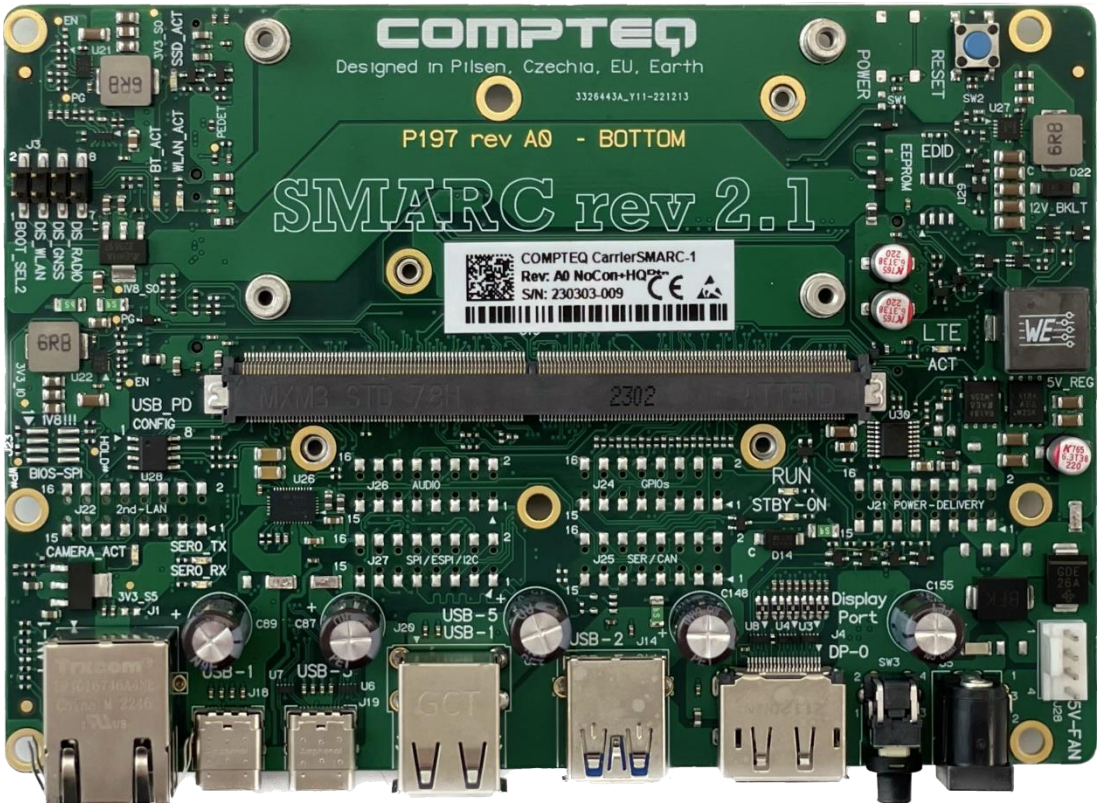
USER GUIDE



SMARC 2.1 Carrier

IoT Platform

Revision History

Revision	Date (yyyy-mm-dd)	Author	Changes
1.0	2022-12-13	Milan Hubený	First release
1.1	2022-12-15	Milan Hubený	Input voltage 24V
1.2	2023-04-13	Martin Vit	Added photos and chapter 20
1.3	2023-11-10	Martin Vít	Added LED commands, chapter 7.3
1.4	2024-02-02	Linh Hai Nguyen Martin Vít	Updated overview images in chapter and it's tables – corresponding to HW revision A2, added chapter 7.4 LED connector J6 description and usage of this LED connector
1.5	2024-02-08	Martin Vít	Added J7 connector , Declaration of Conformity

Disclaimer

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Electrostatic Sensitive Device



The Compteq SMARC Carrier is electrostatic sensitive device. Board is enclosed in shielding bag, and insert to secondary carton packing. Carton packing does not provide electrostatic protection.

Do not remove the board from the static shielding bag or handle it, except at an electrostatic-free workstations.

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Abbreviations

Abbreviation	Meaning
ATX	Advanced Technology eXtended
COM	Computer On Module
DP	Display Port
GPIO	General Purpose Input Output
HDMI	High Definition Multimedia Interface
LED	Light Emitting Diode
LDO	Low Dropout regulator
LPC	Low Pin Count
PWM	Pulse Width Modulation
RTC	Real Time Clock
SATA	Serial AT Attachment
SPI	Serial Peripheral Interface
UART	Universal Asynchronous receiver-transmitter
USB	Universal Serial Bus
SMARC	Smart Mobility ARChitecture
USB PD	USB Power Delivery
NC (n.c.)	Not Connected

Referenced Documents

Index	Document	Author	Date (YYYY-MM-DD)	Revision
1	SMARC_V21-specification	SGET Group	2020-03-23	2.1
2	PCI Express M.2 Specification	www.pcisig.com	June 26, 2019	Rev 3.0, Ver 1.2
3	E2312004_01_EMC Test Report_08-231010	Compteq.io	2023-12-22	
4	EC Declaration of Conformity	Compteq.io	2024-02-01	
5	Temperature measurement according EN50155	Compteq.io	2024-01-08	

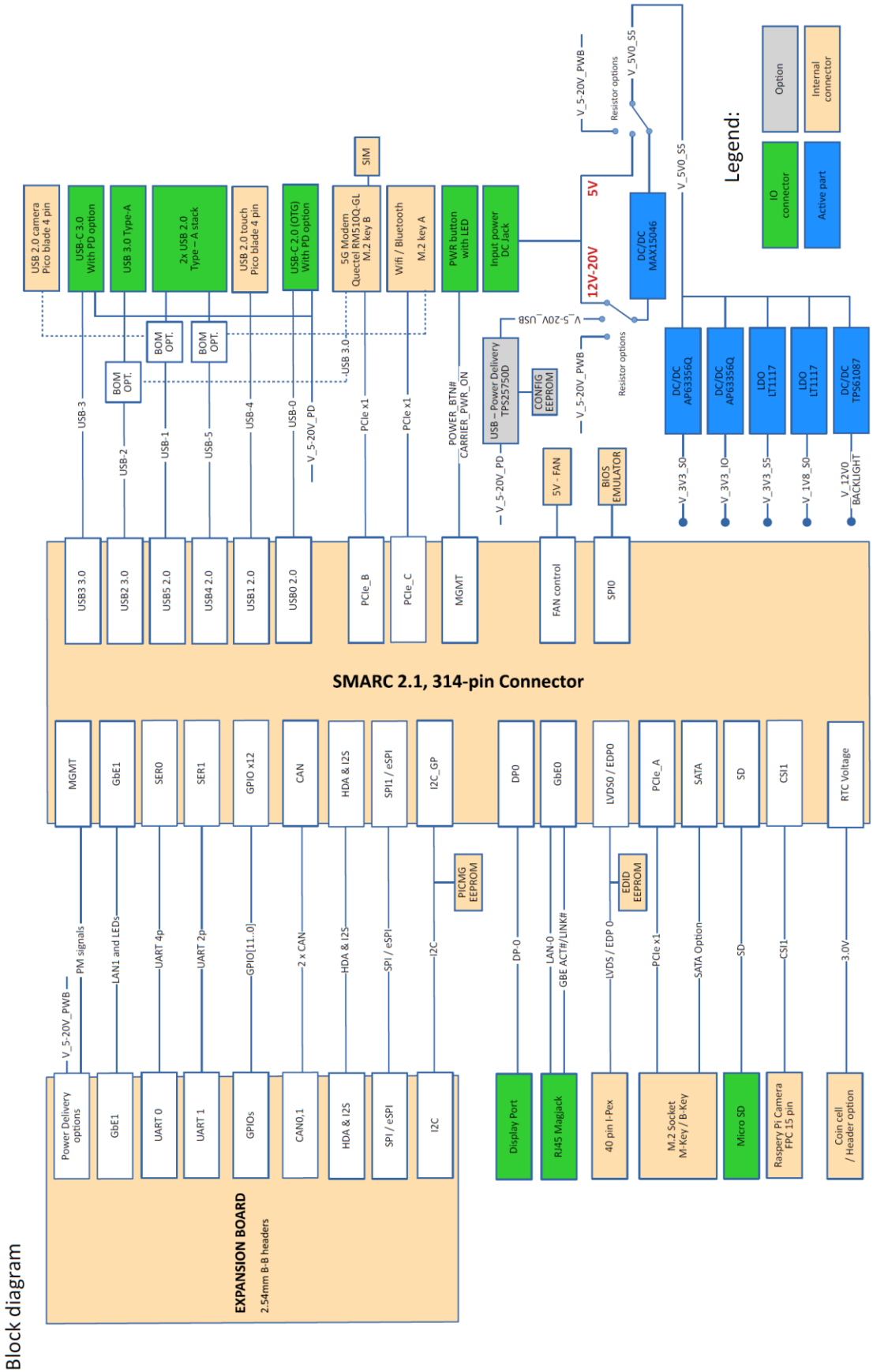
Introduction

Compteq SMARC Carrier is SMARC 2.1 carrier board, intended for **first hands-on experience** of our customers with SMARC 2.1 modules. By combining the scalability of SMARC modules, the Compteq SMARC carrier board provides manufacturers and developers to start the development of **x86-based or ARM-based** systems. This helps to reduce product design cycle and encourages rapid innovation in system design, to meet the ever-changing needs of the market.

Carrier board form factor is done to **fit in a standard 3.5 inch chassis** directly and implements options for many interesting features, like three **M.2 slots (key A, B, M)**, six board-to-board headers for an **Extension Board** (GPIOs, Serial ports, 2nd LAN, Audio, etc.) and different power delivery options (USB power delivery, Power Over Ethernet, Battery management).

Extension Board can be also developed by the end-customer to exactly **fit in particular applications**. See Extension Board chapter for more details.

