Development Kit User Guide

Q52 Omni Wireless CPU®

Reference: **WI_DEV_ASSM_UGD_006**

Revision: **001**

Date: **December 18, 2008**

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Cautions

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. The antenna(s) used for this transmitter must not exceed a gain of 3 dBi for mobile operation and 7 dBi for fixed operation.

Users and OEM integrators must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. OEM must also be provided with labeling instructions.

This device contains EGSM/GPRS functions. This filing is applicable for GSM850 MHz, E-GSM900 MHz, DCS1800 MHz and PCS1900 MHz operations.

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Overview

This document describes the Q52 Omni Development Kit based on a mother board Version 20, Ref. Wm0502301-012-20.

This Development Kit is equipment which can be used to develop software and hardware based on the Q52 Omni Wireless CPU®.

Refer to the documentation [1] for further information about the Q52 Omni Wireless CPU®.

Document History

Revision	Date	History of the evolution	
001	December 18, 2008	Creation	

Table of Contents

Reference Documents

[1] Q52 Omni Wireless CPU® Product Technical Specification and Customer Design Guidelines
Ref.: WI_DEV_ASSM_PTS_001

[2] Q52 Omni Wireless CPU® AT Commands Manual
Ref.: WI_DEV_ASSM_UGD_003

[3] Q52 Omni Wireless CPU® User Guide
Ref.: WI_DEV_ASSM_UGD_005

List of Abbreviations

ADC	**A**nalog to **D**igital **C**onverter
AUX	**AUX**iliary
CLK	**CL**oc**K**
CPU	**C**entral **P**rocess **U**nit
CTS	**C**lear **T**o **S**end
DAC	**D**igital to **A**nalog **C**onverter
DC	**D**irect **C**urrent
DCD	**D**ata **C**arrier **D**etect
DCE	**D**ata **C**ommunication **E**quipment
DSR	**D**ata Set **R**eady
DTE	**D**ata **T**erminal **E**quipment
DTR	**D**ata **T**erminal **R**eady
ESD	**E**lectro**S**tatic **D**ischarges
GND	**G**rou**ND**
GPI	**G**eneral **P**urpose **I**nput
GPIO	**G**eneral **P**urpose **I**nput **O**utput
GPO	**G**eneral **P**urpose **O**utput
IIC (I2C)	**Inter IC control bus**
I/O	**I**nput / **O**utput
MIC	**MIC**rophone
PC	**P**ersonal **C**omputer
PCB	**P**rinted **C**ircuit **B**oard.
PCM	**P**ulse **C**ode **M**odulation
PWM	**P**ulse **W**idth **M**odulation
RF	**R**adio **F**requency
RI	**R**ing **I**ndicator
RTC	**R**eal Time **C**lock
RTS	**R**equest **T**o **S**end
RXD	**R**eceive **D**ata
SIM	**S**ubscriber **I**dentity **M**odule
SPI	**S**erial **P**eripheral **I**nterface
SPK	**SP**ea**K**er
TP	**T**est **P**oint
TXD	**T**ransmit **D**ata
USB	**U**niversal **S**erial **B**us
V_AUX	+12V supply for Q52 and CM52
V_MAIN	3.6V to 4.0V supply for Q52, or 4.5V to 5.5V for CM52

