Hardware Reference Manual

GFK-3014E

September 2021

RXi2-EP

Industrial PC (IPC)

EMERSON

Document-History

Rev	Date	Description
B	2018-03	Initial version
C	2019-11	Emerson rebranding
D	2021-03	Update to IEC/UL62368
E	2021-09	UKCA Update

Warnings and Caution Notes as Used in this Publication

⚠ WARNING

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

⚠ CAUTION

Caution notices are used where equipment might be damaged if care is not taken.

ATTENTION

Indicates a procedure or condition that should be strictly followed to improve these applications.

Note: *Notes merely call attention to information that is especially significant to understanding and operating the equipment.*

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Regulatory compliance

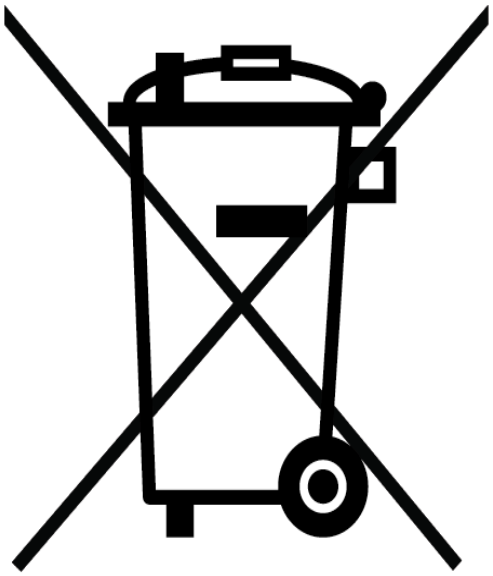
Products sold or transferred between companies or operated on company premises (factory floor, laboratory) do not need CE, FCC or equivalent certification. Boards or subsystems which cannot provide a useful function on their own do not need certification.
Certification can only be granted to complete and operational systems. There are authorized testing agencies, regulatory organizations and laboratories who will issue certificates of compliance after system testing.
Emerson Automation Solutions designs and tests all their products for EMI/EMC conformance. Where Emerson Automation Solutions supplies a complete/functional system for use by end users a certificate will be cited in the manuals/documents which are provided with the products.
Products manufactured by Emerson Automation Solutions should normally be suitable for use in properly designed and produced customer equipment (system boxes or operational systems) without any major redesign or additional filtering. However, the systems might not conform to specific regulations once assembled and used. The system integrator or installer must test for compliance as required in his country or by the intended application and certify this to the end user.

ESD/EMI issues

ESD (Electro-Static Discharge) and EMI (Electro-Magnetic Interference) issues may show up in complete and operational systems. There are many ways to avoid problems with these issues.
Any operational system with cables for I/O signals, connectivity or peripheral devices provides an entry point for ESD and EMI. If Emerson Automation Solutions does not manufacture the complete system, including enclosure and cables, it is the responsibility of the system integrator and end user to protect their system against potential problems. Filtering, optical isolation, ESD gaskets and other measures might be required at the physical point of entry (enclosure wall of box or rack). For example it is state-of-the-art that protection cannot be done at the internal connector of an RTM if a cable is attached and routed outside the enclosure. It has to be done at the physical entry point as specified above.
Products manufactured by Emerson Automation Solutions should normally be suitable for use in properly designed and produced customer equipment (system boxes or operational systems) without any major redesign. However, the systems might be subject to problems and issues once assembled, cabled and used. The end user, system integrator or installer must test for possible problems and in some cases show compliance to local regulations as required in his country or by the intended application.

Waste Disposal

The mark or symbol on any electrical or electronic product shows that this product may not be disposed off in a trash bin. Such goods have to be returned to the original vendor or to a properly authorized collection point.



The black bar underneath the waste bin symbol shows that the product was placed on the market after 13 August 2005. Alternatively the date of 'placed on the market' is shown in place of the bar symbol.

CE conformance declaration

CE certification is required in EU countries for equipment which is used or operated by the end user. Products sold or transferred between companies or operated on company premises (factory floor, laboratory) do not need CE certification.

CE certification can only be granted to complete and operational systems. Boards or subsystems which cannot provide a useful function on their own do not need CE certification.

Emerson Automation Solutions designs and tests all their products for EMI/EMC conformance. Products manufactured by Emerson Automation Solutions should normally be suitable for use in properly designed and produced customer equipment (system boxes or operational systems) without any major redesign or additional filtering. The system integrator or installer must, in any case, test for CE compliance and certify this to the end user.

Where Emerson Automation Solutions supplies a complete/functional system for use by end users in EU countries a CE certificate will be cited in the manuals/documents which are provided with the products. The CE (and year of certification) symbol is shown on the equipment, typically on the type or S/N label or close to the power cable entry.

Emerson Automation Solutions have tested their boards using their own card cages (chassis). Test results of these tests are available upon request.

Corporate addresses

Corporate headquarters
ICC Intelligent Platforms, Inc.
2500 Austin Drive
Charlottesville, VA 22911
U.S.A.
Phone: +1-800-322-3616
Web: https://www.emerson.com/

Germany	US
ICC Intelligent Platforms GmbH Memminger Str. 14 86159 Augsburg Germany	ICC Intelligent Platforms, Inc. 2500 Austin Drive Charlottesville, VA 22911 U.S.A.
Phone: +49-821-5034-0 Fax: +49-821-5034-119	Phone: +1-800-322-3616

ICC Intelligent Platforms on the Web:

https://www.emerson.com/

For contact and other information (service, warranty, support etc.) see address list in chapter: 'Welcome'.

Welcome

Typographic Conventions

This manual uses the following notation conventions:

- Italics (sometimes additionally in blue color) emphasize words in text or documentation or chapter titles or web addresses if underlined.
- Hexadecimal values (base 16) are represented as digits followed by 'h', for example: 0Ch.
- Hexadecimal values (base 16) are represented as digits preceded by 'H', for example: H0C.
- Hexadecimal values (base 16) are represented as digits preceded by '$', for example: $0C.
- Binary values (base 2) are represented as digits followed by 'b', for example 01b
- The use of a '#' (hash) suffix to a signal name indicates an active low signal. The signal is either true when it is at logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.
- The use of a '\' (backslash) prefix to a signal name indicates an active low signal. The signal is either true when it is at logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.
- Text in Courier font indicates a command entry or output from a ICC Intelligent Platforms embedded PC product using the built-in character set.
- Notes, warning symbols and cautions call attention to essential information.

Product Properties

Altitude

Altitude, air pressure and ambient temperature influence the thermal operation of the components described in this manual. They have been developed and tested at about 500 m (1650 ft.) above sea level at a typical ambient temperature of 20 °C (68 °F). Because of only marginal variations within a limited range of altitudes these products operate as specified within altitudes from sea level to 2000 m (~6560 ft). This is with reference to temperature ranges of air-cooled versions. ICC Intelligent Platforms can assist the user of these components in planning operation outside this altitude range upon request.

Options

This manual describes the basic product plus all options. Your product may not have all options implemented. Please verify with your purchase contract which options are implemented. Descriptions of options which are not implemented obviously do not apply to your product.

Support, Service and Warranty

The manufacturer grants the original purchaser of ICC Intelligent Platforms products a warranty of 24 months from the date of delivery. For details regarding this warranty refer to Terms & Conditions of the initial sale.

For support on the web and product information, visit our website at

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Contact Information

If you purchased this product through an Authorized Channel Partner, contact the seller directly.

General Contact Information

Online technical support and GlobalCare	https://www.emerson.com/Industrial-Automation-Controls/support
Additional information	https://www.emerson.com

Technical Support

Contact us by telephone, email, or at https://www.emerson.com/Industrial-Automation-Controls/support

Americas

Phone	1-888-565-4155
If toll free option is unavailable	1-434-214-8532
Tech Support Email	support.mas@emerson.com
Sales/Order Support Email	customercare.mas@emerson.com
Primary language of support	English

Europe (not Germany), Middle-East, & Africa

Phone	+800-4-444-8001
If toll free option is unavailable	+420-225-379-328
Tech Support Email	support.mas.emea@emerson.com
Sales/Order Support Email	customercare.emea.mas@emerson.com
Primary language of support	English, German, Italian, Spanish

Germany

Address	ICC Intelligent Platforms GmbH Memminger Str. 14 86159 Augsburg, Germany
Phone	+49-821–5034–170
Fax	+49-821–5034–119
Tech Support Email	mas.support.augsburg@emerson.com
Primary language of support	English, German

Asia Pacific

Phone	+86-400-842-8599
India, Indonesia & Pakistan	+65-6955-9413
Tech Support Email	support.mas.apac@emerson.com
Sales/Order Support Email	customercare.cn.mas@emerson.com
Primary language of support	Chinese, Japanese, English

Contents

List of Tables

List of Figures

Overview

A Computer-On-Module (COM) is a module containing all components necessary for a bootable host computer, packaged as a super component. A COM requires a carrier board to connect I/O and power up. COMs are used to build modular solutions and offer Original Equipment Manufacturer (OEMs) fast time-to-market with reduced development cost. Like integrated circuits, they provide OEMs with significant freedom in meeting form-fit-function requirements. For these reasons, the COM methodology has gained much popularity with OEMs in the embedded industry.

The RXi2-EP IPC industrial computing platform delivers compact, rugged, mid to high performance computing and high performance graphics capabilities to run HMI, historian, and analytics applications for real-time control of operations. It offers the expandability of 0, 1, 2, or 4 (mini and low profile) PCI Express (PCIe) slots and CFast storage.

The RXi2-EP IPC (NextGenIPC) is composed of the following components:

- bCOM6L17 COM Express module based on AMD R-Series CPU
- CEC09 COM Express carrier board
- PERC12 (1-slot), PERC10 (2-slot) and PERC11 (4-slot) PCIe riser board
- PIP24VDC power supply module
- SRC SATA riser board for additional 2.5 inch mass storage devices support
- Industrial grade enclosure with heat sink for the module and carrier components

This chapter describes features, capabilities, and compatibilities of the RXi2-EP IPC and its components

Figure 1-1 0-slot RXi2-EP IPC

Figure 1-2 1-slot RXi2-EP IPC

Figure 1-3 2-slot RAID RXi2-EP IPC

Figure 1-4 4-slot RXi2-EP IPC

Figure 1-5 4-slot RAID RXi2-EP IPC

1.1 Capability and Compatibility

The bCOM6L17 COM Express module is a fully IBM-AT compatible single board computer module containing many functions in a very small form-factor. It is based on the PICMG COM Express Module Base Specification V2.1 Type 6. (Refer to the documentation located at www.picmg.org.) The bCOM6L17 uses the AMD x86 Bald Eagle CPU and the AMD A77E chipset to provide most of the interface for Type 6.

The CEC09 COM Express carrier board is also compliant with the PICMG COM Express Module Base Specification V2.1 Type 6.
The PERC10 and PERC11 PCI Express (PCIe) riser boards provide signals from the Edge connector interface to a PCIe packet switch device (limited to PCIe Gen2) through PCIe expansion slots. The PERC12 riser board provides signals from the Edge and is a passive device that supports a PCIe Gen3 link.
The PIP24VDC power supply module provides a voltage input of nominal 24 V (± 25%).

