

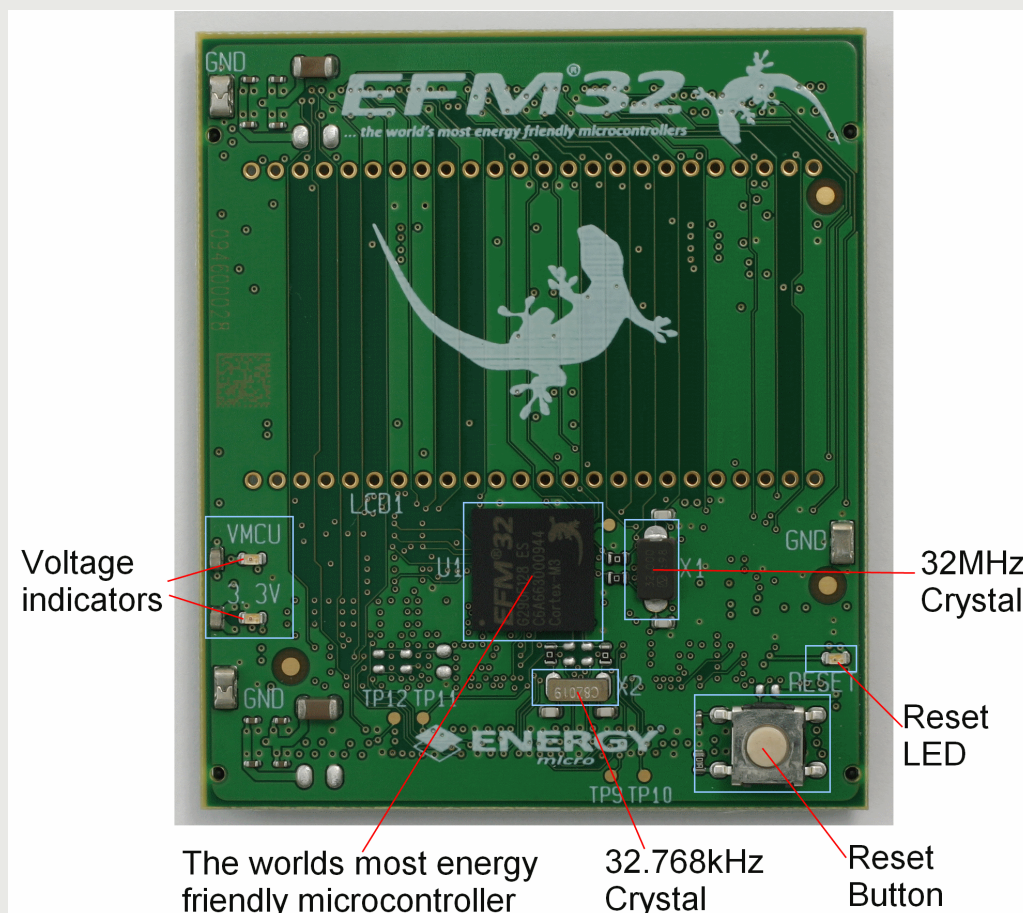
EFM32 G290 MCU Board

Preliminary

The EFM32 G290 MCU Board is a small plugin module for usage with the EFM32 Gecko Development Kit.

Features:

- The world's most energy friendly microcontroller
- Compatible with the Advanced Energy Monitoring (AEM) system of the EFM32 Gecko Development Kit
- Leds indicating power and reset
- 32 MHz crystal
- 32.768 kHz crystal
- Reset button and ground-hooks for easy debugging



1 Usage

1.1 Placement

This board is intended for use with the EFM32 Gecko Development Kit.

1.2 Reset Button / Reset LED

When pressed, the reset button resets the EFM32 device. When reset is asserted, a red led next to the button is lit. A filter is connected to the reset line in order to reduce bouncing.

1.3 LEDs Indicating Power

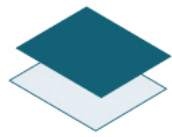
The two green LEDs indicate power on the VMCU and 3.3V nets, respectively.

1.4 Crystal Oscillators

The board features one 32.768kHz and one 32MHz crystal. These are connected through 0-ohm resistors to the respective inputs of the low-frequency and high-frequency crystal oscillators of the EFM32. Using these instead of the internal RC-oscillators will ensure higher frequency accuracy. However, if the reduced accuracy is acceptable, these lines can be used as normal IO-lines instead by removing the 0-ohm resistors. In order to export these IO lines to the Kit mainboard, insert resistors for connection to the EFM32_A bus. See schematic for details.

1.5 Kit Connection

It is possible to access the board controller on the Kit mainboard for example to turn LEDs on or off, read push button status or connecting the EFM32 to specific hardware on the mainboard. The access may either through SPI or the parallel interface (EBI), and the access mode is signaled to the board controller by asserting one of two dedicated signal lines. It is recommended to use the Board Support Package (BSP) for access to the mainboard. Please see the Kit user guide for further description of the BSP.



