Development and Prototyping X2-Series Expansion Board

September 2024

Revision 001

***X2BDEV10XZ** Development and Prototyping X2-Series Expansion Board*

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Before opening the host product enclosure, disconnect all power sources and any connection to external devices, including USB and Ethernet cables.

Follow all applicable electrical safety standards, guidelines, specifications and regulations for installation, wiring and operations of this board.

Carefully and fully read this user guide before installation, as well as the user guide of the host product.

This board is not authorised for use in safety-critical applications where a failure of the product would reasonably be expected to cause personal injury or death. Safety-critical applications include, without limitation, life support devices and systems, equipment or systems for the operation of nuclear facilities and weapons systems. This board is neither designed nor intended for use in critical military or aerospace applications or environments and for automotive applications or environment. Customer acknowledges and agrees that any such use of this board is solely at Customer's risk, and that Customer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

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Safety information

Carefully and fully read this user guide before installation and retain it for future reference.

Qualified personnel

The product described in this manual must be operated only by personnel qualified for the specific task and installation environment, in accordance with all relevant documentation and safety instructions. A qualified person should be capable of fully identifying all installation and operation risks and avoid potential hazards when working with this product.

Hazard levels

This manual contains information you must observe to ensure your personal safety and prevent damage to property. Safety information in this manual are highlighted by the safety symbols below, graded according to the degree of danger.

DANGER

Indicates a hazardous situation which, if not avoided, **will** result in death or serious personal injury.

WARNING

Indicates a hazardous situation which, if not avoided, **may** result in death or serious personal injury.

CAUTION

Indicates a hazardous situation which, if not avoided, can result in minor or moderate personal injury.

NOTICE

Indicates a situation which, if not avoided, can result in damage of property.

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Safety instructions

General safety instructions

Protect the unit against moisture, dirt and any kind of damage during transport, storage and operation. Do not operate the unit outside the specified technical data.

Never open the housing. If not otherwise specified, install in closed housing (e.g. distribution cabinet). Earth the unit at the terminals provided, if existing, for this purpose. Do not obstruct cooling of the unit. Keep out of the reach of children.

WARNING

Life threatening voltages are present within and around an open control cabinet.

When installing this product in a control cabinet or any other areas where dangerous voltages are present, always switch off the power supply to the cabinet or equipment.

WARNING

Risk of fire if not installed and operated properly.

Follow all applicable electrical safety standards, guidelines, specifications and regulations for installation, wiring and operations of this product.

The expansion board could generate a substantial amount oh heat, particularly when subject to a significant amount of electrical load.

NOTICE

The connection of expansion devices to this product may damage the product and other connected systems, and may violate safety rules and regulations regarding radio interference and electromagnetic compatibility.

Use only appropriate tools when installing this product. Using excessive force with tools may damage the product, alter its characteristics or degrade its safety.

