Z80 Retro! – FLEADiP Board
FPGA Logic Engine And Display Processor Board

Z80 Retro Interface

File: Z80Interface.kicad_sch

Joystick & IO Ports

File: Joystck_IO_Ports.kicad_sch

Power Supply

File: PowerSupply.kicad_sch

Mouse Config

File: Mouse-config.kicad_sch

Mouse IO

File: Mouse-io.kicad_sch

Mouse Serdes RGB & HDMI

File: Mouse-serdes.kicad_sch

Mouse VGA

File: Mouse-vga.kicad_sch

PAGE 1 : INTRODUCTION

PAGE 2 : Z80 RETRO INTERFACE

PAGE 3 : JOYSTICK & I/O PORTS

PAGE 4 : POWER SUPPLY

PAGE 5 : MOUSE FPGA CONFIGURATION

PAGE 6 : MOUSE FPGA I/O

PAGE 7 : MOUSE FPGA SERDES, RGB, & HDMI

PAGE 8 : VGA BUFFERS & CONNECTOR

MOUNTING HOLES

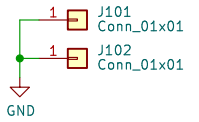
- 4 required for tooling
- 4 required for mechanical
- 1 extra if board connects directly above Z80-Retro main board

H1 MountingHole H2 MountingHole H3 MountingHole H4 MountingHole

PCB STACKUP NOTE

JLC04161H-3313 stackup gives :
* Ideal trace impedance (50 & 100ohms).
* GND plane closer to signal layer routing for improved signal integrity.

PROBE GND PINS



LOGO101 LOGO102

Z80 Retro! – FLEADiP Board FPGA Logic Engine And Display Processor		
Title: Z80 Retro! – FLEADiP Board		
Size: USLetter	Date: 2023-06-12	Rev: 0.0
KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 1/8

Z80 Retro! Interface

Z80 PIN HEADER

Possible Alternatives to Amazon receptacle?
SSQ-120-04-G-D
SSQ-120-04-F-D

J2

A11	1	40	A10
A12	2	39	A9
A13	3	38	A8
A14	4	37	A7
A15	5	36	A6
CLK	6	35	A5
D4	7	34	A4
D3	8	33	A3
D5	9	32	A2
D6	10	31	A1
	11	30	A0
D2	12	29	
D7	13	28	
D0	14	27	M1
D1	15	26	RESET
INT	16	25	BUSRQ
NMI	17	24	WAIT
	18	23	BUSACK
MREQ	19	22	WR
IORQ	20	21	RD

+5V, GND

J202: 1 INT, 2 NMI, 3

Q201 MMUN2211LT1G

Z80_INT 3,5

C210 10uF X5R 10V 0603
C204 100nF X7R 16V 0603
C205 100nF X7R 16V 0603

Z80 ADDRESS

U202 SN74LVC8T245DBR

A[0..15] → Z80_A[0..15] 6

A0	21	A1	3 Z80_A0
A1	20	A2	4 Z80_A1
A2	19	A3	5 Z80_A2
A3	18	A4	6 Z80_A3
A4	17	A5	7 Z80_A4
A5	16	A6	8 Z80_A5
A6	15	A7	9 Z80_A6
A7	14	A8	10 Z80_A7

DIR = 0 = BtoA

U205 SN74LVC8T245DBR

A15	21	A1	3 Z80_A15
A14	20	A2	4 Z80_A14
A13	19	A3	5 Z80_A13
A8	18	A4	6 Z80_A8
A12	17	A5	7 Z80_A12
A9	16	A6	8 Z80_A9
A11	15	A7	9 Z80_A11
A10	14	A8	10 Z80_A10

DIR = 0 = BtoA

C202 10uF X5R 10V 0603
C203 10uF X5R 10V 0603
C211 100nF X7R 16V 0603
C212 100nF X7R 16V 0603

Z80 CONTROL

U201 SN74LVC1G125DBVR

WAIT → Z80_WAIT_N → Z80_WAIT_N 6

U203 SN74LVC1G125DBVR

BUSRQ → Z80_BUSRQ_N → Z80_BUSRQ_N 6

C201 100nF X7R 16V 0603
C206 100nF X7R 16V 0603

U206 SN74LVC8T245DBR

CLK	21	A1	3 Z80_CLK → Z80_CLK 6
M1	20	A2	4 Z80_M1_N → Z80_M1_N 6
RESET	19	A3	5 Z80_RESET_N → Z80_RESET_N 5,6
RD	18	A4	6 Z80_RD_N → Z80_RD_N 6
WR	17	A5	7 Z80_WR_N → Z80_WR_N 6
IORQ	16	A6	8 Z80_IORQ_N → Z80_IORQ_N 6
MREQ	15	A7	9 Z80_MREQ_N → Z80_MREQ_N 6
BUSACK	14	A8	10 Z80_BUSACK_N → Z80_BUSACK_N 6

