

## FCC Test Report

Product Name	TUF GAMING H1 WIRELESS DONGLE
Model No.	TUF GAMING H1 WIRELESS DONGLE
FCC ID	BJM-TH1WD

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

Date of Receipt	Jun. 27, 2021
Issued Date	Aug. 02, 2021
Report No.	2161098R-E3032110120
Report Version	V1.0



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.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

# Test Report

Issued Date: Aug. 02, 2021

Report No.: 2161098R-E3032110120



Product Name	TUF GAMING H1 WIRELESS DONGLE
Applicant	Tatung Company
Address	22 Chungshan N Road Sec 3 ,Taipei 10451,Taiwan
Manufacturer	Tatung Company
Model No.	TUF GAMING H1 WIRELESS DONGLE
FCC ID	BJM-TH1WD
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 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By

:

*Ida Tung*

( Project Specialist / Ida Tung )

Tested By

:

*Ivan Chuang*

( Senior Engineer / Ivan Chuang )

Approved By

:

*Alan Chen*

( Senior Engineer / Alan Chen )

## TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION .....</b>	<b>5</b>
1.1. EUT Description.....	5
1.2. Tested System Details.....	7
1.3. Configuration of Test System .....	7
1.4. EUT Exercise Software .....	7
1.5. Test Facility .....	8
1.6. List of Test Equipment .....	9
1.7. Uncertainty .....	10
<b>2. Conducted Emission.....</b>	<b>11</b>
2.1. Test Setup .....	11
2.2. Limits .....	11
2.3. Test Procedure .....	12
2.4. Test Result of Conducted Emission.....	13
<b>3. Radiated Emission.....</b>	<b>15</b>
3.1. Test Setup .....	15
3.2. Limits .....	16
3.3. Test Procedure .....	17
3.4. Test Result of Radiated Emission.....	18
<b>4. Band Edge .....</b>	<b>32</b>
4.1. Test Setup .....	32
4.2. Limits .....	32
4.3. Test Procedure .....	33
4.4. Test Result of Band Edge .....	34
<b>5. Duty Cycle.....</b>	<b>38</b>
5.1. Test Setup .....	38
5.2. Test Result of Duty Cycle.....	39
<b>6. EMI Reduction Method During Compliance Testing .....</b>	<b>40</b>
Appendix 1: EUT Test Photographs	
Appendix 2: EUT Detailed Photographs	

## **Revision History**

Report No.	Version	Description	Issued Date
2161098R-E3032110120	V1.0	Initial issue of report.	Aug. 02, 2021

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	TUF GAMING H1 WIRELESS DONGLE
Trade Name	ASUS
Model No.	TUF GAMING H1 WIRELESS DONGLE
FCC ID	BJM-TH1WD
Frequency Range	2403.35MHz~2477.35MHz
Channel Number	38CH
Type of Modulation	Pi/4 DQPSK
Antenna Type	Chip Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Connector	Trade Name: ASUS, M/N: TUF GAMING H1 WL

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Advanced Ceramic X Corp.	AT3216-B2R7HAA_	Chip Antenna	0.5dBi for 2.4GHz

Note: The antenna of EUT is conform to FCC 15.203

**Center Frequency of Each Channel:**

Channel	Frequency	Channel	Frequency
Channel 01:	2403.35MHz	Channel 21:	2443.35MHz
Channel 02:	2405.35MHz	Channel 22:	2445.35MHz
Channel 03:	2407.35MHz	Channel 23:	2447.35MHz
Channel 04:	2409.35MHz	Channel 24:	2449.35MHz
Channel 05:	2411.35MHz	Channel 25:	2451.35MHz
Channel 06:	2413.35MHz	Channel 26:	2453.35MHz
Channel 07:	2415.35MHz	Channel 27:	2455.35MHz
Channel 08:	2417.35MHz	Channel 28:	2457.35MHz
Channel 09:	2419.35MHz	Channel 29:	2459.35MHz
Channel 10:	2421.35MHz	Channel 30:	2461.35MHz
Channel 11:	2423.35MHz	Channel 31:	2463.35MHz
Channel 12:	2425.35MHz	Channel 32:	2465.35MHz
Channel 13:	2427.35MHz	Channel 33:	2467.35MHz
Channel 14:	2429.35MHz	Channel 34:	2469.35MHz
Channel 15:	2431.35MHz	Channel 35:	2471.35MHz
Channel 16:	2433.35MHz	Channel 36:	2473.35MHz
Channel 17:	2435.35MHz	Channel 37:	2475.35MHz
Channel 18:	2437.35MHz	Channel 38:	2477.35MHz
Channel 19:	2439.35MHz		
Channel 20:	2441.35MHz		

**Note:**

1. The EUT is a TUF GAMING H1 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. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. 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.

Test Mode	Mode 1: Transmit
	Mode 2: Normal mode

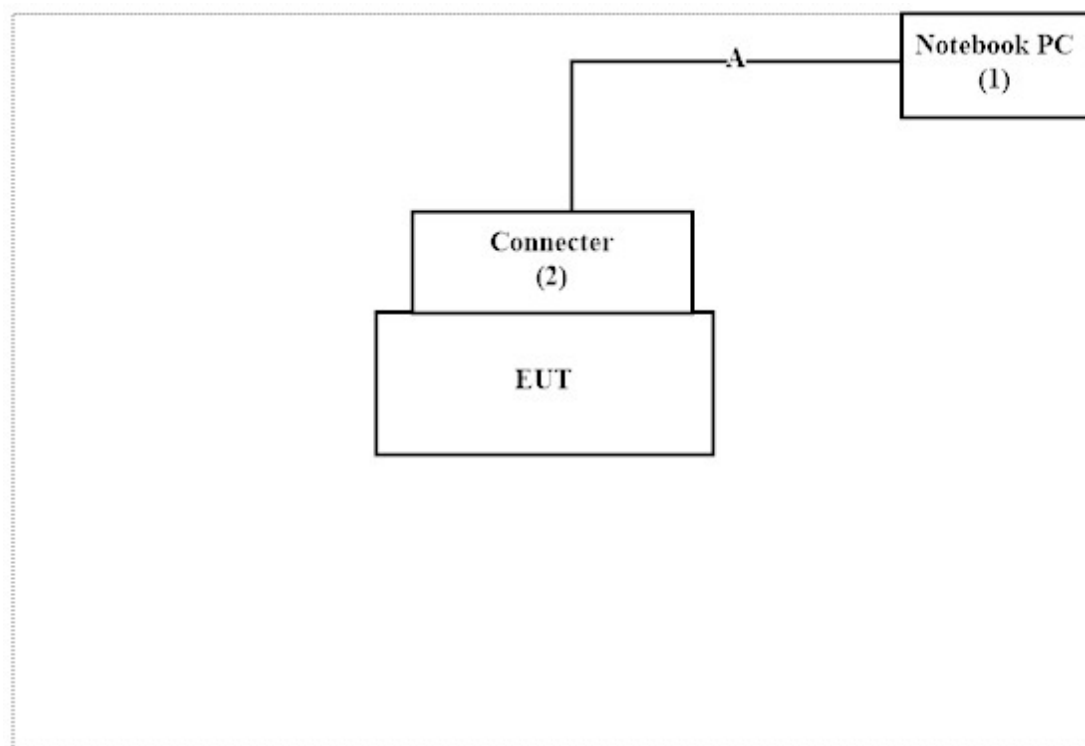
## 1.2. Tested System Details

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	Latitude 5501	GS9GL13	N/A
2	Connector	ASUS	TUF GAMING H1 WL	N/A	N/A

Signal Cable Type		Manufacturer	Model No.	Signal cable Description
A	USB Cable	cingkang	UB-192	Shielded, 1.8m

## 1.3. Configuration of Test System



## 1.4. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.3.
- (2) Execute “RF Power Version 2020.11.4.1” program on the Notebook PC.
- (3) Configure the test mode and the test channel
- (4) Start the continuous transmit.
- (5) Verify that the EUT works properly.

## 1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	29.5 °C
	Humidity (%RH)	10~90 %	54.3 %
Radiated Emission	Temperature (°C)	10~40 °C	25.3 °C
	Humidity (%RH)	10~90 %	65.2 %

**USA : FCC Registration Number: TW0033**

**Canada : IC Registration Number: 26930**

Site Description : Accredited by TAF  
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd  
Address : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City  
333411, Taiwan  
Phone number : +886-3-275-7255  
Fax number : +866-3-327-5505  
Email address : [info.tw@dekra.com](mailto:info.tw@dekra.com)  
Website : <http://www.dekra.com.tw>



## 1.6. List of Test Equipment

### For Conduction measurements /SH1

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	EMI Test Receiver	R&S	ESR7	101601	2021.01.04	2022.01.03
X	Two-Line V-Network	R&S	ENV216	101306	2021.04.08	2022.04.07
X	Two-Line V-Network	R&S	ENV216	101307	2021.05.04	2022.05.03
X	Coaxial Cable	DEKRA	RG400_BNC	RF001	2021.05.24	2022.05.23

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 : DEKRA Testing System V2.0

### For Conducted measurements /SH2

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Spectrum Analyzer	R&S	FSV30	103466	2021.02.11	2022.02.11
	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2021.06.07	2022.06.06
	Power Sensor	KEYSIGHT	N1923A	MY59240002	2021.05.17	2022.05.16
	Power Sensor	KEYSIGHT	N1923A	MY59240003	2021.05.17	2022.05.16

