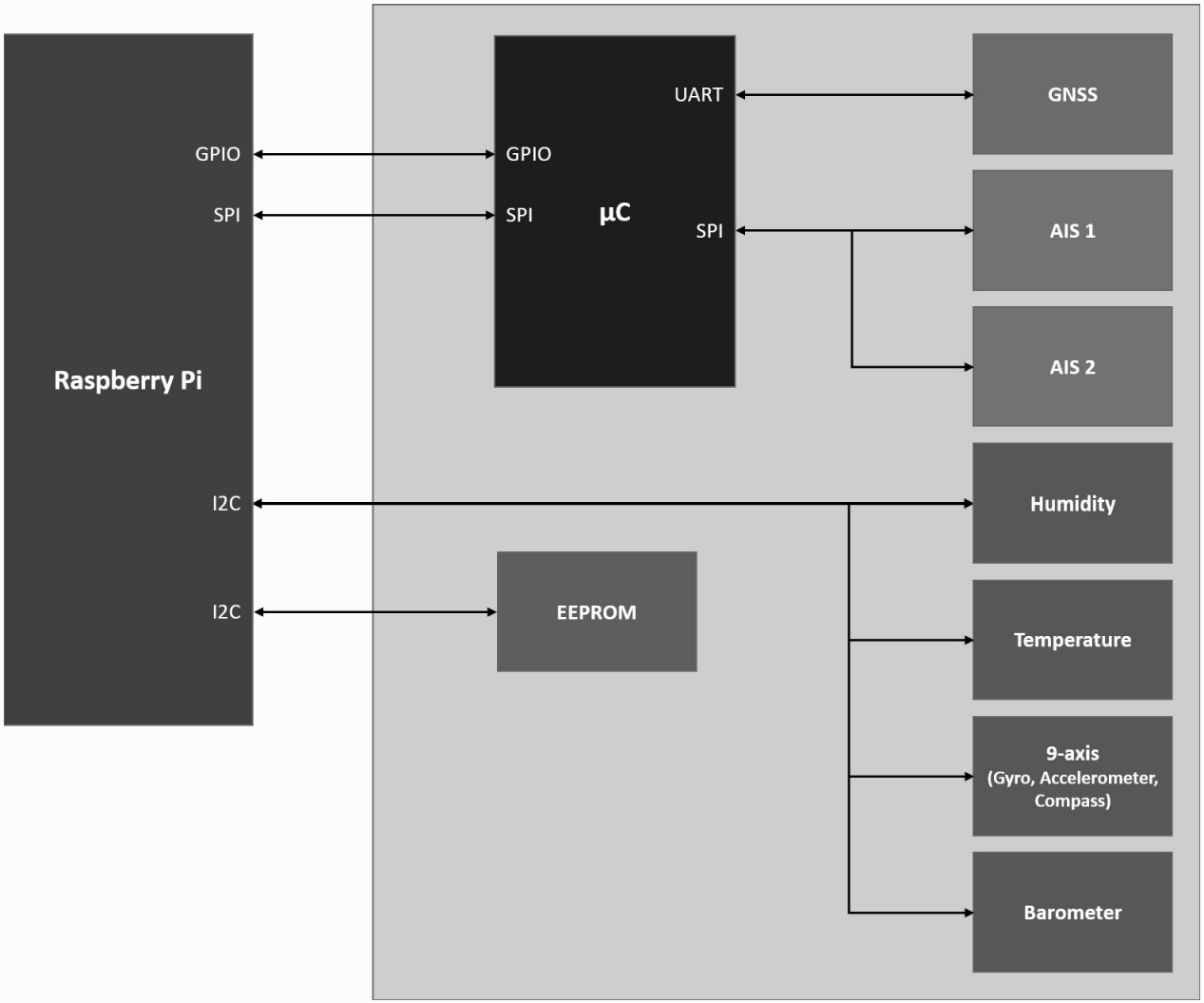
Project Name:	Rooco Moitesssier HAT
Drawing Number:	P770010E05-Xx-SH-x
Revision:	E05
Drawn by:	Thomas POMS
Variant:	X1



