RENESAS

DA16200 DA16600 AT GUI Tool

This document provides instructions on how to control the DA16200 and DA16600 EVBs in GUI environment.

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1. Terms and Definitions

AP	Access Point
AT	Attention
CoAP	Constrained Application Protocol
Devkit	Development Kit
DHCP	Dynamic Host Configuration Protocol
EVB	Evaluation Board
EVK	Evaluation Kit
GUI	Graphical User Interface
HTTP	Hypertext Transfer Protocol
MFC	Microsoft Foundation Class
MQTT	Message Queuing Telemetry Transport
OTP	One-Time Programmable
PEM	Privacy Enhanced Mail
QFN	Quad Flat No-Lead
RX	Receive
SDK	Software Development Kit
SSID	Service Set Identifier
STA	Station
TCP	Transmission Control Protocol
TLS	Transport Layer Security
ТХ	Transmit
UART	Universal Asynchronous Receiver Transmitter
UDP	User Datagram Protocol
USB	Universal Serial Bus

2. References

[1] DA16200, Datasheet, Renesas Electronics.

[2] UM-WI-046, DA16200 DA16600, FreeRTOS SDK Programmer Guide, User Manual, Renesas Electronics.

[3] UM-WI-056, DA16200 DA16600, FreeRTOS Getting Started Guide, User Manual, Renesas Electronics.

[4] UM-WI-003, DA16200 DA16600, Host Interface and AT Command, User Manual, Renesas Electronics.

Note 1 References are for the latest published version, unless otherwise indicated.

3. Introduction

The DA16200/DA16600 GUI tool allows you to control the DA16200/DA16600 EVBs in a GUI environment. There are three modes of operation: Certification mode, Network mode, and OTP mode (see Figure 1).

	×
Settings Certification OTP Network Data Transfer MQTT Client TLS	
RS232 RF Mode	
COM port : COM3 V Open State : Certification Mode	
Baud Rate : 115200 V Open Open Octification Mode	
Status : Refresh O Network Mode	
Software Version	
Chip Name	
Main OS	
Syslib	

Figure 1. DA16200 EVB GUI

NOTE

This document also covers the DA16600.

3.1 Certification Mode

This mode is for Wi-Fi RF test (TX power, RX sensitivity) also known as "TEST Mode".

3.2 Network Mode

With Network mode, the Station or AP mode of the DA16200 can be tested.

- **AP mode**: Soft AP test with configurable parameters like SSID, security, and DHCP Server.
- **Station mode**: STA test to search and connect to an Access Point and check/test the STA function. After the network mode is set, you can test the TCP/UDP or the MQTT and manage the TLS certificates.
- Data Transfer: message exchange through the TCP Server/Client, and UDP session.
- **MQTT Client**: message exchange through the MQTT protocol.
- **TLS Setting**: management of TLS certificate that is set (for example, Root CA, Client Certificate, Client Private Key).

3.3 OTP Mode

This mode is for power calibration and temperature calibration with OTP memory location.

4. DA16200/DA16600 EVB Setup

The DA16200 evaluation board supports USB to serial interface. Connect DA16200 EVB with a desktop through a micro-USB cable and then two COM ports are detected automatically.

One (UART0) is for console command and the other (UART1) is for AT command. Normally, the higher number COM port is for AT commands and the lower number COM port is for the console.

• See Ref. [3] on how to set up DA16200 and DA16600.

5. DA16200/DA16600 Firmware for AT Commands

The official pre-built image package (DA16200 DA16600 FreeRTOS SDK Image vX.X.X.X) contains the firmware supporting AT command for DA16200 and DA16600. These images can be used with the AT GUI tool.

In the package, the images for using the AT GUI tool are as follows:

- For DA16200 EVB: DA16200_IMG_FreeRTOS_ATCMD_UART1_EVK_vX.X.X.4MB.zip
- For DA16600 EVB: DA16600_IMG_FreeRTOS_ATCMD_UART2_EVK_vX.X.X.4MB.zip

Alternatively, the firmware image can be created using the DA16200 DA16600 SDK.

