DRTECH

EXT AP

User Manual

Version 1.3

DRTECH

Revision History

Date	Version	Category	Writer
2020-05-04	1.0	Initial Draft	CH.Kim
2020-07-07	1.1	Add User interface manual	CH.Kim
2020-07-28	1.2	5. Added antenna specifications	DS.KIM
2020-08-10	1.3	6. Statement	DS.KIM

Table of contents

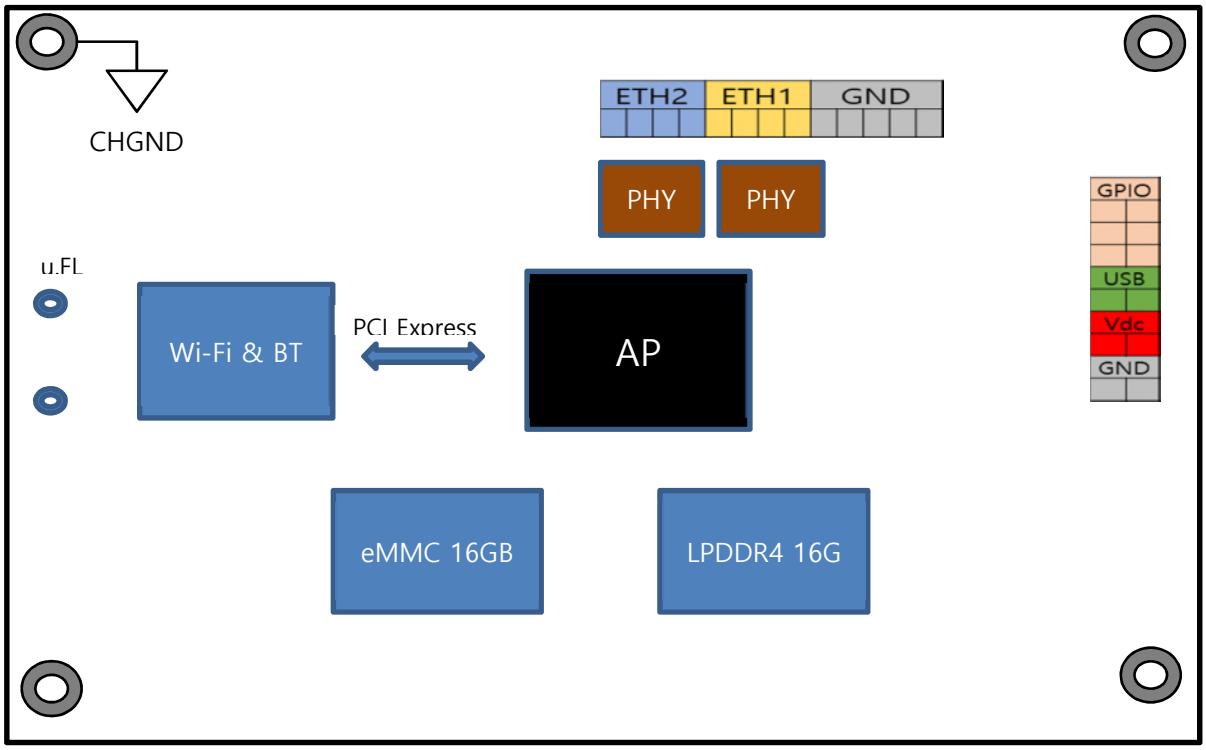
1. Overview

EXT_AP is a wireless module capable of high-speed communication for distances up to 300 meters using Wi-Fi technology in open areas.
This can be used by choosing between 2.4 GHz and 5 GHz frequency bands.
2x2 MIMO function is supported when using 5GHz frequency band.
Bluetooth supports v4.1 specification, EDR.

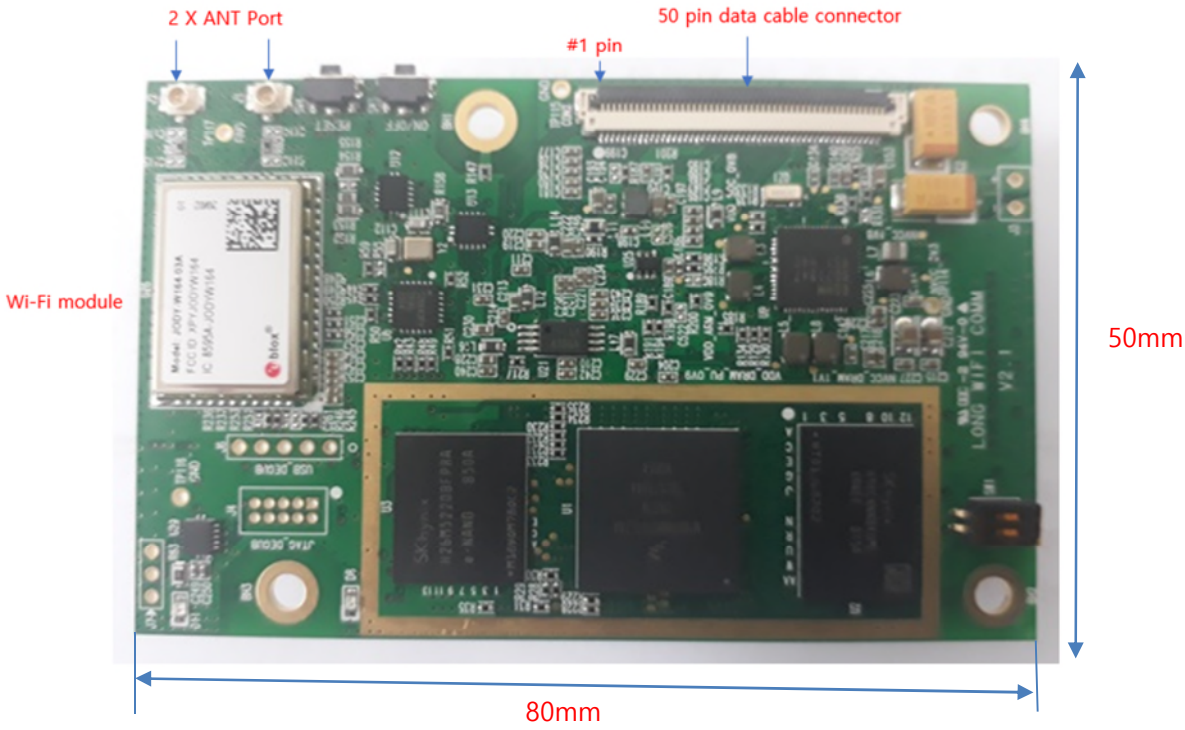
1.1 Key Functions and features

- Wi-Fi Access point functions
- Control external devices using host interface & Bluetooth communication
- Wireless transmission of sensor input image data to the server
- User can select the communication way. (Ethernet or Wi-Fi)
- Control the module ON/OFF
- Web Uesr interface function for set up the Access Point functions

1.2 Block diagram



2. H/W Features



No	Items	Value
1	AP	i.MX8M Mini
2	DRAM	DDR4 512Mbyte x 4
3	NAND Flash	eMMC 16GB 5.1
4	Wi-Fi	802.11 n/ac 2x2
5	Bluetooth	Bluetooth 4.1
6	Ethernet	Gigabit 2 Port
7	USB	2.0 Host I/F
8	External I/F	I2C, UART, SPI, GPIO
9	ANT	2 x u.FL Connector
10	Power	DC 5V
11	Size	50 x 80 mm

<Table 1-1>

3. Specification

3.1 Power and Specification

<table>
<tr><th colspan="3">Item</th><th colspan="2">Specifications</th></tr>
<tr><td rowspan="14">Power Speci-fication</td><td rowspan="3">Device specification</td><td>Rated power input</td><td colspan="2">DC 5V 2A</td></tr>
<tr><td>DC voltage input range</td><td colspan="2">+4.5V ~ +5.5V</td></tr>
<tr><td>Power consumption</td><td colspan="2">7W (Typical)</td></tr>
<tr><td rowspan="11">Adapter Specification</td><td>Rated power input</td><td colspan="2">AC 100 ~ 240V, 50/60Hz</td></tr>
<tr><td>AC voltage input range</td><td colspan="2">AC 100V ~ 240V</td></tr>
<tr><td>AC input frequency range</td><td colspan="2">47 ~ 63Hz</td></tr>
<tr><td>AC Input Current</td><td colspan="2">Max. 0.5A</td></tr>
<tr><td>Rated power output</td><td colspan="2">DC 5V/2A</td></tr>
<tr><td>Line regulation</td><td colspan="2">Rated power output ± 5%
(4.75V ~ 5.25V)</td></tr>
<tr><td>Load regulation</td><td colspan="2">Rated power output ± 5%
(4.75V ~ 5.25V)</td></tr>
<tr><td rowspan="2">Ripple & noise</td><td colspan="2">Maximum 50mVp-p</td></tr>
<tr><td colspan="2">(Input 220VAC, Output 3A load resistance case)</td></tr>
<tr><td rowspan="2">Output over-current protection</td><td colspan="2">Minimum 4.5A Over operations</td></tr>
<tr><td colspan="2">(Input 220VAC standards)</td></tr>
<tr><td rowspan="2">Output short protection</td><td>Short</td><td>Protection</td></tr>
<tr><td>Open</td><td>Run</td></tr>
<tr><td rowspan="2">Power efficiency</td><td colspan="2">73% Over</td></tr>
<tr><td colspan="2">(Rated power input 220VAC, Output DC 5V/3A standards)</td></tr>
<tr><td colspan="2" rowspan="3">Environment Condition</td><td>Operation temperature</td><td colspan="2">0℃ ~ 40℃</td></tr>
<tr><td>Operation humidity</td><td colspan="2">25~90% (non-condensing)</td></tr>
<tr><td>Storage temperature</td><td colspan="2">-10℃ ~ 85℃</td></tr>
</table>

3.2 Bluetooth Specification

Parameter	value
Transmit Power Range	+9 dBm ± 2 dB
Receive Dynamic Range	BDR : -93 dBm ± 1.5 dB
Modulation	BDR(GFSK) : 1 Mbps
Channel	79
Frequency Range	2402 ~ 2480 MHz

3.3 Wi-Fi Specification

Parameter	value
Transmit Power Range	802.11 n: 0 ~ 32 dBm 802.11 n/ac: 0 ~ 32 dBm
Receive Dynamic Range	802.11 n: -95 dBm ± 1 dB @ 54 Mbps 802.11 n/ac: 0 ~ 90dBm ± 1 dB @ 867 Mbps
Data Rate	802.11 n MIMO(MCS8~15): ~ 300 Mbps 802.11 ac MIMO(MCS0~9): ~ 867 Mbps
Channel	802.11 n: 1 ~ 13 802.11 n/ac: 36, 40, 44, 48, 149, 153, 157, 161, 165, 149, 151, 153, 155, 157, 159, 161
Frequency Range	2400 ~ 2500 MHz, 5180 ~ 5240 MHz, 5745 ~ 5825 MHz
Bandwidth	2.4GHz band : 20 MHz 5GHz band : 20 / 40 / 80 MHz