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 V9.0.5

### For Radiated measurements /966-3

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Loop Antenna	AMETEK	HLA6121	49611	2021.04.14	2021.03.15
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-678	2020.09.04	2021.01.02
X	Horn Antenna	ETS-Lindgren	3117	00201259	2020.10.23	2021.10.22
X	Horn Antenna	Com-Power	AH-840	101087	2020.06.08	2021.06.07
X	Pre-Amplifier	EMCI	EMC001330	980254	2021.01.20	2022.01.19
X	Pre-Amplifier	EMCI	EMC051835SE	980313	2020.11.25	2021.11.24
X	Pre-Amplifier	EMCI	EMC05820SE	980309	2020.09.26	2021.09.25
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2021.06.24	2022.06.23
X	Filter	MICRO TRONICS	BRM50702	G251	2020.09.17	2021.09.16
	Filter	MICRO TRONICS	BRM50716	G188	2020.09.17	2021.09.16
X	EMI Test Receiver	R&S	ESR7	101602	2020.12.17	2021.12.16
X	Spectrum Analyzer	R&S	FSV40	101148	2021.02.03	2022.02.02
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2021.03.03	2022.03.02
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2021.06.24	2022.06.23

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 : DEKRA Testing System V2.0

## 1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

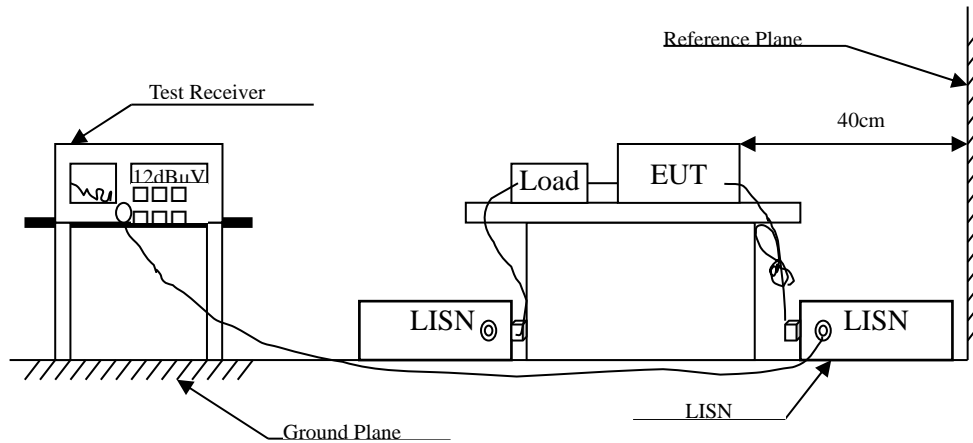
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	$\pm 3.42$ dB	
Radiated Emission	Under 1GHz $\pm 4.06$ dB	Above 1GHz $\pm 3.73$ dB
Band Edge	Under 1GHz $\pm 4.06$ dB	Above 1GHz $\pm 3.73$ dB
Duty Cycle	$\pm 2.31$ ms	

## 2. Conducted Emission

### 2.1. Test Setup



### 2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB $\mu$ V ) 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**

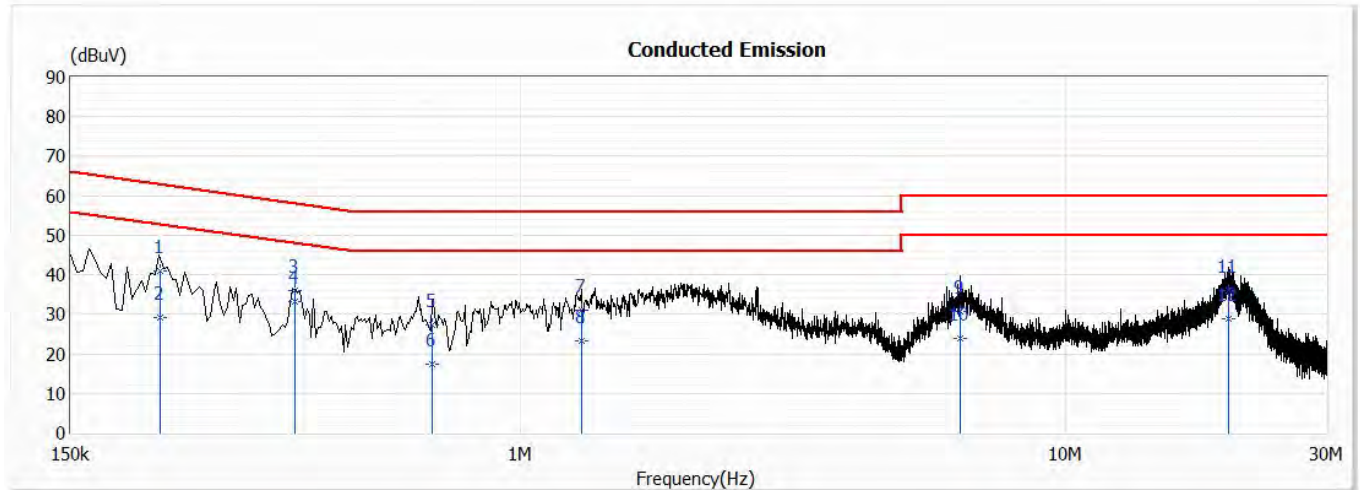
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling 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 investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 2.4. Test Result of Conducted Emission

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Conducted Emission Test  
 Power Line : L1  
 Test Date : 2021/06/29  
 Test Mode : Mode 1: Transmit (2439.35MHz)

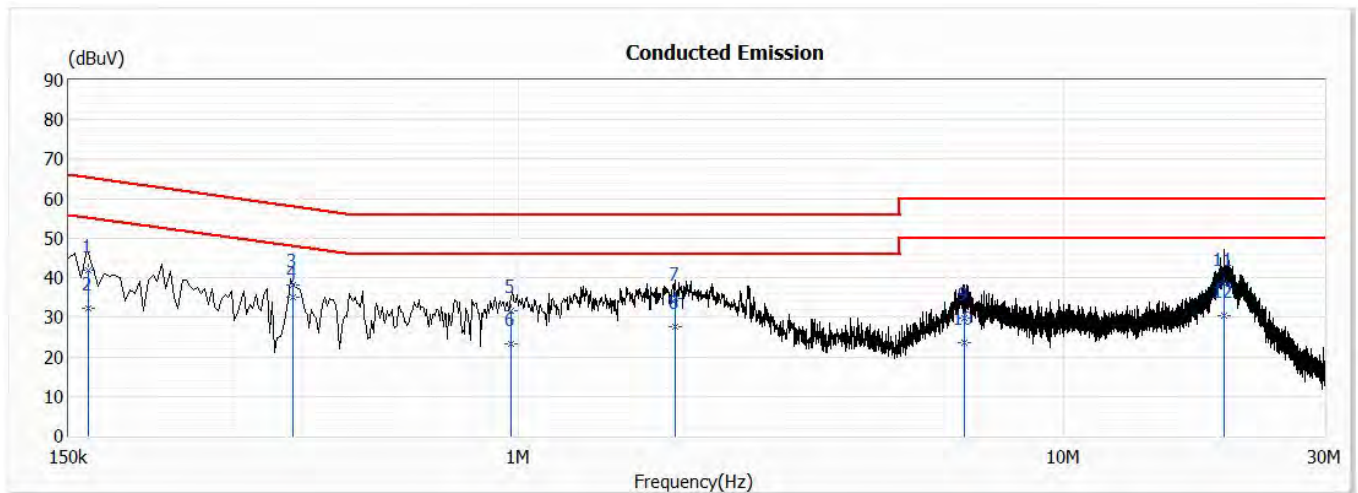


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.219	40.98	62.87	-21.89	31.33	9.65	QP
2	0.219	29.09	52.87	-23.78	19.44	9.65	AV
3	0.385	35.87	58.16	-22.29	26.21	9.66	QP
*4	0.385	33.09	48.16	-15.07	23.43	9.66	AV
5	0.689	27.30	56.00	-28.70	17.63	9.67	QP
6	0.689	17.41	46.00	-28.59	7.74	9.67	AV
7	1.295	31.04	56.00	-24.96	21.34	9.70	QP
8	1.295	23.39	46.00	-22.61	13.69	9.70	AV
9	6.392	30.76	60.00	-29.24	20.94	9.82	QP
10	6.392	24.00	50.00	-26.00	14.18	9.82	AV
11	19.821	36.11	60.00	-23.89	26.14	9.97	QP
12	19.821	28.72	50.00	-21.28	18.75	9.97	AV

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 H1 WIRELESS DONGLE  
 Test Item : Conducted Emission Test  
 Power Line : N  
 Test Date : 2021/06/30  
 Test Mode : Mode 1: Transmit (2439.35MHz)



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.163	41.79	65.30	-23.51	32.12	9.67	QP
2	0.163	32.43	55.30	-22.87	22.76	9.67	AV
3	0.386	38.25	58.16	-19.91	28.58	9.67	QP
*4	0.386	34.96	48.16	-13.20	25.29	9.67	AV
5	0.968	31.52	56.00	-24.48	21.83	9.69	QP
6	0.968	23.43	46.00	-22.57	13.74	9.69	AV
7	1.936	34.89	56.00	-21.11	25.16	9.73	QP
8	1.936	27.75	46.00	-18.25	18.02	9.73	AV
9	6.551	29.89	60.00	-30.11	20.04	9.85	QP
10	6.551	23.72	50.00	-26.28	13.87	9.85	AV
11	19.656	38.54	60.00	-21.46	28.49	10.05	QP
12	19.656	30.34	50.00	-19.66	20.29	10.05	AV

