RF Data Modem
HWC-M100
HWC-W100
HWC-W120
User Manual

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1. Overview

1.1 Features

■ A license and qualification of application of the radio station are unnecessary.

■ RF Range
- Indoor/Urban up to 75m(depending on environment)
- Outdoor(line-of-sight) up to 300m

■ Communication Interface
[RF Master(HWC-M100)]
- Ethernet port(for Host) : 10/100Base-T, UDP
- Serial port(for Debug) : RS-232(57600bps,8-N-1)
- Interface with HWC-W100 through ethernet

[RF Modem(HWC-W100)]
- RS-232/422/485(for Device) : 4800~38400bps, 8-N-1
- Serial port(for Debug) : RS-232(57600bps,8-N-1)
- Interface with HWC-W100 through ethernet
- Interface with HWC-W120 through RF

[RF Modem(HWC-W120)]
- RS-232/422/485(for Device) : 4800~38400bps, 8-N-1
- Serial port(for Debug) : RS-232(57600bps,8-N-1)
- Interface with HWC-W100 through RF

■ Wireless Interface
- Based on the IEEE 802.15.4 DSSS(Direct Sequence Spread Spectrum)
- ISM 2.4GHz operating frequency band

■ RF Modem Diversity(Antenna Diversity-Dedicated Receive Port)
- Reduced the Multi-pass interference in the communication between moving-vehicles.

■ Interactive wireless communication
- Half-duplex packet-communication based on Time-division-multiple-access
- Supports the interactive communication between devices with RF-Modem

■ Supports up to 16 RF channels in the same area

- RF Channel can be selected by rotary switch in front panel of RF-Modem
- The RF Channel of HWC-W100 and HWC-W120

■ N:M network supply
- One RF-Master(HWC-M100) can manage N RF-Modem(HWC-W100) in AP-mode
- RF-Modem (HWC-W100) in EP-mode can bypass the data to other modem(HWC-W100).
- One RF-Modem(HWC-W100) can manage N RF-Modem(HWC-W120) in EP-mode

■ Supports the special GUI to optimize the RF devices in RF Environment
In each AP, you can identify the frequency usage of 2.4GHz band through GUI and see the variation of RSSI according to movement of EP.

■ Serial communication type can be selected in RS-232,RS-422 and RS-485 through GUI
- HWC-W100 and HWC-W120

■ Supply Voltage : DC 24V(Input Range : DC 8V ~ DC 32V) (HWC-M100, HWC-W100, HWC-W120)

■ Operating Temperature : -30°C ~ 80°C (HWC-M100, HWC-W100, HWC-W120)

■ RF Modem Specification (HWC-W100, HWC-W120)

항목	내용	비고
Operating Frequency	2,400MHz ~ 2,483.5MHz	CFR47 part 15
Transmit Power	1mW and less	
Occupied Bandwidth	3MHz and less	
Spread Spectrum	DSSS(Direct Sequence SS)	
Modulation	O-QPSK	
DS-SS	32-chip PN code	2MChips/s chips rate
Communication Method	Half duplex	
RF Data Rate	250Kbps	
Data Format	@@	
Channel Spacing	5MHz	
RF Channels	16 Channels	
Frequency Stability	±10 ppm	
Transmit Spurious	-40dBm	
Receiver Sensitivity	High sensitivity -94dBm	

1.2 Accessories

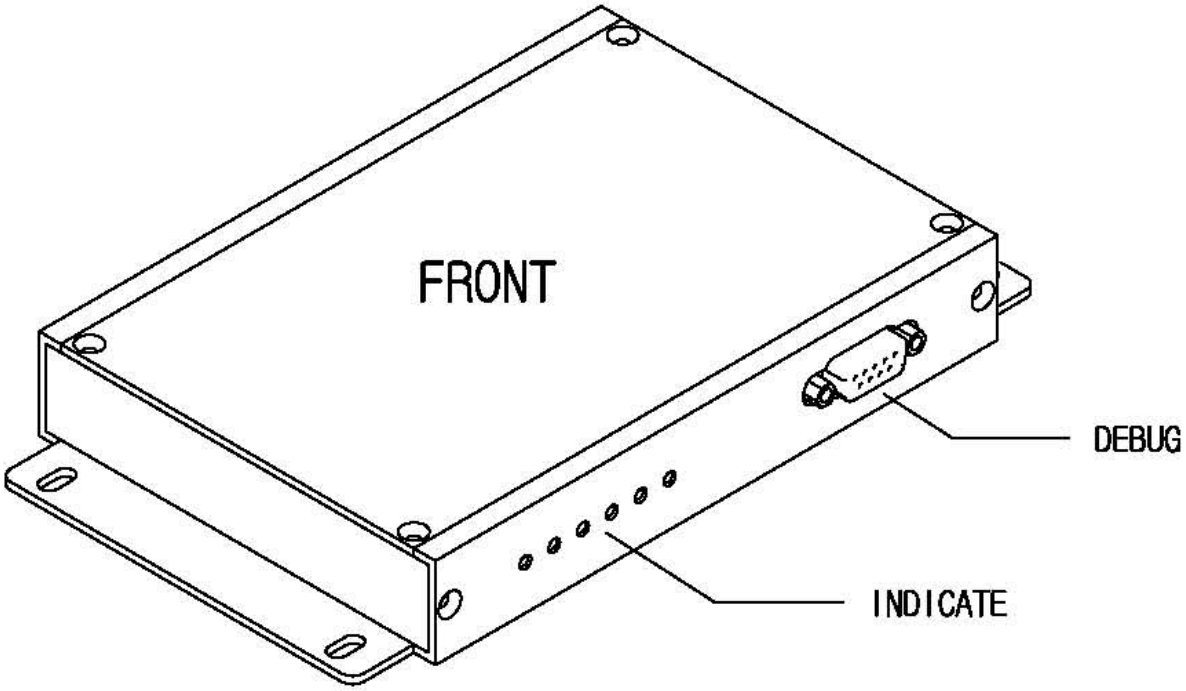
■ RF Master(HWC-M100)

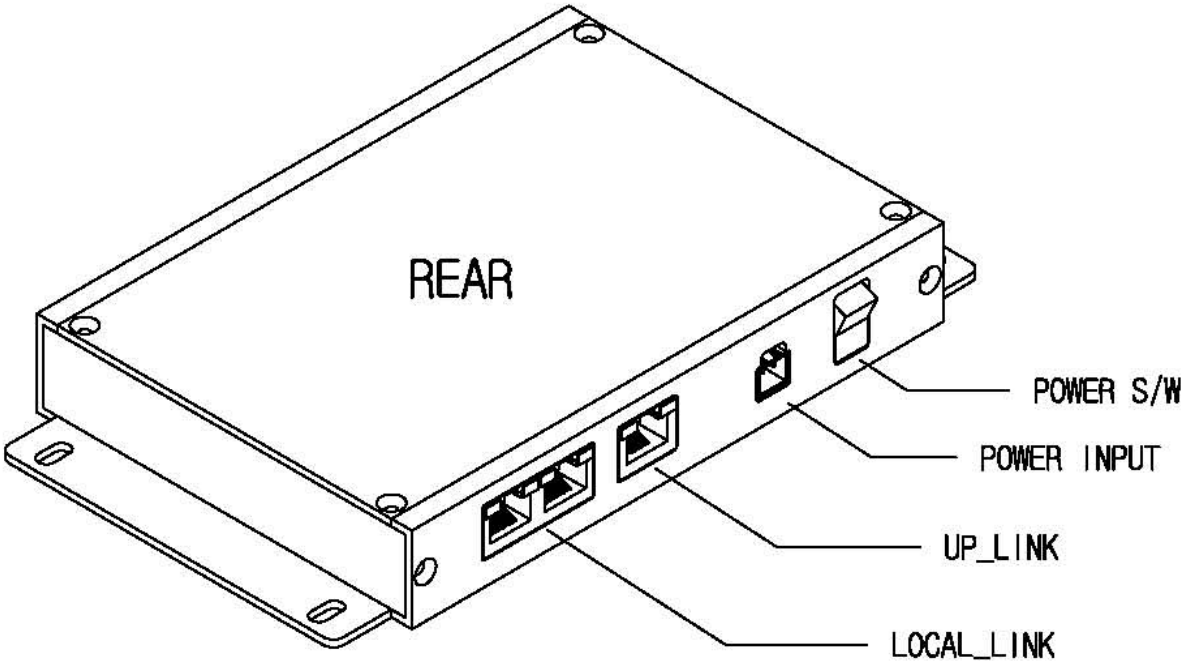
■ RF Modem(HWC-W100)

■ RF Master(HWC-W120)

1.3 Product Description

■ RF Master(HWC-M100)





① Debug

- Connecting PC or Notebook to debug port, you can set control data and see the operating status of device.

② Indicator

- Indicate the operation status of device, visually.

PWR LED	: DC power supply is ok
RUN LED	: Blink in normal operation of device
UP LED	: Ethernet communication with the HOST
LOCAL LED	: Ethernet communication with the AP
ALM LED	: Turn on RED in case of fault operation

③ Power S/W

- DC power on/off switch

④ Power Input

- Connector to supply dc power(DC 24V)
- Using reverse voltage protect circuit, ensure device against the reverse voltage

