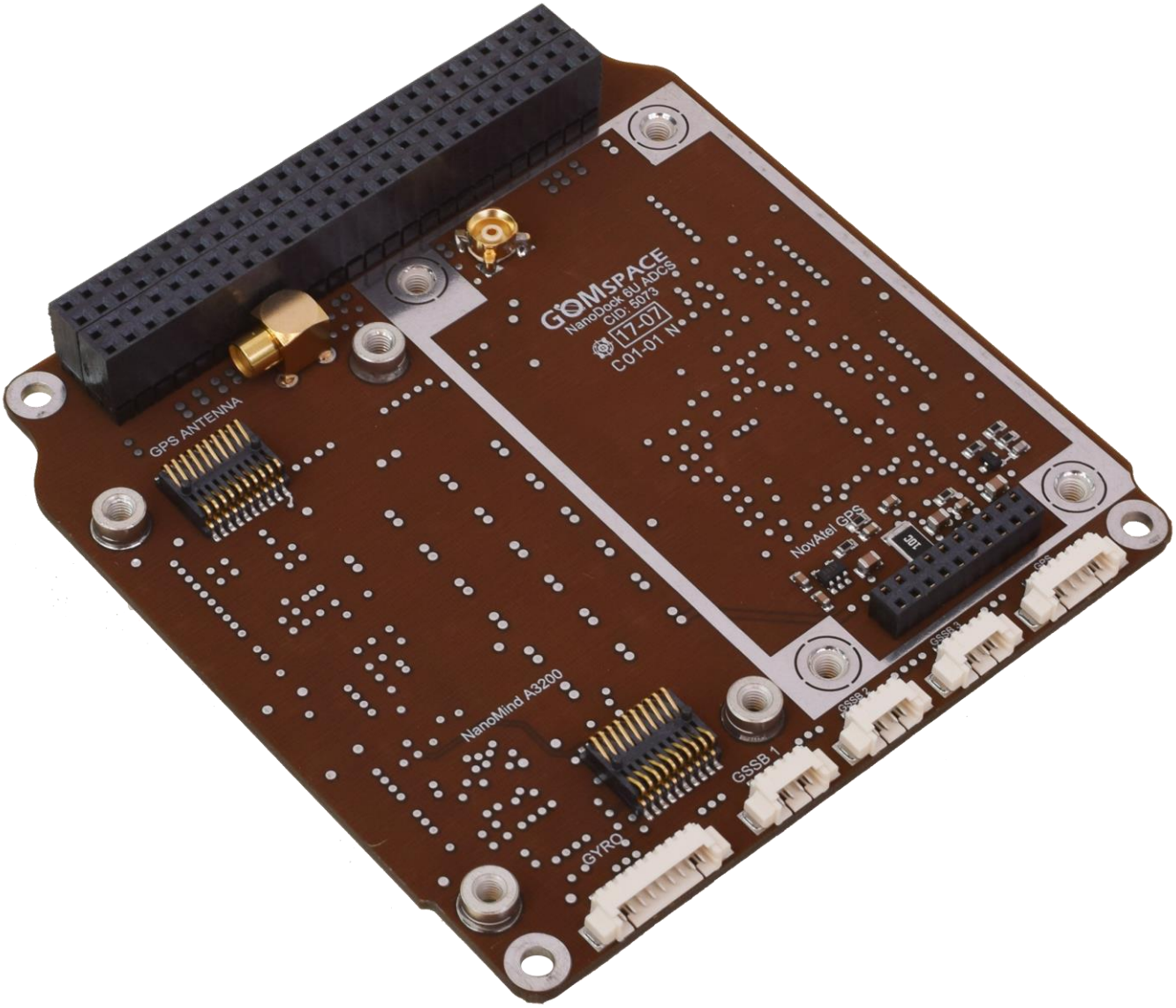


NanoDock
ADCS-6

Datasheet

Carrier for ADCS daughterboards

GomSpace A/S | Langagervej 6 | DK-9220 Aalborg East | Denmark
gomspace.com | sales@gomspace.com | T: +45 71 741 741

Product name: NanoDock ADCS-6

Document No.: 1023250

Revision: 1.3

Author: KERA

Approved by: LAV

Approval date: 21 August 2020

Confidentiality Notice

1 Table of Contents

2 Overview

The GomSpace NanoDock ADCS-6 is designed to be a component in a complete ADCS system. On the NanoDock ADCS-6 can be mounted a NanoMind A3200 computer and GomSpace NovAtel GPS. It has a number of connectors to external sensors and to a GomSpace NanoTorque GSW-600 reaction wheel.

