

# XMC1200 CPU Card

For XMC1000 Family

## CPU-12A-V1

XMC1200 CPU Card

## Board User's Manual

Revision 2.0, 2013-12-18

Microcontroller

**Edition 2013-12-18**

**Published by  
Infineon Technologies AG  
81726 Munich, Germany  
© 2013 Infineon Technologies AG  
All Rights Reserved.**

#### **Legal Disclaimer**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

#### **Information**

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

#### **Warnings**

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

## Revision History

| Page or Item                    | Subjects (major changes since previous revision) |
|---------------------------------|--------------------------------------------------|
| <b>Revision 2.0, 2013-12-18</b> |                                                  |
| 14, 15                          | Change C210 to 4.7uF                             |
|                                 |                                                  |
|                                 |                                                  |
|                                 |                                                  |
|                                 |                                                  |

## Trademarks of Infineon Technologies AG

AURIX™, C166™, CanPAK™, CIPOS™, CIPURSE™, EconoPACK™, CoolMOS™, CoolSET™, CORECONTROL™, CROSSAVE™, DAVE™, DI-POL™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPIM™, EconoPACK™, EiceDRIVER™, eupec™, FCOS™, HITFET™, HybridPACK™, I<sup>2</sup>RF™, ISOFACE™, IsoPACK™, MIPAK™, ModSTACK™, my-d™, NovalithIC™, OptiMOS™, ORIGA™, POWERCODE™, PRIMARION™, PrimePACK™, PrimeSTACK™, PRO-SIL™, PROFET™, RASIC™, ReverSave™, SatRIC™, SIEGET™, SINDRION™, SIPMOS™, SmartLEWIS™, SOLID FLASH™, TEMPFET™, thinQ!™, TRENCHSTOP™, TriCore™.

## Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, KEIL™, PRIMECELL™, REALVIEW™, THUMB™, µVision™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-ig™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Satellite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2011-11-11

## Table of Contents

|          |                                           |           |
|----------|-------------------------------------------|-----------|
| <b>1</b> | <b>Overview.....</b>                      | <b>7</b>  |
| 1.1      | Key Features .....                        | 7         |
| 1.2      | Block Diagram.....                        | 7         |
| <b>2</b> | <b>Hardware Description .....</b>         | <b>8</b>  |
| 2.1      | Power Supply .....                        | 8         |
| 2.2      | Reset .....                               | 9         |
| 2.3      | Clock Generation .....                    | 9         |
| 2.4      | Boot Option.....                          | 9         |
| 2.5      | Debug Interface and virtual com port..... | 9         |
| 2.6      | LED .....                                 | 9         |
| 2.7      | Potentiometer.....                        | 10        |
| 2.8      | Application Card connector .....          | 10        |
| <b>3</b> | <b>Production Data .....</b>              | <b>12</b> |
| 3.1      | Schematics .....                          | 12        |
| 3.2      | Layout and Geometry.....                  | 15        |
| 3.3      | Bill of Material .....                    | 15        |

## List of Figures

|          |                                            |    |
|----------|--------------------------------------------|----|
| Figure 1 | Block Diagram of XMC1200 CPU Card.....     | 7  |
| Figure 2 | XMC1200 CPU Card .....                     | 8  |
| Figure 3 | Power Supply circuit.....                  | 8  |
| Figure 4 | LEDs circuit.....                          | 10 |
| Figure 5 | Potentiometer Circuit.....                 | 10 |
| Figure 6 | Pinout of the 2x30 pin edge connector..... | 11 |
| Figure 7 | Schematic 1 of 2 XMC1200 CPU Card .....    | 13 |
| Figure 8 | Schematic 2 of 2 XMC1200 CPU Card .....    | 14 |
| Figure 9 | XMC1200 CPU Card layout and geometry ..... | 15 |

## List of Tables

|         |                           |    |
|---------|---------------------------|----|
| Table 1 | Debug connector X201..... | 9  |
| Table 2 | LEDs Pinout.....          | 10 |
| Table 3 | XMC1200 CPU Card.....     | 15 |

## Introduction

This document describes the features and hardware details of the XMC1200 CPU Card. This board is mounted with ARM® Cortex™-M0 based XMC1200 Microcontroller from Infineon Technologies AG and part of Infineon's XMC1000 offering of Kits

## 1 Overview

The XMC1200 CPU Card (CPU-12A-V1) houses the XMC1200 Microcontroller and a 2x30 pin edge for application expansion. This board along with application cards (e.g. LED Lighting Application Card) demonstrates the capabilities of XMC1200. The main use case for this board is to demonstrate the generic features of XMC1200 device including tool chain. The focus is safe operation under evaluation conditions. The board is neither cost nor size optimized and does not serve as a reference design.

