

EFM32 Leopard Gecko Starter Kit


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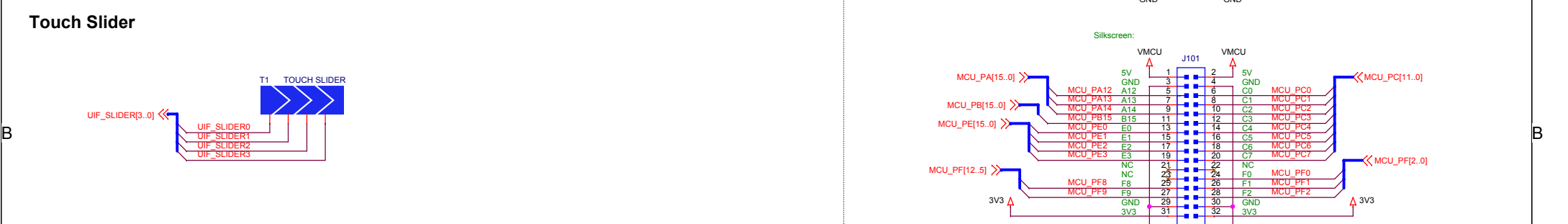
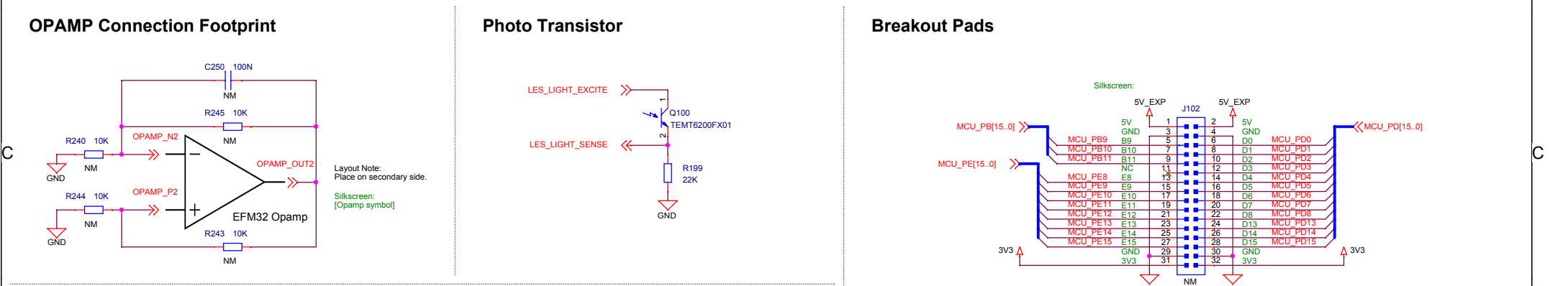
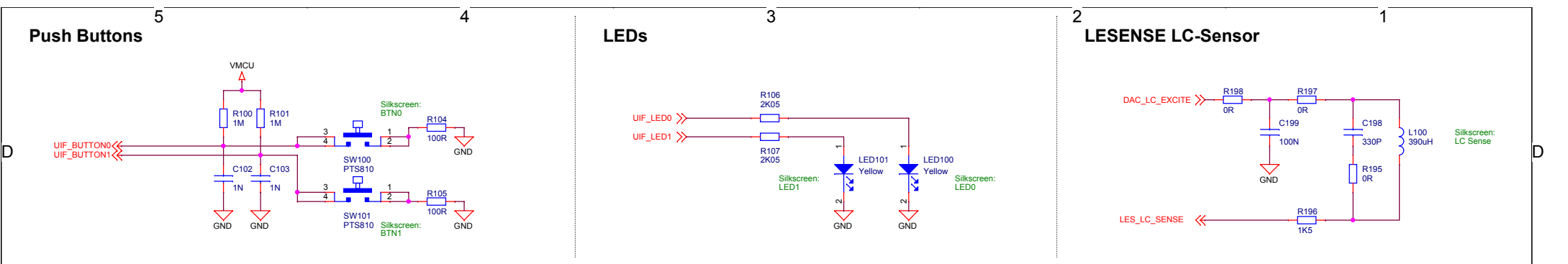


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Revision History

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		EFM32 Leopard Gecko Starter Kit	
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EXP Header

EXP_HEADER[16..3]

BC_I2C_EXP_SCL

BC_I2C_EXP_SDA

P101

HEADER_2X10_2.54MM_TH

Silkscreen:

EXP Header Functionality

Top Row			
2	VMCU		
4	PD0	US1_TX	ADC0_CH0
6	PD1	US1_RX	ADC0_CH1
8	PD2	US1_CLK	ADC0_CH2
10	PD3	US1_CS	ADC0_CH3
12	PD4	LEU0_TX	ADC0_CH4
14	PD5	LEU0_RX	ADC0_CH5
16	PD6	I2C0_SDA#1	
18	5V		
20	3V3		

Bottom Row			
1	GND		ACMP0_CH4
3	PC0		ACMP0_CH5
5	PC3		ACMP1_CH4
7	PC4		ACMP0_O
9	PC5		DAC0_OUT0
11	PB11		DAC0_OUT1
13	PB12		
15	PD7	I2C0_SCL#1	
17		Reserved for EXP Board Identification	
19		Reserved for EXP Board Identification	

