BLE112 DEVELOPMENT KIT

DATASHEET

Tuesday, 13 December 2011

Version 1.01

VERSION HISTORY

Version	Comment
1.01	Added maximum battery voltage
1.0	Release
0.1	Draft

TABLE OF CONTENTS

1 Design Overview

BLE112 Development Kit is targeted for engineers evaluating BLE112 *Bluetooth 4.0* single mode modules and developing or prototyping *Bluetooth* 4.0 systems utilizing BLE112 module(s). BLE112 Development Kit features:

Evaluation board for BLE112 module containing

- Switchable powering either from a coin cell battery or USB
- Bus powered USB interface
- RS-232 serial interface for USB powered configuration
- programming interface for upgrading the firmware and parameters
- Display connected to SPI
- Accelerometer connected to SPI
- Potentiometer for ADC input
- Push buttons for 4 PIOs and reset
- All the PIOs available at a pin header
- Current measurement points for measuring peak currents of the modules and DC current of the whole board.

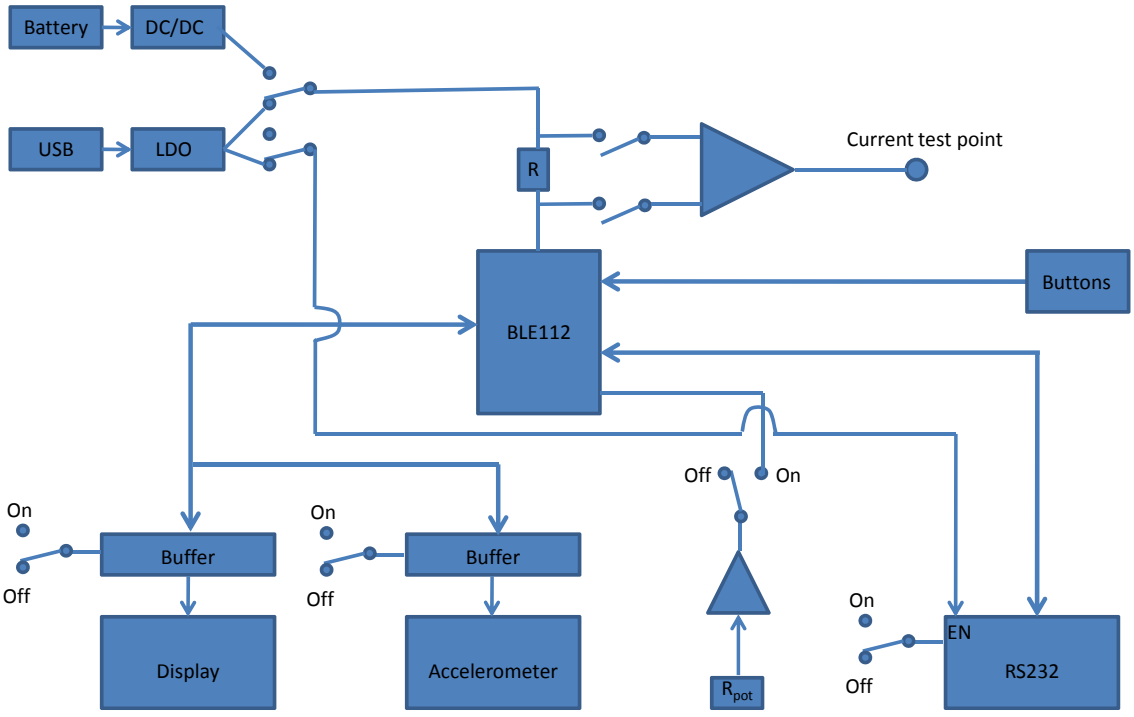

Figure 1: Block diagram of BLE112 evaluation board

Please, refer to the latest BLE112 data sheet for information about BLE112 *Bluetooth 4.0* single mode module. The physical outlook, schematics, assembly and the PIN configurations of the interfaces of BLE112 Development Kit are described in this document.

