FCC Test Report

Product Name	TUF GAMING H7 WIRELESS Dongle
Model No.	TUF Gaming H7 WL Yellow dongle, TUF Gaming H7 WL Gun metal dongle
FCC ID	BJM-TUFH7WLDG

Applicant	Tatung Company
Address	22 Chungshan N Road Sec 3 ,Taipei 10451 ,Taiwan

Date of Receipt	Mar. 11, 2019
Issued Date	May 08, 2019
Report No.	1930136R-RFUSP15V00
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.

Test Report

Issued Date: May 08, 2019
Report No.: 1930136R-RFUSP15V00

Product Name	TUF GAMING H7 WIRELESS Dongle
Applicant	Tatung Company
Address	22 Chungshan N Road Sec 3 ,Taipei 10451 ,Taiwan
Manufacturer	Tatung Company
Model No.	TUF Gaming H7 WL Yellow dongle, TUF Gaming H7 WL Gun metal dongle
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Ida Tung

(Adm. Assistant / Ida Tung)

Tested By : Leo Chen

(Assistant Engineer / Leo Chen)

Approved By :

(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	TUF GAMING H7 WIRELESS Dongle
Trade Name	ASUS
Model No.	TUF Gaming H7 WL Yellow dongle, TUF Gaming H7 WL Gun metal dongle
FCC ID	BJM-TUFH7WLDG
Frequency Range	2405.35MHz~2477.35MHz
Channel Number	37CH
Type of Modulation	Pi/4 DQPSK
Antenna Type	Print on PCB Antenna
Channel Control	Refer to the table “Antenna List”
Antenna Gain	Auto

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ASUS	N/A	Print on PCB Antenna	-3.71dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2.40535 MHz	Channel 02:	2.40735 MHz	Channel 03:	2.40935 MHz	Channel 04:	2.41135 MHz
Channel 05:	2.41335 MHz	Channel 06:	2.41535 MHz	Channel 07:	2.41735 MHz	Channel 08:	2.41935 MHz
Channel 09:	2.42135 MHz	Channel 10:	2.42335 MHz	Channel 11:	2.42535 MHz	Channel 12:	2.42735 MHz
Channel 13:	2.42935 MHz	Channel 14:	2.43135 MHz	Channel 15:	2.43335 MHz	Channel 16:	2.43535 MHz
Channel 17:	2.43735 MHz	Channel 18:	2.43935 MHz	Channel 19:	2.44135 MHz	Channel 20:	2.44335 MHz
Channel 21:	2.44535 MHz	Channel 22:	2.44735 MHz	Channel 23:	2.44935 MHz	Channel 24:	2.45135 MHz
Channel 25:	2.45335 MHz	Channel 26:	2.45535 MHz	Channel 27:	2.45735 MHz	Channel 28:	2.45935 MHz
Channel 29:	2.46135 MHz	Channel 30:	2.46335 MHz	Channel 31:	2.46535 MHz	Channel 32:	2.46735 MHz
Channel 33:	2.46935 MHz	Channel 34:	2.47135 MHz	Channel 35:	2.47335 MHz	Channel 36:	2.47535 MHz
Channel 37:	2.47735 MHz						

Note:

1. The EUT is a TUF GAMING H7 WIRELESS Dongle with a built-in 2.4GHz wireless transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.249 for spread spectrum devices.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
5. The different of each model is shown as below:

Model Number	Wireless	Colour	Description
TUF Gaming H7 WL Yellow dongle	V	Yellow	The serial product only has the different color of the enclosure, and the product functions, brand, design and the external appearance are all the same.
TUF Gaming H7 WL Gun metal dongle	V	Gun Metal	

Test Mode	Mode 1: Transmit

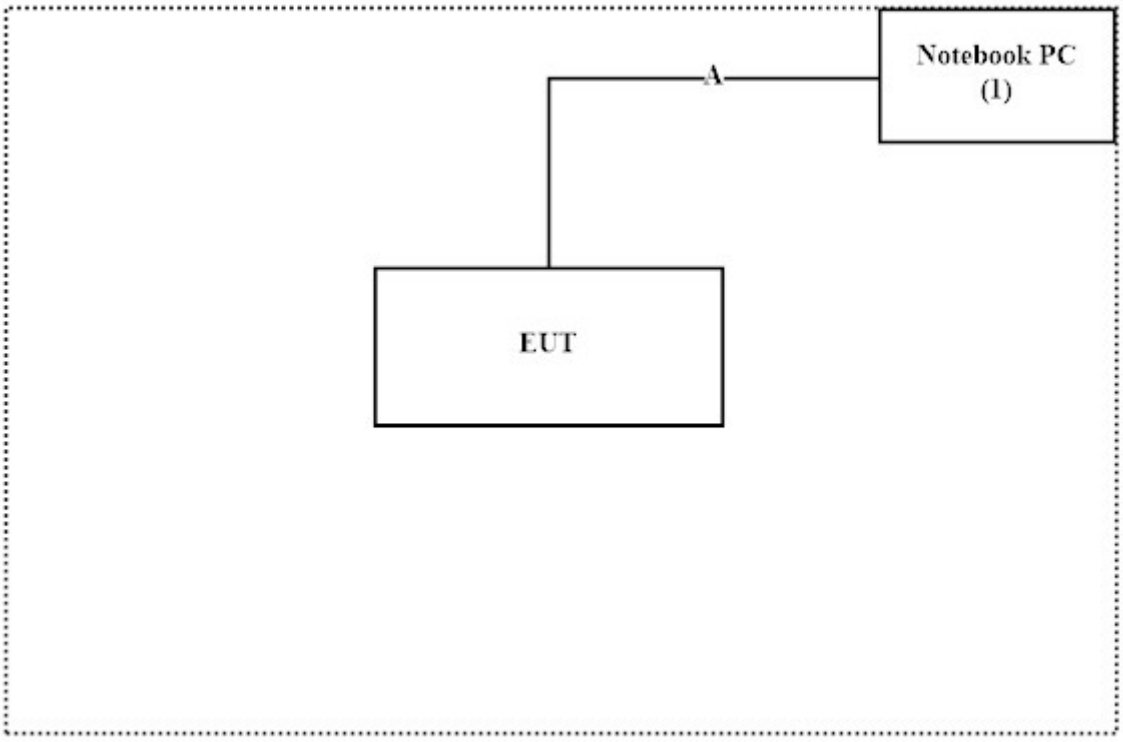
1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Inspiron 15 3000	GT5JPJ2	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 1.8m

1.4. Configuration of Test System



1.5. EUT Exercise Software

(1) Setup the EUT and peripherals as shown in Section 1.3

(2) Execute “Avnera_Continue_Power V2018.5.18.1” on the Notebook PC.

(3) Configure the test mode, the test channel, and the data rate to start the continuous transmit

(4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:
http://www.dekra.com.tw/english/about/certificates.aspx?bval=5
The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW0023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101602	2018.12.17	2019.12.16
X	Two-Line V-Network	R&S	ENV216	101306	2019.03.11	2020.03.10
X	Two-Line V-Network	R&S	ENV216	101307	2019.04.03	2020.04.02
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2018.05.24	2019.05.23

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2019.01.25	2020.01.24
	Power Meter	Anritsu	ML2496A	1548003	2018.12.19	2019.12.18
	Power Sensor	Anritsu	MA2411B	1531024	2018.12.19	2019.12.18
	Power Sensor	Anritsu	MA2411B	1531025	2018.12.19	2019.12.18
	Bluetooth Tester	R&S	CBT	101238	2019.01.21	2020.01.20

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.1

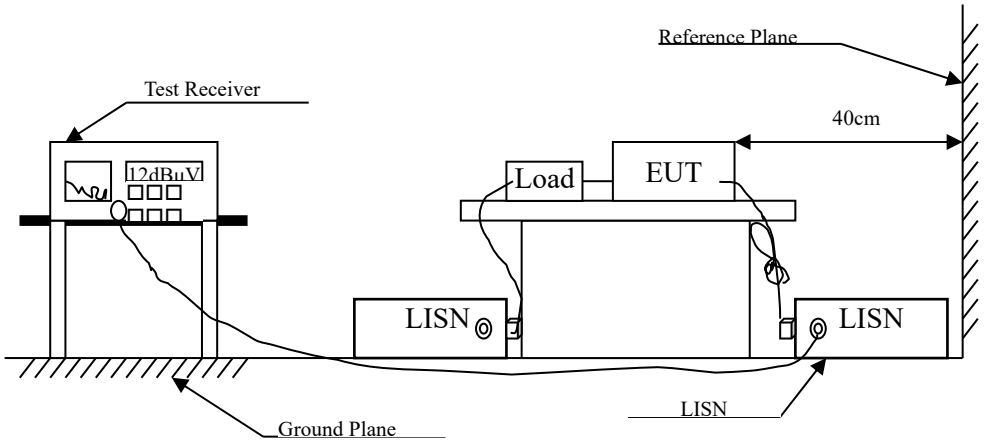
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	49611	2019.02.22	2020.02.21
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2018.06.05	2019.06.04
X	Horn Antenna	ETS-Lindgren	3117	00203800	2018.12.11	2019.12.10
X	Horn Antenna	Com-Power	AH-840	101087	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC001330	980316	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2018.05.16	2019.05.15
X	Filter	MICRO TRONICS	BRM50702	G251	2018.09.04	2019.09.03
	Filter	MICRO TRONICS	BRM50716	G188	2018.09.04	2019.09.03
X	EMI Test Receiver	R&S	ESR7	101602	2018.12.17	2019.12.16
X	Spectrum Analyzer	R&S	FSV40	101148	2019.02.20	2020.02.19
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2018.05.25	2019.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2018.05.16	2019.05.15

