



PG23 Pro Kit

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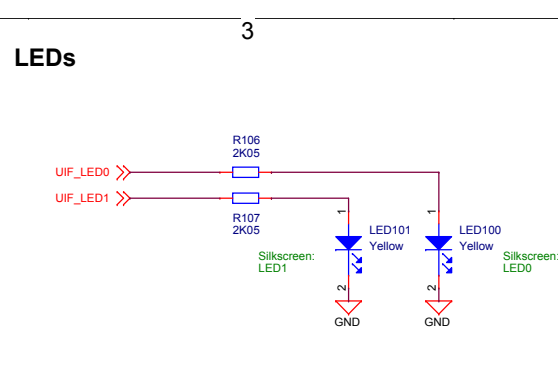
Revision History

Rev.	Description
A00	Initial version.
A01	Bump U1 revision.
A02	Not mount clamping diodes for ADC input.

 SILICON LABS		Board Name	
		EFM32PG23 Pro Kit	
Designed MAH		Approved RGU	
Size A3	Sheet Modified Date Friday, June 11, 2021	Page Title Title Page	
		Board Number BRD2504A	Revision A02
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The image displays three circuit diagrams for the PCB layout, each with a title and a grid of 5x5 units.

- Push Buttons:** This diagram shows two push buttons, SW100 and SW101, both labeled as PTS810. They are connected to a VMCU pin. The circuit includes resistors R100 (1M), R101 (1M), R104 (100R), and R105 (100R). Capacitors C102 (1N) and C103 (1N) are connected to GND. The buttons are labeled with silkscreen as BTN0 and BTN1. The input signals are labeled UIF_BUTTON0 and UIF_BUTTON1.
- LEDs:** This diagram shows two LEDs, LED100 and LED101, both labeled as Yellow. They are connected to UIF_LED0 and UIF_LED1. The circuit includes resistors R106 (2K05) and R107 (2K05). The LEDs are labeled with silkscreen as LED1 and LED0.
- LESENSE LC-Sensor:** This diagram shows the LC-Sensor circuit. It includes a DAC_LC_EXCITE input, a resistor R121 (100R), a capacitor C123 (100N), a resistor R122 (0R), a capacitor C124 (330P), an inductor L125 (470uH), and a resistor R126 (1K5). The output is labeled LES_LC_SENSE. The sensor is labeled with silkscreen as LC Sense.



LESENSE LC-Sensor

The diagram shows the internal circuit of the LESENSE LC-Sensor. It is a two-terminal device with pins labeled DAC_LC_EXCITE and LES_LC_SENSE. The internal components are:

- Resistor R121 (100R) in series with the DAC_LC_EXCITE pin.
- Capacitor C123 (100N) connected to ground (GND) after R121.
- Resistor R122 (0R) in series with the signal path.
- Capacitor C124 (330P) connected to ground (GND) after R122.
- Inductor L125 (470uH) connected in parallel to ground (GND) after C124.
- Resistor R126 (1K5) in series with the LES_LC_SENSE pin.

Silkscreen: LC Sense

Relative Humidity & Temperature Sensor

SMA Connector

[illegible]

Breakout Pads

B

BREAKOUT_TOP[14..3]

3V3

GND

Silkscreen: 5V GND

J102

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

5V GND NC NC NC NC NC A5 A3 A2 A1 NC GND 3V3

A

BREAKOUT_BOT[14..3]

3V3

GND

Silkscreen: VMCU GND

J101

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

VMCU GND C8 C9 B6 B5 B4 NC B2 B1 NC NC RST1 ADC1 GND 3V3

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	

The diagram illustrates the EXP Header pinout. A 2x20 pin header is shown with pins numbered 1 to 20. The top row (pins 2-20) and bottom row (pins 1-19) are detailed in the tables above. The diagram shows the following connections:

- EXP_HEADER[16..3]** (red signal lines) connected to pins 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2.
- BC_I2C_EXP_SCL** (red signal line) connected to pin 15.
- BC_I2C_EXP_SDA** (red signal line) connected to pin 16.
- VMCU 5V** (red power line) connected to pin 18.
- 3V3** (red power line) connected to pin 20.
- EXP_HEADER4** (red signal line) connected to pin 4.
- EXP_HEADER6** (red signal line) connected to pin 6.
- EXP_HEADER8** (red signal line) connected to pin 8.
- EXP_HEADER10** (red signal line) connected to pin 10.
- EXP_HEADER12** (red signal line) connected to pin 12.
- EXP_HEADER14** (red signal line) connected to pin 14.
- EXP_HEADER16** (red signal line) connected to pin 16.
- HEADER_2X10_2.54MM_TH** (blue signal line) connected to pins 1, 3, 5, 7, 9, 11, 13, 15, 17, 19.
- GND** (blue ground symbol) connected to pin 1.

4

3

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	

VMCU 5V 3V3

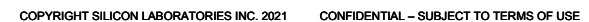
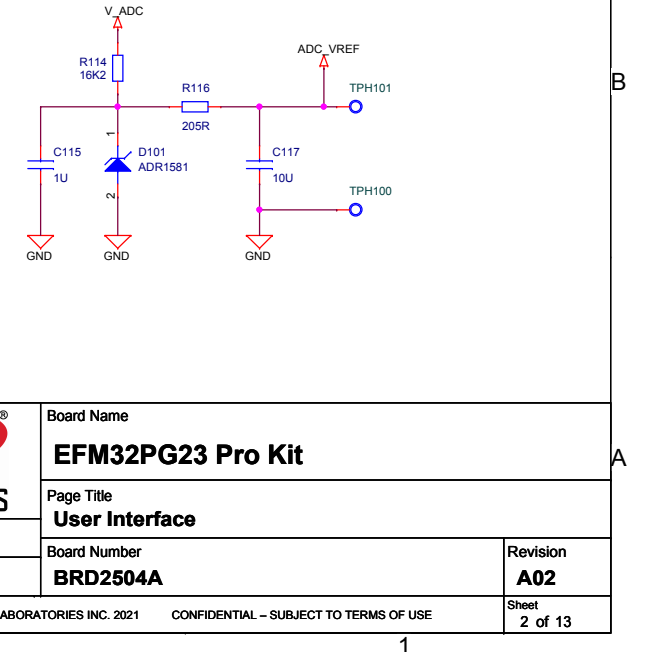
P101

