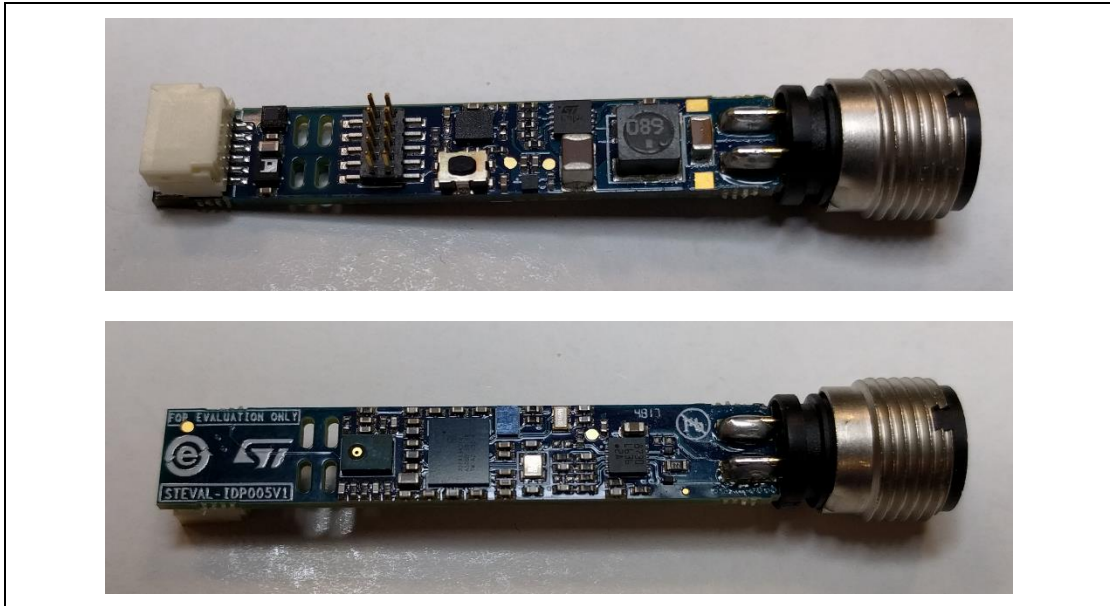


## Industrial Sensor board for Predictive Maintenance

Testing Procedure

**Figure 1: STEVAL-IDP005V1 views**

### Introduction

This document explains how to test and program the STEVAL-IDP005V1 (Industrial Sensor board for Predictive Maintenance).

The following parts will be tested:

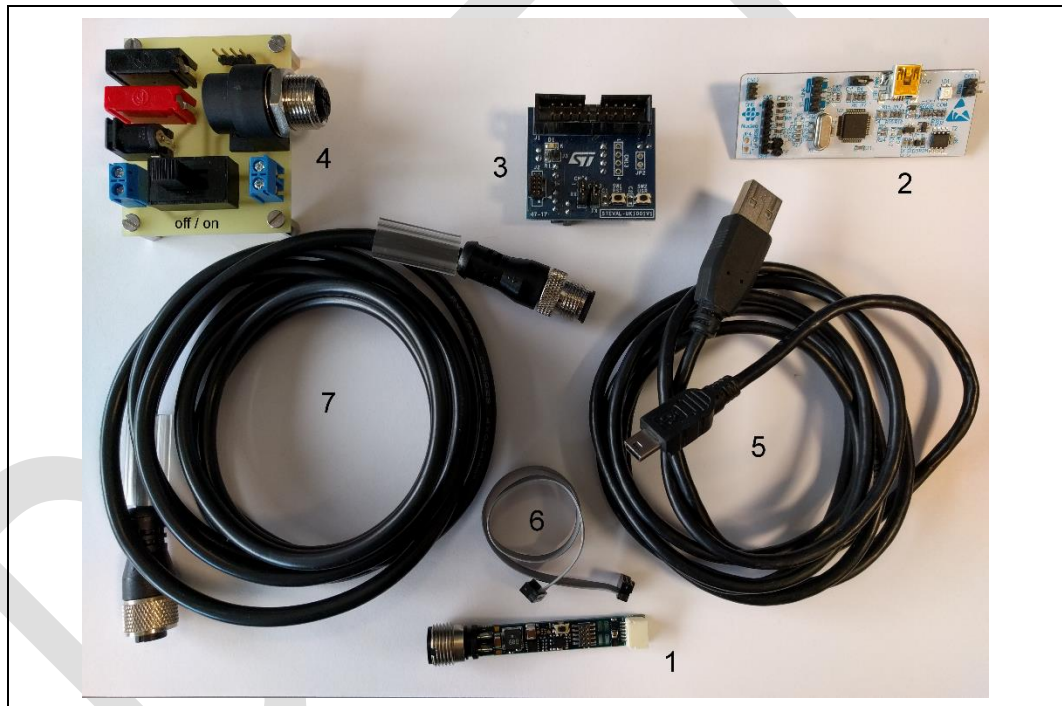
- IO-Link
- EEPROM
- Humidity and temperature sensor
- Pressure sensor
- Accelerometer
- Microphone

