## EFM8SB2 Sleepy Bee STK



## Revision History

| Rev. | Description |
|---|---|
| A00 | Initial release for production. |
| A01 | Removed ST1 and J103 from the BOM. |
| A02 | Updated PCB revision. |
| A03 | Updated EFM8 to Rev B.<br>Un-mounted D801. |
| A04 | Changed joystick to L-KLS7-MT-03 |



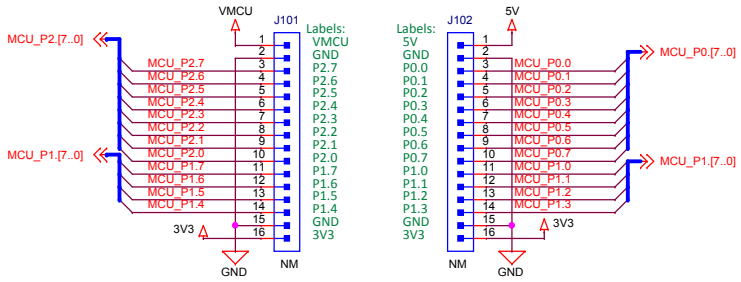
PCB1

PCB5100

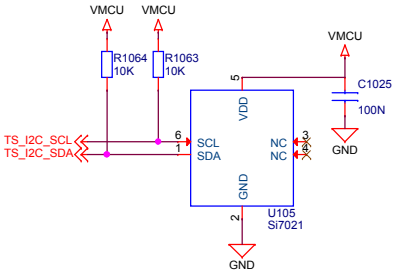
/
STK

| | |
|---|---|
| Schematic Title | EFM8SB2 Sleepy Bee STK |
| Page Title | Title Page |
| Designed: MRW / Approved: JNO | |
| Size: A3 / BOM Doc No: | |
| Document number | BRD5100A |
| Revision | A04 |
| Design Created Date: Wednesday, December 03, 2008 | |
| Sheet Created Date: Thursday, May 15, 2014 | |
| Sheet Modified Date: Wednesday, October 30, 2019 | |
| Sheet: 1 of 11 | |

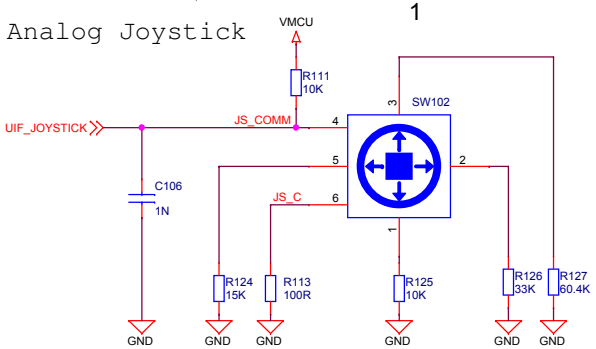
## Breakout Connections



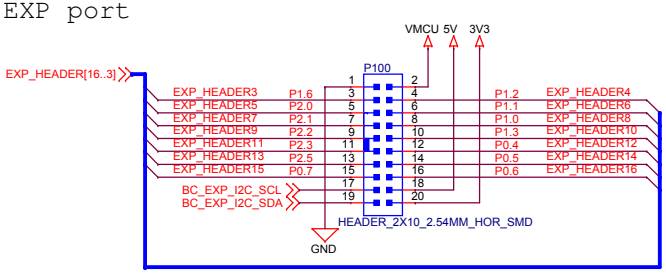

## Temperature & Relative Humidity Sensor




## Analog Joystick




## EXP port



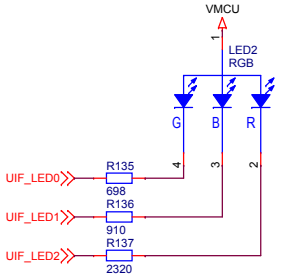

### EXP-Header Functionality

** Indicates potential STK hardware conflicts

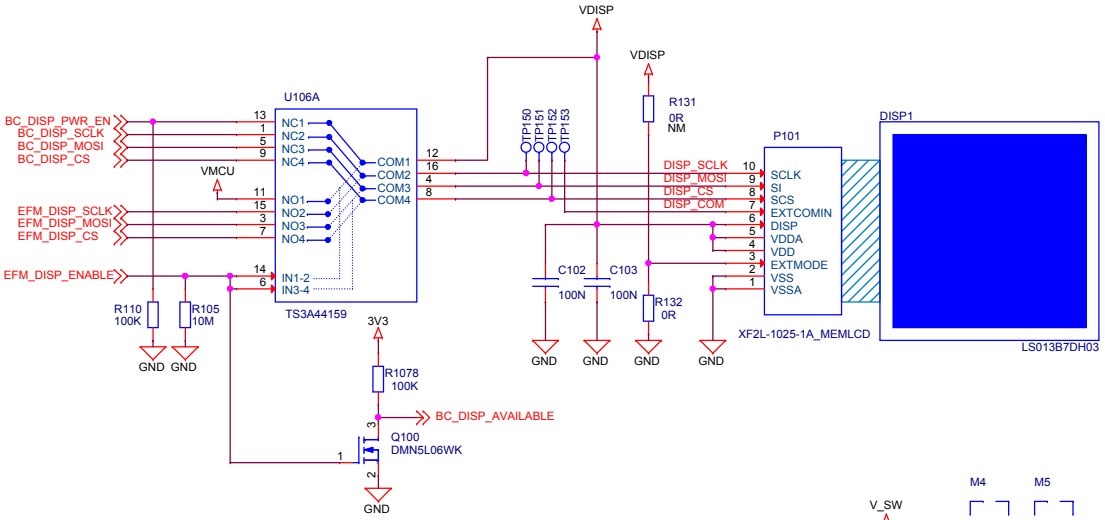
| | | | |
|---|---|---|---|
| 1 | GND | | |
| 3 | P1.6 | | CMPP.7/ADC0.14 |
| 5 | P2.0 | | CMPP.8/ADC0.16 ** STK LED0 |
| 7 | P2.1 | | CMPN.8/ADC0.17 ** STK LED1 |
| 9 | P2.2 | | CMPP.9/ADC0.18 ** STK LED2 |
| 11 | P2.3 | | CMPN.9/ADC0.19 |
| 13 | P2.5 | | CMPN.10/ADC0.21 |
| 15 | P0.7 | I2C0_SCL | CMPN.3/ADC0.7 |
| 17 | Reserved for EXP Board Identification | | |
| 19 | Reserved for EXP Board Identification | | |

| | | | |
|---|---|---|---|
| 2 | VMCU | | |
| 4 | P1.2 | SPI0_MOSI | CMPP.5/ADC0.10 |
| 6 | P1.1 | SPI0_MISO | CMPN.4/ADC0.9 |
| 8 | P1.0 | SPI0_SCK | CMPP.4/ADC0.8 |
| 10 | P1.3 | SPI0_NSS | CMPN.5/ADC0.11 |
| 12 | P0.4 | UART0_TX | CMPP.2/ADC0.4 |
| 14 | P0.5 | UART0_RX | CMPN.2/ADC0.5 |
| 16 | P0.6 | I2C0_SDA | CMPN.3/ADC0.6 |
| 18 | 5V | | |
| 20 | 3V3 | | |

