C-LAB Tensor-I22 Build to Order

C-LAB Tensor-I22 Build to Order Owner's Manual

Contents

C-LAB Tensor-I22 Build to Order

Product Information

Specifications

- Model: Tensor-I22
- Design: Fanless PC
- Location: Hayetsira St. 17, Yokneam, Israel
- Contact: Tel: +972-48-290-168 | Fax: +972-48-325-251
- Website: **www.fit-iot.com**

Product Usage Instructions

Safety Guidelines

- Disconnect all power sources before opening the computer cover or panels.
- Replace all covers, panels, and screws before connecting to the power source after working inside the computer.
- Some repairs may only be done by a certified service technician.
- Avoid electrostatic discharge by grounding yourself before touching internal components.
- Handle components and cards with care; avoid touching components or contacts directly.
- Handle cables carefully; pull on connectors or pull-tabs, not on the cables themselves.
- Ensure cables are correctly oriented and aligned before connecting them.
- Not suitable for use in locations where children are likely to be present.

Installation and Maintenance

Properly install Tensor-I22 for optimal performance. The fanless design eliminates the need for maintenance after installation, providing years of service without additional upkeep.

FAQs

Q: Do I need a certified technician for all repairs?

A: Some repairs may require a certified service technician. Refer to your product documentation or contact the service and support team for guidance.

Q: How do I avoid electrostatic discharge when handling the computer?

A: Ground yourself by using a wrist grounding strap or periodically touching an unpainted metal surface before touching internal components.

Q: Can Tensor-I22 be used in locations with children?

A: No, this equipment is not suitable for use in locations where children are likely to be present.

Safety instructions

Use the following safety guidelines to help protect your computer from potential damage and to help ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that you have read the safety information that was shipped with your computer.
WARNING: Disconnect all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting to the power source.
CAUTION: Some repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by C-Lab, is not covered by your warranty. Read and follow the safety instructions that came with the product.
CAUTION: To avoid electrostatic discharge and prevent damage to internal components from electrostatic discharge, when touching the computer or its parts, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface, such as a connector on the back of the computer.
CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.
CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.
CAUTION: This equipment is not suitable for use in locations where children are likely to be present.

Introduction

Thank you for purchasing Tensor-I22. A fanless PC designed to be tough, capable, versatile and user-friendly. With proper installation, we expect Tensor-I22 to serve you for many years. The unique fanless design of Tensor-I22 eliminates the need for any maintenance after installation.
Please consult this owner's manual for getting started with Tensor-I22. You are welcome to contact the Tensor-I22 manufacturer, C-Lab, at **www.fit-iot.com** or **support@fit-pc.com** should you have any technical questions.

Tensor-I22 features

- Intel® 11th Gen. Core processor
- Up to 64 GB DDR4 RAM
- NVMe | M.2 SATA | 2.5" storage*
- Dual head 4K display
- Up to 4 Gbit Ethernet ports* | WiFi* | cellular communication*

- USB 3.1, USB 2.0, audio, optional Isolated serial + GPIO ports.
- Supports Windows 10, Windows 11, and Linux
- Additional features can be added with Tensor Elements (TELs)
- All-metal fanless housing (standard housing is 200 mm X 200 mm X 35.3 mm)
- Operating temperature range is from -40°C to 65°C (depending on the ordered configuration)
  * Feature may require an extension TEL module or may not be enabled by default

Package contents

1. Tensor-I22 computer
2. Power supply: input 100-240VAC 50/60Hz, output 12VDC 5A with universal AC plugs
3. Antennas, according to configuration
4. Owner's manual

NOTES

1. Additional accessories can be purchased separately here: **https://fit-iot.com/web/products/Tensor-I22/buy-Tensor-I22/**
2. Some Tensor-I22 configurations come pre-installed with additional devices and accessories

Specifications

Features

- IOT gateway / Fanless industrial PC
- Intel® 11th Gen. Core processor
- NVMe + M.2 SATA + 2.5" HDD storage
- 2x/4x Gigabit LAN
- Optional Wi-Fi/BT + LTE/5G modem
- Optional Isolated serial + GPIO ports
- 7V – 42V DC power input

|		
CPU	Intel® Core i7-1185G7E	4 Core | Base: 1.8/2.8 GHz, Boost: 4.4 GHz | TDP: 15/28 W | vPro
	Intel® Core i5-1145G7E	4 Core | Base: 1.5/2.6 GHz, Boost: 4.1 GHz | TDP: 15/28 W | vPro
	Intel® Celeron 6305E	2 Core | Base: 1.8 GHz | TDP: 15 W
Memory	Type	2x SO-DIMM DDR4 up to 3200MT/s
	Max. capacity	64 GB
	Storage devices	Up to 3 NVMe/ SATA storage devices
	Basic configuration	NVMe or SATA on M.2 (PCIe x4 Gen. 4 or SATA 3)

Storage	Optional TEL-NVME on TRIP1	Additional NVMe on M.2 (PCIe x4 Gen. 3)
	Optional TEL-NVME on TRIP2	Additional SATA on M.2
	Optional TEL-SATA1 [1]	Additional SATA on 2.5" for SSD/HDD
Display	Display outputs	Up to 4 independent displays
	HDMI	2x HDMI 1.4b (up to 3840 x 2160 @ 30Hz)
	Mini-Display Port	2x DP 1.2 (up to 4096 x 2160 @ 60Hz) Dual mode
Ethernet	Ethernet ports	Up to 4 ports
	Basic configuration	2x Gigabit Ethernet on RJ45
	Optional TEL-LANX2	Additional 2x Gigabit Ethernet on RJ45
	Optional TEL-OPLNX2	Additional 2x SFP+ ports for optical LAN
	Optional TEL-POEX2 [1]	Additional 2x GbE LAN on RJ45 with PoE source of up to 15W
Wireless Connectivity	M.2 Key-E [2]	For M.2 2230 module with Wi-Fi 6E, BT 5.2
	M.2 Key-B [2]	For M.2 LTE/5G
	Optional TEL-PCIEmini	For mini PCIe module, w/ Nano-SIM tray
USB	USB ports	Up to 12 USB 3.1 / 2.0 ports
	Basic configuration	4x USB 3.1 on USB Type-A
	Optional TEL-USB3V4	Up to 2 additional 4x USB 3.1 on USB Type-A
	Optional TEL- USB2V4	Up to 2 additional 4x USB 2.0 on USB Type-A
Serial/GPIO	Serial/GPIO ports [1]	Up to 20 RS-232 / RS-485 or 40+ isolated GPIOs
	RS-232 / RS-485 [1]	Up to 20 RS-232 / RS-485 ports on DB9
	CAN bus	Up to 5 isolated CAN bus ports on DB9
	GPIO	Up to 5 modules with 20 isolated GPIOs each, on terminal blocks
Audio	Codec	Optional analog audio on TEL-AUDIO
	Interfaces	Optional analog output, analog input on 3.5 mm jacks
Power	Input power	Modular power
	Standard power input	12V, 5.5 mm power jack w/ locking, 60W universal PSU
TPM	Internal firmware TPM	Intel® PTT (TPM 2.0)
	Discreet TPM	Optional discreet TPM 2.0: RSA-2048, ECC-256, SHA-256, EAL4 +
OS support	Windows 10	Windows 10 IoT Enterprise LTSC 2021 / Windows 10 Pro
	Windows 11	Windows 11 Pro
	Linux	Linux Mint / Ubuntu

