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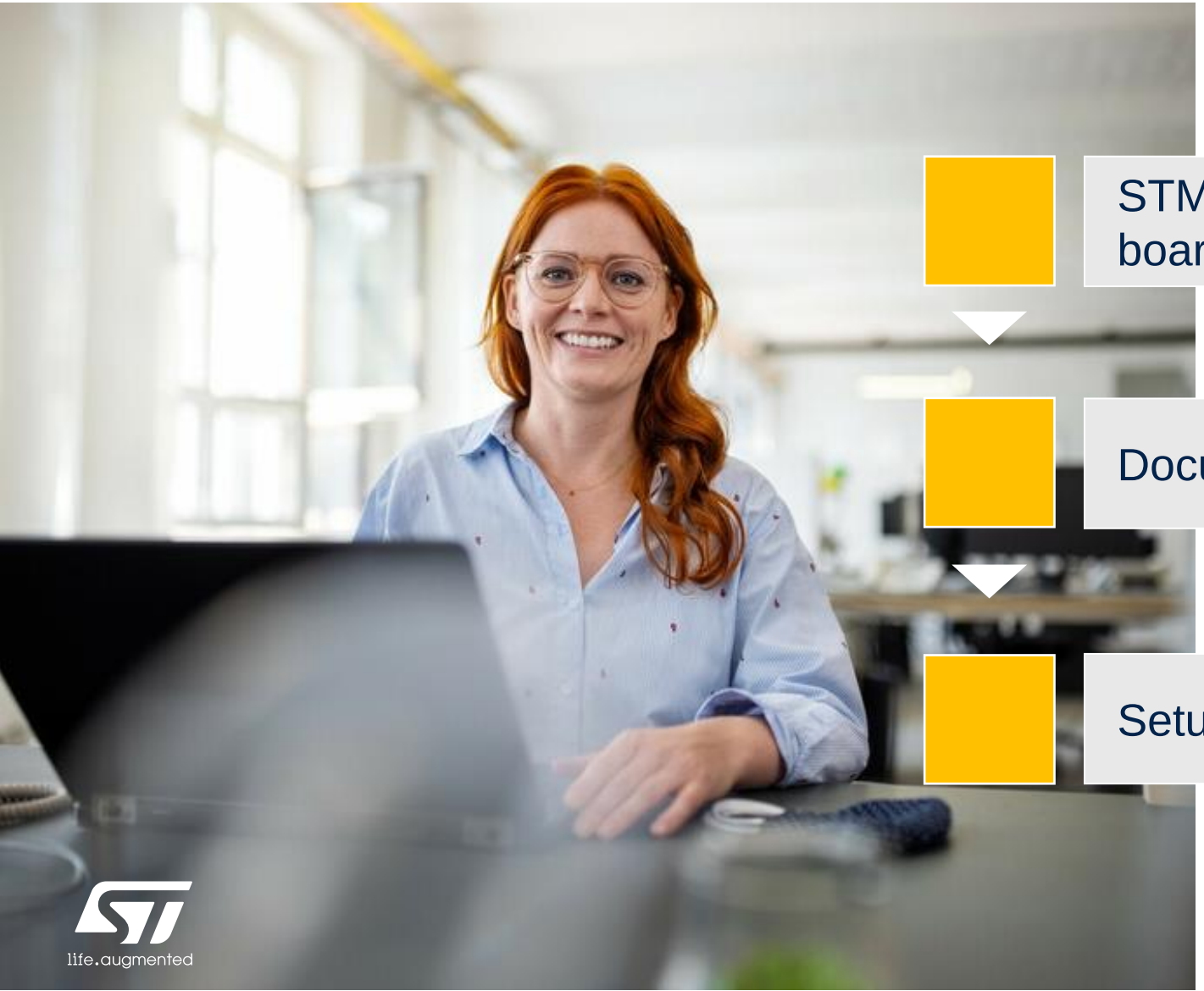
Quick Start Guide

Gas sensing expansion board for electrochemical sensors (P-NUCLEO-IKA02A1)

June 2023

Index



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STM32 Nucleo multifunctional expansion board for gas sensors

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Electrochemical gas sensor expansion board
Hardware overview

P-NUCLEO-IKA02A1 hardware description

- The P-NUCLEO-IKA02A1 is an electrochemical gas sensor evaluation board.
- It embeds several footprints to host different types of sensors and different target gas.
- The connectivity is ensured thanks to Arduino® UNO R3 connector and ST morpho connector layout.

