1 Introduction

The L9942 demonstration board is a board designed to provide the user with a platform for the evaluation of the L9942. The board provides all the main input/output capabilities necessary to correctly drive a bipolar stepper motor and supply also diagnostic functionalities.

The L9942 evaluation board is a standalone evaluation board for the L9942 devices.

The L9942 is a stepper motor driver for bipolar stepper motors in automotive applications like Throttle control, light levelling and bending light.
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2 System description

Figure 1. System connection

![System connection diagram](image)

Figure 2. System diagram

![System diagram](image)

The ST10F276 is configured as 64M Hz CPU clock as indicated in Table 1. and Table 2.

### Table 1. ST10F276 S3 configuration

<table>
<thead>
<tr>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>B6</th>
<th>B7</th>
<th>B8</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>off</td>
</tr>
</tbody>
</table>

### Table 2. ST10F276 S4 configuration

<table>
<thead>
<tr>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
<th>B6</th>
<th>B7</th>
<th>B8</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>on</td>
<td>off</td>
<td>on</td>
<td>off</td>
</tr>
</tbody>
</table>

Connect PC COM port to ST10 UART0 as it can be configured by graphic user interface.
3 Hardware description

The L9942 demonstration board provides all the main input/output capabilities necessary to correctly drive a DC motor and supply also diagnostic functionalities.

- DI, CS, SCK, SO, SI, EN, PWM accessibility by test point.
- EN and VS LED indicator.

3.1 Block diagram

Figure 3. Application diagram

3.1.1 Microcontroller

- Standard connector for ST10xx family.
- PWM input
- Configuration and Diagnostic of L9942 via SPI
- Possibility to connect to others micros by wire adaptor
4 L9942 application circuit

Figure 4. Application circuit
5 L9942 pin description

Figure 5. L9942 pinout

Table 3. L9942 pin descriptions

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 12, 13, 24</td>
<td>PGND</td>
<td>Power ground.</td>
</tr>
<tr>
<td>3, 10, 15, 22</td>
<td>VS</td>
<td>Power supply voltage.</td>
</tr>
<tr>
<td>2, 23</td>
<td>QA1, QA2</td>
<td>Fullbridge outputs An.</td>
</tr>
<tr>
<td>11, 14</td>
<td>QB1, QB2</td>
<td>Fullbridge outputs Bn.</td>
</tr>
<tr>
<td>4</td>
<td>CLK</td>
<td>SPI clock input.</td>
</tr>
<tr>
<td>5</td>
<td>DI</td>
<td>Serial data input.</td>
</tr>
<tr>
<td>6</td>
<td>CSN</td>
<td>Chip select not input.</td>
</tr>
<tr>
<td>7</td>
<td>DO</td>
<td>SPI data output.</td>
</tr>
<tr>
<td>8</td>
<td>PWM</td>
<td>PMW output.</td>
</tr>
<tr>
<td>9</td>
<td>STEP</td>
<td>Step clock input.</td>
</tr>
<tr>
<td>16</td>
<td>CP</td>
<td>Charge pump output.</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>Ground.</td>
</tr>
<tr>
<td>18</td>
<td>TEST</td>
<td>Test input.</td>
</tr>
<tr>
<td>19</td>
<td>VCC</td>
<td>Logic supply voltage.</td>
</tr>
</tbody>
</table>
Table 3. L9942 pin descriptions (continued)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>RREF</td>
<td>Reference resistor.</td>
</tr>
<tr>
<td>21</td>
<td>EN</td>
<td>Enable input.</td>
</tr>
</tbody>
</table>
6 Board layout, views and images

Figure 6. Board front layout

Figure 7. Board back layout
Figure 8.  Board front view

Figure 9.  Board back view
7 Board main components and connectors description

Figure 10. Board main components and connectors description
8 Connectors descriptions

