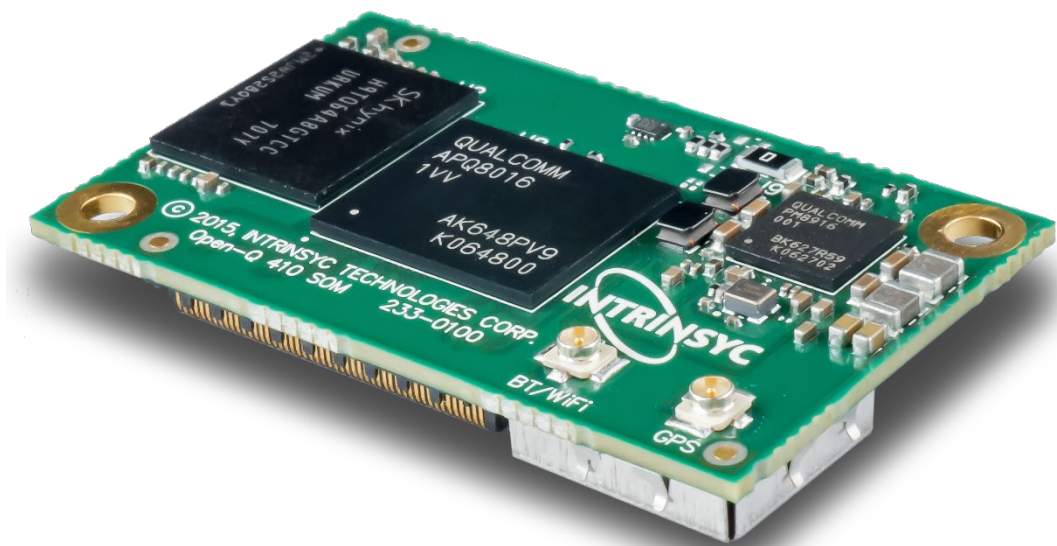




Open-Q 410 SOM Datasheet

Part Number PDS-0019
Revision B June 2021

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Revision History

Date	Rev.	Comments
January 2021	A	Initial Lantronix document.
June 2021	B	Update memory density to 16GB (Figure 1, Table 1) Update product marking and ordering information (section 7.1, 7.2)

For the latest revision of this product document, please check our online documentation at <http://www.lantronix.com/support/documentation>.

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1. Introduction

This document applies to the Open-Q 410 SOM. Technical specifications for other SOMs in the Lantronix product line are covered under separate documents.

1.1 Purpose

The purpose of this document is to provide the technical specifications of the Lantronix Open-Q 410 SOM.

1.2 Scope

This document covers the following information on the Open-Q 410 SOM:

- Electrical and mechanical specifications
- SOM pin-out
- Device handling and packaging
- Ordering information.

1.3 Intended Audience

This document is intended for users who wish to understand the technical specifications of the Lantronix Open-Q 410 SOM.

1.4 Acronyms and Abbreviations

Acronym / Abbreviation	Definition
ANT	ANTenna
BAT, BATT	BATTery
BAM	Bus Access Manager
BLSP	BAM-based Low-Speed Peripheral
BOM	Bill of Materials
BT	Blue Tooth
CLK	Clock
CPU	Central Processing Unit
CS	Chip Select
CSI	Camera Serial Interface
DSI	Display Serial Interface
EMI	Electro-Magnetic Interference
EN	ENable
ERM	Eccentric Rotating Mass
ESD	Electro-Static Discharge
GND	GrouND
GPIO	General Purpose I/O
GPS	Global Positioning System
HDMI	High Definition Multimedia Interface
I2C	Inter-Integrated Circuit
I2S	Inter-IC Sound
INT	INTerrupt

Acronym / Abbreviation	Definition
JTAG	Joint Test Action Group
LDO	Low Drop-Out
LRM	Linear Resonant Actuator
LTE	Long-Term Evolution
LPI	Low Power Island
MDP	Mobile Display Port
MI2S	Mobile Inter-IC Sound
MIC	MIcrophone
MIPI	Mobile Industry Processor Interface
MPP	Multi-Purpose Pin
NFC	Near Field Communication
PCB	Printed Circuit Board
PCIE	Peripheral Component Interconnect Express
PWM	Pulse-Width Modulation
QUP	Qualcomm Universal Peripheral
RF	Radio Frequency
RX	Receive
SCL	Serial Clock
SDA	Serial DAta
SDC	Secure Digital Interface
SOM	System on Module
SPI	Serial Peripheral Interface
SSC	Sensor Core
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
UIM	User Interface Module
USB	Universal Serial Bus
WLAN	Wireless Local Area Network

1.5 Signal Name Suffix

Suffix	Definition
_N	Indicates that the signal is ACTIVE LOW
_P/N	Identifies the two signals comprising a differential pair

2. Documents

This section lists any parent and supplementary documents for the Open-Q 410 SOM Datasheet. Unless stated otherwise, applicable documents supersede this document and reference documents provide background and supplementary information.

2.1 Applicable Documents

REFERENCE	AUTHOR	TITLE
A-1	Lantronix	Lantronix Purchase and Software License Agreement for the Open-Q 410 SOM

2.2 Reference Documents

Available at <http://tech.intrinsyc.com/> (dev kit registration required).

REFERENCE	TITLE
R-1	Open-Q 410 SOM Development Kit User Guide
R-2	Open-Q 410 SOM Carrier Board Design Guide
R-3	Open-Q 410 SOM Schematics (SOM and Carrier)
R-4	Open-Q 410 SOM Module Certification OEM Integrator Tech Note

3. Summary of Features

The Open-Q 410 SOM contains the core of the Qualcomm APQ8016 architecture. Measuring in at 44.0mm x 26.5mm, the SOM is where all the processing occurs. It connects to a carrier board via two Samtec ST4 connectors totaling 200 pins, which allows essential power rails and signals to be exposed for supporting peripherals and interfaces on the platform.

