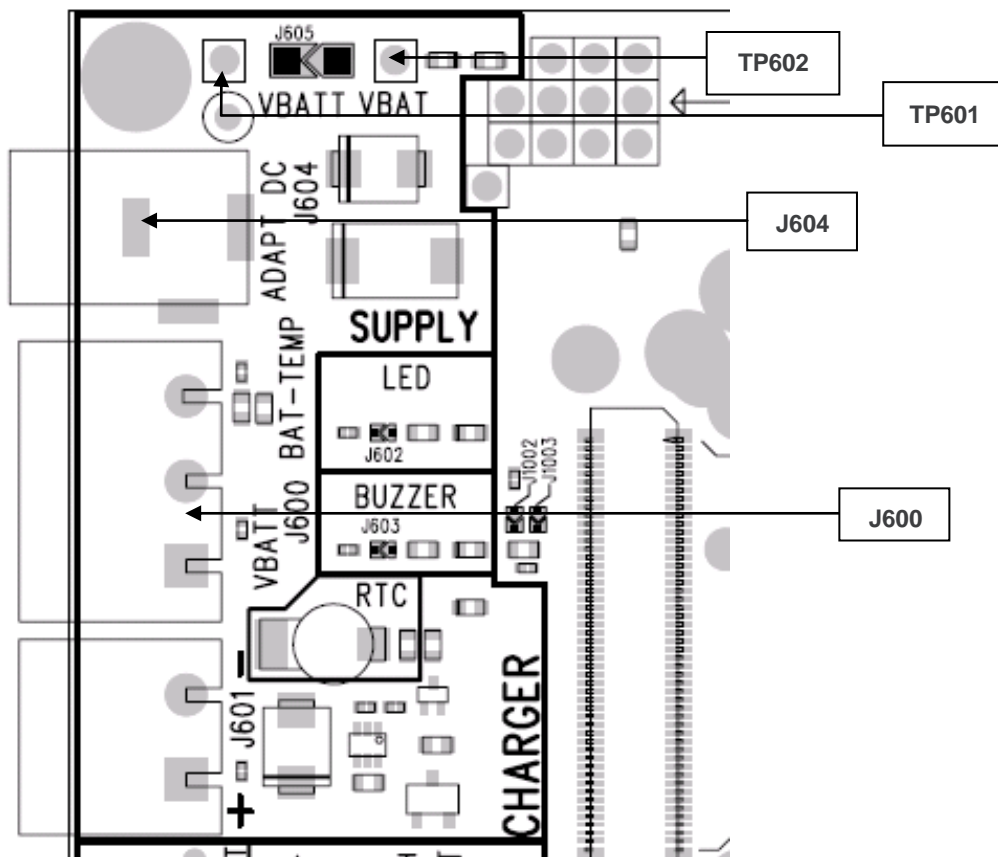


Figure 10. Power Supply Voltage (J604 and J600)

Each of these power supplies are used for **both** the AirPrime WISMO218 and the AirPrime WISMO228 and the peripherals on the AirPrime WS Series Development Kit board.

It is possible to separate the power supply for the AirPrime WS Series Socket-Up Board ("VBATT" via TP601) and the power supply for the peripherals ("VBAT" via TP602) by unsoldering J605. Current measurement is therefore possible for the AirPrime WS Series Development Kit and for the AirPrime WISMO218 or the AirPrime WISMO228. Refer to section 7 Current Consumption Measurement for more information).

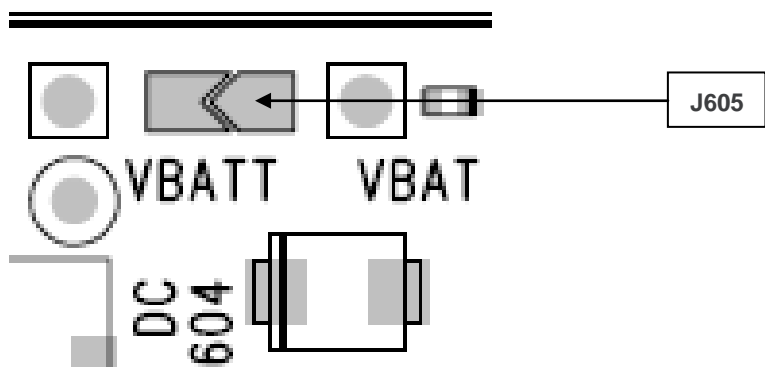


Figure 11. Zoom on “J605”

5.1.1. LED Signalization (“VBAT”)

The “VBAT” indicator is a green LED and it indicates the presence of a power supply at J600 or J604. Both the AirPrime WISMO218 and the AirPrime WISMO228 and peripherals are powered by this power source when J605 is soldered. If J605 is unsoldered, an extra external power supply should be connected to “VBAT” for the AirPrime WS Series Development Kit. It is recommended to always use both VBATT and VBAT simultaneously.

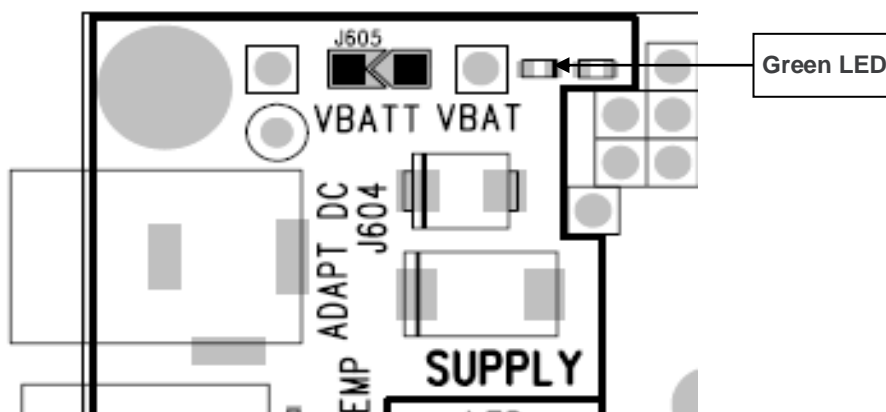


Figure 12. LED Signalization of “VBAT”

Table 2. LED of “VBAT”

LED	VBATT	VBAT
Light ON	ON	ON
Light OFF	Can be ON	OFF

5.1.2. External Supply

The J600 connector has three pins:

- **J600: Pins 1-2** are used to plug the power supply.
- **J600: Pins 2-3** are used to plug in BAT-TEMP. (Refer to section 5.1.2.1 BAT-TEMP for more information.)

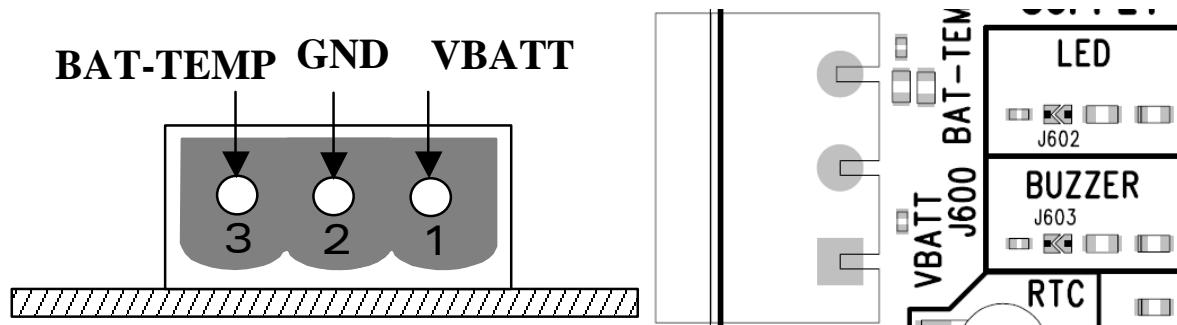


Figure 13. Power Supply Voltage

Table 3. Electrical Characteristics of VBATT

	V_{MIN}	V_{NOM}	V_{MAX}
VBATT ^{1,2}	3.2V	3.6V	4.8V

- 1: This value has to be guaranteed during the burst (with 1.5A Peak in GSM or GPRS mode).
- 2: Maximum operating Voltage Stationary Wave Ratio (VSWR) is 2:1.

For further information, refer documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline.

5.1.2.1. BAT-TEMP

The BAT-TEMP signal is an input (ADC) to the AirPrime WISMO218 or the AirPrime WISMO228.

J600: Pins 2-3 also allows simulation of the temperature level from a sensor inside the battery

Table 4. Electrical Characteristics of BAT-TEMP

	V_{MIN}	V_{NOM}	V_{MAX}
BAT-TEMP	0	-	3V

For further information, refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline.

5.1.3. Main Supply Adapter

The J604 connector powers the AirPrime WS Series Development Kit using the AC/DC power supply cable.

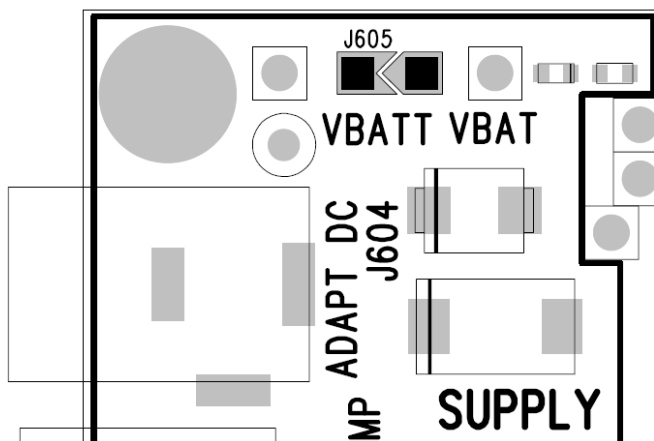


Figure 14. Main Supply Adapter

The only supported adapter is listed in the table below.

Manufacturer	Reference	Characteristics
SINPRO	SPU12C-101	4V DC / 2.5A

5.2. FLASH LED (“FLASH-LED”, D602)

The “FLASH-LED” location is shown in the following figure.

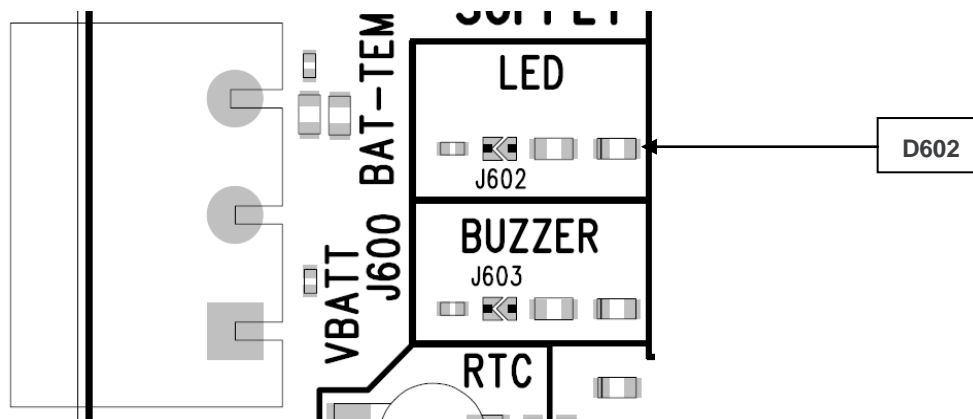


Figure 15. FLASH-LED Location

The “FLASH-LED” indicator, D602, is a green LED that indicates when the AirPrime WISMO218 or the AirPrime WISMO228 is in burst mode. The “FLASH-LED” indicates increased current consumption during uplink transmission bursts. However, the lighting might not be clearly visible as the period of each TX burst is very short.

For further information, refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline.

5.3. UART1

UART1 of the AirPrime WS Series Development Kit is connected to the RS232 serial link interface of the AirPrime WISMO218 or the AirPrime WISMO228. The voltage level of UART1 is 2.8V from the AirPrime WS Series Development Kit side.

The eight UART1 signals in the AirPrime WS Series Development Kit could be electrically disconnected from the AirPrime WISMO218 or the AirPrime WISMO228 if the eight tie pads, J101 to J108, are dissociated. Unsoldering them allows the UART1 signals to transmit via the external connector (J1100) to an external interface board.

UART1 is available by default on its dedicated connector, J100; as J101 to J108 are soldered.

5.3.1. UART1 Connector (J100)

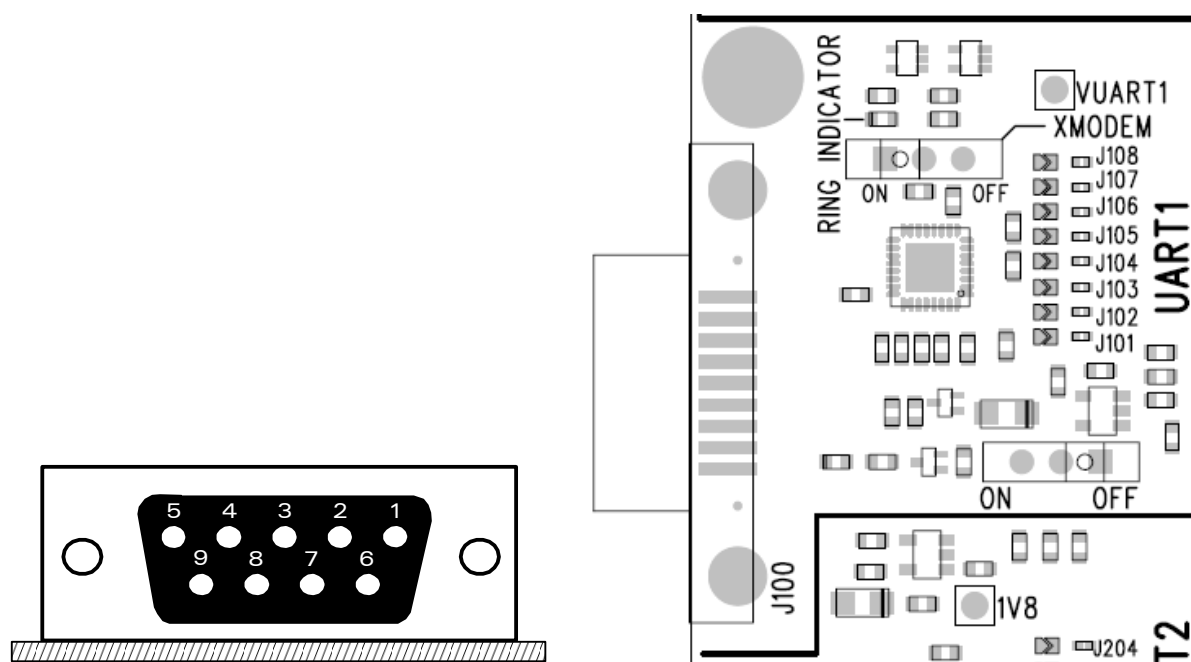


Figure 16. DB-9 Female Connector

J100 is a SUB-D 9-pin female connector. Connector signal details for the J100 are listed in the table below.

Table 5. UART1 Connector Pin Out

Pin #	Signal Name	I/O	I/O Type	Description
1	CT109 DCD	O	RS232 (V24/V28)	Data Carrier Detect
2	CT104 RXD	O	RS232 (V24/V28)	Receive serial data
3	CT103 TXD	I	RS232 (V24/V28)	Transmit serial data
4	CT108-2 DTR	I	RS232 (V24/V28)	Data Terminal Ready
5	GND			Ground
6	CT107 DSR	O	RS232 (V24/V28)	Data Set Ready
7	CT105 RTS	I	RS232 (V24/V28)	Request To Send
8	CT106 CTS	O	RS232 (V24/V28)	Clear To Send
9	CT125 RI	O	RS232 (V24/V28)	Ring Indicator

5.3.2. UART1 Configuration

The AirPrime WS Series Development Kit acts as a DCE and is connected to a DTE (PC or terminal) with a "straight cable". This is a full UART.

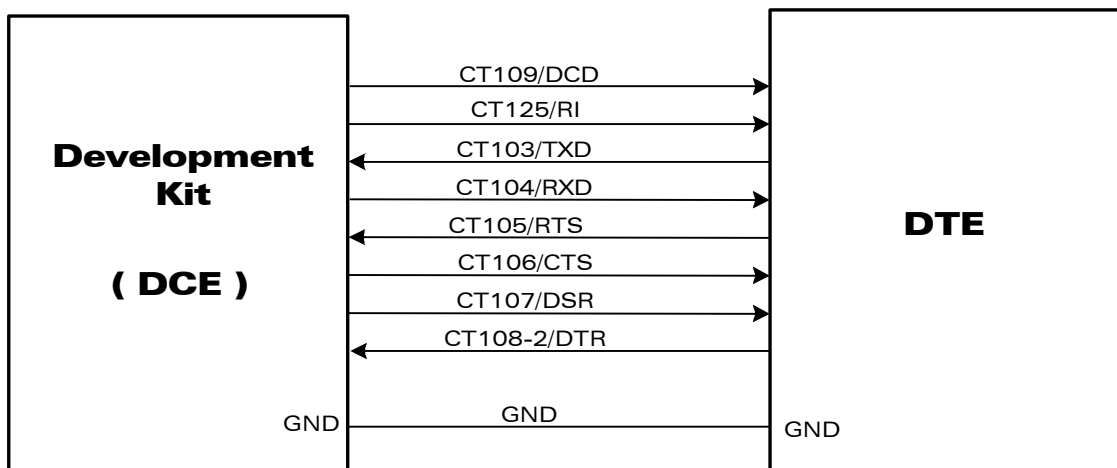


Figure 17. RS232 Main Serial Link

5.3.3. LED Signalization (D100, D101)

The LED signalization locations are shown in the following figure.

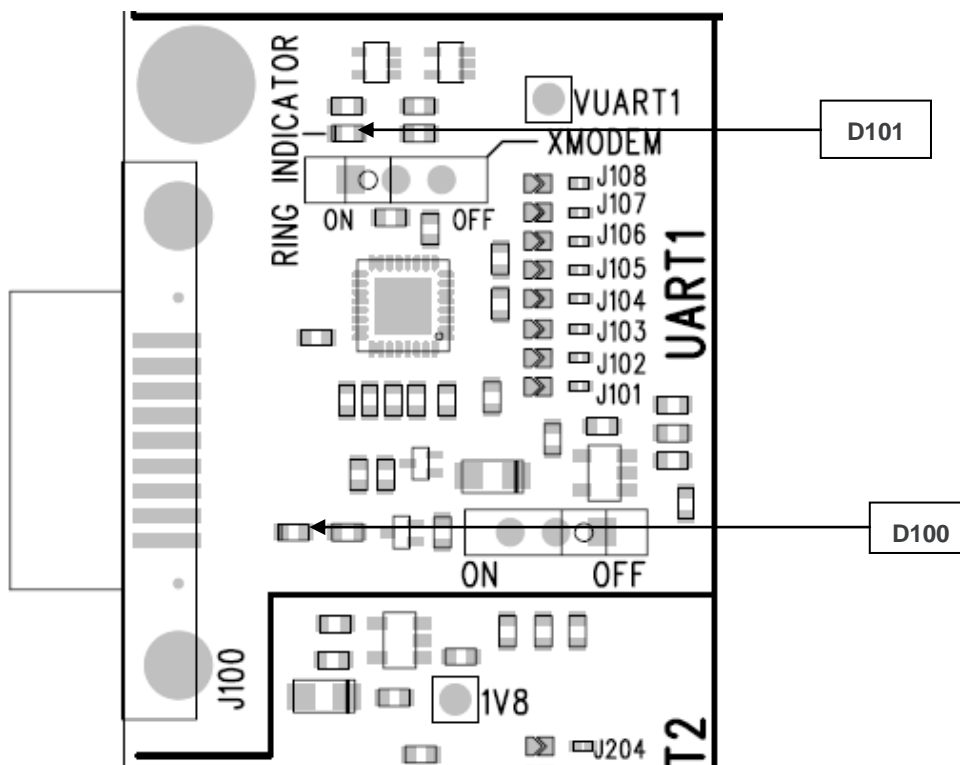


Figure 18. LEDs Location (D100, D101)

5.3.3.1. LED “UART1” (D100)

This green LED indicates the power supply state of UART1.

