STSW-L9960, STSW-L9960T Graphical User Interface (GUI) for EVAL-L9960 & EVAL-L9960T

## Introduction

This document describes the STSW-L9960, STSW-L9960T Graphical User Interface (GUI) dedicated to set and control the EVAL-L9960 & EVAL-L9960T board (ETC H/Bridge motor application boards for L9960) through the SPI protocol, manage the DIS, NDIS and IN2 pins and send PWM to IN1 pins.

The STSW-L9960, STSW-L9960T has been developed using Labview$^®$ 2015 and it works with SPC560P-DISP evaluation board programmed with a dedicated FW (GP-Pictus_v1.1.elf).

# Contents

# List of figures

# 1 Graphical User Interface description

The SW-L9960, STSW-L9960T GUI includes the fields highlighted in *Figure 1*:

**Figure 1. SW-L9960, STSW-L9960T Graphical User Interface (GUI) for EVAL-L9960**



1. **Com Port Setup**: this menu allows to set the COM port

2. **SDI**: this menu allows to select and to configure each device register. It is possible to program all the bits of each register.

3. **SDO**: the value of each register is copied in the field of this menu. This portion of the GUI allows to monitor the device status.

4. **SPI Send/Receive**: in this portion of the GUI it is possible:
   a) To end an SPI command or configuration as programmed in the SDI menu (see #2) by pressing the "***SEND***" button.
   b) To send a single SPI command manually written in the MOSI field (HEX format). In the same time it is possible to read the register value in the MISO filed.
   c) **SPI functionality**: the LEDs, SPI SEND OK and SPI RECEIVE OK provide a visual feedback about the SPI communication status (if the LEDs are on it means communication is working properly).

5. **PWM signals**: the Frequency and the Duty cycle of the each PWM signal are programmed in this frame. The "***START***" button enables the PWM signal generators (PWM signals: IN1A and IN1B), whereas "***STOP***" button stops the PWM signals. Before sending a PWM configuration, the selected Frequency must be confirmed by pushing the "***SET***" button.

6. **DIS – NDIS – IN2:** this frame is used to configure the DIS1, NDIS1 and IN2 pins of the L9960.

7. **HELP**: through this menu it is possible to download the SW help, the L9960 Datasheet and info about the HW.

# 2       How to use the GUI to configure and test the EVAL-L9960 / L9960T

The following procedure has to be followed to start the EVAL-L9960 & EVAL-L9960T device using the L9960 GUI.

1.  Configure the COM port
2.  Press "OK"
3.  Insert the desired value of the SPI in the field n°2
4.  Press "SEND" in the field n°4. If the communication has been established and the right command has been sent, the led "SPI SEND OK" will appear red. The same for the led "SPI RECEIVE OK" it will appear red if the device answer has been received correctly.
5.  In the field n°3 it is possible to read the device answer in bit, in the field n° 4 it is possible to read the SDI and SDO signals expressed in hex
6.  Insert the desired value of the frequency in the field n°5
7.  Press "SET"
8.  Configure Duty Cycle
9.  Press "START"
10. Set the DIS, NDIS and IN2 by pressing the corresponding button in the field n°6. If the communication has been established and the right command has been sent, the corresponding led "Write OK" will appear red. If the value is set "ON",the corresponding led Dx on the EVAL-L9960 will be turned ON.
11. The DC motor will start to run
12. Pressing "STOP PWM" in the field n°5 the PWM will be stopped and consequently the motor will be stopped.
13. Press the big button "STOP" on the top side of the GUI in order to stop the execution of Labview and after closing the window.

# 3 Start EVAL-L9960 / L9960T in normal mode

1. Configure the COM Port
2. Press"OK"
3. Send the SPI frame 0x2201 (0b 0010001000000001) – Restart_Trigger
4. The device will answer (MISO) with the SPI frame 0x2000 (0b 0010000000000000) – Answer to Restart_Trigger
5. Insert the desired value of the frequency in the field n°5
6. Press "SET"
7. Configure Duty Cycle
8. Press "START"
9. Set DIS1 (DIS2 for channel B) OFF
10. Set NDIS1 (NDIS2 for channel B) ON
11. The DC Motor connected to the configured Output will start to run
12. Set IN2A (IN2B for channel B) ON or OFF for Clockwise or Counter Clockwise direction.
13. Press "STOP" in the field n°5 to stop PWM
14. Press the button "STOP" on the top side of the GUI to stop the execution of Labview code and close the window.

# 4 How to plug SCP560P-DISP and EVAL-L9960 & EVAL-L9960T

In the SPC560P-DISP it is implemented a 0.1" 4x37 pin array; it is used as a connector to plug the EVAL-L9960 & EVAL-L9960T.
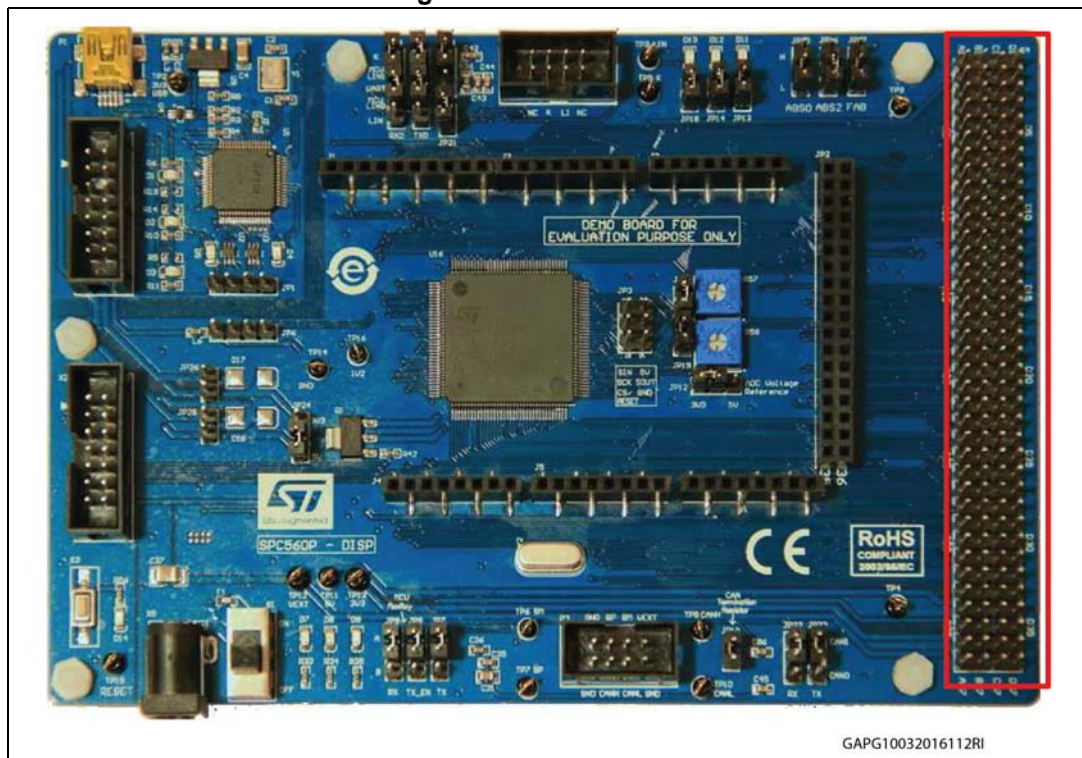
**Figure 2. SPC560P-DISP**