1.2 Software Requirements

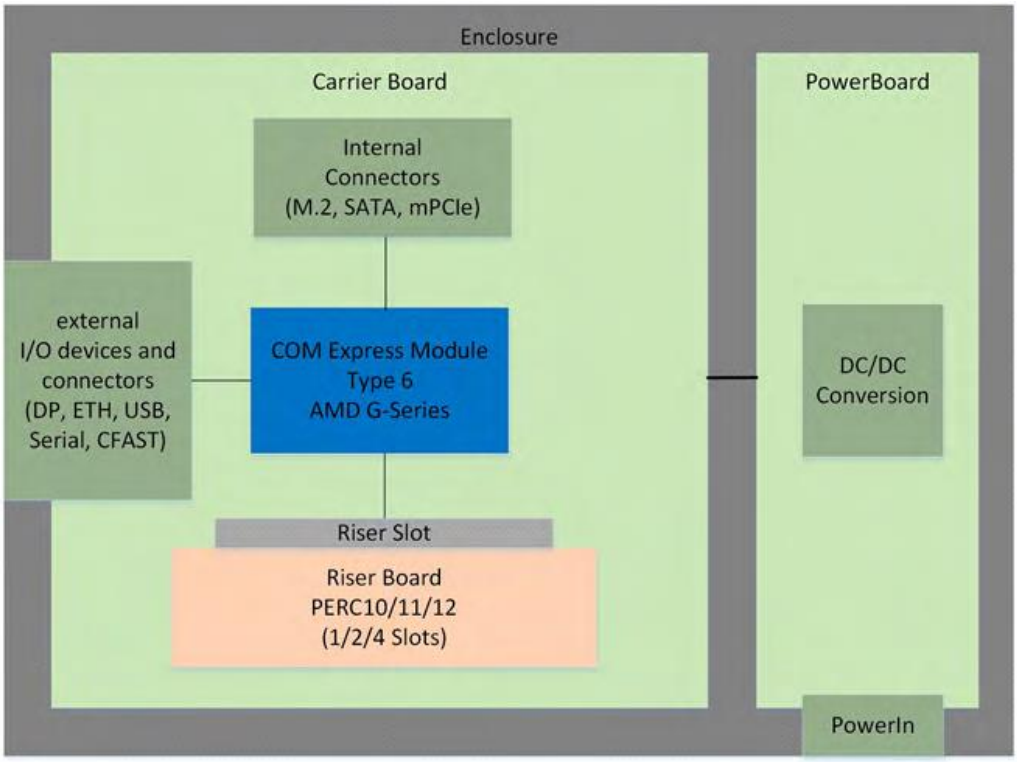
- Microsoft® Windows® 7 Professional 64-Bit
- Microsoft Windows 10 Professional 64-Bit
- Linux Kernel 4.8

1.3 Features

RXi2-EP IPC module features are as follows:

- Processor
  - RX427BB, quad core, 2.7 GHz, L2 4 MB, 8CUs 600 MHz, DDR3 2133 MHz, 35 W
  - RX225FB, dual core, 2.2 GHz, L2 2 MB, 3CUs 464 MHz, DDR3 1600 MHz, 17 W
- System memory:
  - 4 GB up to 16 GB DDR3 SDRAM (soldered) with ECC
  - Organized dual channel with two ranks each
- 2x Display Port
- 4x USB 3.0
- 5x Gig Ethernet ports (1 from module plus 4 Ethernet controller (4x i210IT) with TimeSYNC IEEE1588 and 802.1AS
- Alternative 1x GigE and 4x SFP (4x i210IS) (Emerson support is available)
- Mini PCIe slot (half and full size)
  - Unified Infrastructure Management (UIM) interface
- M.2 PCIe M-Key (PCIe Gen3 x4) and SATA capability
- M.2 PCIe A-Key (general connectivity)
- TPM V1.2 or V2.0
- Up to 4 serial interfaces (2x RS-232, 2x galvanic isolated RS-485/RS-422)
- Capable of two additional 2.5 inch storage devices with SATA riser board/RAID option
- UIM interface
- 0, 1, 2 or 4-slots with active/passive riser board (depending on slot size)
- Operating at 24 V dc (±25%), including over and under-voltage protection

Figure 1-6 2–slot RXi2-EP IPC System Block Diagram



Unpacking and Inspection

⚠ CAUTION

If the RXi2-EP IPC operates by an enhanced ambient temperature up to 65°C (149 ° F), the surface of the enclosure, especially the heat sink, can reach a temperature of85°C (185 °F) and above. Be careful and do not touch the RXi2-EP IPC with bare fingers.
Si le RXi2-EP IPC est opérée à une température ambiante élevée jusqu'à 70 ° C (149 ° F), la surface du boîtier, en particulier le dissipateur thermique, peut atteindre une température de 85 ° C (185 ° F) et plus. Soyez prudent et ne touchez pas le RXi2-EP IPC avec les doigts nus.

Install the RXi2-EP IPC only in rooms with restricted access.

CHAPTER SCOPE:

This chapter describes unpacking, initial inspection, and required preparation considerations prior to using the RXi2-EP IPC. Perform the procedures in this chapter to verify proper operation after shipping and prior to system integration.

2.1 Package Contents

Verify that the delivered package contains the contents listed in the following table.

Table 2-1 Delivery Volume

Qty	Item	Purpose
1	RXi2-EP	RXi2-EP Industrial PC

2.2 Available Options and Accessories

The following tables list the available options and accessories for the RXi2-EP IPC.

Table 2-2 Available Options

Item	Description
R2E0N1A0A1T0A	0–slot, Quad Core 2.7 GHz, 128 GB, RJ–45
R2E0N1C0A1T0A	0–slot, Dual Core 2.2 GHz, 128 GB, RJ–45
R2E2N1A0A2T0A	2–slot, Quad Core 2.7 GHz, 128 GB, RJ–45
R2E2N1C0A2T0A	2–slot, Dual Core 2.2 GHz, 128 GB, RJ–45

Table 2-3 Available Accessories

Item	Description
Contact Emerson	10 pcs Flat mounting kit
R2X00ACCMP05	1 pc Flat mounting kit
Contact Emerson	1 pc Slim mounting kit

Note: *For the most current information on options and accessories, contact the nearest Emerson sales or service office, or an authorized Emerson sales representative. Options are subject to change without notice.*

2.3 ESD and EMI

Electrostatic Discharge (ESD) is the discharge of static electricity. Electromagnetic Interference (EMI) is a disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction. ESD and EMI issues may show up in complete and operational systems. There are many ways to avoid problems with these issues.

Any operational system with cables for I/O signals, connectivity or peripheral devices provides an entry point for ESD and EMI. If Emerson does not manufacture the complete system, including enclosure and cables, it is the responsibility of the system integrator and end user to protect their system against potential problems. Filtering, optical isolation, ESD gaskets and other measures might be required at the physical point of entry (enclosure wall of box or rack). For example it is state-of-the-art that protection cannot be done at the internal connector of an RTM if a cable is attached and routed outside the enclosure. It has to be done at the physical entry point as specified in this document.

Products manufactured by Emerson should normally be suitable for use in properly designed and produced customer equipment (system boxes or operational systems) without any major redesign. However, the systems might be subject to problems and issues once assembled, cabled and used. The end user, system integrator or installer must test for possible problems and in some cases show compliance to local regulations as required in his country or by the intended application.

ESD is a major cause of electronic component failure. The component has been packed in a static-safe bag to protect it from ESD while it is in the bag. Before removing the component or

any other electronic product from its static-safe bag, be prepared to handle it in a static-safe environment.

⚠ CAUTION

Static-sensitive Devices: Handle only at static-safe work stations.

⚠ CAUTION

This is an FCC Class A product for use in an industrial environment. In a home or residential environment, this product may cause radio interference in which case the user may be required to take adequate measures.

⚠ CAUTION

Drain static electricity before you install or remove any parts. Installing or removing modules without observing this precaution could result in damage to this and/or other modules or component in your system.

Wear a properly-functioning anti-static strap and make sure you are fully grounded. Any surface upon which you place the unprotected module or unit should be static-safe, which is usually facilitated by the use of anti-static mats. From the time it is removed from the anti-static bag until it is in the board carrier and functioning properly, extreme care should be taken to avoid zapping the component with ESD. Be aware that you could zap the component without knowing it; a small discharge, imperceptible to the eye and touch, can often be enough to damage electronic components. Extra caution should be taken in cold and dry weather when electrostatics easily builds up.
Only after ensuring that both you and the surrounding area are protected from ESD, carefully remove the component from the shipping carton by grasping the module on its edges. Place the component, in its anti-static bag, flat down on a suitable surface. You may then remove the component from the anti-static bag by tearing the ESDCaution labels.

2.4 Unpack and Inspect

⚠ WARNING

Before installing or removing any board or module, ensure that the system power and external supplies have been turned off.

⚠ WARNING

Do not apply power to the board if it has visible damage. Doing so may cause further, possibly irreparable damage, as well as introduce a fire or shock hazard.

ATTENTION

Retain all packing material in case of future need.

Before unpacking the board or module, or fitting the device into your system, read the manual carefully. Also adhere to the following guidelines:

- Observe all precautions for electrostatic sensitive modules.

- If the product contains batteries, do not place it on conductive surfaces, anti-static plastic, or a sponge, which can cause shocks and lead to battery or board trace damage.
- Do not exceed the specified operational temperatures. Batteries and storage devices might also have temperature restrictions.
- Keep all original packaging material for future storage or warranty shipments of the board.

After unpacking the component, inspect it for visible damage that may have occurred during shipping or unpacking. Although the product is carefully packaged to protect it against the rigors of shipping, it is still possible that shipping damages may occur. Careful inspection of the shipping carton should reveal some information about how the package was handled by the shipping service.

If evidence of damage or rough handling is found (usually in the form of bent component leads or loose socketed components), notify the shipping service as soon as possible and contact Emerson for additional instructions. Depending on the severity of the damage, it may be necessary to return the product to the factory for repair.

Figure 2-1 RXi2-EP IPC Packaging

2.5 Handling

⚠ WARNING

If the RXi2-EP IPC operates with an enhanced ambient temperature up to 65°C (149 ° F), the surface of the enclosure, especially the heat sink, can reach a temperature of 85°C (185 °F) and above. Be careful and do not touch the RXi2-EP IPC with bare fingers

⚠ CAUTION

Install the RXi2-EP IPC only in rooms with restricted access.

⚠ CAUTION

Hot surfaces are possible, depending on factors such as CPU load, ambient temperature, and so forth. Be careful and do not touch the RXi2-EP with bare fingers!

