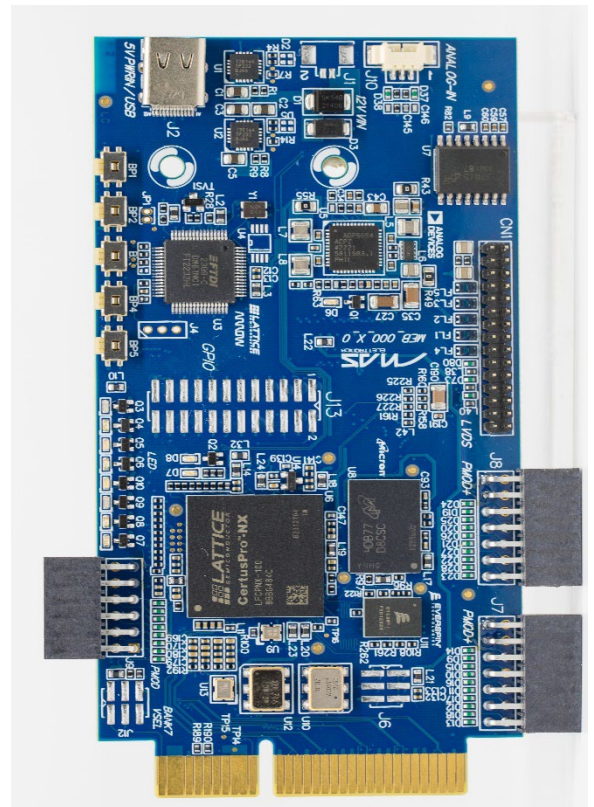


MAS_EDB
CERTUS PRO NX
EDUCATIONAL Board
Hardware Manual



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Revision History:

Doc. Version	BOARD Version	Date	Change
V1.0	REV1	2024-08-21	Initial Version

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1 Introduction

1.1 The board

This document describes the MAS Elettronica's EDB CERTUS PRO-NX™ educational board.

MAS Elettronica is proud to present MAS_EDUCATIONAL_BOARD_CERTUS_PRO_NX the new product dedicated to Lattice's Certus PRO NX and developed in collaboration with Arrow electronics. The product is designed for those who want to build a POC (proof of concept) based on this technology without having to design a dedicated board, or those who need an off-the-shelf solution.

Its main features are:

FPGA LATTICE	CERTUS PRO NX 100 BGA 484
Video	1x Soft MIPI CSI/DSI 1 TO 4X UP TO 4K 30fps Through Ziff Connector
	1 x LVDS/FDPLink 4x up to 4K 30fps Through strip connector
USB	USBC for board Power and programming.
JTAG	JTAG for for programming
LED	8 x led for general purpose use
Button	4 x Push Buttons for general purpose use
PMOD Connectors	2 x PMOD+ 3,3V connector or in multi-mode for standard accessories (VGA, HyperRam, HDMI). 1 x PMOD 3,3V connector
Flash QSPI	ON Board 512Mbit QSPI FLASH for bit stream or general purpose use
Octal xSPI MRAM	Everspin PERSYST EMxxLX 64Mbit JEDEC xSPI Industrial STT-MRAM Unlimited, Fast read and write operations, Speed up to 400Mbytes/sec

	Superior Data Integrity, Persistent data, Power loss protection
LPDDR4	512M x 32 bit LPDDR4 interface
CRUVI	60 pin 3V3 Cruvi connector for expansion Boards.
GPIO	20 x 3V3 GPIO (24 pin strip p=2,54mm)
ADC	2x analog input range 0-1,2V single ended.
POWER	5V single supply using the USBC connector 12V Using auxiliary or PCIe connections
Dimensions	162mm x 98mm

Below is shown the Board Block Diagram

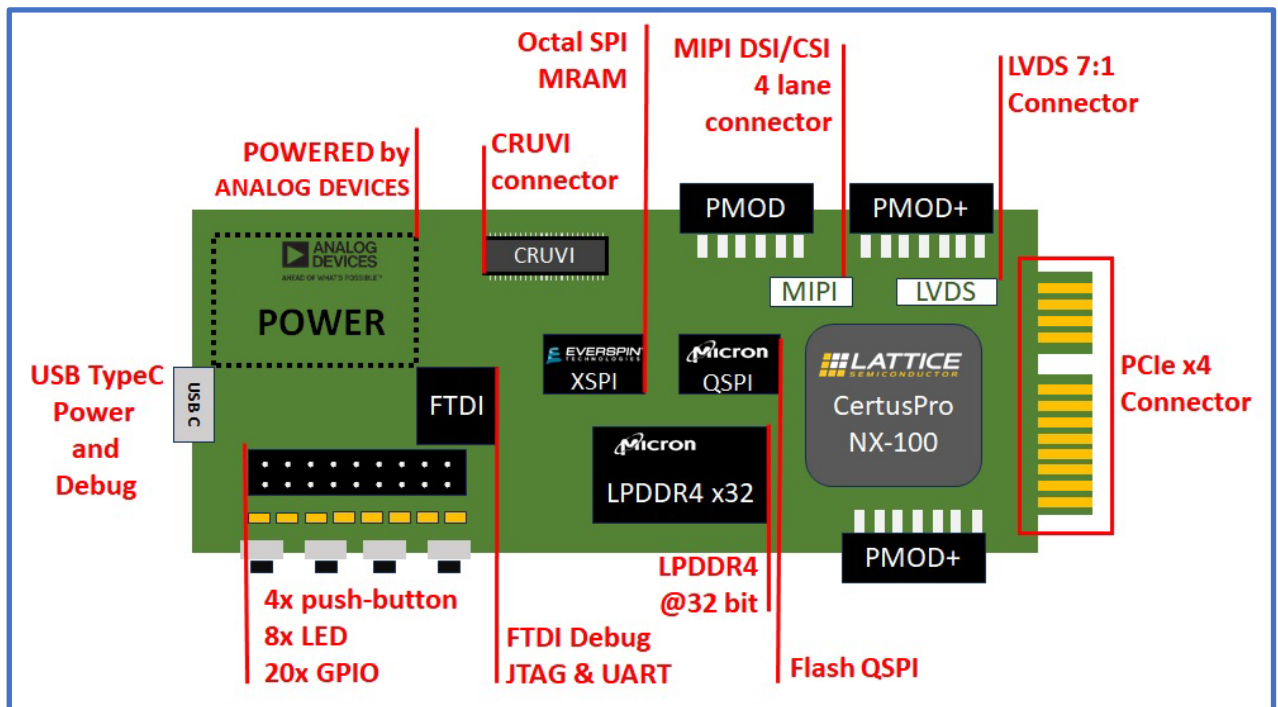


FIGURE 1 BLOCK DIAGRAM OF THE BOARD

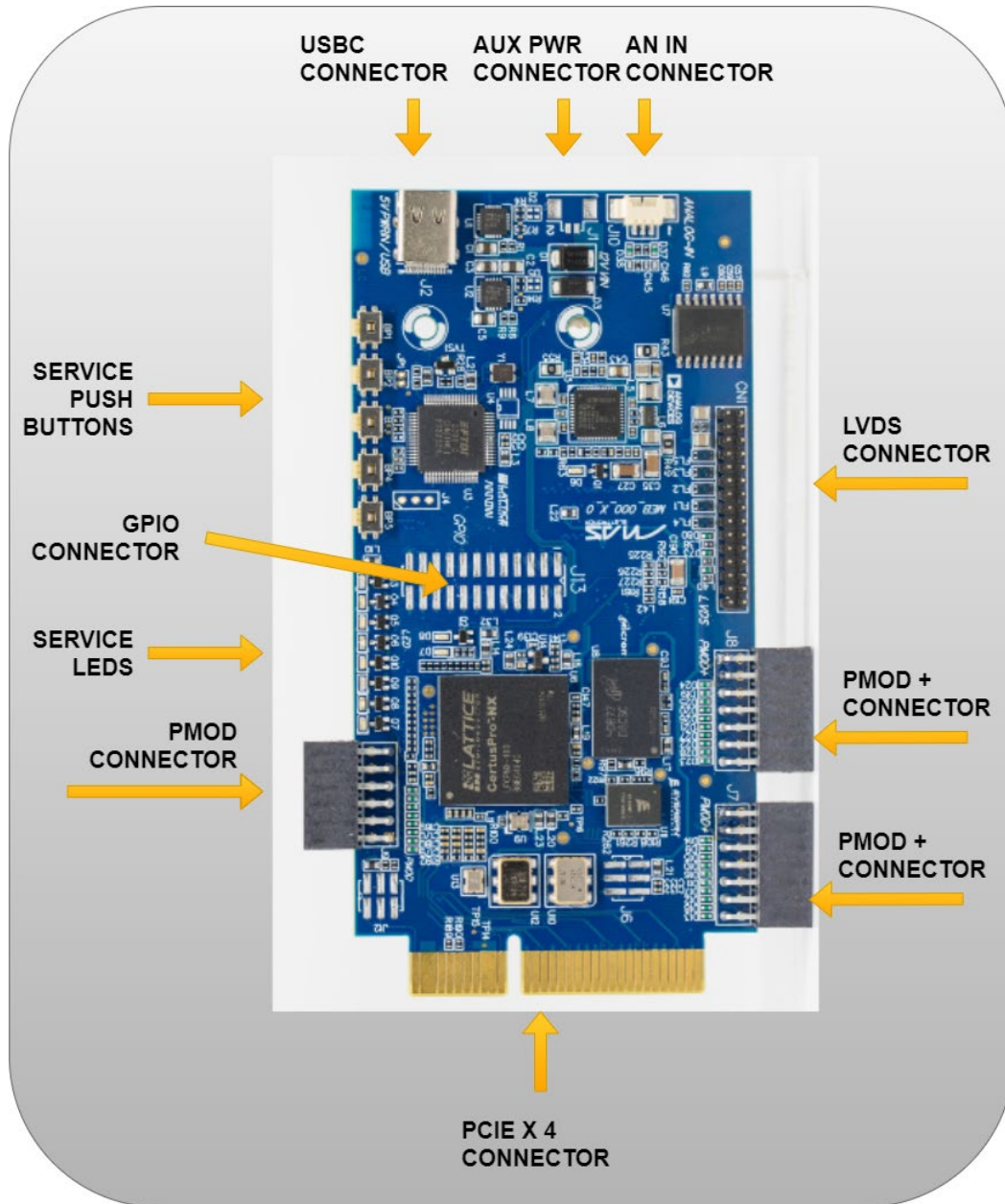


FIGURE 2 TOP OF THE BOARD

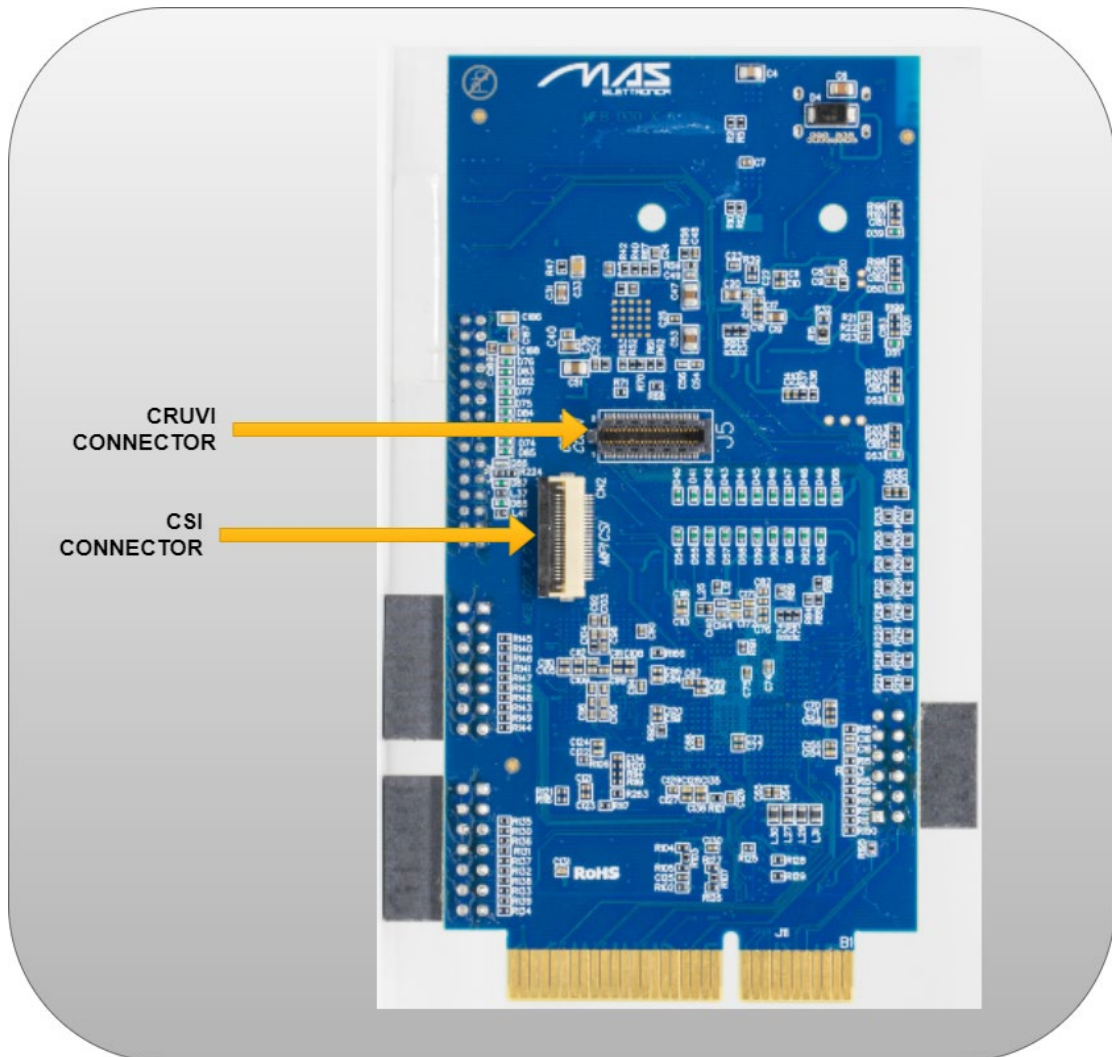


FIGURE 3 BOTTOM OF THE BOARD

2 Headers and Connections

Below are described the pinout of the connectors of the board:

J1 Auxiliary Power connector

J1 is the Auxiliary connector PN is 53261-0271 Molex

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
12V Power IN	1	12V power IN	P	12V	12V		
Ground	2	Ground	P				

J2 USBC connector

J2 is a USBC CONN RCP USB3.1 TYPEC 24P SMD RA WURTH 632723300011

Name	Pin #	Description	I/O Type	I/O Level	Power Do-main	PIN FPGA	Comments
GND	A1,A12,B1,B12	GROUND	P				
VBUS	A4,A9,B4,B9	5V POWER SUPPLY FROM USB	P	TTL	5V		
USB_DM	A7,B7	Test Data Output	S	TTL	USB	-	Connected to FTDI
USB_DP	A6,B6	Test Data Input	S	TTL	USB	-	Connected to FTDI
NC	A2,A3,B2,B3,A8,B8,A10,A11,B10,B11	NC					
CC1,CC2	A5,B5	PULLDOWN TO GROUND	P				

J4 Bank FPGA PROGRAMN JUMPER

J4 is a Header 2 pin 2,54mm pitch Samtec Part number TLW-102-05-G-S

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
FPGA_PRO-GRAM	1	FPGA RELOAD OF BIT STREAM	I/O			C20	
GND	2	GROUND	P			-	

J5 CRUVI connector

J5 is a Header 2x30 0,4 mm pitch Samtec Part number SS4-30-3.00-L-D-K-TR

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	4,9	3V3 POWER SUPPLY	P			-	
GND	12,13,18,19,24,25,30,31,37,42,43,48,49,54	Ground signal	P				
CRUVI_1	1	CRUVI GENERIC GPIO	S	TTL	3V3	G7	
CRUVI_2	2	CRUVI GENERIC GPIO	S	TTL	3V3	L8	
CRUVI_3	3	CRUVI GENERIC GPIO	S	TTL	3V3	G6	
CRUVI_5	5	CRUVI GENERIC GPIO	S	TTL	3V3	H8	
CRUVI_6	6	CRUVI GENERIC GPIO	S	TTL	3V3	K8	
CRUVI_7	7	CRUVI GENERIC GPIO	S	TTL	3V3	H7	
CRUVI_8	8	CRUVI GENERIC GPIO	S	TTL	3V3	K4	
CRUVI_10	10	CRUVI GENERIC GPIO	S	TTL	3V3	K3	
CRUVI_11	11	CRUVI GENERIC GPIO	S	TTL	3V3	G5	
CRUVI_14	14	CRUVI GENERIC GPIO	S	TTL	3V3	K2	
CRUVI_15	15	CRUVI GENERIC GPIO	S	TTL	3V3	H6	

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
CRUVI_16	16	CRUVI GENERIC GPIO	S	TTL	3V3	K1	
CRUVI_17	17	CRUVI GENERIC GPIO	S	TTL	3V3	H5	
CRUVI_20	20	CRUVI GENERIC GPIO	S	TTL	3V3	L11	
CRUVI_21	21	CRUVI GENERIC GPIO	S	TTL	3V3	H4	
CRUVI_22	22	CRUVI GENERIC GPIO	S	TTL	3V3	L10	
CRUVI_23	23	CRUVI GENERIC GPIO	S	TTL	3V3	H1	
CRUVI_26	26	CRUVI GENERIC GPIO	S	TTL	3V3	L9	
CRUVI_27	27	CRUVI GENERIC GPIO	S	TTL	3V3	J1	
CRUVI_28	28	CRUVI GENERIC GPIO	S	TTL	3V3	M8	
CRUVI_29	29	CRUVI GENERIC GPIO	S	TTL	3V3	J9	
CRUVI_32	32	CRUVI GENERIC GPIO	S	TTL	3V3	K6	
CRUVI_33	33	CRUVI GENERIC GPIO	S	TTL	3V3	J8	
CRUVI_34	34	CRUVI GENERIC GPIO	S	TTL	3V3	L6	
CRUVI_35	35	CRUVI GENERIC GPIO	S	TTL	3V3	J7	
VADJ	36	ADJ POWER	S	P	VBANK7		programmable
CRUVI_38	38	CRUVI GENERIC GPIO	S	TTL	3V3	L5	
CRUVI_39	39	CRUVI GENERIC GPIO	S	TTL	3V3	J6	
CRUVI_40	40	CRUVI GENERIC GPIO	S	TTL	3V3	L4	
CRUVI_41	41	CRUVI GENERIC GPIO	S	TTL	3V3	J3	
CRUVI_44	44	CRUVI GENERIC GPIO	S	TTL	3V3	L3	
CRUVI_45	45	CRUVI GENERIC GPIO	S	TTL	3V3	J2	

