



## PG23 Pro Kit

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|----------------|------|

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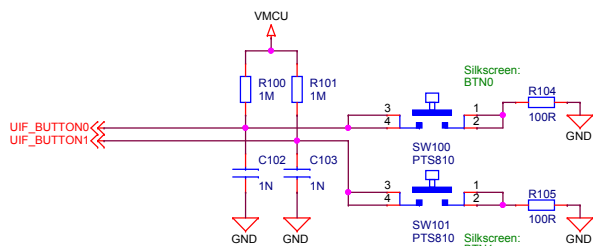
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## Revision History

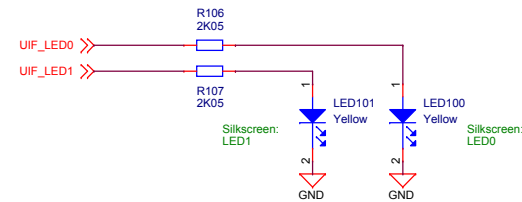
| Rev. | Description       |
|------|-------------------|
| A00  | Initial version.  |
| A01  | Bump U1 revision. |

|                                                                                                              |                                                      |                                        |                         |
|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------|-------------------------|
| <br><b>SILICON LABS</b> |                                                      | Board Name<br><b>EFM32PG23 Pro Kit</b> |                         |
|                                                                                                              |                                                      | Page Title<br><b>Title Page</b>        |                         |
| Designed<br><b>MAH</b>                                                                                       | Approved<br><b>RGU</b>                               | Board Number<br><b>BRD2504A</b>        | Revision<br><b>A01</b>  |
| Size<br><b>A3</b>                                                                                            | Sheet Modified Date<br><b>Thursday, May 06, 2021</b> |                                        | Sheet<br><b>1 of 13</b> |
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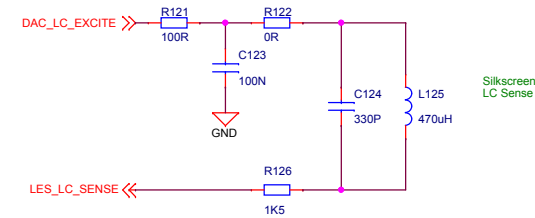
## Push Buttons



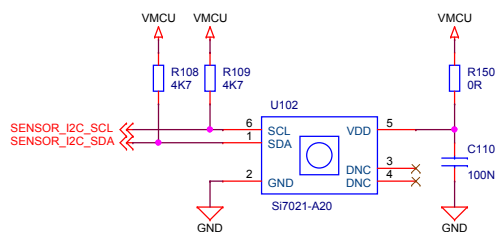
## LEDs



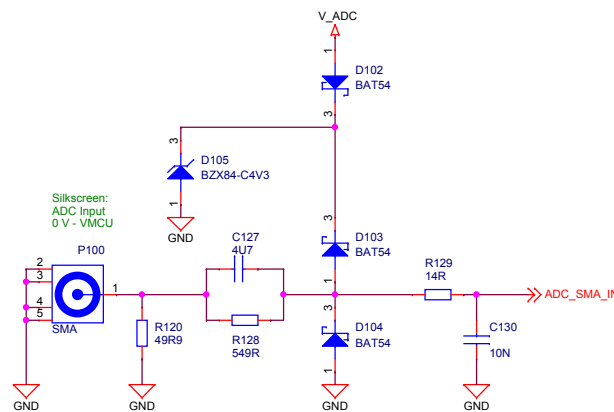
## LESENSE LC-Sensor



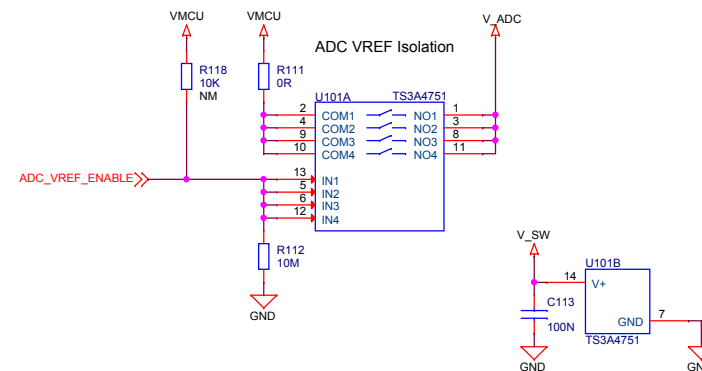
## Relative Humidity & Temperature Sensor



