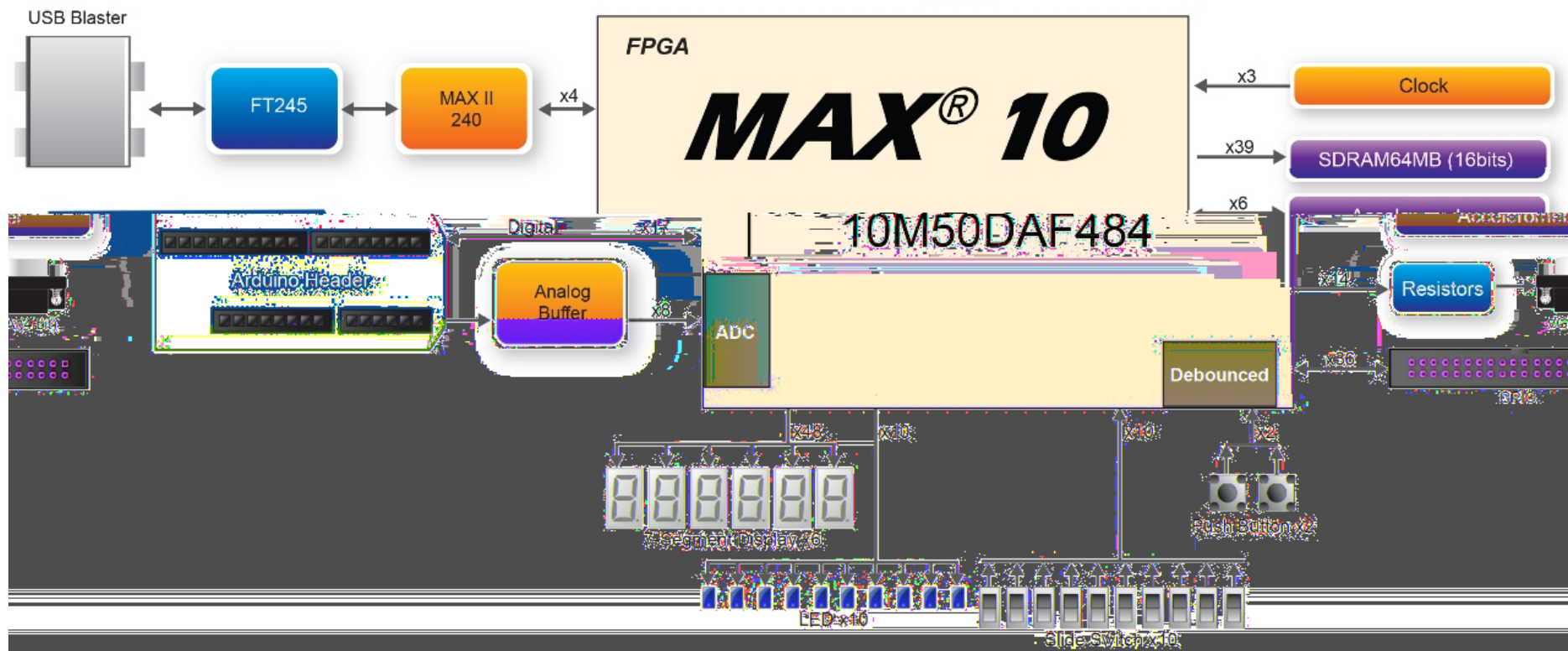


ALTERA MAX10 Development & Education Board (DE10-Lite)

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15	VGA and Accelerometer		
16	Power - 5V, 1.2V		
17	Power - 1.8V, 2.5V, 3.3V		
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MAX10 Bank 1 & 2

Analog input interface

13 ADC1IN[8..1]

VGA

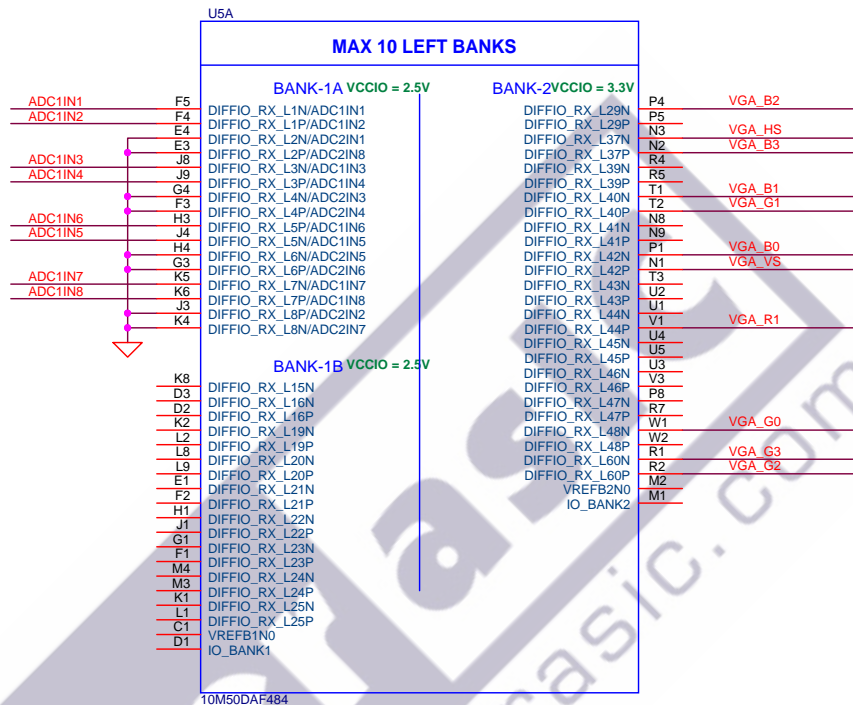
15 VGA_R[3..0]

15 VGA_G[3..0]

15 VGA_B[3..0]

15 VGA_HS

15 VGA_VS



MAX10 Bank 3 & 4

GPIO 0

7,13 GPIO [35..0]

