PIC

PIC

DONE
INITB
PROGB

MCLK
SCK
CS
SO
SI

PIC.sch

Power Supply

POWER SUPPLY

Power Supply.sch

Spartan

DONE
INITB
PROGB

MCLK
SCK
CS
SO
SI

SPARTAN

XC3S50AN−TQG144

Spartan.sch

DP[1..8]
SW[1..6]
LED[1..8]

7Seg_[0...7]
7Seg_1en
7Seg_2en
7Seg_3en

Vsync
Hsync
B[0..1]
G[0..2]
R[0..2]

CLK
CMD
DAT0
DAT1
DAT2
DAT3

AUDIO_L
AUDIO_R

Expansion Modules

DP[1..8]
SW[1..6]
LED[1..8]

7Seg_[0...7]
7Seg_1en
7Seg_2en
7Seg_3en

Vsync
Hsync
B[0..1]
G[0..2]
R[0..2]

CLK
CMD
DAT0
DAT1
DAT2
DAT3

AUDIO_L
AUDIO_R

EXPANSION
MODULES

Expansion Modules.sch

Title: Elbert − Spartan 3A FPGA Development Board
Size: A3 | Date: 25 mar 2014 | Rev:
KiCad E.D.A. | Id: 1/5

SPARTAN -XC3S50A

VCCIO VCCAUX VCCINIT

119 136 86 95 40 61 14 23 | 36 66 108 133 | 22 52 94 122

TMS	1	TMS
TDO	107	TDO
TDI	2	TDI
TCK	109	TCK

VCCO0 VCCO0 VCCO1 VCCO1 VCCO2 VCCO2 VCCO3 VCCO3 VCCAUX VCCAUX VCCAUX VCCAUX VCCINIT VCCINIT VCCINIT VCCINIT

DONED	DONE	73	DONE
PROGBD	PROGB	144	PROG_B
	SUSPEND	74	SUSPEND

IP7	142	IO_0
7Seg_2	111	IO_L01N_0
7Seg_3	110	IO_L01P_0
7Seg_0	113	IO_L02N_0
	112	IO_L02P_0/VREF_0
7Seg_1	112	IO_L03N_0
7Seg_4	117	IO_L03P_0
7Seg_5	116	IO_L04N_0
7Seg_6	115	IO_L04P_0
7Seg_7	114	IO_L05N_0
7Seg_2en	121	IO_L05P_0
7Seg_1en	120	IO_L06N_0/GCLK5
IP4	126	IO_L06P_0/GCLK4
7Seg_3en	124	IO_L07N_0/GCLK7
IP3	127	IO_L07P_0/GCLK6
IP1	125	IO_L08N_0/GCLK9
IP5	131	IO_L08P_0/GCLK8
MCLKD	MCLK	129	IO_L09N_0/GCLK11
GPIO31	132	IO_L09P_0/GCLK10
GPIO30	130	IO_L10N_0
GPIO29	135	IO_L10P_0
GPIO28	134	IO_L11N_0
GPIO27	139	IO_L11P_0
GPIO26	138	IO_L12N_0/PUDC_B
GPIO25	143	IO_L12P_0/VREF_0
GPIO24	141	IP_0
IP8	140	IP_0/VREF_0
IP2	123	

0

SW2	79	IO_1
SW3	78	IO_L01N_1/LDC2
SW5	76	IO_L01P_1/HDC
SW4	77	IO_L02N_1/LDC0
SW6	75	IO_L02P_1/LDC1
CMD	84	IO_L03N_1
DAT1	82	IO_L03P_1
DAT3	85	IO_L04N_1/RHCLK1
DAT0	83	IO_L04P_1/RHCLK0
AUDIO_L	88	IO_L05N_1/TRDY1/RHCLK3
AUDIO_R	87	IO_L05P_1/RHCLK2
Vsync	92	IO_L06N_1/RHCLK5
DAT2	90	IO_L06P_1/RHCLK4
Hsync	93	IO_L07N_1/RHCLK7
IP6	91	IO_L07P_1/IRDY1/RHCLK6
B1	98	IO_L08N_1
B0	96	IO_L08P_1
G1	101	IO_L09N_1
G0	99	IO_L09P_1
R1	104	IO_L10N_1
G2	102	IO_L10P_1
R2	105	IO_L11N_1
R0	103	IO_L11P_1
SW1	80	IP_1/VREF_1
	97	IP_1/VREF_1

1

SW[1..6]
B[0..1]
G[0..2]
R[0..2]

7Seg_[0...7]

