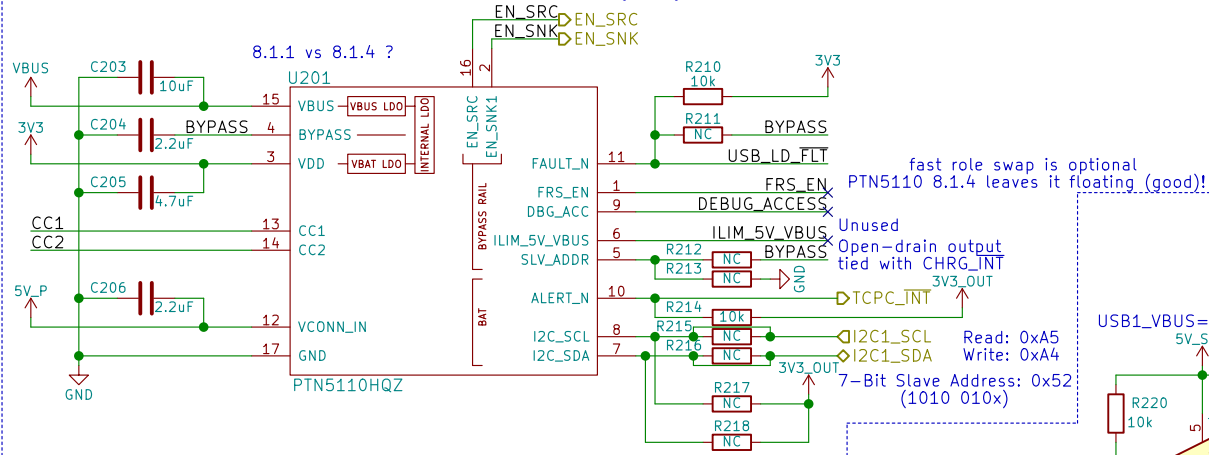
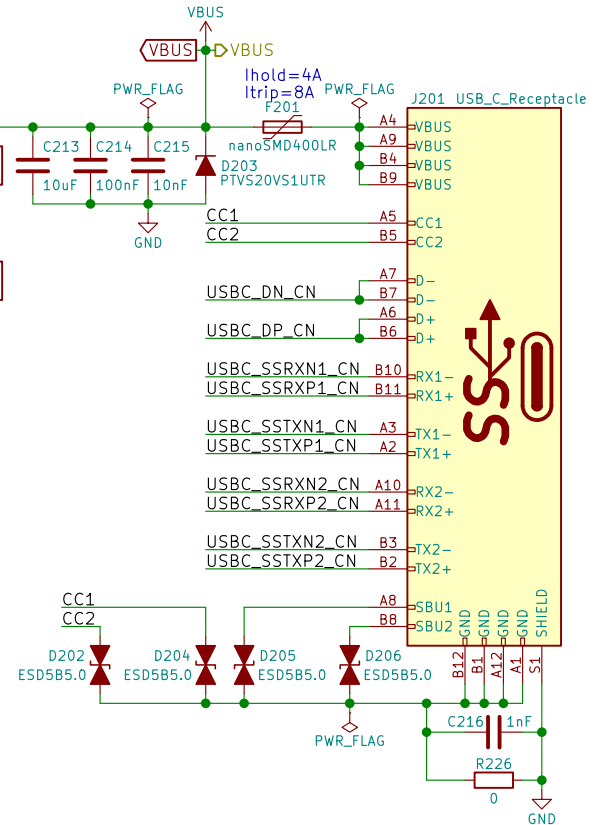
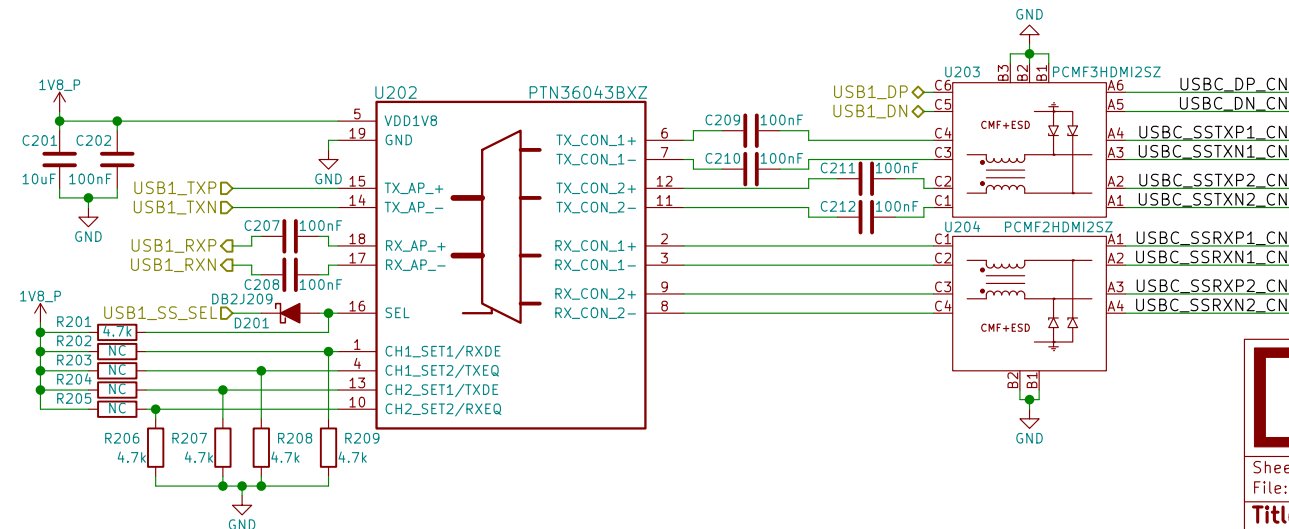


USB-C TCPC – Config Channel (CC) and PD Role Controller



"Under dead battery operation, PTN5110 applies voltage clamps to both CC pins so that the system may receive power as a Sink. To support platforms with buck-boost configuration, PTN5110 asserts EN_SNK1 pin based on validity of VBUS voltage (facilitates 5 V VBUS sinking)."

fast role swap is optional
PTN5110 8.1.4 leaves it floating (good!)
Unused
Open-drain output tied with CHRG_INT
3V3_OUT
Read: 0xA5
Write: 0xA4
7-Bit Slave Address: 0x52 (1010 010x)
Initialize as the UFP (device)
read CC_STATUS to determine role
use Host Negotiation Protocol (HNP)
to become an DFP (host)
∴ USB ID is effectively unused
⇒ Legacy devices would "wait" for this
⇒ If CC initializes as UFP then no HNP needed