Arduino Digital Interface

13 Arduino_IO[15..0]

Digital Accelerometer

15 GSENSOR_SDI

15 GSENSOR_SCLK

15 GSENSOR_INT1

15 GSENSOR_INT2

15 GSENSOR_CS_n

15 GSENSOR_SDO

VGA

15 VGA_R[3..0]

U5B

MAX 10 BOTTOM BANKS

BANK-3VCCIO = 3.3V

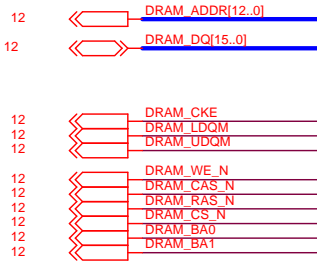
BANK-4VCCIO = 3.3V

GPIO_25	Y7	DIFFIO_RX_B10N	W11	GPIO_19
GPIO_23	Y8	DIFFIO_RX_B10P	Y11	GPIO_17
GPIO_34	AB2	DIFFIO_RX_B12N	AB10	GPIO_20
GPIO_32	AB3	DIFFIO_RX_B12P	AB11	GPIO_18
GPIO_33	Y3	DIFFIO_RX_B14N	AB12	GPIO_16
GPIO_31	Y4	DIFFIO_RX_B14P	AB13	GPIO_15
GPIO_30	AA5	DIFFIO_RX_B17N	W12	GPIO_14
Arduino_IO0	AB5	DIFFIO_RX_B17P	W13	GPIO_13
Arduino_IO1	AB6	DIFFIO_RX_B19N	AA14	GPIO_12
Arduino_IO2	AB7	DIFFIO_RX_B19P	AB15	GSSENSOR_SCLK
GPIO_24	AA8	DIFFIO_RX_B21N	AA15	GPIO_11
Arduino_IO3	AB8	DIFFIO_RX_B21P	Y16	
GPIO_22	AA9	DIFFIO_RX_B23N	AB16	GSSENSOR_CS_n
Arduino_IO4	AB9	DIFFIO_RX_B23P	AA16	
	V4	DIFFIO_RX_B2N	AB19	Arduino_IO10
GPIO_9	V5	DIFFIO_RX_B2P	AB20	Arduino_IO13
VGA_R3	Y1	DIFFIO_RX_B4N	AA19	Arduino_IO11
VGA_R2	Y2	DIFFIO_RX_B4P	Y18	
VGA_R0	AA1	DIFFIO_RX_B6N	AB21	Arduino_IO14
GPIO_35	AA2	DIFFIO_RX_B6P	AA20	Arduino_IO15
GPIO_29	Y5	DIFFIO_RX_B8N	AB17	Arduino_IO8
GPIO_27	Y6	DIFFIO_RX_B8P	AB18	
GPIO_3	W9	DIFFIO_TX_RX_B11N	V11	GSSENSOR_SDI
GPIO_1	W10	DIFFIO_TX_RX_B11P	V12	GSSENSOR_SDO
GPIO_7	W7	DIFFIO_TX_RX_B13N	R12	
GPIO_5	W8	DIFFIO_TX_RX_B13P	P12	
	R10	DIFFIO_TX_RX_B15N	AA11	Arduino_IO6
	P10	DIFFIO_TX_RX_B15P	AA12	Arduino_IO7
GPIO_28	AA6	DIFFIO_TX_RX_B16N	V13	
GPIO_26	AA7	DIFFIO_TX_RX_B16P	W14	
GPIO_10	W5	DIFFIO_TX_RX_B1N	R13	
GPIO_8	W6	DIFFIO_TX_RX_B1P	P13	
Arduino_IO5	Y10	DIFFIO_TX_RX_B22N	Y13	GSSENSOR_INT2
GPIO_21	AA10	DIFFIO_TX_RX_B22P	Y14	GSSENSOR_INT1
	U6	DIFFIO_TX_RX_B3N	V14	
	U7	DIFFIO_TX_RX_B3P	W15	
	W4	DIFFIO_TX_RX_B5N	U15	
	W3	DIFFIO_TX_RX_B5P	V16	
GPIO_6	V7	DIFFIO_TX_RX_B7N	AA17	Arduino_IO9
GPIO_4	V8	DIFFIO_TX_RX_B7P	Y17	
	R9	DIFFIO_TX_RX_B9N	V15	
	P9	DIFFIO_TX_RX_B9P	W16	
	AA3	DIFFIO_TX_RX_B9P	Y19	Arduino_IO12
	AB4	VREFB3N0	W18	
	IO_BANK3	VREFB4N0	AA13	
		IO_BANK4	AB14	

