EFM32PG12 Pearl Gecko STK

Revision History

Rev.	Description
A00	Initial release
A01	Changed to rev B of EFM32

PCB1

PCB2501A

/
EFM32PG STK

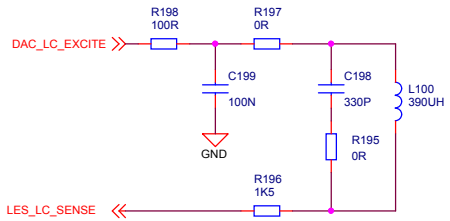
SILICON LABS

Schematic Title
EFM32PG12 Pearl Gecko Starter Kit

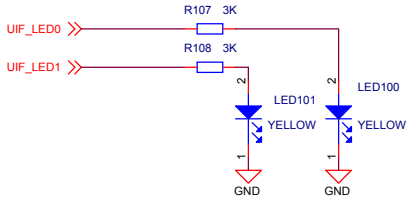
Page Title
Title Page

Designed: HEL	Approved: JNO	Document number: BRD2501A	Revision: A01
Size: A3	BOM Doc No: <Cage Code>		
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date: Saturday, March 21, 2009	Sheet Modified Date: Tuesday, January 03, 2017
			Sheet: 1 of 10

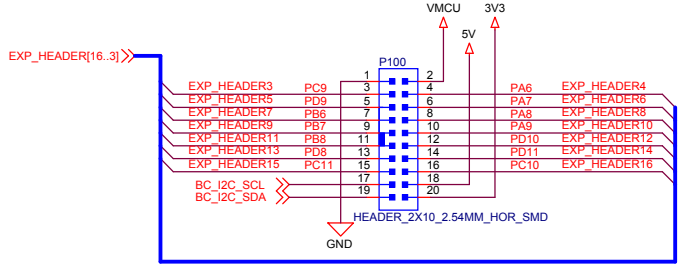
LESENSE LC-Sensor



User LEDs



EXP Header

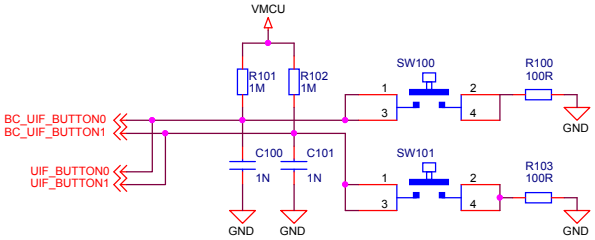


EXP-Header Functionality

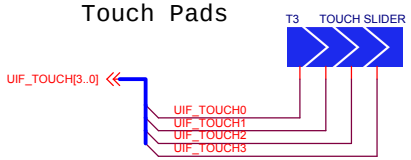
1	GND		
3	PC9		..
5	PD9		
7	PB6	US3_TX #10	I2C1_SDA#6
9	PB7	US3_RX #10	I2C1_SCL#6
11	PB8	US3_CLK #10	
13	PD8	US3_CS #29	
15	PC11	I2C0_SCL#15	
17	Reserved for EXP Board Identification		
19	Reserved for EXP Board Identification		

2	VMCU		
4	PA6	US2_TX #1	
6	PA7	US2_RX #1	
8	PA8	US2_CLK #1	
10	PA9	US2_CS #1	
12	PD10	LEU0_TX #18	
14	PD11	LEU0_RX #18	
16	PC10	I2C0_SDA#15	
18	5V		
20	3V3		

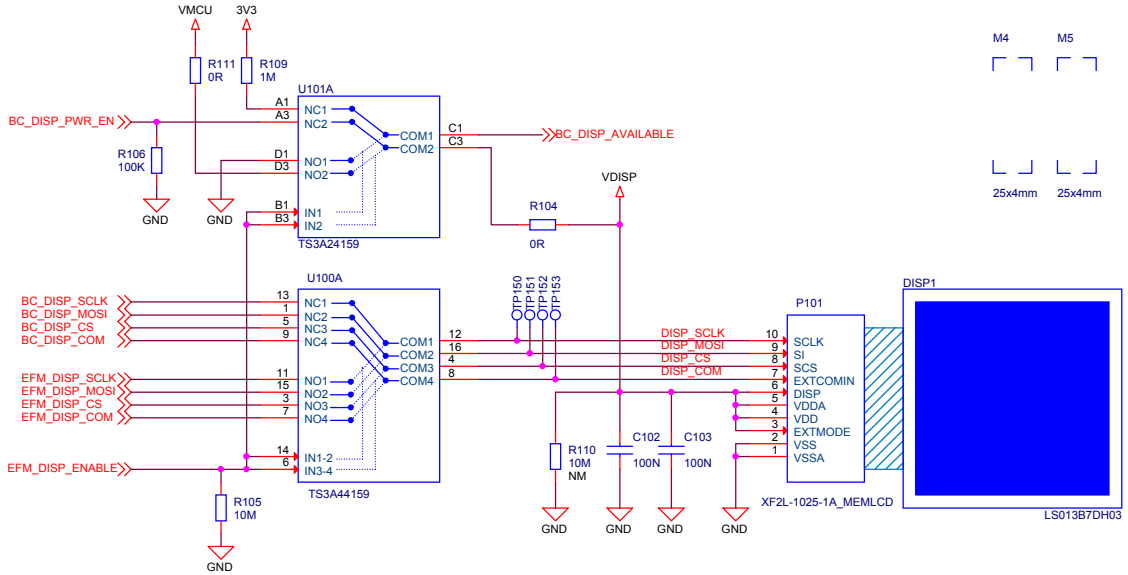
User Pushbuttons



Touch Pads

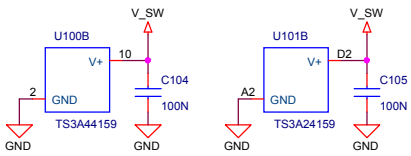


Memory LCD-TFT Display & Multiplexer

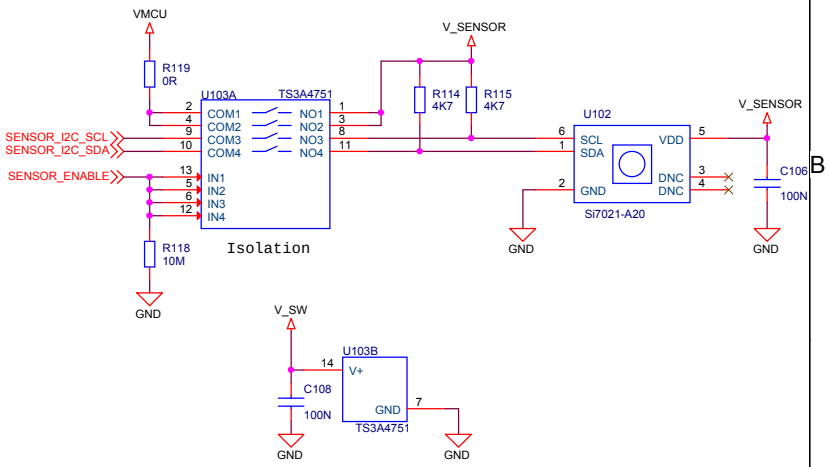


EFM_DISP_ENABLE	DISP_CTRL	VDISP	BC_DISP_AVAILABLE
1	EFM	VMCU	0
0	BC	BC_DISP_PWR_EN	1

The EFM32 always controls ownership of the display using the EFM_DISP_ENABLE signal.



Relative Humidity & Temperature Sensor



EFM32PG STK

SILICON LABS

Schematic Title

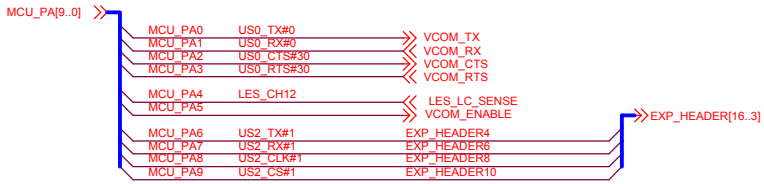
EFM32PG12 Pearl Gecko Starter Kit

Page Title

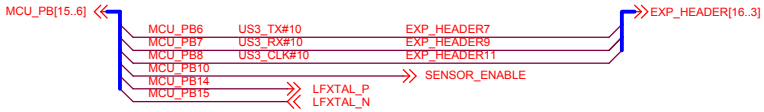
User Interfaces

Designed: HEL	Approved: JNO	Document number: BRD2501A	Revision: A01
Size: A3	BOM Doc No:		
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date: Friday, October 31, 2014	Sheet Modified Date: Friday, December 23, 2016
			Sheet 2 of 10

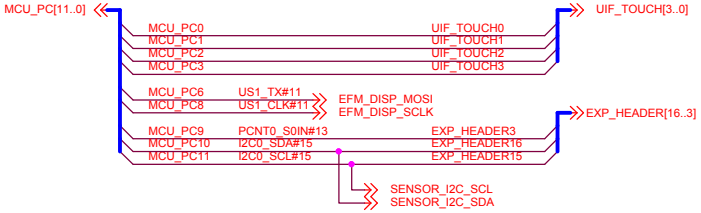
PA Connections



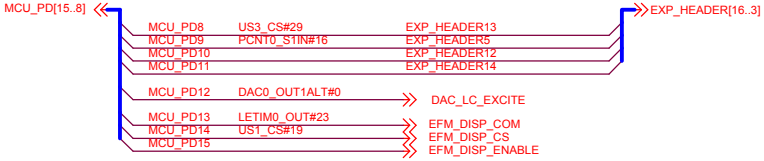
PB Connections



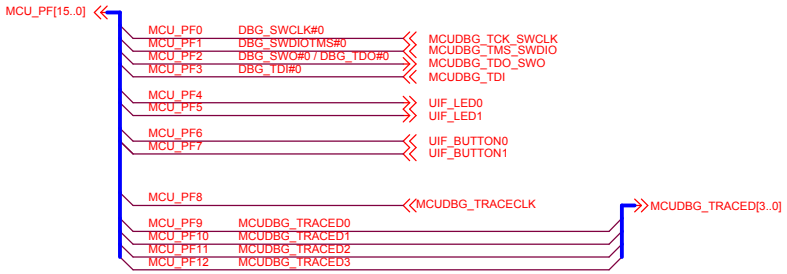
PC Connections



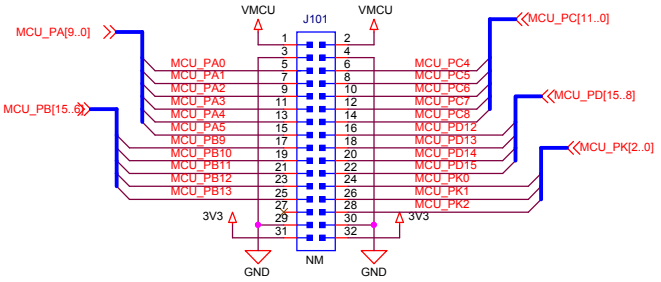
PD Connections



PF Connections

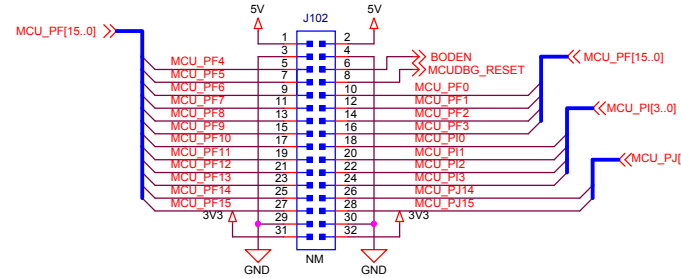


Breakout Connections



Breakout header labels:

VMCU	VMCU
GND	GND
PA0	PC4
PA1	PC5
PA2	PC6
PA3	PC7
PA4	PC8
PA5	PD12
PB9	PD13
PB10	PD14
PB11	PD15
PB12	PK0
PB13	PK1
NC	PK2
GND	GND
3V3	3V3

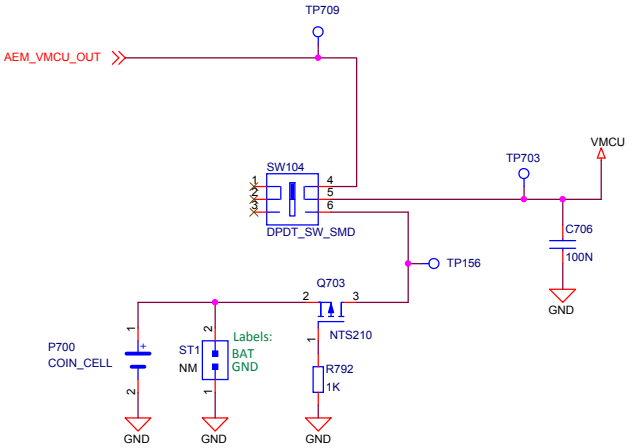


5V	5V
GND	GND
PF4	BDEN
PF5	RST
PF6	PF0
PF7	PF1
PF8	PF2
PF9	PF3
PF10	PI0
PF11	PI1
PF12	PI2
PF13	PI3
PF14	PJ14
PF15	PJ15
GND	GND
3V3	3V3

SILICON LABS

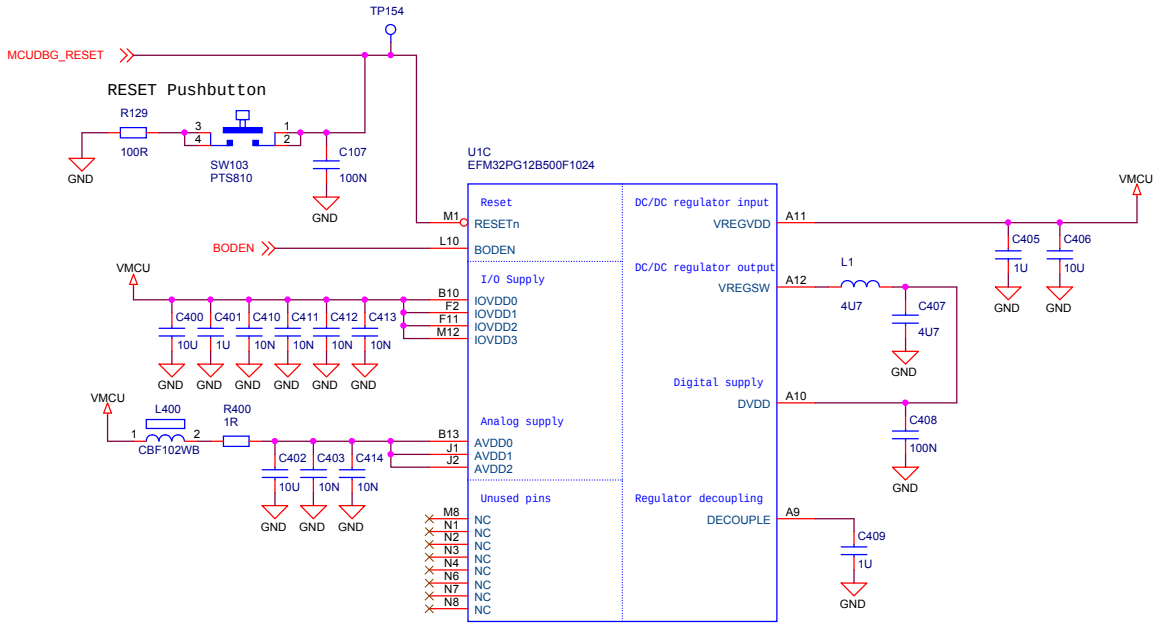
Designed: HEL	Approved: JNO	Schematic Title: **EFM32PG12 Pearl Gecko Starter Kit**	
Size: A3	BOM Doc No: <Cage Code>	Page Title: **EFM32 Signal Assignments**	
Design Created Date: Wednesday, December 03, 2008		Document number: **BRD2501A**	Revision: A01
		Sheet Created Date: Friday, October 31, 2014	Sheet Modified Date: Thursday, December 15, 2016
			Sheet 3 of 10

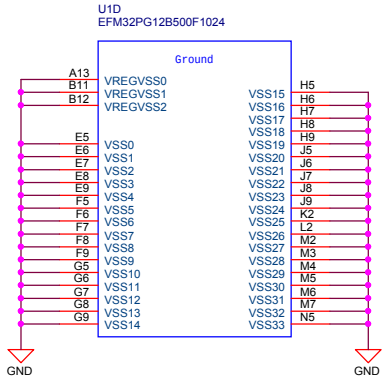
Power Select Switch: AEM/BAT



SWITCH POS	MODE DESCRIPTION
AEM	AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply
BAT	AEM Disabled, VMCU sourced from coin-cell battery or external power supply

EFM32 Power and Decoupling





SILICON LABS

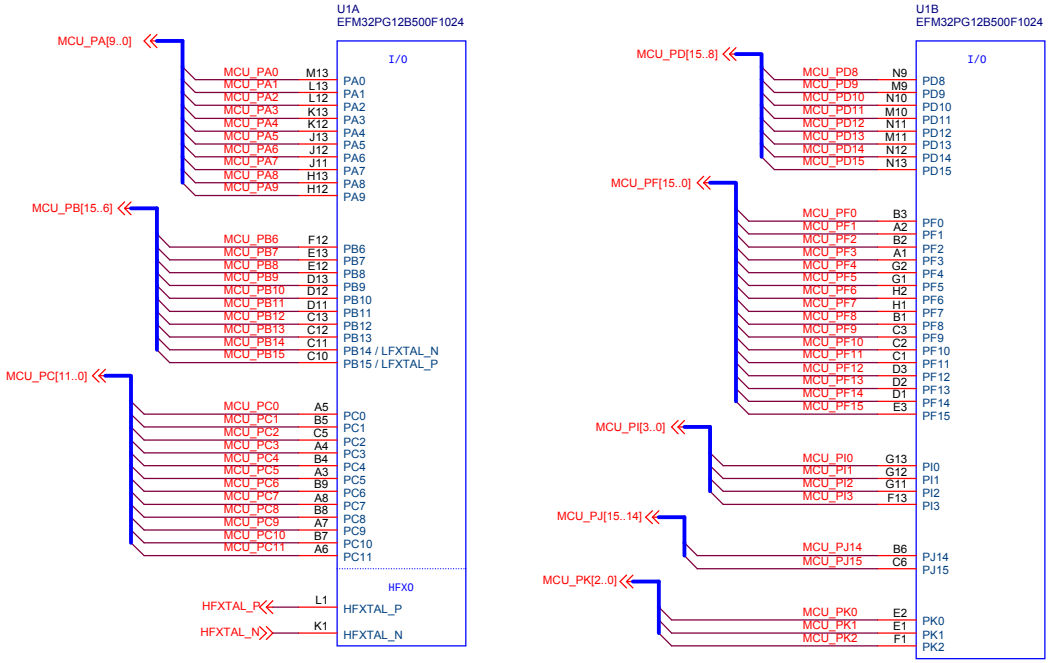
Designed: HEL	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Wednesday, December 03, 2008	

Schematic Title: **EFM32PG12 Pearl Gecko Starter Kit**

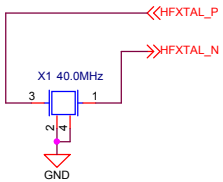
Page Title: **EFM32 Power**

Document number: **BRD2501A**		Revision: **A01**
Sheet Created Date: Friday, October 31, 2014	Sheet Modified Date: Tuesday, January 03, 2017	Sheet 4 of 10

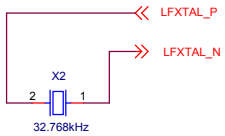
EFM32 PG MCU



High Frequency Clock



Low Frequency Clock



SILICON LABS

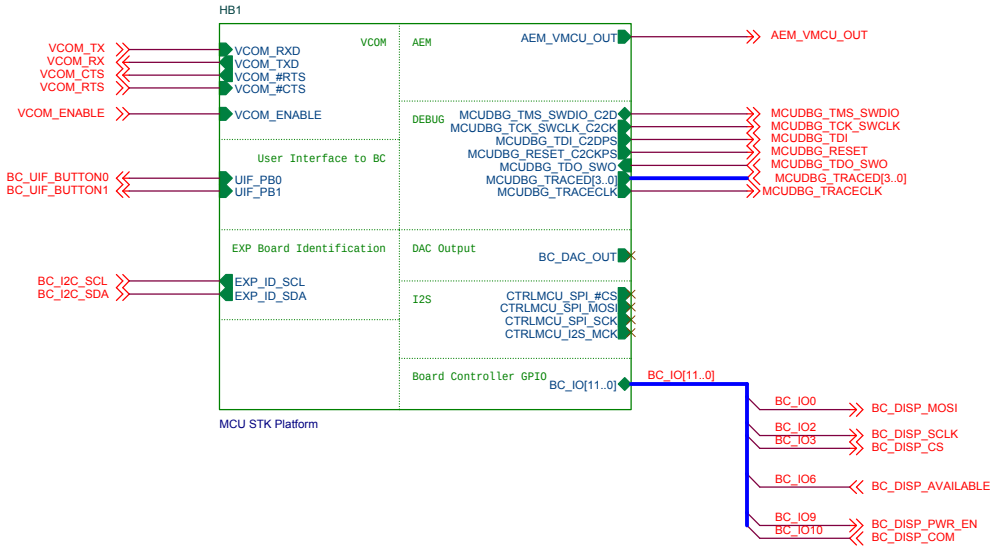
Designed: HEL	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Wednesday, December 03, 2008	

Schematic Title
EFM32PG12 Pearl Gecko Starter Kit

Page Title
EFM32 I/O

Document number: **BRD2501A**	Revision: A01
Sheet Created Date: Monday, November 17, 2014	Sheet Modified Date: Tuesday, January 03, 2017
	Sheet 5 of 10

Board Controller Functional Block



SILICON LABS

Designed: HEL	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Wednesday, December 03, 2008	

Schematic Title

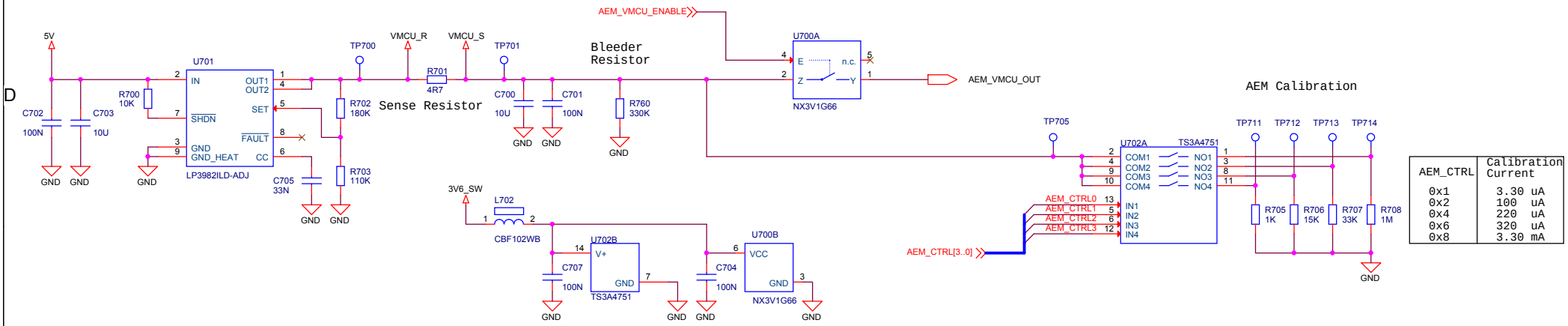
EFM32PG12 Pearl Gecko Starter Kit

Page Title

STK Board Controller

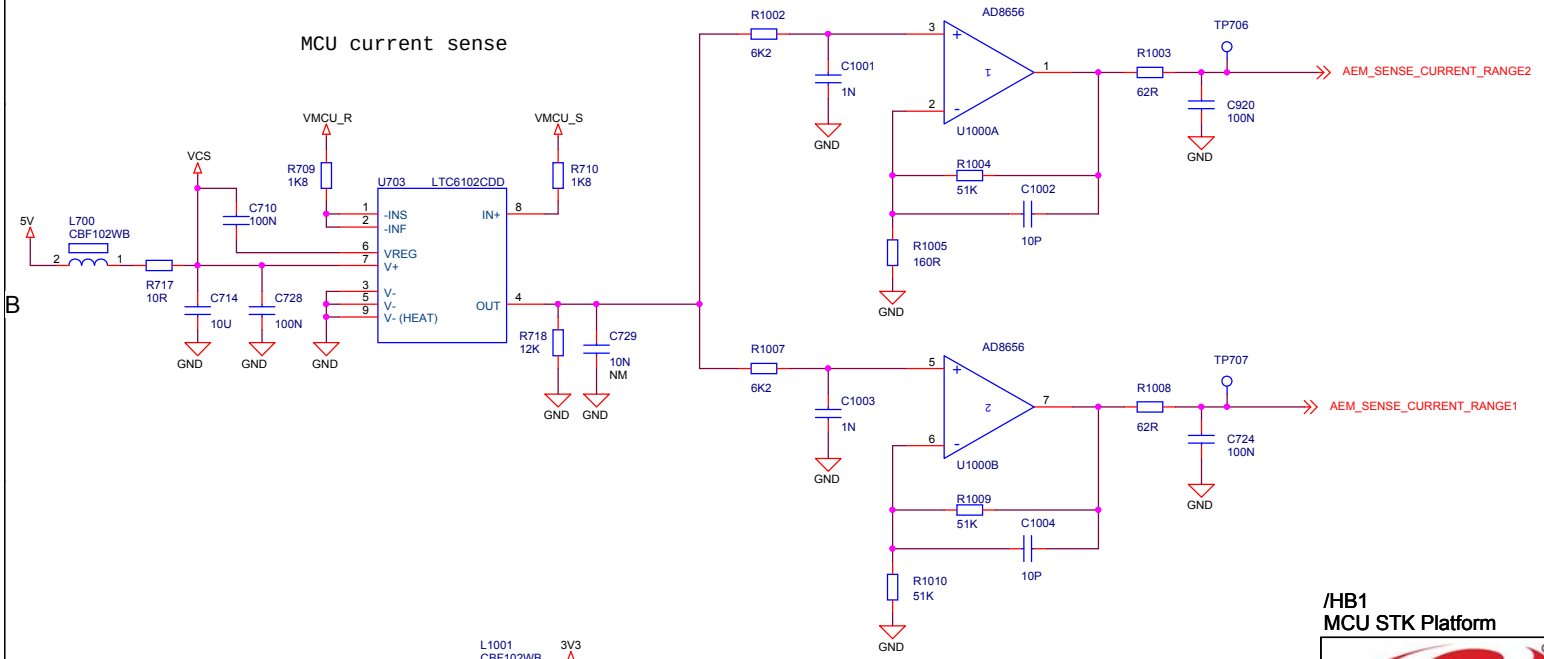
Document number: **BRD2501A**		Revision: A01
Sheet Created Date: Friday, October 31, 2014	Sheet Modified Date: Thursday, December 15, 2016	Sheet: 6 of 10

MCU power regulator

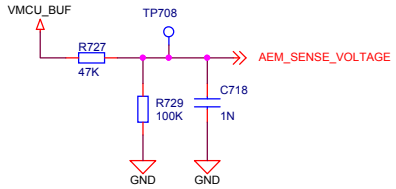


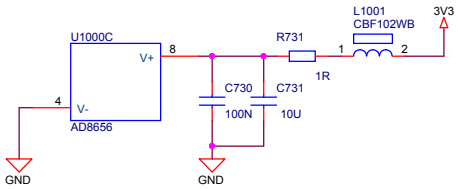
AEM_CTRL	Calibration Current
0x1	3.30 uA
0x2	100 uA
0x4	220 uA
0x6	320 uA
0x8	3.30 mA

MCU current sense



MCU Voltage Sense





/HB1
MCU STK Platform

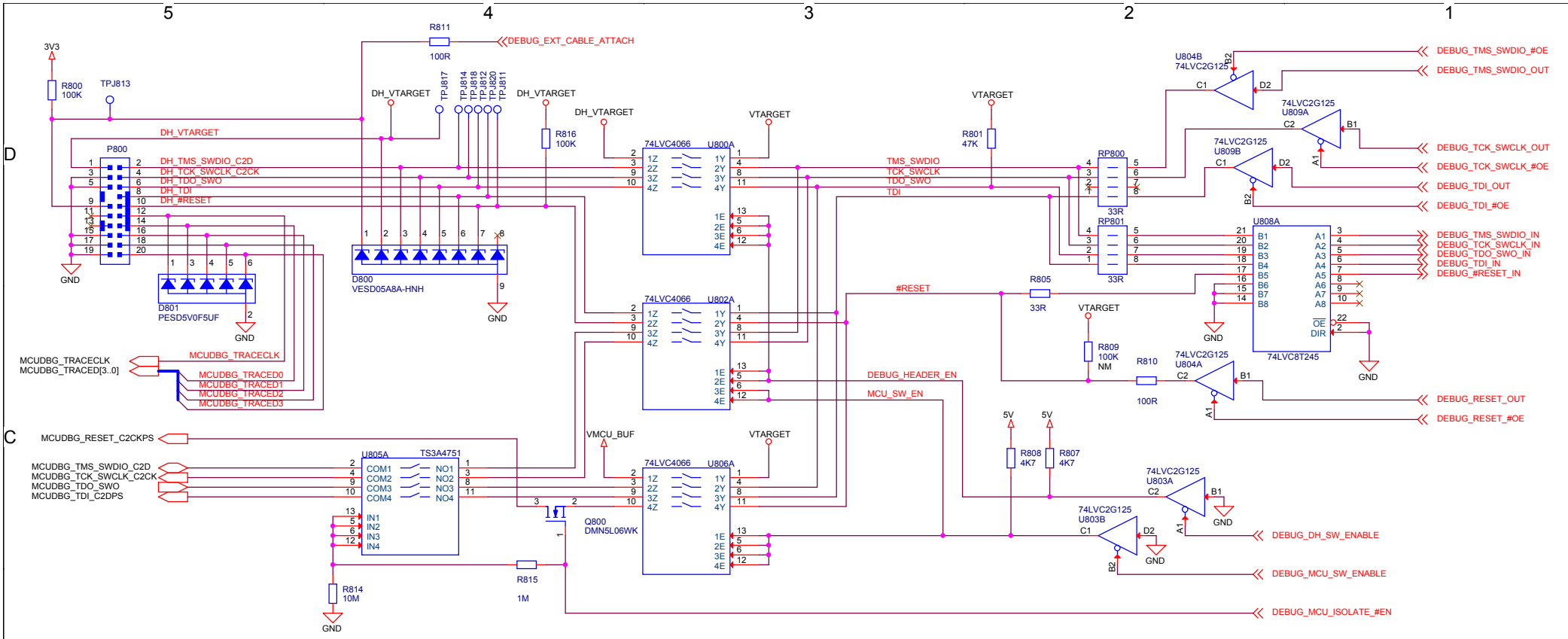
SILICON LABS

Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

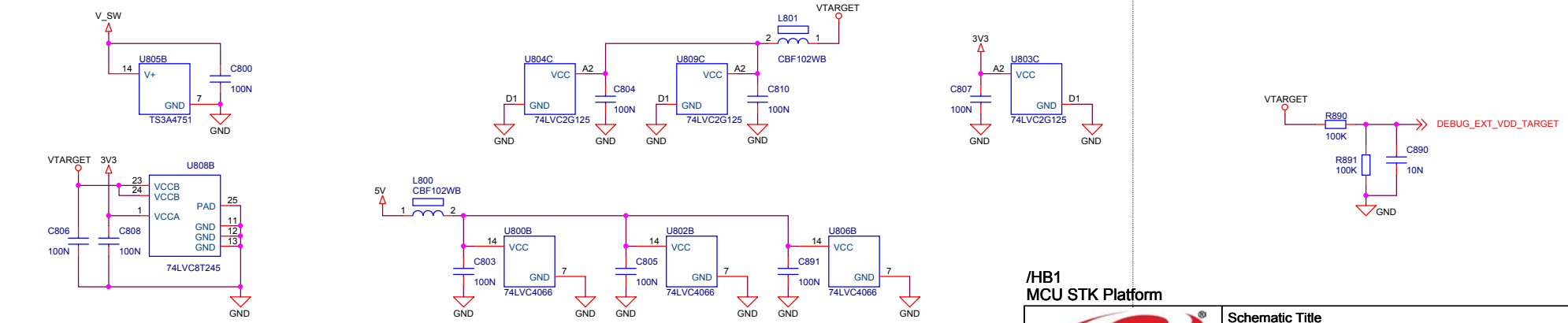
Schematic Title
EFM32PG12 Pearl Gecko Starter Kit

Page Title
Advanced Energy Monitor

Document number: **BRD2501A**		Revision: A01
Sheet Created Date: Tuesday, May 13, 2014	Sheet Modified Date: Thursday, December 15, 2016	Sheet 7 of 10



Power & Decoupling



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	-	-

/HB1
MCU STK Platform

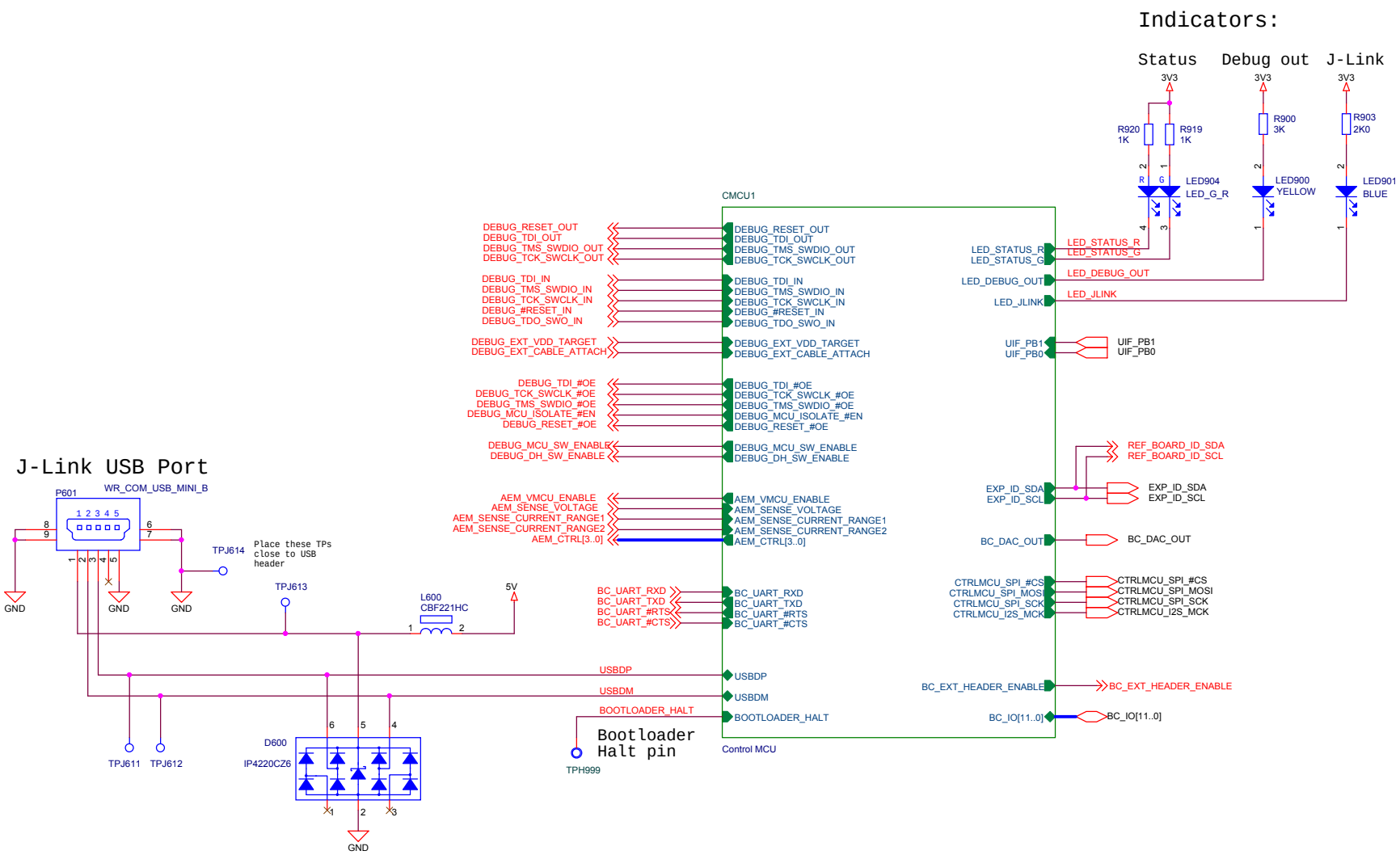
SILICON LABS

Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

Schematic Title
EFM32PG12 Pearl Gecko Starter Kit

Page Title
Debug Interface

Document number: BRD2501A	Revision: A01
Sheet Created Date: Monday, May 12, 2014	Sheet Modified Date: Thursday, December 15, 2016
	Sheet: 8 of 10



/HB1
MCU STK Platform

SILICON LABS

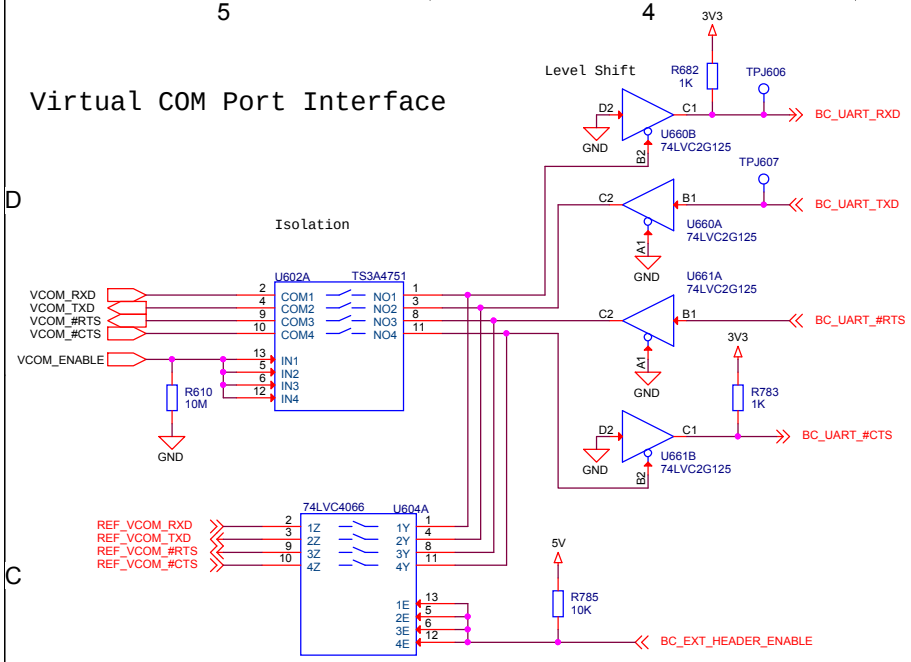
Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

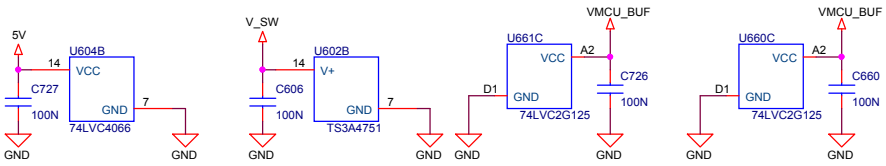
Schematic Title
EFM32PG12 Pearl Gecko Starter Kit

Page Title
Board Controller

Document number: **BRD2501A**	Revision: A01
Sheet Created Date: Wednesday, May 14, 2014	Sheet Modified Date: Thursday, December 15, 2016
	Sheet: 9 of 10

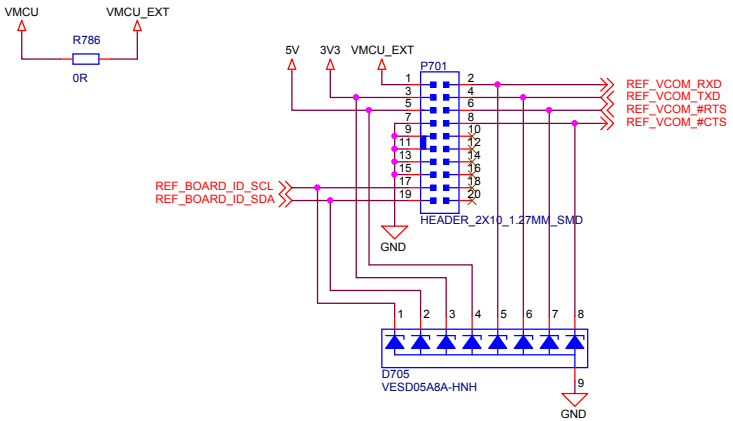
Virtual COM Port Interface



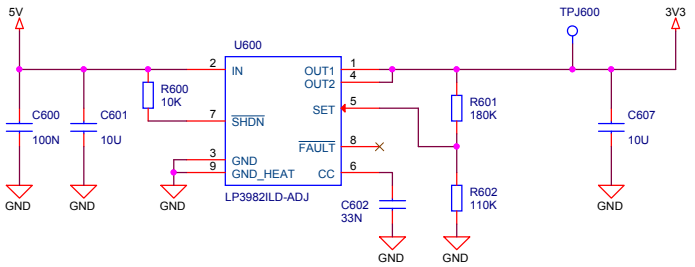


Connector for external reference designs boards

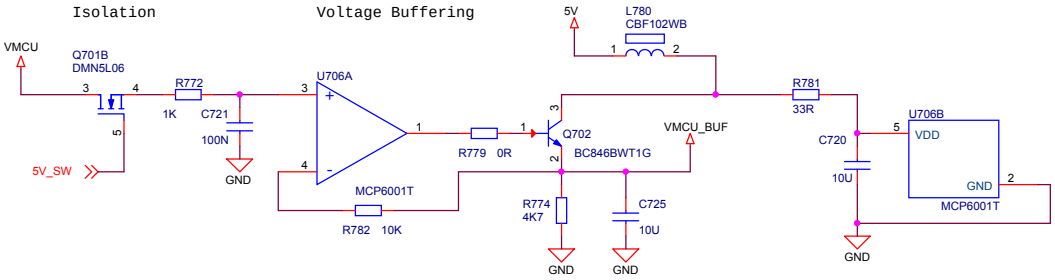
EXTERNAL BOARD



3V3 Regulator



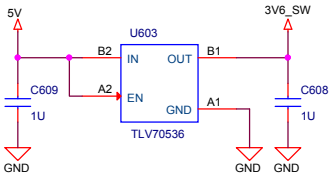
VMCU Voltage Mirror

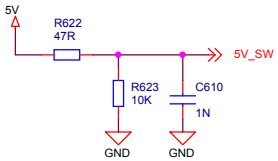


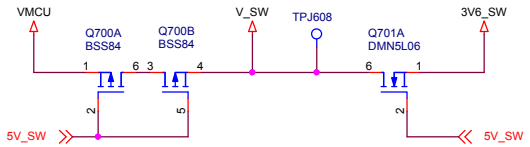
Power Supply for Analog Switches

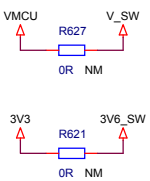
The USB VBUS voltage is used to bias these transistors, turning the P-Channel MOSFETs (Q700) off, and the N-Channel MOSFETs (Q701) on.

J-Link USB Cable	PMOS State	NMOS State	V_SW	VMCU_SENSE
Connected	Off	ON	3.6V	VMCU
Disconnected	ON	OFF	VMCU	Isolated









/HB1
MCU STK Platform

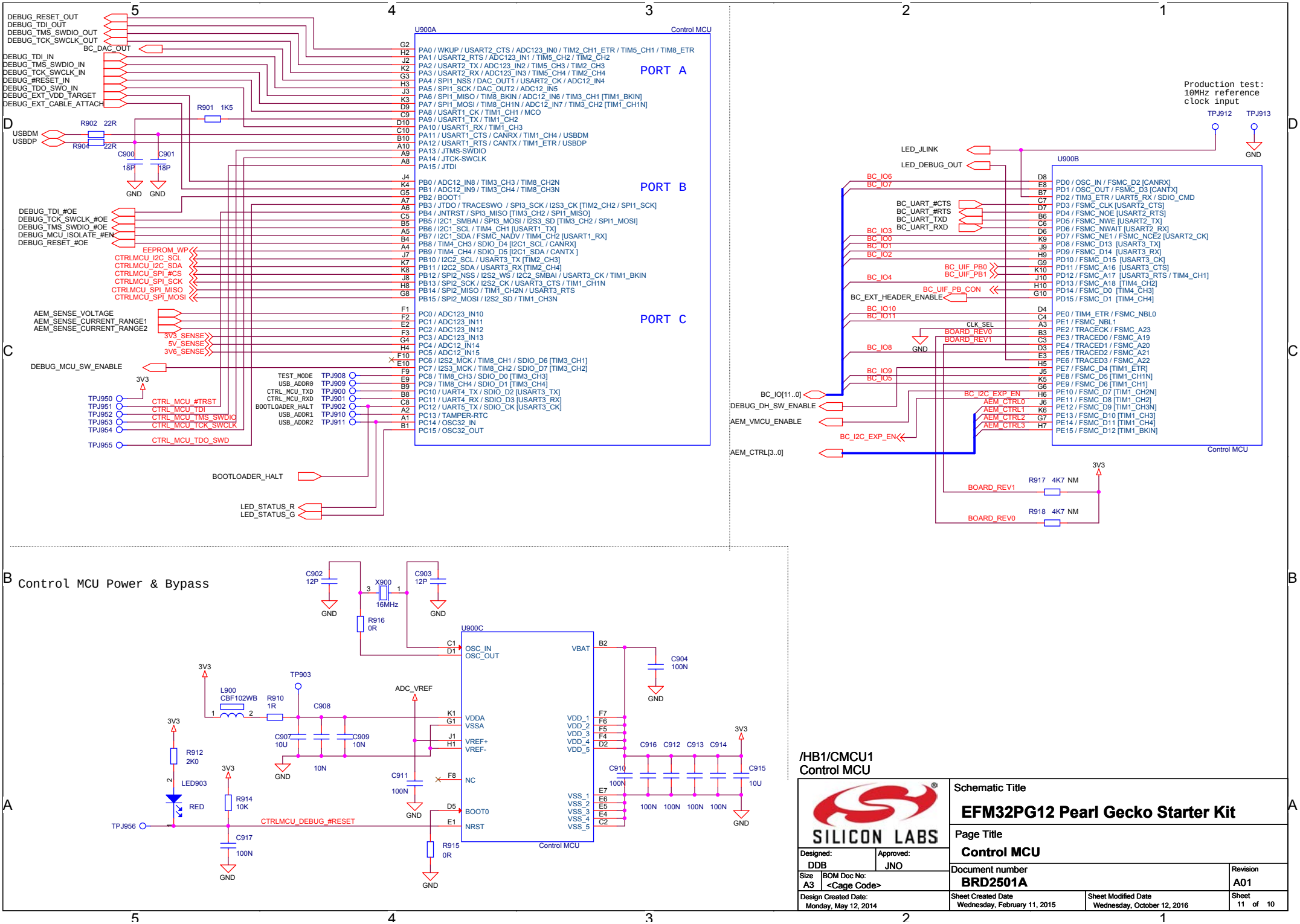
SILICON LABS

Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

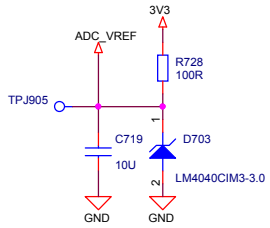
Schematic Title: **EFM32PG12 Pearl Gecko Starter Kit**

Page Title: **Power & Misc**

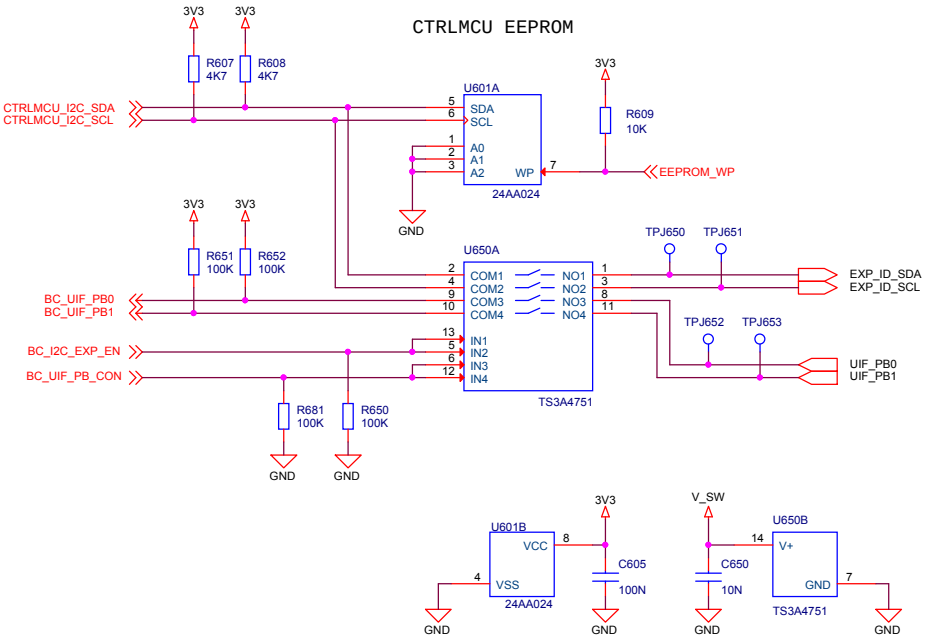
Document number: **BRD2501A**		Revision: A01
Sheet Created Date: Monday, May 12, 2014	Sheet Modified Date: Thursday, December 15, 2016	Sheet 10 of 10


DEBUG_RESET_OUT
DEBUG_TDI_OUT
DEBUG_TMS_SWDIO_OUT
DEBUG_TCK_SWCLK_OUT
BC_DAC_OUT
DEBUG_TDI_IN
DEBUG_TMS_SWDIO_IN
DEBUG_TCK_SWCLK_IN
DEBUG_#RESET_IN
DEBUG_TDO_SWO_IN
DEBUG_EXT_VDD_TARGET
DEBUG_EXT_CABLE_ATTACH
R901 1K5
R902 22R
R904 22R
USBDM
USBDP
C900 18P
C901 18P
GND
U900A
Control MCU
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
PORT A
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
PORT B
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
PORT C
DEBUG_TDI_#OE
DEBUG_TCK_SWCLK_#OE
DEBUG_TMS_SWDIO_#OE
DEBUG_MCU_ISOLATE_#EN
DEBUG_RESET_#OE
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
3V6_SENSE
DEBUG_MCU_SW_ENABLE
3V3
TPJ950
TPJ951
TPJ952
TPJ953
TPJ954
TPJ955
CTRL_MCU_#TRST
CTRL_MCU_TDI
CTRL_MCU_TMS_SWDIO
CTRL_MCU_TCK_SWCLK
CTRL_MCU_TDO_SWD
TEST_MODE TPJ908
USB_ADDR0 TPJ909
CTRL_MCU_TXD TPJ900
CTRL_MCU_RXD TPJ901
BOOTLOADER_HALT TPJ902
USB_ADDR1 TPJ910
USB_ADDR2 TPJ911
BOOTLOADER_HALT
LED_STATUS_R
LED_STATUS_G
Production test:
10MHz reference
clock input
TPJ912
TPJ913
GND
LED_JLINK
LED_DEBUG_OUT
U900B
BC_IO6
BC_IO7
BC_UART_#CTS
BC_UART_#RTS
BC_UART_TXD
BC_UART_RXD
BC_IO3
BC_IO0
BC_IO1
BC_IO2
BC_UIF_PB0
BC_UIF_PB1
BC_IO4
BC_UIF_PB_CON
BC_EXT_HEADER_ENABLE
BC_IO10
BC_IO11
CLK_SEL
BOARD_REV0
BOARD_REV1
BC_IO8
BC_IO9
BC_IO5
BC_I2C_EXP_EN
AEM_CTRL0
AEM_CTRL1
AEM_CTRL2
AEM_CTRL3
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]
Control MCU
BC_IO[11..0]
DEBUG_DH_SW_ENABLE
AEM_VMCU_ENABLE
AEM_CTRL[3..0]
R917 4K7 NM
R918 4K7 NM
Control MCU Power & Bypass
C902 12P
C903 12P
X900
16MHz
R916 0R
U900C
OSC_IN
OSC_OUT
VBAT
C904 100N
L900 CBF102WB
R910 1R
TP903
C908
ADC_VREF
C907 10U
C909 10N
10N
VDDA
VSSA
VREF+
VREF-
NC
BOOT0
NRST
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
R912 2K0
LED903
RED
R914 10K
C911 100N
C917 100N
CTRLMCU_DEBUG_#RESET
TPJ956
R915 0R
/HB1/CMCU1
Control MCU
SILICON LABS
Schematic Title
EFM32PG12 Pearl Gecko Starter Kit
Page Title
Control MCU
Designed: DDB
Approved: JNO
Size A3
BOM Doc No: <Cage Code>
Document number BRD2501A
Revision A01
Design Created Date: Monday, May 12, 2014
Sheet Created Date Wednesday, February 11, 2015
Sheet Modified Date Wednesday, October 12, 2016
Sheet 11 of 10

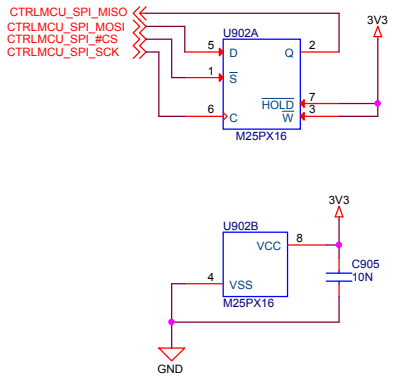
ADC reference voltage



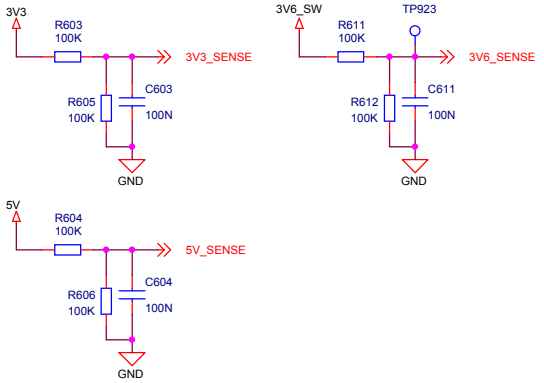
CTRLMCU EEPROM



CTRLMCU SERIAL FLASH



POWER SENSE



/HB1/CMCU1
Control MCU

SILICON LABS

Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

Schematic Title: **EFM32PG12 Pearl Gecko Starter Kit**

Page Title: **Board Controller Misc**

Document number: **BRD2501A**	Revision: A01
Sheet Created Date: Wednesday, February 11, 2015	Sheet Modified Date: Friday, October 14, 2016
	Sheet: 12 of 10