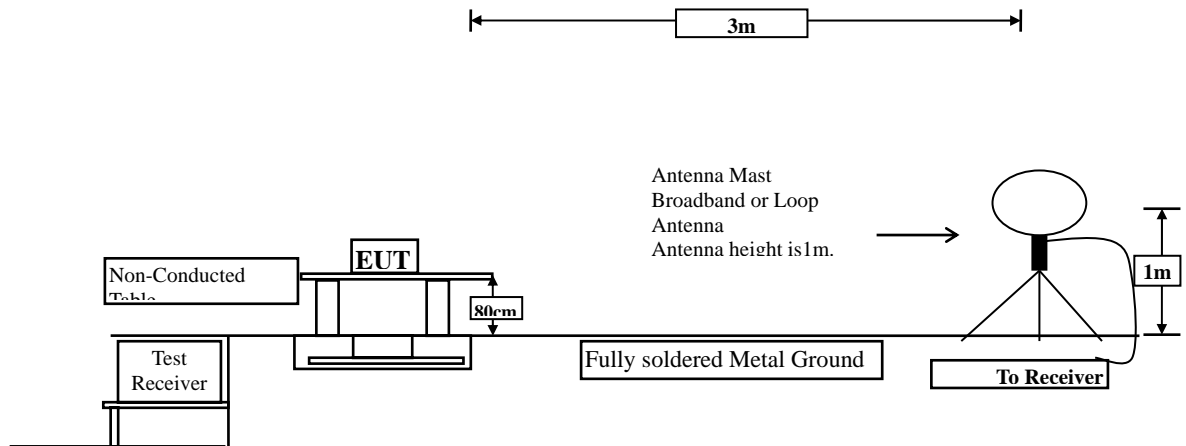
Note:

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

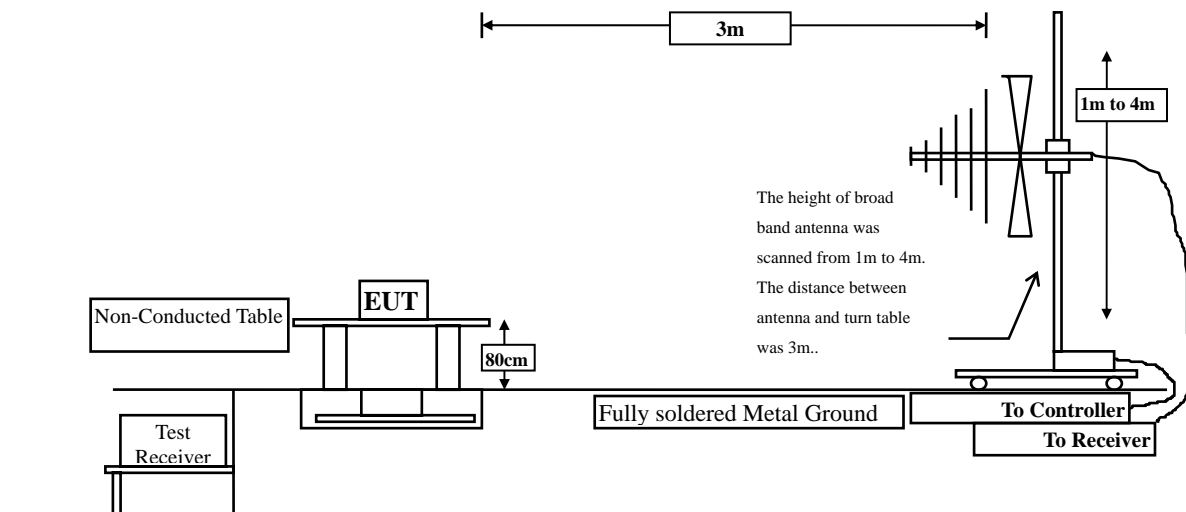
### 3. Radiated Emission

#### 3.1. Test Setup

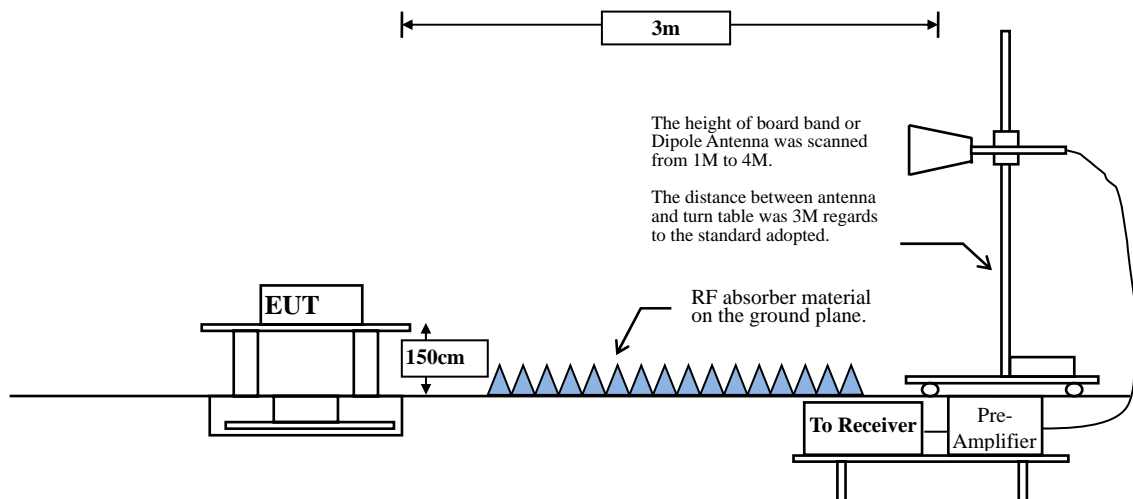
##### Radiated Emission Under 30MHz



##### 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
24000-24250	250	108	2500	68

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.

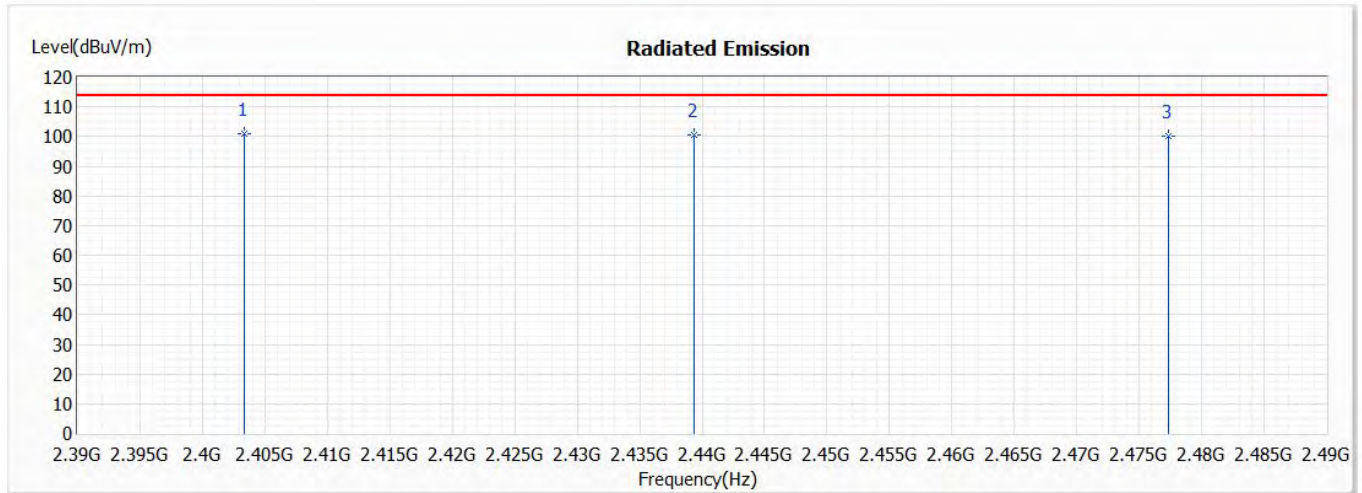
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the 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 from 9kHz - 10th Harmonic of fundamental was investigated.

### 3.4. Test Result of Radiated Emission

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

#### Horizontal\_X-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	100.89	114.00	-13.11	88.41	12.48	PK
2	2439.350	100.55	114.00	-13.45	87.96	12.59	PK
3	2477.350	99.95	114.00	-14.05	87.25	12.70	PK

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.

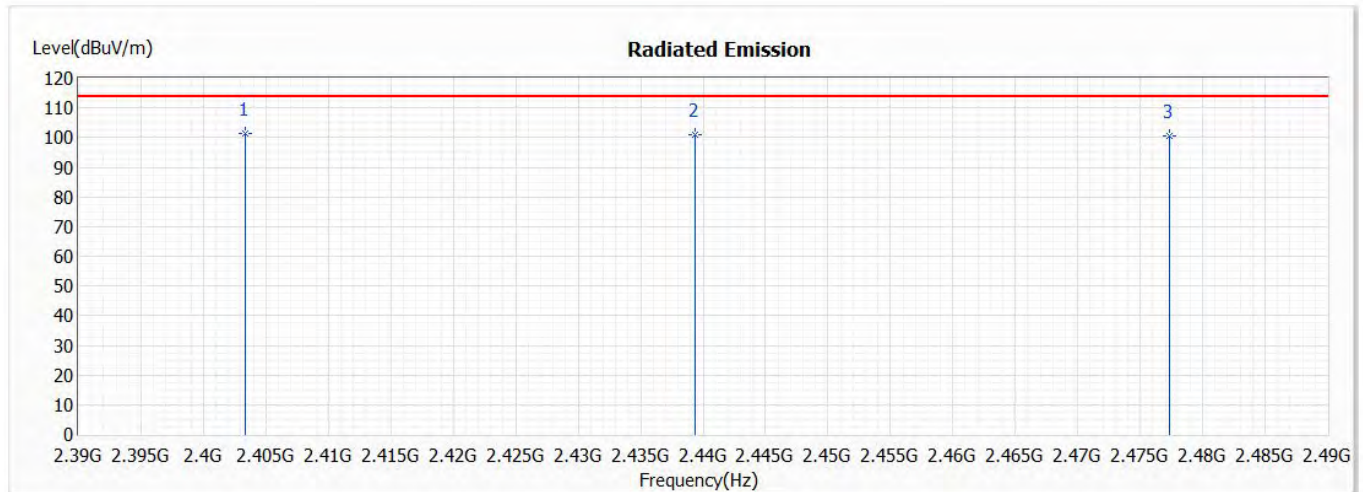
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	100.890	-40.382	60.508	-33.492	94.000
2439.350	100.550	-40.382	60.168	-33.832	94.000
2477.350	99.950	-40.382	59.568	-34.432	94.000

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

### Vertical\_X-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	101.25	114.00	-12.75	88.77	12.48	PK
2	2439.350	101.11	114.00	-12.89	88.52	12.59	PK
3	2477.350	100.46	114.00	-13.54	87.76	12.70	PK

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.

