Cyclone V SoC Development & Education Board (DE10-Nano)

Title: **DE10-Nano Board**

Size	Document Number	Rev
B	Cover Page	B2

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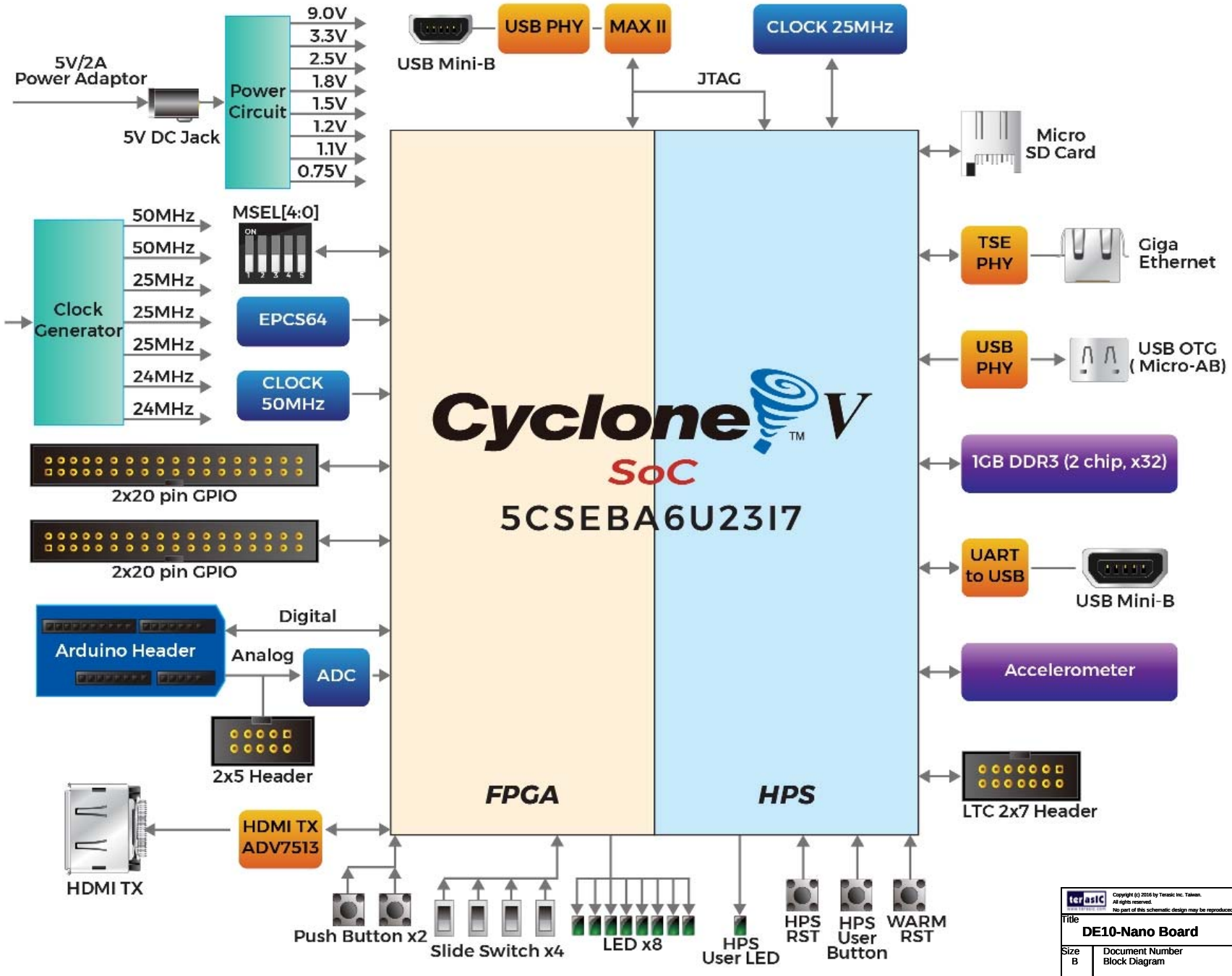

Title
DE10-Nano Board

Size	Document Number	Rev
B	Block Diagram	B2

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CYCLONE V SoC BANK 3

Bank 3A
VCCIO = 3.3V

GPIO_0_D32	Y11	IO_3A/PR_ERROR/DIFFIO_RX_B7P	
GPIO_0_D35	AA11	IO_3A/PR_DONE/DIFFIO_RX_B7N	
GPIO_0_D10	AD5	IO_3A/DIFFIO_TX_B8P/DQ1B	
GPIO_0_D13	AE6	IO_3A/PR_READY/DIFFIO_TX_B8N/DQ1B	

Bank 3B
VCCIO = 3.3V

HDMI_TX_D16	AE4	IO_3B/DIFFIO_TX_B9P/B_WEN/DQ2B	IO_3B/DIFFIO_TX_B17P/B_BA_0/DQ3B	AF7	GPIO_0_D6
GPIO_0_D8	AF4	IO_3B/DIFFIO_TX_B9N/GND	IO_3B/DIFFIO_TX_B17N/GND	AG6	HDMI_TX_D21
HDMI_TX_D5	AD10	IO_3B/DIFFIO_RX_B10P/B_A_14/DQ2B	IO_3B/DIFFIO_RX_B18P/B_BA_1/DQ3B	AF11	HDMI_TX_INT
HDMI_TX_D10	AE9	IO_3B/DIFFIO_RX_B10N/B_A_15/DQ2B	IO_3B/DIFFIO_RX_B18N/B_BA_2/DQ3B	AF10	HDMI_TX_D8
HDMI_LRCLK	T11	IO_3B/DIFFIO_RX_B11P/B_CSN_0/DQS2B	IO_3B/DIFFIO_RX_B19P/B_CK/DQS3B	T13	HDMI_I2S0
HDMI_MCLK	U11	IO_3B/DIFFIO_RX_B11N/B_CSN_1/DQSN2B	IO_3B/DIFFIO_RX_B19N/B_CKN/DQSN3B	T12	HDMI_SCLK
HDMI_TX_D12	AE7	IO_3B/DIFFIO_TX_B12P/B_A_12	IO_3B/DIFFIO_TX_B20P/B_A_6	AH3	GPIO_0_D9
HDMI_TX_D14	AF8	IO_3B/DIFFIO_TX_B12N/B_A_13/DQ2B	IO_3B/DIFFIO_TX_B20N/B_A_7/DQ3B	AH2	HDMI_TX_D17
HDMI_TX_D23	AE8	IO_3B/DIFFIO_TX_B13P/B_A_10/DQ2B			
HDMI_TX_D22	AF9	IO_3B/DIFFIO_TX_B13N/B_A_11/DQ2B			
HDMI_TX_D4	AD11	IO_3B/DIFFIO_RX_B14P/B_A_8/DQ2B	IO_3B/DIFFIO_RX_B22P/B_A_4/DQ3B	AE12	HDMI_TX_D1
HDMI_TX_D6	AE11	IO_3B/DIFFIO_RX_B14N/B_A_9/DQ2B	IO_3B/DIFFIO_RX_B22N/B_A_5/DQ3B	AD12	HDMI_TX_D0
HDMI_TX_D15	AF5	IO_3B/DIFFIO_TX_B16P/B_CASN/DQ2B	IO_3B/DIFFIO_TX_B24P/B_A_0/DQ3B	AH6	HDMI_TX_D20
HDMI_TX_D13	AF6	IO_3B/DIFFIO_TX_B16N/B_RASN/DQ2B	IO_3B/DIFFIO_TX_B24N/B_A_1/DQ3B	AH5	HDMI_TX_D19

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CYCLONE V SoC BANK 5

Bank 5A
VCCIO = 3.3V

LED4	AF26	IO_5A/RZQ_1/DIFFIO_TX_R1P/DQ1R			
LED5	AE26	IO_5A/PR_REQUEST/DIFFIO_TX_R1N/DQ1R			
			IO_5A/DIFFIO_RX_R6P/DQS1R	Y16	LED6
			IO_5A/DIFFIO_RX_R6N/DQSN1R	W15	LED0
			IO_5A/DIFFIO_TX_R7P/DQ1R	AA24	LED1
GPIO_1_D3	AD26			AA23	LED7
GPIO_0_D29	Y17	IO_5A/CVP_CONFDONE/DIFFIO_TX_R3N/DQ1R	IO_5A/DIFFIO_TX_R7N	V16	LED2
GPIO_0_D28	Y18	IO_5A/DIFFIO_RX_R4P/DQ1R	IO_5A/DIFFIO_RX_R8P/DQ1R	V15	LED3
		IO_5A/DIFFIO_RX_R4N/DQ1R	IO_5A/DIFFIO_RX_R8N/DQ1R		

Bank 5B
VCCIO = 3.3V

GPIO_0_D30	AB25	IO_5B/RZQ_2/DIFFIO_TX_R24N

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CYCLONE V SoC BANK 4

Bank 4A
VCCIO = 3.3V

Arduino_Reset_n	AH7	IO_4A/RZQ_0/DIFFIO_TX_B25N			
Arduino_IO6	AG8	IO_4A/DIFFIO_TX_B25P/B_DQ_2/DQ4B	IO_4A/DIFFIO_TX_B41P/B_DQ_18/DQ6B	AF18	GPIO_1_D30
Arduino_IO0	AG13	IO_4A/DIFFIO_RX_B26P/B_DQ_1/DQ4B	IO_4A/DIFFIO_RX_B42P/B_DQ_17/DQ6B	AE19	GPIO_1_D34
Arduino_IO1	AF13	IO_4A/DIFFIO_RX_B26N/B_DQ_0/DQ4B	IO_4A/DIFFIO_RX_B42N/B_DQ_16/DQ6B	AD19	HDMI_TX_DE
Arduino_IO4	U14	IO_4A/DIFFIO_RX_B27P/B_DQS_0/DQS4B	IO_4A/DIFFIO_RX_B43P/B_DQS_2/DQS6B	AA19	GPIO_0_D24
Arduino_IO5	U13	IO_4A/DIFFIO_RX_B27N/B_DQSN_0/DQSN4B	IO_4A/DIFFIO_RX_B43N/B_DQSN_2/DQSN6B	AA18	GPIO_0_D26
Arduino_IO3	AG9	IO_4A/DIFFIO_TX_B28P/B_ODT_0	IO_4A/DIFFIO_TX_B44P/B_RESETN	AG18	GPIO_1_D28
Arduino_IO7	AH8	IO_4A/DIFFIO_TX_B28N/B_DQ_3/DQ4B	IO_4A/DIFFIO_TX_B44N/B_DQ_19/DQ6B	AH18	GPIO_1_D29
Arduino_IO2	AG10	IO_4A/DIFFIO_TX_B29P/B_DQ_6/DQ4B	IO_4A/DIFFIO_TX_B45P/B_DQ_22/DQ6B	AG19	GPIO_1_D26
Arduino_IO14	AH9	IO_4A/DIFFIO_TX_B29N/B_ODT_1/DQ4B	IO_4A/DIFFIO_TX_B45N/GND/DQ6B	AH19	GPIO_1_D27
Arduino_IO10	AF15	IO_4A/DIFFIO_RX_B30P/B_DQ_5/DQ4B	IO_4A/DIFFIO_RX_B46P/B_DQ_21/DQ6B	AE20	GPIO_1_D33
Arduino_IO9	AE15	IO_4A/DIFFIO_RX_B30N/B_DQ_4/DQ4B	IO_4A/DIFFIO_RX_B46N/B_DQ_20/DQ6B	AD20	GPIO_0_D17
Arduino_IO15	AG11	IO_4A/DIFFIO_TX_B32P/B_DM_0/DQ4B	IO_4A/DIFFIO_TX_B48P/B_DM_2/DQ6B	AF20	GPIO_1_D31
Arduino_IO12	AH11	IO_4A/DIFFIO_TX_B32N/B_DQ_7/DQ4B	IO_4A/DIFFIO_TX_B48N/B_DQ_23/DQ6B	AG20	GPIO_1_D24
Arduino_IO13	AH12	IO_4A/DIFFIO_TX_B33P/B_DQ_10/DQ5B	IO_4A/DIFFIO_TX_B49P/B_DQ_26/DQ7B	AG21	GPIO_1_D19
Arduino_IO8	AF17	IO_4A/DIFFIO_RX_B34P/B_DQ_9/DQ5B	IO_4A/DIFFIO_RX_B50P/B_DQ_25/DQ7B	AF22	GPIO_1_D22
Arduino_IO11	AG16	IO_4A/DIFFIO_RX_B34N/B_DQ_8/DQ5B	IO_4A/DIFFIO_RX_B50N/B_DQ_24/DQ7B	AF21	GPIO_1_D25
GPIO_0_D27	W14	IO_4A/DIFFIO_RX_B35P/B_DQS_1/DQS5B	IO_4A/DIFFIO_RX_B51P/B_DQS_3/DQS7B	AD23	GPIO_0_D14
HDMI_TX_VS	V13	IO_4A/DIFFIO_RX_B35N/B_DQSN_1/DQSN5B	IO_4A/DIFFIO_RX_B51N/B_DQSN_3/DQSN7B	AE22	GPIO_1_D23
GPIO_0_D11	AG14	IO_4A/DIFFIO_TX_B36P/B_CKE_1			
GPIO_0_D5	AH13	IO_4A/DIFFIO_TX_B36N/B_DQ_11/DQ5B	IO_4A/DIFFIO_TX_B52N/B_DQ_27/DQ7B	AH21	GPIO_1_D18
GPIO_1_D32	AG15	IO_4A/DIFFIO_TX_B37P/B_DQ_14/DQ5B	IO_4A/DIFFIO_TX_B53P/B_DQ_30/DQ7B	AH23	GPIO_1_D20
GPIO_0_D7	AH14	IO_4A/DIFFIO_TX_B37N/B_CKE_0/DQ5B	IO_4A/DIFFIO_TX_B53N/GND/DQ7B	AH22	GPIO_1_D17
GPIO_0_D19	AD17	IO_4A/DIFFIO_RX_B38P/B_DQ_13/DQ5B	IO_4A/DIFFIO_RX_B54P/B_DQ_29/DQ7B	AG23	GPIO_1_D14
GPIO_1_D35	AE17	IO_4A/DIFFIO_RX_B38N/B_DQ_12/DQ5B	IO_4A/DIFFIO_RX_B54N/B_DQ_28/DQ7B	AF23	GPIO_1_D15
KEY0	AH17	IO_4A/DIFFIO_TX_B40P/B_DM_1/DQ5B	IO_4A/DIFFIO_TX_B56P/B_DM_3/DQ7B	AG24	GPIO_1_D16
KEY1	AH16	IO_4A/DIFFIO_TX_B40N/B_DQ_15/DQ5B	IO_4A/DIFFIO_TX_B56N/B_DQ_31/DQ7B	AH24	GPIO_1_D12
			IO_4A/DIFFIO_TX_B57P/B_DQ_34/DQ8B	AG26	GPIO_1_D8
			IO_4A/DIFFIO_RX_B58P/B_DQ_33/DQ8B	AE24	GPIO_0_D15
			IO_4A/DIFFIO_RX_B58N/B_DQ_32/DQ8B	AE23	GPIO_0_D12
			IO_4A/DIFFIO_RX_B59P/B_DQS_4/DQS8B	AC22	GPIO_0_D21
			IO_4A/DIFFIO_RX_B59N/B_DQSN_4/DQSN8B	AC23	GPIO_0_D20
			IO_4A/DIFFIO_TX_B60N/B_DQ_35/DQ8B	AH26	GPIO_1_D11
			IO_4A/DIFFIO_TX_B61P/B_DQ_38/DQ8B	AG28	GPIO_1_D4
			IO_4A/DIFFIO_TX_B61N/GND/DQ8B	AH27	GPIO_1_D9
			IO_4A/DIFFIO_RX_B62P/B_DQ_37/DQ8B	AF25	GPIO_1_D13
			IO_4A/DIFFIO_RX_B62N/B_DQ_36/DQ8B	AG25	GPIO_1_D10
			IO_4A/DIFFIO_TX_B64P/B_DM_4/DQ8B	AF27	GPIO_1_D7
			IO_4A/DIFFIO_TX_B64N/B_DQ_39/DQ8B	AF28	GPIO_1_D5

