

User Manual

DA16200 AT GUI Tool

DA16200 AT GUI Tool**Contents**

Contents	2
Figures	3
Terms and Definitions	4
References	4
1 Introduction	5
1.1 Certification mode	5
1.2 Network mode	5
2 How to Connect	5
2.1 USB to Serial Driver	5
2.2 Setup Serial Terminal Utility.....	6
3 How to Run GUI for DA16200 Board	7
3.1 Board Setup	7
3.2 Board Connection	8
3.3 RF Certification Mode Setup	9
3.3.1 TX Test Mode	9
3.3.2 RX Test Mode.....	12
3.4 Network Mode Setup.....	12
3.4.1 Station Mode.....	13
3.4.2 AP Mode	14
3.5 OTP Mode Setup	16
4 Regulatory Approval	17
4.1 Federal Communication Commission Interference Statement	17
4.1.1 FCC Caution:	17
4.1.2 FCC Radiation Exposure Statement:	17
4.1.3 End Product Labeling	17
4.1.4 Manual Information to the End User	18
4.2 Canada Statement	18
4.2.1 Caution Exposure:	18
4.2.2 The final end product must be labelled in a visible area with the following:	18
Revision History	19

Figures

Figure 1: Terminal Configuration	6
Figure 2: Development Kit connections	7
Figure 3: AT GUI	8
Figure 4: RS232 Setup - Disconnected	8
Figure 5: RS232 Setup - Connected	8
Figure 6: Debug Console - Connected	8
Figure 7: Certification Mode Configuration	9
Figure 8: Certification Mote Tab	9
Figure 9: Tx Test Mode Configuration	9
Figure 10: Debug Console - Tx mode	10
Figure 11: Start & Stop Tx	11
Figure 12: Debug Console - Start Tx	11
Figure 13: Debug Console - Stop Tx	11
Figure 14: Rx Configuration	12
Figure 15: Network Mode Configuration	12
Figure 16: Network Mode Tab	13
Figure 17: Debug Console - Station Mode	13
Figure 18: Station Mode - SCAN	13
Figure 19: Station Mode - Choose AP and Connect	14
Figure 20: Debug Console - Connect to AP	14
Figure 21: Debug Console - AP Mode	14
Figure 22: AP Configuration	14
Figure 23: Debug Console - AP Configuration	15
Figure 24: DHCP Configuration	15
Figure 25: Debug Console - DHCP Configuration	15
Figure 26: OTP Mode	16

DA16200 AT GUI Tool

Terms and Definitions

GUI	Graphical User Interface
UART	Universal Asynchronous Receiver Transmitter
SSID	Service Set Identifier.
DHCP	Dynamic Host Configuration Protocol
AP	Access Point
USB	Universal Serial Bus
MFC	Microsoft Foundation Class

References

- [1] DA16200, Datasheet, Dialog Semiconductor
- [2] DA16200, SDK_Programmer_guide, User Manual, Dialog Semiconductor
- [3] DA16200, EVK_User_Guide, Dialog Semiconductor
- [4] DA16200, AT Command User Guide, Dialog Semiconductor

DA16200 AT GUI Tool

1 Introduction

This section introduces the subject or problem described in this document. The DA16200 GUI tool (DA16200_GUI_yyyymmdd.exe) lets users control DA16200 EVK in GUI environment. It provides two modes of operation: Certification mode and Network mode

1.1 Certification mode

This mode is for Wi-Fi RF test (Tx power, Rx sensitivity, etc.) aka “TEST Mode”.

1.2 Network mode

With this mode, you can test Station or AP mode of DA16200

- AP mode
SoftAP test with configurable parameters like SSID, security, DHCP Server, etc.
- Station mode
STA test; search and connect to an Access Point & check / test STA function.

2 How to Connect

2.1 USB to Serial Driver

The DA16200 evaluation board supports both serial port (UART) and USB port (default USB). The user just needs to connect with a micro USB cable and then two COM ports will be detected automatically.

- If USB port is used, install the FT232 Driver for windows
- In most cases, it will be installed automatically
The FTDI driver for the FT232 FTDI chip used on the Pro-DK motherboard can be found at following download link: http://www.ftdichip.com/Drivers/CDM/CDM21224_Setup.zip

After connecting the PC and the EVB board, two ports will be detected.

- Please see your EVK User Guide to find the UART1 port. GUI tool is using UART1 port.
The other port (UART0) is for debug console connection. This port is used for firmware update.
- If you want to update with a new DA16200 firmware, please refer to “DA16200 EVK User Guide”.

RF certification program was developed by MFC. Therefore, this program may need to install the MFC library package.

- You can download the Visual Studio Redistributable file in Microsoft soft home page
<https://www.microsoft.com/en-us/download/details.aspx?id=48145>
- Select windows OS type (32bit or 64bit) and download & install.

DA16200 AT GUI Tool

2.2 Setup Serial Terminal Utility

Users can control DA16200 by using a serial terminal tool (e.g. Teraterm or SecureCRT) and the following configurations are required to connect to the console of DA16200.

