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Report No.: 1908TW8501-U3
Report Version: 1.0
Issue Date: 2019-09-19

MEASUREMENT REPORT

FCC PART 15.247 & RSS-247 ANT+

FCC ID:	2AH2P-BC90019
APPLICANT:	DECATHLON USA LLC
Application Type:	Certification
Product:	GPS BIKE COMPUTER
Model No.:	BC900
FCC Classification:	(DTS) Digital Transmission System
FCC Rule Part(s):	Part 15.247
Test Procedure(s):	ANSI C63.10-2013, KDB 558074 D01v05r02
Received Date:	August 2, 2019
Test Date:	August 14 ~ 28, 2019

Tested By : (Peter Syu)

Reviewed By : (Paddy Chen)

Approved By : (Chenz Ker)

Testing Laboratory
3261

The test results only relate to the tested sample.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
1908TW8501-U3	1.0	Original Report	2019-09-19	

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§2.1033 General Information

Applicant	DECATHLON USA LLC
Applicant Address	2415 3rd Street, Suite 231, San Francisco, California 94107, United States
Manufacturer	DECATHLON SE
Manufacturer Address	4 Boulevard de Mons 59650 VILLENEUVE D’ASCQ FRANCE
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT FCC Registration No.	291082
FCC Rule Part(s)	Part 15.247
Model No.	BC900
Test Device Serial No.	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

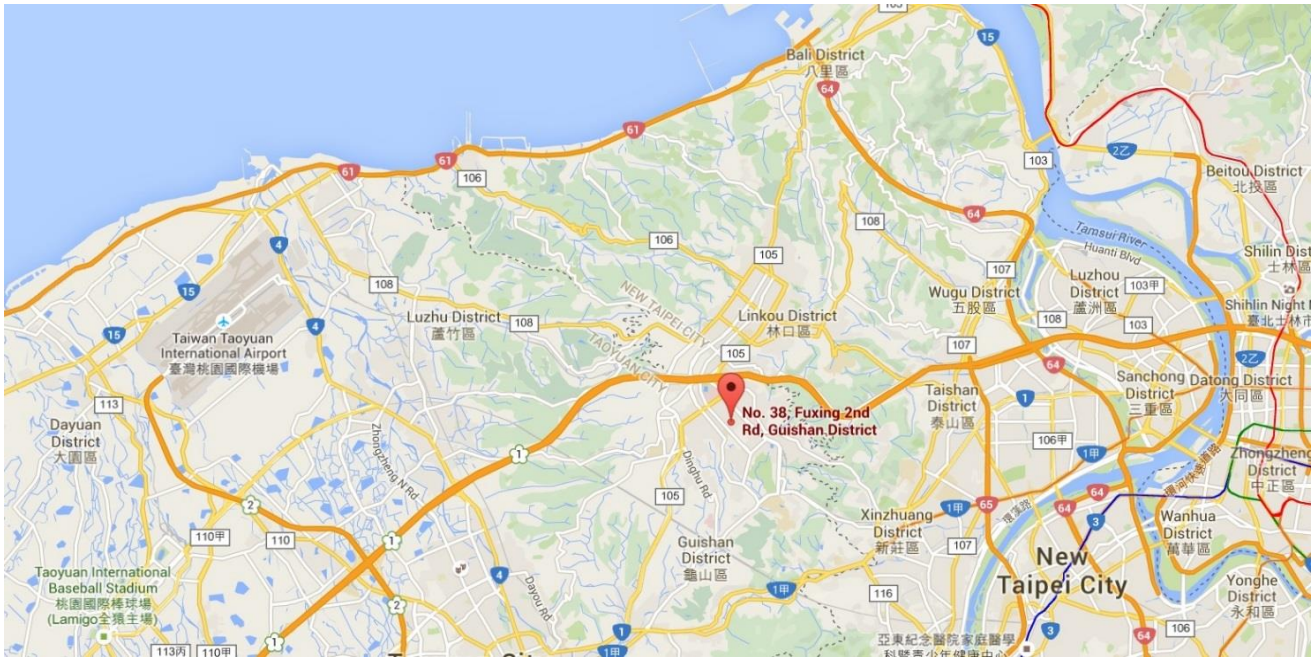
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	GPS BIKE COMPUTER
Model No.	BC900
Trademark	DECATHLON
Supports Radios Spec.	BLE 4.2 ANT+ GPS
Specification	ANT+
Maximum Power	-3.117dBm
Battery	DC 3.7V / 1.3Wh / 350mAh
Item code	2538963
Conception code	124542
Model code	8487158

2.2. Product Specification Subjective to this Standard

Operating Frequency	2402~2480MHz
Type of modulation	GFSK
Data Rate	1Mbps

2.3. Test Mode

Test Mode	Mode 1: Transmit – ANT+

Note: Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.