### 1.1 Key Features

The XMC1200 CPU Card is equipped with the following features:

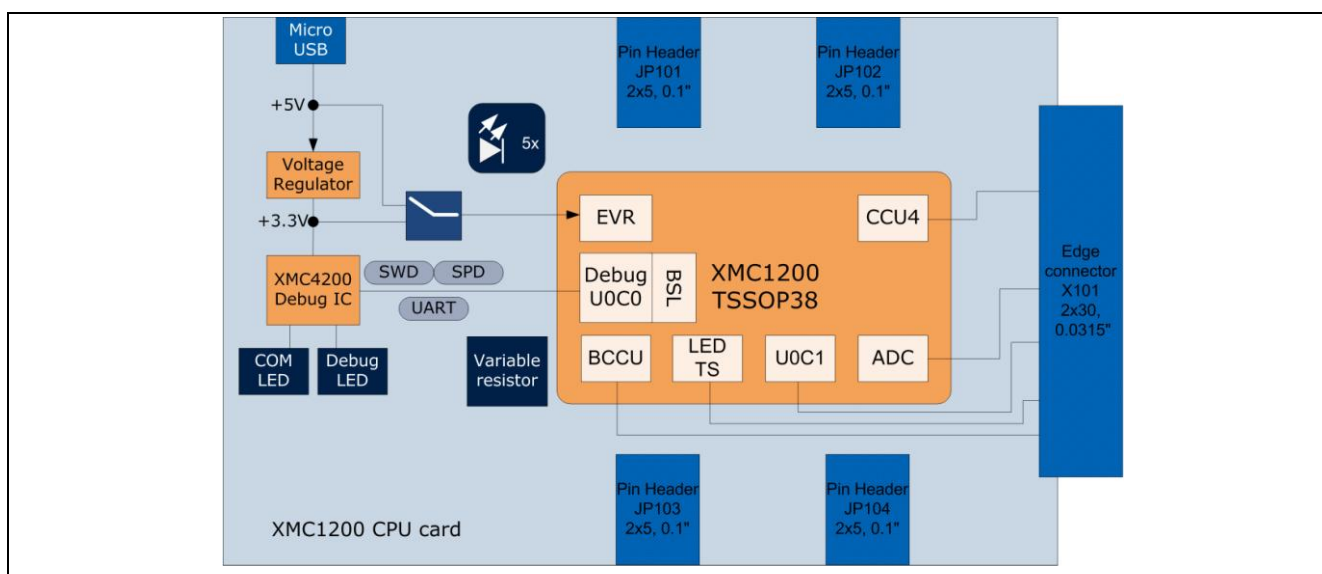
- XMC1200 (ARM® Cortex™-M0 based) Microcontroller, TSSOP38
- Connection to application cards via card edge connector
- Detachable SEGGER J-Link debugger and UART virtual COM port, with micro USB connector
- Five user LEDs
- Potentiometer, connected to analog input P2.5
- Power supply via Micro-USB connector

### 1.2 Block Diagram

Figure 1 shows the functional block diagram of the XMC1200 CPU Card.

Features include:

- On board Debugger, for downloading and debugging of application code
- Virtual com port for uart communication with terminal program e.g. Hyperterminal.
- 2x30 Card edge connector, for extension to application card e.g. LED Lighting and Motor Control Application Card.
- 5 User LEDs connected to GPIO P0.0, P0.2, P0.5, P0.6, P0.7
- Variable resistor R110 connected to Analog input P2.5
- All the pins of XMC1200 are accessible via the connector JP101, JP102, JP103 and JP104



**Figure 1 Block Diagram of XMC1200 CPU Card**



## 2.2 Reset

XMC1200 does not have a reset pin, hence, user needs to unplug and replug the USB cable to achieve power-on with master reset to the XMC1200 device.

## 2.3 Clock Generation

No external clock source is required. XMC1200 has two internal oscillators DCO1 and DCO2. DCO1 has a clock output of 64MHz. DCO2 is used to generate the standby clock running at 32.768KHz which used for Real Time Clock too. The main clock, MCLK and fast peripheral clock, PCLK, are generated from DCO1's output.

## 2.4 Boot Option

After power-on with master reset, XMC1200 device will enter different boot mode depend on the BMI (Boot Mode Index) value stored in XMC1200's flash configuration sector 0 (CS0). The BMI value pre-programmed in the XMC1200 CPU Card is User mode with debug enabled, hence, XMC1200 CPU Card will start to run the application code in its embedded Flash after power on reset.

## 2.5 Debug Interface and virtual com port

XMC1200 CPU Card 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 XMC1200. There is a 2x5 pins Header Debug connector X201.

