Manual
ION MINI PC

Prepared by Trenton Systems 1725 MacLeod Dr Lawrenceville, GA 30043	**Date:** July 7, 2023
	Model Number: MPC1000
	Revision: 3

Table of Contents

Preface

The information in this user's manual has been carefully reviewed and is believed to be accurate. Trenton Systems assumes no responsibility for any inaccuracies that may be contained in this document and makes no commitment to update or to keep current the information in this manual, or to notify any person or organization of the updates.

Please Note: For the most up-to-date version of this manual, please visit our website at: www.trentonsystems.com.

Contact Information

Trenton Systems, Inc.
1725 MacLeod Drive
Lawrenceville, GA 30043
(770) 287-3100

info@trentonsystems.com
sales@trentonsystems.com
support@trentonsystems.com

www.trentonsystems.com

About Trenton Systems

“Unbelievably light. Unquestionably rugged. Undeniably powerful.”

BACKGROUND

Since its establishment in 1989, Trenton Systems has been the leading, high-performance computer hardware and systems manufacturer dedicated to crafting application-specific solutions for the military, industrial and commercial markets. Our rugged computing solutions are designed and manufactured in-house at our state-of-the-art facility in Lawrenceville, Georgia, which we relocated to in 2016 after outgrowing our original facility in Gainesville. Versatile, adaptable and built-to-last, our multi-faceted computing solutions sport completely customizable, ultra-rugged designs, both inside and outside the chassis.

EXPERIENCE

Trenton Systems is trusted by the world’s leading technology companies. Some of our happy customers include Boeing, IBM, L3Harris, Northrop Grumman, Lockheed Martin and Raytheon. We also partner with Intel via the Embedded and Communications Alliance, which provides us with access to Intel’s roadmap, as well as with technical support directly from the company. Throughout the years, we’ve been at the forefront of the industry in numerous capacities. As a founding member of the PCI Industrial Manufacturers Group (PICMG), we redefined the industry in 1994 with our PICMG 1.0 form factor, and redefined it again in 2005, when we wrote the PICMG 1.3 specification. In 2008, we streamlined our design and manufacturing capabilities, allowing us to craft our systems fully in-house and provide customers with a one-stop shop for all things Trenton rugged.

PHILOSOPHY

Trenton Systems believes in stress-testing and certifying its USA-made products to and beyond the highest military and industrial standards. We believe in crafting solutions that last decades, rather than just a few years. We believe in providing rapid and effective follow-up support so that our customers don’t have to spend hours, days or weeks trying to resolve a simple issue. At Trenton, we believe in setting our customers up for success, both on and off the front lines.

Warranty & Policies

WARRANTY

The following is an abbreviated version of Trenton Systems' warranty policy for Mini PC products. For a complete warranty statement, contact Trenton Systems or visit our website at www.trentonsystems.com.

Board-level products manufactured by Trenton Systems are warranted against material and manufacturing defects for five years from date of delivery to the original purchaser. Buyer agrees that if this product proves defective Trenton Systems, Inc. is only obligated to repair, replace or refund the purchase price of this product at Trenton Systems' discretion. The warranty is void if the product has been subjected to alteration, neglect, misuse or abuse; if any repairs have been attempted by anyone other than Trenton Systems, Inc.; or if failure is caused by accident, acts of God, or other causes beyond the control of Trenton Systems, Inc. Trenton Systems, Inc. reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.

In no event shall Trenton Systems, Inc. be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental or consequential damages arising out of or in connection with the performance or use of the product or information provided. Trenton Systems, Inc.'s liability shall in no event exceed the purchase price of the product

RETURN POLICY

A Return Material Authorization (RMA) number, obtained from Trenton Systems prior to return, must accompany products returned for repair. The customer must prepay freight on all returned items, and the customer is responsible for any loss or damage caused by common carrier in transit. Items will be returned from Trenton Systems via Ground, unless prior arrangements are made by the customer for an alternative shipping method.

To obtain an RMA number, call us at (800) 875-6031 or (770) 287-3100. We will need the following information:

- Return company address and contact

- Model name and model # from the label on the back of the product
- Serial number from the label on the back of the product
- Description of the failure

An RMA number will be issued. Mark the RMA number clearly on the outside of each box, include a failure report for each board and return the product(s) to our Lawrenceville, GA facility:

Trenton Systems, Inc.
1725 MacLeod Drive
Lawrenceville, GA 30043
Attn: Repair Department

TRADEMARKS

- Intel, Xeon, Intel Quick Path Interconnect, Intel Hyper-Threading Technology, Intel Virtualization Technology and Intel Active Management Technology are trademarks or registered trademarks of Intel Corporation.
- Microsoft are registered trademarks of Microsoft Corp.
- PCI Express is a trademark of the PCI-SIG
- All other brand and product names may be trademarks or registered trademarks of their respective companies.

LIABILITY DISCLAIMER

This manual is as complete and factual as possible at the time of printing; however, the information in this manual may have been updated since that time. Trenton Systems, Inc. reserves the right to change the functions, features or specifications of their products at any time, without notice.