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User Interface (FPGA)

20	KEY[1..0]	
20	LED[7..0]	

GPIO

6,7,19	GPIO_0_D[35..0]	
6,19	GPIO_1_D[35..0]	

Arduino Digital Interface

19	Arduino_IO[15..0]	
19	Arduino_Reset_n	

HDMI TX

6,21	HDMI_TX_D[23..0]	
6,21	HDMI_TX_CLK	
6,21	HDMI_TX_HS	
6,21	HDMI_TX_VS	
6,21	HDMI_TX_DE	

HDMI Audio Interface

21	HDMI_MCLK	
21	HDMI_LRCLK	
21	HDMI_I2S0	
21	HDMI_SCLK	

HDMI Interface

21	HDMI_TX_INT	
21	HDMI_TX_DE	
21	HDMI_TX_VS	

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DDR3 Interface (HPS)

12 HPS_DDR3_ADDR[14..0]
12 HPS_DDR3_BA[2..0]
12 HPS_DDR3_DM[3..0]
12 HPS_DDR3_DQ[31..0]
12 HPS_DDR3_DQS_P[3..0]
12 HPS_DDR3_DQS_N[3..0]
12 HPS_DDR3_RESET_N
12 HPS_DDR3_CK_P
12 HPS_DDR3_CK_N
12 HPS_DDR3_CAS_N
12 HPS_DDR3_RAS_N
12 HPS_DDR3_CS_N
12 HPS_DDR3_WE_N
12 HPS_DDR3_ODT
12 HPS_DDR3_CKE
12 HPS_DDR3_CS1_N
12 HPS_DDR3_CKE1
12 HPS_DDR3_ODT1

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CYCLONE V SoC BANK 6 (HPS)

Bank 6A
VCCIO = 1.5V

R117 100 HPS_DDR3_RZQ D25 — HPS_RZQ_0

HPS_DDR3_ADDR0	C28	HPS_DDR/HPS_A_0	
HPS_DDR3_ADDR1	B28	HPS_DDR/HPS_A_1	
HPS_DDR3_ADDR2	E26	HPS_DDR/HPS_A_2	
HPS_DDR3_ADDR3	D26	HPS_DDR/HPS_A_3	
HPS_DDR3_ADDR4	J21	HPS_DDR/HPS_A_4	
HPS_DDR3_ADDR5	J20	HPS_DDR/HPS_A_5	
HPS_DDR3_ADDR6	C26	HPS_DDR/HPS_A_6	
HPS_DDR3_ADDR7	B26	HPS_DDR/HPS_A_7	
HPS_DDR3_ADDR8	F26	HPS_DDR/HPS_A_8	
HPS_DDR3_ADDR9	F25	HPS_DDR/HPS_A_9	
HPS_DDR3_ADDR10	A24	HPS_DDR/HPS_A_10	
HPS_DDR3_ADDR11	B24	HPS_DDR/HPS_A_11	
HPS_DDR3_ADDR12	D24	HPS_DDR/HPS_A_12	
HPS_DDR3_ADDR13	C24	HPS_DDR/HPS_A_13	
HPS_DDR3_ADDR14	G23	HPS_DDR/HPS_A_14	
	F24	HPS_DDR/HPS_A_15	
HPS_DDR3_CK_P	N21	HPS_DDR/HPS_CK	
HPS_DDR3_CK_N	N20	HPS_DDR/HPS_CKn	
HPS_DDR3_CKE	L28	HPS_DDR/HPS_CKE_0	
HPS_DDR3_CKE1	K28	HPS_DDR/HPS_CKE_1	
HPS_DDR3_BA0	A27	HPS_DDR/HPS_BA_0	
HPS_DDR3_BA1	H25	HPS_DDR/HPS_BA_1	
HPS_DDR3_BA2	G25	HPS_DDR/HPS_BA_2	
HPS_DDR3_RAS_N	A25	HPS_DDR/HPS_RASn	
HPS_DDR3_CAS_N	A26	HPS_DDR/HPS_CASn	
HPS_DDR3_WE_N	E25	HPS_DDR/HPS_WEn	
HPS_DDR3_CS_N	L21	HPS_DDR/HPS_CSn_0	
HPS_DDR3_CS1_N	L20	HPS_DDR/HPS_CSn_1	
HPS_DDR3_ODT	D28	HPS_DDR/HPS_ODT_0	
HPS_DDR3_ODT1	G26	HPS_DDR/HPS_ODT_1	

HPS_DDR/HPS_DQ_0	J25	HPS_DDR3_DQ0	
HPS_DDR/HPS_DQ_1	J24	HPS_DDR3_DQ1	
HPS_DDR/HPS_DQ_2	E28	HPS_DDR3_DQ2	
HPS_DDR/HPS_DQ_3	D27	HPS_DDR3_DQ3	
HPS_DDR/HPS_DQ_4	J26	HPS_DDR3_DQ4	
HPS_DDR/HPS_DQ_5	K26	HPS_DDR3_DQ5	
HPS_DDR/HPS_DQ_6	G27	HPS_DDR3_DQ6	
HPS_DDR/HPS_DQ_7	F28	HPS_DDR3_DQ7	
HPS_DDR/HPS_DQS_0	R17	HPS_DDR3_DQS_P0	
HPS_DDR/HPS_DQSn_0	R16	HPS_DDR3_DQS_N0	
HPS_DDR/HPS_DM_0	G28	HPS_DDR3_DM0	
HPS_DDR/HPS_DQ_8	K25	HPS_DDR3_DQ8	
HPS_DDR/HPS_DQ_9	L25	HPS_DDR3_DQ9	
HPS_DDR/HPS_DQ_10	J27	HPS_DDR3_DQ10	
HPS_DDR/HPS_DQ_11	J28	HPS_DDR3_DQ11	
HPS_DDR/HPS_DQ_12	M27	HPS_DDR3_DQ12	
HPS_DDR/HPS_DQ_13	M26	HPS_DDR3_DQ13	
HPS_DDR/HPS_DQ_14	M28	HPS_DDR3_DQ14	
HPS_DDR/HPS_DQ_15	N28	HPS_DDR3_DQ15	
HPS_DDR/HPS_DQS_1	R19	HPS_DDR3_DQS_P1	
HPS_DDR/HPS_DQSn_1	R18	HPS_DDR3_DQS_N1	
HPS_DDR/HPS_DM_1	P28	HPS_DDR3_DM1	
HPS_GPI10	U15		
HPS_GPI11	U16		
HPS_GPI12	AC27		
HPS_GPI13	V24		

Bank 6B
VCCIO = 1.5V

HPS_DDR3_DQ16	N24	HPS_DDR/HPS_DQ_16	
HPS_DDR3_DQ17	N25	HPS_DDR/HPS_DQ_17	
HPS_DDR3_DQ18	T28	HPS_DDR/HPS_DQ_18	
HPS_DDR3_DQ19	U28	HPS_DDR/HPS_DQ_19	
HPS_DDR3_DQ20	N26	HPS_DDR/HPS_DQ_20	
HPS_DDR3_DQ21	N27	HPS_DDR/HPS_DQ_21	
HPS_DDR3_DQ22	R27	HPS_DDR/HPS_DQ_22	
HPS_DDR3_DQ23	V27	HPS_DDR/HPS_DQ_23	
HPS_DDR3_DQS_P2	T19	HPS_DDR/HPS_DQS_2	
HPS_DDR3_DQS_N2	T18	HPS_DDR/HPS_DQSn_2	
HPS_DDR3_DM2	W28	HPS_DDR/HPS_DM_2	
HPS_DDR3_DQ24	R26	HPS_DDR/HPS_DQ_24	
HPS_DDR3_DQ25	R25	HPS_DDR/HPS_DQ_25	
HPS_DDR3_DQ26	AA28	HPS_DDR/HPS_DQ_26	
HPS_DDR3_DQ27	W26	HPS_DDR/HPS_DQ_27	
HPS_DDR3_DQ28	R24	HPS_DDR/HPS_DQ_28	
HPS_DDR3_DQ29	T24	HPS_DDR/HPS_DQ_29	
HPS_DDR3_DQ30	Y27	HPS_DDR/HPS_DQ_30	
HPS_DDR3_DQ31	AA27	HPS_DDR/HPS_DQ_31	
HPS_DDR3_DQS_P3	U19	HPS_DDR/HPS_DQS_3	
HPS_DDR3_DQS_N3	T20	HPS_DDR/HPS_DQSn_3	
HPS_DDR3_DM3	AB28	HPS_DDR/HPS_DM_3	

HPS_DDR/HPS_DQ_32	T26		
HPS_DDR/HPS_DQ_33	U25		
HPS_DDR/HPS_DQ_34	AC28		
HPS_DDR/HPS_DQ_35	V25		
HPS_DDR/HPS_DQ_36	V19		
HPS_DDR/HPS_DQ_37	V20		
HPS_DDR/HPS_DQ_38	AE27		
HPS_DDR/HPS_DQ_39	AD28		
HPS_DDR/HPS_DQS_4	V18		
HPS_DDR/HPS_DQSn_4	V17		
HPS_DDR/HPS_DM_4	AE28		
HPS_GPI0	M25		
HPS_GPI1	K27		
HPS_GPI2	R20		
HPS_GPI3	R21		
HPS_GPI4	R28		
HPS_GPI5	P26		
HPS_GPI6	T17		
HPS_GPI7	T16		
HPS_GPI8	Y28		
HPS_GPI9	Y26		
HPS_DDR/HPS_RESETn	V28	HPS_DDR3_RESET_N	

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UBS PHY Interface (ULPI)

14 HPS_USB_DATA[7..0]
14 HPS_USB_CLKOUT
14 HPS_USB_NXT
14 HPS_USB_DIR
14 HPS_USB_STP
10,14 HPS_USB_RESET

Ethernet PHY Interface (RGMII)

15 HPS_ENET_TX_DATA[3..0]
15 HPS_ENET_GTX_CLK
15 HPS_ENET_TX_EN
15 HPS_ENET_RX_DATA[3..0]
15 HPS_ENET_RX_CLK
15 HPS_ENET_RX_DV
15 HPS_ENET_INT_N
15 HPS_ENET_MDC
15 HPS_ENET_MDIO
10,15,17 HPS_ENET_RESET_N

SD Card Interface

13 HPS_SD_DATA[3..0]
13 HPS_SD_CMD
13 HPS_SD_CLK

UART Interface

13 HPS_UART_RX
13 HPS_UART_TX
13 HPS_CONV_USB_N

HPS Reset

10,17 HPS_WARM_RST_N
10,17 HPS_RESET_N

HPS Clock

6 HPS_CLK1_25
6 HPS_CLK2_25

HPS JTAG INTERFACE

11 HPS_TCK
11 HPS_TMS
11 HPS_TDI
11 HPS_TDO
10 JTAG_TRST

Accelerometer Interface

16 HPS_I2C0_SDAT
16 HPS_I2C0_SCLK
16 HPS_GSENSOR_INT

LTC Interface

16 HPS_I2C1_SDAT
16 HPS_I2C1_SCLK
16 HPS_SPIM_MOSI
16 HPS_SPIM_MISO
16 HPS_SPIM_CLK
16 HPS_SPIM_SS
16 HPS_LTC_GPIO

HPS Key and LED

17 HPS_KEY
17 HPS_LED

VCC3P3
R143 4.7K HPS_PORSEL
R118 4.7K JTAG_TRST
R119 0 DNI HPS_TCK
C89 33p 50V DNI HPS_TMS HPS_TDI HPS_TDO

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CYCLONE V SoC BANK 7 (HPS)

Bank 7A
VCCIO = 3.3V

HPS_WARM_RST_N	A23	HPS_NRST	TRACE_CLK/ - / - /HPS_GPIO48	C21	
HPS_RESET_N	H19	HPS_NPOR	TRACE_D0/SPIS0_CLK/UART0_RX/HPS_GPIO49	A22	HPS_UART_RX
			TRACE_D1/SPIS0_MOSI/UART0_TX/HPS_GPIO50	B21	HPS_UART_TX
HPS_CLK1_25	E20	HPS_CLK1	TRACE_D2/SPIS0_MISO/I2C1_SDA/HPS_GPIO51	A21	HPS_I2C1_SDAT
HPS_CLK2_25	D20	HPS_CLK2	TRACE_D3/SPIS0_SS0/I2C1_SCL/HPS_GPIO52	K18	HPS_I2C1_SCLK
			TRACE_D4/SPIS1_CLK/CAN1_RX/HPS_GPIO53	A20	HPS_LED
HPS_PORSEL	E18	HPS_PORSEL	TRACE_D5/SPIS1_MOSI/CAN1_TX/HPS_GPIO54	J18	HPS_KEY
JTAG_TRST	C22		TRACE_D6/SPIS1_SS0/I2C0_SDA/HPS_GPIO55	A19	HPS_I2C0_SDAT
		HPS_TRST	TRACE_D7/SPIS1_MISO/I2C0_SCL/HPS_GPIO56	C18	HPS_I2C0_SCLK
HPS_TCK	K19	HPS_TCK	SPIM0_CLK/I2C1_SDA/UART0_CTS/HPS_GPIO57	A18	
HPS_TMS	C23	HPS_TMS	SPIM0_MOSI/I2C1_SCL/UART0_RTS/HPS_GPIO58	C17	
HPS_TDI	D22	HPS_TDI	SPIM0_MISO/CAN1_RX/UART1_CTS/HPS_GPIO59	B18	
HPS_TDO	B23	HPS_TDO	SPIM0_SS0,BOOTSEL0/CAN1_TX/UART1_RTS/HPS_GPIO60	J17	HPS_BOOTSEL0
			UART0_RX/CAN0_RX/SPIM0_SS1/HPS_GPIO61	A17	HPS_GSENSOR_INT
			UART0_TX,CLKSEL1/CAN0_TX/SPIM1_SS1/HPS_GPIO62	H17	HPS_CLOCKSEL1
			I2C0_SDA/UART1_RX/SPIM1_CLK/HPS_GPIO63	C19	HPS_SPIM_CLK
			I2C0_SCL/UART1_TX/SPIM1_MOSI/HPS_GPIO64	B16	HPS_SPIM_MOSI
			CAN0_RX/UART0_RX/SPIM1_MISO/HPS_GPIO65	B19	HPS_SPIM_MISO
			CAN0_TX,CLKSEL0/UART0_TX/SPIM1_SS0/HPS_GPIO66	C16	HPS_SPIM_SS

