

## Qualcomm's IPQ5322 System On Module with WiFi 7 and 5G Cellular Support

WiFi 7 support: 2.4GHz with 2x2 MU-MIMO

**Model: WSB530**



### KEY FEATURES

- Qualcomm IPQ5322 Quad-Core Cortex-A53 @ 1.5GHz processor
- 2x2 on-board 2.4GHz radio, up to 688Mbps physical data rate
- Supports 1x USB3.0 + 2x PCIe 3.0 or 1x USB3.0 + 1x PCIe 3.0 + 2x PCIe 3.0
- Supports Wi-Fi 7 and 5G cellular modules

### APPLICATIONS

- 802.11be MU-MIMO OFDMA Access Point
- Internet of Things (IoT)
- HD streaming and gaming

## Specifications

Chipset	Qualcomm IPQ5322 Quad-Core Cortex-A53 @ 1.5GHz processor 'Miami' Series
Reference Design	Qualcomm AP.MI01.2
System Memory	1GB (up to 3GB), DDR4 16-bit (1x16-bit) interface
Flash	No NOR Flash EMMC: 16GB
Wireless	On-board 2x2 2.4GHz MU-MIMO 802.11b/g/n/ax/be, max 22dBm per chain
Frequency Range	2.4GHz: 2.412~2.472GHz
Modulation Techniques	OFDMA: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM, 4096-QAM
Available Interfaces	33x GPIOs 2x PCIe 3.0 1x USB 3.0 (or 1x USB 2.0 + PCIe 3.0 option) 3x BLSP ports for UART, I2C, and SPI interfaces 4x PWM 2x multi-GbE Ethernet SerDes supporting external 10G/5G/2.5G/1G PHYs
RF Connector	2x U.FL connectors (IPEX1)
DC Power	3.3V 12V 5V
Power Consumption (Board only)	6W (max)
Certification	CE Certified, REACH & RoHS Compliance
Environmental Humidity, Non-Condensing	Operating: 5% to 95%, Storage: Max. 90%
Reset	Reset controlled via voltage monitor
Dimensions (W x H x D) in mm	65 x 45 x 7.4 mm

1. The Serial Port is a 4-pin header (TTL). A Serial Converter is available to change the TTL signals on the board to RS-232 signals for debugging.