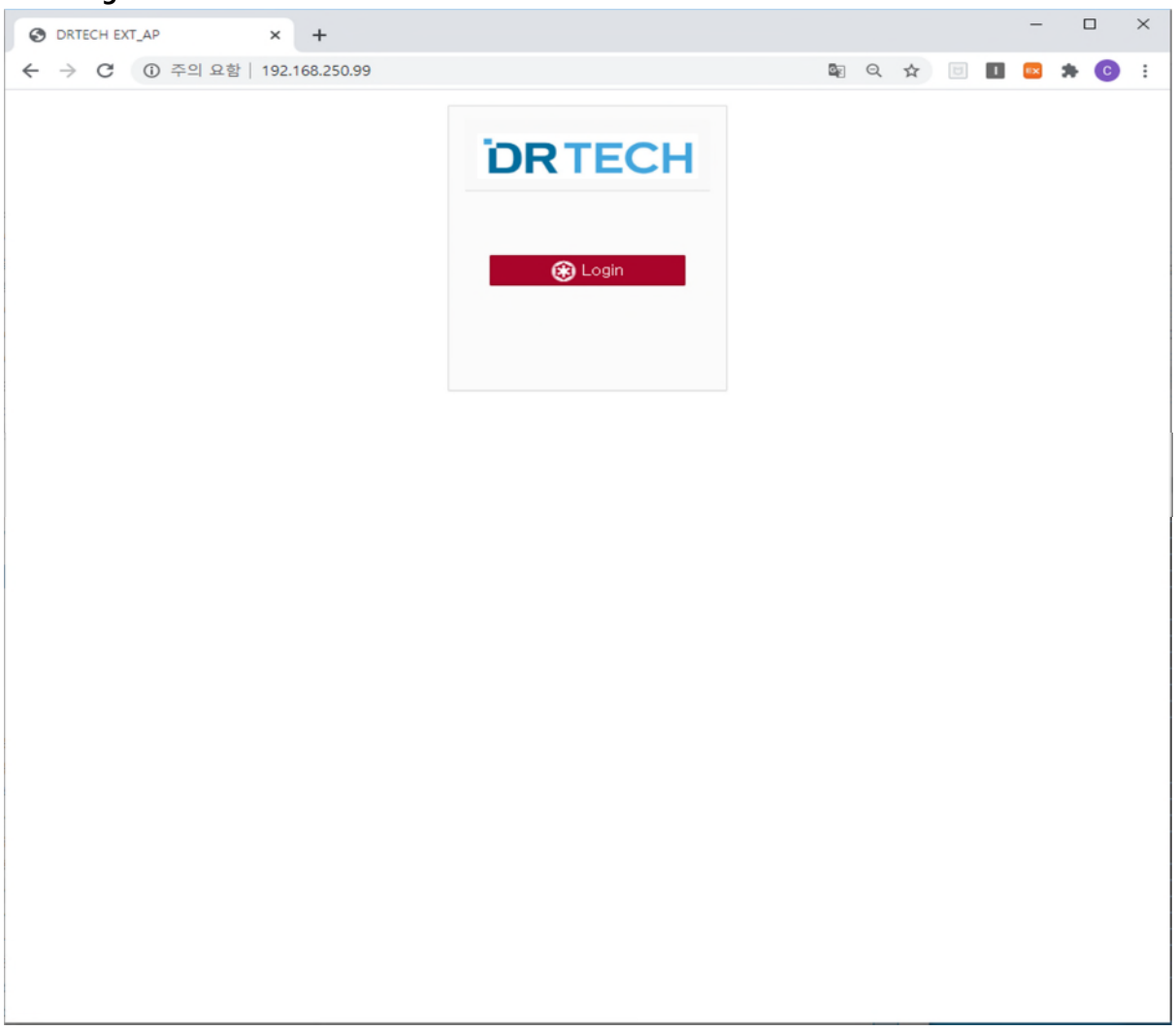
4. Web GUI User manual

The user can set the access point function of EXT AP using the Web GUI.

1. Launch the web browser (Internet Explorer , Chrome) etc.
2. enter the below address at address bar. (Enter log in IP address)
   http://192.168.250.99

4.1 User Interface manual

4.1.1 Log in



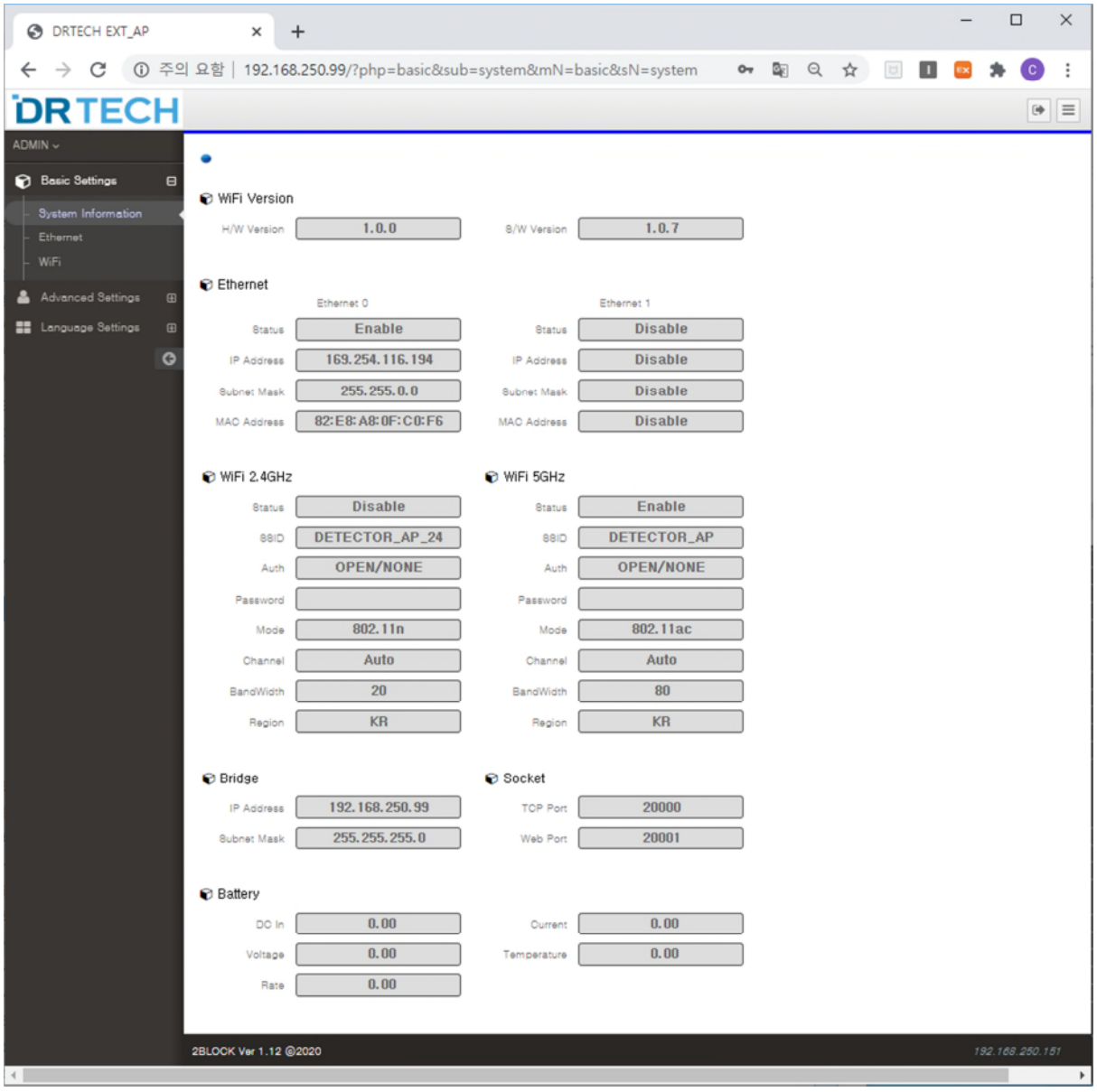
To access the Web UI, user must enter ID and password on the login screen.
ID: admin
Password: admin

4.2 Basic Setting

4.2.1 System information

This menu shows the set values of the EXT AP.

Setting values cannot be changed on this page.