SILICON LABS

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User Interface

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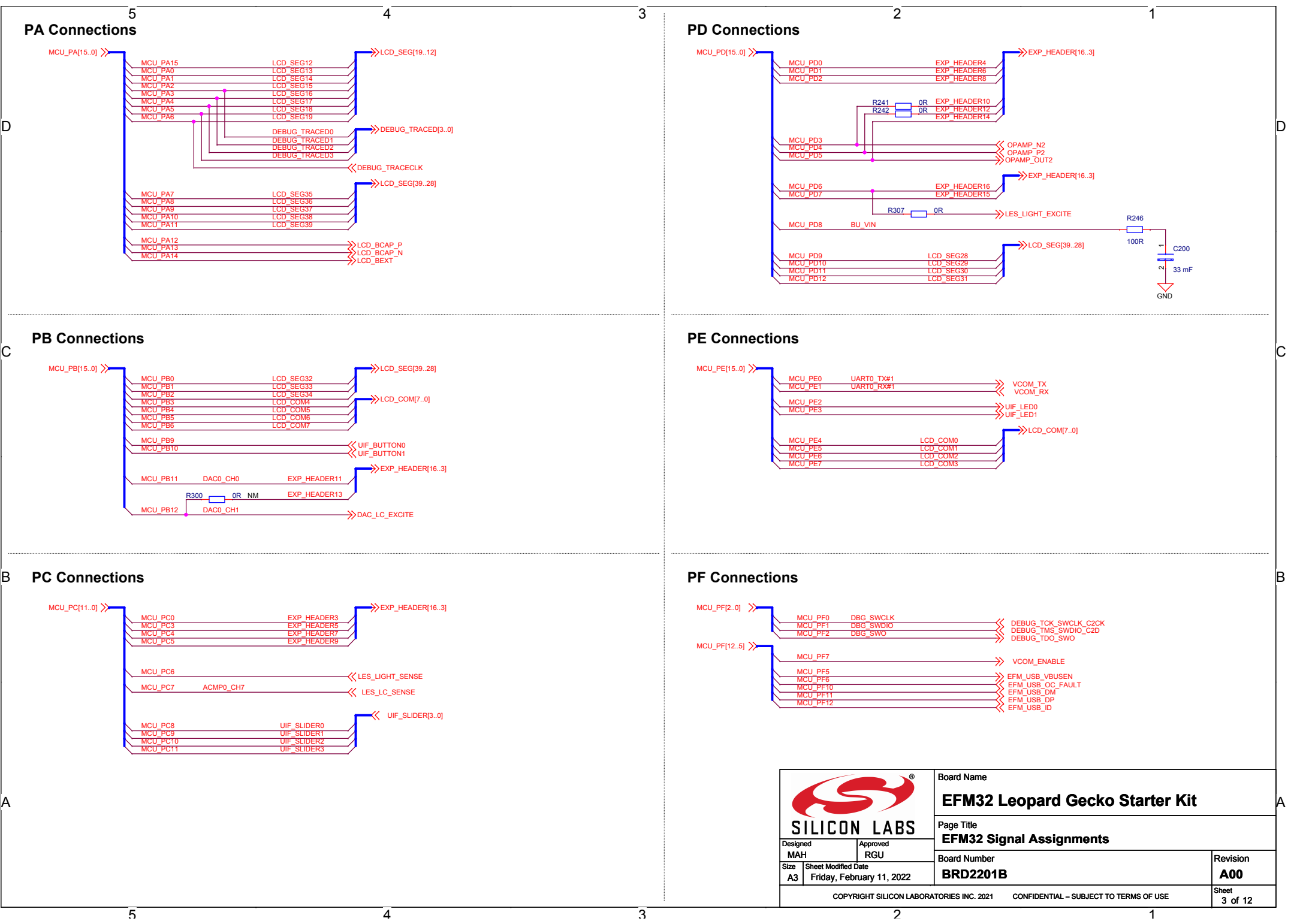
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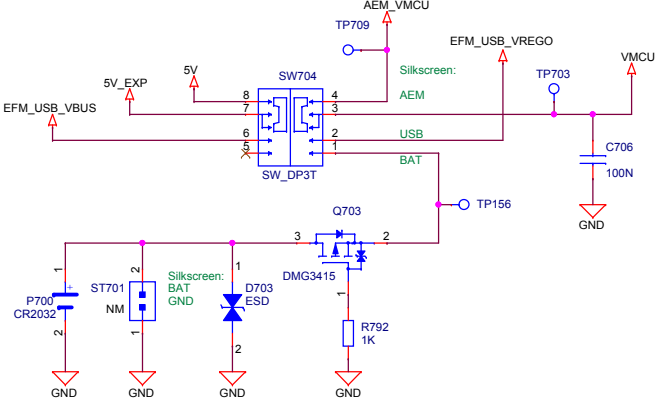
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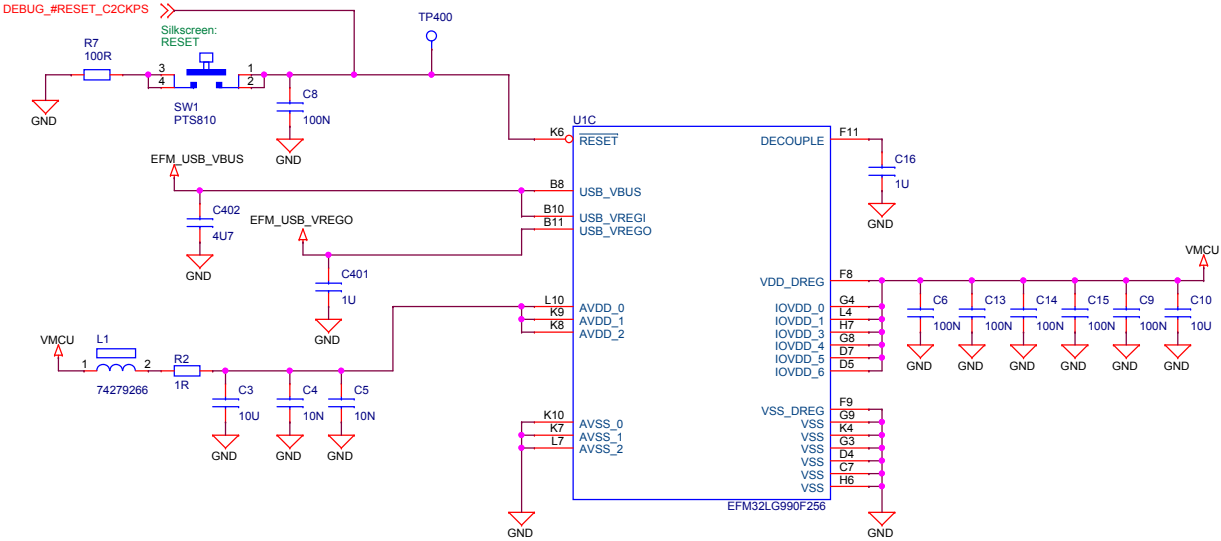


Power Selection Switch: AEM/USB/BAT

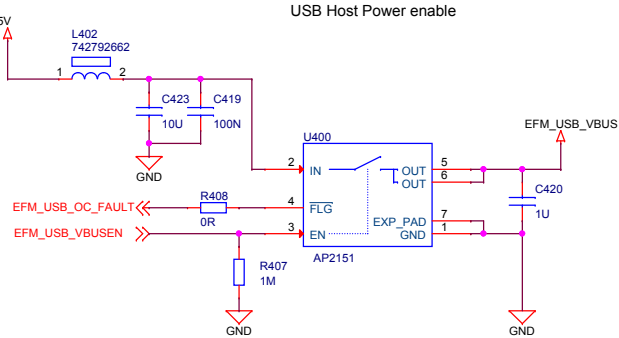
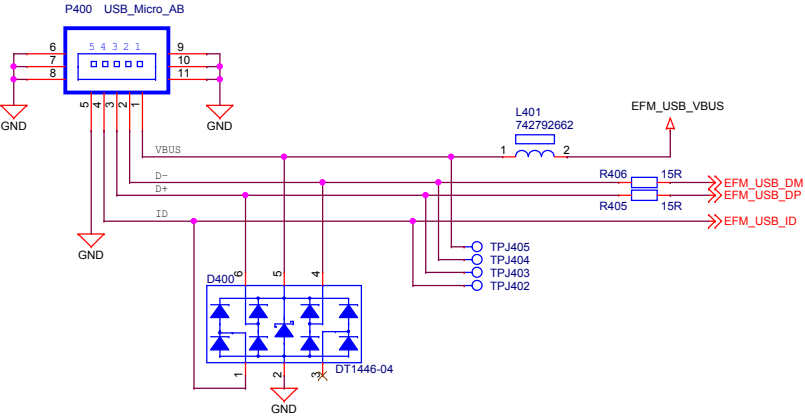



SWITCH POS	MODE DESCRIPTION
AEM	AEM Enabled, VMCU sourced from external 3.3V LDO powered by BC USB 5V supply
USB	AEM Disabled, VMCU sourced from internal 3.3V LDO powered by MCU USB 5V supply, EXP header and breakout 5V sourced from MCU USB 5V supply
BAT	AEM Disabled, VMCU sourced from coin-cell battery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