- Port: Com port number on Windows system
- Baud rate: 115,200 bps
- Data bits: 8 bits
- Parity: None
- Stop bits: 1 bit
- Flow control: None

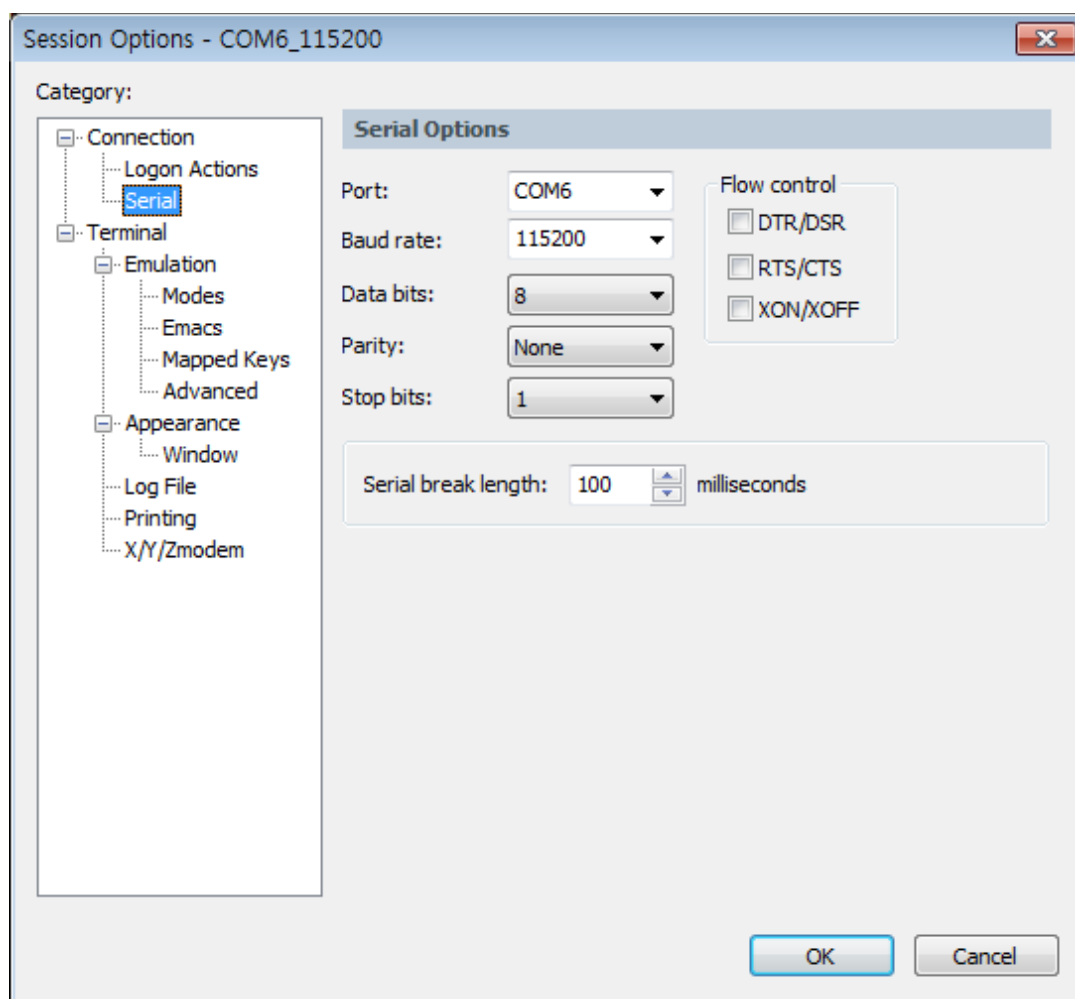


Figure 1: Terminal Configuration

When the DA16200 board is connected, two COM ports will be detected on the Windows machine. One (UART0) is for console command and the other (UART1) is for AT command. Normally, the large number COM port is for the AT commands and higher number COM port is for the console.

DA16200 AT GUI Tool

3 How to Run GUI for DA16200 Board

3.1 Board Setup

DA16200 AT GUI program is a single executable file.

Note: If an error message which tells “a DLL file (e.g. vcruntime140.dll or mfc1400u.dll) is missing” prompts when running this tool, You need to install Microsoft Visual Studio redistributable package (<https://www.microsoft.com/en-us/download/details.aspx?id=48145>) or copy the dll file into the Windows system folder (C:\Windows\System32 or C:\Windows\SysWOW64).

Here is the program setup sequence.

- DA16200 Development Kit is connected to the host PC over the connector, as shown in Figure 2