The interface can be used when it is lit, depending on which power supply is present (J600 or J604. Refer to section 5.1 Power Supplies for more information).

5.3.3.2. LED “RING INDICATOR” (D101)

The “RING INDICATOR” indicator is a yellow LED controlled by the RI signal on the AirPrime WISMO218 or the AirPrime WISMO228.

When the AirPrime WISMO218 or the AirPrime WISMO228 receives an incoming call, the RI signal goes from high to low for 0.5sec alternately, hence making the D101 LED blink

5.3.4. Enabling the UART1 Function (SW101)

The UART1 interface can be enabled by switching SW101 to the “ON” position. Please refer to the following figure.

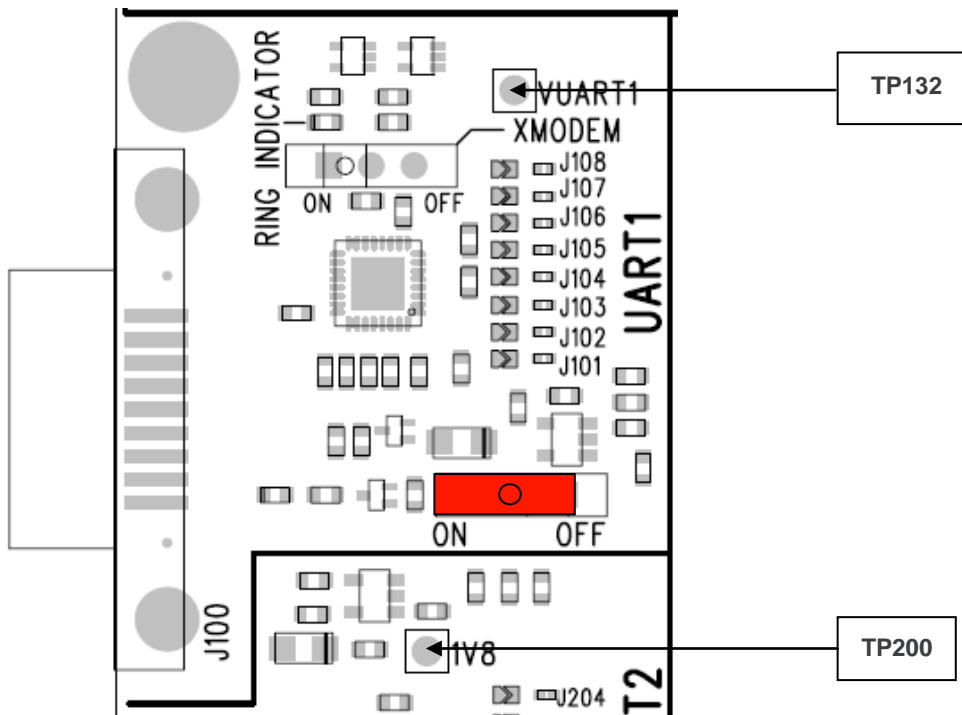


Figure 19. UART1 Switch Configuration

5.4. UART2

This interface is reserved for the software debugging tool, Spytracer. Please refer to section 8 SPI Interface for Debugging (Spytracer Tool) for more information. The UART2 in the AirPrime WS Series Development Kit is provided by an SPI-to-serial converter, SC16IS750, in the AirPrime WS Series Socket-Up Board. It interfaces with the SPI interface of the AirPrime WISMO218 or the AirPrime WISMO228 and performs SPI-to-serial conversion on data characters.

The four UART2 signals from the AirPrime WS Series Socket-Up Board could be disconnected by dissociating the solder pads J201 to J205. Dissociating the four pads allows for the transmission of undisturbed signals via the external connector (J1100) to an external interface board.

By default, UART2 is available on its dedicated connector J200 (J201 to J204 soldered).

Please refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline for detailed information on the characteristics of the SPI interface of the AirPrime WISMO218 and the AirPrime WISMO228.

5.4.1. UART2 Connector (J200)

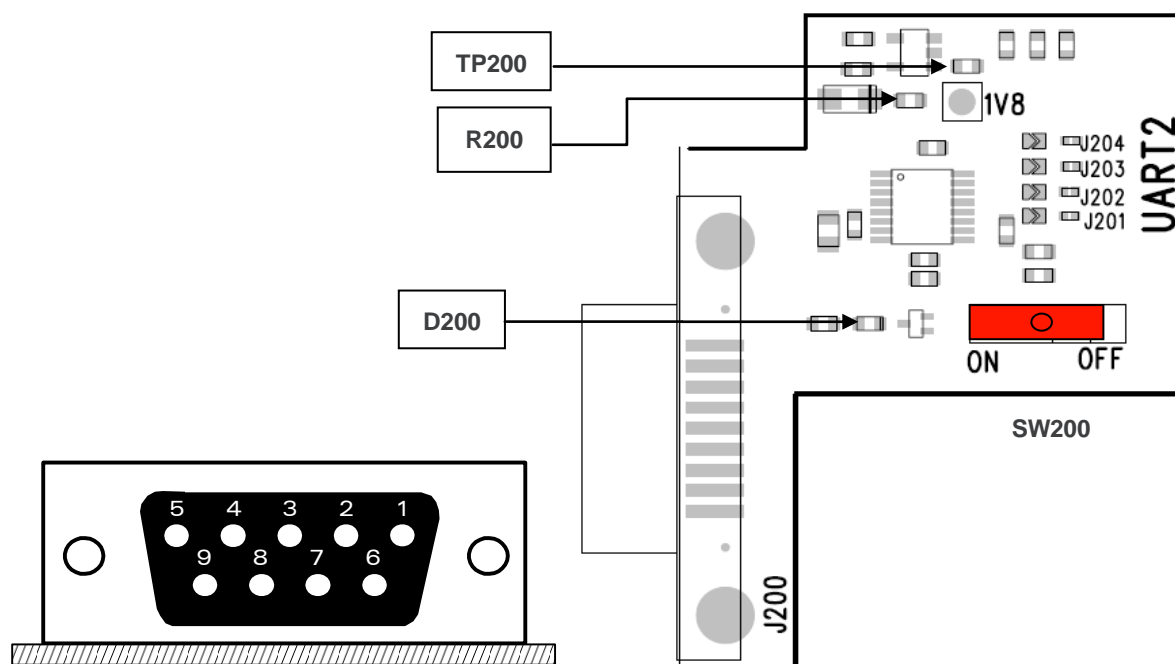


Figure 20. Enable UART2 Configuration

J200 is a SUB-D 9-pin female connector. The table below defines its connector signals.

Table 6. UART2 Connector Pin Out

Pin #	Signal Name	I/O	I/O Type	Description
1	Not used*	-	-	-
2	CT104 RXD	O	RS232 (V24/V28)	Receive serial data
3	CT103 TXD	I	RS232 (V24/V28)	Transmit serial data
4	Not used*	-	-	-
5	GND			Ground

Pin #	Signal Name	I/O	I/O Type	Description
6	Not used*	-	-	-
7	CT105 RTS	I	RS232 (V24/V28)	Request To Send
8	CT106 CTS	O	RS232 (V24/V28)	Clear To Send
9	Not used*	-	-	-

* Only 4 signals are used on this connector.

5.4.2. UART2 Configuration

The AirPrime WS Series Development Kit acts as a DCE and is connected to a DTE (PC or terminal) with a “straight cable”. There are only 4 signals on the UART2 as shown in the figure below.

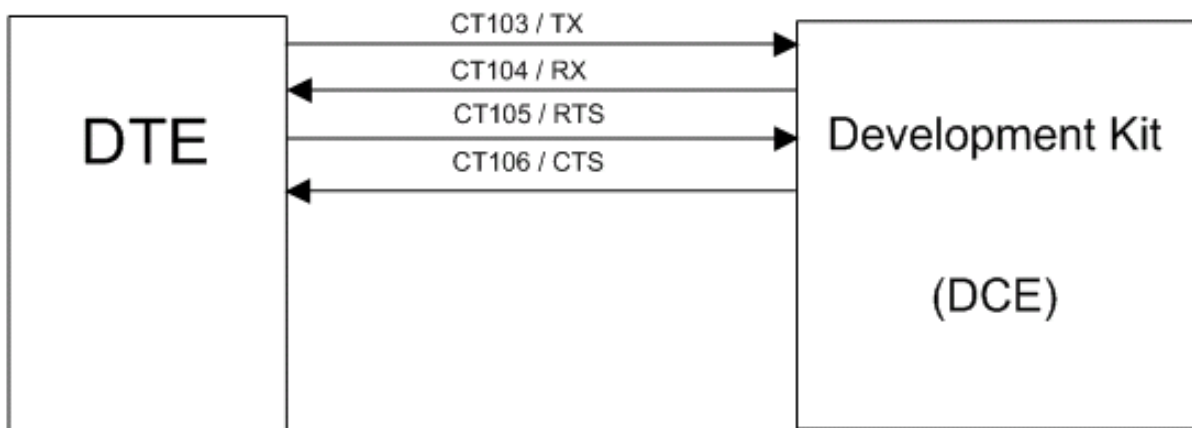


Figure 21. RS232 Auxiliary Serial Link

5.4.3. LED Signalization (D200)

This green LED indicates the UART2 state. The UART2 interface can be used when this LED is lit.

5.4.4. Enabling UART2 Function (SW200)

The UART2 interface can be enabled by switching the SW200 switch to the “ON” position. Refer to Figure 20 Enable UART2 Configuration for a visual representation.

5.5. Switch “XMODEM” (SW100)

Caution: The “XMODEM” switch must always be in the “OFF” position, as shown in the figure below. Do not use this switch. If SW100 is in the wrong position (“ON”), UART1 will not work properly.

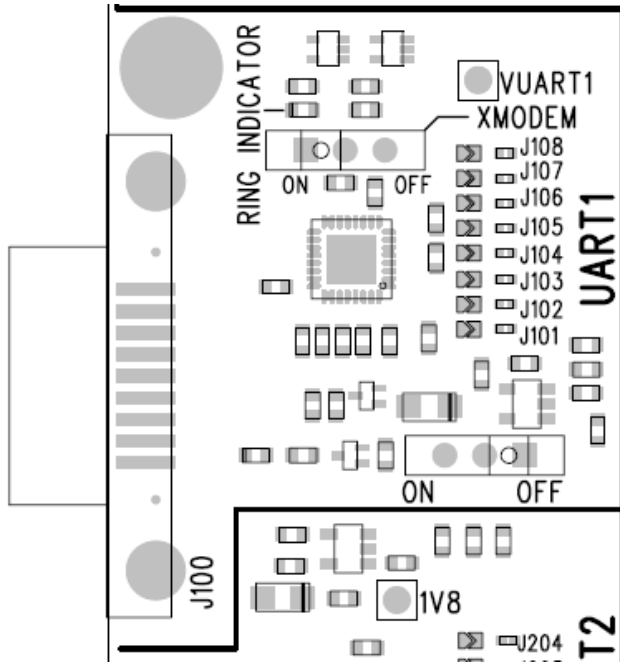


Figure 22. XMODEM Switch Configuration (SW100)

Table 7. XMODEM Configuration

Mode	XMODEM
Normal	OFF
-	-

5.6. SIM

5.6.1. SIM Connector (J400)

J400 is a standard 1V8 or 3V socket.

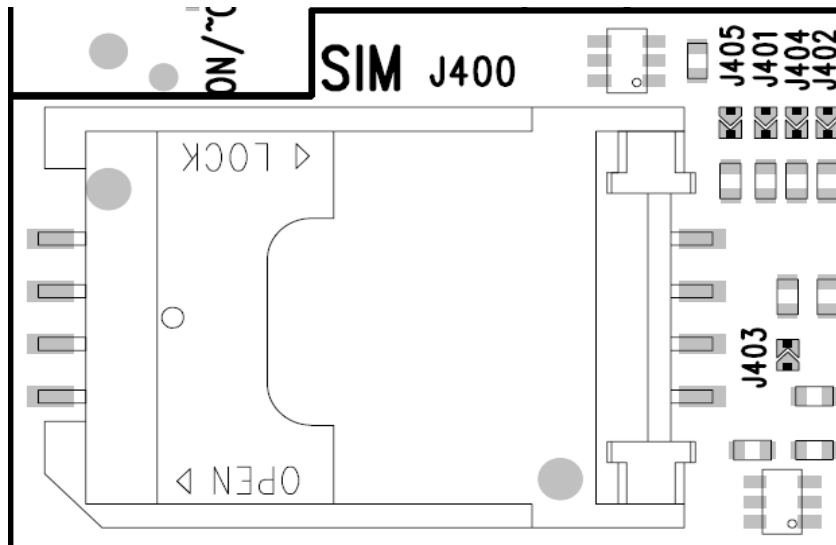


Figure 23. SIM Connector

The following table details the signals and relative pins for the SIM connector.

Table 8. SIM Connector Pin Out

Pin #	Signal Name	I/O	I/O Type	Description
1	SIM-VCC	O	1V8 or 2V9	SIM Power Supply
2	SIM-RST	O	1V8 or 2V9	SIM Reset
3	SIM-CLK	O	1V8 or 2V9	SIM Clock
4	SIMPRES	I	2V8 max*	SIM Card Detect (Not used)
5	GND			Ground
6	VPP	Not used		
7	SIM-IO	I/O	1V8 or 2V9	SIM Data
8	CC8		2V8	SIMPRES signal supply (Not used)

* For either 1V8 or 3V SIM cards.

The SIM interface controls both the 3V and 1.8V SIM cards.

ESD protections are available on all SIM signals.

The SIM interface of the AirPrime WISMO218 and the AirPrime WISMO228 could be electrically disconnected from the SIM card connector, J400, if the soldering pads, J401 to J405, are dissociated. That is, dissociating the four soldering pads allows for the transmission of undisturbed signals via the external connector (J1100) to an external interface board.

By default, the SIM signals are available on its dedicated connector, J400 (J401 to J405 are soldered).

5.7. Audio

There is one AUDIO interface in the AirPrime WISMO218 and the AirPrime WISMO228. Use J700 (AUDIO2) in the AirPrime WS Series Development Kit to connect to this audio interface.

The audio connector could be disconnected from the AirPrime WISMO218 or the AirPrime WISMO228 when soldering pads, J702 to J709, are dissociated. That is, having it unsoldered allows for the transmission of undisturbed signals via the external connector (J1100) to an external interface board.

By default, AUDIO signals of the AirPrime WISMO218 and the AirPrime WISMO228 are available on its dedicated connector J700 (AUDIO2) when J702 to J705 are soldered.

5.7.1. AUDIO1 Connector (J701)

The audio function at AUDIO1, J701, is not available.

5.7.2. AUDIO2 Connector (J700)

The microphone signal of the AirPrime WISMO218 and the AirPrime WISMO228 can either be single ended or differential. By default, both microphone and speaker signals are set to be differential with the following AirPrime WS Series Socket-Up Board and AirPrime WS Series Development Kit configuration.

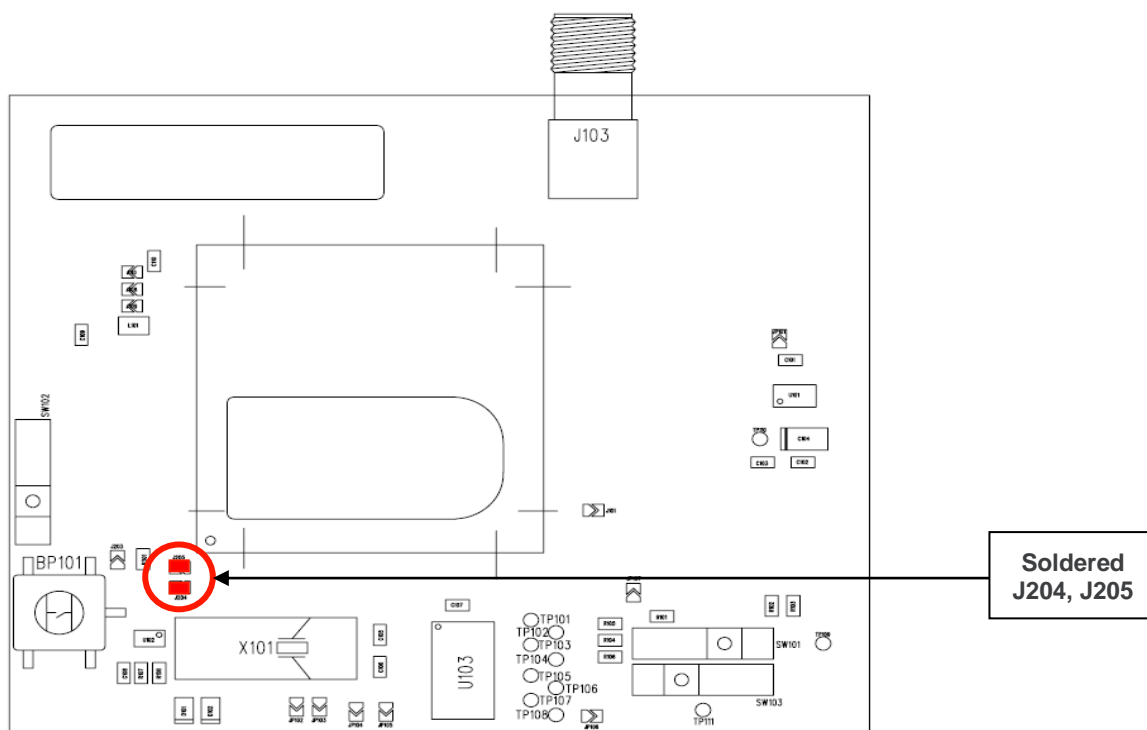


Figure 24. Settings for a Differential Microphone on the AirPrime WS Series Socket-Up Board

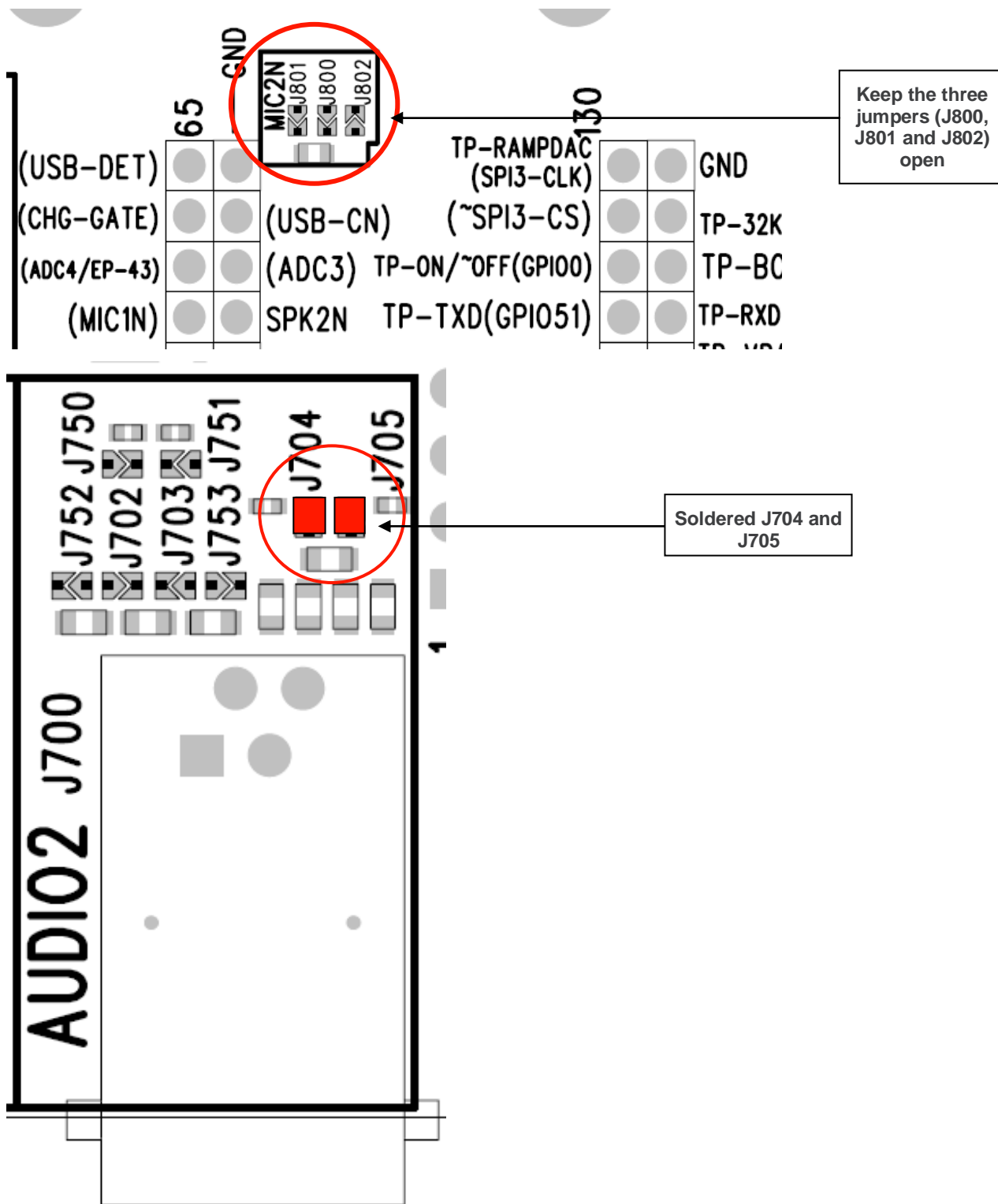


Figure 25. Settings for a Differential Microphone on the AirPrime WS Series Development Kit

