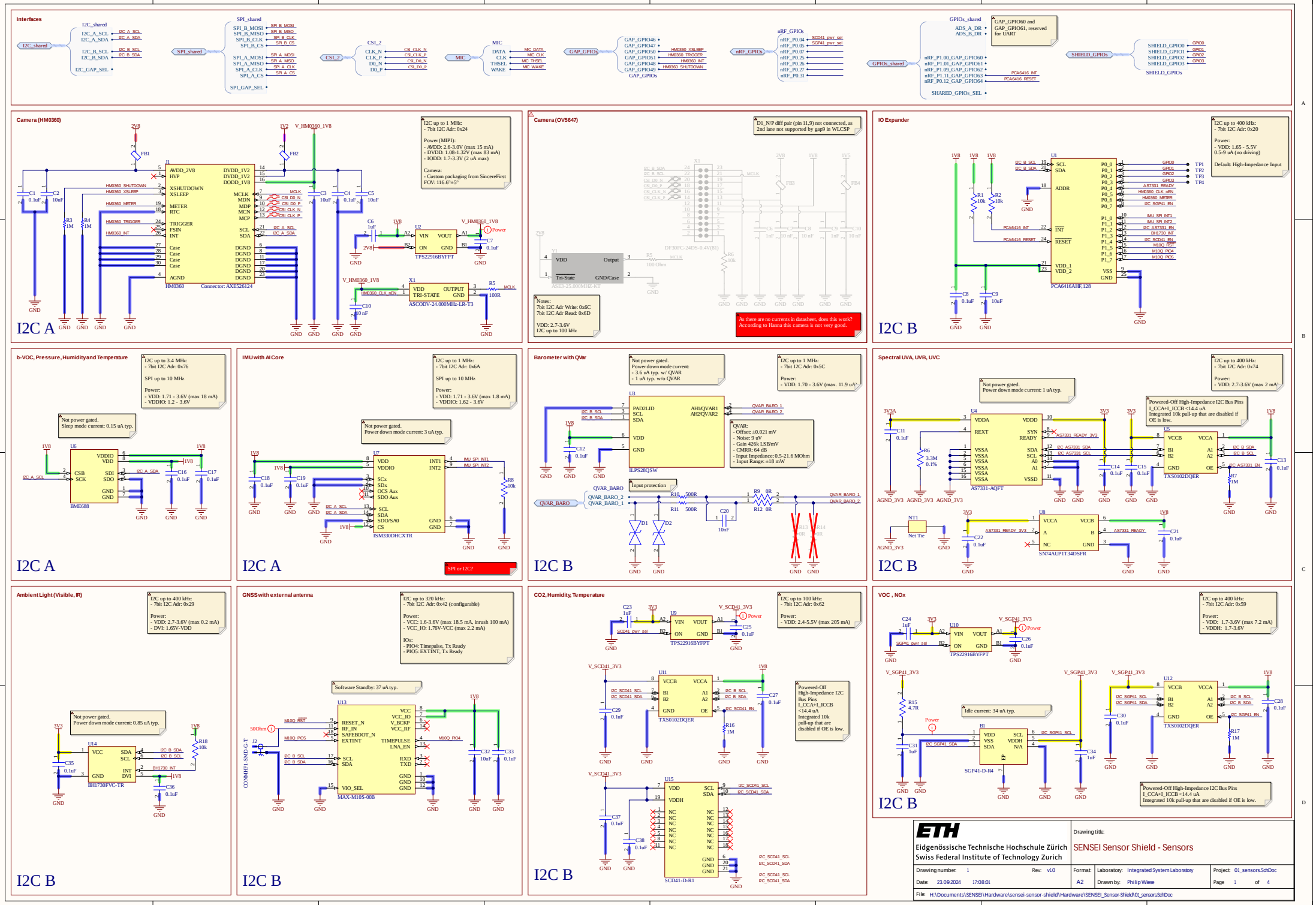
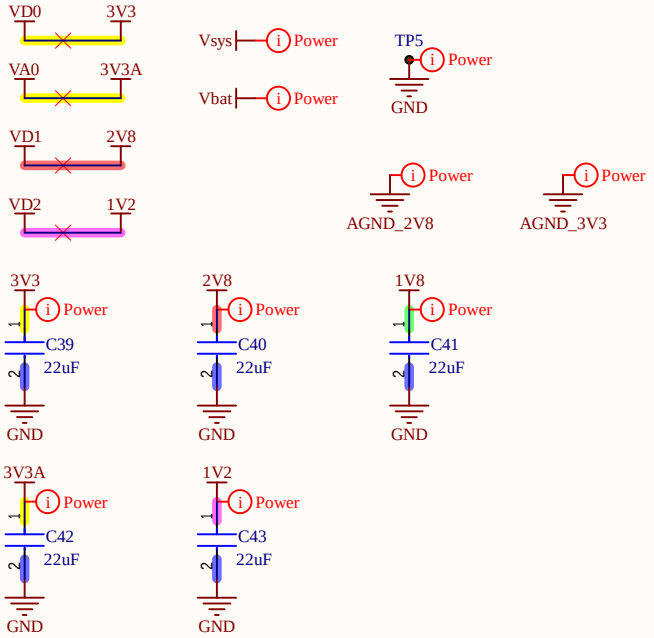

