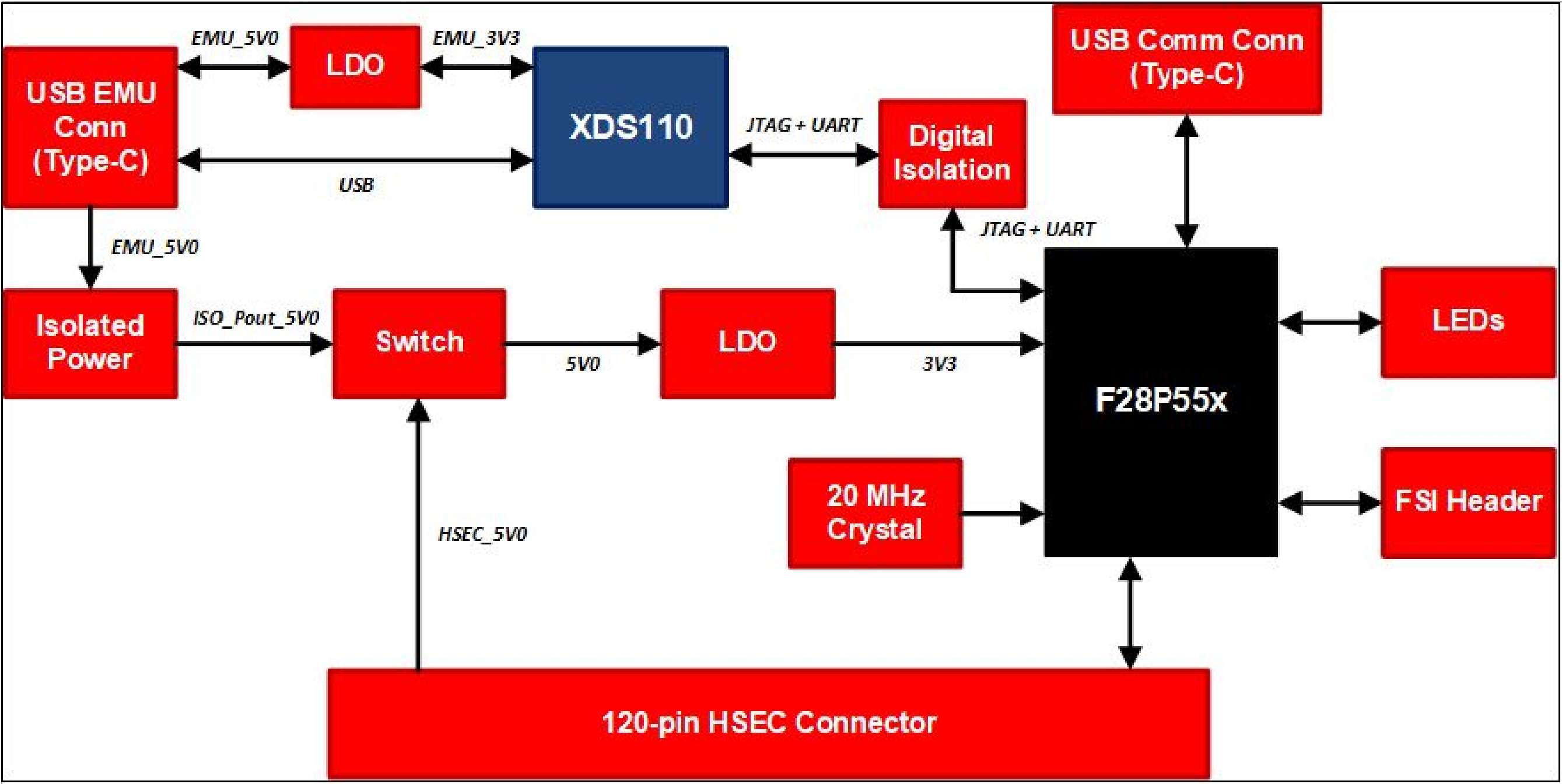


1) USB Differential Pairs - 90 Ohm  
(A) XDS\_D\_P and XDS\_D\_N  
(B) USB\_D\_P (GPIO41) and USB\_D\_N (GPIO23)

2) ADC PGA Differential pair Impedance Matching - 50 Ohm  
(A) HSEC\_PGAx\_IN\_P pins should match with HSEC\_PGAx\_IN\_N, where x is between 1-3  
(B) MCU\_PGAx\_IN\_P pins should match with MCU\_PGAx\_IN\_N, where x is between 1-3

Revision History				
Rev	ECN #	Approved Date	Approved by	Notes
E1	N/A	Sept 13, 2023	PL	Initial Draft



Power to the MCU is either supported by the USB-C on the left or through the HSEC

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Orderable:	Designed for: Public Release	Mod. Date: 10/10/2023
TID #: N/A	Project Title: F28P55x controlCARD	
Number: MCU132	Rev: E1	Sheet: 1 of 10
SVN Rev: Version control disabled	Assembly Variant: [No Variations]	Size: B
Drawn By: Peter Luong	File: MCU132E1_CoverSheet.SchDoc	
Engineer: Peter Luong	Contact: <a href="http://www.ti.com/support">http://www.ti.com/support</a>	