Operating Enviro nment	Commercial temperature	0°C to 45°C
	Extended temperature	-20°C to 65°C
	Industrial temperature	-40°C to 65°C
	Humidity	5% – 95% non-condensing
Physical Charact eristics	Cooling	Fanless, passive cooling
	Dimensions	200 mm X 200 mm X 35.3 mm for standard housing
	Mounting	Side/bottom VESA / DIN Rail mount

Notes:

1. Some expansion TELs require a larger housing
2. Additional options are available with expansion TELs

Dimensions
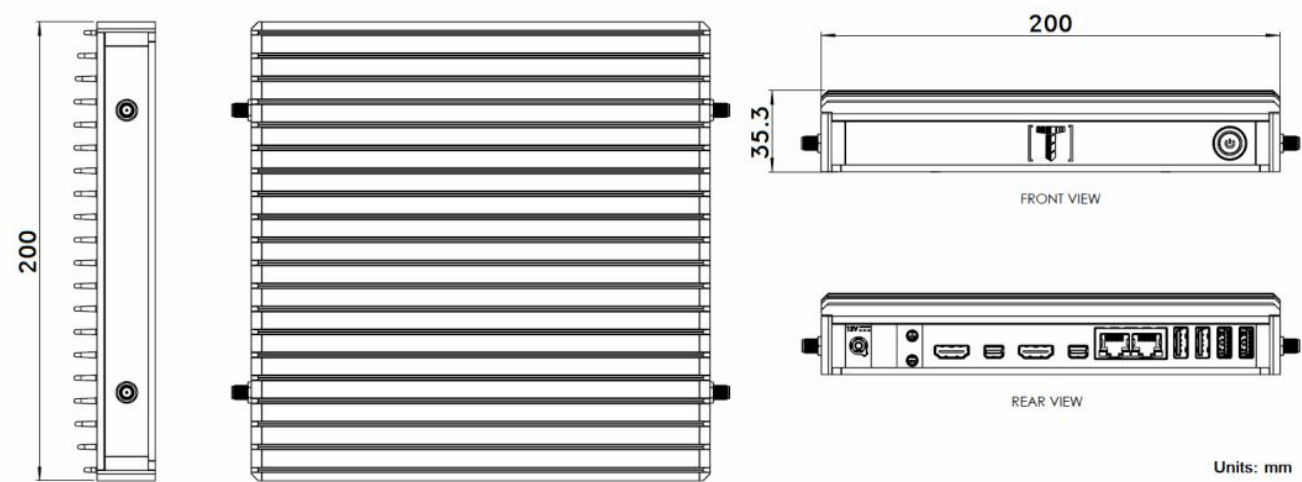
Interfaces

Location	Connector		Interface	
Rear Panel	Power input: 5.5mm		12V up to 60W	
	Optional 2x 3.5mm jacks		Optional analog audio (TEL-AUDIO)	
	2x HDMI		HDMI 1.4b (up to 3840 x 2160 @ 30Hz)	
	2x mini-DP		DP 1.2 (up to 4096 x 2160 @ 60Hz) Dual mode	
	2x RJ45		2 x RJ45 10/100/1000 Mbps Ethernet	
	2x USB Type-A		2x USB 2.0	
	2x USB Type-A		2x USB 3.1	
Front Panel	Power button		On/Off push button w/ power LED	
	Optional expansion TELs		2x RJ45, DB9, terminal block, etc.	
Right Panel	2x SMA		2x SMA antennas for Wi-Fi/BT or cellular modem	
	Optional expansion TELs		2x RJ45, DB9, terminal block, etc.	
Left Panel	2x SMA		2x SMA antennas for Wi-Fi/BT or cellular modem	
	Optional expansion TELs		2x RJ45, DB9, terminal block, etc.	

Location	Connector	Form factor	Interface	Usage
Internal	2x SO-DIMM	DDR4 SO-DIMM	DDR4, up to 3200 MT/s	2x DDR4 module
	M.2 Key-B	M.2 Up to 3060	PCIe Gen 3 x1 + USB 2.0	LTE/5G modem
	M.2 Key-E	M.2 2230 or	PCIe Gen 3 x1 + USB 2.0	Wi-Fi/BT module
	M.2 Key-M	M.2 up to 2280	PCIe Gen 3 x4 / SATA	NVMe/SATA storage/AI
	TRIP1	Expansion TEL	PCIe Gen 3 x4/ 2x PCIe	TEL expansions for TRIP1
	TRIP2	Expansion TEL	PCIe Gen 3 x1 / SATA	TEL expansions for TRIP2
	4-pin internal USB	Expansion TEL	USB 2.0	USB TEL expansions