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Sheet: /USB-C/
File: usb-c.sch

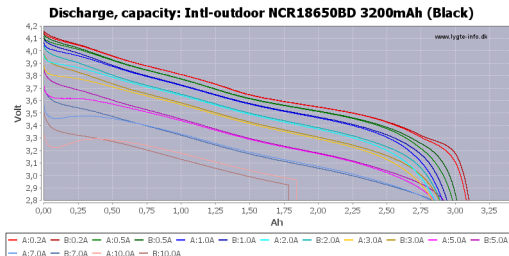
Title: LibreM5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

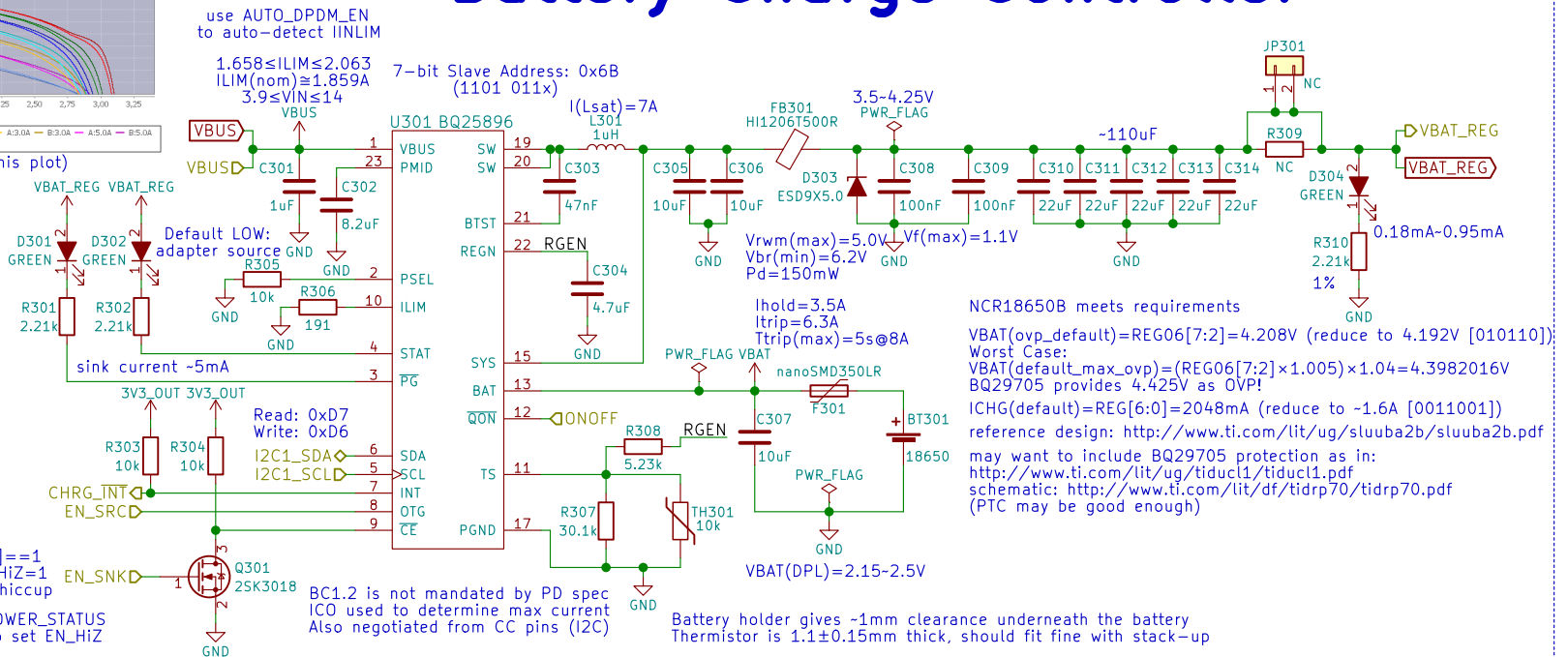
Rev: v0.1.0

Id: 2/24



(interpret RSOC% based on this plot)

Drawing ~333.33mA, or consuming <1.2W, should give close to 10 hours going from 100% to 0% charge





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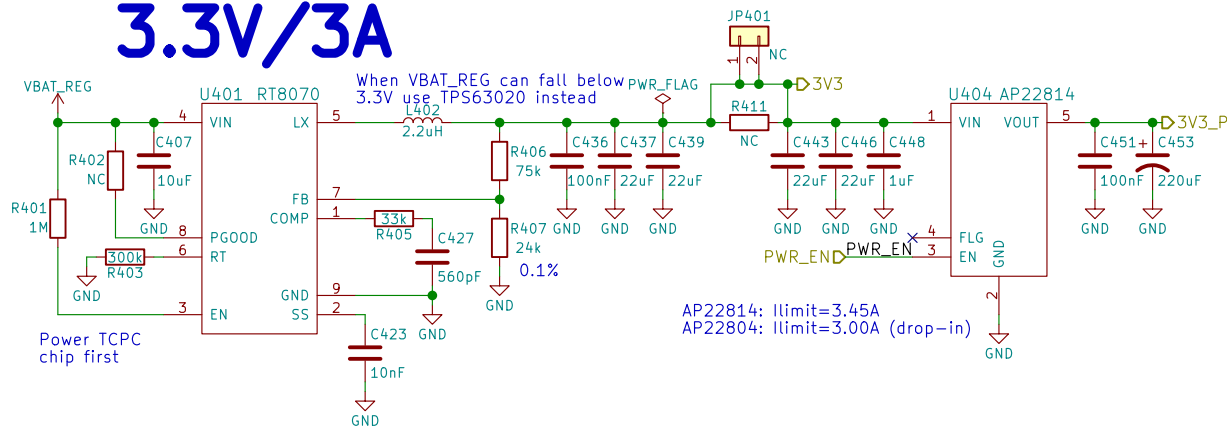
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 angus.ainstlie@puri.sm
 nicole.farber@puri.sm
 christian.schilmoeller@puri.sm