## RGB LED

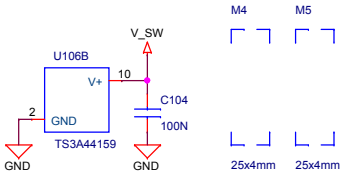



## Memory LCD-TFT Display & Multiplexer

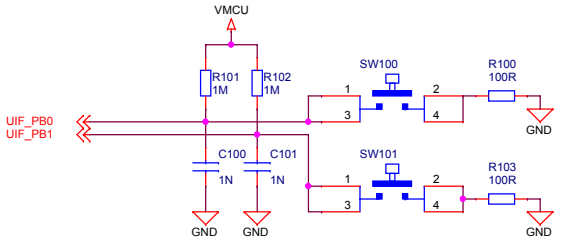



The EFM8 always controls ownership of the display using the EFM_DISP_ENABLE signal.

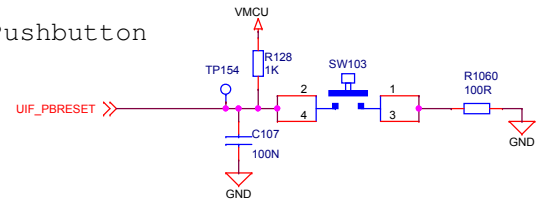
| EFM_DISP_ENABLE | DISP_CTRL | VDISP |
|---|---|---|
| 0 | BC | BC_DISP_PWR_EN |
| 1 | EFM | VMCU |




## User pushbuttons




## RESET Pushbutton




/
STK

SILICON LABS

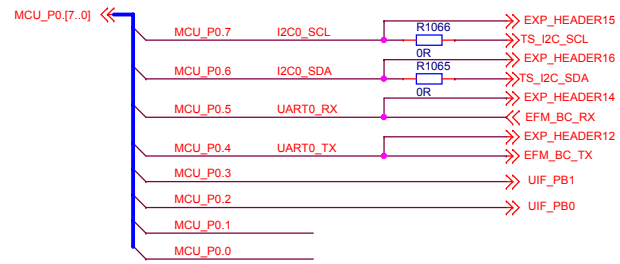
| | |
|---|---|
| Designed: MRW | Approved: JNO |
| Size A3 | BOM Doc No: |
| Design Created Date: Wednesday, December 03, 2008 | |

Schematic Title
**EFM8SB2 Sleepy Bee STK**

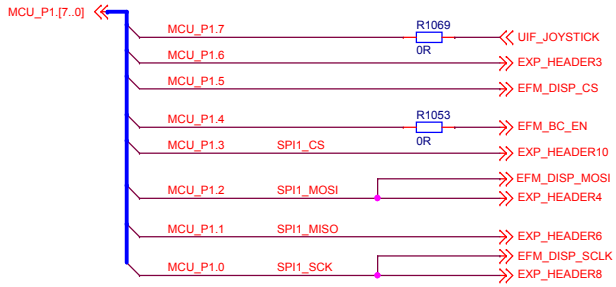
Page Title
**User Interfaces**

| | |
|---|---|
| Document number BRD5100A | Revision A04 |
| Sheet Created Date Wednesday, August 28, 2013 | Sheet Modified Date Wednesday, October 30, 2019 |
| | Sheet 2 of 11 |

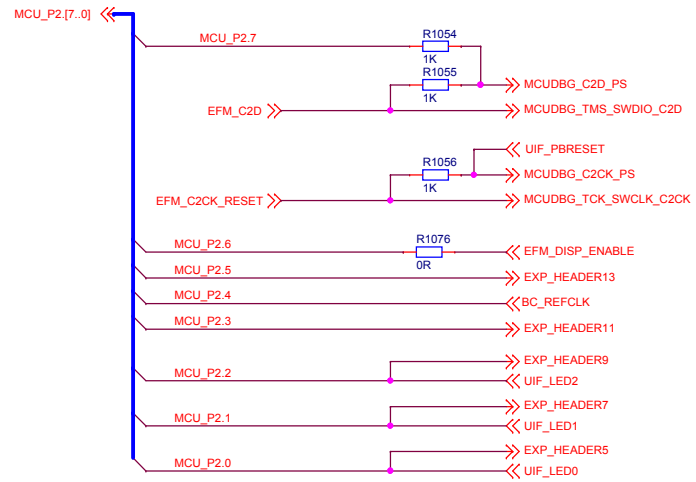
## P0 Connections




## P1 Connections




## P2 & DEBUG Connections



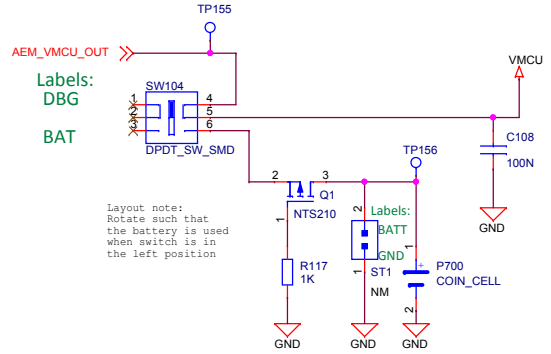

/
STK

SILICON LABS

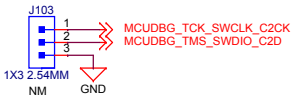
| | |
|---|---|
| Schematic Title | EFM8SB2 Sleepy Bee STK |
| Page Title | Signal Assignments |
| Designed: MRW / Approved: JNO | |
| Size A3 / BOM Doc No: | Document number BRD5100A / Revision A04 |
| Design Created Date: Wednesday, December 03, 2008 | Sheet Created Date: Wednesday, August 28, 2013 / Sheet Modified Date: Tuesday, December 19, 2017 / Sheet 3 of 11 |

