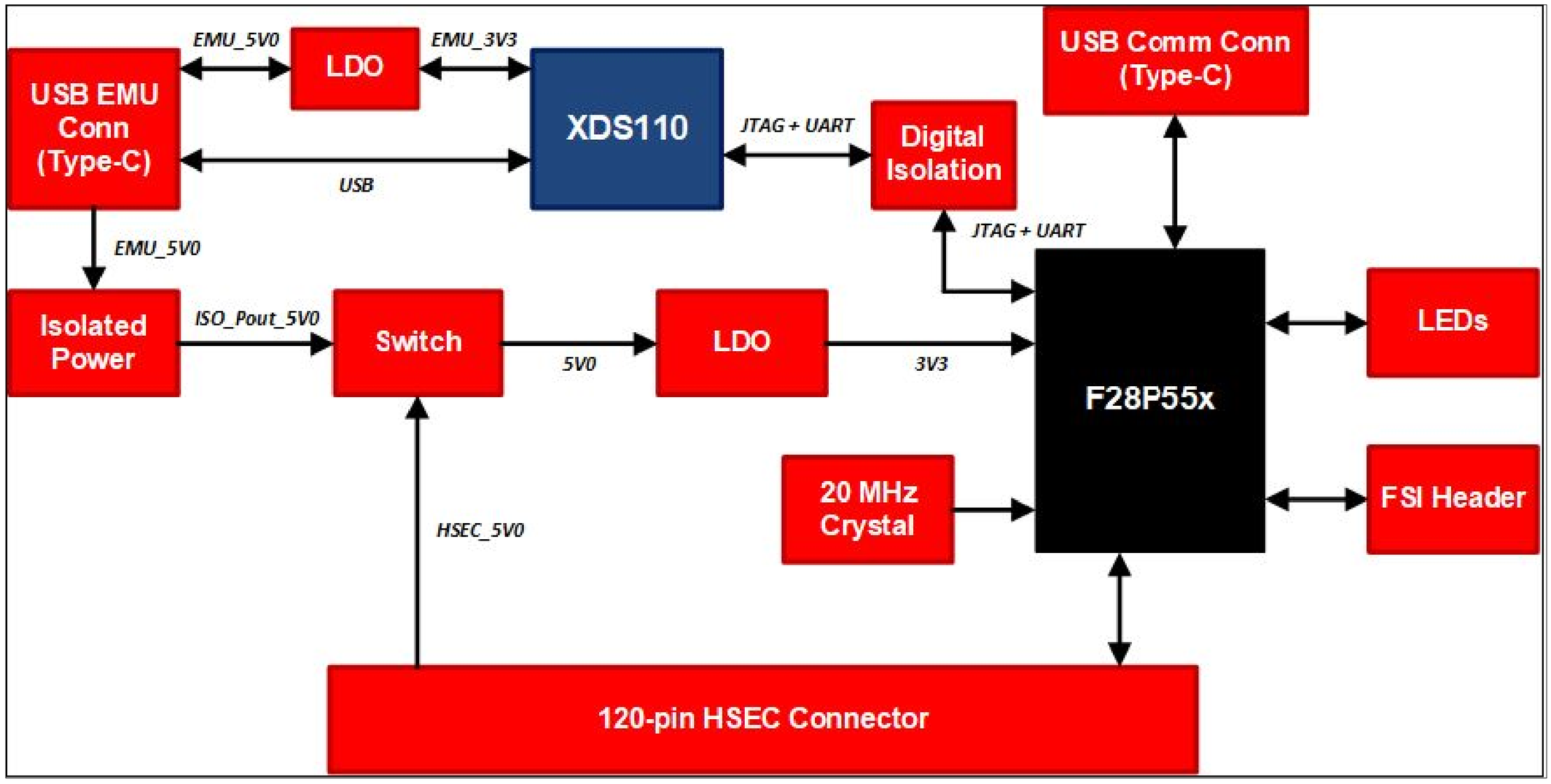
Revision History				
Rev	ECN #	Approved Date	Approved by	Notes
E1	N/A	Sept 13, 2023	PL	Initial Draft
A	N/A	Jan 29, 2024	PL	Added Test Point for 5V0 and 3V3 Dampening resistor tuned per characterization Switched U1 from PBK to PDT package Minor changes to silkscreen and GND pour Adjustments to analog signal routing

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 - 90 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



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

Orderable:	Designed for: Public Release	Mod. Date: 1/31/2024
TID #: N/A	Project Title: F28P55x controlCARD	
Number: MCU132 Rev: A	Sheet Title:	
SVN Rev: Version control disabled	Assembly Variant: [No Variations]	Sheet: 1 of 10
Drawn By: Peter Luong	File: MCU132A_CoverSheet.SchDoc	Size: B
Engineer: Peter Luong	Contact: http://www.ti.com/support	