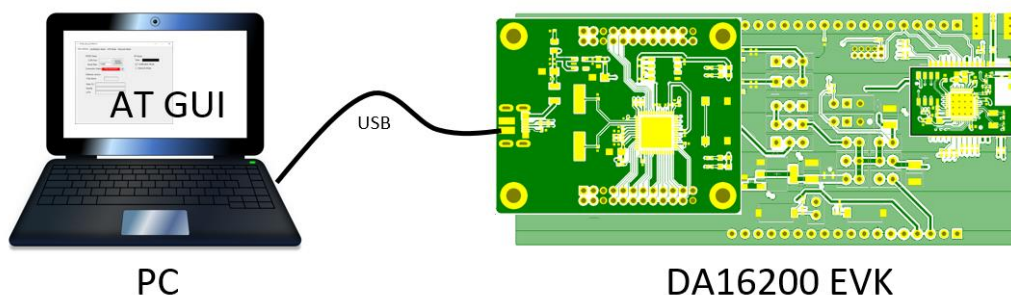
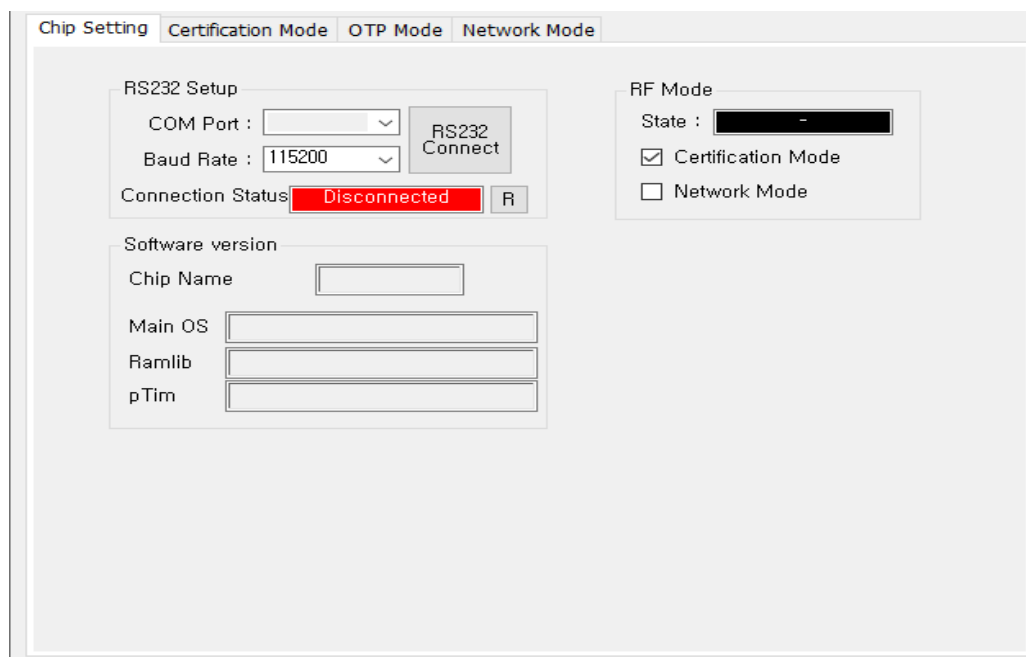


Figure 2: Development Kit connections

Note) please refer to EVK User Guide to check the port.

- Execute AT GUI program



DA16200 AT GUI Tool

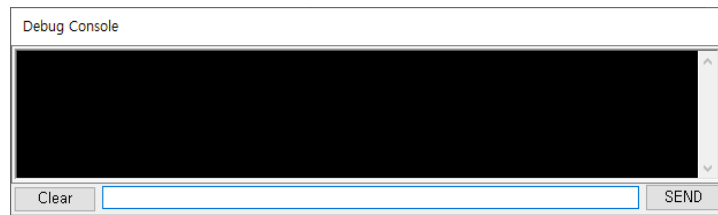


Figure 3: AT GUI

3.2 Board Connection

- When AT GUI program runs, connection status is red (not connected). If any COM port is not detected by the program, press the **R** button to refresh COM Port

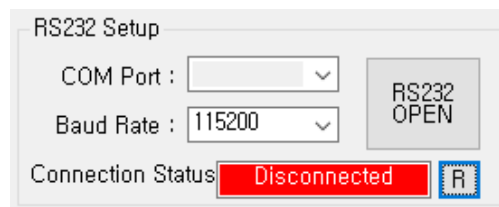


Figure 4: RS232 Setup - Disconnected

- Select a COM port and click the RS232 **OPEN** button. (Wait for a few seconds). Connection status will be soon changed to green color and you can see “Connected” status with green color . It means communication is OK

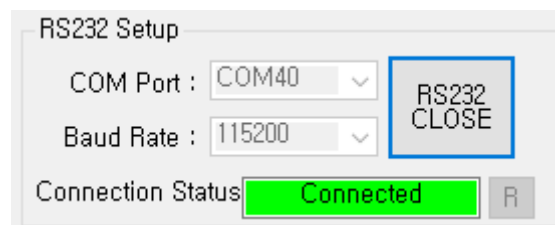


Figure 5: RS232 Setup - Connected

- “Echo on” message will be shown on the debug window (in the black box).

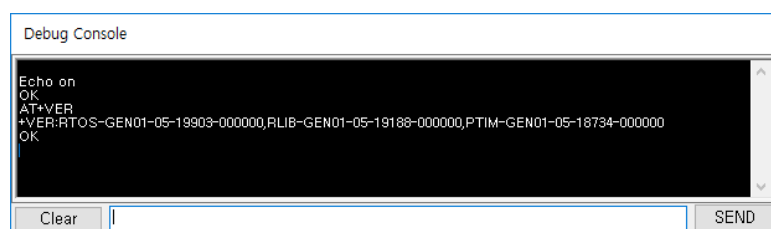


Figure 6: Debug Console - Connected

DA16200 AT GUI Tool

3.3 RF Certification Mode Setup

To enable certification mode, check on the mode option on the Chip Setting tab

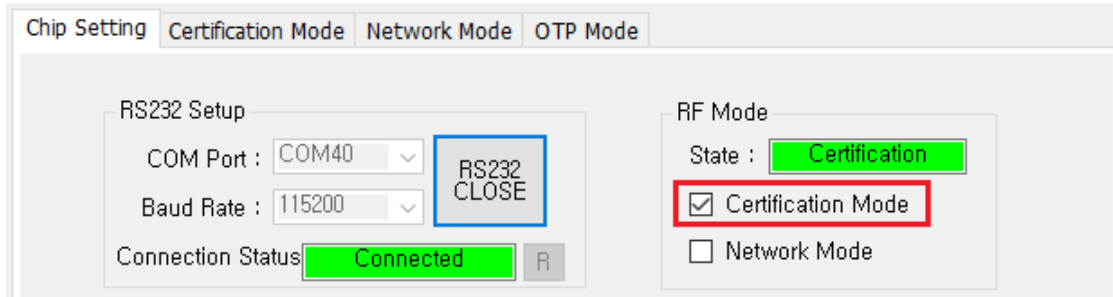


Figure 7: Certification Mode Configuration

Alternatively, on the Certification Mode tab.