Sheet: /Battery/
 File: battery.sch

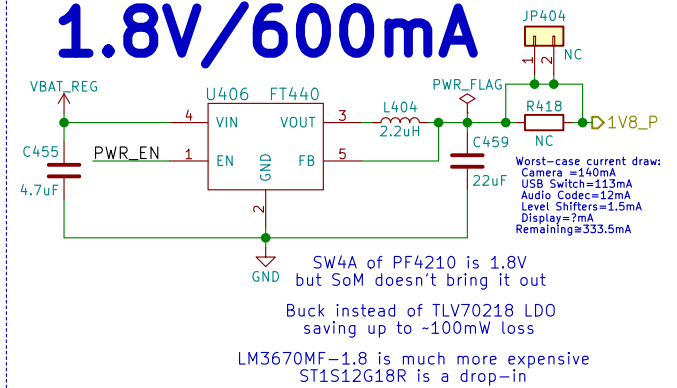
Title: LibreM5 development kit

Size: A4	Date: 2018-06-07	Rev: v0.1.0
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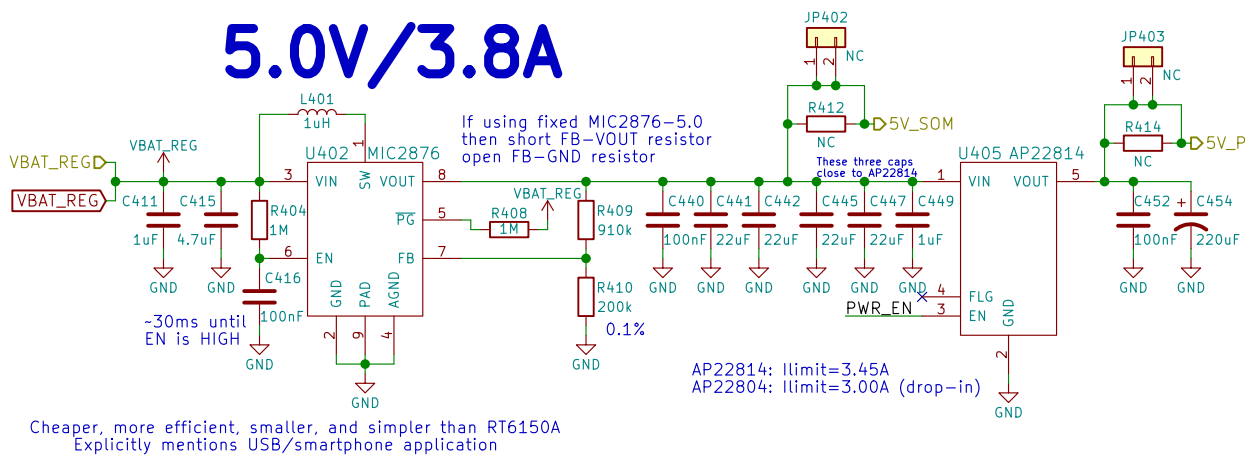
3.3V/3A



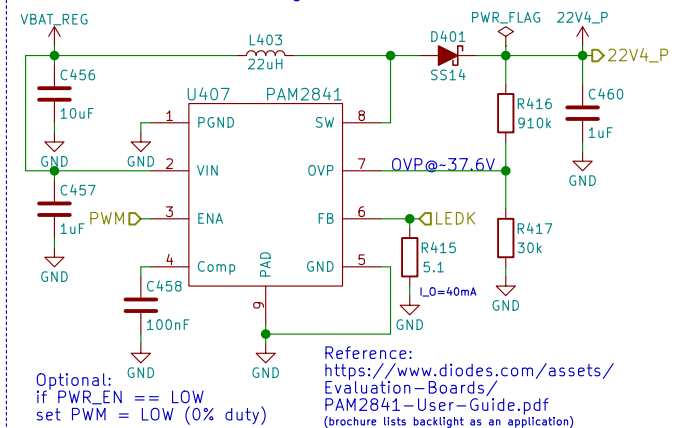
1.8V/600mA



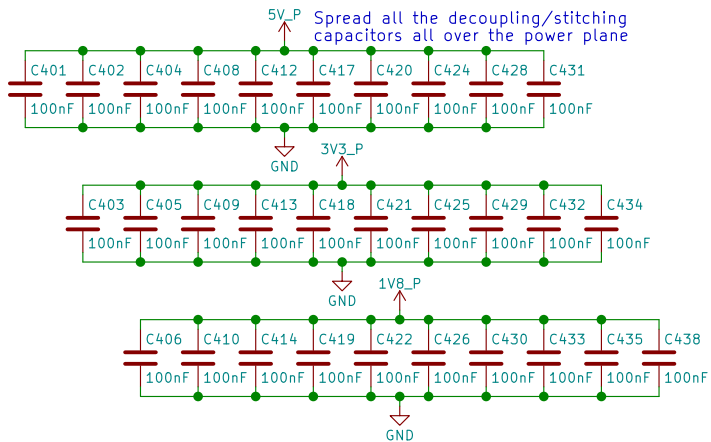
5.0V/3.8A



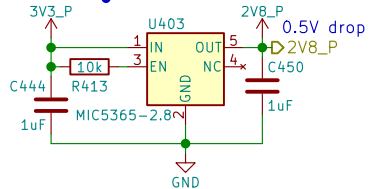
22.4V/40mA



5V_P Spread all the decoupling/stitching capacitors all over the power plane



2.8V/150mA



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Sheet: /Power/
File: power.sch

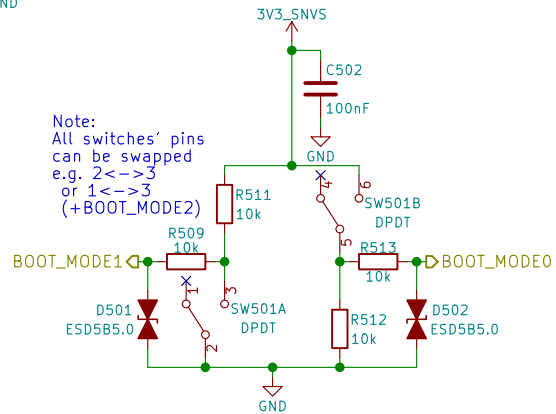
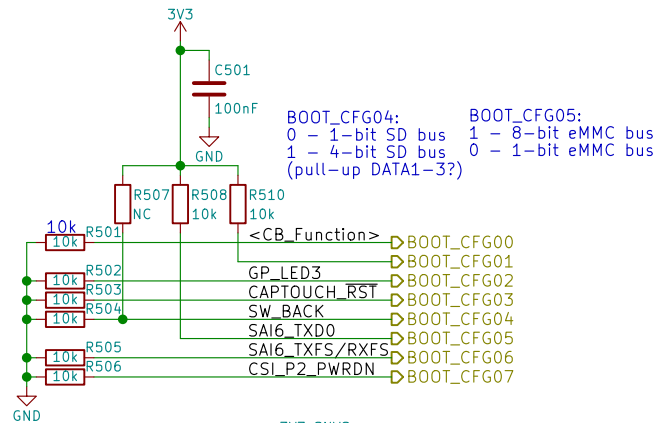
Title: Librem5 development kit