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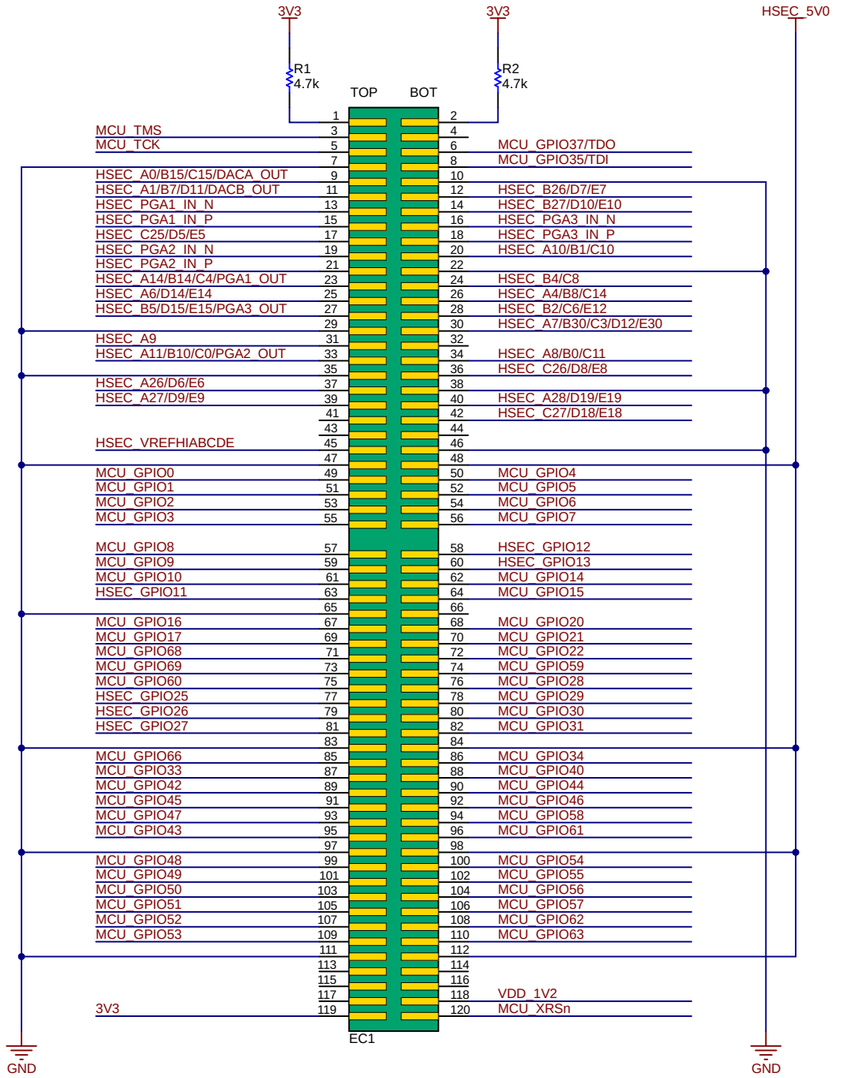
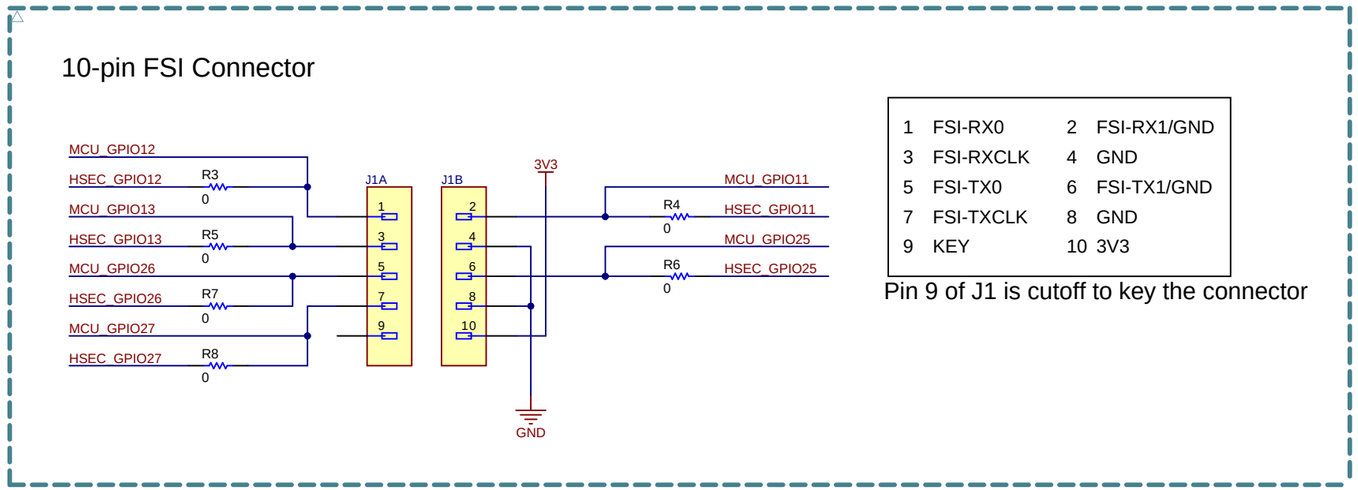
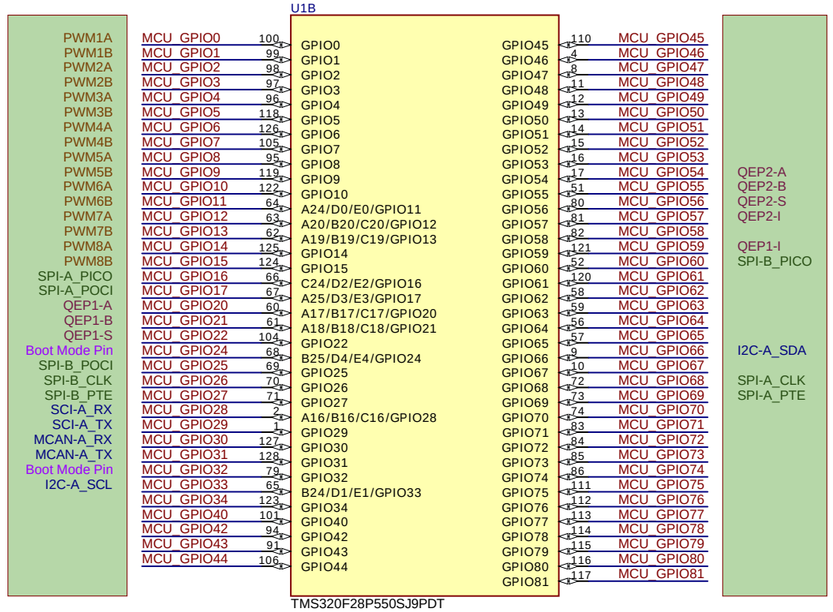
J1 has been updated over previous designs. Pins 9 and 10 were added enabling power to the connector. Additionally Pins 2 and 6, previously GND, have been repurposed to enable the full 3 pin FSI communication. The user can shunt HSEC GPIO11 and HSEC GPIO25 to ground if backwards compatibility is required.







