Dear customer

ROHM Co., Ltd. ("ROHM"), on the 1st day of April, 2024,
has absorbed into merger with 100%-owned subsidiary of LAPIS Technology Co., Ltd.

Therefore, all references to "LAPIS Technology Co., Ltd.", "LAPIS Technology"
and/or "LAPIS" in this document shall be replaced with "ROHM Co., Ltd."
Furthermore, there are no changes to the documents relating to our products other than
the company name, the company trademark, logo, etc.

Thank you for your understanding.

ROHM Co., Ltd.
April 1, 2024

Dear customer

LAPIS Semiconductor Co., Ltd. ("LAPIS Semiconductor"), on the 1st day of October, 2020, implemented the incorporation-type company split (shinsetsu-bunkatsu) in which LAPIS established a new company, LAPIS Technology Co., Ltd. (“LAPIS Technology”) and LAPIS Technology succeeded LAPIS Semiconductor’s LSI business.

Therefore, all references to "LAPIS Semiconductor Co., Ltd.", "LAPIS Semiconductor" and/or "LAPIS" in this document shall be replaced with "LAPIS Technology Co., Ltd."

Furthermore, there are no changes to the documents relating to our products other than the company name, the company trademark, logo, etc.

Thank you for your understanding.

LAPIS Technology Co., Ltd.
October 1, 2020

ROHM GROUP
LAPIS SEMICONDUCTOR

Sub-GHz LSI Evaluation Kit Start Guide

Issue Date: Nov 20th, 2018

ROHM SEMICONDUCTOR

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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 start guide indicates enclosure attachment ant the connection method.

The manual shown in the following other than this document is prepared. Please check if needed.

- Datasheet
- Design Guide
- Simple MAC User’s Manual
- Wireless Control Tool3 (WCT3) User’s Manual

This supports the following evaluation board.

・ML7344
・ML7406
・ML7345
・ML7345C
・ML7345D
・ML7404
・ML7414
・ML7411

1. Attention on the handling of this product

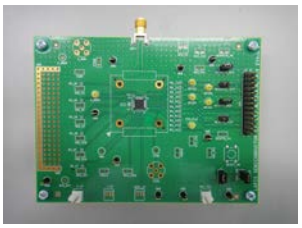
- This product is evaluation kit. It is available for evaluation only.
- Any responsibility cannot be taken about building this product into other products.
- Please use the application software of this product with the PC with which Japanese version Windows 7 is installed.
- It will become infringement of copyright, if all or a part of software of this product is reproduced without permission of copyright or duplicate things are distributed.
- Any responsibility cannot be taken about reconstruction and illegal use of this product.
- If the example of a harmful electric wave interference should occur from this product, please change operating frequency promptly, or suspend the output of an electric wave, and perform disposal for interference evasion etc.

2. Setup Flow

Please check when open the box and all the following articles are assembled first. If it should run short or should have damaged, please inform a purchasing agency.

- CD-ROM is packed only when first time purchase.
- By shipment time, mounting parts etc may differ from a photograph in part.
- Please prepare a stabilized power supply if necessary.
- Please prepare serial communication software (Tera Term) if necessary.
- A USB UART IC (FT232R), which is made by FTDI, is placed on the control board. Please download a USB device driver from http://www.ftdichip.com.

- Sub-GHz LSI Evaluation Board… 1



- USB(A-MicroB) Cable… 1
- CD-ROM… 1 (First time purchase only)

- Control Board… 1

- Antenna… 1

*Attached antenna is for 800-900MHz band. If using other band (e.g. 400MHz), antenna gain will be worse. In case of testing communication, please use proper antenna.

2.1. Control Board Setting

This section describes the control board setting.