To use AT commands, the following change is required to the config_generic_sdk.h:

// AT command features	
#defineSUPPORT_ATCMD	// Support AT commands

The config_generic_sdk.h files are in the following directory path in the DA16200 DA16600 SDK.

- For DA16200: <sdk_root>/apps/da16200/get_started/include/user_main/config_generic_sdk.h
- For DA16600: <sdk_root>/apps/da16600/get_started/include/user_main/config_generic_sdk.h

To program this image into the EVB, see the Programming Firmware Image section in Ref. [3].



6. Run GUI with DA16200 EVB

6.1 Connection and Running

The DA16200 AT GUI program is a single executable file.

NOTE

If "a DLL file (for example, vcruntime140.dll or mfc1400u.dll) is missing" message appears, 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).

The program setup sequence is:

1. Connect the DA16200 Development Kit (Devkit) to the host computer as shown in Figure 2.



Figure 2. Devkit connections

NOTE	
See Ref. [3] to see which port to use.	

2. Start the AT GUI program.

🎂 Dialog	AT GUI v0.0.4	4.0					-		×
Settings	Certification	OTP	Network	Data Transfer	MQTT C	ient TLS			
- RS232 COM J Baud	port : COM3 Rate : 11520	0	~	Open		RF Mode State : State :	Certification	Mode	
Status	s :			Refr	resh	O Network M	ode		
Chip Ma S	o Name								

Figure 3. AT GUI

6.2 COM Port and Baud Rate Configuration

1. When running the AT GUI program, the connection status is red (not connected). If the program does not detect any COM port, click the **Refresh** button to refresh the COM port, see Figure 4.

RS232			
COM port :	COM3	~	0
Baud Rate :	115200	~	Open
Status :	Disconnected		Refresh



- 2. Select a COM port and click the **OPEN** button and wait for a few seconds, see Figure 5 and Figure 6.
- The connection status soon changes to a green color and shows "Connected". This means that communication is OK.

RS232				
COM port :	COM12	~	Class	
Baud Rate :	115200	~	Close	
Status :	Conneted		Refresh	

Figure 5. RS232 setup – connected

• In the **Console** window (see Figure 6), when it is connected, the message "Echo on" is shown.

Console
ATE Echo on OK AT+CHIPNAME AT+CHIPNAME +CHIPNAME:DA16200 OK AT+VER AT+VER +VER:RTOS-GEN01-01-12627-000000,SLIB-GEN01-01-12283-000000 OK ATF +INIT:DONE.0 AT+TMRFNOINIT=1 OK
Clear Send

Figure 6: Debug console – connected

6.3 **RF Certification Mode**

To enable certification mode:

- 1. Open the **Settings** tab, see Figure 7.
- 2. In the **RF Mode** area, select the **Certification Mode** check box.

RS232		RF Mode			
COM port :	COM12	~	C	State : Certificatio	on Mode
Baud Rate :	115200	~	Close	Certification Mode	
Status :	Conneted		Refresh	O Network Mode	

Figure 7. Configuring certification mode

6.4 TX Test Mode

1. Open the Certification Mode, see Figure 8.

● Packet ○(ata Rate	Cont O CW
ata Rate	Channel
	Unannei
_1Mbps	CH1 (2412MHz) V
ata Pattern	Power
LL_0 ~	0 ~
reamble	Packet Amount
1B_LONG ~	0 🜩
ze(1~1000 Bytes)	(0→ Infinity mode)
200 🜲	
short GI	Start TX
Override CCA	Stop TX
_1 ati LL rea 1E ze	Mbps a Pattern a Pattern amble B_LONG (1~1000 Bytes) 200 short GI Override CCA

Figure 8. TX setting

2. Click the **Select** button under **Mode** (see Figure 8). A confirmation message is shown, see Figure 9. This is a normal state.

