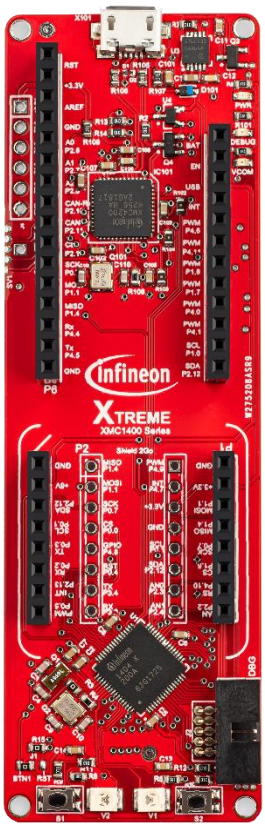
XMC1400 XTREME Connectivity Kit

Board User's Manual



About this document

This document describes the features and hardware details of the XMC1400 XTREME Connectivity Board. This board is powered by an ARM® Cortex™-M0 based XMC1404 Microcontroller from Infineon Technologies AG and part of Infineon's XMC1400 family of Microcontrollers.

Table of contents

List of figures

List of tables

1 Overview

The XMC1400 connectivity board has 4 expansion sets of headers that fully support Infineon's shields 2Go™ and are fully compatible with Adafruit Feather Wing and MikroClick™ shield from MikroElekronika. Hence, user can buy various shield boards off-the-shelf to test the capabilities of XMC1400 series Microcontroller and build a complete IoT system with End-to-End security in mind. All product information about XMC1404-200 can be found at Infineon website [5]

1.1 Key Features

The XMC1400 XTREME board is equipped with the following features

- XMC1404 (ARM® Cortex™-M0 based) Microcontroller, 48MHz, 200KB, 64-VFQFN
- Headers compatible with Infineon shield 2Go™, Adafruit Feather Wing™ and MikroClick™ from MikroElectronika
- On board SEGGER J-Link debugger and UART virtual COM port, with micro USB connector
- Off board SEGGER J-Link
- LED indicators for
    - Power
    - Debug
    - Virtual COM
- Two LED left for user
- Two push buttons left for user
- 6 pin expansion header

1.2 Block Diagram

Figure 1 shows the block diagram of the XMC1400 XTREME. These are the following blocks:

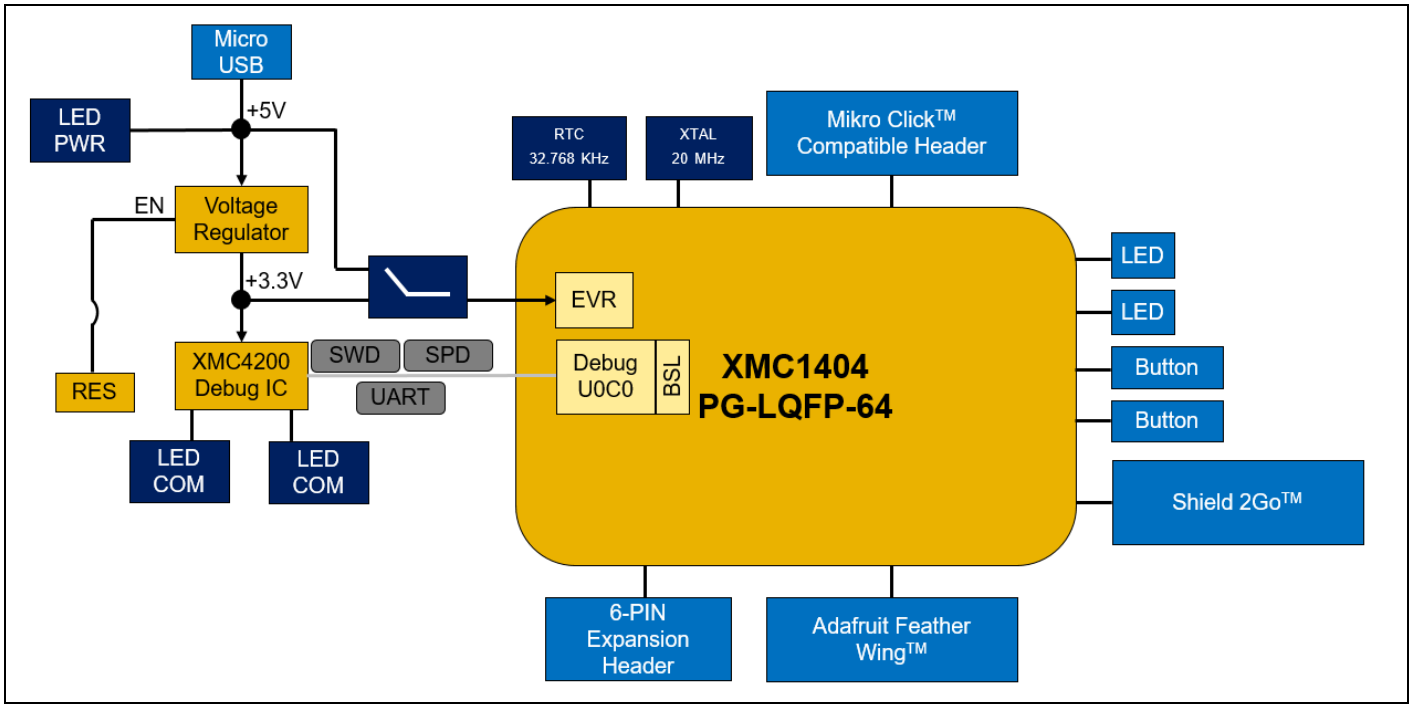


Figure 1 Block Diagram of XMC1400 XTREME Connectivity Kit

2 XMC1400 XTREME Board Hardware Description

The following sections give a detailed description of the hardware and how it can be used.

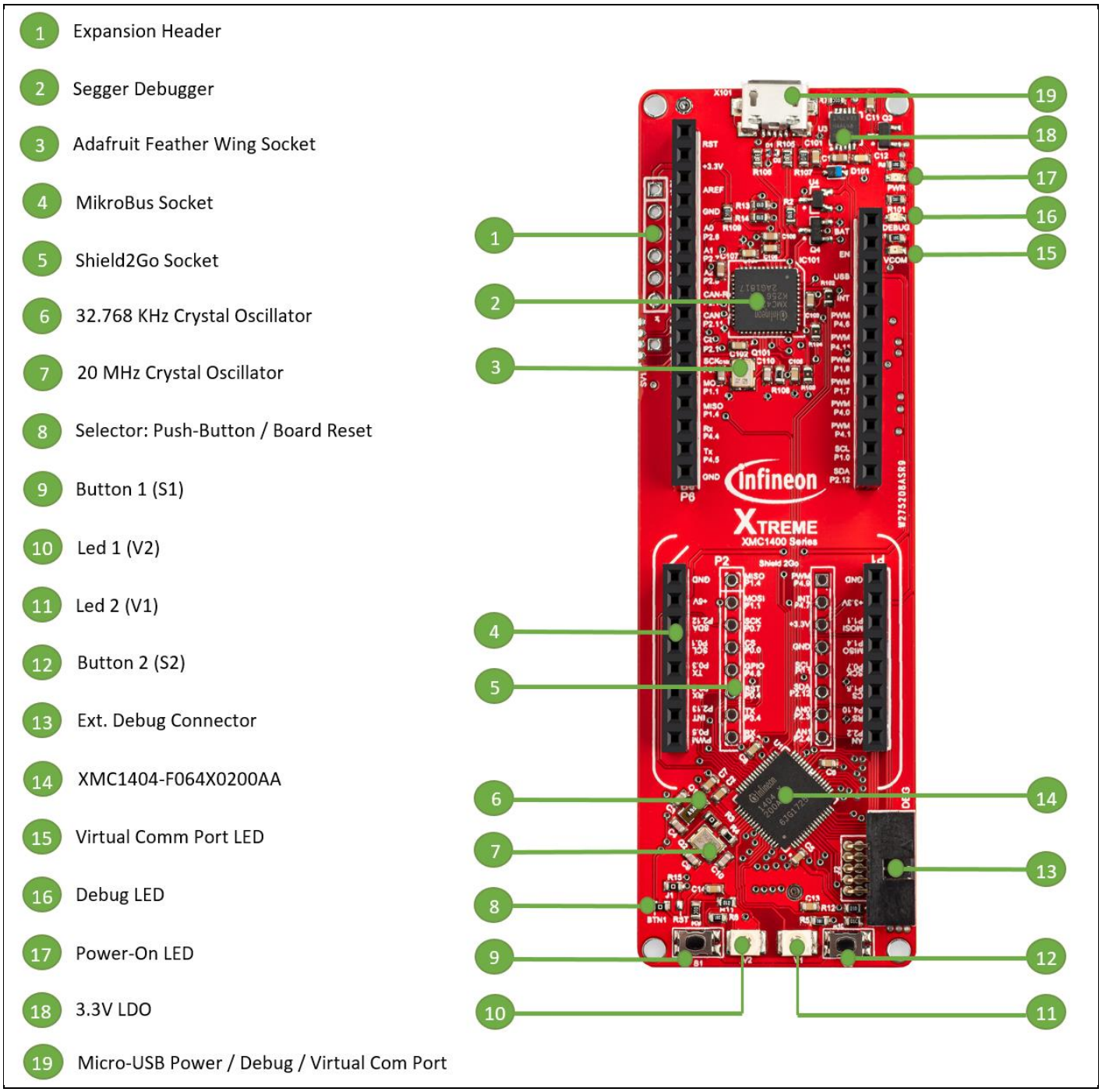


Figure 2 XMC1400 EXTREME connectivity

2.1 Power Supply

XMC1400 XTREME Connectivity Kit is powered from the micro USB connector (+5V); however, there is a current limit that can be drawn from the host PC through USB. The total current that can be drawn is 500mA which is also the limit capability of the IFX1763LD V33 low dropout voltage regulator. The XMC1404 device can operate by power supply of 1.8V till 5.5Vdc. On this board +3.3Vcc is used to power the XMC1404 device, coming out of the IFX1763LD V33. However, the Power supply also offers a +5Vcc rail to the MikroClick™ compatible header only.

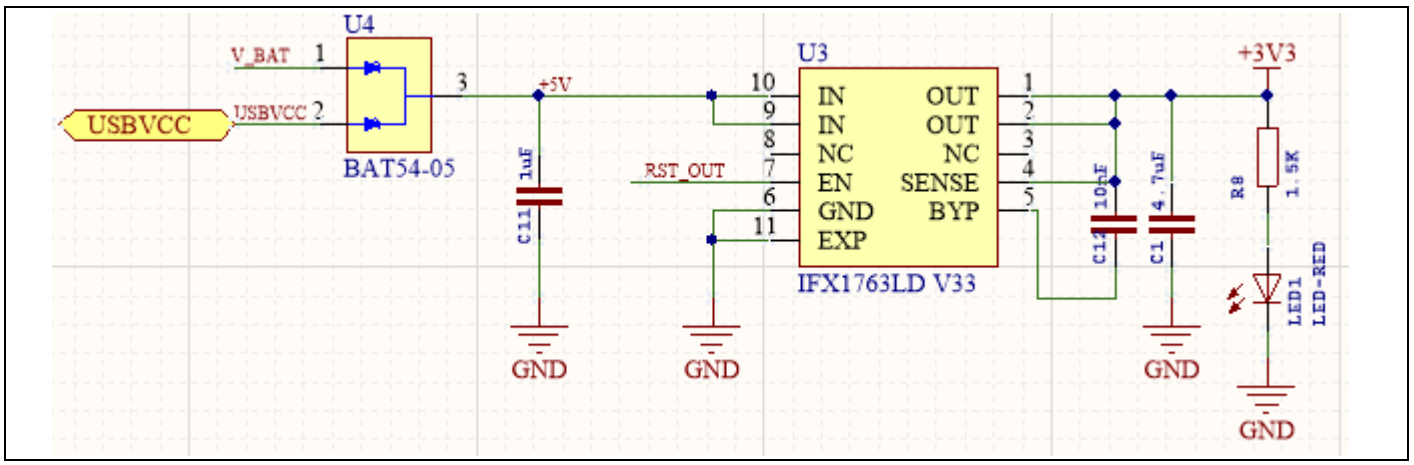


Figure 3 Power Supply Circuit

2.2 Reset

Power-on master reset for the XMC1404 can be achieved by two means.