## Power Switch

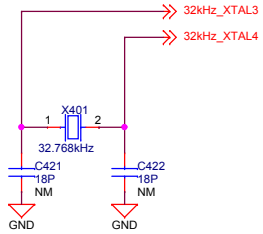
| SWITCH POS | MODE DESCRIPTION |
|---|---|
| DBG | AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply |
| | |
| BAT | AEM Disabled, VMCU sourced from external coin-cell battery or external power supply |

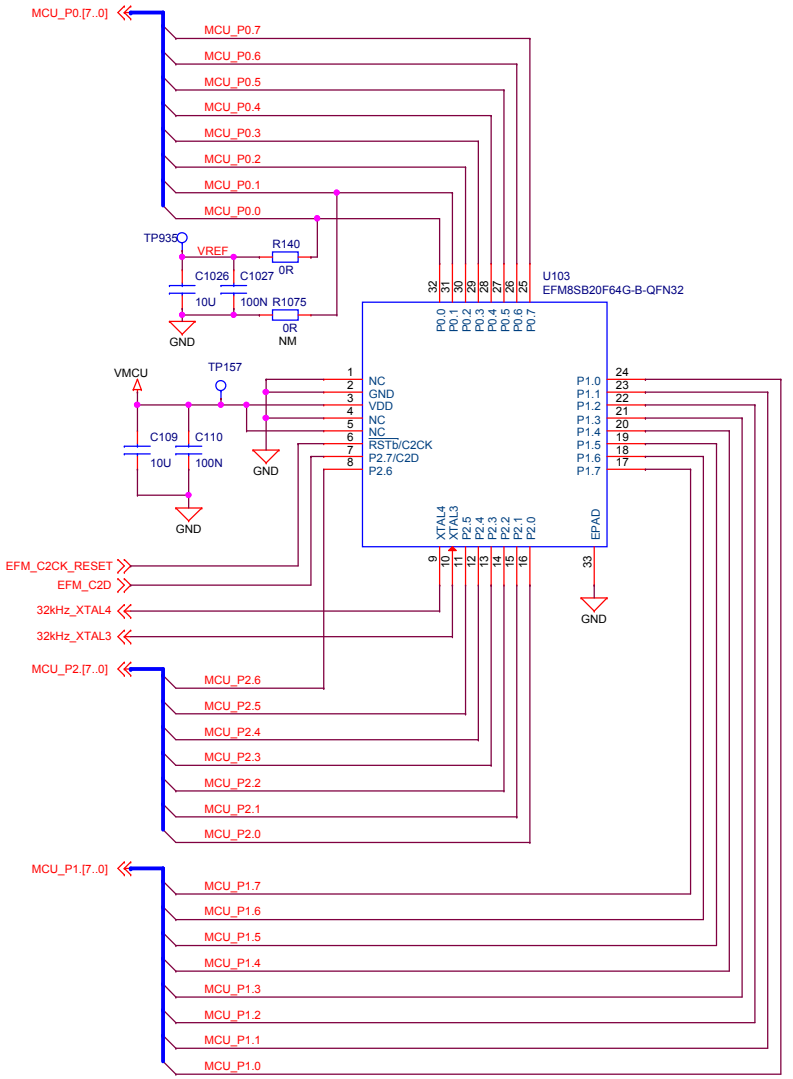



## C2 Debug Header




## Low Frequency Clock




/
STK

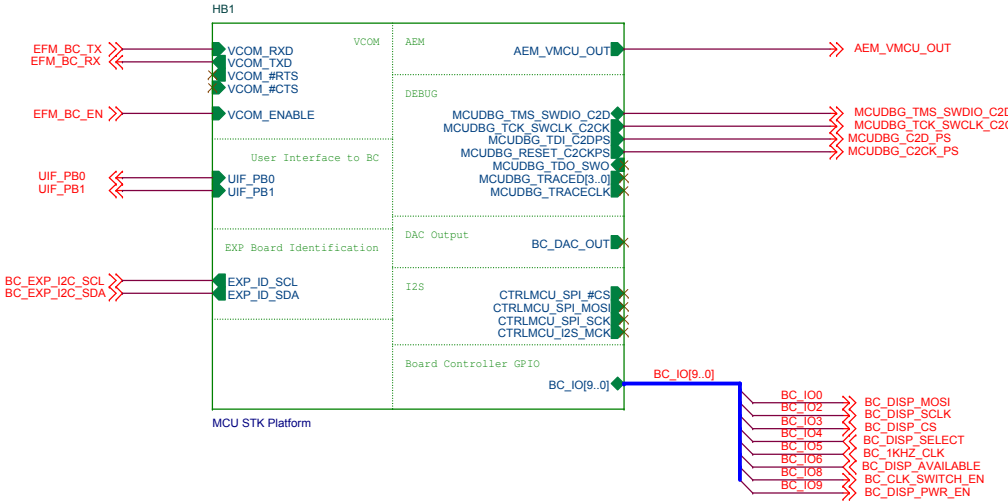
SILICON LABS

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

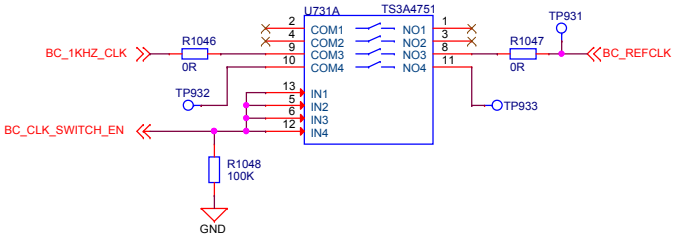
Schematic Title
**EFM8SB2 Sleepy Bee STK**

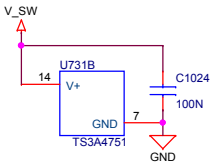
Page Title
**EFM8 I/O & Power**

| | | |
|---|---|---|
| Document number BRD5100A | | Revision A04 |
| Sheet Created Date Wednesday, August 28, 2013 | Sheet Modified Date Tuesday, December 19, 2017 | Sheet 4 of 11 |