EFM32 Power and Decoupling



EFM32 USB Interface





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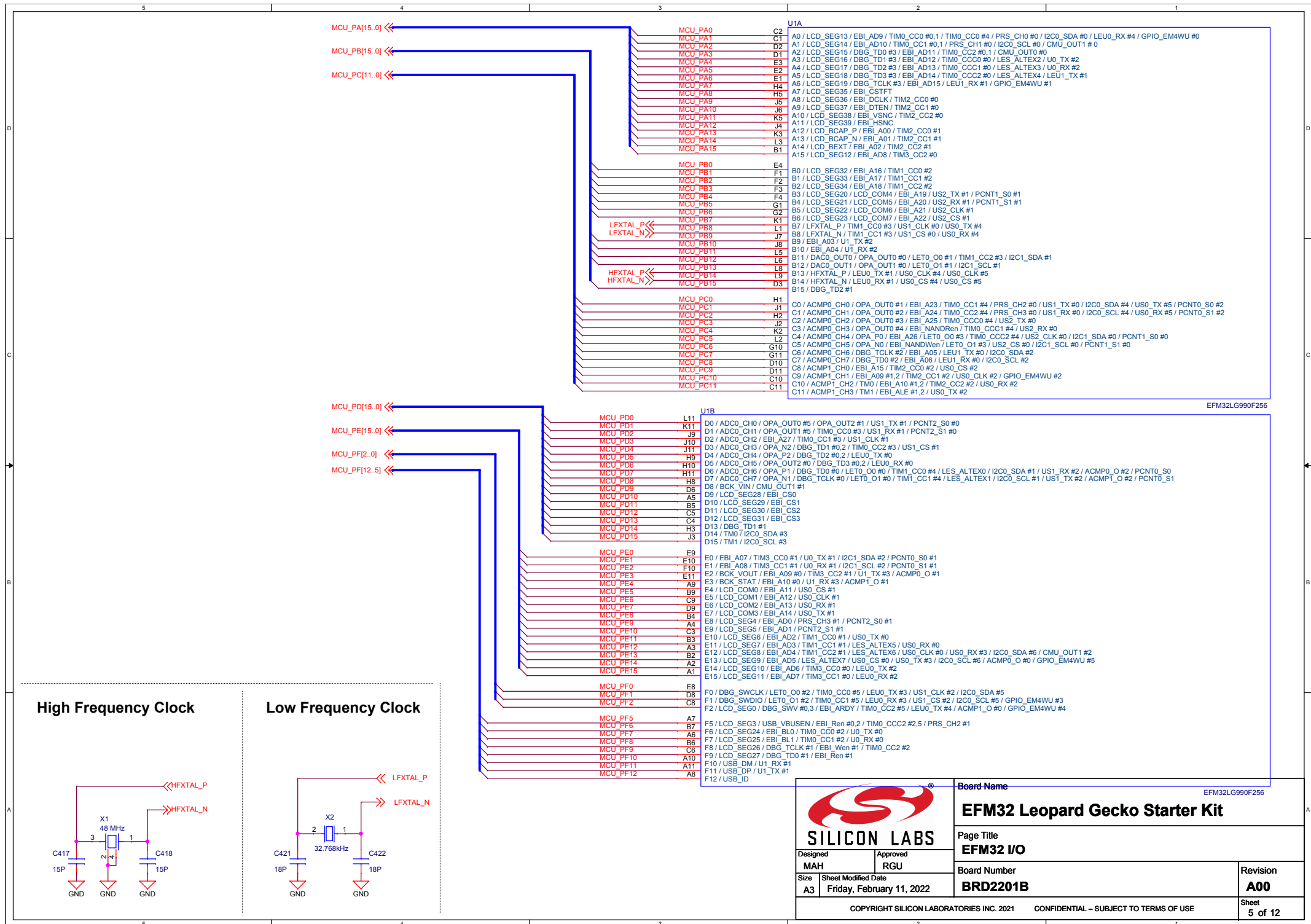
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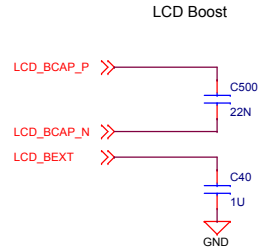
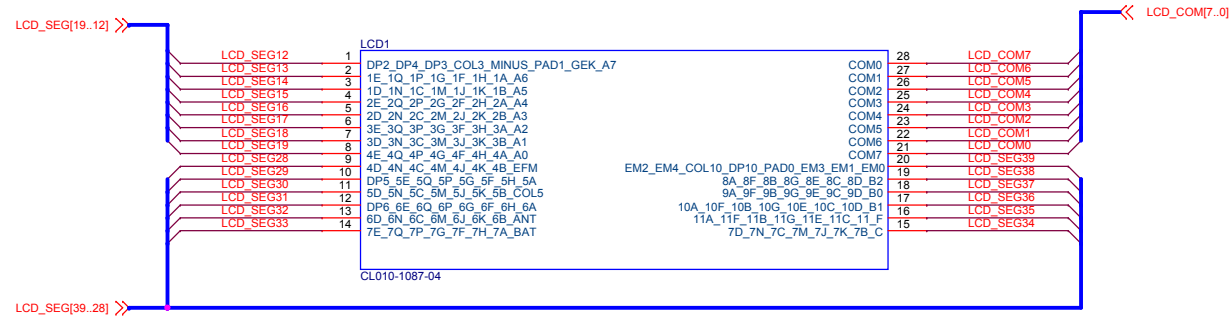
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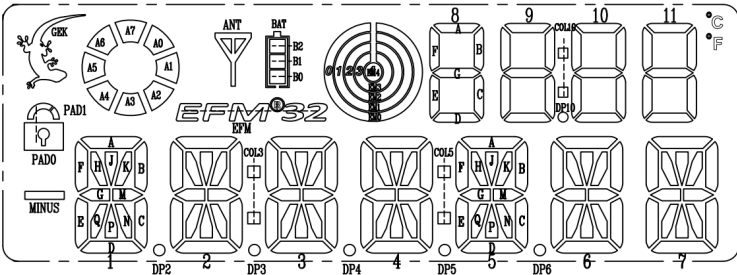
Segment LCD Signal Connections



