Common Sheets:
500 GRID
600 USB_POWER
700 MCU

Module Specific:
800 HWCFG
900 LED
1000 UI

UI_POT
OUT_0 ANA_0
OUT_1 ANA_1
OUT_2 ANA_2
OUT_3 ANA_3
OUT_4 ANA_4
OUT_5 ANA_5
OUT_6 ANA_6
OUT_7 ANA_7
OUT_8 ANA_8
OUT_9 ANA_9
OUT_10 ANA_10
OUT_11 ANA_11
File: UI_POT.kicad_sch

UI_LED
LED_DATA_IN
LED_DATA_OUT
File: UI_LED.kicad_sch

MCU
LED_DATA_OUT
HWCFG_SHIFT
HWCFG_CLOCK
HWCFG_DATA
File: MCU.kicad_sch

HWCFG
HWCFG_SHIFT
HWCFG_CLOCK
HWCFG_DATA
File: HWCFG.kicad_sch

UI_BUTTON
OUT_12
OUT_13
OUT_14
OUT_15
File: UI_BUTTON.kicad_sch

UI_HALL_PREAMP
IN_0 OUT_0 ANA_12
IN_1 OUT_1 ANA_13
IN_2 OUT_2 ANA_14
IN_3 OUT_3 ANA_15
File: UI_HALL_PREAMP.kicad_sch

Sheet5D7C8BFD
ANA_0 IN_0 OUT ESP_GPIO_1 ESP_GPIO_18
ANA_1 IN_1
ANA_4 IN_2
ANA_5 IN_3
ANA_8 IN_4
ANA_9 IN_5 ADDRESS_A
ANA_12 IN_6 ADDRESS_B
ANA_13 IN_7 ADDRESS_C
File: UI_MUX.kicad_sch

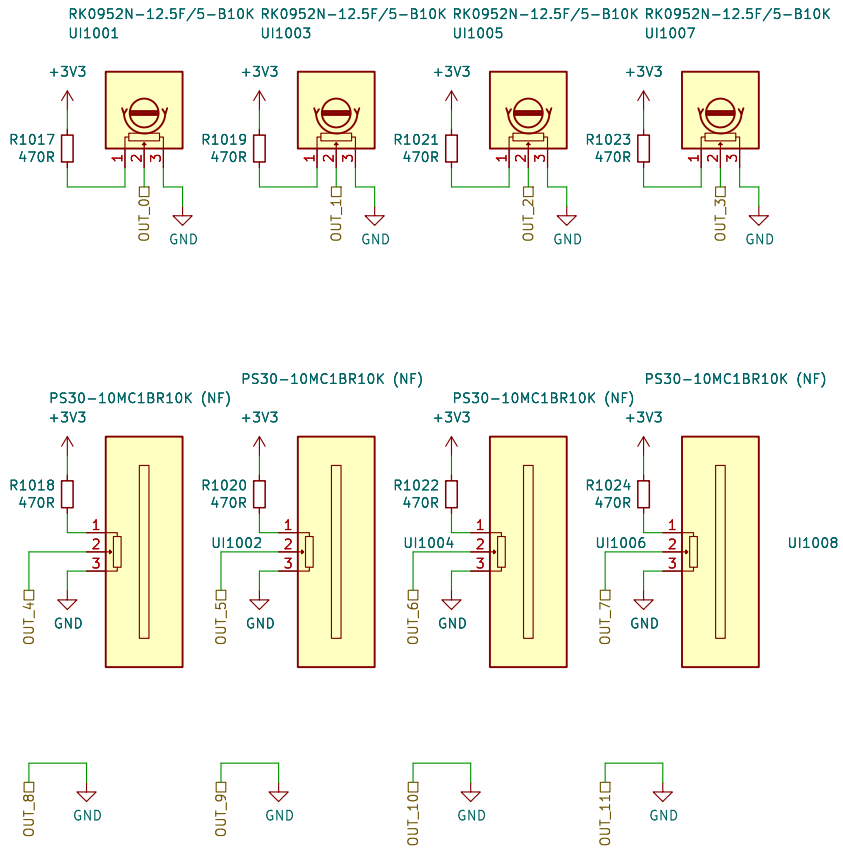
sheet5D8763D6
ANA_2 IN_0 OUT ESP_GPIO_2
ANA_3 IN_1
ANA_6 IN_2
ANA_7 IN_3
ANA_10 IN_4
ANA_11 IN_5 ADDRESS_A ESP_GPIO_5
ANA_14 IN_6 ADDRESS_B ESP_GPIO_4
ANA_15 IN_7 ADDRESS_C ESP_GPIO_3
File: UI_MUX.kicad_sch

J509
SMTSO1625MTJ
GND

J510
SMTSO1625MTJ
GND

Sheet: /
File: PCBA-PBF4.kicad_sch
Title:
Size: A3 | Date: | **Rev:**
KiCad E.D.A. 8.0.8 | Id: 1/15