Bank 7B
VCCIO = 3.3V

HPS_ENET_GTX_CLK	J15	NAND_ALE/RGMII1_TX_CLK/QSPI_SS3/HPS_GPIO14	QSPI_IO0/ - /USB1_CLK/HPS_GPIO29	A8	
HPS_ENET_TX_DATA0	A16	NAND_CE/RGMII1_TXD0/USB1_D0/HPS_GPIO15	QSPI_IO1/ - /USB1_STP/HPS_GPIO30	H16	
HPS_ENET_TX_DATA1	J14	NAND_CLE/RGMII1_TXD1/USB1_D1/HPS_GPIO16	QSPI_IO2/ - /USB1_DIR/HPS_GPIO31	A7	
HPS_ENET_TX_DATA2	A15	NAND_RE/RGMII1_TXD2/USB1_D2/HPS_GPIO17	QSPI_IO3/ - /USB1_NXT/HPS_GPIO32	J16	
HPS_ENET_TX_DATA3	D17	NAND_RB/RGMII1_TXD3/USB1_D3/HPS_GPIO18	QSPI_SS0,BOOTSEL1/ - / - /HPS_GPIO33	A6	HPS_BOOTSEL1
HPS_ENET_RX_DATA0	A14	NAND_DQ0/RGMII1_RXD0/ - /HPS_GPIO19	QSPI_CLK/ - / - /HPS_GPIO34	C14	
HPS_ENET_MDIO	E16	NAND_DQ1/RGMII1_MDIO/I2C3_SDA/HPS_GPIO20	QSPI_SS1/ - / - /HPS_GPIO35	B14	HPS_ENET_INT_N
HPS_ENET_MDC	A13	NAND_DQ2/RGMII1_MDC/I2C3_SCL/HPS_GPIO21			
HPS_ENET_RX_DV	J13	NAND_DQ3/RGMII1_RX_CTL/USB1_D4/HPS_GPIO22			
HPS_ENET_TX_EN	A12	NAND_DQ4/RGMII1_TX_CTL/USB1_D5/HPS_GPIO23			
HPS_ENET_RX_CLK	J12	NAND_DQ5/RGMII1_RX_CLK/USB1_D6/HPS_GPIO24			
HPS_ENET_RX_DATA1	A11	NAND_DQ6/RGMII1_RXD1/USB1_D7/HPS_GPIO25			
HPS_ENET_RX_DATA2	C15	NAND_DQ7/RGMII1_RXD2/ - /HPS_GPIO26			
HPS_ENET_RX_DATA3	A9	NAND_WP/RGMII1_RXD3/QSPI_SS2/HPS_GPIO27			
HPS_BOOTSEL2	D15	NAND_WE,BOOTSEL2/QSPI_SS1/ - /HPS_GPIO28			

Bank 7C
VCCIO = 3.3V

HPS_SD_CMD	D14	SDMMC_CMD/USB0_D0/ - /HPS_GPIO36	SDMMC_PWREN/USB0_D1/ - /HPS_GPIO37	A5	
HPS_SD_DATA0	C13	SDMMC_D0/USB0_D2/ - /HPS_GPIO38	SDMMC_D4/USB0_D4/ - /HPS_GPIO40	H13	HPS_LTC_GPIO
HPS_SD_DATA1	B6	SDMMC_D1/USB0_D3/ - /HPS_GPIO39	SDMMC_D5/USB0_D5/ - /HPS_GPIO41	A4	
HPS_SD_DATA2	B11	SDMMC_D2/USB0_DIR/ - /HPS_GPIO46	SDMMC_D6/USB0_D6/ - /HPS_GPIO42	H12	R120 0 DNI HPS_USB_RESET
HPS_SD_DATA3	B9	SDMMC_D3/USB0_NXT/ - /HPS_GPIO47	SDMMC_D7/USB0_D7/ - /HPS_GPIO43	B4	R121 0 DNI HPS_ENET_RESET_N
	B12	SDMMC_FB_CLK_IN/USB0_CLK/ - /HPS_GPIO44	SDMMC_CCLK_OUT/USB0_STP/ - /HPS_GPIO45	B8	HPS_SD_CLK

Bank 7D
VCCIO = 3.3V

HPS_USB_DATA4	C8	RGMII0_RXD0/USB1_D4/ - /HPS_GPIO5	RGMII0_TXD0/USB1_D0/ - /HPS_GPIO1	C10	HPS_USB_DATA0
HPS_USB_STP	C5	RGMII0_RXD1/USB1_STP/ - /HPS_GPIO11	RGMII0_TXD1/USB1_D1/ - /HPS_GPIO2	F5	HPS_USB_DATA1
HPS_USB_DIR	E5	RGMII0_RXD2/USB1_DIR/ - /HPS_GPIO12	RGMII0_TXD2/USB1_D2/ - /HPS_GPIO3	C9	HPS_USB_DATA2
HPS_USB_NXT	D5	RGMII0_RXD3/USB1_NXT/ - /HPS_GPIO13	RGMII0_TXD3/USB1_D3/ - /HPS_GPIO4	C4	HPS_USB_DATA3
HPS_USB_CLKOUT	G4	RGMII0_RX_CLK/USB1_CLK/ - /HPS_GPIO10	RGMII0_TX_CTL/ - / - /HPS_GPIO9	C6	HPS_CONV_USB_N
HPS_USB_DATA7	F4	RGMII0_RX_CTL/USB1_D7/ - /HPS_GPIO8	RGMII0_TX_CLK/ - / - /HPS_GPIO0	E4	
HPS_USB_DATA5	D4	RGMII0_MDIO/USB1_D5/I2C2_SDA/HPS_GPIO6			
HPS_USB_DATA6	C7	RGMII0_MDC/USB1_D6/I2C2_SCL/HPS_GPIO7			

5CSEBA6U23I7

Default Setting: BOOTSEL[2:0]=101 (Boot from SD CARD)
CLKSEL[1:0] =00

VCC3P3

DNI R127	1K	HPS_BOOTSEL0	(BOOTSEL0)	R140	10K		
R126	1K	HPS_BOOTSEL1	(BOOTSEL1)	R139	10K	DNI	
DNI R125	1K	HPS_BOOTSEL2	(BOOTSEL2)	R138	10K		
R124	1K	HPS_SPIM_SS	(CLOCKSEL0)	R137	10K	DNI	
R123	1K	HPS_CLOCKSEL1	(CLOCKSEL1)	R135	10K	DNI	

Title: **DE10-Nano Board**

Size	Document Number	Rev
B	FPGA Bank 7	B2

Date: Monday, August 21, 2017 Sheet 5 of 24

GPIO

3,7,19 GPIO_0_D[35..0]

3,19 GPIO_1_D[35..0]

User Interface (FPGA)

20 SW[3..0]

Clock Generator

5 HPS_CLK1_25

5 HPS_CLK2_25

15 CLK_ENET_25

10 CLK_UB2_24

14 CLK_USB_24

HDMI TX

3,21 HDMI_TX_D[23..0]

21 HDMI_TX_CLK

21 HDMI_TX_HS

21 HDMI_TX_DE

U1B

CYCLONE V SoC Clock

Bank 3B VCCIO = 3.3V

FPGA_CLK1_50	V11	IO_3B/CLK0P,FPLL_BL_FBP/DIFFIO_RX_B15P	IO_3B/FPLL_BL_CLKOUT0,FPLL_BL_CLKOUTP,FPLL_BL_FB/DIFFIO_TX_B21P/B_A_2/DQ3B
GPIO_0_D25	W11	IO_3B/CLK0N,FPLL_BL_FBN/DIFFIO_RX_B15N	IO_3B/FPLL_BL_CLKOUT1,FPLL_BL_CLKOUTN/DIFFIO_TX_B21N/B_A_3/DQ3B
GPIO_0_D0	V12	IO_3B/CLK1P/DIFFIO_RX_B23P	
GPIO_0_D2	W12	IO_3B/CLK1N/DIFFIO_RX_B23N	

AG5 HDMI_TX_CLK

AH4 HDMI_TX_D18

Bank 4A VCCIO = 3.3V

FPGA_CLK2_50	Y13	IO_4A/CLK2P/DIFFIO_RX_B31P
GPIO_0_D34	AA13	IO_4A/CLK2N/DIFFIO_RX_B31N
GPIO_1_D0	Y15	IO_4A/CLK3P/DIFFIO_RX_B39P
GPIO_1_D2	AA15	IO_4A/CLK3N/DIFFIO_RX_B39N

Bank 5B VCCIO = 3.3V

SW0	Y24	IO_5B/CLK4P,FPLL_BR_FBP/DIFFIO_RX_R23P	IO_5B/FPLL_BR_CLKOUT0,FPLL_BR_CLKOUTP,FPLL_BR_FB/DIFFIO_TX_R22P
SW1	W24	IO_5B/CLK4N,FPLL_BR_FBN/DIFFIO_RX_R23N	IO_5B/FPLL_BR_CLKOUT1,FPLL_BR_CLKOUTN/DIFFIO_TX_R22N
SW2	W21	IO_5B/CLK5P/DIFFIO_RX_R21P	
SW3	W20	IO_5B/CLK5N/DIFFIO_RX_R21N	

AB26 GPIO_0_D31

AA26 GPIO_0_D33

Bank 8A VCCIO = 3.3V

FPGA_CLK1_50 R159 0 FPGA_CLK3_50 E11

GPIO_0_D3	D11	IO_8A/CLK6P,FPLL_TL_FBP/DIFFIO_RX_T9P	IO_8A/FPLL_TL_CLKOUT0,FPLL_TL_CLKOUTP,FPLL_TL_FB/DIFFIO_TX_T4P
GPIO_0_D16	D12	IO_8A/CLK6N,FPLL_TL_FBN/DIFFIO_RX_T9N	IO_8A/FPLL_TL_CLKOUT1,FPLL_TL_CLKOUTN/DIFFIO_TX_T4N
GPIO_0_D18	C12	IO_8A/CLK7P/DIFFIO_RX_T1P	
		IO_8A/CLK7N/DIFFIO_RX_T1N	

E8 GPIO_0_D1

D8 GPIO_0_D4

5CSEBA6U23I7

Factory Default Configuration:
50MHz x2
25MHz x3
24MHz x2

CAD Note: Place near pin 3 and 5 (C3 & C322)

CAD Note: Place near IC power pin

VCC1P8 — L4 220 ohm, 0.3A — C247 4.7u 6.3V — C49 0.01u 50V — C50 1n 50V

L17 220 ohm, 0.3A — VCC3P3 — C253 0.1u 16V — C244 0.1u 16V — C246 0.1u 16V — C252 4.7u 6.3V

U15 CDCE937PWRG4

C236 4p 6.3V DNI — Y1 24.00MHz — C245 4p 6.3V DNI

CLK_I2C_SDA — CLK_I2C_SCL

VCC3P3 — R174 4.7K DNI — R175 4.7K DNI

Default : I2C Address 0xDA/0xDB

Y1	R47	18.2	CLK_UB2_24	Default: 24MHz
Y2	R48	18.2	CLK_ENET_25	Default: 25MHz
Y3	R49	18.2	CLK_USB_24	Default: 24MHz
Y4	R54	18.2	HPS_CLK1_25	Default: 25MHz
Y5	R55	18.2	HPS_CLK2_25	Default: 25MHz
Y6	R56	18.2	FPGA_CLK1_50	Default: 50MHz
Y7	R57	18.2	FPGA_CLK2_50	Default: 50MHz

Title: **DE10-Nano Board**

Size: B | Document Number: FPGA Clock and Clock Generator | Rev: B2

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FPGA JTAG INTERFACE

11 FPGA_TCK
11 FPGA_TMS
11 FPGA_TDI
11 FPGA_TDO

USB Blaster

10 FPGA_NCONFIG
10 FPGA_CONF_DONE

GPIO

3,6,19 GPIO_0_D[35..0]
6,19 GPIO_1_D[35..0]

ADC

18 ADC_CONVST
18 ADC_SCK
18 ADC_SDO
18 ADC_SDI

I2C Interface

6,21 HDMI_I2C_SDA
6,21 HDMI_I2C_SCL

6,21 HDMI_TX_D[23..0]
21 HDMI_TX_HS

R171 0 DNI FPGA_TCK
C35 33p 50V DNI
R169 1K
VCC3P3
R176 10K DNI
R178 0 DNI
R177 1K DNI
C237 12p 50V DNI

Design Note:
Optional termination resistor for DCLK

CAD Note:
Place near FPGA DCLK pin

U1A

CYCLONE V SoC Configuration

Bank 3A
VCCIO = 3.3V

FPGA_TCK	AB5	TCK
FPGA_TMS	AC7	TMS
FPGA_TDI	W10	TDI
FPGA_TDO	Y9	TDO
EPCQ_DCLK	AA8	DCLK
EPCQ_AS_DATA0	AD7	AS_DATA0,ASDO/DATA0
EPCQ_AS_DATA1	AC6	AS_DATA1/DATA1
EPCQ_AS_DATA2	AC5	AS_DATA2/DATA2
EPCQ_AS_DATA3	AB6	AS_DATA3/DATA3
EPCQ_nCSO	AA6	NCSO/DATA4
HDMI_TX_D9	Y4	IO_3A/DATA5/DIFFIO_TX_B2N
HDMI_TX_D3	Y8	IO_3A/DATA6/DIFFIO_RX_B1N/DQ1B
HDMI_TX_D7	Y5	IO_3A/DATA7/DIFFIO_TX_B2P/DQ1B
HDMI_TX_D2	W8	IO_3A/DATA8/DIFFIO_RX_B1P/DQ1B
HDMI_TX_D11	AB4	IO_3A/DATA9/DIFFIO_TX_B4N/DQ1B
HDMI_TX_HS	T8	IO_3A/DATA10/DIFFIO_RX_B3N/DQSN1B
HDMI_I2C_SDA	AA4	IO_3A/DATA11/DIFFIO_TX_B4P
ADC_CONVST	U9	IO_3A/DATA12/DIFFIO_RX_B3P/DQS1B
ADC_SDO	AD4	IO_3A/DATA13/DIFFIO_TX_B6N/DQ1B
ADC_SCK	V10	IO_3A/DATA14/DIFFIO_RX_B5N/DQ1B
ADC_SDI	AC4	IO_3A/DATA15/DIFFIO_TX_B6P/DQ1B
HDMI_I2C_SCL	U10	IO_3A/CLKUSR/DIFFIO_RX_B5P/DQ1B

Bank 5A
VCCIO = 3.3V

AA20	GPIO_1_D21	IO_5A/INIT_DONE/DIFFIO_RX_R2P
AC24	GPIO_1_D1	IO_5A/DEV_OE/DIFFIO_TX_R5P
AB23	GPIO_0_D23	IO_5A/DEV_CLRn/DIFFIO_TX_R5N/DQ1R
Y19	GPIO_0_D22	IO_5A/CRC_ERROR/DIFFIO_RX_R2N
AE25	GPIO_1_D6	IO_5A/nCEO/DIFFIO_TX_R3P/DQ1R

Bank 9A
VCCIO = 3.3V

J8	FPGA_CONF_DONE	R147	10K
H8	FPGA_NSTATUS	R144	10K
F7	FPGA_NCONFIG	R136	10K
E6			
J10	MSEL0		
H9	MSEL1		
G6	MSEL2		
K10	MSEL3		
K9	MSEL4		

CONF_DONE
nSTATUS
nCONFIG
nCE
MSEL0
MSEL1
MSEL2
MSEL3
MSEL4

VCC3P3

5CSEBA6U23I7

U1N

CYCLONE V SoC BANK XCVR

Bank GXB_L0

AF1	GXB_RX_L0n,GXB_REFCLK_L0n	GXB_TX_L0p	AD2
AF2	GXB_RX_L0p,GXB_REFCLK_L0p	GXB_TX_L0n	AD1
AB1	GXB_RX_L1n,GXB_REFCLK_L1n	GXB_TX_L1p	Y2
AB2	GXB_RX_L1p,GXB_REFCLK_L1p	GXB_TX_L1n	Y1
V1	GXB_RX_L2n,GXB_REFCLK_L2n	GXB_TX_L2p	T2
V2	GXB_RX_L2p,GXB_REFCLK_L2p	GXB_TX_L2n	T1
V5	REFCLK0Lp		
V4	REFCLK0Ln		

Bank GXB_L1

P1	GXB_RX_L3n,GXB_REFCLK_L3n	GXB_TX_L3p	M2
P2	GXB_RX_L3p,GXB_REFCLK_L3p	GXB_TX_L3n	M1
K1	GXB_RX_L4n,GXB_REFCLK_L4n	GXB_TX_L4p	H2
K2	GXB_RX_L4p,GXB_REFCLK_L4p	GXB_TX_L4n	H1
F1	GXB_RX_L5n,GXB_REFCLK_L5n	GXB_TX_L5p	D2
F2	GXB_RX_L5p,GXB_REFCLK_L5p	GXB_TX_L5n	D1
P8	REFCLK1Lp		
N8	REFCLK1Ln		

