

# RF EXPOSURE EVALUATION REPORT

**Product Name:** WIFI MODULE  
**Trade Mark:** GSD  
**Model No.:** NTUD-U5  
**HVIN:** NTUD-U5  
**Report Number:** 180627001RFC-5  
**Test Standards:** FCC 47 CFR Part 1 Subpart I  
 RSS-102 Issue 5  
**FCC ID:** 2ANM3NTUDU5  
**IC:** 23165-NTUDU5  
**Test Result:** PASS  
**Date of Issue:** July 19, 2018

Prepared for:

**Shenzhen Chuangwei-RGB Electronics Co., Ltd.**  
**13F-16F, Unit A, Skyworth Building, Shennan Road, Nanshan District, Shenzhen, China**

Prepared by:

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**  
**16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China**  
**TEL: +86-755-2823 0888**  
**FAX: +86-755-2823 0886**

Tested by: Henry Lu  
 Henry Lu  
 Project Engineer

Reviewed by: Kevin Liang  
 Kevin Liang  
 Assistant Manager

Approved by: Billy Li  
 Billy Li  
 Technical Director

Date: July 19, 2018



**Version**

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# 1. GENERAL INFORMATION

## 1.1 CLIENT INFORMATION

<b>Applicant:</b>	Shenzhen Chuangwei-RGB Electronics Co., Ltd.
<b>Address of Applicant:</b>	13F-16F, Unit A, Skyworth Building, Shennan Road, Nanshan District, Shenzhen, China
<b>Manufacturer:</b>	Shenzhen Chuangwei-RGB Electronics Co., Ltd.
<b>Address of Manufacturer:</b>	13F-16F, Unit A, Skyworth Building, Shennan Road, Nanshan District, Shenzhen, China

## 1.2 EUT INFORMATION

<b>Product Name:</b>	WIFI MODULE		
<b>Model No.:</b>	NTUD-U5		
<b>Add. Model No.:</b>	N/A		
<b>Trade Mark:</b>	GSD		
<b>DUT Stage:</b>	Identical Prototype		
<b>EUT Supports Function:</b>	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth V5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac

## 1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For 2.4 GHz ISM Band of BT_LE 5.0	
<b>Frequency Band:</b>	2400 MHz to 2483.5 MHz
<b>Frequency Range:</b>	2402 MHz to 2480 MHz
<b>Bluetooth Version:</b>	Bluetooth LE/ 2LE/ LE Code
<b>Type of Modulation:</b>	GFSK
<b>Number of Channels:</b>	40
<b>Channel Separation:</b>	2 MHz
<b>Antenna Type:</b>	PCB Antenna
<b>Antenna Gain:</b>	3.1 dBi
<b>Maximum EIRP:</b>	12.79 dBm

For 2.4 GHz ISM Band of BT_EDR	
<b>Frequency Band:</b>	2400 MHz to 2483.5 MHz
<b>Frequency Range:</b>	2402 MHz to 2480 MHz
<b>Bluetooth Version:</b>	Bluetooth BR+EDR
<b>Modulation Technique:</b>	Frequency Hopping Spread Spectrum(FHSS)
<b>Type of Modulation:</b>	GFSK, π/4DQPSK, 8DPSK
<b>Number of Channels:</b>	79
<b>Channel Separation:</b>	1 MHz
<b>Antenna Type:</b>	PCB Antenna
<b>Antenna Gain:</b>	3.1 dBi
<b>Maximum EIRP:</b>	16.33 dBm

