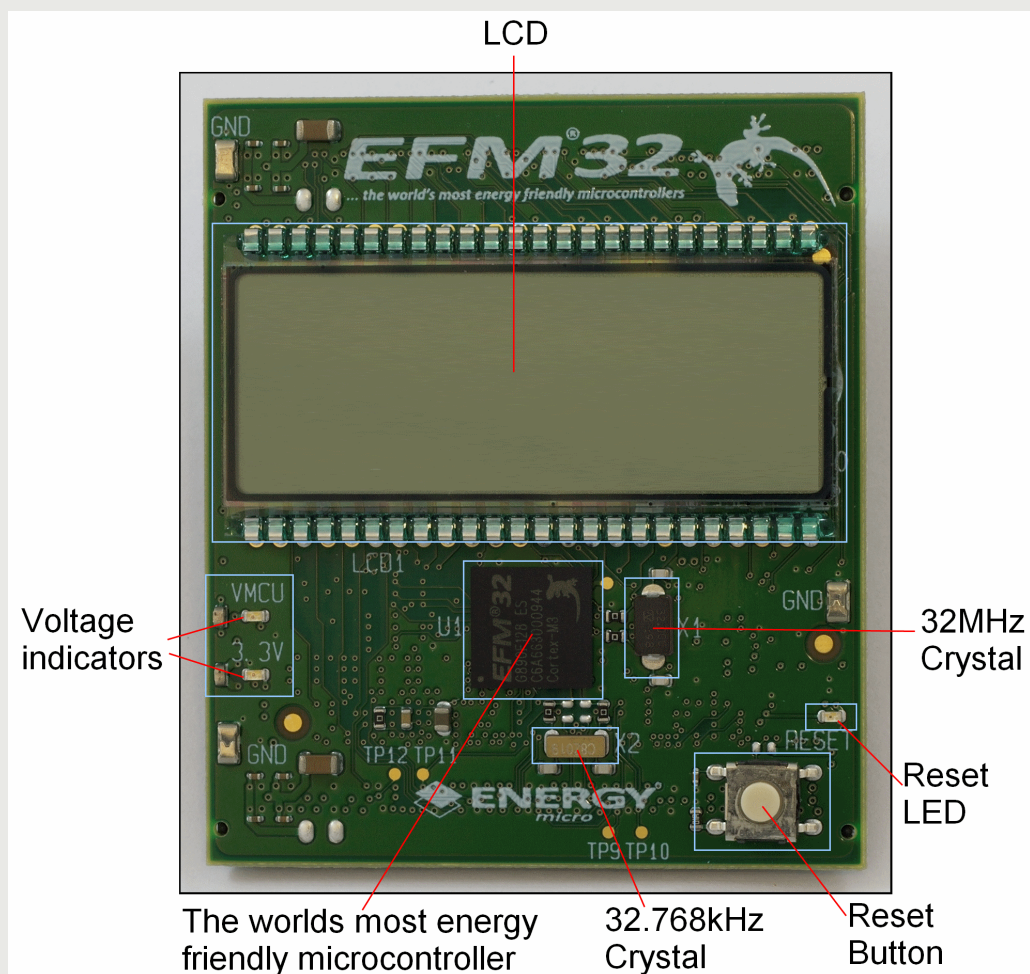


EFM32 G890 MCU Board

The EFM32 G890 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
- Energy Micro LCD



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

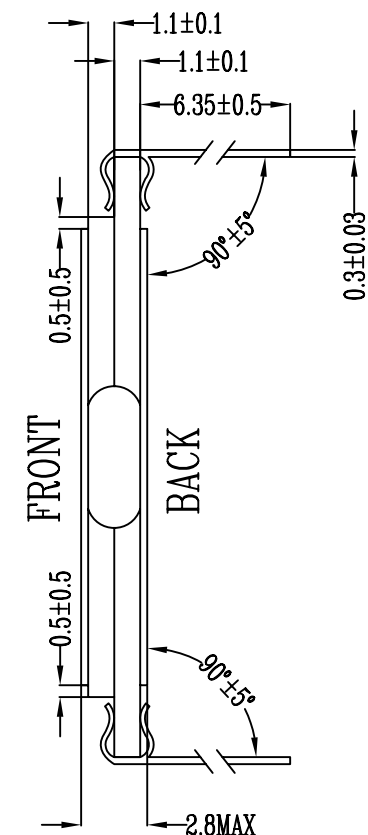
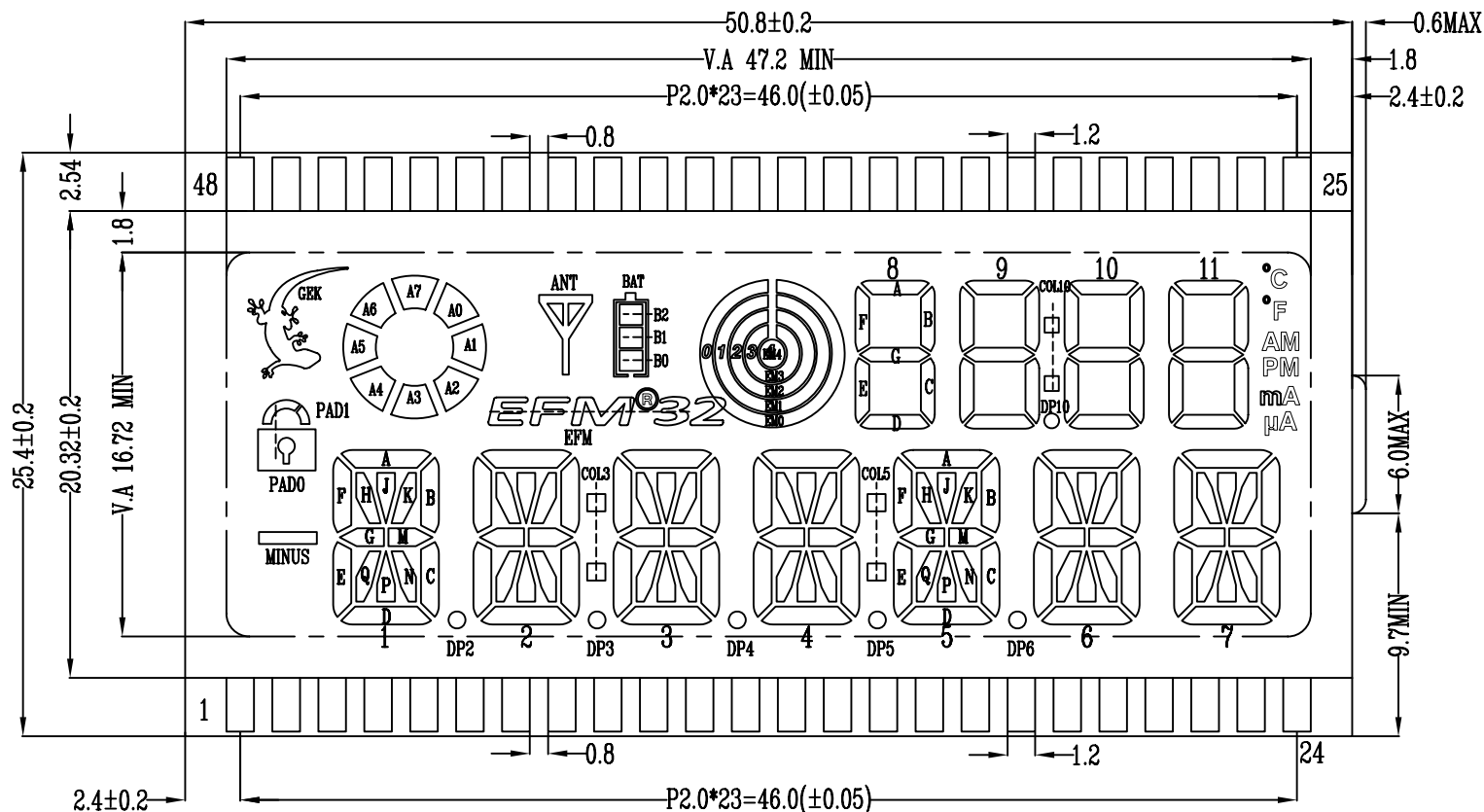
It is possible to access the board controller on the Kit mainboard for example to turn LEDs on or off, read push button status or connecting the EFM32 to specific hardware on the mainboard. Accesses may be performed either through SPI or the parallel interface (EBI), and the access mode is signaled to 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.