Key products on board

TSU111

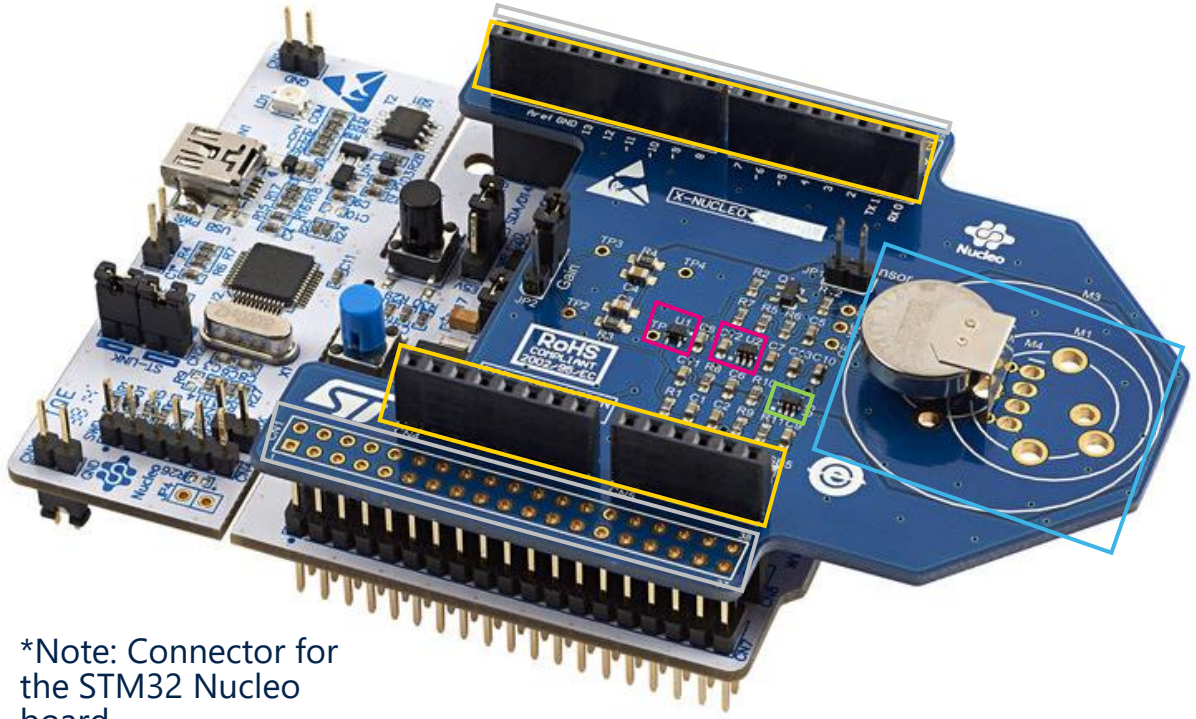
Nanopower (900 nA), high accuracy (150 uV) 5 V operational amplifier

STLM20

Ultra-low current 2.4 V precision analog temperature sensor

Gas sensor

Four different footprints for various electrochemical gas sensors (PCD 13,5 mm, PCD 17 mm, miniature, TGS5141).