Size: A4	Date: 2018-06-07
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Rev: v0.1.0

Id: 4/24

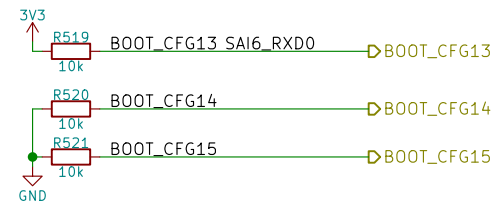
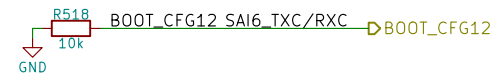
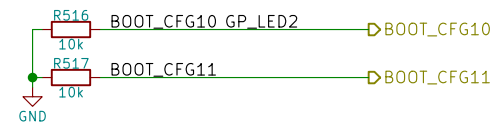
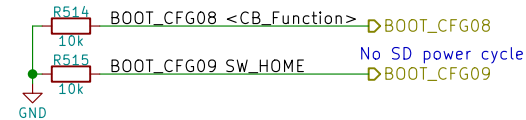


2->1: eMMC 2->3: USB (Serial Downloader)	
BOOT_MODE[1:0]	Boot Type
00	Boot From Fuses
01	Serial Downloader
10	Internal Boot
11	Reserved

Only eMMC

BOOT_CFG[14:12]		Boot device			
001		SD/eSD			
010		MMC/eMMC			
011		NAND			

Fuse	Config	Definition	GPIO ¹	Shipped value	Settings
BOOT_CFG[11:10]	OEM	USDHC port selection	Yes	00	00 - USDHC-1 01 - USDHC-2 10 - USDHC-3 else - reserved





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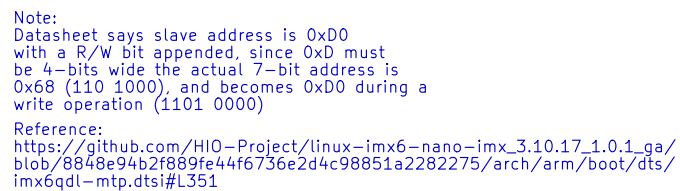
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nicole.farber@puri.sm
christian.schilmoeller@puri.sm

Sheet: /Boot Config/
File: boot.sch

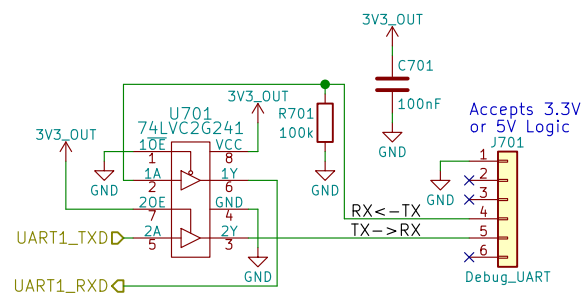
Title: LibreM5 development kit

Size: A4 Date: 2018-06-07
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Rev: v0.1.0
Id: 5/24



Id: 6/24



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Sheet: /UART Debug/
File: uart.sch

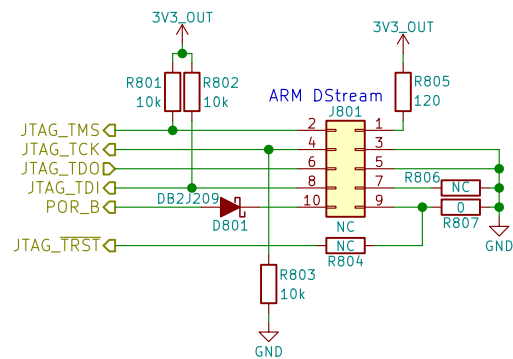
Title: LibreM5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 7/24

