

# Mercury KX1 FPGA Module

## Revision 3

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- Sheet 20: Mechanics

DNE = do not equip				
Copyright	© 2015 by Enclustra GmbH			Confidential
Company	Enclustra GmbH			
Sheet name	1_COVER			
Project	Mercury KX1			
Revision	R3	Designed	MH	Date 23 Apr 2015 Sheet/sheets 1 / 20

D

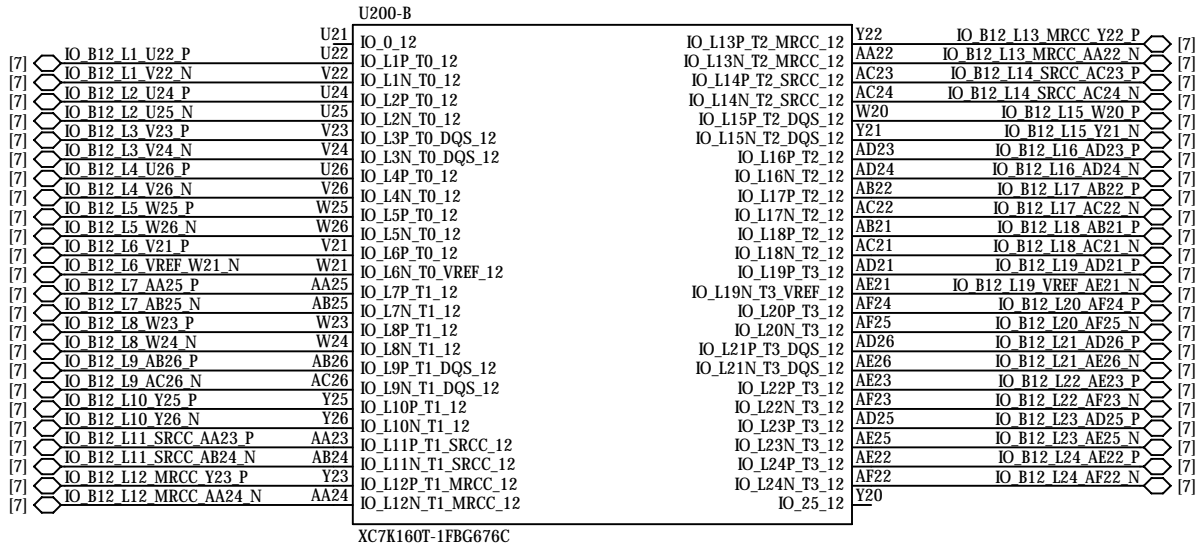
C

B

A

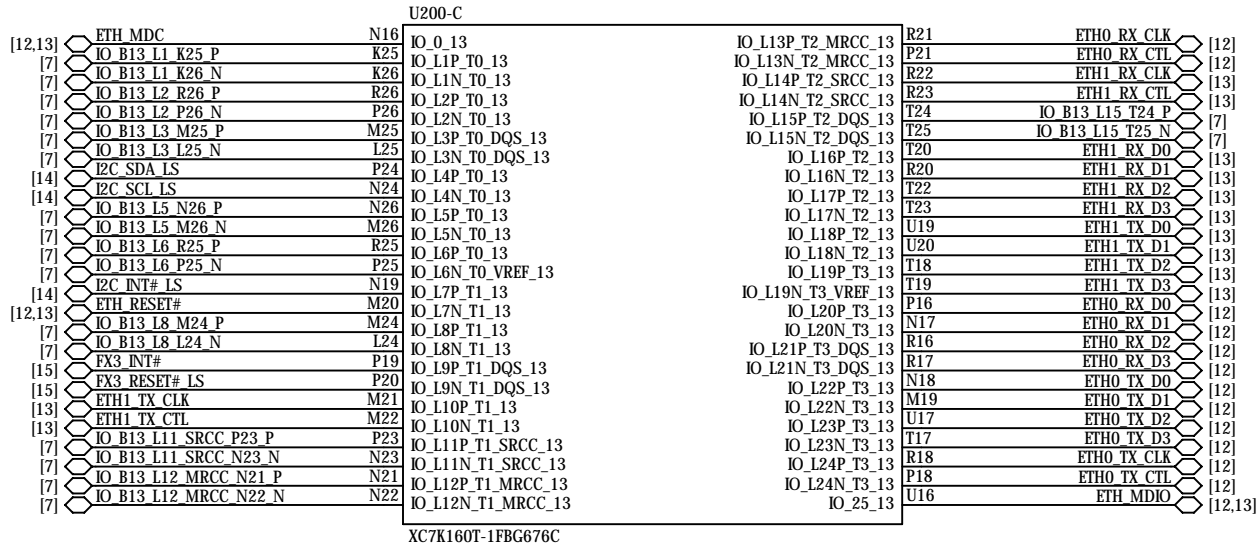
## FPGA Bank 12

VCCO = VCC\_B12  
Bank is not available in XC7K70T



## FPGA Bank 13

VCCO = VCC\_CFG\_B13

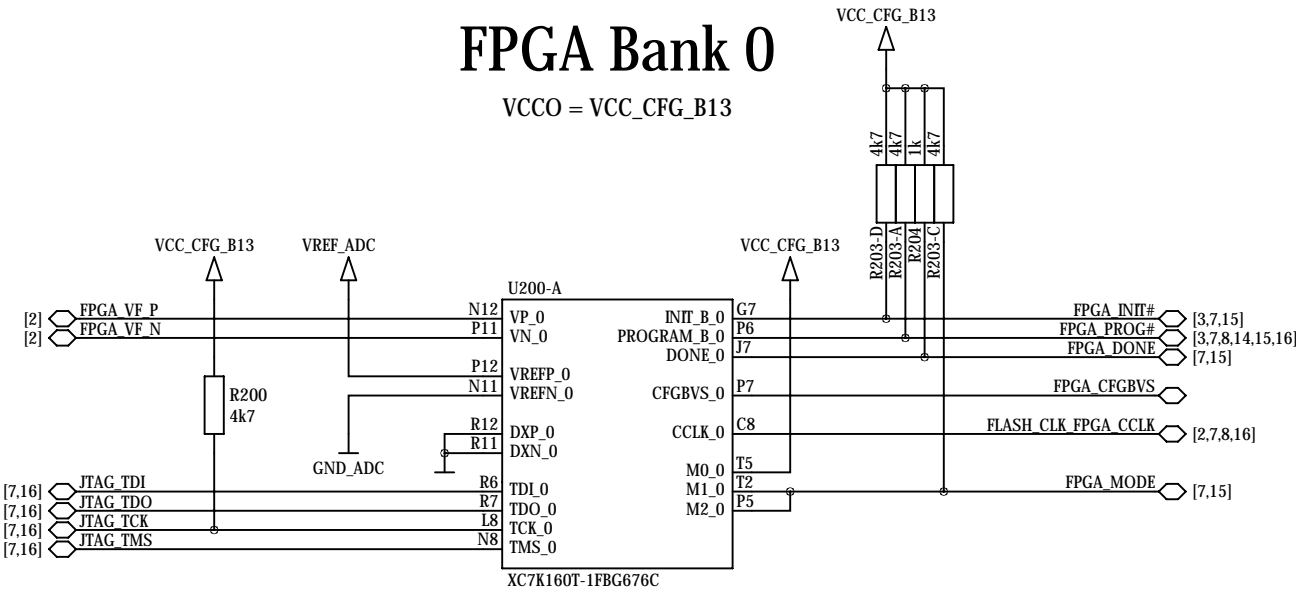


D

C

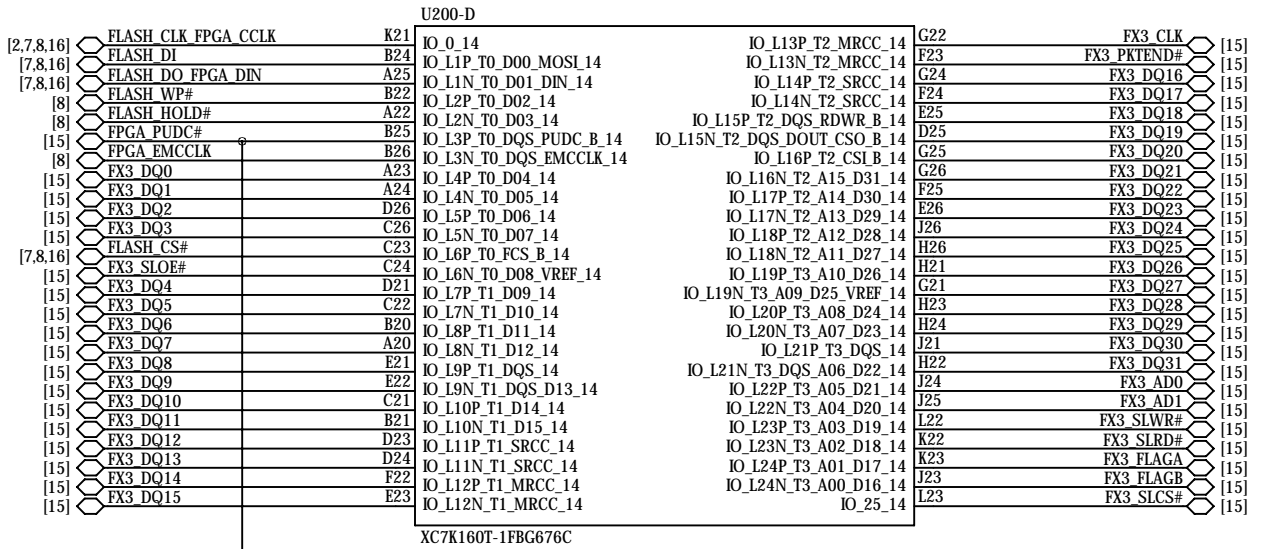
## FPGA Bank 0

VCCO = VCC\_CFG\_B13



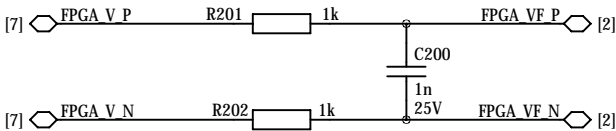
## FPGA Bank 14

VCCO = VCC\_CFG\_B13



B

## ADC Anti-Alias Filter



## FPGA Mode

Default	0	Configuration
	1	Active Serial Passive Serial

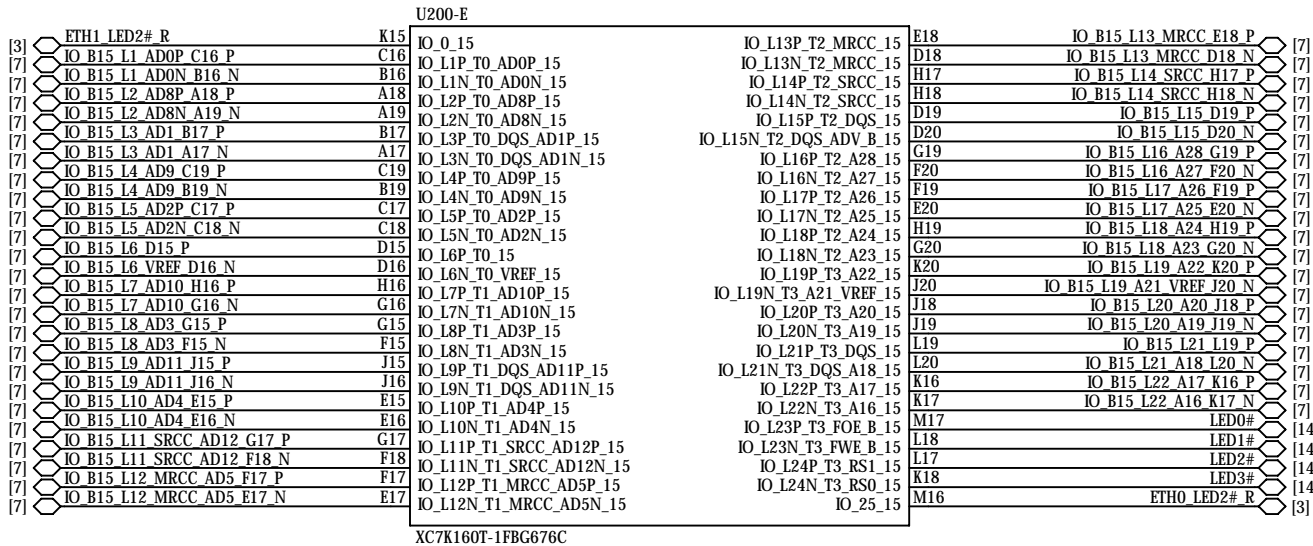
Copyright		© 2015 by Enclustra GmbH		Confidential	
Company		Enclustra GmbH			
Sheet name		2_FPGA_BANK0_12_13_14			
Project		Mercury KX1			
Revision	R3	Designed	MH	Date	23 Apr 2015
			Sheet/sheets	2 / 20	

