

# Data Sheet and Hardware Reference



## Hologram Nova Global 2G/3G Cellular USB Modem V1.0

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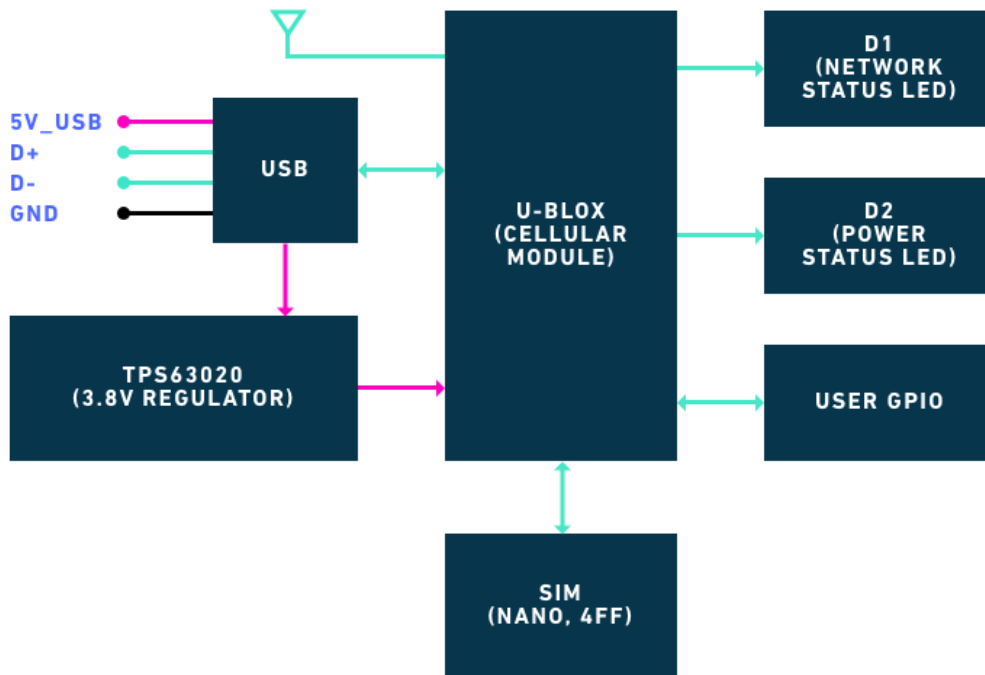
# Nova Data Sheet and Hardware Reference

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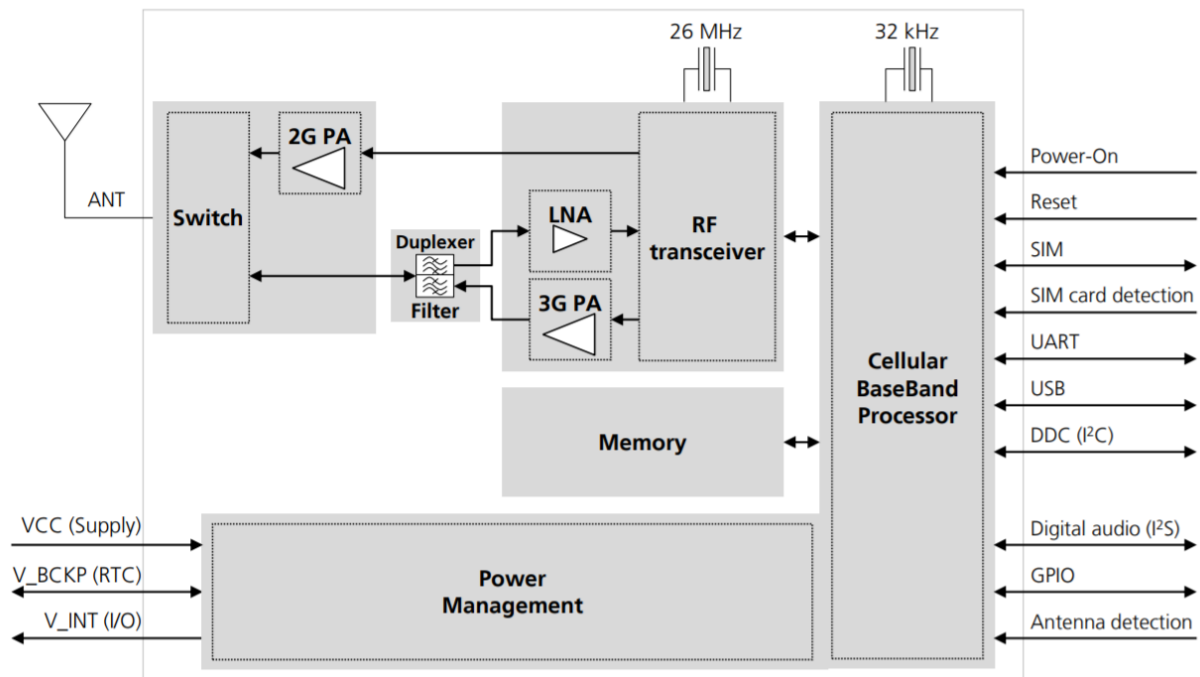
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## System Block Diagrams