**Table 1      Debug connector X201**

| Pin | Signal Name | XMC1200 Signal | Description        |
|-----|-------------|----------------|--------------------|
| 1   | SWCLK       | P0.15          | SWD clock signal   |
| 2   | SWD(SPD)    | P0.14          | SWD / SPD signal   |
| 3   | VDDP        | VDDP           | +5V                |
| 4   | GND         | VSSP           | Ground             |
| 5   | GND         | VSSP           | Ground             |
| 6   | VDDP        | VDDP           | +5V                |
| 7   | PC_TXD      | P1.3           | UART data received |
| 8   | PC_RXD      | P1.2           | UART data transmit |
|     |             |                |                    |

## 2.6 LED

The port pins P0.0, P0.2, P0.5, P0.6 and P0.7 are connected to LED101, LED102, LED103, LED104 and LED105 respectively. The LED is turns on by output 'Low' at the port pin.

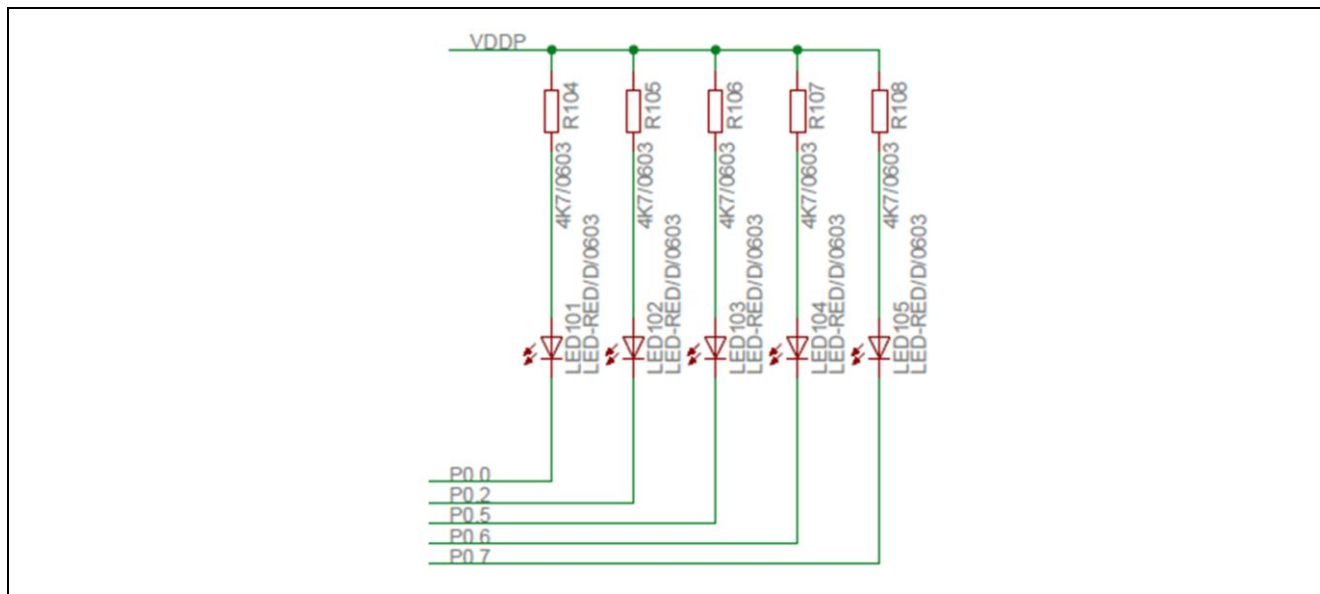


Figure 4 LEDs circuit

Table 2 LEDs Pinout

| LED    | XMC1200 Port Pin | Description            |
|--------|------------------|------------------------|
| LED101 | P0.0             | Output 'Low' to on LED |
| LED102 | P0.2             | Output 'Low' to on LED |
| LED103 | P0.5             | Output 'Low' to on LED |
| LED104 | P0.6             | Output 'Low' to on LED |
| LED105 | P0.7             | Output 'Low' to on LED |

## 2.7 Potentiometer

XMC1200 CPU Card provides a potentiometer R110 for ease of use and testing of the on-chip analog to digital converter. The potentiometer is connected to the analog input P2.5. The analog output of the potentiometer is the same the VDDP voltage supplied to the XMC1200 device.

