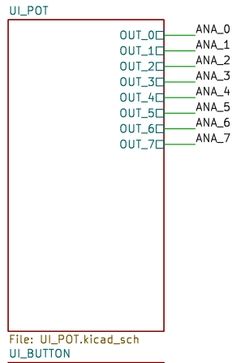
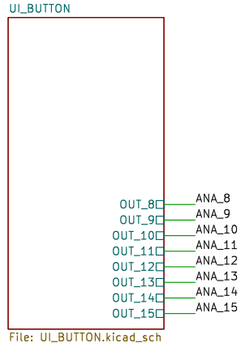
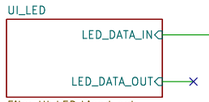
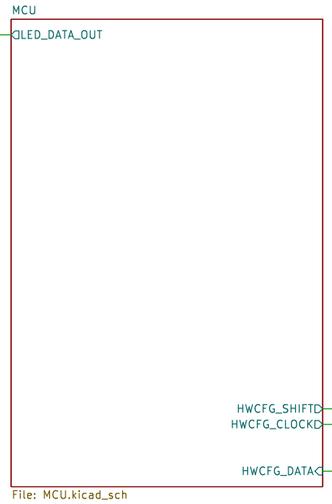
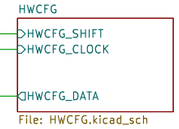
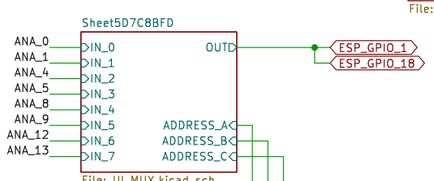


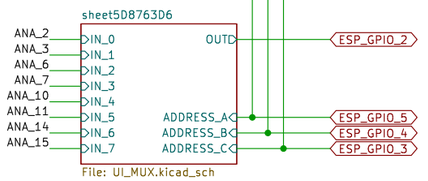












Common Sheets:
500 GRID
600 USB_POWER
700 MCU

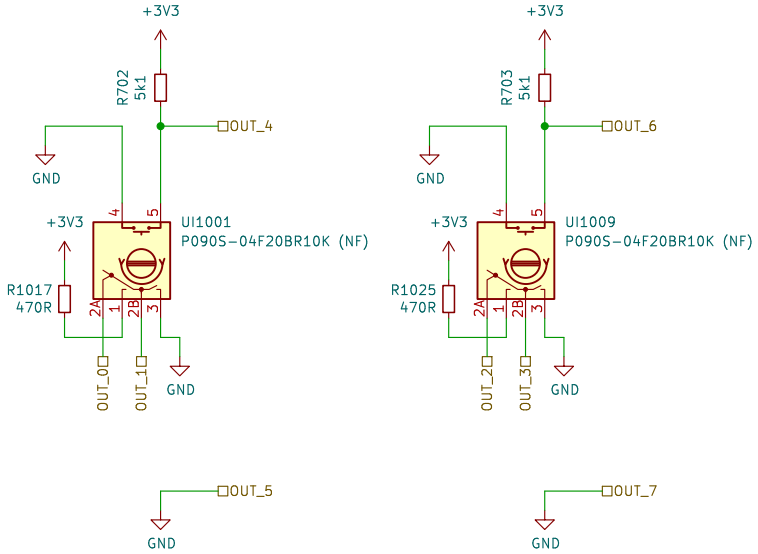
Module Specific:
800 HWCFG
900 LED
1000 UI

Sheet: /
File: PCBA-TEK2.kicad_sch

Title:

Size: A3	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 1/10

1000



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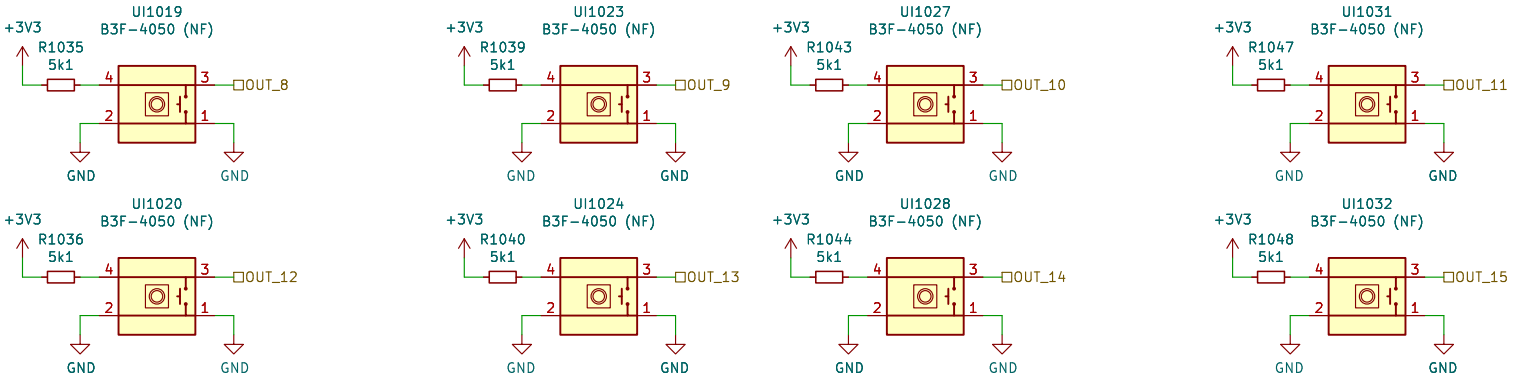
File: UI_POT.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 2/10

1000

Simulation:

http://tinyurl.com/y229mty4



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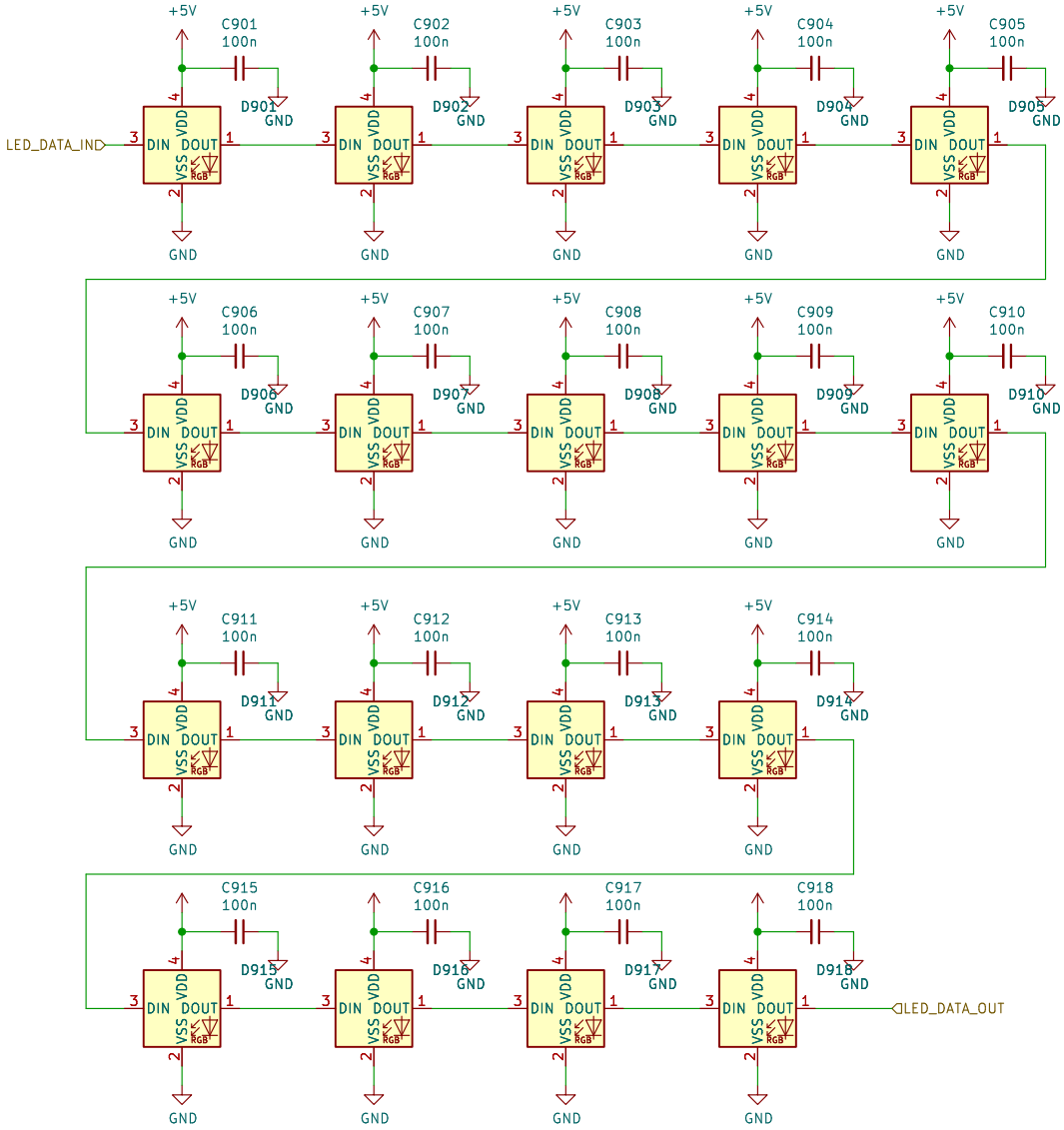
Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 3/10

