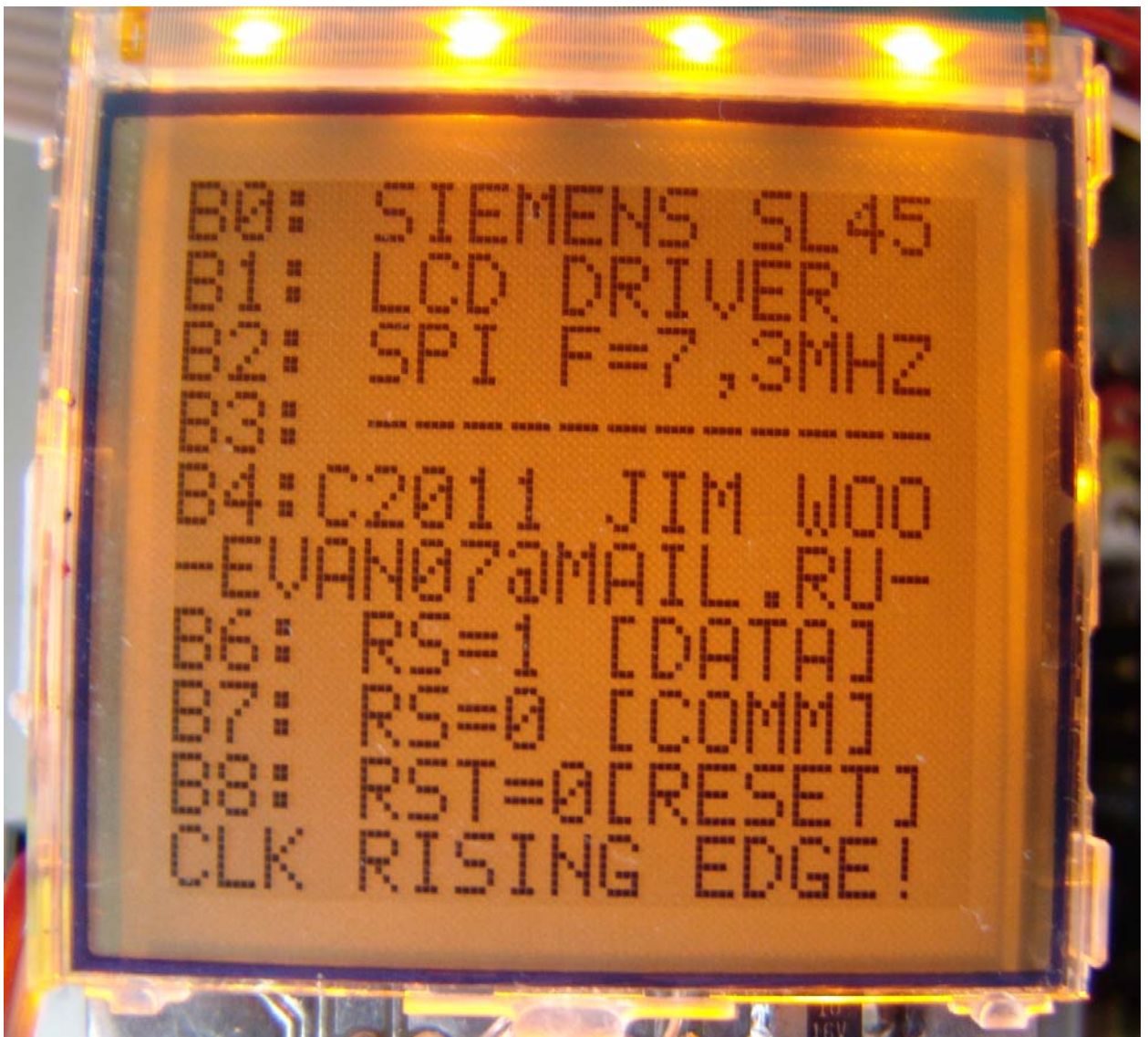# Connecting SIEMENS SL42, SL45 LCD to microcontroller

CS (pin 30), RESET (pin 29), RS (pin 28), CLK (pin 27), DATA (pin 26) are from 0V to 2.8V
"LED+" = max 3.7V, "LED-" =GND

