ScioSense™

UFC
ST Nucleo Shields
Expansion Boards User Guide
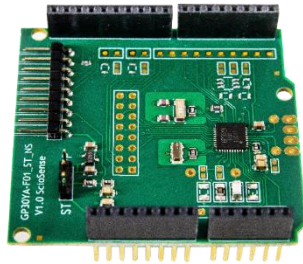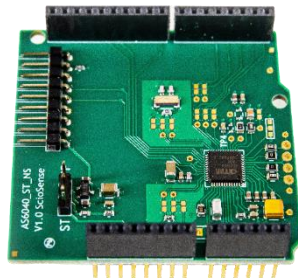
Content Guide

1   Introduction

ScioSense ultrasonic flow converters are well established in the market as leading solutions as frontends for time-of-flight ultrasonic flow meters. For those users that design their system based on a ST Microelectronics platform ScioSense offers a series of ST Nucleo shields. Those boards can easily be combined with both, the ST development kits and the ScioSense evaluation kits in combination with the UfcEvaluationSoftware package.

The boards have two rows of connectors following the ARDUINO® Uno V3 connectivity support or Arduino R3 Shield. They fit into the STM32 Nucleo-64 development board and the STM32 Nucleo-144 development board. In addition they have a connector to our PICOPROG interface. Actually, shields are available for TDC-GP30YA-F01 (with flow firmware), AS6031 and AS6040.

Figure 1: Available shields

| Product	Material number	Image
GP30YA-F01_ST_NS	220260014	
AS6031-QF_ST_NS	221020007	
AS6040-QF_ST_NS	220500002	

2 Hardware

2.1 Common Hardware Elements

All shields have some interfaces or connectors in common:

- Power selection. Via jumper the user can select whether the 5V supply comes from the ST motherboard or from the ScioSense PICOPROG interface.
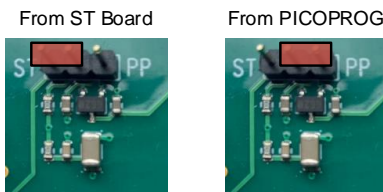
- 9-pin connector to PICOPROG with SPI interface, interrupt, level shifter feedback, power.
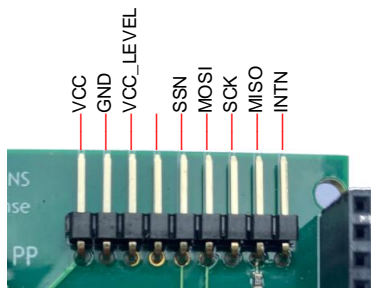
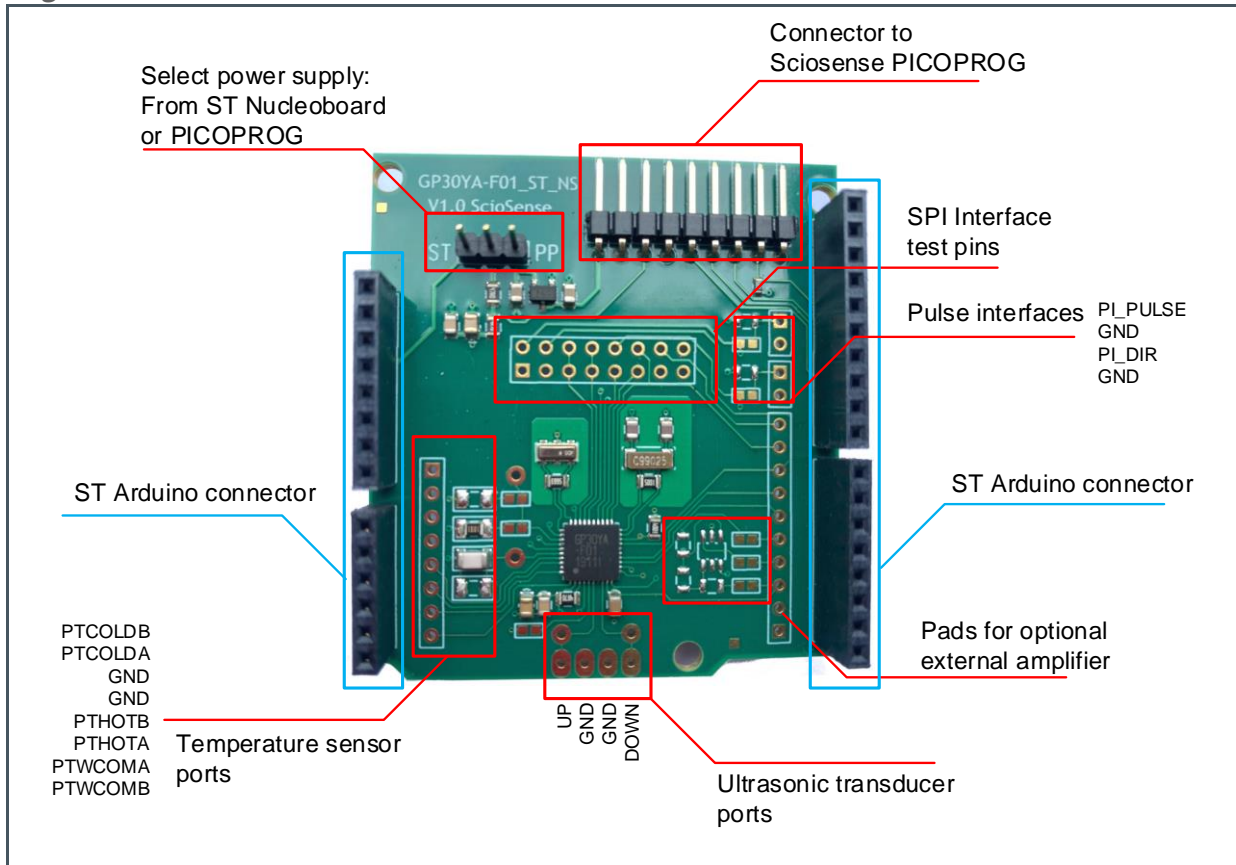## 2.2 GP30YA-F01 Shield