A

D

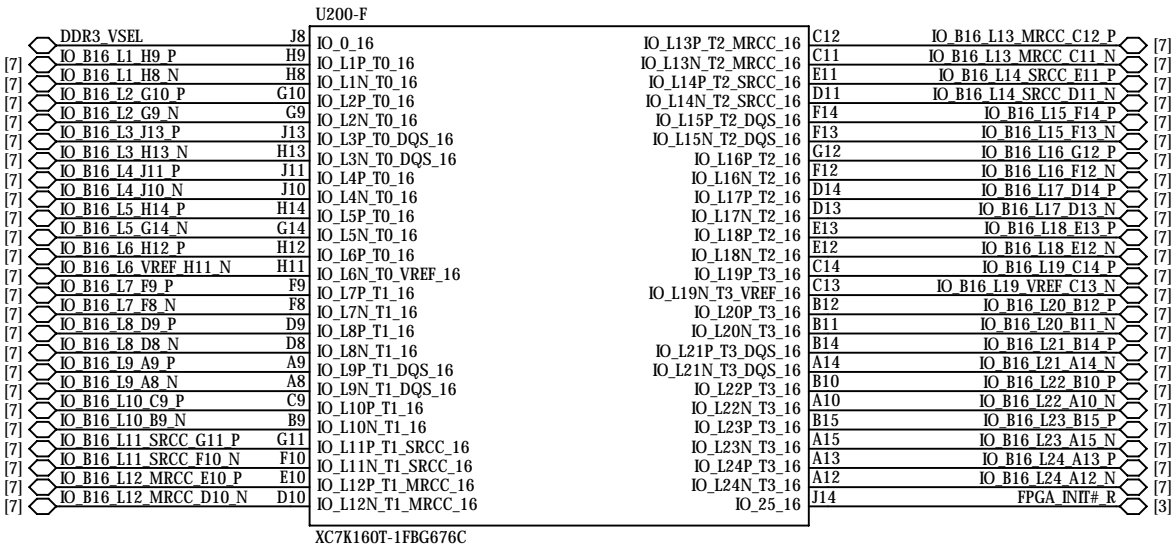
# FPGA Bank 15

VCCO = VCC\_B15



# FPGA Bank 16

VCCO = VCC\_B16

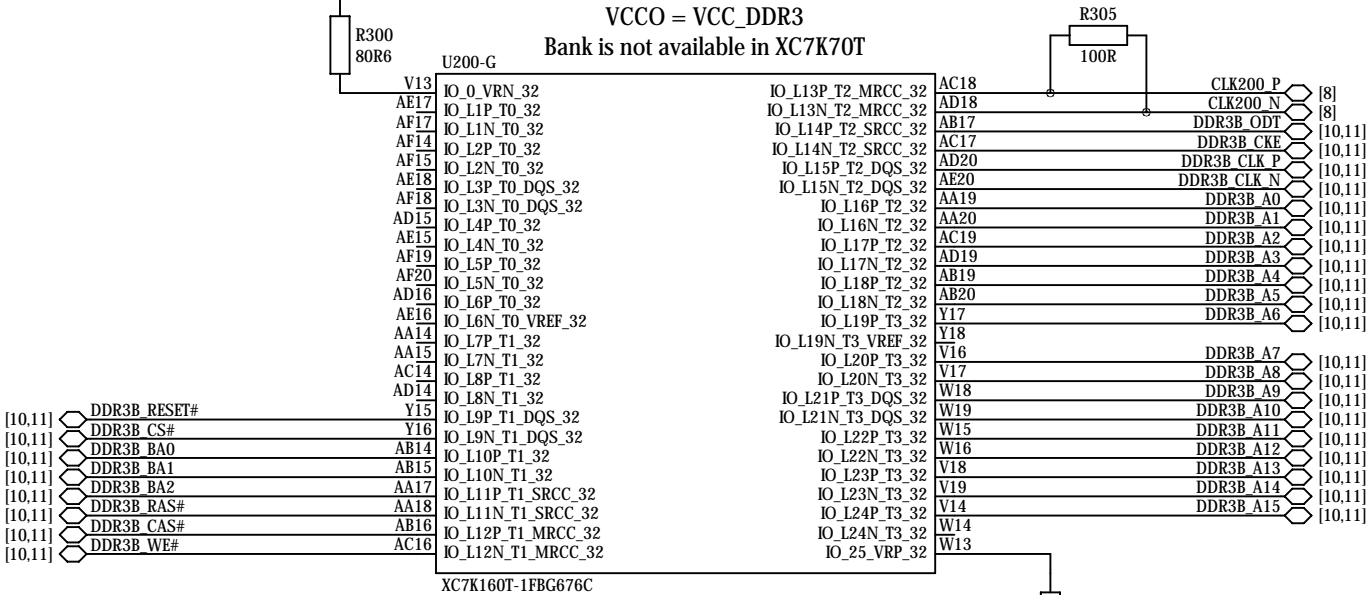


D

C

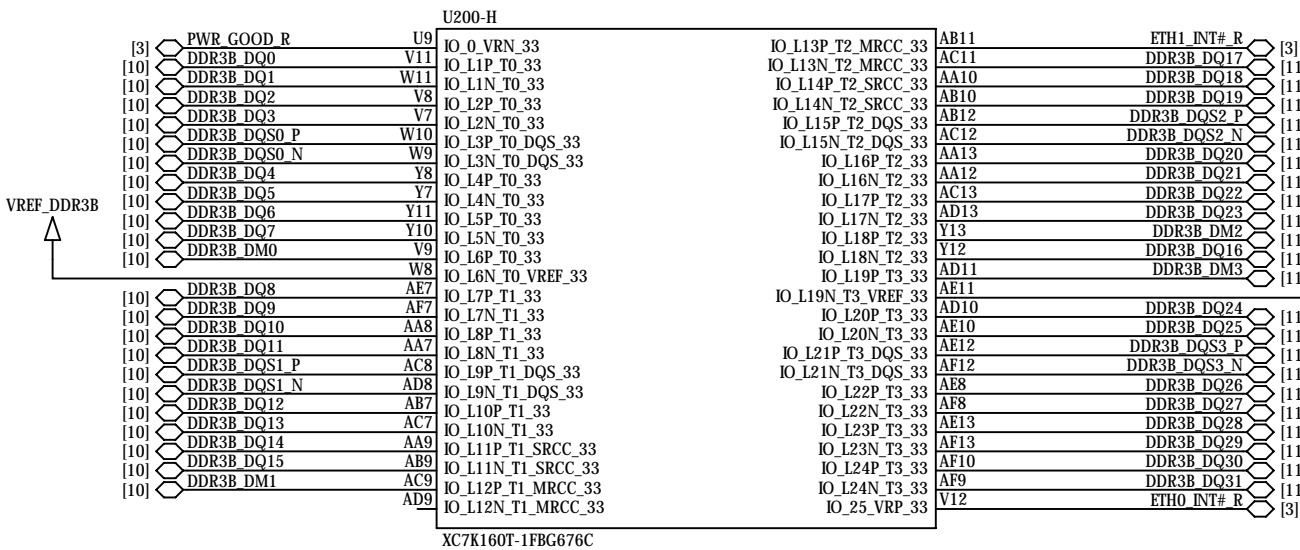
# FPGA Bank 32

VCCO = VCC\_DDR3  
Bank is not available in XC7K70T



# FPGA Bank 33

VCCO = VCC\_DDR3



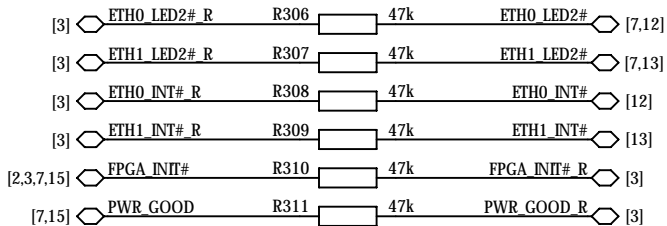
C

B

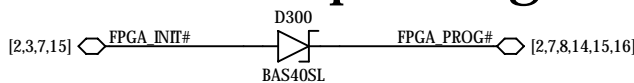
# VREF DDR3-B

not included in free schematics

# Series Resistors



# Power Sequencing



B

A

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Company	Enclustra GmbH						
Sheet name	3_FPGA_BANK15_16_32_33						
Project	Mercury KX1						
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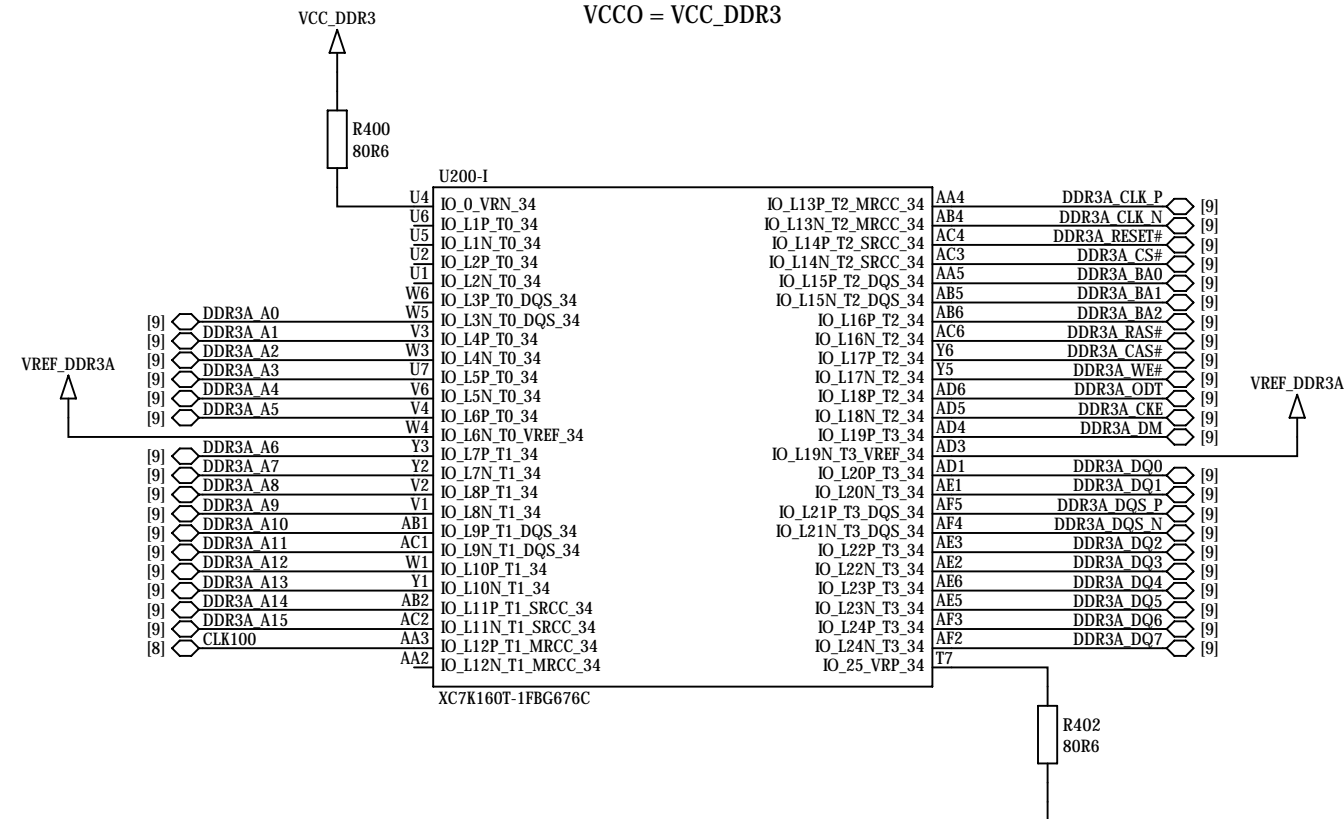
A

