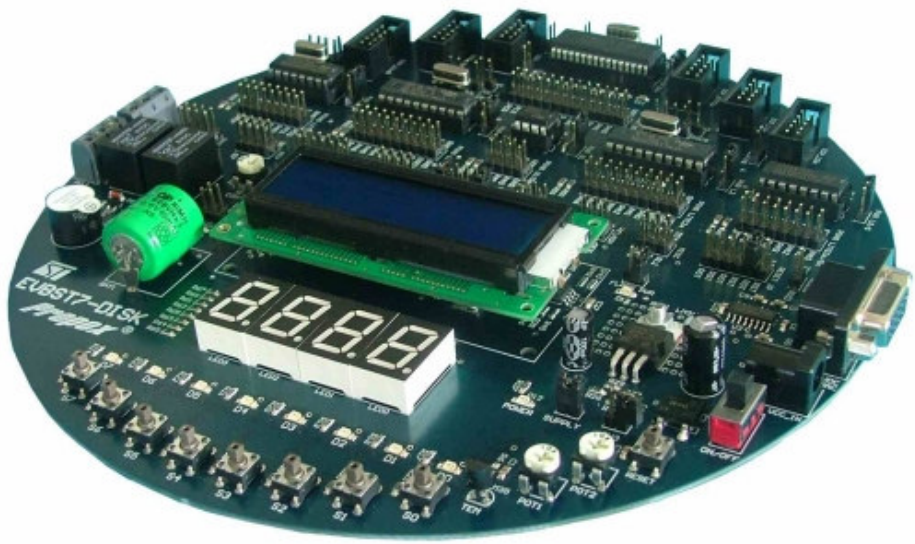


EVBST7-DISK Evaluation board for microcontrollers ST7LITE and ST72F26x.

User Manual

REV 1.0

Propox®
Many ideas one solution

1. Introduction

EVBST7-DISK is a development board designed for the hobbyists and engineers who want easily prototype their system based on ST7LITE and ST72F26x microcontrollers from STMicroelectronics. This board allows implementing engineer's idea without a hitch.
Developer has access to all pins all processors and peripherals devices, which are connected to the header (pin connectors). There are six sockets for microcontrollers (which every microcontroller is independent) and peripheral devices like: thermometer, relays, potentiometers, eight buttons and eight LED's, real time clock, interface RS232, FLASH memory, LED displays and optionally assembled LCD (2 x 16 symbols) on board.
The board contains also a power supply which relieves the user from the need to provide a regulated supply voltage. This board comes with the several examples of the C code routines (source form), to facilitate testing and quick development in using the board's resources.

We wish great success and full satisfaction while designing and constructing appliances based on EVBST7-DISK

Features:
- **6 sockets for microcontrollers**
- **connectors of all peripherals accessible on board**
- **power supply circuit**
- **port RS232**
- **independent programming connectors**
- **socket for LCD 2x16**
- **2 potentiometers**
- **8 buttons**
- **real time clock**
- **Flash memory**
- **8 LEDs**
- **4 LED displays**
- **buzzer**