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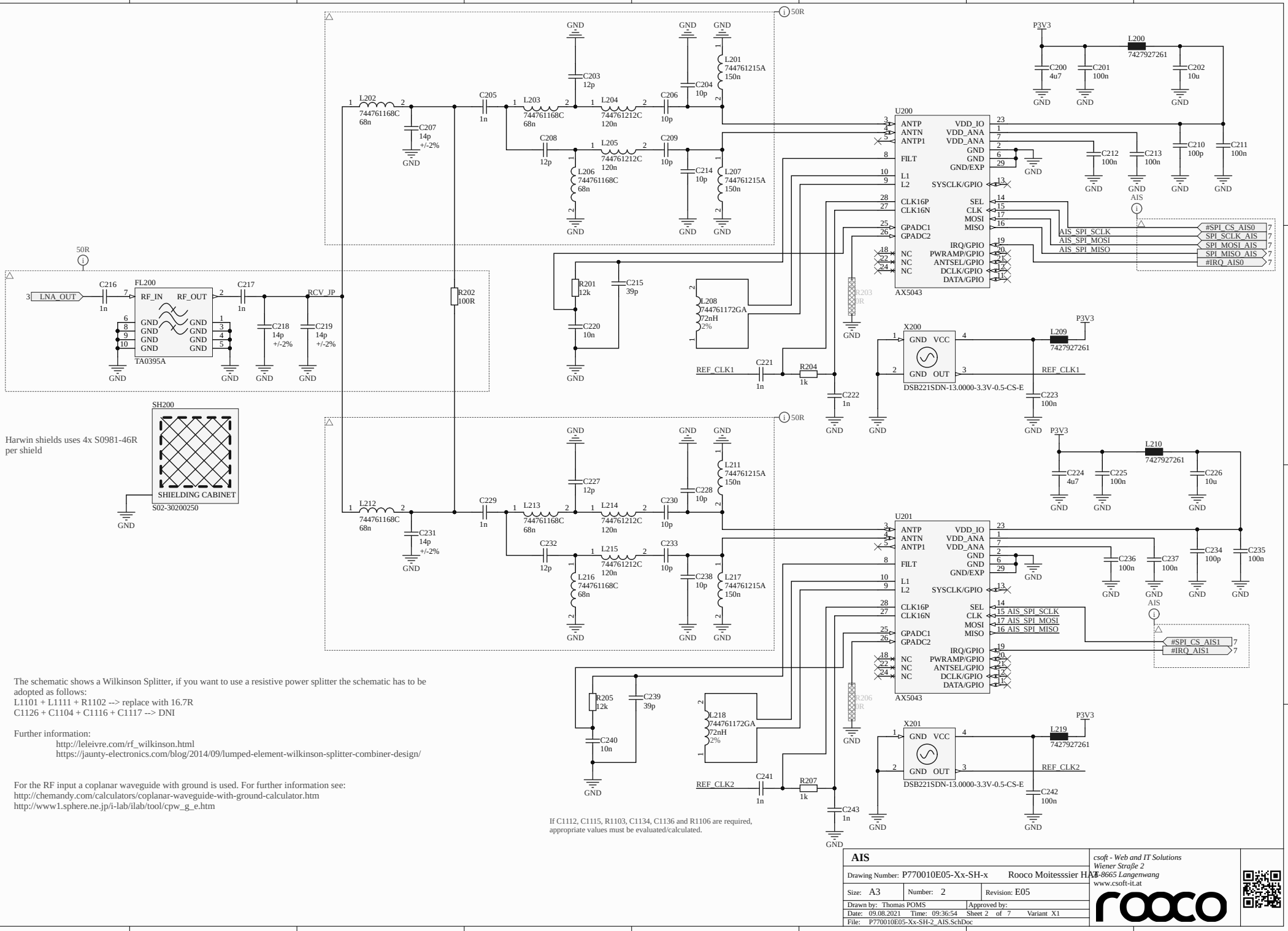
rooco