## FPGA Bank 34

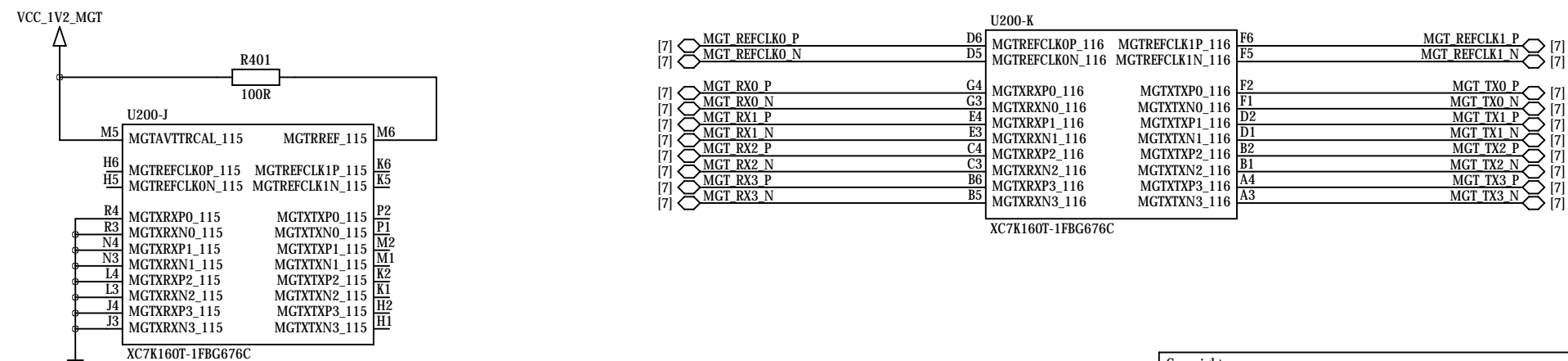
VCCO = VCC\_DDR3

## VREF DDR3-A

not included in free schematics



## FPGA MGT Banks 115 / 116



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Sheet name		4_FPGA_BANK34_MGT			
Project		Mercury KX1			
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				Sheet/sheets	4 / 20



D

D

C

C

B

B

A

A

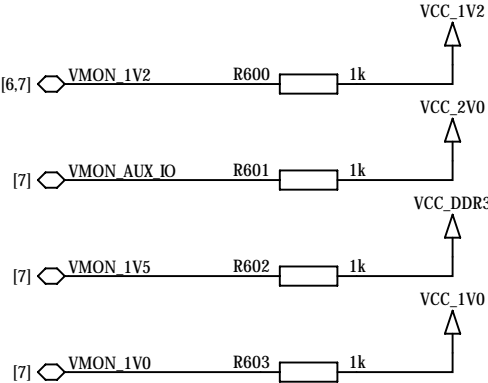
# FPGA Decoupling

not included in free schematics

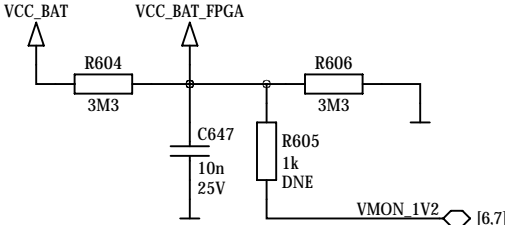
## Power Decoupling

not included in free schematics

## Voltage Monitoring

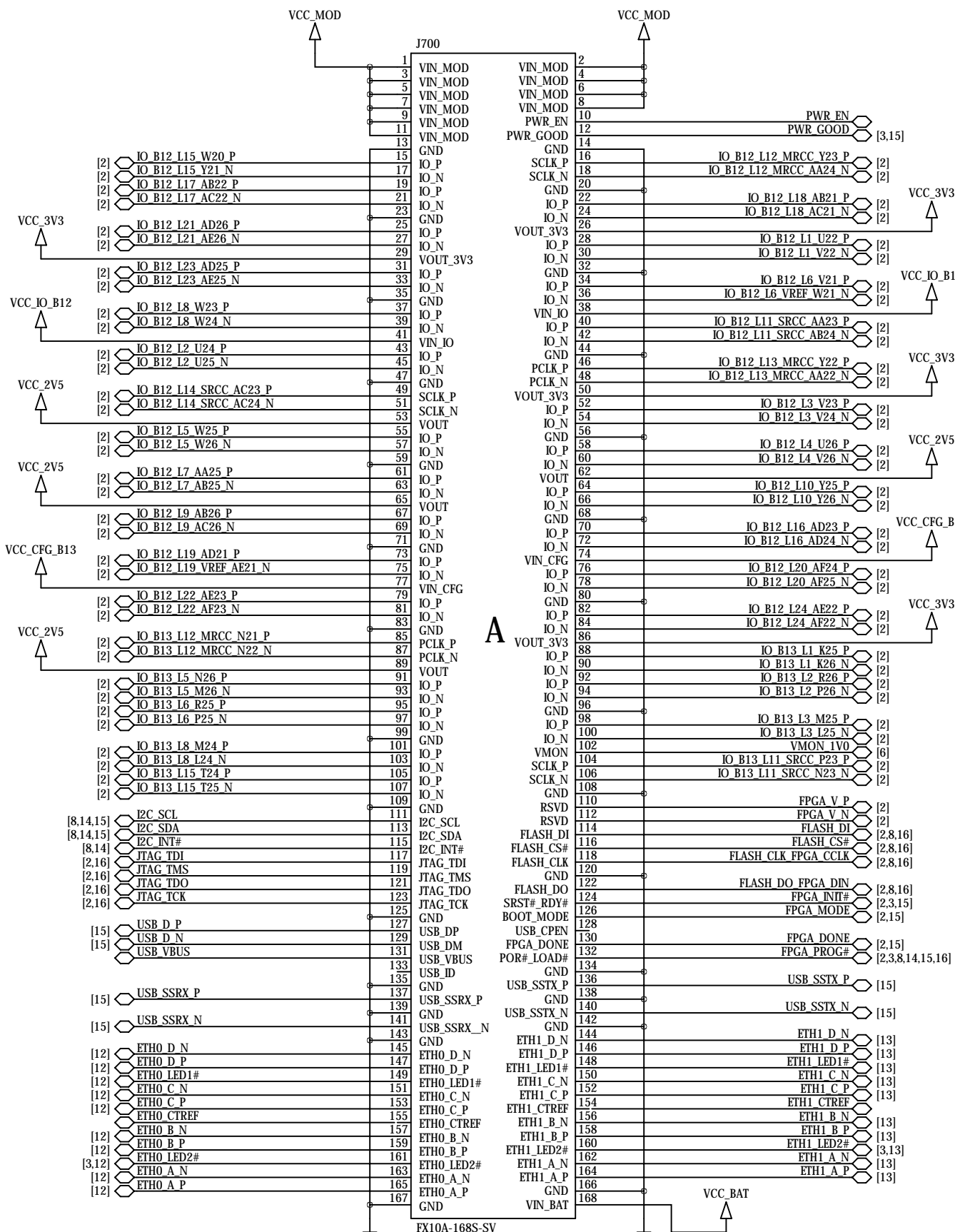


## FPGA Battery Voltage

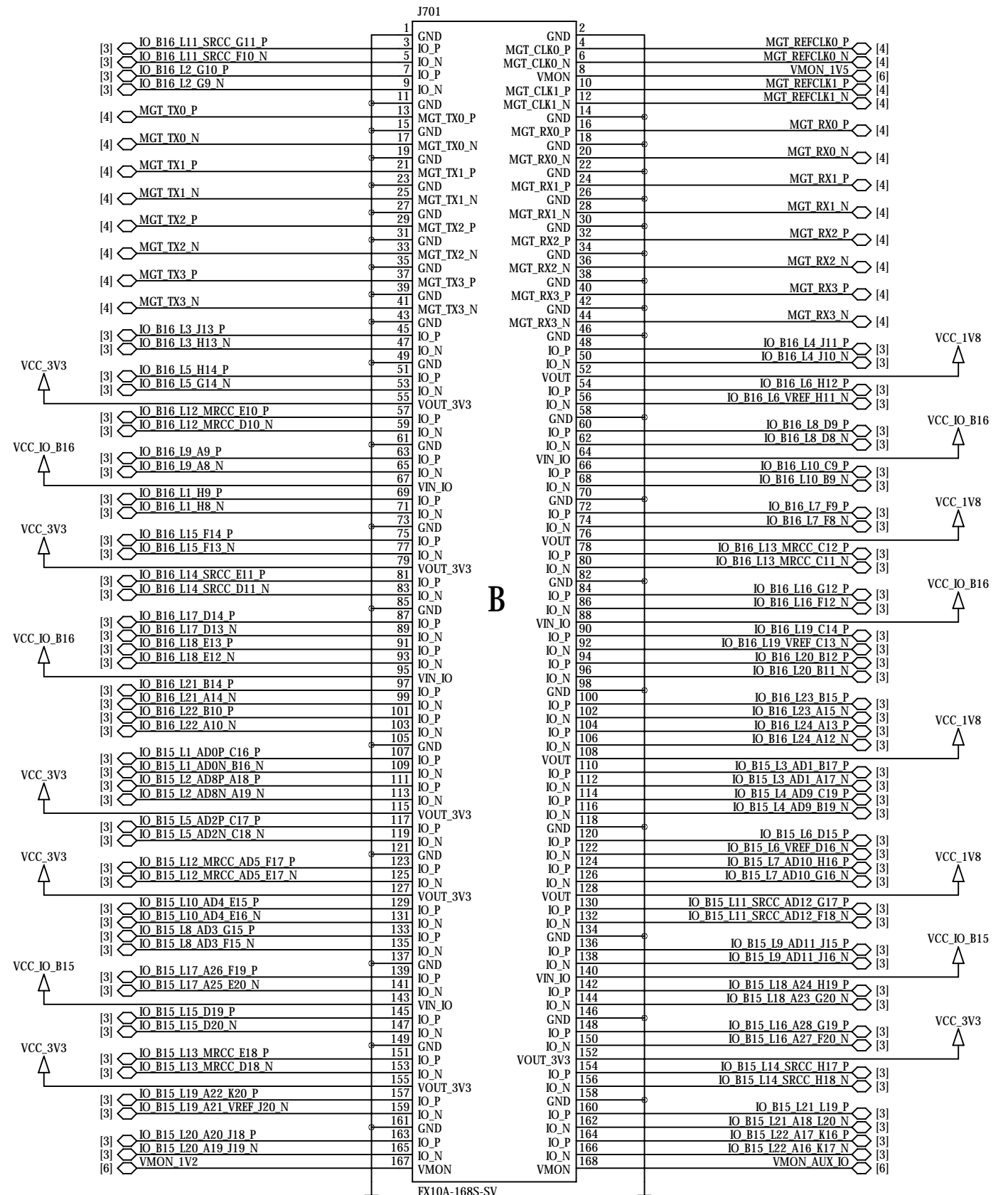


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Sheet name	6_FPGA_DECOUPLING			
Project	Mercury KX1			
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		Sheet/sheets		6 / 20

# Module Connector A

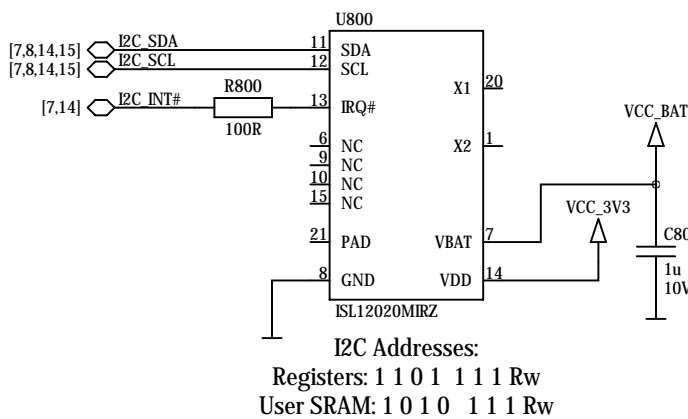


## Module Connector B

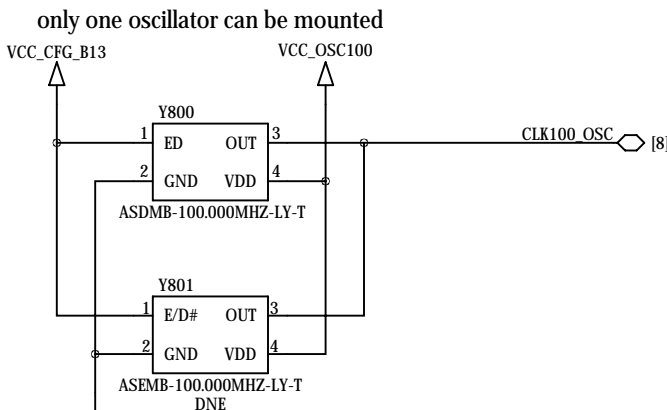


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Company	Enclustra GmbH		
Sheet name	7_MODULE_CONNECTORS		
Project	Mercury KX1		
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		Sheet/sheets	7 / 20

