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REVISION HISTORY

VER #	DATE	REVISION	DESCRIPTION OF CHANGES	AUTHOR
Rev A	26 Apr 2024	BeagleY-AI_SCH_Rev A_240426	Initial Release	Junqing.Xin

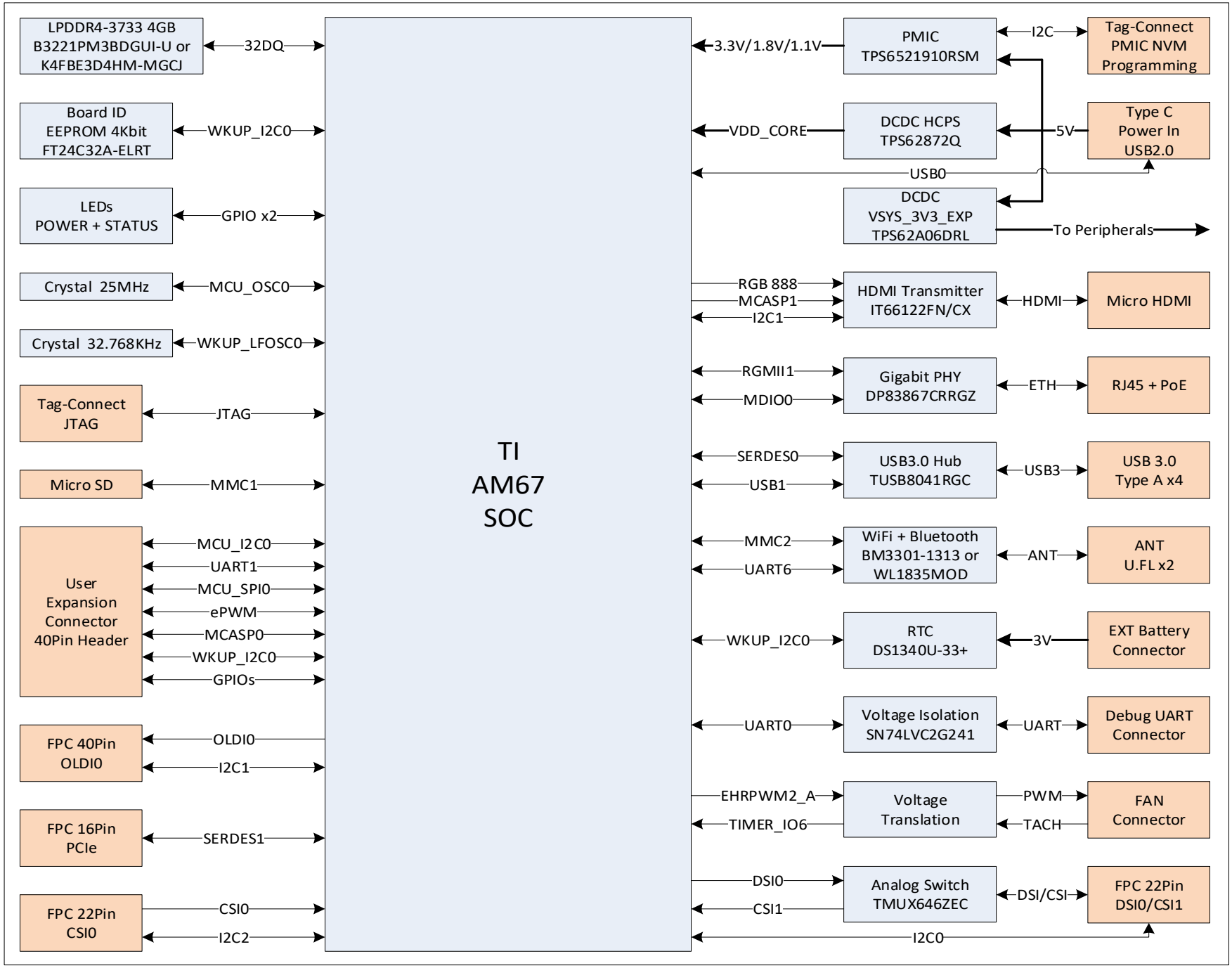
seeed studio

https://www.seeedstudio.com

Title: BeagleY-AI

Size: C	Document Number: 01 REVISION HISTORY	Rev: A
Draw By: Junqing.Xin	Date: Tuesday, June 11, 2024	Sheet: 1 of 27

BLOCK DIAGRAM



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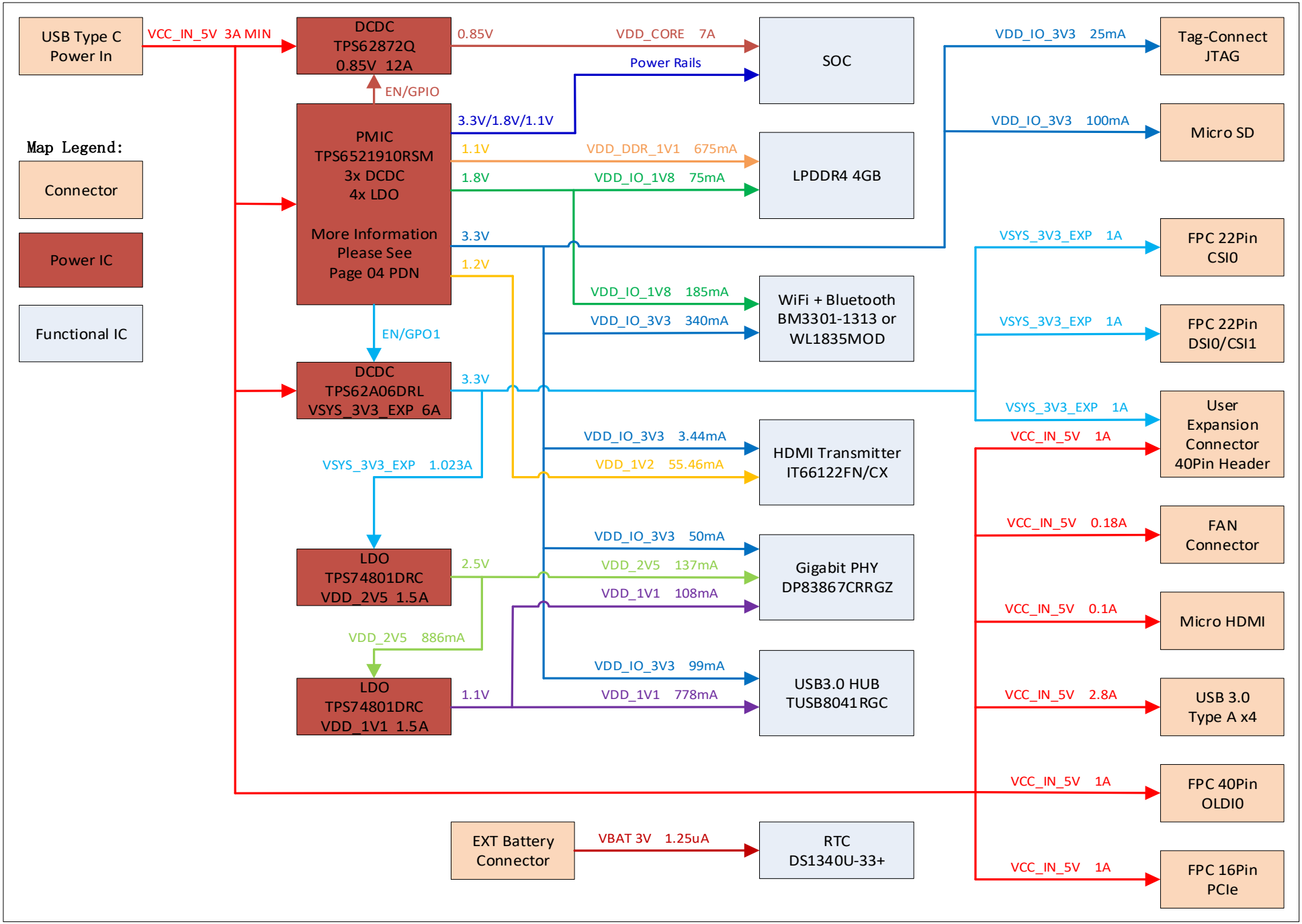
		Title:	BeagleY-AI
Size: C	Document Number: 02 BLOCK DIAGRAM		Rev: A
Draw By: Junqing.Xin	Date: Tuesday, June 11, 2024		Sheet: 2 of 27

POWER FLOW DIAGRAM



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	Title: BeagleY-AI	
Size: C	Document Number: 03 POWER FLOW DIAGRAM	Rev: A
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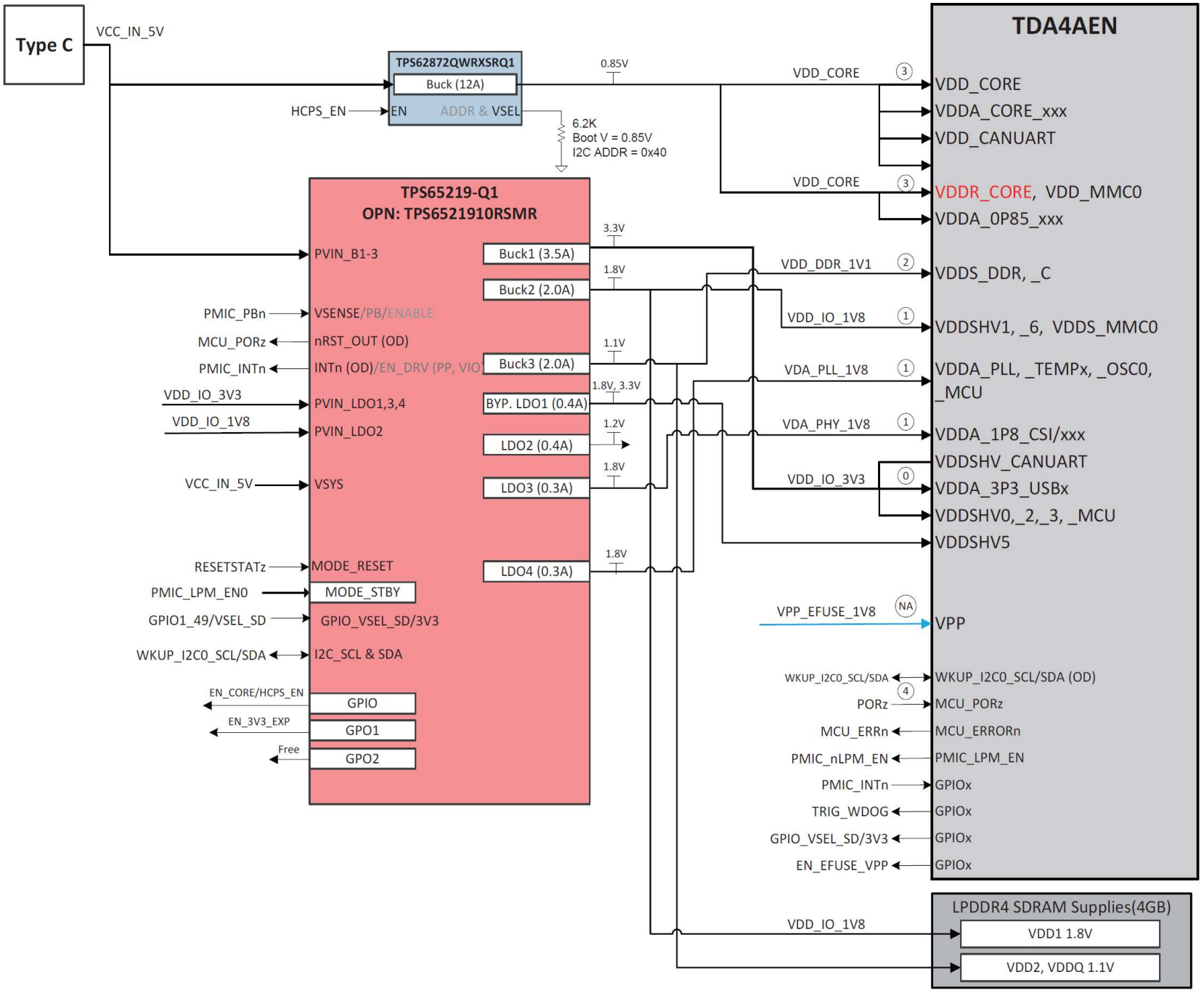
PDN