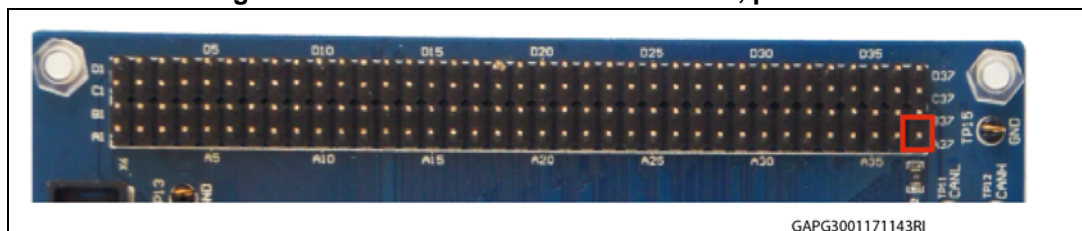**Figure 3. SPC560P-DISP - 4x37 Connector, pin "A-34"**



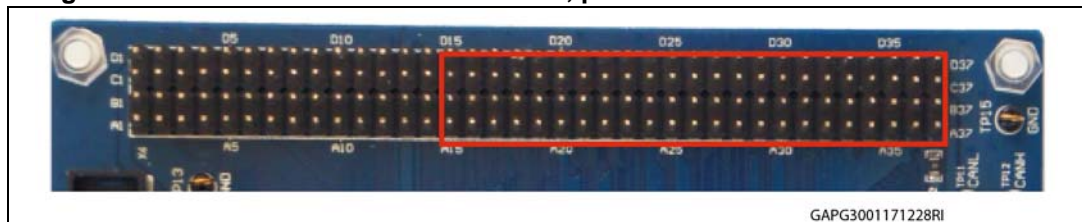**Figure 4. SPC560P-DISP - 4x37 Connector, pins used to connect the EVAL-L9960**
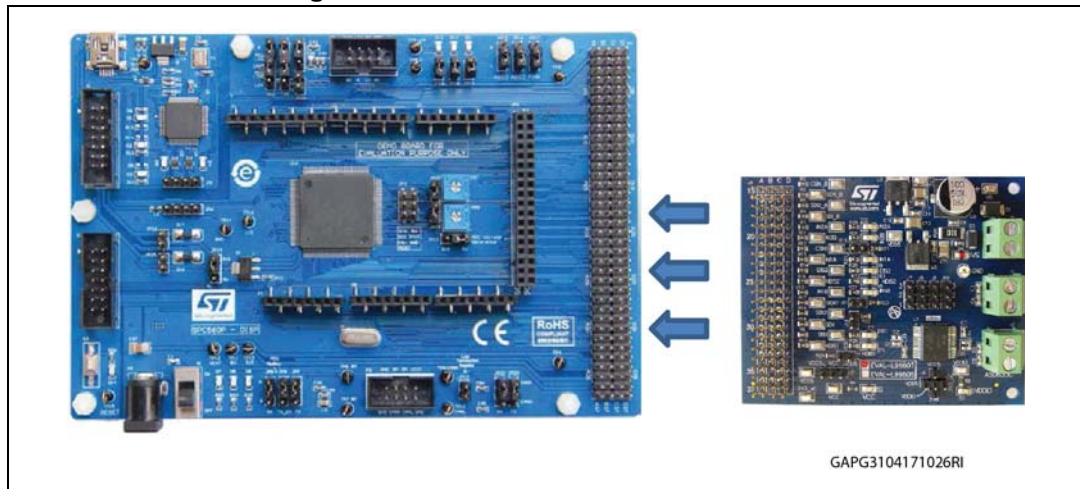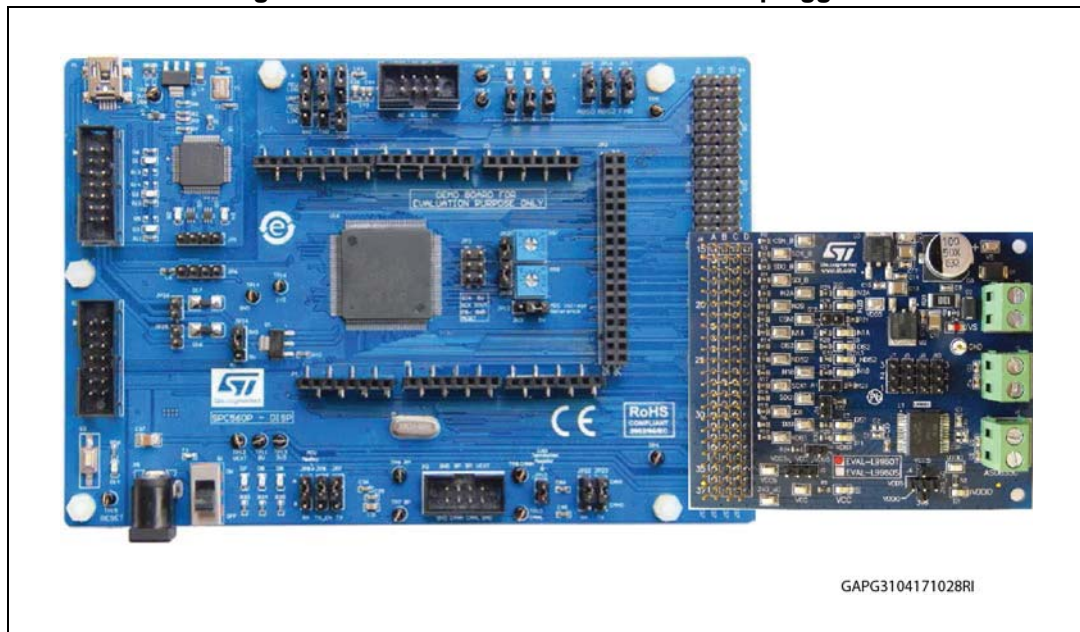
**Figure 5. EVAL-L9960 and SPC560P-DISP**



