SH-PCBM-1GC
QUADRO PLATFORM

Datasheet

24/07/2017

Summary

.1 REVISION HISTORY

Date	Revision	Author	Revision history
27/07/2017	V0	A.Valda	First draft

.2 INTRODUTCION

This datasheet provides a description of Arrow Quadro platform.

.3 DESCRIPTION

Quadro Platform is an evaluation board for PCBM-1GC Module who integrate many peripherals (ARM Cortex-R4, FLASH, RAM, MII, USB, SDIO, SPI, I2C, UART and others), JTAG debugger and Arduino Uno connectors to expand the functions of the board.
PCBM-1GC Module help developers create IoT applications by integrating also a dual band wireless LAN (Wi-Fi).
Ready to use lbireries provide support for necessary protocols, offering connectivity to leading cloud services, enabling interoperability with the existing ecosystem, and providing the flexibility to work with popular MCUs

.4 POWER SUPPLY

Quadro platform has two way to be powered: from micro USB connector and from Arduino Uno connectors.
Quadro platform can supply power for shield expansion boards

.4.1 USB

Board supply is received from USB bus with micro USB-B connector J10

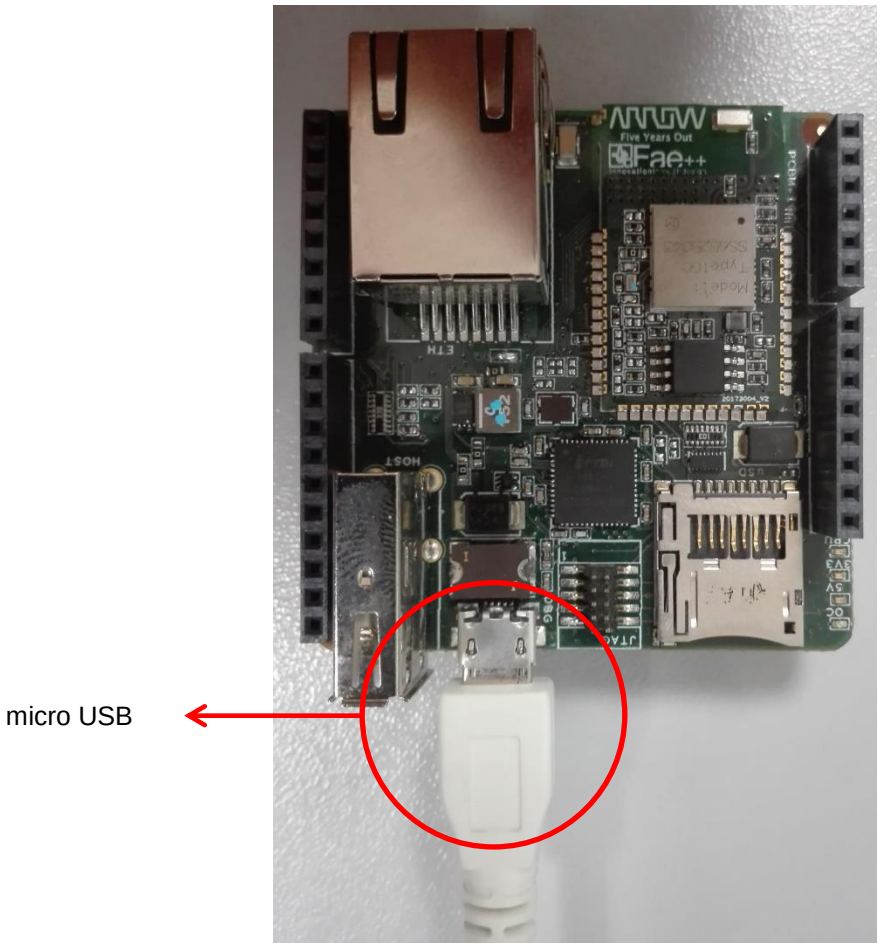


Figure 1

.4.2 Arduino Uno Connector

External 5V supply voltage by Arduino Uno connector on J3-5 pin

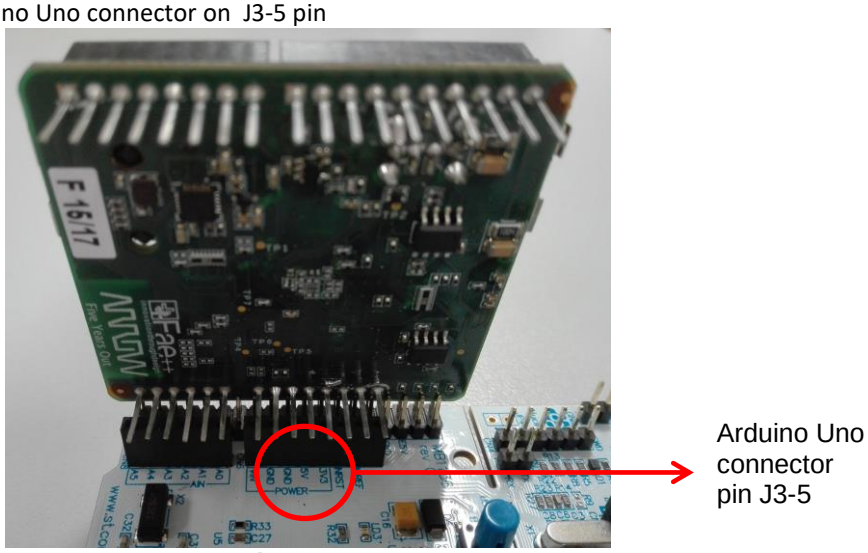


Figure 2

.4.3 Shield Power Supply

For enable 3V3 for power supply of shields you need to close R67 like a jumper solder

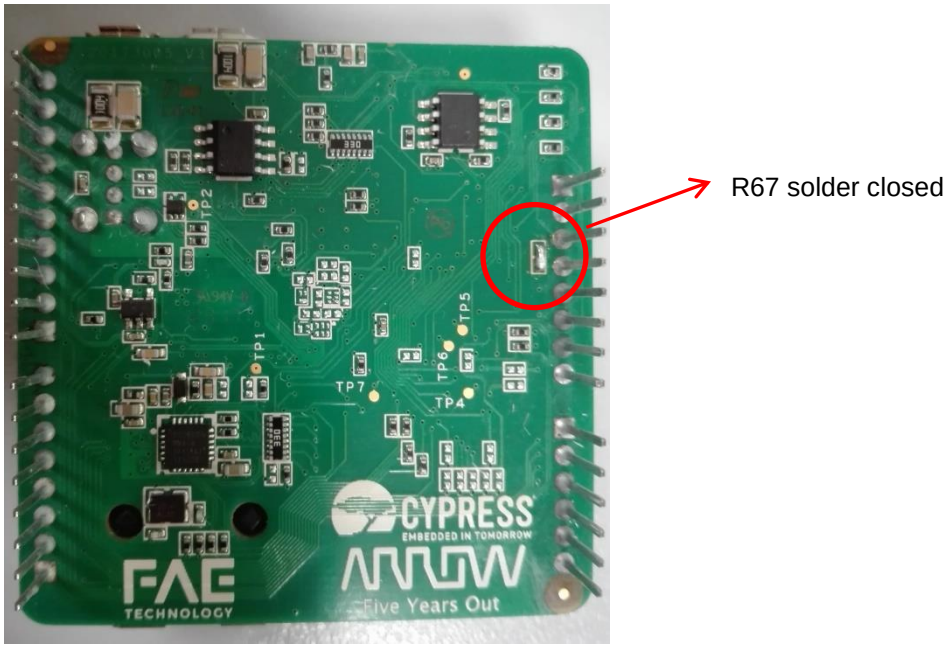


Figure 3

Quadro platform can be used as a standalone device or as a Master controller for other shields (with Arduino Uno connector) or as a shiled expansion board