IN_L13P_3	33	
IN_L13N_3/VREF_3	35	
IO_L12P_3	31	GPIO0
IO_L12N_3	32	GPIO1
IO_L11P_3	28	GPIO2
IO_L11N_3	30	GPIO3
IO_L10P_3	27	GPIO4
IO_L10N_3	29	GPIO5
IO_L09P_3	26	GPIO6
IO_L09N_3	25	GPIO7
IO_L08P_3/TRDY2/LHCLK6	19	GPIO8
IO_L08N_3/LHCLK7	21	GPIO9
IO_L07P_3/LHCLK4	18	GPIO10
IO_L07N_3/LHCLK5	20	GPIO11
IO_L06P_3/LHCLK2	15	GPIO12
IO_L06N_3/IRDY2/LHCLK3	16	GPIO13
IO_L05P_3/LHCLK0	12	GPIO14
IO_L05N_3/LHCLK1	13	GPIO15
IO_L04P_3	10	GPIO16
IO_L04N_3/VREF_3	11	GPIO17
IO_L03P_3	7	GPIO18
IO_L03N_3	8	GPIO19
IO_L02P_3	5	GPIO20
IO_L02N_3	3	GPIO21
IO_L01P_3	4	GPIO22
IO_L01N_3	6	GPIO23

3

IP_2/VREF_2	53	
IO_L14P_2/D1	70	DP1
IO_L14N_2/CCLK	72	SCK
IO_L13P_2/D2	69	DP2
IO_L13N_2/D0/DIN/MISO	71	SO
IO_L12P_2/INIT_B	67	INITB
IO_L12N_2/D3	68	DP3
IO_L11P_2/AWAKE	63	DP5
IO_L11N_2/DOUT	64	DP4
IO_L10P_2/GCLK2	58	DP8
IO_L10N_2/GCLK3	60	DP6
IO_L09P_2/GCLK0	57	CLK
IO_L09N_2/GCLK1	59	DP7
IO_L08P_2/GCLK14	54	LED2
IO_L08N_2/GCLK15	55	LED1
IO_L07P_2/D5	50	LED4
IO_L07N_2/D4	51	LED3
IO_L06P_2	47	LED7
IO_L06N_2/D6	49	LED5
IO_L05P_2	46	LED8
IO_L05N_2/D7	48	LED6
IO_L04P_2/VS2	43	VS2
IO_L04N_2/VS0	45	VS0
IO_L03P_2/RDWR_B	44	VS1
IO_L03N_2/VS1	42	
IO_L02P_2/M2	39	M2
IO_L02N_2/CS0_B	41	CS
IO_L01P_2/M1	37	M1
IO_L01N_2/M0	38	M0
IO_2/MOSI/CSI_B	62	SI

2

DP[1..8]
SCK
SO
INITB
CLK
LED[1..8]
VS2
VS0
VS1
CS
M1
M0
SI

XC3S50AN/TQG144
U1

GND
9 17 26 34 56 65 81 89 100 106 118 128 137
GND

EXPANSION CONNECTORS

P1
GPIO0	1	2	GPIO1
GPIO2	3	4	GPIO3
GPIO4	5	6	GPIO5
GPIO6	7	8	GPIO7
GND	9	10	GND
VCCAUX	11	12	VCCAUX

P6
GPIO8	1	2	GPIO9
GPIO10	3	4	GPIO11
GPIO12	5	6	GPIO13
GPIO14	7	8	GPIO15
GND	9	10	GND
VCCAUX	11	12	VCCAUX

P2
GPIO16	1	2	GPIO17
GPIO18	3	4	GPIO19
GPIO20	5	6	GPIO21
GPIO22	7	8	GPIO23
GND	9	10	GND
VCCAUX	11	12	VCCAUX

P4
GPIO24	1	2	GPIO25
GPIO26	3	4	GPIO27
GPIO28	5	6	GPIO29
GPIO30	7	8	GPIO31
GND	9	10	GND
VCCAUX	11	12	VCCAUX

P5
IP1	1	2	IP2
IP3	3	4	IP4
IP5	5	6	IP6
IP7	7	8	IP8
GND	9	10	VCCAUX

VS2 GS2 SJ1
VS1 GS2 SJ2 GND
VS0 GS2 SJ3
M2 GS2 SJ4
M1 GS2 SJ5 GND
M0 GS2 SJ6

VCCAUX
47K R35 47K R36
PROGB
INITB

DONE — R34 1.5K — D9 — GND
LED

SUSPEND — GS1 — GND

JTAG

P3
1	2	VCCAUX
3	4	TMS
5	6	TCK
7	8	TDO
9	10	TDI
11	12	
13	14	

GND

VCCINIT
0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF VCCAUX
C1 C3 C5 C7 C10 C12 C13 C31