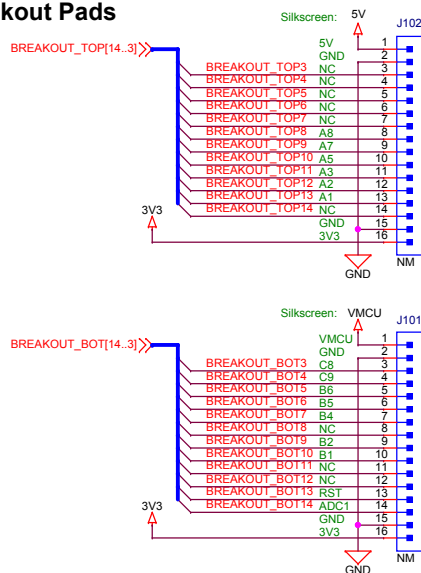
## SMA Connector



## ADC VREF

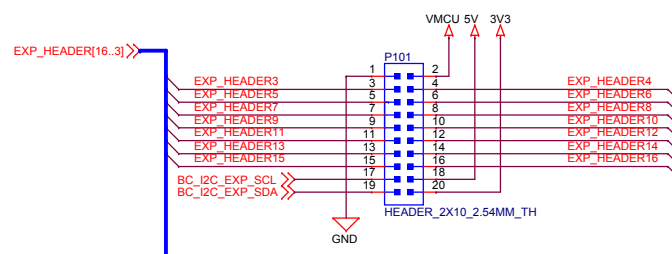


## Breakout Pads



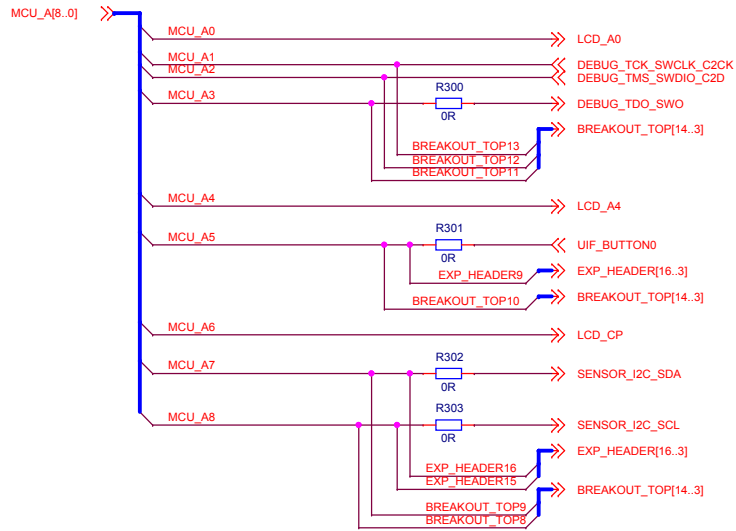
## EXP Header

| EXP Header Functionality |                                       | Top Row    |
|--------------------------|---------------------------------------|------------|
| 2                        | VMCU                                  |            |
| 4                        | NC                                    |            |
| 6                        | NC                                    |            |
| 8                        | NC                                    |            |
| 10                       | NC                                    |            |
| 12                       | B5                                    | UART_TX    |
| 14                       | B6                                    | UART_RX    |
| 16                       | A7                                    | I2C_SDA    |
| 18                       | 5V                                    |            |
| 20                       | 3V3                                   |            |
|                          |                                       | Bottom Row |
| 1                        | GND                                   |            |
| 3                        | ADC1                                  |            |
| 5                        | NC                                    |            |
| 7                        | NC                                    |            |
| 9                        | A5                                    | GPIO       |
| 11                       | B4                                    | GPIO       |
| 13                       | C9                                    | GPIO       |
| 15                       | A8                                    | I2C_SCL    |
| 17                       | Reserved for EXP Board Identification |            |
| 19                       | Reserved for EXP Board Identification |            |

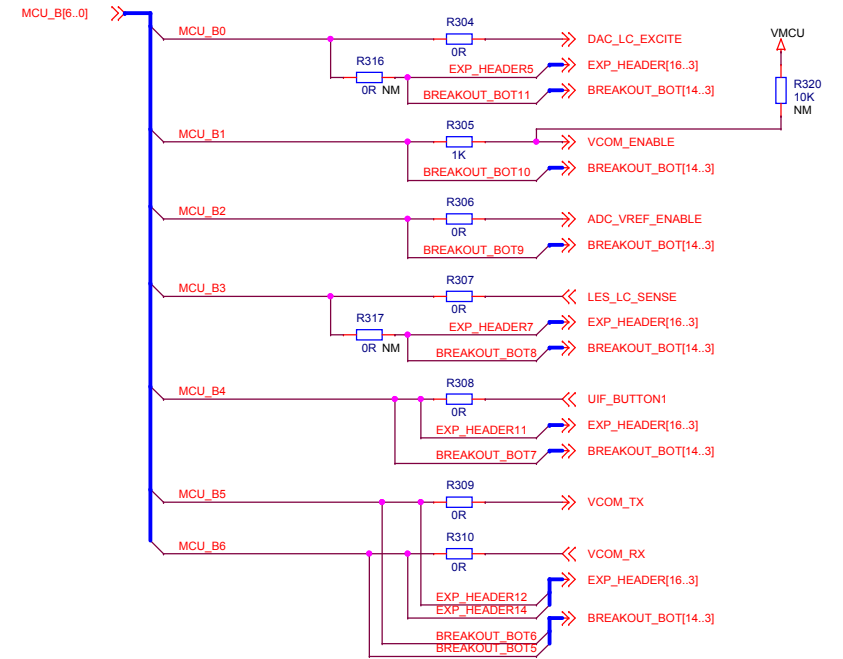


|                                                                                    |  |                                               |                                 |                        |
|------------------------------------------------------------------------------------|--|-----------------------------------------------|---------------------------------|------------------------|
|                                                                                    |  | Board Name                                    |                                 |                        |
|                                                                                    |  | <b>EFM32PG23 Pro Kit</b>                      |                                 |                        |
| Designed<br>MAH                                                                    |  | Page Title                                    |                                 |                        |
|                                                                                    |  | <b>User Interface</b>                         |                                 |                        |
| Size<br>A3                                                                         |  | Sheet Modified Date<br>Thursday, May 06, 2021 | Board Number<br><b>BRD2504A</b> | Revision<br><b>A01</b> |
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| Sheet<br>2 of 13                                                                   |  |                                               |                                 |                        |

