EVBST7-03

Evaluation board for Microcontrollers, series ST72F26x.

User's manual

REV 1.2

Propox ®

Many ideas one solution

1. Introduction

EVBST7-03-XXX is a development board designed for the hobbyists and engineers who want to quickly prototype their system based on ST72F26x family of microcontrollers from ST Microelectronics. Depending upon the board's configuration (listed versions) some or all of the following components are found on the board: analog thermometer, potentiometer, two relays, buzzer, RTC (real time clock) and LCD display (2x16), RS232 interface, FLASH memory, eight switches and LEDs. Developer has access to all pins of the micro, which are brought to the header (pin connectors) and labeled accordingly. The bard has also the large, adjacent prototype area. The power circuitry on board (bridge, voltage regulator) eliminates the need for an external regulated power supply. 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 EVBST7-03-XXX

2. Board layout
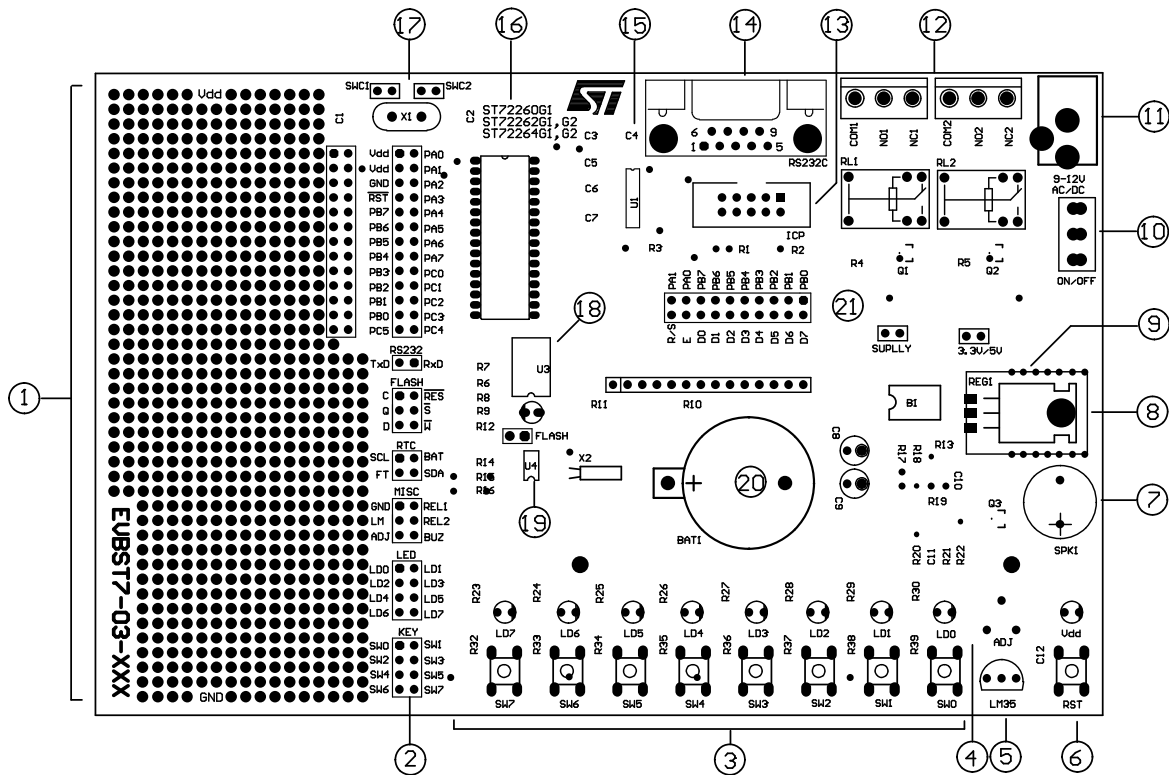
1. Prototype area
2. Processor and additional components connector
3. LED's and micro-switches
4. Potentiometer (may be connected to the ADC of the processor)
5. LM35 thermometer
6. RESET switch and power supply LED
7. Buzzer
8. LM317 voltage regulator
9. LCD 2x16 display (optional)
10. Power ON/OFF switch
11. Input power jack (AC/DC)
12. Relays headers
13. Programmer header
14. RS232 connector
15. RS232 – TTL converter
16. Socket for processors
17. Quartz oscillator and jumpers
18. FLASH memory, FLASH diode and jumper
19. Real time clock M41T00
20. Socket for lithium battery
21. LCD jumpers

3. Supported processors

|	ST72260G1	ST72262G1	ST72262G2	ST72264G1	ST72264G2
FLASH	4kB	4kB	8kB	4kB	8kB
RAM	256(128)B				
Peripherals	Watchdog timer, RTC, SPI, two 16bit timers	Watchdog timer, RTC, ADC, SPI, two 16bit timers		Watchdog timer, RTC, ADC, SPI, SCI, IIC two 16bit timers	
Supply voltage	2.4V – 5.5V				
Clock frequency	To 8MHz (with quartz to 16MHz) PLL 4/8MHz				
Temperature range	from -40ºC to 85ºC				from 0ºC to 70ºC
Cases	SO28 , SDIP32				LFBGA

4. Power supply for board

Recommended external power supply voltage is 7-12V AC, or 9-15V DC. A standard power jack (bolt diameter 2.1mm - negative) 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 header allows for direct access to the power jack input. Placing a jumper bypasses the bridge and voltage regulator.