Orderable:		Designed for: Public Release	Mod. Date: 1/18/2024
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 2 of 10
Drawn By: Peter Luong		File: MCU132A_GPIO.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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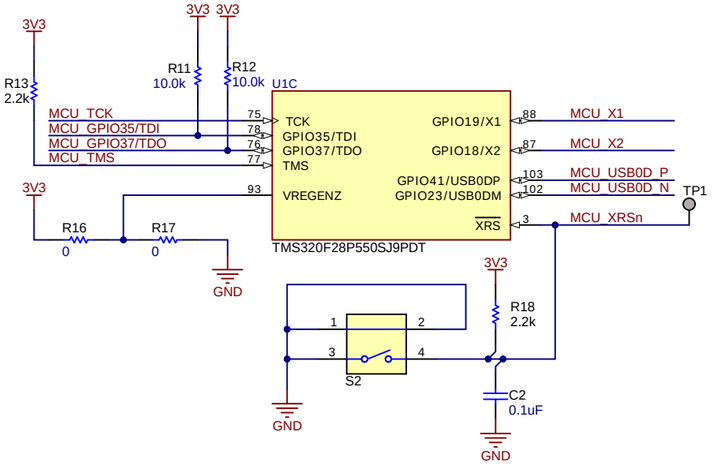
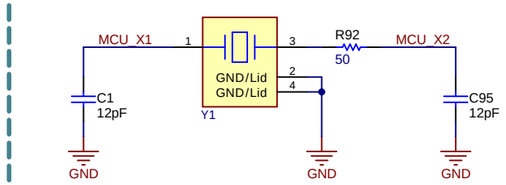
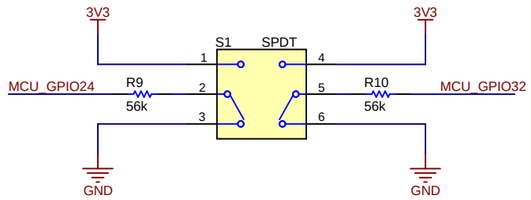
JTAG and Reset



20 MHz External Crystal



Boot Mode Switch

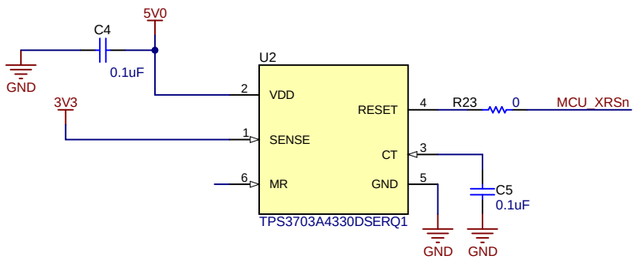


Boot Mode Selection Chart

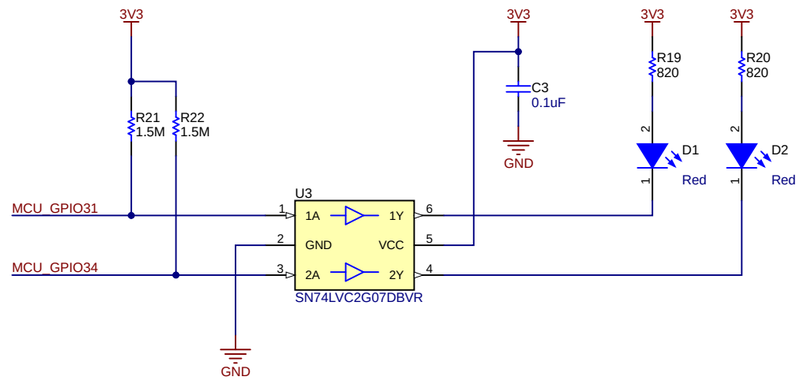
(S2: UP is '1', DOWN is '0')

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



Orderable:	Designed for: Public Release	Mod. Date: 1/24/2024
TID #: N/A	Project Title: F28P55x controlCARD	
Number: MCU132 Rev: A	Sheet Title:	
SVN Rev: Version control disabled	Assembly Variant: [No Variations]	Sheet: 3 of 10
Drawn By: Peter Luong	File: MCU132A_Support.SchDoc	Size: B
Engineer: Peter Luong	Contact: http://www.ti.com/support	