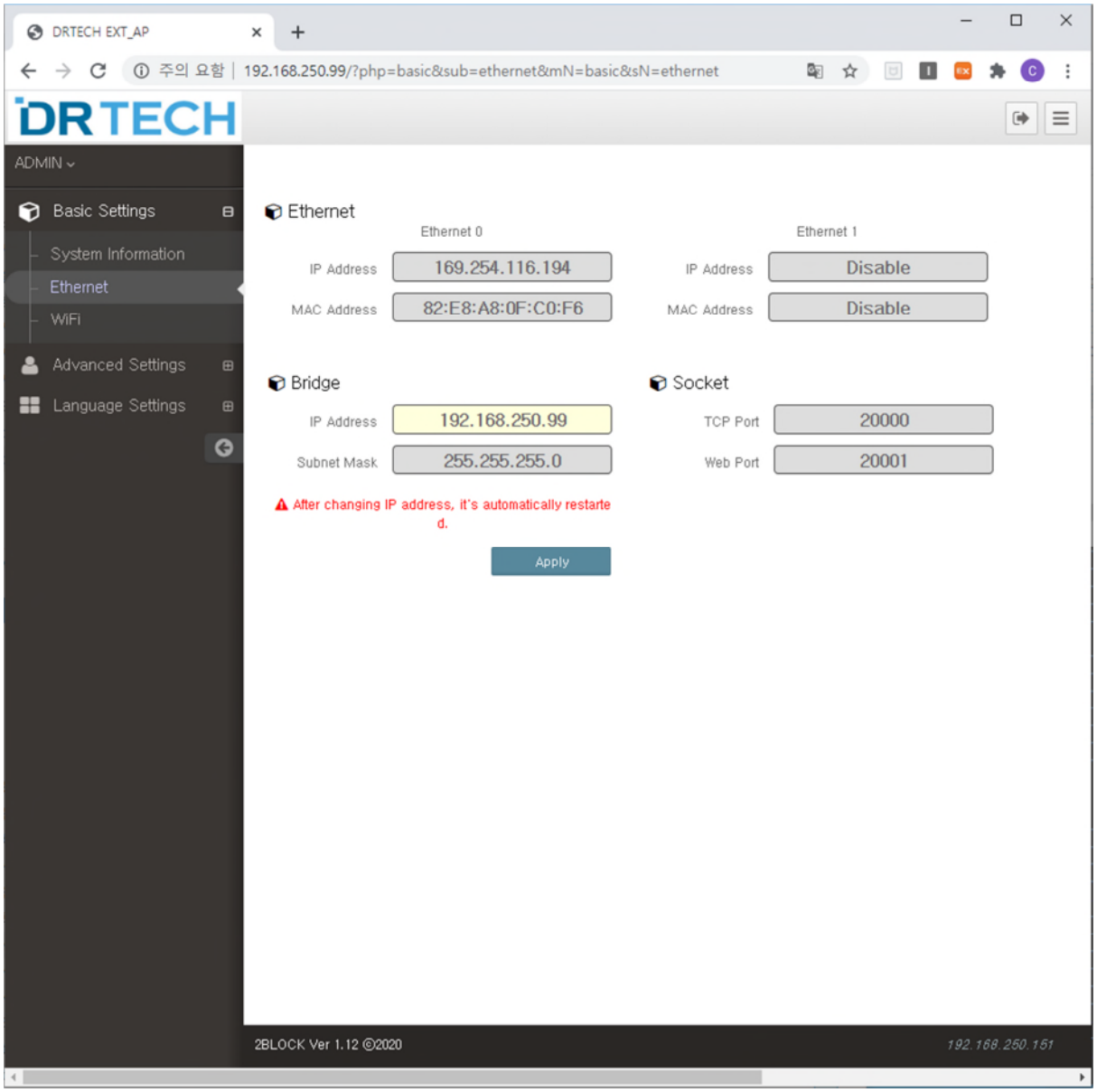


Item	Display	Description
Wi-Fi Version	H/W	Displays H/W version and S/W version information for EXT_AP.
	S/W version	
Ethernet	Enable / Disable status	Displays network information for Ethernet 0 and Ethernet 1.
	IP address	
	Subnet Mask address	
	MAC address	
Wi-Fi	Enable / Disable status	Displays information on Wi-Fi 2.4GHz, 5GHz networks
	SSID	
	Authentication	
	Password	
	Mode	
	Channel	
	Bandwidth	
	Region	
Bridge	IP address	Displays bridge network information
	Subnet Mask	
Socket	TCP Port Number	Display TCP socket port number and Web port number
	Web Port Number	
Battery	Input voltage	Display the status of the battery when EXT AP is in PWU mode.
	Operation voltage	
	Capacity	
	Operation current	
	Operation temperature	

4.2.2 Ethernet

Displays the setting values of Ethernet0, Ethernet1.

Cannot change the setting values for Ethernet0, Ethernet1.



Change the Bridge Port address (Log in IP address)

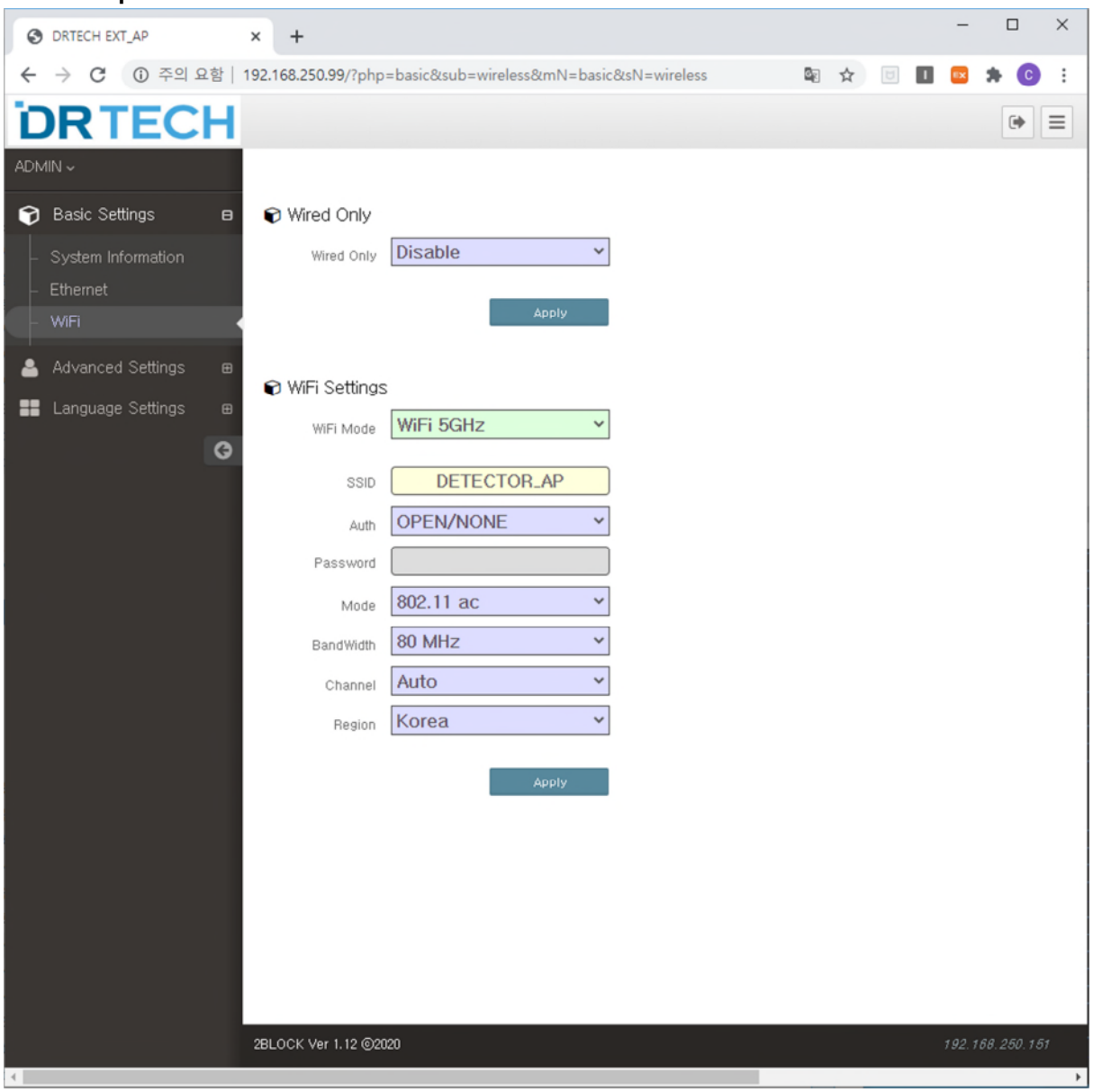
User can change the Web UI login IP address.

Under the Bridge entry, type the IP address you want to change in the IP address window.

After changing the IP address, press the Apply button to change it.

After changing the bridge port address, you must log in again to the changed IP address.

4.2.3 Setup Wi-Fi



4.2.3.1 Wired Only

Can set wired mode priority

Option	Description
Enable	The EXT AP will operate in wired mode. Wi-Fi features are disabled.
Disable	Enable Wi-Fi function. User can set Wi-Fi features.

4.2.3.2 Set up Wi-Fi features

Can be set for Wi-Fi 2.4GHz and 5GHz.

Item	Description
Wi-Fi Mode	Supports Wi-Fi 5GHz and Wi-Fi 2.4GHz. Users can select Wi-Fi mode.
SSID	Can enter up to 64 characters in alphabetic and numeric combinations. For special characters, user can only enter underscores (_), periods (.), and dashes (-).
Auth (Authentication)	Supports OPEN method and WPA2PSK. Users can choose the authentication method.
Password	Can enter from 8 to 32 characters.
Mode	Displays the Wi-Fi mode options available for selection at 2.4 GHz and 5 GHz. User can select a mode.
BandWidth	Displays bandwidth options that can be selected at 2.4 GHz and 5 GHz. Users can select bandwidth.
Channel	Displays the channel options available for selection at 2.4 GHz and 5 GHz. User can select a channel.
Region	Display the country options available for selection at 2.4 GHz and 5 GHz. User can select a country.

4.3 Advanced Settings

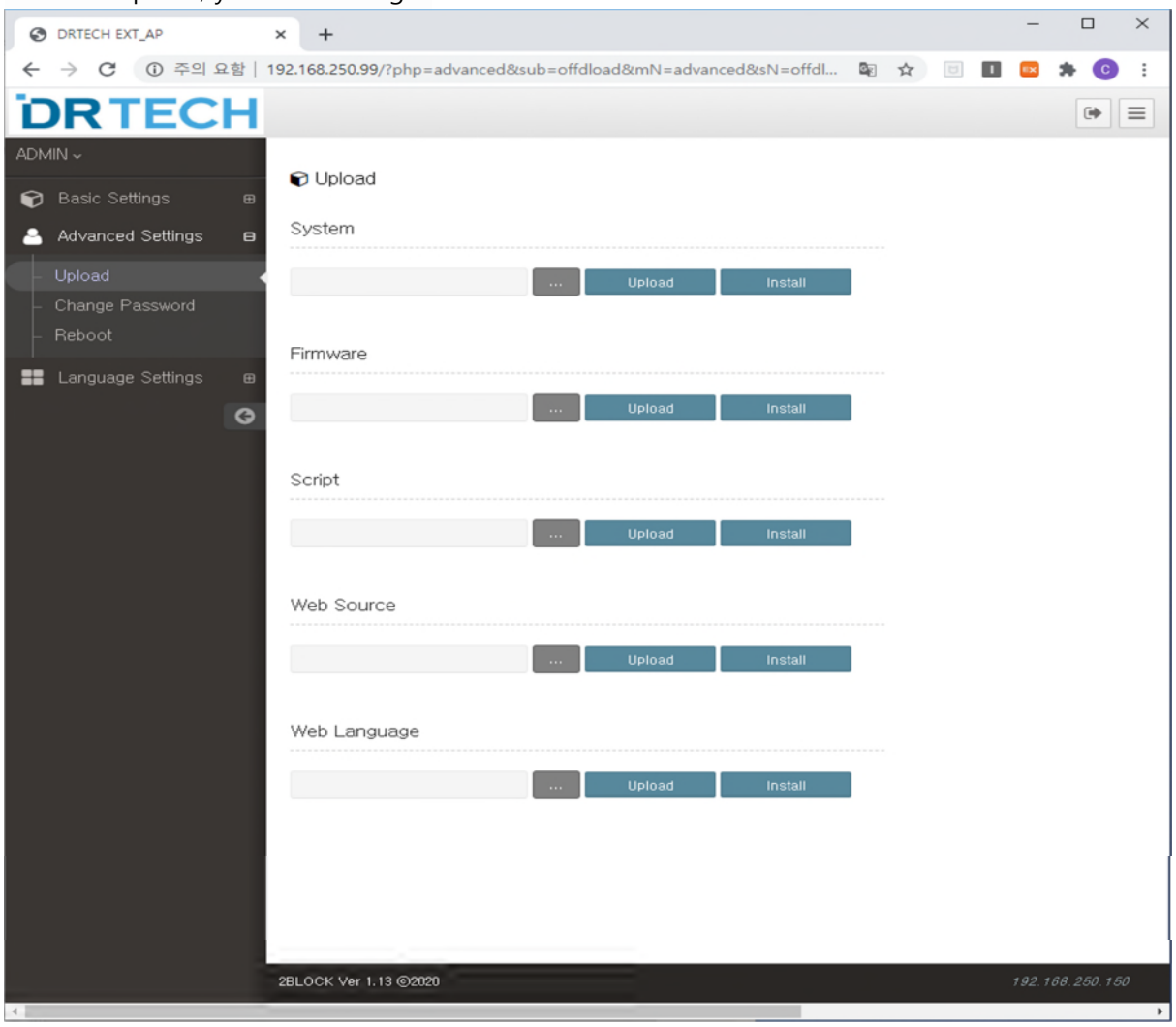
4.3.1 Upload

The upload function of the Web UI allows various updates of the EXT AP system.