This shield is based on TDC-GP30YA-F01 which has a flow firmware on chip.

The following figure shows the main interfaces:

Figure 2: GP30YA-F01 Shield

2.2.1 GP30YA-F01 Layout

Figure 3: GP30YA-F01 Shield layout

Figure 3a: Example Temperature Ports with PT1000 2 Wire Configuration

Remark: When using only one PT1000, connect it to "HOT" input (TPI_M2_A)

2.2.2 GP30YA-F01 Schematics

The schematic of this boards is mainly a copy of the GP30-DEV reference board.

Figure 4: GP30YA-F01 Shield schematics
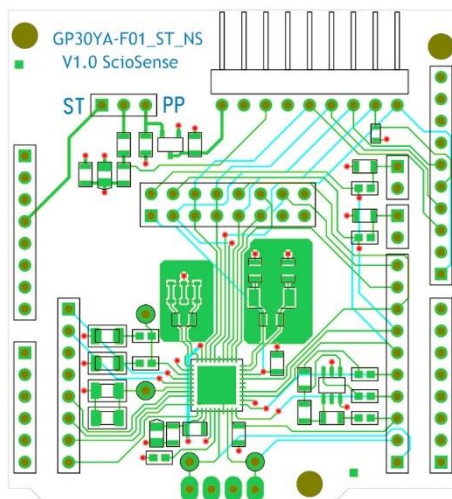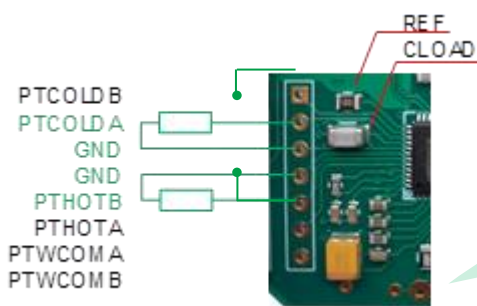
2.3 AS6031 Shield