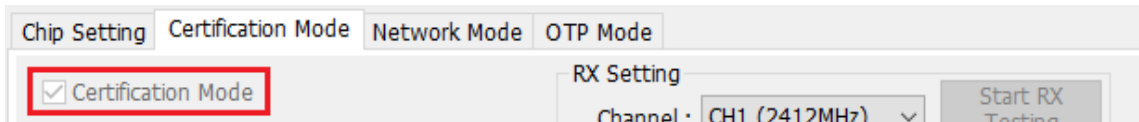


Figure 8: Certification Mode Tab

3.3.1 TX Test Mode

- Move to the Certification Mode tab

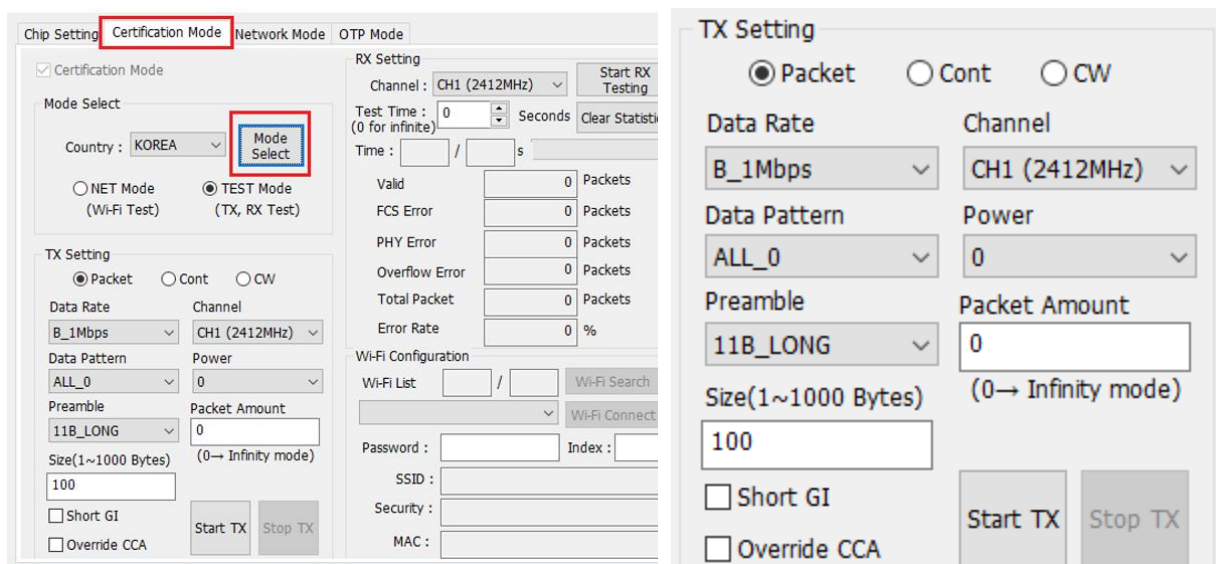


Figure 9: Tx Test Mode Configuration

DA16200 AT GUI Tool

- Check TX Setting parameters and click the Mode Select button. Confirm message will be shown as [Figure 10](#). This is a normal state

```
AT+TMRFN0INIT=1
OK
AT+RESTART
OK

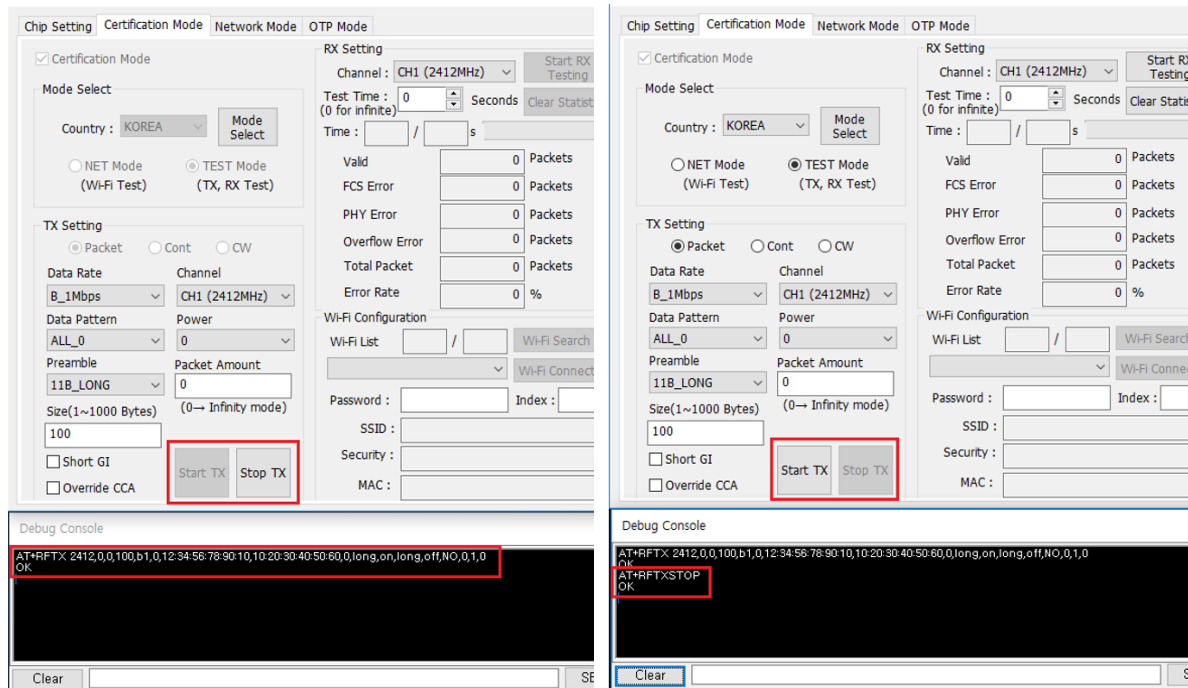
+INIT:DONE

Echo on
OK
AT+RFTESTSTART
OK
```