- Unplug and Re-Plug the USB cable to achieve power-on master reset
- Configure button S1 to serve as a Reset Button using the IFX1763LD V33 enable capability. To enable this future J1 must be changed to position 3-2 as shown in Figure 4.

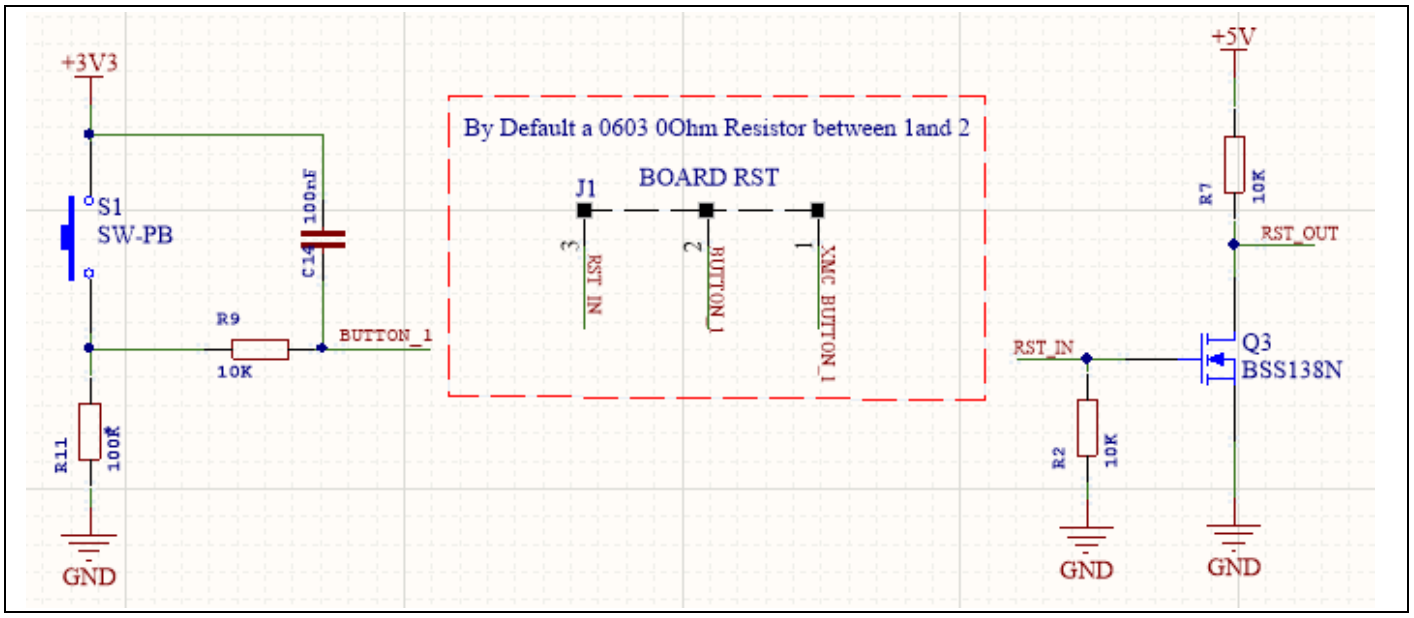


Figure 4 Reset

2.3 Clock Generation

XMC1404 has two internal oscillators: DCO1 and DCO2. DCO1 has a clock output of 96 MHz. DCO2 is used to generate the standby clock running at 32.768 kHz which used for Real Time Clock too. The main clock, MCLK and fast peripheral clock, PCLK, are generated from the output of DCO1. External Crystal and fast peripheral clock, PCLK, are generated from the output of DCO1.

2.3.1 External Crystal and external Real time Clock crystal

The XMC1400 device allows its main clock MCLK to be generated from external crystal to achieve higher accuracy. It also allows its real time clock to be run from external RTC crystal. On the XMC1400 XTREME Connectivity Kit, a 20 MHz external crystal circuit and a 32.768 kHz RTC external crystal circuit are implement on board to allow user to run its application using external crystals. The 20 MHz crystal Q2 is connected to the XMC1404 device via R3 and R4. The 32.768 kHz crystal Q1 is also connected to the XMC1404.

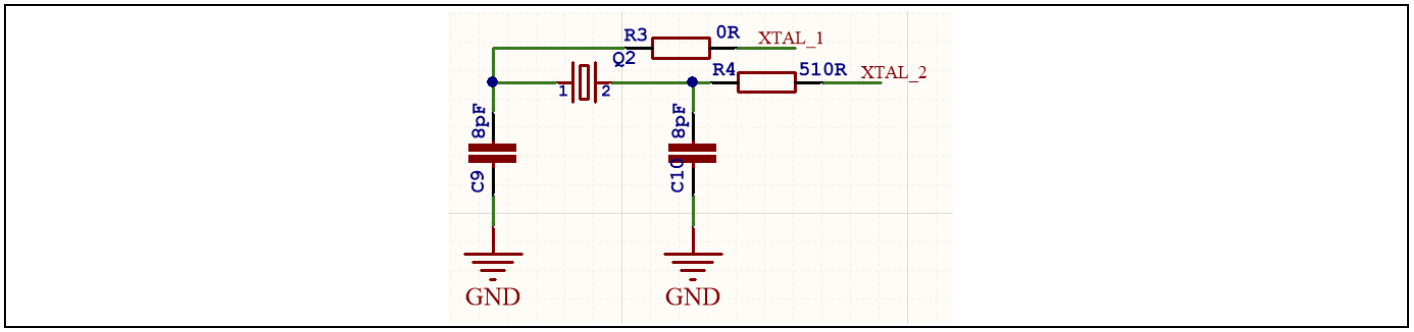


Figure 5 The external 20 MHz crystal

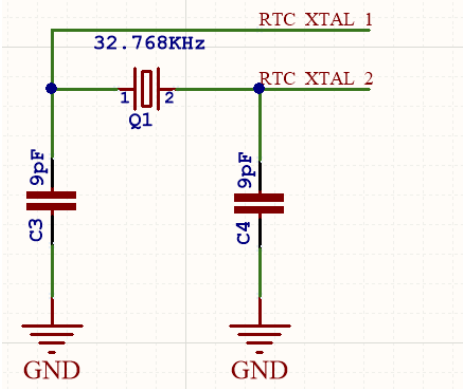


Figure 6 The external 32.768 kHz RTC crystal

2.4 Boot Option

After power-on reset with master reset, XMC1404 device enters different boot modes depending on the BMI (Boot Mode Index) value stored in flash configuration sector 0 (CS0). The BMI value pre-programmed in the XMC1404 on XTREME Connectivity Kit is User mode with debug enabled, hence, the XMC1404 device will start to run the application code in its embedded flash after power on reset.

2.5 Debug Interface and virtual com port

XMC1400 XTREME Connectivity Kit has on-board debugger which supports Serial Wire Debug (SWD) and Single Pin Debug (SPD) as debug interface. SPD is a proprietary debugging protocol from Infineon Technologies and it requires only 1 pin for debug communication. The debugger also provides a virtual COM port which support UART communication via P1.3 (rx-in) and P1.2 (tx-out) of XMC1404.

The XTREME Connectivity Kit has also the capability of being programmed and debugged through an off-board SEGGER JLink by means of J2.

Table 1 Jtag Interface

Pin	Signal Name	XMC1404 Signal	Description
1	+3V3	VDDP	+3V3
2	SWD(SPD)	P0.14	SWD/SPD signal
3	GND	GND	GND
4	SWCLK	P0.15	SWCLK Clock
5	GND	GND	GND
6	NC	NC	NC
7	GND	GND	GND
8	NC	NC	NC
9	RES-DBG	NC	RESET on-board debugger
10	RES-OUT	NC	RESET Board

2.6 LED

The port pins P0.12, P4.2, are connected to LED1 (V1) and LED2 (V2). The LEDs turns on by output ‘Low’ at the respective port pins.

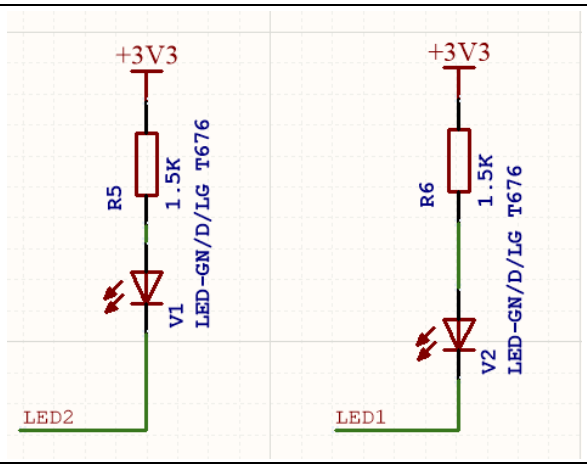


Figure 7 LEDs circuit

Table 2 LED’s available to user

LED	XMC1404 Port Pin	Description
LED1 (V2)	P0.12	Output ‘Low’ to on LED
LED2 (V1)	P4.2	Output ‘Low’ to on LED

2.7 Adafruit Feather Wing™ Compatible Header

XMC1400 XTREME Connectivity Kit supports Adafruit’s Feather Wing™ ecosystem.

These are the pin assignments:

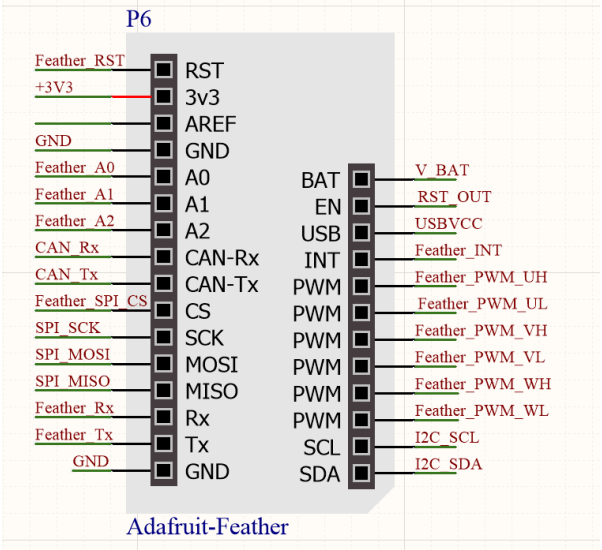


Figure 8 Adafruit Feather Wing™ pin assignments

Table 3 Adafruit Feather Wing™ pin assignments

TAG	XMC1404 Port Pin	Description
Feather RST	P3.2	STD_INOUT
+3V3	VDDP	
NC	NC	
GND	GND	
Feather A0	P2.6	STD_IN/AN
Feather A1	P2.7	STD_IN/AN
Feather A2	P2.8	STD_IN/AN
CAN Rx	P2.10	STD_INOUT /AN/CAN_RX
CAN Tx	P2.11	STD_INOUT /AN/CAN_TX
Feather SPI CS	P0.13	STD_INOUT / SPI_CS
SPI CLK	P0.7	STD_INOUT/SPI_CLK
SPI MOSI	P1.1	STD_INOUT / High Current / SPI_MOSI
SPI MISO	P1.4	STD_INOUT / High Current / SPI_MISO
Feather Rx	P4.4	STD_INOUT / RX
Feather Tx	P4.5	STD_INOUT / TX
GND	GND	
I2C SDA	P2.12	STD_INOUT /AN / I2C_SDA
I2C SCL	P0.1	STD_INOUT / I2C_SCL
Feather PWM WL	P4.1	STD_INOUT / PWM
Feather PWM WH	P4.0	STD_INOUT /PWM

TAG	XMC1404 Port Pin	Description
Feather PWM VL	P1.7	STD_INOUT / High Current / PWM
Feather PWM VH	P1.8	STD_INOUT / PWM
Feather PWM UL	P4.11	STD_INOUT / PWM
Feather PWM UH	P4.6	STD_INOUT / PWM
Feather INT	P2.9	STD_INOUT / INT
USBVCC	+5V	
RST_OUT	IFX1763LD V33 EN	RESET Board through IFX1763LD V33 ENABLE PIN
V_BAT	Battery Vcc	BATTERY VCC

2.8 MikroClick™ Compatible Header

XMC1400 XTREME Connectivity Kit supports MikroClick™ ecosystem.