The NanoDock ADCS-6 is a physical platform for the daughterboards and electrical connections to the stack connector.

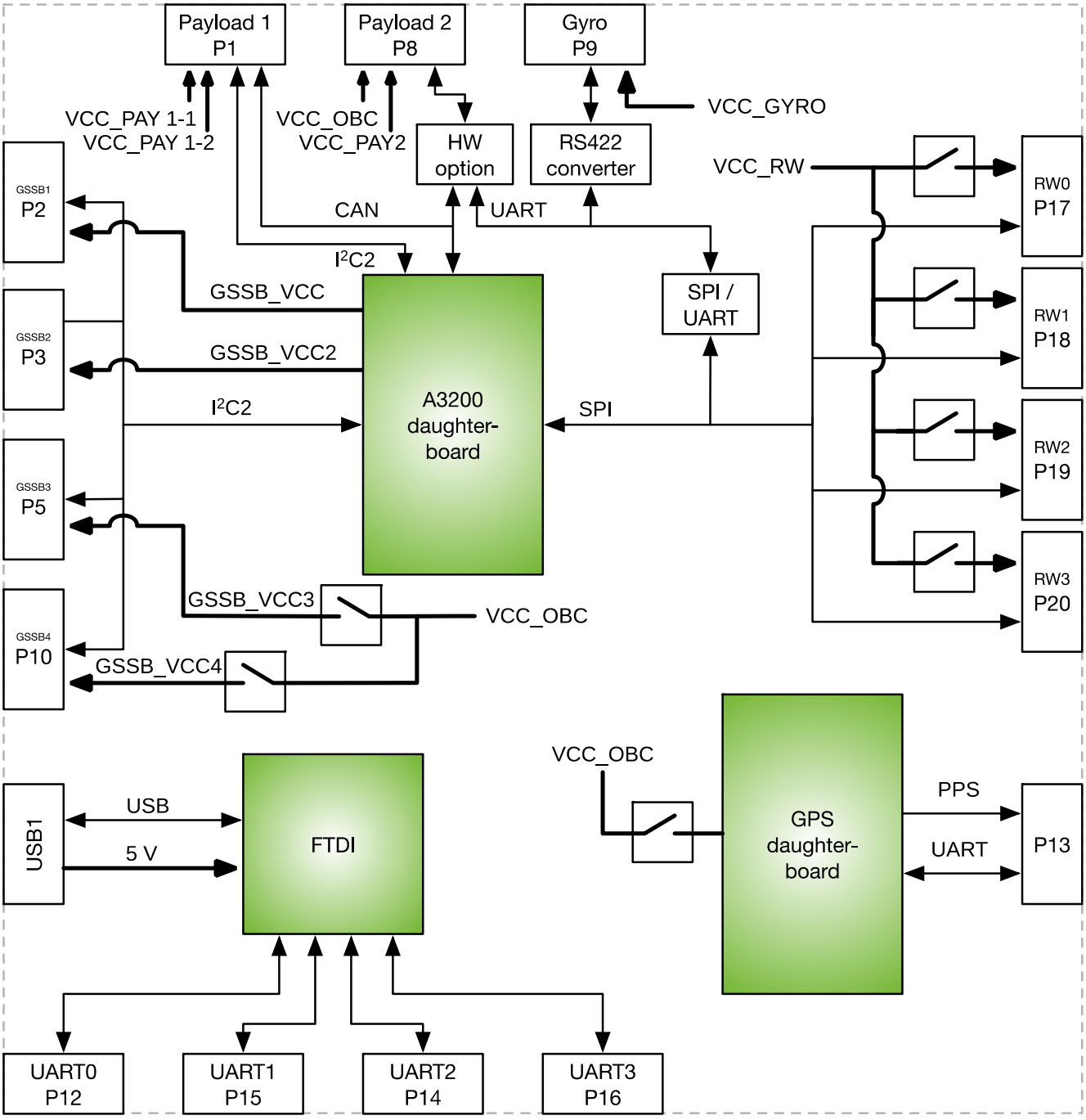
To facilitate tabletop debugging, there is easy access to the A3200 and the GPS unit; a USB to four UARTs interface (FTDI) is mounted on the motherboard giving the ability access UART0 on each of the daughterboards through USB.

