KIT XMC1400 AR

XMC1000 family

About this document

Scope and purpose

This document serves as a guide for using the KIT XMC1400 AR kit from the XMC1000 family. The kit utilizes Infineon's industry leading Arm® Cortex®-M0 microcontroller in combination with Arduino form factor. The focus is to evaluate the capabilities of the XMC1400 microcontroller's multiple applications solutions.

Intended audience

This document is intended for anyone who would like to evaluate the capabilities of XMC1400 using the Arduino compatible shields.

Reference Board/Kit

Product(s) embedded on a PCB, with focus on specific applications and defined use cases that can include Software. PCB and auxiliary circuits are optimized for the requirements of the target application.

Note: *Boards do not necessarily meet safety, EMI, quality standards (for example UL, CE) requirements*

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Safety precautions

Note: *Please note the following warnings regarding the hazards associated with development systems.*

Table 1   **Safety precautions**

⚠	**Warning:** The DC link potential of this board is up to 1000 VDC. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.
⚠	**Warning:** The evaluation or reference board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.
⚠	**Warning:** The evaluation or reference board is connected to the grid input during testing. Hence, high-voltage differential probes must be used when measuring voltage waveforms by oscilloscope. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.
⚠	**Warning:** Remove or disconnect power from the drive before you disconnect or reconnect wires, or perform maintenance work. Wait five minutes after removing power to discharge the bus capacitors. Do not attempt to service the drive until the bus capacitors have discharged to zero. Failure to do so may result in personal injury or death.
⚠	**Warning:** The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.
⚠	**Caution:** Only personnel familiar with the drive, power electronics and associated machinery should plan, install, commission and subsequently service the system. Failure to comply may result in personal injury and/or equipment damage.
⚠	**Caution:** The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.
⚠	**Caution:** A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as undersizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.
⚠	**Caution:** The evaluation or reference board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.

Table of contents

1 Introduction

This document describes the features and hardware details of the XMC1400 CPU Card for Arduino. This board is mounted with Arm® Cortex®-M0 based XMC1400 microcontroller from Infineon Technologies AG and part of Infineon's XMC1000 offering of kits.

1.1 Overview

The XMC1400 CPU Card for Arduino has two rows of pin headers, which are fully compatible with the Arduino shield. Hence, the user can buy various Arduino shield boards off-the-shelf to test the capabilities of the XMC1400 microcontroller.

1.1.1 Key features

The XMC1400 CPU Card for Arduino is equipped with the following features:

- XMC1400 (Arm® Cortex® -M0 based) microcontroller, TSSOP38
- Headers compatible with Arduino shield
- Detachable SEGGER J-Link debugger and UART virtual COM port, with micro USB connector
- Power supply concept compatible with Arduino Uno
- Three user LEDs and separate LEDs each, for COM port and debug
- XTAL (20 MHz) and RTC_XTAL (32768 Hz)

Figure 1 shows the block diagram of the XMC1400 CPU Card for Arduino.

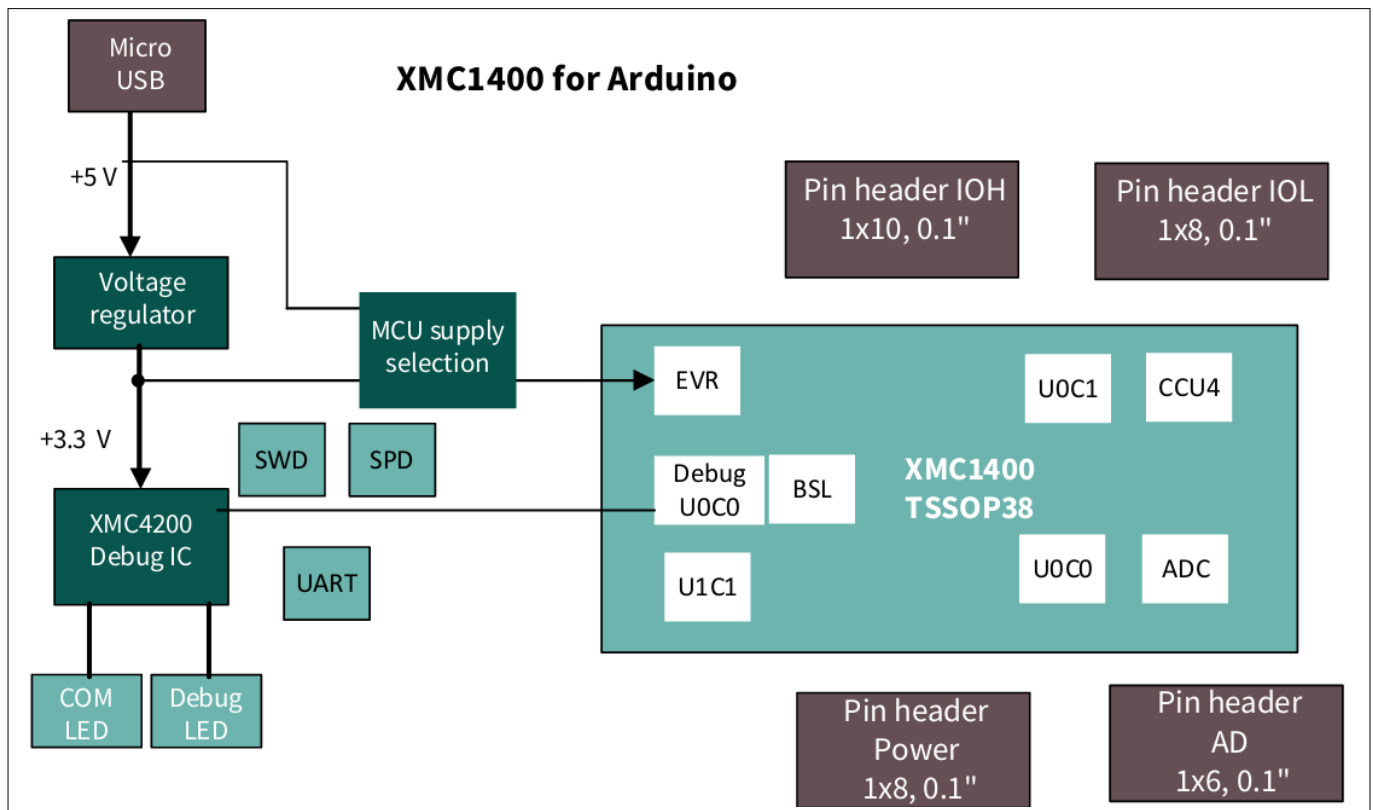**Figure 1**   **Block diagram of XMC1400 CPU Card for Arduino**