Mounting

RXi2-EP IPC cooling is designed for wall mounted orientation of the box. There are two possible mounting options:

- Flat wall mounting
- Slim mounting (contact Emerson for instructions)

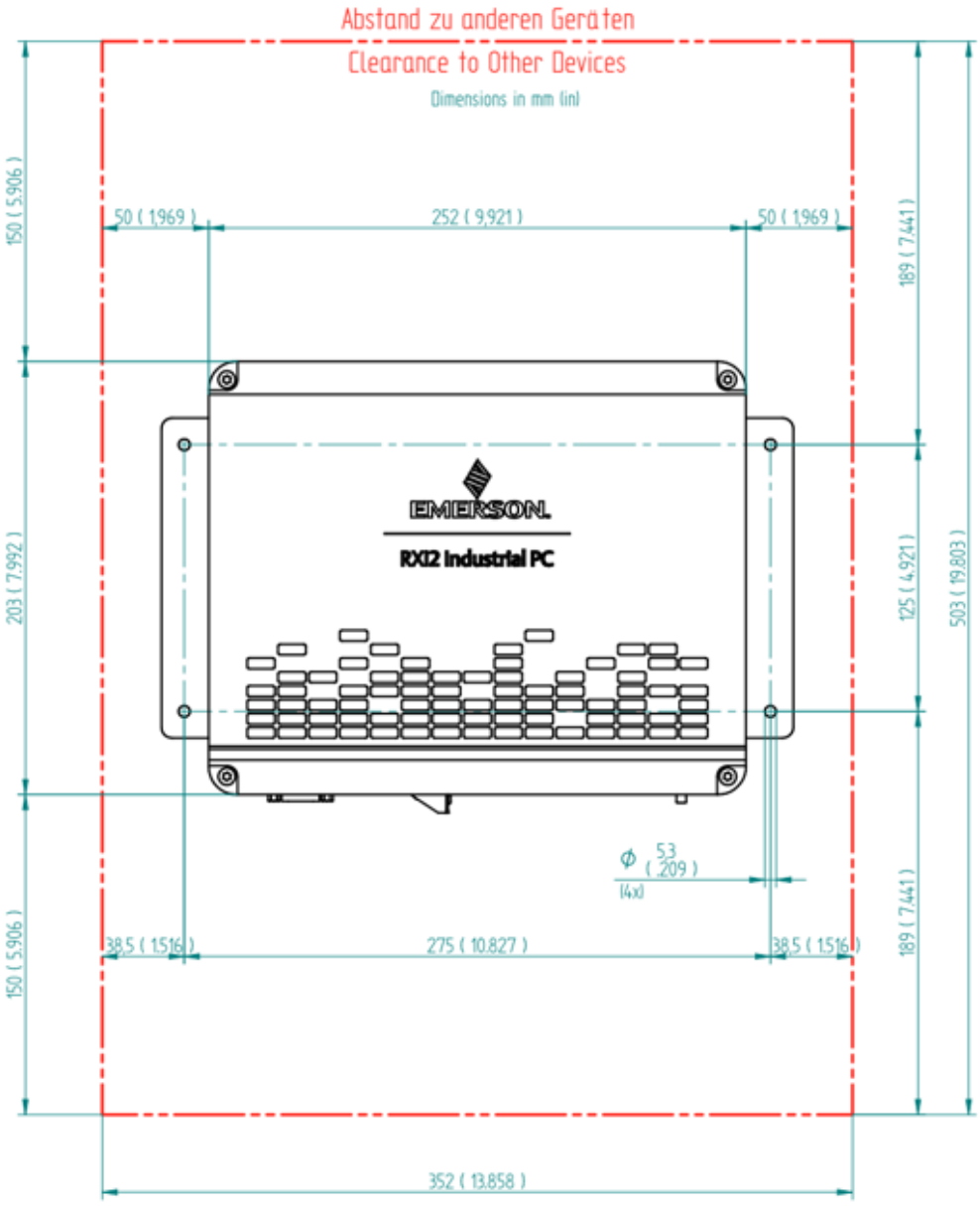
3.1 Flat Wall Mounting

There are two types of wall mounting:

- Flat wall mounting with mounting plates
- Flat wall mounting through the wall

For the best results of heat dissipation, observe the minimum clearances for flat wall mounting as illustrated in the following figure.

Figure 3-1 Heat Dissipation Clearance

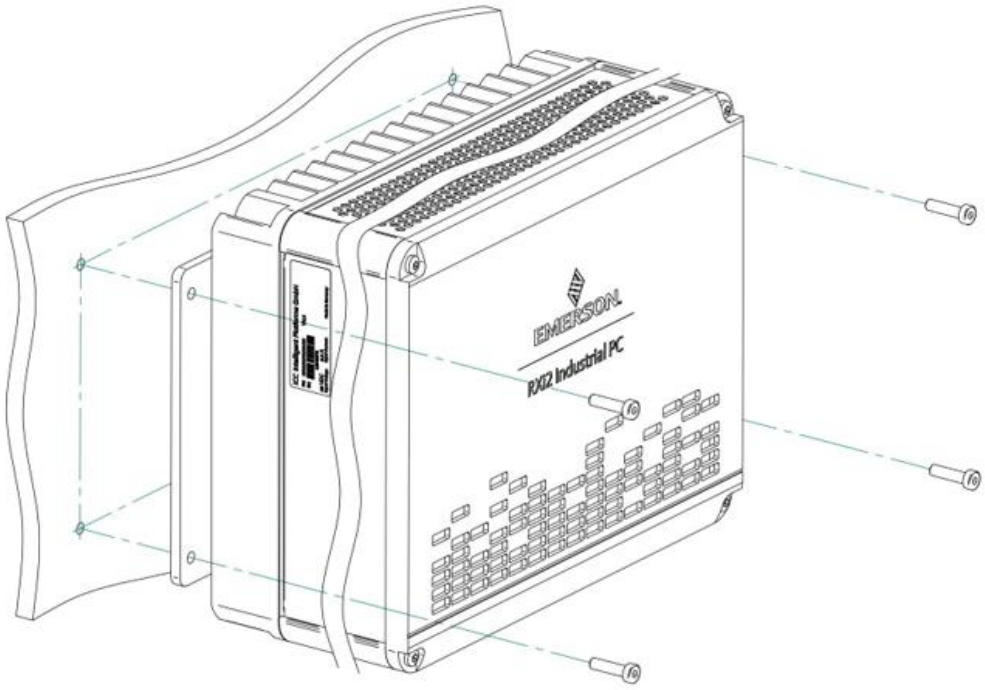


Flat Wall Mounting with Mounting Plates

The screws selected for use depends on the nature of the wall. The mounting plates have four drills holes with a diameter of 5.3 mm (0.209 in), so the maximum screw diameter cannot be higher than 5.2 mm (0.205 in). The head of the screws must be smaller than 10 mm (0.4 in) to pass the hole of the top fixing points of the mounting plate.

Note: *The mounting plate for the 2-slot and 4-slot version will be the same*

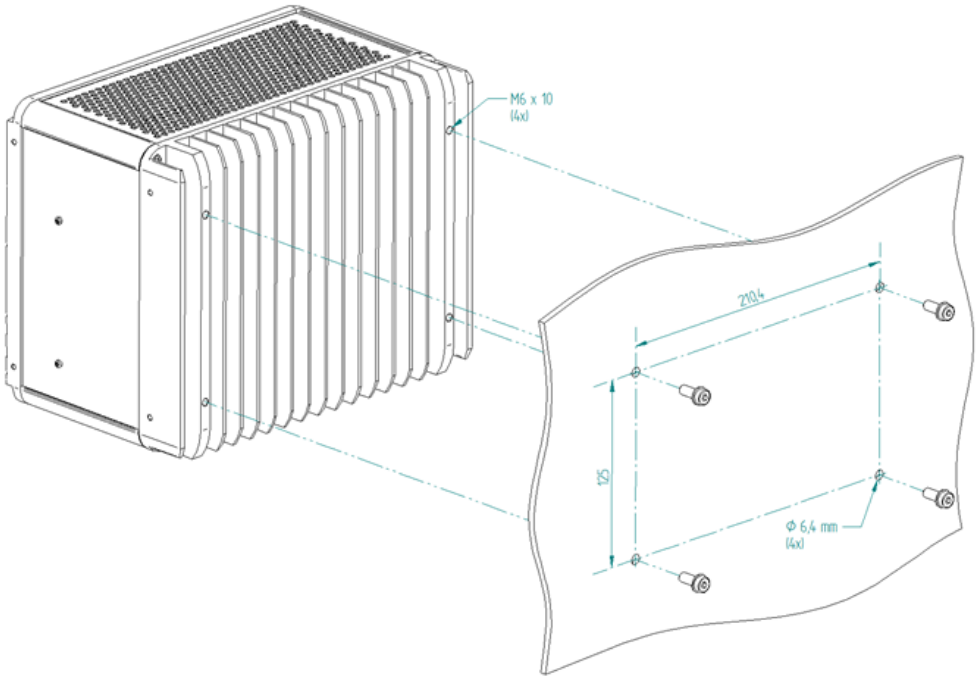
Figure 3-2 Flat Wall Mounting with Mounting Plates



Flat Wall Mounting Through Wall

To mount the IPC with screws from the wall side, place drill holes in the wall. Refer to the following figure for the positions for the holes. The thread in the enclosure is a M6 with a usable thread length of 15 mm (0.60 in). Select the screw length so that a minimum of 10 mm (0.4 in) thread will be used and torque to 3.5 Nm (30.98 in lb).

Figure 3-3 Flat Wall Mounting Through Wall

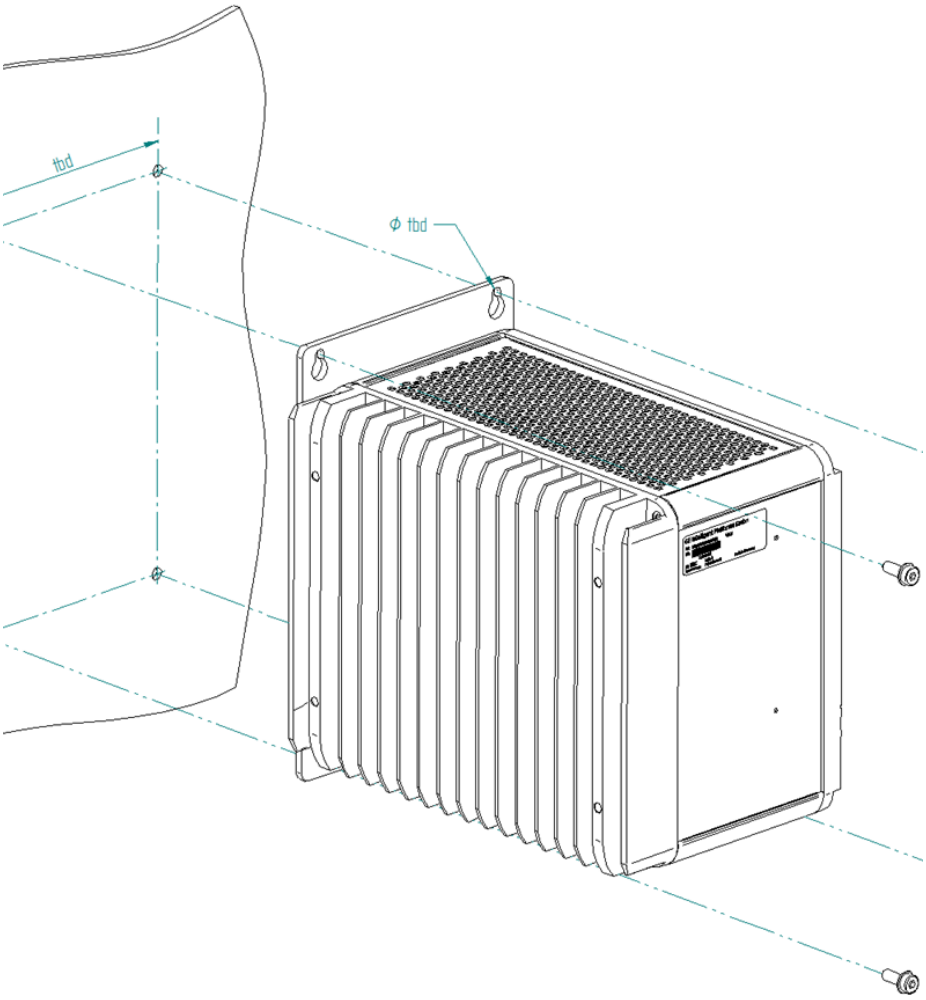


3.2 Slim Mounting

Slim Mounting with Mounting Plate

For details please contact Emerson support.