LCD format: 101 x 80 pix.
10 rows (every row is 8 pix high = *1byte: LSB upper, MSB lower*), 101 column (1 pix long)

F_{clk} = 7.4 MHz (*tested*)
CLK=1 (idle)
RS=0 (command), RS=1 (data) [you can change it when CS=1]
CS=0 (active), CS=1 (idle)
RESET =0 (reset), RESET =1 (normal)
Data loaded into LCD on rising edge of CLK signal, MSB first (Atmel AVR SPI mode=3: CPOL=1, CPHA=1)

Startup:
CS=1
RESET=0
wait 75 mS
RESET=1
wait 525 mS

LCDinit:
1. RS=0,CS=0, Command (2 bytes):
    0x81,0x45, CS=1
2. RS=0,CS=0, Command (18 bytes): **0xA1, 0xC0, 0xA6, 0x74, 0x00, 0x81, 0x45, 0x40, 0x55,0xAB, 0x27, 0x8A, 0x00, 0xB0, 0x10, 0x00, 0xA4, 0xAF**, CS=1

LCDwrite:
RS=0, CS=0, Command (3 bytes): **0xB0***, **0x10**, **0x00****, CS=1
RS=1, CS=0, Data0,Data1,…Data100, CS=1

RS=0, CS=0, Command (3 bytes): 0xB1, 0x10, 0x00, CS=1
RS=1, CS=0, Data0,Data1,…Data100, CS=1
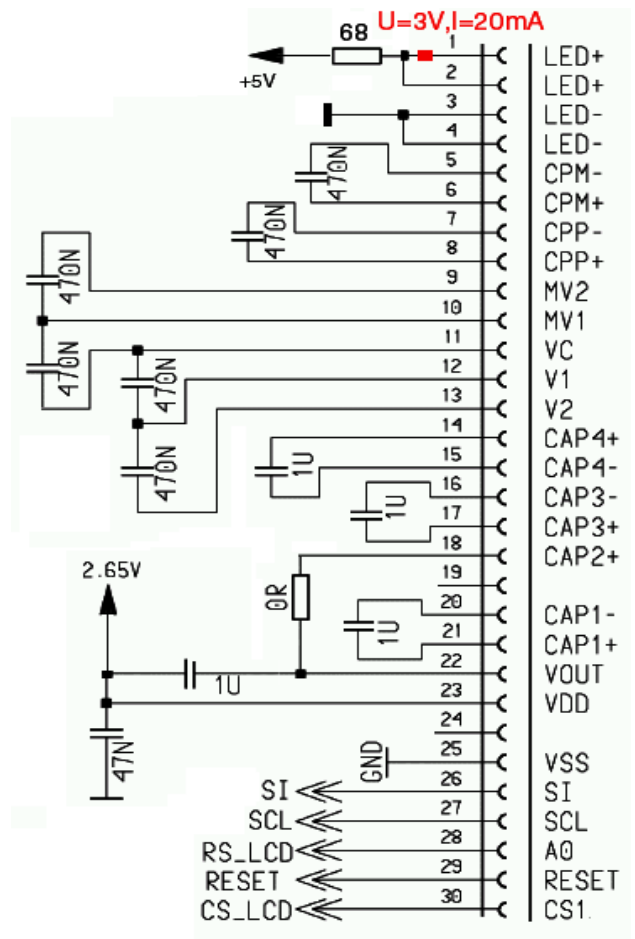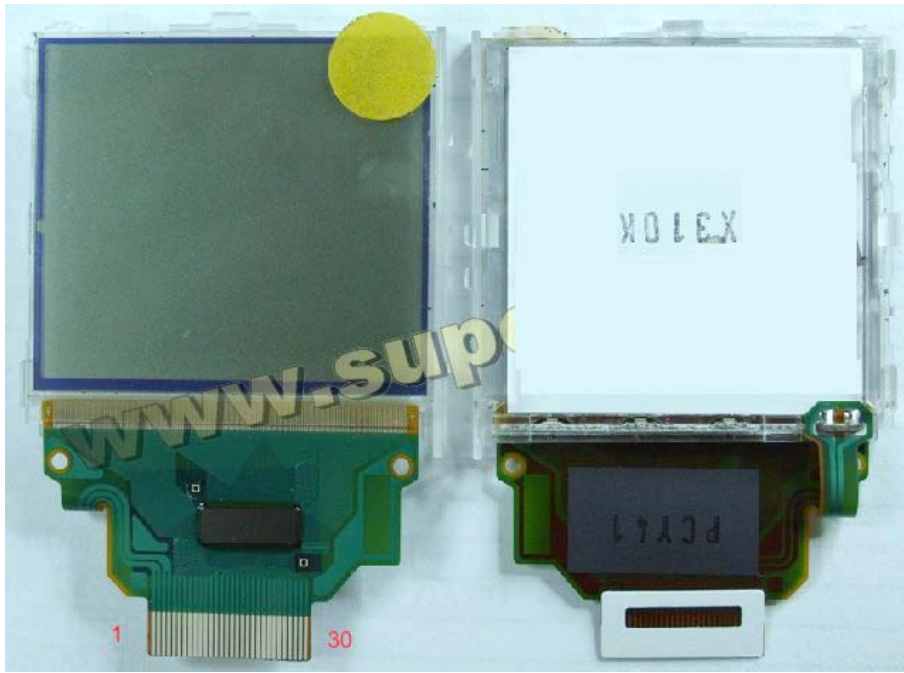
…. To 0xB9