DIR = 0 = BtoA

C213 100nF X7R 16V 0603
C214 100nF X7R 16V 0603
C215 10uF X5R 10V 0603
C216 10uF X5R 10V 0603

Z80 DATA

U204 SN74LVC8T245DBR

D[0..7] → Z80_D[0..7] 6

D1	21	A1	3 Z80_D1
D0	20	A2	4 Z80_D0
D7	19	A3	5 Z80_D7
D2	18	A4	6 Z80_D2
D6	17	A5	7 Z80_D6
D5	16	A6	8 Z80_D5
D3	15	A7	9 Z80_D3
D4	14	A8	10 Z80_D4

Z80_DBUF_RD_N 6
Z80_DBUF_EN_N 6
DIR = 1 = AtoB
= 0 = BtoA

C207 10uF X5R 10V 0603
C208 100nF X7R 16V 0603
C209 100nF X7R 16V 0603

R201 10K 5% 0603 Z80_DBUF_RD_N
R202 10K 5% 0603 Z80_DBUF_EN_N

Z80 Retro! Interface			
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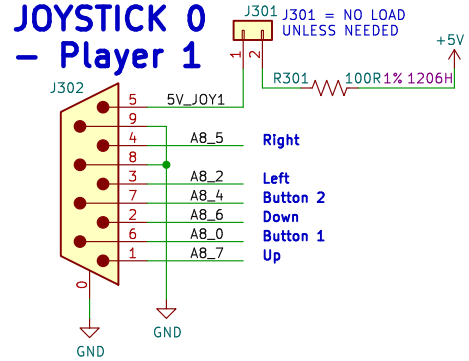
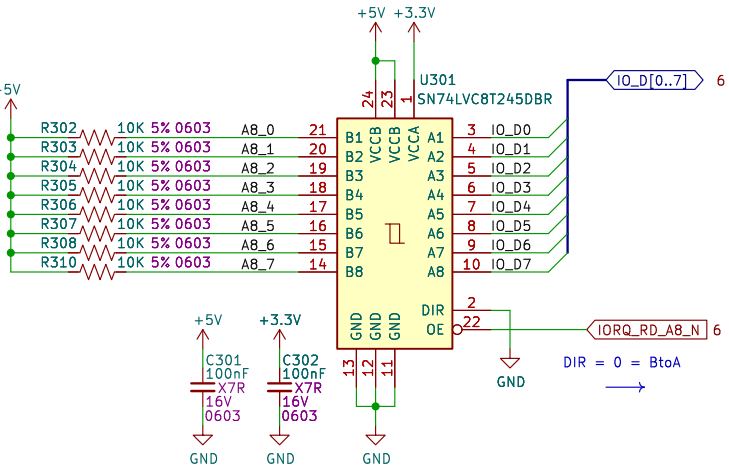
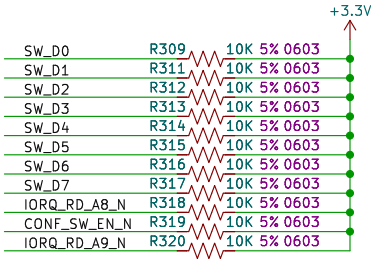
JOYSTICK & I/O PORTS

JOYSTICK 0 – Player 1



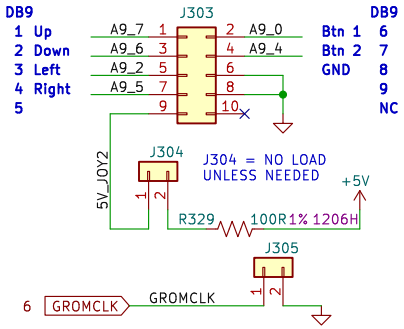
JOYSTICK0 and JOYSTICK1 btn2 and 5V are wired per MSX two button joypad.
Not for 2 button Atari compatibale joystick!



