

## Features

- **STM32H747XIH6** Microcontroller
  - Dual-core
    - 32-bit Arm® Cortex®-M7 core with double-precision FPU and L1 cache up to 480 MHz
    - 32-bit Arm® 32-bit Cortex®-M4 core with FPU up to 240 MHz
  - Full set of DSP instructions
  - Memory Protection Unit (MPU)
- **Murata® 1DX** Wi-Fi®/Bluetooth® Module
  - Wi-Fi® 802.11b/g/n 65 Mbps
  - Bluetooth® Low Energy (version 5.X via Cordio stack, version 4.2 via Arduino Stack)
  - Micro UFL connector for external antenna
- **Memory**
  - **STM32H747XI**
    - 2 MB Flash
    - 1 MB RAM
  - **AT25SF128A-MHB-T**
    - 16 MB NOR Flash
    - QSPI Interface
  - **AS4C4M16SA**
    - 8 MB SDRAM
- **I/O**
  - Digital I/O Pins: 76
  - Analog input pins: 12
  - PWM pins: 13
  - Analog output pins (DAC0/DAC1): 2
  - USB Host: USB 2.0 A
  - USB Peripheral: USB-C®
  - Logic level: 3.3V
  - VRTC: To power the RTC while the board is off
  - OFF pin: To turn off the board
- **Communication**
  - 4x UART
  - 3x I2C
  - 2x SPI
  - 1x CAN (an external transceiver is required)
- **Secure Element** ATECC608A-MAHDA-T Module



- **USB**

- **USB Host** USB 2.0 Type A

- Host

- **USB Peripheral** USB-C®

- Programming Port
    - HID

- **Connectors**

- Camera: 20 pin Arducam camera connector
  - Display: D1N, D0N, D1P, D0P, CKN, CKP, D68-D75
  - Audio jack: DAC0, DAC1, A7
  - JTAG connector

- **Power**

- Circuit operating voltage: 3.3V
  - Input voltage (VIN): 6-24V
  - DC Current per I/O Pin: 8 mA



### 3 Related Products

- Arduino Mega Proto Shield Rev3 (A000080)
- Arduino 4 Relays Shield (A000110)
- Arduino Motor Shield Rev3 (A000079)