VDDR_CORE must be 0.85V always even if VDD_CORE wants to operate at 0.75V

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	Title: BeagleY-AI	
Size: C	Document Number: 04 PDN	Rev: A
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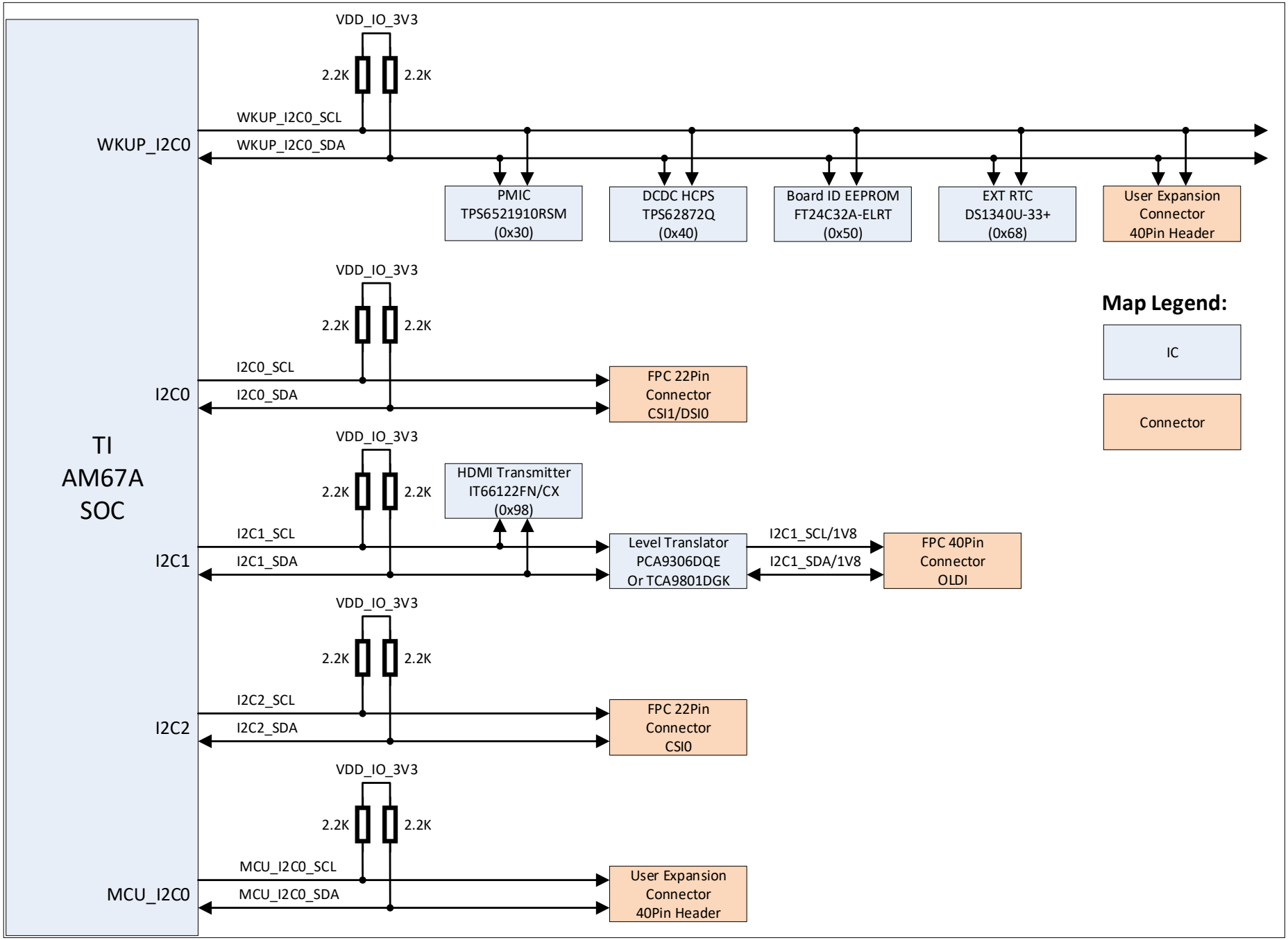
IIC TREE



seeed studio	https://www.seeedstudio.com	
	Title: BeagleY-AI	
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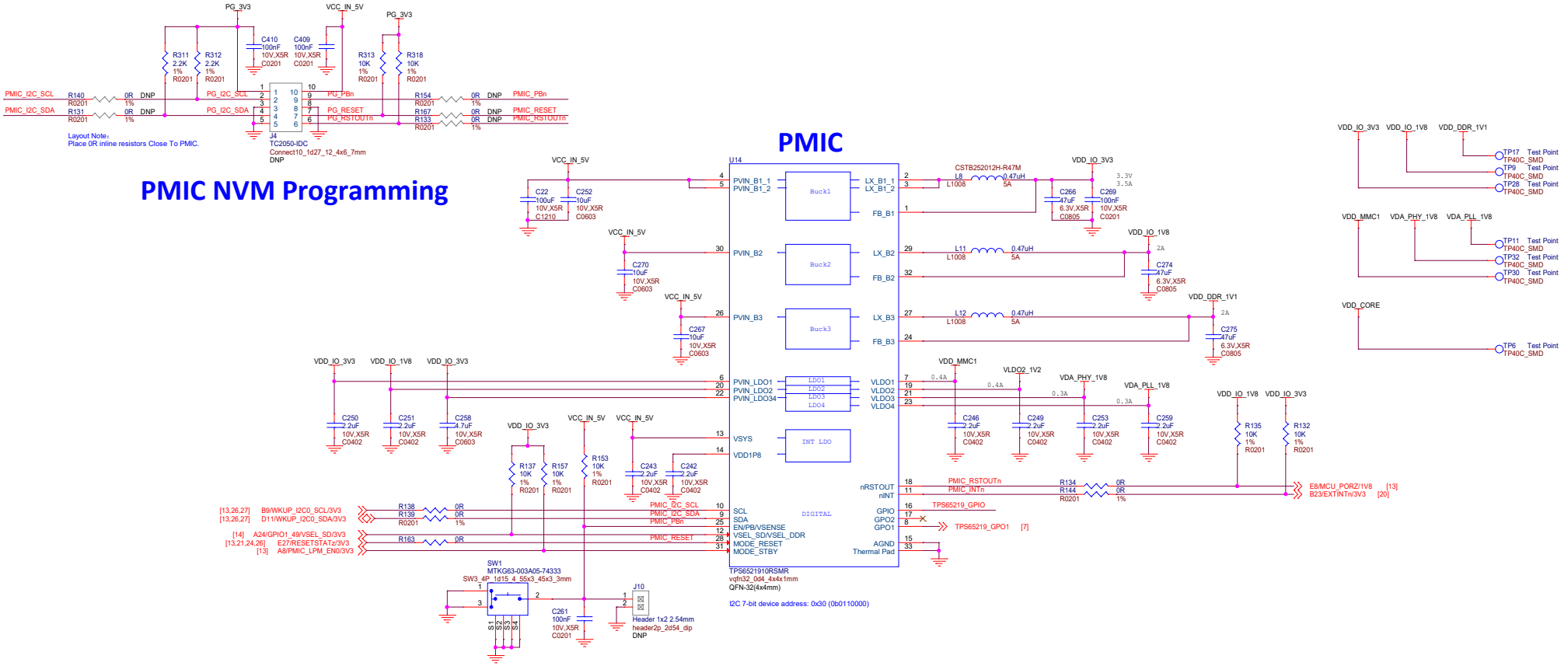

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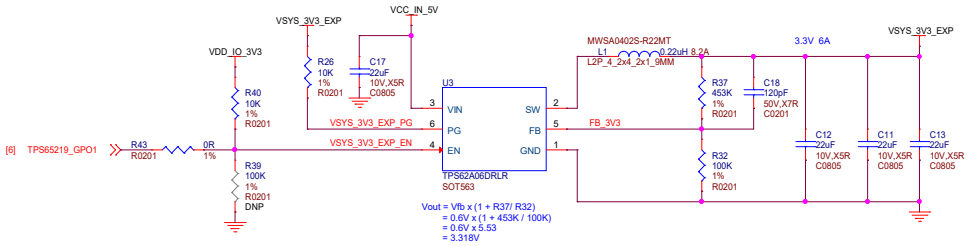
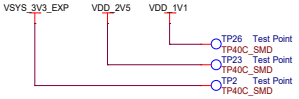
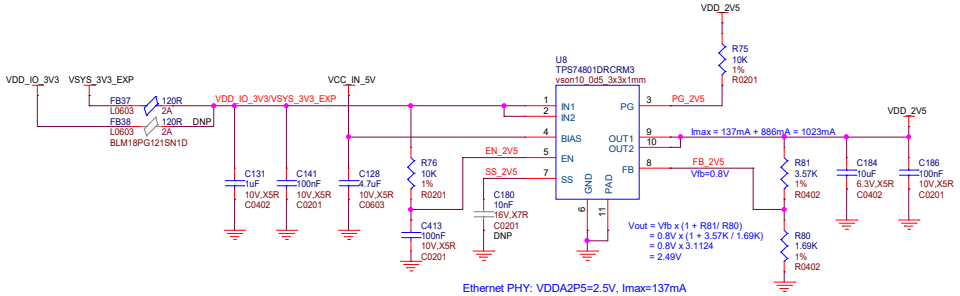
VSYS_3V3_EXP For LDO & CSI & DSI & RPi 40Pin (Total: 4A)





ETHERNET POWER

3.3V to 2.5V LDO



Ethernet PHY: VDDA2P5=2.5V, Imax=137mA

LDO U18 Power In=2.5V, Imax=886mA

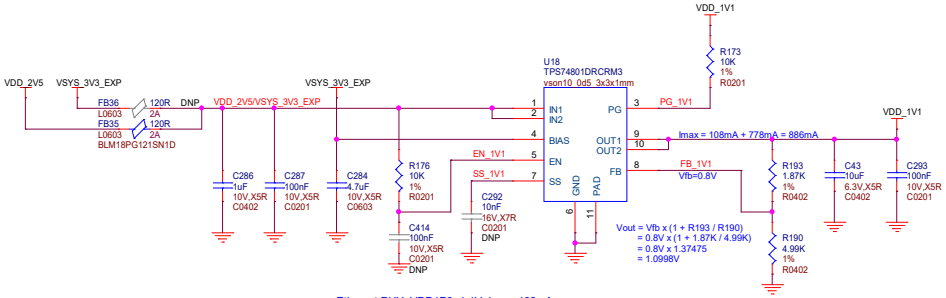
Total: Imax= 137mA + 886mA = 1023mA

Power Consumption: (3.3V-2.5V) * 1.023A = 0.8184W

Thermal Junction-to-ambient: 0.8184W * 44.2°C/W=36.17°C

USB3.0 HUB & ETHERNET POWER

3.3V/2.5V to 1.1V LDO



Ethernet PHY: VDD1P0=1.1V, Imax=108mA

USB3.0 HUB: VDD=1.1V, Imax=778mA

Total: Imax = 108mA + 554mA = 886mA

Option 1: VIN_2V5/3V3 = 3.3V

Power Consumption: (3.3V-1.1V) * 0.886A = 1.9492W

Thermal Junction-to-ambient: 1.9492W * 44.2°C/W=86.15°C

Option 2: VIN_2V5/3V3 = 2.5V

Power Consumption: (2.5V-1.1V) * 0.886A = 1.2404W

Thermal Junction-to-ambient: 1.2404W * 44.2°C/W=54.83°C

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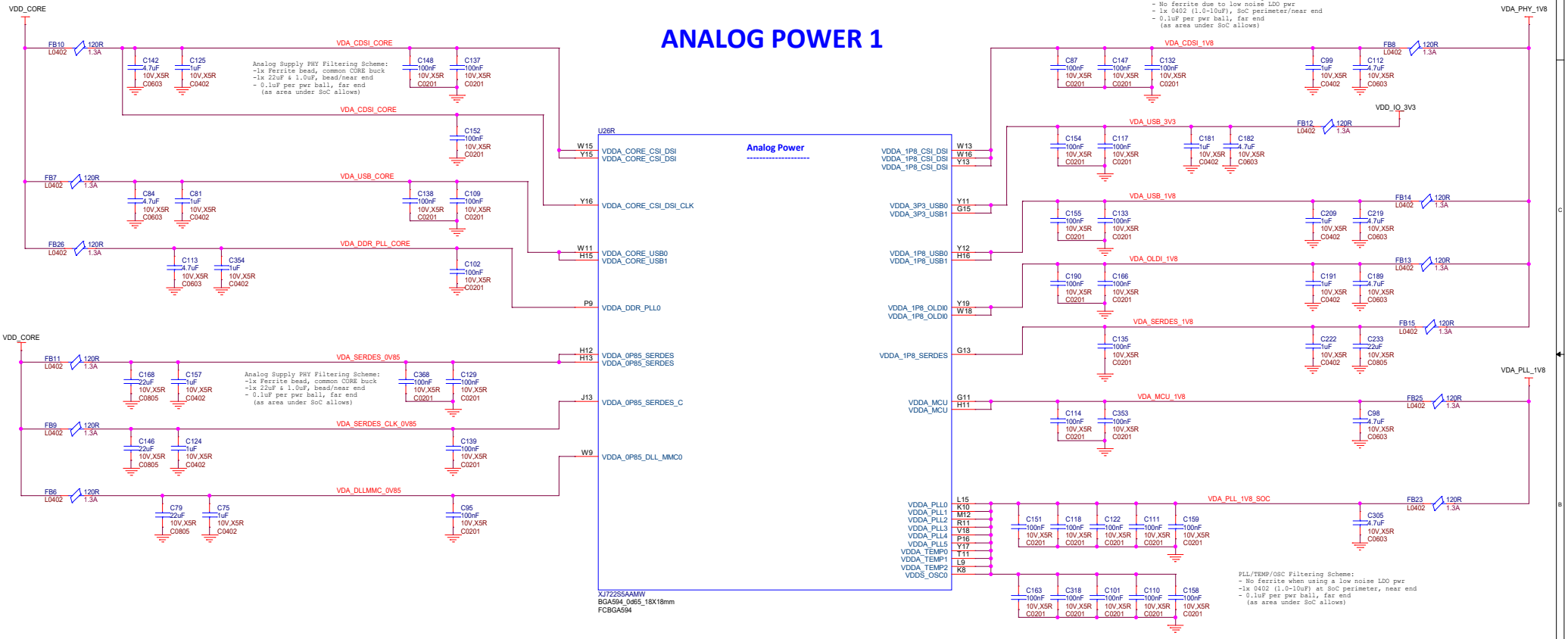
ANALOG POWER 1



