balenaFin

Document Type	Datasheet
Product ID:	BLNFN100001 (20173009)
Product Name	BalenaFin
Product Version	1.0.0
Document Version	1.0.1
Author	Carlo Maria Curinga
State (Draft/Proposed/Approved)	Approved

Revision history

Date (dd/mm/yyyy)	Version	Author	Description
24/05/2018	0.0.1	Carlo Maria Curinga	First draft
15/06/2018	0.0.2	Carlo Maria Curinga	First release
26/06/2018	0.0.3	Carlo Maria Curinga	Fixed voltage range in section 2
31/07/2018	0.0.4	Carlo Maria Curinga	Updated device mapping images
16/12/2018	0.0.5	Nicolas Tzovanis	Updated operating temperature range
16/12/2018	1.0.0	Nicolas Tzovanis	Public release
06/06/2019	1.0.1	Nicolas Tzovanis	Fixed HAT Header pinout for pin 13
26/06/2020	1.0.2	Alex Bucknall	Added Artik020 Port Reference
		Konstantinos	

01/04/2022	1.0.3	Mouzakis	Corrected coin cell battery type

1. Introduction

BalenaFin is a carrier board for the Raspberry Pi Compute Module 3 Lite produced by the Raspberry Pi Foundation. For more informations about the Raspberry Pi Compute Module 3 Lite please refer to the following links:

Datasheet:

https://www.raspberrypi.org/documentation/hardware/computemodule/datasheet.md (https://www.raspberrypi.org/documentation/hardware/computemodule/datasheet.md)

Schematics:

https://www.raspberrypi.org/documentation/hardware/computemodule/schematics.md (https://www.raspberrypi.org/documentation/hardware/computemodule/schematics.md)

2. Availability and Support

BalenaFin (current version or a compatible later revision) availability is guaranteed until at least to January 2023

3. BalenaFin images and mapping

Top	Bottom
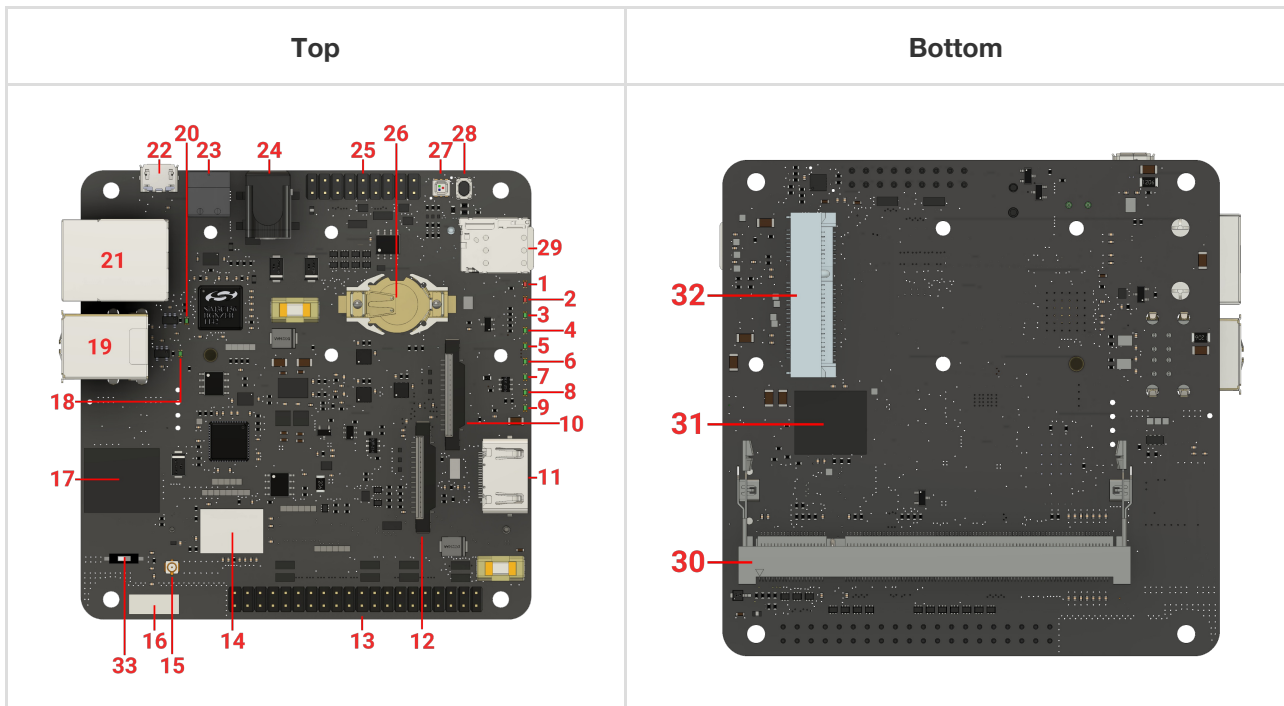
#	Name	Notes/Description
1	5V Status LED	Indicates 5V current flow.
2	3V3 Status LED	Indicates 3.3V current flow. This is the same as the red LED on the Raspberry Pi 3 Model B
3	ACT Status LED	CM3L Activity LED. This is the same as the green LED on the Raspberry Pi 3 Model B
4	SPD Status LED	Ethernet Speed LED. off when in 10-Mbps mode, on when in 100-Mbps mode
5	FDX Status LED	Ethernet Full-Duplex indicator
6	LNK Status LED	Ethernet Link/Activity LED.
7	PAN Status LED	If supported by the mPCIE (32) card connected, indicates PAN network activity
8	LAN Status LED	If supported by the mPCIE (32) card connected, indicates LAN network activity