5CSEBA6U23I7

Default Setup MSEL[4:0] = 10010, AS Fast Mode

VCC3P3
SW10
DIP SWITCH

12	MSEL0	R8	1K
11	MSEL1	R9	1K
10	MSEL2	R10	1K
9	MSEL3	R11	1K
8	MSEL4	R12	1K

R3	0 DNI	MSEL0	
R4	0 DNI	MSEL1	
R5	0 DNI	MSEL2	
R6	0 DNI	MSEL3	
R7	0 DNI	MSEL4	

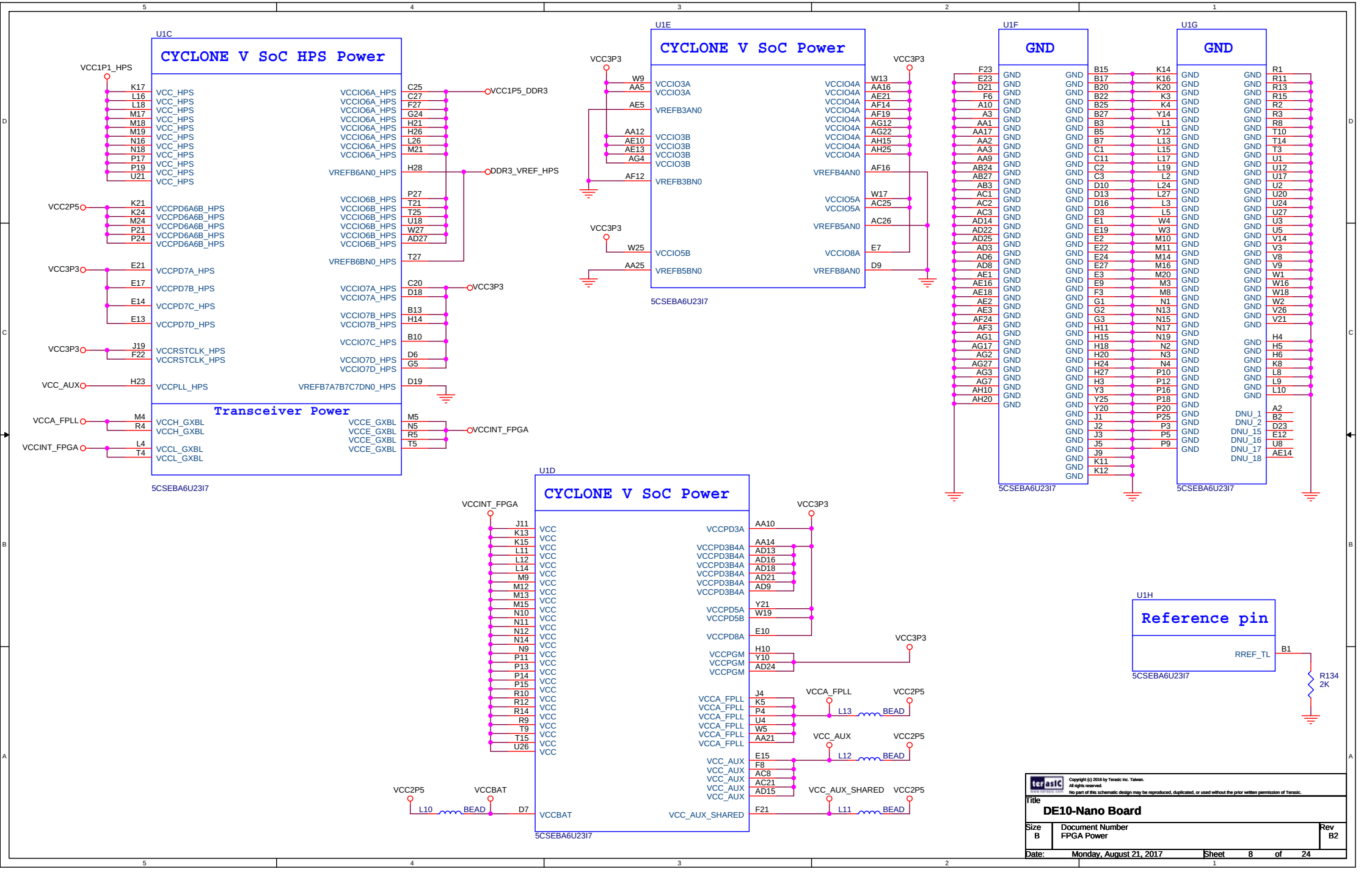
VCC3P3
C40 0.1u 16V
U28
EPCS64

NC01		DATA0	EPCQ_AS_DATA0
NC02		DATA1	EPCQ_AS_DATA1
NC03		DATA2	EPCQ_AS_DATA2
NC04		DATA3	EPCQ_AS_DATA3
NC05		DCLK	EPCQ_DCLK
NC06		nCS	EPCQ_NCSO
NC07			
NC08			
VCC			
GND			

Title: DE10-Nano Board

Size	Document Number	Rev
B	FPGA Configuration and EPCS	B2

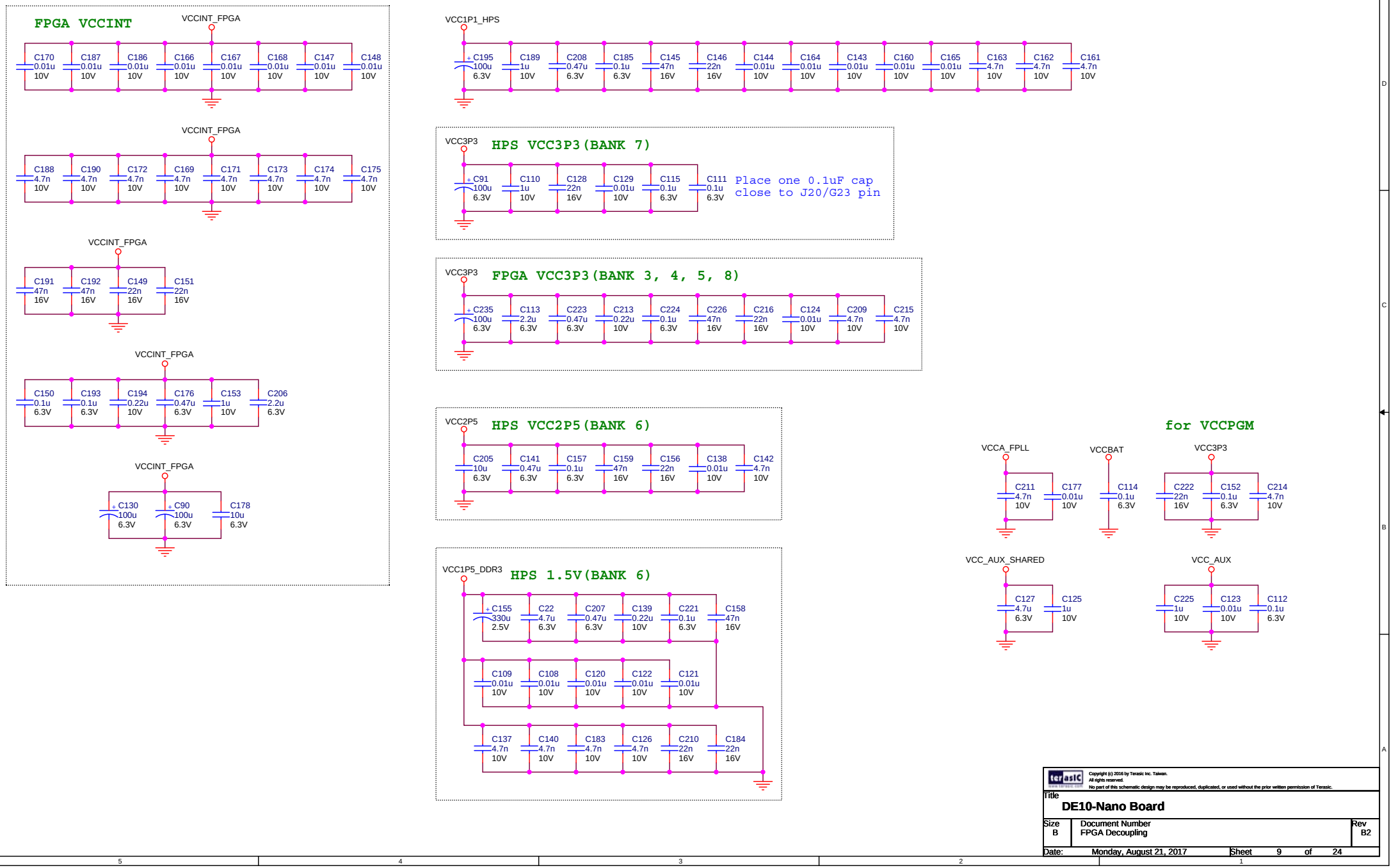
Date: Monday, August 21, 2017 Sheet 7 of 24



Title
DE10-Nano Board

Size	Document Number	Rev
B	FPGA Power	B2

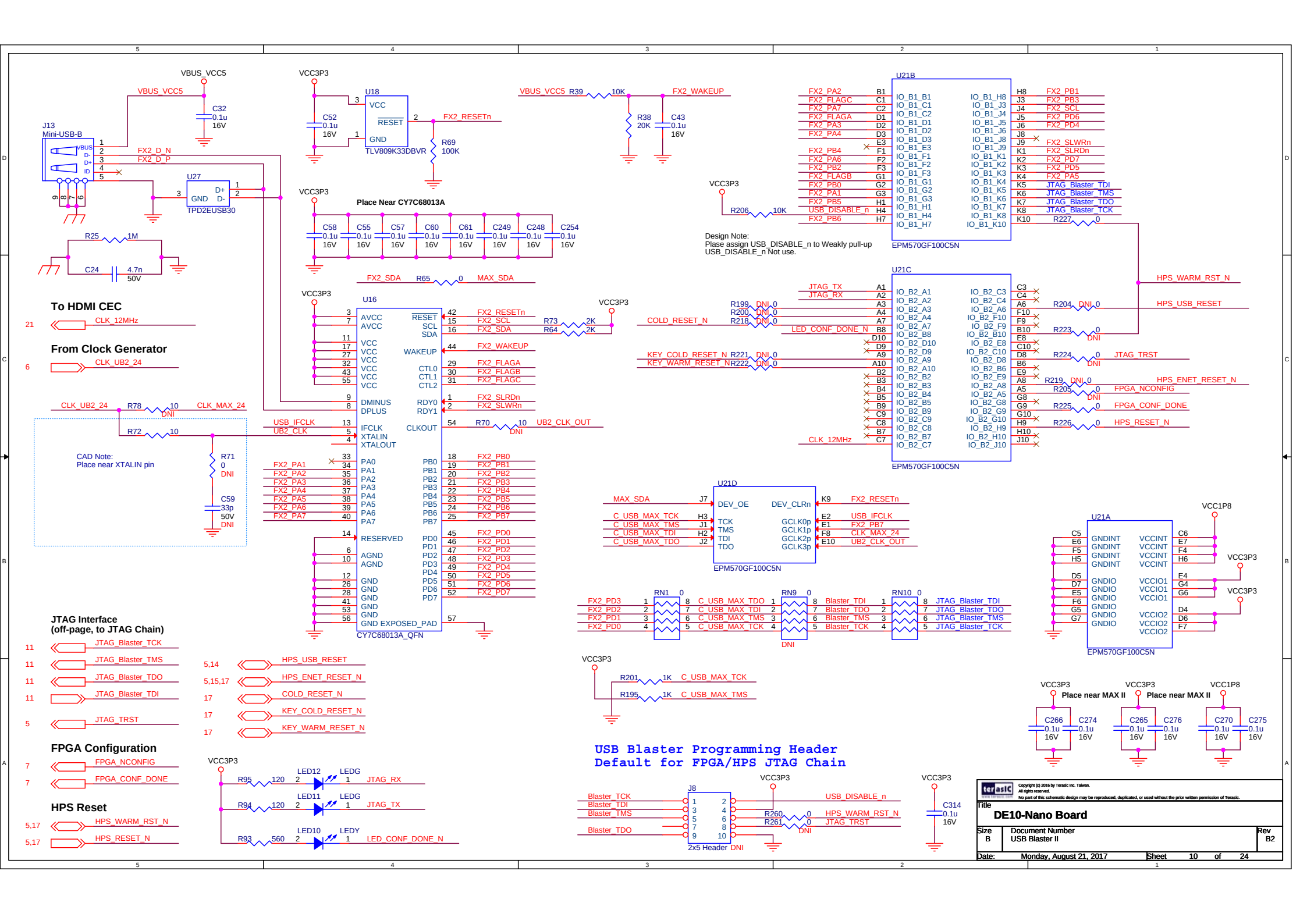
Date: Monday, August 21, 2017 Sheet 8 of 24



Title
DE10-Nano Board

Size	Document Number	Rev
B	FPGA Decoupling	B2

Date: Monday, August 21, 2017 Sheet 9 of 24


VBUS_VCC5
J13
Mini-USB-B
C32
0.1u
16V
FX2_D_N
FX2_D_P
U27
TPD2EUSB30
R25
1M
C24
4.7n
50V
VCC3P3
U18
TLV809K33DBVR
C52
0.1u
16V
R69
100K
FX2_RESETn
VBUS_VCC5 R39
10K
R38
20K
C43
0.1u
16V
FX2_WAKEUP
Place Near CY7C68013A
C58 C55 C57 C60 C61 C249 C248 C254
0.1u 16V
FX2_SDA
R65
0
MAX_SDA
U16
CY7C68013A_QFN
To HDMI CEC
CLK_12MHz
From Clock Generator
CLK_UB2_24
CLK_UB2_24
R78
10
DNI
CLK_MAX_24
R72
10
R71
0
DNI
C59
33p
50V
DNI
CAD Note:
Place near XTALIN pin
USB_IFCLK
UB2_CLK
R70
10
DNI
UB2_CLK_OUT
JTAG Interface
(off-page, to JTAG Chain)
JTAG_Blaster_TCK
JTAG_Blaster_TMS
JTAG_Blaster_TDO
JTAG_Blaster_TDI
JTAG_TRST
FPGA Configuration
FPGA_NCONFIG
FPGA_CONF_DONE
HPS Reset
HPS_WARM_RST_N
HPS_RESET_N
HPS_USB_RESET
HPS_ENET_RESET_N
COLD_RESET_N
KEY_COLD_RESET_N
KEY_WARM_RESET_N
LED12
LEDG
JTAG_RX
LED11
LEDG
JTAG_TX
LED10
LEDY
LED_CONF_DONE_N
R95 120
R94 120
R93 560
U21B
EPM570GF100C5N
FX2_PA2
FX2_FLAGC
FX2_PA7
FX2_FLAGA
FX2_PA3
FX2_PA4
FX2_PB4
FX2_PA6
FX2_PB2
FX2_FLAGB
FX2_PB0
FX2_PA1
FX2_PB5
USB_DISABLE_n
FX2_PB6
FX2_PB1
FX2_PB3
FX2_SCL
FX2_PD6
FX2_PD4
FX2_SLWRn
FX2_SLRDn
FX2_PD7
FX2_PD5
FX2_PA5
JTAG_Blaster_TDI
JTAG_Blaster_TMS
JTAG_Blaster_TDO
JTAG_Blaster_TCK
R206
10K
R227
0
Design Note:
Plase assign USB_DISABLE_n to Weakly pull-up
USB_DISABLE_n Not use.
U21C
EPM570GF100C5N
JTAG_TX
JTAG_RX
R199 DNI 0
R200 DNI 0
R218 DNI 0
COLD_RESET_N
LED_CONF_DONE_N
KEY_COLD_RESET_N R221 DNI 0
KEY_WARM_RESET_N R222 DNI 0
CLK_12MHz
HPS_WARM_RST_N
HPS_USB_RESET
R204 DNI 0
R223 0 DNI
R224 0 DNI
JTAG_TRST
R219 DNI 0
HPS_ENET_RESET_N
R205 0 DNI
FPGA_NCONFIG
R225 0
FPGA_CONF_DONE
R226 0
HPS_RESET_N
U21D
EPM570GF100C5N
MAX_SDA
C_USB_MAX_TCK
C_USB_MAX_TMS
C_USB_MAX_TDI
C_USB_MAX_TDO
FX2_RESETn
USB_IFCLK
FX2_PB7
CLK_MAX_24
UB2_CLK_OUT
U21A
EPM570GF100C5N
VCC1P8
VCC3P3
VCC3P3
RN1 0
RN9 0
RN10 0
FX2_PD3
FX2_PD2
FX2_PD1
FX2_PD0
C_USB_MAX_TDO
C_USB_MAX_TDI
C_USB_MAX_TMS
C_USB_MAX_TCK
Blaster_TDI
Blaster_TDO
Blaster_TMS
Blaster_TCK
JTAG_Blaster_TDI
JTAG_Blaster_TDO
JTAG_Blaster_TMS
JTAG_Blaster_TCK
DNI
R201
1K
C_USB_MAX_TCK
R195
1K
C_USB_MAX_TMS
Place near MAX II
Place near MAX II
C266 C274
C265 C276
C270 C275
0.1u 16V
USB Blaster Programming Header
Default for FPGA/HPS JTAG Chain
J8
2x5 Header DNI
Blaster_TCK
Blaster_TDI
Blaster_TMS
Blaster_TDO
USB_DISABLE_n
R260 0
R261 0 DNI
HPS_WARM_RST_N
JTAG_TRST
C314
0.1u
16V
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Title
DE10-Nano Board
Size B
Document Number
USB Blaster II
Rev B2
Date: Monday, August 21, 2017
Sheet 10 of 24