2. Board layout

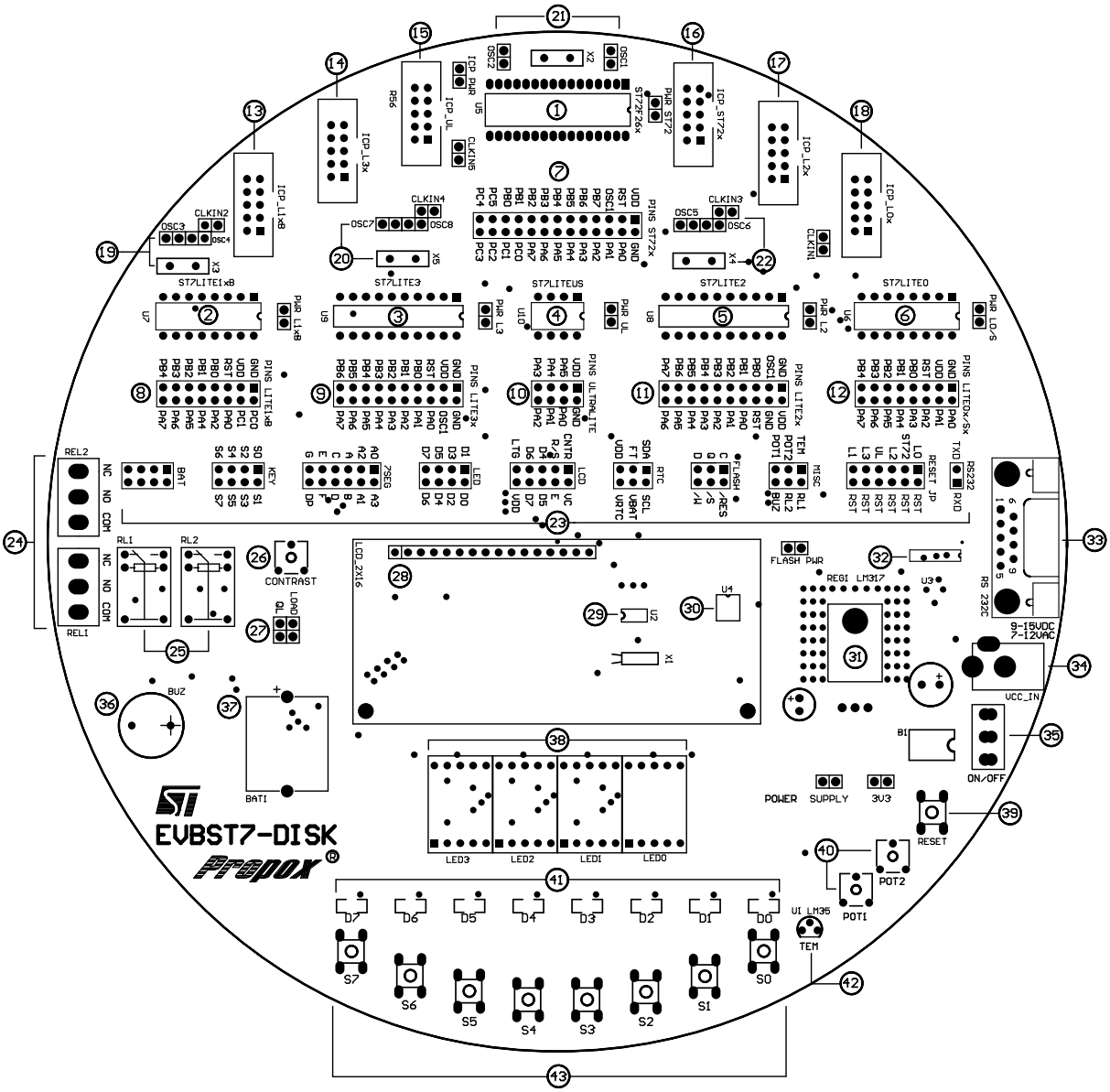


Fig.1 Component location on EVBST7-DISK

1. Socket for ST7226x microcontroller
2. Socket for ST7LITE1xB microcontroller
3. Socket for ST7LITE3 microcontroller
4. Socket for ST7UltraLite microcontroller
5. Socket for ST7LITE2 microcontroller
6. Socket for ST7LITE0x and ST7SuperLite microcontroller
7. Connector with all terminals of ST7226x
8. Connector with all terminals of ST7LITE1xB
9. Connector with all terminals of ST7LITE3
10. Connector with all terminals of ST7UltraLite
11. Connector with all terminals of ST7LITE2
12. Connector with all terminals of ST7LITE0 i ST7UltraLite
13. Programming connector for ST7LITE1xB

14. Programming connector for ST7LITE3
15. Programming connector for ST7UltraLite
16. Programming connector for ST7226x
17. Programming connector for ST7LITE2
18. Programming connector for ST7LITE0 i ST7SuperLite
19. Quartz crystal and jumpers for ST7LITE1xB
20. Quartz crystal and jumpers for ST7LITE3
21. Quartz crystal and jumpers for ST7226x
22. Quartz crystal and jumpers for ST7LITE2
23. Connectors of all peripherals
24. Terminal blocks connected to relays contacts
25. Relays
26. Potentiometer for LCD contrast
27. Battery charging jumpers
28. Connector for LCD 2x16
29. Real Time Clock M41T81
30. 8Mbit Flash memory - M45PE80
31. LM317 voltage regulator
32. RS-232 driver / receiver (ST3232)
33. RS-232 port
34. Power supply connector
35. Power switch
36. Buzzer
37. Battery 3,6V 65mAh
38. LED displays
39. RESET button
40. Potentiometers
41. Eight LEDs
42. Thermometer LM35
43. Eight buttons

3. Supported microcontrollers

EVBST7-DISK has been prepared for microcontrollers:

- ST7226x (SDIP-32)
- ST7LITE3 (DIP-20)
- ST7LITE2 (DIP-20)
- ST7LITE1xB (DIP-16)
- ST7LITE0 (DIP-16)
- ST7SuperLite (DIP-16)
- ST7UltraLite (DIP-8)

4. Board power supply

Recommended external power supply voltage is 7-12V AC, or 9-15V DC. A standard power jack (bolt diameter 2.1mm) is provided at the edge of the board. Stabilized voltage VDD is available on the double header and on the prototype area of the board. The selection of the VDD is provided through a 3V3 header. The default voltage VDD is 5VDC (no jumper on 3V3 header). By placing a jumper Vdd becomes 3.3 VDC.

The SUPPLY jumper provides power from voltage regulator to devices and microcontrollers. Additionally, each microcontroller has one jumper to provide power supply voltage to microcontroller VDD pin. The jumpers' names are: PWR ST72, PWR L3, PWR L2, PWR L1xB, PWR L0/S and PWR UL. These additional jumpers where implement to give a possibility of current measure or powering MCU from battery.

5. Microcontrollers circuits

There are six sockets on board for microcontrollers marked on Fig.1 as 1, 2… 6, six programming connector for each MCU and four of them have quartz oscillator. Every MCU is connected to own header. This construction allows working with more than one MCU at the same time.

6. Peripheral circuits

6.1. LED's

The board has 8 LED diodes, which make the simplest interface between the system and the user. This is especially useful for the beginners. All diode are connected via resistor to VDD, the diode turns on after grounding of the associated LDn (n = 0 – 8)pin

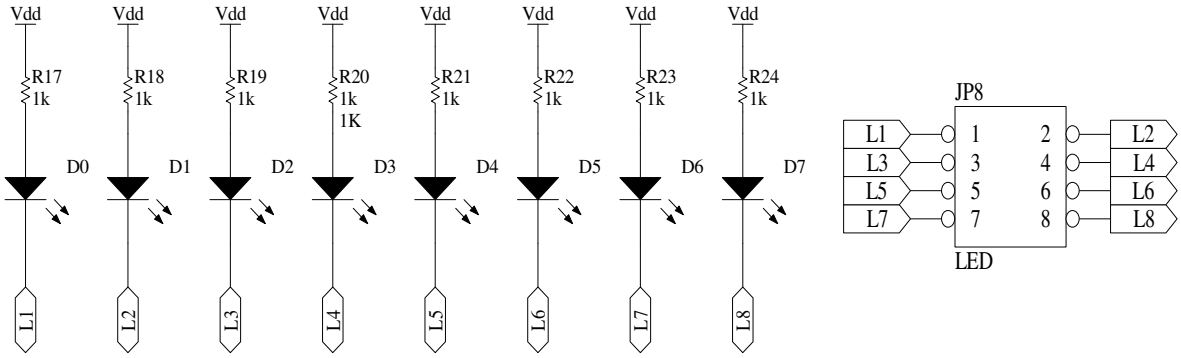


Fig.2. Implementation of LED's

6.2. Switches

The board is equipped with 8 push-buttons. Pressing one of them causes grounding of the corresponding pin on the KEY header.

