X2E Reference Sensor

Variant: Default

25.02.2024
V1.0

DESIGN CONSIDERATIONS

DESIGN NOTE:
Example text for informational design notes .

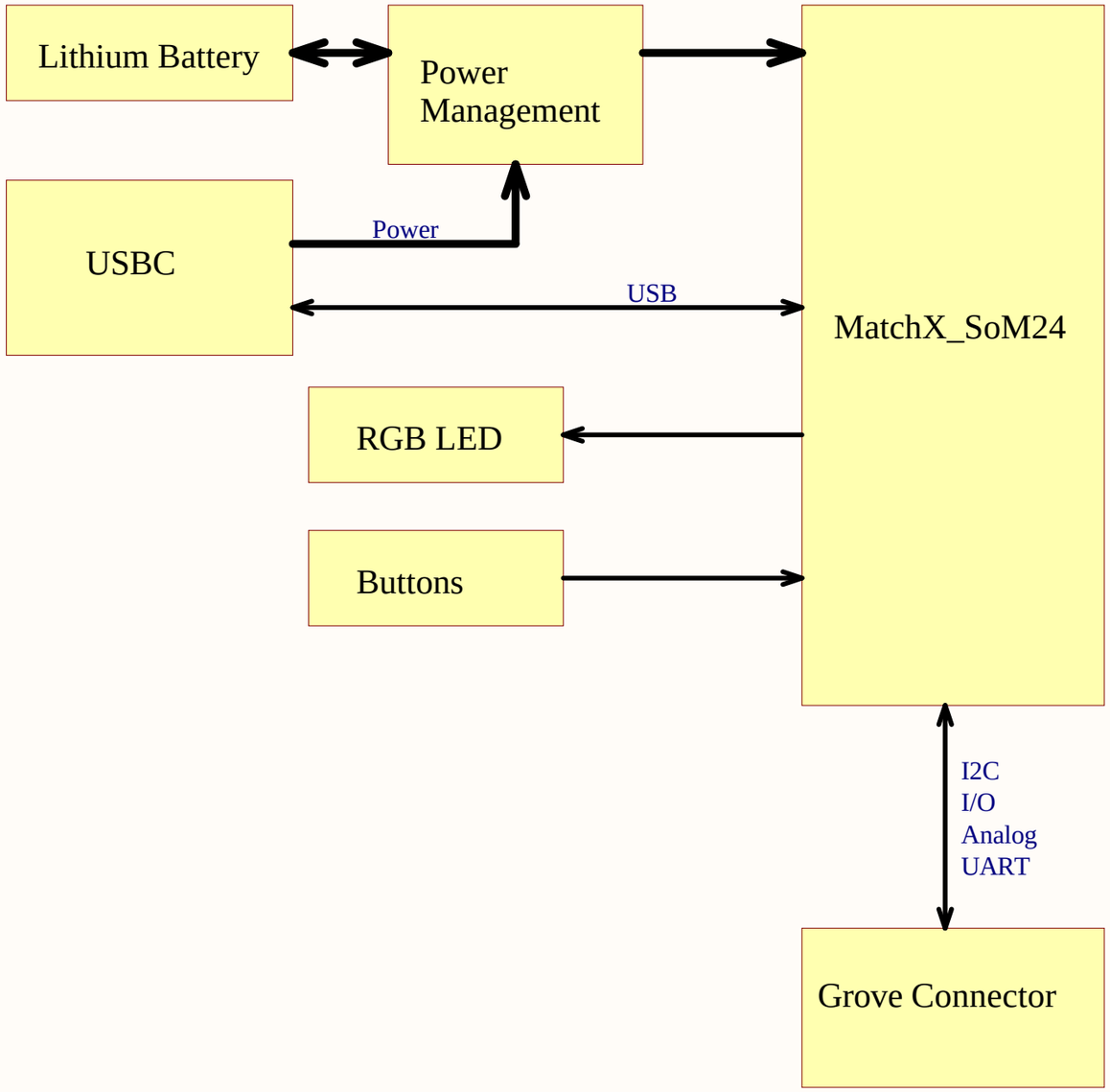
DESIGN NOTE:
Example text for critical design notes.

DESIGN NOTE:
Example text for cautionary design notes.

LAYOUT NOTE:
Example text for critical layout guidelines.