5. Peripheral circuits

5.1. 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, who want to manipulate or debug their program with different hardware configurations. The diode turns on after grounding of the associated LDn (n = 0 – 8) pin.
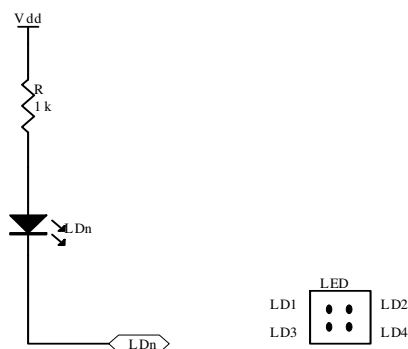
5.2. Switches

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

Vdd

R
1 0k

SWn

S n
SW

KEY

SW1   SW2
SW3   SW4

GND
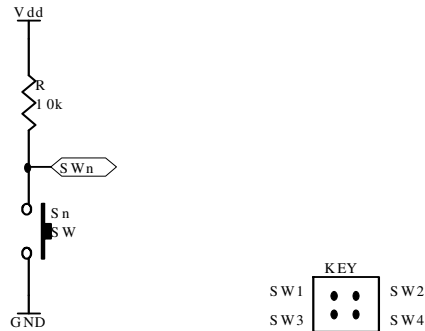
5.3. Relay

Access to the relay circuitry consists of the RELn (n=1, 2) pin of the MISC header and pins: NC, NO, COM of the relay header. REL pin is indirectly connected to the base of the transistor. Logic level 1 (5 or 3.3 VDC) applied to the REL pin, will activate the relay. External circuits can be controlled via NC, NO, COM I/O pins.

Vdd

Q   R   REL
           4k7
BC 857

COM

D   RL1
   RELAY

NC   NO

GND
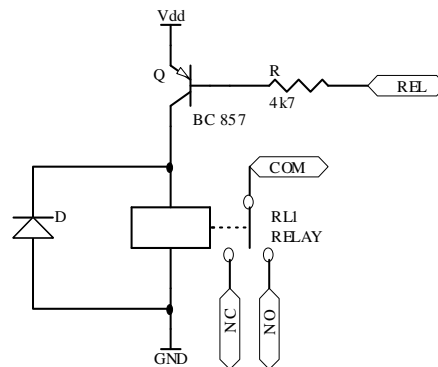
5.4. Acoustic indicator

The board has an acoustic indicator turned on and off by the transistor. The base of the transistor is connected to the SPK pin of the MISC header. Logic level '1' (5 or 3.3 VDC) applied to the SPK pin, will activate the buzzer.

Vdd

Q2   R8   SPK
BC 557   4k7

SPK

BUZER   GND
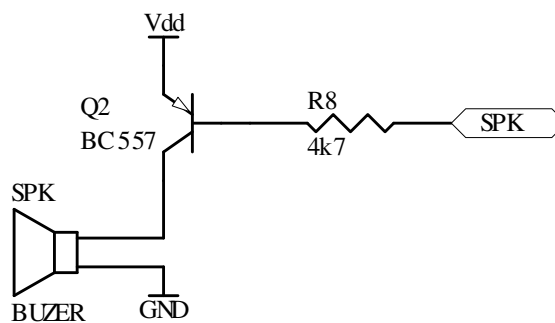
5.5. Thermometer

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

U3
LM35

VCC Vout GND

1   2   3

Vdd   GND

R9
75

C9
1u

LM35

GND
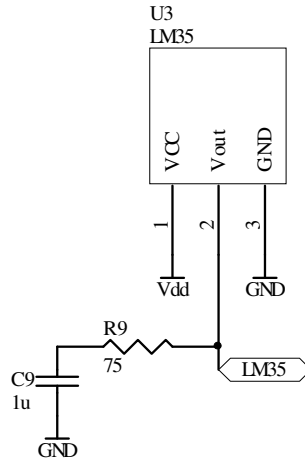
5.6. Potentiometer

The board is equipped with one potentiometer, allowing for simulation of the analog circuit outputs. The potentiometer enables the adjustment of voltage in the range 0 - Vdd. The potentiometer output is accessible on ADJ pin of the MISC connector.

Vdd

R10
POT1

ADJ

GND
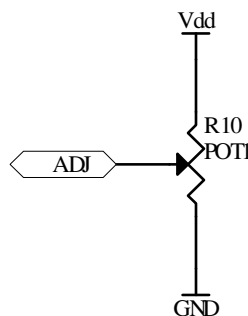
5.7. Interface RS232

There is a DB-9 connector on the board, connected with the ST3232 state converter. On the other side of the converter there are pin connectors with converter circuit terminals, allowing to plug in to the processor.