900



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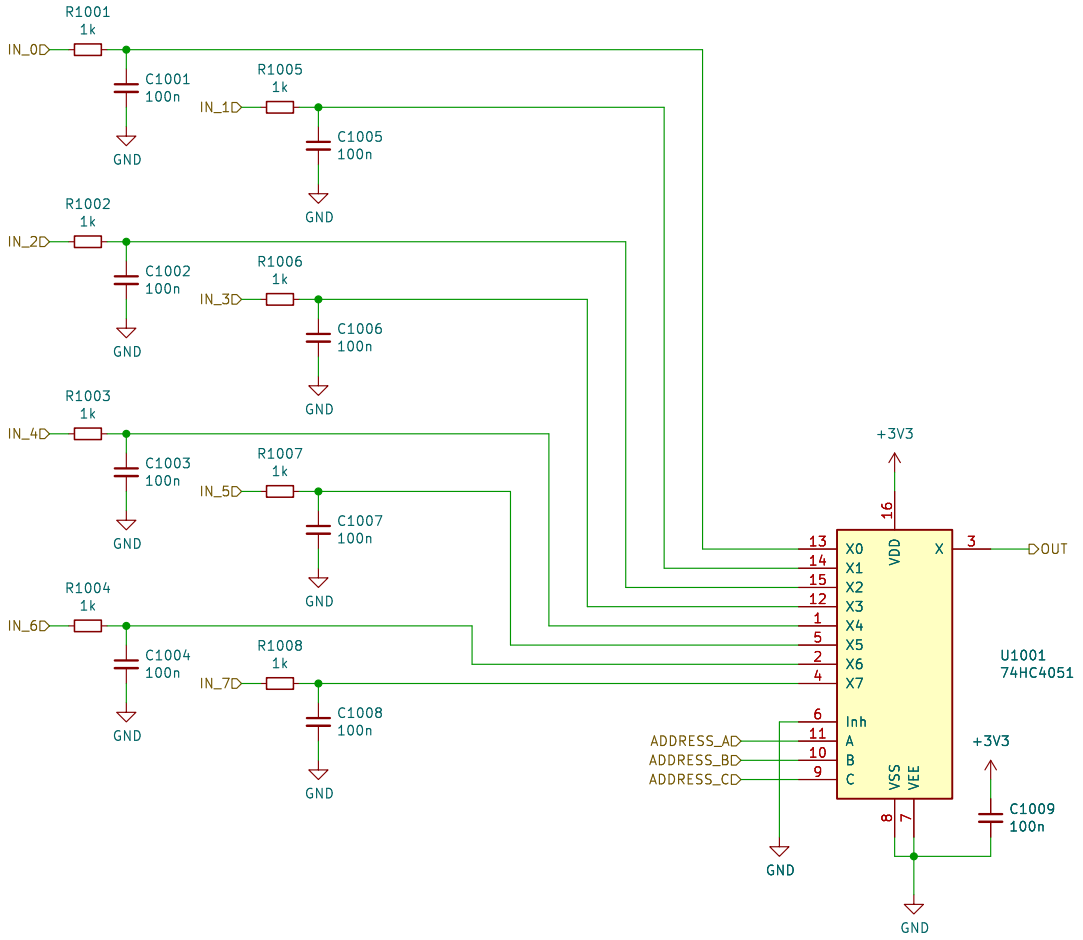
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 4/10

1000



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Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 5/10