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

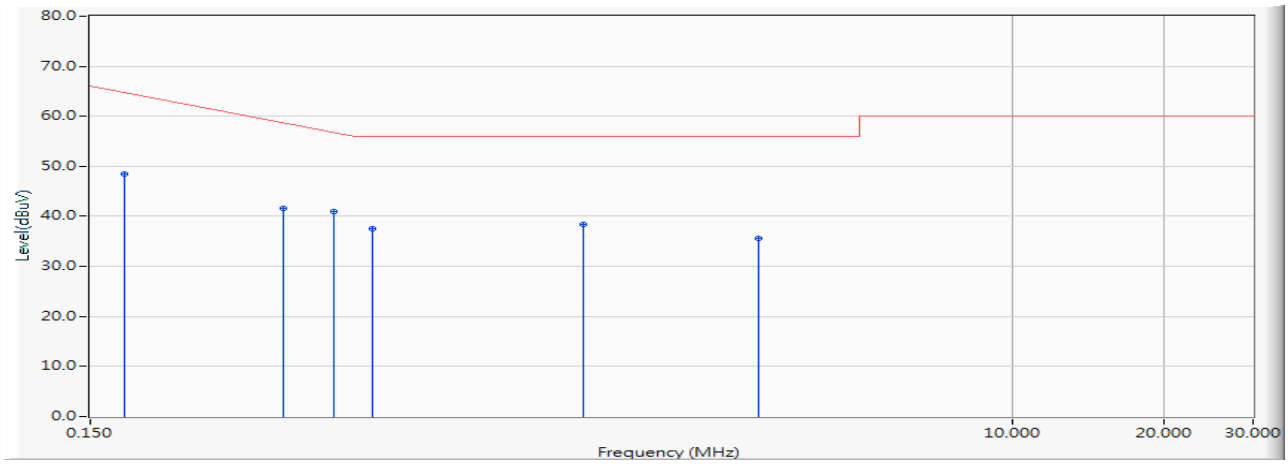
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.
Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.35 dB

2.5. Test Result of Conducted Emission

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2019/04/10
Test Mode : Mode 1: Transmit (2441.35MHz)

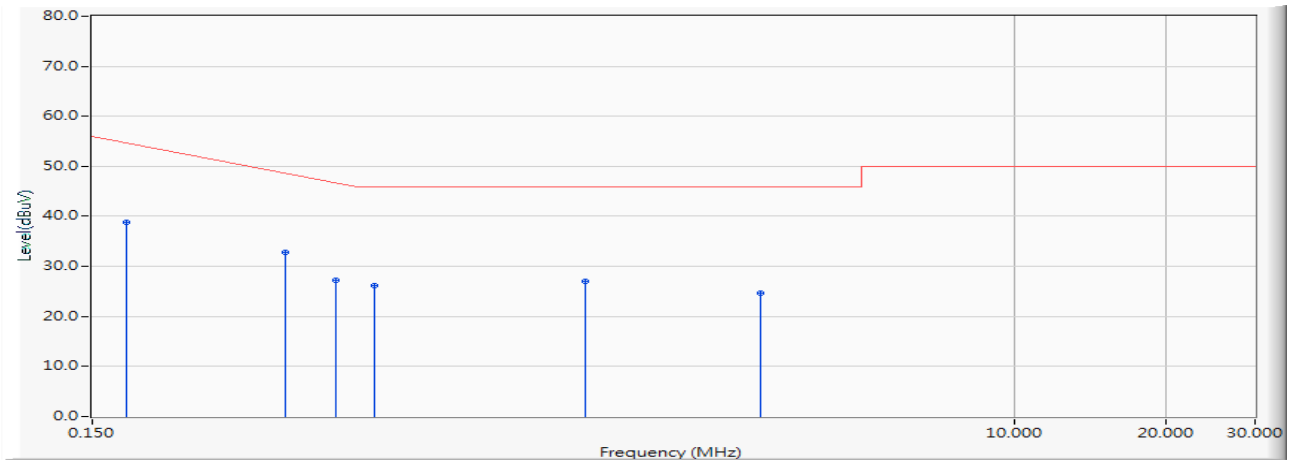


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.175	9.610	38.830	48.440	-16.846	65.286	QUASIPEAK
2		0.361	9.621	31.892	41.512	-18.459	59.971	QUASIPEAK
3	*	0.454	9.627	31.365	40.991	-16.323	57.314	QUASIPEAK
4		0.541	9.630	27.989	37.619	-18.381	56.000	QUASIPEAK
5		1.421	9.650	28.795	38.445	-17.555	56.000	QUASIPEAK
6		3.145	9.692	25.889	35.581	-20.419	56.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "*" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Conducted Emission Test
Power Line : Line 1
Test Date : 2019/04/10
Test Mode : Mode 1: Transmit (2441.35MHz)

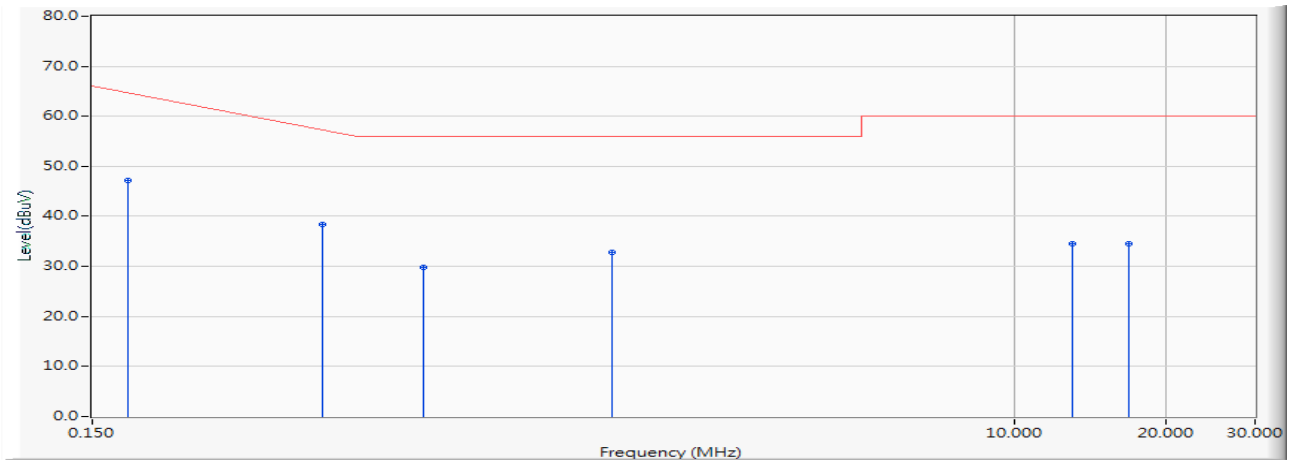


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.175	9.610	29.311	38.921	-16.365	55.286	AVERAGE
2		0.361	9.621	23.151	32.771	-17.200	49.971	AVERAGE
3		0.454	9.627	17.538	27.165	-20.149	47.314	AVERAGE
4		0.541	9.630	16.486	26.116	-19.884	46.000	AVERAGE
5		1.421	9.650	17.276	26.926	-19.074	46.000	AVERAGE
6		3.145	9.692	15.075	24.767	-21.233	46.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "*" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2019/04/10
Test Mode : Mode 1: Transmit (2441.35MHz)

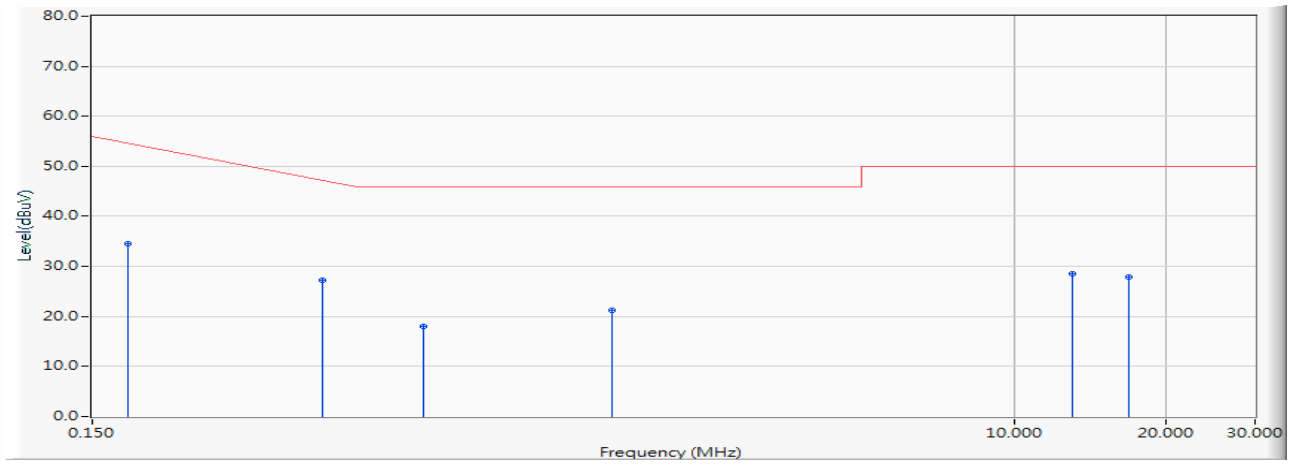


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.177	9.606	37.644	47.250	-17.979	65.229	QUASIPEAK
2		0.429	9.618	28.767	38.385	-19.644	58.029	QUASIPEAK
3		0.679	9.629	20.138	29.766	-26.234	56.000	QUASIPEAK
4		1.599	9.650	23.059	32.709	-23.291	56.000	QUASIPEAK
5		13.047	9.894	24.674	34.567	-25.433	60.000	QUASIPEAK
6		16.890	9.966	24.646	34.612	-25.388	60.000	QUASIPEAK