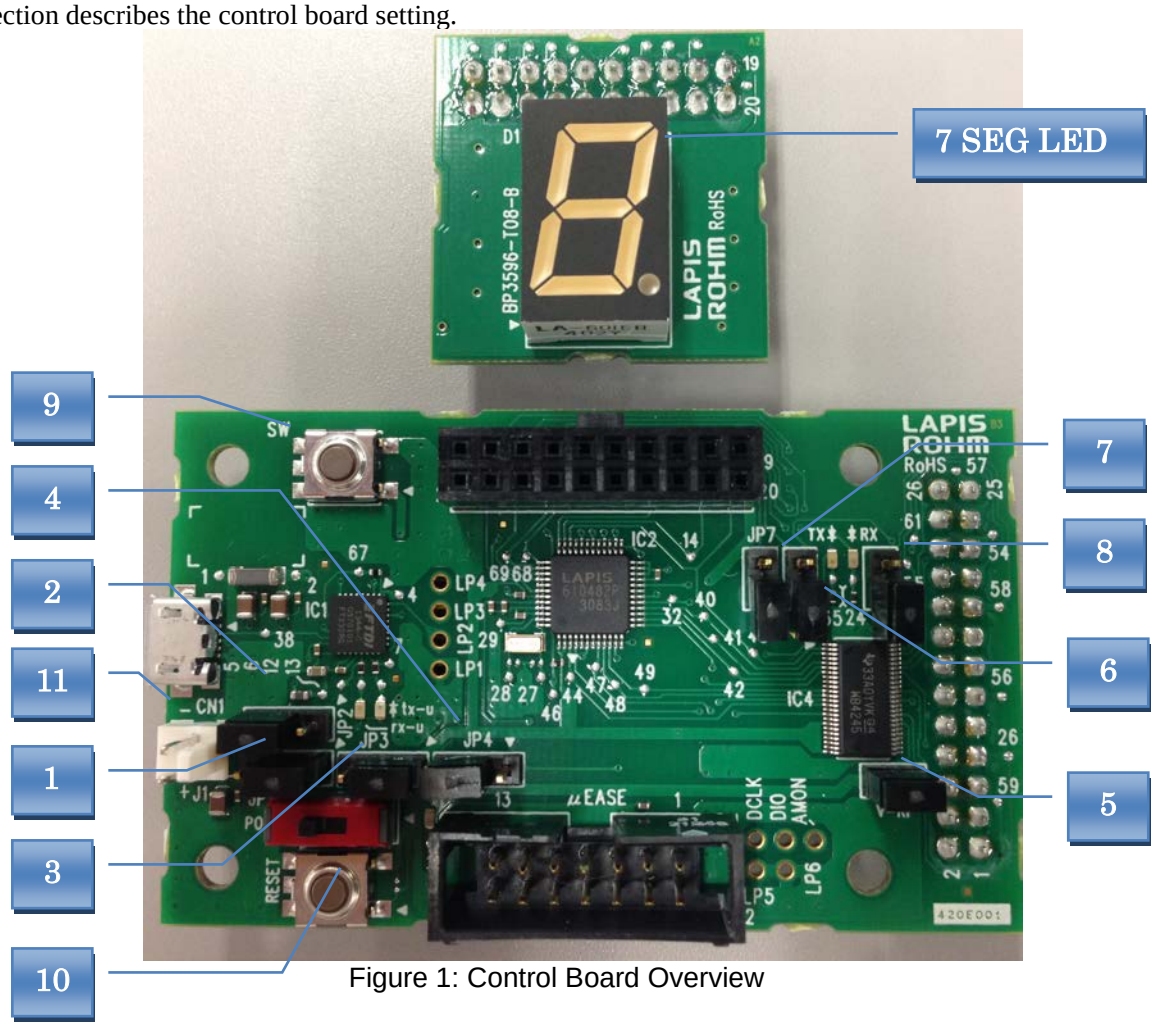


Figure 1: Control Board Overview

Table 1: Detailed Description of Control Board

No.	Symbol	Name	Function	Initial configuration
1	JP1	Main power supply setup	USB electric supply (1-2) and external electric supply (2-3)	1-2
2	JP2	External electric supply setup to JP1	Power supply terminal J1 (1-2) and for uEASE (2-3)	1-2
3	JP3	Evaluation board power supply setup	A main power supply (1-2) and the power supply terminal J1 (2-3) *1	1-2
4	JP4	RESET setup	uEASE (1-2) and RESET SW (2-3)	2-3
5	JP5 (V-RF)	Evaluation board power supply	The consumption current of an evaluation board is measured.	short
6	JP6	DIO signal connection	Connects DIO and MCU(short) *2	open
7	JP7	DCLK signal connection	Connects DCLK and MCU (short) *2	open
8	JP8	No use	Open *3	no jumper
9	SW	SW	General SW (future extension)	
10	RESET	RESET	Hard reset button	
11	J1	Power supply terminal	Power supply connector	

*1. *(2-3) is used when a test the voltage characteristic of an evaluation board.
*2. uses in DIO mode（future extension）
*3. It may break, when it is made to Short with products.

