

ML7425 Evaluation Kit Start Guide

Issue Date Sep 26th , 2023

NOTES

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Introduction

Thank you very much for purchasing products of our company. Before using this product, please use correctly after reading this “start guide”. Moreover, please keep it carefully even after reading this.

This document provides an overview of how to connect to attachments, how to set up the RF evaluation tool, and what steps are required for Sigfox communication. [This document is an explanation for Sigfox communication in Japan.](#)

The target LSI product is as follows.

ML7425

For the hardware specifications of this evaluation kit and the software specifications implemented in the evaluation kit, please register to My ROHM (free of charge) from the following site, and download the corresponding file to refer to and use it.

《MyROHM Login》

<https://www.rohm.com/registration>

《Lapis Technology Products Web site》

<https://www.rohm.com/lapis-tech>

Home ⇒ Wireless LSIs ⇒ Sub-GHz LSI, SoC ⇒ Sub-GHz SoC ⇒ ML7425

(X indicates version number)

●Hardware

LAPIS Sub-GHz CPU Board(LSCB)/LAPIS RF Shield Board(LRSB) Hardware Manual

●Tool

RF Evaluation Tools: WCT3.5.3User's Guide

FlashWrite Tools:FlashWriterForSubG

●Software

ML7425 LWCSP

For the LSI specifications of the ML7425, please download the relevant file from our website below.

《Lapis Technology Products Web site》

<https://www.rohm.com/lapis-tech>

Home ⇒ Wireless LSI ⇒ Sub-GHz LSI, SoC ⇒ Sub-GHz SoC ⇒ ML7425

ML7425 Data Sheet

ML7425 Application Note Hardware Operation Details

ML7425 LSI Design Guide

ML7425 Initiallization Table

Notation

Classification	Notation	Description
□ Numeric value	<i>Oxnn</i>	Represents a hexadecimal number.
	<i>Obnnnn</i>	Represents a binary number.
□ Address	<i>Oxnnnn_nnnn</i>	Represents a hexadecimal number. (indicates Oxnnnnnnnn)
□ Unit	word, W	1 word = 32 bits
	byte, B	1 byte = 8 bits
	Mega, M	10^6
	Kilo, K (uppercase)	$2^{10}=1024$
	Kilo, k (lowercase)	$10^3=1000$
	Milli, m	10^{-3}
	Micro, μ	10^{-6}
□ Terminology	"H" level	Signal level on the high voltage side; indicates the voltage level of V_{IH} and V_{OH} as defined in electrical characteristics.
	"L" level	Signal level on the low voltage side; indicates the voltage level of V_{IL} and V_{OL} as defined in electrical characteristics.
□ Register description		Read/write attribute: R indicates read-enabled; W indicates write-enabled. MSB: Most significant bit in an 8-bit register (memory) LSB:Least significant bit in an 8-bit register(memory)

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1. Precautions of handling this product

- This product is the evaluation kit. This is used for only evaluation.
- Use the application software of this product on the PC that installs the Windows10.
- Refer the software license, then use the application software for PC and the software for MCU relating to this product.
- LAPIS Technology shall have no responsibility for remodeling and any illegal usages of our product.
- If this product emits harmful radio waves, change the frequency or stop the radio wave emission immediately, then avoid interference.

2. Package Contents Confirmation

Please open the box and make sure that all of the following components are available.
 In the unlikely event that it is missing or damaged, please contact the place of purchase.

*Depending on the shipping time, some mounting parts may differ from the photo
 (1) and (2) are connected by connectors and are integrated
 Please prepare a PC separately by yourself.