Analog Switch



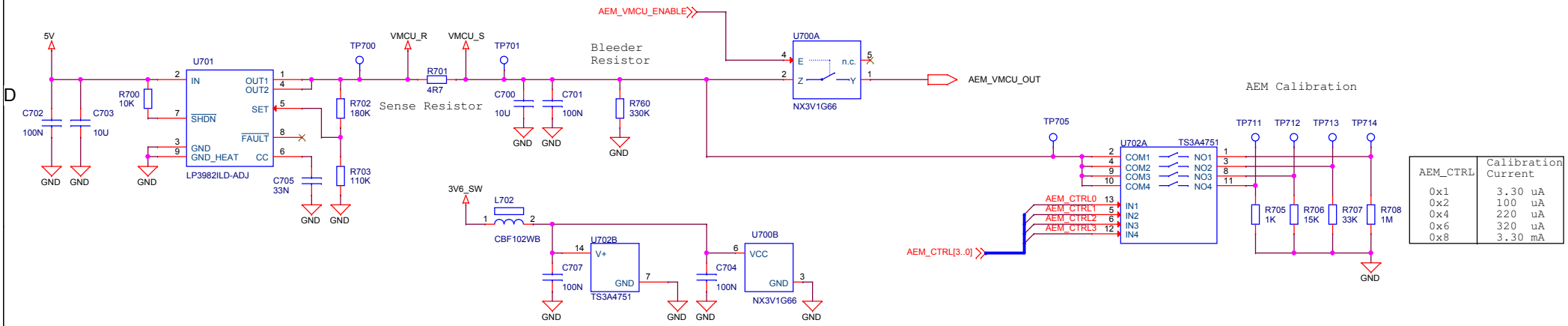




/
STK

SILICON LABS

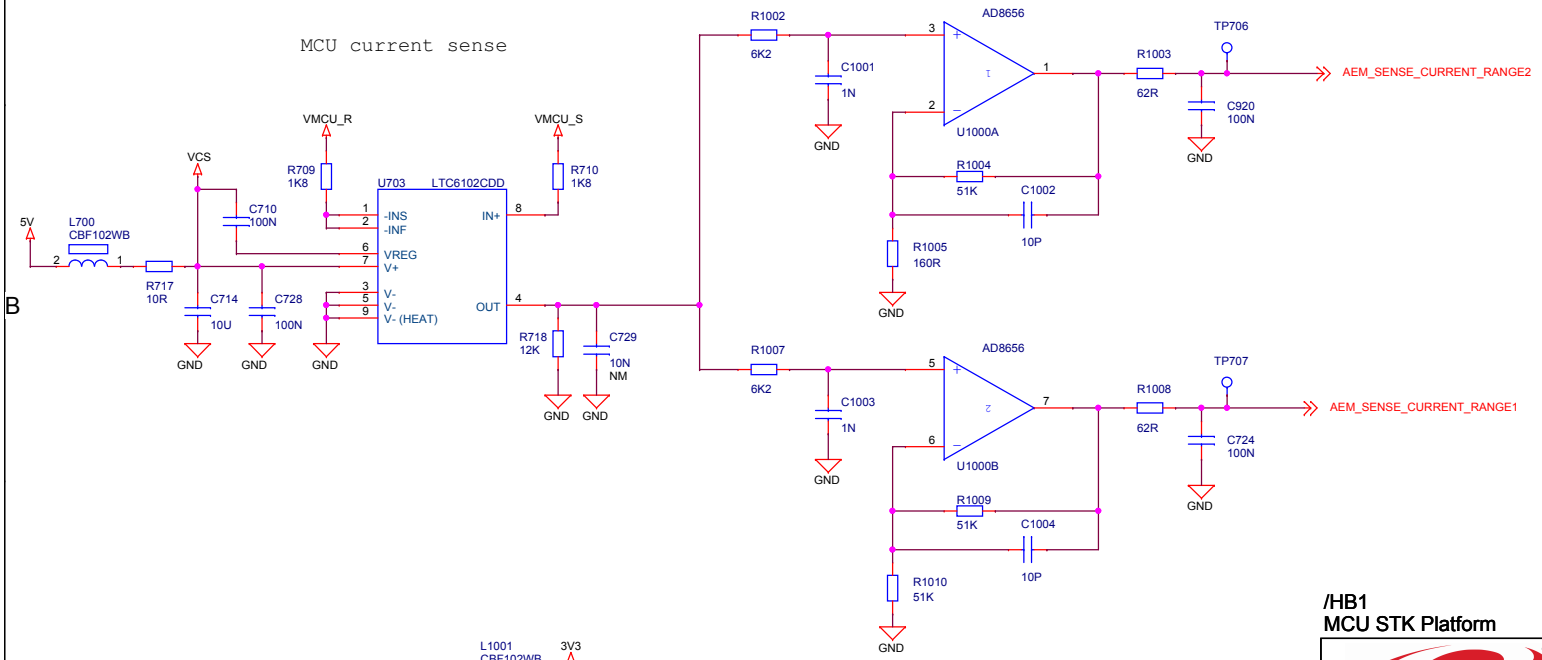
| | |
|---|---|
| Schematic Title | **EFM8SB2 Sleepy Bee STK** |
| Page Title | **STK Common Platform** |
| Designed: MRW / Approved: JNO | |
| Size: A3 / BOM Doc No: | Document number: **BRD5100A** / Revision: **A04** |
| Design Created Date: Wednesday, December 03, 2008 | Sheet Created Date: Thursday, May 15, 2014 / Sheet Modified Date: Tuesday, December 19, 2017 / Sheet 5 of 11 |

## MCU power regulator

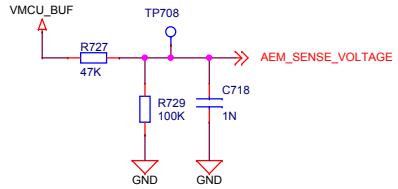


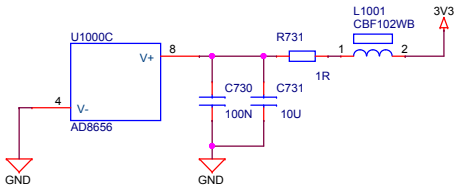

| AEM_CTRL | Calibration Current |
|---|---|
| 0x1 | 3.30 uA |
| 0x2 | 100 uA |
| 0x4 | 220 uA |
| 0x6 | 320 uA |
| 0x8 | 3.30 mA |