Company: *MatchX GmbH*			CONFIDENTAL. Do not distribute.
Title: *X2E Reference Sensor* Variant: Default			*MatchX GmbH*
Size: A3	Number: 1	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:40	Sheet 1 of 9	
File: COVER PAGE.SchDoc			Engineer: PSB

X2E Reference Sensor
(Block Diagram)



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Title: *X2E Reference Sensor* Variant: Default		*MatchX GmbH*
Size: A3	Number: 2	Revision: 1.0
Date: 25.02.2024 Time: 22:10:40	Sheet 2 of 9	
File: BLOCK DIAGRAM.SchDoc		Engineer: PSB

Designator
COVER PAGE.SchDoc

Designator
BLOCK DIAGRAM.SchDoc

Designator
DOC REVISION HISTORY.SchDoc

Designator
ESP32_S3.SchDoc

Designator
SENSORS.SchDoc

Designator
POWER.SchDoc

Designator
LoRa.SchDoc

Designator
GPS.SchDoc

TEMPLATE NOTES

Set Project Parameters

1) Go to Project -> Project Options -> Parameters
2) Set Company, Project and VersionRevision

Mark Not Fitted Components as
NF

Net Class Example

Differential signal example

TITLE Examples (You can change the color to reflect your company color)

PAGE TITLE

Peripheral / Group of component title

Smaller Ttitle

Schematic Status Explanation

DRAFT - Very early stage of schematic, ignore details.

PRELIMINARY - Close to final schematic.

CHECKED - There should not be any mistakes. Tell the engineer if you find one.

RELEASED - A board with this schematic has been sent to production.

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Title: ***X2E Reference Sensor*** Variant: Default			*MatchX* * * * *
Size: A3	Number: 3	Revision: V1.0	
Date: 25.02.2024 Time: 22:10:40		Sheet 3 of 9	
File: TOP SHEET.SchDoc			Engineer: PSB

ESP32_S3.SchDoc

ESP32-S3 Module

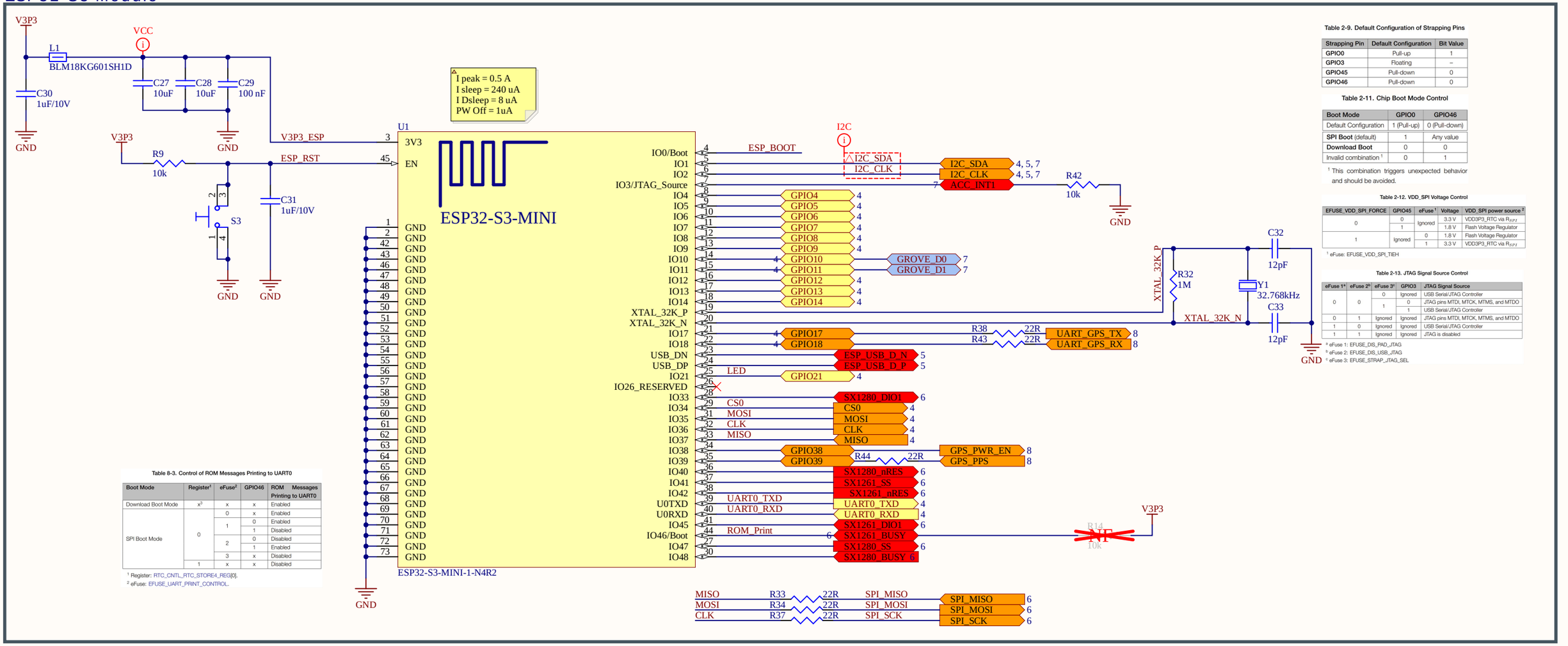


Table 8-3. Control of ROM Messages Printing to UART0

Boot Mode	Register[1]	eFuse[2]	GPIO46	ROM Messages Printing to UART0
Download Boot Mode	x[3]	x	x	Enabled
SPI Boot Mode	0	0	x	Enabled
		1	0	Enabled
			1	Disabled
		2	0	Disabled
			1	Enabled
		3	x	Disabled
	1	x	x	Disabled

[1] Register: RTC_CNTL_RTC_STORE4_REG[0].
[2] eFuse: EFUSE_UART_PRINT_CONTROL.