*Note: Connector for the STM32 Nucleo board

Gas sensor footprints

STLM20

TSU111

ST morpho connector**

Arduino UNO R3 connector

P-NUCLEO-IKA02A1

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Electrochemical gas sensor expansion board
Software overview

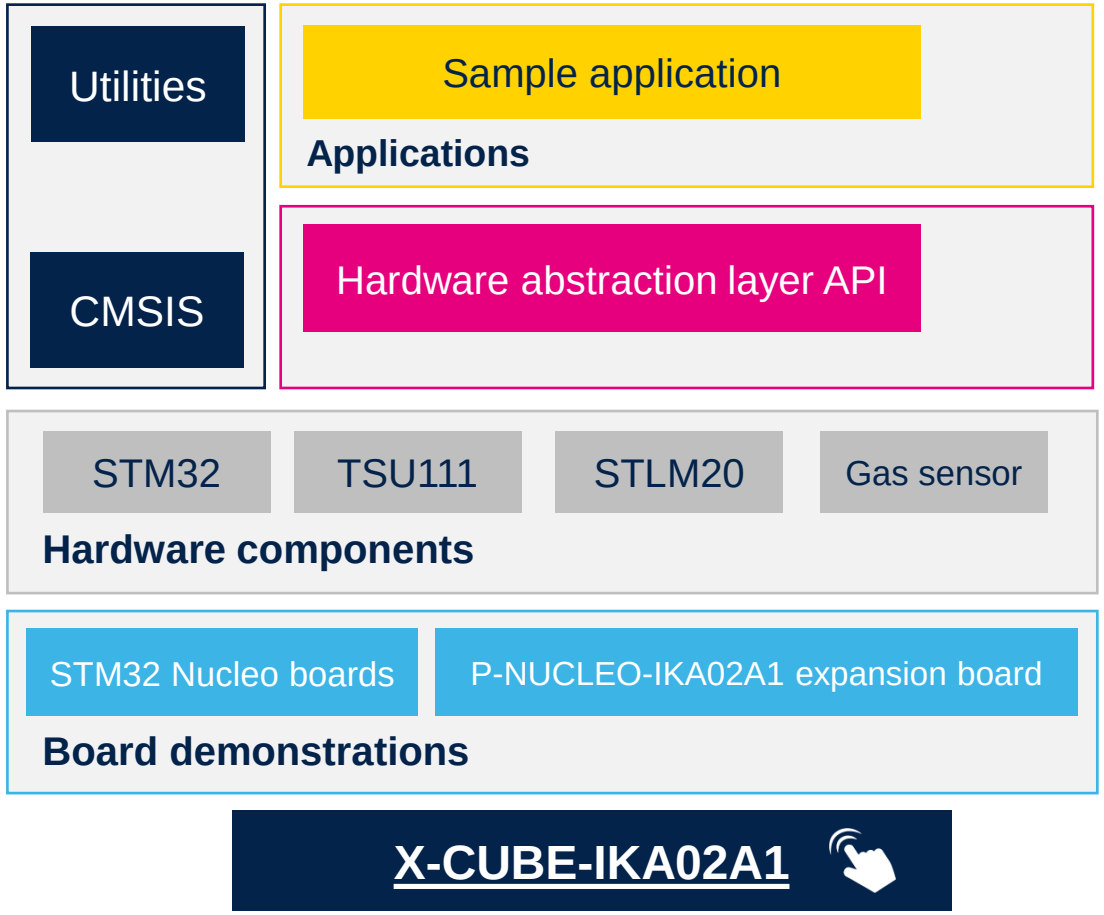
X-CUBE-IKA02A1 software description

- The X-CUBE-IKA02A1 software package is an expansion for STM32Cube, associated with the P-NUCLEO-IKA02A1 expansion board.
- It is compatible with NUCLEO-F401RE, NUCLEO-L053R8.

Key features

- Complete middleware to build applications using electrochemical gas sensors with signal conditioning done by TSU111.
- Library uses STLM20 temperature sensor for compensation over temperature range.
- Easy portability across different MCU families, thanks to STM32Cube.
- Low-power optimization (suitable for the STM32L0 MCU family).
- Free, user-friendly license terms.

Overall software architecture



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Documents & related resources

Documents & related resources

All documents are available in the design resources tab of the multifunctional expansion board webpage.

P-NUCLEO-IKA02A1

- Product specifications
- User manual

X-CUBE-IKA02A1

- User manual
- Software setup file

Design resources

Technical documentation

Product specifications

DB2668: Multifunctional expansion board based on operational amplifiers for STM32 Nucleo.