Size: A3	Sheet 1 of 7
Date: 09.08.2021	Time: 09:36:53


50R
GND
C203 12p
C204 10p
L201 744761215A 150n
L202 744761168C 68n
C205 1n
L203 744761168C 68n
L204 744761212C 120n
C206 10p
C207 14p +/-2%
C208 12p
L205 744761212C 120n
C209 10p
L206 744761168C 68n
C214 10p
L207 744761215A 150n
P3V3
L200 7427927261
C200 4u7
C201 100n
C202 10u
U200
ANTP
ANTN
ANTP1
FILT
L1
L2
CLK16P
CLK16N
GPADC1
GPADC2
NC
NC
NC
VDD_IO
VDD_ANA
VDD_ANA
GND
GND
GND/EXP
SYSCLK/GPIO
SEL
CLK
MOSI
MISO
IRQ/GPIO
PWRAMP/GPIO
ANTSEL/GPIO
DCLK/GPIO
DATA/GPIO
AX5043
C210 100p
C211 100n
C212 100n
C213 100n
AIS
AIS_SPI_SCLK
AIS_SPI_MOSI
AIS_SPI_MISO
#SPI_CS_AIS0
SPI_SCLK_AIS
SPI_MOSI_AIS
SPI_MISO_AIS
#IRQ_AIS0
LNA_OUT
C216 1n
FL200
RF_IN
RF_OUT
TA0395A
C217 1n
C218 14p +/-2%
C219 14p +/-2%
RCV_JP
R202 100R
R201 12k
C215 39p
C220 10n
L208 744761172GA 72nH 2%
R203 0R
REF_CLK1
C221 1n
R204 1k
C222 1n
X200
GND VCC
GND OUT
DSB221SDN-13.0000-3.3V-0.5-CS-E
L209 7427927261
C223 100n
SH200
SHIELDING CABINET
S02-30200250
Harwin shields uses 4x S0981-46R per shield
L210 7427927261
C224 4u7
C225 100n
C226 10u
L211 744761215A 150n
L212 744761168C 68n
C227 12p
C228 10p
C229 1n
L213 744761168C 68n
L214 744761212C 120n
C230 10p
C231 14p +/-2%
C232 12p
L215 744761212C 120n
C233 10p
L216 744761168C 68n
C238 10p
L217 744761215A 150n
U201
C234 100p
C235 100n
C236 100n
C237 100n
#SPI_CS_AIS1
#IRQ_AIS1
R205 12k
C239 39p
C240 10n
L218 744761172GA 72nH 2%
R206 0R
REF_CLK2
C241 1n
R207 1k
C242 100n
C243 1n
L219 7427927261
The schematic shows a Wilkinson Splitter, if you want to use a resistive power splitter the schematic has to be adopted as follows:
L1101 + L1111 + R1102 --> replace with 16.7R
C1126 + C1104 + C1116 + C1117 --> DNI
Further information:
http://leleivre.com/rf_wilkinson.html
https://jaunty-electronics.com/blog/2014/09/lumped-element-wilkinson-splitter-combiner-design/
For the RF input a coplanar waveguide with ground is used. For further information see:
http://chemandy.com/calculators/coplanar-waveguide-with-ground-calculator.htm
http://www1.sphere.ne.jp/i-lab/ilab/tool/cpw_g_e.htm
If C1112, C1115, R1103, C1134, C1136 and R1106 are required, appropriate values must be evaluated/calculated.
AIS
Drawing Number: P770010E05-Xx-SH-x
Rooco Moitesssier HAT
Size: A3
Number: 2
Revision: E05
Drawn by: Thomas POMS
Approved by:
Date: 09.08.2021 Time: 09:36:54 Sheet 2 of 7 Variant X1
File: P770010E05-Xx-SH-2_AIS.SchDoc
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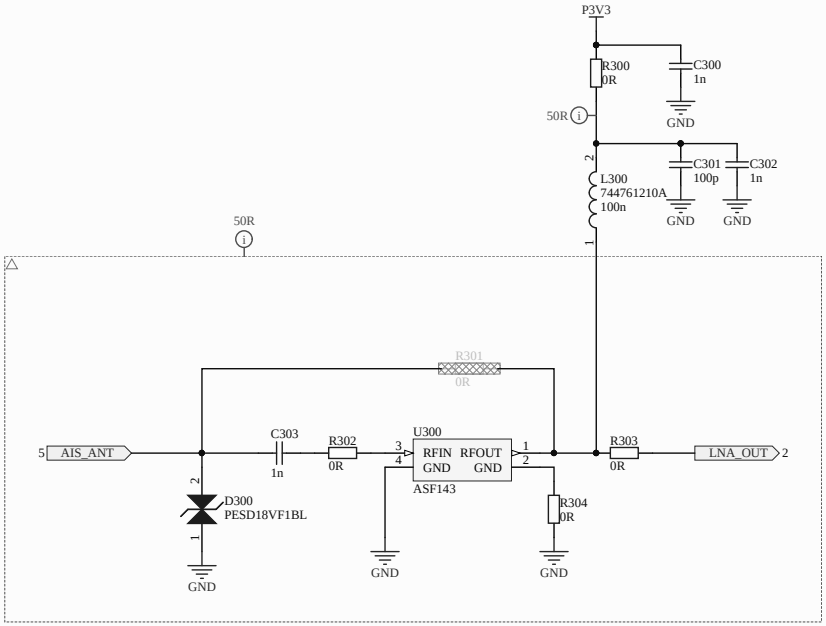
rooco



R302 and R303 might be used for impedance matching purpose.

