USER MANUAL

TELEMATICS CONTROL UNIT
JE-5030, JE-5031

Ver 1.0
7 Mar 2014

REVISION HISTORY

Ver.	Date	Name	Status
1.0	7 Mar 2014	M.Kanamori	Initial Release

Contents

1. INTRODUCTION

1.1 Overview
This document shows the user manual of the 'TCU'.

1.2 Acronyms

Acronym / Definition	Description
CL	Clarion
TCU	Telematics Communication(Control) Unit
CAN	Controller Area Network

2. SYSTEM OVERVIEW

2.1 System Diagram
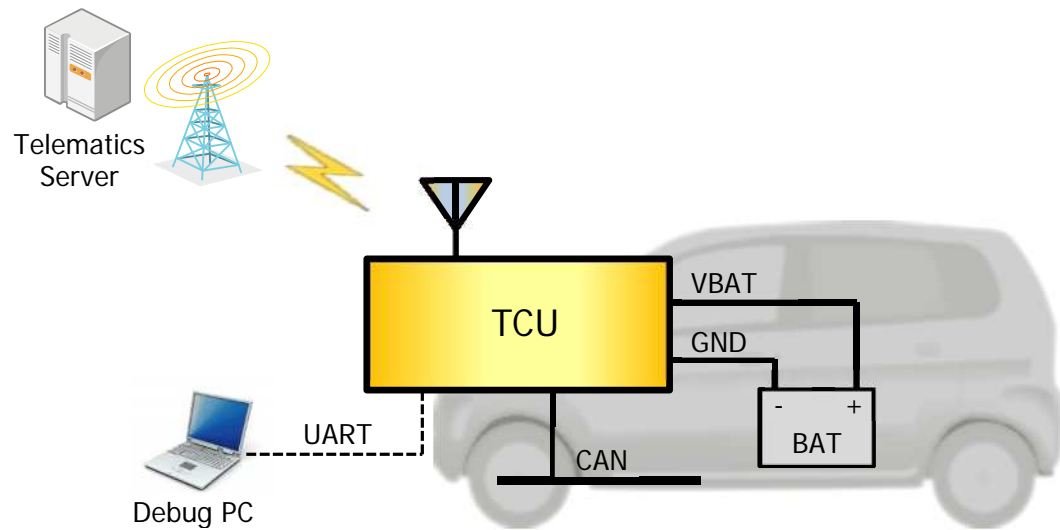
2.2 General Description

Item	Spec
Power Voltage	Typ. 13.5V (9V~16V)
Power Consumption (Max)	1000 mA
Module Information	Name: HE920-NA/EU Manufacturer: Telit Wireless Solutions
Frequency Band	UMTS / HSPA (WCDMA / FDD) 850/1700/1900 MHz(NA) 850/900/2100(EU) GSM / GPRS / EDGE Quad-band 850/900/1800/1900
Data	HSPA : Down: 14.4Mbps / Up: 5.76Mbps WCDMA : Down/Up: 384kbps EDGE : Down/Up: 236.8kbps GPRS : Down/Up: 85.6kbps
Antenna Gain (Max)	External Antenna (JE-5030): 0dBi Internal Antenna (JE-5031): 0dBi
CAN	ISO11898 Compliance / 500kbps
Temperature Range	-40°C to +85°C

2.3 TCU Lineup

   TCU has two models which are the external antenna model and the internal antenna model. The only different point is just only the antenna type.
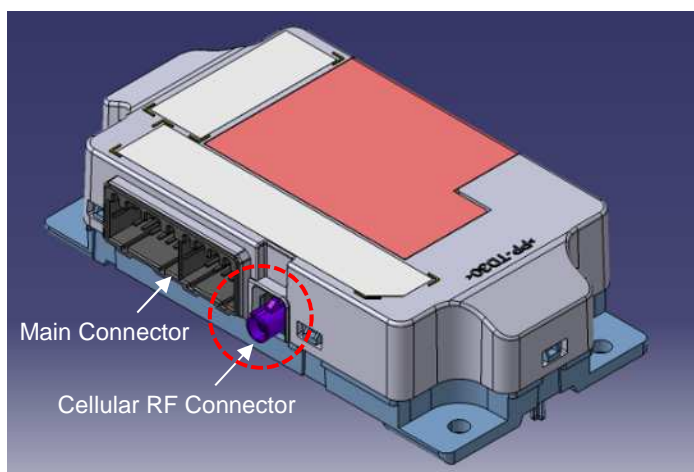
MODEL No.	MODEM	Antenna Type	Destination
JE-5030	HE920-NA	External Antenna	NA
JE-5031		Internal Antenna	

