



ConnectCore MP25

Development Board

Hardware Reference Manual

Revision history—90002594

Revision	Date	Description
1P	August 2024	Initial draft.

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- Description of issue
- Steps to reproduce

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About the ConnectCore MP25 DVK

The Digi ConnectCore® MP25 System-on-Module (SOM) platform is a highly integrated, cost-effective, connected, secure embedded solution, built on the STM32MP25 MPU family. It integrates memory, power management, pre-certified wireless connectivity and advanced Digi TrustFence device security with a complete, open-source Linux software platform based on the Yocto Project.

Note While the ConnectCore MP25 system-on-module is designed to be used in a production environment, the ConnectCore MP25 Development Kit is designed only for development and testing in a pre-production environment.

Features and functionality

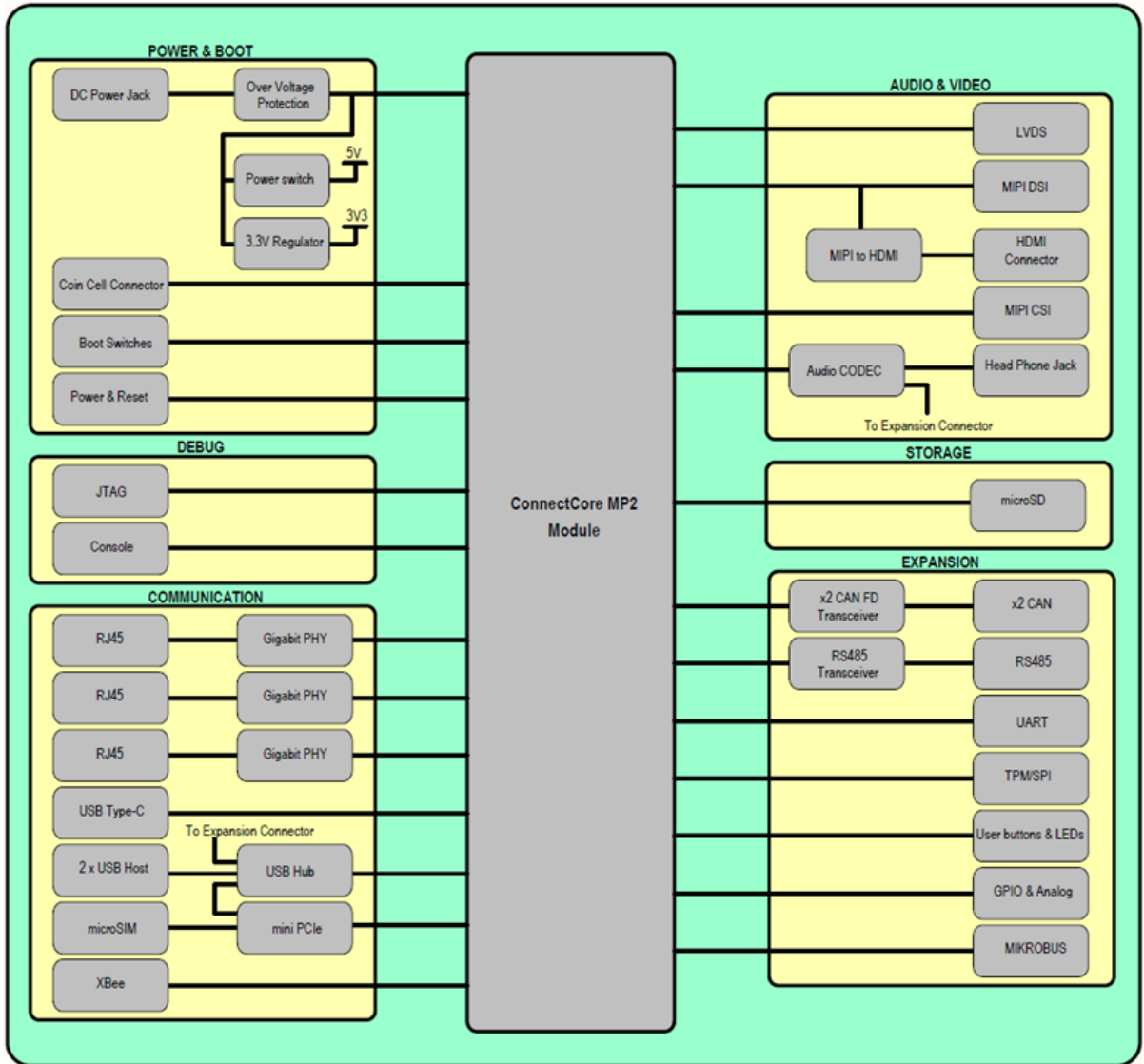
- ConnectCore MP25 module:
 - STM32MP25 dual ARM Cortex-A35 and single Cortex-M33 cores operating at speeds up to 1.5 GHz
 - Up to 1 GB 16-bit DDR4 memory
 - Up to 8 GB 8-bit eMMC memory
 - IEEE 802.11 a/b/g/n/ac/ax WLAN (WiFi 6) and Bluetooth 5.4
- Power
 - Power jack (5 V)
 - On-board supercap supplying the module's and on-board RTCs
 - Power and reset buttons
- Boot source configuration
 - eMMC
 - USB
- Debug
 - JTAG/serial-wire debug port
 - Serial console at C-type USB connector
- Multimedia
 - HDMI display (through MIPI-to-HDMI transceiver)
 - LVDS interface with up to four differential data pairs
 - MIPI CSI-2 camera with two data pairs
 - Audio CODEC supporting the following functionality:
 - One 3.5 mm headphone jack
 - One 3.5 mm microphone jack
 - Two speaker outputs