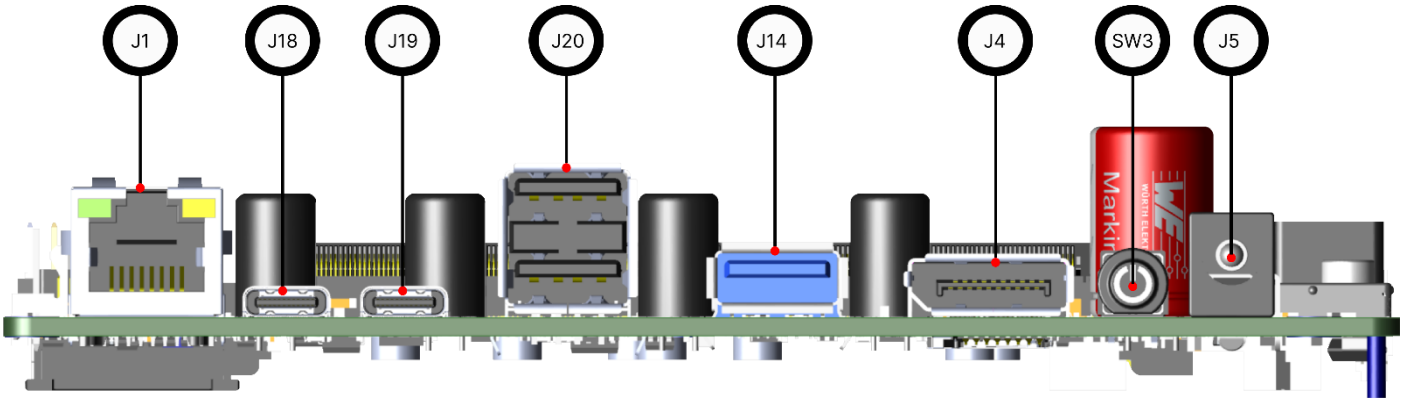
1. Block Diagram



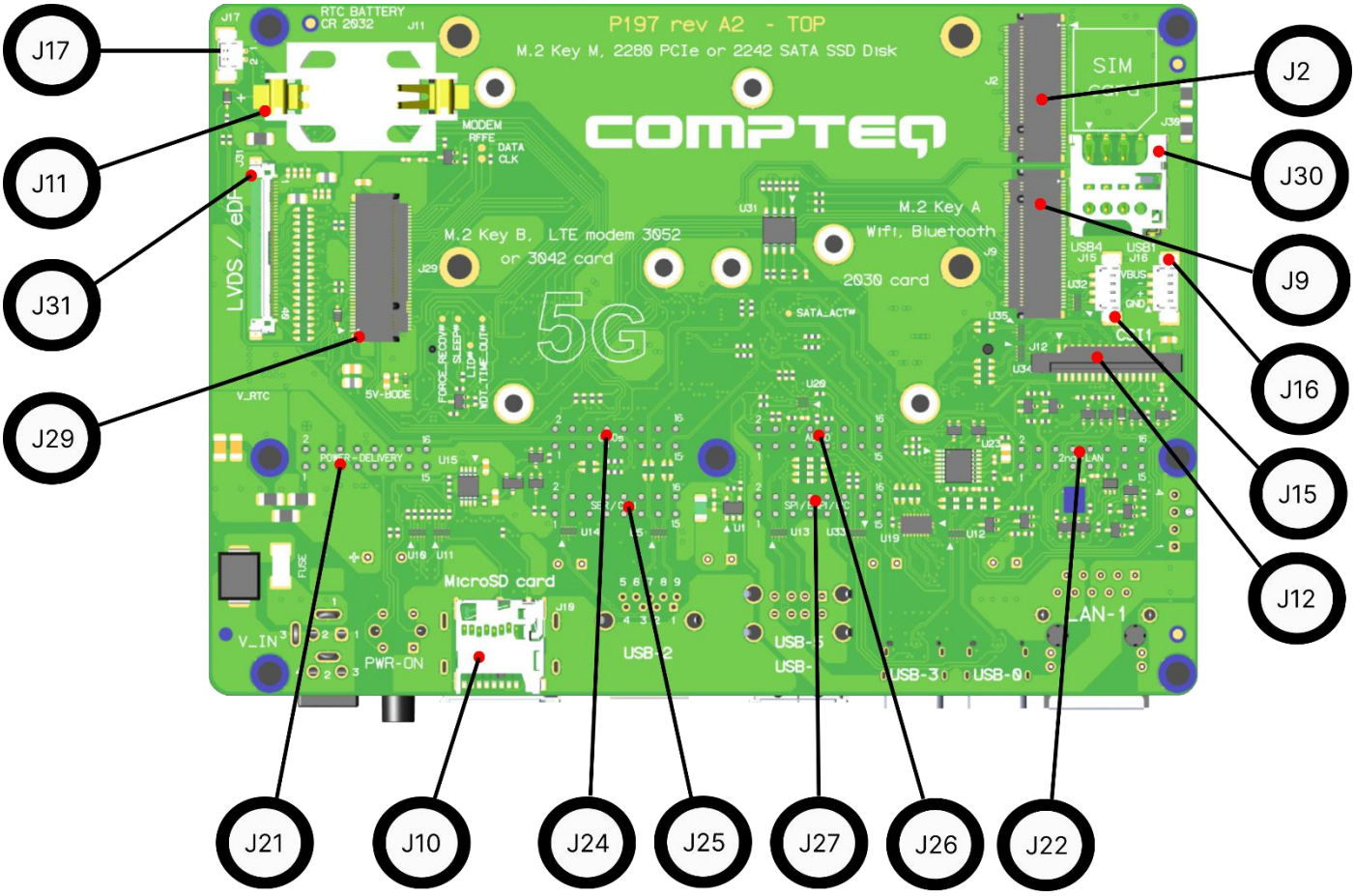
Picture 1 - Block diagram

2. Overview

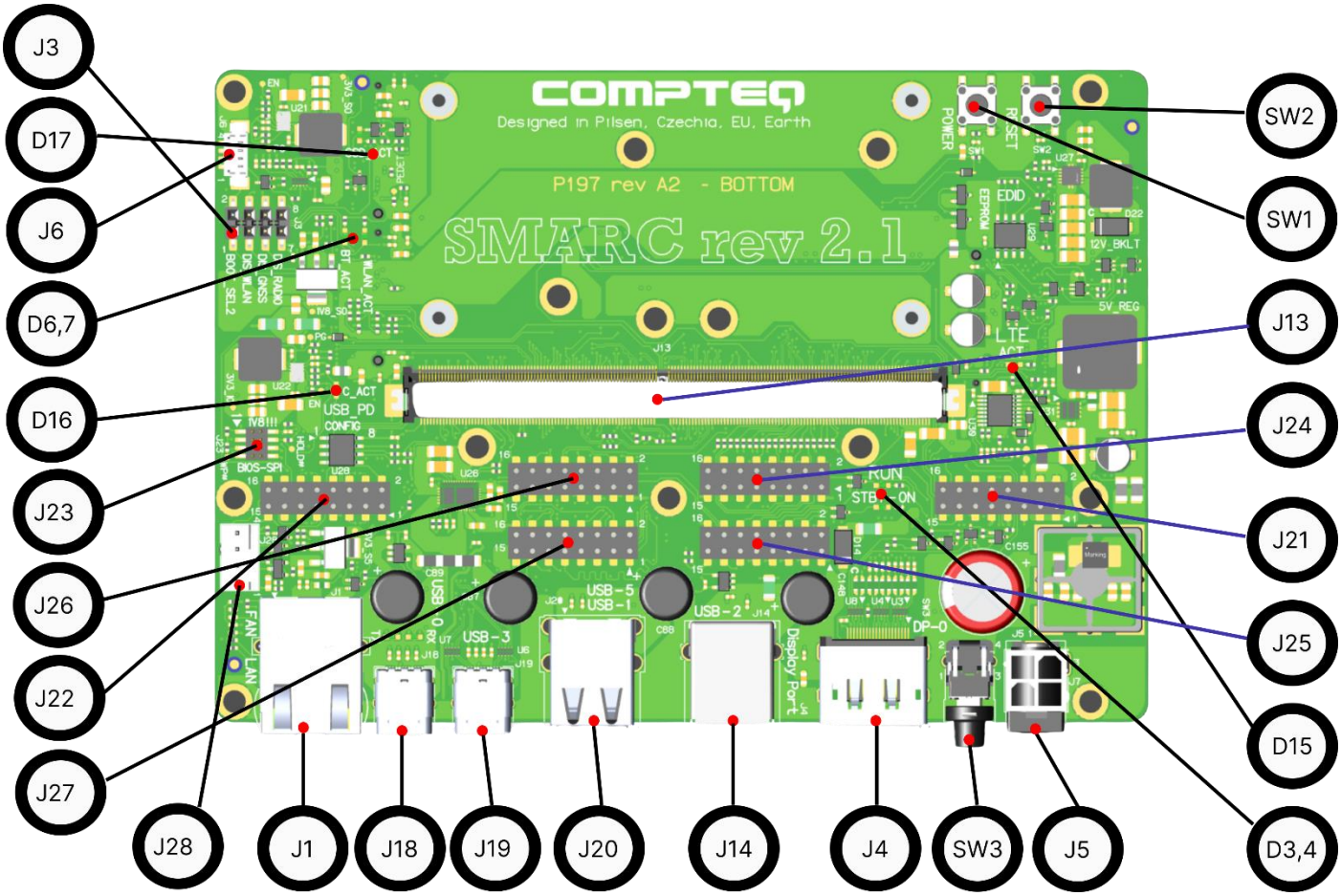
2.1. Connectors, buttons, LEDs



Picture 2 – Connectors overview – front view, Rev A2



Picture 3 – Connectors overview – bottom view, Rev A2



Picture 4 – Connectors overview – top view, Rev A2

Ref - link	Description
J5	Power Input Jack, see Power Input chapter below.
J6	LED connector
J13	SMARC 2.1 standard 314-pin connector
J1	Ethernet GbE0, RJ45 connector with integrated magnetics
J4	Display Port DP++, DP0
J31	LVDS / eDP connector, LCD panel can be attached directly using 40pin connector (including backlight power pins)
J21	Extension Board – Power Delivery Options
J22	Extension Board – GbE1 (second LAN) Option
J24	Extension Board – GPIOs, up to 12 single GPI or GPO can be used.
J25	Extension Board – Serial Ports, SER0, SER1, CAN0 and CAN1
J26	Extension Board – Audio, using HDA or I2S bus any kind of Audio inputs and outputs can be realized.
J27	Extension Board – SPI / I2C, allows connection of additional I2C, SPI or eSPI devices
J18	USB Type-C, USB 2.0 Port 0, or Debug port (SER0 to USB), with PD option
J19	USB Type-C, USB 3.0 Port 3, with PD option
J14	USB Type-A, USB 3.0 Port 2
J20	USB Type-A, USB 2.0 Ports 4 and 5
J15	Internal USB connector, USB2.0 Port 4 (for USB Touch)
J16	Internal USB connector, Option for USB 2.0 Port 1 (internal Camera connection)
J11	Slot for standard Coin-Cell RTC Battery (CR2032)
J17	External RTC Battery, connector for a long term ext. battery (maintenance-free solution)

J28	FAN connector, not needed for low-power applications mostly, nevertheless 5V FAN option is here.
J12	CSI Camera Connector, CSI1 of SMARC, using Raspberry Pi pin-out
J10	Micro SD card slot (card accessible from outside of the chassis)
J23	BIOS Flash header, allows direct connection of external boot device (SPI Flash Emulator)
J3	Configuration header. Using 2.54 jumpers you can change M2 cards functionality or enable booting from J23 SPI header.
J2	M.2 Key M - PCIe (Port A) or SATA SSD (2280 card by default, 2242 option)
J9	M.2 Key A – Wifi / Bluetooth card 2230, using PCIe Port C, USB Port 5 optionally
J29	M.2 Key B, LTE modem, 3042 or 3052 card, using PCIe Port B and USB3.0 Port 2 optionally
J30	SIM Card Slot, connected to Modem card plugged in J29 slot
SW1	Internal Power Button
SW2	Internal Reset Button
SW3	Power Button with LED for CARRIER_PWR_ON signal, going outside of the chassis
D3, D4	D3 = CARRIER_PWR_ON, D4 = CARRIER_STBY#
D6, D7	M.2 - D6 = WLAN activity, D7 = Bluetooth activity
D15	M.2 - LTE Modem activity
D17	M.2 - NVME disk activity

2.2. Form Factor

102mm x 146mm, mounting holes according to **3.5" standard**, ask for 3D model for more details.

2.3. Temperature Range

Operation and Storage temperature **-40° to +85°C (industrial range)**

2.4. Power Input

12V-24V over power jack J5 as default. Power over molex mini fit connector J7 as BOM option.

USB Type-C Power Delivery option. System can be powered from one of the two USB Type-C connectors. This is allowed by an assembly option when 12V - 20V capable source is attached.

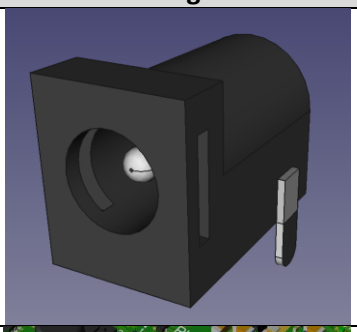
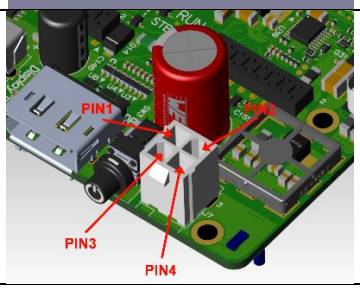
5V (max 5A) over J5 power jack for assembly option without main 5V DCDC regulator (cost reduction).

Power over Extension Board. Additional features like a Power Filtering, Power Over Ethernet (GbE1 port), or Battery Management can be realized on an extension board stacked on carrier and connected using board-to-board headers. See Extension Board capture below.

3. Power Input connectors (J5 and J7)

Input voltage 12V – 24V shall be applied to DC power jack (J5) Central pin of jack is positive + power and outside contact of jack is negative power -. Instead DC Power jack (J5) can be assembled 4 pin mini fit Molex connector (J7). Pinout for Mini Fit connector is following: Pin 1 and 2 are negative power nets -, and pins 3 and 4 are positive + power nets.

Depending on the carrier BOM options, there're more possibilities to provide power for the system (USB Power Delivery or Extension Board, see next chapters). We are also able customise power inputs on customer request. For example we were soldering red and black wires with ring terminals. See figure below.

Input port	Connector part number	Possible mating	Image
DC Jack (J5)	Kycon KLDHCX-0202-B-LT (5.5/2.5mm)	Kycon KLDX-PA-0202-B-LT	
Mini fit (J7)	Molex 39288040 (4.2mm pitch)	Molex 39012045 (White) 39013042 (Natural) 39013045 (Black)	

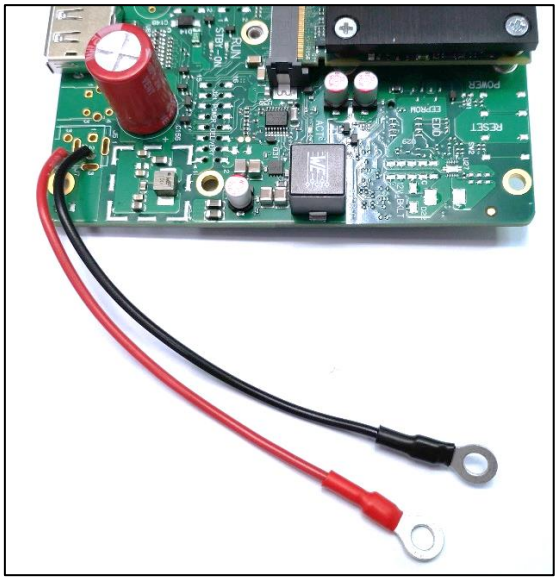
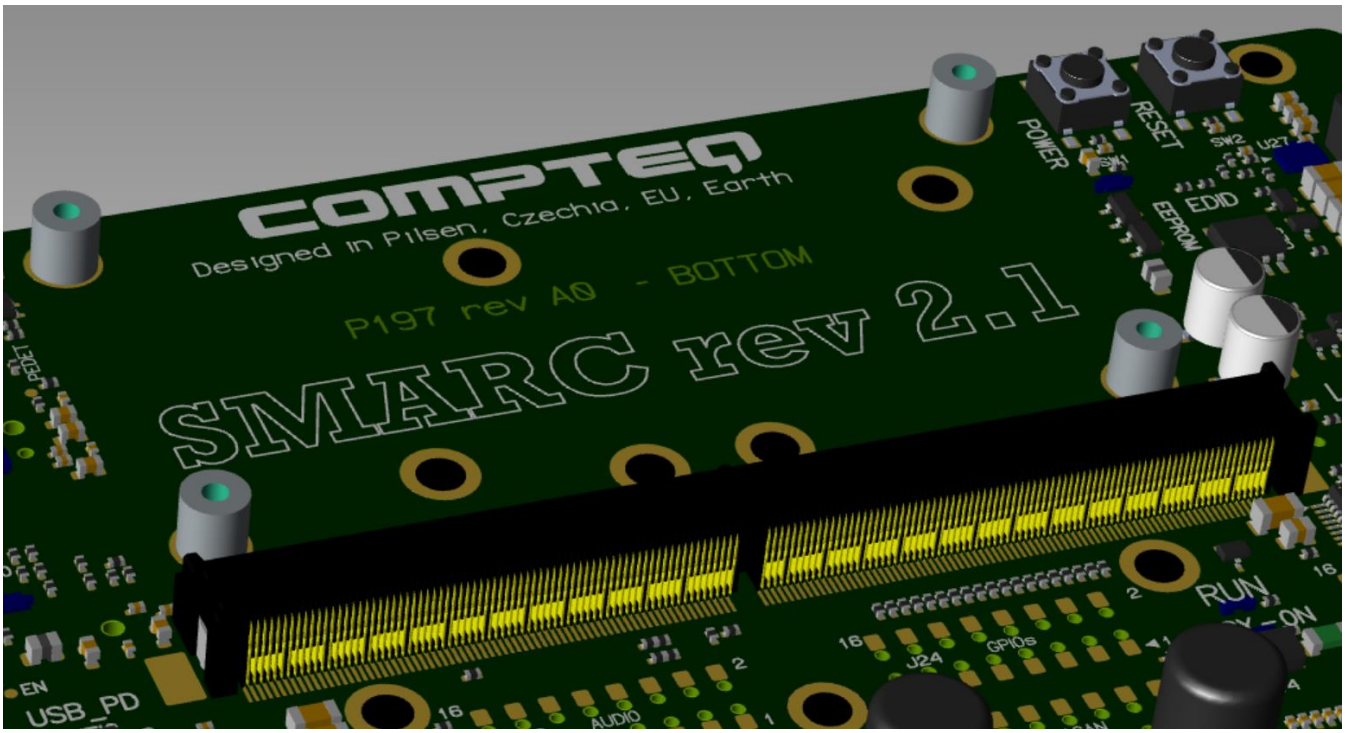


Figure Example of fully customized power input – two wires and ring terminals

4. SMARC Connector (J13)

The Compteq SMARC Carrier provides connector to attach a standard SMARC 2.1 module.