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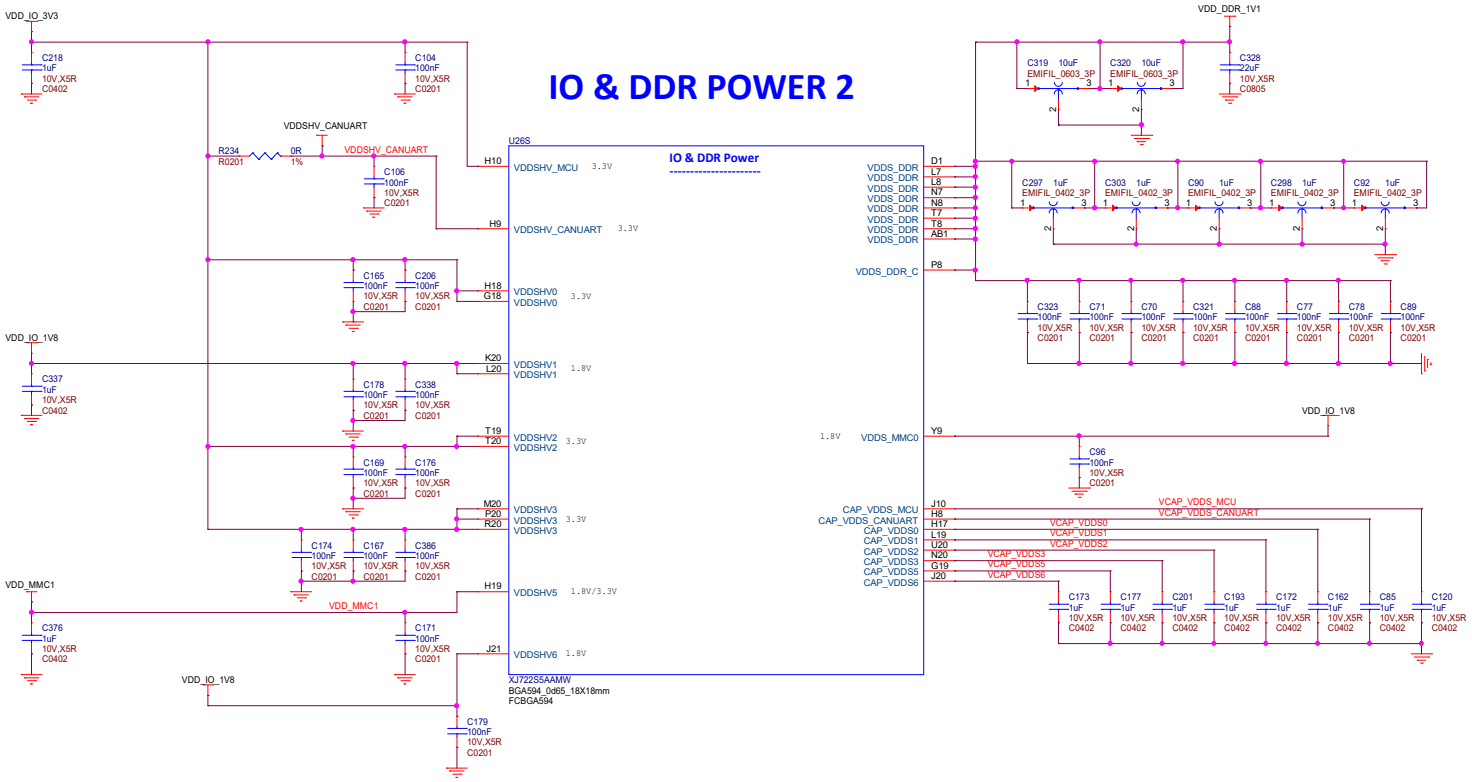
IO & DDR POWER 2



Note:

A few Dcaps shown here have been provisioned on PCB layout underneath SoC at individualpower ball vias & around perimeter in case additional high-freq decoupling might be needed.

Some Dcaps may be shown as "Do Not Populate" (DNP) components if Power Integrity (PI) simulation results for a particular power rail on this PCB design combined with Dcap scheme (value, pkg type, ESL, Loop-Inductance, etc.) results in an impedance response below or equal to the desired target impedance (Zt).

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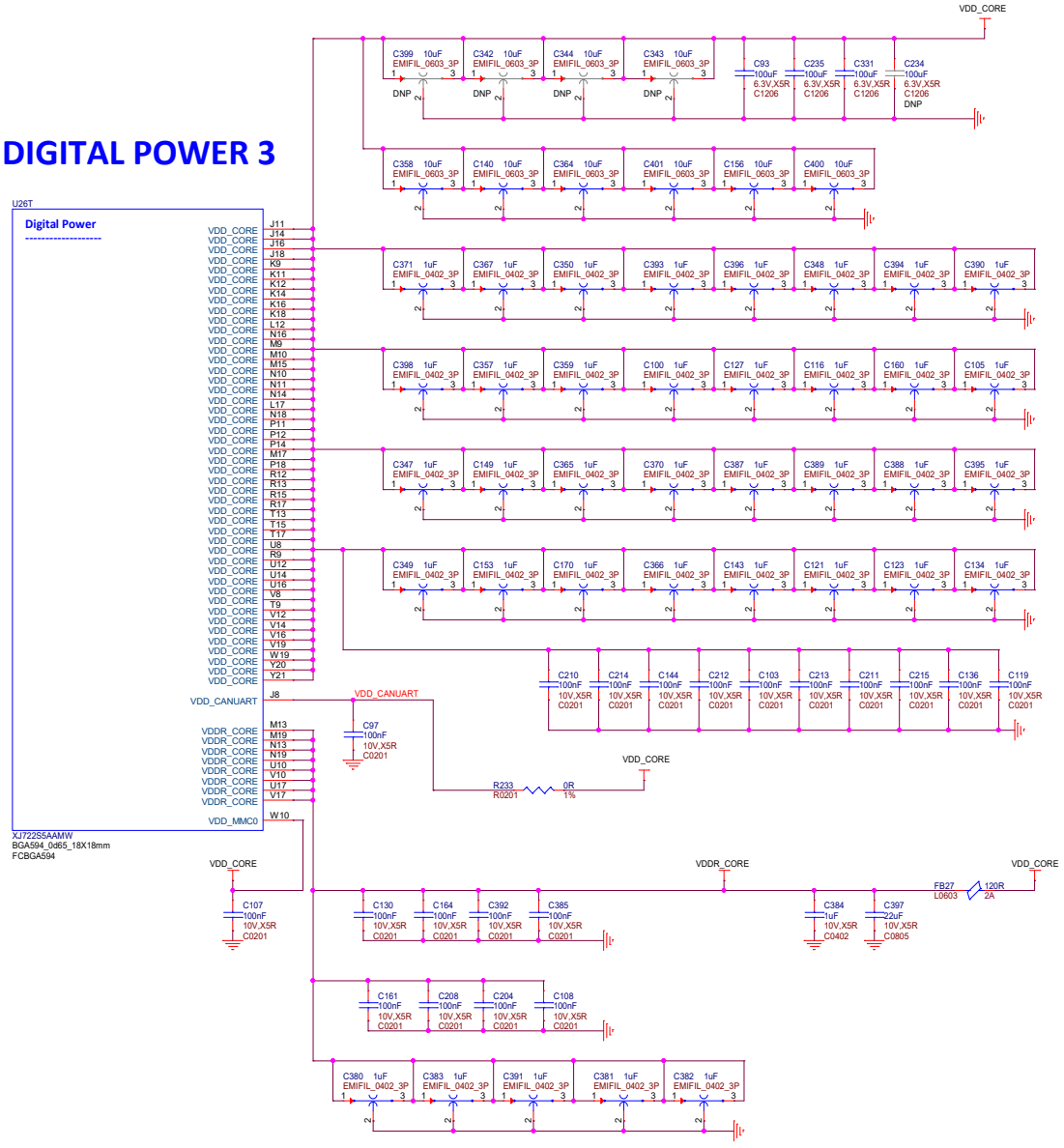
DIGITAL POWER 3



seeed studio	https://www.seeedstudio.com	
	Title: BeagleY-AI	
Size: C	Document Number: 10 SOC DIGITAL POWER 3	Rev: A
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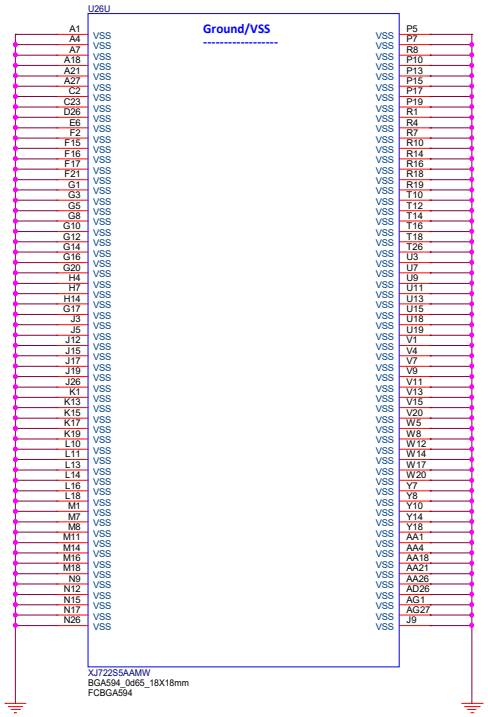
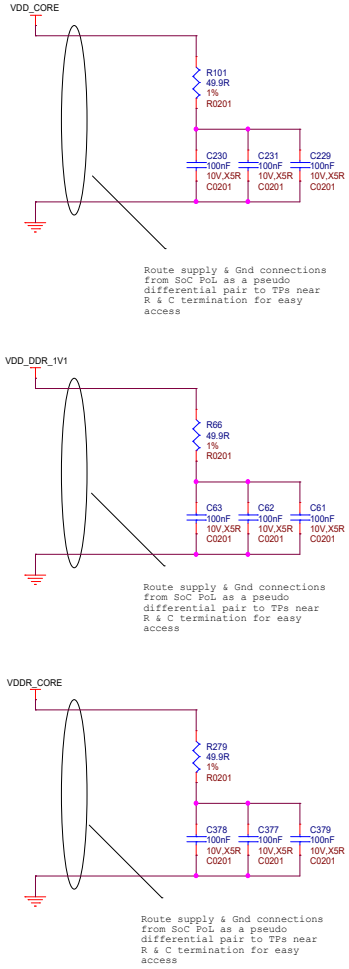
SOC GROUND



SoC Supply Noise Kelvin Sensing



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	Title: BeagleY-AI	
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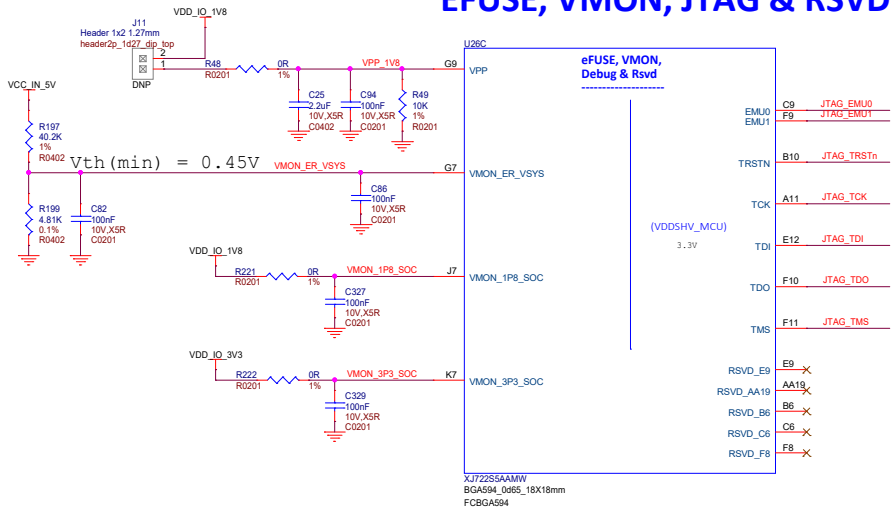
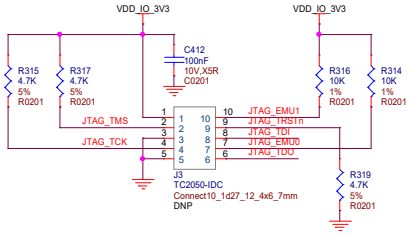
EFUSE, VMON, JTAG & RSVD

monitoring VCC_IN_5V, to protect SoC from 1st stage power fault.