If no LNA is required R301 is installed and C303, R302, U300, R303, R304, L300, R300, C300, C301 and C302 are not assembled.

Alternate parts:
BGA427 --> R304 = 2p2, reverse pinning compared to ASF143
BGA612
BGA616
ASF143 --> R304 = 0R, reverse pinning compared to BGA427

LNA			
Drawing Number: P770010E05-Xx-SH-x		Rooco Moitesssier HAT	
Size: A3	Number: 3	Revision: E05	
Drawn by: Thomas POMS		Approved by:	
Date: 09.08.2021 Time: 09:36:54	Sheet 3 of 7	Variant X1	
File: P770010E05-Xx-SH-3_LNA.SchDoc			

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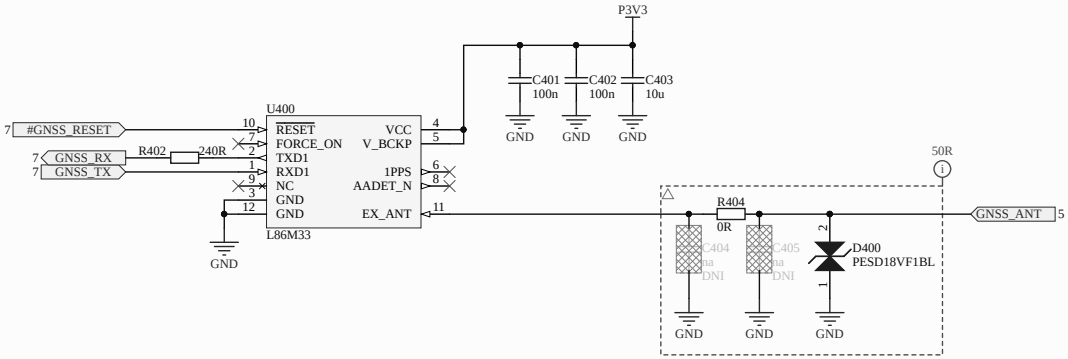
#GNSS_RESET must not actively driven high. The microcontroller should use open collector output.



If C404 and C405 are required, appropriate values must be evaluated/calculated.

GNSS		
Drawing Number: P770010E05-Xx-SH-x		Rooco Moitesssier HAT
Size: A3	Number: 4	Revision: E05
Drawn by: Thomas POMS		Approved by:
Date: 09.08.2021 Time: 09:36:54	Sheet 4 of 7	Variant X1
File: P770010E05-Xx-SH-4_GNSS.SchDoc		

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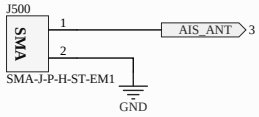
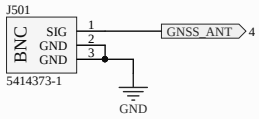
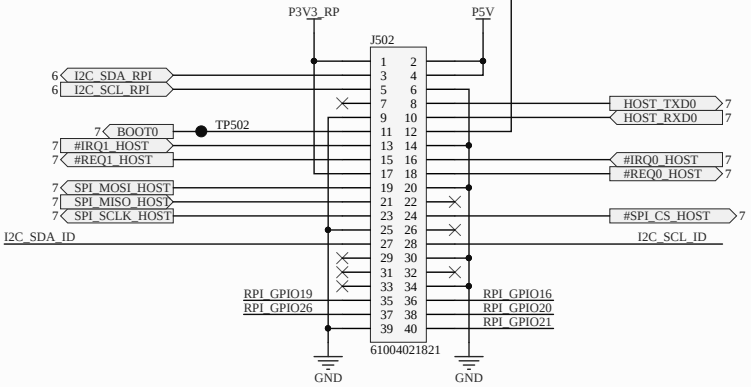
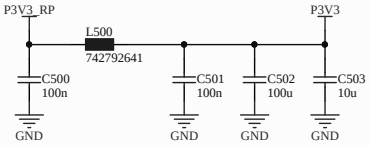
Alternate parts:
RF Solutions CON-SMA-EDGE-S
Cinch 142-0711-821
RS Pro 526-5785