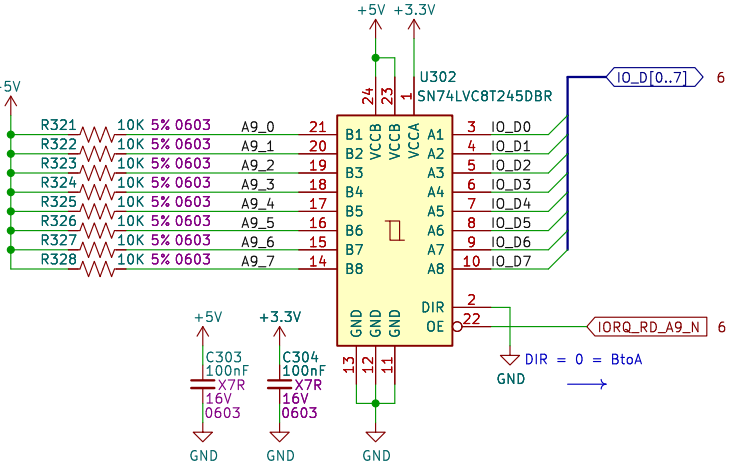


JOYSTICK 1 – Player 2

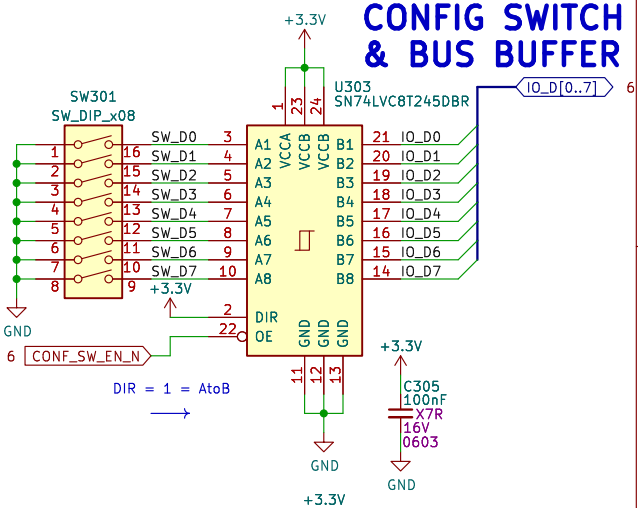
Use header to Female DB9 Cable + gender changer.
Alterate : 2x5 to Male DB9 cable with pin swap.



GROMCLK is used to check the FPGA PLL function.
Frequency should be 447,411.9Hz

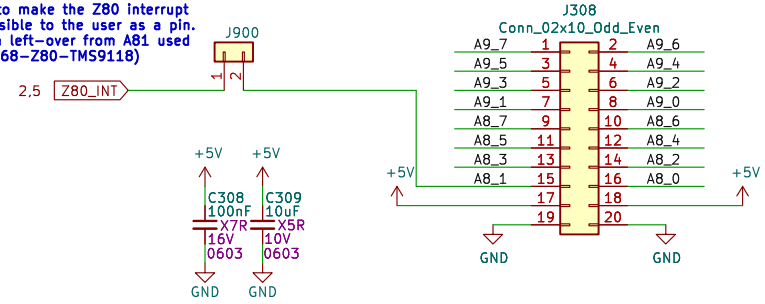


CONFIG SWITCH & BUS BUFFER

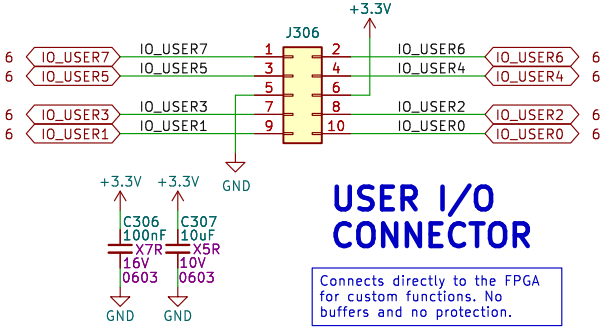


INPUT CONNECTOR

J900 has no use on FLEADiP other than to make the Z80 interrupt accessible to the user as a pin. (It's a left-over from A81 used on 2068-Z80-TMS9118)



USER I/O CONNECTOR



Connects directly to the FPGA for custom functions. No buffers and no protection.