- One line-out output
- Two line-in inputs
- Storage
 - MicroSD card slot
- Communication
 - Up to three Gigabit Ethernet with RJ45 connector
 - RS-485
 - Two CAN FD
 - Two USB Host 2.0 interfaces through a stacked USB A type connector
 - USB type-C port supporting USB 2.0
 - PCI Express Mini Card slot supporting full and half-size cards connected through USB and PCIE
 - XBee socket supporting XBee Cellular
 - MikroBus socket
 - IEEE 802.11 a/b/g/n/ac/ax + Bluetooth 5.4 with on-module U.FL or external SMA antenna connector
- User
 - Three user LED, two of them shared with user button
 - One tamper button
- Dimensions
 - 120 x 160 mm

Safety instructions

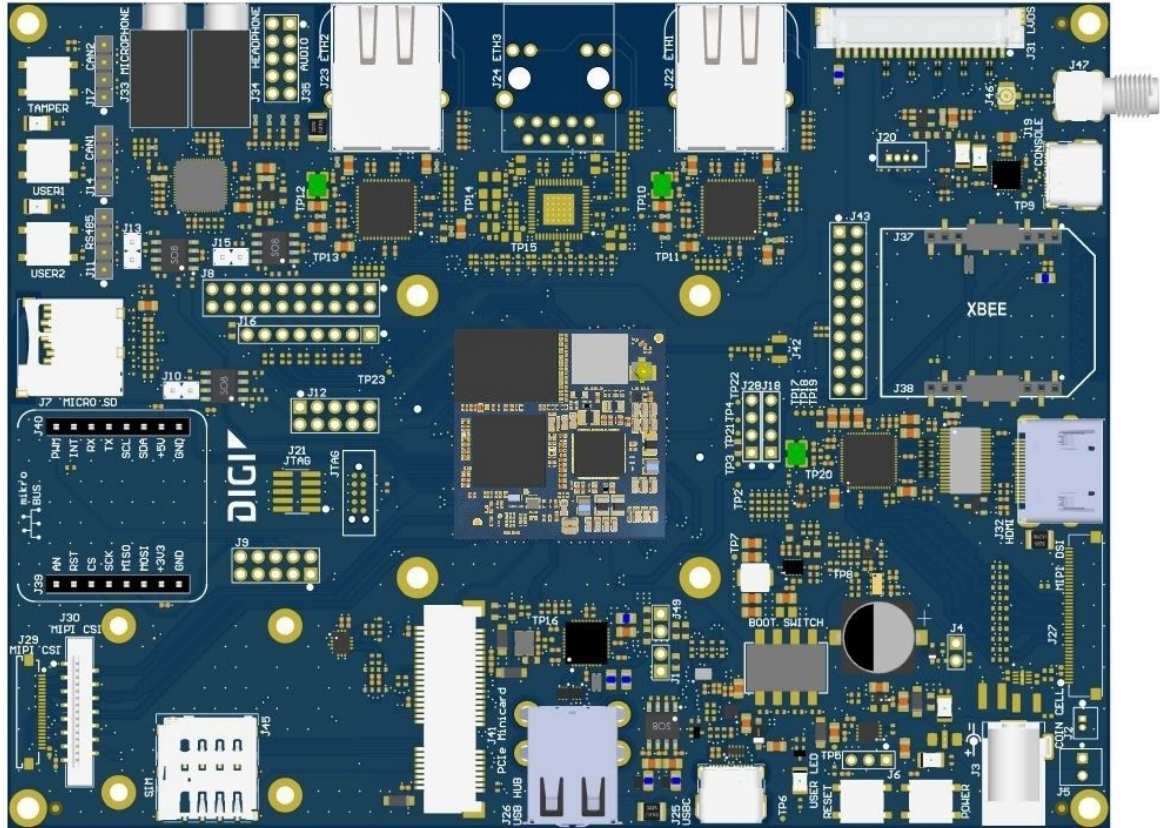
- The ConnectCore MP25 Development Board cannot be guaranteed operation due to the radio link and so should not be used for interlocks in safety critical devices such as machines or automotive applications.
- The ConnectCore MP25 Development Board has not been approved for use in (this list is not exhaustive):
 - nuclear applications
 - explosive or flammable atmospheres
- There are no user serviceable components inside the ConnectCore MP25 Development Board. Do not modify the ConnectCore MP25 in any way. Modifications may exclude the Development Board from any warranty and can cause the ConnectCore MP25 to operate outside of regulatory compliance for a given country, leading to the possible illegal operation of the radio.
- Use industry standard ESD protection when handling the ConnectCore MP25 Development Board.
- Take care while handling to avoid electrical damage to the PCB and components.
- Do not expose ConnectCore MP25 Development Board to water or moisture.
- Use this product with the antennas specified in the ConnectCore MP25 Development Board user guides.

