EFM32 Leopard Gecko STK

Revision History

Rev.	Description
A00	Initial Version for series production
A01	Updated EFM32 to Leopard Gecko Rev.D
A02	Added test points for EFM USB. Fixed small error on PCB.

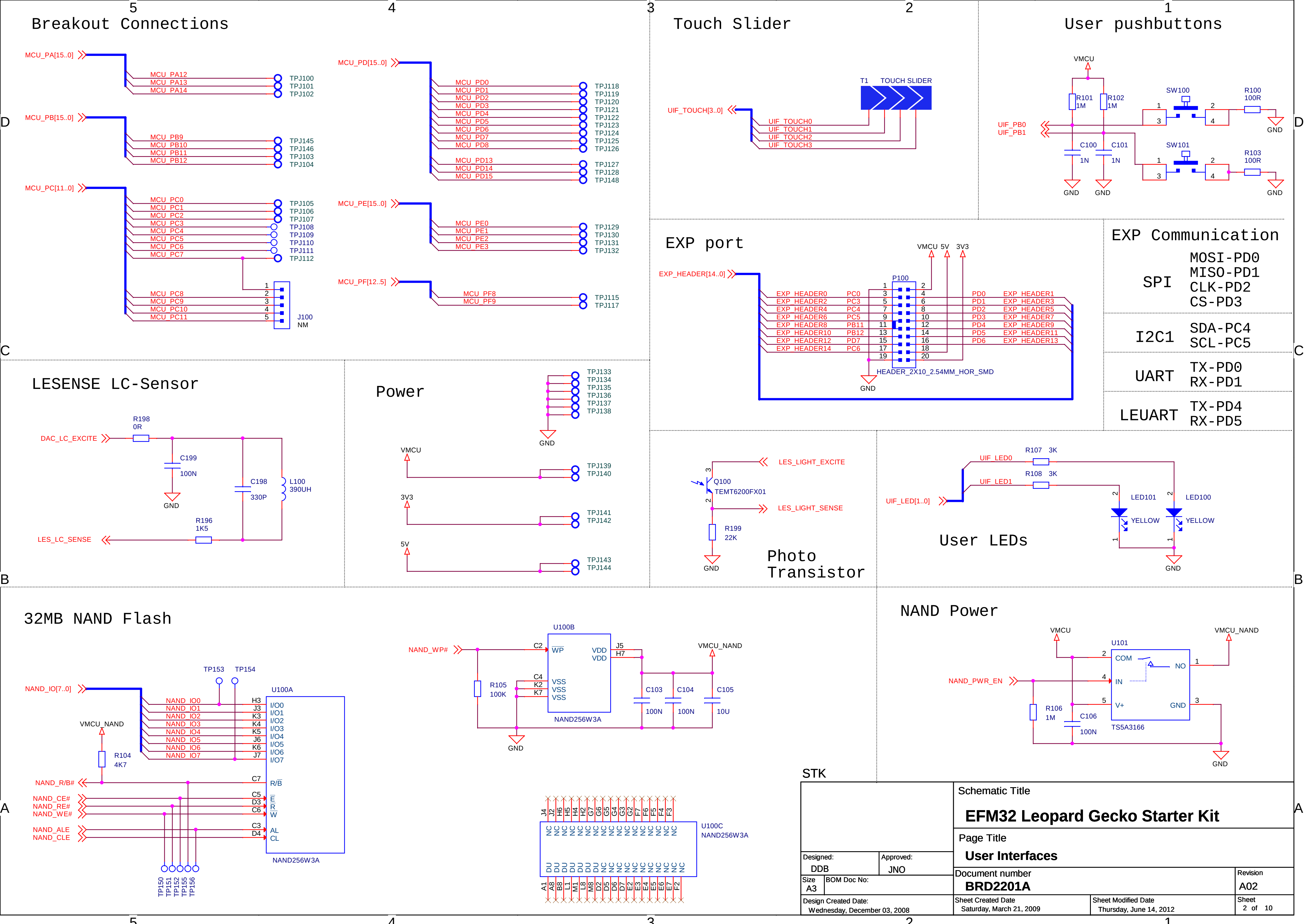
STK

Schematic Title: **EFM32 Leopard Gecko Starter Kit**

Page Title: **Title Page**

Designed: DDB	Approved: JNO	Document number: BRD2201A	Revision: A02
Size: A3	BOM Doc No:		
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date: Saturday, March 21, 2009	Sheet Modified Date: Thursday, June 14, 2012

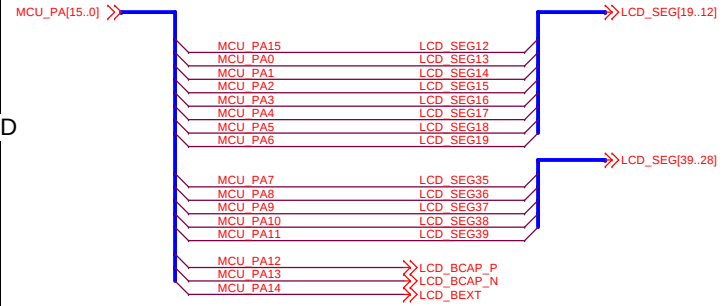
Sheet 1 of 10



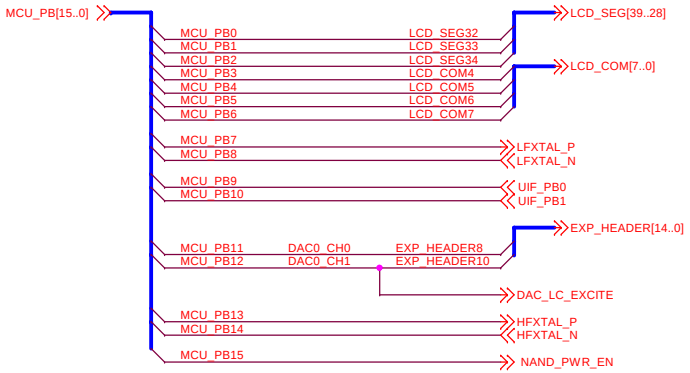
Breakout Connections
MCU_PA[15..0]
MCU_PA12 MCU_PA13 MCU_PA14
TPJ100 TPJ101 TPJ102
MCU_PB[15..0]
MCU_PB9 MCU_PB10 MCU_PB11 MCU_PB12
TPJ145 TPJ146 TPJ103 TPJ104
MCU_PC[11..0]
MCU_PC0 MCU_PC1 MCU_PC2 MCU_PC3 MCU_PC4 MCU_PC5 MCU_PC6 MCU_PC7
TPJ105 TPJ106 TPJ107 TPJ108 TPJ109 TPJ110 TPJ111 TPJ112
MCU_PC8 MCU_PC9 MCU_PC10 MCU_PC11
J100 NM
MCU_PD[15..0]
MCU_PD0 MCU_PD1 MCU_PD2 MCU_PD3 MCU_PD4 MCU_PD5 MCU_PD6 MCU_PD7 MCU_PD8
TPJ118 TPJ119 TPJ120 TPJ121 TPJ122 TPJ123 TPJ124 TPJ125 TPJ126
MCU_PD13 MCU_PD14 MCU_PD15
TPJ127 TPJ128 TPJ148
MCU_PE[15..0]
MCU_PE0 MCU_PE1 MCU_PE2 MCU_PE3
TPJ129 TPJ130 TPJ131 TPJ132
MCU_PF[12..5]
MCU_PF8 MCU_PF9
TPJ115 TPJ117
Touch Slider
T1 TOUCH SLIDER
UIF_TOUCH[3..0]
UIF_TOUCH0 UIF_TOUCH1 UIF_TOUCH2 UIF_TOUCH3
User pushbuttons
VMCU
R101 1M
R102 1M
SW100
R100 100R
UIF_PB0
UIF_PB1
C100 1N
C101 1N
SW101
R103 100R
GND
EXP port
VMCU 5V 3V3
EXP_HEADER[14..0]
P100
EXP_HEADER0 PC0
EXP_HEADER2 PC3
EXP_HEADER4 PC4
EXP_HEADER6 PC5
EXP_HEADER8 PB11
EXP_HEADER10 PB12
EXP_HEADER12 PD7
EXP_HEADER14 PC6
PD0 EXP_HEADER1
PD1 EXP_HEADER3
PD2 EXP_HEADER5
PD3 EXP_HEADER7
PD4 EXP_HEADER9
PD5 EXP_HEADER11
PD6 EXP_HEADER13
HEADER_2X10_2.54MM_HOR_SMD
EXP Communication
SPI MOSI-PD0 MISO-PD1 CLK-PD2 CS-PD3
I2C1 SDA-PC4 SCL-PC5
UART TX-PD0 RX-PD1
LEUART TX-PD4 RX-PD5
LESENSE LC-Sensor
R198 0R
DAC_LC_EXCITE
C199 100N
C198 330P
L100 390UH
R196 1K5
LES_LC_SENSE
Power
TPJ133 TPJ134 TPJ135 TPJ136 TPJ137 TPJ138
VMCU TPJ139 TPJ140
3V3 TPJ141 TPJ142
5V TPJ143 TPJ144
LES_LIGHT_EXCITE
Q100 TEMT6200FX01
LES_LIGHT_SENSE
R199 22K
Photo Transistor
UIF_LED0 R107 3K
UIF_LED1 R108 3K
UIF_LED[1..0]
LED101 YELLOW
LED100 YELLOW
User LEDs
32MB NAND Flash
NAND_IO[7..0]
NAND_IO0 NAND_IO1 NAND_IO2 NAND_IO3 NAND_IO4 NAND_IO5 NAND_IO6 NAND_IO7
TP153 TP154
U100A
VMCU_NAND
R104 4K7
NAND_R/B#
NAND_CE#
NAND_RE#
NAND_WE#
NAND_ALE
NAND_CLE
TP150 TP151 TP152 TP155 TP156
NAND256W3A
NAND_WP#
U100B
R105 100K
C103 100N
C104 100N
C105 10U
U100C NAND256W3A
NAND Power
VMCU
VMCU_NAND
U101
NAND_PWR_EN
R106 1M
C106 100N
TS5A3166
STK

