GATEWORKS
INNOVATIONS FOR EMBEDDED DESIGNS

Venice GW7100
Single Board Computer

Operating Manual

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Get Started Quickly
www.gateworks.com/quickstart

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1. INTRODUCTION

1.1. Product Description

The GW7100-00 is a member of the Gateworks 7th generation Venice family of single board computers targeted for rugged and industrial embedded applications. The GW7100-00 features the 64-bit NXP™ i.MX8M Mini Quad Core ARM ® Cortex™-A53 SoC processor operating at 1.6GHz, 1GBytes of LPDDR4 DRAM, and 8GBytes of eMMC System Flash. A single Mini-PCIe expansion socket can be used for PCI Express peripherals such as 802.11ax/ac/b/g/n WiFi radios, 5G/4G/3G/CATM1 cellular modems. Peripheral headers support Digital I/O, Analog Input, UART/TTL Serial, I2C and SPI. A Nano SIM slot is standard for cellular modems. A 3-Axis accelerometer is standard. An optional GPS is available. The Gateworks System Controller provides embedded features such as real time clock, voltage and temperature monitor, programmable pushbutton, and programmable board shut-down and wake-up for remote applications. A wide-range DC input power supply provides up to 15W of power. Power is applied through a dedicated header or an Ethernet port in a passive Power over Ethernet (PoE) architecture. Ubuntu Linux BSP is supported.

1.2. Standard Features

- NXP™ 64-bit i.MX8M Mini 1.6GHz Quad Core ARM® Cortex™-A53 SoC Processor
- 1GByte LPDDR4 DRAM Memory
- 8GBytes eMMC Flash System Memory
- One High-Power Gen 2 Mini-PCIe Socket with USB 2.0 and Nano SIM
- One GbE Ethernet Port supporting Passive PoE
- Optional u-blox GPS with MMCX Antenna Connector
- Digital I/O & Analog Port, I2C & SPI Port
- UART TTL Serial Port
- USB 2.0 Type-C Port
- Digital 3-axis MEMS Accelerometer
- Real Time Clock with Battery Backup
- Voltage and Temperature Monitor
- Serial Configuration EEPROM
- Programmable Watchdog Timer
- 8 to 60VDC Input Voltage Range
- Power Through Dedicated Connector or Ethernet with Passive PoE
- 6W@25°C Typical Operating Power
- 9W Available for Mini-PCIe Socket
- Reverse Voltage Protection
- -40°C to +85°C Operating Temperature
- Ubuntu Linux Board Support Package
- 1 Year Warranty

1.3.   Ordering Options – Standard Configuration*

Order Code	ARMv8 processor	SDRAM	Flash	Operating Temp	Peripherals
GW7100-00	Quad Core @ 1.6GHz	1GByte	8GBytes	-40°C to +85°C	Standard
GW7100-01	Quad Core @ 1.6GHz	4GByte	64GBytes	-40°C to +85°C	Standard
GW7101-00	Quad Core @ 1.6GHz	1GByte	8GBytes	-40°C to +85°C	+GPS
GW7101-01	Quad Core @ 1.6GHz	4GByte	64GBytes	-40°C to +85°C	+GPS

 * Contact factory for different configurations of CPU, DRAM, Flash, and support peripherals

1.4.   Ordering Options – Accessories

Order Code	Description
GW11033	USB JTAG Programmer 10-pin Kit (Contains GW16099)
GW10054	Gigabit PoE Injector
GW10030	24V Supply
GW11047	Development Kit, Includes GW7100 SBC