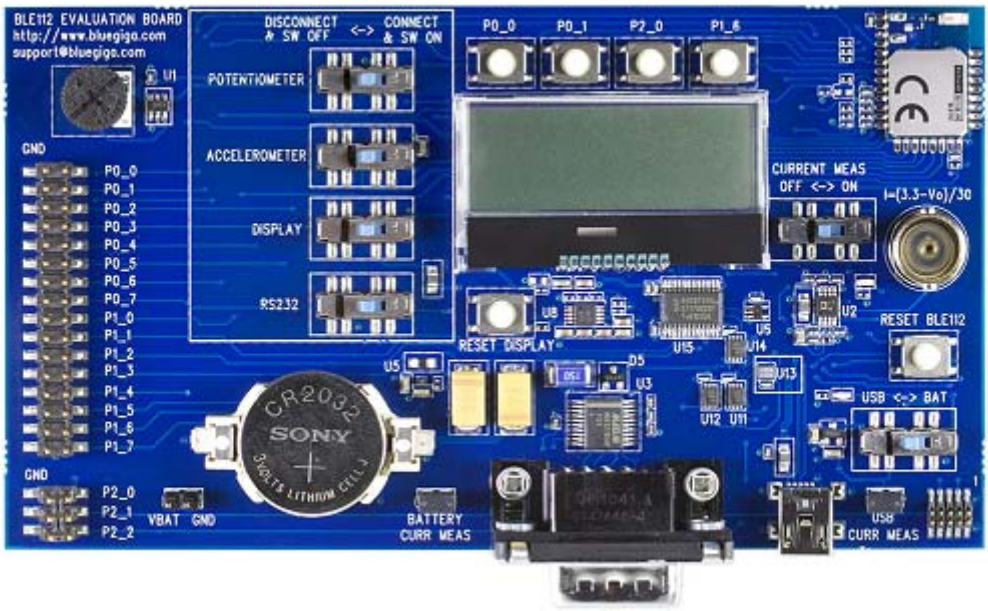

Figure 2: BLE112 Development Kit

2 Schematics

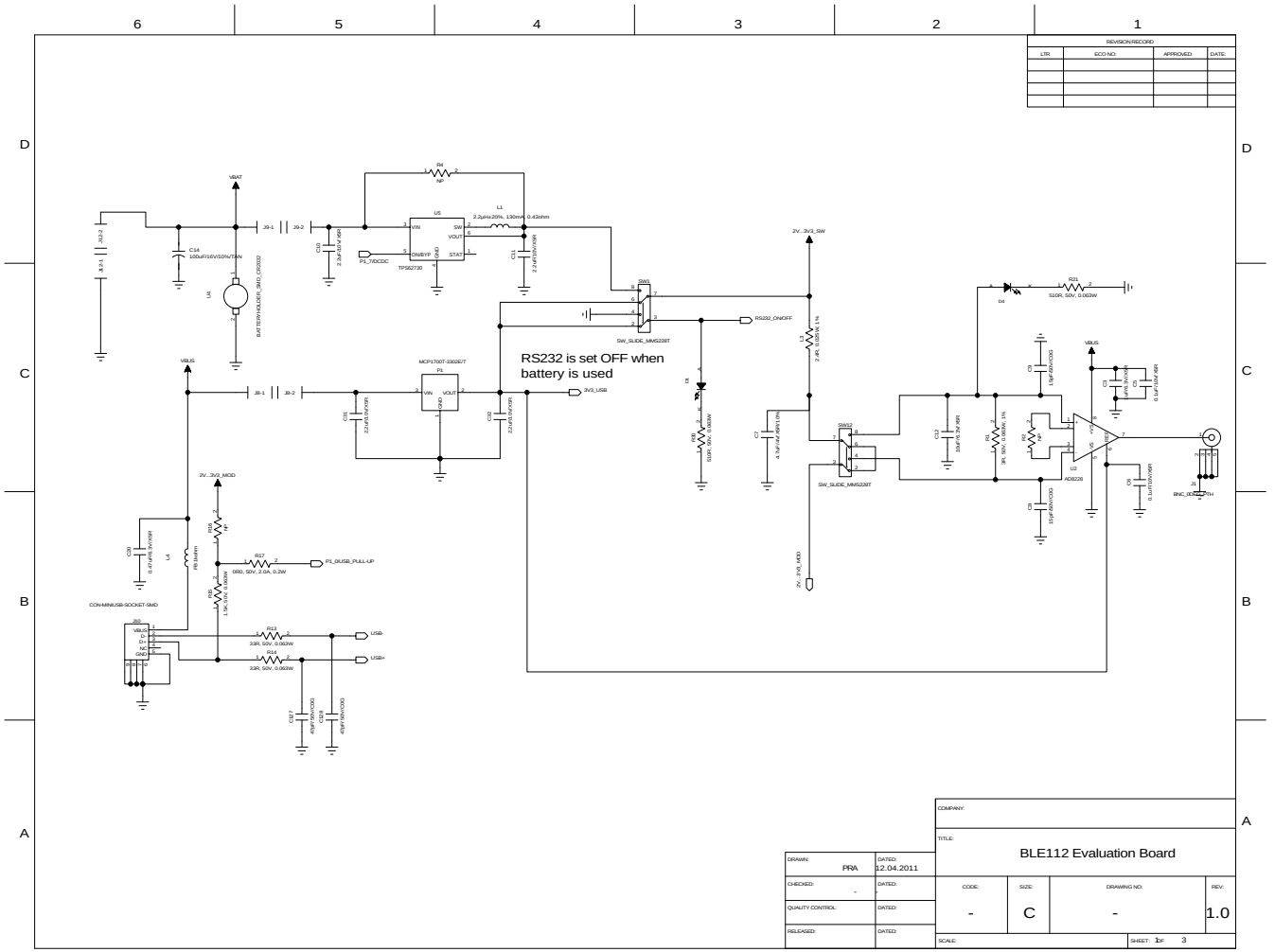

Figure 3: BLE112 Evaluation Board Schematic (1/3)