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EFM32 Microcontroller Board

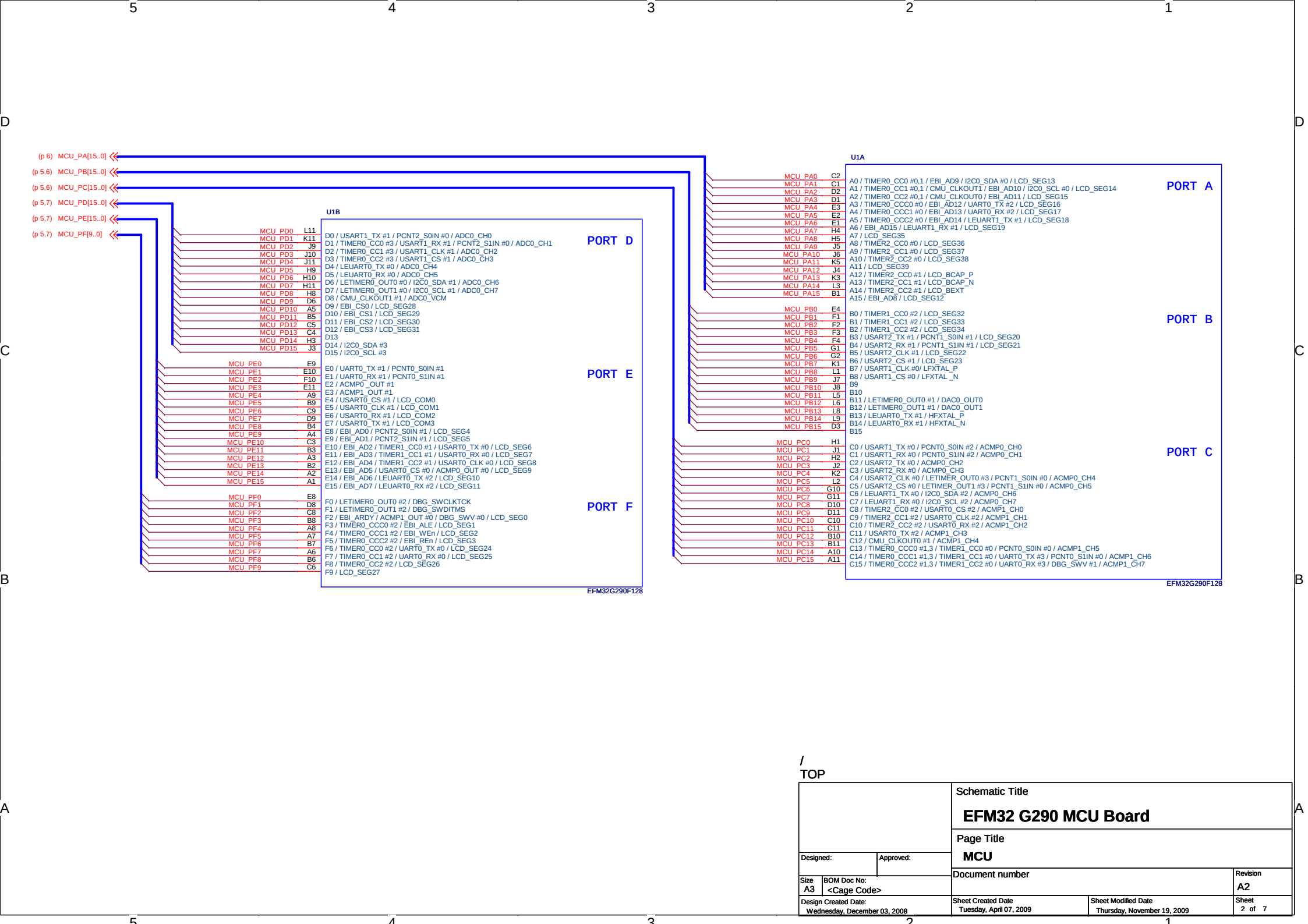
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Revision History

Revision	Comment
PA5	Updated after feedback from Contec
PA6	Moved the location of the VMCU R0 resistors
PA7	BOM update
A	Some BOM updates. Final version
A1	Removed pullup on reset. Added transistors to control the reset LED
A2	BOM changes. Removed pullup on reset button and some decoupling caps.