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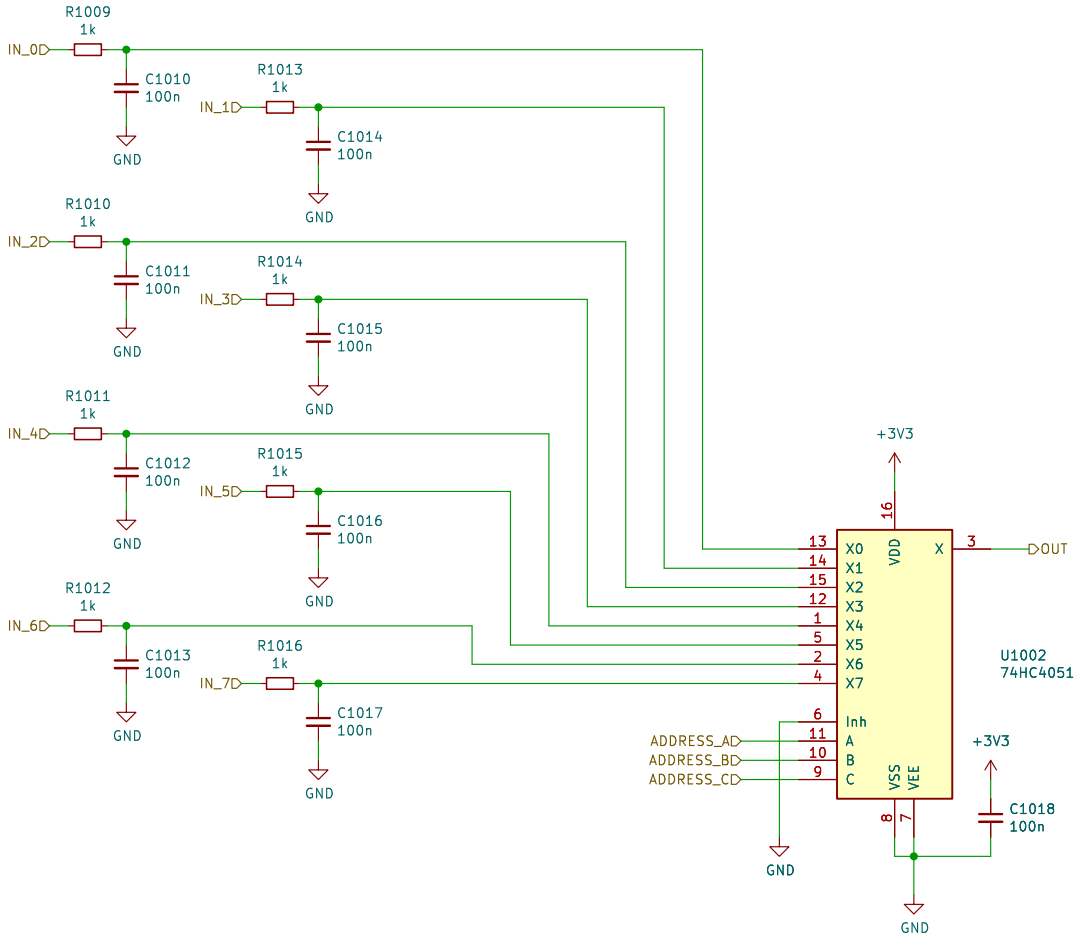

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File: UI_MUX.kicad_sch

Title:

Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 6/10

700

USB_POWER

USB_DP
USB_DN
U0TXD
U0RXD
ESP_RESET
ESP_BOOT0

USB_DATA_P
USB_DATA_N
DEBUG_TX
DEBUG_RX
DEBUG_RESET
DEBUG_BOOT0

File: USB_POWER.kicad_sch

ESP32-S3FN8

+3V3 C743 10u GND
C746 1u C747 100n C749 100n GND
L702 GZ2012D601TF
PWR_FLAG
+3V3 C751 100n GND
VDD_SPI
+3V3 C752 100n GND
+3V3 C753 10n C754 1u GND

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

1.8nH LQG15HS1N8S02D
3.9pF GJM1555C1H3R9WB01D
1.8pF GJM1555C1H1R8BB01D

ESP_RESET	4	CHIP_PU	
ESP_LNA	1	LNA_IN	
USB_DN	25	GPIO19	D-
USB_DP	26	GPIO20	D+
	28	GPIO26	SPICS1
SPIHD	30	GPIO27	SPIHD
SPIWP	31	GPIO28	SPIWP
SPICS0	32	GPIO29	SPICS0
SPICLK	33	GPIO30	SPICLK
SPIQ	34	GPIO31	SPIQ
SPID	35	GPIO32	SPID
	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
	57	GND	

