Technical Information

YFGW510 Field Wireless Access Point
RF Output Setting Guide

TI 01W01A54-01EN

Table of Contents

YOKOGAWA

Yokogawa Electric Corporation
2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 Japan
Tel.: 81-422-52-5634 Fax.: 81-422-52-9802

Introduction

This document describes the requirements for RF professional installation for the YFGW510 field wireless access point. These procedures are mandatory for compliance with the Radio Act.

Notes

- The contents of this document are subject to change without prior notice for improvements in performance or functions.
- All reasonable efforts have been made to ensure the accuracy of this document. If any errors or omissions are found, please inform us.
- Unauthorized copying or reproduction of part or all of this manual is strictly prohibited.

Trademarks

- All brand names and product names of Yokogawa appearing in this document are either trademarks or registered trademarks of Yokogawa Electric Corporation.
- All brand names and product names of other companies appearing in this document are either trademarks or registered trademarks of their respective holders.
- The TM or ® marks are not included for trademarks or registered trademarks mentioned in this document.

Scope of this document

- This document does not cover the basic procedures for using operating systems such as Windows; please refer to respective user's guides if necessary.
- This document does not cover the basic settings and operations of software or hardware including the configuration tools; please refer to respective user's manuals if necessary.

1. Antennas and Remote Antenna Cables

1.1 Antennas permitted to be connected

IMPORTANT

Antennas conforming to the Radio Act certification are listed in the table below.

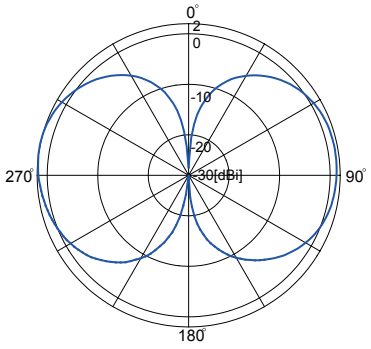
Do not use any other antennas for the YFGW510.

Parts number	Parts name	Direction	Gain (dBi)	Frequency (GHz)	Remarks
F9915KW	2 dBi standard antenna (2.4 GHz)	Omni	2.14	2.4	Note 1
F9915KY	6 dBi high gain antenna (2.4 GHz)	Omni	6.0	2.4	
F9195VG	9 dBi high gain antenna (2.4 GHz)	Omni	9.0	2.4	
F9195VA	2 dBi standard antenna (2.4 GHz/5 GHz dual band)	Omni	2.14	2.4, 5	Note 2

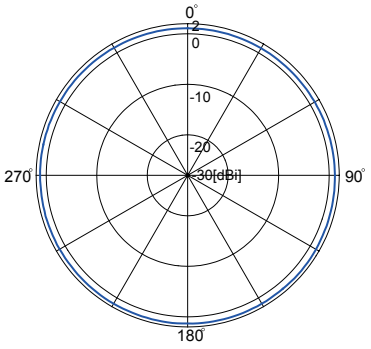
Note 1: This antenna is included in the package when the ISA100.11a antenna code is specified as 1, or the wireless LAN antenna 1 or 2 is specified as 3.
Note 2: This antenna is included in the package when the wireless LAN antenna 1 or 2 is specified as 4.

1.1.1 Technical specifications of 2 dBi standard antenna (2.4 GHz)

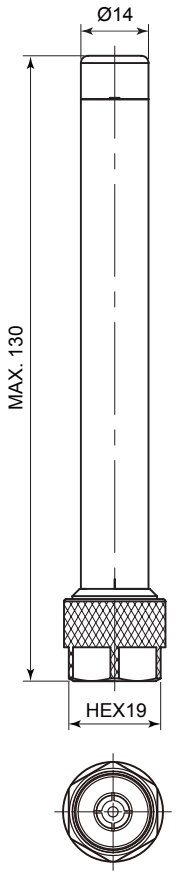
Item	Specifications
Type	Omni directional sleeve antenna
Frequency	2400 to 2500 MHz
Gain	2.14 dBi
VSWR	2.0 or less
Input impedance	50 Ω
Half-power angle	E-plane: 70°, H-plane: 360°
Connector type	N-type plug
Mass	57 g
Tolerable wind speed	Up to 60 m/sec
Operating temperature	–40°C to +85°C



E-plane radiation pattern



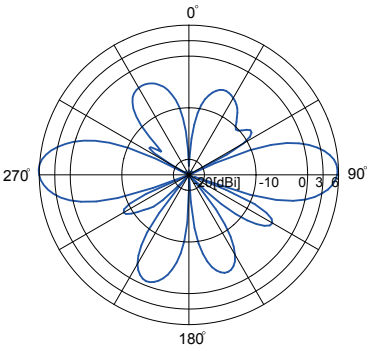
H-plane radiation pattern



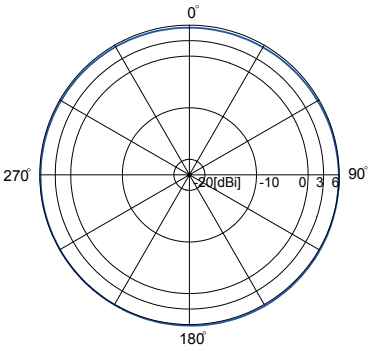
Dimensions (unit: mm)