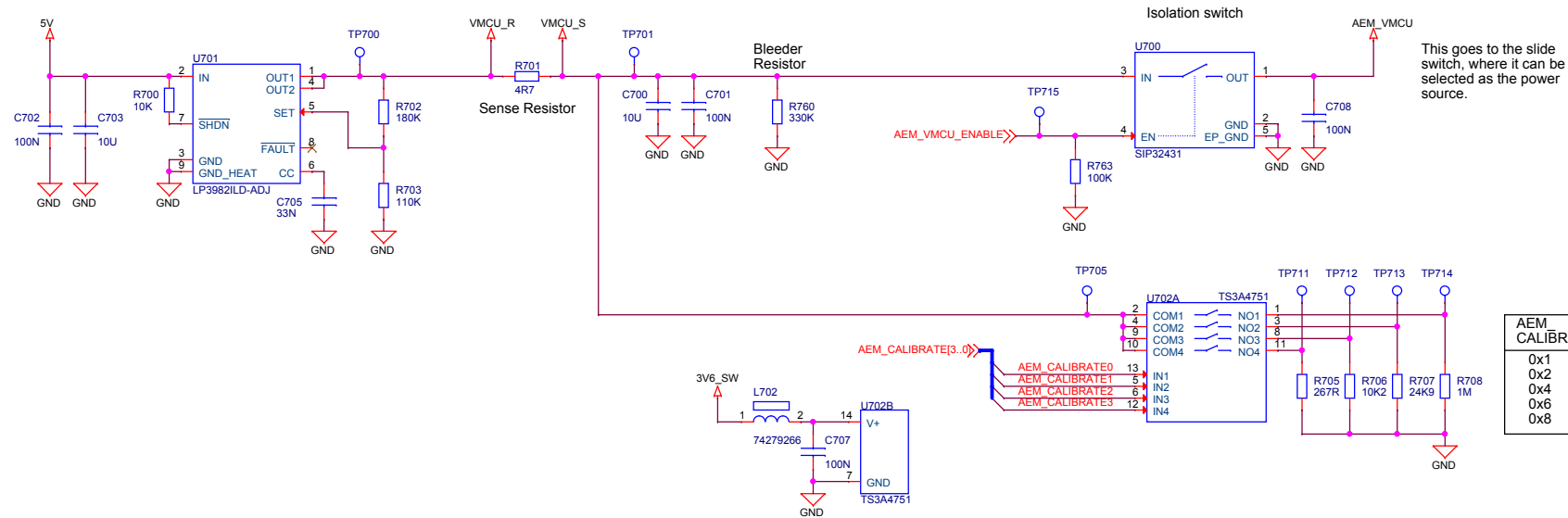
Segment Names

PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
COM0	DP2	1 E	1 D	2 E	2 D	3 E	3 D	4 E	4 D	DP5	5 D	DP6	6 D	7 E
COM1	DP4	1 Q	1 N	2 Q	2 N	3 Q	3 N	4 Q	4 N	5 E	5 N	6 E	6 N	7 Q
COM2	DP3	1 P	1 C	2 P	2 C	3 P	3 C	4 P	4 C	5 Q	5 C	6 Q	6 C	7 P
COM3	COL3	1 G	1 M	2 G	2 M	3 G	3 M	4 G	4 M	5 P	5 M	6 P	6 M	7 G
COM4	MINUS	1 F	1 J	2 F	2 J	3 F	3 J	4 F	4 J	5 G	5 J	6 G	6 J	7 F
COM5	PAD1	1 H	1 K	2 H	2 K	3 H	3 K	4 H	4 K	5 F	5 K	6 F	6 K	7 H
COM6	GEK	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 H	5 B	6 H	6 B	7 A
COM7	A7	A6	A5	A4	A3	A2	A1	A0	EFM	5 A	COL5	6 A	ANT	BAT

PIN	15	16	17	18	19	20	21	22	23	24	25	26	27	28
---	S14	S15	S16	S17	S18	S19	COM7	COM6	COM5	COM4	COM3	COM2	COM1	COM0
COM0	7 D	11 A	10 A	9 A	8 A	EM2								COM0
COM1	7 N	11 F	10 F	9 F	8 F	EM4							COM1	
COM2	7 C	11 B	10 B	9 B	8 B	COL10						COM2		
COM3	7 M	11 G	10 G	9 G	8 G	DP10					COM3			
COM4	7 J	11 E	10 E	9 E	8 E	PAD0				COM4				
COM5	7 K	11 C	10 C	9 C	8 C	EM3			COM5					
COM6	7 B	11 D	10 D	9 D	8 D	EM1		COM6						
COM7	°C	°F	B1	B0	B2	EM0	COM7							

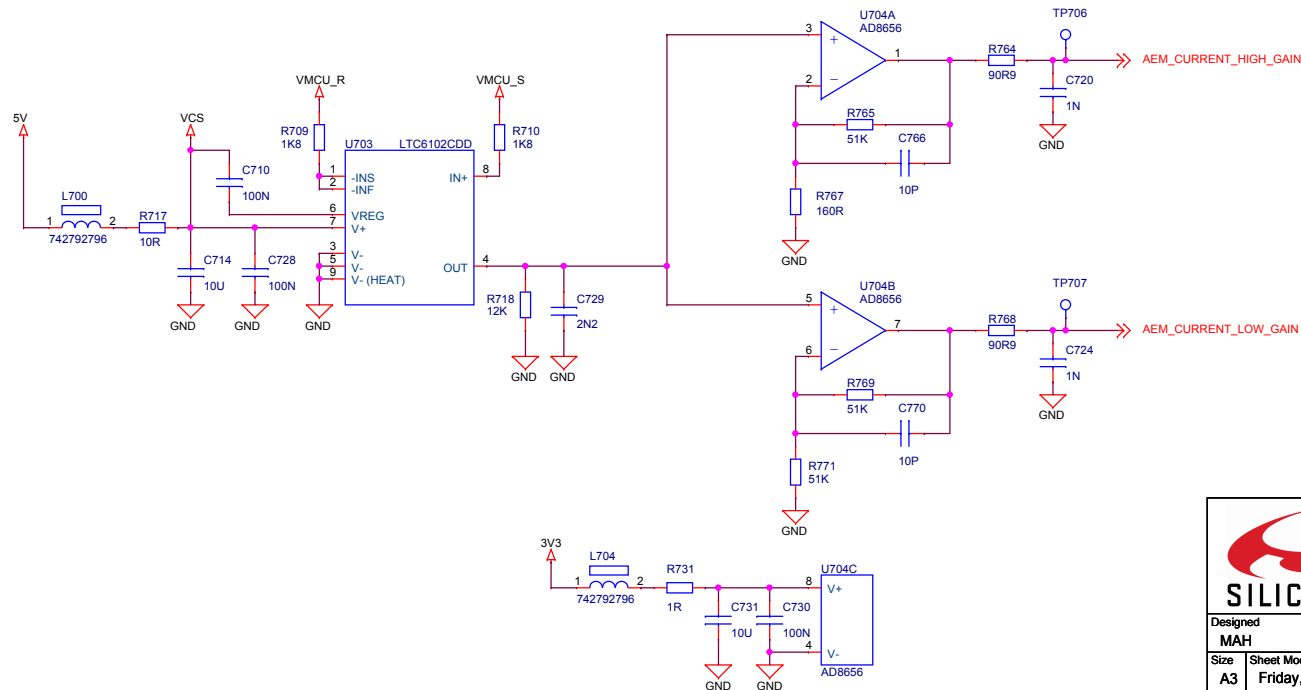


MCU Power Regulator



AEM CALIBRATE	Current
0x1	3.30 uA
0x2	132.5 uA
0x4	323.5 uA
0x6	456.1 uA
0x8	12.36 mA