# 1 Requirement

## 1.1 Hardware

1. STEVAL-IDP005V1 (Board Under Test).
2. ST-LINK/V2-1 (programmer that is part of the STM32 Nucleo-64 board).
3. STEVAL-UKI001V1 (SWD adapter for STM32 Nucleo-64 board).
4. Power supply adapter for STEVAL-IDP005V1.
5. USB Type-A Male to Type-B mini cable.
6. 0.050" 10-pin flat IDC wire cable (e.g. samtec FFSD-05-D-XX.XX-01-N).
7. IO-Link cable, 4-position, Plug M12, A-coded, on Socket M12, A-coded (e.g. PHOENIX CONTACT 1696028).
8. MS Windows OS x64 based PC.
9. Power supply able to provide a voltage into the range  $[18\div 32]$ VDC.

Figure 2: Hardware Requirements



## 1.2 Software

1. STM32 ST-LINK utility (STSW-LINK004).
2. STM32 Virtual COM Port Driver (STSW-STM32102).
3. Serial port terminal application (PuTTY).
4. Audio player (Small Player).
5. Testing firmware (STEVAL\_IDP005V1\_TESTING.bin).
6. Release firmware (STEVAL\_IDP005V1\_RELEASE).
7. Tone audio file (1kHz.ogg).
8. A dedicated register key for PuTTY (STEVAL\_IDP005V1.reg).
9. A dedicated batch file for testing (STEVAL\_IDP005V1\_Testing.bat).

The required software is in the file 'STEVAL-IDP005V1 Testing Bundle.zip'.

Following the folder path list:

*Folder PATH listing for "STEVAL-IDP005V1 Testing Bundle"*

```
. \
+---Binary
|     STEVAL_IDP005V1_RELEASE.bin
|     STEVAL_IDP005V1_TESTING.bin
|
\---Testing Procedure
|     STEVAL_IDP005V1_Testing.bat
|
+---Docs
|     STEVAL-IDP005V1, Testing Procedure.pdf
|
+---Logging
\---Utilities
|     1kHz.ogg
|
+---PuTTY
|     PuTTY.exe
|     STEVAL_IDP005V1.reg
|
+---small-player-x64
|     bass.d11
|     bassflac.d11
|     basswma.d11
|     bass_ape.d11
|     splayer.exe
|
\---SWToBeInstalled
|     STM32 ST-LINK Utility v4.2.0 setup.exe
|     VCP_V1.4.0_Setup.exe
```