Block diagram of the Nova board:



Below is the block diagram for the u-blox SARA-U201 module.



## Input/Output Characteristics

### *USB*

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

SARA-U2 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.

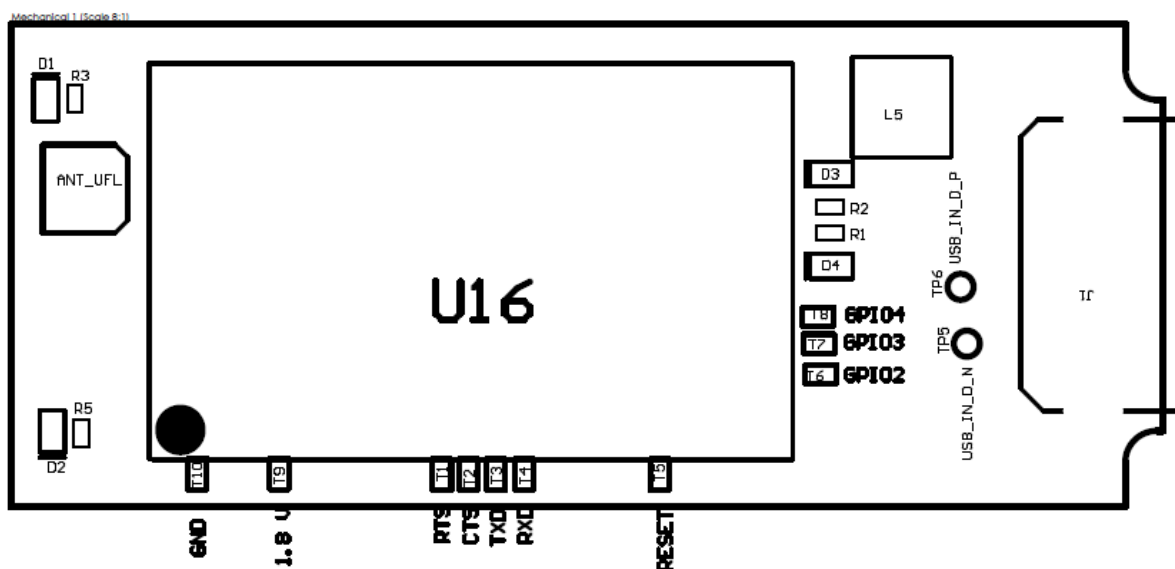
The USB\_D+ / USB\_D- lines carry the USB serial data and signaling. The USB interface is automatically enabled by an external valid USB VBUS supply voltage (5.0 V typical) applied on the VUSB\_DET pin.