2.1 Highlighted Features

- Allows one GomSpace NanoMind A3200 to do the stand-alone ADCS missions
- Compatible with GomSpace NovAtel GPS
- Compatible with GomSpace NanoTorque GSW-600
- Multiple sensor interfaces routed
  - I^2C
  - SPI
  - CAN
  - RS422
- Peripherals powered from configurable by power channels
- Powered through the stack connector or from distributed PSU
- USB to UART console interface for easy use in lab setup
- Operational temperature: -40 °C to +85 °C
- PCB Material: Glass/Polyimide IPC 6012C cl. 3/A
- IPC-A-610 Class 3 assembly

2.2 Block Diagram

The block diagram below shows the communications and power pathways.



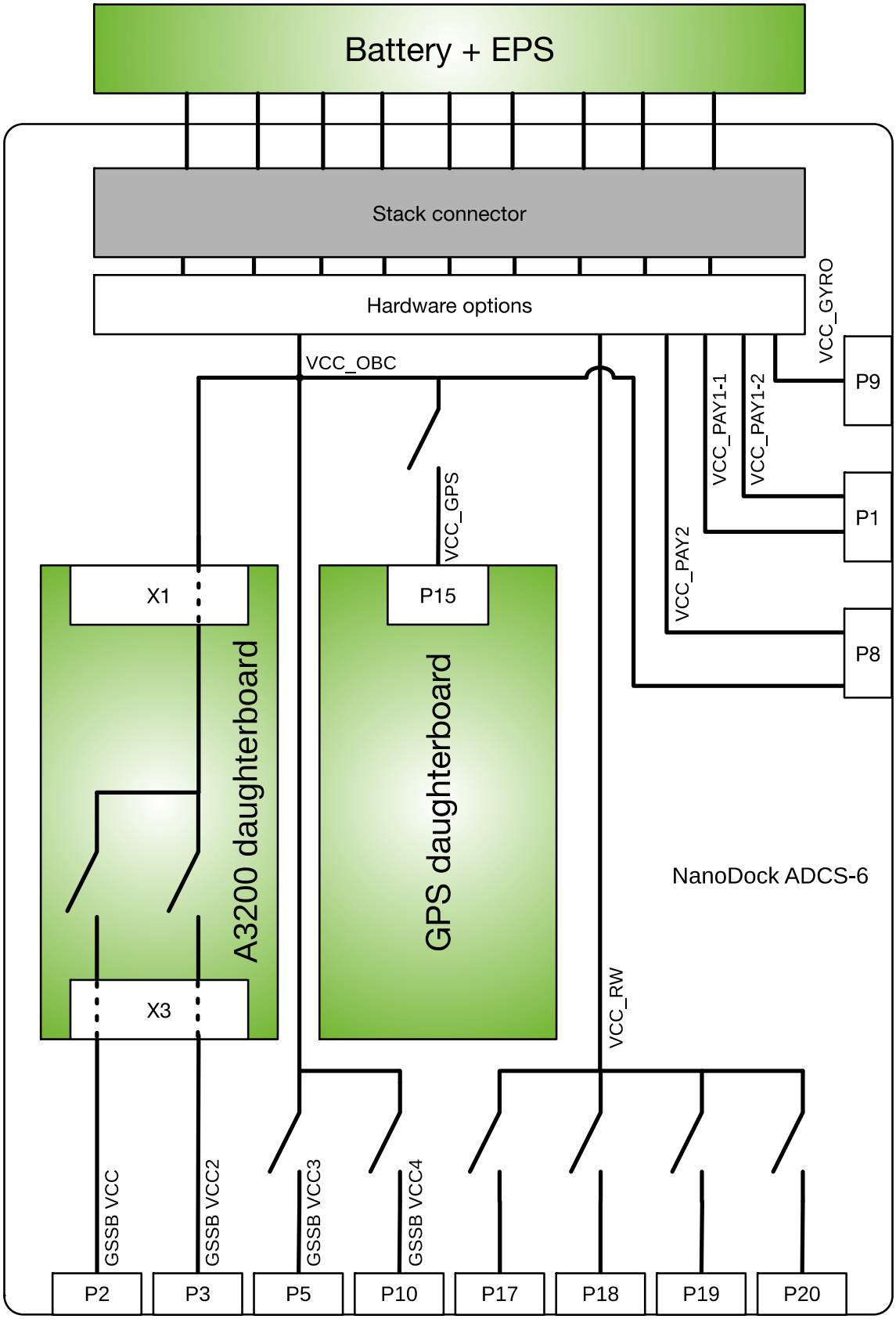
2.3 Example of Power Scheme

The NanoDock ADCS-6 is distributing power to the attached daughter boards.

The battery and EPS are connected through the stack connector and is distributed through the NanoDock ADCS-6 depending on the hardware options chosen. Alternatively the battery and EPS can be connected through P4 and P21.