3.1 SOM Block Diagram

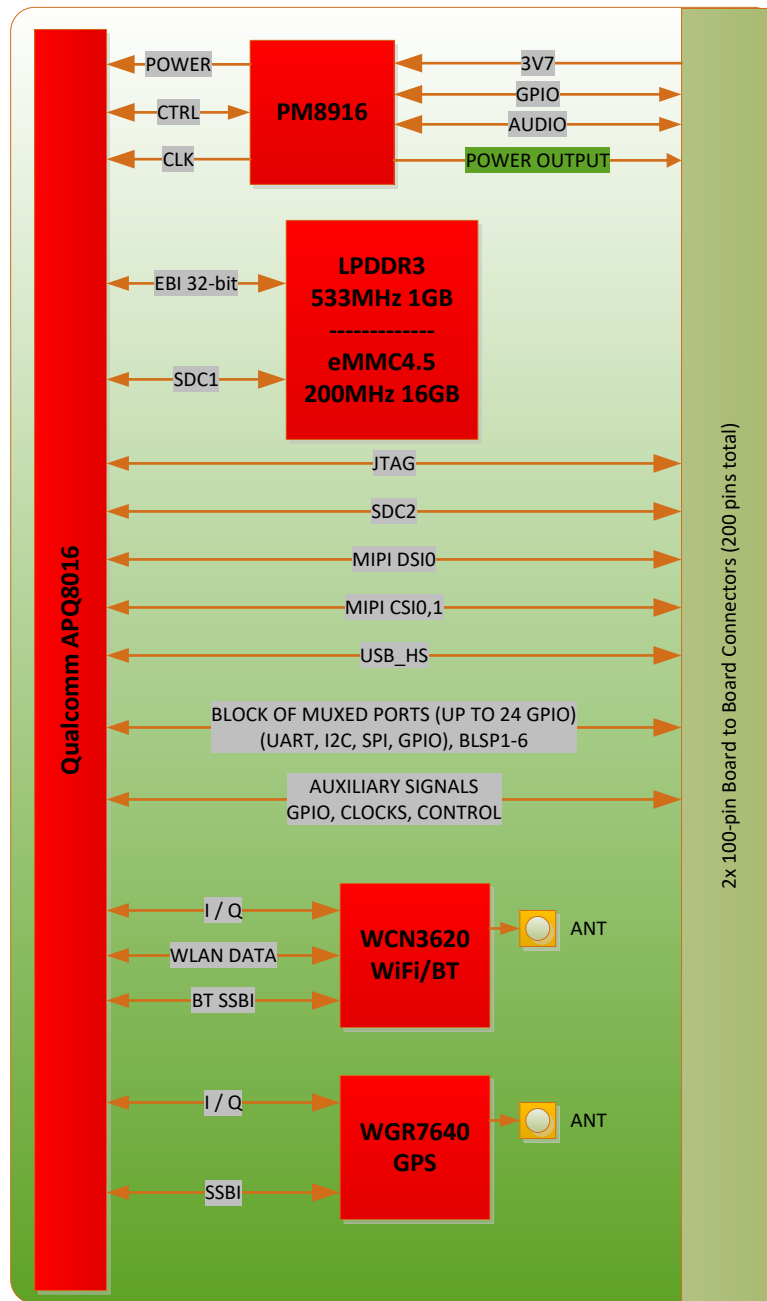


Figure 1 – Open-Q 410 SOM Block Diagram

3.2 SOM Technical Specifications

See the table below for the Open-Q 410 SOM technical specifications.

Table 1 – Open-Q 410 SOM Technical Specifications

Subsystem or Connectors	Feature Set	Description	Notes
Chipset	APQ8016	QUALCOMM® APQ8016 Processor	64-bit Quad 1.2GHz ARM Cortex-A53 with 512kB L2 cache. Adreno™ A306 3D graphics core.
	PM8916	QUALCOMM® companion PMIC for APQ8016 processor	Includes audio codec functionality
Memory	1GB (8Gb) LPDDR3	32-bit 533MHz	embedded multi chip package (eMCP)
	16GB eMMC	eMMC4.5 / HS200	embedded multi chip package (eMCP)
Connectivity	Wi-Fi 2.4Ghz via WCN3620	QUALCOMM® WCN3620 Wi-Fi + BT Combo Chip	802.11b/g/n single band
	BT 4.0 via WCN3620	QUALCOMM® WCN3620 Wi-Fi + BT Combo Chip	BT 4.0 + BLE
	GPS receiver	QUALCOMM® WGR7640	GPS, GLONASS, COMPASS
RF Interfaces	1x WLAN / BT Antenna Connector on SOM	External BT / Wi-Fi Antenna	U.FL connector
	1x GPS Antenna Connectors on SOM	External GPS Antenna connector	U.FL connector
Audio Interfaces	Headset support	Headset connection with stereo output, mono-microphone input, and jack detection	
	Audio input	Stereo line input	
	Audio output	Loudspeaker and earpiece audio outputs	
	Digital Mic	One digital microphone input	
Special Control Interfaces	Power Button	Power On/Off Signal	
	Volume Up	Volume Up Signal	
	Volume Down	Volume Down/Reset Signal	
Status Indication Interfaces	Wi-Fi LED	Wi-Fi Presence LED	
	BT LED	BT Presence LED	
	Charging LED	Charging Indicator LED	
	User LED 1-4	User LEDs	
I/O Interfaces	MIPI DSI	One 4-lane MIPI DSI Display Interface	MIPI Alliance Specification v1.01
	MIPI CSI	One 4-lane and One 2-lane MIPI CSI Interface	MIPI Alliance Specification v1.0 compliant
	SDIO	One 4-bit, Dual-Voltage (1.8/2.95 V) up to 200MHz	Supports XSDHC/ SDHC and SDIO v3.0

Subsystem or Connectors	Feature Set	Description	Notes
	USB2.0	One USB 2.0 Interface	Configurable as Host or Device mode. Also being used as ADB port
	GPIO/I2C/UART/SPI	Configurable I/O	Configurable IO exposed as GPIO or BLSP ports, giving GPIO, I2C, UART, and SPI connections options
	Debug UART	Debug UART Interface	
	JTAG	JTAG Interface	Reserved for internal development
Connectors	2x 100-pin board to board connectors	2x Samtec ST4 family	200 pins total for connection to carrier board

4. I/O Definitions

4.1 Location of Major Components

The figures below identify the major components and connectors found on the Open-Q 410 SOM top and bottom sides.