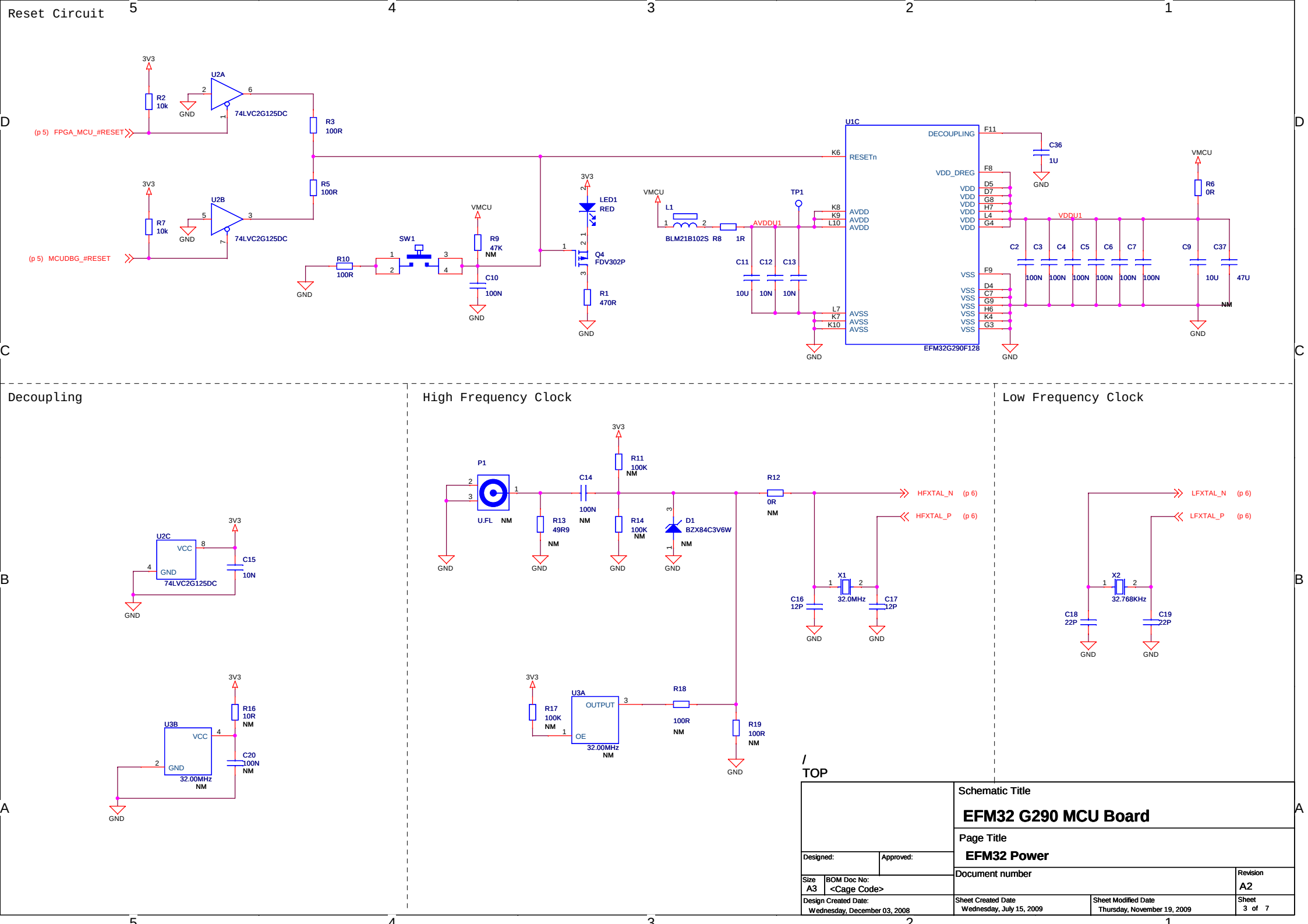
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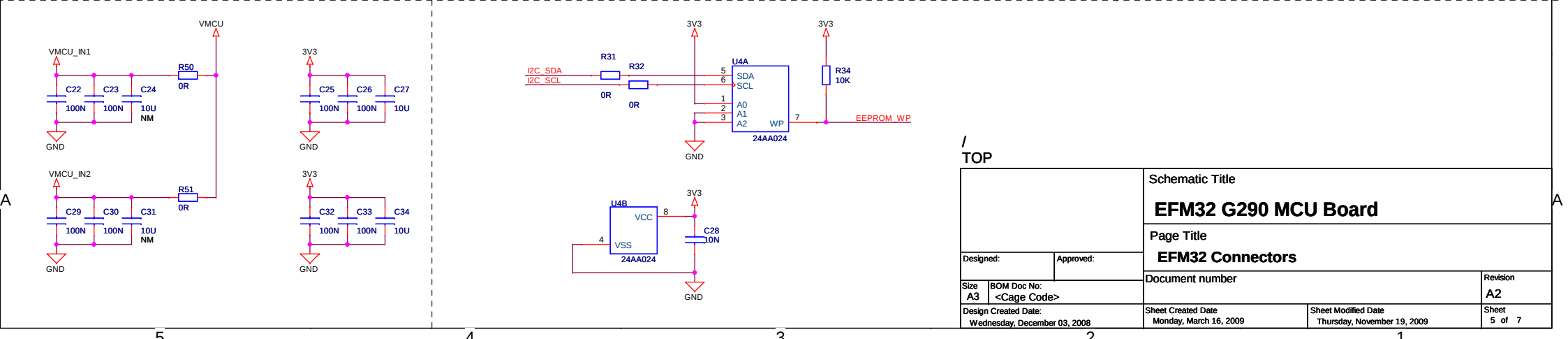
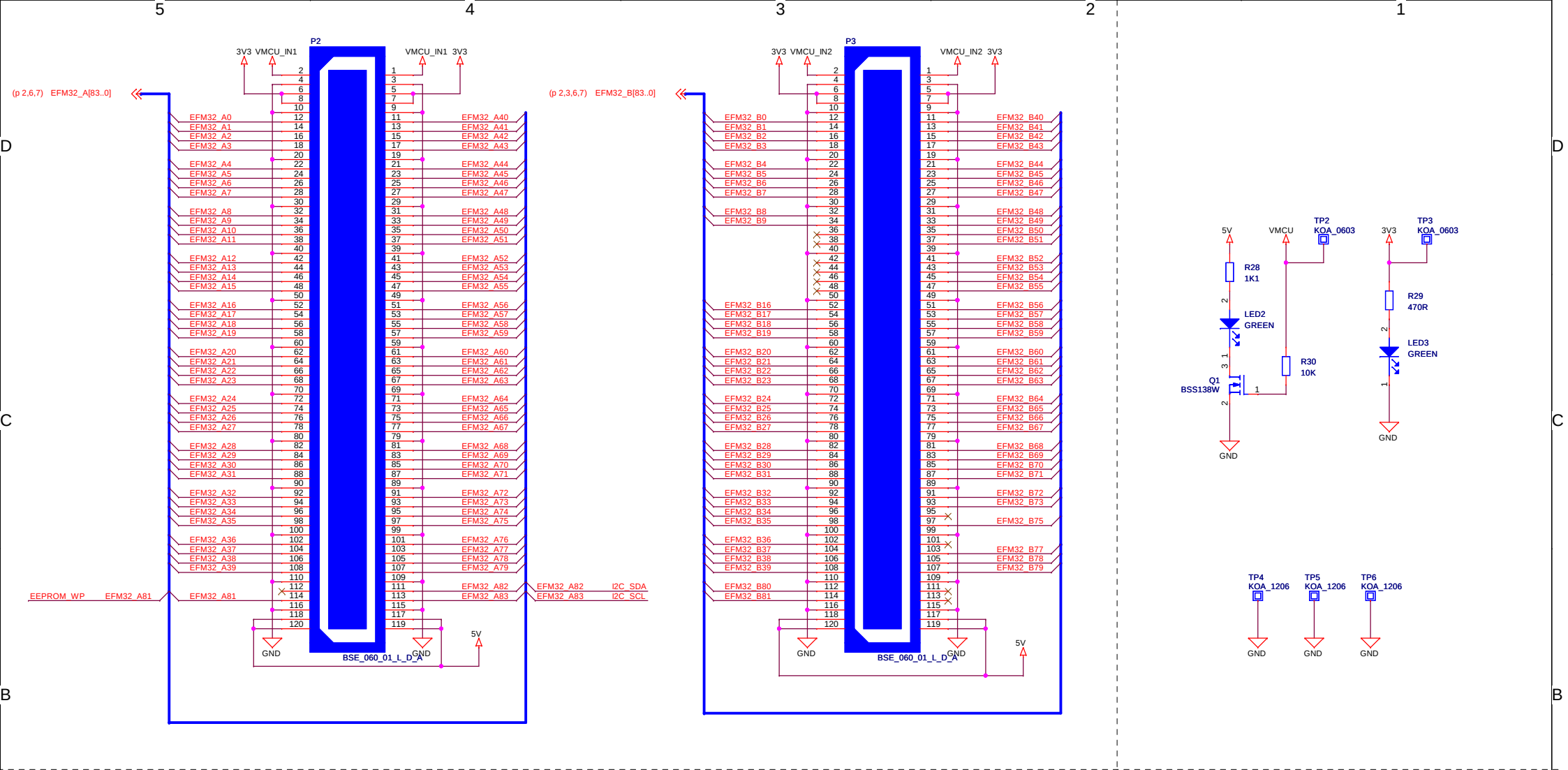




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		EFM32 Connectors	
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PA Connections

MCU_PA[15..0] connects to LCD_PA[15..0] (p 4) and EFM32_A[83..0] (p 2,5,7). The PA pins are connected to the MCU and the LCD through a series of 8-pin connectors (RP1, RP3, RP5, RP7, RP9, RP10, RP11, RP12) and OR gates. The EFM32 pins are connected to the MCU and the LCD through a series of 8-pin connectors (RP1, RP3, RP5, RP7, RP9, RP10, RP11, RP12) and OR gates.