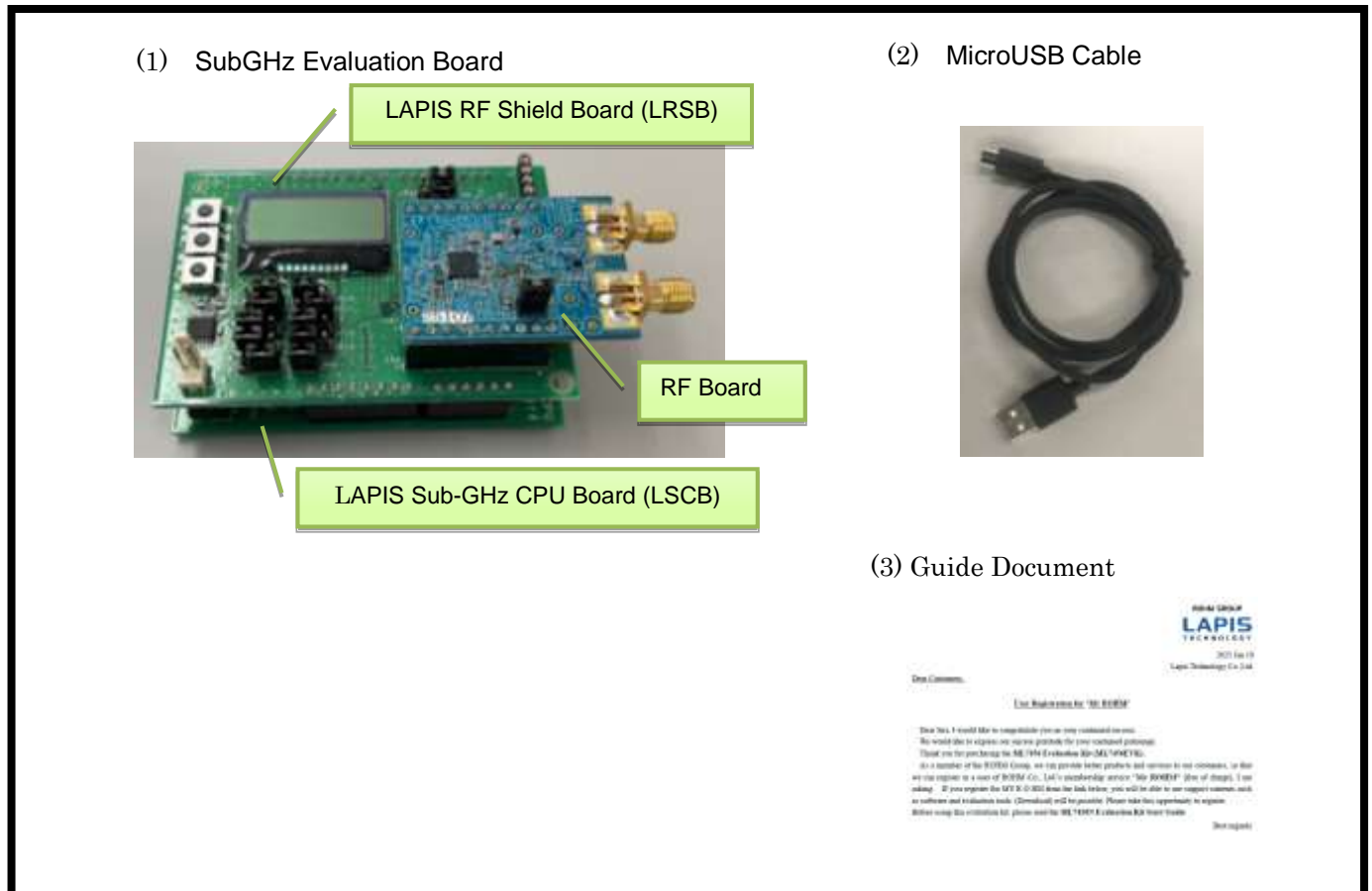


Figure 1: Evaluation Kit (Package Contents)

3. Evaluation kit appearance and USB connection

When this evaluation kit is delivered, the Sigfox communication (Sigfox bypass application) program is set to start by default.

When changing the settings of Jumper or Switch implemented on this evaluation kit, be sure to turn off the power (USB cable to PC) Please do it separately from.

For details of the specifications of this evaluation kit, please refer to the "LAPIS Sub-GHz CPU Board (LSCB) / LAPIS RF Shield Board (LRSB) Hardware Manual" separately.

Plug the USB cable into the USB connector marked in red on the evaluation kit in the photo below.

【Please note】 If the USB cable is inserted at an angle, there is a risk of damage to the connector.