10M50DAF484

MAX10 Bank 5 & 6

SDRAM



SWITCH



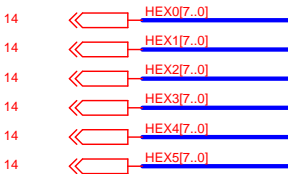
KEY



LED

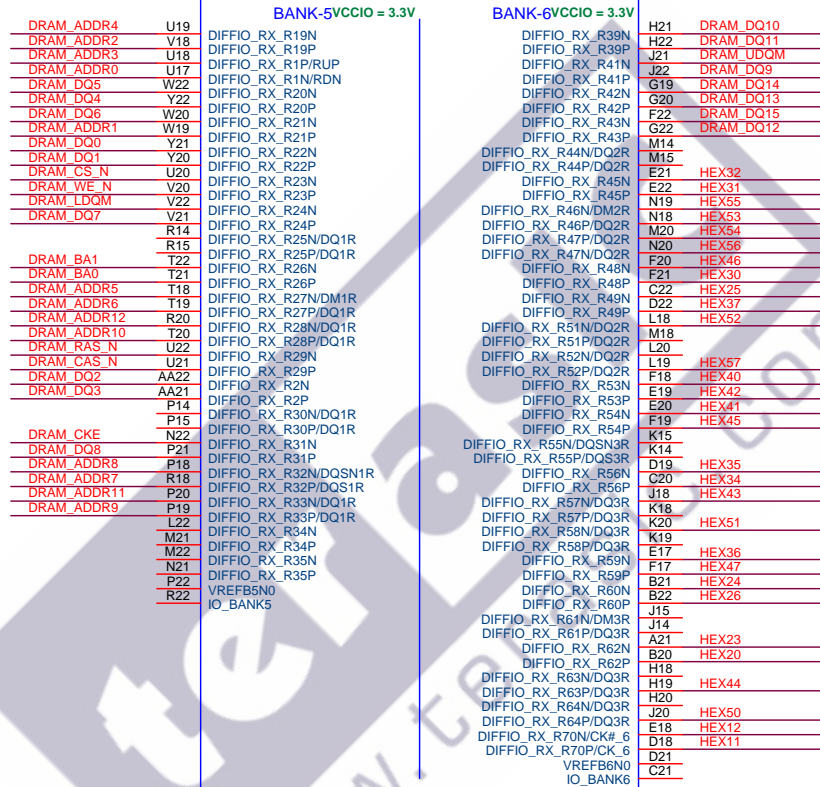


7-segment Display



U5C

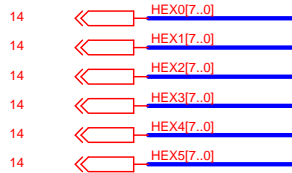
MAX 10 RIGHT BANKS



10M50DAF484

MAX10 Bank 7 & 8

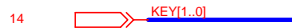
7-segment Display



SWITCH



KEY



LED



Arduino Digital Interface



U5D

MAX 10 TOP BANKS

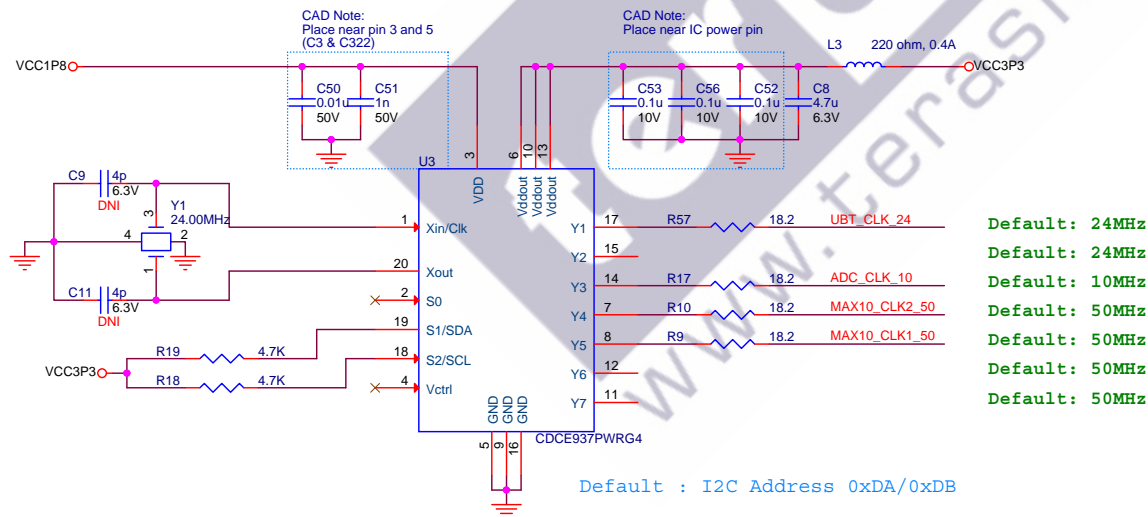
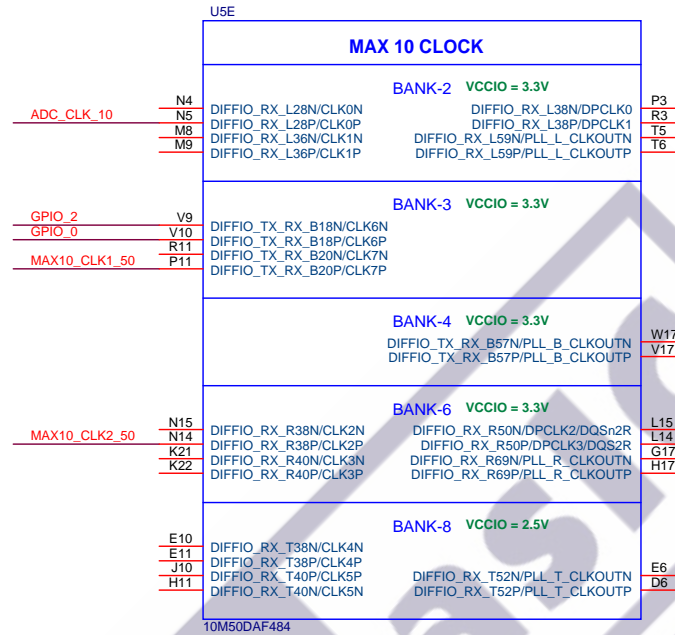
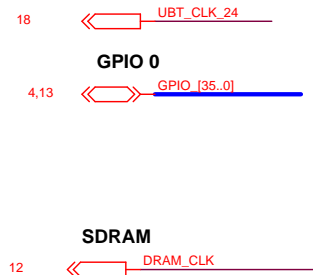
BANK-7VCCIO = 3.3V

BANK-8VCCIO = 2.5V

HEX14	A17	DIFFIO_RX_T10N	C7
HEX15	A18	DIFFIO_RX_T10P	C8
HEX02	C15	DIFFIO_RX_T15N	A6
HEX03	C16	DIFFIO_RX_T15P	B7
HEX17	A16	DIFFIO_RX_T16N	D8
HEX13	B16	DIFFIO_RX_T16P	A4
	J13	DIFFIO_RX_T17N	A5
	H14	DIFFIO_RX_T17P	E9
LEDR5	C13	DIFFIO_RX_T18N	A2
HEX00	C14	DIFFIO_RX_T18P	A3
SW8	B14	DIFFIO_RX_T19N	B3
SW7	A14	DIFFIO_RX_T19P	B4
HEX01	E15	DIFFIO_RX_T1N	B5
HEX04	E16	DIFFIO_RX_T1P	C4
	E13	DIFFIO_RX_T20N	E8
LEDR7	D14	DIFFIO_RX_T20P	D5
	E12	DIFFIO_RX_T21N	C5
LEDR4	D13	DIFFIO_RX_T21P	B1
	J12	DIFFIO_RX_T22N	B2
	H13	DIFFIO_RX_T22P	C2
SW4	A12	DIFFIO_RX_T23N	C3
SW6	A13	DIFFIO_RX_T23P	D7
SW2	D12	DIFFIO_RX_T24N	C6
SW3	C12	DIFFIO_RX_T24P	
LEDR2	A10	DIFFIO_RX_T25N	
LEDR8	A11	DIFFIO_RX_T25P	
SW0	C10	DIFFIO_RX_T26N	
SW1	C11	DIFFIO_RX_T26P	
LEDR9	B11	DIFFIO_RX_T27N	
SW5	B12	DIFFIO_RX_T27P	
	J11	DIFFIO_RX_T28N	
	H12	DIFFIO_RX_T28P	
KEY0	B8	DIFFIO_RX_T31N	
LEDR1	A9	DIFFIO_RX_T31P	
HEX06	C17	DIFFIO_RX_T2N	
HEX05	D17	DIFFIO_RX_T2P	
	C9	DIFFIO_RX_T30N	
LEDR3	B10	DIFFIO_RX_T30P	
KEY1	A7	DIFFIO_RX_T29P	
LEDR0	A8	DIFFIO_RX_T29N	
SW9	F15	DIFFIO_RX_T5N	
Arduino_Reset_n	F16	DIFFIO_RX_T5P	
HEX22	B19	DIFFIO_RX_T6N	
HEX33	C19	DIFFIO_RX_T6P	
HEX16	B17	DIFFIO_RX_T7N	
HEX10	C18	DIFFIO_RX_T7P	
HEX27	A19	DIFFIO_RX_T8N	
HEX21	A20	DIFFIO_RX_T8P	
LEDR6	E14	DIFFIO_RX_T9N	
HEX07	D15	DIFFIO_RX_T9P	
	B15	VREFB7N0	
	A15	IO_BANK7	