1 Q52 Omni Development Kit Description

1.1 Carrier Board overview

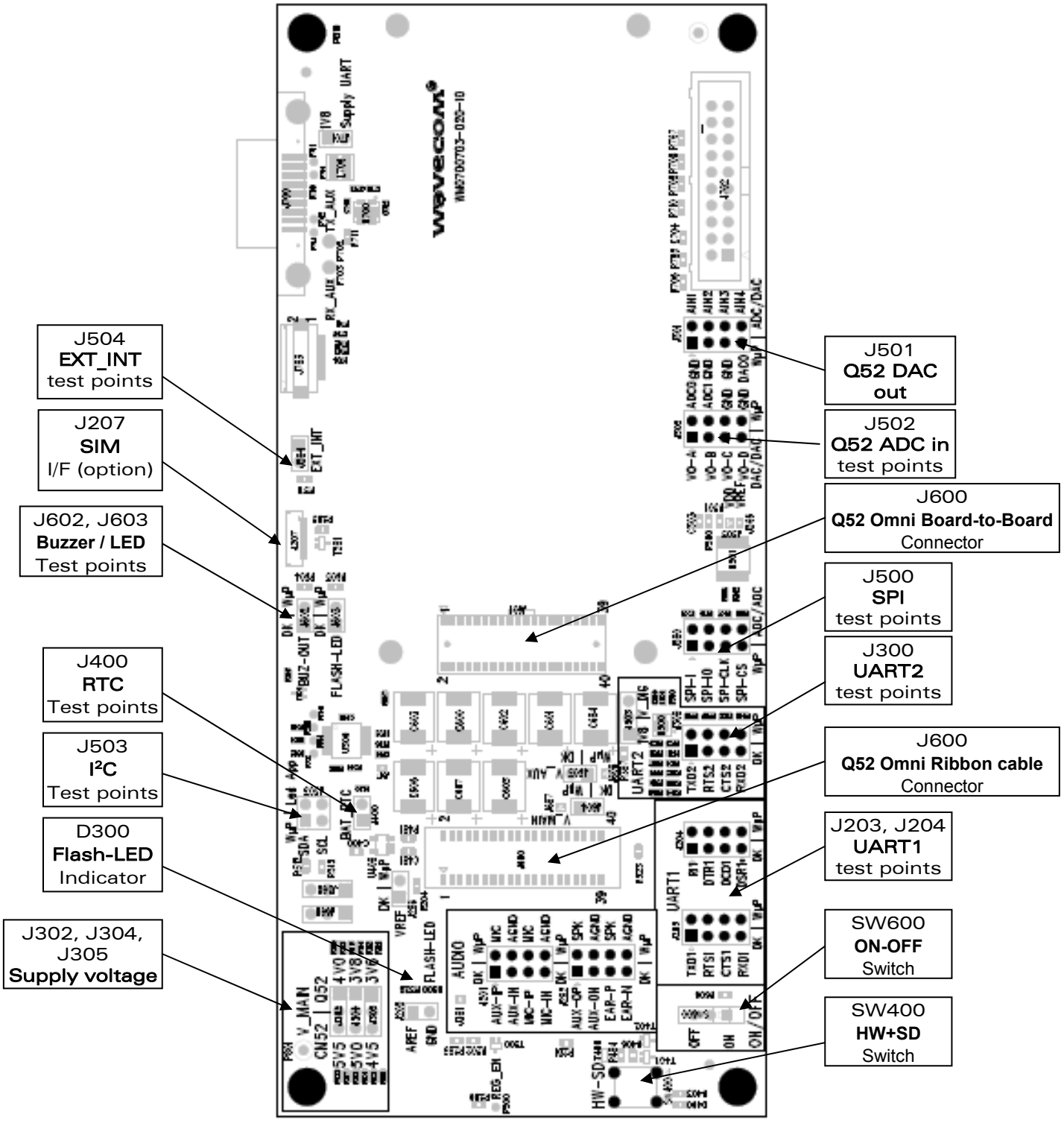


Figure 1: Q52 Omni Development Kit - Carrier Board

1.2 Base Board overview

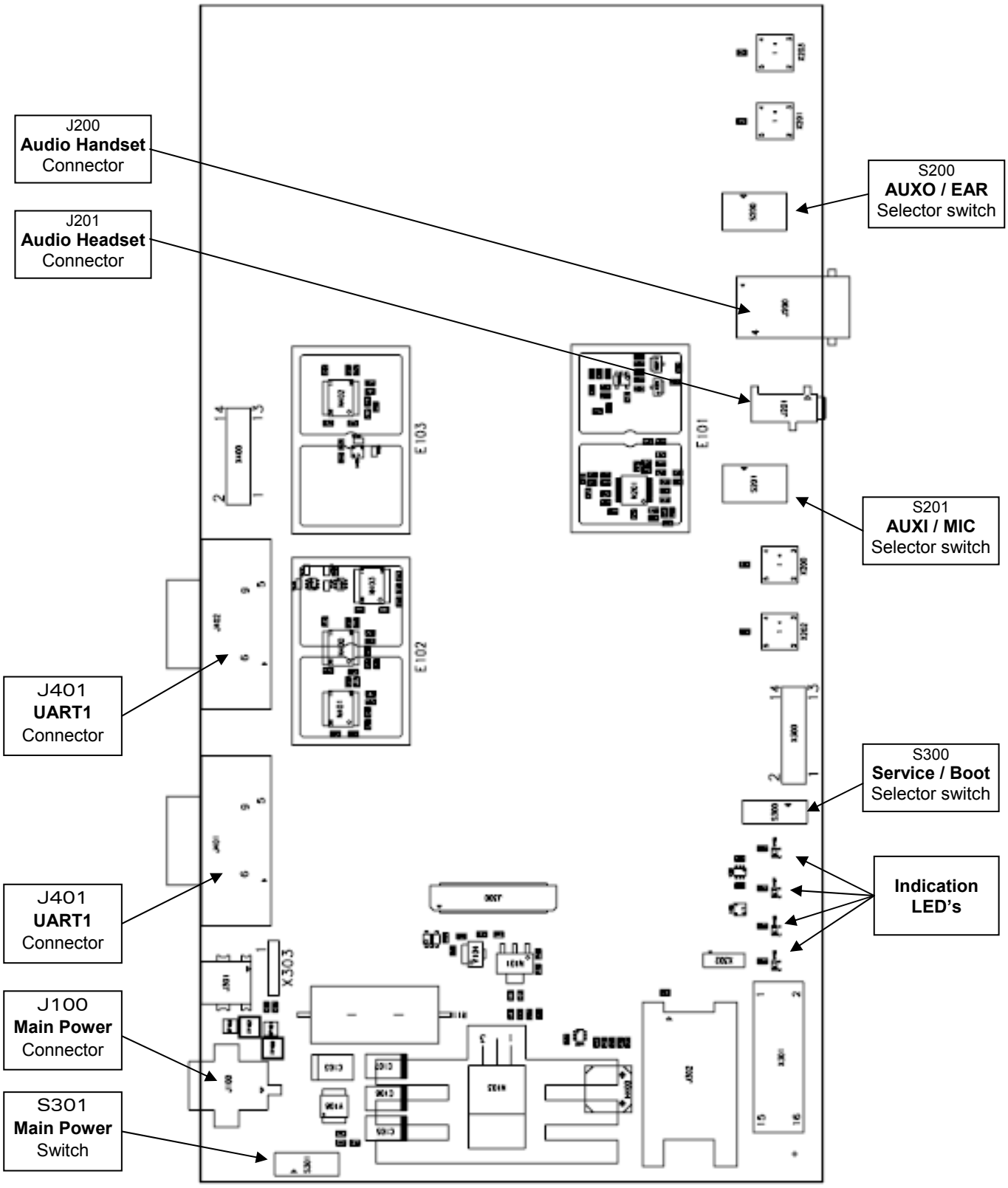


Figure 2: Q52 Omni Development Kit - Base Board

2 General Description

2.1 Q52 Development Kit

All Q52 Development Kit functionality is provided by the Q52 Omni Wireless CPU®. Interfaces on the board include:

- Main serial link RS232, UART1
- Ring Indicator
- Auxiliary serial link RS232, UART2 with 4 signals
- AUDIO connector
- LEDs for several indications
- Power supply connector
- ON/OFF switch
- SERVICE / BOOT switch
- Buzzer
- Flash LED

2.2 RoHS Compliance

The Q52 Omni and the Development Kit board are 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)”.

Wireless CPU® units which are compliant with this directive are identified by the RoHS logo on their label.

3 Power Supply