Figure 10: Debug Console - Tx mode

- Have to select Data Rate, Channel, and Power as you want to test.
 - **Packet mode:** Normal test mode with packet generation mode. We can adjust duty of RF Burst at time domain in this mode.
 - **Cont mode:** Continuous TX out mode.
 - This mode is for TX power test and etc.
 - In this mode, TX packet is generated continuously over 95% duty cycle.
 - **CW mode:** Only single sinewave tone out mode. This mode is for freq err check.
 - **Data Rate:** Choose modulation type to test.
 - **Power:** Select or tune the power level. ("0" step is Maximum)
 - The difference between power steps is about 0.8~1dB/1step
 - **Size:** You can adjust duty rate with this number. However, it is not linear as the number, so it needs to check with equipment like spectrum analyzer to set exactly. (Equipment setting is to zero span setting or burst mode setting)
- TX packet generation
 - Use the Start TX button and the Stop TX button.
 - When you want to change for another condition, you should click "Stop TX" before starting new test.

DA16200 AT GUI Tool



Start TX

Stop TX

Figure 11: Start & Stop Tx

- Tested setting is 802.11n MCS7, channel 1, 100 bytes packet and power grade 0.
 - When you click the Start TX button, you can see messages as blow.

```
AT+RFTX 2412,0,0,100,n65,0,12:34:56:78:90:10,10:20:30:40:50:60,0,long,off,short,off,NO,0,1,0
OK
```

Figure 12: Debug Console - Start Tx

- When you click the Stop TX button, you can see messages as blow.

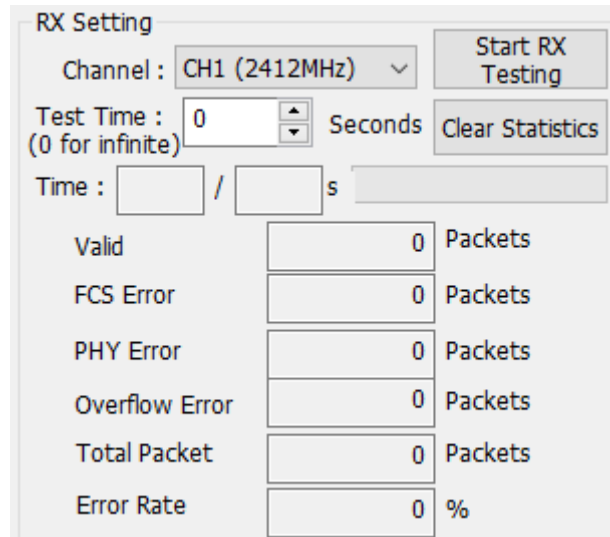
```
AT+RFTX 2412,0,0,100,n65,0,12:34:56:78:90:10,10:20:30:40:50:60,0,long,off,short,off,NO,0,1,0
OK
AT+RFTXSTOP
OK
```

Figure 13: Debug Console - Stop Tx

DA16200 AT GUI Tool

3.3.2 RX Test Mode

- RX Setting
 - **Channel:** Support CH1 ~ CH13
 - **Test Time:** Maximum 3600s (Duration is 1 second fixed)



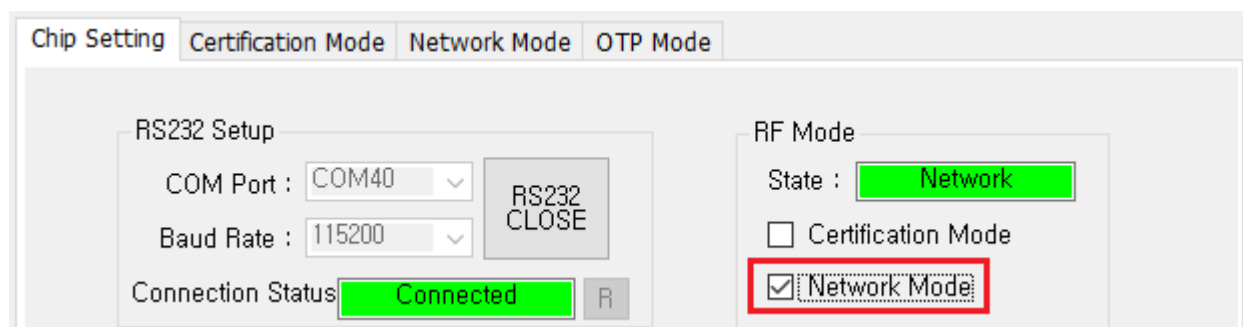
Category	Value	Unit
Channel	CH1 (2412MHz)	
Test Time	0	Seconds
Valid	0	Packets
FCS Error	0	Packets
PHY Error	0	Packets
Overflow Error	0	Packets
Total Packet	0	Packets
Error Rate	0	%