1.1.2 Technical specifications of 6 dBi high gain antenna (2.4 GHz)

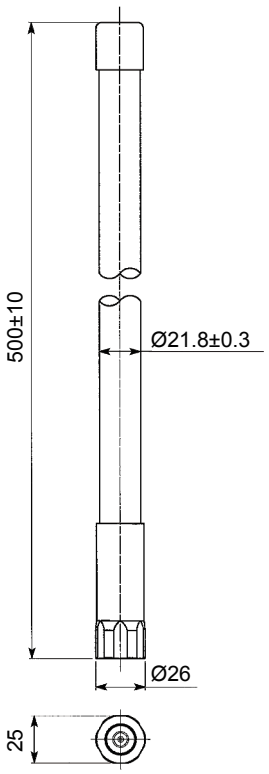
Item	Specifications
Type	Omni directional collinear antenna
Frequency	2400 to 2500 MHz
Gain	6.0 dBi
VSWR	2.0 or less
Input impedance	50 Ω
Half-power angle	E-plane: 22°, H-plane: 360°
Connector type	N-type plug
Mass	0.3 kg
Tolerable wind speed	Up to 60 m/sec
Operating temperature	–40°C to +85°C



E-plane radiation pattern



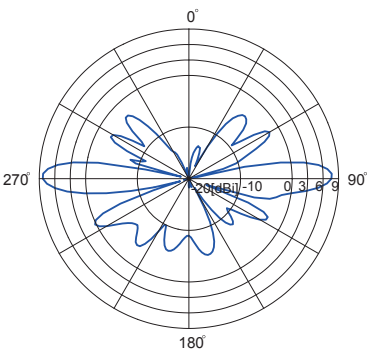
H-plane radiation pattern



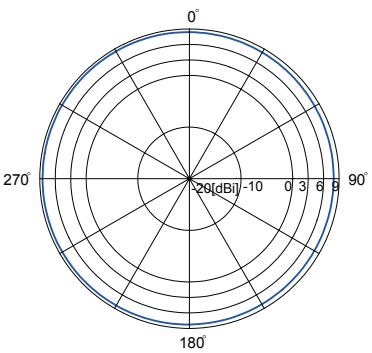
Dimensions (unit: mm)

1.1.3 Technical specifications of 9 dBi high gain antenna (2.4 GHz)

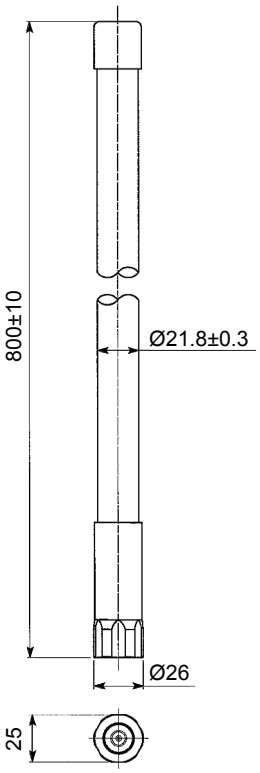
Item	Specifications
Type	Omni directional collinear antenna
Frequency	2400 to 2500 MHz
Gain	9.0 dBi
VSWR	2.0 or less
Input impedance	50 Ω
Half-power angle	E-plane: 11°, H-plane: 360°
Connector type	N-type plug
Mass	0.4 kg
Tolerable wind speed	Up to 60 m/sec
Operating temperature	–40°C to +85°C