## Rating

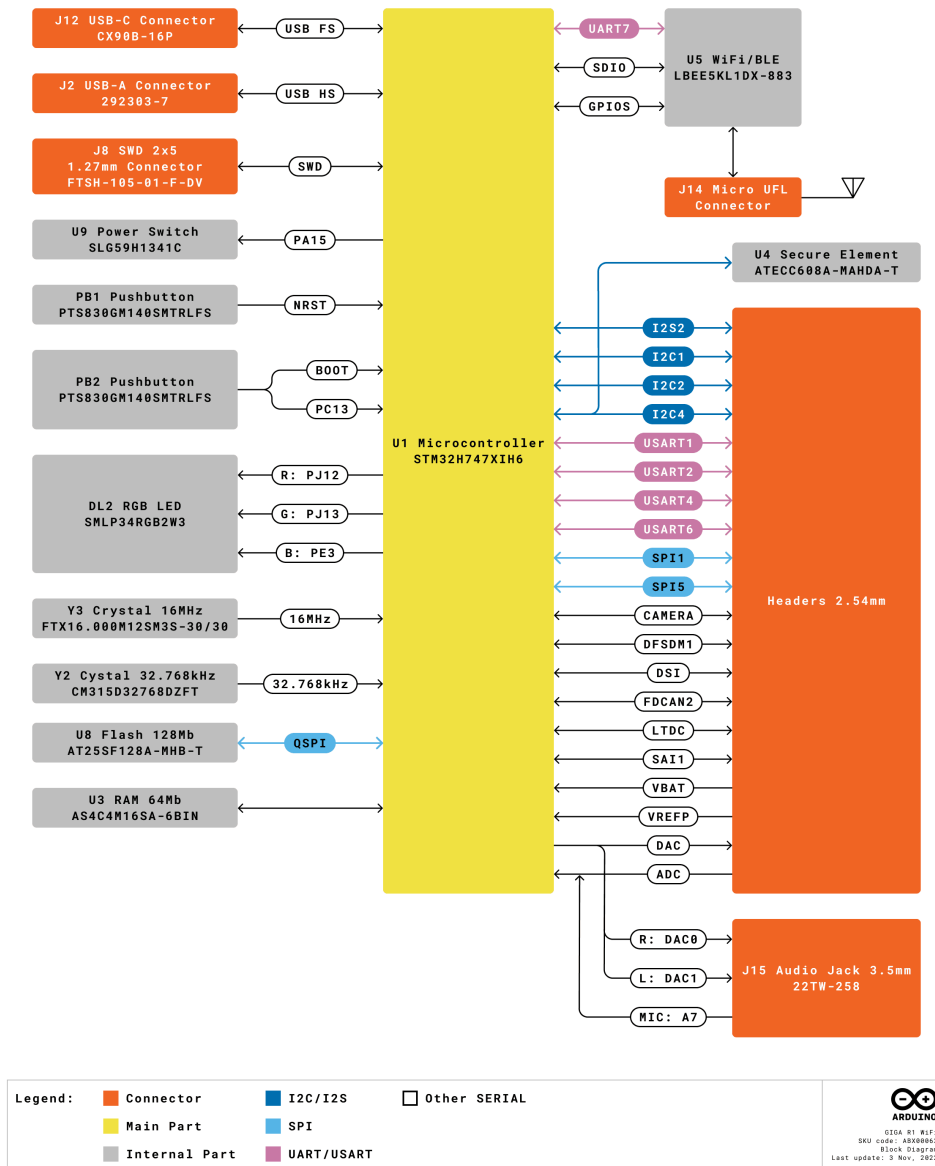
### 4 Recommended Operating Conditions

Symbol	Description	Min	Typ	Max	Unit
$V_{IN}$	Input voltage from VIN pad	6	7.0	32	V
$V_{USB}$	Input voltage from USB connector	4.8	5.0	5.5	V
$V_{DD}$	Input high-level voltage	$0.7 \cdot V_{DD}$		$V_{DD}$	V
$V_{IL}$	Input low-level voltage	0		$0.3 \cdot V_{DD}$	V
$T_{OP}$	Operating Temperature	-40	25	85	°C

**Note:**  $V_{DD}$  controls the logic level and is connected to the 3.3V power rail.  $V_{AREF}$  is for the analog logic.