Console	
AT+TMRFNOINIT=1 OK AT+RESTART OK	^
ATE +INIT:DONE.0 AT+RFTESTSTART OK	×
Clear Send	

Figure 9. Debug console – TX mode

- 3. Select the **Data Rate**, **Channel**, and **Power** for the purpose of the test.
- **Packet mode**: Packet generation TX mode. Packets of a fixed size are sent according to the modulation.
- Cont mode: Continuous TX mode. TX packet is generated continuously over 95% duty cycle. This mode is for TX power test.
- **CW mode**: Single tone TX mode. Continuous wave signal with a single frequency, which is unmodulated and does not carry information. This mode is for frequency error check.
- Data rate: Select a modulation type to test.
- **Power**: Select or tune the power level. ("0" step is maximum). The difference between power steps is about 0.8~1 dB/1 step.
- Size: You can adjust the duty rate. However, the size is not linear as the number, so set the exact number you need with equipment like a spectrum analyzer to check the value. Equipment setting is set to zero span setting or burst mode setting.

For TX packet generation:

 To start and stop TX packet generation, use the Start TX button and the Stop TX button. If you want to make changes for another condition, click Stop TX before a new test starts.

🚥 Dialog loT WiFi GUI v0.0.1.0	- 0	X Dialog IoT WiFi GUI v0.0.1.0	- 🗆 X
Settings Certification OTP Network Data Transfer Mode Country : KOREA Select O NET Mode Image: TEST Mode TEST Mode (Wi-R Test) Image: TEST Mode TX. X Test) TX Setting Image: TEST Mode Image: TEST Mode Image: Image: Image: TEST Mode Image: TEST Mode Image: TEST Mode Image: Image: Image: Image: Image: TEST Mode Image: TEST Mode Image: TEST Mode Image: I	r MQTT Client TLS RX Setting Channel: [CH1 (2412MHz) ✓ Start R. Test Time: 0 € Seconds Clear St () for infinite) Time: 0 € Seconds Clear St Vald Packet PGS Error Packet PHY Error Packet Total Packet Total Packet Total Packet Total Packet Seconds Clear St Vald Packet Packet Stor Rate 7, VW-F Configuration WH-F List Science 1, 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 1	Settings Certification OTP Network Data Transf Mode Country : KOREA Select at O NET Mode Image: Test Mode (Wi-R Test) TX Setting Image: Test Mode Image: Test Mode as Image: Test Mode Image: Test Mode Image: Test Mode TX Setting Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Mode Image: Test Test Mode Image: Test Test Mode Image: Test Mode Image: Test Test Test Mode Image: Test Test Test Mode Image: Test Mode Image: Test Test Test Test Test Test Test Test	ier MQTT Client TLS RX Setting Channel: CH1 (2412/Hz) Seconds Clear Stat (0 for infinite) Time: 0 € Seconds Clear Stat (0 for infinite) Time: 0 € Seconds Clear Stat (0 for infinite) Time: 0 € Seconds Clear Stat CS For Packets PHY Enor Packets PHY Enor Packets Coreflow Enor Packets Total Packet Connect Password: 0 Second Secunty: MAC: 0 Seconds
Console OK ATE +INIT-DONE.0 AT+RFTESTSTART OT AT+RFTX 2412.0.0.0b1.0.12:34:56:78:90:10.10:20:30:40: OK Clear	50:60.0.long.on.long.off.NO.0.1.0	Console INIT-DONE.0 AT-RFTESTSTART OK AT-RFTX 2412,0.0,0 h 1,0.12.34.56:78:90:10.10.20.30.40 OK AT-RFTXSTOP OK Clear Clear	D:50:60.0 Jong.on Jong.off. NO.0.1.0



Stop TX

Figure 10. Start and stop TX

For example, assume that you have a test setting with 802.11n MCS7, channel 1, 100 bytes packet, and power grade 0.

• When you click the **Start TX** button, the message appears as shown in Figure 11.



• When you click the **Stop TX** button, the message appears as shown in Figure 12.

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	\wedge
ĂT+RFTXSTOP	
Figure 12. Debug console – Stop TX	

6.5 RX Test Mode

The settings are made in the **RX Setting** area. See Figure 13.