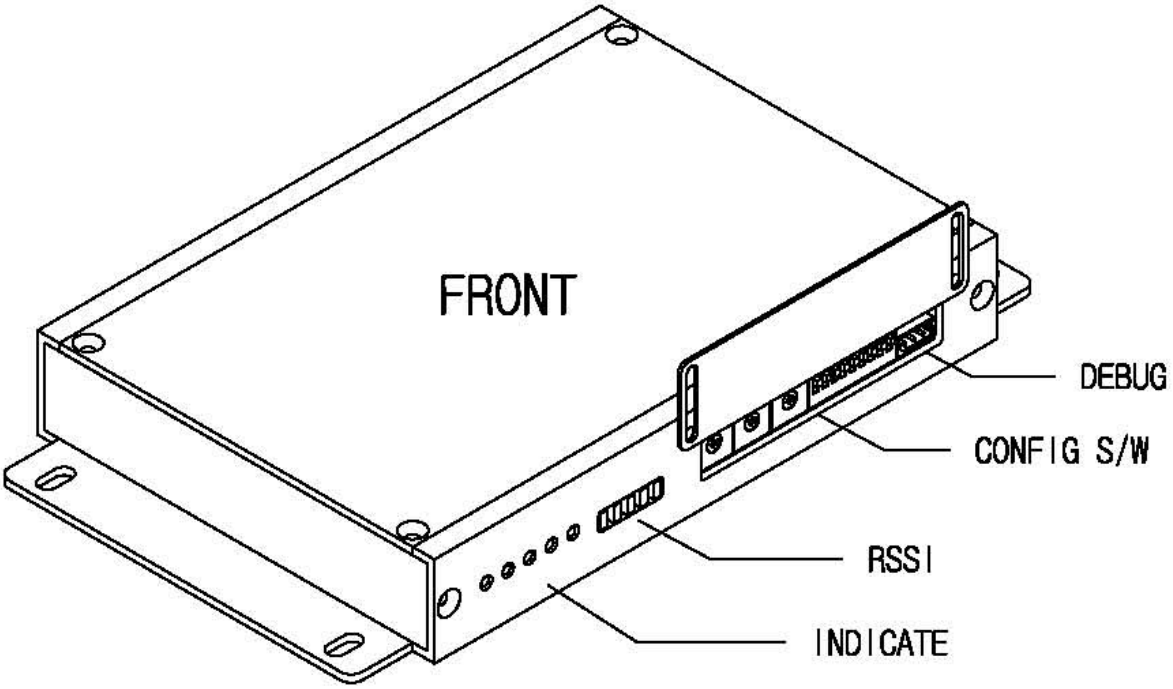
⑤ Up_Link

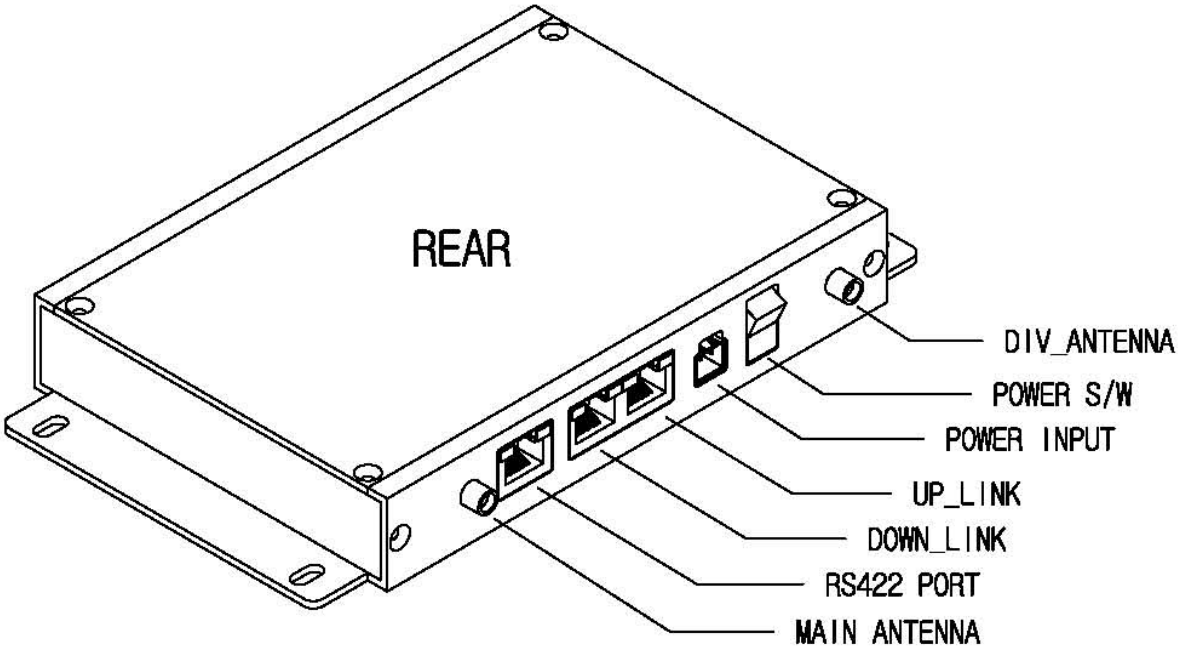
- Ethernet port to communicate with upper HOST

⑥ Local_Link

- Ethernet port to communicate with lower AP

■ RF Modem(HWC-W100)





① Debug

- Connecting PC or Notebook to debug port, you can configure parameter of modem and see the operation status of the device.

② Configuration S/W

- You can use this switch to configure nework-ID, devide-ID, communication-type and so on.

③ RSSI

- Display the strength of receiving RF signal in LED segment

④ Indicator

- Indicate the operation status of device, visually.

  PWR LED : dc power supply is ok
  RUN LED : blink in normal operation of device
  TX LED : turn on in data transmission to End Device
  RX LED : turn on in data reception from End Device
  ALM LED : turn on RED in fault operation

⑤ Main/Div Antenna

- bi-directional antenna for RF communication. It consist of main and diversity antenna.

⑥ Power S/W

- DC power on/off switch

⑦ Power Input

- connector to supply dc power(DC 24V)
  using bridge-diode in the internal circuit, ensure device against the reverse voltage

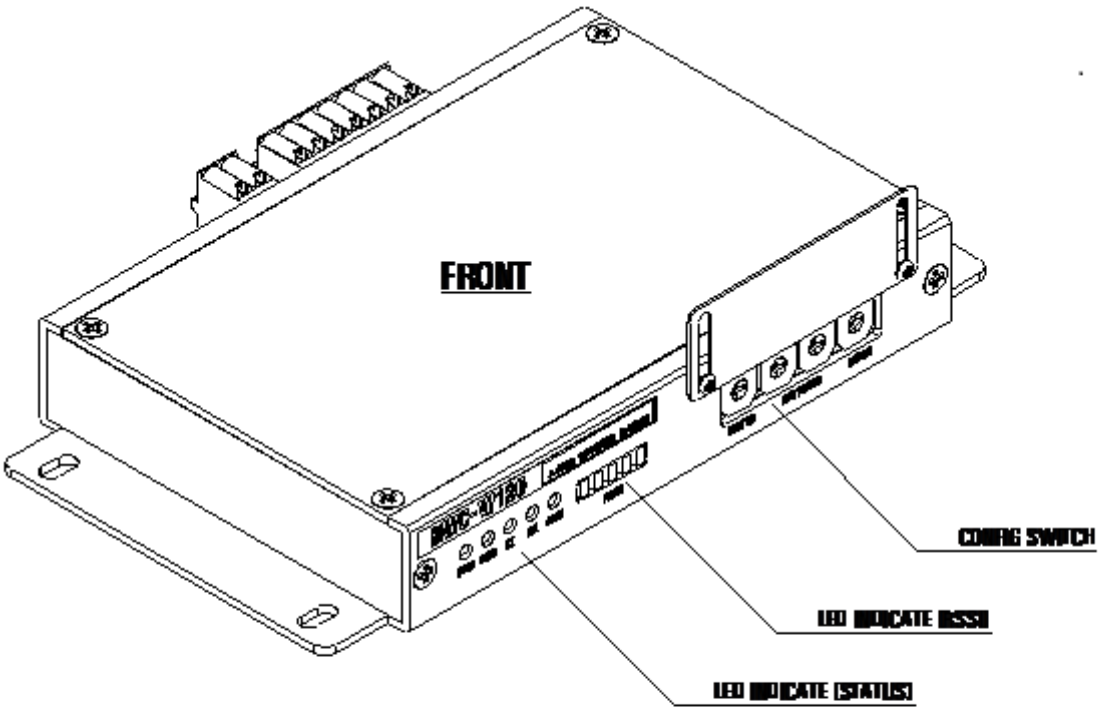
⑧ Up/Down_Link

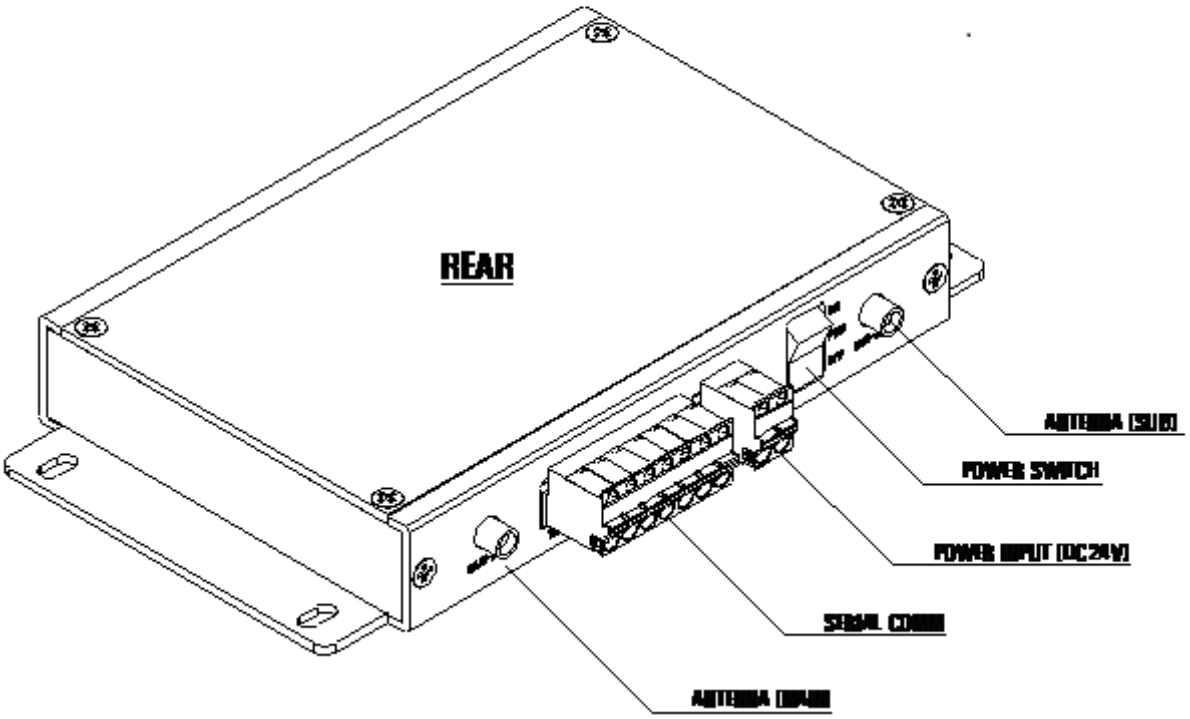
- ethernet port to receive data from RF-Master and transmit data to another AP

⑨ Serial Communication Port

- Serial port to communicate with lower device.
- You can select communicate type : RS-232 or RS-422 or RS-485.

■ RF Modem(HWC-W120)





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③ Power S/W

- DC power on/off switch

④ Power Input

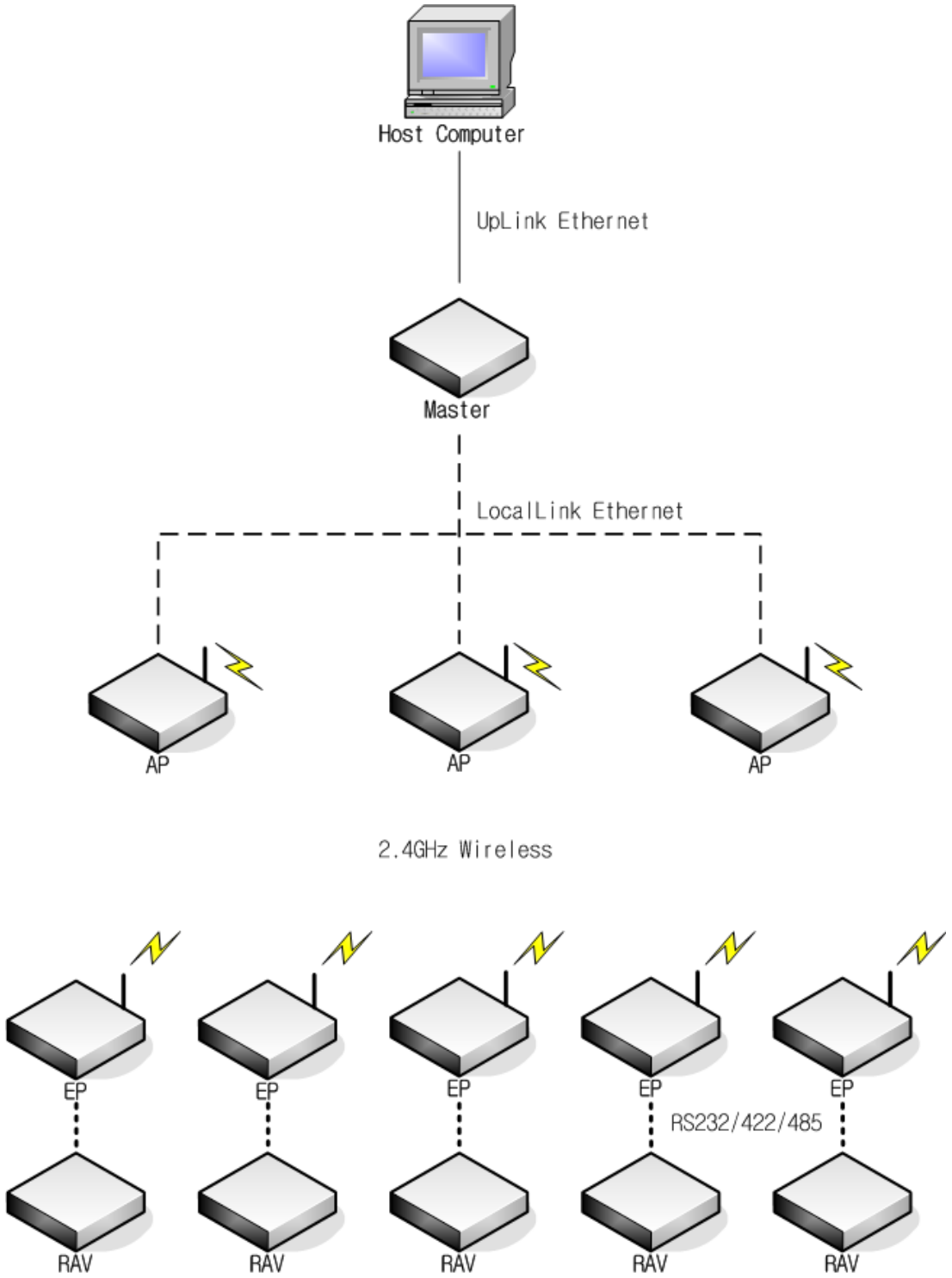
- Connector to supply dc power(DC 24V)
- Using reverse voltage protect circuit, ensure device against the reverse voltage

⑤ Serial Communication Port

- Serial port to communicate with lower device.
- You can select communicate type : RS-232 or RS-422 or RS-485.