There are four modes of operation in this evaluation kit, and setup of a jumper differs for each mode.
Please set up a jumper correctly after referring to the following table.

Table 2: Mode of operation and a jumper setup

Mode	Function	Function			
		JP1	JP2	JP3	JP4
Usually mode (Initial condition)	all operate USB bus power	1-2	-	1-2	2-3
Debug mode	Uses uEASE	2-3	2-3	1-2	1-2
Demo mode	uses Battery BOX for the power supply terminal J1	2-3	1-2	1-2	2-3
Evaluation mode	Electric power is supplied to a control board from USB, and an evaluation board is supplied from the power supply terminal J1. (The power supply voltage of an evaluation board is changeable)	1-2	1-2	2-3	2-3

2.2. Sub-GHz LSI's Evaluation Board Setting Procedure

The Evaluation board is connected with the control board as shown below.

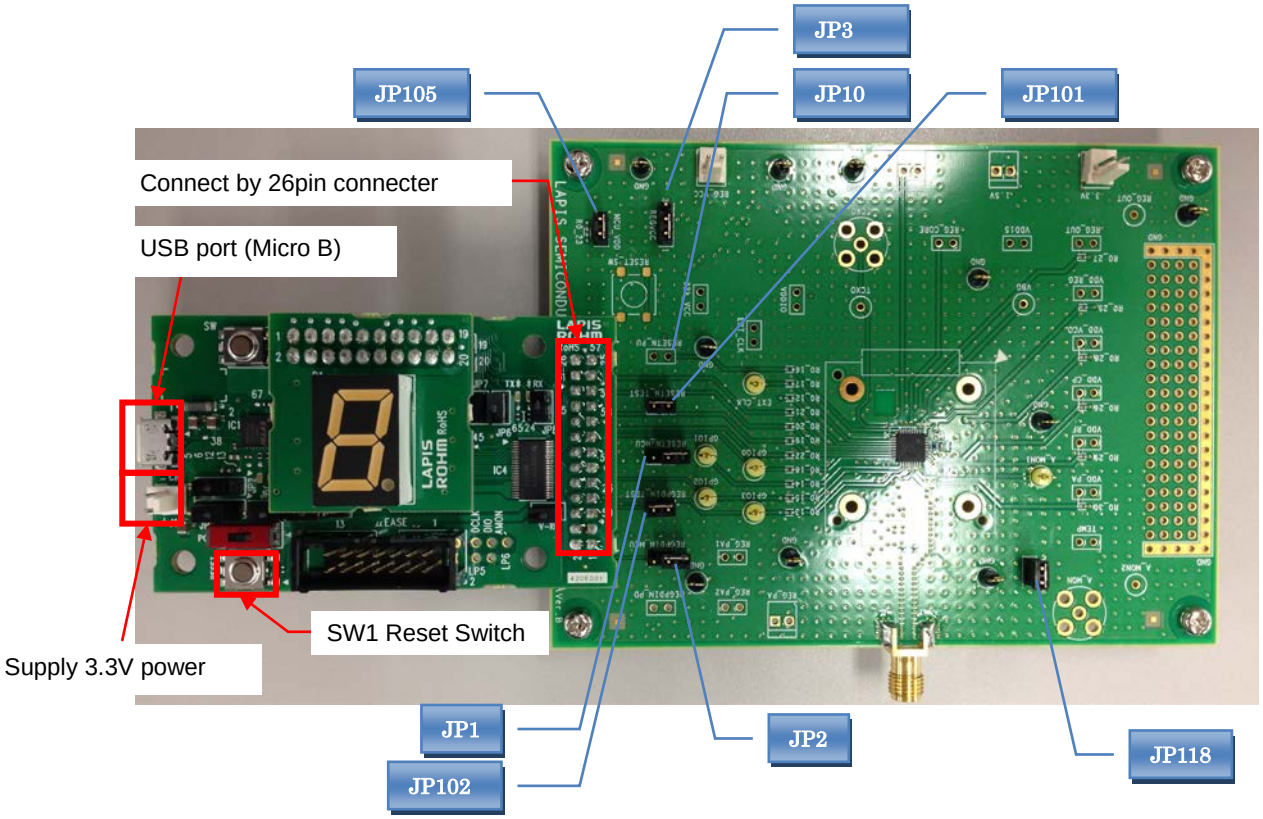
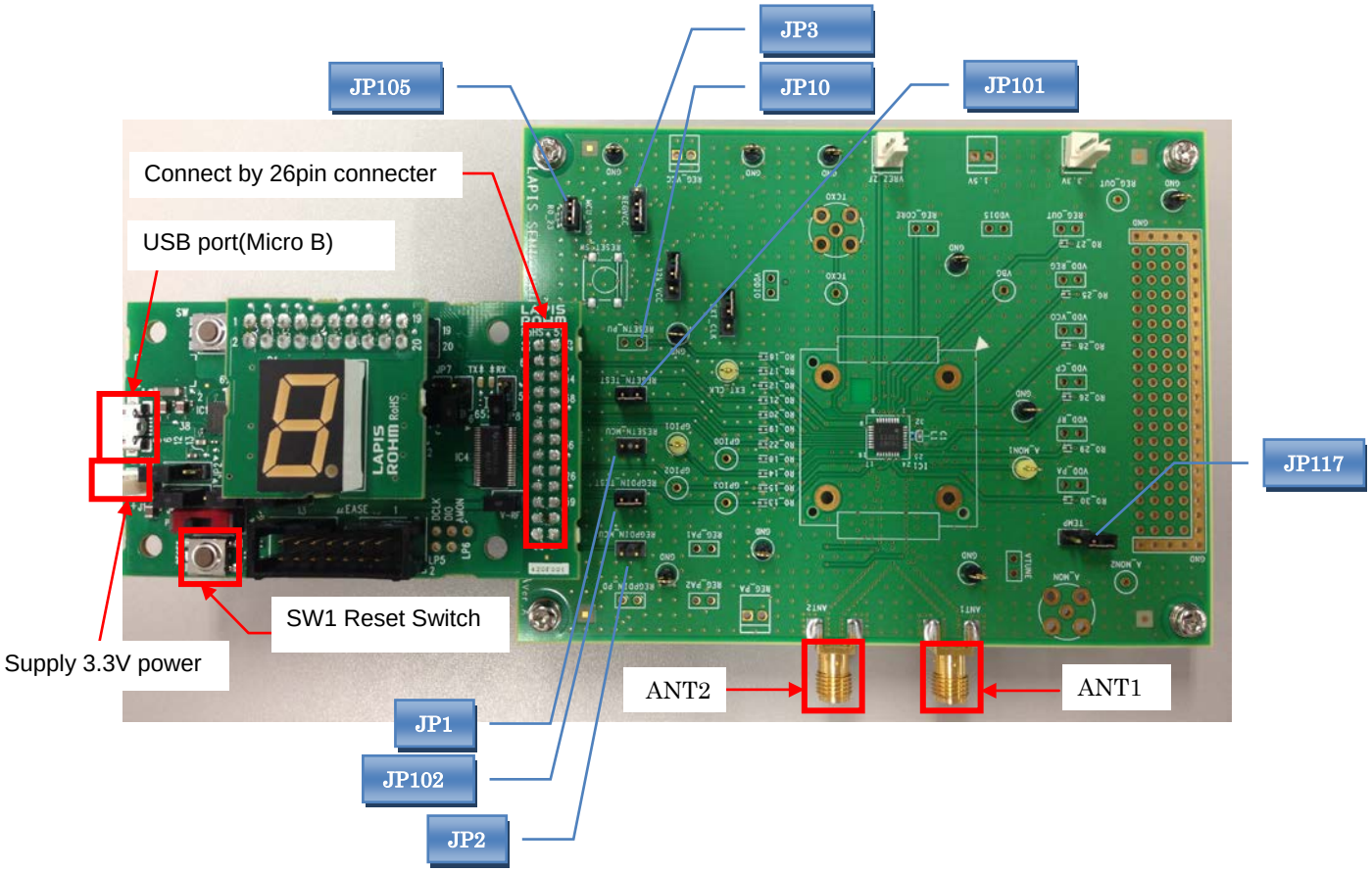