The main +12V power is supplied from an external AC/DC adaptor through connector J100. It supplies all circuitry on the two developer boards (base board and carrier board).

3.1 Main Supply Adapter

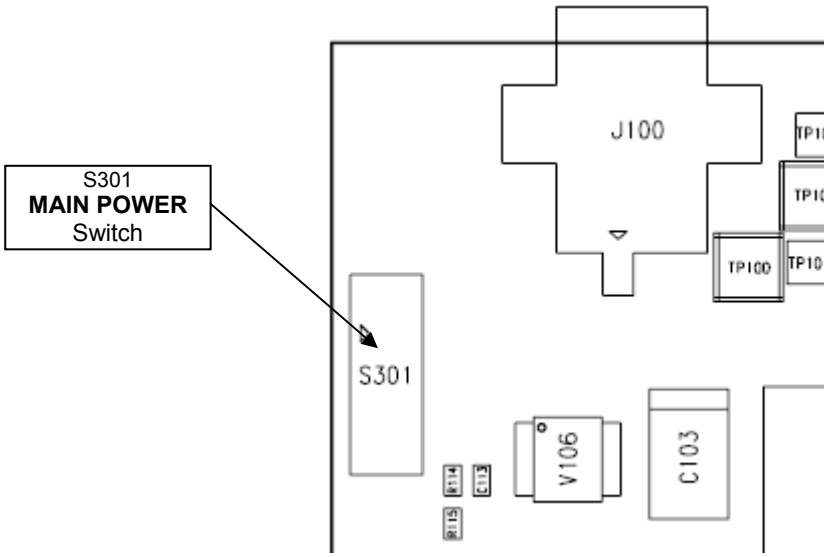
The Q52 Development Kit is powered by an AC/DC power supply.

Manufacturer	Reference	Characteristics
Astrodyne		12V DC / x.x A.

Table 1: Main supply adapter reference

3.2 Main power Switch and LED Indication

“Main Power” indicator is a red LED located on the base board. It indicates the presence of the main supply adaptor and that the Development Kit is powered on; S301 “MAIN PWR” is set to “ON”.



The indicator LED “MAIN POWER” is located on the base board in the indication LED area in the front.

3.3 Voltage setting of V_MAIN

It is possible to select different Main supply voltage levels (V_MAIN) by applying a jumper on header pins J302, J304, or J305. The headers can be found in the upper left corner of the Carrier Board. The voltage settings support two products; CM52 and Q52 Omni.

