Data Sheet and Hardware Reference

Hologram Nova Global IoT Cellular USB Modem V1.4



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Hologram

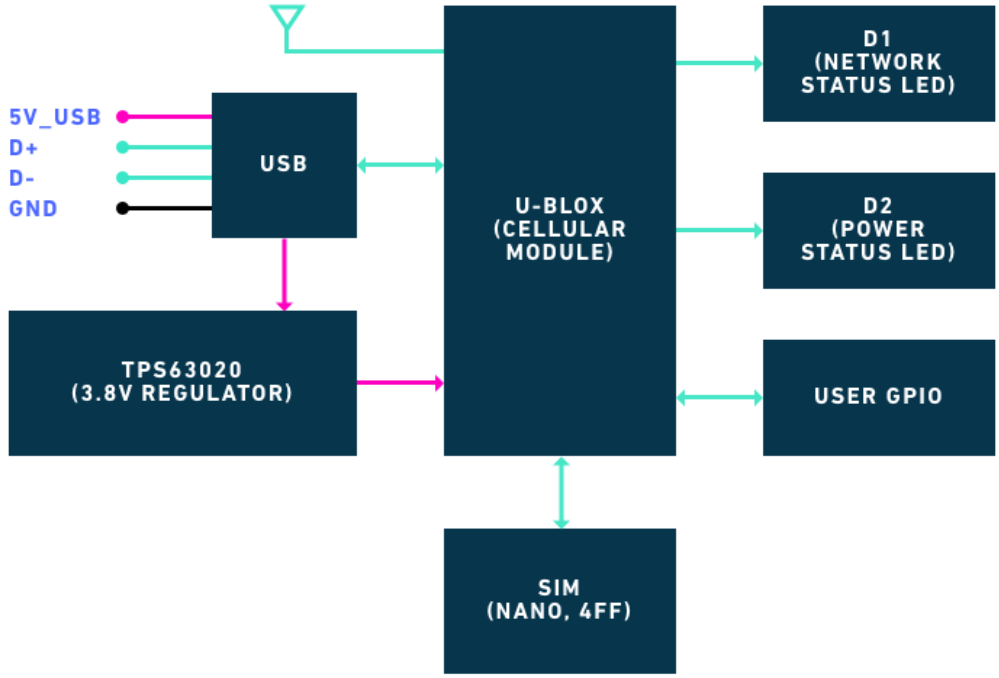
Nova Data Sheet and Hardware Reference

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System Block Diagrams

Block diagram of the Nova board:



Input/Output Characteristics

USB

The Hologram Nova is designed to provide easy access to the u-blox SARA-U201 and SARA-R410-02B USB interface.

SARA series modules include a high-speed USB 2.0 compliant interface with maximum 480 Mb/s data rate. The module itself acts as a USB device and can be connected to any USB host. The USB is the suitable interface for transferring high speed data between SARA-U2 series and a host processor, available for AT commands.

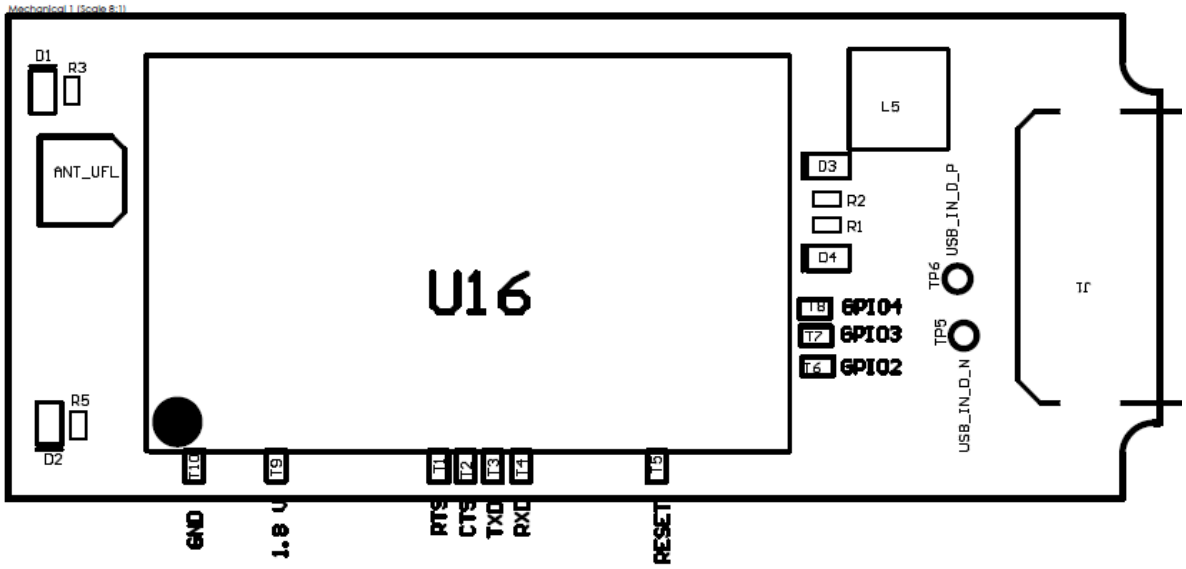
The USB_D+ / USB_D- lines carry the USB serial data and signaling. The USB interface is automatically enabled by an external valid USB VBUS supply voltage (5.0 V typical) applied on the VUSB_DET pin.