10M50DAF484

MAX10 Clock

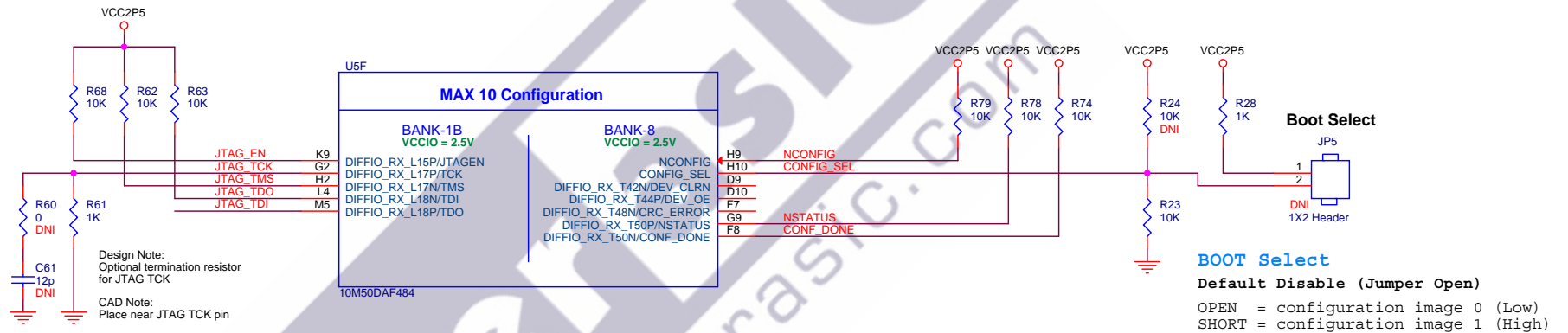
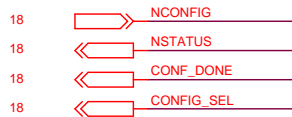