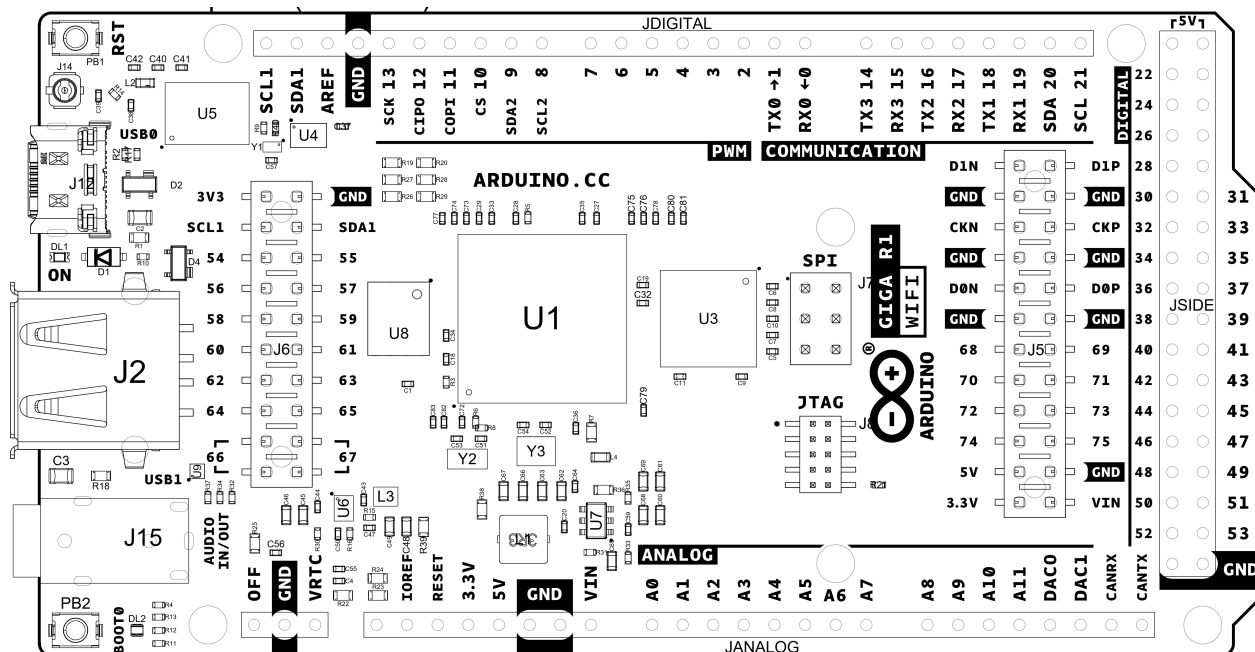
# Functional Overview

## 5 Block Diagram



Arduino GIGA R1 WiFi Block Diagram

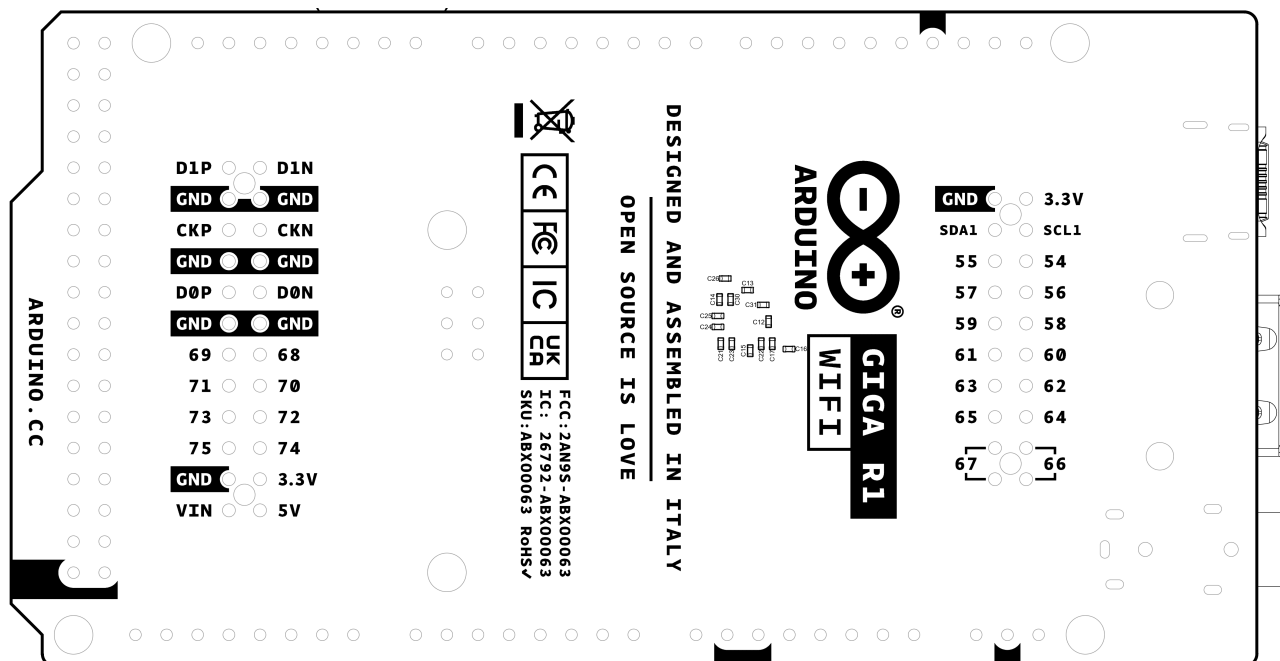
### 6.1 Front View



Top View of Arduino GIGA R1 WiFi

Ref.	Description	Ref.	Description
U1	STM32H7 Dual Core Microcontroller IC	U8	AT25SF128A-MHB-T 16 MB Flash IC
U3	AS4C4M16SA 8MB SDRAM IC	U4	ATECC608A-MAHDA-T Secure Element IC
U5	LBEE5KL1DX-883 Wi-Fi®/Bluetooth® Module	U6	MP2322GQH Buck Converter 3.3V IC
U7	MP2269GD-Z Buck Converter 5V IC	JANALOG	Analog input/output headers
JDIGITAL	Digital input/output headers	JSIDE	Digital input/output headers
SPI	SPI headers	JTAG	JTAG Headers
J2	USB 2.0 A Host	J15	3.5 mm audio in/out
PB1	RESET Button	PB2	BOOT0 button
J14	Micro UFL connector	J5	Camera
J6	Camera	DL1	Power LED
DL2	RGB SMLP34RGB2W3 Common anode LED	J12	CX90B-16P USB-C® connector

## 6.2 Back View



Back View of Arduino GIGA R1 WiFi