For additional details, please see the following datasheets:
u-blox SARA-U201 datasheet
u-blox SARA-R4 Series datasheet

UART

At Hologram, we believe in providing an open platform for developers to build hardware. To support this mission, the Nova exposes the u-blox modem's UART interface as solderable pads on the top half of the board. For more advanced hardware devlopment, this provides direct access to the u-blox modem which runs at 1.8V

Note: USE UART PADS AT YOUR OWN RISK. Pads are directly connected to the u-blox modem so using these I/O or improperly handling the board runs the risk of damaging the u-blox modem. Additionally, we do not officially provide support this interface.



Technical Specifications

Absolute Maximum Ratings (Power Inputs)

Stressing the device above one or more of the ratings listed in the Absolute Maximum Rating section may cause permanent damage. These are stress ratings only. Operating the device at these or at any conditions other than those specified in the Operating Conditions should be avoided. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

Symbol	Description	Min.	Max.	Unit
VCC, USB 5V	Input DC voltage at VCC pins	-0.30	5.50	V
USB D+/D- line	Input DC voltage at USB_D+/D- pins	-1.00	5.35	V
UBLOX_RTS UBLOX_CTS UBLOX_TXD UBLOX_RXD	Input DC voltage at u-blox digital interface pins	-0.30	3.60	V
UBLOX_RESET_N	Input DC voltage at u-blox RESET_N pin	-0.15	2.10	V
GPIO2 GPIO3 GPIO4	Input DC voltage at u-blox GPIO pins	-0.30	3.60	V

For power draw characteristics under certain cellular conditions, please view respective u-blox datasheets.

Operating Conditions

The Hologram Nova is designed to operate within temperatures between -45°C to 85°C. It is not designed to withstand material contact with moisture or any other conductors, aside from intended use of the USB. The Hologram Nova may be installed into appropriate enclosures that can protect the device from heat, cold, moisture, and humidity for Industrial use.

If handling the Nova circuit board directly, please do so in an ESD-safe environment and wear ESD protection.

Radio Specifications

The Hologram Nova platform features cellular modems which support a global list of 2G, 3G, and LTE Cat-M1/NB-IoT frequencies.

Nova 3G/2G (SARA-U201)

- 3G Bands:
  - Americas: Band 5 (850MHz), Band 2 (1900MHz)
  - Europe/Asia/Africa: Band 8 (900MHz), Band 1 (2100MHz)
- 2G Bands
  - GSM - 850MHz
  - E-GSM - 900MHz
  - DCS - 1800 MHz
  - PCS - 1900 MHz

Nova LTE-M & NB-IoT (SARA-R410M-02B)

- LTE Cat-M1/N1 Bands:
  - LTE FDD: 1, 2, 3, 4, 5, 8, 12, 13, 17, 18, 19, 20, 25, 26, 28