.4.4 Standalone

Quadro platform can work as standalone board, can be powered with micro USB connector and can be used with application such as Ethernet-Usart Bridge

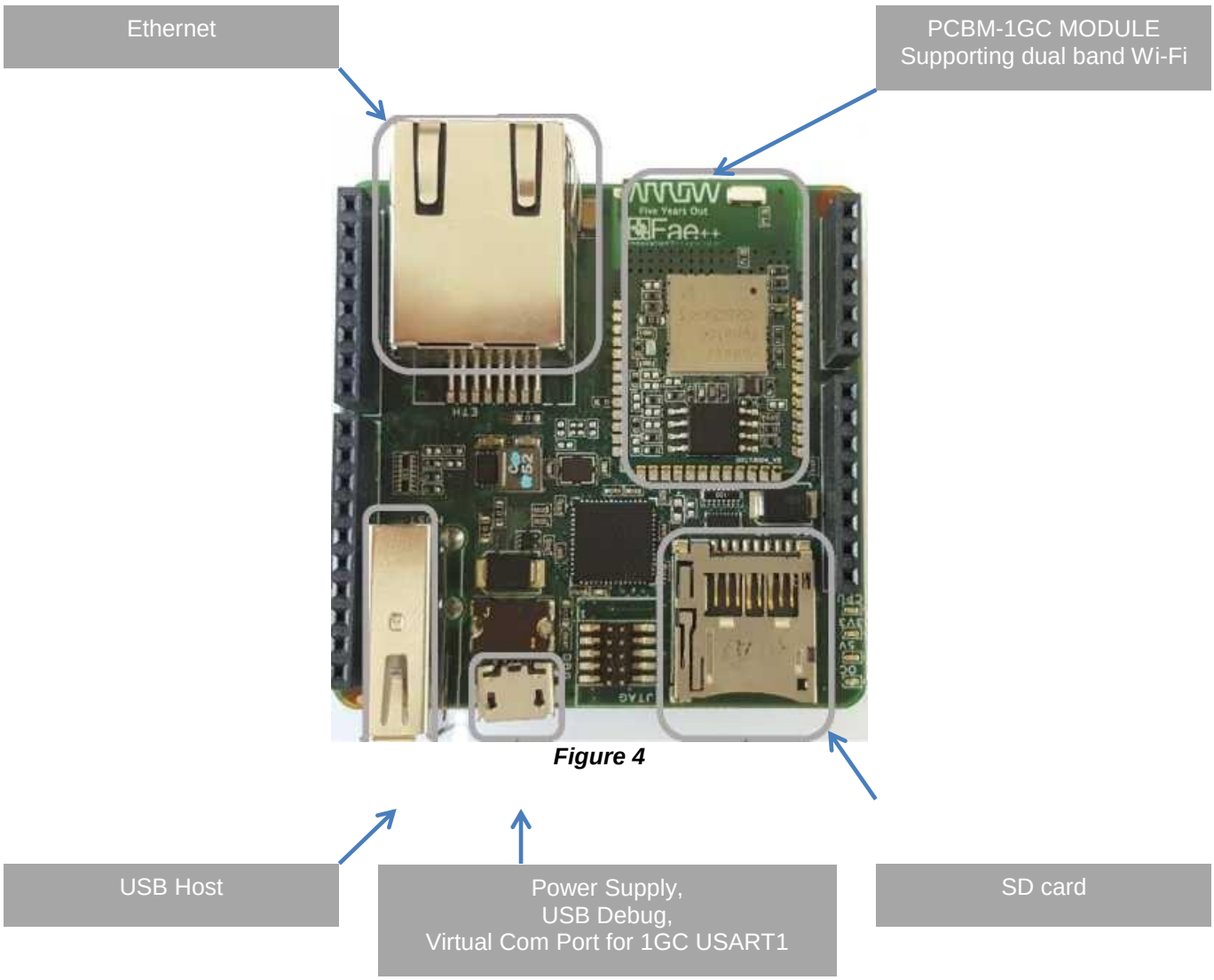


Figure 4

.4.5 Quadro Platform as a Master for control shield expansion board

This is an example with X-NULCEO-IKS01A1 a motion MEMS and environmental sensor expansion a shield board connected to Quadro platform

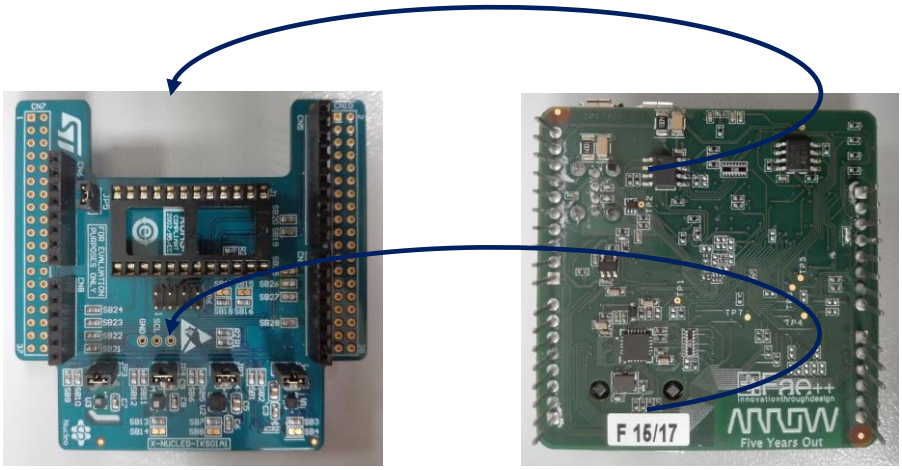


Figure 5

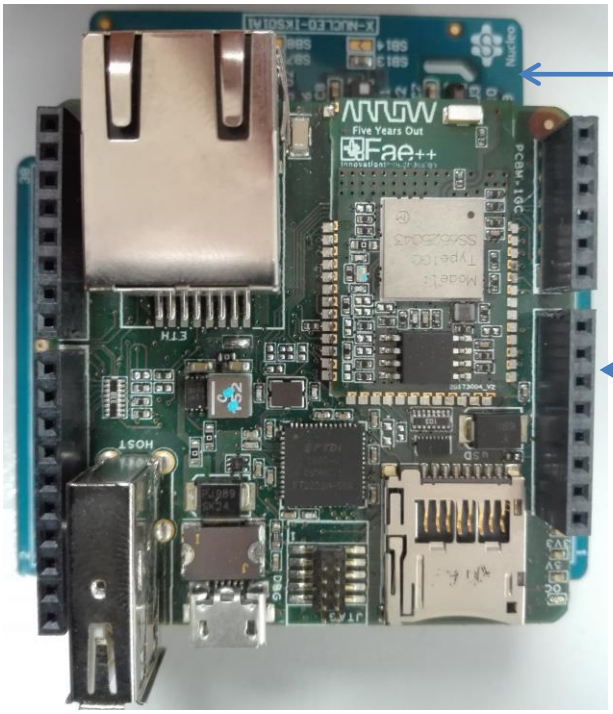


Figure 6

.4.6 Quadro as a Shiels

This is an example with a ST nucleo board who control Quadro polatform such as shield expansion board