1000



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Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 2/15

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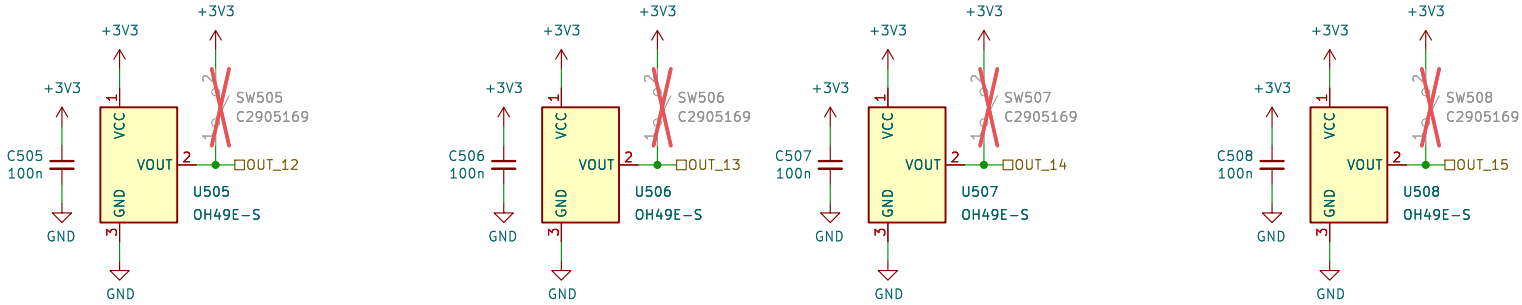
Simulation:

http://tinyurl.com/y229mty4



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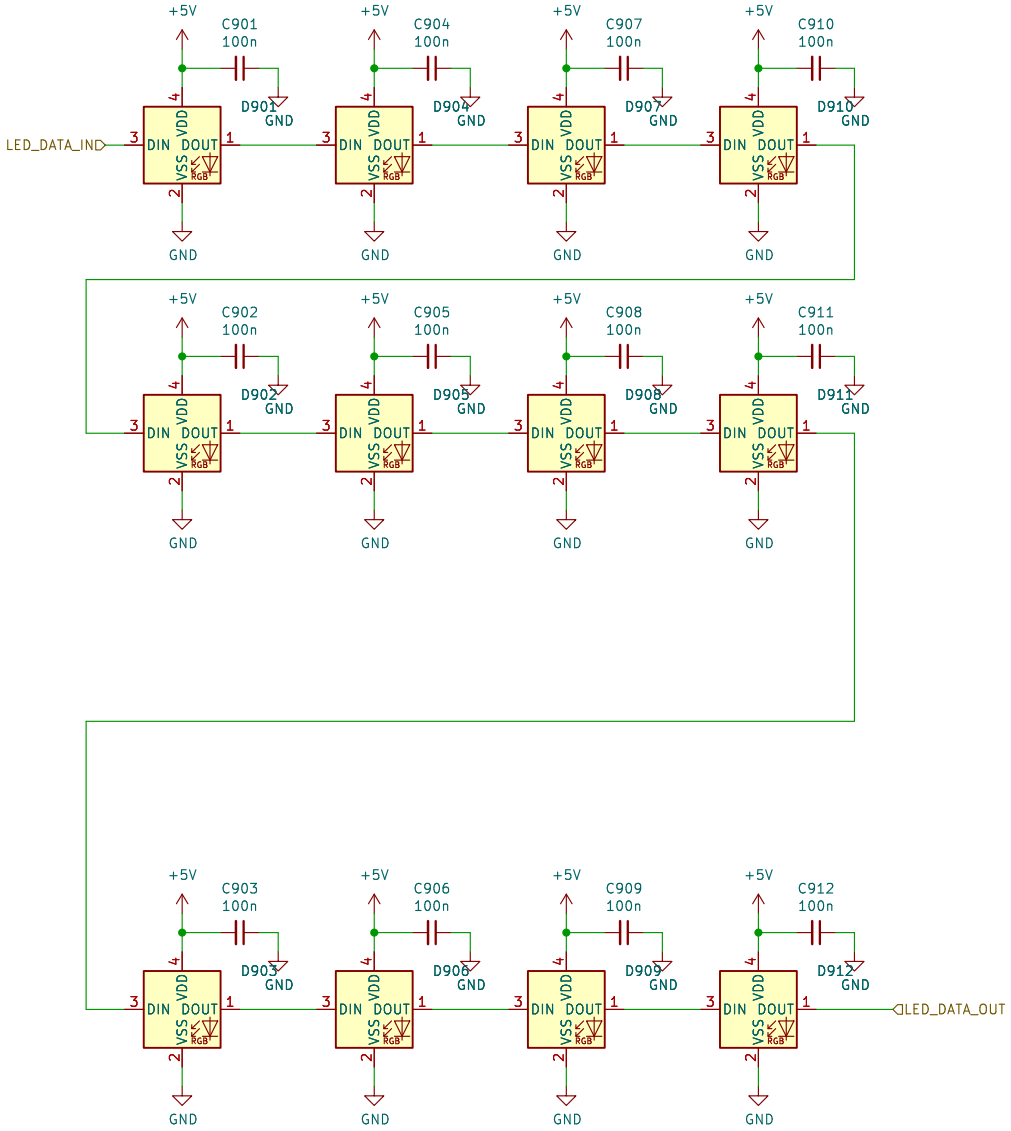
File: UI_BUTTON.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 3/15