These are the pin assignments:

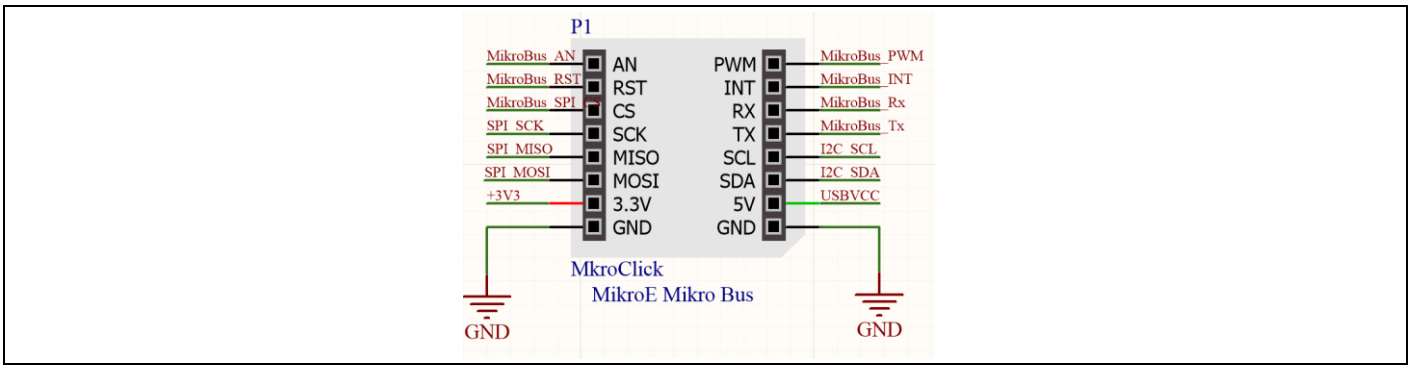


Figure 9 MikroClick™ pin assignments

Table 4 MikroClick™ pin assignments

TAG	XMC1404 Port Pin	Description
MikroBus™ AN	P2.2	STD_IN/AN
MikroBus™ RST	P4.10	STD_INOUT / RST
MikroBus™ SPI_CS	P1.5	STD_INOUT / High Current / SPI_CS
MikroBus™ SPI_SCK	P0.7	STD_INOUT/SPI_CLK
MikroBus™ SPI_MISO	P1.4	STD_INOUT / High Current / SPI_MISO
MikroBus™ SPI_MOSI	P1.1	STD_INOUT / High Current / SPI_MOSI

TAG	XMC1404 Port Pin	Description
+3V3	VDDP	
GND	GND	
GND	GND	
USBVCC	+5V	
I2C_SDA	P2.12	STD_INOUT /AN / I2C_SDA
I2C_SCL	P0.1	STD_INOUT / I2C_SCL
MikroBus Tx	P0.3	STD_INOUT / TX
MikroBus Rx	P0.2	STD_INOUT / RX
MikroBus INT	P2.13	STD_INOUT /AN / INT
MikroBus PWM	P0.5	STD_INOUT / PWM

2.9 Shield 2Go Header

XMC1400 XTREME Connectivity Kit supports Infineon's Shields 2Go™ ecosystem.

These are the pin assignments:

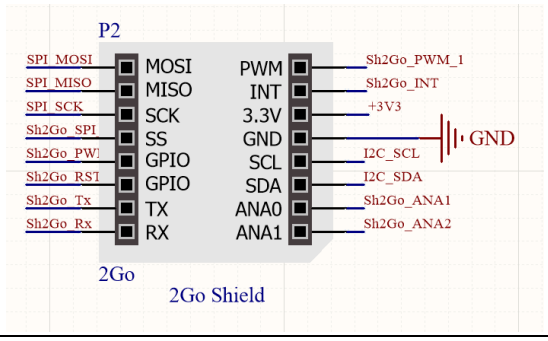


Figure 10 Shield 2Go™ pin assignments

Table 5 Shield2Go™ pin assignments

TAG	XMC1404 Port Pin	Description
SPI_MOSI	P1.1	STD_INOUT / High Current / SPI_MOSI
SPI_MISO	P1.4	STD_INOUT / High Current / SPI_MISO
SPI_SCK	P0.7	STD_INOUT/SPI_CLK
Sh2Go_SPI_CS	P0.0	STD_INOUT / SPI_CS
Sh2Go_PWM_2	P4.8	STD_INOUT / PWM

TAG	XMC1404 Port Pin	Description
Sh2Go_RST	P4.0	STD_INOUT / RST
Sh2GoTx	P3.4	STD_INOUT / TX
Sh2GoRx	P3.3	STD_INOUT / RX
Sh2Go_ANA2	P2.3	STD_IN/AN
Sh2Go_ANA1	P2.4	STD_IN/AN
I2C_SDA	P2.12	STD_INOUT /AN / I2C_SDA
I2C_SCL	P0.1	STD_INOUT / I2C_SCL
GND		
+3V3		
Sh2Go_INT	P4.7	STD_INOUT / INT
Sh2Go_PWM_1	P4.9	STD_INOUT / PWM

3 Product Data

3.1 Schematics

This chapter contains the schematics for the XMC1400 XTREME Connectivity Kit:

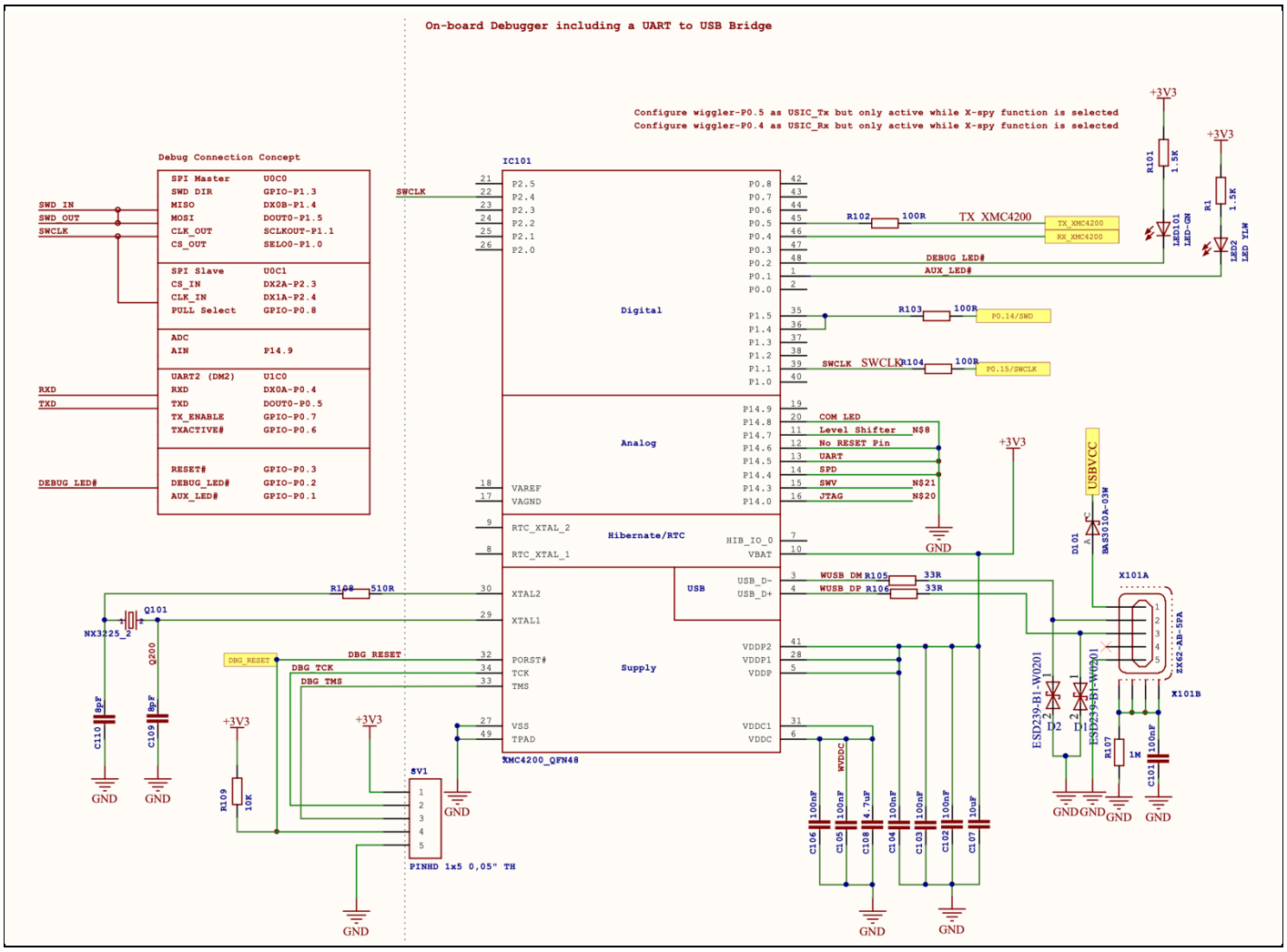


Figure 11 On-Board SEGGER JLINK Debugger

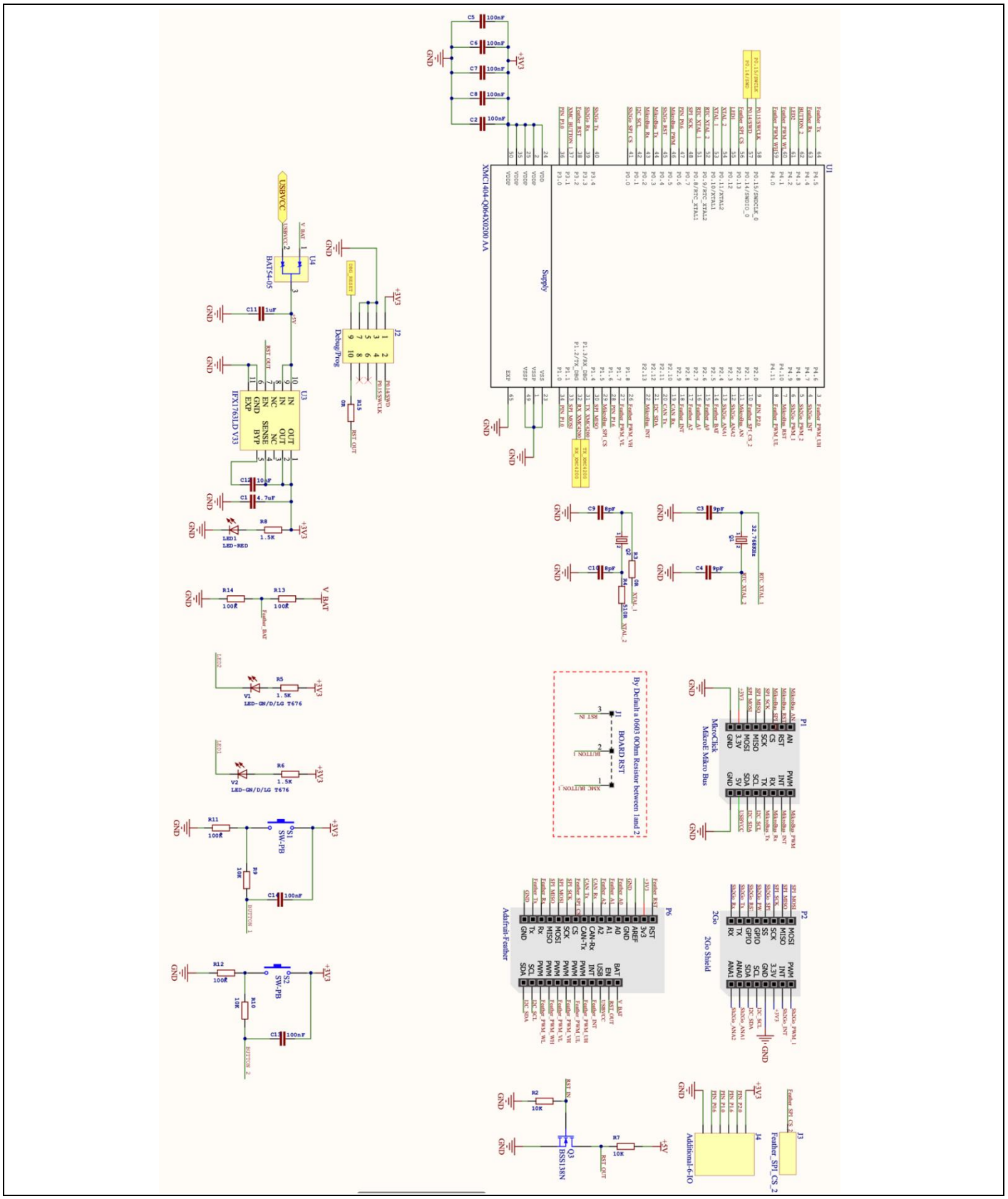


Figure 12 XMC1400 XTREME Connectivity Kit Schematics

3.2 Layout and Geometry

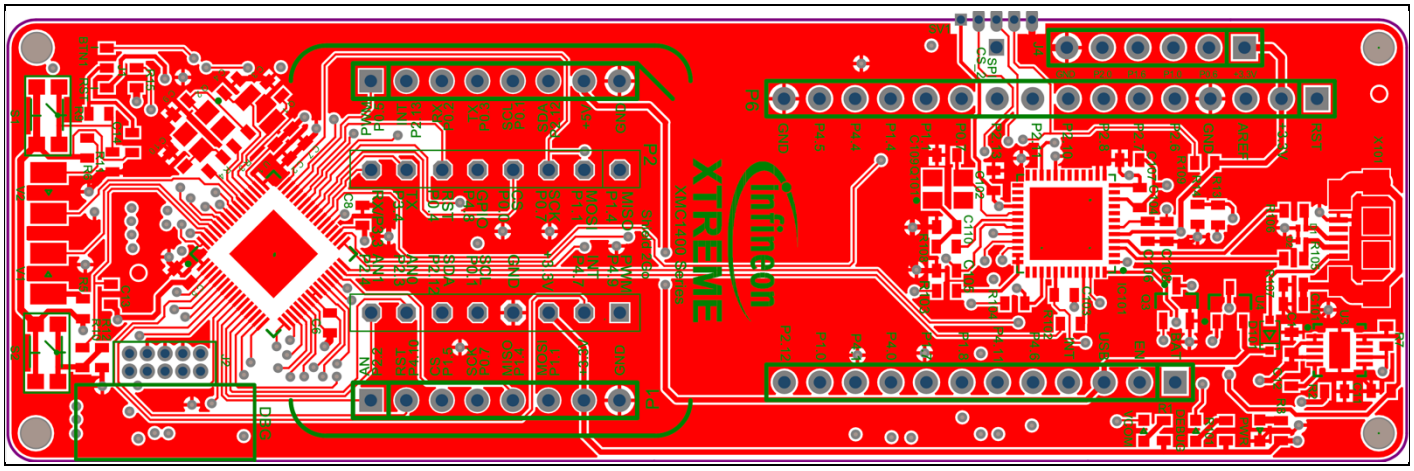


Figure 13 Layout Top Layer

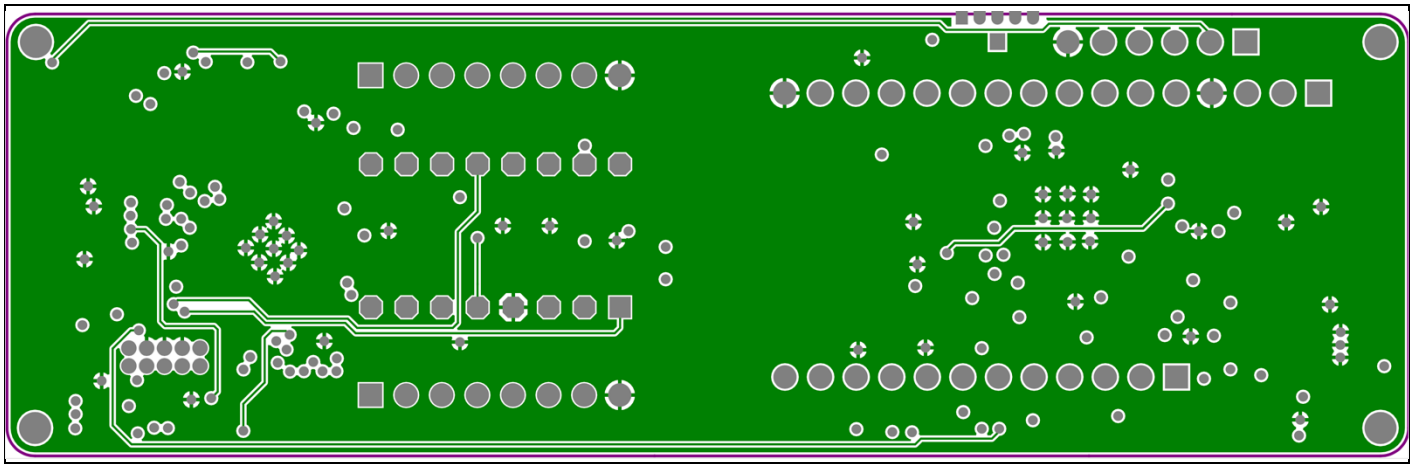


Figure 14 Layout Signal Layer 1

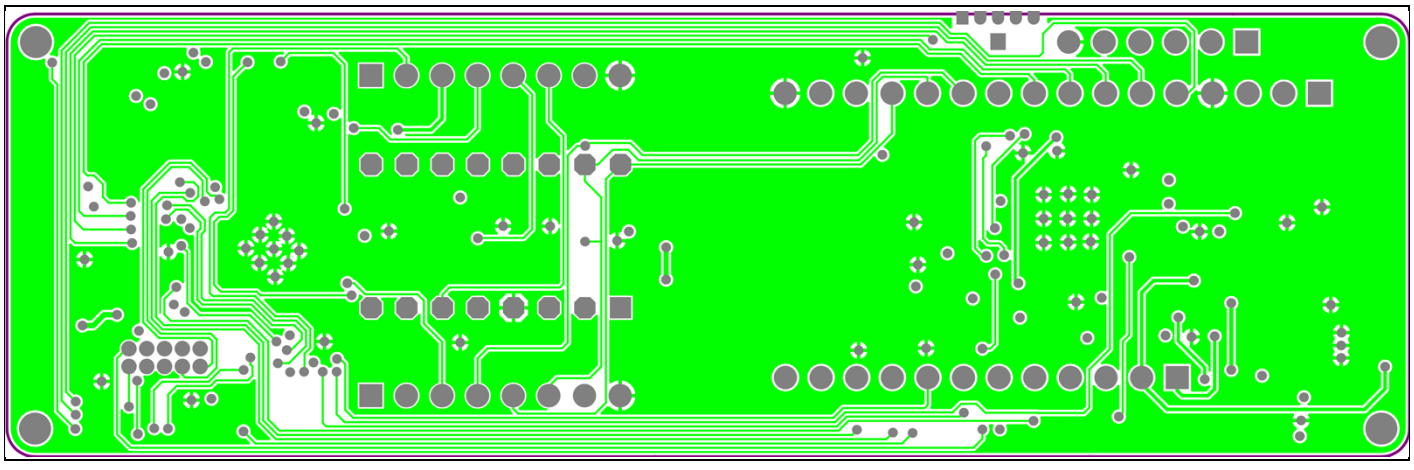


Figure 15 Layout Signal Layer 2

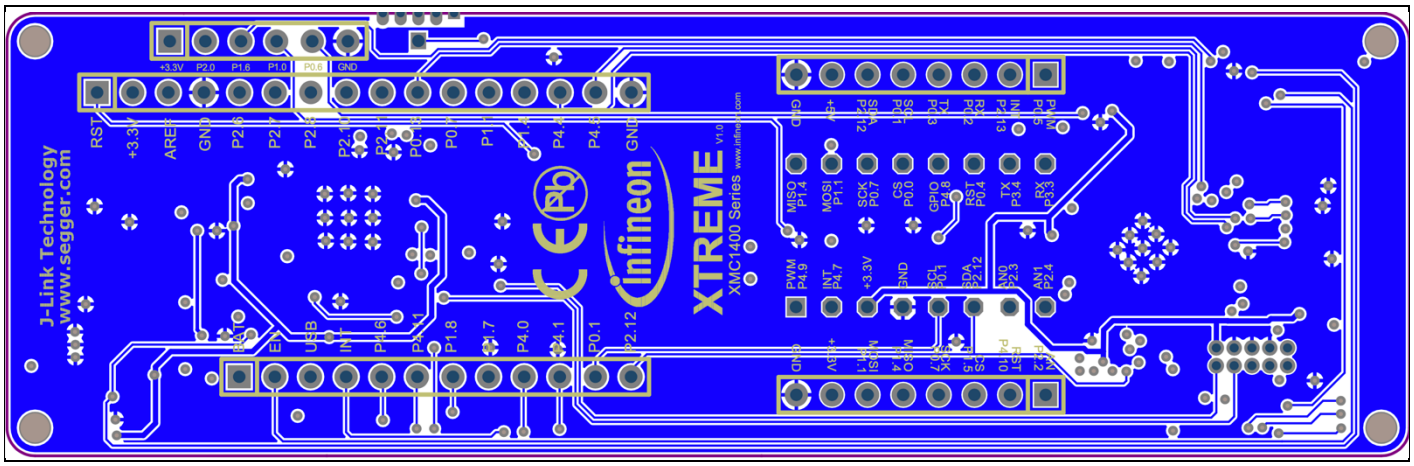


Figure 16 Layout Bottom Layer

3.3 CR number of XMC1400 XTREME Connectivity Kit

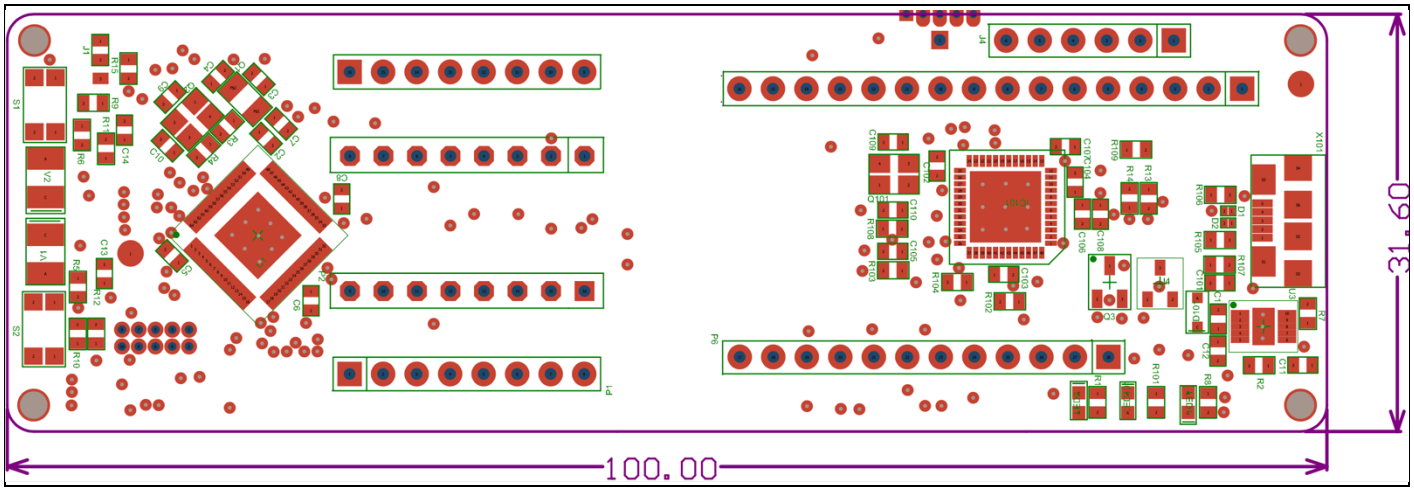


Figure 17 CR number

3.4 Bill of Materials

#	Quantity	Article Number	Designator	Value	Footprint	Description	Manufacturer	Manufacturer Order Number
1	2		C1, C108	4.7uF	C0603	4.7µF ±10% 6.3V Ceramic Capacitor X7R 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10B475KQ8NQNC
2	13		C2, C5, C6, C7, C8, C13, C14, C101, C102, C103, C104, C105, C106	100nF, [NoParam]	C0603	0.1µF ±10% 50V Ceramic Capacitor X7R 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10B104KB8NNNC
3	2		C3, C4	9pF	C0603	9pF ±0.5pF 50V Ceramic Capacitor C0G, NP0 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10C090DB8NNNC
4	4		C9, C10, C109, C110	8pF	C0603	8pF ±0.25pF 50V Ceramic Capacitor C0G, NP0 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10C080CB8NNNC
5	1		C11	1uF	C0603	1µF ±20% 16V Ceramic Capacitor X7R 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10B105MO8NNWC
6	1		C12	10nF	C0603	10000pF ±10% 50V Ceramic Capacitor X7R 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10B103KB8NNNC
7	1		C107	10uF	C0603	10µF ±20% 6.3V Ceramic Capacitor X5R 0603 (1608 Metric)	Samsung Electro-Mechanics	CL10A106MQ8NNNC
8	2		D1, D2	ESD239B1W0201E6327XTSA1	ESD239-B1-W0201	26.5V Clamp 3A (8/20µs) Ipp Tvs Diode Surface Mount WLL-2-3	Infineon Technologies	ESD239B1W0201E6327XTSA1
9	1		D101	BAS3010A03WE6327HTSA1	SOD323-R	Diode Schottky 30V 1A Surface Mount PG-SOD323-2	Infineon Technologies	BAS3010A03WE6327HTSA1
10	1		IC101	IFX_ XMC4200Q48K256ABXUMA1	QFN-48-7X7	ARM® Cortex®-M4 XMC4000 Microcontroller IC 32-Bit 80MHz 256KB (256K x 8) FLASH 48-VQFN (7x7)	Infineon Technologies	XMC4200Q48K256BAXUMA1
11	1		J1	0R	Jumper	0 Ohms Jumper 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film. By Default a 0603 0Ohm Resistor between 1and 2	Yageo	RC0603JR-070RL
12	1		J2	3221-10-0200-00	3221-10-0200-00	Connector Header Through Hole, Right Angle 10 position 0.050 (1.27mm)"	CNC Tech	3221-10-0200-00
13	1		J3		Additional PIN-Pad			
14	1		J4		Additional-6-IO			
15	1		LED1	LTST-C190KRKT	LED0603-RED	Red 631nm LED Indication - Discrete 2V 0603 (1608 Metric)	Lite-On Inc.	LTST-C190KRKT
16	1		LED2	LTST-C190KSKT	LED0603-YELLOW	Yellow 591nm LED Indication - Discrete 2.1V 0603 (1608 Metric)	Lite-On Inc.	LTST-C190KSKT
17	1		LED101	LTST-C190GKT	LED0603-GREEN	Green 569nm LED Indication - Discrete 2.1V 0603 (1608 Metric)	Lite-On Inc.	LTST-C190GKT
18	2		P1	CONN HDR 8POS 0.1 TIN PCB	MikroClick	8 Position Header Connector 0.100" (2.54mm) Through Hole Tin	Sullins Connector Solutions	PPTC081LFBN-RC
19	0		P2	CONN HDR 8POS 0.1 TIN PCB	2Go_Shield	8 Position Header Connector 0.100" (2.54mm) Through Hole Tin	Sullins Connector Solutions	PPTC081LFBN-RC
20	1		P6		Adafruit-Feather	12 Position Header Connector 0.100" (2.54mm) Through Hole Gold	Sullins Connector Solutions	PPPC121LFBN-RC
	1					16 Position Header Connector 0.100" (2.54mm) Through Hole Tin	Sullins Connector Solutions	PPTC161LFBN-RC
22	1		Q1	FC-135 32.7680KA-AC3	MARS_FC-135	32.768kHz ±20ppm Crystal 9pF 70 kOhms 2-SMD, No Lead	EPSON	FC-135 32.7680KA-AC3