User manual

UM1955: Getting started with the multifunctional expansion board based on operational amplifiers for STM32 Nucleo.

User manual

UM2230: Getting started with the X-CUBE-IKA02A1 multifunctional software expansion for STM32Cube

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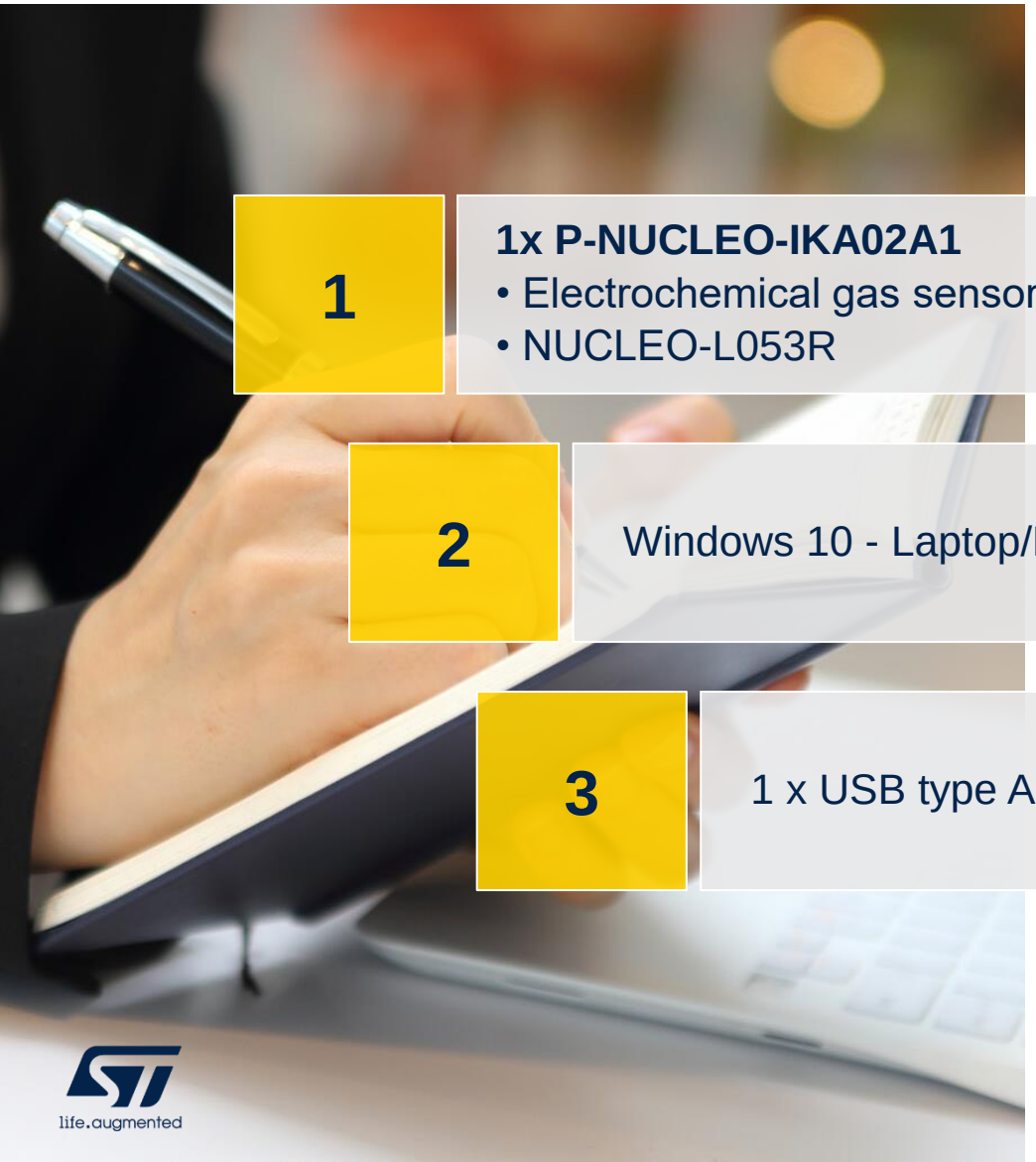
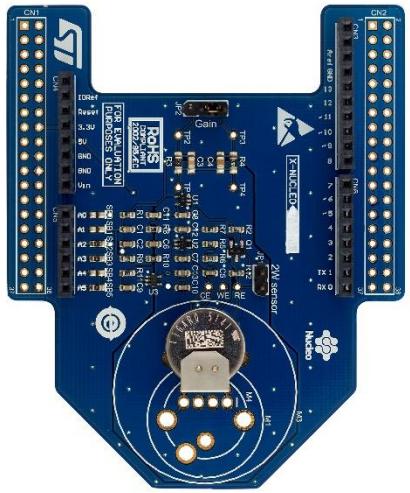
Setup & demo examples