2 Hardware description

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

This kit has three User LEDS, connected to Port P0.5, P1.5, and P0.3 that is marked as DEBUG. When the board is connected using a Micro USB, the LEDs marked as "Power on LED" glow.
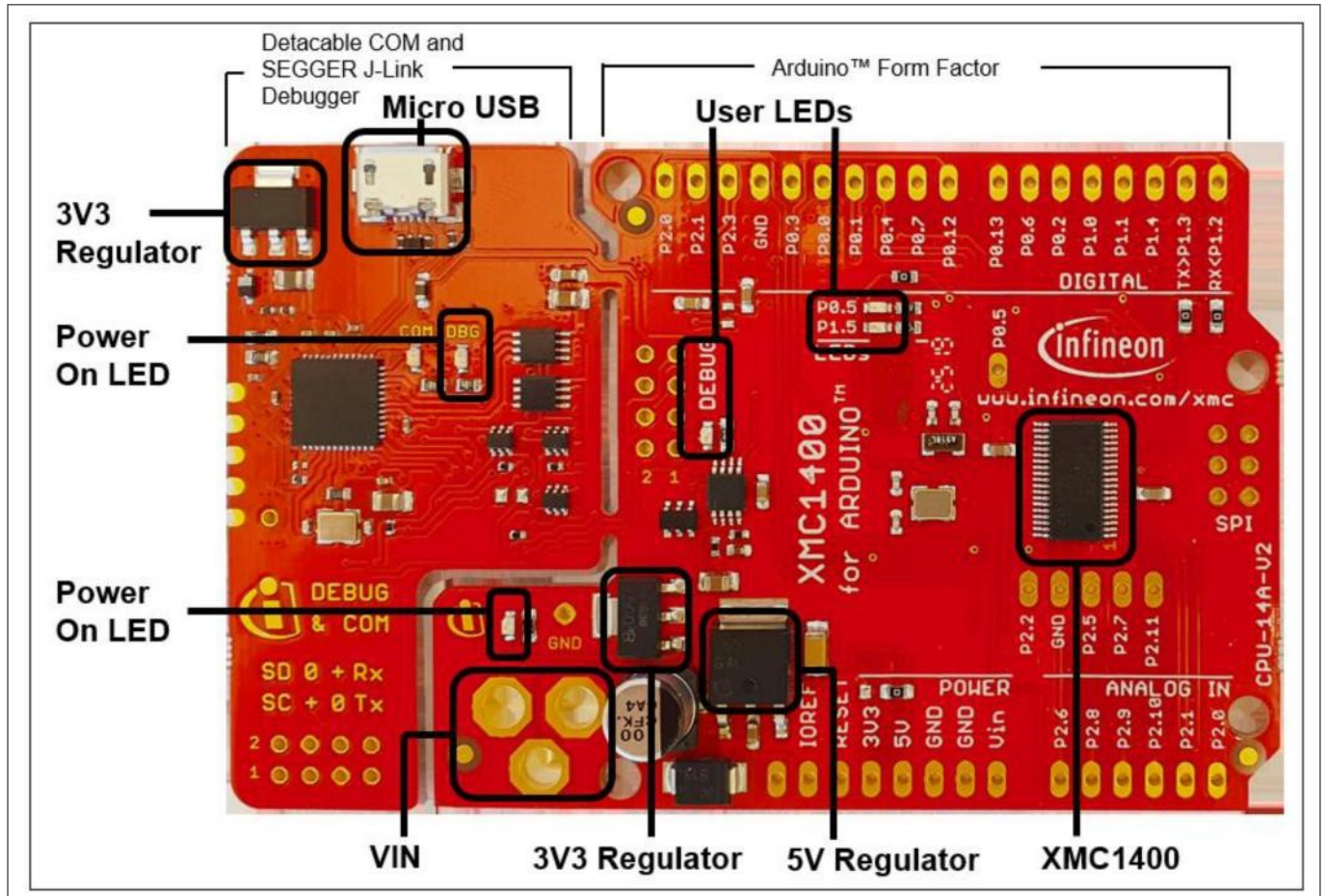