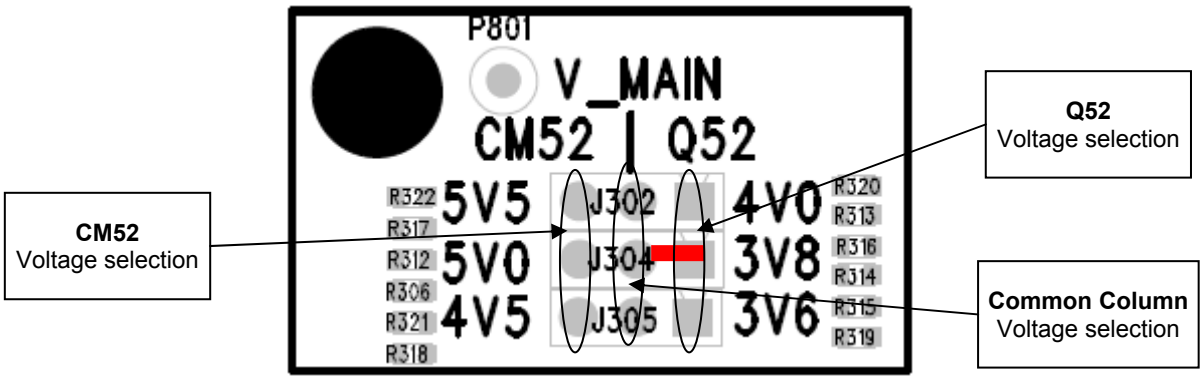


Figure 3: Supply voltage setting

To select the nominal supply voltage setting for Q52, the jumper shall be placed between the center and right column in the middle position (see Figure 3). This will set the supply voltage to 3.8V (factory setting).

3.4 External Supply

It is possible to apply a custom voltage source on both V_MAIN and V_AUX. Customers can use this feature to test out their own power supplies before creating an application PCB.

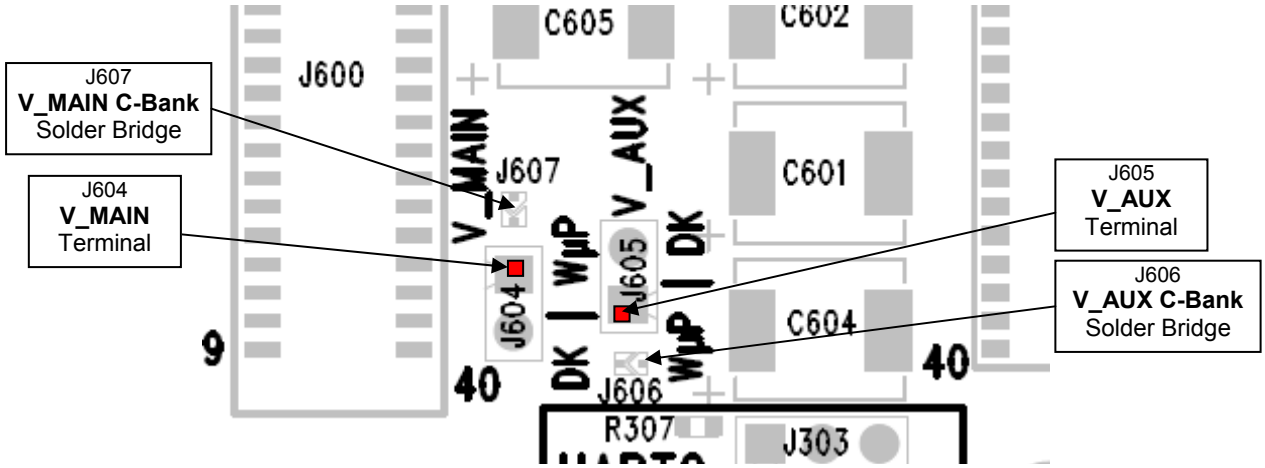


Figure 4: External custom supply connection

3.4.1 V_MAIN

To apply an external supply on V_MAIN, jumper J604 should be removed and the custom supply be connected to the terminal indicated in Figure 4. If a capacitor bank is required for stability, Solder Bridge J607 can be shorted. This will add a capacitor bank of 300uF.

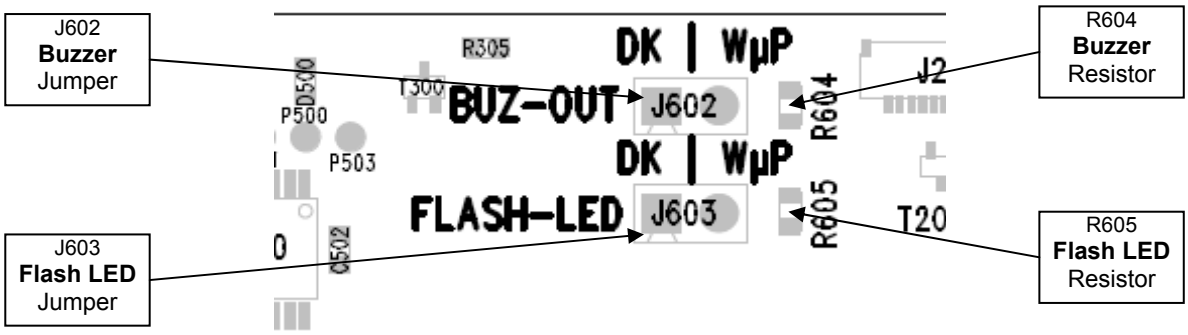
3.4.2 V_AUX

To apply an external supply on V_AUX, jumper J605 should be removed and the custom supply be connected to the terminal indicated in Figure 4. If a capacitor bank is required for stability, Solder Bridge J606 can be shorted. This will add a capacitor bank of 500uF.