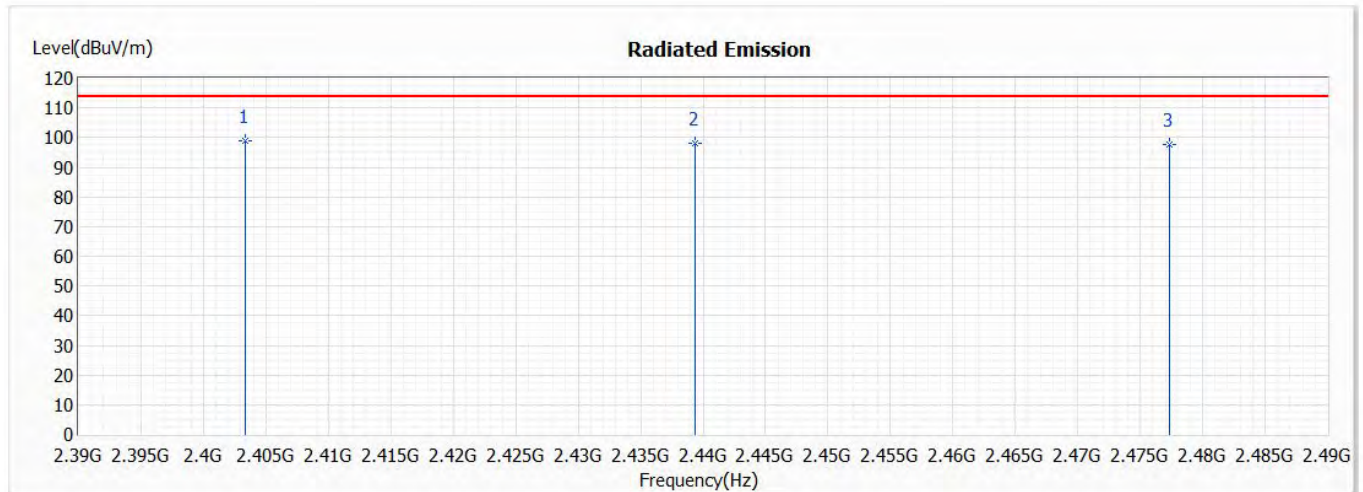
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	101.250	-40.382	60.868	-33.132	94.000
2439.350	101.110	-40.382	60.728	-33.272	94.000
2477.350	100.460	-40.382	60.078	-33.922	94.000

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

### Horizontal\_Y-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	98.96	114.00	-15.04	86.48	12.48	PK
2	2439.350	98.16	114.00	-15.84	85.57	12.59	PK
3	2477.350	97.59	114.00	-16.41	84.89	12.70	PK

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.

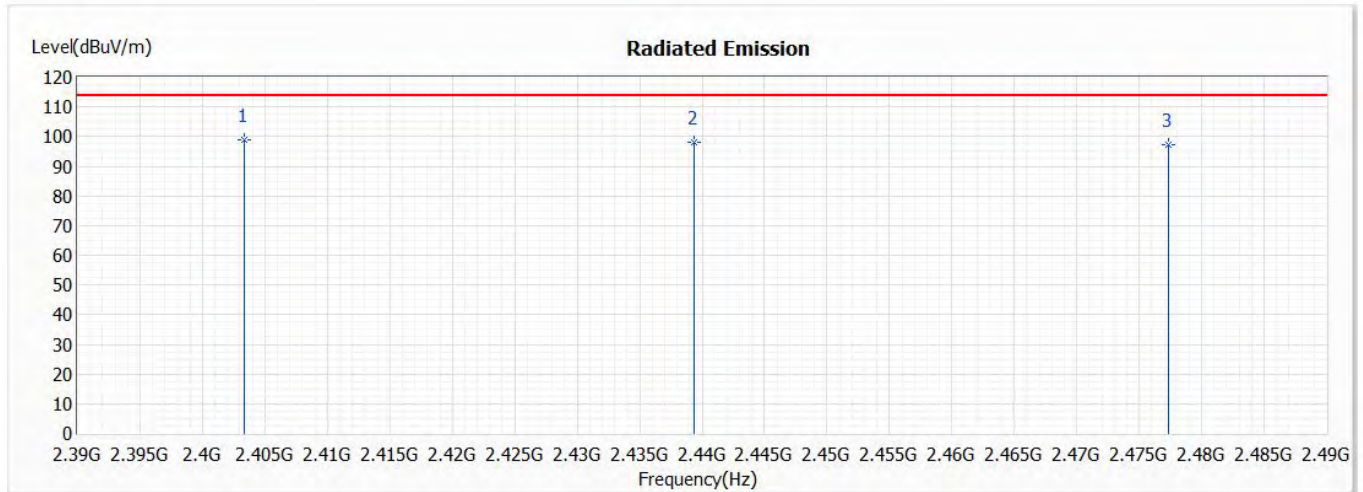
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	98.960	-40.382	58.578	-35.422	94.000
2439.350	98.160	-40.382	57.778	-36.222	94.000
2477.350	97.590	-40.382	57.208	-36.792	94.000

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

### Vertical\_Y-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	98.85	114.00	-15.15	86.37	12.48	PK
2	2439.350	98.22	114.00	-15.78	85.63	12.59	PK
3	2477.350	97.38	114.00	-16.62	84.68	12.70	PK

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.

Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	98.850	-40.382	58.468	-35.532	94.000
2439.350	98.220	-40.382	57.838	-36.162	94.000
2477.350	97.380	-40.382	56.998	-37.002	94.000

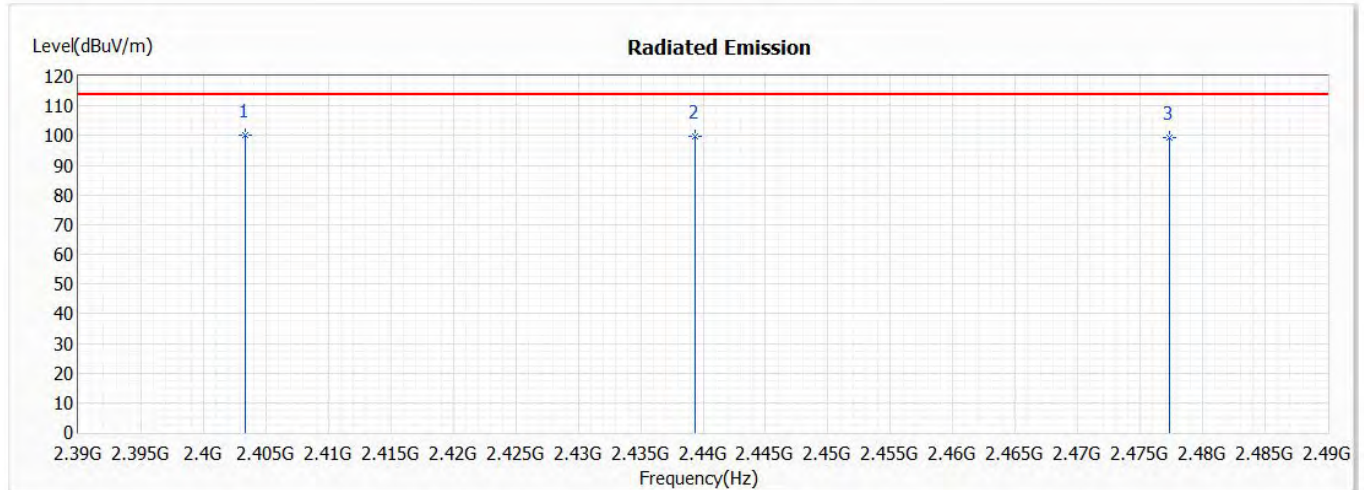
Note:

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



Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

### Horizontal\_Z-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	100.08	114.00	-13.92	87.60	12.48	PK
2	2439.350	99.91	114.00	-14.09	87.32	12.59	PK
3	2477.350	99.12	114.00	-14.88	86.42	12.70	PK

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.

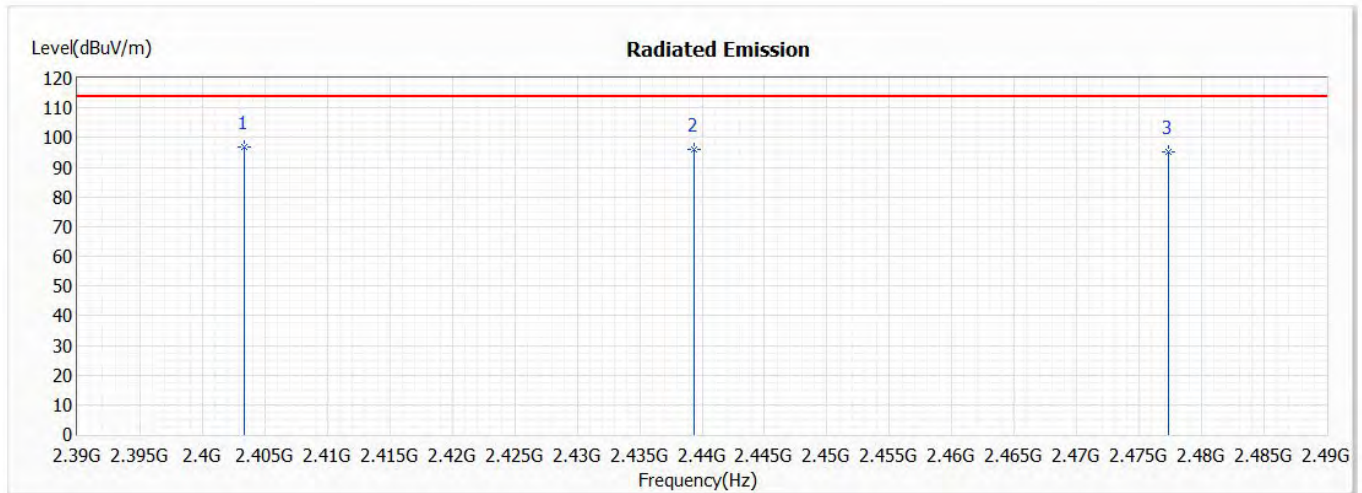
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	100.080	-40.382	59.698	-34.302	94.000
2439.350	99.910	-40.382	59.528	-34.472	94.000
2477.350	99.120	-40.382	58.738	-35.262	94.000

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Fundamental Radiated Emission  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit

### Vertical\_Z-Axis



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	2403.350	96.77	114.00	-17.23	84.29	12.48	PK
2	2439.350	95.87	114.00	-18.13	83.28	12.59	PK
3	2477.350	95.20	114.00	-18.80	82.50	12.70	PK

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.