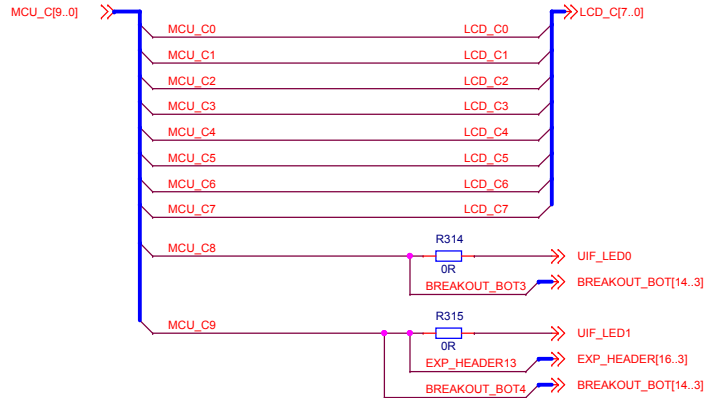
## PA Connections



## PB Connections



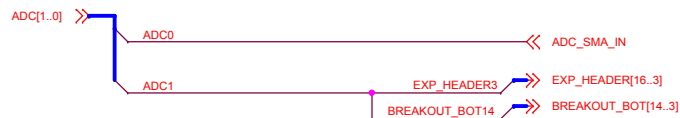
## PC Connections



## PD Connections

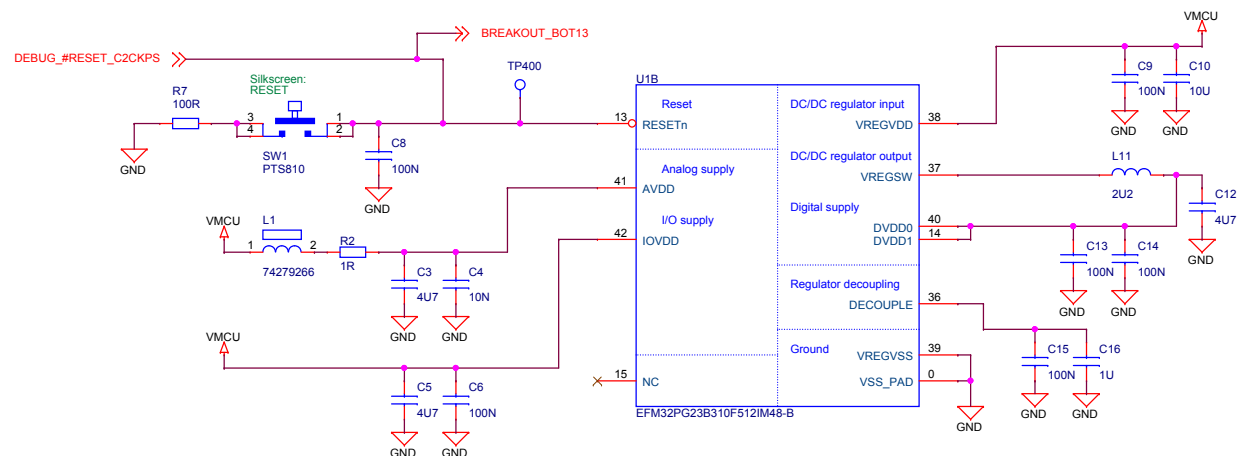


## ADC Connections



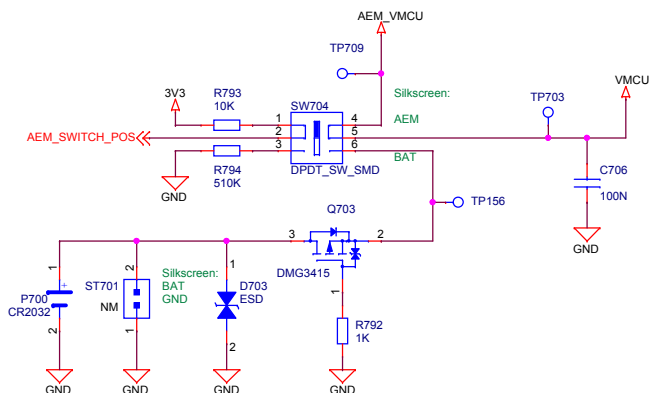
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|---------------------------------------------------------------------------------------|--------------------------------------------|--------------------|---------------|
|  |                                            | Board Name         |               |
|                                                                                       |                                            | EFM32PG23 Pro Kit  |               |
| Designed MAH                                                                          |                                            | Page Title         |               |
| Approved RGU                                                                          |                                            | Signal Assignments |               |
| Size A3                                                                               | Sheet Modified Date Thursday, May 06, 2021 | Board Number       | Revision      |
|                                                                                       |                                            | BRD2504A           | A01           |
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## EFM32 Power and Decoupling

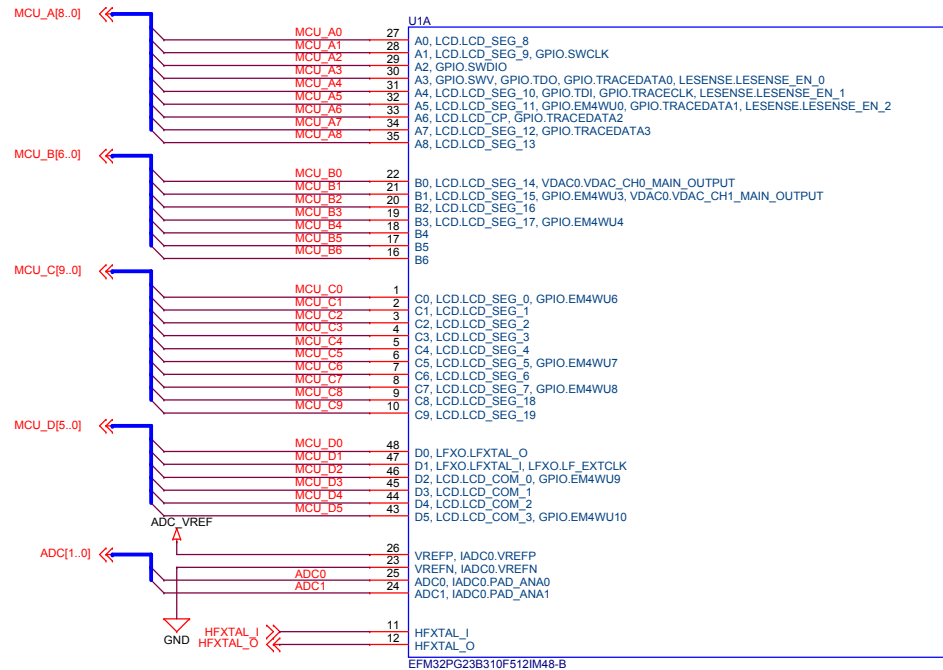


## Power Select Switch: AEM/BAT

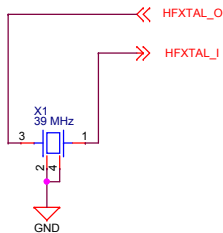
| SWITCH POS | MODE DESCRIPTION                                                             |
|------------|------------------------------------------------------------------------------|
| AEM        | AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply |
| BAT        | AEM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



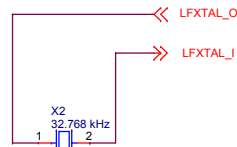
|                                                                                       |                                               |                                                                                                     |                        |
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|  |                                               | Board Name<br><b>EFM32PG23 Pro Kit</b>                                                              |                        |
|                                                                                       |                                               | Page Title<br><b>EFM32 Power</b>                                                                    |                        |
| Designed<br>MAH                                                                       | Approved<br>RGU                               | Board Number<br><b>BRD2504A</b>                                                                     | Revision<br><b>A01</b> |
| Size<br>A3                                                                            | Sheet Modified Date<br>Thursday, May 06, 2021 | COPYRIGHT SILICON LABORATORIES INC. 2021    CONFIDENTIAL – SUBJECT TO TERMS OF USE<br>Sheet 4 of 13 |                        |