9	WAN Status LED	If supported by the mPCIE (32) card connected, indicates WAN network activity
10	DSI connector	Standard full-size Raspberry Pi Display connector
11	HDMI	Full-size HDMI Type A with CEC support
12	CSI connector	Standard full-size Raspberry Pi Camera connector
13	HAT connector	40-pin Raspberry Pi HAT (Hardware Attached on Top) standard connector
14	WiFi/BT combo chip	802.11ac/a/b/g/n 2.4 & 5GHz WiFi + Bluetooth 4.2
15	WiFi/BT uFL antenna connector	If the RF switch is set on the external position, the antenna attached to this connector will become the main Radio antenna for the WiFi/BT combo chip (14)
16	WiFi/BT embedded antenna	Embedded high-performance SMD antenna covering both 2.4 and 5GHz frequencies. It is the default antenna selected for the WiFi/BT combo chip (14)
17	Co-processor	Artik020 MCU
18	USB1 ON Status LED	The green LED stays on as long as there is enough current flowing on the top USB port. When this LED is off, it means a fault or under-voltage is happening on the top USB port
19	USB	2 x USB Type-A
20	USB2 ON Status LED	The green LED stays on as long as there is enough current flowing on the bottom USB port. When this LED is off, it means a fault or under-voltage is happening on the bottom USB port
21	Ethernet	10/100 ethernet RJ45 connector
22	DBG - Programming port	micro-USB connector that allows to flash the eMMC from a host computer using balenaEtcher (balena.io/etcher) or usbboot. If the device is powered on while there is a cable connected to this port, it will enter a programming mode exposing its eMMC as mass-storage to a host computer (via balenaEtcher or usbboot)
23	Phoenix	2-POS Phoenix type connector for 6-24V input power. Negative polarity is denoted by '-' symbol on PCB silkscreen. This is an Industry standard

	power in	connector.
24	Barrel Jack power in	2.1 / 5.5 mm barrel jack type connector for 6-24V input power. Positive polarity (Positive tip, Negative sleeve) - Denoted by symbol on PCB silkscreen.
25	Co-Processor I/O connector	8 x GPIO / ADC, 1 x SPI, 1 x I2C, 1 x Debug UART
26	CR1225 RTC coin-cell battery socket	This allows the embedded RTC to keep track of time while the device is powered off.
27	RGB LED	
28	RESET push-button	When pressed (and released) DS1307 reboots the CM3L (30)
29	nano-SIM socket	This allows the use of a wide portfolio of cellular Modems via the mPCIE socket (32)
30	CM3L socket	SODIMM-200 socket for the Raspberry Pi Compute Module 3 Lite
31	eMMC	8/16/32/64 GB class 5.1 industrial eMMC - main storage for the CM3L (30). Positioned under the CM3L (30)
32	mPCIE	Mini PCI express socket
33	Antenna switch	2 position switch - when set to OFF, the WiFi/BT combo chip (14) uses the WiFi/BT embedded antenna (16). When set to ON, the WiFi/BT combo chip (14) uses the WiFi/BT uFL antenna connector (15)