1.5. Feature Locations
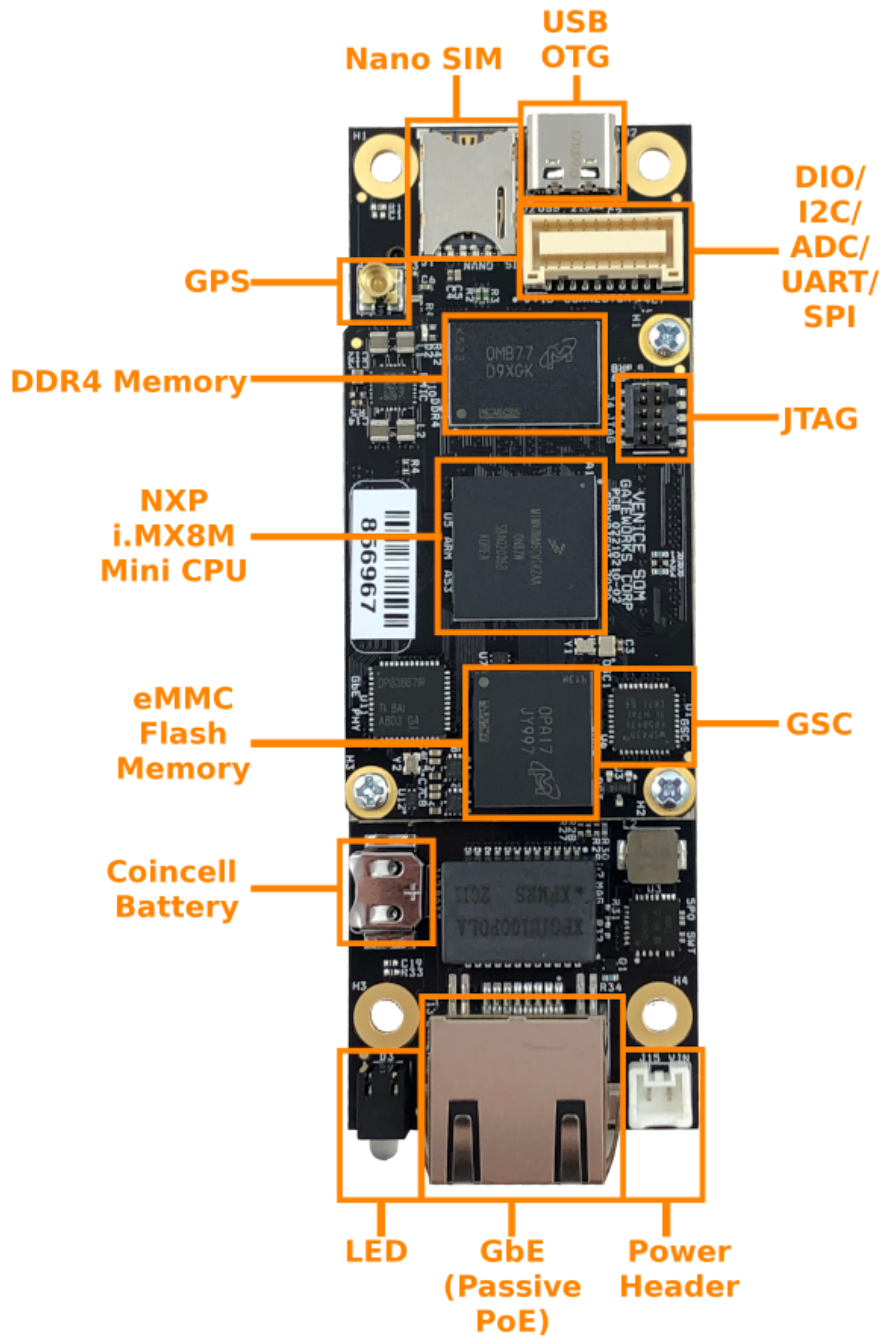
Top Side Features

Bottom Side Features

1.6. Functional Blocks

The functional block diagram is shown below followed by a detailed description of each major functional block.
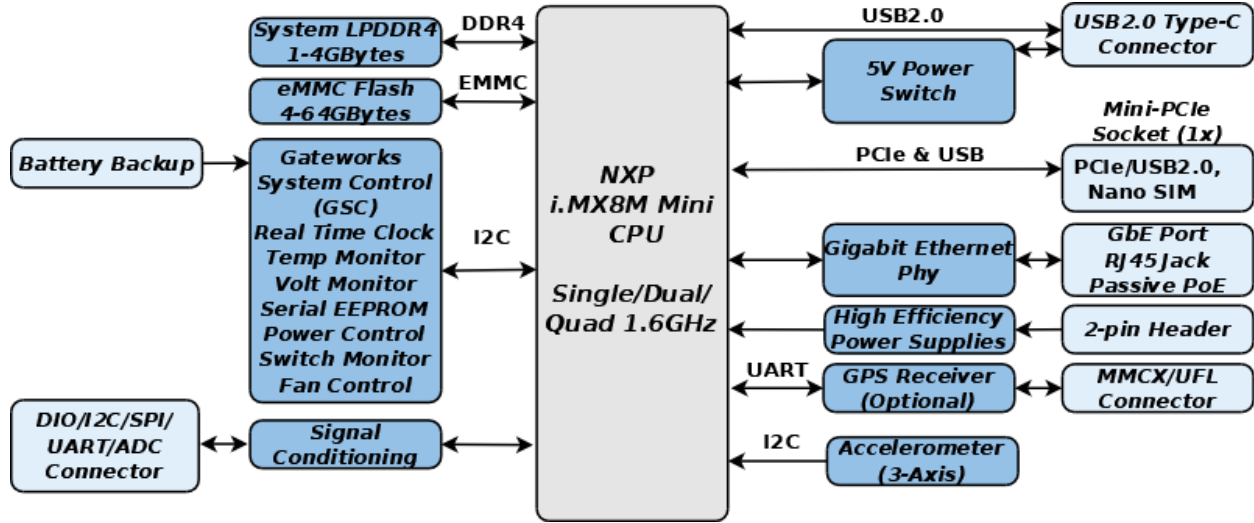
Functional Block Diagram

ARMv8 Processor

The 64-bit NXP™ i.MX8M Mini Quad Core ARM® Cortex™-A53 SoC processor includes many peripherals for supporting secure network and multimedia processing and connectivity in small embedded applications.

- Quad Cortex-A53 processing cores
- Core operating frequency of 1.6GHz
- DDR4 SDRAM supports up to 2133MTps data rate
- Interfaces include Gigabit Ethernet, PCIe Gen2, and USB 2.0
- Peripheral interfaces include eMMC, SPI, I2C, UART, and GPIO
- Integrated acceleration for security
- Integrated 2D & 3D GPU (1x shader, OpenGL® ES 2.0)
- MIPI Display DSI & Camera CSI
- 1080p60 Encoder and Decoder
- IEEE1588 precision stamp protocol support

DDR4 SDRAM

The SDRAM resides in one LPDDR4 device soldered directly to the board. This architecture supports DDR4 memory capacities from 1GByte to 4GBytes. The 32-bit DDR4 interface operates at up to 1500MHz for supporting fast data transfer rates. The factory default includes 1GByte of LPDDR4.