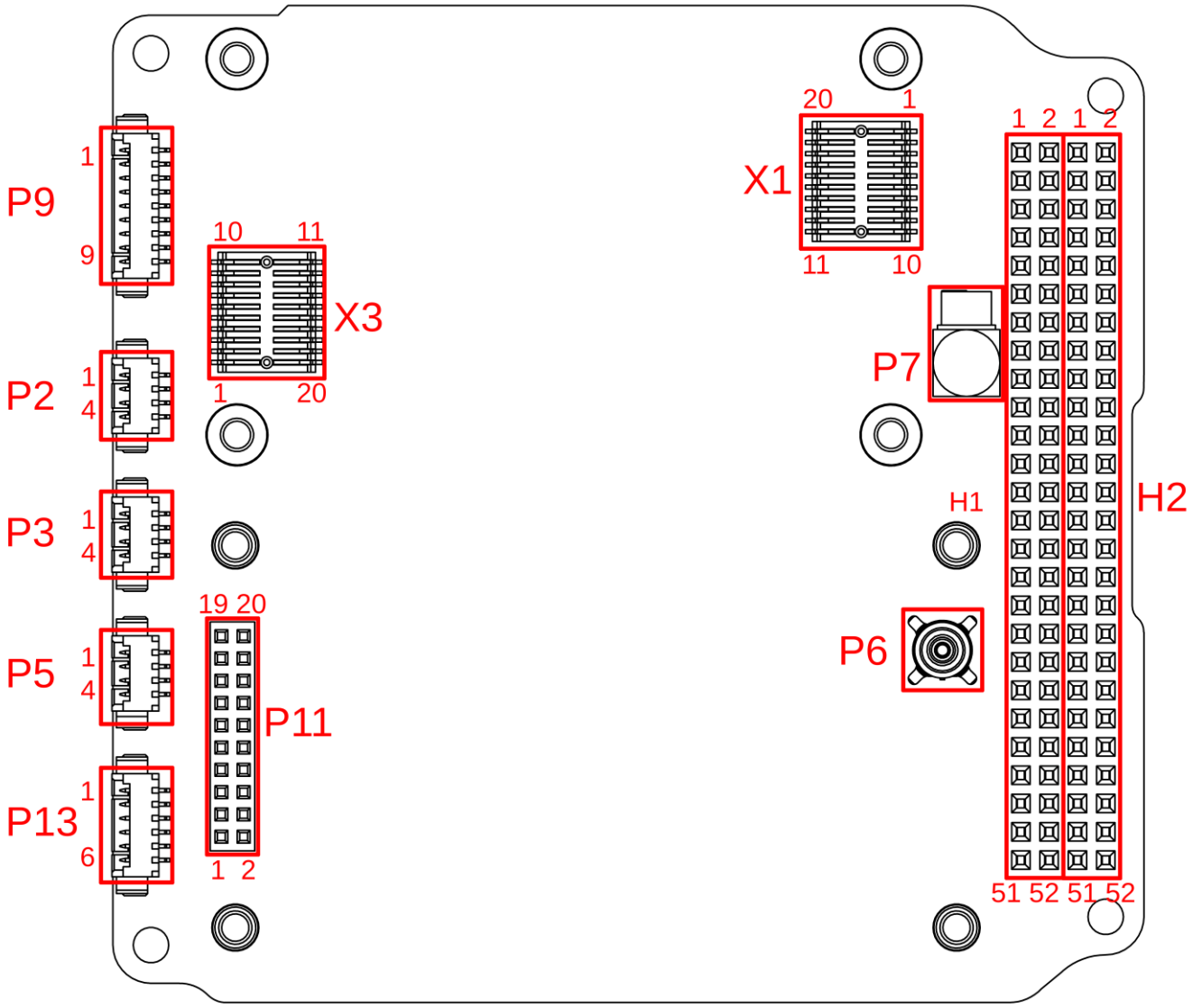
The different voltages used on the board are described below.

- **VCC_OBC** is the power for the NanoMind A3200.
- **GSSB_VCC** is used for powering GomSpace Sensor Bus (GSSB). This is sourced from the VCC_OBC on the A3200 and can be switched on/off.
- **GSSB_VCC(2/3/4)** is used for powering a GomSpace Sensor Bus. This is, in addition to the above, sourced from VCC_OBC and can be switched on/off.
- **VCC_PAY1-1** is one of two separate supply for a payload connected to P1
- **VCC_PAY1-2** is the second separate supply for a payload connected to P1
- **VCC_PAY2** is a separate supply for a payload connected to P8
- **VCC_GPS** is the power for the GPS unit. This is sourced from VCC_OBC and can be switched on/off.
- **VCC_RW** is the power for the Reaction Wheels connected to P17-P20. The individual Reaction Wheels can be switch on/off.