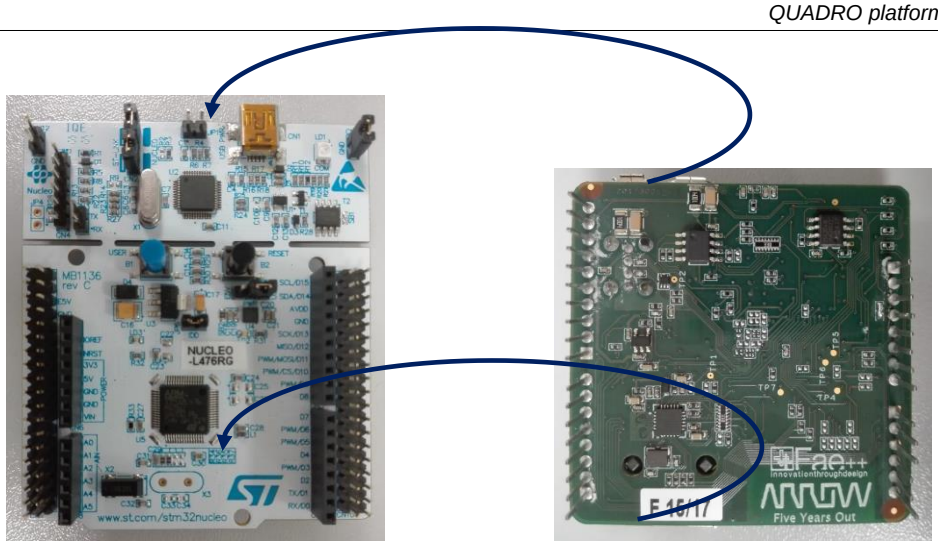
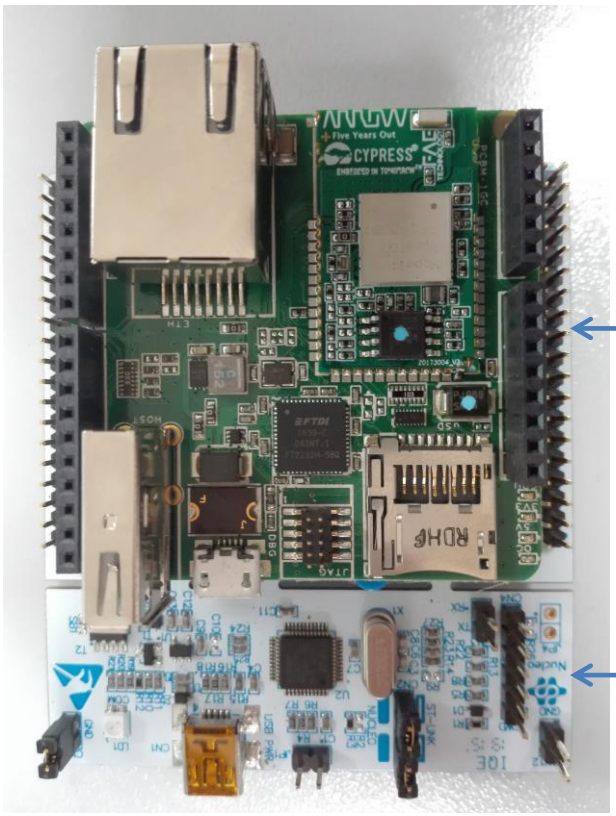


Figure 7



Quadro platform as a Shield of ST nucleo Board

ST Nucleo Board controlling **Quadro** as a shield

Figure 8

.5 HARDWARE & COMPONENTS DETAIL

.5.1 Embedded Debugger

Quadro incorporates the OpenOCD debugger and so it is capable not only to download the firmware but also to debug it with the main development tools.

.5.2 MODULE CORE (PCBM-1GC)

- Processor: ARM Cortex-R4
- Chipset: Cypress (CYW43907)
- 2.4GHz & 5GHz Wi-Fi / Ethernet Module
- Network Topology: AP & STA dual mode
- Modulation: DSSS / CCK / OFDM

.5.3 Peripherals

.5.3.1 Eeprom with Node Identity

2K SPI Bus Serial EEPROMs with EUI-48™ or EUI-64™ Node Identity.
The 25AA02E48/25AA02E64 (25AA02EXX) is a 2 Kbit Serial Electrically Erasable Programmable Read-Only Memory (EEPROM). The memory is accessed via a simple Serial Peripheral Interface (SPI) compatible serial bus. The bus signals required are a clock input (SCK) plus separate data in (SI) and data out (SO) lines. Access to the device is controlled through a Chip Select (CS) input.

.5.3.2 Ethernet PHY

The Quadro platform supports 10/100-Mbit Ethernet communication using PHY KSZ8081RNAIA from MICROCHIP and a integrated RJ45 connector. Ethernet PHY is connected to Quadro via an RMII interface.
The oscillator X2 generates a 25 MHz clock for the PHY, the PHY RMII_REF_CLK generates the 50 MHz clock for the Quadro.

.5.3.3 USB Host

Quadro platform supports USB HOST communication via USB Type A connector.
The Quadro platform can be powered by the USB connectors at 5V DC with 500 mA current limitation.
A USB power switch is also connected on VBUS and provides power from J9.
The red LED LD4 is lit when an overcurrent occurs

.5.3.4 uSD card

A microSD card can be connected to SDMMC2 port of Quadro platform.

.5.3.5 FTDI

OpenOCD integrated

Virtual-COM port connected to USART1

.6 SYSTEM REQUIREMENTS

Windows
OSX
Linux 32-bit
Linux 64-bit

.7 DEVELOPMENT TOOLCHAINS

Cypress's WICED® (Wireless Connectivity for Embedded Devices) is a full-featured platform with proven Software Development Kits (SDKs) and turnkey hardware solutions from partners to readily enable Wi-Fi and Bluetooth® connectivity in system design.

The new WICED Studio is the only SDK for the Internet of Things (IoT) that combines Wi-Fi and Bluetooth into a single integrated development environment.

In addition to providing WICED APIs and an application framework designed to abstract complexity, WICED Studio also leverages many common industry standards.

Benefits/Features:

- Runs on Windows®, Mac® OS X®, and Linux® through Eclipse®-based integrated development environment (IDE)
- Single installer package with support for:
    - Wi-Fi + Bluetooth combo solution
    - Wi-Fi solutions

  - Bluetooth (Basic Rate, Enhanced Data Rate and Bluetooth Low Energy)

- Sample applications for many popular use cases like
  - Connecting to cloud services
  - Audio-over-Bluetooth/Wi-Fi
  - Low-power BLE-based sensors and beacons
  - Smart home gateways
- Code snippets to understand WICED APIs
- Applications for manufacturing and certification

.8 HARDWARE LAYOUT AND CONFIGURATION

The Quadro Board board is designed around the PCBM-1GC. The hardware block diagram (see Figure 9) illustrates the connections between the PCBM-1GC and the peripherals (EEPROM, USB HOST connectors, USART, Ethernet, microSD card, Arduino Uno shields, FTDI for OpenOCD debugger).
Figure 10 help users to locate these features on the discovery board.
The mechanical dimensions of the discovery board are showed in Figure 11 and Figure 12