Optional TEL expansion modules

TEL	Description	Max. quantity	Where connected	PN
FT.C-LAN2	Additional 2x Gbit LAN 1	1	TRIP1	FC
FT.EC-USB2V4	Additional 4x USB 2.0	2	TRIP1 / TRIP2	FEC
FT.ED-USB3PCIV4	Additional 4x USB 3.0	2	TRIP 1,2	FED
FT.F-M2NVME for NVMe	Additional M.2 Key-M for NVMe	1	TRIP1	FFN
FT.F-M2NVME for SATA	Additional M.2 Key-M for SATA	1	TRIP2	FFS
FT.H-SER4	1-4 isolated RS232 or RS485	3	TRIP1 / TRIP2 / int. USB	FH
FT.HB-DB9	DB9 connector for FT.H-SER4	3 per FT.H-SER4	FT.H-SER4	
FT.HA-SER1	1 port RS232	3	TRIP1 / TRIP2 / int. USB	FHA
FT.I-M2B	Additional M.2 Key-B for modem	2	TRIP1 / TRIP2	FI
FT.J-M2E	Additional M.2 Key-E for Wi-Fi/BT	2	TRIP1 / TRIP2	FJ
FT.L-PCIEmini	Mini PCIe compartment	2	TRIP1 / TRIP2	FL
FT.Q-CAN	Isolated CAN bus port	3	TRIP1 / TRIP2 / int. USB	FQ
FT.S-GPIO	4 – 20 isolated GPIOs	3	TRIP1 / TRIP2 / int. USB	FS
FT.V-TERM4	Terminal block 4x for FT.S-GPIO	4 per FT.S-GPIO	FT.S-GPIO	FV
FT.T-SATA1	2x 2.5″ SSD / HDD	1		FT

FT.U-POE2	2x Gbit Ethernet with PoE PSE 802.3at Type 1 by RJ45	1	TRIP1	FU
FT.W-OPLN2	2 x SFP+ socket for optical GbE connection	1	TRIP1	FW

Notes:
This interface is also available in some quantity on the motherboard, without a TEL.

Connector layout

Back view

Front view

Power button
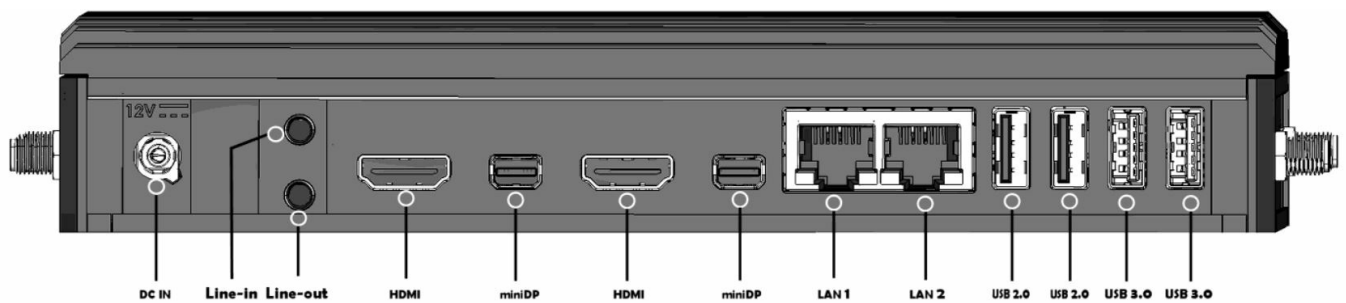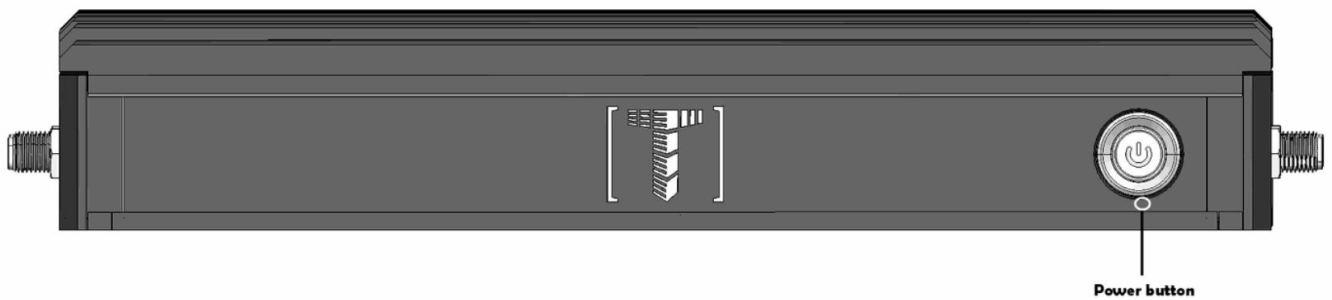
Quick start guide

Minimum requirements
To use Tensor-I22 you will need:

- RAM and storage device (if not pre-installed)
- A display with HDMI or DisplayPort input + HDMI or mini-DisplayPort cable
- USB keyboard and mouse

Identifying Tensor-I22 configuration
Your Tensor-I22 configuration is detailed on the label attached to the bottom of the computer.
Note
Pay attention to RAM and storage. If not installed, Tensor-I22 will not boot. You will have to install these devices first.

Opening Tensor-I22
You will need to open Tensor-I22 in order to install RAM, storage, cellular modem, WiFi module, RTC battery or expansion TELs.
*Required tool: Phillips screwdriver.
To open Tensor-I22 please follow these steps:

1. Place Tensor-I22 on a flat surface bottom-up.
2. Open the four screws using the Phillips screwdriver (counter clock-wise).
3. Lift the bottom cover to remove it.
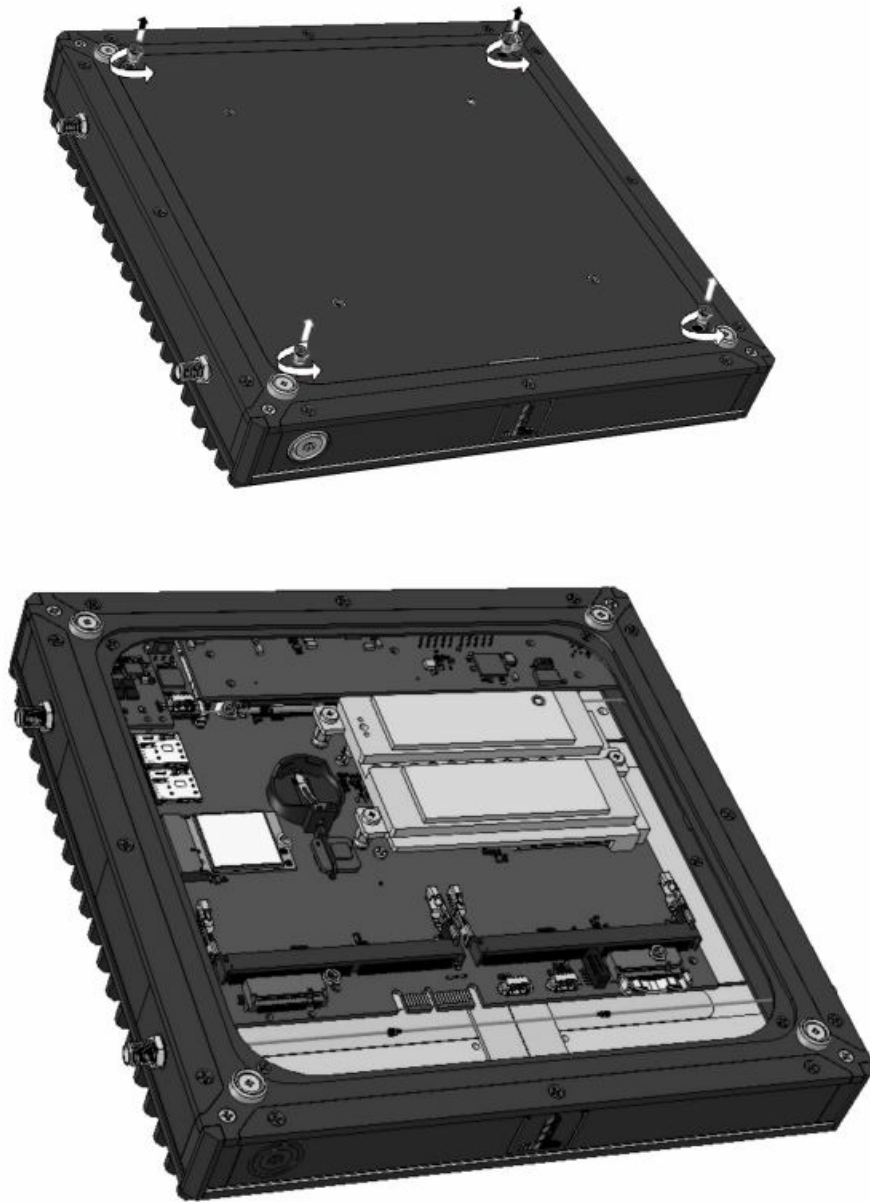
Installing RAM

*Required tool: Phillips screwdriver.

1. Tensor-I22 can accept two SODIMM DDR4 modules
2. Insert DDR4 SODIMM module and press it down until it latches firmly on both sides
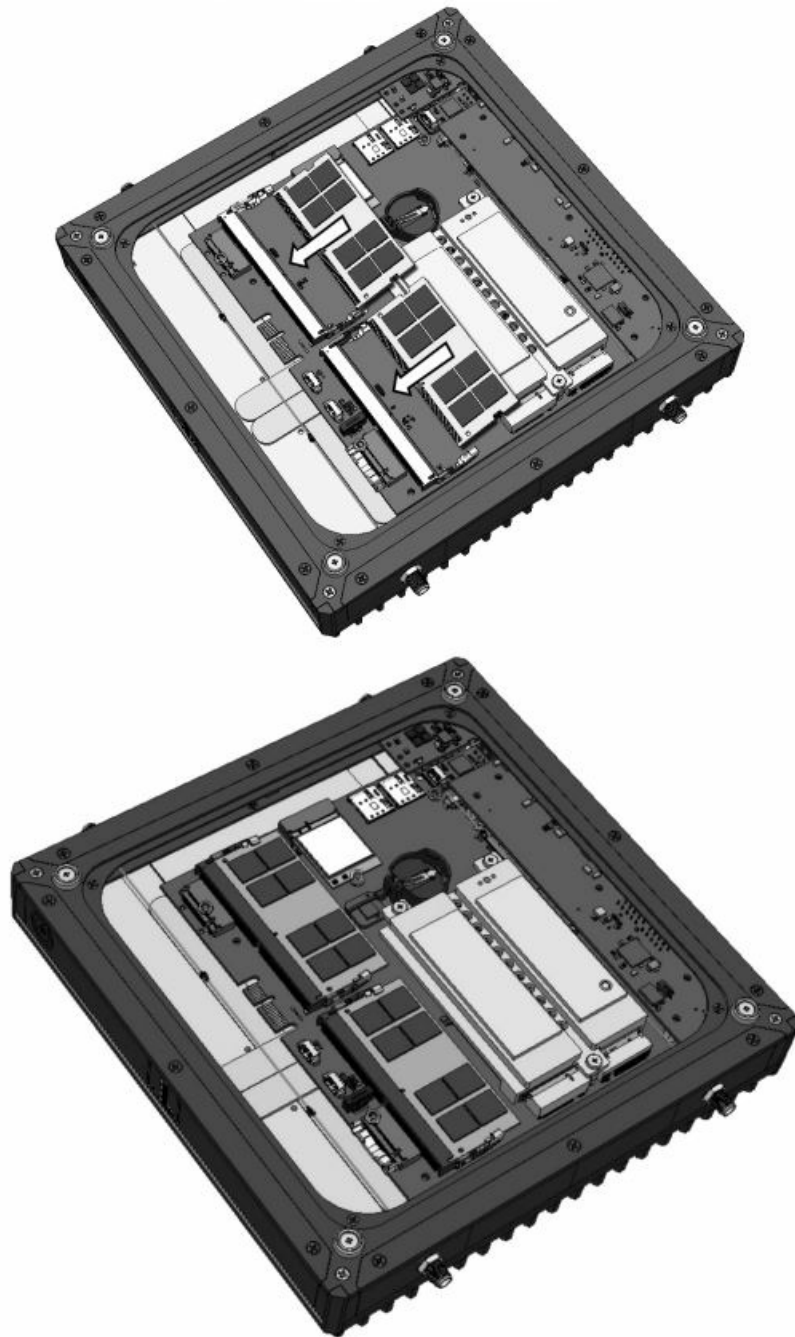
M.2 cooling plate and NVMe/SATA

*Required tool: Phillips screwdriver.
The M.2 cooling plate has several purposes:

1. Allows installation of multiple form factor M.2 devices

2. Provides cooling to M.2 devices

   M.2 Key-M accepts SATA of NVME modules, 2230, 2242, 2260 or 2280.