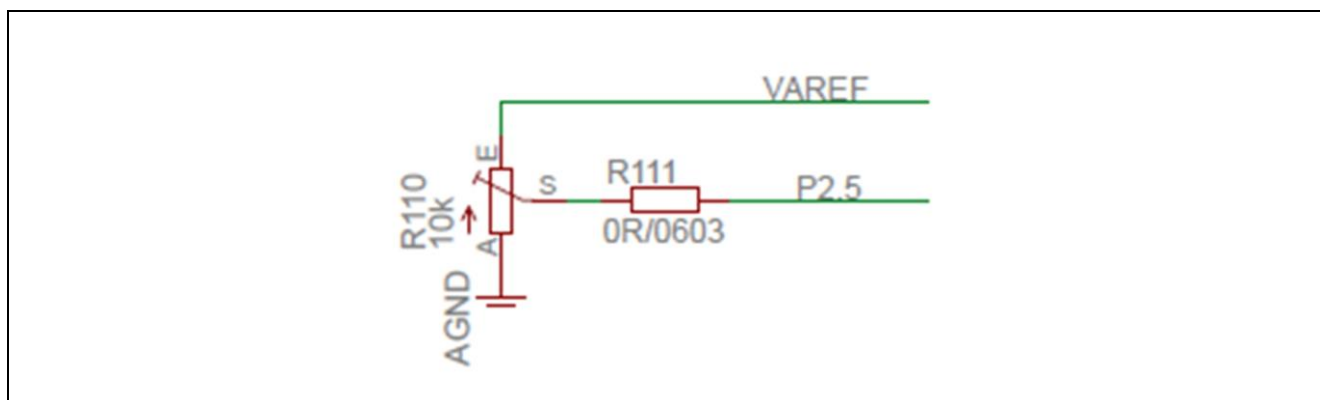


Figure 5 Potentiometer Circuit

## 2.8 Application Card connector

XMC1200 CPU Card has a 2x30 pins card edge connector. The mating connector is SAMTEC HSEC8-130-01-L-RA-XX.

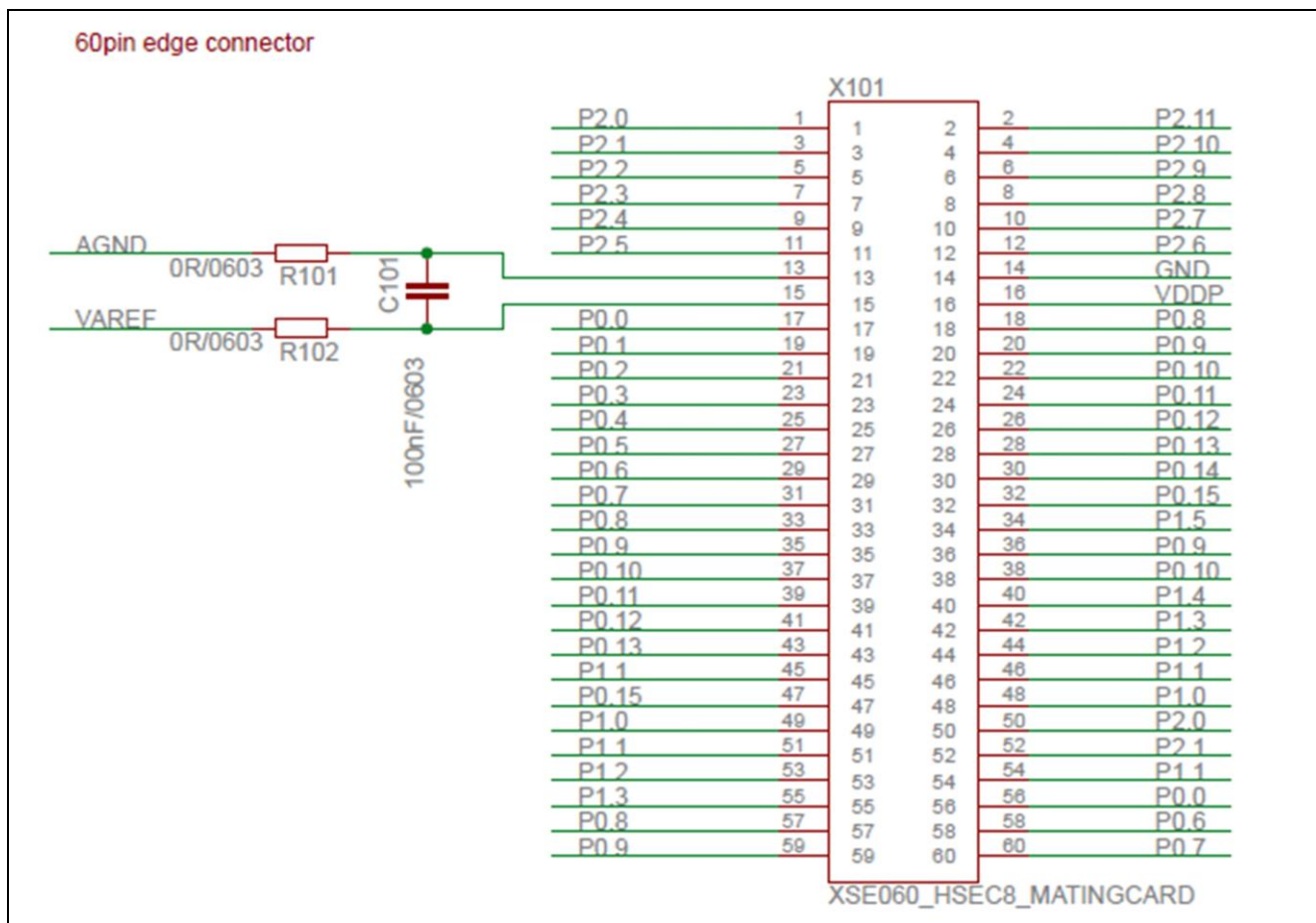


Figure 6 Pinout of the 2x30 pin edge connector

## **3            Production Data**

### **3.1           Schematics**

This chapter contains the schematics for the XMC1200 CPU Card:

- Figure 7: CPU, Pin Headers, Potentiometer and LED and 60pin Edge connector
- Figure 8: On-board Debugger, Power Supply

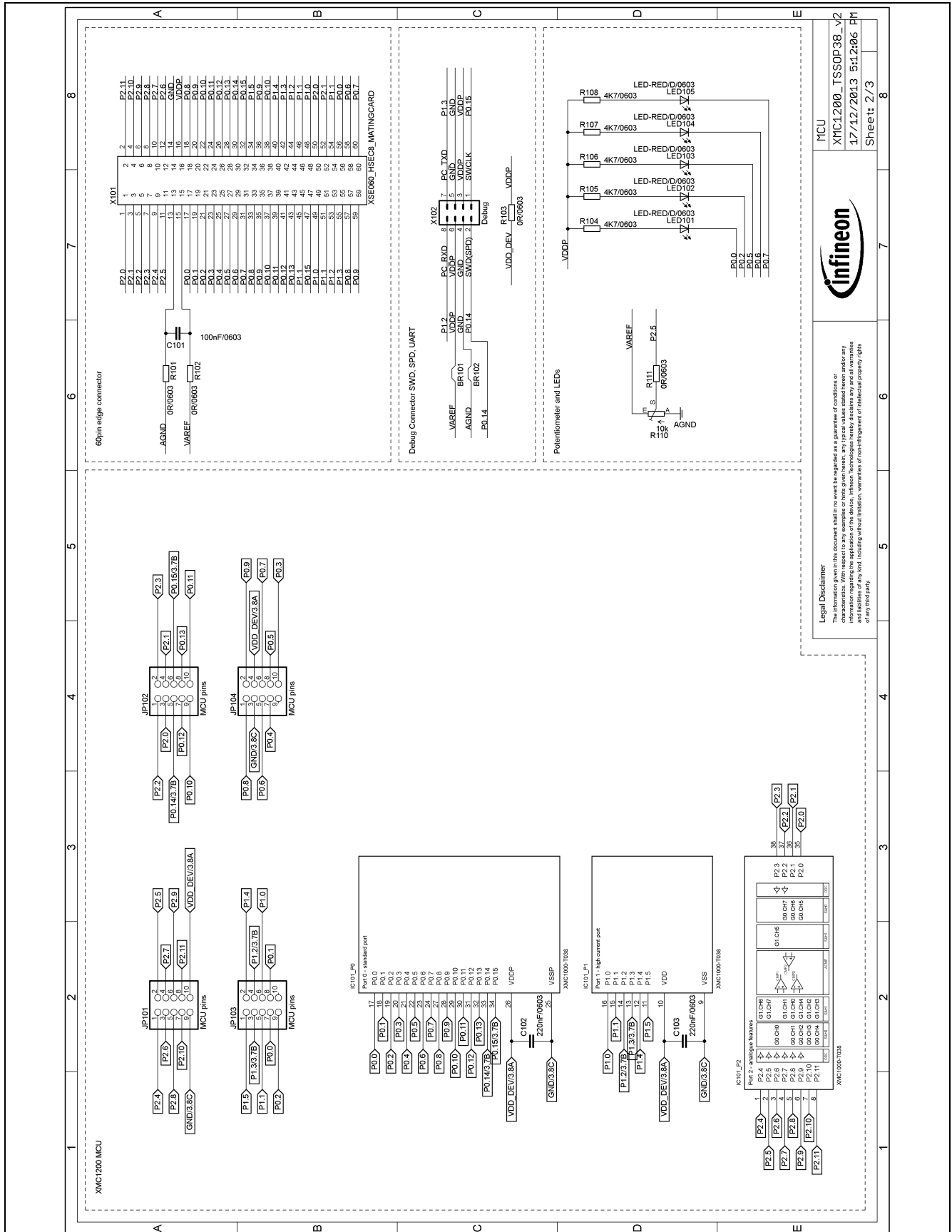
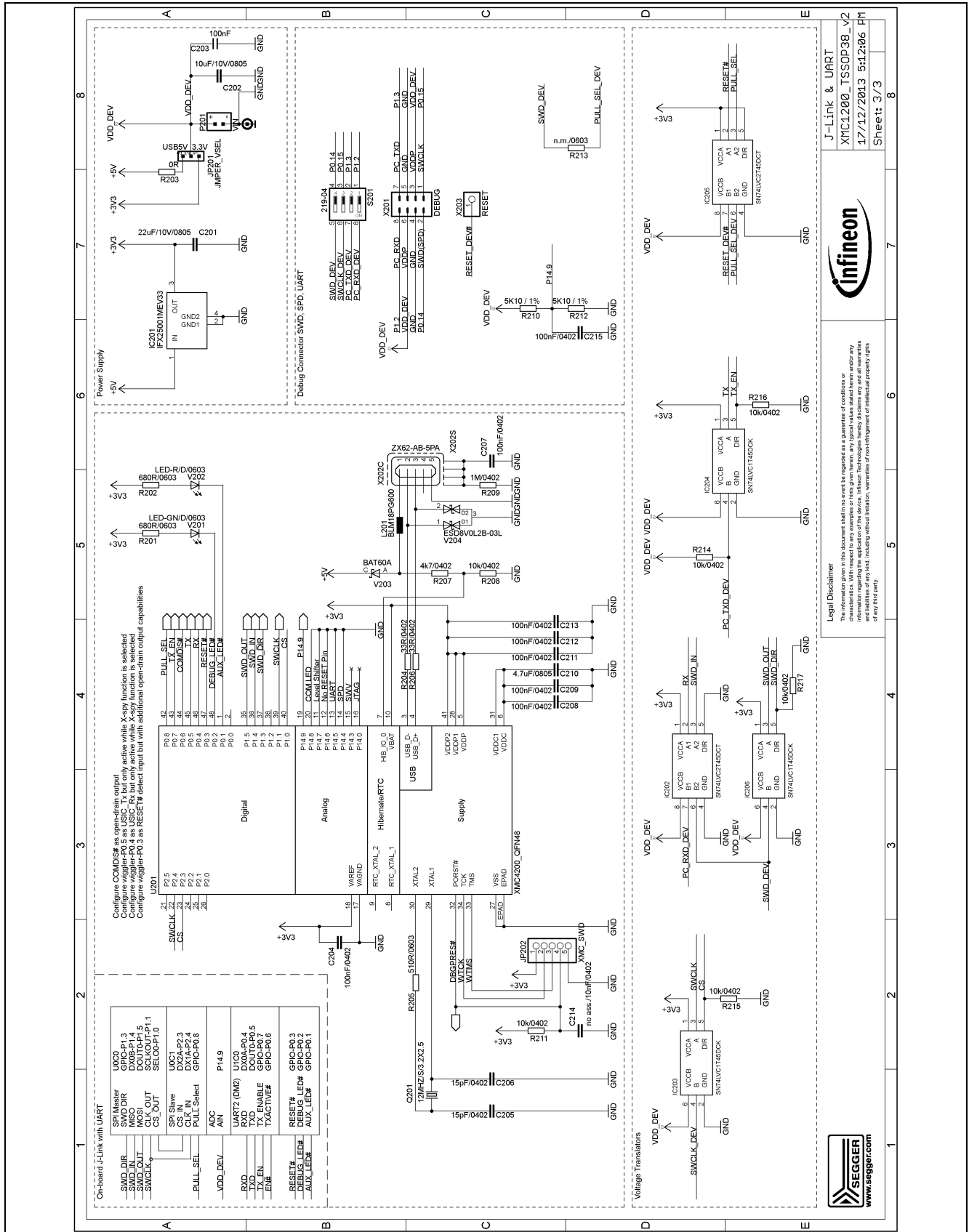