A

A

B

B

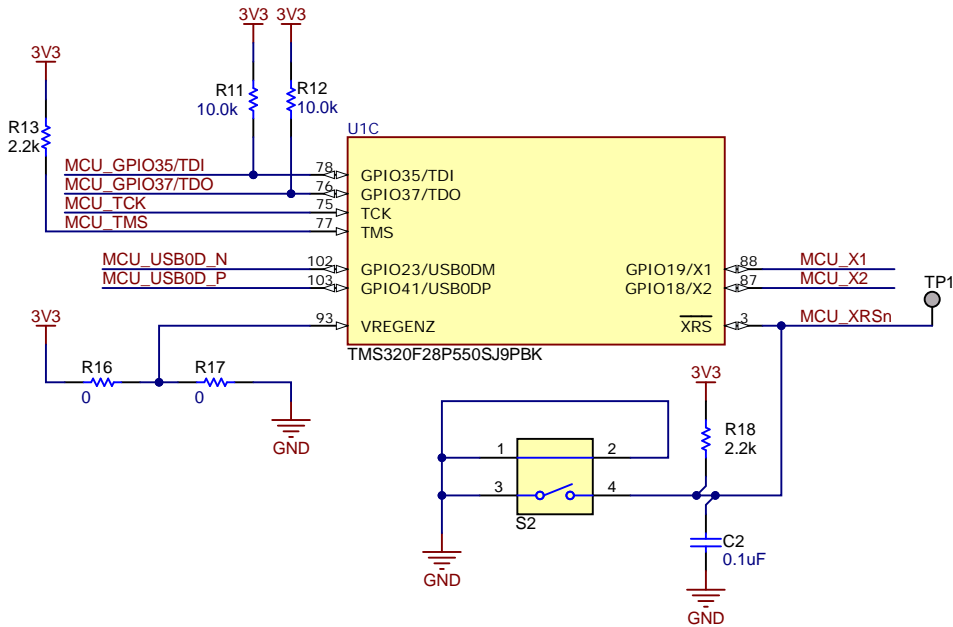
C

C

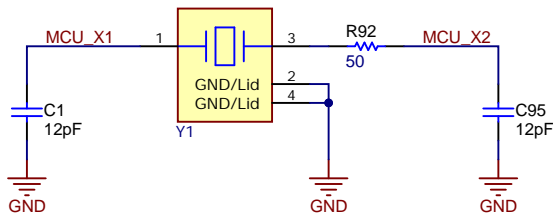
D

D

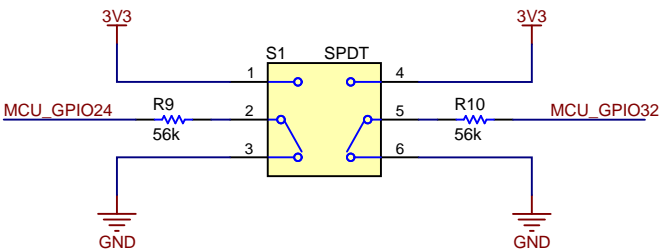
### JTAG and Reset



### 20 MHz External Crystal



### Boot Mode Switch

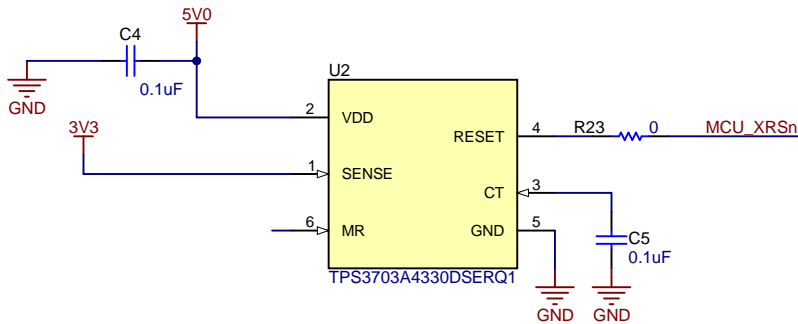


### Boot Mode Selection Chart

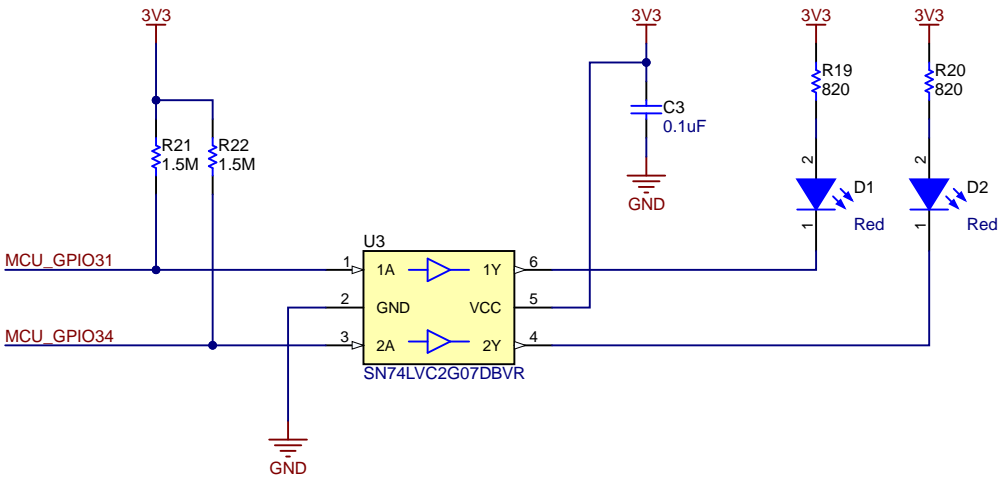
(S2: UP is '1', DOWN is '0')