PB Connections

MCU_PB[15..0] connects to LCD_PB[6..0] (p 4) and EFM32_A[83..0] (p 2,3,5,7). The PB pins are connected to the MCU and the LCD through a series of 8-pin connectors (RP2, RP4, RP6, RP8, RP35, RP37, RP39, RP41) and OR gates. The EFM32 pins are connected to the MCU and the LCD through a series of 8-pin connectors (RP2, RP4, RP6, RP8, RP35, RP37, RP39, RP41) and OR gates.

PC Connections

MCU_PC[15..0] connects to EFM32_A[83..0] (p 2,5,7) and EFM32_B[83..0] (p 2,3,5,7). The PC pins are connected to the MCU and the EFM32 pins through a series of 8-pin connectors (RP1, RP3, RP5, RP7, RP9, RP10, RP11, RP12) and OR gates. The EFM32 pins are connected to the MCU and the LCD through a series of 8-pin connectors (RP1, RP3, RP5, RP7, RP9, RP10, RP11, RP12) and OR gates.

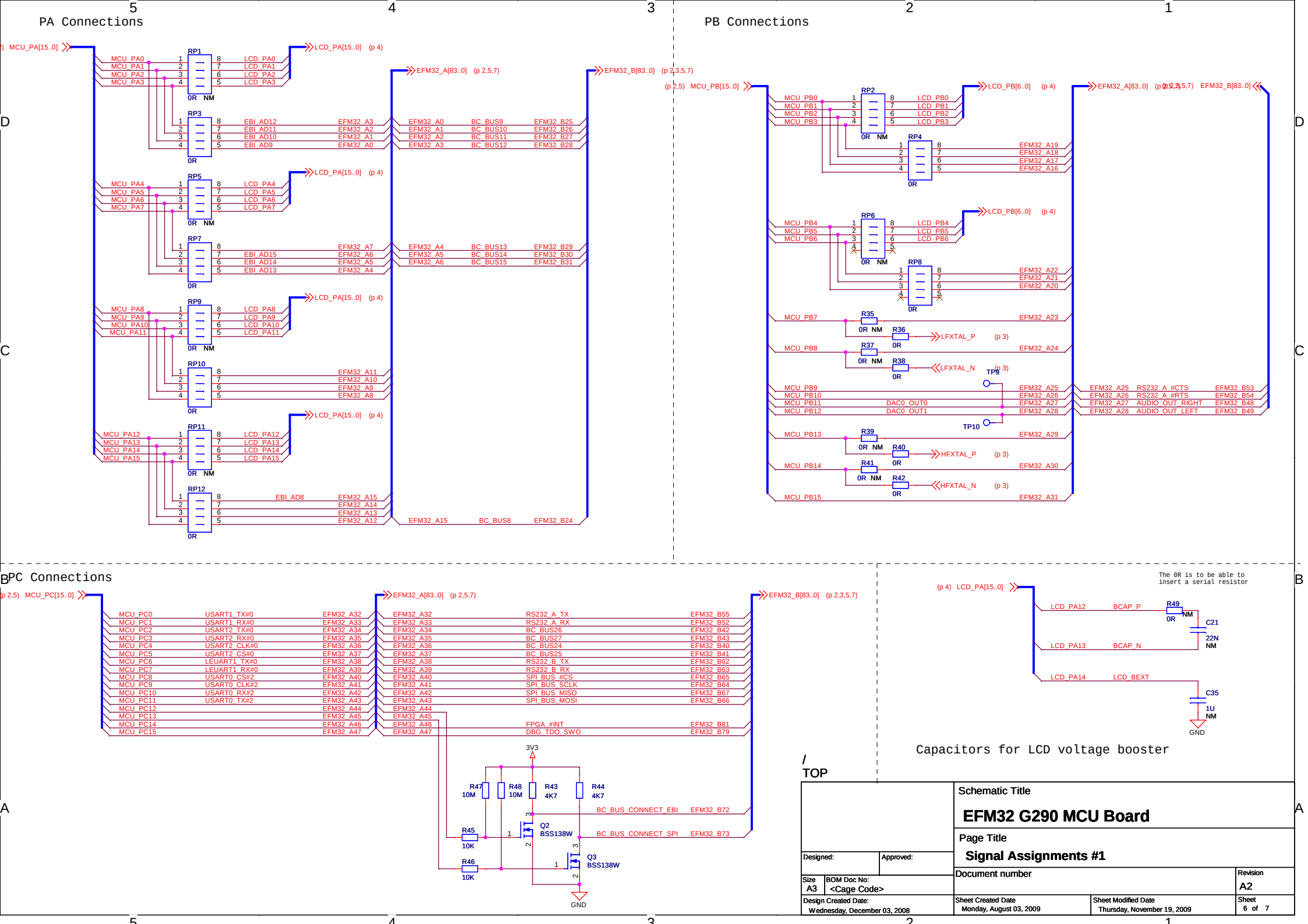
Voltage Booster Circuit

The voltage booster circuit is used to boost the LCD voltage. It consists of a 3V3 input, a 10M resistor (R47), a 10M resistor (R48), a 4K7 resistor (R43), a 4K7 resistor (R44), a 10K resistor (R45), a 10K resistor (R46), a BSS138W MOSFET (Q2), and a BSS138W MOSFET (Q3). The output of the circuit is connected to the LCD_PA[15..0] and LCD_PB[6..0] pins.

Capacitors for LCD voltage booster

The capacitors for the LCD voltage booster are C21 (22N) and C35 (1U). They are connected to the LCD_PA[15..0] and LCD_PB[6..0] pins.