Table 2-9. Default Configuration of Strapping Pins

Strapping Pin	Default Configuration	Bit Value
GPIO0	Pull-up	1
GPIO3	Floating	–
GPIO45	Pull-down	0
GPIO46	Pull-down	0

Table 2-11. Chip Boot Mode Control

Boot Mode	GPIO0	GPIO46
Default Configuration	1 (Pull-up)	0 (Pull-down)
SPI Boot (default)	1	Any value
Download Boot	0	0
Invalid combination[1]	0	1

[1] This combination triggers unexpected behavior and should be avoided.

Table 2-12. VDD_SPI Voltage Control

EFUSE_VDD_SPI_FORCE	GPIO45	eFuse[1]	Voltage	VDD_SPI power source[2]
0	0	Ignored	3.3 V	VDD3P3_RTC via R_{SPI}
	1		1.8 V	Flash Voltage Regulator
1	Ignored	0	1.8 V	Flash Voltage Regulator
		1	3.3 V	VDD3P3_RTC via R_{SPI}

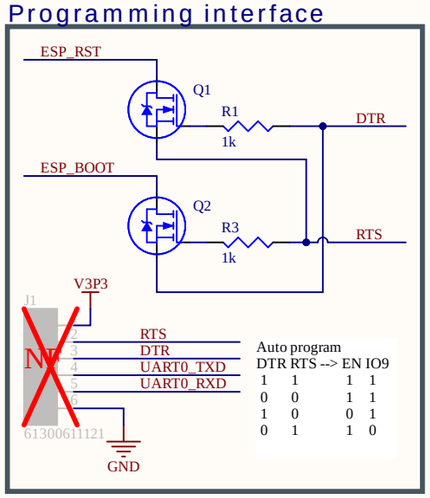
[1] eFuse: EFUSE_VDD_SPI_TIEH

Table 2-13. JTAG Signal Source Control

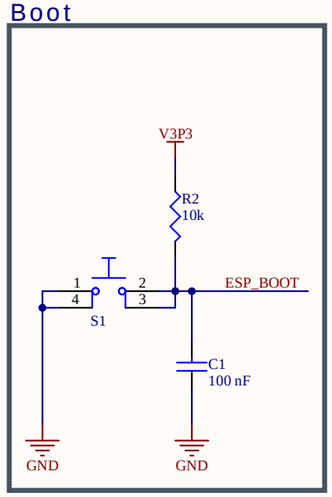
eFuse 1[a]	eFuse 2[b]	eFuse 3[c]	GPIO3	JTAG Signal Source
0	0	0	Ignored	USB Serial/JTAG Controller
		1	0	JTAG pins MTDI, MTCK, MTMS, and MTDO
			1	USB Serial/JTAG Controller
0	1	Ignored	Ignored	JTAG pins MTDI, MTCK, MTMS, and MTDO
1	0	Ignored	Ignored	USB Serial/JTAG Controller
1	1	Ignored	Ignored	JTAG is disabled

[a] eFuse 1: EFUSE_DIS_PAD_JTAG
[b] eFuse 2: EFUSE_DIS_USB_JTAG
[c] eFuse 3: EFUSE_STRAP_JTAG_SEL