MAX10 Configuration

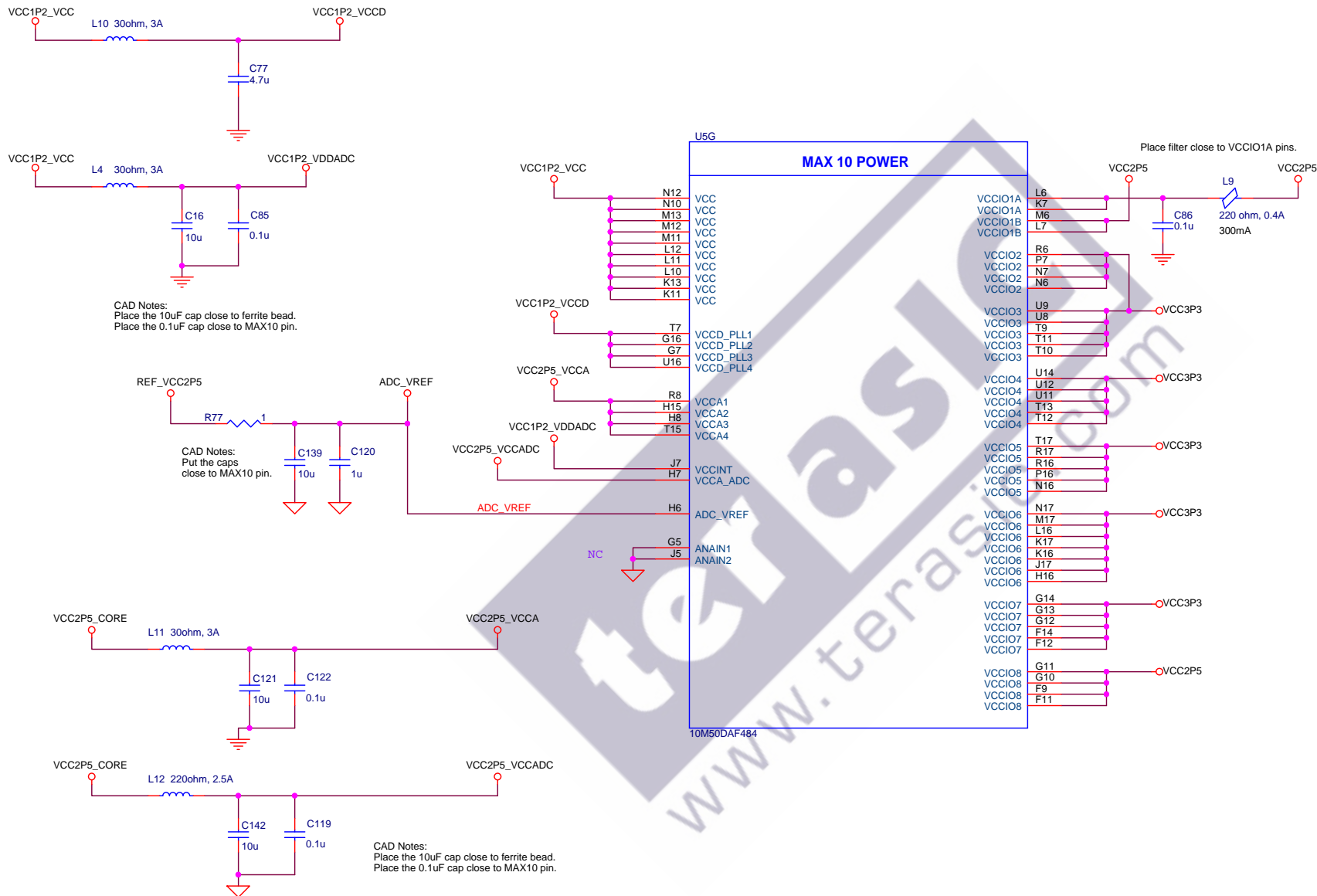
JTAG Interface



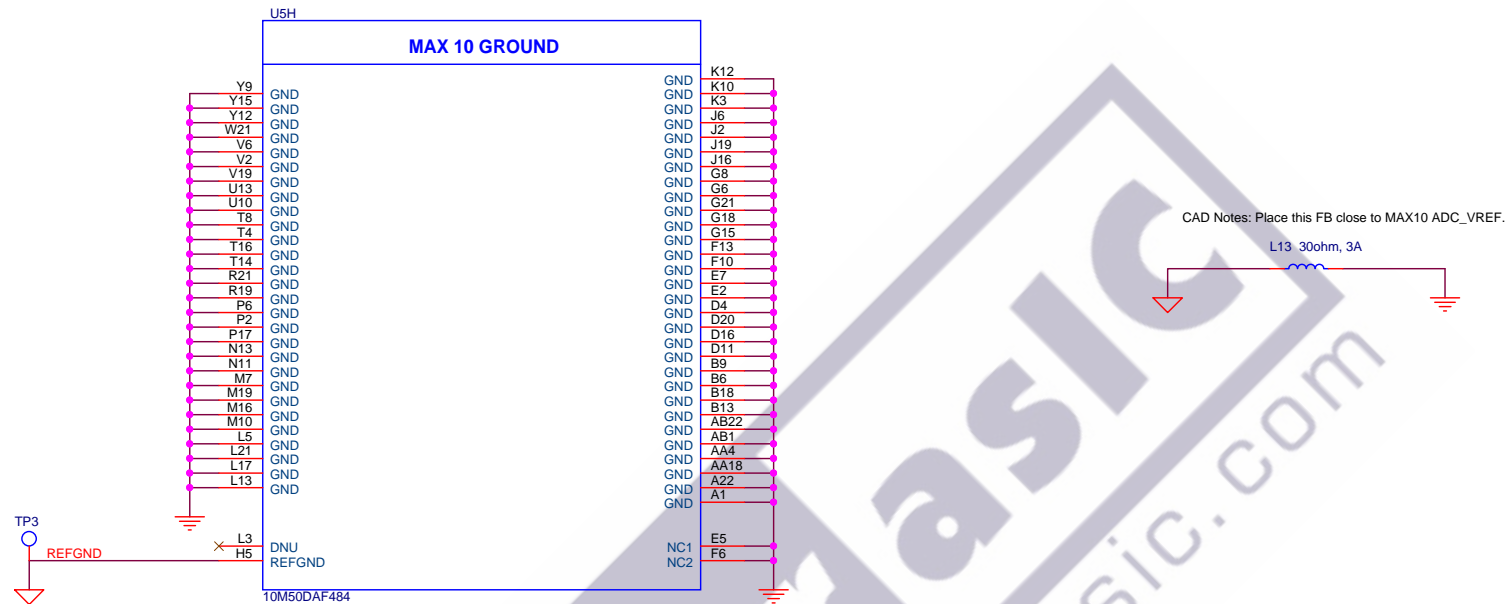
FPGA CONFIG



MAX10 Power



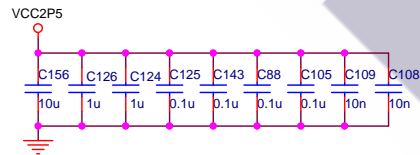
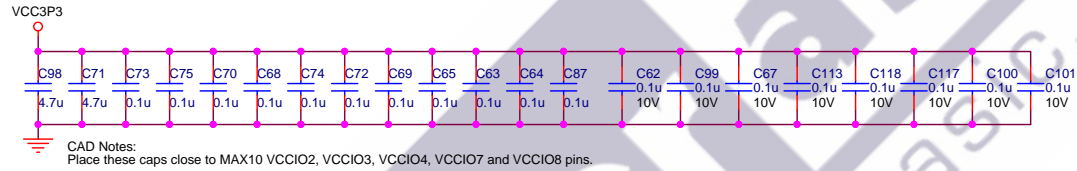
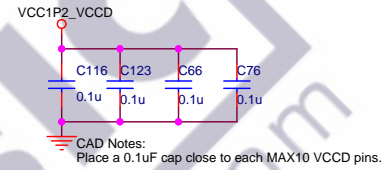
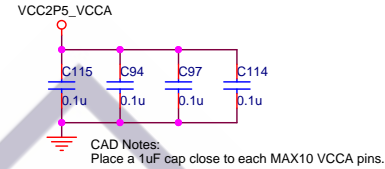
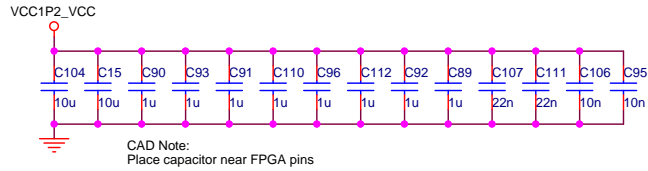
MAX10 Ground



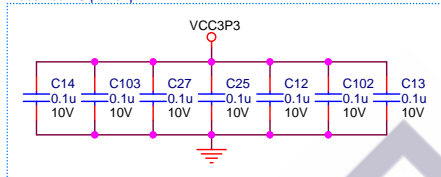
- 1. Use REFVDD as ground reference.
- 2. Route analog input signal adjacent to AVSSREF as possible.

CAD Notes: Place this FB close to MAX10 ADC_VREF.

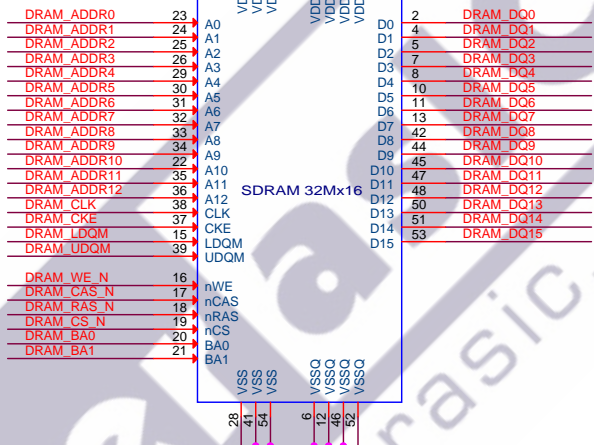
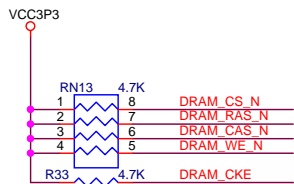
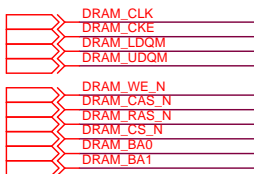
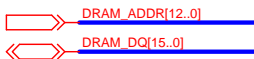
MAX10 Decoupling



CAD Note:
Place near IC power pin



SDRAM



GPIO

4,7 GPIO [35..0]

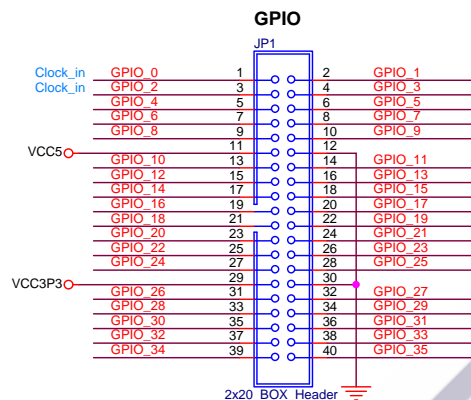
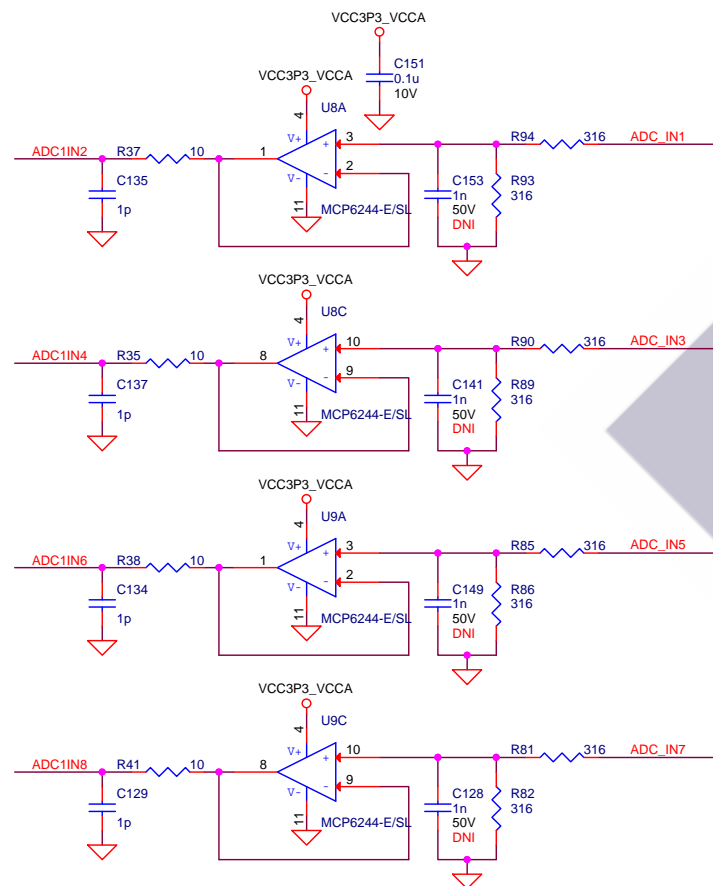
Arduino Digital Interface