Figure 2: Evaluation Board Connection Overview

Table 3: Evaluation board jumper setting table
(ML7344/ ML7345/ML7345C/ML7345D/ML7404/ML7414)

JP No.	Silk	Recommended Jumper Setting	Remarks
JP1	RESETN_MCU	short	For old micro controller
JP2	REGPDIN_MCU	short	For old micro controller
JP3	REG_VCC	1-2short	TCXO internal power supply (3.3V) If TCXO is external power supplied from REG_VCC, 2-3 short.
JP101	RESETN_TEST	open	For micro controller
JP102	REGPDIN_TEST	open	For micro controller
JP104	RESETN_PU	open	
JP105	MCU_VDD	short	Micro controller and evaluation board power supply simultaneously (3.3V) If these are individual power supplied, open
JP118	VTUNE	short(ML7344)	
		open(except for ML7344)	

The ML7406 evaluation board is connected with the control board as shown below.



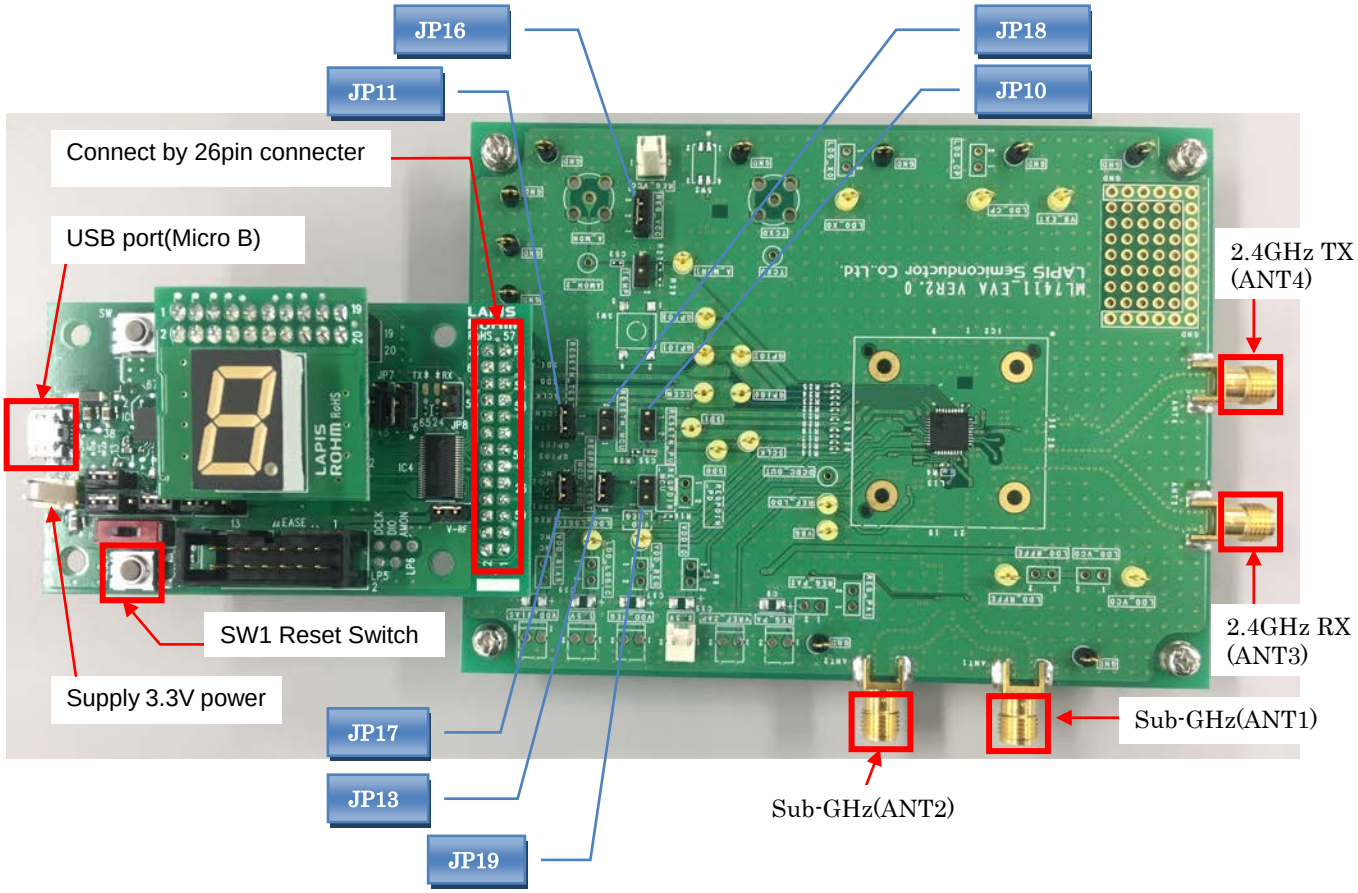
* When you do not use diversity function for Sub-GHz, please use ANT1.