## High Frequency Clock

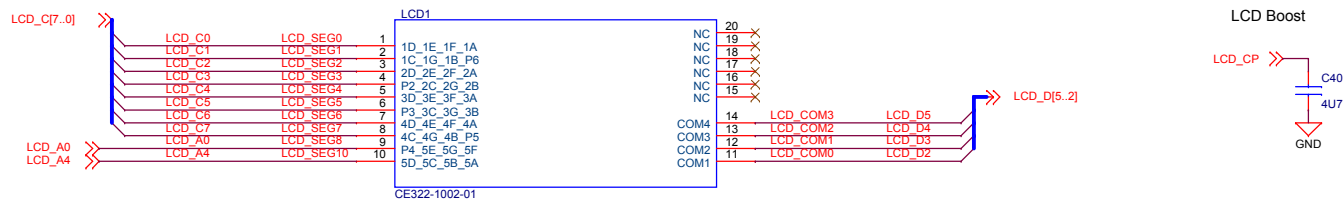


## Low Frequency Clock



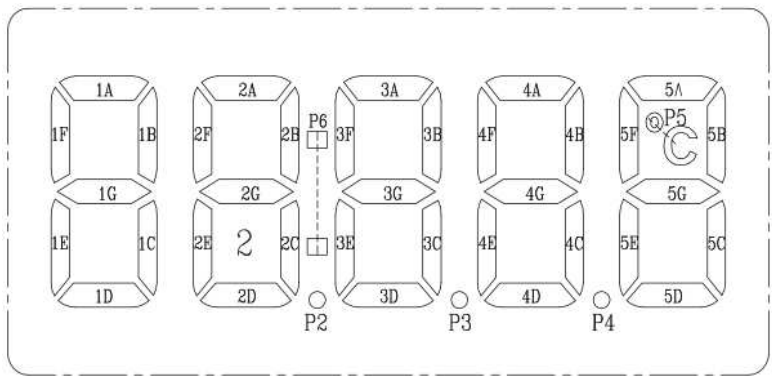
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|------------------------------------------|------------------------|----------------------------------------|--|
|                                          |                        | Board Name                             |  |
|                                          |                        | EFM32PG23 Pro Kit                      |  |
| Designed                                 |                        | Page Title                             |  |
| MAH                                      |                        | EFM32 I/O                              |  |
| Approved                                 |                        | Board Number                           |  |
| RGU                                      |                        | BRD2504A                               |  |
| Size                                     | Sheet Modified Date    | Revision                               |  |
| A3                                       | Thursday, May 06, 2021 | A01                                    |  |
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## Segment LCD Signal Connections



## Segment Names

| PIN  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11   | 12   | 13   | 14   | 15 | 16 | 17 | 18 | 19 | 20 |
|------|----|----|----|----|----|----|----|----|----|----|------|------|------|------|----|----|----|----|----|----|
| COM1 | 1D | 1C | 2D | P2 | 3D | P3 | 4D | 4C | P4 | 5D | COM1 | --   | --   | --   | -- | -- | -- | -- | -- | -- |
| COM2 | 1E | 1G | 2E | 2C | 3E | 3C | 4E | 4G | 5E | 5C | --   | COM2 | --   | --   | -- | -- | -- | -- | -- | -- |
| COM3 | 1F | 1B | 2F | 2G | 3F | 3G | 4F | 4B | 5G | 5B | --   | --   | COM3 | --   | -- | -- | -- | -- | -- | -- |
| COM4 | 1A | P6 | 2A | 2B | 3A | 3B | 4A | P5 | 5F | 5A | --   | --   | --   | COM4 | -- | -- | -- | -- | -- | -- |



|                                                                                                              |  |                          |  |
|--------------------------------------------------------------------------------------------------------------|--|--------------------------|--|
| <br><b>SILICON LABS</b> |  | Board Name               |  |
|                                                                                                              |  | <b>EFM32PG23 Pro Kit</b> |  |
| Designed<br>MAH                                                                                              |  | Page Title               |  |
| Size<br>A3                                                                                                   |  | <b>Segment LCD</b>       |  |
| Sheet Modified Date<br>Thursday, May 06, 2021                                                                |  | Board Number             |  |
|                                                                                                              |  | <b>BRD2504A</b>          |  |
|                                                                                                              |  | Revision                 |  |
|                                                                                                              |  | <b>A01</b>               |  |
|                                                                                                              |  | Sheet                    |  |
|                                                                                                              |  | 6 of 13                  |  |

**MCU Power Regulator**

The schematic diagram illustrates the MCU Power Regulator circuit, which is divided into several functional sections:

- 5V Input Section:** A 5V input is connected to a network of capacitors (C702, C703) and resistors (R700, R703) to filter and regulate the voltage.
- 3V6 SW Input Section:** A 3V6 SW input is connected to a network of capacitors (C707) and resistors (R705, R706, R707, R708) to filter and regulate the voltage.
- MCU Section:** The LP3982ILD-ADJ voltage regulator (U701) is used to regulate the 5V input. It includes pins for IN, OUT1, OUT2, SHDN, SET, FAULT, GND, GND\_HEAT, and CC. The output is connected to the MCU (TP700).
- Sense Resistor Section:** A sense resistor (R701) is used to monitor the current flowing through the MCU. It is connected between the MCU and the AEM section.
- Bleeder Resistor Section:** A bleeder resistor (R760) is used to discharge the capacitor (C701) when the power is turned off.
- Isolation switch Section:** An isolation switch (U700) is used to switch the power source between the 5V input and the 3V6 SW input. It includes pins for IN, OUT, EN, EP\_GND, and GND.
- AEM Calibration Section:** The TS3A4751 multiplexer (U702A) is used to select the calibration current source. It includes pins for COM1, COM2, COM3, COM4, IN1, IN2, IN3, IN4, NO1, NO2, NO3, and NO4. The output is connected to the AEM section (TP711, TP712, TP713, TP714).

**Calibration Currents Table:**

| CALIBRATE | Calibration Current |
|-----------|---------------------|
| 0x1       | 13.30 uA            |
| 0x2       | 110 uA              |
| 0x4       | 230 uA              |
| 0x6       | 320 uA              |
| 0x8       | 3.30 mA             |

Calibration currents include contribution from sense and bleeder resistors.

[illegible]