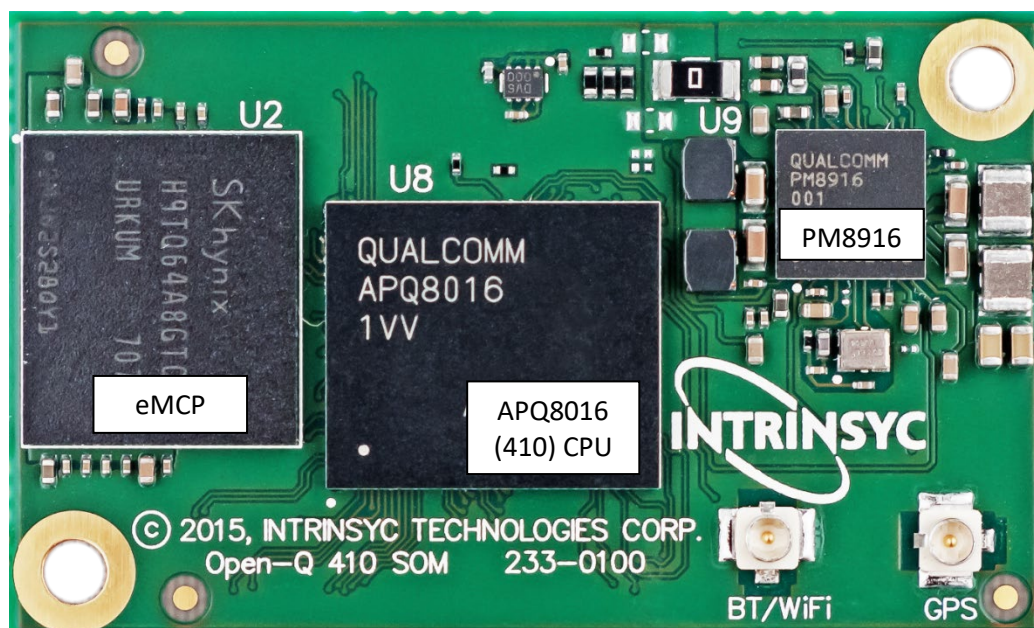


Figure 2 – Open-Q 410 SOM Top View

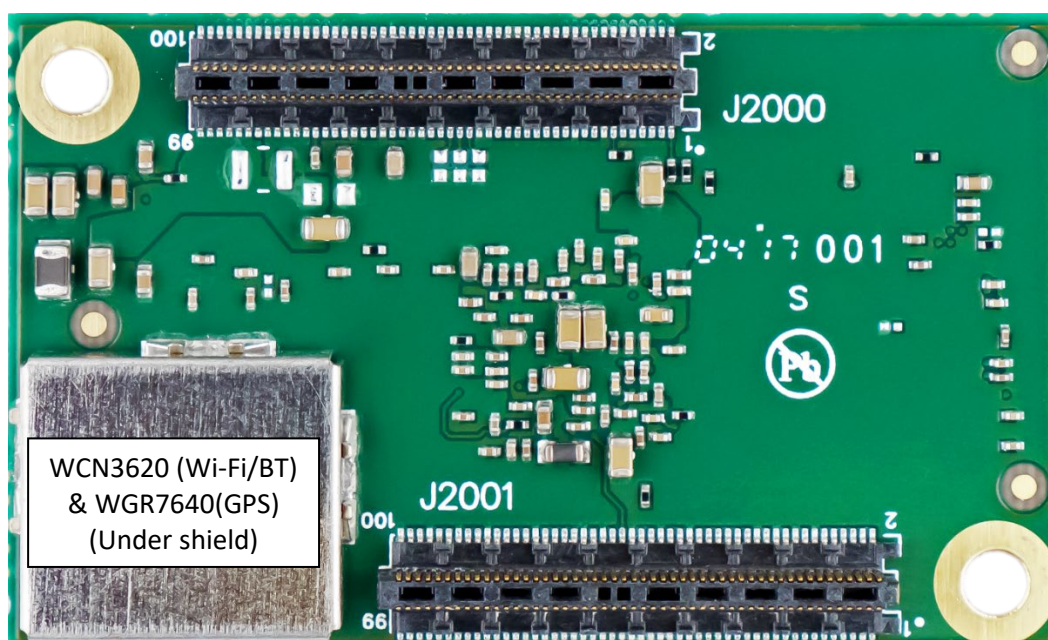


Figure 3 – Open-Q 410 SOM Bottom View

The SOM mating connectors J2000, and J2001 are located on the bottom side of the SOM. The connector pin 1 locations are shown in the figure below (looking at bottom of SOM). Key dimensions are provided in later sections of this document.

Both J2000 and J2001 connectors are Samtec ST4-50-1.00-L-D-P-TR. See section 6.3 for information on the available mating connectors.

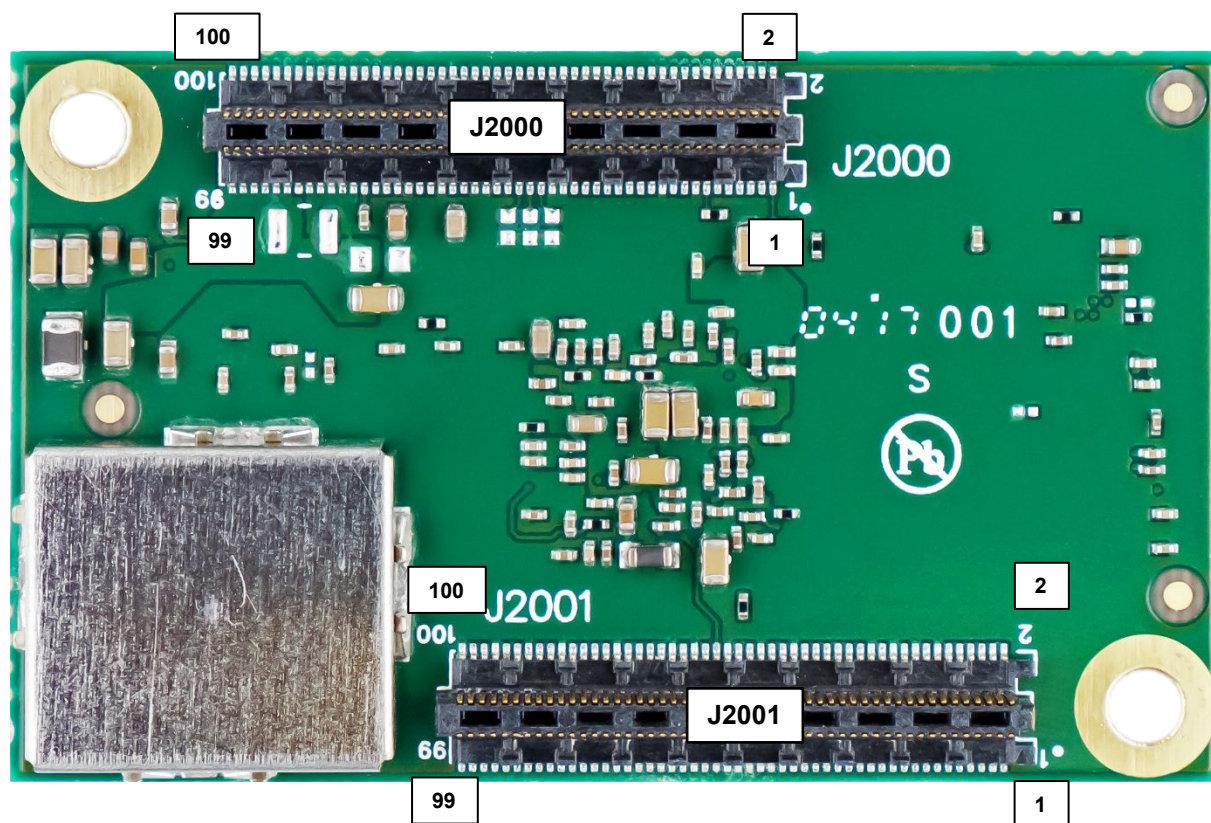


Figure 4 – Pin Locations of Board-to-Board Connectors

4.2 B2B Connector Signal Assignments

The following tables list the pinouts of the two Open-Q 410 SOM board to board connectors. A more detailed description of the signal group functions can be found in reference document R-2 (the carrier board design guide), which provides the background information for customers developing a custom Carrier Board for the Open-Q 410 SOM.