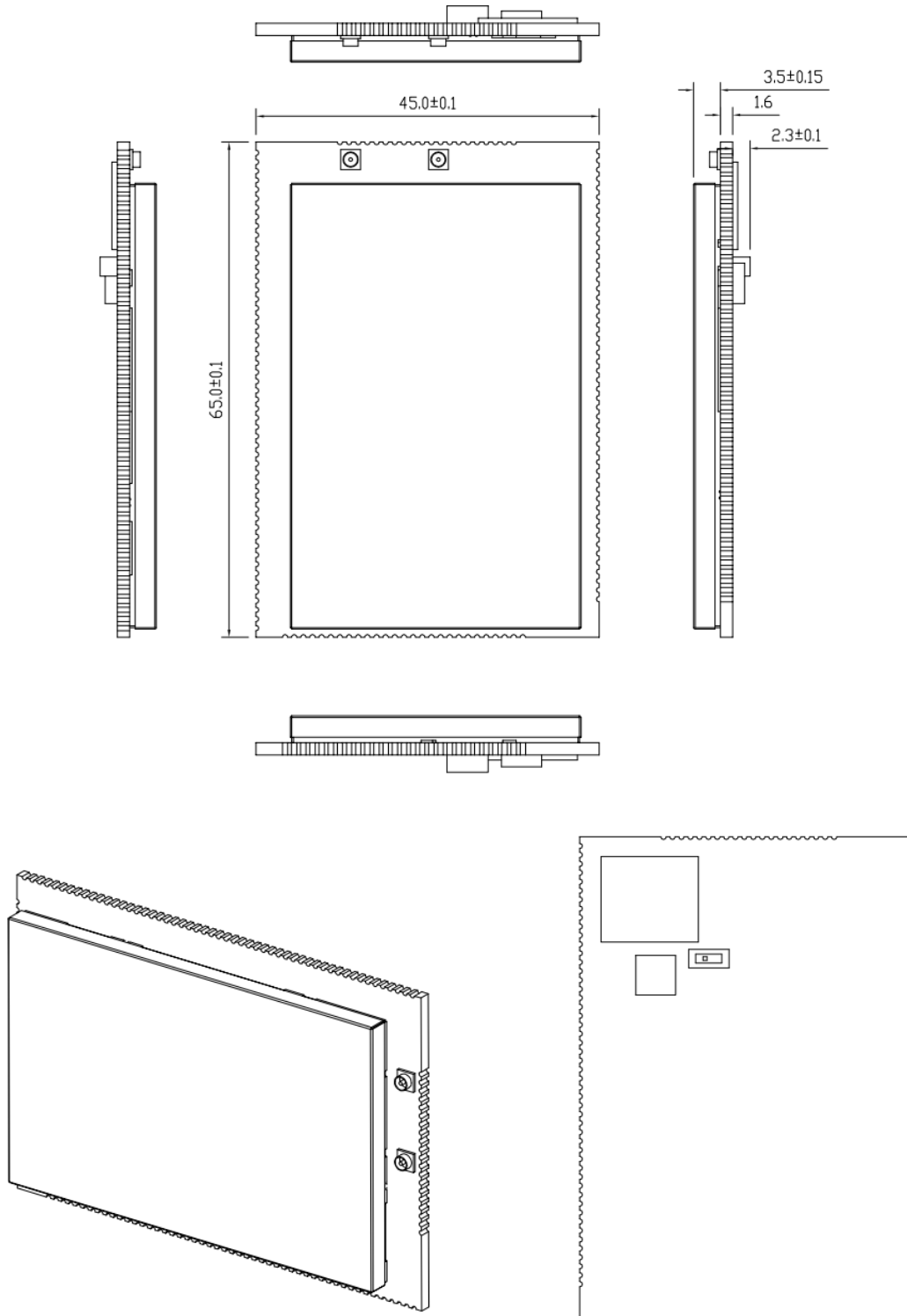
\*Configurations are subject to change without notifications.

## RF Performance Table for 2.4GHz

	Data Rate	TX Power (per chain)	TX Power (2 chains)	Tolerance
2.4GHz 802.11be EHT20	MCS 0	22dBm	25dBm	±2dB
	MCS 1	22dBm	25dBm	±2dB
	MCS 2	21dBm	24dBm	±2dB
	MCS 3	20dBm	23dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	19dBm	22dBm	±2dB
	MCS 6	18dBm	21dBm	±2dB
	MCS 7	18dBm	21dBm	±2dB
	MCS 8	17dBm	20dBm	±2dB
	MCS 9	17dBm	20dBm	±2dB
	MCS 10	16dBm	19dBm	±2dB
	MCS 11	16dBm	19dBm	±2dB
	MCS 12	15dBm	18dBm	±2dB
	MCS 13	15dBm	18dBm	±2dB
2.4GHz 802.11be EHT40	MCS 0	22dBm	25dBm	±2dB
	MCS 1	22dBm	25dBm	±2dB
	MCS 2	21dBm	24dBm	±2dB
	MCS 3	20dBm	23dBm	±2dB
	MCS 4	19dBm	22dBm	±2dB
	MCS 5	19dBm	22dBm	±2dB
	MCS 6	18dBm	21dBm	±2dB
	MCS 7	18dBm	21dBm	±2dB
	MCS 8	17dBm	20dBm	±2dB
	MCS 9	17dBm	20dBm	±2dB
	MCS 10	16dBm	19dBm	±2dB
	MCS 11	16dBm	19dBm	±2dB
	MCS 12	15dBm	18dBm	±2dB
	MCS 13	15dBm	18dBm	±2dB