For 2.4 GHz ISM Band of Wi-Fi	
<b>Frequency Range:</b>	2400 MHz to 2483.5 MHz
<b>Support Standards:</b>	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40
<b>Type of Modulation:</b>	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK)
<b>Data Rate:</b>	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15 IEEE 802.11n-HT40: Up to MCS15
<b>Number of Channels:</b>	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20: 11 IEEE 802.11n-HT40: 7
<b>Channel Separation:</b>	5 MHz
<b>Antenna Type:</b>	Chain 0 PIFA Antenna
	Chain 1 PIFA Antenna
<b>Antenna Gain:</b>	Chain 0 3.1 dBi
	Chain 1 3.1 dBi
<b>Directional gain:</b>	6.11 dBi
<b>Maximum Peak Power:</b>	SISO_ Chain 0 IEEE 802.11b: 19.48 dBm IEEE 802.11g: 20.66 dBm IEEE 802.11n-HT20: 20.12 dBm IEEE 802.11n-HT40: 15.39 dBm
	SISO_ Chain 1 IEEE 802.11b: 16.75 dBm IEEE 802.11g: 18.69 dBm IEEE 802.11n-HT20: 18.11 dBm IEEE 802.11n-HT40: 13.62 dBm
	MIMO_ Chain 0+1 IEEE 802.11n-HT20: 22.19 dBm IEEE 802.11n-HT40: 17.60 dBm
<b>Maximum EIRP:</b>	SISO_ Chain 0 IEEE 802.11b: 22.58 dBm IEEE 802.11g: 23.76 dBm IEEE 802.11n-HT20: 23.22 dBm IEEE 802.11n-HT40: 18.49 dBm
	SISO_ Chain 1 IEEE 802.11b: 19.85 dBm IEEE 802.11g: 21.79 dBm IEEE 802.11n-HT20: 21.21 dBm IEEE 802.11n-HT40: 16.72 dBm
	MIMO_ Chain 0+1 IEEE 802.11n-HT20: 25.29 dBm IEEE 802.11n-HT40: 20.70 dBm

For 5 GHz U-NII Bands of Wi-Fi	
<b>Frequency Range:</b>	5150 MHz to 5250 MHz
<b>Support Standards:</b>	IEEE 802.11a/n/ac
<b>TPC Function:</b>	Not Support
<b>Type of Modulation:</b>	IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK)
<b>Channel Spacing:</b>	IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz
	IEEE 802.11n-HT40/ac-VHT40: 40 MHz
	IEEE 802.11ac-VHT80/: 80 MHz
<b>Data Rate:</b>	IEEE 802.11a: Up to 54 Mbps

**Shenzhen UnionTrust Quality and Technology Co., Ltd.**

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

	IEEE 802.11n-HT20: Up to MCS15			
	IEEE 802.11n-HT40: Up to MCS15			
	IEEE 802.11ac-VHT20: Up to MCS8			
	IEEE 802.11ac-VHT40: Up to MCS9			
	IEEE 802.11ac-VHT80: Up to MCS9			
<b>Number of Channels:</b>	5150 MHz to 5250 MHz: 4 for IEEE 802.11a/n-HT20/ac-VHT20 2 for IEEE 802.11n-HT40)/ac-VHT40 1 for IEEE 802.11acVHT80			
<b>Antenna Type:</b>	Chain 0	PIFA Antenna		
	Chain 1	PIFA Antenna		
<b>Antenna Gain:</b>	Chain 0	5150 MHz to 5250 MHz: 2.3 dBi		
	Chain 1	5150 MHz to 5250 MHz: 2.3 dBi		
<b>Directional gain:</b>	5150 MHz to 5850 MHz:5.31 dBi			
<b>Maximum conducted output power (dBm):</b>	<b>SISO_Chain 0</b>			
	IEEE 802.11a:	16.49		
	IEEE 802.11n-HT20:	15.01		
	IEEE 802.11n-HT40:	9.41		
	IEEE 802.11ac-VHT20:	15.32		
	IEEE 802.11ac-VHT40:	9.93		
	IEEE 802.11ac-VHT80:	7.03		
	<b>SISO_Chain 1</b>			
	IEEE 802.11a:	14.75		
	IEEE 802.11n-HT20:	12.89		
	IEEE 802.11n-HT40:	6.04		
	IEEE 802.11ac-VHT20:	12.73		
	IEEE 802.11ac-VHT40:	6.05		
	IEEE 802.11ac-VHT80:	3.64		
	<b>MIMO_Chain 0+1</b>			
	IEEE 802.11n-HT20:	16.90		
	IEEE 802.11n-HT40:	10.98		
	IEEE 802.11ac-VHT20:	17.07		
IEEE 802.11ac-VHT40:	11.33			
IEEE 802.11ac-VHT80:	8.67			
<b>Maximum EIRP (dBm):</b>	<b>U-NII-1</b>			
		<b>SISO_Chain 0</b>	<b>SISO_Chain 1</b>	<b>MIMO_Chain 0+1</b>
	IEEE 802.11a:	18.79	17.05	N/A
	IEEE 802.11n-HT20:	17.62	15.03	19.37
	IEEE 802.11n-HT40:	12.23	8.35	13.63
	IEEE 802.11ac-HT20:	17.31	15.19	19.20
	IEEE 802.11ac-HT40:	11.71	8.34	13.28
	IEEE 802.11ac-VHT80:	9.33	5.94	10.97