Setup & demo examples
Hardware prerequisites

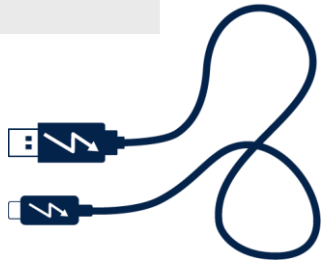


1	**1x P-NUCLEO-IKA02A1** • Electrochemical gas sensor expansion board • NUCLEO-L053R
2	Windows 10 - Laptop/PC
3	1 x USB type A to mini-B USB cable



P-NUCLEO-IKA02A1

NUCLEO-F401RE
NUCLEO-L053R8
NUCLEO-L476RG



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Setup & demo examples

Software prerequisites

STSW-LINK009: ST-LINK/V2-1 USB driver

X-CUBE-IKA02A1

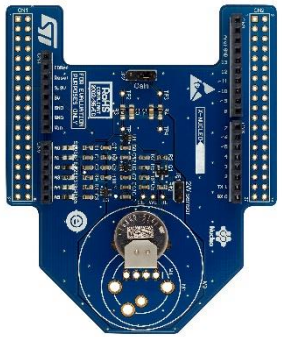
- Copy the .zip file content into a folder on your PC.
- The package contains source code examples (Keil®, IAR, system workbench) based on NUCLEO-F401RE, NUCLEO-L053R8 or NUCLEO-L4.

X-CUBE-IKA02A1

Start coding in just a few minutes

1 www.st.com/x-nucleo

2 Select **P-NUCLEO-IKA02A1**



3

Download & unpack
X-CUBE-IKA02A1

STM32 CubeIDE

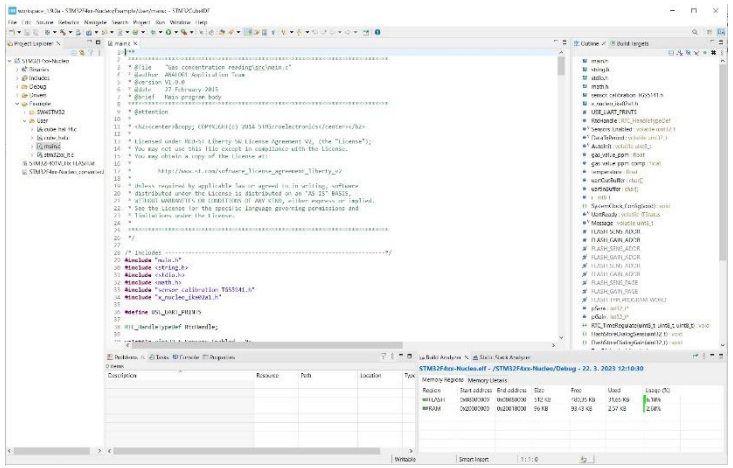
X-CUBE-IKA02A1 package structure

Drivers — Núcleo drivers

Drivers — L0 / L4 / F4 src codes

4

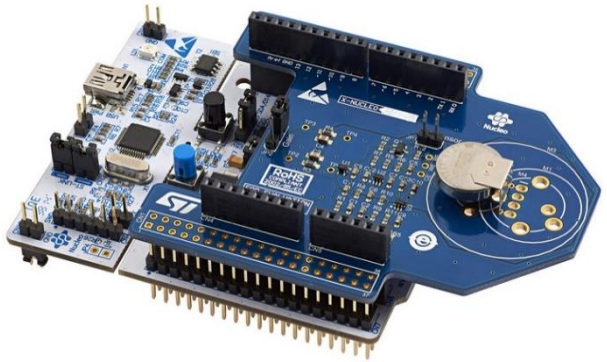
.\X-CUBE-IKA02A1_V1.0.0\Projects\Multi\Examples\Gas concentration reading



