
EU045 Evaluation Kit

Quick Start Guide

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1. Overview

This is Renesas EU045 Air Quality Sensor solution kit.

It demonstrates Air Quality and further environmental sensors to allow quick evaluation of Renesas ZMOD gas sensors, relative humidity / temperature and ambient light sensors. Its Bluetooth® 5.0 communication allows nice and easy visualization of data on a contemporary GUI running on a Smartphone or Tablet, and it comes along with Li-Ion battery, charger and Qi standard wireless power transfer.

The EU045 evaluation kit is available in three variants, basically differing in the assembled air quality sensor:

Kit Name / Order Code	Description	Gas Sensor	Color
Y-EU045-BLUEPUCK / EU045-IAQEV1Z	Indoor Air Quality	ZMOD4410	Blue
Y-EU045-GREENPUCK / EU045-OAQEV1Z	Outdoor Air Quality Sensor	ZMOD4510	Green
Y-EU045-YELLOWPUCK / EU045-RQAEV1Z	Refrigerator Air Quality Sensor	ZMOD4450	Yellow

When closed, the case is somewhat waterproof and contains a membrane to let gas in and out, similar to IP54 (not tested).

All three versions use a common Smartphone App, which is available for Android and Apple iOS and autodetects the type of EU045, see <https://www.renesas.com/us/en/blogs/do-you-know-your-air-quality>.

The solution kits contain the following Renesas Parts

- [HS3001](#) - relative humidity and ambient temperature sensor
- [ISL29020](#) - ambient light sensor (fitted in lots with S/N: A20* and A21* only)

one of the following Renesas Air quality sensor:

- [ZMOD4410](#) - indoor air quality sensor
(gas sensor module for TVOC, eCO2 and IAQ according to German Umweltbundesamt)
- [ZMOD4510](#) - outdoor air quality sensor
(gas sensor module for OAQ incl. NO2 and O3 according to standard classification from US)
- [ZMOD4450](#) - refrigeration air quality
(gas sensor module for typical odor in fridge)

plus

- [ISL9301](#) Li-Ion Battery Charger
- [ISL9122A](#) Ultra-Low IQ Buck/Boost Regulator
- [RA4W1](#) MCU for Bluetooth® 5.0 LE communication
- [RL78/G13](#) MCU for sensor data evaluation / provision

2. Purpose of this document

This Quick Start Guide walks you through the best out-of-the-box experience and provides a step-by-step guide on how to use this solution kit.

3. Running the Out-of-Box demo

1. Download the Smartphone App “**Renesas Bluetooth LE Puck**” from either Google Play Store (in case of Android phone or tablet) or Apple App Store (for iPhone / iPad) and install it.



2. Open the case by pulling the top cover upwards while holding the little wings of the bottom part (Figure 1)

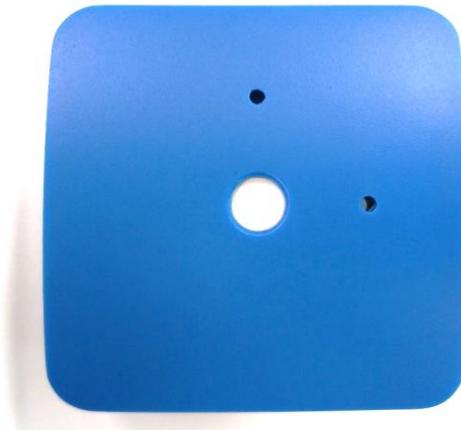


Figure 1: Top view of the case (EU045-IAQEV1Z Blue-Puck Version) with and without the top cover.

3. Verify that the jumper configuration matches the “default configuration” (J3 closed, J5 open, J10 open as indicated in [1]) as shown in Figure 2

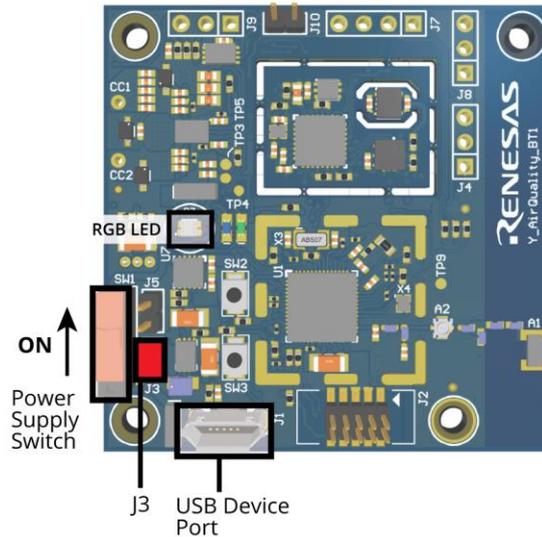


Figure 2: PCB Top View with the default jumper configuration.

4. Move the Power Supply Switch to ON Position (Figure 2)
5. Verify the board status through the RGB LED Color (Table 1)

Led Coding ¹		
Information	Color Coding	Notes
RA4W1 is connecting to RL78	Blue	Board Power on
Low Battery Charge (<=10%)	Red (blink 500ms)	
RA4W1 Bluetooth® Communication (4.2) is ready	Blue (1 flash each 3 s)	Board running

Table 1: (Partial) RGB Led Coding Table (Battery Charger is not connected)

6. If the RGB LED is off (Battery fully discharged) or the battery charge is low, connect the solution kit either to a USB cable or put it on a legacy Qi-standard charger pod to Wireless charge it. The green LED (RBG LED) will come up to indicate the battery is now charged and is switched off when charge is completed.
7. As soon as the RA4W1 Bluetooth® communication starts (Table 1), open the Smartphone App to visualize data as described in the next steps. There is no need for any further setup or Bluetooth connection, the App handles all of those automatically for you.
8. You may repeat 2-7 with further EU045 solution kits, if you want.
9. The APP’s Device tab now lists all EU045 Solution kits that are currently transmitting their Data via Bluetooth®. Select the desired EU045 solution kit and open the Sensors Tab.