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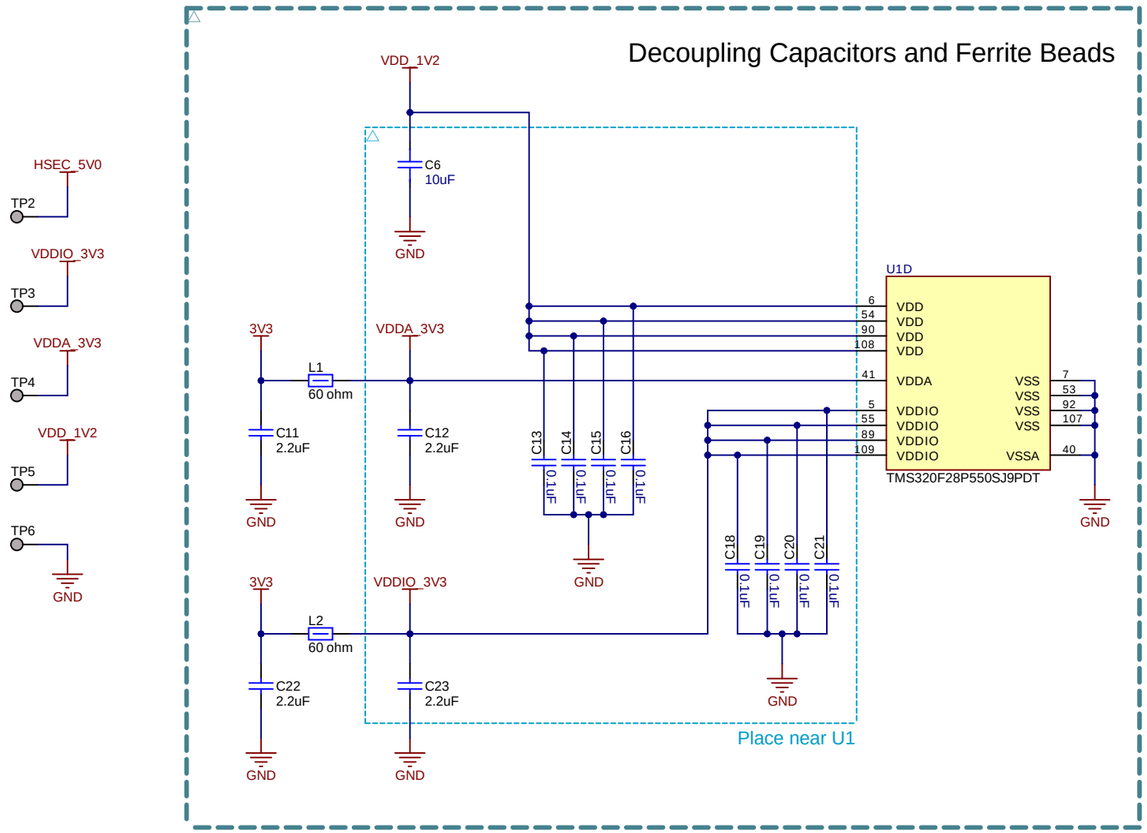

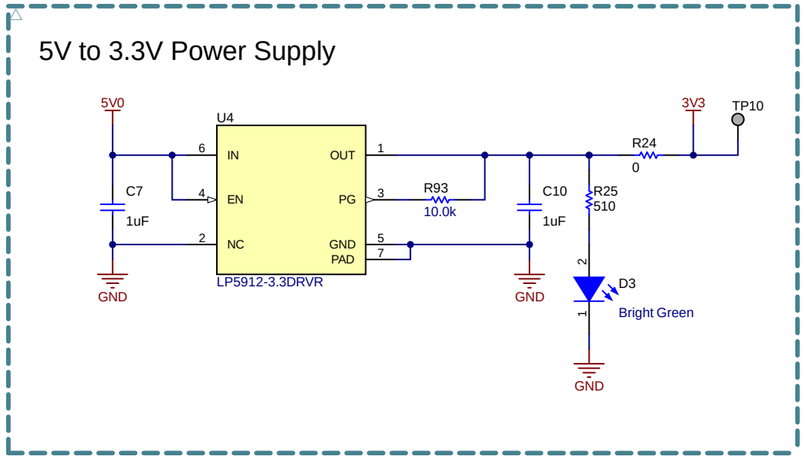

The F28P55x controlCARD uses the internal VREG to generate the 1.2V voltage rail for VDD.

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.

Orderable:		Designed for: Public Release	Mod. Date: 1/24/2024
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 4 of 10
Drawn By: Peter Luong		File: MCU132A_Power.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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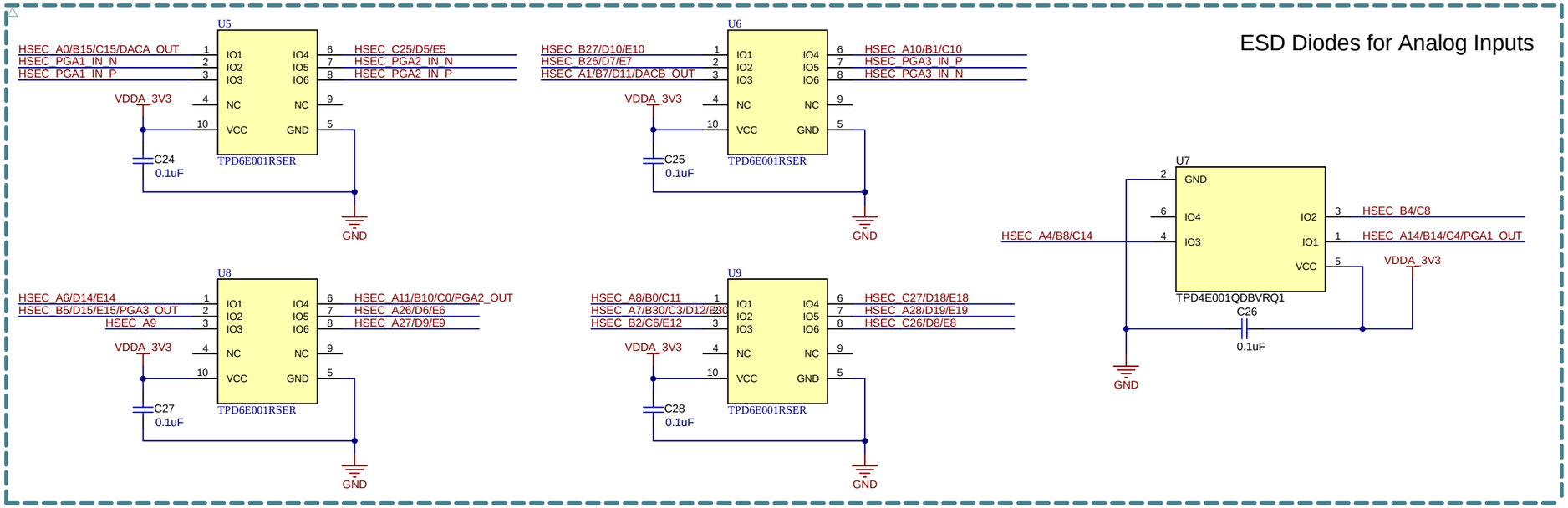
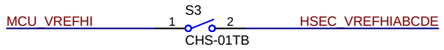
ESD Diodes for Analog Inputs