**Figure 6. EVAL-L9960 and SPC560P-DISP plugged**

# 5 SPC560P-DISP: USB drivers installation

The GUI needs a dedicated USB driver to enable the serial communication channel. If the driver is not yet installed or not appropriately configured, the following procedure describes how to install the Driver or to update the current version.

To install the drivers the board SPC560P-DISP does not need the external supplier; the USB connection provides the supply voltage.

1. Disconnect the USB from SPC560P-Discovery

2. If the UDE Visual Platform 4.2 is already installed as well as the drivers are updated go to step #7 otherwise continue with to next step

3. Download the SPC5-UDE/STK 4.02.07 from pls-mc web site.

4. Install the SW; right click on the icon named "ude-4-02-07-spc5-udestk.exe" then select "Run as Administrator"
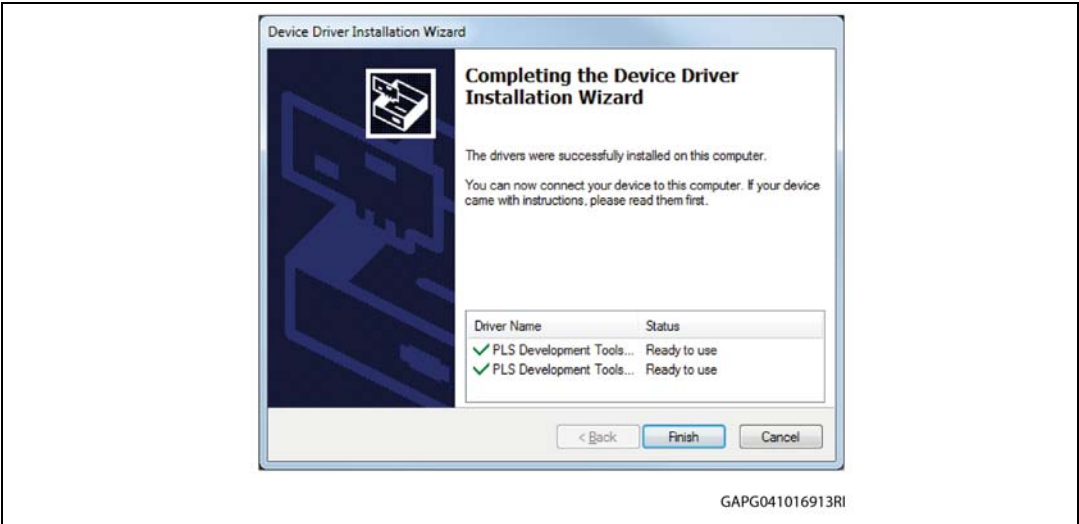
**Figure 7. UDE software**
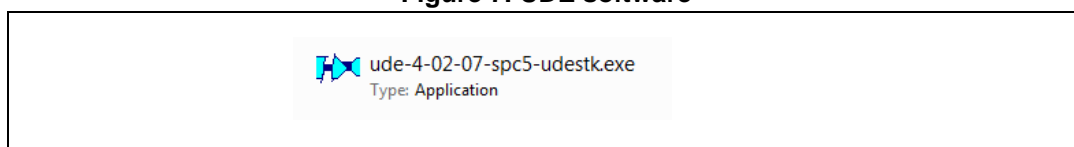


5. Accept to install the USB drivers (see *Figure 8*)

**Figure 8. USB driver installation**



6. The Drivers installation is completed when the window here below appears (*Figure 9*). Pressing the "Finish button" the installation will be completed and the installation program will be closed.

**Figure 9. Device driver installation wizard**



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7. Open the folder "C:\Program Files (x86)\pls\UDE 4.2\Driver\JtagUsbDriver"[a]

8. Right click on "InstallPlsUsbJtagDriver.bat" then select "Run as administrator"

**Figure 10. USB Driver Installation – folder "JtagUsbDriver"**



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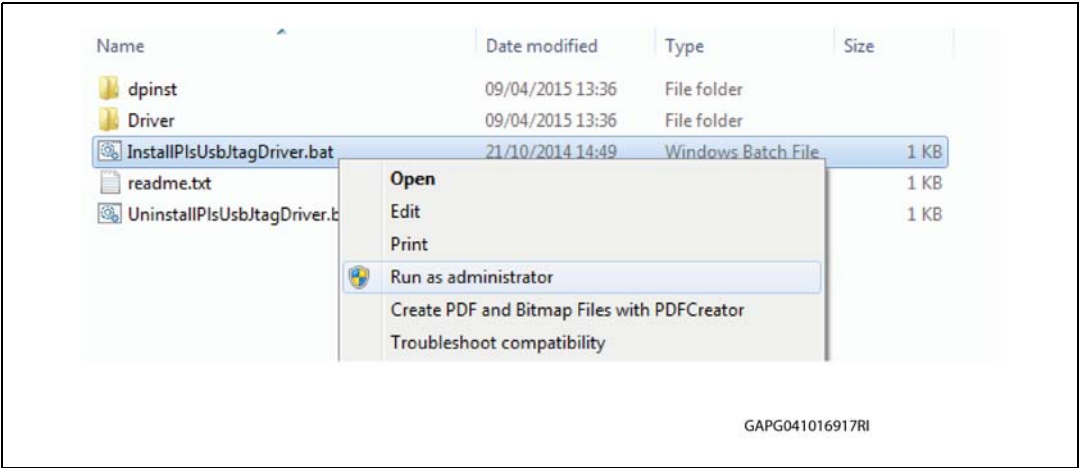
9. Once the installation is completed, connect the USB cable to the SPC560P-DISP board;