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
CRUVI_46	46	CRUVI GENERIC GPIO	S	TTL	3V3	L2	
CRUVI_47	47	CRUVI GENERIC GPIO	S	TTL	3V3	K10	
CRUVI_50	50	CRUVI GENERIC GPIO	S	TTL	3V3	L1	
CRUVI_52	52	CRUVI GENERIC GPIO	S	TTL	3V3	M1	
CRUVI_56	56	CRUVI GENERIC GPIO	S	TTL	3V3	M2	
CRUVI_58	58	CRUVI GENERIC GPIO	S	TTL	3V3	M3	
NC	51,53,55,57,59,60						

J6 Bank7 Voltage Select

J6 is a Header 6 pin 2,54mm pitch TE connectivity Part number 1241050-3

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	1	3V3 POWER (DEFAULT)	P			-	
1V8	3	1V8 POWER	P				
1V1	5	1V1 POWER	P				
VCCIO_7	2,4,6	POWER TO BANK 7	P			K5,J4	

J7 PMOD+ CONNECTOR

J7 is a Socket 2x7 2,54mm pitch SAMTECH Part number SSW-107-22-F-D-RA

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
PMODP1_0	5	Pomod plus gpio	S	TTL	3V3	M11	
PMODP1_1	7	Pomod plus gpio	S	TTL	3V3	N1	
PMODP1_2	9	Pomod plus gpio	S	TTL	3V3	N2	
PMODP1_3	11	Pomod plus gpio	S	TTL	3V3	N3	
PMODP1_4	13	Pomod plus gpio	S	TTL	3V3	N4	
PMODP1_5	6	Pomod plus gpio	S	TTL	3V3	N5	
PMODP1_6	8	Pomod plus gpio	S	TTL	3V3	N6	
PMODP1_7	10	Pomod plus gpio	S	TTL	3V3	N7	
PMODP1_8	12	Pomod plus gpio	S	TTL	3V3	N8	
PMODP1_9	14	Pomod plus gpio	S	TTL	3V3	M9	
GND	3,4	Ground signal	P				
3V3	1,2	3V3 POWER SUPPLY	P			-	

J8 PMOD+ CONNECTOR

J8 is a Socket 2x7 2,54mm pitch SAMTECH Part number SSW-107-22-F-D-RA

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
PMODP2_0	5	Pomod plus gpio	S	TTL	3V3	N9	
PMODP2_1	7	Pomod plus gpio	S	TTL	3V3	P1	
PMODP2_2	9	Pomod plus gpio	S	TTL	3V3	P2	
PMODP2_3	11	Pomod plus gpio	S	TTL	3V3	P3	
PMODP2_4	13	Pomod plus gpio	S	TTL	3V3	P4	
PMODP2_5	6	Pomod plus gpio	S	TTL	3V3	P9	
PMODP2_6	8	Pomod plus gpio	S	TTL	3V3	P8	
PMODP2_7	10	Pomod plus gpio	S	TTL	3V3	N10	
PMODP2_8	12	Pomod plus gpio	S	TTL	3V3	P10	
PMODP2_9	14	Pomod plus gpio	S	TTL	3V3	R1	
GND	3,4	Ground signal	P				
3V3	1,2	3V3 POWER SUPPLY	P			-	

J9 PMOD CONNECTOR

J9 is a Socket 2x6 2,54mm pitch SAMTECH Part number SSW-106-22-F-D-RA

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
PMOD_0	5	Pomod plus gpio	S	TTL	3V3	R3	
PMOD_1	7	Pomod plus gpio	S	TTL	3V3	R4	
PMOD_2	9	Pomod plus gpio	S	TTL	3V3	R5	
PMOD_3	11	Pomod plus gpio	S	TTL	3V3	R6	
PMOD_4	13	Pomod plus gpio	S	TTL	3V3	R7	
PMOD_5	6	Pomod plus gpio	S	TTL	3V3	T7	
PMOD_6	8	Pomod plus gpio	S	TTL	3V3	R8	
PMOD_7	10	Pomod plus gpio	S	TTL	3V3	R9	
GND	9,10	Ground signal	P				

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	11,12	3V3 POWER SUPPLY	P			-	

J10 Analog IN connector

J10 is the Analog In connector PN is 53261-0371Molex

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
Analog IN 1	1	ANALOG INP CH 0	Analog 1,1V			R14	
Analog IN 1	2	ANALOG INP CH 1	Analog 1,1V			R16	
Ground	3	Ground	P				

J11 PCIE X 4 PCB CONNECTOR

J11 is the Pcie x 4 PCB connector

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
A1	PCIE_EC_PRSENT1N	PCIE PRESENT1	3V3				
A2	12V_IN_PCIE	12V IN FROM PCIE	P				
A3	12V_IN_PCIE	12V IN FROM PCIE	P				
A4	GND						
A5	NC						
A6	NC						
A7	NC						
A8	NC						
A9	3V3_PCIE	3V3 FROM PCIE	P				
A10	3V3_PCIE	3V3 FROM PCIE	P				
A11	PCIE_RSTN	PCIE RSTN	3V3			L20	
A12	GND						
A13	F_PCIE_100MHz_P	100 Mhz REF CLK	LVTTTL			D7	
A14	F_PCIE_100MHz_N	100 Mhz REF CLK	LVTTTL			E7	
A15	GND		P				
A16	PCIE_TXD0_P	PCIE TX0 P	PCIE			B1	

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
A17	PCIE_TXD0_N	PCIE TX0 N	PCIE			C1	
A18	GND		P				
A19	NC						
A20	GND		P				
A21	PCIE_TXD1_P	PCIE TX1 P	PCIE			E1	
A22	PCIE_TXD1_N	PCIE TX1 N	PCIE			F1	
A23	GND		P				
A24	GND		P				
A25	PCIE_TXD2_P	PCIE TX2 P	PCIE			A2	
A26	PCIE_TXD2_N	PCIE TX2 N	PCIE			A3	
A27	GND		P				
A28	GND		P				
A29	PCIE_TXD3_P	PCIE TX3 P	PCIE			A5	
A30	PCIE_TXD3_N	PCIE TX3 N	PCIE			A6	
A31	GND		P				
A32	NC						
B1	12V_IN_PCIE	12V IN FROM PCIe	P				
B2	12V_IN_PCIE	12V IN FROM PCIe	P				
B3	12V_IN_PCIE	12V IN FROM PCIe	P				
B4	GND						
B5	PCIE_SMCLK		3V3			K20	
B6	PCIE_SMDATA		3V3			K21	
B7	GND		P				
B8	3V3_PCIE		P				
B9	PCIE_TRST	PCIE TRST	3V3			L18	
B10	NC						
B11	PCIE_WAKE	PCIE WAKE SIGNAL	3V3			L19	
B12	NC						
B13	GND		P				
B14	PCIE_RXD0_P		PCIE			E3	
B15	PCIE_RXD0_N		PCIE			D2	
B16	GND		P				

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
B17	PCIE_EC_PRSENT2N	PCIE PRESENT2	3V3				
B18	GND		P				
B19	PCIE_RXD1_P	PCIE RX1 P	PCIE			G2	
B20	PCIE_RXD1_N	PCIE RX1 N	PCIE			G3	
B21	GND		P				
B22	GND		P				
B23	PCIE_RXD2_P	PCIE RX2 P	PCIE			C3	
B24	PCIE_RXD2_N	PCIE RX2 N	PCIE			B4	
B25	GND		P				
B26	GND		P				
B27	PCIE_RXD3_P	PCIE RX3 P	PCIE			C6	
B28	PCIE_RXD3_N	PCIE RX3 N	PCIE			C5	
B29	GND		P				
B30	NC						
B31	PCIE_EC_PRSENT3N	PCIE PRESENT3	3V3				
B32	GND		P				

J12 PCIE PRESENT SELECTION

J12 is a Header 6 pin 2,54mm pitch TE connectivity Part number 1241050-3

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
PRSENT1N	1	PRESENT1 SIGNAL	3V3			-	
PRSENT3N	3	PRESENT3 SIGNAL	3V3				
PRSENT2N	2	PRESENT2 SIGNAL	3V3				
PCIE_RSTN	4	PCIE RESET SIGNAL					
GND	5,6		P				

J13 GPIO strip connector

J13 is a Header 2x12 2,00mm pitch

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	21,22	3V3 POWER SUPPLY	P			-	
GND	23,24	Ground signal	P				
GPIO_1	1	GPIO GENERIC FROM FPGA		3V3		M13	
GPIO_2	3	GPIO GENERIC FROM FPGA		3V3		N11	
GPIO_3	5	GPIO GENERIC FROM FPGA		3V3		N12	
GPIO_4	7	GPIO GENERIC FROM FPGA		3V3		N13	
GPIO_5	9	GPIO GENERIC FROM FPGA		3V3		N14	
GPIO_6	11	GPIO GENERIC FROM FPGA		3V3		N14	
GPIO_7	13	GPIO GENERIC FROM FPGA		3V3		N14	
GPIO_8	15	GPIO GENERIC FROM FPGA		3V3		M16	
GPIO_9	17	GPIO GENERIC FROM FPGA		3V3		M15	
GPIO_10	19	GPIO GENERIC FROM FPGA		3V3		N22	
GPIO_11	2	GPIO GENERIC FROM FPGA		3V3		N21	
GPIO_12	4	GPIO GENERIC FROM FPGA		3V3		P22	
GPIO_13	6	GPIO GENERIC FROM FPGA		3V3		P21	
GPIO_14	8	GPIO GENERIC FROM FPGA		3V3		P20	
GPIO_15	10	GPIO GENERIC FROM FPGA		3V3		R20	
GPIO_16	12	GPIO GENERIC FROM FPGA		3V3		P19	
GPIO_17	14	GPIO GENERIC FROM FPGA		3V3		P18	
GPIO_18	16	GPIO GENERIC FROM FPGA		3V3		P13	
GPIO_19	18	GPIO GENERIC FROM FPGA		3V3		P14	
GPIO_20	20	GPIO GENERIC FROM FPGA		3V3		R22	

J14 JTAG CONN

J14 is a Header 2x5 1,27mm pitch Samtec Part number SHF-105-01-L-D-TH

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
VCCIO_1	1	3V3 POWER SUPPLY	P			-	
GND	3,5	Ground signal	P				
NC	7,9,10	NC					
TMS	2	JTAGTEST MODE	3V3			G19	
TCK	4	JTAG CLK	3V3			H21	
TDO	6	JTAG TDO	3V3			J15	
TDI	8	JTAG TDI	3V3			H15	

CN1 LVDS CONN

CN1 is a Header 2x15 2mm pitch

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	1	3V3 Power supply	P	3V3			
3V3	2	3V3 Power supply	P	3V3			
3V3	3	3V3 Power supply	P	3V3			
5V	4	5V Power supply	P	5V			
GND	5	Ground signal	P	GND			
GND	6	Ground signal	P	GND			
LVDS_DSI_0_0_N	7	LVDS CHANNEL 0 NEGATIVE SIGNAL	OUT	LVDS		Y5	
LVDS_DSI_0_0_P	8	LVDS CHANNEL 0 POSITIVE SIGNAL	OUT	LVDS		W5	
LVDS_DSI_0_1_N	9	LVDS CHANNEL 1 NEGATIVE SIGNAL	OUT	LVDS		Y3	
LVDS_DSI_0_1_P	10	LVDS CHANNEL 1 POSITIVE SIGNAL	OUT	LVDS		W3	
LVDS_DSI_0_2_N	11	LVDS CHANNEL 0 DATA 2 NEGATIVE SIGNAL	OUT	LVDS		U6	
LVDS_DSI_0_2_P	12	LVDS CHANNEL 0 DATA 2 POSITIVE SIGNAL	OUT	LVDS		T6	
GND	13	Ground signal	P	GND			
GND	14	Ground signal	P	GND			

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
LVDS_DSI_0_CK_N	15	LVDS CHANNEL 0 CLOCK NEGATIVE SIGNAL	OUT	LVDS		T5	
LVDS_DSI_0_CK_P	16	LVDS CHANNEL 0 CLOCK POSITIVE SIGNAL	OUT	LVDS		U5	
LVDS_DSI_0_3_N	17	LVDS CHANNEL 3 NEGATIVE SIGNAL	OUT	LVDS		U4	
LVDS_DSI_0_3_P	18	LVDS CHANNEL 3 POSITIVE SIGNAL	OUT	LVDS		T4	
I2C_LCD0_DAT_3V3	19	I2C DATA FOR DISPLAY	I/O	3V3		G20	
I2C_LCD0_CLK_3V3	20	I2C CLOCK FOR DISPLAY	I/O	3V3		H20	
TS RESET	21	TOUCH SCREEN RST	OUT	3V3		K17	
INT0	22	GPIO FOR TOUCH INTERRUPT	IN	3V3		H22	
LCD0_BKLT_PWM	23	PWM FOR BACKLIGHT CONTROL	OUT	3V3		J17	
LCD0_BKLT_EN	24	BACKLIGHT ENABLE	OUT	3V3		J16	
NC	25,26,27,8,29,30	Non connesso		Non connesso			

CN2 CSI-2 strip connector

CN2 is a ZIF 22 PIN CONNECTOR

Name	Pin #	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
3V3	1	3V3 POWER SUPPLY	P			-	
GND	4,7,10,13,16,19,22	Ground signal	P				
I2C_SCL_ADAPTER	3	I2C clock to sensor	S	TTL	1V8/3V3	M20	
CAM_RESET#	4	Sensor reset#	S	TTL	1V8/3V3	M17	
I2C_SDA_ADAPTER	2	I2C data to sensor	S	TTL	1V8/3V3	N20	
CAM0_CONN_MCLK	5	Sensor Master clock	S	TTL	1V8/3V3	M22	
MIPI_PPHY0_CKP	14	Mipi clock positive signal	S	MIPI	1V2	Y21	
MIPI_PPHY0_CKN	15	Mipi clock negative signal	S	MIPI	1V2	AA21	
MIPI_PPHY0_DP0	20	Mipi data 0 positive signal	S	MIPI	1V2	Y19	
MIPI_PPHY0_DN0	21	Mipi data 0 negative signal	S	MIPI	1V2	Y18	
MIPI_PPHY0_DP1	17	Mipi data1 positive signal	S	MIPI	1V2	AA18	
MIPI_PPHY0_DN1	18	Mipi data1 negative signal	S	MIPI	1V2	AA17	
MIPI_PPHY0_DP2	11	Mipi data 2 positive signal	S	MIPI	1V2	W19	
MIPI_PPHY0_DN2	12	Mipi data 2 negative signal	S	MIPI	1V2	W18	
MIPI_PPHY0_DP3	8	Mipi data 3 positive signal	S	MIPI	1V2	AB21	
MIPI_PPHY0_DN3	9	Mipi data 3 negative signal	S	MIPI	1V2	AB20	

LEDS AND BUTTONS

LED connections are made through a MOS:

Name	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
GPIO_LED1	Connected to led LED1	S	TTL	3V3	K12	Active high
GPIO_LED2	Connected to led LED2	S	TTL	3V3	K11	Active high
GPIO_LED3	Connected to led LED3	S	TTL	3V3	K14	Active high
GPIO_LED4	Connected to led LED4	S	TTL	3V3	K15	Active high
GPIO_LED5	Connected to led LED5	S	TTL	3V3	K19	Active high
GPIO_LED6	Connected to led LED6	S	TTL	3V3	K13	Active high
GPIO_LED7	Connected to led LED7	S	TTL	3V3	J20	Active high
GPIO_LED8	Connected to led LED8	S	TTL	3V3	K18	Active high

Service buttons connections are made directly :

Name	Description	I/O Type	I/O Level	Power Domain	PIN FPGA	Comments
PB1	Active low user button	S	TTL	3V3	J13	Active low
PB2	Active low user button	S	TTL	3V3	J22	Active low
PB3	Active low user button	S	TTL	3V3	J21	Active low
PB4	Active low user button	S	TTL	3V3	J19	Active low

Further Information

The following references provide detailed information on the
MAS_EDB_CERTUS_PRO_NX ED BOARD:

- Appendix A. [MAS_EDB_CERTUS_PRO_NX_ED_Board_Schematics](#)
- Appendix B. [MAS_EDB_CERTUS_PRO_NX_ED_Board_Mount](#)
- Appendix C. [MAS_EDB_CERTUS_PRO_NX_ED_Board_Bill_of_Materials](#)
- Appendix C. [MAS_EDB_CERTUS_PRO_NX_ED_Board_accessories](#)
- <https://www.latticesemi.com/en/Products/FPGAandCPLD/CertusPro-NX>
for details on the CERTUS PRO-NX FPGA
- More info can be found at <https://maselettronica.com/>

3.0 Power supply diagram

Below is the power supply diagram of the board:

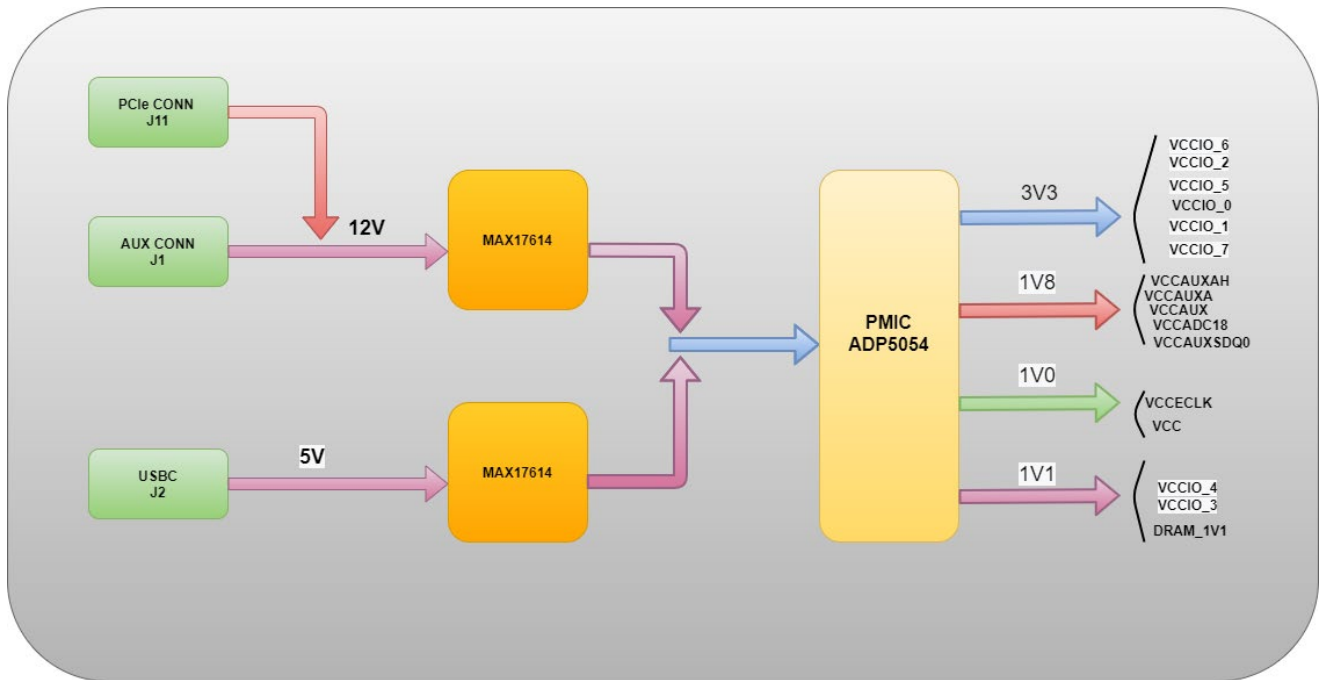


Figure 4 Power Diagram of the Board

4.0 Board Clock sources

MAS_EDB Certus PRO NX Board has three clock sources for the CertusPro-NX FPGA. Refer to Table 4.1 and Figure 4.1 for more details regarding the clock sources.

Clock Frequency	Signal Name	Clock Sources	CertusPro-NX Ball	Type
125 MHz	125MHZ_LVDS_CLK_SE	U23	L12	Single Ended
125 MHz	125MHZ_LVDS_CLKP 125MHZ_LVDS_CLKN	U10	T2/U2	Differential
100 MHz	LVDS_CLKP LVDS_CLKN	U12	U3/T3	Differential
50 MHz	N17197127	U13	M10	Single Ended

5.0 I2C,UART AND SPI

This section describes the topology of the various configuration and communication buses.

5.1 I²C Topology

MAS_EDB Certus PRO NX Board uses the I2C bus to support CertusPro-NX configuration. The I2C bus has the signal names I2C_LCD0_DAT and I2C_LCD0_CK. And are located on the CN1 connector for a touch screen.

I²C Bus Connections

Signal Name	CertusPro-NX Ball Location	CN1 Location
I2C_LCD0_DAT	G20	19
I2C_LCD0_CK	H20	20

5.2 UART Topology

The board provides one UART communication interface by providing a flexible connection between the CertusPro-NX device and FTDI chip.

UART Bus Connections

Signal Name	CertusPro-NX Ball Location	FTDI Chip Ball Location
UART_TX	D18	38
UART_RX	D19	39

Note: The signal name and ball location refer to the FTDI chip perspective. When assigning the pins in Radiant, make sure the UART soft IP TX signal is connected to pin D19 (UART_RX). Repeat the same process for the RX signal.

5.3 SPI Topology

SPI Configuration

One of the major functions of SPI connections on the board is to support CertusPro-NX configuration from the SPI Flash MT25QL512A as shown in Table 6.3. The CertusPro-NX Versa Evaluation Board can support both Master SPI (MSPI) and Slave SPI (SSPI) modes for CertusPro-NX configuration.

Signal Name	CertusPro-NX Ball
FPGA_MCLK	F15
FPGA_MOSI	E18
FPGA_MISO	C21
FPGA_CSN	F17
FPGA_MD2	C22
FPGA_MD3	E16

Table 6.3. SPI Bus Connections

6 Programming the board

6.1 Fast Programming

MAS_EDB Certus PRO NX ED Board has the programmer on board. Is a FT232H device.

6.2 Programming the device

6.3 Programming the FPGA

Use the Process Toolbar to generate files for exporting. One of the files exported will be a bitstream file (.bit) that can be used to program an actual CrossLink-NX device on a circuit board.

6.4 Generating the Bitstream

The final step in the Process Toolbar is Export Files. This generates the bitstream file used to program the FPGA.

To generate files for export:

1. In the Process Toolbar, click **Export Files**. The Radiant software generates the bitstream file and saves it in the directory of the implementation.
2. In the Reports view, check that the timing errors are gone.
3. Click **Export Reports** and examine the available reports.


At the end of the Bitstream report is the pathname of the bitstream file.

4. In the File List view, right-click on impl_1 and choose **Open Containing Folder**. A window opens showing the contents of the impl_1 folder.
5. Look for a file named **CLNXtutorial_impl_1.bit**.
6. Close the impl_1 folder window.

6.5 Downloading the Bitstream

This task requires that you have a CertusPro-NX Educational Board. In this section, you will use the Radiant Programmer to download a bitstream to a CertusPro-NX FPGA.

To download the bitstream to the FPGA on the board:

1. Connect the USB cable from your computer to the CertusPro-NX Evaluation Board. Give the computer a few seconds to detect the USB device.
2. Choose **Tools >**  **Programmer**.
The Radiant Programmer opens in a separate window. In the File List view, source/impl_1.xcf appears under Programming Files.
3. In the Cable Setup box, under the **Detect Cable** button, you should see:
 - ▶ Cable: HW-USBN-2B (FTDI) The board uses an FTDI USB2-type of cable.
 - ▶ Port: FTUSB-<number>

Ports for this type of cable are labeled FTUSB-<number>. The number is assigned based on the USB port address.

Click **Detect Cable**. In the Programmer dialog box, choose FTUSB-0, as shown in [Figure 5](#).

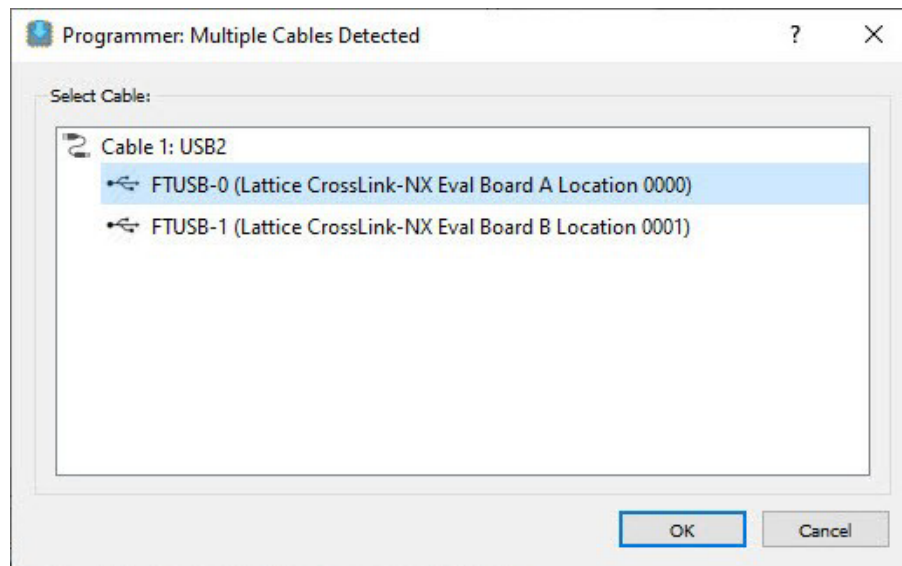



Figure 5: Programmer Dialog Box

4. Choose **Run** >  **Scan Device**.

A progress bar appears while Programmer scans the board. This will take a moment.

When the scan is done, the spreadsheet view changes to show “LFCPNX” and “LFCPNX-100.” Also, the spreadsheet view splits to show a diagram of the connection between your computer and the FPGA. You may have to expand the Programmer window to see the whole diagram.

5. Click on row 1 in the spreadsheet and choose **Edit** >  **Device**

Properties. The Device Properties dialog box opens.

6. Ensure the settings are as follows:

- ▶ Target Memory: **Static Random Access Memory (SRAM)**
- ▶ Port Interface: **JTAG**
- ▶ Access Mode: **Direct Programming**
- ▶ Operation: **Fast Program**
- ▶ Programming file: `<project_path>/impl_1/CLNXtutorial_impl_1.bit`

- ▶ Password Protection Options: cleared (*not* selected)

The Device Properties dialog box should resemble [Figure 6](#).

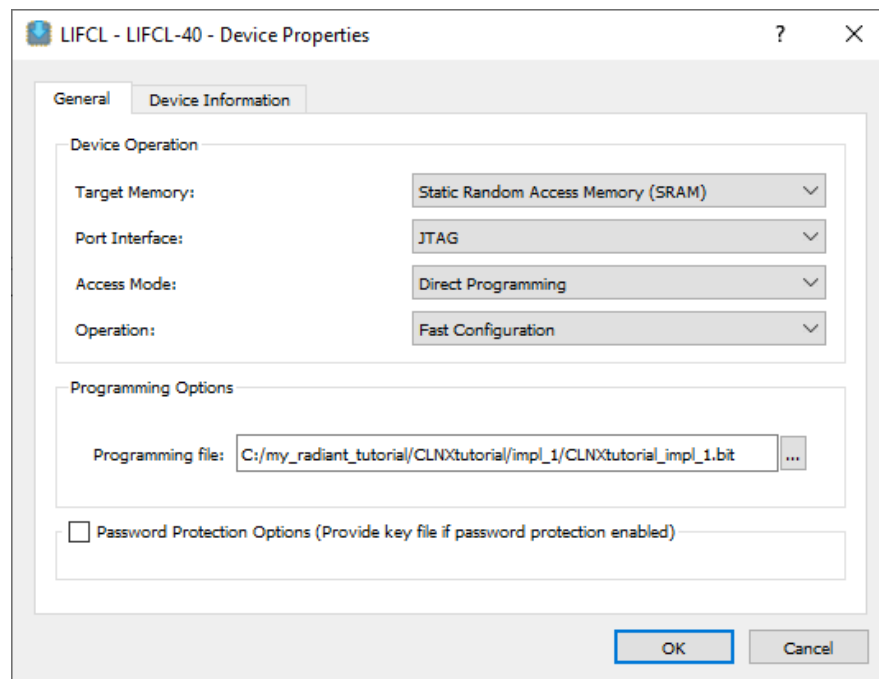


Figure 6: Device Properties Dialog Box

7. Click **OK**.
8. In Programmer, choose **Run** >  **Program Device**.

A processing bar appears. Programming takes a few moments. In the Output view, info messages appear. On the board, the blinking lights stop as the boot-up design is erased.

When the programming is done, "PASS" appears in the Status column.

9. Close Programmer.

A dialog box opens asking if you want to save changes.

10. Click **Yes**.

6.6 SPI Flash Device Selection in Programmer

The Flash device on this board is a Micron MT25QL512ABB8ESF-0SIT which is powered by default to 3.3 V. Flash device programming is discussed in more detail in [sysCONFIG Usage Guide for Nexus Platform \(FPGA-TN-02099\)](#).

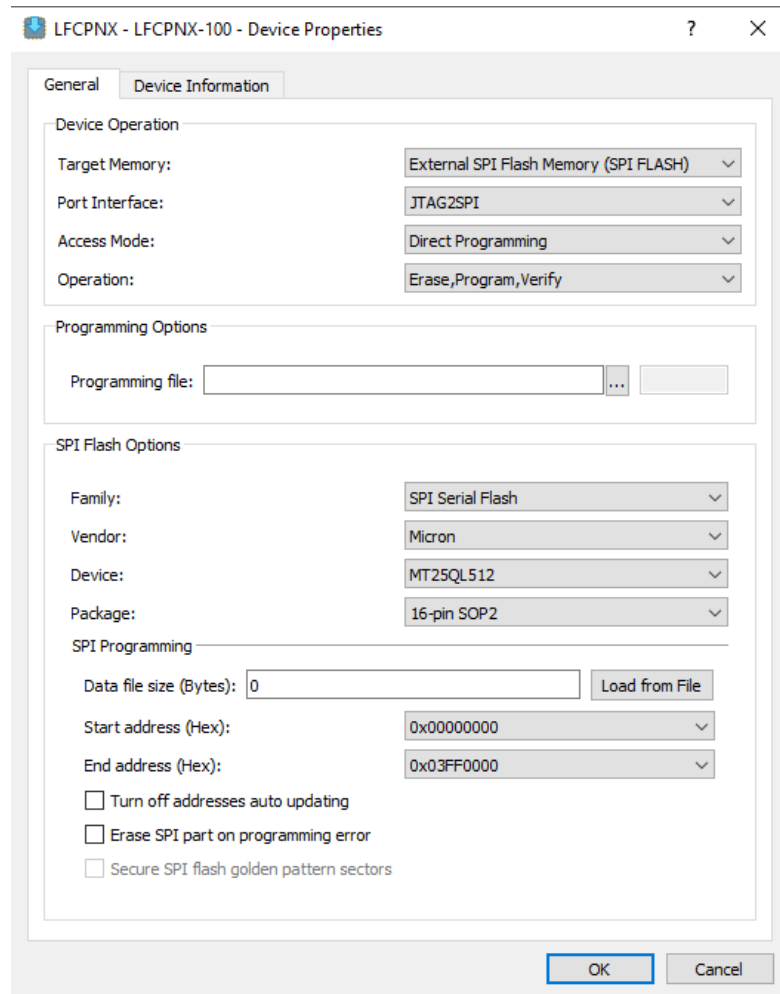


Figure 7: Device Properties Dialog Box


6.7 Programming the FPGA

This section guides you through the process of uploading the bit file in SPI Flash.

Follow the instructions below. To program the .bit file, you need to install Lattice Radiant 2.2 or later versions.

Note: The software programs are available at

<http://www.latticesemi.com/en/Products/DesignSoftwareAndIP>. The software programs are available for download only if you log into your account at this website.

1. Connect the USB Cable to the J2 connector of the MAS_EDB Certus PRO NX
2. If the Radiant project is already opened in Lattice Radiant software, click the Radiant Programmer icon  from the toolbar. If the project is not opened, click the Windows Start menu and choose Radiant Programmer to open the stand-alone Radiant Programmer. The Radiant Programmer - Getting Started dialog pops up (Figure 3.3). The default project name is Untitled. Enter a desired project name and browse to choose the project location from the Project Location area. Click OK.