LCD turn off:
1. CS=0,RS=0, Command (1 byte): **0xAE**, CS=1
2. Turn power OFF

*0xB0: 0xBN, where "N" is address of the row (0xB0 – upper row, 0xB9 – down row)
**0x00: it seems to be address of the column in row, but it works correct only from 0x00 to 0x12

Real Time Data transfer:

81	45																
A1	C0	A6	74	00	81	45	40	55	AB	27	8A	00	B0	10	00	A4	AF

B0	10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
				B1	10	00	00													

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00	00	00	00	B2	10	00	00
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00  00  00  00  00  00  00  00
00  00  00  FF  FF  11  FF  EE
00  90  D8  48  F8  F0  00  08
FC  FE  08  00  08  FC  FE  08
00  F0  F8  48  78  30  00  F8
F0  18  18  00  78  F8  80  F8
F8  00  00  00  00  00  00  00
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00  00  00  00  B3  10  00  00
00  00  00  00  00  F0  F8  F8
FC  FC  FE  7E  00  00  00  00
00  00  00  03  83  82  83  01
00  81  03  82  81  03  80  80
01  03  82  00  80  81  03  02
80  C1  E3  82  03  81  80  03
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83  80  00  00  F4  F4  07  03
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00  00  00  00  B4  10  00  00
00  00  00  00  00  03  FF  FF
FF  FF  3F  00  00  00  00  00
00  00  00  1F  3F  24  37  13
00  3F  3F  00  3F  3F  00  3F
3F  00  7F  7F  10  1F  0F  00
00  1F  3F  20  00  47  4F  78
3F  0F  00  00  2F  2F  00  00
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7F  1F  00  00  00  00  00  00
00  00  00  FF  FF  21  3F  1E
00  FF  FF  00  F0  F8  48  78
30  00  90  D8  48  F8  F0  00
30  78  48  D8  90  00  F0  F8
48  78  30  00  00  00  00  00
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00  00  00  00  B6  10  00  00
00  00  00  00  00  00  78  7C
7C  7C  3C  00  00  00  00  00
00  00  00  F3  F3  10  F0  E0
00  03  83  80  81  03  02  03
81  80  81  03  02  F1  F3  80
81  03  02  03  81  80  81  03
02  83  01  80  80  00  00  80
80  00  80  00  00  80  80  80
00  00  00  F0  F0  00  00  00
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00	00	00	3F	3F	02	3F	3D
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3F	20	39	19	00	3F	3F	00
3F	3F	00	19	3D	24	1F	3F
00	3F	3F	01	01	00	4F	5F
50	7F	3F	00	1F	3F	24	37
13	00	00	2F	2F	00	00	00
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