3 Hardware Layout

3.1 Connector Location Top



3.1.1 H1/H2 Stack Connector

SSQ-126-21-G-D

H1

Pin	Description
1	CANL
2	GPS_Heart
3	CANH
4	Optional Power Channel *
5	Optional Power Channel *
6	Optional Power Channel *
8	Optional GND
35	Optional Power Channel *
36	Optional Power Channel *
37	Optional Power Channel *
38	Optional Power Channel *
39	Optional Power Channel *
40	Optional Power Channel *
41	SDA
43	SCL
45	Optional GND
46	Optional GND
47	Optional Power Channel *
48	Optional Power Channel *
50	Optional Power Channel *

H2

Pin	Description
1	Optional Power Channel *
3	Optional Power Channel *
5	Optional Power Channel *
7	Optional GND
8	Optional GND
28	Optional Power Channel *
29	GND
30	GND
32	GND
45	VBAT
46	VBAT
47	Optional Power Channel *
48	Optional GND
49	Optional Power Channel *

* option sheet choice

3.1.2 X1 – FSI

Samtec FSI-110-D

Pin	Description	Pin	Description
1	GND	**20**	GND
2	GND	**19**	GND
3	VCC_OBC	**18**	VCC_OBC
4	VCC_OBC	**17**	VCC_OBC
5	SCL	**16**	VAUX (connected to VBAT)
6	SCA	**15**	VAUX(connected to VBAT)
7	CANH	**14**	PPS
8	CANL	**13**	Not connected
9	UART4 RX	**12**	GPS UART RX
10	UART4 TX	**11**	GPS UART TX

3.1.3 X3 – FSI

Samtec FSI-110-D

Pin	Description	Pin	Description
1	SDA 2	**20**	SPIO_SCK
2	SCL 2	**19**	SPIO_MOSI
3	GSSB_VCC	**18**	SPIO_MISO
4	GND	**17**	SPIO_CS0
5	GSSB_VCC2	**16**	SPIO_CS1
6	VAUX (connected to VBAT)	**15**	SPIO_CS2
7	AD0	**14**	AD4
8	AD1	**13**	AD5
9	AD2	**12**	AD6
10	AD3	**11**	AD7

3.1.4 P2 – GSSB1

Molex PicoBlade 53261-0471

Pin	Description
1	GSSB VCC
2	GND
3	SDA2
	SCL2

3.1.5 P3 – GSSB2

Molex PicoBlade 53261-0471

Pin	Description
1	GSSB VCC2
2	GND
3	SDA2
	SCL2

3.1.6 P5 – GSSB3

Molex PicoBlade 53261-0471

Pin	Description
1	GSSB VCC3
2	GND
3	SDA2
	SCL2

3.1.7 P6 and P7 antenna wire through

P7 is a Samtec MCX-7-P-H-RA-TH1

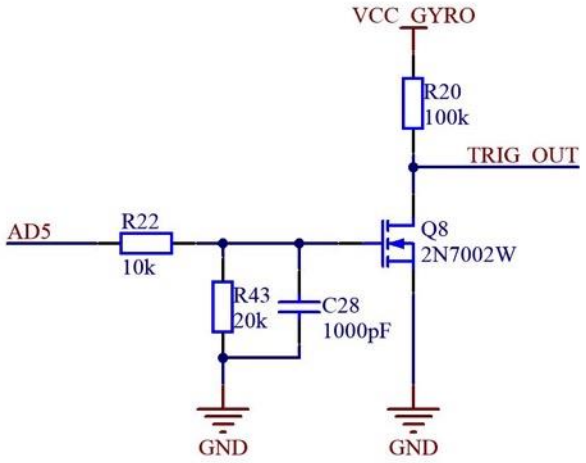
P6 and P7 are directly connected to access the antenna.