23	1		Q2	NX3225SA-20.000M-STD-CSR-1	32X25_4PAD	20MHz ±15ppm Crystal 8pF 50 Ohms 4-SMD, No Lead	NDK America, Inc.	NX3225SA-20.000M-STD-CSR-1
24	1		Q101	NX3225SA-12.000M-STD-CRS-2	32X25_4PAD	12MHz ±15ppm Crystal 8pF 120 Ohms 4-SMD, No Lead	NDK America, Inc.	NX3225SA-12.000M-STD-CRS-2
26	1		Q3	BSS138NH6327XTSA2	SOT23_L	N-Channel 60V 230mA (Ta) 360mW (Ta) Surface Mount SOT-23-3	Infineon Technologies	BSS138NH6327XTSA2
27	5		R1, R5, R6, R8, R101	1.5K	R0603	Green 569nm LED Indication - Discrete 2.1V 0603 (1608 Metric), 1.5 kOhms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Thin Film	Yageo	RT0603FRE071K5L
28	4		R11, R12, R13, R14	100K	R0603	100 kOhms ±0.5% 0.063W, 1/16W Chip Resistor 0603 (1608 Metric) Thin Film	Susumu	RR0816P-104-D
29	2		R3, R15	0R	R0603	0 Ohms Jumper 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	Yageo	RC0603JR-070RL
30	2		R4, R108	510R	R0603	510 Ohms ±1% 0.125W, 1/8W Chip Resistor 0603 (1608 Metric) Anti-Sulfur Thin Film	Vishay Beyschlag	MCT06030C5100FP500
31	5		R2, R7, R9, R10, R109	10K	R0603	10 kOhms ±1% 0.125W, 1/8W Chip Resistor 0603 (1608 Metric) Anti-Sulfur, Moisture Resistant Thin Film	Stackpole Electronics Inc	RNCP0603FTD10K0
32	3		R102, R103, R104	100R	R0603	100 Ohms ±5% 0.25W, 1/4W Chip Resistor 0603 (1608 Metric) Automotive AEC-Q200, Pulse Withstanding Thick Film	Rohm Semiconductor	ESR03EZPJ101
33	2		R105, R106	33R	R0603	33 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film 33 Ohms ±1% 0.1W, 1/10W Chip Resistor 0603 (1608 Metric) Moisture Resistant Thick Film	Yageo	RC0603FR-0733RL
34	1		R107	1M	R0603	1 MOhms ±1% 0.125W, 1/8W Chip Resistor 0603 (1608 Metric) Anti-Sulfur Thin Film	Vishay Beyschlag	MCT06030C1004FP500
35	2		S1, S2	KMR731NG LFS	SW_PB	Tactile Switch SPST-NO Top Actuated Surface Mount	C&K	KMR731NG LFS
36	1		SV1		PINHEAD_127	Segger JLINK Programming		
37	1		U1	XMC1404-Q064x0200	XMC1404-Q064x0200	ARM® Cortex®-M0 XMC1000 Microcontroller IC 32-Bit 48MHz 200KB (200K x 8) FLASH PG-VQFN-64-6	Infineon	XMC1404-Q064X0200AA
38	1		U3	IFX1763LDV33XUMA1	PG-TSON-10	IFX1763LD V33	Infineon Technologies	IFX1763LDV33XUMA1
39	1		U4	BAT54-05	BAT54-05	Diode Array 1 Pair Common Cathode Schottky 30V 200mA (DC) Surface Mount SC-70, SOT-323	Infineon Technologies	BAT5405WH6327XTSA1
40	2		V1, V2	LG T676-P1Q2-24-Z	LS-T67K	Green 570nm LED Indication - Discrete 2V 2-PLCC	OSRAM Opto Semiconductors Inc.	LG T676-P1Q2-24-Z
41	1		X101	ZX62-AB-5PA(31)	ZX62-AB-5PA_MICRO-USB	USB - micro AB USB 2.0 Receptacle Connector 5 Position Surface Mount, Right Angle	Hirose Electric Co Ltd	ZX62-AB-5PA(31)

Figure 18 Bill of Materials XMC1400 XTREME Connectivity Kit

4 OPTIGA™ Trust M esWiFi Feather Wing™

4.1 Key Features

The OPTIGA™ Trust M esWiFi Feather Wing™ board is equipped with the following features

- Inventek ISM4343-WBM-L54[2] (Based on Cypress CYW4343[3])
- OPTIGA™ Trust M1[3]
- Headers compatible with Adafruit Feather Wing™
- SEGGER J-Link micro SWD connector for debugging/programming Inventek ISM4343-WBM-L54 Cortex M4 MCU
- Boot-Loader enable push button.
- Off board SEGGER J-Link
- LED indicators for
    - Power
    - 2 - ISM4343 LED Indicators for user use
    - OPTIGA™ Trust M Enable Indicator
- 5 x ADCs
- 10 x GPIO
- 1 x I2C
- 1 x UART
- 1 x SPI
- Wi-Fi
- BLE

4.2 Block Diagram

Figure 1 shows the block diagram of the OPTIGA™ Trust M esWiFi Feather Wing™. These are the following blocks:

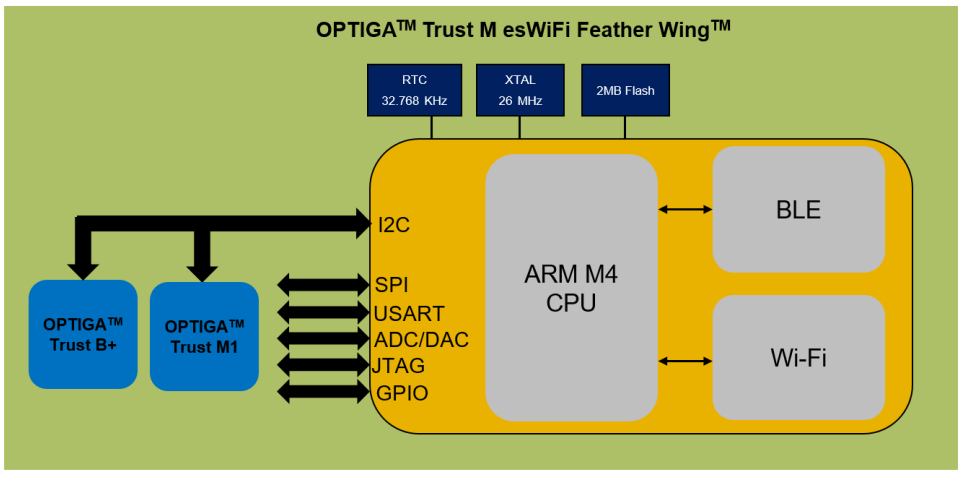


Figure 19 Block Diagram of OPTIGA™ Trust M esWiFi Feather Wing™

4.3 OPTIGA™ Trust M esWiFi Feather Wing™

The following sections give a detailed description of the hardware and how it can be used.