System Flash

The System Flash supports eMMC memory capacities from 4GBytes to 64GBytes. The 8-bit data bus interface supports double data transfer rates. The default boot device is the eMMC Flash. The factory default is 8GBytes.

Mini-PCIe Sockets

Mini-PCIe is a small form factor PCI card that uses the same signal protocol, electrical specifications, and configuration definitions as conventional PCI Express. The board includes Gen 2 capable Mini-PCIe sockets with the following enhancements to the PCI Express standard.

- The 3.3V power for the socket is increased from a maximum of 3.3W to 8W for accommodating higher power radios. The 8W limit is due to the 0.5A limit of the individual socket pins.
- The PCIe reset for the socket is unique and under software control.
- Certain sockets support both PCIe and USB 2.0 signaling

USB Support

- Slot J6 Supports PCIe, USB 2.0, SIM

PCIe Socket Reset & WiFi Disable

The Mini-PCIe sockets support individual software programmable resets and shared WiFi disable signals. The reset signal is controlled through the processor PCIe interface and the WiFi disable signal is controlled through the Gateworks System Controller.

Nano SIM Expansion

A Nano SIM socket extends the functionality of the SBC.

The Nano SIM (4FF) socket accepts 12.3 mm by 8.8 mm cellular SIM cards. The SIM signals are routed to a single Mini-PCIe socket for cellular modem usage.

GbE Ethernet

The SBC supports Gigabit Ethernet. The Ethernet ports operate in a 10BASE-T, 100BASE-TX or 1000BASE-T configuration and include auto MDI/MDIX for automatically switching data receive and data transmit pairs. Additional features include full-duplex operation as well as support for auto- negotiation. The data interfaces include direct-touch ESD protection that exceeds IEC61000-4-2-ESD. The Ethernet MAC addresses are programmed into the Gateworks System Controller Configuration EEPROM during automated factory testing.

The IEEE802.3 compliant Ethernet MAC Media Access Controllers are located in the processor. The Gigabit Ethernet Port MAC communicates to an external PHY physical layer device through an RGMII interface. The external PHY is reset under software control using a processor digital I/O signal.

The RJ45 connector for the Gigabit Ethernet Port includes integrated status lights. The green light is on for link and blinking for activity. The yellow status light indicates speed. The yellow light is off for both 10Mbps and 100Mbps, and on for 1000Mbps.

The SBC input power can be provided through the Gigabit Ethernet Port jack in a Passive Power over Ethernet architecture. This is discussed in greater detail at the end of this section. The RJ45 connectors can be replaced with a header as an ordering option.

USB Ports

The processor includes two USB ports. The default processor supports USB 2.0. Future SOMs may support USB 3.0. One port is connected to a USB Type-C connector and the other to a Mini-PCIe socket. The USB ports support low-speed 1.5Mbps transfers, full-speed 12Mbps transfers, and high- speed 480Mbps transfers. The SBC is configured as a Downstream Facing Port capable of sourcing 5V at 1.5A. The output power is enabled through a CPU GPIO signal (GPIO[1]:DIO[12]) and the current fault monitoring is monitored through another CPU GPIO signal (GPIO[1]:DIO[13]).

Peripheral Expansion

The SBC includes a peripheral expansion connector that supports digital I/O, serial I/O, analog input, system reset, I2C and power.

Digital I/O

There are several general purpose digital I/O signals supported with CPU GPIO digital I/O signals. The 3.3V digital I/O signals support 10mA drive current, 10mA sink current, and signal conditioning in the form of a series 332 ohm resistor.

Serial I/O

The serial interface is available through several UARTs as defined in the connector section in this document. One UART is routed out of a 20-pin I/O connector. Another UART is routed to the optional GPS.

Analog Input

There is one analog inputs that is available through the Gateworks System Controller. The 0 to 5V analog input is divided by two.

System Reset

The system reset signal is connected to the Gateworks System Controller pushbutton input and supports all of the associated features. This includes generating an interrupt, system reset, and powering the SBC on and off. This signal can be found on the 20-pin I/O connector.

I2C Two Wire Interface

An I2C interface is offered.The 3.3V two wire interface supports standard SCL/SDA protocols up to 400KHz with 7-bit and 10-bit addressing in both master and slave operation. The two wire interface is supported with the processor port and includes pull up resistors on both signals.
More information can be found at the following links:
- http://trac.gateworks.com/wiki/I2C

SPI Serial Peripheral Interface

An SPI serial peripheral interface is available through the 20-pin I/O connector. The interface operates up to 50MHz, and supports both interrupt and polled transactions.
More information can be found at the following links:
- http://trac.gateworks.com/wiki/SPI

Gateworks System Controller

The GSC Gateworks System Controller is a custom battery-backed micro-controller designed by Gateworks to implement many of the embedded features found on the board. This includes features such as real time clock with battery backup, system temperature and voltage monitor, configuration EEPROM, and digital I/O. Software information can be found at http://trac.gateworks.com/wiki/gsc

Real Time Clock with Battery Backup

The real time clock is provided by the Gateworks System Controller. The Gateworks System Controller emulates an industry standard [Dallas Semiconductor DS1672](#) to support the real time clock. This includes a 32-bit counter that counts seconds for determining time of day, week, month, and year. The I2C address for the real time clock is 0x68h. The real time clock is battery backed to retain time information when power is removed from the board. The battery is a 6.8mm MS621T rechargeable coin cell installed in a surface mount socket.