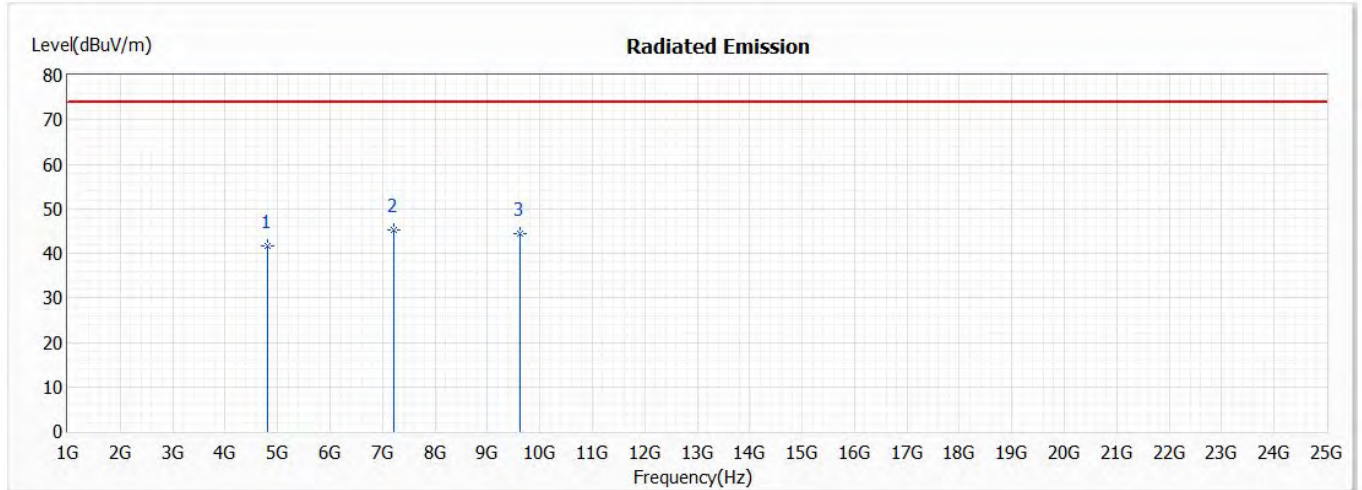
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)
2403.350	96.770	-40.382	56.388	-37.612	94.000
2439.350	95.870	-40.382	55.488	-38.512	94.000
2477.350	95.200	-40.382	54.818	-39.182	94.000

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2403.35MHz)

### Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4806.700	41.79	74.00	-32.21	43.36	-1.57	PK
* 2	7210.050	45.32	74.00	-28.68	42.40	2.92	PK
3	9613.400	44.54	74.00	-29.46	39.60	4.94	PK

#### 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
--	--	--	--	--	74.000	54.000

#### Average Detector:

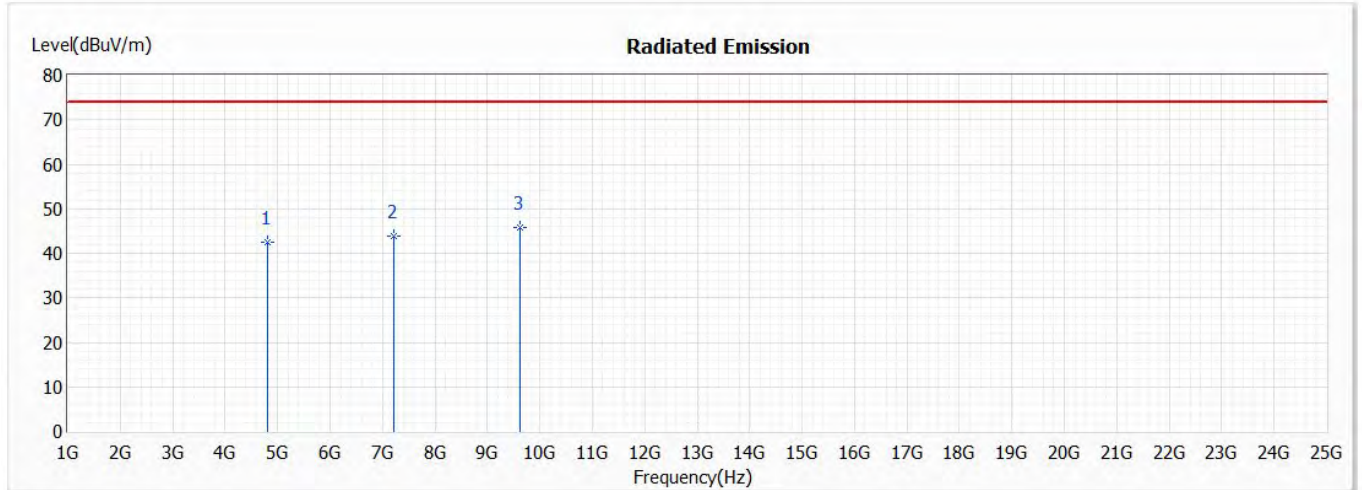
#### Note:

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



Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2403.35MHz)

### Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4806.700	42.56	74.00	-31.44	44.13	-1.57	PK
2	7210.050	43.94	74.00	-30.06	41.02	2.92	PK
* 3	9613.400	45.88	74.00	-28.12	40.94	4.94	PK

Note:

- All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- Measurement Level = Reading Level + Correct Factor.
- Correct Factor = Antenna factor + Cable loss – Amplifier gain.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- 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
--	--	--	--	--	74.000	54.000

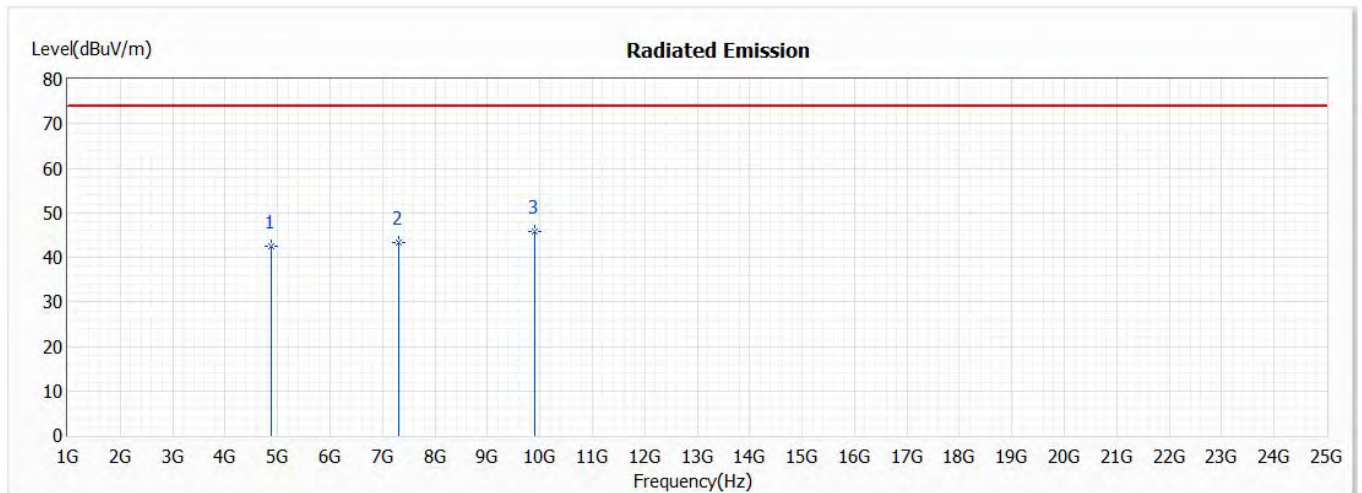
### Average Detector:

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2439.35MHz)

### Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4878.700	42.41	74.00	-31.59	43.91	-1.50	PK
2	7318.050	43.36	74.00	-30.64	40.43	2.93	PK
* 3	9757.400	45.74	74.00	-28.26	40.49	5.25	PK

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
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#### Average Detector:

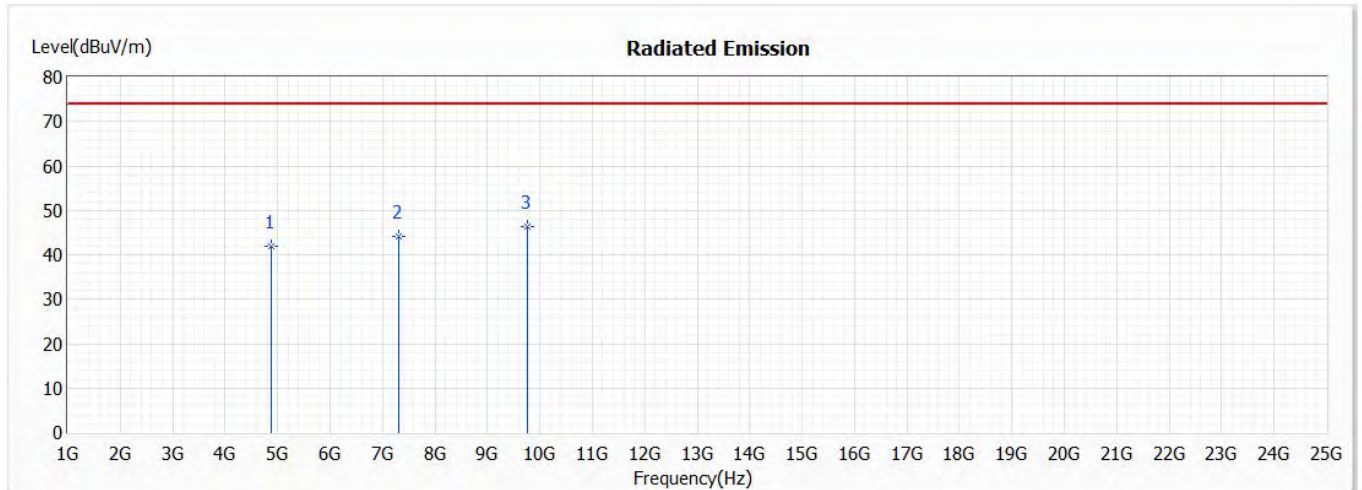
--	--	--	--	--	74.000	54.000
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Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2439.35MHz)

### Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4878.700	42.01	74.00	-31.99	43.51	-1.50	PK
2	7318.050	44.07	74.00	-29.93	41.14	2.93	PK
* 3	9757.400	46.28	74.00	-27.72	41.03	5.25	PK

#### Note:

- All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- Measurement Level = Reading Level + Correct Factor.
- Correct Factor = Antenna factor + Cable loss – Amplifier gain.
- The average measurement was not performed when the peak measured data under the limit of average detection.
- 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
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#### Average Detector:

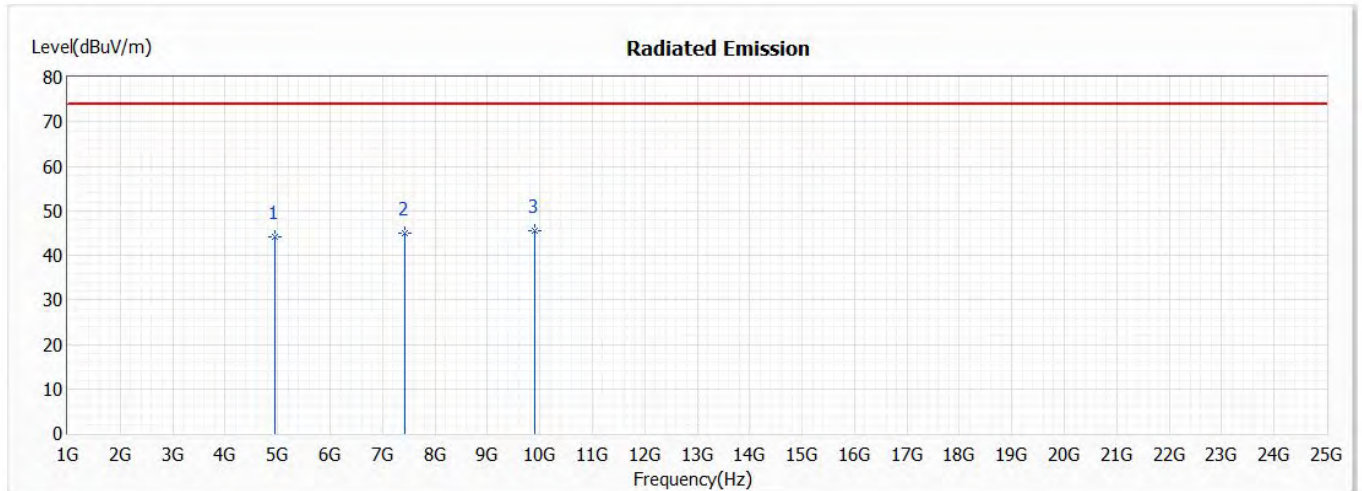
--	--	--	--	--	74.000	54.000
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#### Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2477.35MHz)

### Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4954.700	44.09	74.00	-29.91	45.23	-1.14	PK
2	7432.050	44.94	74.00	-29.06	41.88	3.06	PK
* 3	9909.400	45.40	74.00	-28.60	39.98	5.42	PK

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
--	--	--	--	--	74.000	54.000

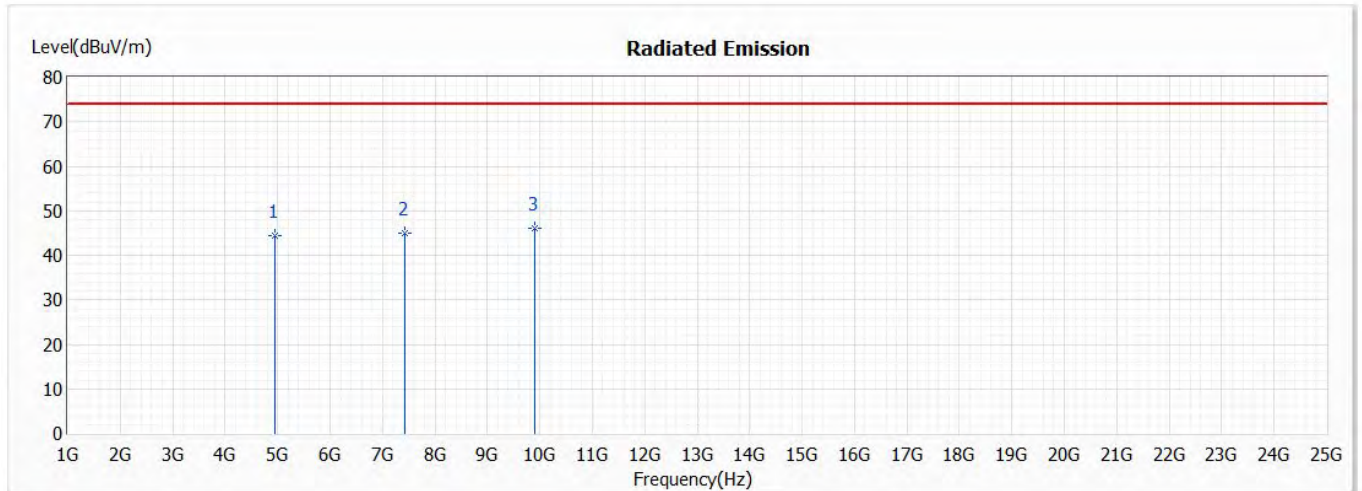
### Average Detector:

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Harmonic Radiated Emission Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2477.35MHz)

## Vertical



### 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
--	--	--	--	--	74.000	54.000

### Average Detector:

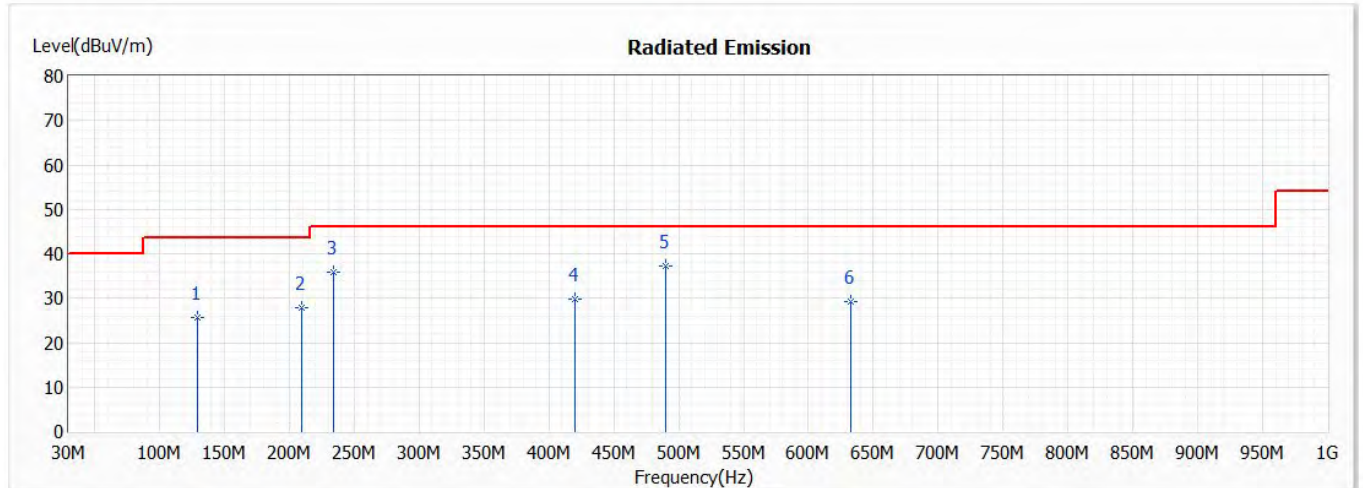
### Note:

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



Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : General Radiated Emission Data  
 Test Date : 2020/11/03  
 Test Mode : Mode 1: Transmit (2439.35MHz)