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “*“ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Conducted Emission Test
Power Line : Line 2
Test Date : 2019/04/10
Test Mode : Mode 1: Transmit (2441.35MHz)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.177	9.606	24.889	34.495	-20.734	55.229	AVERAGE
2		0.429	9.618	17.628	27.246	-20.783	48.029	AVERAGE
3		0.679	9.629	8.354	17.983	-28.017	46.000	AVERAGE
4		1.599	9.650	11.495	21.145	-24.855	46.000	AVERAGE
5		13.047	9.894	18.736	28.629	-21.371	50.000	AVERAGE
6		16.890	9.966	18.002	27.968	-22.032	50.000	AVERAGE

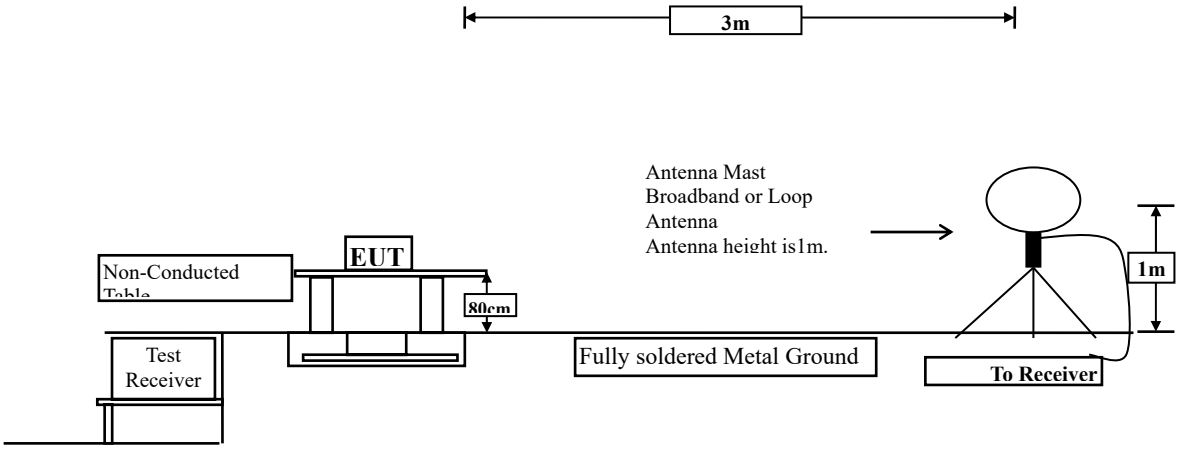
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “*“ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

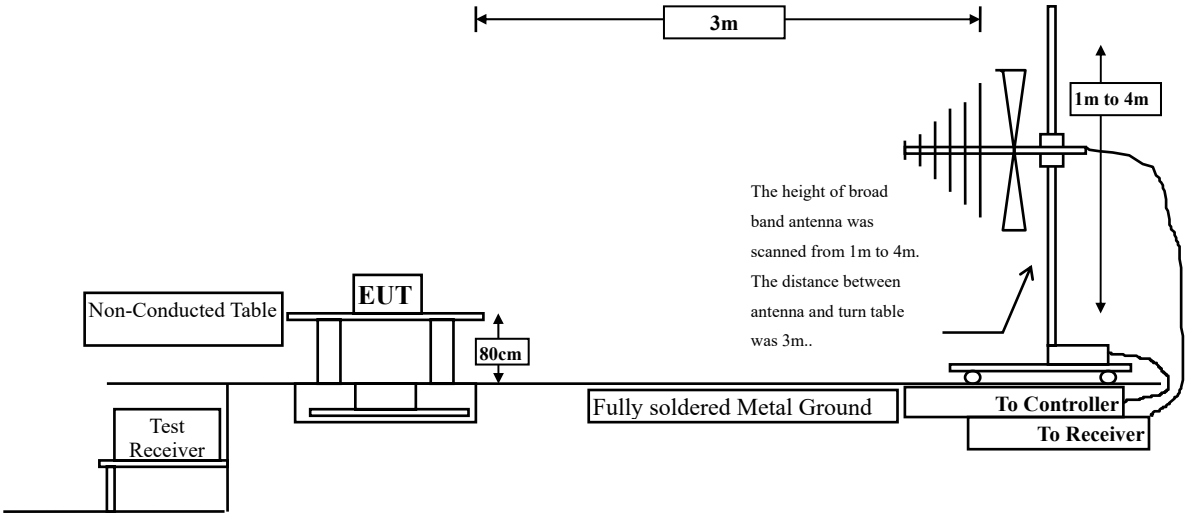
3. Radiated Emission

3.1. Test Setup

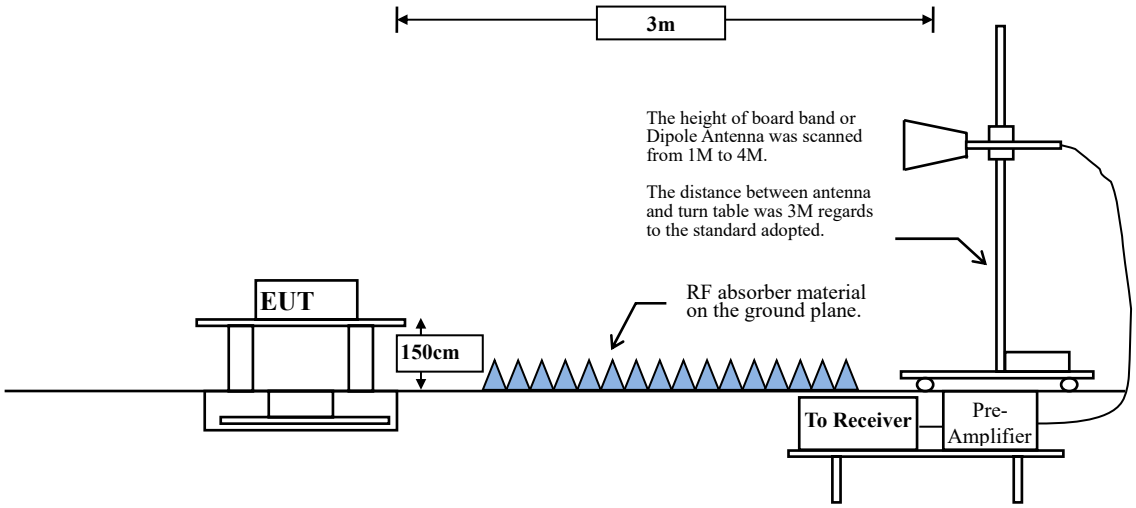
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

➢ **Fundamental and Harmonics Emission Limits**

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBμV /m @3m)	(uV/m @3m)	(dBμV /m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBμV /m) = 20 log RF Voltage (uV/m)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV /m) = 20 log E field strength (uV/m)

3.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level.

This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

3.4. Uncertainty

Horizontal：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB。

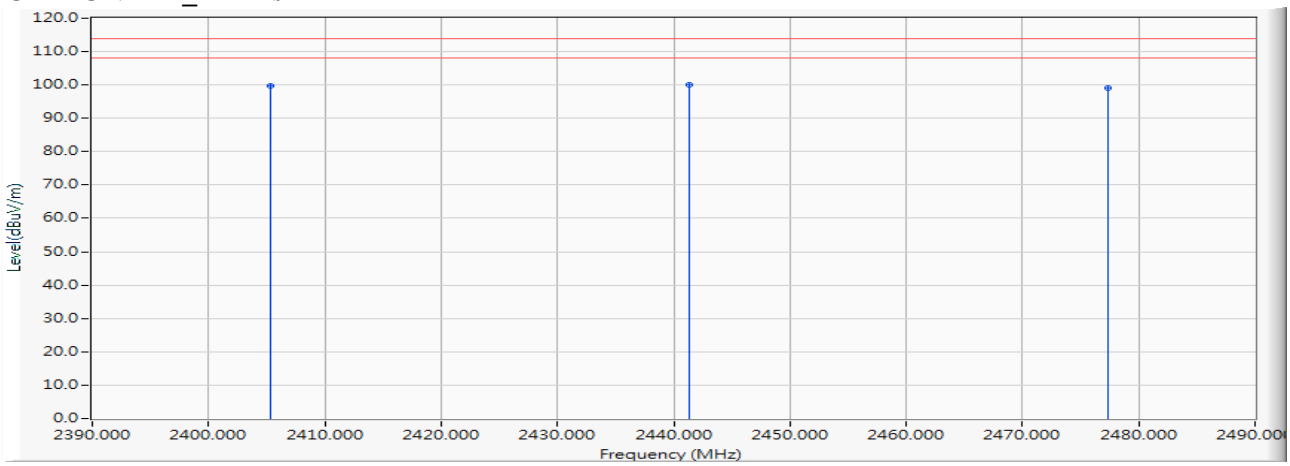
Vertical：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz: ±3.83dB；18-40GHz: ±3.98dB。

3.5. Test Result of Radiated Emission

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Fundamental Radiated Emission
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (X-Axis)

HORIZONTAL_X-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2405.350	-8.894	108.650	99.756	-14.244	114.000	PEAK
2	*	2441.350	-8.760	108.910	100.151	-13.849	114.000	PEAK
3		2477.350	-8.626	107.670	99.044	-14.956	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