Table 4. Connectors description

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2</td>
<td>Stepper Motor connector</td>
<td>Screw</td>
</tr>
<tr>
<td>J3</td>
<td>Stepper Motor connector</td>
<td>Screw</td>
</tr>
<tr>
<td>GND</td>
<td>Supply voltage GND connector</td>
<td>Screw</td>
</tr>
<tr>
<td>VBAT</td>
<td>+12V Supply voltage connector (VS)</td>
<td>Screw</td>
</tr>
<tr>
<td>J4</td>
<td>Microcontroller connector</td>
<td>Multipin</td>
</tr>
</tbody>
</table>

Table 5. Microcontroller connectors

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>D34</td>
<td>Vcc</td>
<td>Pin</td>
</tr>
<tr>
<td>A,C,C34</td>
<td>GND</td>
<td>Pin</td>
</tr>
<tr>
<td>D17</td>
<td>EN</td>
<td>Pin</td>
</tr>
<tr>
<td>A22</td>
<td>PWM</td>
<td>Pin</td>
</tr>
<tr>
<td>D18</td>
<td>CSN</td>
<td>Pin</td>
</tr>
<tr>
<td>D25</td>
<td>SCK</td>
<td>Pin</td>
</tr>
<tr>
<td>C26</td>
<td>SDI</td>
<td>Pin</td>
</tr>
<tr>
<td>D26</td>
<td>SDO</td>
<td>Pin</td>
</tr>
</tbody>
</table>

Figure 11. Microcontroller connectors
## 8.1 Test points description

Table 6. Test points description

<table>
<thead>
<tr>
<th>TP Name</th>
<th>Pin Name</th>
<th>Description</th>
<th>I/O Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>SCK</td>
<td>SPI clock test point</td>
<td>I</td>
</tr>
<tr>
<td>T2</td>
<td>DI</td>
<td>Serial in test point</td>
<td>I</td>
</tr>
<tr>
<td>T3</td>
<td>CSN</td>
<td>Chip select test point</td>
<td>I</td>
</tr>
<tr>
<td>T4</td>
<td>DO</td>
<td>Serial out test point</td>
<td>O</td>
</tr>
<tr>
<td>T5</td>
<td>PWM</td>
<td>PWM input test point</td>
<td>I</td>
</tr>
<tr>
<td>T6</td>
<td>CLK</td>
<td>Step clock input</td>
<td>I</td>
</tr>
<tr>
<td>T7</td>
<td>EN</td>
<td>Enable test point</td>
<td>I</td>
</tr>
<tr>
<td>T8</td>
<td>QA1</td>
<td>Fullbridge output A1</td>
<td>O</td>
</tr>
<tr>
<td>T9</td>
<td>QA2</td>
<td>Fullbridge output A2</td>
<td>O</td>
</tr>
<tr>
<td>T10</td>
<td>QB1</td>
<td>Fullbridge output B1</td>
<td>O</td>
</tr>
<tr>
<td>T11</td>
<td>QB2</td>
<td>Fullbridge output B2</td>
<td>O</td>
</tr>
</tbody>
</table>
8.2 Board schematic

Figure 12. Board schematic
9 Grafic user interface general description

The L9942 graphic user interface consists of five fields:
1. motor control command field
2. SPI menu select field
3. current profile set
4. diagnostic status display
5. port configuration field

Figure 13. L9942 graphic user interface general view and default value
10 Run and stop L9942 graphic user interface

The L9942 graphic user interface is automatically running when it is opened.\(^{(a)}\)
User can stop and exit the graphic user interface via click “exit” key or press “ESC” key on keypad.

---

\(^{(a)}\) The default value was shown in Figure 3.
11 Configure L9942 graphic user interface

11.1 SPI menu select field

This field is used to set the value of registers 0~6. The values are sent to L9942 by ST10 via SPI. The Figure 14 shows the SPI and 8 registers, the first three bits at the DI-input are used to select one of the input registers.

Figure 14. SPI configuration protocol

11.1.1 Dir

Description: this bit controls direction of motor movement. DIR=1 clockwise, DIR=0 counter clockwise.

Value: Counter clockwise $\rightarrow 0$

Default: $\rightarrow 0$

SPI-DIN Bit: register 0, bit 0.
11.1.2 **Step mode (ST1, ST0)**

Description: these bits controls step mode of motor movement.