## 7 Processor

The GIGA R1 WiFi's main processor is the dual-core STM32H747 (U1) including a Arm® Cortex®-M7 running at 480 MHz and a Arm® Cortex®-M4 running at 240 MHz. The two cores communicate via a *Remote Procedure Call* mechanism that allows calling functions between each processor seamlessly.

## 8 Wi-Fi®/Bluetooth® Connectivity

The Murata® LBEE5KL1DX-883 wireless module (U5) simultaneously provides Wi-Fi® and Bluetooth® connectivity in an ultra-small package based on the Cypress CYW4343W. The IEEE802.11 b/g/n Wi-Fi® interface can be operated as an access point (AP), station (STA) or as a dual mode simultaneous AP/STA and supports a maximum transfer rate of 65 Mbps. Bluetooth® interface supports Bluetooth® Classic and Bluetooth® Low Energy. An integrated antenna circuitry switch allows a single external antenna (J14) to be shared between Wi-Fi® and Bluetooth®.

## 9 Onboard Memories

The GIGA R1 WiFi supplements the 2 MB Flash and 1 MB SRAM on the STM32H747 (U1) with 16 MB of NOR Flash with the AT25SF128A-MHB-T (U8) as well as 8 MB of SDRAM with the AS4C4M16SA (U3). U8 connects over a Quad-SPI interface to the main processor (U1). U3 operates at a frequency of 166 MHz.