Calibration currents include contribution from sense and bleeder resistors

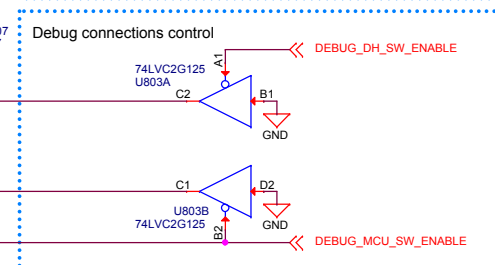
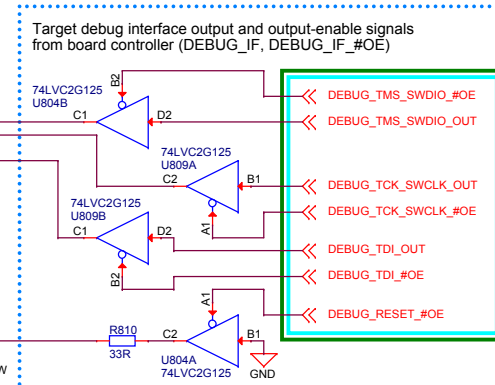
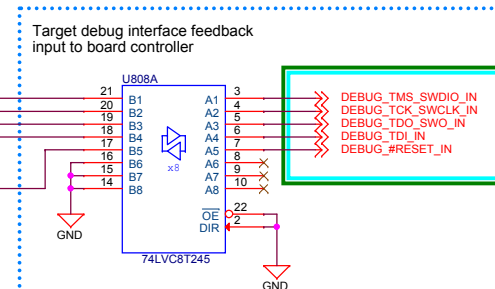
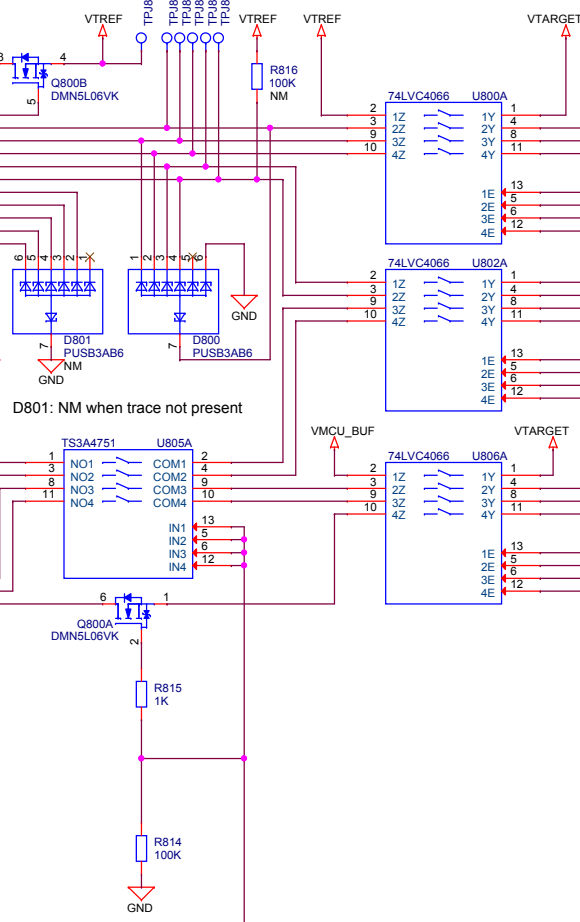
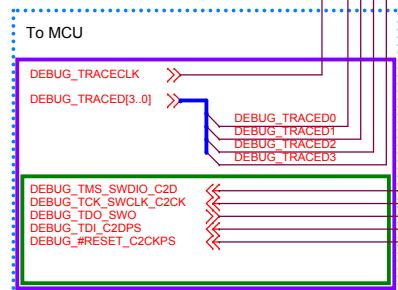
## A





Diagram illustrating the ARM Coresight 20-pin Debug + ETM header pinout. The header is labeled P800 and shows connections for 20 pins:

- Pin 1: GND
- Pin 2: DH TMS SWDIO
- Pin 3: DH TCK SWCLK
- Pin 4: DH TDO SWO
- Pin 5: DH TDI
- Pin 6: DH #RESET
- Pin 7: (Unlabeled)
- Pin 8: (Unlabeled)
- Pin 9: (Unlabeled)
- Pin 10: (Unlabeled)
- Pin 11: (Unlabeled)
- Pin 12: (Unlabeled)
- Pin 13: (Unlabeled)
- Pin 14: (Unlabeled)
- Pin 15: (Unlabeled)
- Pin 16: (Unlabeled)
- Pin 17: (Unlabeled)
- Pin 18: (Unlabeled)
- Pin 19: (Unlabeled)
- Pin 20: (Unlabeled)



| Mode      | DEBUG_DH_SW_ENABLE | DEBUG_MCU_SW_ENABLE | DEBUG_IF_#OE | VTREF            | VTARGET          |
|-----------|--------------------|---------------------|--------------|------------------|------------------|
| Debug Out | 1                  | 0                   | 0/1          | External voltage | External voltage |
| MCU Debug | 0                  | 1                   | 0/1          | Disconnected     | VMCU             |
| Debug In  | 1                  | 1                   | 1            | VMCU             | VMCU             |
| Debug Off | 0                  | 0                   | 1            | -                | -                |

Color coded frames indicates which groups of signal nodes that are active in a given debug mode

Board Name  
**EFM32PG23 Pro Kit**

|            |                        |
|------------|------------------------|
| Page Title | <b>Debug Interface</b> |
|------------|------------------------|

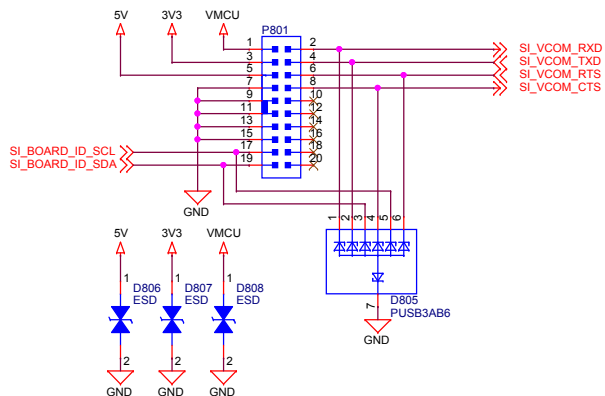
|              |                 |
|--------------|-----------------|
| Board Number | <b>BRD2504A</b> |
|--------------|-----------------|

|          |            |
|----------|------------|
| Revision | <b>A01</b> |
|----------|------------|