4 Buzzer and Flash LED

The “BUZZER” is located on the base board. To connect it to BUZZ-OUT of Q52, jumper J602 must be mounted, or mount a 0 ohm resistor on R604.

The “FLASH LED” is located on the carrier board. To connect it to the LED output of Q52, jumper J603 must be mounted, or mount a 0 ohm resistor on R605.



5 Control Functions

5.1 ON/OFF (PWR_EN)

To be able to power on the Q52 or CM52 the main power switch S301 on the base board must be set to “ON” (see 3.2 above). This is indicated by the “MAIN POWER” LED.
The powering up of the Q52 or CM42 is controlled by the ON/OFF switch SW600 located on the carrier board, which set to the ON-position will power up the unit. The success powering of the unit is indicated by the “UNIT POWERED ON” LED located in the indication LED area of the base board.

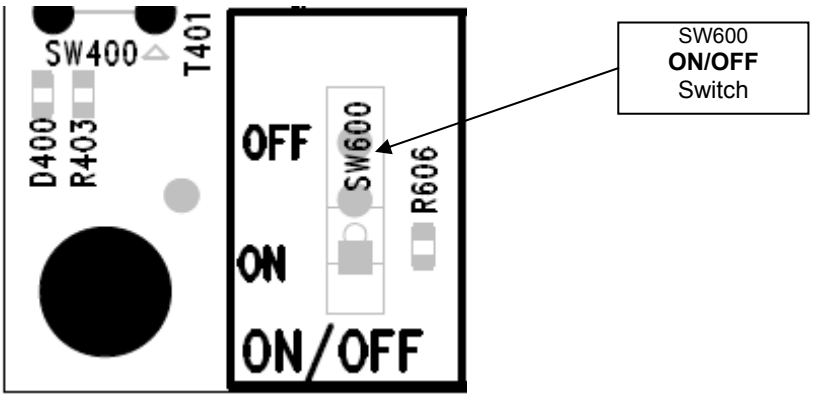


Figure 5: ON/OFF switch

5.2 Service / BOOT (DCD1)

The Service / BOOT switch S300 is only used to download new software to the Q52 Omni via UART1, with the specific downloaded software provided by WAVECOM.
By default S300 switch, located on the base board, must be in the “NORMAL MODE” position.

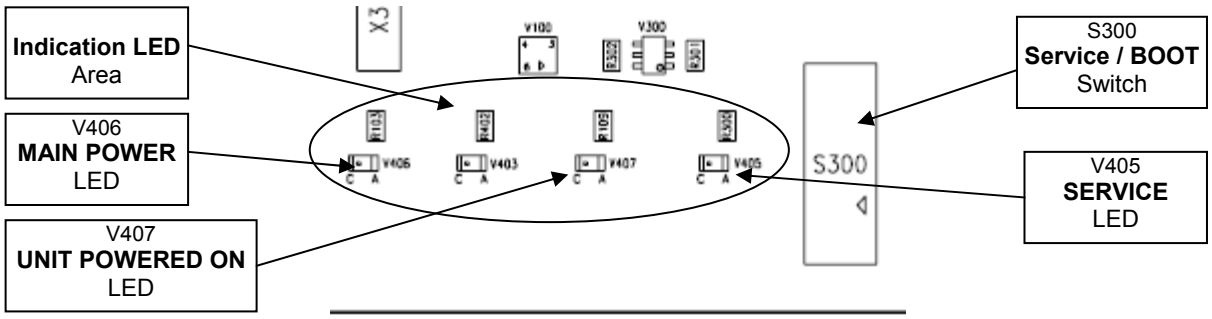


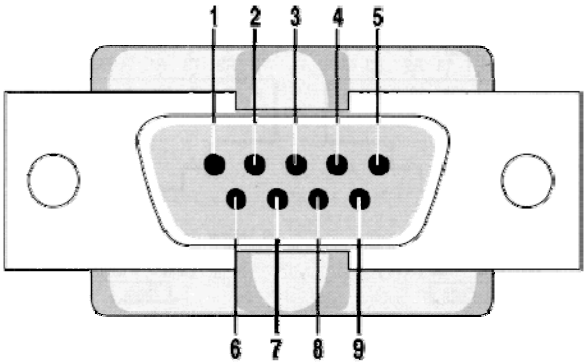
Figure 6: Service / BOOT switch

Before downloading new SW the whole Development Kit should be powered down (S301 set to “OFF”).
The sequence for powering the unit up in Service / BOOT – mode is listed below:

1. Ensure main power is off (base board switch S301 set to “OFF”).
2. Set Service / BOOT switch S300 on the base board to “SERVICE MODE”.
3. Set ON/OFF switch SW600 on the carrier board to “ON”.
4. Connect the computer RS-232 interface to UART1.
5. Start SW down load sequence.
6. Apply main power by setting the MAIN POWER switch S301 of the base board to “ON”.