USB Blaster

10 JTAG_Blaster_TCK
10 JTAG_Blaster_TMS
10 JTAG_Blaster_TDO
10 JTAG_Blaster_TDI

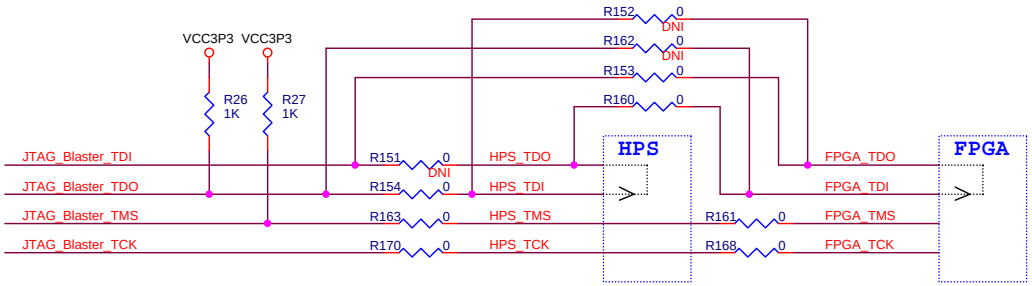
FPGA JTAG INTERFACE

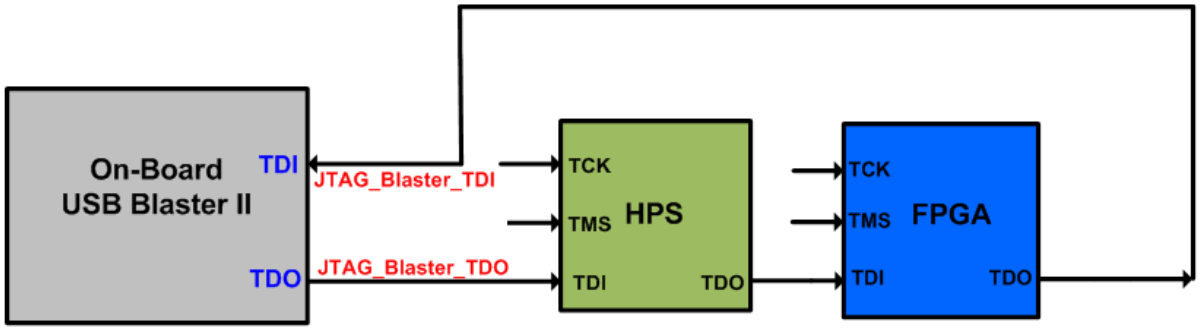
7 FPGA_TCK
7 FPGA_TMS
7 FPGA_TDI
7 FPGA_TDO

HPS JTAG INTERFACE

5 HPS_TCK
5 HPS_TMS
5 HPS_TDI
5 HPS_TDO

JTAG Chain





Title: **DE10-Nano Board**

Size	Document Number	Rev
B	JTAG Chain	B2

Date: Monday, August 21, 2017 Sheet 11 of 24

DDR3 Interface (HPS)

Note :
you can only swap the DQ signals
within x8 group (e.g. 0-7,8-15,16-23,24-31)
on the DDR3 chips

Note : you can swap the signals on the OCT resistor array
(include NC pin)

HPS_DDR3_ADDR[14..0]
HPS_DDR3_DQ[31..0]
HPS_DDR3_BA[2..0]
HPS_DDR3_DM[3..0]
HPS_DDR3_DQS_P[3..0]
HPS_DDR3_DQS_N[3..0]
HPS_DDR3_CK_P
HPS_DDR3_CK_N
HPS_DDR3_CKE
HPS_DDR3_CS_N
HPS_DDR3_RESET_N
HPS_DDR3_WE_N
HPS_DDR3_RAS_N
HPS_DDR3_CAS_N
HPS_DDR3_ODT
HPS_DDR3_CS1_N
HPS_DDR3_CKE1
HPS_DDR3_ODT1

VCC1P5_DDR3 — R22 2K HPS_DDR3_RESET_N — V30
V1 — HPS_DDR3_CK_P — R132 100 HPS_DDR3_CK_N — V2

CAD Note:
Place close to DDR3 chip

DDR3_VTT_HPS — CN3 0.1u
DDR3_VTT_HPS — CN2 0.1u
DDR3_VTT_HPS — CN1 0.1u

DDR3_VTT_HPS — RN5
HPS_DDR3_ADDR11 V11
HPS_DDR3_ADDR14 V13
HPS_DDR3_CAS_N V16
HPS_DDR3_WE_N V18
HPS_DDR3_ADDR0 V23
HPS_DDR3_ADDR9 V27
HPS_DDR3_ADDR13 V29
HPS_DDR3_ADDR2 V25
51

DDR3_VTT_HPS — RN4
HPS_DDR3_ADDR10 V4
HPS_DDR3_ADDR12 V7
HPS_DDR3_BA1 V6
HPS_DDR3_ADDR1 V9
HPS_DDR3_ADDR4 V8
HPS_DDR3_ADDR6 V10
HPS_DDR3_RAS_N V14
HPS_DDR3_ADDR8 V12
51

DDR3_VTT_HPS — RN6
HPS_DDR3_ADDR7 V28
HPS_DDR3_ADDR5 V26
HPS_DDR3_ADDR3 V24
HPS_DDR3_BA2 V21
HPS_DDR3_BA0 V22
HPS_DDR3_CS_N V19
HPS_DDR3_ODT V17
HPS_DDR3_ODT1 V15
51
R21 51 HPS_DDR3_CS1_N — V20 (DNI)

R146 4.7K HPS_DDR3_CKE1 — V5 (DNI)
R149 4.7K HPS_DDR3_CKE — V3

VCC1P5_DDR3
DDR3_VREF_HPS

U11 / U6 — IS43TR16256A-15HBL

HPS_DDR3_ADDR0	N3	A0			
HPS_DDR3_ADDR1	P7	A1			
HPS_DDR3_ADDR2	P3	A2			
HPS_DDR3_ADDR3	N2	A3	DQ0	E3	HPS_DDR3_DQ16
HPS_DDR3_ADDR4	P8	A4	DQ1	F7	HPS_DDR3_DQ17
HPS_DDR3_ADDR5	P2	A5	DQ2	F2	HPS_DDR3_DQ18
HPS_DDR3_ADDR6	R8	A6	DQ3	F8	HPS_DDR3_DQ19
HPS_DDR3_ADDR7	R2	A7	DQ4	H3	HPS_DDR3_DQ20
HPS_DDR3_ADDR8	T8	A8	DQ5	H8	HPS_DDR3_DQ21
HPS_DDR3_ADDR9	R3	A9	DQ6	G2	HPS_DDR3_DQ22
HPS_DDR3_ADDR10	L7	A10/AP	DQ7	H7	HPS_DDR3_DQ23
HPS_DDR3_ADDR11	R7	A11	DQ8	D7	HPS_DDR3_DQ24
HPS_DDR3_ADDR12	N7	A12/BC_n	DQ9	C3	HPS_DDR3_DQ25
HPS_DDR3_ADDR13	T3	A13	DQ10	C8	HPS_DDR3_DQ26
HPS_DDR3_ADDR14	T7	A14	DQ11	C2	HPS_DDR3_DQ27
			DQ12	A7	HPS_DDR3_DQ28
HPS_DDR3_CK_P	J7	CLK	DQ13	A2	HPS_DDR3_DQ29
HPS_DDR3_CK_N	K7	CLK_n	DQ14	B8	HPS_DDR3_DQ30
HPS_DDR3_CKE	K9	CKE	DQ15	A3	HPS_DDR3_DQ31
HPS_DDR3_CS_N	L2	CS	LDQS	F3	HPS_DDR3_DQS_P2
HPS_DDR3_RESET_N	T2	RESET	LDQSn	G3	HPS_DDR3_DQS_N2
HPS_DDR3_WE_N	L3	WE	UDQS	C7	HPS_DDR3_DQS_P3
HPS_DDR3_RAS_N	J3	RAS	UDQSn	B7	HPS_DDR3_DQS_N3
HPS_DDR3_CAS_N	K3	CAS			
HPS_DDR3_BA0	M2	BA0			
HPS_DDR3_BA1	N8	BA1	NC1	J1	HPS_DDR3_ODT1
HPS_DDR3_BA2	M3	BA2	NC2	J9	HPS_DDR3_CKE1
			NC3	L1	HPS_DDR3_CS1_N
HPS_DDR3_DM2	E7	LDM	NC4	L9	HPS_DDR3_ZQ11 — R150 240 DNI
HPS_DDR3_DM3	D3	UDM	NC5	M7	
HPS_DDR3_ODT	K1	ODT	ZQ	L8	HPS_DDR3_ZQ10 — R28 240

HPS_DDR3_ADDR0	N3	A0			
HPS_DDR3_ADDR1	P7	A1			
HPS_DDR3_ADDR2	P3	A2			
HPS_DDR3_ADDR3	N2	A3	DQ0	E3	HPS_DDR3_DQ0
HPS_DDR3_ADDR4	P8	A4	DQ1	F7	HPS_DDR3_DQ1
HPS_DDR3_ADDR5	P2	A5	DQ2	F2	HPS_DDR3_DQ2
HPS_DDR3_ADDR6	R8	A6	DQ3	F8	HPS_DDR3_DQ3
HPS_DDR3_ADDR7	R2	A7	DQ4	H3	HPS_DDR3_DQ4
HPS_DDR3_ADDR8	T8	A8	DQ5	H8	HPS_DDR3_DQ5
HPS_DDR3_ADDR9	R3	A9	DQ6	G2	HPS_DDR3_DQ6
HPS_DDR3_ADDR10	L7	A10/AP	DQ7	H7	HPS_DDR3_DQ7
HPS_DDR3_ADDR11	R7	A11	DQ8	D7	HPS_DDR3_DQ8
HPS_DDR3_ADDR12	N7	A12/BC_n	DQ9	C3	HPS_DDR3_DQ9
HPS_DDR3_ADDR13	T3	A13	DQ10	C8	HPS_DDR3_DQ10
HPS_DDR3_ADDR14	T7	A14	DQ11	C2	HPS_DDR3_DQ11
			DQ12	A7	HPS_DDR3_DQ12
HPS_DDR3_CK_P	J7	CLK	DQ13	A2	HPS_DDR3_DQ13
HPS_DDR3_CK_N	K7	CLK_n	DQ14	B8	HPS_DDR3_DQ14
HPS_DDR3_CKE	K9	CKE	DQ15	A3	HPS_DDR3_DQ15
HPS_DDR3_CS_N	L2	CS	LDQS	F3	HPS_DDR3_DQS_P0
HPS_DDR3_RESET_N	T2	RESET	LDQSn	G3	HPS_DDR3_DQS_N0
HPS_DDR3_WE_N	L3	WE	UDQS	C7	HPS_DDR3_DQS_P1
HPS_DDR3_RAS_N	J3	RAS	UDQSn	B7	HPS_DDR3_DQS_N1
HPS_DDR3_CAS_N	K3	CAS			
HPS_DDR3_BA0	M2	BA0			
HPS_DDR3_BA1	N8	BA1	NC1	J1	HPS_DDR3_ODT1
HPS_DDR3_BA2	M3	BA2	NC2	J9	HPS_DDR3_CKE1
			NC3	L1	HPS_DDR3_CS1_N
HPS_DDR3_DM0	E7	LDM	NC4	L9	HPS_DDR3_ZQ01 — R114 240 DNI
HPS_DDR3_DM1	D3	UDM	NC5	M7	
HPS_DDR3_ODT	K1	ODT	ZQ	L8	HPS_DDR3_ZQ00 — R115 240

VCC1P5_DDR3 decoupling: C204 2.2n 50V, C203 2.2n 50V, C201 2.2n 50V, C181 2.2n 50V, C199 2.2n 50V, C200 2.2n 50V, C198 3.3n 50V, C202 4.7n 50V, C182 0.01u 50V, C233 0.01u 50V, C220 0.01u 50V

VCC1P5_DDR3 decoupling: C105 2.2n 50V, C104 2.2n 50V, C103 2.2n 50V, C101 2.2n 50V, C102 2.2n 50V, C100 2.2n 50V, C99 3.3n 50V, C97 4.7n 50V, C135 0.01u 50V, C134 0.01u 50V, C133 0.01u 50V

VCC1P5_DDR3: C219 0.1u 16V, C232 0.1u 16V, C231 0.1u 16V, C218 0.47u 10V, C228 0.47u 10V, C229 0.47u 10V
DDR3_VREF_HPS: C230 0.1u 16V, C197 0.1u 16V

VCC1P5_DDR3: C117 0.1u 16V, C154 0.1u 16V, C131 0.1u 16V, C119 0.47u 10V, C118 0.47u 10V, C87 0.47u 10V
DDR3_VREF_HPS: C98 0.1u 16V, C132 0.1u 16V