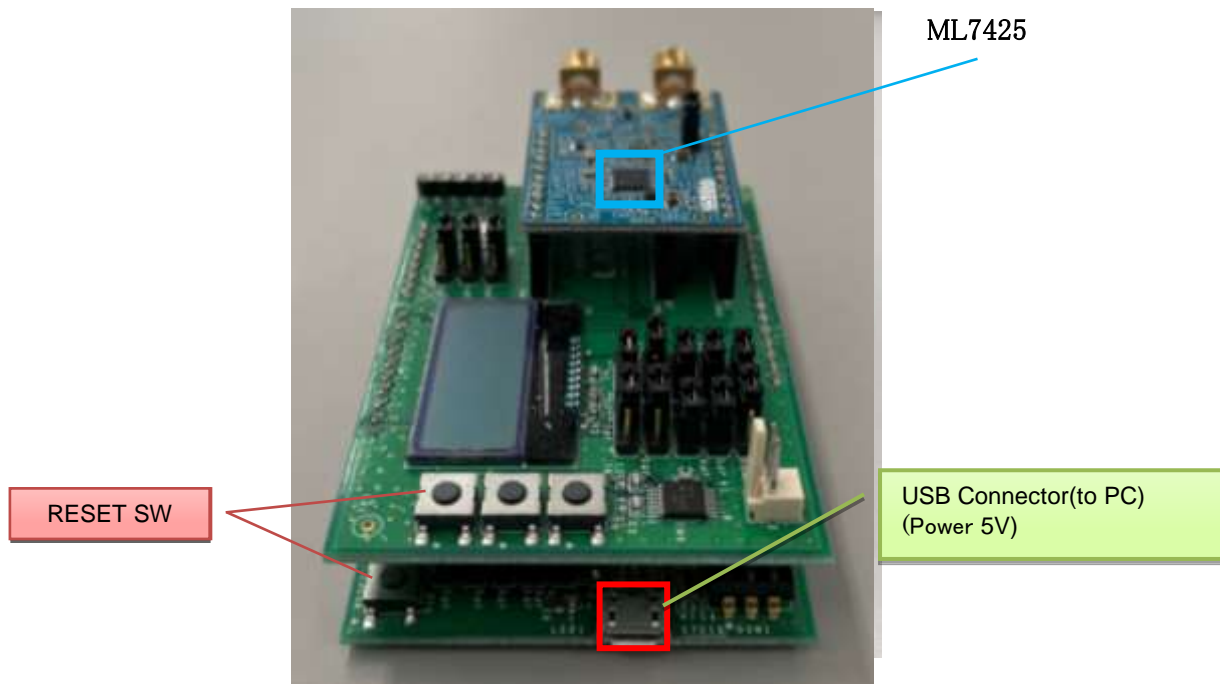


Figure 2: Evaluation Kit (USB Cable Connection)

4. Setup RF Evaluation Tool (WCT3)

1. Install (copy) WCT3 on your computer.
2. Install the Virtual COM Port driver for the FTDI device to USB-to-UART on the computer used for evaluation. Please download the driver from the following web page.

<https://ftdichip.com/drivers/vcp-drivers/>

3. Connect the USB cable to the computer where WCT3 is installed.

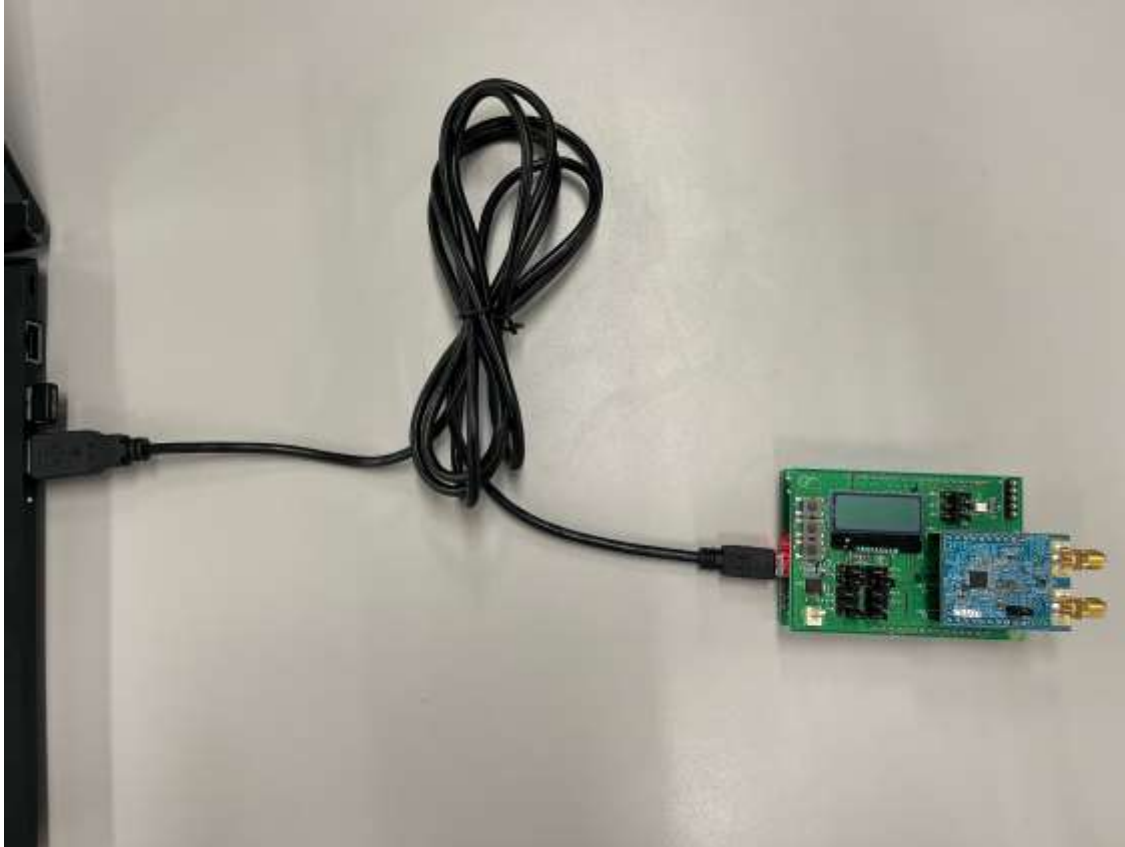


Figure3: Evaluation Kit(USB Cable Connection)

