Smart Home
PIC32MZ Click Kit
for AWS

QUICK USER GUIDE

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In the world of IoT solutions, Mikroe presents the perfect universal solution for rapid prototyping.

Our mission is to make IoT understandable by bringing modularity and versatility. This allows us to create smart and easy to use solutions that both integrates devices and services to our valued consumers through AWS Cloud solutions.

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powered by **aws**

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The Smart Home PIC32MZ Click Kit for AWS provides an AWS IoT development experience based entirely on the Mikroe Flip&Click for PIC32MZ development board. This kit will help you evaluate Amazon FreeRTOS and its services, learn how to develop IoT application and evaluate HVAC device functionality. What this kit also offers is mikroBUS™ compatibility with hundreds of other Click boards™ that can be used for customization of the existing application of making a new one. The board carries four different Click boards™, showcasing the power and the versatility of Mikroe rapid development solutions.

The core of the system is the PIC32MZ2048 MCU, running the HVAC Remote Controller application using Amazon FreeRTOS. Amazon FreeRTOS enables you to easily and securely connect your MCU-based thermostat device to cloud services like AWS IoT Core or to other IoT devices running AWS IoT Greengrass.

1. Hardware overview and requirements

The development kit includes the following items :

1. **Flip & Click PIC32MZ**
2. **Weather click**
3. **WiFi 7 click**
4. **Rotary Y click**
5. **OLED C click**
6. **USB cable**

In addition to hardware provided in this kit you will also need *mikroProg* for PIC programmer to upload hex file to MCU placed on the Flip & Click board.

You might also use any other programmer capable of uploading hex to the PIC32MZ2048EFH.

Optionally you can use :

- MPLAB Snap

- PicKit 3 / 4

- ICD 3 / 4
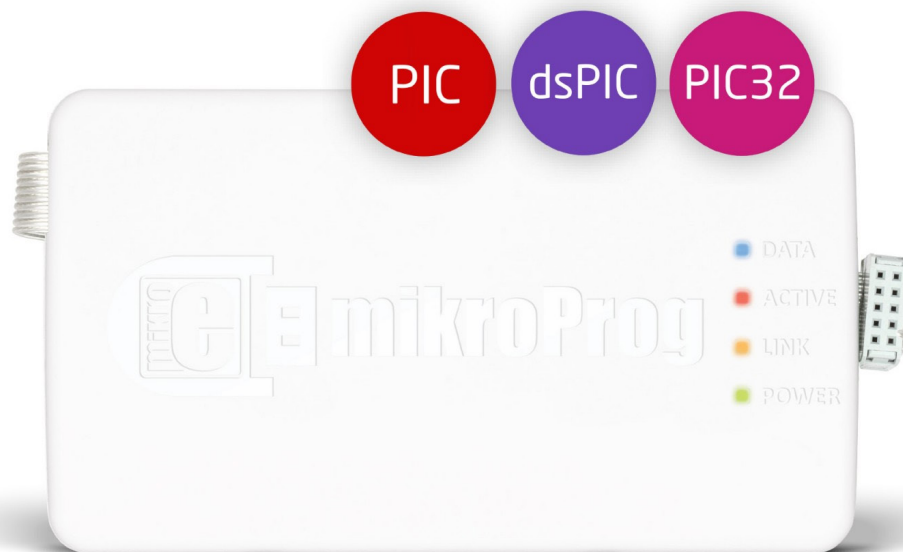
2. Hardware Setup

Assemble the board as on the right picture. The Flip&Click forms the central hub, while the other boards plug into mikroBUS sockets. For setting up the hardware you should follow next steps:

1. Insert the WiFi 7 Click into mikroBUS A.

2. Insert the OLED C Click into mikroBUS B.

3. Insert the Rotary Y Click into mikroBUS C.

4. Insert the Weather Click into mikroBUS D.

5. Solder pins on the ICSP header (J6 connector) for connecting external programmer to Flip&Click.

6. Connect mikroProg (or any other PIC32MZ programmer) to soldered pins on Flip&Click for programming/debugging.

7. Connect the Flip&Click to the PC with the USB cable which goes into the mini USB plung next to the RST button. This cable will provide power for the kit and at the same time be used for tranfering statuses to the Therminal Emulator on PC.
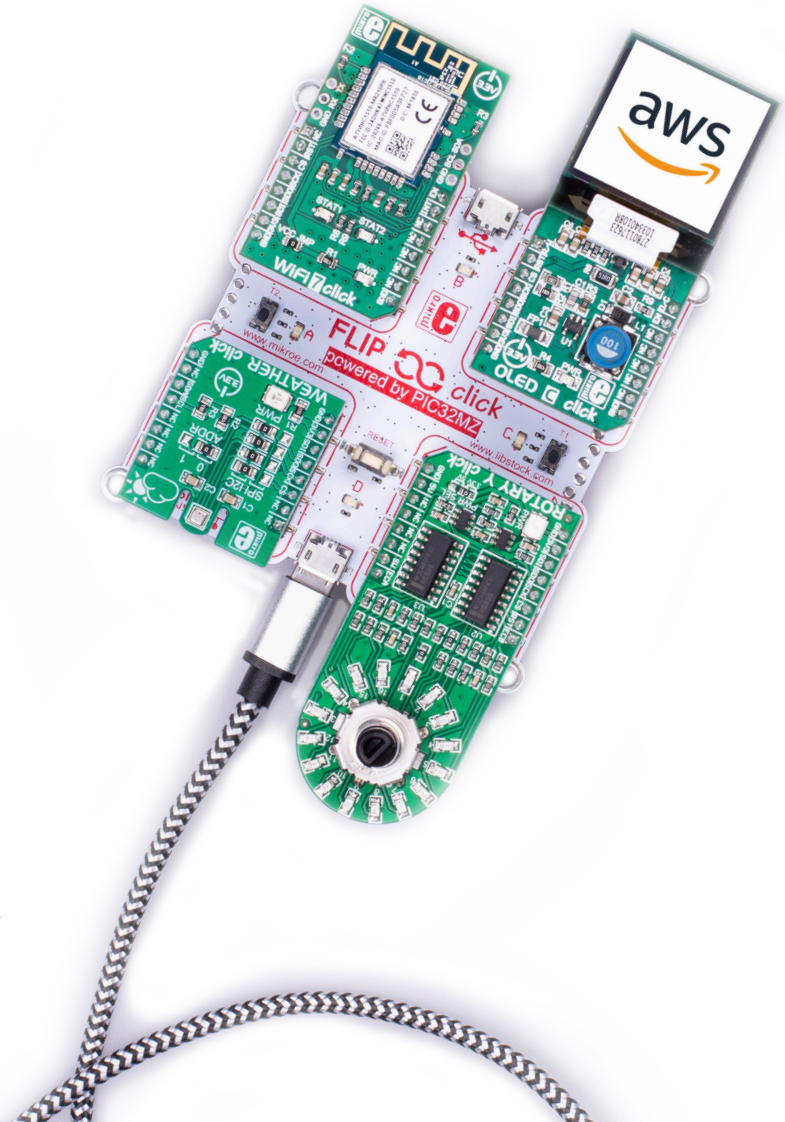
3. Software overview and requirements

Software required to compile and program the MCU are :

- Microchip MPLAB X IDE v5.15 or higher

- Microchip MPLAB XC32 v2.10 (REQUIRED)

- Microchip MPLAB Harmony v2.05

- mikroProg Suite

In addition to this you will also need some additional software packets such as :

- Terminal emulator configured with following settings:

  › Baud rate: 115200
  › Data: 8 bit
  › Parity: None
  › Stop bits: 1
  › Flow control: None

- GNU operating environment, with (minimally):

  › GNU Coreutils
  › GNU Shellutils
  › GNU Fileutils
  › Git

- AWS Command Line Interface (CLI) (Python 3 / Boto)

Some of this components are preinstaled on your OS depends on which one you using. **NOTE**

4. Software Setup

Before you start customizing and programing existing HVAC application on your KIT you should:

1. Install ***MPLAB IDE X***

2. Install ***MPLAB Harmony 2.05***

3. Install mikroProg Suite if your are using ***mikroProg*** programmer.

4. Install desired PC console application (putty, gtkterm, minicom...).

5. Open, configure PC console application and connect it to the development system.

5. Build and Run HVAC Remote Controller application

Before you begin, please download HVAC Remote controller application source code and project files from the following link: **https://github.com/MikroElektronika/remote_hvac**

You also have to configure AWS IoT and your HVAC Remote controller application to connect your device to the AWS Cloud. For more information how to setup your AWS account please refer to **First Steps**.

With each development kit you will receive FREE voucher code, value of 10$.

To redeem voucher code:

1. Login to your AWS account

2. Go to drop down menu under your username

3. Click to "My Billing Dashboard"

4. Click "Credits" on the left side menu

5. Type code and click "Redeem"

6. Run the Amazon FreeRTOS Demo Project

1. In the MPLAB IDE, from the File menu, choose Open Project.

2. Browse to and open *<BASE_FOLDER>\smarthome-kitmicrochip\curiosity_pic32mzef\mplab.*

3. Choose Open project.

When you open the project for the first time, you might get an error message about the compiler. In the IDE, navigate to Tools, Options, Embedded, and then select the compiler that you are using for your project.
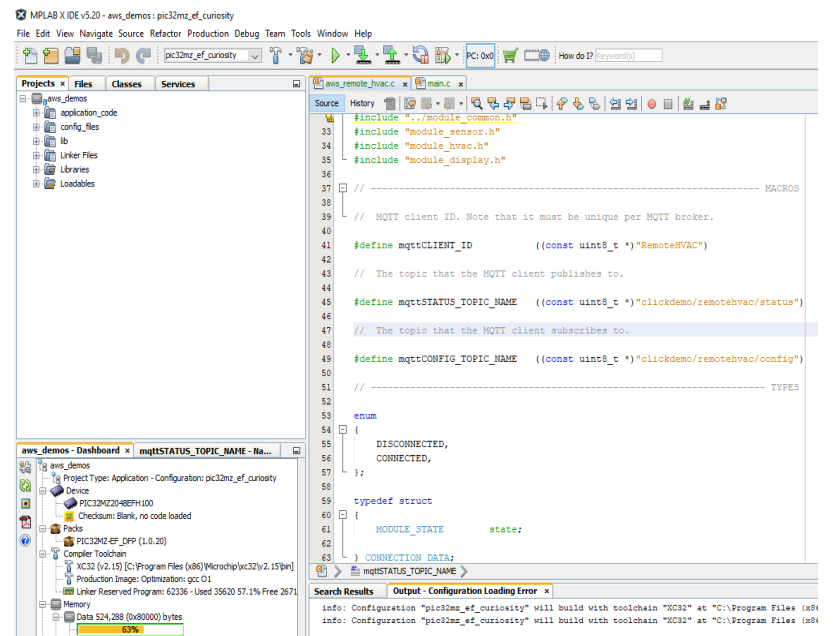
7. Rebuild your project and upload it to the MCU

1. In the Projects tab, right-click the aws_demos top-level folder

2. Rebuild you project

3. After successful build you should see newly created hex fil
**<BASE_FOLDER>\smarthome-kit\microchip\curiosity_
pic32mzef\production/mplab.prodwuction.hex**

4. Open mikroProg Suite and "Load" previously mentioned hex file
and click "Write" to upload it to the MCU.

You can use the MQTT client in the AWS IoT console to monitor the
messages that your device sends to the AWS Cloud.
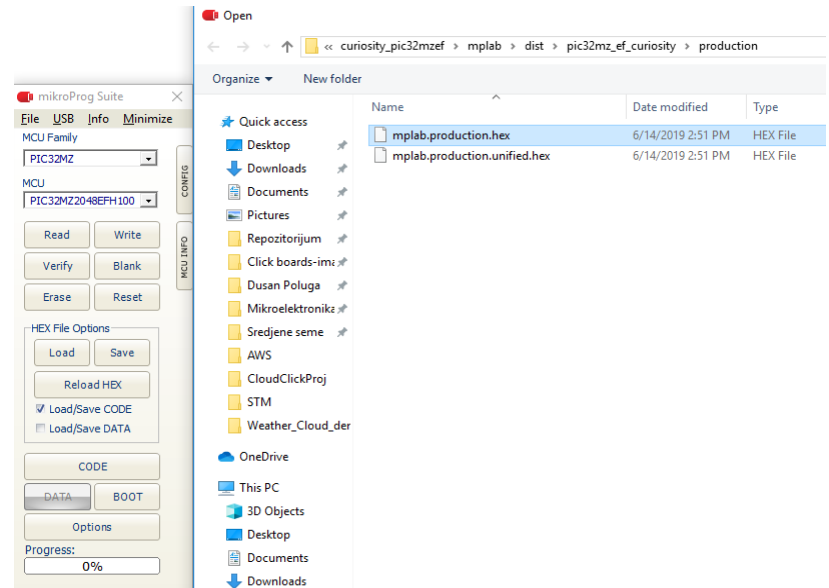
8. Subscribe to the MQTT topic with the AWS IoT MQTT client

1.   Sign in to the AWS IoT console.

2.   In the navigation pane, choose Test to open the MQTT client.

3. In Subscription topic, clickdemo/remotehvac/status, and then choose Subscribe to topic.

Additional files:

Detailed User Guide

Flip&Click Schematic

Subscribe to a topic

Publish to a topic

clickdemo/remotehvac/status ✖

Publish
Specify a topic and a message to publish with a QoS of 0.

clickdemo/remotehvac/status

```
1  {
2      "message": "Hello from AWS IoT console"
3  }
```

}

clickdemo/remotehvac/status   Jun 14, 2019 5:19:59 PM +0200

```
{
    "SENSOR_T": "30.5",
    "SENSOR_H": "37.5"
}
```

clickdemo/remotehvac/status   Jun 14, 2019 5:19:55 PM +0200

```
{
    "TARGET_T": "30.4"
}
```

clickdemo/remotehvac/status   Jun 14, 2019 5:19:55 PM +0200

```
{
    "SENSOR_T": "30.4",
    "SENSOR_H": "37.3"
}
```

Troubleshooting

For general troubleshooting information about Getting Started with Amazon FreeRTOS, see *Troubleshooting Getting Started.*

If you are having a problem with the hardware contact *Mikroe Technical Support.*

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