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

RX Setting		
Channel : CH1 (2	412MHz) ~	Start RX
Test Time : (0 for infinite) Time : /	0 🜩 Seconds	Clear Stat
Vaild ECS Error		Packets Packets
PHY Error		Packets
Overflow Error		Packets
Total Packet		Packets
Error Rate		%

Figure 13. RX configuration

• **RX Packet Rate:** FCS + PHY + Overflow packet/Total packet = Error rate



7. Network Mode

To enable network mode:

- 1. Open the **Settings** tab.
- 2. Select the Network Mode checkbox, see Figure 14.

Settings	Certifi	cation	OTP	Network	Data Transfer	MQTT Client	TLS
RS232						RF	Mode
COM p	oort :	COM3		\sim	~	Sta	ite : Network Mode
Baud F	Rate :	115200)	\sim	Close	0	Certification Mode
Status	:	Connet	ed		Refn	esh	Network Mode

Figure 14. Network mode configuration

7.1 Station Mode

1. In the Mode field, select Station Mode.

The mode is changed to Network mode. Then, the DA16200 reboots, and the station mode setup window opens, see Figure 15.

🚥 Dialog AT GUI v0.0.4.0			_		×
Settings Certification OTP Network Data Transfer	MQTT Client	TLS			
Mode : Station Mode 🗸		Factory Reset		Reboot	
Scan AP Mode	- Wi-Fi Connect SSID :				
	Password :			Index : Connect	
	IP Address IP Addr :				
Scan	Gateway : DNS #1 :		 		
SNTP Server : R C Enable Disable Confirm	DNS #2 :	 inable () Disat	ble	Confirm	
PING Test Ping! Count :4 Destination IP: 172601	Recv / Send : Min/Max/Avr :		/	m	IS

Figure 15. Setup – Station Mode

2. Click the **Scan** button to scan Aps, see Figure 16.



Figure 16. Station mode – Scan

- 3. When scanning is finished, select one AP in the list, see Figure 17.
- 4. Click the **Connect** button.
- 5. If required by the security mode of the AP, enter a password or key index.

Scan	Wi-Fi Connect			
AD 10 1201	SSID : KT_GiGA_2G_9417	1		
KT_GiGA_2G_9417	Security : WPAPSK/WPA2PSK + TKIP/AES Password : N12345678 Index :			
	88:3c:1c:94:29:4b Connect			

Figure 17. Station mode – select AP and connect

AT+WFJAP=N604R_MIKE,4,2,N12345678 OK	^
+WFJAP:1,N604R_MIKE,192,168,0,9 AT+NWIP=? +NWIP:0,192,168,0,9,255,255,255,0,192,168,0,1 OK	





7.2 AP Mode

1. In the **Mode** field, select **AP Mode**.

The mode is changed to Network mode. Then, the DA16200 reboots, and the AP Mode setup window opens, see Figure 19.

🚥 Dialog AT G	UI v0.0.4.0					_		Х
Settings Cert	ification OTF	Network	Data Transfer	MQTT Client	TLS			
Mode : AF	^o Mode	~			Factory Rese	t	Reboot	
- AP Configur	ation			IP Address				
SSID :				IP Addr :	_10.	_00.	_1	
Password :				Netmask :	255.2	255.255.	_0	
Country :	KOREA ~	Channel :	luto ~					
Security :	WPA2PSK +	AES (recomme	ended) 🗸			[Confirm	
			Confirm	DHCP Server				
Connected	ΔΤΑ		Committe	Start IP:	_10.	_00.	_2	
Connected	317			End IP :	_10.	_00.	_11	
				DNS IP :	8.	_ <u>88</u> .	_8	
				🔿 Enable	Disable	[Confirm	
			Check					
			licconnect					
			JISCONNECL					
PING Test								
Ping!		Count	: <u>4</u> F	Recv / Send :	/			
Destination	IP: 1	17260	1 1	Min/Max/Avr :	/	/	m	s

Figure 19. Setup – AP Mode

- 2. Set the fields of SSID, Password, Country, Channel, and Security mode, see Figure 20.
- 3. Click the **Confirm** button.