Interfaces
I2C_shared
SPI_shared
CSI_2
MIC
GAP_GPIOs
nRF_GPIOs
GPIOs_shared
SHIELD_GPIOs
Camera (HM0360)
I2C A
Camera (OV5647)
Notes:
7bit I2C Adr Write: 0x6C
7bit I2C Adr Read: 0x6D
VDD: 2.7-3.6V
I2C up to 100 kHz
As there are no currents in datasheet, does this work? According to Hanna this camera is not very good.
IO Expander
I2C B
b-VOC, Pressure, Humidity and Temperature
BME688
I2C A
IMU with AI Core
ISM330DHCXTR
SPI or I2C?
I2C A
Barometer with QVar
ILPS28QSW
Input protection
I2C B
Spectral UVA, UVB, UVC
AS7331-AQFT
TXS0102DQER
SN74AUP1T34DSFR
I2C B
Ambient Light (Visible, IR)
BH1730FVC-TR
I2C B
GNSS with external antenna
MAX-M10S-00B
I2C B
CO2, Humidity, Temperature
SCD41-D-R1
I2C B
VOC , NOx
SGP41-D-R4
I2C B
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich
Drawing title:
SENSEI Sensor Shield - Sensors
Drawing number: 1
Rev: v1.0
Format: A2
Laboratory: Integrated System Laboratory
Drawn by: Philip Wiese
Project: 01_sensors.SchDoc
Page 1 of 4
Date: 23.09.2024 17:08:01
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\01_sensors.SchDoc

Power Configuration

- Battery (VBAT)
- Always on 1.8V up to 750mA (1V8)
- System voltage between VBAT and VUSB (Vsys)
- Three software-controlled digital supplies (VD0, VD1, VD2)
- Two software-controlled analog supplies (VA0, VA1)

Default
- VD0: Off
- VD1: 1.8V Buck
- VD2: Off
- VA0: Off
- VA1: Off
- 1V8: Always On

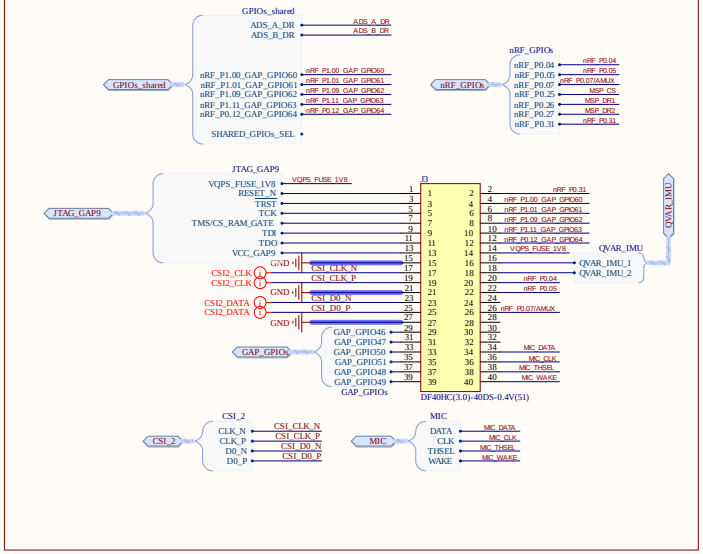
This Board
- VD0: 3.3V
- VD1: 2.8V
- VD2: 1.2V
- VA0: 3.3V
- VA1: NC
- 1V8: Always On



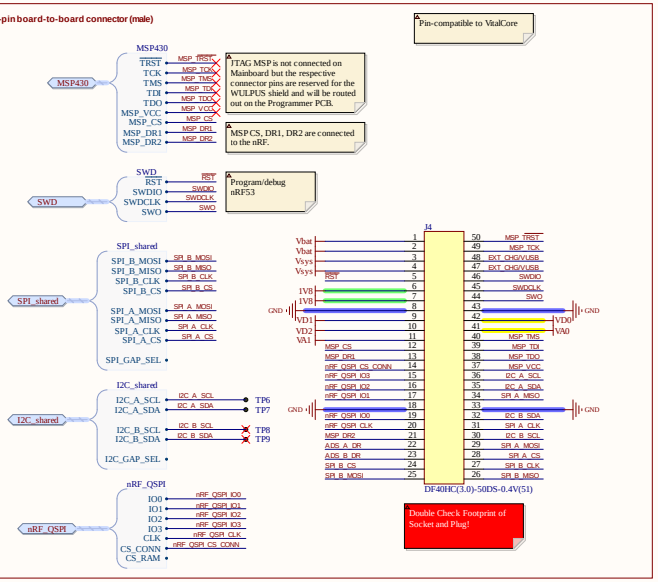
ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich			Project: SENSEI Sensor Shield - Power		
Drawing number: 2	Rev: v1.0	Format: A4 Q	Laboratory: Integrated System Laboratory	Sheet: 02_power.SchDoc	
Date: 23.09.2024 17:08:02			Drawn by: Philip Wiese	Page 2 of 4	
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\02_power.SchDoc					

Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich	Drawing title: SENSEI Sensor Shield - MCUs
Drawing number: 3 Rev: v1.0 Date: 23.09.2024 17:08:02	Format: A2 Laboratory: Integrated System Laboratory Drawn by: Philip Wiese
Project: 03_mcus.SchDoc Page 3 of 4	
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\03_mcus.SchDoc	

40-pin board-to-board connector (male)



