

APPLICATION NOTE

BCG REFERENCE DESIGN



BCGMCU-D01

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1 Introduction

1.1 Description

The purpose of this reference design is to help the integration of SCL3300 and BCGMCU into the final application. Though not intended to be used as is, it is a fully tested debugger and BCG performance validation tool.

1.2 Features

- SCL3300 inclinometer
- preprogrammed BCGMCU (EFM32PG1B100F256GM32 microcontroller)
- 5...9 V input voltage
- UART interfaces for data and FW upgrade
- 40 MHz crystal

1.3 Getting started

1. Connect voltage supply 5...9 V to Vin (J1). USB-UART bridge power wire can also be used as long as power supply is over 5V.
2. Connect the host e.g. UART-USB bridge (e.g. FTDI's TTL-232RG-VSW5V-WE) to the 3.3V UART-interface pins SERIAL_RX and SERIAL_TX (J2).
UART settings are below in Table 1.

Table 1 Serial port configuration

Parameter	
Baud rate	230400 baud
Data bits	8
Parity	None
Stop bits	1
Flow control	None

3. BCGMCU will start to send BCG-data at 1 Hz in binary format according to *Product Specification 6169 Rev.1 BCGMCU binary protocol specification ENG*

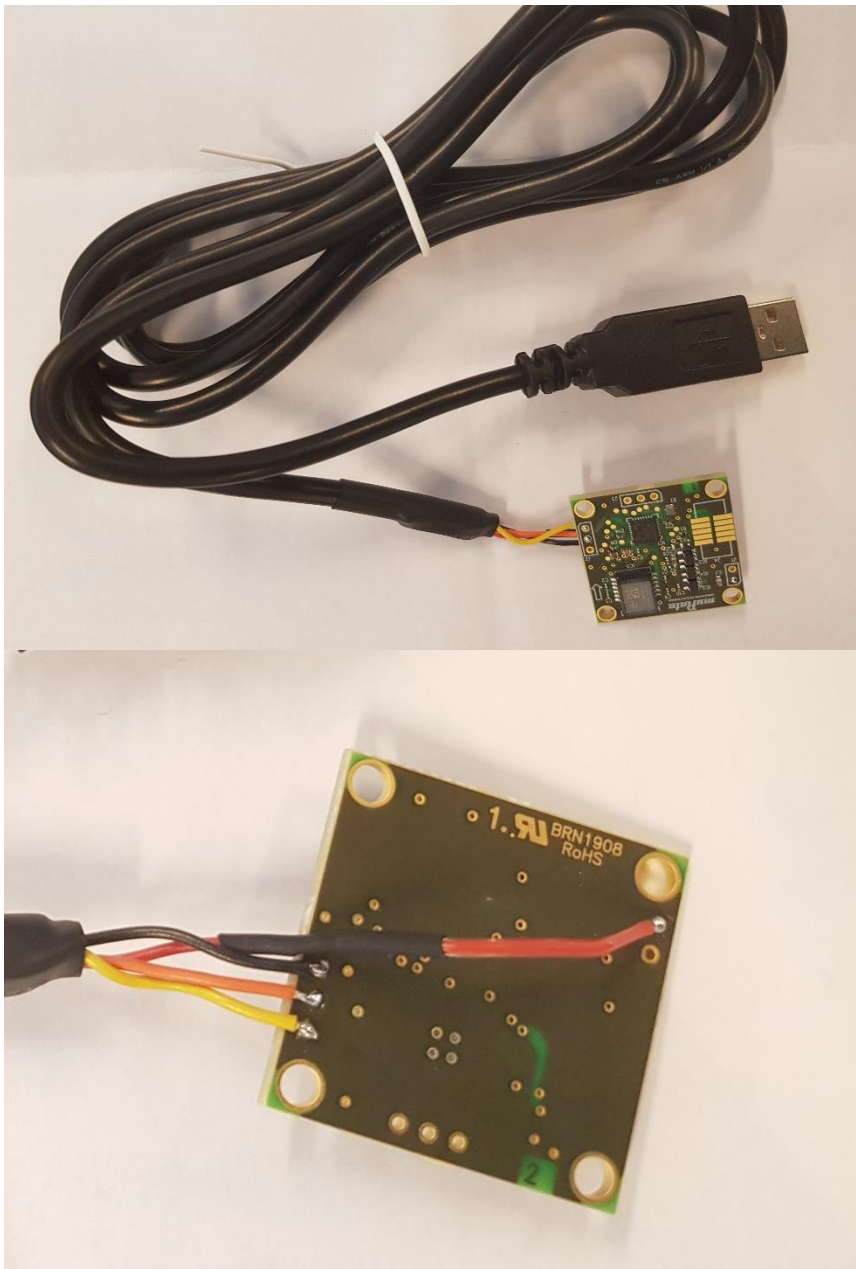
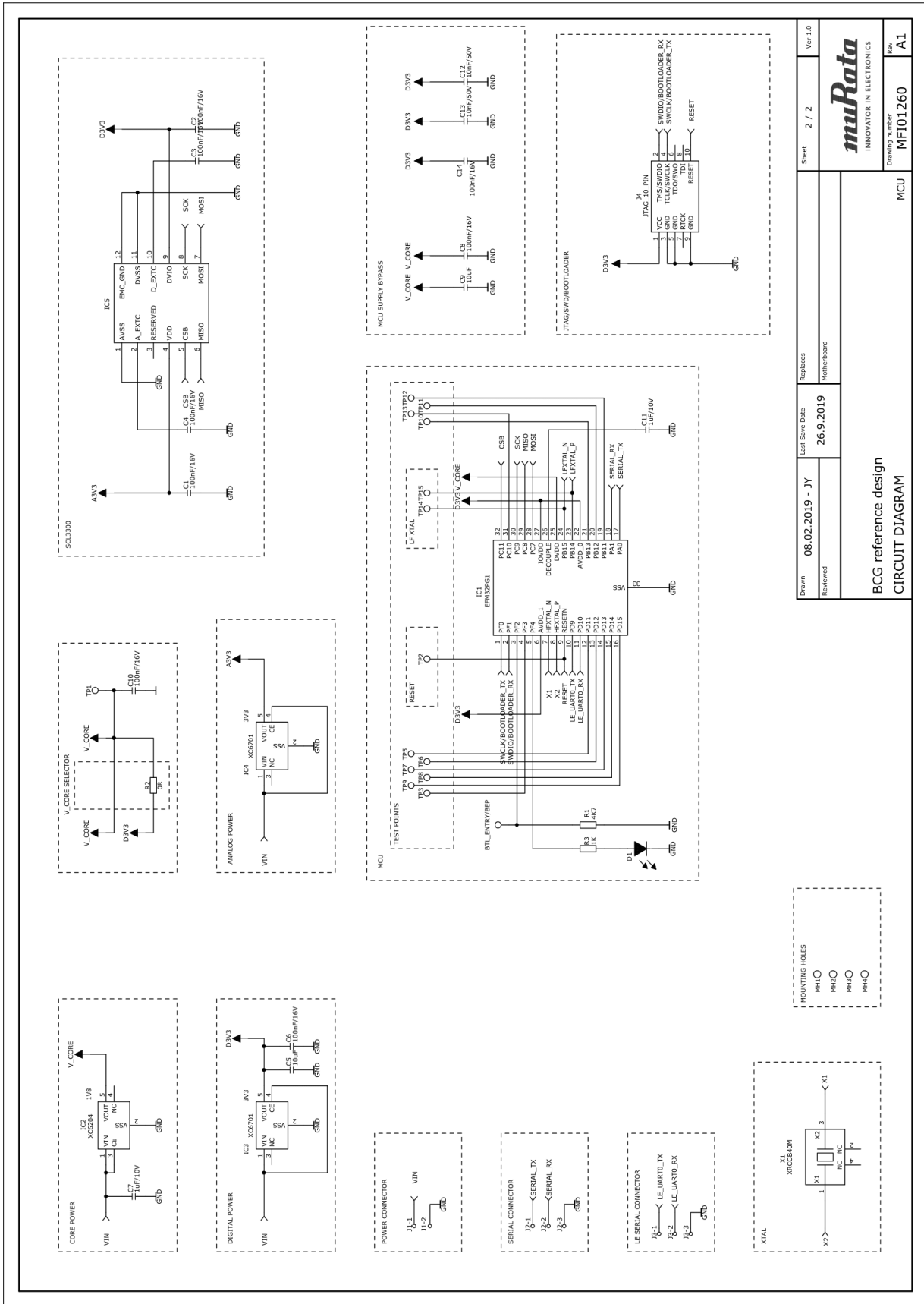


Figure 1 FTDI USB-UART soldered on the reference design sample PCB

Schematics



Drawn	08.02.2019 - JY	Sheet	2 / 2	Ver.1.0
Reviewed	26.9.2019	Replaces	Motherboard	
BCG reference design		MCU		Drawing number
CIRCUIT DIAGRAM		MFI01260		Rev
		A1		