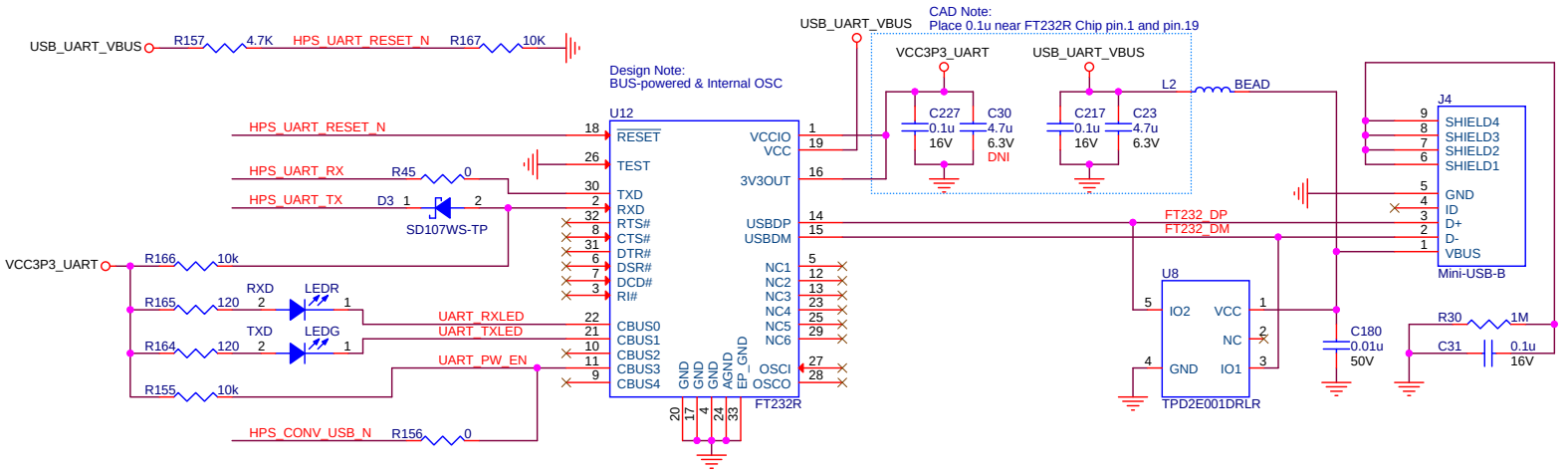
Title: **DE10-Nano Board**

Size	Document Number	Rev
B	HPS : DDR3 SDRAM	B2

Date: Monday, August 21, 2017 Sheet 12 of 24

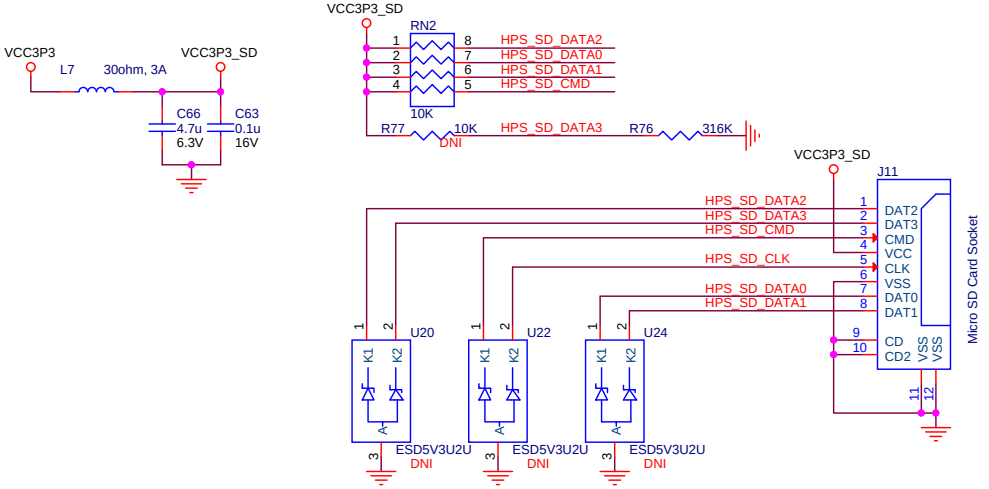
UART Interface

5 HPS_UART_RX
5 HPS_UART_TX
5 HPS_CONV_USB_N
17 HPS_UART_RESET_N



SD Card Interface

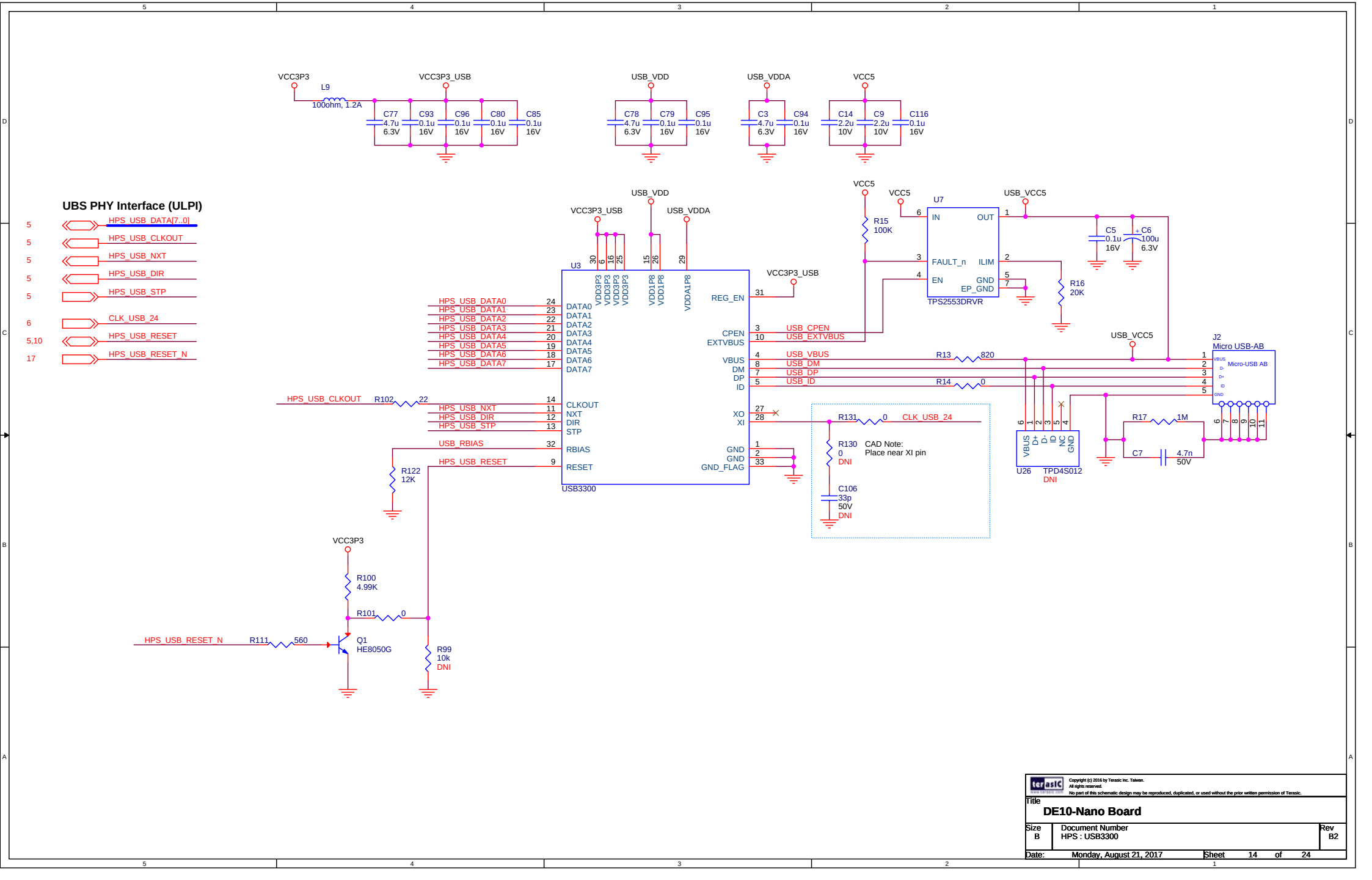
5 HPS_SD_DATA[3..0]
5 HPS_SD_CMD
5 HPS_SD_CLK



Title: **DE10-Nano Board**

Size	Document Number	Rev
B	HPS : UART to USB & SD CARD	B2

Date: Monday, August 21, 2017 Sheet 13 of 24



Title	DE10-Nano Board	
Size B	Document Number HPS : USB3300	Rev B2
Date: Monday, August 21, 2017	Sheet 14 of 24	

Ethernet PHY Interface (RGMII)

HPS_ENET_TX_DATA[3..0]
HPS_ENET_GTX_CLK
HPS_ENET_TX_EN
HPS_ENET_RX_DATA[3..0]
HPS_ENET_RX_CLK
HPS_ENET_RX_DV
HPS_ENET_INT_N
HPS_ENET_MDC
HPS_ENET_MDIO
HPS_ENET_RESET_N
CLK_ENET_25

U17 KSZ9031RNX

GTX_CLK, TX_EN, TXD0, TXD1, TXD2, TXD3
RX_CLK/PHYAD2, RX_DV/CLK125_EN
RXD0/MODE0, RXD1/MODE1, RXD2/MODE2, RXD3/MODE3
CLK125_NDO/LED_MODE, INT_N, RESET_N
MDC, MDIO

ENET_PLL, ENET_VCCA, ENET_DVDDL, ENET_AVDD, ENET_DVDDH
AVDDL_PLL, AVDDL, DVDDL, AVDDH, DVDDH, LDO_O
VSS, VSS_PS, PADDLE

HPS_ENET_LDO_O
TXRXP_A / TXRXM_A ... TXRXP_D / TXRXM_D
MDI_HPS_P0 / MDI_HPS_N0 ... MDI_HPS_P3 / MDI_HPS_N3
LED1/PHYAD0 — LED2_DUAL_1
LED2/PHYAD1 — LED2_DUAL_2
ISET — R84 12.1K
XI — R82 0 CLK_ENET_25
XO — R83 0 DNI
C64 33p 50V DNI
CAD Note: Place near XI pin

J10 — 8207S-810X4372
GND1, GND2, SHIELD_1, SHIELD_2
LEDG+, LEDG-, LEDY+, LEDY-
R46 10, C47 0.01u 50V
R88 220, R43 220
LED2_DUAL_2, LED2_DUAL_1
VCC3P3

VCC3P3
R202 4.7K HPS_ENET_INT_N
R74 4.7K HPS_ENET_MDC
R203 4.7K HPS_ENET_MDIO
R81 4.7K HPS_ENET_RESET_N

C65 10n 50V DNI — R86 49.9 DNI MDI_HPS_P0 — R85 49.9 DNI MDI_HPS_N0
C62 10n 50V DNI — R75 49.9 DNI MDI_HPS_P1 — R68 49.9 DNI MDI_HPS_N1
C56 10n 50V DNI — R63 49.9 DNI MDI_HPS_P2 — R62 49.9 DNI MDI_HPS_N2
C51 10n 50V DNI — R53 49.9 DNI MDI_HPS_P3 — R52 49.9 DNI MDI_HPS_N3

ENET_DVDDH
PHY Address is 00001
R173 4.7K LED2_DUAL_1 — R181 1K DNI
R220 4.7K DNI LED2_DUAL_2 — R228 1K
R67 4.7K DNI HPS_ENET_RX_CLK — R197 1K

VCC3P3
R80 4.7K DNI CLK125_NDO_LED_MODE — R79 4.7K
R66 4.7K DNI HPS_ENET_RX_DV — R196 4.7K
R41 4.7K DNI HPS_ENET_GTX_CLK — R42 4.7K DNI
R61 4.7K HPS_ENET_RX_DATA0 — R185 4.7K DNI
R60 4.7K HPS_ENET_RX_DATA1 — R184 4.7K DNI
R51 4.7K HPS_ENET_RX_DATA2 — R183 4.7K DNI
R50 4.7K HPS_ENET_RX_DATA3 — R182 4.7K DNI

VCC3P3 — L18 100ohm, 1.2A — ENET_AVDD
C255 0.22u 50V, C239 1u 10V, C267 10u 6.3V

VCC3P3 — L20 100ohm, 1.2A — ENET_DVDDH
C258 0.22u 50V, C259 1u 10V, C269 10u 6.3V

VCC1P2 — L15 100ohm, 1.2A — ENET_VCCA
C251 0.22u 50V, C250 1u 10V, C240 10u 6.3V

VCC1P2 — L19 100ohm, 1.2A — ENET_PLL
C257 0.22u 50V, C256 1u 10V, C268 10u 6.3V

VCC1P2 — L14 100ohm, 1.2A — ENET_DVDDL
C241 0.22u 50V, C243 1u 10V, C242 10u 6.3V

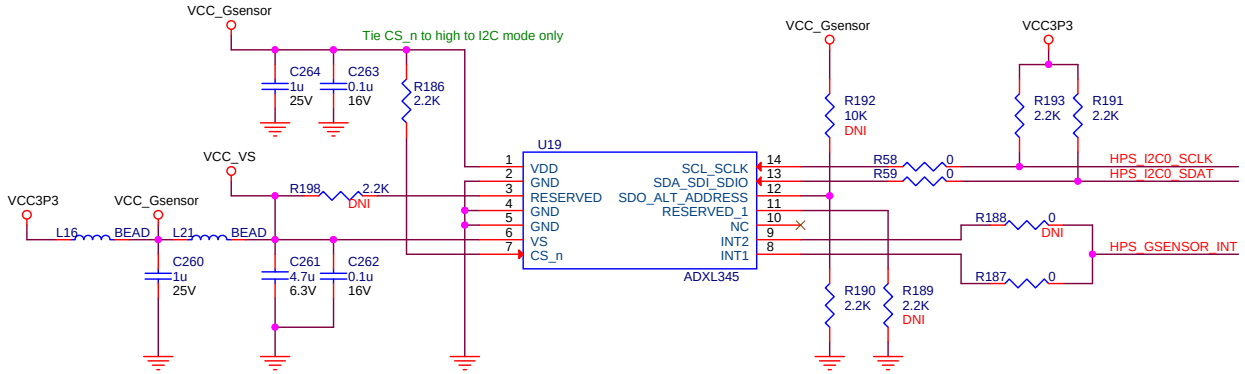
ENET_AVDD — Q5 AO3415 DNI — VCC1P2
HPS_ENET_LDO_O

Title: DE10-Nano Board
Size: B | Document Number: HPS : Gagabit Ethernet | Rev: B2
Date: Monday, August 21, 2017 | Sheet 15 of 24

Digital Accelerometer

Accelerometer Interface

- HPS_I2C0_SDAT
- HPS_I2C0_SCLK
- HPS_GSENSOR_INT

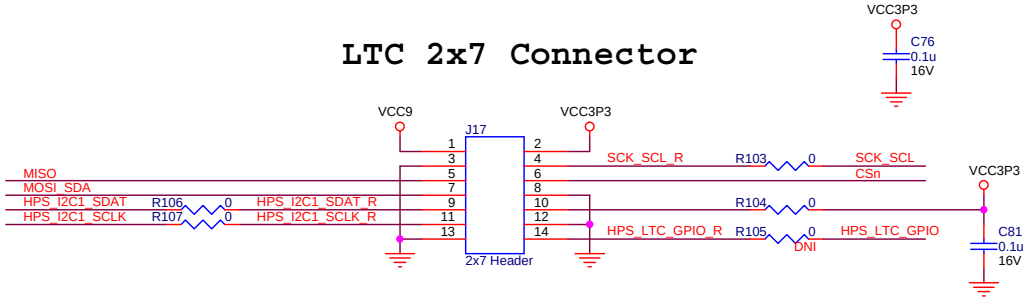


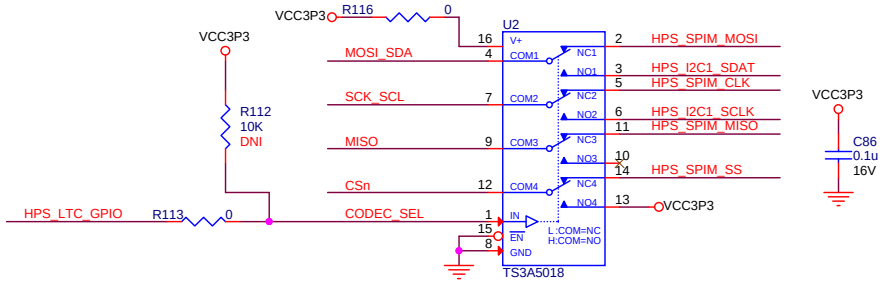
Default : I2C Address 0xA6/0xA7

LTC Interface

- HPS_I2C1_SDAT
- HPS_I2C1_SCLK
- HPS_SPIM_MOSI
- HPS_SPIM_MISO
- HPS_SPIM_CLK
- HPS_SPIM_SS
- HPS_LTC_GPIO

LTC 2x7 Connector



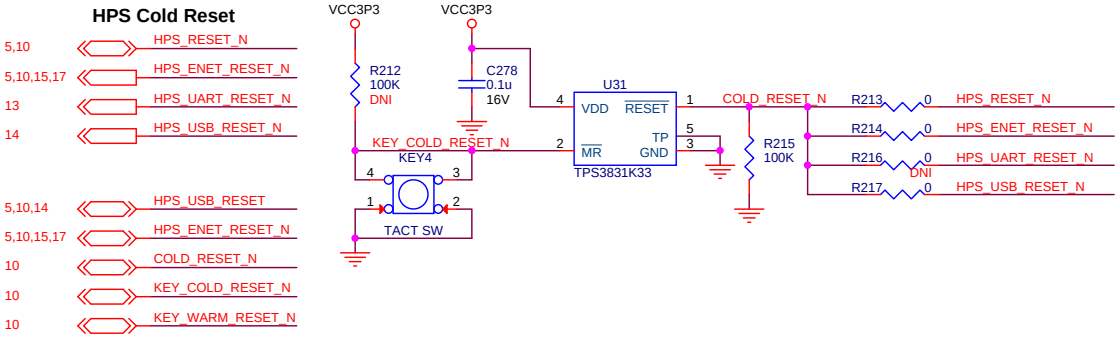


Title: **DE10-Nano Board**

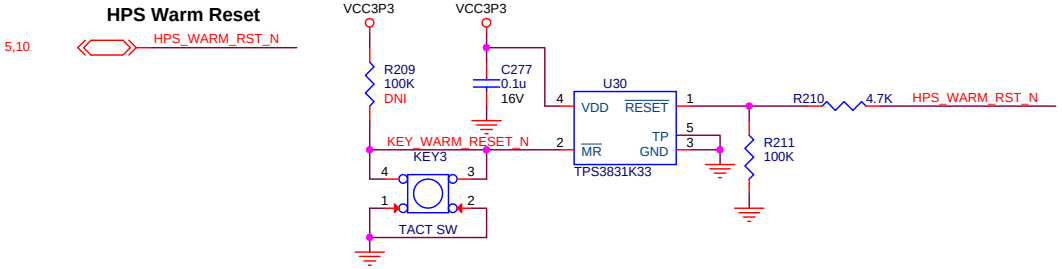
Size	Document Number	Rev
B	HPS : Accelerometer, LTC Connector	B2