4. Double-click the TEST_ML7425.bat to launch WCT3. Below is the main WCT3 window that opens at startup.

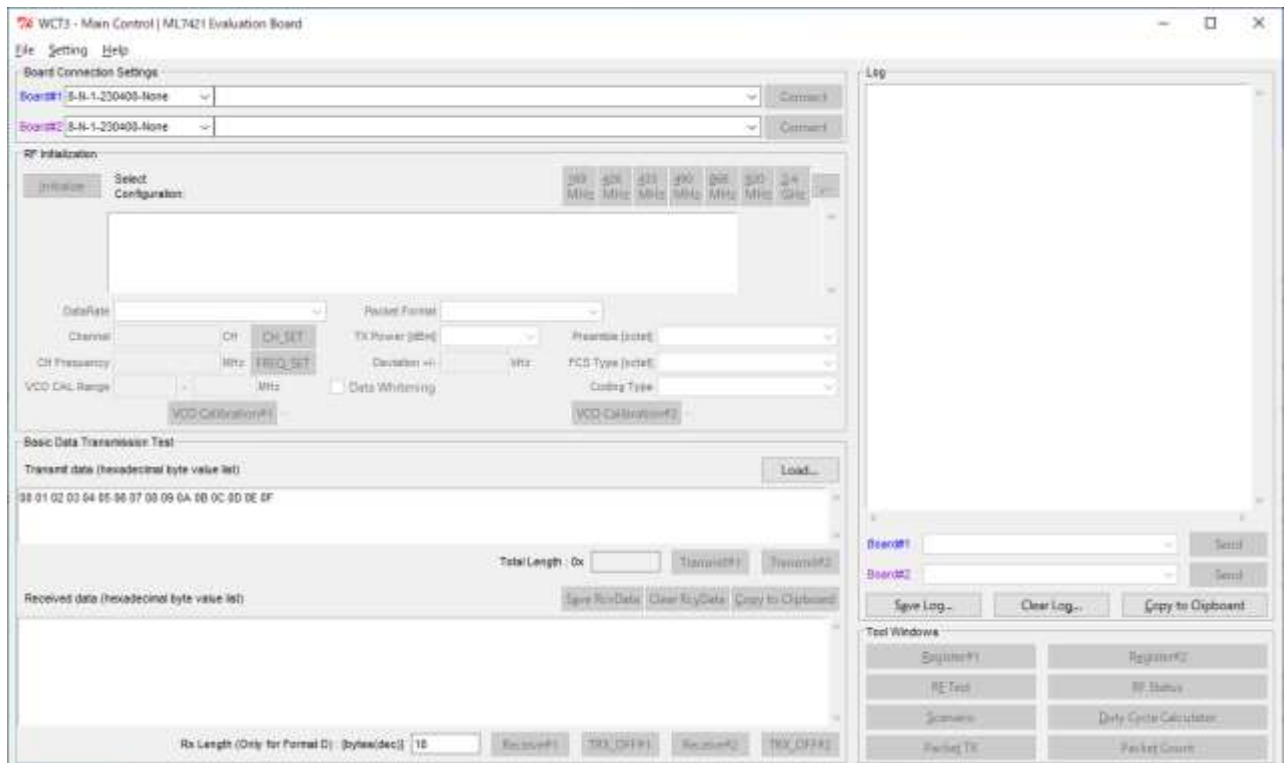


Figure4: WCT3 startup screen

For details on how to operate WCT3, refer to the WCT3.5.3 User Guide.