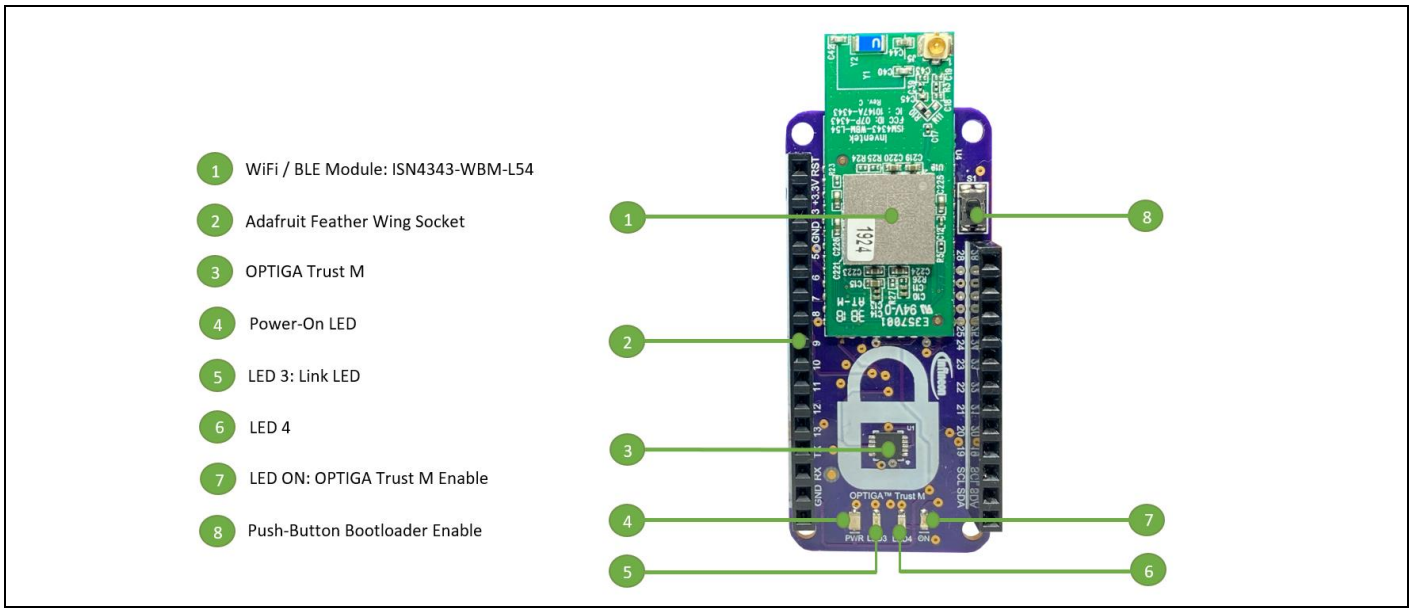


Figure 20 OPTIGA™ Trust M esWiFi Feather Wing™

4.4 Power Supply

The OPTIGA™ Trust M esWiFi Feather Wing™ is powered by a 3.3V supply typically provided by the Adafruit Feather wing host board, like for example the XMC1400 XTREME controller board (Section 2). The OPTIGA™ Trust M esWiFi Feather Wing™ does not support 5V.

Note: ***The OPTIGA™ Trust M esWiFi Feather Wing™ does not support 5V. It's supplyed with 3.3V from the +3.3V power rail.***

4.5 Boot Option

The OPTIGA™ Trust M esWiFi Feather Wing™ can enter in "boot mode" in two ways:

- By pressing "Button Boot-Loader Enable" Figure 20

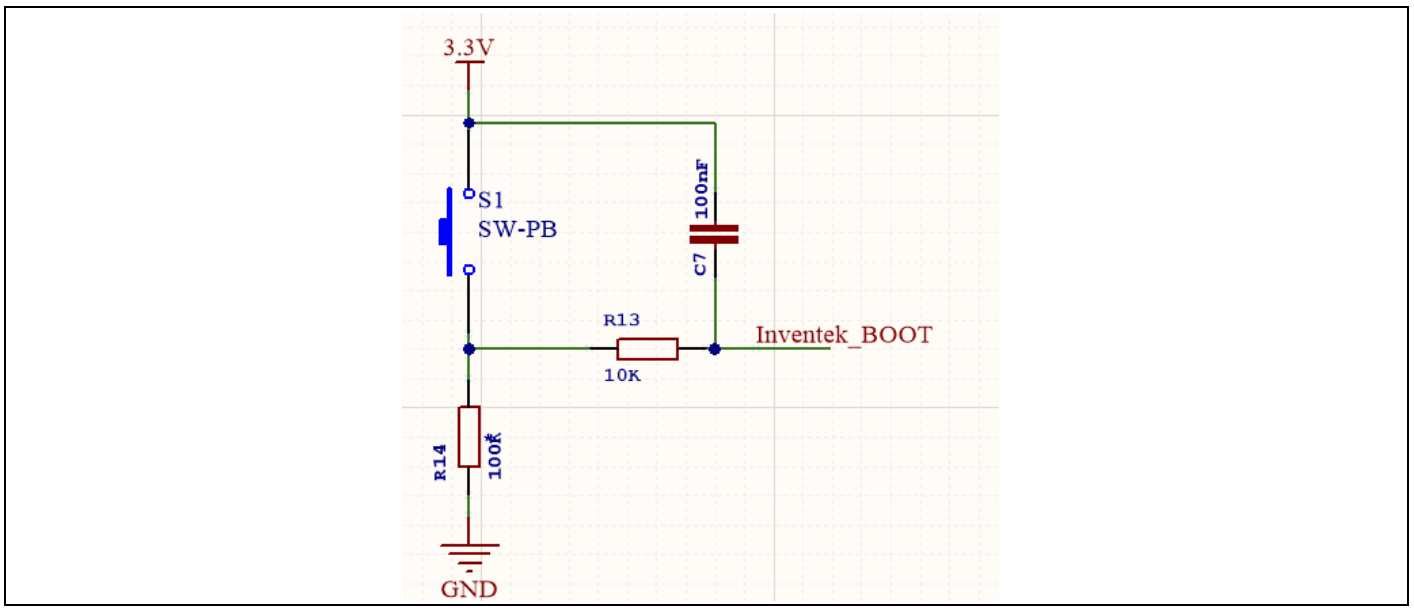


Figure 21 OPTIGA™ Trust M esWiFi Feather Wing™ Boot-Loader Enable Push Button

4.6 Programming and Debug Interface

The OPTIGA™ Trust M esWiFi Feather Wing™ supports Serial Wire Debug (SWD) as programming and debug interface. A SEGGER JLink programmer can be used by connecting it to P2 as shown in Table 6.

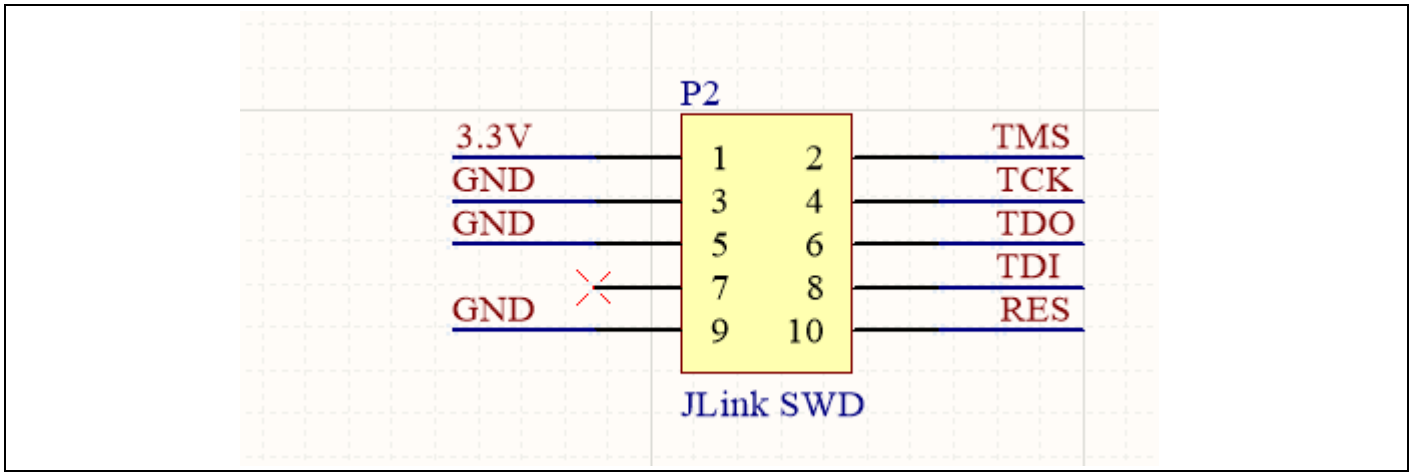


Figure 22 OPTIGA™ Trust M esWiFi Feather Wing™ programming and debugging interface

Table 6 Jtag Interface

Pin	Signal Name	Description
1	+3V3	+3V3
2	TMS/SWD	TMS/SWD
3	GND	GND
4	TCK/SWCLK	TCK/SWCLK
5	GND	GND
6	TDO	TDO
7	NC	NC
8	TDI	TDI
9	GND	GND
10	RES	RESET

4.7 LED

The two LEDs available to the user are connected to GPIO3 and GPIO4. The LEDs turns on by output ‘Low’ at the respective port pins.