E-plane radiation pattern



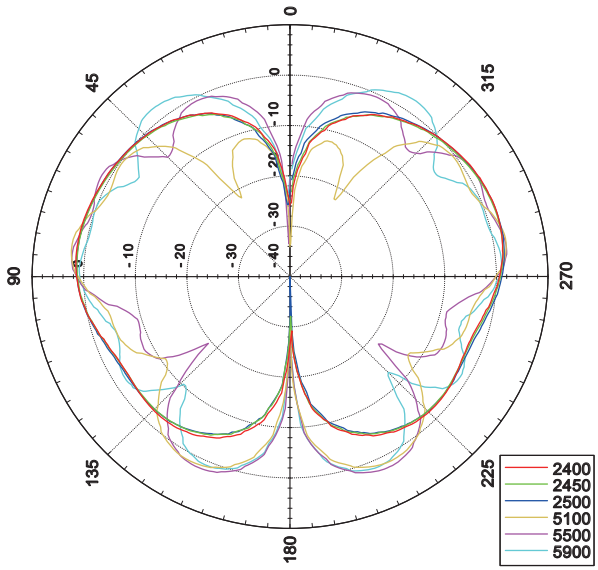
H-plane radiation pattern



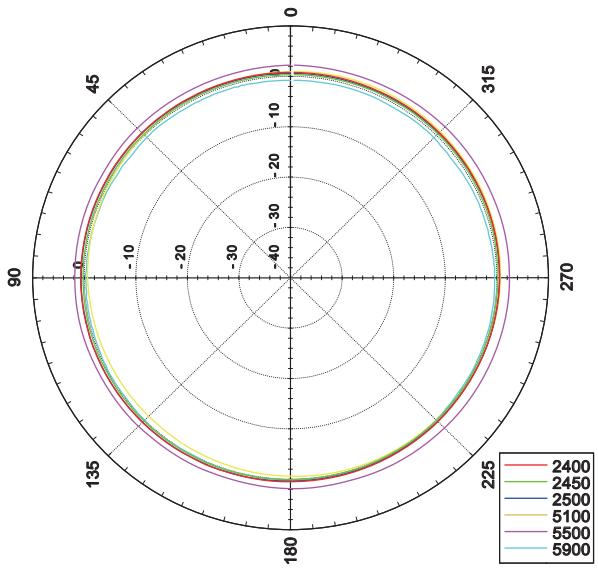
Dimensions (unit: mm)

1.1.4 Technical specifications of 2 dBi standard antenna (2.4 GHz/5 GHz dual band)

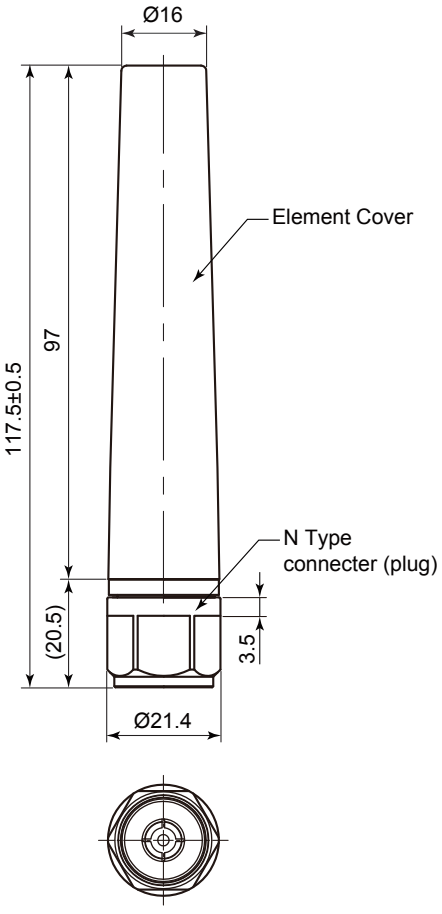
Item	Specifications
Type	Omni directional sleeve antenna
Frequency	2.4 to 2.5 GHz 5.1 to 5.9 GHz
Gain	2.14 dBi
VSWR	2.0 or less
Input impedance	50 Ω
Half-power angle	E-plane: 70°, H-plane: 360°
Connector type	N-type plug
Mass	100 g
Tolerable wind speed	Up to 60 m/sec
Operating temperature	–40°C to +85°C



E-plane radiation pattern



H-plane radiation pattern



Dimensions (unit: mm)

1.2 Remote antenna cables

Use the cables listed in the table below.

Parts number	Length	Connector	Arrestor	Insertion loss (dB), typical		Remarks
				2.4 GHz	5 GHz	
F9915KU	3 m	N-male to N-female	N/A	0.6 dB	1.0 dB	Note 1
F9915KV	13 m (3 m + 10 m)	N-male to N-female	Yes	2.6 dB	4.1 dB	

Note 1: This cable is included in the package when the wireless LAN antenna 1 or 2 is specified as 3 or 4.

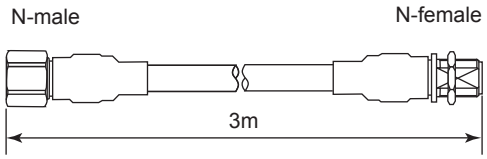


Figure 1-1 F9915KU remote antenna cable (3 m)

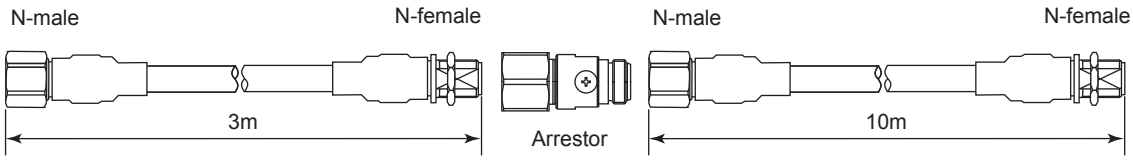


Figure 1-2 F9915KV remote antenna cable (13 m)

2. Setting the RF Output

IMPORTANT

To make the YFGW510 comply with the Radio Act, an appropriate RF output power must be set by following the procedures described in this document.

Only trained Yokogawa service personnel are permitted to set the RF output power with the dedicated passwords.

2.1 EIRP

EIRP refers to the Equivalent Isotropically Radiated Power or Effective Isotropically Radiated Power in radio communication systems. This is equal to the amount of power radiated from an isotropic antenna (a hypothetical antenna assumed to distribute power evenly in all directions) which is converted from the power emitted from an actual antenna in a certain direction.

Maximum EIRP values are stipulated in the Radio Act of each country.

2.2 RF output settings in YFGW510

RF output setting items in the YFGW510 are listed in the table below.