### 1.4 OTHER INFORMATION

Test channels for BT_LE 5.0				
Type of Modulation	Tx/Rx Frequency	Test RF Channel Lists		
GFSK	2402 MHz to 2480 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 0	Channel 19	Channel 39
		2402 MHz	2440 MHz	2480 MHz

Test channels for BT_EDR				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
GFSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 0	Channel 39	Channel 78
$\pi$ /4DQPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	2402 MHz	2441 MHz	2480 MHz
		Channel 0	Channel 39	Channel 78
8DPSK (DH1, DH3, DH5)	2402 MHz to 2480 MHz	2402 MHz	2441 MHz	2480 MHz
		Channel 0	Channel 39	Channel 78

Test channels for 2.4 GHz ISM Band of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
IEEE 802.11b	2412 MHz to 2462 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 1	Channel 6	Channel 11
IEEE 802.11g	2412 MHz to 2462 MHz	2412 MHz	2437 MHz	2462 MHz
		Channel 1	Channel 6	Channel 11
IEEE 802.11n-HT20	2412 MHz to 2462 MHz	2412 MHz	2437 MHz	2462 MHz
		Channel 1	Channel 6	Channel 11
IEEE 802.11n-HT40	2422 MHz to 2452 MHz	2422 MHz	2437 MHz	2452 MHz
		Channel 3	Channel 6	Channel 9

Test channels for 5 GHz U-NII Bands of Wi-Fi				
Mode	Tx/Rx Frequency	Test RF Channel Lists		
IEEE 802.11a IEEE 802.11n-HT20 IEEE 802.11ac-VHT20	5150 MHz to 5250 MHz	Lowest(L)	Middle(M)	Highest(H)
		Channel 36	Channel 44	Channel 48
IEEE 802.11n-HT40 IEEE 802.11ac-VHT40	5150 MHz to 5250 MHz	5180 MHz	5220 MHz	5240 MHz
		Channel 38	--	Channel 46
IEEE 802.11ac-VHT80	5150 MHz to 5250 MHz	5190 MHz	--	5230 MHz
		--	Channel 42	--
		--	5210 MHz	--

### 1.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

**FCC 47 CFR Part 1 Subpart I**  
**RSS-102 Issue 5**

All test items have been performed and recorded as per the above standards

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**1.6 DEVIATION FROM STANDARDS**

None.

**1.7 ABNORMALITIES FROM STANDARD CONDITIONS**

None.

**1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER**

None.

**2. EQUIPMENT LIST**

Please refer to the RF test report.



### 3. MPE EVALUATION

#### 3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	RSS-102 Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
3	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

#### 3.2 MPE COMPLIANCE REQUIREMENT

##### 3.2.1 Limits

##### 3.2.1.1 FCC 47 CFR Part 1 Subpart I

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

##### Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

##### Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

**Note:** f = frequency in MHz: \* = Plane-wave equivalent power density.

### 3.2.1.2 RSS-102 Issue 5

According to RSS-102 Issue 5, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

#### RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric Field (E) (V/m rms)	Magnetic Field (H) (A/m rms)	Power Density (S) (W/m <sup>2</sup> )	Reference Period H   <sup>2</sup> or S (minutes)
0.003-10 <sup>21</sup>	83	90	-	Instantaneous*
0.1-10	-	0.73/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> <sup>0.5</sup>	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> <sup>0.25</sup>	0.1540/ <i>f</i> <sup>0.25</sup>	8.944/ <i>f</i> <sup>0.5</sup>	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> <sup>0.3417</sup>	0.008335 <i>f</i> <sup>0.3417</sup>	<b>0.02619</b> <i>f</i> <sup>0.6834</sup>	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> <sup>1.2</sup>
150000-300000	0.158 <i>f</i> <sup>0.5</sup>	4.21 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	6.67 x 10 <sup>-5</sup> <i>f</i>	616000/ <i>f</i> <sup>1.2</sup>

Note: *f* is frequency in MHz.  
 \*Based on nerve stimulation (NS).  
 \*\* Based on specific absorption rate (SAR).

#### RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency range (MHz)	Electric Field (E) (V/m rms)	Magnetic Field (H) (A/m rms)	Power Density (S) (W/m <sup>2</sup> )	Reference Period H   <sup>2</sup> or S (minutes)
0.003-10 <sup>23</sup>	170	180	-	Instantaneous*
1-10	-	1.6/ <i>f</i>	-	6**
1.29-10	193/ <i>f</i> <sup>0.5</sup>	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ <i>f</i> <sup>0.25</sup>	0.3444/ <i>f</i> <sup>0.25</sup>	44.72/ <i>f</i> <sup>0.5</sup>	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 <i>f</i> <sup>0.25</sup>	0.04138 <i>f</i> <sup>0.25</sup>	0.6455 <i>f</i> <sup>0.5</sup>	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ <i>f</i> <sup>1.2</sup>
150000-300000	0.354 <i>f</i> <sup>0.5</sup>	9.40 x 10 <sup>-4</sup> <i>f</i> <sup>0.5</sup>	3.33 x 10 <sup>-4</sup> <i>f</i>	616000/ <i>f</i> <sup>1.2</sup>

Note: *f* is frequency in MHz.  
 \*Based on nerve stimulation (NS).  
 \*\* Based on specific absorption rate (SAR).

### 3.2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

### 3.3 MPE CALCULATION METHOD

#### 3.3.1 FCC 47 CFR Part 1 Subpart I

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., mw/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

#### 3.3.2 RSS-102 Issue 5

$$S = PG/4\pi R^2 = EIRP/4\pi R^2$$

S = power density (in appropriate units, e.g., w/m<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., w)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., m)

### 3.4 MPE CALCULATION RESULTS

**Note:** For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

#### 3.4.1 For WLAN

For Wi-Fi function, operating at 2412MHz to 2462 MHz for IEEE802.11b/g/n and operating at 5150 MHz to 5250 MHz for IEEE802.11a/n/ac

##### 3.4.1.1 Antenna Type:

Chain 0: PIFA Antenna

Chain 1: PIFA Antenna

##### 3.4.1.2 Antenna Gain:

Chain 0:	Chain 1:
2412MHz to 2462 MHz: 3.1 dBi	2412MHz to 2462 MHz: 3.1 dBi
5150 MHz to 5250 MHz: 2.3 dBi	5150 MHz to 5250 MHz: 2.3 dBi

For MIMO mode (2Tx/2Rx), there are two transmission antennas. Both Chain 0 and Chain 1 used at the same time and antenna ports have uniform output powers. The Chain 0 and Chain 1 antenna ports can be used alone. The transmit signals are correlated with each other.

For 2.4 GHz WIFI & 5 GHz WIFI

$$Directional\ gain = 10\ log\ [(10^{G1}/20 + 10^{G2}/20 + \dots + 10^{GN}/20)^2 / NANT]\ dBi$$

[Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

For SISO mode (1Tx/1Rx), there are two transmission antennas. Both Chain 0 and Chain 1 used at the same time and antenna ports have uniform output powers. The Chain 0 and Chain 1 antenna ports cannot be used alone

For 2.4 GHz WIFI & 5 GHz WIFI

The antenna gain = Chain 0 or Chain 1

**3.4.1.3 Results for FCC 47 CFR Part 1 Subpart I**

**For SISO (1TX/1RX) Mode**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(mW/cm <sup>2</sup> )		
SISO	IEEE 802.11b	2412-2462	18	3	3.1	24.1	257.0396	1	0.0511
	IEEE 802.11g	2412-2462	18	3	3.1	24.1	257.0396	1	0.0511
	IEEE 802.11a	5180-5240	15	3	2.3	20.3	107.1519	1	0.0213

**For MIMO (2TX/2RX) Mode**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive Tolerance according manufacturer	Directional Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)	(dBm)		(dBi)	(dBm)	(mW)	(mW/cm <sup>2</sup> )		
MIMO (2TX/2RX)	IEEE 802.11n-HT20	2412-2462	20	3	6.11	29.11	814.7043	1	0.1621
	IEEE 802.11n-HT40	2422-2452	15	3	6.11	24.11	257.6321	1	0.0513
	IEEE 802.11n-HT20	5180-5240	15	2	5.31	22.31	170.2159	1	0.0339
	IEEE 802.11n-HT40	5190-5230	10	2	5.31	17.31	53.8270	1	0.0107
	IEEE 802.11ac-VHT20	5180-5240	17	2	5.31	24.31	269.7739	1	0.0537
	IEEE 802.11ac-VHT40	5190-5230	10	2	5.31	17.31	53.8270	1	0.0107
	IEEE 802.11ac-VHT80	5210	9	2	5.31	16.31	42.7563	1	0.0085