Figure 3-4 Conceptual drawing of Slim Mounting with Mounting Plate



Installation and Startup

This chapter describes the installation and initial startup operations. Because the unit is available in several options, the description in this chapter is related to the standard configuration.

⚠ WARNING

Before installing or removing any component, make sure that the system power and external supplies have been turned off.

⚠ CAUTION

Static-sensitive Devices: Handle only at static-safe work stations.

⚠ CAUTION

Drain static electricity before you install or remove any parts. Installing or removing modules without observing this precaution could result in damage to this and/or other components in your system.

4.1 General Installation Guidelines

Adhere to the following guidelines during installation:

- Observe all safety procedures to avoid damaging the system and protect operators and users.
- Before installing or removing any board, verify that the system power and external supplies have been turned off.
- Verify that the jumpers (if any) are correctly configured for your application.
- Make sure the RXi2-EP IPC is properly *mounted*.
- Connect all I/O cables.
- Do not restore power until all components are fitted correctly into the system and all connections have been made properly.

4.2 Required Materials

The following items are required to start the RXi2-EP IPC in a standard configuration:

- *Power supply*
- *Keyboard and mouse*
- *Video monitor*

4.2.1 Power Supply

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

Adhere to the following guidelines:

- Verify that the power supply is capable of meeting the total power requirements of the RXi2-EP IPC. (Refer to the section *Specifications*.)
- Verify you do not have the power supply turned ON while opening the enclosure to install add-on boards and modules into the RXi2-EP IPC (such as the PCIe boards or internal SATA drives).

4.2.2 Keyboard

A compatible USB keyboard for initial system operation of the RXi2-EP IPC is required. Depending on your application, this may be a standard keyboard, or one that uses membrane switches for harsh environments.

4.2.3 Video Monitor

Any video monitor with native Display Port (or a suitable adaptor for the Display Port) can be used for initial setup.

4.3 Minimum System Requirements

The RXi2-EP IPC has been thoroughly tested and is nearly ready for usage in the target system. To verify operation for the first time, Emerson recommends that you only configure a minimal system. It is not necessary to have disk drives, a Flash disk, or other accessories connected to perform the Power-On Self-Test (POST).

4.4 Power-On Self-Test (POST)

Each time the computer boots up it must pass the POST. If the computer does not pass any of the test items, the unit will fail the POST.
Test items are as follows:

- CPU must exit the reset status mode and thereafter be able to execute instructions
- SPI Flash ROM and Non-Volatile Random-Access Memory (NOVRAM) is readable
- Checksum is valid (readable)
- CMOS is readable (CMOS checksum is valid)
- CPU is able to read all forms of memory, such as the memory controller, memory bus, and memory module
- First 64 KB of memory is operational and has the capability to be Read and Written to and from, and contains the POST code
- I/O bus / controller is accessible
- I/O bus is able to Read/Write from the video subsystem and be able to read all video RAM

4.5 Installation Procedures

4.5.1 PCIe Board Installation

Install a PCIe board into the RXi2-EP IPC using the following procedure.

To install the PCIe board

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

1. Remove the top cover by removing the four screws in each corner (Tx20).

Figure 4-1 RXi2-EP Top Cover

2. Remove the PCIe support bracket screws (qty 4) (Tx10).

Figure 4-2 PCIe Support Bracket Screws

3. Remove the PCIe support bracket.

Figure 4-3 Removed PCIe Support Bracket and Screws

4. Remove the PCIe slot bracket.

Figure 4-4 Removed PCIe Slot Bracket

5. Insert the PCIe board bracket into the slot.

Figure 4-5 PCIe Board Bracket Inserted into Slot

6. Insert the PCIe board bracket into the PCIe connector at the riser board. Ensure that the board fits properly into the connector and is well connected.

Figure 4-6 PCIe Board Bracket Inserted into PCIe Connector

7. Reattach the PCIe support bracket.

Figure 4-7 Reattached PCIe Support Bracket

8. Reattach the four PCIe support bracket screws (Tx10 [0.6 Nm/5.3 in lb]).

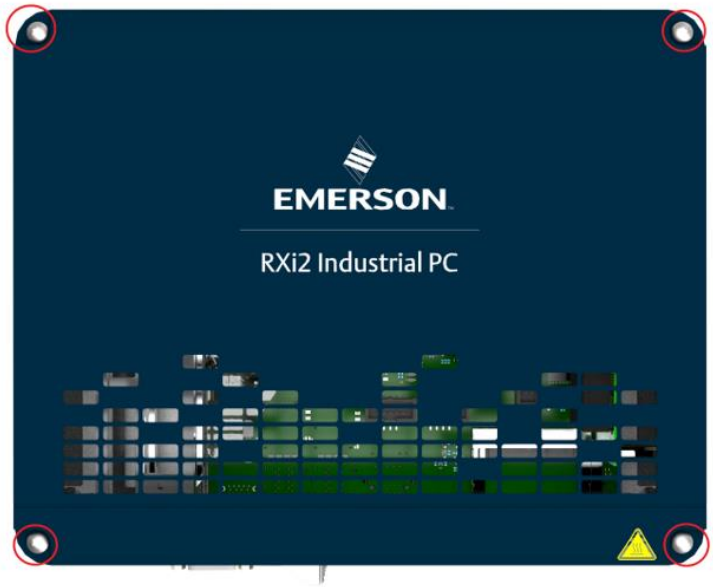
Figure 4-8 Reattached PCIe Bracket Screws

9. Adjust the card holder.

Figure 4-9 Card Holder Adjustment

10. Reattach the top cover by reattaching the four screws in each corner (Tx20 [1 Nm/8.9 in lb]).

Figure 4-10 Reattached Top Cover



4.5.2 Mini PCIe Add-on Board Installation

ATTENTION

The information described in this section applies to service technician only.

The Mini PCIe (mPCIe) board is connected to the RXi2-EP IPC by inserting the board into either a full size slot or a half size slot, depending on the size of the Mini PCIe board you are inserting.

To install the Mini PCIe board

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

1. Adjust the slot size to allow for the size of the Mini PCIe board being inserted (Tx8 [0.6 Nm/5.3 in lb]).

Figure 4-11 Short Position for mPCIe Bracket

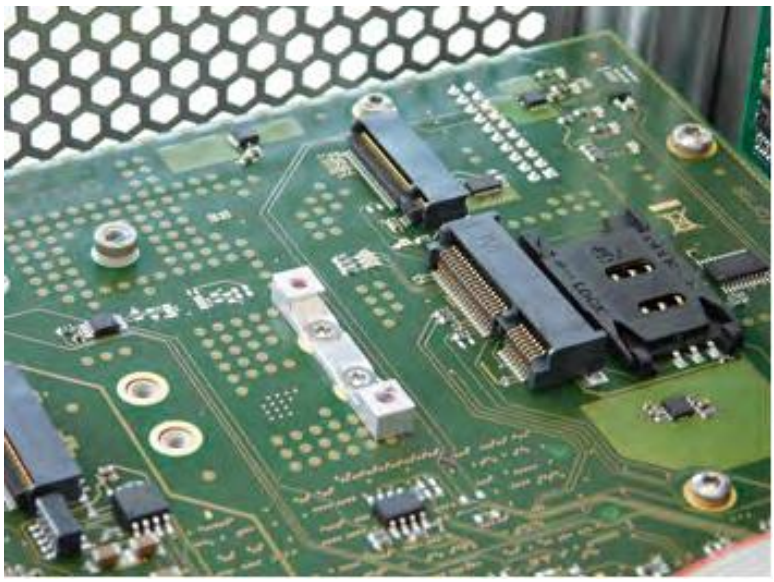
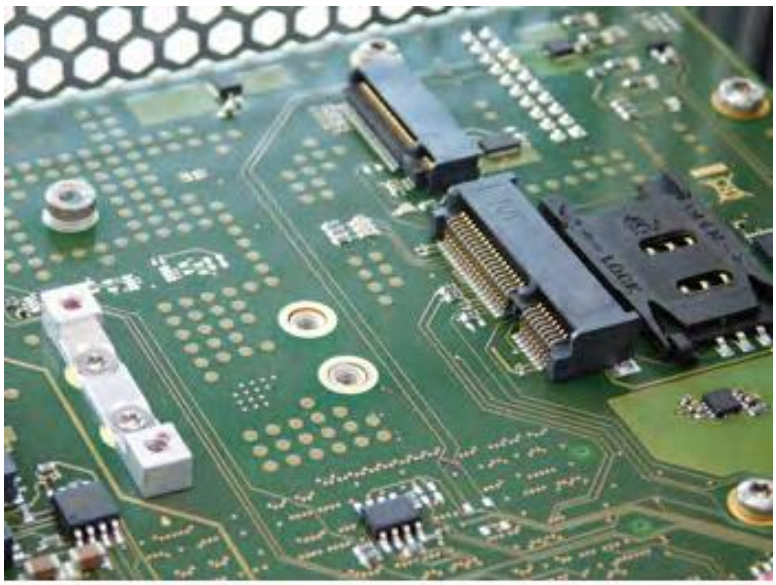


Figure 4-12 Long Position for mPCIe Bracket



2. Insert the Mini PCIe board into the connector slot.

Figure 4-13 Mini PCIe Board Inserted

3. Mount Mini PCIe board into the connector slot using standard screws (Tx8 [0.6 Nm/5.3 in lb]) screw: ISO14583 M2.5 x 6 or M2.5 x 5.

Figure 4-14 Mini PCIe Board Mounted to RXi2-EP IPC

4.5.3 SIM Card Interface Installation

To install the SIM card

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

1. Open SIM card holder by moving the upper part in the OPEN → direction (as shown on the part).

Figure 4-15 SIM Interface Connected to mPCIe – Unlocked but Closed

2. Open the SIM card holder.

Figure 4-16 SIM Card Holder Open

3. Insert the SIM card.

Figure 4-17 Inserted SIM card

4. Lock the SIM card into position by moving the upper part in the LOCK ← direction (as shown on the part).

Figure 4-18 SIM Card Holder Closed and Locked

4.5.4 M.2 A-Key Add-on Board Installation

ATTENTION

The information described in this section applies to service technician only.

The M.2 board is connected to the RXi2-EP IPC by inserting the board with a form factor of 2230.