2.4. Operation Frequency / Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz
03	2405 MHz	04	2406 MHz	05	2407 MHz
06	2408 MHz	07	2409 MHz	08	2410 MHz
09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz
15	2417 MHz	16	2418 MHz	17	2419 MHz
18	2420 MHz	19	2421 MHz	20	2422 MHz
21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz
27	2429 MHz	28	2430 MHz	29	2431 MHz
30	2432 MHz	31	2433 MHz	32	2434 MHz
33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz
39	2441 MHz	40	2442 MHz	41	2443 MHz
42	2444 MHz	43	2445 MHz	44	2446 MHz
45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz
51	2453 MHz	52	2454 MHz	53	2455 MHz
54	2456 MHz	55	2457 MHz	56	2458 MHz
57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz
63	2465 MHz	64	2466 MHz	65	2467 MHz
66	2468 MHz	67	2469 MHz	68	2470 MHz
69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz
75	2477 MHz	76	2478 MHz	77	2479 MHz
78	2480 MHz	N/A	N/A	N/A	N/A

2.5. Test Configuration

This device was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.6. Test Software

The test utility software used during testing was “putty”.

2.7. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.8. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v05r02 were used in the measurement of the **GPS BIKE COMPUTER.**

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x3' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment which determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.8.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.
For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.
Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, which produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.
Radiated emissions test results are shown in Section 7.6 & 7.7 .

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the **GPS BIKE COMPUTER,** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Advanced Ceramic X	AT3216-B2R7HAA	Chip	0.5dBi

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2020/4/25
Cable	Rosnol	N1C50-RG400-B 1C50-500CM	MRTTWE00013	1 year	2020/6/18
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2020/3/25

Radiated Emissions – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2020/6/4
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2020/3/25
Acitve Loop Antenna	Schwarzbeck	FMZB 1519B	MRTTWA00002	1 year	2020/4/29
Broadband Horn antenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2020/4/22
Breitband Hornantenna	Schwarzbeck	BBHA 9170	MRTTWA00004	1 year	2020/4/23
Broadband Amplifier	Schwarzbeck	BBV 9721	MRTTWA00006	1 year	2020/4/24
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2020/4/24
Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2020/4/22
Cable	Rosnol	K1K50-UP0264-K1K50-4M	MRTTWA00012	1 year	2019/9/30

Conducted Test Equipment – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/10/30
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2020/3/26

Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 2.42dB
Conducted Measurement– SR1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.3dB
Radiated Emission Measurement – AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 9K~30MHz: 4.14dB 30MHz~1GHz: 4.22dB 1GHz~40GHz: 4.05dB Vertical: 9K~30MHz: 4.14dB 30MHz~1GHz: 3.37dB 1GHz~40GHz: 4.08dB

7. TEST RESULT

7.1. Summary

Product Name: **GPS BIKE COMPUTER**

FCC Classification: **(DTS) Digital Transmission System**

FCC Part Section(s)	IC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 5.2 (a)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	RSS-247 5.4 (d)	Output Power	≤ 30.00dBm		Pass	Section 7.3
15.247(e)	RSS-247 5.2 (b)	Power Spectral Density	≤ 8.00dBm/3kHz		Pass	Section 7.4
15.247(d)	RSS-247 5.5	Out-of-Band Emissions	Conducted ≥ 20dBc		Pass	Section 7.5
15.205 15.209	RSS-247 5.5	Spurious Emission	< FCC 15.209 limits	Radiated	Pass	Section 7.6
15.205 15.209	RSS-247 5.5	Band Edge Measurement	≦ 74dBuV/m(Peak) ≦ 54dBuV/m(Average)		Pass	Section 7.7
15.207	RSS-Gen 8.8	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
3) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
4) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. Occupied Bandwidth Measurement