5mm Stack Height, 7.8mm Body Height connector used



SMARC connector pinout

Pin	Signal	Pin	Signal
		S1	CSI1_TX+ / I2C_CAM1_CK
P1	SMB_ALERT#	S2	CSI1_TX- / I2C_CAM1_DAT
P2	GND	S3	GND
P3	CSI1_CK+	S4	RSVD
P4	CSI1_CK-	S5	n.c.
P5	n.c.	S6	CAM_MCK
P6	n.c.	S7	n.c.
P7	CSI1_RX0+	S8	n.c.
P8	CSI1_RX0-	S9	n.c.
P9	GND	S10	GND
P10	CSI1_RX1+	S11	n.c.
P11	CSI1_RX1-	S12	n.c.
P12	GND	S13	GND
P13	n.c.	S14	n.c.
P14	n.c.	S15	n.c.
P15	GND	S16	GND
P16	n.c.	S17	GBE1_MDI0+
P17	n.c.	S18	GBE1_MDI0-
P18	GND	S19	GBE1_LINK100#
P19	GBE0_MDI3-	S20	GBE1_MDI1+
P20	GBE0_MDI3+	S21	GBE1_MDI1-
P21	GBE0_LINK100#	S22	GBE1_LINK1000#
P22	GBE0_LINK1000#	S23	GBE1_MDI2+

P23	GBE0_MDI2-	S24	GBE1_MDI2-
P24	GBE0_MDI2+	S25	GND
P25	GBE0_LINK_ACT#	S26	GBE1_MDI3+
P26	GBE0_MDI1-	S27	GBE1_MDI3-
P27	GBE0_MDI1+	S28	GBE1_CTREF
P28	GBE0_CTREF	S29	n.c.
P29	GBE0_MDI0-	S30	n.c.
P30	GBE0_MDI0+	S31	GBE1_LINK_ACT#
P31	n.c.	S32	n.c.
P32	GND	S33	n.c.
P33	SDIO_WP	S34	GND
P34	SDIO_CMD	S35	USB4+
P35	SDIO_CD#	S36	USB4-
P36	SDIO_CK	S37	USB3_VBUS_DET
P37	SDIO_PWR_EN	S38	AUDIO_MCK
P38	GND	S39	I2S0_LRCK
P39	SDIO_D0	S40	I2S0_SDOUT
P40	SDIO_D1	S41	I2S0_SDIN
P41	SDIO_D2	S42	I2S0_CK
P42	SDIO_D3	S43	ESPI_ALERT0#
P43	SPI0_CS0#	S44	ESPI_ALERT1#
P44	SPI0_CK	S45	n.c.
P45	SPI0_DIN	S46	n.c.
P46	SPI0_DO	S47	GND
P47	GND	S48	I2C_GP_CK
P48	SATA_TX+	S49	I2C_GP_DAT
P49	SATA_TX-	S50	HDA_SYNC / I2S2_LRCK
P50	GND	S51	HDA_SDO / I2S2_SDOUT
P51	SATA_RX+	S52	HDA_SDI / I2S2_SDIN
P52	SATA_RX-	S53	HDA_CK / I2S2_CK
P53	GND	S54	SATA_ACT#
P54	ESPI_CS0# / SPI1_CS0# / QSPI_CS0#	S55	n.c.
P55	ESPI_CS1# / SPI1_CS1# / QSPI_CS1#	S56	ESPI_IO_2 / QSPI_IO_2
P56	ESPI_CK / SPI1_CK / QSPI_CK	S57	ESPI_IO_3 / QSPI_IO_3
P57	ESPI_IO_1 / SPI1_DIN / QSPI_IO_1	S58	ESPI_RESET#
P58	ESPI_IO_0 / SPI1_DO / QSPI_IO_0	S59	USB5+
P59	GND	S60	USB5-
P60	USB0+	S61	GND
P61	USB0-	S62	USB3_SSTX+
P62	n.c.	S63	USB3_SSTX-
P63	USB0_VBUS_DET	S64	GND
P64	USB0_OTG_ID	S65	USB3_SSRX+
P65	USB1+	S66	USB3_SSRX-
P66	USB1-	S67	GND
P67	n.c.	S68	USB3+
P68	GND	S69	USB3-
P69	USB2+	S70	GND
P70	USB2-	S71	USB2_SSTX+
P71	n.c.	S72	USB2_SSTX-
P72	RSVD	S73	GND

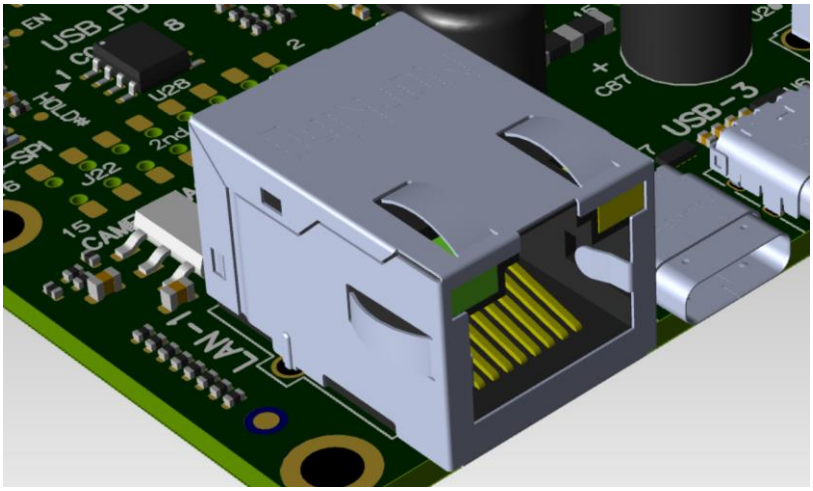
P73	RSVD	S74	USB2_SSRX+
P74	n.c.	S75	USB2_SSRX-
	KEY		KEY
P75	PCIE_A_RST#	S76	PCIE_B_RST#
P76	n.c.	S77	PCIE_C_RST#
P77	PCIE_B_CKREQ#	S78	PCIE_C_RX+ / SERDES_1_RX+
P78	PCIE_A_CKREQ#	S79	PCIE_C_RX- / SERDES_1_RX-
P79	GND	S80	GND
P80	PCIE_C_REFCK+	S81	PCIE_C_TX+ / SERDES_1_TX+
P81	PCIE_C_REFCK-	S82	PCIE_C_TX- / SERDES_1_TX-
P82	GND	S83	GND
P83	PCIE_A_REFCK+	S84	PCIE_B_REFCK+
P84	PCIE_A_REFCK-	S85	PCIE_B_REFCK-
P85	GND	S86	GND
P86	PCIE_A_RX+	S87	PCIE_B_RX+
P87	PCIE_A_RX-	S88	PCIE_B_RX-
P88	GND	S89	GND
P89	PCIE_A_TX+	S90	PCIE_B_TX+
P90	PCIE_A_TX-	S91	PCIE_B_TX-
P91	GND	S92	GND
P92	n.c.	S93	DP0_LANE0+
P93	n.c.	S94	DP0_LANE0-
P94	GND	S95	DP0_AUX_SEL
P95	n.c.	S96	DP0_LANE1+
P96	n.c.	S97	DP0_LANE1-
P97	GND	S98	DP0_HPD
P98	n.c.	S99	DP0_LANE2+
P99	n.c.	S100	DP0_LANE2-
P100	GND	S101	GND
P101	n.c.	S102	DP0_LANE3+
P102	n.c.	S103	DP0_LANE3-
P103	GND	S104	USB3_OTG_ID
P104	n.c.	S105	DP0_AUX+
P105	n.c.	S106	DP0_AUX-
P106	n.c.	S107	n.c.
P107	n.c.	S108	LVDS1_CK+ / eDP1_AUX+ / DSI1_CLK+
P108	GPIO0 / CAM0_PWR#	S109	LVDS1_CK- / eDP1_AUX- / DSI1_CLK-
P109	GPIO1 / CAM1_PWR#	S110	GND
P110	GPIO2 / CAM0_RST#	S111	LVDS1_0+ / eDP1_TX0+ / DSI1_D0+
P111	GPIO3 / CAM1_RST#	S112	LVDS1_0- / eDP1_TX0- / DSI1_D0-
P112	GPIO4 / HDA_RST#	S113	n.c.
P113	GPIO5 / PWM_OUT	S114	LVDS1_1+ / eDP1_TX1+ / DSI1_D1+
P114	GPIO6 / TACHIN	S115	LVDS1_1- / eDP1_TX1- / DSI1_D1-
P115	GPIO7	S116	n.c.
P116	GPIO8	S117	LVDS1_2+ / eDP1_TX2+ / DSI1_D2+
P117	GPIO9	S118	LVDS1_2- / eDP1_TX2- / DSI1_D2-

P118	GPIO10	S119	GND
P119	GPIO11	S120	LVDS1_3+ / eDP1_TX3+ / DSI1_D3+
P120	GND	S121	LVDS1_3- / eDP1_TX3- / DSI1_D3-
P121	I2C_PM_CK	S122	n.c.
P122	I2C_PM_DAT	S123	n.c.
P123	BOOT_SEL0#	S124	GND
P124	BOOT_SEL1#	S125	LVDS0_0+ / eDP0_TX0+ / DSI0_D0+
P125	BOOT_SEL2#	S126	LVDS0_0- / eDP0_TX0- / DSI0_D0-
P126	RESET_OUT#	S127	LCD0_BKLT_EN
P127	RESET_IN#	S128	LVDS0_1+ / eDP0_TX1+ / DSI0_D1+
P128	POWER_BTN#	S129	LVDS0_1- / eDP0_TX1- / DSI0_D1-
P129	SER0_TX	S130	GND
P130	SER0_RX	S131	LVDS0_2+ / eDP0_TX2+ / DSI0_D2+
P131	SER0_RTS#	S132	LVDS0_2- / eDP0_TX2- / DSI0_D2-
P132	SER0_CTS#	S133	LCD0_VDD_EN
P133	GND	S134	LVDS0_CK+ / eDP0_AUX+ / DSI0_CLK+
P134	SER1_TX	S135	LVDS0_CK- / eDP0_AUX- / DSI0_CLK-
P135	SER1_RX	S136	GND
P136	n.c.	S137	LVDS0_3+ / eDP0_TX3+ / DSI0_D3+
P137	n.c.	S138	LVDS0_3- / eDP0_TX3- / DSI0_D3-
P138	n.c.	S139	I2C_LCD_CK
P139	n.c.	S140	I2C_LCD_DAT
P140	n.c.	S141	LCD0_BKLT_PWM
P141	n.c.	S142	n.c.
P142	GND	S143	GND
P143	CAN0_TX	S144	eDP0_HPD / DSI0_TE
P144	CAN0_RX	S145	WDT_TIME_OUT#
P145	CAN1_TX	S146	PCIE_WAKE#
P146	CAN1_RX	S147	VDD_RTC
P147	VDD_IN	S148	LID#
P148	VDD_IN	S149	SLEEP#
P149	VDD_IN	S150	VIN_PWR_BAD#
P150	VDD_IN	S151	CHARGING#
P151	VDD_IN	S152	CHARGER_PRSNT#
P152	VDD_IN	S153	CARRIER_STBY#
P153	VDD_IN	S154	CARRIER_PWR_ON
P154	VDD_IN	S155	FORCE_RECOV#
P155	VDD_IN	S156	BATLOW#
P156	VDD_IN	S157	n.c.
		S158	GND

5. Ethernet GbE0 (J1)

SMARC module may offer up to two Gigabit Ethernet ports. Compteq SMARC Carrier has one port available on standard RJ45 Connector J1. This connector has two Green LEDs. Left LED indicate activity. While Right LED indicate Link signal. Second (module depended option) Gigabit Ethernet port is available on extension pin header J22.

Wuerth Electronic 7499111447



GbE Connector J1 pinout

Pin	Signal
1	GBE0_MDI0+
2	GBE0_MDI0-
3	GBE0_MDI1+
4	GBE0_MDI1-
5	GB0E_CTREF
6	GBE0_CTREF
7	GBE0_MDI2+
8	GBE0_MDI2-
9	GBE0_MDI3+
10	GBE0_MDI3-
11	GBE0_ACT_LED#
12	GBE0_ACT_LED#_COMPL
13	GBE0_ACT_LINK#
14	GBE0_ACT_LINK#_COMPL
15	GND
16	GND

6. Display Connectors

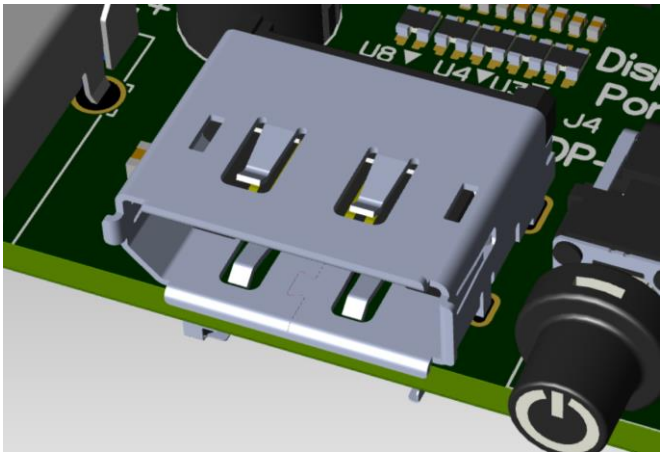
The Compteq SMARC Carrier provides the following display interfaces:

- DisplayPort (DP++)
- LVDS/eDP

6.1. DisplayPort++ (J4)

Compteq SMARC Carrier provides DisplayPort++ on connector J4.