Figure 7 Schematic 1 of 2 XMC1200 CPU Card



**Figure 8 Schematic 2 of 2 XMC1200 CPU Card**

## 3.2 Layout and Geometry

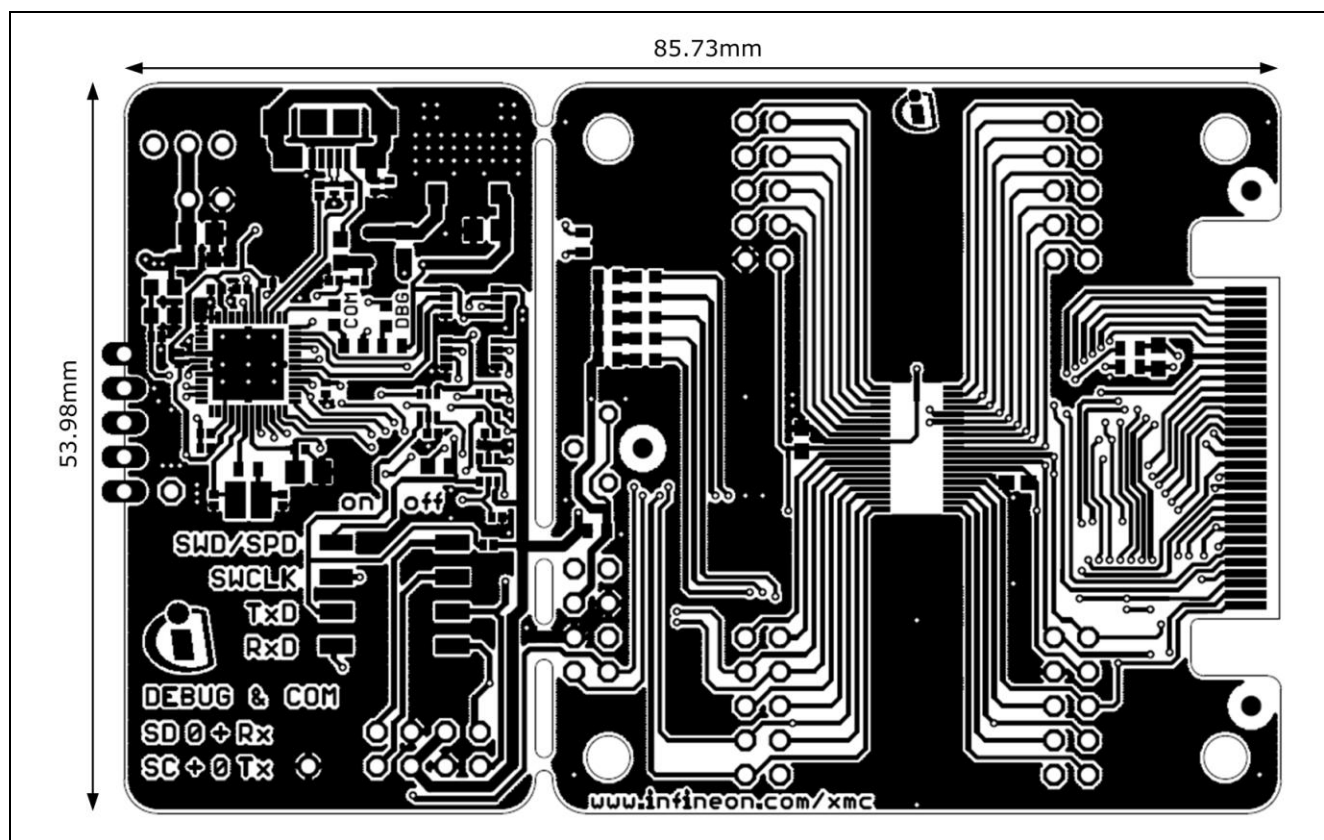


Figure 9 XMC1200 CPU Card layout and geometry

## 3.3 Bill of Material

Table 3 XMC1200 CPU Card

| No. | Qty | Value              | Device    | Reference Designator |
|-----|-----|--------------------|-----------|----------------------|
| 1   | 1   | 100nF/10V/10%/0603 | Capacitor | C101                 |
| 2   | 1   | 220nF/10V/10%/0603 | Capacitor | C102                 |
| 3   | 1   | 220nF/10V/10%/0603 | Capacitor | C103                 |
| 4   | 1   | 22uF/10V/10%/0805  | Capacitor | C201                 |
| 5   | 1   | 10uF/10V/10%/0805  | Capacitor | C202                 |
| 6   | 1   | 100nF/10V/10%/0603 | Capacitor | C203                 |
| 7   | 1   | 100nF/10V/10%/0402 | Capacitor | C204                 |
| 8   | 1   | 15pF/10V/10%/0402  | Capacitor | C205                 |
| 9   | 1   | 15pF/10V/10%/0402  | Capacitor | C206                 |
| 10  | 1   | 100nF/10V/10%/0402 | Capacitor | C207                 |
| 11  | 1   | 100nF/10V/10%/0402 | Capacitor | C208                 |
| 12  | 1   | 100nF/10V/10%/0402 | Capacitor | C209                 |
| 13  | 1   | 4.7uF/10V/10%/0805 | Capacitor | C210                 |
| 14  | 1   | 100nF/10V/10%/0402 | Capacitor | C211                 |
| 15  | 1   | 100nF/10V/10%/0402 | Capacitor | C212                 |
| 16  | 1   | 100nF/10V/10%/0402 | Capacitor | C213                 |