Select the update files on the PC connected to the Web UI.

Proceed with the Upload and Install procedure.

After the update, you must re-login.



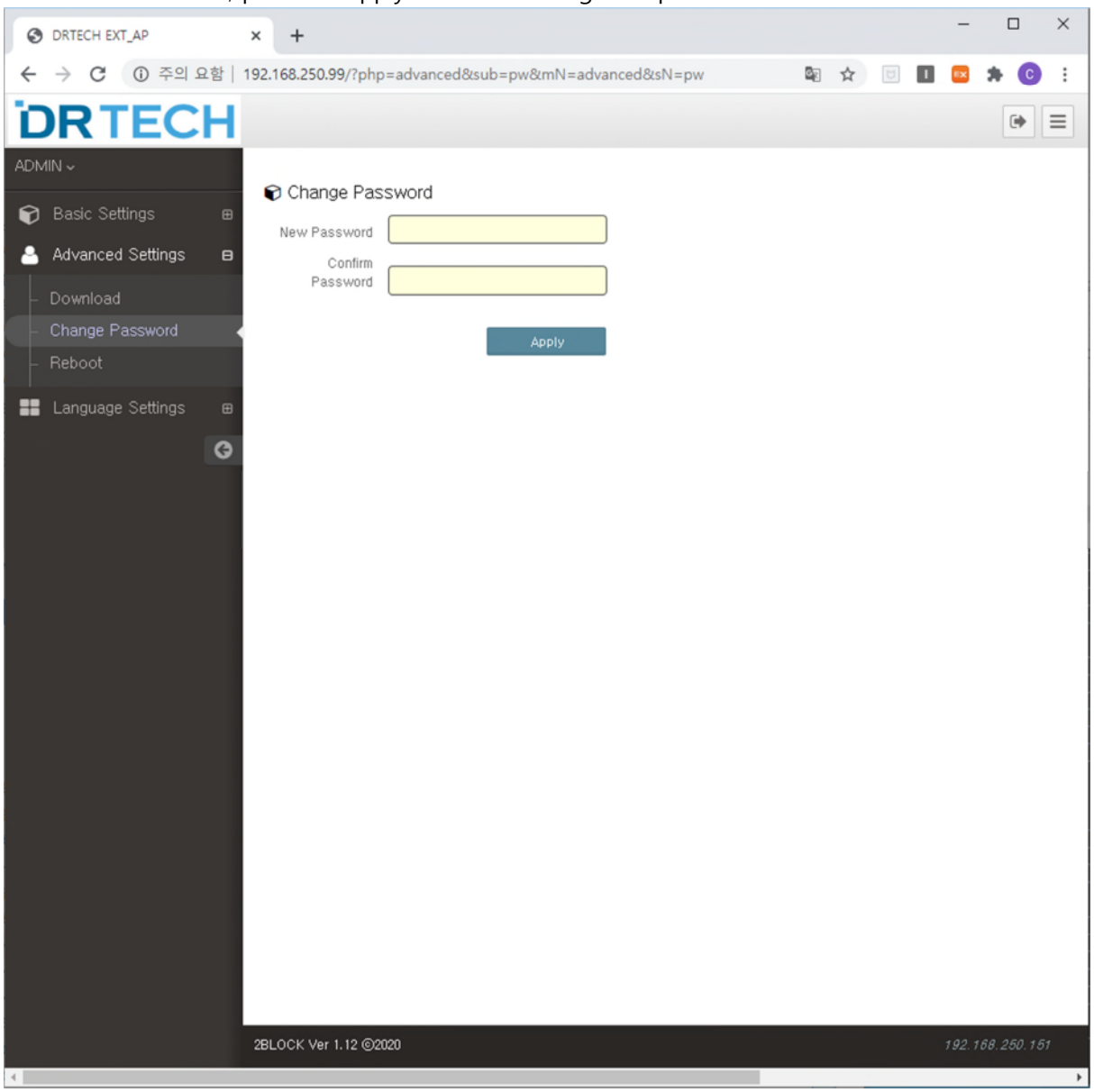
Item	File name rule	Description
System	drtech_system.tar.gz	Update the kernel image
Firmware	drtech_firmware_v1.0.8.tar.gz	Update the Linux application drtech_app. Only change the version name.
Script	drtech_script.tar.gz	Update the script file.
Web Source	drtech_websrc.tar.gz	Update the Web UI source file.
Web Languages	drtech_weblang.zip	Update the Web UI language.

4.3.2 Change the login password

User can change the login password.

Enter a character with no more than 20 characters.

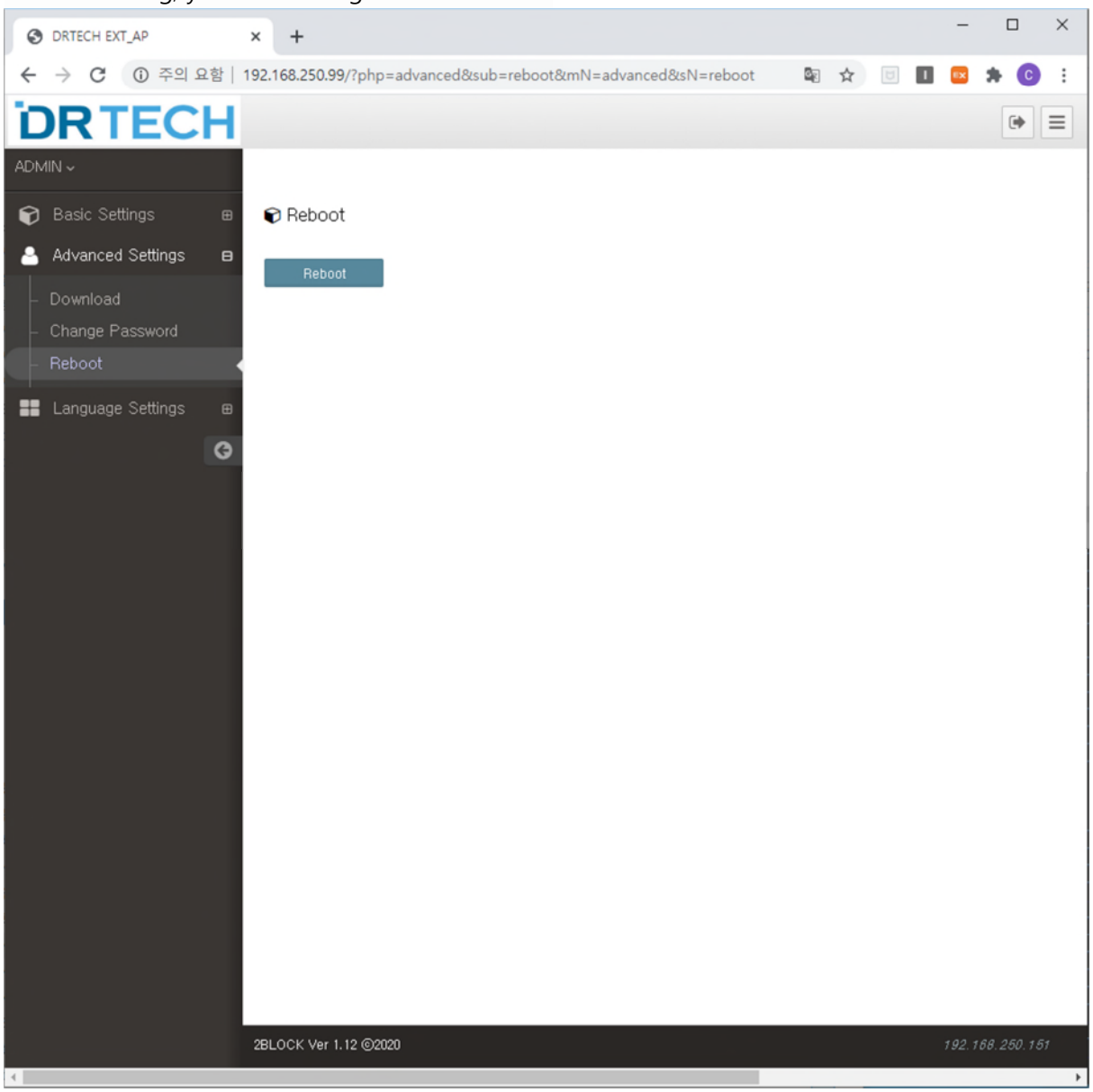
After enter character, push the apply button to change the password.



4.3.3 Rebooting the system

This feature reboots the EXT AP system.

After rebooting, you must re-login to the Web UI.