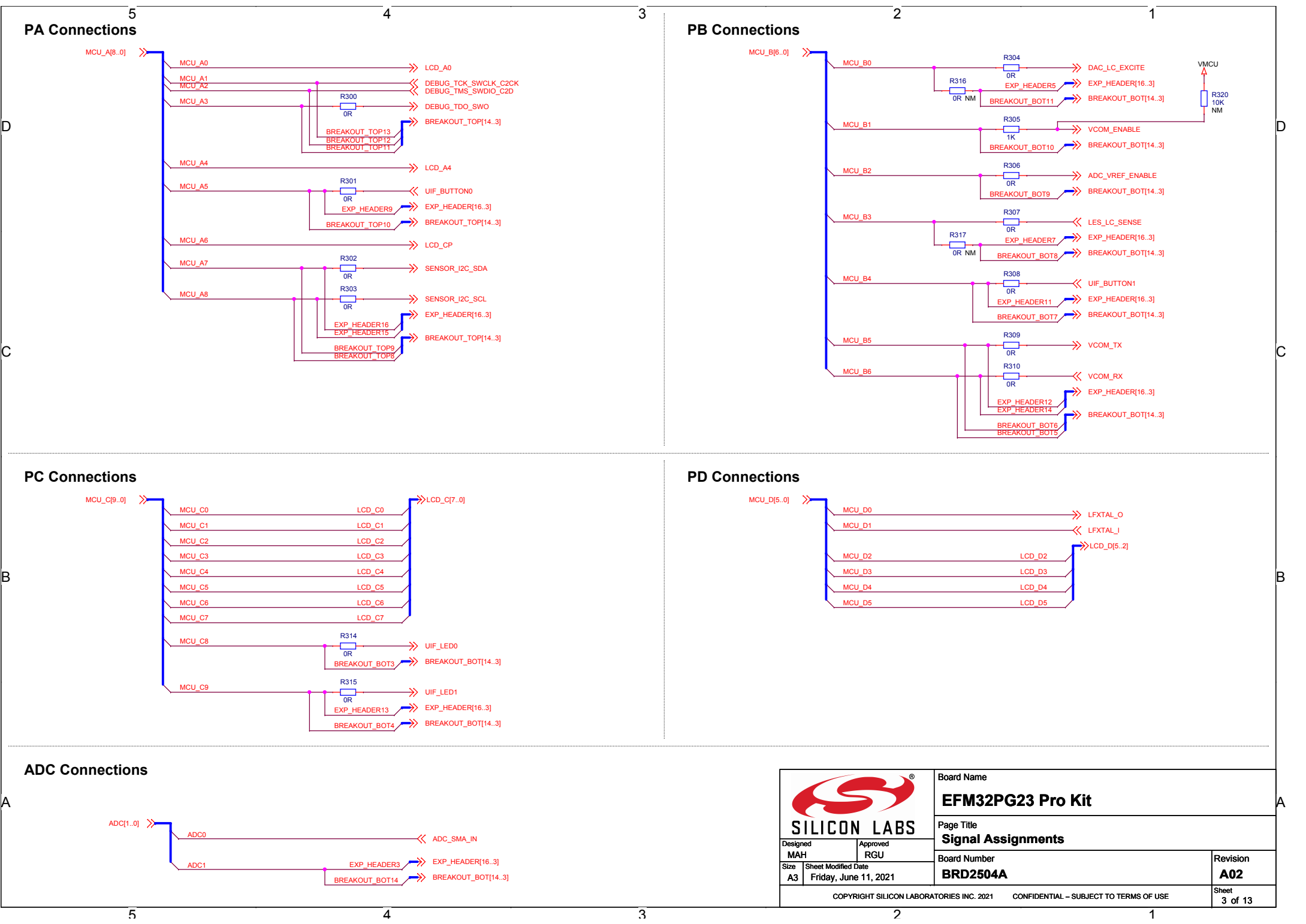
EXP_HEADER4
EXP_HEADER6
EXP_HEADER8
EXP_HEADER10
EXP_HEADER12
EXP_HEADER14
EXP_HEADER16