AP Configur	ation
SSID :	DA16200_AP1
Password :	N123456789
Country :	KOREA 🗸 Channel : CH11 (24 🗸
Security :	WPA2PSK + AES (recommended) ~
	Confirm

Figure 20. AP configuration

The message appears in the Debug console as shown in Figure 21.

Console	
AT+WFSAP=DA16200_AP1.3.1.N123456789.11.KR +WFSAP:DA16200_AP1 OK	^
AT+RESTART OK ATE	
+INIT:DONE,1 ATE Echo on	
OK Clear Send	■ ¥

Figure 21. Debug console – AP configuration

4. In the **DHCP Server** area, make the required settings for the IP addresses and click the **Confirm** button, see Figure 22.

When a client is connected, the MAC address appears as shown in Figure 23.







Figure 23. Debug console – DHCP configuration

7.3 Data Transfer (TCP/UDP)

The DA16200 GUI tool provides data transfer functions with TCP/UDP. Before messages are sent with this tool, connect the DA16200 to an access point as shown in Section 7.1. Then, click the **Data Transfer** tab. If the DA16200 successfully connects with an AP, the IP address is automatically populated, see Figure 24.

Settings Certification OTP	Network Data Transfer MQTT Client TLS		
TCP Server	172. 30. 1. 33	Connect	X
O TCP Client	000	Connect	X
O UDP Session	0. 0. 0. 0	Start	X

Figure 24. Data transfer tab

The DA16200 provides three sessions: **TCP Server**, **TCP Client**, and **UDP Session**. You can use the three sessions simultaneously.

7.3.1 TCP Server

To use TCP server, fill in a port number and click the **Connect** button on the **TCP Server** line. When the server is opened, the **X** changes to **O**, see Figure 25.

TCP Server	172. 30. 1. 33	1505_	Disconnect	0
O TCP Client	000		Connect	X
O UDP Session	0. 0. 0. 0		Start	X
*** [TCP Server] Open ***				^

Figure 25. TCP server open

You can connect to the DA16200 TCP server with tools for data exchange like the IO Ninja. When a client is connected successfully, the information is shown in Figure 26. The DA16200 TCP server can accept up to eight client sessions.

TCP Server	172. 30. 1. 33	1505_	Disconnect	0
O TCP Client	000		Connect	Х
O UDP Session	0. 0. 0. 0		Start	Х
*** [TCP Server] Open ***				^
*** [TCP Server] Client connect	ed from 172.30.1.45:58688 ***			

Figure 26. TCP server connection with client

7.3.2 TCP Client

To connect to a TCP server, fill in the IP address and port number of the server and click the **Connect** button on the **TCP Client** line, see Figure 27. When the DA16200 TCP client is successfully connected, the **X** changes to **O**.

O TCP Server	172. 30. 1. 33	1505_	Connect	Х	
TCP Client	17230145	_4000	Disconnect	þ	
O UDP Session	0. 0. 0. 0		Start	Х	
*** [TCP Server] Client connect	ed from 172.30.1.45:58688 ***				^
*** [TCP Server] Client 172.30.	1.45:58688 disconnected ***				
*** [TCP Server] Close ***					
*** [TCP Client] Connecting to TCP Server (172.30.1.45:4000) OK ***					

Figure 27. TCP client connection to server

7.3.3 UDP Session

To open a UDP session, enter a port number and click the **Start** button. When the DA16200 TCP client is successfully connected, the **X** changes to **O**, see Figure 28.

○ TCP Server	172. 30. 1. 14	1505_	Disconnect	0
C TCP Client	17230124	1500_	Connect	Х
UDP Session	172. 30. 1. 14	12001	Stop	þ
•••• [TCP Server] Open •••				^
*** [UDP Session] Open ***				

Figure 28. UDP session open

7.3.4 Data Exchange

To send a message to a peer, select a session first. Each session is slightly different in method.

- TCP Server:
- 1. Select the **TCP Server** checkbox.
- 2. Select the destination IP in the drop-down list.
- 3. Type a message.
- 4. Click the **Send** button (see Figure 29).