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a. The path could be different because it depends on the choice the user made during the installation procedure.
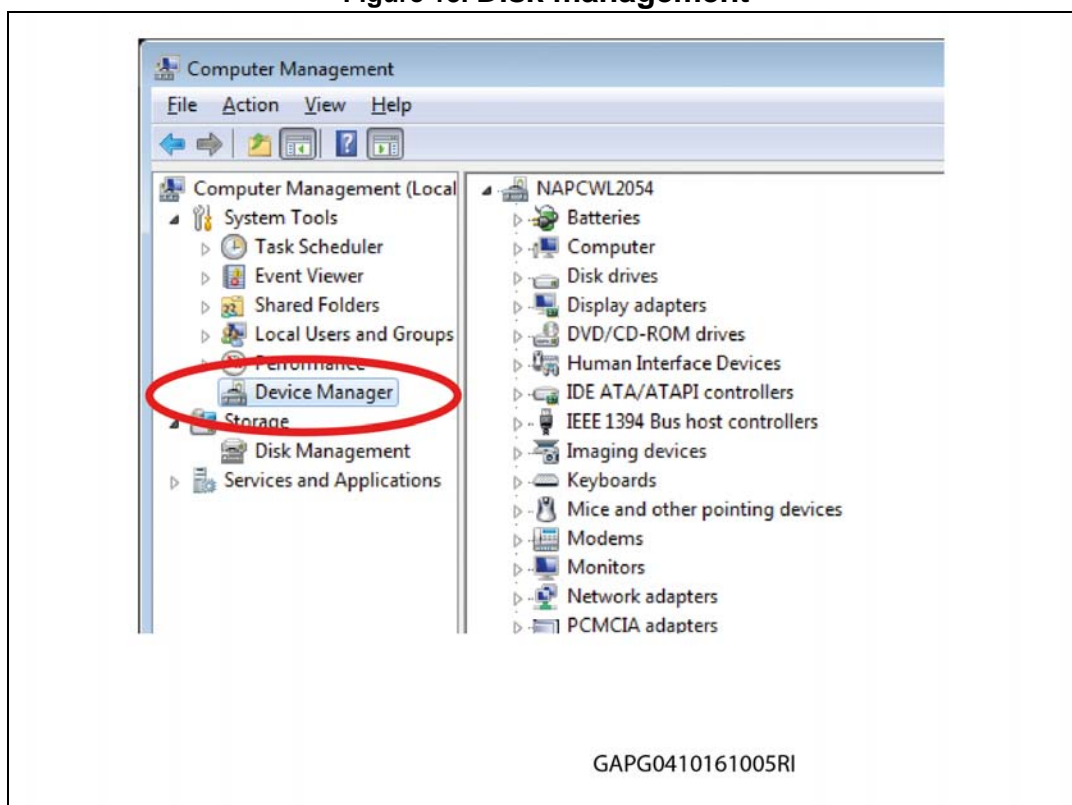
**Figure 11. SPC560P-DISP: USB port**



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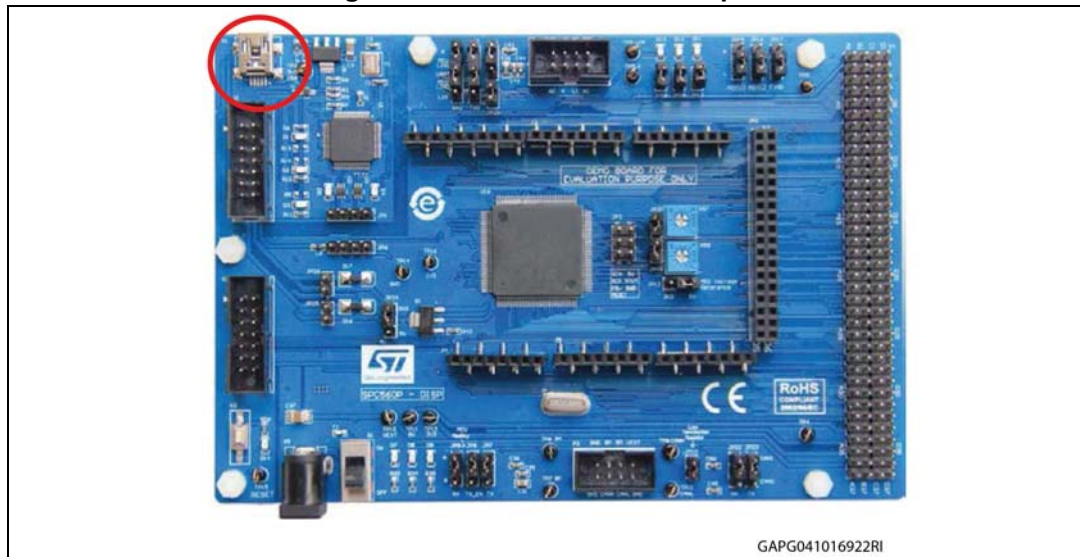
10. From "Start" Menu, right click on "Computer" item then select "Manage".