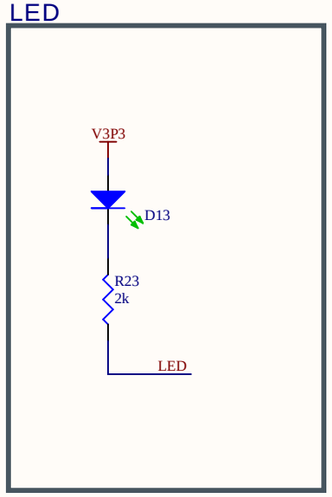
Programming interface



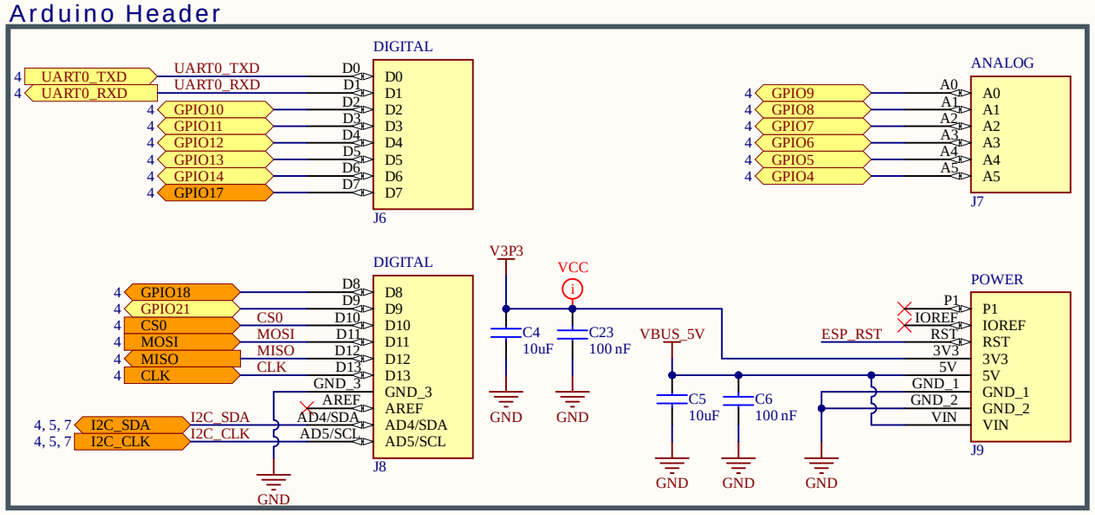
Boot



LED



Arduino Header



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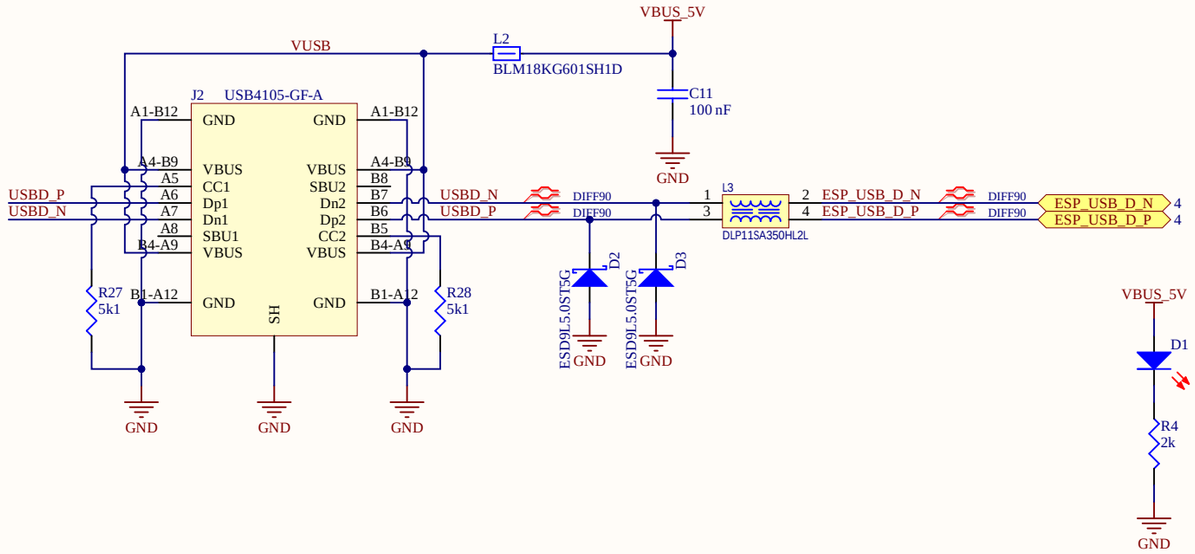
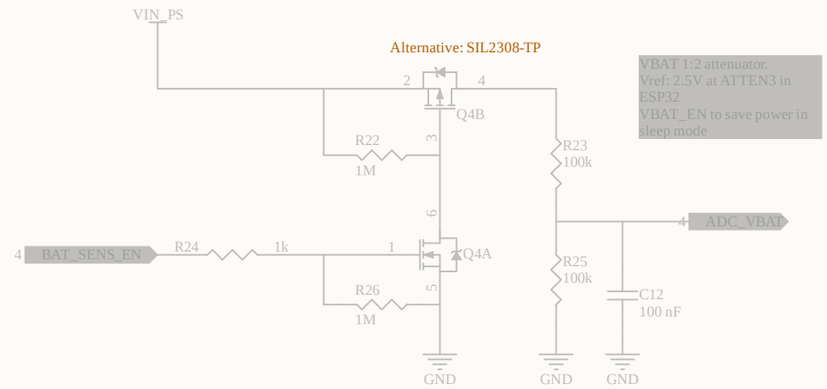
Title: X2E Reference Sensor	Variant: Default		MatchX GmbH
Size: A3	Number: 4	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:41	Sheet 4 of 9	
File: ESP32_S3.SchDoc		Engineer: PSB	