Figure 14: Rx Configuration

- RX Packet Rate
 - $FCS + PHY + Overflow\ packet / Total\ packet = Error\ rate$

3.4 Network Mode Setup

To enable network mode, check on the mode option on the Chip Setting tab.



Section	Parameter	Value
RS232 Setup	COM Port	COM40
	Baud Rate	115200
	Connection Status	Connected
RF Mode	State	Network
	Network Mode	<input checked="" type="checkbox"/>

Figure 15: Network Mode Configuration

DA16200 AT GUI Tool

Alternatively, on the Certification Mode tab.

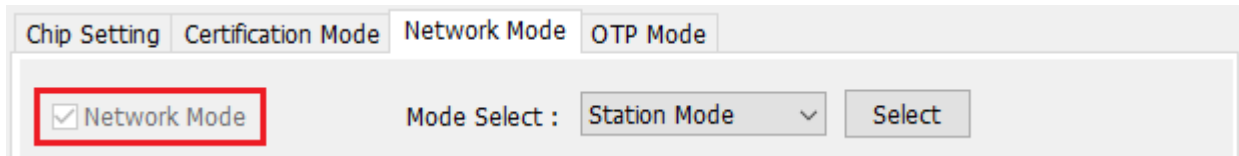


Figure 16: Network Mode Tab

3.4.1 Station Mode

- Choose the Station Mode and click the Select button on the Mode Select option show in [Figure 16](#)
- Network mode is changed, DA16200 reboots and the station mode setup window will be shown as [Figure 18](#)

```

AT+TMRFN0INIT=0
OK
AT+WFMODE=0
OK
AT+RESTART
OK
+INIT: DONE
Echo on
OK
    
```

Figure 17: Debug Console - Station Mode

- Scan APs by pressing the Scan button

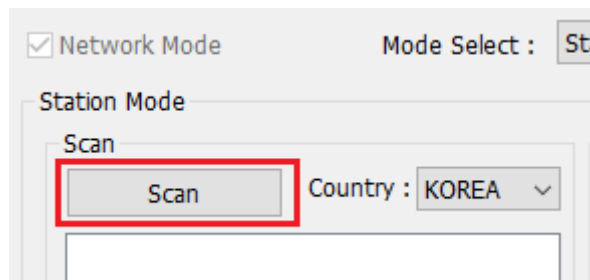


Figure 18: Station Mode - SCAN

- After scanning finishes, choose one AP in the list and click the Connect button. You may need to enter password or key index according to security mode of the AP.

DA16200 AT GUI Tool

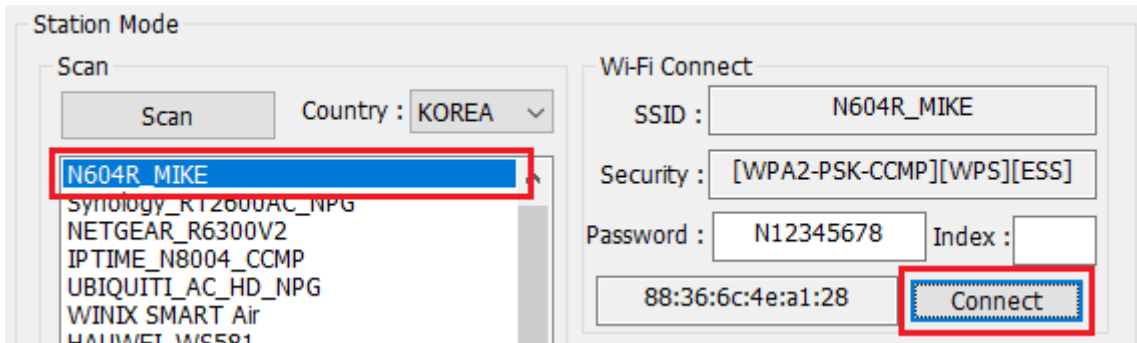


Figure 19: Station Mode - Choose AP and Connect



Figure 20: Debug Console - Connect to AP

3.4.2 AP Mode

- Choose the AP Mode and click the Select button on the Mode Select option then network mode is changed, DA16200 reboots and the AP Mode setup window will be shown as [Figure 22](#).



Figure 21: Debug Console - AP Mode

- Set SSID, password, country, channel and security mode and click the Confirm button.