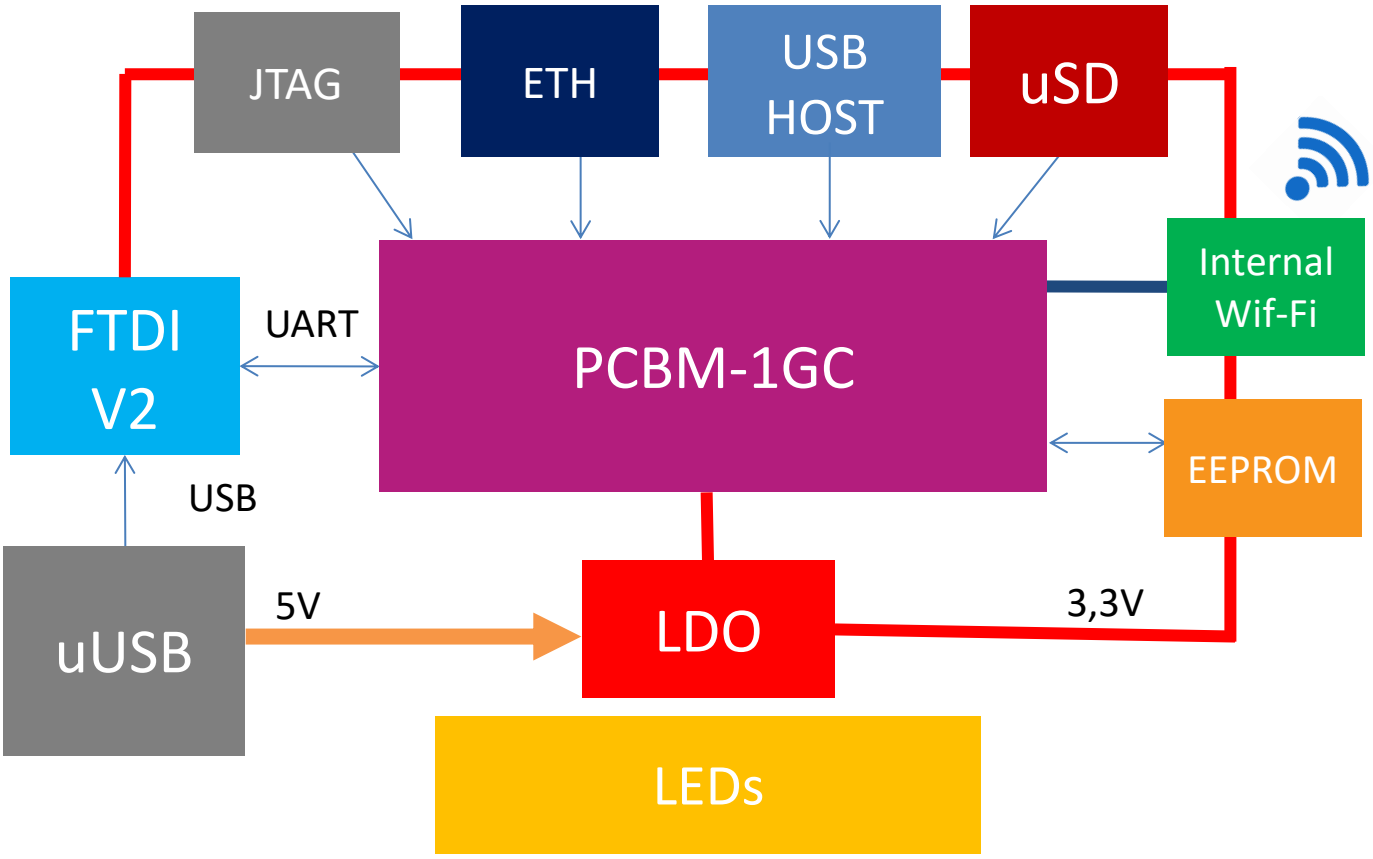


Figure 9

.8.1 Board Layout

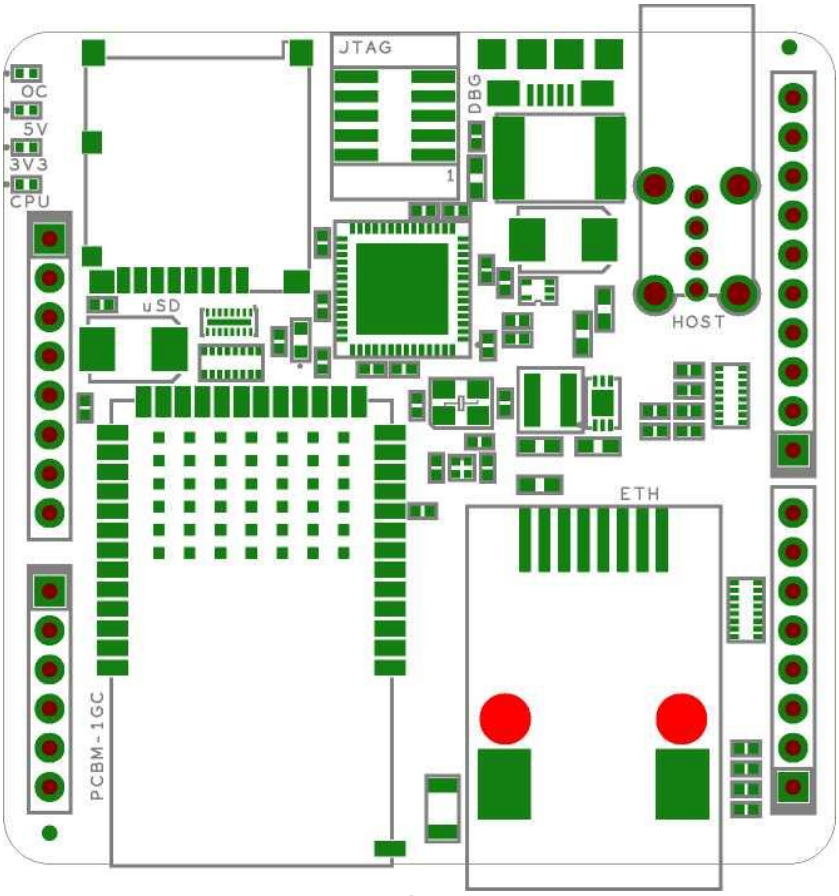


Figure 10

.8.2 The Quadro board mechanical drawing