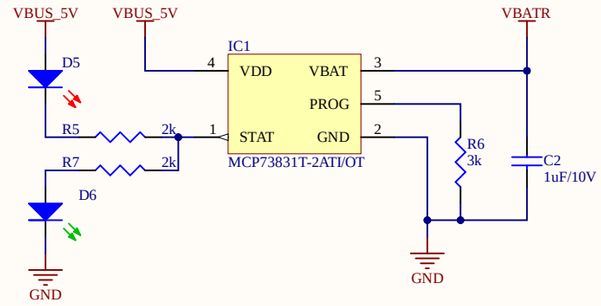
USB-C Connector



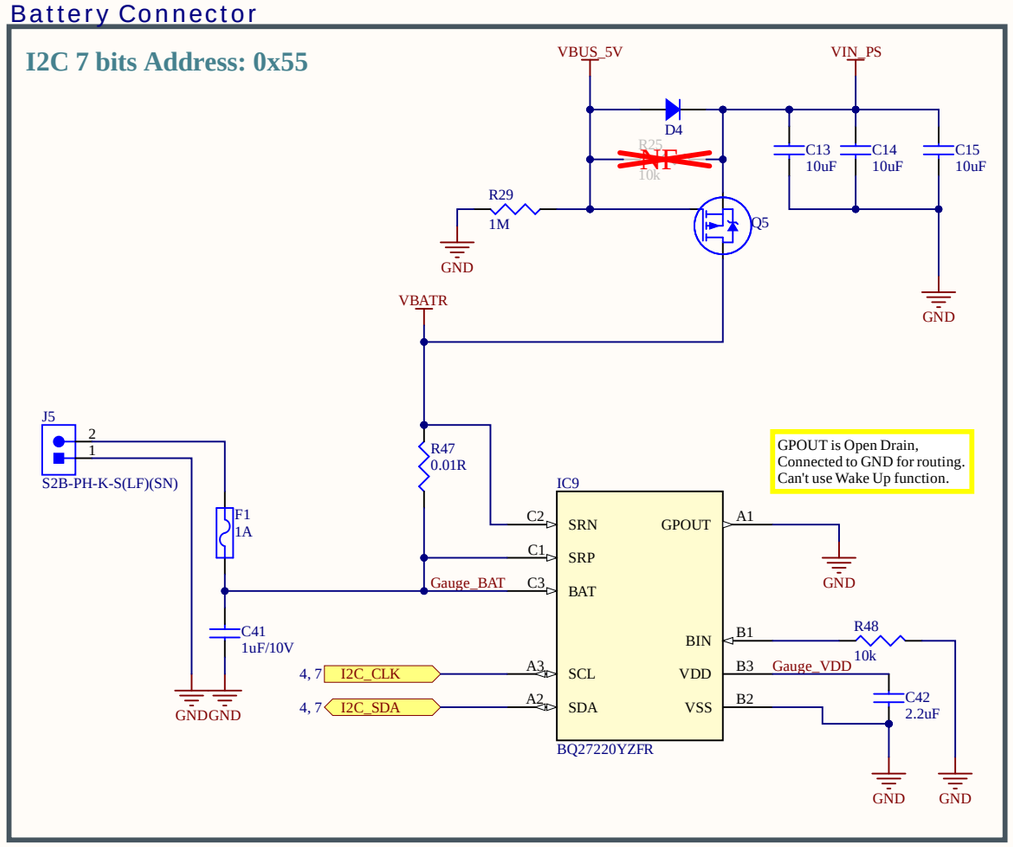
Battery Voltage Measurement



Battery Charger

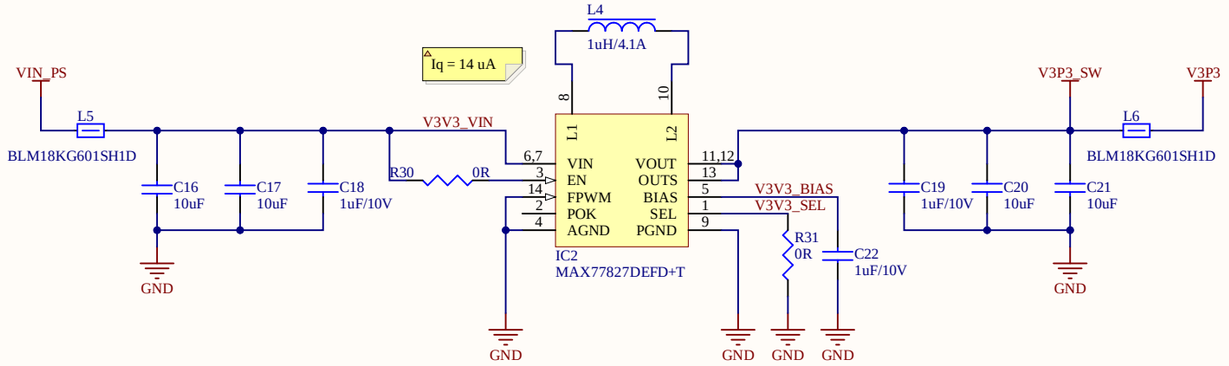


Battery Connector



3.3V Buck-Boost Always On

1.8V to 5.3V Input, 900mA Out, 6µA IQ, 2.5MHz Fsw