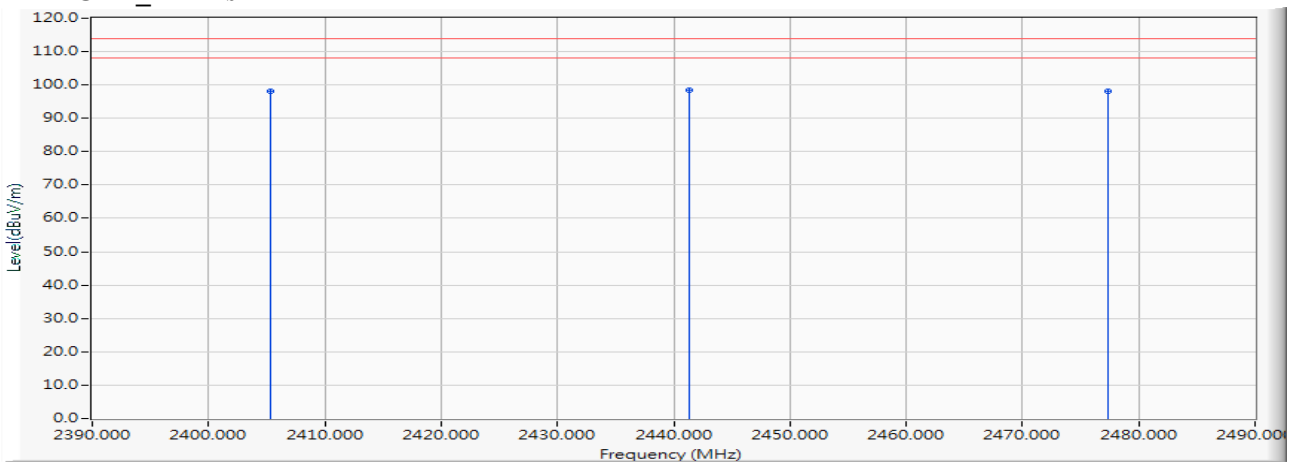
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)
HORIZONTAL_X-Axis						
01 (Average)	2405.35	99.756	-40.386	59.370	-34.630	94.000
19 (Average)	2441.35	100.151	-40.386	59.765	-34.235	94.000
37 (Average)	2477.35	99.044	-40.386	58.658	-35.342	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Fundamental Radiated Emission
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (X-Axis)

VERTICAL_X-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2405.350	-8.894	106.950	98.056	-15.944	114.000	PEAK
2	*	2441.350	-8.760	107.090	98.331	-15.669	114.000	PEAK
3		2477.350	-8.626	106.700	98.074	-15.926	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

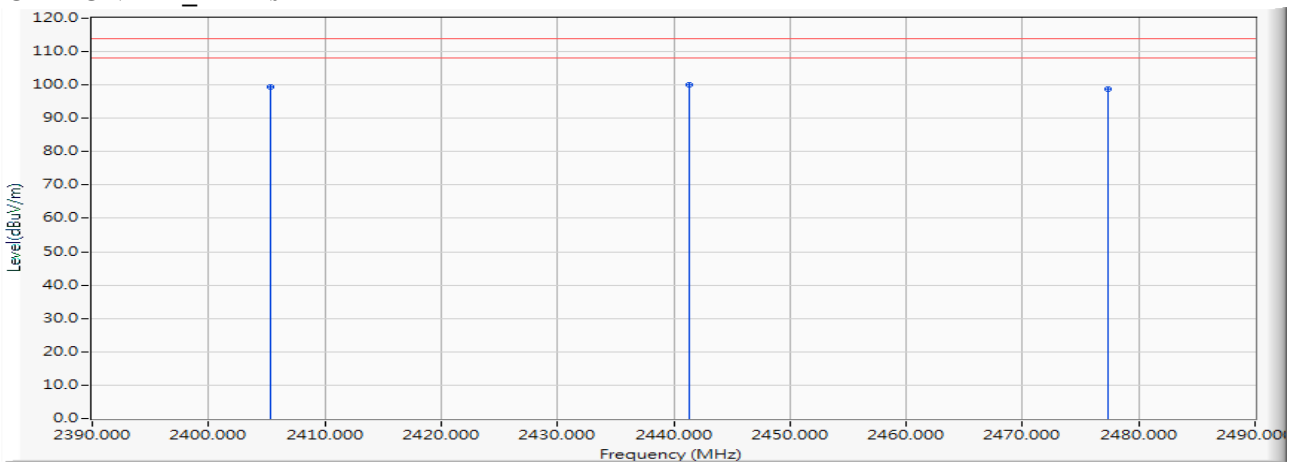
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)
VERTICAL_X-Axis						
01 (Average)	2405.35	98.056	-40.386	57.670	-36.330	94.000
19 (Average)	2441.35	98.331	-40.386	57.945	-36.055	94.000
37 (Average)	2477.35	98.074	-40.386	57.688	-36.312	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Fundamental Radiated Emission
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (Y-Axis)

HORIZONTAL_Y-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2405.350	-8.894	109.580	100.686	-13.314	114.000	PEAK
2	*	2441.350	-8.760	110.470	101.711	-12.289	114.000	PEAK
3		2477.350	-8.626	109.520	100.894	-13.106	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

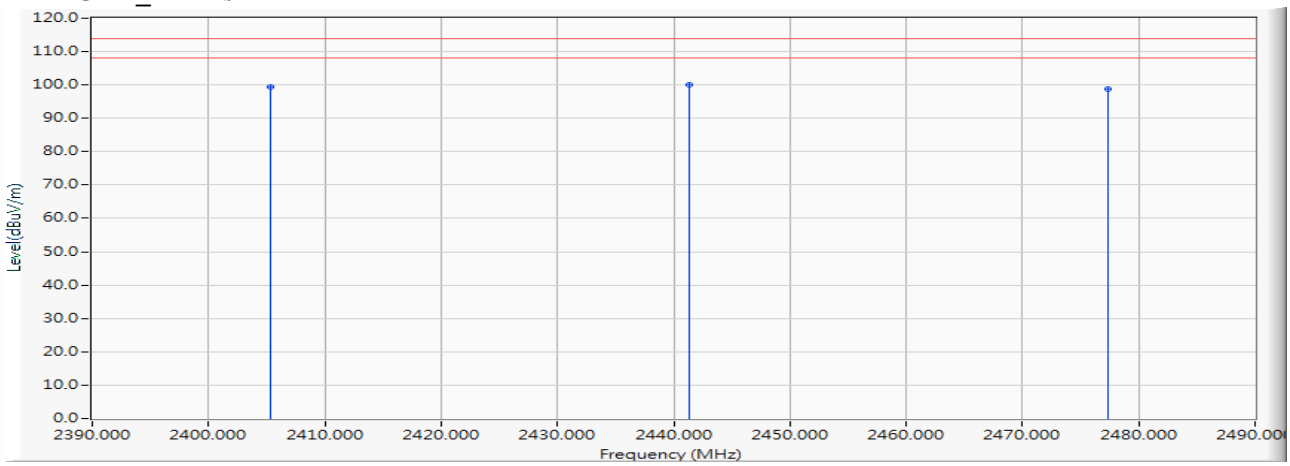
Channel No.	Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
HORIZONTAL_Y-Axis						
01 (Average)	2405.35	100.686	-40.386	60.300	-33.700	94.000
19 (Average)	2441.35	101.711	-40.386	61.325	-32.675	94.000
37 (Average)	2477.35	100.894	-40.386	60.508	-33.492	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Fundamental Radiated Emission
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (Y-Axis)

VERTICAL_Y-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2405.350	-8.894	108.260	99.366	-14.634	114.000	PEAK
2	*	2441.350	-8.760	108.680	99.921	-14.079	114.000	PEAK
3		2477.350	-8.626	107.550	98.924	-15.076	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

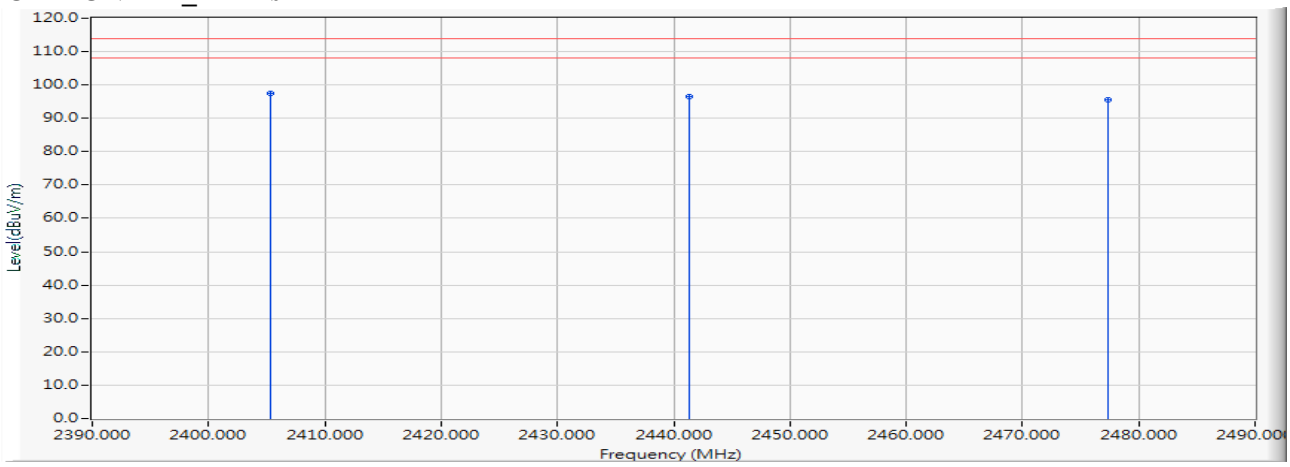
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)
VERTICAL_Y-Axis						
01 (Average)	2405.35	99.366	-40.386	58.980	-35.020	94.000
19 (Average)	2441.35	99.921	-40.386	59.535	-34.465	94.000
37 (Average)	2477.35	98.924	-40.386	58.538	-35.462	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product	:	TUF GAMING H7 WIRELESS Dongle
Test Item	:	Fundamental Radiated Emission
Test Date	:	2019/03/27
Test Mode	:	Mode 1: Transmit (Z-Axis)