3.1 HAT connector pinout

Pin #	Name	Notes/Description	Pin #	Name	Notes/Description
1	3V3	3.3V rail, shared with CM	2	5V	5V rail, from regulator
3	I2C1_SDA	Compute Module I2C1 Data	4	5V	5V rail, from regulator

5	I2C1_SCL	Compute Module I2C1 Clock	6	GND	Ground
7	GPIO4	Compute Module GPIO_4	8	GPIO14	Compute Module GPIO_14
9	GND	Ground	10	GPIO15	Compute Module GPIO_15
11	GPIO17	Compute Module GPIO_17	12	GPIO18	Compute Module GPIO_18
13	GPIO27	Compute Module GPIO_27	14	GND	Ground
15	GPIO22	Compute Module GPIO_22	16	GPIO23	Compute Module GPIO_23
17	3V3	3.3V rail, shared with CM	18	GPIO24	Compute Module GPIO_24
19	GPIO10	Compute Module GPIO_10	20	GND	Ground
21	GPIO9	Compute Module GPIO_9	22	GPIO25	Compute Module GPIO_25
23	GPIO11	Compute Module GPIO_11	24	GPIO8	Compute Module GPIO_8
25	GND	Ground	26	GPIO7	Compute Module GPIO_7
27	I2C0_SDA	Compute Module I2C0 Data	28	I2C0_SCL	Compute Module I2C0 Clock
29	GPIO5	Compute Module GPIO_5	30	GND	Ground
31	GPIO6	Compute Module GPIO_6	32	GPIO12	Compute Module GPIO_12
33	GPIO13	Compute Module GPIO_13	34	GND	Ground
35	GPIO19	Compute Module GPIO_19	36	GPIO16	Compute Module GPIO_16

37	GPIO26	Compute Module GPIO_26	38	GPIO20	Compute Module GPIO_20
39	GND	Ground	40	GPIO21	Compute Module GPIO_21

3.2 Artik020 connector pinout

Pin #	Name	Artik020	Notes
1	MCU_GPIO0	PD14	Co-processor GPIO_0
2	3V3	3V3	3.3V rail, from regulator
3	MCU_GPIO1	PA2	Co-processor GPIO_1
4	SPI_MCU_CS-CON_EXT	PB13	
5	MCU_GPIO2	PA3	Co-processor GPIO_2
6	SPI_MCU_CS-SCLK_EXT	PC8	
7	MCU_GPIO3	PA4	Co-processor GPIO_3
8	SPI_MCU_CS-MOSI_EXT	PC6	
9	MCU_GPIO4	PA5	Co-processor GPIO_4
10	SPI_MCU_CS-MISO_EXT	PC7	
11	MCU_GPIO5	PB11	Co-processor GPIO_5
12	DBG_uP-RX_DEV-TX_EXT	PA1	
13	MCU_GPIO6	PF6	Co-processor GPIO_6
14	DBG_uP-TX_DEV-RX_EXT	PA0	
15	MCU_GPIO7	PF7	Co-processor GPIO_7
16	MCU_GPIO8	PD15	Co-processor GPIO_8
17	GND	GND	Ground
18	MCU_GPIO9	PD13	Co-processor GPIO_9

3.2.1 Artik020 internal pinout

Name	Artik020	Notes
PW_ON_5V	PC9	5V Power Rail for the Compute Module
PW_ON_3V3	PF5	3V3 Power Rail for the Compute Module
SW_I2C_SDA_ON	PC10	Internal I2C1 SDA (shared with Compute Module)
SW_I2C_SCL_ON	PC11	Internal I2C1 SCL (shared with Compute Module)
ARTIK-TX_CM3-RX	PF3	Artik020 TX to Compute Module RX (UART)
ARTIK-RX_CM3-TX	PF2	Artik020 RX to Compute Module TX (UART)
SWDIO_MCU	PF1	Artik020 Serial Wire Debug (IO)
SWCLK_MCU	PF0	Artik020 Serial Wire Debug (Clock)