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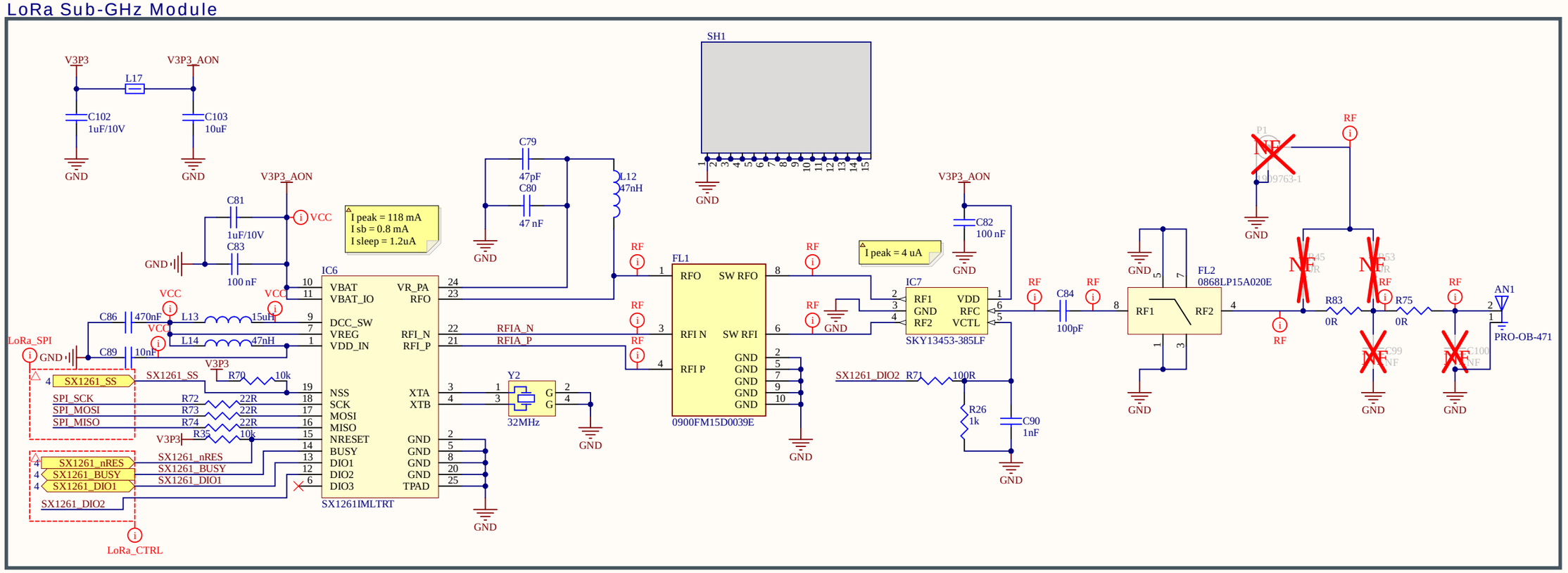
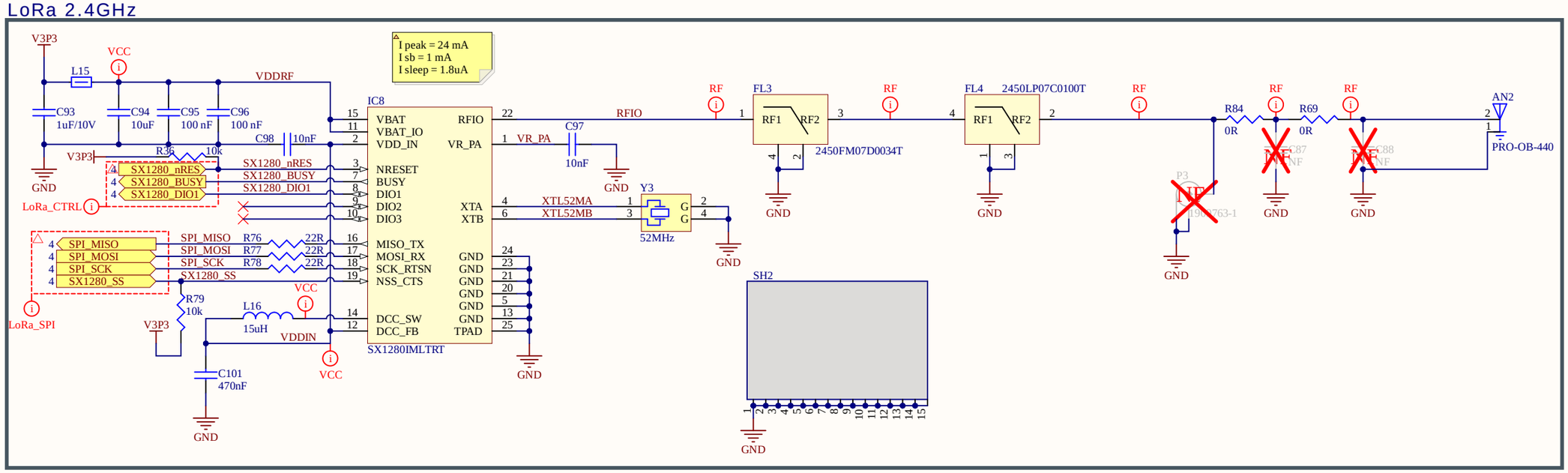
Size: A3	Number: 5	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:41	Sheet 5 of 9	
File: POWER.SchDoc			Engineer: PSB