900



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Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 4/15

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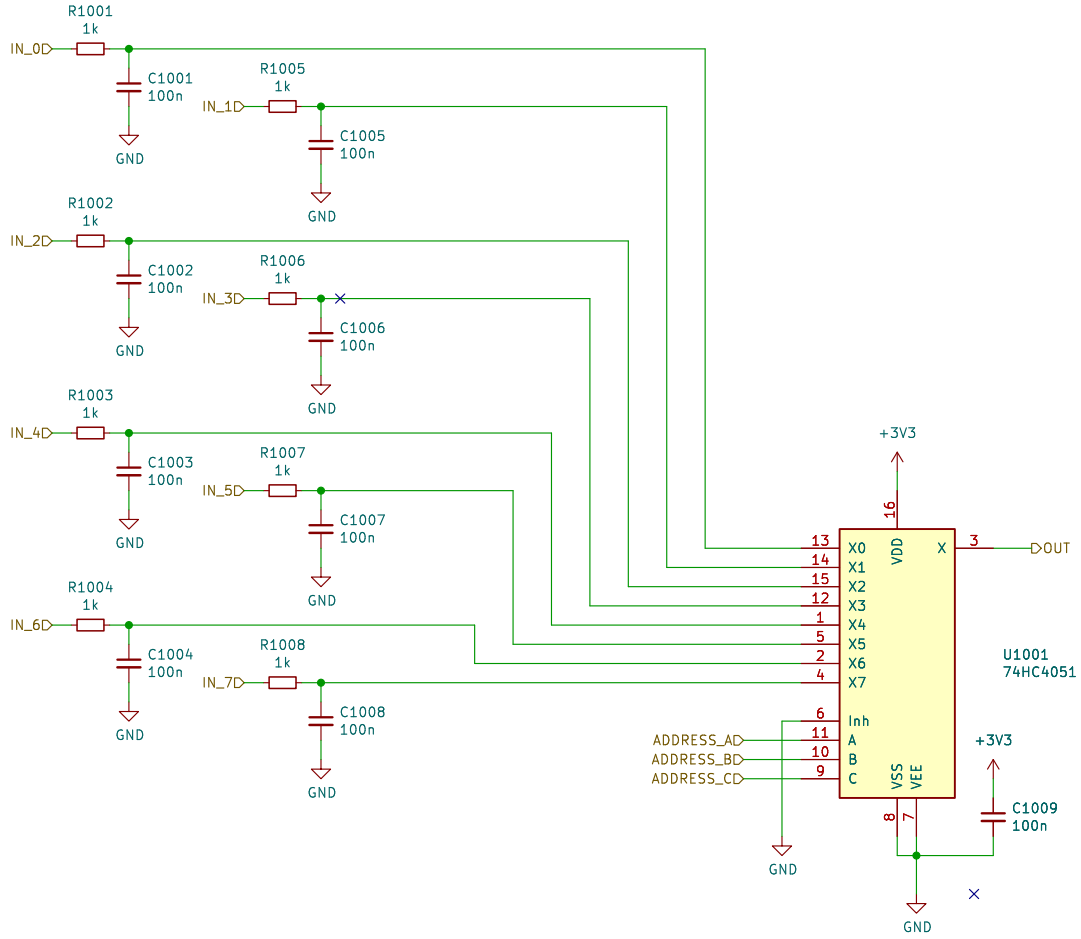