HORIZONTAL_Z-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2405.350	-8.894	106.270	97.376	-16.624	114.000	PEAK
2		2441.350	-8.760	105.240	96.481	-17.519	114.000	PEAK
3		2477.350	-8.626	104.060	95.434	-18.566	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

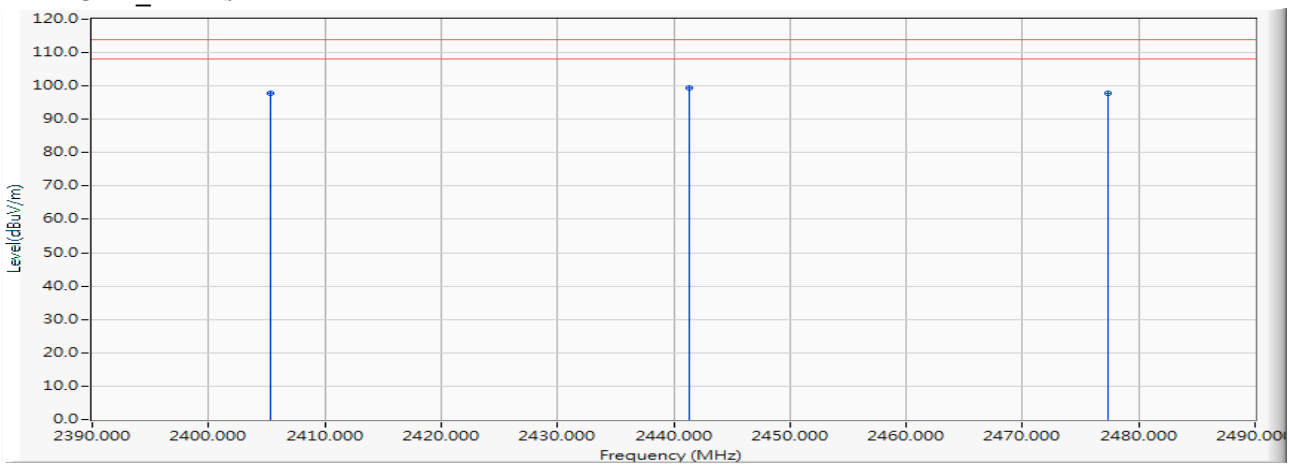
Channel No.	Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
HORIZONTAL_Z-Axis						
01 (Average)	2405.35	97.376	-40.386	56.990	-37.010	94.000
19 (Average)	2441.35	96.481	-40.386	56.095	-37.905	94.000
37 (Average)	2477.35	95.434	-40.386	55.048	-38.952	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Fundamental Radiated Emission
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (Z-Axis)

VERTICAL_Z-Axis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2405.350	-8.894	106.650	97.756	-16.244	114.000	PEAK
2	*	2441.350	-8.760	108.260	99.501	-14.499	114.000	PEAK
3		2477.350	-8.626	106.370	97.744	-16.256	114.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.

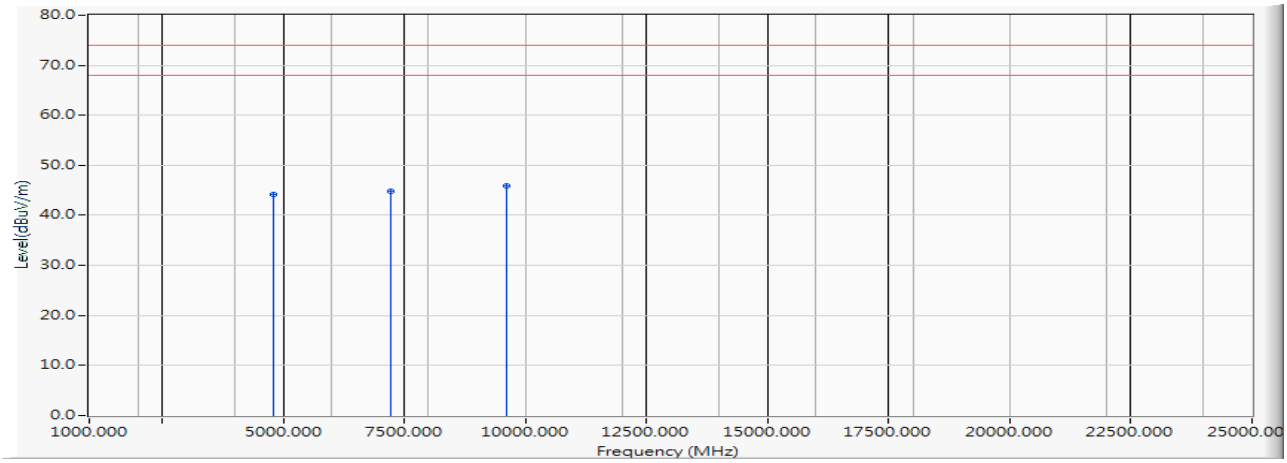
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)
VERTICAL_Z-Axis						
01 (Average)	2405.35	97.756	-40.386	57.370	-36.630	94.000
19 (Average)	2441.35	99.501	-40.386	59.115	-34.885	94.000
37 (Average)	2477.35	97.744	-40.386	57.358	-36.642	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2405.35MHz)

Horizontal



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4810.700	-6.083	50.210	44.126	-29.874	74.000	PEAK
2		7216.050	-3.024	47.860	44.836	-29.164	74.000	PEAK
3	*	9621.400	-0.670	46.650	45.979	-28.021	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

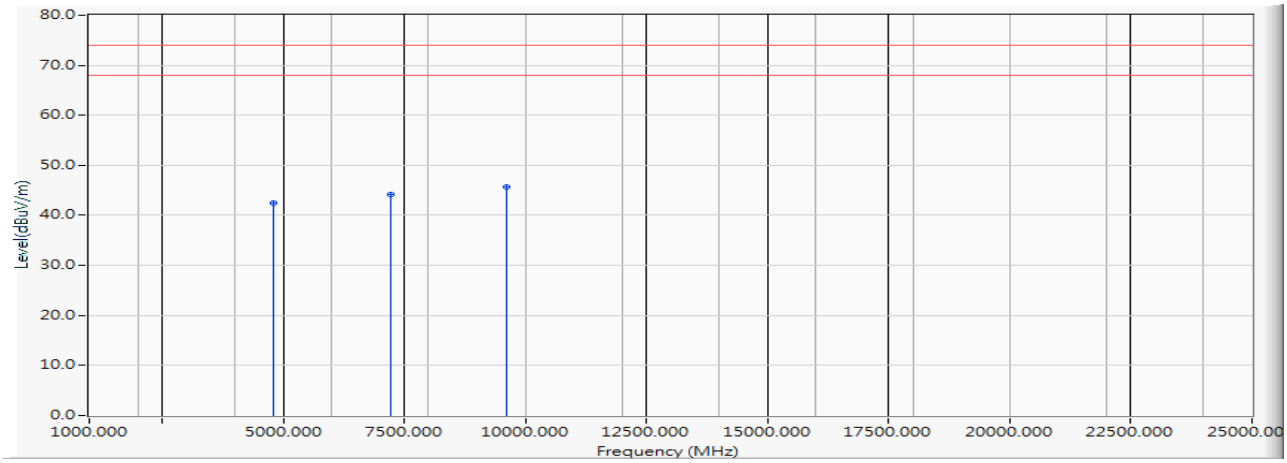
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2405.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4810.700	-6.083	48.610	42.526	-31.474	74.000	PEAK
2		7216.050	-3.024	47.270	44.246	-29.754	74.000	PEAK
3	*	9621.400	-0.670	46.460	45.789	-28.211	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

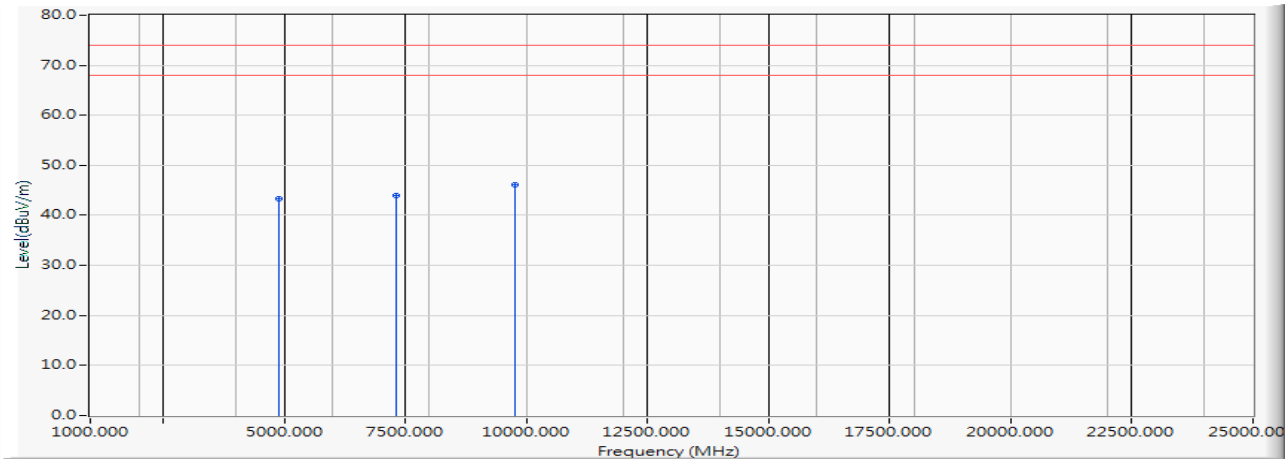
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2441.35MHz)