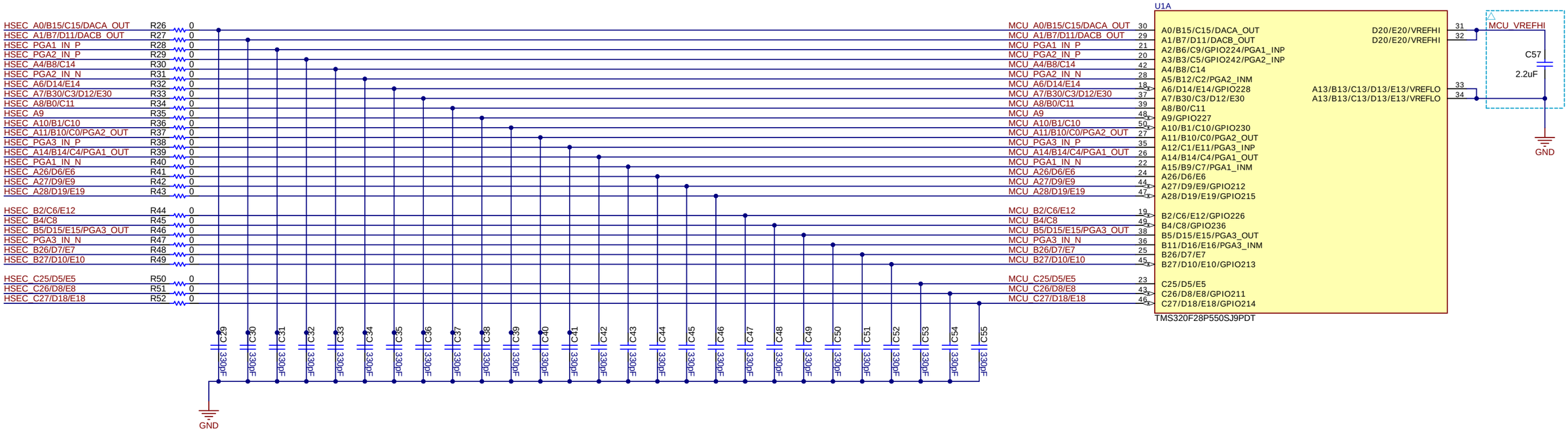
S3 Is the analog configuration switch

Position 1 - ON
- ADC uses external reference voltage supplied on pin 45 of TMDSHSECDOCK