For additional details, please see the [u-blox SARA-U201 datasheet](#).

## UART

At Hologram, we believe in your ability to hack your own hardware. True to form we went ahead and exposed the u-blox modem's UART interface as pads available to solder to on the top half of the board. For the ambitious hardware hacker, this will give you direct access to the u-blox modem (and all the associated glory with getting this interface up and running).

Note: USE UART PADS AT YOUR OWN RISK. They 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

### *Operating Conditions*

The Hologram Nova 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.

When handling the product in the field, please place the Nova in an enclosure to reduce chance of ESD shock to the board.

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

## *Radio Specifications*

The Hologram Nova features the SARA-U201, a modem which supports a global list of 2G and 3G frequencies.

- 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

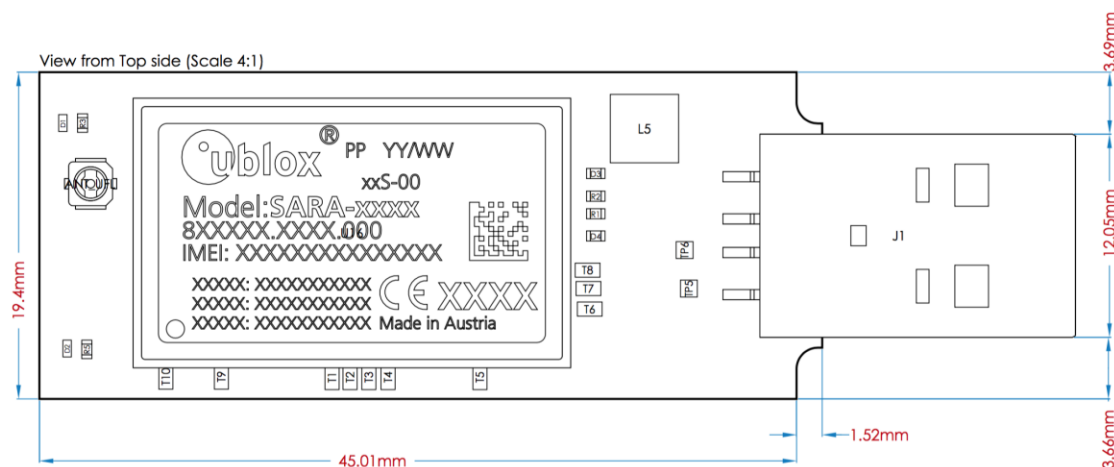
## Mechanical Dimensions

The Hologram Nova board without an enclosure is:

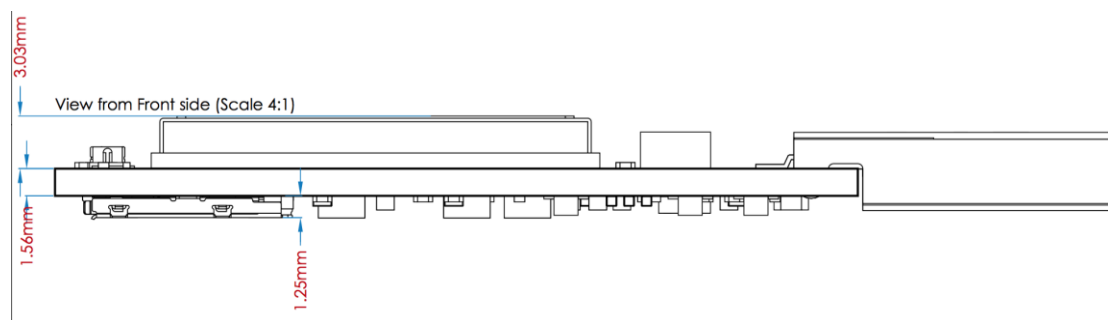
- Length: 61.58 millimeters
- Width: 19.4 millimeters
- Height: 5.84 millimeters (from the top of the u-blox module to the bottom of the SIM card holder)