System Temperature and Voltage Monitor

The system temperature and voltage monitor is provided by the Gateworks System Controller. The Gateworks System Controller does not emulate a specific device to support the temperature and voltage monitoring functions. The I2C address for the temperature and voltage monitor is 0x29h. The temperature and voltage parameters monitored by the Gateworks System Controller are listed in the table below. The GSC mapping includes the value referenced by the software driver written for the Gateworks System Controller. Software information is available on the following Gateworks Wiki page:
http://trac.gateworks.com/wiki/gsc

Analog Input	Input Divider R1/(R1+R2)	Description
0	10K/10K	Board Level Operating Temperature
1	22.1K/1K	Board Level Input Operating Voltage
2	10K/10K	ADC1
3	N/A	N/A
4	None	1.1V MX8M Mini DRAM
6	None	1.2V Core Mipi
7	None	1.0V RGMII Phy
8	10K/10K	2.5V RGMII Phy
9	10K/10K	3.3V Primary Supply
12	None	0.95V CPU
13	None	1.8V LPDDR4
14	None	Reserved
15	None	Reserved

Gateworks System Controller Monitored Temperature and Voltages

Configuration EEPROM

The configuration EEPROM is provided by the Gateworks System Controller. The Gateworks System Controller emulates an Atmel 24C04. The EEPROM is divided into a general purpose section available to the application and a section reserved by Gateworks for storing various system configuration parameters. The I2C address for the configuration EEPROM is 0x50h.

Additional System Level Functions

The Gateworks System Controller also supports encryption key and software programmable hardware shut-down and wake-up for the highest possible power conservation.

Battery Backup

The Gateworks System Controller must be powered at all times if support features such as continuous real time clock, and programmable hardware sleep and wake-up are required. This power is supplied by a coin cell battery when the SBC is powered down. The Gateworks System Controller seamlessly switches from the coin cell battery to input power when the SBC is powered on to extend coin cell battery life. The coin cell socket includes both a reverse charge protection resistor and a current blocking diode to provide two levels of protection required for some agency approvals.

3-Axis Accelerometer/Magnetometer

The 3-Axis sensor device combines a 8-bit linear accelerometer. The device includes a +/-2g, +/-4g, +/-8g and +/-16g dynamically selectable acceleration full scale range. Acceleration event functions include free fall and motion detection. The accelerometer communicates to the CPU on the I2C[2] bus at address 0x19. The accelerometer is a STMicroelectronics LIS2DE12TR.

More information can be found at the following links:
- https://www.st.com/en/mems-and-sensors/lis2de12.html
- http://trac.gateworks.com/wiki/accelerometer

Optional GPS Receiver

The optional u-blox ZOE-M8 GPS Receiver is a 72 channel Global Navigation Satellite System (GNSS) device for delivering position, velocity, and time information. The GPS Receiver includes a dual frequency RF front end for concurrent reception of up to three GNSS systems. This includes GPS/ZQSS, GLONASS, Galileo, and BeiDou.

The device is typically configured for 9600 NMEA protocol depending on the GPS firmware revision. Communication to the CPU through the UART1 serial port interface. A pulse-per-second signal is also supported through the CPU GPIO[1]:DIO15 digital I/O signal. The PPS signal can be factory optionally routed to a Mini-PCIe socket. A MMCX or a U.FL connector connects to an externally mounted active antenna. The antenna includes a series current limit resistor to protect against a shorted antenna.

More information can be found at the following links:
- https://www.u-blox.com/en/product/zoe-m8-series
- http://trac.gateworks.com/wiki/gps

Key Parameter	Specification
PPS Time Accuracy RMS	30nS
PPS Time Accuracy 99%	60nS

Dynamic Operational Limit	<4G
Altitude Operation Limit	50,000m
Velocity Operational Limit	500m/s
Velocity Accuracy (50% @ 30ms)	0.05m/s
Heading Accuracy (50% @ 30ms)	0.3 degrees

GPS Receiver Key Parameters

GNSS Parameter	GPS & Glonass	GPS	Glonass	BeiDou	Galileo
Horizontal Position Accuracy	2.5m	2.5m	4m	3m	TBD
Navigation Update Rate					
ROM	10Hz	18Hz	18Hz	18Hz	18Hz
Flash	5Hz	10Hz	10Hz	10Hz	10Hz
First Fix Time					
Cold Start	26s	29s	30s	34s	45s
Hot Start	1s	1s	1s	1s	1s
Aided Start	2s	2s	2s	3s	7s
Tracking Sensitivity	-167dBm	-166dBm	-166dBm	-160dBm	-159dBm
Re-acquisition Sensitivity	-160dBm	-156dBm	-156dBm	-157dBm	-153dBm
Cold Start Sensitivity	-148dBm	-145dBm	-145dBm	-143dBm	-138dBm
Hot Start Sensitivity	-157dBm	-157dBm	-156dBm	-155dBm	-151dBm

GPS Receiver GNSS Parameters

JTAG Programming Port

The primary purpose for the JTAG Port is for automated factory testing and to facilitate downloading the application program into Flash memory. This feature requires the GW16099 USB JTAG Programmer (sold as a GW11033 kit). The JTAG programming port also includes a CPU UART interface in a logic-level configuration. This serial port facilitates an operator console though the USB JTAG Programmer. Refer to Section 3 for USB JTAG Programmer instructions.