3.1.8 P9 – Gyro

Molex PicoBlade 53261-0971

Pin	Description	Note
1	RxD+	Through a SPI/UART converter
2	RxD-	Through a SPI/UART converter
3	TxD-	Through a SPI/UART converter
4	TxD+	Through a SPI/UART converter
5	Trig Out	100k pull-up to VCC_GYRO
6	VCC_GYRO	
7	GND	
8	GND	
9	GND	

The trigger output is implemented with the schematic circuit shown in drawing below:



3.1.9 P11 – GPS Connection to NanoDock ADCS

Samtec MMS-110-01-L-DV

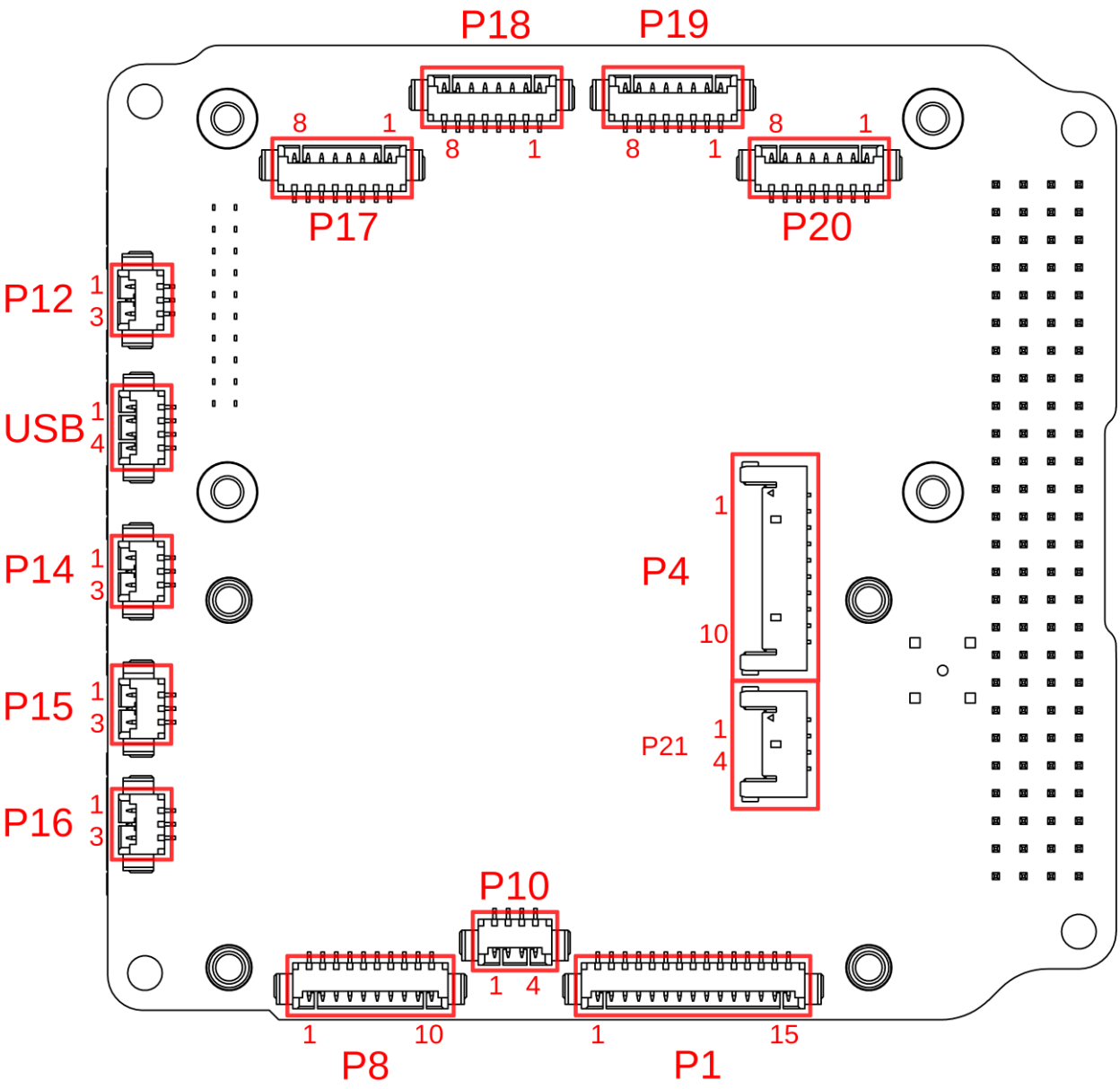
Pin	Description	Pin	Description
1	VCC_GPS (3.3 V)	**2**	VCC_GPS (3.3 V)
3	Not connected	**4**	GPS RX3
5	Not connected	**6**	VARF
7	Not connected	**8**	Not connected
9	GPS TX3	**10**	GND
11	GPS TX	**12**	GPS RX
13	GND	**14**	GPS TX 2
15	GPS RX 2	**16**	GND
17	Not connected	**18**	GND
19	PPS	**20**	Not connected