   M.2 Key-B accepts SATA M.2 modules or modems, with lengths of 30mm, 42mm, 52mm or 60mm and widths

   22mm or 30mm

   All modules must be fastened to the M.2 cooling plate.

To install NVMe/SSD onto M.2 cooling plate

1. The red spacer is already assembled on the plate. Move the red M.2 spacer according to the length of the M.2

NVMe/SSD as depicted below. Insert M.2 fastening screw but do not tighten!

2. Place edge of M.2 NVMe/SSD against the fastening screw
   - Press the NVMe/SSD firmly until its connector edge is seated between the alignment pins and rests on the fastening screw.
     Once positioned correctly the connector edge should stick out above the edge of the M.2 cooling plate.
3. Tighten the spacer screws
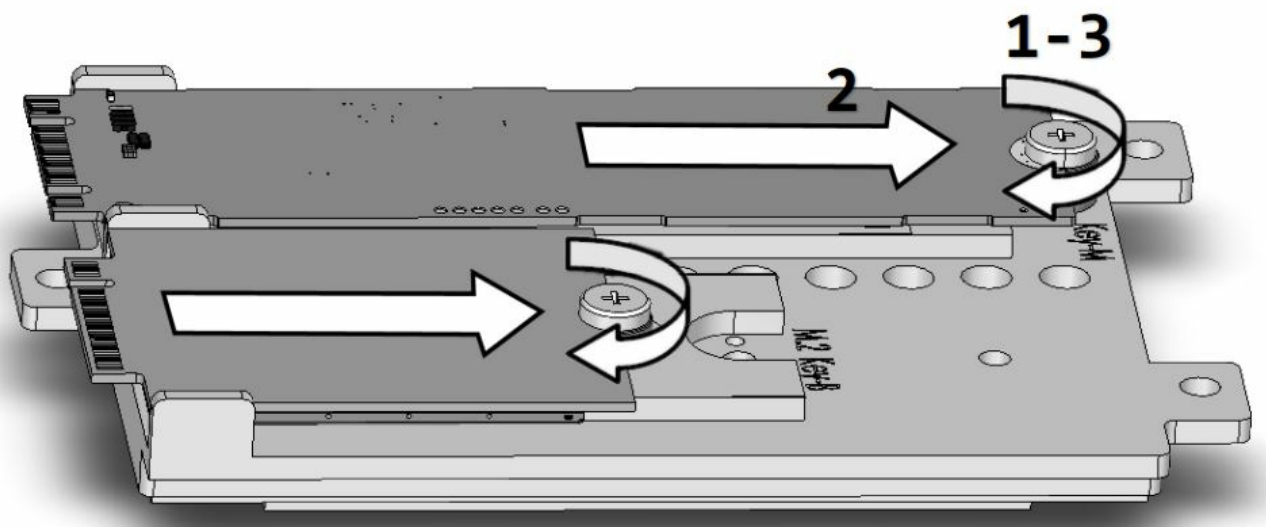
4. Place edge of M.2 plate connectors against the appropriate sockets on the SBC.
   - Press firmly on the plate until its connector edge is fully seated in the socket. After correct positioning, the holes in the plate align with the spacers on the board.
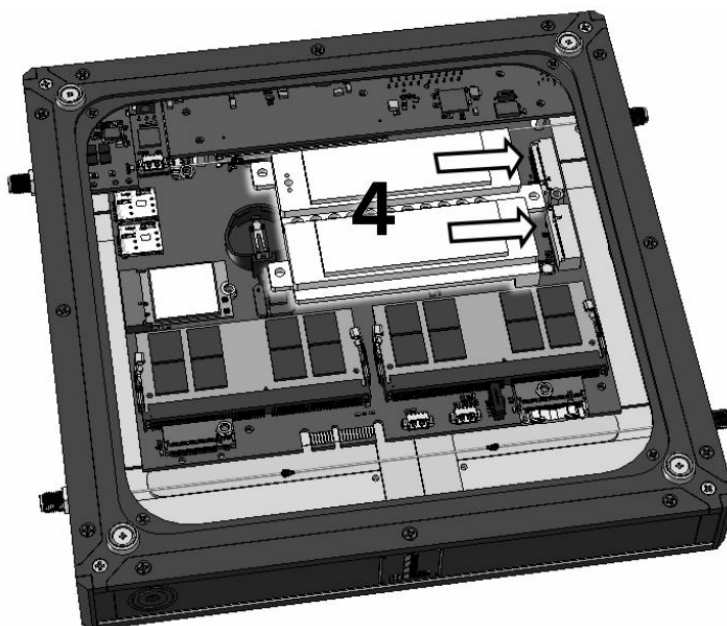
5. Hold down the M.2 cooling plate and tighten the 3 panel screws
6. Return the bottom cover to its place and tighten the screws.
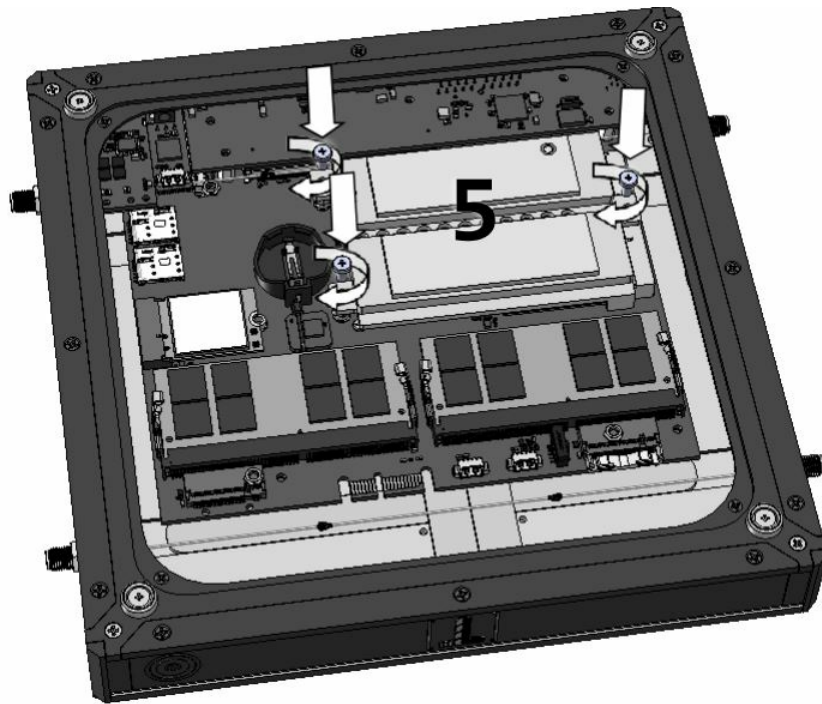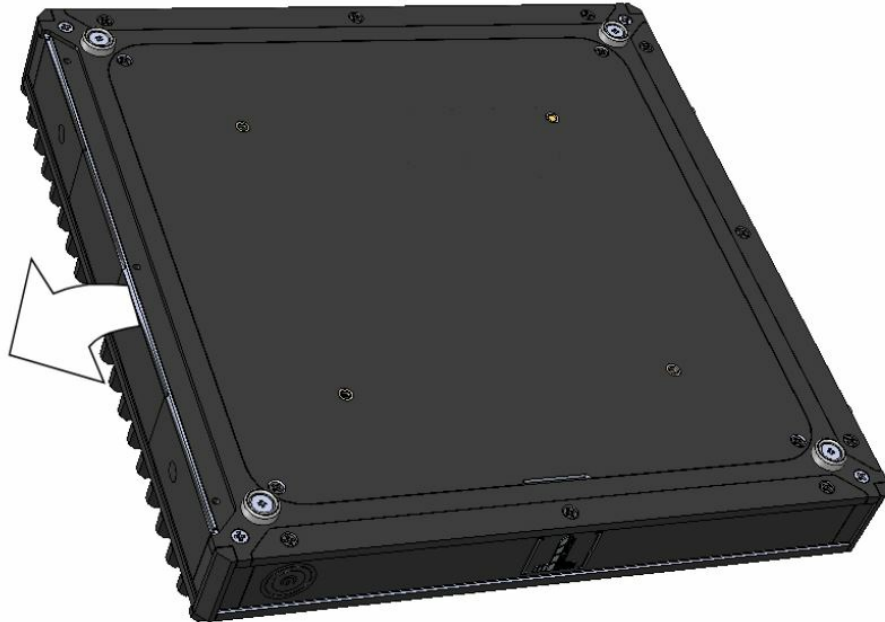
Optional WiFi/BT Module