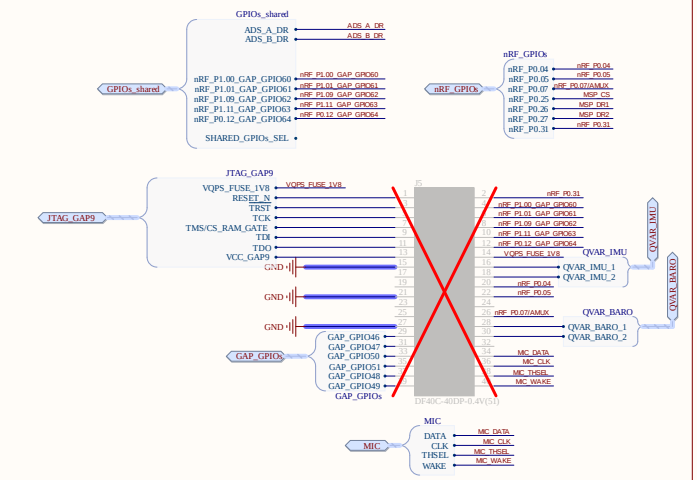
50-pin board-to-board connector (male)



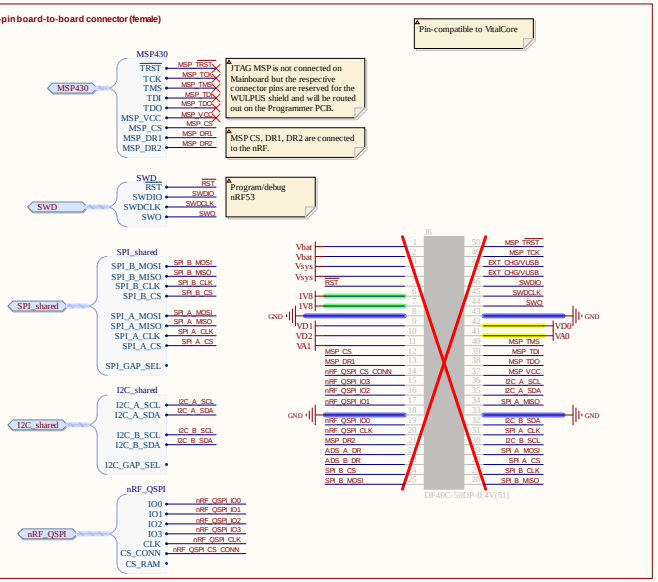
Questions:
- Add power measure shunts?
- Find better connectors?

Possible Connectors:
- I2C
- UART
- QVAR
- GPIO

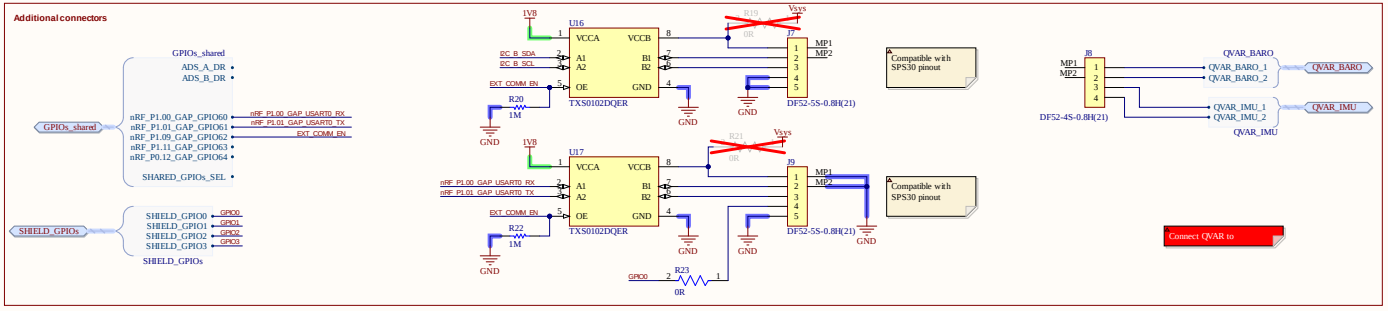
40-pin board-to-board connector (female)



50-pin board-to-board connector (female)



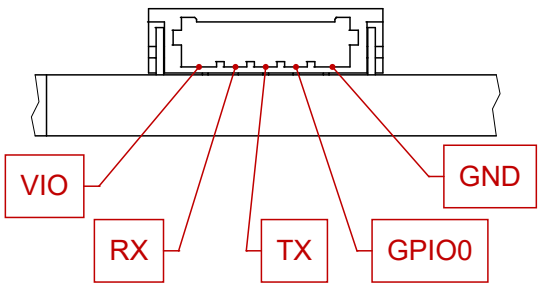
Additional connectors



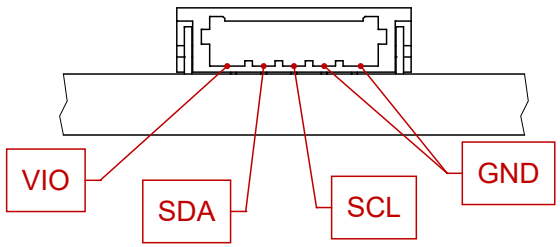
ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich		Drawing title: SENSEI Sensor Shield - GAP Interface	
Drawing number: 4	Rev: v1.0	Format: A2	Laboratory: Integrated System Laboratory
Date: 23.09.2024 17:08:02		Drawn by: Philip Wiese	Project: 04_gap_interface.SchDoc
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\04_gap_interface.SchDoc			Page 4 of 4