Figure 2   XMC1400 CPU Card for Arduino

2.1 XMC1400 connector for Arduino

2.1.1 Digital I/O connector

The XMC1400 CPU Card for Arduino has a 10-pin connector mounting holes and an 8-pin connector mounting holes at IOH and IOL respectively. Sixteen of those pins are digital input or output pins. The pinouts are listed in Table 2 and Table 3.
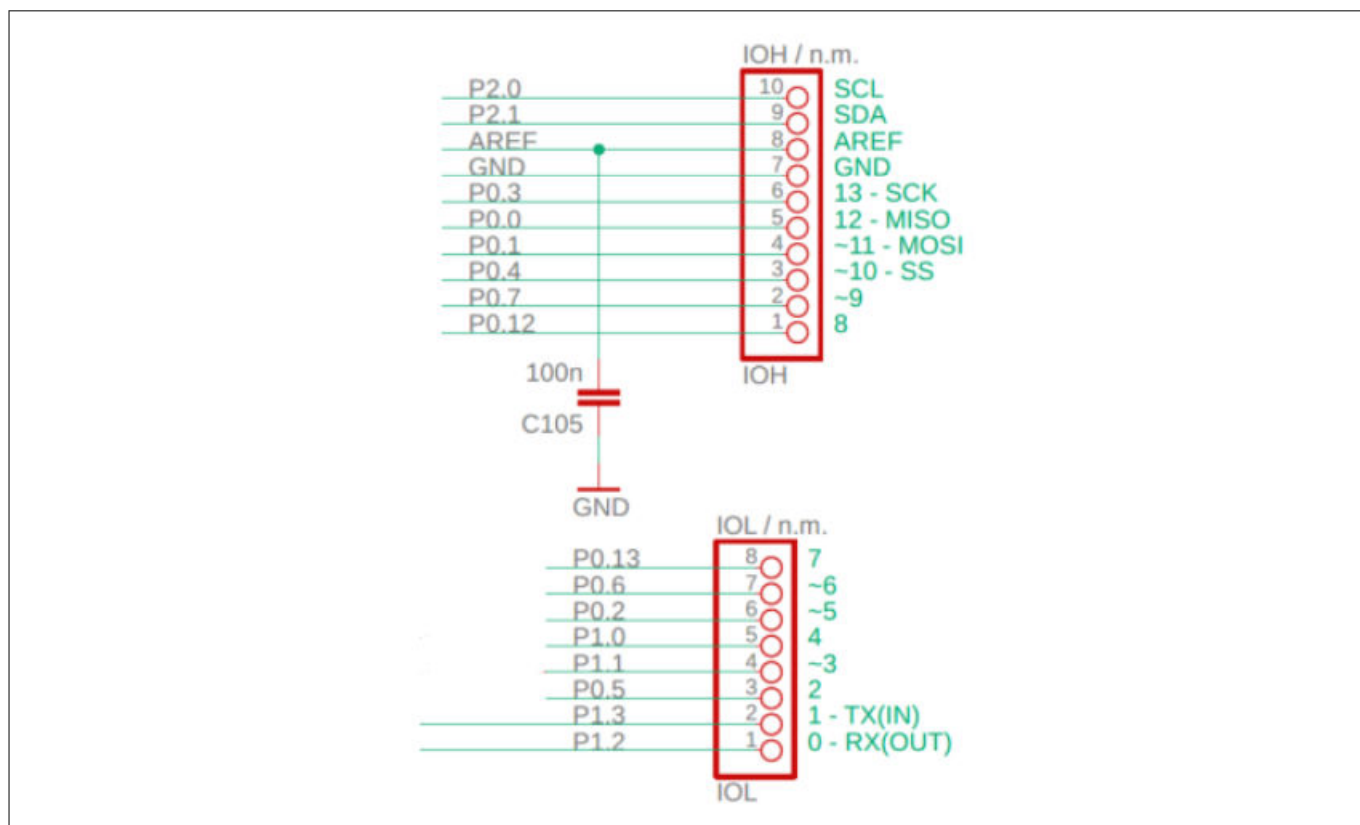
Figure 3   **Digital I/O IOHIOL connectors**

Table 2   **Digital I/O of IOH connector**

Pin No.	Arduino signal name	XMC1400 signal name	Description
10	SCL	P2.0	I^2C clock
9	SDA	P2.1	I^2C data / address
8	AREF	P2.3	Analog reference voltage
7	GND	GND	Ground
6	13 - SCK	P0.3	SPI-SCK / LED output
5	12 - MISO	P0.0	SPI-MISO
4	~11 - MOSI	P0.1	SPI-MOSI / PWM output
3	~10 - SS	P0.4	SPI-SS / PWM output
2	~9	P0.7	PWM output
1	8	P0.12	GPIO

Table 3   **Digital I/O of IOL connector**

Pin No.	Arduino signal	XMC1400 signal	Description
8	7	P0.13	GPIO
7	~6	P0.6	PWM output
6	5	P0.2	GPIO
5	~4	P1.0	GPIO/PWM
4	~3	P1.1	External interrupt / PWM output
3	2	P0.5	GPIO/LED2
2	1 - TX	P1.3	UART Transmit
1	0 - RX	P1.2	UART Receive

2.1.2   Analog input

The XMC1400 CPU Card for Arduino has six analog inputs at connector AD.
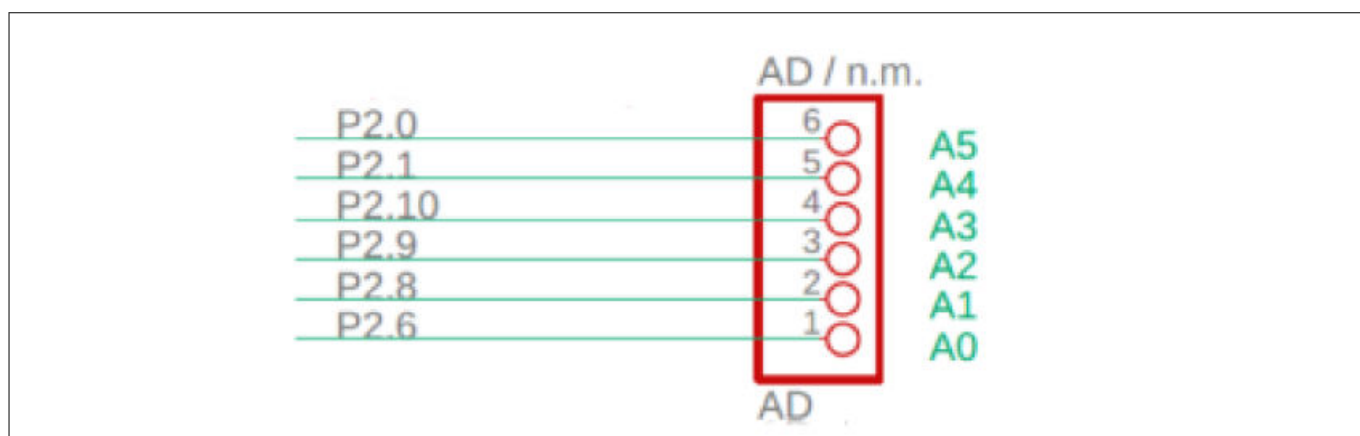
Figure 4   **Analog input AD connector**

Table 4   **Pinout of the AD connector**

Pin No.	Arduino signal	XMC1400 signal	Description
1	A0	P2.6	ADC input
2	A1	P2.8	ADC input
3	A2	P2.9	ADC input
4	A3	P2.10	ADC input
5	A4	P2.1	ADC input
6	A5	P2.0	ADC input

2.1.3 Power connector, POWER

The XMC1400 CPU Card for Arduino can be powered from the micro USB connector or with an external power supply via the DC power jack. However, the DC power jack is not mounted.