Schematic Title	
EFM32 Leopard Gecko Starter Kit	
Page Title	User Interfaces
Designed: DDB	Approved: JNO
Size A3	BOM Doc No:
Document number BRD2201A	Revision A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date Saturday, March 21, 2009
Sheet Modified Date Thursday, June 14, 2012	Sheet 2 of 10

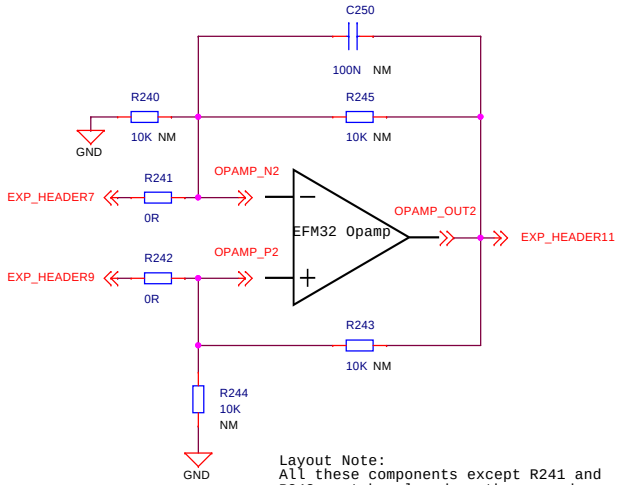
PA Connections



PB Connections

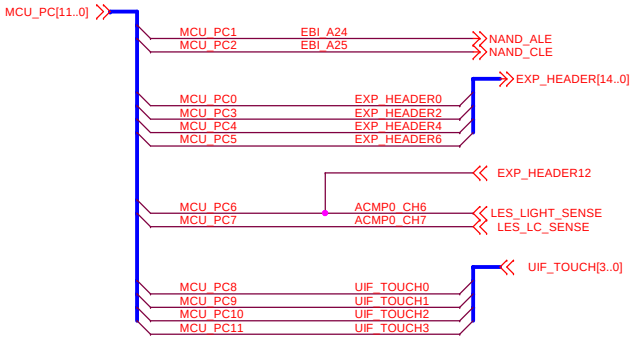


OPAMP Connection Footprint

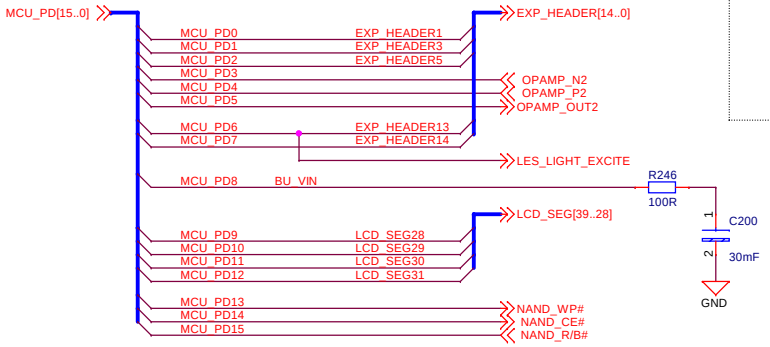


Layout Note:
All these components except R241 and R242 must be placed on the secondary side, and are not to be mounted in production.