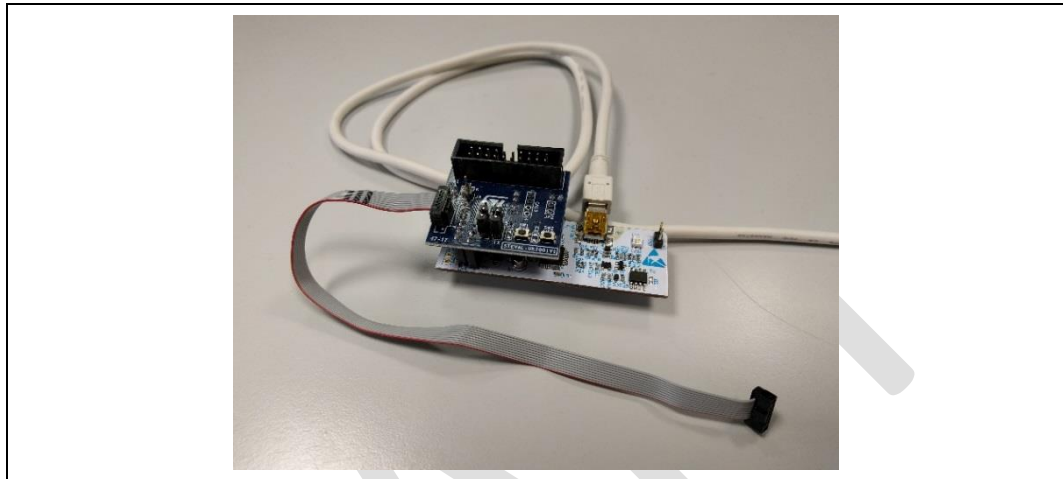
## 2 Procedure

### 2.1 Before begin

1. Take care the PC sound speakers work correctly and they are enabled with a right volume.

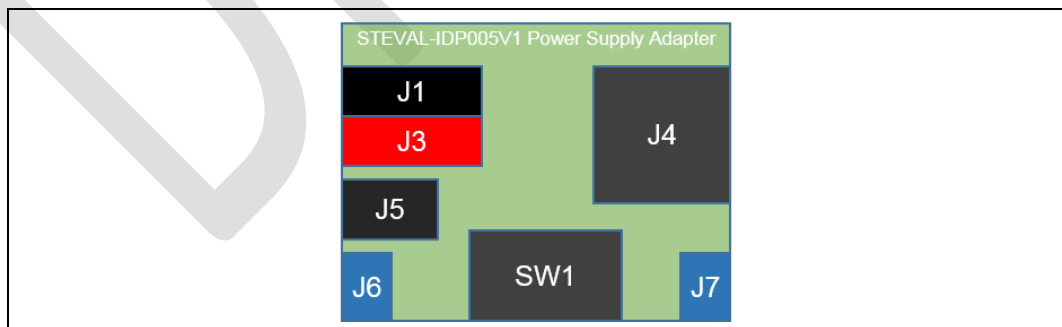
### 2.2 Connections

Figure 3: ST-LINK/V2-1 connection



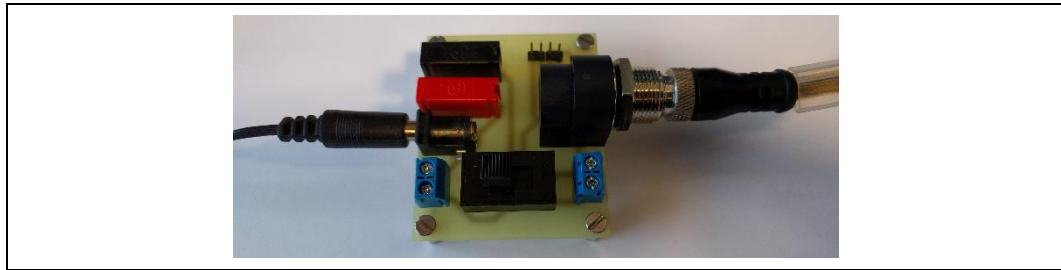
1. Plug the STEVAL-UKI001V1 on ST-LINK/V2-1 in a manner that the connectors with the same identification are overlapped.
2. Connect the ST-LINK/V2-1 to the PC through the USB Type-A Male to Type-B mini cable.
3. Respecting the polarity, connect an end of the 10-pin flat IDC wire cable to J2 of the STEVAL-UKI001V1.
4. On STEVAL-UKI001V1 shorts the CN14 pin 2-3 and the CN15.