**3.4.1.4 Results for RSS-102 Issue 5**

**For SISO (1TX/1RX) Mode**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)								(dBm)
SISO	IEEE 802.11b	2412-2462	20	3	3.1	26.1	407.3803	5.35	0.0810
	IEEE 802.11g	2412-2462	21	3	3.1	27.1	512.8614	5.35	0.1020
	IEEE 802.11a	5180-5240	18	2	2.3	22.3	169.8244	9.01	0.0338

**For MIMO (2TX/2RX) Mode**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive Tolerance according manufacturer	Directional Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value	
	(MHz)								(dBm)
MIMO (2TX/2RX)	IEEE 802.11n-HT20	2412-2462	23	3	6.11	32.11	1625.5488	5.35	0.3234
	IEEE 802.11n-HT40	2422-2452	20	3	6.11	29.11	814.7043	5.35	0.1621
	IEEE 802.11n-HT20	5180-5240	18	2	5.31	25.31	339.6253	9.01	0.0676
	IEEE 802.11n-HT40	5190-5230	13	2	5.31	20.31	107.3989	9.01	0.0214
	IEEE 802.11ac-VHT20	5180-5240	18	2	5.31	25.31	339.6253	9.01	0.0676
	IEEE 802.11ac-VHT40	5190-5230	13	2	5.31	20.31	107.3989	9.01	0.0214
	IEEE 802.11ac-VHT80	5210	10	2	5.31	17.31	53.8270	9.01	0.0107

**3.4.2 For BT**

For BT\_5.0 function, operating at 2402MHz to 2480 MHz for GFSK and

For BT\_EDR function, operating at 2402MHz to 2480 MHz for GFSK,  $\pi/4$  DQPSK, 8DPSK

**3.4.2.1 Antenna Type:**

Chain 0: PCB Antenna

**3.4.2.2 Antenna Gain:**

Chain 0: 2402MHz to 2480 MHz: 3.1 dBi

**3.4.2.3 Results for FCC 47 CFR Part 1 Subpart I**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)							
V5.0	2402-2480	12	2	3.1	17.1	51.2861	1	0.0102
EDR	2402-2480	15	2	3.1	20.1	102.3293	1	0.0204

**3.4.2.4 Results for RSS-102 Issue 5**

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)							
LE 5.0	2402-2480	12	2	3.1	17.1	51.2861	5.35	0.0102
EDR	2402-2480	15	2	3.1	20.1	102.3293	5.35	0.0204

### 3.4.3 Simultaneous Multi-band Transmission MPE Analysis

#### 3.4.4.1 List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Support/Not Support
1	2.4G_SISO_WLAN + BT	Support
2	2.4G_MIMO_WLAN + BT	Support
3	5G_SISO_WLAN + BT	Support
4	5G_MIMO_WLAN + BT	Support

#### 3.4.4.2 Results for transmit simultaneously

##### FCC 47 CFR Part 1 Subpart I

No.	Configurations	Maximum MPE Value (mW/cm <sup>2</sup> )			Limits (mW/cm <sup>2</sup> )
		WLAN	BT	Transmit simultaneously	
1	2.4G_SISO_WLAN + BT	0.0511	0.0064	0.0708	1
2	2.4G_MIMO_WLAN + BT	0.1621	0.0064	0.9962	1
3	5G (Band 1)_SISO_WLAN + BT	0.0213	0.0064	0.0402	1
4	5G (Band 1)_MIMO_WLAN + BT	0.0537	0.0064	0.9997	1

**Note:**

According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

$$\text{Transmit simultaneously MPE} = \Sigma \text{ of MPE ratios}$$

$$\text{MPE ratios} = \text{Field strengths or power density} / \text{MPE limit at the test frequency}$$

##### RSS-102 Issue 5

No.	Configurations	Maximum MPE Value (W/m <sup>2</sup> )			Limits (W/m <sup>2</sup> )
		WLAN	BT	Transmit simultaneously	
1	2.4G_SISO_WLAN + BT	0.1020	0.0204	0.1224	1
2	2.4G_MIMO_WLAN + BT	0.3234	0.0204	0.3438	1
3	5G (Band 1)_SISO_WLAN + BT	0.0338	0.0204	0.0542	1
4	5G (Band 1)_MIMO_WLAN + BT	0.0676	0.0204	0.0880	1

**Note:**

According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

$$\text{Transmit simultaneously MPE} = \Sigma \text{ of MPE ratios}$$

$$\text{MPE ratios} = \text{Field strengths or power density} / \text{MPE limit at the test frequency}$$

## APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

N/A

## APPENDIX 2 PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photographs.

\*\*\* End of Report \*\*\*

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