3. HARDWARE SPECIFICATION

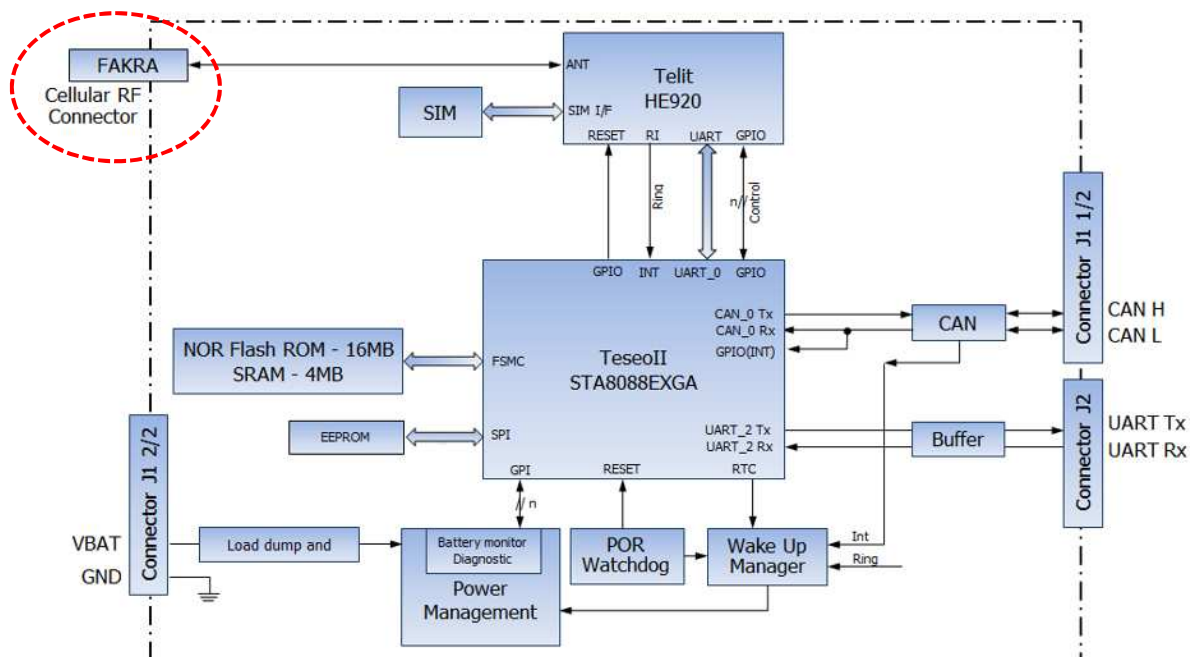## 3.1 External View and Block Diagram

3.1.1 External Antenna Model (JE-5030)
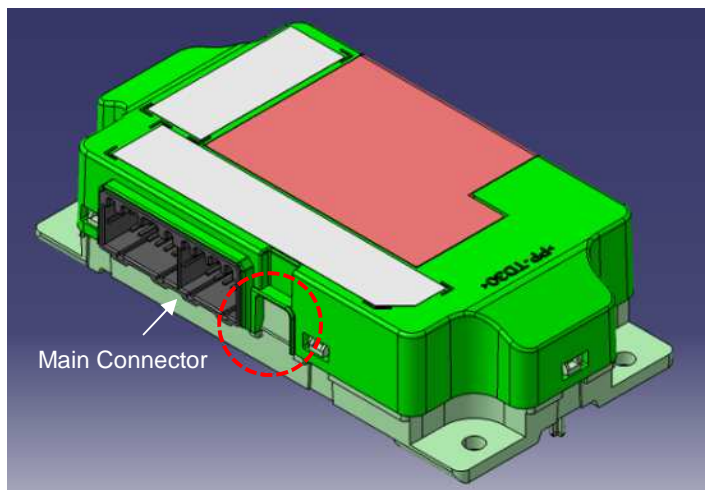
(1) External View

Main Connector

Cellular RF Connector

Size: 155.0x76.3x38.0 [mm]
Weight: under 200 [g]
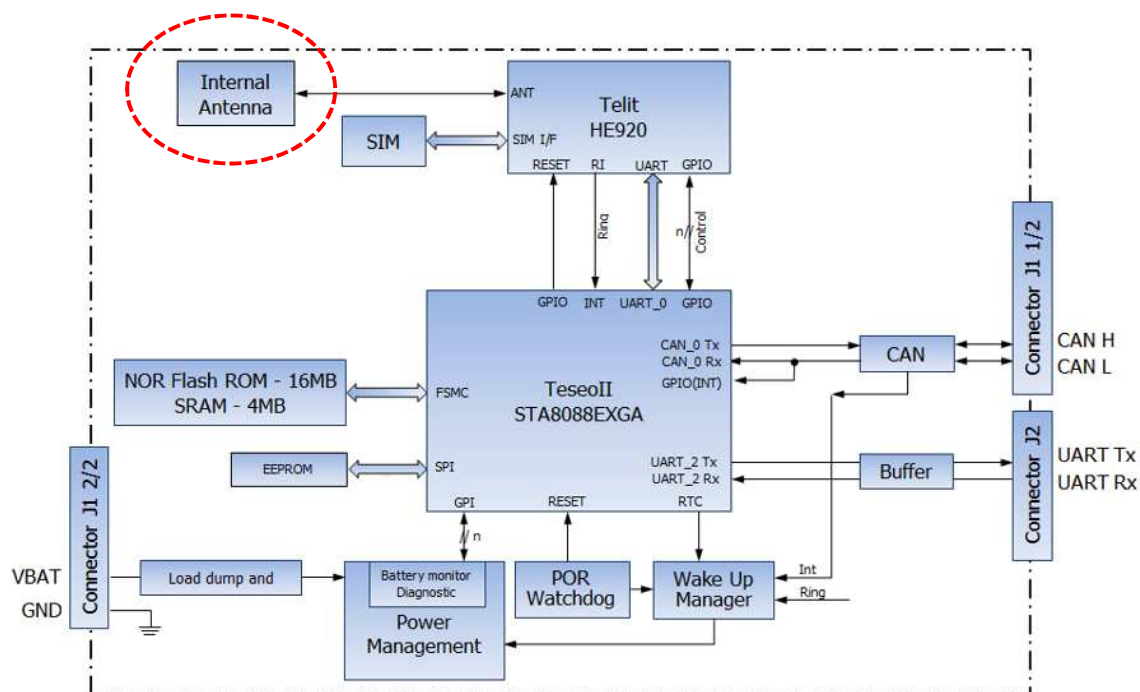
(2) Block Diagram

3.1.2 Internal Antenna Model (JE-5031)

(1) External View

Main Connector

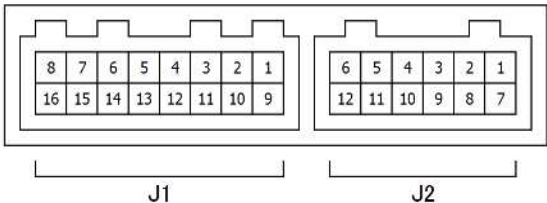**Size:** 155.0x76.3x38.0 [mm]
Weight: under 200 [g]

(2) Block Diagram

3.2 Connector

3.2.1 Main Connector

The below figure shows the pin-out of main connector of TCU.