KEIL™ Tools by ARM

IAR SYSTEMS

Flash and run the project.



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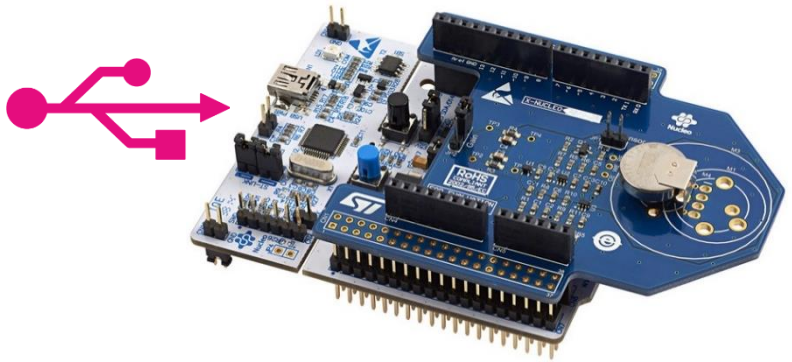
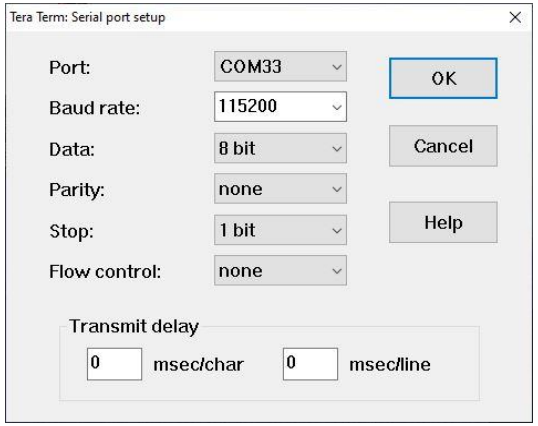
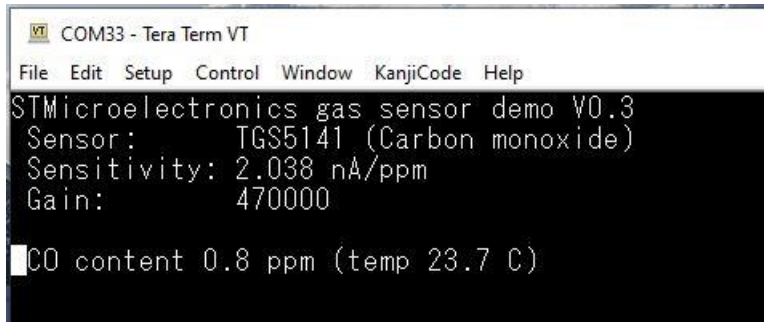
X-CUBE-IKA02A1 quick example (1/2)
Using serial line monitor – e.g.TeraTerm

Gas concentration reading example
X-CUBE-IKA02A1 for NUCLEO-F401RE, NUCLEO-L053R8 or NUCLEO-L476RG

- Configure the serial line monitor (speed, LF)
- Press the BLACK user button on STM32 Nucleo to restart MCU