Status LEDs

The board includes a bi-color LED and optional surface mount LED located towards the front edge of the board.

Label	Function
3.3V	Primary voltage rail is active
PRG	Programmable using i.MX8M GPIO[5]:DIO[4] and GPIO[5]:DIO[5]and digital I/O signal

Surface Mount Status LED Functionality

Power Architecture

DC input power is supplied through a 2-pin connector, or the Ethernet Port connector using Passive Power over Ethernet.

2-Pin Connector Power

The 2-pin connector is at location J15 in a 1x2x2mm configuration. The input voltage range is 8-60V. The mating connector is PAP-02V-S, available from Digikey as part number 455-1486-ND.

Passive Power over Ethernet

The RJ45 Ethernet jack supports Full Wave Passive Power over Ethernet. This configuration is most useful for powering the SBC through an Ethernet jack without an 802.3at compliant PSE switch. The input voltage range is 10-60V.

The data pairs for Passive Power over Ethernet have a 0.8A current limit. It may be necessary to increase the input operating voltage to deliver the power needed for the Mini-PCIe radios and USB charging ports. As an example, assume the application includes a high power radio card that requires a total of 8W and a USB device that requires a total of 7W. The required power is 15W for the peripherals plus 4W for the SBC. The total power requirement is approximately 21W assuming 90% efficiency for the primary power supply.

More PoE information is available on the Gateworks wiki here:
http://trac.gateworks.com/wiki/poe

Switching DC/DC Regulators

All power supply voltage rails are generated with high efficiency DC to DC switching regulators. The SBC is classified as a SELF Safety Extra Low Voltage Device since the maximum input voltage is below the 60VDC SELV limit as defined by IEC 60950-1 and other standards.

Feature	Benefit
High efficiencies (up to 95%)	Reduces heat generated in enclosure
High power output (up to 30W)	Supports high power Mini-PCIe cards
Thermal shutdown	Protects against overheating
Output current limit	Protects against short circuits
Controlled startup	Reduces component stress and power surges
Common mode input filter	Reduces emissions for agency certification

Switching DC/ DC Regulator Features

2. CONNECTORS

The board interface connector pin assignments and signal descriptions are included in the following sections. The connectors are listed in the table below.

Connector	Populated	Function
J1	Yes	Nano SIM Socket
J2	Yes	USB Type C Socket
J3	No	Optional GPS Receiver MMCX Antenna
J4	Yes	Peripheral Expansion (GPIO, UART, I2C, SPI, ADC)
J6	Yes	Mini-PCIe Socket with PCIe and USB 2.0
J7	Yes	SOM Connector
J8	Yes	Test Header
J9	Yes	SOM Connector
J12	Yes	Coin Cell Battery Socket
J13	Yes	Gigabit Ethernet Port with Passive PoE Input Power
J14	No	Optional Ethernet Header
J15	Yes	Power Input Header

Connector Summary

Cellular Nano SIM Expansion Socket (J1)

The Nano SIM (4FF) socket accepts 12.3 mm by 8.8 mm cellular SIM cards. The SIM signals are routed to the Mini-PCIe socket for cellular modem usage.

USB Type C Connector (J2)

The USB 2.0 port from the CPU is available through a standard Type-C connector with the following pin assignment.

Pin	Signal	Connect	Pin	Signal	Connect
A1	GND	Ground	B12	GND	Ground
A2	TX1+	No Connect	B11	RX1+	No Connect
A3	TX1-	No Connect	B10	RX1-	No Connect
A4	VBUS	VBUS	B9	VBUS	VBUS
A5	CC1	CC1	B8	SBU2	No Connect
A6	D+	D+	B7	D-	D-
A7	D-	D-	B6	D+	D+
A8	SBU1	No Connect	B5	CC2	CC2
A9	VBUS	VBUS	B4	VBUS	VBUS
A10	RX2-	No Connect	B3	TX2-	No Connect
A11	RX2+	No Connect	B2	TX2+	No Connect
A12	GND	Ground	B1	GND	Ground

USB Type C Connector

Optional GPS MMCX or u.FL Antenna (J3)

The optional GPS feature includes an antenna connector for an externally mounted passive or active antenna. The 50 Ohm MMCX antenna connector (standard loading

option) is a vertical mount Molex 73415-2061, or equivalent. The 50 Ohm U.FL connector (optional) is a vertical mount Sunridge MCBG-ST-00T, or equivalent.

Peripheral Expansion (J4)

The connector is a 20-pin header in a 2x10 configuration with 1.25mm pin spacing. The mating connector is a JST GHDR-20V-S, available from Digi-Key as part number 455-1913-ND. The mating connector pins are JST SGHD-002GA-P0.2, available from Digi-Key as part number 455-1914-2-ND. The digital I/O signals include signal conditioning in the form of a series 332 ohm resistor.