2. Installation the device

2.1 Network configuration



■ The network consists of one RF-Master(HWC-M100) and several AP(Access Point)/EP(End Point)

■ You can set AP(Access Point) or EP(End Point) mode of RF Master(HWC-M100) using configuration-Switch.

■ Communication between HOST and RF-Master can be implemented in public or private network.

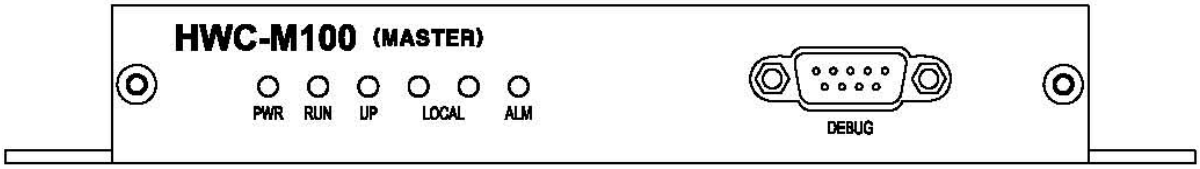
■ One RF-Master can be connected to several AP in ethernet communication. It can be implemented in multi-drop bus for interconnecting RF-Master and APs.

■ RF-Master manages network that relays the communication of HOST and lower equipment.

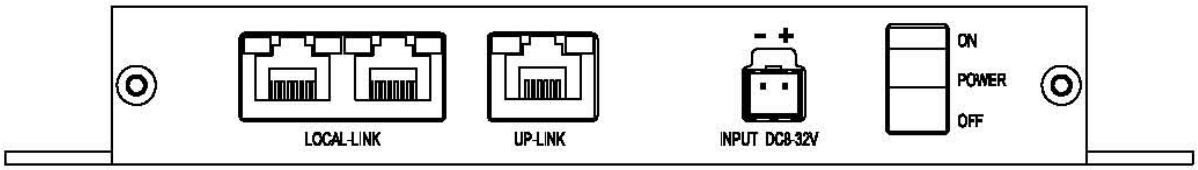
■ AP(Access poing) Managed by RF-Master relays data in which Host delivers to EP. When the shadow region exists with a AP, AP can be additionally installed and the coverage can be expanded.

■ EP(End Point) is connected with a subordinate equipment by wire and supports a communication with HOST. You can select one of the RS232/RS422/RS485 to communicate with the lower equipment.

2.2 Configure the Setting of RF-Master(HWC-M100)



< Front View >



< Rear View >

■ **DEBUG** : You can configure RF-Master through the debug-port using special GUI in PC or notebook. The debug-port supports RS-232C interface(57600 bsp, 8 bit data, None parity, 1stop).

Pin Number	Description
2	TXD
3	RXD
5	GND

< Pin description of Debug-Port >

■ RF-Master has two ethernet network. One is to link the upper Host, another is to link the lower APs.

■ **UP-LINK** : RF-Master could be connected using LAN cable with upper device(HOST) through RJ-45 connector(UP-LINK) in rear panel of device.

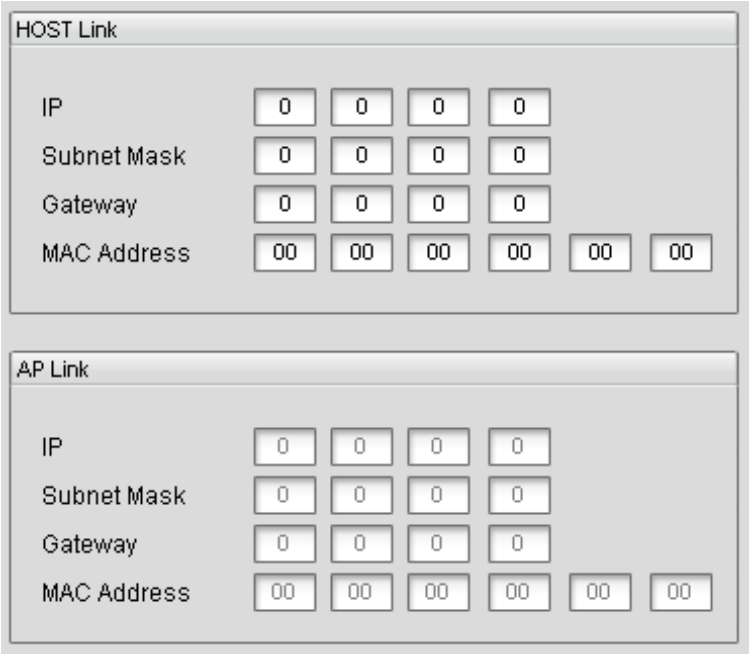
■ **LOCAL-LINK** : This port(LOCAL-LINK) is used for communication with lower device(AP). RF-Master has 2 channel Ethernet hub inside in it. So you can extend APs without any external Ethernet hub.

■ Ethernet communication between HOST and RF-Master(UP-LINK) can be implemented in public or private network. and AP can use in the private network that configured in production.

Each ethernet network is configured as following:

- UP-LINK : IP Address, Subnet Mask, Gateway Address, MAC Address
  (MAC Address is assigned when RF-Master is producted. If RF-Master has no MAC address, you can re-assign by the address printed on sticker that attached on PCB.)
- LOCAL-LINK : You don't need to set Ethernet network parameter for AP.
  It is fixed as following:

IP Address : 192.168.10.1
Subnet Mask : 255.255.255.0
Gateway : 192.168.10.254
MAC Address : 00:0A:1F:00:EC:01

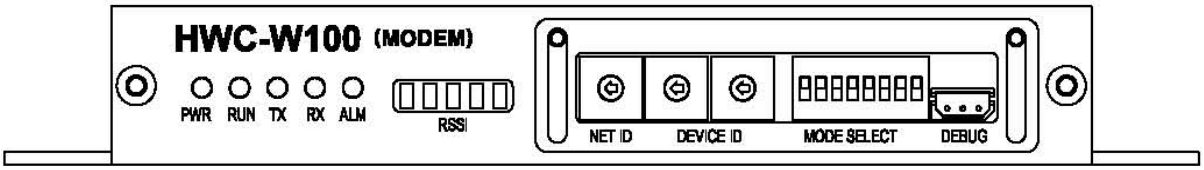


<Network Parameter Window in GUI>

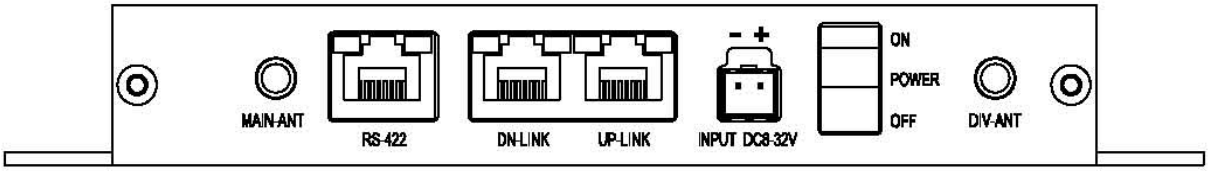
■ Start-up procedure of RF-Master

① Supply power(8~32VDC)
② Connect ethernet cable to UP-LINK Port(connection with Host)
③ Connect ethernet cable to LOCAL-LINK Port(connection with AP)
④ Turn on the power switch
⑤ Confirm that PWR-LED is ON
⑥ Connect with PC or note-book through Debug-port
⑦ Execute the GUI program.
⑧ Enter the IP Address, Subnet Mask and Gateway Address in Host-Link Window.
⑨ Confirm that UP-LED is ON.(ethernet link with HOST)
⑩ Confirm that LOCAL-LED is ON.(ethernet link with AP)

2.3 Configure the Setting of RF-Modem(HWC-W100)



< Front View >



< Rear View >

■ You can configure Net-ID, Device-ID and Mode of RF-Modem using switches. And you can confirm the configuration information in special GUI. The debug-port supports RS-232C interface(57600 bsp, 8 bit data, None parity, 1stop).

Pin Number	Description
1	TXD
2	RXD
3	GND

< Pin description of Debug-Port >

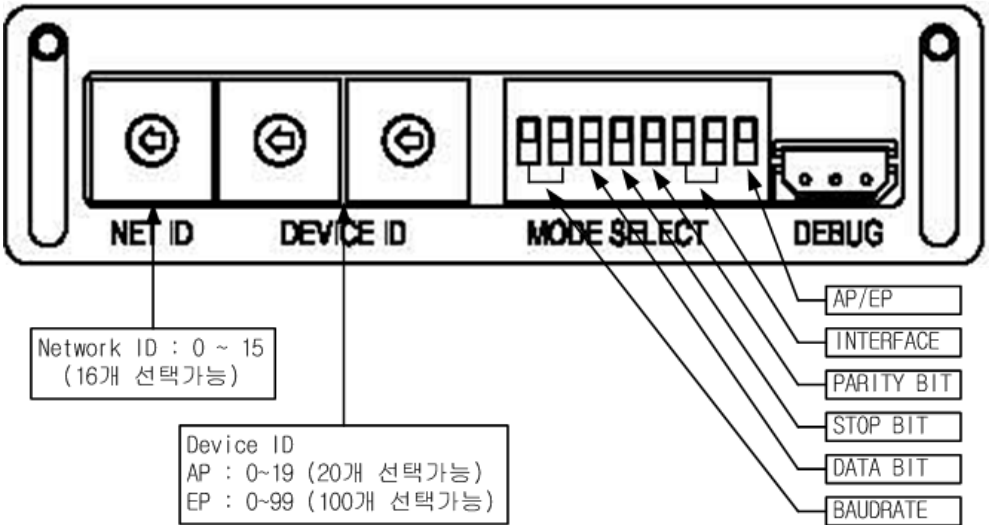
■ RF-Modem relays data in which Host delivers to the End-Device by wireless. And It can be used as AP(to communicate with Host) or EP(to communicate with End-Device) by selection of dip-switch in front panel of it.