Pin Number	Signal Name	I/O	Remarks
J1-1	VBATT	-	Vehicle Battery (+13.5V)
J1-2	Reserved	-	
J1-3	Reserved	-	
J1-4	Reserved	-	
J1-5	Reserved	-	
J1-6	Reserved	-	
J1-7	Reserved	-	
J1-8	CAN (H)	I/O	
J1-9	Reserved	-	
J1-10	Reserved	-	
J1-11	Reserved	-	
J1-12	Reserved	-	
J1-13	GND	-	Body Ground
J1-14	Reserved	-	
	Reserved	-	
J1-15	Reserved	-	
J1-16	CAN (L)	I/O	
J2-1	Reserved	-	
J2-2	Reserved	-	
J2-3	Reserved	-	
J2-4	Reserved	-	
J2-5	Reserved	-	
J2-6	Reserved	-	
J2-7	Reserved	-	
J2-8	Reserved	-	
J2-9	Reserved	-	
J2-10	Reserved	-	
J2-11	UART(Tx)	O	for Debug
J2-12	UART(Rx)	I	for Debug

3.2.2 Cellular RF Connector (JE-5030)

The following figure shows the cellular RF connector which is based on FAKRA-D. It is used only for the external antenna model (JE-5030).
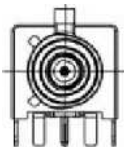
4. OPERATING CONNECTION FOR DEBUG

4.1 Evaluation Environment

The following charts show the example of connection diagram for debugging. TCU can be powered up on the condition as descripted in the chapter 2.2 and debugged over the UART by using the external PC. The only different point between the external antenna model and the internal antenna model is the way to establish the RF connection.
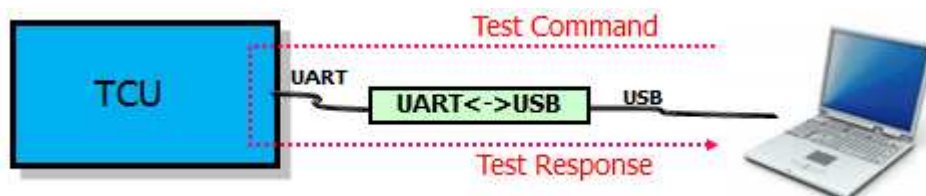
(1) External Antenna Model (JE-5030)
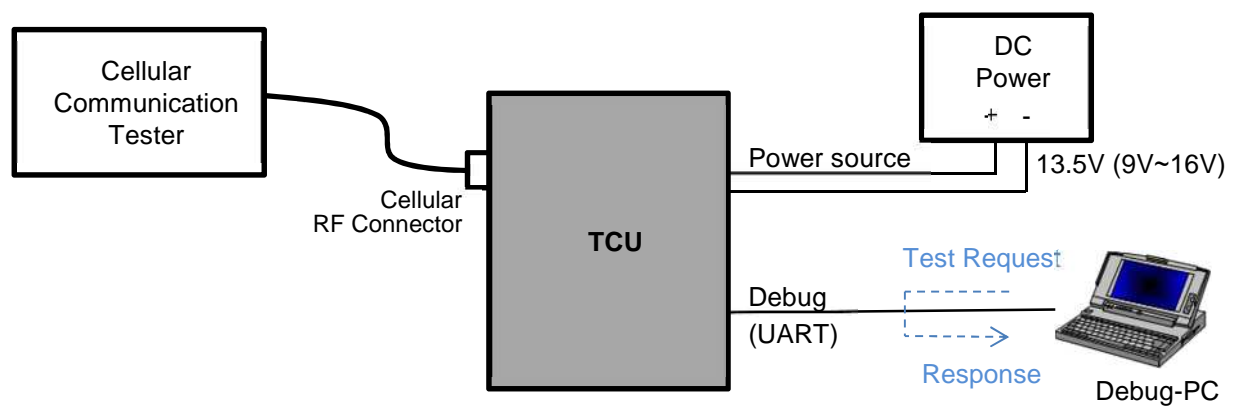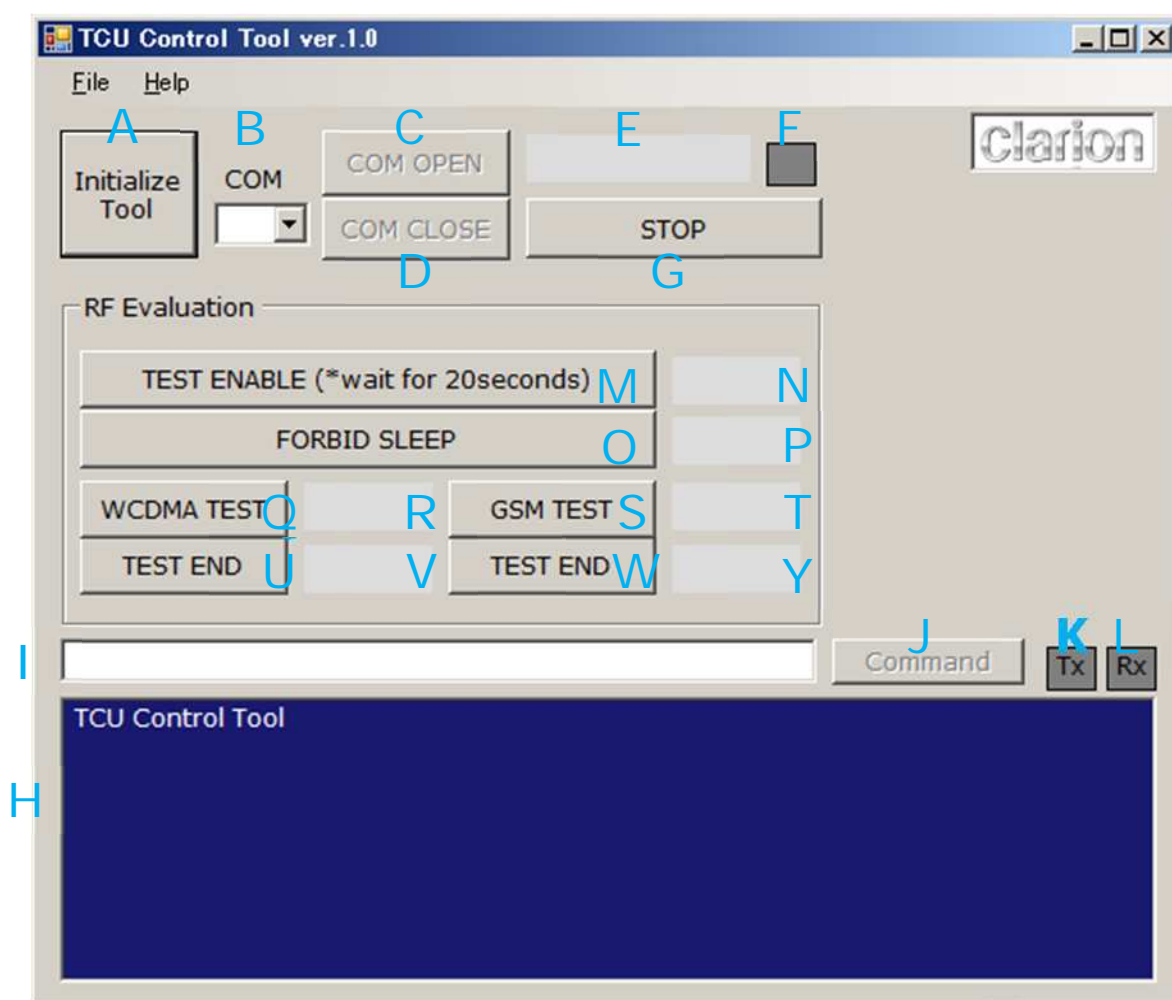