Figure 4: Layout of the power supply adapter



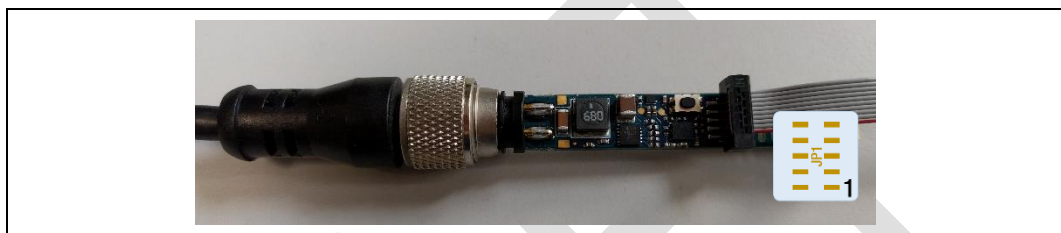
5. Connect the input side of the power supply adapter to power supply set at right voltage (choose among J1/J3, J5 and J6 of STEVAL-UKI001V1 PSA).
6. Connect the male side of the IO-Link cable to the output side of the power supply adapter (J4 of STEVAL-UKI001V1 PSA).
7. Take care the switch on the power supply adapter is open (SW1 of STEVAL-UKI001V1 PSA in 'off' position).

Figure 5: Power supply adapter connections



## 2.3 Testing

Figure 6: IO-Link and SWD connection



1. Extract the 'STEVAL-IDP005V1 Testing Bundle.zip' into a folder into the PC used for this test.
2. Respecting the polarity, connect the free end of the 10-pin flat IDC wire cable to J1 (SWD connector) of the STEVAL-IDP005V1 (see Figure 6).
3. Connect the female side of the IO-Link cable to JP1 (IO-Link connector) of the STEVAL-IDP005V1 (see Figure 6).
4. Place the board under test near the PC speakers so that its microphone can be able to grab the sound used for testing (please take care that there isn't no environmental noise).
5. Close the switch on the power supply adapter (SW1 of STEVAL-UKI001V1 PSA in 'on' position) to power on the board under test.
6. Launch the batch file for testing, double click on '`.\Testing Procedure\STEVAL_IDP005V1_Testing.bat`' (see Figure 7).
  - The procedure will check/install:
    - ST-Link Utility.
    - ST-Link Virtual COM.
  - The procedure will check the presence of
    - The necessary files.
    - One only ST-Link probe attached.
  - Now it will prompt to choose for testing, press 'T'.
  - The terminal emulator will be open for data logging.
  - At the end of the test the result will be shown.
  - The board under test will be loaded with the release firmware, if passed, or erased, if not passed.
  - The log file will be stored inside 'Logging' folder.
7. Open the switch on the power supply adapter (SW1 of STEVAL-UKI001V1 PSA in 'off' position) to power off the board under test.

8. Disconnect the end of the 10-pin flat IDC wire cable from J1 (SWD connector) of the STEVAL-IDP005V1.

Now:

- i Test another board.
  - a) Get another STEVAL-IDP005V1 (BUT).
  - b) Power on the board under test (SW1 of STEVAL-UKI001V1 PSA in 'on' position).
  - c) Press 'T' to perform another test.
- ii No board has to be tested.
  - a) Press 'Q' to quit.

