

COREXOM R405LQ LR EVA KIT USER GUIDE

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Revision History

Rev.	Date	Description
0.0	2024/03/19	Preliminary
0.1	2024/04/01	Model name update



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About This Document

- Illustrations in this documentation might look different from your product.
- Depending on the model, some optional accessories, features, and software programs might not be available on your device.
- Depending on the version of operating systems and programs, some user interface instructions might not be applicable to your device.
- Documentation content is subject to change without notice. Coretronic Reality Inc. (CRI)
 makes constant improvements on the documentation of your computer, including this
 guidebook.

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1. Introduction

CRI R405LQ LR EVA KIT is major packed with a R405LQ LR module, Antenna Kit (frame with 4 pcs Dipole Antenna) and accessories (cables and adaptor), through USB or UART connection to work similar as external WiFi network module. The R405LQ can support RNDIS (Remote Network Driver Interface Specification) standard as module interface control. The R405LQ LR is leverage WiFi technology, and capable for long distances connection and data communication.





R405LQ LR Module

Antenna Kit

When using R405LQ LR to build up connection network, please need to set up one of R405LQ LR as AP mode (default), and others R405LQ LR are set as STA (Cline) mode. They are communicate working in closed network areas.

1.1 Features and Specification

The following table shows the detailed features and Spec. of R405LQ LR module and Antenna.

Key features of R405LQ LR module

Item	Description		
Platform	Qualcomm QCS405 + QCN9074		
Technology	Leverage Wi-Fi 6 (802.11ax)		
MIMO	4T4R		
Fraguanay	• 2412MHz~2462MHz		
Frequency	• 5180MHz~5240MHz / 5745MHz~5825MHz		
RF signal B.W	5MHz / 10MHz / 20MHz		
Throughput	240 Mbps (TBC)		
Radio Tx Power	● ≦ 24dBm @ 2.4GHz		
Radio 1x Power	● ≦ 24dBm @ 5GHz		
Distance	> 10KM (Open space without distractions)		
Connection	1. USB 3.0 (Type C)		
Interfaces	2. USB 2.0 (Micro USB, for FW UD)		
Interraces	3. UART x2 (1.8V)		

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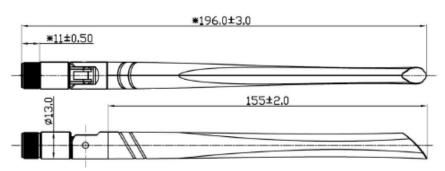
Item	Description		
	4. UART x1 (3.3V, for Debug only)		
	5. Buttons x6		
Power Supply	DC 6.6V~17V via Power Jack		
	• 2.4GHz 4T4R Tx < 9.8W		
Power	• 2.4GHz 4T4R Rx < 4.0W		
Consumption	• 5GHz 4T4R Tx < 13.8W		
	● 5GHz 4T4R Rx < 4.5W		
Dimension	60 x 72 x 9.9 mm		
Weight	Around 21 g		
Operation Temp.	-20 ~ 70 °C		
Storage Temp.	-20 ~ 70 °C		
Device Driver	RNDIS (Remote Network Driver Interface Specification)		

Notice : When using, be sure to connect the antenna as a load at the antenna terminal to prevent no-load reflection from damaging the PA.

Major Spec. of Dipole Antenna

Item	Description
Fraguenov	2400 ~ 2500 MHz
Frequency	5150 ~ 5850 MHz
S.W.R	≦ 2.0
Antenna Gain	5 dBi ± 0.5 dBi @ 2400 ~ 2500 MHz
Antenna Gain	5 dBi ± 0.5 dBi @ 5150 ~ 5850 MHz
Efficiency	>81% @ 2400 ~ 2500 MHz
Efficiency	>73% @ 5150 ~ 5850 MHz
Polarization	Linear
Impedance	50 ohm
Connector	RP-SMA male
Operation Temp.	-40 ~ 65 °C
Storage Temp.	-40 ~ 80 °C

Notice: Antenna Kit is placed 4 pcs Dipole Antenna at 4 corners of base frame.