| No. | Qty | Value              | Device        | Reference Designator |
|-----|-----|--------------------|---------------|----------------------|
| 17  | 1   | 100nF/10V/10%/0402 | Capacitor     | C215                 |
| 18  | 1   | SN74LVC2T45DCT     | Resistor      | IC202                |
| 19  | 1   | SN74LVC1T45DCK     | Resistor      | IC203                |
| 20  | 1   | SN74LVC1T45DCK     | Resistor      | IC204                |
| 21  | 1   | SN74LVC2T45DCT     | Resistor      | IC205                |
| 22  | 1   | SN74LVC1T45DCK     | Resistor      | IC206                |
| 23  | 1   | BLM18PG600         | Ferrite Bead  | L201                 |
| 24  | 1   | LED-RED/D/0603     | Red ChipLED   | LED101               |
| 25  | 1   | LED-RED/D/0603     | Red ChipLED   | LED102               |
| 26  | 1   | LED-RED/D/0603     | Red ChipLED   | LED103               |
| 27  | 1   | LED-RED/D/0603     | Red ChipLED   | LED104               |
| 28  | 1   | LED-RED/D/0603     | Red ChipLED   | LED105               |
| 29  | 1   | 12MHZ/S/3.2X2.5    | Quarz         | Q201                 |
| 30  | 1   | 0R/0603            | Resisto       | R101                 |
| 31  | 1   | 0R/0603            | Resistor      | R102                 |
| 32  | 1   | 0R/0603            | Resistor      | R103                 |
| 33  | 1   | 4K7/0603           | Resistor      | R104                 |
| 34  | 1   | 4K7/0603           | Resistor      | R105                 |
| 35  | 1   | 4K7/0603           | Resistor      | R106                 |
| 36  | 1   | 4K7/0603           | Resistor      | R107                 |
| 37  | 1   | 4K7/0603           | Resistor      | R108                 |
| 38  | 1   | 10k                | Potentiometer | R110                 |
| 39  | 1   | 0R/0603            | Resistor      | R111                 |
| 40  | 1   | 680R/0603          | Resistor      | R201                 |
| 41  | 1   | 680R/0603          | Resistor      | R202                 |
| 42  | 1   | 33R/0402           | Resistor      | R204                 |
| 43  | 1   | 510R/0603          | Resistor      | R205                 |
| 44  | 1   | 33R/0402           | Resistor      | R206                 |
| 45  | 1   | 4k7/0402           | Resistor      | R207                 |
| 46  | 1   | 10k/0402           | Resistor      | R208                 |
| 47  | 1   | 1M/0402            | Resistor      | R209                 |
| 48  | 1   | 5K10/1%/0603       | Resistor      | R210                 |
| 49  | 1   | 10k/0402           | Resistor      | R211                 |
| 50  | 1   | 5K10/1%/0603       | Resistor      | R212                 |
| 51  | 1   | 10k/0402           | Resistor      | R214                 |
| 52  | 1   | 10k/0402           | Resistor      | R215                 |
| 53  | 1   | 10k/0402           | Resistor      | R216                 |
| 54  | 1   | 10k/0402           | Resistor      | R217                 |
| 55  | 1   | JMPER_VSEL         | 1x3 Header    | JP201                |
| 56  | 1   | JUMPER             | Red           | JP201a               |
| 57  | 1   | 219-04             | Switch - DIL  | S201                 |
| 58  | 1   | MA04-2             | 2x4 Header    | X102                 |
| 59  | 1   | MA04-2             | 2x4 Header    | X202                 |

| No. | Qty | Value             | Device                       | Reference Designator |
|-----|-----|-------------------|------------------------------|----------------------|
| 60  | 1   | LED-GN/D/0603     | ChipLED                      | V201                 |
| 61  | 1   | LED-R/D/0603      | ChipLED                      | V202                 |
| 62  | 1   | ESD8V0L2B-03L     | Diode                        | V204                 |
| 63  | 1   | ZX62-AB-5PA       | Micro-USB                    | X202                 |
| 64  | 1   | XMC1200-T038      | Microcontroller,<br>Infineon | IC101                |
| 65  | 1   | IFX25001MEV33     | 3V3 regulator,<br>Infineon   | IC201                |
| 66  | 1   | XMC4200_QFN48     | Microcontroller,<br>Infineon | U201                 |
| 67  | 1   | BAT60A            | Diode                        | V203                 |
| 68  | 1   | BRIDGE10X10       | BRIDGE10                     | BR101                |
| 69  | 1   | BRIDGE10X10       | BRIDGE10                     | BR102                |
| 70  | 1   | no ass./10nF/0402 | Capacitor                    | C214                 |
| 71  | 1   | no ass./MCU       | 2x5 pin header               | JP101                |
| 72  | 1   | no ass./MCU       | 2x5 pin header               | JP102                |
| 73  | 1   | no ass./MCU       | 2x5 pin header               | JP103                |
| 74  | 1   | no ass./MCU       | 2x5 pin header               | JP104                |
| 75  | 1   | no ass./XMC_SWD   | 1x5 pin header               | JP202                |

[www.infineon.com](http://www.infineon.com)

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Infineon:](#)

[KIT\\_XMC12\\_BOOT\\_001](#) [KITXMC12BOOT001TOBO1](#)