	Data Rate	RX Specifications Sensitivity	Tolerance
2.4GHz 802.11be EHT20	MCS 0	-94dBm	±2dB
	MCS 1	-91dBm	±2dB
	MCS 2	-88dBm	±2dB
	MCS 3	-86dBm	±2dB
	MCS 4	-83dBm	±2dB
	MCS 5	-79dBm	±2dB
	MCS 6	-77dBm	±2dB
	MCS 7	-75dBm	±2dB
	MCS 8	-72dBm	±2dB
	MCS 9	-70dBm	±2dB
	MCS 10	-67dBm	±2dB
	MCS 11	-65dBm	±2dB
	MCS 12	-	±2dB
	MCS 13	-	±2dB
2.4GHz 802.11be EHT40	MCS 0	-91dBm	±2dB
	MCS 1	-88dBm	±2dB
	MCS 2	-85dBm	±2dB
	MCS 3	-83dBm	±2dB
	MCS 4	-80dBm	±2dB
	MCS 5	-77dBm	±2dB
	MCS 6	-75dBm	±2dB
	MCS 7	-72dBm	±2dB
	MCS 8	-68dBm	±2dB
	MCS 9	-66dBm	±2dB
	MCS 10	-64dBm	±2dB
	MCS 11	-61dBm	±2dB
	MCS 12	-	±2dB
	MCS 13	-	±2dB