4.4 Setup Language

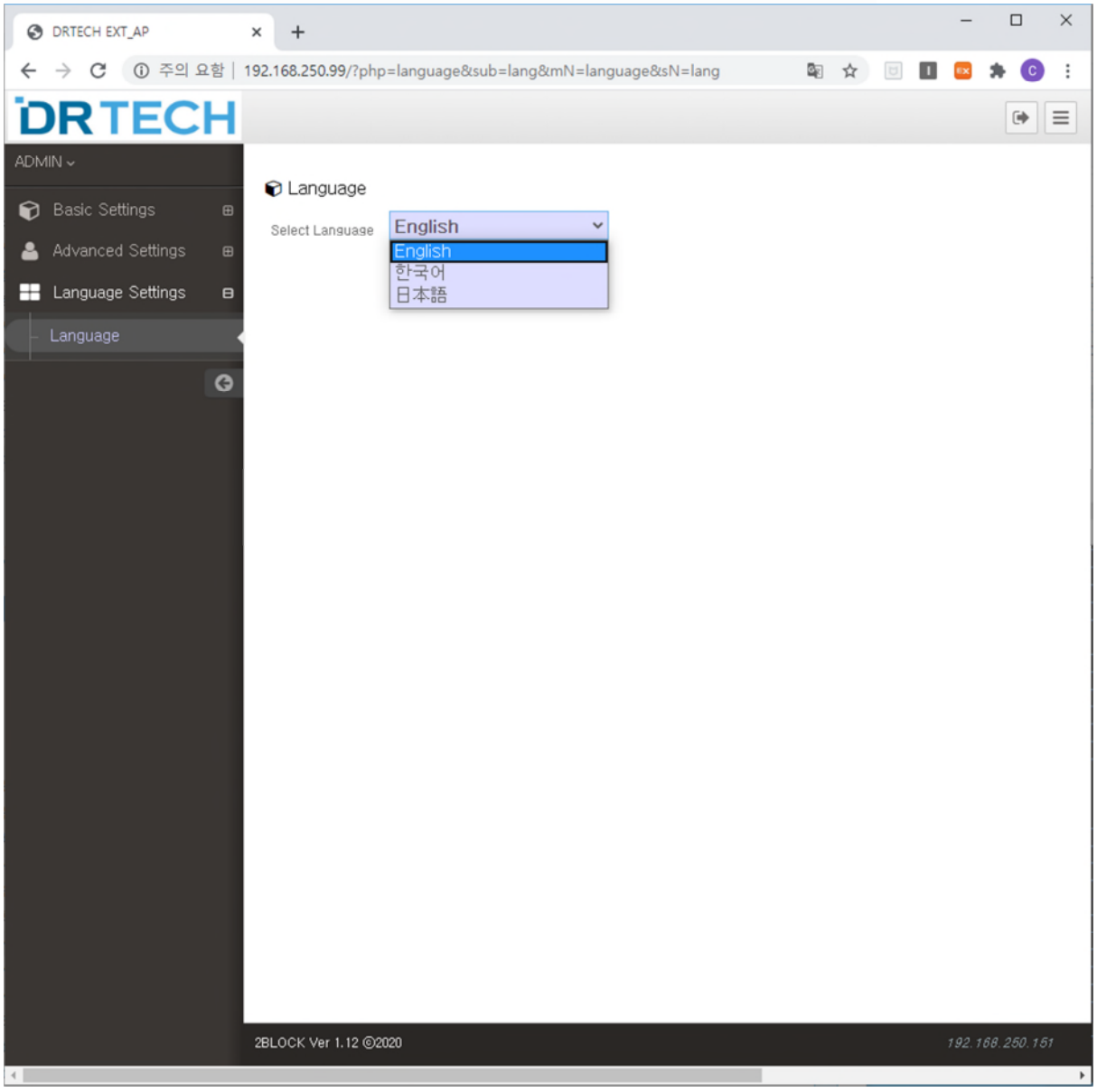
The Web UI supports English/Korean/Japanese.

User can select the language to use in the Web UI.

Use Another language

If you want to choose another language, you can add it.

You can add another language to Advanced settings / Upload/ Web Language.



5. Antenna

5.1 Dipole Antenna - AN2458-5701SM

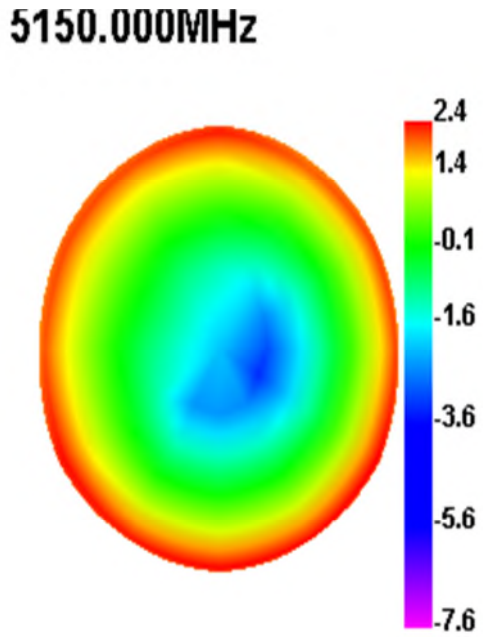
5.1.1 Sample Photo

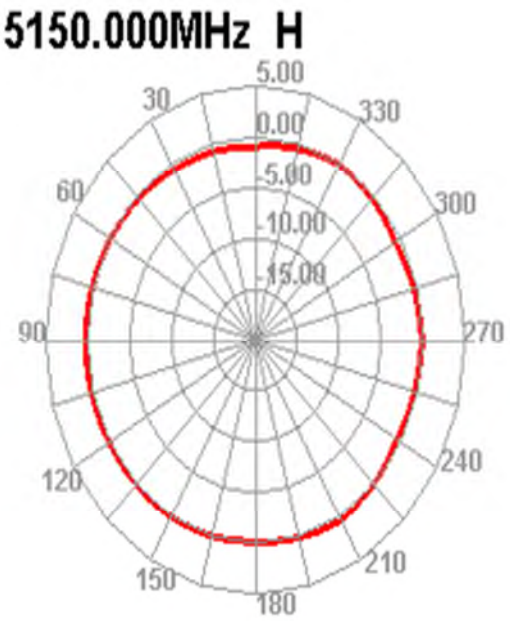
5.1.2 Antenna Gain

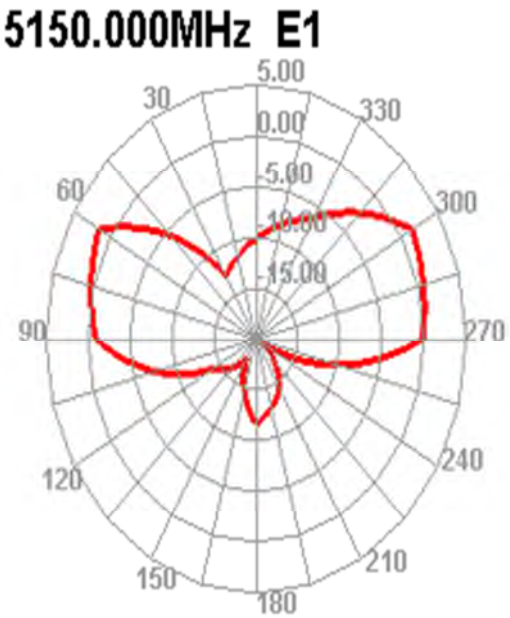
Passive Test For WIFI-5G										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)
5150	62.93	-2.01	2.37	0.22	49.378	13.548	2.37	-25.86	4.39	30
5250	53.75	-2.7	2.94	0.79	43.73	10.02	2.94	-17.63	5.63	0
5350	57.21	-2.42	2.62	0.47	43.164	14.051	2.62	-13.08	5.04	30
5450	60.16	-2.21	1.45	-0.7	40.454	19.702	1.45	-13	3.65	30
5550	59.6	-2.25	1.45	-0.7	36.792	22.81	1.45	-16.5	3.7	30
5650	93.59	-0.29	2.96	1.91	54.322	39.265	4.06	-16.01	4.35	30
5750	92.21	-0.35	2.73	2.58	53.631	38.582	4.73	-18.51	5.09	30
5850	78.44	-1.05	2.7	1.85	48.373	30.072	4	-18.03	5.05	30

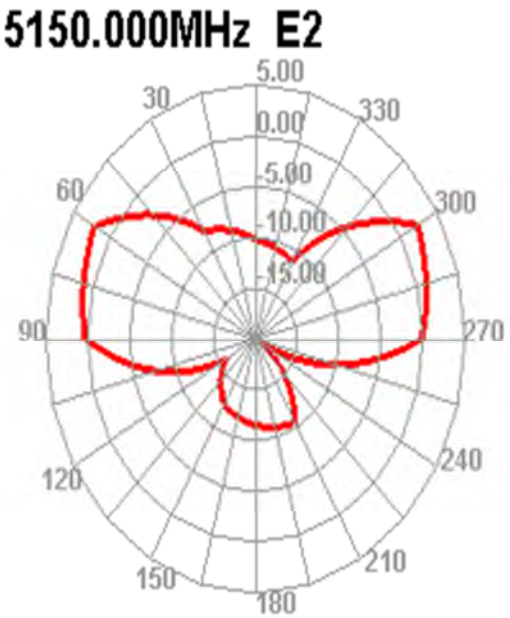
Passive Test For WIFI2400										
Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)	Gain (dBd)	UHIS (%)	DHIS (%)	Max (dB)	Min (dB)	Directivity (dBi)	Beamwidth (3dB)
2400	61.12	-2.14	2.09	-0.06	43.266	17.855	2.09	-18.83	4.22	0
2410	62.55	-2.04	2.16	0.01	44.146	18.402	2.16	-18.8	4.19	0
2420	65.87	-1.81	2.28	0.13	46.101	19.764	2.28	-15.44	4.09	0
2430	65.92	-1.81	2.14	-0.01	45.554	20.363	2.14	-13.03	3.95	0
2440	68.86	-1.62	2.2	0.05	46.967	21.893	2.2	-12.57	3.82	30
2450	69.08	-1.61	2.05	-0.1	46.486	22.591	2.05	-13.63	3.66	30
2460	69.72	-1.57	1.98	-0.17	46.428	23.296	1.98	-14.13	3.55	30
2470	68.31	-1.66	1.81	-0.34	45.043	23.264	1.81	-14.84	3.47	30
2480	71.73	-1.44	1.92	-0.23	46.77	24.955	1.92	-15.24	3.36	30
2490	72.49	-1.4	2.02	-0.13	46.484	26.006	2.02	-15.44	3.42	30
2500	72.97	-1.37	2.15	0	45.775	27.193	2.15	-15.59	3.52	30