To install the M.2 A-key board

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

1. Insert the M.2 A-Key board into the connector slot.

Figure 4-19 RXi2-EP IPC Connector Slot

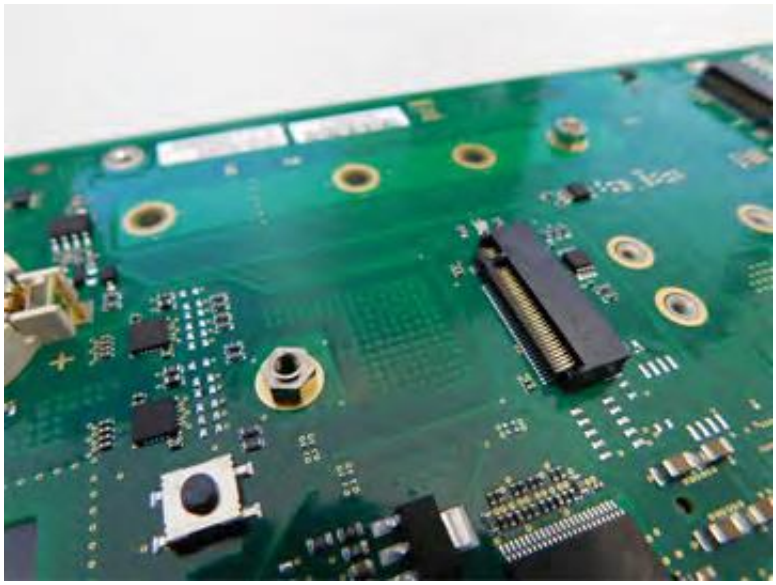


Figure 4-20 M.2 A-Key Insertion into Connector Slot

2. Mount the M.2 A-Key board into the connector slot using standard screws (Tx8 [0.45 Nm/5 in lb]) screw: ISO14583 M2.5 x 6 or M2.5 x 5.

Figure 4-21 M.2 A-Key Mounted to RXi2-EP IPC

4.5.5 M.2 M-Key Add-on Board Installation

ATTENTION

The information described in this section applies to service technician only.

The M.2 board is connected to the RXi2-EP IPC by inserting the board with a with form factor of 2242, 2260, 2280 or 22110.

To install the M.2 M-key board

⚠ WARNING

Verify that the power supply is turned off while installing boards or modules into the RXi2-EP IPC.

1. Insert the M.2 M-Key board into the connector slot.

Figure 4-22 RXi2-EP IPC Connector Slot

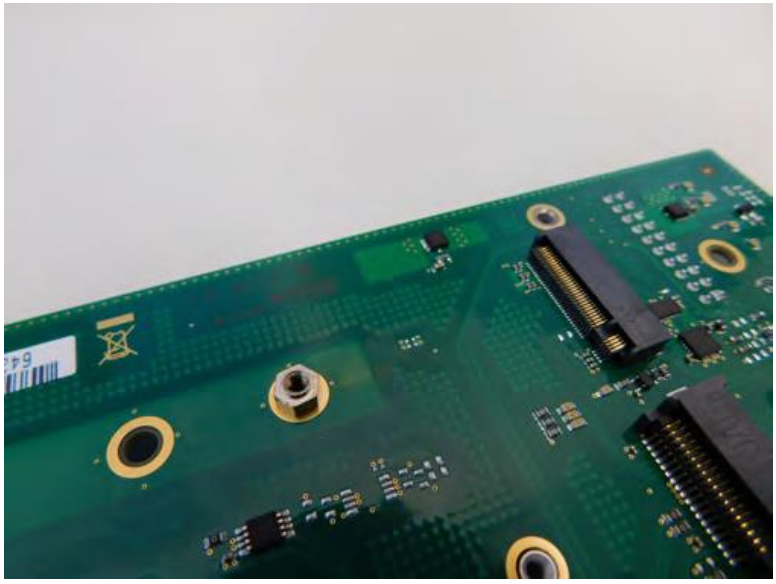


Figure 4-23 M.2 M-Key Insertion into Connector Slot

2. Mount the M.2 M-Key board into the connector slot using standard screws (Tx8 [0.45 Nm/5 in lb]) screw: ISO14583 M2.5 x 6 or M2.5 x 5.

Figure 4-24 M.2 M-Key Mounted to RXi2-EP IPC

4.6 Initial Startup

A few seconds after powering up, the RXi2-EP IPC system BIOS banner displays on the screen. If you do not see any error messages up to this point, the RXi2-EP IPC is running properly and ready to be configured for your application.

4.7 UEFI Firmware Setup

To enter setup during the initial startup sequence: press the [Delete] or [F2] key during the startup sequence. Adhere to the applicable on-screen messages when prompted.

Note: *If the RXi2-EP IPC does not perform as described, some damage may have occurred during shipment or the board is not installed or configured properly. Contact Emerson for technical support. (Refer to the section Contact Information.)*

4.8 RTC Battery Replacement

⚠ WARNING

There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type to Murata CR2032W. Dispose used batteries according to Emerson provided instructions and applicable local regulations.

⚠ CAUTION

Static-sensitive Devices: Handle only at static-safe work stations.

ATTENTION

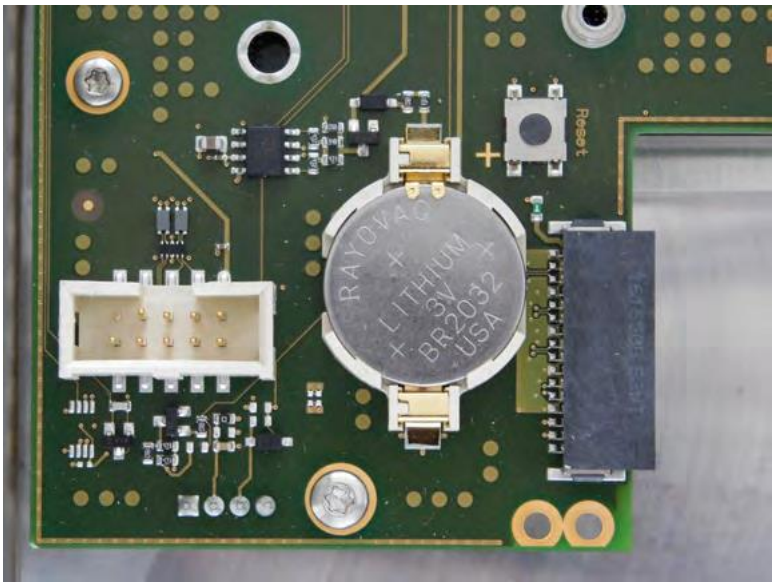
The information described in this section applies to service technician only.

To replace the Real Time Clock (RTC) battery

1. Remove power from the RXi2-EP IPC.

2. Loosen the four captive screws on the RXi2-EP IPC's top cover and remove it.

Figure 4-25 RTC Battery (Removed Top Cover)



3. Remove the RTC battery from the retaining clip.

4. Install a new RTC battery in the retaining clip with the positive (+) side up.

⚠ WARNING

Do not use a different battery type other than the same type as removed or equivalent type to Murata CR2032W as this may present a risk of fire or explosion!

⚠ WARNING

The battery may explode if mistreated. Do not recharge, disassemble, heat above 100° C (212 °F), or incinerate!

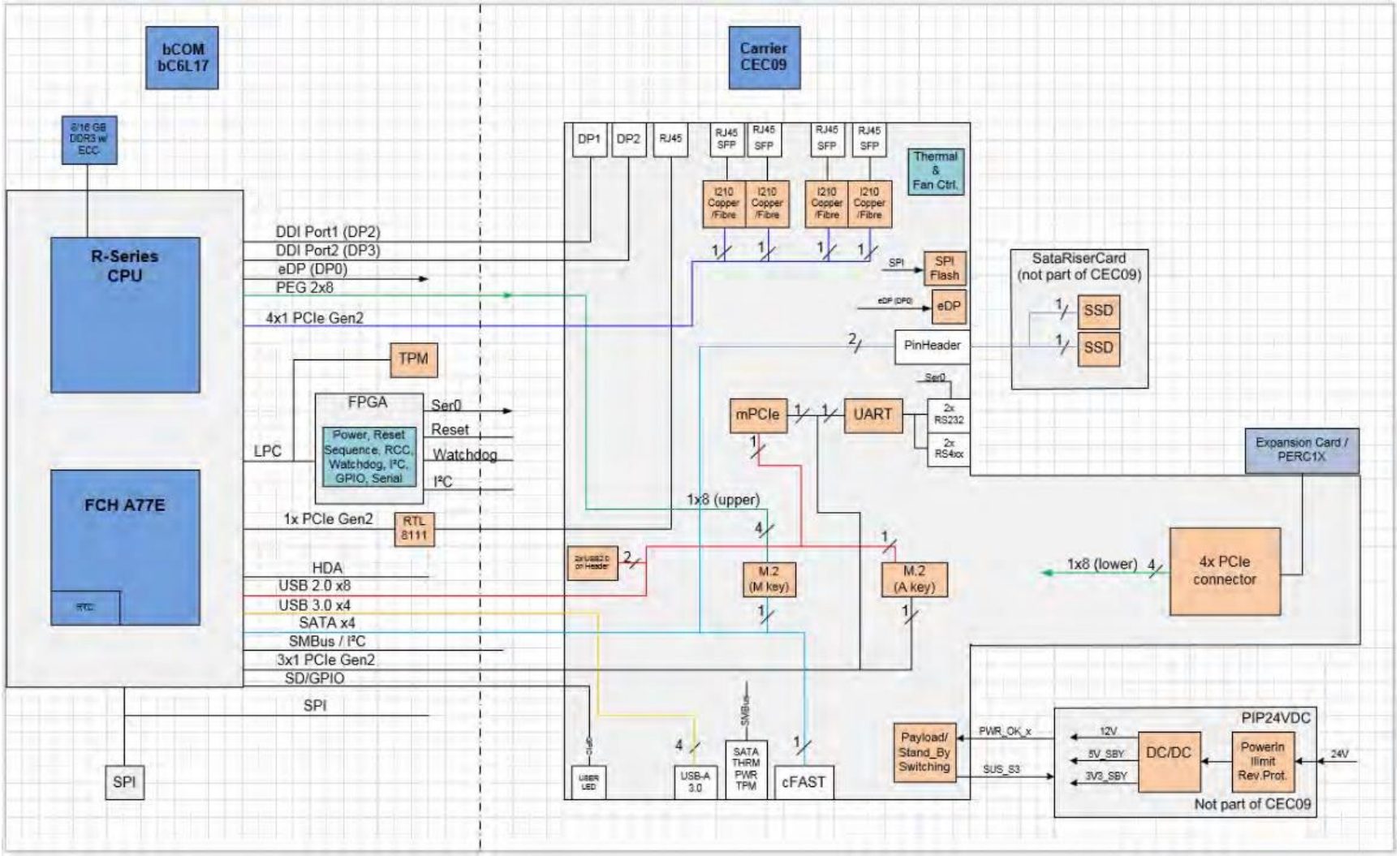
5. Reattach the top cover on the IPC and tighten the four screws to secure it.

Hardware Interface

CHAPTER SCOPE:

This chapter describes the hardware interface used in the RXi2-EP IPC. The following diagram provides an overview of the way the hardware interface is used.