Setting item	Description
Antenna gain	Set the gain of the antenna to be connected.
Cable loss	Must be set to 0. (*1)
Max. EIRP	Set the maximum EIRP value stipulated by local regulations.

*1: Output correction is not calculated in the current version. (Available in the future.)

Based on these settings, the output power at the YFGW510 antenna connector is calculated as follows:

Output power at the antenna connector (dBm)
= Max. EIRP (dBm) – Antenna gain (dBi) + Cable loss (dB)

2.3 Default settings

The default settings of each antenna are as follows.

Table 2-1 Default settings of the ISA100.11a antenna

Specification code of the ISA100.11a antenna	Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)
1	2	0	9.9
A	9	0	9.9

Table 2-2 Default settings of the wireless LAN antenna (2.4 GHz)

Specification code of the wireless LAN antenna 1 or 2	Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)
3 or 4	2	0	9.9
A	9	0	9.9

Table 2-3 Default settings of the wireless LAN antenna (5 GHz)

Specification code of the wireless LAN antenna 1 or 2	Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)
3 or 4	2	0	9.9
A	2	0	9.9

2.4 RF output settings for field wireless (ISA100.11a)

For each area, set RF output values by following the tables below.

2.4.1 Radio Act (construction design attestation) (Japan)

Specification code of the ISA100.11a antenna	Antenna	Remote antenna cable	Setting			Remarks
			Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)	
1	Integral (2 dBi)	N/A	2	0	14	
A	2 dBi F9915KW F9195VA	N/A	2	0	14	
		F9915KU (3 m)	2	0	14	
		F9915KV (13 m)	2	0	14	
	6 dBi F9915KY	F9915KU (3 m)	6	0	14	
		F9915KV (13 m)	6	0	14	
	9 dBi F9195VG	F9915KU (3 m)	9	0	14	
		F9915KV (13 m)	9	0	14	

2.4.2 Regulatory compliance for radio and telecommunication (R&TTE)

Specification code of the ISA100.11a antenna	Antenna	Remote antenna cable	Setting			Remarks
			Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)	
1	Integral (2 dBi)	N/A	2	0	12	
A	2 dBi F9915KW F9195VA	N/A	2	0	12	
		F9915KU (3 m)	2	0	12	
		F9915KV (13 m)	2	0	12	
	6 dBi F9915KY	F9915KU (3 m)	6	0	12	
		F9915KV (13 m)	6	0	12	
	9 dBi F9195VG	F9915KU (3 m)	9	0	12	
		F9915KV (13 m)	9	0	12	

2.4.3 FCC

Specification code of the ISA100.11a antenna	Antenna	Remote antenna cable	Setting			Remarks
			Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)	
1	Integral (2 dBi)	N/A	2	0	12	(*1)
A	2 dBi F9915KW F9195VA	N/A	2	0	12	
		F9915KU (3 m)	2	0	12	
		F9915KV (13 m)	2	0	12	
	6 dBi F9915KY	F9915KU (3 m)	6	0	16	
		F9915KV (13 m)	6	0	16	
	9 dBi F9195VG	F9915KU (3 m)	9	0	17	
		F9915KV (13 m)	9	0	17	

*1 The hopping pattern cannot be set to Channel 26.

2.4.4 Industry Canada (IC) compliance

Specification code of the ISA100.11a antenna	Antenna	Remote antenna cable	Setting			Remarks
			Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)	
1	Integral (2 dBi)	N/A	2	0	12	
A	2 dBi F9915KW F9195VA	N/A	2	0	12	
		F9915KU (3 m)	2	0	12	
		F9915KV (13 m)	2	0	12	
	6 dBi F9915KY	F9915KU (3 m)	6	0	16	
		F9915KV (13 m)	6	0	16	
	9 dBi F9195VG	F9915KU (3 m)	9	0	17	
		F9915KV (13 m)	9	0	17	

2.5 RF output settings for wireless LAN

(When the communication interface specification is wireless LAN client)

- Set an appropriate antenna gain for the antenna to be connected from those listed in the table below.
- Set the same Max. EIRP value as described for field wireless (ISA100.11a). Set the same value in all WLAN C1 (2.4 GHz), WLAN C1 (5 GHz), WLAN C2 (2.4 GHz), and WLAN C2 (5 GHz).

Specification code of the wireless LAN antenna	Antenna	Remote antenna cable	Setting		
			Antenna gain (dBi)	Cable loss (dB)	Max. EIRP (dBm)
3	Integral 2 dBi (2.4 GHz)	Bundled (3 m)	2	0	Set the same value as described for field wireless (ISA100.11a).
4	Integral 2 dBi (2.4 GHz/5 GHz)	Bundled (3 m)	2	0	
A	2 dBi F9915KW (2.4 GHz) F9195VA (2.4 GHz/5 GHz)	F9915KU (3 m)	2	0	
		F9915KV (13 m)	2	0	
	6 dBi F9915KY (2.4 GHz)	F9915KU (3 m)	6	0	
		F9915KV (13 m)	6	0	
	9 dBi F9195VG (2.4 GHz)	F9915KU (3 m)	9	0	
		F9915KV (13 m)	9	0	

2.5.1 Radio Act (construction design attestation) (Japan)

- Channels 36 through 64 are for indoor use only.
- Channels 100 through 140 are for either indoor or outdoor use. Channels 52 through 140 can be used only when the wireless LAN access point has the function of dynamic frequency selection (DFS).
- Channels 149 and over cannot be used.