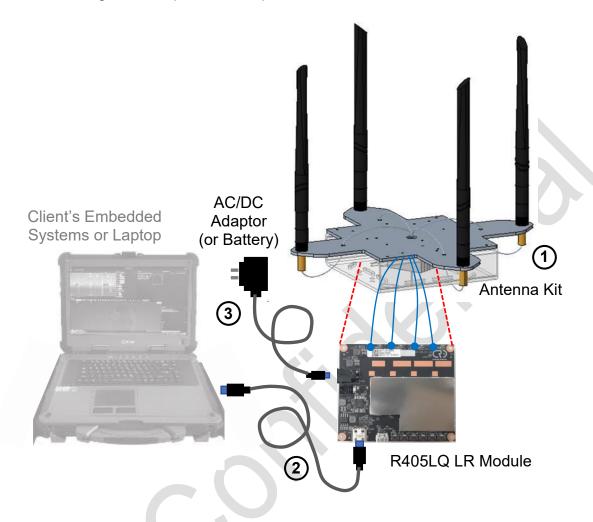


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1.2 Product Diagram

R405LQ LR EVA KIT contains the items listed in the table below, and typical evaluation case is configured setup like below picture.



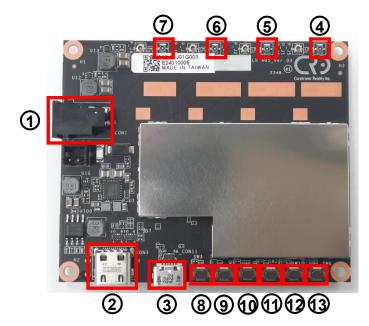
No.	Box contents	
1	R405LQ LR EVA KIT	
	(LR Module + Heat sink + Antenna Kit)	I
2	USB Type A to C Cable	1
3	AC110/220V to DC 12V 36W Adaptor	1
4	USB Type A to Micro Cable (option for FW UD)	1
5	USB Type A to UART Cable (option for Debug)	1
6	XT60 Cable (option for DC Power)	1
7	Quick User Guide	1

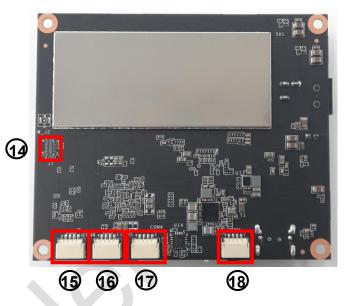
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1.3 Major interface components location

Below picture identify the major interface components and connectors found on the R405LQ LR module





No.	Function Description	No.	Function Description
1	DC Power Jack	10	Key SW, Pair
2	USB 3.0 Type C	11	Key SW, Volume -
3	USB 2.0 Micro (for FW UD)	12	RESET (QCS_RESIN_N)
4	RF Conn, Chain 1	13	USB BOOT
5	RF Conn, Chain 2	14	JTAG (for Debug only)
6	RF Conn, Chain 3	15	UART (1.8V)
7	RF Conn, Chain 4	16	UART (1.8V)
8	Key SW, Power	17	UART (3.3V, for Debug only)
9	Key SW, Volume +	18	USB 2.0 (ALT with #3 for FW UD)

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2. Device Tools Operation

This chapter introduces the detail setup and testing steps of R405LQ LR EVA KIT build in configuration tools, and via PC's connection and operation. Please install the ADB (Android Debug Bridge) environment in your PC at first, then refer <u>section 1.2</u> to setup R405LQ LR EVA KIT and connected with PC via USB cable.