Position 1 - OFF
- ADC uses the internal voltage reference



Place near U1



Orderable:		Designed for: Public Release	Mod. Date: 1/24/2024
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 5 of 10
Drawn By: Peter Luong		File: MCU132A_ADC.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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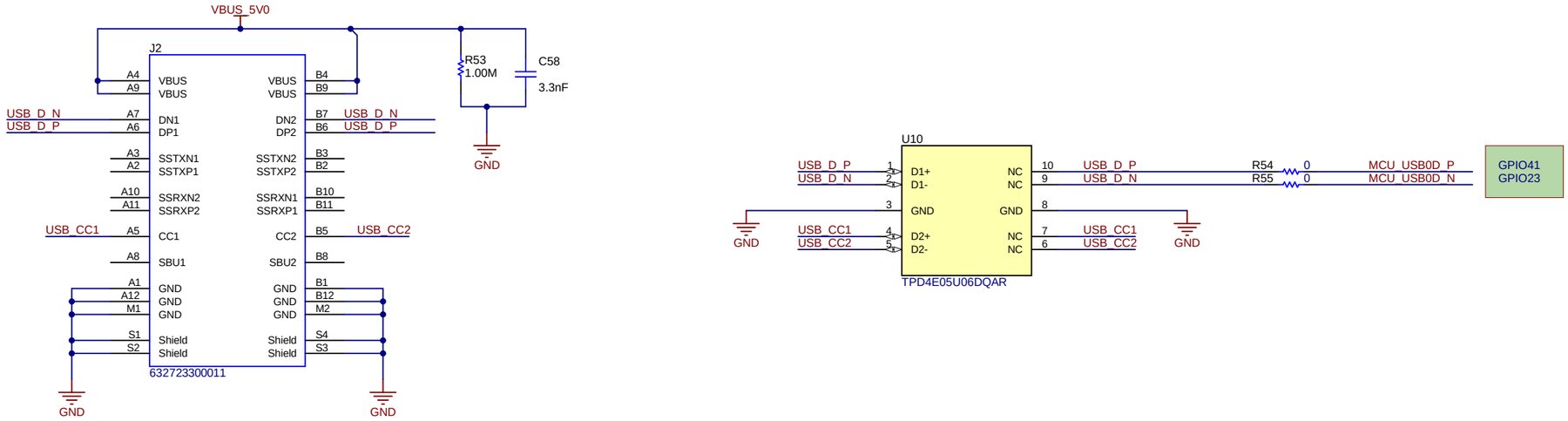
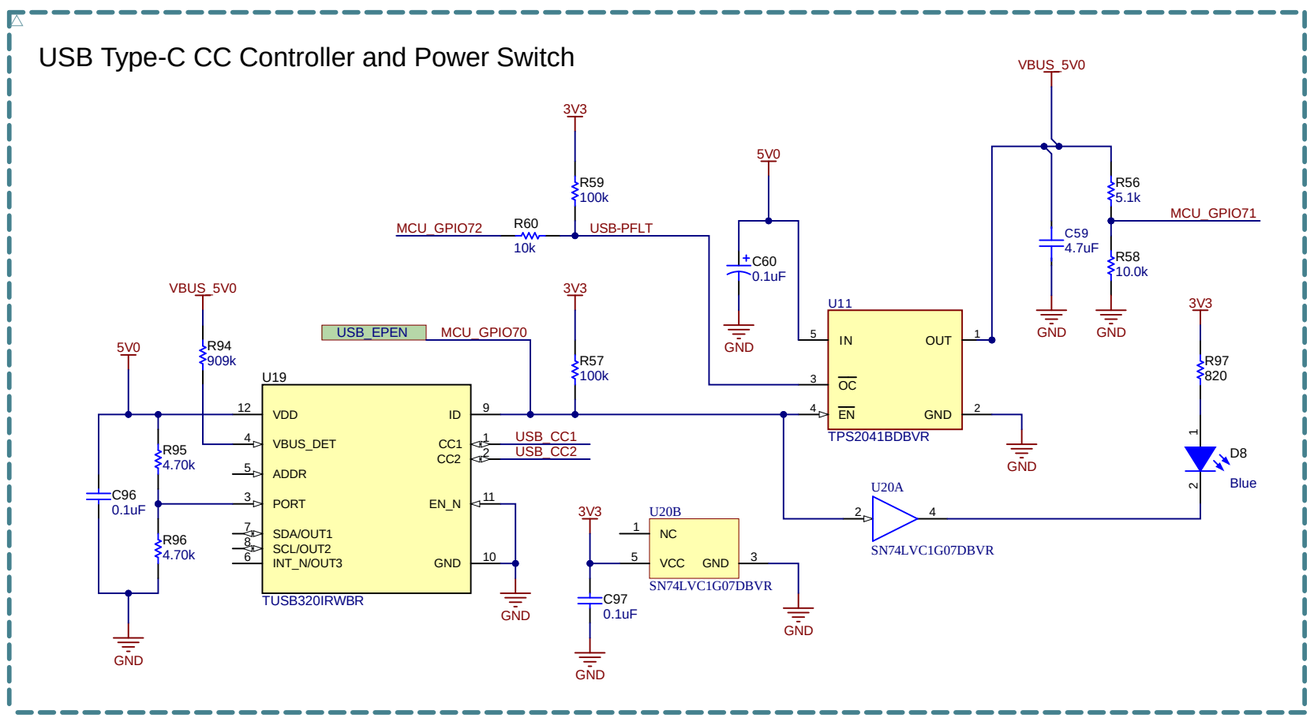
USB Type-C Connector - Communication Peripheral to MCU



USB Type-C CC Controller and Power Switch



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.

Orderable:		Designed for: Public Release	Mod. Date: 10/18/2023
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 6 of 10
Drawn By: Peter Luong		File: MCU132A_USB.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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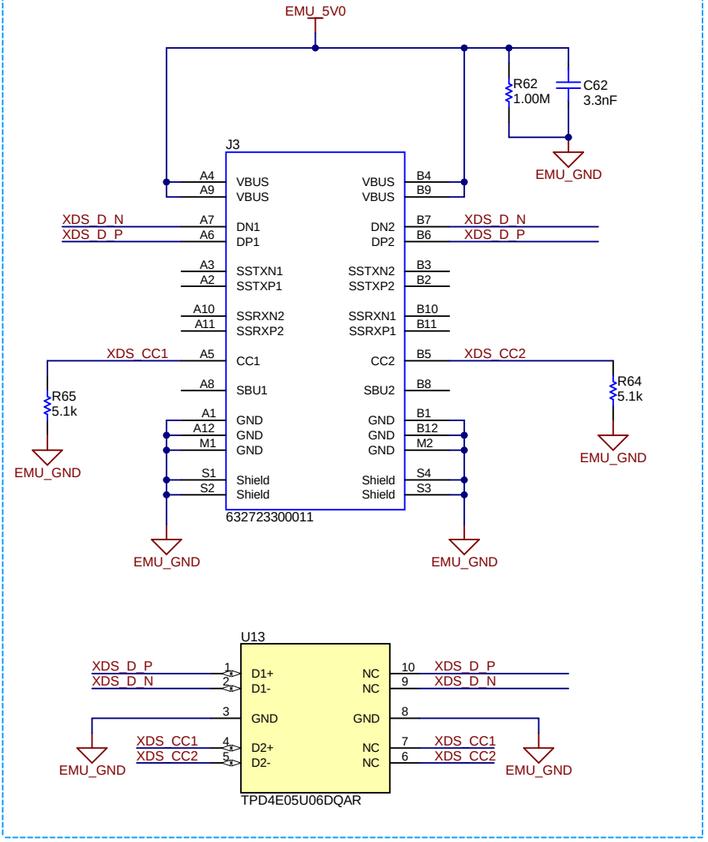
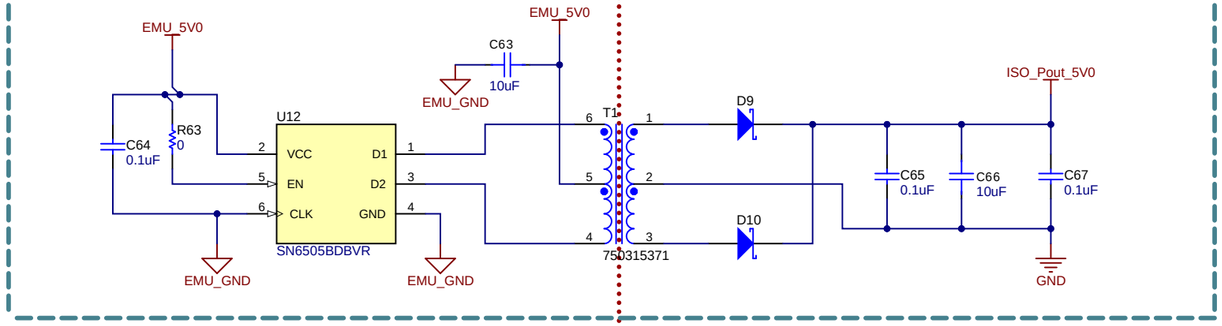
USB Type-C Connector - XDS110 side