E-mail: support@trentonsystems.com

Web: www.trentonsystems.com

Handling Precautions

WARNING: This product has components that may be damaged by electrostatic discharge.

To protect your Mini PC from electrostatic damage, be sure to observe the following precautions when handling or storing the system:

- Keep the Mini PC in its static-shielded bag until you are ready to perform your installation.
- Do not touch the I/O connector pins.
- Use a grounded wrist strap at your workstation or ground yourself frequently by touching the metal chassis of the system before handling any components. The system must be plugged into an outlet that is connected to an earth ground.
- Use antistatic padding on all work surfaces.
- Avoid static-inducing carpeted areas.

WARNING: There is danger of explosion if the CMOS battery is replaced incorrectly. Disposal of battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.

WARNING: Risk of explosion if the MPC1000 battery is replaced by an incorrect type. Dispose of used batteries according to the instructions. The MPC1000 uses a Panasonic CR2032 battery available from Trenton. The Trenton Systems part number for a replacement battery is 29-005774-000.

Regulatory Compliance

DECLARATION OF CONFORMITY

FCC

This device complies with part 15 of the FCC rules as a Class A device. 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 might cause undesired operation.

CE

This equipment complies with all applicable European Union (CE) directives if it has a CE marking. For this device to remain CE compliant, only CE compliant parts can be installed, and proper cables and cabling techniques are required.

AGENCY APPROVALS

All standards should be at applicable revision levels at time of test.

- Electromagnetic Emissions (EMI)
  - Designed to meet FCC 47 CFR Part 15 Subpart B ISED Canada ICES-003 Issue 6 Class A as a minimum.
  - Designed to meet Electromagnetic Compatibility Directive 2014/30/EU
  - Immunity Product Standard: EN55035:2017
  - Emissions Product Standards: EN55032:2012, EN 61000-3-2:2014, EN61000-3-3:2013

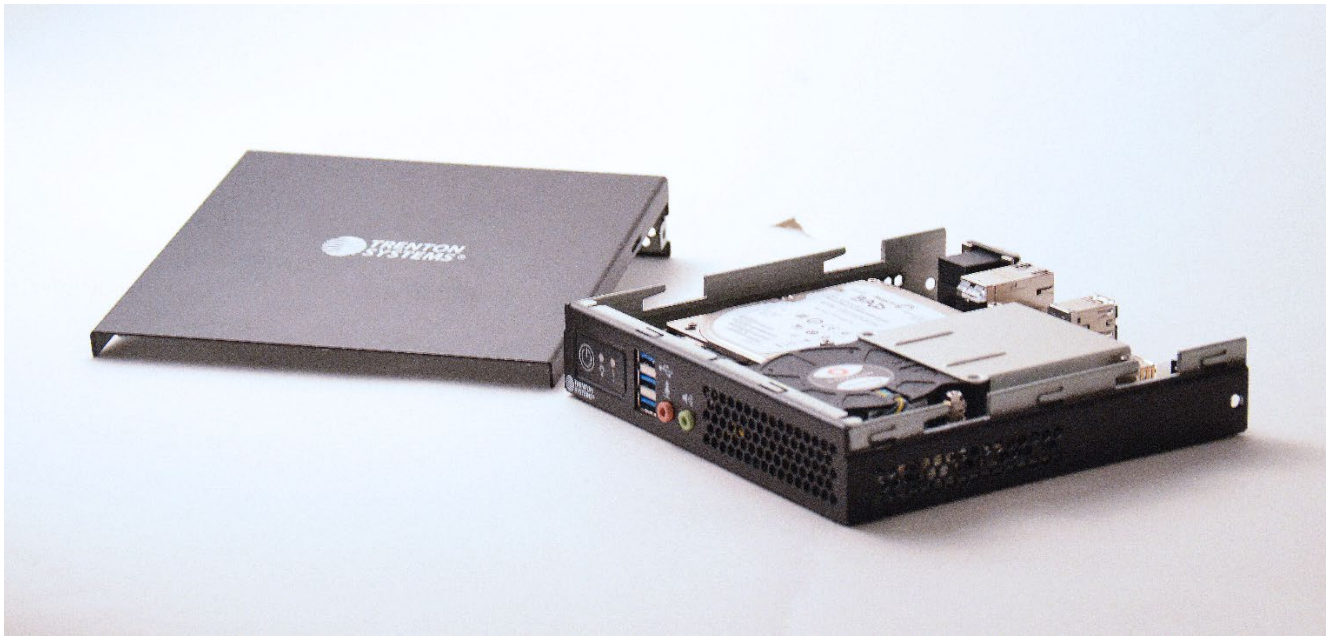
Safety

- This product will be UL approvable for safety concerns and designed for IEC 60950-1:2005 and IEC 62368-1:2014

Environmental

- This product will be approvable for MIL-STD-810G High and Low-Temp Operating and Storage system testing to test methods 501.5 and 502.5, Procedures II and I
- This product will be approvable for MIL-STD-810G Altitude Operational and Storage system testing to test method 500.5, Procedures II and I.