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Introduction

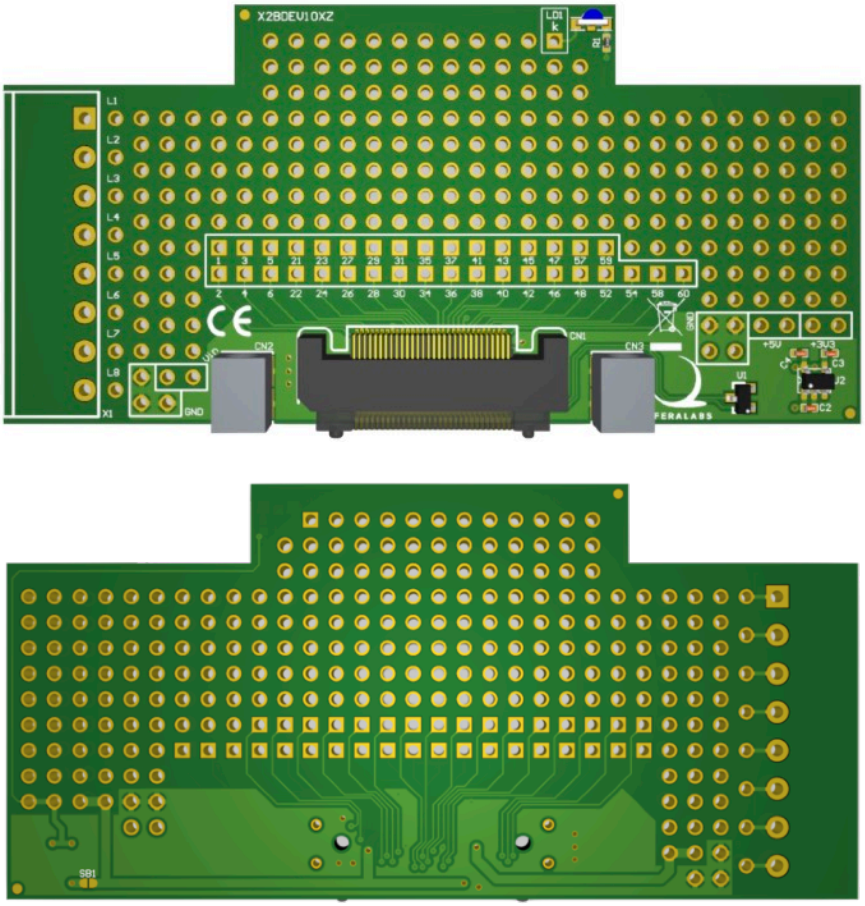
The X2-Series X2BDEV10XZ board is a development and prototyping circuit board that exposes all standard X2-Series expansion bus lines making it easy to design and test custom circuits.

The proto area is a two sided grid of standard 100 mil (0.1") spaced thru-holes for soldering. The board also has holes on one side for an X2-Series standard 3.81 mm (0.15") 8 lines pluggable terminal block.

A front facing LED can be wired to be turned on when the board is powered, or driven by custom circuits.

An on-board 3.3 V regulator is also available and can be wired to the main 5 V board power rail if needed.

This manual also serves as the official X2-Series Standard Electrical and Mechanical Specifications.



X2BDEV10XZ DEVELOPMENT AND PROTOTYPING X2-SERIES EXPANSION BOARD

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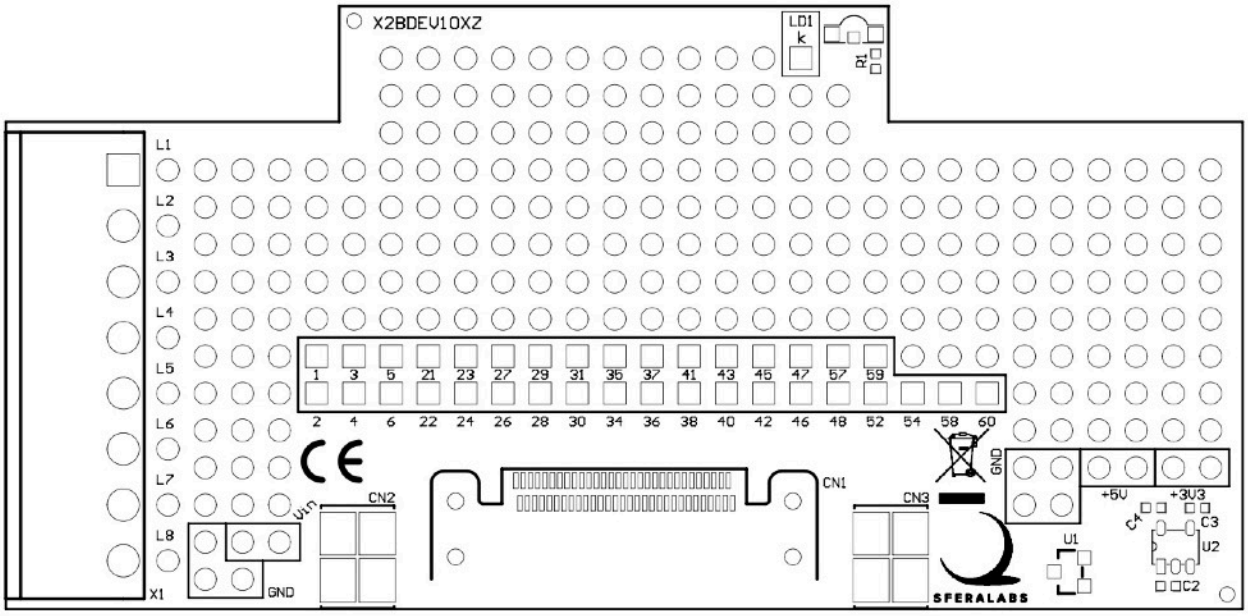
Features