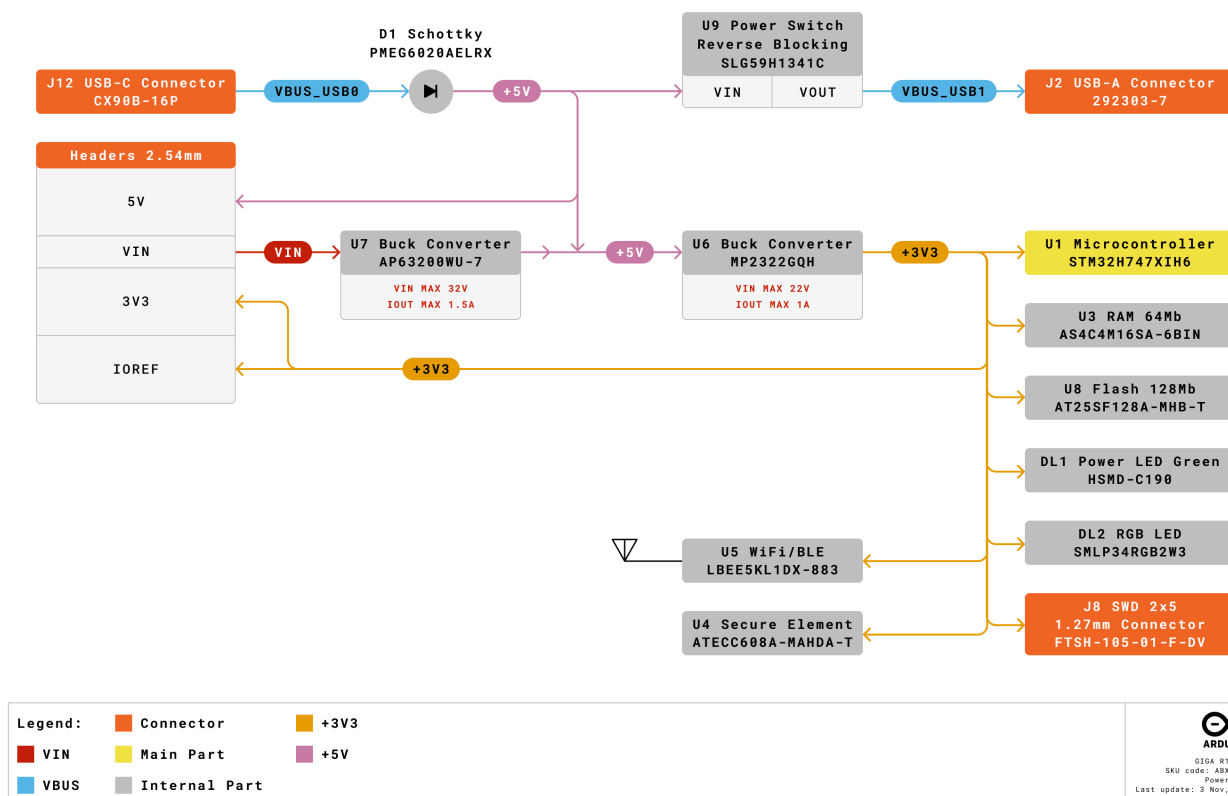
## 10 USB Connector

Two USB ports are provided on the GIGA R1 WiFi. One USB 2.0 type A (J2) and a USB-C® (J12). The USB 2.0 connector allows external devices to be connected as peripherals, while the USB-C® connector allows the GIGA board to be connected as a peripheral for other devices. Note that super speed pins on the USB-C® connector (J12) are unpopulated. A TVS diode array is placed on the VBUS of each connector (D4, D2) for ESD protection purposes.

## 11 Audio

The STM32H7 (U1) has two digital-to-analog converters (DAC) which drive the stereo audio output on the 3.5 mm jack connector (J15). Each DAC has a resolution of up to 12 bits. The right and left channels are also accessible via pins DAC0 and DAC1 respectively. A microphone input is also present on the jack connector (J15), which is shared with analog pin A7. The *Buffered mode* in the STM32H7 can allow for low-impedance output while *Sample and hold* functionality can help to reduce power consumption. Up to 10 mega samples per second are supported.

## 12 Power Tree



Arduino GIGA R1 WiFi Power Tree

Power can either be supplied via the VIN pins, or the 5V of the USB connectors (J2, J12). If power is supplied via VIN, the MP2269GD-Z (U7) buck converter steps the voltage down to 5V. The 5V power rail is then stepped down to 3.3V by the MP2322GQH (U6) buck converter. The logic level of components on the GIGA R1 WiFi is 3.3V.



## Mechanical Information

### 14 Pinout

#### 14.1 Three-Pins Header - J1

Pin	Function	Type	Description
1	OFF	Digital	3V3 Enable Pin (U6)
2	GND	Power	Ground
3	VRTC	Reset	Real Time Clock Battery

#### 14.2 Analog

Pin	Function	Type	Description
1	NC	NC	Not Connected
2	IOREF	IOREF	Reference for digital logic V - connected to 3.3V
3	Reset	Reset	Reset
4	+3V3	Power	+3V3 Power Rail
5	+5V	Power	+5V Power Rail
6	GND	Power	Ground
7	GND	Power	Ground
8	VIN	Power	Voltage Input
9	A0	Analog	Analog input 0 /GPIO
10	A1	Analog	Analog input 1 /GPIO
11	A2	Analog	Analog input 2 /GPIO
12	A3	Analog	Analog input 3 /GPIO
13	A4	Analog	Analog input 4 /GPIO
14	A5	Analog	Analog input 5 /GPIO
15	A6	Analog	Analog input 6 /GPIO
16	A7	Analog	Analog input 7 /GPIO
17	A8	Analog	Analog input 8 /GPIO
18	A9	Analog	Analog input 9 /GPIO
19	A10	Analog	Analog input 10 /GPIO
20	A11	Analog	Analog input 11 /GPIO
21	DAC0	Analog	Digital to Analog Converter 0
22	DAC1	Analog	Digital to Analog Converter 1
23	CANRX	Digital	CAN Bus Receive
24	CANTX	Digital	CAN Bus Transfer