*Required tools: Phillips screwdriver and small wrench WiFi module is not installed by default.
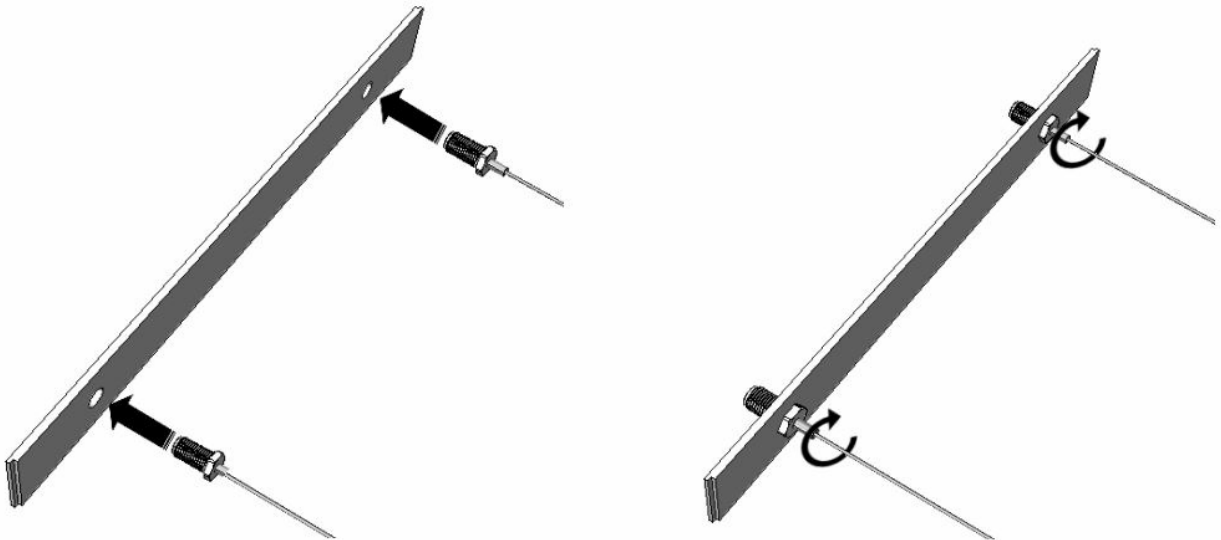
Installing WiFi/BT module
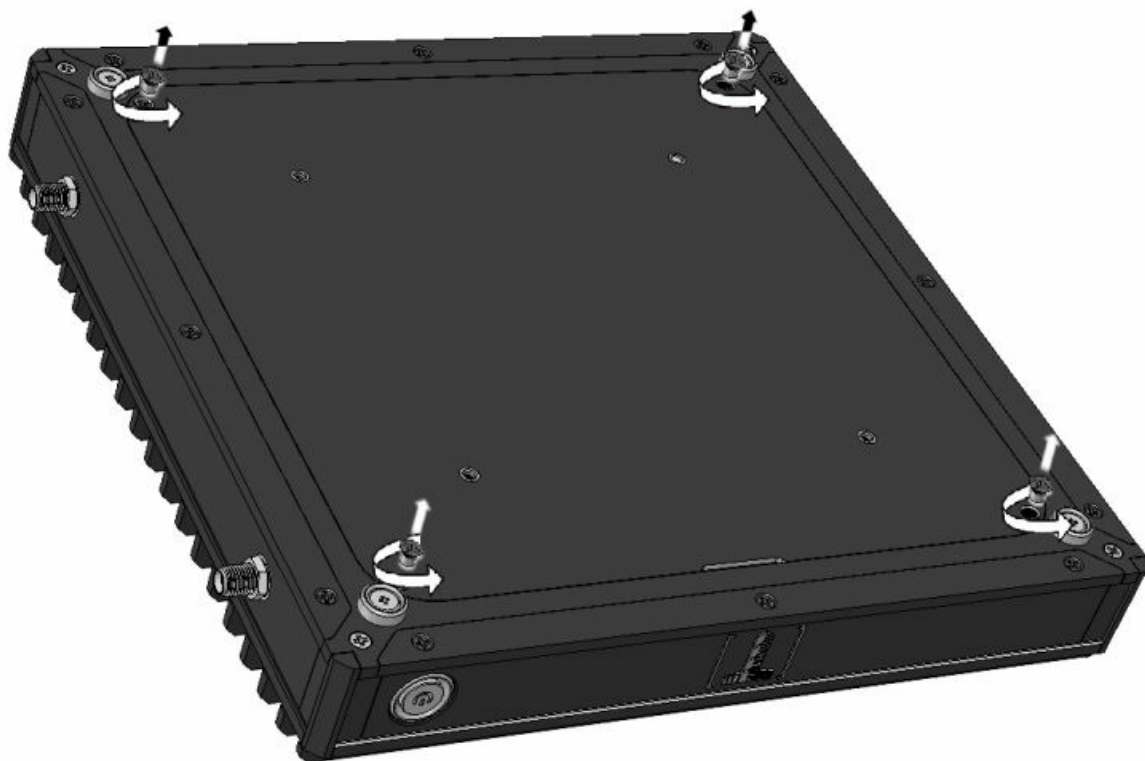
1. Unscrew the side frame(s) as shown below
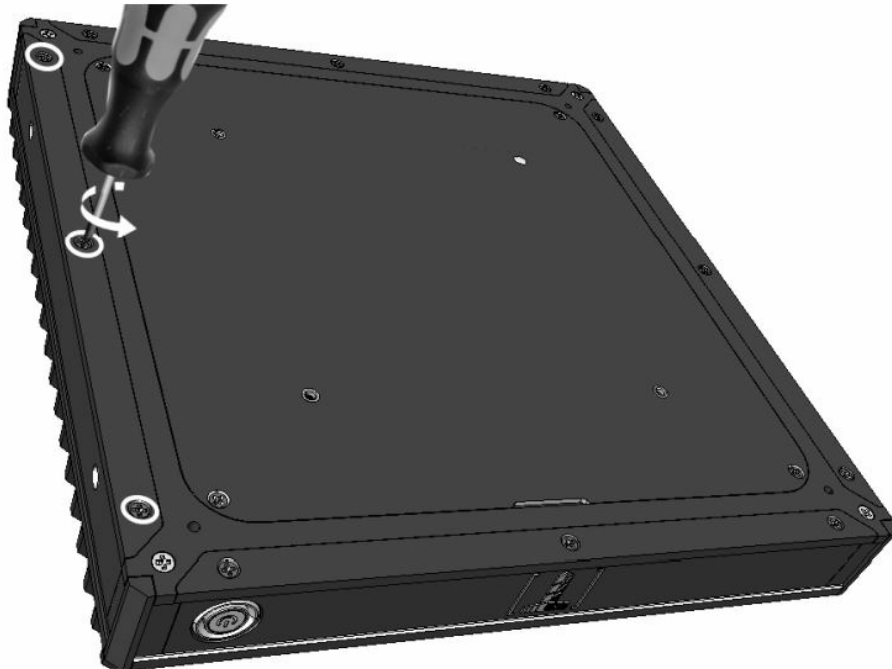