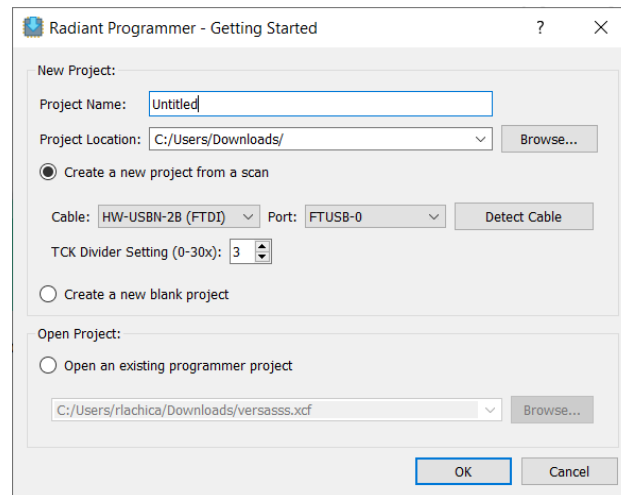


Figure 8. Stand-alone Radiant Programmer Opened from Windows Start Menu

3. You can see the selected project opened in the Programmer.

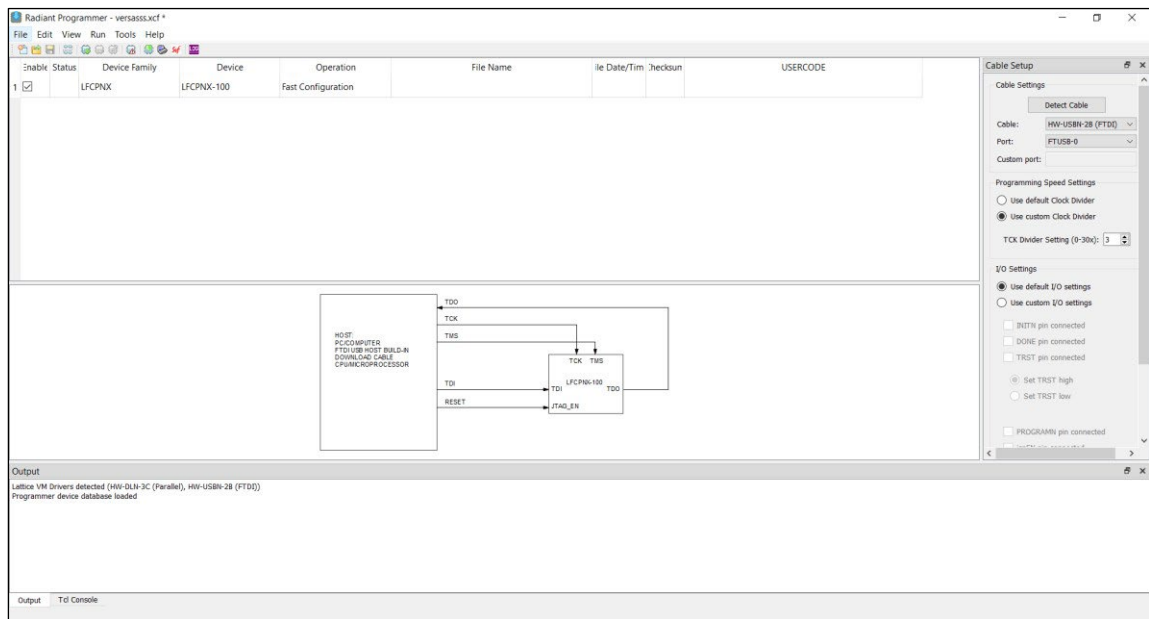


Figure 9 Radiant Programmer Opened from Windows Start Menu

4. If the settings you see are not the same as those shown in Figure 3.5, manually make changes and make settings (device family, device, and so on) the same as those shown in figure 10



Figure 10

5. Click on **Fast Configuration** from the **Operation** column figure 10. The **Device Properties** dialog pops up figure 11 Change the **Target Memory** settings using the drop-down menu, and then you can see the device properties settings exactly as those shown in figure 11

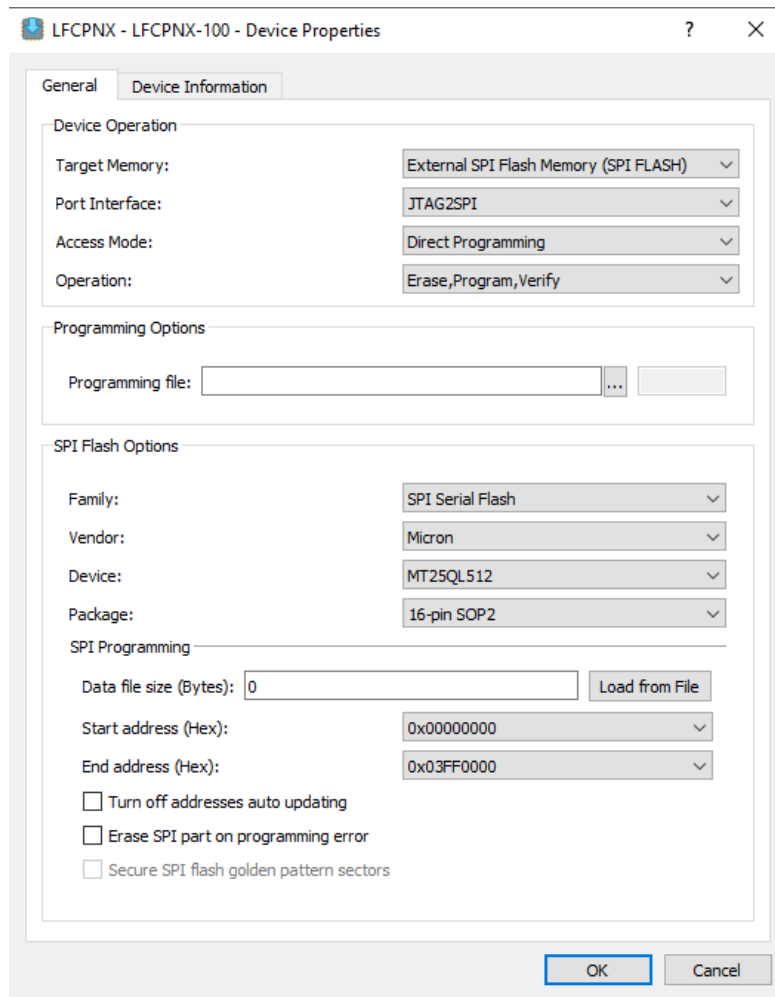


Figure 11. Device Properties Dialog for SPI Flash Programming Setting


6. Browse to choose the programming file “LFCPNX_100_PCIe_Basic_Demo”.bit figure 11
7. Click OK.
8. Click the Program Device icon  from the toolbar figure 12 to start the programming.



Figure13. Programmer Toolbar

9. Check the Output console for the status of the programming. You should see Operation: Successful, as shown in figure 14



Figure 14. Programmer Output Window

10. If there is any issue or problem, refer to the Troubleshooting section for more details.
11. After programming, power cycle the board.

7 Power

7.1 Supply Voltage

Name	Description	I/O Type	Min	Typ	Max	Unit
12V	12V Main power supply PCIe or auxiliary connector	Input	11.5	12.0	12.5	V
5V	5V through USBC	Input	4.75	5.0	5.25	V
3V3	3V3 internal supply	Input	3.0	3.3	3.6	V
1V8	1V8 internal supply	Input	1.7	1.8	1.9	V
1V2	1V2 internal supply	Input	1.14	1.2	1.26	V
1V0	1V0 internal supply	Input	0.95	1.0	1.05	V

7.2 Mechanical and Environmental

Form Factor

Dimension

162mm x 98mm

Operating Temperature

Standard: 0°C to +60°C

Rugged: -20°C to +85°C (optional)

Humidity

5-90% RH operating, non-condensing

5-95% RH storage

Ordering Information

ORDERING CODE	DESCRIPTION	COMMENTS
EDB_000_0_1	Full feature board	Standard product
EDB_000_1_1	Board without connectors	Available upon request


Appendix A Schematics of the MAS_EDB CERTUS PRO NX ED Board

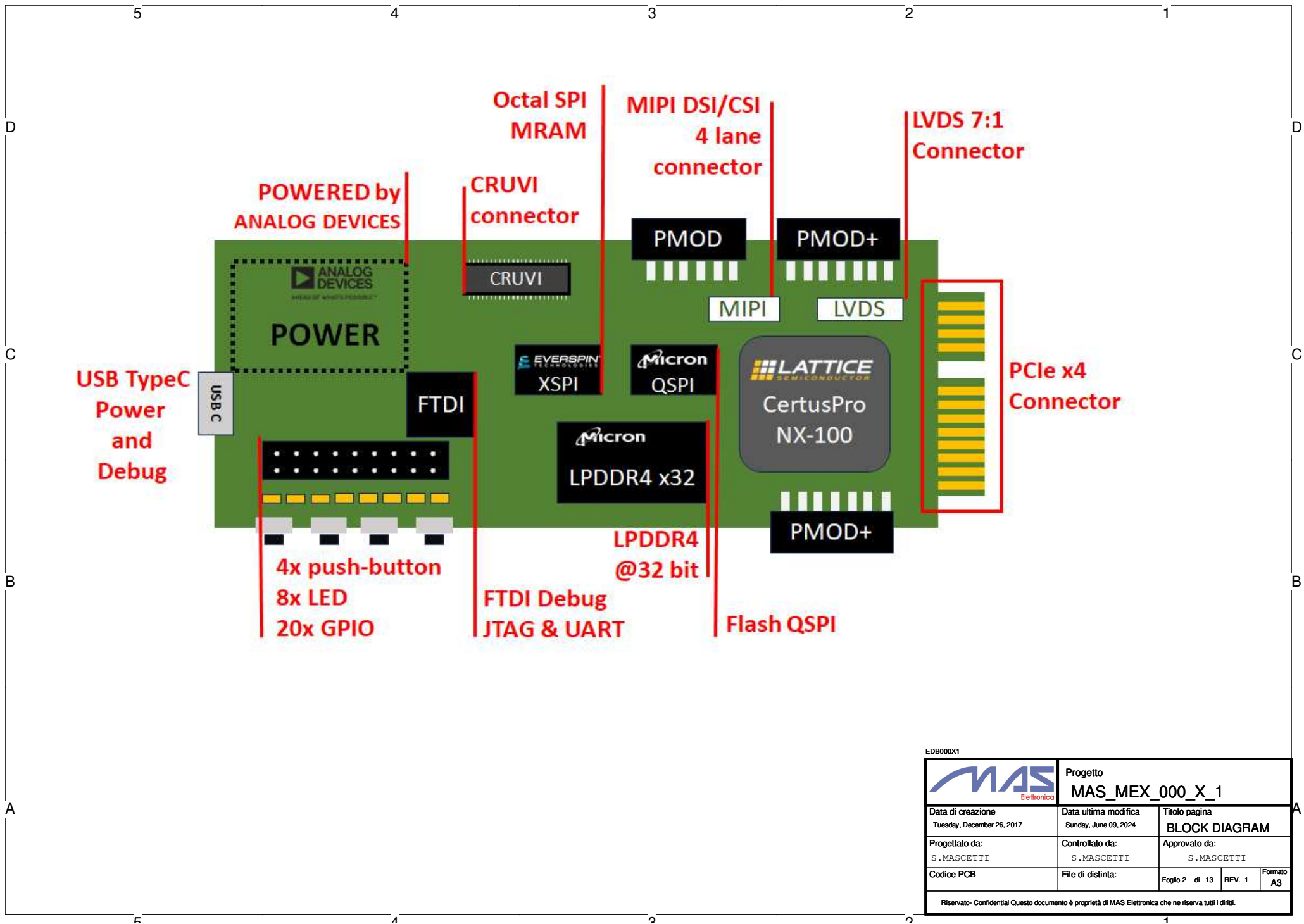
MAS CERTUS PRO NX EDUCATIONAL BOARD

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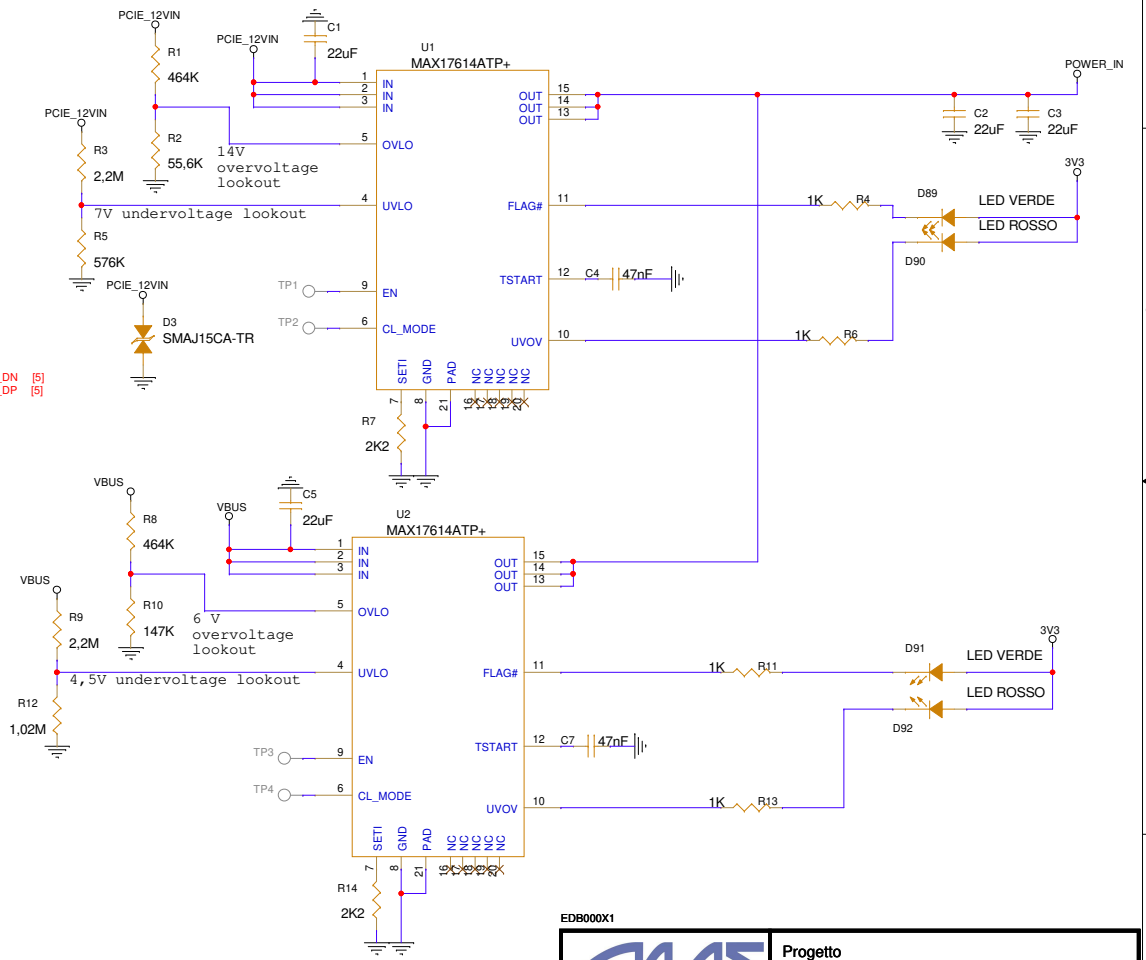
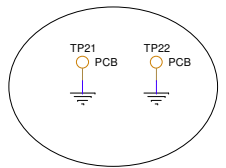
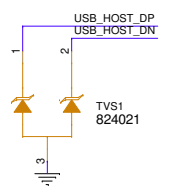
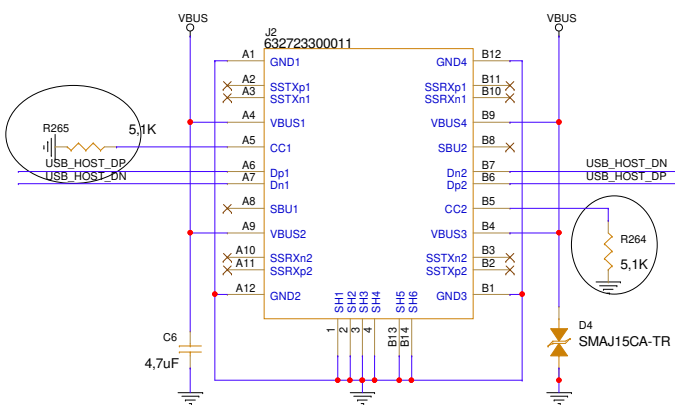
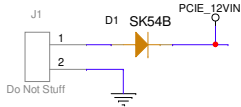
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1	10/06/2024	S.M.	FIRST RELEASE OF SCHEMATICS