5.8. Real time clock M41T00

The board has one real time clock with battery back-up. The clock communicates with the micro through the I^2C interface. All the connections needed for controlling the M41T00 circuit are brought out to the RTC pin header. The battery pin is also placed on the header.

5.9. LCD display

The board has one LCD display interface. The LCD connector has eight data lines and two control lines: strobe line E and control line R/S. The display R/W line is permanently connected to ground; all other lines are available at the pin header. The adjustment of contrast is done by the selection of the resistors in the bridge circuit.

5.10. FLASH memory

Serial FLASH memory (M45PE40) is storage 4MB capacity. One page of memory is storing 256B. Access to memory is possible by SPI interface with 25MHz speed. Memory power voltage range is between 2.7V and 3.6V. Because voltage of power supply may be to 5V, memory is powering passing by LED diode. However the inputs of memory are connected by resistors.

## 6. Headers and connectors

6.1. Processor and peripherals

PA0...PA7 – processor port A processor
PB0...PB7 – processor port B
PC0...PC5 – processor port C
RST – processor reset
GND – ground
Vdd – power voltage

RxD, TxD – RS232 converter pins

C – FLASH clock
Q – FLASH output
D – FLASH input
S – FLASH chip select
W – FLASH write protect
RES – FLASH reset

BAT – battery
SDA –I^2C real time clock interface data line
SCL –I^2C real time clock interface clock line
FT – real time clock operation correction line

REL1,2 – relays driver pins
POT – potentiometer
LM35 – thermometer detector output pin
BUZ – buzzer driving pin

LD0...LD7 – LED driving pins
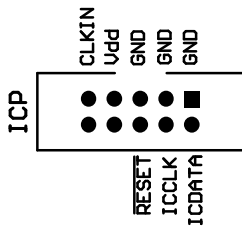SW0...SW7 – micro-switches

6.2. LCD display jumpers

D0...D7 – LCD data lines
RS –LCD control line - data/command
E –LCD strobe line
PB0...PB7 – port B lines
PA0...PA1 – A lines

6.3. Relays
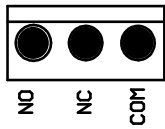
NO – normally open
NC – normally closed
COM – common

6.4. Programmer's connector

CLKIN –optional external clock
Vdd – voltage supply
GND – ground
RESET –reset
ICCLK –clock
ICDATA –data

7. Jumpers, supply LED and reset

3V3/5V – jumper shorted power is 3.3V, open 5V.
SUPPLY – shorted regulated voltage is provided from local power circuitry, open voltage comes from the external power supply.
Jumpers SWC1, 2 – allow to choose the source of the processor's clock signal. Using internal RC circuit as clock source, both jumpers should be closed. When external oscillator is chosen (quartz), both jumpers should be open. To drive processor with clock signal from programmer connector (max. 4 MHz) the jumpers should be set: SWC1 closed, SWC2 open.
Jumper FLASH – closed when 3.3V power voltage is chosen

Vdd LED – power LED indicator
 RST switch – hardware processor reset

8. Demo programs

- LCD.c displays scrolling "EVBST7-01-XXX" string on the LCD panel
- LED_ADC.c potentiometer setting is displayed by a pattern of the LED diodes
- TERMOMETR.c measured temperature in [^{o}C] is displayed on the LCD panel
- RTC.c displays the current date in the form: hour: min: day: month: year. The update of the clock settings using the keyboard. Microcontroller's port lines should be connected with the appropriate lines SDL and SCL in circuit M41T00 connected to the pin connectors.
- RS.c program RS 232, the program uses external interrupts and those from the timer, the TxD and RxD lines should be connected to the corresponding terminals of the ST3232 circuit, brought out to the pin connectors.
- LED.c pressing one of the switches turns on a pattern of LED lights.

9. Available versions

The EVBST7-03-XXX set is sold in three basic versions: Lite, Standard and Advance or according to individual orders.

The set System **EVBST7-03 Lite** includes:

- Board **EVBST7-03**: ST72F262G2 processor, all connectors (without RS connector), diodes, buttons, one relay, buzzer, thermometer, potentiometer (also there is no RS-TTL converter, FLASH memory, RTC and battery socket).
- Cables to connect peripheral devices.
- Propox CD-ROM with manuals and software

The set System **EVBST7-03 Standard** includes:

- Board **EVBST7-03**: ST72F262G2 processor, all connectors, diodes, buttons, one relay, buzzer, thermometer, potentiometer, LCD 2x16 display, RS converter with RS connector, RTC and battery socket
- Cables to connect peripheral devices
- Propox CD-ROM with manuals and software

The set System **EVBST7-03 Advance** includes:

- Board **EVBST7-03** : ST72F262G2 processor, all connectors, diodes, buttons, two relays, buzzer, thermometer, potentiometer, LCD 2x16 display, RS converter with RS connector, RTC and battery socket, FLASH memory 4MB
- Cables to connect peripheral devices
- Propox CD-ROM with manuals and software

9. Schematic diagram