Tag-Connect



seeed studio	https://www.seeedstudio.com	
	Title: BeagleY-AI	
Size: C	Document Number: 12 SOC EFUSE, VMON & JTAG	Rev: A
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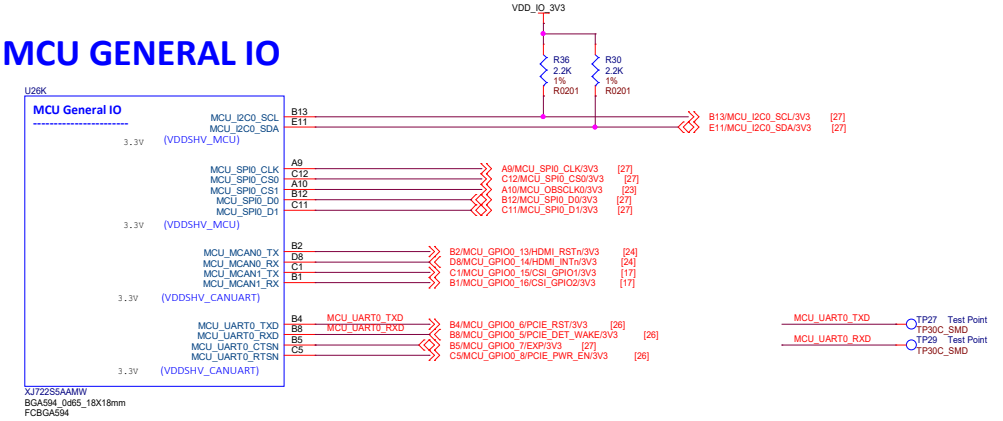
MCU GENERAL IO



RESETS, CNTRLS & MCU OSC

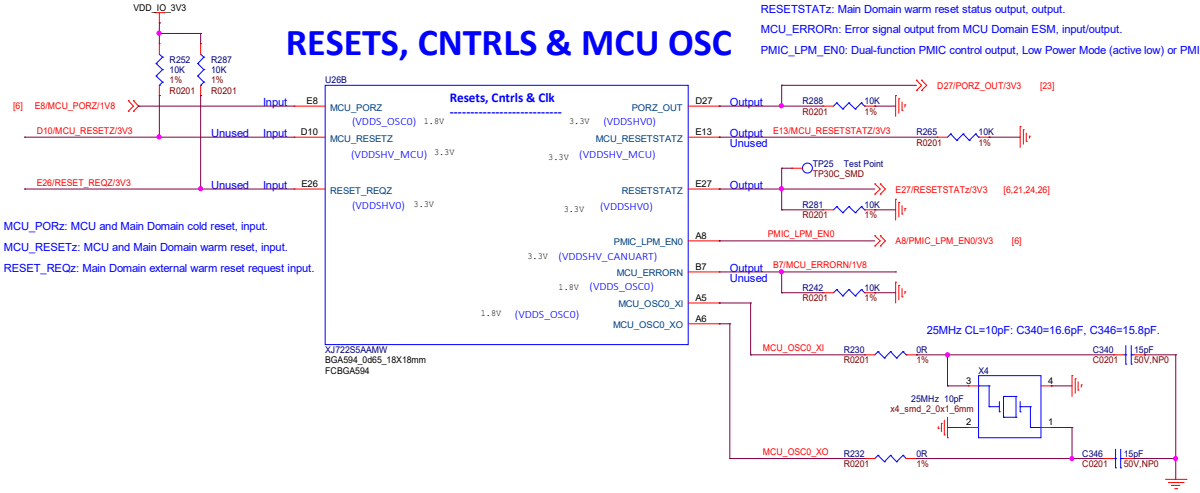
PORz_OUT: Main Domain POR status output, output.

MCU_RESETSTATz: MCU Domain warm reset status output, output.

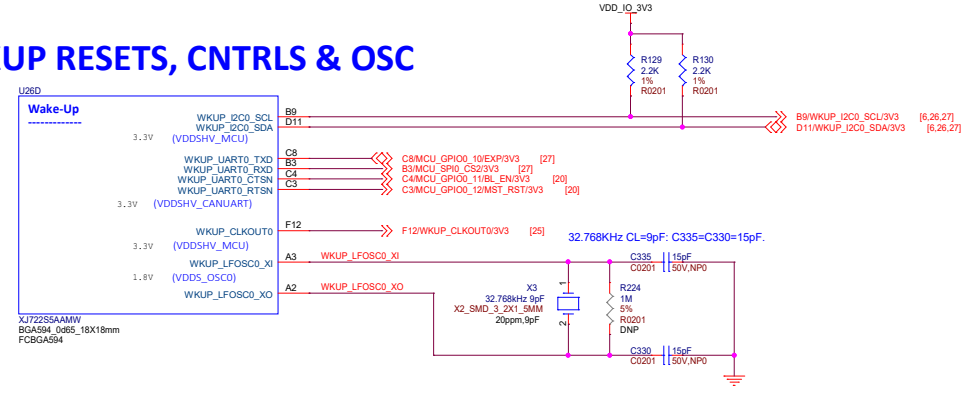
RESETSTATz: Main Domain warm reset status output, output.

MCU_ERRORn: Error signal output from MCU Domain ESM, input/output.

PMIC_LPM_EN0: Dual-function PMIC control output, Low Power Mode (active low) or PMIC Enable (active high), output.



WKUP RESETS, CNTRLS & OSC



seeed studio	https://www.seeedstudio.com		
	Title: BeagleY-AI		
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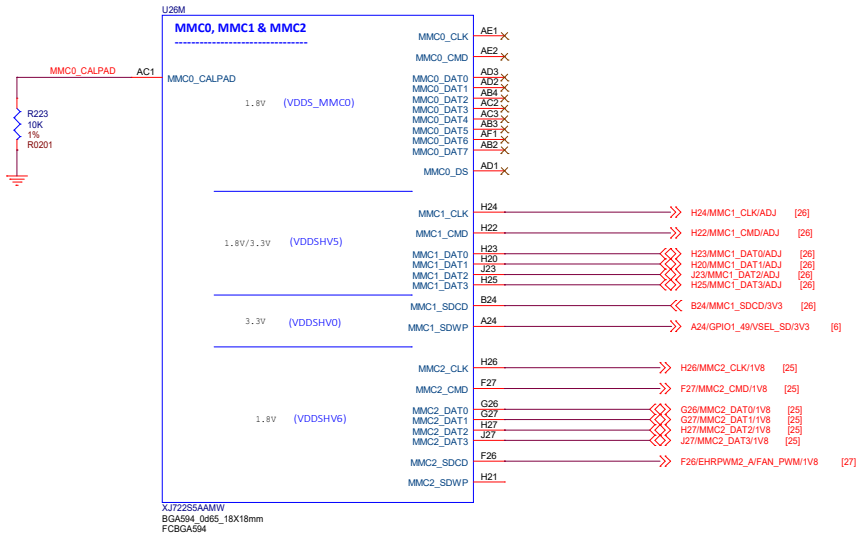
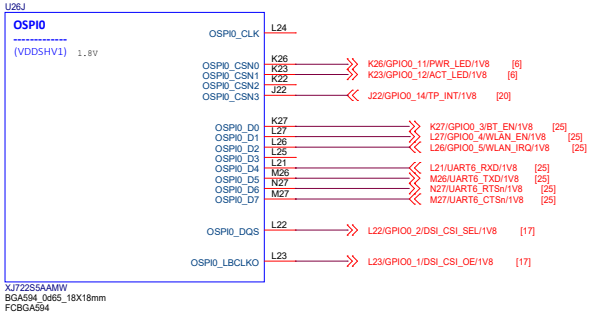
MMC 0, 1, 2



OSPI



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	Title: BeagleY-AI	
Size: C	Document Number: 14 SOC OSPI, MMC	Rev: A
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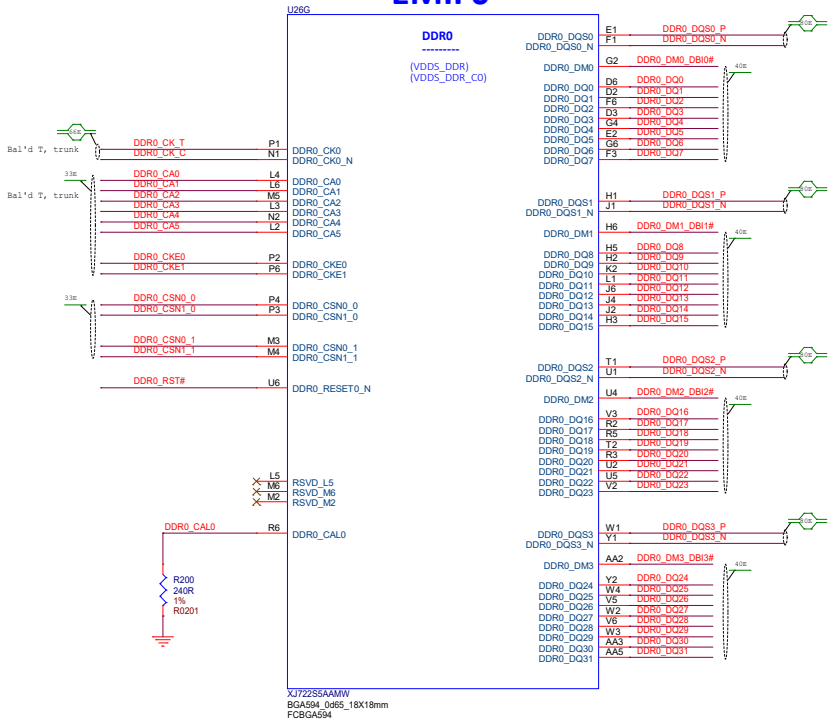
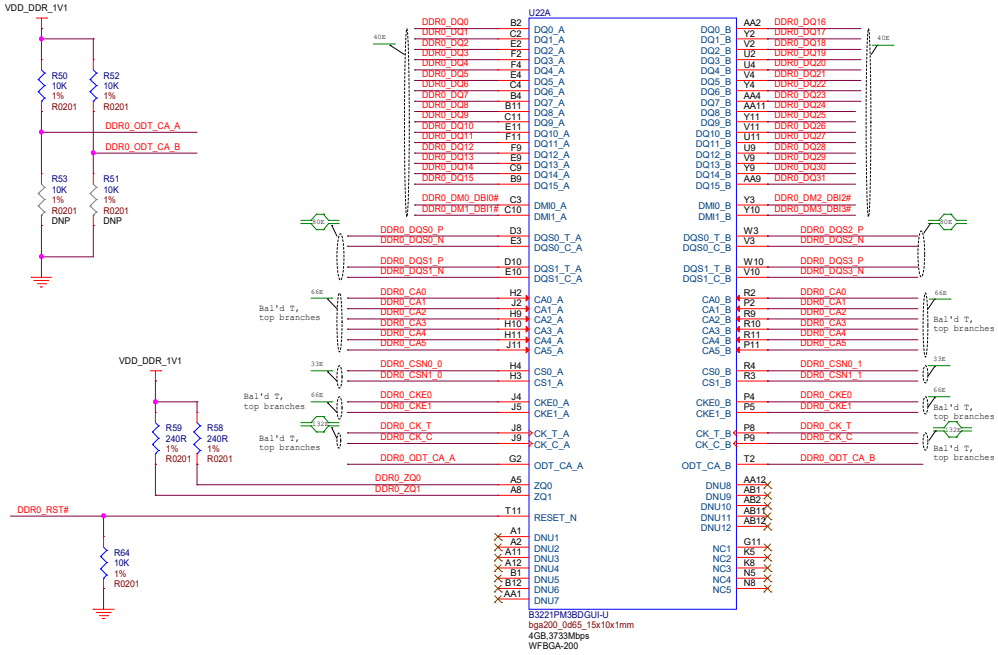
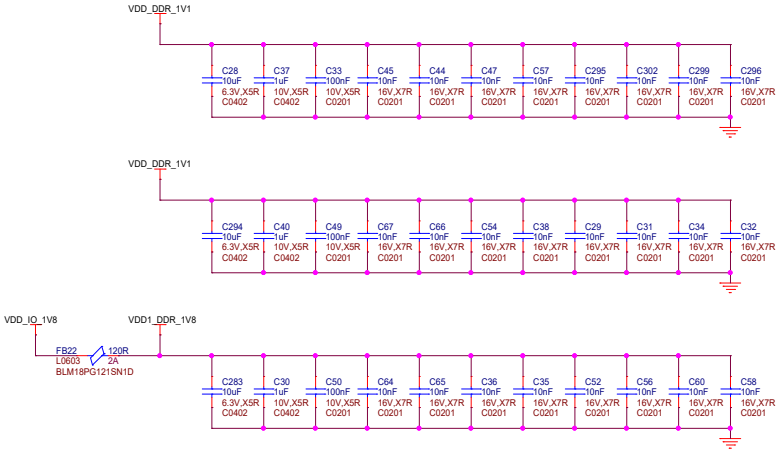
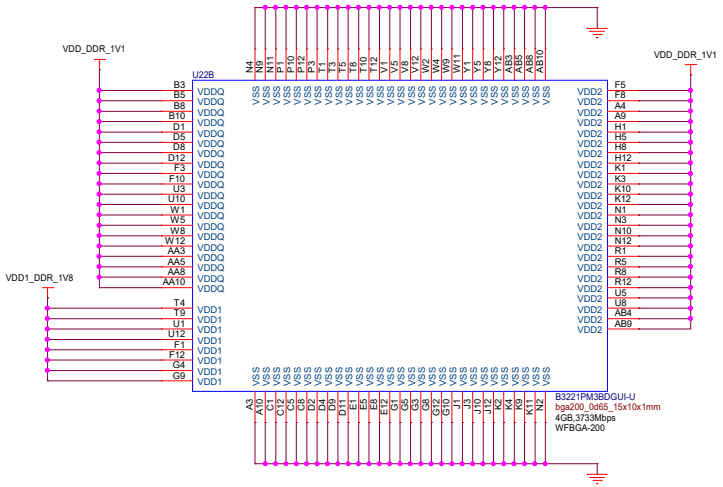
LPDDR4 MEMORY I/F