## Mechanical Dimension

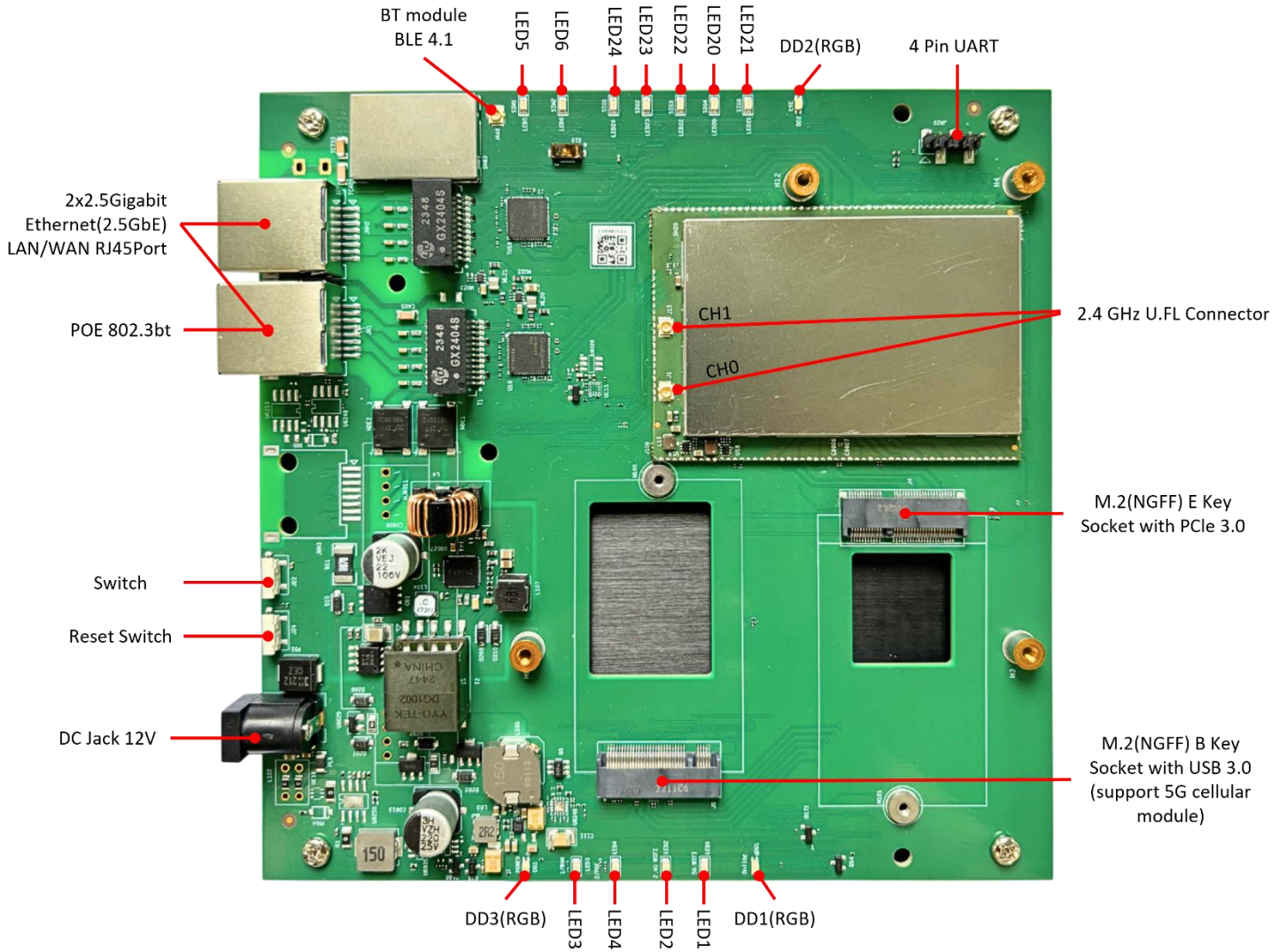


All dimensions are in mm.