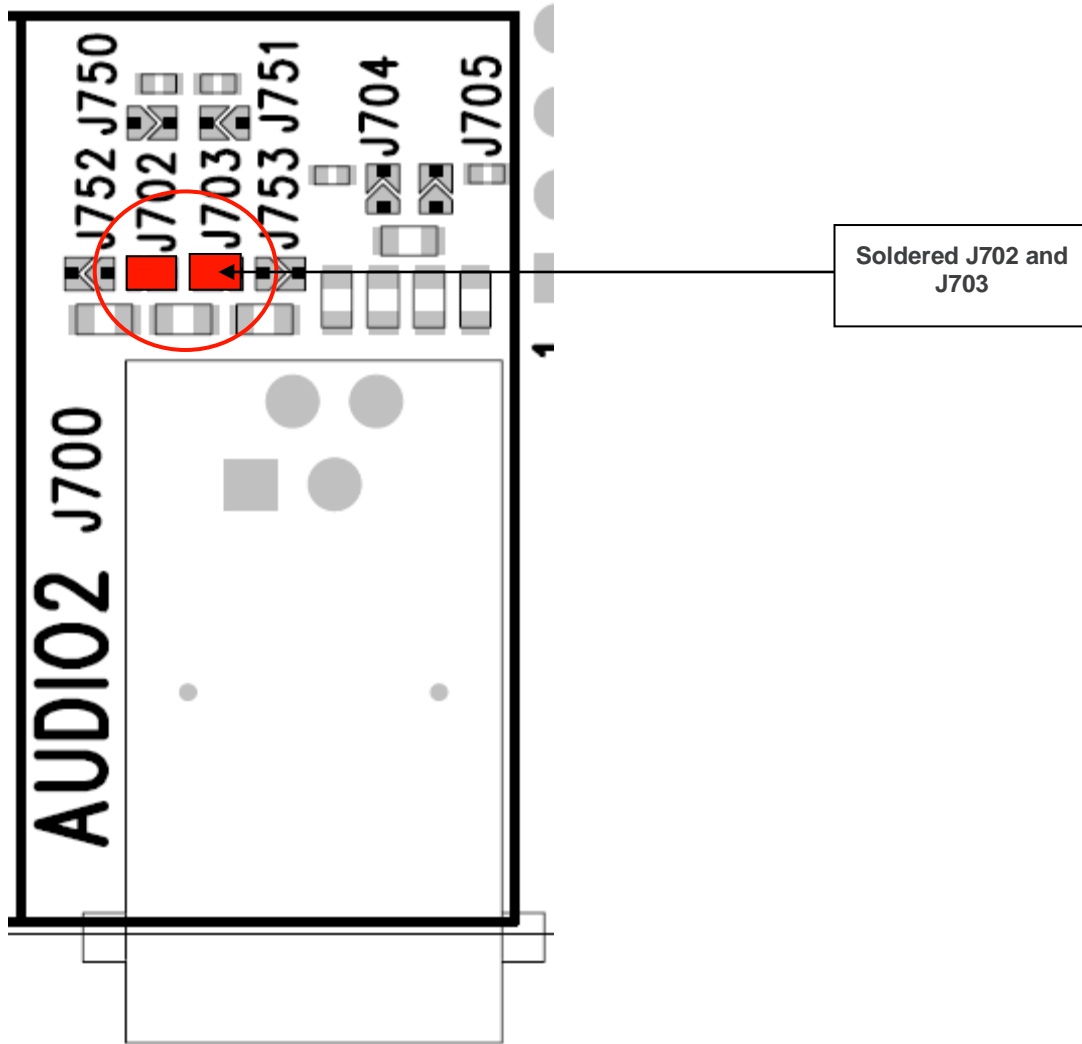


Figure 26. Settings for a Differential Speaker on the AirPrime WS Series Development Kit

For a single-ended microphone, only the settings on the AirPrime WS Series Socket-Up Board should be modified. Refer to the following figure.

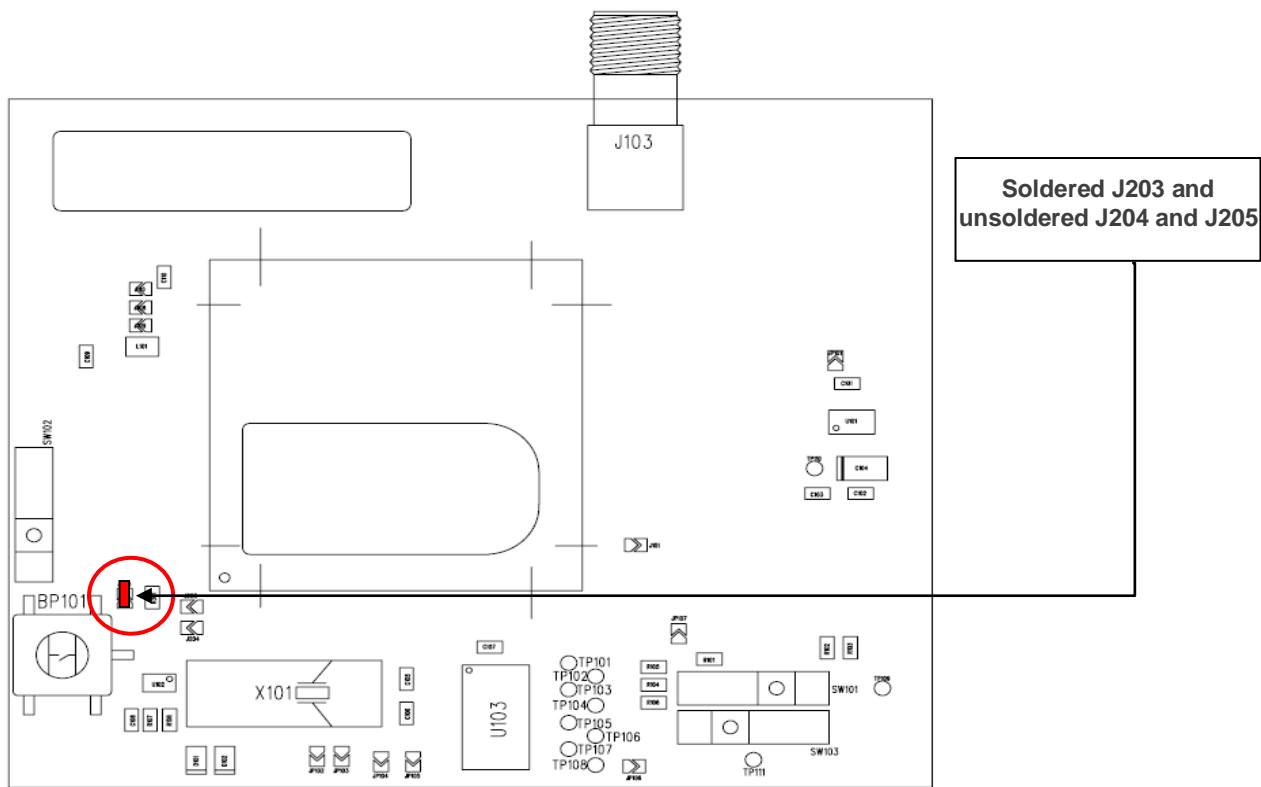


Figure 27. Settings for a Single-Ended Microphone on the AirPrime WS Series Socket-Up Board

Note that J700 is an RJ9 4-pin connector.

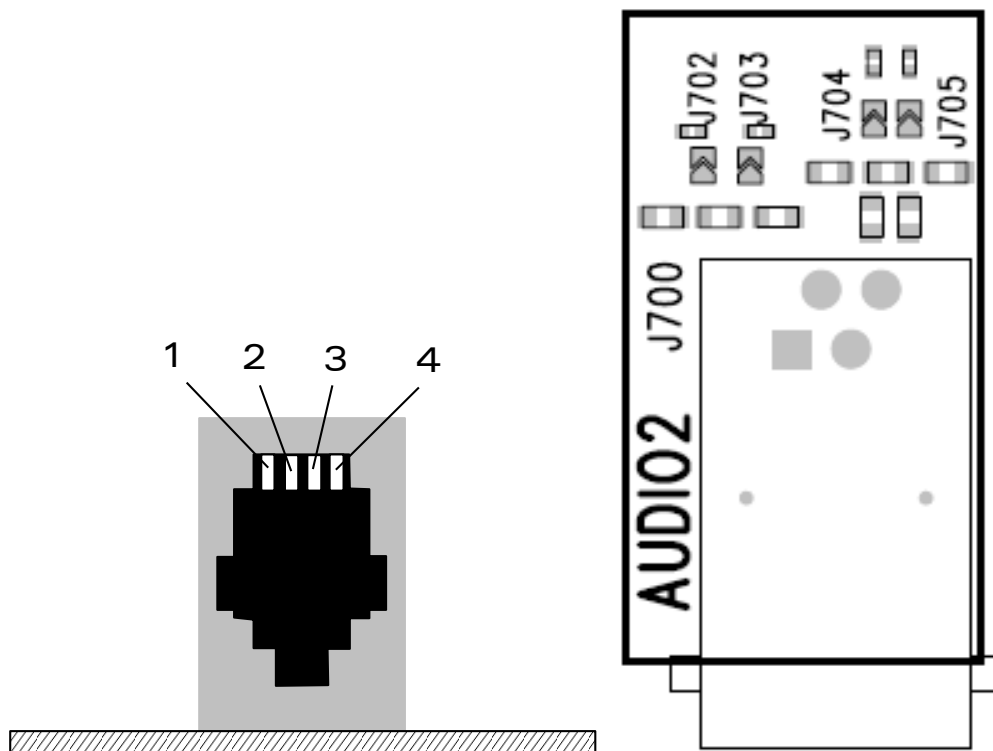


Figure 28. AUDIO2 Connector

The following table describes the signals and relative pins for the AUDIO2 connector.

Table 9. AUDIO2 Connector Pin Out

Pin #	Signal Name	I/O	I/O Type	Description
1	MIC Ground	GND	Analog	Microphone ground
2	HSET_OUTN	O	Analog	Main speaker negative output
3	HSET_OUTP	O	Analog	Main speaker positive output
4	INTMIC_P	I	Analog	Main microphone positive input

5.8. Other Interfaces

There are some other interfaces available on the AirPrime WS Series Development Kit. These signals are available on the test points of the AirPrime WS Series Development Kit, and also on the external board connector J1100.

5.8.1. Power Supply Function

VCC_2V8 is the VGPIO output from the AirPrime WISMO218 or the AirPrime WISMO228. The voltage of VCC_2V8 is 2.8V. VCC_2V8 can be used to connect pull-up resistors, and it must only be used as a reference supply.

5.8.2. Backup Battery Function

The AirPrime WISMO218 and the AirPrime WISMO228 provides an input/output signal, VBAT-RTC, for connecting a Real Time Clock power supply. This pin is used as a backup power supply to preserve the date and time when VBATT is switched off (no VBATT).

5.8.3. ADC Function

The AirPrime WISMO218 and the AirPrime WISMO228 provides one analog to digital converter, AUX_ADC0. AUX_ADC0 of the AirPrime WISMO218 and the AirPrime WISMO228 is connected to ADC1/BAT-TEMP in the AirPrime WS Series Development Kit.

5.9. Antenna Function

Use the SMA connector, J103, available on the AirPrime WS Series Socket-Up Board for customer applications.

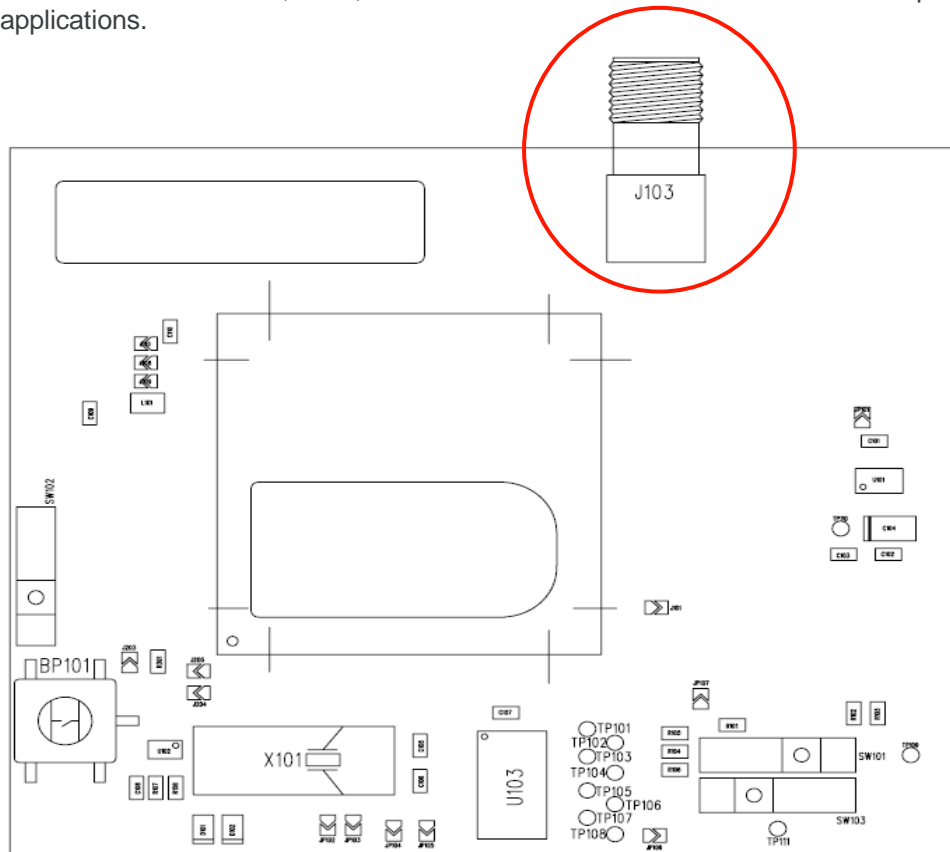


Figure 29. SMA Connector on the AirPrime WS Series Socket-Up Board for Customer Applications

5.10. External Board Connector (J1100)

The external board connector is an interface to connect an external test bench for testing or debugging.

5.10.1. AirPrime WISMO218 and AirPrime WISMO228 Signals

Most of the AirPrime WS Series Socket-Up Board signals are connected to the external board connector (J1100) and are available via TP from the center of the AirPrime WS Series Development Kit. The J1100 connector pin out is listed in the table below.

For further information about the AirPrime WISMO218 and the AirPrime WISMO228 signals and multiplexing, please refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline.

5.10.2. External Board Connector (J1100)

Table 10. External Board Connector (J1100) Pin Out

Pin #	Signal Name	I/O	I/O Type	Description
1	VBATT	I	Supply	Battery Input
2	VBATT	I	Supply	Battery Input
3	Not used	-	-	-
4	Not used	-	-	-
5	Not used	-	-	-
6	VCC_2V8	O	Supply	2.8V digital supply output ¹
7	GND	-	-	Ground
8	BAT-RTC	I/O	Supply	RTC back-up supply
9	SIM-VCC	O	Supply	SIM card supply
10	Not used	-	-	-
11	SIM-CLK	O	1V8 / 2V9	SIM clock
12	SIM-IO	I/O	1V8 / 2V9	SIM data
13	~SIM-RST	O	1V8 / 2V9	SIM reset
14	GND	-	-	Ground
15	BUZZER	O	2V8	PWM2 from the AirPrime WISMO218 or WISMO228 intended for controlling buzzer
16	FLASH-LED	O	2V8	Network status / Burst indication
17	ON / ~OFF	I	2V8	Power on signal from the AirPrime WISMO218 or WISMO228
18	Not used	-	-	-
19	~RESET	I	2V8	System Reset (Active Low)
20	Not used	-	-	-
21	BAT-TEMP	I	Analog	ADC0 input for battery temperature measurement
22	GND	-	-	Ground
23	SPI1-I	I/O	2V8	SPI interface MUXed with General purpose input / output
24	SPI1-CS	I/O	2V8	SPI interface MUXed with General purpose input / output
25	SPI1-IO	I/O	2V8	SPI interface MUXed with General purpose input / output
26	SPI1-CLK	I/O	2V8	SPI interface MUXed with General purpose input / output
27	Not used	-	-	-
28	Not used	-	-	-
29	Not used	-	-	-
30	Not used	-	-	-
31	GND	-	-	Ground
32	CT104-RXD2 / GPIO15	I/O	2V8	Auxiliary RS232 Receive Serial Data (According to PC view and Multiplexed)

Pin #	Signal Name	I/O	I/O Type	Description
33	~CT106-CTS2 / GPIO16	I/O	2V8	Auxiliary RS232 Clear To Send (According to PC view and Multiplexed)
34	CT103-TXD2 / GPIO14	I/O	2V8	Auxiliary RS232 Transmit Serial Data (According to PC view and Multiplexed)
35	GND			Ground
36	~CT105-RTS2 / GPIO17	I/O	2V8	Auxiliary RS232 Request To Send (According to PC view and Multiplexed)
37	Not used	-	-	-
38	Not used	-	-	-
39	Not used	-	-	-
40	GND	-	-	Ground
41	Not used	-	-	-
42	Not used	-	-	-
43	Not used	-	-	-
44	Not used	-	-	-
45	Not used	-	-	-
46	Not used	-	-	-
47	Not used	-	-	-
48	Not used	-	-	-
49	Not used	-	-	-
50	Not used	-	-	-
51	GND	-	-	Ground
52	GND	-	-	Ground
53	MIC2P	I	Analog	Microphone 2 positive input
54	Not used	-	-	-
55	Not used	-	-	-
56	Not used	-	-	-
57	Not used	-	-	-
58	SPK2P	O	Analog	Speaker 2 positive output
59	Not used	-	-	-
60	SPK2N	O	Analog	Speaker 2 negative output
61	Not used	-	-	-
62	Not used	-	-	-
63	Not used	-	-	-
64	Not used	-	-	-
65	Not used	-	-	-
66	VBATT	I	Supply	Battery Input
67	VBATT	I	Supply	Battery Input
68	CT103-TXD1 / GPIO36	I/O	2V8	Main RS232 Transmit Serial Data (According to PC view and Multiplexed)
69	~CT125-RI1 / GPIO42	I/O	2V8	Main RS232 Ring indicator (According to PC view and Multiplexed) MUXed with KEYOUT3