PC Connections

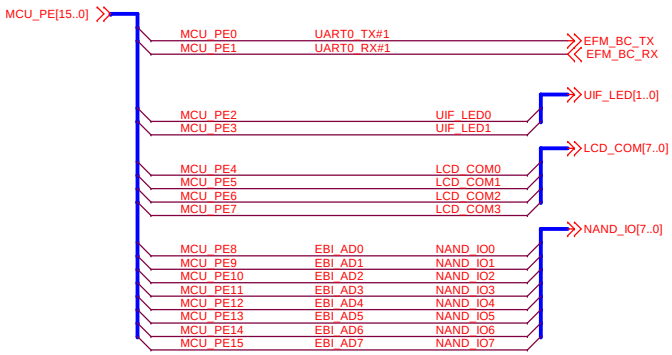


PD Connections

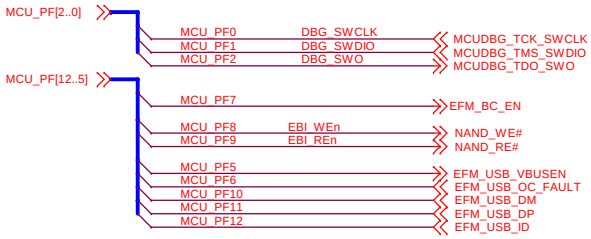


Capacitor for Backup Power Domain

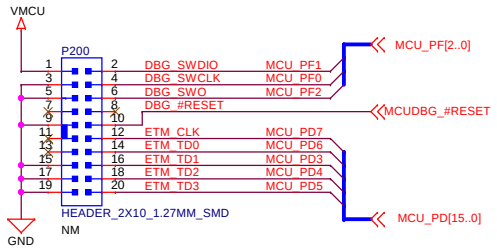
PE Connections



PF Connections

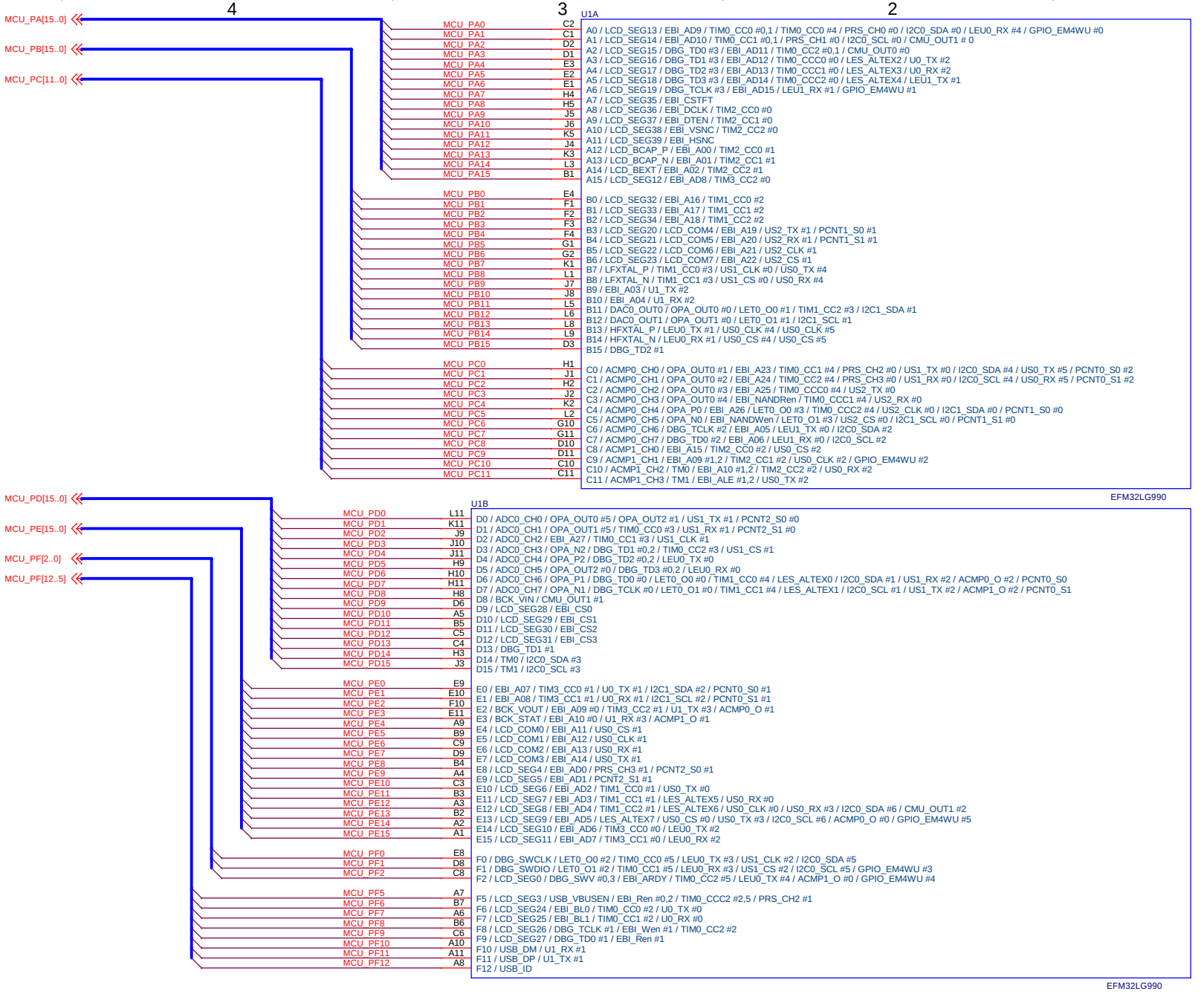


19-pin JTAG/SWD and Trace connector footprint (reverse side)

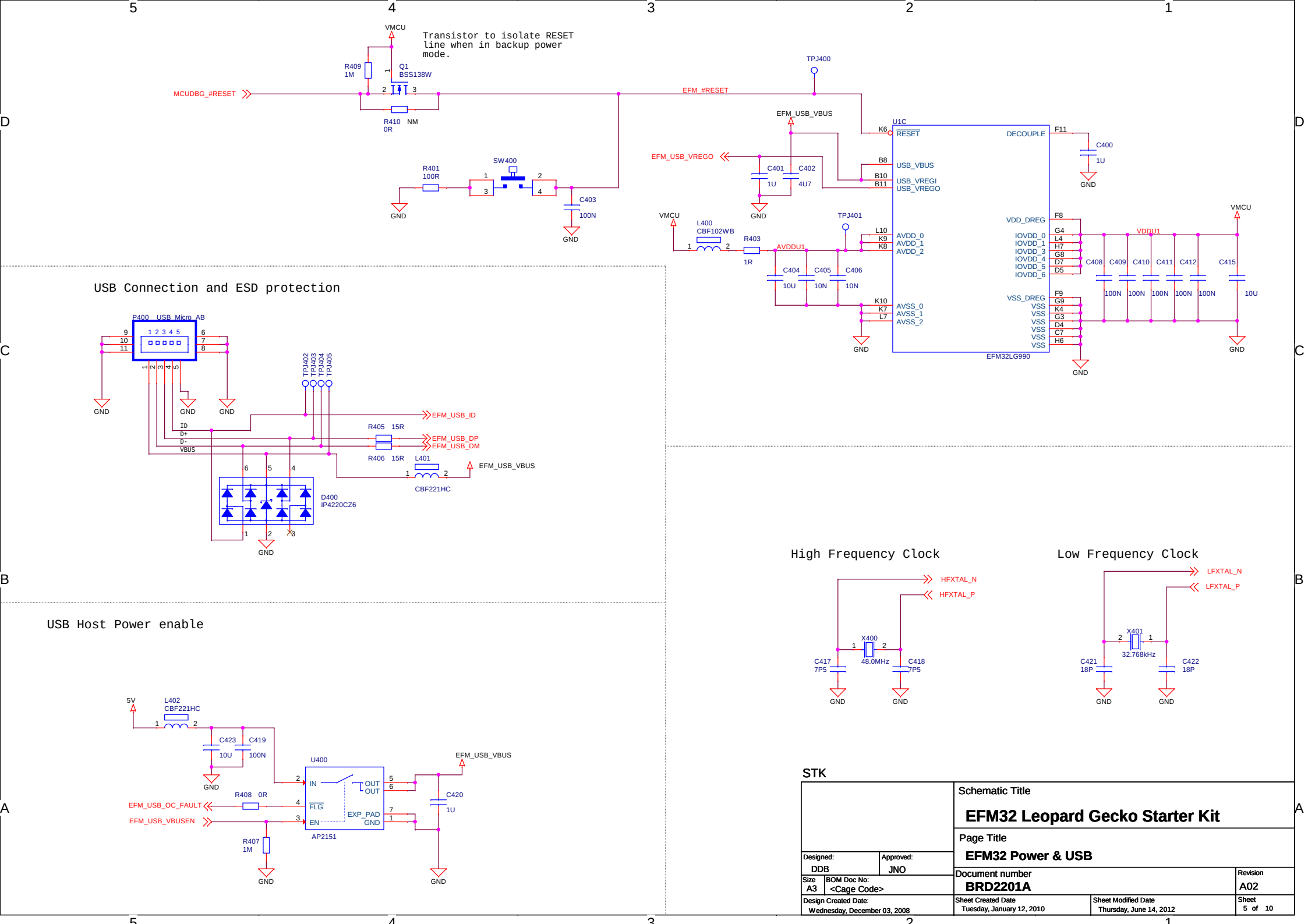


STK

Schematic Title	**EFM32 Leopard Gecko Starter Kit**
Page Title	**Signal Assignments**
Designed: DDB / Approved: JNO	
Size: A3 / BOM Doc No: <Cage Code>	Document number: **BRD2201A** / Revision: A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Friday, January 15, 2010 / Sheet Modified Date: Thursday, June 14, 2012 / Sheet 3 of 10