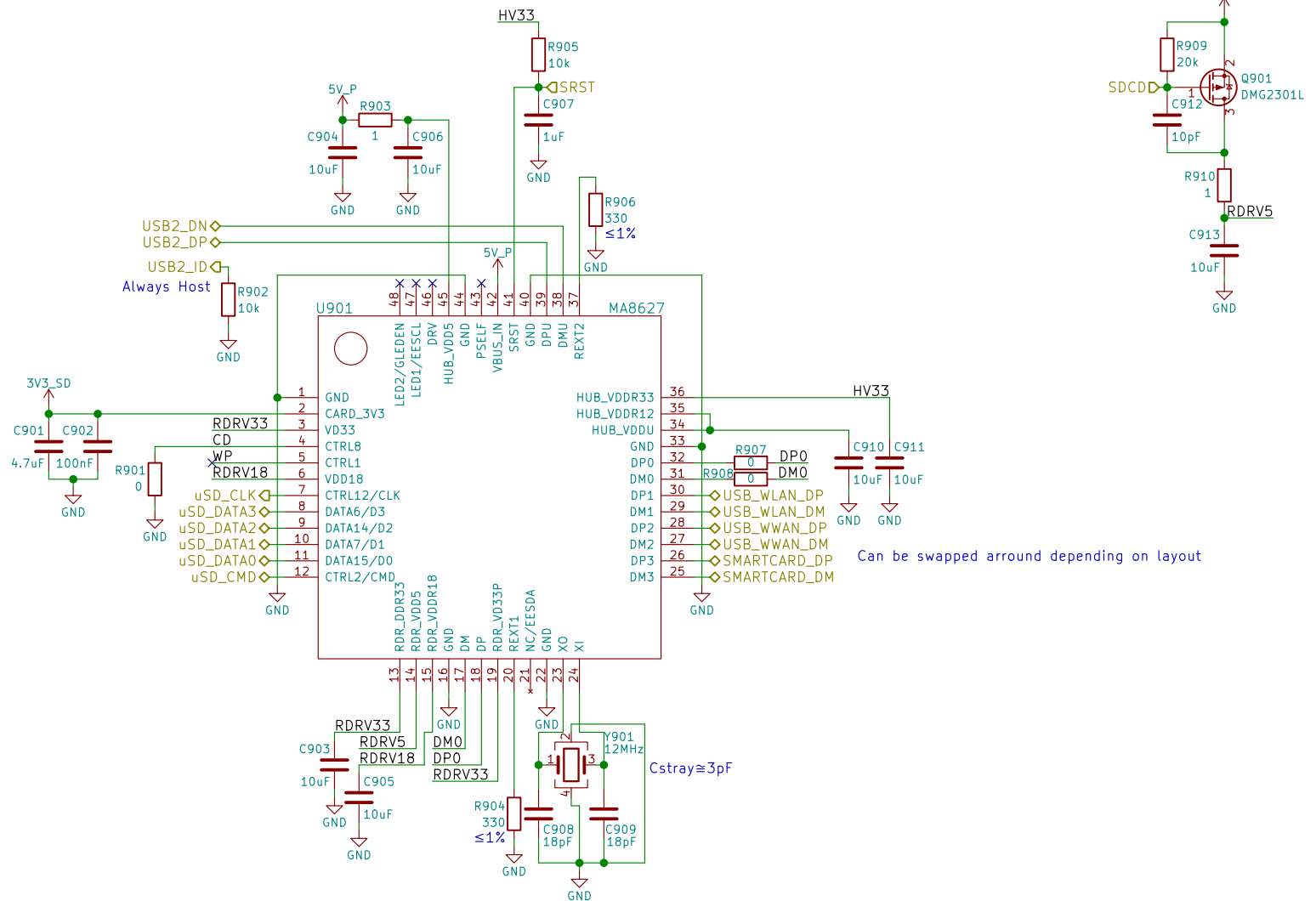




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Sheet: /JTAG/ File: jtag.sch		
Title: Librem5 development kit		
Size: A4	Date: 2018-06-07	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7		Id: 8/24



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Sheet: /USB Hub + SDIO Bridge/
 File: usb_hub_sdio.sch

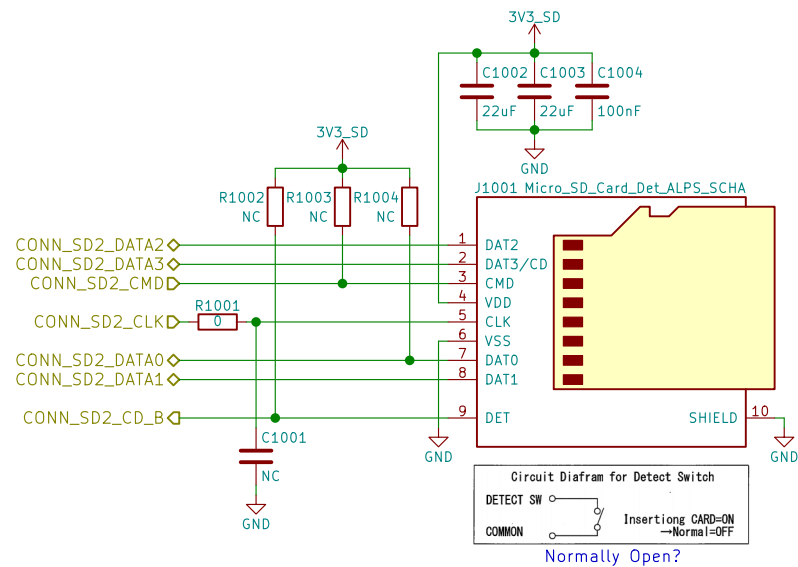
Title: Librem5 development kit

Size: A4 Date: 2018-06-07

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Rev: v0.1.0

Id: 9/24



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Sheet: /uSD Card/
File: sd.sch

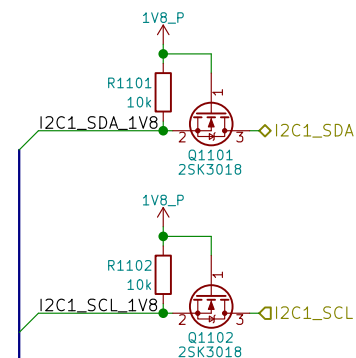
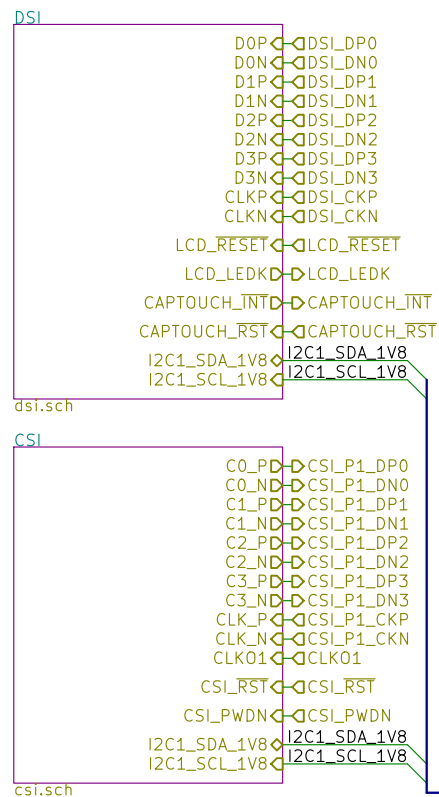
Title: LibreM5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 10/24



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Sheet: /MIPI/
File: mipi.sch

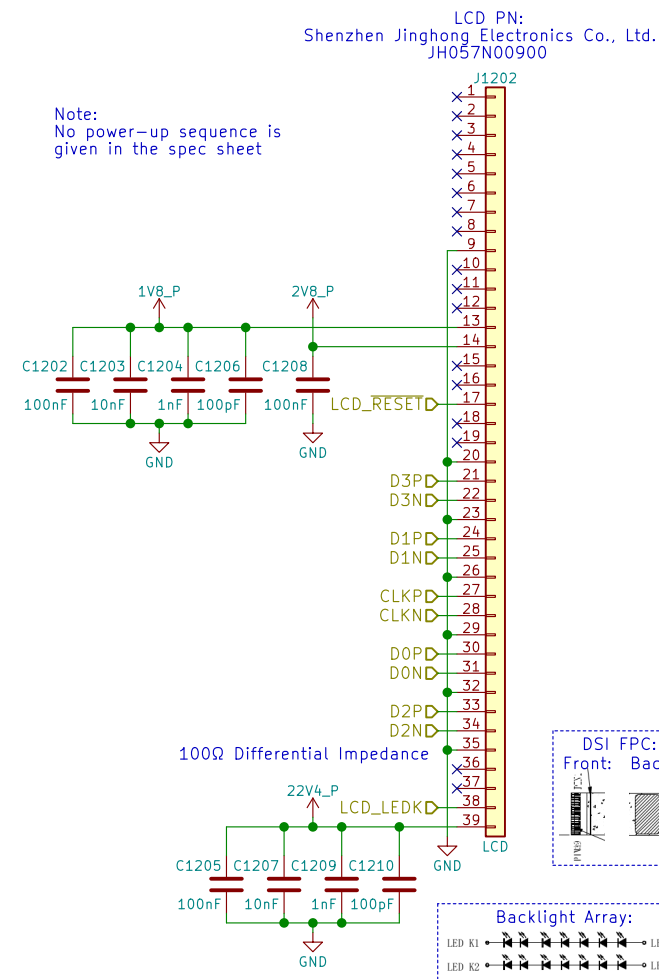
Title: LibreM5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