This shield is based on AS6031-QF_DK_RB. The following figure shows the main interfaces:

Figure 5: AS6031 Shield

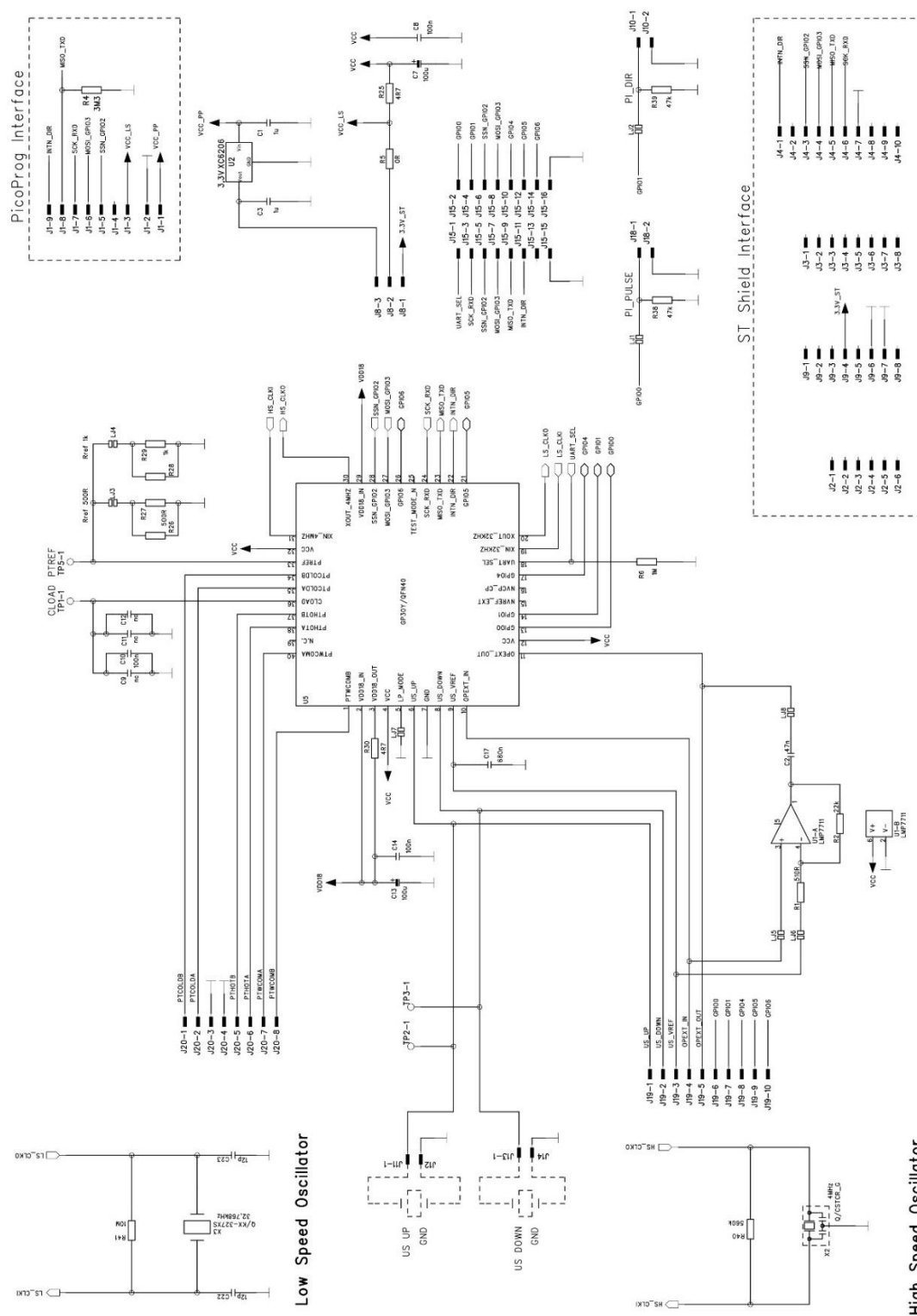### 2.3.1 AS6031 Layout

Figure 6: AS6031 Shield layout

Figure 6a: Example Temperature Ports with PT1000 2 Wire Configuration

Remark: When using only one PT1000, connect it to "HOT" input

(TPI_M2_A)