7.2.1. Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

7.2.2. Test Procedure used

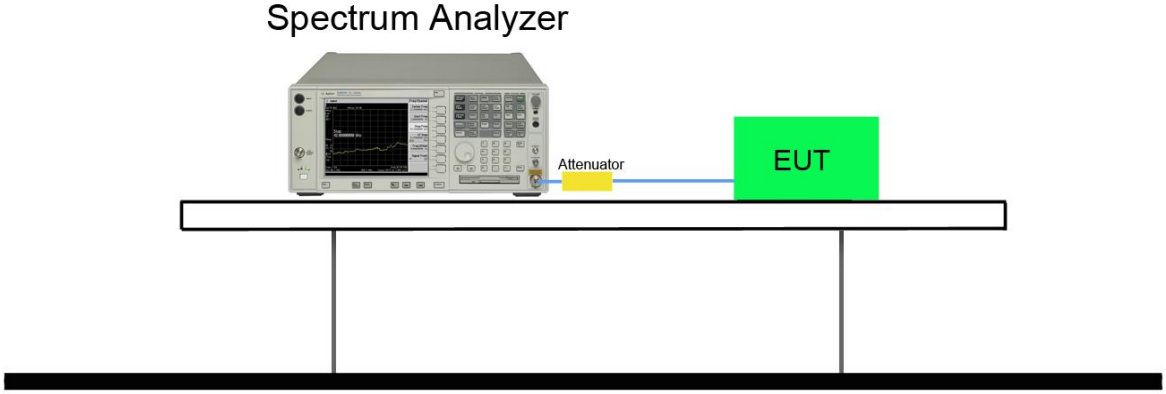
KDB 558074 D01v05r02- Section 8.2 / ANSI C63.10 6.9.3 / RSS-Gen 6.7

7.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

P.S In 99% bandwidth, The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW,

7.2.4. Test Setup



7.2.5. Test Result

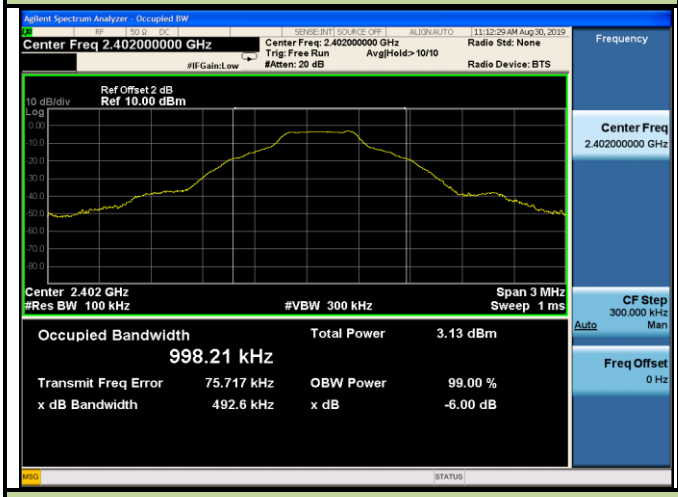
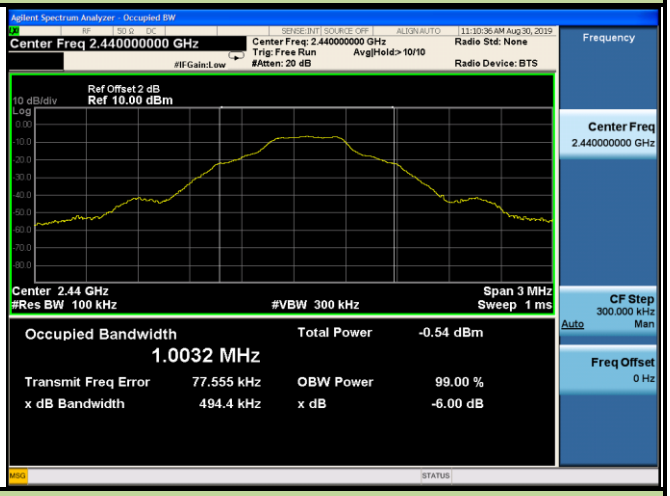
6dB Bandwidth:

Test Mode	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
ANT+	0	2402	0.4926	0.9982	≥ 0.5	Pass
	39	2440	0.4944	1.0032	≥ 0.5	Pass
	78	2480	0.5001	0.9804	≥ 0.5	Pass

99% Bandwidth:

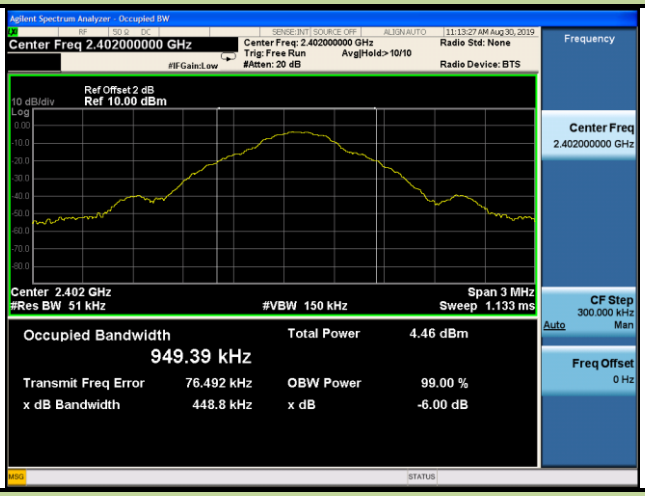
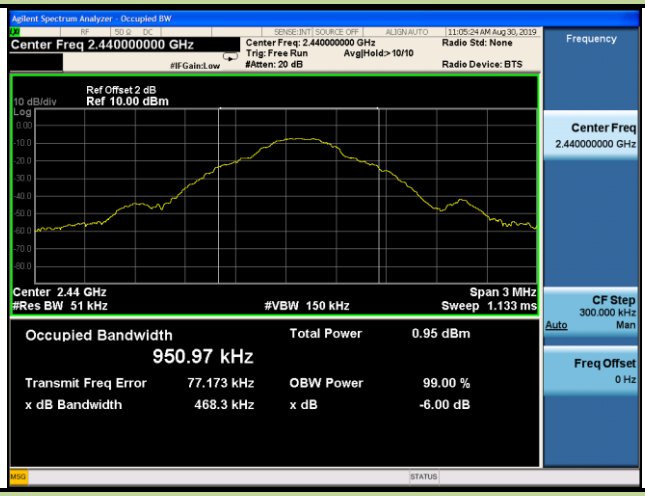
Test Mode	Channel No.	Frequency (MHz)	99 % Bandwidth (MHz)	Result
ANT+	00	2402	0.9494	Pass
	39	2440	0.9510	Pass
	78	2480	0.9614	Pass

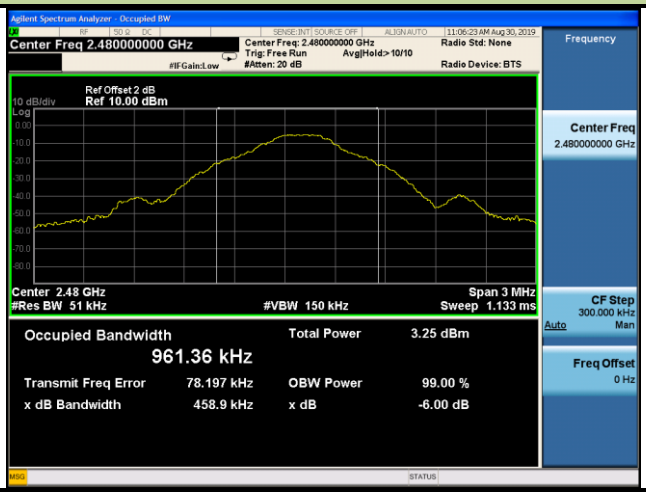
6dB Bandwidth:

ANT+ CH00 (2402MHz)	ANT+ CH39 (2440MHz)
	

ANT+ CH78 (2480MHz)


99% Bandwidth:

ANT+ CH00 (2402MHz)	ANT+ CH39 (2440MHz)
	

ANT+ CH78 (2480MHz)


7.3. Output Power Measurement

7.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm).