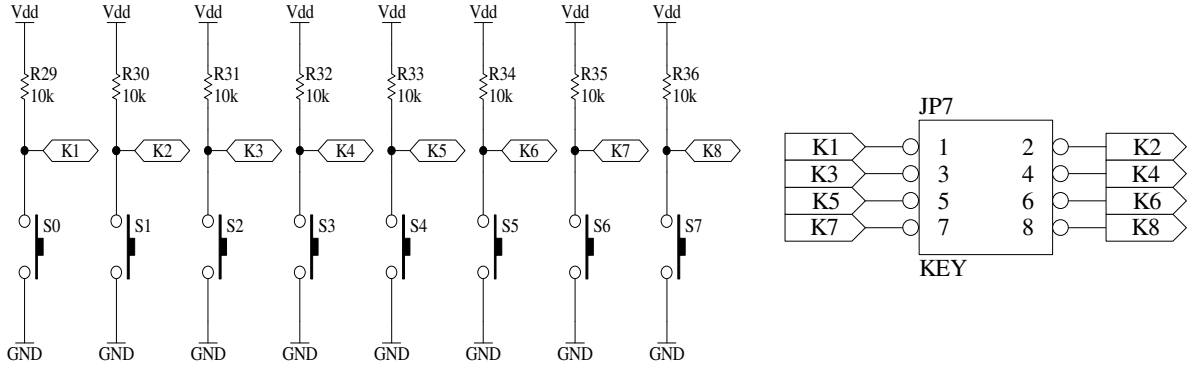


Fig.3. Implementation of push-buttons

6.3. Relays

The board has two relays driven through transistors, where the base of transistor is connected to MISC header and marked as RL1 and RL2. The relays contacts NO, NC, COM, are connected to JP9 and JP11, which allows driving external device. The relay is switching-on after grounding of the associated pin.

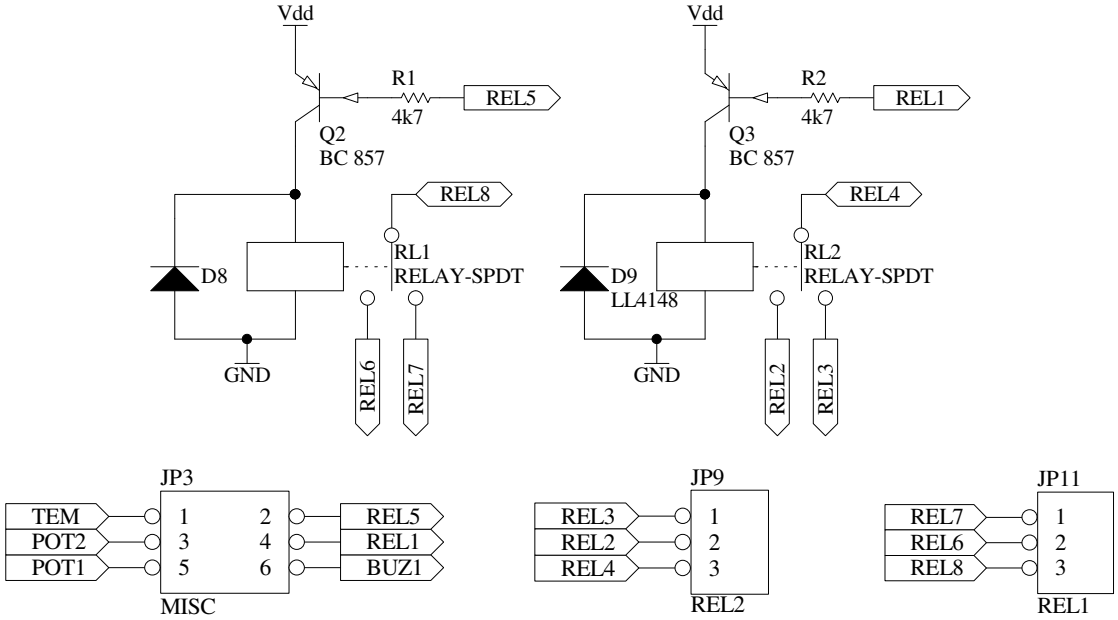


Fig.4. Implementation of relays

6.4. Buzzer

The board has a built-in acoustic signaler, controlled by a logic low state through a transistor. The base of the transistor is connected to connector MISC marked as BUZ.

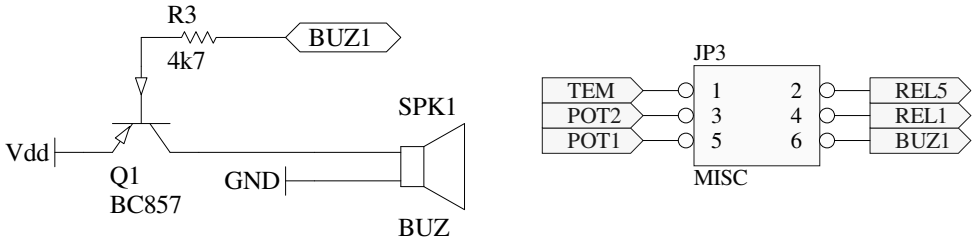


Fig.5. Connection schematic of buzzer

6.5. Thermometer

The board has one temperature sensor LM35. The voltage on output (Vout) is proportional to the gradient of the ambient temperature. Access to Vout is provided by TEM pin of the MISC connector. User can wire this pin to the micro's A/D input and measure the temperature.

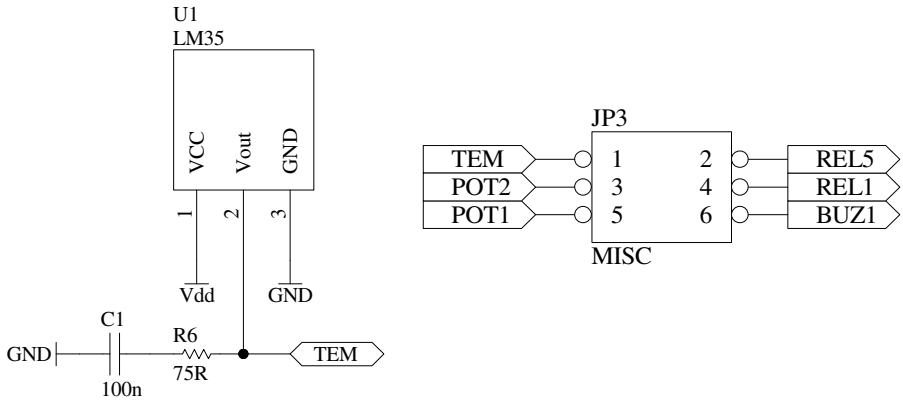


Fig.6. Implementation of thermometer

6.6. Potentiometers

The board is equipped with two potentiometers, allowing for simulation of the analog circuit outputs. The potentiometers enable the adjustment of voltage in the range 0-Vdd. The potentiometers outputs are accessible on POT1 and POT2 pins of the MISC connector.