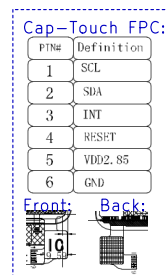
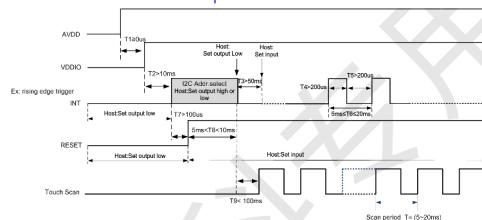
Id: 11/24



The upper 7 bits are the address,
and bit 0 is used to select read or write.
GT5688 has two slave device addresses to choose from:

	7-Bit Address	8-Bit Write Address	8-Bit Read Address
LOW	0x5D	0xBA	0xBB
HIGH	0x14	0x28	0x29

Every time you power on or reset, you need to use the INT pin to set the I2C address:



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Sheet: /MIPI/DSI/
File: dsi.sch

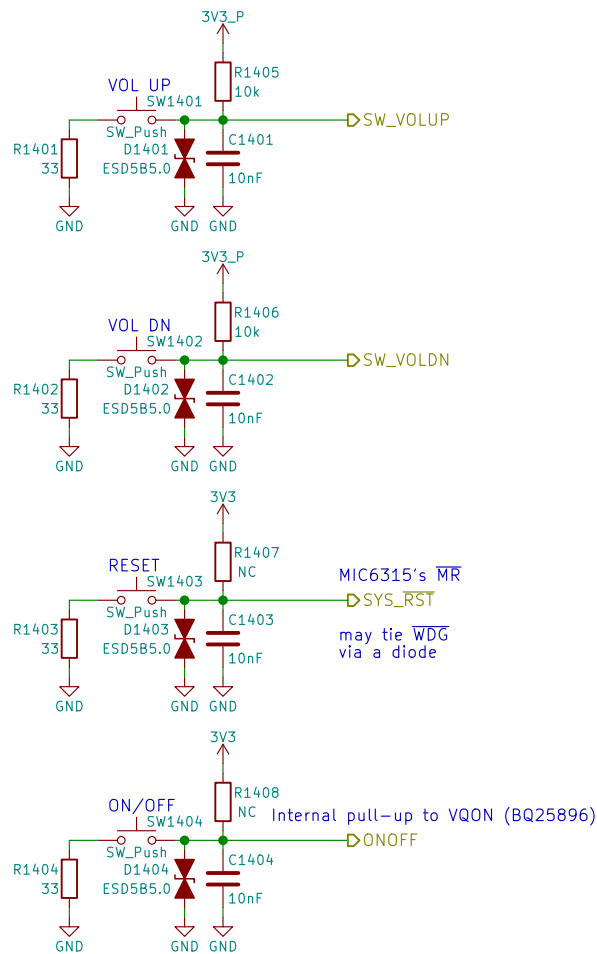
Title: Librem5 development kit

Size: A4	Date: 2018-06-07
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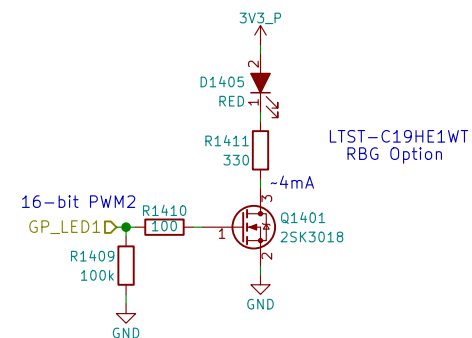
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 12/24



Use PWM2_PWMSAR to set the compare value (duty cycle)
 Use PWM2_PWMCR[15:4] to set the PRESCALER (frequency)
 Use PWM2_PWMPR to set the top of the counter (frequency)



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 christian.schilmoeller@puri.sm

Sheet: /Buttons & LED/
 File: buttons_led.sch

Title: Librem5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 14/24

RGMII 10/100/1000 Ethernet

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nicole.faeber@puri.sm
christian.schilmoeller@puri.sm