EMIF0









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Size: C	Document Number: 15 SOC EMIF & LPDDR4 MEMORY		Rev: A
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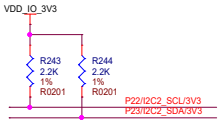
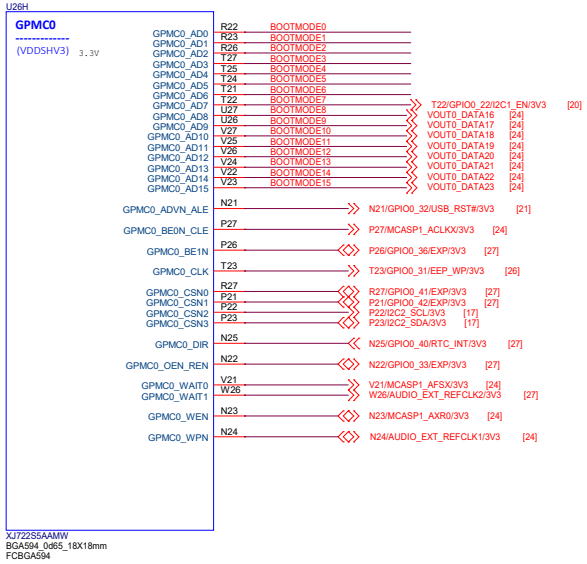
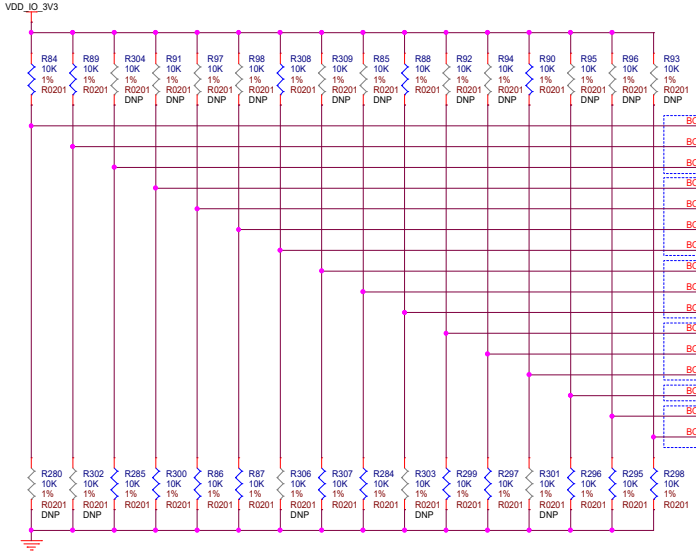
VOUT



GPMC





BOOTMODE0	1	BOOTMODE[2:0]: PLL Config, set to '011' for 25MHz input frequency.
BOOTMODE1	1	
BOOTMODE2	0	
BOOTMODE3	0	MCU_BOOTMODE[6:3]: Primary Boot Mode, set to '1000' for primary boot is MMCSD Boot (SD Card).
BOOTMODE4	0	
BOOTMODE5	0	
BOOTMODE6	1	
BOOTMODE7	0	MCU_BOOTMODE[9:7]: Primary Boot Mode Config, set to '100'. B9=1: MMC Port 1 (4 bit width). B8=x: Reserved. B7=0: Filesystem mode.
BOOTMODE8	0	
BOOTMODE9	1	
BOOTMODE10	0	MCU_BOOTMODE[12:10]: Backup Boot Mode, set to '100' for Backup boot is Ethernet.
BOOTMODE11	0	
BOOTMODE12	1	
BOOTMODE13	0	MCU_BOOTMODE[13]: Backup Boot Mode Config, set to '0' :RGMII with internal TX delay.
BOOTMODE14	0	MCU_BOOTMODE[15:14]: Reserved pins.
BOOTMODE15	0	

BOOT MODES SUPPORTED:

Primary Boot: SD CARD

Backup Boot: Ethernet.

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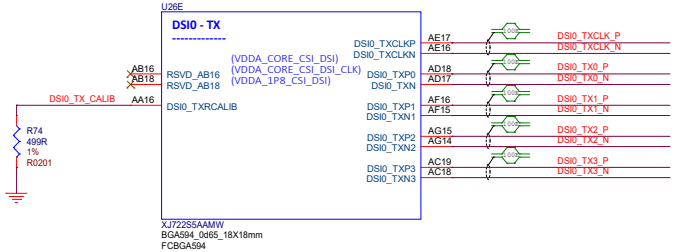
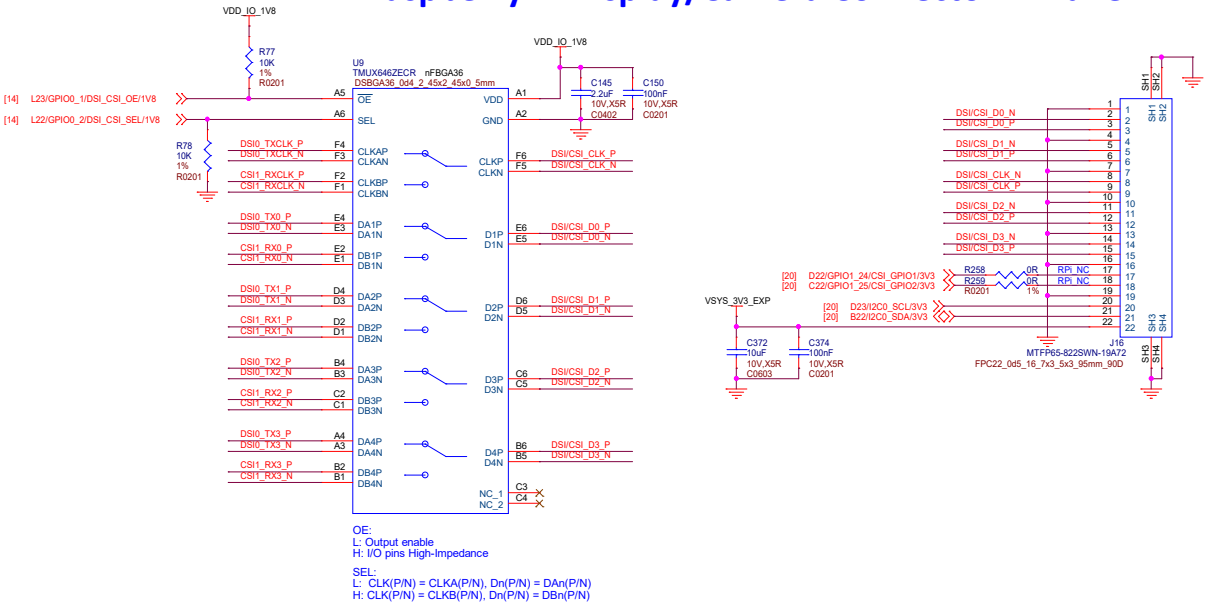
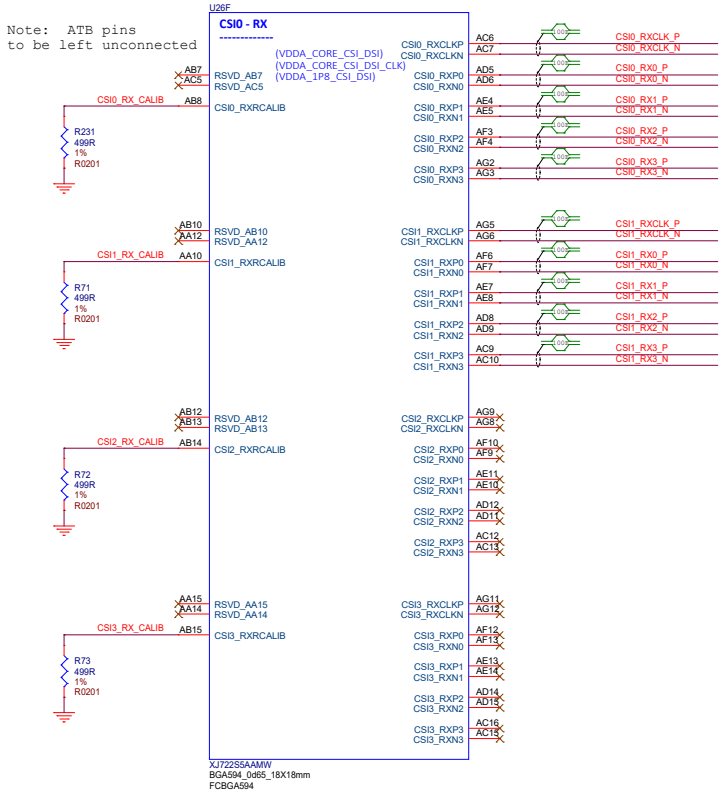
DSI



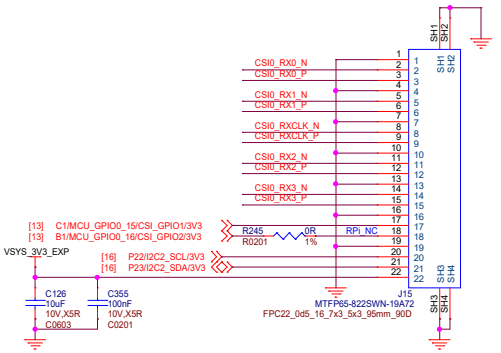
Raspberry Pi Display/Camera Connector x4 Lane



CSI 0, 1, 2, 3



Raspberry Pi Camera Connector x4 Lane



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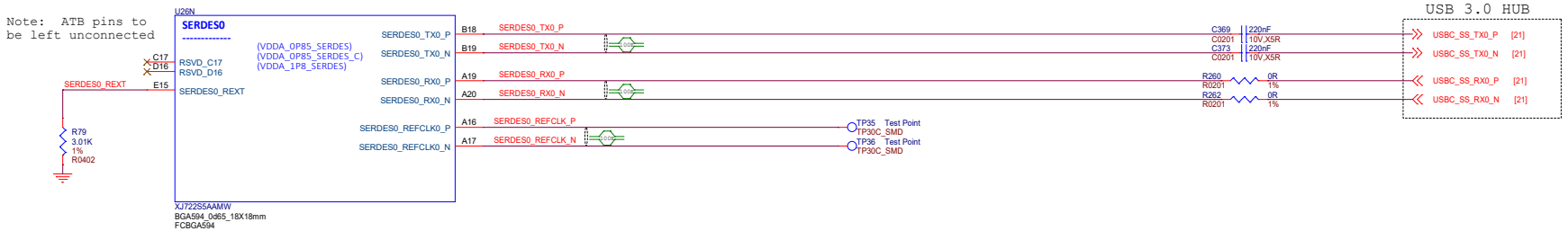
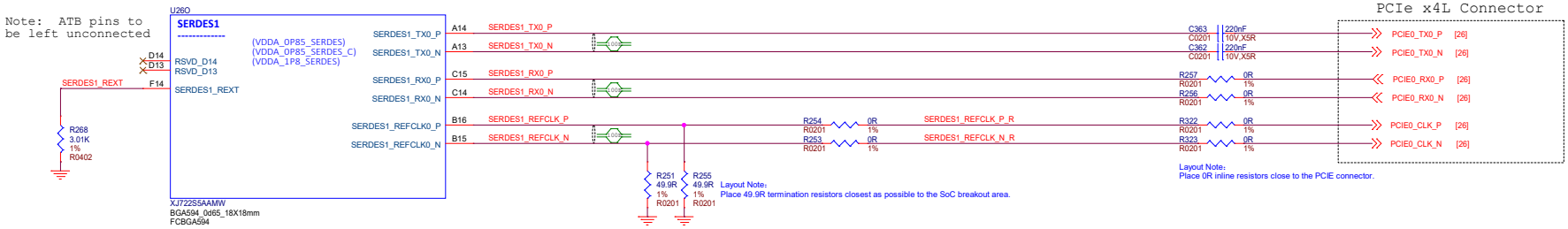
SERDES0



SERDES1



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	Title: BeagleY-AI	
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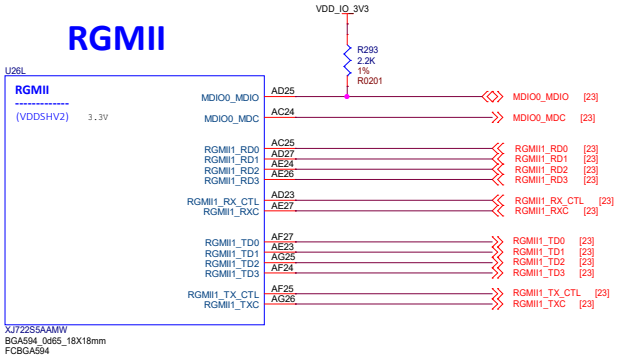
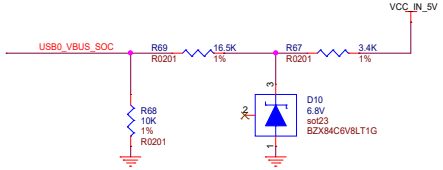
RGMII