*** [TCP Server] Client connected from [172.30.1.54:57510 -> TCP Server] Hi. [UDP Session -> 172.30.1.54:57510] Hi.	172.30.1.54:57510 **	•		
				~
Hi.				^
				~
172.30.1.54:57510	V Dest. :	17230154	57510	Send
172.30.1.54:57510 DPM	Sleep			

Figure 29. TCP server data transfer

TCP Client:

- 1. Select the **TCP Client** checkbox.
- 2. Type a message.
- 3. Click the **Send** button (see Figure 30).

[TCP Client -> 172.30.1.54:1500] Hi. by the TCP Client			
			*
Hi. by the TCP Client			^
			~
	✓ Dest.:	17230154	1500_ Send



- UDP Session:
- 1. Select the UDP Session checkbox.
- 2. Enter the destination IP and port number.
- 3. Type a message.
- 4. Click the **Send** button (see Figure 31).

[UDP Session -> 172.30.1.54:45200] Hi. by the UDP					
					×
Hi. by the UDP					~
					~
	 ✓ Dest. : 	17230154	4	45200	Send

Figure 31. UDP session data transfer

When a session receives a message from a peer, the message is shown, see Figure 32.

[172.30.1.54:49890 -> TCP Server] from your guest.

Figure 32. TCP/UDP data reception

7.3.5 Data Transfer on DPM Mode

The DA16200 GUI provides TCP/UDP sockets operation in DPM (DA16200 power-save) mode. See Figure 33.

DPM	Disabled	Sleep
DPM	Disabled	Sleep

Figure 33. DPM mode setting

- **DPM Button**: Start or end the DPM mode.
- DPM_STATUS: DPM state (Disabled/DPM init.../DPM Sleep/DPM wake-up).
- Sleep Button: The DA16200 returns to DPM sleep state (only available DPM wake-up state).
- 1. To initiate TCP/UDP sockets in DPM mode:
 - a. Open the desired socket.
 - b. Click the DPM button to start DPM mode.
 - c. After all sockets are ready in DPM mode, the DPM_STATUS changes to DPM sleep.

When the DA16200 in DPM sleep state receives a TCP or UDP messages from a peer, the message appears, see Figure 32.

- 2. To send a message in DPM Sleep status:
 - a. Wake up the DA16200 with the switch. The DPM_STATUS changes to DPM wake-up.
 - b. Select the session to send, type a message, and click the **Send** button.
 - c. After sending messages, click the Sleep button. The DPM_STATUS changes to DPM sleep.
- 3. To exit DPM mode:
 - a. Wake up the DA16200 with the switch. The **DPM_STATUS** change to **DPM Wake-up**.
 - b. Click the **Sleep** button. The **DPM_STATUS** changes to **Disabled**.

7.4 MQTT Client

The DA16200 GUI tool provides data transfer functions with MQTT protocol. Before messages are sent with this tool, connect the DA16200 to an access point as shown in Section 7.1. Click the **MQTT Client** tab.



7.4.1 Configuration

Before connecting to an MQTT broker, set the required fields for the connection information. See Figure 34.

Settings Certification OTP Network Data Transfer MQTT Client TLS	
MQTT Client Connect X Broker Keep-Alive Period 3600 Sec. Save	+ •
Image: Cogning Image: Cogning	Save
	^
	Ŷ
DPM Sleep	PUBLISH

Figure 34. MQTT client tab

- 1. Broker IP address
- 2. Broker port number
- 3. Subscriber topics (up to 4)
- 4. Publisher topic
- 5. Sending PINGREQ cycle (second)
- 6. Login ID
- 7. Login password
- 8. MQTT QoS (0~2)
- 9. TLS use (0 or 1)
- 10. Reset all configuration to default

When the DA16200 MQTT client succeeds to connect, the letter X changes to O. Moreover, you can send a PUBLISH message to the broker or receive a message.

7.4.2 Data Exchange

To exchange a message with the broker, connect the MQTT Client. To send a PUBLISH, type the message, and click the **PUBLISH** button. See Figure 35.

*** [SUB] Connected ***	
[PUB : da16k_pub] abc	
	~
abc	^
	×
	PUBLISH

Figure 35. MQTT PUBLISH transfer

When the client receives a message from the broker, the message is displayed as shown in Figure 36.