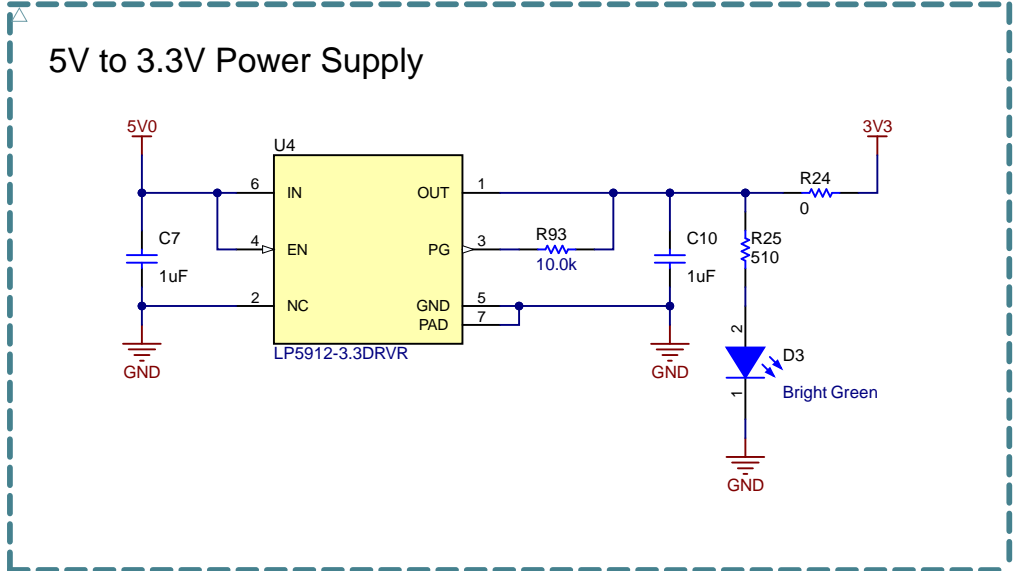
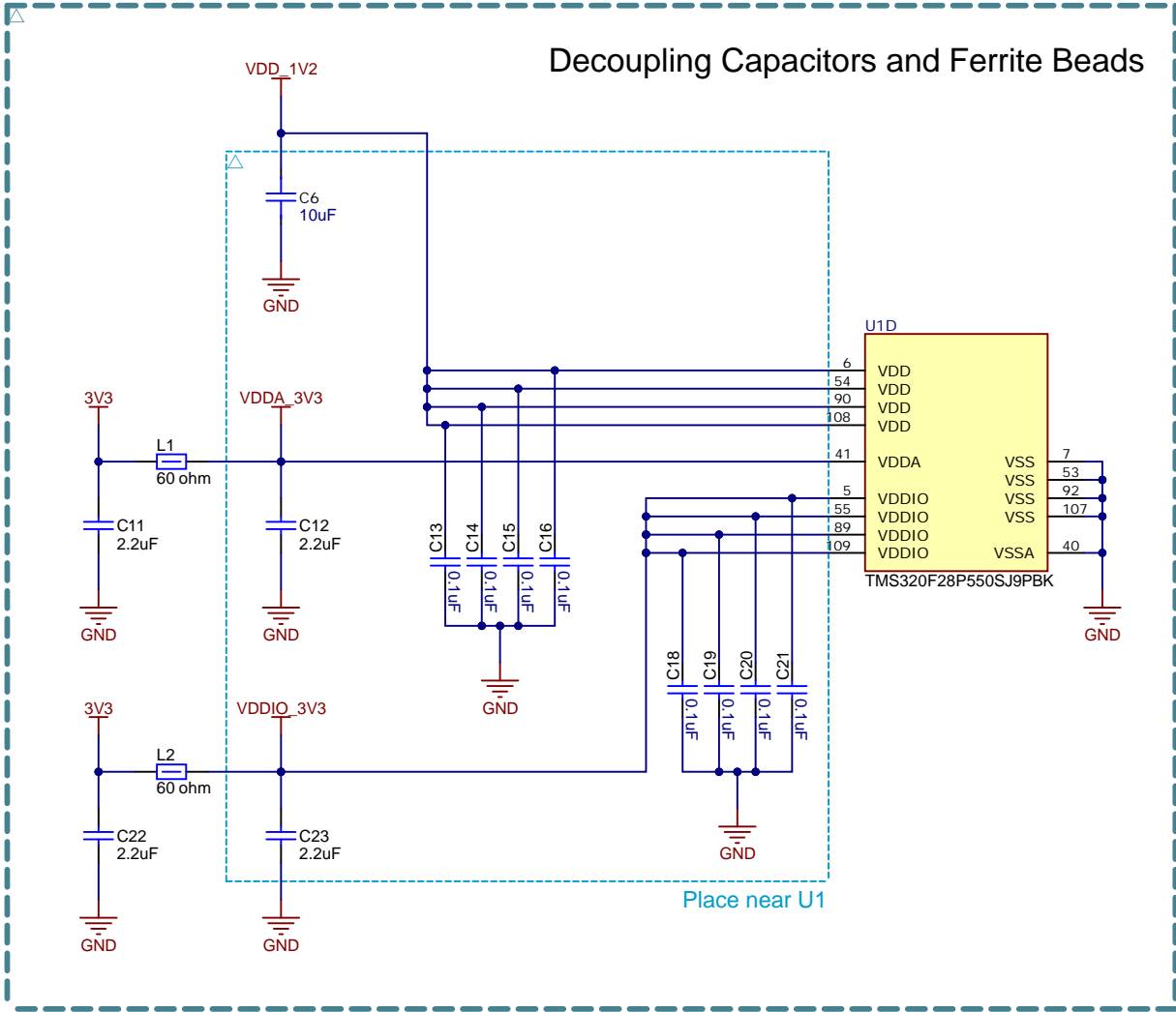
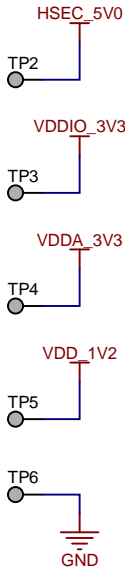
Mode #	GPIO24	GPIO32	Boot Mode
00	0	0	Boot from Parallel GPIO
01	0	1	Boot from SCI / Wait Mode
02	1	0	Boot from CAN (MCAN-NONFD)
03	1	1	Boot from Flash (USB)