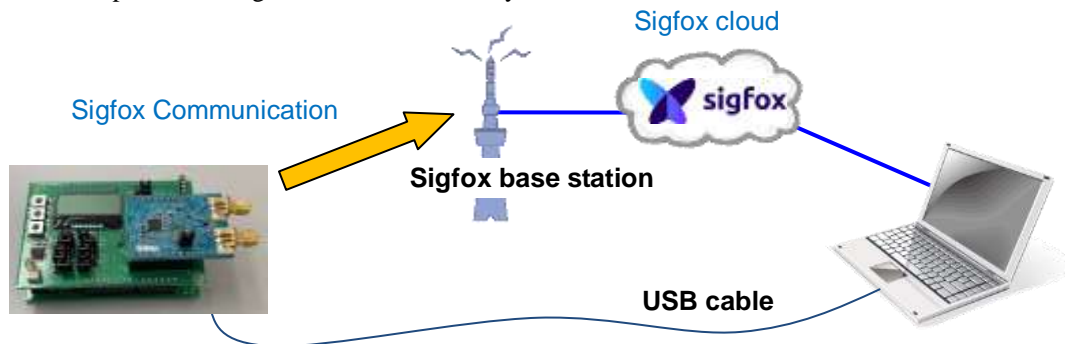
5. Sample Applications

By switching between multiple sample applications written in advance in this evaluation kit, various evaluation and demonstration operations can be performed.

This chapter provides an overview of three modes of operation: 1) Sigfox communication, 2) Sigfox periodic transmission, and 3) RF evaluation using WCT3. In addition to these, sample applications are available, so please refer to the software manual "LWCSP_System_for_ARM_VXXX.chm" for details..

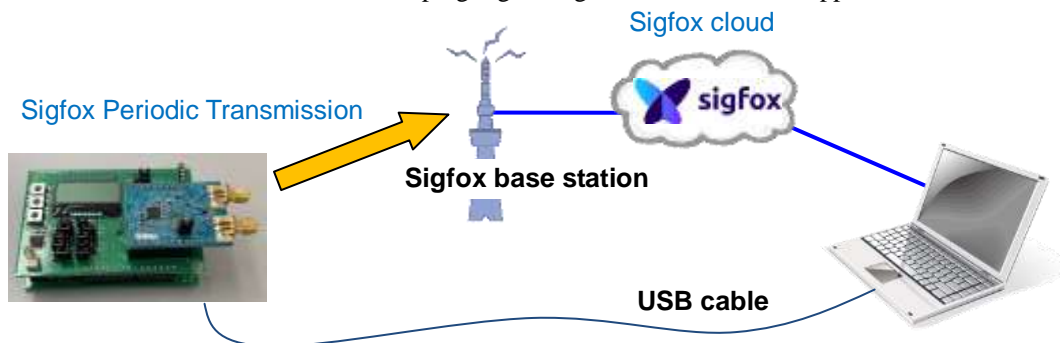
1) Sigfox Communications(Sigfox Application)

Using this evaluation kit, data can be sent to the Sigfox Backend Cloud(Hereinafter referred to as Sigfox Cloud) by control from a PC. Data uploaded to Sigfox Cloud can be easily checked on a PC.



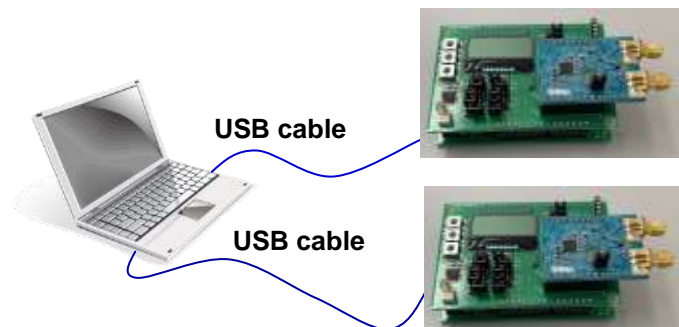
2) Sigfox Periodic Transmission (Sigfox Periodic Transmission Application)

This evaluation kit can be used to periodically send data to the Sigfox cloud. Data uploaded to Sigfox Cloud can be easily checked on a PC. Please refer to it when developing Sigfox regular communication applications.



3) RF Evaluation Using WCT3 (WC IF Application)

Using the WCT3 GUI tool for Windows, RF evaluation can be easily performed by reading and writing various registers. It is also possible to connect two evaluation boards to one PC via USB for opposite communication.



6. Switching Operation Modes

This chapter describes how to switch between three sample applications: 1) Sigfox communication, 2) Sigfox periodic transmission, and 3) RF evaluation using WCT3. For each of these operating modes, the following sample applications can be configured as startup software.