(2) Internal Antenna Model (JE-5031)
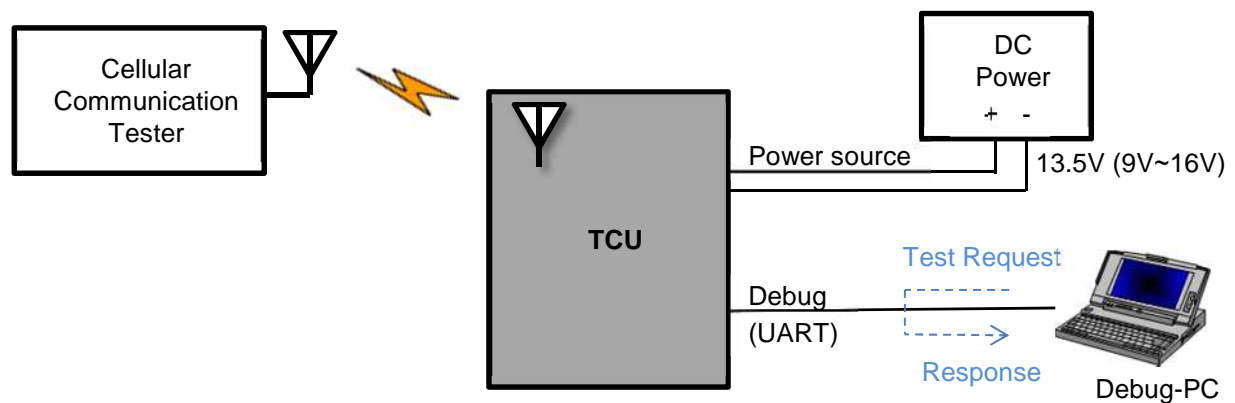
4.2 TCU Control Tool

TCU can be controlled by the dedicated application "TCU Control Tool", which is the Windows application delivered by Clarion.
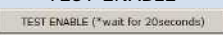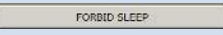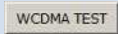

4.2.1 Operation Manual
Here is the view of the TCU Control Tool as below.

Description of the button and the enterable white box in the TCU Control Tool:

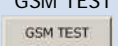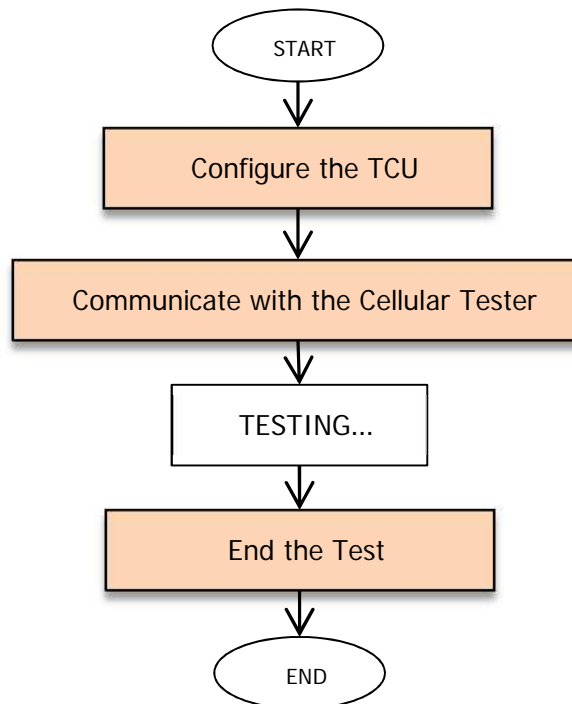| #	Name and View	Type	Description
A	Initialize Tool	Button	The 'Initialize Tool' is the button to initialize the TCU Control Tool.
B	COM	Enterable box	The 'COM' is the enterable white box to select the serial port number. It is able to be selected from the drop-down list or be keyed by a keyboard.
C	COM OPEN	Button	The 'COM OPEN' is the button to open the COM port number selected on the 'COM'
D	COM CLOSE	Button	The 'COM CLOSE' is the button to close the COM port number selected on the 'COM'
E	Tool Status Message	Display	The 'Tool Status Message' is the display to show the status of TCU Control Tool. A message is visible when the TCU Control Tool is running.
F	Tool Running Indicator	Display	The 'Tool Running Indicator' is the display to show the running condition of the TCU Control Tool. When TCU Control Tool is running, the Tool Running Indicator is blinking on and off. This is just only for reference.
G	STOP TOOL	Button	The 'STOP TOOL' is the button to stop the TCU Control Tool.
H	Command Display	Display	The 'Command Display' is the display to show the dialogue between TCU and the TCU Control Tool.
I	Command Box	Enterable box	The 'Command Box' is the enterable box to enter the command you want to send to TCU.
J	Send Command	Button	The 'Send Command' is the button to send the text of Command Box to TCU.
K	TX STATE	Display	The 'TX STATE' is the display to show the condition of sending a command from the TCU Control Tool to the TCU. While the TCU Control Tool is sending a command the TX STATE is colored green.
L	RX STATE	Display	The 'RX STATE' is the display to show the condition of receiving a command from the TCU to the TCU Control Tool. While the TCU Control Tool is receiving a command the RX STATE is colored orange.
M	TEST ENABLE	Button	The 'TEST ENABLE' is the button to enter the TCU in TEST ENABLE MODE. The TCU is able to accept sending/receiving of the other commands during the TEST ENABLE MODE. The TEST ENABLE MODE is reset after TCU restarted.
N	RES TEST ENABLE	Display	The 'RES TEST ENABLE' is the display to show the result message of the TEST ENABLE. If the TEST ENABLE is passed, the word 'OK' is displayed in the RES TEST ENABLE. It takes 20senconds to get the result after powered +13.5V.
O	FORBID SLEEP	Button	The 'FORBID SLEEP' is the button to enter the TCU in FORBID SLEEP MODE. The TCU is able to be working during FORBID SLEEP MODE. The FORBID SLEEP MODE is reset after TCU restarted.
P	RES FORBID SLEEP	Display	The 'RES FORBID SLEEP' is the display to show the result message of the FORBID SLEEP. If the FORBID SLEEP is passed, the word 'OK' is displayed in the RES FORBID SLEEP.
Q	WCDMA TEST	Button	The 'WCDMA TEST' is the button to enter the TCU in WCDMA TEST MODE. The TCU is able to communicate with WCDMA signaling tester during WCDMA TEST MODE. The WCDMA TEST MODE is kept after TCU restarted. The WCDMA TEST MODE is stored in the non-volatile memory.
R	RES WCDMA TEST	Display	The 'RES WCDMA TEST' is the display to show the result message of the WCDMA TEST. If the WCDMA TEST is passed, the word 'OK' is displayed in the RES WCDMA TEST.
S	WCDMA TEST END	Button	The 'WCDMA TEST END' is the button to return the TCU in NORMAL MODE. The TCU should be entered in NORMAL MODE when the test of connection with tester is ended.
T	RES WCDMA TEST END	Display	The 'RES WCDMA TEST END' is the display to show the result of the RES WCDMA TEST END. If the WCDMA TEST END is passed, the word 'OK' is displayed in the RES WCDMA TEST END.
U	GSM TEST	Button	The 'GSM TEST' is the button to enter the TCU in GSM TEST MODE. The TCU is able to communicate with GSM signaling tester during GSM TEST MODE. The GSM TEST MODE is kept after TCU restarted. The GSM TEST MODE is stored in the non-volatile memory.
V	RES GSM TST	Display	The 'RES GSM TEST' is the display to show the result message of the GSM TEST. If the GSM TEST is passed, the word 'OK' is displayed in the RES GSM TEST.
W	GSM TEST END	Button	The 'GSM TEST END' is the button to return the TCU in NORMAL MODE. The TCU should be entered in NORMAL MODE when the test of connection with tester is ended.
Y	RES GSM TEST END	Display	The 'RES GSM TEST END' is the display to show the result of the RES GSM TEST END. If the GSM TEST END is passed, the word 'OK' is displayed in the RES GSM TEST END.

4.2.2 Procedure

TCU can be controlled according to the below procedure by using "TCU Control Tool".
Test the TCU according to the flow chart as below.

```
                        ┌─────────────┐
                        │    START     │
                        └─────────────┘
                               │
                               ▼
                 ┌───────────────────────────┐
                 │      Configure the TCU      │
                 └───────────────────────────┘
                               │
                               ▼
             ┌───────────────────────────────────┐
             │ Communicate with the Cellular Tester │
             └───────────────────────────────────┘
                               │
                               ▼
                 ┌───────────────────────────┐
                 │         TESTING...          │
                 └───────────────────────────┘
                               │
                               ▼
                 ┌───────────────────────────┐
                 │         End the Test        │
                 └───────────────────────────┘
                               │
                               ▼
                        ┌─────────────┐
                        │     END      │
                        └─────────────┘
```

Procedure of the RF TEST

(1) Configure the TCU

The below is the procedure to configure the TCU to establish the RF communication with the cellular tester.

1. Setup the evaluation environment according to chapter 4.1 and Appendix C.

2. Start the program 'TCU Control Tool'.

3. Click the button **A**.

4. Select the COM port number in the **B**. COM port name is 'USB Serial Port'. It can be found in the device manager on windows PC.

5. Click the button **C**. And wait until 'ACTIVE' is displayed on **E**.

6. Supply DC Power 13.5V(9V~16V) to the TCU.

7. Click the button **M**. And wait to until 'ACTIVE' is displayed on **N**.

   Note: It can take about 20seconds to show the result OK.

8. Click the button **O**. And wait until 'OK' is displayed on **P**.

9. (i) In the case of communication with WCDMA signaling;

   Click the button **Q**. And wait until 'OK' is displayed on **R**.

   (ii) In the case of communication with GSM signaling;

   Click the button **S**. And wait until 'OK' is displayed on **T**.