Figure 3: ML7406 Evaluation Board Connection Overview

Table 4: Evaluation board jumper setting table (ML7406)

JP No.	Silk	Recommended Jumper Setting	Remarks
JP1	RESETN_MCU	short	For old micro controller
JP2	REGPDIN_MCU	short	For old micro controller
JP3	REG_VCC	1-2short	TCXO internal power supply (3.3V) If TCXO is external power supplied from REG_VCC, 2-3 short.
JP101	RESETN_TEST	open	For micro controller
JP102	REGPDIN_TEST	open	For micro controller
JP104	RESETN_PU	open	
JP105	MCU_VDD	short	Micro controller and evaluation board power supply simultaneously (3.3V) If these are individual power supplied, open
JP117	TEMP	open	Short when using thermometer

The ML7411 evaluation board is connected with the control board as shown below.



* When you do not use diversity function for Sub-GHz, please use ANT1.

Figure 4: ML7411 Evaluation Board Connection Overview

Table 5: Evaluation board jumper setting table (ML7406)

JP No.	Silk	Recommended Jumper Setting	Remarks
JP10	RESETN_PU	open	
JP11	RESETN_TEST	short	For micro controller
JP13	REGPDIN_TEST	short	For micro controller
JP16	REG_VCC	1-2short	TCXO internal power supply (3.3V) If TCXO is external power supplied from REG_VCC, 2-3 short.
JP17	MCU_VDD	short	Micro controller and evaluation board power supply simultaneously (3.3V) If these are individual power supplied, open
JP18	RESETN_MCU	open	For old micro controller
JP19	REGPDIN_MCU	open	For old micro controller

2.3. How to check connection

You can control the evaluation board using “WCT3” or “Tera Term”. The connection procedure when using each tool is shown below. “WCT3” is a GUI tool to control Sub-GHz LSI evaluation boards which are made in LAPIS Semiconductor Co., Ltd.

(1) WCT3 (GUI tool)

1. Supply 3.3V power supply.
   By short-circuiting “MCU_VDD” jumper, 3.3V is supplied to the evaluation board with USB bus power.
2. Reset the control board.
3. Start WCT3 (For WCT3 settings, refer to "2.4.1 Wireless Control Tool Setting".).
   WCT3 setup program creates "LAPIS WCT3" group to Start button to start application.
   Please click the icon of the article number of the RF LSI registered with the "LAPIS WCT3" group, and start WCT3.

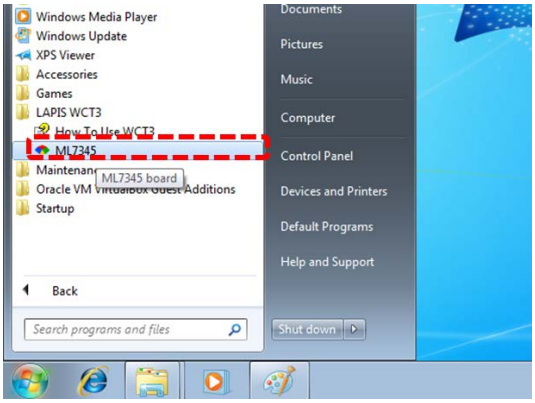


Figure 5: WCT3 group which WCT3 setup program made

4. Connect the evaluation board and PC.
   Push “Connect” button to connect to the evaluation board with the COM port displayed in the “Board Connection Setting”.
5. Verify the connection by a register read command. The connection is correct if confirm of “88” is displayed in response to the read command “RREG 0B”.