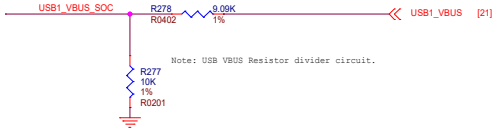


USB VBUS Resistor divider circuit

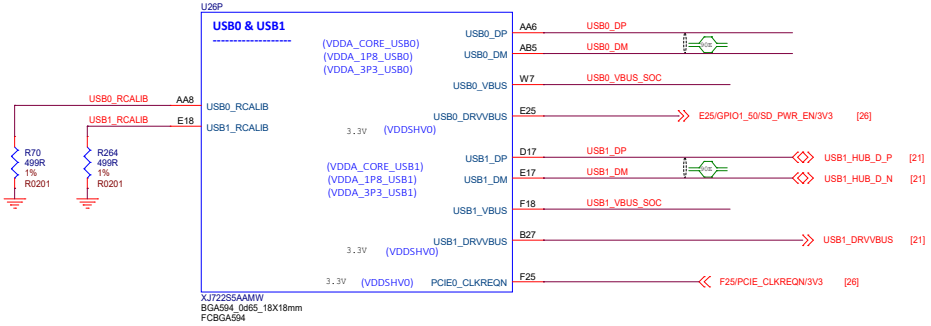
Note: Recommended VBUS circuit for USB connector. Supports 5V VBUS

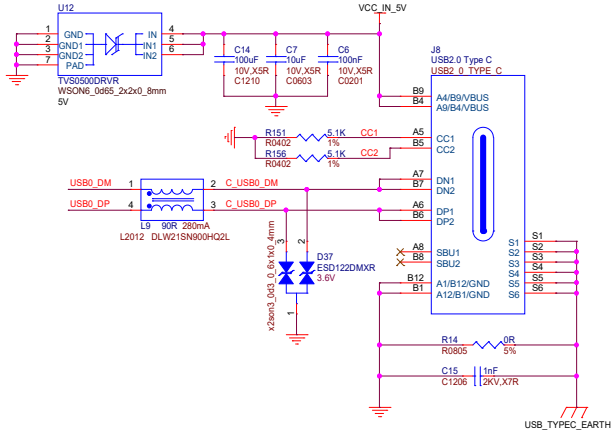


Note: Recommended VBUS circuit for embedded Hub



USB0 & USB1





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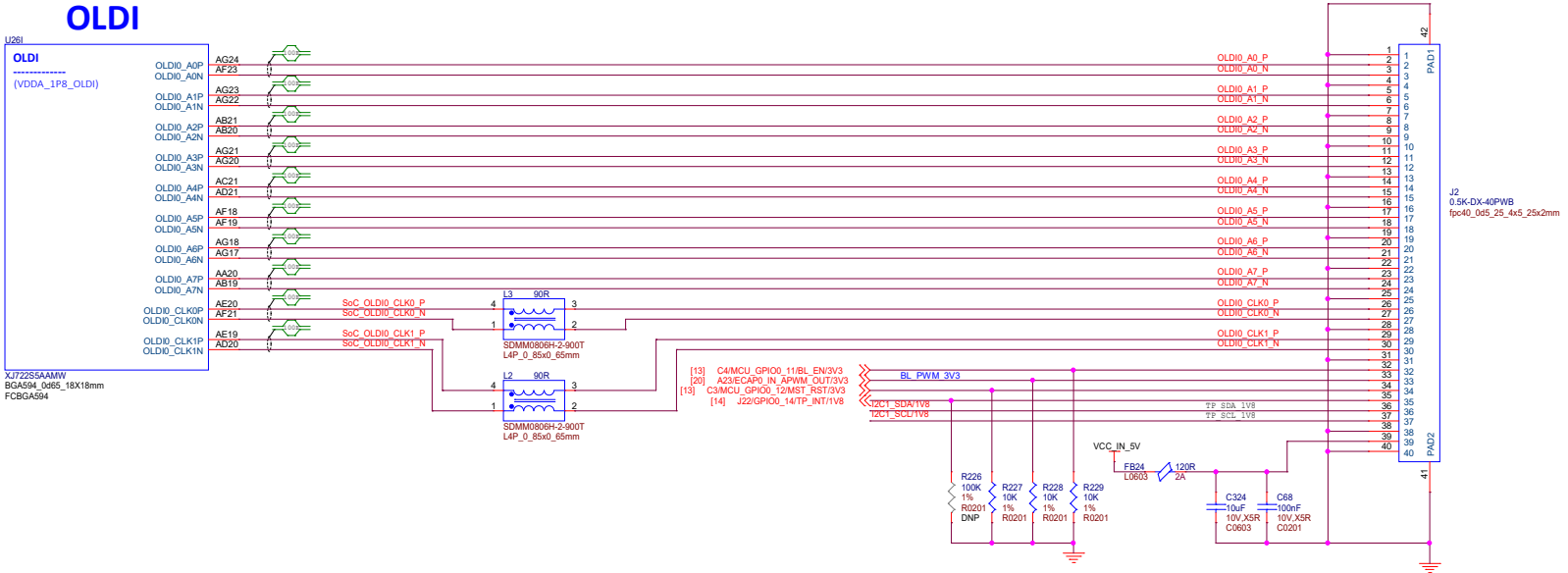
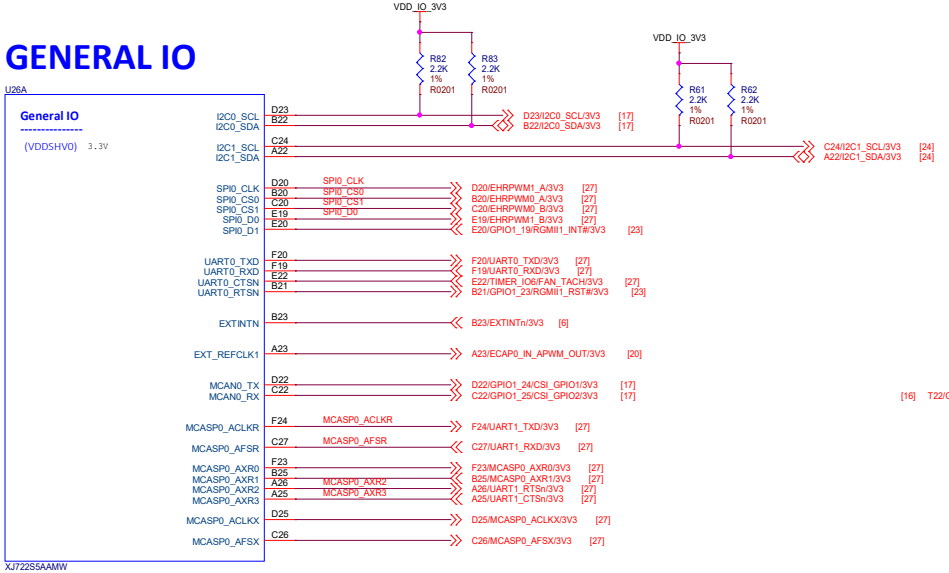
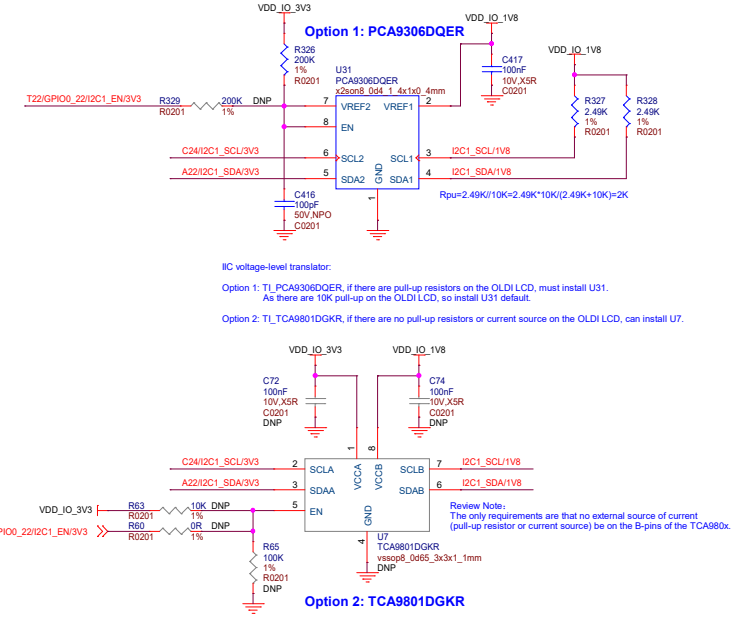
OLDI



GENERAL IO





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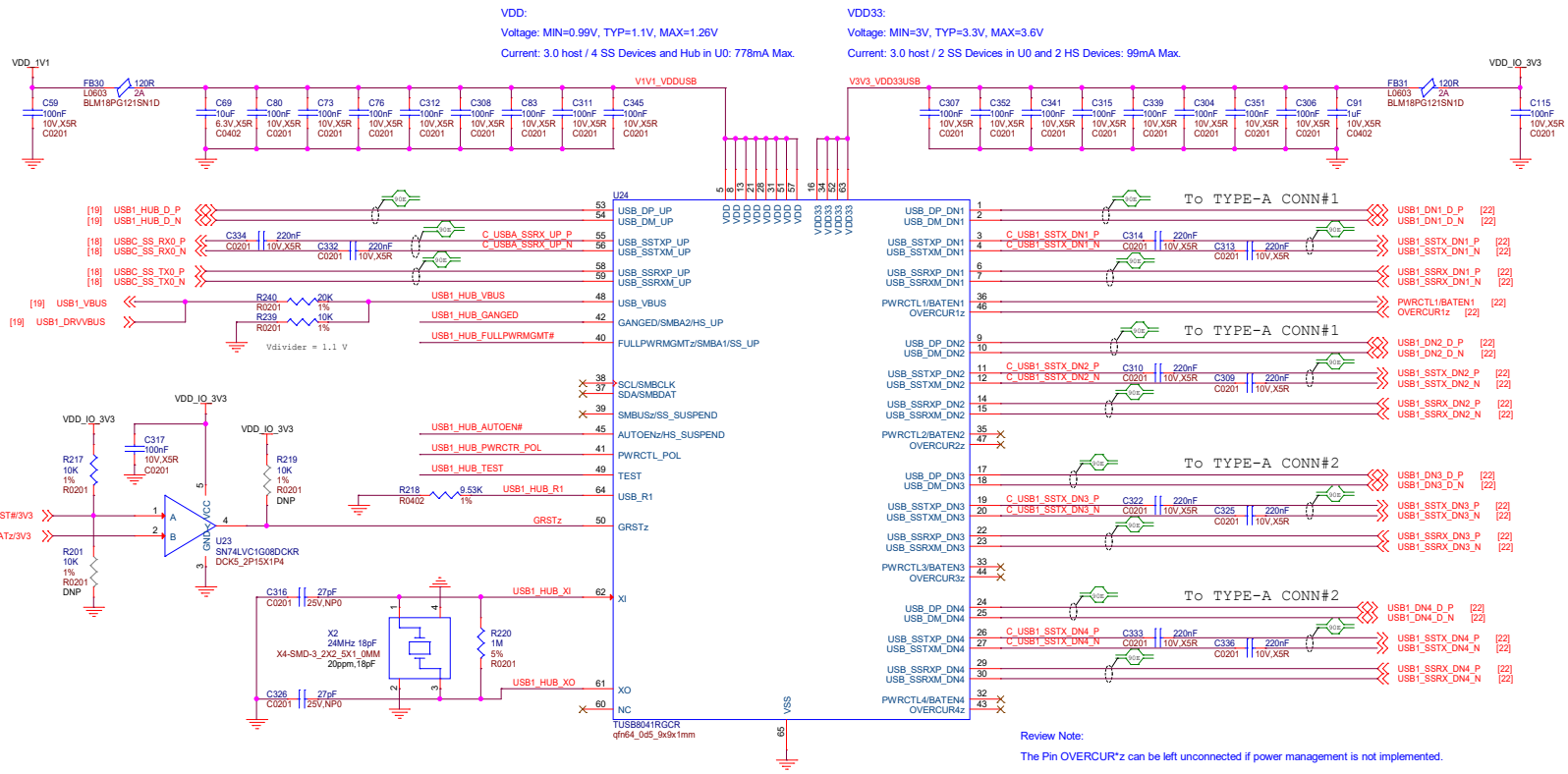
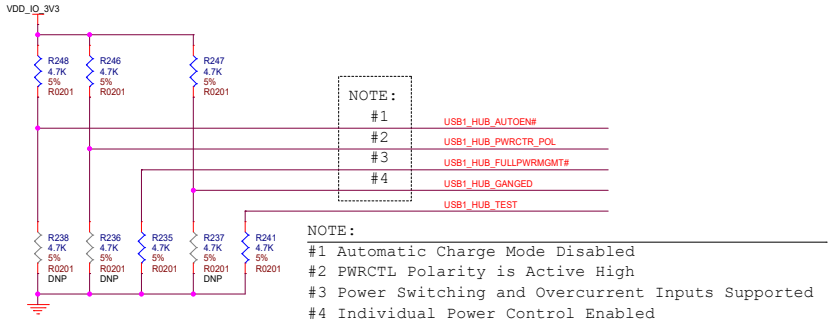
USB 3.0 HUB