Note: the SOM schematic (document R-3) is the controlling document. In the event of pin-out difference(s) between this document and the SOM schematic, the SOM schematic shall take precedence.

Table 2 – B2B Connector J2000 Pin-outs

Pin #	J2000 Signal Name	Description
1	JTAG_PS_HOLD	JTAG Signal - reserved for internal development

Pin #	J2000 Signal Name	Description
2	KEY_VOLP_N	Volume Up
3	GPIO115	Sensor INT / Configurable GPIO
4	GPIO113	Sensor INT / Configurable GPIO
5	SD_CARD_DET_N	SD Card Detect
6	GPIO114	Configurable GPIO
7	GPIO118	MI2S Serial CLK / Configurable GPIO
8	GPIO120	User LED 2 / Configurable GPIO
9	MI2S_WS	Configurable GPIO
10	GND	Ground reference for the SOM
11	USB_SW_SEL	USB Mode selection signal / PMIC GPIO 4
12	GPIO69	Sensor INT / Configurable GPIO
13	USB_HS_ID	USB ID
14	KEY_VOL_DWN_PM_RESIN_N	Volume Down / Reset
15	GND	Ground reference for the SOM
16	GND	Ground reference for the SOM
17	USB_HS_D_P	USB High Speed D+
18	GND	Ground reference for the SOM
19	USB_HS_D_N	USB High Speed D-
20	GND	Ground reference for the SOM
21	GND	Ground reference for the SOM
22	BBCLK2	PM8916 Baseband (low power) XO output 2
23	BLSP4_0	BLSP4 Bit 0 / Configurable GPIO
24	GND	Ground reference for the SOM
25	BLSP4_1	BLSP4 Bit 1 / Configurable GPIO
26	GPIO117	MI2S Word Select / Configurable GPIO
27	BLSP4_2	BLSP4 Bit 2 / Configurable GPIO
28	GND	Ground reference for the SOM
29	BLSP4_3	BLSP4 Bit 3 / Configurable GPIO
30	VREG_L11_SDC2	SD Card Power / PMIC VREG L11
31	BLSP1_0	BLSP1 Bit 0 / Configurable GPIO
32	GND	Ground reference for the SOM
33	BLSP1_1	BLSP 1 Bit 1 / Configurable GPIO
34	GND	Ground reference for the SOM
35	BLSP1_2	Digital MIC Data / BLSP1 Bit 2 / Configurable GPIO
36	GND	Ground reference for the SOM
37	BLSP1_3	Digital MIC CLK / BLSP1 Bit 3 / Configurable GPIO
38	VREG_L16_UIM3	PMIC VREG L16
39	GND	Ground reference for the SOM
40	GND	Ground reference for the SOM
41	GND	Ground reference for the SOM

Pin #	J2000 Signal Name	Description
42	GPIO119	MI2S D0 / Configurable GPIO
43	CDC_HPH_REF	Headphone GND reference
44	BOOT_CONFIG_2	Boot Config Bit 2
45	CDC_HPH_R	Headphone output (Right Channel)
46	BOOT_CONFIG_3	Boot Config Bit 3
47	CDC_HPH_L	Headphone output (Left Channel)
48	BOOT_CONFIG_5	Boot Config Bit 5
49	CDC_HDS_MIC2_P	Headphone MIC input
50	VREG_L15_UIM2	PMIC VREG L15
51	CDC_HS_DET	Headphone detect
52	PMIC_OPT_1	PMIC Option hardware configuration control bit 1
53	GND	Ground reference for the SOM
54	WLED_PWM_MPP_4	LCD Backlight PWM / PMIC Configurable Multi-Purpose Pin 4
55	GND	Ground reference for the SOM
56	PMIC_OPT_2	PMIC Option hardware configuration control bit 2
57	VREG_L17_2P85	PMIC VREG L17
58	USR_CTRL_LED4	User LED 4 / PMIC GPIO 02
59	VREG_L17_2P85	PMIC VREG L17
60	GND	Ground reference for the SOM
61	GND	Ground reference for the SOM
62	BT_LED_CTRL	Bluetooth LED / PMIC Configurable Multi-Purpose Pin 3
63	CDC_EAR_P	Earpiece PA + output
64	CHG_LED_SINK	Charging Indicator LED Sink
65	CDC_EAR_N	Earpiece PA - output
66	BATT_ID	Battery ID
67	GND	Ground reference for the SOM
68	WLAN_LED_CTRL	Wi-Fi LED / PMIC Configurable Multi-Purpose Pin 2
69	VREG_L10_2P8	PMIC VREG L10
70	USB_VBUS_IN_PMIC	Input power from USB source
71	SPKR_OUT_P	Class-D speaker amp + output
72	USB_VBUS_IN_PMIC	Input power from USB source
73	SPKR_OUT_N	Class-D speaker amp - output
74	GND	Ground reference for the SOM
75	VREG_L5_1P8	PMIC VREG L5
76	VBATT_CONN_SENSE	Main battery voltage sense point
77	GND	Ground reference for the SOM
78	PMIC_VIB_DRV_N	Vibration motor driver output control
79	GND	Ground reference for the SOM
80	USB_HUB_RESET_N	USB Hub Reset / PMIC GPIO 3

Pin #	J2000 Signal Name	Description
81	GND	Ground reference for the SOM
82	CDC_MIC_BIAS1	Microphone bias 1
83	GND	Ground reference for the SOM
84	CDC_MIC_BIAS2	Microphone bias 2
85	GND	Ground reference for the SOM
86	USR_CTRL_LED3	User LED 3 / PMIC GPIO 1
87	GND	Ground reference for the SOM
88	GND_CFILT	Headset GND reference
89	VPH_PWR	SOM Main power. Max 6V
90	CDC_MIC1_P	Main mic
91	VPH_PWR	SOM Main power. Max 6V
92	CDC_MIC3_P	Second mic
93	VPH_PWR	SOM Main power. Max 6V
94	CBL_PWR_N	Cable power-on detect input
95	VPH_PWR	SOM Main power. Max 6V
96	VREF_BATT_THERM	Reference voltage for battery thermistor
97	VPH_PWR	SOM Main power. Max 6V
98	BATT_THERM	Battery Thermistor input
99	VPH_PWR	SOM Main power. Max 6V
100	KPD_PWR_N	Power On