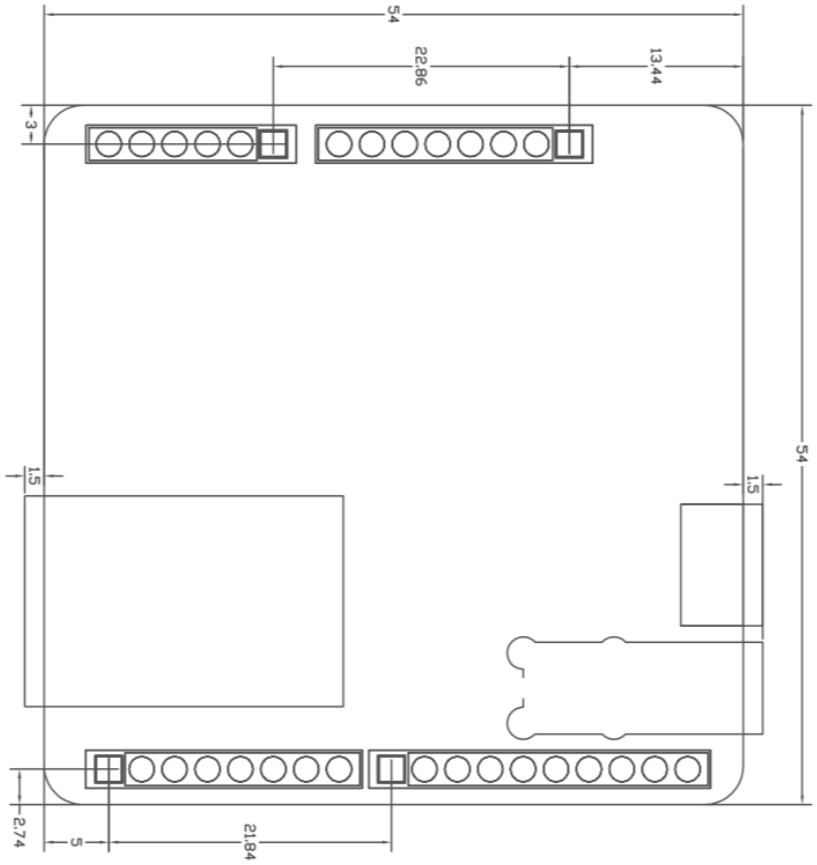


Figure 11

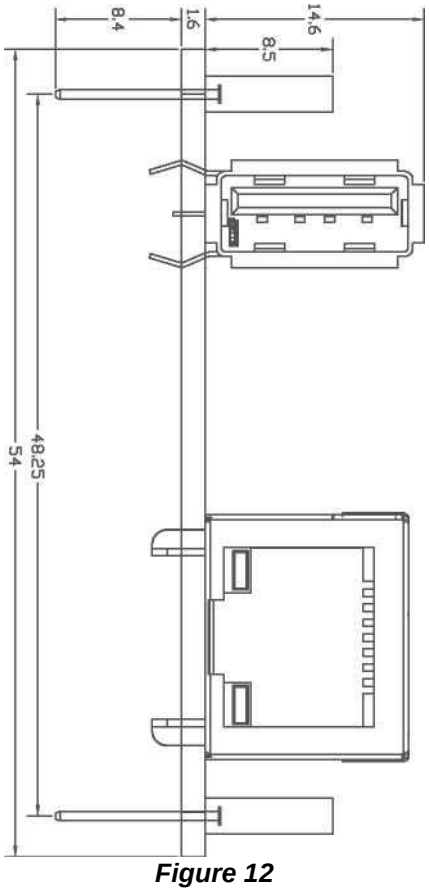


Figure 12

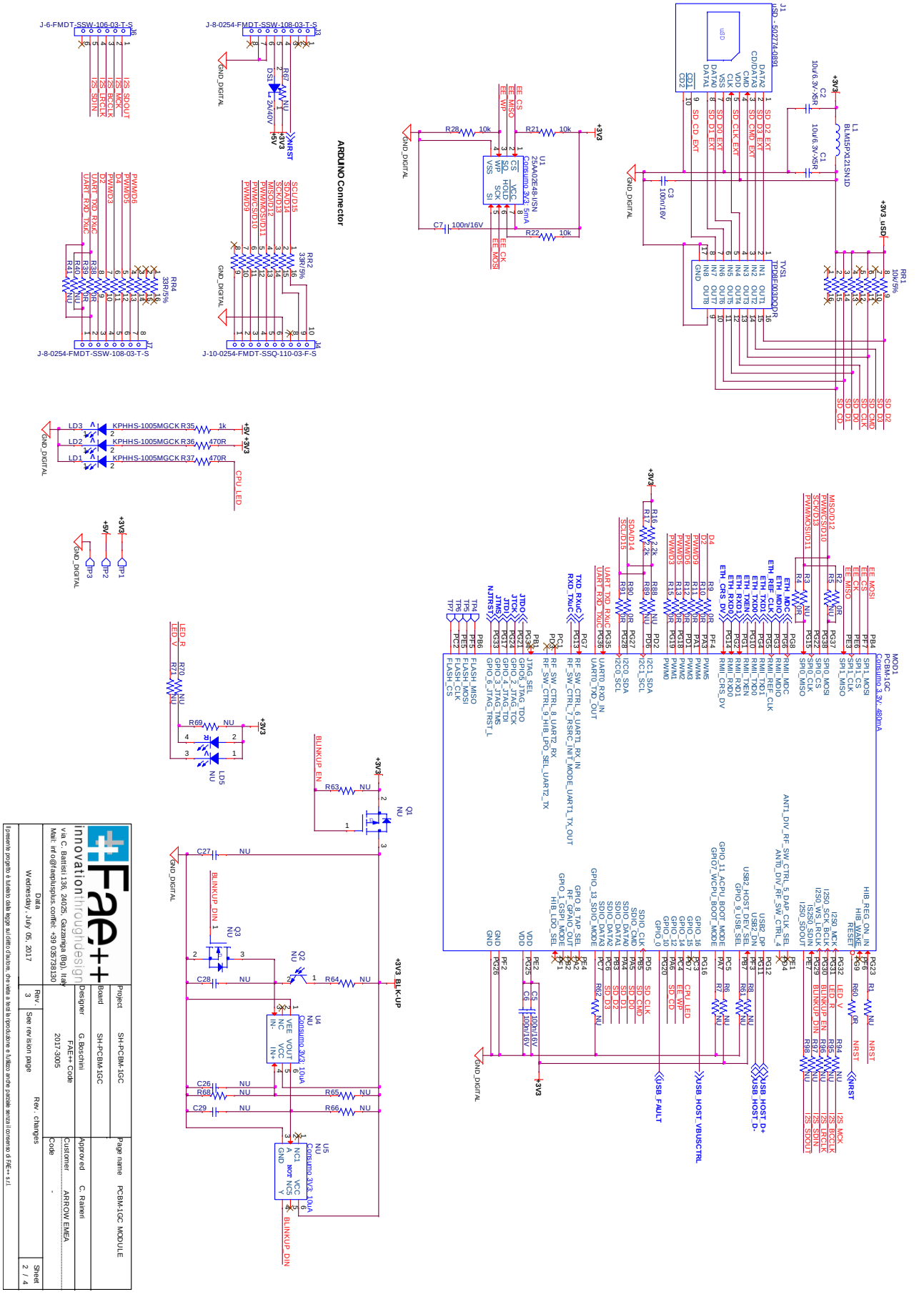
.8.3 Arduino connectors on Quadro Platform