VCCAUX VCCAUX
VCCINIT VCCINIT
VCCIO VCCIO

VCCIO
0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF 0.1uF
C2 C4 C6 C8 C9 C11 C29 C30

PIC18F14K50

IC1

SPI FLASH — M25P16 — U3

PIC ICSP — P9

1	MCLR
2	VCCAUX
3	GND
4	D+
5	D-
6	

FWUP — P10

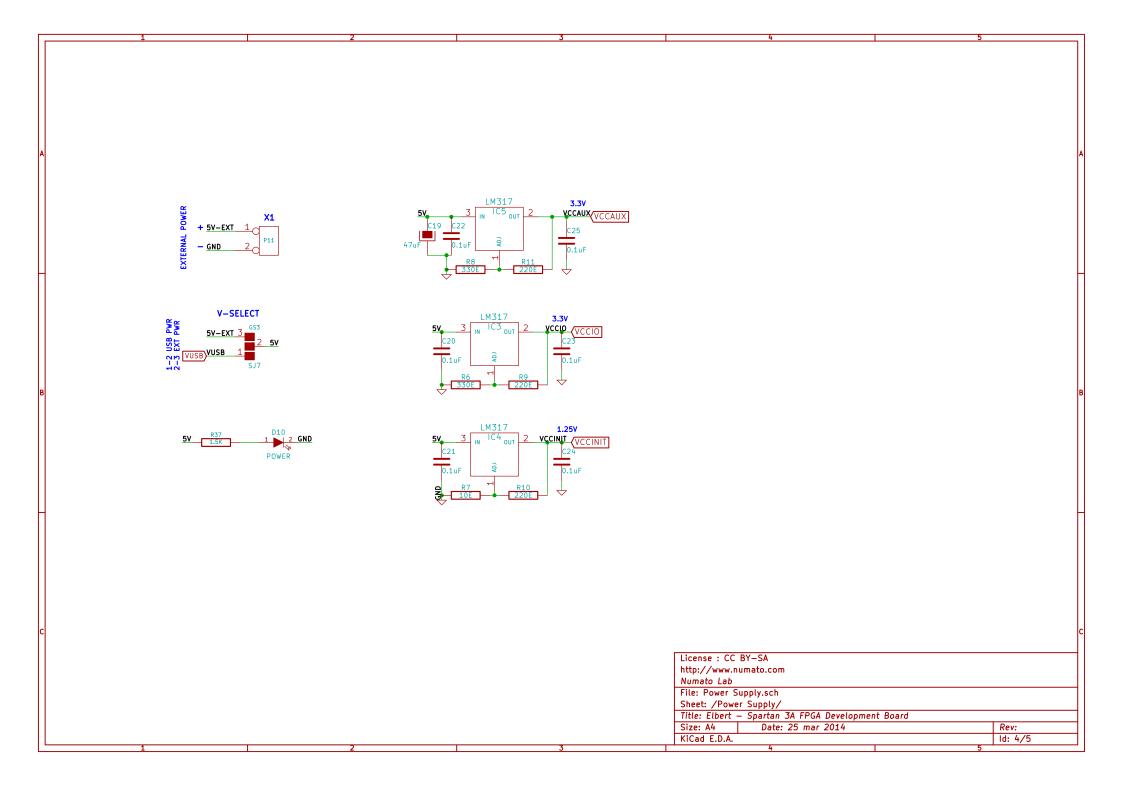|	
1	MCLR
2	GND

P8

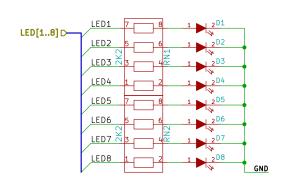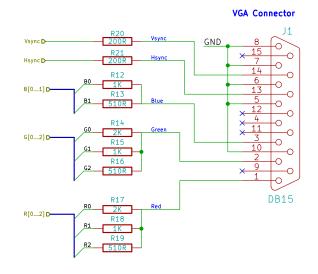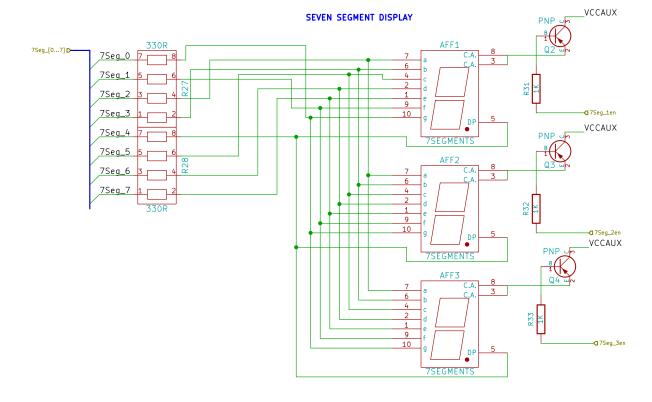|		
1	ANO	
2	AN1	
3	AN2	
4	GND	