1.6 LCD

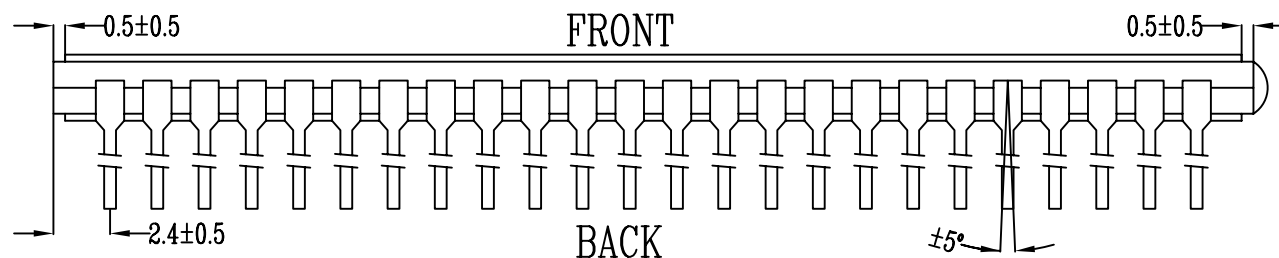
The LCD is a 164 segment display designed for 1/4 Duty, 1/3 bias. The operating voltage is 3.0V and the frame frequency is 64 Hz. Since the EFM32 only supports 160 segments, the Celsius and Fahrenheit along with uA and mA segments are not connected. However, they may be made available by moving a 0-ohm resistor. See schematic for details. Please see the LCD software example project for details on how to use the LCD. For details on segment connections see the attached mapping table and LCD illustration.

1.7 EBI / LCD Configuration

Since many of the IO lines used by the EBI are also used by the LCD, the board is either configured to route the IO lines to the LCD connector or to the Kit mainboard. The configuration is determined by a set of 0-ohm resistor arrays. This configuration may be altered by moving the arrays. See schematic for details.



↑ 6 O'CLOCK VIEWING DIRECTION

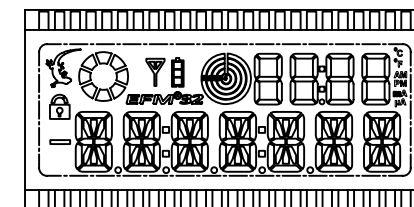


NOTE:

- 1 DISPLAY TYPE : TN
- 2 VIEWING DIRECTION : 6 O'CLOCK
- 3 POLARIZER MODE : REFLECTIVE/POSITIVE
- 4 DRIVE METHOD : 1/4 DUTY 1/3 BIAS
- 5 OPERATING VOLTAGE : 3.0V(FOR REFERENCE VOLTAGE)
- 6 OPERATING TEMP : $0^\circ\text{C} \sim +50^\circ\text{C}$
- 7 STORAGE TEMP : $-10^\circ\text{C} \sim +60^\circ\text{C}$
- 8 CONNECTION : PIN
- 9 FRAME FREQUENCY : 64Hz

REVISION RECORD			NAME	DATE	TRI-T COMPANY LIMITED					
1					VERSION	C	UNIT	MM	NO. 1/6	CL010-1087-01
2					APPROVED		CHECKED		DRAWN	
3										
4										