Advanced Energy Monitoring



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Target Voltage Supply & AEM

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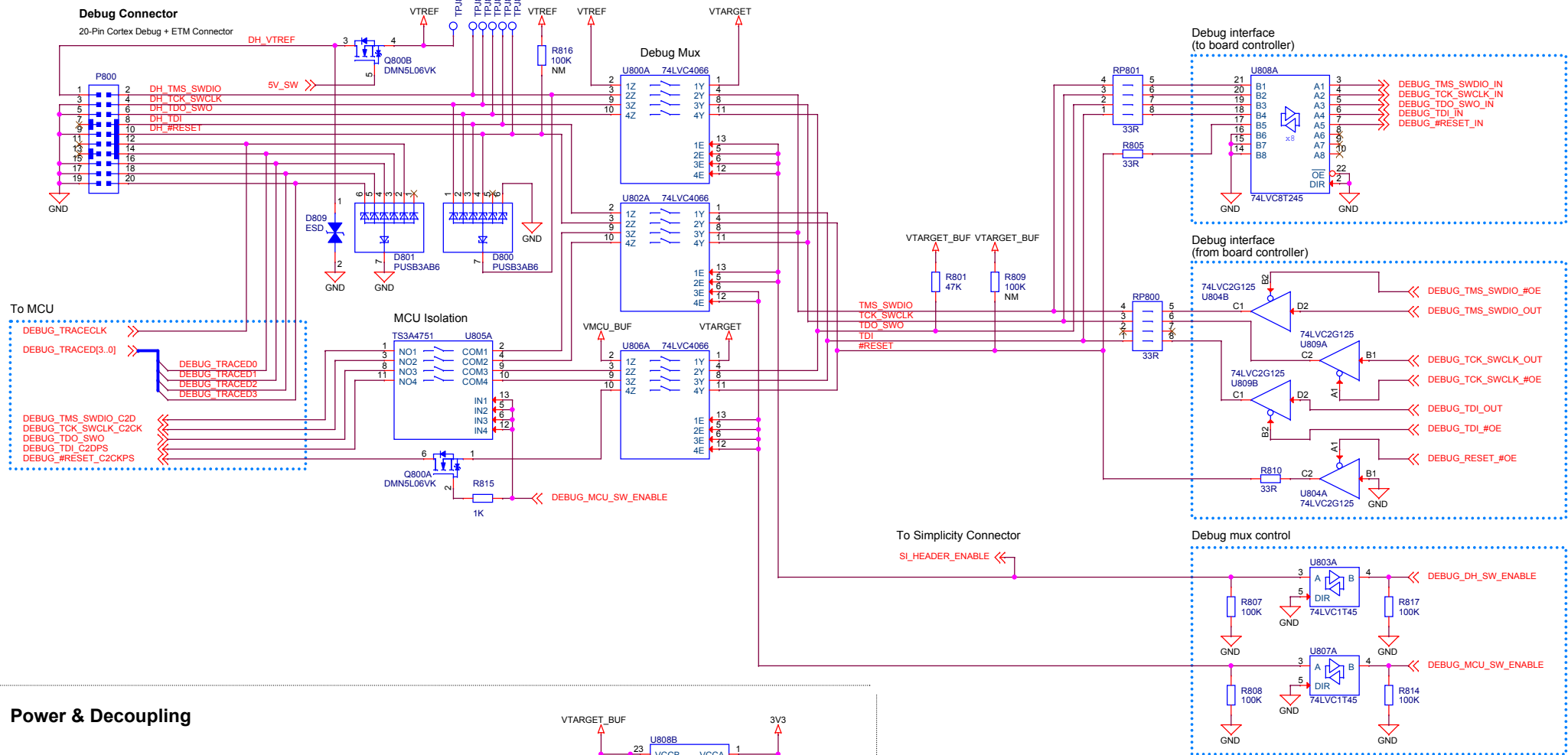
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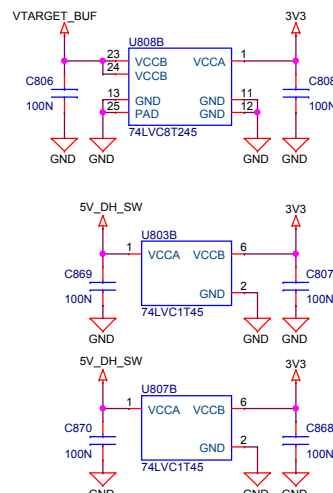
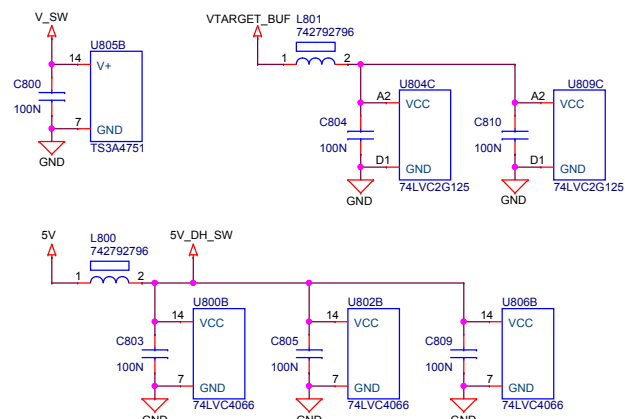
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Debug Mux



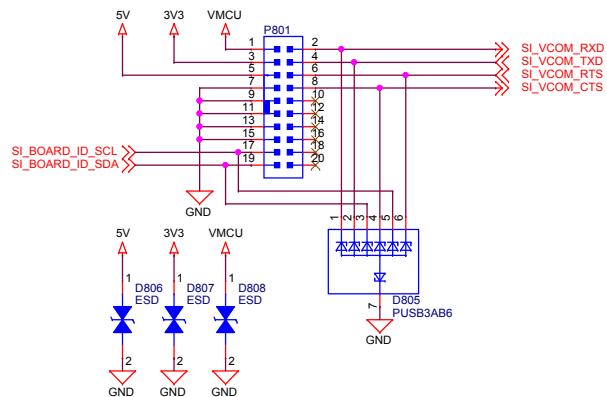
Power & Decoupling



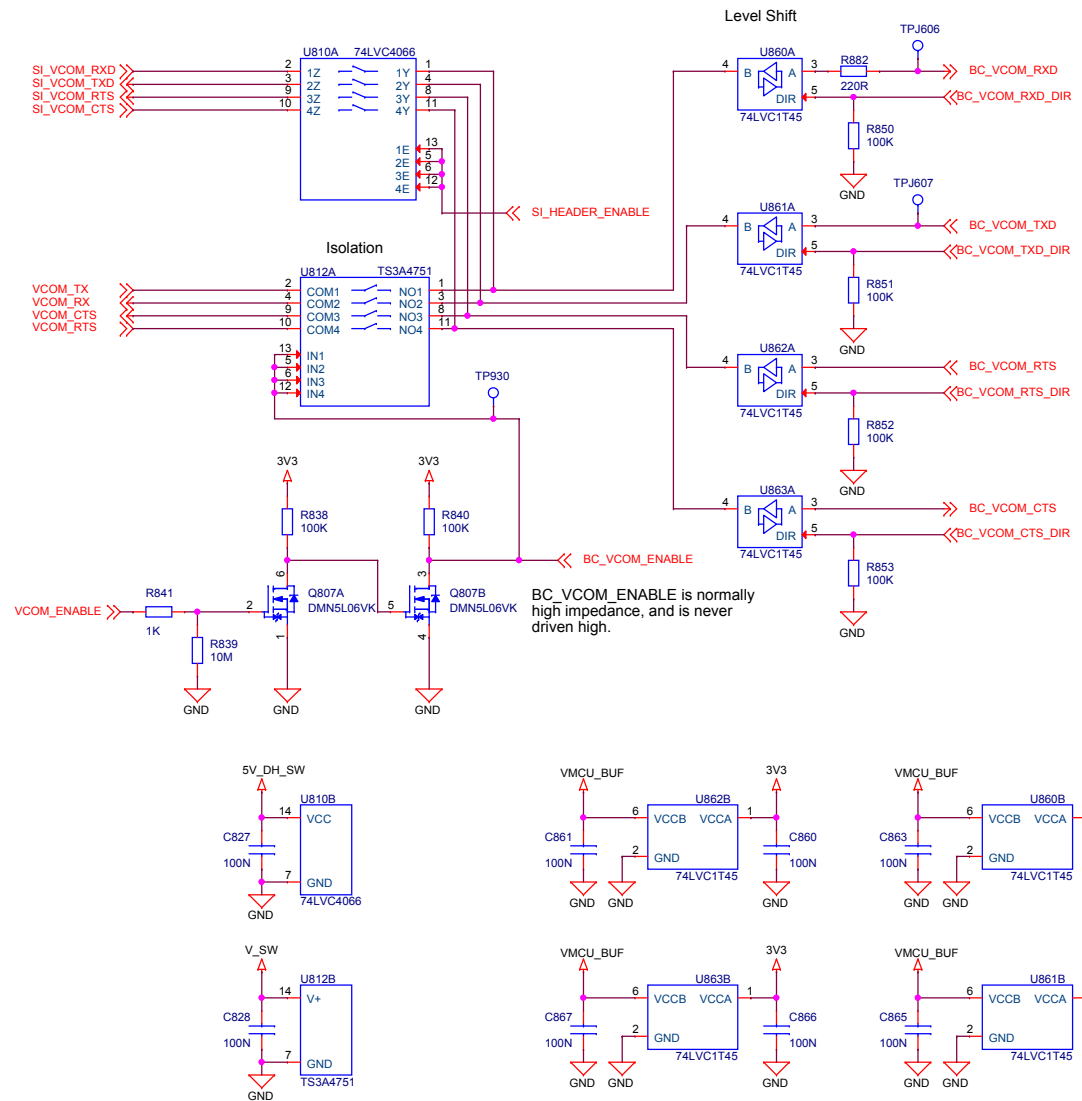
Debug Mode	DH_SW_ENABLE	MCU_SW_ENABLE	Debug Mode	VTARGET Source	VTREF Source
MCU	0	1	MCU	VMCU	None
Debug Out	1	0	Debug Out	VTREF (EXT)	External
Debug In	1	1	Debug In	VMCU	VMCU_BUF
Debug Off	0	0	Debug Off	None	None


