

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : OT-189-RWD-006

AGR No. : A187A-312

Applicant : Humax Co., Ltd.

Address : HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17040, South Korea

Manufacturer : Humax Co., Ltd.

Address : HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17040, South Korea

Type of Equipment : Beam Projector

FCC ID. : O6ZW1

Model Name : W1

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 20 pages (including this page)

Date of Incoming : August 02, 2018

Date of issue : September 05, 2018

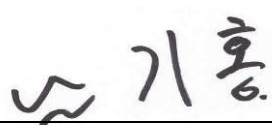
SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART C Section 15.247 and SUBPART E Section 15.407*

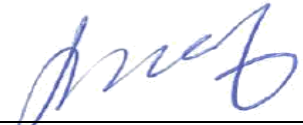
This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:


Ki-Hong, Nam / Chief Engineer
ONETECH Corp.

Approved by:


Keun-Young, Choi / Vice President
ONETECH Corp.

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-189-RWD-006	2018.09.05	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : Humax Co., Ltd.
 Address : HUMAX BLDG., 2, Yeongmun-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17040, South Korea
 Contact Person : Nak Yool Sung / Engineer
 Telephone No. : +82-31-776-6448
 FCC ID : O6ZW1
 Model Name : W1
 Brand Name : -
 Serial Number : N/A
 Date : September 05, 2018

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	Beam Projector
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247, FCC PART 15 SUBPART E Section 15.407
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The Humax Co., Ltd., Model W1 (referred to as the EUT in this report) is a Beam Projector. The product specification described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Beam Projector		
Operating Frequency	Bluetooth LE	2 402 MHz ~ 2 480 MHz	
	Bluetooth	2 402 MHz ~ 2 480 MHz	
	WLAN	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))	
	2.4 GHz Band	2 422 MHz ~ 2 452 MHz (802.11n(HT40))	
	WLAN 5 GHz Band	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
			5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
			5 210 MHz (802.11ac(VHT80))
		5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))
5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))			
5 775 MHz (802.11ac(VHT80))			
RF Output Power	Bluetooth LE	1.91 dBm	
	Bluetooth	1 Mbps (-5.49 dBm)	
		2 Mbps (-7.21 dBm)	
		3 Mbps (-6.73 dBm)	
	WLAN 2.4 GHz Band	Antenna 0	Wi-Fi 802.11b (17.70 dBm)
			Wi-Fi 802.11g (21.34 dBm)
		Antenna 1	Wi-Fi 802.11n(HT20) (21.53 dBm)
Wi-Fi 802.11n(HT40) (22.44 dBm)			
Wi-Fi 802.11b (17.62 dBm)			
Antenna 0 + Antenna 1	Wi-Fi 802.11g (20.99 dBm)		
	Wi-Fi 802.11n(HT20) (21.47 dBm)		
		Wi-Fi 802.11n(HT40) (22.44 dBm)	
		Wi-Fi 802.11n(HT20) (21.20 dBm)	
		Wi-Fi 802.11n(HT40) (22.09 dBm)	

RF Output Power	WLAN 5 GHz Band	5 150 MHz ~ 5 250 MHz Band	Antenna 0	Wi-Fi 802.11a (14.72 dBm) Wi-Fi 802.11n(HT20) (14.66 dBm) Wi-Fi 802.11n(HT40) (16.49 dBm) Wi-Fi 802.11ac(HT80) (14.99 dBm)
			Antenna 1	Wi-Fi 802.11a (14.74 dBm) Wi-Fi 802.11n(HT20) (14.74 dBm) Wi-Fi 802.11n(HT40) (16.38 dBm) Wi-Fi 802.11ac(HT80) (14.78 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (14.69 dBm) Wi-Fi 802.11n(HT40) (16.23 dBm) Wi-Fi 802.11ac(HT80) (14.95 dBm)
		5 725 MHz ~ 5 850 MHz Band	Antenna 0	Wi-Fi 802.11a (15.18 dBm) Wi-Fi 802.11n(HT20) (14.88 dBm) Wi-Fi 802.11n(HT40) (16.55 dBm) Wi-Fi 802.11ac(HT80) (15.21 dBm)
			Antenna 1	Wi-Fi 802.11a (15.11 dBm) Wi-Fi 802.11n(HT20) (14.94 dBm) Wi-Fi 802.11n(HT40) (16.48 dBm) Wi-Fi 802.11ac(HT80) (15.03 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (14.94 dBm) Wi-Fi 802.11n(HT40) (16.46 dBm) Wi-Fi 802.11ac(HT80) (15.10 dBm)