Table 3 – B2B Connector J2001 Pin-outs

Pin #	J2001 Signal Name	Description
1	APQ_RESOUT_N	Reset Output
2	CAM0_RST_N	CAM0 Reset / Configurable GPIO
3	GND	Ground reference for the SOM
4	CAM_I2C0_SDA	CCIO SDA / Configurable GPIO
5	BOOT_CONFIG_0	Boot Config Bit 0
6	CAM_I2C0_SCL	CCIO SCL / Configurable GPIO
7	BOOT_CONFIG_1	Boot Config Bit 1
8	CCI_ASYNC0	CAM1 PWR DN / Configurable GPIO
9	BLSP3_0	BLSP3 Bit 0 / Configurable GPIO
10	CAM1_RST_N	CAM 1 Reset / Configurable GPIO
11	BLSP3_1	BLSP3 Bit 1 / Configurable GPIO
12	CAM0_STANDBY_N	CAM0 Standby / Configurable GPIO
13	BLSP3_2	BLSP3 Bit 2 / Configurable GPIO
14	GND	Ground reference for the SOM
15	BLSP3_3	BLSP3 Bit 3 / Configurable GPIO
16	CAM_MCLK1	CAM1 MCLK / Configurable GPIO

Pin #	J2001 Signal Name	Description
17	BLSP5_2	BLSP5 Bit 2 / Configurable GPIO
18	GND	Ground reference for the SOM
19	BLSP5_1	BLSP5 Bit 1 / Configurable GPIO
20	CAM_MCLK0	CAM0 MCLK / Configurable GPIO
21	BLSP5_0	BLSP5 Bit 0 / Configurable GPIO
22	GND	Ground reference for the SOM
23	BLSP5_3	BLSP5 Bit 3 / Configurable GPIO
24	GPIO32	Configurable GPIO
25	GND	Ground reference for the SOM
26	GND	Ground reference for the SOM
27	JTAG_TDI	JTAG Signal - reserved for internal development
28	FORCED_USB_BOOT	Forced USB Boot
29	JTAG_TDO	JTAG Signal - reserved for internal development
30	LCD_RST_N	LCD Reset / Configurable GPIO
31	JTAG_TRST_N	JTAG Signal - reserved for internal development
32	LCD_TE	LCD TE / Configurable GPIO
33	JTAG_SRST_N	JTAG Signal - reserved for internal development
34	VREG_L6_1P8	VREG L6
35	JTAG_TMS	JTAG Signal - reserved for internal development
36	GPIO36	Configurable GPIO
37	JTAG_TCK	JTAG Signal - reserved for internal development
38	GPIO31	Display INT / Configurable GPIO
39	GND	Ground reference for the SOM
40	GND	Ground reference for the SOM
41	MIPI_CSIO_LN3_P	CSIO Lane 3+
42	MIPI_CSIO_LN0_P	CSIO Lane 0+
43	MIPI_CSIO_LN3_N	CSIO Lane 3-
44	MIPI_CSIO_LN0_N	CSIO Lane 0-
45	GND	Ground reference for the SOM
46	GND	Ground reference for the SOM
47	MIPI_CSIO_LN1_P	CSIO Lane 1+
48	MIPI_CSIO_CLK_P	CSIO Lane CLK+
49	MIPI_CSIO_LN1_N	CSIO Lane 1-
50	MIPI_CSIO_CLK_N	CSIO Lane CLK-
51	GND	Ground reference for the SOM
52	GND	Ground reference for the SOM

Pin #	J2001 Signal Name	Description
53	MIPI_CSI0_LN2_P	CSI0 Lane 2+
54	VREG_L12	VREG L12
55	MIPI_CSI0_LN2_N	CSI0 Lane 2-
56	SDC2_CMD	SD Card CMD
57	GND	Ground reference for the SOM
58	GND	Ground reference for the SOM
59	MIPI_CSI1_CLK_P	CSI1 CLK+
60	SDC2_CLK	SD Card CLK
61	MIPI_CSI1_CLK_N	CSI1 CLK-
62	GND	Ground reference for the SOM
63	GND	Ground reference for the SOM
64	SDC2_DATA0	SD Card D0
65	MIPI_CSI1_LN0_P	CSI1 Lane 0+
66	SDC2_DATA1	SD Card D1
67	MIPI_CSI1_LN0_N	CSI1 Lane 0-
68	SDC2_DATA3	SD Card D3
69	GND	Ground reference for the SOM
70	SDC2_DATA2	SD Card D2
71	MIPI_CSI1_LN1_P	CSI1 Lane 1+
72	GND	Ground reference for the SOM
73	MIPI_CSI1_LN1_N	CSI1 Lane 1-
74	BLSP6_3	BLSP6 Bit 3 / Configurable GPIO
75	GND	Ground reference for the SOM
76	BLSP6_2	User LED 1 / BLSP6 Bit 2 / Configurable GPIO
77	MIPI_DSI0_LN0_P	DSI0 Lane 0+
78	BLSP6_1	BLSP6 Bit 1 / Configurable GPIO
79	MIPI_DSI0_LN0_N	DSI0 Lane 0-
80	BLSP6_0	BLSP6 Bit 0 / Configurable GPIO
81	GND	Ground reference for the SOM
82	GND	Ground reference for the SOM
83	MIPI_DSI0_CLK_P	DSI0 CLK+
84	MIPI_DSI0_LN2_P	DSI0 Lane 2+
85	MIPI_DSI0_CLK_N	DSI0 CLK-
86	MIPI_DSI0_LN2_N	DSI0 Lane 2-
87	GND	Ground reference for the SOM
88	GND	Ground reference for the SOM
89	BLSP2_0	Sensor I2C SCL / BLSP2 Bit 0 / Configurable GPIO
90	MIPI_DSI0_LN1_N	DSI0 Lane 1-

Pin #	J2001 Signal Name	Description
91	BLSP2_1	Sensor I2C SDA / BLSP2 Bit 1 / Configurable GPIO
92	MIPI_DSI0_LN1_P	DSI0 Lane 1+
93	BLSP2_2	Debug UART RX / BLSP2 Bit 2
94	GND	Ground reference for the SOM
95	BLSP2_3	Debug UART TX / BLSP2 Bit 3
96	MIPI_DSI0_LN3_N	DSI0 Lane 3-
97	GND	Ground reference for the SOM
98	MIPI_DSI0_LN3_P	DSI0 Lane 3+
99	FM_RX_ANT	FM RX Antenna
100	GND	Ground reference for the SOM

4.3 RF Antenna Connections

4.3.1 Wi-Fi and BT RF Antenna

The Open-Q 410 SOM provides 802.11 b/g/n Wi-Fi and Bluetooth V4.2 (BR/EDR+BLE) connectivity via the Qualcomm WCN3620 chipset. The Wi-Fi and BT functions require an antenna for maximum throughput and operates at 2.4GHz.