UART_TX
UART_RX
I2C_SDA

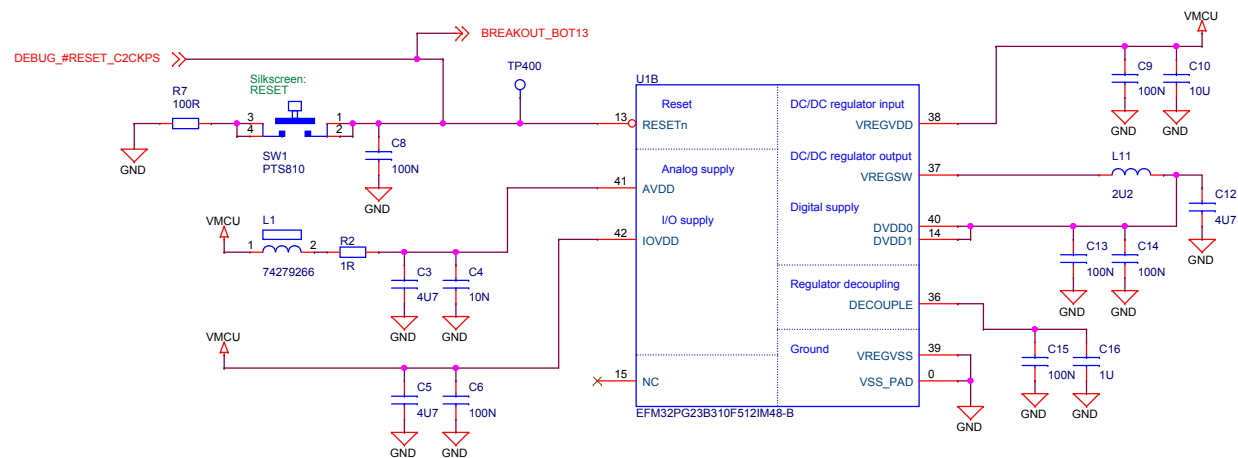
GND

HEADER_2X10_2.54MM_TH



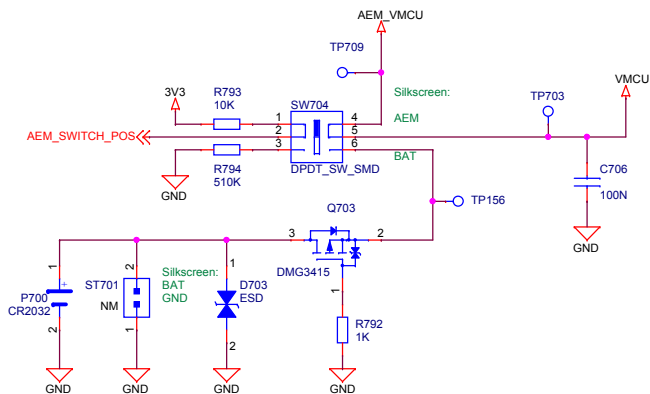


EFM32 Power and Decoupling

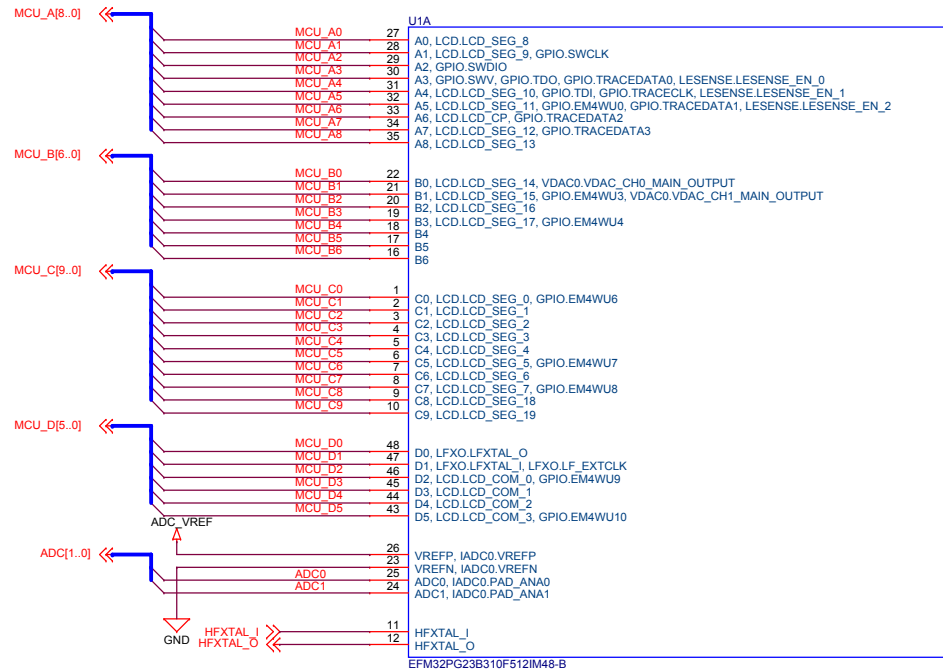


Power Select Switch: AEM/BAT

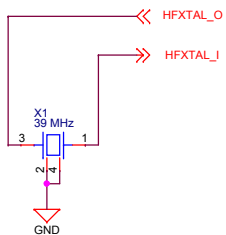
SWITCH POS	MODE DESCRIPTION
AEM	AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply
BAT	AEM Disabled, VMCU sourced from coin-cell battery or external power supply



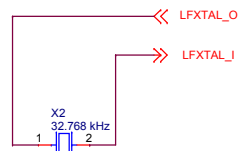
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		Page Title EFM32 Power	
Designed MAH	Approved RGU	Board Number BRD2504A	Revision A02
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High Frequency Clock

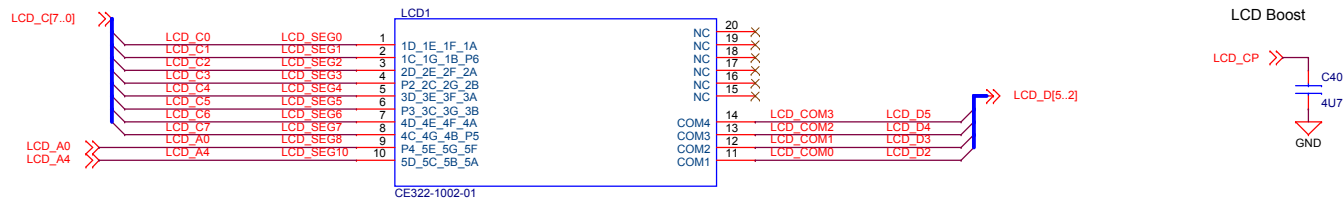


Low Frequency Clock



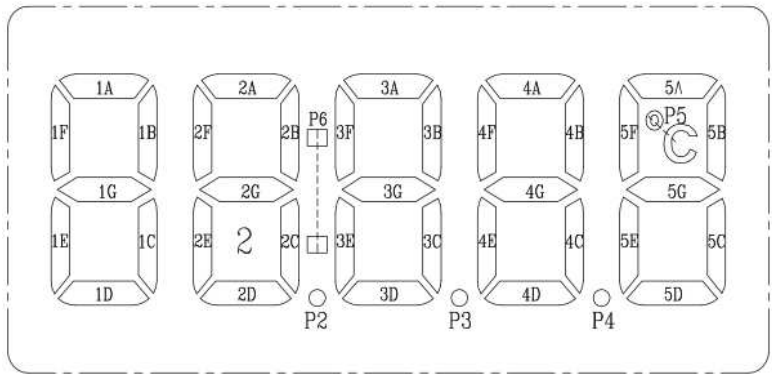
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Designed		Page Title	
MAH		EFM32 I/O	
Approved		Board Number	
RGU		BRD2504A	
Size	Sheet Modified Date	Revision	
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Segment LCD Signal Connections