4 Arduino_IO[15..0]

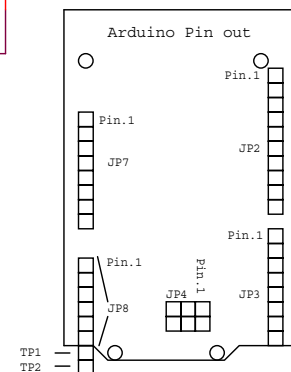
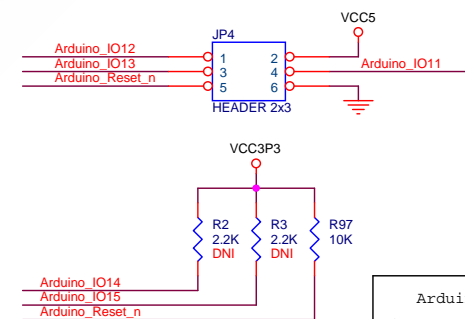
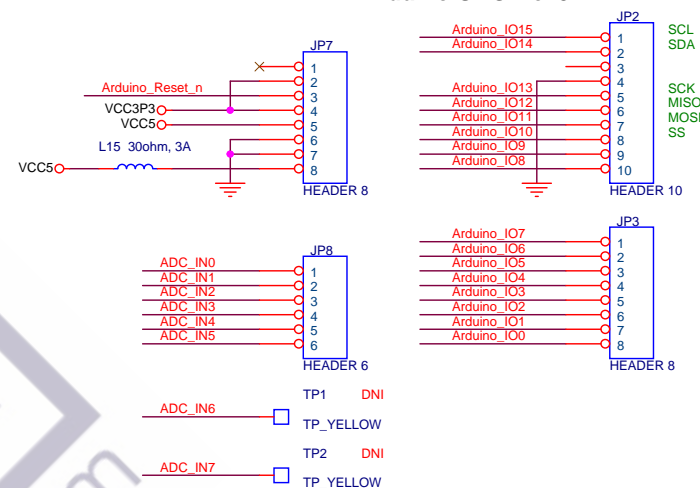
4 Arduino_Reset_n

Analog input interface

3 ADC1IN[8..1]



Arduino UNO Rev3



User IO, 7-Seg, LED

SWITCH

SW[9..0]

KEY

KEY[1..0]

LED

LEDR[9..0]

7-segment Display

HEX0[7..0]

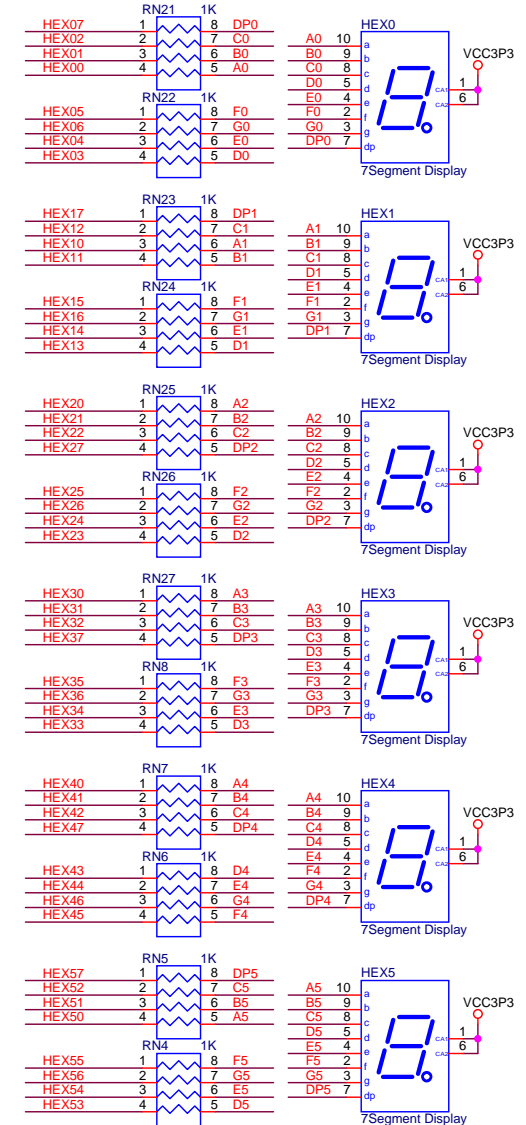
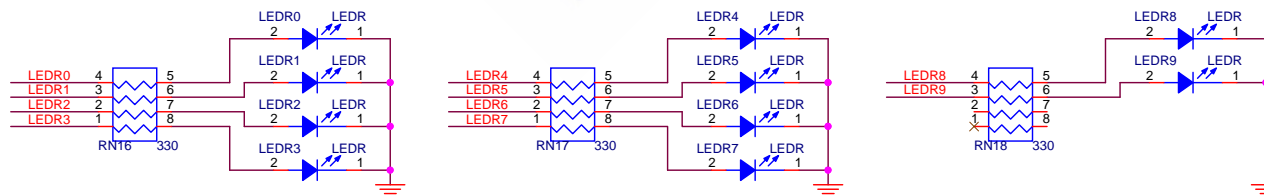
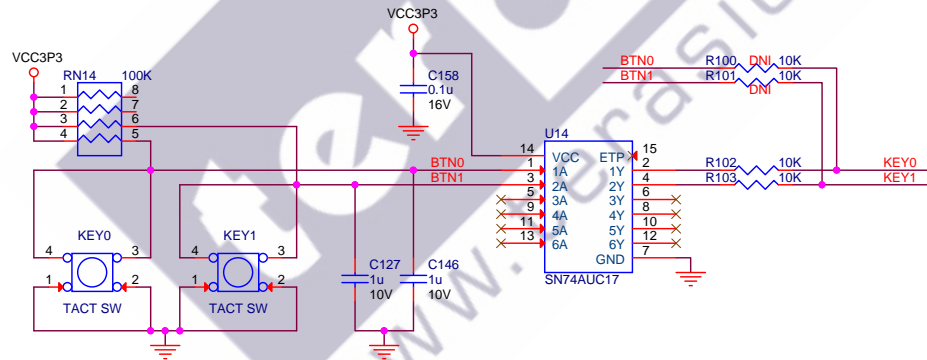
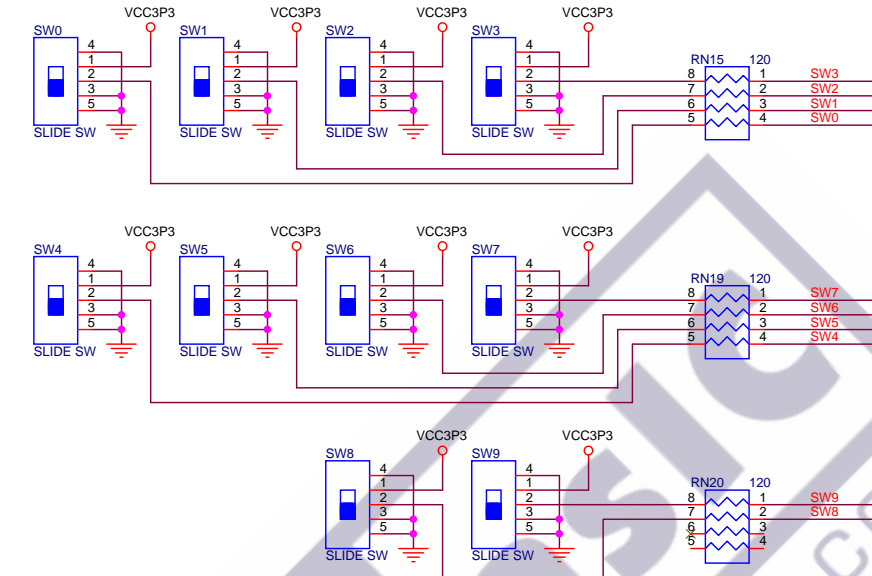
HEX1[7..0]