10. Click the button **D**.

11. Power off the TCU.

12. Configuration of TCU is completed.
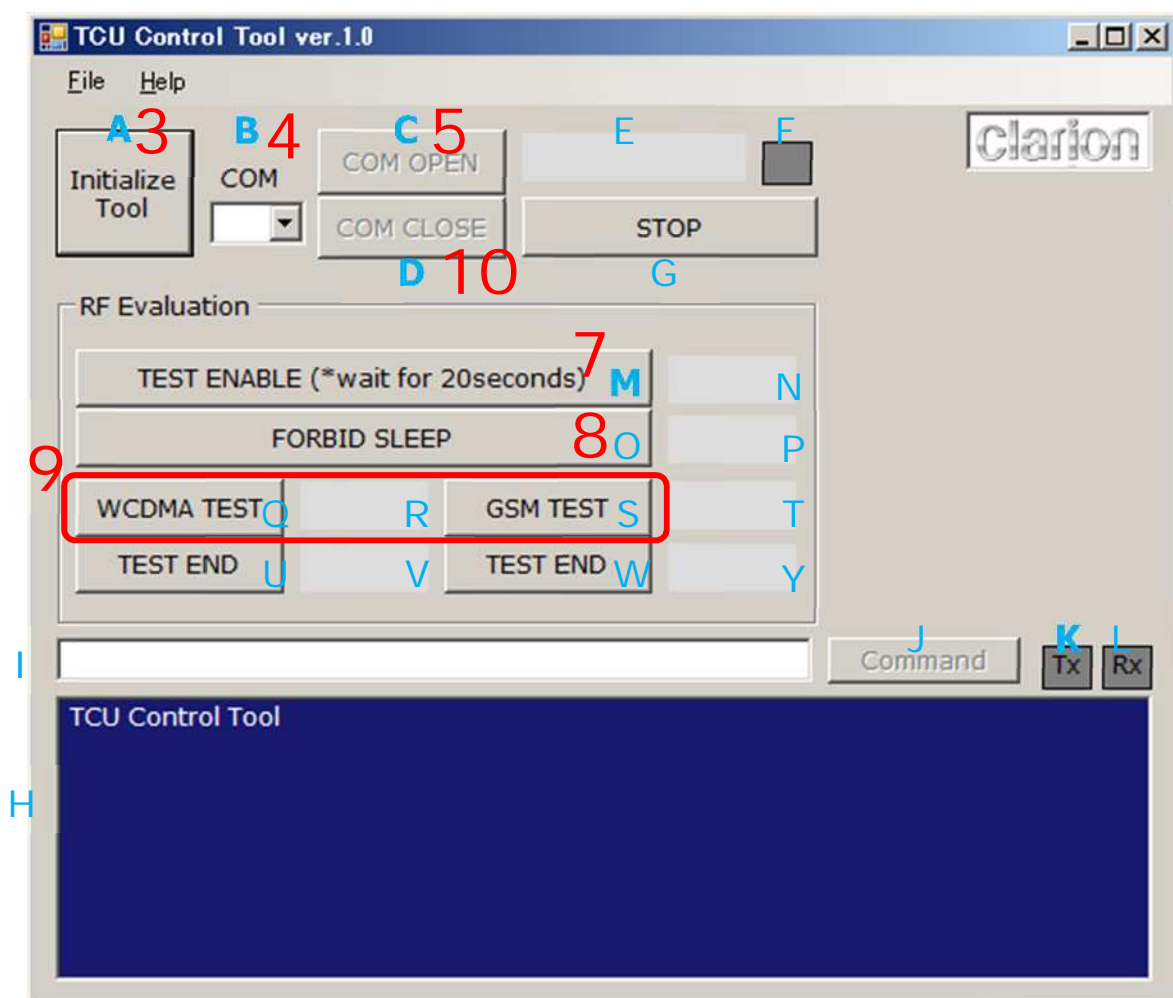
(2) Procedure to Communicate with the Cellular Tester

In order to establish the RF signaling connection with the cellular tester, the dedicated configuration should be needed, because TCU implements the embedded SIM chip for the real commercial network. The below is the procedure to establish the RF signaling connection with the cellular tester. Besides, the detail information of the configuration of the cellular tester is shown in Appendix A.

1. Configure the setting of the cellular tester referring to the Appendix A.

2. Click the button **C**. And wait until 'ACTIVE' is displayed on **E**.

3. Supply DC Power 13.5V(9V~16V) to the TCU.

4. Click the button **M**. And wait until 'OK' is displayed on **N**.

   Note: It can take about 20seconds to see the result OK.