Value:
- Micro-stepping → 00
- Mini-stepping → 01
- Half-stepping → 10
- Full-stepping → 11

Default: 11

SPI-DIN Bit: register 0, bits 2 and 1

11.1.3 **Slew rate (SR1, SR0)**

Description: These bits control slew rate of bridge switches.\(^{(1)}\)

Default: 00

SPI-DIN Bit: register 0, bits 4 and 3

1. For more details, please refer to Table 12 in L9942 data sheet.

11.1.4 **Decay mode (DM2, DM1, DM0)**

Description: These bits control decay mode of output current.\(^{(1)}\)

Value:
- Slow decay \(\neq 000\)
- Mixed decay, fast decay until TMD>4us \(\neq 001\)
- Mixed decay, fast decay until TMD>8us \(\neq 010\)
- Mixed decay, fast decay until current undershoot \(\text{Tmc} = \text{TFT} + \text{TCC} \neq 011\)
- Auto decay, fast decay without delay time \(\neq 100\)
- Auto decay, fast decay until TMD>4us \(\neq 101\)
- Auto decay, fast decay until TMD>8us \(\neq 110\)
- Auto decay, fast decay until current undershoot \(\text{Tmc} \neq 111\)

Default: \(\neq 101\)

SPI-DIN Bit: Register 0, bits 7, 6 and 5

1. For more details, please refer to figure 4 in L9942 datasheet.

11.1.5 **Phase counter (P4~P0)**

Description: These bits control position of motor

Default: 00000

SPI-DIN Bit: Register 0, bits 12~8.
11.1.6 **DAC scale (DC2, DC1, DC0)**

Description: These bits set full scale range of limit.

Value:
- 95mA → 000
- 140mA → 001
- 230mA → 010
- 360mA → 011
- 550mA → 100
- 810mA → 101
- 1150mA → 110
- 1350mA → 111

Default: 000

SPI-DIN Bit: Register 1, bits 12, 11 and 10.

11.1.7 **NPWM**

Description: This bit switches internal PWM signal of bridge A to pin PWM if set to 0.

Value:
- Internal PWM signal of bridge A switch to pin PWM → 0
- Pin PWM is in high resistance status → 1

Default: 0

SPI-DIN Bit: Register 3, bit 5.

11.1.8 **PWM counter (D7~D0)**

Description: These bits are for threshold value in counter of active time during signal PWM.

Value: 0~255

Default: 0

SPI-DIN Bit: Register 3, bits 7 and 6; Register 4, bits 7, 6 and 5; Register 5, bits 7, 6 and 5

11.1.9 **FRE**

Description: This bit sets frequency of PWM cycle.

Value:
- PWM frequency 30 kHz → 0
- PWM frequency 20 kHz → 1

Default: 0
SPI-DIN Bit: Register 6, bit 9

11.1.10 Filter time (FT)

Description: This bit set filter time in glitch filter.
Value: TF=1.5us → 0
       TF=2.5us → 1
Default: 0

11.1.11 SST

Description: This bit specifies output PWM to reflect same logical level like bit ST
Value: Output PWM not reflect bit ST → 0
       Output PWM reflect bit ST → 1
Default: 0

After configuring SPI menu, the configured SPI command will be automatically sent to L9942.

11.2 Motor control command field

This field is purposed to control motor command: motor enable, PWM frequency, PWM duty-cycle, PWM cycles, motor direction control.
11.2.1 EN switch
This switch controls EN input signal of L9942 to make the device in standby mode or active mode.

11.2.2 PWM duty-cycle and frequency control
- PWM duty-cycle control
  Range \([0, 100]\) %
  Step 1
  Default 50%

- PWM frequency control
  Range \([20, 1000]\) Hz
  Step 1
  Default 200Hz
Figure 18. Example of frequency control

To adjust PWM control bars will change the duty-cycle and frequency of L9942’s PWM input signal. Be careful do not change the PWM status if the motor is running, as the motor will run incorrectly.