**Figure 12. Start menu, Computer, Manage**



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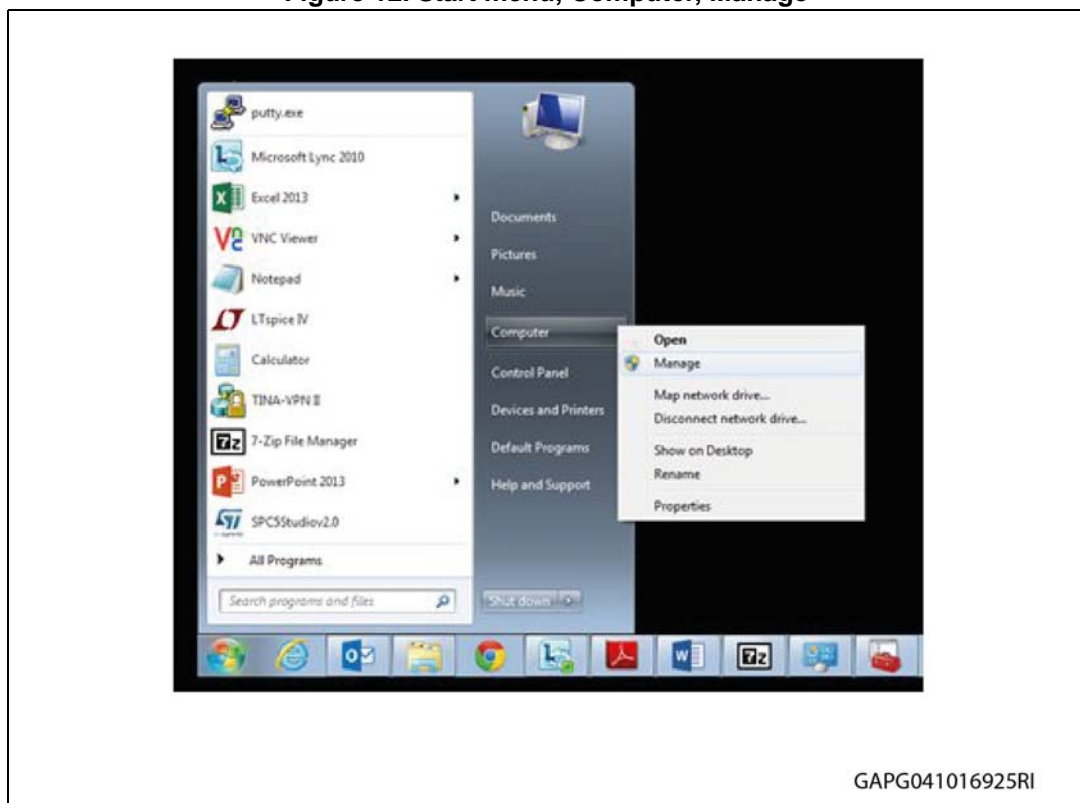
11. Once the Computer management popup appears, from the System Tools menu, select "Device Manager" from the System Tools menu

**Figure 13. Disk management**



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12. Expand the item Universal Serial Bus controllers; Identify "PLS USB JTAG Adapter for SPC5xxx A" and "PLS USB JTAG Adapter for SPC5xxx B" (see *Figure 14*)

**Figure 14. PLS USB JTAG Adapter- COM Ports**



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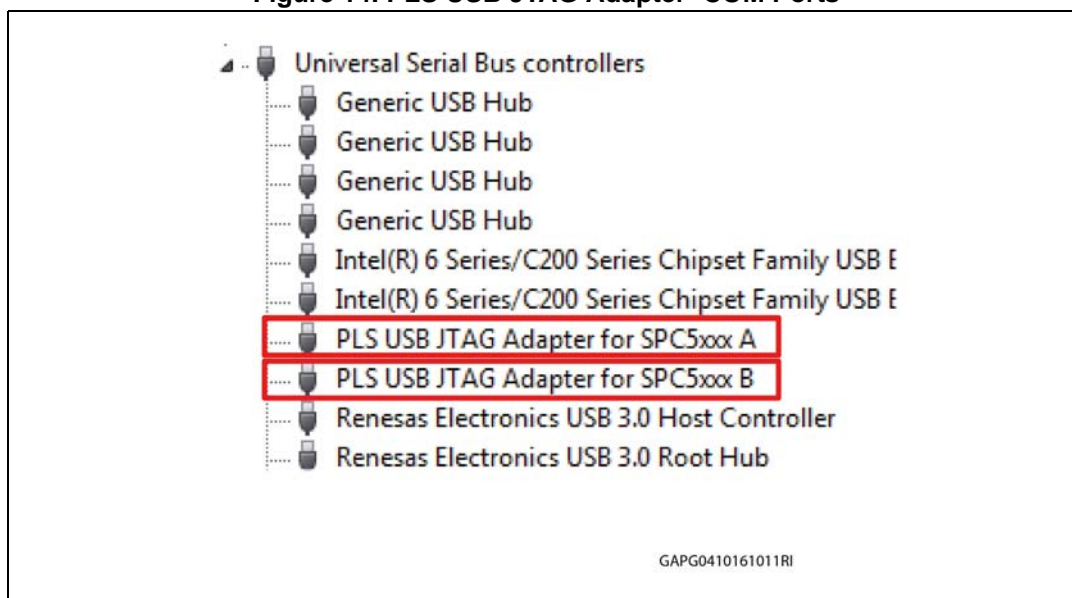
13. To enable the COM port, right click on "PLS USB JTAG Adapter for SPC5xxx B" then click "Properties" and select the "Advanced" tab. Flag the "LOAD VCP" (Virtual COM Port) box.