The XMC1400 device can operate with a power supply of 1.8 V till 5.5 Vdc. On this board, 5 Vdc is used to power the XMC1400 device. However, if you want to power the XMC1400 device with 3.3 Vdc, then remove R102 and solder a 0-Ω resistor R101.
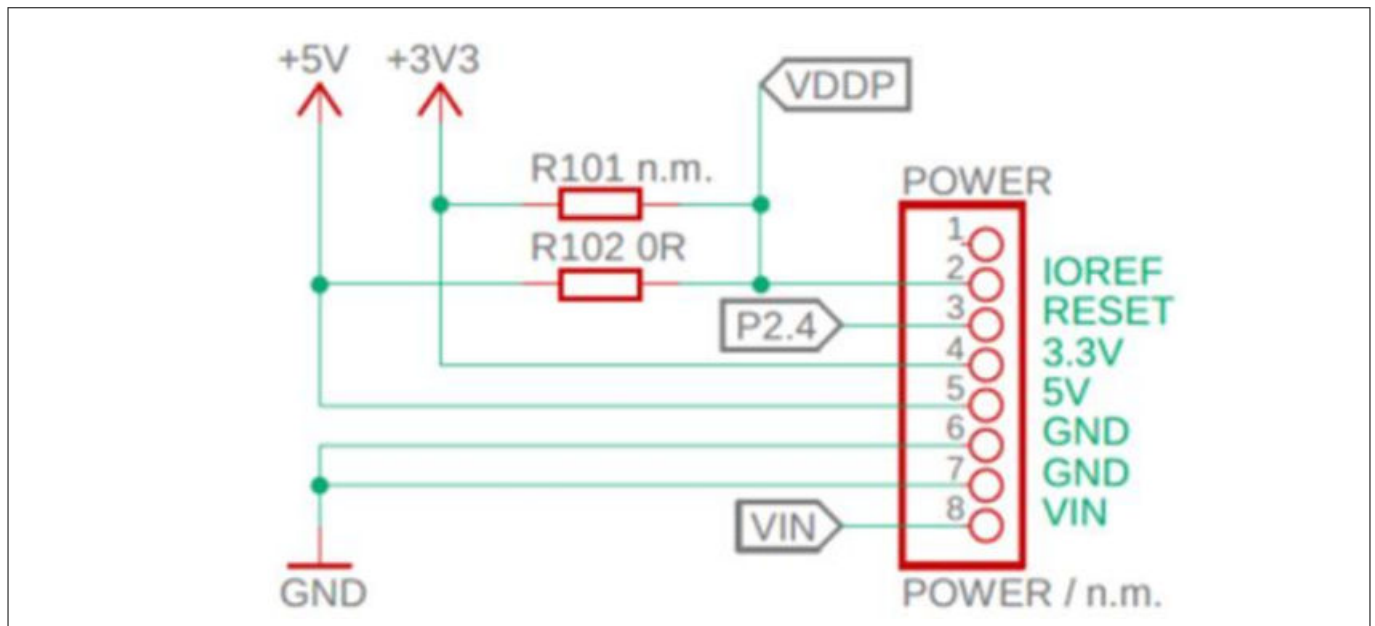

Figure 5   **Power connector**

Table 5   **Pinout of the power connector**

Pin No.	Arduino signal	XMC1400 signal	Description
1	-	-	-
2	IOREF	VDDP	VDDP connect to 5 V via R102
3	RESET	P2.4	RESET signal
4	3.3 V	+3V3	3.3 V is generated by a 3.3-V regulator IC101 from +5 V
5	5 V	+5 V	+5 V is generated by the 5-V regulator IC102 from VIN input. If VIN is not powered, +5 V is supplied by the micro-USB connector.
6	GND	GND	Ground
7	GND	GND	Ground
8	VIN	VIN	DC jack (not mounted), 7-12 V

2.1.4 In-circuit serial programming (ICSP) header

The SPI connector (not mounted) is used to program the XMC1400 microcontroller via the SPI interface.
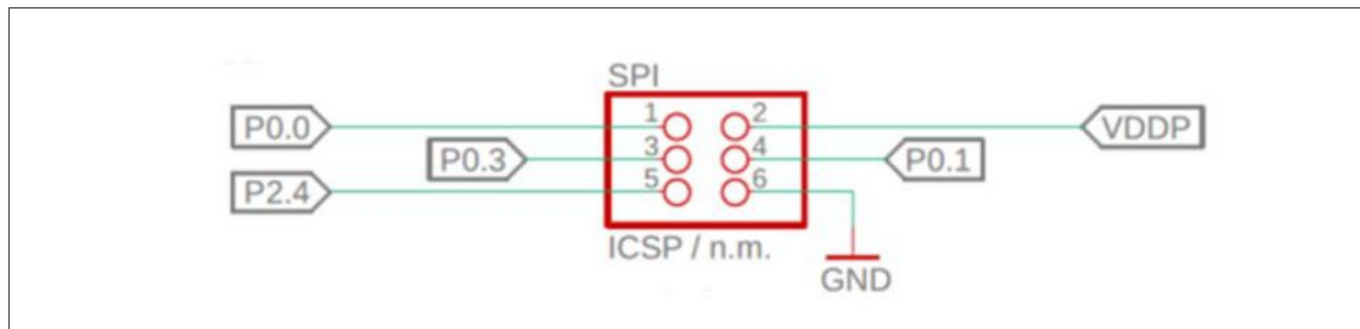