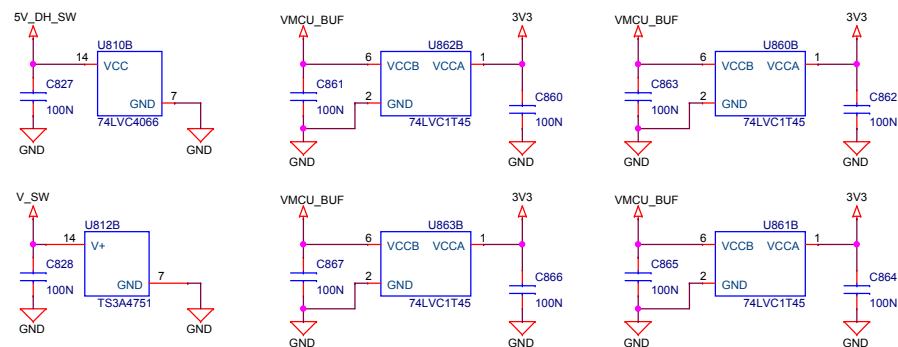
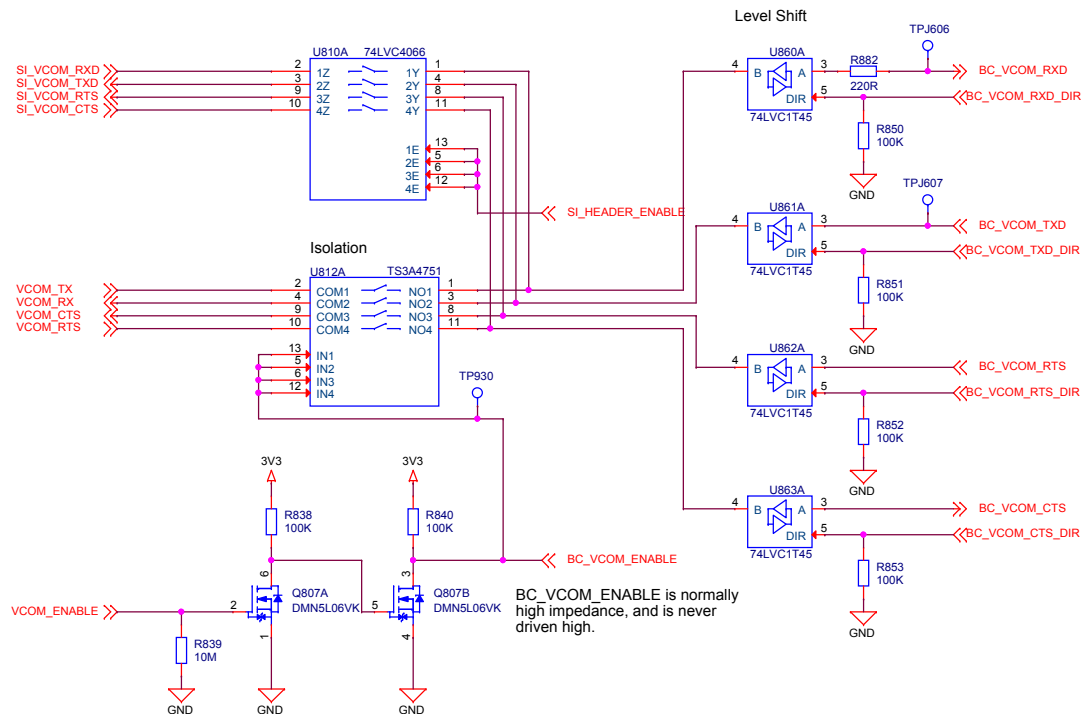
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# Simplicity Connector

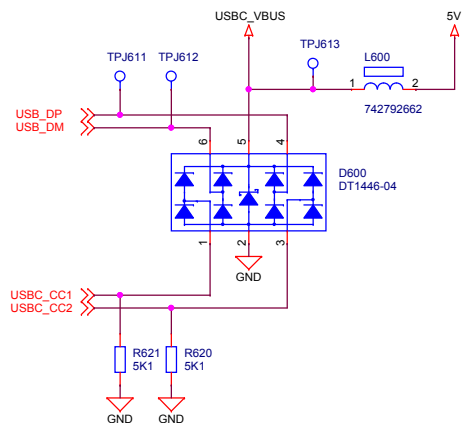
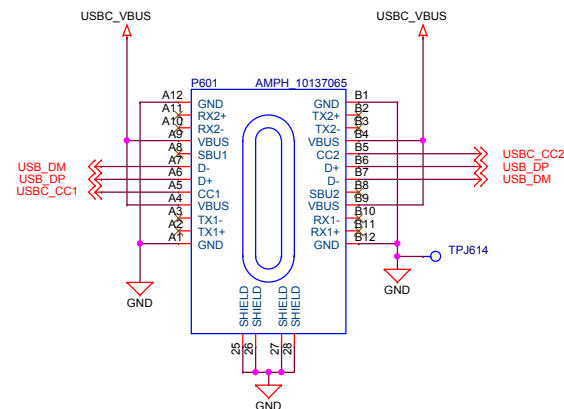


# VCOM Interface

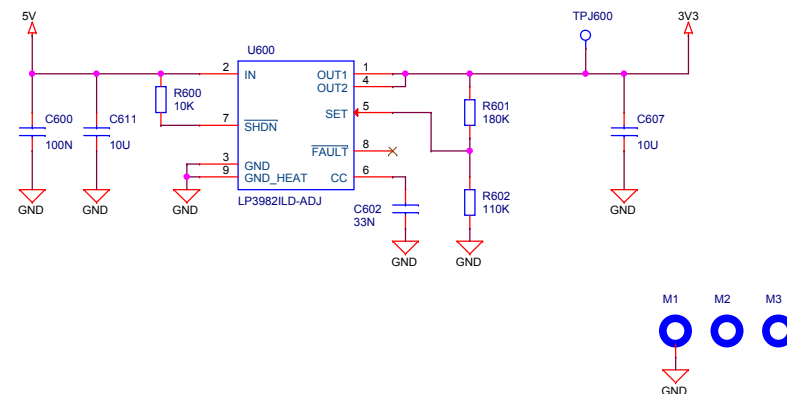


|                                                                                       |  |                   |          |
|---------------------------------------------------------------------------------------|--|-------------------|----------|
|  |  | Board Name        |          |
|                                                                                       |  | EFM32PG23 Pro Kit |          |
| Designed<br>MAH                                                                       |  | Page Title        |          |
| Size<br>A3                                                                            |  | Simplicity & VCOM |          |
| Sheet Modified Date<br>Thursday, May 06, 2021                                         |  | Board Number      | Revision |
|                                                                                       |  | BRD2504A          | A01      |
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| Sheet 10 of 13                                                                        |  |                   |          |