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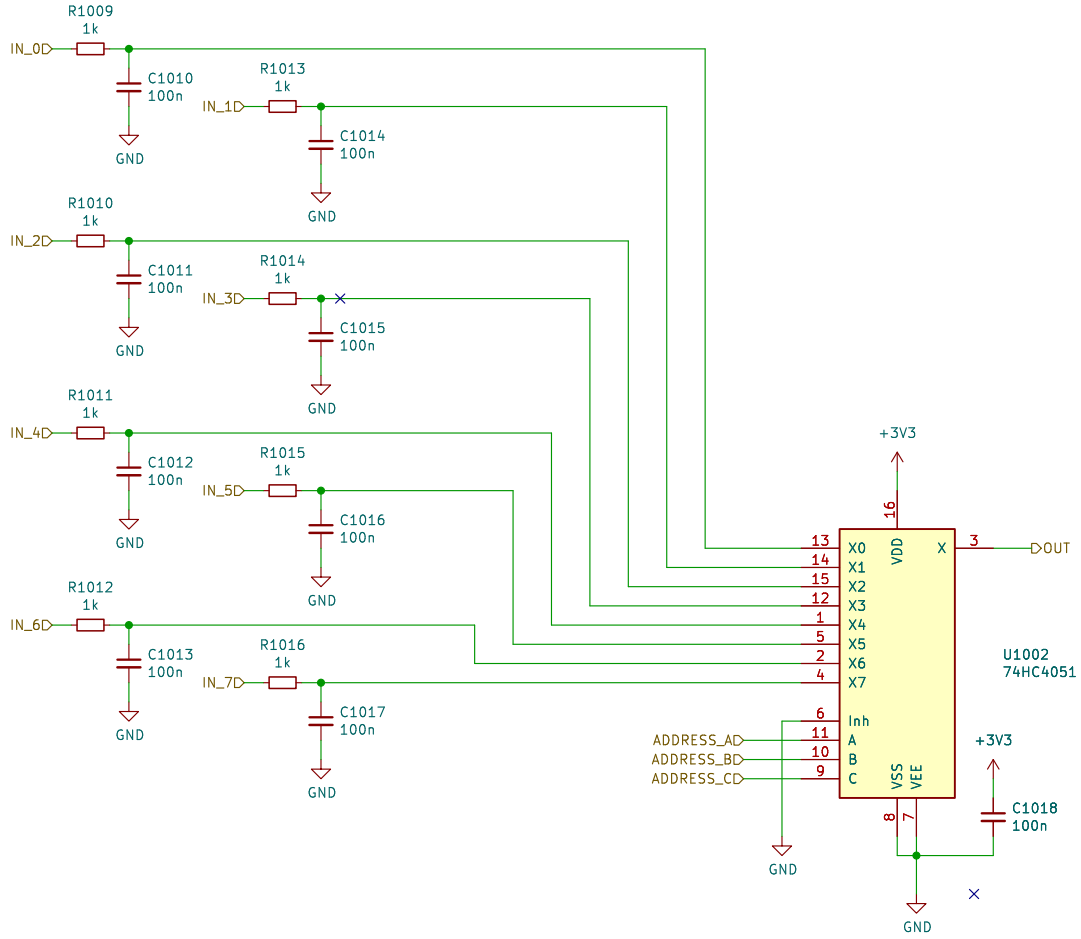
File: UI_MUX.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 5/15

1000



Sheet: /sheet5D8763D6/		
File: UI_MUX.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 6/15

700

Sheet60F06FE1

USB_DP
USB_DN
USB_DATA_P
USB_DATA_N

File: USB_POWER.kicad_sch

+3V3 GZ2012D601TF L702 PWR_FLAG

C743 10u
C746 1u
C747 100n
C749 100n
C751 100n
C752 100n
C753 10n
C754 1u

+3V3 VDD_SPI +3V3 +3V3

GND

J701 C5137195
L701 1n8
U.FL-R-SMT-1(80)
ESP_LNA
C739 3p9
C742 1p8

1.8nH LQG15HS1N8S02D
3.9pF GJM1555C1H3R9WB01D
1.8pF GJM1555C1H1R8BB01D

ESP32-S3

ESP_RESET	4	CHIP_PU	
ESP_LNA	1	LNA_IN	
USB_DN	25	GPIO19	D-
USB_DP	26	GPIO20	D+
SPIHD	28	GPIO26	SPICS1
SPIWP	30	GPIO27	SPIHD
SPICS0	31	GPIO28	SPIWP
SPICLK	32	GPIO29	SPICS0
SPIQ	33	GPIO30	SPICLK
SPID	34	GPIO31	SPIQ
	35	GPIO32	SPID
40MHz Y701	54	XTAL_P	
	53	XTAL_N	
TCK	44	GPIO39	MTCK
TDO	45	GPIO40	MTDO
TDI	47	GPIO41	MTDI
TMS	48	GPIO42	MTMS
U0TXD	49	GPIO43	U0TXD
U0RXD	50	GPIO44	U0RXD