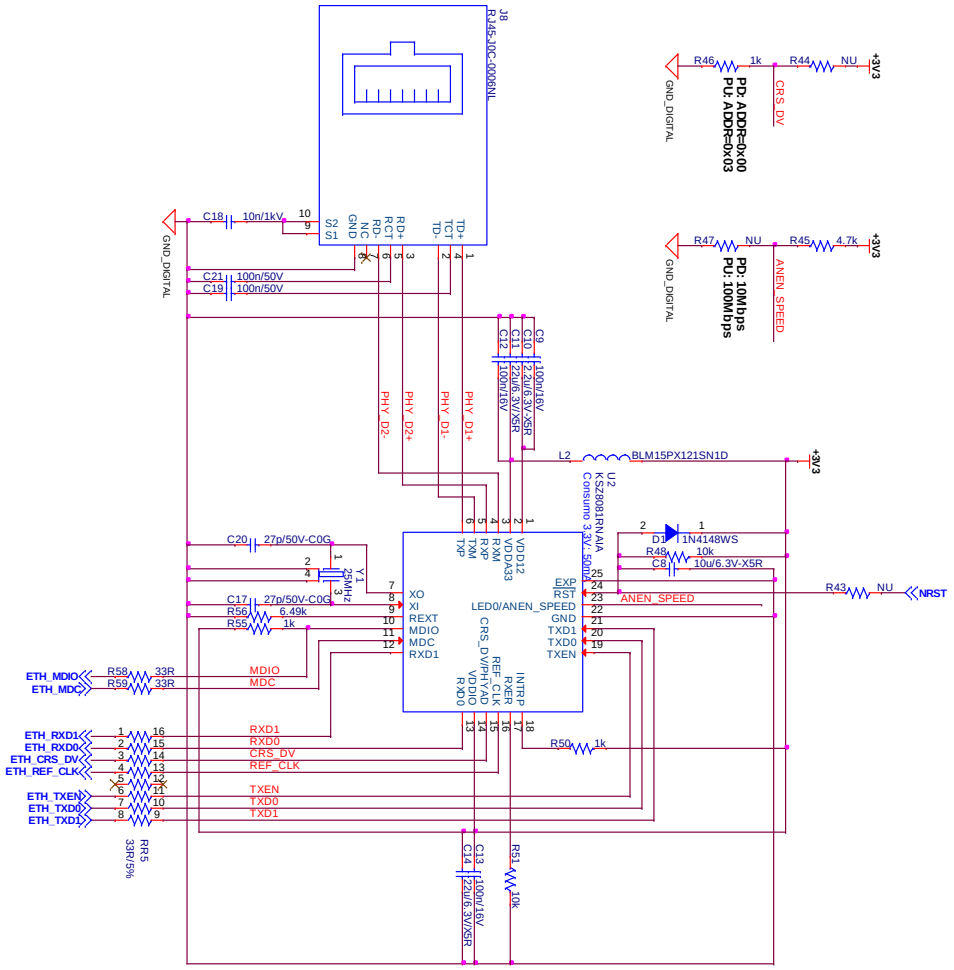
Connector	Pin	Pin name	1GC pin	Function
Left connectors				
J3 Power	1	NC	-	-
	2	IOREF	-	-
	3	RESET	RESET	RESET
	4	+3.3V	-	3.3V input/output
	5	+5V	-	5V input
	6	GND	-	Ground
	7	GND	-	Ground
	8	VIN	-	-
J6	1	A0	I2S0_SDOUT	I2S_SDOUT
	2	A1	I2S0_MCK	I2S_MCK
	3	A2	I2S0_SCK_BCLK	I2S_BCCLK
	4	A3	I2S0_WS_LRCLK	I2S_LR_CLK
	5	A4	IS2S0_SDIN	I2S_SDIN
	6	A5	-	-
Right connectors				
J4	10	D15	I2C0_SCL	SCL
	9	D14	I2C0_SDA	SDA
	8	AREF	-	-
	7	GND	-	Ground
	6	D13	SPI0_CLK	SPI CLK
	5	D12	SPI0_MISO	SPI MISO
	4	D11	SPI0_MOSI	SPI MOSI
	3	D10	SPI0_CS	SPI CS
	2	D9	PWM3	PWM
	1	D8	-	-
J7	8	D7	-	-
	7	D6	PWM2	PWM
	6	D5	PWM1	PWM
	5	D4	PWM5	PWM
	4	D3	PWM0	PWM
	3	D2	PWM4	PWM
	2	D1	UART0_RXD_IN	UART RX
	1	D0	UART0_TXD_OUT	UART TX

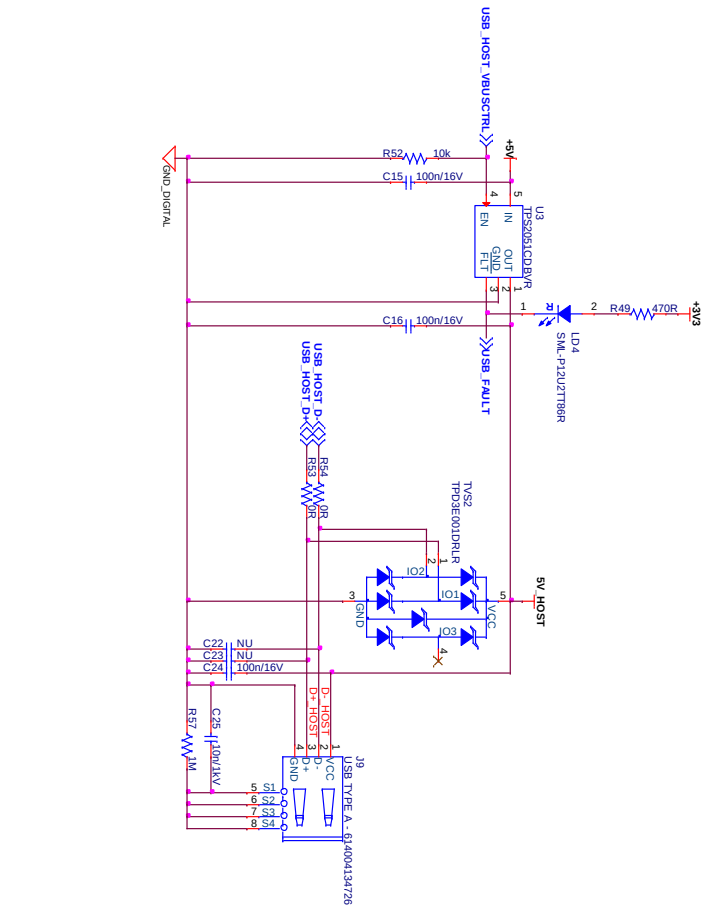
.8.4 Solder Bridges

Bridge	State	Description
R6	CLOSE	ACPU_BOOT_MODE (SOCSRAM)
	OPEN	ACPU_BOOT_MODE (SOCROM)
R7	CLOSE	WCPU_BOOT_MODE (TCROM)
	OPEN	WCPU_BOOT_MODE (TCMSRAM)
R94	CLOSE	I2S are connected to J6
	OPEN	I2S are disconnected from J6
R95	CLOSE	I2S are connected to J6
	OPEN	2S are disconnected from J6
R96	CLOSE	I2S are connected to J6
	OPEN	2S are disconnected from J6
R97	CLOSE	I2S are connected to J6
	OPEN	2S are disconnected from J6
R98	CLOSE	I2S are connected to J6
	OPEN	2S are disconnected from J6
R8	CLOSE	USB2_HOST_DEV_SEL (USB Device)
	OPEN	USB2_HOST_DEV_SEL (USB Hos)
R61	CLOSE	USB_SEL (HSIC PHY)
	OPEN	USB_SEL (USB PHY)
R62	CLOSE	SDIO_MODE
	OPEN	SDIO_MODE
R2	CLOSE	MOSI swapped with MISO on J4 (R5 must be open)
	OPEN	
R3	**CLOSE**	MOSI connected to MOSI on J4 (R4 must be open)
	OPEN	
R4	CLOSE	MISO swapped with MOSI on J4 (R3 must be open)
	OPEN	
R5	**CLOSE**	MISO connected to MISO on J4 (R2 must be open)
	OPEN	