11.2.3 Motor direction control key

These keys control the running of stepper motor. Click to run and unclick to stop. After running a finite step (PWM cycles), the key will unclick automatically when the motor stop. At any time, only one key can be clicked, when a key is clicked, the other 2 keys are disabled and can’t be clicked.

11.3 Function configuration field

The function configuration field consists of 5 parts: Port Configuration, Rx Error, Continue Diagnosis switch, PWM output indication, Reset ST10 button and Exit button as shown in the Figure 19.

Figure 19. Function configure field

11.3.1 Port configuration field

Com port (0) can be changed by user, according the used COM port number of PC. After modified the com port number, user must click the reset key to reset and configure the ST10 evaluation board.

Port number: (COM Number – 1)
Baud rate: 38400 (default)
Figure 20. COM number map on pc

Example:
For COM1: “0” port number should be selected COM port 0
For COM3: “2” port number should be selected COM port 2
If the port configuration failed, when select ON/OFF, Com port 0 error happened:

Notes: when this error appeared, please do below actions:
● Configure the Port number correctly
● Click the reset ST10 button to reset the L9942 graphic user interface and ST10 configuration

11.3.2 Reset ST10 button
Reset ST10 and configure ST10 DIO, SPI and CC.

11.3.3 Rx error
The rx error turned red, indicate below receive error:
● Receive timeout
● Receive error
● Received frame incorrect

11.3.4 Exit button
The exit button was only used to stop and exit the L9942 graphic user interface.

11.3.5 Continue diagnosis switch
If the continue diagnosis is clicked, the L9942 graphic user interface enters automatic in diagnosis mode. The current SPI menu configuration will be sent to L9942 to do the continuous diagnosis.

11.3.6 PWM output indication
This part indicates the status of PWM pin of L9942.
11.4 SPI diagnosis indication

This field indicates the diagnosis status. SPI diagnosis word will display at SPI diagnosis indication field. The diagnosis protocol is referred in

Table 7. Control, status and profile register

<table>
<thead>
<tr>
<th>Bit</th>
<th>CLR</th>
<th>ST (PWM)</th>
<th>Filter</th>
<th>Freq</th>
<th>ST</th>
<th>REF</th>
<th>ERR</th>
<th>Openload</th>
<th>Current profile 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>rw</td>
<td>rw</td>
<td>rw</td>
<td>r</td>
<td>r</td>
<td>r</td>
<td>rw</td>
<td>rw</td>
<td>rw</td>
</tr>
<tr>
<td>Reset</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Name</td>
<td>CLR6</td>
<td>SST</td>
<td>FT</td>
<td>FRE</td>
<td>ST</td>
<td>RERR</td>
<td>OB</td>
<td>OA</td>
<td>i4</td>
</tr>
</tbody>
</table>

Table 8. Bits description

<table>
<thead>
<tr>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB OA</td>
<td>These bits indicate openland at bridges</td>
</tr>
<tr>
<td>RERR</td>
<td>This bit indicates if reference current is ok (15uA&lt;ref current 250uA&gt;t</td>
</tr>
<tr>
<td>ST</td>
<td>This bit indicates stall decision</td>
</tr>
</tbody>
</table>

Table 9. Status register

<table>
<thead>
<tr>
<th>Bit</th>
<th>CLR</th>
<th>Temperature</th>
<th>Vs monitor</th>
<th>Overcurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access</td>
<td>rw</td>
<td>r</td>
<td>r</td>
<td>r</td>
</tr>
<tr>
<td>Reset</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Name</td>
<td>CLR7</td>
<td>TSD</td>
<td>TW</td>
<td>OV</td>
</tr>
</tbody>
</table>