SCALE 1:1



PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
—	S0	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23
COM0	A0	A1	A2	A3	A4	A5	A6	A7	EFM	MINUS	1 D	1 N	BAT	B2	2 D	2 N	COL3	B0	3 D	3 N	B1	DP6	4 D	4 N
COM1	EM2	EM0	7 C	7 E	6 C	6 E	5 C	5 E	PAD0	1 E	1 Q	1 P	1 C	2 E	2 Q	2 P	2 C	3 E	3 Q	3 P	3 C	4 E	4 Q	4 P
COM2	EM3	EM1	7 M	7 G	6 M	6 G	5 M	5 G	PAD1	1 G	1 H	1 J	1 M	2 G	2 H	2 J	2 M	3 G	3 H	3 J	3 M	4 G	4 H	4 J
COM3	EM4	ANT	7 B	7 F	6 B	6 F	5 B	5 F	GEK	1 F	1 A	1 K	1 B	2 F	2 A	2 K	2 B	3 F	3 A	3 K	3 B	4 F	4 A	4 K

PIN	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
—	S24	S25	S26	S27	S28	S29	S30	S31	S32	S33	S34	S35	S36	NC	NC	S37	S38	NC	S39	S40	COM0	COM1	COM2	COM3
COM0	COL5	5 D	5 N	6 D	6 N	7 D	7 N	11 D	AM	10 D	°C	PM	DP2	NC	NC	9 D	DP10	NC	8 D	COL10	COM0			
COM1	4 C	5 Q	5 P	6 Q	6 P	7 Q	7 P	11 C	11 E	10 C	°F	10 E	DP3	NC	NC	9 C	9 E	NC	8 C	8 E		COM1		
COM2	4 M	5 H	5 J	6 H	6 J	7 H	7 J	11 B	11 G	10 B	μA	10 G	DP4	NC	NC	9 B	9 G	NC	8 B	8 G			COM2	
COM3	4 B	5 A	5 K	6 A	6 K	7 A	7 K	11 A	11 F	10 A	mA	10 F	DP5	NC	NC	9 A	9 F	NC	8 A	8 F				COM3



TRI-T COMPANY LIMITED



EFM32 Gecko Development Kit

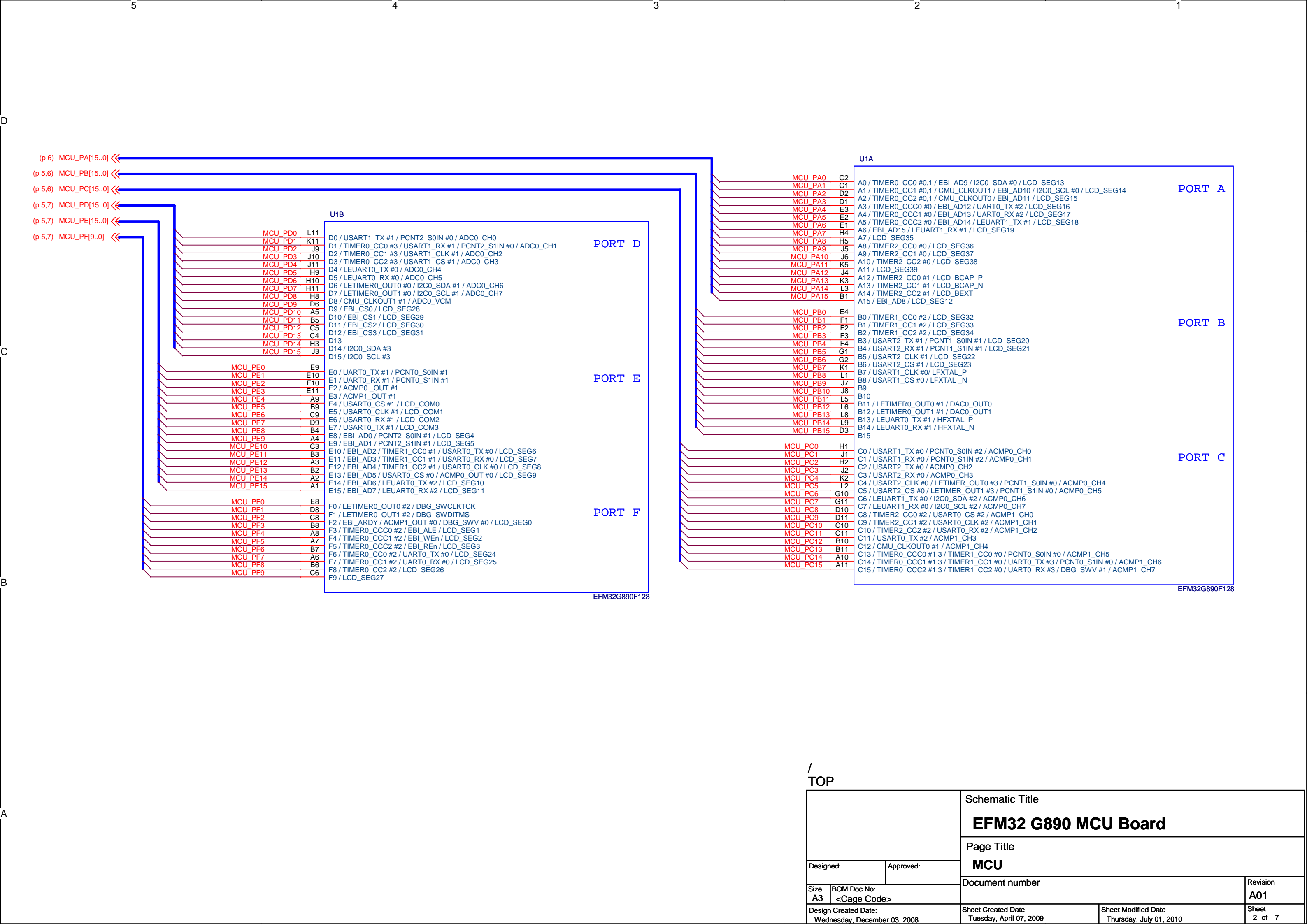
G890 MCU module with 4x40 segment LCD

BRD3300A	
Board Function	Page
Front Page	1
EFM32 Microcontroller	2
EFM32 Power	3
LCD Panel	4
EFM32 Connectors	5
Signal Assignments #1	6
Signal Assignments #2	7