## Physical Product View

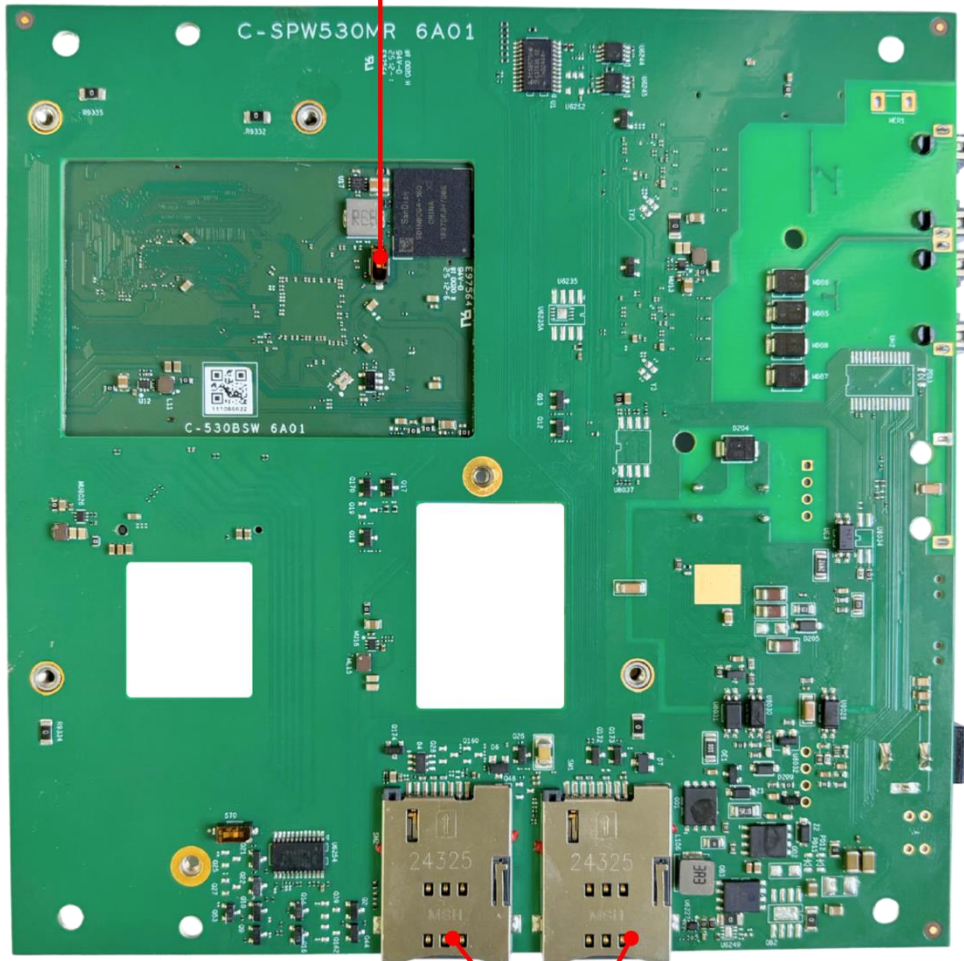


## Component Map



## Component Map

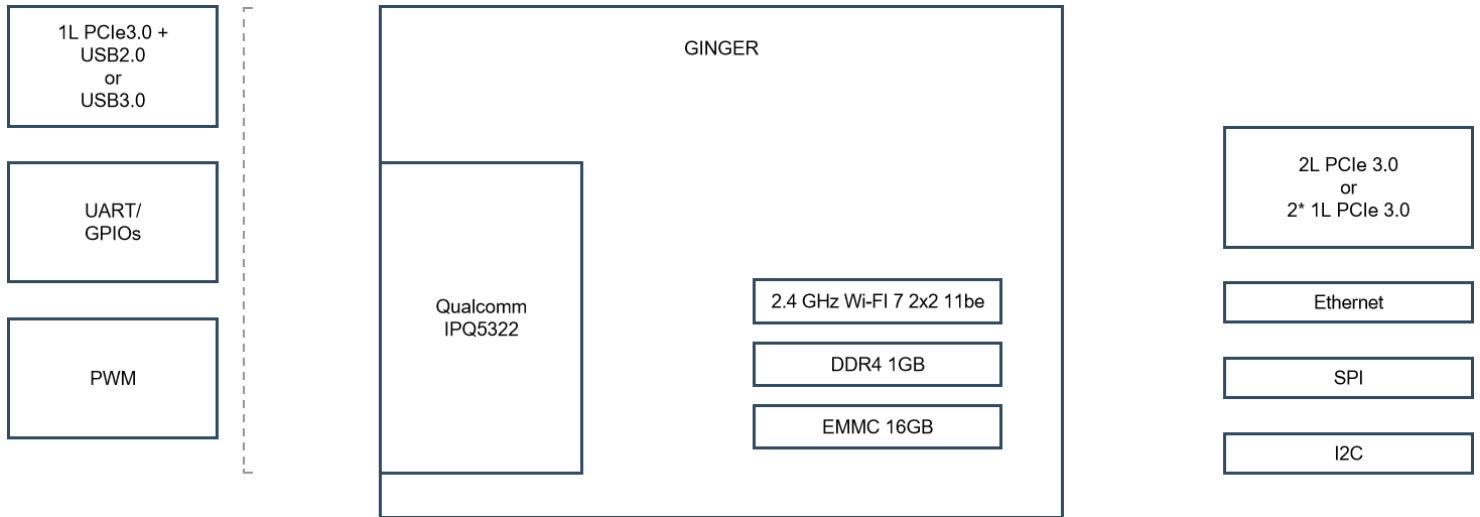
Switch for Force USB  
ON: Normal mode  
OFF: Force USB