2.5.2 Regulatory compliance for radio and telecommunication (R&TTE)

- Channels 36 through 64 are for indoor use only.
- Channels 100 through 116 and 132 through 140 are for either indoor or outdoor use. Channels 52 through 64, 100 through 116, and 132 through 140 can be used only when the wireless LAN access point has the function of DFS.
- Channels 120 through 128 and channels 149 and over cannot be used.

2.5.3 FCC

- Channels 36 through 48 are for indoor use only.
- Channel 52 through 64, 100 through 140, and 149 through 165 are for either indoor or outdoor use. Channels 52 through 64 and 100 through 140 can be used only when the wireless LAN access point has the function of DFS.

2.5.4 Industry Canada (IC) compliance

- Channels 36 through 48 are for indoor use only.
- Channels 52 through 64, 100 through 116, 132 through 140, and 149 through 165 are for either indoor or outdoor use. Channels 52 through 64, 100 through 116, and 132 through 140 can be used only when the wireless LAN access point has the function of DFS.
- Channels 120 through 128 cannot be used.
- Channels 36 through 48 are for indoor use only.

3. Setup Tool

The RF output is set by using the Field Wireless Access Point Setup Tool. For the installation and operating conditions of the Setup Tool, see the user's manual of the YFGW510.

3.1 Setting the RF output

IMPORTANT

Only trained Yokogawa service personnel are permitted to set the RF output power with the dedicated passwords.

Disconnect the YFGW410 from the YFGW510 before setting RF output values in the YFGW510.

Starting the Setup Tool and logging-in

- Connect the PC in which the Setup Tool is installed to the YFGW510 via IR communication. Start the Setup Tool.

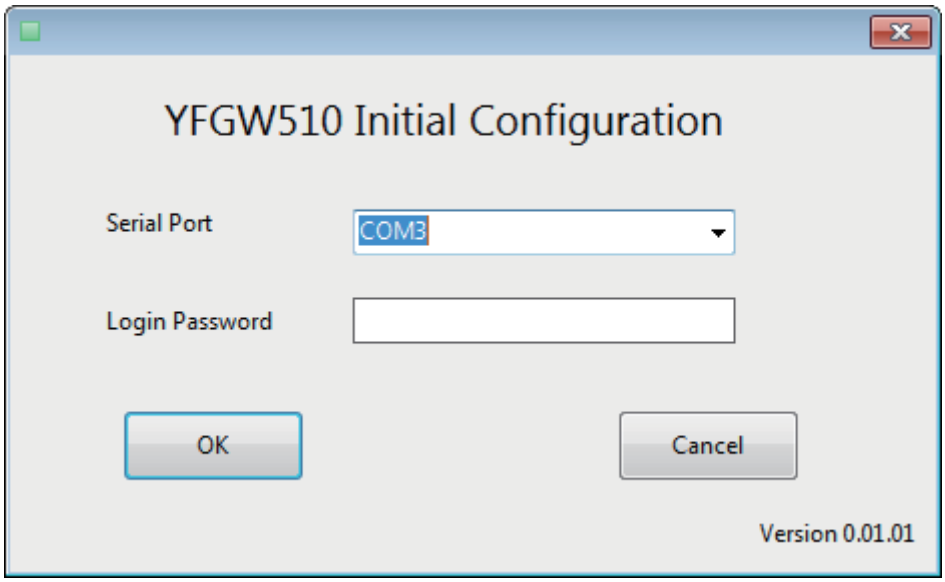


Figure 3-1 Log-in window

- Turn on the YFGW510. Check the ACT LED on the front of the YFGW510. Enter the password depending on the status of the LED.

Status of the LED	Password
Orange lit or orange blink	Engineering password
Red blink	Maintenance password

When the password is accepted, the main window shown in Figure 3-2 appears.