- ✓ Mechanical and electrical interconnection reference design for the X2-Series Standard
- ✓ Break out of all X2 board-to-board connector lines
- ✓ 3.3 V 300 mA LDO voltage regulator
- ✓ DS28E05 1-Wire EEPROM for X2-Series board identity
- ✓ Blue LED.

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Device identification

The circuit board is identified by the "**X2BDEV10XZ**" markings on the upper left corner of the circuit board (front view). One or more alphanumeric characters may be printed after the version number.



CIRCUIT BOARD IDENTIFICATION MARKINGS

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Hardware setup

Connections

In order to install or remove the expansion board, the plastic DIN rail enclosure must be removed

NOTICE

Before opening the host product enclosure, disconnect all power sources and any connection to external devices, including USB and Ethernet cables.

Follow the host product user guide installation instructions.

This expansion board can be installed in any X2 standard slot.

Carefully align the board-to-board connectors and gently push the board in place. Note that the connectors could be damaged if not properly aligned during insertion or removal.

Use the two screws provided with the expansion board to lock the board in place.

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Using the Development and Proto Expansion Board

Power Supply

The main 5V power supply rail voltage is available on two thru-hole pads marked as "+5V" in the bottom right corner of the board.

Ground pads are available on seven pads marked as "GND", left and right of the board-to-board connector

The host system power supply input voltage, after protection circuits, is available on two two pads marked as "Vin", to the left of the board-to-board connector.

In order to use the on-board 3.3 V regulator, its input should be connected to the 5V rail. This is done with a solder joint on pad SB1, on the back side of the board.

The 3.3V output is available on two pads marked as "+3V3".

LED

In order to have LD1 turn on when the board receives the main 5V power supply rail voltage, connect the pad marked as "LD1 k", the diode's cathode, to GND. You may also control the LED with an open-collector driver.

Board Identity EEPROM

Each X2-Series board is equipped with a 1-Wire identity EEPROM, used by the host system to detect the presence and read the type and serial number of the boards installed in each expansion slot.

The EEPROM IC is an Analog Devices / Maxim Integrated DS28E05, a 112-byte user-programmable EEPROM organized as 7 pages of 16 bytes each. Each part has its own guaranteed unique 64-bit ROM identification number (ROM ID) that is factory programmed into the chip.

The 1-Wire data line is connected to pin 21 of the board-to-board connector.

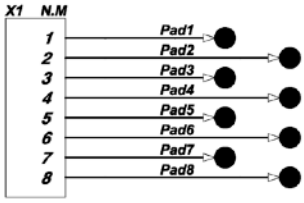
The ground pin goes to pin 23 of the board-to-board connector.

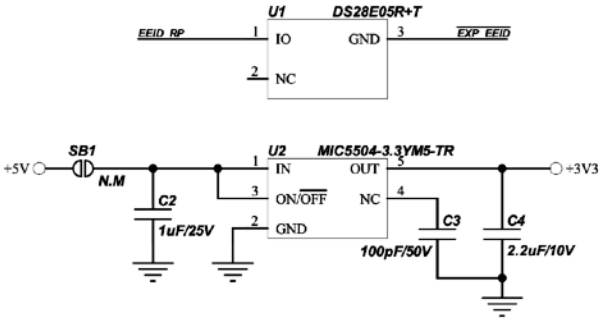
There are no other connections needed, so this EEPROM also works when the expansion slot 5V supply is turned off.

The factory-set development board type id is 07h.