MCU Pin	MCU Function	MCU Pin	MCU Function	MCU Pin	MCU Function	MCU Pin	MCU Function
MCU_PA0	MCU_PA0	MCU_PB0	MCU_PB0	MCU_PC0	USART1_TX#0	MCU_PA12	LCD_PA12
MCU_PA1	MCU_PA1	MCU_PB1	MCU_PB1	MCU_PC1	USART1_RX#0	MCU_PA13	LCD_PA13
MCU_PA2	MCU_PA2	MCU_PB2	MCU_PB2	MCU_PC2	USART2_TX#0	MCU_PA14	LCD_PA14
MCU_PA3	MCU_PA3	MCU_PB3	MCU_PB3	MCU_PC3	USART2_RX#0	MCU_PA15	LCD_PA15
MCU_PA4	MCU_PA4	MCU_PB4	MCU_PB4	MCU_PC4	USART2_CLK#0		
MCU_PA5	MCU_PA5	MCU_PB5	MCU_PB5	MCU_PC5	USART2_CS#0		
MCU_PA6	MCU_PA6	MCU_PB6	MCU_PB6	MCU_PC6	LEUART1_TX#0		
MCU_PA7	MCU_PA7	MCU_PB7	MCU_PB7	MCU_PC7	LEUART1_RX#0		
MCU_PA8	MCU_PA8	MCU_PB8	MCU_PB8	MCU_PC8	USART0_CS#2		
MCU_PA9	MCU_PA9	MCU_PB9	MCU_PB9	MCU_PC9	USART0_CLK#2		
MCU_PA10	MCU_PA10	MCU_PB10	MCU_PB10	MCU_PC10	USART0_RX#2		
MCU_PA11	MCU_PA11	MCU_PB11	MCU_PB11	MCU_PC11	USART0_TX#2		
MCU_PA12	MCU_PA12	MCU_PB12	MCU_PB12	MCU_PC12			
MCU_PA13	MCU_PA13	MCU_PB13	MCU_PB13	MCU_PC13			
MCU_PA14	MCU_PA14	MCU_PB14	MCU_PB14	MCU_PC14			
MCU_PA15	MCU_PA15	MCU_PB15	MCU_PB15	MCU_PC15			

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PD Connections

The diagram illustrates the connections for the PD (Peripheral Device) pins of the EFM32 microcontroller. The connections are organized into several sections:

- MCU PD0-PD8:** These pins are connected to ADC0 channels (CH0-CH7) and VCM. The connections are as follows:
 - MCU PD0: ADC0 CH0
 - MCU PD1: ADC0 CH1
 - MCU PD2: ADC0 CH2
 - MCU PD3: ADC0 CH3
 - MCU PD4: ADC0 CH4
 - MCU PD5: ADC0 CH5
 - MCU PD6: ADC0 CH6
 - MCU PD7: ADC0 CH7
 - MCU PD8: ADC0 VCM
- MCU PD9-PD12:** These pins are connected to the LCD PD9-PD12. The connections are as follows:
 - MCU PD9: LCD PD9
 - MCU PD10: LCD PD10
 - MCU PD11: LCD PD11
 - MCU PD12: LCD PD12
- MCU PD13-PD15:** These pins are connected to I2C SDA and SCL. The connections are as follows:
 - MCU PD13: I2C0 SDA#3
 - MCU PD14: I2C0 SCL#3
 - MCU PD15: I2C0 SCL#3
- EFM32 Pins:** The EFM32 pins are connected to various peripherals and sensors. The connections are as follows:
 - EFM32 A48: AUDIO IN RIGHT
 - EFM32 A49: AUDIO IN LEFT
 - EFM32 A50: ACCEL XOUT
 - EFM32 A51: ACCEL YOUT
 - EFM32 A52: ACCEL ZOUT
 - EFM32 A53: POTMETER
 - EFM32 A54: ANALOG DIFF N
 - EFM32 A55: ANALOG DIFF P
 - EFM32 A56: ANALOG DIFF VCM
 - EFM32 B50: ANALOG SE A
 - EFM32 B51: ANALOG SE B
 - EFM32 B52: SENSOR LIGHT
 - EFM32 B53: BC BUS20
 - EFM32 B54: BC BUS21
 - EFM32 B55: BC BUS22
 - EFM32 B56: BC BUS23
 - EFM32 B57: I2C BUS SDA
 - EFM32 B58: I2C BUS SCL

The diagram illustrates the Peripheral Expansion (PE) connections for the EFM32 microcontroller. It is divided into two main sections, 1 and 2, separated by a vertical dashed line.

Section 1 (Right): This section shows the connections for the EFM32 modules. The connections are grouped by MCU PE number (0-15) and LCD PE number (4-15). The connections are as follows:

- MCU PE0:** EFM32_A64
- MCU PE1:** EFM32_A65
- MCU PE2:** EFM32_A66
- MCU PE3:** EFM32_A67
- MCU PE4:** LCD_PE[15..4] (p 4)
- MCU PE5:** LCD_PE[15..4] (p 4)
- MCU PE6:** LCD_PE[15..4] (p 4)
- MCU PE7:** LCD_PE[15..4] (p 4)
- MCU PE8:** LCD_PE[15..4] (p 4)
- MCU PE9:** LCD_PE[15..4] (p 4)
- MCU PE10:** LCD_PE[15..4] (p 4)
- MCU PE11:** LCD_PE[15..4] (p 4)
- MCU PE12:** LCD_PE[15..4] (p 4)
- MCU PE13:** LCD_PE[15..4] (p 4)
- MCU PE14:** LCD_PE[15..4] (p 4)
- MCU PE15:** LCD_PE[15..4] (p 4)
- LCD PE4:** EFM32_A70, IRDA_RXD, EFM32_B61
- LCD PE5:** EFM32_A71, IRDA_TXD, EFM32_B60
- LCD PE6:** EFM32_A72, BC_BUS0, EFM32_B16
- LCD PE7:** EFM32_A73, BC_BUS1, EFM32_B17
- LCD PE8:** EFM32_A74, BC_BUS2, EFM32_B18
- LCD PE9:** EFM32_A75, BC_BUS3, EFM32_B19
- LCD PE10:** EFM32_A76, BC_BUS4, EFM32_B20
- LCD PE11:** EFM32_A77, BC_BUS5, EFM32_B21
- LCD PE12:** EFM32_A78, BC_BUS6, EFM32_B22
- LCD PE13:** EFM32_A79, BC_BUS7, EFM32_B23
- LCD PE14:** EFM32_A70, IRDA_RXD, EFM32_B61
- LCD PE15:** EFM32_A71, IRDA_TXD, EFM32_B60

Section 2 (Left): This section shows the connections for the MCU PE0-PE15 and LCD modules (PE4-PE15). The connections are grouped by MCU PE number (0-15) and LCD PE number (4-15). The connections are as follows:

- MCU PE0:** EFM32_A64
- MCU PE1:** EFM32_A65
- MCU PE2:** EFM32_A66
- MCU PE3:** EFM32_A67
- MCU PE4:** LCD_PE[15..4] (p 4)
- MCU PE5:** LCD_PE[15..4] (p 4)
- MCU PE6:** LCD_PE[15..4] (p 4)
- MCU PE7:** LCD_PE[15..4] (p 4)
- MCU PE8:** LCD_PE[15..4] (p 4)
- MCU PE9:** LCD_PE[15..4] (p 4)
- MCU PE10:** LCD_PE[15..4] (p 4)
- MCU PE11:** LCD_PE[15..4] (p 4)
- MCU PE12:** LCD_PE[15..4] (p 4)
- MCU PE13:** LCD_PE[15..4] (p 4)
- MCU PE14:** LCD_PE[15..4] (p 4)
- MCU PE15:** LCD_PE[15..4] (p 4)
- LCD PE4:** EFM32_A70, IRDA_RXD, EFM32_B61
- LCD PE5:** EFM32_A71, IRDA_TXD, EFM32_B60
- LCD PE6:** EFM32_A72, BC_BUS0, EFM32_B16
- LCD PE7:** EFM32_A73, BC_BUS1, EFM32_B17
- LCD PE8:** EFM32_A74, BC_BUS2, EFM32_B18
- LCD PE9:** EFM32_A75, BC_BUS3, EFM32_B19
- LCD PE10:** EFM32_A76, BC_BUS4, EFM32_B20
- LCD PE11:** EFM32_A77, BC_BUS5, EFM32_B21
- LCD PE12:** EFM32_A78, BC_BUS6, EFM32_B22
- LCD PE13:** EFM32_A79, BC_BUS7, EFM32_B23
- LCD PE14:** EFM32_A70, IRDA_RXD, EFM32_B61
- LCD PE15:** EFM32_A71, IRDA_TXD, EFM32_B60

PF Connections

The diagram illustrates the pin connections for the PF (Pin Function) of the RP21, RP22, RP23, and RP24. The connections are as follows:

- RP21:**
 - MCU PF0 → DBG_SWCLKTCK → EFM32 B0
 - MCU PF1 → DBG_SWDTMS → EFM32 B1
 - MCU PF2 → LCD PF2
 - MCU PF3 → LCD PF3
 - MCU PF4 → LCD PF4
 - MCU PF5 → LCD PF5
- RP22:**
 - EBI REN → EFM32 B5
 - EBI WEN → EFM32 B4
 - EBI ALE → EFM32 B3
 - EBI ARDY → EFM32 B2
- RP23:**
 - MCU PF6 → LCD PF6
 - MCU PF7 → LCD PF7
 - MCU PF8 → LCD PF8
 - MCU PF9 → LCD PF9
- RP24:**
 - EFM32 B9
 - EFM32 B8
 - EFM32 B7
 - EFM32 B6