The SOM uses a single U.FL coaxial connector (Hirose U.FL-R-SMT-1 (10)) for the Wi-Fi/BT antenna port, as shown in the figure below.

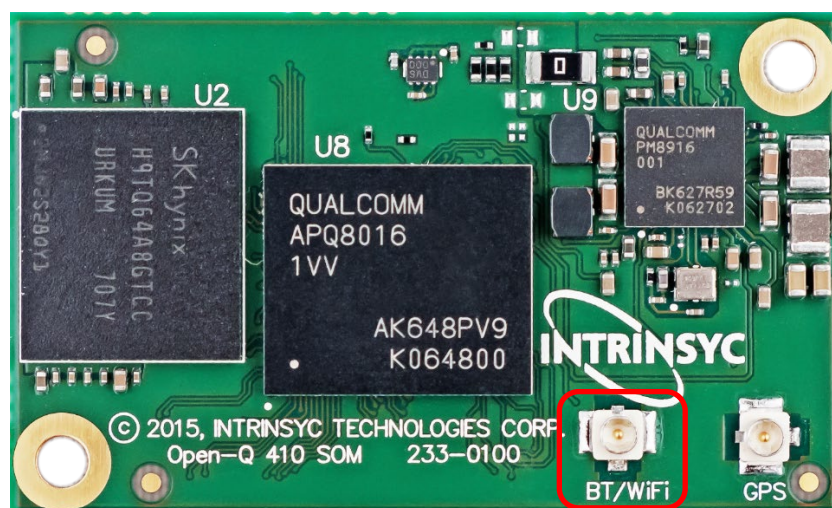


Figure 5- Wi-Fi/BT Antenna Port

4.3.2 GPS Antenna

The SOM uses a single U.FL coaxial connector (Hirose U.FL-R-SMT-1 (10)) for the GPS antenna port, as shown in the figure below. The GPS antenna connector has a +1.8V bias. An active GPS antenna is recommended. A Passive Antenna can be used only if the antenna is DC-Open.

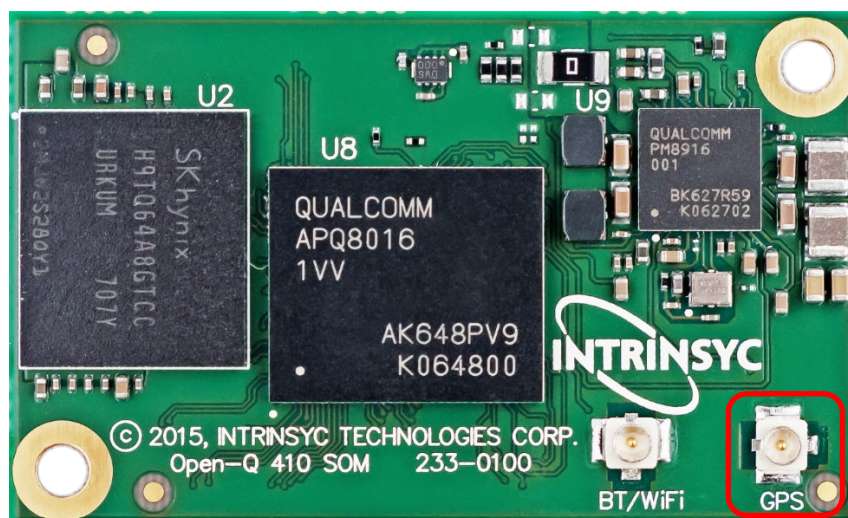


Figure 6 - GPS Antenna Port

5. Electrical Specifications

The input power to the SOM is provided by a power supply (battery or wall adapter) and a USB source, for battery charging purposes. All input power sources enter the PM8916 power management IC on the SOM, which then distributes power to other circuits on the SOM and connected carrier board via LDOs.

5.1 Absolute Maximum Ratings

The table below shows the absolute maximum ratings in which the SOM input power sources can be exposed to without experiencing functional failure.

Table 4 – Absolute Maximum Input Power Ratings

Parameter	Min	Max	Units
Battery or DC power input (VPH_PWR)	-0.5	6	V
USB VBUS battery charger input voltage source (USB_VBUS_IN_PMIC)	-0.5	16	V

5.2 Operating Conditions

The table below shows the recommended operating conditions for the SOM to meet all performance specifications (provided the absolute maximum ratings have never been exceeded).

Table 5 – Operating Input Power Ratings

Parameter	Min	Typ.	Max	Units
Battery or DC power input (VPH_PWR)	3.3 ¹	3.6	4.2	V
USB VBUS battery charger input voltage source (USB_VBUS)	4.35	5	5.5	V

5.3 Operating Temperature

The SOM operating temperature ratings listed below are based only on the operating temperature grade of the SOM components. Users should consider the specific environmental conditions in which the final product is used in.

Table 6 – Input Power Ratings for Operational Use

Parameter	Min	Typ.	Max	Units
Overall SOM (case temperature)	-25	+25	+85	°C

¹ For optimal Wi-Fi performance, it is recommended to have VPH_PWR above 3.5V.

5.4 Power Consumption

The SOM power consumption tests have been performed under common operational modes. These results are outlined in the table below. All tests (other than the suspend mode test) were executed at room temperature with Android 7.1.1 running using the Open-Q 410 development kit.

Table 7 – Power Consumption Ratings

Operational Modes	Description	Average	Peak
Suspend	Power consumption when system placed in standby (everything off)	<15mW ²	N/A
Video Record	Power consumption when system recording 1080P video	2.03W	2.78W
Video Playback	Power consumption when system playing back 1080P video	0.80W	2.32W
Audio Playback	Power consumption when system playing back MP3	0.24W	1.01W
Download via Wi-Fi	Power consumption when system downloading large file via Wi-Fi	0.64W	1.73W
Upload via Wi-Fi	Power consumption when system uploading large file via Wi-Fi	0.90W	2.09W
Quad Core	Power consumption when system is running all 4 cores	2.66W	2.86W
Single core	Power consumption when system is running only 1 core (others off/ suspend)	1.19W	1.41W
eMMC Write	Power consumption when system is writing data to eMMC	0.21W	0.84W
eMMC Read	Power consumption when system is reading data from eMMC	0.21W	0.54W

5.5 ESD Ratings

The SOM is not designed with additional ESD protection other than what is included in the integrated circuits. It is recommended to take proper precautions in a static free environment when handling the SOM.

² Suspend mode power consumption represents SOM consumption only using Android 5 BSP.

6. Mechanical Specifications

The sections below present some mechanical details of the Open-Q 410 SOM. For access to the 3D design files, please see <http://tech.intrinsyc.com/> (dev kit registration required).

6.1 SOM Mechanical Outline

The outer dimensions of the SOM are 44.0mm x 26.5mm, as shown below.