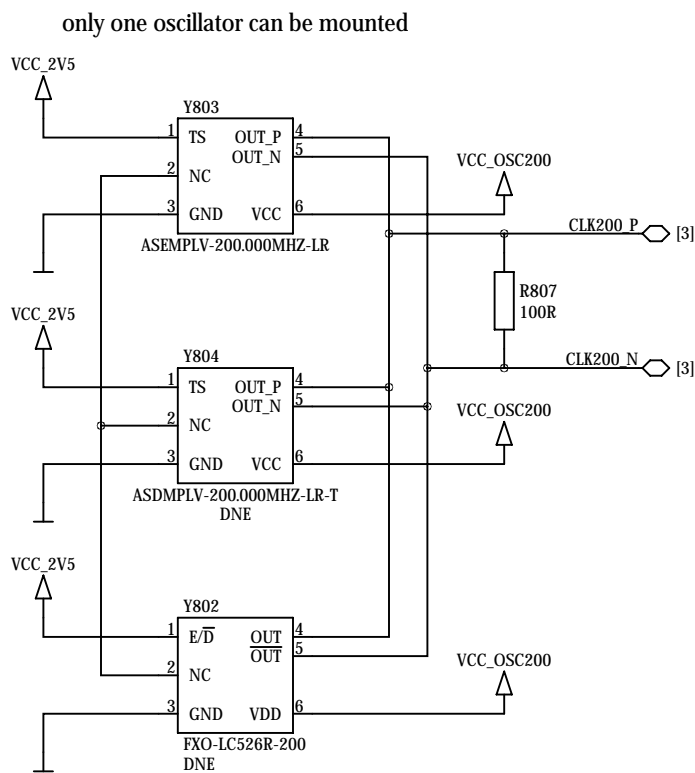
## Real-time Clock



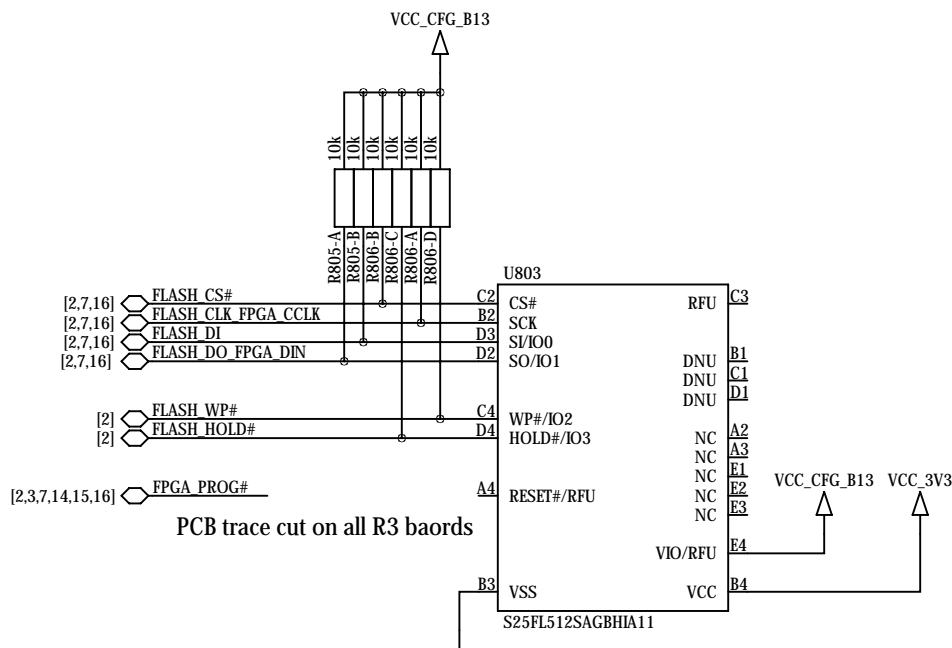
## 100 MHz Oscillator



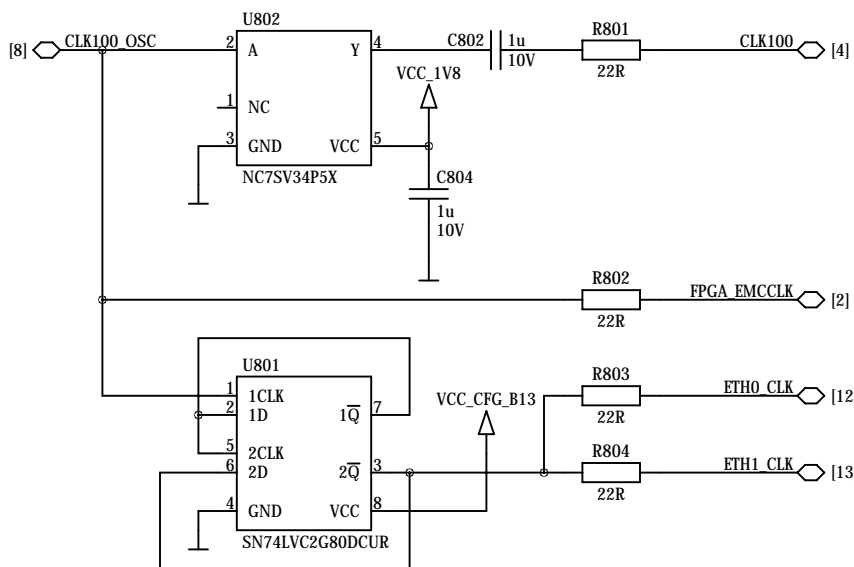
## 200 MHz Oscillator



## Quad SPI Flash

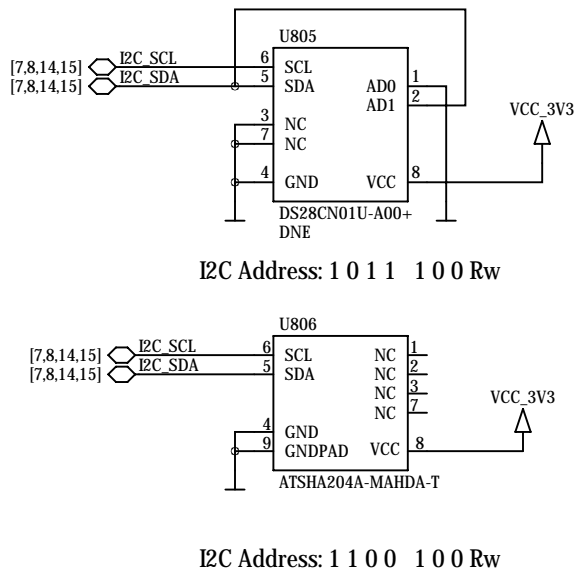


## Clock Divider



## Secure EEPROMs

for Enclustra use only  
only one EEPROM can be mounted



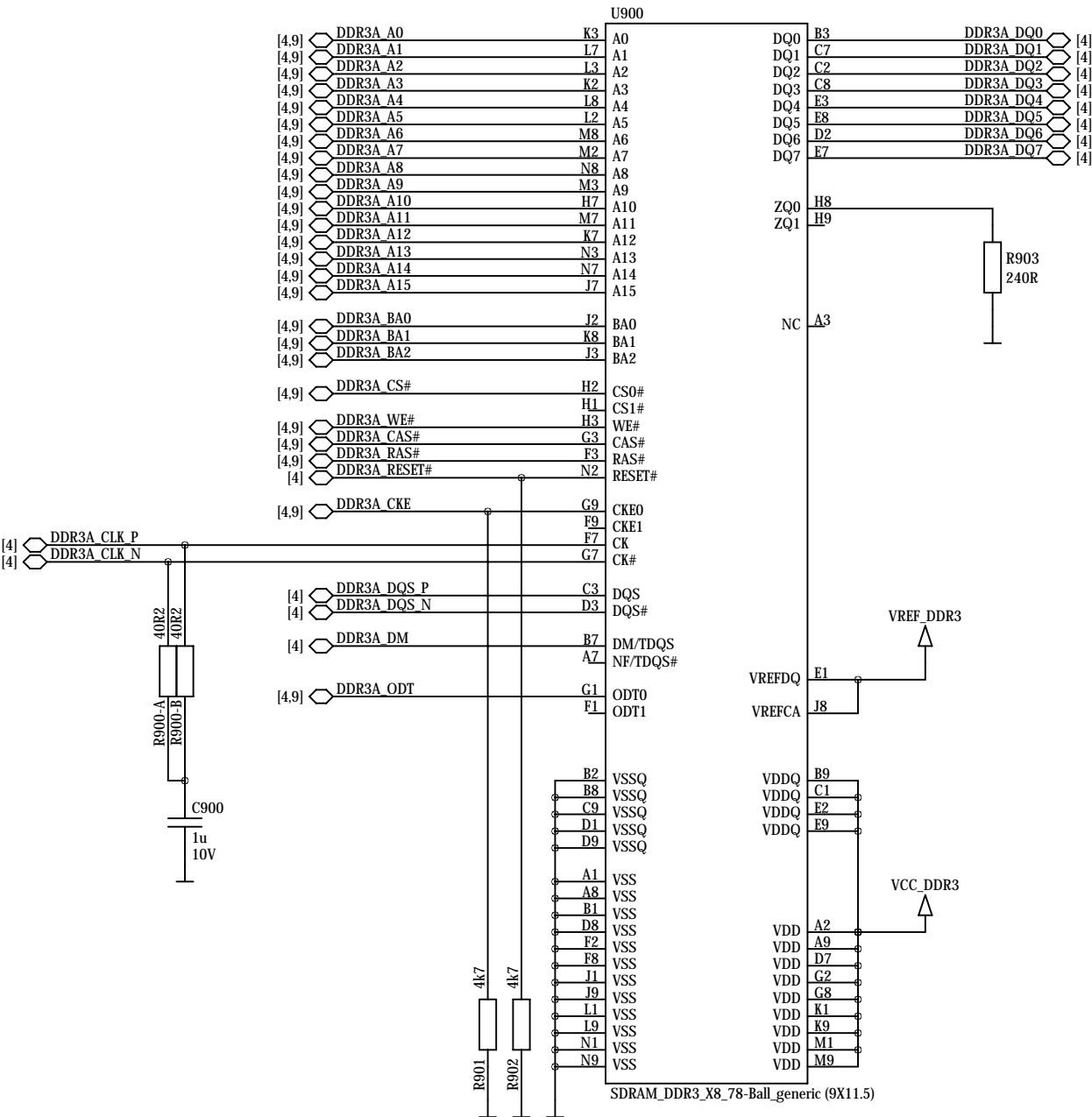
## Oscillator Power Filters

not included in free schematics

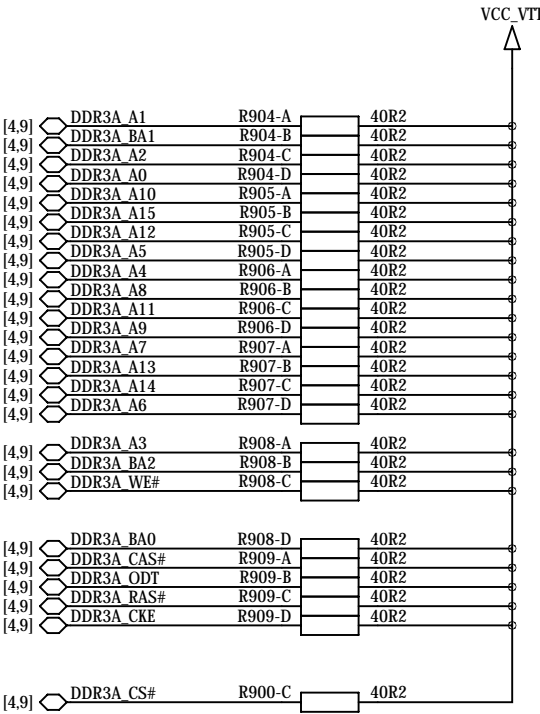
Copyright	© 2015 by Enclustra GmbH			Confidential
Company	Enclustra GmbH			
Sheet name	8_RTC/EEPROM/FLASH/OSCILLATOR			
Project	Mercury KX1			
Revision	R3	Designed	MH	Date 23 Apr 2015 Sheet/sheets 8 / 20