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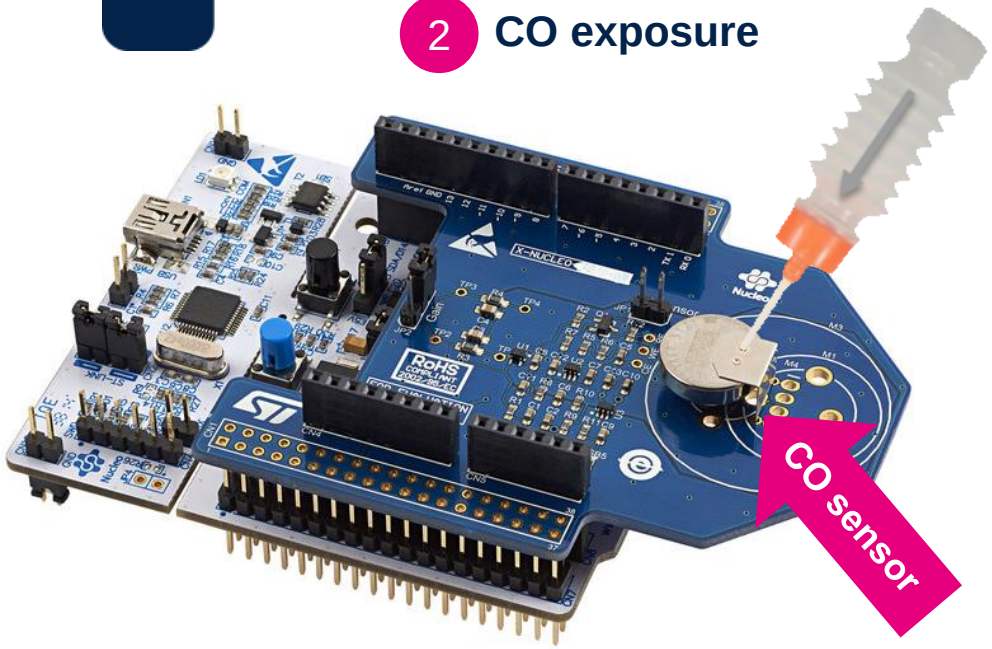
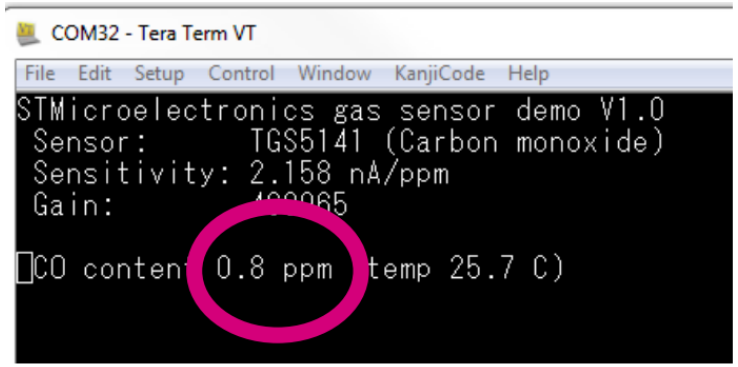
X-CUBE-IKA02A1 quick example (2/2)
Using serial line monitor – e.g.TeraTerm