Horizontal



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4882.700	-6.043	49.310	43.267	-30.733	74.000	PEAK
2		7324.050	-2.952	46.950	43.998	-30.002	74.000	PEAK
3	*	9765.400	-0.486	46.640	46.155	-27.845	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

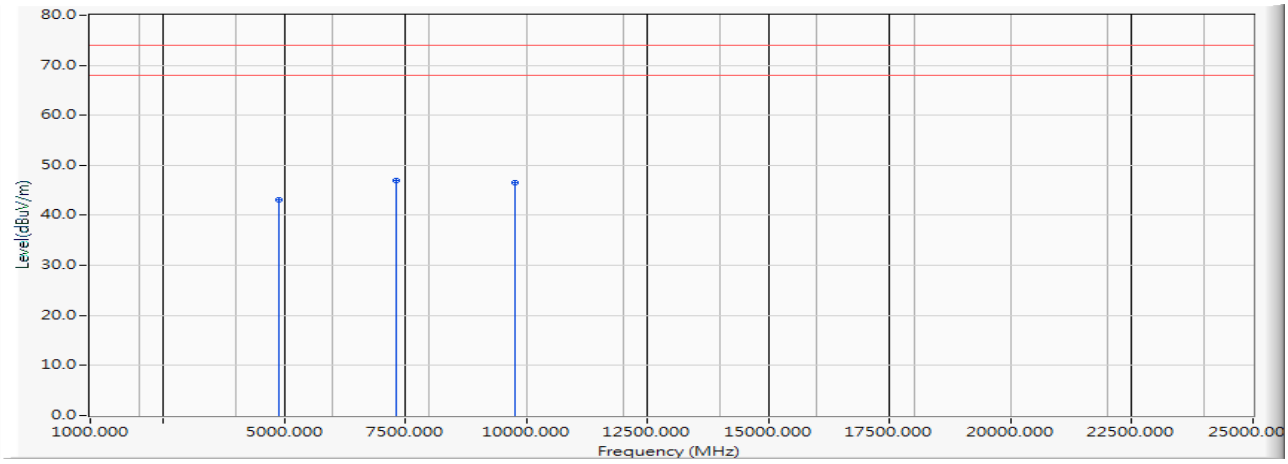
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2441.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4882.700	-6.043	49.260	43.217	-30.783	74.000	PEAK
2	*	7324.050	-2.952	49.830	46.878	-27.122	74.000	PEAK
3		9765.400	-0.486	47.090	46.605	-27.395	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

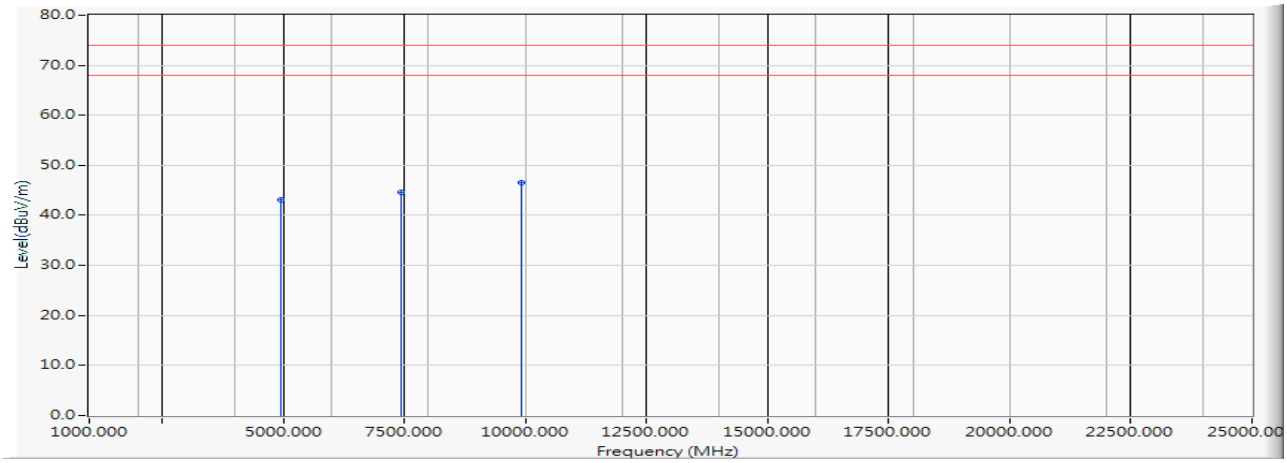
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2477.35MHz)

Horizontal



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4954.700	-6.042	49.220	43.178	-30.822	74.000	PEAK
2		7432.050	-2.825	47.400	44.575	-29.425	74.000	PEAK
3	*	9909.400	-0.276	46.720	46.444	-27.556	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

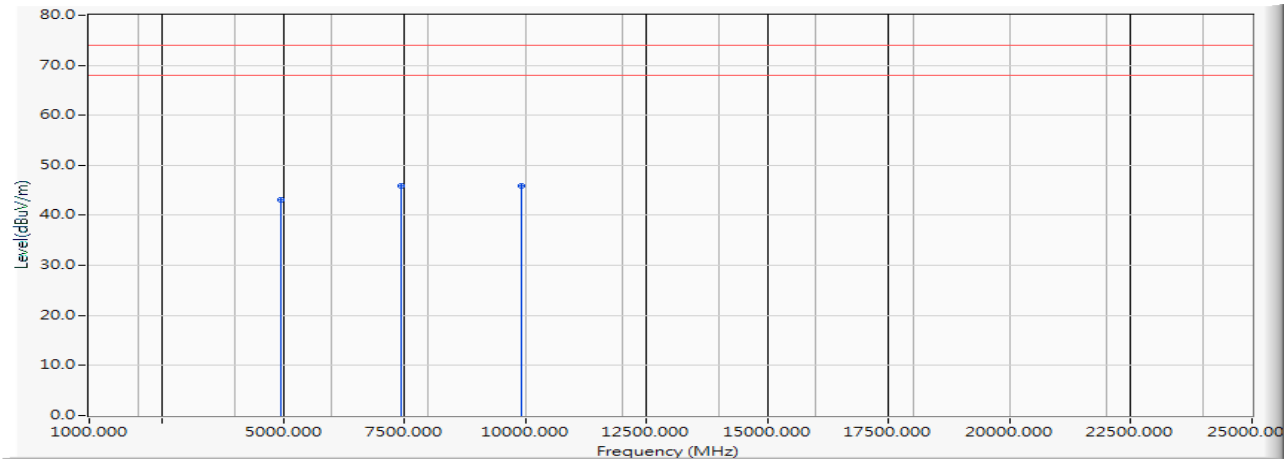
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Harmonic Radiated Emission Data
Test Date : 2019/03/27
Test Mode : Mode 1: Transmit (2477.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		4954.700	-6.042	49.230	43.188	-30.812	74.000	PEAK
2		7432.050	-2.825	48.700	45.875	-28.125	74.000	PEAK
3	*	9909.400	-0.276	46.260	45.984	-28.016	74.000	PEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

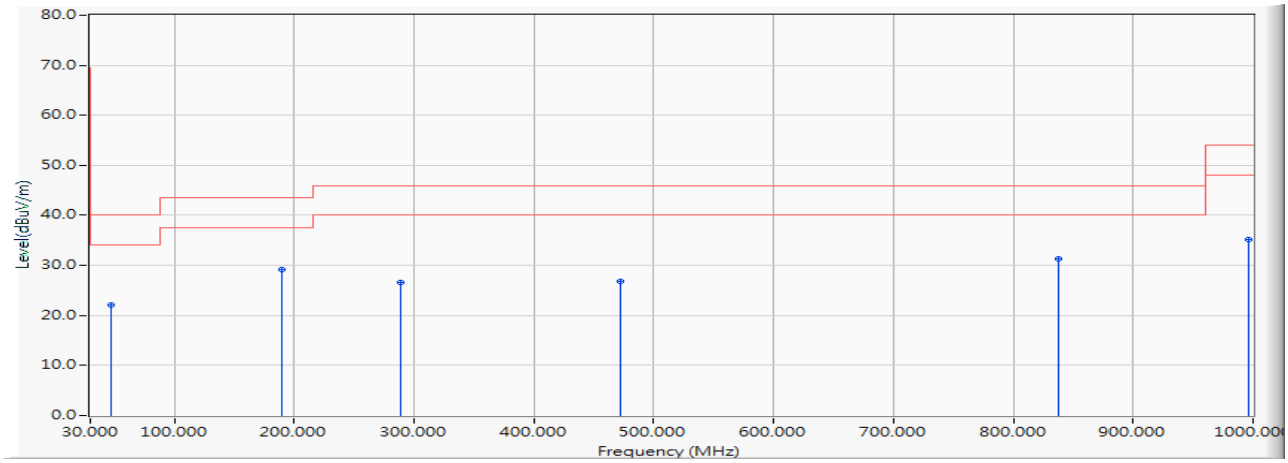
Frequency MHz	Peak Measurement dBµV/m	Duty Cycle Factor dB	Average Measurement dBµV/m	Margin dB	Peak Limit dBµV/m	Average Limit dBµV/m
Average Detector:						
--	--	--	--	--	74.000	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Test Item : General Radiated Emission Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2441.35MHz)