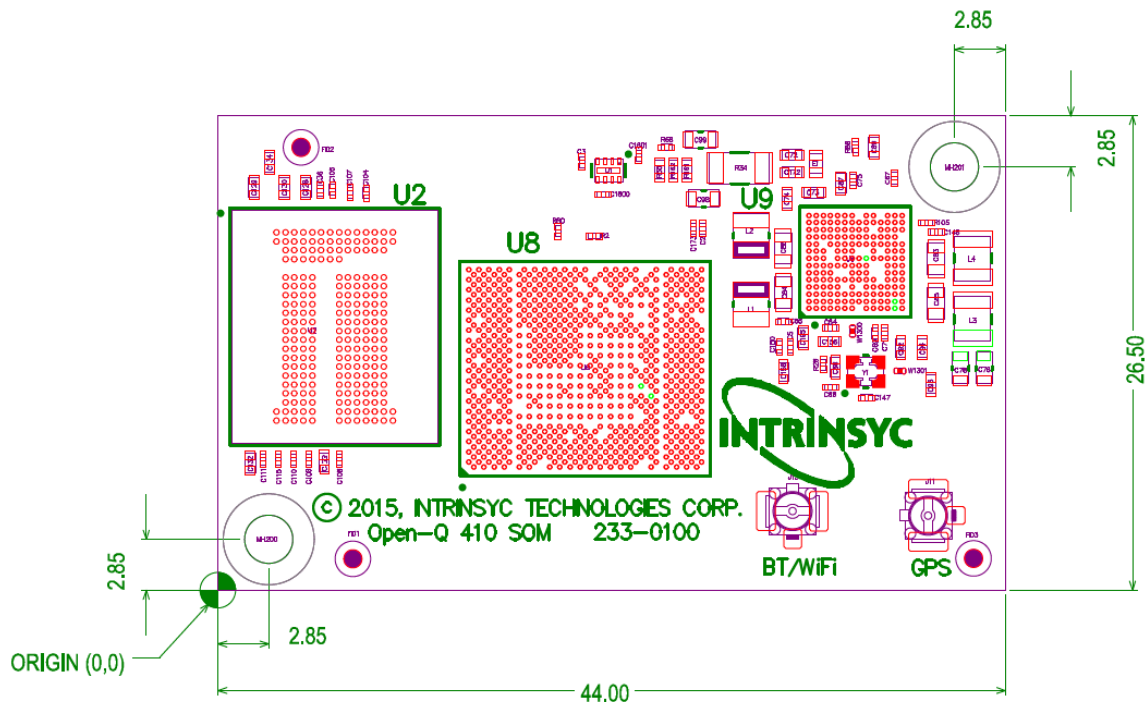


Figure 7 - SOM Mechanical Outline (mm)

6.2 Top and Bottom Height Restrictions

The tallest component on the topside of the SOM is the U.FL connector at 1.25 mm (nominal). Please note that when the mating coax cables are connected, the top side height will be higher.

The tallest component on the bottom-side of the SOM is the Wi-Fi/GPS shield can at 3mm (nominal).

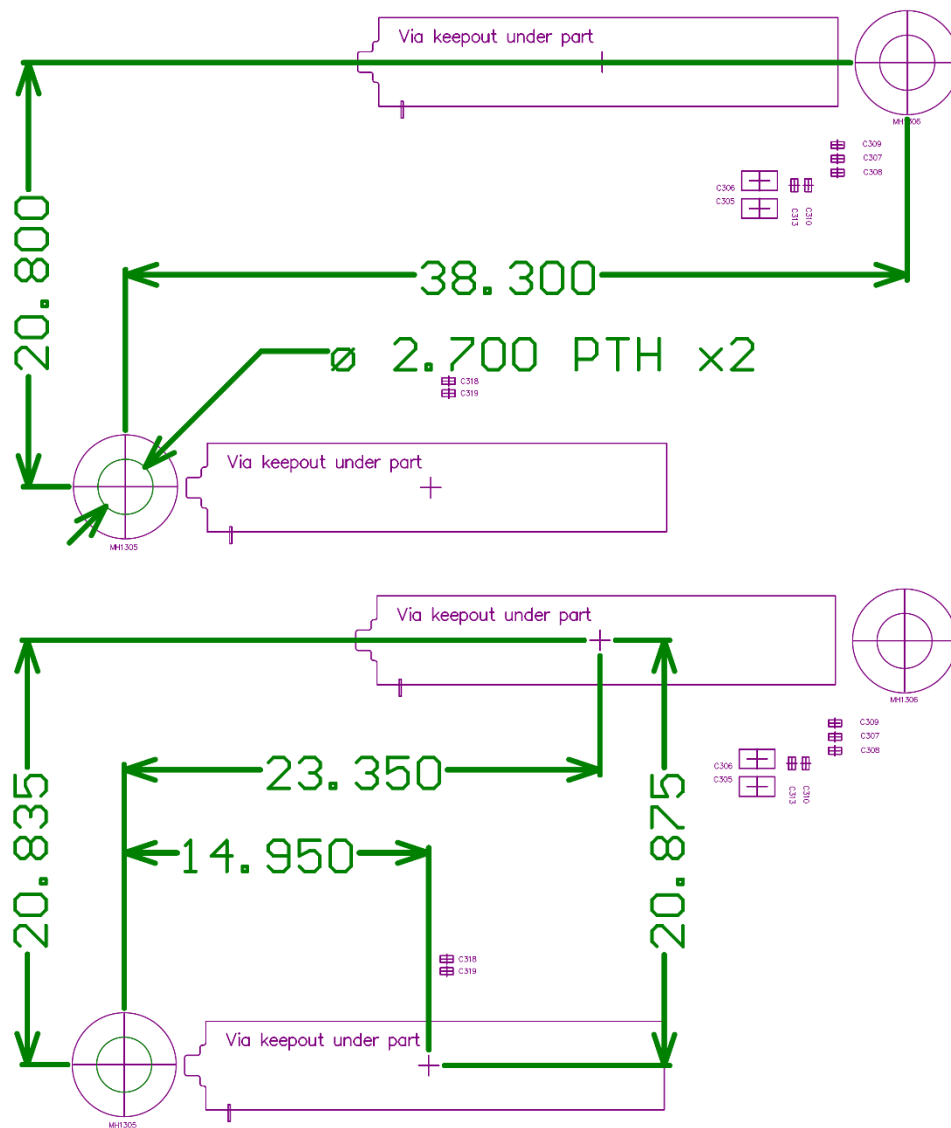
For 3D design files, please go to <http://tech.intrinsyc.com/>

6.3 Landing Pattern

The footprint information in this section can be used as a guide when designing a landing area for the SOM.