■ In AP-mode, you need to set Net-ID, Device-ID, AP/EP-Mode as follows:

- NET-ID : Network Number. Each network has its own unique frequency band. and you can select one of the 16 network.(Net.ID : 0~15)
- DEVICE-ID : Device-ID of the AP. Each AP has its own unique number in a network. and you can select one of the 20 APs.(Device-ID : 0~19)
- AP/EP-Mode : You must turn the dip-switch for AP/EP-mode to ON.

■ In AP-mode, you need to set Net-ID, Device-ID, Baud-rate, data-bit, stop-bit, parity-bit, interface-type and AP/EP-Mode as follows:

- NET-ID : Network Number. Each network has its own unique frequency band. and you can select one of the 16 network.(Net.ID : 0~15)
- DEVICE-ID : Device-ID of the EP. Each EP has its own unique number in a network. and you can select one of the 100 EPs.(Device-ID : 0~99)
- BAUDRATE : Baud-rate of interface between EP and End Device(4800~38400Bps)
- DATA BIT : Length of Data-bit(7 or 8 bits)
- STOP BIT : Length of Stop-bit(1 or 2 bits)
- PARITY BIT : Selection of use of parity-bit(even or none)
- INTERFACE : Type of Interface between EP and End-Device.(RS232/RS485/RS422)
- AP/EP Mode : You must turn the dip-switch for AP/EP-mode to OFF.



NET ID		0 ~ 15	Selection of Network(RF-band)
DEVICE ID		00 ~ 19(AP) 00 ~ 99(EP)	Unique AP/EP ID in a network
MODE SELECT	Baudrate	00 : 4800bps 01 : 9600bps 10 : 19200bps 11 : 38400bps	Baud-Rate for communication with End-Device.
	Data Bit Length	0 : 7Bits 1 : 8Bits	Length of Data Bit
	Stop Bit Length	0 : 1Bit 1 : 2Bits	Length of Stop Bit
	Parity Bit	0 : Even 1 : None	Use of Parity Bit
	Interface	00 : RS232 01 : RS485 10 : RS422	Selection of interface
	AP/EP Select	0 : EP 1 : AP	Selection of RF-Modem Mode

■ Frequency Table according to setting of NET-ID is as following:

NET ID	Frequency	NET ID	Frequency
0	2,405 MHz	8	2,445 MHz
1	2,410 MHz	9	2,450 MHz
2	2,415 MHz	10	2,455 MHz
3	2,420 MHz	11	2,460 MHz
4	2,425 MHz	12	2,465 MHz
5	2,430 MHz	13	2,470 MHz
6	2,435 MHz	14	2,475 MHz
7	2,440 MHz	15	2,480 MHz

< Frequency Table for Network-ID >

■ All device in a nework has the same NET-ID with the same frequency. It is good to avoid the use of adjacent NET-ID in a adjacent area to enhance the stability of the frequency

■ The stability of a communication can be enhanced that it possibly excludes the wireless LAN or Bluetooth, and the installation of the Zigbee equipment from the Network neighboring in which it is installed by using the frequency of the ISM BAND.

■ Basically, one RF-Master need to be installed in a network and can manage 1~20 APs and 1~100 EPs at the same time. Number of AP that is installed, is related to the coverage of each network and Number of EP is same as the number of End-Device that you want to use in each network.

■ You can use UP-Link connector to connect with RF-Master. And you can use DN-Link connector to connect with next AP in which you can use UP-Link.

■ You can use RS-422 port to connect with End-Device. Assignment of pin is different according to the type of interface as following:

Pin Number	Description		
	RS232	RS422	RS485
1		TXD+	TRXD+
2		TXD-	TRXD-
3		RXD+	
4	GND	GND	GND
5	GND	GND	GND
6		RXD-	
7	TXD		
8	RXD		

■ In AP-mode, you need to set Net-ID, Device-ID, AP/EP-Mode as follows:

- NET-ID : Network Number. Each network has its own unique frequency band. and you can select one of the 16 network.(Net.ID : 0~15)
- DEVICE-ID : Device-ID of the AP. Each AP has its own unique number in a network. and you can select one of the 20 APs.(Device-ID : 0~19)
- AP/EP-Mode : You must turn the dip-switch for AP/EP-mode to ON.

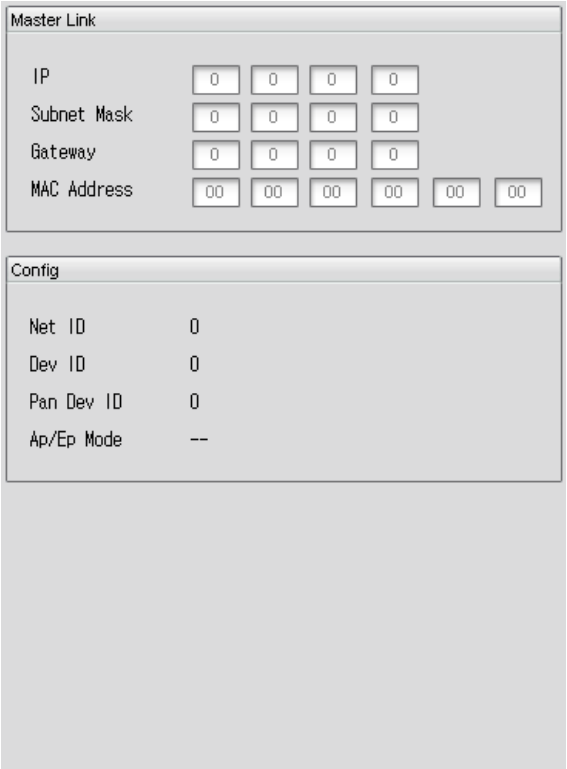
■ In AP-Mode, RF-Modem communicate with RF-Master through Ethernet. Its network parameter(IP-address, subnet-mask, gateway, MAC-address) is automatically configured by Device-ID because it is operated in private network.

ex.1) In AP Mode, Device-ID is 3.

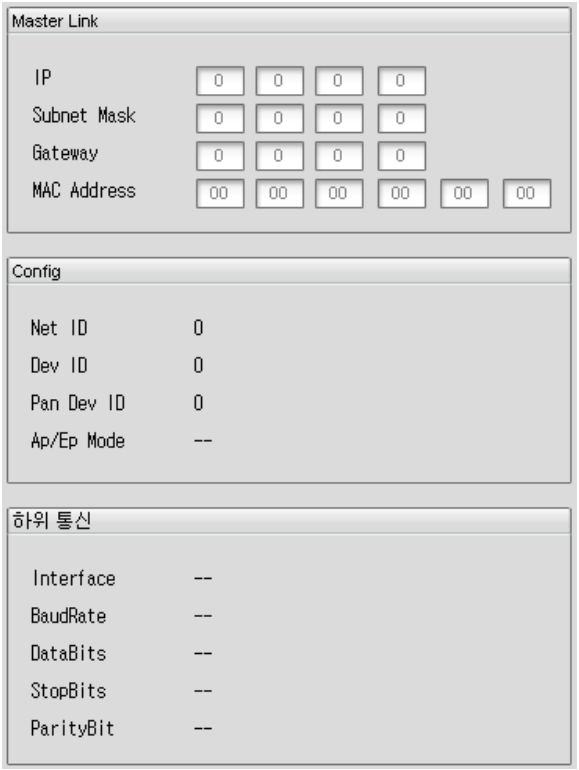
Device ID : 3
IP Address : 192.168.10.53(Device-ID + 50)
Subnet Mask : 255.255.255.0
Gateway : 192.168.10.254
MAC Address : 00:0A:1F:00:EC:35(Device-ID + 50)

ex.2) In EP Mode, Device ID is 3

Device ID : 3
IP Address : 192.168.10.103(Device ID + 100)
Subnet Mask : 255.255.255.0
Gateway : 192.168.10.254
MAC Address : 00:0A:1F:00:EC:67(Device ID + 100)

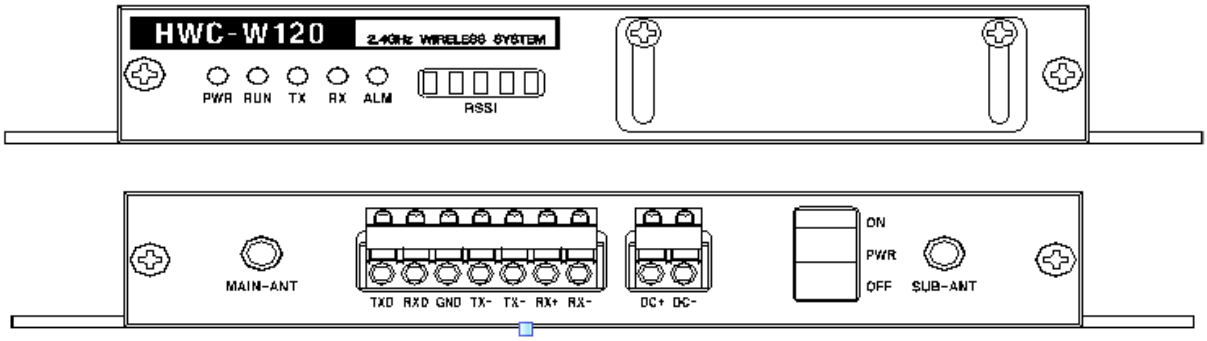


< AP Information Window in GUI >



< EP Information Window in GUI >

2.4 Configure the Setting of RF-Modem(HWC-W120)



■ You can configuration NET-ID, DEVICE ID, MODE by Rotary Swtich

- NET-ID : Network Number. Each network has its own unique frequency band. and you can select one of the 16 network.(Net.ID : 0~15)
- DEVICE-ID : Each HWC-W120 has its own unique number in a network.(Device-ID : 0~19)
- MODE : You can select Rf Test MODE or Normal operation Mode(0~8 : Normal / 9 : Test)

■ Frequency Table according to setting of NET-ID is as following:

NET ID	Frequency	NET ID	Frequency
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1	2,410 MHz	9	2,450 MHz
2	2,415 MHz	10	2,455 MHz
3	2,420 MHz	11	2,460 MHz
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coverage of each network and Number of EP is same as the number of End-Device that you want to use in each network.

■ You can use Serial port to connect with End-Device. Assignment of pin is differnet according to the type of interface as following :

pin numberr	RS-232	RS-485 or RS-422	RS-422
1	TXD		
2	RXD		
3	GND	GND	GND
4		TRXD+	TXD+
5		TRXD-	TXD-
6			RXD+
7			RXD-

3. Communication with HOST

3.1 Communication method

- You can use Up-Link connector of RF Master to communicate with HOST through ethernet. HOST must know the IP address and udp port of RF Master. Udp port is fixed to 9506. You can set-up the IP address of RF Master in the Host Link window of GUI.

3.2 Communication data

- Communication data in the Ethernet Protocol is as follows :

RAV Layer				Header	Information	Terminator
UDP Layer			UDP Header	UDP Information		
IP Layer		IP Header	IP Information			
MAC Layer	MAC Header	MAC Information				

- Data of the UDP Information consists of Header, Infomation and Terminator as follows:

HOST → RF Master

Header						Information			Terminator	
R	X	T	2	4	0	No1	No2		CR	LF
3Bytes			3Bytes			2Bytes		nBytes	2Bytes	

HOST ← RF Master

Header							Information			Terminator	
@	T	X	T	2	4	0	No1	No2		CR	LF
4Bytes				3Bytes			2Bytes		nBytes	2Bytes	

No.1~2 of the Information is Device-ID of the End Device.
It is same as Device-ID of EP. (possible range 00 to 99)

4. Communication with the End Device

4.1 Communication Method

■ You can use Up-Link connector of RF-Modem to communicate with HOST through ethernet. HOST must know the IP address and udp port of RF Master. Udp port is fixed to 9506. You can set-up the IP address of RF Master in the Host Link window of GUI.