Date: Monday, August 21, 2017 Sheet 16 of 24

HPS Cold Reset



HPS Warm Reset

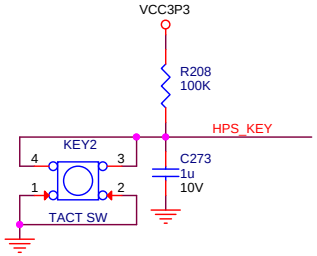


HPS Key and LED

5 HPS_KEY

5 HPS_LED

HPS User Button

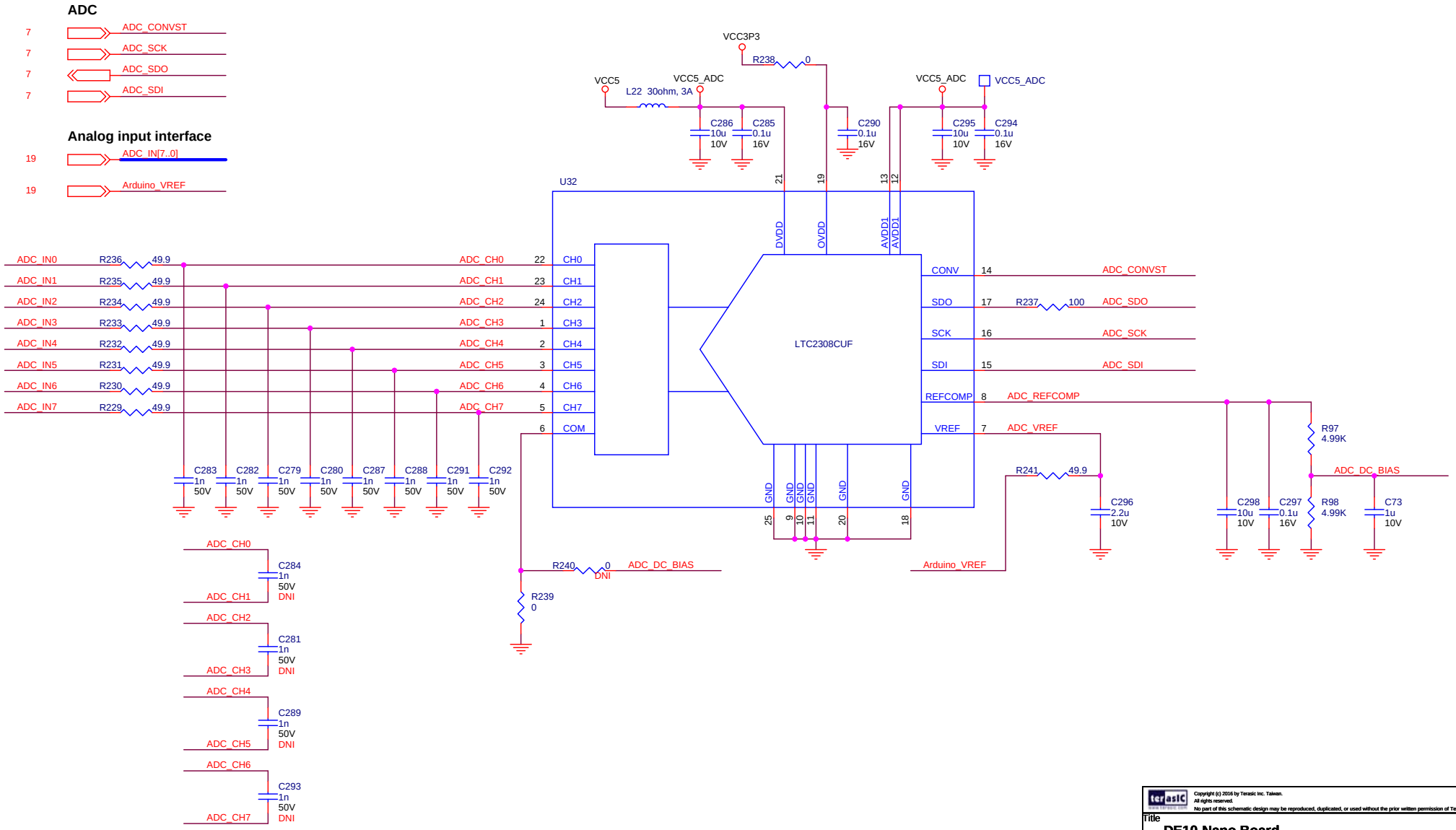


HPS User LED

Title: **DE10-Nano Board**

Size	Document Number	Rev
B	HPS : BUTTON and LED	B2

Date: Monday, August 21, 2017 Sheet 17 of 24



Title
DE10-Nano Board

Size	Document Number	Rev
B	FPGA : ADC1 - LTC2308 for ADC Header Analog input	B2

Date: Monday, August 21, 2017 Sheet 18 of 24

GPIO

3,6,7 — GPIO_0_D[35..0]

3,6 — GPIO_1_D[35..0]

Arduino Digital Interface

3 — Arduino_IO[15..0]

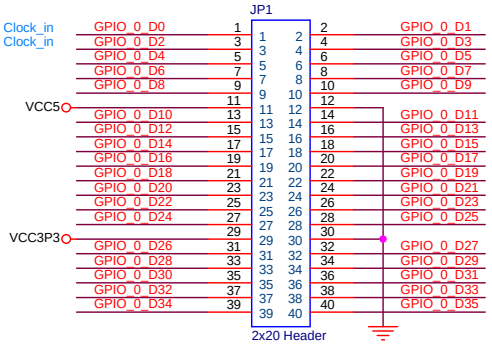
3 — Arduino_Reset_n

Analog input interface

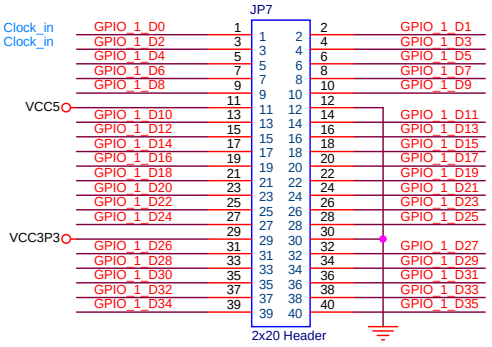
18 — ADC_IN[7..0]

18 — Arduino_VREF

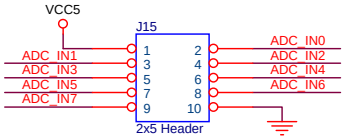
GPIO 0 Header

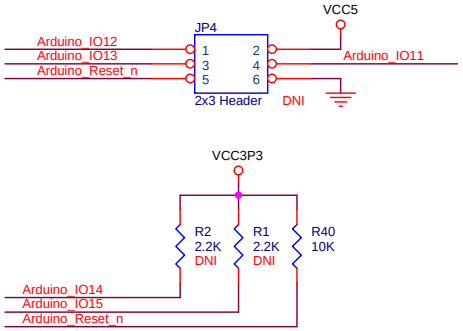


GPIO 1 Header

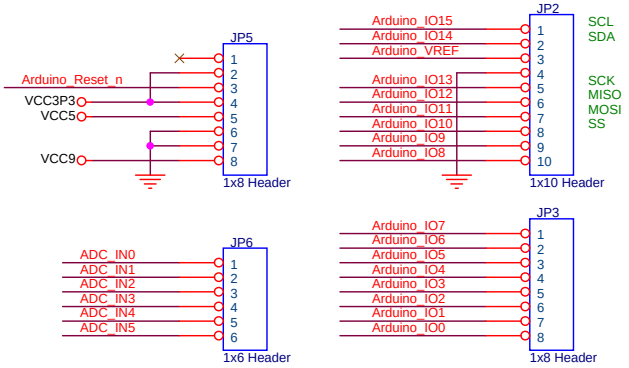


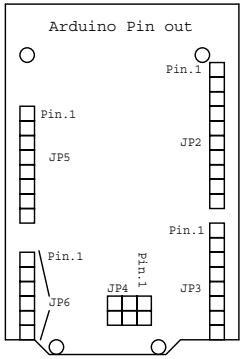
ADC Header





Arduino UNO Rev3





Title: **DE10-Nano Board**

Size	Document Number	Rev
B	FPGA : GPIO, ADC & Arduino Expansion Header	B2

Date: Monday, August 21, 2017 Sheet 19 of 24

KEY

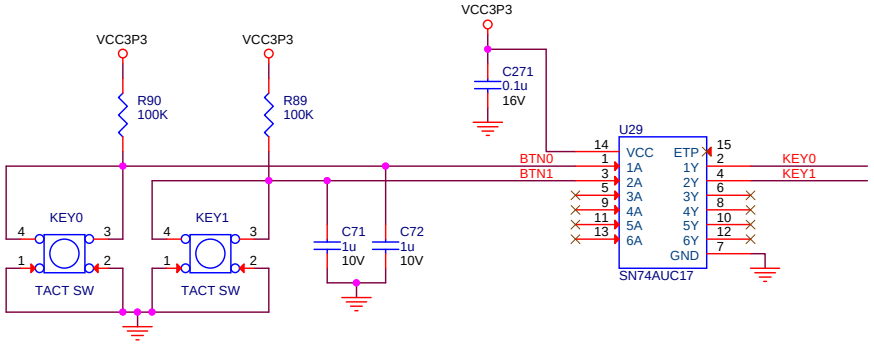
3 KEY[1..0]

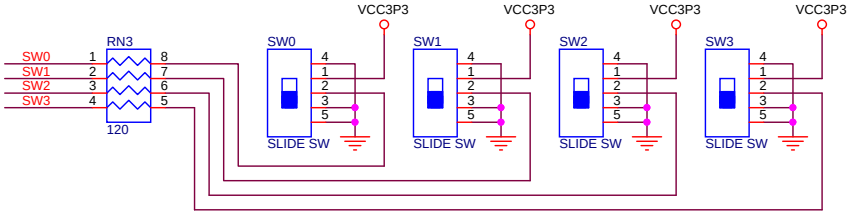
SWITCH

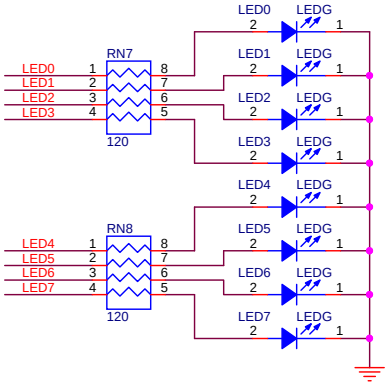
3 SW[3..0]