	2	VDD3P3	
	3	VDD3P3	
	20	VDD3P3_RTC	
	29	VDD_SPI	
	46	VDD3P3_CPU	
	55	VDDA1	
	56	VDDA2	
* GPIO0	5	ESP_BOOT0	
GPIO1	6	ESP_GPIO_1	
GPIO2	7	ESP_GPIO_2	
* GPIO3	8	ESP_GPIO_3	
GPIO4	9	ESP_GPIO_4	
GPIO5	10	ESP_GPIO_5	
GPIO6	11	RP_SPIO_RX	
GPIO7	12	RP_SPIO_CS	
GPIO8	13	RP_SPIO_TX	
GPIO9	14	RP_SPIO_SCK	
GPIO10	15	HWCFG_SHIFT	
GPIO11	16	HWCFG_CLOCK	
GPIO12	17	HWCFG_DATA	
GPIO13	18	RP_SWDIO	
GPIO14	19	RP_SWCLK	
GPIO15	21	RP_CLK	
GPIO16	22	ESP_GPIO_16	
GPIO17	23	RP_INTERRUPT	
GPIO18	24	ESP_GPIO_18	
GPIO21	27	LED_DATA_OUT	
GPIO33	38	ESP_GPIO_33	
GPIO34	39	ESP_GPIO_34	
GPIO35	40	ESP_GPIO_35	
GPIO36	41	ESP_GPIO_36	
GPIO37	42	ESP_GPIO_37	
GPIO38	43	MAP_MODE	
*GPIO45	51	ESP_GPIO_45	
*GPIO46	52	ESP_GPIO_46	
GPIO47	37	ESP_GPIO_47	
GPIO48	36	ESP_GPIO_48	

40MHz Y701
C748 10p C750 10p
R733 1k
U704

LCSC:
TXM40M0004322HBCEO00T
S3240000091040JY

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

	3	4	TMS
	5	6	TCK
	7	8	TDO
	9	10	TDI

Conn_02x05_Odd_Even
J702

Mapmode switch

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

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

+1V1 / +3V3 Decoupling

C731 100n C732 100n C733 1u
+1V1
+3V3 C734 1u C735 100n C736 100n C737 100n C738 100n C740 100n C741 100n C744 100n C745 100n

RP2040

+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	
	1	IOVDD	
	48	USB_VDD	
	43	ADC_AVDD	
	44	VREG_IN	
	45	VREG_VOUT	
	23	DVDD	
RP_UART0_TX	2	GPIO0	
RP_UART0_RX	3	GPIO1	
GRID_SOUTH_TX	4	GPIO2	
GRID_WEST_RX	5	GPIO3	
GRID_SYNC_2	6	GPIO4	
GRID_WEST_TX	7	GPIO5	
GRID_NORTH_RX	8	GPIO6	
	9	GPIO7	
	11	GPIO8	
	12	GPIO9	
	13	GPIO10	
	14	GPIO11	
TP701 TestPoint	15	GPIO12	
TP702 TestPoint	16	GPIO13	
TP703 TestPoint	17	GPIO14	
TP704 TestPoint	18	GPIO15	
RP_SPIO_RX	27	GPIO16	
RP_SPIO_CS	28	GPIO17	
RP_SPIO_SCK	29	GPIO18	
RP_SPIO_TX	30	GPIO19	
	31	GPIO20	
	32	GPIO21	
RP_INTERRUPT	34	GPIO22	
GRID_NORTH_TX	35	GPIO23	
GRID_EAST_RX	36	GPIO24	
GRID_SYNC_1	37	GPIO25	
GRID_EAST_TX	38	GPIO26_ADC0	
GRID_SOUTH_RX	39	GPIO27_ADC1	
	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

R735 / SW702

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

SW703

ESP_BOOT0
SW703 C2905169

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 R734 5k1
SPICS0
SPICLK
U705 W25Q64JVSSIQ