7.3.2. Test Procedure Used

KDB 558074 D01v05r02 - Section 9.1.2 & 9.2.3.2

7.3.3. Test Setting

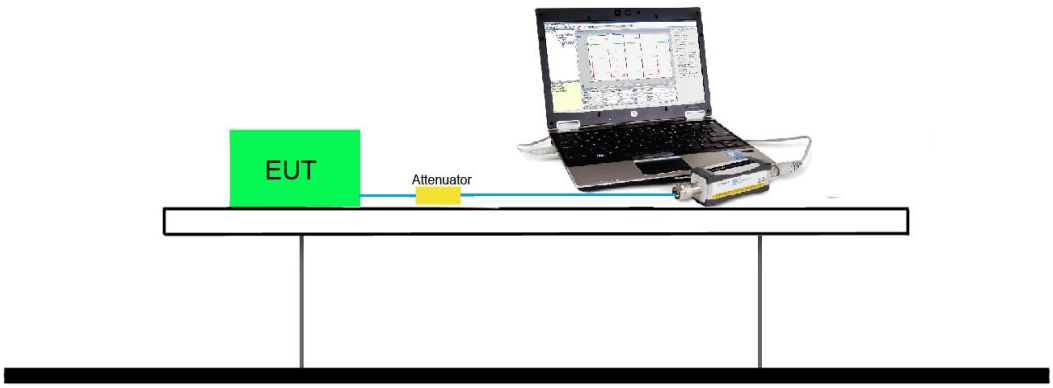
Peak Power Measurement

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.3.4. Test Setup



7.3.5. Test Result of Output Power

Test Mode	Channel No.	Frequency (MHz)	Peak Power (dBm)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
ANT+	00	2402	-3.117	-2.617	< 30	< 36
	39	2440	-6.881	-6.381	< 30	< 36
	78	2480	-4.042	-3.542	< 30	< 36

Note1: Output power =Reading value on power meter + cable loss.

Note2: Antenna Gain: 0.5dBi

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

7.4.2. Test Procedure Used

KDB 558074 D01v05r02 - Section 8.4 Method PKPSD

7.4.3. Test Setting

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to: 3 kHz.

d) Set the VBW ≥ 3* RBW.

e) Detector = peak.

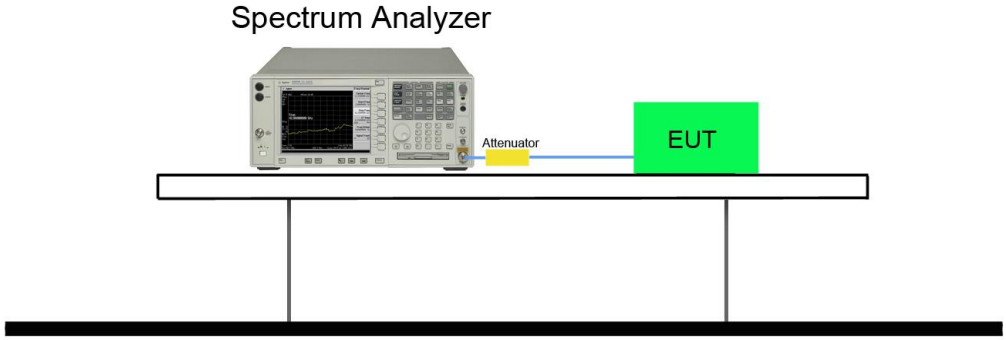
f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