Pin #	Signal Name	I/O	I/O Type	Description
70	~CT106-CTS1 / GPIO39	I/O	2V8	Main RS232 Clear To Send (According to PC view and Multiplexed)
71	CT104-RXD1 / GPIO37	I/O	2V8	Main RS232 Receive Serial Data (According to PC view and Multiplexed)
72	~CT105-RTS1 / GPIO38	I/O	2V8	Main RS232 Request To Send (According to PC view and Multiplexed)
73	~CT109-DCD1 / GPIO43	I/O	2V8	Main RS232 Data Carrier Detect (According to PC view and Multiplexed) MUXed with KEYOUT1
74	~CT108-2-DTR1 / GPIO41	I/O	2V8	Main RS232 Data Terminal Ready (According to PC view and Multiplexed)
75	~CT107-DSR1 / GPIO40	I/O	2V8	Main RS232 Data Set Ready (According to PC view and Multiplexed) MUXed with KEYOUT2
76	GND	-	-	Ground
77	GND	-	-	Ground
78	Not used	-	-	-
79	Not used	-	-	-
80	Not used	-	-	-
81	Not used	-	-	-
82	Not used	-	-	-
83	Not used	-	-	-
84	Not used	-	-	-
85	Not used	-	-	-
86	Not used	-	-	-
87	Not used	-	-	-
88	Not used	-	-	-
89	Not used	-	-	-
90	Not used	-	-	-
91	Not used	-	-	-
92	Not used	-	-	-
93	Not used	-	-	-
94	Not used	-	-	-
95	Not used	-	-	-
96	Not used	-	-	-
97	Not used	-	-	-
98	GND	-	-	Ground
99	GND	-	-	Ground
100	Not used	-	-	-
101	Not used	-	-	-
102	GND	-	-	Ground
103	GND	-	-	Ground
104	Not used	-	-	-
105	Not used	-	-	-
106	Not used	-	-	-
107	Not used	-	-	-

Pin #	Signal Name	I/O	I/O Type	Description
108	PWM0(GPIO3)	I/O	2V8	PWM0 signal from the AirPrime WISMO218 or WISMO228
109	GND	-	-	Ground
110	Not used	-	-	-
111	GPIO2(GPIO20)	I/O	2V8	General purpose input / output
112	SPI-IRQ(GPIO23)	I/O	2V8	General purpose input / output MUXed with SPI interrupt
113	GPIO5(GPIO22)	I/O	2V8	General purpose input / output MUXed with KEYIO1
114	Not used	-	-	-
115	Not used	-	-	-
116	GPIO3(GPIO21)	I/O	2V8	General purpose input / output
117	PWM1 (INT1/GPIO25)	O	2V8	PWM1 signal from the AirPrime WISMO218 or WISMO228
118	Not used	-	-	-
119	GPIO1(GPIO19)	I/O	2V8	General purpose input / output
120	Not used	-	-	-
121	Not used	-	-	-
122	Not used	-	-	-
123	Not used	-	-	-
124	Not used	-	-	-
125	Not used	-	-	-
126	Not used	-	-	-
127	Not used	-	-	-
128	Not used	-	-	-
129	Not used	-	-	-
130	Not used	-	-	-

1: This signal can be electrically disabled by not soldering the jumper soldering pads, J1002 and J1003.

6. ESD Protections

External ESD protections are available on the AirPrime WS Series Development Kit for the following signals:

- SIM interface signals: SIM-VCC, SIM-IO, SIM-CLK, and SIM-RST

Other interface signals protected on the AirPrime WISMO218 or WISMO228 are as follows:

- UART1 signals with the ADM3307 transceiver
- UART2 signals with the LTC2804 transceiver

Caution: *As the test points at the center of the AirPrime WS Series Development Kit are not protected against ESD discharge and they are directly connected to the signal pins of the AirPrime WISMO218 or the AirPrime WISMO228, users must be careful when using these TP signals.*

7. Current Consumption Measurement

To measure the current consumption of the AirPrime WISMO218 or the AirPrime WISMO228, configure the AirPrime WS Series Development Kit as shown in Figure 30 Configuration of VBATT for Current Consumption Measurement and Figure 31 Configuration of the AirPrime WS Series Socket-Up Board for Current Consumption Measurement.

Caution: Before making any of the adjustments below, ensure that the AirPrime WS Series Development Kit is disconnected from the power supply.

Configure the AirPrime WS Series Development Kit as follows:

- Around the Power Supply area:
 - Unsolder jumper, J605 to disconnect VBATT and VBAT
- Around the UART2 area:
 - Disconnect UART2 from the AirPrime WISMO218 or WISMO228 in the AirPrime WS Series Socket-Up Board by dissociating J201 to J204.
- Around BAT-TEMP (VBATT area):
 - Remove R600, D603 and D604 in order to eliminate the current drawn by the application circuit on the AirPrime WS Series Development Kit.
 - Dissociate J605 in order to separate the power supplies of the AirPrime WS Series Development Kit and the AirPrime WISMO218 or the AirPrime WISMO228.
 - Connect a 4V external power supply to the test point TP602 (“VBAT”) and ground.

Note: The current from J600 is supplied to the AirPrime WISMO218 or the AirPrime WISMO228; while the current from TP602 is supplied to the development kit

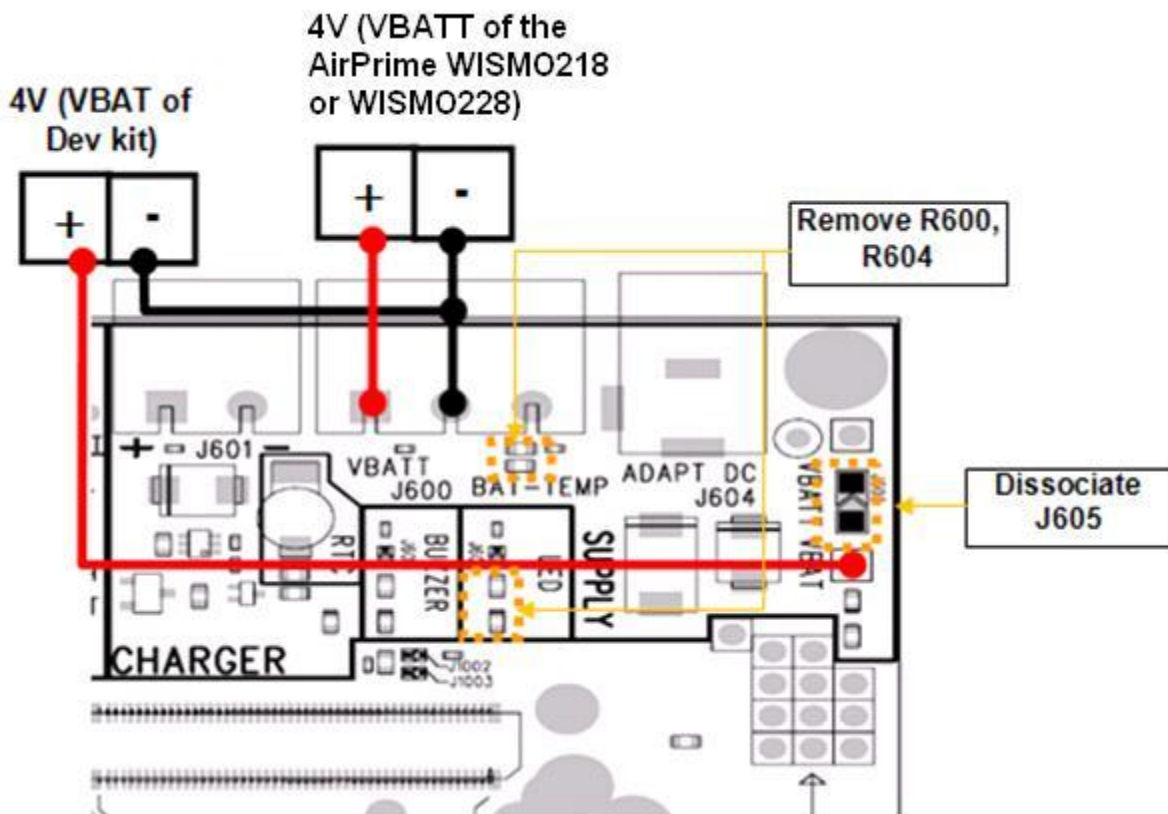


Figure 30. Configuration of VBATT for Current Consumption Measurement

Configure the AirPrime WS Series Socket-Up Board as follows:

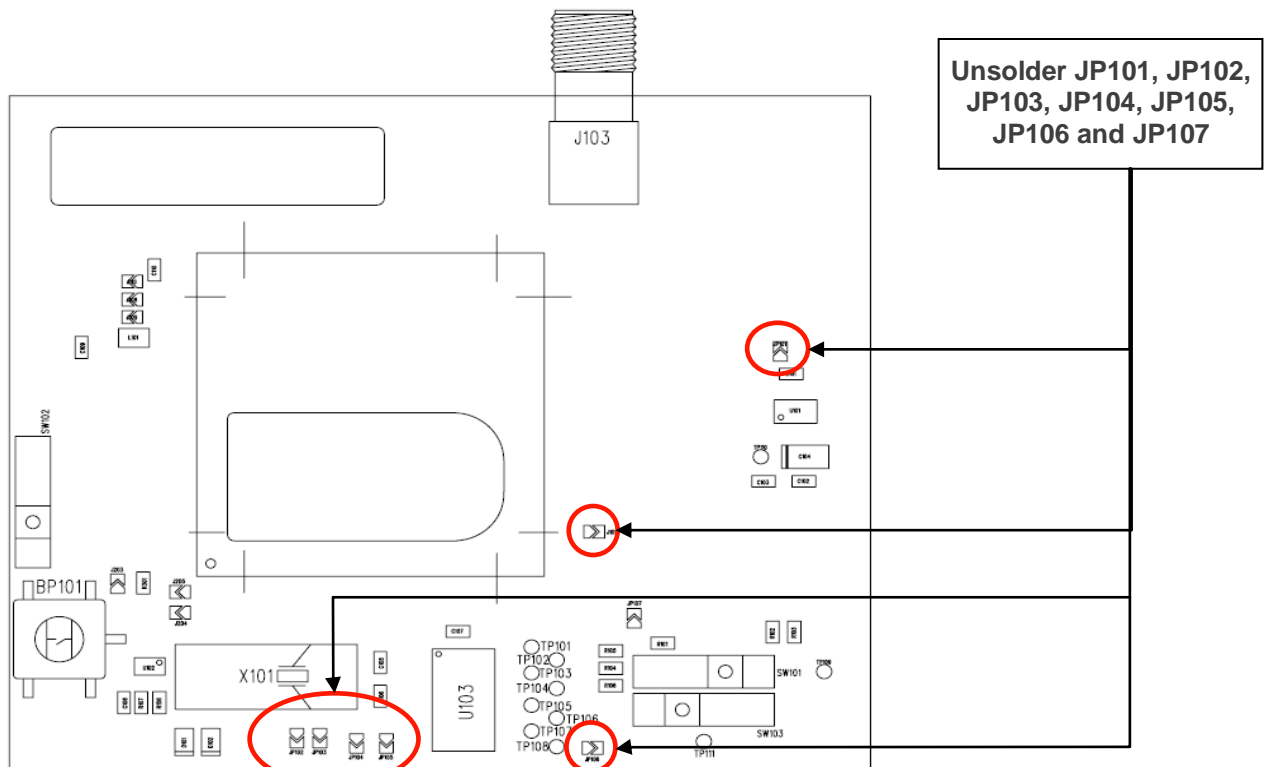


Figure 31. Configuration of the AirPrime WS Series Socket-Up Board for Current Consumption Measurement

With this configuration, the consumption current from VBATT is ONLY* that of the AirPrime WISMO218 or the AirPrime WISMO228 plugged in. For further information, refer to documents [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline and [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline.

Note: * Subtract a quiescent current of 50µA from T100.

Please note the following:

- T100 used for UART1 enable will affect power consumption on 4V (VBATT) by an additional 50µA.
- C600 and D604 connected on 4V (VBATT) may affect power consumption on 4V (VBATT). Disconnect these 2 components if necessary.
- Flash LED (D602) can affect power consumption and can be disconnected by opening jumper J602.



8. SPI Interface for Debugging (Spytracer Tool)

Spytracer is a PC tool that is used for debugging purposes and anomalies detection. It retrieves messages from the AirPrime WISMO218 and the AirPrime WISMO228, decodes these messages and then displays them for the user. It also traces messages exchanged by the different processes inside the AirPrime WISMO218 or the AirPrime WISMO228, which includes messages coming from the network infrastructures and specific messages from the AirPrime WISMO218 or the AirPrime WISMO228. An SPI-to-serial interface provides a link to connect the AirPrime WISMO218 or the AirPrime WISMO228 to a PC for Spytracer when using the AirPrime WS Series Development Kit as a debug tool. (Please also refer to section 5.4 UART2 for more information on the connection between a PC and the AirPrime WS Series Development Kit.)

The following figures and procedures describe how to connect a customer product to the AirPrime WS Series Development Kit and use it as a debug tool.

1. Prepare the AirPrime WS Series socket-up board.

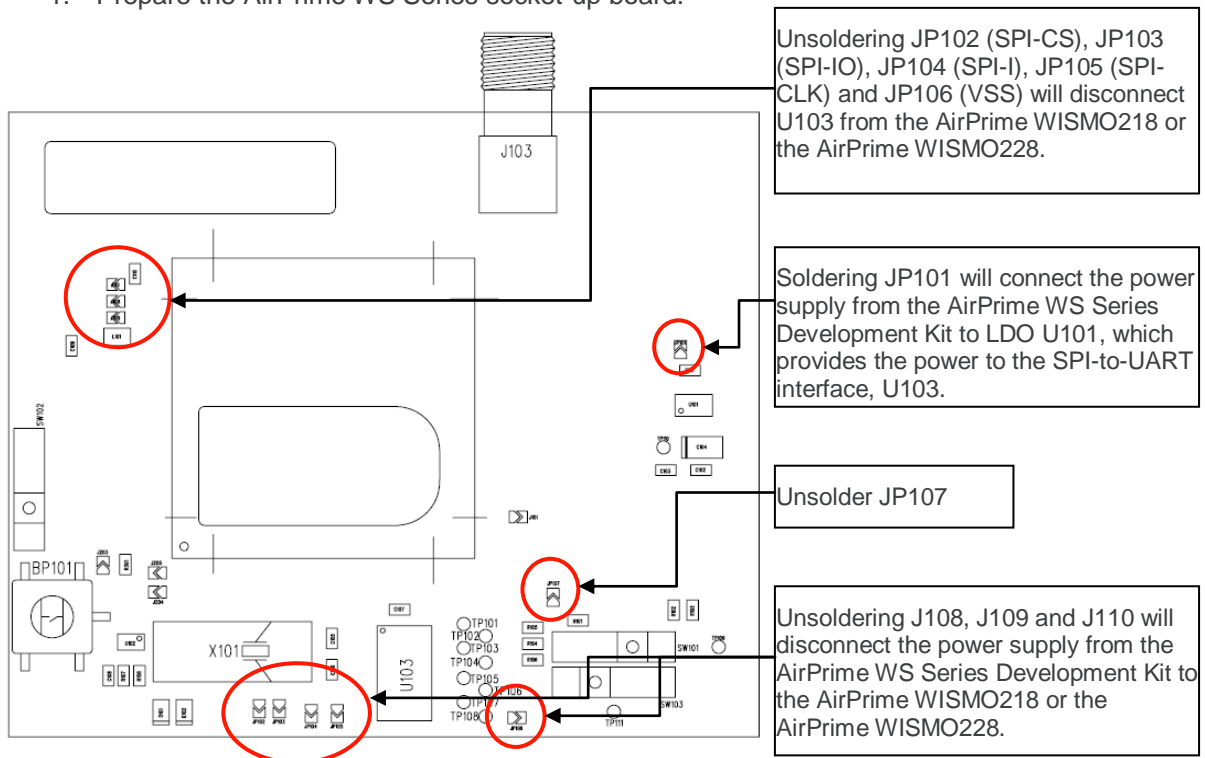


Figure 32. AirPrime WS Series Socket-Up Board Settings for an Internal SPI Application

2. Connect the customer application and the AirPrime WS Series socket-up board.

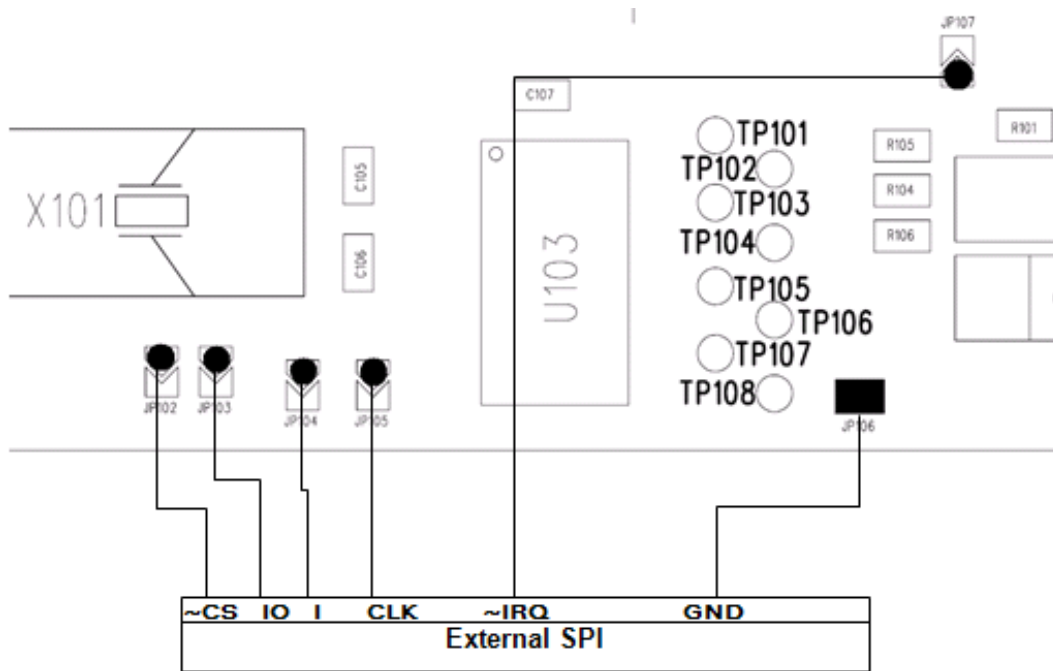
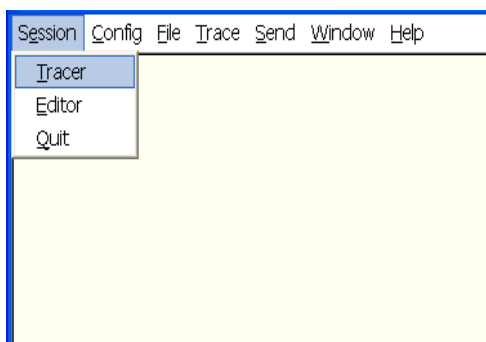
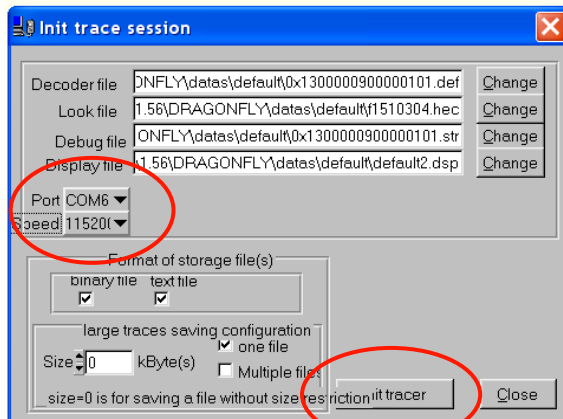