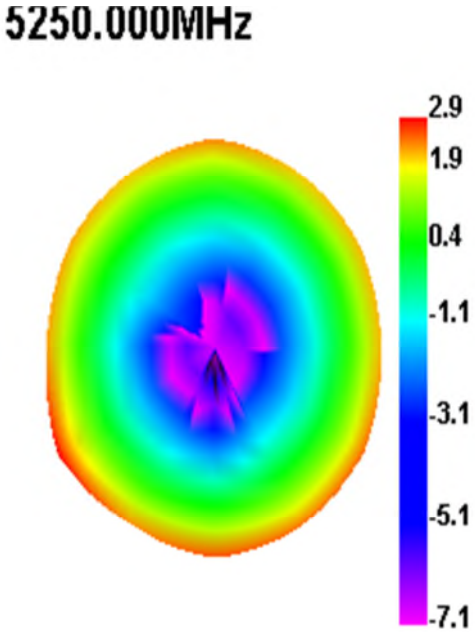
5.1.3 Radiation Patterns







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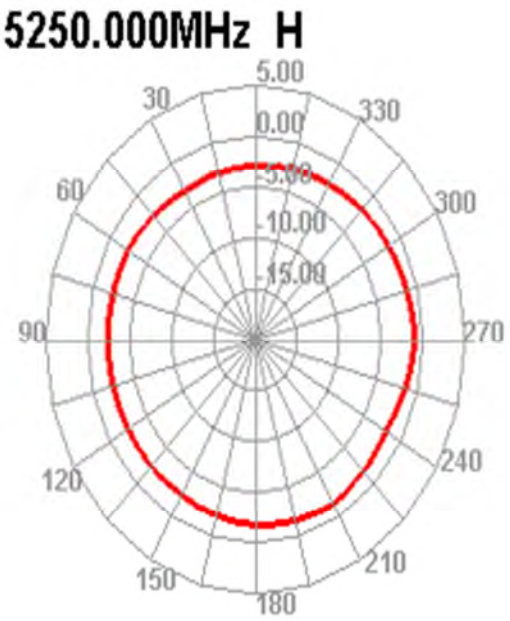
1.9
0.4
-1.1
-3.1
-5.1
-7.1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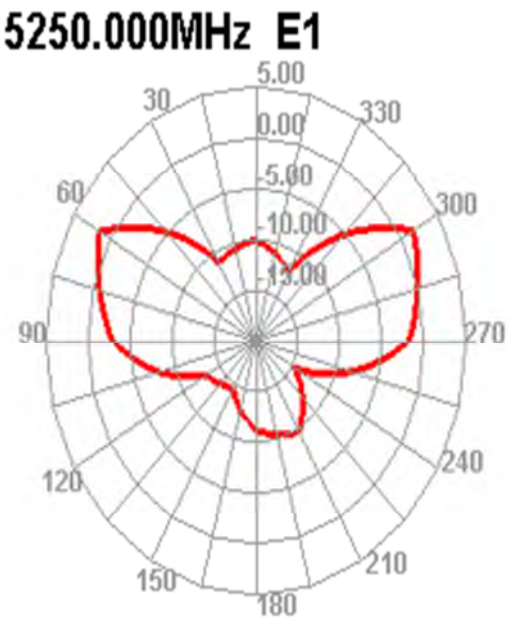
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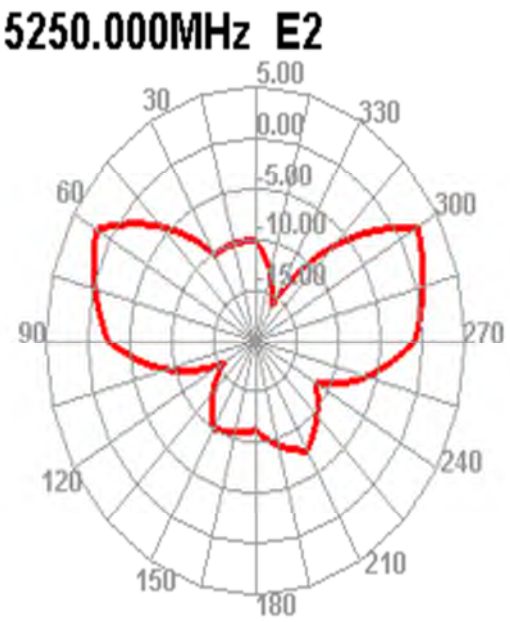
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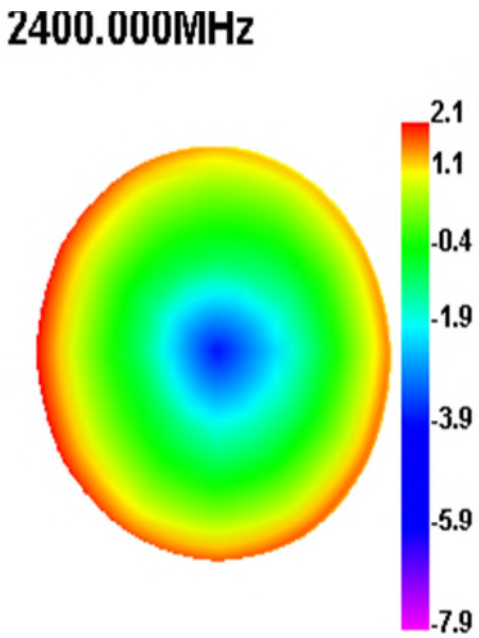
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1.1
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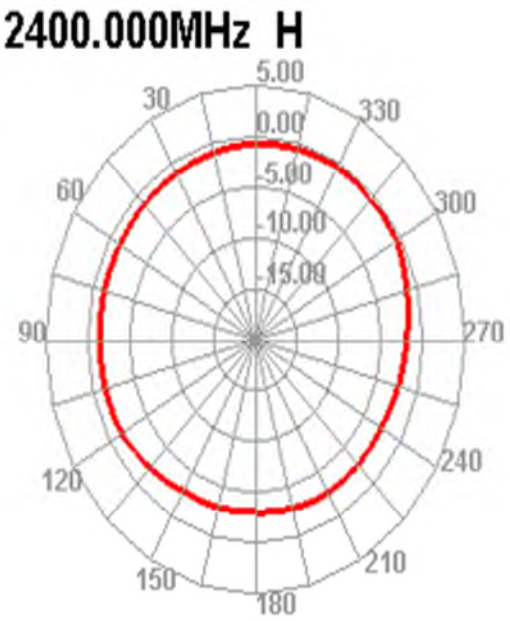
-5.9
-7.9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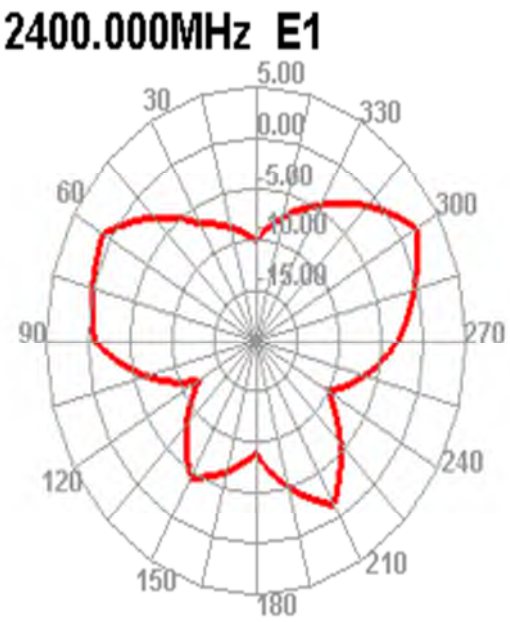
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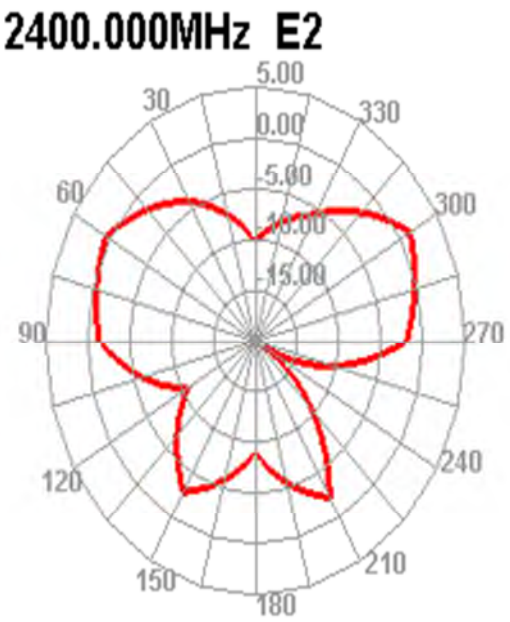
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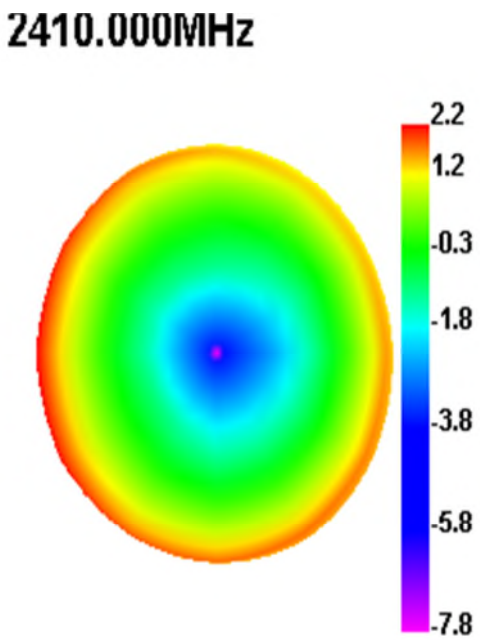
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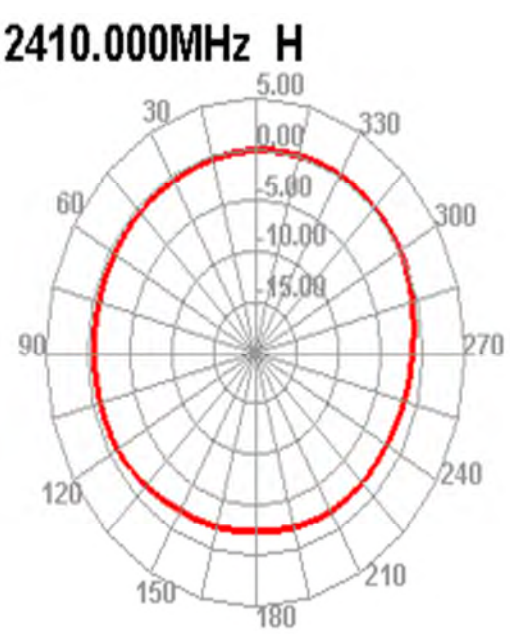
2410.000MHz H
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-5.00
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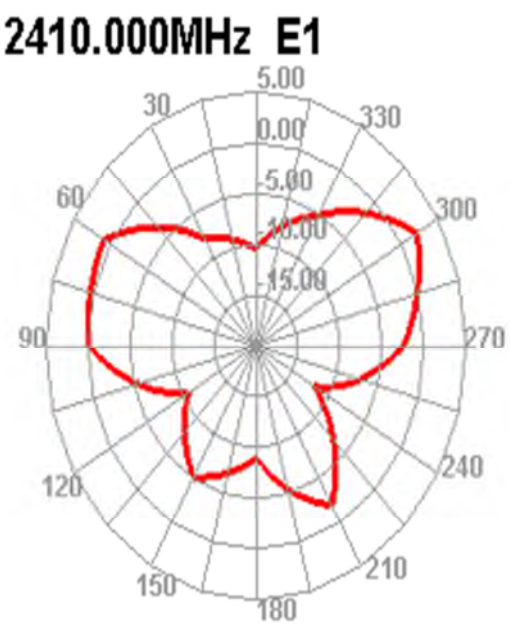
2410.000MHz E1
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-5.00
-15.00
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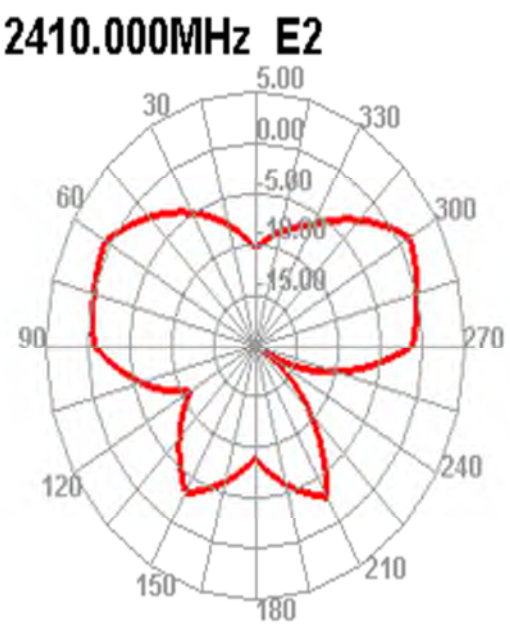
180