Please use the "adb devices" command to check whether the R405LQ LR module is successfully connected to the PC? Then use the "cricfg" command to enter the device tool's control menu of R405LQ LR EVA KIT.

```
jeffrey@TP620:~$ adb devices
List of devices attached
e057c36 device

jeffrey@TP620:~$ adb shell
sh-5.0#
sh-5.0# cricfg _
```

2.1 AP mode Menu operation

R405LQ LR EVA KIT can be configured as AP (Access Point) mode or STA (Station, Cline) mode through System Menu setup. This section introduces when R405LQ LR is configured as AP mode then re-power on. After connected with ADB PC, and enter "cricfg" command. The items select Menu will be shown on ADB PC as below.

```
1.0110.1
loadConfig: channel: 36, freq: 5180
loadConfig: bandwidch: 20MHz
loadConfig: mode: 11AHE20
*~*~*~*~*~*~*~*~ CRI Wi-Fi Config Tool - Menu
    SAP Menu
 1: SAP - Settings
 2: SAP - Service Switch (on/off)
 3: SAP - Switch Channel / Bandwidth
4: SAP - Advance setting (CBS/SBS/Long Range)
 5: SAP - Get Current Channel and Bandwidth
 6: SAP - Get RSSI
 7: SAP - Throughput test
    System Menu
91: System - Enable device as SAP mode.
92: System - Enable device as STA mode.
93: System - Enable iperf service.
95: Device Info
99: Factory Reset.
0. Exit.
Please enter the operation number to be performed:
```



2.1.1 Settings (SSID)

When enter "1" at top menu, then into "SAP - settings" menu.

You can enter "1" again to get current SSID and Password set

Or, enter "2" to setup new SSID and Password.

Or, enter "0" will exit to go back top Menu



2.1.2 Switch Channel and Bandwidth

When enter "3" at top menu, then into "SAP - Switch Channel / Bandwidth" menu.

You can enter "1" to get current Channel and Bandwidth information, or enter "2" to change the Channel number, or enter "3" to change Channel Bandwidth. Or, enter "4" to change Channel and Bandwidth in the same time.

```
Please enter the new channel: 44
Bandwidth only support: 0: 20MHz, 1: 10MHz, 2: 5MHz
Please enter the new bandwidth: [0/1/2]: 0
Change channel to 44 with bandwidth to 20 MHz, please wait...
loadConfig: channel: 44, freq: 5220
loadConfig: bandwidch: 20MHz
loadConfig: mode: 11AHE20
Channel changed to 44 successfully.
getBandwidthInt: bandwidth: 0
Bandwidth changed to 20MHz successfully.
*~*~*~*~*~*~*~*~ CRI Wi-Fi Config Tool - Menu
    SAP Channel / Bandwidth settings
 1: SAP - Get Current Channel and Bandwidth.
 2: SAP - Switch Channel.
 3: SAP - Switch Bandwidth.
 4: SAP - Switch Channel and Bandwidth.
 0. Exit.
Please enter the operation number to be performed: _
```

Or, enter "0" will exit to go back top Menu

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2.1.3 Advance Setting (CBS / SBS /Long Range)

When enter "4" at top menu, then into "SAP – Advance setting CBS/SBS/Long Range)" menu.