HEX2[7..0]

HEX3[7..0]

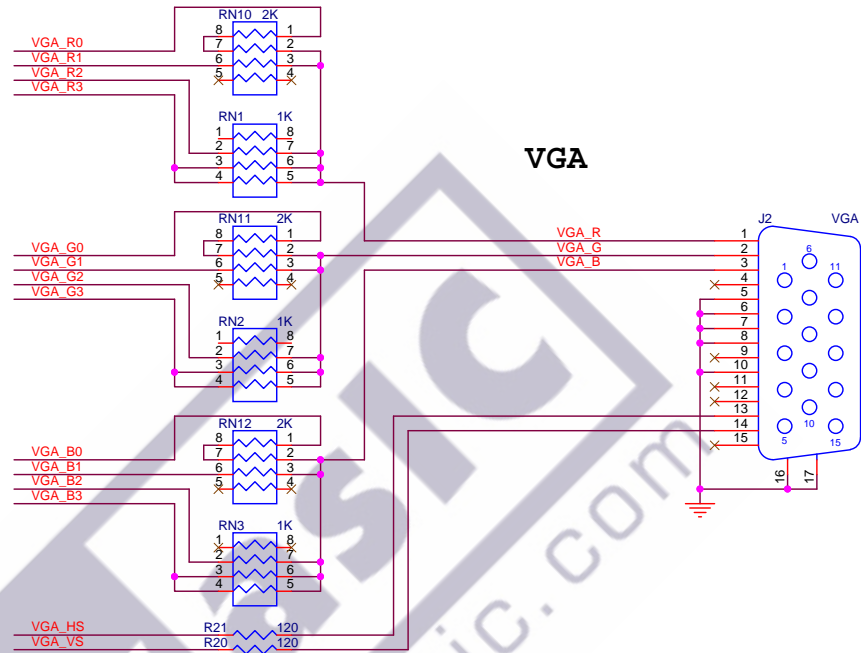
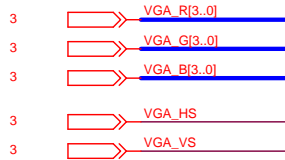
HEX4[7..0]

HEX5[7..0]

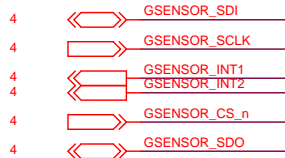


VGA and Accelerometer

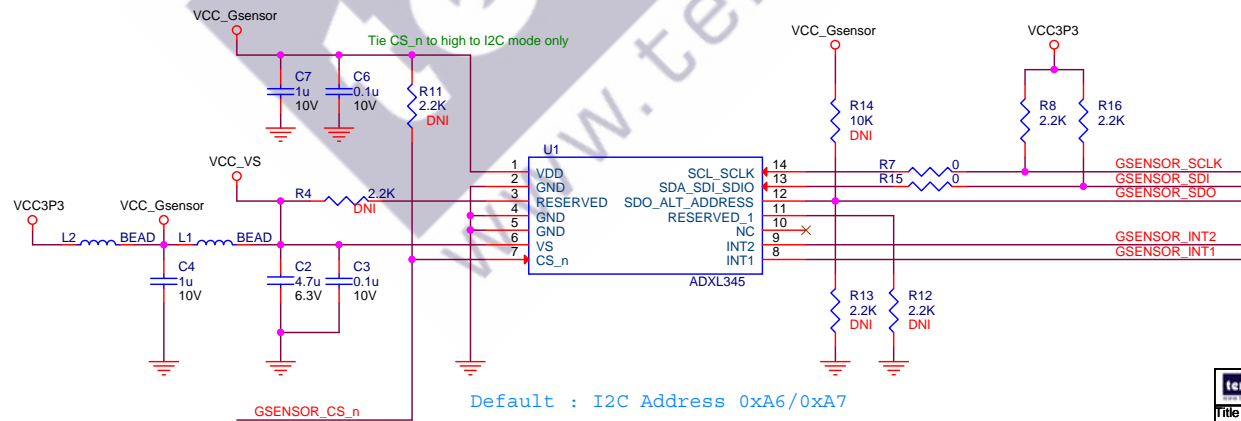
VGA



Digital Accelerometer



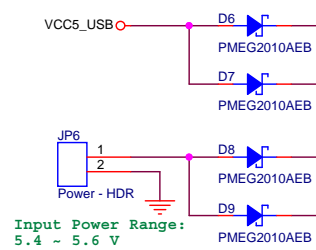
Digital Accelerometer



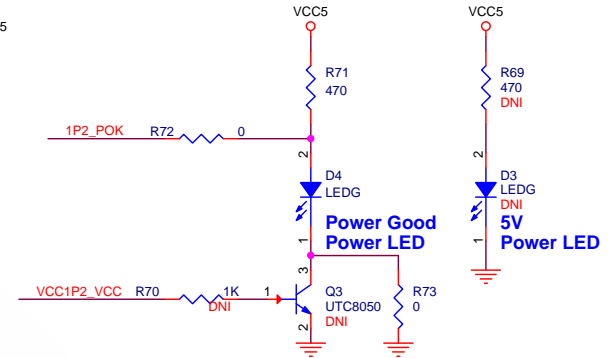
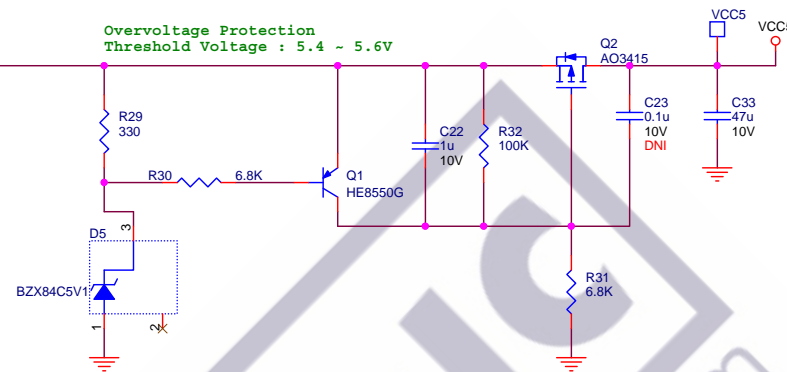
Power - 5V_DCIN / 1.2V