Figure 7: STEVAL\_IDP005V1\_Testing.bat execution

```
*** STEVAL_IDP005V1 Testing ***
2018-02-08 14:31:47
Wait...
STMicroelectronics STLink Utility is not installed yet.
STMicroelectronics STLink Utility is already installed.
STMicroelectronics STLink Virtual COM Port driver is already installed.
Testing firmware found.
Release firmware found.
PuTTY register key found.
STLink probe has been found.
STLink probe uses the port COM4
PuTTY session has not been found
Add PuTTY session key to the system register
PuTTY session key has been added to the system register
PuTTY session has been found
PuTTY session uses the port COM4
PuTTY session stores the data in STEVAL_IDP005V1.log
The ports are equal
The logs are equal
Get info about the ST-LINK probe connected to the computer ...

STM32 ST-LINK CLI v3.2.0.0
STM32 ST-LINK Command Line Interface

--- Available ST-LINK Probes List ---

ST-LINK Probe 0:
  SN: 066EFF525750877267062935
  FW: V2J29M18

-----
```

```

[E]rase, [T]esting or [Q]uit? T

Your choice is Testing

Program the chip with the testing firmware ...

STM32 ST-LINK CLI v3.2.0.0
STM32 ST-LINK Command Line Interface

ST-LINK SN : 066EFF525750877267062935
ST-LINK Firmware version : V2J29M18
Connected via SWD.
SWD Frequency = 4000K.
Target voltage = 0.0 V.
Connection mode : Normal.
Device ID:0x434
Device flash Size : 2048 Kbytes
Device family :STM32F469x/F479x

Loading file...
Flash Programming:
  File : ..\Binary\STEVAL_IDP005V1_TESTING.bin
  Address : 0x08000000
Memory programming...
北北北北北北北北北北北北北北北北北北北北北北 0%
  0% ██████████ 100%
Reading and verifying device memory...
北北北北北北北北北北北北北北北北北北北北北北 0%
  0% ██████████ 100%
Memory programmed in 13s and 385ms.
Verification...OK
Programming Complete.

System reset ...

STM32 ST-LINK CLI v3.2.0.0
STM32 ST-LINK Command Line Interface

ST-LINK SN : 066EFF525750877267062935
ST-LINK Firmware version : V2J29M18
Connected via SWD.
SWD Frequency = 4000K.
Target voltage = 0.0 V.
Connection mode : Normal.
Device ID:0x434
Device flash Size : 2048 Kbytes
Device family :STM32F469x/F479x
MCU Reset.

Open the terminal emulator (PuTTY) ...

Close the terminal emulator (PuTTY) ...

SUCCESS: The process "PuTTY.exe" with PID 8492 has been terminated.

┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐
|  _  | |  _  | |  _  | |  _  | |  _  |
|_  _| |_  _| |_  _| |_  _| |_  _|
└───┘ └───┘ └───┘ └───┘ └───┘

Program the chip with the release firmware ...

```

```

STM32 ST-LINK CLI v3.2.0.0
STM32 ST-LINK Command Line Interface

ST-LINK SN : 066EFF525750877267062935
ST-LINK Firmware version : V2J29M18
Connected via SWD.
SWD Frequency = 4000K.
Target voltage = 0.0 V.
Connection mode : Normal.
Device ID:0x434
Device flash Size : 2048 Kbytes
Device family :STM32F469x/F479x

Loading file...
Flash Programming:
  File : ..\Binary\STEVAL_IDP005V1_RELEASE.bin
  Address : 0x08000000
Memory programming...
北北北北北北北北北北北北北北北北北北北北北北 0%
  0%北北北北北北北北北北北北北北北北北北北北北北 100%
Reading and verifying device memory...
北北北北北北北北北北北北北北北北北北北北北北 0%
  0%北北北北北北北北北北北北北北北北北北北北北北 100%
Memory programmed in 9s and 17ms.
Verification...OK
Programming Complete.

Rename the created log file ...

1 file(s) copied.

```

Figure 8: STEVAL\_IDP005V1 testing log file

```

===== PuTTY log 2018.02.08 14:33:23 =====

STEVAL-IDP005V1 (Testing)
COPYRIGHT(c) 2018 STMicroelectronics

MCU ID: 0x003800383035511939383238

IO-Link Test ...
--- PASSED ---

M95M01-DF (EEPROM) Test ...

  Initialization Passed
  Write-protected Passed
  Write all pages Passed
  --- PASSED ---

HTS221 (humidity and temperature sensor) Self-Test ...

  Initialization Passed

```

```
Data Available Bits Passed
Data Ready Pin Passed
Self-Test Passed
--- PASSED ---

LPS22HB (pressure sensor) Self-Test ...
  Initialization Passed
  Data Available Bits Passed
  Data Ready Pin Passed
  Self-Test_#1 Passed
  Self-Test_#3 Passed
  --- PASSED ---

ISM330DLC (accelerometer) Self-Test ...
  Initialization Passed
  Data Available Bits Passed
  Data Ready Pin Passed
  Positive sign self-test Passed
  Negative sign self-test Passed
  --- PASSED ---

MP34DT05 (microphone) Test ...
  Initialization Passed
  --- PASSED ---

*** PASSED ***
```

### 3 Revision history

Table 1: Document revision history

Date	Version	Changes
12-Feb-2018	1.0	Initial release.

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