■ You can use RS422 connector of RF-Modem which is in EP mode to communicate with End Device. Communication method is selected by dip-switch for mode select. It could support one of RS232, RS422 and RS485, and the assignment of pin is different according to selection. You can also configure data bit, stop bit and parity bit to support the End-device.

4.2 Communication Data

■ Communication Data consists of header, informaiton and terminator as follows:

EP → End Device

Header						Information			Terminator	
R	X	T	2	4	0	No1	No2		CR	LF
3Bytes			3Bytes			2Bytes		nBytes	2Bytes	

EP ← End Device

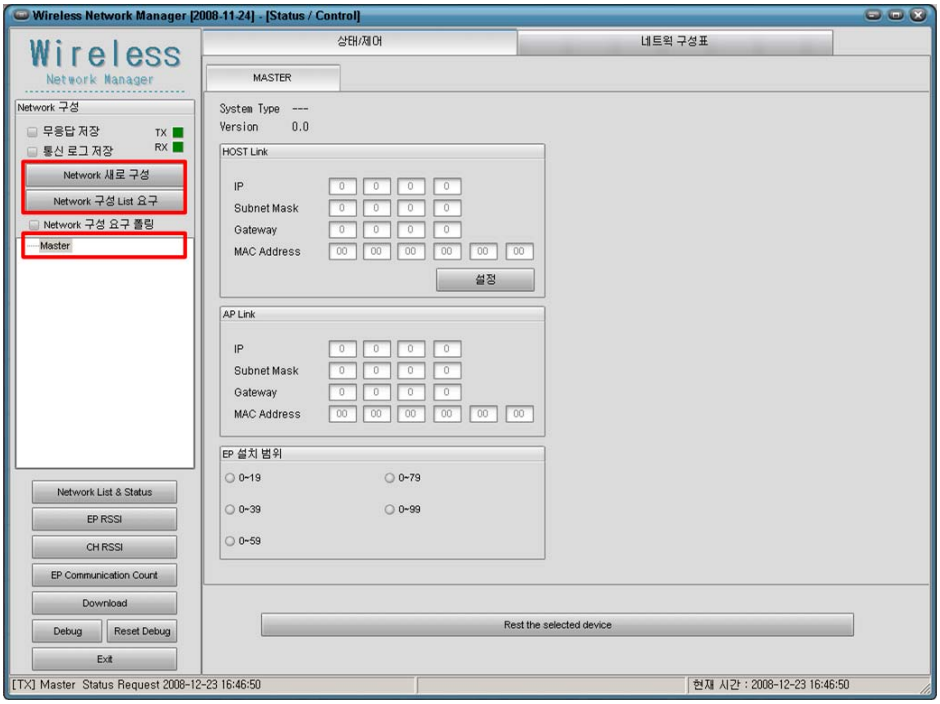
Header							Information			Terminator	
@	T	X	T	2	4	0	No1	No2		CR	LF
4Bytes				3Bytes			2Bytes		nBytes	2Bytes	

No.1~2 of the Information is Device-ID of the End Device.
It is same as Device-ID of EP. (possible range 00 to 99)

5. Quick Start for GUI

5.1 Initial Screen after Execution

When you execute the GUI program, the following screen is shown up.
(In case of showing message about the setting of program, please refer to "5.11 Configure the setting of communication with device"!)



This system consists of Master, AP and EP. As soon as excutuion, you can only see Master in left window. Therefore, user must request the list of device(AP, EP) by clicking [Configure Network] or [Request Device List].

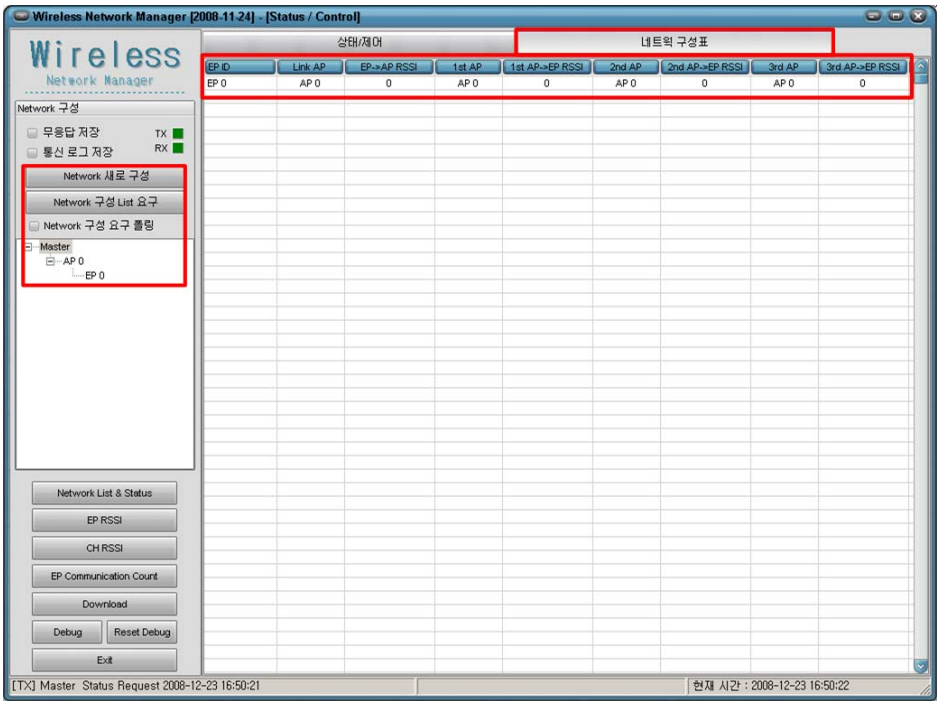
There is the following differences between [Configure Network] and [Request Device List].

- [Configure Network] : It send commands to Master to gather the list of AP/EP again, Master begins to gather information and sends the progressing status and result to GUI.
- [Request Device List] : It requests the device list that Master already gathers. Master sends the device list of AP/EP to GUI.

Tip) After execution, It only show Master. If PC is not connected to Master, you couldn't see any AP/EP in left window because PC can't receive the device list. In other words, when PC is directly connected to AP/EP, PC can't receive any device list. In this case,

you can see AP.0/EP.0 by pressing 'F5'Key. It could be different with real device list, and This is the function that you can see device information without Master.

5.2 Network Configuration



User must request device list of network after execution of GUI.(Refer to "5.1 Initial Screen after Execution"). The following is explanation about result of request.

At first, user must watch the left window. After requeset the network configuratin, It shows Master, APs and EPs. The upper window shows one AP and one EP that communicate with Master and owner-member relation between them.

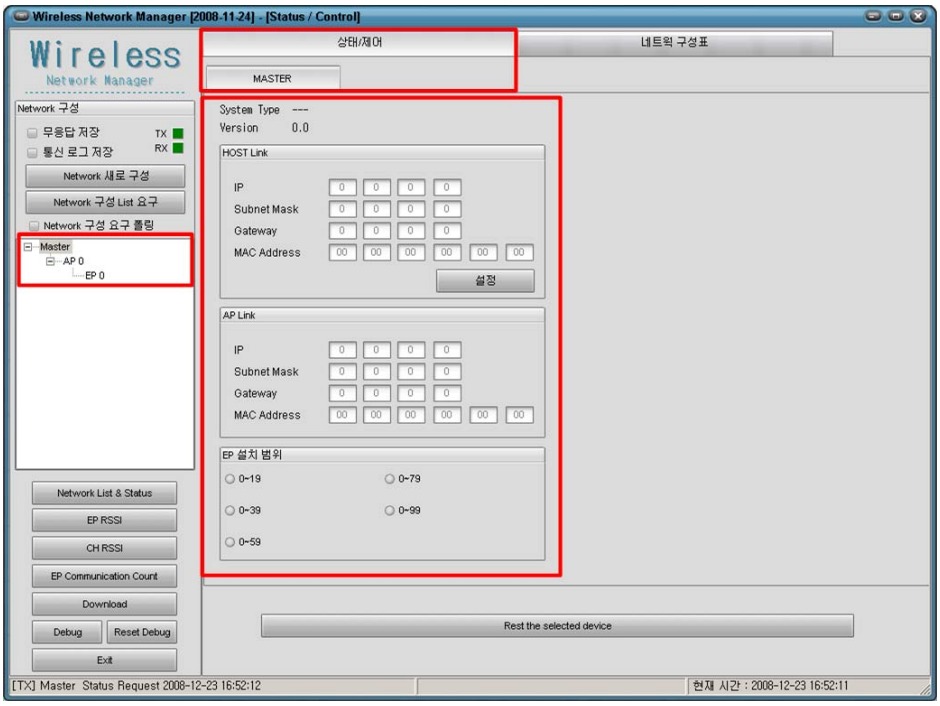
Device list of the left window shows result of request briefly. You must click "Network Configuration" to see more detail.

The following is in the network configuration.

- EP ID : EP's ID
- Link AP : AP linked to each EP
- EP → AP RSSI : Receiver-Sensitivity that measured in AP
- 1st, 2nd, 3rd AP : List of AP that selected by Receiver-Sensitivity
- 1st, 2nd, 3rd AP → EP RSSI : Receiver-Sensitivity that measured in EP

In the "Network Configuration", you can find out the linked AP list, its receiver-sensitivity and list of adjacent APs.

5.3 Status and Control of Master

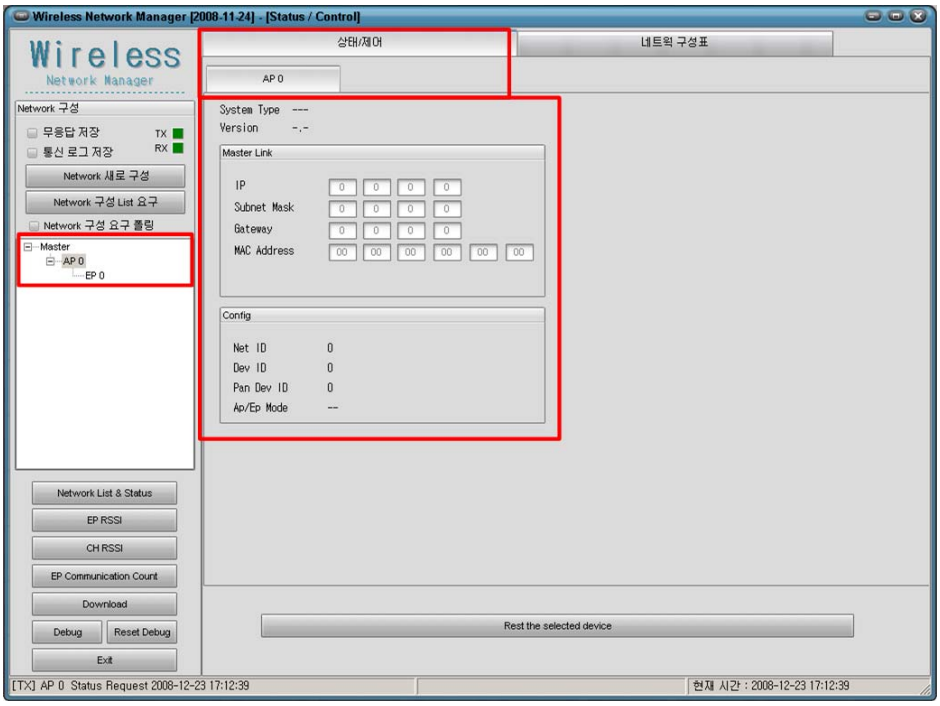


In upper screen, please confirm whether the "state/control" is selected.
(If "status/control" is not selected, click the tab of "status/control")
The following is the status information of Master.