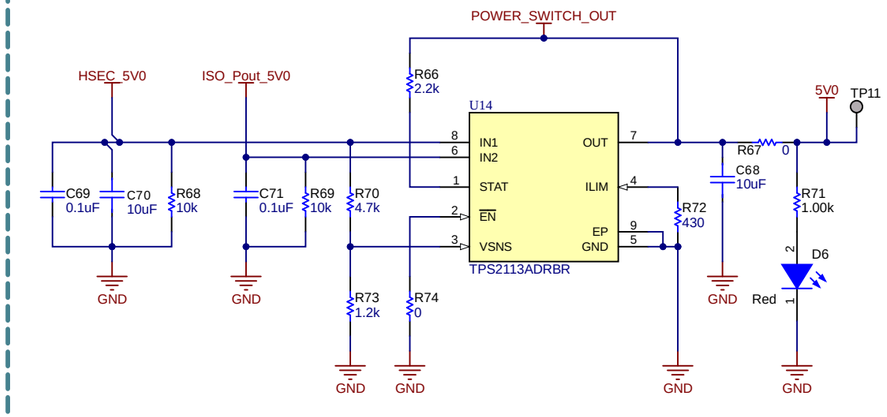


(Cold Side) (Hot Side)

USB Isolated Power

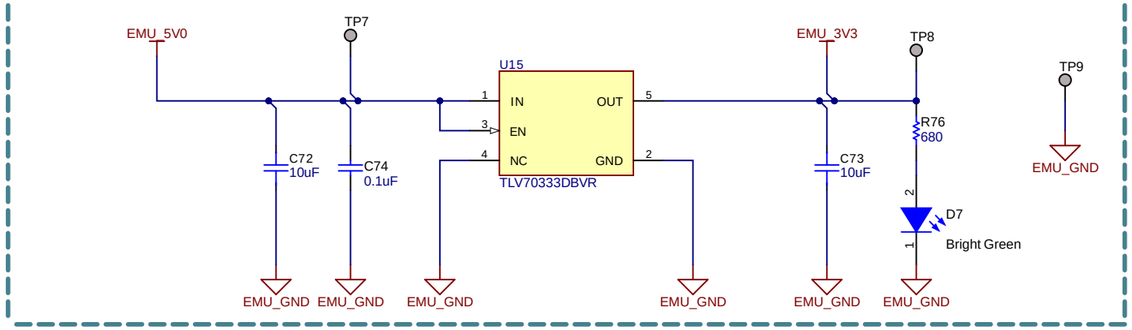


Power Selection Switch



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

LDO_5V0_3V3



Orderable:		Designed for: Public Release	Mod. Date: 1/8/2024
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 7 of 10
Drawn By: Peter Luong		File: MCU132A_XDS110_USB_Power.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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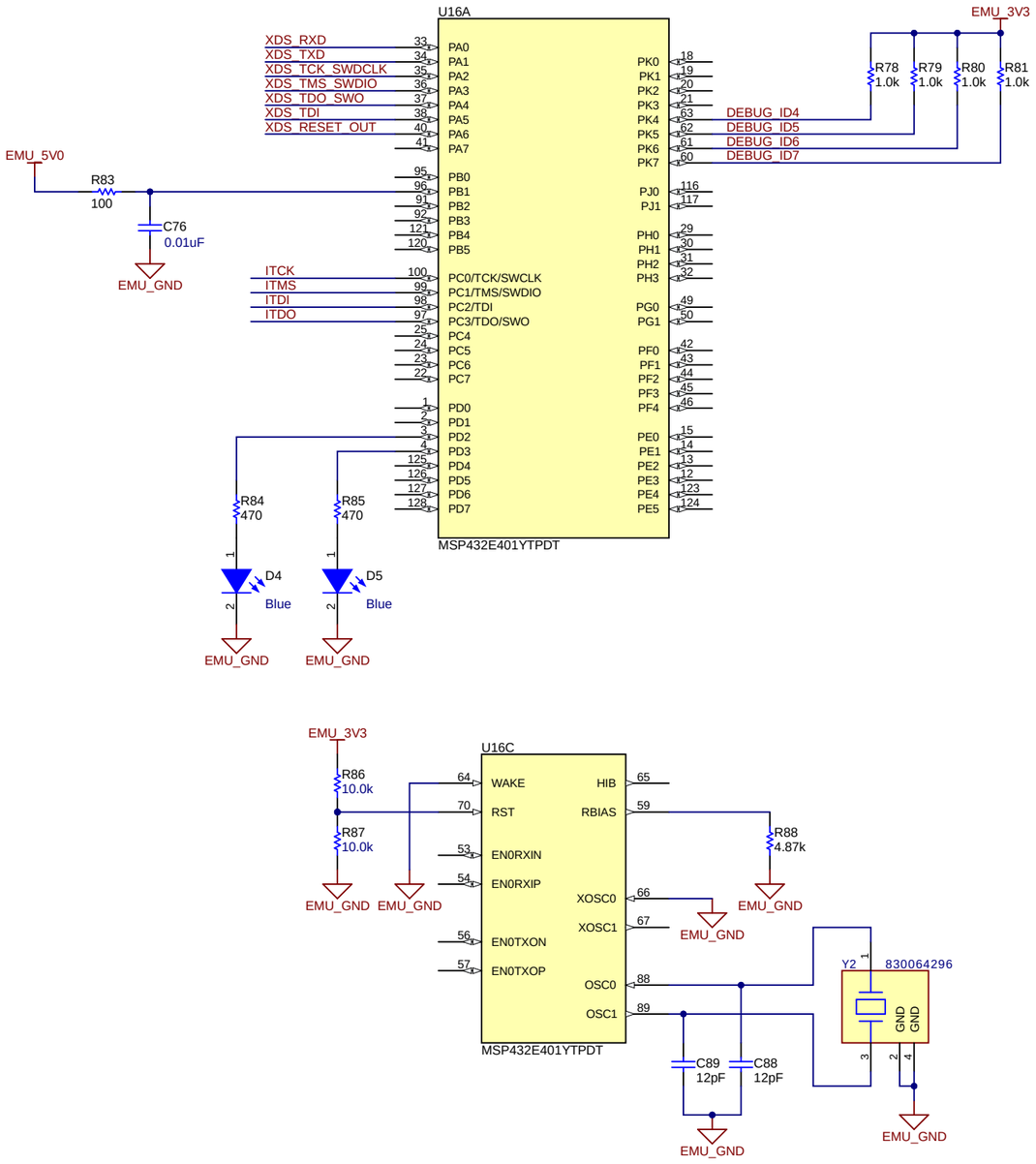
XDS110 Device