What's in the Box



ION Mini PC: Dimensions of the system measure 7.01" x 7.17" x 1.34" (L x W x H)

Power Supply: CUI, Inc. SDI90-12-U

Screws: HDD Mounting Screws

Optional: Mounting Brackets

System Overview

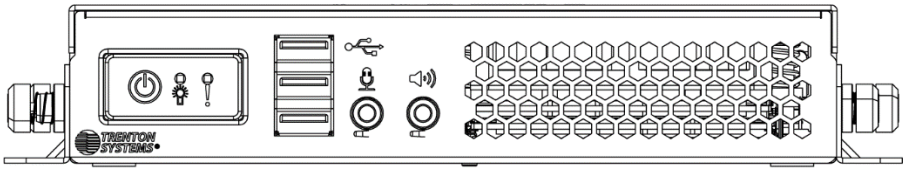


Figure 1: MPC1000 with side brackets - Front

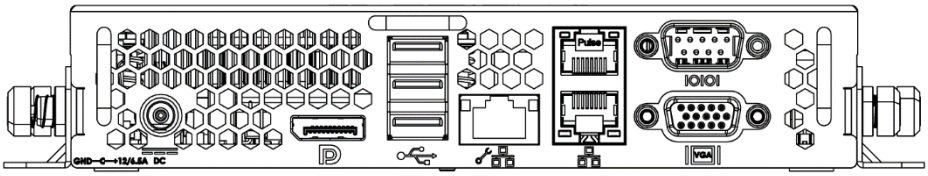


Figure 2: MPC1000 with side brackets - Rear

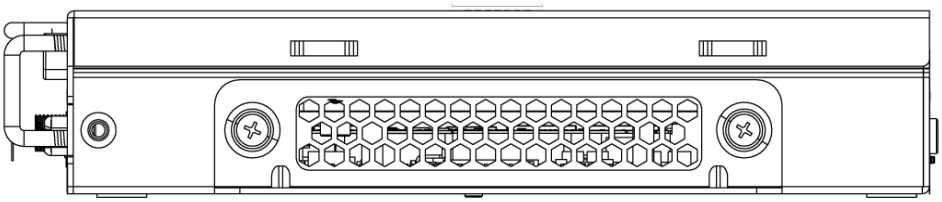


Figure 3: MPC1000 Sides with brackets

SERIAL NUMBER
STICKER LOCATION

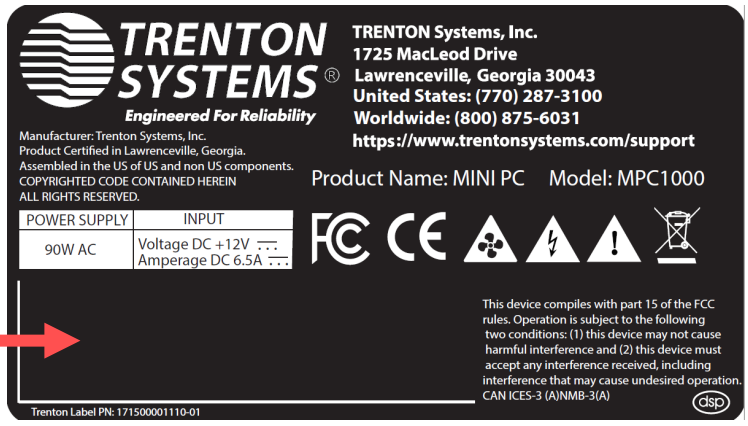


Figure 4: Serial Number Location

MODEL NUMBER

MPC1000 | Form Factor: Mini PC

PROCESSOR BOARD

MXT8288 |**Type:** Mini-ITX

PROCESSOR

- Intel® Coffee Lake & Coffee Lake-R Processor
- CPU TDP support up to 35W

Processor	Gen	ECC	Cores/Threads	Frequency	Watts
i7-9700TE	9th	Yes	8/8	1.80 GHz	35W
i3-9100TE	9th	No	4/4	2.20 GHz	35W
i3-8100T	8th	Yes	4/4	3.10 GHz	35W
i7-8700T	8th	No	6/12	2.40 GHz	35W
i5-8500T	8th	No	6/6	2.10 GHz	35W

MEMORY

- **Slots:** 2x DDR4 SODIMM sockets
- **Capacity:** Up to 32GB DDR4 ECC SODIMM
- **Type:** 2400/2666 ECC DDR4 UDIMM
- **DIMM Sizes:** 16GB, 8GB
- **Error Detection:** Corrects single-bit errors and detects double-bit errors using ECC memory

STORAGE

- **Type(s):** 1x 2.5" SSD/HDD SATA3 (6 Gbps) drive up to 15mm height; 1x M.2 NVMe x4 PCIe
- **Capacity:** Up to 1TB (larger capacities available upon request)

ON-BOARD DEVICES

- **Chipset:** Intel® C246
- **IPMI:** Support for Intelligent Platform Management Interface v2
  - IPMI 2.0 with virtual media over LAN and KVM-over-LAN support
  - ASPEED AST2500 BMC
- **Network Controllers:**
  - Intel i350 Gigabit Ethernet
  - Supports 1000BASE-T, RJ-45 output
- **Graphics:** Intel Integrated Graphics & ASPEED AST2500 BMC
- **TPM 2.0:** Secure crypto-processor that helps you with actions such as generating, storing, and limiting the use of cryptographic keys