Modulation Type	Bluetooth LE	DSSS Modulation(GFSK)	
	Bluetooth	GFSK (1 Mbps), $\pi/4$ -QPSK (2 Mbps), 8-DPSK (3 Mbp)	
	WLAN 2.4 GHz Band	DSSS Modulation(DBPSK/DQPSK/CCK) OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
	WLAN 5 GHz Band	OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
Antenna Type	Bluetooth LE	Antenna 1	5.60 dBi
	Bluetooth		
	WLAN 2.4 GHz Band	Antenna 0	5.50 dBi
		Antenna 1	5.60 dBi
		Antenna 0 + Antenna 1	8.56 dBi
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	6.90 dBi
		Antenna 1	5.90 dBi
		Antenna 0 + Antenna 1	9.44 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	6.90 dBi
		Antenna 1	5.90 dBi
		Antenna 0 + Antenna 1	9.44 dBi
	Antenna Type	FPCB Antenna	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	24 MHz, 37.4 MHz		

2.2 Alternative type(s)/model(s); also covered by this test report.

-. None

3. EUT MODIFICATIONS

-. None

4. MAXIMUM PERMISSIBLE EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are $f/1500$ mW/cm² for the frequency range between 300 MHz and 1 500 MHz and 1.0 mW/cm² for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$$E = \sqrt{(30 * P * G)} / d, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric field strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 0.01 * d (m)

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

4.2 EUT Description

Kind of EUT	Beam Projector		
Operating Frequency Band	<ul style="list-style-type: none"> ■ Bluetooth LE: 2 402 MHz ~ 2 480 MHz ■ Bluetooth: 2 402 MHz ~ 2 480 MHz ■ WLAN: 2 412 MHz ~ 2 462 MHz ■ WLAN: 2 422 MHz ~ 2 452 MHz ■ WLAN: 5 180 MHz ~ 5 240 MHz ■ WLAN: 5 190 MHz ~ 5 230 MHz ■ WLAN: 5 210 MHz ■ WLAN: 5 745 MHz ~ 5 825 MHz ■ WLAN: 5 755 MHz ~ 5 795 MHz ■ WLAN: 5 775 MHz 		
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others		
RF Output Power	Bluetooth LE	1.91 dBm	
	Bluetooth	1 Mbps (-5.49 dBm)	
		2 Mbps (-7.21 dBm)	
		3 Mbps (-6.73 dBm)	
WLAN 2.4 GHz Band	Antenna 0	Wi-Fi 802.11b (17.70 dBm) Wi-Fi 802.11g (21.34 dBm) Wi-Fi 802.11n(HT20) (21.53 dBm) Wi-Fi 802.11n(HT40) (22.44 dBm)	
	Antenna 1	Wi-Fi 802.11b (17.62 dBm) Wi-Fi 802.11g (20.99 dBm) Wi-Fi 802.11n(HT20) (21.47 dBm) Wi-Fi 802.11n(HT40) (22.44 dBm)	
	Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (21.20 dBm) Wi-Fi 802.11n(HT40) (22.09 dBm)	

RF Output Power	WLAN 5 GHz Band	5 150 MHz ~ 5 250 MHz Band	Antenna 0	Wi-Fi 802.11a (14.72 dBm) Wi-Fi 802.11n(HT20) (14.66 dBm) Wi-Fi 802.11n(HT40) (16.49 dBm) Wi-Fi 802.11ac(HT80) (14.99 dBm)
			Antenna 1	Wi-Fi 802.11a (14.74 dBm) Wi-Fi 802.11n(HT20) (14.74 dBm) Wi-Fi 802.11n(HT40) (16.38 dBm) Wi-Fi 802.11ac(HT80) (14.78 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (14.69 dBm) Wi-Fi 802.11n(HT40) (16.23 dBm) Wi-Fi 802.11ac(HT80) (14.95 dBm)
		5 725 MHz ~ 5 850 MHz Band	Antenna 0	Wi-Fi 802.11a (15.18 dBm) Wi-Fi 802.11n(HT20) (14.88 dBm) Wi-Fi 802.11n(HT40) (16.55 dBm) Wi-Fi 802.11ac(HT80) (15.21 dBm)
			Antenna 1	Wi-Fi 802.11a (15.11 dBm) Wi-Fi 802.11n(HT20) (14.94 dBm) Wi-Fi 802.11n(HT40) (16.48 dBm) Wi-Fi 802.11ac(HT80) (15.03 dBm)
			Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (14.94 dBm) Wi-Fi 802.11n(HT40) (16.46 dBm) Wi-Fi 802.11ac(HT80) (15.10 dBm)
Antenna Type	Bluetooth LE	Antenna 1	5.60 dBi	
	Bluetooth			
	WLAN 2.4 GHz Band	Antenna 0	5.50 dBi	
		Antenna 1	5.60 dBi	
		Antenna 0 + Antenna 1	8.56 dBi	
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	6.90 dBi	
		Antenna 1	5.90 dBi	
		Antenna 0 + Antenna 1	9.44 dBi	
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	6.90 dBi	
		Antenna 1	5.90 dBi	
Antenna 0 + Antenna 1		9.44 dBi		
Antenna Gain	5.60 dBi			
Exposure Evaluation Applied	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR <input type="checkbox"/> N/A			