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	--	--	--	--	--	--



		Board Name	
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MCU Power Regulator

The schematic diagram illustrates the MCU Power Regulator circuit. It includes a 5V input, a 3V6 SW input, and various components like resistors (R700, R701, R702, R703, R705, R706, R707, R708), capacitors (C701, C702, C703, C705, C706, C707, C761, C762, C708), and integrated circuits (U701: LP3982ILD-ADJ, U702A: TS3A4751, U700: SIP32431). It also features an isolation switch and an AEM Calibration section. A table provides calibration currents for different settings.

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.

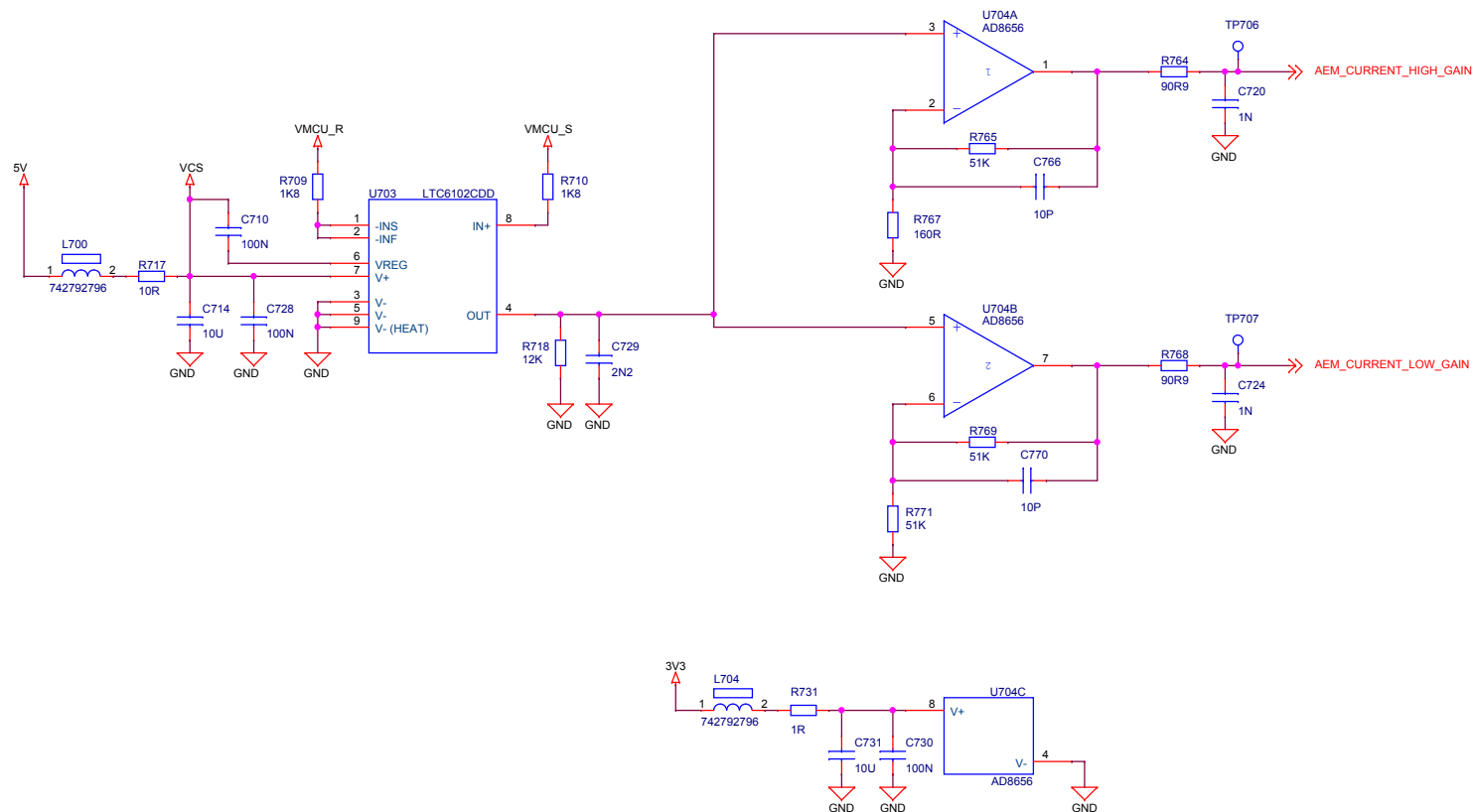
AEM Bypass Control

Default state:
AEM_BYPASS_#EN = 1 (AEM bypass not enabled)
AEM_SENSE_#EN = 0 (AEM sense enabled)

