Voltage Regulators

+5V → Voltage Regulators
→ +3.3V
→ +1.2V

SPI Flash

FLASH-DISABLE

CSO# CCLK MOSI MISO

Shared with SDRAM address & control

JTAG Header

USB Port

D+
D−

uC

12 MHz

JTAG
PROG#
DONE
FPGA-CLK

FPGA

CHAN-I/O (26)
CHAN-IN (6)
CHAN-CLK

Prototyping Header

SDRAM-CLK   CTRL (4)   ADDRESS (12)   DATA (16)

68 user I/O pins

+3.3V → CKE
CS#
DQMH
DQML

SDRAM

OSC2   OSC1

R2
0
Q1
12 MHz
C2 10pF   C3 10pF
GND

+3.3V
R1 5.1K
RST#
LED
FPGA-CLK   R4E 100
R4D 100
LED1
GND

U2
PIC 18F14K50 uC

+3.3V	1	VDD
OSC1	2	RA5/IOCA5/OSC1/CLKIN
OSC2	3	RA4/AN3/IOCA3/OSC2/CLKOUT
	4	RA3/IOCA3/MCLR#/VPP
	5	RC5/CCP1/P1A/T0CKI
	6	RC4/P1B/C12OUT/SRQ
PROG#	7	RC3/AN7/P1C/C12IN3-/PGM
TMS	8	RC6/AN8/SS/T13CKI/T1OSCI
TDI	9	RC7/AN9/SDO/T1OSCO
FLSH-DSBL	10	RB7/IOCB7/TX/CK

VSS	20	GND
RA0/IOCA0/D+/PGD	19	USB_D+
RA1/IOCA1/D-/PGC	18	USB_D-
VUSB	17	VUSB
RC0/AN4/C12IN+/INT0/VREF+	16	DONE
RC1/AN5/C12IN1-/INT1/VREF-	15	SENSE-USB
RC2/AN6/P1D/C12IN2-/CVREF/INT2	14	ANALOG-IO0
RB4/AN10/IOCB4/SDI/SDA	13	TDO
RB5/AN11/IOCB5/RX/DT	12	ANALOG-IO1
RB6/IOCB6/SCK/SCL	11	TCK

VUSB
C8 0.47uF
GND

JP3
TDI 1   2 TCK
TMS 3   4 TDO

FLSH-DSBL
R6 47K   +3.3V

R5C 1.0K
A7
A10   R9 110
+3.3V
GND

U5
W25X20BV-SNIG/SSIG

CS#	1	8	VCC	+3.3V
DO	2	7	HOLD#	+3.3V
WP#	3	6	CLK	BS
GND	4	5	DI	A2

U3
8Mx16 SDRAM

+3.3V	1	VDD@3	VSS@1	54	GND
D0	2	DQ0	DQ15	53	D15
+3.3V	3	VDDQ@3	VSSQ@1	52	D14
D1	4	DQ1	DQ14	51	D14
D2	5	DQ2	DQ13	50	D13
GND	6	VSSQ@3	VDDQ@4	49	+3.3V
D3	7	DQ3	DQ12	48	D12
D4	8	DQ4	DQ11	47	D11
+3.3V	9	VDDQ@2	VSSQ@4	46	GND
D5	10	DQ5	DQ10	45	D10
D6	11	DQ6	DQ9	44	D9
GND	12	VSSQ@2	VDDQ@1	43	+3.3V
D7	13	DQ7	DQ8	42	D8
+3.3V	14	VDD@1	VSS@2	41	GND
GND	15	LDQM	NC@2	40	
WE#	16	WE#	UDQM	39	
CAS#	17	CAS#	CLK	38	SDRAM-CLK
RAS#	18	RAS#	CKE	37	+3.3V
CS#	19	CS#	NC@1	36	
BS	20	BS0	A11	35	A11
BS	21	BS1	A9	34	A9
A10	22	A10/AP	A8	33	A8
A0	23	A0	A7	32	A7
A1	24	A1	A6	31	A6
A2	25	A2	A5	30	A5
A3	26	A3	A4	29	A4
+3.3V	27	VDD@2	VSS@3	28	GND

JP1

CHAN-CLK	1	
CHAN0	2	
CHAN1	3	
CHAN2	4	
CHAN3	5	
CHAN4	6	
CHAN5	7	
CHAN6	8	
CHAN7	9	
CHAN8	10	
CHAN9	11	
CHAN10	12	
CHAN11	13	
CHAN12	14	
CHAN13	15	
CHAN14	16	
+3.3V	17	
GND	18	
+1.2V	19	
RST#	20	

JP2

CHAN15	1	
CHAN16	2	
CHAN17	3	
CHAN18	4	
CHAN19	5	
CHAN20	6	
CHAN21	7	
CHAN22	8	
CHAN23	9	
CHAN24	10	
CHAN25	11	
CHAN26	12	
CHAN27	13	
CHAN28	14	
CHAN29	15	
CHAN30	16	
CHAN31	17	
+5V	18	
ANALOG-IO0	19	
ANALOG-IO1	20	

PROG#   R4F 100   11   100   PROG_B
DONE   R4C 100   14   51   DONE
TDI   R4H 100   9   2   TDI
TDO   R4B 100   15   75   TDO
TMS   R4G 100   10   1   TMS
TCK   R4A 100   16   76   TCK