2.1.4 Get RSSI

When enter "6" at top menu, then can get RSSI information shows in below as reference depend on R405LQ LR working environment and situation.

```
AID CHAN TXRATE RXRATE RSSI MINRSSI MAXRSSI IDLE
                                                                               TXSEQ RXSEQ CAPS XCAPS ACAPS
  STATE MAXRATE(DOT11) HTCAPS VHTCAPS ASSOCTIME IEs MODE RXNSS TXNSS 4:a8:42:ff:46:df 1 44 6M 17M -51 -52 -51 27 0
                                                                                                              PSMODE
44:a8:42:ff:46:df
b 286800
                                                                           27 0 65535 ES EIWE MODE
WME IEEE80211_MODE_11AXA_HE20 4 2
                                       APM
                                                       1gTRs 00:04:05
 RSSI is combined over chains in dBm
 Minimum Tx Power
 Maximum Tx Power
HT Capability
                                        Yes
 VHT Capability
                                      : Yes
                                     : No
: 42
 MU capable
 SNR
                                           5GHz
 Operating band
                                        115
 Current Operating class
 Supported Operating classes
127 128 130
                                      : 81 82 83 84 115 116 117 118 119 120 121 122 123 124 125 126
 Supported Rates
                                     : 12 18 24 36 48 72 96 108
: IEEE80211_MODE_11AXA_HE20
Max STA phymode
00:03:7f:06:00:22
                                           14M -15
                                                          -15
                                                                   -12
                                                                                    0 65535
                                                                                                    Es ETWt NULL
    b
                144400
                                       APM
                                                       1gTRs 00:04:04
                                                                             WME IEEE80211_MODE_11NA_HT20 4 2
                                                                                                                        0
```



2.1.5 Throughput Test

When enter "7" at top menu, then into "SAP – Throughput Test" menu

```
************ CRI Wi-Fi Config Tool - SAP throughput test **********

1: TCP: iperf 10 seconds

2: TCP: iperf 60 seconds

3: TCP: assign time

4: UDP: iperf 10 seconds

5: UDP: iperf 60 seconds

6: UDP: assign time

0. Exit.

Please enter the operation number to be performed: __
```

Choose the throughput test item number to perform the test as requirement, and result shows in below as reference

```
4]
       1.01-2.01
                  sec 14.5 MBytes 122 Mbits/sec 1860
                                                        (omitted)
  4]
                 sec 14.4 MBytes 121 Mbits/sec 1840
       2.01-3.00
                                                        (omitted)
  4]
       0.00-1.00
                 sec 14.2 MBytes 119 Mbits/sec 1820
       1.00-2.01
                  sec 14.5 MBytes 121 Mbits/sec 1850
       2.01-3.01
                  sec 13.4 MBytes
                                  112 Mbits/sec 1710
                 sec 14.4 MBytes
       3.01-4.00
                                    121 Mbits/sec
                                                 1840
                 sec 14.2 MBytes
                                  119 Mbits/sec
                                                 1820
       4.00-5.00
  4]
       5.00-6.00 sec 14.1 MBytes 118 Mbits/sec 1800
  4]
                  sec 13.8 MBytes 115 Mbits/sec 1760
       6.00-7.00
  4]
                  sec 13.2 MBytes 111 Mbits/sec 1690
       7.00-8.00
       8.00-9.01 sec 13.4 MBytes 112 Mbits/sec 1710
       9.01-10.00 sec 13.9 MBytes
  4]
                                    117 Mbits/sec 1780
[ ID] Interval
                       Transfer
                                                  Jitter
                                   Bandwidth
                                                           Lost/Total Datagrams
     0.00-10.00 sec 139 MBytes 117 Mbits/sec 0.664 ms 0/17780 (0%)
  4] Sent 17780 datagrams
iperf Done.
*~*~*~*~*~*~*~* CRI Wi—Fi Config Tool — SAP throughput test ~*~*~*~*~*~*
1: TCP: iperf 10 seconds
2: TCP: iperf 60 seconds
3: TCP: assign time
4: UDP: iperf 10 seconds
5: UDP: iperf 60 seconds
6: UDP: assign time
0. Exit.
```

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2.2 STA (Cline) mode Menu operation

This section introduces when R405LQ LR is configured as STA (Cline) mode then repower on. After connected with ADB PC, and enter "cricfg" command. The below items select Menu will shows on ADB PC.

2.2.1 STA (Cline) Setting

When enter "1" at top menu, then into "STA - Settings" menu.