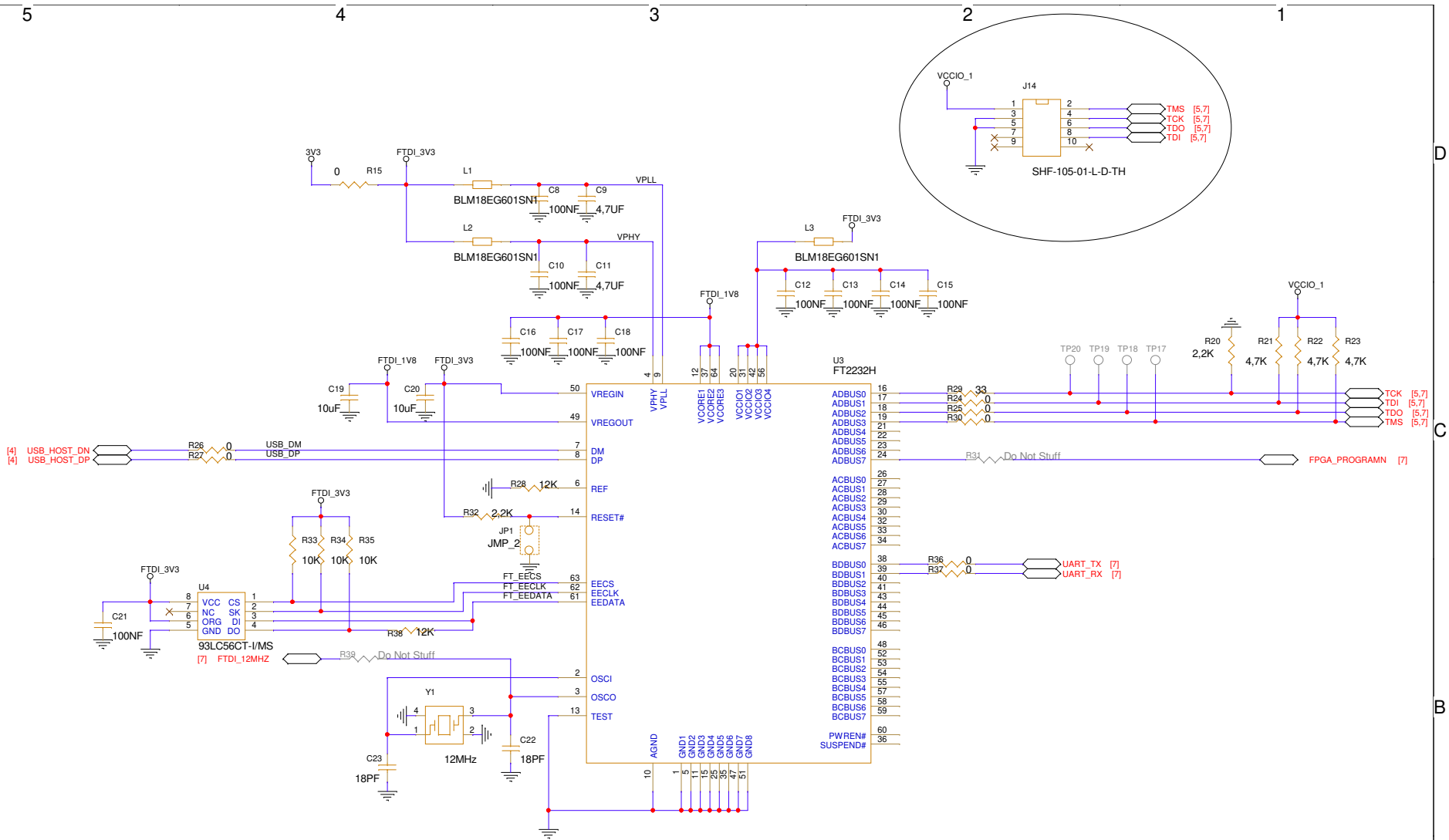
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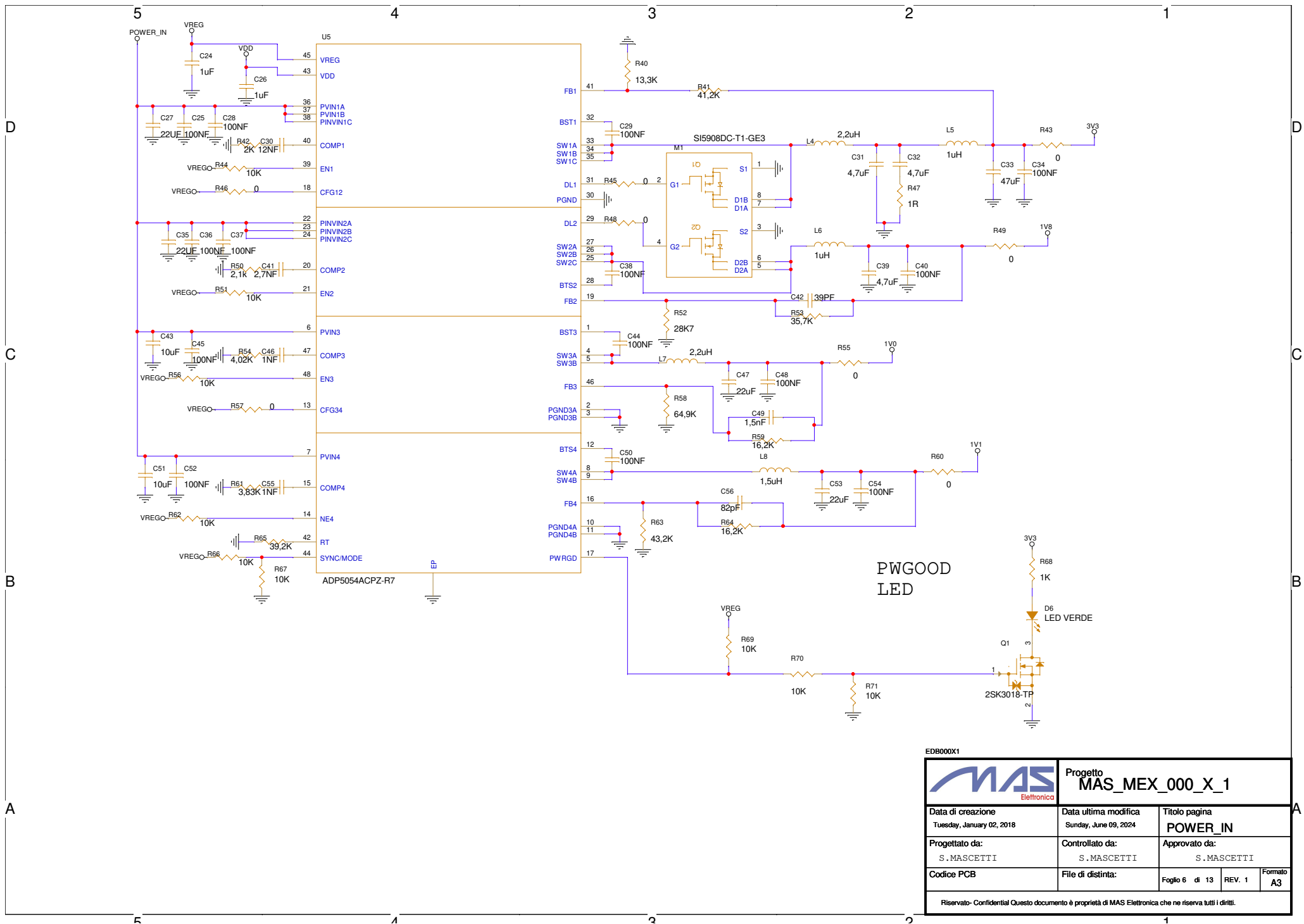


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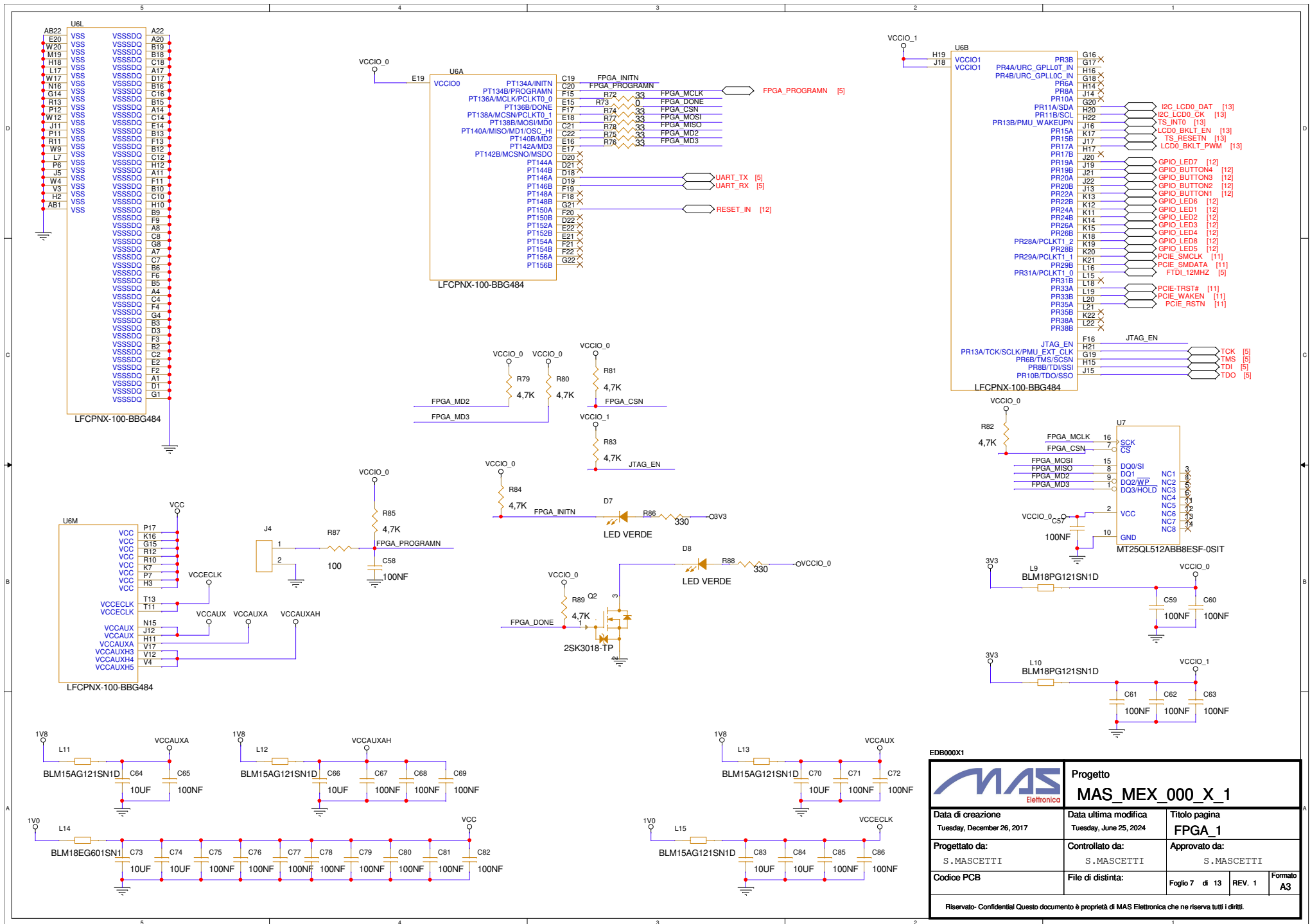
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VT2 Do Not Stuff

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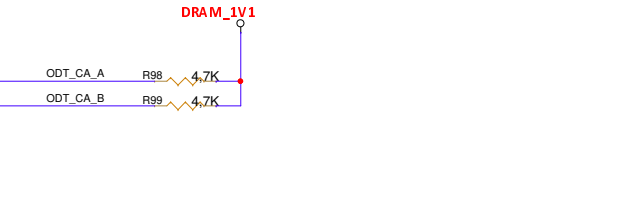
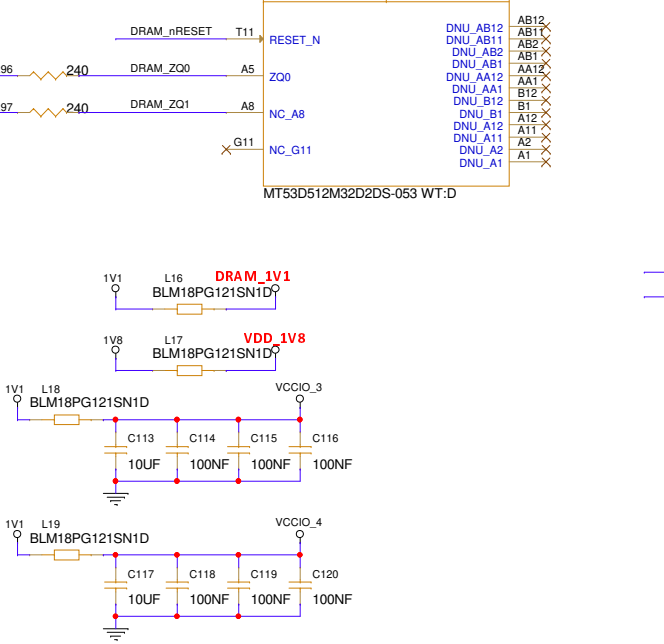
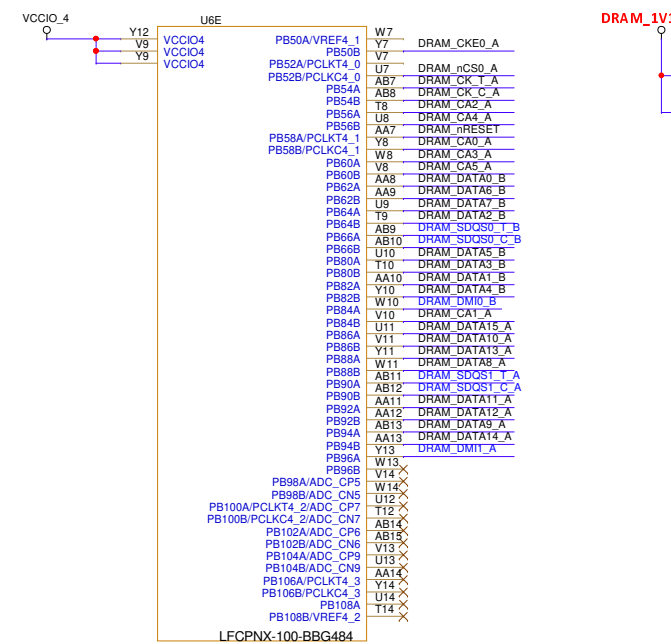
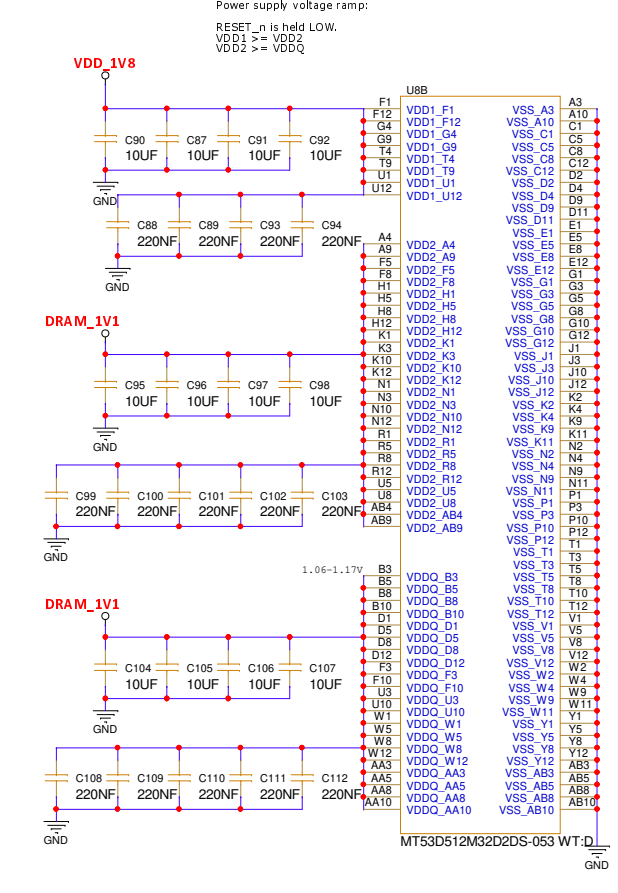
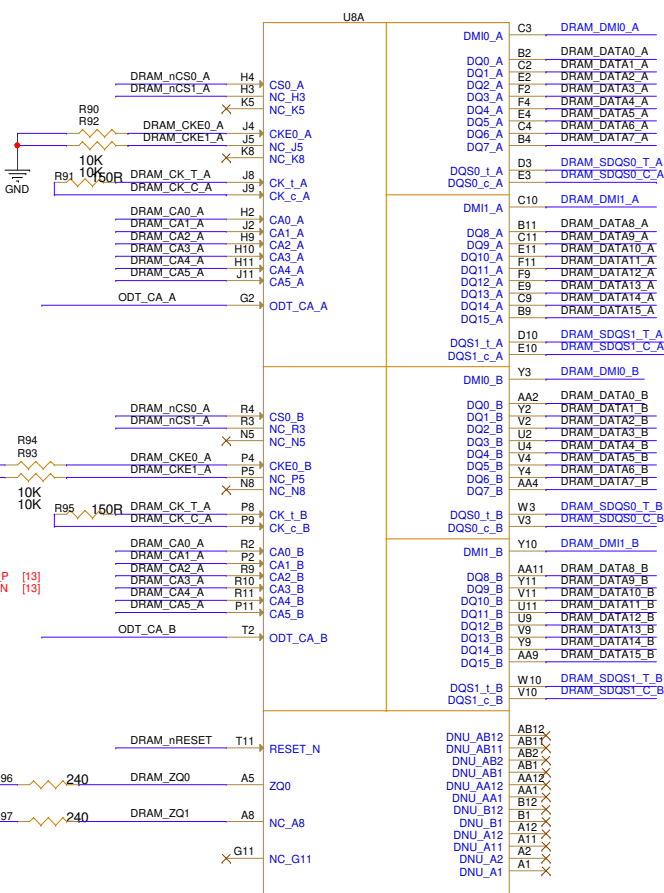
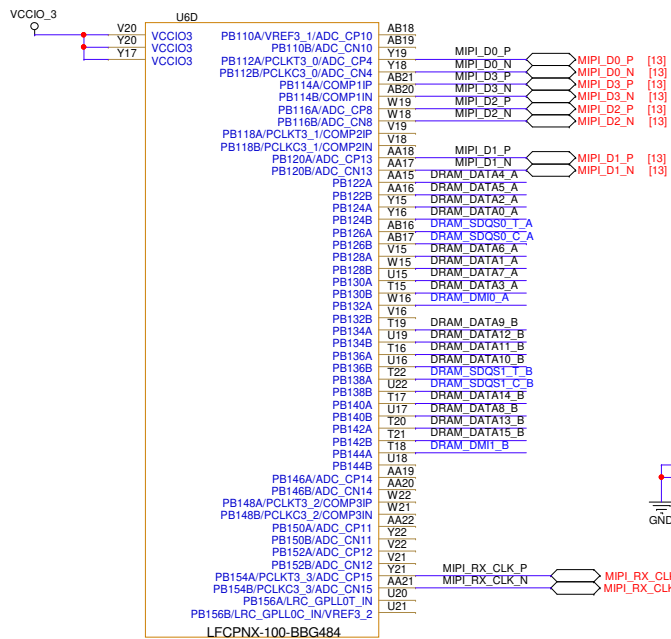