	5	* GPIO0	ESP_BOOT0
	6	GPIO1	ESP_GPIO_1
	7	GPIO2	ESP_GPIO_2
	8	* GPIO3	ESP_GPIO_3
	9	GPIO4	ESP_GPIO_4
	10	GPIO5	ESP_GPIO_5
	11	GPIO6	RP_SPIO_RX
	12	GPIO7	RP_SPIO_CS
	13	GPIO8	RP_SPIO_TX
	14	GPIO9	RP_SPIO_SCK
	15	GPIO10	HWCFG_SHIFT
	16	GPIO11	HWCFG_CLOCK
	17	GPIO12	HWCFG_DATA
	18	GPIO13	RP_SWDIO
	19	GPIO14	RP_SWCLK
	21	GPIO15	RP_CLK
	22	GPIO16	ESP_GPIO_16
	23	GPIO17	RP_INTERRUPT
	24	GPIO18	ESP_GPIO_18
	27	GPIO21	LED_DATA_OUT
	38	GPIO33	ESP_GPIO_33
	39	GPIO34	ESP_GPIO_34
	40	GPIO35	ESP_GPIO_35
	41	GPIO36	ESP_GPIO_36
	42	GPIO37	ESP_GPIO_37
	43	GPIO38	MAP_MODE
	51	* GPIO45	ESP_GPIO_45
	52	* GPIO46	ESP_GPIO_46
	37	GPIO47	ESP_GPIO_47
	36	GPIO48	ESP_GPIO_48

C748 10p
C750 10p

LCSC: TXM40M0004322HBCEO00T
S3240000091040JY

U704

ESP_GPIO_47 TP706 TestPoint
ESP_GPIO_48 TP707 TestPoint
ESP_GPIO_34 TP708 TestPoint
ESP_GPIO_33 TP709 TestPoint
TP710 TestPoint

Programming Interface

RP_UART0_TX
RP_UART0_RX
U0TXD
U0RXD
1k R733
TMS
TCK
TDO
TDI
Conn_02x05_Odd_Even
J702

Mapmode switch

This pusbutton is acessible through the housing, activates USB bootloader.

+3V3 +3V3
R701 5k1
100n C757
R736 1k
SW701 C255807
MAP_MODE
Internal Pull-up

+3V3
R735 5k1
SW702 C2905169
ESP_RESET
C758 1u

SW703 C2905169
ESP_BOOT0

+1V1 +3V3

C731 100n
C732 100n
C733 1u
C734 1u
C735 100n
C736 100n
C737 100n
C738 100n
C740 100n
C741 100n
C744 100n
C745 100n

+3V3
R729 5k1
RP_RUN

RP_RUN	26	RUN	
	47	USB_DP	
	46	USB_DM	
	56	QSPI_SS	
	53	QSPI_SD0	
	55	QSPI_SD1	
	54	QSPI_SD2	
	51	QSPI_SD3	
	52	QSPI_SCLK	
RP_CLK	20	XIN	
	21	XOUT	
RP_SWCLK	24	SWCLK	
RP_SWDIO	25	SWD	
	19	TESTEN	
	57	GND	
	45	VREG_VOUT	
	23	DVDD	
	1	IOVDD	
	48	USB_VDD	
	43	ADC_AVDD	
	44	VREG_IN	
	2	GPIO0	RP_UART0_TX
	3	GPIO1	RP_UART0_RX
	4	GPIO2	GRID_SOUTH_TX
	5	GPIO3	GRID_WEST_RX
	6	GPIO4	GRID_SYNC_2
	7	GPIO5	GRID_WEST_TX
	8	GPIO6	GRID_NORTH_RX
	9	GPIO7	
	11	GPIO8	
	12	GPIO9	
	13	GPIO10	
	14	GPIO11	
	15	GPIO12	TP701 TestPoint
	16	GPIO13	TP702 TestPoint
	17	GPIO14	TP703 TestPoint
	18	GPIO15	TP704 TestPoint
	27	GPIO16	RP_SPIO_RX
	28	GPIO17	RP_SPIO_CS
	29	GPIO18	RP_SPIO_SCK
	30	GPIO19	RP_SPIO_TX
	31	GPIO20	
	32	GPIO21	
	34	GPIO22	RP_INTERRUPT
	35	GPIO23	GRID_NORTH_TX
	36	GPIO24	GRID_EAST_RX
	37	GPIO25	GRID_SYNC_1
	38	GPIO26_ADC0	GRID_EAST_TX
	39	GPIO27_ADC1	GRID_SOUTH_RX
	40	GPIO28_ADC2	
	41	GPIO29_ADC3	

TP705 TestPoint

U703 RP2040

GRID Connector

Connector arrays for the interface boards on all four sides of the module.

sheet5D85C9EA

GRID_SYNC_1	GRID_WEST_SYNC_1
GRID_WEST_TX	GRID_WEST_TX
GRID_WEST_RX	GRID_WEST_RX
GRID_SYNC_2	GRID_WEST_SYNC_2
GRID_SYNC_1	GRID_SOUTH_SYNC_1
GRID_SOUTH_TX	GRID_SOUTH_TX
GRID_SOUTH_RX	GRID_SOUTH_RX
GRID_SYNC_2	GRID_SOUTH_SYNC_2
GRID_SYNC_1	GRID_EAST_SYNC_1
GRID_EAST_TX	GRID_EAST_TX
GRID_EAST_RX	GRID_EAST_RX
GRID_SYNC_2	GRID_EAST_SYNC_2
GRID_SYNC_1	GRID_NORTH_SYNC_1
GRID_NORTH_TX	GRID_NORTH_TX
GRID_NORTH_RX	GRID_NORTH_RX
GRID_SYNC_2	GRID_NORTH_SYNC_2