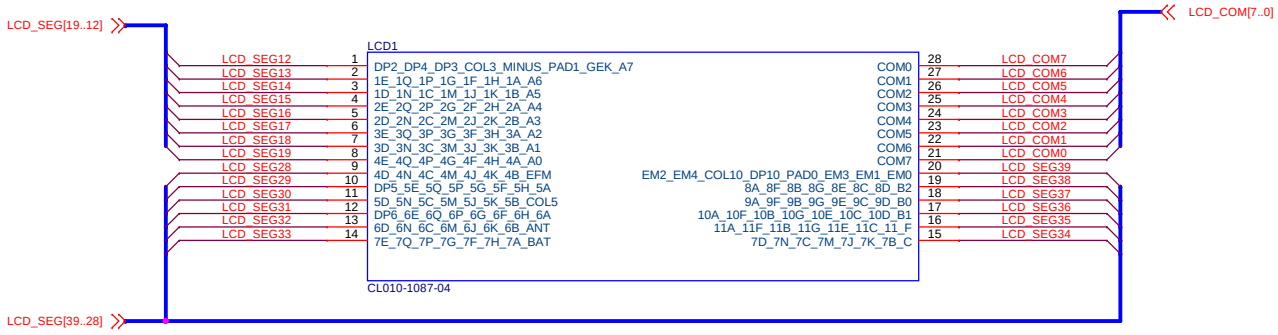
Schematic Title: **EFM32 Leopard Gecko Starter Kit**		
Page Title: **EFM32 I/O**		
Designed: DDB	Approved: JNO	Document number: **BRD2201A**
Revision: A02	Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Tuesday, January 12, 2010	Sheet Modified Date: Thursday, June 14, 2012
Sheet: 4 of 10		



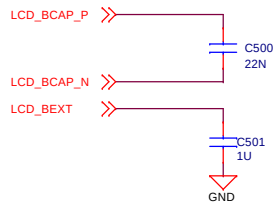
STK

Schematic Title	**EFM32 Leopard Gecko Starter Kit**
Page Title	**EFM32 Power & USB**
Designed: DDB / Approved: JNO	
Size: A3 / BOM Doc No: <Cage Code>	Document number: **BRD2201A** / Revision: A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Tuesday, January 12, 2010 / Sheet Modified Date: Thursday, June 14, 2012 / Sheet 5 of 10

LCD signal connections



LCD Boost

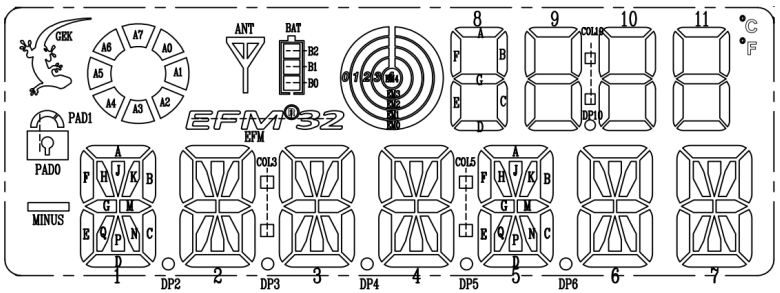


Segment names

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
———	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
COM0	DP2	1 E	1 D	2 E	2 D	3 E	3 D	4 E	4 D	DP5	5 D	DP6	6 D	7 E
COM1	DP4	1 Q	1 N	2 Q	2 N	3 Q	3 N	4 Q	4 N	5 E	5 N	6 E	6 N	7 Q
COM2	DP3	1 P	1 C	2 P	2 C	3 P	3 C	4 P	4 C	5 Q	5 C	6 Q	6 C	7 P
COM3	COL3	1 G	1 M	2 G	2 M	3 G	3 M	4 G	4 M	5 P	5 M	6 P	6 M	7 G
COM4	MINUS	1 F	1 J	2 F	2 J	3 F	3 J	4 F	4 J	5 G	5 J	6 G	6 J	7 F
COM5	PAD1	1 H	1 K	2 H	2 K	3 H	3 K	4 H	4 K	5 F	5 K	6 F	6 K	7 H
COM6	GEK	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 H	5 B	6 H	6 B	7 A
COM7	A7	A6	A5	A4	A3	A2	A1	A0	EFM	5 A	COL5	6 A	ANT	BAT

PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
———	S14	S15	S16	S17	S18	S19	COM7	COM6	COM5	COM4	COM3	COM2	COM1	COM0
COM0	7 D	11 A	10 A	9 A	8 A	EM2								COM0
COM1	7 N	11 F	10 F	9 F	8 F	EM4							COM1	
COM2	7 C	11 B	10 B	9 B	8 B	COL10						COM2		
COM3	7 M	11 G	10 G	9 G	8 G	DP10					COM3			
COM4	7 J	11 E	10 E	9 E	8 E	PAD0				COM4				
COM5	7 K	11 C	10 C	9 C	8 C	EM3			COM5					
COM6	7 B	11 D	10 D	9 D	8 D	EM1		COM6						
COM7	°C	°F	B1	B0	B2	EM0	COM7							

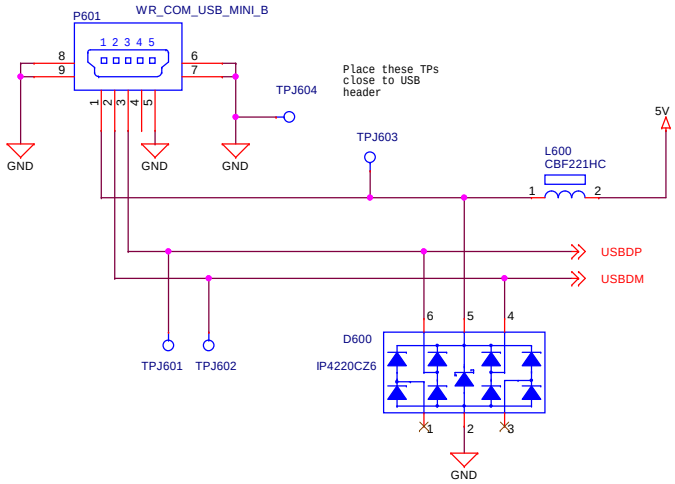
Segment placement



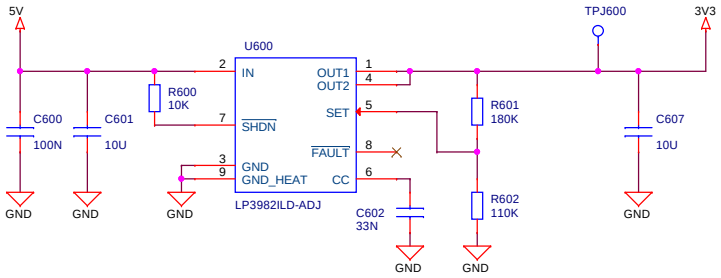
STK

	Schematic Title: **EFM32 Leopard Gecko Starter Kit**	
	Page Title: **LCD**	
Designed: DDB / Approved: JNO	Document number: **BRD2201A**	Revision: A02
Size: A3 / BOM Doc No: <Cage Code>		
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Tuesday, January 12, 2010	Sheet Modified Date: Thursday, June 14, 2012 / Sheet: 6 of 10