Sheet: /Ethernet/
File: ethernet.sch

Title: Libre5 development kit

Size: A4 Date: 2018-06-07
KiCad E.D.A. kicad 4.0.7

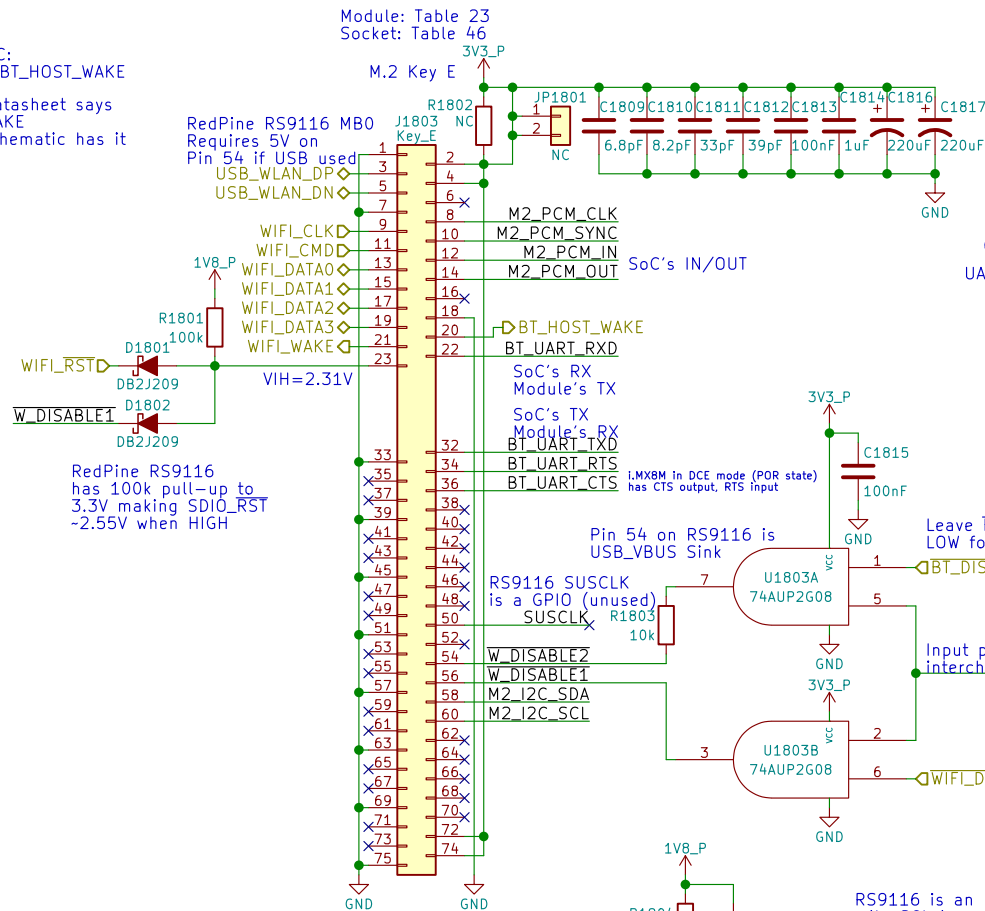
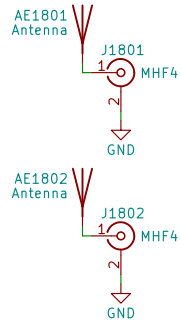
Rev: v0.1.0
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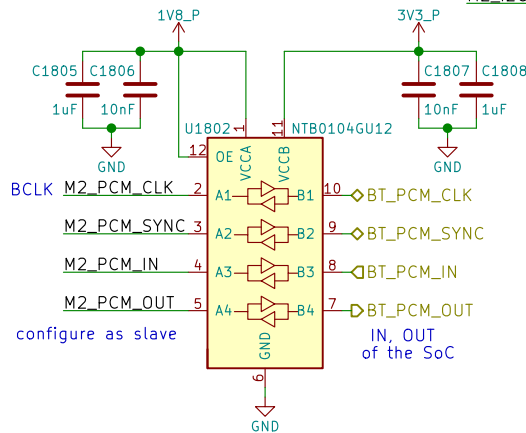
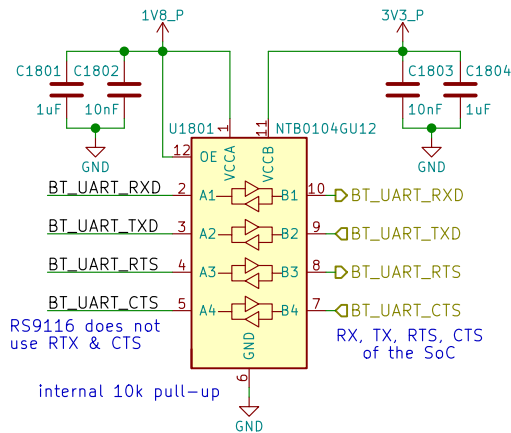
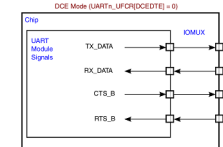
RS9116 NC:
RTS, CTS, BT_HOST_WAKE

RS9116 datasheet says
no WIFI_WAKE
but the schematic has it



6.2 M.2 Signal Directions

UARTn_UFCR[DCEDTE]=0 on POR



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Sheet: /WLAN+BT M.2/
File: wifi_bt_m2.sch

Title: LibreM5 development kit

Size: A4 Date: 2018-06-07

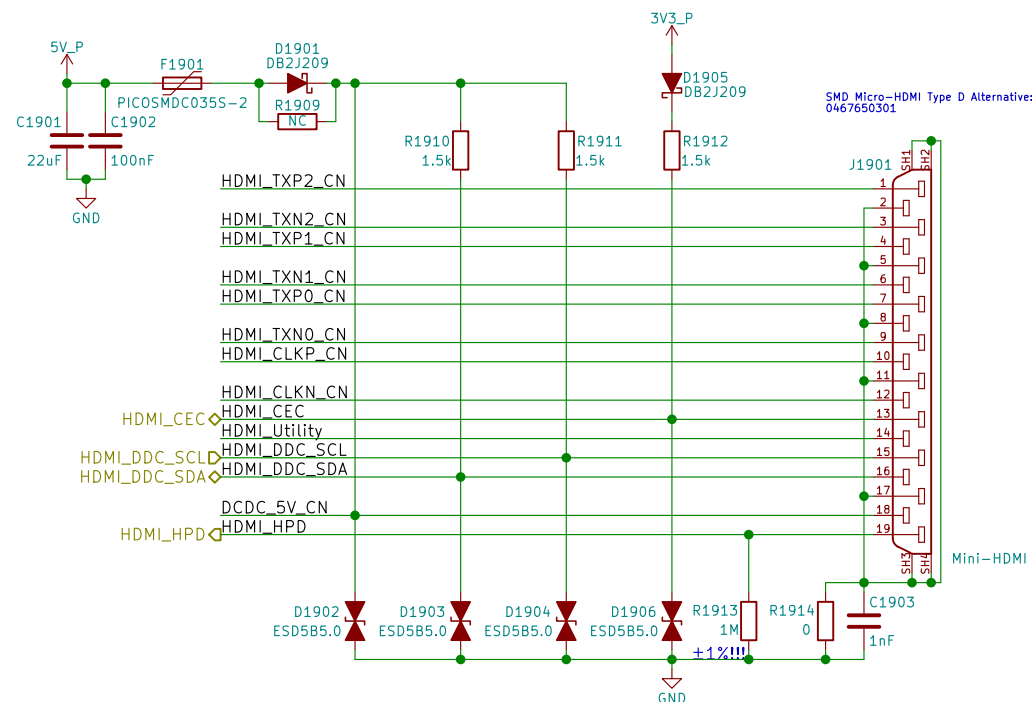
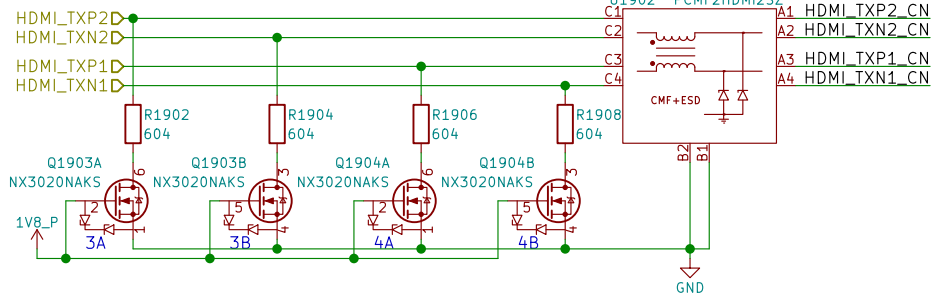
KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 18/24