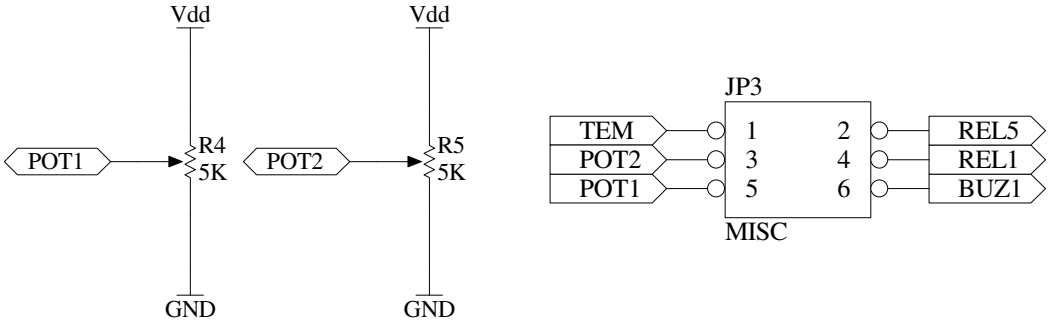


Fig.7. Implementation of potentiometers

6.7. RS232 interface

There is a DB-9 connector on the board, connected with the ST3232 state converter. On the other side of the converter there is header JP10 with converter circuit terminals, allowing connecting to the processor.

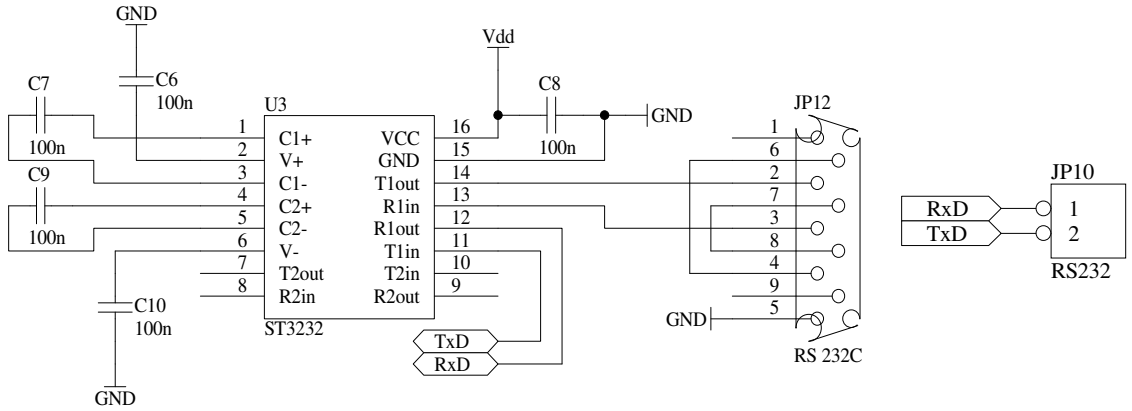


Fig.8. Connection of converter to DB-9 connector and header

6.8. Real Time Clock M41T81 and battery

The board is equipped with real time clock with battery back-up. The RTC communicate with MCU via I^2C interface, all M41T81 pins are connected to RTC header. On this header on VBAT pin constructor can directly measure battery voltage.

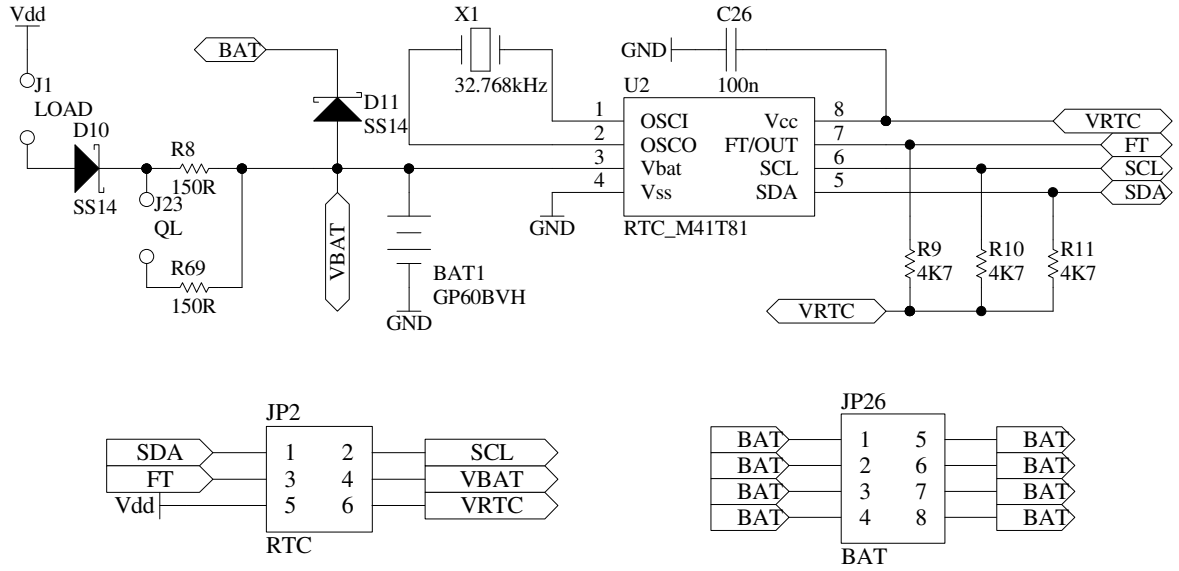


Fig.9. Real Time Clock circuit.

User has to connect 5 and 6 pin on JP2 to power the RTC from board VDD, or connect by wire VRTC pin with one pin on JP26 to power it from battery. Data Sheet of M41T81 user can find on www.st.com/rtc web site.

On all pins of BAT header are connected though diode D11 to battery, from where can power for example MCU or Flash. The battery can be charging with direct

current through LOAD jumper. QL jumper is implementing to quick charging. User has to be careful to prevent from battery damage in this case. Data Sheet of GP60BVH battery user can find on www.gpbatteries.com web site.

***CAUTION**: User shouldn't charge/discharge the battery with more than specified current at Data Sheet!!!*

6.9. LCD

The LCD (2 x 16 characters) socket is connected to JP6 header. The connection method permits only the write operation to the display, which is, however, sufficient for its operation. Contrast adjustment can be regulated by R12 potentiometer, when user will connect pins 1 and 2 on JP6.