Pin	Signal
1	5V
2	Ground
3	5V
4	Ground
5	3.3V
6	Ground
7	SPI_MOSI
8	SPI_MISO
9	SPI_SCLK
10	SPI_SS0
11	Serial Clock i.MX8M I2C3 SCL
12	Serial Data i.MX8M I2C3 SDA
13	UART[3] RXD (logic level)
14	UART[3] TXD (logic level)
15	GSC Pushbutton Interrupt
16	GSC ADC1
17	i.MX8M GPIO[1]:DIO[7]
18	i.MX8M GPIO[1]:DIO[9]
19	i.MX8M GPIO[4]:DIO[3]
20	i.MX8M GPIO[4]:DIO[4]

Digital I/O Connector

Mini-PCIe (J6)

The PCI Express Mini Card socket is an industry standard form factor.
- Slot J6 can support PCIe and USB 2.0 and SIM.

Pin	Signal	Connect	Pin	Signal	Connect
1	WAKE#	No Connect	2	3.3VAUX	3.3V
3	COEX1	No Connect	4	GND	Ground
5	COEX2	No Connect	6	1.5V	No Connect
7	CLKREQ#	No Connect	8	USIMPWR	Note 2
9	GND	Ground	10	USIMDAT	Note 2
11	REFCLK-	REFCLK-	12	USIMCLK	Note 2
13	REFCLK+	REFCLK+	14	USIMRST	Note 2
15	GND	Ground	16	USIMVPP	Note 2

17	RSVD	No Connect	18	GND	Ground
19	RSVD	No Connect	20	WDIS#	No Connect
21	GND	Ground	22	PERST#	Note 3
23	PERN0/SATA+B	Note 1	24	3.3VAUX	3.3V
25	PERP0/SATA-B	Note 1	26	GND	Ground
27	GND	Ground	28	1.5V	No Connect
29	GND	Ground	30	SMBCLK	No Connect
31	PETN0/SATA-A	Note 1	32	SMBDAT	No Connect
33	PETP0/SATA+A	Note 1	34	GND	Ground
35	GND	Ground	36	USBD-	Note 4
37	GND	Ground	38	USBD+	Note 4
39	3.3VAUX	3.3V	40	GND	Ground
41	3.3VAUX	3.3V	42	LEDWWAN#	No Connect
43	GND	Ground	44	LEDWLAN#	No Connect
45	RSVD	No Connect	46	LEDWPAN#	No Connect
47	RSVD	No Connect	48	1.5V	No Connect
49	RSVD	No Connect	50	GND	Ground
51	RSVD	No Connect	52	3.3VAUX	3.3V

Mini-PCIe Socket

SOM Header (J7 & J9)

The System on Module (SOM) with the CPU, DRAM and Flash connects to the baseboard. There are roughly 180 pins between the 2 sockets. The system is not designed in a way that the SOM would be removed and the user would interface with connectors directly. If more information is required, please contact Gateworks support.

Test Header (J8)

This is for internal Gateworks use. Please contact Gateworks technical support with any further questions.

Battery Coin Cell Socket (J12)

The 6.8mm backup battery socket allows for easy replacement of the battery. A rechargeable 6.8mm, 3V, 3mAH Lithium coin cell should be used when replacing the battery. Replacement batteries can be ordered from Digi-Key with part number 728-1078-ND.

Gigabit Ethernet Port and Passive PoE Input Power (J13)

The Gigabit Ethernet Ports are available through a standard 8-pin RJ45 connector. The connector also supports Full Wave Passive Power over Ethernet. The power inputs are diode protected to prevent back feeding with other power inputs. The Passive PoE architecture is discussed in more detail in Section 1 and the input voltage requirements are listed in Section 3.

Pin	Signal	Passive Power
1	TX1+/RX1+	PoE V+/PoE Ground
2	TX1-/RX1-	PoE V+/PoE Ground

3	TX2+/RX2+	PoE V+/PoE Ground
4	TX3+/RX3+	PoE V+/PoE Ground
5	TX3-/RX3-	PoE V+/PoE Ground
6	TX2-/RX2-	PoE V+/PoE Ground
7	TX4+/RX4+	PoE V+/PoE Ground
8	TX4-/RX4-	PoE V+/PoE Ground

GbE Ethernet Port Connector

Optional GbE Ethernet RJ45 Replacement Header (J14)

The Ethernet port is optionally available through an 8-pin header in a 1x8 configuration with 1.25mm pin spacing. The mating connector is a Molex Picoblade 51021-0800, available from Digi-Key as part number WM1726-ND. The mating connector pins are Molex 50058-8100, available from Digi-Key as 50058-8100-ND. Contact the factory for additional information on this option.

Input Power Header (J15)

Power is normally applied to the SBC through a latching 2-pin connector in a 1x2 configuration with 2mm spacing or through the Gigabit Ethernet Port connector in a Passive Power over Ethernet configuration. The 2-pin mating connector is a JST PAP-02V-S, available from Digi-Key as part number 455-1486-ND. The mating connector pins are JST SPHD-002T-P05, available from Digi-Key as part number 455-1313-1-ND.

Pin	Signal
1	8-60VDC Positive
2	Ground

Input Power Connector

JTAG Programming and Serial Console (SOM J4)

The JTAG programming port and serial console port are both available through a single 10-pin header in a 2x5 configuration with 0.05-inch pin spacing. The mating cable is a Samtec FFSD series, or equivalent. For example the FFSD-05-S-05.00-01-N is a 5-inch ribbon cable with a mating connector on one end.