Joystick and IO Ports		
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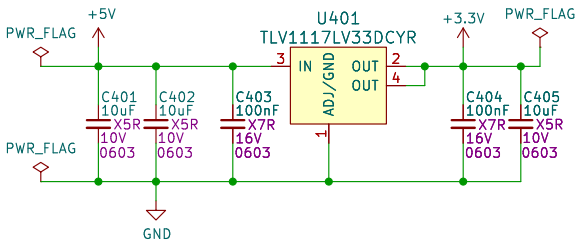
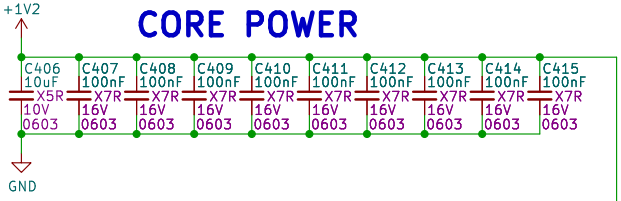
POWER SUPPLY

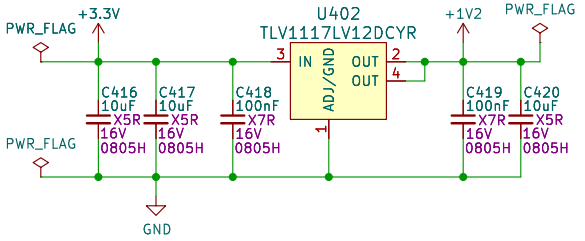
3.3V POWER SUPPLY



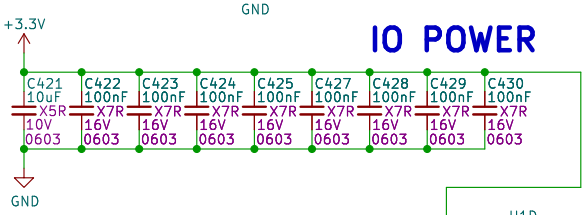
CORE POWER



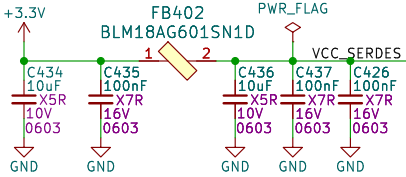
1.2V POWER SUPPLY

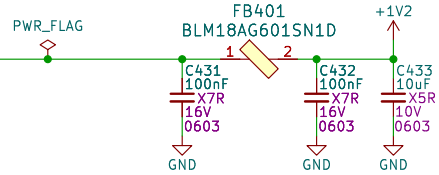


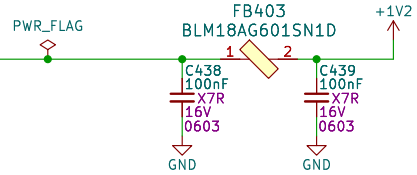
IO POWER

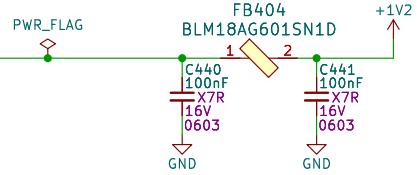


SERDES POWER





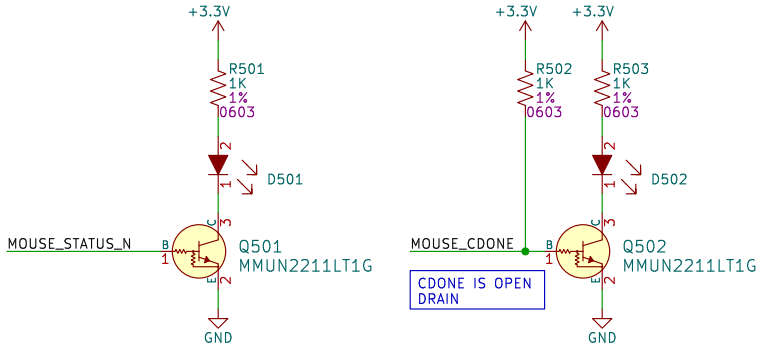




PLL POWER FILTERS

Power Supply 3.3V & 1.2V		
Title: Z80 Retro! – FLEADiP Board		
Size: USLetter	Date: 2023-06-12	Rev: 0.0
KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 4/8