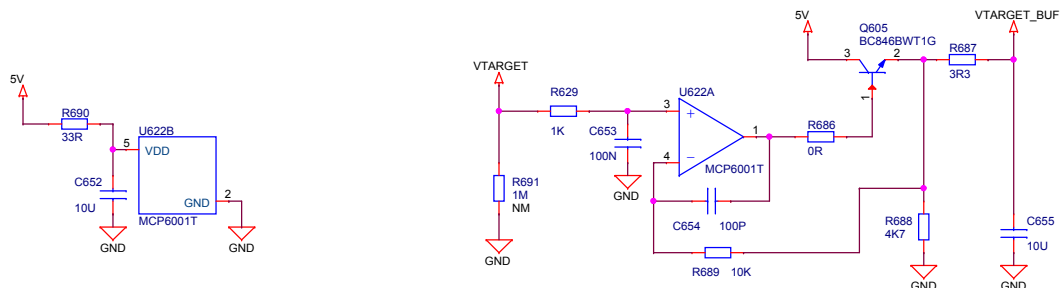
## J-Link USB Port



## 3V3 Regulator



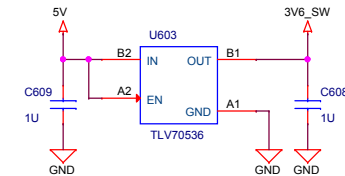
## VTarget Voltage Mirror



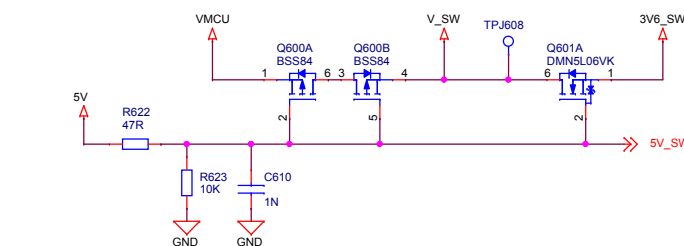
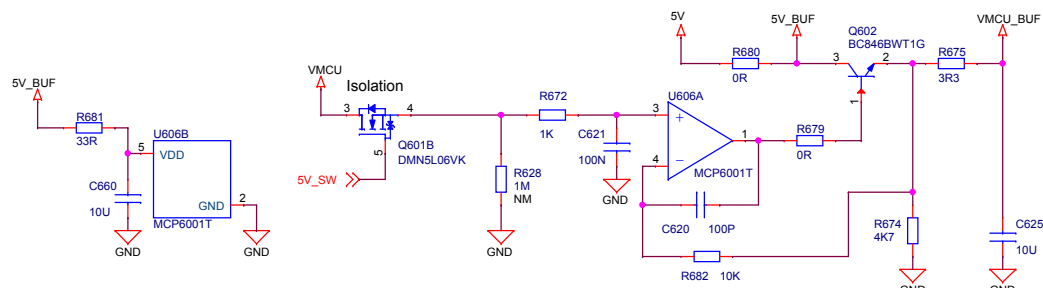
## Power Supply for Analog Switches

Analog switches used for isolation are powered by 3V6\_SW when the USB cable is connected, otherwise by VMCU.

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

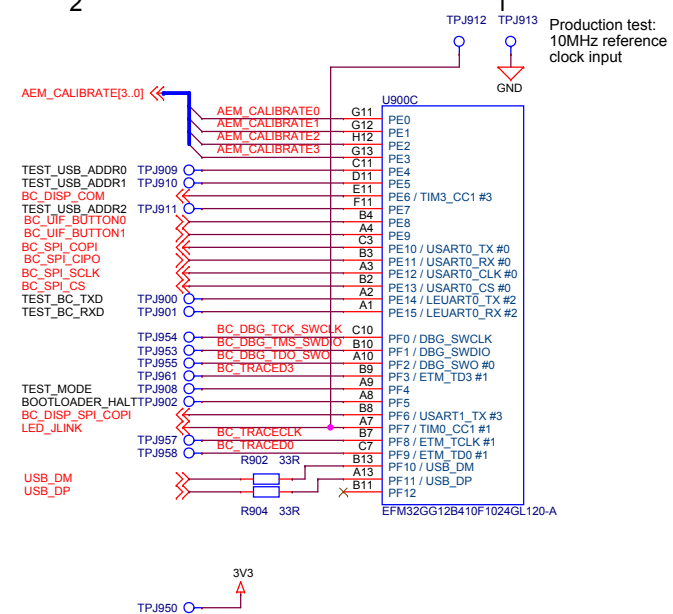
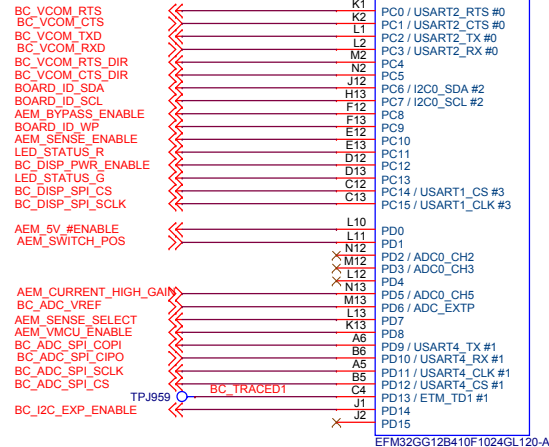
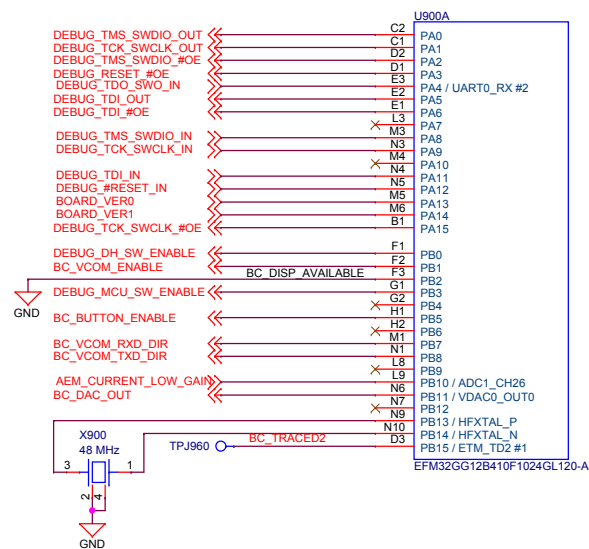