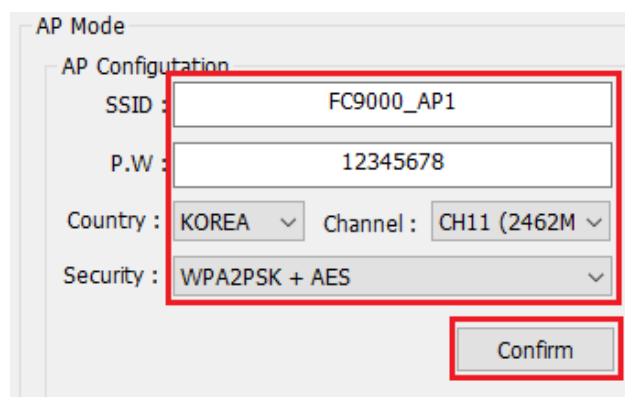


Figure 22: AP Configuration

DA16200 AT GUI Tool

```

AT+WFSAP=FC9000_AP1,3,1,12345678,11,kr
OK
AT+RESTART
OK
+INIT:DONE
Echo on
OK
    
```

Figure 23: Debug Console - AP Configuration

- Configure DHCP server. Set IP addresses and click the Confirm button. When a client is connected, its MAC address will be shown as [Figure 24](#)

DHCP Server

Start IP :

End IP :

DNS IP :

Enable Disable

Figure 24: DHCP Configuration

```

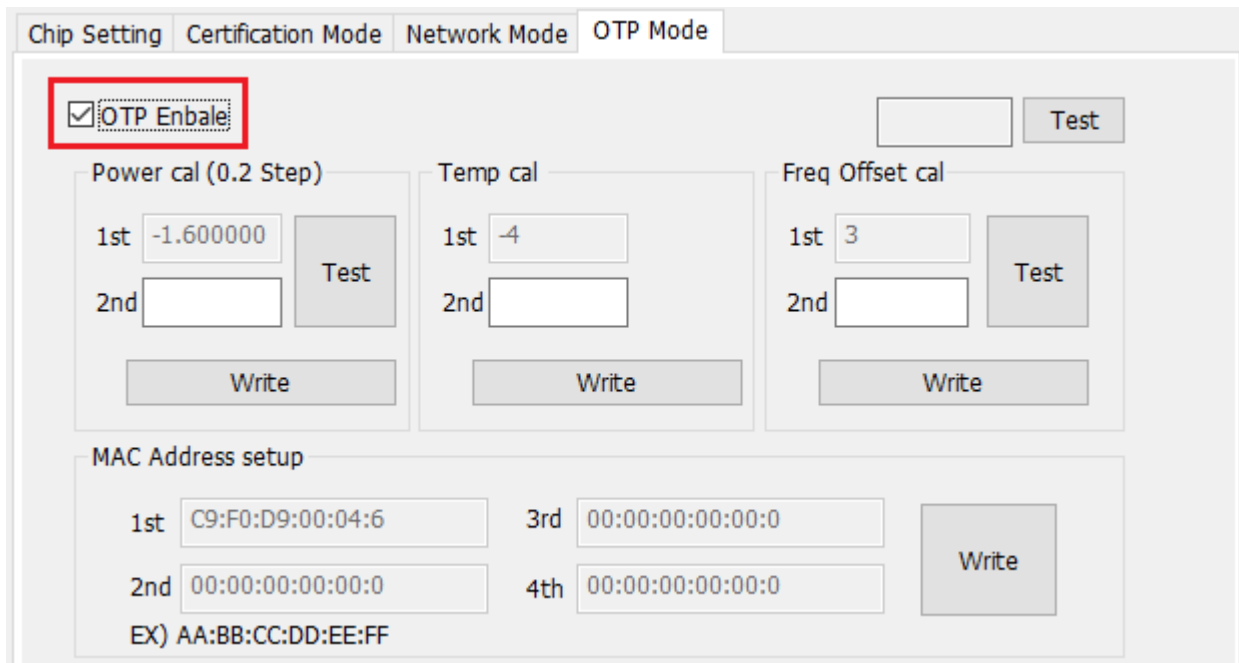
AT+NWDHR=10,0,0,2,10,0,0,10
OK
AT+NWDHDNS=8,8,8,8
OK
AT+NWDHS=1
OK
+WFCST:34:f3:9a:0a:d4:3f
    
```

Figure 25: Debug Console - DHCP Configuration

DA16200 AT GUI Tool

3.5 OTP Mode Setup

To enable OTP mode, check on OTP Enable option on the OTP Mode tab then the current OTP data will be shown in [Figure 26](#).



The screenshot shows the 'OTP Mode' tab in the GUI tool. At the top, there are tabs for 'Chip Setting', 'Certification Mode', 'Network Mode', and 'OTP Mode'. The 'OTP Mode' tab is active. A red box highlights the 'OTP Enable' checkbox, which is checked. Below this, there are three calibration sections: 'Power cal (0.2 Step)', 'Temp cal', and 'Freq Offset cal'. Each section has two input fields (1st and 2nd), a 'Test' button, and a 'Write' button. The 'Power cal' section has a 1st value of -1.600000. The 'Temp cal' section has a 1st value of -4. The 'Freq Offset cal' section has a 1st value of 3. Below these is the 'MAC Address setup' section, which has four input fields for 1st, 2nd, 3rd, and 4th addresses, and a 'Write' button. The 1st address is C9:F0:D9:00:04:6, the 2nd is 00:00:00:00:00:0, the 3rd is 00:00:00:00:00:0, and the 4th is 00:00:00:00:00:0. Below the input fields, an example MAC address 'EX) AA:BB:CC:DD:EE:FF' is shown.