Horizontal



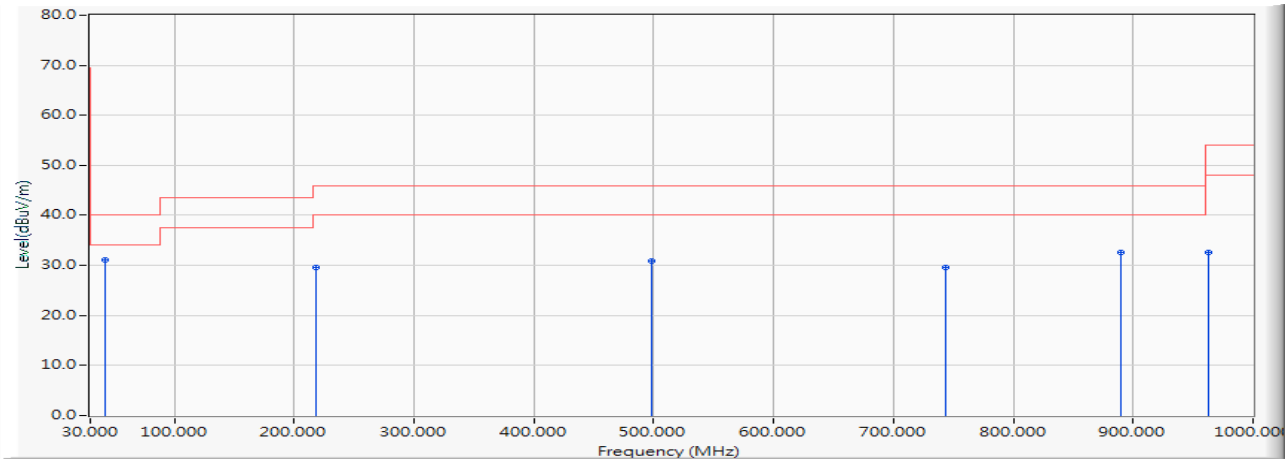
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		46.870	-10.852	33.046	22.193	-17.807	40.000	QUASIPEAK
2	*	190.261	-13.582	42.797	29.215	-14.285	43.500	QUASIPEAK
3		288.667	-10.696	37.237	26.541	-19.459	46.000	QUASIPEAK
4		472.826	-6.411	33.189	26.779	-19.221	46.000	QUASIPEAK
5		838.333	-1.058	32.339	31.280	-14.720	46.000	QUASIPEAK
6		995.783	0.952	34.120	35.072	-18.928	54.000	QUASIPEAK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.
7. No emission found between lowest internal used/generated frequency to 30MHz.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : General Radiated Emission Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2441.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	42.652	-10.961	42.016	31.054	-8.946	40.000	QUASIPEAK
2		218.377	-13.307	42.850	29.543	-16.457	46.000	QUASIPEAK
3		498.130	-5.984	36.834	30.851	-15.149	46.000	QUASIPEAK
4		744.145	-2.136	31.706	29.570	-16.430	46.000	QUASIPEAK
5		890.348	-0.331	32.921	32.590	-13.410	46.000	QUASIPEAK
6		963.449	0.529	32.013	32.542	-21.458	54.000	QUASIPEAK

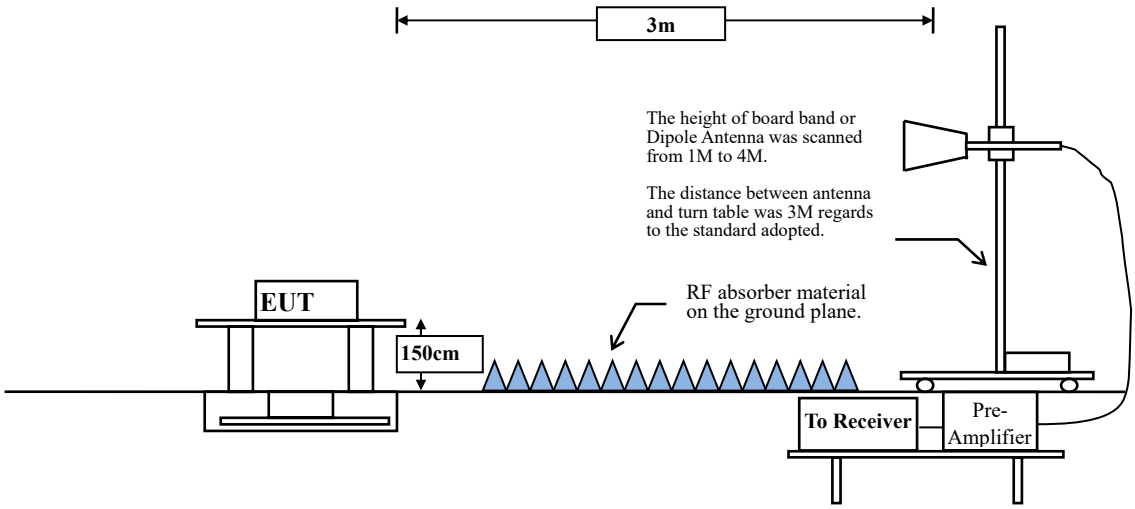
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.
7. No emission found between lowest internal used/generated frequency to 30MHz.

4. Band Edge

4.1. Test Setup

RF Radiated Measurement:



4.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV /m) = 20 log E field strength (uV/m)

4.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

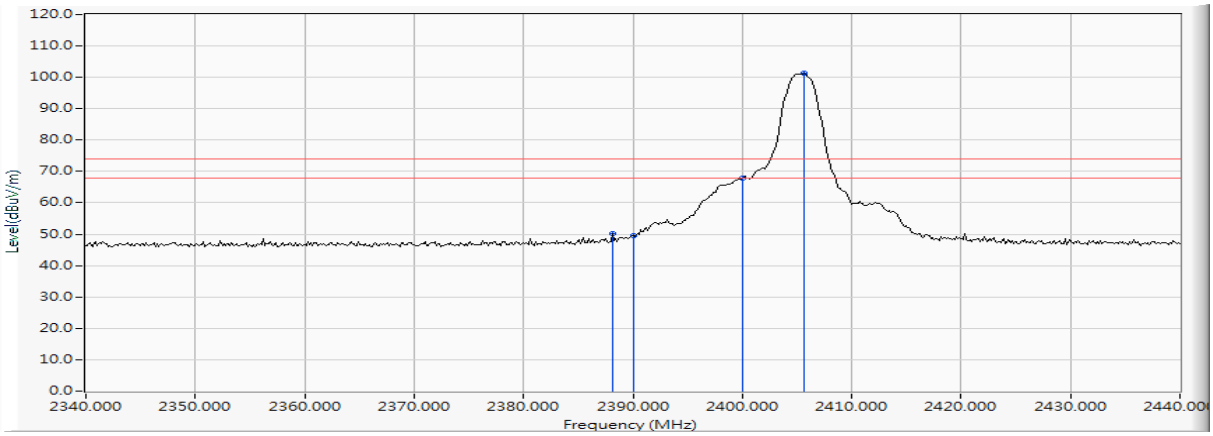
4.4. Uncertainty

Horizontal polarization：1-18GHz: ±3.77dB
Vertical polarization：1-18GHz : ±3.83dB

4.5. Test Result of Band Edge

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Band Edge Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2405.35MHz)

Horizontal



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2388.116	10.254	39.923	50.177	-23.823	74.000	PEAK
2		2390.000	10.262	39.164	49.426	-24.574	74.000	PEAK
3		2400.000	10.304	57.494	67.797	-6.203	74.000	PEAK
4	*	2405.652	10.326	90.873	101.199	--	--	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.

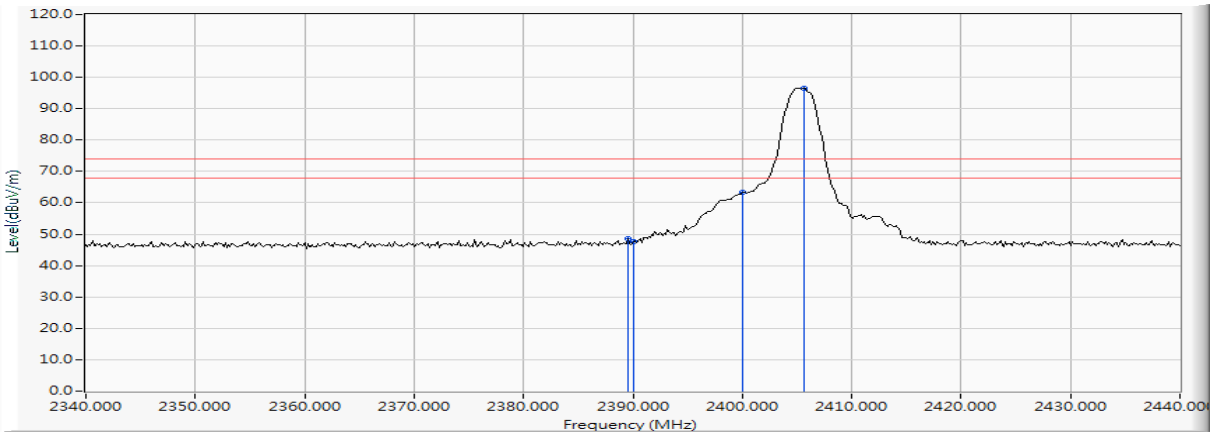
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)	Result
01 (Average)	2388.116	50.177	-40.386	9.791	-44.209	54.000	Pass
01 (Average)	2390.000	49.426	-40.386	9.040	-44.960	54.000	Pass
01 (Average)	2400.000	67.797	-40.386	27.411	-26.589	54.000	Pass

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Band Edge Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2405.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2389.565	10.261	38.329	48.589	-25.411	74.000	PEAK
2		2390.000	10.262	37.348	47.610	-26.390	74.000	PEAK
3		2400.000	10.304	53.086	63.389	-10.611	74.000	PEAK
4	*	2405.652	10.326	86.273	96.599	--	--	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.