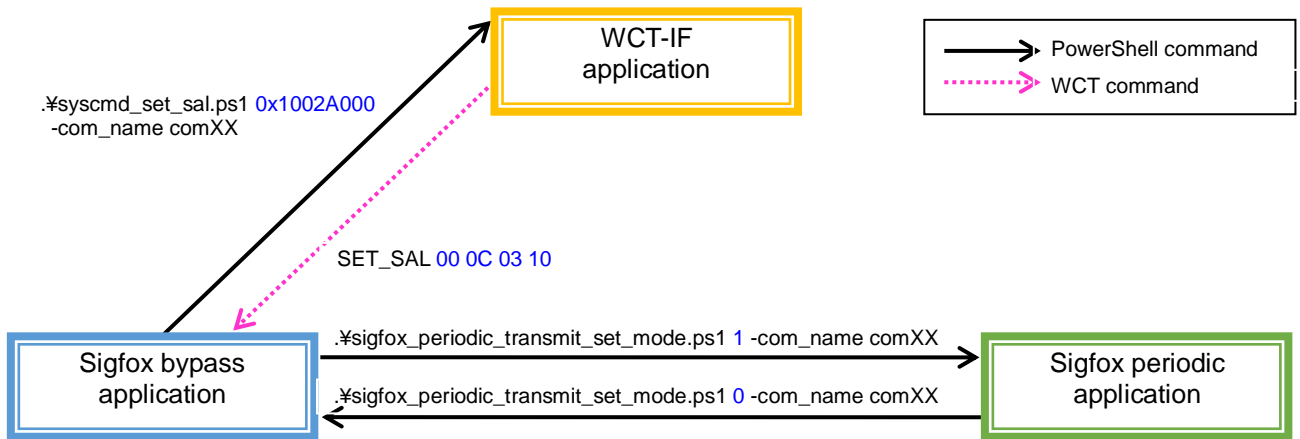
- | | |
|---------------------------------|--|
| 1) Sigfox communication | Sigfox bypass application |
| 2) Sigfox periodic transmission | Sigfoxte Periodic Transmission application |
| 3) RF evaluation using WCT3 | WCT-IF application |

The startup software can be configured by rewriting the SAL (Start Address List). After rewriting the SAL, the program starts executing from the specified address when the power is turned on or reset. How the SAL is rewritten depends on the software that is currently running. To start the WCT-IF application, issue the SET_SAL command from the WCT3 tool. To start other applications, execute the syscmd_set_sal.ps1 script or sigfox_periodic_transmit_set_mode.ps from PowerShell.

After rewriting the SAL, hard reset.

The following shows the relationship between the boot software and the SAL rewrite command:

* The factory default of this evaluation kit is set to operate the WCT-IF application.



■ How to switch between sample applications

- (1) Launch PowerShell.
- (2) On PowerShell, navigate to the folder where the command script is located (¥***¥***¥script¥command).
- (3) In PowerShell, run the command script " **syscmd_set_sal.ps1**" or "sigfox_periodic_transmit_set_mode.ps".

Sigfox bypass applications: **¥sigfox_periodic_transmit_set_mode.ps1 0 -com_name comXX**

Sigfox periodic transmission applications: **¥sigfox_periodic_transmit_set_mode.ps1 1 -com_name comXX**

WCT-IF applicaions: **¥syscmd_set_sal.ps1 0x1002A000 -com_name comXX**

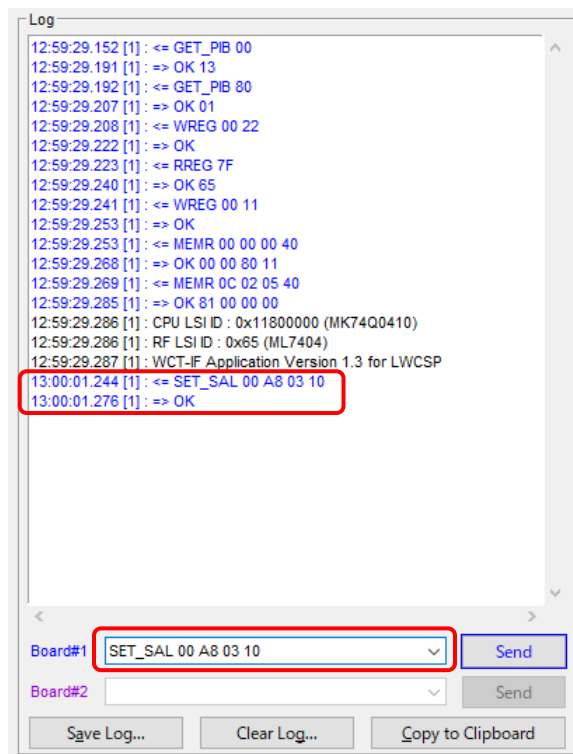
【Execution example】

```
PS C:\LWCSP#script#command> .#syscmd_set_sal.ps1 0x10030C00 -com_name com5
System Command SET_SAL
com5 : 01FF080001000100000C031003
com5 : 02FF0500010001000003
10
```

■ How to switch with WCT command

- (1) Launch the WCT3 tool.
- (2) Press the "Connect" button on WCT3 to connect to the evaluation kit.
- (3) Enter the SET_SAL command from the command input field on the right side of WCT3.

