Manual

(WRP100)

Safety Information
Safety Warnings

To reduce the risk of electric shock, do not remove the cover (or back) of the router.

Warning

- To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

Caution

- Do not expose this device to dripping or splashing. Do not place objects filled with liquids, such as vases, on the products
- To turn this device off completely you must pull its plug out of the wall socket. To ensure you can unplug the product quickly if necessary, only plug the product into an easily accessible outlet.
- Only connect this device to an AC outlet with a protective grounding connection.

Precautions

- Ensure that the AC power supply in your house complies with the requirements listed on the identification sticker located on the back of this device.
- Install your device horizontally or vertically on a suitable piece of furniture or on a wall using the included wall mounting kit with enough space around it for proper ventilation (7.5–10cm)
- Do not place the device on an amplifiers or other piece of equipment which may become hot.
- Do not stack anything on top of the device.
- To disconnect the device completely from the power supply, remove its plug from the wall outlet. We strongly recommend unplugging the device if you are going to leave it unused for a long period of time.
- During thunderstorms, disconnect the AC plug from the wall outlet. Voltage spikes due to lightning could damage the device.
- Do not expose the device to direct sunlight or other heat sources. Exposure to heat sources can cause the device to overheat and malfunction.
- Protect the device from moisture, excess heat and equipment creating strong magnetic or electric fields (i.e. speakers.).
- Unplug the device from the wall socket if it malfunctions.
- Your device is not intended for industrial use. It is for personal use only.
- Condensation may occur in the device if is has been stored in cold temperatures. If you transport the device during the winter, wait approximately 2 hours until the device has reached room temperature before using.

1. Summary

WRP100 (Model name) is a Wi-Fi repeater to transmit AV data. The Wi-Fi repeater receives from an AP and retransmits to display devices. The main goal of the Wi-Fi repeater is to enlarger communication coverage between AP and display device.

To meet the goal, the Wi-Fi repeater is composed of two transceivers. One transceiver communicates date with AP with 5GHz lower band channel, and the other transceiver receives the data through USB, and retransmits to target display devices with 5GHz upper band channel. The channel is able to be changed for each transceiver.

Each transceiver follows IEEE 802.11n specification, and uses HT40 data format. Therefore, the transceiver uses 40MHz channel bandwidth. The transceiver has 2x4 MIMO(Multi Input Multi Output) architecture. The transmitter operates with two antennas and receives with 4 antennas.

- Operating temperature : 0°C ~40°C
- Operating Voltage : 120V/50~60Hz
- The frequency generation portion of device is ±20ppm.
- This device operates in the 5190 - 5230 MHz band which is restricted to Indoor operations

2. Set descriptions

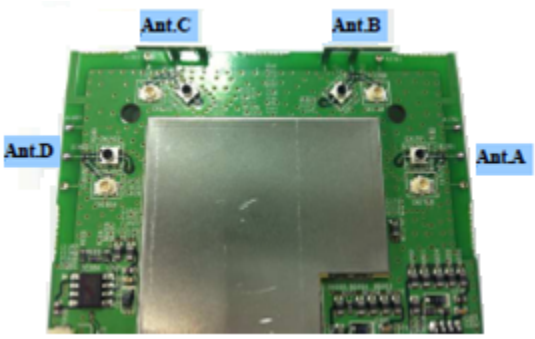
2.1 Main Chipset Information

Item	Vender	Part number
Transceiver (MAC/BBP/Radio)	Samsung	Spirra-V2
FEM (PA/LNA/SW)	Skyworks	5012T

3. Wireless module

Both wireless modules use HT40 (IEEE 802.11n) and each wireless module uses following channel (center frequency).

* Lower band wireless module : #36(5190MHz), #44(5230MHz)
* Upper band wireless module : #149(5755MHz), #157(5795MHz)



Inverted F-type antennas are used for both wireless modules and four antennas are used for receive mode, two antennas are used for transmission mode.

Following Modulation Modes are available.

MCS Index	Modulation	R	$N_{BPSCS(i_{SS})}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
0	BPSK	1/2	1	108	6	108	54	13.5	15.0
1	QPSK	1/2	2	108	6	216	108	27.0	30.0
2	QPSK	3/4	2	108	6	216	162	40.5	45.0
3	16-QAM	1/2	4	108	6	432	216	54.0	60.0
4	16-QAM	3/4	4	108	6	432	324	81.0	90.0
5	64-QAM	2/3	6	108	6	648	432	108.0	120.0
6	64-QAM	3/4	6	108	6	648	486	121.5	135.0
7	64-QAM	5/6	6	108	6	648	540	135.0	150.0

MCS Index	Modulation	R	$N_{BPSCS(i_{SS})}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
8	BPSK	1/2	1	108	6	216	108	27.0	30.0
9	QPSK	1/2	2	108	6	432	216	54.0	60.0
10	QPSK	3/4	2	108	6	432	324	81.0	90.0
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0
12	16-QAM	3/4	4	108	6	864	648	162.0	180.0
13	64-QAM	2/3	6	108	6	1296	864	216.0	240.0
14	64-QAM	3/4	6	108	6	1296	972	243.0	270.0
15	64-QAM	5/6	6	108	6	1296	1080	270.0	300.0

Transmit signals are emitted through the Antenna B and the Antenna C for all MCS index (MCS Index 0~15 of above table) which means that the antenna A and the antenna D do not work during transmit state. Operating MCS Index 0~7, wireless module transmits same signal through the Antenna B and the Antenna C which means that one spatial same stream is transmitted through the Antenna B and the Antenna C. On the other hand, Operating MCS Index 8~15, wireless module transmits two spatial streams through Antenna B and Antenna C. When wireless module is in receiving state, it receives with all four antennas.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B conforme á la norme NMB-003 du Canada.

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

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

For product available in the USA/Canada market, only channel 5190Mhz (Channel 36), 5230MHz (Channel 44), 5755MHz (Channel 149), 5795MHz (Channel 157) can be operated. And Selection of

other channels is not possible.

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

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

IC Radiation Exposure Statement:
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Command for FCC test

* Channel selection command : wch channel_number, 1 (enter)
  - channel_number : 36, 33 for wireless lower band module
  - channel_number : 149, 157 for wireless upper band module
  Example) wch 36, 1 : #36 channel (5190MHz) selection
  wch 157, 1 : #157 channel (5795MHz) selection

* Transmission data rate selection : tvec 0x41, mcs_index (enter)
  - mcs_index : 0~7 for number of spatial stream= 1
  - mcs_index : 8~15 for number of spatial stream=2

  Example)
  tvec 0x41, 2 :

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
2	QPSK	3/4	2	108	6	216	162	40.5	45.0

  tvec 0x41, 11 :

MCS Index	Modulation	R	$N_{BPSCS(iSS)}$	N_{SD}	N_{SP}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)	
								800 ns GI	400 ns GI
11	16-QAM	1/2	4	108	6	864	432	108.0	120.0

* Transceiver setting to transmission state
  : wstart (enter)
  : ton (enter)

* Transceiver setting to receiving state
  : toff (enter)