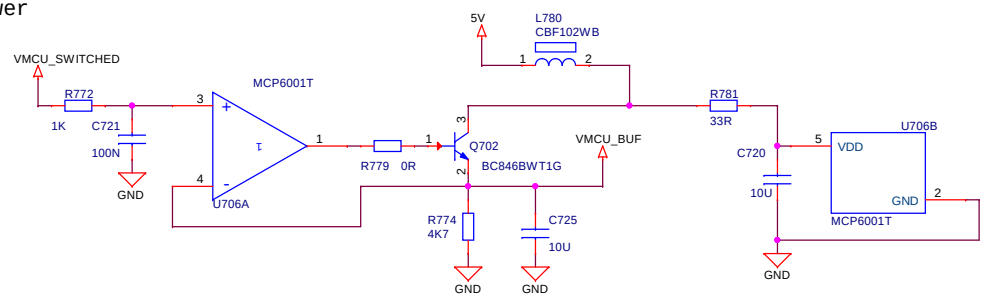
Power input



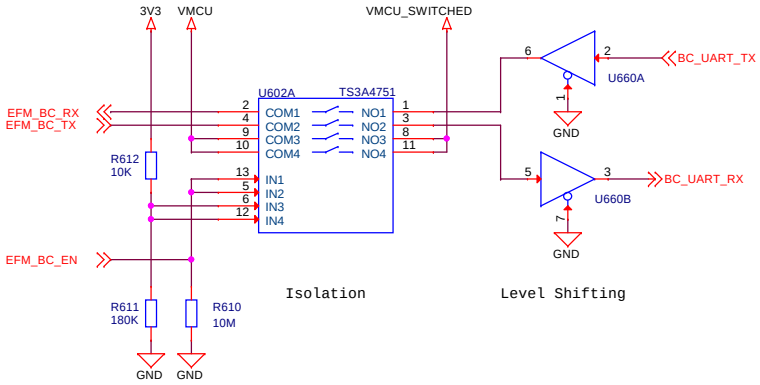
3V3 Regulator

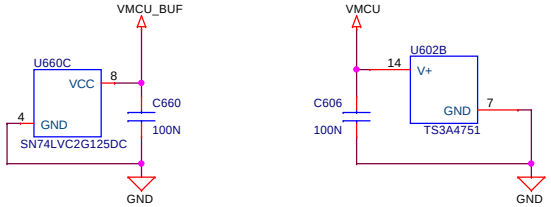


VMCU_DBG power

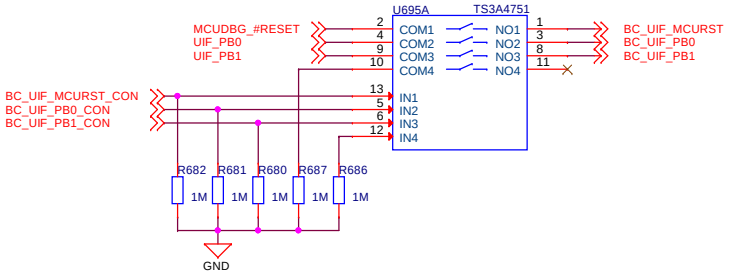


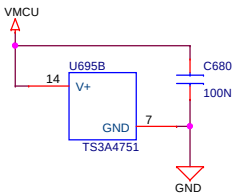
VMCU Switch
Board Controller communication switch

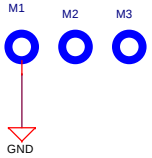




User input to board controller



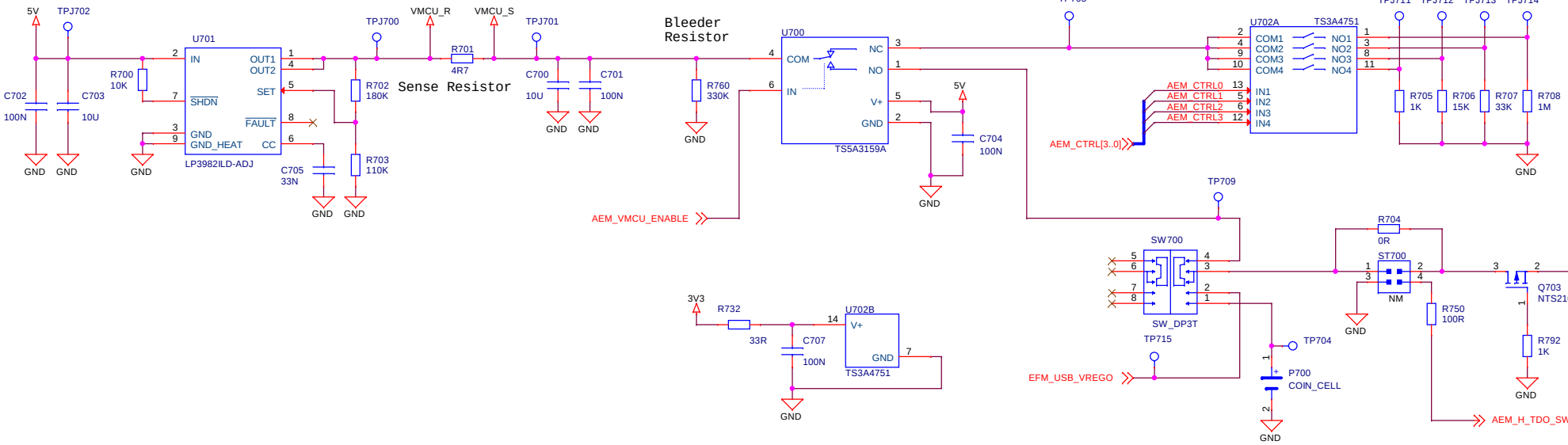




STK

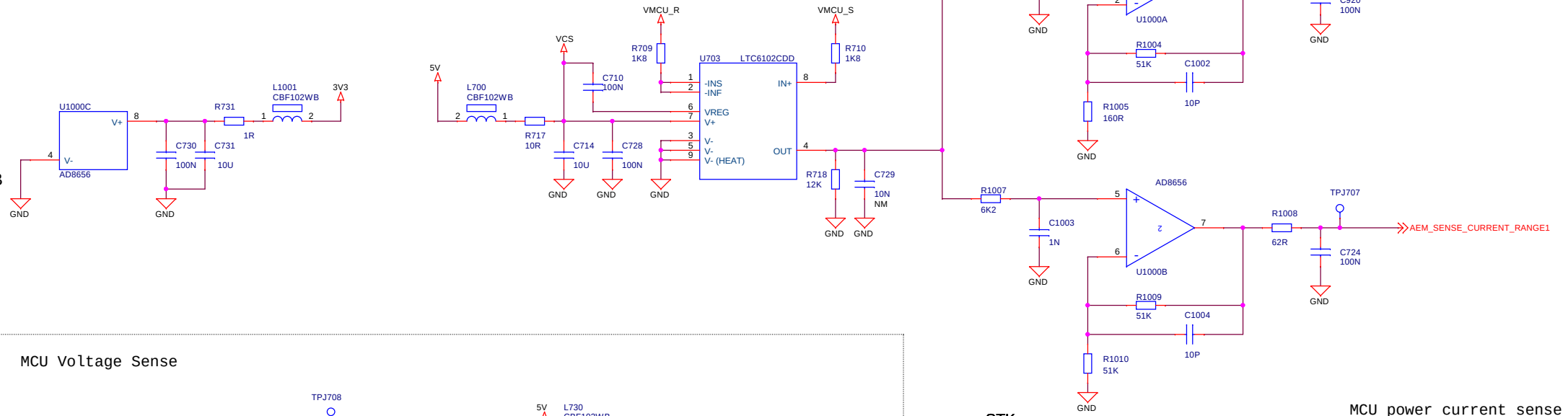
Schematic Title	**EFM32 Leopard Gecko Starter Kit**
Page Title	**Power & Misc**
Designed: DDB / Approved: JNO	
Size: A3 / BOM Doc No: <Cage Code>	Document number: **BRD2201A** / Revision: A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Saturday, March 21, 2009 / Sheet Modified Date: Thursday, June 14, 2012 / Sheet 7 of 10

MCU power regulator

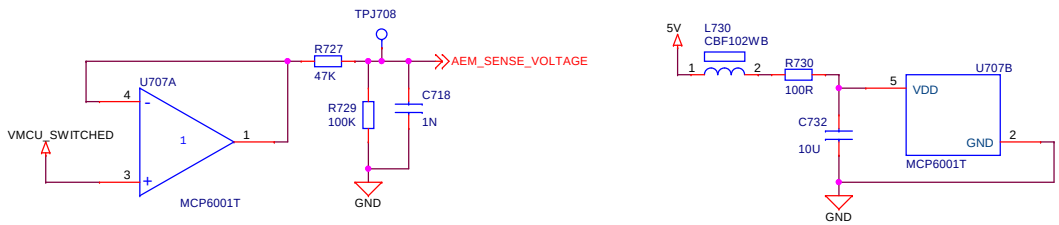


AEM_CTRL	Calibration Current
0x1	3.30 uA
0x2	100 uA
0x4	320 uA
0x5	220 uA
0x8	3.30 mA