MOLEX 47272-0001

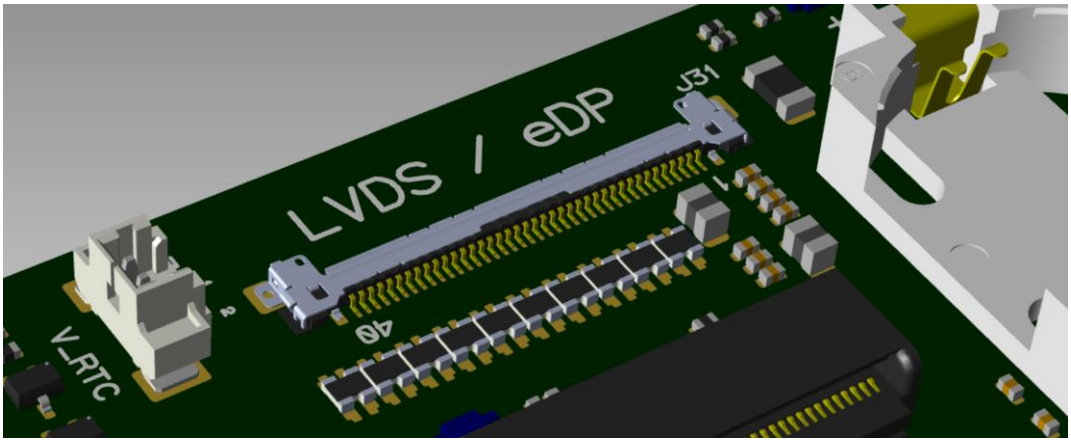


Pin	Signal
1	DP0_LANE0+
2	GND
3	DP0_LANE0-
4	DP0_LANE1+
5	GND
6	DP0_LANE1-
7	DP0_LANE2+
8	GND
9	DP0_LANE2-
10	DP0_LANE3+
11	GND
12	DP0_LANE3-
13	DP0_AUX_SEL
14	DP_CONFIG2
15	DP0_AUX+
16	GND
17	DP0_AUX-
18	DP0_HPD
19	GND
20	V_3V3_S0
21	GND
22	GND
23	GND
24	GND

6.2. LVDS/eDP (J31)

Compteq SMARC Carrier provides LVDS/eDP on connector J31. Connector pinout was optimized to use together with Innolux G156HCE display.

I-PEX 20455-040E-76



Pin	Signal	eDP
1	V_12V0_BACKLIGHT	V_12V0_BACKLIGHT
2	V_12V0_BACKLIGHT	V_12V0_BACKLIGHT
3	V_12V0_BACKLIGHT	V_12V0_BACKLIGHT
4	V_12V0_BACKLIGHT	V_12V0_BACKLIGHT
5	GND	GND
6	GND	GND
7	GND	GND
8	GND	GND
9	LCD0_BKLT_EN	LCD0_BKLT_EN
10	LCD0_BKLT_PWM	LCD0_BKLT_PWM
11	V_VDD	V_VDD
12	V_VDD	V_VDD
13	V_VDD	V_VDD
14	NC	eDP0_HPD
15	I2C_LCD_CK	I2C_LCD_CK
16	I2C_LCD_DAT	I2C_LCD_DAT
17	REV_SCAN	NC
18	LVDS0_0-	eDP0_TX0-
19	LVDS0_0+	eDP0_TX0+
20	LVDS0_1 -	eDP0_TX1-
21	LVDS0_1+	eDP0_TX1+
22	LVDS0_2-	eDP0_TX2-
23	LVDS0_2+	eDP0_TX2+
24	GND	GND
25	LVDS0_CK-	eDP0_AUX-
26	LVDS0_CK+	eDP0_AUX+
27	GND	GND
28	LVDS0_3-	eDP0_TX3-
29	LVDS0_3+	eDP0_TX3+
30	LVDS1_0-	n.c.
31	LVDS1_0+	n.c.
32	LVDS1_1-	n.c.
33	LVDS1_1+	n.c.
34	GND	GND
35	LVDS1_2-	n.c.
36	LVDS1_2+	n.c.

37	LVDS1_CK-	n.c.
38	LVDS1_CK+	n.c.
39	LVDS1_3-	n.c.
40	LVDS1_3+	n.c.
S1	GND	GND
S2	GND	GND
S3	GND	GND
S4	GND	GND

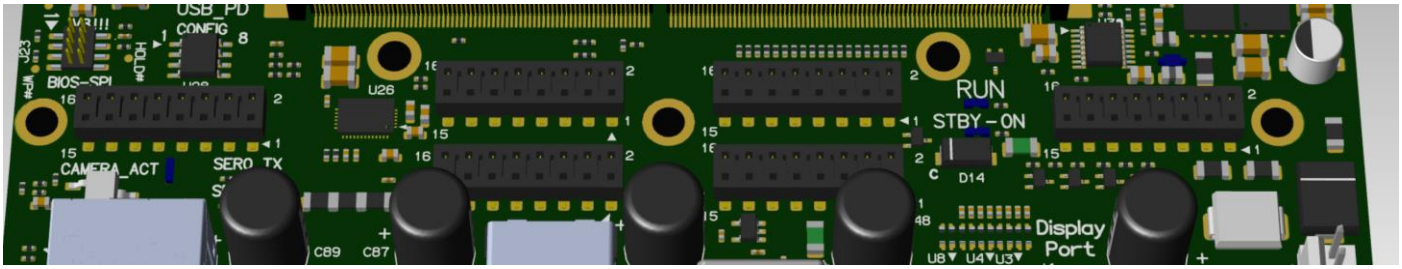
7. Extension Board Headers

Carrier board provides six board-to-board connectors to allow a fully customized design using an Extension Board, which can be also developed by the end customer directly. Additional serial ports, audio connections, different GPIOs, second Ethernet, and any Power Delivery option can be realized on this Extension Board. See pin-out of connectors below and Mechanical Drawings chapter for more details of possible application.

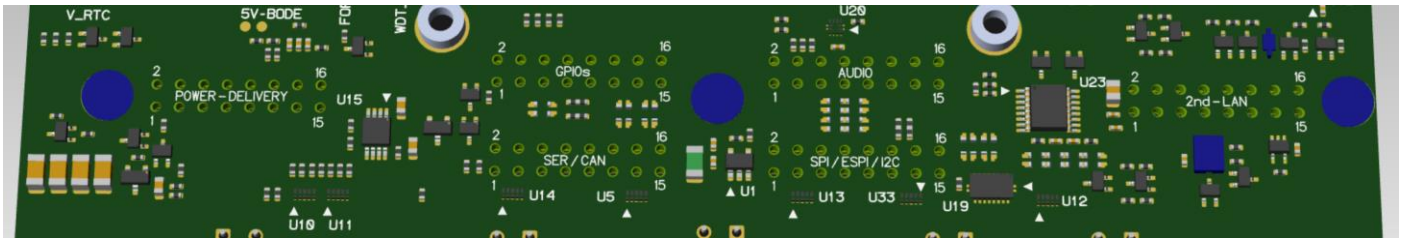
Attention! All the extension connector pins **can be accessed from top and bottom side** of the carrier board, depending on your mechanical concept. Be careful to not get your Extension Board pin-out mirrored!

Wuerth Electronic 610016243021

Connector's side



Using Bottom entry pass-through connector option, all pins are accessible from both sides of carrier board



7.1. Power Delivery Pin Header (J21)

J21 pin header pinout

Pin	Signal	Pin	Signal
1	V_5-20V_PWB	2	V_5-20V_USB
3	V_5-20V_PWB	4	V_5-20V_USB
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	VIN_PWR_BAD#	12	PD_I2CM_SCL
13	CHARGING#	14	PD_I2CM_SDA
15	CHARGER_PRSNT#	16	BATLOW#

7.2. Ethernet GbE1 (J22)

GbE Pin Header J22 pinout

Pin	Signal	Pin	Signal
1	GBE1_LINK100#	2	GBE1_LINK_ACT#
3	GBE1_MDI0+	4	GBE1_MDI1+
5	GBE1_MDI0-	6	GBE1_MDI1-
7	GND	8	GND
9	GBE1_MDI2+	10	GBE1_MDI3+
11	GBE1_MDI2-	12	GBE1_MDI3-
13	GBE1_LINK1000#	14	GBE1_CTREF
15	GND	16	GND

7.3. GPIO signals (J24)

Compteq SMARC Carrier provides GPIO signals via the pin header J24. The following table provides pinout information for the GPIO pin header J24. GPIO8..11 are not available by default BOM option and are used as second functionality (see table below). GPIO1/3/5/6 are also possible to use alternatively, but as default BOM option are used like GPIOs.

J24 GPIO pin header pinout

Pin	Signal	Pin	Signal
1	V_5V0_S5	2	M25G_WWAN_LED#
3	GPIO1 (CAM1_PWR#)	4	GPIO0
5	GPIO3 (CAM1_RST#)	6	GPIO2
7	GPIO5 (PWM_OUT)	8	GPIO4
9	GPIO7	10	GPIO6 (TACHIN)
11	GPIO9 (CONFIG_1)	12	GPIO8 (CONFIG_0)
13	GPIO11 (CONFIG_3)	14	GPIO10 (CONFIG_2)
15	GND	16	GND

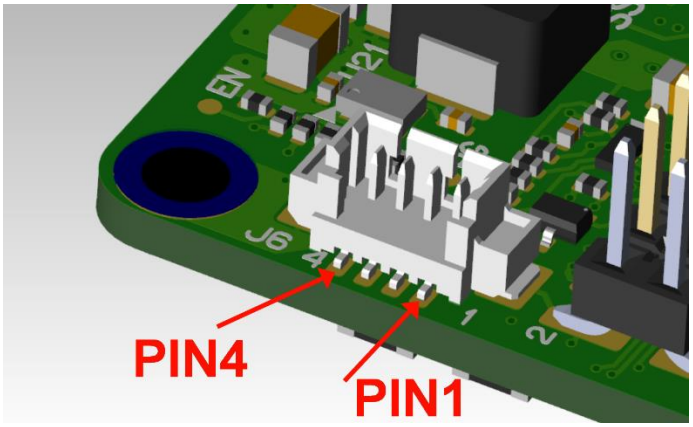
7.4. LED connector (J6)

On board are additional GPIO pins for LED signaling. LED on pins 1 and 3 are controlled by GPIO_SMARC_0 and GPIO _SMARC_2 on pins 2 and 4.

J6 GPIO LED connector pinout

Pin	Signal	Description	Controlled by
1	LED1_A*	LED1 anode	GPIO0(GPIO_SMARC_0)
2	LED2_A*	LED2 anode	GPIO2(GPIO_SMARC_2)
3	LED1_K	LED1 kathode	GPIO0(GPIO_SMARC_0)
4	LED2_K	LED2 kathode	GPIO2(GPIO_SMARC_2)

*Powered by 3V3 and current limited by 130R resistor.



Used connector is 4 pin 1.25mm Molex Pico Blade PN: 53398-0471. Matches with cable housing Molex: P/N 510210400

Here is an example how to control LEDs in the EFI shell
Please use the following commands in EFI shell console:

```
mm a80 40 -io
mm a81 5 -io
mm a80 42 -io
mm a81 5 -io
mm a81 4 -io
mm a81 1 -io
mm a81 0 -io
```

The green commands set GPIO0 and GPIO2 as output

Blue command is index of output register

Red command are data for output register. Data 5 – both LEDs on, Data 0 – both LEDs are off, Data 1 – One LED is on, Data 4 – second LED is on

7.5. Serial Interfaces (J25)

Compteq SMARC Carrier provides two UART ports and two CAN ports via the expansion header J25. The following table provides pinout information for the UART pin header J25.