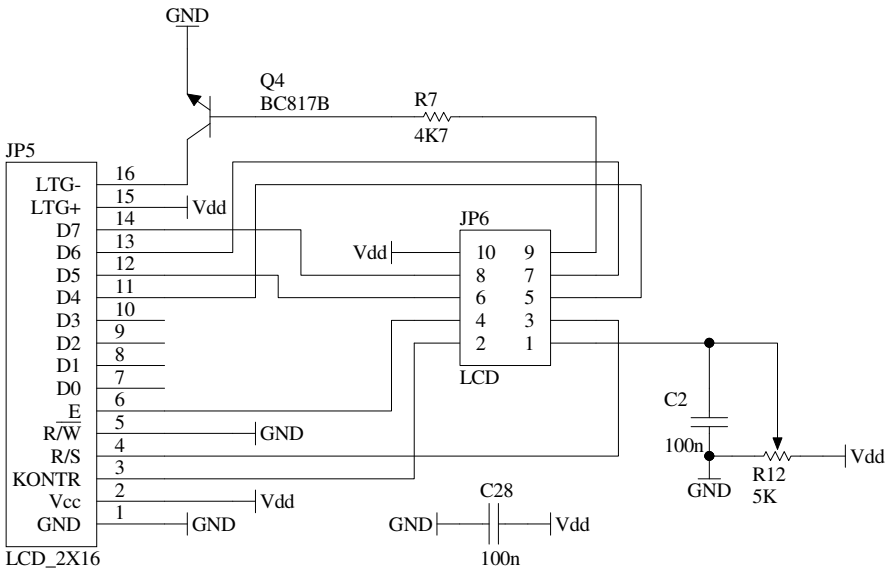


Fig.10.Schematic of LCD connection

Four data lines (D4-D7) and two control lines (R/S, E) are available on JP6 header. Pin no. 9 is used to control LCD backlight through transistor. This pin can be permanently connected to pin no.10.

6.10. FLASH memory

The M45PE80 is a 8Mbit (1M x 8 bit) Serial Paged Flash Memory accessed by a high speed SPI-compatible bus (up to 33MHz). One page of memory is storing 256B.

Memory supply voltage range is between 2.7V and 3.6V. Because voltage of board power supply may be to 5V, memory is powering passing by LED diode. However the inputs of memory are connected by resistors.

When voltage of board power supply is regulated to 3.3V, user can close FLASH PWR jumper to power memory directly (without diode).

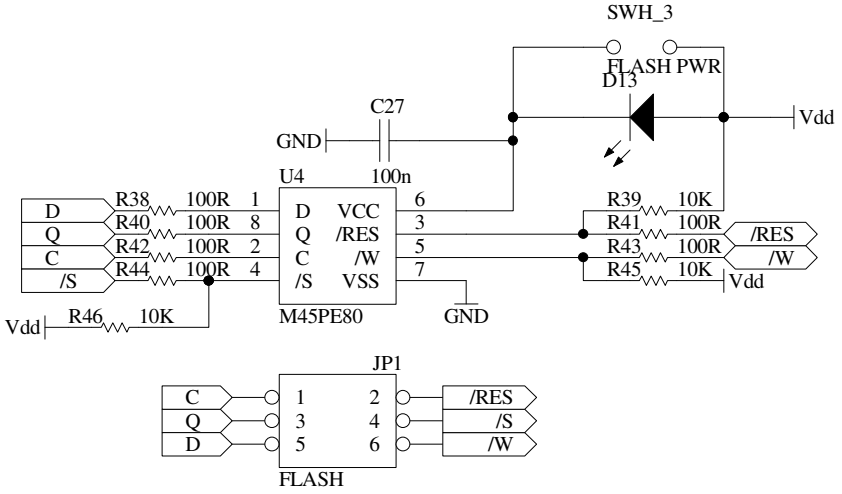


Fig.11. Implementation of Flash memory

6.11. LED displays

The board is equipped with four 7-segment LED displays with common anode. All segments are connected to 7SEG (JP4) header through serial resistors, anodes are driven trough transistors. Implementation like this allows to multiplexing control.

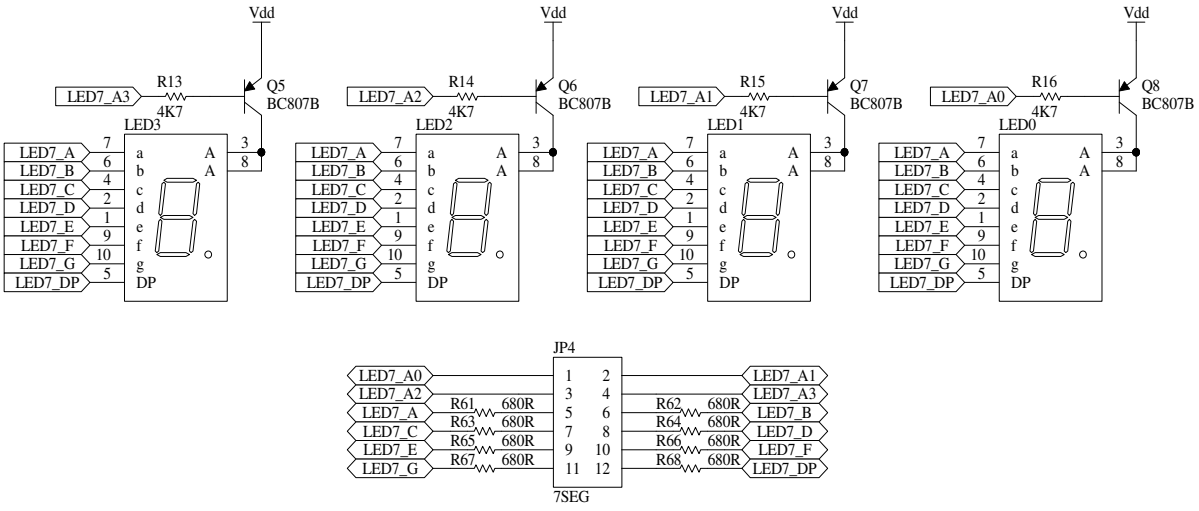
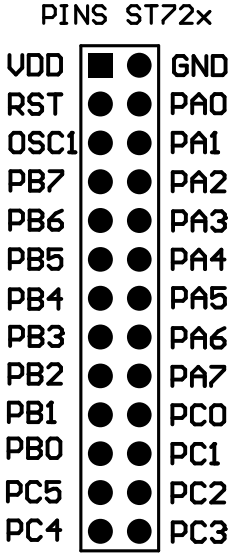