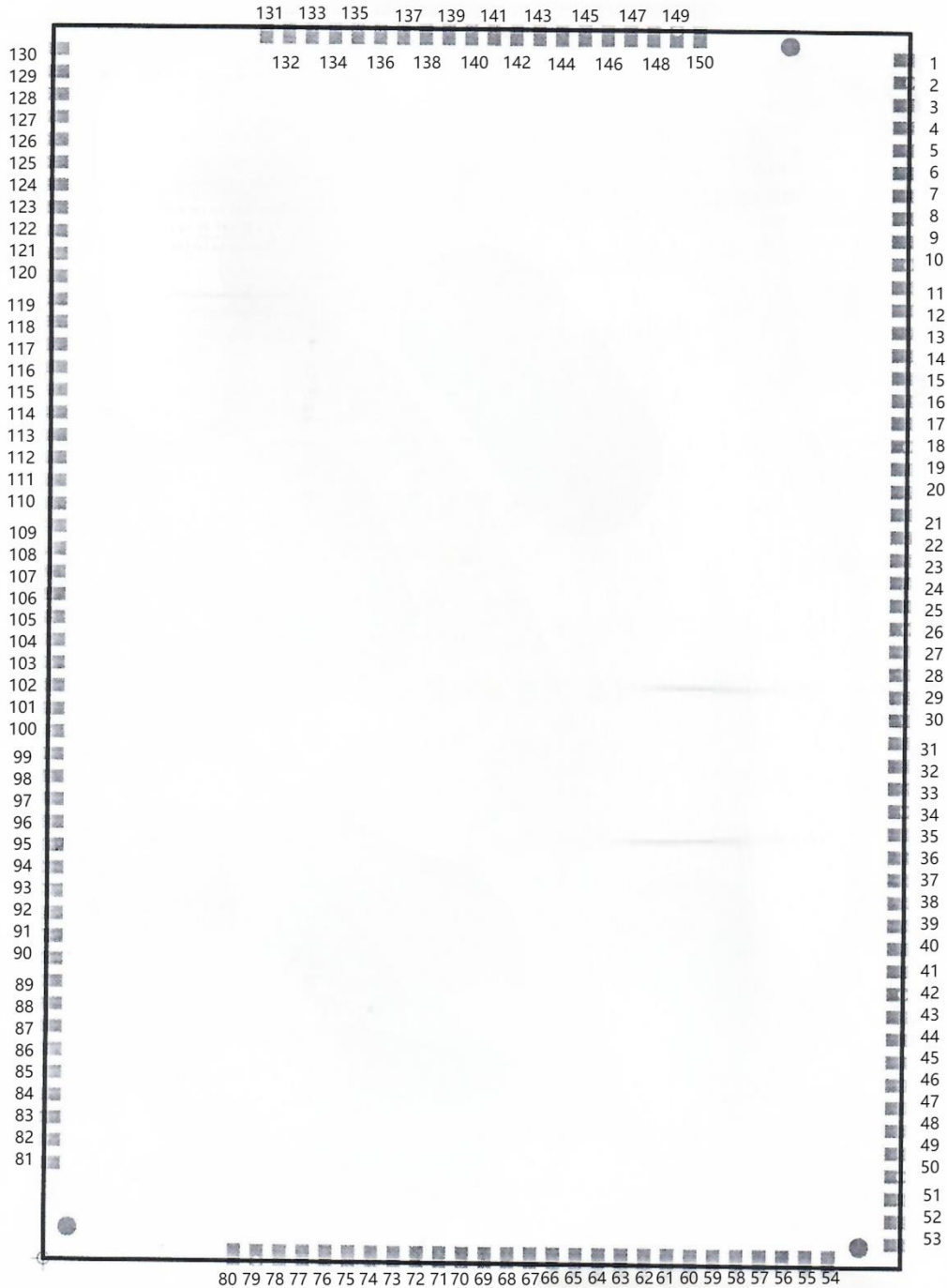
2x SIM Card slot for 5G  
cellular module

## Block Diagram

The following figure provides a basic overview of the GINGER module.



## Module Pinout



\* For detailed pin descriptions, please refer to the Hardware Guide.