6 UART1 Function

The UART1 function is the main RS232 serial link of the Q50 Omni / CM52.
By default UART1 is available on its dedicated base board connector J401.



Pin Number	Signal Name	I/O	I/O Type	Description
1	DCD	O	RS232 (V24/V28)	Data Carrier Detect Out From Q52/CM42
2	RXD	O	RS232 (V24/V28)	Receive serial data Data From Q52/CM42
3	TXD	I	RS232 (V24/V28)	Transmit serial data Data To Q52/CM42
4	DTR	I	RS232 (V24/V28)	Data Terminal Ready In To Q52/CM42
5	GND			Ground
6	DSR	O	RS232 (V24/V28)	Data Set Ready Out From Q52/CM42
7	RTS	I	RS232 (V24/V28)	Request To Send In To Q52/CM42
8	CTS	O	RS232 (V24/V28)	Clear To Send Out From Q52/CM42
9	RI	O	RS232 (V24/V28)	Ring Indicator Out From Q52/CM42

Table 2: UART1 pin-out

6.1 RI LED

The “RING INDICATOR” indicator is a green LED located in the Indicator LED area on the base board. The LED blinks in the case of incoming calls.

7 UART2 Function

The UART2 function is the auxiliary RS232 serial link of the Q52. It operates at 1.8V, but is level translated to 2.8V on the carrier board before being routed to J402 of the base board.

J402 is a SUB-D 9-pin female connector. The table below defines the connector signals.

Pin Number	Signal Name	I/O	I/O Type	Description
1	Not used	-	-	-
2	RXD	O	RS232 (V24/V28)	Receive serial data Data From Q52/CM42
3	TXD	I	RS232 (V24/V28)	Transmit serial data Data To Q52/CM42
4	Not used	-	-	-
5	GND			Ground
6	Not used	-	-	-
7	RTS	I	RS232 (V24/V28)	Request To Send In To Q52/CM42
8	CTS	O	RS232 (V24/V28)	Clear To Send Out From Q52/CM42
9	Not used	-	-	-

Table 3: UART2 pin-out

8 Audio

There is one single ended audio interface on the Q52 Omni containing MIC, SPK and an audio reference AGND.
The base board has two differential audio interfaces (MIC/EAR and AUXI/AUXO). The MIC/EAR directly connects the handset to Q52 via the carrier board, while AUXI/AUXO is going through amplifiers before being routed to Q52 via the carrier board.

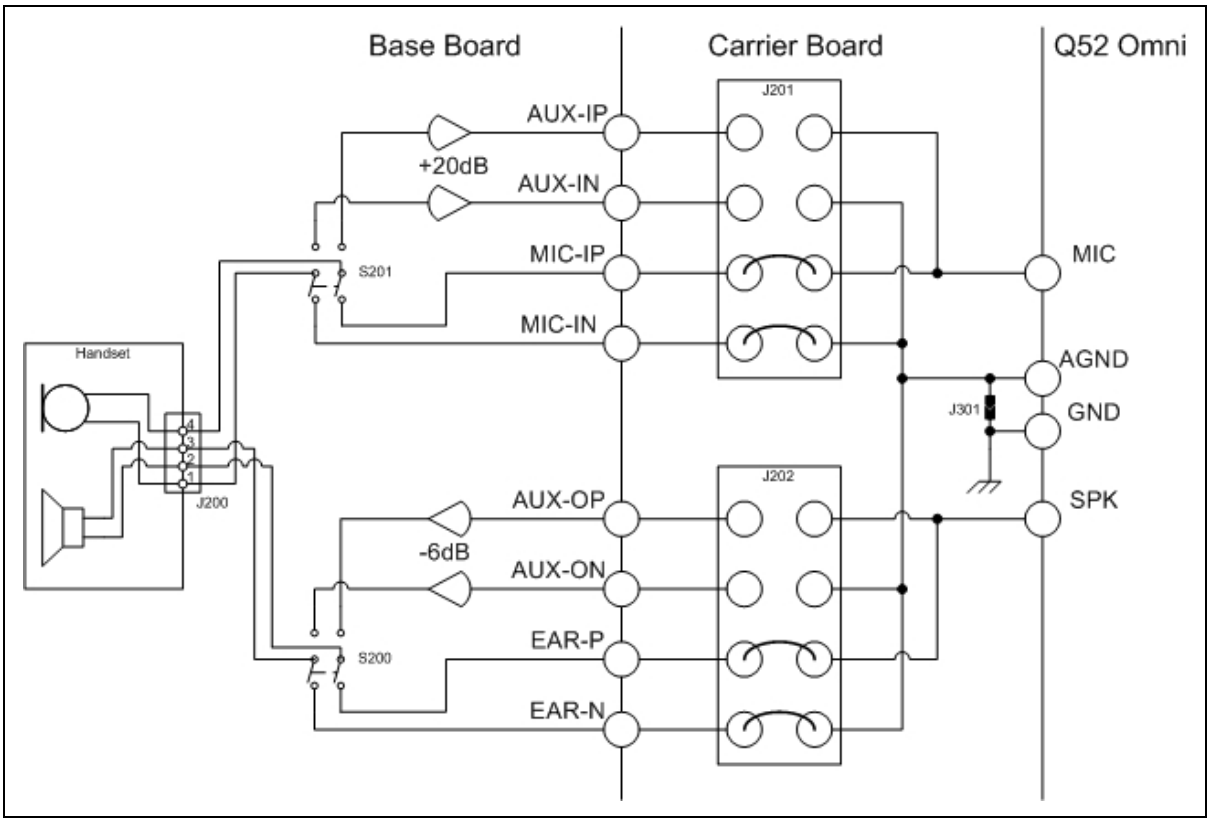


Figure 7: Audio path overview

Default recommended jumper settings for J201 and J202 of the carrier board are shown in Figure 7 above. S200 on the base board should be set to “EAR” and S201 on the base board should be set to “MIC”. This provides a low gain path to Q52 Omni.

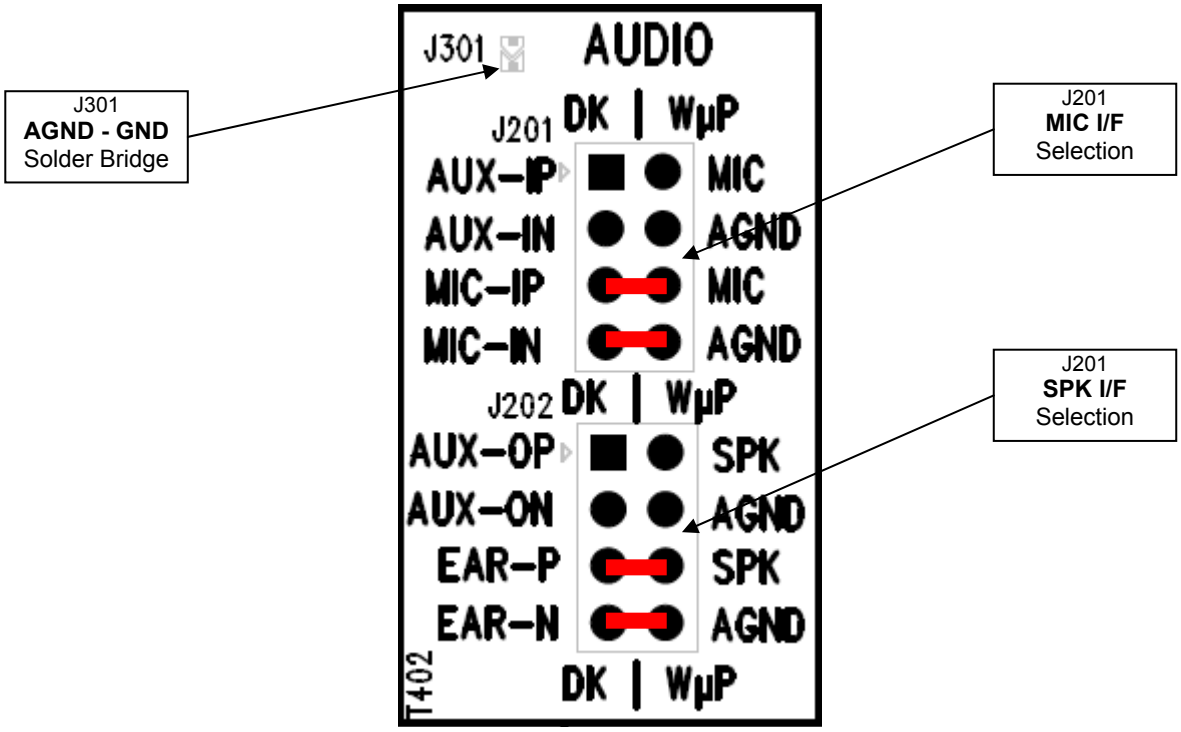


Figure 8: Audio setup on carrier board

By default, AUDIO signals are available on its dedicated carrier board test point interfaces J201 (MIC / AUXI), and J202 (EAR / AUXO). Their recommended default setting is shown in Figure 8 above.

Solder bridge J301 should be bridged so to connect AGND with GND.

Setting	J201	S201
Mic. Low Gain	MIC-IP to MIC MIC-IN to AGND	MIC
Mic. High Gain	AUX-IP to MIC AUX-IN to AGND	AUXI

Table 4: Microphone Settings

Setting	J202	S200
SPK Low Gain	SPK to EAR-P AGND to EAR-N	EAR
SPK High Gain	SPK to AUX-OP AGND to AUX-ON	AUXO

Table 5: Speaker Settings

8.1 Handset Connector

Caution: The analog audio channels are very sensitive to noise; this board is not designed for audio noise optimization.

J200 is a RJ9 4-pin connector.

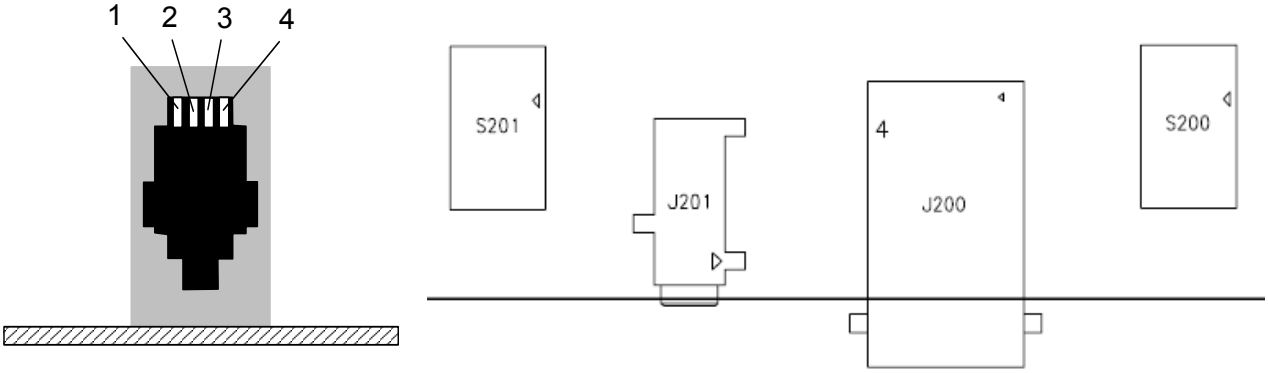


Figure 9: Handset connectorJ200

Table 16 defines the signals and relative pins for the AUDIO1 connector.

Pin Number	Signal Name	I/O	I/O Type	Description
1	MIC-IN AUX-IN	I	Analog	Microphone negative input
2	EAR-N AUX-ON	O	Analog	Speaker negative output
3	EAR-P AUX-OP	O	Analog	Speaker positive output
4	MIC-IP AUX-IP	I	Analog	Microphone positive input

Table 6: Pin out of the Handset connector

9 Others Interfaces

There are other available interfaces on the Q52 Development Kit.

9.1 Reference Supply Output (VCC_2V8)

The VCC_2V8 output can be used to connect pull-up resistors and can supply minor external logic such as level translators etc.
It must be used as a reference supply for all external interfaces.

9.2 Backup Battery (BAT-RTC)

The Q52 provides this input/output signal (BAT-RTC) to connect a Real Time Clock power supply. This pin is used like a backup power supply to save date and time values when V_MAIN is switched off. Q52 will output 2.7V ±2% with a typical output current of 1.0mA. (0.4mA to 2.0mA).

9.3 ADC Input signals (ADC0, ADC1)

The Q52 provides two analog to digital converters.
These are 10-bit resolution ADCs ranging from 0V to 2V.

9.4 DAC Output signal (DAC0)

The Q52 provides one digital to analog converter, the DAC0 signal. This is an 8-bit resolution DAC ranging from 0V to 2.3V.

9.5 Serial Bus

The Q52 provides one SPI bus. The master mode is available up to 13Mbit/s with 3 or 4 wires.

9.6 I^2C Bus

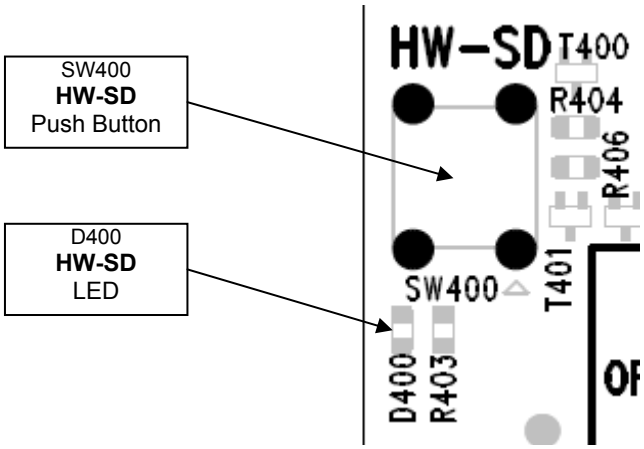
The Q52 provides one I^2C bus.

9.7 External Interrupt

The Q52 provides an external interrupt “EXT-INT”.

9.8 HW-SD

The Q52 provides a HardWare ShutDown feature. By applying a short low pulse (nominally 150ms), Q52 will perform a controlled power down sequence.



When a low level is applied on HW-SD, Q52 re-defines the signal from an input to an output and sets it low. LED D400 will be turned on until Q52 has performed a proper shut down. At this point Q52 will re-define HW-SD as an input and it will be pulled high, causing LED D400 to turn off. It is now safe to remove power from Q52.

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