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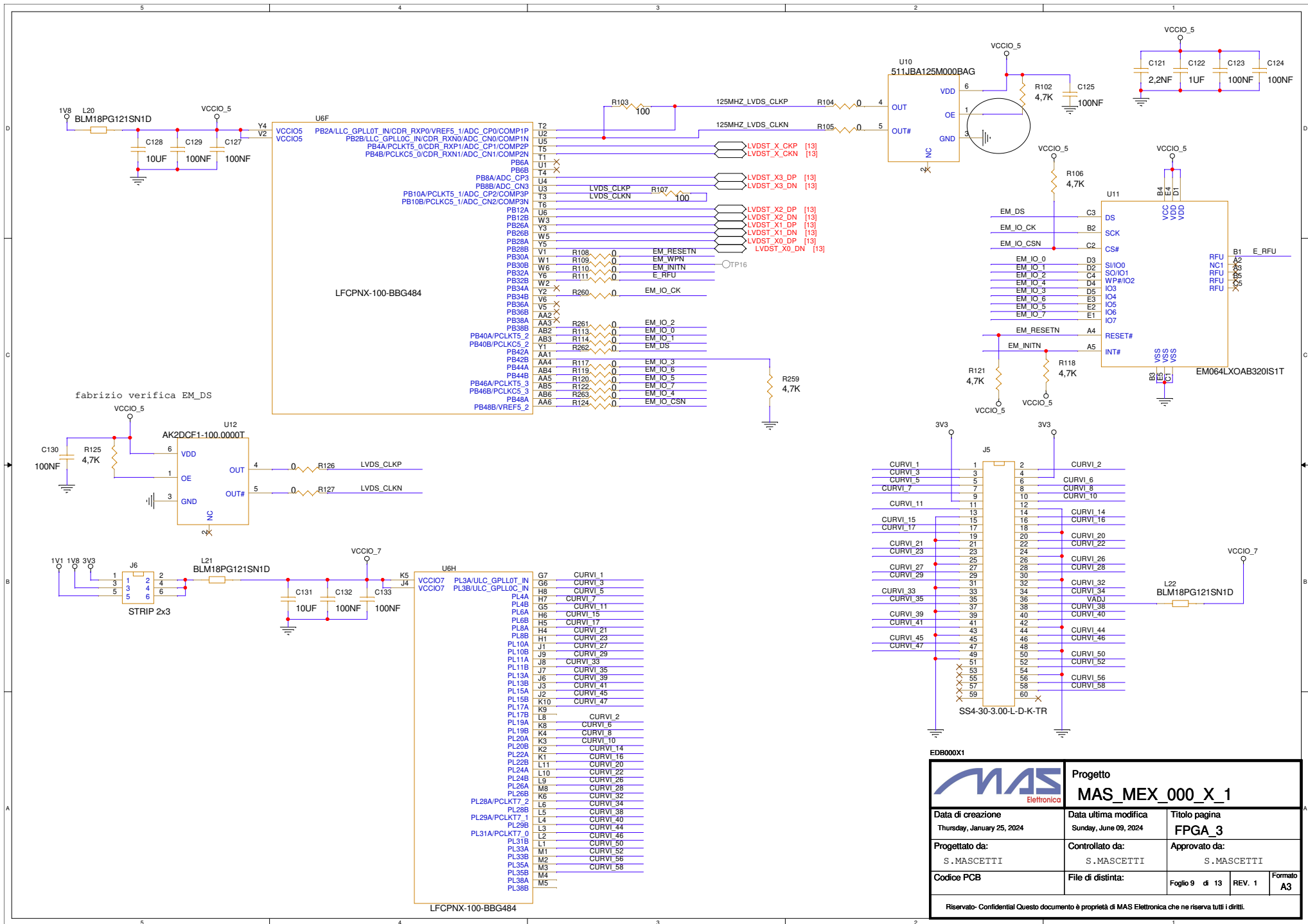
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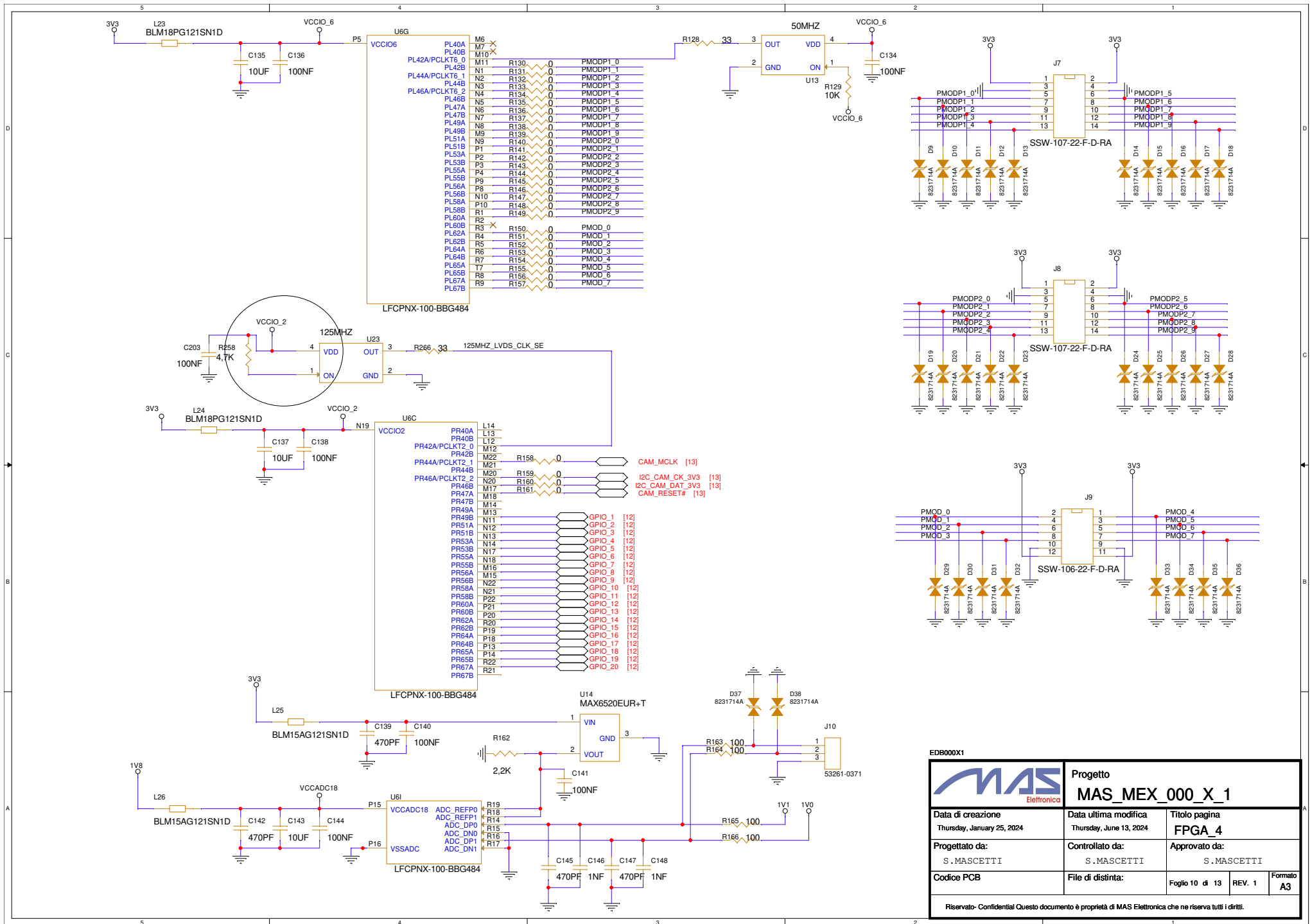
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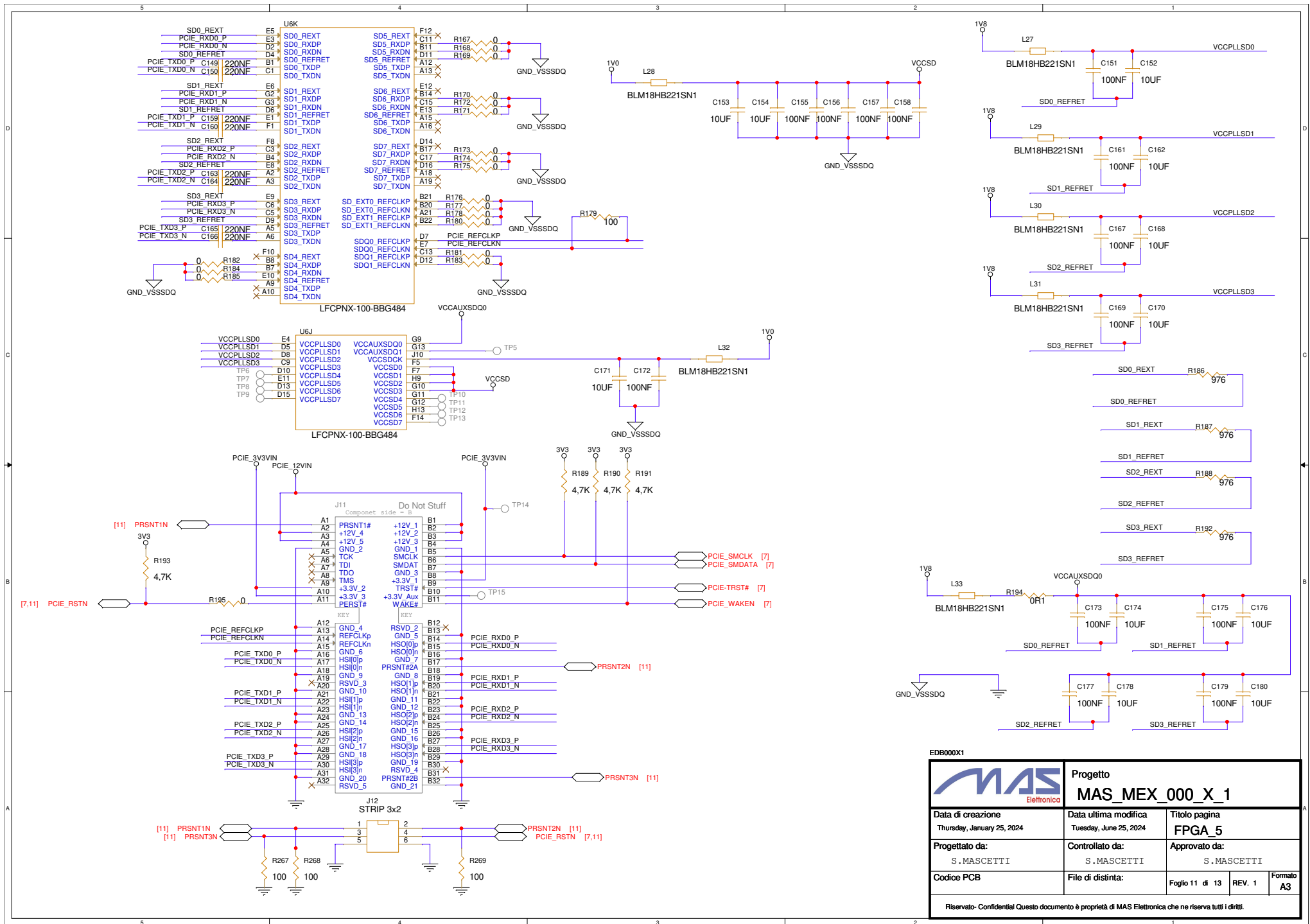
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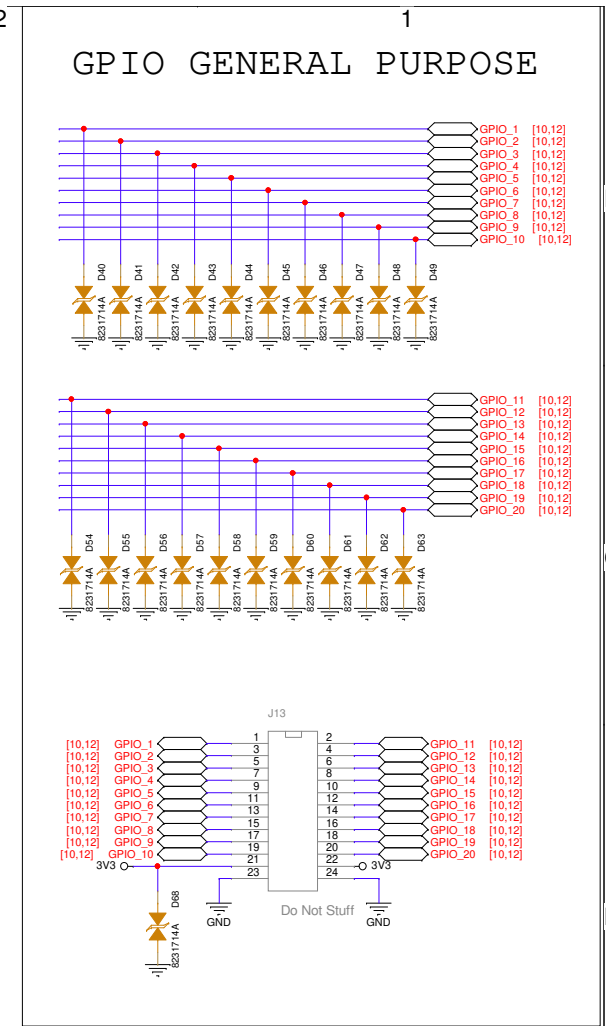
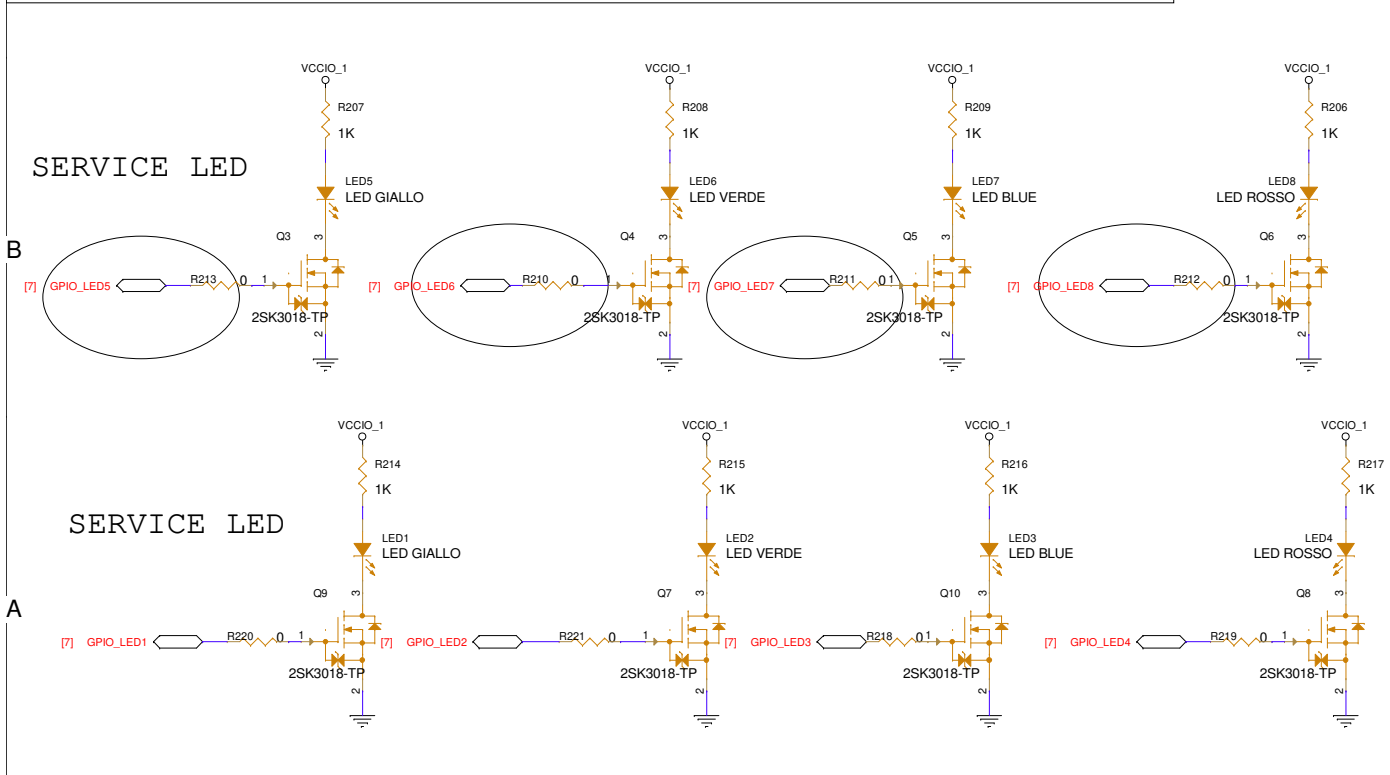
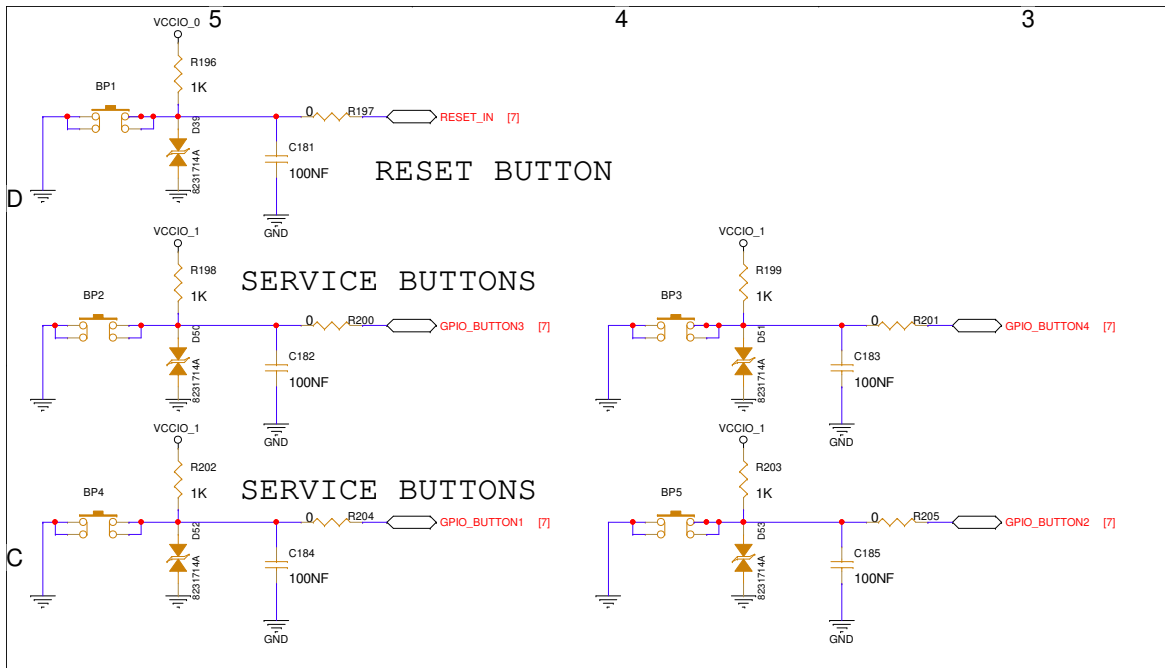
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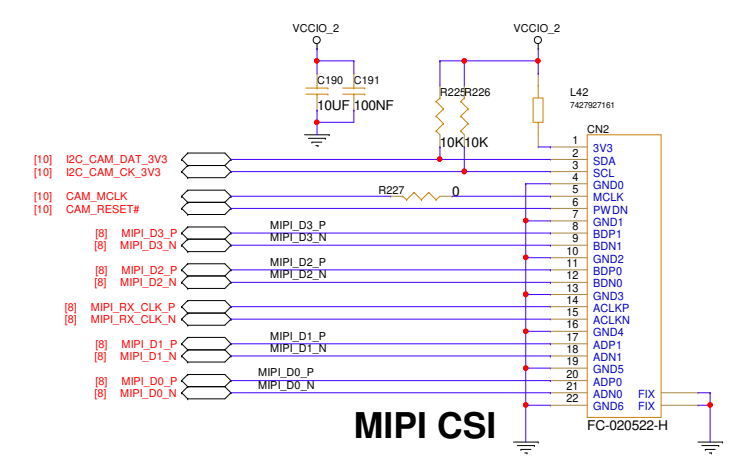
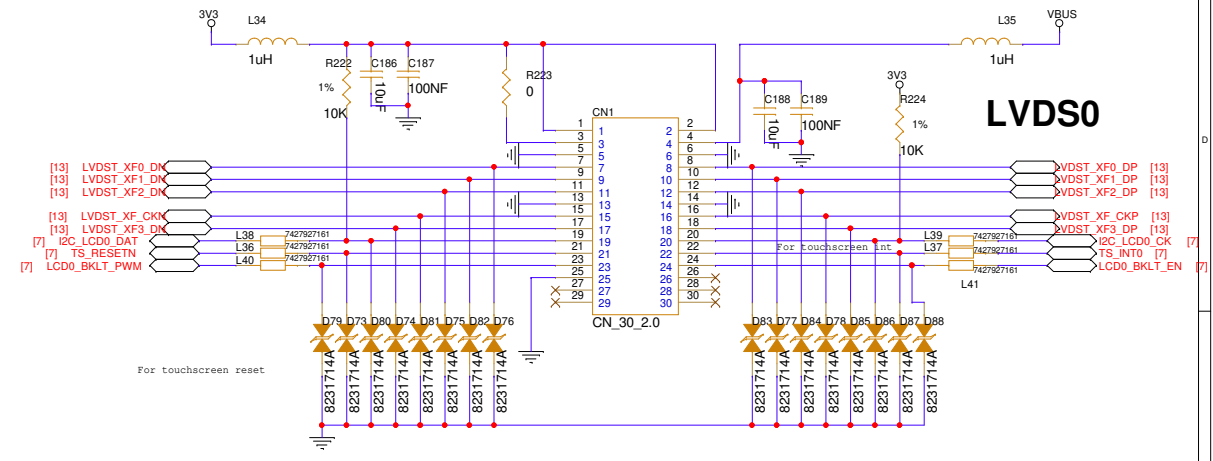
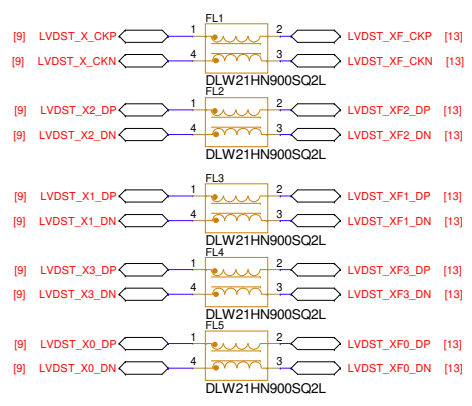