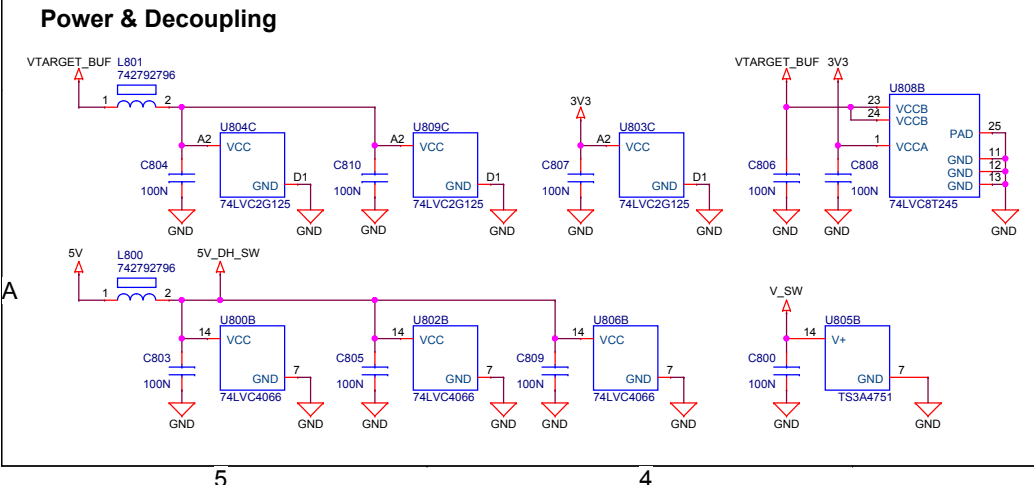
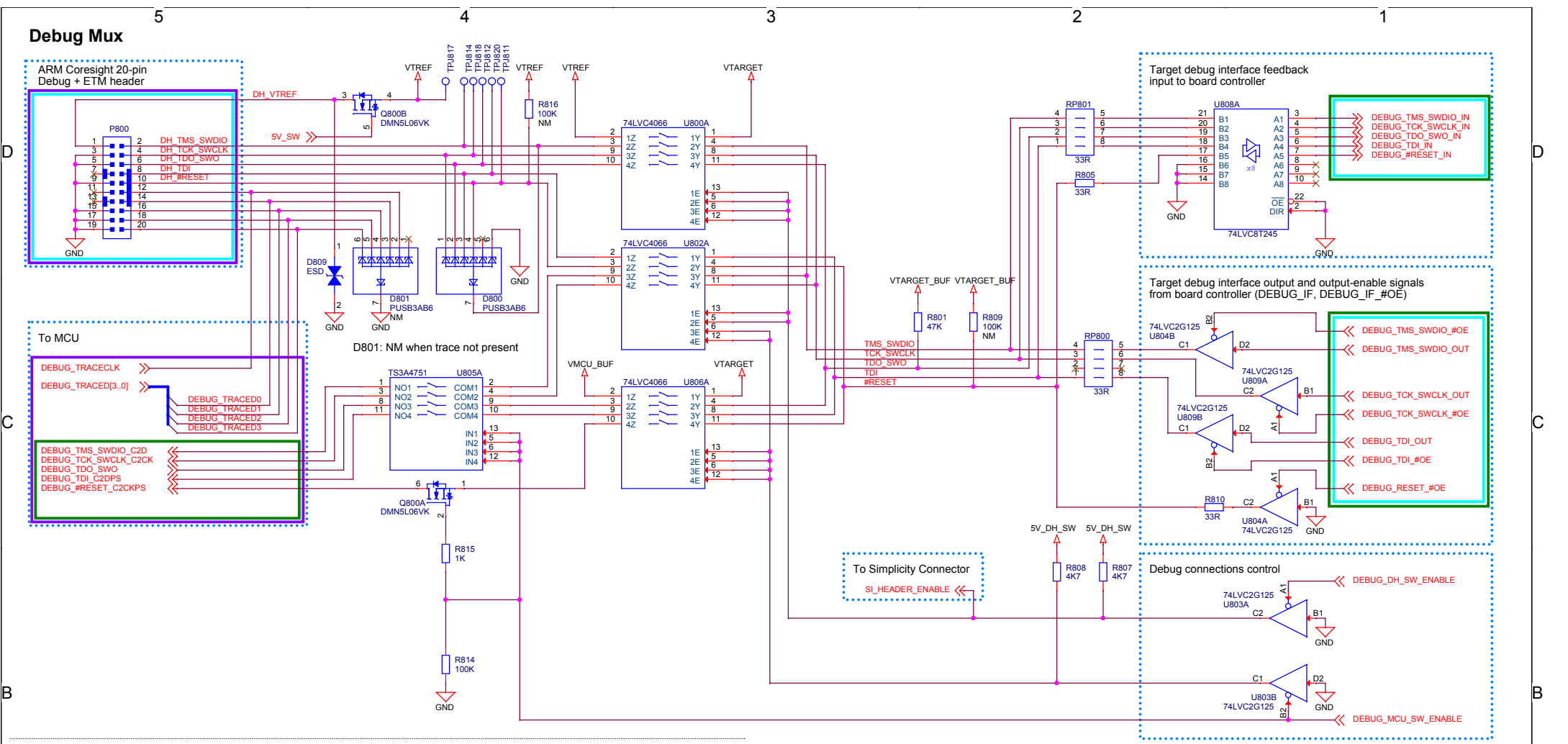
 SILICON LABS		Board Name	
		EFM32PG23 Pro Kit	
Designed MAH		Approved RGU	
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MCU Current Sense



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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