Figure 6 ICSP connector

Table 6 Signals of ICSP connector

Pin No.	Arduino signal	XMC1400 signal	Description
1	MISO	P0.0	Data transmit
2	+5 V	VDDP	5V DC
3	SCK	P0.3	Clock input
4	MOSI	P0.1	Data received
5	CS	P2.4	Chip select
6	GND	GND	ground

2.2 LEDs

The Arduino pinout signal '13-SCK' is connected to the yellow LED102 via a buffer. LED102 is labelled as DEBUG on the board and co-exists with SPI-CLK on P0.3. Furthermore, two surface-mount LEDs are available for user signaling. Table 7 shows the LED's driving signals.
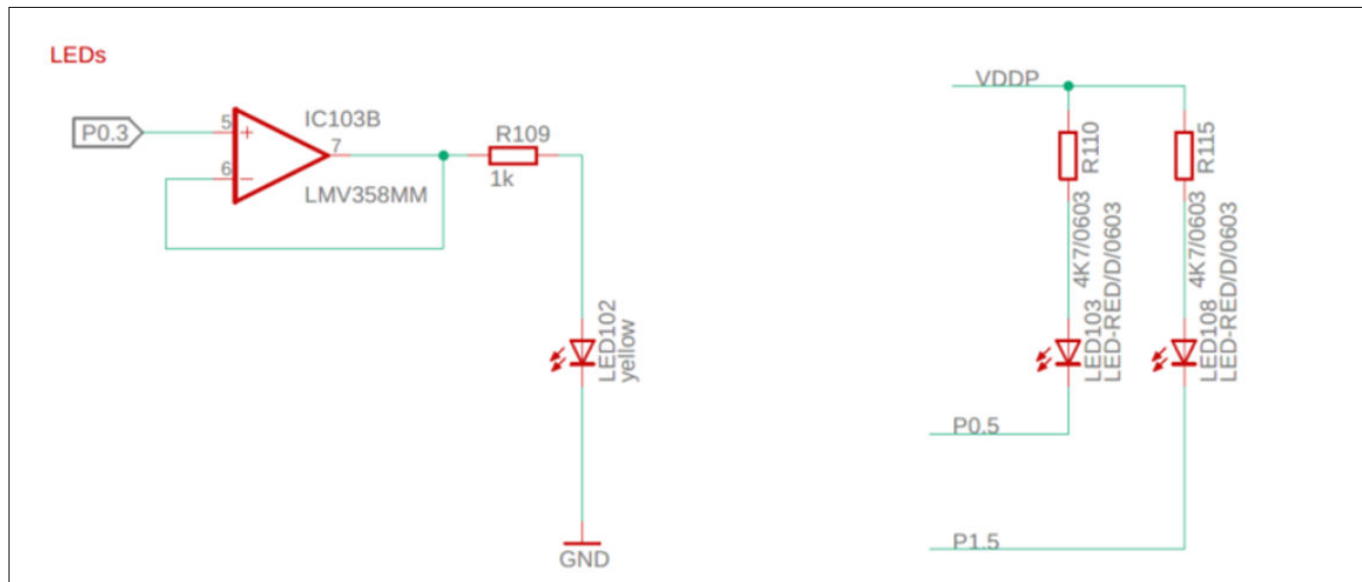

Figure 7 LEDs circuit

Table 7 LEDs signal description

LED designation	Signal name	Description
LED102	P0.3	Output 'High' to switch on LED
LED103	P0.5	Output 'Low' to switch on LED
LED108	P1.5	Output 'Low' to switch on LED

2.3   Other connectors

The XMC1400 microcontroller has more pins than is required for the Arduino board's pinouts. These extra pins are grouped into connector AD_AUX (not mounted) and AUX (not mounted).
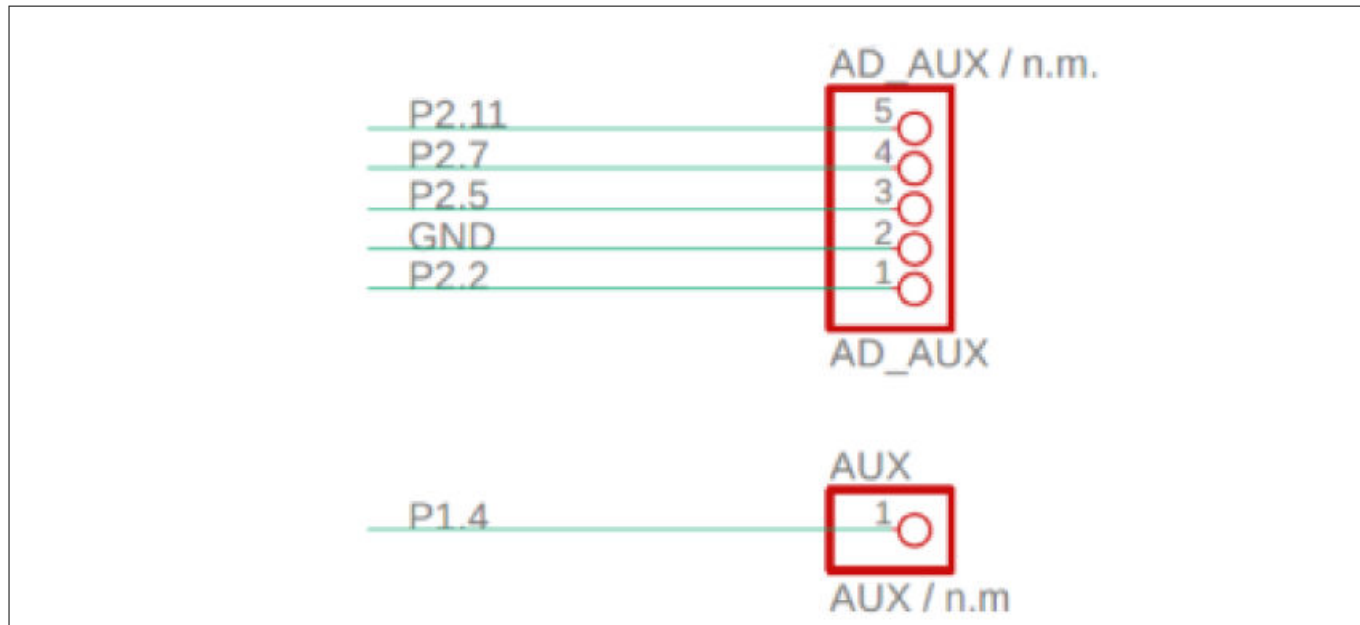