4. Block diagram
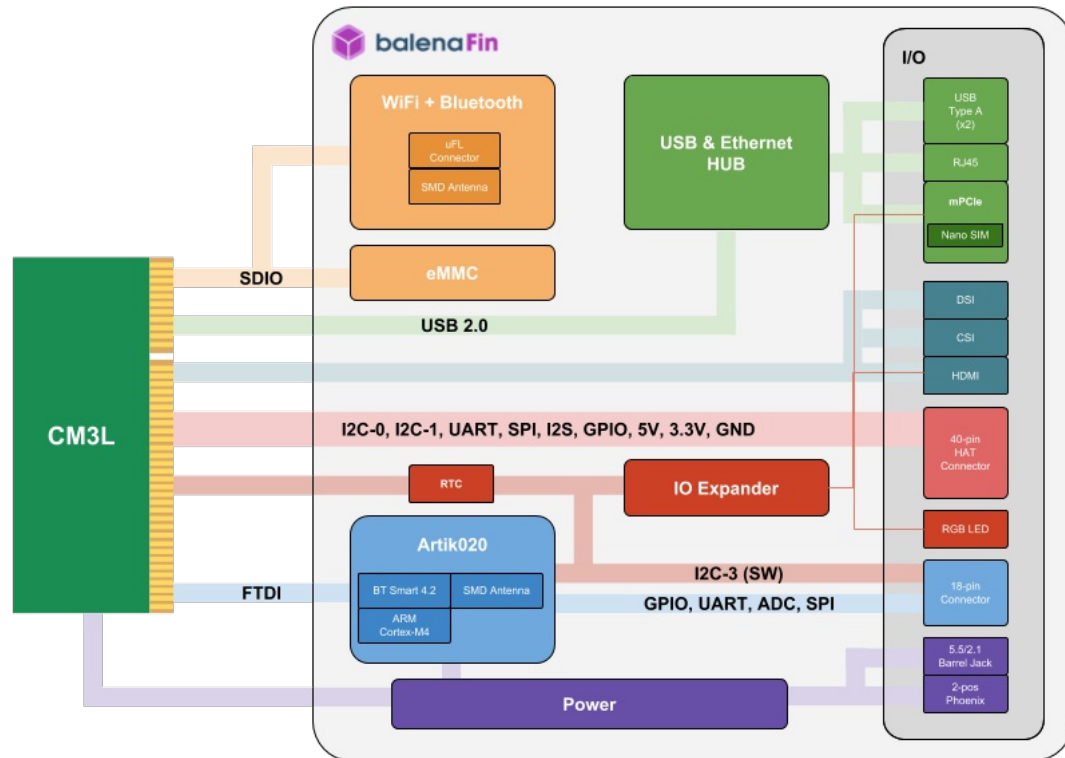
5. Mechanical specifications (mm)

Top	Bottom
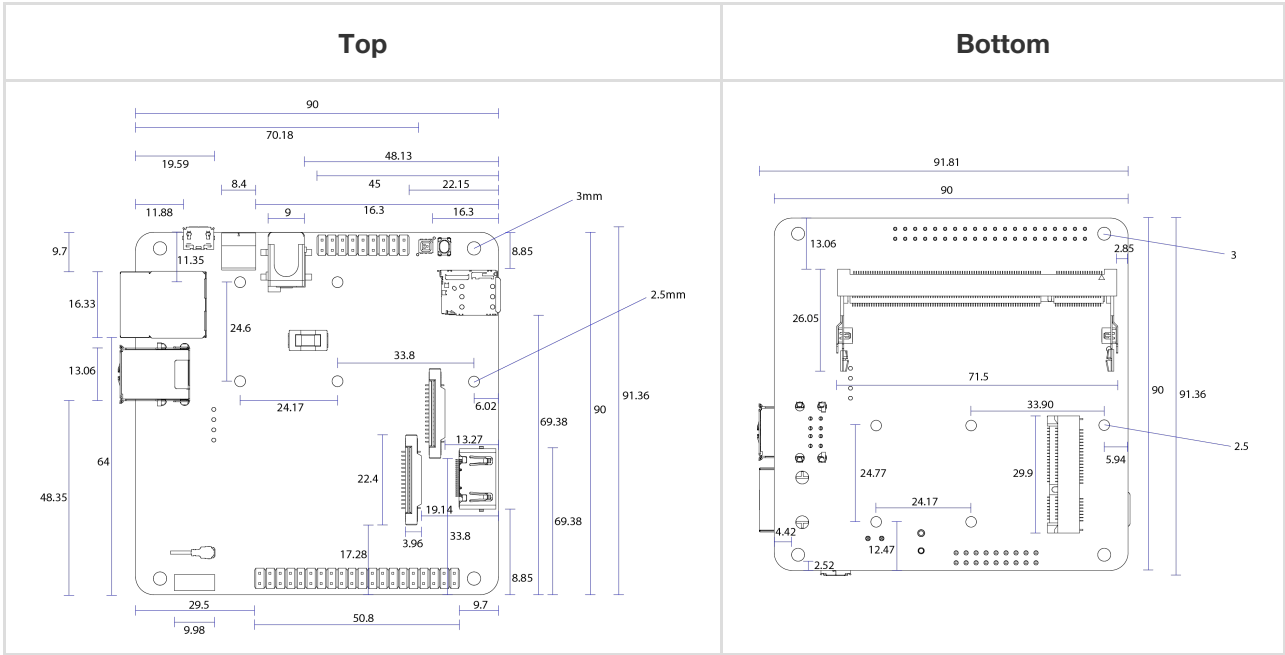
6. General specifications

Parameter	Minimum	Typical	Maximum	Conditions
Power input via power connectors	6V	-	24V	12.5W
Power input via HAT connector	5V	5V	5V	12.5W
Operation temperature	0 celsius	-	70 celsius	

7. Radio specifications

7.1 Frequency range

Description	Min.	Typ.	Max.	Unit
11b / g / n (HT20/HT40)	2412	-	2472	MHz
11a / ac (HT80)	5180	-	5825	MHz
BT / BLE (main)	2402	-	2480	MHz
BT / BLE (secondary, co-processor)	2400	-	2483.5	MHz

7.2 TX Output Power

Description	Min.	Typ.	Max.	Unit
11b/11g/11n-2G(20TH/40TH)	10 / 10 / 10	12 / 12 / 12	14/ 14/ 14	dBm
11a/11n-5G20TH/40TH/11ac	10 / 10 / 8 / 6	12 / 12 / 10 / 8	14 / 14 / 12 / 10	dBm
BT / BLE (main)	-6	0	4	dBm
BT / BLE (secondary, co-processor)	-26	-	8	dBm

7.3 RX Sensitivity

Description	Min.	Typ.	Max.	Unit
11b/11g/11n-2G(20TH/40TH)	-	-87/-73/-69/-66	-76 / -65 / -64/-61	dBm
11a/11n-5G(20TH/40TH)/11ac	-	-71/-68/-65/-57	-65 / -64/-61 /-51	dBm
BT / BLE (main)	-	-86/-86	-70 / -70	dBm
BT / BLE (secondary, co-processor)	-	-55.2/-47.2	-	dBm

8. Certification

Certification	Country / Region	Identifier(s)
CE	Europe	RE-18071303
FCC	USA	2APW6BLN-FN-1-00001
IC	Canada	24038-BLNFN100001
MIC	Japan	R-208-180131
RCM	Australia	*ongoing*
OFCA	Hong Kong	*ongoing*

9. Labelling

The end product must be labeled, in a visible area, with the following:

- *Contains FCC ID: 2APW6BLN-FN-1-00001 IC: 24038-BLNFN100001*
- *Contains FCC ID: QOQBGM111 IC: 5123A-BGM111*

10. Regulatory Insert

FCC Compliance Statement (USA)

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Non-modification Warning

Any changes or modifications to this device not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure Statement

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radiofrequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles les radioélectriques (RF) de la FCC lignes directrices d'exposition dans et d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement doitêtre installé et utilisé en gardant une distance de 20 cm ou plus entre le dispositif rayonnant et le corps

NOTE: : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a

particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian DOC Compliance Statement

Cet appareil numerique de la classe B est conforme a la norme NMB-003 du Canada. This Class B digital apparatus complies with Canadian ICES-003.

Industry Canada (IC) Warning

Le present appareil est conforme aux CNR d Industrie Canada applicables aux appareils radio exempts de licence. L exploitation est autorisee aux deux conditions suivantes : (1) appareil ne doit pas produire de brouillage, et (2) l utilisateur de l appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible n compromettre le fonctionnement.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: 1) This device may not cause interference., 2) This device must accept any interference, including interference that may cause undesired operation of the device.