- System Type : Type of system.
- Version : Firmware version of Master
- Host Link : Network information to communicate with HOST.
  These are network information of the Master.
- AP Link : Network information of communicate with AP.
  (User do not need to set this information.)
- Range of EP : Number of EP that installed. (Only by range)

[Caution.1] When you want to see the status or control the value, "Network Polling" must not be checked. GUI program requests the network device list when "Network Polling" is checked and the status of selected device in other case, by periods.
[Caution.2] If you couldn't see the upper screen, please confirm whether you select Master!

5.4 Status and control of AP



After selecting AP in device list, please confirm whether the "state/control" is selected (If "status/control" is not selected, click the tab of "status/control")

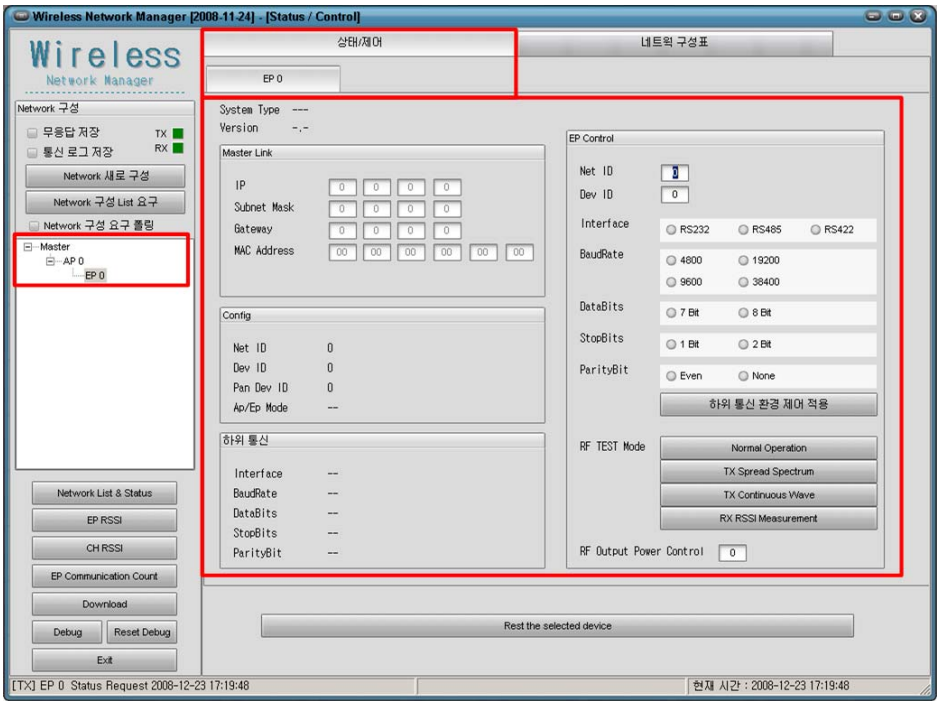
The following is the status information of AP.

- System Type : Type of system.
- Version : Firmware version of AP.
- Master Link : Network information to communicate with Master. (User do not need to set this information.)
- Config : Configuration information of AP

[Caution.1] When you want to see the status or control the value, "Network Polling" must not be checked. GUI program requests the network device list when "Network Polling" is checked and the status of selected device in other case, by periods.

[Caution.2] If you couldn't see the upper screen, please confirm whether you select AP!

5.5 Status and Control of EP



After selecting EP in device list, please confirm whether the "state/control" is selected (If "status/control" is not selected, click the tab of "status/control")

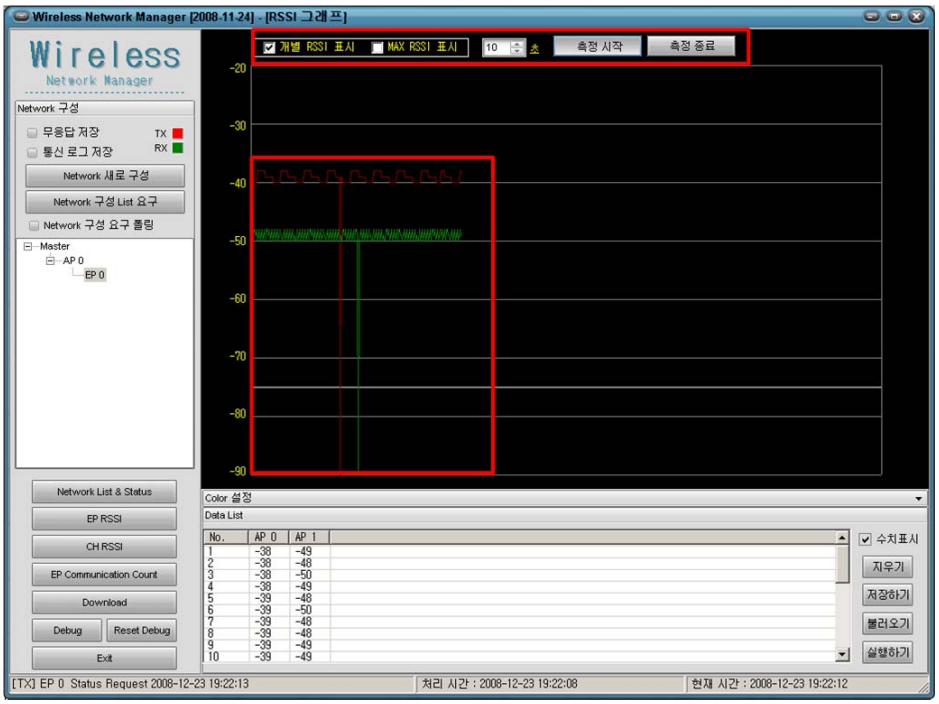
The following is the status information of EP.

- System Type : Type of system.
- Version : Firmware version of EP.
- Master Link : Network information to communicate with Master.
  (User do not need to set this information.)
- Config : Configuration information of EP
- Comm. of End Device : Information of serial port to communicate with End-device
- EP Control : Item to control EP.

[Caution.1] When you want to see the status or control the value, "Network Polling" must not be checked. GUI program requests the network device list when "Network Polling" is checked and the status of selected device in other case, by periods.

[Caution.2] If you couldn't see the upper screen, please confirm whether you select EP!

5.6 RSSI Graph

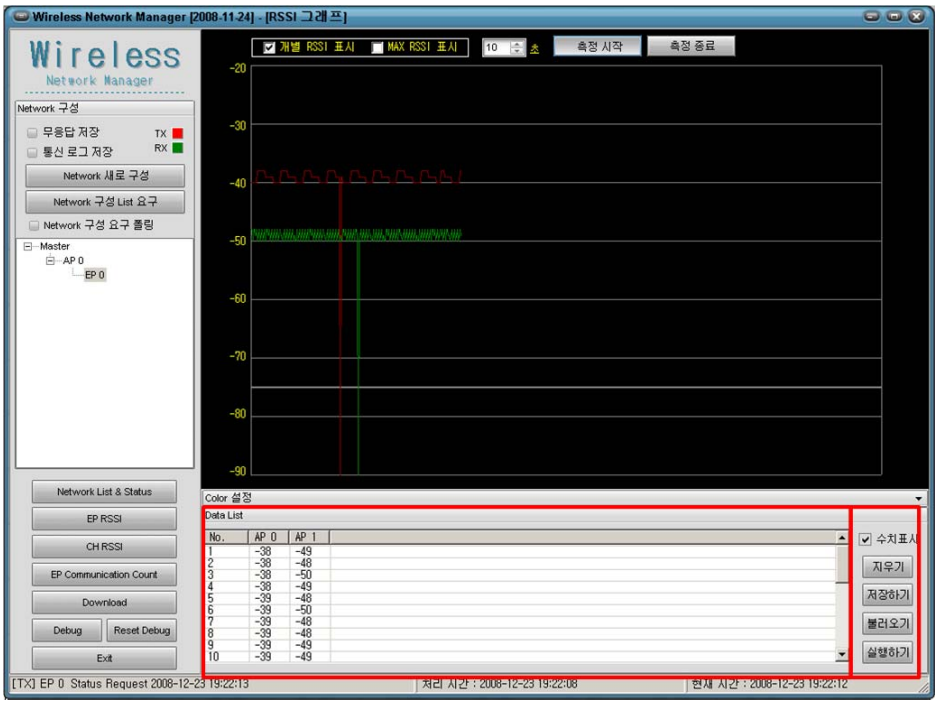


The Graph of RSSI visualizes the received signal strength between the installed AP and the selected EP. When it tries to determine whether the installation position of APs is appropriate or not, it will be useful.

The following is the usage :

1. Select the EP of the End-device that you want to see in left window.
2. Click the check box for "Individual RSSI" and "MAX RSSI"
   Individual RSSI : display all of the RSSI value
   MAX RSSI : display the maximum value of each RSSI valule
   It is possible to select over 1 option.
3. Set the time. It can set till a maximum 200 second, and this time means the X-axis. For example, If the time setting was 10 seconds, receiver-sensitivity data of 10 second amount is drawn on a screen. The time itself to measure is not limited to 10 seconds. Moreover, it is the setting about time interval to measure receiver-sensitivity data. The time interval is calculated by following formula :
   [Time interval for receiver-sensitivity data = time / 700]
4. Start to move the End-device and measure. (click "Start measure")
5. If the device does not communicate with any AP, finish to measure. and restart the measurement after changing the installation position of AP.
   (If the device does not communicate with any AP, it is not drawn on screen during that time. In this case, you must confirm the installation position of AP!)

5.7 Store the RSSI Data

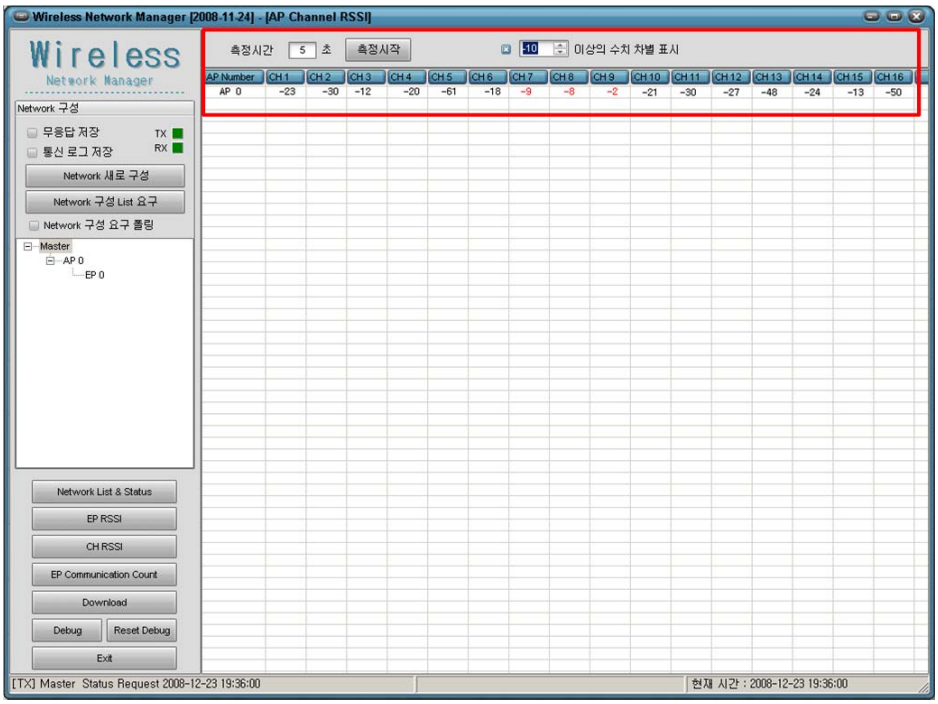


RSSI drawn on the graph is expressed in the list(Red box) as the numeric value.
This data can be stored as a file. And the stored file is retrieved and the RSSI graph can be drawn again.

The following is for the button and the check box.