## MCU current sense




## MCU Voltage Sense




/HB1
MCU STK Platform

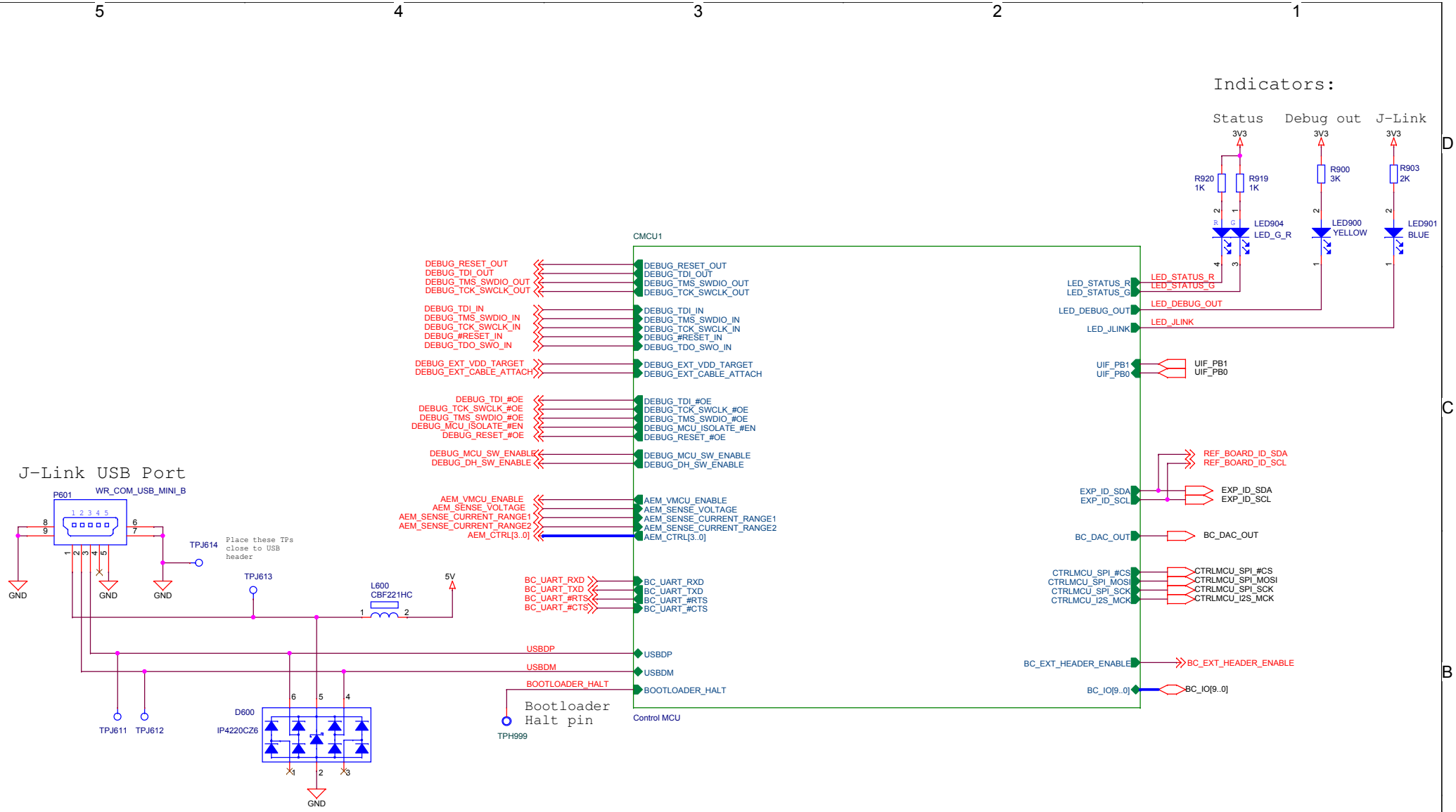
SILICON LABS

| | |
|---|---|
| Designed: DDB | Approved: JNO |
| Size A3 | BOM Doc No: |
| Design Created Date: Monday, May 12, 2014 | |

Schematic Title
**EFM8SB2 Sleepy Bee STK**

Page Title
**Advanced Energy Monitor**

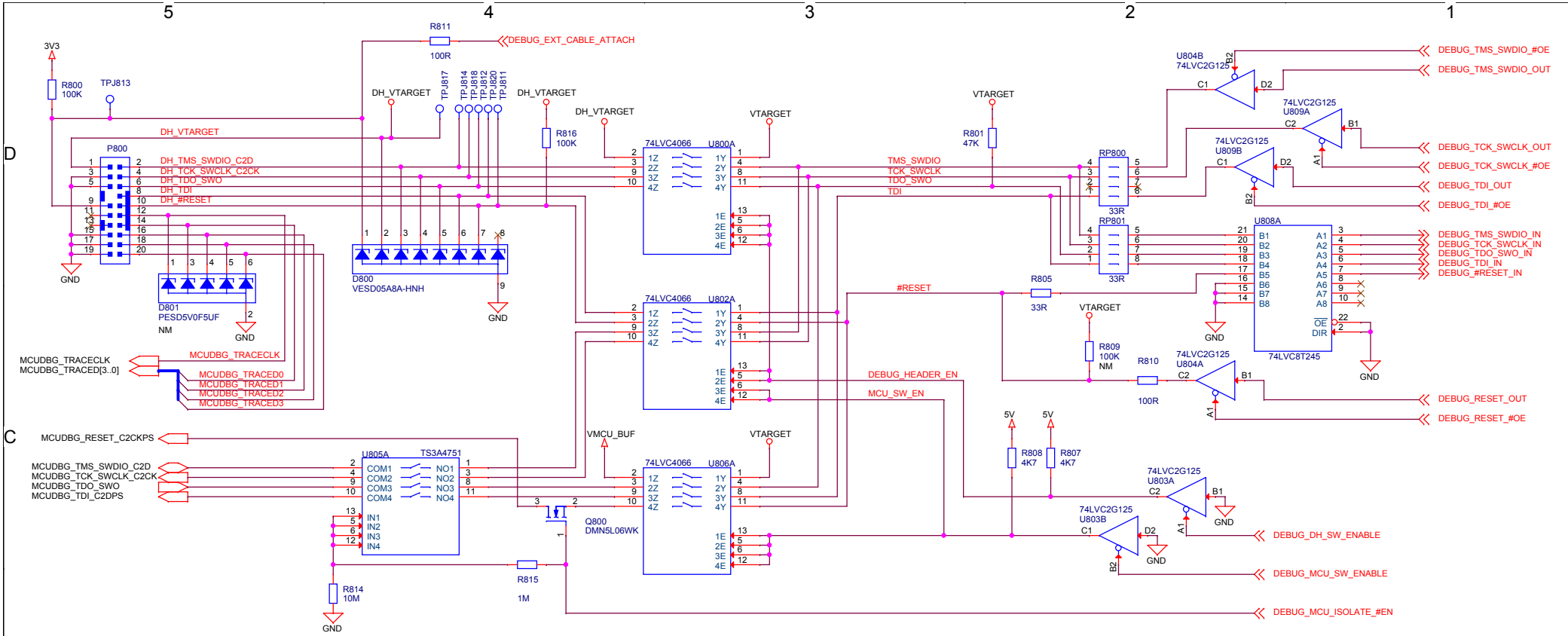
| | | |
|---|---|---|
| Document number BRD5100A | | Revision A04 |
| Sheet Created Date Tuesday, May 13, 2014 | Sheet Modified Date Wednesday, December 13, 2017 | Sheet 6 of 11 |