2.3.2 AS6031 Schematics

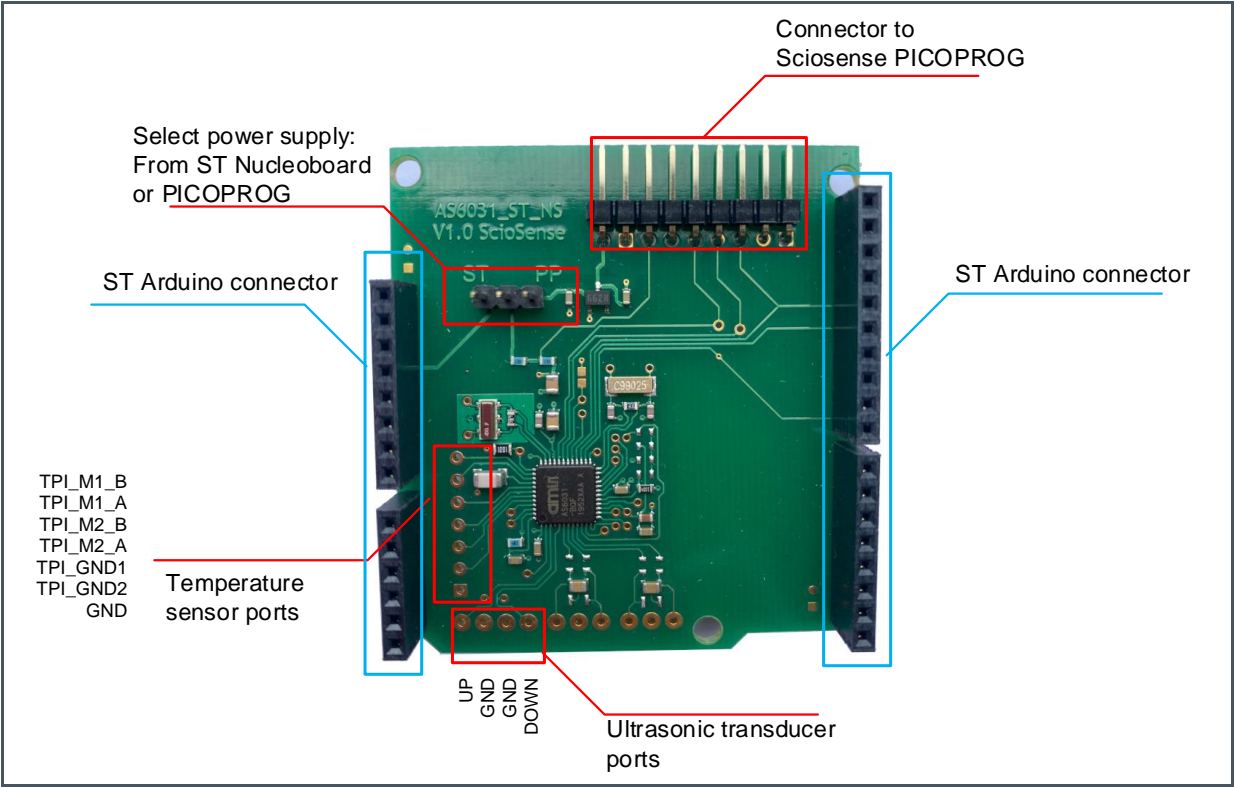**Figure 7: AS6031 Shield schematics**

2.4   AS6040 Shield

This shield is based on AS6040-QF_DK_RB.