Block diagram

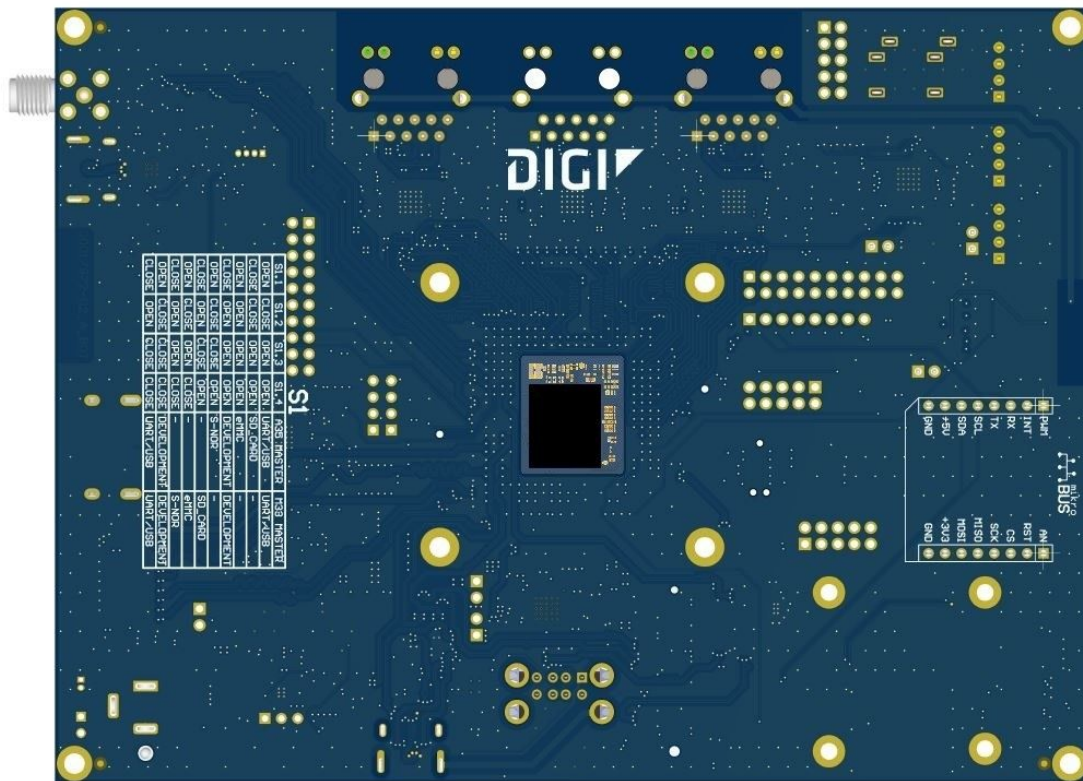


Placement

Top view



Bottom view



Connectors

The following table lists all connectors on the ConnectCore MP25:

Connector	Interface
J1	VSYS/VSYS2 series jumper
J2	Coin-cell
J3	5V power-in jack
J4	VCC_LICELL series jumper
J5	5V power-in
J6	Power and reset buttons
J7	MicroSD
J8	Flexible IO

Connector	Interface
J9	TPM SPI
J10	RS485 termination resistor
J11	RS485
J12	UART
J13	CAN1 termination resistor
J14	CAN1
J15	CAN2 termination resistor
J16	QSPI
J17	CAN2
J18	I2C1 expansion
J19	USB console
J20	TTL console
J21	JTAG
J22	ETH1 RJ45
J23	ETH2 RJ45
J24	ETH3 RJ45
J25	USB type-C
J26	Dual USB A-type receptacle
J27	MIPI display
J28	I2C2 expansion
J29	MIPI camera
J30	MIPI camera
J31	LVDS display
J32	HDMI
J33	Microphone jack
J34	Headphones jack
J35	Audio expansion
J37-J38	XBee socket
J39-40	MikroBus socket

Connector	Interface
J41	Mini PCIe
J42	U.FL
J43	WLAN/Bluetooth expansion
J45	Micro SIM
J46	U.FL
J47	SMA
J49	3V3 series jumper
CAD1	JTAG Tag Connect
S1	Boot switches
SW1	Power button
SW2	Reset button
SW3	Tamper button
SW4	User button
SW5	User button

Interfaces

The following interfaces are available on the ConnectCore MP25:

Power interfaces

This section describes the ConnectCore MP25 power interfaces.

DC-in jack connector

The input voltage of the ConnectCore MP25 Development Board is 5V. This input power supply is provided via a DC-in power jack connector.

Note There is an additional 2-pin power connector (J5) not populated by default.

An overvoltage circuit protects the board from overvoltage and overcurrent events. Downstream from these input power protections, there are two regulators/switches for powering the carrier board circuitry:

- **5V load switch (U4):** A 5V load switch that controls the power delivery to different interfaces on the carrier board.
- **3.3V On-board regulator (U3):** A regulator that provides 3.3V to different peripherals of the development board.

RTC

The ConnectCore MP25 Development Board supports an external RTC, which is powered from an on-board supercap (C5). This supercap also powers the internal RTC of the ConnectCore MP25 module.

Power and reset buttons

One power button (SW1) and one reset button (SW2) are included on the development board.

System boot

The ConnectCore MP25 module supports different boot modes (see the [ConnectCore MP25 System-on-Module Hardware Reference Manual](#) for detailed information). A quadruple switch (S1) allows you to select the desired mode:

S1.1	S1.2	S1.3	S1.4	A35 Master	A33 Master
Open	Close	Open	Open	UART/USB	UART/USB
Close	Close	Open	Open	SD-Card	-
Open	Open	Open	Open	eMMC	-
Close	Open	Open	Open	Development	Development
Open	Close	Close	Open	S-NOR	-
Close	Open	Close	Open	-	SD-Card
Open	Close	Open	Close	-	eMMC
Close	Open	Open	Close	-	S-NOR
Open	Close	Close	Close	Development	Development
Close	Open	Close	Close	UART/USB	UART/USB

Note To boot from microSD you must use the SDMMC1 interface, which is connected to the wireless chip internally in the SOM. This means that only non-wireless variants of the CCMP2 can boot from an external microSD.

Debug interfaces

JTAG

The ConnectCore MP25 Development Board provides a Tag Connect footprint for accessing the STM32MP25 JTAG debug port. Additionally, a standard 10-pin, 1.27 mm pitch connector (J21) is available for accessing the JTAG interface:

Pin	Signal name	Description
1	JTMS-SWDIO	Mode select line
2	VDDIO	3.3V power supply
3	JTCK-SWCLK	Clock line
4	GND	
5	JTDO-TRANCESWO	Data output line
6	GND	
7	JTDI	Data input line
8	NC	
9	NRST	Reset line of the CPU
10	GND	



CAUTION! Pinout mirrored compared to standard pinout.