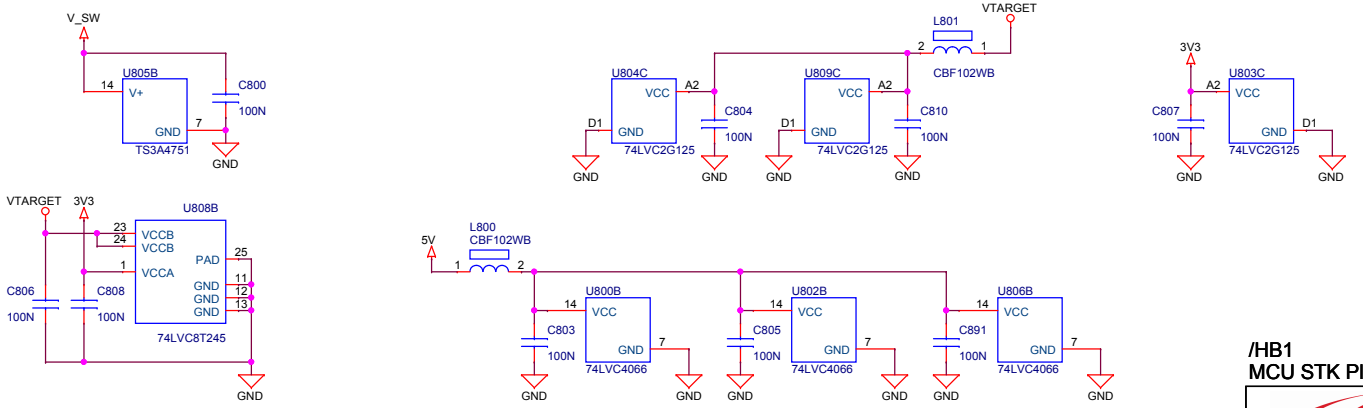

/HB1
MCU STK Platform

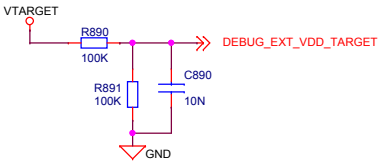
SILICON LABS

| | |
|---|---|
| Schematic Title | EFM8SB2 Sleepy Bee STK |
| Page Title | Control MCU |
| Designed: ANB / Approved: JNO | |
| Size A3 / BOM Doc No: | |
| Document number | BRD5100A |
| Revision | A04 |
| Design Created Date: Monday, May 12, 2014 | |
| Sheet Created Date: Wednesday, May 14, 2014 | |
| Sheet Modified Date: Wednesday, December 13, 2017 | |
| Sheet 7 of 11 | |




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: |
| Design Created Date: Monday, May 12, 2014 | |

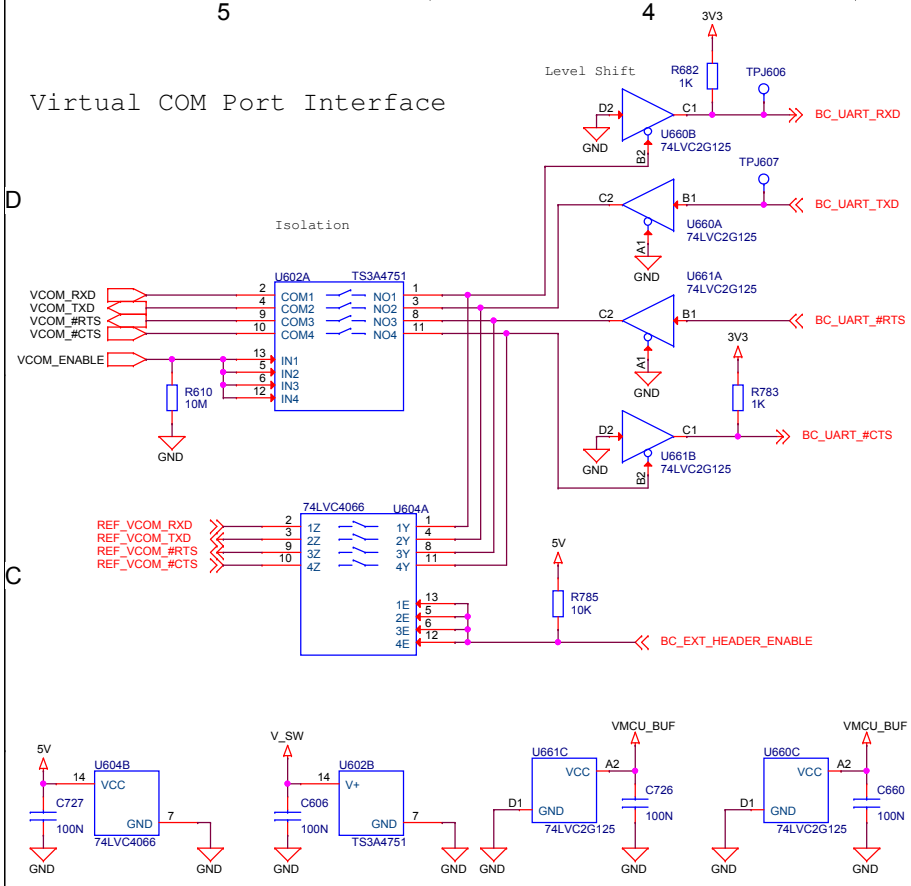
Schematic Title
**EFM8SB2 Sleepy Bee STK**