J25 UART pin header pinout

Pin	Signal	Pin	Signal
1	V_5V0_S5	2	CAN0_TX
3	SER0_TX	4	CAN0_RX
5	SER0_RX	6	CAN1_TX
7	SER0_RTS#	8	CAN1_RX
9	SER0_CTS#	10	CARRIER_STBY#
11	SER1_TX	12	CARRIER_PWR_ON
13	SER1_RX	14	RESET_OUT#
15	GND	16	GND

7.6. Audio Pin Header (J26)

J26 Audio pin header pinout

Pin	Signal	Pin	Signal
1	V_5V0_S5	2	HDA_SYNC
3	AUDIO_MCK	4	HDA_SDO
5	I2S0_LRCK	6	HDA_SDI
7	I2S0_SDOUT	8	HDA_CK
9	I2S0_SDIN	10	GPIO4 (HDA_RST#)
11	I2S0_CK	12	M2W_WLAN_LED#
13	NVME_ACT#	14	M2W_BT_LED#
15	GND	16	GND

7.7. SPI1/eSPI/I2C Pin Header (J27)

J27 pin header pinout

Pin	Signal	Pin	Signal
1	SPI1_CS0#	2	ESPI_ALERT0#
3	SPI1_CS1#	4	ESPI_ALERT1#
5	SPI1_CK	6	ESPI_IO_2
7	SPI1_DIN	8	ESPI_IO_3
9	SPI1_DO	10	ESPI_RESET#
11	POWER_BTN#	12	I2C_GP_CK
13	RESET_IN#	14	I2C_GP_DAT
15	GND	16	GND

8. USB Interfaces

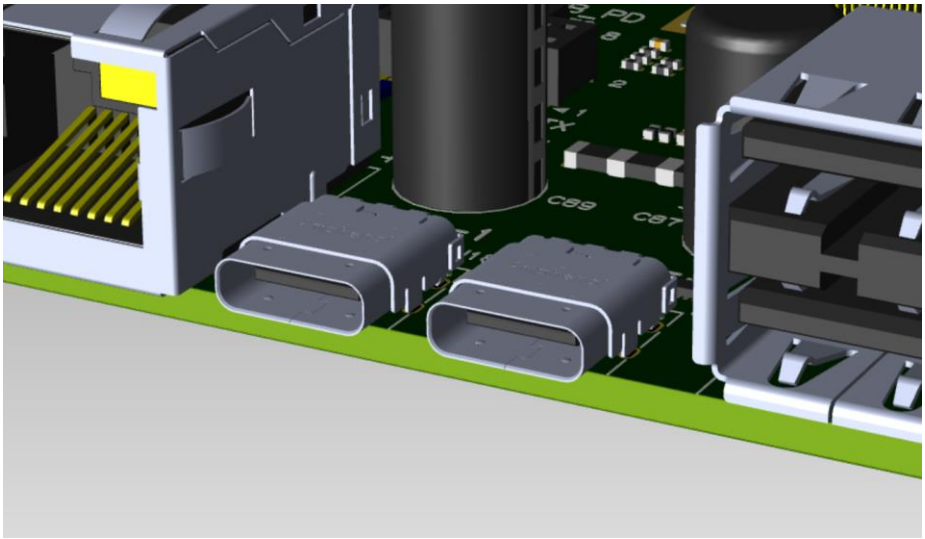
Compteq SMARC Carrier provides

- Two USB-C ports (one with USB3.0 and one with USB2.0 support)
- One USB 3.0 Type A port
- Two USB 2.0 Type A ports
- Alternatively, two USB 2.0 Pin Headers can be used internally for USB Camera and USB Touch and two USB ports are also optionally routed to M.2 slots (Bluetooth, LTE Modem)

8.1. USB-C ports (J18, J19)

Connector J18 and J19 support USB - C port. J18 supports USB2.0 only and alternativelly, it can be connected to the debug port SER0 via SERIAL to USB option. By default it routes out USB Port 0. J19 provides USB3.0 Port 3 of SMARC. Optionally (BOM option), one of the two connectors can support USB Power Delivery standard and power whole system when 12V-20V compatible source is attached.

Amphenol 12401826E412A



J18 connector pinout

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	n.c.	B2	n.c.
A3	n.c.	B3	n.c.
A4	V_5-20V_USB0	B4	V_5-20V_USB0
A5	USB0_CC1	B5	USB0_CC2
A6	USB0+	B6	USB0+
A7	USB0-	B7	USB0-
A8	n.c.	B8	n.c.
A9	V_5-20V_USB0	B9	V_5-20V_USB0
A10	n.c.	B10	n.c.
A11	n.c.	B11	n.c.
A12	GND	B12	GND
S1	GND	S2	GND
S3	GND	S4	GND

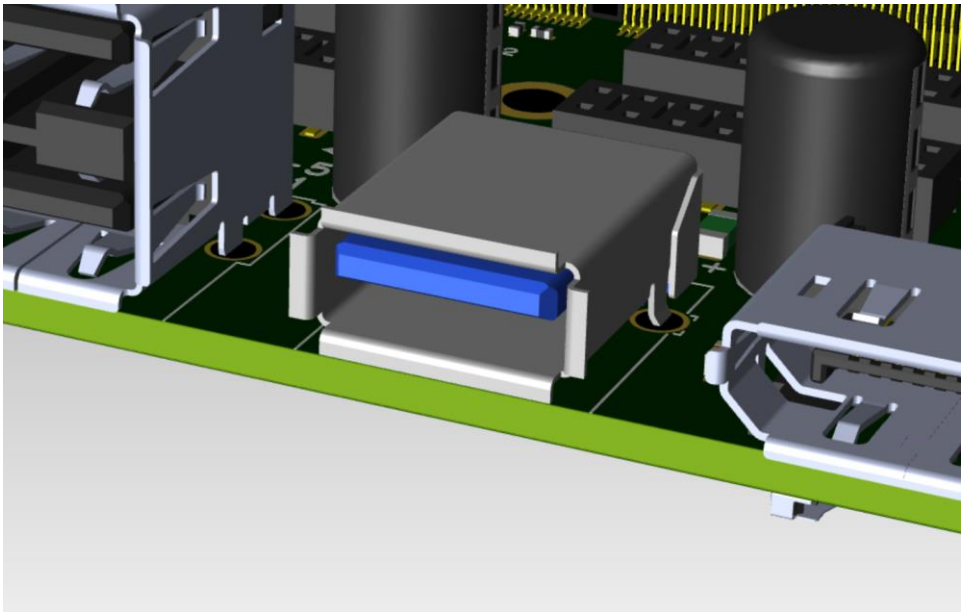
J19 connector pinout

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	USB3_SSTX1+	B2	USB3_SSTX2+
A3	USB3_SSTX1-	B3	USB3_SSTX2-
A4	V_5-20V_USB3	B4	V_5-20V_USB3
A5	USB3_CC1	B5	USB3_CC2
A6	USB3+	B6	USB3+
A7	USB3-	B7	USB3-
A8	n.c.	B8	n.c.
A9	V_5-20V_USB3	B9	V_5-20V_USB3
A10	USB3_SSRX2-	B10	USB3_SSRX1-
A11	USB3_SSRX2+	B11	USB3_SSRX1+
A12	GND	B12	GND
S1	GND	S2	GND
S3	GND	S4	GND

8.2. USB 3.0 Type A port (J14)

Connector J14 support USB 3.0 Type A port. It uses USB3.0 Port 1 of SMARC. Alternativelly (BOM Option), this USB Port 1 can be routed to LTE Modem card (J29).

Foxconn UEA1112C-4HK1-4F



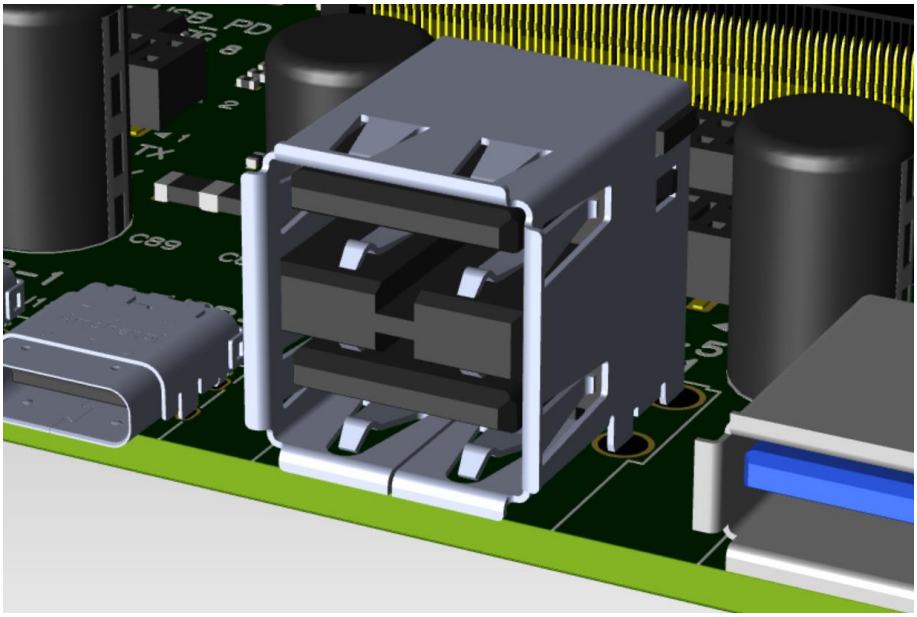
Pin	Signal
1	V_5V0_USB2
2	USB2-
3	USB2+
4	GND
5	USB_SSRX1-
6	USB_SSRX1+
7	GND

8	USB_SSTX1-
9	USB_SSTX1+
MTG1	GND
MTG2	GND

8.3. USB 2.0 Type A ports (J20)

Connector J20 supports 2x USB 2.0 Type A ports. Alternatively (BOM Option), these two USB ports can be routed to internal devices, to M.2 card (J9) for Bluetooth support and to an internal connector (J16) for possible camera connection.

TE Connectivity **5787617-1**



Pin	Signal
1	V_5V0_USB15
2	USB5-
3	USB5+
4	GND
5	V_5V0_USB15
6	USB1-
7	USB1+
8	GND
9	GND
10	GND
11	GND
12	GND

8.4. USB 2.0 Pin Headers (J15, J16)

Connector J15 and J16 support USB 2.0 devices like USB Camera or USB Touch. USB port 1 goes to J20 by default.

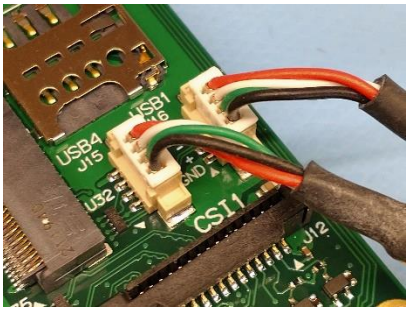
Molex 53398-0471



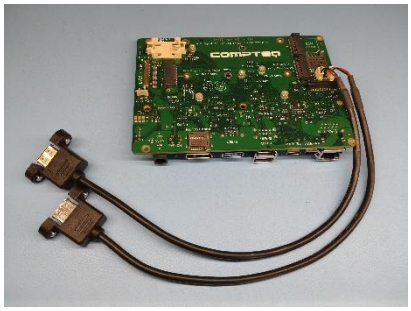
Pin	Signal
1	GND
2	USB1+
3	USB1-
4	V_5V0_S5
MTG1	GND
MTG2	GND

Pin	Signal
1	GND
2	USB4+
3	USB4-
4	V_5V0_S5
MTG1	GND
MTG2	GND

Examples of using internal USB connectors.



Detail of connection J15 and J16

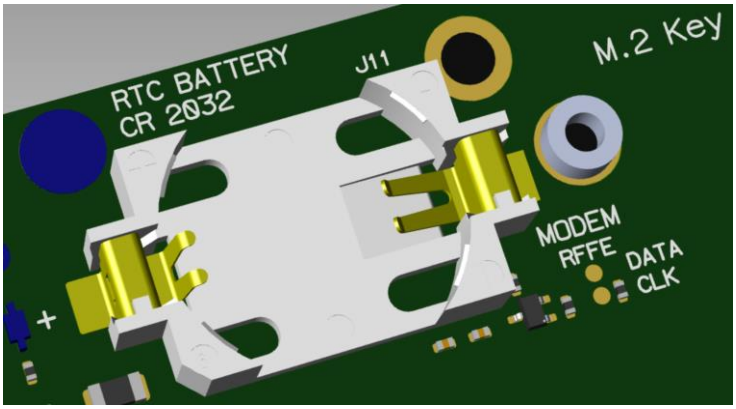


USB 2.0 type A Panel mount cables

Red wire	5V power
White wire	Data -
Green wire	Data +
Black wire	GND

9. RTC Battery holder (J11)

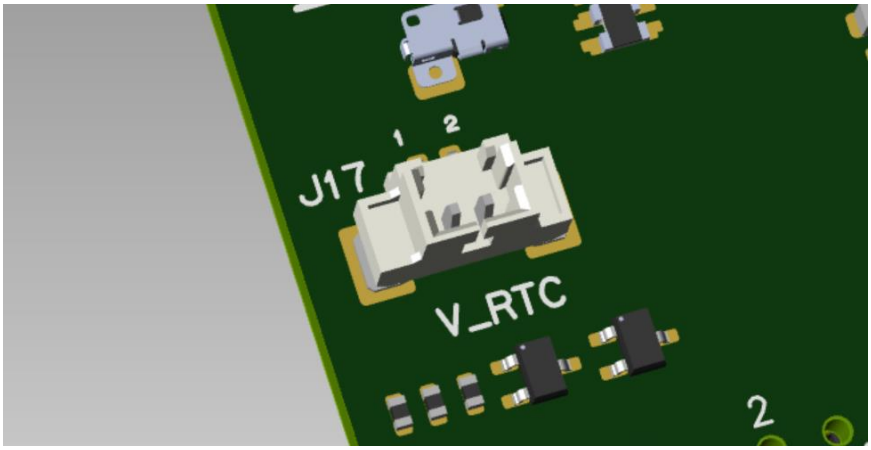
Connector J11 is battery holder for 3V RTC battery. Insert 3V Lithium coin battery CR2032 or BR2032 for extended temperature range.



10. Connector for external RTC Battery (J17)

Compteq SMARC Carrier provides J17 connector for an optional external RTC battery. Do not use coin cell battery in J11 when external battery is in use! It's two-pin MOLEX 53398-0271 connector, which allows connection of any kind of a long term 3V lithium battery to provide a maintenance free solution.