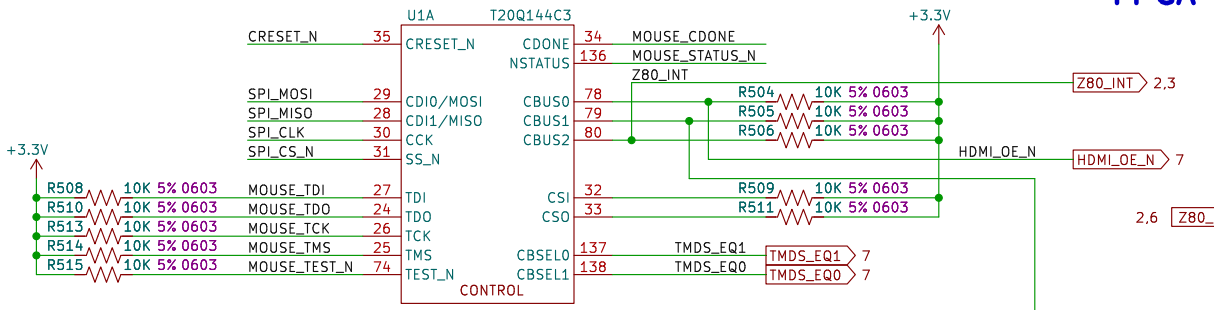
MOUSE FPGA CONFIGURATION

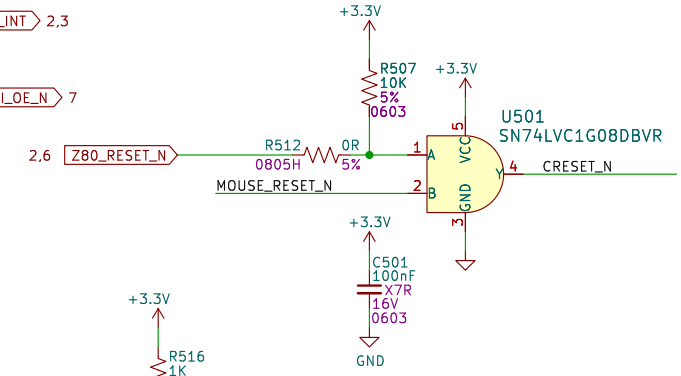


FPGA NSTATUS LED

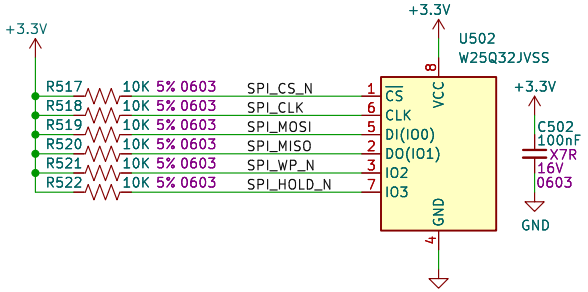
FPGA CDONE LED

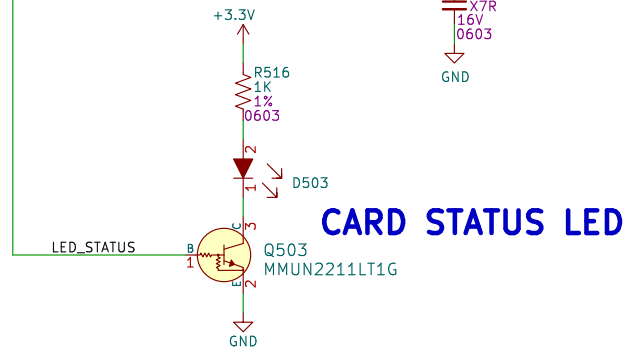
FPGA CONFIGURATION





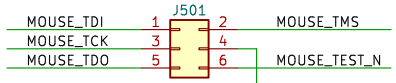
SPI FLASH





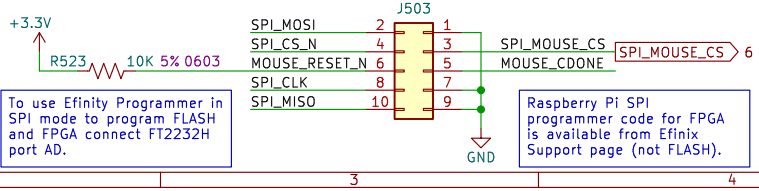
CARD STATUS LED

JTAG INTERFACE



To use Efinity Programmer and Debug tools in JTAG Mode Connect FT2232H port BD

SPI INTERFACE TO ESP PROGRAMMER BOARD



To use Efinity Programmer in SPI mode to program FLASH and FPGA connect FT2232H port AD.