Connector

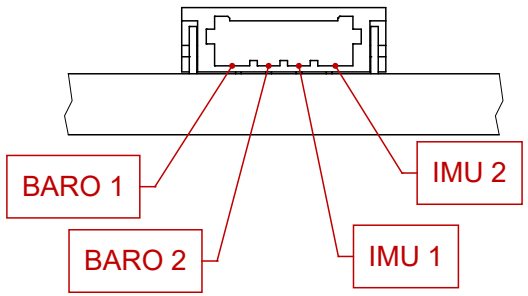
J9 (UART B)



J7 (I2C B)

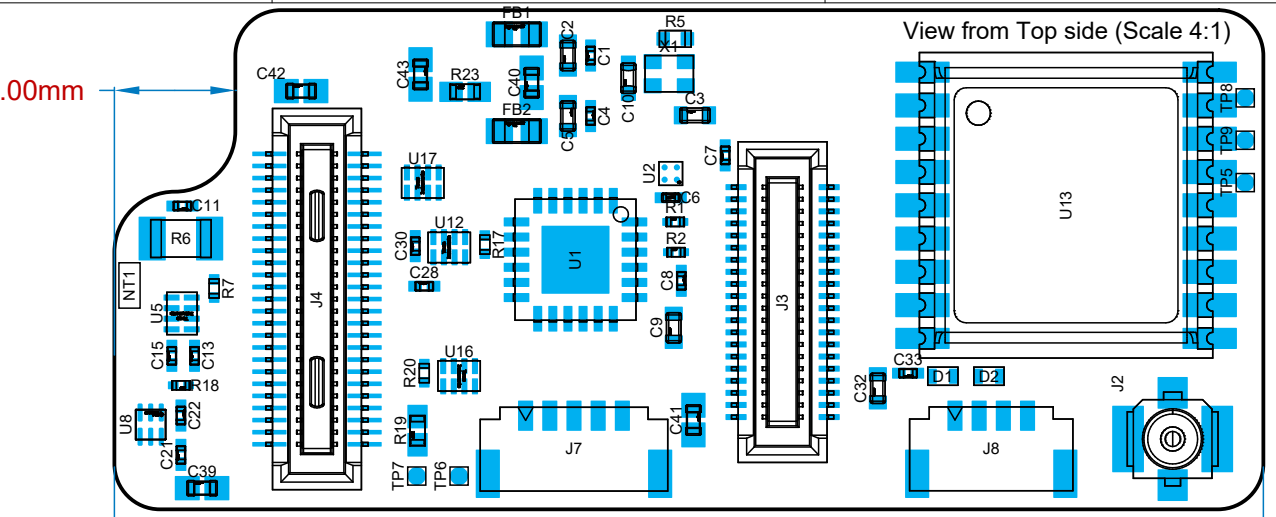


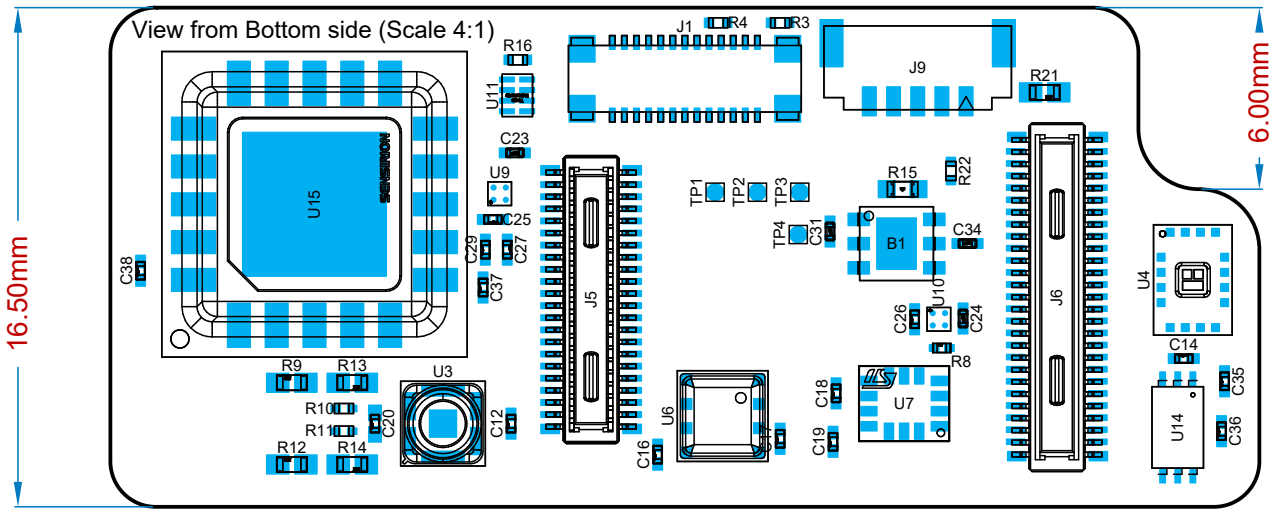
J8 (QVar)



Notes:

1. VIO can be tied to VSys via jumper resistor. (R19 & R21)





ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project:

SENSEI Sensor Shield

Drawing number: 1	Rev: v1.0	Format: A4 Q	Laboratory: Integrated Systems Laboratory
Date: 23.09.2024 17:08			Drawn by: Philip Wiese
Sheet: SENSEI_Sensor-Shield_V1-0			Page 1 of 4

File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\SENSEI_Sensor-Shield_V1-0.PCBDwf

Bill Of Materials

Line #	Designator	Comment	Quantity	Capacitance	Tolerance	Resistance	Description
1	B1	SGP41-D-R4	1				Air Quality Sensors VOC and NOx (MOX) Gas Pollutant Sensor
2	C1, C4, C7, C8, C11, C12, C13, C14, C15, C16, C17, C18, C19, C21, C22, C25, C26, C27, C28, C29, C30, C33, C35, C36, C37, C38	GRM033Z71C104KE14D	26	0.1uF	15%		Chip Multilayer Ceramic Capacitors for General Purpose, 0201, 0.10uF, X7R, 15%, 10%, 16V
3	C2, C3, C5, C9, C32	GRM155R60G106ME47D	5	10uF	20%		Chip Multilayer Ceramic Capacitors for General Purpose, 0402, 10uF, X5R, 15%, 20%, 4V
4	C6, C23, C24, C31, C34	CL03A105KP3NSNC	5	1uF	10%		Cap Ceramic 1uF 10V X5R ±10% Pad SMD 0201 +85°C T/R
5	C10	CC0402KRX7R7BB103	1	10 nF	0.1		CAP CER 10000PF 16V X7R 0402
6	C20	GRM033R71A103JA01D	1	10nF	5%		Chip Multilayer Ceramic Capacitors for General Purpose, 0201, 10000pF, X7R, 15%, 5%, 10V
7	C39, C40, C41, C42, C43	GRM158R60J226ME01D	5	22uF	20%		CAP CER 22UF 6.3V X5R 0402
8	D1, D2	TPD1E01B04DPYRQ1	2				TVS Diode (Bi-directional)
9	FB1, FB2	BLM18HE152SN1D	2		25%		Chip Ferrite Bead, 0603, 1500Ω @ 100MHz, 0.5Ω, 25%, 500mA
10	J1	Connector: AXE526124	1				FFC/FPC Connector, 26 Contact(s), 2 Row(s), Female, Straight, Surface Mount Terminal, Socket
11	J2	CONMHF1-SMD-G-T	1				U.FL/MHF1 Jack 50 Ohm PCB Surface Mount
12	J3	DF40HC(3.0)-40DS-0.4V(51)	1				40 Position 0.4mm Pitch Dual Row Vertical Surface Mount (SMT) Pin Socket, 3.0mm Stacking Height
13	J4	DF40HC(3.0)-50DS-0.4V(51)	1				50 Position 0.4mm Pitch Dual Row Vertical Surface Mount (SMT) Pin Socket, 3.0mm Stacking Height
14	J5	DF40C-40DP-0.4V(51)	0				50 Position 0.4mm Pitch Dual Row Vertical Surface Mount (SMT) Receptacle
15	J6	DF40C-50DP-0.4V(51)	0				50 Position 0.4mm Pitch Dual Row Vertical Surface Mount (SMT) Receptacle,
16	J7, J9	DF52-5S-0.8H(21)	2				Hirose DF52 52 Series 0.8mm Pitch 5 Way Right Angle Female FPC Connector
17	J8	DF52-4S-0.8H(21)	1				Hirose DF52 52 Series 0.8mm Pitch 4 Way Right Angle Female FPC Connector
18	R1, R2, R8, R18	RMCF0201FT10K0	4		1%	10k	RES 10K OHM 1% 1/20W 0201
19	R3, R4, R7, R16, R17, R20, R22	1M 5% 0201(0603), ERJ-1GNJ105C	7		5 %	1M	1M 0.05W 5% 0201 (0603 Metric) SMD
20	R5	ERJ-2RKF1000X	1		1%	100R	Chip Resistor, 100 Ohm, +/- 1%, 100 mW, -55 to 155 degC, 0402 (1005 Metric), RoHS, Tape and Reel
21	R6	MCU0805MD3304BP500	1		0.1%	3.3M	3.3M Ohm .1% 25PPM 1/8W
22	R9, R12, R13, R14, R19, R21, R23	RMCF0402ZT0R00	3			0R	RES 0 OHM JUMPER 1/16W 0402
23	R10, R11	ERJ-1GNF4990C	2		1%	500R	Thick Film Resistors - SMD 0201 499ohm 1% HalogenFree AEC-Q200
24	R15	CRCW04024R70FKED	1		1%	4.7R	RES Thick Film, 4.7Ω, 1%, 0.063W, 100ppm/°C, 0402
25	U1	PCA6416AHF,128	1				Parallel I/O Port, 16-Bit, 16 I/O, CMOS, PQCC24
26	U2, U9, U10	TPS22916BYFPT	3				5.5-V, 2-A, 60-m?, 10-nA leakage load switch with output discharge 4-DSBGA -40 to 85
27	U3	ILPS28QSW	1				No Description Available
28	U4	AS7331-AQFT	1				3-Channel UV-A/B/C Spectral Sensor-ICs
29	U5, U11, U12, U16, U17	TXS0102DQER	5				IC TRNSLTR BIDIRECTIONAL 8X2SON
30	U6	BME688	1				Gas sensor measuring relative humidity, barometric pressure, ambient temperature and gas (VOC)
31	U7	ISM330DHCXTR	1				INEMO INERTIAL MODULE: ALWAYS-ON
32	U8	SN74AUP1T34DSFR	1				IC TRNSLTR UNIDIRECTIONAL 6SON
33	U13	MAX-M10S-00B	1				u-blox M10 GNSS module ROM, TCXO, LNA, SAW LCC, 9.7x10 mm, 500 pcs/reel
34	U14	BH1730FVC-TR	1				Digital output type ambient light sensor IC is composed of photodiodes, current-voltage converter circuit, A / D converter, control logic circuits, interface circuits and etc. It connects with I²C Bus in an equipment
35	U15	SCD41-D-R1	1				CO2 SENSOR 40 PPM I2C SMD
36	X1	ASCODV-24.000MHz-LR-T3	1				CONTINUOUS VOLTAGE SMD CRYSTAL OSCILLATOR