Molex 53398-0271

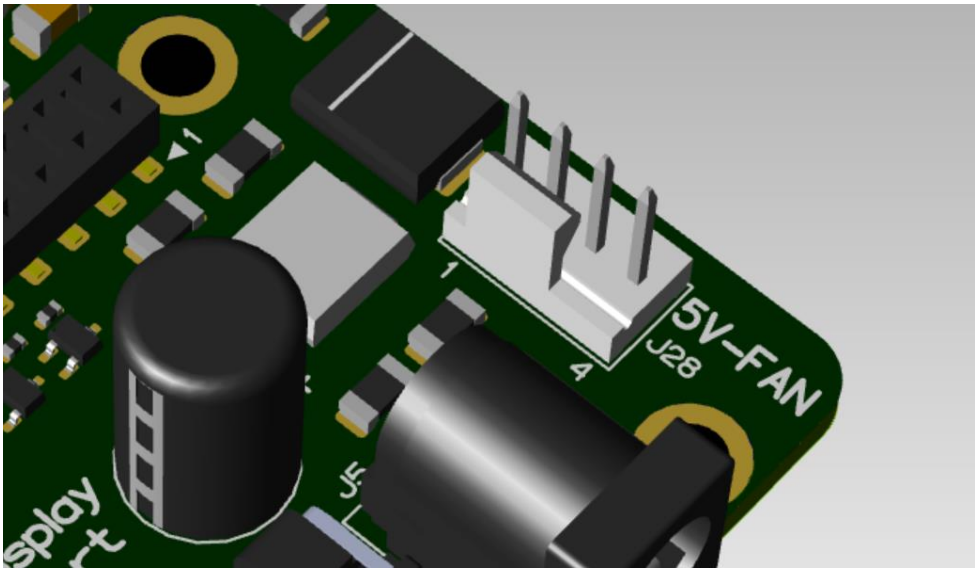


Pin	Signal	Pin	Signal
1	V_VBAT	2	GND

11. FAN Header (J28)

Compteq SMARC Carrier allows connect fan on standard 4 pin header J28. Fan voltage is set to 5V only.

Molex 47053-1000

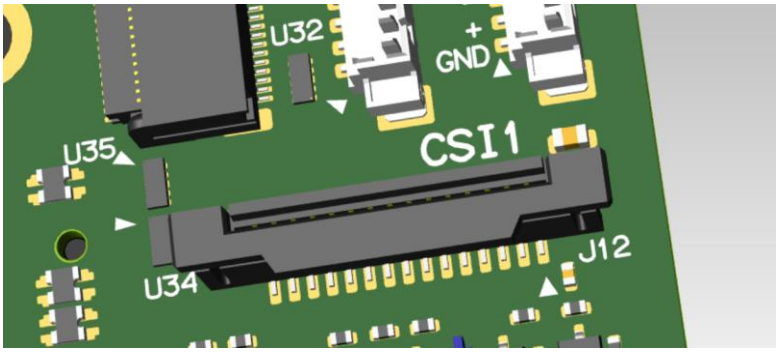


Pin	Signal
1	GND
2	V_5V0_S0
3	TACHIN
4	PWM_OUT

12. CSI Camera (J12)

Compteq SMARC Carrier allows connect CSI Camera on dedicated connector J12 with Raspberry-Pi compatible pin-out, using CSI1 port of SMARC.

TE Connectivity **1-1734248-5**



J12 Connector pinout

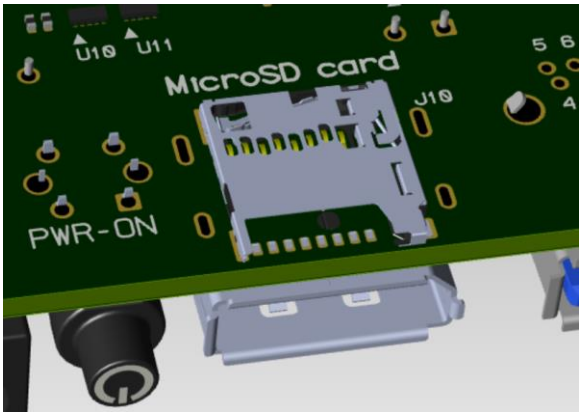
Pin	Signal
1	V_3V3_IO
2	I2C_CAM1_DAT_3V
3	I2C_CAM1_CK_3V
4	CAM_MCK_3V
5	CSI1_PWDN_3V
6	CAM1_RST_3V#
7	CSI1_CK+
8	CSI1_CK-
9	GND
10	CSI1_RX1+

11	CSI1_RX1-
12	GND
13	CSI1_RX0+
14	CSI1_RX0-
15	GND

13. Micro SD Card Connector (J10)

SDIO port of SMARC goes to J10 slot. Card is accessible from outside of the chassis.

Molex 503398-1892



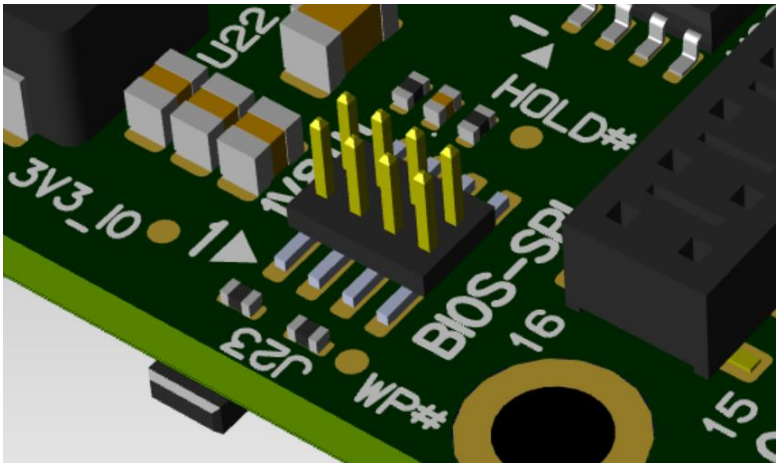
J10 Connector Pinout

Pin	Signal
1	SDIO_D[2]
2	SDIO_D[3]
3	SDIO_CMD
4	V_3V3_SDCARD
5	SDIO_CK
6	GND
7	SDIO_D[0]
8	SDIO_D[1]
9	SDIO_CD#
10	GND
S1	GND
S2	GND
S3	GND
S4	GND

14. BIOS Flash Header (J23)

In combination with BOOT_SEL2# jumper (see J3 chapter) you can boot from external device (BIOS Flash, or an Emulator, like EM100Pro from DediProg), which can rapidly simplify and shorten your customized BIOS development.

2mm pin-header



J23 SPI0 header pinout

Pin	Signal	Pin	Signal
1	SPI0_CS0#	2	V_SPI_VCC
3	SPI0_DIN	4	NC
5	NC	6	SPI0_CK
7	GND	8	SPI0_DO

15. Configuration Header (J3)

Using a standard 2.54mm jumpers you can configure M.2 cards functionality, or enable booting from external BIOS Flash (J23)

Jumper position:

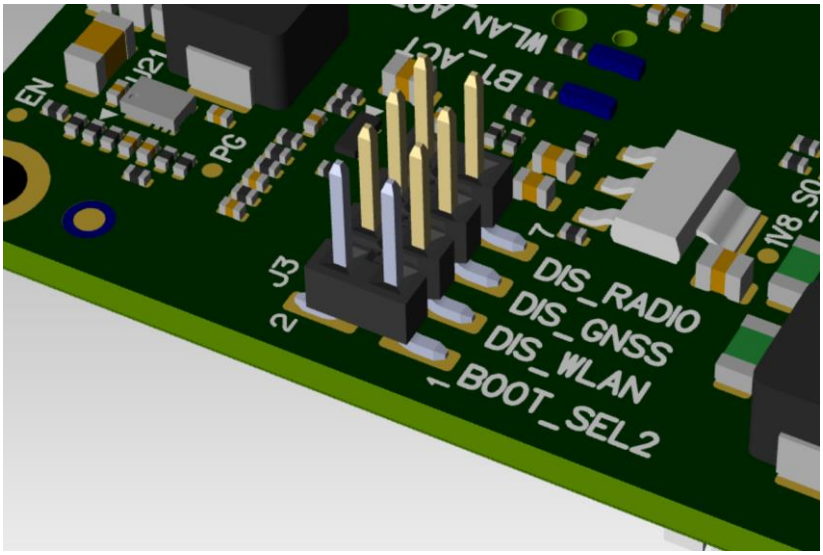
1-2 BOOT_SEL2# active – Booting from external BIOS Flash connected to J23 header.

3-4 M2W_EN_WLAN inactive – Disables Wifi and Bluetooth functionality of M.2 card in J9 slot.

5-6 W_DISABLE2# active – Turns off GNSS (satellite location radio) functionality of M.2 card in J29 slot.

7-8 W_DISABLE1# active – Turns off radio functionality of M.2 card in J29 slot to airplane mode.

2.54mm pin-header



J3 pin header pinout

Pin	Signal
1	BOOT_SEL2#
2	GND
3	M2W_EN_WLAN
4	GND
5	W_DISABLE2#
6	GND
7	W_DISABLE1#
8	GND

16. M.2 NVMe/SSD Connector (J2)

Compteq SMARC Carrier supports M.2 NVMe/SSD modules over connector J2. Module size 22 x 80mm is supported and optionally 22 x 42mm as well. Key B / Key M are supported. As default is assembled signal path for PCIe x1 NVMe using PCIe Port A of SMARC. As (BOM) option is possible to use SATA SSDs.

M.2 standard low profile connector



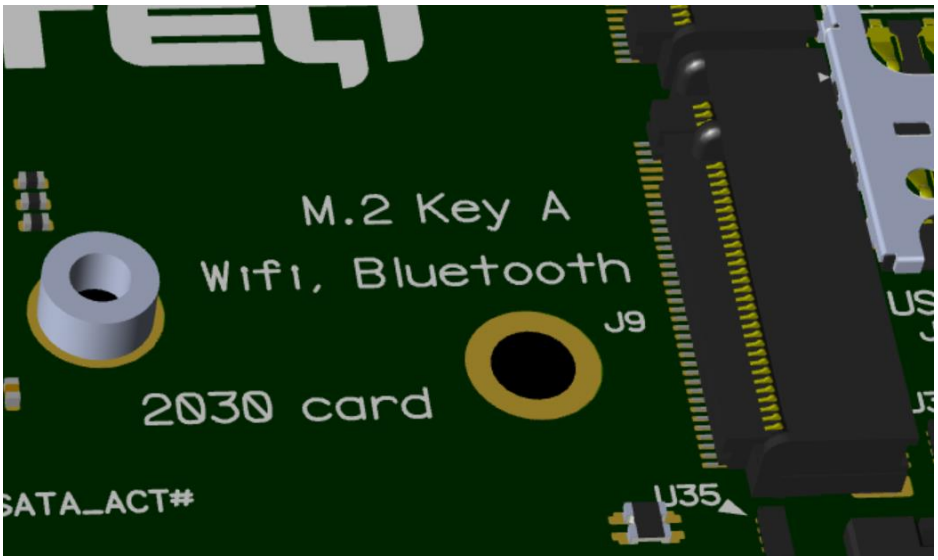
Pin	Signal
1	GND
2	V_3V3_S0
3	GND
4	V_3V3_S0
5	NC
6	NC
7	NC
8	NC
9	GND
10	M2_LED#
11	NC
12	V_3V3_S0
13	NC
14	V_3V3_S0
15	GND
16	V_3V3_S0
17	NC
18	V_3V3_S0
19	NC
20	NC
21	GND
22	NC
23	NC
24	NC
25	NC

26	NC
27	GND
28	NC
29	NC
30	NC
31	NC
32	NC
33	GND
34	NC
35	NC
36	NC
37	NC
38	M2A_DEVSLP
39	GND
40	NC
41	PCIE_A_RX- / SATA_RX+
42	NC
43	PCIE_A_RX+ / SATA_RX-
44	NC
45	GND
46	NC
47	PCIE_A_TX- / SATA_TX-
48	NC
49	PCIE_A_TX+ / SATA_TX+
50	PCIE_A_RST#
51	GND
52	PCIE_A_CLKREQ#
53	PCIE_A_REFCK-
54	PEWAKE_M2A#
55	PCIE_A_REFCK+
56	NC
57	GND
58	NC
59	NC
60	NC
61	NC
62	NC
63	NC
64	NC
65	NC
66	NC
67	NC
68	SUSCLK_M2A
69	PEDET_M2
70	V_3V3_S0
71	GND
72	V_3V3_S0
73	GND
74	V_3V3_S0
75	GND

17. M.2 WiFi/BT Connector (J9)

Compteq SMARC Carrier supports M.2 WiFi/BT modules over connector J9. Module key A/E size 22 x 30mm is supported. USB differential pair, which is used for BT on the M.2 module, is shared with USB port available on J20 by default. Connector uses PCIe Port C of SMARC and optionally USB Port 5 can be used (BOM option) for Bluetooth.

M.2 standard low profile connector



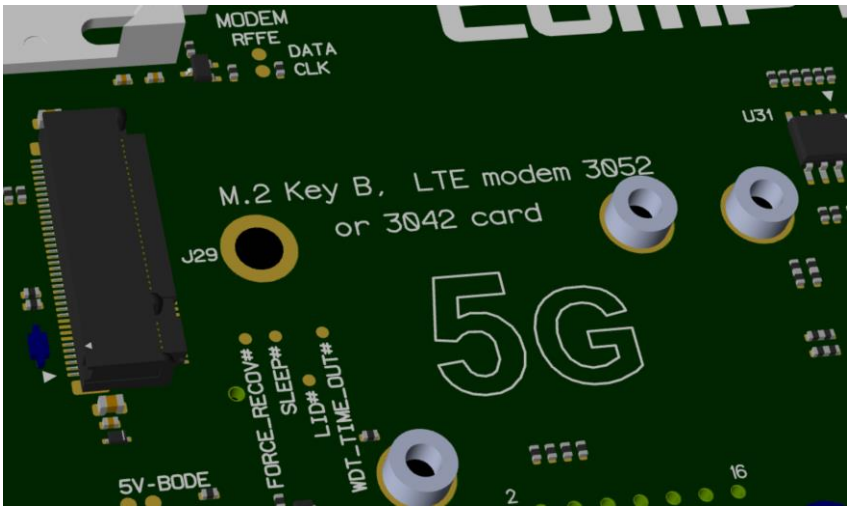
Pin	Signal
1	GND
2	V_3V3_S0_WLAN
3	USB5+
4	V_3V3_S0_WLAN
5	USB5-
6	WLAN_LED#
7	GND
8	NC
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC
16	BT_LED#
17	NC
18	GND
19	NC
20	NC
21	NC
22	NC
23	GND
24	GND
25	NC
26	NC
27	NC

28	NC
29	GND
30	GND
31	NC
32	NC
33	GND
34	NC
35	PCIE_C_TX+
36	GND
37	PCIE_C_TX-
38	NC
39	GND
40	NC
41	PCIE_C_RX+
42	NC
43	PCIE_C_RX-
44	COEX3
45	GND
46	COEX2
47	PCIE_C_REFCK+
48	COEX1
49	PCIE_C_REFCK-
50	SUSCLK_M2C
51	GND
52	PCIE_C_RST#
53	CLKREQ_M2W_3V3#
54	M2W_EN_WLAN
55	PCIE_WAKE#
56	M2W_EN_WLAN
57	GND
58	I2C_PM_DAT
59	NC
60	I2C_PM_CK
61	NC
62	SMB_ALERT#
63	GND
64	NC
65	NC
66	PCIE_C_RST#
67	NC
68	NC
69	GND
70	NC
71	NC
72	V_3V3_S0_WLAN
73	NC
74	V_3V3_S0_WLAN
75	GND

18. M.2 Modem Connector (J29, J30)

Compteq SMARC Carrier supports M.2 Modem modules over connector J29. Module key B size 30 x 52mm is supported, optionally may be used 30 x 42mm module size. There is also Micro SIM card holder J30 available. Connector uses PCIe Port C of SMARC and alternatively (BOM option) USB3.0 Port 2 can be also connected.