You can enter "2" to get current connected SSID of AP

```
Current current connection, ssid: CRIssidJeff

STA Settings

1: STA Mode: Show WPA supplicant network Info.
2: STA Mode: Get Connected SSID And PSK.
3: STA Mode: Add new SSID And PSK.
4: STA Mode: Remove Saved SSID.
5: STA Mode: List the Actived WPA supplicant.

0. Exit or Return to the Upper Level Directory.

Please enter the operation number to be performed: 2_
```



Or, enter "5" to get the list of active WPA supplicant which shows as below picture as reference.

2.2.2 STA Connection status

When enter "4" at top menu, then get current W405LQ LR Cline connection information.

```
*************************************

STA Menu

1: STA - Scan the Available Hotspots
2: STA - Settings
3: STA - Service Switch (on/off)
4: STA - Connection status
5: STA - Throughput test

System Menu

91: System - Enable device as SAP mode.
92: System - Enable device as STA mode.
93: System - Enable iperf service.
95: Device Info
99: Factory Reset.

0. Exit or Return to the Upper Level Directory.

Please enter the operation number to be performed: 4_
```

Connected to 46:a8:42:ff:46:a8 (on ath1)
SSID: CRIssidJeff
freq: 5220



2.2.3 STA Throughput Test

When enter "5" at top menu, then into "STA – Throughput Test" menu

Choose the throughput test item number to perform the test as requirement, and result shows in below as reference

```
run: iperf3 10 seconds in UDP.
♦♦eU
Connecting to host 192.168.1.1, port 5201
  4] local 192.168.1.2 port 46308 connected to 192.168.1.1 port 5201
 ID] Interval
                         Transfer
                                      Bandwidth
                                                      Total Datagrams
                                                     1480
  4]
       0.00-1.00
                   sec 11.6 MBytes 96.9 Mbits/sec
                                                            (omitted)
  4]
                   sec 13.8 MBytes
                                      116 Mbits/sec 1770
       1.00-2.00
                                                            (omitted)
                                      158 Mbits/sec
  4]
       2.00-3.00
                   sec 18.9 MBytes
                                                     2420
                                                            (omitted)
                   sec 19.5 MBytes
  4]
       0.00-1.00
                                      163 Mbits/sec
                                                     2490
       1.00-2.00
                   sec
                        18.3 MBytes
                                      154 Mbits/sec
                                                      2340
                        21.8 MBytes
  4]
       2.00-3.00
                                      183 Mbits/sec
                                                      2790
                   sec
  4]
                        16.3 MBytes
       3.00-4.00
                                      137 Mbits/sec
                                                      2090
                   sec
       4.00-5.00
                        20.2 MBytes
                                      170 Mbits/sec
                                                      2590
                   sec
  4]
       5.00-6.00
                   sec 20.0 MBytes 168 Mbits/sec
                                                      2560
  4]
                   sec 20.2 MBytes 169 Mbits/sec 2580
       6.00-7.00
  4]
       7.00 - 8.00
                       20.2 MBytes
                                      170 Mbits/sec 2590
                   sec
                        17.5 MBytes
                                       146 Mbits/sec 2240
       8.00-9.01
                   sec
                        14.1 MBytes
       9.01-10.00
                                       119 Mbits/sec 1800
                  sec
 ID] Interval
                        Transfer
                                      Bandwidth
                                                      Jitter
                                                                Lost/Total Datagrams
  4]
       0.00-10.00 sec 188 MBytes
                                      158 Mbits/sec 0.718 ms
                                                               1081/24064 (4.5%)
  4] Sent 24064 datagrams
iperf Done.
```

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2.3 System Menu operation

The "System Menu" are common supported by both AP mode and STA (Cline) mode of R405LQ LR.

2.3.1 System - Enable device as SAP mode

When enter "91" at top menu, then R405LQ LR module will be configured as AP mode, and disable STA (Cline) mode.

Note: The system only changes the configuration file. To complete the change mode, you need to restart the device.

2.3.2 System – Enable device as STA mode

When enter "92" at top menu, then R405LQ LR module will be configured as STA (Cline) mode, and disable AP mode

Note: The system only changes the configuration file. To complete the change mode, you need to restart the device.