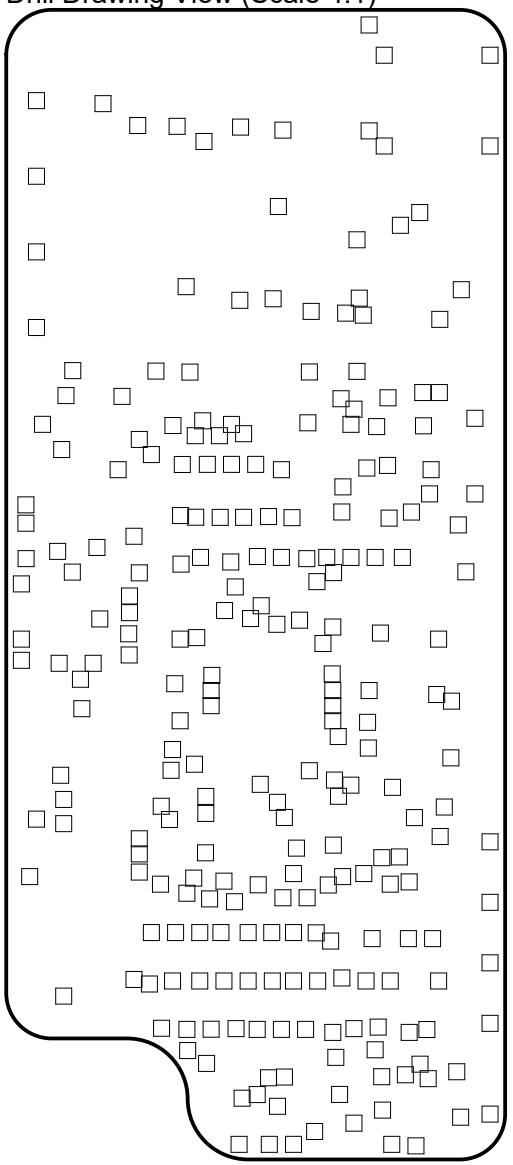
ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

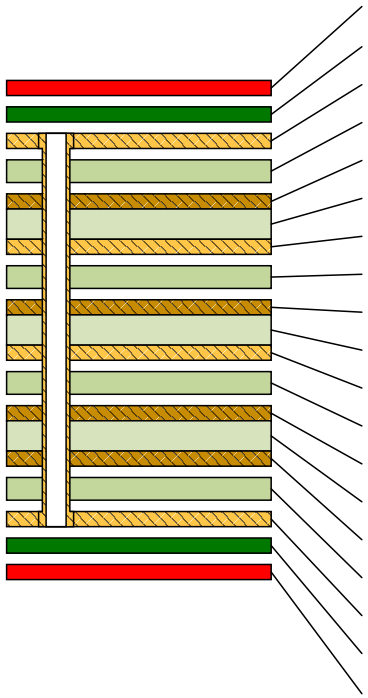
Project: **SENSEI Sensor Shield**

Drawing number: 1 Rev: v1.0
Date: 23.09.2024 17:08
Format: A4 Q
Laboratory: Integrated Systems Laboratory
Drawn by: Philip Wiese
Sheet: SENSEI_Sensor-Shield_V1-0
Page 2 of 4
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\SENSEI_Sensor-Shield_V1-0.PCBDwf

Drill Drawing View (Scale 4:1)



Layer Stack Legend



Material	Layer	Thickness	Dielectric Material	Type	Gerber
	Top Overlay			Legend	GTO
Surface Material	Top Solder	0.01mm	Solder Resist	Solder Mask	GTS
CF-003	Top Layer	0.04mm		Signal	GTL
Prepreg		*0.11mm*	*PP-021*	*Dielectric*	
CF-004	Mid-Layer 1	0.04mm		Internal Plane	GP1
Core		*0.30mm*	*Core-023*	*Dielectric*	
Copper	Mid-Layer 2	0.04mm		Signal	G1
Prepreg		*0.11mm*	*PP-021*	*Dielectric*	
CF-004	Mid-Layer 3	0.04mm		Internal Plane	GP2
Core		*0.30mm*	*Core-023*	*Dielectric*	
CF-004	Mid-Layer 4	0.04mm		Signal	G2
Prepreg		*0.11mm*	*PP-021*	*Dielectric*	
CF-004	Mid-Layer 5	0.04mm		Internal Plane	GP3
Core		*0.30mm*	*Core-023*	*Dielectric*	
CF-004	Mid-Layer 6	0.04mm		Internal Plane	GP4
Prepreg		*0.11mm*	*PP-021*	*Dielectric*	
CF-003	Bottom Layer	0.04mm		Signal	GBL
Surface Material	Bottom Solder	0.01mm	Solder Resist	Solder Mask	GBS
	Bottom Overlay			Legend	GBO