INPUT / OUTPUT

- **Power:** 1x Power Connector
- **USB:** 3x USB 3.0 Ports
- **Display:**
  - 1x DisplayPort
  - 1x VGA Port
- **LAN:**
  - 2x RJ-45 Gigabit Ethernet LAN ports
  - 1x RJ-45 Shared IPMI LAN port
- **Serial:** 1x RS232 Serial Port

DIMENSIONS

Width: 7.0" | 17.78 cm
Height: 1.4" | 3.56 cm
Depth: 6.8" | 17.27 cm
Average System Weight*: 3.2 lbs. | 1.45 kg
**dependent on component selection*

FRONT PANEL

- 3x USB Ports
- Power Button
- Audio In/Out
- Fault LED

SYSTEM COOLING

1x PWM CPU Blower Fan; DC 12 V

POWER SUPPLY

84W Power Brick, 12 Vdc, 7A

SYSTEM BIOS

BIOS Type: 128 Mb SPI NOR Flash with Insyde BIOS
BIOS Features:

- Plug and Play (PnP)
- APM 1.2
- PCI 2.2
- ACPI 1.0 / 2.0
- USB Keyboard Support
- SMBIOS 2.3
- UEFI

MANAGEMENT

AST2500 Baseband Management Controller: rKVM, System Monitoring, Out of Band Management

ENVIRONMENTALS

- Operating Temperature: 0°C - 45°C
- Storage Temperature: -40°C - 70°C
- Operating Humidity: 8% - 90% Non-Condensing
- Non-operating Humidity: 5% - 95% Non-Condensing

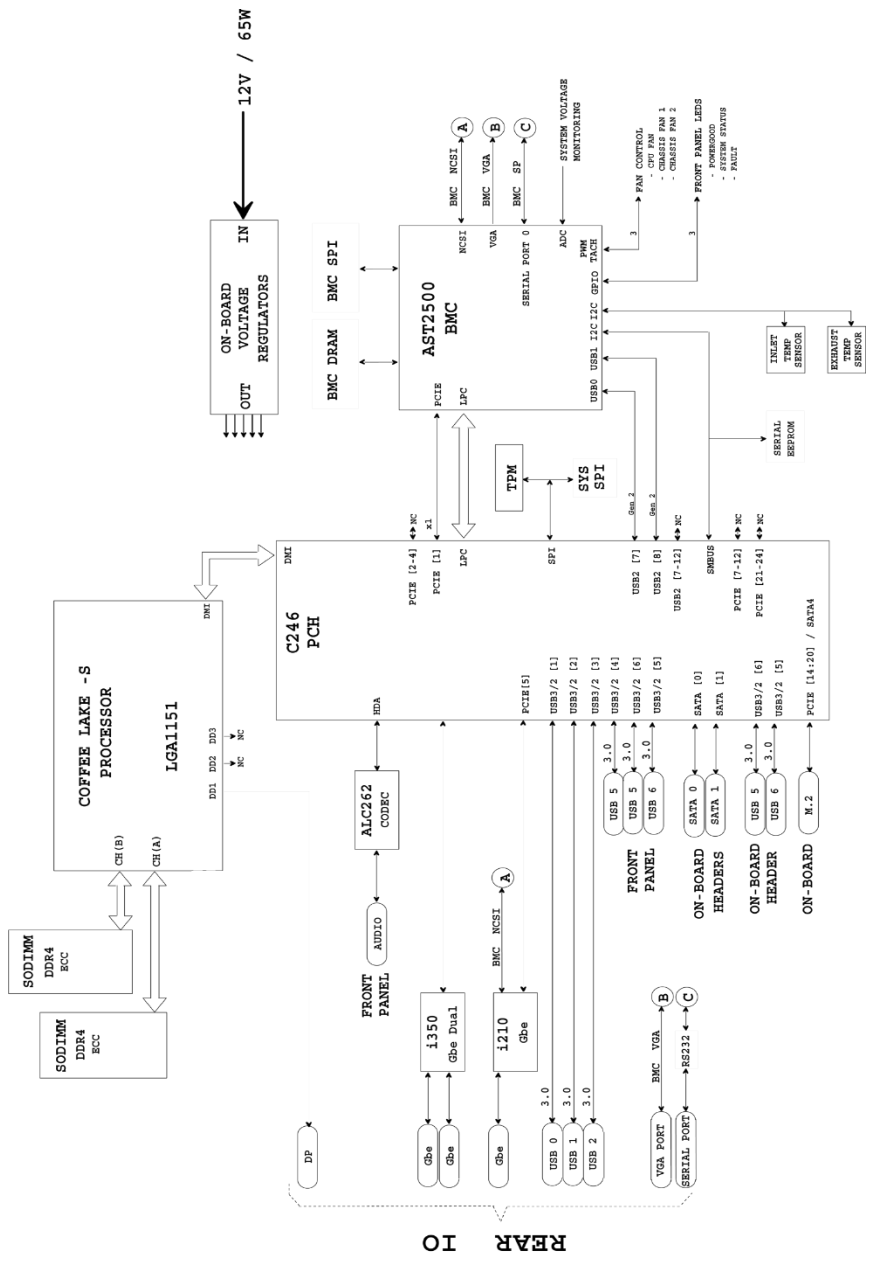
Preliminary numbers noted.