Figure 5-1 RXi2-EP IPC Hardware Interface Overview



5.1 Interface

Figure 5-2 RXi2-EP IPC Hardware Interface Overview (2-slot Option)

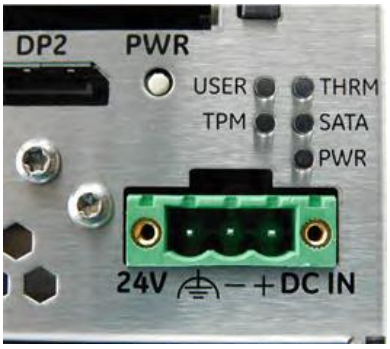
5.1.1 Status LEDs

The RXi2-EP IPC contains a set of status LEDs to indicate various functions. The CEC09 provides LEDs on the front panel, in a location near the power connector and power button.

Table 5-1 Status LEDs

LED Name	Color	LED Status Indication
PWR (Power)	Red	Table body text Standby power available, but no power good signal active (error condition)
	Yellow	Standby power valid (S3, S4, S5)
	Green	All power available and valid (S0)
SATA	Green	SATA access in progress (SATA, CFAST, M.2)
THRM (Port Expander: P0: Green; P1: Red)	Green	Thermal OK
	Yellow	T_{Hot} reached (available also in S5 after Shutdown)
	Red	T_{Crit} reached (available also in S5 after Shutdown)
USER (GPO0)	Green	Switchable from User
TPM (Port Expander: P2: Green and Red)	Yellow	Flashes when TPM button is pressed for a defined amount of time

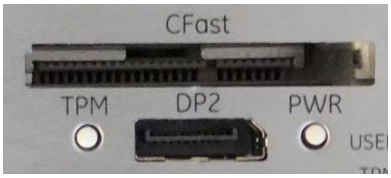
Figure 5-3 Status LEDs



5.1.2 Power Button

The Power button powers on the RXi2-EP IPC. It is located on the front panel.

Figure 5-4 Power Button



Note: *Use an appropriate tool for operation as needed.*
Pressing (short push) the power button triggers the operating system to shut down (Power State S5). If the operating system does not immediately shut down, press and hold the Power button for more than 5 sec to force the RXi2-EP IPC to shut down immediately without operating system support.
State S5 (Soft-off mode) will switch off the CPU core power and reset the RXi2-EP IPC. The state S5 is indicated with an Amber Power LED. At this state, it is possible to reactivate the RXi2-EP IPC by pressing (short push) the Power button. This action switches on the CPU core voltage and the boards restart.

5.1.3 TPM Button

Pressing the Trusted Platform Module (TPM) button for a defined amount of time activates TPM maintenance mode.

Note: *The TPM button is not currently supported. This feature will be implemented later. After implementation, support will depend on the selected configuration.*

5.1.4 Ethernet Ports (Eth1, Eth2, Eth3, Eth4, Eth5)

Five Ethernet interface ports are available on the RXi2-EP IPC. They are located on the front panel. Ethernet interface requires the use of a CAT 5 cable for proper operation with 100/1000BaseT.

Figure 5-5 Ethernet Interface Ports (1–slot Option)

Table 5-2 Ethernet Interface

10/100BaseT Name	1000BaseT Name	Pin
TxD+	LP_DA+	1
TxD-	LP_DA-	2
RxD+	LP_DB+	3
NC	LP_DC+	4
NC	LP_DC-	5
RxD-	LP_DB-	6
NC	LP_DD+	7
NC	LP_DD-	8

5.1.5 Ethernet LEDs

Two LEDs (green and yellow) are integrated in each of the RJ–45 connector. These LEDs indicate Ethernet interface link status and activity.

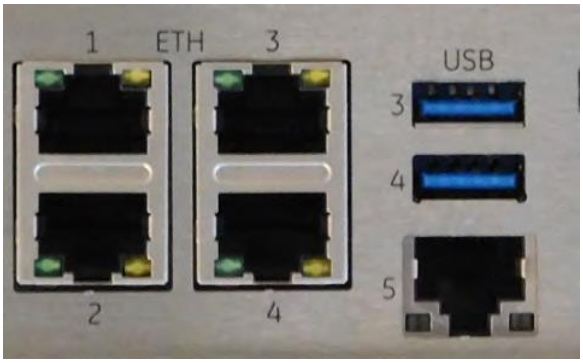
Table 5-3 ETH1 to ETH4 LEDs

Pin	LED Color	LED Status Indication
#GBEx_LINK	Green	Solid = 1000 Mbit Off = 10/100 Mbit
#GBEx_ACT	Yellow	Solid = No activity, but 10/100/1000 Mbit link Blinking = Activity ongoing

Table 5-4 ETH5 LEDs

Pin	LED on RJ–45 Jack	LED Status Indication
#GBE5_LINK	Yellow	Solid = Any LINK
#GBE5_ACT		Blinking = ACTIVITY
#GBE5_LINK100	Orange	LINK100
#GBE5_LINK1000	Green	LINK1000

Figure 5-6 RXi2-EP IPC GBE



5.1.6 Display Port

A Display port (DP1 and DP2) interface provides signals for connecting either a suitable monitor or an adaptor to several other display standards.

Figure 5-7 Display Port Interface Ports (2–slot Option)

Table 5-5 Display Port Interface Signals

Signal Name	Pin
TxD0+/-	1/3
TxD1+/-	4/6
TxD2+/-	7/9
TxD3+/-	10/12
AUXSEL	13
NC	14
CLK/AUX+	15
DAT/AUX-	17
HTPLG	1/3
DP_VCC *DP_VCC is fused with 2 A fuse, but for normal operation do not exceed 1 A at this pin.*	20
GND	2, 5, 8, 11, 16, 19

5.1.7 USB 3.0 Connectors

Four USB channels are available at standard USB Type A connectors. Each pair of them is fused with 2 A, but the normal operation do not exceed 0.9 A per connector.

Figure 5-8 USB 3.0 Connectors

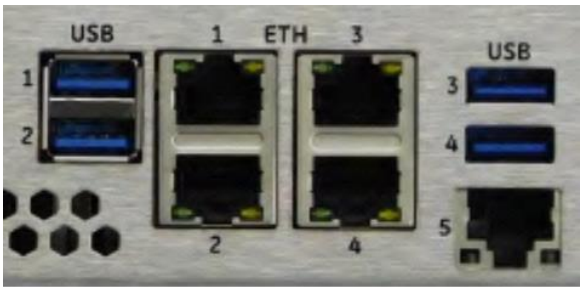


Table 5-6 USB Port 1-2 Signals

Signal Name	Pin
FUSE_VCC *FUSE_VCC is fused with 2 A fuse, but for normal operation do not exceed 0.9 A current per connector.*	1
USB-	2
USB+	3
GND	4
SSRX-	5
SSRX+	6
GND	7
SSTX-	8
SSTX+	9

Table 5-7 USB Port 3-4 Signals

Signal Name	Pin
FUSE_VCC *FUSE_VCC is fused with 2 A fuse, but for normal operation do not exceed 0.9 A current per connector.*	1
USB-	2
USB+	3
GND	4
SSRX-	5
SSRX+	6
GND	7
SSTX-	8
SSTX+	9

5.1.8 Power Connectors

The power inlet into the RXi2-EP IPC is a Phoenix contact Base strip - MSTB 2.5/ 3-GF - 1776702 connector. The corresponding plug is a type FKCN 2.5/ 3-STF - 1732975 from a Phoenix contact.

Figure 5-9 Power Connectors

Table 5-8 Power Connectors

Signal Name	Pin (Left to Right)
Frame GND	1
Power -	2
Power +	3

The power input is filtered internally on the RXi2-EP IPC. Directly after the power connector Frame GND and Power – are hard connected. When using a power supply with a supply reference to PE ground, connect the +24 V to power plus and the GND to power minus.

ATTENTION

Never use a power supply generating a -24 V output if the positive supply is related to PE ground. It will be shortened if any external device is connected to the RXi2-EP IPC.

ATTENTION

The power input is secured with one 10 A blow fuse. If the input power exceeds the limits, the fuse will be blown to protect all circuitry within the RXi2-EP IPC. Contact Emerson for a suitable replacement.

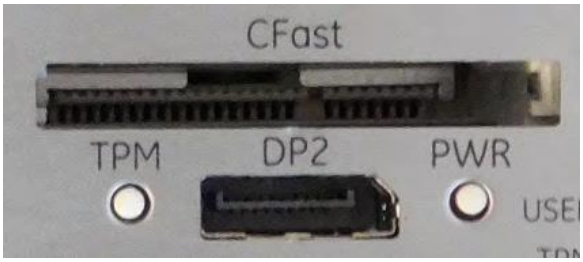
5.1.9 Internal SATA Connector

One M.2 M-Key (PCIe 4x and SATA) with sizes 2242, 2260, 2280 and 22110 is located inside the RXi2-EP IPC

5.1.10 CFast Connector

Located on the front of the RXi2-EP IPC is a CFast Type 1 flash connector. CFast is a variant of a CompactFlash that supports a higher maximum transfer rate than current Compact Flash cards. Standard CFast cards can be used for storage of data or the operating system. The device is connected to a standard SATA port of the COM Express module, and is hot plug capable with standard OS.

Figure 5-10 CFast Connector



5.1.11 Serial (COM) Ports

The 0-slot and 1-slot variant of the RXi2-EP IPC is provided with two serial ports. The two serial ports are RS–232 on 9–pin, D-connectors for local terminals or peripheral communication.
The 2-slot and 4-slot variant is equipped with four serial ports. Serial ports 1 and 2 are RS–232, serial ports 3 and 4 are RS–422 / RS–485.

Figure 5-11 Serial Ports – 0-Slot Variant

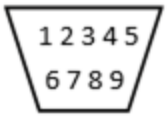
Figure 5-12 Serial Ports – 4-Slot Variant

Table 5-9 Serial Ports

Signal Name	Pin

RS–232 Pin	
DCD	1
RxD	2
TxD	3
DTR	4
GND	5
DSR	6
RTS	7
CTS	8
RI	9
RS–422 / RS–485 Pin	
Rx+	1
Rx-	2
Tx-	3
Tx+	4
GND	5

Figure 5-13 Pin Assignment



For RS–422 and RS–485-4 wire modes, connect the corresponding RX+/- with the TX+/- of the counterpart and vice versa. For RS–485-2 wire mode connect RX+ and TX+ together with the + line of the cable and the RX- and the TX- together with the – line of the cable.

The difference of the various RS–4xx modes is the Tx/Rx control. RS-422 has Tx and Rx always active. RS-485 four-wire enables Tx only when there is something to transmit, Rx is always active. RS-485 two-wire enables Tx and disables Rx when transmitting, disables Tx and enables Rx when not transmitting. The various modes can be selected within the device driver of the used operating system.

5.1.12 SATA 2.5 inch Drive Tray Replacement

ATTENTION

Indicates a procedure or condition that should be strictly followed to improve these applications.

Two additional 2.5 inch storage devices are available for use with the SATA riser board or the RAID option. The 2.5 inch hard disk trays (located in the front of the unit) can be used as SSD or rotating devices.

ATTENTION

Before before physically ejecting the device, make sure you dismount or eject the drive from the OS.