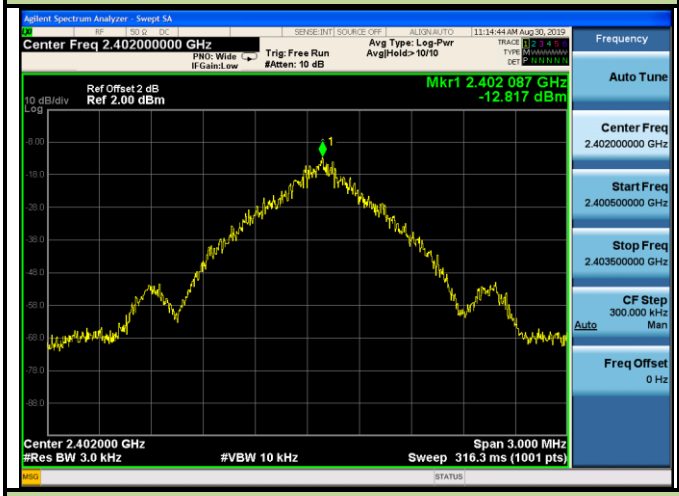
7.4.4. Test Setup



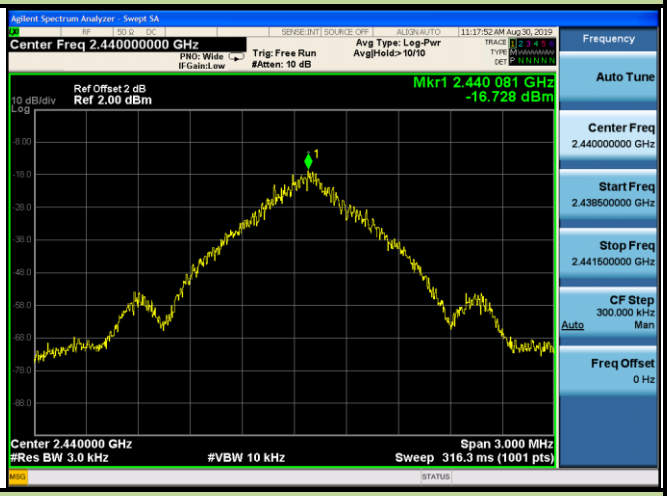
7.4.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Result
ANT+	00	2402	-12.817	≤ 8	Pass
	39	2440	-16.728	≤ 8	Pass
	78	2480	-13.706	≤ 8	Pass

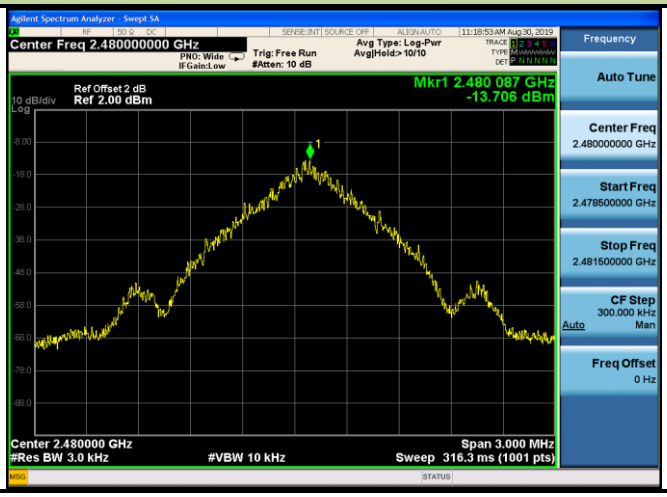
ANT+ CH00 (2402MHz)



ANT+ CH39 (2440MHz)



ANT+ CH78 (2480MHz)