Power up Sequence:
VCC5--->
VCC2P5, VCC3P3 --->
VCC1P2_VCC

5V Power from USB Port

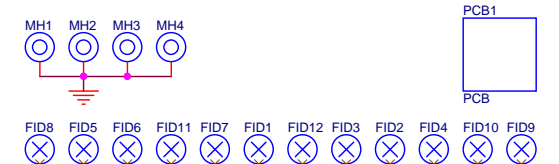
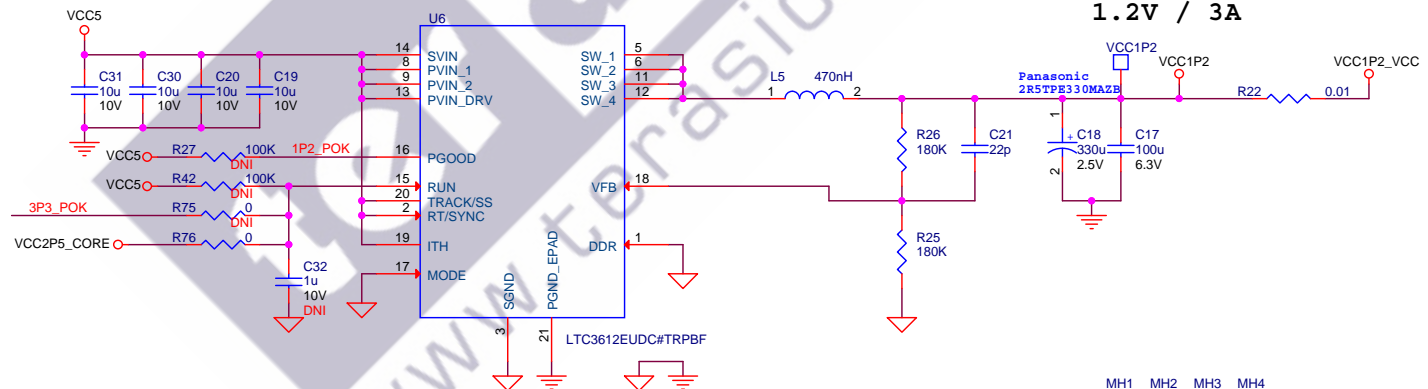


Overvoltage Protection
Threshold Voltage : 5.4 ~ 5.6V



Ramp Time
Tsoft-start = 1 msec
Switching Frequency : 2.25MHz
1.2V / 3A

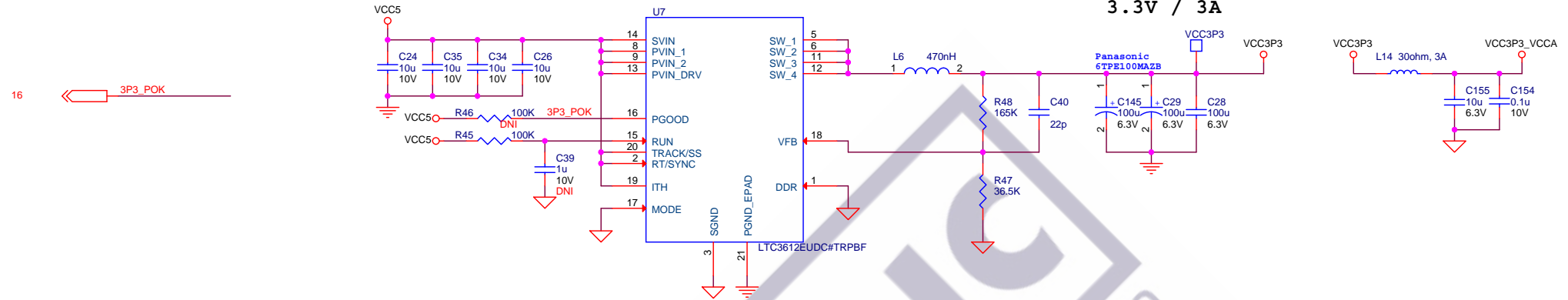
17 3P3_POK



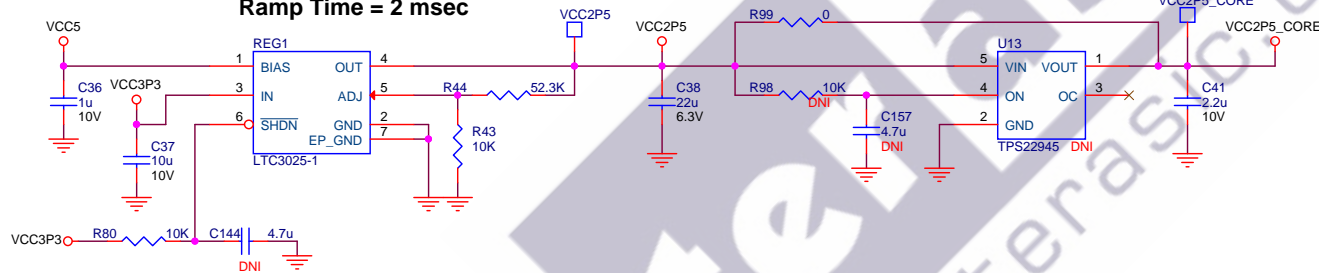
terasic <small>Copyright (c) 2016 by Terasic Inc. Taiwan. All rights reserved. No part of this schematic design may be reproduced, duplicated, or used without the prior written permission of Terasic.</small>	
Title DE10-Lite	
Size B	Document Number Power - 12V, 5V
Date: Friday, January 20, 2017	Sheet 16 of 18
Rev B1	

Power - 3.3V / 2.5V

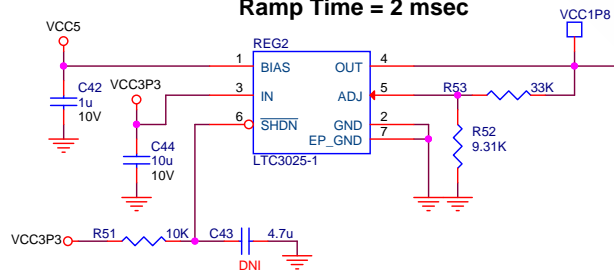
Ramp Time
Tsoft-start = 1 msec
Switching Frequency : 2.25MHz
3.3V / 3A



2.5V / 0.5A Ramp Time = 2 msec



1.8V / 0.5A Ramp Time = 2 msec



Voltage Reference