SILICON LABS

Board Name
EFM32PG23 Pro Kit

Page Title
Debug Interface

Board Number
BRD2504A

Revision
A02

Designed
MAH

Approved
RGU

Size
A3

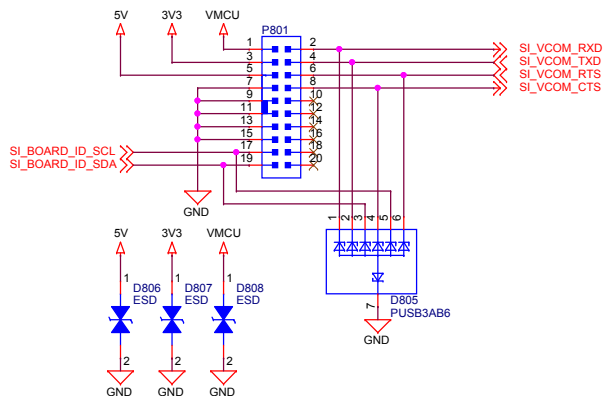
Sheet Modified Date
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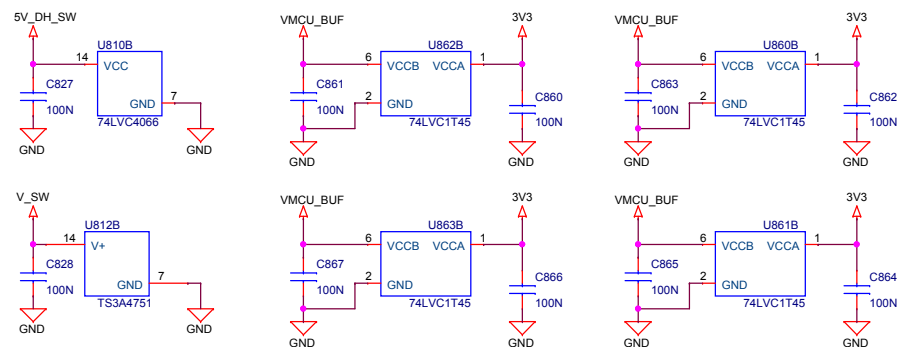
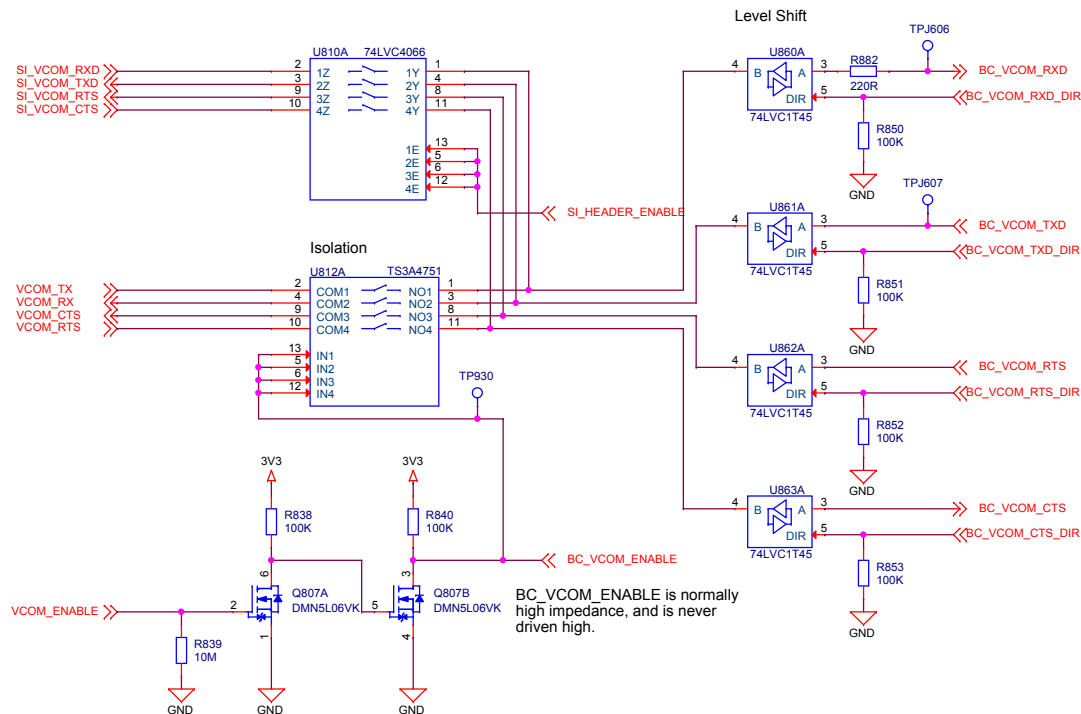
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Simplicity Connector

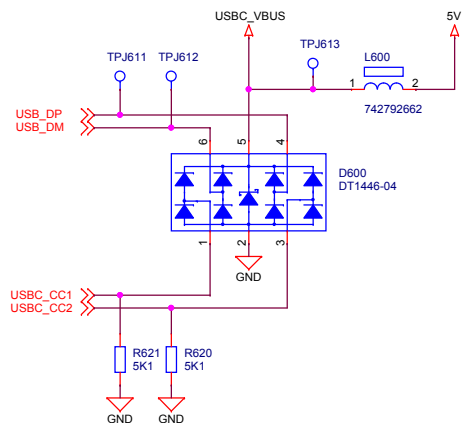
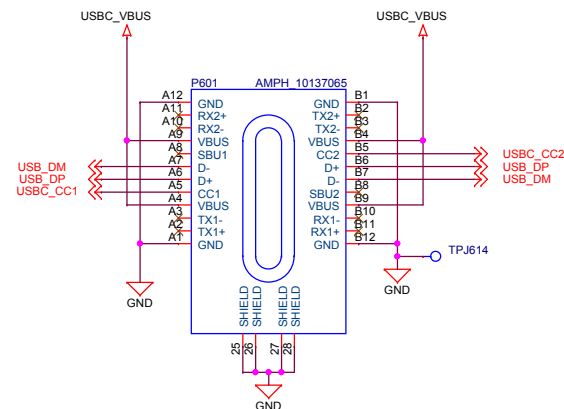