### System Supervisory Circuitry



### LEDs





The F28P55x controlCARD uses the internal VREG to generate the 1.2V voltage rail for VDD.

For custom boards using external VREG mode, recommend to use dual-output DC-DC (e.g., TPS62441) to generate both 3.3V and 1.2V supplies.



The schematic diagram illustrates the electrical connections for a USB-to-serial module, identified by the part number 632723300011. The module is represented as a central component with two main pin headers, J2 and J3, and two ground connection points.

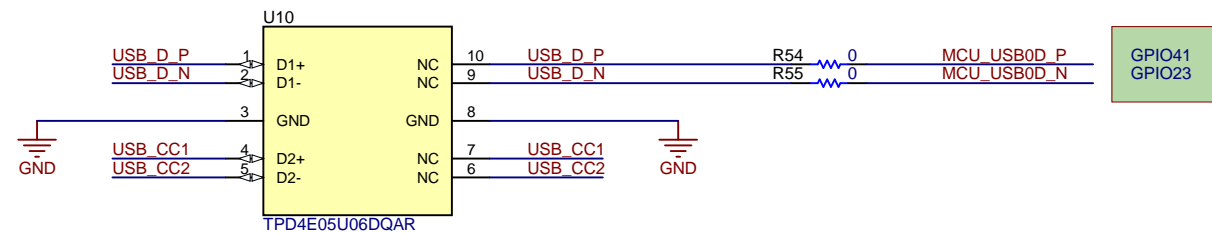
**Power and Ground Connections:**

- VBUS\_5V0:** The primary power supply input, connected to the VBUS pins (A4, A9, B4, B9) and the CC1 and CC2 pins (A5, A8, B5, B8).
- 3.3nF:** A decoupling capacitor connected between VBUS and ground.
- USB\_CC1:** A dedicated power supply input, connected to the CC1 and CC2 pins.
- Ground (GND):** Multiple ground connections are shown, including the USB ground (A12, M1, S1, S2) and the module's own ground (A1, A12, M1, S1, S2, B1, B12, M2, S3, S4).

**Signal Connections:**

- USB D+ and D-:** The data lines are connected to the DP1 and DP2 pins (A7, A6, B7, B6).
- SSTXN1, SSTXP1, SSRXN1, SSRXP1:** The serial-to-USB interface pins, connected to the A3, A2, B3, B2, A10, A11, B10, B11 pins.
- SBU1, SBU2:** The Serial Bus Undervoltage protection pins, connected to the A8 and B8 pins.

The module is shown with its internal components, including the USB-to-serial converter chip and the associated passive components like capacitors and resistors.

[illegible]

Switch Truth Table		
MCU_GPIO70 STATUS	DESCRIPTION	USB_MODE
1 (HIGH)	UB_CC1 & USB_CC2 are pulled up	Host mode (DFP)
0 (LOW)	UB_CC1 & USB_CC2 are strongly pulled down	Device mode (UFP)

LED D8 will turn on to indicate that the C2000 device is in Host Mode (DFP).