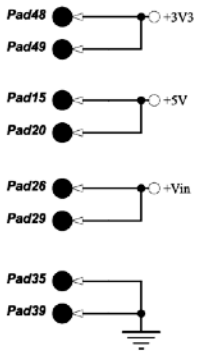
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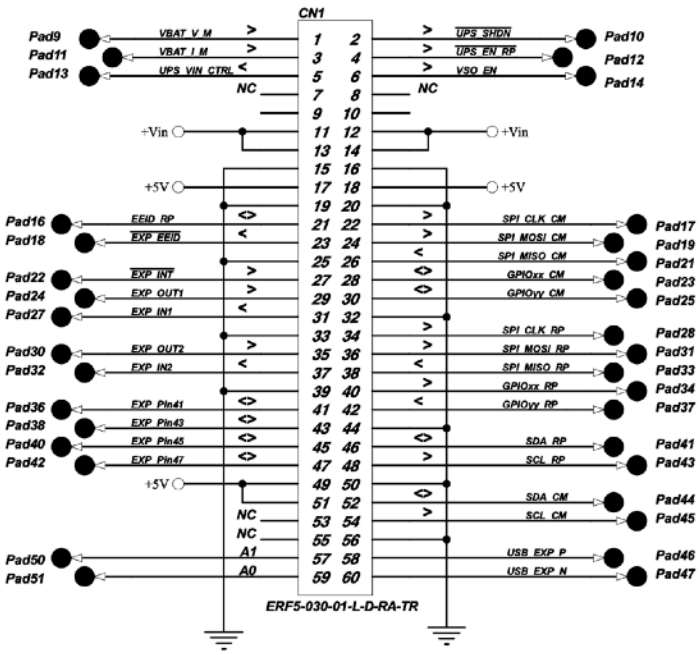
Schematic Diagram











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Bill Of Material

Des.	Not Placed	Manufacturer	P/N	Value	Description
C2		Murata	GRT155R61E105KE01D	1uF/25V	Ceramic capacitor
C3				100pF 50V 0402	Ceramic capacitor
C4		Murata	GRM155Z71A225KE01D	2.2uF/10V	Ceramic capacitor
CN1		Samtec	ERF5-030-01-L-D-RA-TR		
CN2		Wurth Elektronik	7466303		WP-SMRA REDCUBE
CN3		Wurth Elektronik	7466303		WP-SMRA REDCUBE
HW1				M3 6mm	Metal screw
HW2				M3 6mm	Metal screw
LD1		Wurth Elektronik	155124BS73200		WL-SMSW Blue LED
R1				4K7 Ohm 0402 1%	resistor
U1		Analog Devices	DS28E05R+T		1-Wire EEPROM
U2		Microchip	MIC5504-3.3YM5-TR		LDO regulator
X1	✔	Wurth Elektronik	691322310008		3.81MM WR-TBL