VCOM Interface

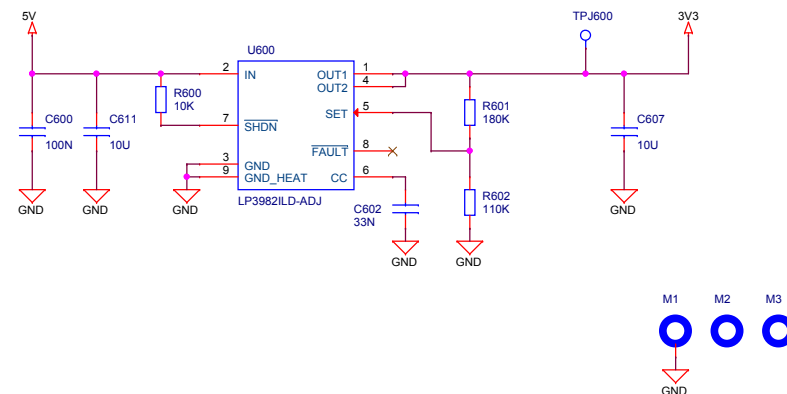


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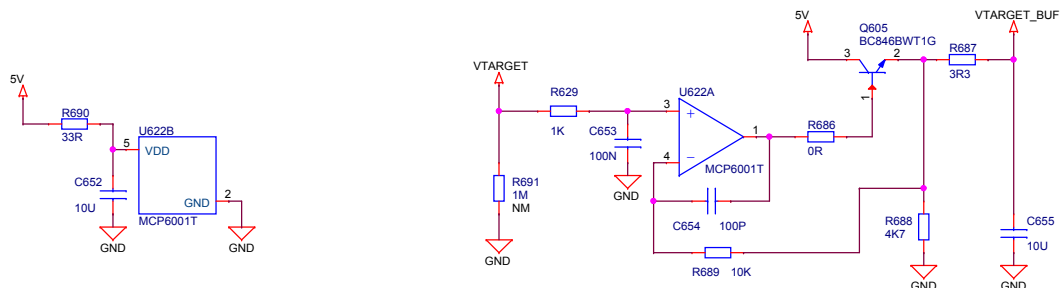
J-Link USB Port



3V3 Regulator



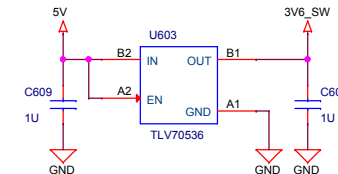
VTarget Voltage Mirror



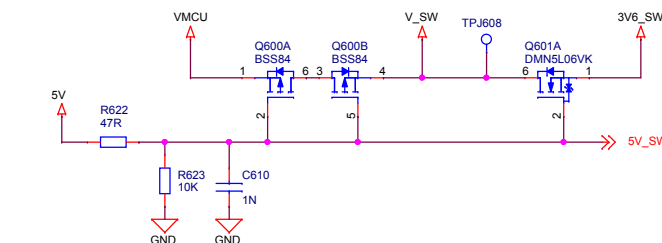
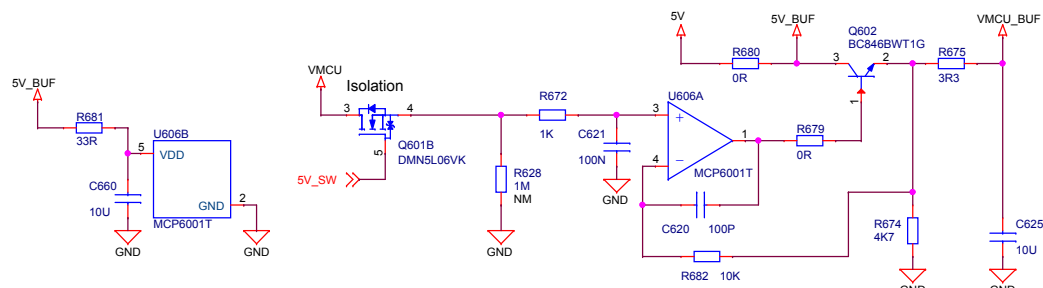
Power Supply for Analog Switches

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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The diagram illustrates the internal wiring of a Board Controller, centered around three main ICs: U900A, U900B, and U900C. U900A (left) and U900B (middle) are connected to U900C (right). The schematic includes numerous signal lines for debugging, control, and data, such as `DEBUG_TMS_SWIDIO_OUT`, `BC_VCOM_RTS`, `BC_DISP_AVAILABLE`, `BC_BUTTON_ENABLE`, `BC_VCOM_RXD_DIR`, `AEM_CURRENT_LOW_GAIN`, `BC_DAC_OUT`, `BC_TRACE2`, `BC_VCOM_TXD`, `BC_VCOM_RXD`, `BC_VCOM_CTS`, `BC_VCOM_RTS`, `BC_VCOM_CTS_DIR`, `BOARD_ID_SDA`, `BOARD_ID_SCL`, `AEM_BYPASS_ENABLE`, `BOARD_ID_WP`, `AEM_SENSE_ENABLE`, `LED_STATUS_R`, `BC_DISP_PWR_ENABLE`, `LED_STATUS_G`, `BC_DISP_SPI_CS`, `BC_DISP_SPI_SCLK`, `AEM_5V_ENABLE`, `AEM_SWITCH_POS`, `AEM_CURRENT_HIGH_GAIN`, `BC_ADC_VREF`, `AEM_SENSE_SELECT`, `AEM_VMCU_ENABLE`, `BC_ADC_SPI_COPI`, `BC_ADC_SPI_CPO`, `BC_ADC_SPI_SCLK`, `BC_ADC_SPI_CS`, `BC_I2C_EXP_ENABLE`, `BC_TRACE1`, `BC_TRACE2`, `BC_TRACE3`, `BC_TRACE4`, `BC_TRACE5`, `BC_TRACE6`, `BC_TRACE7`, `BC_TRACE8`, `BC_TRACE9`, `BC_TRACE10`, `BC_TRACE11`, `BC_TRACE12`, `BC_TRACE13`, `BC_TRACE14`, `BC_TRACE15`, `BC_TRACE16`, `BC_TRACE17`, `BC_TRACE18`, `BC_TRACE19`, `BC_TRACE20`, `BC_TRACE21`, 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[illegible]