COMPLIANCE

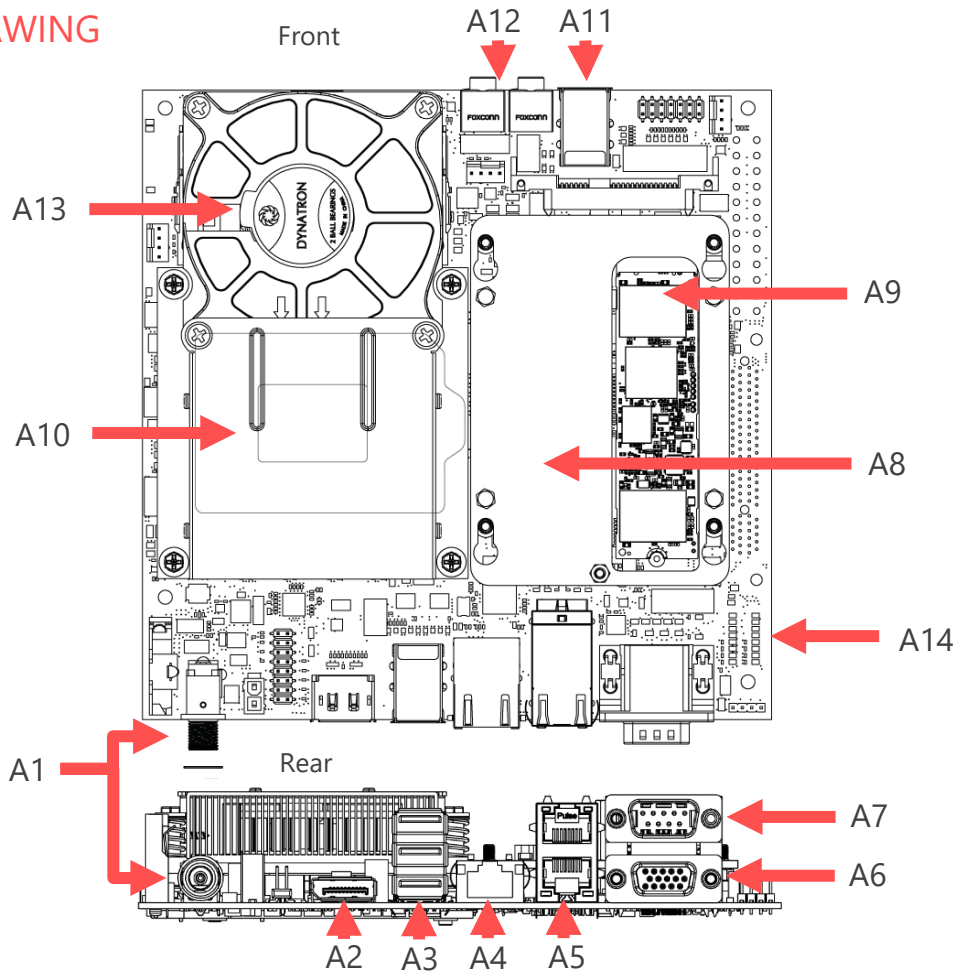
- Random Vibe B, 3 Axis
- Shock 6g +/-
- CE certified to health, safety, and environmental protection standards for products sold within the European Economic Area

Diagrams & Layouts

BLOCK DIAGRAM



LAYOUT DRAWING



ITEM	DESCRIPTION
A1	Power Connector
A2	DisplayPort
A3	3x USB 3.0 Ports
A4	1GbE LAN Port (Management Port)
A5	2x 1GbE LAN Ports
A6	VGA Port
A7	Serial Port
A8	2.5" SATA SSD Drive
A9	M.2 NVMe x4 PCIe
A10	Heatsink over CPU
A11	3x USB 3.0 Ports
A12	Audio In/Out
A13	Fan over SODIMM slots
A14	LED Post Codes

Technical Specifications

MEMORY & STORAGE

TYPE	PART NUMBER	SIZE
RAM	26-504615-001	8 GB
RAM	26-504615-002	16 GB
2.5″ SSD	263500001521-00	240 GB
2.5″ SSD	263500001522-00	480 GB
2.5″ SSD	263500001523-00	960 GB
M.2	263500001543-00	250 GB
M.2	263500001534-00	512 GB
M.2	263500001533-00	1 TB

This device complies with part 15 of the FCC rules as a Class A device. 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 might cause undesired operation.

PROCESSOR GRAPHICS

Onboard Intel® UHD Graphics 630 processing circuitry is integrated into the processor.