- Numeric : It sets up whether the numerical value display will be indicated or not.
- Delete : It deletes all contents of the table.
- Store : It stores the contents of the table as a CSV file that can be open in excel.
- Load : It load the stored data from a CSV file.
- Execute : It draw the RSSI graph with the loaded data.

5.8 CH RSSI

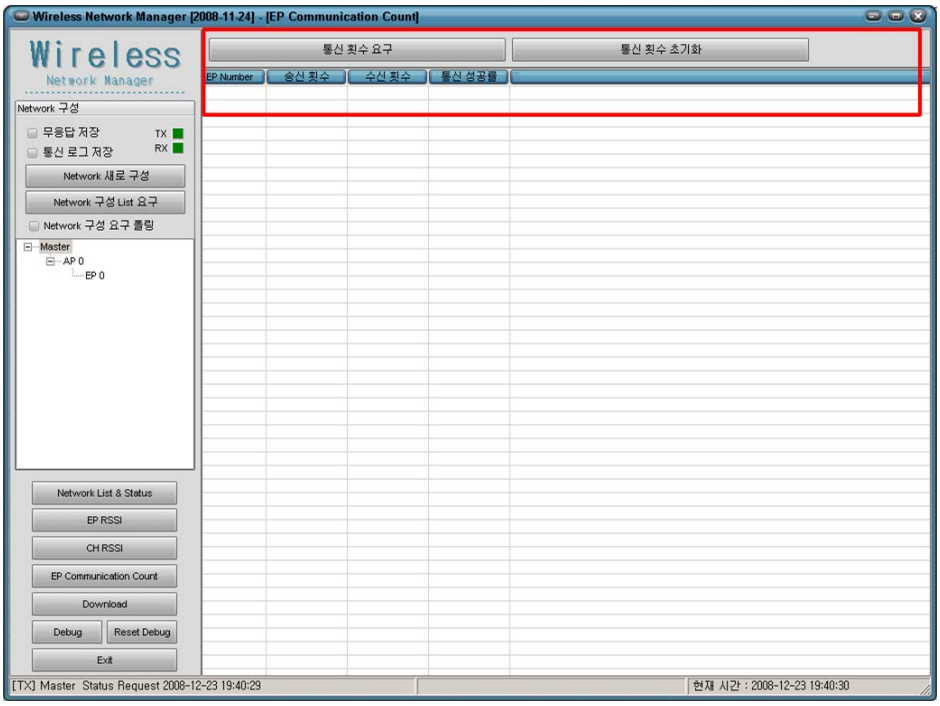


The CH-RSSI is the RSSI value of the radio channel. It shows whether the channel is already occupied or not. that is, function to search the available channel without the cross talk.

The following is the usage :

1. Set up the measurement time. it sets up as a value between 1~10 second.
2. Set the option "Color value".
If the value is more than the set value, the value is expressed as the red letter. In other case, It is expressed as the black letter. That is, user can easily confirm the status of channel by its color.
3. Start to measure. (click "Start measure")
4. With the information of 16 channel, user confirm whether there is the channel in which it is not occupied. And user determines whether there is the channel in which it can be assigned to the current system or not.

5.9 EP Communication Count

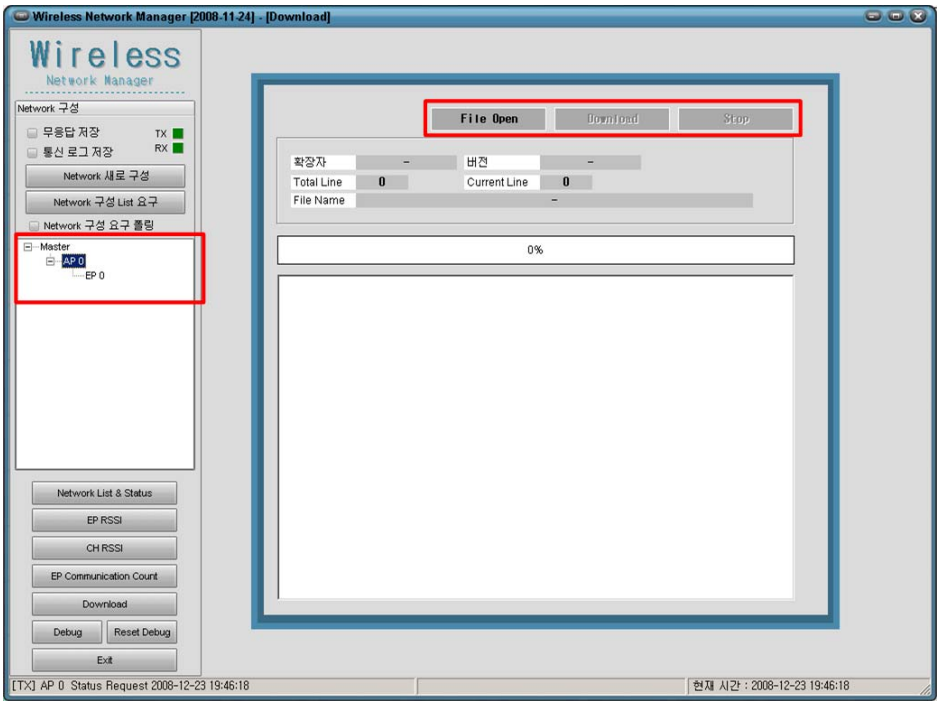


"EP Communication Count" is the function in which we know whether the communication state with each EP is good or not.

The following is the usage :

- Request Status of Communication
  : It require the number of transmission and reception
  It shows the rate of communication success.
- Init Status of Communication
  : It initialize all of values to '0'.

5.10 Download

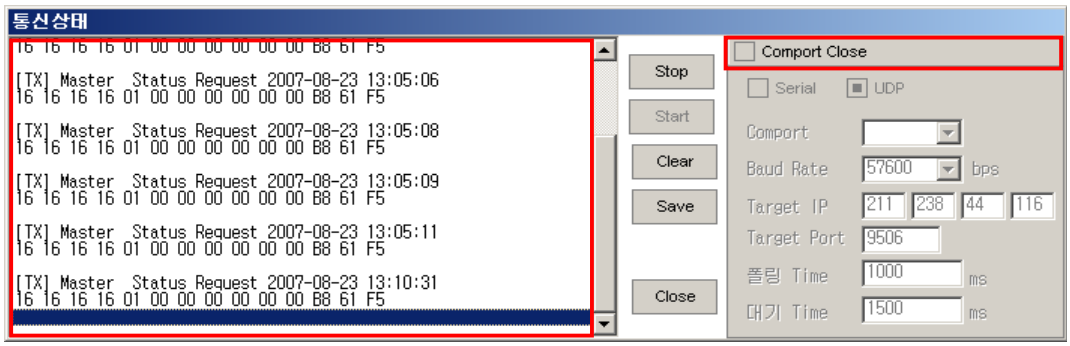


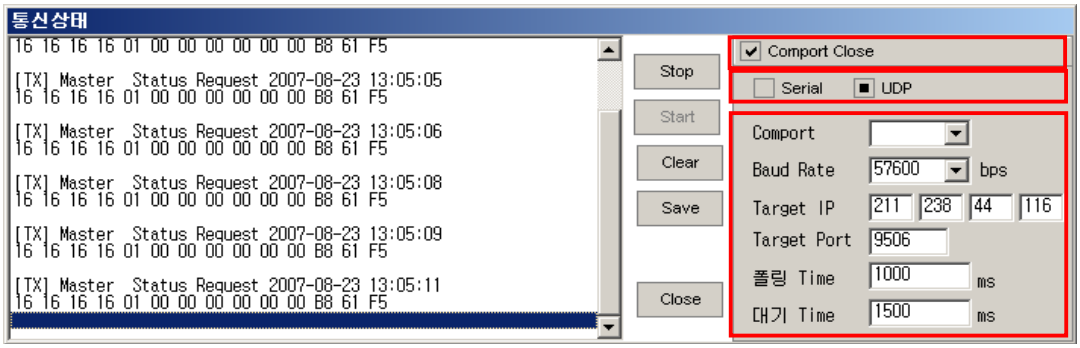
This is the function that upgrade the firmware of the device

The following is the usage :

1. Select the device that is to be upgraded in the left list.
2. Click the 'File Open' button and show up the dialog box. Click the 'OK' button after selecting the download file.
   (The file extension is MAU[Master], AP[RFU] and EP[RFU]. If the file extension is different, please confirm the device selected in left window)
3. If the file is opened correctly, 'Download' button is activated. Press the button to begin to download.
4. Download in Progress. If you would like to finish the download, press the "Stop" button
5. Complete to download. If it fails, try again!

5.11 Configure the setting of communication with device





In spite of executing the program after connecting the device with PC, If it is not communicated, The configuration of communication has to be confirmed.

The following is the usage :

1. Click the 'Debug' button in the main window.
2. Check whether the received data "[RX] -------" is in the left window.
   You can use the 'start/stop' to start/stop the communication with the device.
   If there is not the received data "[RX] -----", please confirm the hardware connection.
3. After checking the check box "Comport Close", you can change the configuration of communication.
4. At first, confirm whether the PC is connected with the device through the serial cable or LAN cable. And select one of Serial/UDP.
5. In case of serial, you must select and confirm the comport and baud-rate.
   In case of UDP, you must confirm the Target IP and Target Port. Target IP means the IP address of the device. Target Port must be always set to '9506'.
   The initial value of the polling Time is 1000, and the initial value of the waite time is 1500. It is recommended that is not changed.
6. After the setting the communication configuration, Be sure to uncheck the check box 'Comport Close' and confirm the received data "[RX] -----" in the left side of the window.
   If there is not the received data, confirm whether the 'start' button is activated.

When there is an error related to the setting of communication after executing the GUI program, the communication status window is automatically pop up. In this case, please confirm the communication configuration again!

The error is in following case :

- In serial mode, when the comport is set up incorrectly.
- In UDP mode, when the TargetIP is set to "0.0.0.0" or the Target Port is set to '0'.

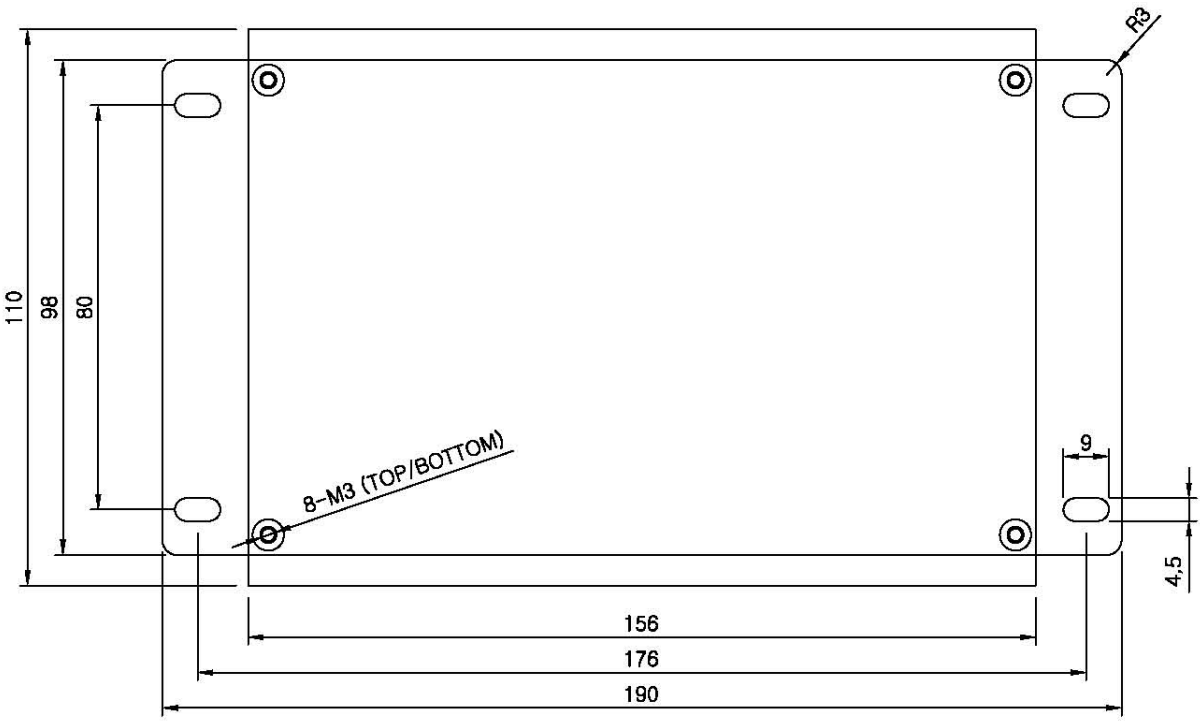
5.12 Others

The following is essential function to debug the system ; "No Response Store", "Store Communication Log" and "Reset Debug". Normally "No Response Store", "Store Communication Log" are unchecked.