Board ID & Button Isolation

BC Serial Flash

Board Version

SILICON LABS

Designed
MAH

Approved
RGU

Size
A3

Sheet Modified Date
Friday, June 11, 2021

Board Name
EFM32PG23 Pro Kit

Page Title
Board Controller

Board Number
BRD2504A

Revision
A02

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BC Serial Flash

U902A: MX25R8035F

U902B: MX25R8035F

3V3

BC_SPI_COP1

BC_SPI_SCLK

R906 10K

BC_SPI_CS

BC_SPI_CPO

D2

E1

A3

C1

SO / SIO1

S1 / SIO0

SCLK

CS#

WP# / SIO2

RESET# / SIO3

C3

3V3

C914 100nF

A1

VCC

GND

B2

BOARD_VER0

BOARD_VER1

R931 1K

R930 1K

GND

GND

BC Serial Flash

U902A: MX25R8035F

U902B: MX25R8035F

3V3

BC_SPI_COP1

BC_SPI_SCLK

R906 10K

BC_SPI_CS

BC_SPI_CPO

D2

E1

A3

C1

SO / SIO1

S1 / SIO0

SCLK

CS#

WP# / SIO2

RESET# / SIO3

C3

3V3

C914 100nF

A1

VCC

GND

B2

BOARD_VER0

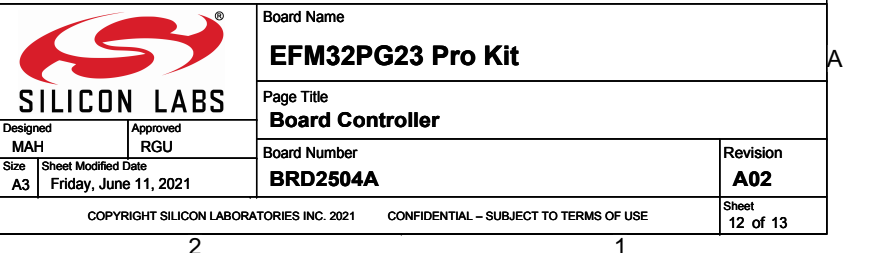
BOARD_VER1

R931 1K

R930 1K

GND

GND



Board Name		A
EFM32PG23 Pro Kit		
Page Title		
Board Controller		
Board Number		Revision
BRD2504A		A02
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EFM32PG23 Pro Kit		
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Board Controller		
Board Number		Revision
BRD2504A		A02
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EFM32PG23 Pro Kit		
Page Title		
Board Controller		
Board Number	Revision	
BRD2504A	A02	
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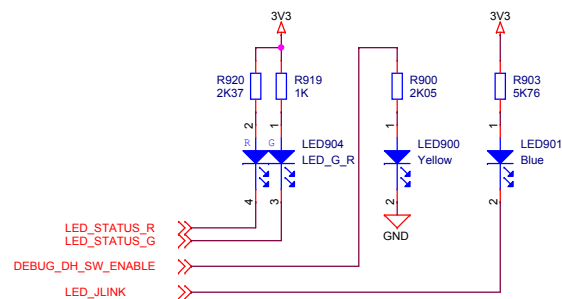
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EFM32PG23 Pro Kit		
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Board Controller		
Board Number	Revision	
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Board Controller		
Board Number	Revision	
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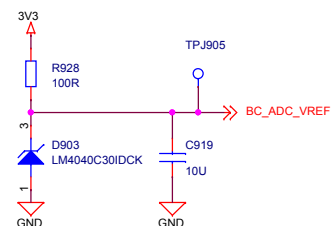
Board Name		A
EFM32PG23 Pro Kit		
Page Title		
Board Controller		
Board Number	Revision	
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 SILICON LABS	Board Name		A
	EFM32PG23 Pro Kit		
	Page Title		
	Board Controller		
Designed MAH	Approved RGU	Board Number	Revision
Size A3	Sheet Modified Date Friday, June 11, 2021	BRD2504A	A02
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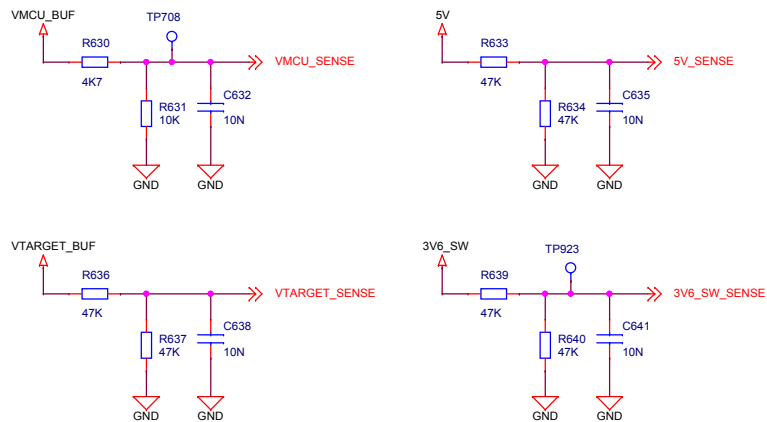
Indicator LEDs



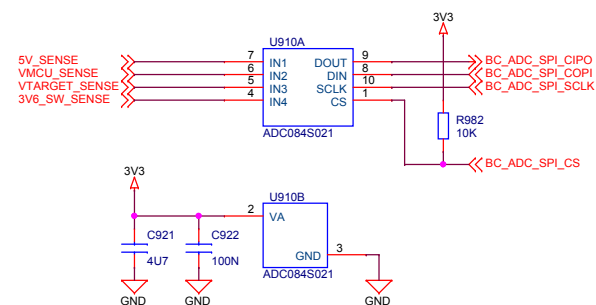
BC ADC Reference



BC Voltage Sense



BC Voltage Sense ADC



		Board Name	
		EFM32PG23 Pro Kit	
Designed MAH		Page Title	
Size A3		Board Controller Misc	
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