Dimensions show the relative position of each connector on the SOM; referenced to the center of the connector body and mounting holes. NOTE: This information is given for reference. Please see SOM Carrier Board Design Guide for more detail (Reference document R-2).

*The perspective of this figure is looking through the SOM from the top side.



The mating carrier board B2B Connectors are 2x, 100-pin, 0.4mm pitch, Samtec SS4 family. Using part number SS4-50-3.00-L-D-K, will give the minimum 4mm stack height between SOM and carrier.

Customers can use the following custom part number for a potential price reduction with Samtec or authorized distributors: **REF-195707-01**

The SOM has two mounting holes as shown above. If used, an M2.5, 4mm stand-off and screw assembly is required. **Please be aware that the centre of the mounting holes do not align with the centre of the connectors.** All dimensions are in mm.

6.4 Thermal Characteristics

The APQ8016 CPU has built in thermal protections which will reduce processor frequency as the die temperature approaches set operating limits. These limits protect the processor from damage that could be caused by elevated die temperature. Additional product-level thermal management will remove heat from the SOM and its components, allowing the processor to run at higher frequencies for longer time periods before approaching the built-in die temperature limits. This enables the average processor speed to remain higher through processor-intensive applications. Effectively removing heat from the Open-Q 410 SOM is required to optimize system performance and efficiency and to ensure that the APQ8016 CPU processor can perform as desired.

6.5 Weight

The SOM weighs approximately 6 grams.

7. Product Marking, Ordering, and Shipping Info

7.1 Product Marking

The SOM part number and product marking can be identified on the white label on the top of the module. The figure and table below show a label example which includes Lantronix, the product name (placeholder shown), and QR code.



Figure 9 – Open-Q 410 SOM Label (top of PCB)

Table 8 – Open-Q 410 SOM Label Marking Details

Marking	Description/ Notes
Open-Q 410 SOM	Lantronix product name
QR code *	Embeds serial number and Wi-Fi MAC address. The serial number ** format is VVV-WXXX-YYYYYY-ZZZZ - VVV = Product number - W = SKU variant. For the Open-Q 410: - o 0: QC-DB-H00004, QC-DL-H00004 - o A: QC-DL-H00004B - o B: QC-DB-H00004C, QC-DL-H00004C - o C: QC-DB-H00004A - XXX = Part number revision - o Example: A11. Alpha (A) represents a software change and numeric (11) represents a hardware change. - YYYYYY = Date of manufacture (mm/dd/yy) - ZZZZ = Unique serial number for PCB The MAC address format is 0123456789AB - 12 hexadecimal digit MAC address

Marking	Description/ Notes
	* QR code reader mobile app (e.g. Neo Reader) can be used to read embedded serial number and the MAC address.
	** Older serial number format (differences shown in bold) is: VVV- WWXX -YYYYYY-ZZZZZ
	- VVV = Product number
	- WW = PCB revision number
	- XX = BOM revision number
	- YYYYYY = Date of manufacture (mm/dd/yy)
	- ZZZZZ = Unique serial number for PCB

7.2 Product Ordering Information

The Open-Q 410 SOM can be ordered for evaluation and prototype use from Lantronix. For volume production orders or for custom requirements please contact sales at <http://www.lantronix.com/about-us/contact/>.

Table 9 – Product Ordering

Description	SKU	NCNR	MOQ
Open-Q 410 SOM std memory (16GB eMMC + 8Gb DDR)	QC-DB-H00004	No	1
Open-Q 410 SOM std memory (16GB eMMC + 8Gb DDR), no GPS	QC-DB-H00004A	Yes	100

7.3 Packaging and Shipping Information

The Open-Q 410 SOM is packaged individually in small anti-static bags and bubble-wrap bags for protection during shipping – see Figure 10 below. They are then put into different sized boxes depending upon the quantity of the order. Small quantities are shipped in standard courier boxes with bubble-wrap protection and large quantity orders are packaged in a carton with dividers, as shown in Figure 11, below.



Figure 10 - Individual SOM Packaging



Figure 11 - Packaging for Large Quantity Shipments

8. Handling Precautions

8.1 ESD Precautions

Electrostatic discharge (ESD) occurs naturally in laboratory and factory environments. An established high-voltage potential is always at risk of discharging to a lower potential. If this discharge path is through a semiconductor device, destructive damage may result.

The Open-Q 410 SOM is designed as a component meant to be integrated into a final product and therefore has no additional ESD protection built-in. It should be handled only in a static-safe environment to prevent damage.

8.2 SOM – Carrier Board Mating Cautions

Caution must be taken when connecting or disconnecting the SOM to a carrier board to prevent damage. Ensure that the SOM is inserted and removed straight up and down to prevent any sideways force on the connectors which could damage them.

8.3 Storage Conditions

The SOM must be stored in an antistatic bag.

Recommended Storage Conditions	
Temperature	-40 -> +85 °C
Humidity (non-condensing, relative)	5% -> 85 %

9. Certification

9.1 Radio Certification

The Open-Q 410 SOM has received the following Wi-Fi modular regulatory certifications.

Country/Organization	Certification Number
USA/FCC	2AFDI-ITCOQ410S
CANADA/IC	9049A-ITCOQ410S
Japan/MIC	005-101866

The Open-Q 410 SOM passed certification using antennas of specific type and gain. If the user chooses a different antenna type or an antenna with higher gain, the Wi-Fi/BT module regulatory certification may not be re-usable and re-certification may be necessary.

In addition, changing firmware, drivers or board configuration files may result in a Class II permissive change to recertify the module.

For these reasons, it is recommended to refer to the Wi-Fi/BT certification documents (see R-4) for information regarding the test configurations used for certification. Deviating from the documented configuration may trigger the need for re-certification.

9.2 ROHS/REACH Compliance

The Lantronix Open-Q 410 SOM complies with the ROHS/REACH standard.



CERTIFICATE OF CONFORMITY

COC NO: HT-ITC-0001

Unit 9-11, 7/F., Technology Park No.18 On Lai Street, Shatin, New Territories, Hong Kong

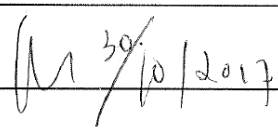
TEL: (752) 537 8000

FAX: (752) 537 8199

Doc Issued Date (yyyy.mm.dd): 2017.10.19

Product Name	8016
Customer Part Number	030-0193-0100
Model Description	APQ8016 OPEN 8016
Honor Tone Part Number	660-8016001-00R1
Manufacture location	People Republic of China
Products specification	Function according customer test spec
ROHS compatible	The components and materials can meet ROHS.
REACH compatible	The components and materials can meet REACH 173.

We hereby confirm that all delivered units have been manufactured according to the approved drawings, inspected and conform to the above specification, and are passed functional tester (FT) before shipment.

Quality Manager	Honor Tone Limited
Signed On Behalf of Honor Tone Limited	 30/10/2017