Figure 8   **AD_ AUX and AUX connector**

Table 8   **Signals of connector AD_AUX**

Pin No.	Signal name	Description
1	P2.2	ADC input
2	GND	Ground
3	P2.5	ADC input
4	P2.7	ADC input
5	P2.11	ADC input

Table 9   **Signals of connector AUX**

Pin No.	Signal name	Description
1	P1.4	Interrupt /GPIO

3 Production data

3.1 Schematics

This section contains the schematics for the XMC1400 CPU Card for Arduino:

- Schematic 1: On-board debugger, power
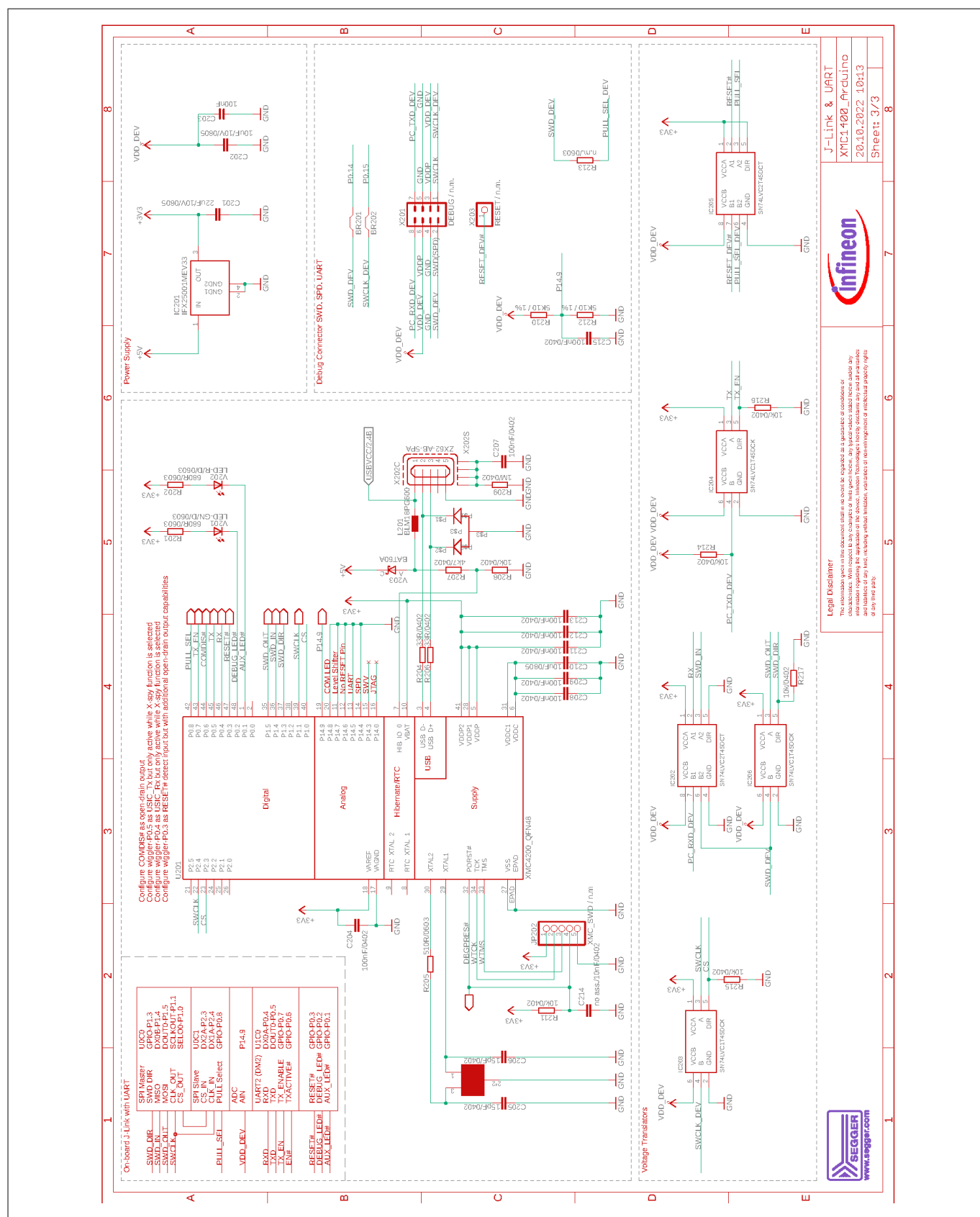- Schematic 2: CPU, Arduino pin header, LEDs, power supply