2410.000MHz E2
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-5.00
-15.00
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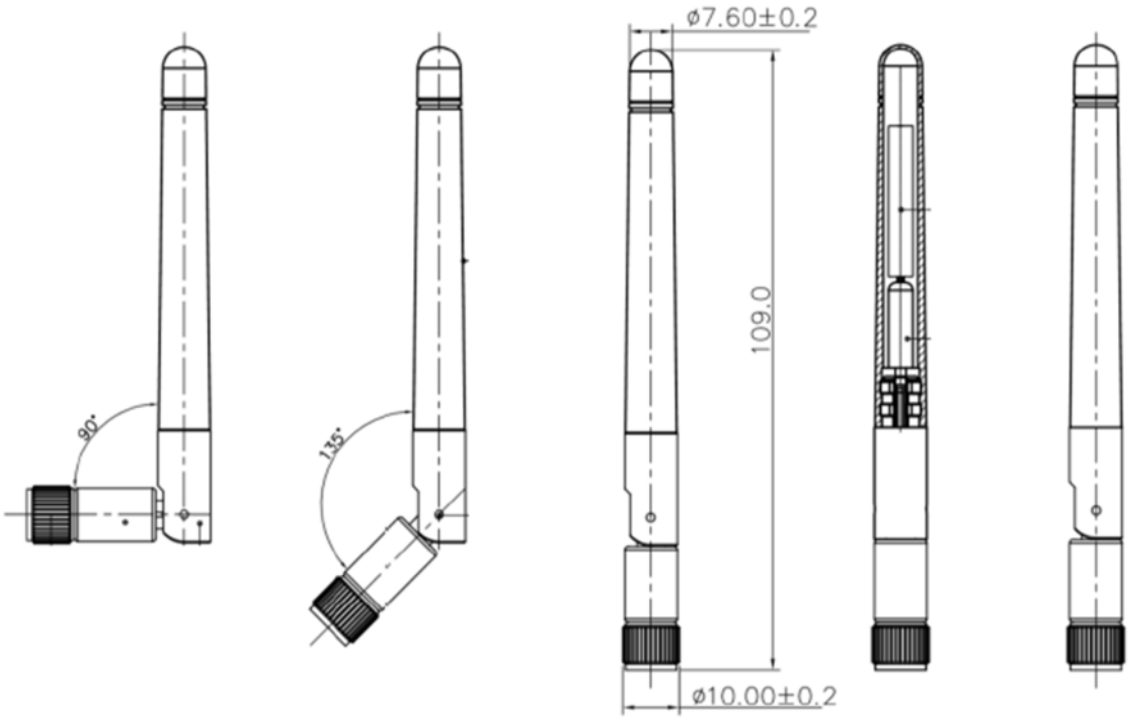
5.1.4 Antenna Dimensions



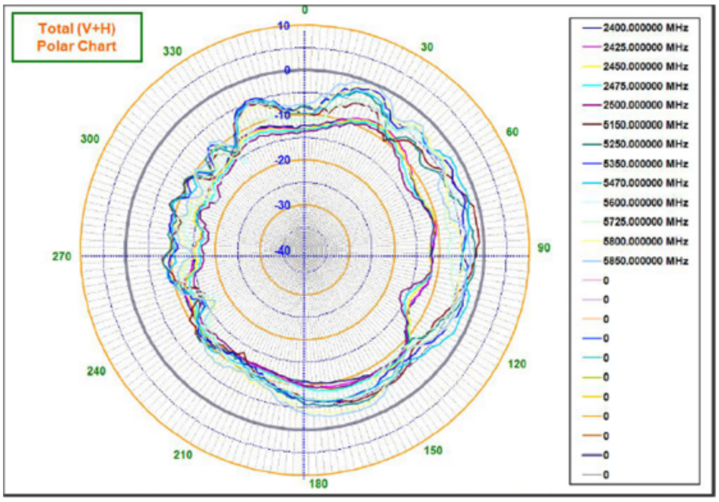
5.2 PCB Antenna - APDR-600WT

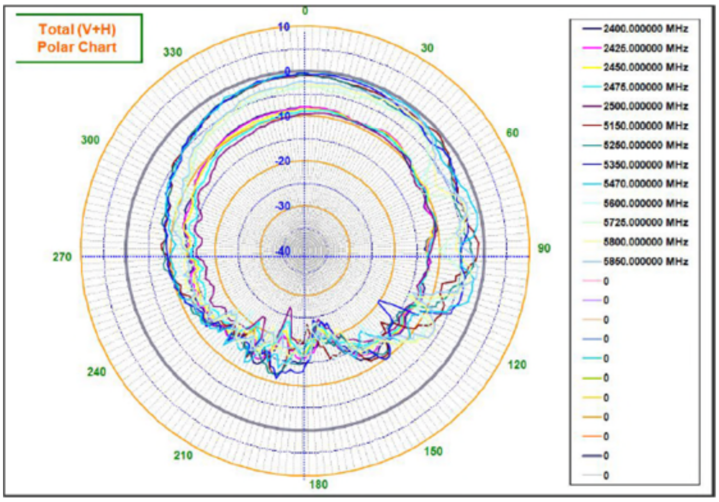
5.2.1 Sample Photo

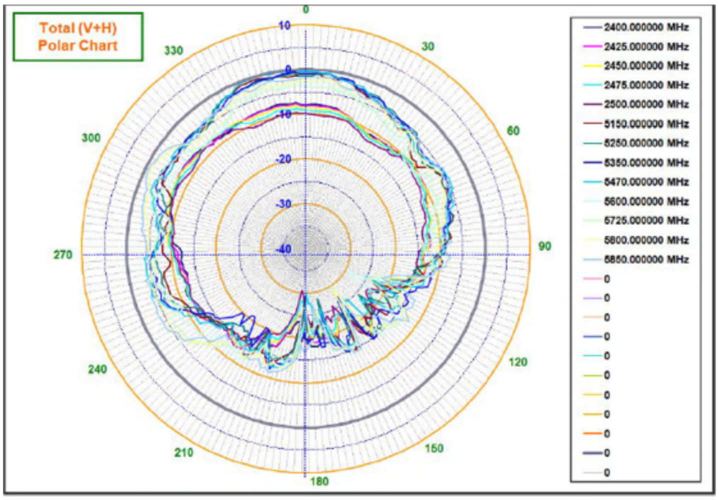
5.2.2 Antenna Gain

Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
2400.000000 MHz	7.9 %	-14.8 dBi	-13.4 dBi	-11.0 dBi	-7.3 dBi	-7.8 dBi	-5.5 dBi	Theta15/Pie195	5.50 dB
2425.000000 MHz	7.9 %	-14.7 dBi	-13.5 dBi	-11.0 dBi	-7.0 dBi	-7.8 dBi	-5.6 dBi	Theta15/Pie195	5.38 dB
2450.000000 MHz	7.7 %	-14.6 dBi	-13.8 dBi	-11.1 dBi	-6.7 dBi	-7.7 dBi	-5.7 dBi	Theta30/Pie180	5.46 dB
2475.000000 MHz	7.1 %	-14.7 dBi	-14.4 dBi	-11.5 dBi	-6.9 dBi	-8.0 dBi	-6.0 dBi	Theta75/Pie165	5.52 dB
2500.000000 MHz	6.1 %	-15.2 dBi	-15.2 dBi	-12.2 dBi	-7.9 dBi	-8.5 dBi	-6.6 dBi	Theta75/Pie165	5.62 dB
5150.000000 MHz	23.0 %	-8.5 dBi	-10.5 dBi	-6.4 dBi	-1.1 dBi	-1.5 dBi	0.6 dBi	Theta15/Pie120	6.95 dB
5250.000000 MHz	23.5 %	-8.5 dBi	-10.3 dBi	-6.3 dBi	-0.7 dBi	-1.3 dBi	0.7 dBi	Theta15/Pie270	7.02 dB
5350.000000 MHz	25.0 %	-8.1 dBi	-10.2 dBi	-6.0 dBi	-0.6 dBi	-0.9 dBi	1.7 dBi	Theta15/Pie105	7.73 dB
5470.000000 MHz	27.0 %	-7.7 dBi	-10.0 dBi	-5.7 dBi	0.1 dBi	-0.2 dBi	2.1 dBi	Theta15/Pie105	7.82 dB
5600.000000 MHz	16.1 %	-9.8 dBi	-12.5 dBi	-7.9 dBi	-1.9 dBi	-3.2 dBi	-0.6 dBi	Theta15/Pie270	7.29 dB
5725.000000 MHz	16.9 %	-9.8 dBi	-11.9 dBi	-7.7 dBi	-2.1 dBi	-3.4 dBi	-1.2 dBi	Theta15/Pie90	6.52 dB
5800.000000 MHz	22.9 %	-8.6 dBi	-10.4 dBi	-6.4 dBi	-1.4 dBi	-1.8 dBi	0.5 dBi	Theta15/Pie105	6.90 dB
5850.000000 MHz	26.0 %	-8.1 dBi	-9.8 dBi	-5.9 dBi	-0.5 dBi	-1.3 dBi	1.1 dBi	Theta15/Pie105	6.93 dB