# DDR3 SDRAM Channel A



# DDR3-A Termination

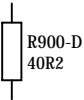


# VTT DDR3 Decoupling

not included in free schematics

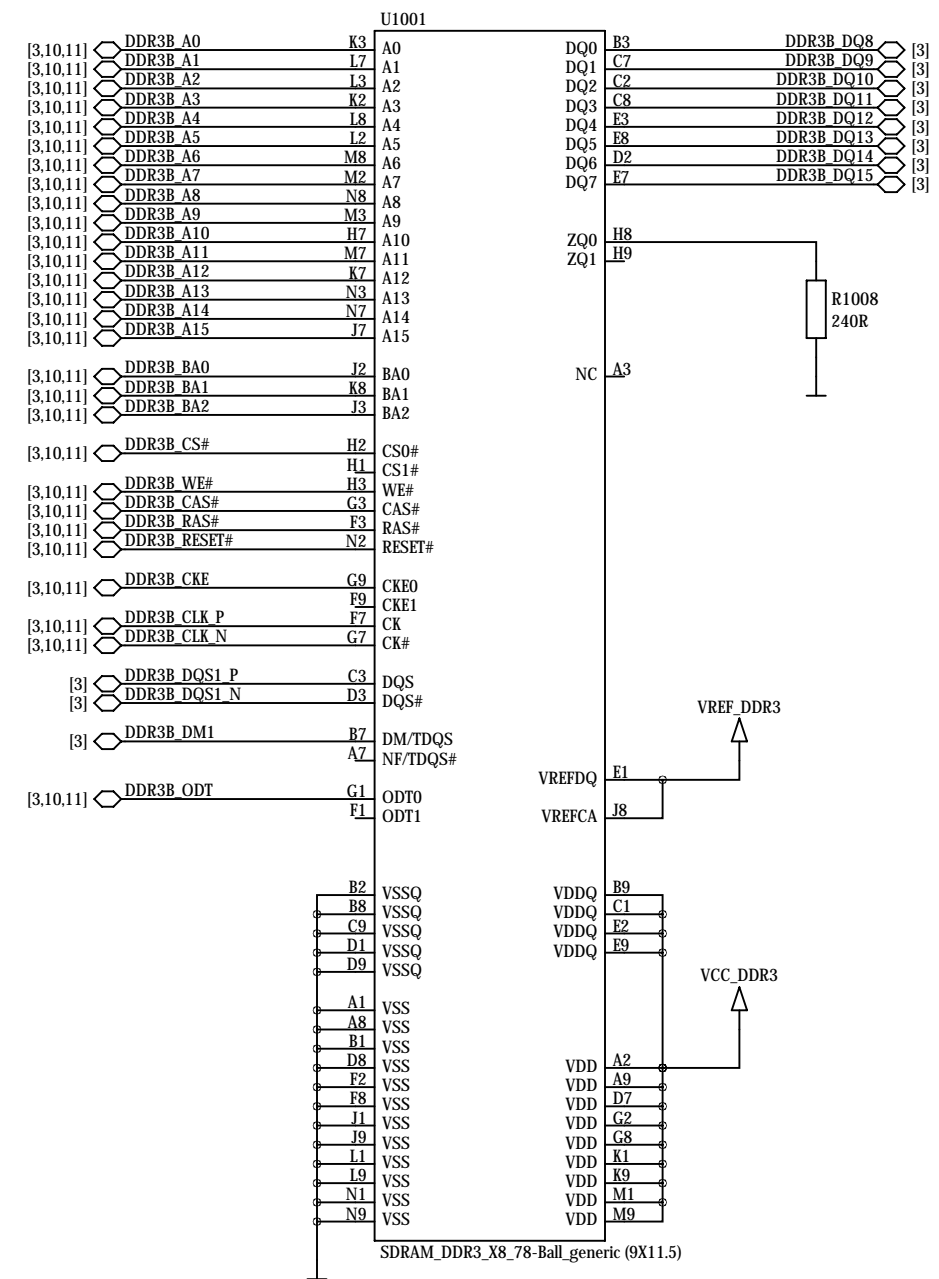
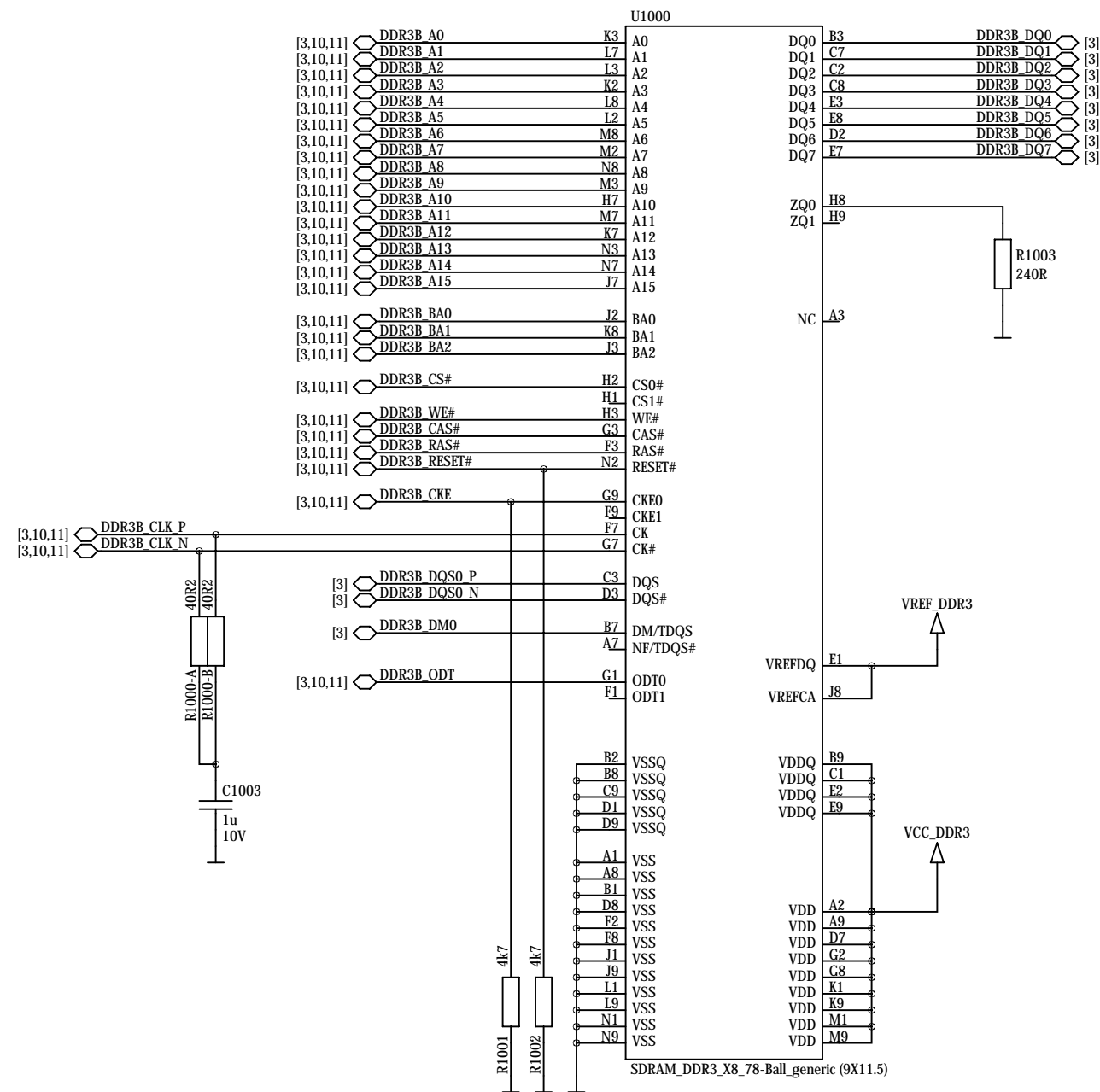
# DDR3-A Decoupling

not included in free schematics



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Sheet name	9_DDR3_SDRAM			
Project	Mercury KX1			
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		Sheet/sheets		9 / 20

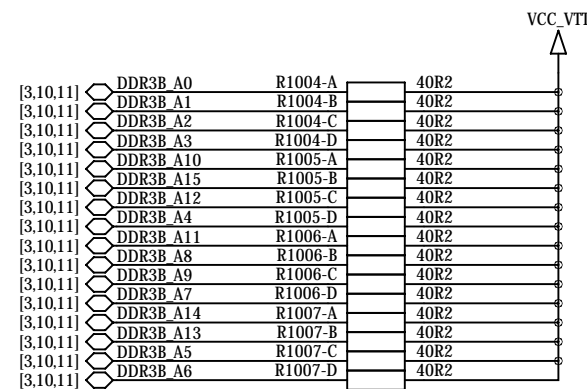
## DDR3 SDRAM Channel B



## DDR3-B Decoupling

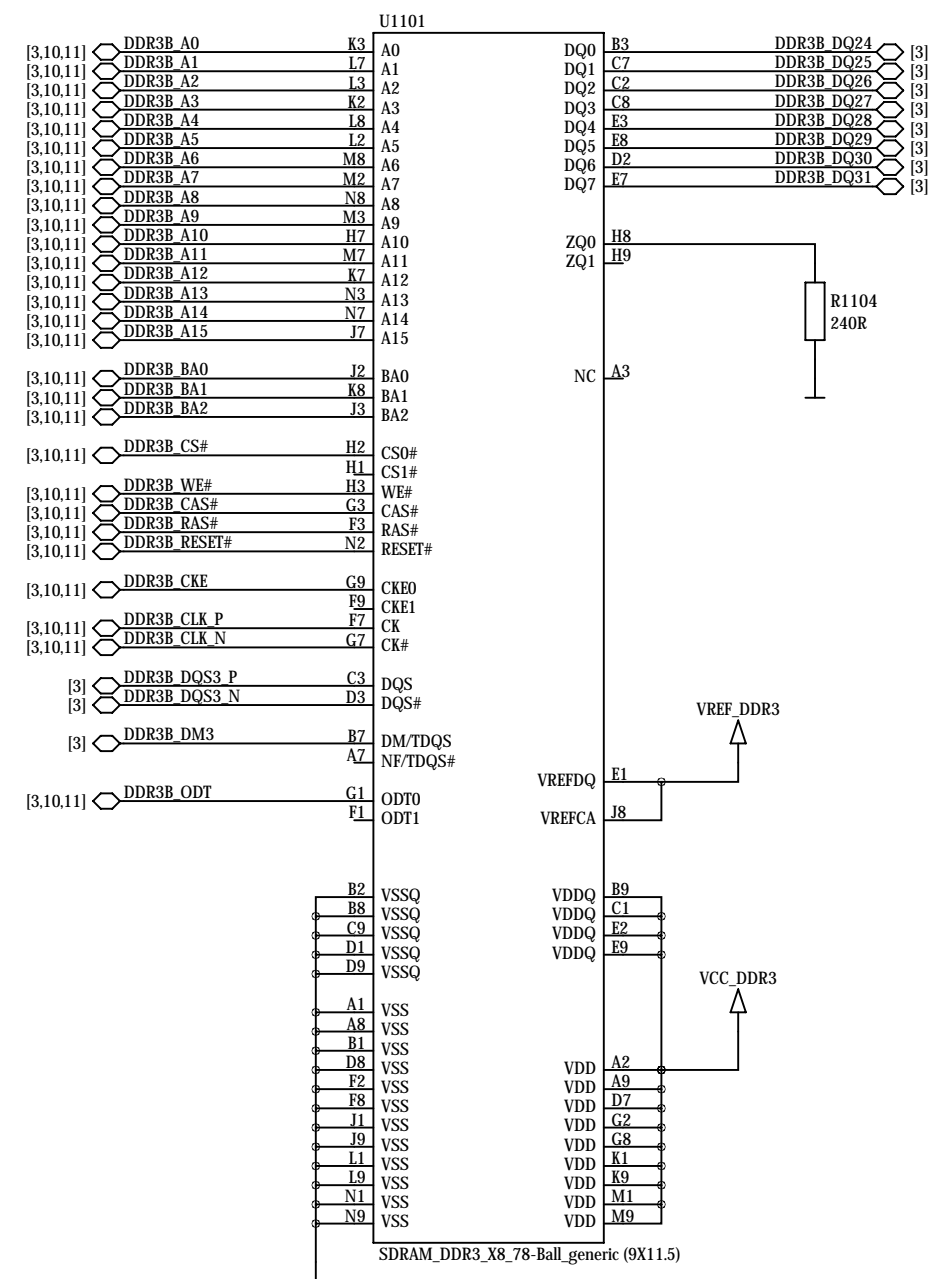
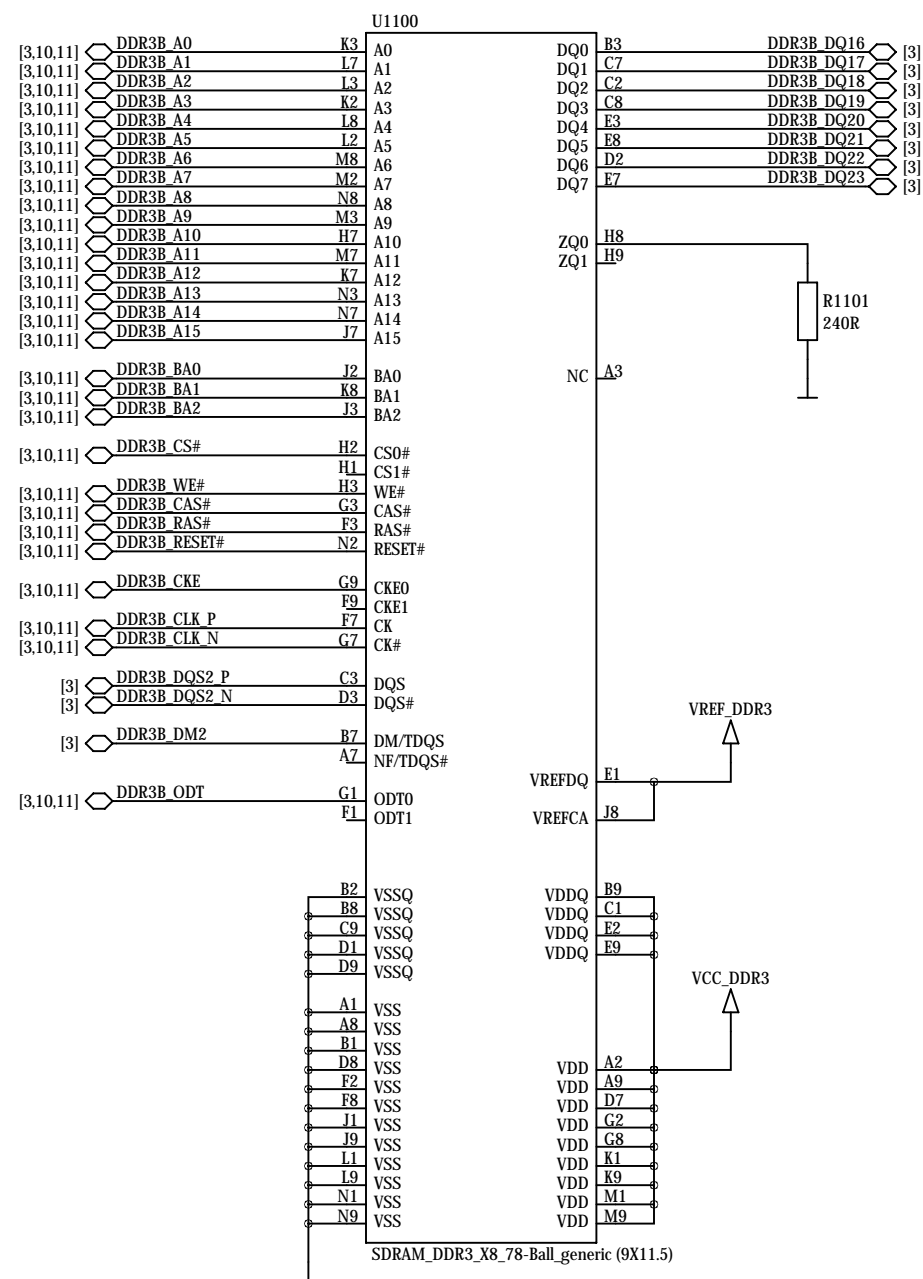
not included in free schematics