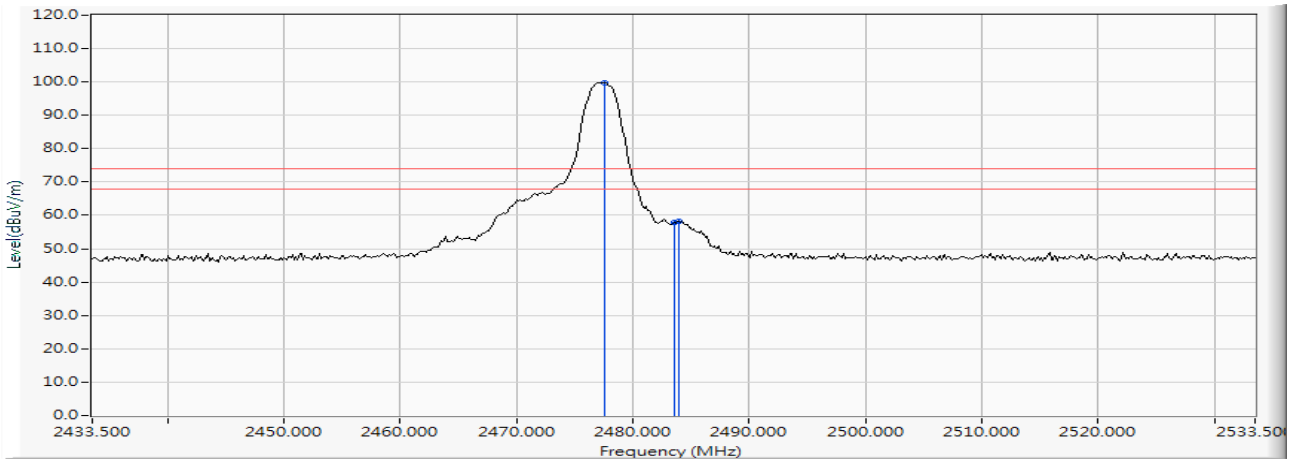
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)	Result
01 (Average)	2389.565	48.589	-40.386	8.203	-45.797	54.000	Pass
01 (Average)	2390.000	47.610	-40.386	7.224	-46.776	54.000	Pass
01 (Average)	2400.000	63.389	-40.386	23.003	-30.997	54.000	Pass

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Band Edge Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2477.35MHz)

Horizontal



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2477.558	10.617	89.127	99.745	--	--	PEAK
2		2483.500	10.640	47.187	57.828	-16.172	74.000	PEAK
3		2483.935	10.644	47.689	58.332	-15.668	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.

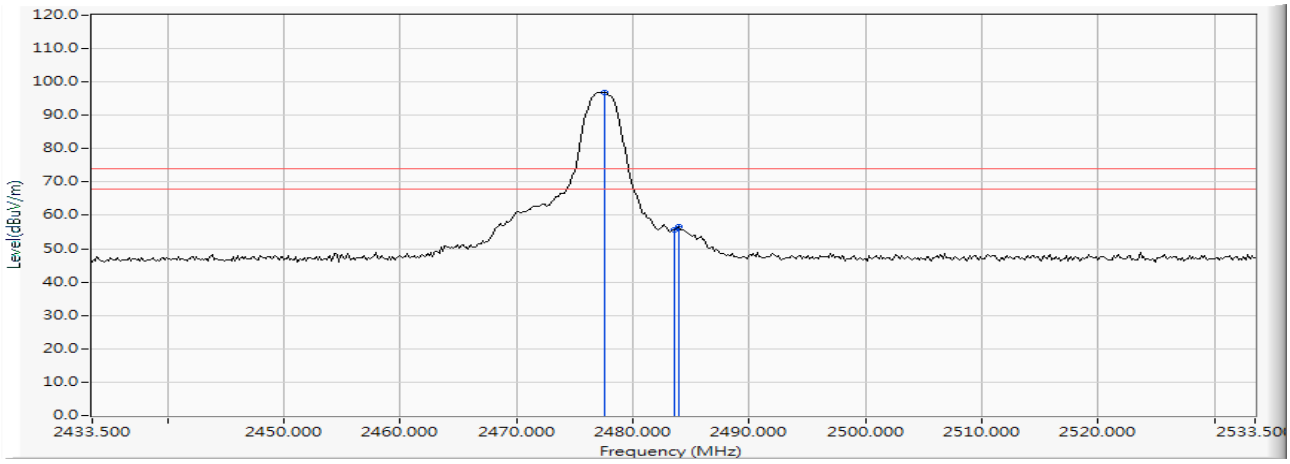
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)	Result
37 (Average)	2483.500	57.828	-40.386	17.442	-36.558	54.000	Pass
37 (Average)	2483.935	58.332	-40.386	17.946	-36.054	54.000	Pass

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 5.

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Band Edge Data
Test Date : 2019/03/28
Test Mode : Mode 1: Transmit (2477.35MHz)

Vertical



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2477.558	10.617	86.320	96.938	--	--	PEAK
2		2483.500	10.640	44.860	55.501	-18.499	74.000	PEAK
3		2483.935	10.644	45.940	56.583	-17.417	74.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.

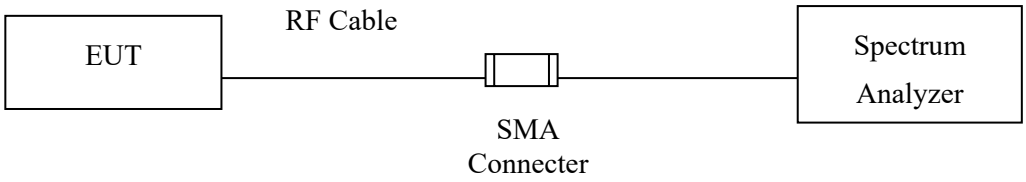
Channel No.	Frequency (MHz)	Peak Measurement (dBµV/m)	Duty Cycle Factor (dB)	Average Measurement (dBµV/m)	Margin (dB)	Average Limit (dBµV/m)	Result
37 (Average)	2483.500	55.501	-40.386	15.115	-38.885	54.000	Pass
37 (Average)	2483.935	56.583	-40.386	16.197	-37.803	54.000	Pass

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 5.

5. Duty Cycle

5.1. Test Setup

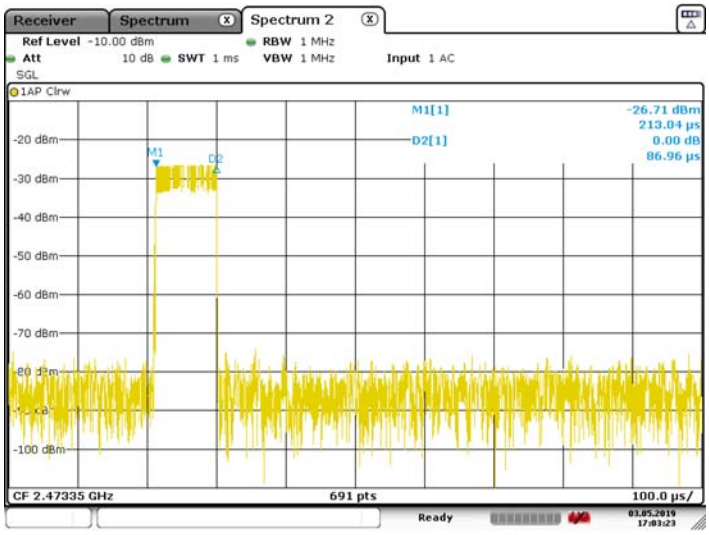


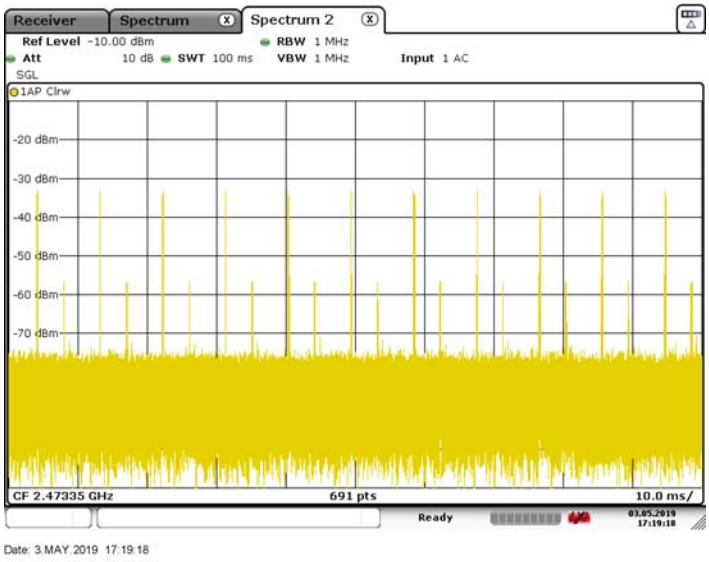
5.2. Uncertainty

± 2.31ms

5.3. Test Result of Duty Cycle

Product : TUF GAMING H7 WIRELESS Dongle
Test Item : Duty Cycle Data
Test Mode : Normal mode





Time on of 100ms= 86.96us*11=0.957ms

Duty Cycle=0.957ms / 100ms= 0.00957

Duty Cycle correction factor= 20 LOG 0.00957= -40.386 dB

Duty Cycle correction factor	**-40.386**	**dB**

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.