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

Top View:

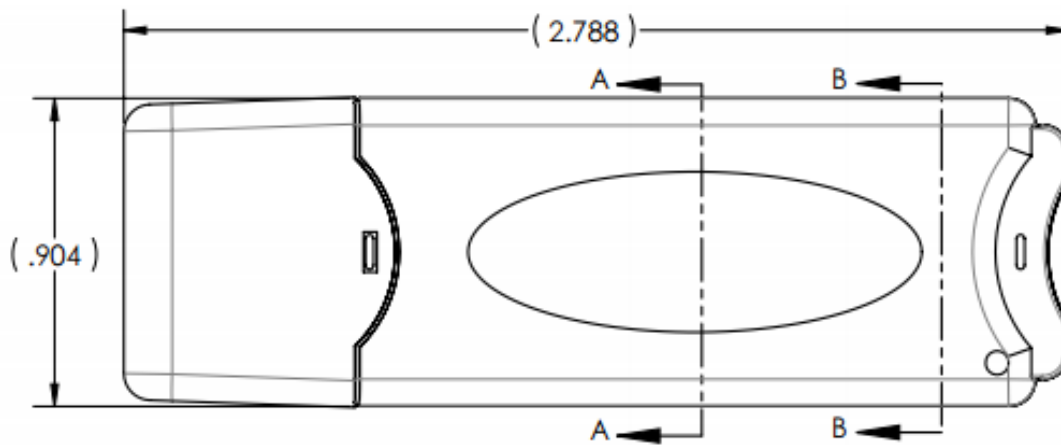


Side View:





The dimensions of the default enclosure included in an individual Nova box are 22.86 mm x 70.87 mm x 8.89 mm.



## LEDs

The Nova has two clear LEDs for providing feedback around what's going on inside the modem. A red LED that represents whether the modem is on or off, and a red LED that indicates the current network status.

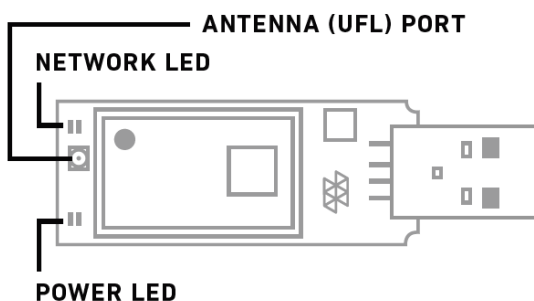
### POWER LED (RED)

**OFF** The modem is currently booting up, may take approximately 20s

**OR**

There is no power being supplied to the modem. Make sure your modem is plugged in to a valid USB host device

**ON** The modem is powered on and has booted up



### NETWORK LED (BLUE)

**OFF** No network detected. Make sure the antenna is securely connected and the SIM is fully inserted

It may take up to 200s for a network to be detected

If no networks are detected, the network status indicator LED will remain off

Make sure your antenna is positioned in the most open and advantageous way possible to receive cell signal in your area

**DOUBLE BLINK** 2G network detected

**RAPID BLINK** 3G network detected

**SOLID** Modem has active data session

The text content of the above diagram is listed below:

- Red: Power status indicator
  - On: USB 5V is connected and the u-blox is powered on
  - Off: USB 5V is not connected and the u-blox is not powered on
- Blue: Network status indicator
  - On, solid: Modem connected to a network
  - On, rapid blink: 3G network detected
  - On, double blink: 2G network detected
  - Off: No network detected

## ***Antennas***

The Nova is made for ultimate flexibility and this extends to the antenna. The stock, smaller gold antenna, which is designed to fit inside the provided enclosure, has the following characteristics:

- Size: 37x7x1mm
- Weight: <1g
- Connector: U.FL
- Mounting: Adhesive 3M tape
- Temperature: -40C - +85C
- VSWR <1.5 on all transmit and receive bands