Figure 33. SPI Connection to an External Application

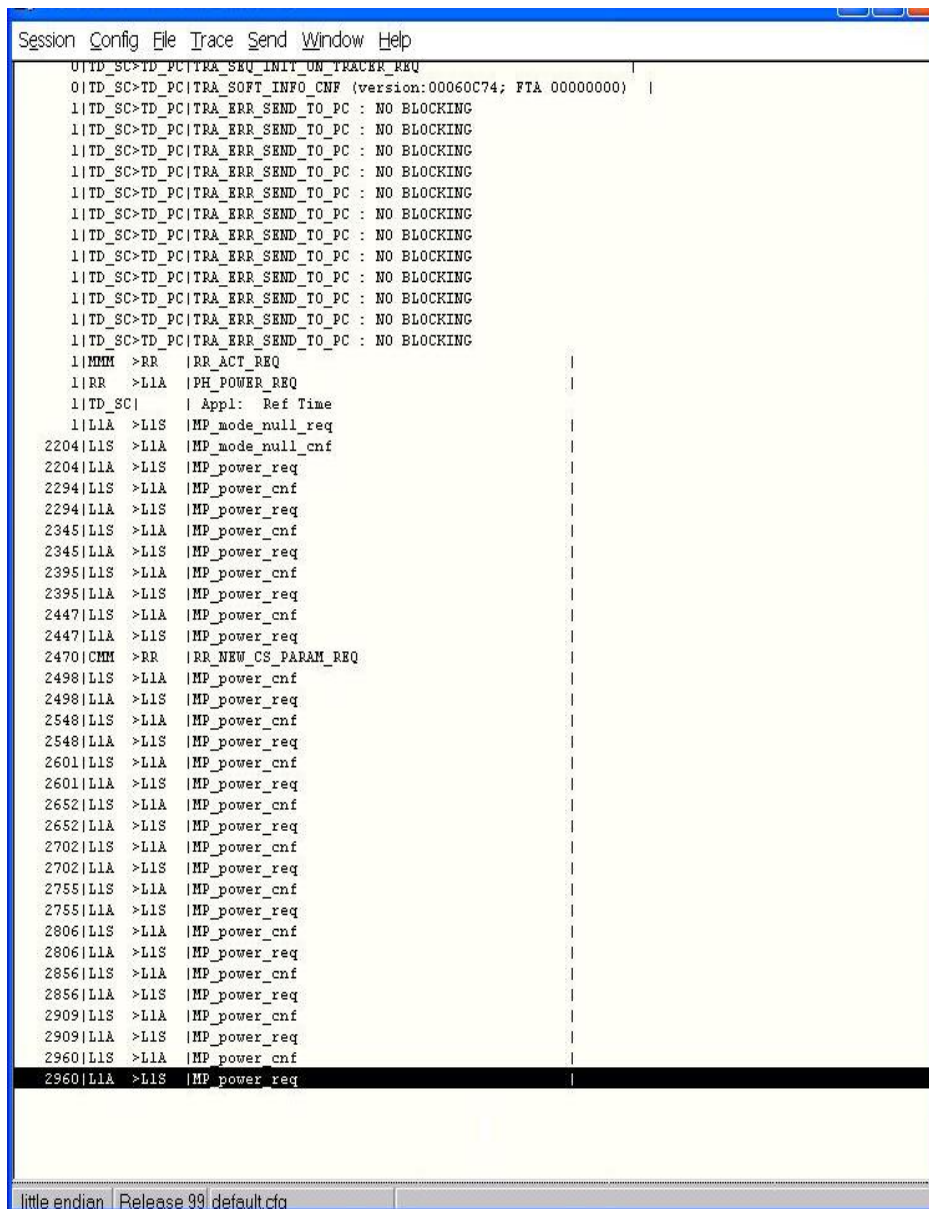
3. Use Spytracer to debug the AirPrime WISMO218 or the AirPrime WISMO228. (Please refer to document [6] AirPrime WS Series Spy Trace User Guide for additional details about Spytracer.)
 - a. Start “Spytracer”.
 - b. Select “Session” → “Tracer”.



- c. Select the Port and Speed, and Save. (In this example, COM6 and 115200 are selected respectively.)



- d. Accept the default values for all other settings.
- e. Switch ON the AirPrime WS Series Development Kit.
- f. The software screen will refresh and scroll automatically as shown in the following figure if all connections and settings were properly configured.





9. Installing the AirPrime WISMO218 or WISMO228 on the AirPrime WMP Series Development Kit

Note: This section is for users who have the AirPrime WMP Series Development Kit.

Both the AirPrime WISMO218 and the AirPrime WISMO228 can be readily used on either V20 or V21 versions of the AirPrime WMP Series Development Kit, together with an AirPrime WS Series Socket-Up Board.

Setup the AirPrime WMP Series Development Kit and the AirPrime WS Series Socket-Up Board as follows:

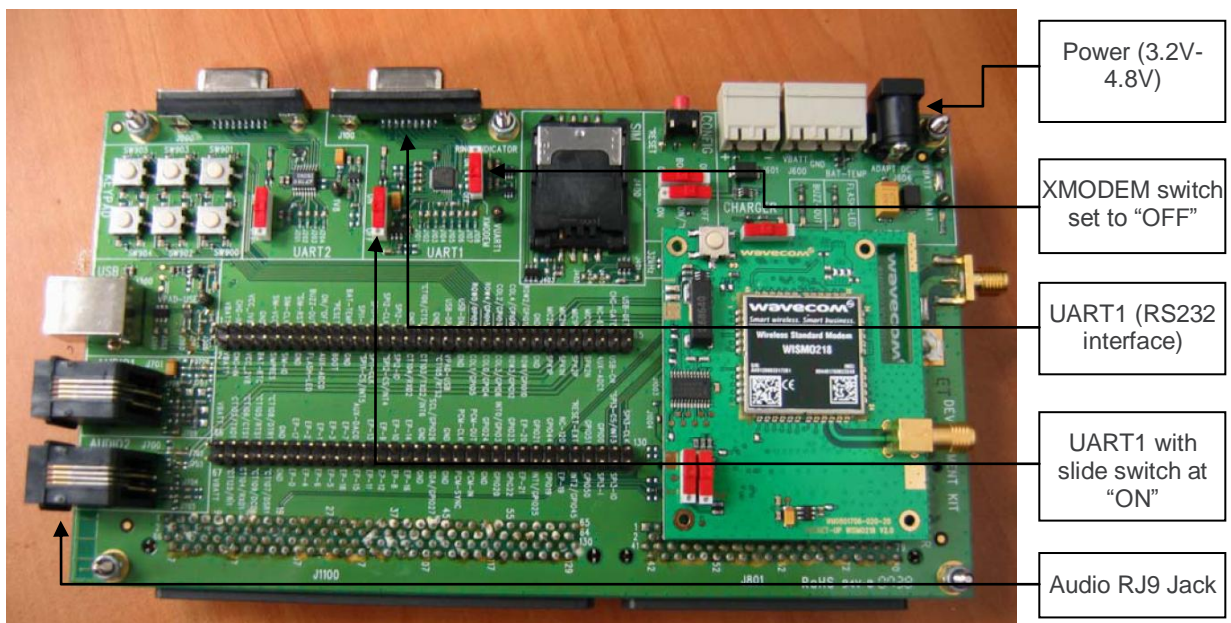
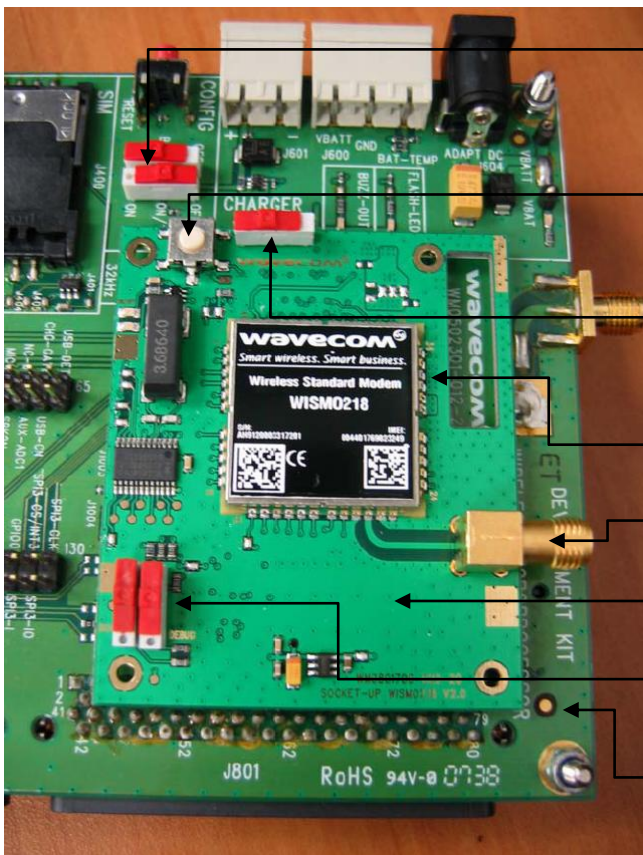
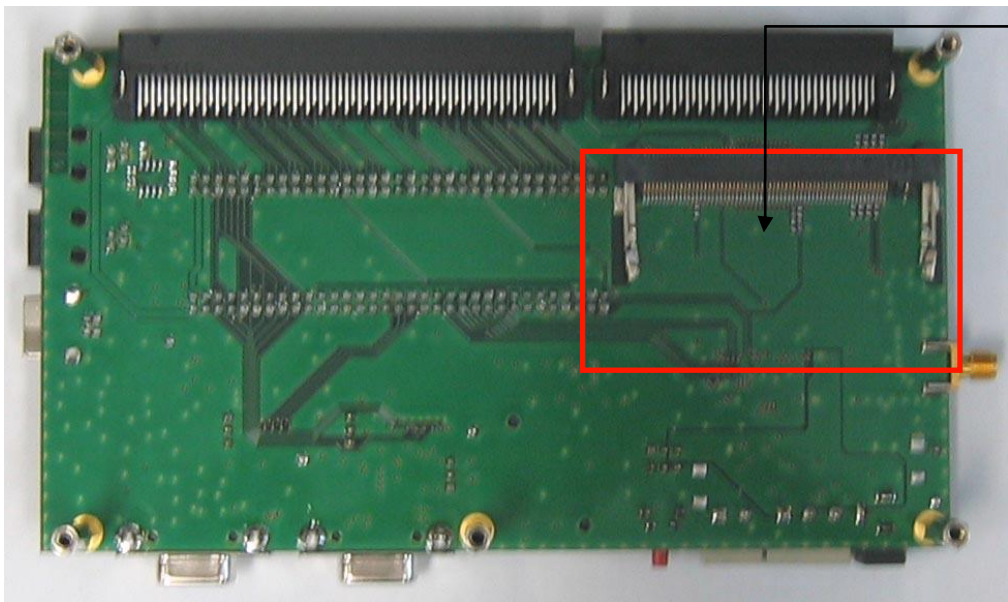


Figure 34. AirPrime WMP Series Development Kit and the AirPrime WS Series Socket-Up Board Set-Up

Caution: The ON/~OFF slide switch on the AirPrime WMP Series development kit **MUST** be set to the “OFF” position; otherwise, it will short circuit the power supply when powering ON the AirPrime WISMO218 or the AirPrime WISMO228 using the tact switch, BP101 or the slide switch, SW102.



- This slide switch on the AirPrime WMP Series development kit **MUST** be set to the "OFF" position; otherwise, it will short circuit the power supply when powering ON the AirPrime WISMO218 or the AirPrime WISMO228.
- ON/~OFF control tact switch
- ON/~OFF control Slide switch. If set to the:
 - Left: Auto Power ON
 - Right: Must press the tact switch to power ON
- AirPrime WISMO218 or WISMO228 module
- SMA connector on the AirPrime WS Series Socket-Up board
- AirPrime WS Series Socket-Up Board
- Not used
- AirPrime WMP Series Development Kit



Remove the memory card from the AirPrime WMP Series Development Kit



10. Reference Documents

- [1] AirPrime WISMO218 Product Technical Specification and Customer Design Guideline
Reference: WA_DEV_W218_PTS_002
- [2] AirPrime WISMO228 Product Technical Specification and Customer Design Guideline
Reference: WA_DEV_W228_PTS_002
- [3] AirPrime WISMO218 AT Commands Manual
Reference: WA_DEV_W218_UGD_003
- [4] AirPrime WISMO228 AT Commands Manual
Reference: WA_DEV_W228_UGD_004
- [5] AirPrime WMP100 Embedded Module Development Kit User Guide
Reference: WM_DEV_WUP_UGD_001
- [6] AirPrime WS Series Spy Trace User Guide
Reference: WA_DEV_WISMO_UGD_006



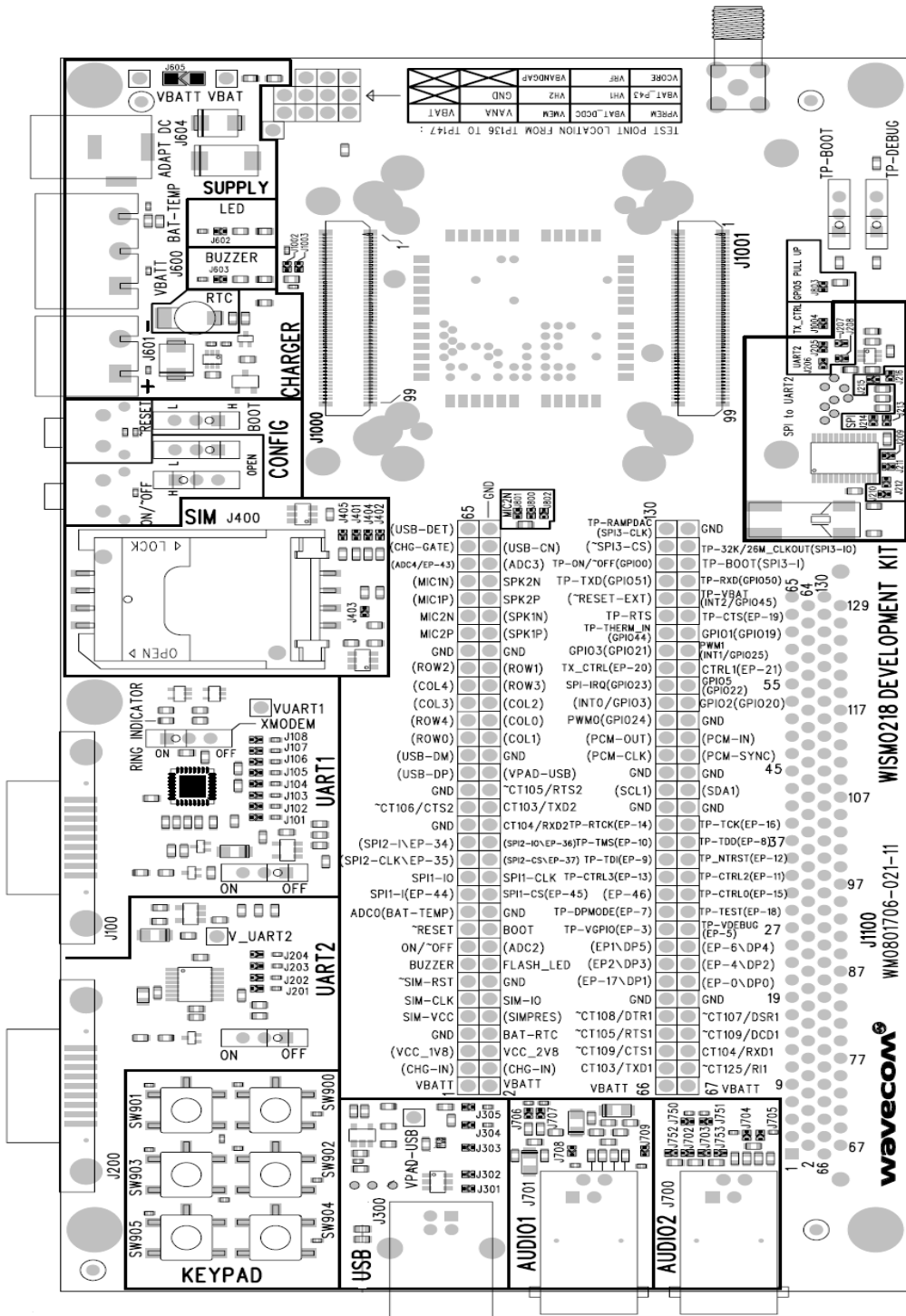
11. List of Abbreviations

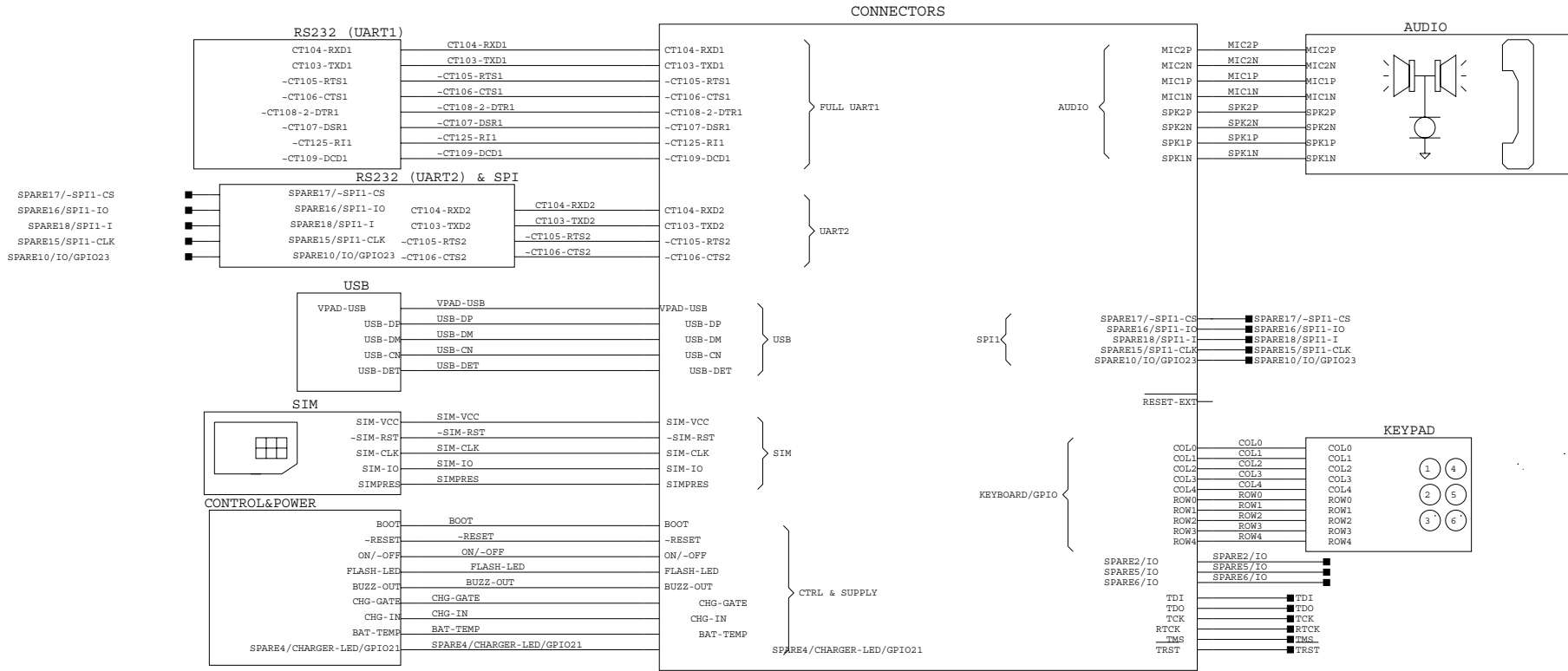
Abbreviation	Definition
ADC	Analog to Digital Converter
AUX	AUXiliary
CLK	CLock
CPU	Central Process Unit
CTS	Clear To Send
DAC	Digital to Analog Converter
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTR	Data Terminal Ready
ESD	ElectroStatic Discharges
GND	GrouND
GPI	General Purpose Input
GPIO	General Purpose Input Output
GPO	General Purpose Output
IIC (I2C)	Inter IC Control bus
I/O	Input / Output
MIC	MICrophone
PC	Personal Computer
PCB	Printed Circuit Board.
PCM	Pulse Code Modulation
PWM	Pulse Width Modulation
RF	Radio Frequency
RI	Ring Indicator
RTC	Real Time Clock
RTS	Request To Send
RXD	Receive Data
SIM	Subscriber Identity Module
SPI	Serial Peripheral Interface
SPK	SPeaKer
TP	Test Point
TXD	Transmit Data
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

>> 12. Appendix

This section contains schematic diagrams and data sheets of the AirPrime WS Series Development Kit and the AirPrime WS Series Socket-Up Board.

12.1. AirPrime WS Series Development Kit



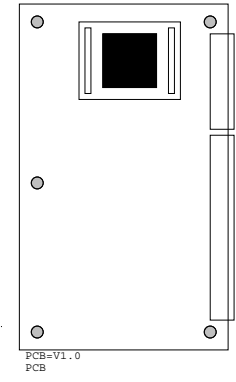
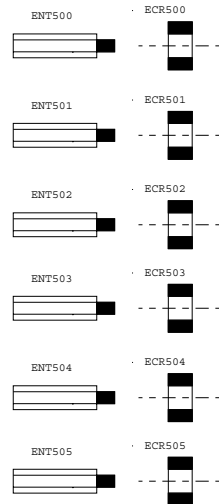
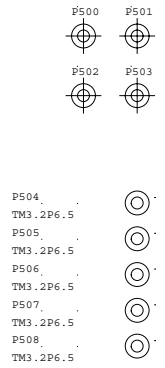


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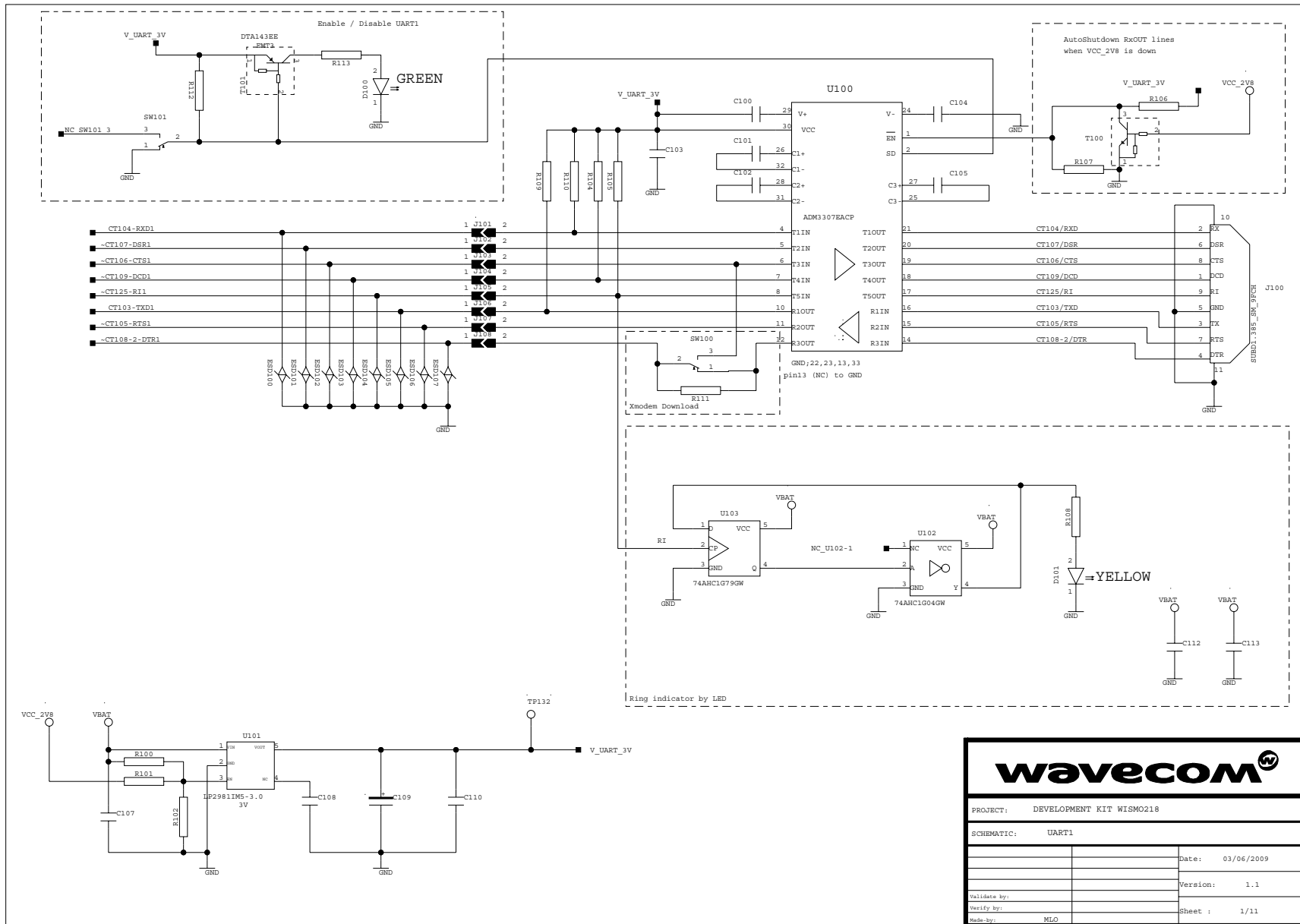
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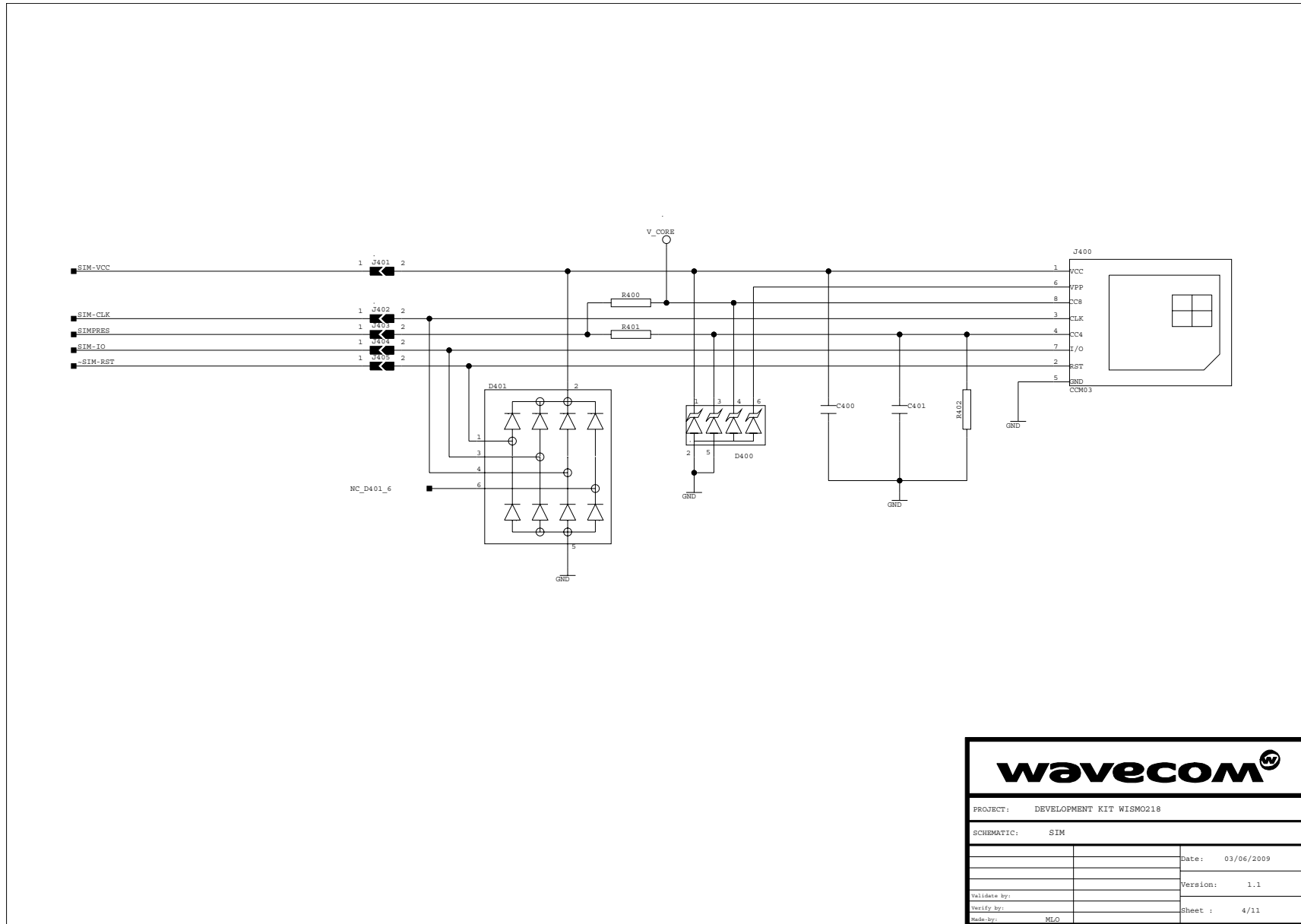
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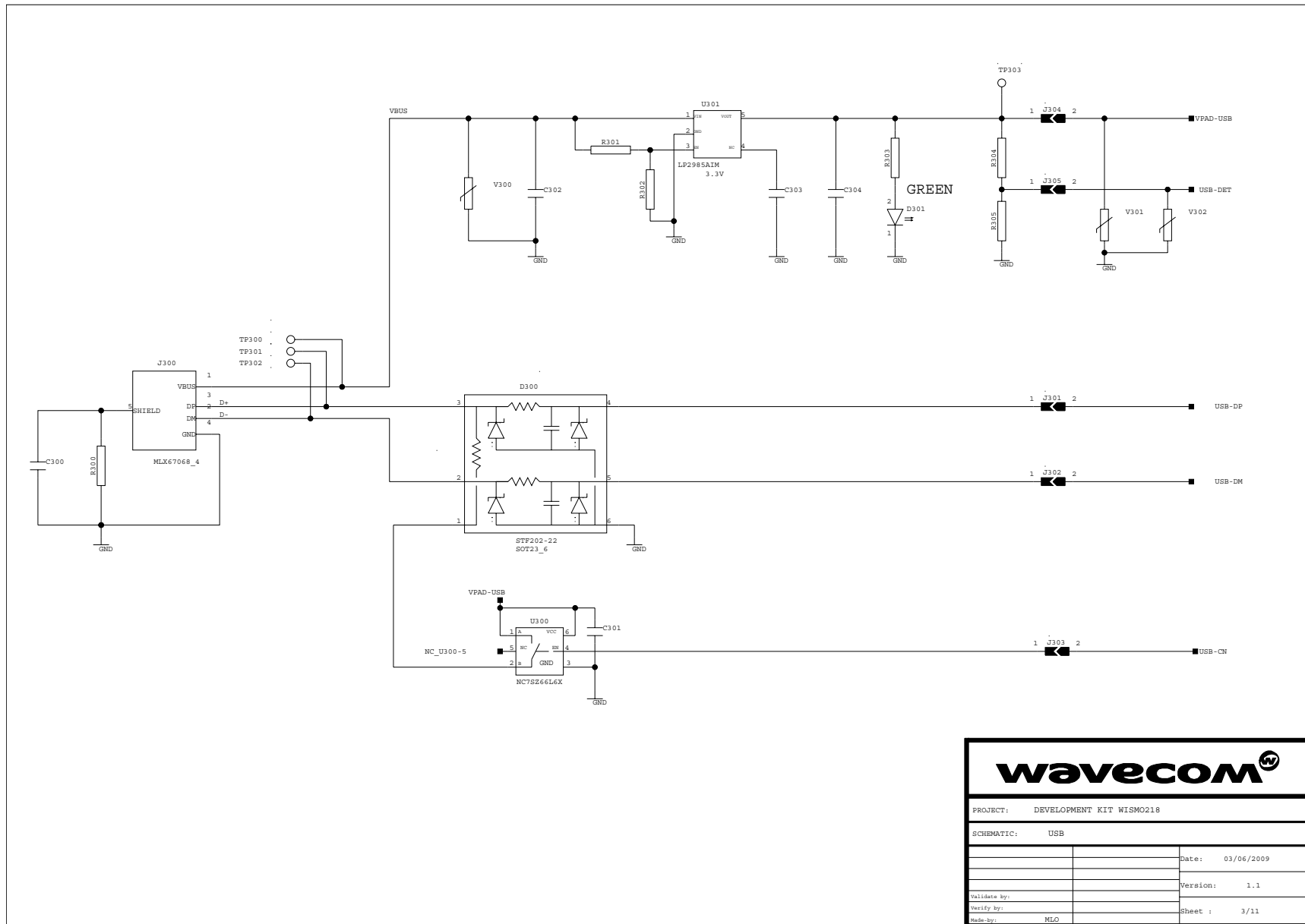


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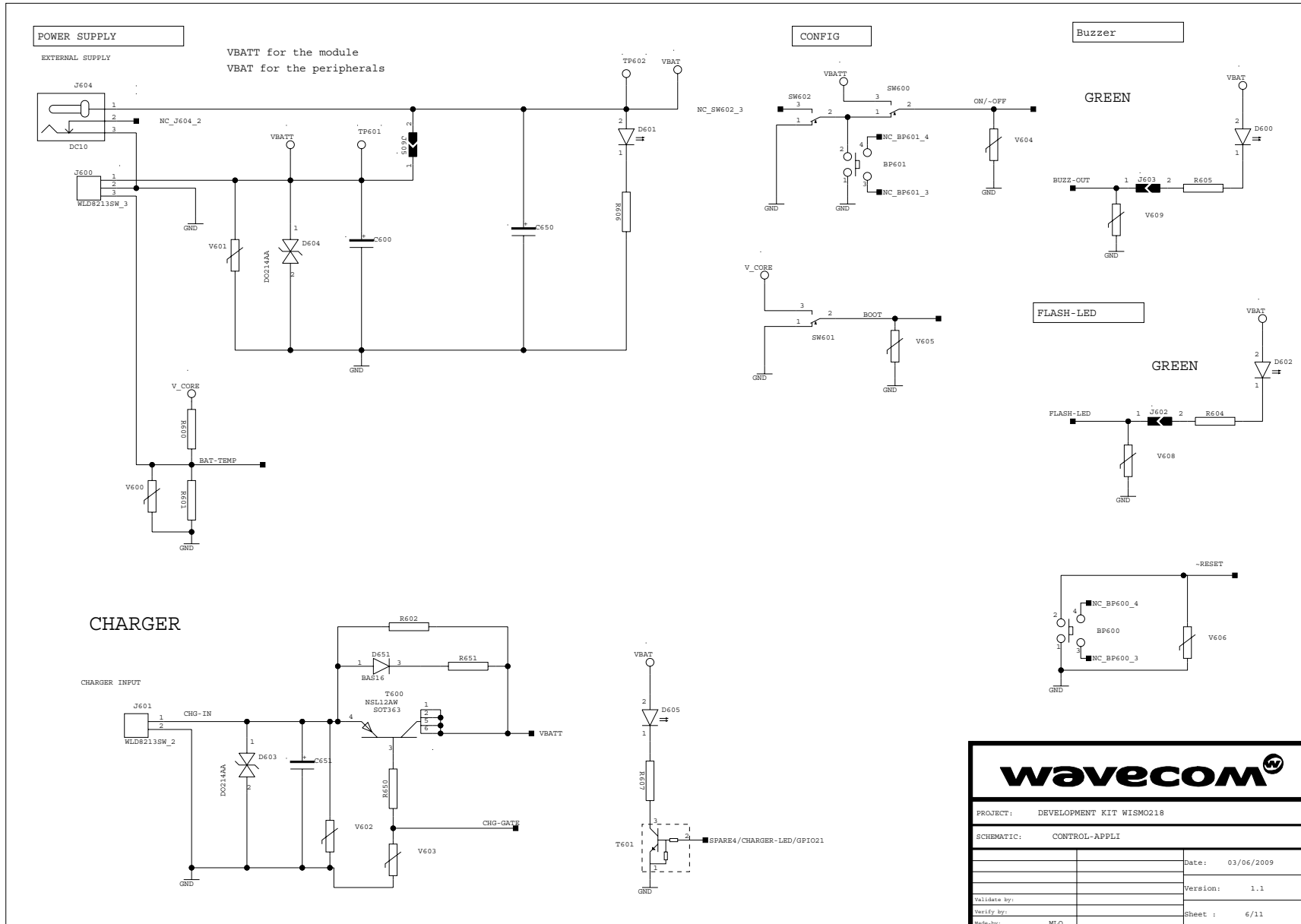




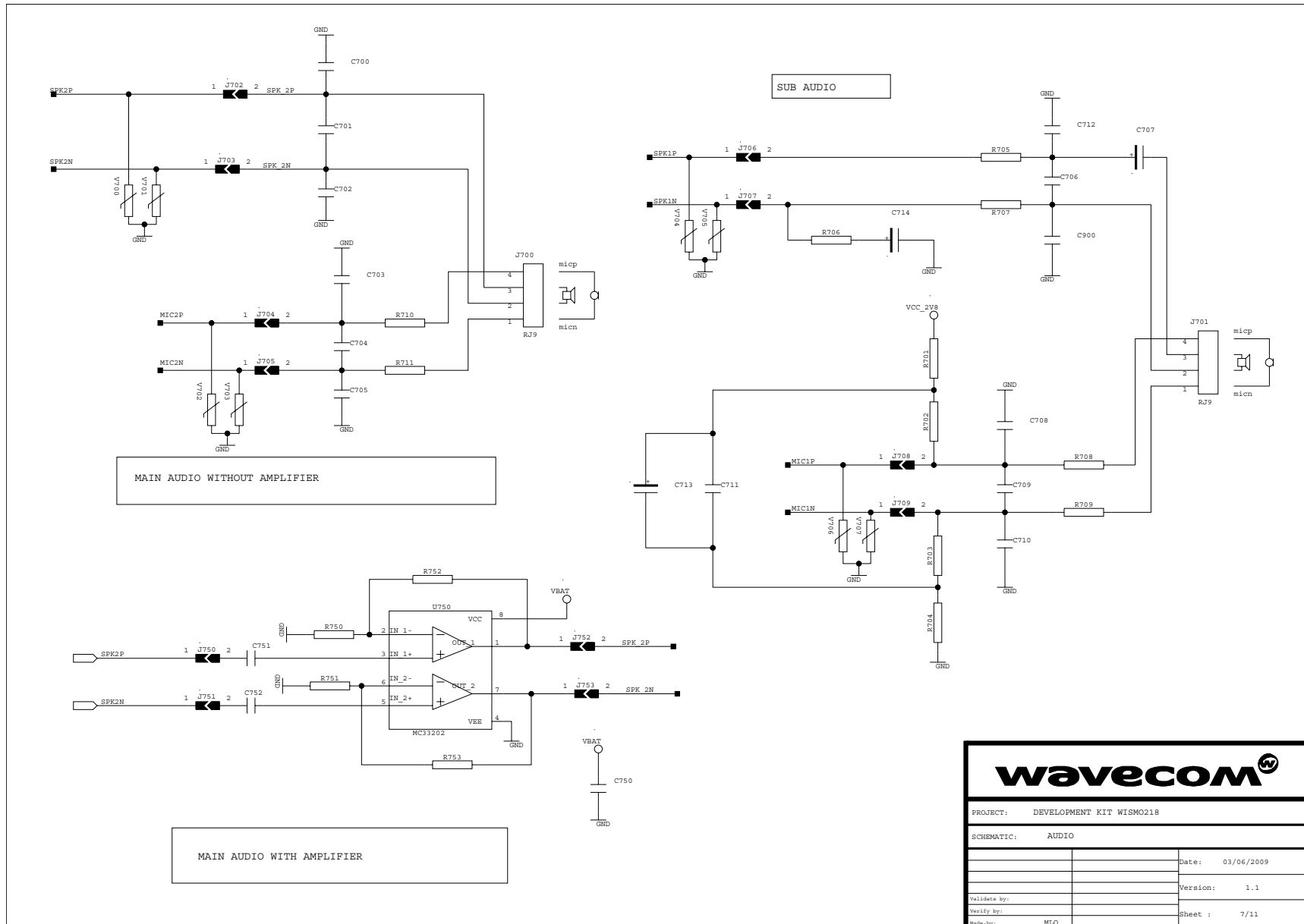
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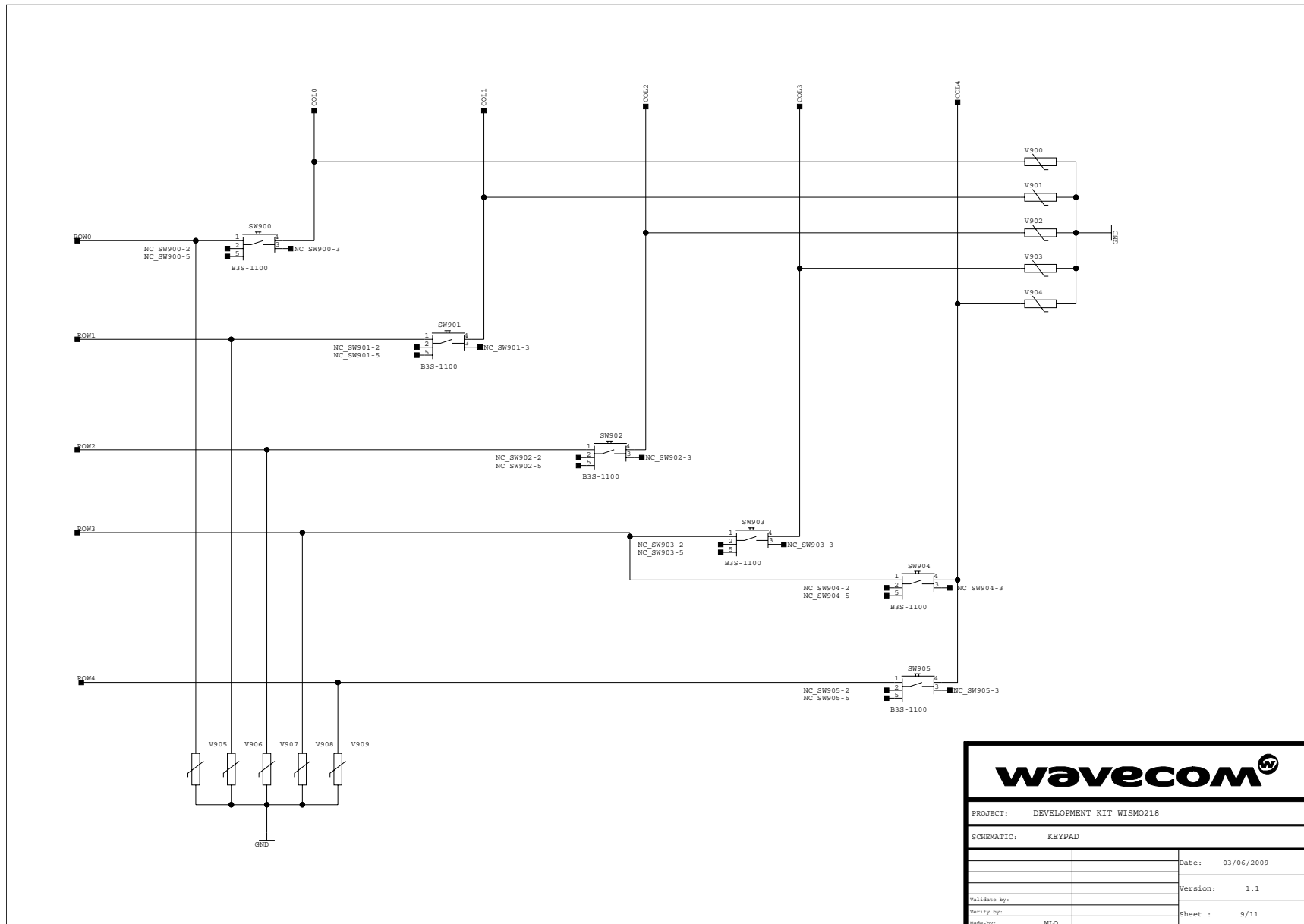


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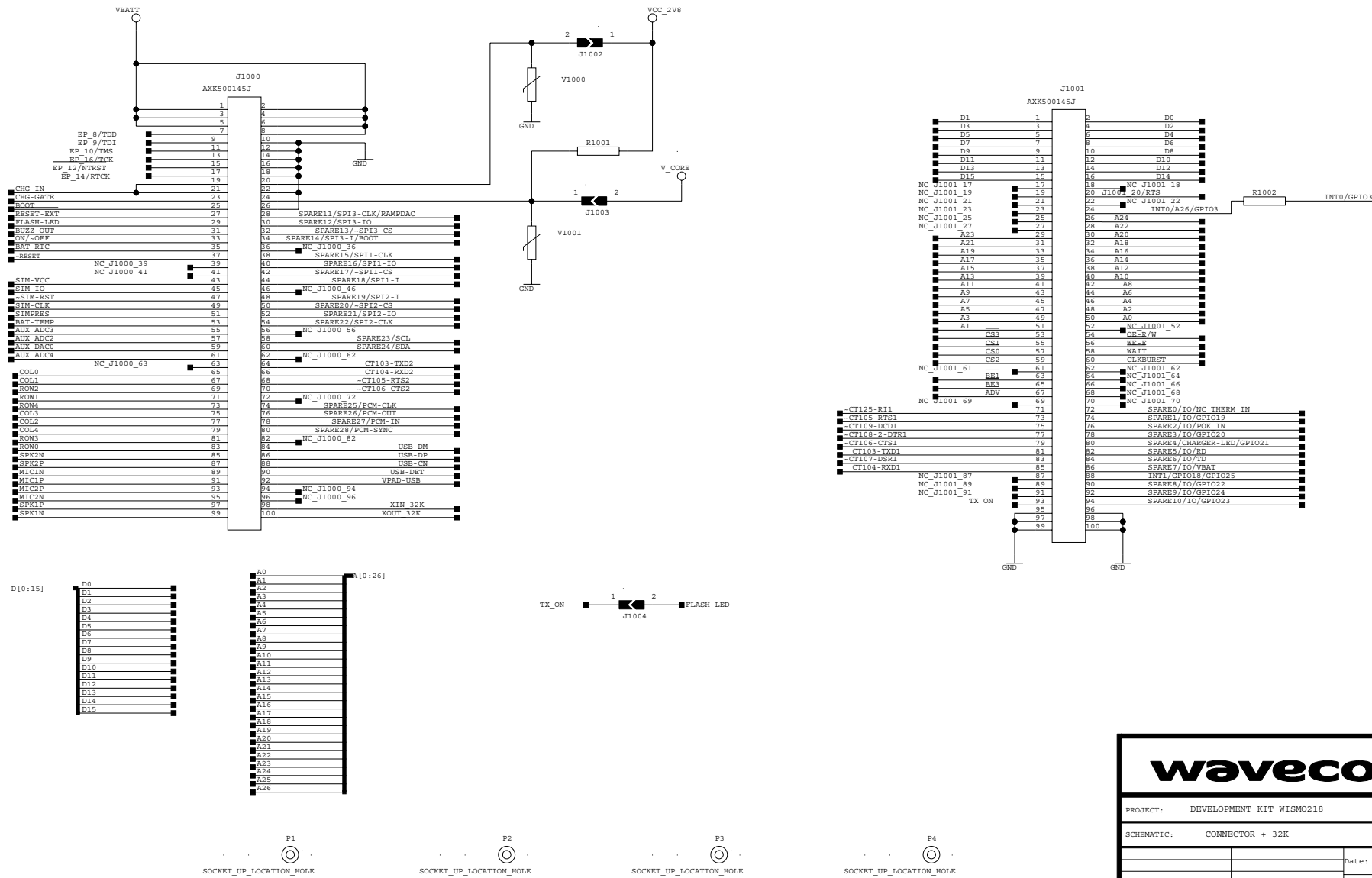
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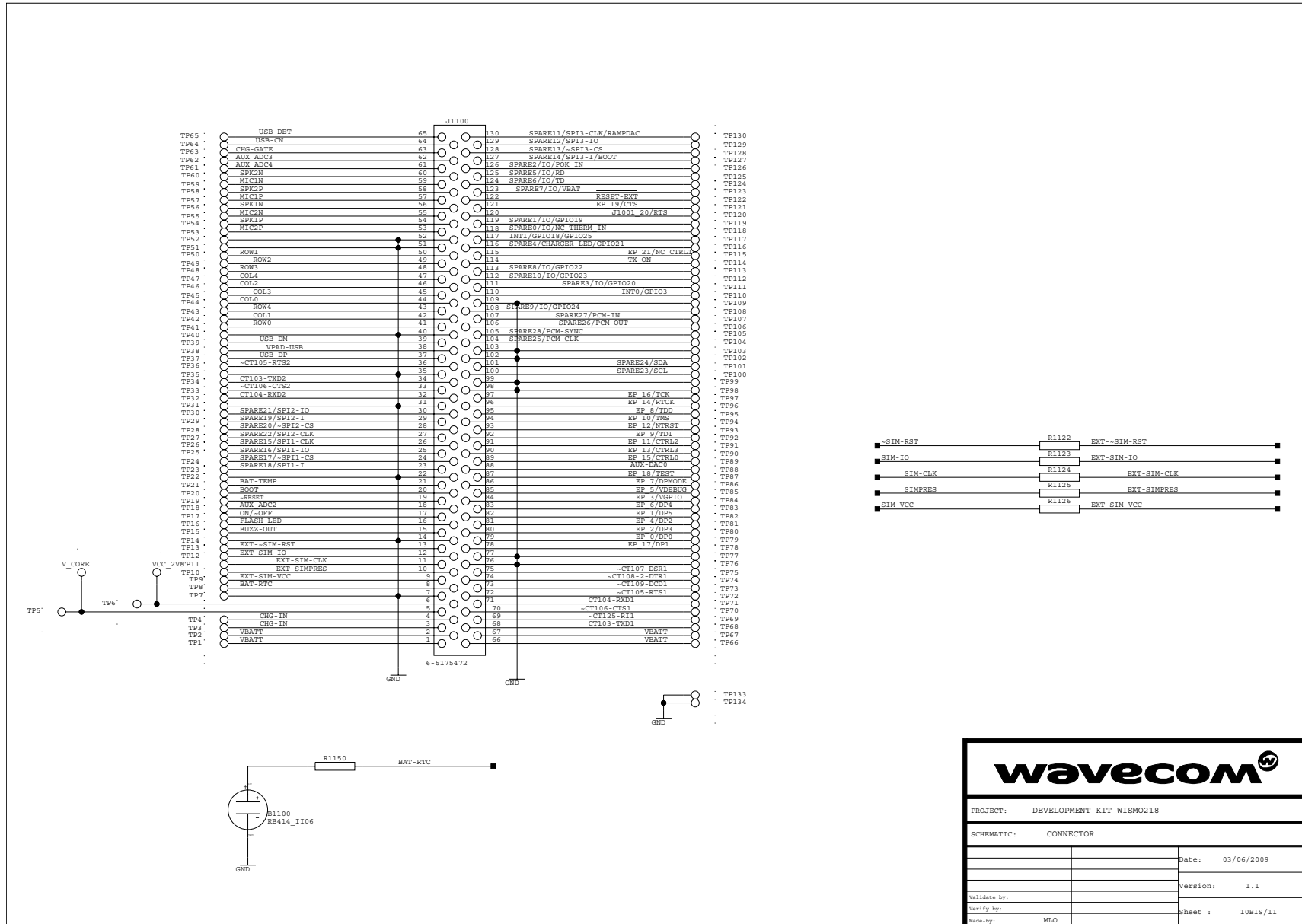


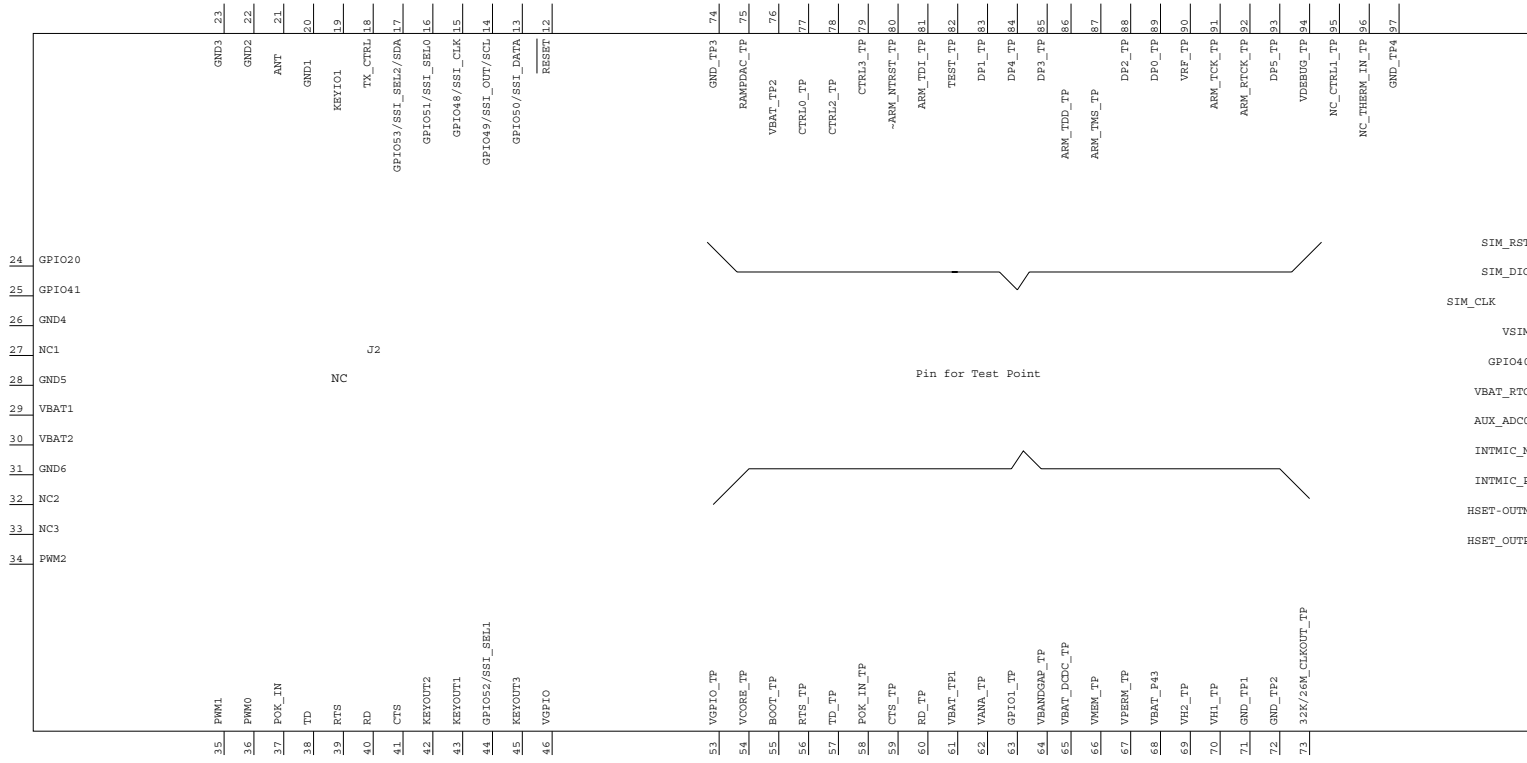
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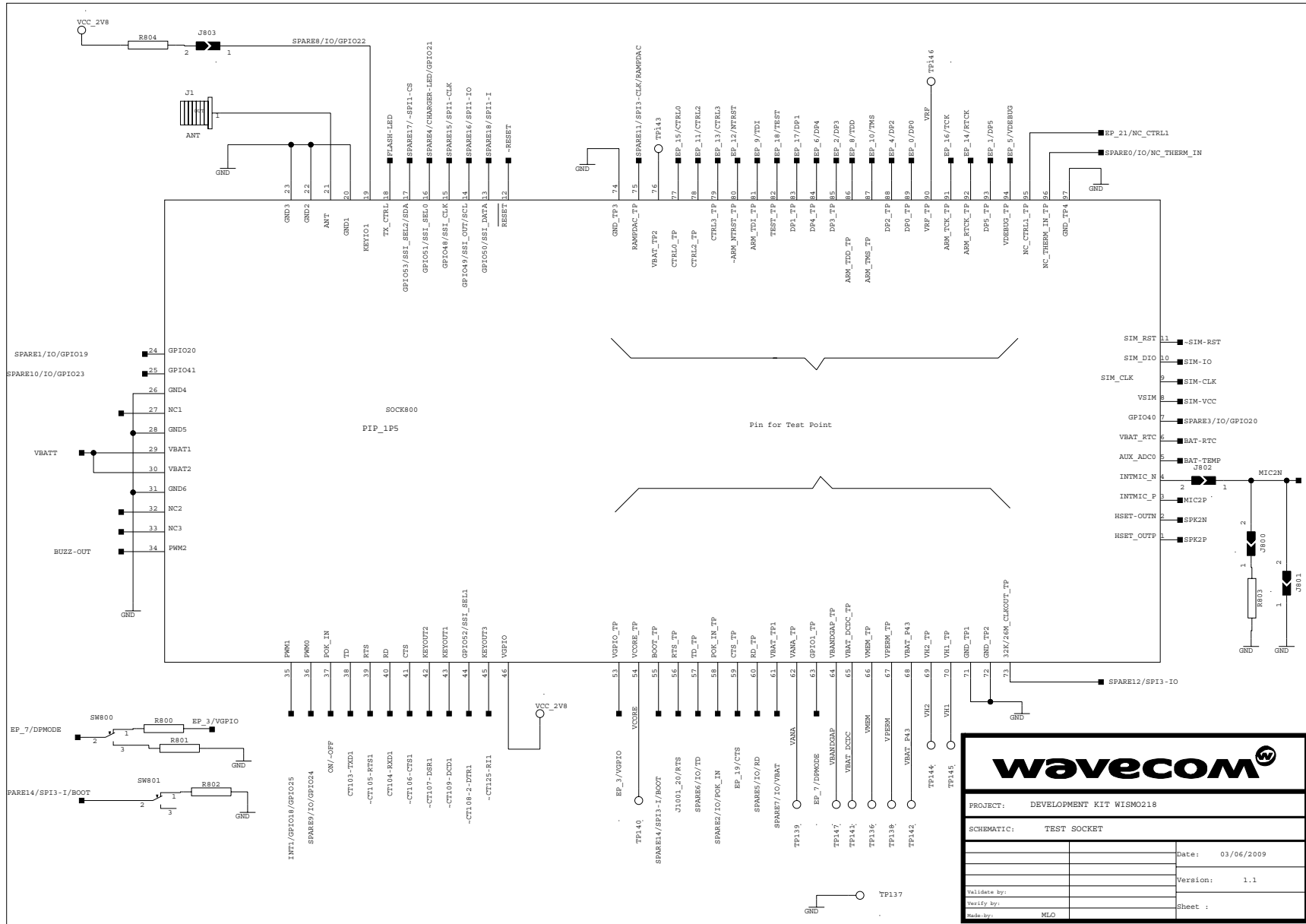