5. Click the button **O**. And wait until 'OK' is displayed on **P**.

6. Execute the RF test.
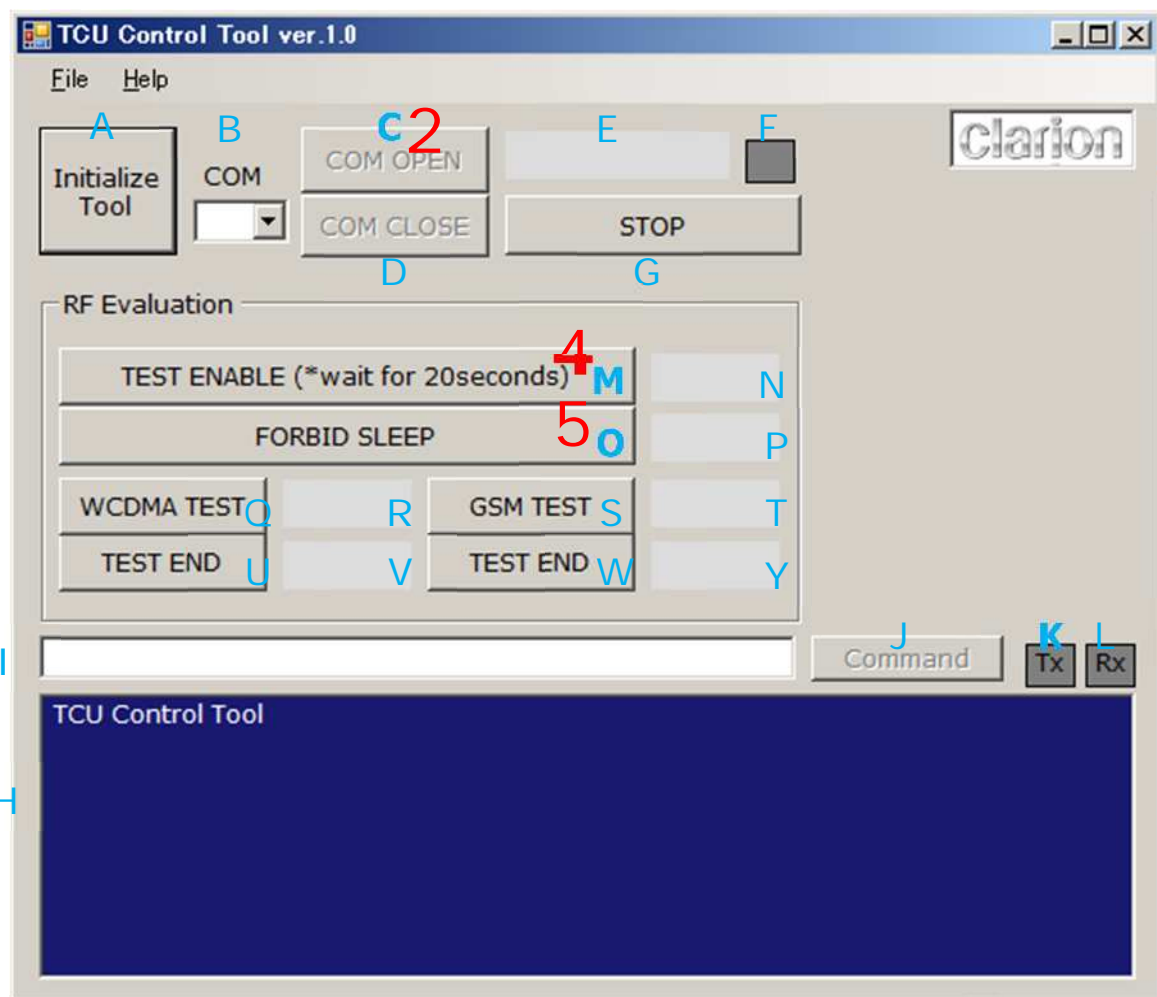
(3) Procedure to End the Test

　The below is the procedure to end the test after the testing is done.

1. (i) In the case of communication with WCDMA signaling;

   Click the button **U**. And wait until 'OK' is displayed on **V**.

   (ii) In the case of communication with GSM signaling;

   Click the button **W**. And wait until 'OK' is displayed on **Y**.

2. Click the button **D**.

3. Power off the TCU.
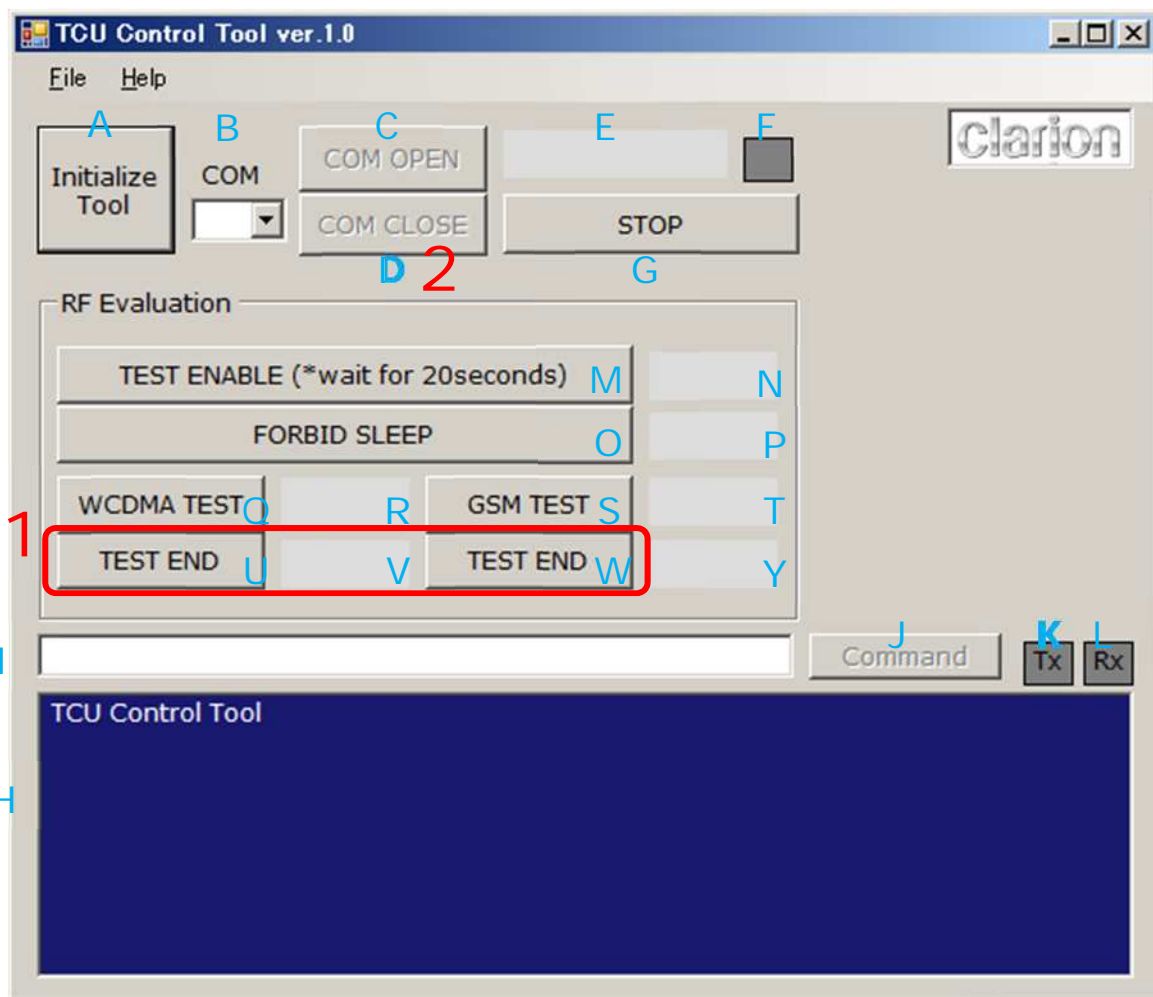
5. FCC/IC Regulatory notices

Compliance Statements:

This device complies with Part 15 of the FCC. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

Modifications not expressly approved by Clarion Co., Ltd. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, users and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radiofrequency radiation exposure Information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Information sur l'exposition au rayonnement electromagnetique :

Cet equipement est conforme aux limites d'Insdustrie Canada concernant l'exposition aux rayonnements electromagnetiques dans un environnement non controle.

L'equipement doit etre installe et utilise a une distance minimum de 20 cm entre le transmetteur et votre corps.

Ce transmetteur ne doit pas etre place au meme endroit ou utilise simultanement avec un autre transmetteur ou antenne.