The following figure shows the main interfaces:

Figure 8: AS6040 Shield

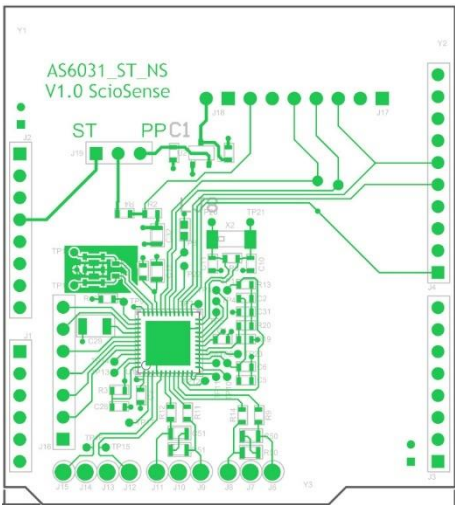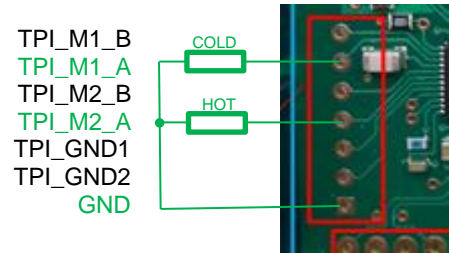### 2.4.1   AS6040 Layout