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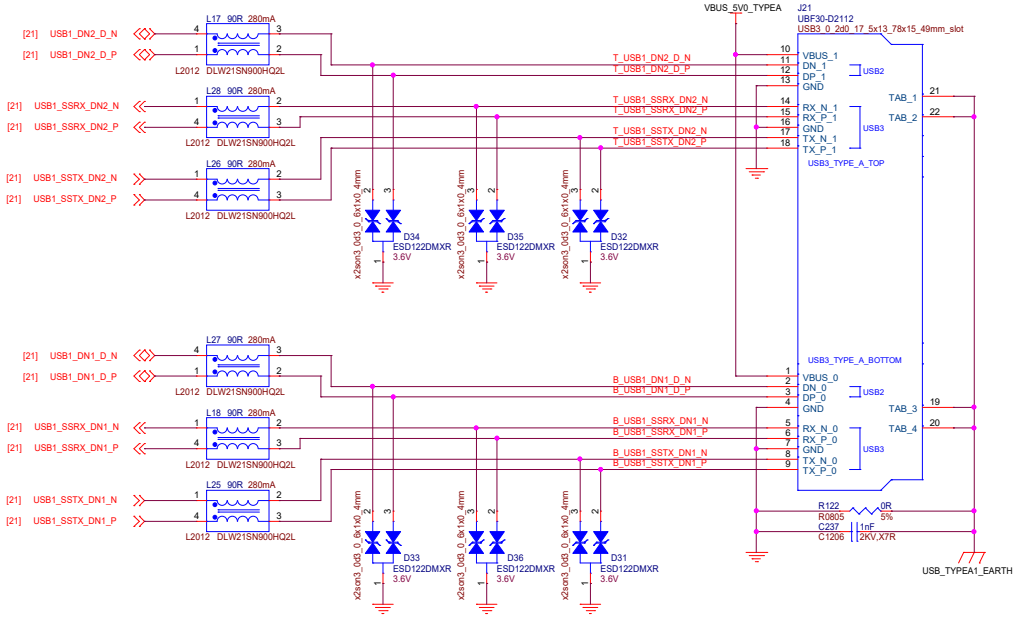
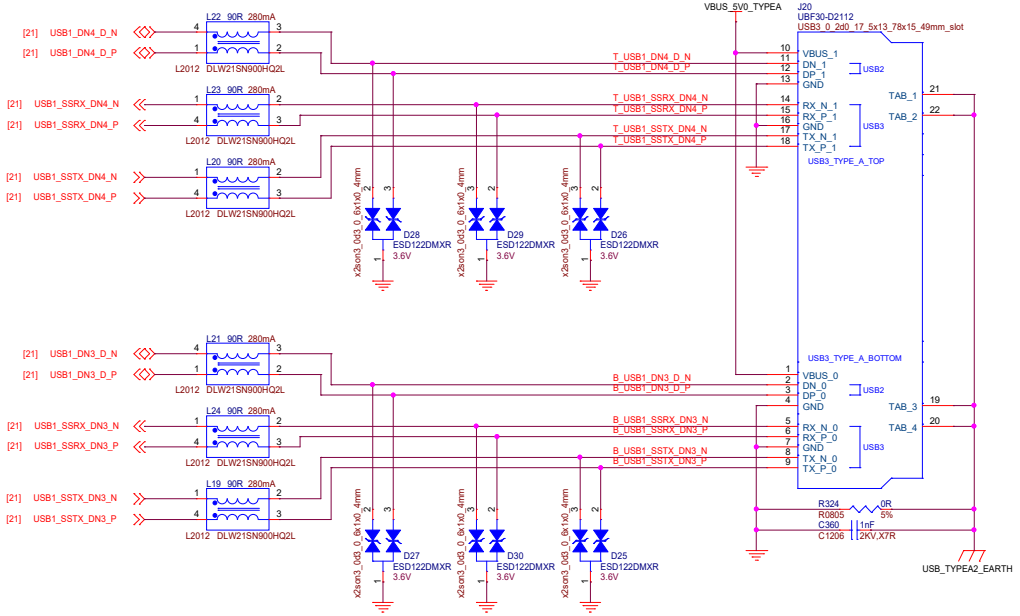
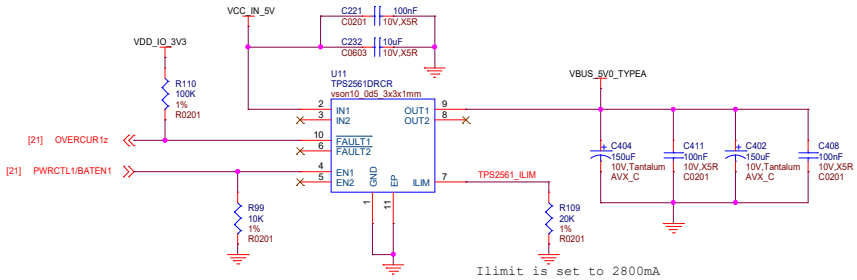
USB 3.0 DUAL TYPE-A







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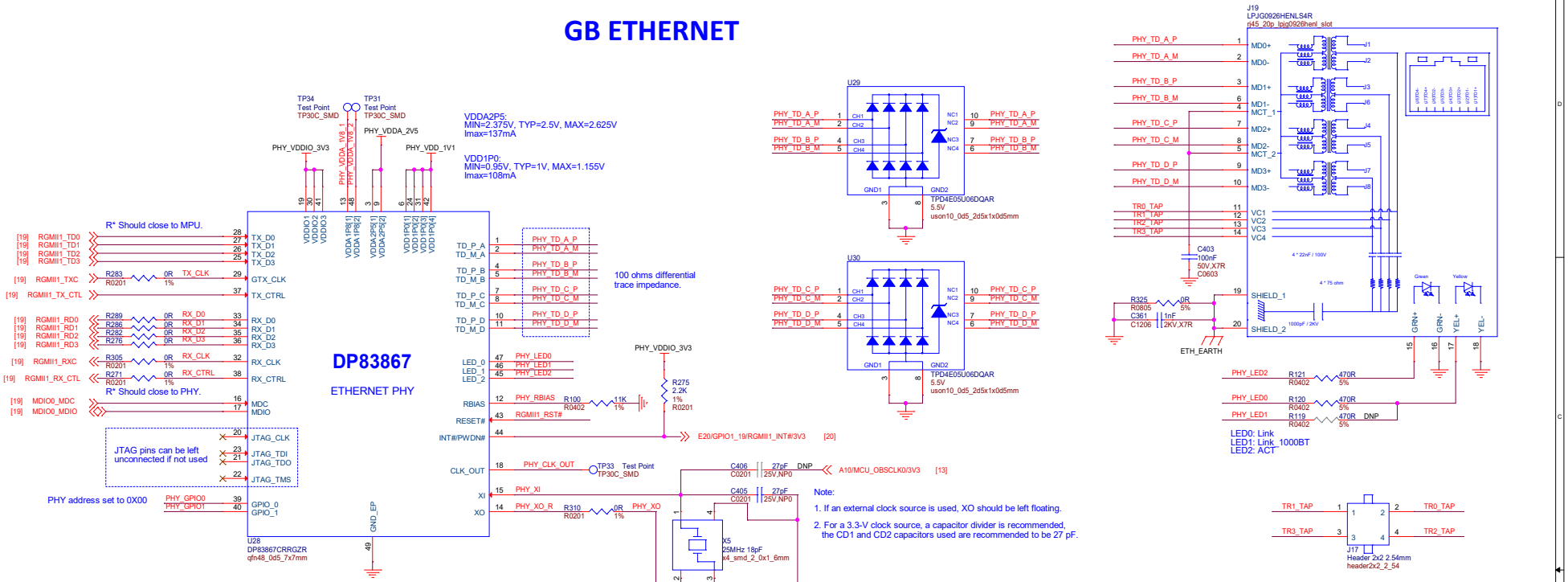
GB ETHERNET



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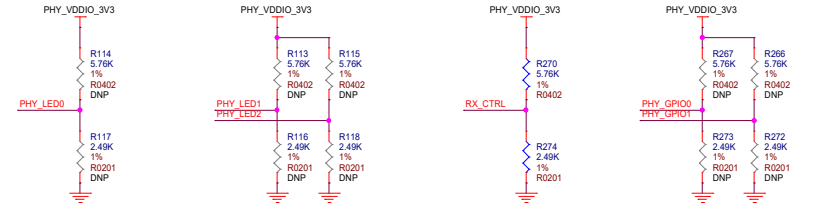

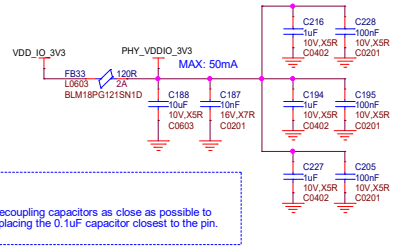

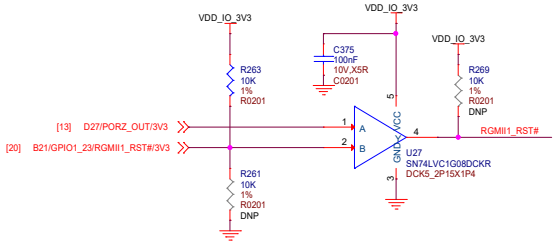

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Size: C	Document Number: 23 GB ETHERNET	Rev: A
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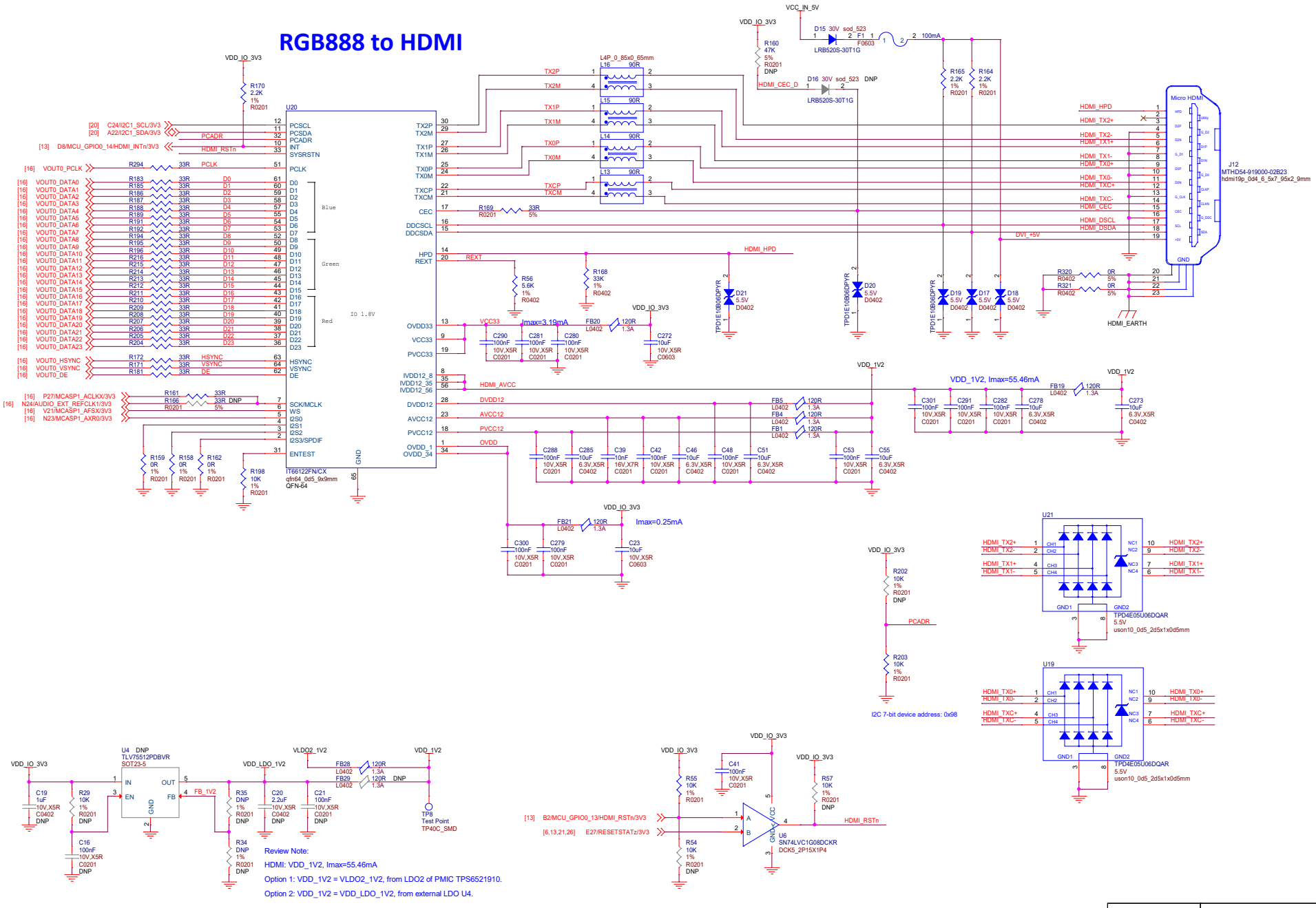
RGB888 to HDMI