Figure 9   On-board debugger, power

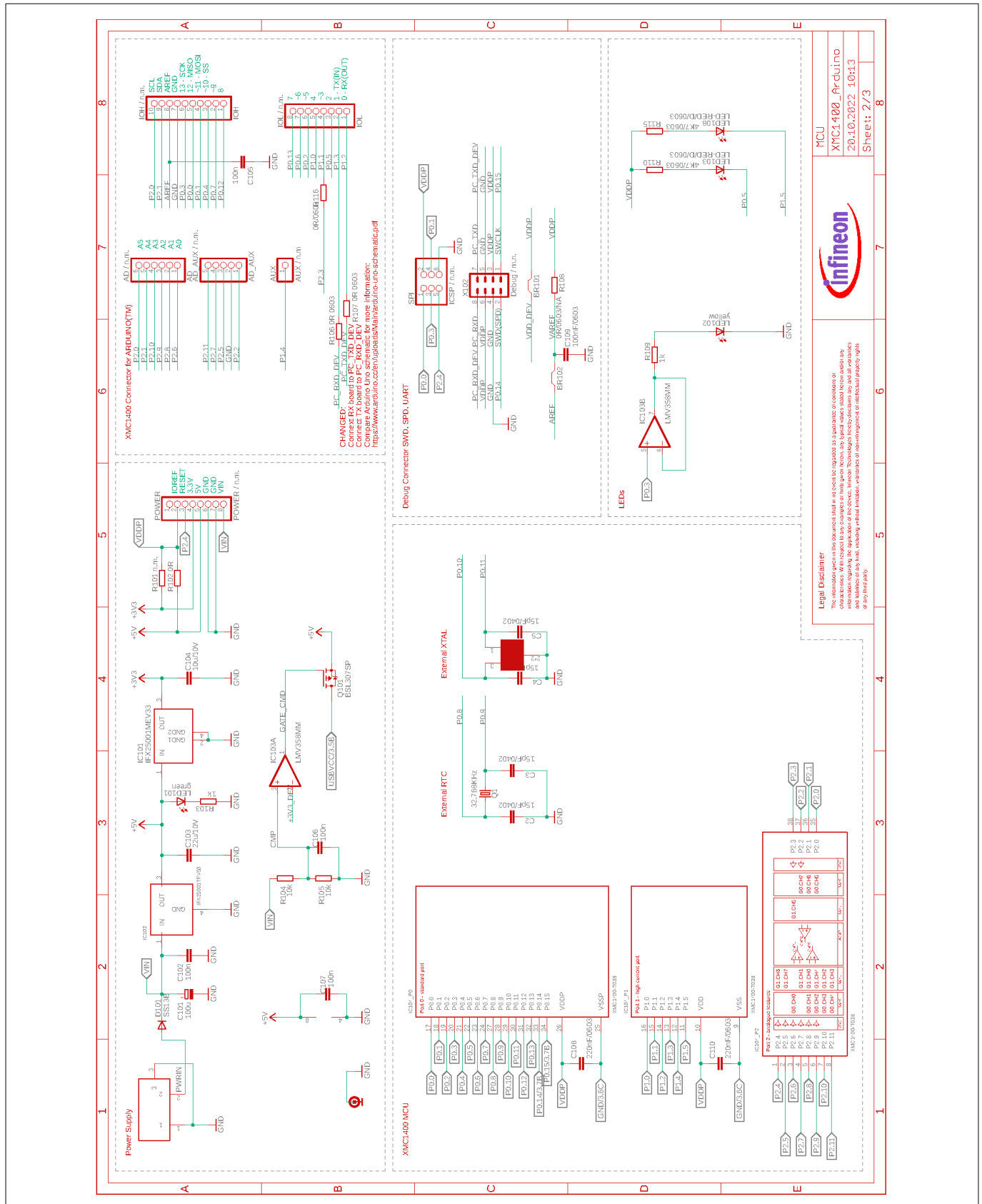**Figure 10**   **CPU, Arduino pin header, LEDs, power supply**
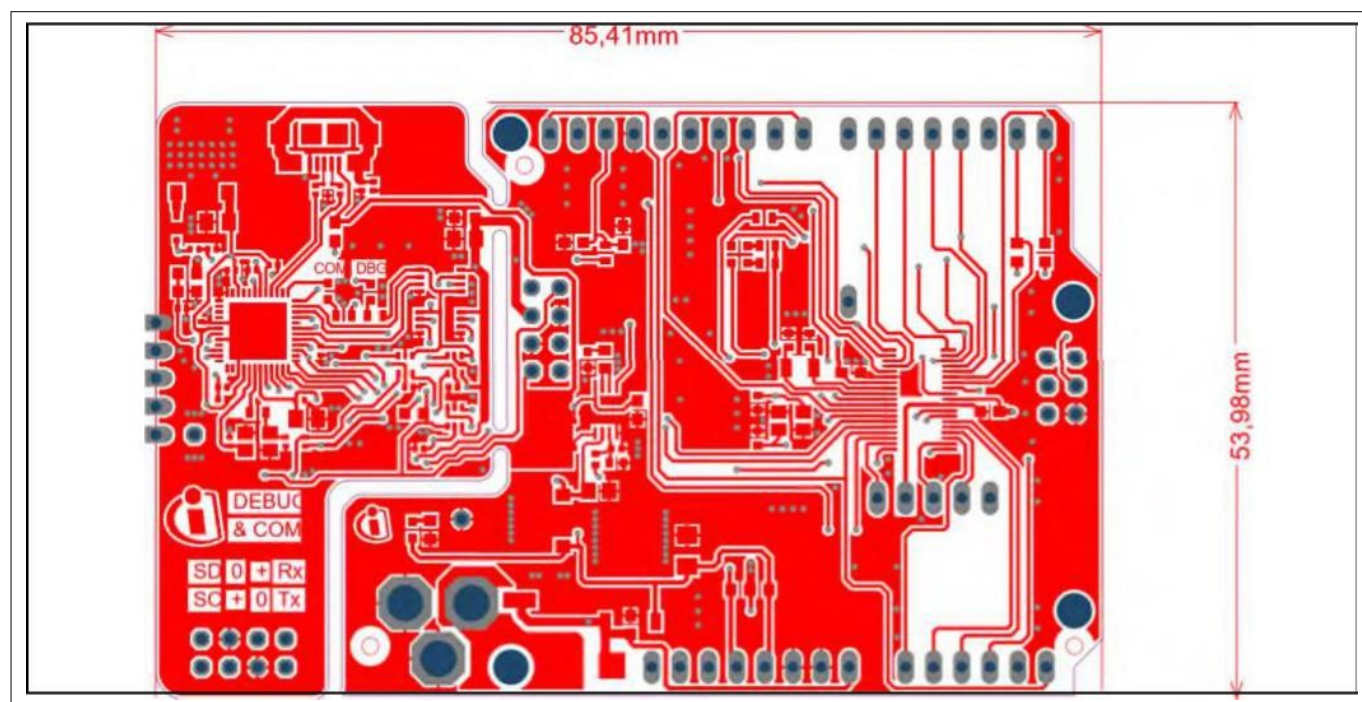
3.2 Layout and geometry