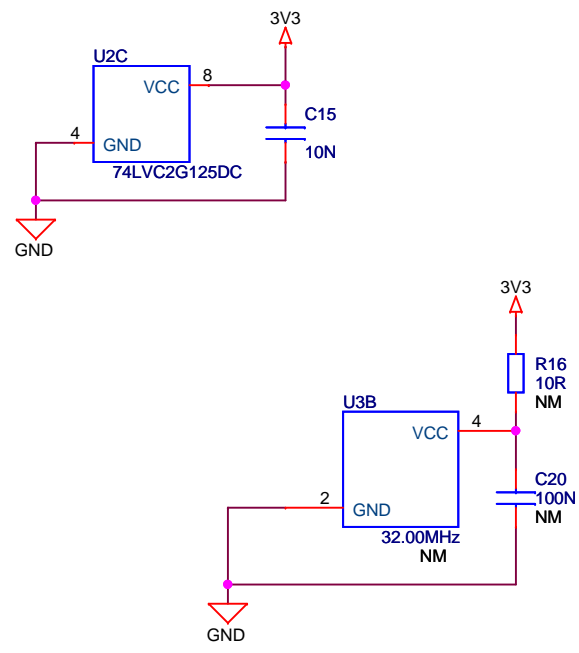
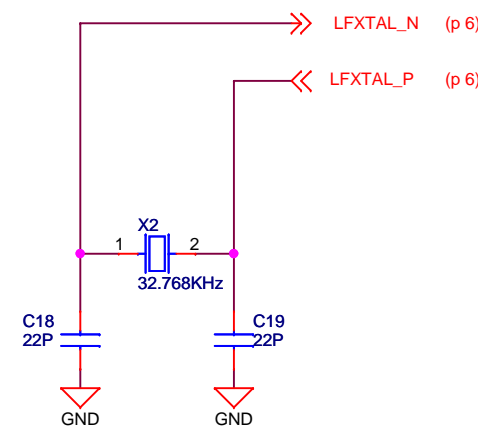
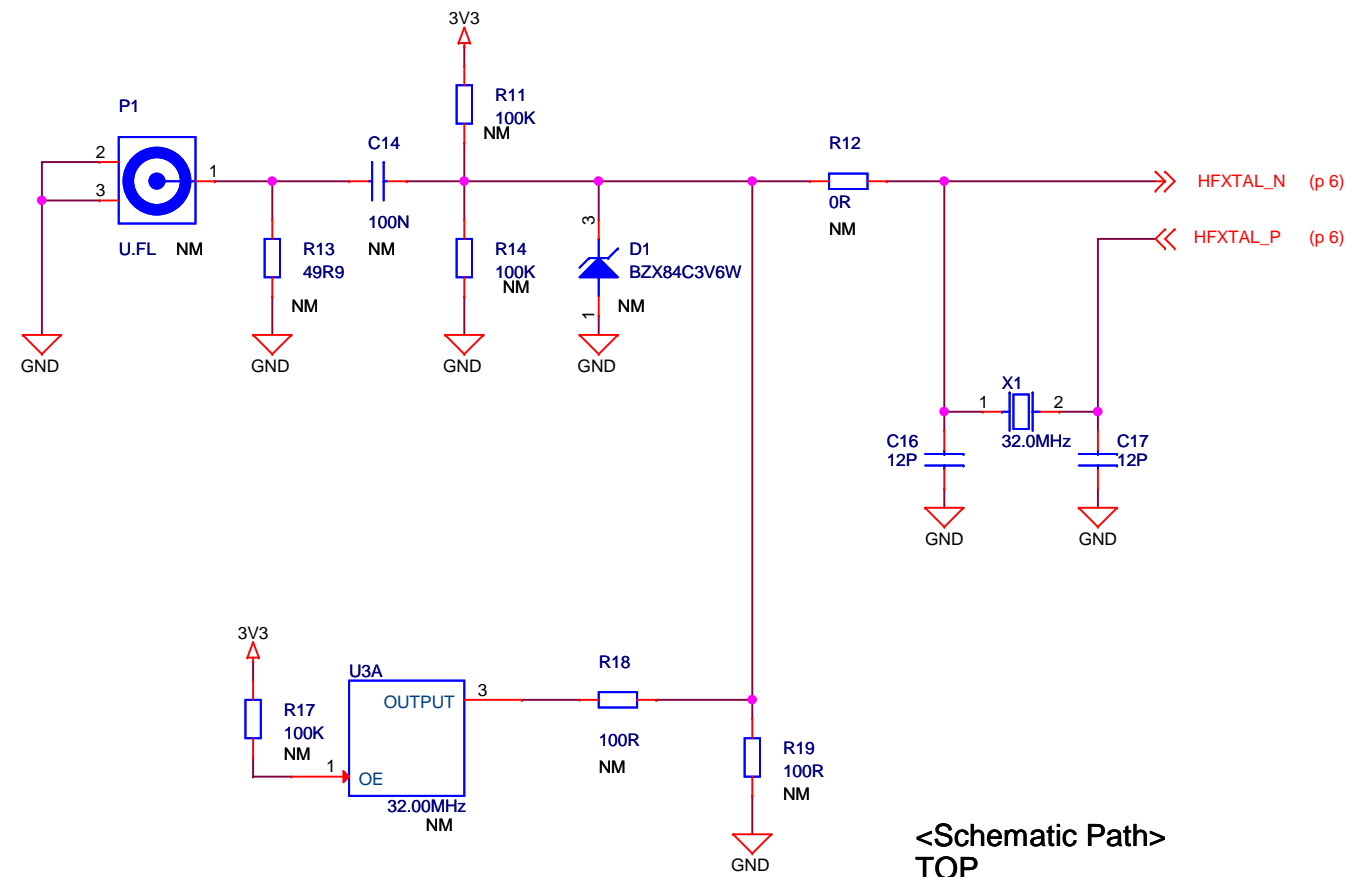
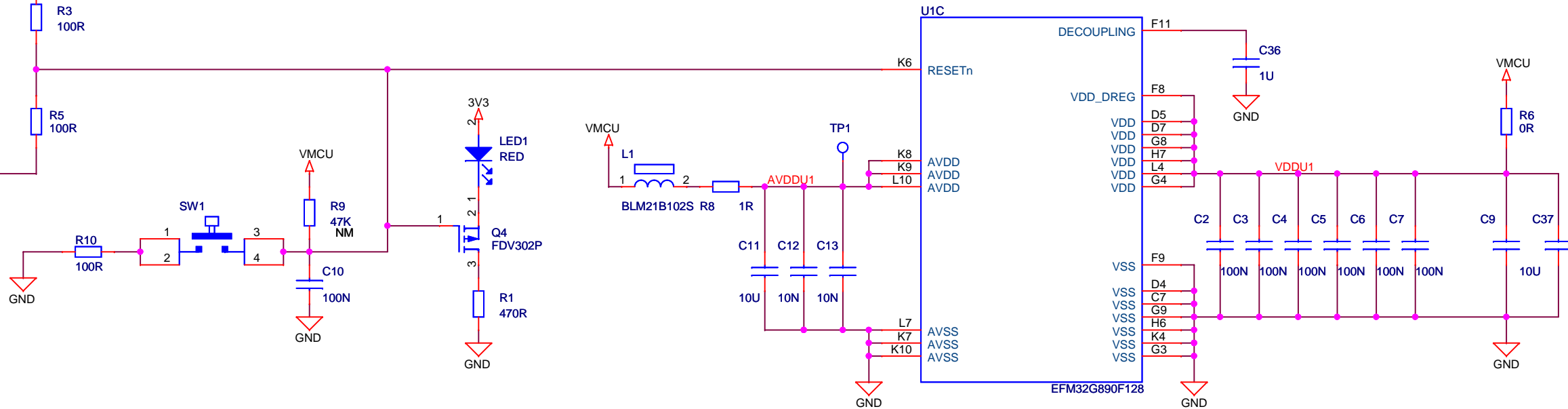
Revision History	
Rev.	Comment
A00	Initial version
A01	BOM change - removed pullup on reset button and removed some caps