Page Title
**Debug Interface**

| Document number | Revision |
|---|---|
| BRD5100A | A04 |

| Sheet Created Date | Sheet Modified Date | Sheet |
|---|---|---|
| Monday, May 12, 2014 | Wednesday, December 13, 2017 | 8 of 11 |

## Virtual COM Port Interface

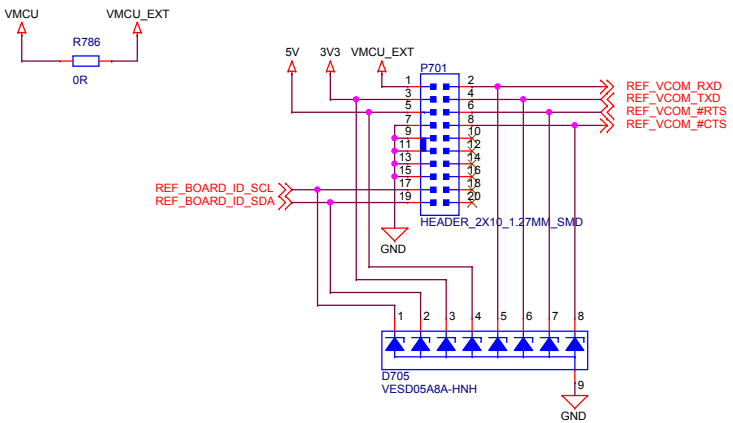




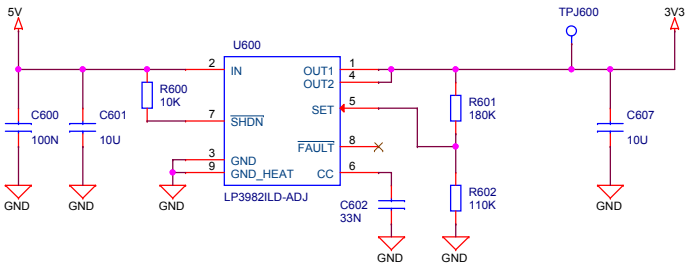


## Connector for external reference designs boards

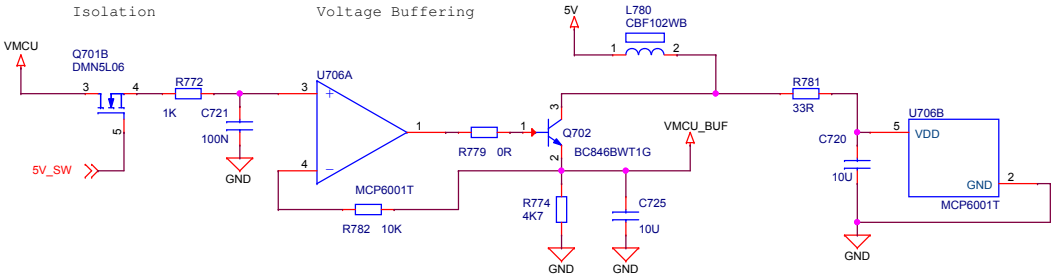
EXTERNAL BOARD




## 3V3 Regulator



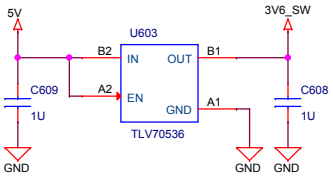

## VMCU Voltage Mirror

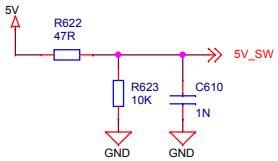


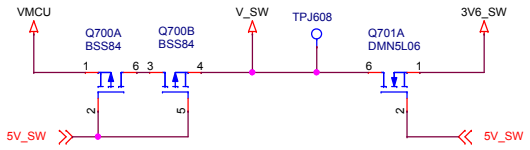

## Power Supply for Analog Switches

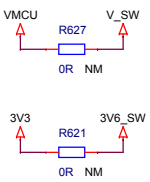
The USB VBUS voltage is used to bias these transistors, turning the P-Channel MOSFETs (Q700) off, and the N-Channel MOSFETs (Q701) on.

| 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

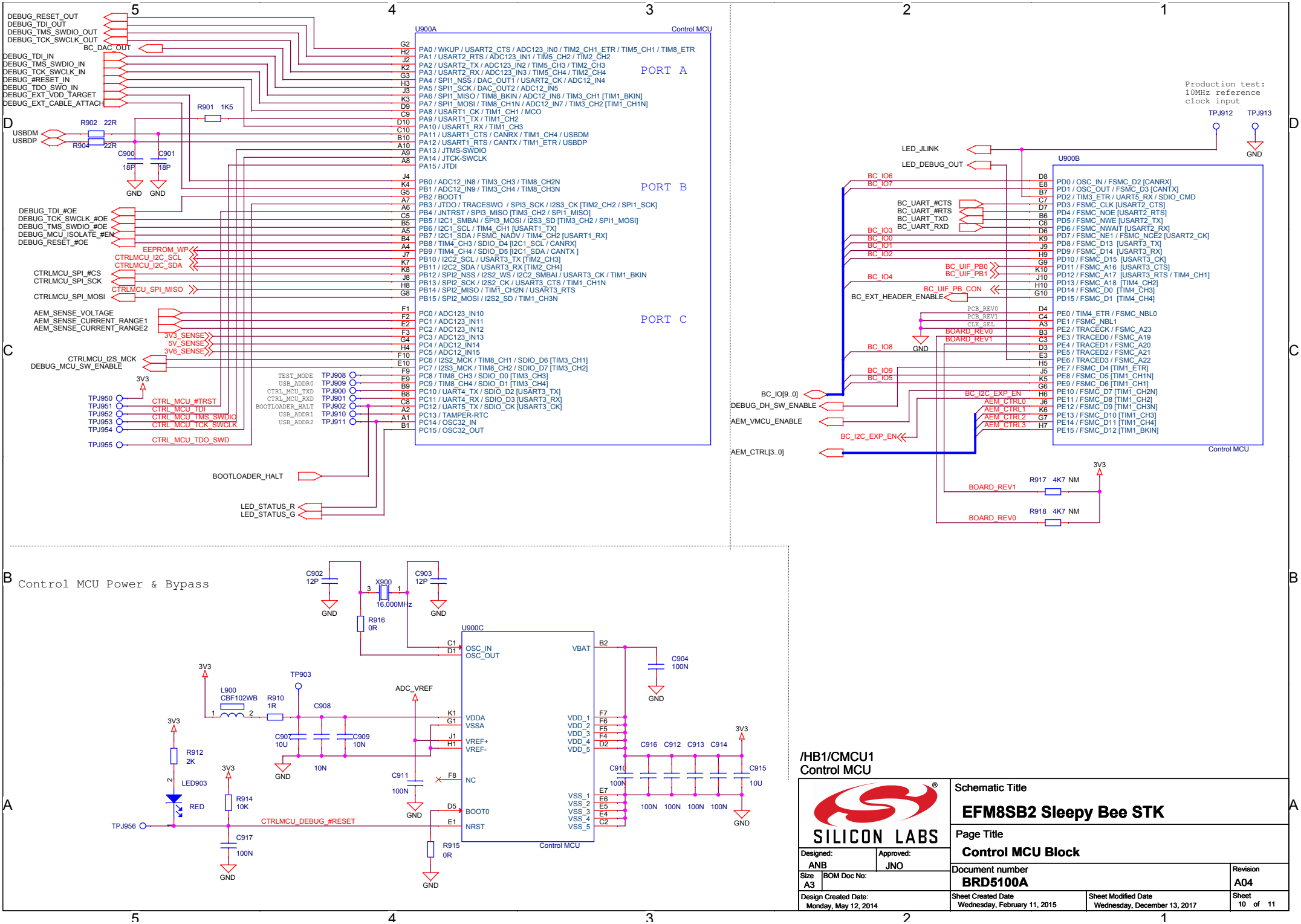
| | |
|---|---|
| Designed: DDB | Approved: JNO |
| Size A3 | BOM Doc No: |
| Design Created Date: Monday, May 12, 2014 | |