**Figure 15. PLS USB JTAG Adapter for SPC5xxx B – Load VCP box**
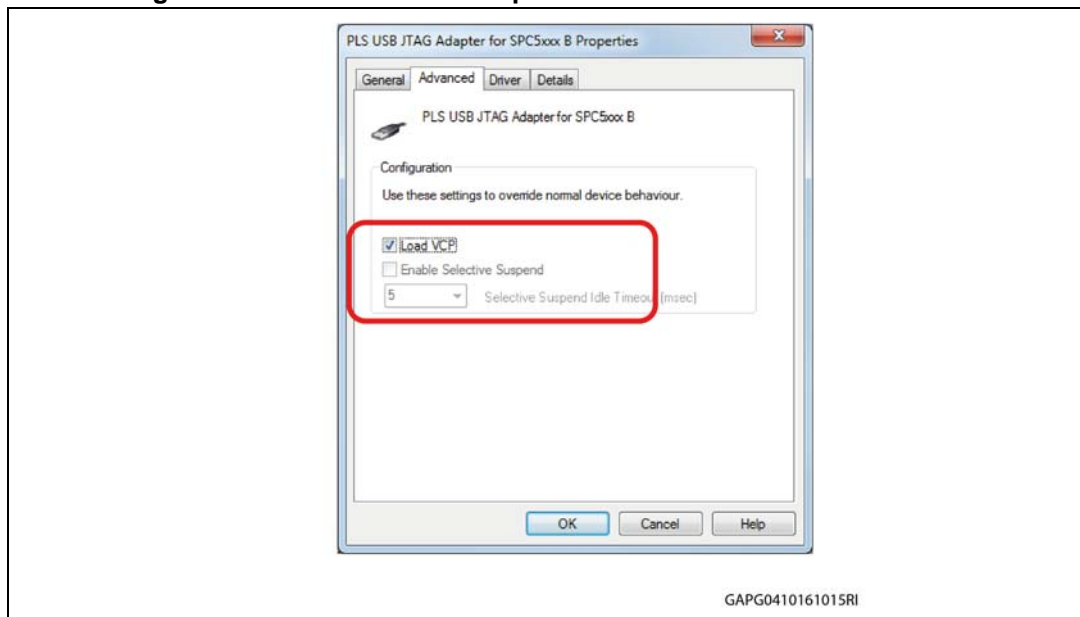


14. Disconnect the USB cable from the SPC56P-Discovery then reconnect. A new COM port appears, and Windows will install the new drivers automatically. From the Device Manager window check the new COM port available.

**Figure 16. PLS USB JTAG Adapter for SPC5xxx B – PLS USB Serial Port**
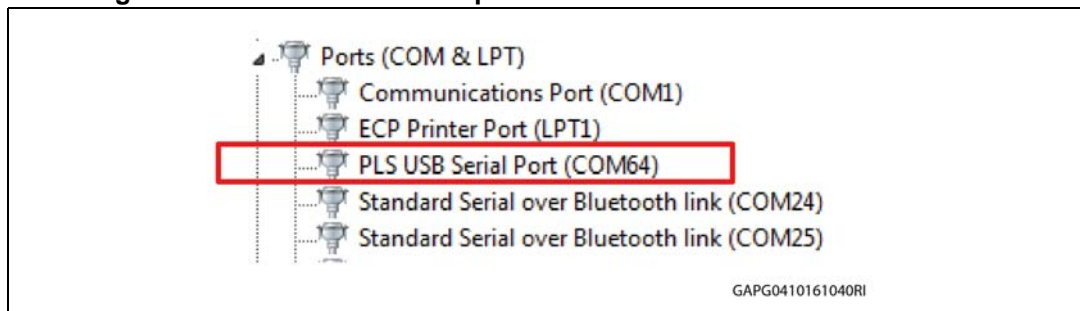


15. The COM port is configured and available to be used for serial communication with the PC.

# 6 Labview Driver: Installation Guide

The STSW-L9960, STSW-L9960T GUI can be used stand alone without a Labview license installing the free SW named "Runtime Engine for Labview" and "VISA Runtime". Latest revision can be downloaded from the National Instrument web site.

# 7    SPC560P-DISP: Load Firmware

To use the STSW-L9960, STSW-L9960T GUI a dedicated FW (file name: "GP-Pictus.elf") must be loaded on the microcontroller in the SPC560P-DISP board following the below procedure (the board is supplied by the USB cable thus the external PSU is not required):

1.    Run "UDE Visual Platform";

**Figure 17. UDE Visual Platform Icon**



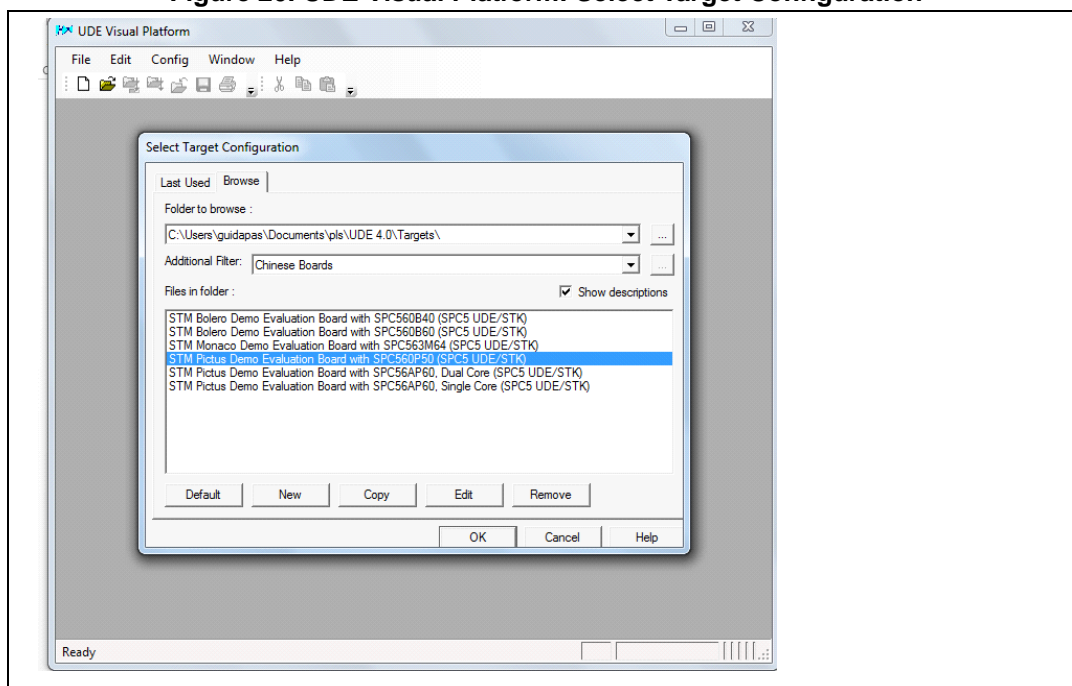2.    Create a New Workspace for SPC560P-DISP. Click File>New Workspace