R5D 1.0K
R10 1.0K
GND   GND

GND   R5A 1.0K   A8
GND   R5B 1.0K   A9

U1
Spartan-3A FPGA

+3.3V	96	VCCO_0@1
	79	VCCO_0@2
	67	VCCO_1
	45	VCCO_2@1
	26	VCCO_2@2
	11	VCCO_3
+3.3V	22	VCCAUX@1
	92	VCCAUX@2
	55	VCCAUX@3
+1.2V	38	VCCINT@1
	17	VCCINT@2
	66	VCCINT@3
	81	VCCINT@4
GND	8	GND@1
	47	GND@2
	42	GND@3
	69	GND@4
	14	GND@5
	58	GND@6
	87	GND@7
	91	GND@8
	95	GND@9
	74	GND@10
	18	GND@11
	80	GND@12
	63	GND@13

CHAN26	3	IO_L01P_3
CHAN25	4	IO_L01N_3
D13	5	IO_L02P_3
D12	6	IO_L02N_3
CHAN24	7	IP_3/VREF_3
D11	9	IO_L03P_3/LHCLK0
D10	10	IO_L03N_3/LHCLK1
CHAN23	12	IO_L04P_3/LHCLK2
CHAN22	13	IO_L04N_3/IRDY2/LHCLK3
D9	15	IO_L05P_3/TRDY2/LHCLK6
D8	16	IO_L05N_3/LHCLK7
CHAN21	19	IO_L06P_3
CHAN20	20	IO_L06N_3
CHAN19	21	IP_3
A8	23	IO_L01P_2/M1
A9	24	IO_L02P_2/M2
A11	25	IO_L01N_2/M0

A7	27	IO_L02N_2/CSO_B
A6	28	IO_L03P_2/RDWR_B
A5	29	IO_L03N_2/VS2
A4	30	IO_L04P_2/VS1
A3	31	IO_L04N_2/VS0
CHAN18	32	IO_L05P_2
CHAN17	33	IO_L05N_2
CHAN16	34	IO_L06P_2/D7
CHAN15	35	IO_L06N_2/D6
CHAN0	36	IO_L07P_2/D5
CHAN1	37	IO_L07N_2/D4
CHAN2	39	IP_2/VREF_2
SDRAM-CLK	40	IO_L08P_2/GCLK14
SDRAM-CLK	41	IO_L08N_2/GCLK15
FPGA-CLK	43	IO_L09P_2/GCLK0
CHAN-CLK	44	IO_L09N_2/GCLK1
A2	46	IO_2/MOSI/CSI_B
A1	48	IO_L10P_2/INIT_B
A0	49	IO_L10N_2/D3
CHAN3	50	IO_L11P_2/D2

A10	51	IO_L12P_2/D0/DIN/MISO
CHAN4	52	IO_L11N_2/D1
BS	53	IO_L12N_2/CCLK
CHAN5	56	IO_L01P_1
CHAN6	57	IO_L01N_1
RAS#	59	IO_L02P_1/RHCLK0
CAS#	60	IO_L02N_1/RHCLK1
CHAN7	61	IO_L03P_1/RHCLK2
CHAN8	62	IO_L03N_1/TRDY1/RHCLK3
WE#	64	IO_L04P_1/IRDY1/RHCLK6
D7	65	IO_L04N_1/RHCLK7
CHAN9	68	IP_1/VREF_1
D6	70	IO_L05P_1
D5	71	IO_L05N_1
CHAN10	72	IO_L06P_1
CHAN11	73	IO_L06N_1

D1	77	IO_L01P_0/VREF_0
D2	78	IO_L01N_0
CHAN12	82	IP_0/VREF_0
CHAN13	83	IO_L02P_0/GCLK4
CHAN14	84	IO_L02N_0/GCLK5
D3	85	IO_L03P_0/GCLK6
D4	86	IO_L03N_0/GCLK7
CHAN31	88	IO_L04P_0/GCLK8
CHAN30	89	IO_L04N_0/GCLK9
D0	90	IO_0/GCLK11
CHAN29	93	IO_L05P_0
CHAN28	94	IO_L05N_0
CHAN27	97	IP_0
D15	98	IO_L06P_0/VREF_0
D14	99	IO_L06N_0/PUDC_B

+3.3V   +3.3V
GND
C12 0.1uF C6 0.1uF C14 0.1uF C18 0.1uF C20 0.1uF C22 0.1uF C23 0.1uF C7 0.1uF C10 0.1uF C11 0.1uF C19 0.1uF C16 10nF C15 10nF C28 10nF C32 10nF C33 10nF C34 10nF C25 10nF C30 10nF
GND

SENSE-USB
R8 680K
R7 330K
5V   +5V
GND

X1
1-VCC
USB_D-   2-D-
USB_D+   3-D+
4-SHLD
5-GND

C1 4.7uF

U6
+3.3V Reg.
IN OUT
GND HS
3.3V

C4 4.7uF   C24 22uF

U7
+1.2V Reg.
IN OUT
GND HS
1.2V   +1.2V

C5 4.7uF   C35 22uF
GND

+1.2V
C9 0.1uF C13 0.1uF C17 0.1uF C21 0.1uF C27 10nF C29 10nF C31 10nF C26 10nF
GND

Schematic

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