¹ See complete RGB LED coding in [2]

10. Check the EU045 solution kit sensor data as shown in Figure 3

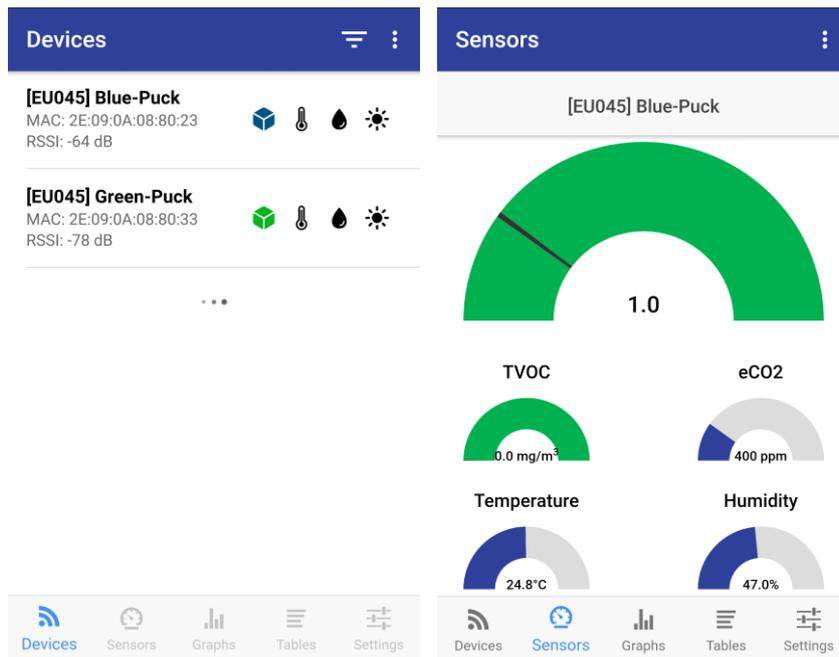


Figure 3: Device and Sensors Tabs of the APP.

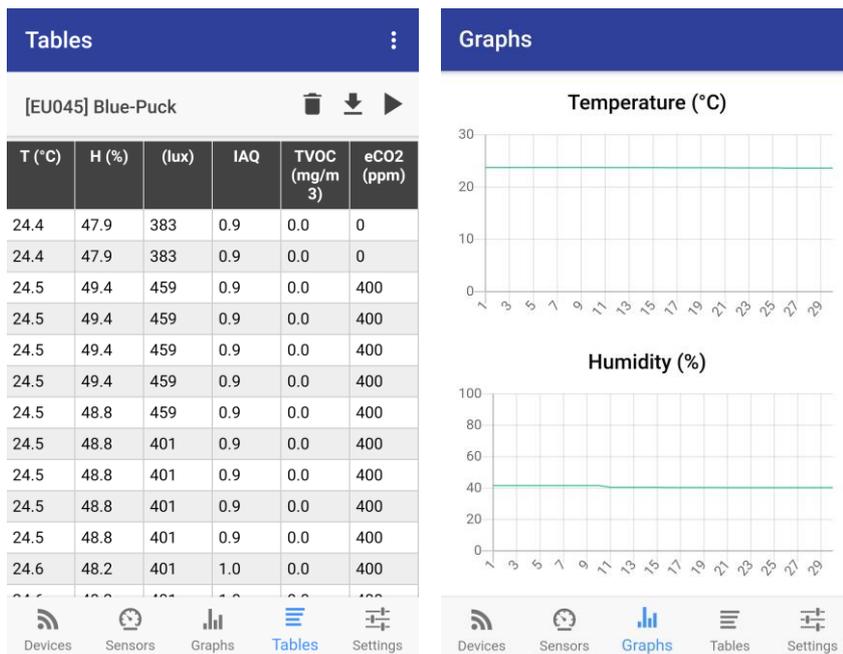


Figure 4: Graphs and Tables Tabs of the APP.

11. Data can also be collected and exported from the Table tab. Moreover, the trend over time can be visualized in the Graphs tab, also for more than one device.

12. In the Setting tab some configurations are also available, for more detail check [2].

4. Software License and Disclaimers

Please note that the Renesas Software License agreement and disclaimers apply.

For more details please see here:

<https://www.renesas.com/eu/en/document/oth/disclaimer002?language=en>
and check out Section “General precautions...” at the end of this document.

5. References

- [1] Renesas Electronics, "EU045 - Hardware User's Guide" - R30AN3066ED0200.
- [2] Renesas Electronics, "EU045 - Software User's Guide" - R30AN3067ED0200.

Revision History

Rev.	Date	Description	
		Page	Summary
0.01	11 Dec 2020		Initial version.
0.05	16 Dec 2020		First revision after Renesas comments.
1.00	18 Jan 2021		Second revision after Renesas comments.
1.10	17 Nov 2021		Added note about ambient light sensor not assembled anymore.
2.00	22 Dec 2021		Editorial changes

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity.

Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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