**Figure 18. UDE Visual Platform: File and New Workspace**
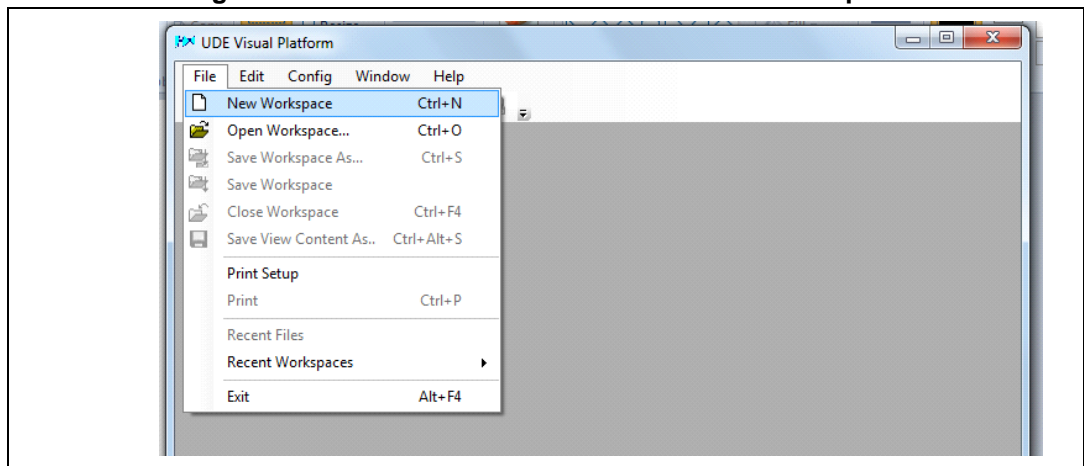


3.    Name the new Workspace i.e. Pictus then select OPEN

**Figure 19. UDE Visual Platform: Define File name**
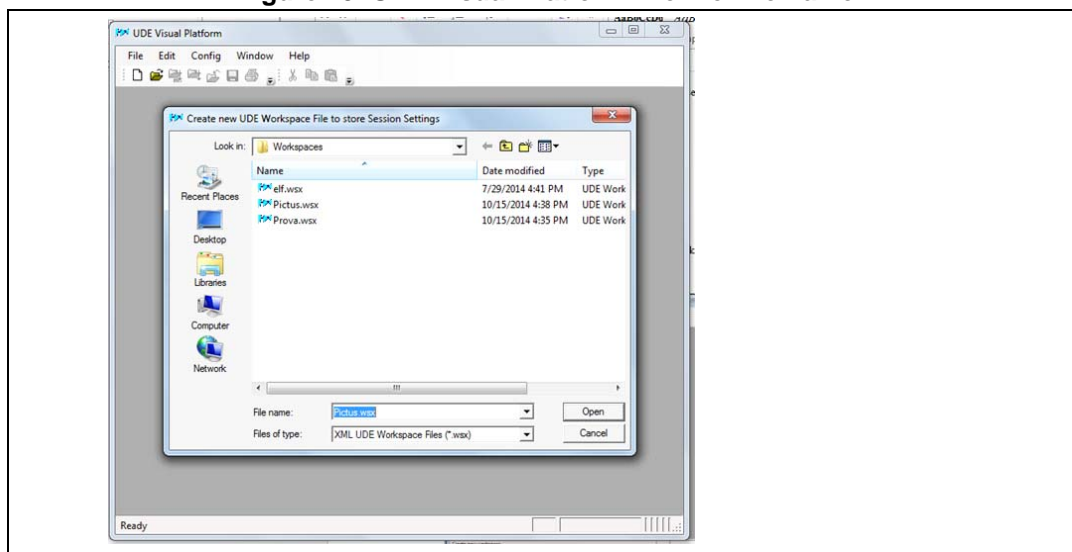


4. Select "S Pictus Evaluation Board with SPC560P50(SPC5 UDE/STK)" then click OK

**Figure 20. UDE Visual Platform: Select Target Configuration**



5. UDE Visual Platform window will be refreshed and new functionalities will appear, then click on the icon "Load Program" highlighted in the red circle; browse the file "GP-Pictus.elf "then click Open".