The primary purpose for the JTAG Port is for automated factory testing and to facilitate downloading the application program into Flash memory. This feature requires the GW16099 USB JTAG Programmer. The JTAG programming port also includes the CPU UART[2] interface in a logic-level configuration. This serial port facilitates an operator console though the USB JTAG Programmer. See ordering options for more information. Refer to Section 3 for USB JTAG Programmer instructions.

Pin	Signal	Pin	Signal
1	JTAG TRST	2	3.3V
3	JTAG TDI	4	Ground
5	JTAG TMS	6	UART[2]:TXD (logic level)

| 7 | JTAG TCK | 8 | UART[2]:RXD (logic level) |
| 9 | JTAG TDO | 10 | System Reset |

JTAG Programming Port and Serial Console Connector

3. SOFTWARE

3.1. Getting Started

The board is factory configured with the U-boot loader and Ubuntu Linux programmed into Flash memory. The software can be configured by using the console through the JTAG serial port or over Ethernet using a Telnet session. Follow the http://trac.gateworks.com/wiki/gettingstarted link for additional software information.

3.2. Gateworks System Controller

The GSC Gateworks System Controller is a custom battery-backed micro-controller designed by Gateworks to implement many of the embedded features found on the board. A complete list of GSC features is shown in the table below. The GSC communicates with the CPU over I2C and a GPIO signal configured as an interrupt. Follow the http://trac.gateworks.com/wiki/gsc link for complete GSC programming information.

Function	Support
Real Time Clock	Yes
Voltage & Temperature Monitor	Yes
Configuration EEPROM	Yes
Fan Controller	No
System Specialized Functions	----
GPS Antenna Fault Monitoring	No
USB OTG System Boot	Yes
Panel LED	Yes
External Status LED	No
Panel Pushbutton Switch	Yes
External Pushbutton Switch	No
External Tamper Switch	Yes
Encryption Key Support	Yes
Programmable Sleep & Wake-up	Yes
GSC Flash CRC	Yes
GSC Revision	Yes

Gateworks System Controller Supported Functions

3.3. JTAG Programming

One method of programming the Flash with application software is through the JTAG programming interface using the GW16099 USB JTAG Programmer. The GW16099 USB JTAG Programming Adapter transfers the application software from the developer's computer to the flash memory. Follow the http://trac.gateworks.com link for JTAG programmer instructions. The GW16099 programmer is included in development kits of available

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3.4.   Manufacturer's Website Links / Support Mailing List

This section provides relevant links. Gateworks is committed to open source software.

Links
Product Change Notification (PCN): http://trac.gateworks.com/wiki/pcn.
Gateworks Quick Start: http://www.gateworks.com/quickstart
Gateworks Board Support Packages: http://trac.gateworks.com
Linux: http://www.linux.org/
OpenWrt: http://openwrt.org
U-Boot: http://u-boot.sourceforge.net
Ubuntu: https://ubuntu.com/
Gateworks Software Source: https://github.com/gateworks

4. SPECIFICATIONS

4.1. Electrical

Parameter Operating Voltage	Specification	
	Min	**Max**

Input Voltage Range
      2-Pin Connector
      Passive PoE
	
	8VDC
	8VDC
		
		60VDC
		60VDC

Digital I/O – VIH	2.3VDC	3.6VDC
Digital I/O – VIL	0	1.0VDC
Digital I/O – VOH (IOH = 9.6mA)	1.44VDC	1.8VDC
Digital I/O – VOH (IOH = 12mA)	2.2VDC	3.3VDC
Digital I/O – VOL (IOL = 2mA)	0	0.36VDC
Digital I/O – VOL (IOL = 2mA)	0	0.66VDC

Parameter Operating Current@25°C	Specification	
	Typ	**Max**
Input Current (no Mini-PCIe cards)	0.16A @ 24VDC	

4.2. Environmental

| Parameter	Specification
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Non-condensing Relative Humidity	Less than 95% at 40°C
Mean Time Between Failure	TBD years at 55°C

4.3. Mechanical

Parameter	Specification
Dimensions, Length x Width	35 x 100.0mm (1.37 x 3.93in)

Dimensions, Height
      Top Side
      Bottom Side
      Total including circuit board
	
	15.5mm (0.61in)
	6mm (0.24in)
	23mm (0.91in)

Weight	4 ounces (113g)