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Simplicity Connector



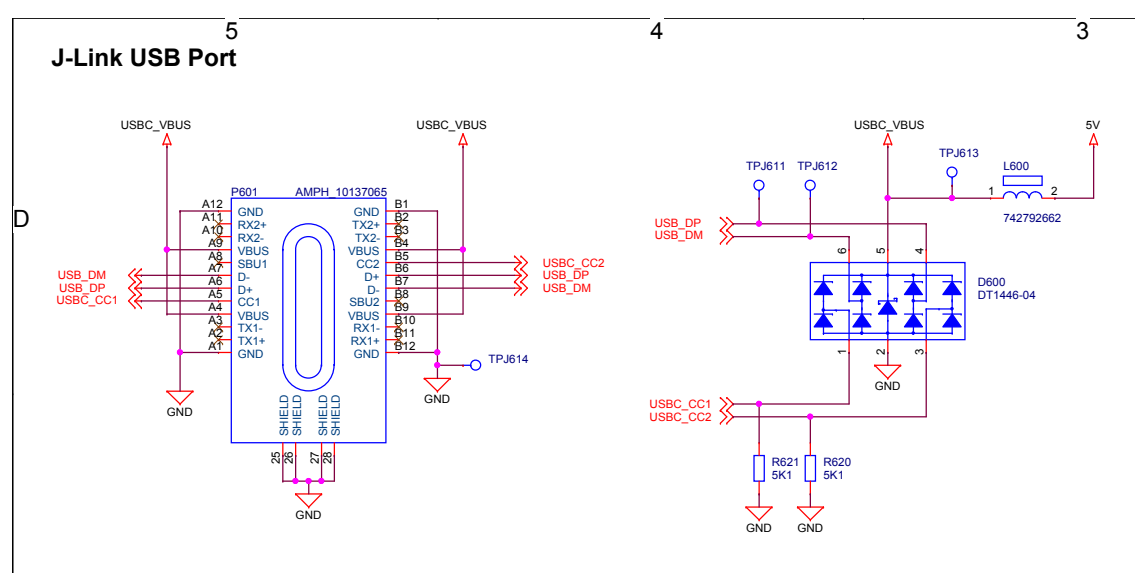
VCOM Interface



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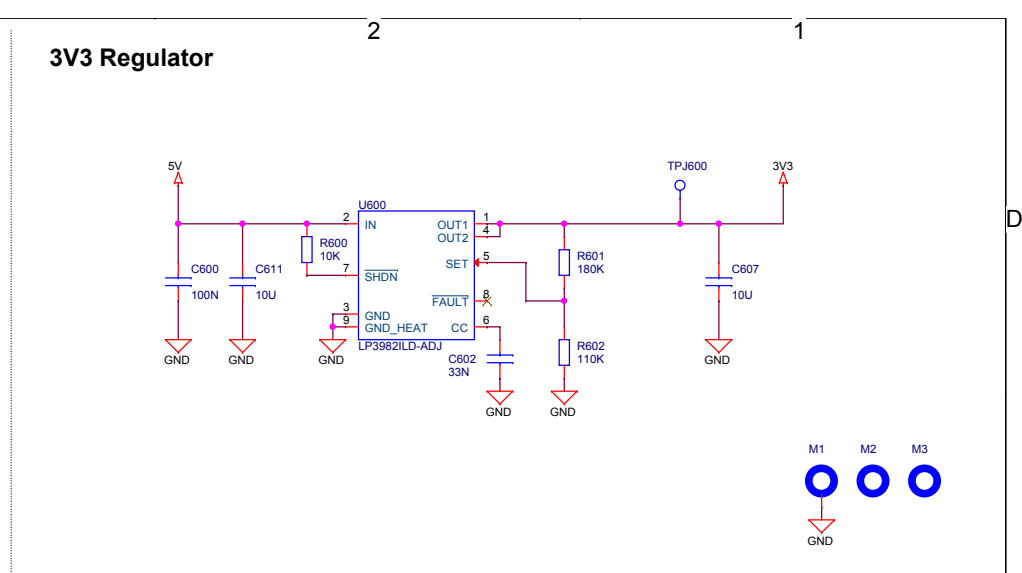
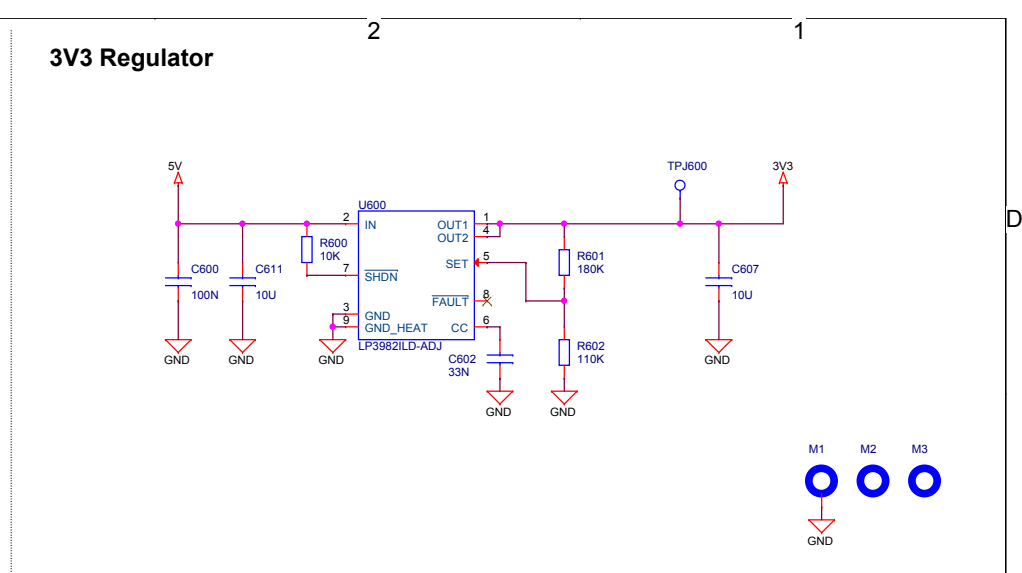
The left diagram illustrates the wiring for a J-Link USB Port. It features a central module labeled P601 AMPH_10137065. On the left side, there are four signal inputs: USB_DM, USB_DP, USB_CC1, and USB_VBUS. These connect to pins A1 through A12. Pin A1 is GND, A2 is TX1+, A3 is TX1-, A4 is VBUS, A5 is D+, A6 is D-, A7 is SBU1, A8 is VBUS, A9 is RX2-, A10 is RX2+, A11 is GND, and A12 is GND. On the right side, there are four signal outputs: USB_VBUS, USB_CC2, USB_DP, and USB_DM. These connect to pins B1 through B12. Pin B1 is GND, B2 is TX2+, B3 is TX2-, B4 is VBUS, B5 is CC2, B6 is D+, B7 is D-, B8 is SBU2, B9 is VBUS, B10 is RX1-, B11 is RX1+, and B12 is GND. There are also three shield pins (26, 27, 28) connected to GND. A test point TPJ614 is connected to pin B12.