## DDR3-B Termination



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Company	Enclustra GmbH		
Sheet name	10_BIG-DDR3_SDRAM(LOWER-BITS)		
Project	Mercury KX1		
Revision	R3	Designed	MH
		Date	23 Apr 2015
		Sheet/sheets	10 / 20

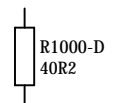
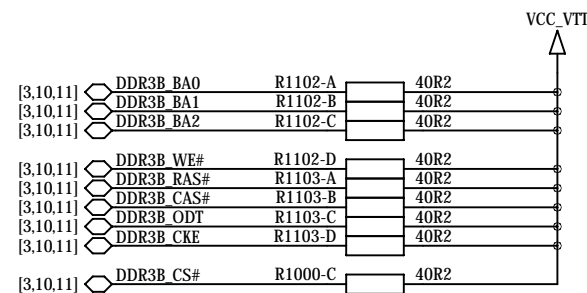
## DDR3 SDRAM Channel B



## DDR3-B Decoupling

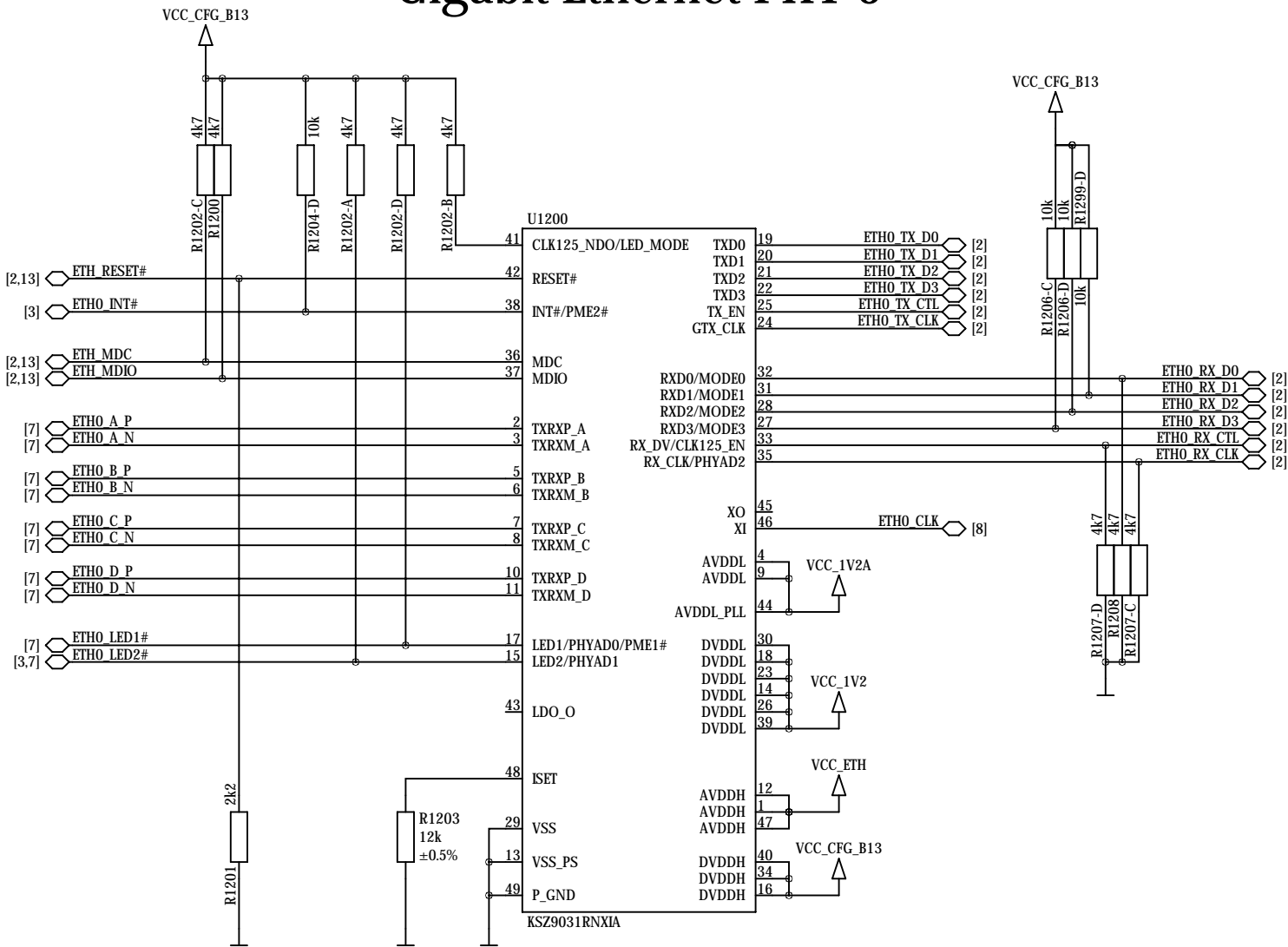
not included in free schematics

## DDR3-B Termination



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Company		Enclustra GmbH			
Sheet name		11_BIG-DDR3_SDRAM(UPPER-BITS)			
Project		Mercury KX1			
Revision	R3	Designed	MH	Date	23 Apr 2015
				Sheet/sheets	11 / 20

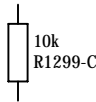
# Gigabit Ethernet PHY 0



MODE<3:0> = 1110 -> RGMII, all capabilities  
LED\_Mode Pull up = Single LED  
PhyAddress <2:0> = 011 -> 3  
LED1 and LED2 are active low

## Ethernet Power Filter

not included in free schematics



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Sheet name	12_ETHERNET_PHY0	
Project	Mercury KX1	
Revision	R3	
Designed	MH	
Date	23 Apr 2015	
Sheet/sheets	12 / 20	

D

D

C

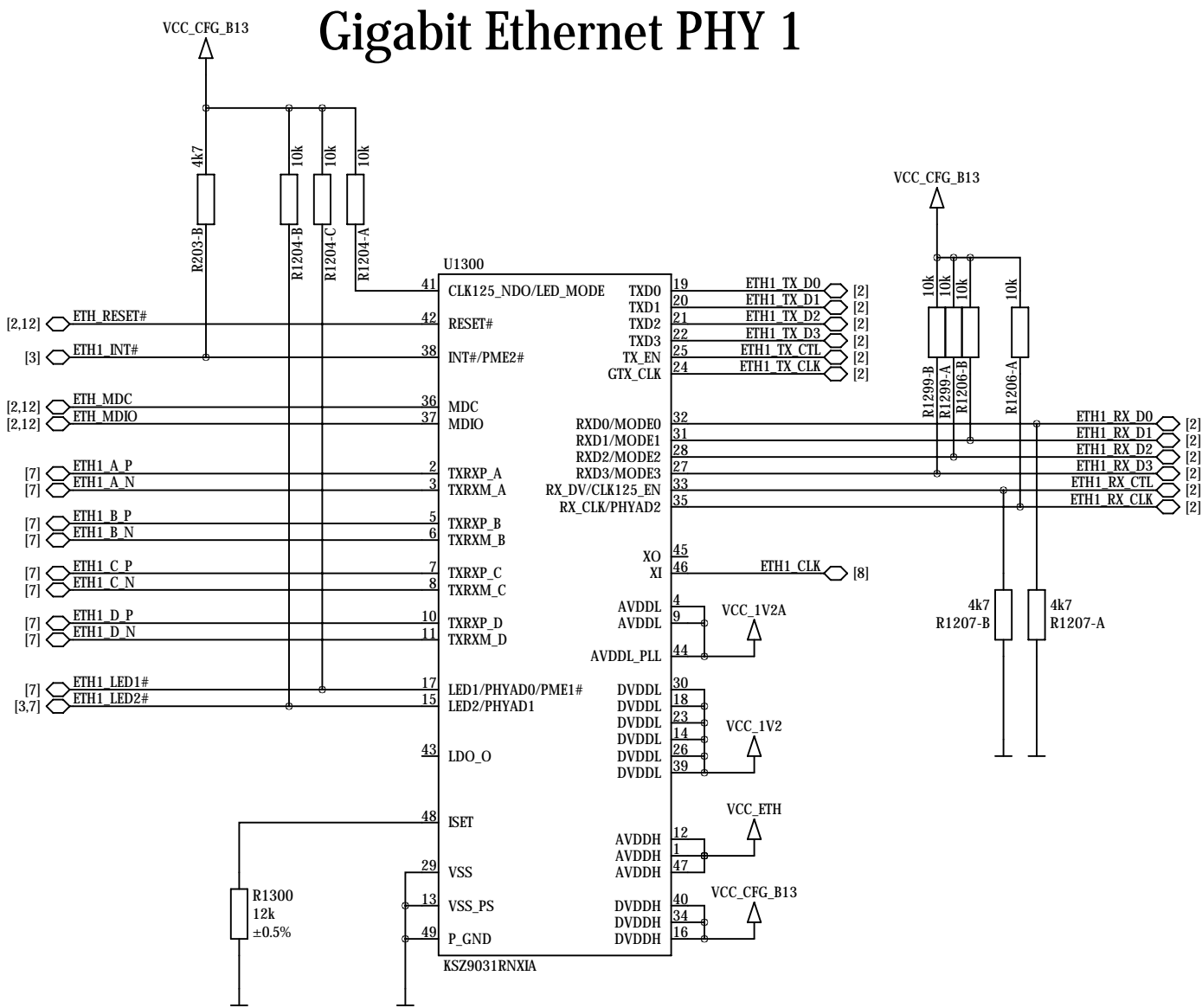
C

B

B

A

A



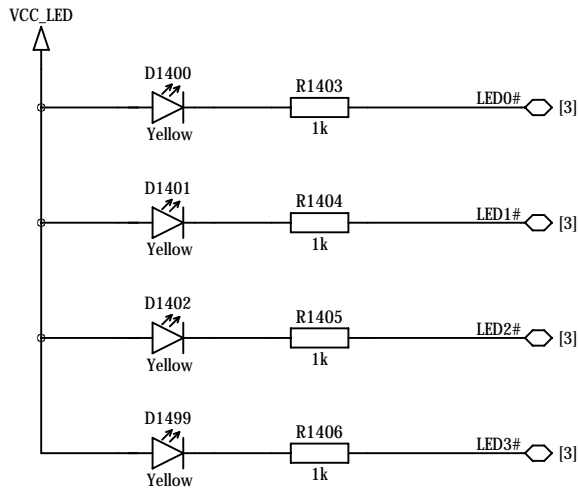
MODE<3:0> = 1110 -> RGMII, all capabilities  
LED\_Mode Pull up = Single LED  
PhyAddress <2:0> = 111 -> 7  
LED1 and LED2 are active low

**Ethernet Power Filter**

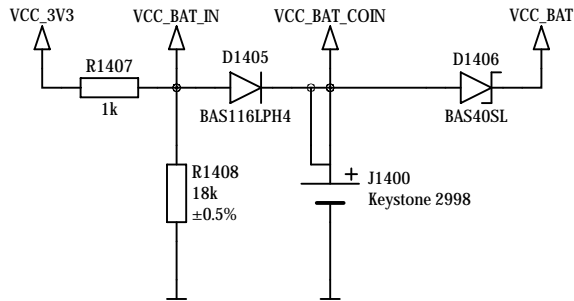
not included in free schematics

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Company	Enclustra GmbH			
Sheet name	13_ETHERNET_PHY1			
Project	Mercury KX1			
Revision	R3	Designed	MH	Date 23 Apr 2015
		Sheet/sheets	13 / 20	

# User LEDs



# Battery Holder

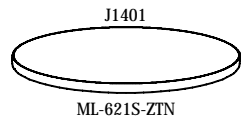


Attention !