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Data di creazione Thursday, January 25, 2024	Data ultima modifica Tuesday, June 25, 2024	Titolo pagina FPGA_5	
Progettato da: S. MASCETTI	Controllato da: S. MASCETTI	Approvato da: S. MASCETTI	
Codice PCB	File di distinta:	Foglio 11 di 13	REV. 1 Formato A3
Riservato - Confidential Questo documento è proprietà di MAS Elettronica che ne riserva tutti i diritti.			



EDB000X1

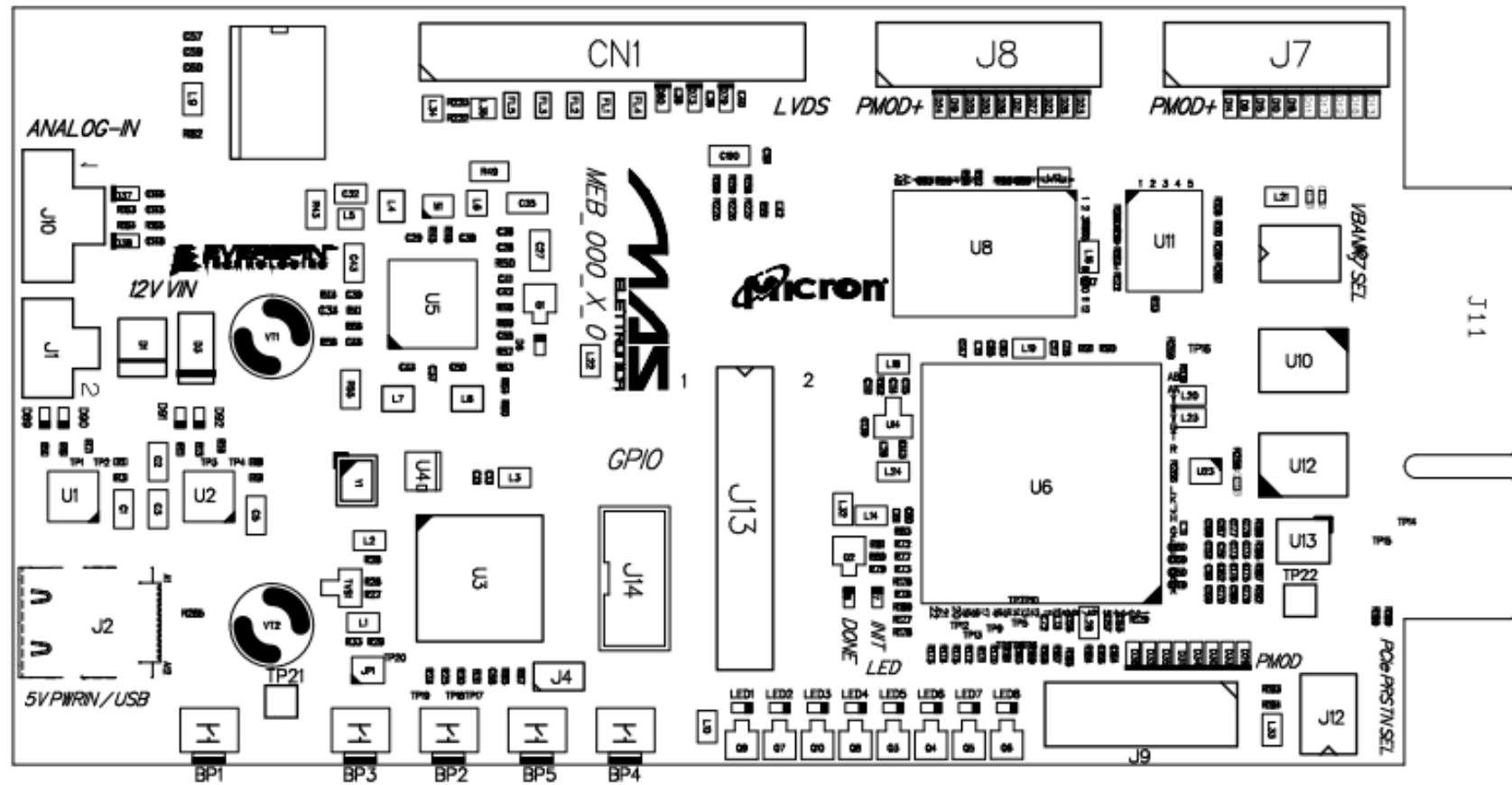
		Progetto MAS_MEX_000_X_1	
Data di creazione Friday, December 29, 2017	Data ultima modifica Tuesday, June 18, 2024	Titolo pagina CONNETTORI SPECIFICI	
Progettato da: S. MASCETTI	Controllato da: S. MASCETTI	Approvato da: S. MASCETTI	
Codice PCB	File di distinta:	Foglio 12 di 13	REV. 0 Formato A3
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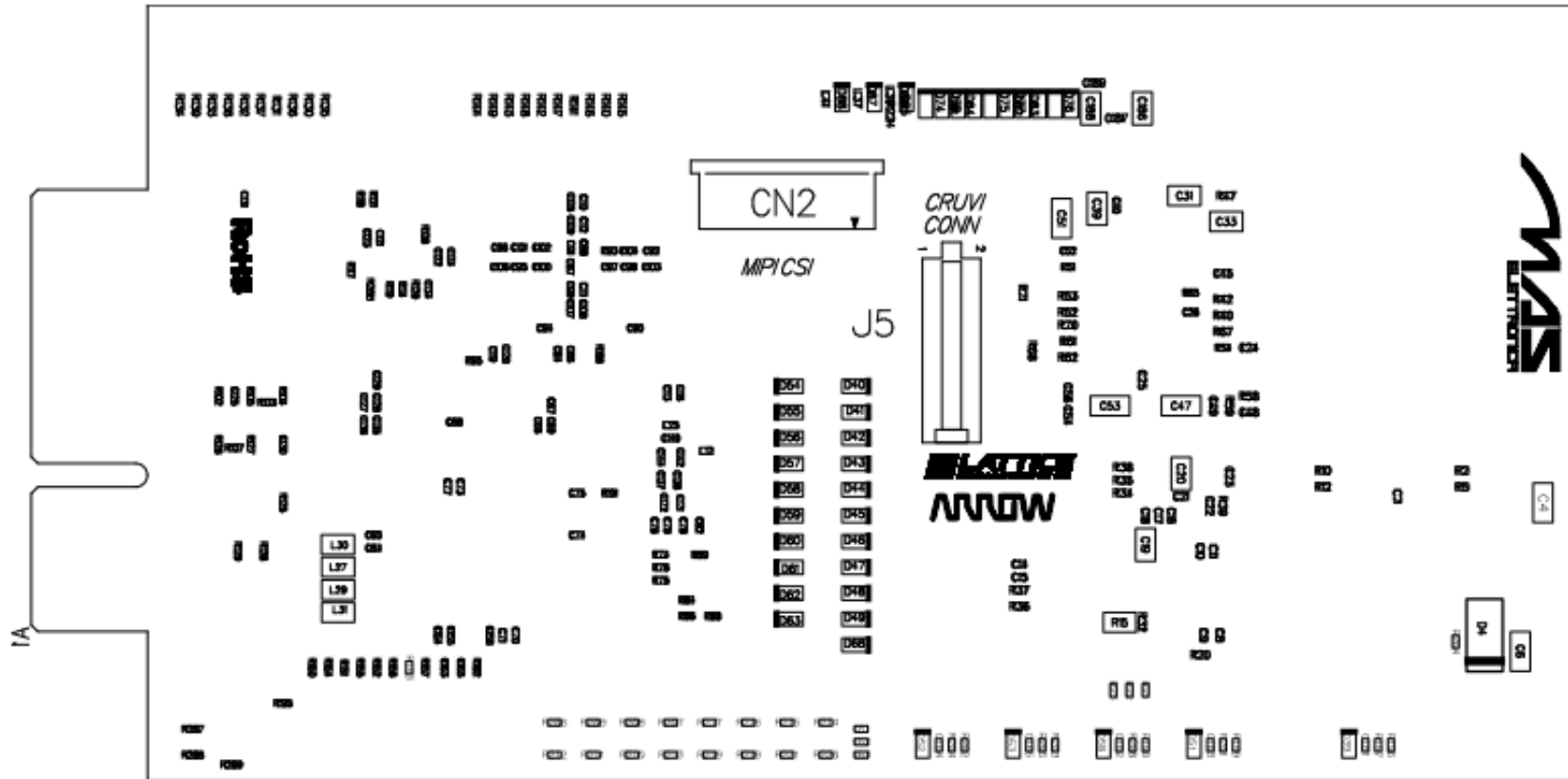
EDB000X1

		Progetto MAS_MEX_000_X_1	
Data di creazione Tuesday, November 03, 2020	Data ultima modifica Sunday, June 09, 2024	Titolo pagina LVDS CONNECTOR	
Progettato da: S. MASCETTI	Controllato da: S. MASCETTI	Approvato da: S. MASCETTI	
Codice PCB	File di distinta:	Foglio 13 di 13	REV. 0
Formato A3			
<small> Riservato - Confidential Questo documento è proprietà di MAS Elettronica che ne riserva tutti i diritti. </small>			

Appendix B MAS_EDB CERTUS PRO NX ED Board MOUNTING



MAS_EDB CERTUS PRO NX ED Board BOARD TOP MOUNT



MAS_EDB CERTUS PRO NX ED Board BOARD BOTTOM

Appendix C MAS_EDB CERTUS PRO NX ED Board Bill of Materials

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
1	5	4,34351E+11	BP1,BP2,BP3,BP4,BP5	SWITCH, 160GF, SIDE PUSH, WHITE, SMD	SMD	WURTH	4,34351E+11
2	4	22uF	C1,C2,C3,C5	22UF 35V 20% 0805	C0805	TDK	C2012X5R1V226M125AC
3	2	47nF	C4,C7	COND.CER. 47nF 16V 0402 X5R SMD	C0402	MURATA	GRM155R61C473KA01J
4	1	4,7uF	C6	CAP CER 4.7UF 35V 10% X7R 0805	SMD_0805	TDK	CGA4J1X7R1V475K125AE
5	86	100NF	C8,C10,C12,C13,C14,C15,C16,C17,C18,C21,C25,C28,C29,C34,C36,C37,C38,C40,C44,C45,C48,C50,C52,C54,C57,C58,C59,C60,C61,C62,C63,C65,C67,C68,C69,C71,C72,C75,C76,C77,C78,C79,C80,C81,C82,C85,C86,C114,C115,C116,C118,C119,C120,C123,C124,C125,C127,C129,C130,C132,C133,C134,C136,C138,C1	CAP CER 0.1UF 16V X7R 0402	SMD_0402	Murata Electronics	GRM155R71C104KA88J

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
			40,C141,C144,C151,C155,C156,C157,C158,C161,C167,C169,C172,C173,C175,C177,C179,C181,C182,C183,C184,C185,C203				
6	2	4,7UF	C9,C11	CAP CER 4.7UF 10V X5R 0402	SMD_0402	TDK Corporation	C1005X5R1A475M050BC
7	2	10uF	C19,C20	CAP CER 10UF 10V X5R 0603	SMD_0603	TDK Corporation	C1608X5R1A106M080AC
8	2	18PF	C22,C23	CAP CER 18PF 50V C0G 0402	SMD_0402	TDK Corporation	C1005C0G1H180J050BA
9	2	1uF	C24,C26	CAP CER 1UF 10V 10% X5R 0402	C0402	MURATA	GRM155R61A105KE15D
10	2	22UF	C27,C35	CAP CER 22UF 35V 20% X5R 1206	C1206	TDK	C3216X5R1V226M160AC
11	1	12NF	C30	COND.CER. 12NF 50V 0402 X7R SMD	C0402	MURATA	GRM155R71123KA61
12	3	4,7uF	C31,C32,C39	COND.CER.4,7uF 16V X5R 0603 SMD	C0603	SAMSUNG	CL10A475KO8NNNC
13	1	47uF	C33	CAP CER 47UF 10V 20% X5R 0805	C0805	TAIYO YUDEN	JMK212BJ476MG-T
14	1	2,7NF	C41	CAP CER 2700PF 50V 10% X7R 0402	C0402	SAMSUNG	CL05B272KB5NNNC

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
15	1	39PF	C42	CAP CER 39PF 50V 5% NPO 0402	C0402	SAMSUNG	CL05C390JB5NNNC
16	2	10uF	C43,C51	CAP CER 10UF 16V 20% X5R 0805	C0805	TDK	C2012X5R1C106M/1.25
17	4	1NF	C46,C55,C146,C 148	COND.CER. 1NF 50V 0402 NPO SMD	C0402	YAGEO	2,23859E+11
18	2	22uF	C47,C53	CAP CER 22UF 6V3 10% X5R 0805	C0805	TDK	C2012X5R1C226K125AC
19	1	1,5nF	C49	COND.CER. 1,5nF 50V 0402 X7R SMD	C0402	YAGEO	04022R152J9B20D
20	1	82pF	C56	COND.CER. 82pF 50V 0402 NPO SMD	C0402	MURATA	GRM15X5C1H820JDB4D
21	19	10UF	C64,C66,C70,C7 3,C74,C83,C84,C 87,C90,C91,C92, C95,C96,C97,C9 8,C104,C105,C1 06,C107	CAP CER 10UF 10V 20% X5R 0402	C0402	SAMSUNG	CL05A106MP5NUNC
22	22	220NF	C88,C89,C93,C9 4,C99,C100,C10 1,C102,C103,C1 08,C109,C110,C 111,C112,C149, C150,C159,C160 ,C163,C164,C16 5,C166	COND.CER. 220NF 10V 0402 X7R SMD	C0402	MURATA	GRM155R61A224KE19

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
23	18	10UF	C113,C117,C128 ,C131,C135,C137,C143,C152,C153,C154,C162,C168,C170,C171,C174,C176,C178 ,C180	CAP CER 10UF 6.3V 20% X5R 0402	C0402	TDK	C1005X5R0J106M050BC
24	1	2,2NF	C121	CAP CER 2200PF 50V X7R 0402	SMD_0402	Walsin Technology Corporation	0402B222K500CT
25	1	1UF	C122	CAP CER 1UF 6.3V X5R 0402	SMD_0402	Murata Electronics	GRM155R60J105KE19D
26	4	470PF	C139,C142,C145 ,C147	CAP CER 470PF 50V COG/NPO 0402	SMD_0402	Murata Electronics	GRM1555C1H471JA01D
27	2	10uF	C186,C188	COND.CER.10uF 0603 25V SMD	C0603	SAMSUNG	CL10A106MA8NRNC
28	3	100NF	C187,C189,C191	COND.CER. 100NF 50V 0402 X7R SMD	C0402	TDK	CGA2B3X7R1H104M050BD
29	1	10UF	C190	CAP CER 10uf 50V 1206 X5R	C1206	SAMSUNG	CL31A106KBHNNNE
30	1	CN_30_2.0	CN1	Connector,Pin Header,Straight,Male,2x15Pin,2.0MM pitch,4.0,2.8,Gold Flash 1u, black,DIP	ST-MV-PTH-P2-15X2-PIN1ORIGIN	GREENCONN	PFA201-3002A001C1BX
31	1	FC-020522-H	CN2	Connector,FPC Connector,Right Angle,22Pin,0.5MM	CON_22		FC-020522-H