- Single Display supports maximum resolution up to 4096 x 2304 @ 60Hz.
- Dual independant diplays achieved through the VGA Port. *Linux multi-monitor support is in development.*

LAN PORTS

i210 LEDs

- Activity LED = Orange

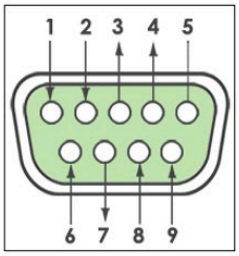
- 10MBs Full Duplex= No LED
- 100MBs Full Duplex = Green LED
- 1000MBs Full Duplex = Amber LED

i350 LEDs

- Activity LED = Green
- 10MBs Full Duplex= No LED
- 100MBs Full Duplex = Green LED
- 1000MBs Full Duplex = Orange LED

SERIAL PORT

Standard DB-9 Serial Port



Serial Port Pinout			
Pin	**Description**	**Pin**	**Description**
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GND	--	--

HEADERS & CONNECTORS

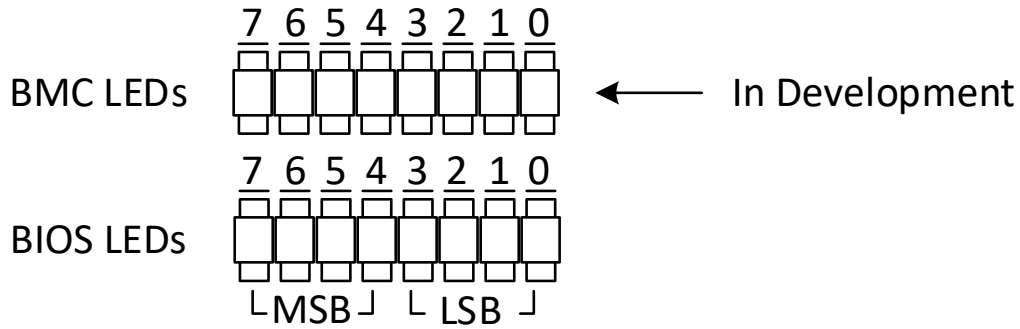
REF DES	PURPOSE
JU1	Clear CMOS, ME Recovery, Flash Security Override (dual row 16P hdr)
JU2	Front Panel (dual row 14P hdr)
JU3	BMC Enable (2P hdr)
JU4	Force PWR On (2P hdr)
P1	SATA0 (22P SATA RCPT)
P2	SATA1 (7P SATA) (8287 only)
P3	Rear I/O Panel Stacked Triple USB (USB3-P0, P1, P2) (USB2-P0, P1, P2)
P4	Front I/O Panel Stacked Triple USB (USB3-P3, P4, P5) USB2 (P3, P4, P5)
P5	Audio: Line Out (Green)
P6	DisplayPort
P7	I/O Panel Stacked i350 Dual Ethernet
P8	I/O Panel i210 Single Ethernet
P9	M.2
P10	I/O Panel Stacked DB9/DB15 Serial/VGA
P11	USB3 On-Board Header (USB3-6,7) (8287 only)
P12	12V Jack (8288 only)
P14	XDP CONN (60p) (p.53)
P15	Front Panel Membrane LED/Switch
P16	I2C hdr (3P hdr) (smbxxx_host)
P17	BMC Serial (4P hdr)
P18	ATX Power (24-pin) (8287 only)
P20	Chassis Fan 0 (4P hdr) (8287 only)
P21	Chassis Fan 1 (4P hdr) (8287 only)
P22	Speaker (2P hdr) (p.22)
P23	CPLD/VR Program Hdr (10P .050")
P24	CPU Fan (4P hdr)
P26	Alternate 12V Pwr In (Mini Fit Jr) (4P hdr) (8288 only)

P27	Audio: Mic In (Pink)
PCIe1	PCIe slot (x8 electrical, x8 mechanical) (8287 only)

LEDs

REF DES	COLOR	SOURCE	PURPOSE
LED(0-7)	GRN	PCH	BIOS Post Codes
LED9	GRN	BMC	Heart Beat
LED(10-17)	GRN	BMC	Programmable – BMC Post Codes
LED18	GRN		SSD_LED# for SATA0
LED19	RED	CPLD	On 2sec/off 2sec: Thermtrip 2 blinks/2 sec: CATERR 1 blink/2 sec: IMVP8 VR Fault On solid: PS_PWROK & PLT_RESET# not asserted

LED POST CODES



**Please look at Layout Drawing A14 for LED Post Codes location on the board.*

PCH-H I/O MAPPING-PCIE

PCH PORT (LANE REVERSAL ON PCIE5-8)	DESTINATION
PCIe5,6	I350 (U6 to P7) (Gen2)
PCIe6	AST2500 (Gen2)
PCIe7,8	I210 (U7 to P8) (Gen1)

PCIe13-16	M.2 (Gen3 x4)