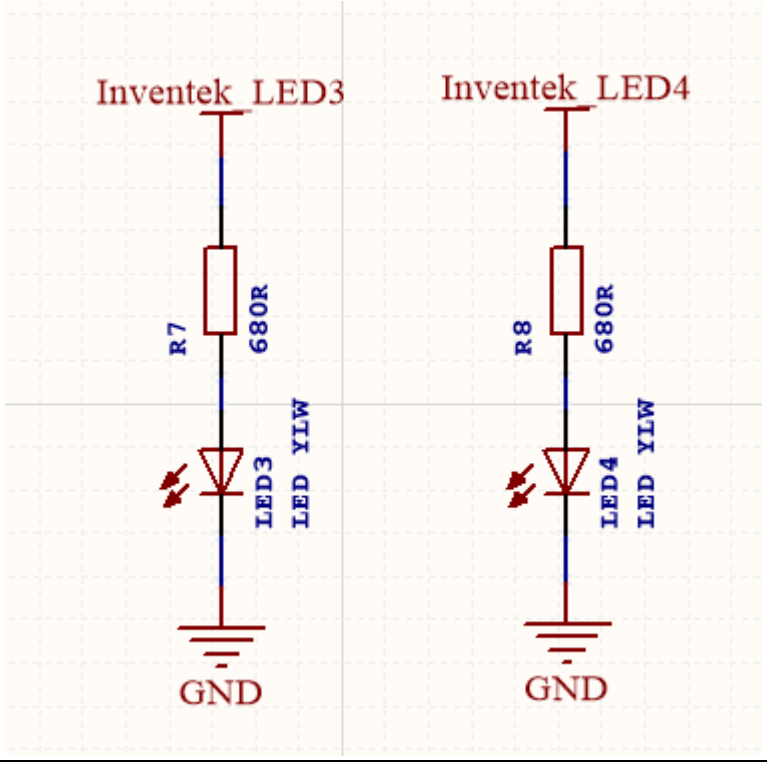


Figure 23 OPTIGA™ Trust M esWiFi Feather Wing™ LEDs circuit

Table 7 LED’s available to user

LED	ISM4343-WBM-L54	Description
LED3	GPIO3	Output ‘Low’ to on LED
LED4	GPIO4	Output ‘Low’ to on LED

4.8 Jumper Selection

The OPTIGA™ Trust M esWiFi Feather Wing™ has the capability of working aside a host controller or it can act in stand-alone mode. To switch the functionality of some peripherals between the two modes, selection jumpers can be used.

Table 8 OPTIGA™ Trust M esWiFi Feather Wing™ Jumper Selection

Jumper	Host Driven	Stand-Alone	Function
J1	Close	Open	OPTIGA Trust M HIB
J2	Open	Close	OPTIGA Trust M HIB
J3	Open	Close	Feather Wing Enable Function
J4	Open	Close	OPTIGA Trust B+ GPO
J5	Open	Close	SCL
J6	Open	Close	SDA
J7	Close	Open	OPTIGA Trust B+ GPO

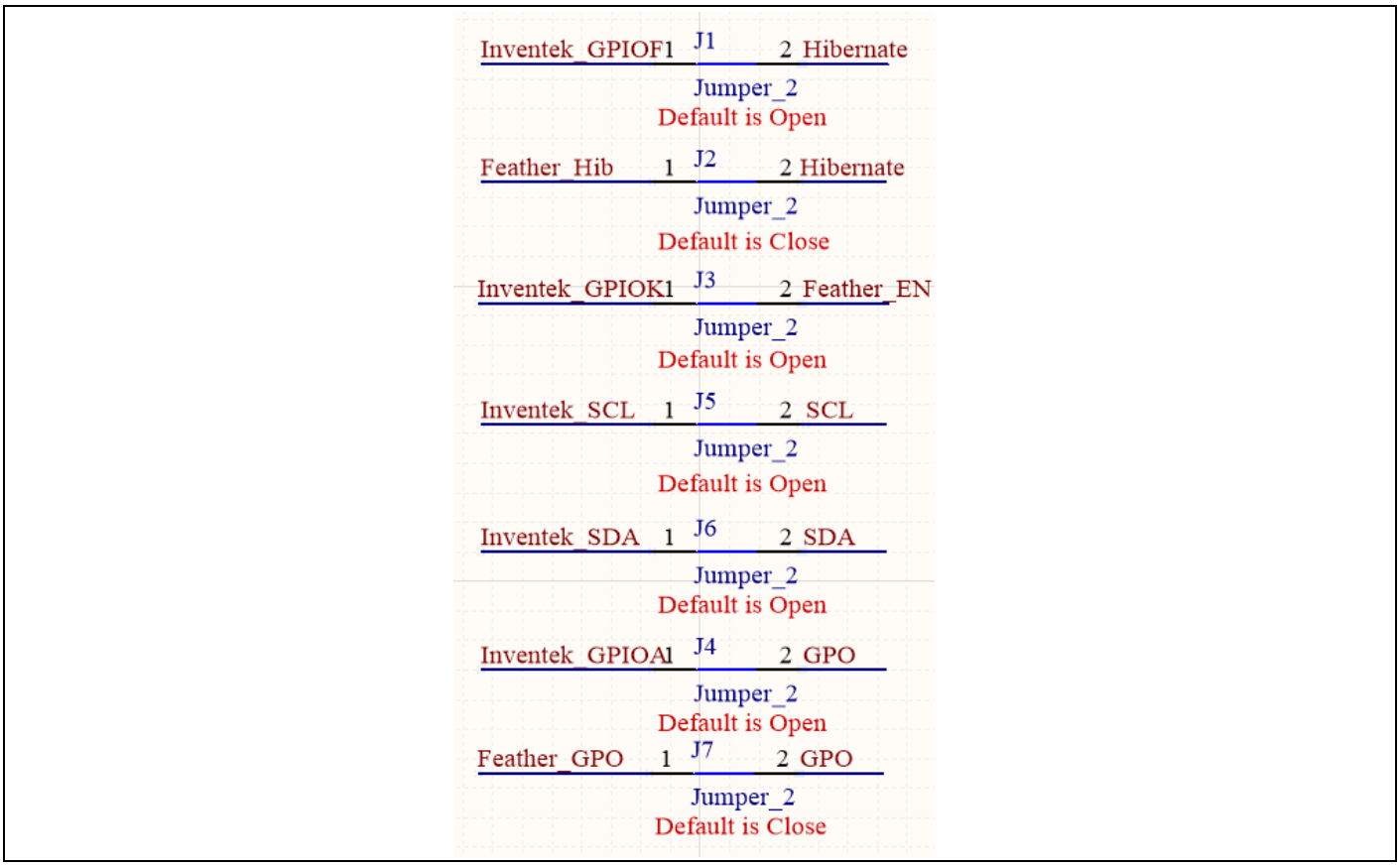


Figure 24 OPTIGA™ Trust M esWiFi Feather Wing™ LEDs circuit

4.9 OPTIGA Trust M1

The OPTIGA™ Trust M esWiFi Feather Wing™ is meant to be an easy to use tool for customers that want to enable End-to-End security to their IoT application. The OPTIGA™ Trust M1 is a crypto coprocessor meant to assist the user application with multiple cybersecurity tools such as secure key management and hardening a TLS1.2 session. More can be found in the OPTIGA™ Trust M product web page [3].

The OPTIGA™ Trust M1 communicates to the host controller using the I2C bus.

For Low power applications the OPTIGA™ Trust M can enter Hibernation mode by securely saving the current session context and by using the “Hibernate” signal to minimize power consumption. More on how to use the Hibernation feature can be found in the OPTIGA™ Trust M product web page [3].

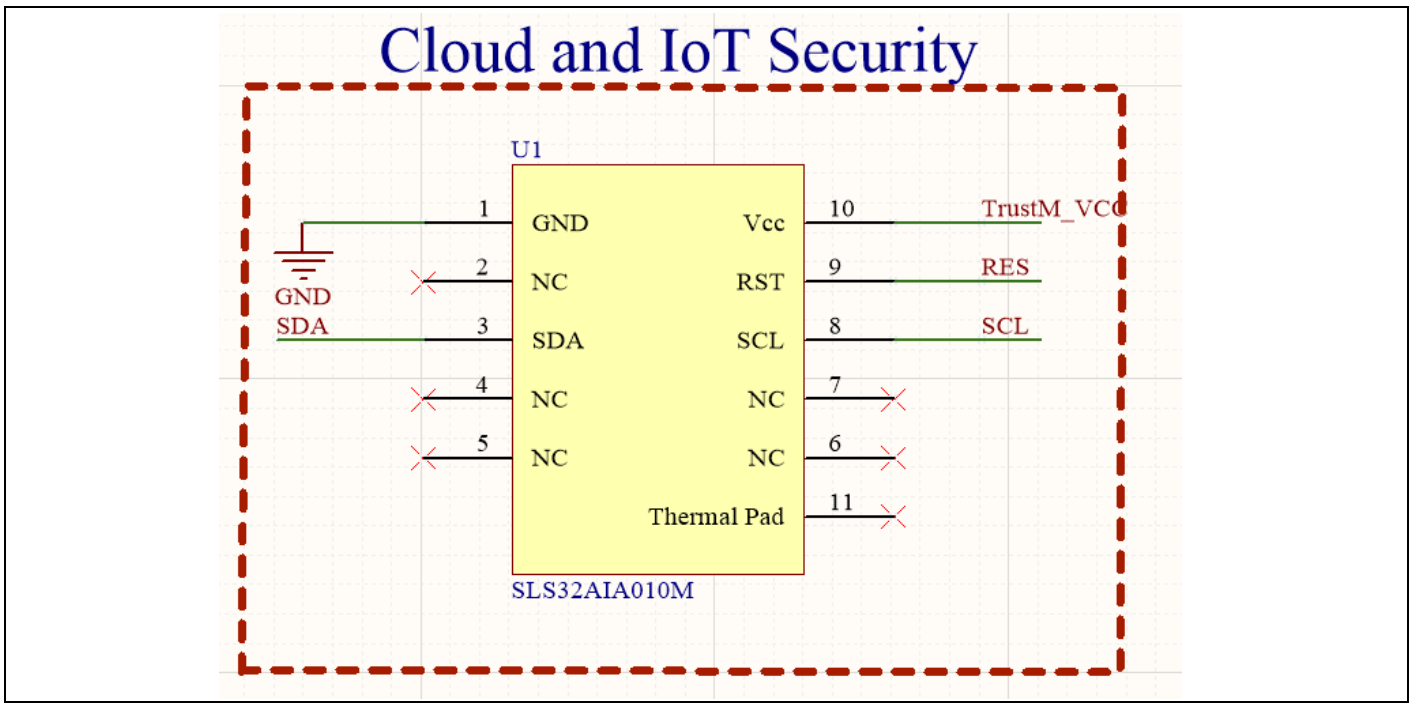


Figure 25 OPTIGA™ Trust M.