Figure 9: AS6040 Shield layout

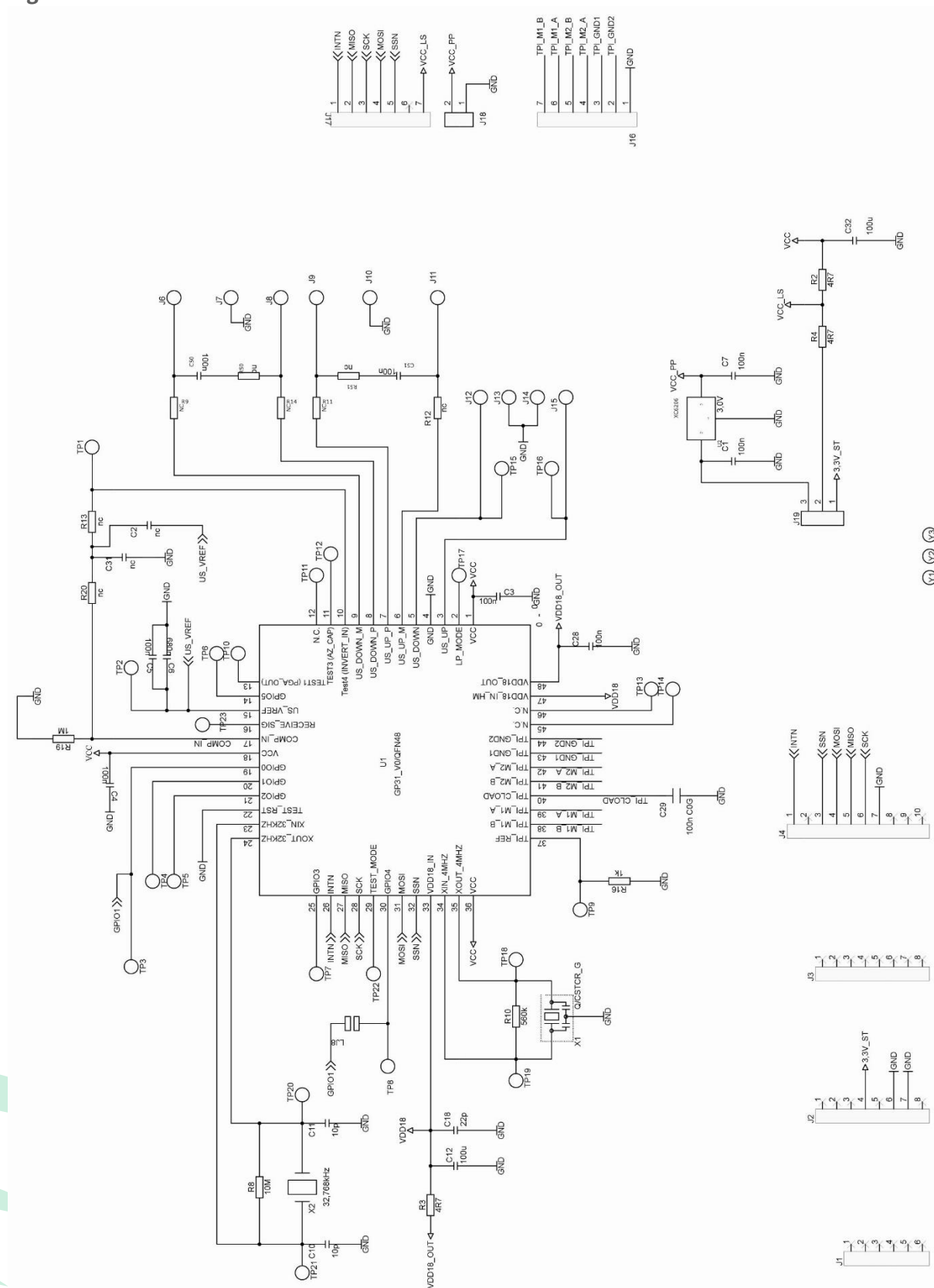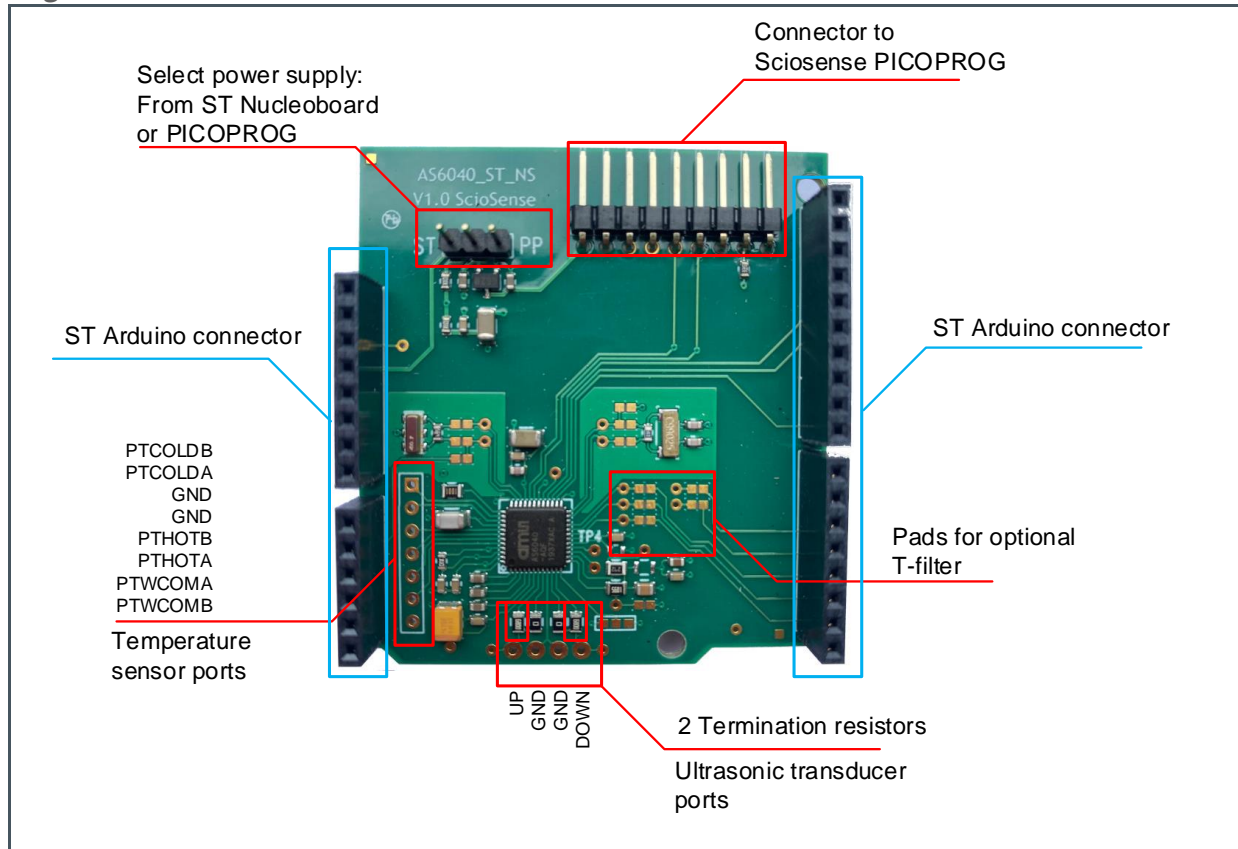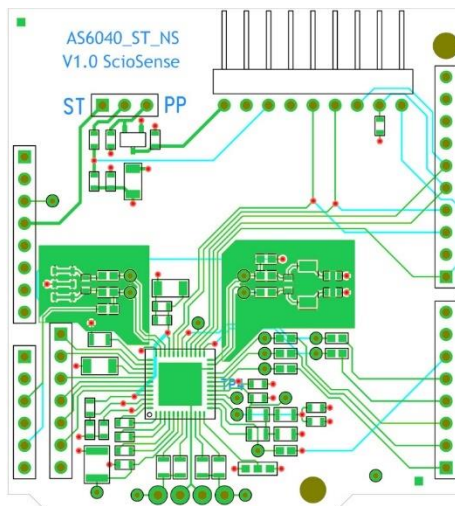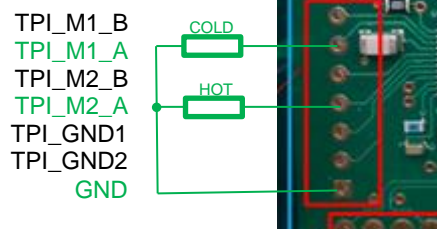**Figure 9a: Example Temperature Ports with PT1000 2 Wire Configuration**