3.1.10 P13 – External GPS Connector

Molex PicoBlade 53261-0671

Pin	Description	Note
1	GPS TX 3	
2	GPS RX 3	
3	PPS P – differential	LVDS levels
4	PPS N - differential	LVDS levels
5	PPS – single ended	LVTTL levels
6	GND	

3.2 Connector Location Bottom



3.2.1 P1 – Payload 1

Molex PicoBlade 53261-1571

Pin	Description
1	GND
2	VCC_PAY1_2
3	VCC_PAY1_2
4	GND
5	VCC_PAY1_1
6	VCC_PAY1_1
7	GND
8	GND
9	SCL2
10	SDA2
11	GND
12	GND
13	CANH
14	CANL
15	VCC_OBC

3.2.2 P4 – Distributed Power

Molex Pico-Lock 504050-1091

Pin	Description
1	VCC_OBC
2	GND
3	VCC_PAY2
4	GND
5	VCC_GYRO
6	GND
7	VCC_PAY1_2
8	GND
9	VCC_PAY1_1
10	GND

3.2.3 P8 – Payload 2

Molex PicoBlade 53261-1071

Pin	Description	Note
1	VCC_PAY2	
2	VCC_PAY2	
3	GND	
4	GND	
5	VCC_OBC	
6	Not connected	
7	SDA2	
8	SCL2	
9	TXD or CANH*	Through a SPI/UART converter
10	RXD or CANL*	Through a SPI/UART converter

*option sheet choice

3.2.4 P10 – GSSB4

Molex PicoBlade 53261-0471

Pin	Description
1	GSSB VCC4
2	GND
3	SDA2
4	SCL2

3.2.5 P12 – FTDI – UART0

Molex PicoBlade 53261-0371

Pin	Description
1	GND
2	TXD0
3	RXD0

3.2.6 P14 – FTDI – UART2

Molex PicoBlade 53261-0371

Pin	Description
1	GND
2	TXD2
3	RXD2

3.2.7 P15 – FTDI – UART1

Molex PicoBlade 53261-0371

Pin	Description
1	GND
2	TXD1
3	RXD1

This UART can be connected to the NanoMind A3200 UART4 directly. See option sheet.

3.2.8 P16 – FTDI – UART3

Molex PicoBlade 53261-0371

Pin	Description
1	GND
2	TXD3
3	RXD3

3.2.9 P17 – Reaction Wheel 0

Molex PicoBlade 53261-0871

Pin	Description
1	VCC_RW0
2	VCC_RW0
3	GND
4	GND
5	SPI0_MISO
6	SPI0_MOSI
7	SPI0_CS_RW0
8	SPIO_SCK

3.2.10 P18 – Reaction Wheel 1

Molex PicoBlade 53261-0871

Pin	Description
1	VCC_RW1
2	VCC_RW1
3	GND
4	GND
5	SPI0_MISO
6	SPI0_MOSI
7	SPI0_CS_RW1
8	SPIO_SCK

3.2.11 P19 – Reaction Wheel 2

Molex PicoBlade 53261-0871

Pin	Description
1	VCC_RW2
2	VCC_RW2
3	GND
4	GND
5	SPI0_MISO
6	SPI0_MOSI
7	SPI0_CS_RW2
8	SPIO_SCK

3.2.12 P20 – Reaction Wheel 3

Molex PicoBlade 53261-0871

Pin	Description
1	VCC_RW3
2	VCC_RW3
3	GND
4	GND
5	SPI0_MISO
6	SPI0_MOSI
7	SPI0_CS_RW3
8	SPIO_SCK

3.2.13 P21 – Distributed Power

Molex Pico-Lock 504050-0491

Pin	Description
1	GND
2	VCC_RW
3	GND
4	VCC_RW

3.2.14 USB

Molex PicoBlade 53261-0471

Pin	Description
1	GND
2	USB_5V
3	D-
4	D+

4 Absolute maximum Ratings

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the NanoDock ADCS-6. Exposure to absolute maximum rating conditions for extended periods may affect the reliability.

Symbol	Description	Min.	Max.	Unit
V_USB_5V	FTDI supply voltage	4.3	6	V
T_{space}	Operating Temperature	-45	+85	ºC
T_{ground}	Operating Temperature with FTDI connected to PC by USB	-40	+85	ºC

5 Electrical Characteristics

The active electronics circuit on the NanoDock ADCS-6 is the USB to serial circuit and the power switches for GPS and WDE. The USB to serial circuit is powered from the USB connector and the switches are powered together with the NanoMind A3200 and the GPS module. Please see the option sheet.