NOTE: USB VBUS\_5V0, PFLT & EPEN do not have a specific mux position in this device.

In this controlCARD, a standard GPIO is used to detect changes to these signals.



A

B

C

D

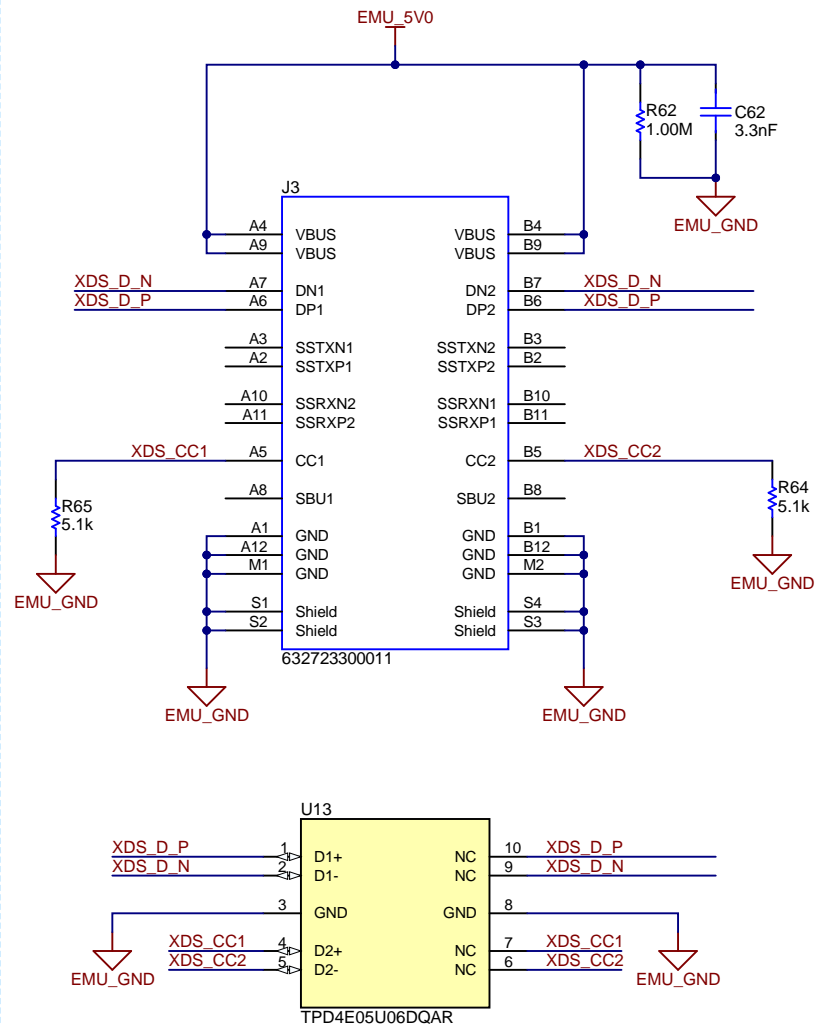
A

B

C

D

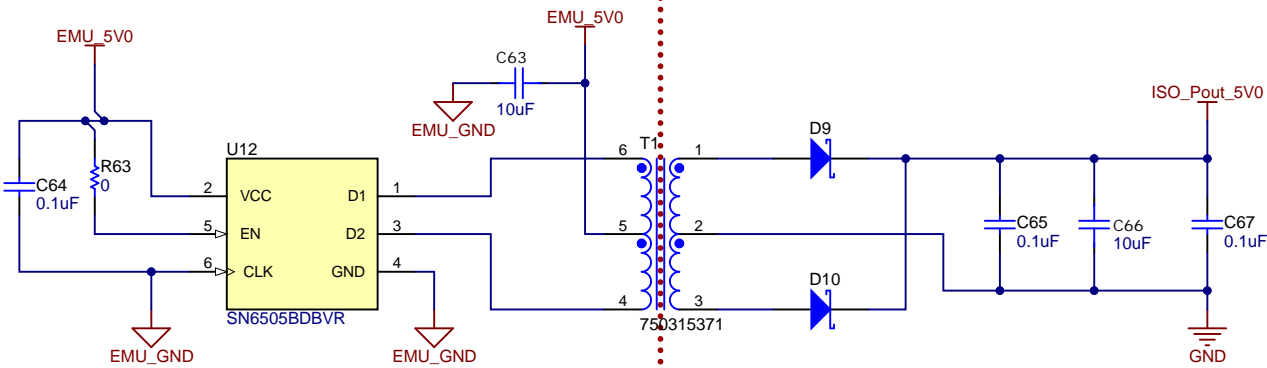
USB Type-C Connector - XDS110 side



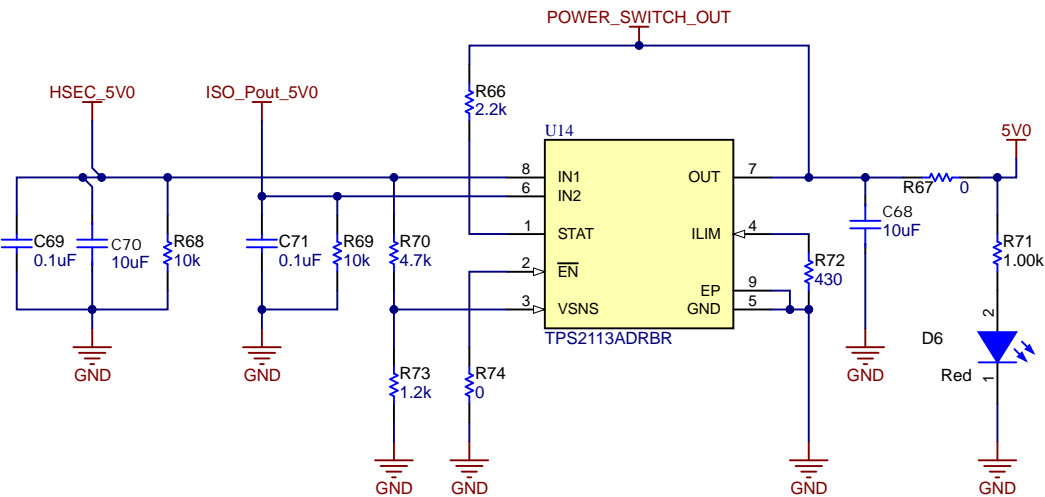
(Cold Side)

(Hot Side)