4.3 Test Result for Bluetooth LE

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	LE	1.5 ± 0.5	2.00	1.58	5.60	3.63	0.68	0.001 1	1.00

According to above table, for 2 402 MHz ~ 2 480 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(1.58 * 3.63)} / 1.00 = 0.68 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 1.58 * 3.63 / (4 * 3.14 * 20^2) = 0.001 1$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.4 Test Result for Bluetooth

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
2 402 ~ 2 480	1 Mbps	-6.5 ± 1.0	-5.50	0.28	5.60	3.63	0.29	0.000 2	1.00
	2 Mbps	-7.5 ± 1.0	-6.50	0.22			0.25	0.000 2	
	3 Mbps	-7.0 ± 1.0	-6.00	0.25			0.27	0.000 2	

According to above table, for 2 402 MHz ~ 2 480 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(0.28 * 3.63)} / 1.00 = 0.29 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 0.28 * 3.63 / (4 * 3.14 * 20^2) = 0.000 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.5 Test Result for WLAN 2.4 GHz Band

4.5.1 Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	17.5 ± 0.5	18.00	63.10	5.50	3.55	4.22	0.044 6	1.00
	802.11g	21.0 ± 0.5	21.50	141.25			6.31	0.099 8	1.00
	802.11n_HT20	21.5 ± 0.5	22.00	158.49			6.69	0.111 9	1.00
	802.11n_HT40	22.5 ± 0.5	23.00	199.53			7.50	0.140 9	1.00

According to above table, for 2 400 ~ 2 483.5 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(199.53 * 3.55)/1.00} = 7.50 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 199.53 * 3.55 / (4 * 3.14 * 20^2) = 0.140 9$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.5.2 Antenna 1

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	17.5 ± 0.5	18.00	63.10	5.60	3.63	4.27	0.045 6	1.00
	802.11g	21.0 ± 0.5	21.50	141.25			6.39	0.102 1	1.00
	802.11n_HT20	21.5 ± 0.5	22.00	158.49			6.76	0.114 5	1.00
	802.11n_HT40	22.5 ± 0.5	23.00	199.53			7.59	0.144 2	1.00

According to above table, for 2 400 ~ 2 483.5 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(199.53 * 3.63)/1.00} = 7.59 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 199.53 * 3.63 / (4 * 3.14 * 20^2) = 0.144 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.5.3 Multiple Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance	Power Density (mW/cm ²) @ 20 cm Separation	Combined Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear	(cm)			
2 400 ~ 2 483.5	802.11n_ HT20 Antenna 0(mimo)	17.5 ± 0.5	18.00	56.23	5.50	3.55	3.98	0.039 7	0.080 3	1.00
	802.11n_ HT20 Antenna 1(mimo)	17.5 ± 0.5	18.00	56.23	5.60	3.63	4.03	0.040 6		1.00
	802.11n_ HT40 Antenna 0(mimo)	18.0 ± 0.5	18.50	70.79	5.50	3.55	4.47	0.050 0	0.101 1	1.00
	802.11n_ HT40 Antenna 1(mimo)	18.0 ± 0.5	18.50	70.79	5.60	3.63	4.52	0.051 1		1.00



Tested by: Tae-Ho, Kim / Senior Manager

4.6 Test Result for WLAN 5 GHz Band

4.6.1 Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
5 150 ~ 5 250	802.11a	14.5 ± 0.5	15.00	31.62	6.90	4.90	3.51	0.030 8	1.00
	802.11n_HT20	14.5 ± 0.5	15.00	31.62			3.51	0.030 8	1.00
	802.11n_HT40	16.5 ± 0.5	17.00	50.12			4.42	0.048 9	1.00
	802.11ac80	16.0 ± 0.5	16.50	44.67			4.17	0.043 5	1.00
5 725 ~ 5 850	802.11a	15.0 ± 0.5	15.50	35.48	6.90	4.90	3.72	0.034 6	1.00
	802.11n_HT20	14.5 ± 0.5	15.00	31.62			3.51	0.030 8	1.00
	802.11n_HT40	16.5 ± 0.5	17.00	50.12			4.42	0.048 9	1.00
	802.11ac80	16.0 ± 0.5	16.50	44.67			4.17	0.043 5	1.00