### Horizontal



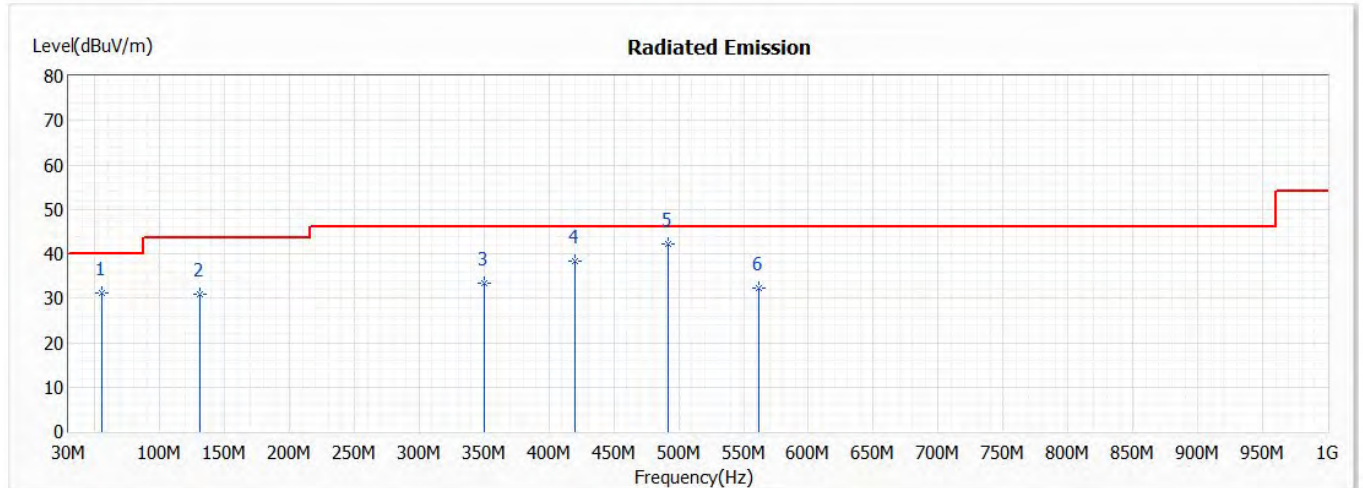
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	128.940	25.61	43.50	-17.89	37.69	-12.08	QP
2	209.450	27.92	43.50	-15.58	41.00	-13.08	QP
3	233.700	35.84	46.00	-10.16	47.35	-11.51	QP
4	419.940	29.73	46.00	-16.27	36.37	-6.64	QP
* 5	489.780	37.27	46.00	-8.73	42.66	-5.39	QP
6	632.370	29.16	46.00	-16.84	31.76	-2.60	QP

### Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : General Radiated Emission Data  
 Test Date : 2020/11/03  
 Test Mode : Mode 1: Transmit (2439.35MHz)

### Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	55.220	31.12	40.00	-8.88	41.81	-10.69	QP
2	130.880	30.91	43.50	-12.59	42.77	-11.86	QP
3	350.100	33.31	46.00	-12.69	41.76	-8.45	QP
4	419.940	38.43	46.00	-7.57	45.07	-6.64	QP
* 5	491.720	42.26	46.00	-3.74	47.63	-5.37	QP
6	561.560	32.25	46.00	-13.75	36.08	-3.83	QP

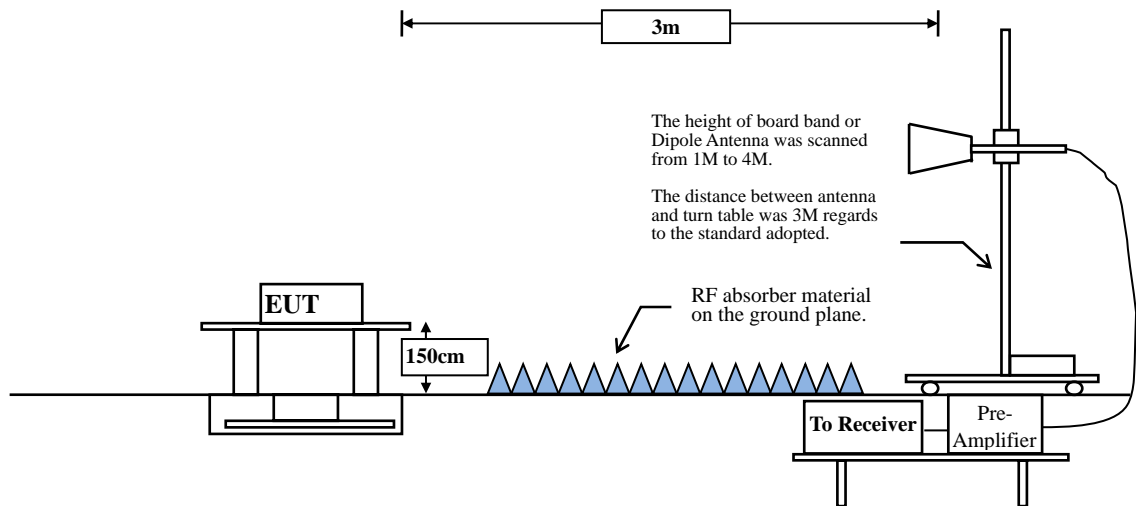
### Note:

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

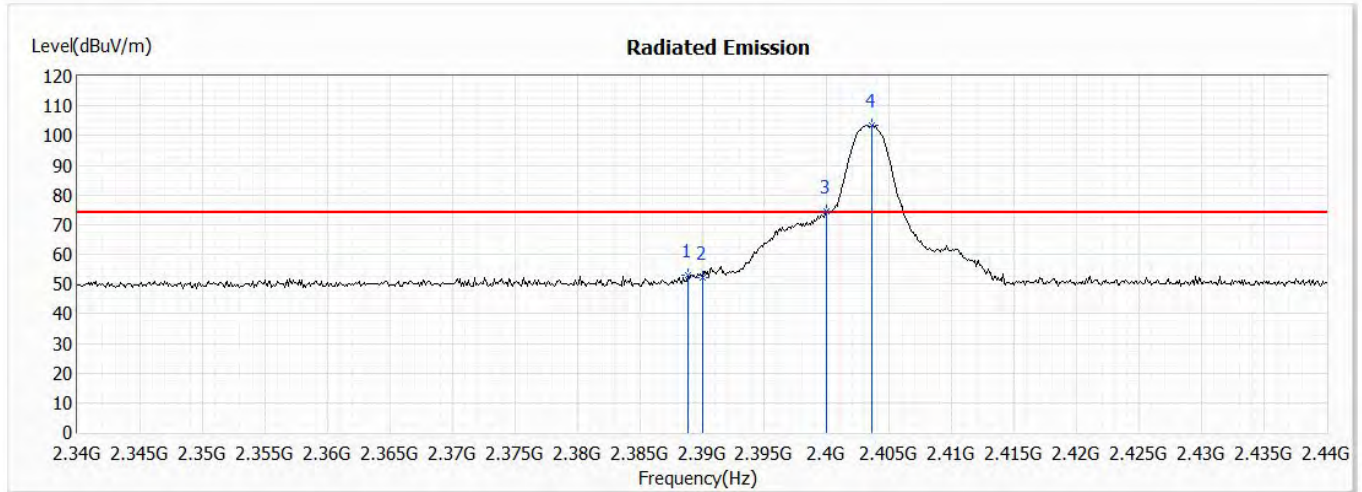
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

#### 4.4. Test Result of Band Edge

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Band Edge Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2403.35MHz)

##### Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2388.900	52.87	74.00	-21.13	40.50	12.37	PK
2	2390.000	52.19	74.00	-21.81	39.81	12.38	PK
3	2400.000	72.37	74.00	-1.63	59.91	12.46	PK
4	2403.600	103.38	--	--	90.90	12.48	PK

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.

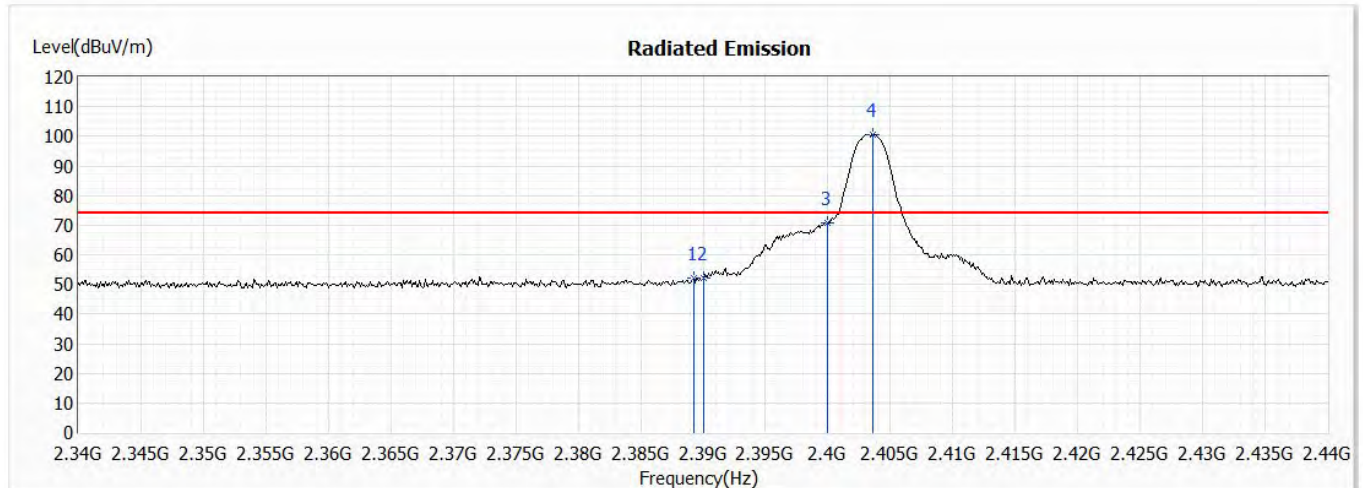
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)	Result
2388.900	52.870	-40.382	12.488	-41.512	54.000	Pass
2390.000	52.190	-40.382	11.808	-42.192	54.000	Pass
2400.000	72.370	-40.382	31.988	-22.012	54.000	Pass
2403.600	103.380	-40.382	62.998	--	--	Pass

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Band Edge Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2403.35MHz)

### Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2389.300	52.22	74.00	-21.78	39.84	12.38	PK
2	2390.000	52.10	74.00	-21.90	39.72	12.38	PK
3	2400.000	70.82	74.00	-3.18	58.36	12.46	PK
4	2403.600	100.60	--	--	88.12	12.48	PK

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.