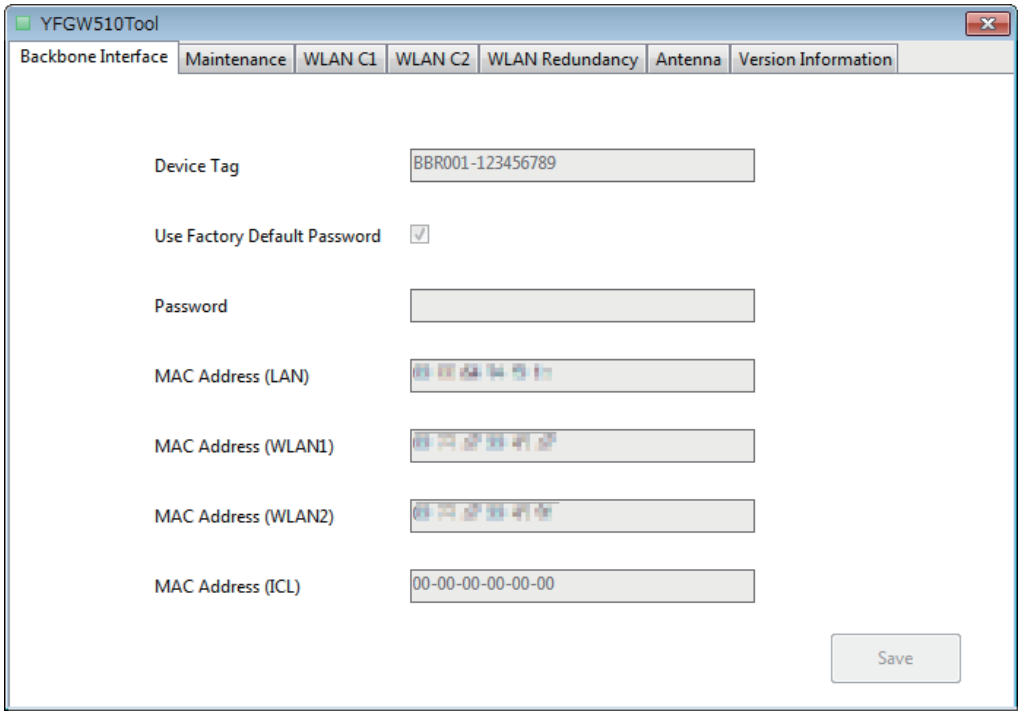


Figure 3-2 Main window

After logging in with the engineering password

Select the [Maintenance] tab. Click the [Edit Mode] button to display the confirmation dialog box as shown in Figure 3-3. Click [OK].

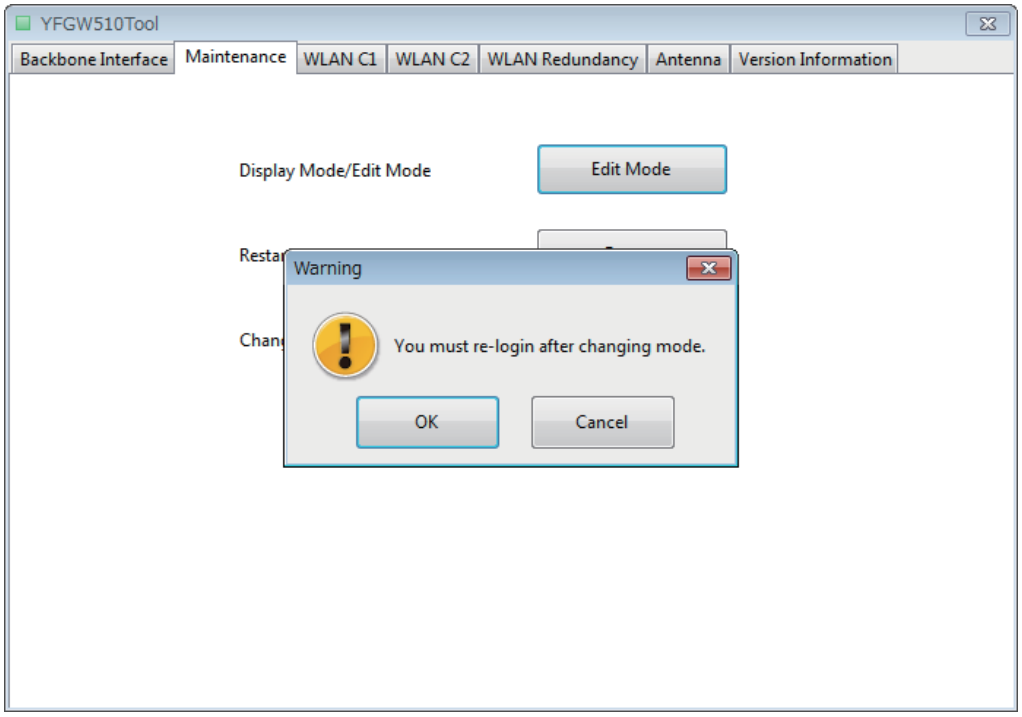


Figure 3-3 Maintenance tab window

The ACT LED starts blinking in red and the log-in window of Figure 3-1 appears again. Log in with the maintenance password.

After logging in with the maintenance password

- Select the [Antenna] tab (Figure 3-4). Set the values by following the procedures described in Section 2.4 “RF output settings for field wireless (ISA100.11a).”
- When the communication interface specification is wireless LAN client, follow the procedures described in Section 2.5 “RF output settings for wireless LAN.”