According to above table, for 5 150 ~ 5 250 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(50.12 * 4.90)/1.00} = 4.42 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 50.12 * 4.90 / (4 * 3.14 * 20^2) = 0.048 9$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.6.2 Antenna 1

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear			
5 150 ~ 5 250	802.11a	14.5 ± 0.5	15.00	31.62	5.90	3.89	3.13	0.024 5	1.00
	802.11n_HT20	14.5 ± 0.5	15.00	31.62			3.13	0.024 5	1.00
	802.11n_HT40	16.5 ± 0.5	17.00	50.12			3.94	0.038 8	1.00
	802.11ac80	15.5 ± 0.5	16.00	39.81			3.51	0.030 8	1.00
5 725 ~ 5 850	802.11a	15.0 ± 0.5	15.50	35.48	5.90	3.89	3.31	0.027 5	1.00
	802.11n_HT20	14.5 ± 0.5	15.00	31.62			3.13	0.024 5	1.00
	802.11n_HT40	16.5 ± 0.5	17.00	50.12			3.94	0.038 8	1.00
	802.11ac80	16.0 ± 0.5	16.50	44.67			3.72	0.034 6	1.00

According to above table, for 5 150 ~ 5 250 MHz Band, safe distance,

$$D = 0.282 * \sqrt{(50.12 * 3.89)/1.00} = 3.94 \text{ cm.}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 50.12 * 3.89 / (4 * 3.14 * 20^2) = 0.038 8$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Tae-Ho, Kim / Senior Manager

4.6.3 Multiple Transmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm ²) @ 20 cm Separation	Combined Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
		(dBm)	(dBm)	(mW)	Log	Linear				
5 150 ~ 5 250	802.11n_HT20 Antenna 0	11.5 ± 0.5	12.00	15.85	6.90	4.90	2.48	0.015 4	0.027 7	1.00
	802.11n_HT20 Antenna 1	11.5 ± 0.5	12.00	15.85	5.90	3.89	2.21			0.012 3
	802.11n_HT40 Antenna 0	13.5 ± 0.5	14.00	25.12	6.90	4.90	3.13	0.024 5	0.043 9	1.00
	802.11n_HT40 Antenna 1	13.5 ± 0.5	14.00	25.12	5.90	3.89	2.79			0.019 4
	802.11ac80 Antenna 0	13.0 ± 0.5	13.50	22.39	6.90	4.90	2.95	0.021 8	0.037 2	1.00
	802.11ac80 Antenna 1	12.5 ± 0.5	13.00	19.95	5.90	3.89	2.48			0.015 4
5 725 ~ 5 850	802.11n_HT20 Antenna 0	11.5 ± 0.5	12.00	15.85	6.90	4.90	2.48	0.015 4	0.027 7	1.00
	802.11n_HT20 Antenna 1	11.5 ± 0.5	12.00	15.85	5.90	3.89	2.21			0.012 3
	802.11n_HT40 Antenna 0	13.5 ± 0.5	14.00	25.12	6.90	4.90	3.13	0.024 5	0.043 9	1.00
	802.11n_HT40 Antenna 1	13.5 ± 0.5	14.00	25.12	5.90	3.89	2.79			0.019 4
	802.11ac80 Antenna 0	13.0 ± 0.5	13.50	22.39	6.90	4.90	2.95	0.021 8	0.039 1	1.00
	802.11ac80 Antenna 1	13.0 ± 0.5	13.50	22.39	5.90	3.89	2.63			0.017 3




Tested by: Tae-Ho, Kim / Senior Manager

4.7 Test Result for Bluetooth(LE) + WLAN 2.4 GHz Band

According to above equation, the following result was obtained.

Operating Mode	Power Density (mW/cm ²) @ 20 cm Separation	Combined Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
Bluetooth(LE)	0.001 1	0.145 3	1.00
WLAN 2.4 GHz Band	0.144 2		

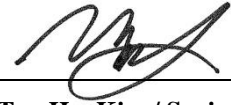


Tested by: **Tae-Ho, Kim / Senior Manager**

4.8 Test Result for Bluetooth(LE) + WLAN 5 GHz Band

According to above equation, the following result was obtained.

Operating Mode	Power Density (mW/cm ²) @ 20 cm Separation	Combined Power Density (mW/cm ²) @ 20 cm Separation	Limit (mW/cm ²)
Bluetooth(LE)	0.001 1	0.050 0	1.00
WLAN 5 GHz Band	0.048 9		



Tested by: **Tae-Ho, Kim / Senior Manager**