LoRa Sub-GHz Module



LoRa 2.4GHz



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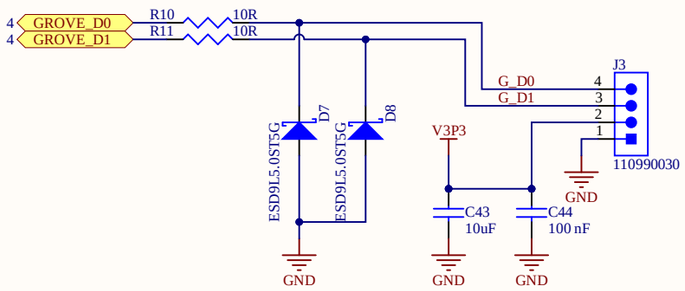
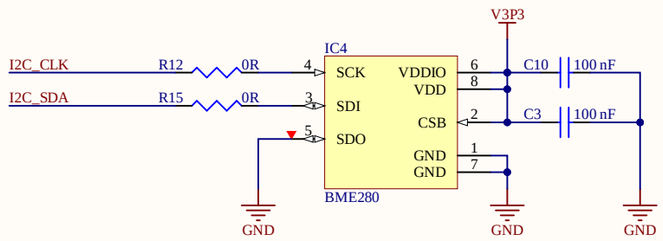
Title: *X2E Reference Sensor* Variant: Default			*MatchX GmbH*
Size: A3	Number: 6	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:42	Sheet 6 of 9	
File: LoRa.SchDoc			Engineer: PSB