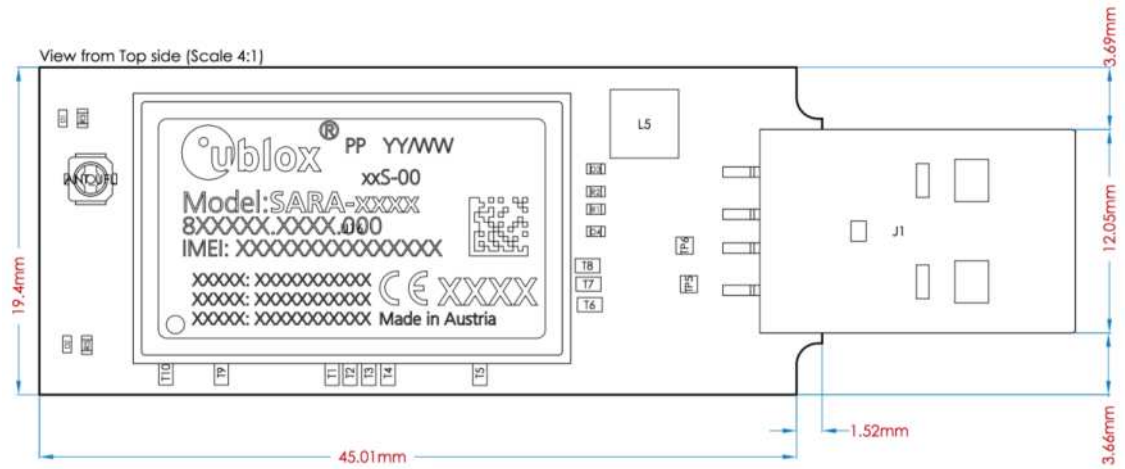
Mechanical Dimensions

The Hologram Nova board without an enclosure is:

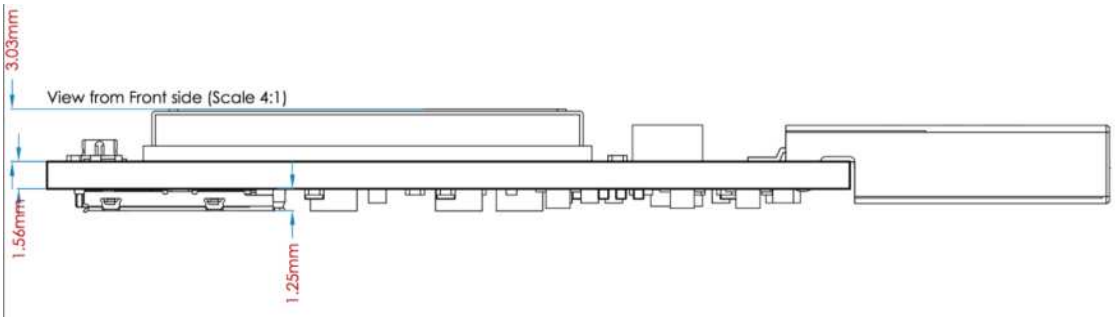
- Length: 61.58 millimeters
- Width: 19.4 millimeters
- Height: 5.84 millimeters (maximum height)

Below are views of the Hologram from the top and side.

Top View:



Side View:



LEDs

The Nova has two clear LEDs for providing power and connectivity feedback. A power LED that represents whether the modem is on or off, and a network LED that indicates the current network status.

Note: Nova LTE-M & NB-IoT modem and Nova 3G/2G modem have same placement of LED color indicators but opposite use for power/network indication. Please use below table for reference.

MODEL	POWER LED	NETWORK LED
Nova 3G/2G	Red	Blue
Nova LTE-M & NB-IoT	Blue	Red

- Power LED status indicator (Red – 3G/2G, Blue – LTE-M & NB-IoT)
  - On: USB 5V is connected and the Nova is powered on
  - Off: USB 5V is not connected and the Nova is not powered on (modem may take up to 30s to boot up and power the LED)
- Network LED status indicator (Blue – 3G/2G, Red – LTE-M & NB-IoT)
  - On, solid: Nova connected in active data session
  - On, rapid blink: 3G network detected (3G/2G Nova Only)
  - On, double blink: 2G network detected (3G/2G Nova Only)
  - Off: No network detected
    - Make sure antenna is securely connected, positioned to receive cell signal and SIM properly inserted
    - Device can take up to 200s to detect available networks

Antennas

The Nova is made for ultimate flexibility and this extends to available antennas. Each model's included antenna characteristics are listed below:

Nova 3G/2G (SARA-U201)

- Black, flexible antenna (Sinbon A9702472)
  - Size: 37x7x1mm
  - Weight: <1g
  - Connector: U.FL
  - Mounting: Adhesive 3M tape
  - Temperature: -40C - +85C

Nova LTE-M & NB-IoT (SARA-R410)

- Black, flexible antenna (Pulse PN W3907B0100)
  - Size: 111.70x20.4x1mm
  - Weight: <1g
  - Connector: U.FL
  - Mounting: Adhesive 3M tape
  - Temperature: -40C - +85C

The Nova can also be used with additional antennas. If you'd like to use the Nova with an antenna which has an SMA connector, you need to purchase a UFL - SMA adapter.