Raspberry Pi SPI programmer code for FPGA is available from Efinix Support page (not FLASH).

Mouse FPGA Configuration		
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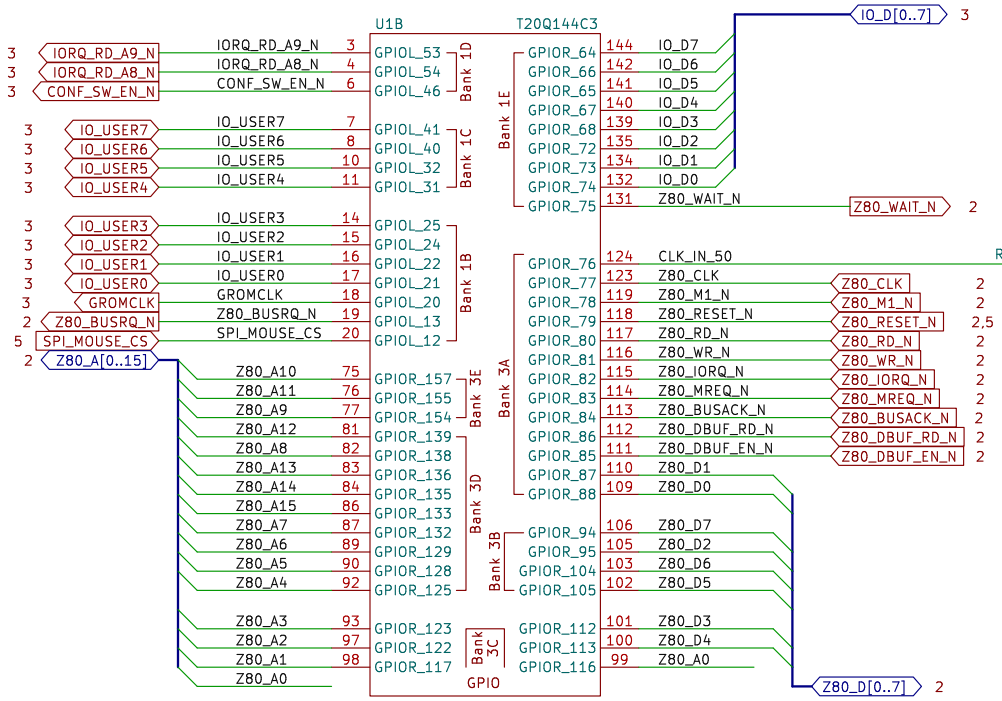
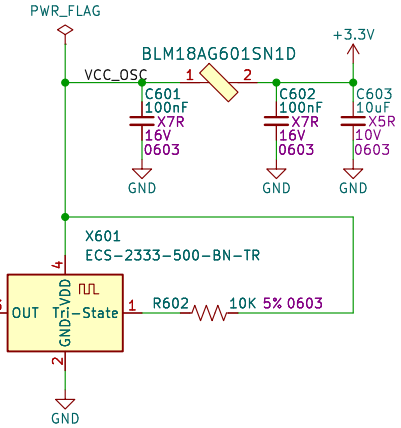
KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 5/8

MOUSE FPGA I/O

GPIO PINS



50MHz OSCILLATOR



Mouse FPGA I/O Ports		
Title: Z80 Retro! – FLEADiP Board		
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KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 6/8

MOUSE FPGA SERDES, RGB, & HDMI

LVDS TO TMDS

U701 PTN3366BSMP

EQ1	EQ0	SETTING
GND	GND	0 dB
GND	VDD	2 dB
VDD	GND	4 dB
VDD	VDD	6 dB

RGB & LVDS OUTPUTS

U1C T20Q144C3 (SERDES)

LINE PROTECTION

U702 RCLAMP0524P

U703 RCLAMP0524P

HDMI

J701 HDMI_A_1.4

On the hdmi connector void the plane underneat the TXP and TXN pins to reduce capacitance.
Ref : Layout Guideline for PTN3366