Fig.12. 7-segment LED display connection schematic

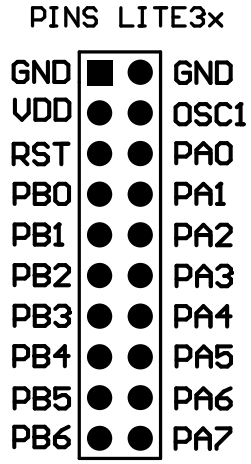
7. Connectors

7.1. Microcontrollers and peripheral headers



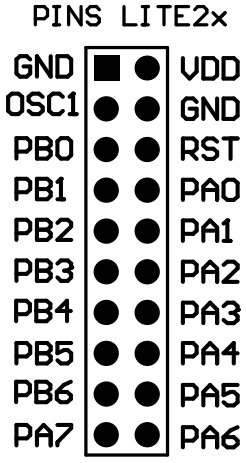
ST7226x microcontroller's header

PA0-PA7, PB0-PB7, PC0-PC5 – pins of MCU ports
OSC1 – microcontroller OSC1/CLKIN pin (input for external clock signal)
RST – connected to microcontroller RESET pin
VDD – board power supply pin
GND – ground



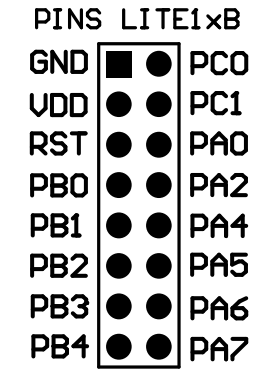
ST7LITE3 microcontroller's header

PA0-PA7, PB0-PB6 – pins of MCU ports
OSC1– microcontroller OSC1/CLKIN pin (input for external clock signal)
RST – connected to microcontroller RESET pin
VDD – board power supply pin
GND – ground



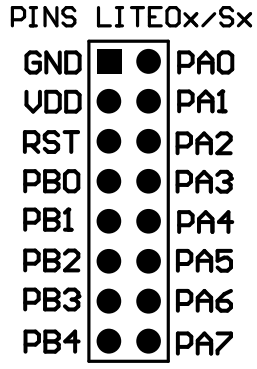
ST7LITE2 microcontroller's header

PA0-PA7, PB0-PB6 – pins of MCU ports
OSC1– microcontroller OSC1/CLKIN pin (input for external clock signal)
RST – connected to microcontroller RESET pin
VDD – board power supply pin
GND – ground



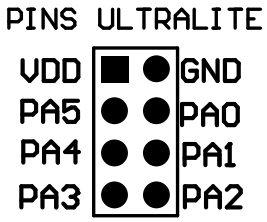
ST7LITE1xB microcontroller's header

PA0-PA7, PB0-PB4 – pins of MCU ports
PC0 – bit no. 0 of optional port C, OSC1, CLKIN (input for external clock signal)
PC1 - bit no. 1 of optional port C, OSC2
RST – connected to microcontroller RESET pin
VDD – board power supply pin
GND – ground



ST7LITE0 and ST7SuperLite microcontroller's header

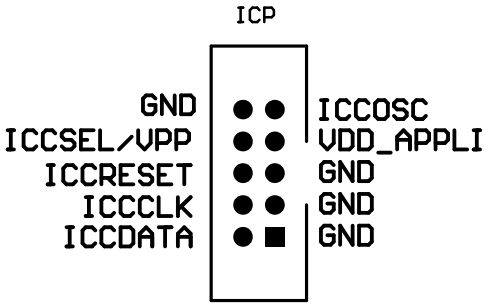
PA0-PA7, PB0-PB4 – pins of MCU ports
RST – connected to microcontroller RESET pin
VDD – board power supply pin
GND – ground



ST7UltraLite microcontroller's header

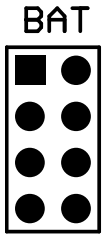
PA0-PA5 – pins of MCU port A
VDD – board power supply pin
GND – ground

7.2. Programming socket

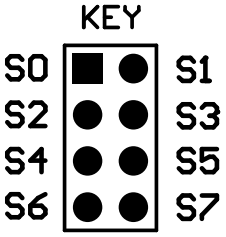


ICCOSC – input for clock signal from programmer
ICCCLK – programming clock signal
ICCDATA – programming data line
ICCRESET – reset line from programmer
ICCSEL/VPP – this pin is using in ICC protocol and some processors need this line to programming session.
VDD_APLI – board power supply pin
GND – ground

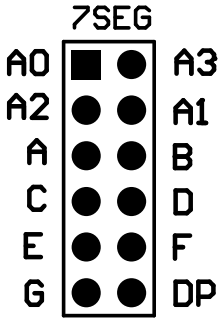
7.3. Peripheral headers



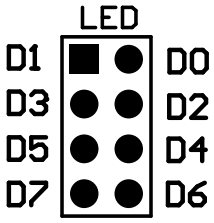
Battery connector, all pins are connected through Schottky diode to battery (3.6V)



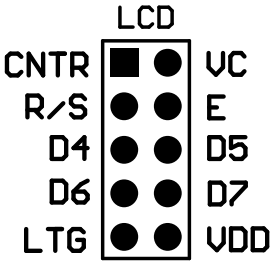
Push-buttons S0-S7 header, all pins pulled-up to VDD



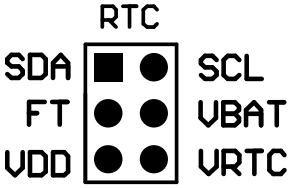
7-segment displays header
A, B, C, D, E, F, G, DP – all segments pins
A0-A3 – pins for anodes driving



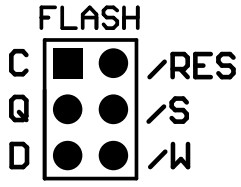
LED's cathodes pins.