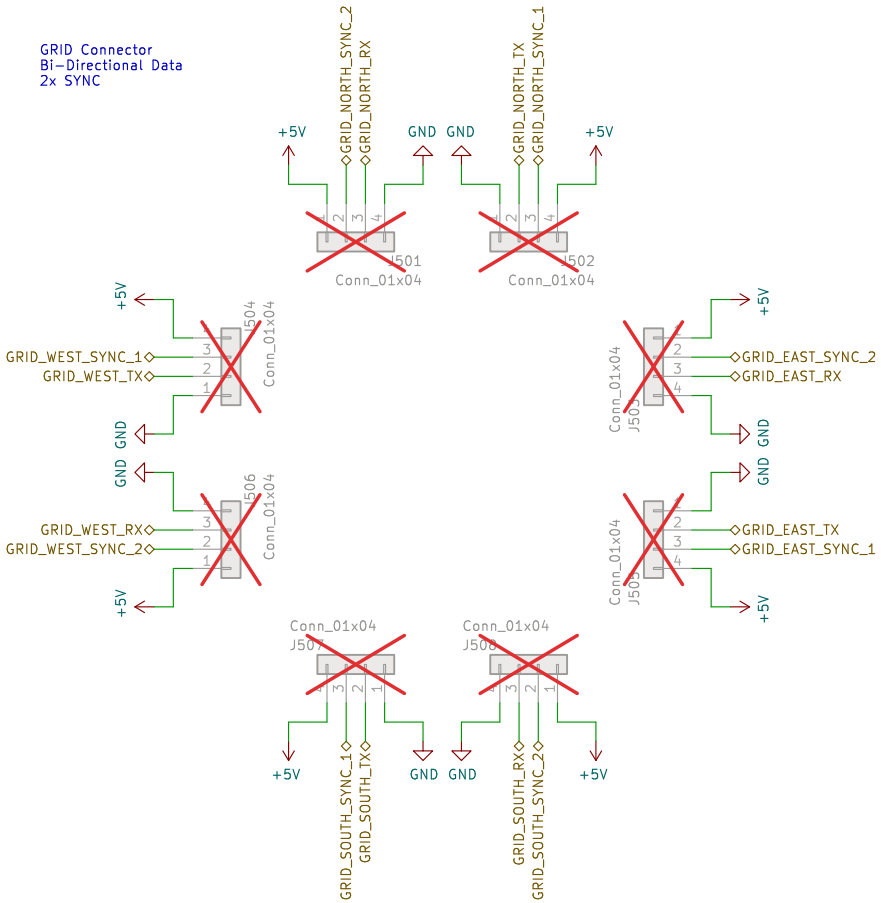
SPICS0	1	CS	
SPID	5	DI(IO0)	
SPIQ	2	DO(IO1)	
SPIWP	3	IO2	
SPIHD	7	IO3	
SPICLK	6	CLK	
	8	VCC	
	4	GND	

C755 1u C756 100n

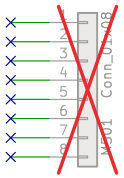
Sheet:	/MCU/
File:	MCU.kicad_sch
Title:	
Size:	A3
Date:	
Rev:	
KiCad E.D.A.	9.0.6
Id:	7/10

500

GRID Connector
Bi-Directional Data
2x SYNC



Board Mounting Pattern



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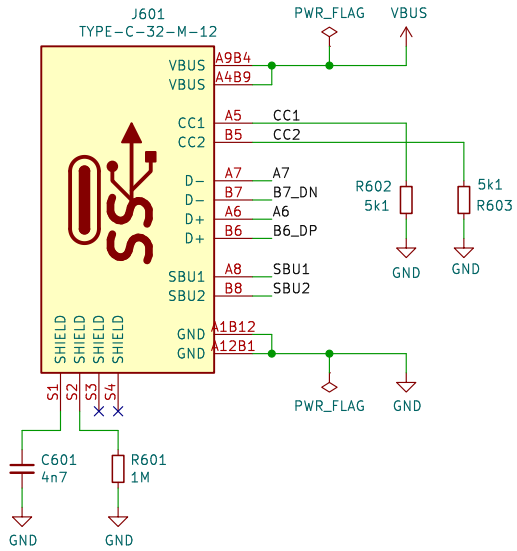
File: GRID.kicad_sch		
Title:		
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 8/10

600

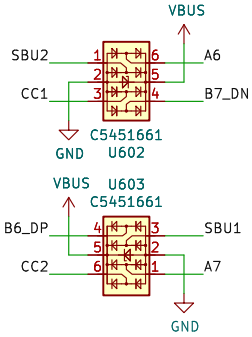
USB Port

USB C upstream facing port configured for 5V 3A power consumption.