Console port

A dedicated USB type-C connector (J19) provides access to the console port of the ConnectCore MP25 system-on-module. This USB port is routed directly to a bridge that converts the USB bus into TTL level. USART2 is used as the console debug port of the STM32MP25 CPU. This USART can also be accessed directly at TTL level through J20 connector (not populated by default):

Pin	Signal name	Description
1	CONSOLE_A35_TX	USART transmission line
2	CONSOLE_A35_RX	USART receiver line
3	3V3_SOM	3.3V power supply
4	GND	

Default console port settings:

- Baud rate: 115200
- Data: 8 bit
- Parity: none
- Stop: 1 bit
- Flow control: none

Multimedia

HDMI

The ConnectCore MP25 system-on-module supports only one MIPI-DSI display interface. On the development board, this MIPI-DSI interface is connected to the Lontium LT8912B bridge to convert it to HDMI. The HDMI is available over a standard HDMI connector (J32).

Note The native MIPI-DSI interface of the ConnectCore MP25 module is also available on a 40 pin, 0.5 mm pitch connector (J27), which is not populated by default.

LVDS display

The ConnectCore MP25 module has one native LVDS display interface, which is available through a 20-pin, 1.25 mm pitch connector (J31):

Pin	Signal name	Description
1	3V3_BOARD	3.3V power supply

Pin	Signal name	Description
2	LVDS1_D0_N	Data pair 0 (-) line
3	LVDS1_D0_P	Data pair 0 (+) line
4	GND	
5	LVDS1_D1_N	Data pair 1 (-) line
6	LVDS1_D1_P	Data pair 1 (+) line
7	GND	
8	LVDS1_D2_N	Data pair 2 (-) line
9	LVDS1_D2_P	Data pair 2 (+) line
10	GND	
11	LVDS1_CLK_N	Clock pair (-) line
12	LVDS1_CLK_P	Clock pair (+) line
13	GND	
14	LVDS1_D3_N	Data pair 3 (-) line
15	LVDS1_D3_P	Data pair 3 (+) line
16	LVDS_BCKL_PWM	Backlight PWM
17	LVDS_I2C_SCL	STM32MP25 I2C1 clock line
18	LVDS_I2C_SDA	STM32MP25 I2C1 data line
19	LVDS_IRQ	Interrupt line
20	5V_BOARD	5V power supply

MIPI CSI

The ConnectCore MP25 Development Board provides a MIPI camera serial interface (MIPI CSI) over a 15-pin connector (J30):

Pin	Signal name	Description
1	GND	
2	CSI_D0_N	Data pair 0 (-) line
3	CSI_D0_P	Data pair 0 (+) line
4	GND	
5	CSI_D1_N	Data pair 1 (-) line
6	CSI_D1_P	Data pair 1 (+) line

Pin	Signal name	Description
7	GND	
8	CSI_CLK_N	Clock pair (-) line
9	CSI_CLK_P	Clock pair (+) line
10	GND	
11	CSI_RST	Reset line
12	NC	
13	CSI_I2C_SCL	STM32MP25 I2C1 clock line
14	CSI_I2C_SDA	STM32MP25 I2C1 data line
15	3V3_BOARD	3.3V power supply

Note There is an additional 22 pin, 0.5 mm pitch MIPI CSI connector (J29) not populated by default.

Audio

The Maxim MAX98089 audio codec manages the audio interface on the development board. The board provides the following audio functionality:

- 3.5 mm headphone jack
- 3.5 mm microphone jack
- x2 speaker outputs (left and right)
- x1 line-out output
- x2 line-in inputs

The speakers, line-out signals and line-in signals are available over a 10-pin connector (J35):

Pin	Signal name	Description
1	LINE1_IN_R	Single-ended line input A1
2	LINE1_IN_L	Single-ended line input A2
3	LINE2_IN_R	Single-ended line input B1
4	LINE2_IN_L	Single-ended line input B2
5	LINE_OUT_R	Right line output
6	LINE_OUT_L	Left line output
7	SPKL_P	Positive left-channel class D speaker output
8	SPKL_N	Negative left-channel class D speaker output
9	SPKR_P	Positive right-channel class D speaker output
10	SPKR_N	Negative right-channel class D speaker output

Storage interface

MicroSD

A microSD socket connected to the SDMMC3 port of the STM32MP25 CPU is available on the ConnectCore MP25.