License : CC BY-SA
http://www.numato.com
Numato Lab
File: PIC.sch
Sheet: /PIC/
Title: Elbert - Spartan 3A FPGA Development Board
Size: A4   Date: 25 mar 2014   Rev:
KiCad E.D.A.   Id: 3/5

EXTERNAL POWER

X1

+ 5V-EXT 1
− GND   2

P11

V-SELECT

1-2 USB PWR
2-3 EXT PWR

GS3
5V-EXT 3
            2 5V
VUSB   1
SJ7

VUSB

5V R37 1.5K D10 GND
POWER

LM317
IC5
5V 3 IN   OUT 2 3.3V VCCAUX
C19   C22   C25
47uF   0.1uF   0.1uF
          ADJ
        R8   R11
        330E   220E

LM317
IC3
5V 3 IN   OUT 2 3.3V VCCIO
C20   C23
0.1uF   0.1uF
          ADJ
        R6   R9
        330E   220E

LM317
IC4
5V 3 IN   OUT 2 1.25V VCCINIT
C21   C24
0.1uF   0.1uF
          ADJ
GND R7   R10
     10E   220E

File: Power Supply.sch
Sheet: /Power Supply/
Title: Elbert — Spartan 3A FPGA Development Board
Size: A4   Date: 25 mar 2014   Rev:
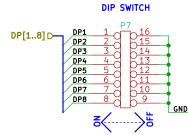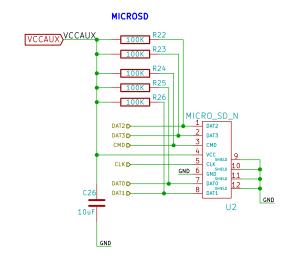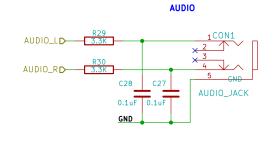KiCad E.D.A.   Id: 4/5

LED[1..8]

LED1, LED2, LED3, LED4, LED5, LED6, LED7, LED8
RN1, RN2 — 2K2
D1, D2, D3, D4, D5, D6, D7, D8
GND

DIP SWITCH

P7
DP[1..8]
DP1, DP2, DP3, DP4, DP5, DP6, DP7, DP8
ON / OFF
GND

PUSH BUTTON SWITCH

SW[1..6]
SW1, SW2, SW3, SW4, SW5, SW6
GND

VGA Connector

Vsync — R20 200R — Vsync
Hsync — R21 200R — Hsync
B[0..1] — B0 — R12 1K
B1 — R13 510R — Blue
G[0..2] — G0 — R14 2K — Green
G1 — R15 1K
G2 — R16 510R
R[0..2] — R0 — R17 2K — Red
R1 — R18 1K
R2 — R19 510R
GND
J1
DB15

MICROSD

VCCAUX
R22 100K
R23 100K
R24 100K
R25 100K
R26 100K
MICRO_SD_N
DAT2, DAT3, CMD, VCC, CLK, GND, DAT0, DAT1
SHIELD
U2
C26 10uF
GND

AUDIO

AUDIO_L — R29 3.3K
AUDIO_R — R30 3.3K
CON1
AUDIO_JACK
GND
C28 0.1uF C27 0.1uF
GND

SEVEN SEGMENT DISPLAY

7Seg_[0...7]
330R
7Seg_0, 7Seg_1, 7Seg_2, 7Seg_3, 7Seg_4, 7Seg_5, 7Seg_6, 7Seg_7
R27, R28
330R
AFF1, AFF2, AFF3 — 7SEGMENTS
C.A.
a b c d e f g DP
PNP — Q2 — R31 1K — VCCAUX — 7Seg_1en
PNP — Q3 — R32 1K — VCCAUX — 7Seg_2en
PNP — Q4 — R33 1K — VCCAUX — 7Seg_3en