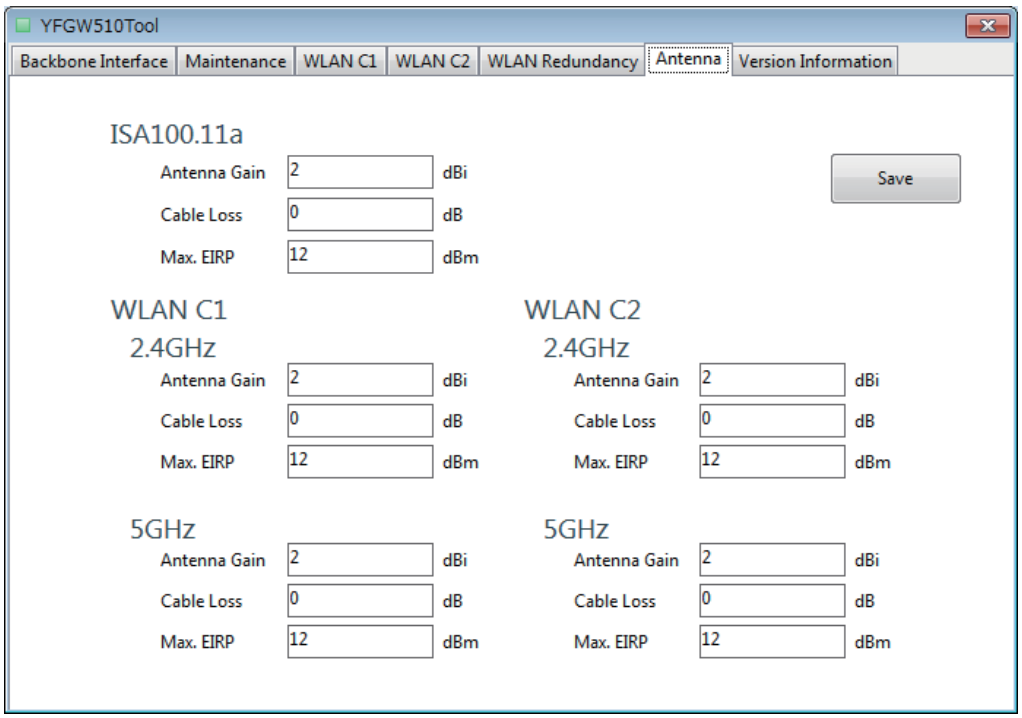


Figure 3-4 Antenna tab window

IMPORTANT

The Setup Tool does not check whether the settings comply with the local Radio Act. Follow the instructions described in Sections 2.4 and 2.5 and those listed below.

- Set the antenna gain corresponding to the antenna to be used.
- Set the cable loss as specified in the tables.
- Set the Max. EIRP as specified in the tables.

- After entering all items, click the [Save] button to save the settings in the YFGW510. The confirmation dialog box appears as shown in Figure 3-5.

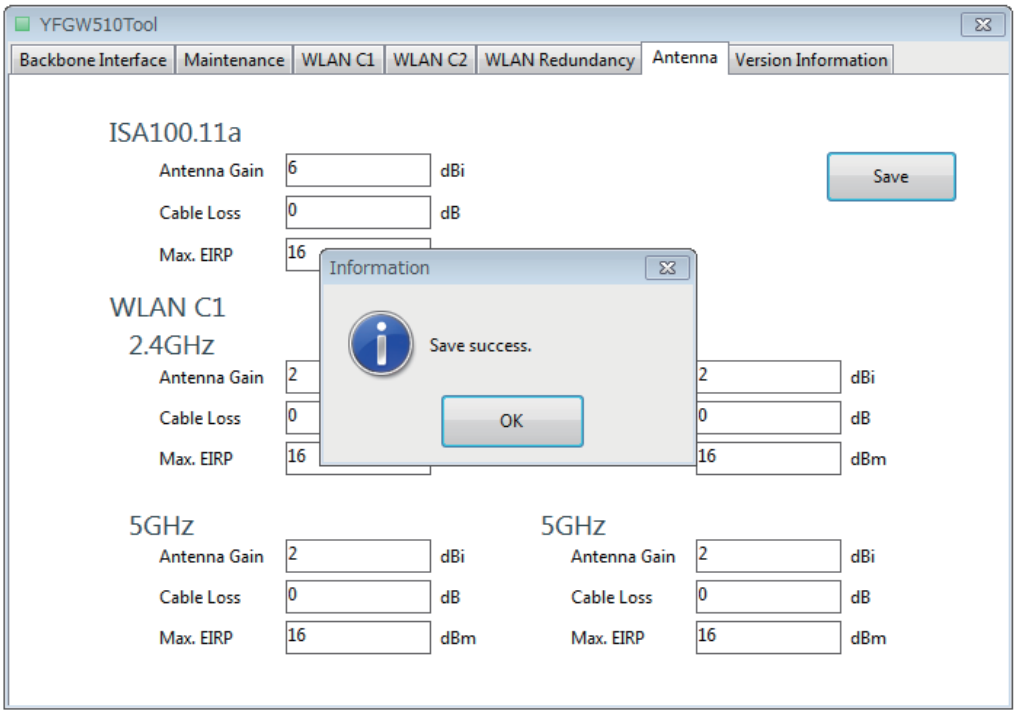


Figure 3-5 Success dialog

- If any value is out of range, the error dialog appears as shown in Figure 3-6.