AEM Current Measurement



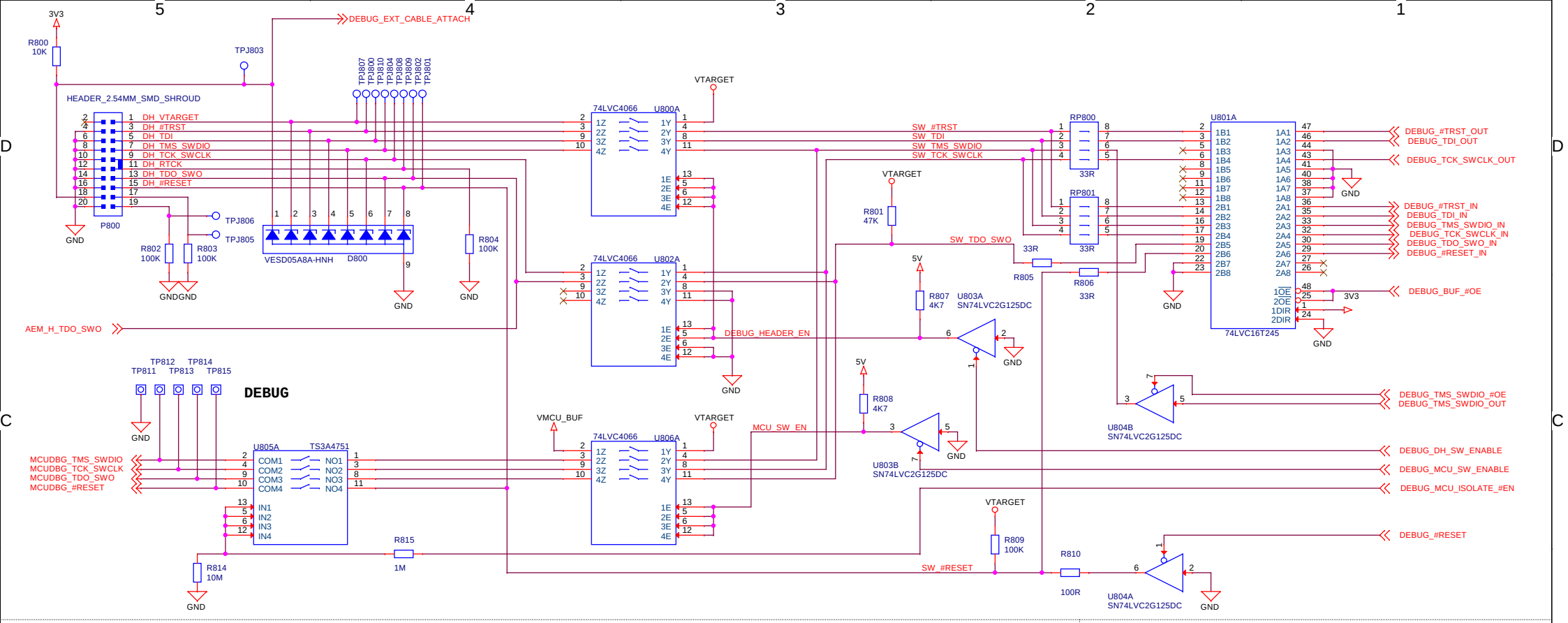
MCU Voltage Sense



MCU power current sense

STK

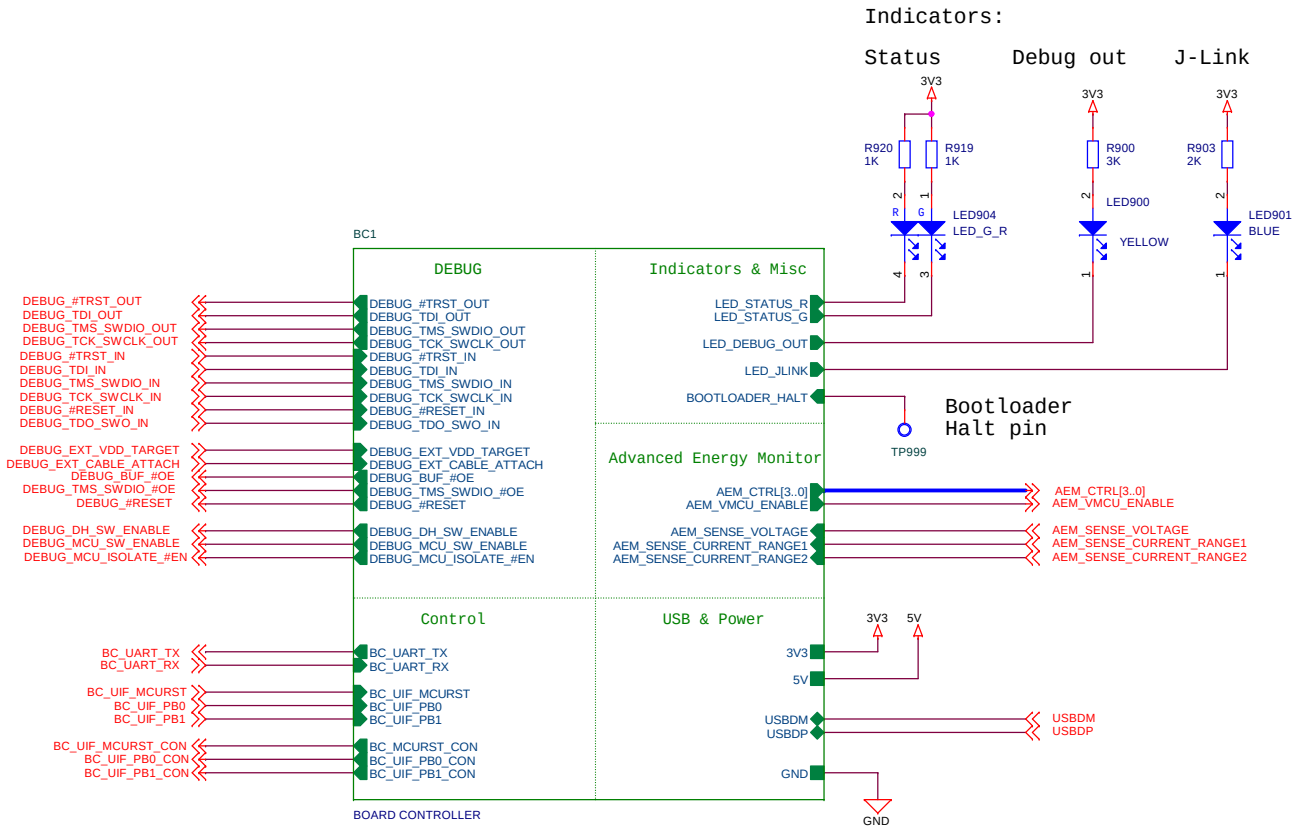
Schematic Title	**EFM32 Leopard Gecko Starter Kit**
Page Title	**Advanced Energy Monitor**
Designed: DDB / Approved: JNO	
Size: A3 / BOM Doc No: <Cage Code>	Document number: **BRD2201A** / Revision: A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Wednesday, August 19, 2009 / Sheet Modified Date: Thursday, June 14, 2012 / Sheet 8 of 10



Mode	DEBUG_MCU_SW_ENABLE	DEBUG_DH_SW_ENABLE	DEBUG_BUF_#OE	ISOLATE_#EN	DH_VTARGET	VTARGET
Debug Out	0	1	0	0	External voltage	External voltage
MCU Debug	1	0	0	1	Disconnected	VMCU
Debug In	1	1	1	1	VMCU	VMCU
Debug Off	1	1	1	0	-	-