LCD header.
D7-D4 – data bus
R/S – control line data/command
E - strobe
CNTR – Contrast potentiometer pin
VC - LCD contrast line
LTG – backlight driving pin
VDD- board power supply pin

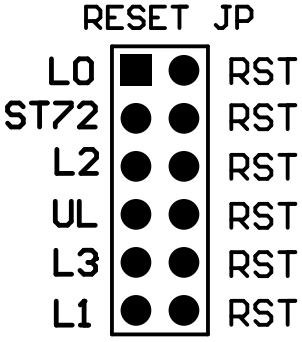


Real Time Clock header.
SDA – I^2C data line for RTC
SCL –I^2C clock line RTC
VRTC – RTC power supply pin
VDD - board power supply pin
FT – depends of RTC configuration (look at RTC Data Sheet)



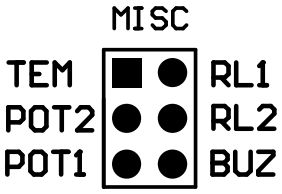
FLASH memory SPI interface header.
C – SPI clock line
Q – SPI serial output
D – SPI serial input
/S – FLASH chip select
/W – write protect pin
/RES – reset pin

RS-232 state converter's header
TXD – transmit line
RXD – receive line



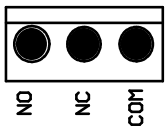
Common reset signal header
RST – pins connected to RESET push-button
L0 – RESET pin of ST7LITE0 lub ST7SuperLite MCU
ST72 – RESET pin of ST7226x MCU
L2 – RESET pin of ST7LITE2 MCU
UL – RESET/PA3 pin of ST7UltraLite MCU
L3 – RESET pin of ST7LITE3 MCU
L1 – RESET pin of ST7LITE1xB MCU

CAUTION: User has to be careful with connecting UL pin to RST pin, because RESET pin at UltraLite microcontroller could be configured as port



Others peripheral pins
REL1,2 – relays driving pins
POT 1,2– potentiometer adjustment pins
TEM – analog thermometer pin
BUZ – buzzer driving pin

7.4. Relays contact connector



NO – normal open contact
NC – normal closed contact
COM – common contact

8. Jumpers

3V3 – when closed causes 3.3V at board power supply, otherwise the power supply is 5V

SUPPLY – when closed regulated voltage is provided from local power supply circuit

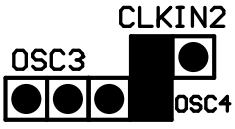
FLASH PWR– closed when voltage of power supply is 3.3V, when 5V this jumper should be open

PWR ST72, PWR L3, PWR L3, PWR L1xB, PWR L0/S, PWR UL – these jumpers when closed are providing board power supply to microcontrollers

ICP PWR – this jumper is used to provide power supply for ICPcable I programmer when user wants to program ST7UltraLite microcontroller when power supply is off

OSC1 and OSC2 – these jumpers are used to closing X2 quartz pins to ground when internal oscillator for ST7226x is used; in case when external clock source is connected to pin OSC1, only OSC2 jumper should be closed; when using X2 quartz both jumpers should be open

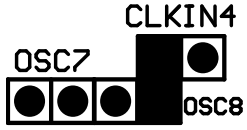
OSC3, OSC4 and CLKIN2 – jumpers OSC3 and OSC4 are using to closing X3 quartz pins to ground when internal oscillator for ST7LITE1xB is used;
In case when external clock source is used (connected to OSC1 or PB4 pin) the jumper OSC3 should be closed;
When external clock source will be delivered through programming connector, user has to close CLKIN2 jumper (external clock will be connected to PB4/CLKIN pin) or close pins between CLKIN2 and OSC4 (external clock will be connected to OSC1/CLKIN pin) as on picture below



When ICP OPT Disable mode is used to programming MCU, clock source from programmer has to be connected to PB4 through CLKIN2

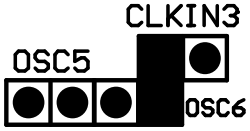
OSC7, OSC8 and CLKIN4 – jumpers OSC7 and OSC8 are using to closing X5 quartz pins to ground when internal oscillator for ST7LITE3 is used;
In case when external clock source is used (connected to OSC1 or PB4 pin) the jumper OSC7 should be closed;
When external clock source will be delivered through programming connector, user has to close CLKIN4 jumper (external clock will be connected to PB4/CLKIN pin) or close pins

between CLKIN4 and OSC8 (external clock will be connected to OSC1/CLKIN pin) as on picture below



When ICP OPT Disable mode is used to programming MCU, clock source from programmer has to be connected to PB4 through CLKIN4.

OSC5, OSC6 and CLKIN3 – jumpers OSC5 and OSC6 are using to closing X4 quartz pins to ground when internal oscillator for ST7LITE2 is used;
In case when external clock source is used (connected to OSC1 or PB4 pin) the jumper OSC5 should be closed;
When external clock source will be delivered through programming connector, user has to close CLKIN3 jumper (external clock will be connected to PB4/CLKIN pin) or close pins between CLKIN3 and OSC6 (external clock will be connected to OSC1/CLKIN pin) as on picture below



When ICP OPT Disable mode is used to programming MCU, clock source from programmer has to be connected to PB4 through CLKIN4.

CLKIN5 – when this jumper is closed external clock source is connected from ICP_UL programming connector to PA5/CLKIN ST7UltraLite pin.

