

RuggedBoard-I.MX6 ULL SOM (Industrial Pico Computer)

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Project Name: RuggedBoard-IMX6 UL (Industrial Pico Computer)		Department: Design and Development	
07-03-2021	PCB No: RB-iMX6UL-1P3	Rev:1P3	Sheet: 1 of 15

1	2	3	4													
A	<div>Block Diagram</div> <div>Cannot open file D:\RB-imx6ul\Rev1P3\NEW_IMX6UL_IP3\RB_PhyCORE_IMX6ULL_Rev1P3_01 (29-12-2020 11-32-28)\BD-RB-imx6ul.jpg</div>			A												
B				B												
C				C												
D	<table><tr><td colspan="2">PHYTEC</td><td colspan="2">PHYTEC Embedded Pvt.Ltd., HSR Layout, Bangalore, India.</td></tr><tr><td colspan="2">Project Name: RuggedBoard-I.MX6 UL (Industrial Pico Computer</td><td colspan="2">Department: Design and Development</td></tr><tr><td>07-03-2021</td><td>PCB No: RB-iMX6UL-1P3</td><td>Rev:1P3</td><td>Sheet: 2 of 15</td></tr></table>			PHYTEC		PHYTEC Embedded Pvt.Ltd., HSR Layout, Bangalore, India.		Project Name: RuggedBoard-I.MX6 UL (Industrial Pico Computer		Department: Design and Development		07-03-2021	PCB No: RB-iMX6UL-1P3	Rev:1P3	Sheet: 2 of 15	D
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Revision History

Revision	Date	SL#	Change Description
1P0	15-03-19	01	First Version Release Rev 1P0
1P1	12-09-19	01	Change in version number 1P1 (Board# RB-iMX6UL-1.1)
		02	Added On Board External RTC IC Interface circuit (2nd option)
		03	Added Pull-up 10K at SW1 and net moved to expansion "X_ENET2_TX_CLK_GPIO2_IO14_GSM-Rst
		04	RS485 DE and RE# connected together via a 0R and Conneceted to SOM GPIO and also added 120R A,B Port
		05	Added a Reverse voltage protection diode in in line with VBUS Port
		06	mPCI Port USB Made default Port @ U7 IC
		07	Removed LCD backlight Circuit (ITs a part of Mapper board)
		08	LCD RGB Signals Mapped with PEB-AV-02 Design
		09	Reduced expansion Header Pin counts
		10	
		11	
1P2	18-12-19	12	Refer Change list Note Pad file
		13	
		14	
		15	

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Project Overview

Page#	SCHEMATIC TITLE		
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04	Project Overview		
05	SOM CONNECTOR- QUAD SMD Pads with GND Pads Bottom		
06	Power Management and RTC Circuit with User LED's		
07	Ethernet RJ45 CONN: 10/100Mbps and Serial Ports RS232 Full modem		
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	Expansion Female Header		
14	SOM Boot Configuration and Selection Circuit		
15	Board Stack up info		
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34			PHYTEC Embedded Pvt.Ltd., HSR Layout, Bangalore, India.
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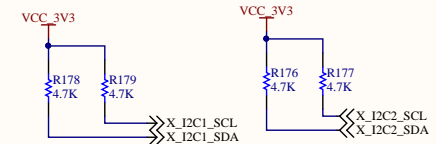
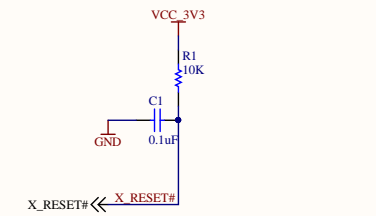
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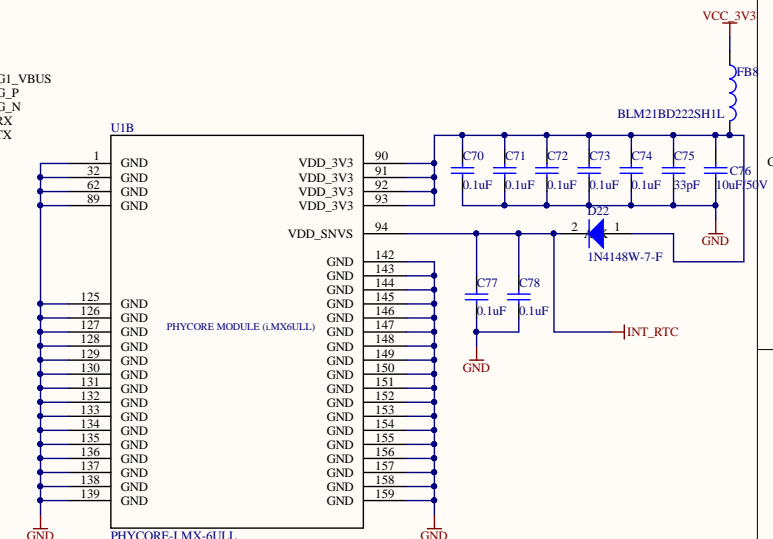
PHYCORE-I.MX-6ULL SOM Module



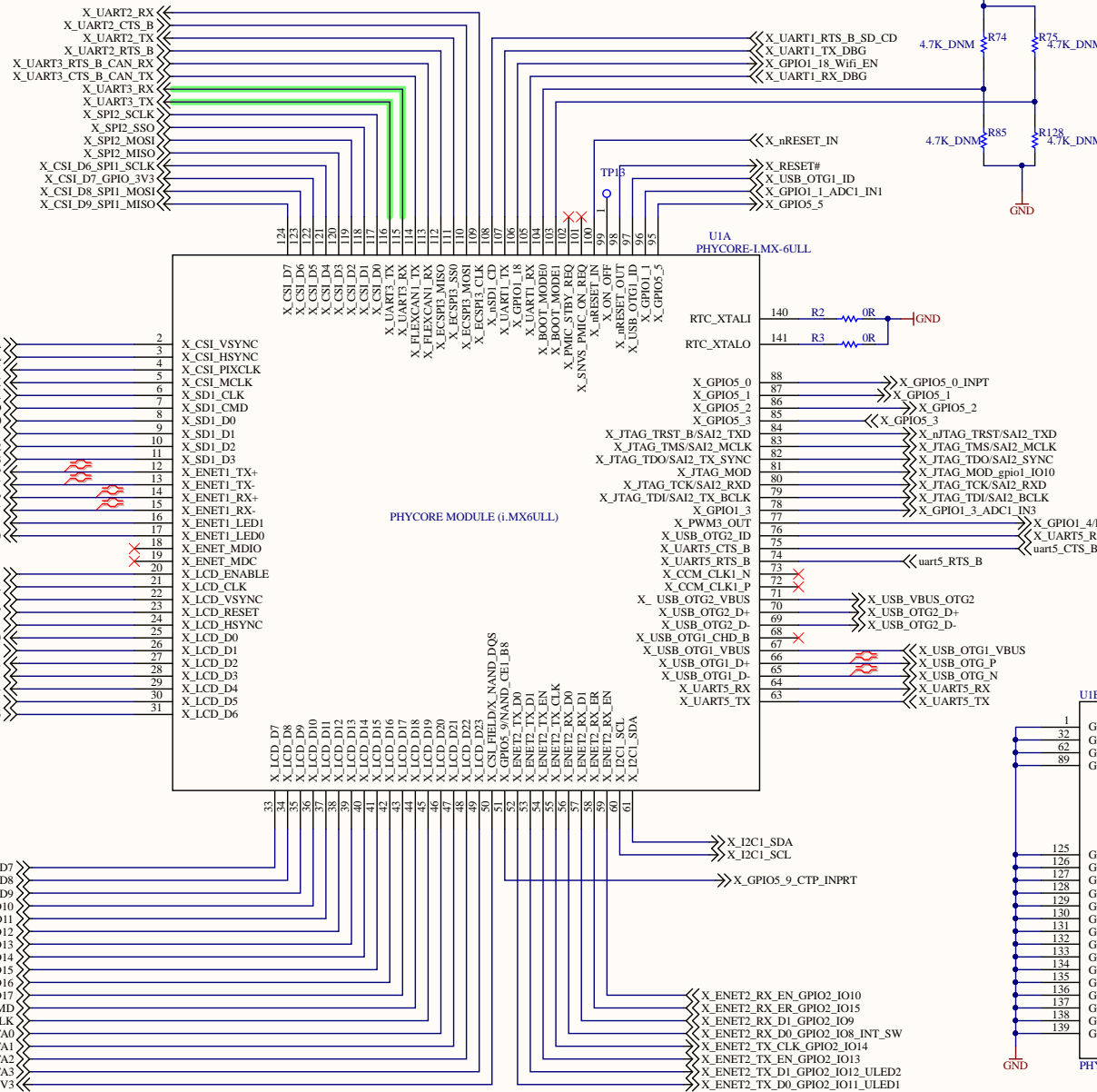
SOM_3V3	Main 3.3V Supply inputs.	~3.3V
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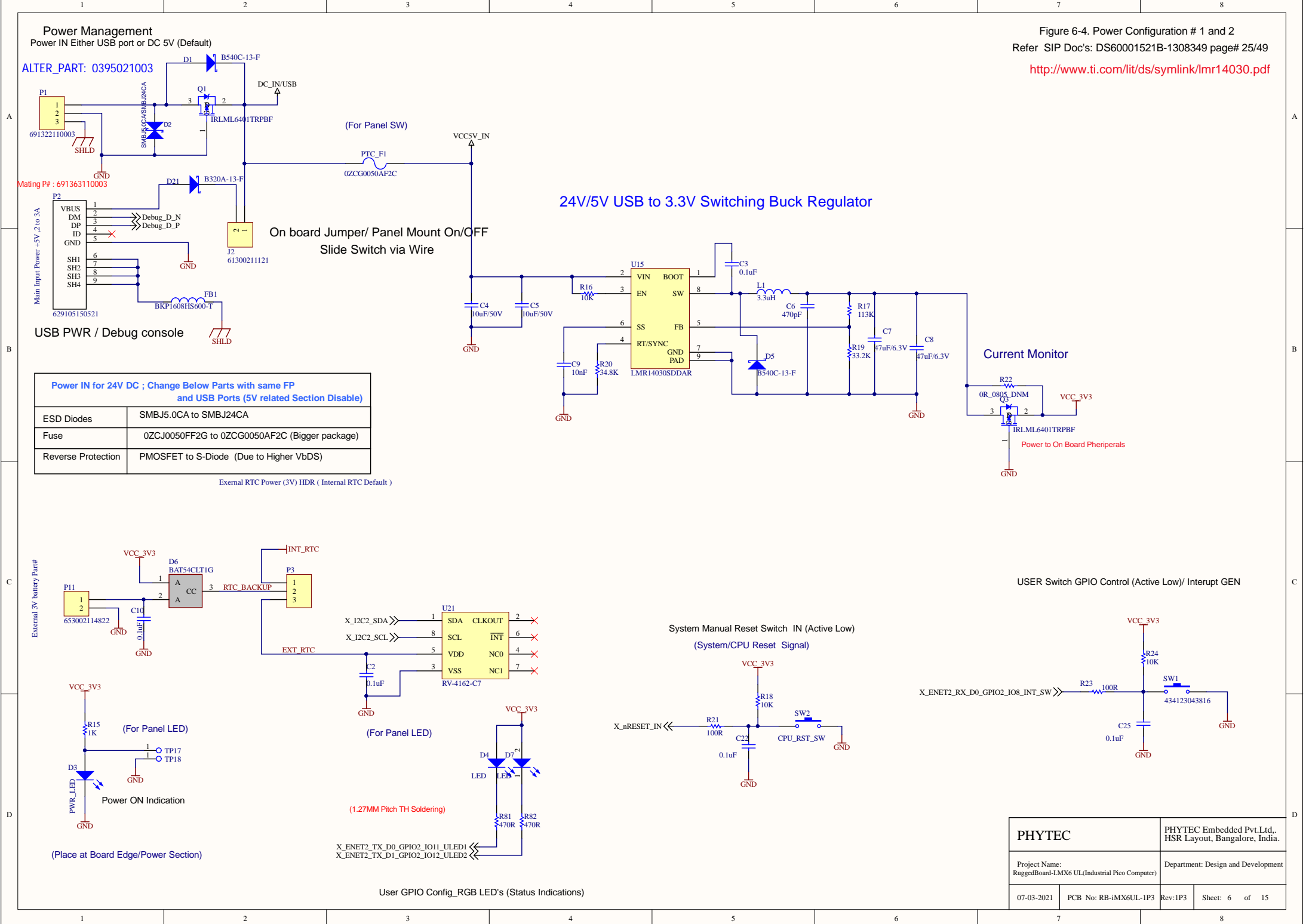


Tamper Pinout:#51,85,86,87,88 and 95

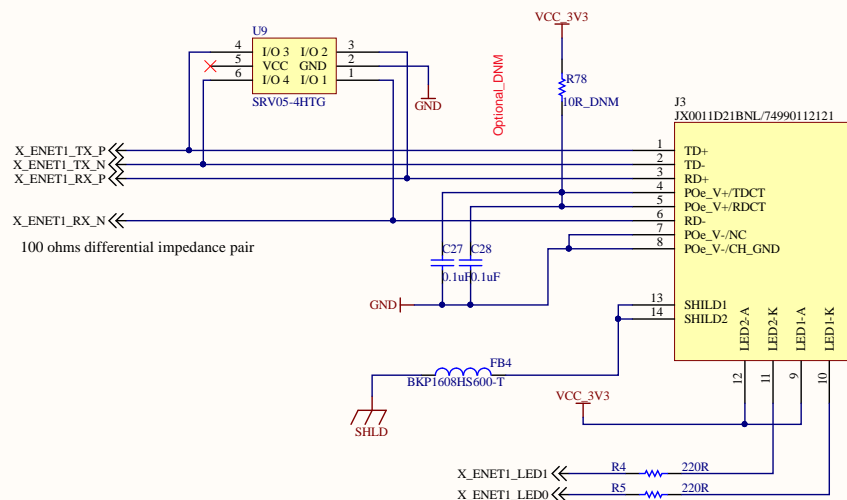


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Industrial Grade: -40°C ~ 85°C
Part# 74990112121
Make: WE

[illegible]

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Mini PCIe SSlot with SIM Conn (3G/4G Modem without SIM Socket)

PCI Express Mini Connector

Part# 0679100002
Make: Molex
Height: 5.1mm Max
Price for 1K: 2.3\$

OR

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

PCI Express Mini Connector

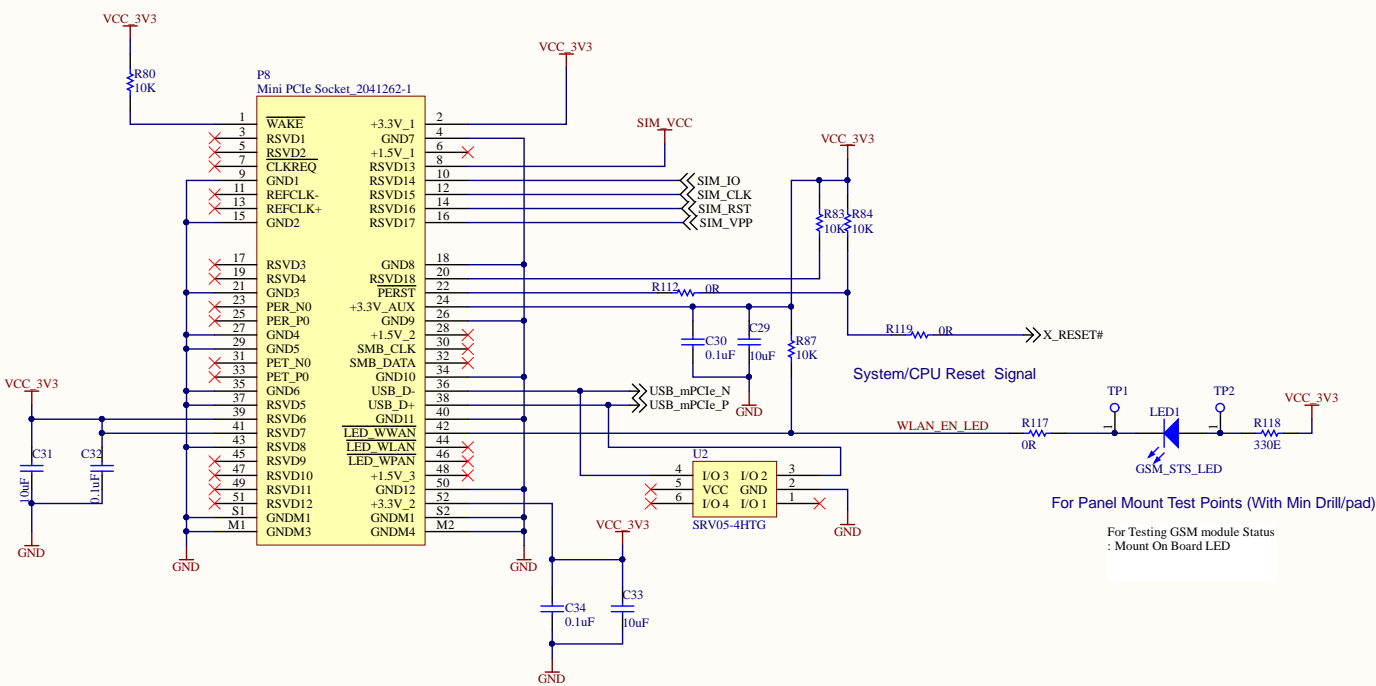
Part# 1775838-2
Make: TEC
Height: 3.65mm
Price for 1K: 0.4\$

OR

Part# 2041262-1
Make: TEC
Height: 4.85mm
Price for 1K: 0.5\$

OR

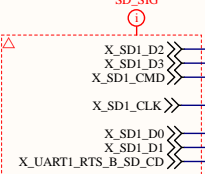
Part# 0679105700
Make: Molex
Height: 5.10mm
Price for 1K: 2.52\$



Hybrid Slot (Micro SD Card and Micro SIM)

SDMMC1 μ SD Card interface

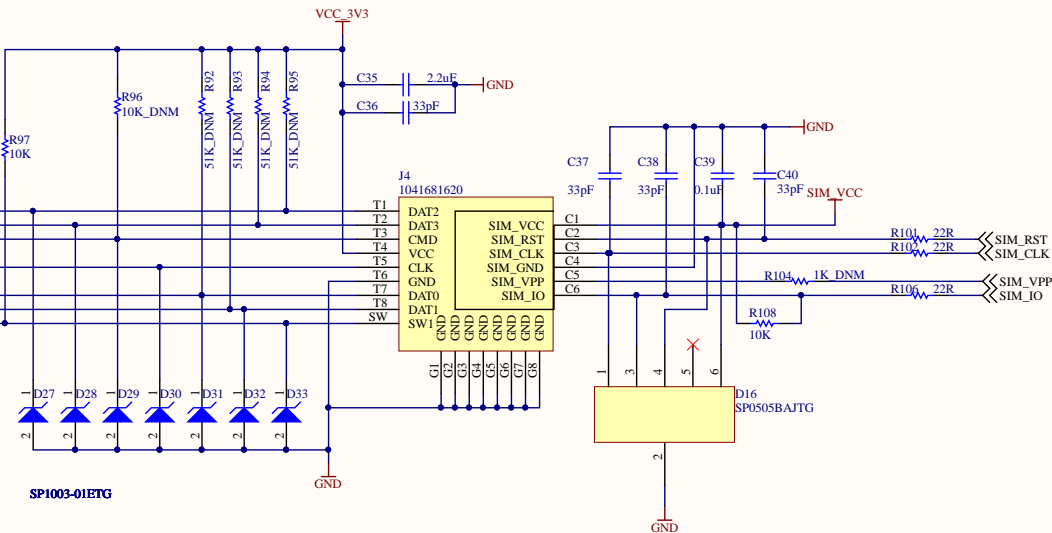
SDIO_Control characteristic impedance as 50 Ω with GND Shielding



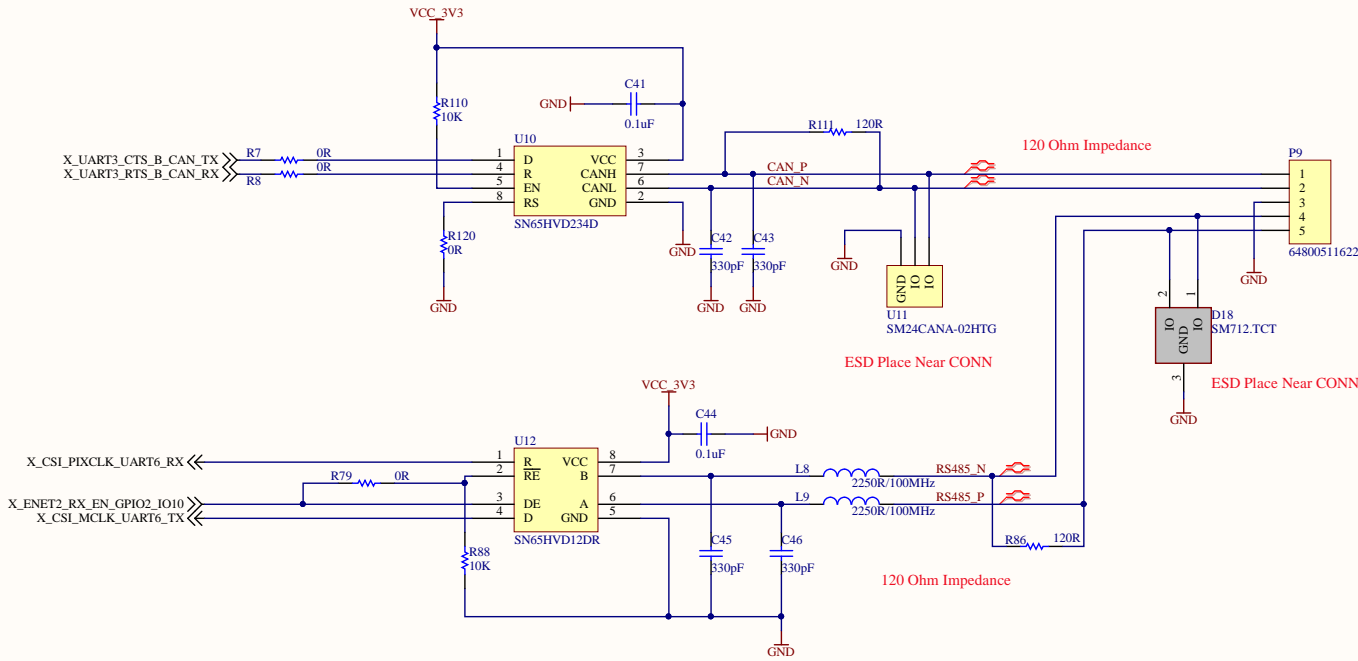
Place Termination Resistors near to Module

Layout Recommendations:

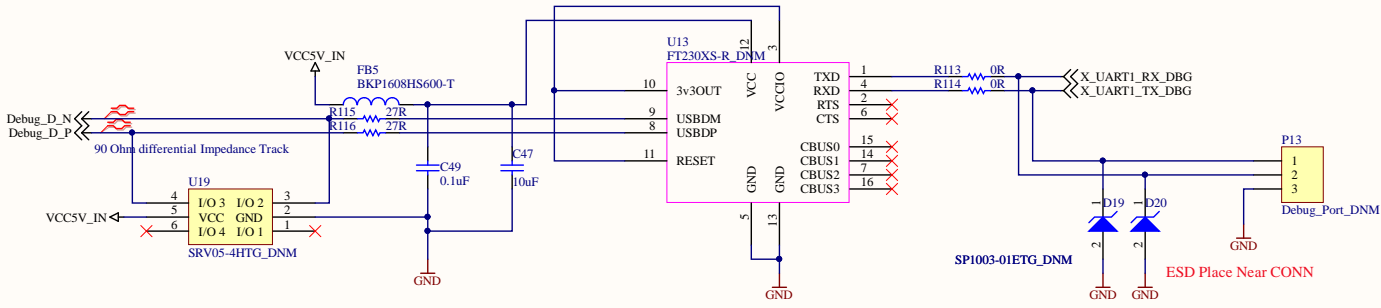
Place Termination 22R resistor as close to the processor as possible (resistor will eliminate possible signal reflections on the signal) & Connector @ Board Edge



Serial Interface RS485 and CAN



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



FTDI Chip (First Option)

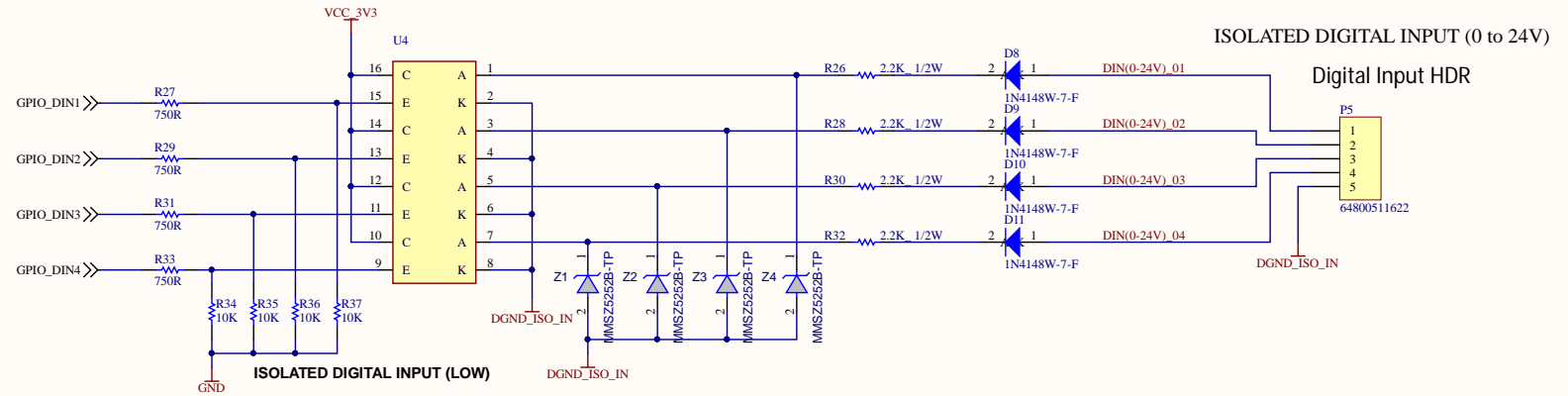
Debug Port;TTL 3V3
(Second Option: To Use above Port to Isolate FTDI Chip)

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

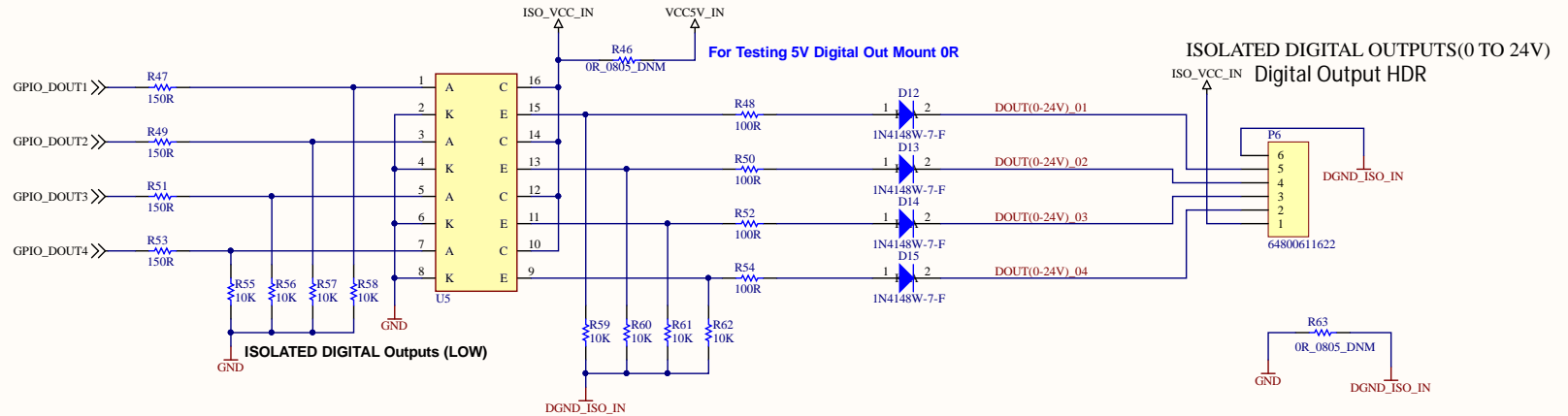
Note:

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



X_GPIO5_5 <- R38 0R >> GPIO_DIN1
X_ENET2_TX_EN_GPIO2_IO13 <- R39 0R >> GPIO_DIN2
X_GPIO1_1_ADC1_IN1 <- R40 0R >> GPIO_DIN3
X_JTAG_TMS/SAI2_MCLK <- R41 0R >> GPIO_DIN4

X_JTAG_TDI/SAI2_BCLK <- R42 0R >> GPIO_DOUT1
X_JTAG_TDO/SAI2_SYNC <- R43 0R >> GPIO_DOUT2
X_nJTAG_TRST/SAI2_TXD <- R44 0R >> GPIO_DOUT3
X_JTAG_TCK/SAI2_RXD <- R45 0R >> GPIO_DOUT4



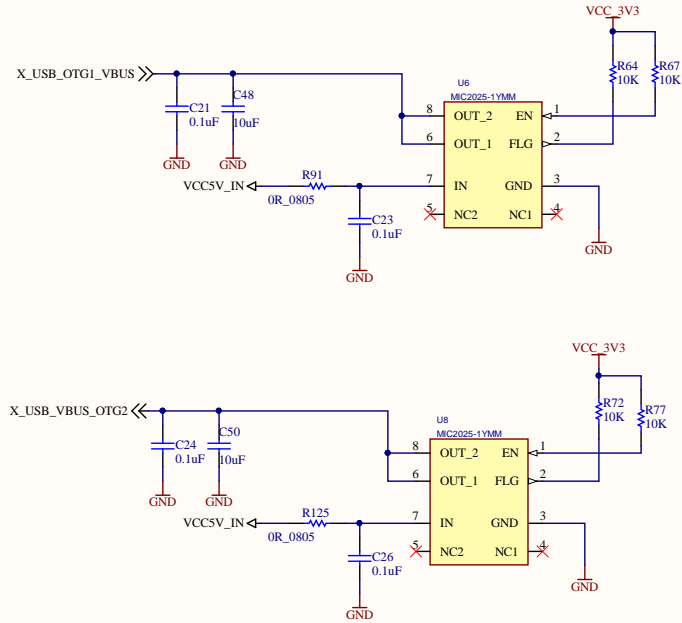
Note:

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))

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

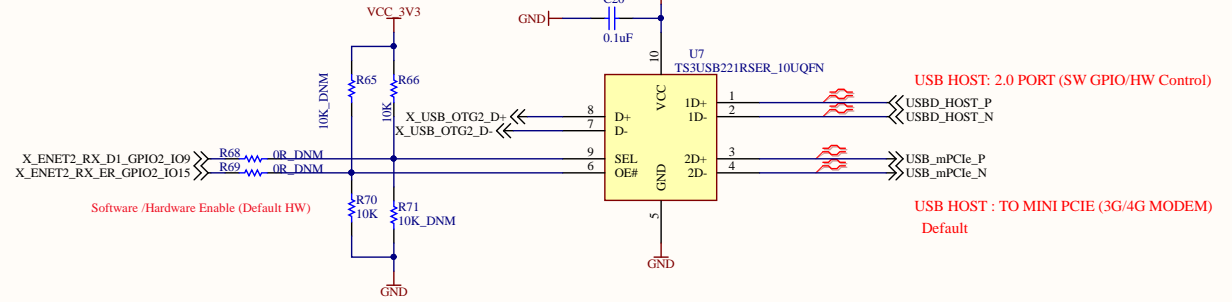
USB 2.0 MUX Switch IC (SPDT) - Bidirectional IC



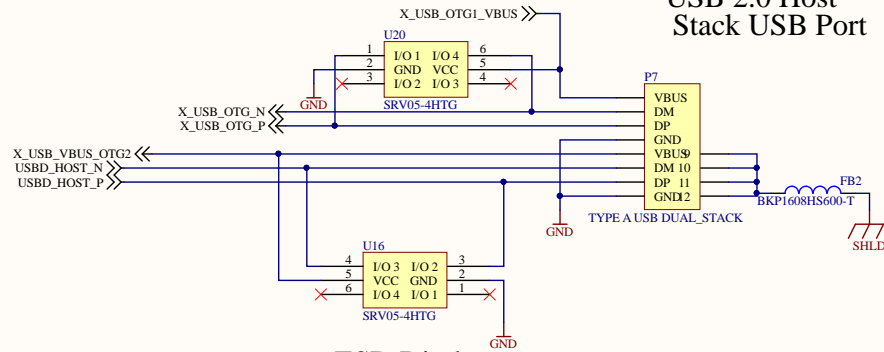
USB Do Not Use when main Input is 24V DC

(Remove Power In -line resistor 0R / At SW Disable EN Pin (default))

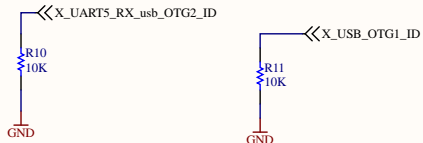
(Active Either USB Host Port /mPCle Port)



USB 2.0 Host Stack USB Port



ESD Diodes



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 (Default)

and mPCle Slot via a USB Mux GPIO Selection

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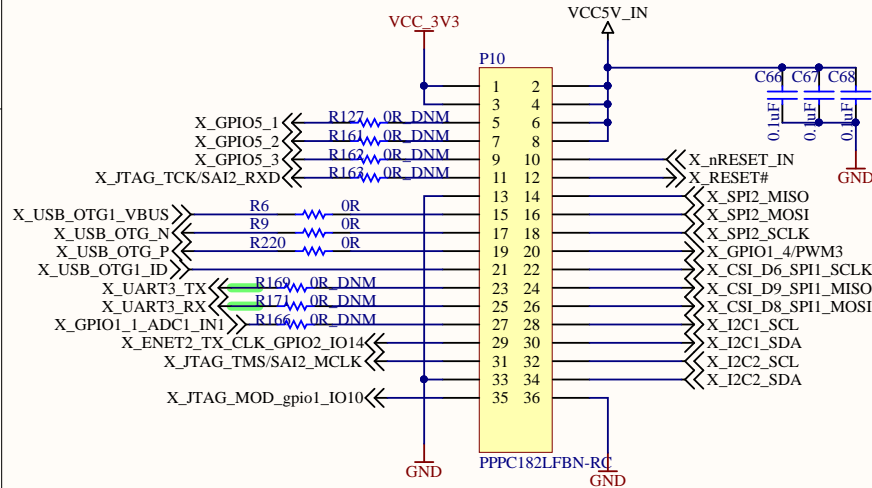
Module PCB Footprint (XY Distance) Dimension Refer below
https://developer.mbed.org/users/allankliu/code/LPC1114_EBadge/wiki/MiniNote-with-mikroBUS

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

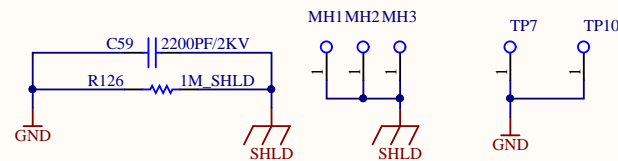
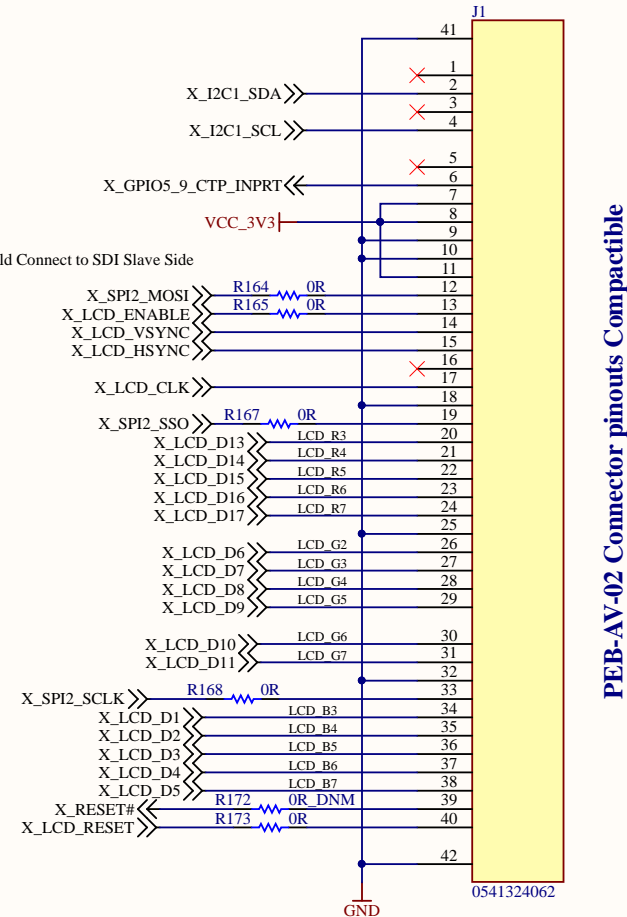
PHYTEC		PHYTEC Embedded Pvt.Ltd., HSR Layout, Bangalore, India.	
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Expansion HDR (Dual Row 2.54mm Female)

RGB LCD Interface (Without Backlight) reference to "PEB-AV-02" Connector
Note; BACK LIGHT CKT Part of Mapper Board



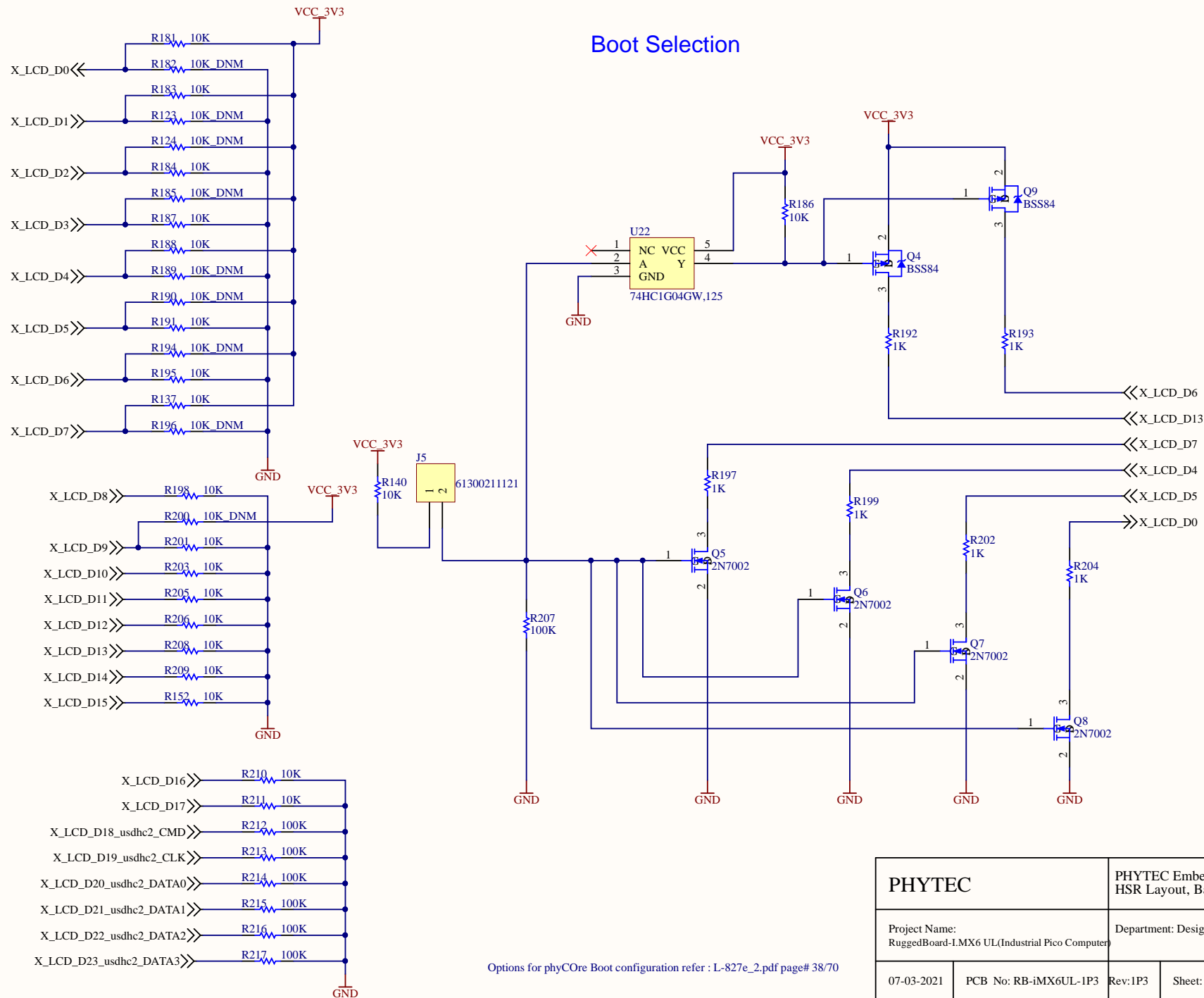
SPI1_MOSI_Should Connect to SD1 Slave Side



Board GND Connect to Shield via RC Board Mounting Holes Connect to Shield Ground TP's for Testing/Debug

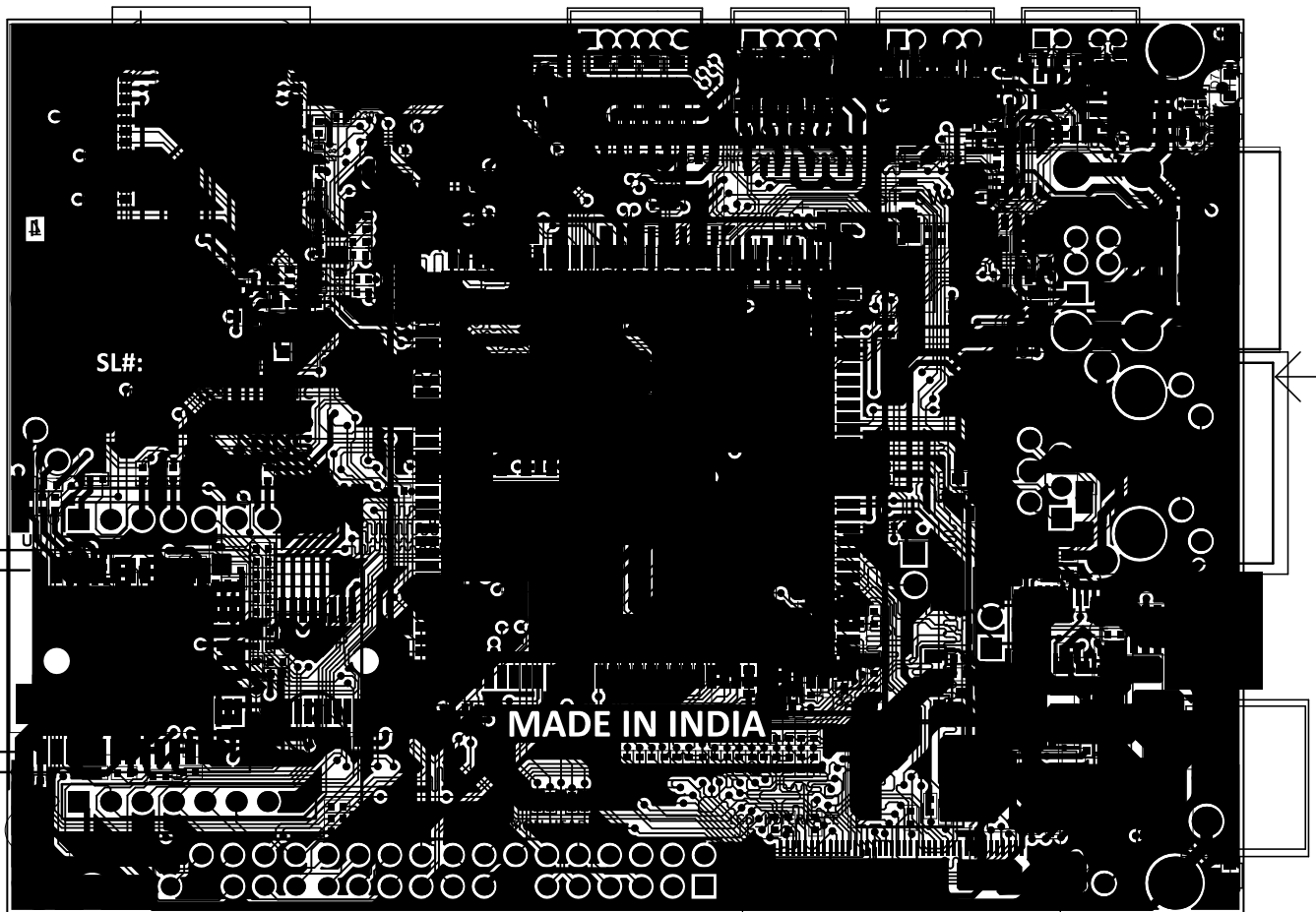
FD1	FD2	FD3	FD4	FD5	FD6
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Boot Configuration (LCD_D0 to LCD_D23)



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A	<div>No of layer : 4 Layer Impedance Controlled Board</div> <div><div>1. Board thickness: 1.6mm</div><div>2. Surface finish:Enig , Green Mask</div><div>3. Copper finish thickness: 35 micron</div><div>4. Minimum line/spacing: As per Fab house Stack up</div><div>5. Impedance Controlled : Yes</div><div>6. Board Dimensions : 100 × 72.5mm MAX</div></div>															
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BOARD OUTLINE

Key North Arrow