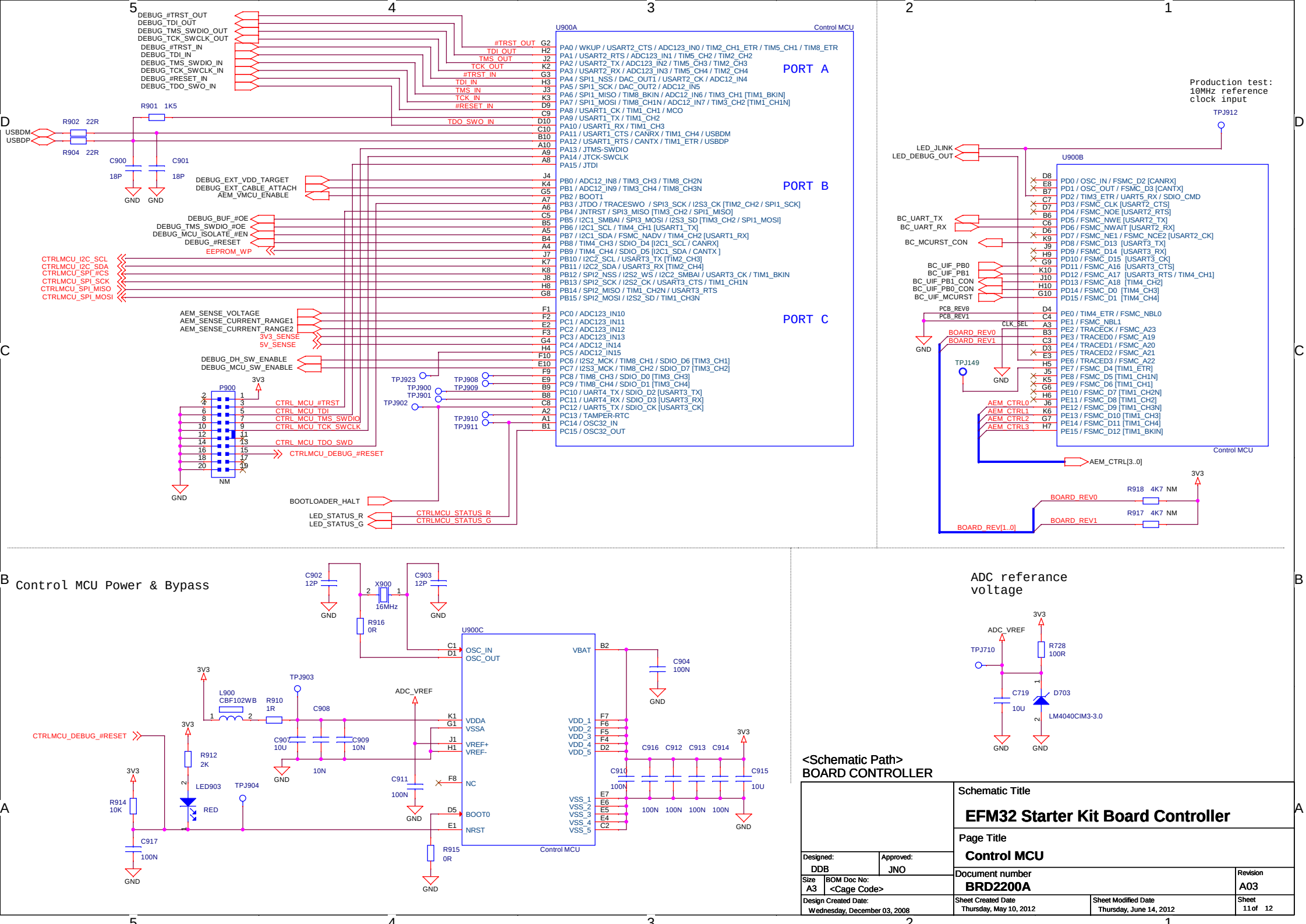
STK

Schematic Title	EFM32 Leopard Gecko Starter Kit
Page Title	Debug Interface
Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Document number	BRD2201A
Revision	A02
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Saturday, March 21, 2009
Sheet Modified Date: Thursday, June 14, 2012	Sheet 9 of 10

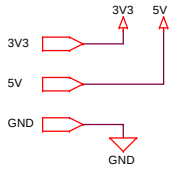


STK

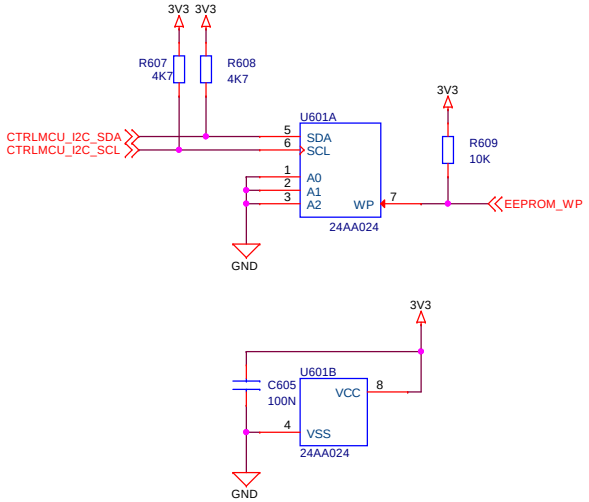
	Schematic Title: **EFM32 Leopard Gecko Starter Kit**
	Page Title: **Board Controller**
Designed: DDB / Approved: JNO	Document number: **BRD2201A** / Revision: A02
Size: A3 / BOM Doc No: <Cage Code>	Sheet Created Date: Saturday, March 21, 2009 / Sheet Modified Date: Thursday, June 14, 2012 / Sheet: 10 of 10
Design Created Date: Wednesday, December 03, 2008	