Schematic Title
**EFM8SB2 Sleepy Bee STK**

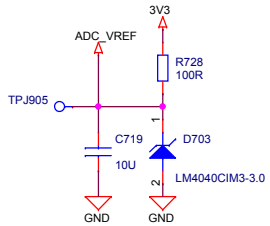
Page Title
**Power & Misc.**

| Document number | Revision |
|---|---|
| BRD5100A | A04 |

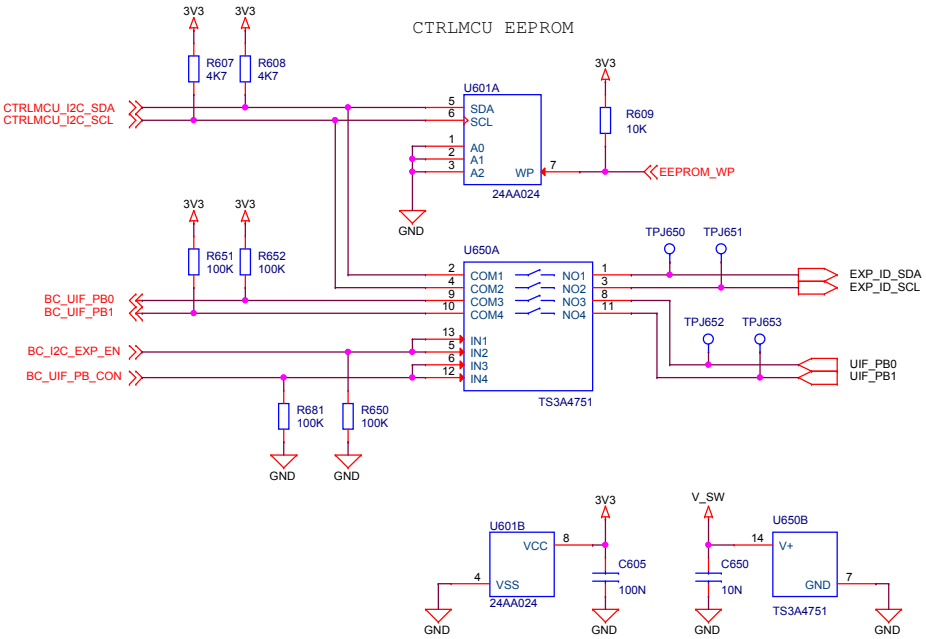
| Sheet Created Date | Sheet Modified Date | Sheet |
|---|---|---|
| Monday, May 12, 2014 | Wednesday, December 13, 2017 | 9 of 11 |



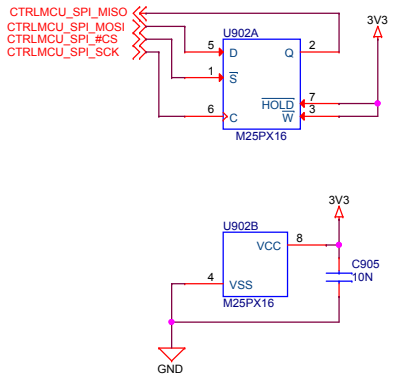
## ADC reference voltage



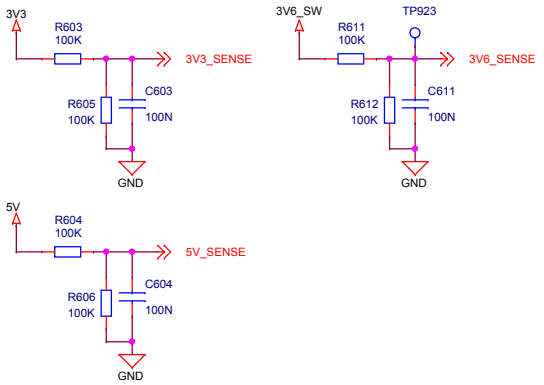

## CTRLMCU EEPROM




## CTRLMCU SERIAL FLASH




## POWER SENSE




/HB1/CMCU1
Control MCU

SILICON LABS

| | |
|---|---|
| Designed: ANB | Approved: JNO |
| Size: A3 | BOM Doc No: |
| Design Created Date: Monday, May 12, 2014 | |

Schematic Title: **EFM8SB2 Sleepy Bee STK**

Page Title: **Control MCU Misc.**

| | |
|---|---|
| Document number: **BRD5100A** | Revision: **A04** |
| Sheet Created Date: Wednesday, February 11, 2015 | Sheet Modified Date: Tuesday, December 19, 2017 |
| | Sheet: 11 of 11 |