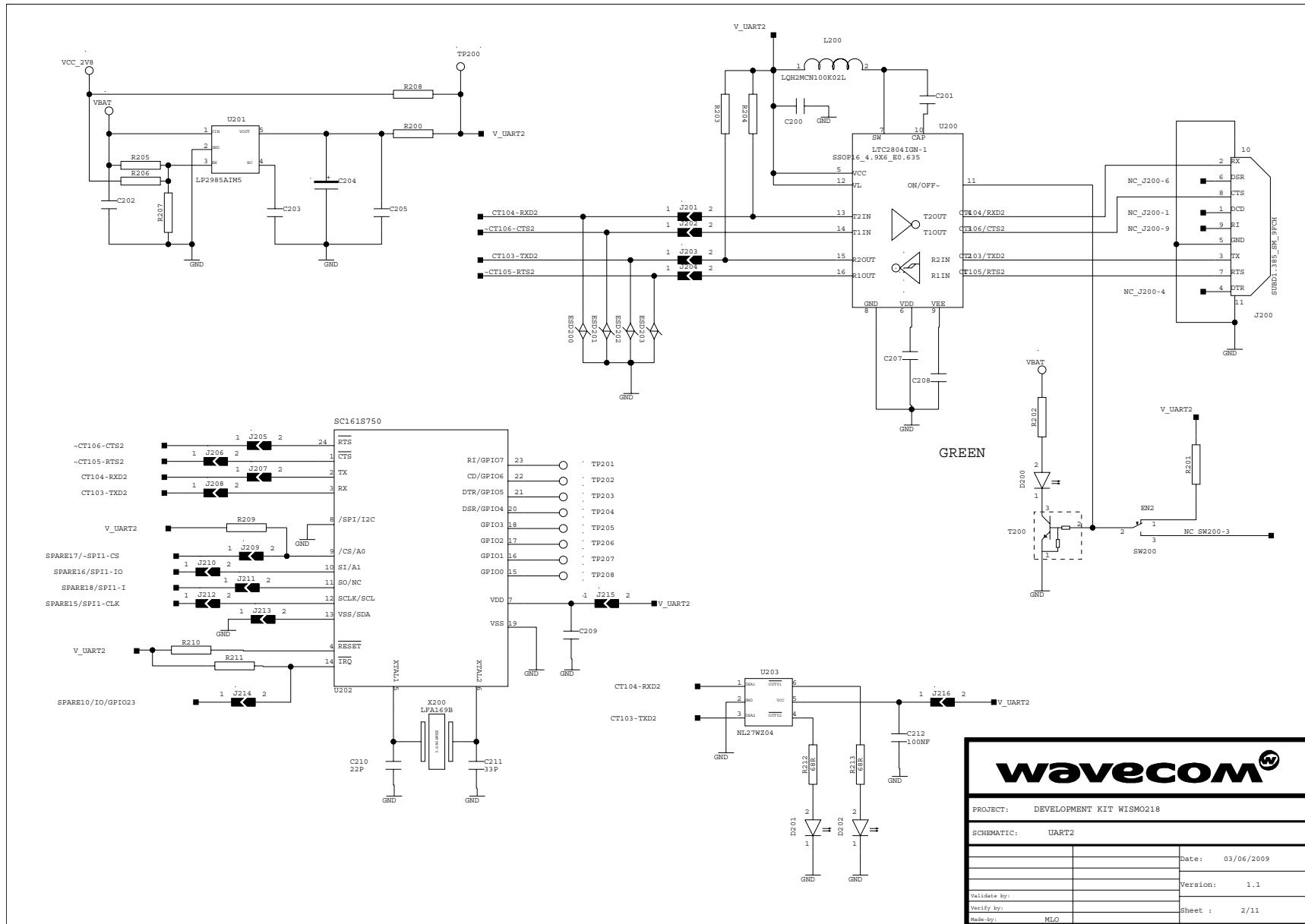
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12.2. AirPrime WS Series Socket-Up Board

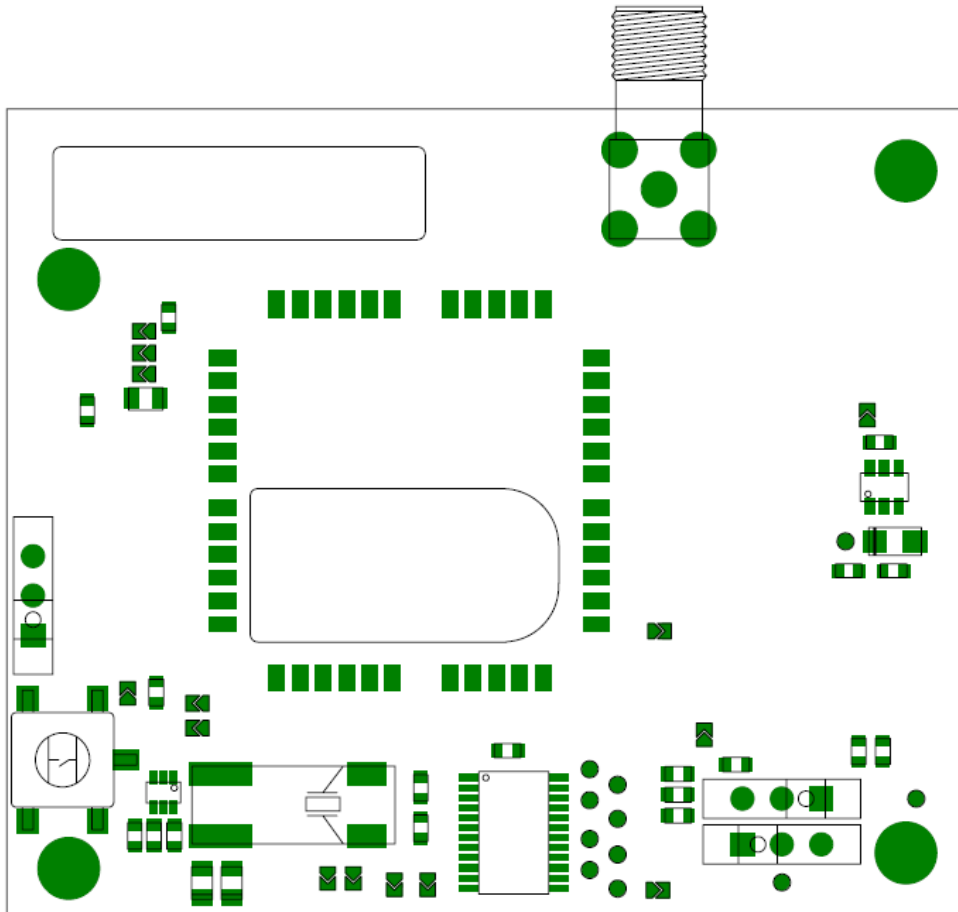


Figure 35. AirPrime WS Series Socket-Up Assembly (Top View)

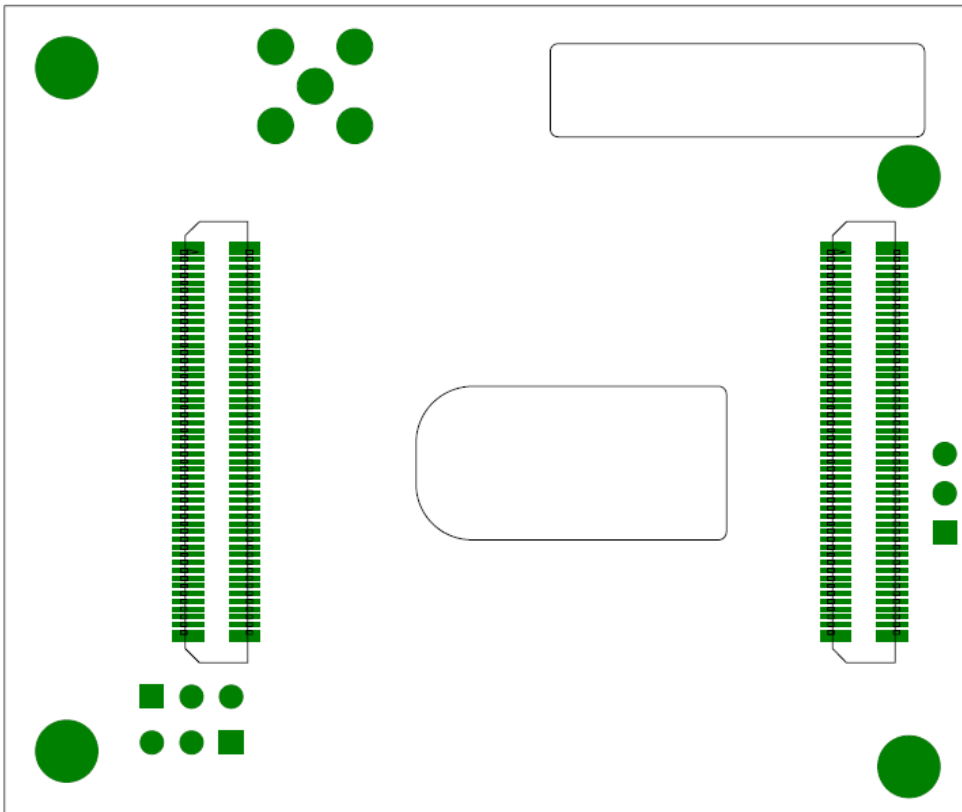
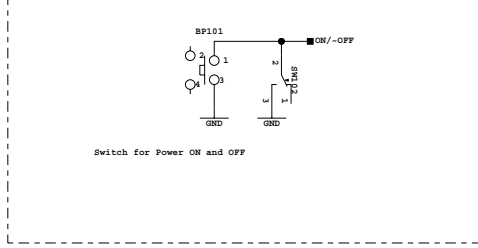
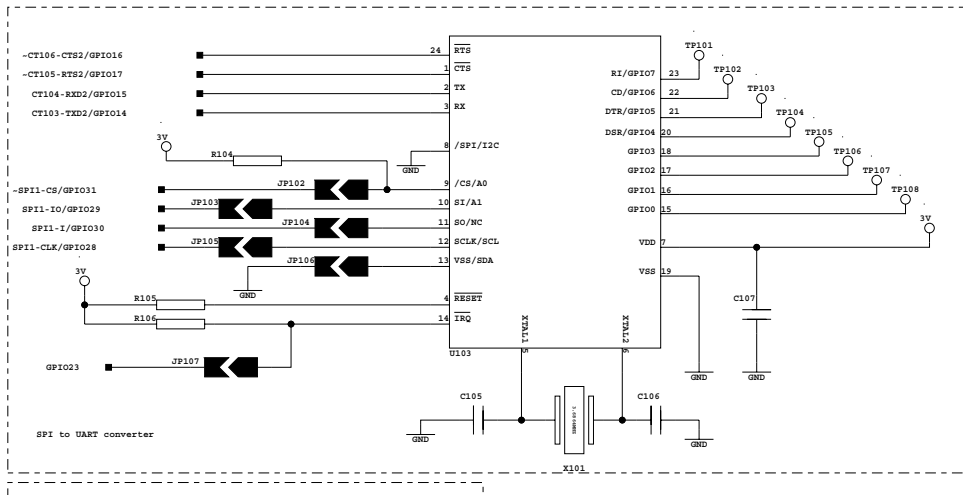
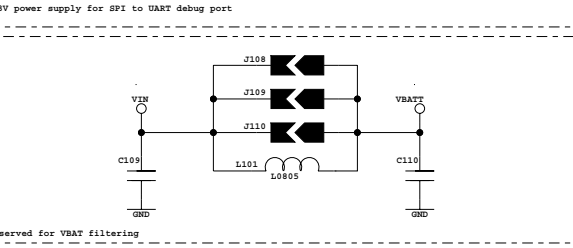
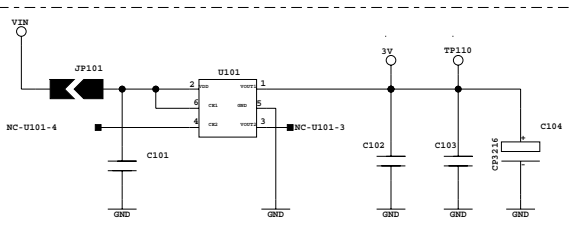
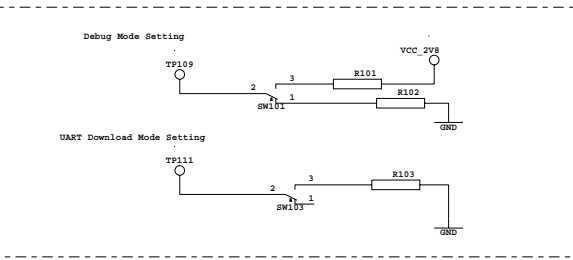
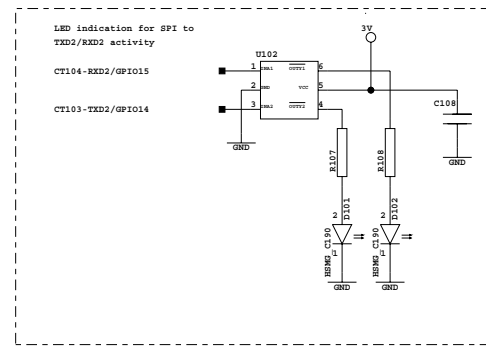
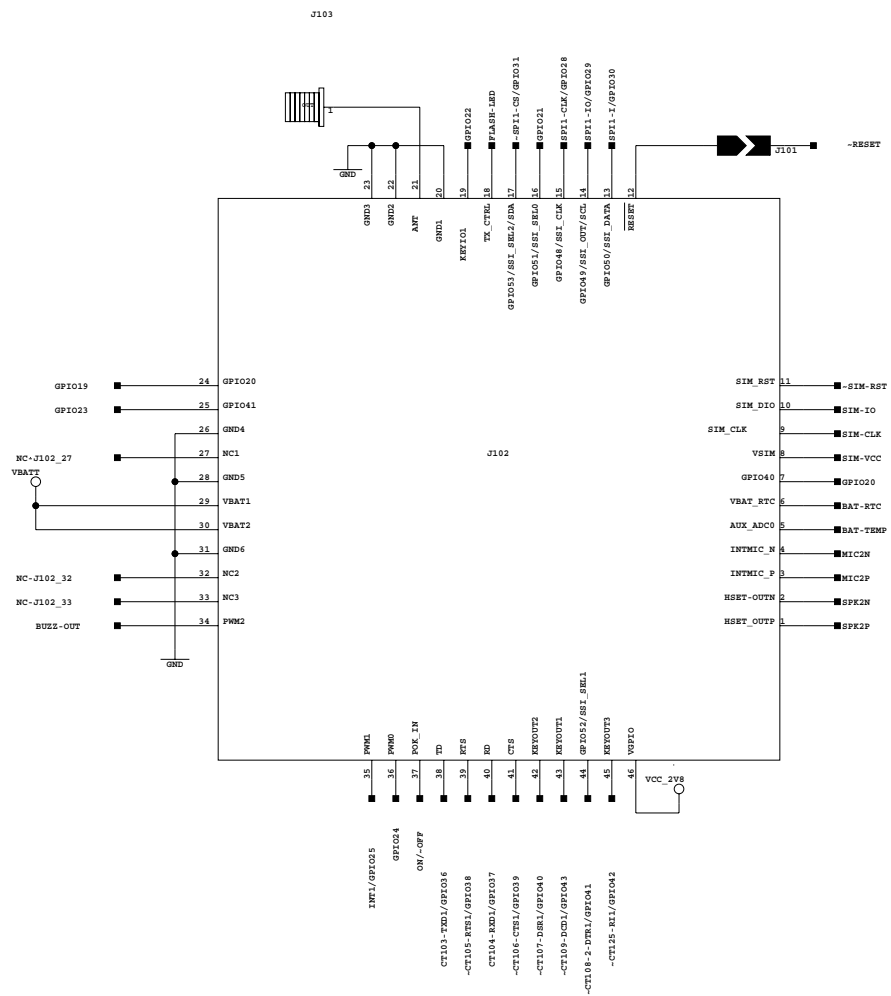
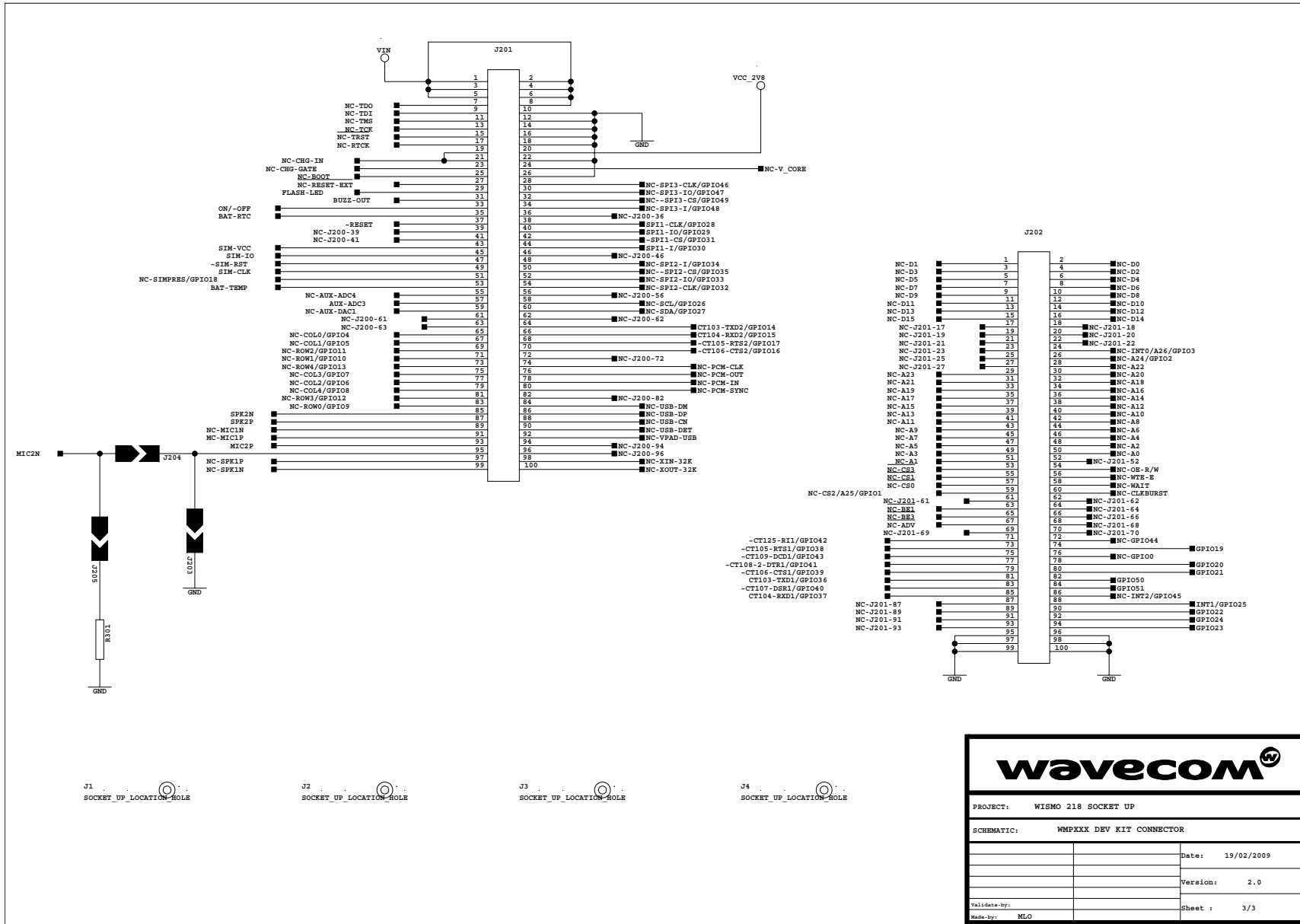


Figure 36. AirPrime WS Series Socket-Up Assembly (Bottom View)



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