Additional connections shown include EFM32 B0, EFM32 B1, EFM32 B2, EFM32 B3, EFM32 B4, EFM32 B5, EFM32 B6, EFM32 B7, EFM32 B8, EFM32 B9, EFM32 B10, EFM32 B11, EFM32 B12, EFM32 B13, EFM32 B14, EFM32 B15, EFM32 B16, EFM32 B17, EFM32 B18, EFM32 B19, EFM32 B20, EFM32 B21, EFM32 B22, EFM32 B23, EFM32 B24, EFM32 B25, EFM32 B26, EFM32 B27, EFM32 B28, EFM32 B29, EFM32 B30, EFM32 B31, EFM32 B32, EFM32 B33, EFM32 B34, EFM32 B35, EFM32 B36, EFM32 B37, EFM32 B38, EFM32 B39, EFM32 B40, EFM32 B41, EFM32 B42, EFM32 B43, EFM32 B44, EFM32 B45, EFM32 B46, EFM32 B47, EFM32 B48, EFM32 B49, EFM32 B50, EFM32 B51, EFM32 B52, EFM32 B53, EFM32 B54, EFM32 B55, EFM32 B56, EFM32 B57, EFM32 B58, EFM32 B59, EFM32 B60, EFM32 B61, EFM32 B62, EFM32 B63, EFM32 B64, EFM32 B65, EFM32 B66, EFM32 B67, EFM32 B68, EFM32 B69, EFM32 B70, EFM32 B71, EFM32 B72, EFM32 B73, EFM32 B74, EFM32 B75, EFM32 B76, EFM32 B77, EFM32 B78, EFM32 B79, EFM32 B80, EFM32 B81, EFM32 B82, EFM32 B83, EFM32 B84, EFM32 B85, EFM32 B86, EFM32 B87, EFM32 B88, EFM32 B89, EFM32 B90, EFM32 B91, EFM32 B92, EFM32 B93, EFM32 B94, EFM32 B95, EFM32 B96, EFM32 B97, EFM32 B98, EFM32 B99, EFM32 B100, EFM32 B101, EFM32 B102, EFM32 B103, EFM32 B104, EFM32 B105, EFM32 B106, EFM32 B107, EFM32 B108, EFM32 B109, EFM32 B110, EFM32 B111, EFM32 B112, EFM32 B113, EFM32 B114, EFM32 B115, EFM32 B116, EFM32 B117, EFM32 B118, EFM32 B119, EFM32 B120, EFM32 B121, EFM32 B122, EFM32 B123, EFM32 B124, EFM32 B125, EFM32 B126, EFM32 B127, EFM32 B128, EFM32 B129, EFM32 B130, EFM32 B131, EFM32 B132, EFM32 B133, EFM32 B134, EFM32 B135, EFM32 B136, EFM32 B137, EFM32 B138, EFM32 B139, EFM32 B140, EFM32 B141, EFM32 B142, EFM32 B143, EFM32 B144, EFM32 B145, EFM32 B146, EFM32 B147, EFM32 B148, EFM32 B149, EFM32 B150, EFM32 B151, EFM32 B152, EFM32 B153, EFM32 B154, EFM32 B155, EFM32 B156, EFM32 B157, EFM32 B158, EFM32 B159, EFM32 B160, EFM32 B161, EFM32 B162, EFM32 B163, EFM32 B164, EFM32 B165, EFM32 B166, EFM32 B167, EFM32 B168, EFM32 B169, EFM32 B170, EFM32 B171, EFM32 B172, EFM32 B173, EFM32 B174, EFM32 B175, EFM32 B176, EFM32 B177, EFM32 B178, EFM32 B179, EFM32 B180, EFM32 B181, EFM32 B182, EFM32 B183, EFM32 B184, EFM32 B185, EFM32 B186, EFM32 B187, EFM32 B188, EFM32 B189, EFM32 B190, EFM32 B191, EFM32 B192, EFM32 B193, EFM32 B194, EFM32 B195, EFM32 B196, EFM32 B197, EFM32 B198, EFM32 B199, EFM32 B200, EFM32 B201, EFM32 B202, EFM32 B203, EFM32 B204, EFM32 B205, EFM32 B206, EFM32 B207, EFM32 B208, EFM32 B209, EFM32 B210, EFM32 B211, EFM32 B212, EFM32 B213, EFM32 B214, EFM32 B215, EFM32 B216, EFM32 B217, EFM32 B218, EFM32 B219, EFM32 B220, EFM32 B221, EFM32 B222, EFM32 B223, EFM32 B224, EFM32 B225, EFM32 B226, EFM32 B227, EFM32 B228, EFM32 B229, EFM32 B230, EFM32 B231, EFM32 B232, EFM32 B233, EFM32 B234, EFM32 B235, EFM32 B236, EFM32 B237, EFM32 B238, EFM32 B239, EFM32 B240, EFM32 B241, EFM32 B242, EFM32 B243, EFM32 B244, EFM32 B245, EFM32 B246, EFM32 B247, EFM32 B248, EFM32 B249, EFM32 B250, EFM32 B251, EFM32 B252, EFM32 B253, EFM32 B254, EFM32 B255, EFM32 B256, EFM32 B257, EFM32 B258, EFM32 B259, EFM32 B260, EFM32 B261, EFM32 B262, EFM32 B263, EFM32 B264, EFM32 B265, EFM32 B266, EFM32 B267, EFM32 B268, EFM32 B269, EFM32 B270, EFM32 B271, EFM32 B272, EFM32 B273, EFM32 B274, EFM32 B275, EFM32 B276, EFM32 B277, EFM32 B278, EFM32 B279, EFM32 B280, EFM32 B281, EFM32 B282, EFM32 B283, EFM32 B284, EFM32 B285, EFM32 B286, EFM32 B287, EFM32 B288, EFM32 B289, EFM32 B290, EFM32 B291, EFM32 B292, EFM32 B293, EFM32 B294, EFM32 B295, EFM32 B296, EFM32 B297, EFM32 B298, EFM32 B299, EFM32 B300, EFM32 B301, EFM32 B302, EFM32 B303, EFM32 B304, EFM32 B305, EFM32 B306, EFM32 B307, EFM32 B308, EFM32 B309, EFM32 B310, EFM32 B311, EFM32 B312, EFM32 B313, EFM32 B314, EFM32 B315, EFM32 B316, EFM32 B317, EFM32 B318, EFM32 B319, EFM32 B320, EFM32 B321, EFM32 B322, EFM32 B323, EFM32 B324, EFM32 B325, EFM32 B326, EFM32 B327, EFM32 B328, EFM32 B329, EFM32 B330, EFM32 B331, EFM32 B332, EFM32 B333, EFM32 B334, EFM32 B335, EFM32 B336, EFM32 B337, EFM32 B338, EFM32 B339, EFM32 B340, EFM32 B341, EFM32 B342, EFM32 B343, EFM32 B344, EFM32 B345, EFM32 B346, EFM32 B347, EFM32 B348, EFM32 B349, EFM32 B350, EFM32 B351, EFM32 B352, EFM32 B353, EFM32 B354, EFM32 B355, EFM32 B356, EFM32 B357, EFM32 B358, EFM32 B359, EFM32 B360, EFM32 B361, EFM32 B362, EFM32 B363, EFM32 B364, EFM32 B365, EFM32 B366, EFM32 B367, EFM32 B368, EFM32 B369, EFM32 B370, EFM32 B371, EFM32 B372, EFM32 B373, EFM32 B374, EFM32 B375, EFM32 B376, EFM32 B377, EFM32 B378, EFM32 B379, EFM32 B380, EFM32 B381, EFM32 B382, EFM32 B383, EFM32 B384, EFM32 B385, EFM32 B386, EFM32 B387, EFM32 B388, EFM32 B389, EFM32 B390, EFM32 B391, EFM32 B392, EFM32 B393, EFM32 B394, EFM32 B395, EFM32 B396, EFM32 B397, EFM32 B398, EFM32 B399, EFM32 B400, EFM32 B401, EFM32 B402, EFM32 B403, EFM32 B404, EFM32 B405, EFM32 B406, EFM32 B407, EFM32 B408, EFM32 B409, EFM32 B410, EFM32 B411, EFM32 B412, EFM32