Figure 36. MQTT PUBLISH reception

7.4.3 MQTT in DPM Mode

The DA16200 GUI provides MQTT client operation in DPM mode. Figure 33 shows the DPM mode setting under the MQTT Client tab.

To initiate MQTT client in DPM mode:

- 1. After setting up, connect to an MQTT Broker.
- 2. Click the **DPM** button to start DPM mode.
- 3. After the MQTT client session is ready in DPM mode, the DPM_STATUS changes to DPM sleep.

When the DA16200 in DPM sleep state receives a PUBLISH from the broker, it is shown in the message window like Figure 36.

To send a message in DPM Sleep status:

- 1. Wake up the DA16200 with the switch. The **DPM_STATUS** changes to **DPM wake-up**.
- 2. Type a message and click the **PUBLISH** button.
- 3. After sending messages, click the Sleep button. The DPM_STATUS changes to DPM sleep.

To exit DPM mode:

- 1. Wake up the DA16200 with the switch. The **DPM_STATUS** changes to **DPM Wake-up**.
- 2. Click the Sleep button. The DPM_STATUS changes to Disabled.

7.5 TLS Setting

You can store a TLS certificate that is set with this tool for MQTT, HTTPs, and CoAPs. The certificate has Root CA, Client Certificate, and Private Key.

The DA16200 can only process Privacy Enhanced Mail (PEM) type. To enter the certificates directly, input the text and click the **Upload** button with the TLS item selection. If this is done successfully, <Content exists> appears in the window, see Figure 37.

If you have TLS certificate files with PEM type, click **File Search** and select the file and then the text should be loaded.



Figure 37: TLS setting tab



8. OTP Mode Setup

To enable OTP mode:

- 1. Open the **OTP Mode** tab.
- 2. Click the **OPT Enable** checkbox.

The current OTP data is as shown in Figure 38.

Settings	Certification	OTP	Network	Data Transfer	MQTT Client	TLS		
OTP	Enable							Read XTAL
- Power of	cal (0.2 Step)-		Τ	emp cal		Fre	eq Offset cal	
1st		Т	aet	lst		1st	66	Test
2nd			1	2nd		2nd	1	Teac
	Write			W	ite		Write	
MAC Ac	ddress setup							
1st	D4:3D	:39:10:D	F:32	3rd				Write
2nd	00:00	:00:01:00):00	4th				white
EX) AA	A:BB:CC:DD:E	E:FF						
OTP R	EAD/WRITE							
ADDR	: 0x	LEN	IGTH : 1	÷		R	ead First !!!	
DATA	: 0x				iead VVnt	e ((Check OTP addre	ess available)

Figure 38. OTP mode

- **Power calibration** and **temperature calibration** are completed for the chipset by Renesas Electronics, so you may not need to do it.
- Freq Offset cal: the range of frequency offset calibration is 0x0 ~ 0x7F.

MAC Address Setup:

The DA16200 has 4 slots to store MAC addresses. The 1st slot is written by Renesas Electronics. You can use 3 slots to write your 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 the MAC address in the first empty slot and click the **Write** button, then the new address substitutes for the previous address.

9. Revision History

Revision	Date	Description			
1.9	Apr 23, 2025	Converted into Renesas template.			
1.8	June 30, 2023	Updated the reference section.			
1.7	Mar 28, 2022	Updated logo, disclaimer, and copyright.			
1.6	Aug 19, 2021	Applied changes to SDK folder hierarchy.			
1.5	Jan 6, 2021	Revised as the user interface changes of the tool.			
1.4	Aug 21, 2020	Added: Section 7.3.5, Section 7.4.3, and Figure 34.			
1.3	Apr 6, 2020	Added TCP/UDP, MQTT, TLS, and GUI Build.			
1.2	Oct 31, 2019	Finalized for publication.			
1.1	Oct 15, 2019	Editorial review.			
1.0	July 3, 2019	First release.			



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.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu Koto-ku, Tokyo 135-0061, Japan

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