U900A
Control MCU
PORT A
PORT B
PORT C
PA0 / WKUP / USART2_CTS / ADC123_IN0 / TIM2_CH1_ETR / TIM5_CH1 / TIM8_ETR
PA1 / USART2_RTS / ADC123_IN1 / TIM5_CH2 / TIM2_CH2
PA2 / USART2_TX / ADC123_IN2 / TIM5_CH3 / TIM2_CH3
PA3 / USART2_RX / ADC123_IN3 / TIM5_CH4 / TIM2_CH4
PA4 / SPI1_NSS / DAC_OUT1 / USART2_CK / ADC12_IN4
PA5 / SPI1_SCK / DAC_OUT2 / ADC12_IN5
PA6 / SPI1_MISO / TIM8_BKIN / ADC12_IN6 / TIM3_CH1 [TIM1_BKIN]
PA7 / SPI1_MOSI / TIM8_CH1N / ADC12_IN7 / TIM3_CH2 [TIM1_CH1N]
PA8 / USART1_CK / TIM1_CH1 / MCO
PA9 / USART1_TX / TIM1_CH2
PA10 / USART1_RX / TIM1_CH3
PA11 / USART1_CTS / CANRX / TIM1_CH4 / USBDM
PA12 / USART1_RTS / CANTX / TIM1_ETR / USBDP
PA13 / JTMS-SWDIO
PA14 / JTCK-SWCLK
PA15 / JTDI
PB0 / ADC12_IN8 / TIM3_CH3 / TIM8_CH2N
PB1 / ADC12_IN9 / TIM3_CH4 / TIM8_CH3N
PB2 / BOOT1
PB3 / JTDO / TRACESWO / SPI3_SCK / I2S3_CK [TIM2_CH2 / SPI1_SCK]
PB4 / JNTRST / SPI3_MISO [TIM3_CH2 / SPI1_MISO]
PB5 / I2C1_SMBAI / SPI3_MOSI / I2S3_SD [TIM3_CH2 / SPI1_MOSI]
PB6 / I2C1_SCL / TIM4_CH1 [USART1_TX]
PB7 / I2C1_SDA / FSMC_NADV / TIM4_CH2 [USART1_RX]
PB8 / TIM4_CH3 / SDIO_D4 [I2C1_SCL / CANRX]
PB9 / TIM4_CH4 / SDIO_D5 [I2C1_SDA / CANTX]
PB10 / I2C2_SCL / USART3_TX [TIM2_CH3]
PB11 / I2C2_SDA / USART3_RX [TIM2_CH4]
PB12 / SPI2_NSS / I2S2_WS / I2C2_SMBAI / USART3_CK / TIM1_BKIN
PB13 / SPI2_SCK / I2S2_CK / USART3_CTS / TIM1_CH1N
PB14 / SPI2_MISO / TIM1_CH2N / USART3_RTS
PB15 / SPI2_MOSI / I2S2_SD / TIM1_CH3N
PC0 / ADC123_IN10
PC1 / ADC123_IN11
PC2 / ADC123_IN12
PC3 / ADC123_IN13
PC4 / ADC12_IN14
PC5 / ADC12_IN15
PC6 / I2S2_MCK / TIM8_CH1 / SDIO_D6 [TIM3_CH1]
PC7 / I2S3_MCK / TIM8_CH2 / SDIO_D7 [TIM3_CH2]
PC8 / TIM8_CH3 / SDIO_D0 [TIM3_CH3]
PC9 / TIM8_CH4 / SDIO_D1 [TIM3_CH4]
PC10 / UART4_TX / SDIO_D2 [USART3_TX]
PC11 / UART4_RX / SDIO_D3 [USART3_RX]
PC12 / UART5_TX / SDIO_CK [USART3_CK]
PC13 / TAMPER-RTC
PC14 / OSC32_IN
PC15 / OSC32_OUT
DEBUG_#TRST_OUT
DEBUG_TDI_OUT
DEBUG_TMS_SWDIO_OUT
DEBUG_TCK_SWCLK_OUT
DEBUG_#TRST_IN
DEBUG_TDI_IN
DEBUG_TMS_SWDIO_IN
DEBUG_TCK_SWCLK_IN
DEBUG_#RESET_IN
DEBUG_TDO_SWO_IN
R901 1K5
R902 22R
R904 22R
USBDM
USBDP
C900 18P
C901 18P
GND
DEBUG_EXT_VDD_TARGET
DEBUG_EXT_CABLE_ATTACH
AEM_VMCU_ENABLE
DEBUG_BUF_#OE
DEBUG_TMS_SWDIO_#OE
DEBUG_MCU_ISOLATE_#EN
DEBUG_#RESET
EEPROM_WP
CTRLMCU_I2C_SCL
CTRLMCU_I2C_SDA
CTRLMCU_SPI_#CS
CTRLMCU_SPI_SCK
CTRLMCU_SPI_MISO
CTRLMCU_SPI_MOSI
AEM_SENSE_VOLTAGE
AEM_SENSE_CURRENT_RANGE1
AEM_SENSE_CURRENT_RANGE2
3V3_SENSE
5V_SENSE
DEBUG_DH_SW_ENABLE
DEBUG_MCU_SW_ENABLE
P900
3V3
CTRL_MCU_#TRST
CTRL_MCU_TDI
CTRL_MCU_TMS_SWDIO
CTRL_MCU_TCK_SWCLK
CTRL_MCU_TDO_SWD
CTRLMCU_DEBUG_#RESET
NM
TPJ923
TPJ900
TPJ901
TPJ902
TPJ908
TPJ909
TPJ910
TPJ911
BOOTLOADER_HALT
LED_STATUS_R
LED_STATUS_G
CTRLMCU_STATUS_R
CTRLMCU_STATUS_G
Production test:
10MHz reference
clock input
TPJ912
U900B
LED_JLINK
LED_DEBUG_OUT
BC_UART_TX
BC_UART_RX
BC_MCURST_CON
BC_UIF_PB0
BC_UIF_PB1
BC_UIF_PB1_CON
BC_UIF_PB0_CON
BC_UIF_MCURST
PCB_REV0
PCB_REV1
CLK_SEL
BOARD_REV0
BOARD_REV1
TPJ149
PD0 / OSC_IN / FSMC_D2 [CANRX]
PD1 / OSC_OUT / FSMC_D3 [CANTX]
PD2 / TIM3_ETR / UART5_RX / SDIO_CMD
PD3 / FSMC_CLK [USART2_CTS]
PD4 / FSMC_NOE [USART2_RTS]
PD5 / FSMC_NWE [USART2_TX]
PD6 / FSMC_NWAIT [USART2_RX]
PD7 / FSMC_NE1 / FSMC_NCE2 [USART2_CK]
PD8 / FSMC_D13 [USART3_TX]
PD9 / FSMC_D14 [USART3_RX]
PD10 / FSMC_D15 [USART3_CK]
PD11 / FSMC_A16 [USART3_CTS]
PD12 / FSMC_A17 [USART3_RTS / TIM4_CH1]
PD13 / FSMC_A18 [TIM4_CH2]
PD14 / FSMC_D0 [TIM4_CH3]
PD15 / FSMC_D1 [TIM4_CH4]
PE0 / TIM4_ETR / FSMC_NBL0
PE1 / FSMC_NBL1
PE2 / TRACECK / FSMC_A23
PE3 / TRACED0 / FSMC_A19
PE4 / TRACED1 / FSMC_A20
PE5 / TRACED2 / FSMC_A21
PE6 / TRACED3 / FSMC_A22
PE7 / FSMC_D4 [TIM1_ETR]
PE8 / FSMC_D5 [TIM1_CH1N]
PE9 / FSMC_D6 [TIM1_CH1]
PE10 / FSMC_D7 [TIM1_CH2N]
PE11 / FSMC_D8 [TIM1_CH2]
PE12 / FSMC_D9 [TIM1_CH3N]
PE13 / FSMC_D10 [TIM1_CH3]
PE14 / FSMC_D11 [TIM1_CH4]
PE15 / FSMC_D12 [TIM1_BKIN]
AEM_CTRL0
AEM_CTRL1
AEM_CTRL2
AEM_CTRL3
AEM_CTRL[3..0]
R918 4K7 NM
R917 4K7 NM
BOARD_REV[1..0]
Control MCU Power & Bypass
C902 12P
C903 12P
X900 16MHz
R916 0R
U900C
OSC_IN
OSC_OUT
VBAT
C904 100N
L900 CBF102WB
R910 1R
C908
TPJ903
ADC_VREF
VDDA
VSSA
VREF+
VREF-
C907 10U
C909 10N
C911 100N
NC
BOOT0
NRST
R915 0R
VDD_1
VDD_2
VDD_3
VDD_4
VDD_5
VSS_1
VSS_2
VSS_3
VSS_4
VSS_5
C916 C912 C913 C914
C910 100N
C915 10U
100N 100N 100N 100N
CTRLMCU_DEBUG_#RESET
R912 2K
LED903
RED
TPJ904
R914 10K
C917 100N
ADC referance
voltage
TPJ710
R728 100R
C719 10U
D703
LM4040CIM3-3.0
<Schematic Path>
BOARD CONTROLLER
Schematic Title
EFM32 Starter Kit Board Controller
Page Title
Control MCU
Designed: DDB
Approved: JNO
Size A3
BOM Doc No: <Cage Code>
Document number BRD2200A
Revision A03
Design Created Date: Wednesday, December 03, 2008
Sheet Created Date Thursday, May 10, 2012
Sheet Modified Date Thursday, June 14, 2012
Sheet 11 of 12

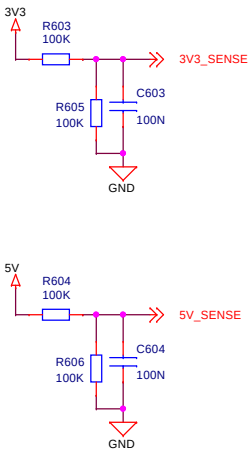
POWER INPUTS



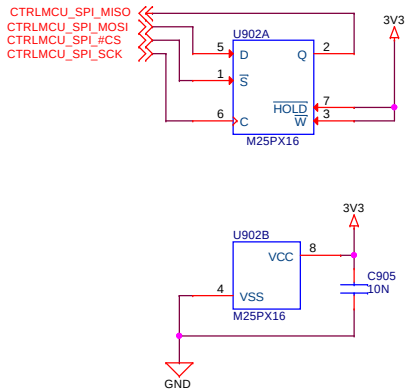
CTRLMCU EEPROM



POWER SENSE



CTRLMCU SERIAL FLASH



<Schematic Path>
BOARD CONTROLLER

	Schematic Title: **EFM32 Starter Kit Board Controller**	
	Page Title: **Board Controller Misc**	
Designed: DDB / Approved: JNO	Document number: **BRD2200A**	Revision: A03
Size: A3 / BOM Doc No: <Cage Code>		
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Thursday, May 10, 2012 / Sheet Modified Date: Thursday, June 14, 2012	Sheet: 12 of 12