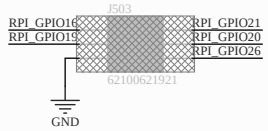


Alternate parts:
0731000105







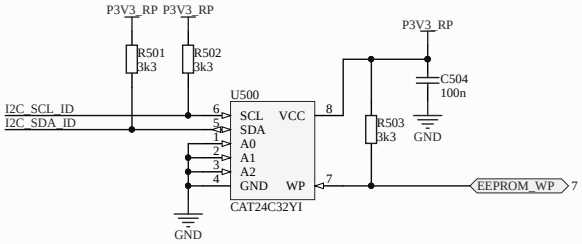


Raspberry Pi 3 GPIO Header

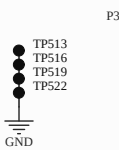
Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I²C)		DC Power 5v	04
05	GPIO03 (SCL1 , I²C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I²C ID EEPROM)		(I²C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40

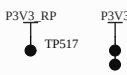
Rev. 2
29/02/2016

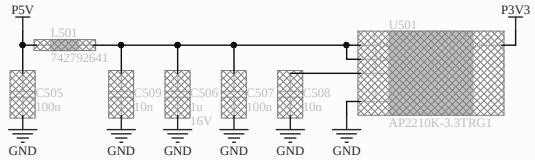
www.element14.com/RaspberryPi



REF500
PCB_Reference_Point
REF501
PCB_Reference_Point
REF502
PCB_Reference_Point







Connector			
Drawing Number: P770010E05-Xx-SH-x		Rooco Moitesssier HAT	
Size: A3	Number: 5	Revision: E05	
Drawn by: Thomas POMS		Approved by:	
Date: 09.08.2021 Time: 09:36:54	Sheet 5 of 7	Variant X1	
File: P770010E05-Xx-SH-5_Connector.SchDoc			

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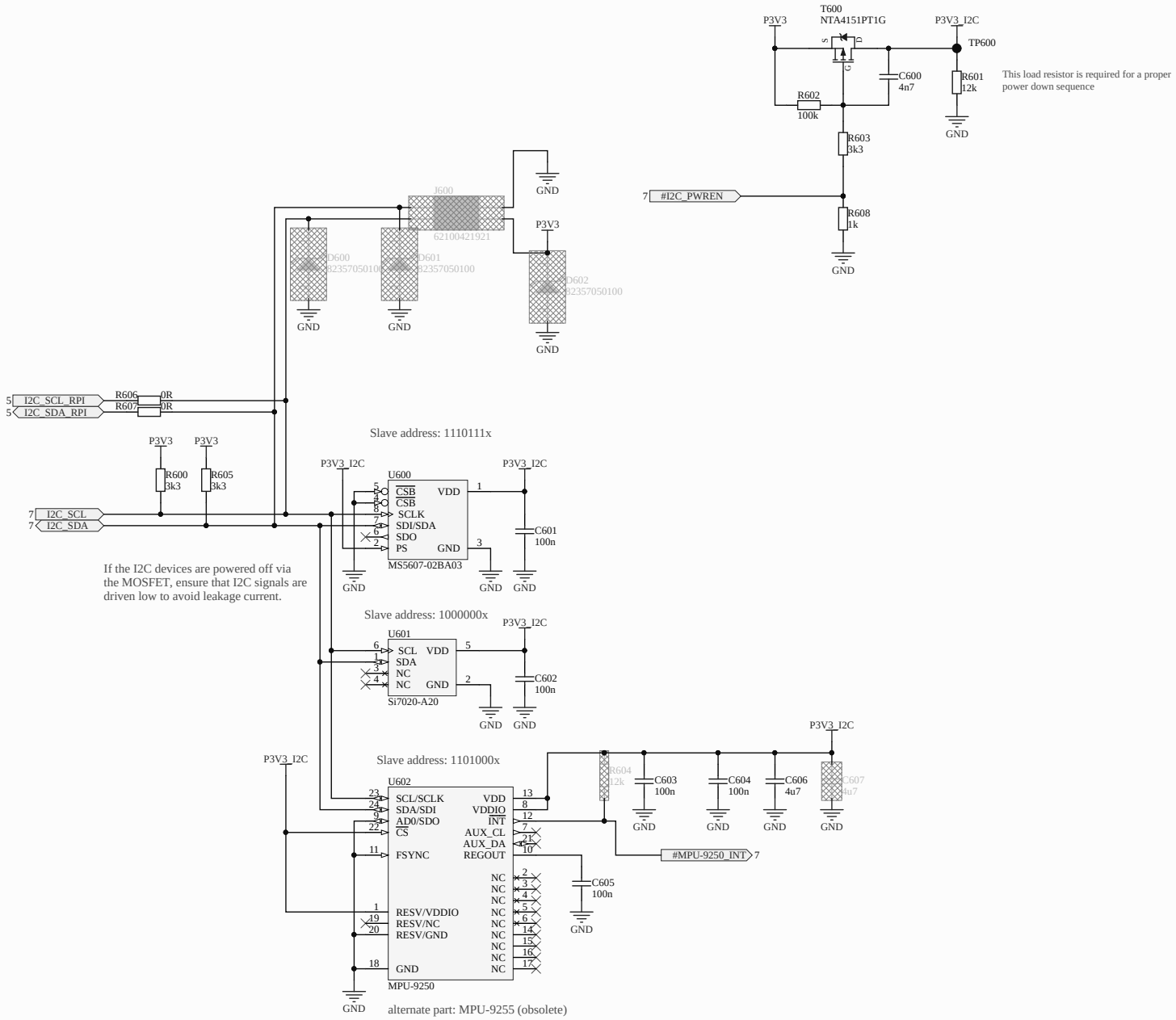