.9 SCHEMATICS

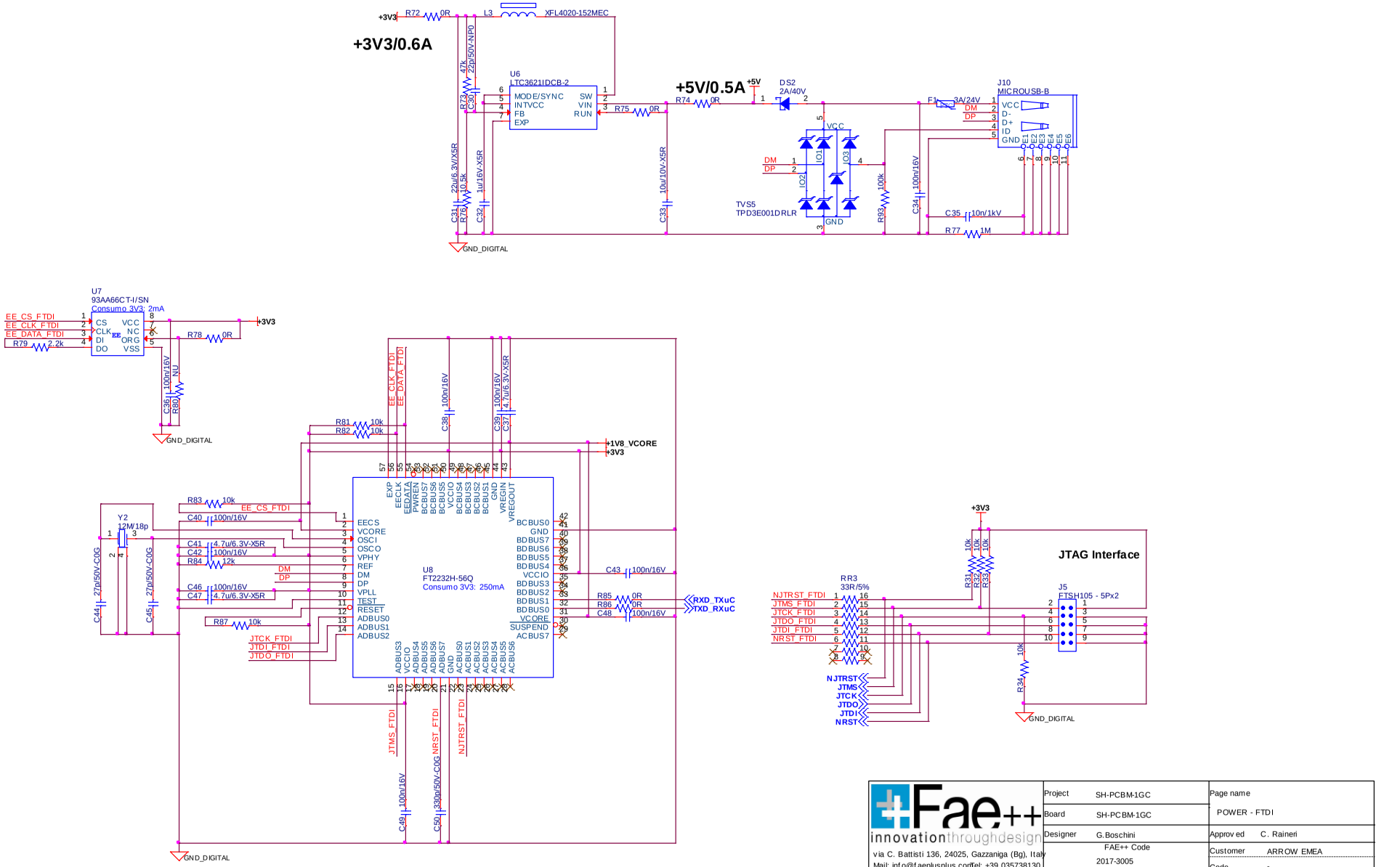






Project	SH-PCBM-1GC	Page name	ETHERNET - USB
Board	SH-PCBM-1GC		
Designer	G.Boschini	Approved	C. Raineri
FAE++ Code	2017-3005	Customer	AR ROW EMEA
Code	-		
Rev. changes	See revision page	Rev.	3
Data	Tuesday, May 09, 2017	Sheet	3 / 4

fae++ innovationthroughdesign
via C. Battisti 136, 24025, Gazzaniga (Bg), Italy
Mail: info@faeplusplus.com Tel: +39 035738130



Fae++ innovationthroughdesign via C. Battisti 136, 24025, Gazzaniga (Bg), Italy Mail: info@faeplusplus.com Tel: +39 035738130	Project	SH-PCBM-1GC	Page name
	Board	SH-PCBM-1GC	POWER - FTDI
	Designer	G.Boschini	Approved C. Raineri
	FAE++ Code	2017-3005	Customer ARROW EMEA
			Code -
Data Tuesday, May 09, 2017	Rev. 3	Rev. changes See revision page	Sheet 4 / 4

.10 ABSOLUTE MAXIMUM RATING

	min	max	unit
Supply voltage	4.40	5.25	V
Storage Temperature	-40	85	deg.C

.11 OPERATING CONDITION

	min	typ	max	unit
Operating Temperature Range	-20	-	70	deg.C
Supply voltage (From USB)	4.40	5.0	5.25	V
Supply voltage (From J3.5)	4.50	5.0	5.25	V
SDIO Interface I/O Pins	**min**	**typ**	**max**	**unit**
Input high voltage – VIH	0.625xVDD	-	-	V
Input low voltage – VIL	-	-	0.25xVDD	V
Output high voltage@2mA – VOH	0.75xVDD	-	-	V
Output low voltage@2mA – VOL	-	-	0.125xVDD	V
Other SDIO Digital I/O Pins	**min**	**typ**	**max**	**unit**
Input high voltage – VIH	2.0	-	-	V
Input low voltage – VIL	-	-	0.8	V
Output high voltage@2mA – VOH	VDD-0.4	-	-	V
Output low voltage@2mA – VOL	-	-	0.4	V
RF Switch control Output Pins	**min**	**typ**	**max**	**unit**
Output high voltage@2mA – VOH	VDD-0.4	-	-	V
Output low voltage@2mA – VOL	-	-	0.4	V
Input capacitance	-	-	5	pF
GPIO, UART, JTAG Interface	**min**	**typ**	**max**	**unit**
Input high voltage – VIH	2.0	-	VDD+0.5	V
Input low voltage – VIL	-0.5	-	0.8	V
Output high voltage@2mA – VOH	2.4	-	-	V
Output low voltage@2mA – VOL	-	-	0.4	V

.12 RF CHARACTERISTICS

.12.1 CHARACTERISTICS for IEEE802.11b

Test conditions: 25deg.C – VDD=+3.3V – 11Mbps mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11b			
Mode	CCK			
Frequency	2400 – 2483.5MHz			
Output Power Setting	17.0 dBm			
DC Current Characteristics	**min**	**typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	380	480	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	15.0	17.0	19.0	dBm
Spectrum Mask Margin 1st side lobes (-30dBr)	0	10	-	dB
Spectrum Mask Margin 2nd side lobes (-50dBr)	0	10	-	dB
Power-on and Power-down ramp	-		2.0	usec
RF Carrier Suppression	15	-	-	dB
Modulation Accuracy (EVM)	-	23	35	%
Frequency tolerance	-20	-5	20	ppm
Out band Spurious Emissions 30MHz to 1GHz (BW=100kHz)	-	-	-36	dBm
Out band Spurious Emissions 1GHz to 12.75GHz (BW=1MHz)	-	-	-30	dBm
Out band Spurious Emissions 1.8GHz to 1.9GHz (BW=1MHz)	-	-	-47	dBm
Out band Spurious Emissions 5.15GHz to 5.3GHz (BW=1MHz)	-	-	-47	dBm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (FER < 8%)	-	-89	-76	dBm
Maximum Input Level (FER < 8%)	-10	-	-	dBm
Adjacent Channel Rejection (FER < 8%)	35	-	-	dB