To replace the 2.5 inch SATA drive

Note: *Due to the SAT hot-plug capability, there is no need to power down the unit for replacement. Just make sure you dismount or eject the drive from the OS before physically removing the device.*

1. Locate the position of the hard disk device you want to remove.

Figure 5-14 2.5 inch SATA Drive Device Tray Location

2. Insert your finger under the handle and carefully remove the storage device tray from the mounted position.

Figure 5-15 Removing Storage Device Tray from Mounted Position

3. Pull down until the device tray is as fully open as possible.

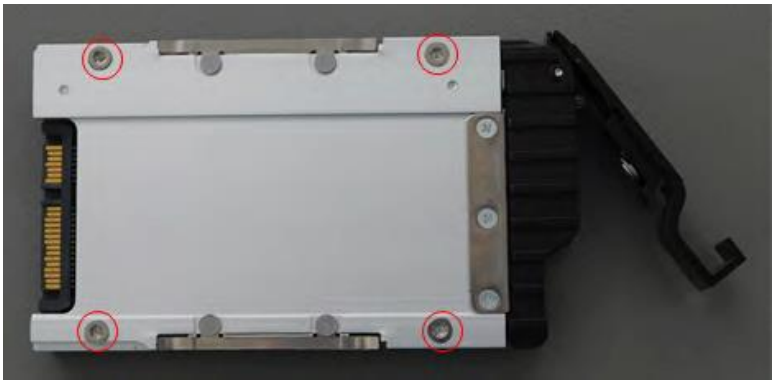
Figure 5-16 Storage Device Tray Fully Open Position

4. Remove the hard disk tray completely from the unit.

Figure 5-17 Removal of Storage Device Tray

5. Unscrew the four mounting screws and separate the hard drive from the tray.

Figure 5-18 Storage Device Tray Screws



6. Insert the replacement hard drive and screw in the four mounting screws to mount it.

Figure 5-19 Insert the replacement hard drive

7. Insert the storage device tray ~25.4 mm (1 in) (maximum) into the slot, move it to the right side until the nose is between the guidance mark of the tray, then push it carefully into the slot.

Figure 5-20 Insert the storage device tray

8. Insert the tray until it is fully and firmly seated.

Figure 5-21 Insert the tray

Note: *You can lock each SSD tray using the provided key.*

5.2 Additional Devices

5.2.1 Temperature Sensor

There are two thermal zones on the CEC09 Carrier board that can be observed with an EMC2113 device. This device contains internal temperature sensors and can connect three external temperature sensors. All external sensors are grouped as one thermal group and placed so that the hottest point can be observed no matter the mounting style.
The EMC2113 device measures the temperature of several higher rated devices (I210IT/IS; RS–232 Transceiver; 4x
PCIe2UART) with the help of a common heatsink.
A dual THRM LED located on the front panel indicates the current thermal.

Table 5-10 THRM LED Indication

LED Color	LED Status Indication
Green	Everything OK
Yellow	T_{Hot} reached (wired to U3080/SMBus Port Expander via pin 0)
Red	T_{Crit} reached (wired to U3080/SMBus Port Expander via pin 1)

5.2.2 NVSRAM

The RXi2-EP IPC is capable of Non-Volatile Random Access Memory (NVSRAM) as a mPCIe board add-in option that is automatically backed up when the RXi2-EP IPC is switched off or loses

power. It is not supplied with battery power but an exhausted Lithium coin battery will not result in a loss of data. Contact Emerson for assistance in accessing NVSRAM.

Hardware and Firmware Programmable Devices

CHAPTER SCOPE:

This chapter describes the hardware and firmware programmable devices of the CEC09 carrier board and the bCOM6L17 module.

6.1 SMBUS Devices

Table 6-1 SMBus Devices

Device	Address	Function
Clock Buffer 8x	1101 110xb [DCh]	PCIe clock
Clock Buffer 4x	1101 110xb [DCh]	PCIe clock
PCA9548A	1110 001xb [E2h]	SMBus switch (to avoid address conflicts from add-in boards)
Fan Controller	0101 110xb [5Ch]	Fan controller includes thermal sensors
Port Expander	0100 000xb [40h]	SMBus port expander

Table 6-2 I2C Bus Device

Device	Address	Function
24C512	1010 000x [A0h]	Factory EEPROM of bCOM6L17
24C64	1010 111x [AEh]	Factory EEPROM of CEC09

6.2 Ethernet

The Ethernet controllers provide internal EEPROMs, which contain the MAC address, as well as their configuration.

6.3 PCIe Ports

The PCIe ports are provided by the COMe module. The PCIe allocation is provided in the following table.

Table 6-3 PCI Routing

Function	Connected to	Vendor	Device (GPU Dependent)	Bus/Dev/Func
bCOM6L17				
Host Bridge	Internal	1022	1422	0/00/0
IOMMU	—	1022	1423	0/0/2
VGA compatible controller	—	1022	131B	0/1/0
Audio device	—	1022	1308	0/1/1
Host Bridge	—	1022	1424	0/2/0

PCI Bridge	Riser Slot	1022	1425	0/2/1
Host Bridge	—	1022	1424	0/3/0
PCI Bridge	I210 #1	1022	1426	0/3/1
PCI Bridge	I210 #2	1022	1426	0/3/2
PCI Bridge	I210 #3	1022	1426	0/3/3
PCI Bridge	I210 #4	1022	1426	0/3/4
Host Bridge	—	1022	1424	0/4/0
USB Controller (XHCI)	—	1022	7814	0/10/0
USB Controller (XHCI)	—	1022	7814	0/10/1
SATA Controller	—	1022	7801	0/11/1
USB Controller (OHCI)	—	1022	7807	0/12/0
USB Controller (EHCI)	—	1022	7808	0/12/2
SMBus Controller	—	1022	780B	0/14/0
IDE Controller	—	1022	780C	0/14/1
ISA Bridge	—	1022	780E	0/14/3
PCI Bridge	—	1022	780F	0/14/4
PCI Bridge	M.2 A-Key Slot	1022	43A0	0/15/0
PCI Bridge	Pericom UART	1022	43A1	0/15/1
PCI Bridge	mPCIe Slot	1022	43A2	0/15/2
PCI Bridge	Realtek	1022	43A3	0/15/3
Processor Function 0	—	1022	141A	0/18/0
Processor Function 1	—	1022	141B	0/18/1
Processor Function 2	—	1022	141C	0/18/2
Processor Function 3	—	1022	141D	0/18/3
Processor Function 4	—	1022	141E	0/18/4
Processor Function 5	—	1022	141F	0/18/5
CEC09				
Riser slot	—	—	—	1/0/0
Ethernet #1	Front	8086	1531	5/0/0
Ethernet #2	Front	8086	1531	6/0/0
Ethernet #3	Front	8086	1531	7/0/0
Ethernet #4	Front	8086	1531	8/0/0
Realtek Ethernet	Front	10EC	8168	9/0/0
M.2 A-Key slot	—	—	—	A/0/0
PCIe Serial	Serial	12D8	7954	B/0/0
Mini PCIe slot	—	—	—	C/0/0
PERC10 Riser Board				
PCIe to PCIe bridge	PCI Slots	12D8	2312	1/0/0

PCIe Slot #1	—	—	—	3/0/0
PCIe Slot #2	—	—	—	4/0/0
PERC11 Riser Board				
PCIe to PCIe bridge	PCI Slots	12D8	2612	1/0/0
PCIe Slot #1	—	—	—	3/0/0
PCIe Slot #2	—	—	—	4/0/0
PCIe Slot #3	—	—	—	5/0/0
PCIe Slot #4	—	—	—	6/0/0

Specifications

CHAPTER SCOPE:
This chapter provides specifications and useful information for the RXi2-EP IPC.

7.1 Power Consumption

⚠ WARNING

The RXI2-EP industrial PC power supply must meet the requirements for SELV (safety extra-low voltage)/LPS (limited power source) or ES1/PS2.
L'alimentation du PC industriel RXI2-EP doit répondre aux exigences SELV (sécurité très basse tension) / LPS (source d'alimentation limitée) ou ES1 / PS2.

Table 7-1 Input Power

Nominal Input	Input Range	Max. Input Ripple
24 V	18-30 V	± 0.2 V

The current consumption can vary, depending on the CPU, load, and input voltage, as follows:

- 18 V dc → 4.34 A (in BurnIn at 25°C (77 °F)
- 24 V dc → 3.58 A (in BurnIn at 25°C (77 °F)
- 30 V dc → 2.61 A (in BurnIn at 25°C (77 °F)

Table 7-2 Power Entry

Operation	CPU Temperature	Power [1]	
		R2E2N1C0A1T0A Dual Core, 8 GB RAM, 128 GB SSD	R2E2N1A0A1T0A Quad Core, 16 GB RAM, 128 GB SSD
UEFI Setup or shell	45°C (113 °F)	36 W	55 W
Windows 10 idle	45°C (113 °F)	17.3 W	28.8 W
Windows 10 Heavy Load Tool	45°C (113 °F)	31.1 W	58.1 W
[1] Measured at shown CPU die temperature. All values are typical.			

Note: *The consumption values include the USB keyboard and a SSD hard disk. For each linked Ethernet channel, add 0.5 W.*

Power Budget for Add-on Devices

The CEC09 Carrier board supports a power budget for USB devices, SATA devices, and add-on boards up to a total of 25 W. For add-on boards on the riser board, any share between +12 V, 5 V and 3.3 V power consumption is possible up to 20 W maximum for all two/four boards together.

7.2 Environmental Specifications

7.2.1 Ambient Temperatures and Humidity

Ambient temperatures and humidity values for the RXi2-EP IPC are provided in the following table.

Table 7-3 Temperature Specifications

Item	Level A
Temperature	
Storage	-40 to 85°C (-40 to 185 °F)
Operating	-40 to 60°C (-40 to 140 °F)
Humidity	
Operating	5 to 95% rH, non-condensing, at 40°C (104 °F)
Storage	

7.2.2 Shock and Vibration without 2.5 inch Mass Storage

The RXi2-UP IPC without 2.5 inch mass storage options is designed to meet the shock and vibration values listed in the following table.

Table 7-4 Temperature Specifications

Item	Vita 47 V1
Vibration	
Spectrum	5 to 100 Hz
Acceleration	2 g RMS
Shock	
Half sine or sawtooth	20 g
Duration	11 ms

7.2.3 Shock and Vibration with 2.5 inch Mass Storage

Due to additional interchangeable non-rugged mechanical parts, Emerson does not recommend exposing the system to shock and vibration.

7.2.4 Altitude

Altitude, air pressure, and ambient temperature influence the thermal operation of the components described in this document. They have been developed and tested at ~500 m (1650 ft) above sea level at a typical ambient temperature of 20°C (68 °F). Because of only marginal variations within a limited range of altitudes, this product operates as specified within altitudes from sea level to 1,000 m (6,560 ft), depending on the level. This is with reference to temperature ranges of air-cooled versions.

Note: *Emerson can assist the user in planning operation outside this altitude range upon request.*

Maximum altitude for the RXi2–EP IPC is specified in the following table.