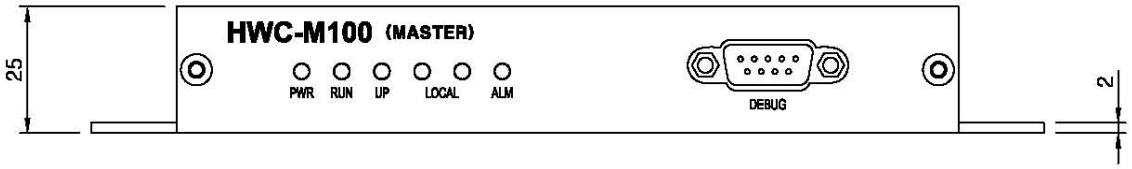
6. Dimension

6.1 RF Master(HWC-M100)

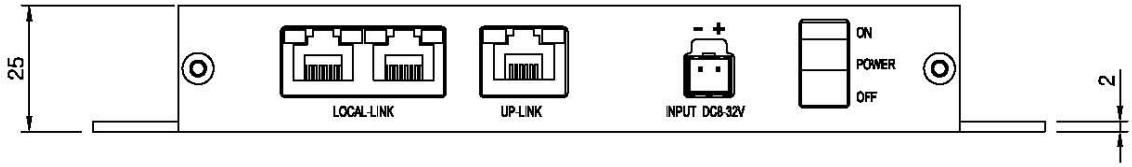
■ TOP VIEW



■ FRONT VIEW

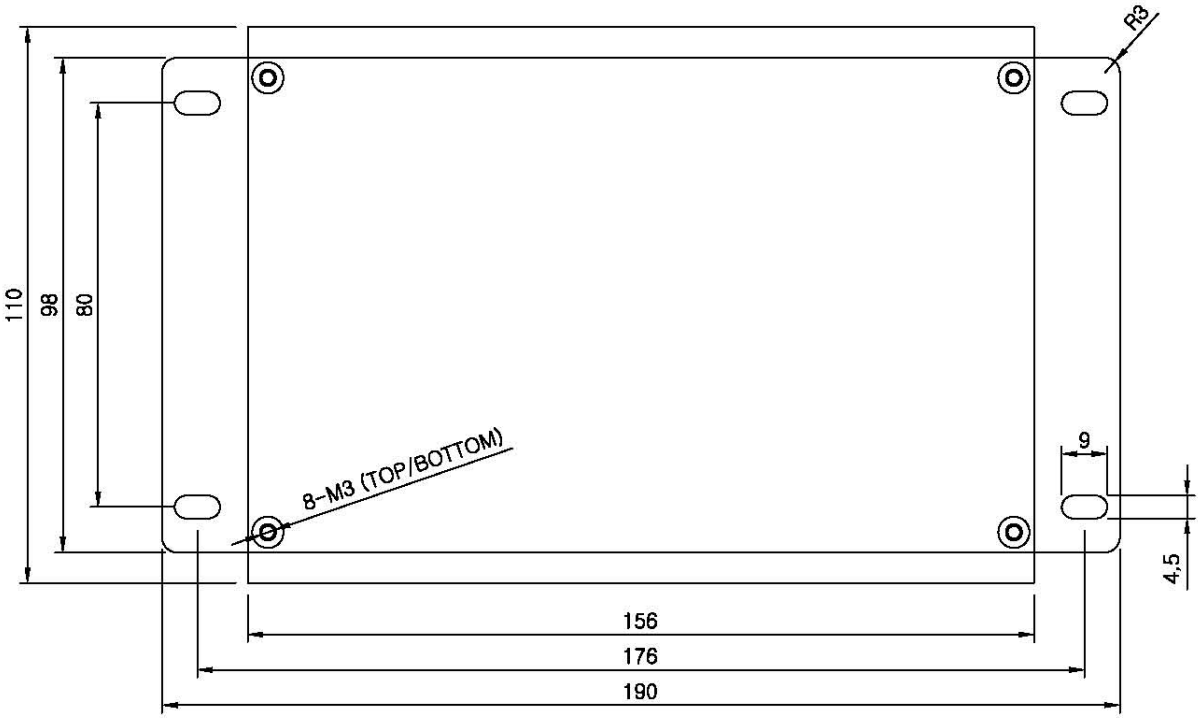


■ REAR VIEW

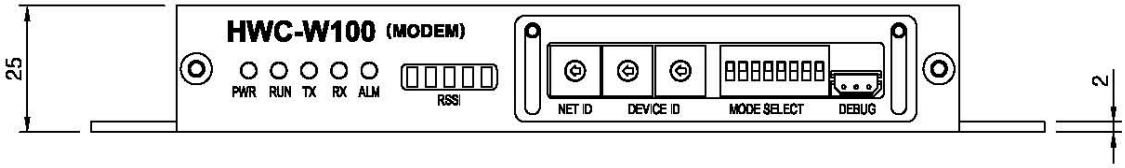


6.2 RF Modem(HWC-W100)

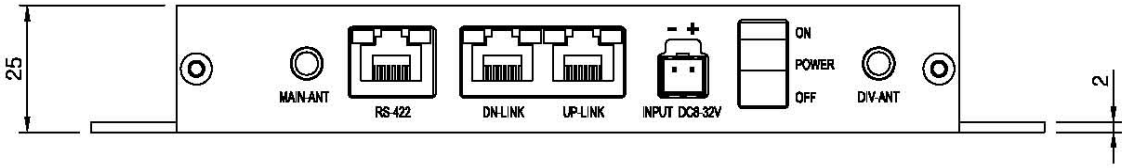
■ TOP VIEW



■ FRONT VIEW

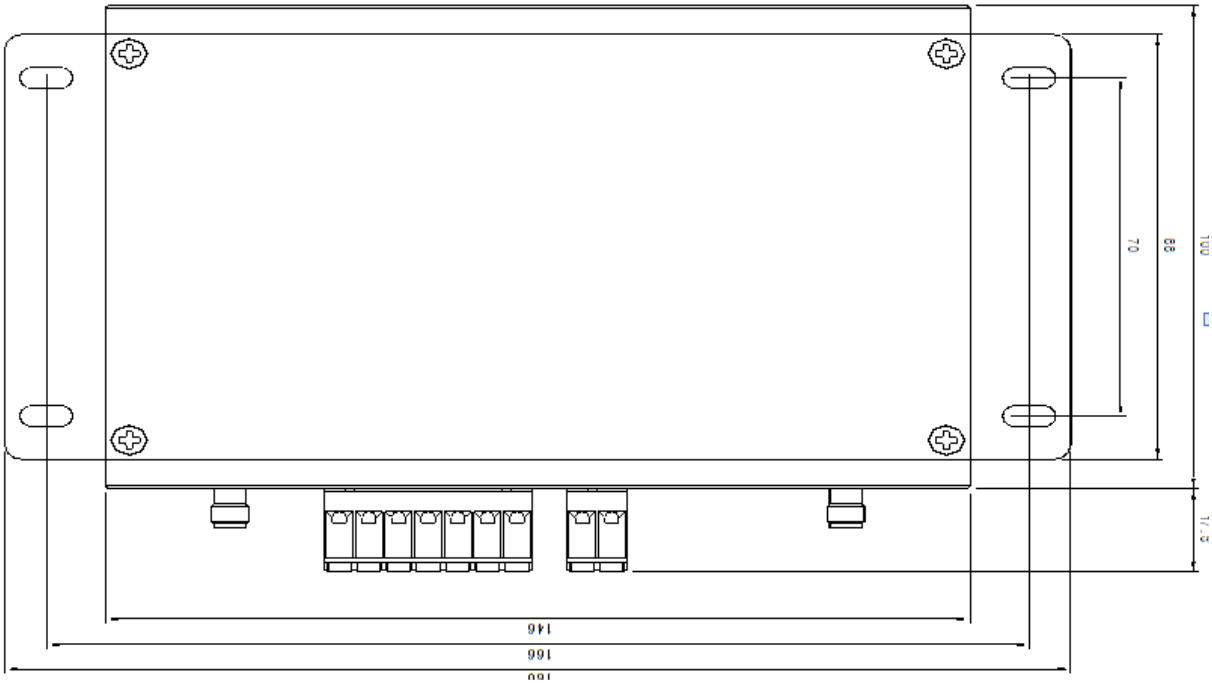


■ REAR VIEW

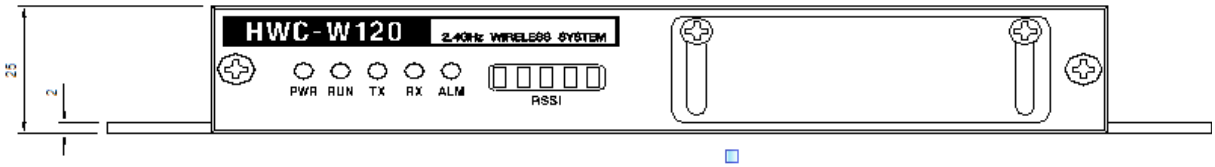


6.3 RF Modem(HWC-W120)

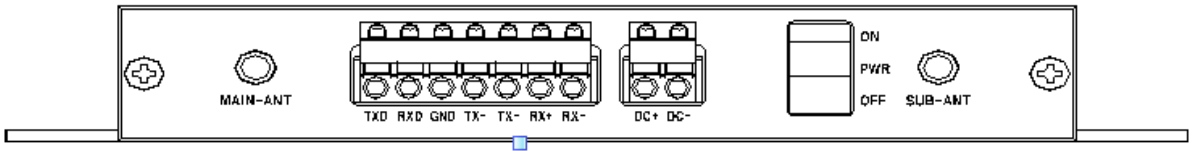
■ TOP VIEW



■ FRONT VIEW



■ REAR VIEW



[A/S CENTER]

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Tel. +82-2-3281-9300
Fax. +82-2-3281-7775

FCC Information to User

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 con-nected.
• Consult the dealer or an experienced radio/TV technician for help.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : 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

WARRANTY

Warranty is to cover the operating defaults after the purchase during the warranty period.(12 months after the purchase).

Please notify us the defaults for repairs with short description of the defaults confirming the information of person in charge.

The demages(defaults) prescribed below are NOT to be covered by warranty.

* Users faults by lack of care.
* Unauthorised electric currency connection defaults.
* Faults by the users own intention of dismantle or repairs.
* Demages caused by natural disaster. (Fire, Flood, Earthquake, Lighting, etc.)
* Replacement to new parts.

Shape or circuit of the product are subject to change without any notice to improve the quality of product.

Customer Name : _____

Address : _____

Telephone Number : _____

E-Mail Address : _____

Serial # : _____

Date of Purchase : _____

Company purchased from : _____