The right diagram shows a USB port connection to a D600 DT1446-04 module. It includes several components: TPJ611, TPJ612, TPJ613, L600, R621, R620, and various signal lines. The module has six pins: 1, 2, 3, 4, 5, and 6. Pin 1 is connected to GND. Pin 2 is connected to R621 (5K1). Pin 3 is connected to R620 (5K1). Pin 4 is connected to GND. Pin 5 is connected to TPJ613. Pin 6 is connected to TPJ611 and TPJ612. The module also has two other pins: 7 and 8. Pin 7 is connected to GND. Pin 8 is connected to GND. The module is connected to a 5V supply via a 742792662 component. The module is also connected to a USB port via a cable with pins DP, DM, CC1, CC2, and VBUS.



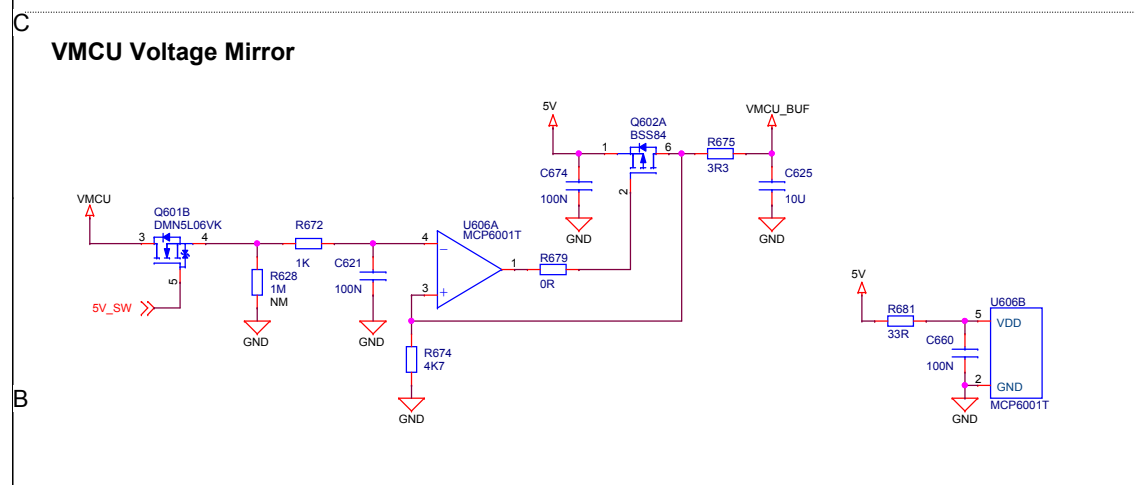
3V3 Regulator

The schematic diagram illustrates a 3V3 Regulator circuit. The central component is the LP3982ILD-ADJ (U600) voltage regulator. The input (IN, pin 2) is connected to a 5V supply through a 100nF capacitor (C600) and a 10uF capacitor (C611). A 10k resistor (R600) connects the input to the shutdown pin (SHDN, pin 7). The shutdown pin is also connected to ground (pin 3). The output (OUT1, pin 1) is connected to a 3V3 output through a 180k resistor (R601) and a 10uF capacitor (C607). The output is also connected to a temperature node (TPJ600). The regulator's setpoint (SET, pin 5) is connected to ground through a 110k resistor (R602). The fault pin (FAULT, pin 8) is connected to ground through a 33nF capacitor (C602). The regulator is also connected to ground at pins 4, 6, and 9. The output is labeled 3V3.

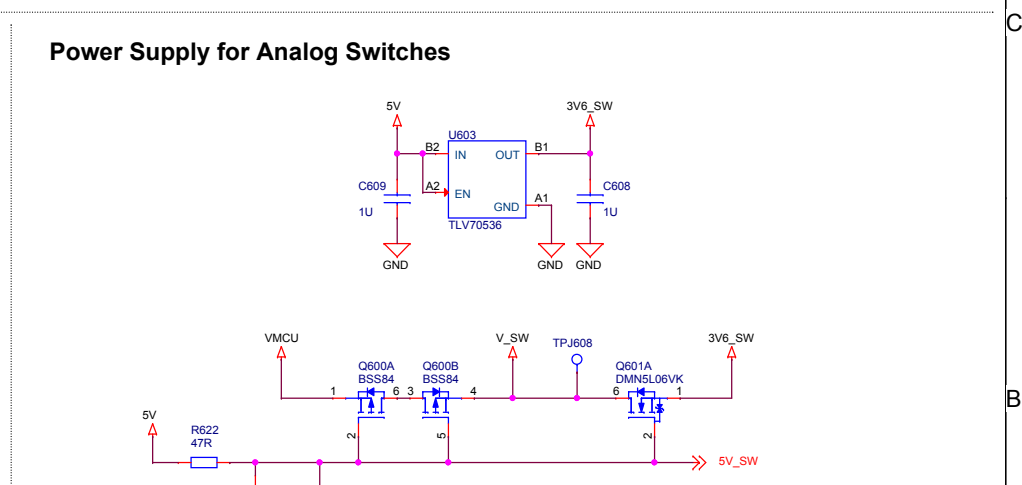


VMCU Voltage Mirror

The schematic diagram illustrates the VMCU Voltage Mirror circuit. It features two main stages of voltage mirroring and buffering. The first stage uses an NMOS transistor (Q601B) to mirror the 5V_SW input, followed by a buffer (U606A) and another NMOS transistor (Q602A) to drive the VMCU output. The second stage uses another NMOS transistor (Q603B) to mirror the 5V supply, followed by a buffer (U606B) and a final NMOS transistor (Q604A) to drive the VDD output. Various resistors (R628, R675, R679, R681, R682, R683) and capacitors (C621, C625, C660, C674) are used for biasing, timing, and signal conditioning. The circuit is powered by a 5V supply and a 5V_SW input.

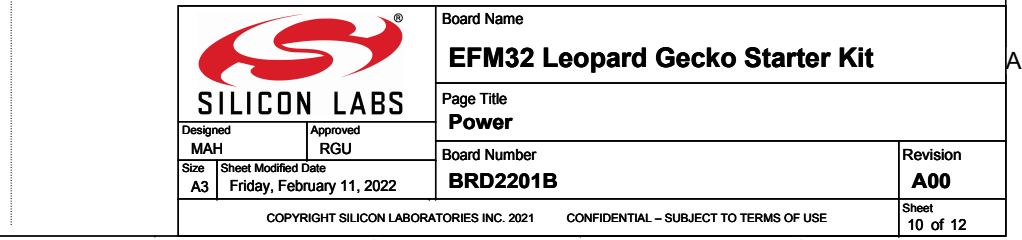



Power Supply for Analog Switches





The diagram shows a USB cable connected to the EFM32 Leopard Gecko Starter Kit. The cable has a red wire labeled R623 10K and a blue wire labeled C610 1N. Both wires are connected to ground (GND) pins on the board. The board is labeled EFM32 Leopard Gecko Starter Kit.