Be extremely careful while inserting the battery to prevent the battery holder from breaking off.

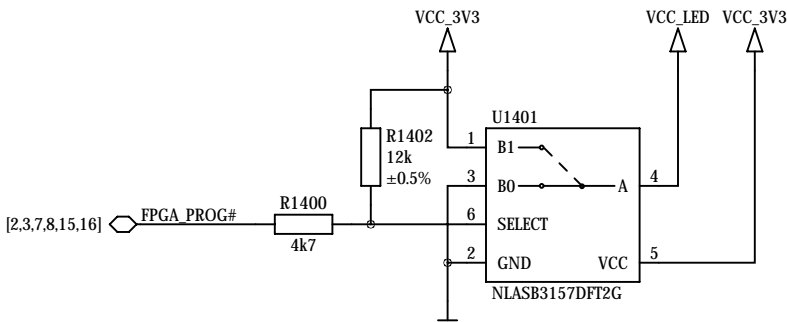
# Rechargeable Battery

optional

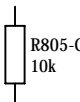
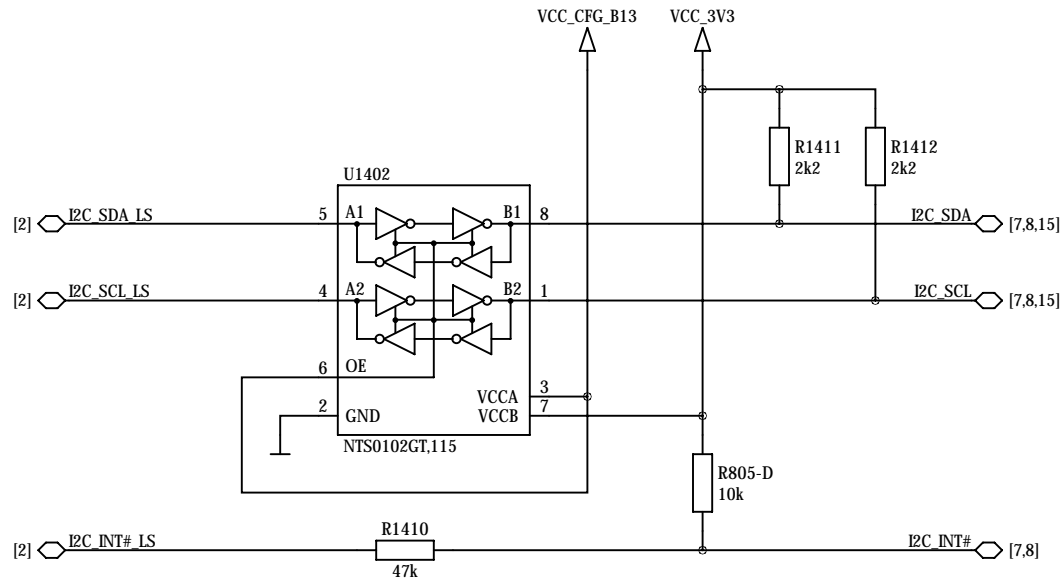


# Voltage Select Detection

not included in free schematics



# I2C Level Shifter

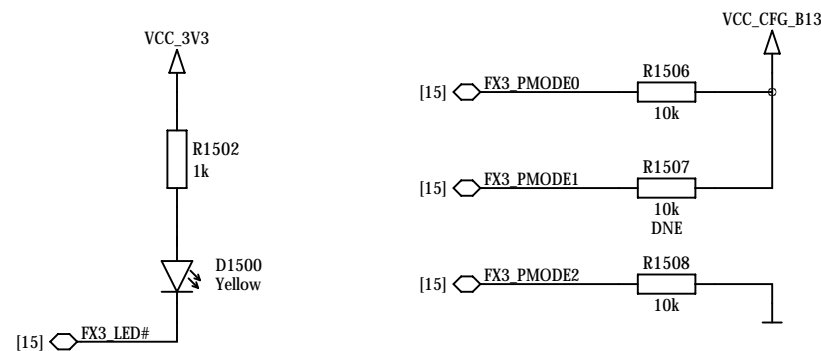


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Sheet name	14_BATTERY/USERLEDS			
Project	Mercury KX1			
Revision	R3	Designed	MH	Date
		23 Apr 2015		Sheet/sheets
				14 / 20

## FX3 LED

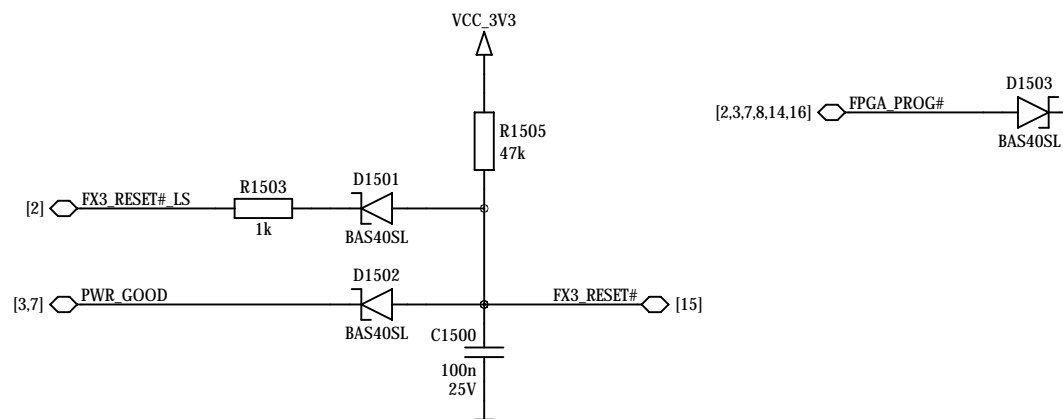
## FX3 Boot Mode

# USB 3.0 Device Controller (Cypress FX3)

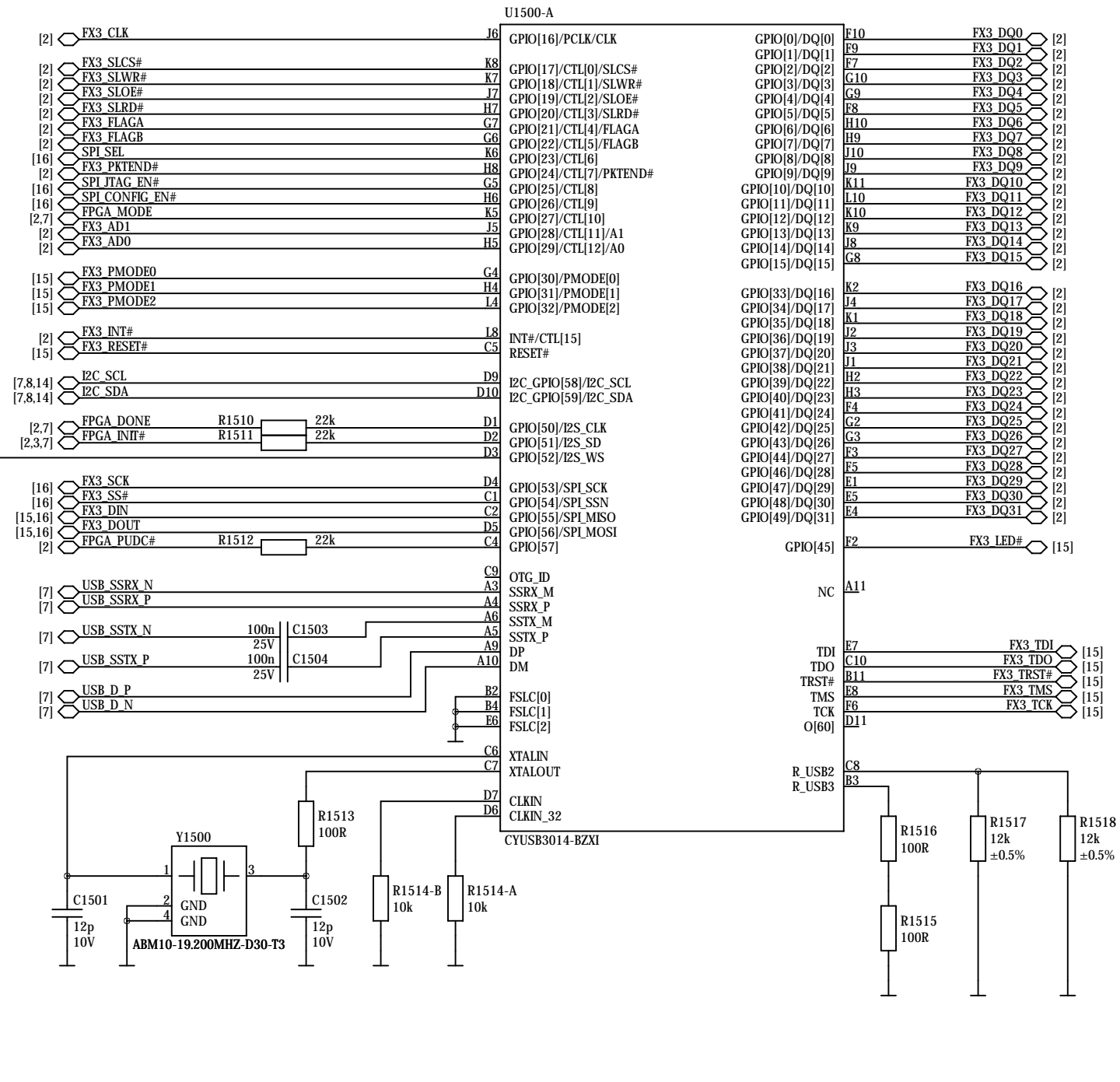
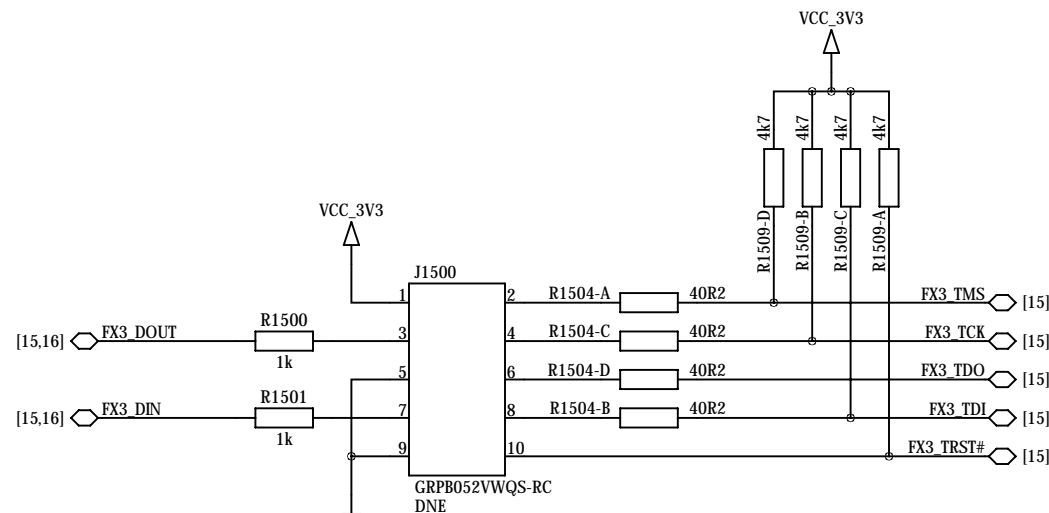