Bill of Materials

DESIGNATOR	QUANTITY	MFG	MPN
ANT_UFL	1	Amphenol	A-1JB
C2, C6, C48	3	MURATA	GRM155R61C104KA88D
C11	1	SAMSUNG	CL10A225MQ8NNNC
C39	1	MURATA	GRM155R71C103KA01D
C34	1	Murata	GRM188R60J106ME84D
C46	1	AVX/ELCO	04025A150JAT2A
C36, C37, C38	3	MURATA	GRM188R60J226MEA0D
C41, C42, C43, C44, C45 (U201 Nova Only)	5	AVX	04025A470JAT2A
C40	1	KEMET	C0402C560J5GACTU
C47, C49, C50	3	AVX	F950J337MBAAQ2
L7	1	Murata	BLM18KG121TN1D
L5	1	Coilcraft	XFL4020-102MEC
D1	1	VISHAY	VLMB1500-GS08
D2	1	VISHAY	VLMS1500-GS08
D3, D4, D5	3	Littlefuse	PESD0402-140

DESIGNATOR	QUANTITY	MFG	MPN
L1	1	YAEGO	RC0603JR-070RL
R13	1	YAEGO	RC0402FR-071ML
R3, R5	2	YAEGO	RC0402FR-073KL
R4, R6, R7, R8	4	YAEGO	RC0402JR-0710KL
R1, R2	2	YAEGO	RC0402FR-0722RL
R11, R51	2	PANASONIC	ERJ-2GEJ104X
R12	1	YAEGO	RC0402FR-07150KL
R9	1	PANASONIC	ERJ-2GEJ471X
U16	1	U-BLOX	SARA-U260-00S
SIM1	1	GLOBAL CONNECTOR TECHNOLOGY	SIM8050-6-0-14-01-A
U2	1	TI	TPS63020DSJ
Q1, Q2, Q3, Q4	4	ON Semiconductor	MMBT3904LT1G
J1	1	MOLEX	480372200

Regulatory information

Carrier Specific Certifications

NOVA-U201 (3G/2G): AT&T, T-Mobile, PTCRB, GCF
NOVA-R410 (LTE-M & NB-IoT): Verizon ODI, AT&T, T-Mobile (In progress), PTCRB, GCF

Verizon Open Development Device #7721
AT&T Network Compatibility Record: 10bkv4QCDm

Export Control Classification Number (ECCN)

ECCNs are five character alpha-numeric designations used on the Commerce Control List (CCL) to identify dual-use items for export control purposes. An ECCN categorizes items based on the nature of the product, i.e. type of commodity, software, or technology and its respective technical parameters.

ECCN for All Nova Modems: 5A992.c

RoHS Compliance

The Nova modem family complies with the RoHS (Restriction of Hazardous Substances) directive of the European Union, EU Directive 2011/65/EU.

Harmonized Tariff Schedule Code (HTS)

HTS Code for All Nova Modems: 8517.62.0010

Interference Statement

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standards. Operation is subject to the following two conditions: (1) This device may not cause harmful interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC & IC Compliance

If the modem's antenna is located farther than 20cm from the human body and there are no proximate transmitters, the FCC/IC approvals of the constituent u-blox SARA-U201 or SARA-R410-02B can be reused by the end product.

Should the modems antenna be mounted closer than 20cm from the human body or if there are proximate transmitters, additional FCC/IC testing may be required for the end product.

Nova 3G/2G & Nova LTE-M & NB-IoT modems make use of the underlying u-blox module's FCC & IC identification numbers below.

MODEL	FCC ID	IC ID (CERTIFICATION NUMBER)
Nova 3G/2G	XPY1CGM5NNN	8595A-1CGM5NNN
Nova LTE-M & NB-IoT	XPY2AGQN4NNN	8595A-2AGQN4NNN

Additionally, all Nova modems are compliant with FCC Part 15 Class B

Modification Statement

Hologram has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authorization to operate the equipment.

End Product Labeling Requirements

End products utilizing Nova 3G/2G modems should be labeled with the following information:

> Device Uses Approved Radio: NOVA-U201
>
> Contains FCC ID: XPY2AGQN4NNN
> Contains IC: 8595A-1CGM5NNN
>
> This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standards. Operation is subject to the following two conditions: (1) This device may not cause harmful interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation.

End products utilizing Nova LTE-M &NB-IoT modems should be labeled with the following information:

> Device Uses Approved Radio: NOVA-R410
>
> Contains FCC ID: XPY2AGQN4NNN
> Contains IC: 8595A-2AGQN4NNN
>
> This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standards. Operation is subject to the following two conditions: (1) This device may not cause harmful interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation.