EFM32 Happy Gecko STK

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Revision History

Rev.	Description
A00	First production release.
B00	Updated Board Controller pin-out.
B01	Minor update to secondary (target USB) AEM channel.

PCB1

PCB2012

/
EFM32 HG STK

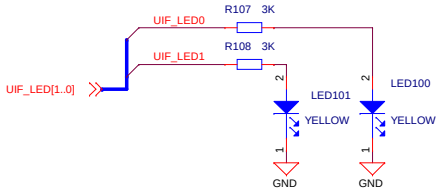
Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Wednesday, December 03, 2008	

Schematic Title
EFM32 Happy Gecko Starter Kit

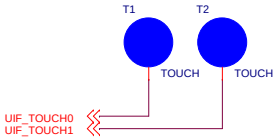
Page Title
Title Page

Document number: BRD2012A		Revision: B01
Sheet Created Date: Saturday, March 21, 2009	Sheet Modified Date: Monday, March 23, 2015	Sheet: 1 of 10

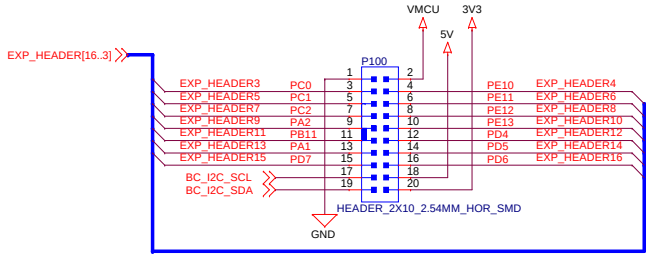
User LEDs



Touch Pads



EXP Header

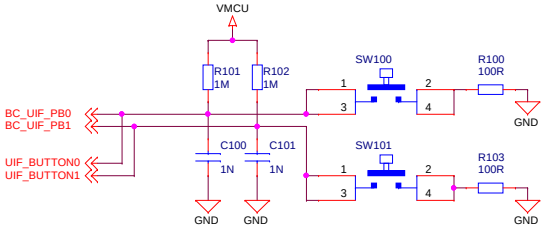


EXP-Header Functionality

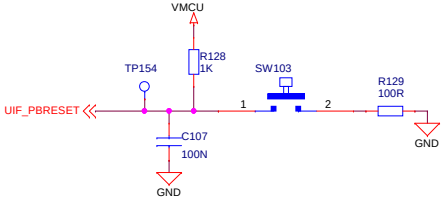
1	GND		
3	PC0		ACMP0_CH0
5	PC1		ACMP0_CH1
7	PC2		ACMP0_CH2
9	PA2		
11	PB11		IDAC0_OUT
13	PA1		
15	PD7	I2C0_SCL	ADC0_CH7
17	Reserved for EXP Board Identification		
19	Reserved for EXP Board Identification		

2	VMCU		
4	PE10	US0_TX	
6	PE11	US0_RX	
8	PE12	US0_CLK	ADC0_CH0
10	PE13	US0_CS	ADC0_CH1
12	PD4	LEU0_TX	ADC0_CH4
14	PD5	LEU0_RX	ADC0_CH5
16	PD6	I2C0_SDA	ADC0_CH6
18	5V		
20	3V3		

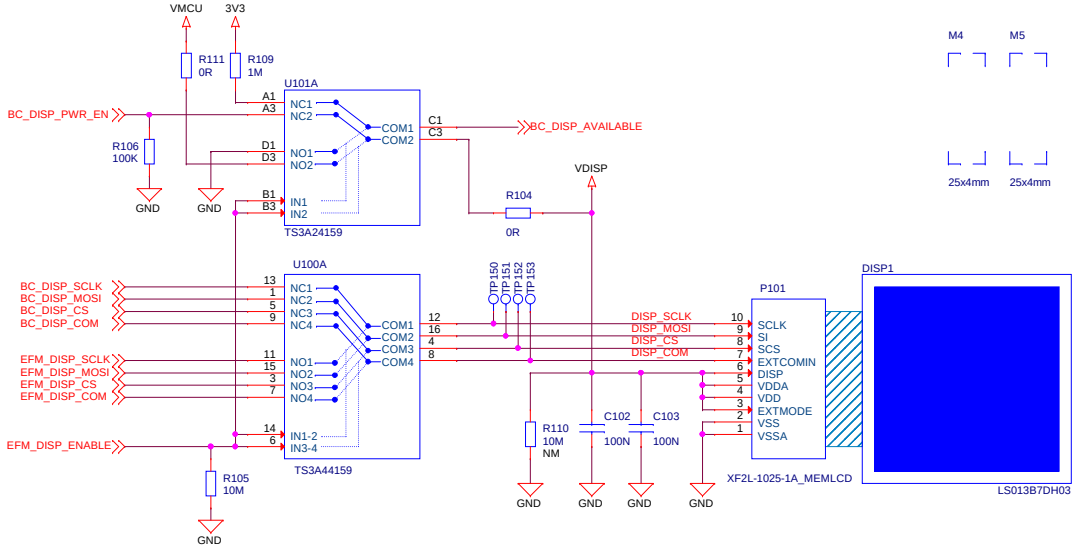
User Pushbuttons



RESET Pushbutton

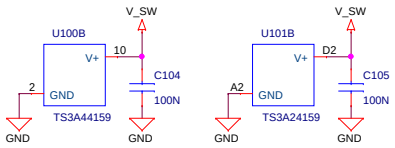


Memory LCD-TFT Display & Multiplexer

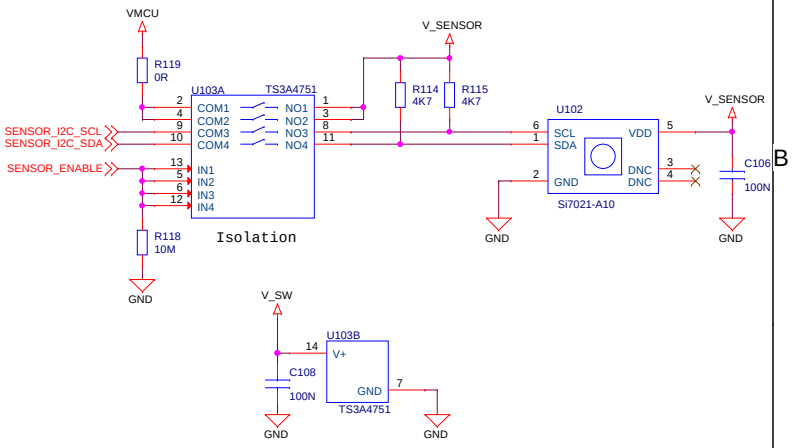


EFM_DISP_ENABLE	DISP_CTRL	VDISP	BC_DISP_AVAILABLE
1	EFM	VMCU	0
0	BC	BC_DISP_PWR_EN	1

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



Relative Humidity & Temperature Sensor



EFM32 HG STK

SILICON LABS

Designed: DDB	Approved: JNO
Size A3	BOM Doc No:
Design Created Date: Wednesday, December 03, 2008	

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

Page Title: **User Interfaces**

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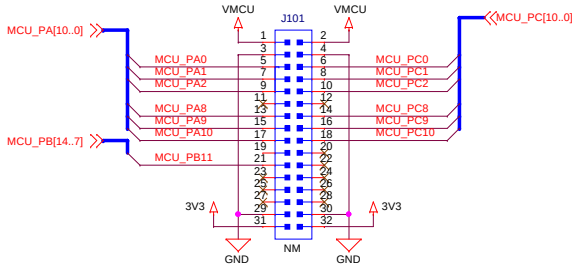
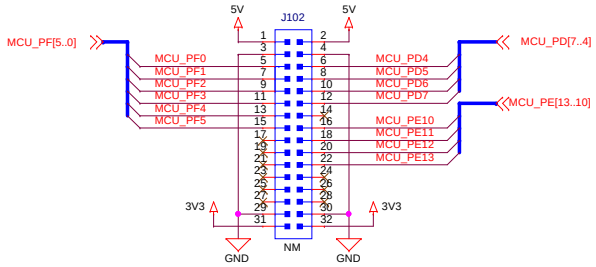
Breakout Connections



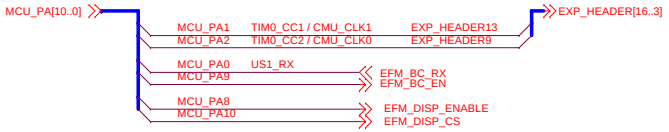
Breakout header labels:

VMCU	VMCU
GND	GND
PA0	PC0
PA1	PC1
PA2	PC2
NC	NC
PA8	PC8
PA9	PC9
PA10	PC10
NC	NC
PB11	NC
NC	NC
NC	NC
NC	NC
NC	NC
GND	GND
3V3	3V3

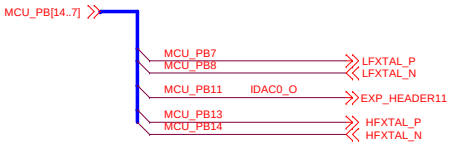


5V	5V
GND	GND
PF0	PD4
PF1	PD5
PF2	PD6
PF3	PD7
PF4	NC
PF5	PE10
NC	PE11
NC	PE12
NC	PE13
NC	NC
NC	NC
NC	NC
NC	NC
GND	GND
3V3	3V3

PA Connections

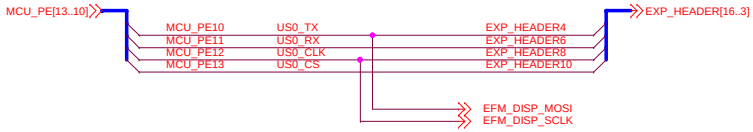


PB Connections

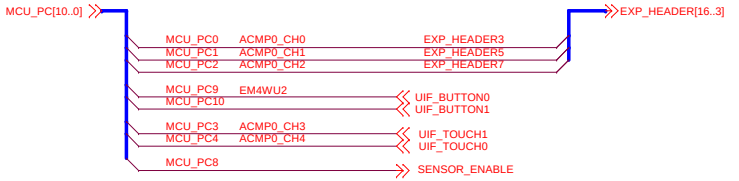


PE Connections

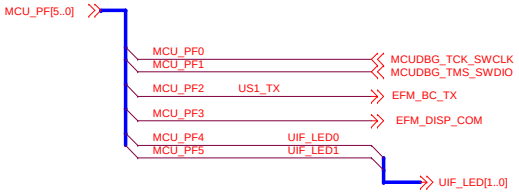
PE10 - PE13 (USART1) are used for the EXP Header
SPI port as well as the display clock and data.



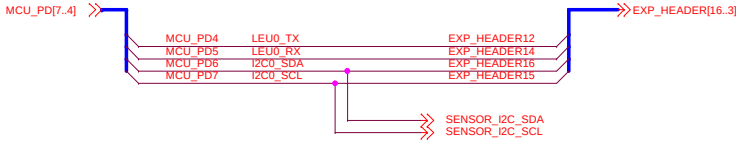
PC Connections



PF Connections



PD Connections



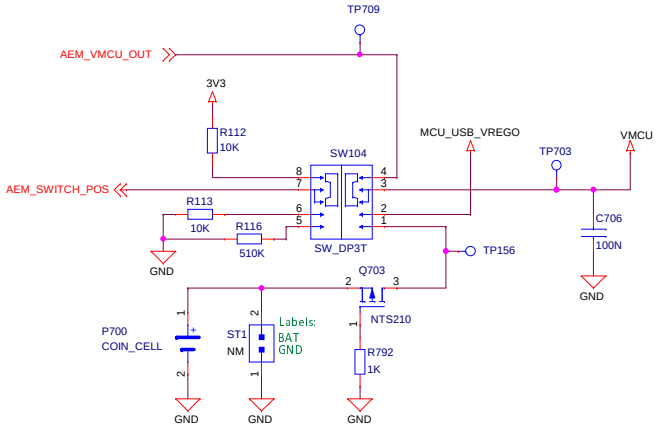
SILICON LABS

Schematic Title
EFM32 Happy Gecko Starter Kit

Page Title
Signal Assignments

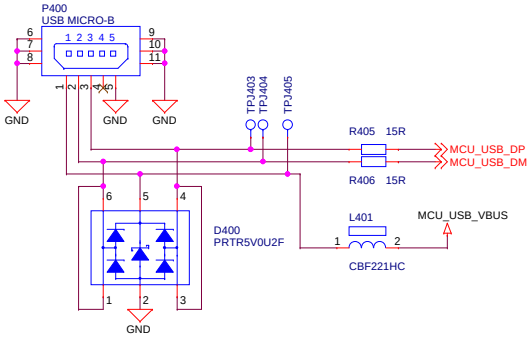
Designed: DDB	Approved: JNO		
Size: A3	BOM Doc No: <Cage Code>	Document number: BRD2012A	Revision: B01
Design Created Date: Wednesday, December 03, 2008	Sheet Created Date: Friday, October 31, 2014	Sheet Modified Date: Thursday, March 26, 2015	Sheet: 3 of 10

Power Select Switch: AEM/USB/BAT

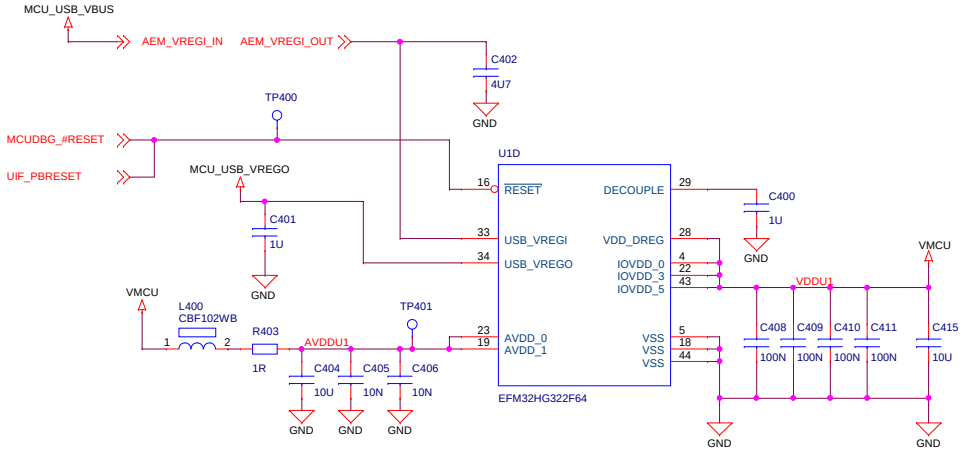


SWITCH POS	MODE DESCRIPTION
AEM	AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply
USB	AEM Enabled. VMCU sourced from internal 3.3V LDO powered by MCU USB 5V supply
BAT	AEM Disabled, VMCU sourced from coin-cell battery or external power supply

USB Connection and ESD Protection



EFM32 Power and Decoupling



Schematic Title	EFM32 Happy Gecko Starter Kit
Page Title	EFM32 Power & USB
Designed: DDB	Approved: JNO
Size A3	BOM Doc No: <Cage Code>
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Revision	B01
Design Created Date:	Wednesday, December 03, 2008
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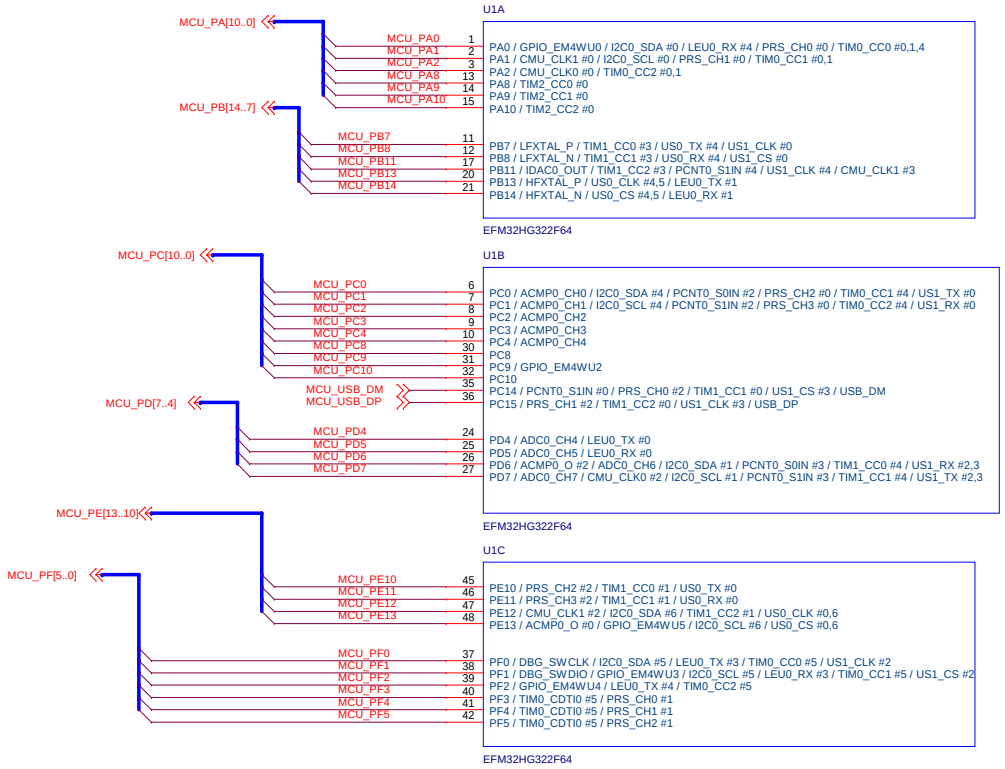
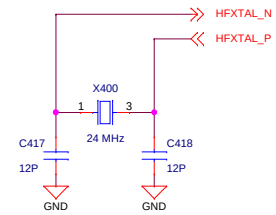
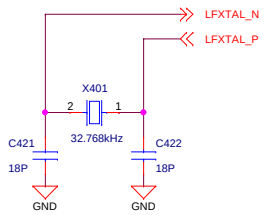
EFM32 HG MCU



High Frequency Clock



Low Frequency Clock



SILICON LABS

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

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

Page Title: **EFM32 IO**

Document number: **BRD2012A**	Revision: B01
Sheet Created Date: Monday, November 17, 2014	Sheet Modified Date: Tuesday, March 24, 2015
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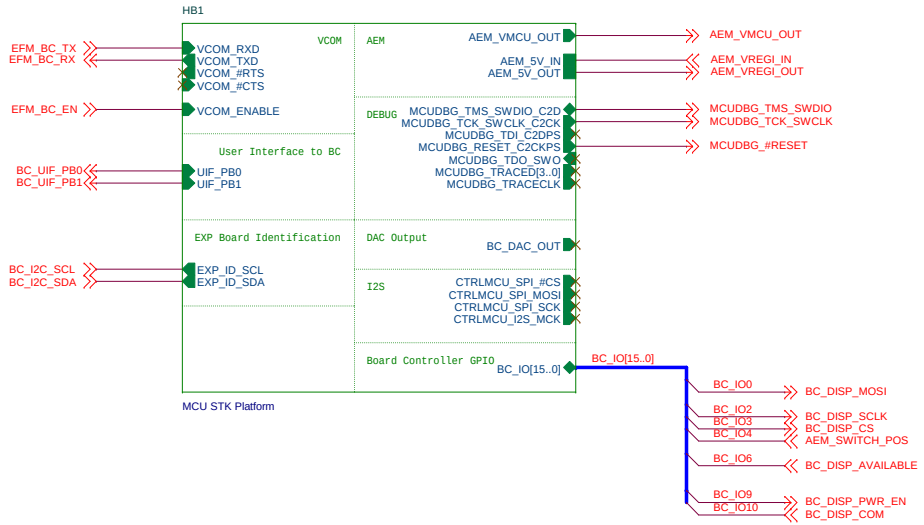
Board Controller Functional Block



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

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

Page Title: **Board Controller Functional Block**

Document number: **BRD2012A**		Revision: B01
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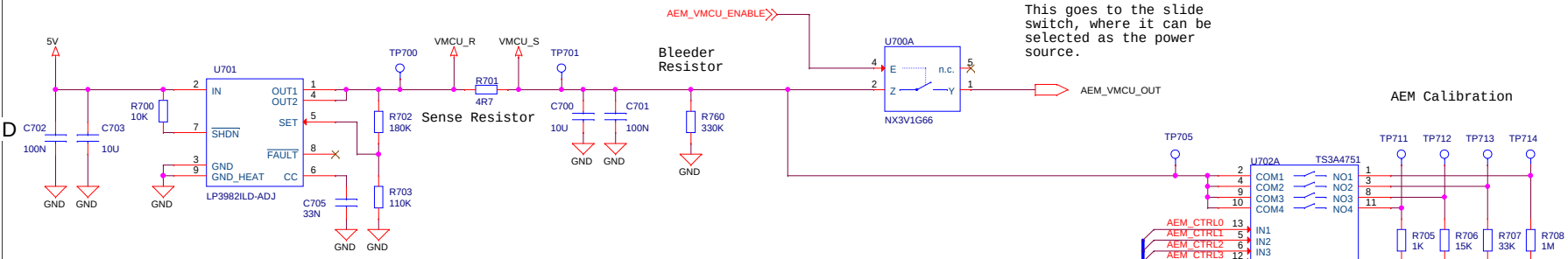
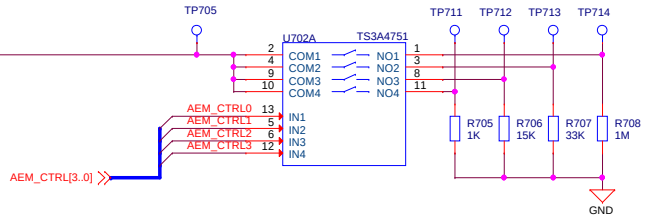
MCU power regulator

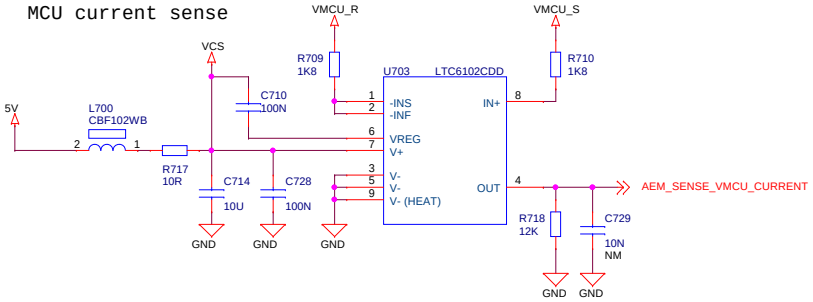


AEM Calibration

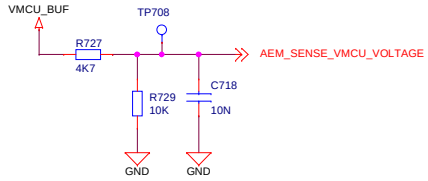


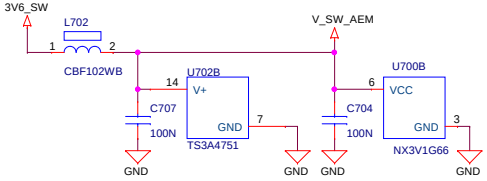
AEM_CTRL	Calibration Current
0x1	3.30 uA
0x2	100 uA
0x4	220 uA
0x6	320 uA
0x8	3.30 mA

MCU current sense

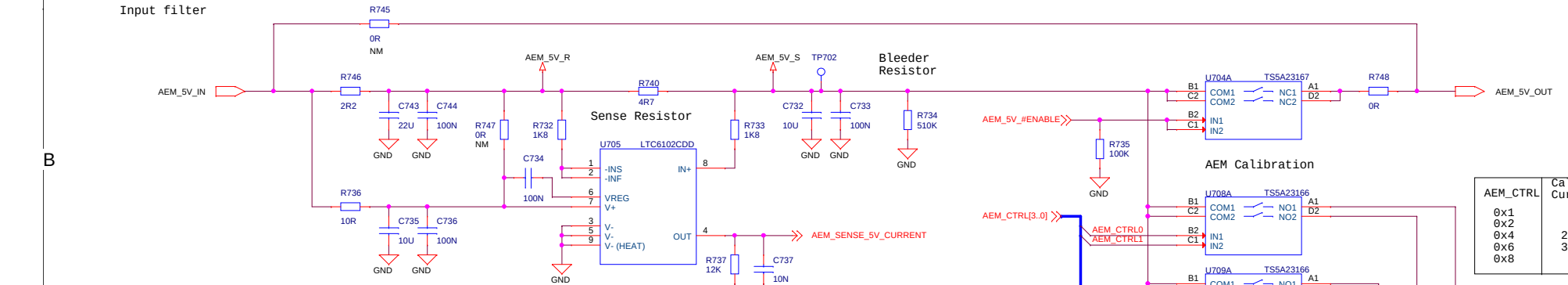


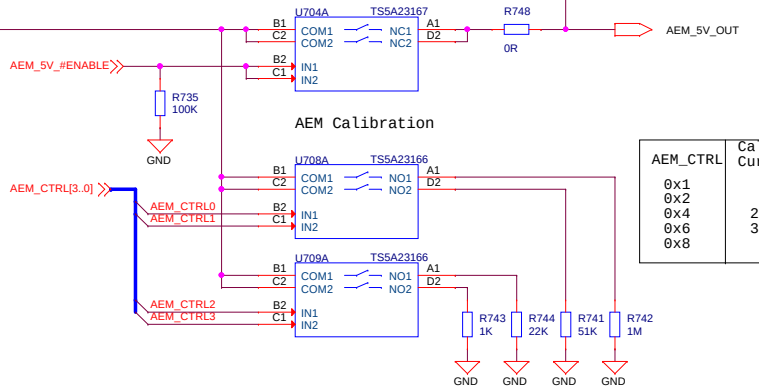
MCU Voltage Sense





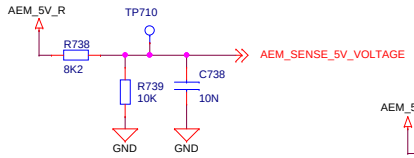
Input filter



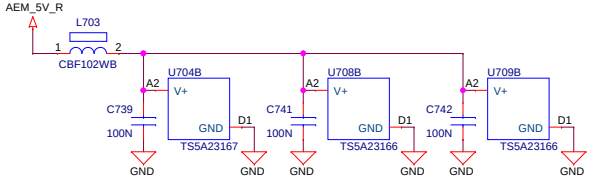


AEM_CTRL	Calibration Current
0x1	5 uA
0x2	98 uA
0x4	227 uA
0x6	325 uA
0x8	5 mA

Target USB Voltage Sense



Decoupling



*Bypass: remove R736 & R746 and add R745 to bypass current sense and filters completely if required for USB compliance testing.

/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: **EFM32 Happy Gecko Starter Kit**

Page Title: **Advanced Energy Monitor - Current Sense**

Document number: BRD2012A	Revision: B01
Sheet Created Date: Thursday, March 19, 2015	Sheet Modified Date: Thursday, March 26, 2015
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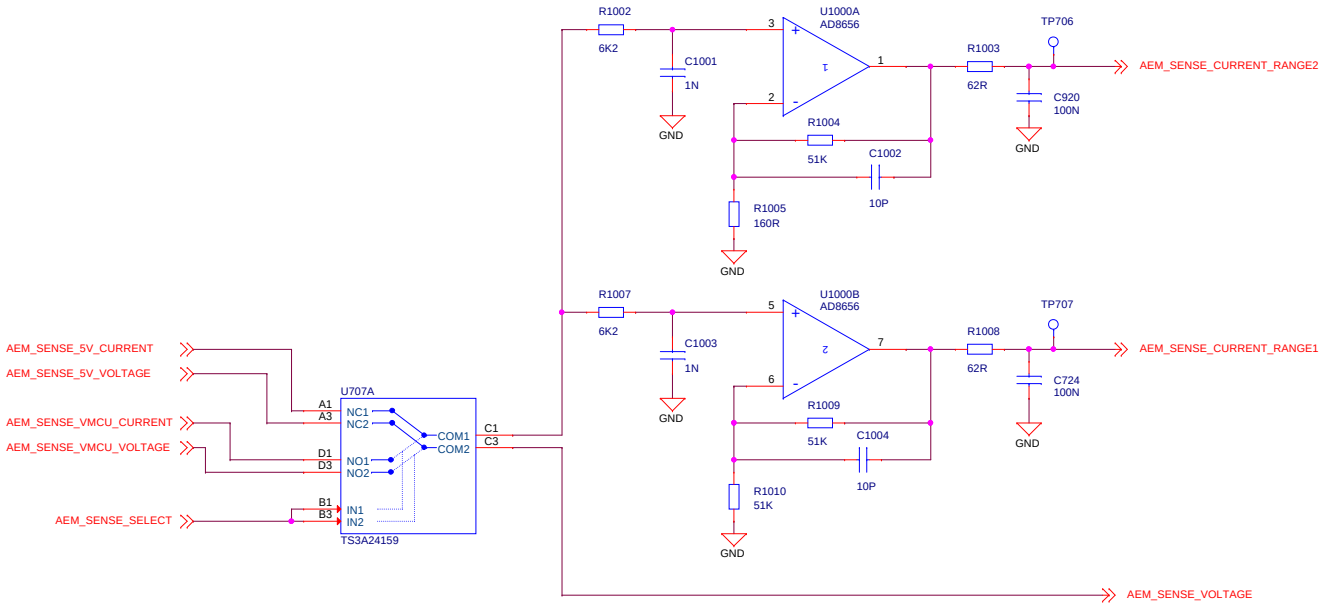

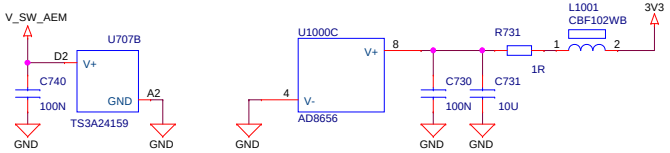

/HB1
MCU STK Platform

SILICON LABS

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

Schematic Title
EFM32 Happy Gecko Starter Kit

Page Title
Advanced Energy Monitor - Gain Stages

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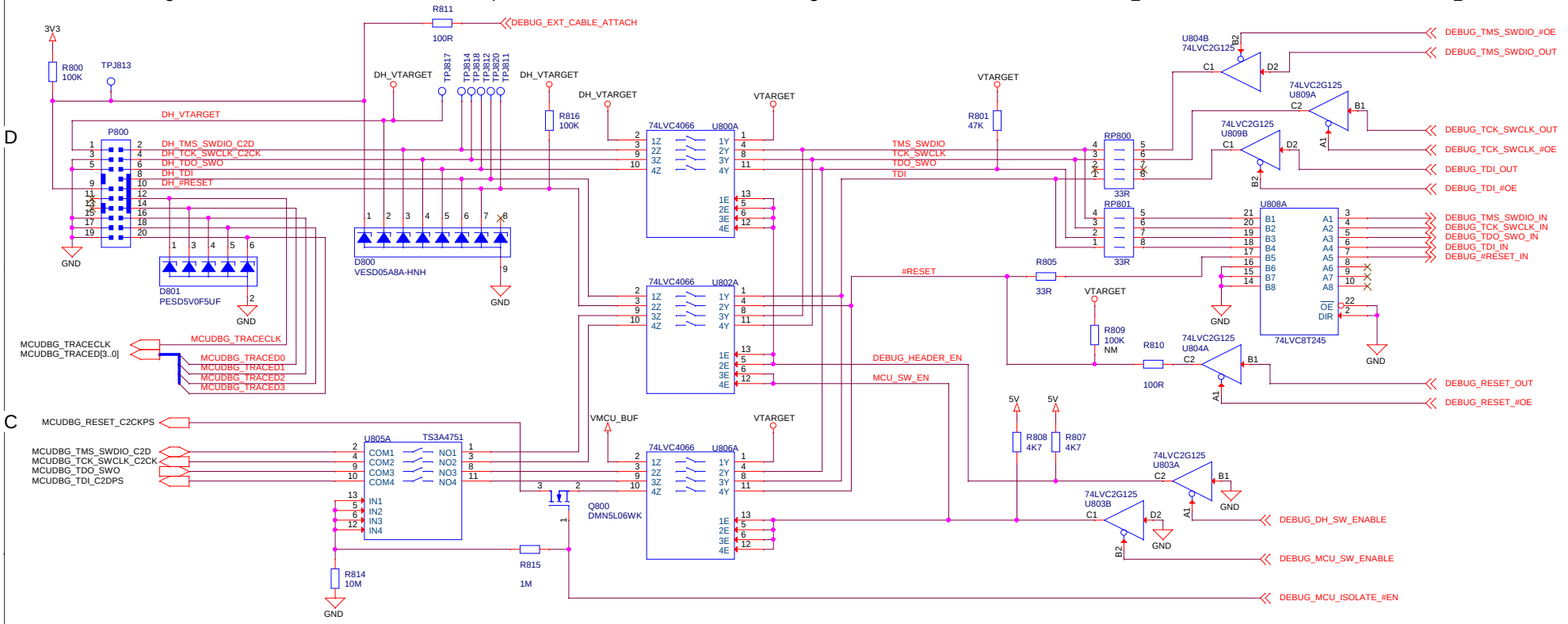
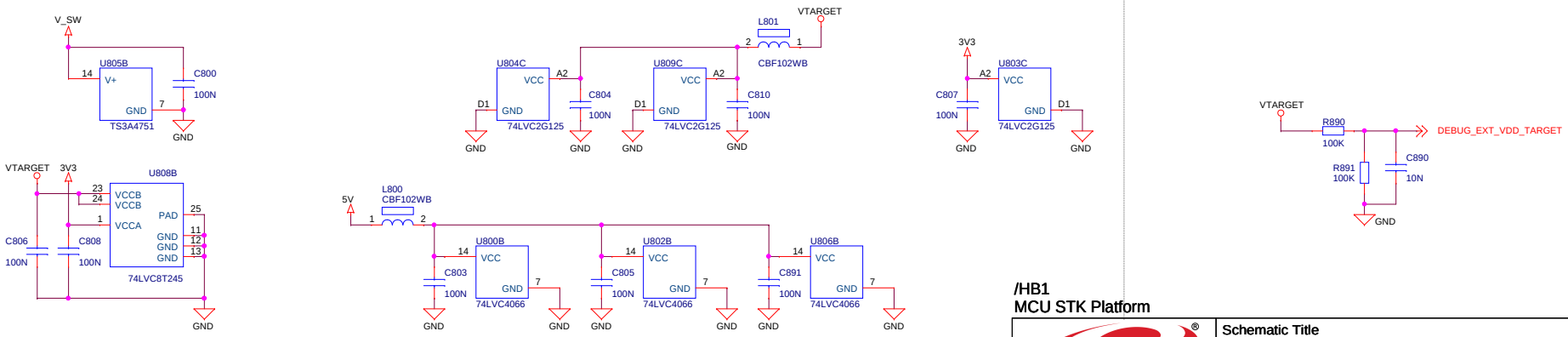


Power & Decoupling



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

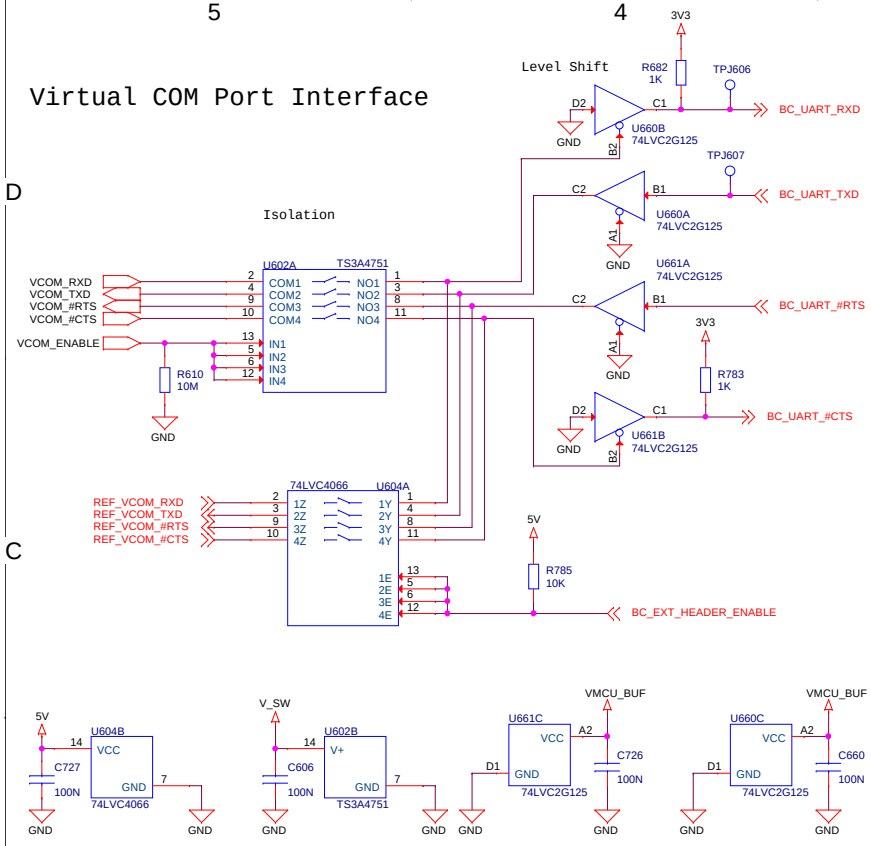
Designed: DDB	Approved: JNO
Size: A3	BOM Doc No: <Cage Code>
Design Created Date: Monday, May 12, 2014	

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

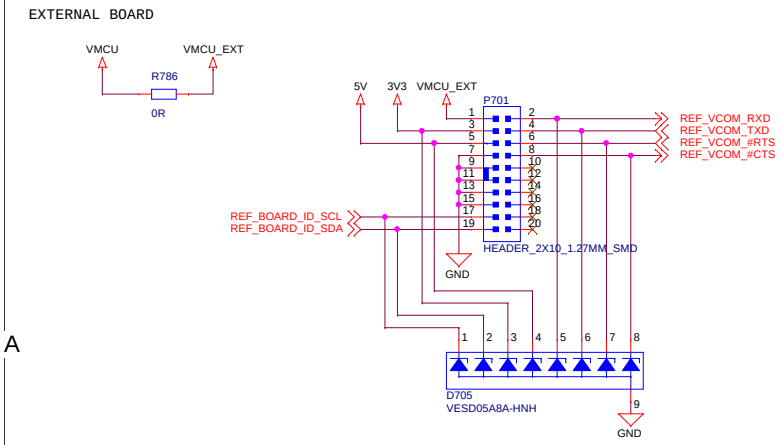
Page Title: **Debug Interface**

Document number: **BRD2012A**		Revision: **B01**
Sheet Created Date: Monday, May 12, 2014	Sheet Modified Date: Monday, March 16, 2015	Sheet: 9 of 10

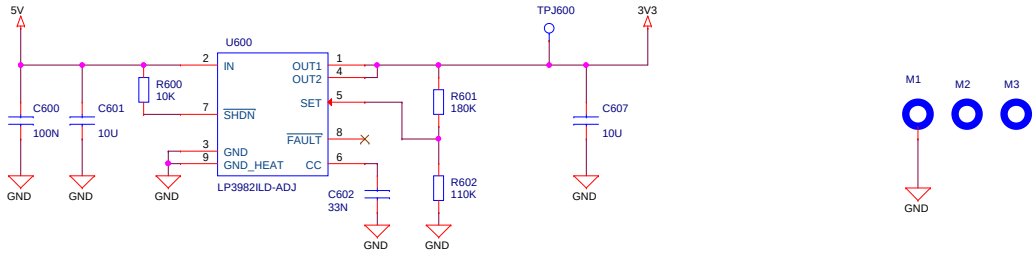
Virtual COM Port Interface



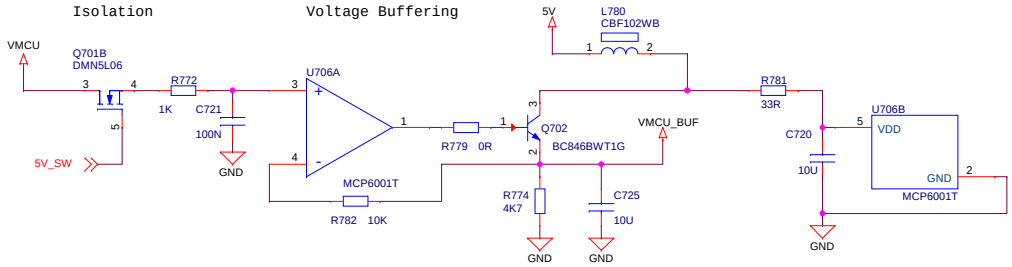
Connector for external reference designs boards



3V3 Regulator



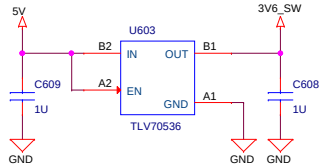
VMCU Voltage Mirror

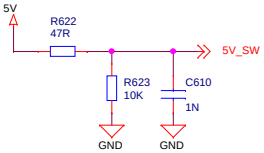


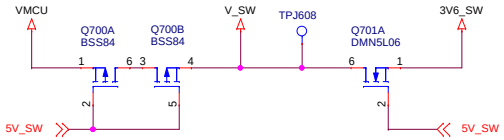
Power Supply for Analog Switches

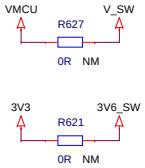
The USB VBUS voltage is used to bias these transistors, turning the P-Channel MOSFETs (Q700) off, and the N-Channel MOSFETs (Q701) on.

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









/HB1
MCU STK Platform

SILICON LABS

Schematic Title	EFM32 Happy Gecko Starter Kit
Page Title	Power & Misc
Designed: DDB	Approved: JNO
Size A3	BOM Doc No: <Cage Code>
Document number	BRD2012A
Revision	B01
Design Created Date: Monday, May 12, 2014	Sheet Created Date Monday, May 12, 2014
Sheet Modified Date	Monday, March 16, 2015
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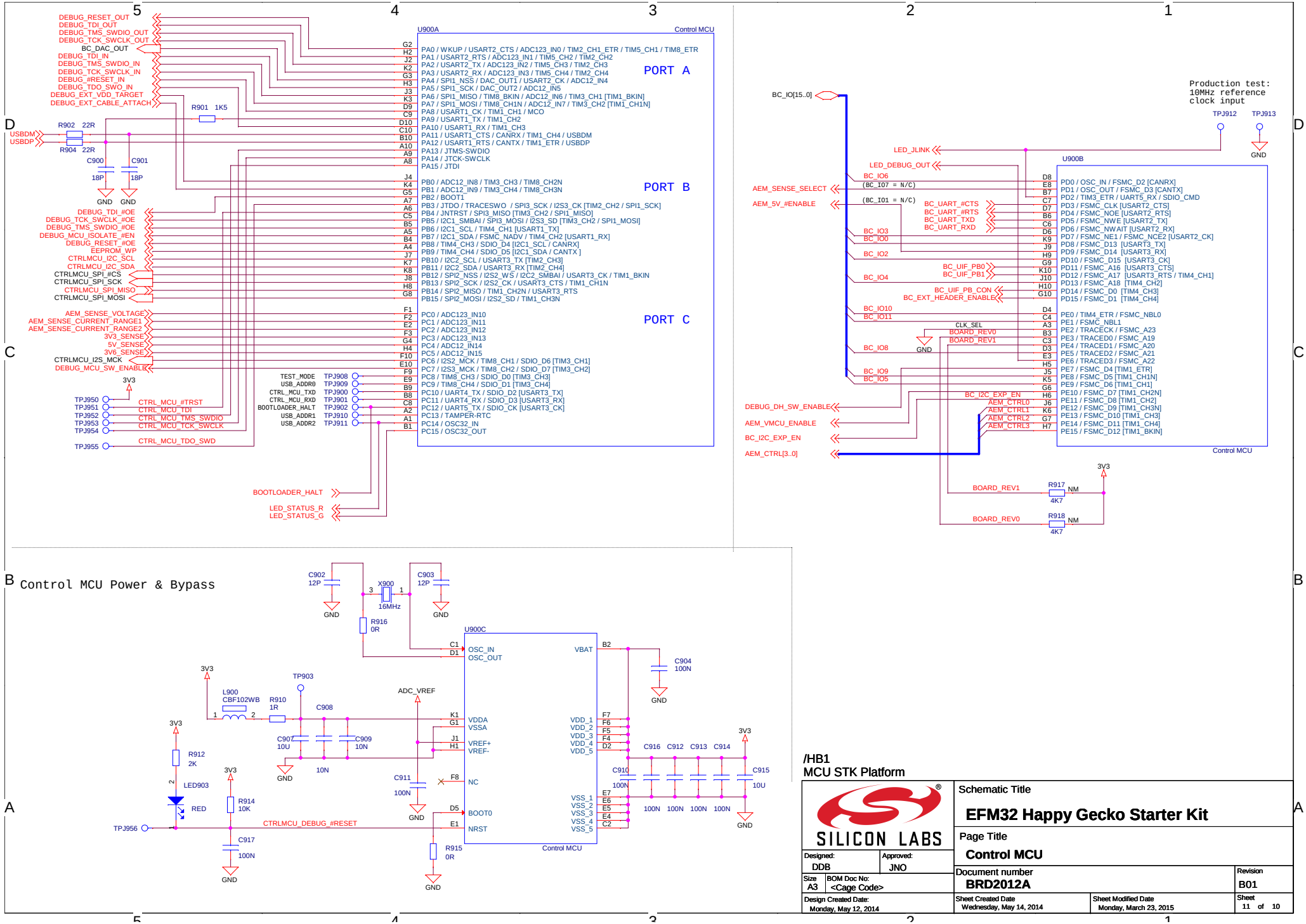

/HB1
MCU STK Platform

SILICON LABS

Schematic Title	EFM32 Happy Gecko Starter Kit
Page Title	Control MCU
Designed: DDB	Approved: JNO
Size A3	BOM Doc No: <Cage Code>
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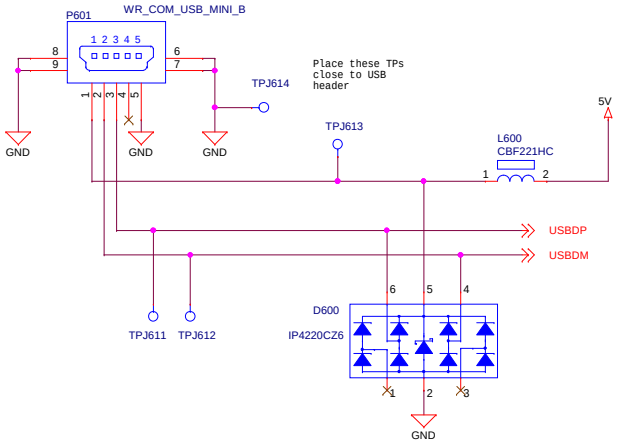
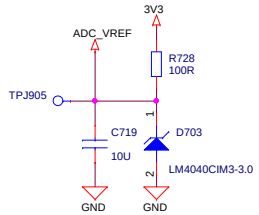
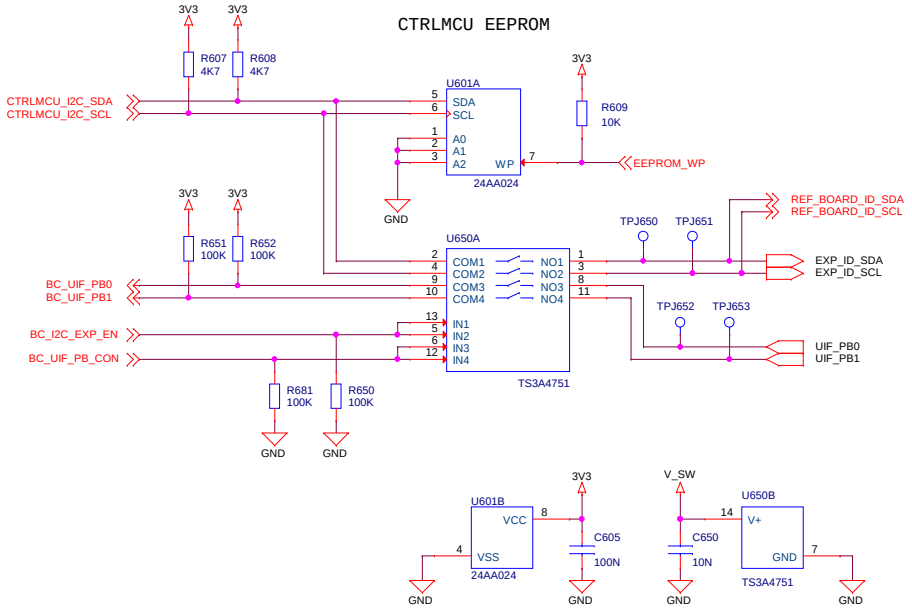
J-Link USB Port



ADC reference voltage



CTRLMCU EEPROM



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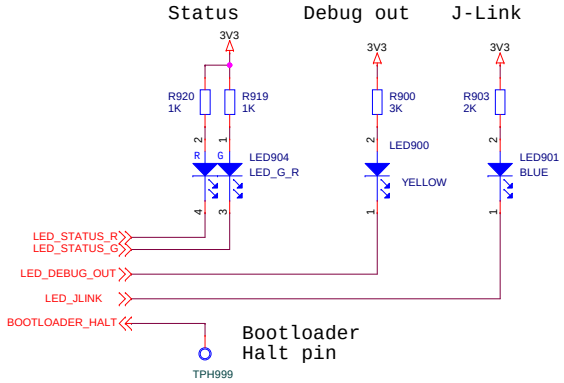
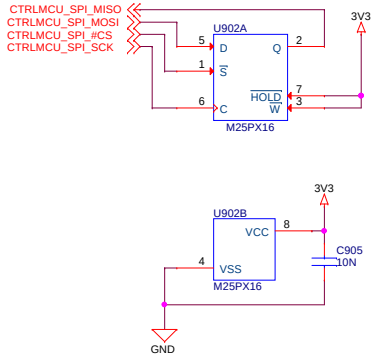
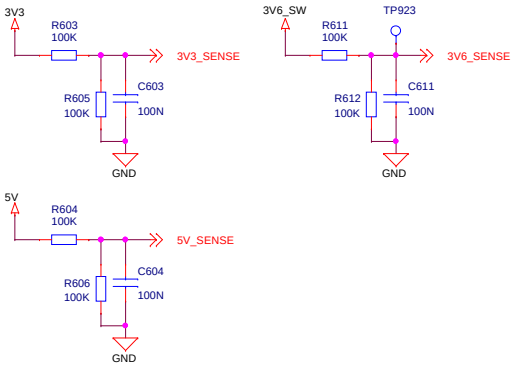


CTRLMCU SERIAL FLASH



POWER SENSE



/HB1
MCU STK Platform

SILICON LABS

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

Page Title: **Board Controller Misc**

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