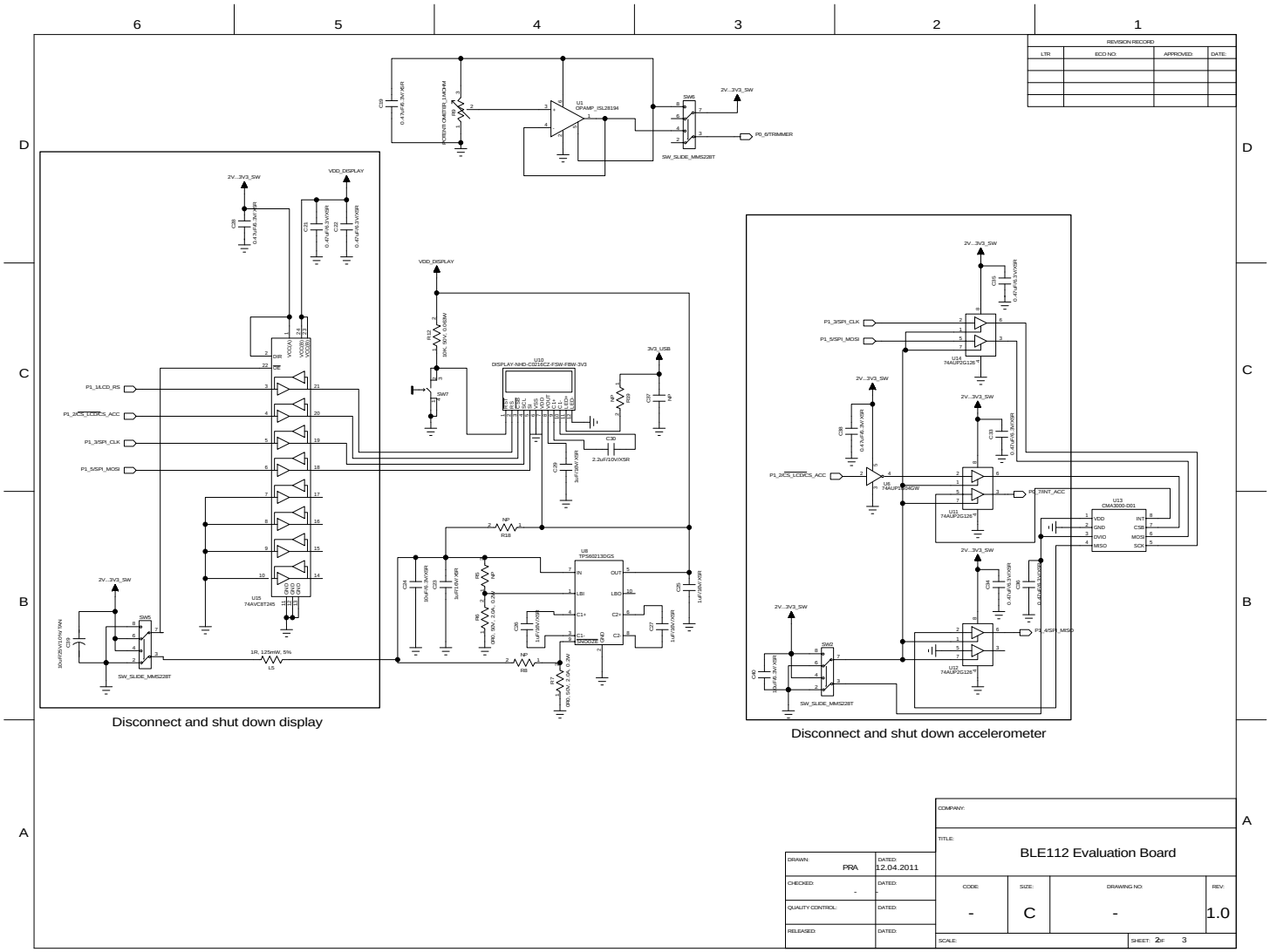

Figure 4: BLE112 Evaluation Board Schematic (2/3)