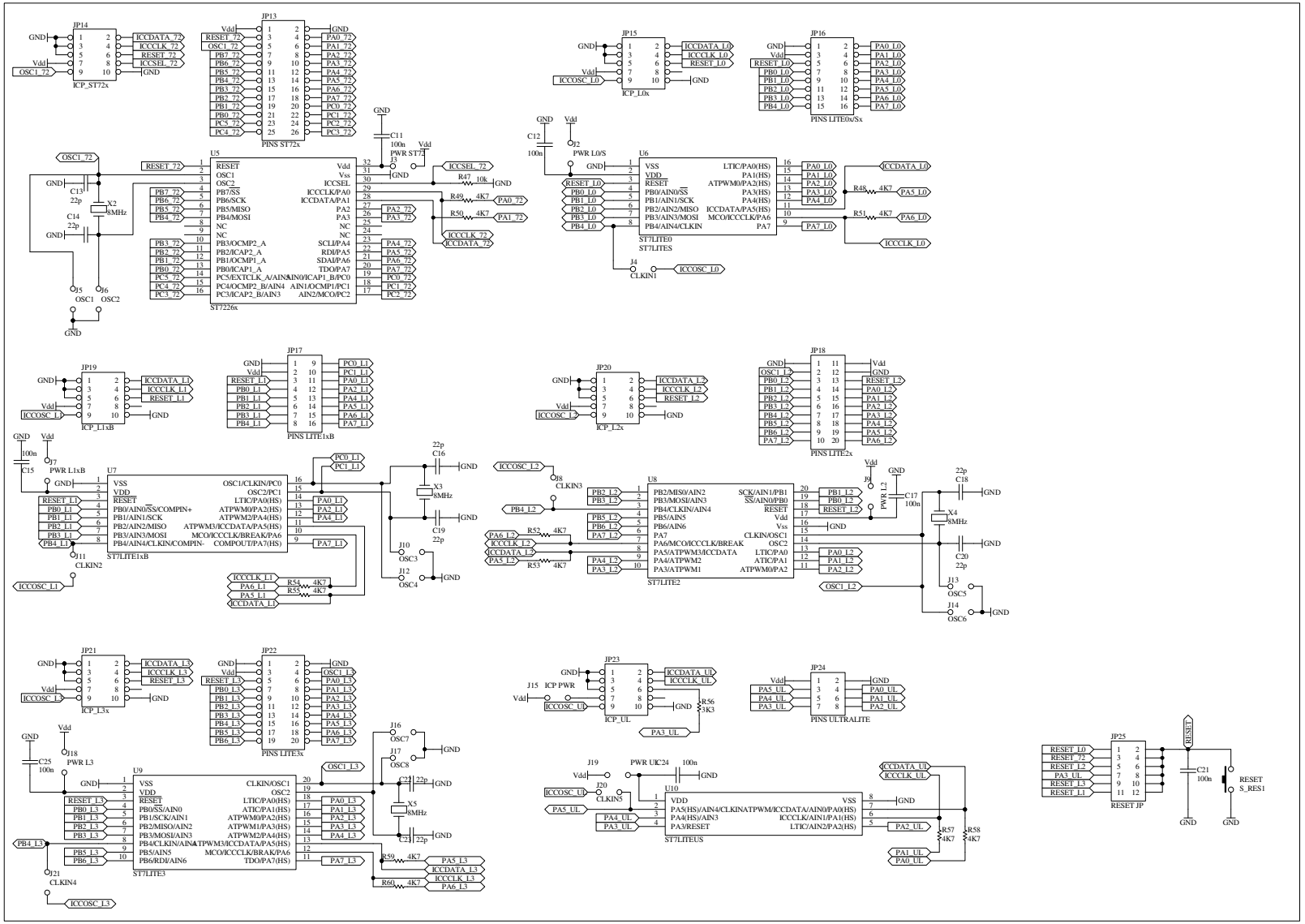
CLKIN1 - when this jumper is closed external clock source is connected from ICP_L0 programming connector to PA5/CLKIN pin of ST7Lite0 or ST7SuperLite

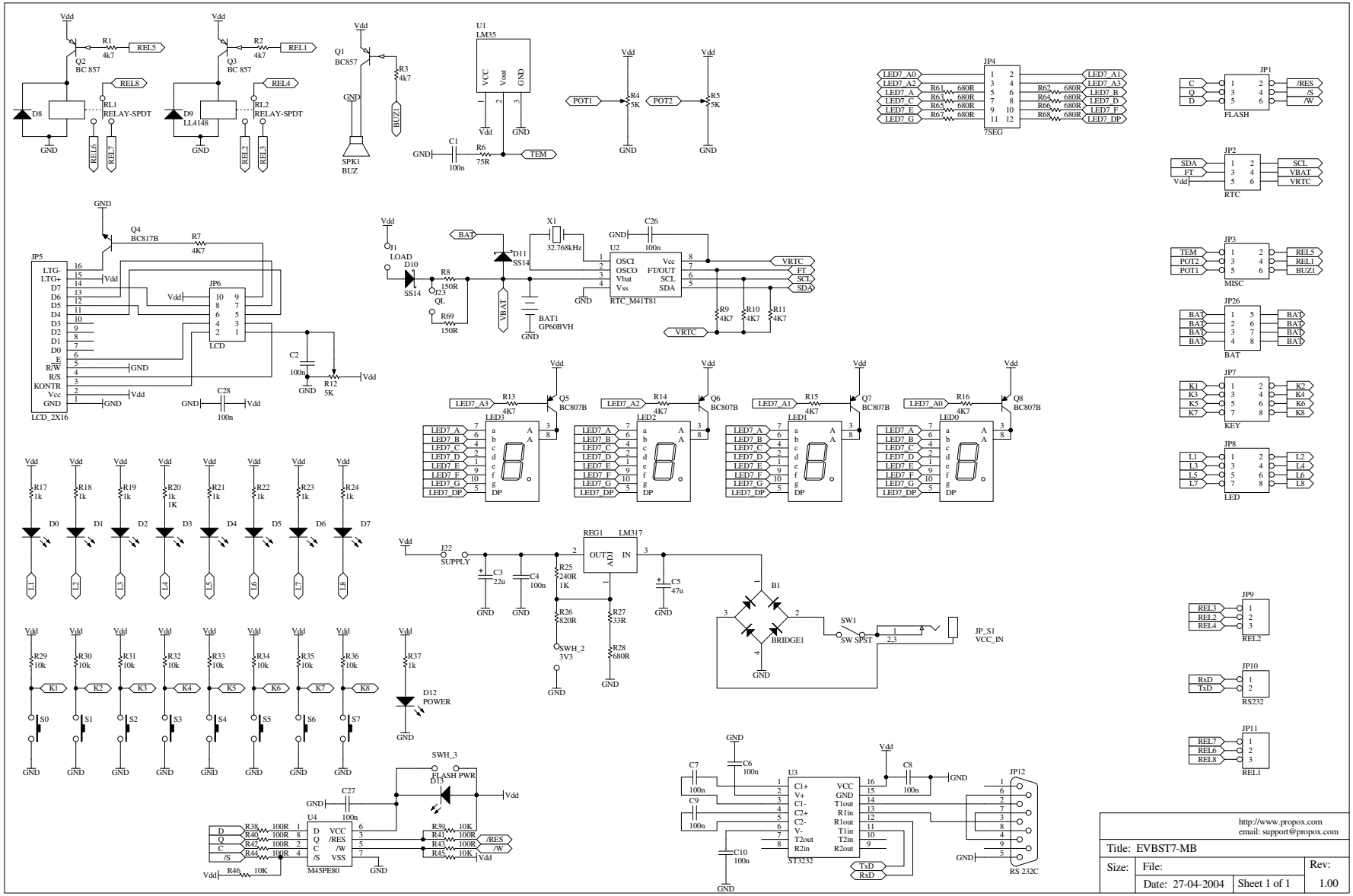
POWER diode – when this diode is shining, the power is connected to VDD.

9. Demo software

- LCD.c displays scrolling string on the LCD panel
- LED_ADC.c potentiometer setting is displayed by a pattern of the LED diodes
- LED.c pressing one of the switches turns on a pattern of LED lights

10. Schematic diagram





		http://www.propox.com email: support@propox.com	
Title: EVBST7-MB			
Size:	File:		Rev:
	Date: 27-04-2004	Sheet 1 of 1	1.00