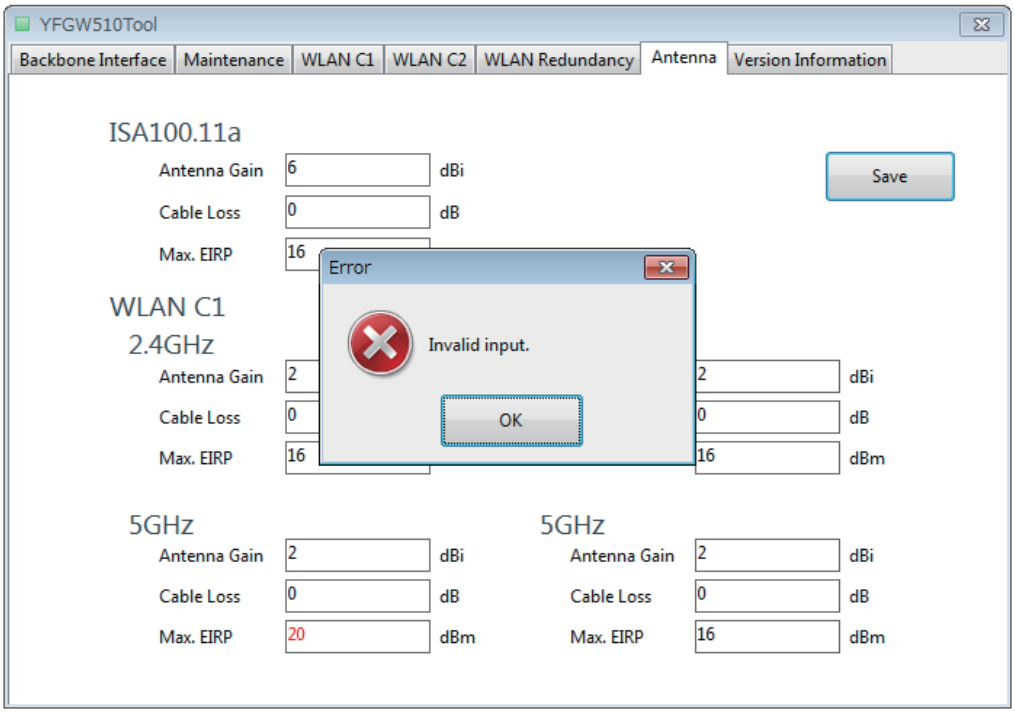


Figure 3-6 Error dialog

- Correct any values displayed in red and click the [Save] button again.

- Follow the instructions described in the User's Manual to input other items than RF output values.
- After finishing all settings, select the [Maintenance] tab and click the [Reset] button to restart the YFGW510.

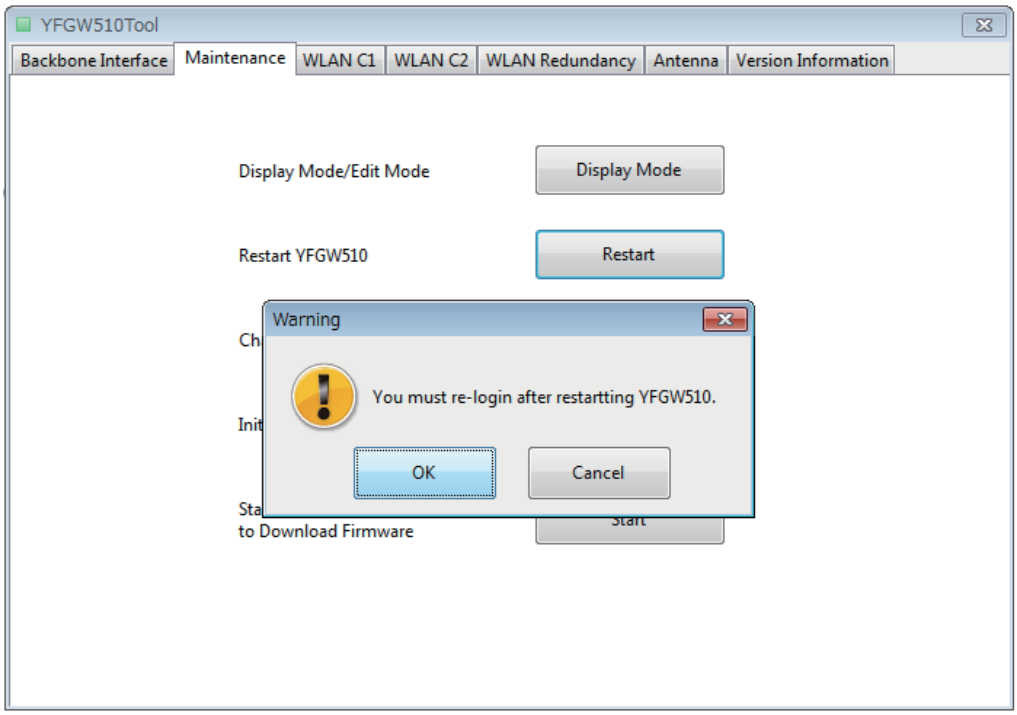


Figure 3-7 Restart confirmation dialog box

- Click the [OK] button in the restart confirmation dialog box.
- The log-in window shown in Figure 3-1 will appear again. Click the [×] button in the upper right corner of the window to exit the Setup Tool.

This completes the RF output setting in the YFGW510.

Revision Information

Document Name : RF Output Setting Guide for YFGW510 Field Wireless Access Point
Document Number : TI 01W01A54-01EN

Edition	Date	Page	Revised Item
1st	February 2013	—	New issue
2nd	December 2014	7, 8	Change Max. EIRP of default settings.