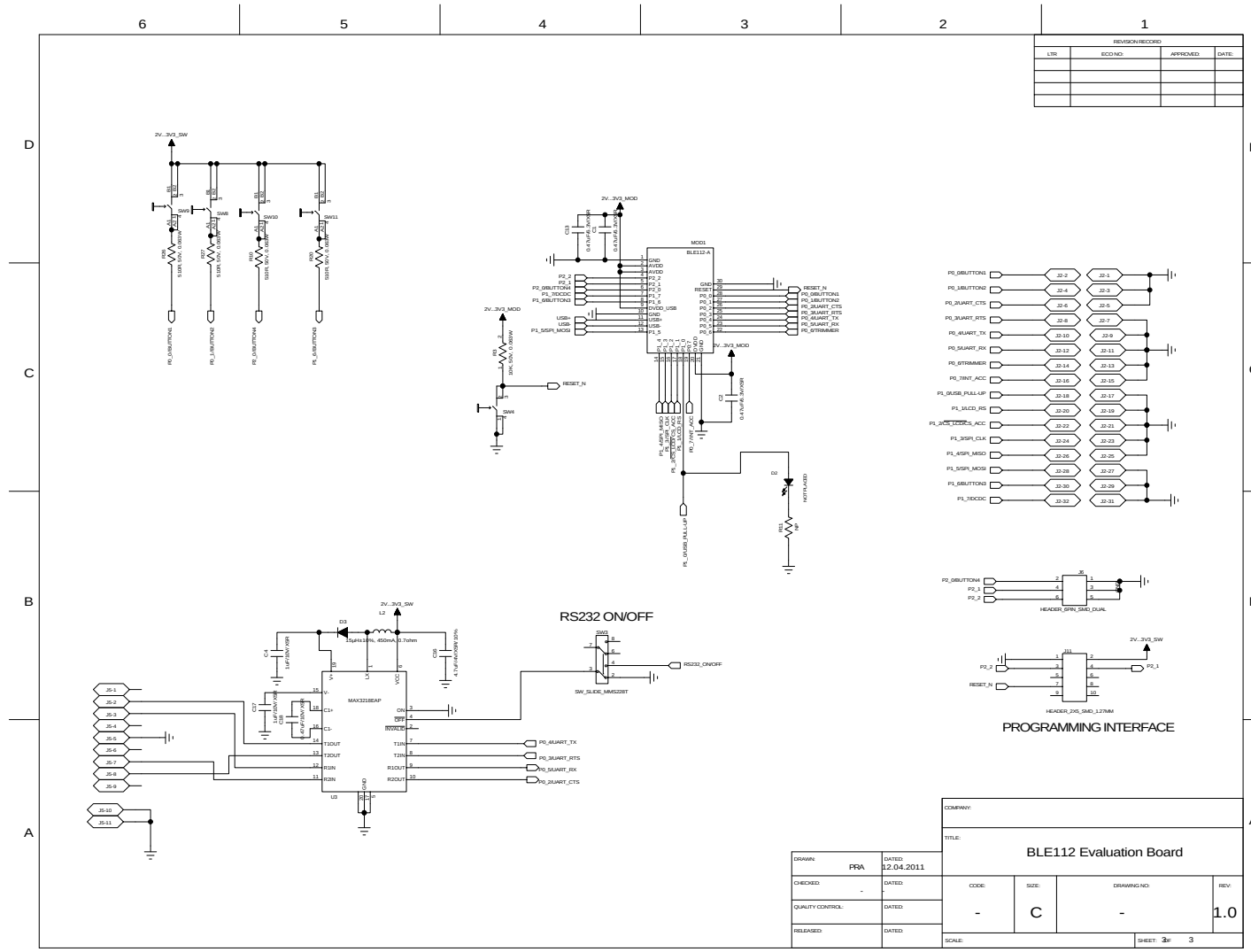

Figure 5: BLE112 Development Board Schematic (3/3)