1 **CO collection**

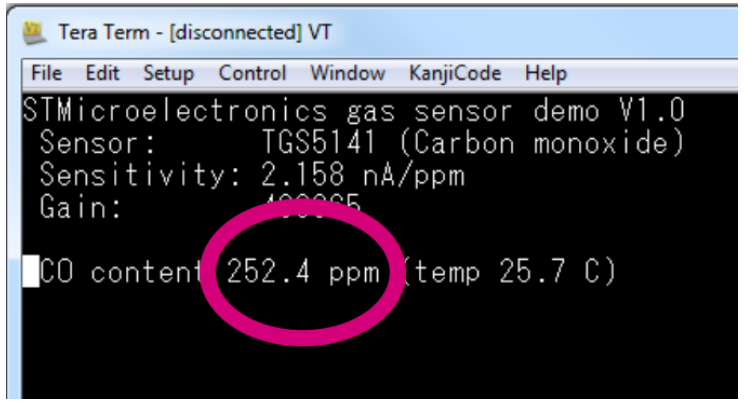
2 **CO exposure**



NO CO detected



CO detected – ppm value



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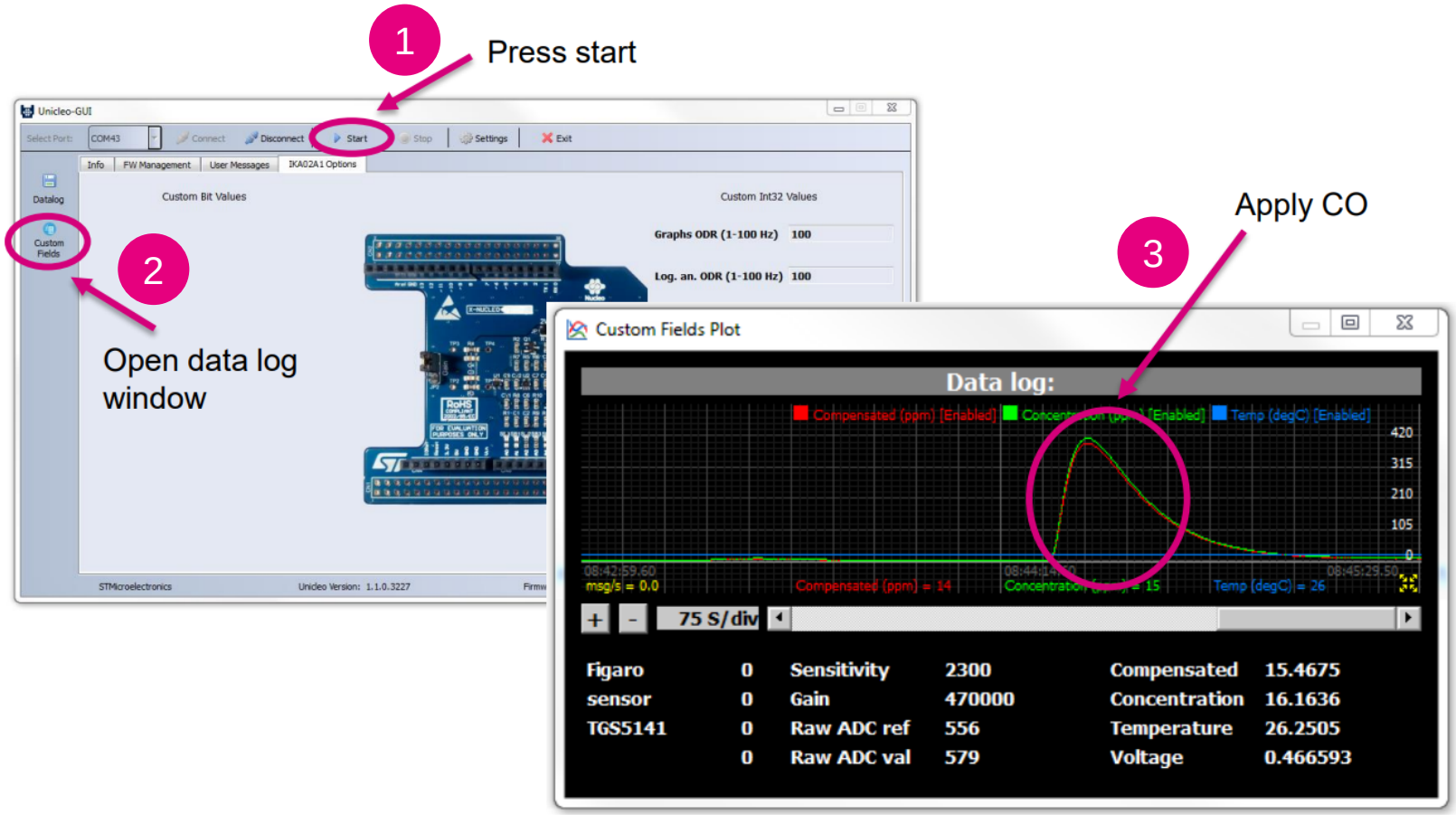
Unicleo-GUI example for X-CUBE-IKA02A1

DataLogCustomLite example
X-CUBE-IKA02A1 for NUCLEO-F401RE, NUCLEO-L053R8 or NUCLEO-L476RG



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