

1	2	3	4	
A	<div>RuggedBoard-A5D2x CB</div>			A
B				B
C				C
D				D
1	2	3	4	

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 1 of 16

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 1 of 16

1		2		3		4	
Block Diagram							
To Be update							
1		2		3		4	
07-11-2019		PCB No: RB-A5D2x-V1.1		Rev:1P1		Sheet: 2 of 16	
Project Name: RuggedBoard-A5D2x CB				Department: Design and Development			
RuggedBoard				#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.			

## Revision History

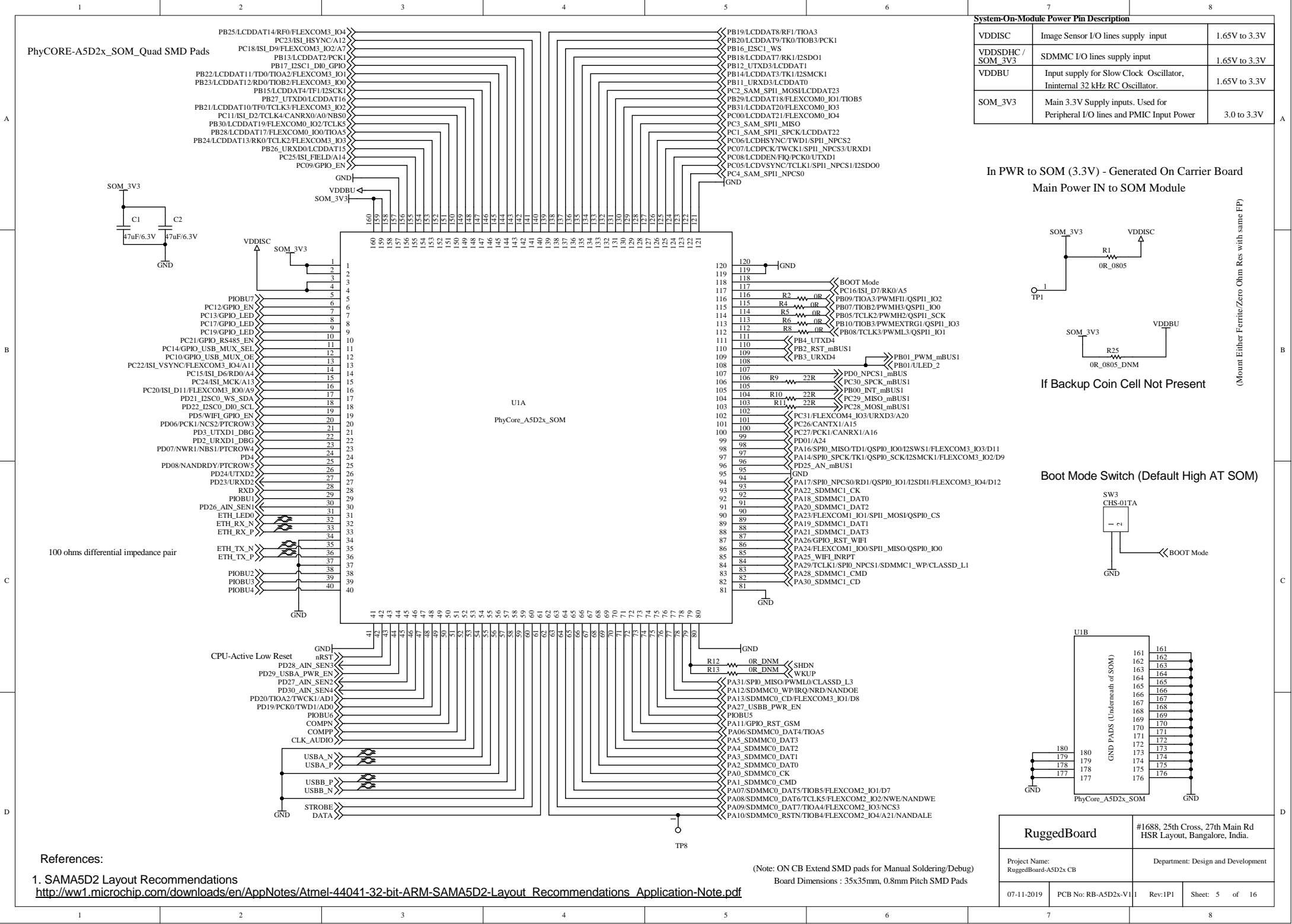
Company Name	Rugged Board
Project Title	RuggedBoard-A5D2x CB
Designed By	Sriram

Version #	Designer	Release Date	Verified	Modifications Done	Remarks
1P0	Sriram	MMDDYYYY	Baswaraj		
1P1	Sriram	MMDDYYYY	Baswaraj	Refer Notepad	

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
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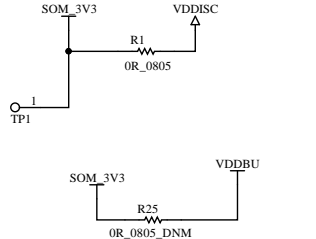
Project Overview

Page#	SCHEMATIC TITLE					
01	Introduction					
02	Block Diagram					
03	Revision History					
04	Project Overview					
05	SOM CONN- QUAD SMD Pads with GND Pads Bottom					
06	Power Management					
07	Ethernet RJ45 CONN: 10/100Mbps and Serial Ports RS232					
08	mPCIe CONN and Hybrid CONN (uSIM & uSD Sockets)					
09	Serial Port RS485_CAN and Debug Console					
10	Digital IN and Digital Out HDR's					
11	USB Host and Power Limit Switch					
12	Micro-BUS HDR Female Dual Row and Wifi ATWIL1000 /eMMC Module					
13	SAM L11 Controller					
14	Expansion Female Header					
15	LCD RGB CONN					
16	Pin Muxing and Board Stack up info					
17						
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32			RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB			Department: Design and Development			
07-11-2019			PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 4 of 16	



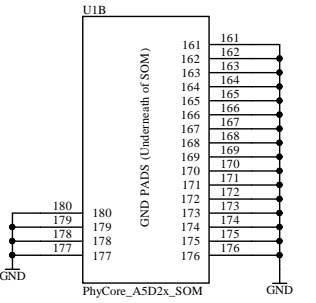
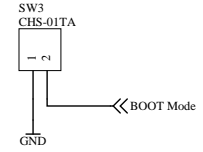
System-On-Module Power Pin Description		
VDDISC	Image Sensor I/O lines supply input	1.65V to 3.3V
VDDSDHC / SOM_3V3	SDMMC I/O lines supply input	1.65V to 3.3V
VDDBU	Input supply for Slow Clock Oscillator, Ininternal 32 kHz RC Oscillator.	1.65V to 3.3V
SOM_3V3	Main 3.3V Supply inputs. Used for Peripheral I/O lines and PMIC Input Power	3.0 to 3.3V

In PWR to SOM (3.3V) - Generated On Carrier Board  
Main Power IN to SOM Module

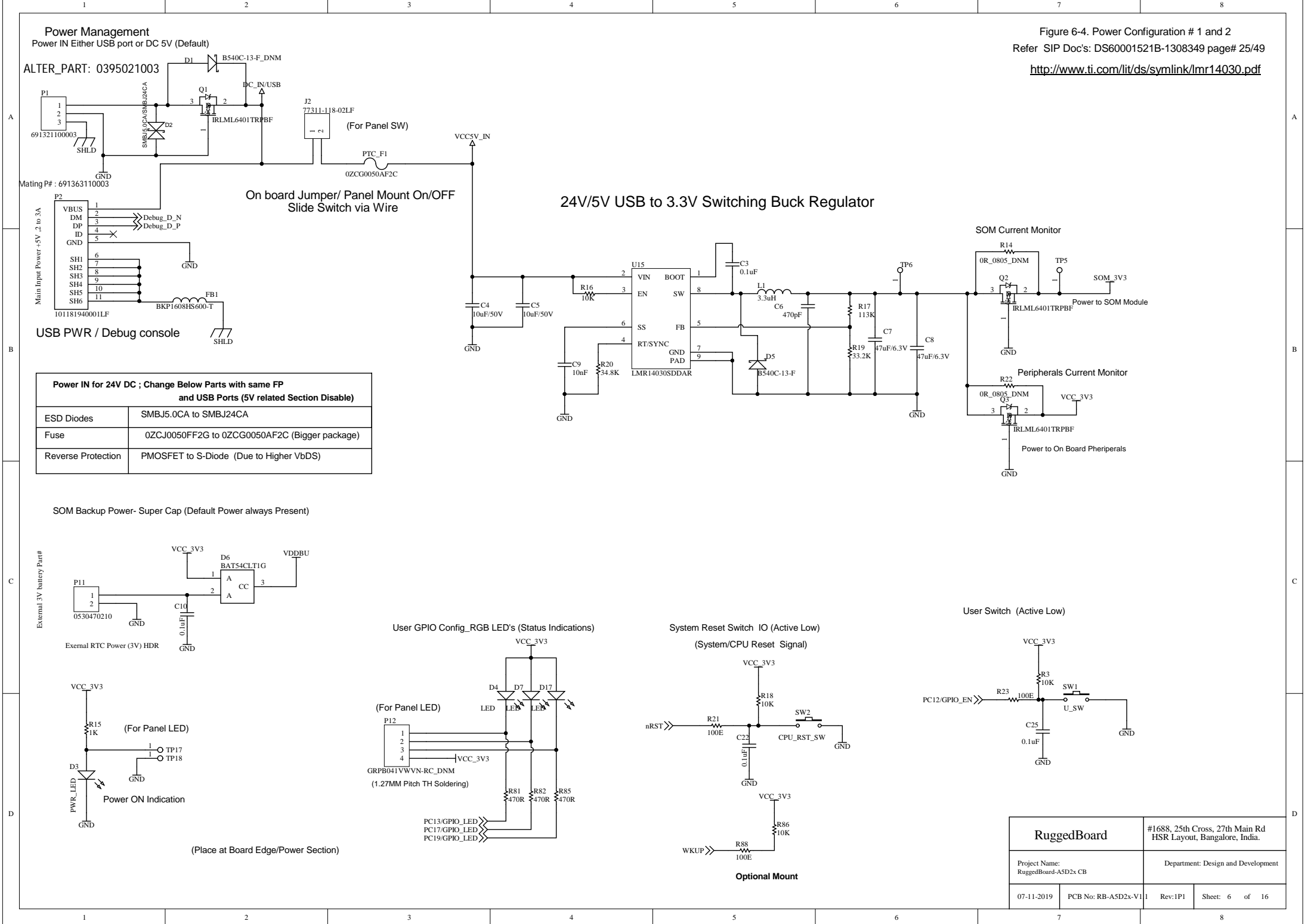


If Backup Coin Cell Not Present

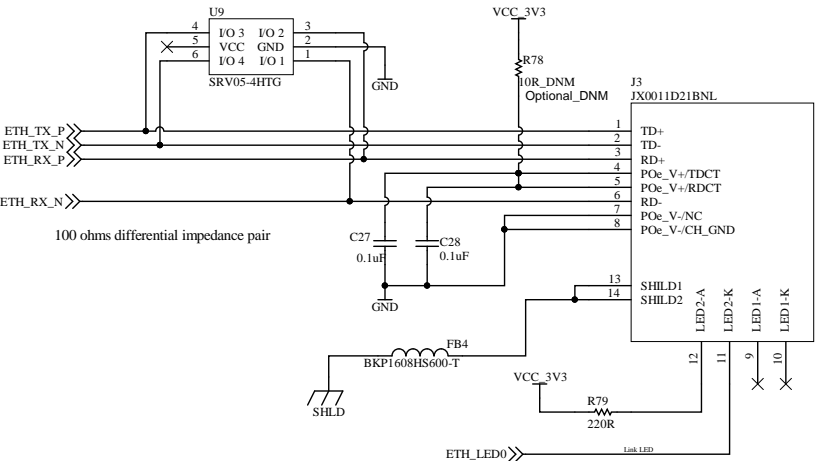
Boot Mode Switch (Default High AT SOM)



RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 5 of 16



Ethernet RJ45 CONN 10/100Mbps

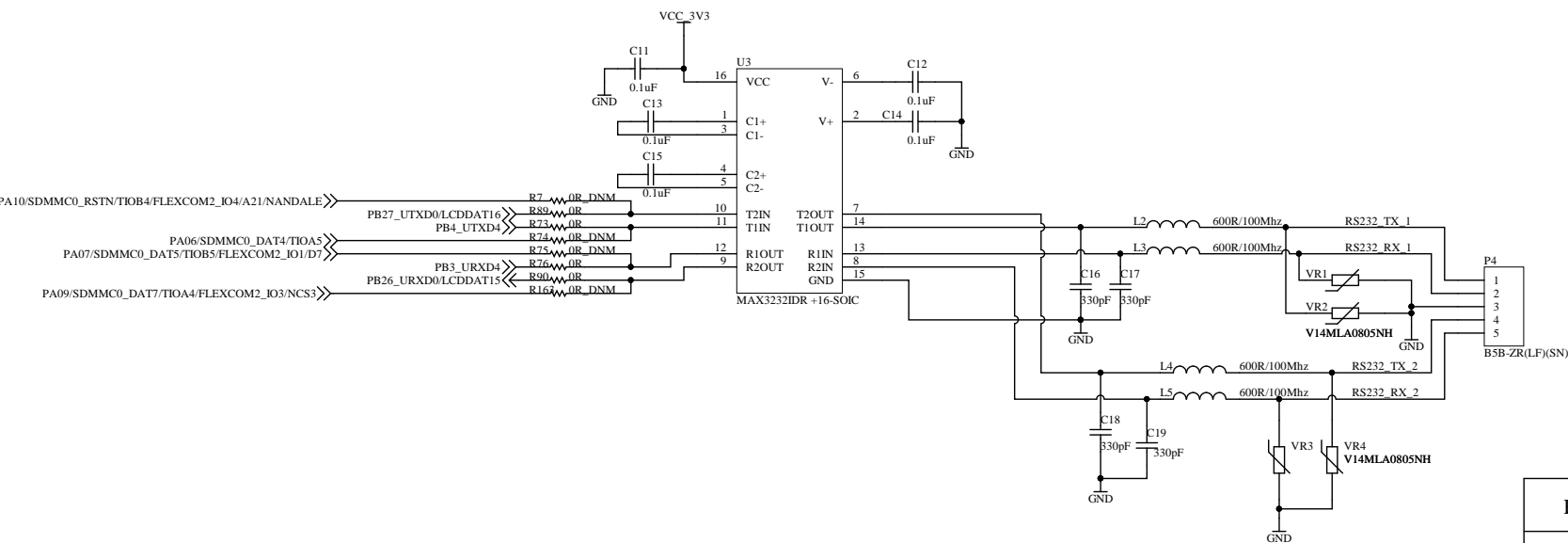


Alternate Equivalent Pin out Connectors ::

Industrial Grade: -40°C ~ 85°C  
Part# 74990111211  
Make: WE

Industrial Grade: -40°C ~ 85°C  
Part# LPJ4011GDNL  
Make : LINK-PP

Serial Port; RS232 x 2 ( or Single Full Duplex Mode Option via Zero Ohm)



RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
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Mini PCIe Connector with SIM Conn (3G/4G Modem without SIM Socket )  
Half Mini ( For Wifi Module -with USB I/F)

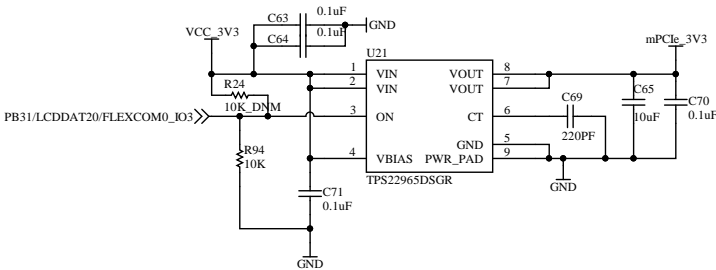
PCI Express Mini Connector

Part# 1775838-2      Part# 2041262-1  
Make: TEC              Make: TEC  
Height: 3.65mm      OR      Height: 4.85mm  
Price for 1K: 0.4\$      Price for 1K: 0.5\$

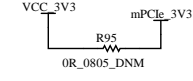
OR

Part# 0679105700  
Make: Molex  
Height: 5.10mm  
Price for 1K: 2.52\$

Power Load Switch for mPCIe (3V3) ; GPIO Control  
( Default Disabled /OFF)



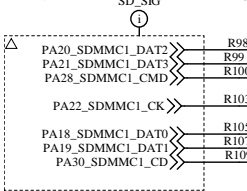
Load Switch By-Pass Option



Hybrid Slot (Micro SD Card and Micro SIM)

SDMMC1 µSD Card interface

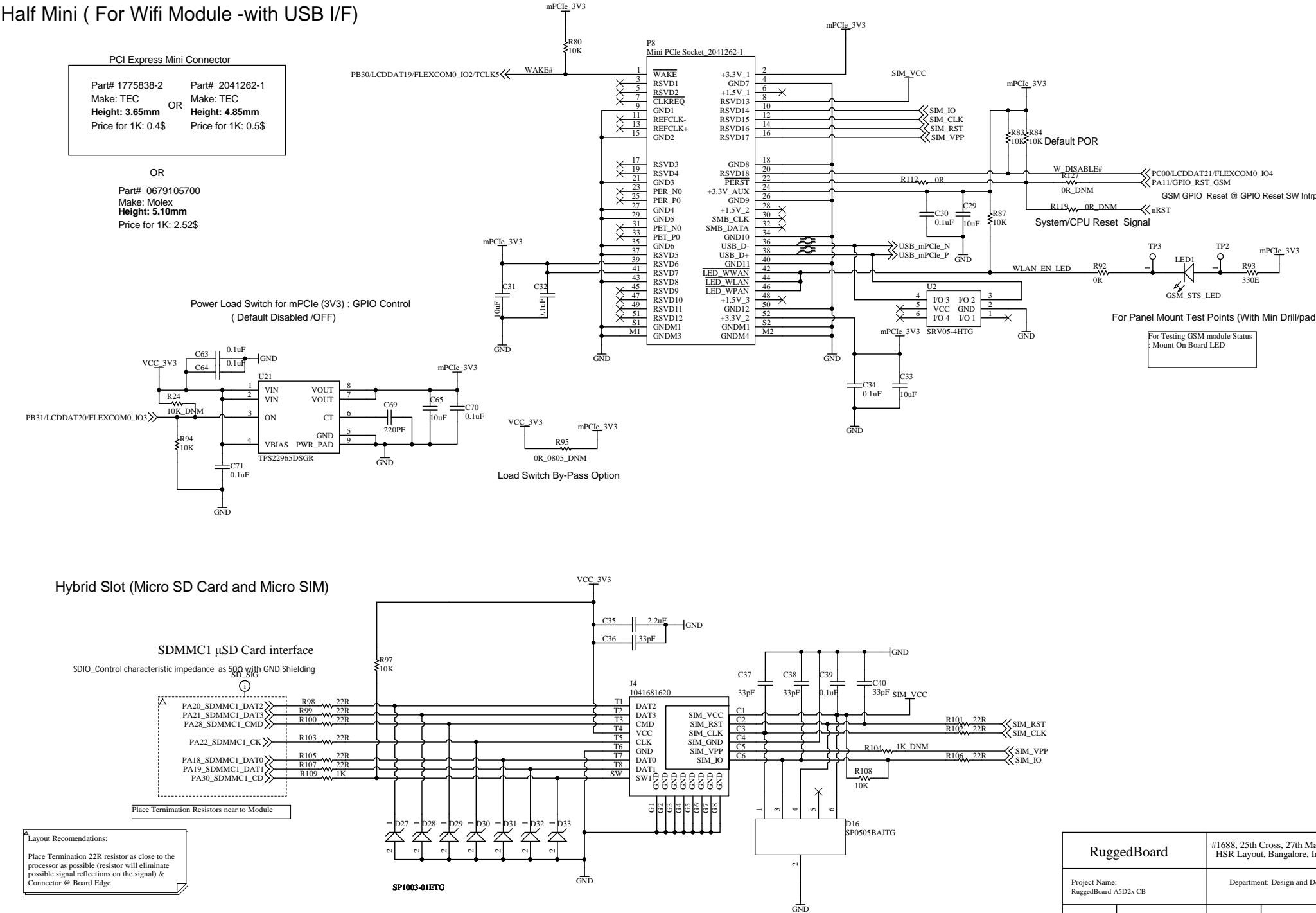
SDIO\_Control characteristic impedance as 50Ω with GND Shielding



Place Termination Resistors near to Module

Layout Recommendations:

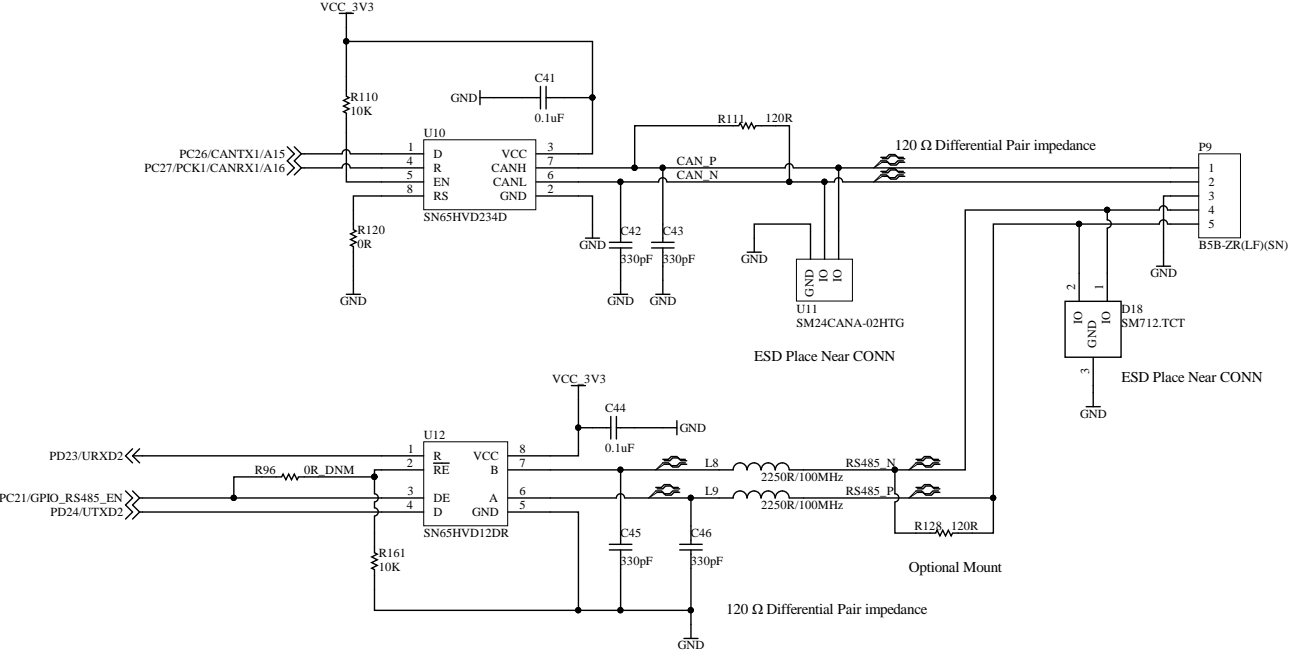
Place Termination 22R resistor as close to the processor as possible (resistor will eliminate possible signal reflections on the signal) & Connector @ Board Edge



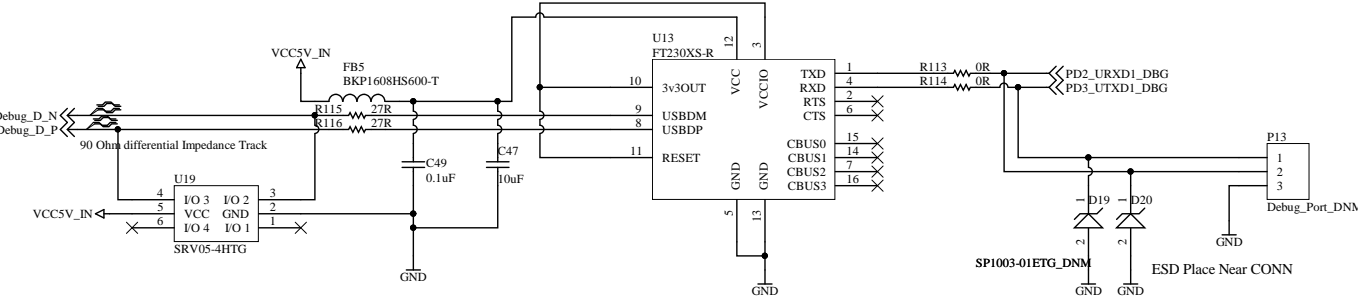
RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 8 of 16



Serial Interface RS485 and CAN



USB Debug Port (UART to USB) /TTL Debug Port (3.3V)



FTDI Chip (Default Mount)

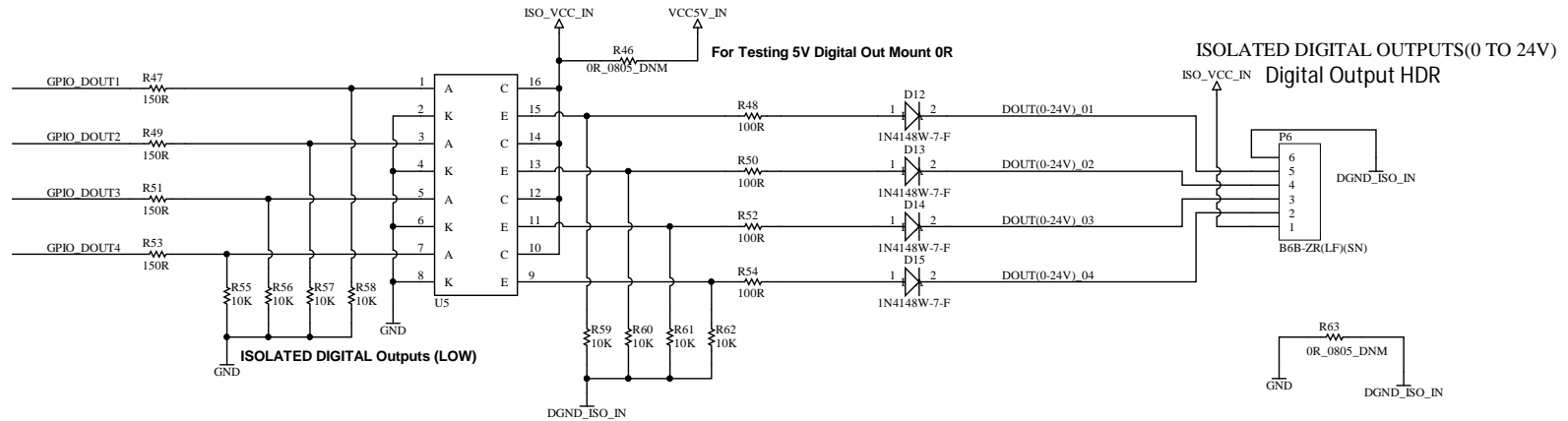
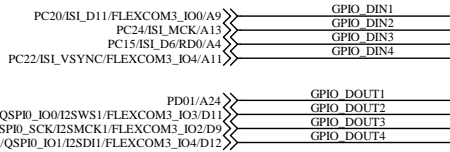
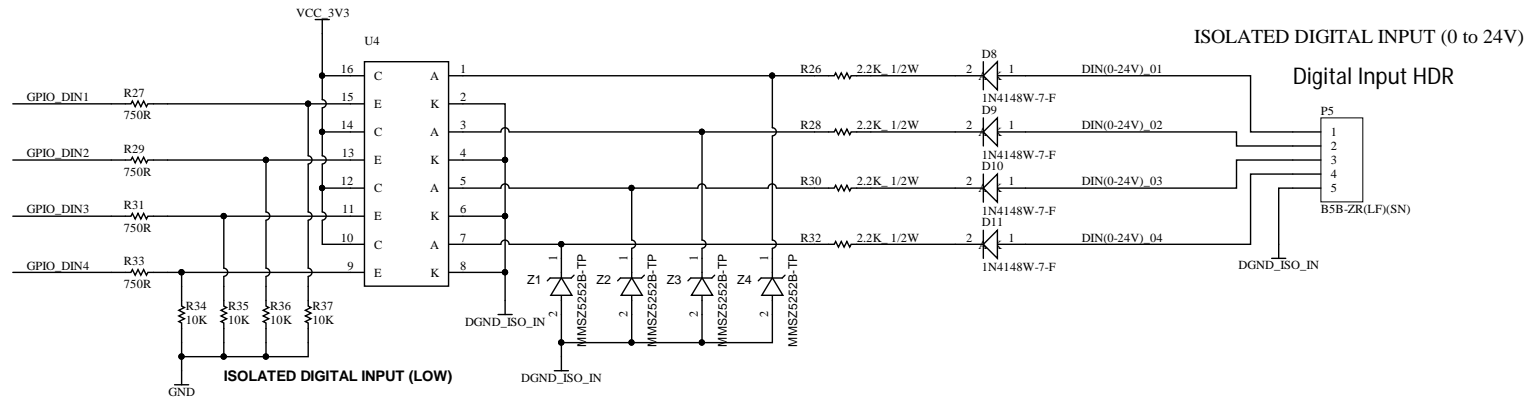
Debug Port;TTL 3V3  
(To Use Above Por to Isolate FTDI Chip when 24V DC IN)

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1	Rev:1P1	Sheet: 9 of 16

## ISOLATED DIGITAL INPUT /OUTPUTS (From 0 ~ 24V)

### Note:

Default State of Digital Input (Low) and Defined as Input Port  
When Isolated Voltage connected upto 24V from external ; MCU reads High (3.3V)

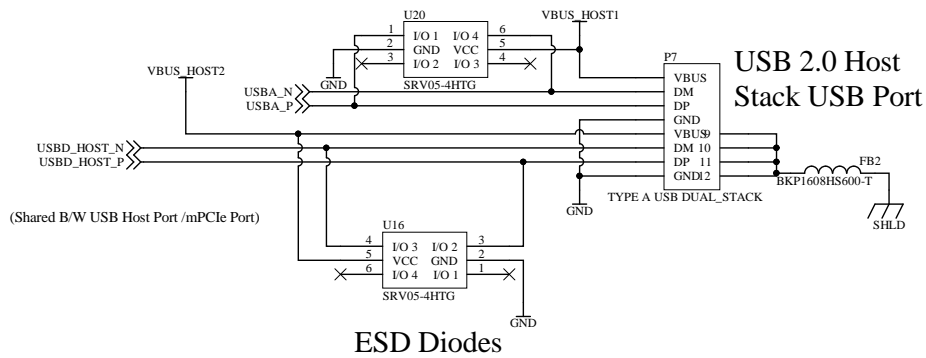
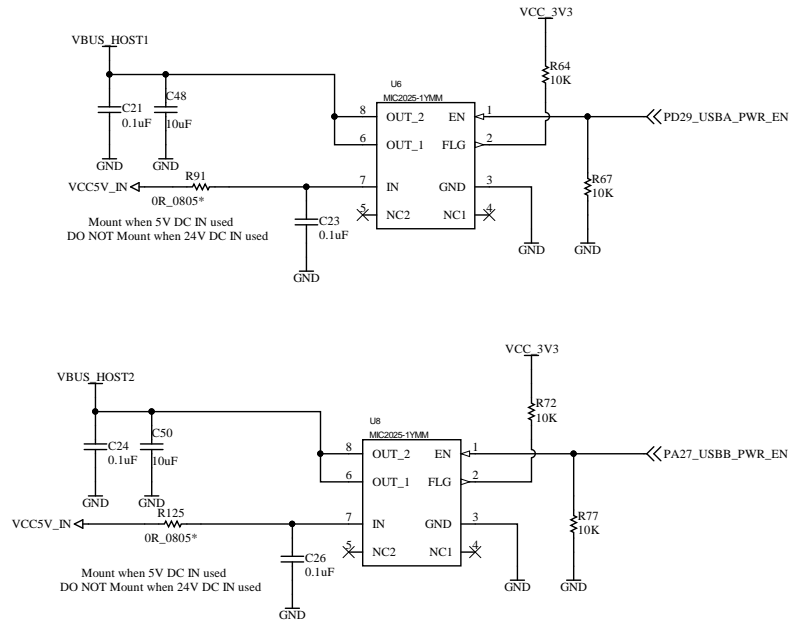


### Note:

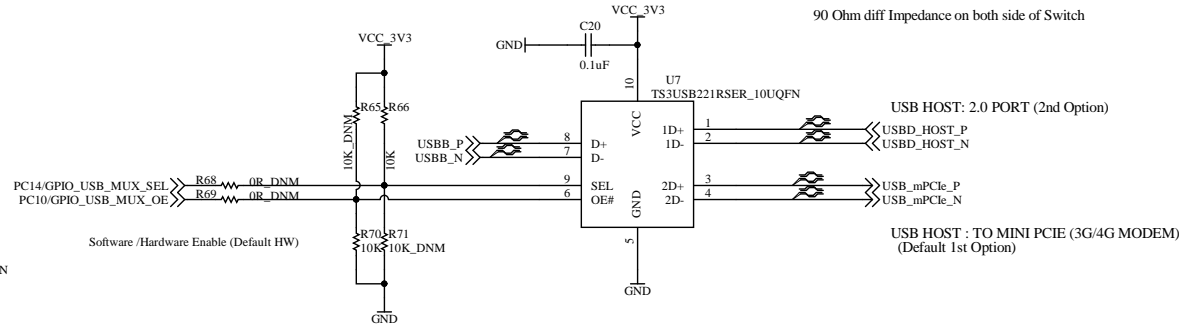
Default State of Digital output (Low) and Defined as Output Port  
When Isolated Voltage connected upto 24V from external ;At SOM configured as Out (High :3.3V)  
the Opto Triggers & Send Isolated VCC to Out (Default Output Is LOW (Pulled Down))

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 10 of 16

## USB Host 2.0 x 2 Ports (One Port Split to mPCIE)



## USB 2.0 MUX Switch IC (SPDT) - Bidirectional IC



### Truth Table : USB MUX Switch Operation

S	OE#	FUNCTION
X	H	Disconnect
L	L	D = 1D
H	L	D = 2D

Default

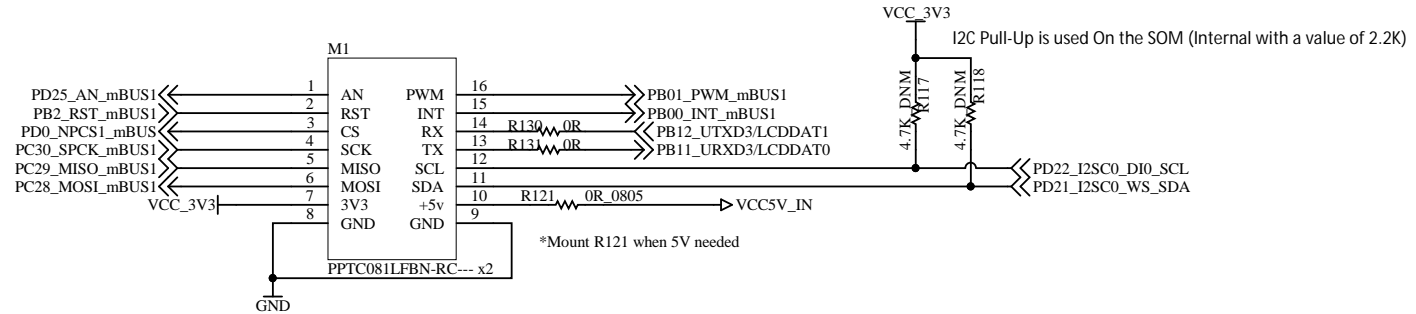
Note:

USB-A HOST : Direct data lines Interface from SOM  
USB- B Host : Datalines shared between USB HOST CONN  
and mPCIe CONN (Default) via a USB Mux GPIO Selection

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-ASD2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-ASD2x-V1	Rev:1P1	Sheet: 11 of 16

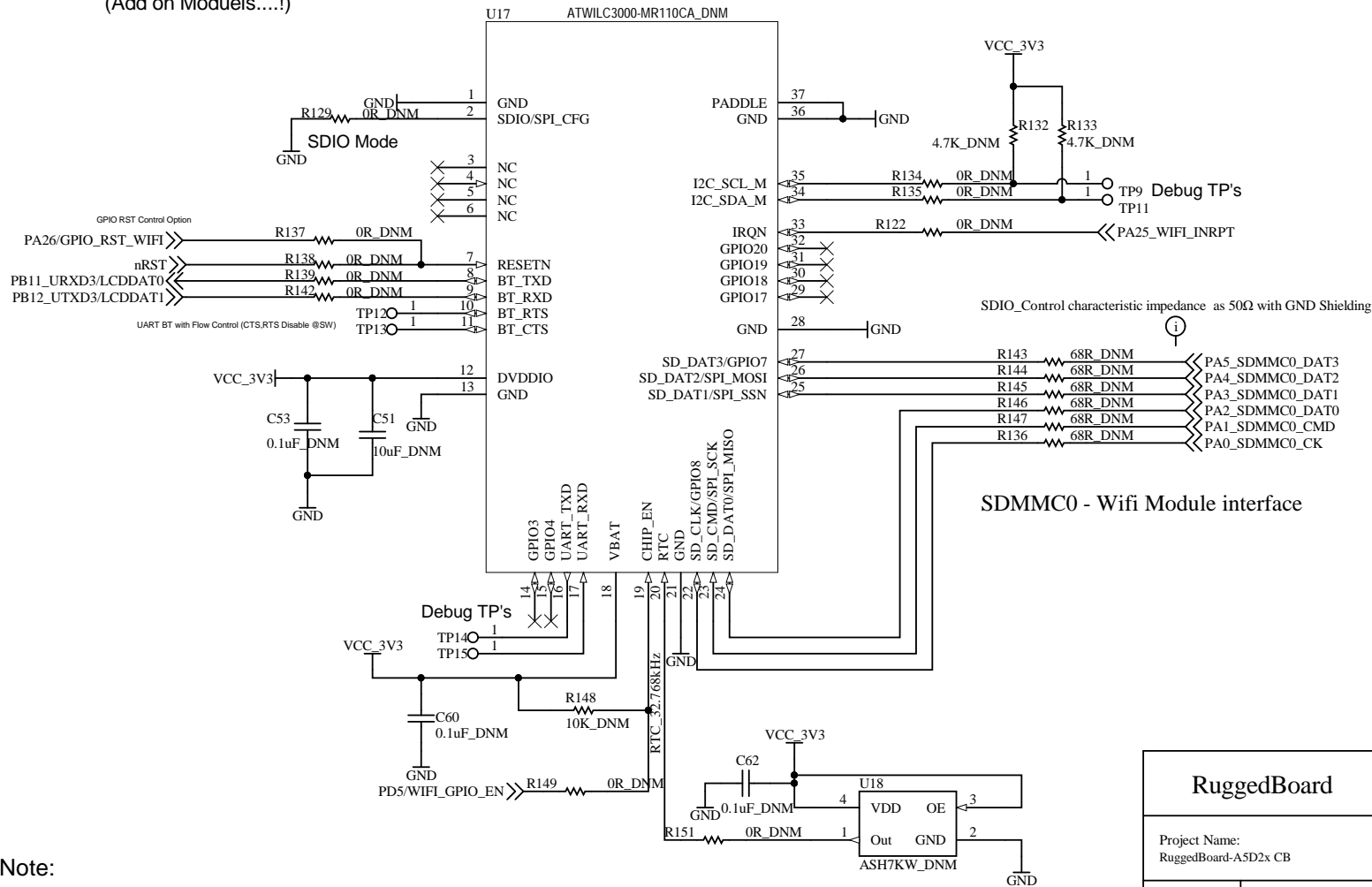
# MikroBUS Module HDR (2.54mm Female) & Wifi/BT eMMC Module

Module PCB Footprint (XY Distance) Dimension Refer below  
[https://developer.mbed.org/users/allankliu/code/LPC1114\\_EBadge/wiki/MiniNote-with-mikroBUS](https://developer.mbed.org/users/allankliu/code/LPC1114_EBadge/wiki/MiniNote-with-mikroBUS)



## MOD BLUETOOTH/WIFI CHIP (With PCB Antenna 2.4GHz)/ e.MMC Phyec Module

(Add on Moduels....!)



Note:

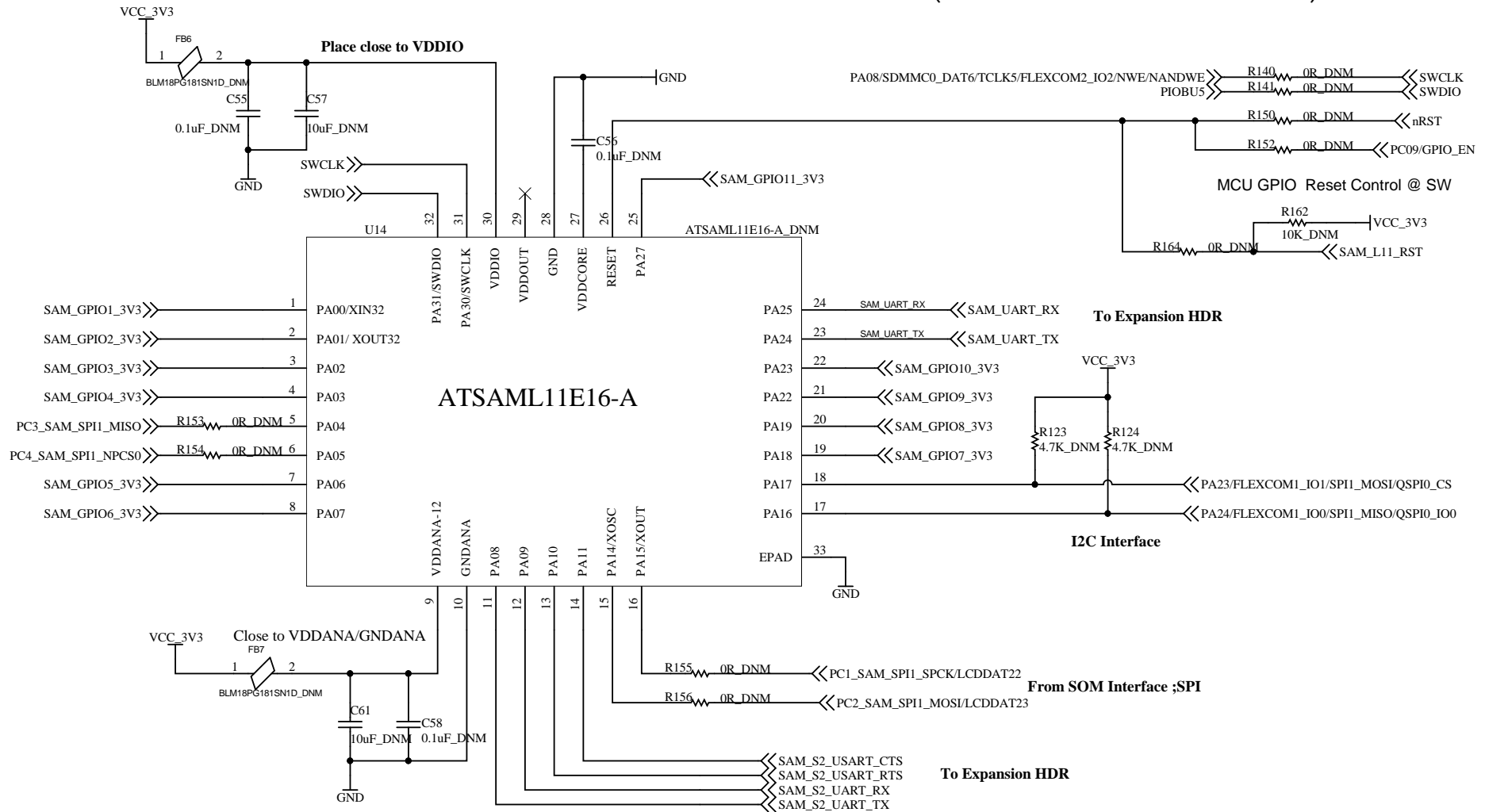
SDIO,UART \* + RSTn /GPIO Interface : For Wifi / BT Module Interface / eMMC NAND Memory (Phy-Module)

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 12 of 16

# SAM L11 Controller With SWD HDR

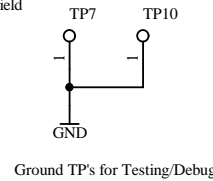
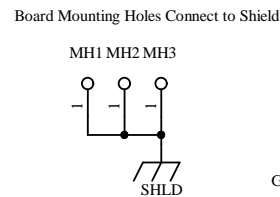
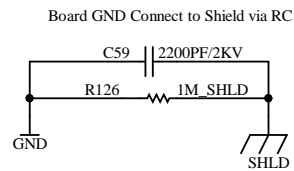
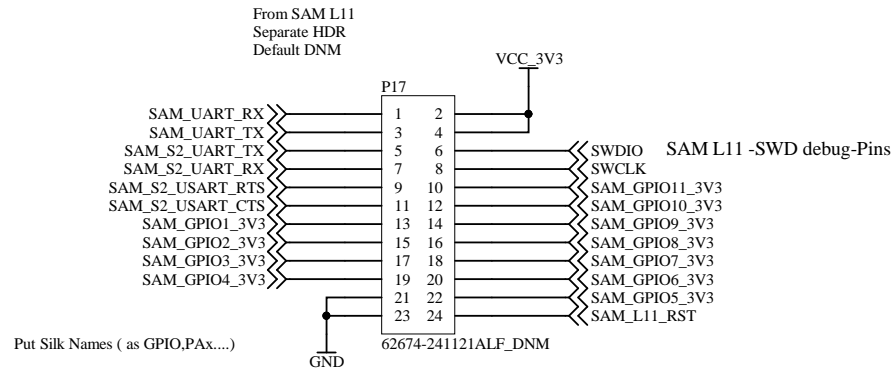
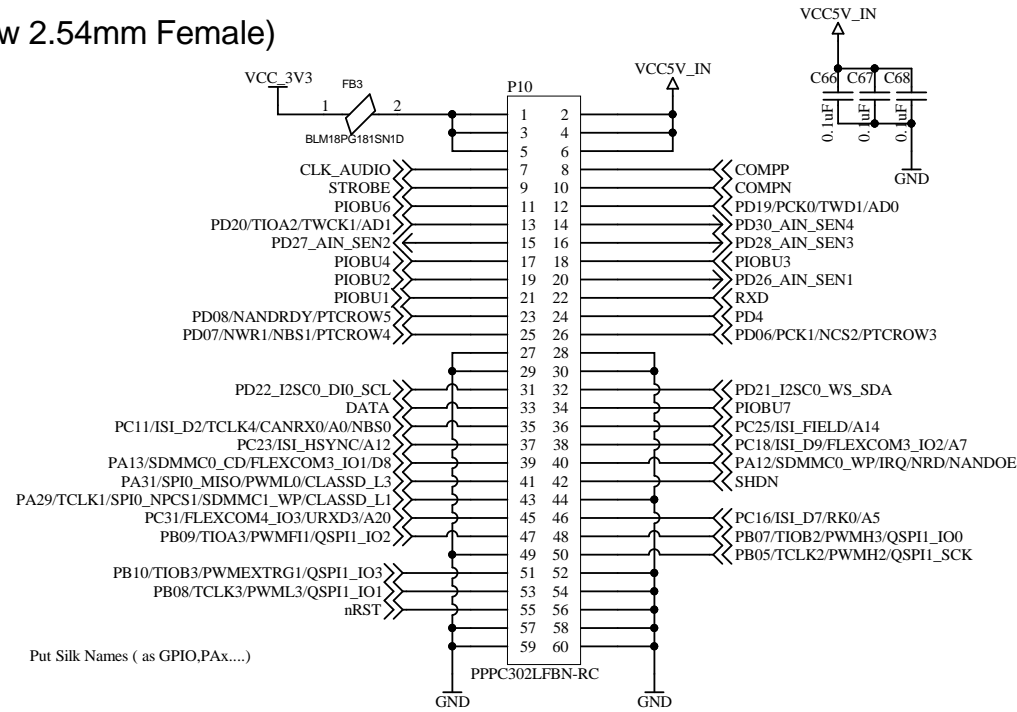
(Default DNM)

GPIO INTERFACE WITH A5D2 & part of EXPNSN  
(Flash from A5D2x SOM Linux Platform)



RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 13 of 16

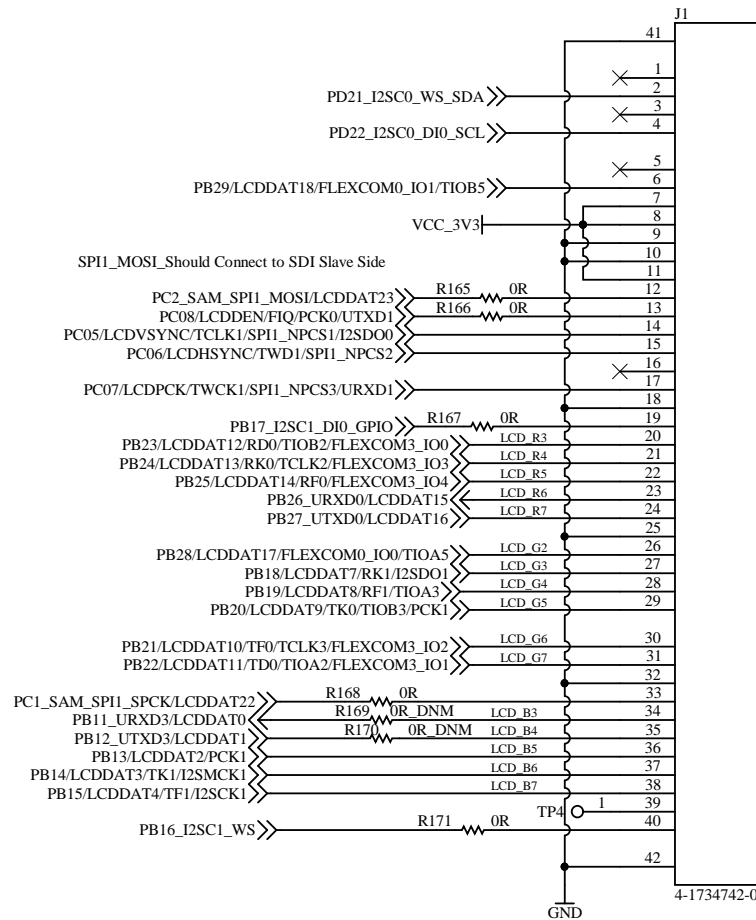
## Expansion HDR (Dual Row 2.54mm Female)



RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
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## RGB LCD Interface ( Without Backlight) reference to "PEB-AV-02" Connector

Note; BACK LIGHT CKT Part of Mapper Board



### PEB-AV-02 Connector pinouts Compactible

To be Check or Map @ A5D2x Pin muxing / Design a Mapper Board as per RGB sequence ....!

No of layer : 4 Layer Impedance Controlled Board

1. Board thickness: 1.6mm
2. Surface finish: Enig , Green Mask
3. Copper finish thickness: 35 micron
4. Minimum line/spacing: As per Fab house Stack up
5. Impedance Controlled : Yes
6. Board Dimensions : 100 × 72.5mm MAX

RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.	
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development	
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 15 of 16

1	2	3	4												
A	Pin Muxing Table			A											
B	To be Update			B											
C				C											
D				D											
1	2	3	4												
			<table><tr><td colspan="2">RuggedBoard</td><td colspan="2">#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.</td></tr><tr><td colspan="2">Project Name: RuggedBoard-A5D2x CB</td><td colspan="2">Department: Design and Development</td></tr><tr><td>07-11-2019</td><td>PCB No: RB-A5D2x-V1.1</td><td>Rev:1P1</td><td>Sheet: 16 of 16</td></tr></table>	RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.		Project Name: RuggedBoard-A5D2x CB		Department: Design and Development		07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 16 of 16
RuggedBoard		#1688, 25th Cross, 27th Main Rd HSR Layout, Bangalore, India.													
Project Name: RuggedBoard-A5D2x CB		Department: Design and Development													
07-11-2019	PCB No: RB-A5D2x-V1.1	Rev:1P1	Sheet: 16 of 16												