PCH-H I/O MAPPING-USB2 & USB3

PCH PORT	DESTINATION
USB2_1	USB2_P0: P3-Lower (Rear IO Panel)
USB2_2	USB2_P1: P3-Middle (Rear IO Panel)
USB2_3	USB2_P2: P3-Upper (Rear IO Panel)
USB2_4	USB2_P3: P4-Lower (Front IO Panel)
USB2_5	USB2_P4: P4-Middle (Front IO Panel)
USB2_6	USB2_P5: P4-Upper (Front IO Panel)
USB2_7	USB2_P11: (On-Board Header-P1)
USB2_8	USB2_P11: (On-Board Header-P2)
USB2_9	Not Connected
USB2_10	Not Connected
USB2_11	USB2_P10: to BMC USB2A
USB2_12	USB2_P11: to BMC USB2B
USB2_13	Not Connected
USB2_14	Not Connected
USB3_1	USB3_0: P3-Lower (Rear IO Panel)
USB3_2	USB3_1: P3-Middle (Rear IO Panel)
USB3_3	USB3_2: P3-Upper (Rear IO Panel)
USB3_4	USB3_3: P4-Lower (Front I/O Panel)
USB3_5	USB3_4: P4-Middle (Front I/O Panel)
USB3_6	USB3_5: P4-Upper (Front I/O Panel)
USB3_7	USB3_P11: (On-Board Header-P1)
USB3_8	USB3_P11: (On-Board Header-P2)

PCH-H I/O MAPPING-SATA3

PCH PORT	DESTINATION
SATA0_PCIE11	SATA0 (P1- 22P SATA connector)
SATA1_PCIE12	SATA1 (P2 – 7P SATA connector)

SUPPORTED DISPLAY RESOLUTIONS

UBUNTU 20.04 LTS (GNOME 3.36.3 & WAYLAND)	
VGA	
RESOLUTION	**ASPECT RATION**
1280 x 1024	5:4
1440 x 900	16:10
1280 x 800	16:10
1024 x 768	4:3
800 x 600	4:3
DISPLAYPORT	
RESOLUTION	**ASPECT RATION**
1920 x 1080	16:9
1600 x 900	16:9
1280 x 1024	5:4
1152 x 864	4:3
1024 x 768	4:3
800 x 600	4:3

WINDOWS 10	
VGA RESOLUTIONS	**DISPLAYPORT RESOLUTIONS**
1440 x 900	1920 x 1080
1360 x 768	1680 x 1050
1280 x 800	1600 x 900
1152 x 864	1400 x 1050
1024 x 768	1360 x 768
800 x 600	1280 x 1024
	1280 x 960

	1280 x 800
	1280 x 768
	1280 x 720
	1280 x 600
	1152 x 864
	1024 x 768

Clearing the CMOS

Setting the jumper with the Clear CMOS jumper shunt allows you to clear the data in the CMOS.

NOTE: Do not clear the CMOS right after updating the BIOS. You must boot up the system first and then shut it down before clearing the CMOS.

NOTE: The password, date, time user default profile will be cleared only if the CMOS battery is removed.

To clear and reset system parameters to the default setup, follow these steps:

1. Turn off the computer and unplug the power cord from the power supply.
2. Wait 15 seconds.
1. Remove the jumper shunt from pins 6 and 4 and use it to short pins 2 and 4 on the header for 5 seconds.
3. Remove the jumper shunt and return it to short pins 6 and 4.

ENVIRONMENTALS

- Operating Temperature: 0ºC to 45ºC (min)
- Storage Temperature: -20ºC to 70ºC
- Operating Humidity: 5% to 90% non-condensing
- Non-operating Humidity: 5% to 95% non-condensing

Installation Instructions

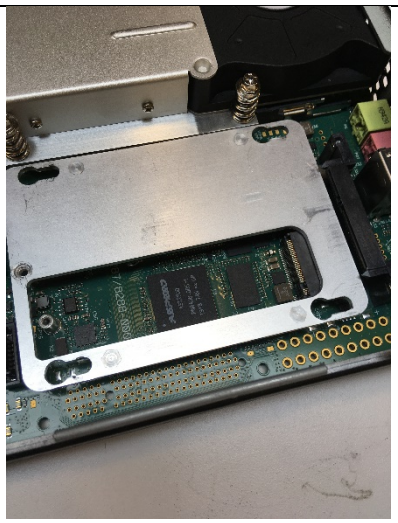
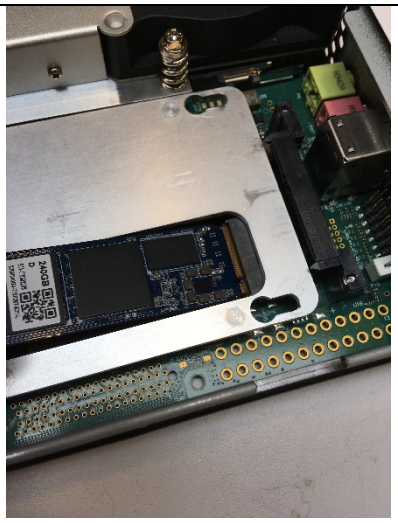
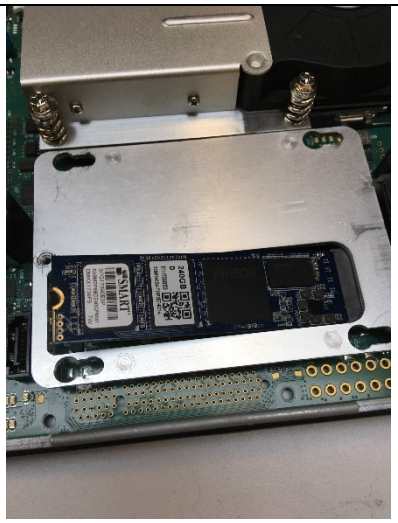
BEFORE STARTING INSTALLATION