<Schematic Path>
TOP

Schematic Title EFM32 G890 MCU Board		Page Title Front Page	
		Document number	Revision A01
		Design Created Date Wednesday, December 03, 2008	Sheet Created Date Tuesday, February 17, 2009
Size A3	BOM Doc No: <Cage Code>	Sheet Modified Date Thursday, July 01, 2010	Sheet 1 of 7



1



		Schematic Title	
		EFM32 G890 MCU Board	
		Page Title	
		EFM32 Power	
Designed:		Approved:	
Size A3	BOM Doc No: <Cage Code>	Document number	Revision A01
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date Wednesday, July 15, 2009	Sheet Modified Date Thursday, July 01, 2010
		Sheet 3 of 7	



B



		Schematic Title	
		EFM32 G890 MCU Board	
		Page Title	
		LCD panel	
Designed:		Approved:	
Size A3	BOM Doc No: <Cage Code>	Document number	Revision A01
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date Tuesday, July 14, 2009	Sheet Modified Date Thursday, July 01, 2010
		Sheet 4 of 7	

The diagram illustrates the PA Connections for a system. It shows the mapping of MCU PA pins to various peripheral pins through connectors RP1 to RP12. The connections are as follows:

- RP1:** MCU PA0, PA1, PA2, PA3 connect to LCD_PA0, PA1, PA2, PA3 respectively.
- RP3:** MCU PA4, PA5, PA6, PA7 connect to EBI_AD12, AD11, AD10, AD9 and EFM32_A3, A2, A1, A0 respectively.
- RP5:** MCU PA8, PA9, PA10, PA11 connect to LCD_PA4, PA5, PA6, PA7 respectively.
- RP7:** MCU PA12, PA13, PA14, PA15 connect to EBI_AD15, AD14, AD13 and EFM32_A7, A6, A5, A4 respectively.
- RP9:** MCU PA16, PA17, PA18, PA19 connect to LCD_PA8, PA9, PA10, PA11 respectively.
- RP10:** MCU PA20, PA21, PA22, PA23 connect to EFM32_A11, A10, A9, A8 respectively.
- RP11:** MCU PA24, PA25, PA26, PA27 connect to LCD_PA12, PA13, PA14, PA15 respectively.
- RP12:** MCU PA28, PA29, PA30, PA31 connect to EBI_AD8 and EFM32_A15, A14, A13, A12 respectively.

Additional connections shown include LCD_PA[15..0] (p 4) and EFM32_A[83..0] (p 2,5,7) to EFM32_B[83..0] (p 2,5,7).

PB Connections

The diagram illustrates the peripheral connections for the PB pins of the MCU. The connections are as follows:

- MCU_PB0 to MCU_PB3:** Connected to an OR gate (RP2) which drives LCD_PB[6..0] (p 4). The OR gate outputs are also connected to EFM32_A[83..0] (p 2,3,5,7) and EFM32_B[83..0] (p 2,3,5,7).
- MCU_PB4 to MCU_PB6:** Connected to an OR gate (RP6) which drives LCD_PB[6..0] (p 4). The OR gate outputs are also connected to EFM32_A22, EFM32_A21, and EFM32_A20.
- MCU_PB7:** Connected to an OR gate (R35) which drives EFM32_A23.
- MCU_PB8:** Connected to an OR gate (R37) which drives LFX TAL_P (p 3) and EFM32_A24.
- MCU_PB9 to MCU_PB12:** Connected to DAC0_OUT0 and DAC0_OUT1. These are also connected to EFM32_A25, EFM32_A26, EFM32_A27, and EFM32_A28. TP9 is connected to EFM32_A25.
- MCU_PB13:** Connected to an OR gate (R39) which drives EFM32_A29.
- MCU_PB14:** Connected to an OR gate (R41) which drives HFX TAL_P (p 3) and EFM32_A30.
- MCU_PB15:** Connected to an OR gate (R42) which drives HFX TAL_N (p 3) and EFM32_A31.

TP9 and TP10 are test points connected to the DAC0_OUT0 and DAC0_OUT1 signals, respectively.