**Figure 21. UDE Visual Platform: Load Program**
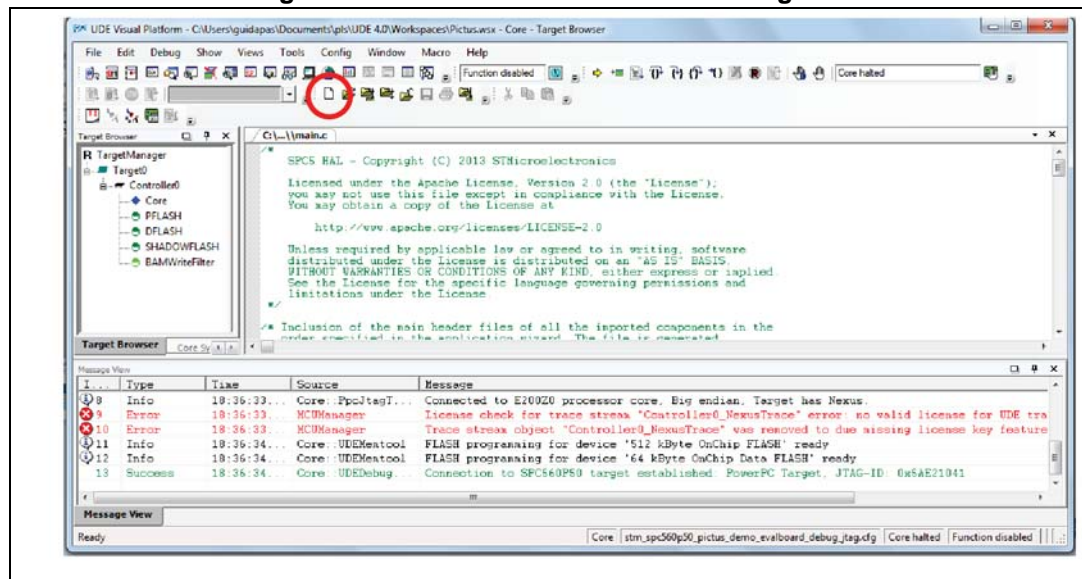


6.    Click on "Program All".

**Figure 22. UDE Visual Platform: Program All**
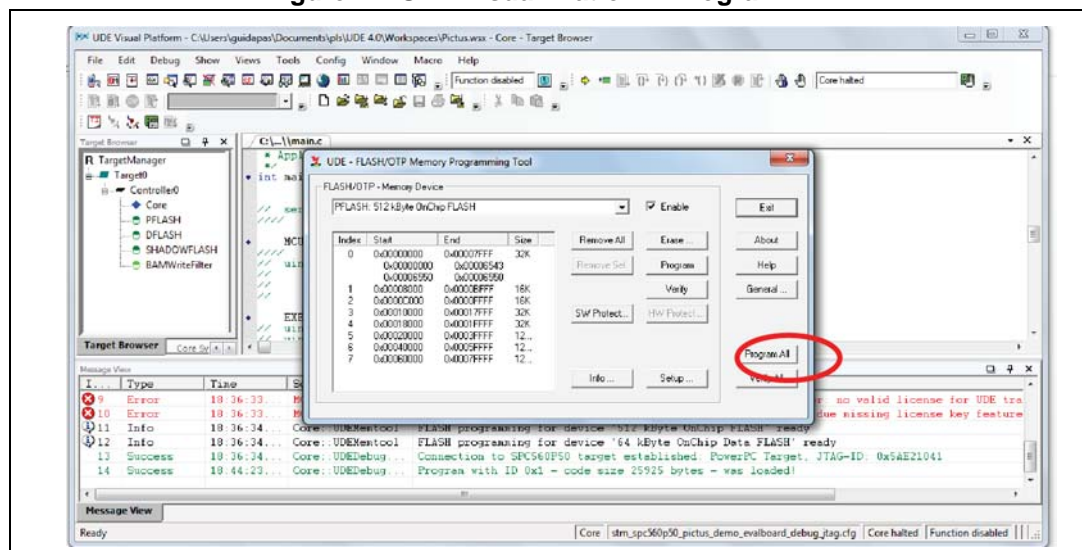
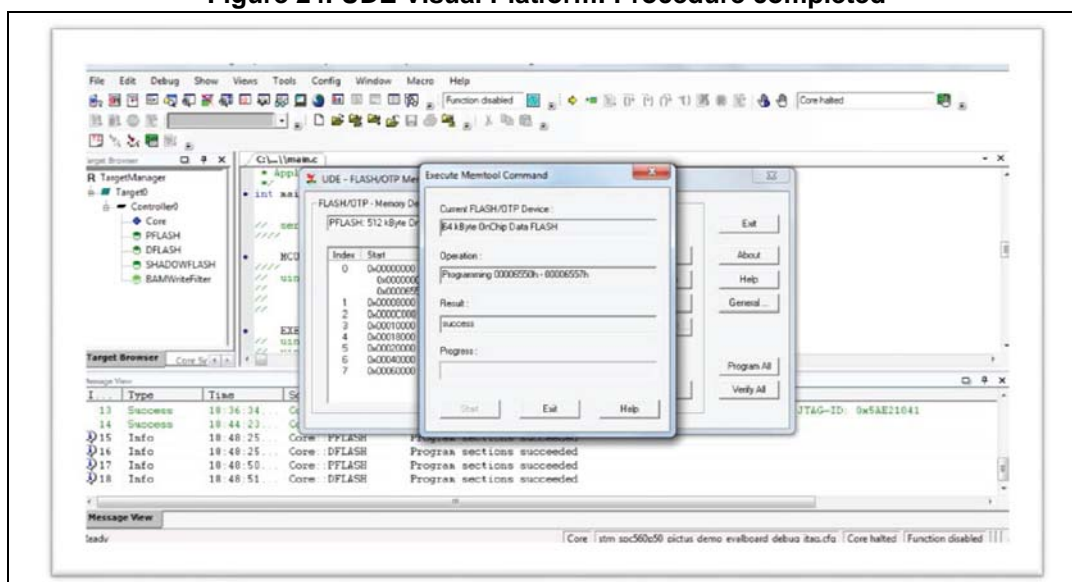**Figure 23. UDE Visual Platform: Execute Memtool Command - loading**
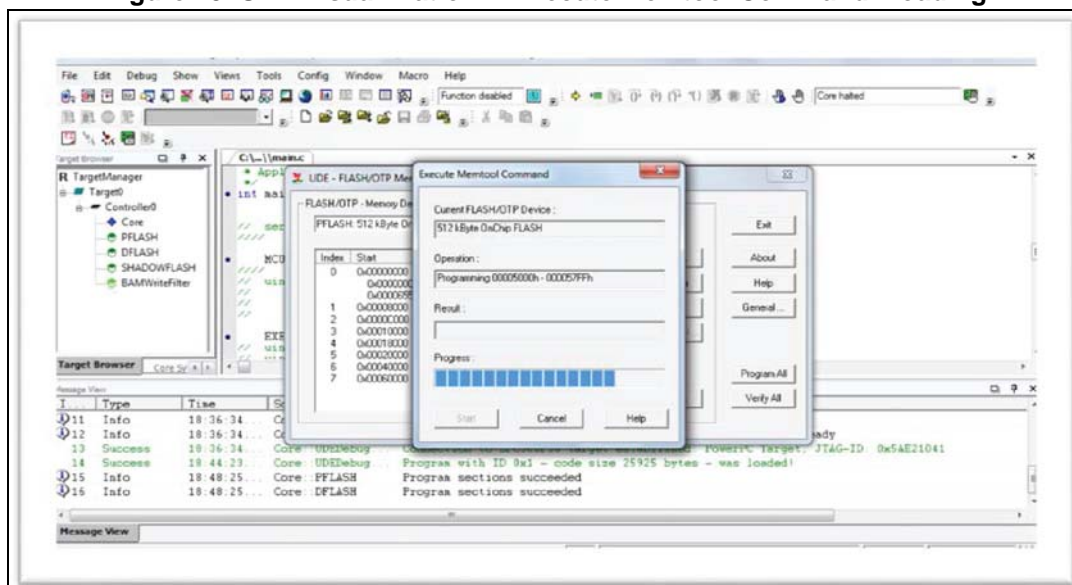


**Figure 24. UDE Visual Platform: Procedure completed**



7. When the procedure is completed click on "Exit" button. The microcontroller in the SPC560P-DISP board is programmed now and the board is ready to be used with the Graphical User Interface (GUI) STSW-L9960 and configure and control the evaluation board EVAL-L9960.

# 8 Revision history

**Table 1. Document revision history**

| Date | Revision | Changes |
|------|----------|---------|
| 01-Feb-2017 | 1 | Initial release. |
| 19-Jul-2017 | 2 | Add RPN STSW-L9960T. |

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**