Sensors			
Drawing Number: P770010E05-Xx-SH-x		Rooco Moitesssier HAT	
Size: A3	Number: 6	Revision: E05	
Drawn by: Thomas POMS		Approved by:	
Date: 09.08.2021 Time: 09:36:55	Sheet 6 of 7	Variant X1	
File: P770010E05-Xx-SH-6_Sensors.SchDoc			

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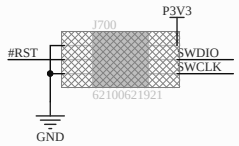
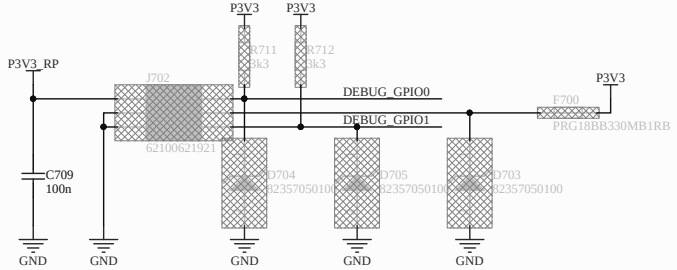
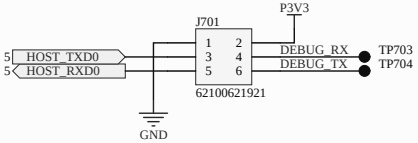