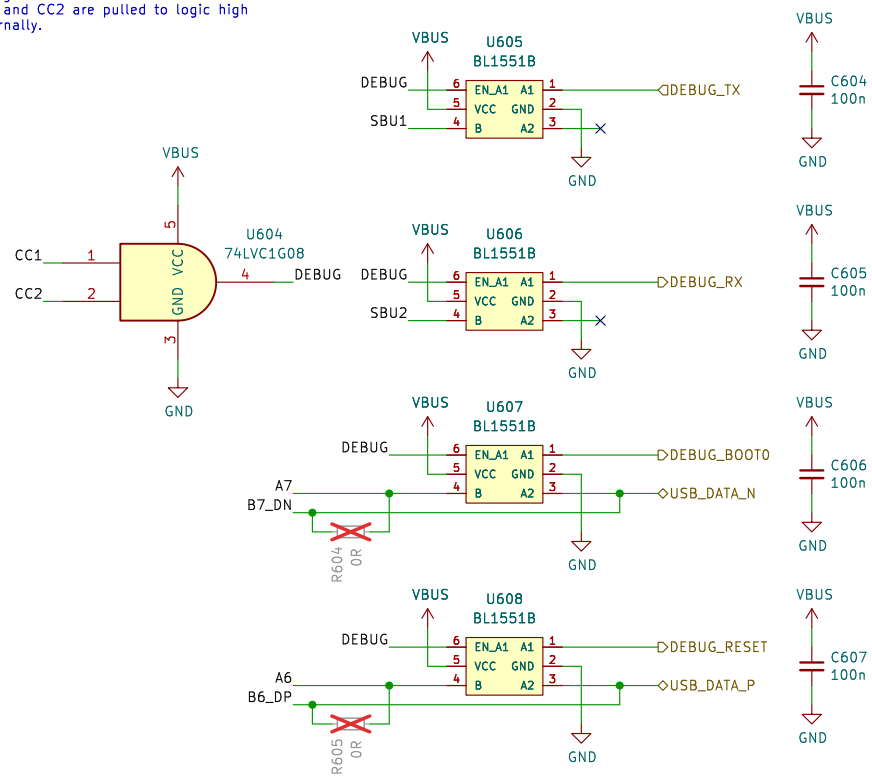
ESD Prot.

ESP protection for all 8 signals externally accessable via the USB C connector.



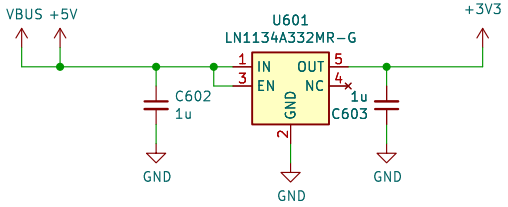
Debug-Mode Multiplexing

Debug.mode is activated when both CC1 and CC2 are pulled to logic high externally.

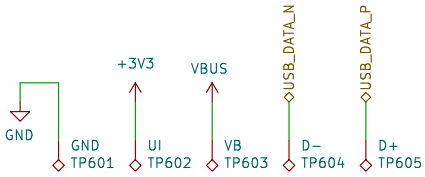


3V3 LDO

LDO regulator for generating the +3V3 power rail for the microcontroller and UI.



Testpoints



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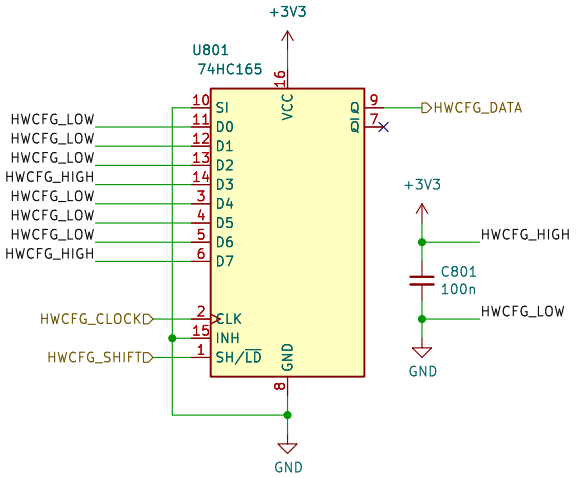
Size: A4	Date:	**Rev:**
KiCad E.D.A. 9.0.6		Id: 9/10

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. 9.0.6		Id: 10/10