*1: Defined when output power setting is 17dBm at Murata module antenna pad

*2: Datarate is 1Mbps

.12.2 CHARACTERISTICS for IEEE802.11g

Test conditions: 25deg.C – VDD=+3.3V – 54Mbps mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11g			
Mode	OFDM			
Frequency	2400 – 2483.5MHz			
Output Power Setting	13.0 dBm			
DC Current Characteristics	**min**	**typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	320	420	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	11.0	13.0	15.0	dBm
Spectrum Mask Margin 9MHz to 11MHz (0 ÷ -20dBr)	0	13	-	dB
Spectrum Mask Margin 11MHz to 20MHz (-20 ÷ -28dBr)	0	13	-	dB
Spectrum Mask Margin 20MHz to 30MHz (-28 ÷ -40dBr)	0	14	-	dB
Spectrum Mask Margin 30MHz to 33MHz (-40dBr)	0	14	-	dB
Constellation Error (EVM)	-	-36	-25	dB
Frequency tolerance	-20	-5	20	ppm
Out band Spurious Emissions 30MHz to 1GHz (BW=100kHz)	-	-	-36	dBm
Out band Spurious Emissions 1GHz to 12.75GHz (BW=1MHz)	-	-	-30	dBm
Out band Spurious Emissions 1.8GHz to 1.9GHz (BW=1MHz)	-	-	-47	dBm
Out band Spurious Emissions 5.15GHz to 5.3GHz (BW=1MHz)	-	-	-47	dBm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (PER < 10%)	-	-77	-65	dBm
Maximum Input Level (PER < 10%)	-12	-	-	dBm
Adjacent Channel Rejection (PER < 10%)	-1	-	-	dB

*1: Defined when output power setting is 13dBm at Murata module antenna pad

*2: Datarate is 6Mbps

.12.3 CHARACTERISTICS for IEEE802.11n

Test conditions: 25deg.C – VDD=+3.3V – 65Mbps (MCS7) mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11n			
Mode	OFDM			
Frequency	2400 – 2483.5MHz			
Output Power Setting	12.0 dBm			
DC Current Characteristics	**min**	**typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	310	410	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	10.0	12.0	14.0	dBm
Spectrum Mask Margin 9MHz to 11MHz (0 ÷ -20dBr)	0	13	-	dB
Spectrum Mask Margin 11MHz to 20MHz (-20 ÷ -28dBr)	0	13	-	dB
Spectrum Mask Margin 20MHz to 30MHz (-28 ÷ -45dBr)	0	9	-	dB
Spectrum Mask Margin 30MHz to 33MHz (-45dBr)	0	9	-	dB
Constellation Error (EVM)	-	-38	-27	dB
Frequency tolerance	-20	-5	20	ppm
Out band Spurious Emissions 30MHz to 1GHz	-	-	-36	dBm
Out band Spurious Emissions 1GHz to 12.75GHz	-	-	-30	dBm
Out band Spurious Emissions 1.8GHz to 1.9GHz	-	-	-47	dBm
Out band Spurious Emissions 5.15GHz to 5.3GHz	-	-	-47	dBm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (PER < 10%)	-	-74	-64	dBm
Maximum Input Level (PER < 10%)	-20	-	-	dBm
Adjacent Channel Rejection (PER < 10%)	-2	-	-	dB

*1: Defined when output power setting is 12dBm at Murata module antenna pad

*2: Datarate is 6.5Mbps (MCS0)

.12.4 CHARACTERISTICS for IEEE802.11a – 5GHz

Test conditions: 25deg.C – VDD=+3.3V – 54Mbps mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11a			
Mode	OFDM			
Frequency	5180 – 5825MHz			
Output Power Setting	13.0 dBm			
DC Current Characteristics	**min**	**typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	330	430	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	11.0	13.0	15.0	dBm
Spectrum Mask Margin 9MHz to 11MHz (0 ÷ -20dBr)	0	12	-	dB
Spectrum Mask Margin 11MHz to 20MHz (-20 ÷ -28dBr)	0	13	-	dB
Spectrum Mask Margin 20MHz to 30MHz (-28 ÷ -40dBr)	0	12	-	dB
Spectrum Mask Margin 30MHz to 33MHz (-40dBr)	0	11	-	dB
Constellation Error (EVM)	-	-34	-25	dB
Frequency tolerance	-20	0	20	ppm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (PER < 10%)	-	-74	-65	dBm
Maximum Input Level (PER < 10%)	-30	-	-	dBm
Adjacent Channel Rejection (PER < 10%)	-1	-	-	dB

*1: Defined when output power setting is 13dBm at Murata module antenna pad

*2: Datarate is 6Mbps

.12.5 CHARACTERISTICS for IEEE802.11n – 5GHz

Test conditions: 25deg.C – VDD=+3.3V – 65Mbps (MCS7) mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11n			
Mode	OFDM			
Frequency	5180 – 5825MHz			
Output Power Setting	12.0 dBm			
DC Current Characteristics	**min**	**Typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	320	420	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	10.0	12.0	14.0	dBm
Spectrum Mask Margin 9MHz to 11MHz (0 ÷ -20dBr)	0	12	-	dB
Spectrum Mask Margin 11MHz to 20MHz (-20 ÷ -28dBr)	0	13	-	dB
Spectrum Mask Margin 20MHz to 30MHz (-28 ÷ -45dBr)	0	12	-	dB
Spectrum Mask Margin 30MHz to 33MHz (-45dBr)	0	11	-	dB
Constellation Error (EVM)	-	-36	-27	dB
Frequency tolerance	-20	0	20	ppm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (PER < 10%)	-	-73	-64	dBm
Maximum Input Level (PER < 10%)	-30	-	-	dBm
Adjacent Channel Rejection (PER < 10%)	-1	-	-	dB

*1: Defined when output power setting is 12dBm at Murata module antenna pad

*2: Datarate is 6.5Mbps (MCS0)

.12.6 CHARACTERISTICS for IEEE802.11n – 5GHz

Test conditions: 25deg.C – VDD=+3.3V – 135Mbps (MCS7_HT40) mode unless otherwise specified

	Characteristics			
Specification	IEEE802.11n			
Mode	OFDM			
Frequency	5180 – 5825MHz			
Output Power Setting	12.0 dBm			
DC Current Characteristics	**min**	**Typ**	**max**	**unit**
TX mode (1024byte, 20usec interval) *1*2	-	330	430	mA
RX mode	-	100	150	mA
TX Characteristics *1	**min**	**typ**	**max**	**unit**
Output Power	10.0	12.0	14.0	dBm
Spectrum Mask Margin 19MHz to 21MHz (0 ÷ -20dBr)	0	18	-	dB
Spectrum Mask Margin 21MHz to 40MHz (-20 ÷ -28dBr)	0	10	-	dB
Spectrum Mask Margin 40MHz to 60MHz (-28 ÷ -45dBr)	0	9	-	dB
Spectrum Mask Margin 60MHz to 80MHz (-45dBr)	0	9	-	dB
Constellation Error (EVM)	-	-33	-27	dB
Frequency tolerance	-20	0	20	ppm
RX Characteristics	**min**	**typ**	**max**	**unit**
Minimum Input Level Sensitivity (PER < 10%)	-	-69	-61	dBm

*1: Defined when output power setting is 12dBm at Murata module antenna pad

*2: Datarate is 13.5Mbps (MCS0)

.13 ANTENNA CHARACTERISTICS

Frequency Range [MHz]	Max Gain [dBi]	Efficiency [%] / [dB]	Return loss min. [dB]	Impedance [Ω]	Operating Temperature [°C]
2400 – 2483.5	1.7 (peak) 1.0 (band edges)	65 / -1.9 (peak) 55 / -2.5 (band edges)	-10	50	-40 to +85
4950 – 5850	4.3 (peak) 3.7 (band edges)	80 / -0.95 (peak) 55 / -2.5 (band edges)	-6	50	-40 to +85