File: GRID.kicad_sch

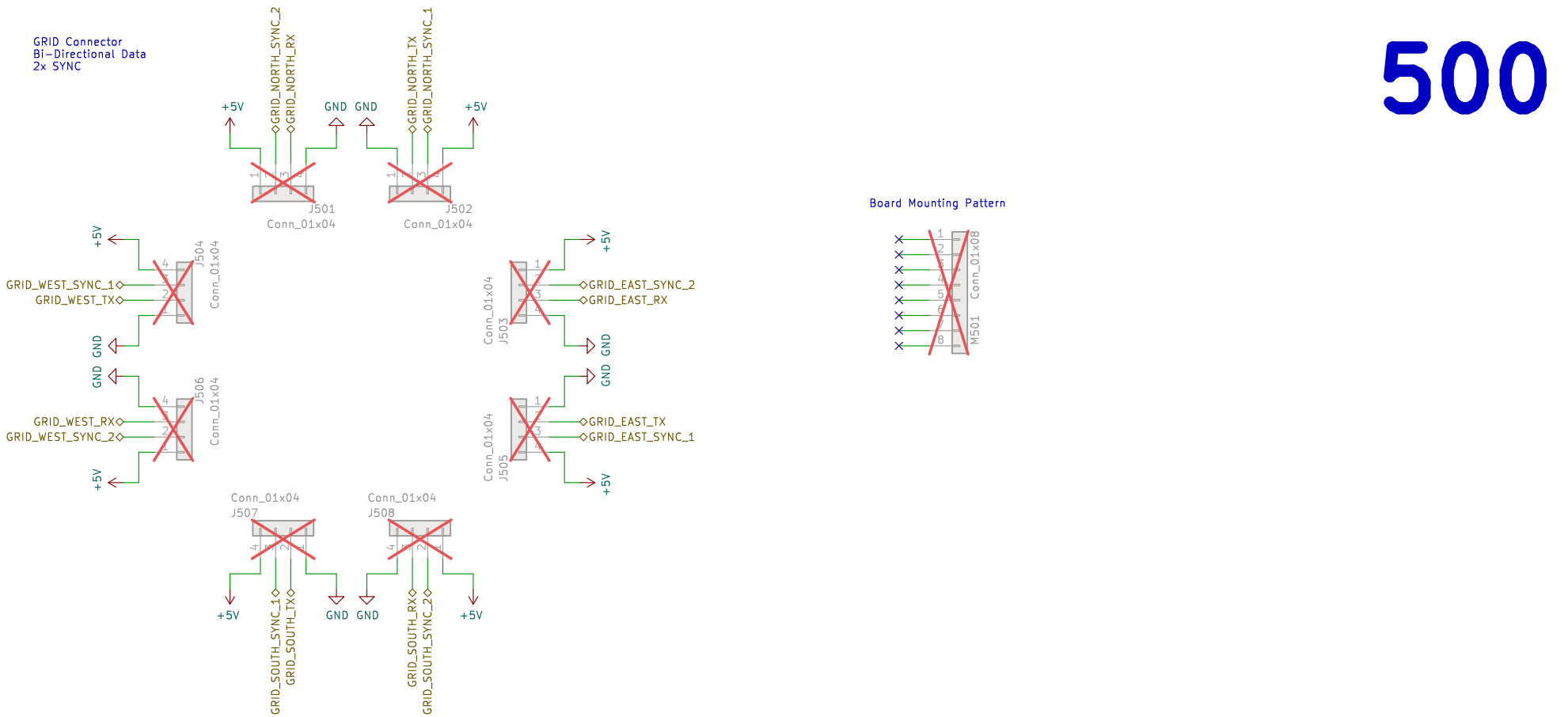
J799 Conn_01x02

QSPI Flash memory

This memory can be accessed throgh the QSPI interface of the MCU. Can be used for configuration, static data or program execution.