The diagram shows a USB cable connected to the EFM32 Leopard Gecko Starter Kit. The cable has a red wire labeled R623 10K and a blue wire labeled C610 1N. Both wires are connected to ground (GND) pins on the board. The board is labeled EFM32 Leopard Gecko Starter Kit.





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The schematic diagram illustrates the Board Controller, which consists of three microcontrollers (U900A, U900B, and U900C) and various peripheral components. The components are connected to a common 3V3 power supply and ground (GND).

Microcontrollers:

- U900A:** EFM32GG12B410F1024GL120-A. Pins include PA0-PA15, PB0-PB15, and various control pins like BC_DISP_AVAILABLE, BC_BUTTON_ENABLE, BC_VCOM_RXD_DIR, BC_VCOM_TXD_DIR, AEM_CURRENT_LOW_GAIN, BC_DAC_OUT, BC_TRACED2, and BC_I2C_EXP_ENABLE.
- U900B:** EFM32GG12B410F1024GL120-A. Pins include PC0-PC15, PD0-PD15, and various control pins like BC_VCOM_RTS, BC_VCOM_CTS, BC_VCOM_TXD, BC_VCOM_RXD, BC_VCOM_RTS_DIR, BC_VCOM_CTS_DIR, BOARD_ID_SDA, BOARD_ID_SCL, BOARD_ID_WP, 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, 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_TRACED1, and BC_I2C_EXP_ENABLE.
- U900C:** EFM32GG12B410F1024GL120-A. Pins include PE0-PE12, PF0-PF12, and various control pins like AEM_CALIBRATE0-3, TEST_USB_ADDR0-2, BC_DISP_COM, BC_UIF_BUTTON0, BC_UIF_BUTTON1, BC_SPI_COPI, BC_SPI_CPO, BC_SPI_SCLK, BC_SPI_CS, TEST_BC_TXD, TEST_BC_RXD, BC_DBG_TCK_SWCLK, BC_DBG_TMS_SWCLK, BC_DBG_TDO_SWCLK, BC_TRACED3, TEST_MODE, BOOTLOADER_HALT, BC_DISP_SPI_COPI, LED_LINK, BC_TRACECLK, BC_TRACED0, R902 33R, R904 33R, and EFM32GG12B410F1024GL120-A.

Peripheral Components:

- TPJ912, TPJ913:** 10MHz reference clock input.
- TPJ900, TPJ901:** TEST_USB_ADDR0, TEST_USB_ADDR1, TEST_USB_ADDR2, BC_UIF_BUTTON0, BC_UIF_BUTTON1, BC_SPI_COPI, BC_SPI_CPO, BC_SPI_SCLK, BC_SPI_CS, TEST_BC_TXD, TEST_BC_RXD.
- TPJ909, TPJ910, TPJ911:** TEST_USB_ADDR0, TEST_USB_ADDR1, TEST_USB_ADDR2, BC_UIF_BUTTON0, BC_UIF_BUTTON1, BC_SPI_COPI, BC_SPI_CPO, BC_SPI_SCLK, BC_SPI_CS, TEST_BC_TXD, TEST_BC_RXD.
- TPJ954, TPJ953, TPJ955, TPJ961, TPJ908, TPJ902, TPJ957, TPJ958:** BC_DBG_TCK_SWCLK, BC_DBG_TMS_SWCLK, BC_DBG_TDO_SWCLK, BC_TRACED3, TEST_MODE, BOOTLOADER_HALT, BC_DISP_SPI_COPI, LED_LINK, BC_TRACECLK, BC_TRACED0, R902 33R, R904 33R.
- X900:** 48 MHz crystal.
- R902, R904:** 33R resistors.

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BC Serial Flash

BOARD VER0
BOARD_VER1

R931 1K
R930 1K

GND GND

Board Name

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Board Controller

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BC Serial Flash

U902A MX25R8035F

U902B MX25R8035F

3V3

3V3

BC_SPL_COP1

BC_SPL_SCLK

R906 10K

BC_SPL_CS

BC_SPL_CIPO

D2 SI / SIO0

E1 SCLK

A3 CS#

E3 WP# / SIO2

C1 RESET# / SIO3

SO / SIO1

C3

3V3

C914 100N

A1 VCC

B2 GND

GND

GND

Board Version

BOARD_VER0

BOARD_VER1

R931 1K

R930 1K

GND

GND

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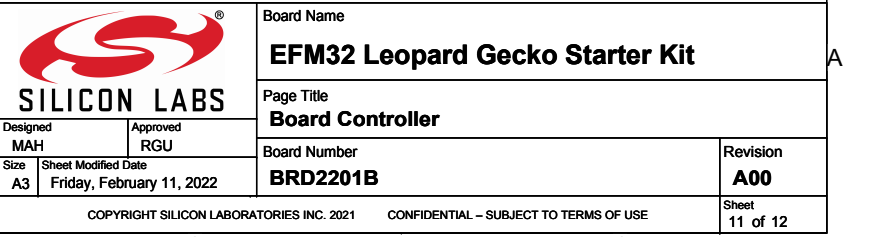
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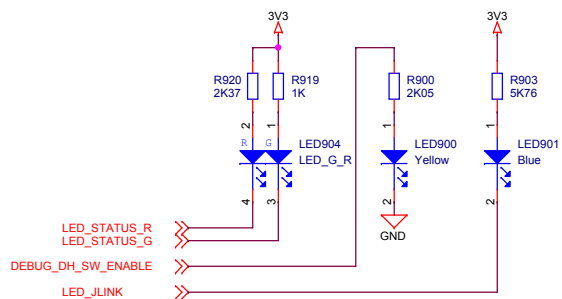
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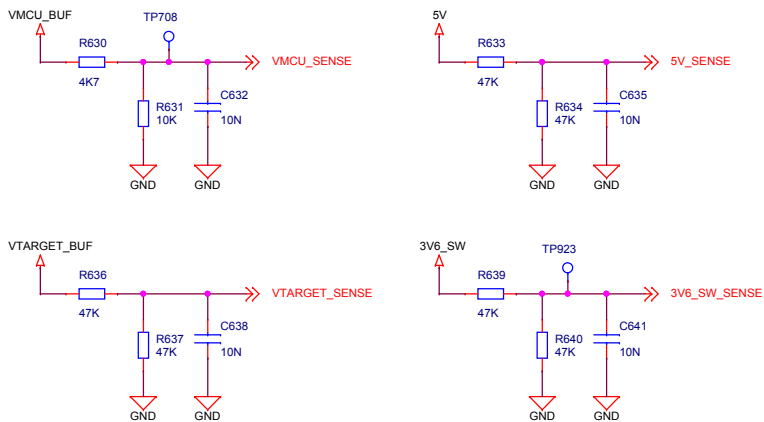


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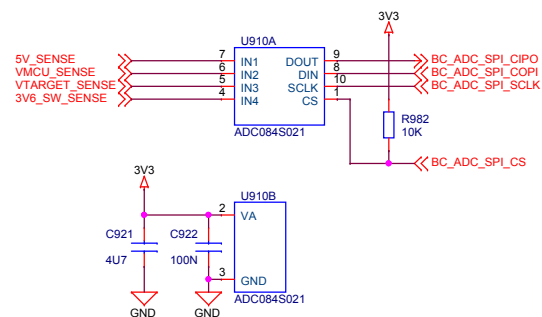
Indicator LEDs



BC Voltage Sense



BC Voltage Sense ADC



		Board Name	
		EFM32 Leopard Gecko Starter Kit	
Designed MAH		Page Title	
Size A3		Board Controller Misc	
Sheet Modified Date Friday, February 11, 2022		Board Number	Revision
		BRD2201B	A00
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