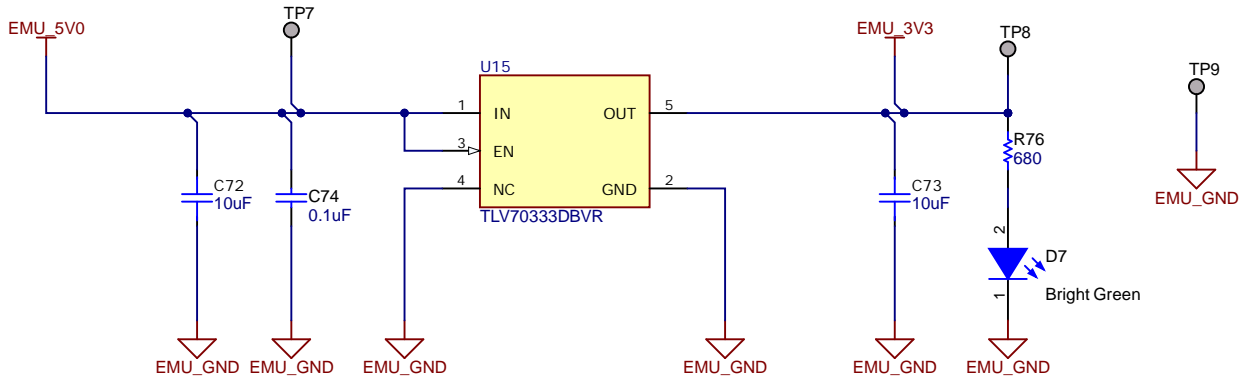
USB Isolated Power



Power Selection Switch



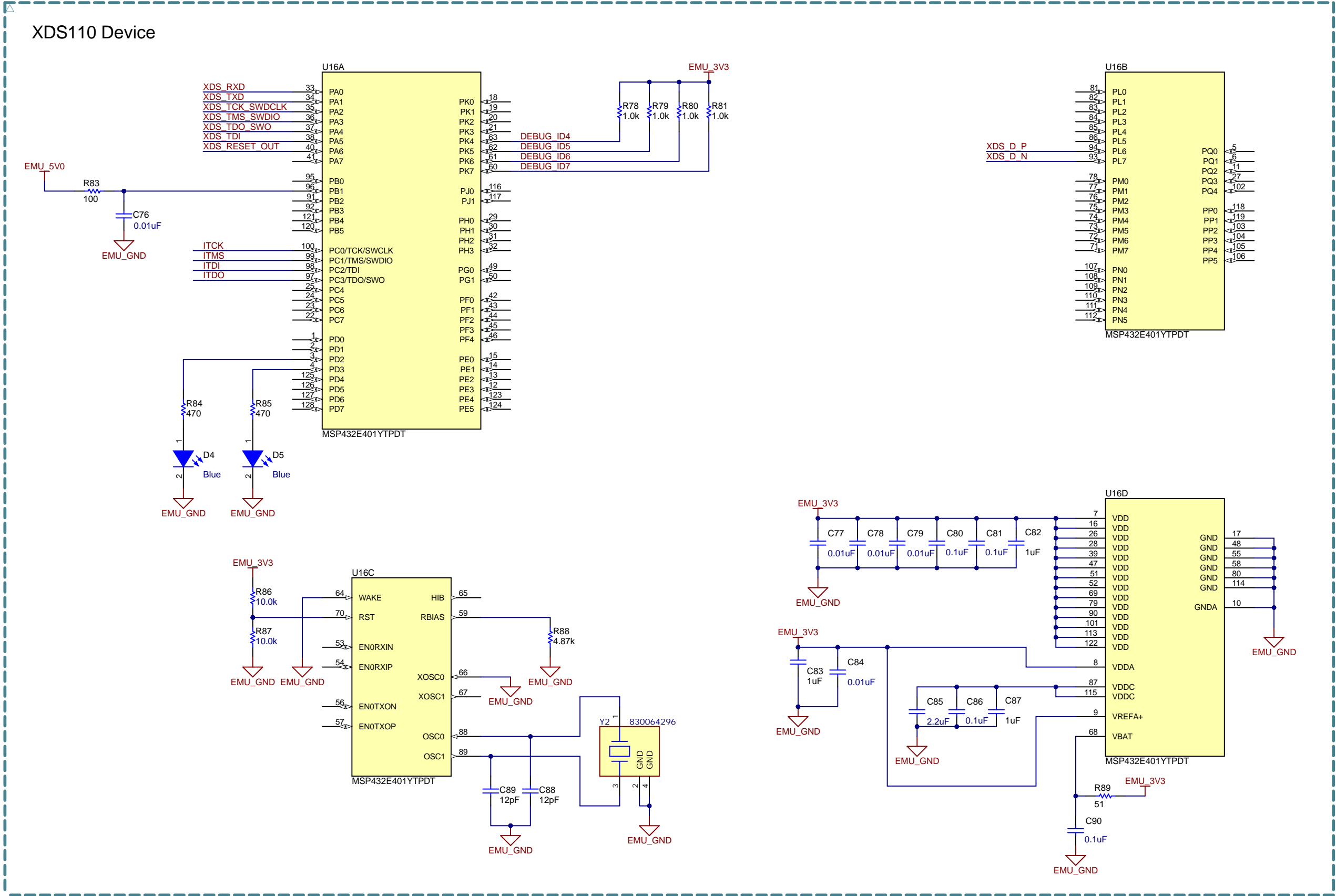
LDO\_5V0\_3V3



Switch Truth Table

HSEC_5V0 > 4V	ISO_Pout_5V0 > HSEC_5V0	POWER_SWITCH_OUT
Yes	X	HSEC_5V0
No	No	HSEC_5V0
No	Yes	ISO_Pout_5V0





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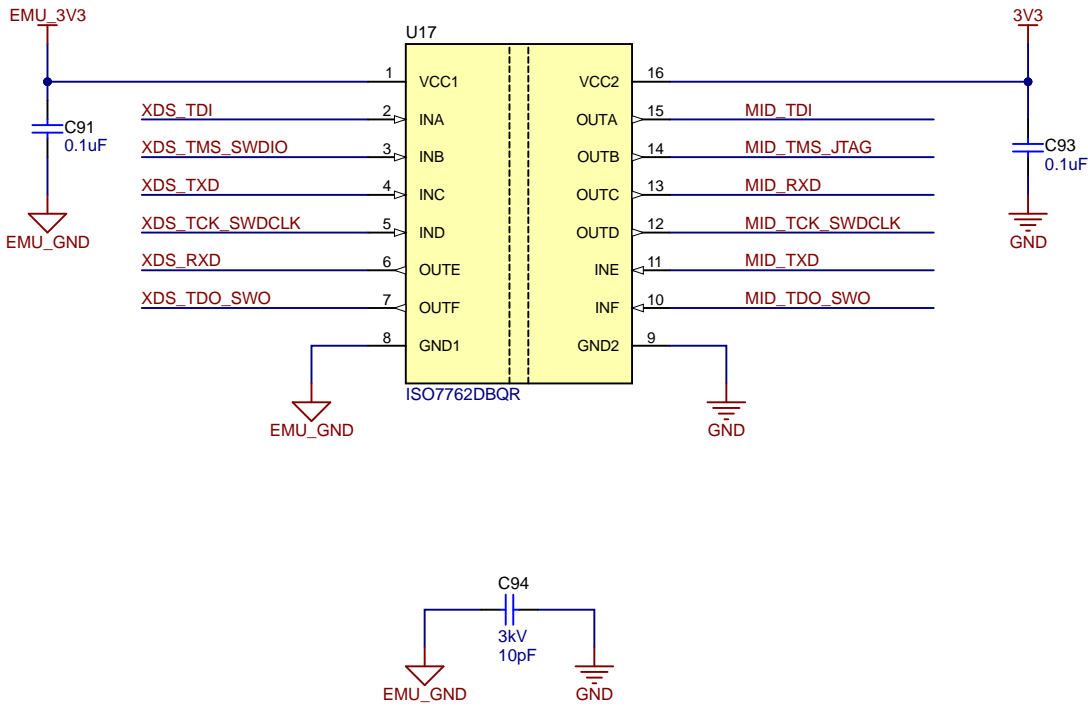
Orderable:	Designed for: Public Release	Mod. Date: 10/9/2023
TID #:	Project Title: F28P55x controlCARD	
Number: MCU132	Rev: E1	Sheet Title:
SVN Rev: Version control disabled	Assembly Variant: [No Variations]	Sheet: 8 of 10
Drawn By: Peter Luong	File: MCU132E1_XDS110_MCU.SchDoc	Size: B
Engineer: Peter Luong	Contact: <a href="http://www.ti.com/support">http://www.ti.com/support</a>	



NOTE: Because the JTAG signals are isolated, cJTAG is not supported on this controlCARD.