Table 7-5 Maximum Altitude

Item	Level A
Maximum Altitude	
Operating	2 km (6,600 ft)
Storage	12 km (40,000 ft)

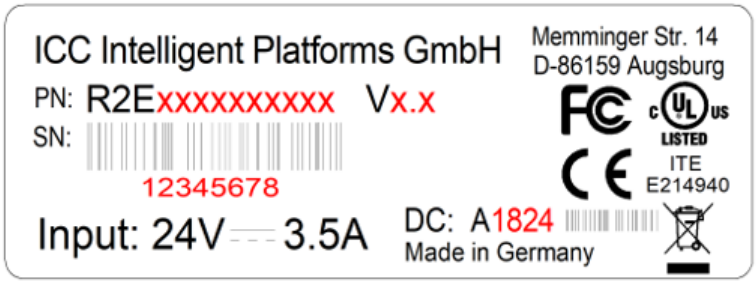
7.2.5 Regulations and Certification

Table 7-6 Regulations and Certification

Item	**Specification**
EMC	EMC Directive 2014/30/EU EN 61000-6-4 Emission standard for industrial environments EN 61000-6-2 Immunity standard for industrial environments FCC Part 15 B This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. CAN ICES-3 (A)/NMB-3(A)
Product Safety	LVD Directive 2014/35/EU IEC 62368-1 2nd Edition UL 62368-1 (UL file number E214940)

UKCA	Emerson Process Management Shared Service Ltd Meridan East, Meridan Business Park, Leicester LE19 1UX United Kingdom

Figure 7-1 RXi2-EP Data Nameplate



7.2.6 Battery

The RXi2-EP IPC contains a CR2032 lithium coin. The maximum current used by the bCOM6L17 module is 6uA.

Depending on the operating hours and temperature, the estimated battery life is 2 to 10 years. Battery current is not used when the RXi2-EP IPC is supplied with 24 V.

7.3 Technical Specification

Table 7-7 Technical Specification

Item	Specification
Processor	AMD R-Series APU dual core 2.2 GHz to 3.0 GHZ
	AMD R-Series APU quad core 2.7 GHz to 3.6 GHz
Memory	Up to 16 GB DDR3 at 1866 Mhz Soldered, with 16 GB ECC RAM
NVSRAM (as mPCIe Add-in Board)	512 KB, 1 MB or 2 MB NVSRAM Storage for process relevant data
SATA interface	M.2 M-Key SATA (form factor 2242, 2260, 2280, 22110) or optional internal 2.5" SATA hard disk drive (HDD)
Ethernet	5 Ethernet (10, 100, 1000 Mbit) ports
Wireless Communication	WLAN optional via internal Mini PCIe or M.2 A-Key
Video/graphics interface	2x Display Port
USB Interface	4x USB 3.0 Standard ports – External 2x USB 3.0 Standard ports – Internal
Serial Communications	RXi2-EP 0/1/2-slot: RS-232 or opto-coupled 422/485 RXi2-EP 4-slot: RS-232 and opto-coupled 422/485
Expansion	Internal Mini PCIe board slot, half and full length (for WLAN, LTE) Internal M.2 A-Key slot, form factor 2230 (WLAN) 0 (Slim version) 1, 2 or 4 full size PCIe Expansion slots
BIOS	UEFI AMI Aptio® 5
Dimensions	0-slot: 252 x 203 x 108.5 mm (9.92 x 8 x 4.24 in)
	1-slot: 252 x 203 x 135.5 mm (9.92 x 8 x 5.33 in)
	2-slot: 252 x 203 x 155.5 mm (9.92 x 8 x 6.13 in)
	4-slot: 252 x 203 x 195.5 mm (9.92 x 8 x 7.70 in)
Weight	0-slot: 3.9 Kg (8.60 lb)
	1-slot: 4.2 kg (9.26lbs)
	2-slot: 4.4 kg (9.70 lb)
	4-slot: 4.7 Kg (10.34 lb)
Enclosure	Aluminum and stainless steel

Appendix: Open Source Software (OSS) List (V0.x)

In accordance with certain software license terms, the General Electric Company (Emerson) provides the following software package installations. This code is provided on an as-is basis, and Emerson makes no representations or warranties for the use of this code independent of any Emerson provided software or services. Refer to the licenses and copyright notices files for each package for specific license terms that apply to each software bundle associated with this product release. For further details, refer to the RX2i-EP Open Source Software (OSS) Copyright & License Information (GFK-3045) or contact Emerson technical support at www.emerson.com/en-us/support.

Note: *These software package versions may change or be removed as needed for updates to this product.*

Table 8-1 Software license terms

Software (by Component)	Company URL	Version	Copyright Notice
EDK	http://www.tianocore.org/	BSD 2.0	Copyright © 2012, Intel Corporation
EDKII	http://www.tianocore.org/	BSD 2.0	Copyright © 2012, Intel Corporation
Crypto Package Using WPA Supplicant	https://w1.fi/wpa_supplicant/	BSD with WPA Supplicant	Copyright © 2003-2016, Jouni Malinen j@w1.fi and contributors
Data Processing Package (Base64 En-/Decoding	https://tls.mbed. org/base64-source-code	Apache 2.0	Copyright © 2006-2015, ARM Limited, All Rights Reserved SPDX-License-Identifier: Apache-2.0
FPGA I2C core	http://opencores.org/project,i2c	BSD 2.0	Copyright © 2000 Richard Herveille richard@asics.ws

Acronyms and Abbreviations

ACPI	Advanced Configuration and Power Interface
APU	Accelerated Processing Unit
AMD	Advanced Micro Devices
BIOS	Basic Input Output System
COM	Computer-on-module
DDC	Display Data Control
DDI	Digital Display Interface
DP	Display Port
DRAM	Dynamic Random Access Memory
DVI	Digital Visual Interface
ECC	Error Correction Code
eDP	Embedded Display Port
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
FCH	Fusion Controller Hub
FPGA	Field Programmable Gate Array
GPI	General-purpose Input
GPIO	General-purpose I/O
GPO	General-purpose Output
HDA	High Definition Audio
I^2C	Inter Integrated Circuit
IRQ	Interrupt Request
LAN	Local Area Network
LPC	Low Pin-Count Interface
NC	No Connected
PCI	Peripheral Component Interface
PCIE	Peripheral Component Interface Express
PEG	PCI Express for Graphics
RMA	Return Material Authorization
RTC	Real Time Clock
SATA	Serial ATA
SMB	System Management Bus
SMI	System Management Interrupt
SPD	Serial Presence Detect
SPI	Serial Peripheral Interface
SSD	Solid State Drive

TDM	Time Division Multiplex
TDP	Thermal Design Power
TPM	Trusted Platform Module
TMDS	Transition Minimized Differential Signaling
UART	Universal Asynchronous Receiver Transmitter
UEFI	Universal Extensible Firmware Interface
USB	Universal Serial Bus
VGA	Video Graphics Adapter
WDT	watchdog Timer

Glossary

AC '97 Audio CODEC (Coder-Decoder)

ACPI Software standard to implement power saving modes in PC-AT systems

Basic Module COM Express 125 x 95 mm (4.9 x 3.7 in) module form factor.

Binary values (base 2) Represented as digits followed by 'b' (for example 01b).

BIOS Firmware in PC-AT system that is used to initialize system components before handing control over to the operating system.

BIT Built-in Test

Carrier Board An application specific circuit board that accepts a COM Express module.

CE Conformité Européenne (European conformity)

CCTV Closed Circuit Television

Courier font Text in Courier font indicates a command entry or output from a Emerson embedded PC product using the built-in character set.

CTDP Configurable TDP (Thermal Design Power)

CVBS Composite Video Baseband Signal

CU Compute Unit

DDC VESA (Video Electronics Standards Association) standard to allow identification of the capabilities of a VGA monitor.

DIMM Dual In-line Memory Module

DP VESA-defined digital video interface display port to transport audio and video in a transmission protocol.

DVI Digital Display Working Group (DDWG) standard that defines a standard video interface supporting both digital and analog video signals. The digital signals use TMDS.

EEPROM Electrically Erasable Programmable Read-Only Memory

EMI/EMC Electromagnetic Immunity/Compatibility

ETI Event Time Indicator

EU European Union

Extended Module COM Express 155 x 110 mm (6.1 x 4.3 in) module form factor.

FCC Federal Communication Commission (USA)

FR4 A type of fiber-glass laminate commonly used for printed circuit boards.

Gb Gigabit

GbE Gigabit Ethernet

GT Giga Transfers I/O

HDCP High-bandwidth Digital Content Protection

Hexadecimal values (base 16) Represented as digits followed by 'h' (for example: 0Ch).

Hexadecimal values (base 16) Represented as digits preceded by 'H' (for example: H0C).

Hexadecimal values (base 16) Represented as digits preceded by '$' (for example: $0C).

I^2C Two-wire (clock and data) signaling scheme allowing communication between integrated circuits, primarily used to read and load register values.

IDE A parallel Integrated Device Electronics interface for hard disk drives (also known as PATA).

Italics (Sometimes in blue color) emphasizes words in text or documentation, or chapter titles or web addresses if underlined.

Legacy Device Relics from the PC-AT computer that are not in use in contemporary PC systems: primarily the ISA bus, UART-based serial ports, parallel printer ports, PS-2 keyboards and mice.

Definitions vary as to what constitutes a legacy device. Some definitions include IDE as a legacy device.

LPC A low speed pin-count interface used for peripheral circuits such as Super I/O controllers, which typically combine legacy-device support into a single IC.

LS Least Significant

LVDS Low Voltage Differential Signaling widely used as a physical interface for TFT flat panels. LVDS can be used for many high-speed signaling applications. In this document, it refers only to TFT flat-panel applications.

MS Most Significant

NTSC National Television Standards Committee video broadcast standard used in North America.

PAL Phase Alternating Line video broadcast standard used in many European countries.

POST Power-on Self Test

PCIE Next-generation high-speed Serialized I/O bus

PHY Ethernet controller physical layer device

ROM Read Only Memory, a legacy term often the device referred to as a ROM can actually be written to, in a special mode. Such writable ROMs are sometimes called Flash ROMs. UEFI Firmware is stored in ROM or Flash ROM.

RTC Battery backed circuit in PC-AT systems that keeps system time and date as well as certain system setup parameter.

SATA Serial AT Attachment: serial-interface standard for hard disks.

SBC Single Board Computer

SB-TSI Side Band Temperature Sensor Interface

SCI System Control Interrupt

SPD Serial Presence Detect refers to serial EEPROM on DRAMs that has DRAM

module configuration information.

SPI Serial Peripheral Interface standard for a synchronous serial data bus with Master- Slave devices.

Super I/O An integrated circuit, typically interfaced via the LPC bus that provides legacy PC I/O functions including PS2 keyboard and mouse ports, serial and parallel port (s) and a floppy interface.

SVI2 Serial VID Interface Rev 2

VR Voltage Regulator

TMDS Adigital Transition Minimized Differential signaling protocol between the graphics subsystem and display that is used for the DVI digital signals.

UMI Unified Media interface between APU and FCH

VGA PC-AT video graphics adapter standard defined by IBM.

VID Voltage Identification

'#' (hash) suffix to a signal name Indicates an active low signal. The signal is either true when it is at logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.

'\' (backslash) prefix to a signal name Indicates an active low signal. The signal is either true when it is at logic zero level (voltage close to 0 V) or the signal initiates actions on a high-to-low transition.

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Emerson Automation Solutions
2500 Austin Drive
Charlottesville, VA 22911
T +1 800 322 3616
www.Emerson.com