## Pin Assignment (Pin 1 - 80)

Pin ID	Pin Name	Pin ID	Pin Name
1	GND	41	GND
2	DVDD_12V	42	USB0_SS_RXP (Option1-USB3.0) PCIE_RXP (Option2-1xPCIe 3.0+ 1xUSB2.0)
3	DVDD_12V	43	USB0_SS_RXN (Option1-USB3.0) PCIE_RXN (Option2-1xPCIe 3.0+ 1xUSB2.0)
4	GND	44	GND
5	GND	45	USB0_DP (Option1-USB3.0) USB0_DP (Option2-1xPCIe 3.0+ 1xUSB2.0)
6	GND	46	USB0_DM (Option1-USB3.0) USB0_DM (Option2-1xPCIe 3.0+ 1xUSB2.0)
7	DVDD_12V	47	GND
8	DVDD_12V	48	WSI_DAT_2>5
9	GND	49	GND
10	DVDD_1V95	50	WSI_CLK_2>5/GPIO42
11	PCIE1_RST_N_5G/GPIO_20	51	GND
12	PCIE1_WAKE_N_5G	52	WSI_DAT_5>2
13	PCIE1_CLKREQ_N_5G	53	GND
14	PCIE0_WAKE_GPIO45	54	WSI_CLK_5>2
15	PCIE0_RSTN_GPIO44	55	GND
16	PCIE0_CLK_REQ_GPIO43	56	DVDD_12V
17	GND	57	GND
18	PCIEX1_TXP1_5G	58	DVDD_1V95
19	PCIEX1_TXN1_5G	59	GND
20	GND	60	5V_in
21	PCIEX1_REFCLK_OP1_5G	61	WDI_GPIO50
22	PCIEX1_REFCLK_ON1_5G	62	WD_OE_GPIO49
23	GND	63	GPIO_51
24	PCIEX1_RXP1_5G	64	GPIO_38
25	PCIEX1_RXN1_5G	65	GPIO_35
26	GND	66	GPIO_39
27	PCIEX2_TXP1_5G	67	GPIO_36
28	PCIEX2_TXN1_5G	68	GPIO_37
29	GND	69	GPIO_34
30	PCIEX1_REFCLK_OP2_5G	70	GPIO_31
31	PCIEX1_REFCLK_ON2_5G	71	GPIO_33
32	GND	72	GPIO_30
33	PCIEX2_RXP1_5G	73	GPIO_29
34	PCIEX2_RXN1_5G	74	GPIO_32
35	GND	75	GND
36	USB0_SS_TXP (Option1-USB3.0) PCIE_TXP (Option2-1xPCIe 3.0+ 1xUSB2.0)	76	GND
37	USB0_SS_TXN (Option1-USB3.0) PCIE_TXN (Option2-1xPCIe 3.0+ 1xUSB2.0)	77	GND
38	GND	78	GND
39	USBCLKP (Option1-USB3.0) PCIE CLKP (Option2-1xPCIe 3.0+ 1xUSB2.0)	79	GND
40	USBCLKN (Option1-USB3.0) PCIE CLKN (Option2-1xPCIe 3.0+ 1xUSB2.0)	80	GND

\* For detailed pin descriptions, please refer to the Hardware Guide.

## Pin Assignment (Pin 81 - 150)

Pin ID	Pin Name	Pin ID	Pin Name
81	GND	116	SGMII1-_REFCLK
82	5V_in	117	SGMII1+_REFCLK
83	5V_in	118	GND
84	GND	119	DVDD_12V
85	GND	120	DVDD_12V
86	GND	121	GPIO_25
87	GND	122	MHT_MDIO/GPIO_28
88	GND	123	GPIO_24
89	GND	124	GND
90	GND	125	MHT_MDC/GPIO_27
91	GND	126	GND
92	GND	127	GND
93	GND	128	GND
94	GND	129	GND
95	GND	130	GND
96	GND	131	GPIO_26
97	GND	132	GND
98	GND	133	GPIO_18
99	GND	134	GPIO_18
100	GND	135	GPIO_22
101	USXGMII_2_TX_N	136	GPIO_20
102	USXGMII_2_TX_P	137	PQ_RSTIN_N
103	GND	138	GND
104	SGMII2-_REFCLK	139	GND
105	SGMII2+_REFCLK	140	GND
106	GND	141	GND
107	USXGMII_2_RX_N	142	GND
108	USXGMII_2_RX_P	143	GND
109	GND	144	GND
110	USXGMII_1_TX_N	145	GND
111	USXGMII_1_TX_P	146	GND
112	GND	147	GND
113	USXGMII_1_RX_N	148	GND
114	USXGMII_1_RX_P	149	GND
115	GND	150	GND

\* For detailed pin descriptions, please refer to the Hardware Guide.

## Firmware / Software

Firmware

OpenWRT 23.05

## Development Kits

SDK

SDKs with QCA binary drivers are available for software developers.

Accessory

JTAG Programmer, Serial Converter, Power Supply Only if available

## Ordering Options

Item Code	Processor	Model	Description	Type
WSB530 6A02BW0F1GB-TE	IPQ5322	WSB530	Ginger SoM with 2x2 MU-MIMO on-board radio 2.4GHz supporting 802.11be	Sample
WSB530 6A02BW0F1GB	IPQ5322	WSB530	Ginger SoM with 2x2 MU-MIMO on-board radio 2.4GHz supporting 802.11be	Mass Production