Communication

Gigabit Ethernet

Up to three 10Base-T/100Base-Tx/1000Base-T Ethernet interfaces are fully integrated in the ConnectCore MP25 development board through the Marvell 88E1512 Ethernet PHY. These interfaces are available over RJ45 connectors with integrated link/activity LEDs.

Note The third Ethernet port is only available on ConnectCore MP25 variants using the STM32MP257 variant of the CPU.

RS-485

RS-485 standard is supported on the ConnectCore MP25 development board through USART6. The interface is available on connector J11:

Pin	Signal name	Description
1	3V3_BOARD	3.3V power supply
2	RS485_B	RS485 B line
3	RS485_A	RS485 A line
4	GND	

You can connect a 120Ω termination resistor to the port by closing J10.

CAN

Two CAN FD buses are available on the development board through connectors J14 (CAN1) and J17 (CAN2). The pinout of these connectors is as follows, where x refers to the CAN interface on each connector:

Pin	Signal name	Description
1	5V_BOARD	5V power supply
2	CANx_H	CAN high line
3	CANx_L	CAN low line
4	GND	

You can connect a 120Ω termination resistor to each port by closing J13 (CAN1) and J15 (CAN2).

USB Host

The ConnectCore MP25 Development Board offers support for four USB Host interfaces. Two of them are available over a stackable dual USB A-type connector. The third USB Host is connected to the PCI Express Mini card connector. The fourth is connected to the XBee socket. All USB Hosts can operate at low-speed, full-speed and hi-speed.

USB type-C port controller

One USB type-C port controller is available on the development board, supporting USB 2.0.

Note The STM32MP25 integrates a COMBOPHY which supports USB3 SuperSpeed and PCIe gen2. By default, the ConnectCore MP25 development board connects the COMBOPHY to the Mini PCIe socket supporting the PCIe interface. However, the development board also allows you to connect the COMBOPHY to the USB type-C port to support USB3 SuperSpeed by modifying the following 0-ohm resistors.

- Remove R232, R234, R236 and R238
 - Populate R233, R235, R237 and R239
-

Mini PCI Express slot

The ConnectCore MP25 Development Board provides a Mini PCI Express socket supporting both USB and PCIe connection to the ConnectCore MP25 module. A micro SIM socket is also connected to the Mini PCI Express slot.

XBee socket

One XBee socket is populated on the development board, supporting XBee Cellular modules. The UART bus connected to the XBee socket is also the default debug port for the Cortex-M33. This UART is also accessible on connector J12.

MikroBus socket

The ConnectCore MP25 Development Board provides a socket compatible with MikroElektronika MikroBus click boards, supporting I2C, UART, SPI, ADC and PWM connectivity.

Wireless

The ConnectCore MP25 System-on-Module supports IEEE 802.11 a/b/g/n/ac/ax and Bluetooth 5.4 with on-module U.FL connector. For complete WLAN specification, refer to the [ConnectCore MP25 System-on-Module Hardware Reference Manual](#).

Additionally, the development board supports a U.FL connector (J46) which is routed directly to a SMA connector (J47). The purpose is to adapt the U.FL form factor to the SMA form factor to extend the number of antennas that can be used on the development board for either the on-module antenna path or any other RF path that could be used on a PCIe or XBee board.

User interfaces

Three LEDs are available on the development board, two of which are shared with user button. A tamper button is also available.

Specifications

Electrical specification

Supply voltages

The ConnectCore MP25 Development Board has one primary supply input, VIN, which powers both the ConnectCore MP25 Development Board and the ConnectCore MP25 system-on-module.

The following table shows the voltage range of the input supply of the ConnectCore MP25 Development Board:

Signal	Description	Min	Typ	Max	Unit
VIN	Power jack input	4.6	5.0	5.5	V

Mechanical specification

The ConnectCore MP25 Development Board dimensions are 120 x 160 mm. Four 3.2 mm drills are located on the four corners of the PCB for assembling the board into an enclosure. These drills have a 5.5 mm round metalized area for the screws and nuts. The board has four 2.6 mm drills to assemble a half-size or full-size PCI express mini card module, with 5.8 mm x 5.8 mm square metalized area for the screws and nuts.

Environmental specification

Specification	Operating temperature
Industrial	-40° C to +85° C