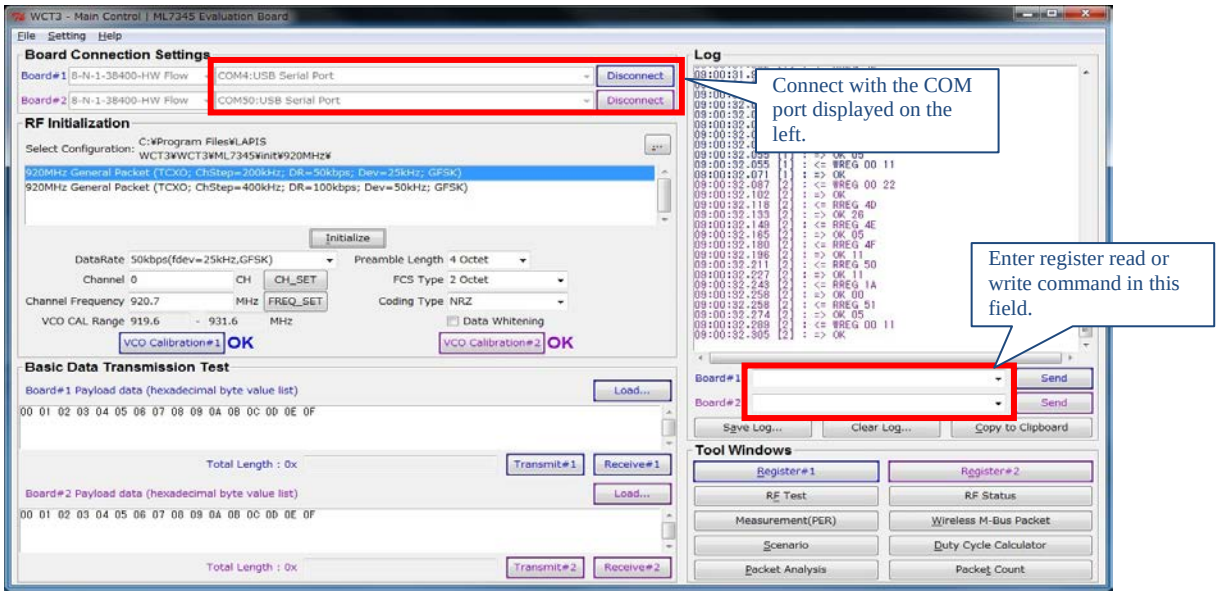


Figure 6: WCT3 main window

For details of WCT3, please refer to “Wireless Control Tool3 User’s manual”.

(2) Tera Term (terminal software)

1. Supply 3.3V power supply.
2. Reset the control board.
3. Start the terminal software (Tera Term).
4. Set the terminal software.
   * No prompt will be displayed by power-on, terminal software setting or reset.
5. Verify the connection by a register read command. The connection is correct if confirm of “88” is displayed in response to the read command “RREG 0B”.

* When a power supply is re-switched on, please reboot terminal software (Tera Term).

Figure 7: Connection Confirmation Image

The Tera Term serial port settings are shown below.
The red frame indicates required settings. Use Tera Term version 4.63 or higher.