Mouse FPGA serdes, RGB, & HDMI		
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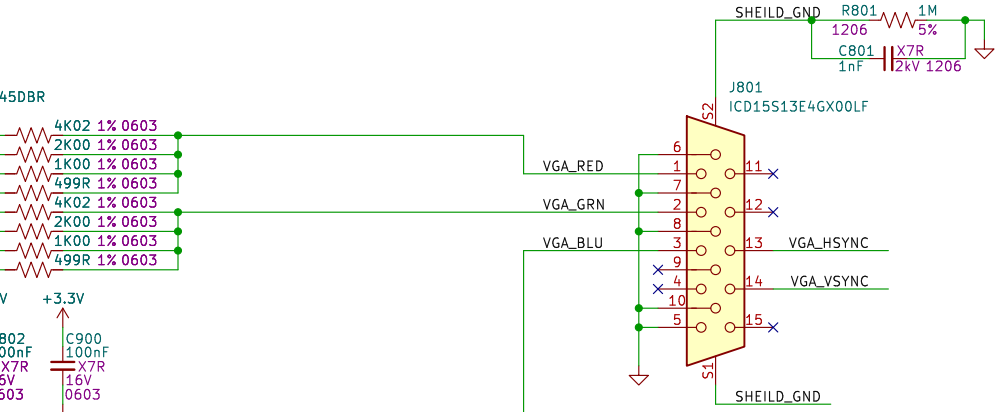
KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 7/8

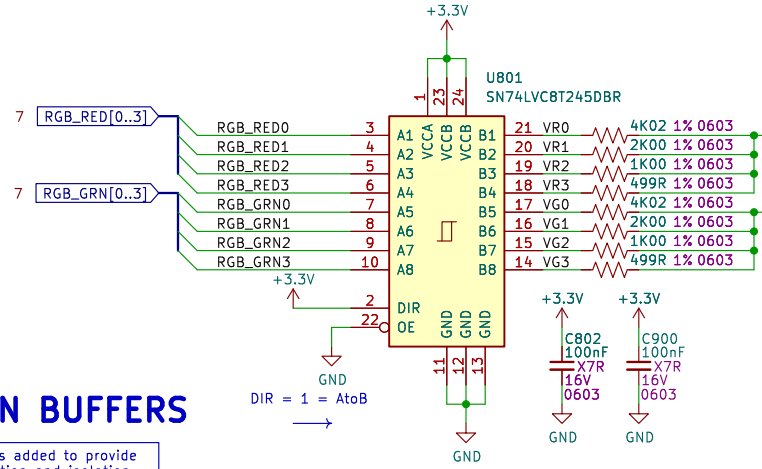
VGA BUFFERS AND CONNECTOR

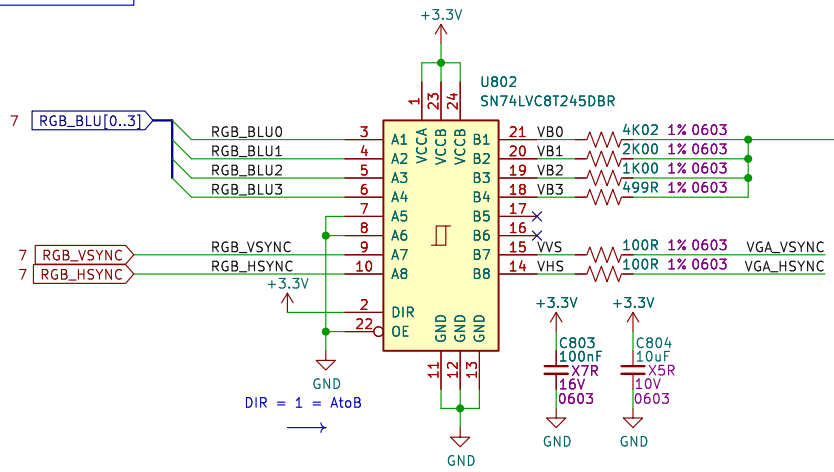
VGA CONNECTOR



ISOLATION BUFFERS

Buffers added to provide protection and isolation for the Mouse FPGA





VGA Buffers and Connector		
Title: Z80 Retro! – FLEADiP Board		
Size: USLetter	Date: 2023-06-12	Rev: 0.0
KiCad E.D.A. kicad 7.0.2	Drawn: Denno Wiggle	Id: 8/8