VDD_SPI VDD_SPI
R734 5k1
U705 W25Q64JVSSIQ
SPICS0 CS
SPICLK CLK
DI(IO0) SPID
DO(IO1) SPIQ
IO2 SPIWP
IO3 SPIHD
VCC GND
C755 1u
C756 100n

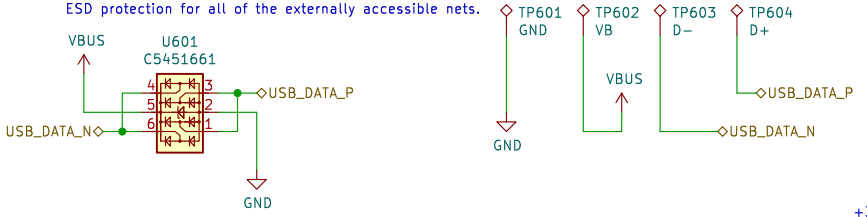
Sheet: /MCU/	
File: MCU.kicad_sch	
Title:	
Size: A3	Date:
KiCad E.D.A. 8.0.8	Id: 7/15
	Rev:


GRID Connector
Bi-Directional Data
2x SYNC
+5V
GRID_NORTH_SYNC_2
GRID_NORTH_RX
GND GND
GRID_NORTH_TX
GRID_NORTH_SYNC_1
+5V
J501
Conn_01x04
J502
Conn_01x04
+5V
GRID_WEST_SYNC_1
GRID_WEST_TX
GND
J504
Conn_01x04
GND
GRID_WEST_RX
GRID_WEST_SYNC_2
+5V
J506
Conn_01x04
Conn_01x04
J503
+5V
GRID_EAST_SYNC_2
GRID_EAST_RX
GND
GND
Conn_01x04
J505
GRID_EAST_TX
GRID_EAST_SYNC_1
+5V
Conn_01x04
J507
Conn_01x04
J508
+5V
GND GND
+5V
GRID_SOUTH_SYNC_1
GRID_SOUTH_TX
GRID_SOUTH_RX
GRID_SOUTH_SYNC_2
Board Mounting Pattern
M501
Conn_01x08
500
Sheet: /MCU/sheet5D85C9EA/
File: GRID.kicad_sch
Title:
Size: A4
Date:
Rev:
KiCad E.D.A. 8.0.8
Id: 8/15

600

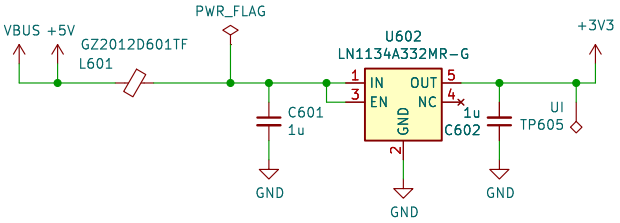
ESD Diodes

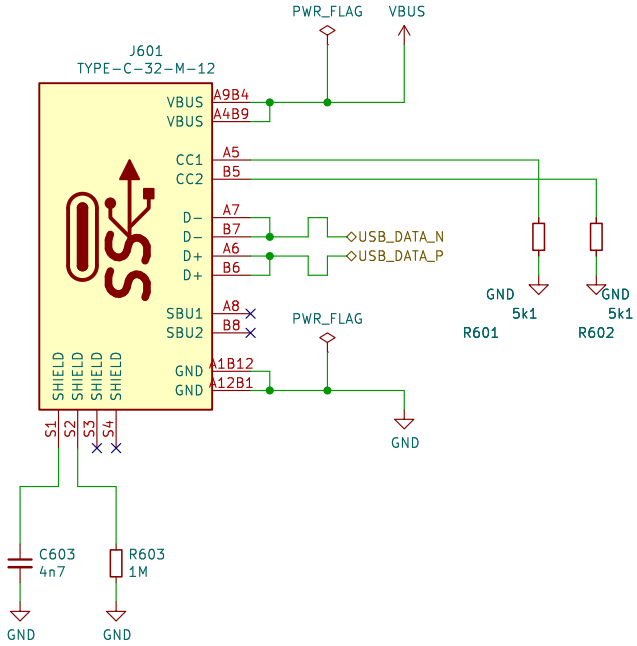
ESD protection for all of the externally accessible nets.



+3V3 LDO Regulators

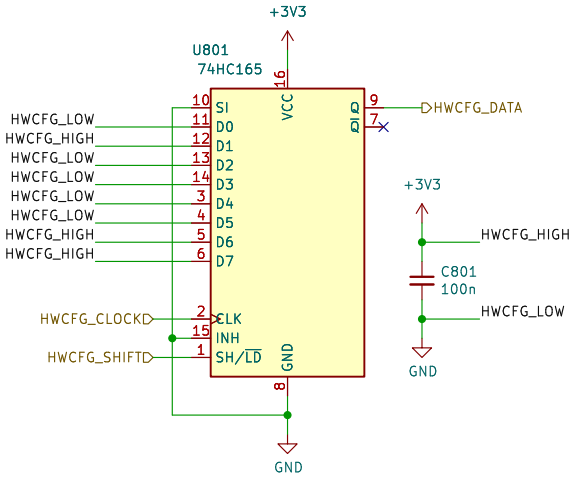
Regulators for generating independent power rails for the microcontroller and the user interface.





Sheet: /MCU/Sheet60F06FE1/		
File: USB_POWER.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 9/15

800



Board Identification

Grid firmware can identify the hardware and the board revision thorugh a 3 wire serial interface using one or more shift register as read only memory. The content of the memory is defined by pulling the inputs high or low through pcb traces or solderable configuration jumpers.