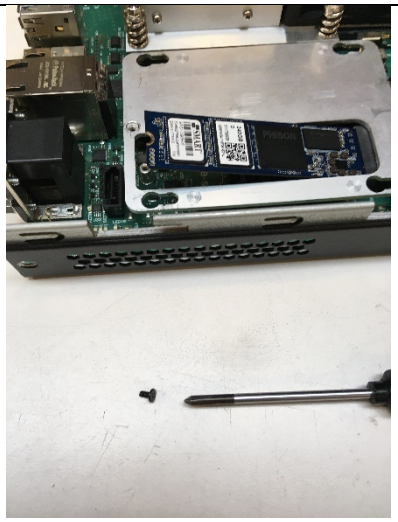
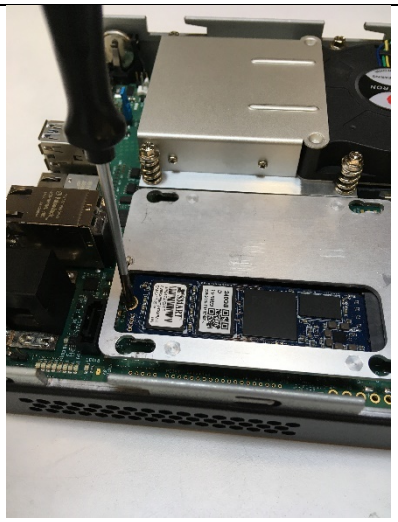
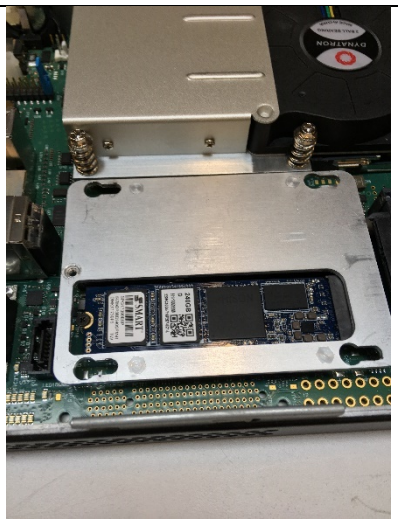
- Read and understand the installation precautions listed in the “Pre-Installation Precautions” section.
- Refer to the drawings and specifications in this chapter for:
    - Using available screw hole positions
    - Locating and connecting jumpers and onboard headers

PRE-Installation Precautions

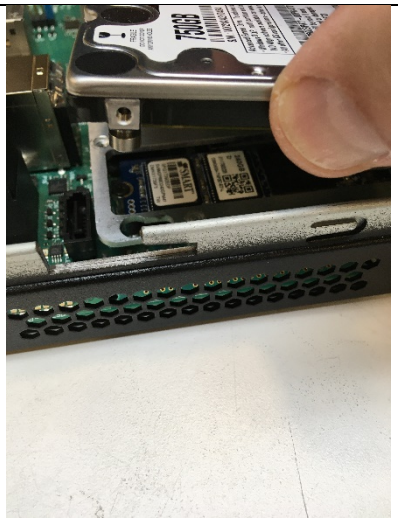
- Wear a grounding strap attached to a grounded device to avoid damage from static electricity
- Before opening the system, discharge static electricity by touching the metal case to a grounded object
- Leave components in the static-proof bags they came in until they can be installed
- Hold all circuit boards by the edges
- Do not bend circuit boards

INSTALLING THE M.2 DRIVE

If you have an SSD on top of the M.2 slot, remove the SSD to access the M.2 compartment show on the right.	
Insert your M.2 card into the M.2 slot.	
The M.2 card will stick out slightly on one end before you place a screw in place.	

Take the screw out of the accessory bag and a philips-head screw driver.	
Screw down the M.2 into its position.	
The final position of the M.2 is shown on the right.	

INSTALLING THE 2.5″ SATA SSD DRIVE

Loosen the right screw on the back-side of the SSD so that they protrude slighty to insert into the screw holes on the SSD plate within the ION Mini PC.	
Loosen the left screw on the back-side of the SSD so that they protrude slighty to insert into the screw holes on the SSD plate within the ION Mini PC.	
Insert SSD screws into the plate's hole patterns so that the SSD sits nice and tight in its appropriate spot.	

Push the SSD into the connector by applying pressure on the top side of the SSD and into the SATA port.	
Tighten the SSD screw to hold it in place.	
Make sure that there's no wiggle of the SSD once you are done fastening the final screw in place.	

Trenton Systems
1725 MacLeod Drive
Lawrenceville, GA 30043

www.trentonsystems.com
t. 770.287.3100
e. info@trentonsystems.com