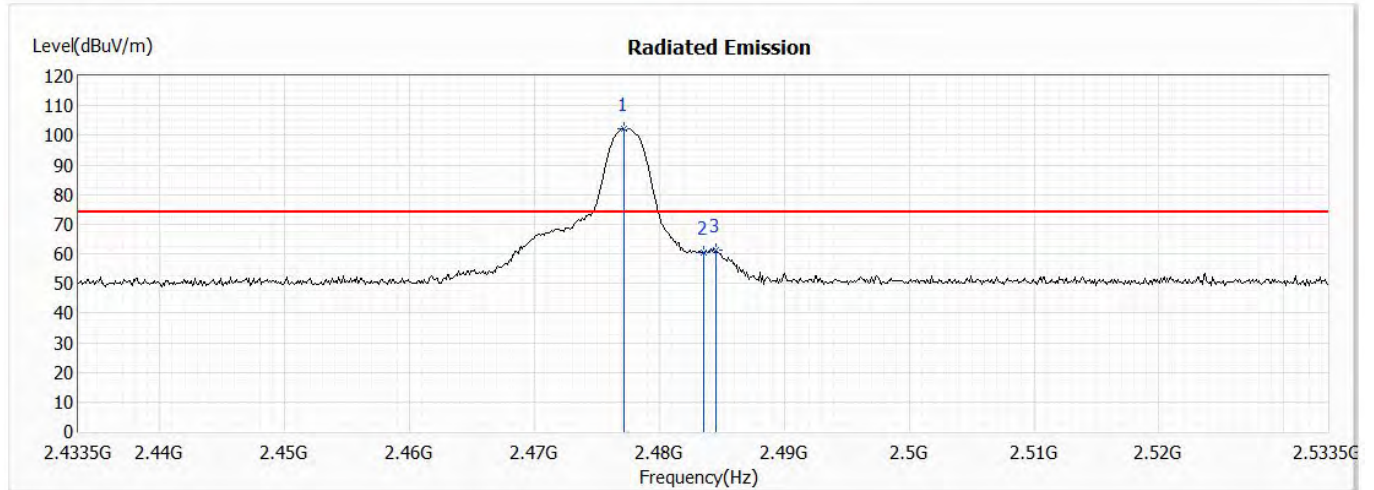
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)	Result
2389.300	52.220	-40.382	11.838	-42.162	54.000	Pass
2390.000	52.100	-40.382	11.718	-42.282	54.000	Pass
2400.000	70.820	-40.382	30.438	-23.562	54.000	Pass
2403.600	100.600	-40.382	60.218	--	--	Pass

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Band Edge Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2477.35MHz)

### Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2477.200	102.10	--	--	89.40	12.70	PK
2	2483.500	60.38	74.00	-13.62	47.65	12.73	PK
3	2484.500	61.41	74.00	-12.59	48.68	12.73	PK

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.

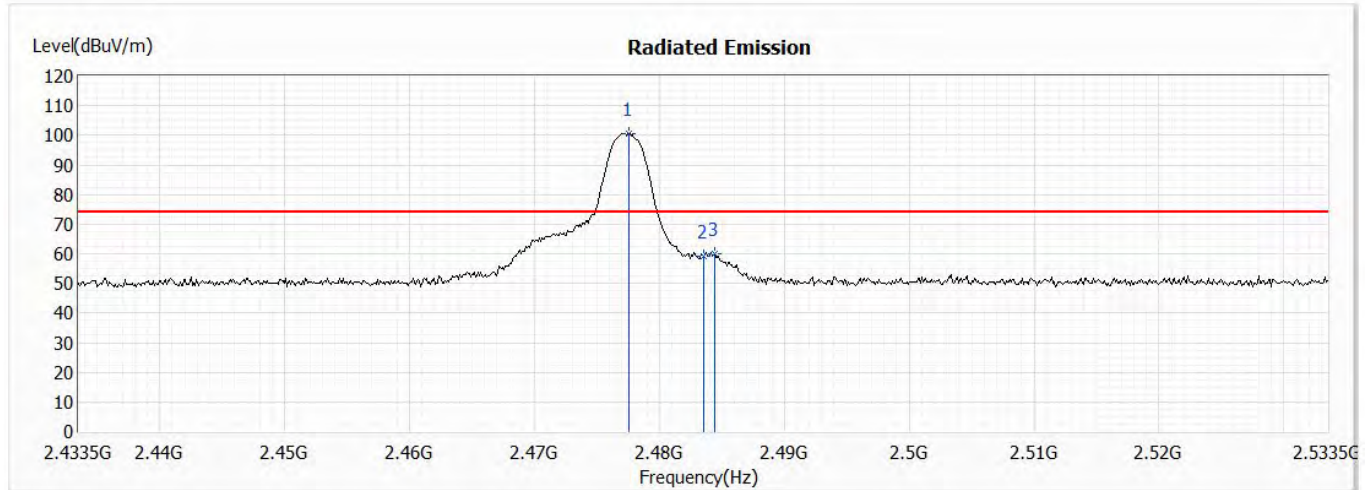
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)	Result
2477.200	102.100	-40.382	61.718	--	--	Pass
2483.500	60.380	-40.382	19.998	-34.002	54.000	Pass
2484.500	61.410	-40.382	21.028	-32.972	54.000	Pass

Note:

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

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Band Edge Data  
 Test Date : 2021/07/01  
 Test Mode : Mode 1: Transmit (2477.35MHz)

### Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2477.600	100.61	--	--	87.90	12.71	PK
2	2483.500	59.30	74.00	-14.70	46.57	12.73	PK
3	2484.400	60.00	74.00	-14.00	47.27	12.73	PK

#### 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.

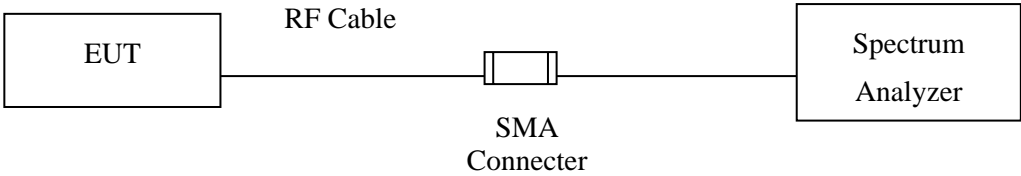
Frequency (MHz)	Peak Measurement (dBμV/m)	Duty Cycle Factor (dB)	Average Measurement (dBμV/m)	Margin (dB)	Average Limit (dBμV/m)	Result
2477.600	100.610	-40.382	60.228	--	--	Pass
2483.500	59.300	-40.382	18.918	-35.082	54.000	Pass
2484.400	60.000	-40.382	19.618	-34.382	54.000	Pass

#### Note:

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

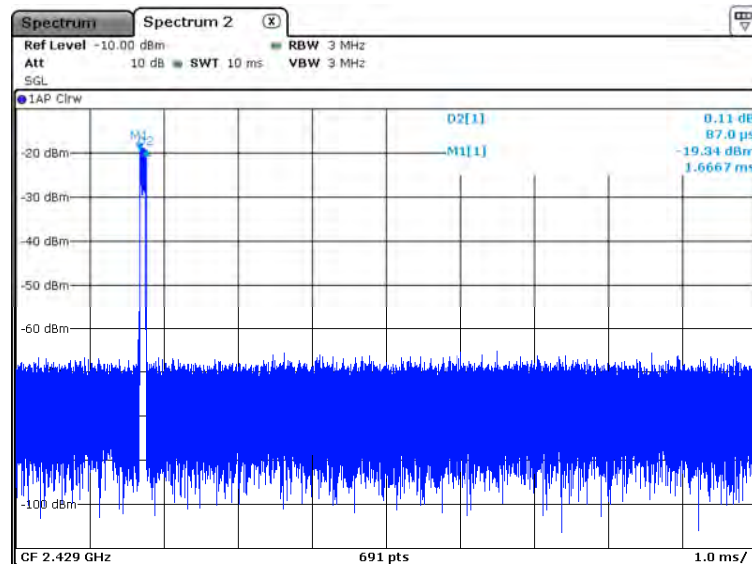
**5. Duty Cycle**

**5.1. Test Setup**

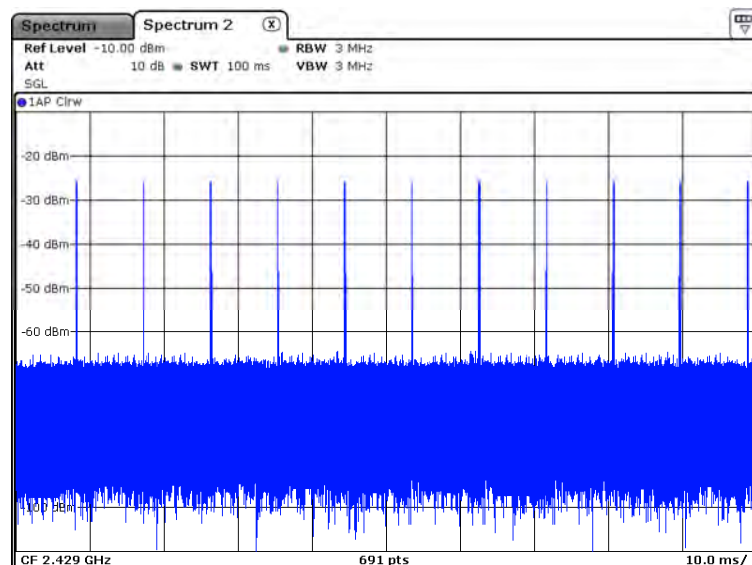


## 5.2. Test Result of Duty Cycle

Product : TUF GAMING H1 WIRELESS DONGLE  
 Test Item : Duty Cycle Data  
 Test Mode : Mode 2: Normal mode



Date: 17.SEP.2021 07:45:26



Date: 17.SEP.2021 07:49:28

Time on of 100ms= 87us\*11= 0.957ms

Duty Cycle=0.957ms / 100ms= 0.00957

Duty Cycle correction factor= 20 LOG 0.00957= -40.382dB

<b>Duty Cycle correction factor</b>	<b>-40.382 dB</b>
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## **6. EMI Reduction Method During Compliance Testing**

No modification was made during testing.