Total thickness: 1.63mm

Drill Table

Symbol	Count	Hole Size	Plated	Hole Tolerance
□	252	0.20mm	Plated	
	252 Total			

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project: **SENSEI Sensor Shield**

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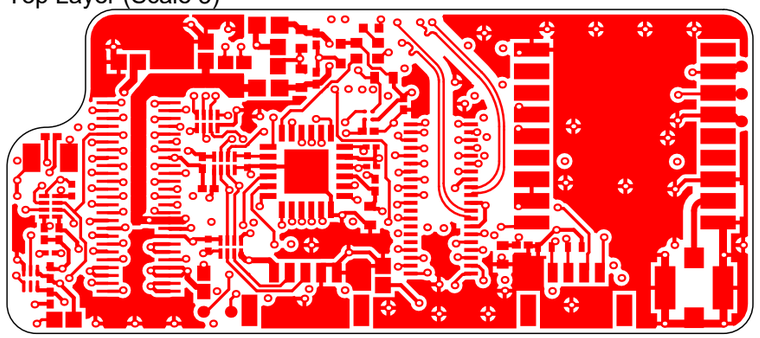
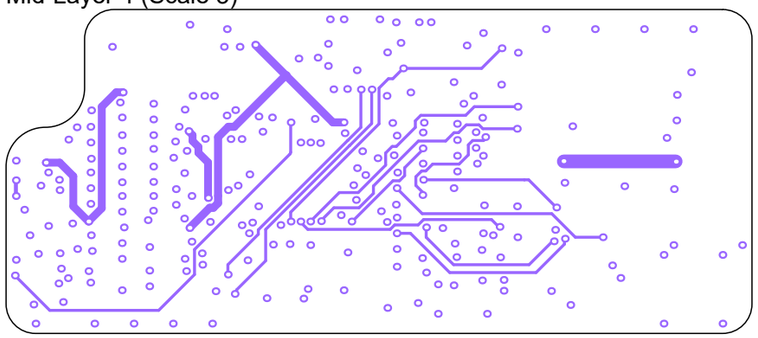
Sheet: SENSEI_Sensor-Shield_V1-0
Page 3 of 4
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\SENSEI_Sensor-Shield_V1-0.PCBDwf

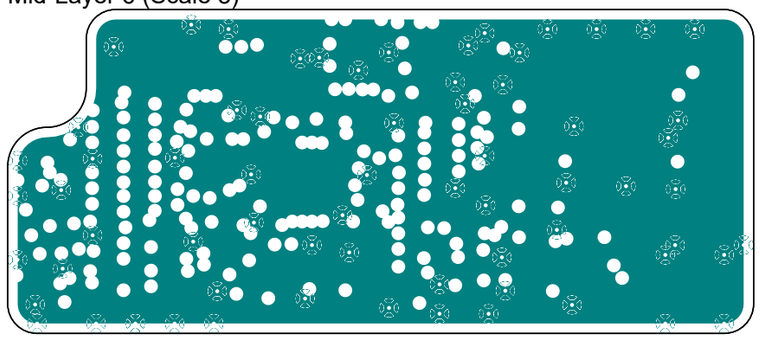
Top Layer (Scale 3)



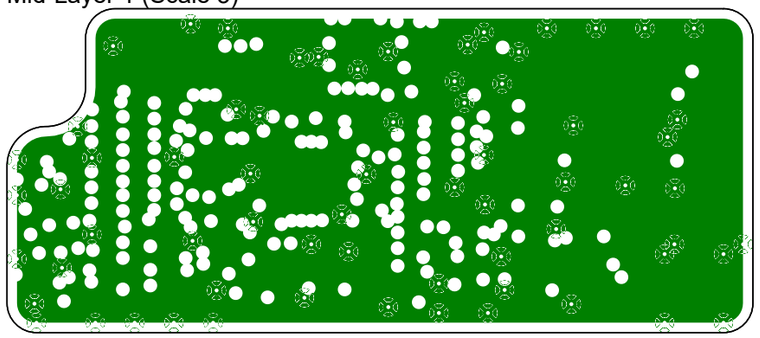
Mid-Layer 4 (Scale 3)



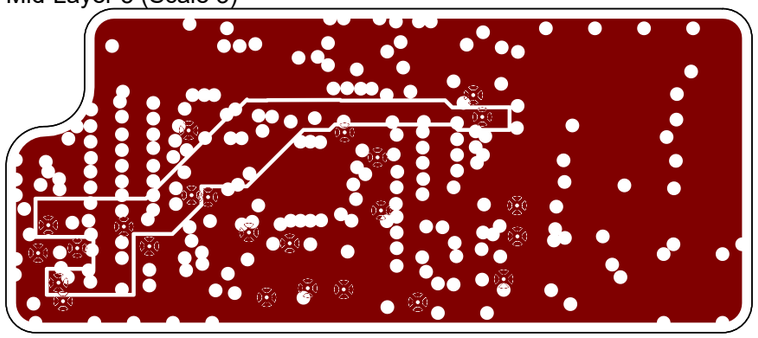
Mid-Layer 6 (Scale 3)