M.2 standard low profile connector



J29 Connector pinout

Pin	Signal
1	CONFIG_3
2	V_3V3_S0_M2
3	GND
4	V_3V3_S0_M2
5	GND
6	FULL_CARD_POWER_OFF#
7	USB2_M25G+
8	W_DISABLE1#
9	USB2_M25G-
10	WWAN_LED#
11	GND
12	NC
13	NC
14	NC
15	NC
16	NC
17	NC
18	NC
19	NC
20	NC
21	CONFIG_0
22	NC
23	PCIE_WAKE#
24	NC
25	DPR
26	W_DISABLE2#

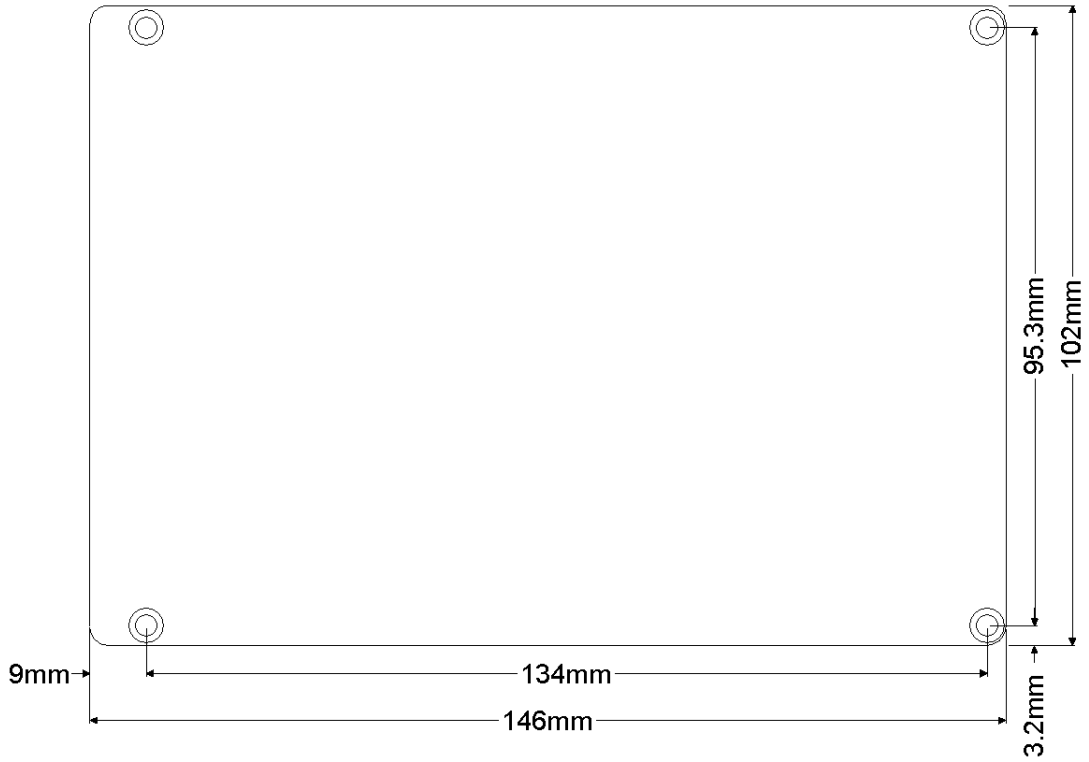
27	GND
28	NC
29	USB2_SSRX_M25G-
30	SIM_RESET
31	USB2_SSRX_M25G+
32	SIM_CLK
33	GND
34	SIM_DATA
35	USB2_SSTX_M25G-
36	SIM_VCC
37	USB2_SSTX_M25G+
38	DEVSLP
39	GND
40	NC
41	PCIE_B_RX-
42	NC
43	PCIE_B_RX+
44	NC
45	GND
46	NC
47	PCIE_B_TX-
48	NC
49	PCIE_B_TX+
50	PCIE_B_RST#
51	GND
52	PCIE_B_CLKREQ#
53	PCIE_B_REFCK_R-
54	PCIE_WAKE#
55	PCIE_B_REFCK_R+
56	NC
57	GND
58	NC
59	NC
60	COEX3
61	NC
62	COEX2
63	NC
64	COEX1
65	NC
66	SIM_DETECT
67	PCIE_B_RST#
68	SUSCLK_M2B
69	CONFIG_1
70	V_3V3_S0_M2
71	GND
72	V_3V3_S0_M2
73	GND
74	V_3V3_S0_M2
75	CONFIG_2

J30 Connector pinout

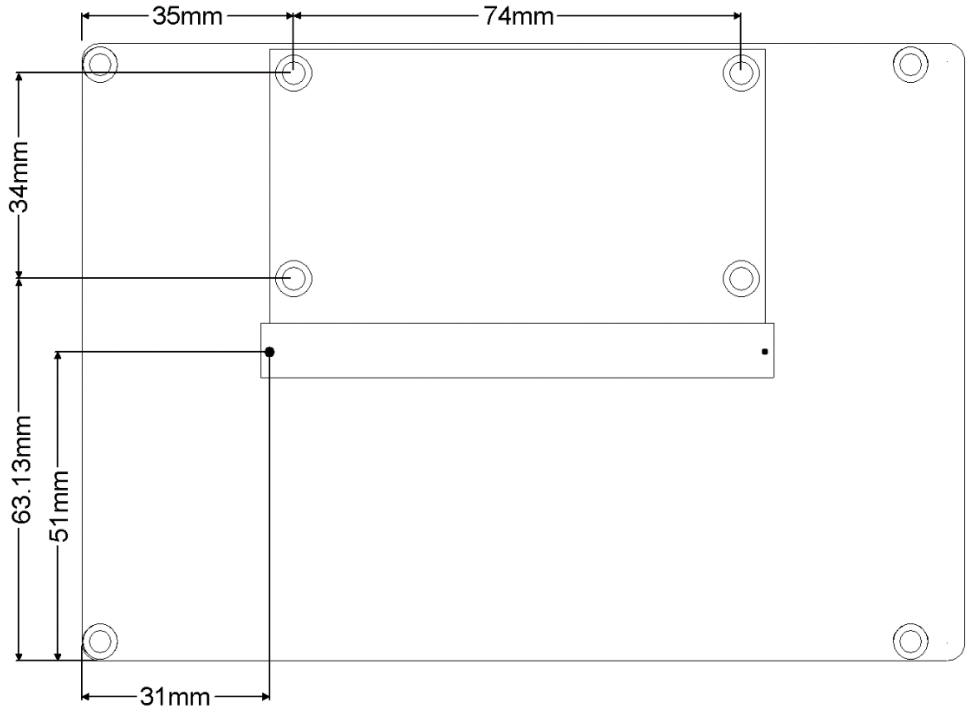
Pin	Signal
C1	SIM_VCC
C2	SIM_RESET
C3	SIM_CLK
C4	NC
C5	GND
C6	SIM_VCC
C7	SIM_DATA
C8	NC
D1	SIM_DETECT
D2	GND
S1	GND
S2	GND
S3	GND
S4	GND
S5	GND
S6	GND

19. Mechanical Drawings

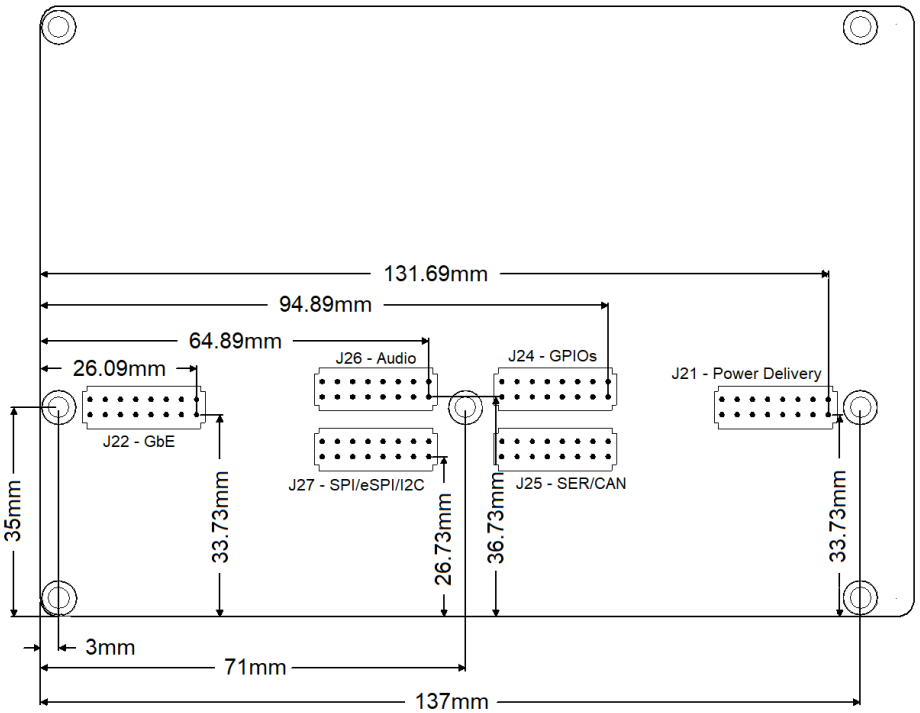
Carrier board is designed to directly fit in 3.5 inch chassis.



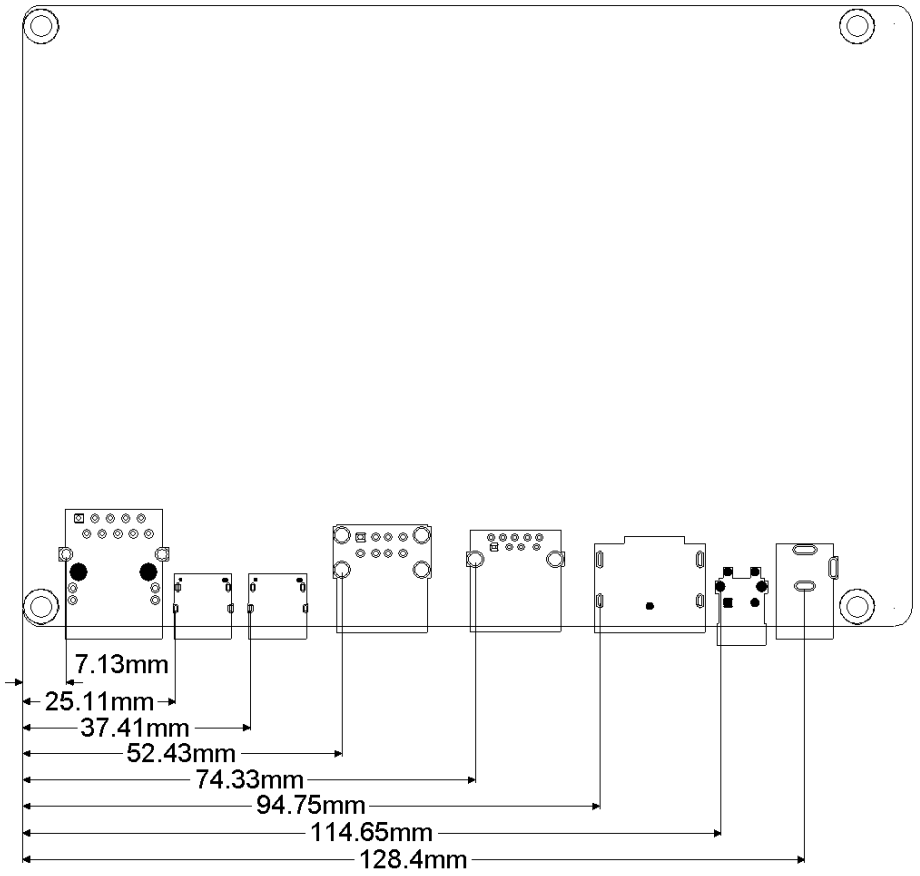
Picture 5 – Montage holes and dimensions



Picture 6 – SMARC module position and mounting holes

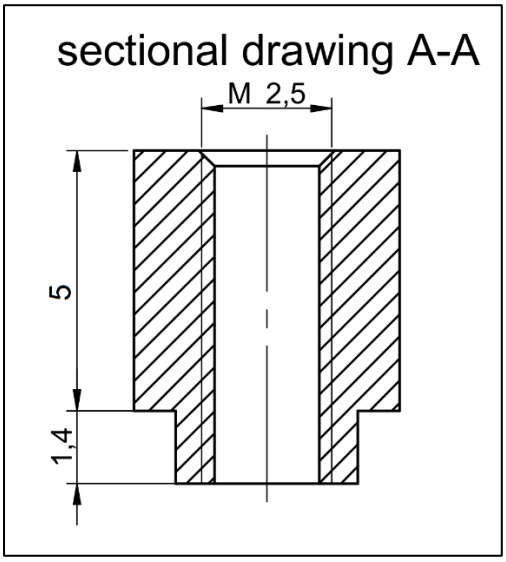


Picture 7 – Extension Board Connectors



Picture 8 – IO connectors

SMARC computer module is to the Compteq SMARC carrier board fixed with 4 x M2,5 screews which are screewed to the Steel spacer (see picture 9) which have internal thread M2.5. As a screews can be used for example Kraftberg PN: M2.5x12/D968B (Philips PH1 DIN 965).