2.3.3 System - Enable iperf service

When enter "93" at top menu, then R405LQ LR module will enable iperf service. After enable iperf service, the R405LQ LR can perform to response specified iperf test package on network.

2.3.4 Device Info

2.3.5 Factory Reset

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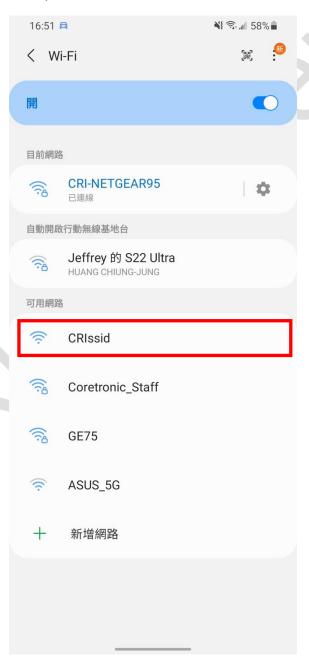
3. Evaluation Case Operation

3.1 WiFi AP access

Since R405LQ is default set as AP mode, you can check whether the default SSID "CRIssid" is on the connection menu through the WiFi function of your computer or mobile phone after power on the device. And, the R405LQ does not provide the DHCP function by default, please need to manually specify the IP address of cline device.

3.1.1 WiFi Connecting

Please refer <u>chapter 1.2</u> to setup R405LQ LR EVA Kit then power On. And, please use a mobile phone as cline device, then choose SSID by "CRIssid" from WiFi connection menu. Then, enter password (default by "12345678") to connect with R405LQ (AP mode).



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3.1.2 Cline device IP address setting

After cline device has connected with R405LQ, please refer below picture to setting IP address related fields at cline device side, then save the setting.

a. IP setting : static (disable DHCP)

b. IP address: 192.168.1.x (set each device to have a different x number)

c. Gateway: 192.168.1.1

d. DNS: 8.8.8.8





3.1.3 WiFi Connection verify

After completing the above settings, the cline device (mobile phone) can connect to the R405LQ EVA Kit (AP mode). Then, you can use some 3rd party's Application Program which like "Wifi Analyser" to check the connection status and information.





3.2 Throughput test by paired 2 sets EVA Kit

This chapter will introduce how to use 2 sets EVA Kit, one is setup as AP mode, and another one is setup as STA mode, then through R405LQ module build in tools to perform "iperf" throughput test as evaluation case.

3.2.1 Setup at AP side

- A. Please refer <u>chapter 2.3.1</u> System Menu 91 operation to setup 1st EVA Kit as AP mode. Please re-power off/on once mode has been changed.
- B. Please refer chapter 2.3.3 System Menu 93 operation to Enable iperf service.

3.2.2 Setup at STA (Cline) side

- A. Please refer <u>chapter 2.3.2</u> System Menu 92 operation to setup 2nd EVA Kit as STA (Cline) mode. Please re-power off/on once mode has been changed.
- B. Please refer chapter 2.3.3 System Menu 93 operation to Enable iperf service
- C. Please refer <u>chapter 2.2.2</u> STA Menu 4, to check WiFi connection status, and confirmed WiFi has been connected.

3.2.3 Perform iperf test

- A. Please refer <u>chapter 2.2.3</u> STA Menu 5, to enter STA Throughput Test Menu. Then, choose the test item which you would like to do?
- B. For example, after enter 4, then the test result of "UDP: iperf 10 second" will be shown like below picture.