Remark: When using only one PT1000, connect it to "HOT" input (TPI_M2_A)

2.4.2 AS6040 Schematics

Figure 10: AS6040 Shield layout
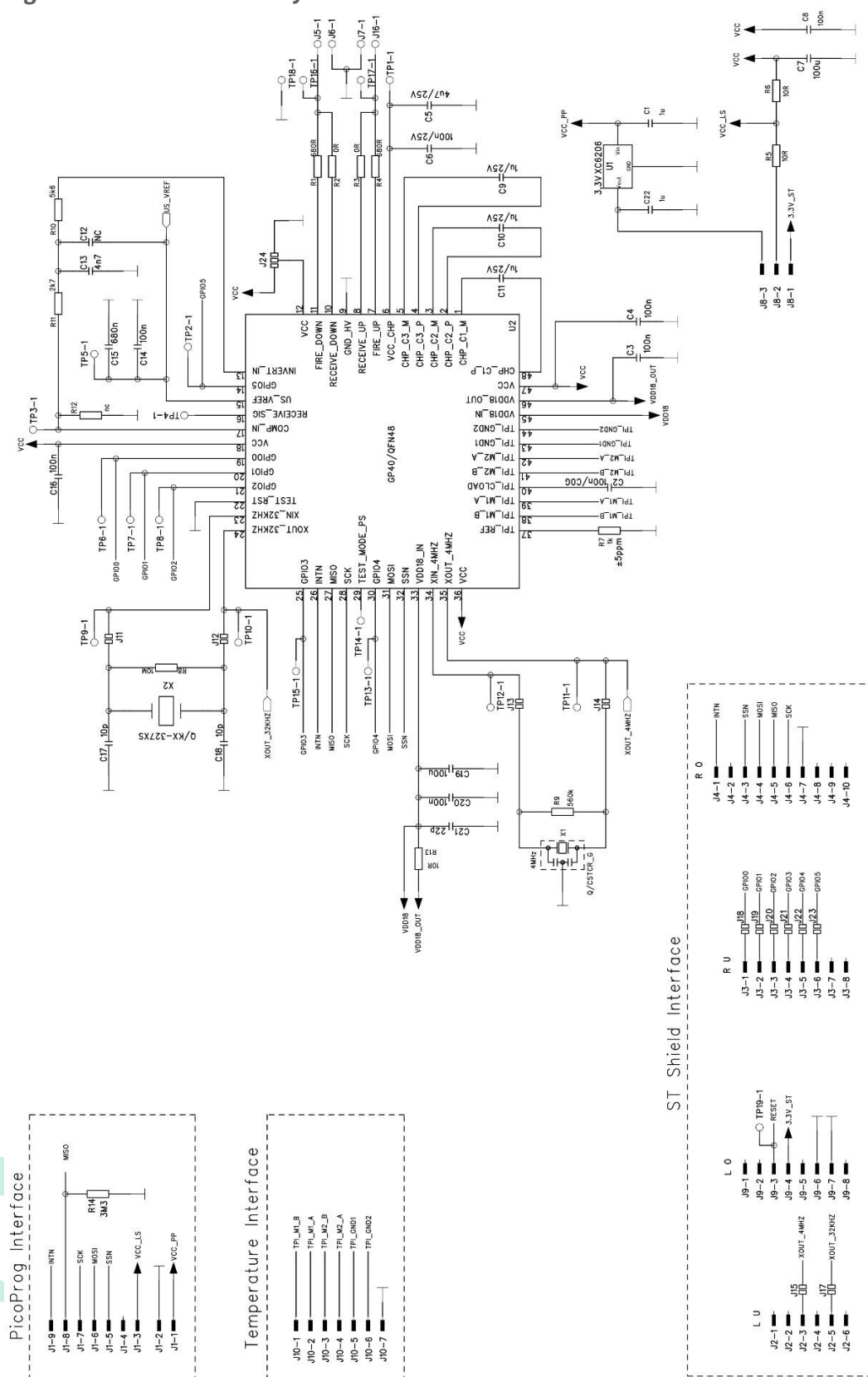
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3   Software

ScioSense provides a common sample software package for the three UFC chips.
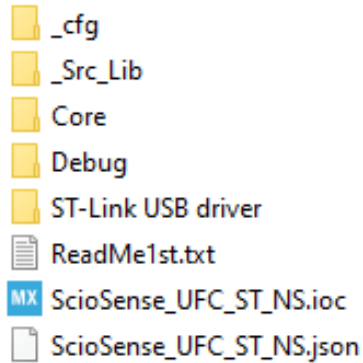
Package Details

_cfg\	Cconfigurations for the different shields, using ScioSense GUI
_Src_Lib\	Contains necessary, useful and additional functions, macros and declarations
Core\	Modified include and source Files
Debug\	.bin file for STM32CubeProgrammer .elf file is the output from the link step. Those executable files can have .elf, .out or .axf extension.
ST-Link USB driver\	ST-LINK, ST-LINK/V2, ST-LINK/V2-1, STLINK-V3 USB driver signed for Windows7, Windows8, Windows10
ReadMe1st.txt	Package details
ScioSense_UFC_ST_NS.ioc	STM32CubeMX project file
ScioSense_UFC_ST_NS.json	JSON (JavaScript Object Notation) is the dashboard flow for STM32CubeMonitor

The main program is found in the \Core\Src folder.

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5 Revision Information

Table 1: Revision History

Revision	Date	Comment	Page
1	July 2021	Initial Version	
2	Jan 2022	Temperature Ports description updated: Picture deleted in Sec 2.1 and Figure 3a, 6a, 9a added	4,5,7,9

Note(s) and/or Footnote(s):

1. Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.

2. Correction of typographical errors is not explicitly mentioned.

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