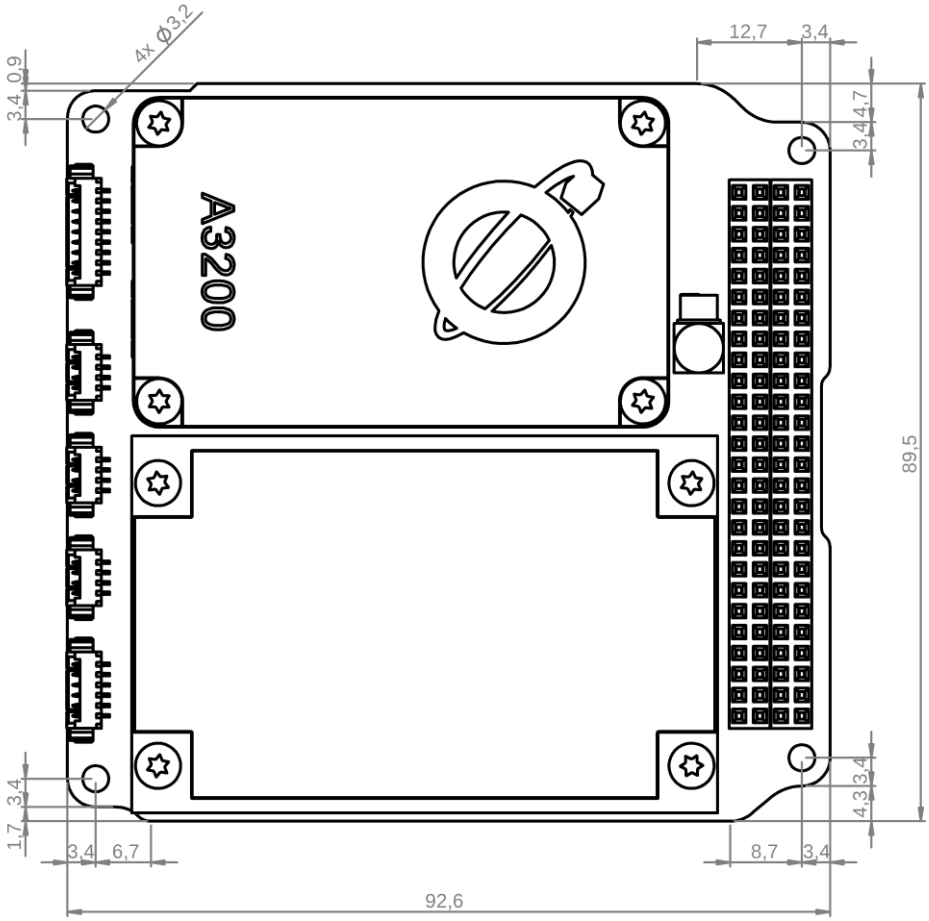
6 Physical Characteristics

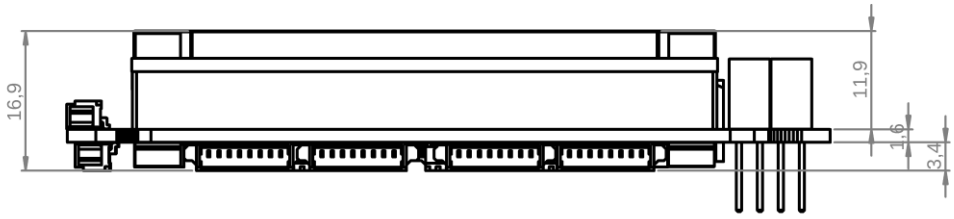
Description	Value	Unit
Mass – without daughter boards	64	g
Size	89.5 x 92.6 x 16.0 (Without stack connector)	mm

7 Mechanical Drawing

All dimensions in mm.

With mounted modules:





Without mounted modules

8 Difference between the NanoDock ADCS-3 and ADCS-6

The NanoDock ADCS is found in two variants; NanoDock ADCS-3 and NanoDock ADCS-6.

The main difference is shown in the table below:

	ADCS-3	ADCS-6
A3200 support	✓	✓
GPS support	✓	✓
Third party WDE interface	✓	
GSW-600 interface		✓
Power through stack connector	✓	✓
Power from distributed PSU		✓
USB to UART interfaces for debug	✓	✓
Antenna deployment	On board	Through NanoPower P60
GSSB interfaces (power)	2	4
Analog interfaces	4	0

9 Disclaimer

The information in this document is subject to change without notice and should not be construed as a commitment by GomSpace. GomSpace assumes no responsibility for any errors that may appear in this document.

In no event shall GomSpace be liable for incidental or consequential damages arising from use of this document or the software and hardware described in this document.