SPI boot mode enabled with USB fall back

## FX3 Reset

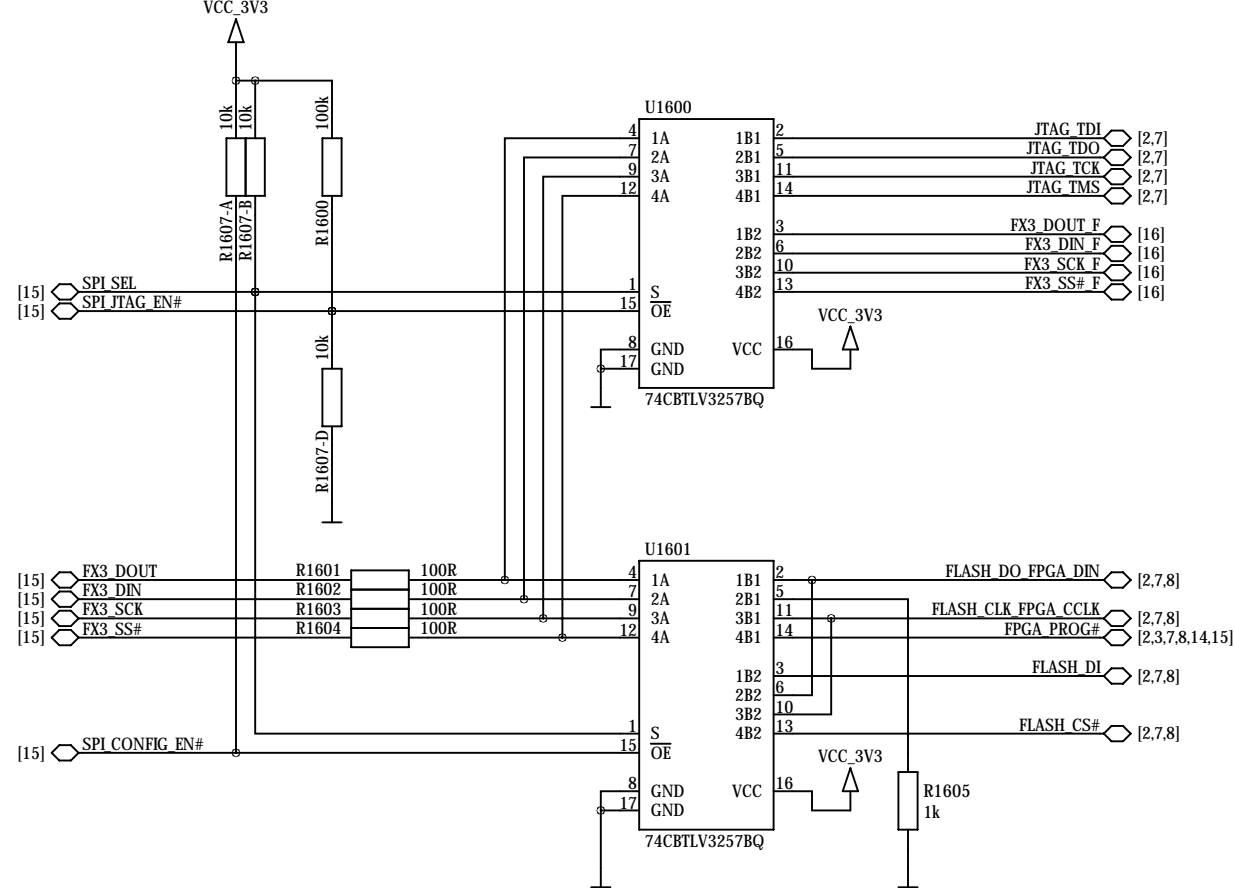


## FX3 JTAG Connector

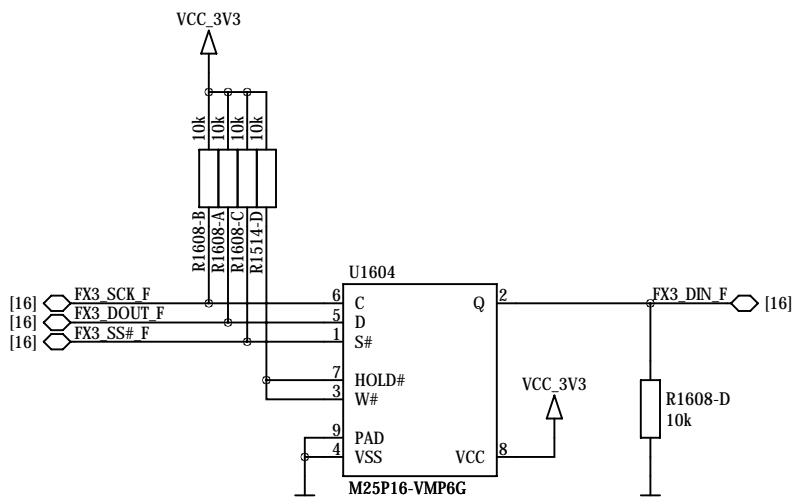


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Company		Enclustra GmbH			
Sheet name		15_USB3.0_CONTROLLER			
Project		Mercury KX1			
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				Sheet/sheets	15 / 20

# FX3 SPI Multiplexers



# FX3 SPI Flash



To prevent the FX3 from booting from the SPI Flash, short circuit R1600 during power-up

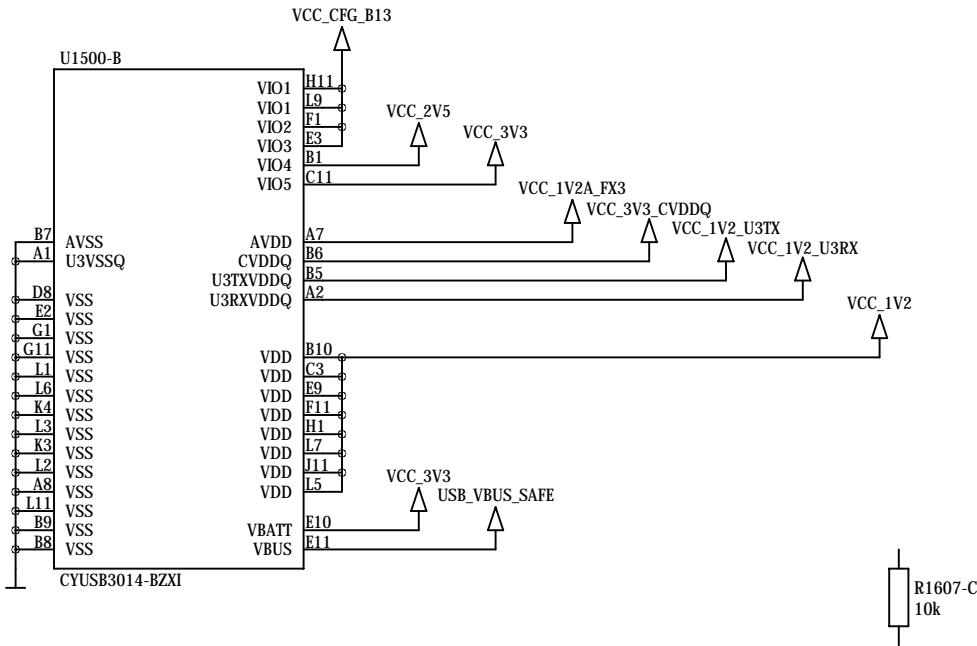
# FX3 Supply Filters

not included in free schematics

# FX3 VBUS Overvoltage Protection

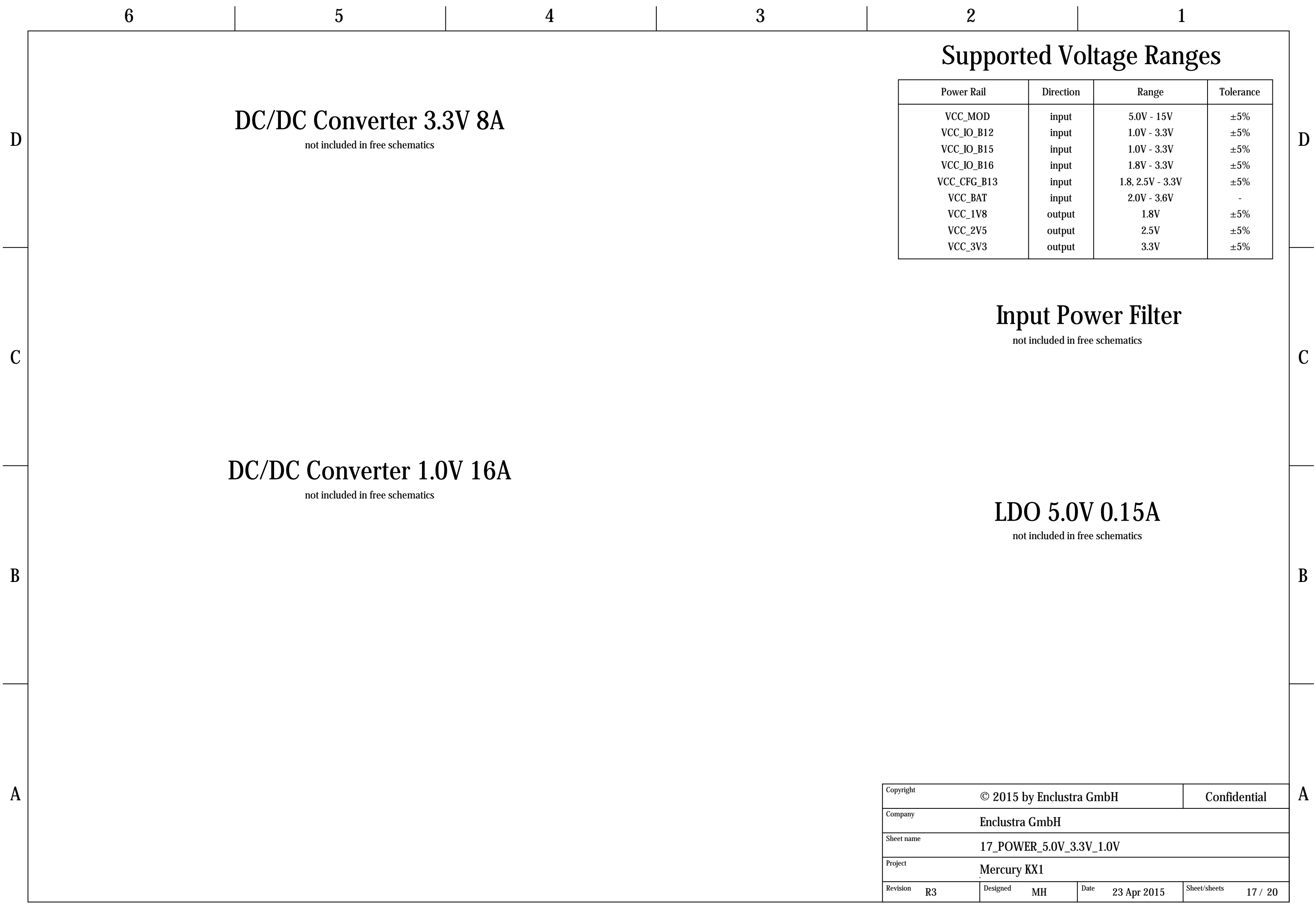
not included in free schematics

# USB 3.0 Device Controller Power



VIO1: GPIO[0..32], INT# VIO2: GPIO[33..45] VIO3: GPIO[46..52] VIO4: GPIO[53..57] (SPI) VIO5: GPIO[58..59] (I2C), JTAG	Copyright	© 2015 by Enclustra GmbH		Confidential
	Company	Enclustra GmbH		
	Sheet name	16_USB3.0_PERIPHERALS		
	Project	Mercury KX1		
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			Date	23 Apr 2015
			Sheet/sheets	16 / 20





6

5

4

3

2

1

D

C

B

A

Dual DC/DC Converter

not included in free schematics

LDO 2.0V 0.15A

not included in free schematics

Assembly Variant

FPGA Package	U1800	R1804
FBG	N	Y
FFG	Y	N

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Company	Enclustra GmbH						
Sheet name	18_POWER_1.2V_1.8V_2.0V						
Project	Mercury KX1						
Revision	R3	Designed	MH	Date	23 Apr 2015	Sheet/sheets	18 / 20