Grove Connector



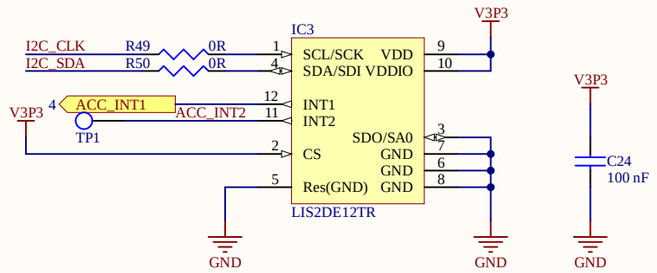
Pressure / Temp / Humidity Sensor

I2C 7 bits Address: 0x76

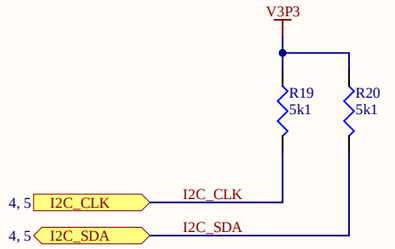


Accelerometer

I2C 7 bits Address: 0x18

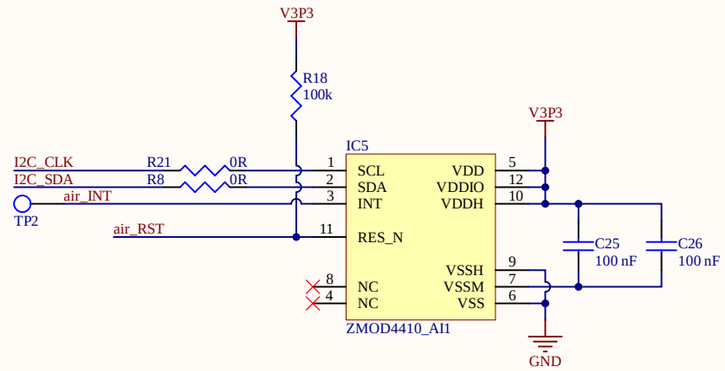


I2C Pull-Ups

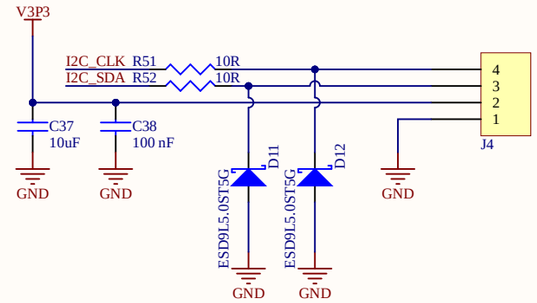


Air Quality Sensor

I2C 7 bits Address: 0x32



STEMMA 4-Pin



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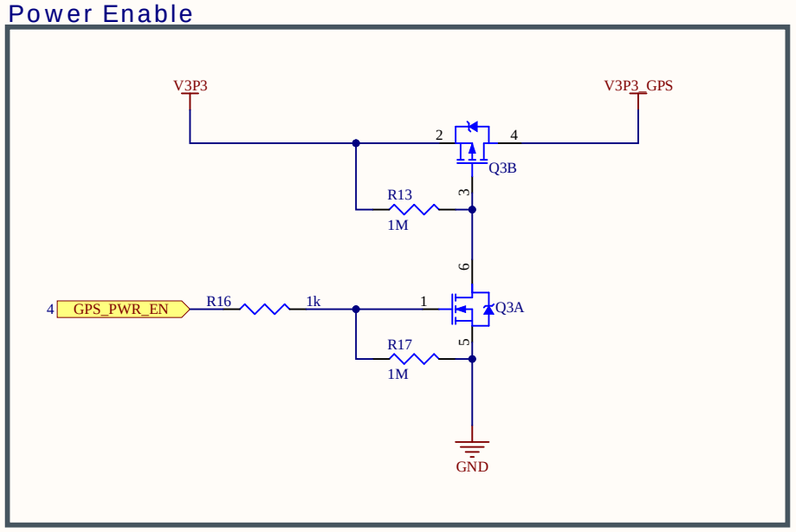
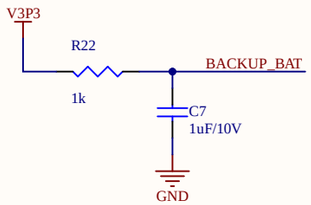
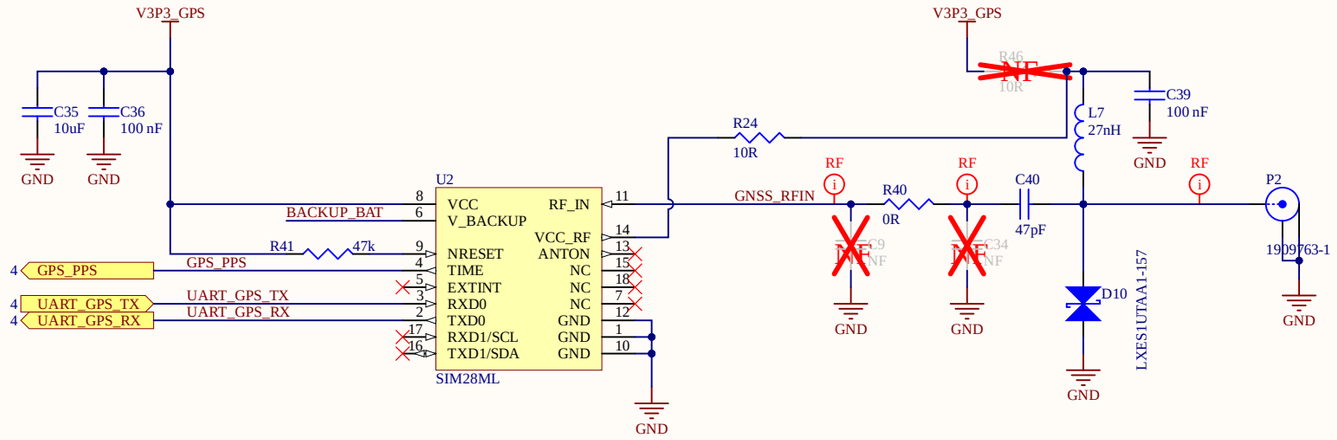
Size: A3	Number: 7	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:42	Sheet 7 of 9	
File: SENSORS.SchDoc			Engineer: PSB

Power Enable







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Size: A3	Number: 8	Revision: 1.0	
Date: 25.02.2024	Time: 22:10:42	Sheet 8 of 9	
File: GPS.SchDoc			Engineer: PSB

DOC: REVISION HISTORY

Revision History

TODO in rev.1.1

CLOCKS (CPU & PCIE)

Company: *MatchX GmbH*		CONFIDENTAL. Do not distribute.
Title: *X2E Reference Sensor* Variant: Default		*MatchX GmbH*
Size: A3	Number: 9	Revision: 1.0
Date: 25.02.2024 Time: 22:10:43		Sheet 9 of 9
File: DOC REVISION HISTORY.SchDoc		Engineer: PSB