Figure 26: OTP Mode

- **Power calibration** and **temperature calibration** has been completed for the chipset by FCI and it may not need to be done by the customer.

- **Freq Offset cal**

The range of frequency offset calibration is 0x0 ~ 0x7F.

- **MAC Address setup**

DA16200 provides 4 slots to store MAC addresses and the 1st slot is written by FCI. The customer can use 3 slots to write their own MAC address. The MAC address written in the OTP must be an even number, it is used for WLAN0 MAC address (for STA interface), and the next number is automatically used for WLAN1 MAC address (for Soft-AP interface).

To write the MAC address, give a MAC address in the first empty slot and click the Write button then the new address substitutes for the previous address.

DA16200 AT GUI Tool

4 Regulatory Approval

4.1 Federal Communication Commission Interference Statement

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, uses 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 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.

4.1.1 FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. 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.

4.1.2 FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

The module must be installed in WiFi Module.

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

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

4.1.3 End Product Labeling

The final end product must be labelled in a visible area with the following:

“Contains FCC ID: 2AU49-DA16200MC”, or “Contains FCC ID: 2AU49-DA16200ME”

DA16200 AT GUI Tool

4.1.4 Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

4.2 Canada Statement

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

4.2.1 Caution Exposure:

This device meets the exemption from the routine evaluation limits in section 2.5 of RSS102 and users can obtain Canadian information on RF exposure and compliance.

Le dispositif répond à l'exemption des limites d'évaluation de routine dans la section 2.5 de RSS102 et les utilisateurs peuvent obtenir des renseignements canadiens sur l'exposition aux RF et le respect.

4.2.2 The final end product must be labelled in a visible area with the following:

The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains transmitter module IC: 25650-DA16200MC, or 25650-DA16200ME.

The module must be installed in WiFi Module.

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

Cet équipement devrait être installé et actionné avec une distance minimum de 20cm entre le radiateur et votre corps.

The end user manual shall include all required regulatory information/warning as show in this manual.

DA16200 AT GUI Tool

Revision History

Revision	Date	Description
1.0	03-Jul-2019	Preliminary DRAFT Release

DA16200 AT GUI Tool

Status Definitions

Status	Definition
DRAFT	The content of this document is under review and subject to formal approval, which may result in modifications or additions.
APPROVED or unmarked	The content of this document has been approved for publication.

Disclaimer

Unless otherwise agreed in writing, the Dialog Semiconductor products (and any associated software) referred to in this document are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of a Dialog Semiconductor product (or associated software) can reasonably be expected to result in personal injury, death or severe property or environmental damage. Dialog Semiconductor and its suppliers accept no liability for inclusion and/or use of Dialog Semiconductor products (and any associated software) in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Information in this document is believed to be accurate and reliable. However, Dialog Semiconductor does not give any representations or warranties, express or implied, as to the accuracy or completeness of such information. Dialog Semiconductor furthermore takes no responsibility whatsoever for the content in this document if provided by any information source outside of Dialog Semiconductor.

Dialog Semiconductor reserves the right to change without notice the information published in this document, including, without limitation, the specification and the design of the related semiconductor products, software and applications. Notwithstanding the foregoing, for any automotive grade version of the device, Dialog Semiconductor reserves the right to change the information published in this document, including, without limitation, the specification and the design of the related semiconductor products, software and applications, in accordance with its standard automotive change notification process.

Applications, software, and semiconductor products described in this document are for illustrative purposes only. Dialog Semiconductor makes no representation or warranty that such applications, software and semiconductor products will be suitable for the specified use without further testing or modification. Unless otherwise agreed in writing, such testing or modification is the sole responsibility of the customer and Dialog Semiconductor excludes all liability in this respect.

Nothing in this document may be construed as a license for customer to use the Dialog Semiconductor products, software and applications referred to in this document. Such license must be separately sought by customer with Dialog Semiconductor.

All use of Dialog Semiconductor products, software and applications referred to in this document is subject to Dialog Semiconductor's [Standard Terms and Conditions of Sale](http://www.dialog-semiconductor.com), available on the company website (www.dialog-semiconductor.com) unless otherwise stated.

Dialog, Dialog Semiconductor and the Dialog logo are trademarks of Dialog Semiconductor Plc or its subsidiaries. All other product or service names and marks are the property of their respective owners.

© 2020 Dialog Semiconductor. All rights reserved

Contacting Dialog Semiconductor

United Kingdom (Headquarters)
Dialog Semiconductor (UK) LTD
 Phone: +44 1793 757700

Germany
Dialog Semiconductor GmbH
 Phone: +49 7021 805-0

The Netherlands
Dialog Semiconductor B.V.
 Phone: +31 73 640 8822

Email:
enquiry@diasemi.com

North America
Dialog Semiconductor Inc.
 Phone: +1 408 845 8500

Japan
Dialog Semiconductor K. K.
 Phone: +81 3 5769 5100

Taiwan
Dialog Semiconductor Taiwan
 Phone: +886 281 786 222

Web site:
www.dialog-semiconductor.com

Hong Kong
Dialog Semiconductor Hong Kong
 Phone: +852 2607 4271

Korea
Dialog Semiconductor Korea
 Phone: +82 2 3469 8200

China (Shenzhen)
Dialog Semiconductor China
 Phone: +86 755 2981 3669

China (Shanghai)
Dialog Semiconductor China
 Phone: +86 21 5424 9058