Figure 1 Reference design schematic

3 Layout

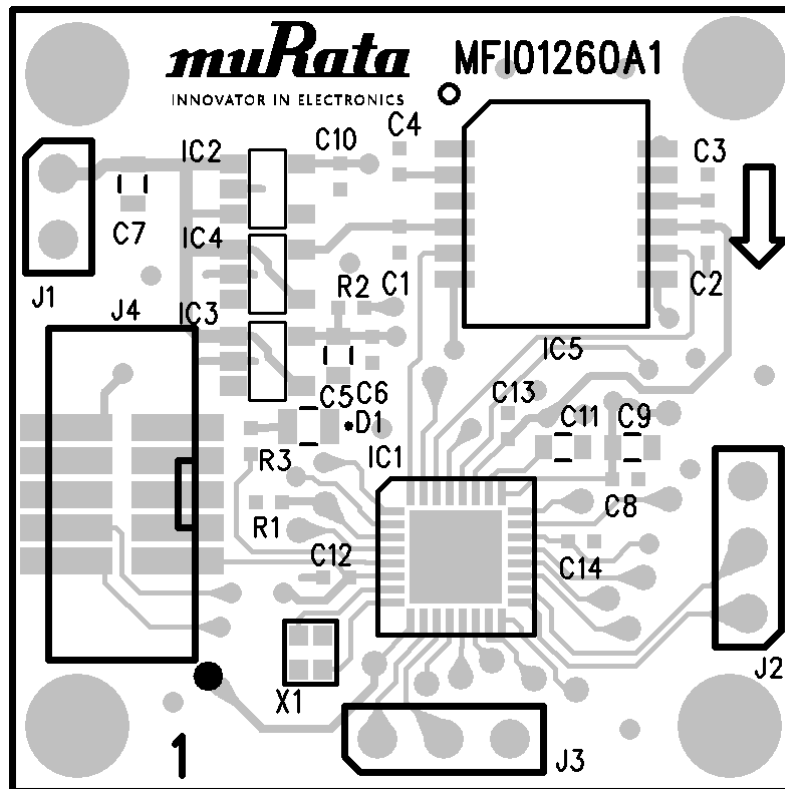


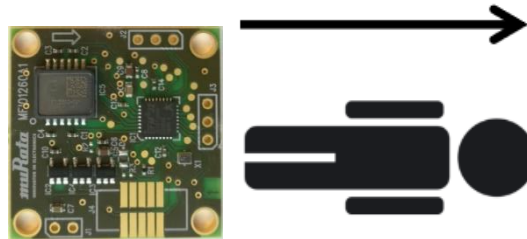
Figure 2 Reference design layout

4 Bill of Materials

Item	Qty	Reference	Description/Component value	Assembled	Manufacturer	Manufacturer type
1	1	IC5	3-axis inclinometer	X	Murata	SCL3300-D01
2	1	IC1	Pre-programmed BCGMCU	X	Silicon Labs	EFM32PG1B100FGM32-C0
3	1	IC2	IC REG LINEAR 1.8V 150MA SOT25 1.8 V	X	Torex	XC6204B182MR-G
4	2	IC3-4	IC REG LINEAR 3.3V 150MA SOT25 3.3 V	X	Torex	XC6701B332MR-G
5	2	C12-13	MLCC 10nF/50V	X	Murata	GCM155R71H103KA55D
6	8	C1-4,C6,C8,C10, C14	MLCC 100nF/16V	X	Murata	GCM155R71C104KA55J
7	2	C5,C9	MLCC 10uF/16V	X	Murata	GRM188C81C106MA73J
8	2	C7,C11	MLCC 1uF/35V	X	Murata	GRT188C8YA105KE13D
9	1	R1	SMD resistor 0402 4K7	X	N/A	N/A
10	1	R2	SMD resistor 0402 0R		N/A	N/A
11	1	R3	SMD resistor 0402 1K		N/A	N/A
12	1	D1	SMD LED 0805 Green		N/A	N/A
13	1	J4	CONNECTOR HEADER SMD 10POS 1.27MM		Samtec	SHF-105-01-L-D-SM
14	1	X1	CRYSTAL 40.0000MHZ 8PF SMD 40 MHz	X	Murata	XRCGB40M000F4M01R0

5 Measurement direction

The Y-axis of the SCL3300 is used by the BCG algorithm, and the PCB should be attached so that the arrow direction points along the longitudinal axis of the person, towards the head of the user when the device is placed on a bed.



6 MCU pin layout and other information

The BCGMCU is a pre-programmed EFM32PG1B100F256GM32 microcontroller. The pin out descriptions etc. can be found from the EFM32PG datasheet here:

<https://www.silabs.com/documents/public/data-sheets/efm32pg1-datasheet.pdf>

7 SW interface

Binary protocol over UART (SERIAL_RX/SERIAL_TX) according to *Product Specification 6169 Rev.1 BCGMCU binary protocol specification ENG*

Compatibility mode fulfills SCA10H BCG Sensor_3.0.0.0 firmware version and is described in *Product Specification 1327 SCA10H binary protocol specification*.

8 FW upgrade

FW can be upgraded on the MCU through bootloader UART (BOOTLOADER_RX/BOOTLOADER_TX/BTL_ENTRY) according to *Product Specification 5668 Rev.1 BCG-MCU FW upgrade specification ENG*.

9 Change control

Rev.	Date	Change Description
1	18-Mar-19	1 st draft
2	26-Sep-19	2 nd revision, processor type to PG, fixed schematic and BOM info, added section 5