### 14.3 Digital

Pin	Function	Type	Description
1	D21/SCL1	Digital	GPIO 21/I2C 1 Clock
2	D20/SDA1	Digital	GPIO 20/I2C 1 Dataline
3	AREF	Digital	Analog Reference Voltage
4	GND	Power	Ground
5	D13/SCK	Digital	GPIO 13/SPI Clock (PWM~)
6	D12/CIPO	Digital	GPIO 12/SPI Controller In Peripheral Out (PWM~)
7	D11/COPI	Digital	GPIO 11/SPI Controller Out Peripheral In (PWM~)
8	D10/CS	Digital	GPIO 10/SPI Chip Select (PWM~)
9	D9/SDA2	Digital	GPIO 9/I2C 2 Dataline (PWM~)
10	D8/SCL2	Digital	GPIO 8/I2C 2 Clockline (PWM~)
11	D7	Digital	GPIO 7 (PWM~)
12	D6	Digital	GPIO 6 (PWM~)
13	D5	Digital	GPIO 5 (PWM~)
14	D4	Digital	GPIO 4 (PWM~)
15	D3	Digital	GPIO 3 (PWM~)
16	D2	Digital	GPIO 2 (PWM~)
17	D1/TX0	Digital	GPIO 1 / Serial 0 Transmitter
18	D0/TX0	Digital	GPIO 0 / Serial 0 Receiver
19	D14/TX3	Digital	GPIO 14 / Serial 3 Transmitter
20	D15/RX3	Digital	GPIO 15 / Serial 3 Receiver
21	D16/TX2	Digital	GPIO 16 / Serial 2 Transmitter
22	D17/RX2	Digital	GPIO 17 / Serial 2 Receiver
23	D18/TX1	Digital	GPIO 18 / Serial 1 Transmitter
24	D19/RX1	Digital	GPIO 19 / Serial 1 Receiver
25	D20/SDA	Digital	GPIO 20 / I2C 0 Dataline
26	D21/SCL	Digital	GPIO 21 / I2C 0 Clock

#### 14.4 STM32 ICSP

Pin	Function	Type	Description
1	CIPO	Internal	Controller In Peripheral Out
2	+5V	Internal	Power Supply of 5V
3	SCK	Internal	Serial Clock
4	COPI	Internal	Controller Out Peripheral In
5	RESET	Internal	Reset
6	GND	Internal	Ground

#### 14.5 Digital Pins D22 - D53 LHS

Pin	Function	Type	Description
1	+5V	Power	+5V Power Rail
2	D22	Digital	GPIO 22
3	D24	Digital	GPIO 24
4	D26	Digital	GPIO 26
5	D28	Digital	GPIO 28
6	D30	Digital	GPIO 30
7	D32	Digital	GPIO 32
8	D34	Digital	GPIO 34
9	D36	Digital	GPIO 36
10	D38	Digital	GPIO 38
11	D40	Digital	GPIO 40
12	D42	Digital	GPIO 42
13	D44	Digital	GPIO 44
14	D46	Digital	GPIO 46
15	D48	Digital	GPIO 48
16	D50	Digital	GPIO 50
17	D52	Digital	GPIO 52
18	GND	Power	Ground



## 14.6 Digital Pins D22 - D53 RHS

Pin	Function	Type	Description
1	+5V	Power	+5V Power Rail
2	D23	Digital	GPIO 23
3	D25	Digital	GPIO 25
4	D27	Digital	GPIO 27
5	D29	Digital	GPIO 29
6	D31	Digital	GPIO 31
7	D33	Digital	GPIO 33
8	D35	Digital	GPIO 35
9	D37	Digital	GPIO 37
10	D39	Digital	GPIO 39
11	D41	Digital	GPIO 41
12	D43	Digital	GPIO 43
13	D45	Digital	GPIO 45
14	D47	Digital	GPIO 47
15	D49	Digital	GPIO 49
16	D51	Digital	GPIO 51
17	D53	Digital	GPIO 53
18	GND	Power	Ground