Orderable:		Designed for: Public Release	Mod. Date: 10/9/2023
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 8 of 10
Drawn By: Peter Luong		File: MCU132A_XDS110_MCU.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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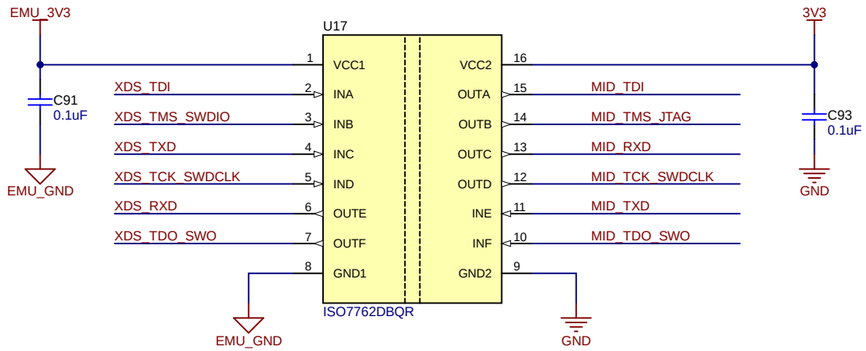
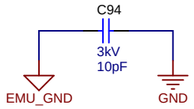
NOTE: Because the JTAG signals are isolated, cJTAG is not suppported on this controlCARD.

(Cold Side) (Hot Side)

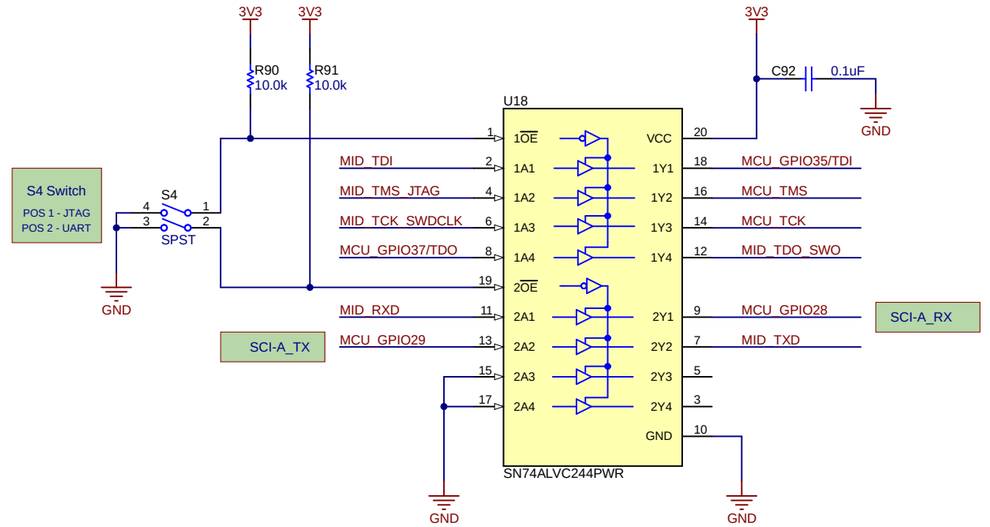




WARNING: To avoid potential shock hazard in high-voltage settings, leave the Y cap (C94) unpopulated from the EVM.

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



Orderable:		Designed for: Public Release	Mod. Date: 10/9/2023
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 9 of 10
Drawn By: Peter Luong		File: MCU132A_Emulator_Interface.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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FID1 FID2 FID3 FID4 FID5 FID6

PCB Number: MCU132
PCB Rev: A

PCB
LOGO
Texas Instruments

CE Mark

PCB
LOGO
FCC disclaimer

PCB
LOGO
WEEE logo

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

Orderable:		Designed for: Public Release	Mod. Date: 10/10/2023
TID #: N/A		Project Title: F28P55x controlCARD	
Number: MCU132	Rev: A	Sheet Title:	
SVN Rev: Version control disabled		Assembly Variant: [No Variations]	Sheet: 10 of 10
Drawn By: Peter Luong		File: MCU132A_Hardware.SchDoc	Size: B
Engineer: Peter Luong		Contact: http://www.ti.com/support	

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