LED

3 LED[7..0]



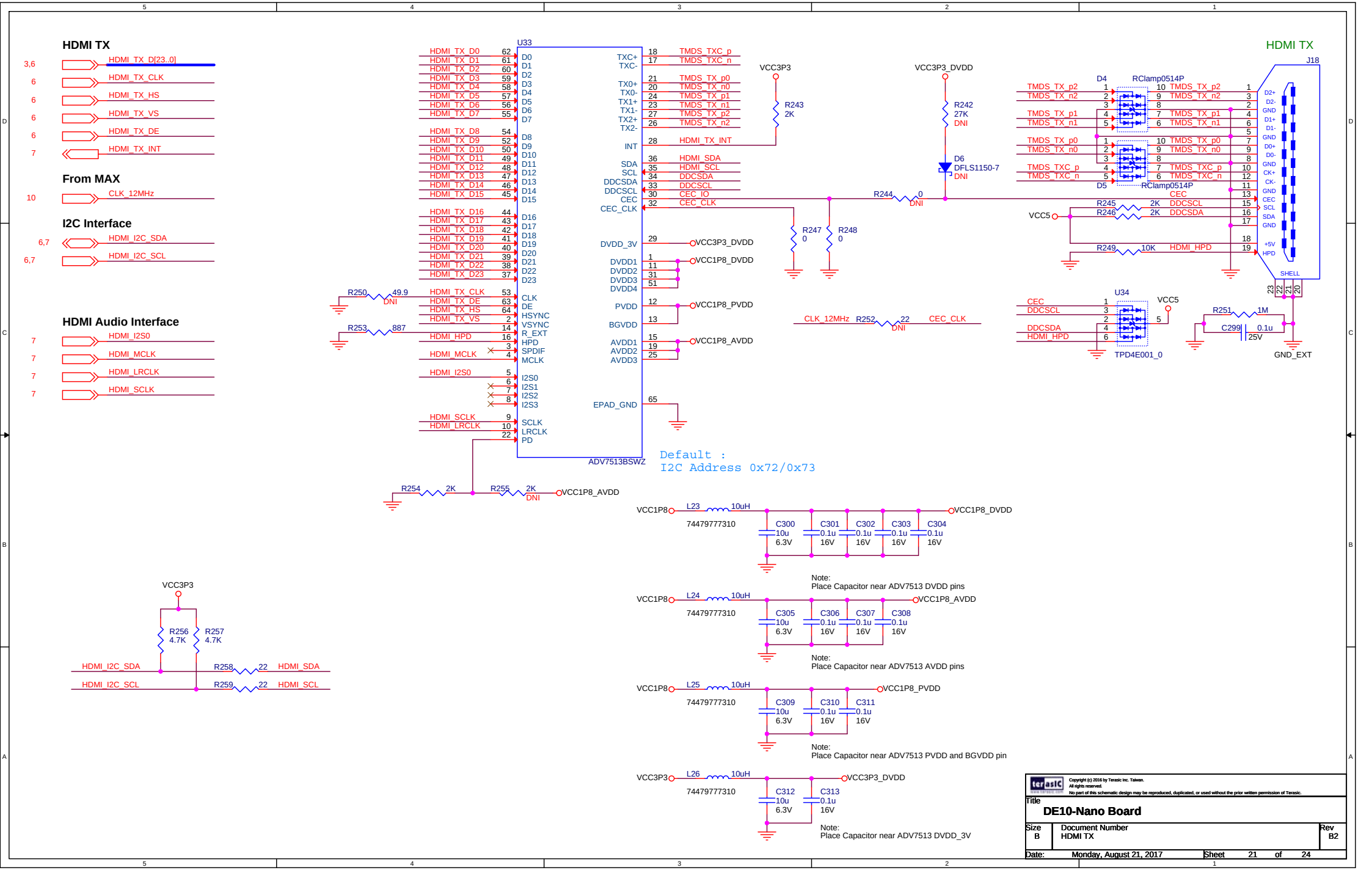




Title
DE10-Nano Board

Size	Document Number	Rev
B	FPGA : LED, KEY, SW	B2

Date: Monday, August 21, 2017 Sheet 20 of 24


HDMI TX
HDMI_TX_D[23..0]
HDMI_TX_CLK
HDMI_TX_HS
HDMI_TX_VS
HDMI_TX_DE
HDMI_TX_INT
From MAX
CLK_12MHz
I2C Interface
HDMI_I2C_SDA
HDMI_I2C_SCL
HDMI Audio Interface
HDMI_I2S0
HDMI_MCLK
HDMI_LRCLK
HDMI_SCLK
U33
ADV7513BSWZ
TMDS_TXC_p
TMDS_TXC_n
TMDS_TX_p0
TMDS_TX_n0
TMDS_TX_p1
TMDS_TX_n1
TMDS_TX_p2
TMDS_TX_n2
HDMI_TX_INT
HDMI_SDA
HDMI_SCL
DDCSDA
DDCSCL
CEC_IO
CEC_CLK
VCC3P3
VCC3P3_DVDD
VCC1P8_DVDD
VCC1P8_PVDD
VCC1P8_AVDD
R243 2K
R242 27K DNI
D6 DFLS1150-7 DNI
R244 0 DNI
R247 0
R248 0
R250 49.9 DNI
R253 887
R254 2K
R255 2K DNI
R252 22 DNI
CLK_12MHz
CEC_CLK
Default :
I2C Address 0x72/0x73
J18
D4 RClamp0514P
D5 RClamp0514P
U34 TPD4E001_0
R245 2K
R246 2K
R249 10K
R251 1M
C299 0.1u 25V
GND_EXT
L23 10uH 74479777310
L24 10uH 74479777310
L25 10uH 74479777310
L26 10uH 74479777310
C300 10u 6.3V
C301 0.1u 16V
C302 0.1u 16V
C303 0.1u 16V
C304 0.1u 16V
C305 10u 6.3V
C306 0.1u 16V
C307 0.1u 16V
C308 0.1u 16V
C309 10u 6.3V
C310 0.1u 16V
C311 0.1u 16V
C312 10u 6.3V
C313 0.1u 16V
Note:
Place Capacitor near ADV7513 DVDD pins
Note:
Place Capacitor near ADV7513 AVDD pins
Note:
Place Capacitor near ADV7513 PVDD and BGVDD pin
Note:
Place Capacitor near ADV7513 DVDD_3V
R256 4.7K
R257 4.7K
R258 22
R259 22
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Title
DE10-Nano Board
Size B
Document Number
HDMI TX
Rev B2
Date: Monday, August 21, 2017
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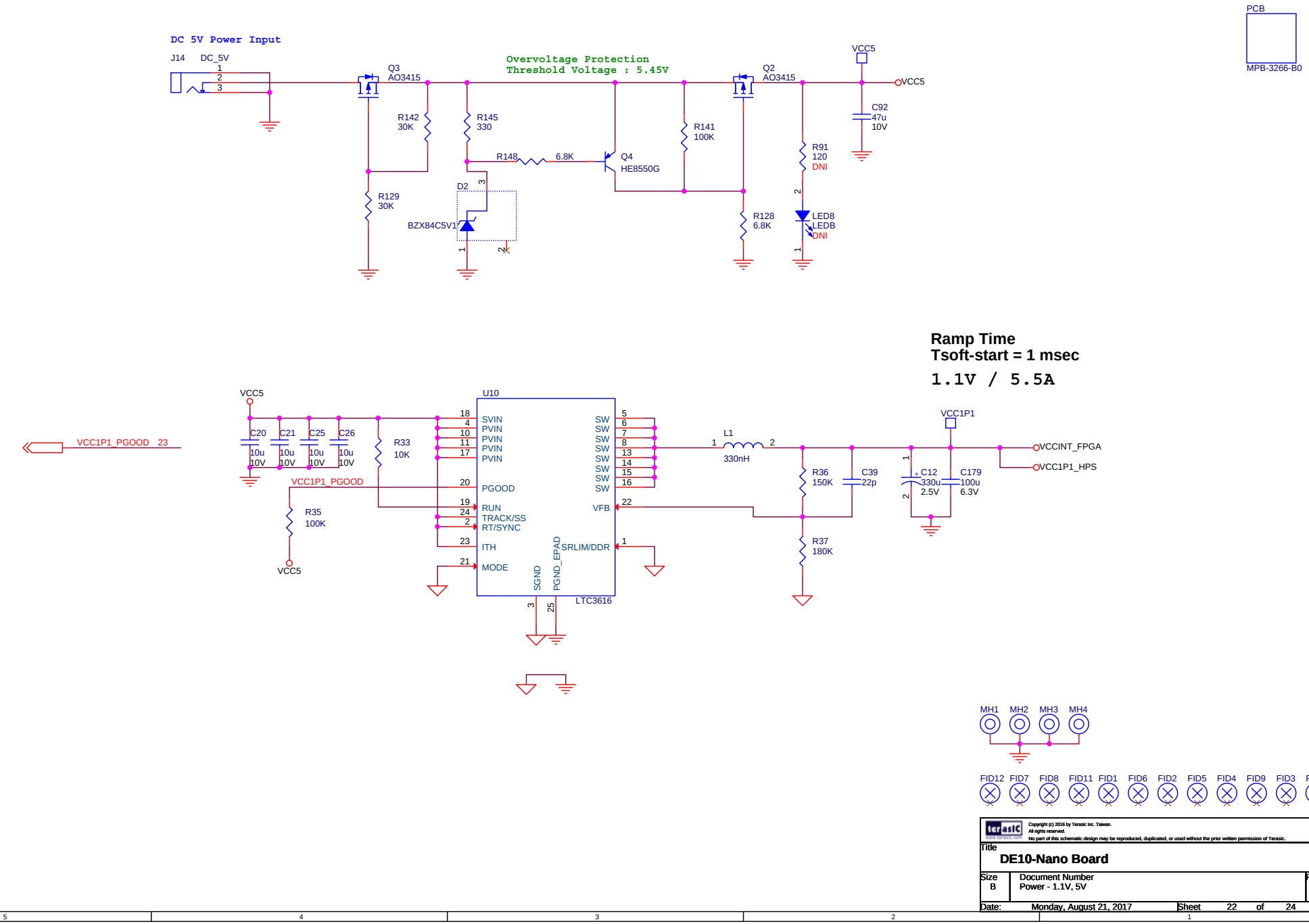
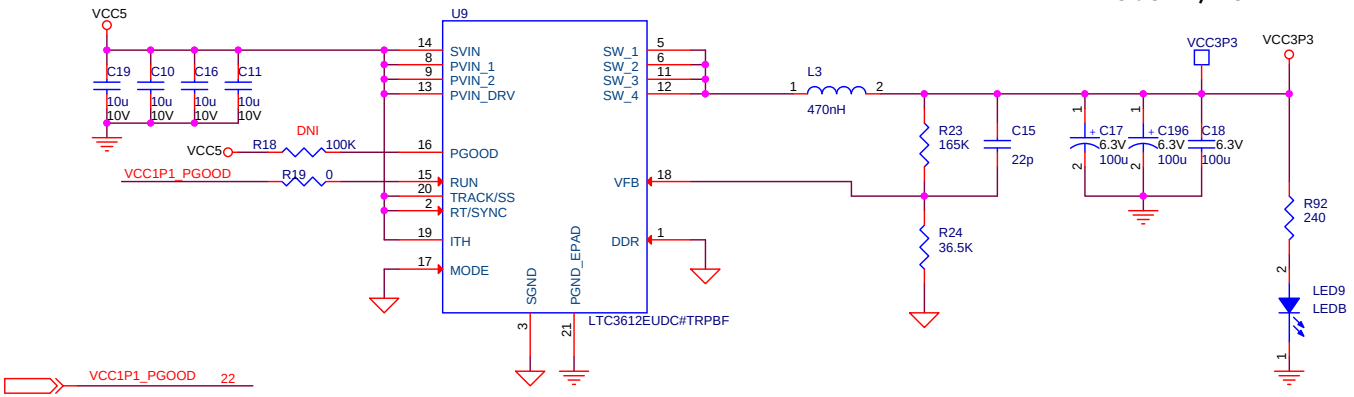


Title	DE10-Nano Board	
Size B	Document Number Power - 1.1V, 5V	Rev B2
Date: Monday, August 21, 2017	Sheet 22 of 24	

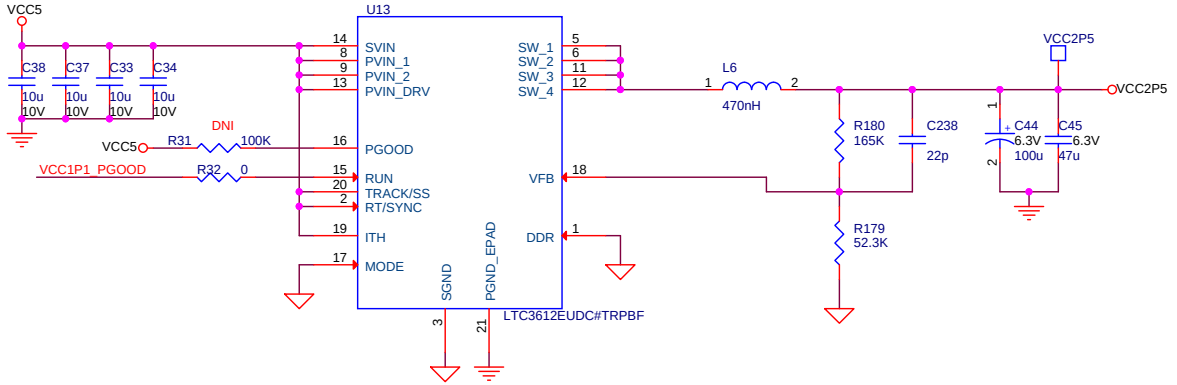
Ramp Time
Tsoft-start = 1 msec

3.3V / 3A



Ramp Time
Tsoft-start = 1 msec

2.5V / 3A

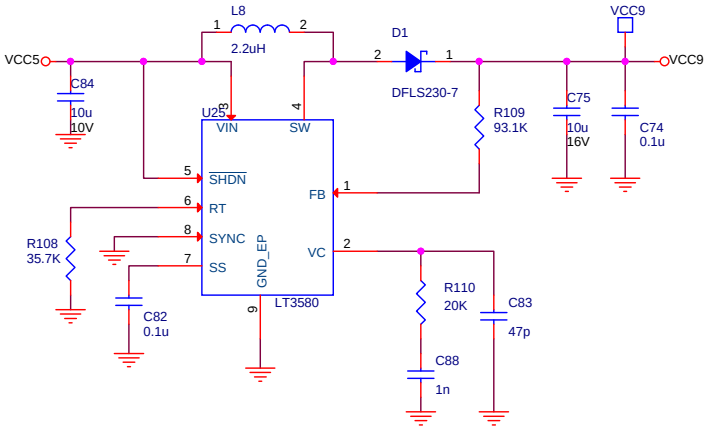


Title
DE10-Nano Board

Size	Document Number	Rev
B	Power - 2.5V, 3.3V	B2

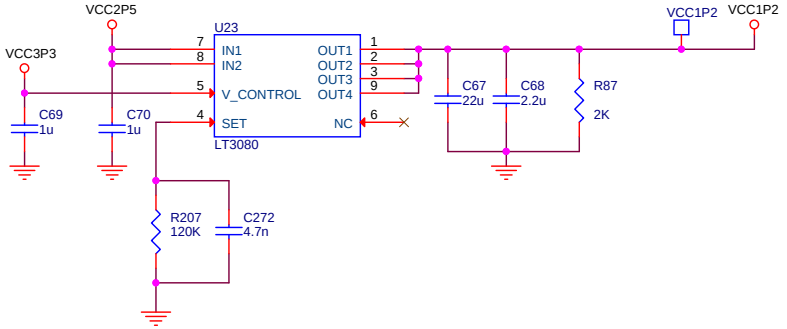
Date: Monday, August 21, 2017 Sheet 23 of 24

9V / 1A



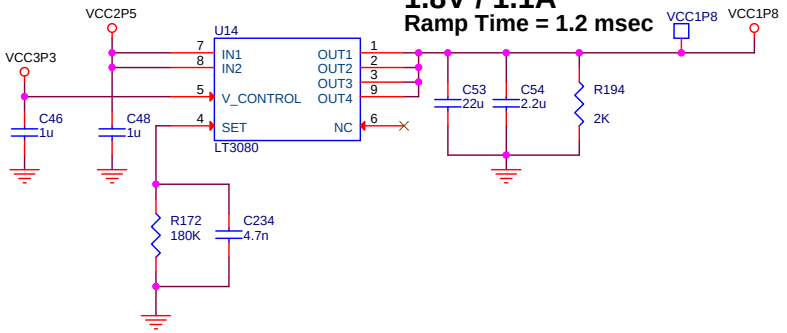
1.2V / 1.1A

Ramp Time = 0.8msec



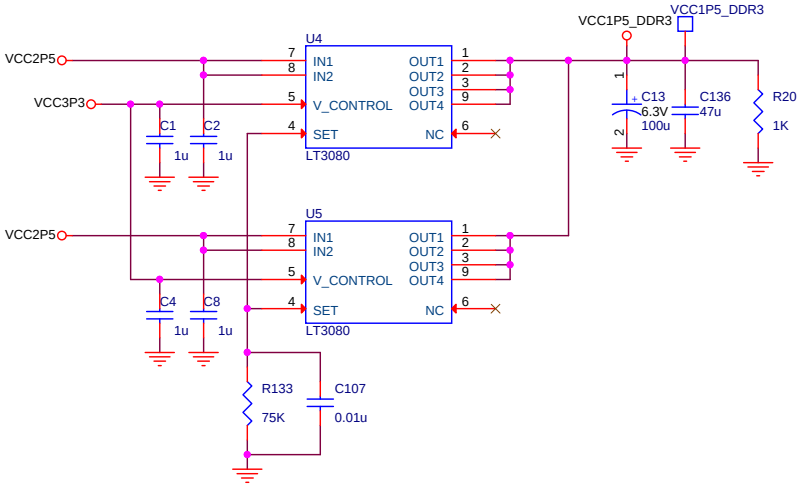
1.8V / 1.1A

Ramp Time = 1.2 msec

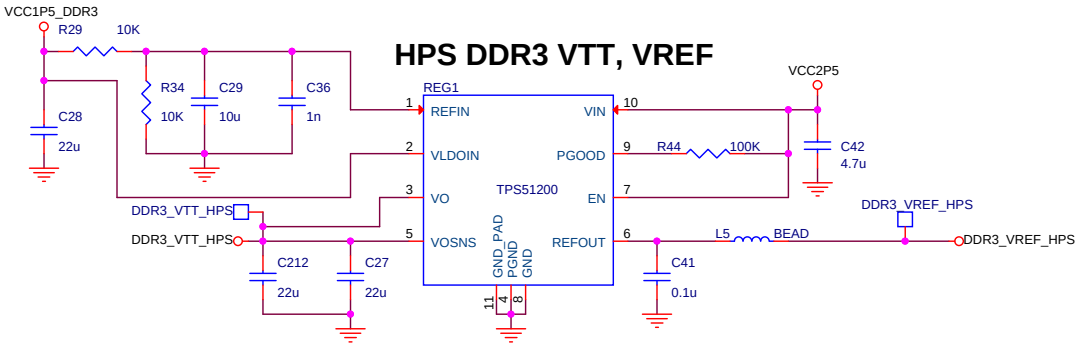


1.5V / 2.2A

Ramp Time = 1.27 msec



HPS DDR3 VTT, VREF



Title	DE10-Nano Board	
Size B	Document Number Power - 1.2V, 1.5V, 1.8V, 9V	Rev B2
Date: Monday, August 21, 2017	Sheet 24 of 24	