Picture 9 Stell Spacer WE 9774050151R

20. Enviromental

Operational temperature -40°C – 85°C
Storage temperature -40°C – 85°C
Board was tested and validated acording EN50155

21. Declaration of Conformity

SMARC carrier board was fully validated acording Europien standards and CE declaration report was done. See document [4].

CE

COMPTEQ

EC Declaration of Conformity

Id-No.: COMP_DoC-20240201-1

The product/device described below:

Model Name:	Car. Board SMARC 2.1 x..x, (where "x" could be any alphanumeric character or blank)
Part Number:	CRB08-yyyyyy (where "y" could be any numeric character)
Description:	Industrial SMARC 2.1 carrier board
Remark:	-

Complies with the European Council Directive on the approximation of the laws of the member states relating to Electromagnetic Compatibility Directive 2014/30/EU, General Product Safety Directive 2001/95/EC, Low Voltage Directive 2014/35/EU and Restriction of Hazardous Substances in Electrical and Electronic Equipment, RoHS Directive 2011/65/EU + 2015/863/EU + 2017/2102/EU, or the latest status thereof.

Following standards are constitutional parts of the declaration:

EN IEC 62368-1:2020 + A11:2020	**Audio/video, information and communication technology equipment Part 1: Safety requirements**
EN 55032:2015 + A11:2020	**Electromagnetic compatibility of multimedia equipment - Emission Requirements**
EN 61000-6-2:2005 + AC:2005	**Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments**
EN IEC 61000-6-2:2019	**Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments**

The responsible party declares in the name of the producer that the equipment specified above conforms to the referenced rules, regulations and standards.

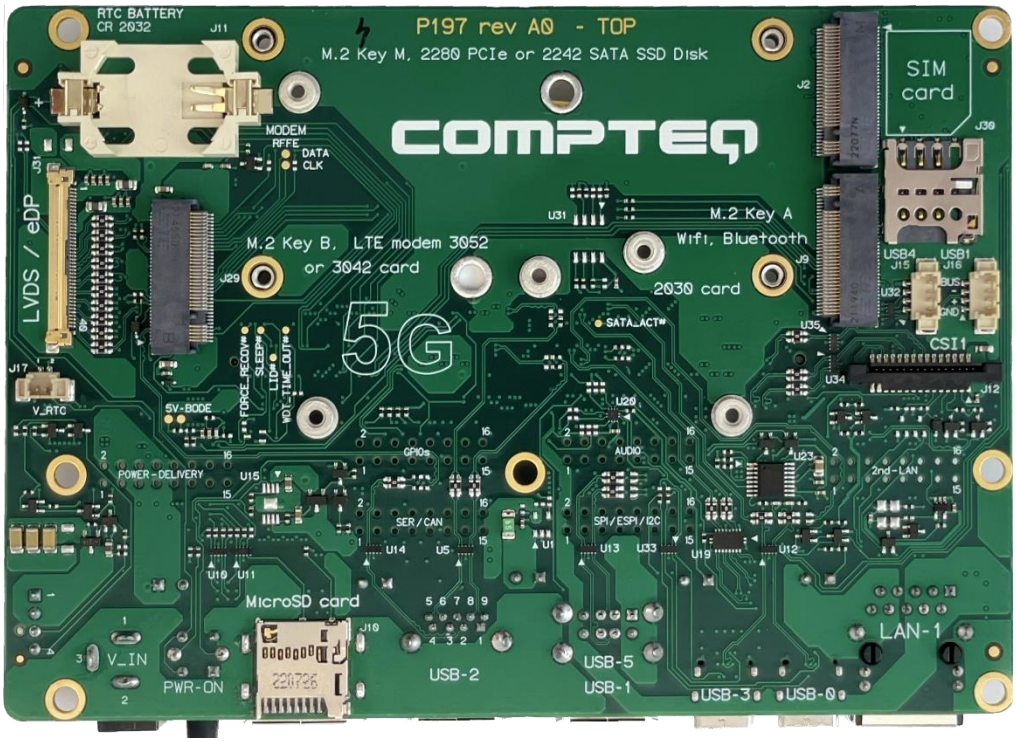
Date: 2024-02-01

Signature: _____

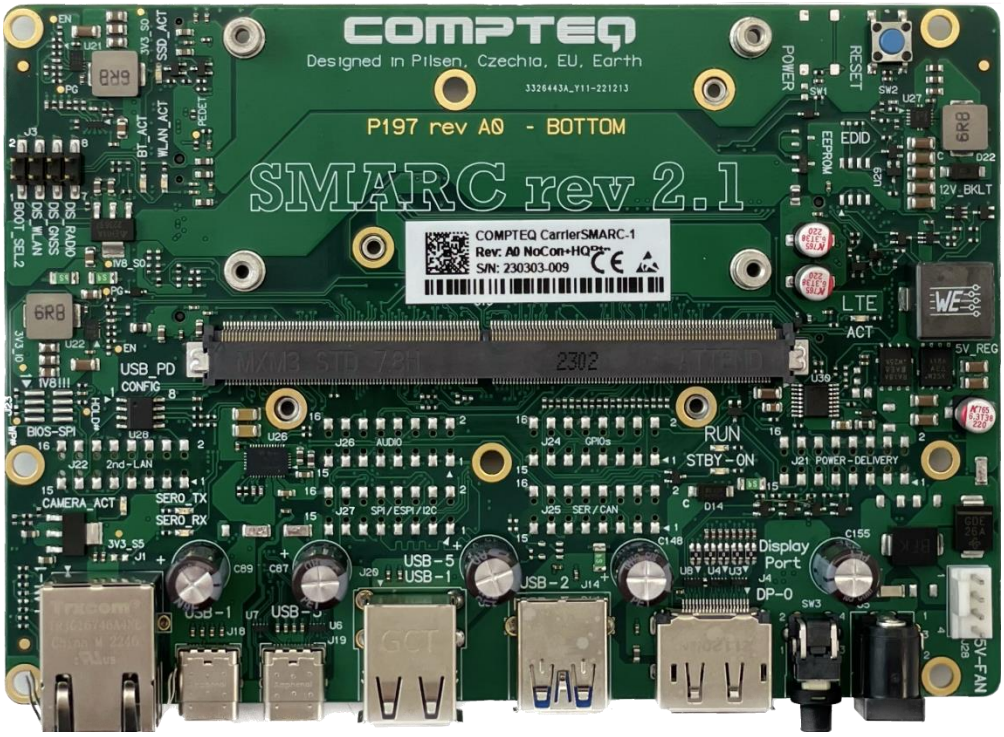
(Martin Pilař, CEO)

Compteq.io s.r.o. ● Teslova1120/1, 301 00 Plzeň, Czech Republic ● VAT ID: CZ 25 24 14 94
Registration court: Plzeň, file C12038 ● Management: Martin Pilař ● www.compteq.io

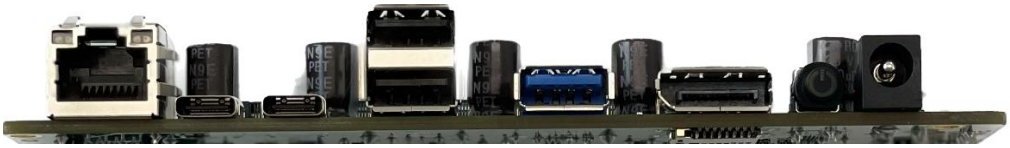
22. Photos



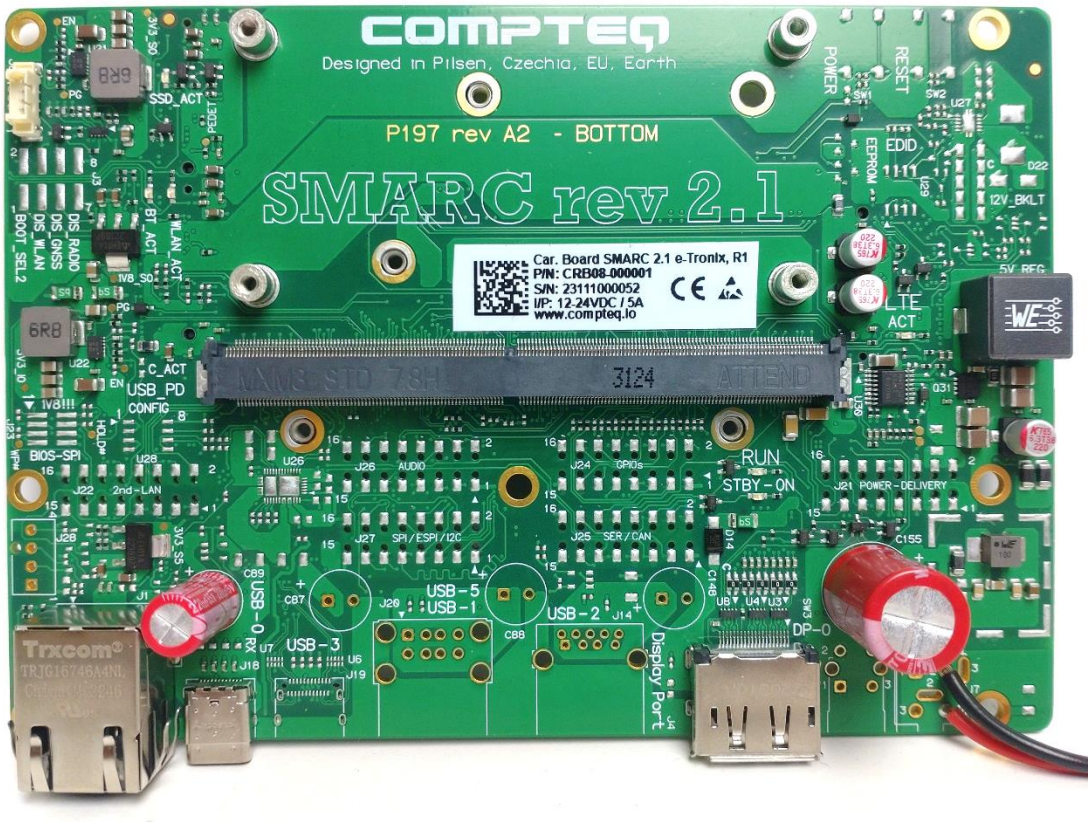
Picture 10 – SMARC carrier bottom view, Rev A0, Full assembly



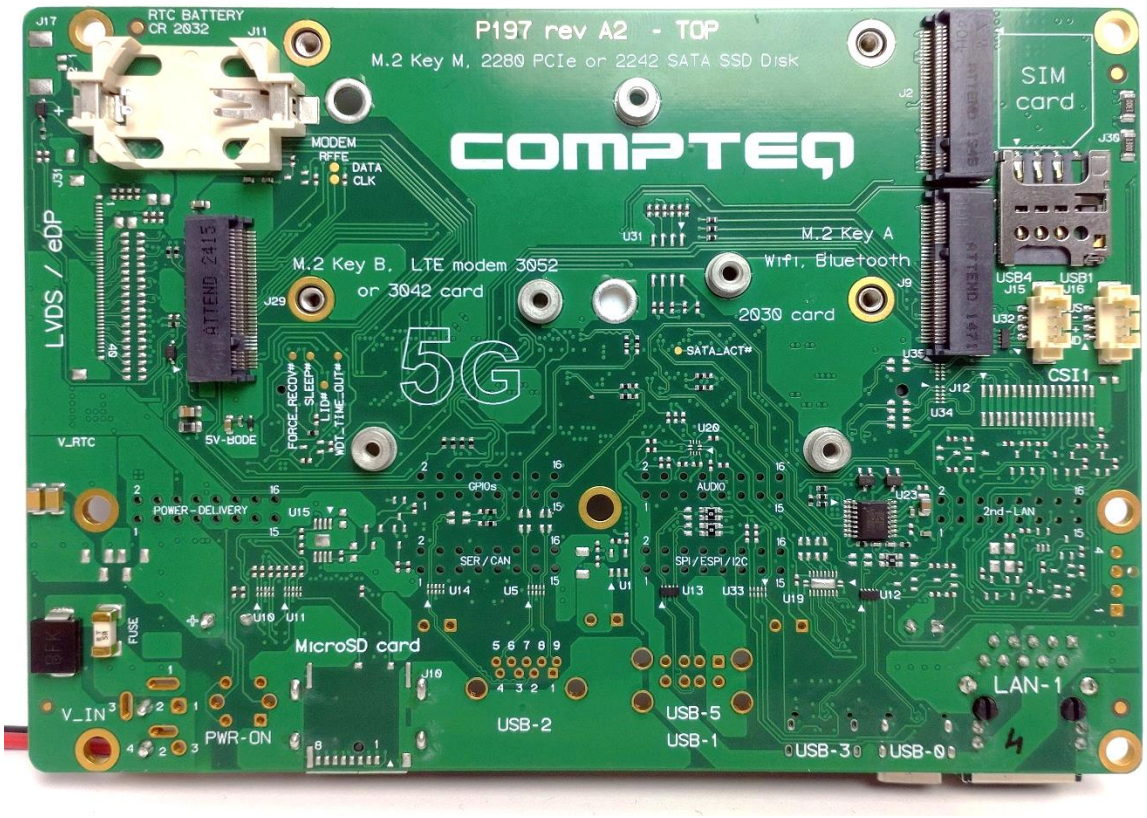
Picture 11 – SMARC carrier top view, Rev A0, Full assembly



Picture 12 – SMARC carrier connector view, Rev A0, Full assembly



Picture 13 SMARC carrier top view, Rev A2, customized assembly



Picture 14 Compteq SMARC carrier bottom view, Rev A2, customized assembly