4b'Model + 4b'Revision + nb'Reserved (Multiple shift registers)

D0: MODEL (LSB)
D1: MODEL
D2: MODEL
D3: MODEL (MSB)
D4: REVISION (LSB)
D5: REVISION
D6: REVISION
D7: REVISION (MSB)

Model Codes (D3-D0):

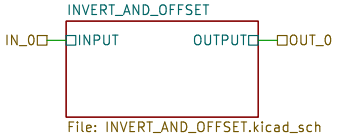
Po16 0000
Bo16 0001
PBF4 0010
EN16 0011
...

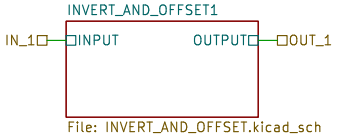
Revision Codes (D7-D4):

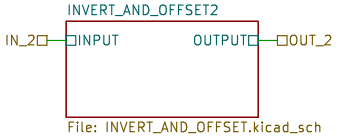
RevA 0000
RevB 0001
RevC 0010
RevD 0011
...

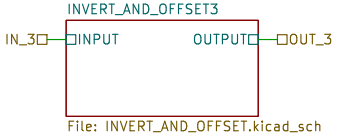
Sheet: /HWCFG/		
File: HWCFG.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 10/15

simulation





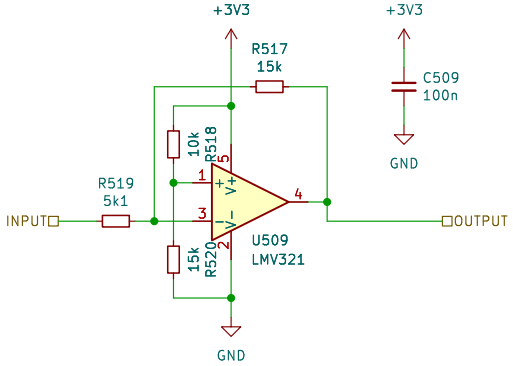




Sheet: /UI_HALL_PREAMP/
File: UI_HALL_PREAMP.kicad_sch

Title:

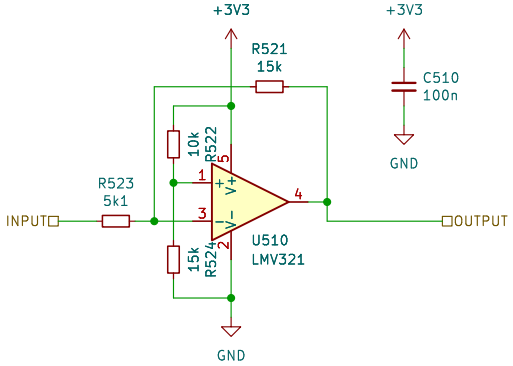
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 11/15



Sheet: /UI_HALL_PREAMP/INVERT_AND_OFFSET/
File: INVERT_AND_OFFSET.kicad_sch

Title:

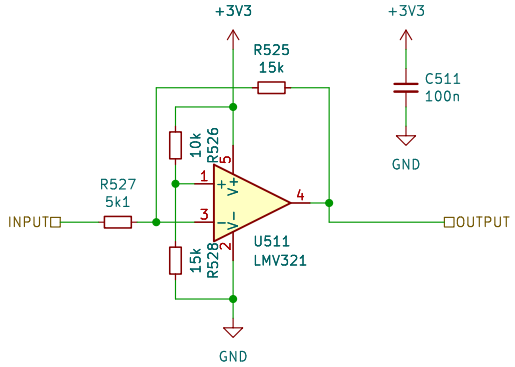
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 16/15



Sheet: /UI_HALL_PREAMP/INVERT_AND_OFFSET1/
File: INVERT_AND_OFFSET.kicad_sch

Title:

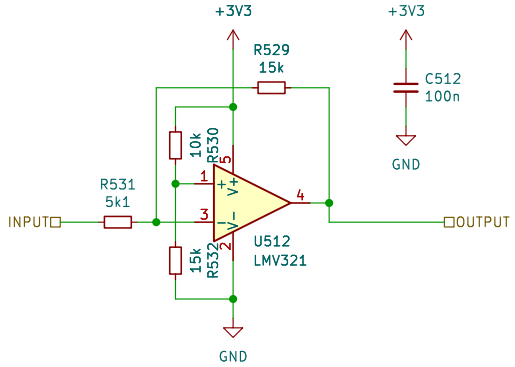
Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 17/15



Sheet: /UI_HALL_PREAMP/INVERT_AND_OFFSET2/
File: INVERT_AND_OFFSET.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 18/15



Sheet: /UI_HALL_PREAMP/INVERT_AND_OFFSET3/
File: INVERT_AND_OFFSET.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 8.0.8		Id: 19/15