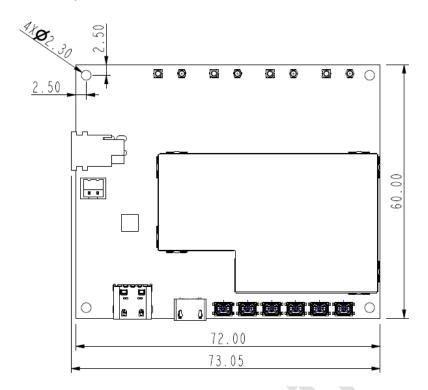
```
run: iperf3 10 seconds in UDP.
♦♦eU
Connecting to host 192.168.1.1, port 5201
  4] local 192.168.1.2 port 46308 connected to 192.168.1.1 port 5201
  ID] Interval
                          Transfer
                                                        Total Datagrams
                                       Bandwidth
                                                              (omitted)
  4]
        0.00-1.00
                         11.6 MBytes
                                       96.9 Mbits/sec
                                                        1480
                    sec
  4]
        1.00-2.00
                         13.8 MBytes
                                        116 Mbits/sec
                                                       1770
                                                              (omitted)
                    sec
                         18.9 MBytes
                                                       2420
  4]
        2.00-3.00
                                        158 Mbits/sec
                                                              (omitted)
                    sec
                         19.5 MBytes
       0.00-1.00
                                        163 Mbits/sec
                                                        2490
                    sec
                         18.3 MBytes
                                        154 Mbits/sec
        1.00-2.00
                                                        2340
                    sec
        2.00-3.00
                    sec 21.8 MBytes
                                        183 Mbits/sec
                                                        2790
        3.00-4.00
                         16.3 MBytes
                                        137 Mbits/sec
                                                        2090
                    sec
       4.00-5.00
                         20.2 MBytes
                                        170 Mbits/sec
                                                        2590
                    sec
  4]
                         20.0 MBytes
        5.00-6.00
                                        168 Mbits/sec
                                                        2560
                    sec
  4]
        6.00-7.00
                         20.2 MBytes
                                        169 Mbits/sec
                                                        2580
                    sec
  4]
        7.00-8.00
                         20.2 MBytes
                                        170 Mbits/sec
                                                        2590
                    sec
        8.00-9.01
                         17.5 MBytes
                                        146 Mbits/sec
  4]
                                                        2240
                    sec
                                        119 Mbits/sec
  4]
        9.01-10.00
                                                       1800
                    sec
                         14.1 MBytes
 ID]
     Interval
                                                       Jitter
                         Transfer
                                       Bandwidth
                                                                  Lost/Total Datagrams
  4]
                          188 MBytes
        0.00-10.00 sec
                                        158 Mbits/sec 0.718 ms 1081/24064 (4.5%)
  4] Sent 24064 datagrams
iperf Done.
```

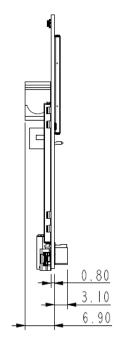
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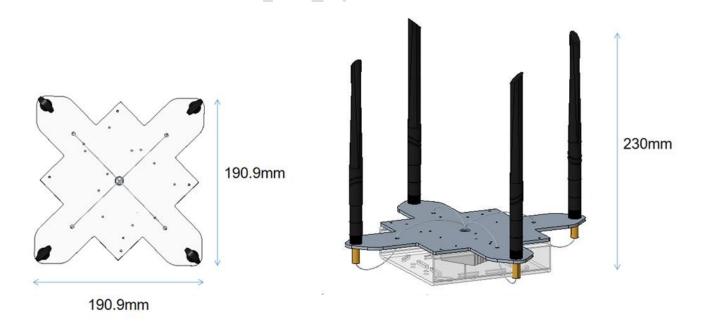
4. Mechanical Specification

4.1 R405LQ LR module Mechanical dimensions





4.2 Antenna Kit outline



4.3 Weight

Around 335 \pm 10 g (included R405LQ LR module + Antenna Kit + Heat sink, excluded AC/DC Adaptor and external cable)

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5. Product Marking, Ordering and Shipping Info.

5.1 Product Marking (Label)