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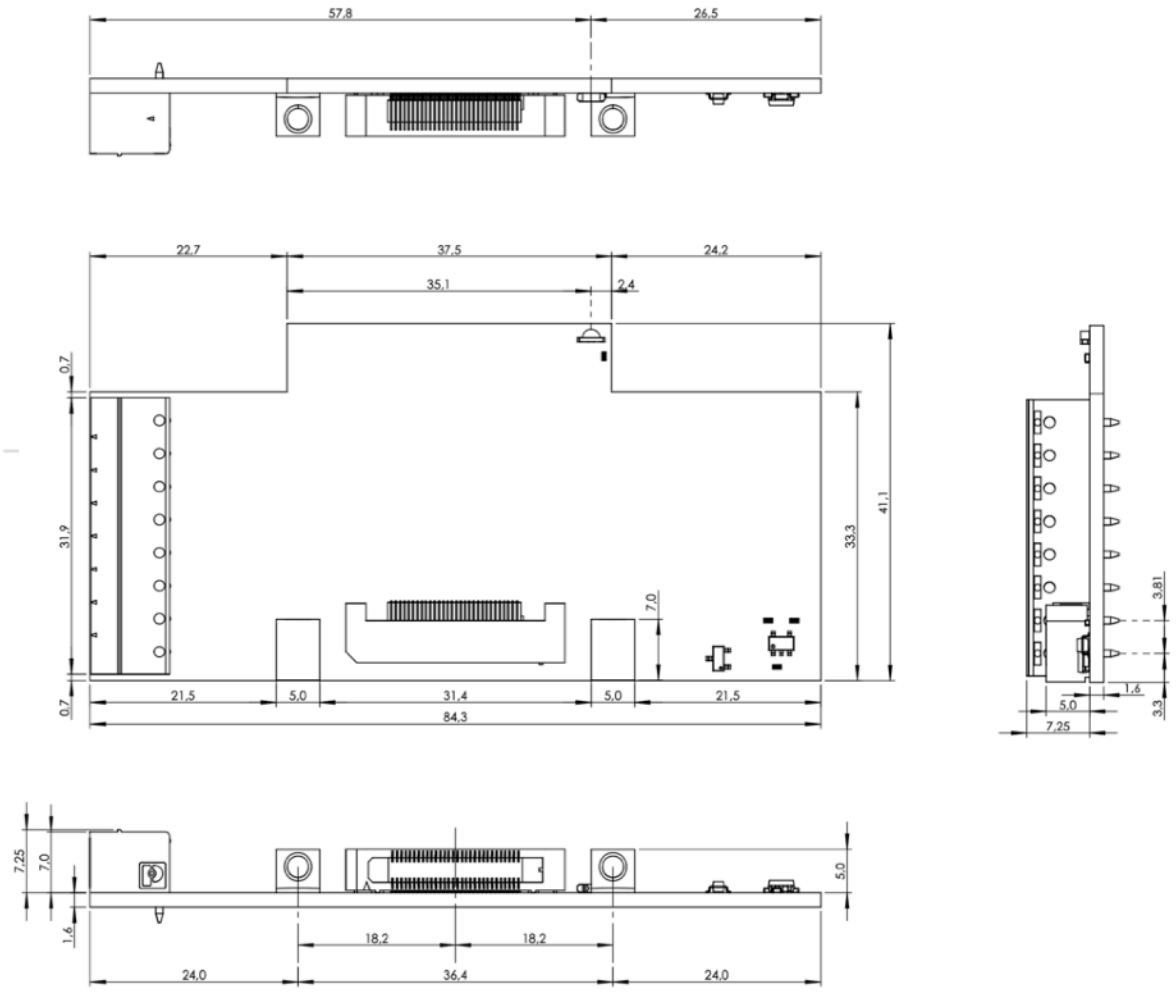
Technical specifications

Note: all values typical, at +25 °C and under normal operating conditions.

INTERNAL LDO VOLTAGE REGULATOR	
Output voltage	3.3 V
Output voltage accuracy	+/- 3%
Output current	300 mA
ENVIRONMENTAL	
Operating temperature	-20…+60 °C
Storage temperature	-30…+80 °C
Altitude	Up to 2000 m
Humidity	5% to 95% RH noncondensing
MECHANICAL	
3.81 mm pitch terminal block characteristics	Maximum conductor cross section: 1.3 mm2 (16AWG), or 0.5 mm2 when using ferrules (highly recommended) Recommended stripping length: 6 mm Screw thread: M2 Maximum screws tightening torque: 0.3 Nm
Dimensions	width: 84.3 mm height: 41.1 mm depth: 8.0 mm
Weight	15 g (including screws)

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Dimensions



X2BDEV10XZ DIMENSIONS (mm)

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Disposal

Waste Electrical & Electronic Equipment



(Applicable in the European Union and other European countries with separate collection systems). This marking on the product, accessories or literature indicates that the product should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

Installation and use restrictions

Standards and regulations

The design and the setting up of electrical systems must be performed according to the relevant standards, guidelines, specifications and regulations of the relevant country. The installation, configuration and programming of the devices must be carried out by trained personnel.

The installation and wiring of connected devices must be performed according to the recommendations of the manufacturers (reported on the specific data sheet of the product) and according to the applicable standards.

All the relevant safety regulations, e.g. accident prevention regulations, law on technical work equipment, must also be observed.

Safety instructions

Carefully read the safety information section at the beginning of this document.

Set-up

For the first installation of the device proceed according to the following procedure:

- ✓ make sure all power supplies are disconnected
- ✓ install and wire the device according to the schematic diagrams on the specific product user guide
- ✓ after completing the previous steps, switch on the power supply and other related circuits.

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Conformity Information

EU

This device complies with the following applicable European Community harmonised standards:

✓ 2011/65/EU and 2015/863/EU - Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 3)

The declaration of conformity is available at: https://www.sferalabs.cc

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