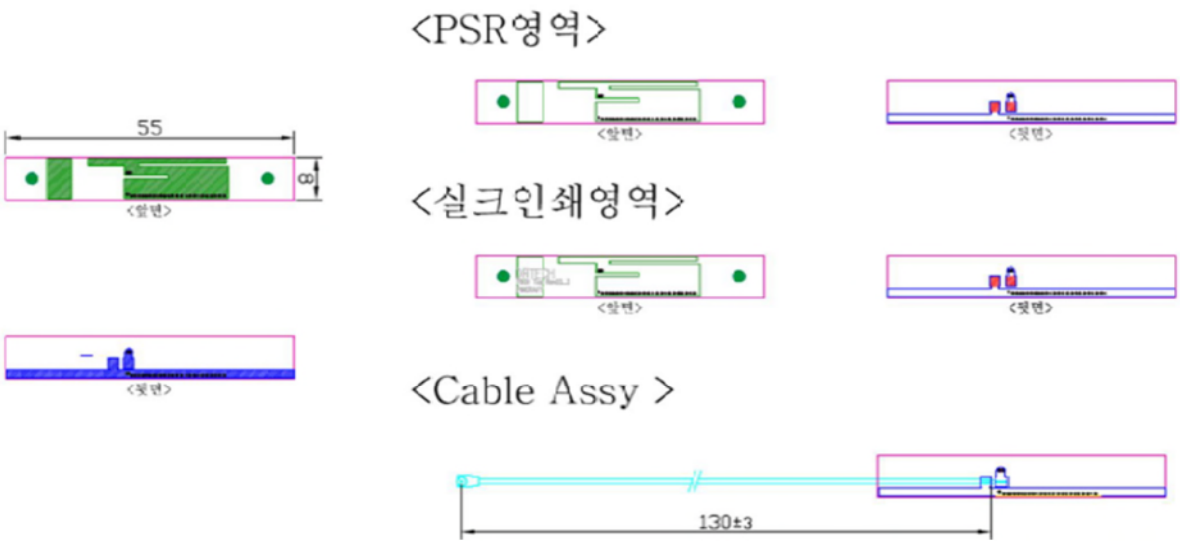
5.2.3 Radiation Patterns





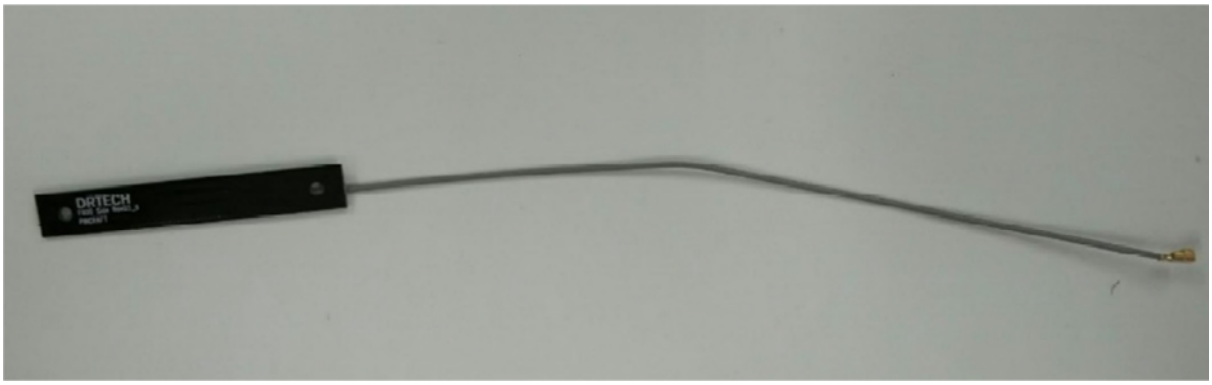


5.2.4 Antenna Dimensions



5.3 PCB Antenna - APDR-600WS

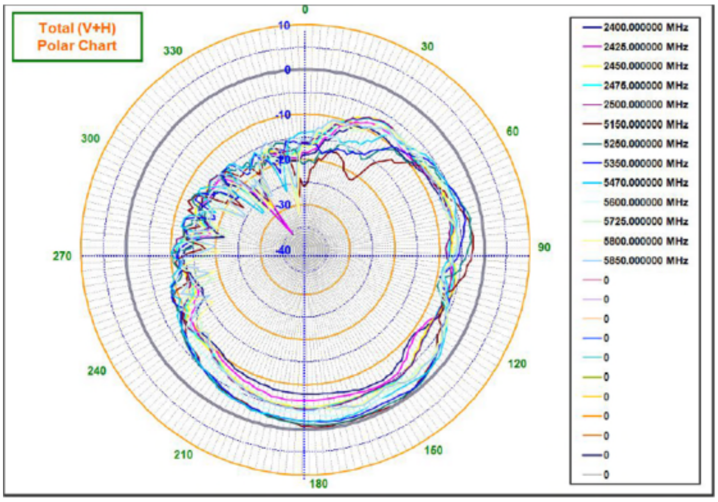
5.3.1 Sample Photo

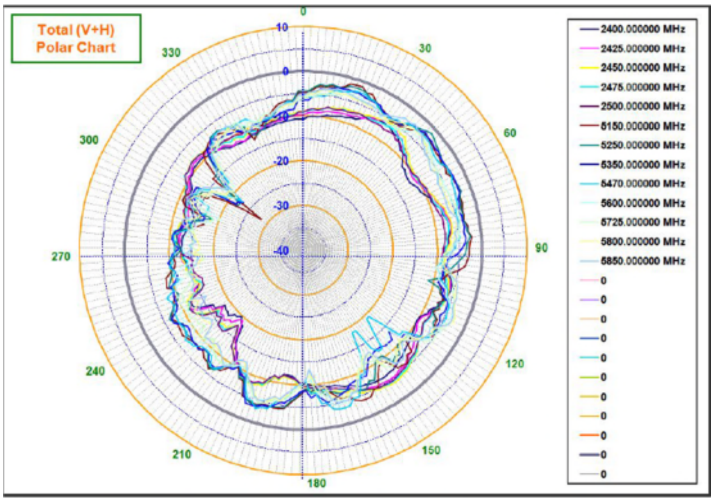


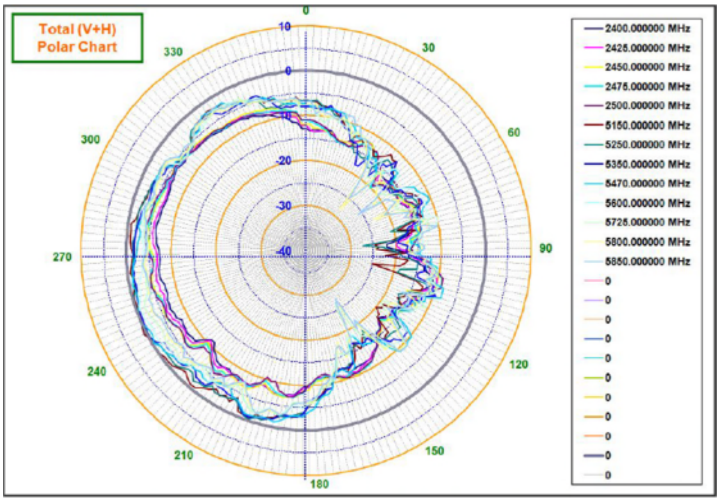
5.3.2 Antenna Gain

Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
2400.000000 MHz	11.3 %	-11.5 dBi	-13.8 dBi	-9.5 dBi	-4.8 dBi	-5.9 dBi	-4.6 dBi	Theta105/Pie45	4.90 dB
2425.000000 MHz	13.0 %	-10.8 dBi	-13.3 dBi	-8.9 dBi	-4.4 dBi	-5.5 dBi	-4.1 dBi	Theta105/Pie45	4.74 dB
2450.000000 MHz	15.4 %	-10.0 dBi	-12.7 dBi	-8.1 dBi	-3.9 dBi	-5.1 dBi	-3.6 dBi	Theta105/Pie45	4.50 dB
2475.000000 MHz	14.9 %	-10.1 dBi	-12.9 dBi	-8.3 dBi	-4.3 dBi	-5.4 dBi	-4.0 dBi	Theta150/Pie90	4.30 dB
2500.000000 MHz	15.1 %	-10.1 dBi	-12.8 dBi	-8.2 dBi	-4.1 dBi	-5.5 dBi	-3.8 dBi	Theta105/Pie30	4.41 dB
5150.000000 MHz	27.6 %	-9.1 dBi	-8.1 dBi	-5.6 dBi	-1.9 dBi	-1.9 dBi	-0.4 dBi	Theta135/Pie165	5.16 dB
5250.000000 MHz	26.8 %	-8.7 dBi	-8.8 dBi	-5.7 dBi	-2.2 dBi	-2.0 dBi	-0.6 dBi	Theta90/Pie150	5.16 dB
5350.000000 MHz	26.0 %	-8.6 dBi	-9.1 dBi	-5.8 dBi	-2.1 dBi	-1.6 dBi	-0.4 dBi	Theta90/Pie150	5.46 dB
5470.000000 MHz	26.1 %	-8.8 dBi	-8.9 dBi	-5.8 dBi	-2.9 dBi	-0.5 dBi	-0.4 dBi	Theta165/Pie105	5.44 dB
5600.000000 MHz	21.7 %	-9.6 dBi	-9.7 dBi	-6.6 dBi	-2.7 dBi	-1.5 dBi	-1.2 dBi	Theta30/Pie120	5.46 dB
5725.000000 MHz	20.4 %	-10.7 dBi	-9.2 dBi	-6.9 dBi	-3.7 dBi	-1.8 dBi	-0.5 dBi	Theta30/Pie120	6.37 dB
5800.000000 MHz	19.1 %	-11.5 dBi	-9.2 dBi	-7.2 dBi	-3.9 dBi	-2.2 dBi	-1.6 dBi	Theta30/Pie105	5.64 dB
5850.000000 MHz	20.3 %	-11.4 dBi	-8.9 dBi	-6.9 dBi	-3.9 dBi	-2.1 dBi	-1.2 dBi	Theta30/Pie120	5.73 dB

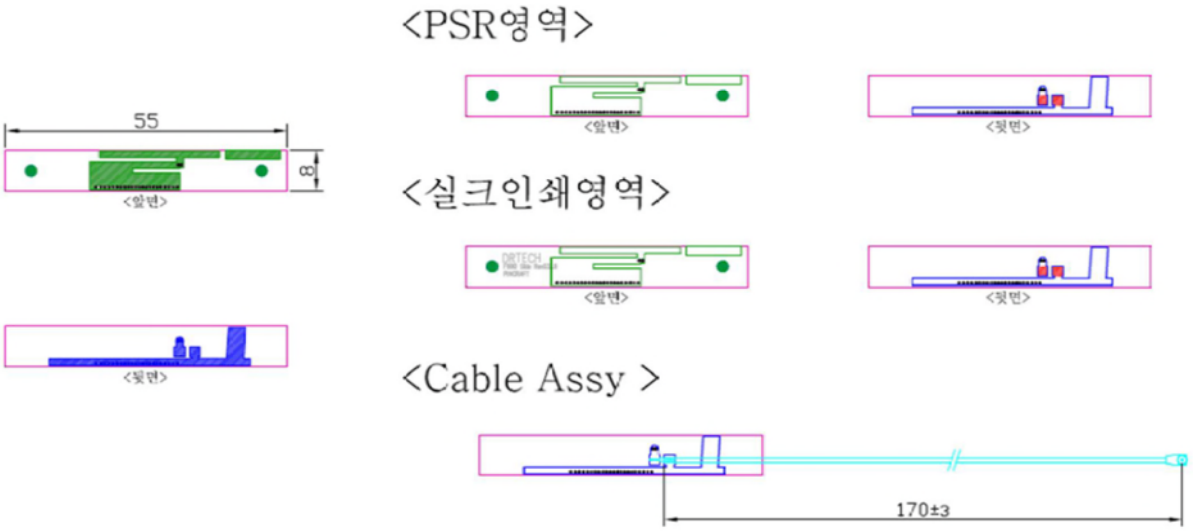
5.3.2 Antenna Gain







5.3.4 Antenna Dimensions



6. Statement

6.1 FCC Statement

FCC ID.	RNH-EXTAP
Model No.	EXT AP
Responsible Party	DRTECH NORTH AMERICA INC. 10148 International Blvd. West Chester, OH 45246-4846 +1-513-714-4900

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.

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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

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

This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).

That separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations.

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

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for a population/uncontrolled environment can be satisfied.

WARNING

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