2. Remove the frame(s)

3. Insert the WiFi/BT antenna connectors into the appropriate holes in the frame(s) and tighten them by using the small wrench.


4. Return the frame and tighten the screws to secure it in place
5. Remove the bottom cover by removing the 4 screws as shown in the picture below

6. Insert the WiFi/BT module into the appropriate socket at an angle.

7. Press it down until it sits on the spacer.

8. Tighten the fastening screw.

9.
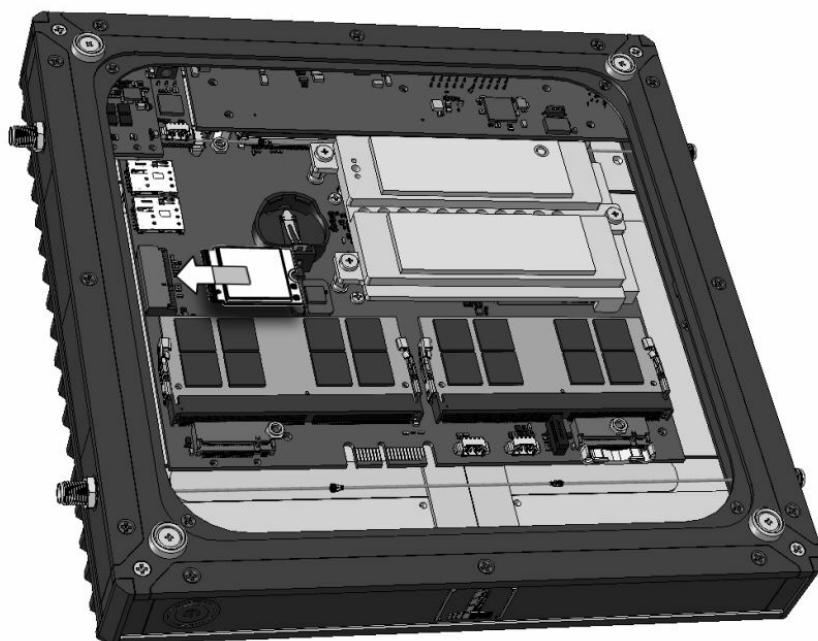
Connect the end of the antenna cable to the appropriate connectors on the WiFi/BT module. Return the bottom cover to its place.
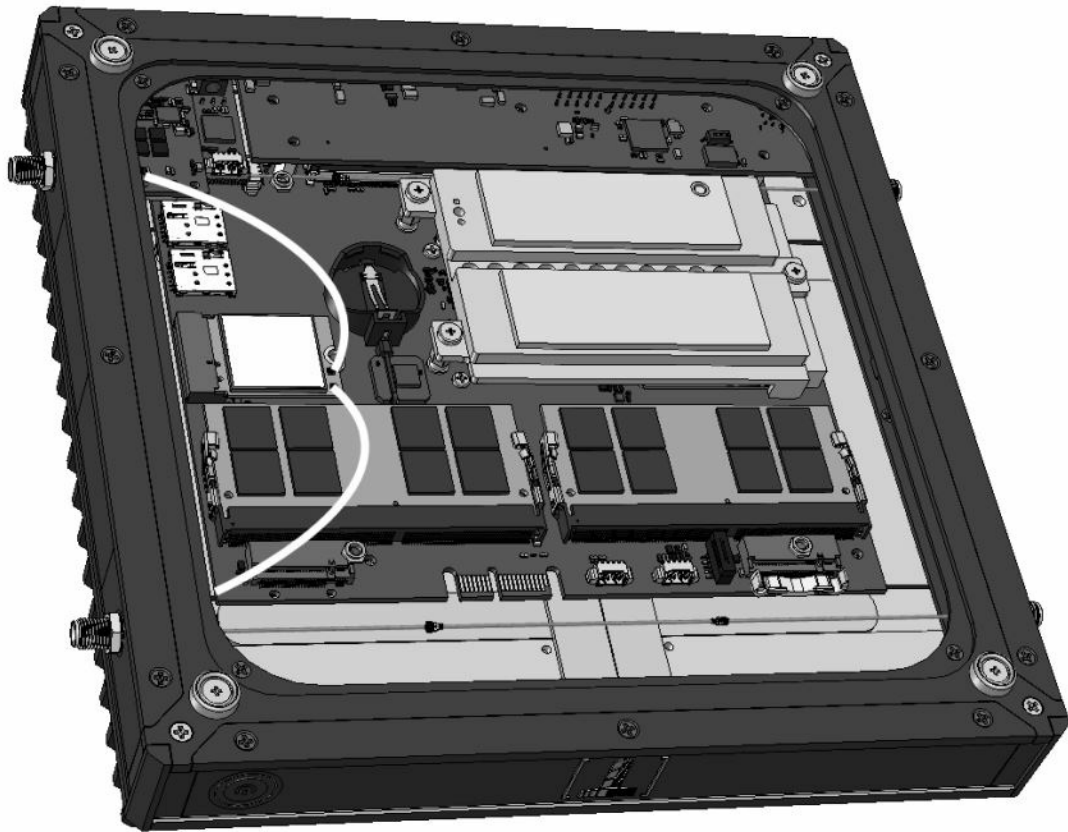
Connecting Tensor-I22

1. Before connecting Tensor-I22, please ensure that the RAM and storage devices are installed as detailed in the above sections.
2. Connect the display to Tensor-I22 using HDMI, or mini-DP cable.
3. Connect to Tensor-I22 USB keyboard and mouse.
4. Insert the DC plug into the Tensor-I22 DC-in jack. Rotate clockwise 90° to secure.
5. Slide the AC blade suitable for your country into the power-supply, and plug the power-supply into an AC-outlet. The power button on Tensor-I22 should turn green. In a few seconds, an image should appear on the display.
6. Connect Ethernet cable as needed. When link is established, the link LED on RJ45 should light.
7. If Tensor-I22 has WiFi module installed you will observe two SMA connectors (gold color screws) on the side panel. Connect the included antennas by screwing them clockwise onto the SMA connectors to enable WiFi communication.
8. If Tensor-I22 has LTE modem assembled – connect the included antennas by screwing them clockwise onto the SMA connectors to enable Cellular communication.

Entering BIOS Setup

Turn off the Tensor-I22.
Turn on while holding down the Del key, until access into BIOS utility.
See **https://fit-pc.com/wiki/index.php?title=Tensor-I22**.

Installing and booting operating system
Please consult **https://fit-pc.com/wiki/index.php?title=Tensor-PC_Software** for instructions.

Service

Support

For technical support and product-related questions, please email: **support@fit-pc.com**
For the Tensor-I22 support wiki please visit:https://fit-pc.com/wiki/index.php?title=Tensor-I22

Warranty

- C-Lab guarantees products against defects in workmanship and materials for a period of 60 months from the date of shipment.
- Your sole remedy and C-Lab's sole liability shall be for C-Lab, at its sole discretion, to either repair or replace the defective product at no charge.
- This warranty is void if the product has been altered or damaged by accident, misuse or abuse.

RMA

- Keep the original package for shipping.
- Please contact the seller of that Tensor-I22.
- When issuing an RMA please provide the following required information:
  - Tensor-I22 serial number
  - Name and address of buyer or Invoice number
  - Problem description
- If Tensor-I22 was purchased directly from C-Lab, please email:**rma@fit-pc.com**

FCC

Tensor-I22
Manufacturer: C-Lab Ltd.
This device complies with Part 15 of the FCC Rules.
FCC ID: PD98260NG,
IC ID: IC 1000M-8260NG; Intel
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.

Statement
Changes or modifications to this equipment not expressly approved by the party responsible for compliance (C-Lab Ltd.) could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This symbol means that you must dispose of an electrical item AND/OR containing in it Li-Mn battery separately from general household waste when they reach the end of their useful life. Take your PC or the battery to your local waste collection point or center. This applies to all countries of the European Union, and to other countries with a separate waste collection system.

Documents / Resources

C-LAB Tensor-I22 Owner's Manual	**C-LAB Tensor-I22 Build to Order** [pdf] Owner's Manual Tensor-I22 Build to Order, Tensor-I22, Build to Order, Order

References

- **fit IoT – Fanless IoT Technology by Compulab**
- **fit IoT – Fanless IoT Technology by Compulab**
- **Tensor-I22 - fit-PC wiki**
- **Tensor-PC Software - fit-PC wiki**
- **User Manual**