Table 10. Bit description

<table>
<thead>
<tr>
<th>Bits</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 7 bit 0</td>
<td>These bits indicate overcurrent in each lowside or highside power transistor</td>
</tr>
<tr>
<td>1</td>
<td>Over current failure I&gt;2A</td>
</tr>
<tr>
<td>OV UV</td>
<td>These bits indicate failure at VS</td>
</tr>
<tr>
<td>01</td>
<td>Voltage at pin VS is too low</td>
</tr>
<tr>
<td>10</td>
<td>Voltage at pin VS is too high</td>
</tr>
<tr>
<td>TSD TW</td>
<td>These bits indicate temperature failure</td>
</tr>
<tr>
<td>01</td>
<td>Only for information set at temperature warning threshold</td>
</tr>
<tr>
<td>10</td>
<td>In case of thermal shutdown all bridges are switched off. It has to reset by bit CLR7</td>
</tr>
</tbody>
</table>
Figure 21. SPI diagnostic information

<table>
<thead>
<tr>
<th>Diagnostic Information</th>
<th>Over Current Warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge A Open Load</td>
<td>HSA1</td>
</tr>
<tr>
<td>Bridge B Open Load</td>
<td>HSA2</td>
</tr>
<tr>
<td>V5 Under Voltage</td>
<td>HSBI</td>
</tr>
<tr>
<td>V5 Over Voltage</td>
<td>HSBI2</td>
</tr>
<tr>
<td></td>
<td>LSA1</td>
</tr>
<tr>
<td></td>
<td>LSA2</td>
</tr>
<tr>
<td></td>
<td>LSBI</td>
</tr>
<tr>
<td></td>
<td>LSBI2</td>
</tr>
</tbody>
</table>

- RERR (Reference Current Wrong)
- ST (Stall Detection)
- Thermal Warning
- Thermal Shutdown
12 Test result

12.1 Test condition

Figure 22. Test condition

```
<table>
<thead>
<tr>
<th>PWM Frequency</th>
<th>200 [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 100 200</td>
<td></td>
</tr>
<tr>
<td>300 400 500</td>
<td></td>
</tr>
<tr>
<td>600 700 800</td>
<td></td>
</tr>
<tr>
<td>900 1000</td>
<td></td>
</tr>
<tr>
<td>PWM Duty</td>
<td>50 [%]</td>
</tr>
<tr>
<td>0 10 20 30</td>
<td></td>
</tr>
<tr>
<td>40 50 60 70</td>
<td></td>
</tr>
<tr>
<td>80 90 100</td>
<td></td>
</tr>
</tbody>
</table>
```

12.2 SPI result

Table 11. SPI result

<table>
<thead>
<tr>
<th>Item</th>
<th>Operation</th>
<th>SPI status register bit</th>
<th>Diagnostic information</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge A open load</td>
<td>Open load</td>
<td>Register 6 bit 5</td>
<td>Bridge A Open Load</td>
<td>Pass</td>
</tr>
<tr>
<td>Bridge B open load</td>
<td>Open load</td>
<td>Register 6 bit 6</td>
<td>Bridge B Open Load</td>
<td>Pass</td>
</tr>
<tr>
<td>High side A1 over current</td>
<td>Connect QA1 and GND</td>
<td>Register 7 bit 2</td>
<td>HSA1</td>
<td>Pass</td>
</tr>
<tr>
<td>Low side A1 over current</td>
<td>Connect QA1 and VS</td>
<td>Register 7 bit 0</td>
<td>LSA1</td>
<td>Pass</td>
</tr>
<tr>
<td>High side A2 over current</td>
<td>Connect QA2 and GND</td>
<td>Register 7 bit 3</td>
<td>HSA2</td>
<td>Pass</td>
</tr>
<tr>
<td>Low side A2 over current</td>
<td>Connect QA2 and VS</td>
<td>Register 7 bit 1</td>
<td>LSA2</td>
<td>Pass</td>
</tr>
<tr>
<td>High side B1 over current</td>
<td>Connect QB1 and GND</td>
<td>Register 7 bit 6</td>
<td>HSB1</td>
<td>Pass</td>
</tr>
</tbody>
</table>
Table 11. SPI result (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Operation</th>
<th>SPI status register bit</th>
<th>Diagnostic information</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low side B1 over current</td>
<td>Connect QB1 and VS</td>
<td>Register 7 bit 4</td>
<td>LSB1</td>
<td>Pass</td>
</tr>
<tr>
<td>High side B2 over current</td>
<td>Connect QB2 and GND</td>
<td>Register 7 bit 7</td>
<td>HSB2</td>
<td>Pass</td>
</tr>
<tr>
<td>Low side B2 over current</td>
<td>Connect QB2 and VS</td>
<td>Register 7 bit 5</td>
<td>LSB2</td>
<td>Pass</td>
</tr>
<tr>
<td>VS under voltage</td>
<td>VS &lt; 6V</td>
<td>Register 7 bit 8</td>
<td>VS Under Voltage</td>
<td>Pass</td>
</tr>
<tr>
<td>VS over voltage</td>
<td>VS &gt; 20V</td>
<td>Register 7 bit 9</td>
<td>VS Over Voltage</td>
<td>Pass</td>
</tr>
<tr>
<td>Reference current wrong</td>
<td>RREF &lt; 5k</td>
<td>Register 6 bit 7</td>
<td>RERR(Reference Current Wrong)</td>
<td>Pass</td>
</tr>
<tr>
<td>Stall detection</td>
<td>Set large PWM counter value</td>
<td>Register 6 bit 8</td>
<td>ST(Stall Detection)</td>
<td>Pass</td>
</tr>
<tr>
<td>Thermal warning</td>
<td></td>
<td>Register 7 bit 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal shutdown</td>
<td></td>
<td>Register 7 bit 11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix A