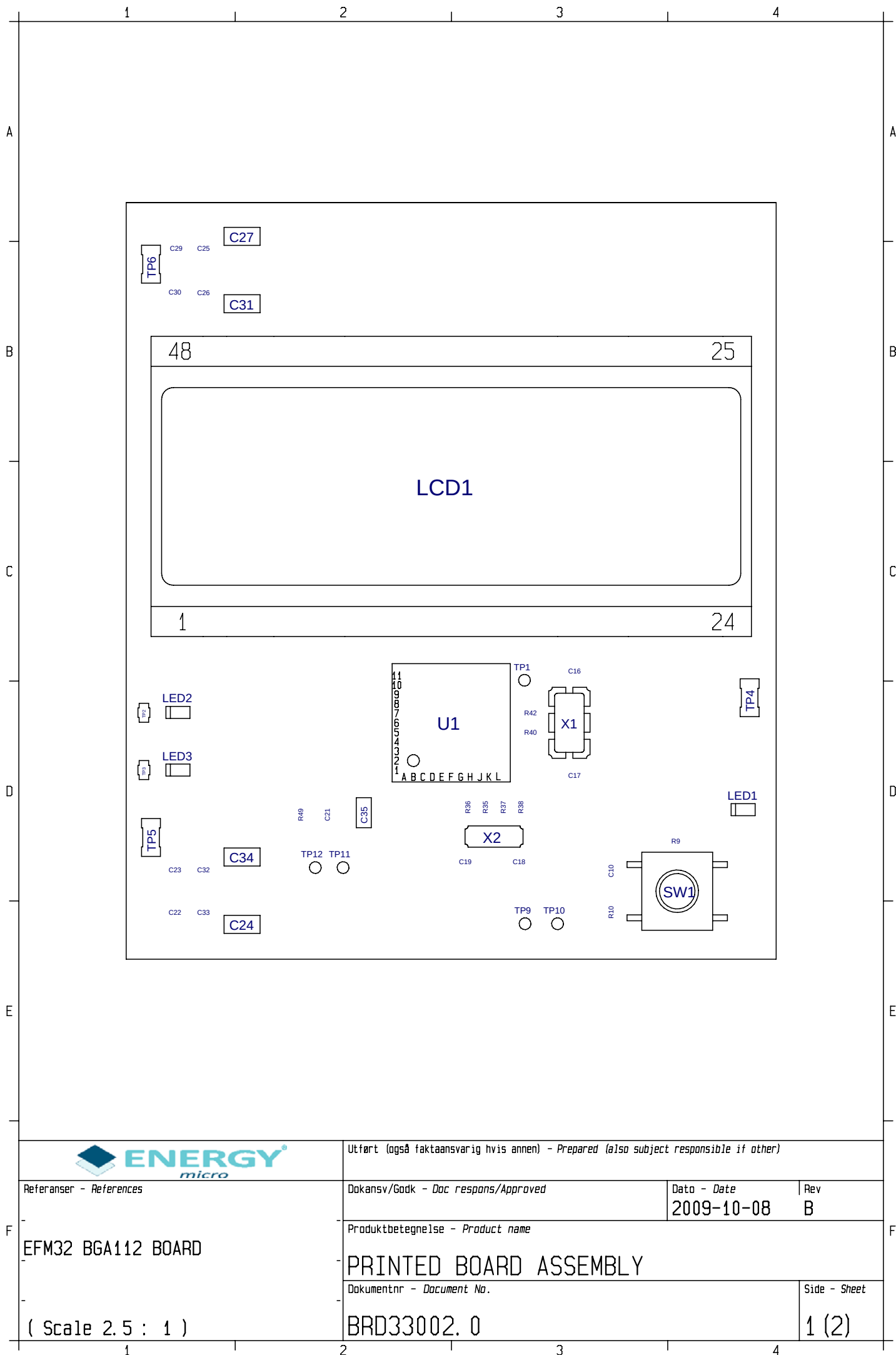
Reset connections

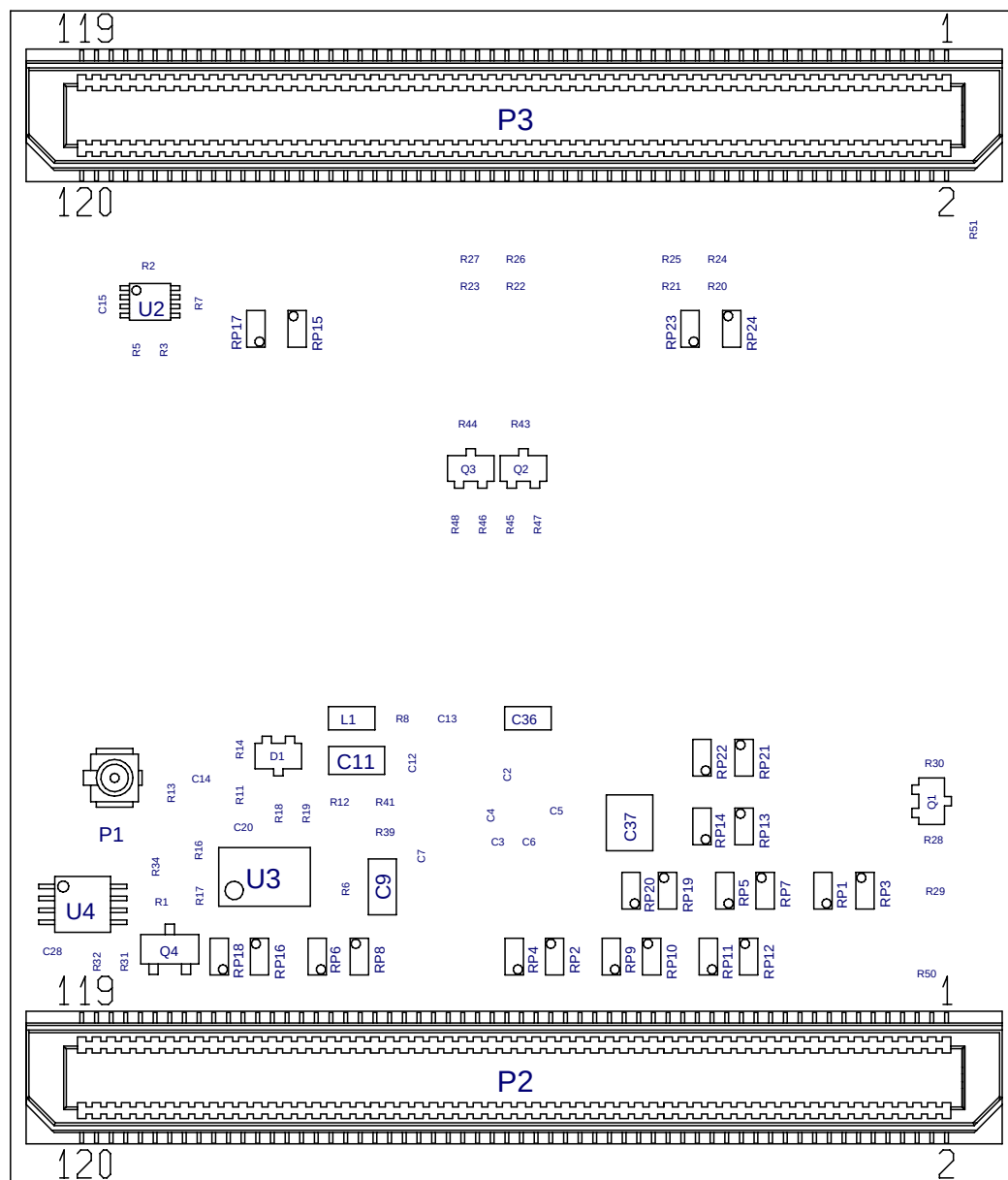
(p 2,3,5,6) EFM32_B[83..0] >>

EFM32_B80 >> FPGA_MCU_#RESET (p 3,5)

EFM32_B75 >> MCUDBG_#RESET (p 3,5)

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Referanser - References

EFM32 BGA112 BOARD

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Dokansv/Godk - Doc respons/Approved

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Produktbetegnelse - Product name

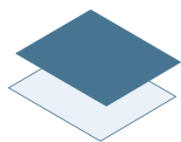
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