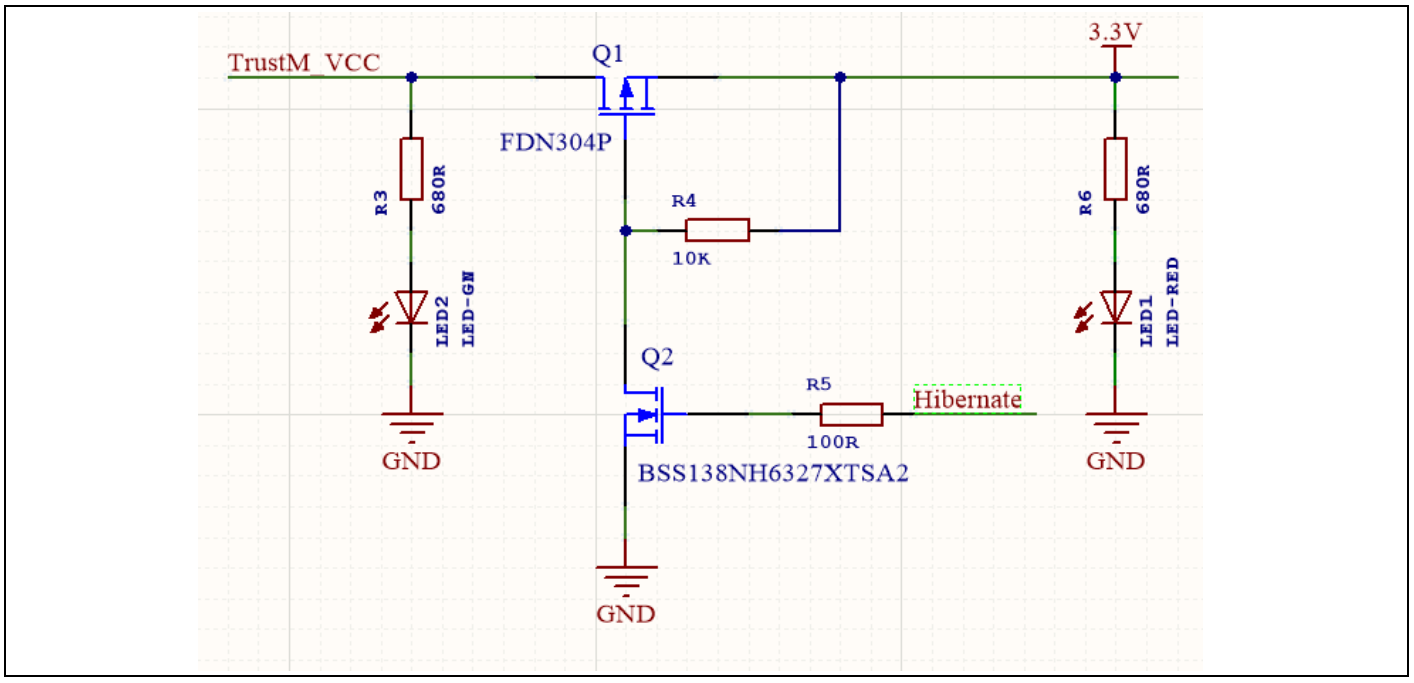


Figure 26 OPTIGA™ Trust M Hibernation reference circuit.

4.10 OPTIGA Trust B+

The OPTIGA™ Trust B+ is used for device and accessory authentication. With growing connectivity and the importance of IoT as a service model the need to authenticate accessories and also communicate securely to the

cloud is of great importance. The OPTIGA™ Trust B+ provides string authentication by using ECC cryptography and mutual authentication between the host and the accessory. More can be found in Infineon's secure products site [4].

The OPTIGA™ Trust B+ communicates to the host controller using the I2C bus.

The OPTIGA™ Trust B+ provides a GPIO that is activated according to the security policy programmed. This GPIO is referred to as GPO.

Note: OPTIGA™ Trust B+ is not populated. Contact your Infineon representative if samples are required.

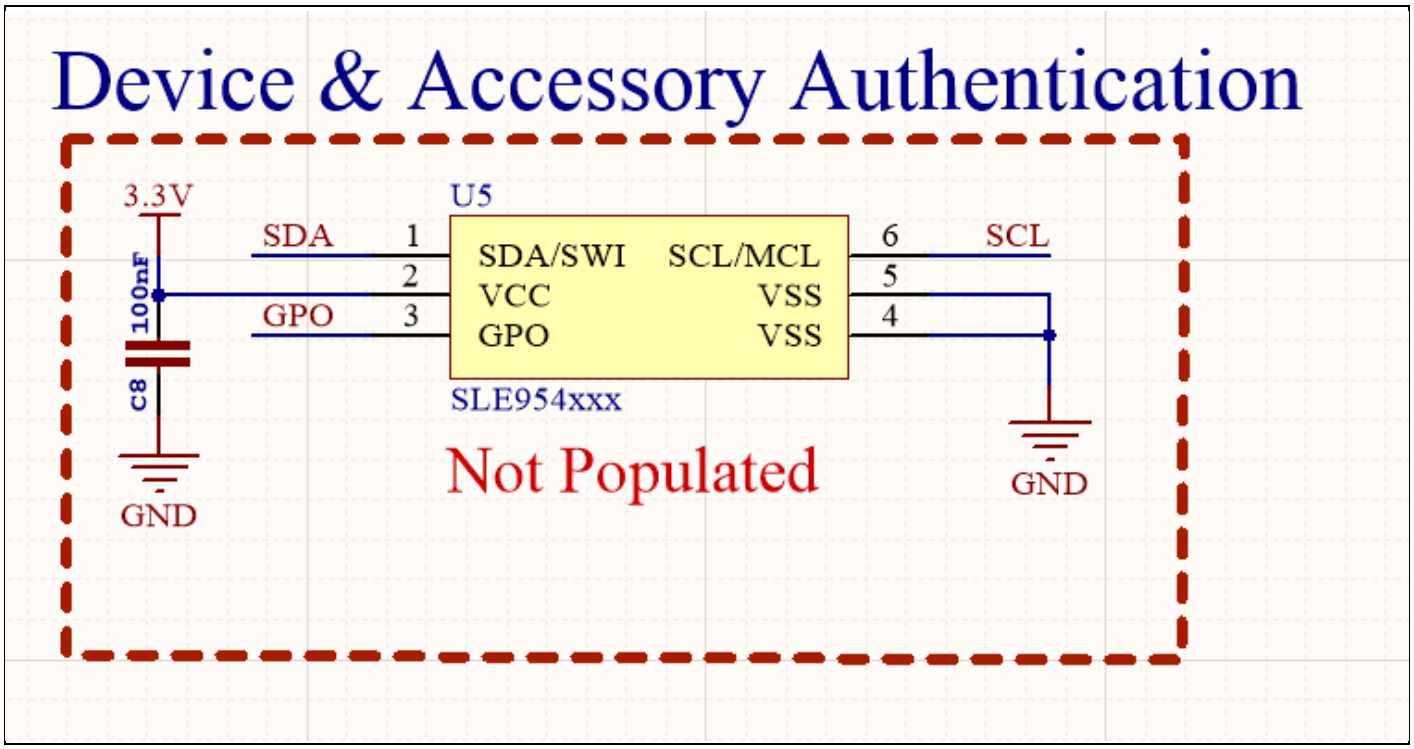


Figure 27 OPTIGA™ Trust B+.

4.11 VBatt

The OPTIGA™ Trust M esWiFi Feather Wing™ is prepared to be used with Adafruit Feather ecosystem of boards. It comes prepared with a battery power measurement circuit to measure the battery power. The battery connector is not provided OPTIGA™ Trust M esWiFi Feather Wing™, but a separate Adafruit Feather board is needed to enable this capability. VBatt is connected to Inventek_ADC1.

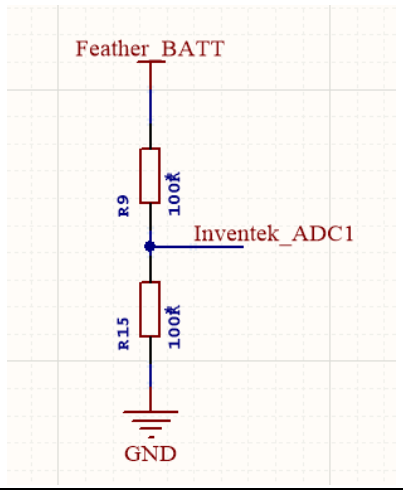


Figure 28 OPTIGA™ Trust M esWiFi Feather Wing™ VBatt

4.12 Schematics

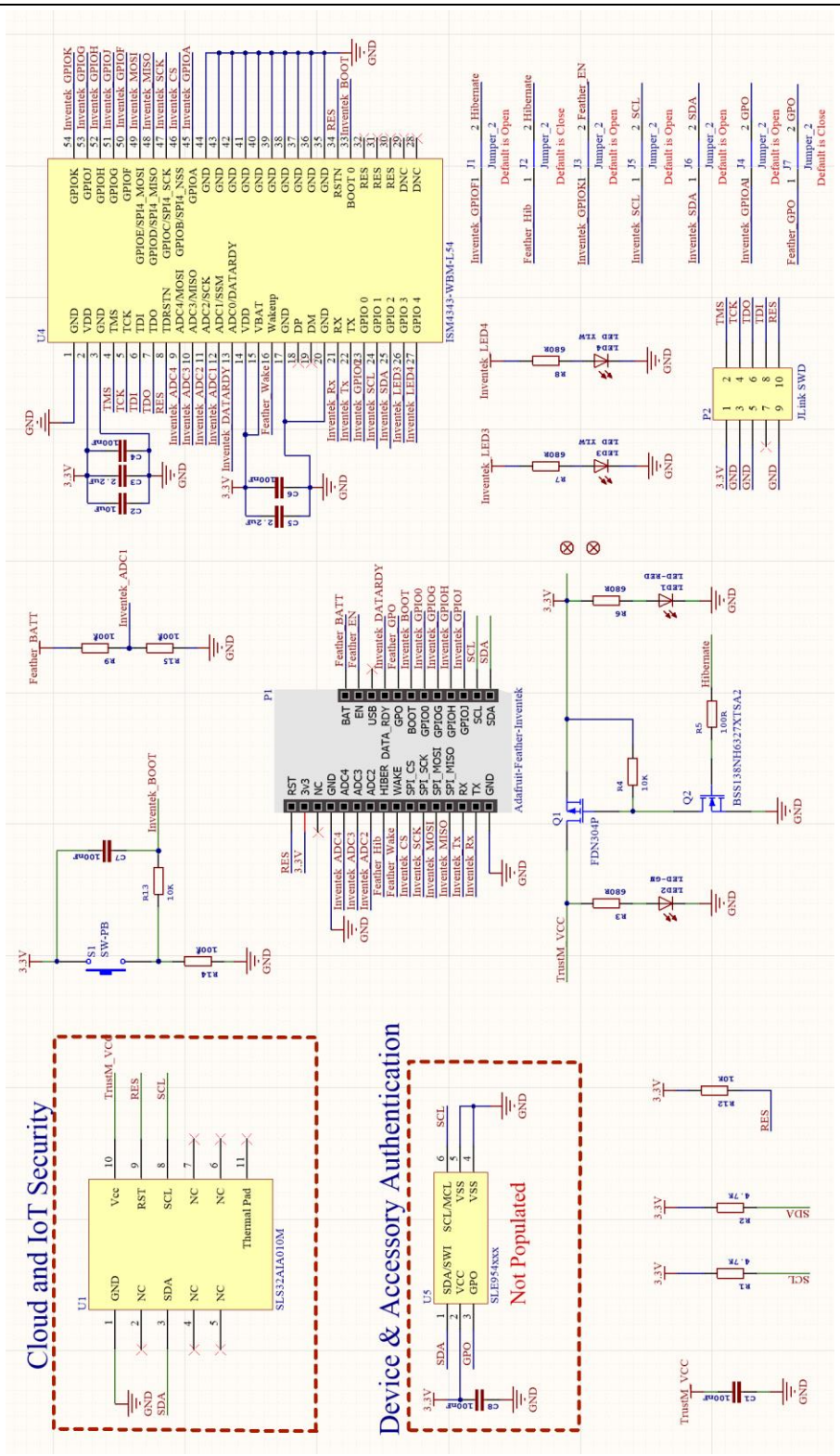


Figure 29 XMC1400 XTREME Connectivity Kit Schematics

5 References

[1] https://www.inventeksys.com/ism4343-wbm-l54-wifi-bt-combo/

[2] https://www.cypress.com/documentation/datasheets/cyw4343w-single-chip-80211-bgn-macbasebandradio-bluetooth-41

[3] https://github.com/Infineon/optiga-trust-m

[4] https://www.infineon.com/cms/en/product/security-smart-card-solutions/optiga-embedded-security-solutions/optiga-trust/

[5] https://www.infineon.com/cms/en/product/microcontroller/32-bit-industrial-microcontroller-based-on-arm-cortex-m/32-bit-xmc1000-industrial-microcontroller-arm-cortex-m0/xmc1404-q064x0200-aa/

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Major changes since the last revision

Page or Reference	Date	Author	Description of change
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