(Cold Side)

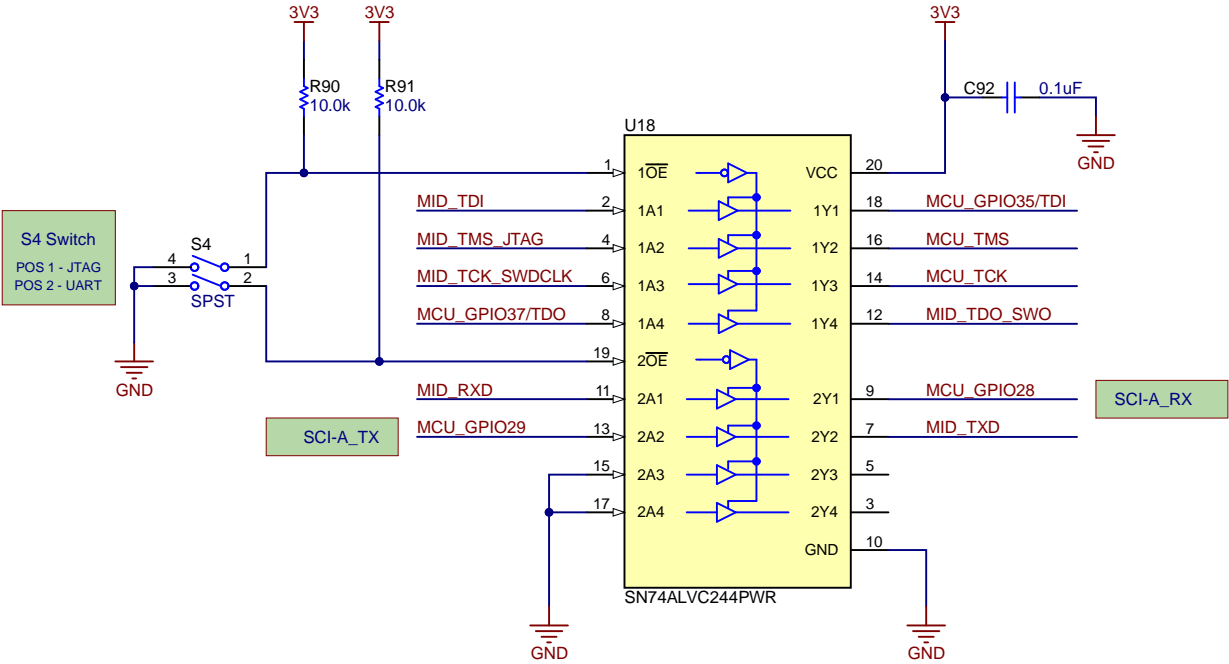
(Hot Side)



WARNING: To avoid potential shock hazard in high-voltage settings, leave the Y cap (C94) unpopulated from the EVM.

### S4 - JTAG Emulation & UART Switch

POS 1 ON: Use XDS110 emulator that is on the cCARD  
POS 1 OFF: Boot from FLASH/peripheral (see boot mode switch) OR use emulator on baseboard  
POS 2 ON: GPIOs 28 & 29 will be connected to the USB-to-UART adapter on the XDS110 emulator  
POS 2 OFF: GPIOs 28 & 29 are disconnected from the USB-to-UART adapter on the XDS110 emulator and connected to the HSEC connector pins





PCB Number: MCU132  
PCB Rev: E1



LBL1  
PCB Label  
THT-14-423-10  
Size: 0.65" x 0.20 "

ZZ1  
Label Assembly Note  
This Assembly Note is for PCB labels only

ZZ2  
Assembly Note  
These assemblies are ESD sensitive, ESD precautions shall be observed.

ZZ3  
Assembly Note  
These assemblies must be clean and free from flux and all contaminants. Use of no clean flux is not acceptable.

ZZ4  
Assembly Note  
These assemblies must comply with workmanship standards IPC-A-610 Class 2, unless otherwise specified.

ZZ5  
Assembly Note  
Clip off KEY pin 9 of J1 connector header

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Orderable:		Designed for: <a href="#">Public Release</a>	Mod. Date: 10/10/2023
TID #: <a href="#">N/A</a>		Project Title: <a href="#">F28P55x controlCARD</a>	
Number: <a href="#">MCU132</a>	Rev: <a href="#">E1</a>	Sheet Title:	
SVN Rev: <a href="#">Version control disabled</a>		Assembly Variant: <a href="#">[No Variations]</a>	Sheet: <a href="#">10</a> of <a href="#">10</a>
Drawn By: <a href="#">Peter Luong</a>		File: <a href="#">MCU132E1_Hardware.SchDoc</a>	Size: B
Engineer: <a href="#">Peter Luong</a>		Contact: <a href="#">http://www.ti.com/support</a>	