## VMCU Voltage Mirror

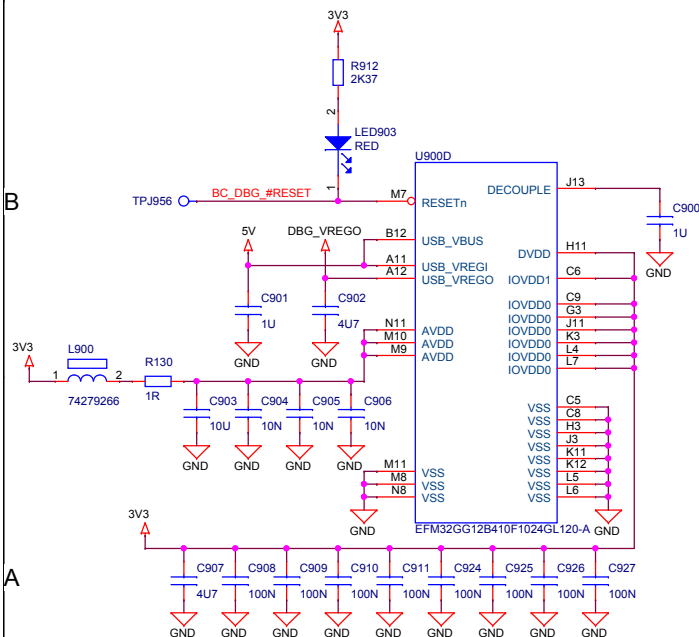


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|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------|------------------------|
| <br><b>SILICON LABS</b> |                                                      | Board Name<br><b>EFM32PG23 Pro Kit</b> |                        |
| Designed<br><b>MAH</b>                                                                                       |                                                      | Page Title<br><b>Power</b>             |                        |
| Size<br><b>A3</b>                                                                                            | Sheet Modified Date<br><b>Thursday, May 06, 2021</b> | Board Number<br><b>BRD2504A</b>        | Revision<br><b>A01</b> |
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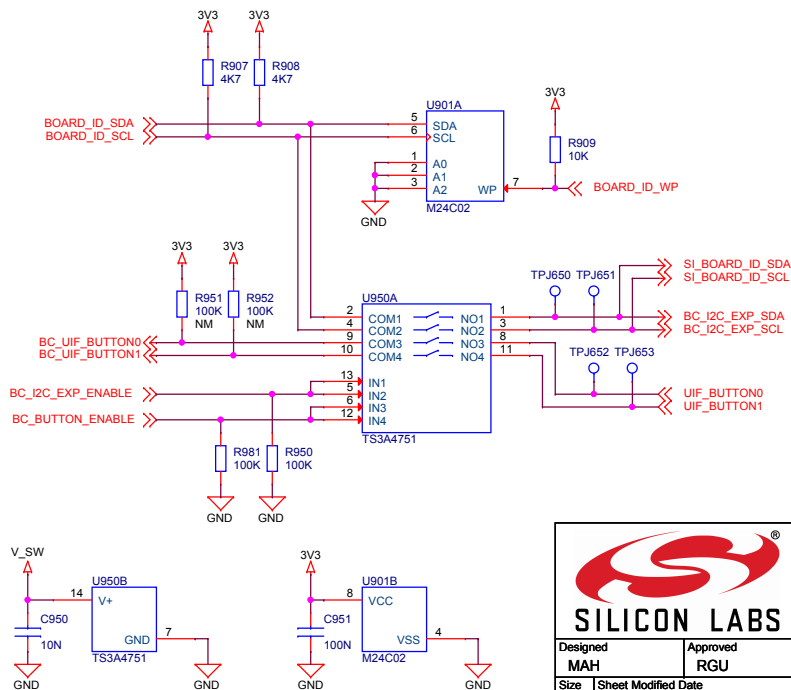
## Board Controller



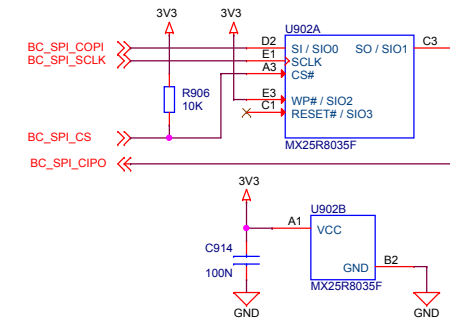
## Power & Decoupling



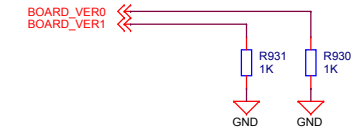
## Board ID & Button Isolation



## BC Serial Flash

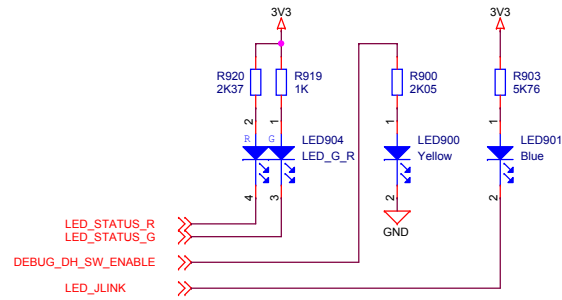


## Board Version

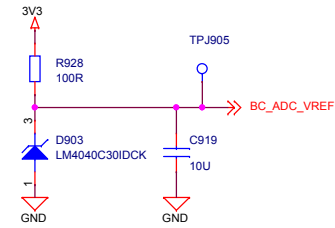


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|--------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------|--|
| <br><b>SILICON LABS</b> |  | Board Name                                           |  |
|                                                                                                              |  | <b>EFM32PG23 Pro Kit</b>                             |  |
| Designed<br><b>MAH</b>                                                                                       |  | Approved<br><b>RGU</b>                               |  |
| Size<br><b>A3</b>                                                                                            |  | Sheet Modified Date<br><b>Thursday, May 06, 2021</b> |  |
| Board Number                                                                                                 |  | Revision                                             |  |
| <b>BRD2504A</b>                                                                                              |  | <b>A01</b>                                           |  |
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|                                                                                                              |  | Sheet<br>12 of 13                                    |  |

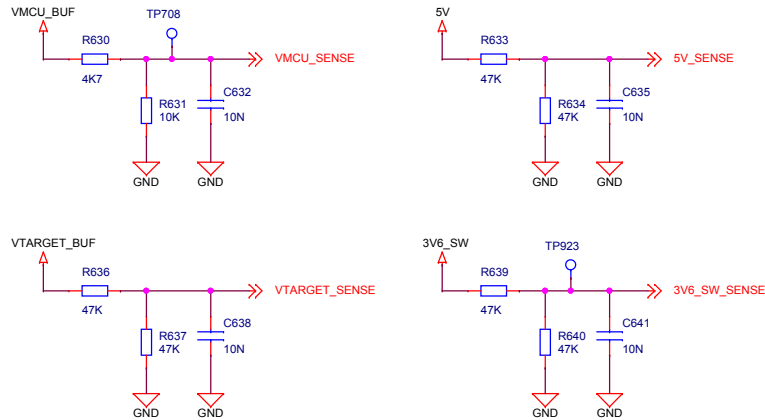
## Indicator LEDs



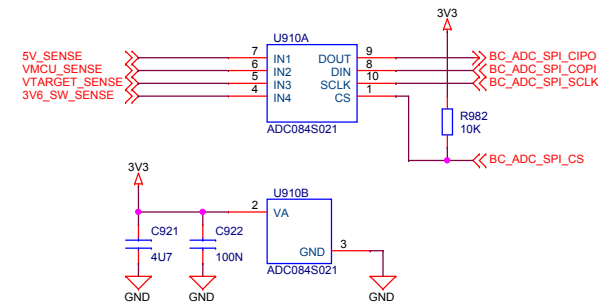
## BC ADC Reference



## BC Voltage Sense



## BC Voltage Sense ADC



|                                                                                       |  |                       |                   |
|---------------------------------------------------------------------------------------|--|-----------------------|-------------------|
|  |  | Board Name            |                   |
|                                                                                       |  | EFM32PG23 Pro Kit     |                   |
| Designed<br>MAH                                                                       |  | Page Title            |                   |
| Size<br>A3                                                                            |  | Board Controller Misc |                   |
| Sheet Modified Date<br>Thursday, May 06, 2021                                         |  | Board Number          | Revision          |
|                                                                                       |  | BRD2504A              | A01               |
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