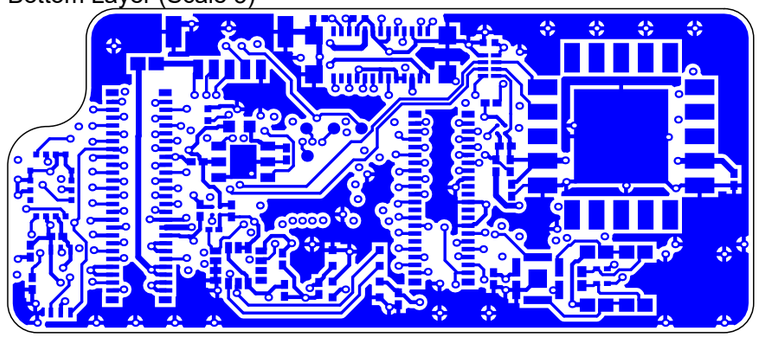
Mid-Layer 1 (Scale 3)



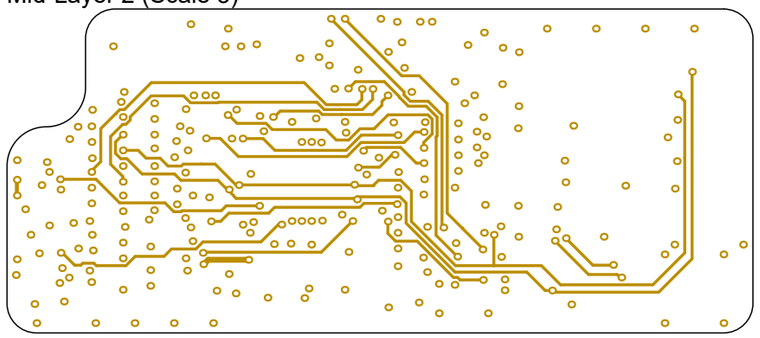
Mid-Layer 5 (Scale 3)



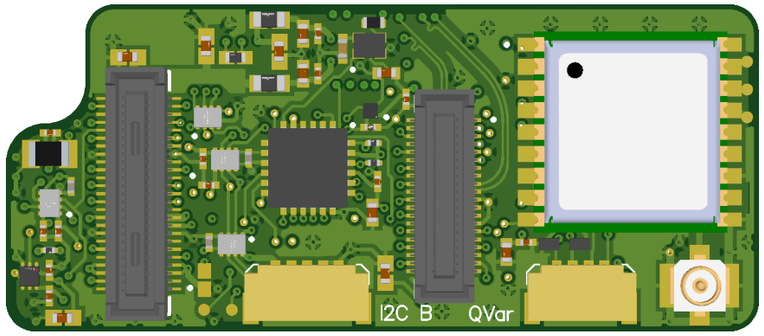
Bottom Layer (Scale 3)



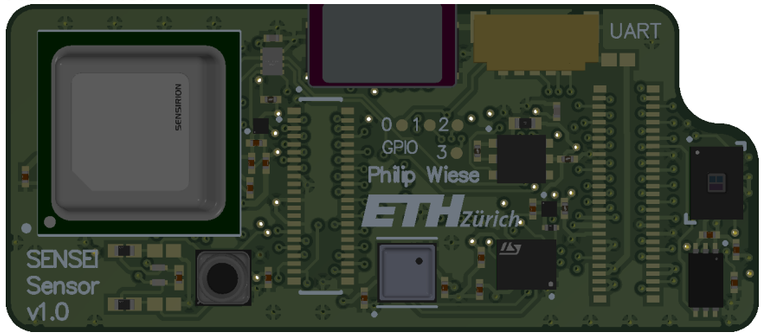
Mid-Layer 2 (Scale 3)



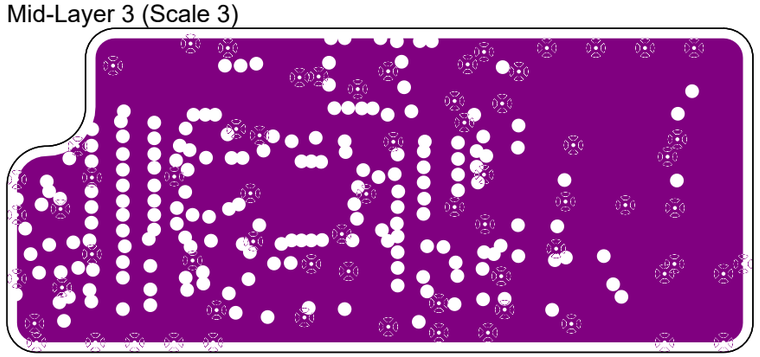
Realistic View



Realistic View



Mid-Layer 3 (Scale 3)



ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project:

SENSEI Sensor Shield

Drawing number: 1 Rev: v1.0	Format: A3	Laboratory: Integrated Systems Laboratory	Sheet: SENSEI_Sensor-Shield_V1-0
Date: 23.09.2024 17:08		Drawn by: Philip Wiese	Page 4 of 4
File: H:\Documents\SENSEI\Hardware\sensei-sensor-shield\Hardware\SENSEI_Sensor-Shield\SENSEI_Sensor-Shield_V1-0.PCBDwf			