BPC Connections

p 2,5) MCU_PC[15..0] >>

>>EFM32_A[83..0] (p 2,5,7)

>>EFM32_B[83..0] (p 2,3,5,7)

MCU PC	MCU Function	EFM32 A Pin	EFM32 B Pin	MCU Function	MCU PC
MCU_PC0	USART1_TX#0	EFM32_A32	EFM32_B55	RS232_A_TX	MCU_PC15
MCU_PC1	USART1_RX#0	EFM32_A33	EFM32_B52	RS232_A_RX	MCU_PC14
MCU_PC2	USART2_TX#0	EFM32_A34	EFM32_B42	BC_BUS26	MCU_PC13
MCU_PC3	USART2_RX#0	EFM32_A35	EFM32_B43	BC_BUS27	MCU_PC12
MCU_PC4	USART2_CLK#0	EFM32_A36	EFM32_B40	BC_BUS24	MCU_PC11
MCU_PC5	USART2_CS#0	EFM32_A37	EFM32_B41	BC_BUS25	MCU_PC10
MCU_PC6	LEUART1_TX#0	EFM32_A38	EFM32_B62	RS232_B_TX	MCU_PC9
MCU_PC7	LEUART1_RX#0	EFM32_A39	EFM32_B63	RS232_B_RX	MCU_PC8
MCU_PC8	USART0_CS#2	EFM32_A40	EFM32_B65	SPI_BUS_#CS	MCU_PC7
MCU_PC9	USART0_CLK#2	EFM32_A41	EFM32_B64	SPI_BUS_SCLK	MCU_PC6
MCU_PC10	USART0_RX#2	EFM32_A42	EFM32_B67	SPI_BUS_MISO	MCU_PC5
MCU_PC11	USART0_TX#2	EFM32_A43	EFM32_B66	SPI_BUS_MOSI	MCU_PC4
MCU_PC12		EFM32_A44			MCU_PC3
MCU_PC13		EFM32_A45			MCU_PC2
MCU_PC14		EFM32_A46			MCU_PC1
MCU_PC15		EFM32_A47			MCU_PC0

FPGA #INT EFM32_B81
DBG_TDO_SWO EFM32_B79

3V3

R47 10M R48 10M R43 4K7 R44 4K7

R45 10K R46 10K

Q2 BSS138W Q3 BSS138W

GND

BC_BUS_CONNECT_EBI EFM32_B72
BC_BUS_CONNECT_SPI EFM32_B73

<Schematic TOP

Designed:

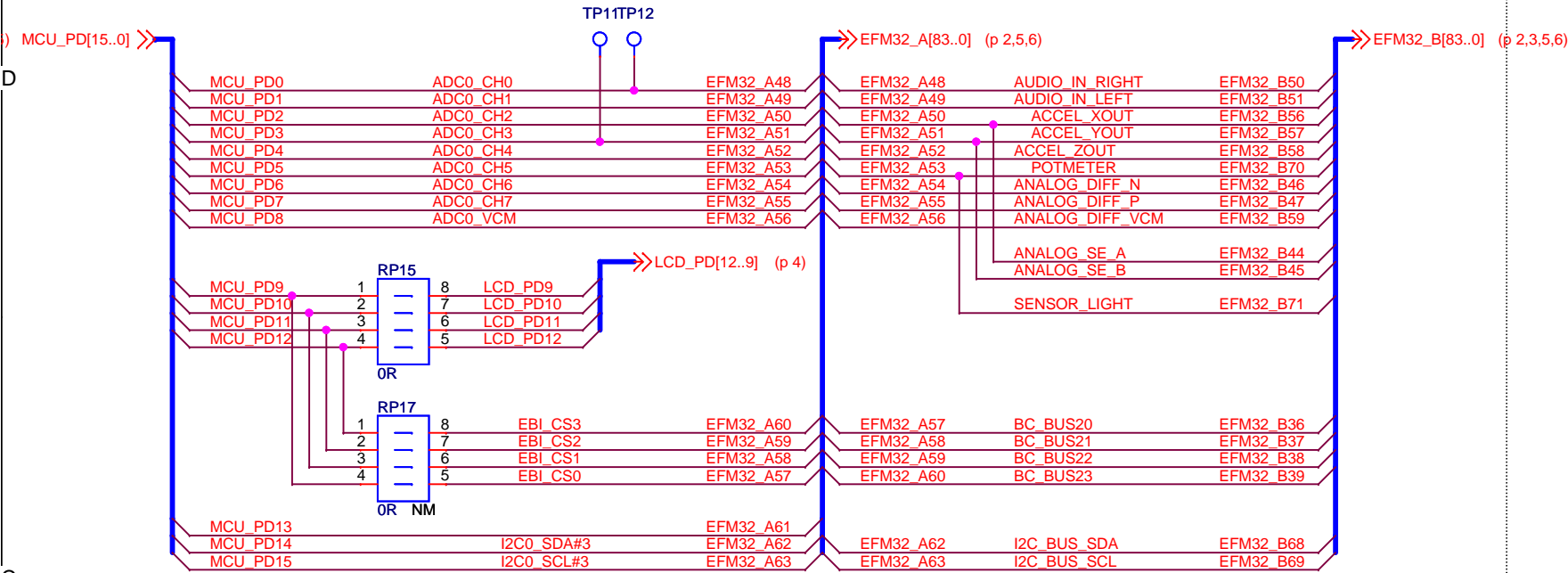
Size A3 BOM Doc No: <Cage Coc

Design Created Date: Wednesday, December

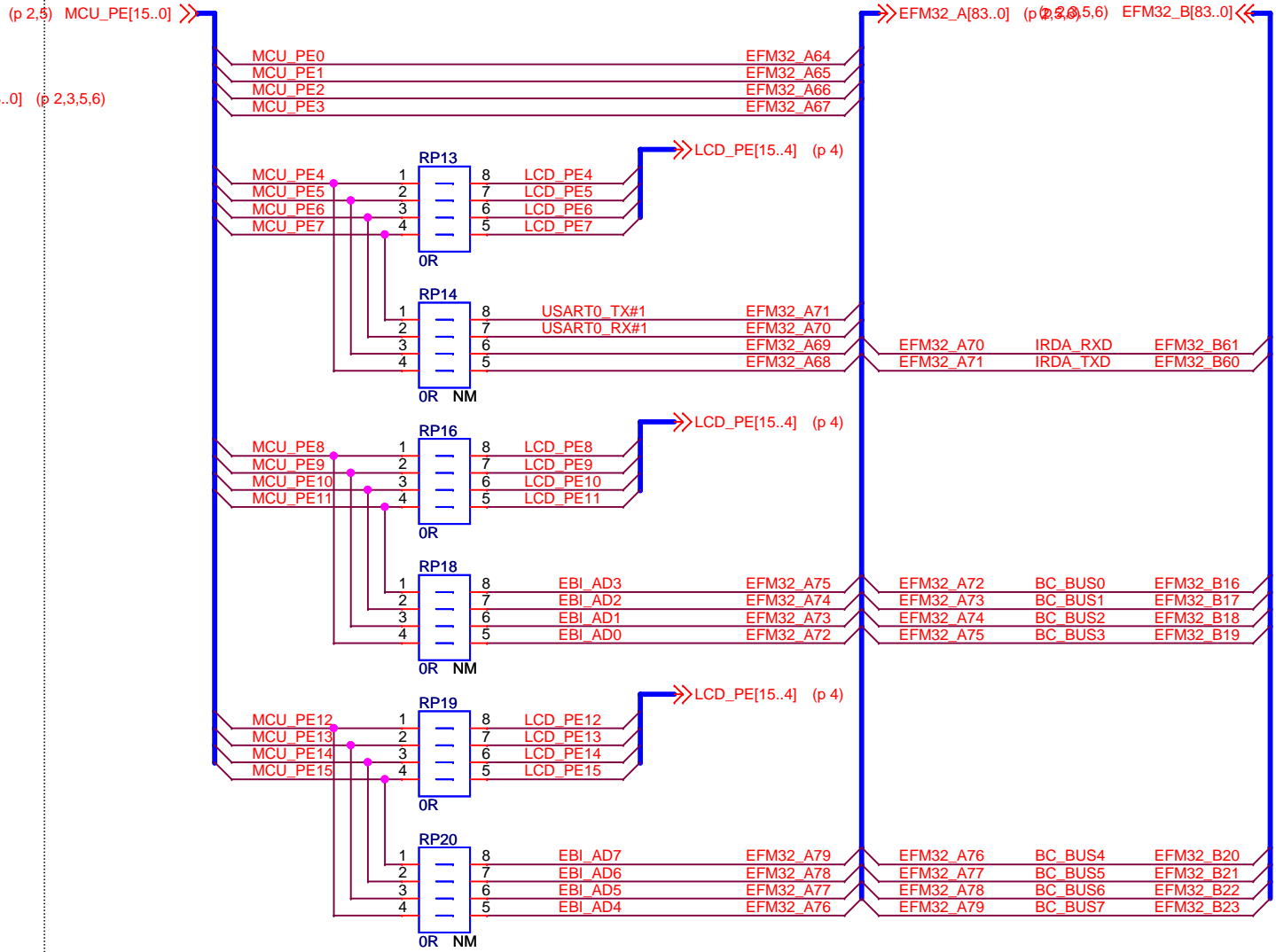


		Schematic Title	
		EFM32 G890 MCU Board	
		Page Title	
Designed:		Approved:	
Size A3	BOM Doc No: <Cage Code>	Document number	Revision A01
Design Created Date: Wednesday, December 03, 2008		Sheet Created Date Monday, August 03, 2009	Sheet Modified Date Thursday, July 01, 2010
		Sheet 6 of 7	