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	Description	Footprint	Comment	MFG	MPN
ANT_UFL	1	Quad Band Antenna	UFL	ANT-A-1JB	Amphenol	A-1JB
C2, C6, C48	3	CAPACITOR, American symbol	CAPO402	0.1 uF	MURATA	GRM155R61C104KA88D
C11	1	Ceramic Capacitor SMD	CAPO603	2.2 uF	SAMSUNG	CL10A225MQ8NNNC
C39	1	CAPACITOR, American symbol	CAPO402	10 nF	MURATA	GRM155R71C103KA01D
C34	1	Ceramic Capacitor SMD	CAPO603	10 uF	Murata	GRM188R60J106ME84D
C46	1	CAPACITOR, American symbol	CAPO402	15 pF	AVX/ELCO	04025A150JAT2A
C36, C37, C38	3	Ceramic Capacitor SMD	CAPO603	22 uF	MURATA	GRM188R60J226ME40D
C41, C42, C43, C44, C45	5	CAPACITOR, American symbol	CAPO402	47 pF	AVX	04025A470JAT2A
C40	1	CAPACITOR, American symbol	CAPO402	56 pF	KEMET	C0402C560J5GACTU
C47, C49, C50	3	Capacitor	CAP1210POL	330uF	AVX	F950J337MBAAQ2
L7	1		RES0603	FerriteBead 120ohm, 3A	Murata	BLM18KG121TN1D
L5	1		COILCRAFT_XFL4020	1uH	Coilcraft	XFL4020-102MEC
D1	1	LED, Vishay Blue 0402	LED_0402_VISHAY_VLMB	LED_0402_VLMB	VISHAY	VLMB1500-GS08
D2	1	LED, Vishay Red 0402	LED_0402_VISHAY_VLMS	LED_0402_VLMS	VISHAY	VLMS1500-GS08
D3, D4, D5	3	DIODE,ZENER VOLTAGE SUPPRESSOR,+/-14V	PESD_0402		Littlefuse	PESD0402-140
L1	1	Resistor, 0 ohm, 0603 case	RES0603	0 ohm	YAEGO	RC0603JR-070RL
R13	1	Resistor, 1M ohm, 0402 case, 1%	RES0402	1M	YAEGO	RC0402FR-071ML
R3, R5	2	Resistor, 3K ohm, 0402 case, 1%	RES0402	3k	YAEGO	RC0402FR-073KL
R4, R6, R7, R8	4	Resistor, 10k ohm, 0402	RES0402	10K	YAEGO	RC0402JR-0710KL
R1, R2	2	Resistor, 22 ohm, 0402 case, 1%	RES0402		22 YAEGO	RC0402FR-0722RL
R11, R51	2	Resistor, 100k ohm, 0402	RES0402	100K	PANASONIC	ERJ-2GEJ104X
R12	1	Res, 150k ohm, 0402 case, 1%	RES0402	150k	YAEGO	RC0402FR-07150KL
R9	1	Resistor, 470 ohm, 0402 case, 1%	RES0402		470 PANASONIC	ERJ-2GEJ471X
U16	1	u-blox Modem	SARA	SARA-U201	u-blox	SARA-U260-00S
SIM1	1	SIM Card Slot	SIM_CARD_NANO	SIM_CARD_NANO	GLOBAL CONNECTOR TECHNOLOGY	SIM8050-6-0-14-01-A
U2	1	Regulator, Boost Buck, 3A	QFN-14-POWERPAD3X4DSJ	TPS63020	TI	TPS63020DSJ
Q1, Q2, Q3, Q4	4	TSTR,NPN 3904, SOT23	SOT23		ON Semiconductor	MMBT3904LT1G
J1	1	Connector, USB A, Plug, 0480372200	USB_A_PLUG_MOLEX_0480372200 - clipped_copper	USB_A_PLUG_MOLEX_0480372200	MOLEX	480372200