3 Assembly

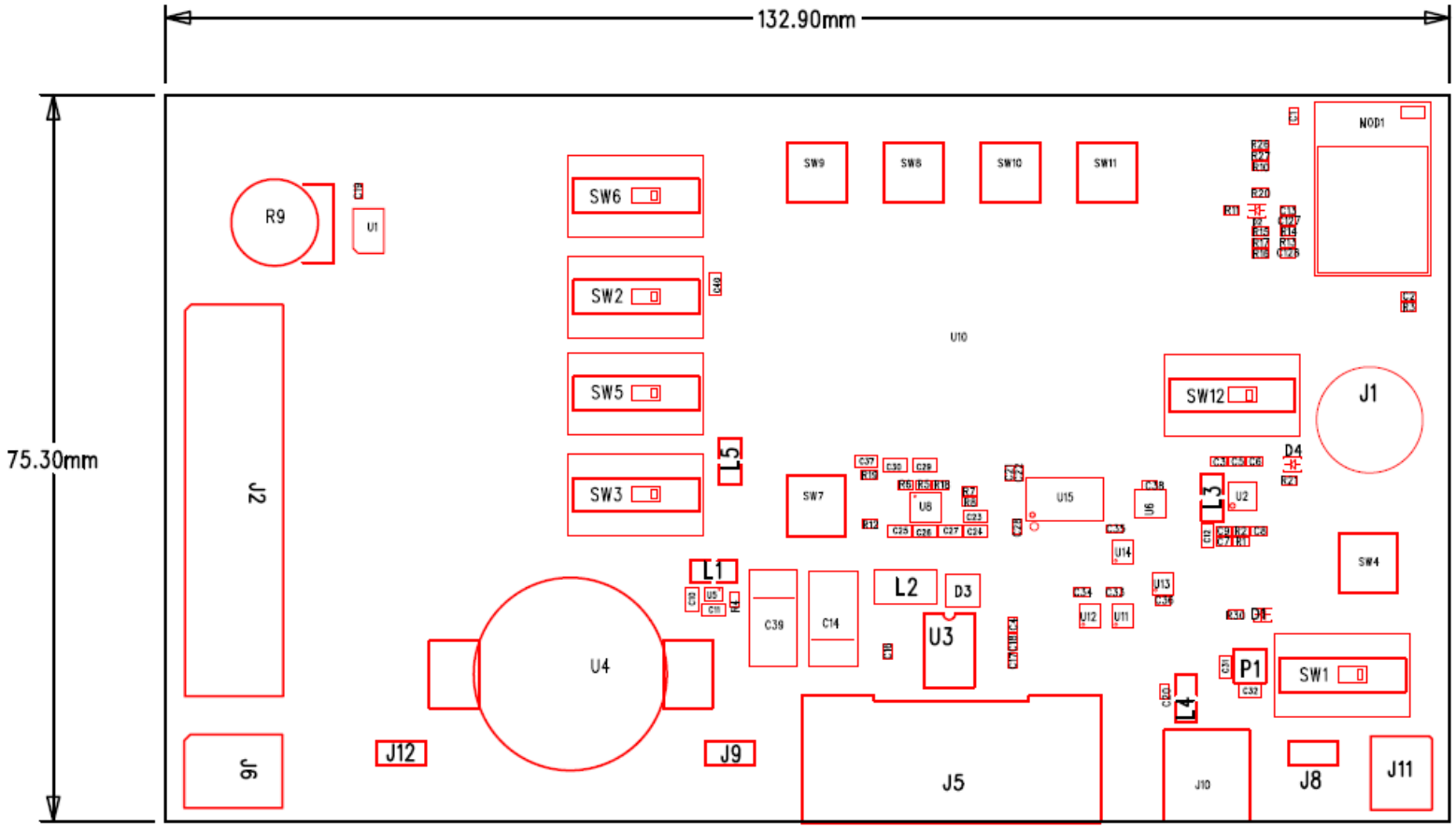

Figure 6: BLE112 Development Board Assembly Drawing

4 Layout

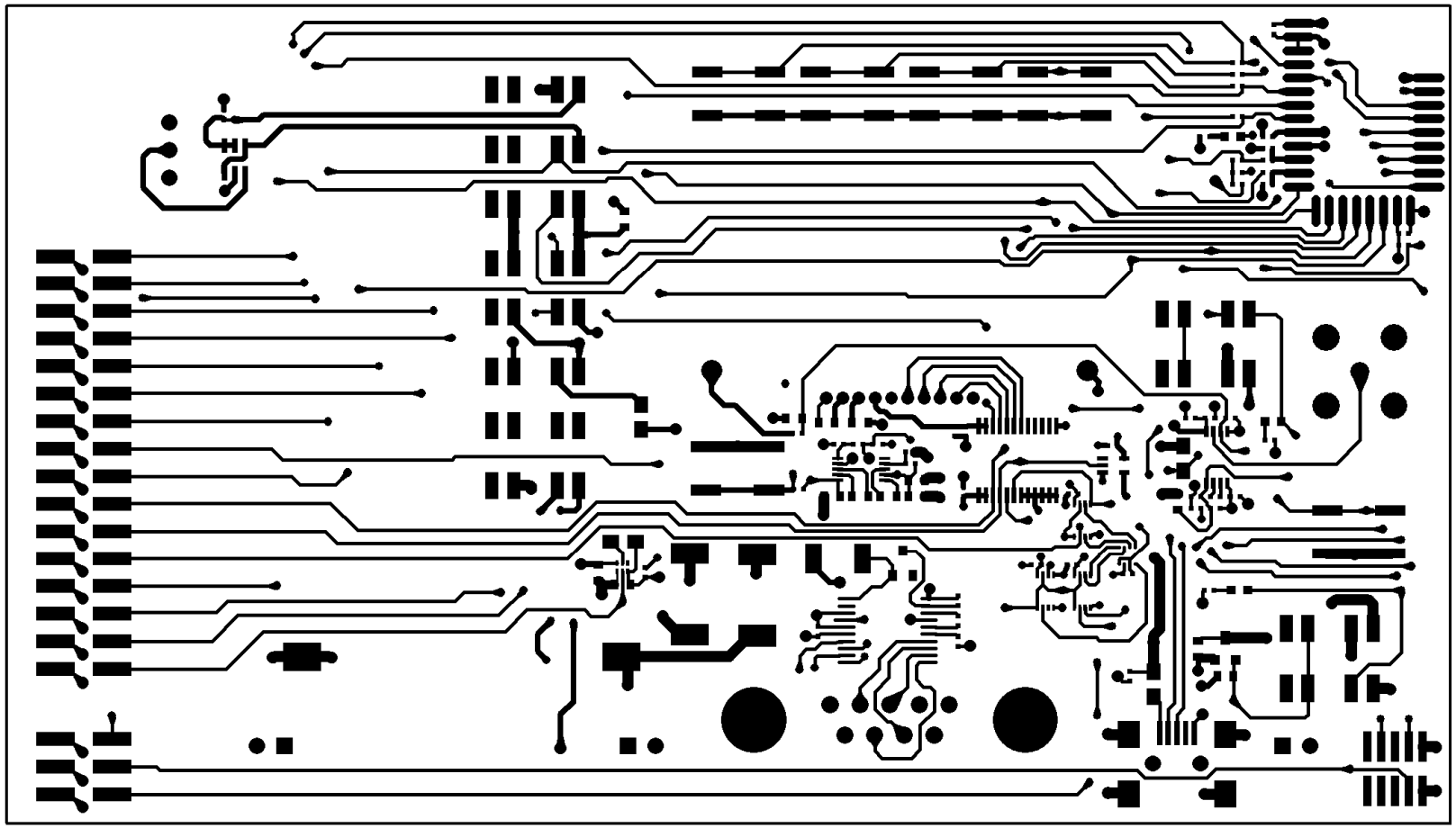

Figure 7: Top Layer Layout

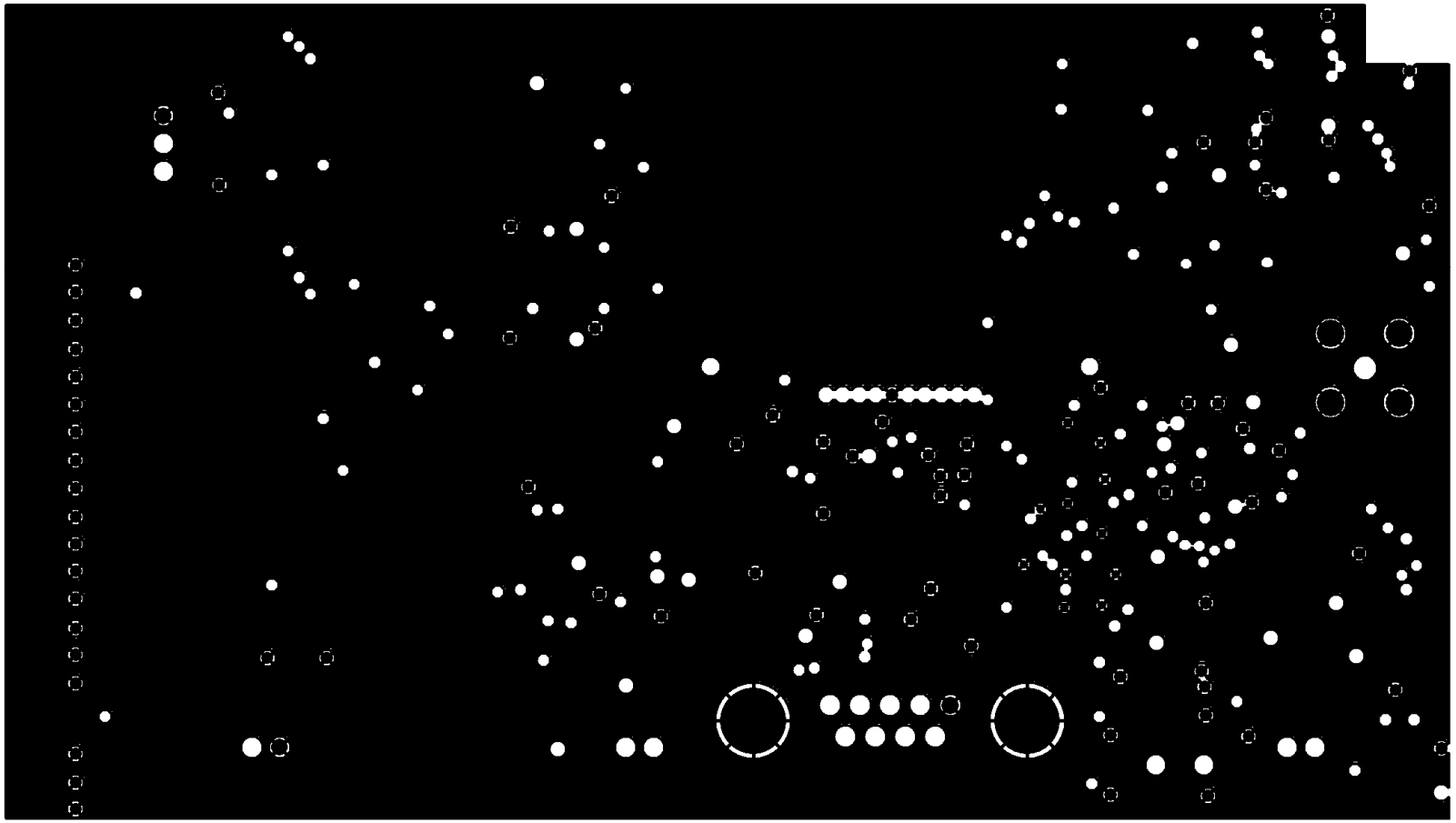

Figure 8: 2nd Layer Layout

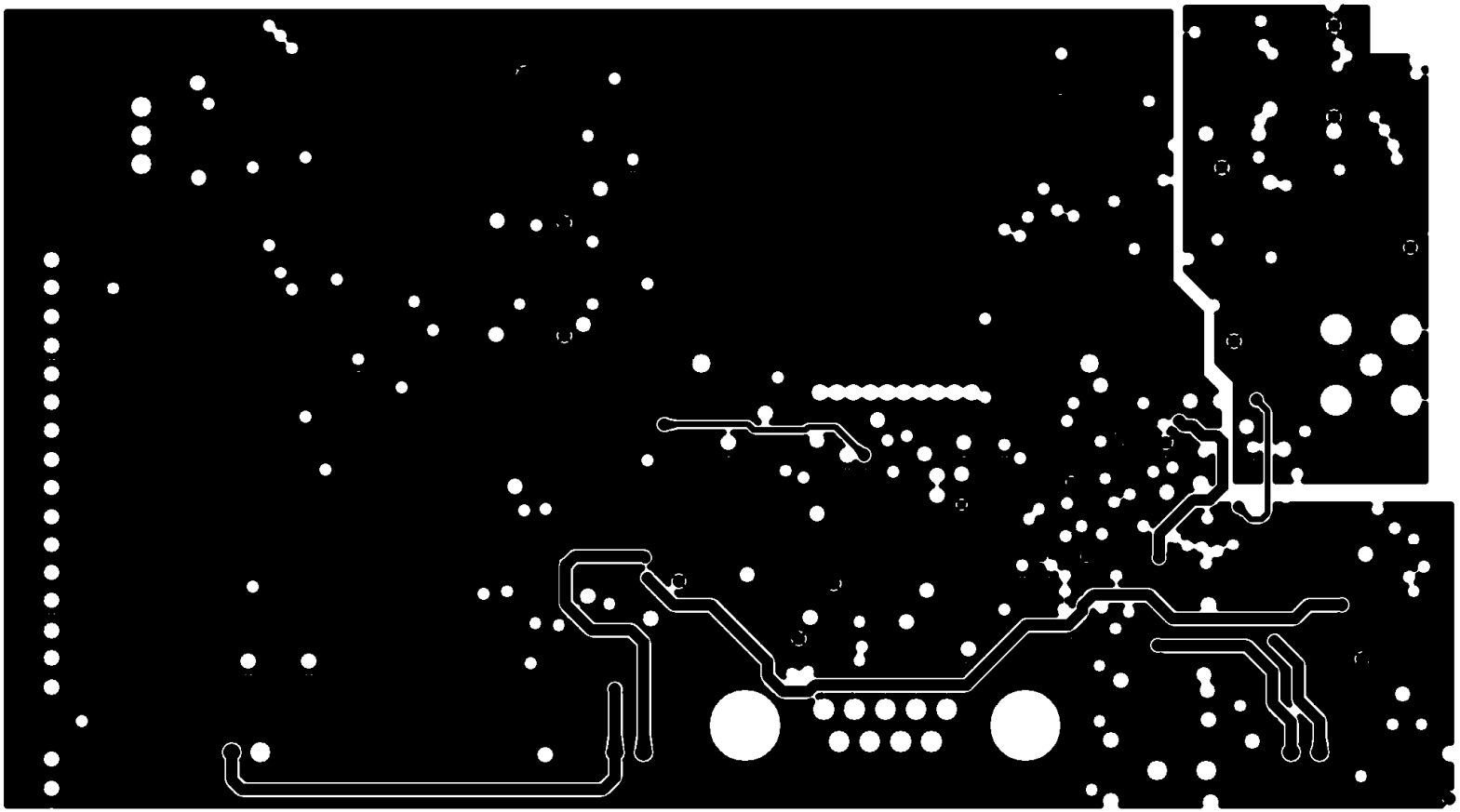

Figure 9: 3rd Layer Layout

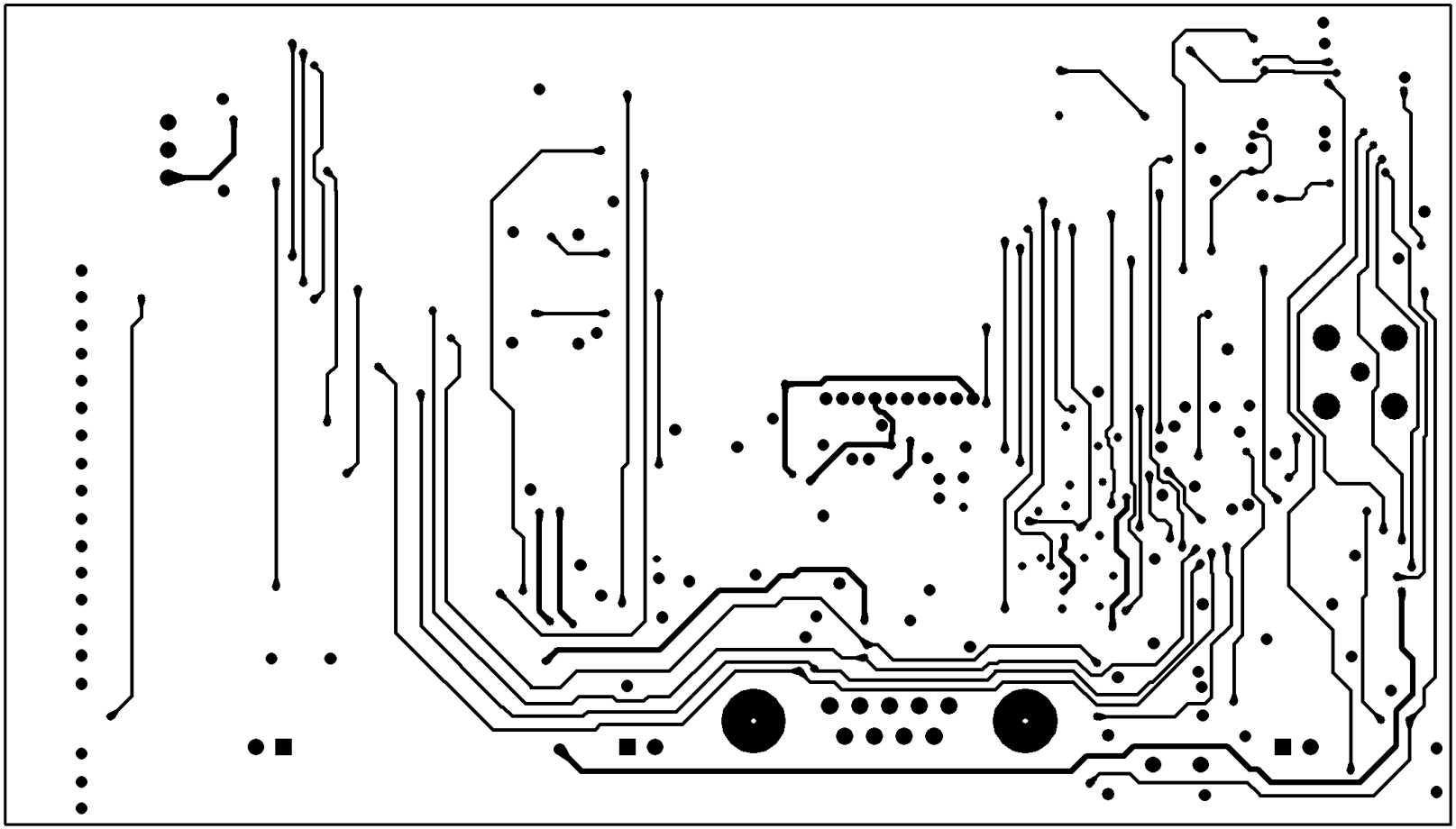

Figure 10: Bottom Layer Layout

5 Interfaces

5.1 Powering the Development Board

The board can be powered either from USB or from a coin cell battery. Absolute maximum battery voltage is 3.6V. USB or battery can be chosen with SW1. When switching to battery, the RS232 transceiver is disabled because of its high current consumption. When using battery, the current measurement should also be switched off to avoid excessive leakage current to the instrumentation amplifier U2. To minimize the leakage currents the display, accelerometer and the potentiometer can be turned off and disconnected from the module by SW2, SW5 and SW6.

5.2 USB

The board operates as a bus powered USB device.

5.3 RS232

The board operates as a DTE (data terminal equipment). Because of high peak currents of the RS232 transceiver, RS232 can only be used when powering the board from USB. When switching to battery the RS232 transceiver is automatically disabled. RS232 can also be disabled and enabled by SW3. When the RS232 transceiver is disabled all of its outputs are set to high impedance state and UART can be used through the pin header.

5.4 Accelerometer and the Display

The accelerometer and the display share the same SPI interface. The display is selected by taking the chip select signal low and the accelerometer is chosen by taking the chip select signal high. A charge pump generates 3.3V supply voltage for the display.

5.5 Programming Interface

Programming interface is in J11.

5.6 Pin Header and Buttons

All the PIOs are available and permanently connected in the pin header J2. In order to use certain PIOs through the pin header, that particular PIO must be disconnected from the device to which it is connected so that it is not actively driven by two devices. Following table shows the PIO connections in the evaluation board.

PIO number	Connection in the evaluation board
P0_0	Button 1
P0_1	Button 2
P0_2	UART CTS
P0_3	UART RTS
P0_4	UART TX
P0_5	UART RX
P0_6	Potentiometer
P0_7	Accelerometer interrupt
P1_0	USB pull-up
P1_1	Display RS
P1_2	SPI chip select for the accelerometer and the display
P1_3	SPI clock for the accelerometer and the display
P1_4	SPI MISO for the accelerometer and the display
P1_5	SPI MOSI for the accelerometer and the display
P1_6	Button 3
P1_7	DCDC on/bypass control
P2_0	Button 4
P2_1	-
P2_2	-

Table 1: PIO connections in the development board

6 Measuring Current Consumption

The current consumption of the module can only be measured when powering the module from USB. When powering from a battery, the current consumption should be disconnected with SW12. The current consumption of BLE112 is measured over 3 ohm resistor using an instrumentation amplifier with a gain of 10. The instrumentation amplifier is powered from USB 5V line and the DC bias is from the 3V3 LDO. Because the amplifier is powered from the USB VBUS, it can't be used unless USB is connected. If USB is not connected then the instrumentation amplifier must be disconnected by SW12 to avoid excessive leakage current into the input of the amplifier.

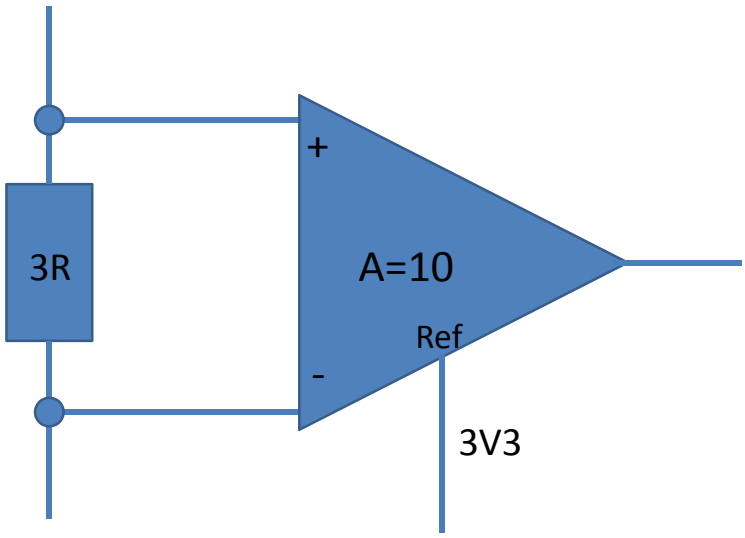

Figure 11: TX current measurement amplifier

To measure the TX current consumption of the module, connect a coaxial cable to the BNC connector in the board and to an oscilloscope. Set the oscilloscope

- Coupling: DC
- Vertical scale 500 mV/DIV
- Horizontal scale: 200 µs/DIV
- Level: 2.5 V
- Offset: -2.0 V
- Trigger: Normal, falling edge

The instrumentation amplifier inverts the signal. The current consumption is calculated by

$$I = \frac{3.3V - Vo}{30}$$

The DC current consumption of the whole board can be measured by connecting a current meter to header J8 if powering from USB or J9 if powering from a battery.

7 WEEE Compliance

The crossed-out wheeled bin means that within the European Union the product must be taken to separate collection at the product end-of-life. Do not dispose of these products as unsorted municipal waste.

8 Contact Information

Sales: sales@bluegiga.com

Technical support: support@bluegiga.com
http://techforum.bluegiga.com

Orders: orders@bluegiga.com

WWW: www.bluegiga.com
www.bluegiga.hk

Head Office / Finland:

Phone: +358-9-4355 060
Fax: +358-9-4355 0660
Sinikalliontie 5A
02630 ESPOO
FINLAND

Postal address / Finland:

P.O. BOX 120
02631 ESPOO
FINLAND

Sales Office / USA:

Phone: +1 770 291 2181
Fax: +1 770 291 2183
Bluegiga Technologies, Inc.
3235 Satellite Boulevard, Building 400, Suite 300
Duluth, GA, 30096, USA

Sales Office / Hong-Kong:

Phone: +852 3182 7321
Fax: +852 3972 5777
Bluegiga Technologies, Inc.
19/F Silver Fortune Plaza, 1 Wellington Street,
Central Hong Kong