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
				Pitch,Flip-Lock Type,Bottom Con- tact,2.0MM Height,Tin Plated, white,SMD			
32	1	SK54B	D1				
33	2	SMAJ15CA-TR	D3,D4	SMAJ15CA DIODO TRANSIL 15V DO214AC SMD	SMA	ST MICROELECTRON- ICS	SMAJ15CA-TR (ROHS COMPLI- ANT)
34	7	LED VERDE	D6,D7,D8,D89,D 91,LED2,LED6	LED GREEN CLEAR 0603 SMD	SMD_0603	Dialight	5988070107F
35	72	8231714A	D9,D10,D11,D1 2,D13,D14,D15, D16,D17,D18,D 19,D20,D21,D22 ,D23,D24,D25,D 26,D27,D28,D29 ,D30,D31,D32,D 33,D34,D35,D36 ,D37,D38,D39,D 40,D41,D42,D43 ,D44,D45,D46,D 47,D48,D49,D50 ,D51,D52,D53,D 54,D55,D56,D57 ,D58,D59,D60,D 61,D62,D63,D68 ,D73,D74,D75,D	TVS WE-VE femtoF 0402 14V 0.05pF 0.05uA 0402	SMD_0402	WURTH	8231714A

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
			76,D77,D78,D79 ,D80,D81,D82,D 83,D84,D85,D86 ,D87,D88				
36	4	LED ROSSO	D90,D92,LED4,L ED8	LED CHIPLED ROSSO	LED0603-AK	KINGBRIGHT	APT1608SRCPRV
37	5	DLW21HN900SQ2L	FL1,FL2,FL3,FL4, FL5	CHOKE COMMON MODE 90 OHM 0805	SMD	MURATA	DLW21HN900SQ2L
39	1	6,32723E+11	J2	CONN RCP USB3.1 TYPEC 24P SMD RA		WURTH	6,32723E+11
40	1	STRIP 2	J4	STRIP MASC.1x2P P=2.00 post H=3.25	PTH	SAMTEC	MTMM-102-03-T-S
41	1	SS4-30-3.00-L-D-K-TR	J5	CONN SOCKET 60POS SMD GOLD P=0,4mm	30X2P=0.4m m SMT	SAMTEC	SS4-30-3.00-L-D-K-TR
42	1	STRIP 2x3	J6	STRIP MASC.2x3P CS.p=2.54mm	2.54mm	TE CONNECTIVITY / AMP	9689567RL
43	2	SSW-107-22-F-D-RA	J7,J8	STRIP_2X7_2,54m m PTH SOCKET	2X7_2,54mm	SAMTEC	SSW-107-22-F-D-RA
44	1	SSW-106-22-F-D-RA	J9	STRIP FEMM.2x6P CS.p=2.54mm SMT RA	2x6_p_2.54 mm	SAMTEC	SSW-106-22-F-D-RA

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
45	1	53261-0371	J10	HDR 3 CKT Right-Angle 1.25MM	3P SMD	MOLEX	53261-0371
47	1	STRIP 3x2	J12	STRIP MASC.2x3P P=2.00 post H=3.25	PTH	SAMTEC	MTMM-103-03-T-D
49	1	SHF-105-01-L-D-TH	J14	CONN.. HEADER. 1.27MM. THT. A 10 VIE	2X5_P_1.27 mm	SAMTEC	SHF-105-01-L-D-TH
50	1	JMP_2	JP1	STRIP MASC.1x2P CS.p=1,27 mm	1x2_P=1_27 mm	HARWIN	M50-3530242
51	4	BLM18EG601SN1	L1,L2,L3,L14	FERRITE BEAD 600 OHM 0603 1LN	SMD_0603	Murata Electronics	BLM18EG601SN1D
52	2	2,2uH	L4,L7	FIXED IND 2.2UH 3A 84 MOHM SMD	SMD_2520	MURATA	DFE252012P-2R2M=P2
53	4	1uH	L5,L6,L34,L35	FIXED IND 1UH 900MA 100 MOHM SMD	Ind_2012	TDK	MLZ2012A1R0MT000
54	1	1,5uH	L8	FIXED IND 1.5UH 3.5A 60 MOHM SMD	SMD_2520	MURATA	DFE252012P-1R5M=P2
55	11	BLM18PG121SN1D	L9,L10,L16,L17,L 18,L19,L20,L21,L 22,L23,L24	FERRITE BEAD 120 OHM 0603 1LN	SMD_0603	Murata Electronics	BLM18PG121SN1D
56	6	BLM15AG121SN1D	L11,L12,L13,L15, L25,L26	FERRITE BEAD 120 OHM 0402 1LN	SMD_0402	Murata Electronics	BLM15AG121SN1D

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
57	7	BLM18HB221SN1	L27,L28,L29,L30, L31,L32,L33	FERRITE BEAD BLM18HB221SN1 220R 0603 SMD	L0603	MURATA	BLM18HB221SN1
58	7	7427927161	L36,L37,L38,L39, L40,L41,L42	FERRITE BEAD 600R 0.25A 0402	L0402	WURTH	7427927161
59	2	LED GIALLO	LED1,LED5	LED CHIPLD GI- ALLO 160Deg 6.5mcd	SMD_0603	VISHAY	TLMY1000-GS08
60	2	LED BLUE	LED3,LED7	LED CHIPLD BLUE TOP 45MCD SMD0603	SMD_0603	OSRAM	LB Q39E-L2N2-35-1
61	1	SI5908DC-T1-GE3	M1	MOSFET 20V Vds 8V Vgs 1206-8 ChipFET	1206	VISHAY	SI5908DC-T1-GE3
62	10	2SK3018-TP	Q1,Q2,Q3,Q4,Q 5,Q6,Q7,Q8,Q9, Q10	N-CHANNEL MOSFET, SOT-323 PACKAG	SOT-323-3	Micro Commercial Co	2SK3018-TP
63	2	464K	R1,R8	RESIS.CHIP 464K 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 464K 1% 0402 SMD
64	1	55,6K	R2	RESIS.CHIP 55,6K 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 55,6K 1% 0402 SMD
65	2	2,2M	R3,R9	RES 2.20M OHM 1/16W 1% 0402 SMD	R0402	Yageo	CRCW04022M20FKED
66	18	1K	R4,R6,R11,R13, R68,R196,R198, R199,R202,R203 ,R206,R207,R20	RESIS.CHIP 1K 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 1K 5% 0402 SMD

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
			8,R209,R214,R215,R216,R217				
67	1	576K	R5	RESIS.CHIP 576K 1% 0402 SMD	R0402	YAGEO	9C04021A5603FLHF3
68	2	2K2	R7,R14	RESIS.CHIP2K2 1% 0402 SMD	R0402	yageo	RT0402DRD072K2L
69	1	147K	R10	RES 147K OHM 1/10W 1% 0402 SMD	R0402	yageo	RC0402FR-07147KL
70	1	1,02M	R12	RESIS.CHIP 1,02M 1% 0402 SMD	R0402	VISHAY	CRCW04021M02FKED
71	1	0	R15	RES SMD 0 OHM JUMPER 1/10W 0603	SMD_0603	Bourns Inc.	CR0603-J/-000ELF
72	3	2,2K	R20,R32,R162	RESIS.CHIP 2,2K 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 2,2K 5% 0402 SMD
73	24	4,7K	R21,R22,R23,R79,R80,R81,R82,R83,R84,R85,R89,R98,R99,R102,R106,R118,R121,R125,R189,R190,R191,R193,R258,R259	RESIS.CHIP 4,7K 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 4,7K 5% 0402 SMD

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
74	97	0	R24,R25,R26,R27,R30,R36,R37,R45,R46,R48,R57,R73,R104,R105,R108,R109,R110,R111,R113,R114,R117,R119,R120,R122,R124,R126,R127,R130,R131,R132,R133,R134,R135,R136,R137,R138,R139,R140,R141,R142,R143,R144,R145,R146,R147,R148,R149,R150,R151,R152,R153,R154,R155,R156,R157,R158,R159,R160,R161,R167,R168,R169,R170,R171,R172,R173,R174,R175,R176,R177,R178,R180,R181,R182,R183,R184,R185,R195,R197,R200,R201,R	RESIS.CHIP OR 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP OR 5% 0402 SMD

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
			204,R205,R210, R211,R212,R213 ,R218,R219,R22 0,R221,R223,R2 27,R260,R261,R 262,R263				
75	2	12K	R28,R38	RESIS.CHIP 12K 1% 0402 SMD	SMD_0402	ROYAL OHM	RESIS.CHIP 12K 1% 0402 SMD
76	9	33	R29,R72,R74,R7 5,R76,R77,R78,R 128,R266	RESIS.CHIP 33R 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 33R 5% 0402 SMD
78	21	10K	R33,R34,R35,R4 4,R51,R56,R62,R 66,R67,R69,R70, R71,R90,R92,R9 3,R94,R129,R22 2,R224,R225,R2 26	RESIS.CHIP 10K 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 10K 5% 0402 SMD
80	1	13,3K	R40	RESIS.CHIP 13,3K 1% 0402 SMD	R0402	vari	Res. 13K3 1% 0402

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
81	1	41,2K	R41	RESIS.CHIP 41K2 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP41K2 1% 0402 SMD
82	1	2K	R42	RESIS.CHIP 2K 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 2K 1% 0402 SMD
83	4	0	R43,R49,R55,R6 0	RESIS.CHIP 0R 5% 0805 E24 SMD	R0805	ROYAL OHM (ROS COMPLIANT)	RESIS. 0R 5% 0805 SMD E24
84	1	1R	R47	RESIS.CHIP 1R 5% 0402 SMD	R0402	PANASONIC	ERJ-2GEJ1R0X
85	1	2,1k	R50	RESIS.CHIP 2,1k 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 2,1k 1% 0402 SMD
86	1	28K7	R52	RESIS.CHIP 28K7 1% 0402 SMD	R0402	YAGEO	RES SMD 28.7K OHM 1% 1/16W 0402
87	1	35,7K	R53	RESIS.CHIP 35,7K 1% 0402 SMD	R0402	ROHM	MCR01MRTF3572
88	1	4,02K	R54	RESIS.CHIP 4,02k 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 4,02k 1% 0402 SMD
89	1	64,9K	R58	RESIS.CHIP 64,9K 1% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 64,9K 1% 0402 SMD
90	2	16,2K	R59,R64	RES 16.2K OHM 1/16W 1% 0402 SMD	R0402	Yageo	9C04021A1622FLHF3
91	1	3,83K	R61	RES 3.83K OHM 1/10W 1% 0402 SMD	R0402	PANASONIC	ERJ-2RKF3831X
92	1	43,2K	R63	RESIS.CHIP 43,2k 1% 0402 SMD	R0402	PANASONIC	ERJ-2RKF4322X
93	1	39,2K	R65	RESIS.CHIP 39,2K 0402 1% SMD	R0402	VISHAY	CRCW040226K7FKED

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
94	2	330	R86,R88	RESIS.CHIP 330R 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 330R 5% 0402 SMD
95	11	100	R87,R103,R107, R163,R164,R165 ,R166,R179,R26 7,R268,R269	RESIS.CHIP 100R 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 100R 5% 0402 SMD
96	2	150R	R91,R95	RESIS.CHIP 150R 1% 0402 SMD	R0402	YAGEO	RC0402FR-07150RL
97	2	240	R96,R97	RESIS.CHIP 240 1% 0402 SMD	R0402	VISHAY DALE	CRCW0402240RFKED
98	4	976	R186,R187,R188 ,R192	RESIS.CHIP 976 1% 0402 SMD	R0402	VISHAY DALE	CRCW0402976RFKED
99	1	0R1	R194	RES 0.1 OHM 1% 1/10W 0402 SMD	R0402	SAMSUNG	RUT1005FR100CS
100	2	5,1K	R264,R265	RESIS.CHIP 5,1K 5% 0402 SMD	R0402	ROYAL OHM	RESIS.CHIP 5,6K 5% 0402 SMD
103	1	824021	TVS1	TVS DIODE ARRAY ETHERNET	SOT-23-3	WURTH	824021
104	2	MAX17614ATP+	U1,U2	Specializzati nel ri- sparmio energetico - PMIC 60V, 3A Ideal Diode Power Path Selector	TQFN-EP-20	ANALOG	MAX17614ATP+
105	1	FT2232H	U3	IC USB HS DUAL UART/FIFO 64- LQFP	64-LQFP	FTDI, Future Tech- nology Devices Inter- national Ltd	FT2232HL-REEL
106	1	93LC56CT-I/MS	U4	IC EEPROM 2K SPI 3MHZ 8MSOP	SSOP-8	Microchip Technol- ogy	93LC56CT-I/MS

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
107	1	ADP5054ACPZ-R7	U5	Buck Regulator Positive Output Step-Down DC-DC Controller IC 48-LFCSP (7x7)	CP48-16	analog	ADP5054ACPZ-R7
112	1	LFCPNX-100-8BBG484C	U6	FPGA Certur Pro NX	BG484C	lattice	
105	1	MT25QL512ABB8ESF-0SIT	U7	IC FLASH 512M SPI 133MHZ 16SOIC	SOIC_16	MICRON	MT25QL512ABB8ESF-0SIT
113	1	MT53E512M32D1ZW-046 WT:B	U8	IC MEM MOBILE LPDDR4 DUAL-CH SINGLE RANK DIS-CRETE 512Mbx32 1.8/1.1V VFBGA200	bga200_0p6 5x0p8_10p1x 14p6	micron	MT53E512M32D1ZW-046 WT:B
111	1	511JBA125M000BAG	U10	XTAL OSC XO 125.0000MHZ LVDS SMD	SMD	skyworks	511JBA125M000BAG
112	1	EM064LXOAB320IS1T	U11	IC RAM 64MBIT XSPI/OCTAL 24TBGA	BGA_24	EVERSPIN	EM064LXOAB320IS1T
113	1	AK2DCF1-100.0000T	U12	XTAL OSC XO 100MHZ 1.8V LVDS	SMD	ABRACON	AK2DCF1-100.0000T
114	1	50MHZ	U13	Oscillator 50Mhz SMD 3.2x2.5mm 4 Pads	SMD_3.2x2.5	CTS	632L3I050M00000
115	1	MAX6520EUR+T	U14	IC VREF SERIES 1.2V SOT23-3	SOT23	MAXIM	MAX6520EUR+T

ITEM	QTY	REF DESIGNATOR	VALUE	DESCRIPTION	PACKAGE	MANUFACTURER	MANUFACTURER P/N
116	1	125MHZ	U23	XTAL OSC XO 125.0000MHZ CMOS SMD 2.5x2,0mmmm 4 Pads	SMD_2.5x2	ECS	ECS-2520MVQ-1250-BN-TR
119	1	12MHz	Y1	CRYSTAL 12.0000MHZ 10PF SMD	SMD_3.2x2.5	Abracon LLC	ABM8G-12.000MHZ-4Y-T3

Appendix D MAS_LIFCL Crosslink NX evaluation Board accessories

Technical Support and Warranty

Technical Support

MAS Elettronica provides its product with one-year free technical support including:

1. Providing software and hardware resources related to the embedded products of MAS Elettronica;
2. Helping customers properly compile and run the source code provided by MAS Elettronica;
3. Providing technical support service if the embedded hardware products do not function properly under the circumstance that customers operate according to the instructions in the documents provided by MAS Elettronica;
4. Helping customers troubleshoot the products.

The following conditions will not be covered by our technical support service. We will take appropriate measures accordingly:

- a. Customers encounter issues related to software or hardware during their development process;
- b. Customers encounter issues caused by any unauthorized alter to the embedded operating system;
- c. Customers encounter issues related to their own applications;
- d. Customers encounter issues caused by any unauthorized alter to the source code provided by MAS Elettronica;

Warranty Conditions

1. 12-month free warranty on the PCB under normal conditions of use since the sales of the product;
2. The following conditions are not covered by free services; MAS Elettronica will charge accordingly:
 - Customers fail to provide valid purchase vouchers or the product identification tag is damaged, unreadable, altered or inconsistent with the products.
 - Products are damaged caused by operations inconsistent with the user manual;
 - Products are damaged in appearance or function caused by natural disasters (flood, fire, earthquake, lightning strike or typhoon) or natural aging of components or other force majeure;
 - Products are damaged in appearance or function caused by power failure, external forces, water, animals or foreign materials;
 - Products malfunction caused by disassembly or alter of components by customers or, products disassembled or repaired by persons or organizations unauthorized by MAS Elettronica, or altered in factory specifications, or configured or expanded with the components that are not provided or recognized by MAS Elettronica and the resulted damage in appearance or function;
 - Product failures caused by the software or system installed by customers or inappropriate settings of software or computer viruses;
 - Products purchased from unauthorized sales;
 - Warranty (including verbal and written) that is not made by MAS Elettronica and not included in the scope of our warranty should be fulfilled by the party who committed. MAS Elettronica has no any responsibility;
3. Within the period of warranty, the freight for sending products from customers to MAS Elettronica should be paid by customers; the freight from MAS Elettronica to customers should be paid by us. The freight in any direction occurs after warranty period should be paid by customers.
4. Please contact technical support if there is any repair request.

Note:

MAS Elettronica will not take any responsibility on the products sent back without the permission of the company.

Contact Information

Phone: +39-0498687469

Sales: sm@maselettronica.com

Support: support@maselettronica.com

Website: <http://www.maselettronica.com>

Address: Via Rossi 1 35030 Rubano (PD) Italy