Note a 3D model is available for download on the Gateworks website on the respective product page under the Documentation tab.
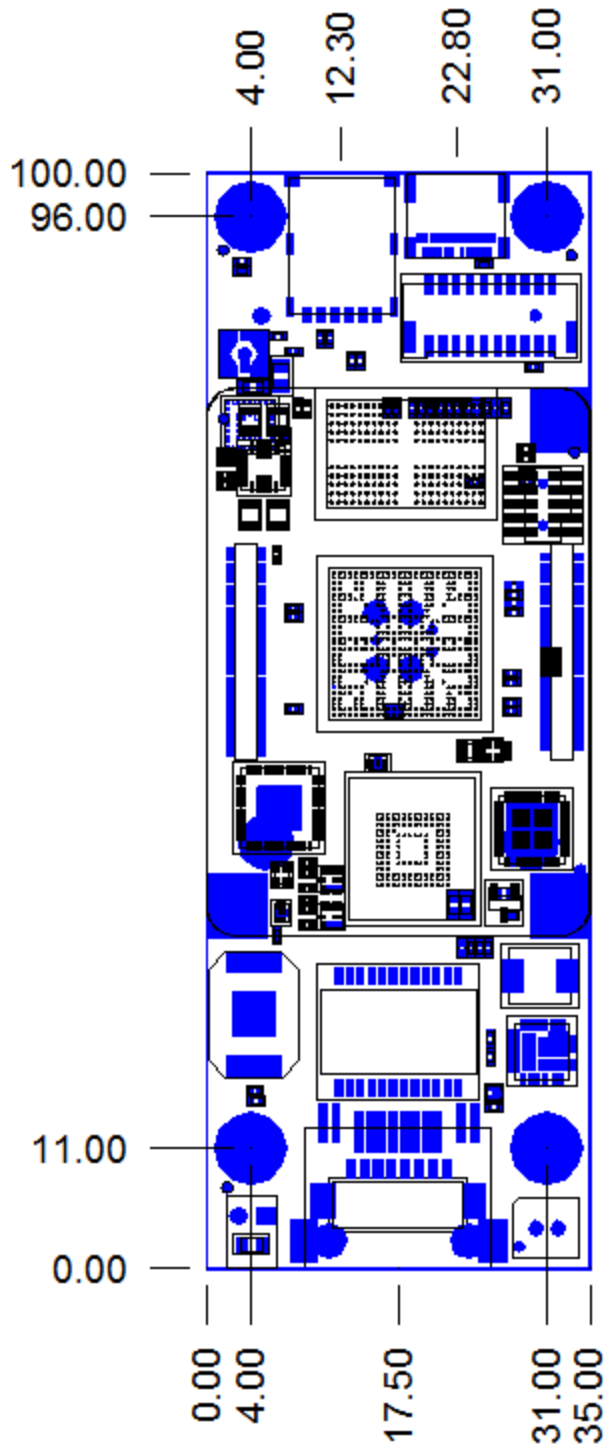
Top Side with Mechanical Dimensions
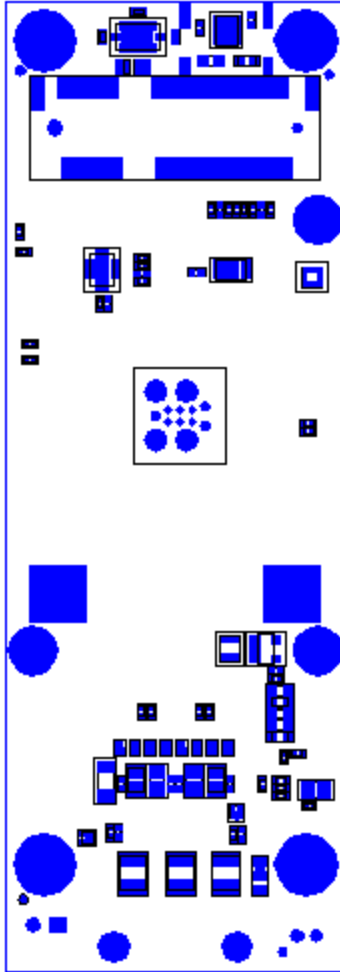
Bottom Side

5. CUSTOMER SUPPORT

5.1. Product Revision History

View revision history online at the Gateworks Wiki SBC Revision page:
http://trac.gateworks.com/wiki/sbcrevisions

5.2. Technical Assistance

Gateworks technical support staff is available to assist you with questions that you may have. Please contact Gateworks using one of the methods shown below.

Phone: (805) 781-2000
Email: support@gateworks.com
Website: http://www.gateworks.com

5.3. Warranty

Standard hardware warranty period is one year from the date of purchase. Gateworks will, solely at its option, repair or replace products, which prove to be defective in materials or workmanship, provided they are returned to a Gateworks authorized repair center. Shipment to Gateworks is at the customer's expense. Gateworks pays return shipping by ground.

Products, which in Gateworks opinion, have been subject to misuse, abuse, neglect or unauthorized alteration or repair are excluded from this warranty.

Products not manufactured by Gateworks are limited to the warranty provided by the original manufacturer and should be returned to the manufacturer in case of defect. Software is licensed AS IS.

The liability of Gateworks under this agreement is limited to a refund of the purchase price of the product. In no event shall Gateworks be liable for loss of profits or other damage.

5.4. Return for Repair

You must obtain a Returned Material Authorization (RMA) number before sending any product to Gateworks. Please contact Gateworks using one of the methods shown below to obtain an RMA number. Please be ready with your name, telephone number, company name, company address, shipping address, invoicing address, product serial number, and a technical description of the problem. A service charge will be applied to units that are out of warranty. Please pack the unit being returned in anti-static material and ship in a sturdy cardboard box with adequate packing material. Mark the RMA number clearly on the outside of the box before returning.

Phone: (805) 781-2000

Fax: (805) 781-2001
Email: support@gateworks.com
Website: http://www.gateworks.com
Address: 3026 South Higuera Street, San Luis Obispo, CA 93401

5.5. Life Support Policy

Gateworks products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of Gateworks Corporation. Refer to the following for definitions of critical components and life support devices.

1. A critical component is any component of a life support device or system whose failure to perform can be expected to cause the failure of the life support device or system, affect its safety, or limit its effectiveness.

2. Life support devices or systems are devices or systems which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.

5.6. Copyright & Trademarks

Specifications are subject to change without notice. All brand names or product names mentioned are trademarks or registered trademarks of their respective proprietors.

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