CAN ICES-3 (B)/NMB-3(B)

Appendix A. Configuration of Cellular Tester for WCDMA Signaling Connection

As described above, TCU implements the embedded SIM (eSIM) chip for the real commercial carrier, so the dedicated configuration of the cellular tester (pseudo base station) should be needed in order to establish the RF connection with it.

Specifically, the process of authentication and security has to be skipped according to the below configuration of the cellular tester.

1. **CMW500 (ROHDE&SCHWARTZ)**

   [Network]
   [Security Settings]
   *- Authentication: **OFF***
   *- Security: **OFF***

2. **MT8820/MT8815(ANRITSU)**

   [Call Processing Parameter]
   *- Integrity Protection: **OFF***
   *- Ciphering: **OFF***

Appendix B. Installation of the driver and the application to PC for debug

As described above, TCU should be controlled by an external PC for debug when RF testing.

Before the test, execute the setup of the PC according to the below.

Please note that an external PC for debug should be Windows PC.

1.   DRIVER

Double-click the file 'CDM v2.08.30 WHQL Certified.exe', which is the driver installer for the serial cable CL delivered by CL.

Install the driver according to instructions on screen.

2.   Application

Double-click the file 'setup.exe' in the folder 'TCU Control Tool Ver.**', which is the installer of the TCU Control Tool.

Install the driver according to instructions on screen.

Appendix C. Accessories for Evaluation

As described above, the following accessories are used for evaluation.

Please connect according to the below when you test the TCU.

1. Power Cable

A colored YELLOW wire with banana plug should be connected to DC Power 13.5V (9~16V).

A colored BLACK wire with banana plug should be connected to the GND.

The other wires except them are not used and should be opened.

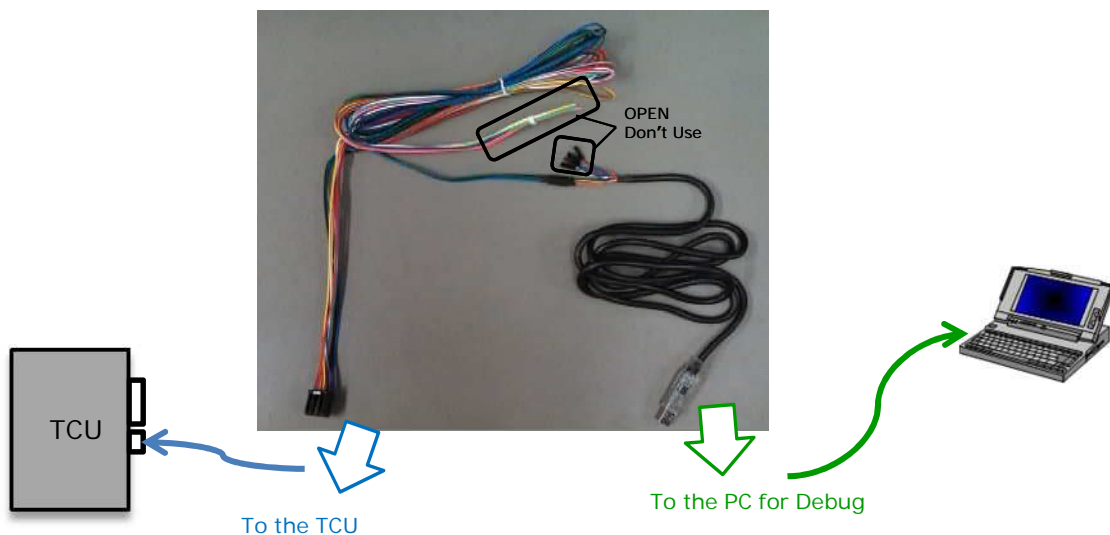Refer to chapter 3.2 about the connector pin-out of TCUs

OPEN Don't Use

TCU

To the TCU

To the GND

To the DC Power 13.5V

DC Power + −
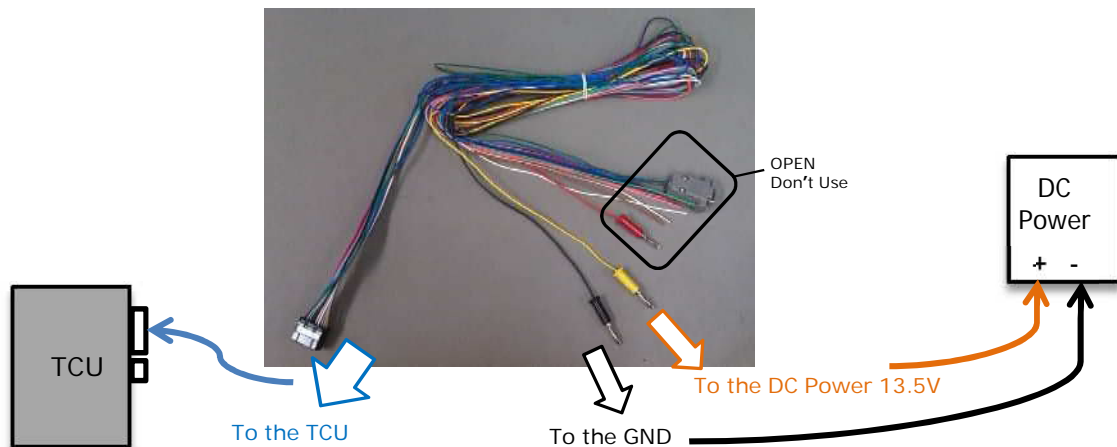
2. Serial Cable

The only three wires are used for serial communication.

The other wires except them are not used and should be opened.

Refer to chapter 3.2 about the connector pin-out of TCU.

OPEN Don't Use

TCU

To the TCU

To the PC for Debug

3. Antenna

This is for the external antenna model (JE-5030).

In the case of 'wireless' communication with the cellular tester;
The antenna is connected to the TCU via the SMA gender changer female/female adapter and FAKRA-SMA conversion cable.

TCU

To the TCU

Cellular Communication Tester

In the case of 'wired' communication with the cellular tester;
The TCU is connected to the cellular tester via the FAKRA-SMA conversion cable.

TCU

To the TCU

To the Cellular Tester

Cellular Communication Tester