【Execution example】



7. Customer Preparation for Sigfox Communication

- Confirmation of device ID information

Before communicating with Sigfox, you need to activate the purchased evaluation kit on the Sigfox Buy website. Before doing so, please check the ID and PAC information of the evaluation kit.

For ⇒details, please refer to "5.1.How to read ID and PAC".

- Evaluation kit activation

In order to communicate with Sigfox,

It is necessary to purchase a line contract from Kyocera Communication Systems Co., Ltd. (hereinafter referred to as "KCCS"), the line operator of Sigfox's Japan. **For non-Japan correspondence, please contact the Sigfox operator in your country.**

⇒details can be found in Section 5.2. How to register an evaluation kit.

* If you rent an evaluation kit, you do not need to activate the evaluation kit.

7.1. Reading method of ID,PAC

ID and PAC information*1 are required to register the device to Sigfox Portal*2.

* The read ID and PAC are essential for Sigfox communication, so please back up the information so that you do not forget it.

Follow the steps below to read the ID and PAC information.

[Procedure]

(1) Use PowerShell*3 on a Windows PC and a PC.
First, PowerShell requires advance preparation*4.

*1: In the Sigfox network, in order to confirm that the terminal has Sigfox communication authentication, Each device has a unique identification number, which is called DEVICE ID (abbreviation = ID) and Portable Authentication Code (abbreviation = PAC).

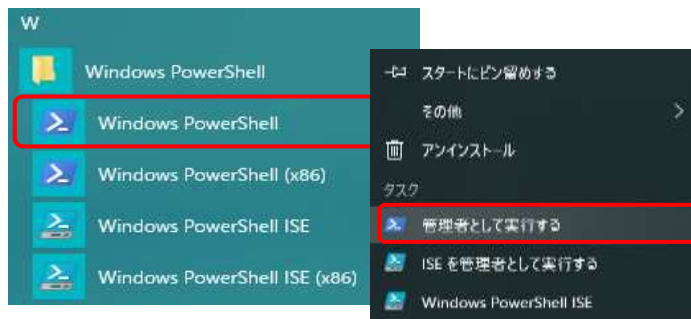
*2: Sigfox Portal is a Sigfox site where you can register and manage Sigfox devices and check data delivered to the Sigfox cloud. (<https://backend.sigfox.com/auth/login> <https://buy.sigfox.com>)

*3: PowerShell is an extensible command line interface (CLI) shell and scripting language developed by Microsoft to replace the traditional DOS prompt, and is a scripting environment that has been standard since Windows 7.

*4: PowerShell scripts are provided without PowerShell signing so that users can edit and use the execution policy. The initial value is set to Restricted, which prevents script execution. Therefore, in order to execute the script you provide, you need to edit the execution policy.

(2) Preparing PowerShell (How to Change the Execution Policy)

1) Right-click the Windows PowerShell icon in the Start menu and specify Run as administrator.



2) The PowerShell console screen will be displayed, so set the following.

```
PS C:\windows\system32>Set-ExecutionPolicy RemoteSigned
```

This allows locally stored scripts to run. Also, non-local scripts (downloaded from the Internet) can only be executed if they are signed.



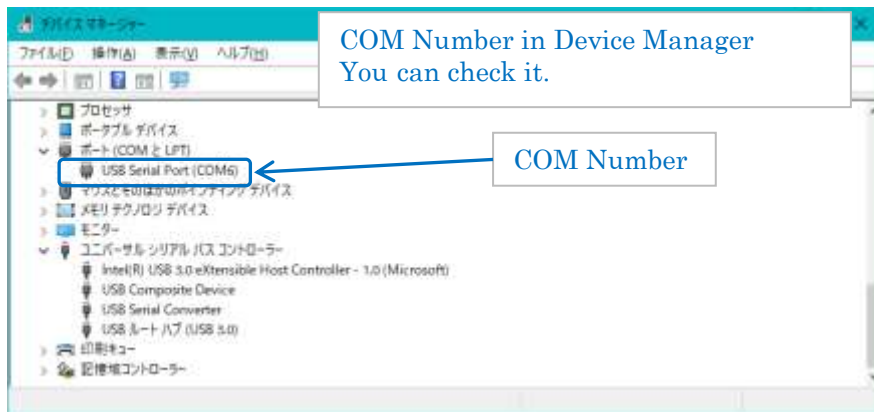
- (3) Connect the evaluation kit to the Windows PC via USB.
- (4) In order to use the command script, from the support site described in Introduction (page 2), LWCSF for ML7456N SB Please download it to the connected PC and place it in an appropriate place.
- (5) On PowerShell, navigate to the folder where the command script is located.

PS C:\windows\system32>cd C:******\ML7456_LWCSP_for_U16_VXXX\script\command
 (Please match the *** part and folder hierarchy to the location of the file you downloaded.))