100Ω diff pairs

PCB Pin	Function
C1	HDMI_UTILITY
C2	HDMI_HPD
C3	HDMI_TXP0_CN
C4	HDMI_TXN0_CN
C5	HDMI_CLKP_CN
C6	HDMI_CLKN_CN



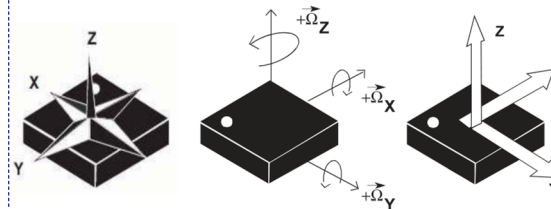
Id: 19/24

D

Reference:
<https://www.vishay.com/docs/84307/designingvcnl4040.pdf>
<http://www.vishay.com/docs/84931/vcni4040sensorboardfiles.pdf>

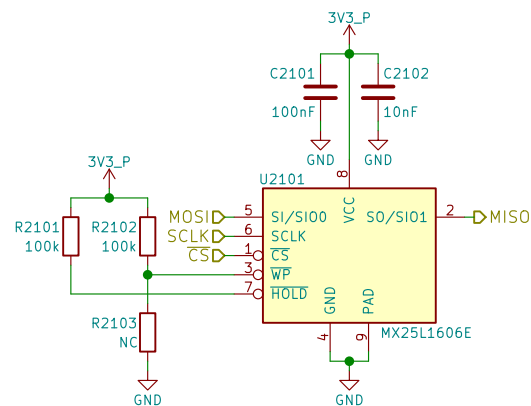
Reference:
<http://www.st.com/en/evaluation-tools/steval-mki159v1.html>

Command	SAD[6:2]	SAD[1] = SDO/SA1	SAD[0]	R/W	SAD+R/W
Read	00111	0	0	1	00111001 (39h)
Write	00111	0	0	0	00111000 (38h)
Read	00111	1	0	1	00111101 (3Dh)
Write	00111	1	0	0	00111100 (3Ch)



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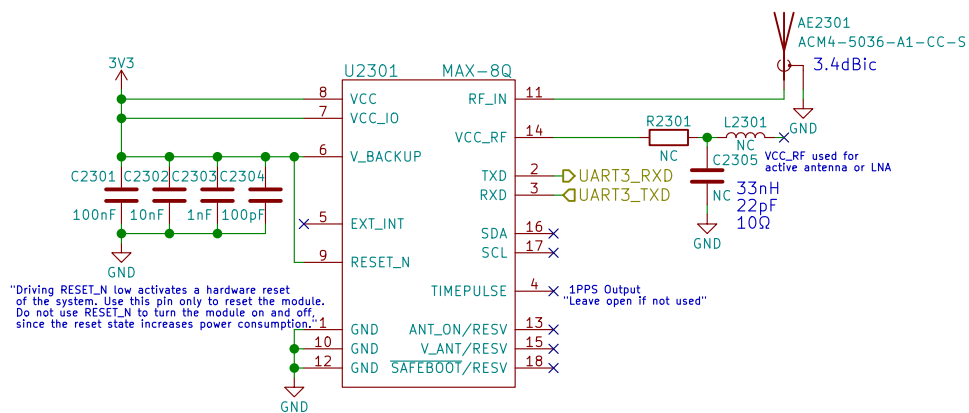




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nicole.farber@puri.sm
christian.schilmoeller@puri.sm

Sheet: /SPI Flash/		
File: flash.sch		
Title: Librem5 development kit		
Size: A4	Date: 2018-06-07	Rev: v0.1.0
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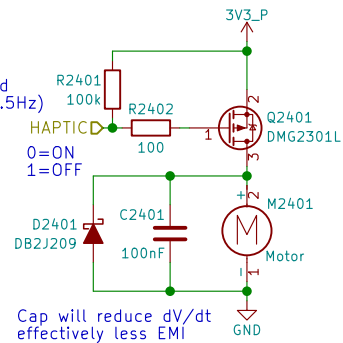
Sheet: /GNSS/
File: gnss.sch

Title: Librem5 development kit

Size: A4	Date: 2018-06-07	Rev: v0.1.0
KiCad E.D.A. kicad 4.0.7	Id: 23/24	

PWM pins occupied:
 GPIO1_I001 - LCD Backlight
 GPIO1_I013 - LED
 GPIO1_I014 - Ethernet (CLKO_25MHz)
 GPIO1_I015 - CSI (CLKO2)

PWM needed?
 Only needs to be toggled
 ON 1 sec, OFF 1 sec (0.5Hz)
 Can MUX as either
 GPIO or PWM2
 swapping with LED



When the motor is off
 both terminals are at GND

Motor will have wire leads
 with a 2-pin Molex or Boom Precision
 connector installed (by request)!
 Metal housing is floating
 (not connected to either pin)
 => could connect housing to GND

Cheaper Motor Connector:
https://lcsc.com/product-detail/1-25T-Connectors_1-25T-1-2AW_C10832.html

Motor Source:
https://www.alibaba.com/product-detail/Coin-motor-vibration-dc-motor-cellphone_1994583657.html?spm=a2700.8443308.0.0.5aa13e5f1wxHgs
 Motor Datasheet:
<https://cloud.puri.sm/s/z8JR6DJ4KrJYzoW>
 Motor PN:
 BY0820Z021L20



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 nicole.farber@puri.sm
 christian.schilmoeller@puri.sm

Sheet: /Haptic Motor/
 File: haptic.sch

Title: Librem5 development kit

Size: A4 Date: 2018-06-07

KiCad E.D.A. kicad 4.0.7

Rev: v0.1.0

Id: 24/24