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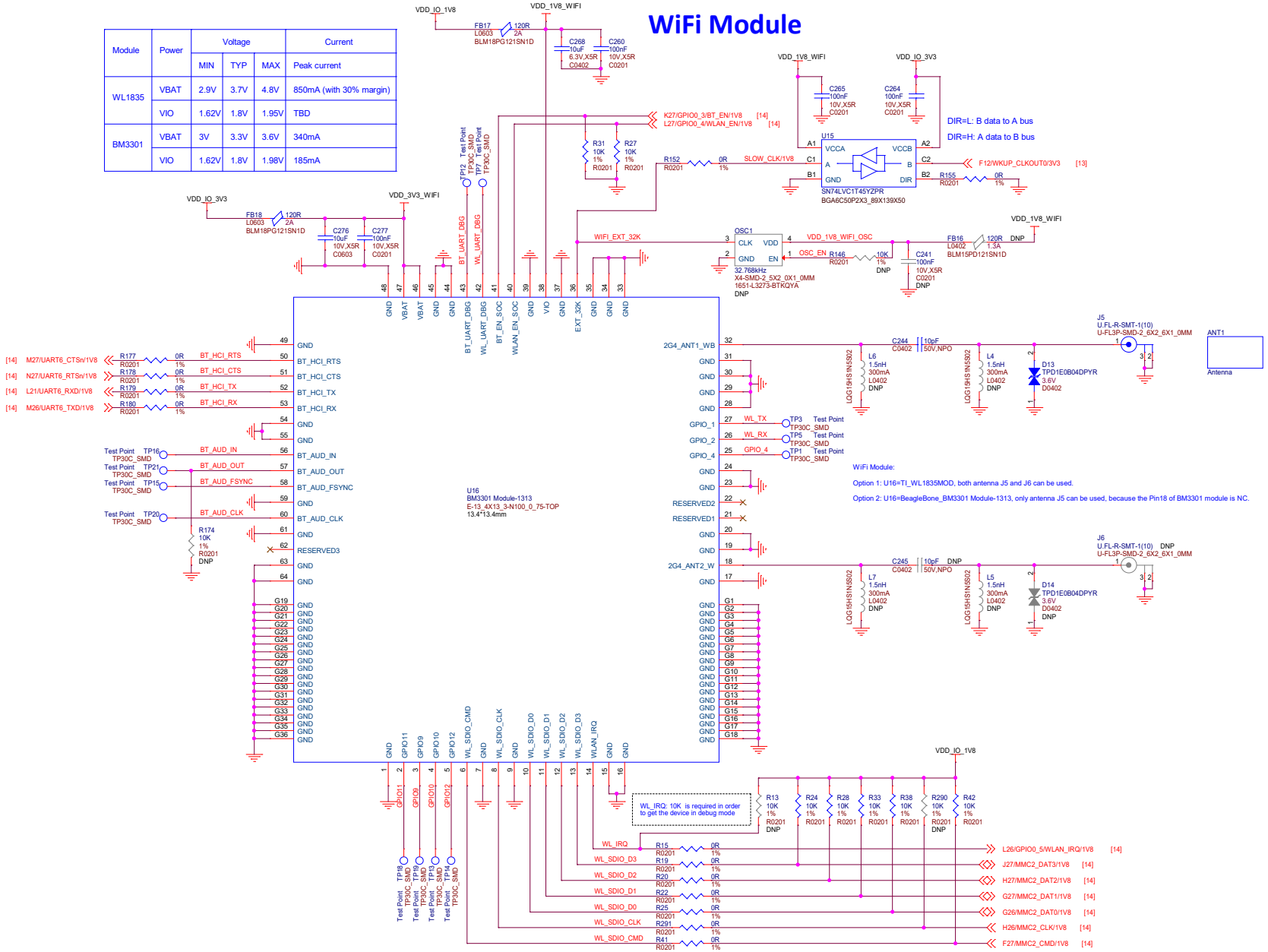
WiFi Module

Module	Power	Voltage			Current
		MIN	TYP	MAX	Peak current
WL1835	VBAT	2.9V	3.7V	4.8V	850mA (with 30% margin)
	VIO	1.62V	1.8V	1.95V	TBD
BM3301	VBAT	3V	3.3V	3.6V	340mA
	VIO	1.62V	1.8V	1.98V	185mA



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Size: C	Document Number: 25 WiFi & Bluetooth	Rev: A
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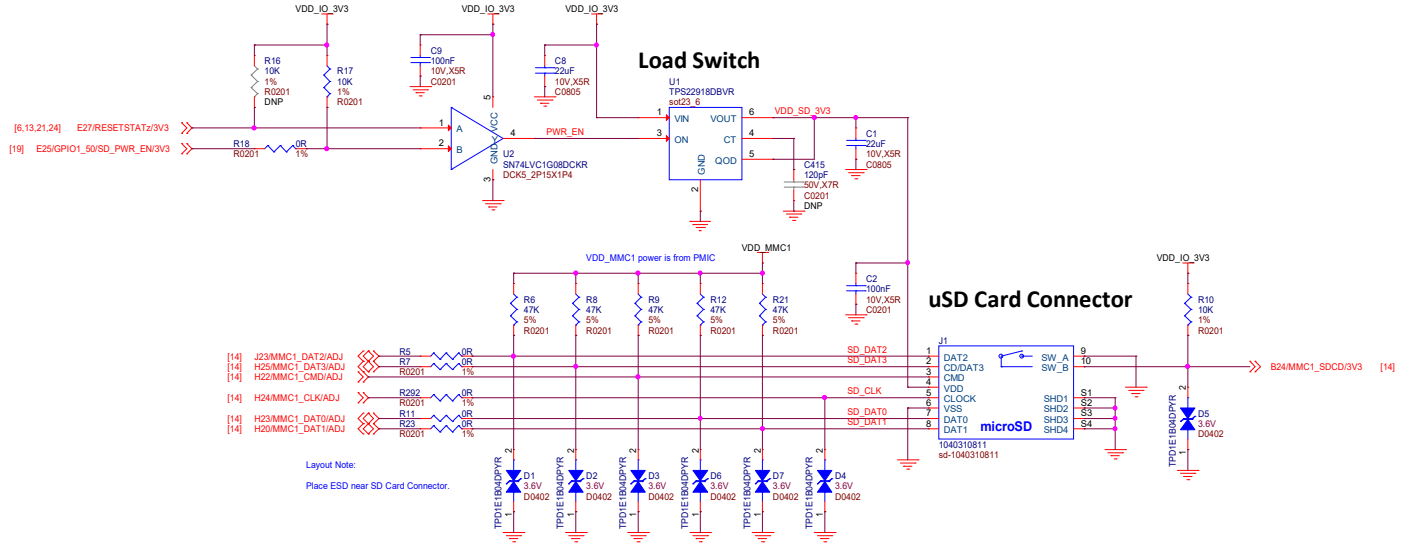
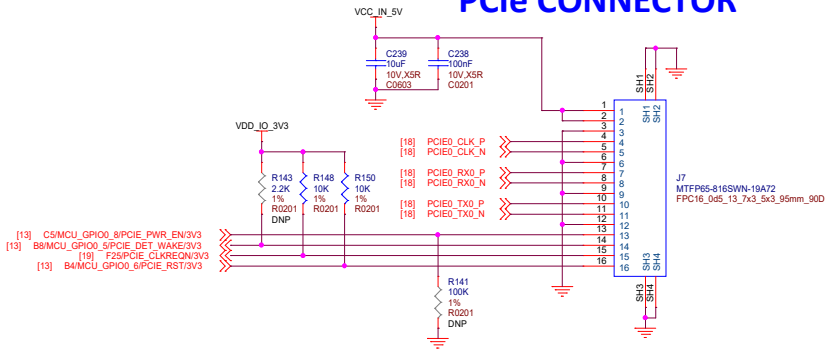
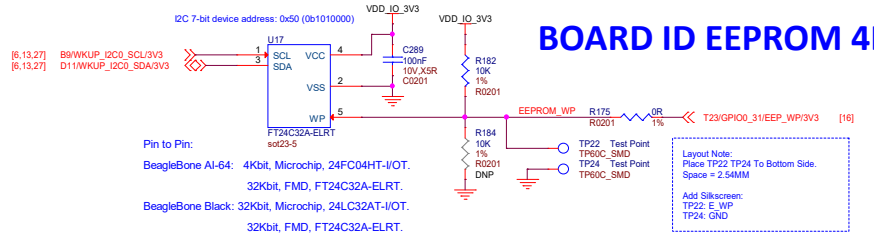
Micro SD CARD INTERFACE



PCIe CONNECTOR



BOARD ID EEPROM 4Kbit



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	Title: BeagleY-AI	
Size: C	Document Number: 26 uSD, PCIe, EEPROM	Rev: A
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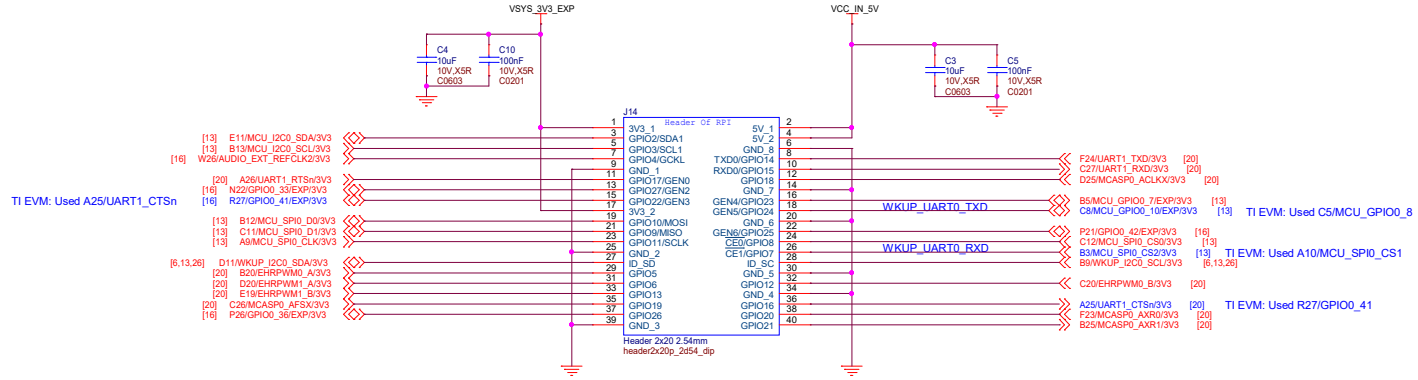
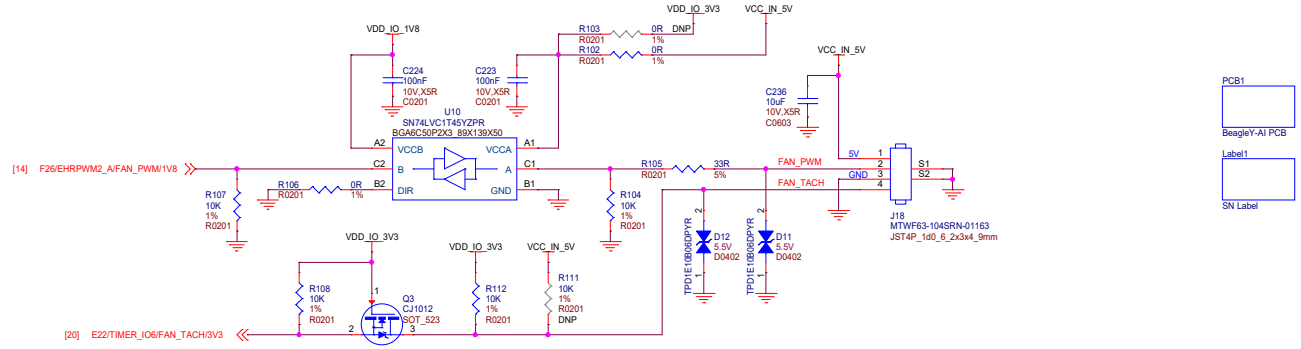
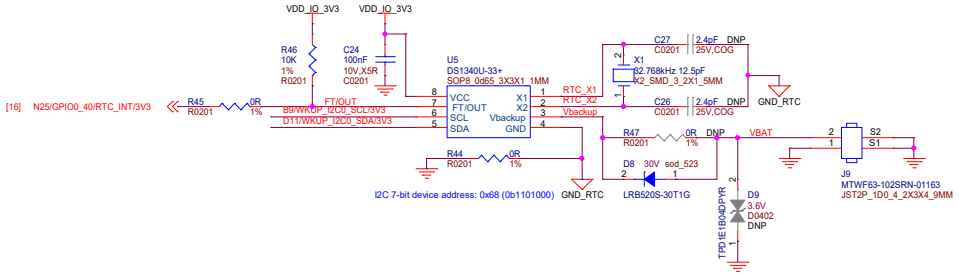
USER EXPANSION CONNECTOR



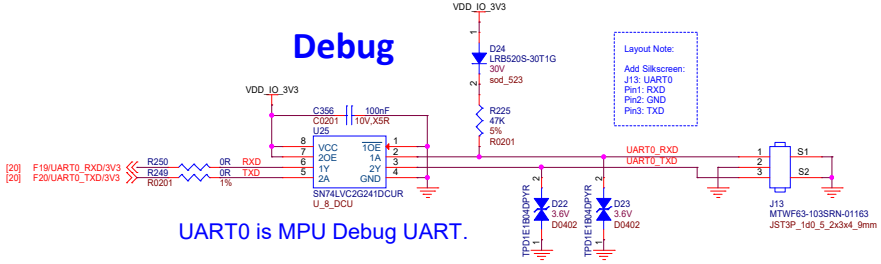
FAN CONNECTOR



IIC EXT RTC



Debug



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	Title: BeagleY-AI	
Size: C	Document Number: 27 EXP 40PIN, FAN, RTC, DEBUG	Rev: A
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