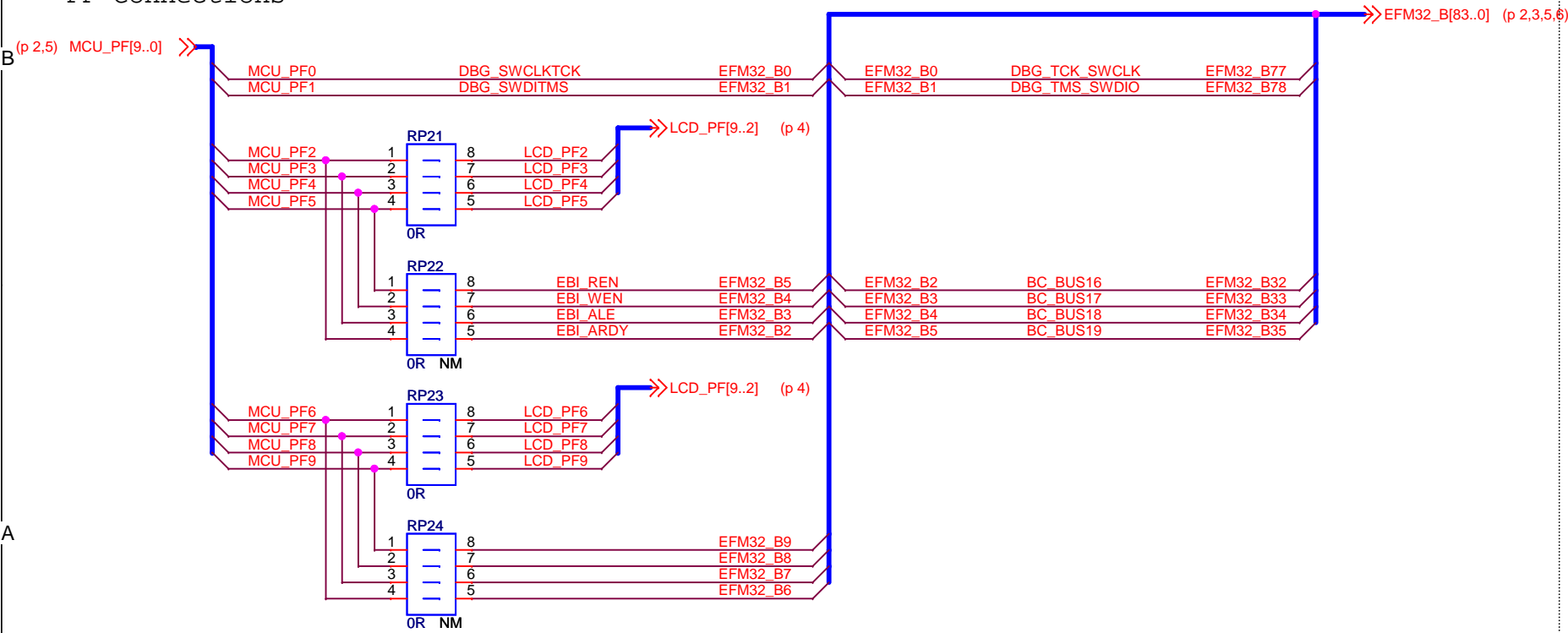
PD Connections



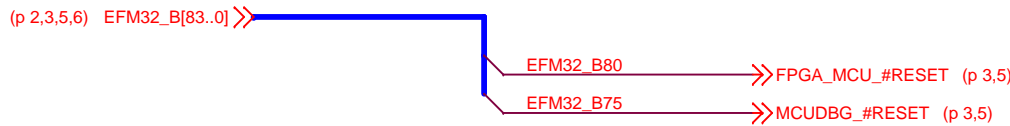
PE Connections



PF Connections

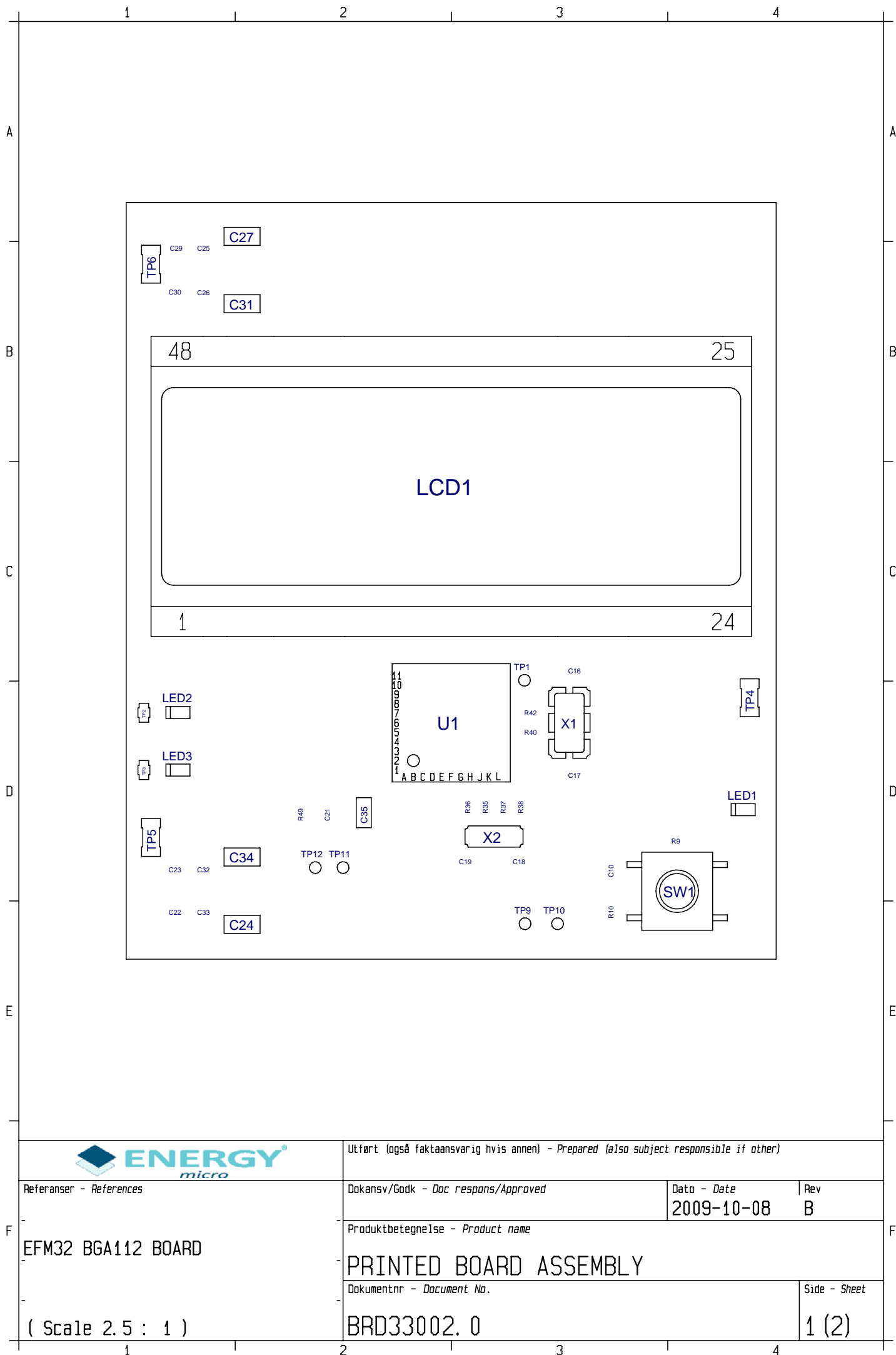


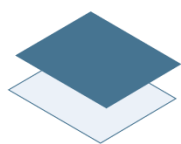
Reset connections



<Schematic Path>
TOP

Schematic Title		EFM32 G890 MCU Board		
		Page Title		
Signal Assignments #2		Document number		Revision
Designed:	Approved:	A01		Sheet
Size	BOM Doc No:	Sheet Created Date		Sheet Modified Date
A3	<Cage Code>	Wednesday, December 03, 2008		Thursday, July 01, 2010
Design Created Date:		Tuesday, August 04, 2009		Sheet
Wednesday, December 03, 2008		Thursday, July 01, 2010		7 of 7





ENERGY[®]
micro

*Energy Micro AS
Sandakerveien 118
P.O. Box 4633 Nydalen
N-0405 Oslo
Norway*

www.energymicro.com