Figure 11   **XMC1400 CPU Card for Arduino layout and geometry**

3.3 Bill of materials

Table 10 **XMC1400 CPU Card for Arduino**

No .	Qty	Value	Device	Reference designator
1	1	AD / n.m.	PINHD-1X6	AD
2	3	FIDUCIAL	FIDUCIAL	ADJ_301, ADJ_302, ADJ_303
3	1	AD_AUX / n.m.*	PINHD-1X5	AD_AUX
4	1	AUX / n.m.*	PINHD-1X1LONG	AUX
5	4	BRIDGE10X10	BRIDGE10X10	BR101, BR102, BR201, BR202
6	4	15pF/0402	RCL_C-EUC0402	C2, C3, C4, C5
7	1	100u	CPOL-EUD	C101
8	3	100 n	C-EUC0603	C102, C105, C107
9	1	22 u/10 V	C-EUC1206	C103
10	1	10 u/10 V	C-EUC0805	C104
11	1	100 n	C-EUC0402	C106
12	2	220 nF/0603	RCL_C-EUC0603	C108, C110
13	1	100 nF/0603	RCL_C-EUC0603	C109
14	1	22 uF/10 V/0805	C-EUC0805K	C201
15	1	10 uF/10 V/0805	C-EUC0805K	C202
16	1	100 nF	CNP-0603	C203
17	8	100 nF/0402	C-EUC0402	C204, C207, C208, C209, C211,C212, C213,
18	2	15 pF/0402	C-EUC0402	C205, C206
19	1	10 uF/0805	C-EUC0805K	C210
20	1	no ass./10nF/0402	C-EUC0402	C214
21	1	SS13B	DIODE-SMB	D101
22	2	IFX25001MEV33	IFX25001MEV33	IC101, IC201
23	1	IFX25001TFV50	IFX25001TFV50	IC102
24	1	LMV358MM	LMV358MM	IC103
25	1	XMC1400-T038	XMC1400-T038	IC104
26	2	SN74LVC2T45DCT	SN74LVC2T45DCT	IC202, IC205
27	3	SN74LVC1T45DCK	SN74LVC1T45DCK	IC203, IC204, IC206
28	1	IOH / n.m.*	PINHD-1X10	IOH
29	1	IOL / n.m.*	PINHD-1X8	IOL
30	1	XMC_SWD / n.m.*	PINHD-1X5	JP202

(table continues…)

Table 10   (continued) XMC1400 CPU Card for Arduino

No .	Qty	Value	Device	Reference designator
31	1	BLM18PG600	L_EU_L0603	L201
32	1	green	LEDCHIPLED_0603	LED101
33	1	yellow	LEDCHIPLED_0603	LED102
34	2	LED-RED/D/0603	LED_LEDCHIP-LED0603	LED103, LED108
35	1	INFINEONS5	INFINEONS5	LOGO301
36	1	GND-PAD	GND-PAD	P101
37	1	INFINEONI3	INFINEONI3	PAGE101
38	1	INFINEONI5	INFINEONI5	PAGE201
39	1	POWER / n.m.*	PINHD-1X8	POWER
40	1	32.768KHz	MARS_FC135-32.768KHZ	Q1
41	1	BSL307SP	BSL307SP	Q101
42	1	CRYTAL_32X25_4PAD	CRYTAL_32X25_4PAD	Q102
43	1	CRYTAL_32X25_4PAD	CRYTAL_32X25_4PAD	Q201
44	1	n.m.	R-EU_R0603	R101
45	3	0R	R-EU_R0603	R102, R106, R107
46	2	1k	R-EU_R0603	R103, R109
47	2	10k	R-EU_R0402	R104, R105
48	1	0R/0603/NA	DSR_R-EU_R0603	R108
49	2	4K7/0603	DSR_R-EU_R0603	R110, R115
50	1	0R/0603	DSR_R-EU_R0603	R116
51	2	680R/0603	R-EU_R0603	R201, R202
52	2	33R/0402	R-EU_R0402	R204, R206
53	1	510R/0603	R-EU_R0603	R205
54	1	4k7/0402	R-EU_R0402	R207
55	6	10k/0402	R-EU_R0402	R208, R211, R214, R215, R216, R217
56	1	1M/0402	R-EU_R06030402	R209
57	2	5K10 / 1%	R-EU_R0603	R210, R212
58	1	n.m./0603	R-EU_R0603	R213
59	1	SEGGER.L_STOP	SEGGER.L_STOP	SEGGER201
60	1	ICSP / n.m.*	PINHD-2X3	SPI
61	1	XMC4200_QFN48	XMC4200_QFN48	U201
62	1	LED-GN/D/0603	LEDCHIPLED_0603	V201
62	1	LED-R/D/0603	LEDCHIPLED_0603	V202

(table continues...)

Table 10   **(continued) XMC1400 CPU Card for Arduino**

No .	Qty	Value	Device	Reference designator
63	1	BAT60A	BAT60	V203
64	1	ESD_2CH_TSFP-3-1	ESD_2CH_TSFP-3-1	V204
65	1	DC21MMX / n.m.*	DC21MMX	X101
66	1	Debug / n.m.*	MA04-2	X102
67	1	DEBUG / n.m.*	MA04-2	X201
68	1	ZX62-AB-5PA	ZX62-AB-5PA_MICRO-	X202
69	1	RESET / n.m.*	PINHD-1X1	X203

*n.m. (Not mounted)

Revision history

Document revision	Date	Description of changes
**	2023-09-12	New kit guide.
*A	2025-06-16	Template update; no content update

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