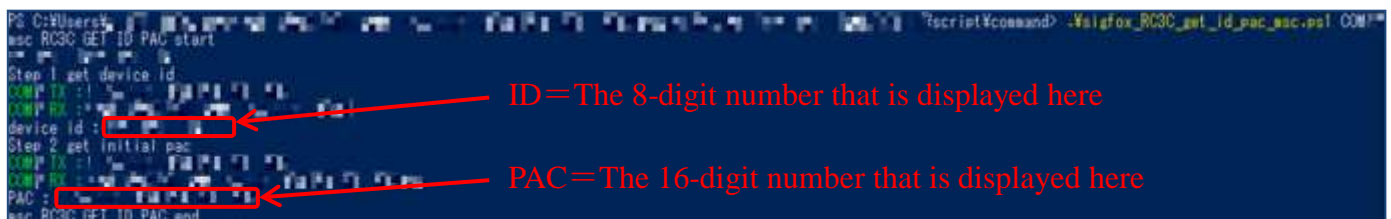
- (6) In PowerShell, run the command script "sigfox_get_id_pac.ps1".

「.PS1" extension is a PowerShell script file. In PowerShell, the execution instructions for a script file must explicitly specify the path. Therefore, script execution in PowerShell is executed with an absolute path or with a .¥ at the beginning of a file in the current directory.

Script execution example : PS C:\Users\¥XXX¥XXX¥XXX¥script¥command>.¥ sigfox_get_id_pac.ps1 COM*
 ("*" specifies the COM number to which the evaluation kit is connected.))



実行例)



7.2. How to register the evaluation kit

In order to transmit data from the Sigfox device to the Sigfox cloud, a line contract with KCCS is required when using it in Japan country. **For non-Japan correspondence, please contact the Sigfox operator in your country.**

Please refer to "Register device as a development kit (DevKit)" on KCCS's technical blog site below and complete the device registration procedure.

<https://qiita.com/organizations/sigfox>

In addition, if you want to apply for a line contract other than the above, it is posted on the following site of KCCS, so please apply and register as appropriate according to the posted contents.

<https://www.kccs-iot.jp/buy/flow/>

Reference: Approximate line charge per line ¥700~¥1,200 Device/year (as of January 2020)

Charges vary depending on the number of communications per day and the presence or absence of Sigfox Atlas (location services).

8. Sigfox Communication

This chapter describes the operations for transmitting to a Sigfox base station. In advance, see "5. Please check and configure the contents described in "Advance preparation for Sigfox communication".

8.1. Data Transmission Method to Sigfox cloud

In PowerShell, run the command script "sigfox_xxxx_send_frame_msc.ps1".

Script execution example : PS C:\Users\¥XXX¥XXX¥XXX¥script¥command>.¥ sigfox_xxxx_send_frame_msc.ps1
-rc_mode 3 -com_name COM*

(* specifies the COM number to which the evaluation kit is connected.)

Example execution response)

```
Get rc_mode parameter
com4 : 01FF0600020201FF000403
com4 : 02FF1600020201FF000403000000FFFFFFFFFFFFFFFFFFFFFFFF03
get rc_mode number: 3

msc RC3C SEND FRAME start
Step 1 open
com4 : 017F0500000200000303
com4 : 027F060000020000000003
Step 2 set std config
com4 : 017F110005020000020000006400000000000000103
com4 : 027F060005020000000003
Step 3 get version
com4 : 017F05000A0200000003
com4 : 027F13000A0200000000C0056322E31302E305F46444C03
Sigfox Library Version : 0.0.0.0

Step 4 send frame
com4 : 017F1400020200000C020000303132333435363738393A3B03
com4 : 027F0800020200000000000003

Step 5 get info
com4 : 017F05000B0200000003
com4 : 027F07000B02000000000B03
Information : 0B

Step 6 close
com4 : 017F04000102000003
com4 : 027F060001020000000003
msc RC3C SEND FRAME end
```

8.2. Confirmation Method of Sigfox cloud

S Device management and data confirmation that is registered to Sigfox service is done on the Sigfox Portal (<https://backend.sigfox.com/auth/login>)^{*6}. Please complete device registration that is introduced at the previous page, transmit data, then confirm the data on it.

(1) Click MESSAGES

(2) Click Id number

(3) Click MESSAGES

Time that data is received

Received data

Time	Data / Decoding	LQI	Callbacks	Location
...
...
...

*6: Sigfox ID is necessary to login the Sigfox Portal. It can be produced in the procedure of KCCS line contract.

Revision History

Document No.	Date	Page		Note
		Before	After	
FEXT7425_startguide-01	2023.9.26	-	-	Initial release