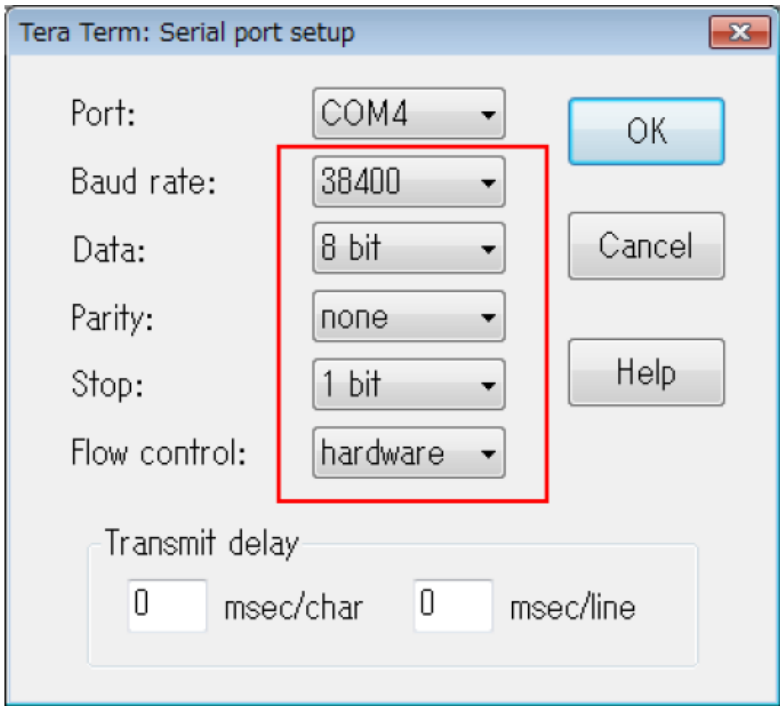


Figure 8: Tera Term Serial Port Setting Screen

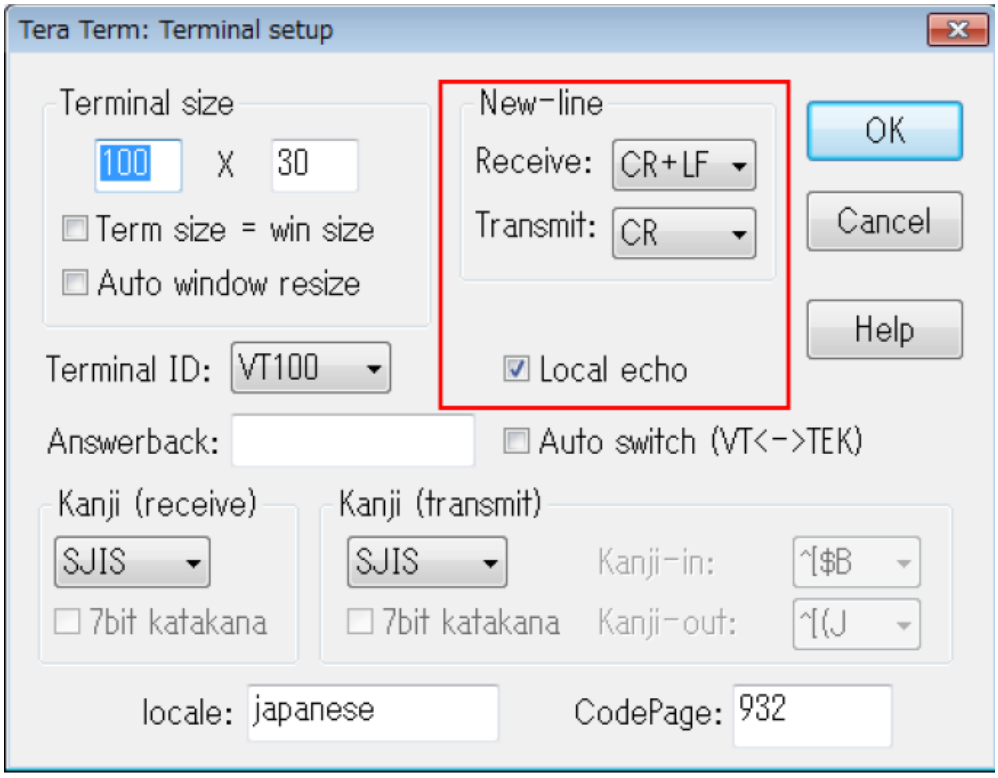


Figure 9: Tera Term Terminal Setting Screen

Revision History

Document No.	Issue Date	Page		Description
		Previous Edition	New Edition	
FEXL_SubGHz_EVA_startguide-01	Oct 10th, 2018	–	–	Initial version
6FEXL_SubGHz_EVA_startguide-02	Nov 20th, 2018	ii	ii	Add ML7411 in support product list
		–	4	Add jumper setting table for ML7344/ML7345/ML7345C/ML7345D/ML7404/ML7414
		–	5	Add jumper setting table for ML7406
		–	6	Add jumper setting table for ML7411 Evaluation board
		–	7-9	Modify structure of the chapter (How to check connection)