A.1 ST10 configuration

CPU frequency: 64MHz

1) ASC
For ST10F276, either ASC0 or ASC1 can be initialized;
Baud rate: 38400, 8 bit data asynchronous, 1 stop bit

2) SSC
Frequency: 1MHz, 16 bit data width, MSB first, low level at idle, and transmit at rising edge
CS line: 2.3

A.2 Pinout

Pin connection between ST10F27x evaluation board and L9942 demonstration board.

<table>
<thead>
<tr>
<th>Function</th>
<th>Name</th>
<th>GPIO</th>
<th>PIN</th>
<th>F27x_SH*</th>
<th>F27x_FS*</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN</td>
<td>EN</td>
<td>P2.1</td>
<td>Pin 48 – GPIO</td>
<td>D17</td>
<td>D16</td>
<td></td>
</tr>
<tr>
<td>Step frequency</td>
<td>PWM</td>
<td>P7.0</td>
<td>Pin 19 – POUT0</td>
<td>A22</td>
<td>A21</td>
<td></td>
</tr>
<tr>
<td>SPI Signals</td>
<td>CSN</td>
<td>P2.3</td>
<td>Pin 50 – GPIO</td>
<td>D18</td>
<td>D17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCK</td>
<td>P3.13</td>
<td>Pin 80 – SCLK0</td>
<td>D25</td>
<td>D24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SDI</td>
<td>P3.9</td>
<td>Pin 76 – MTSR0</td>
<td>C26</td>
<td>C25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SDO</td>
<td>P3.8</td>
<td>Pin 75 – MRST0</td>
<td>D26</td>
<td>D25</td>
<td></td>
</tr>
<tr>
<td>UART signals</td>
<td>Tx0</td>
<td>P3.10</td>
<td>Pin 77 – Tx0</td>
<td>C11</td>
<td>C10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rx0</td>
<td>P3.11</td>
<td>Pin 78 – Rx0</td>
<td>D11</td>
<td>D10</td>
<td></td>
</tr>
</tbody>
</table>

1) F276_SH* is the board made by Shanghai PT&S lab APG China. (ST10F27X EVA v1.0)
2) F276_FS* is the board made by FORTH-SYSTEME. (EVA27X_0)
## Revision history

Table 13. Document revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Nov-2009</td>
<td>1</td>
<td>Initial release.</td>
</tr>
<tr>
<td>19-Sep-2013</td>
<td>2</td>
<td>Updated disclaimer.</td>
</tr>
</tbody>
</table>
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