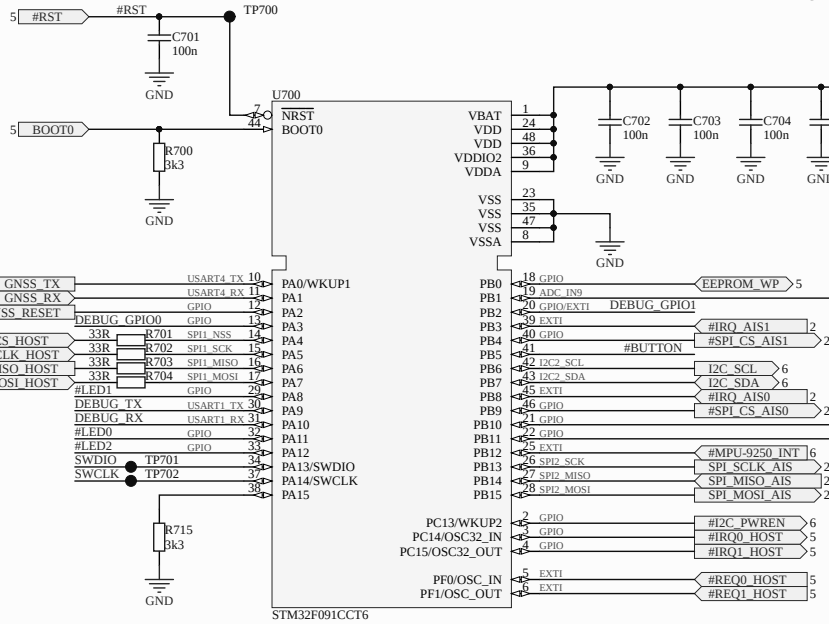
counterpart: Würth, 62000621821

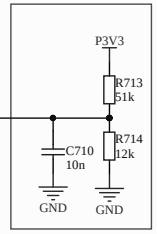
BOOT0	Boot Mode	Note
0	main flash memory	
1	system memory	embedded bootloader

boot configuration bits nBOOT1 and BOOT_SEL must be set to 1 in the user option byte



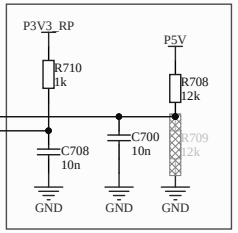




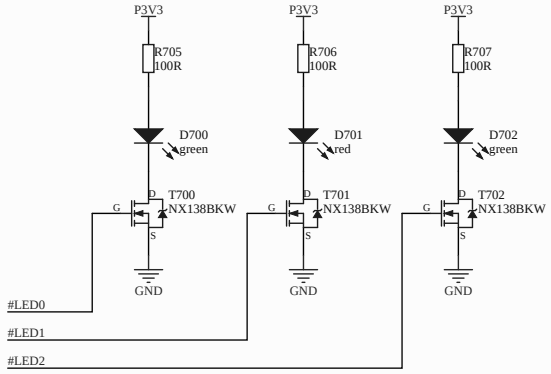


Revision:
- 253mV: E03 12k/1k
- 448mV: E04 21k/3k3
- 628mV: E05 51k/12k

Enable pull-up on PA15 and check if logic '0' --> revision can be read with analog input. If logic '1' --> board is either E01 or E02.



if both inputs (PB10 and PB11) are high, the HAT is attached to the Raspberry Pi, otherwise it is running in standalone mode



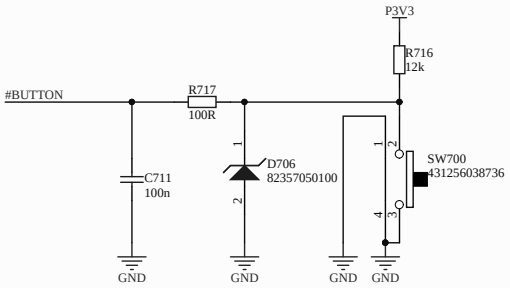
Common interrupt service routines:
EXTI0_1_IRQn
EXTI2_3_IRQn
EXTI4_15_IRQn

Alternate parts:
STM32F030CC, Cortex-M0, 48 MHz, 256 kB FLASH, 32 kB RAM
STM32F091CB, Cortex-M0, 48 MHz, 128 kB FLASH, 32 kB RAM
STM32F091CC, Cortex-M0, 48 MHz, 256 kB FLASH, 32 kB RAM
STM32F071CB, Cortex-M0, 48 MHz, 128 kB FLASH, 32 kB RAM

EXTI0_1_IRQn
- EXTI0_IRQn --> #REQ0_HOST
- EXTI1_IRQn --> #REQ1_HOST

EXTI2_3_IRQn
- EXTI2_IRQn --> DEBUG_GPIO1
- EXTI3_IRQn --> #IRQ_AIS1

EXTI4_15_IRQn
- EXTI4_IRQn -->
- EXTI5_IRQn -->
- EXTI6_IRQn -->
- EXTI7_IRQn -->
- EXTI8_IRQn --> #IRQ_AIS0
- EXTI9_IRQn -->
- EXTI10_IRQn -->
- EXTI11_IRQn -->
- EXTI12_IRQn --> #MPU-9250_INT
- EXTI13_IRQn -->
- EXTI14_IRQn -->
- EXTI15_IRQn -->



Microcontroller			
Drawing Number: P770010E05-Xx-SH-x		Rooco Moitesssier HAT	
Size: A3	Number: 7	Revision: E05	
Drawn by: Thomas POMS		Approved by:	
Date: 09.08.2021 Time: 09:36:55	Sheet 7 of 7	Variant X1	
File: P770010E05-Xx-SH-7_Microcontroller.SchDoc			

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