7.5. Out-of-Band Spurious Emissions Emissions Measurement

7.5.1. Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

7.5.2. Test Procedure Used

KDB 558074 D01v05r02- Section 8.5 & 8.6

7.5.3. Test Settitng

(a) Set instrument center frequency to DTS channel center frequency

(b) Set the span to ≥ 1.5 times the DTS bandwidth

(c) Set the RBW = 100 kHz

(d) Set the VBW ≥ 3 x RBW

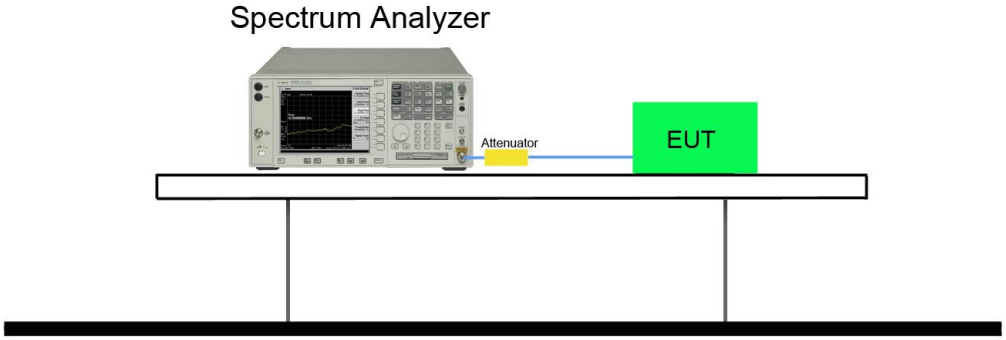
(e) Detector = peak

(f) Sweep time = auto couple

(g) Trace mode = max hold

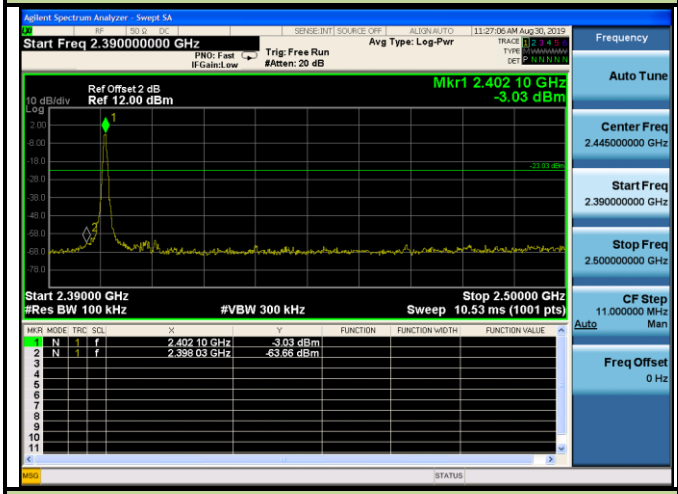
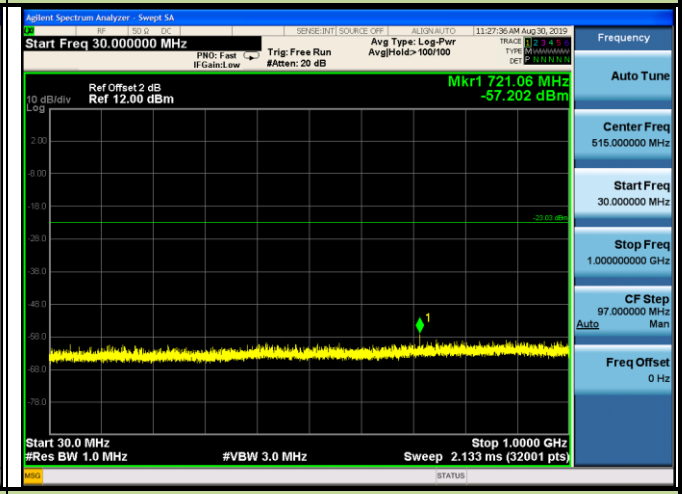
(h) Allow trace to fully stabilize

7.5.4. Test Setup



7.5.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
ANT+	00	2402	20dBc	Pass
	39	2440	20dBc	Pass
	78	2480	20dBc	Pass

ANT+ CH00 (2402MHz)	ANT+ CH00 (2402MHz)
	
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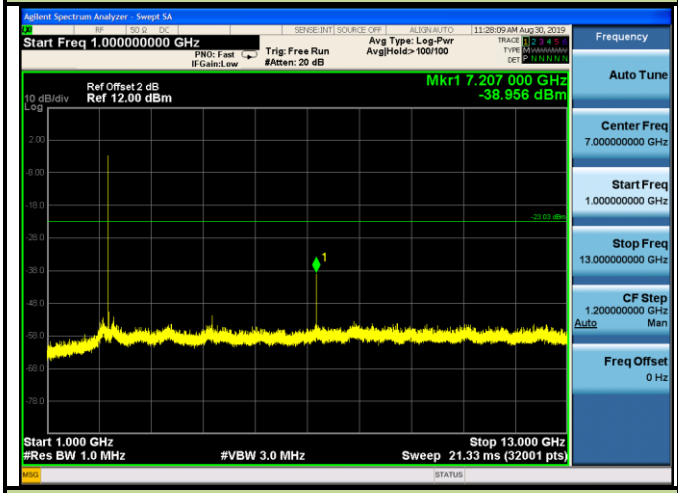	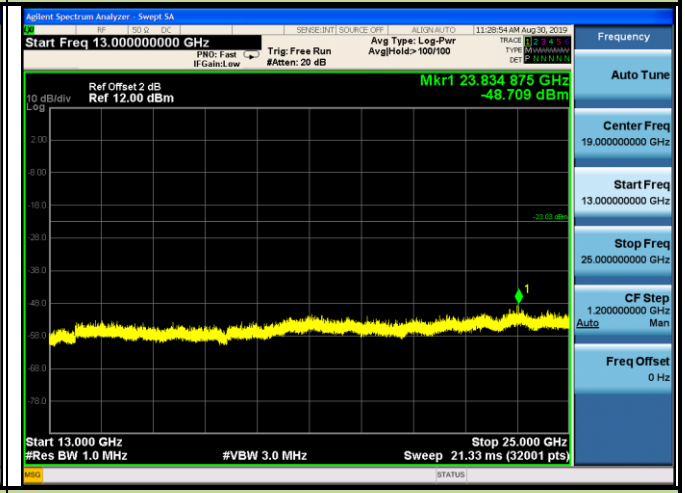
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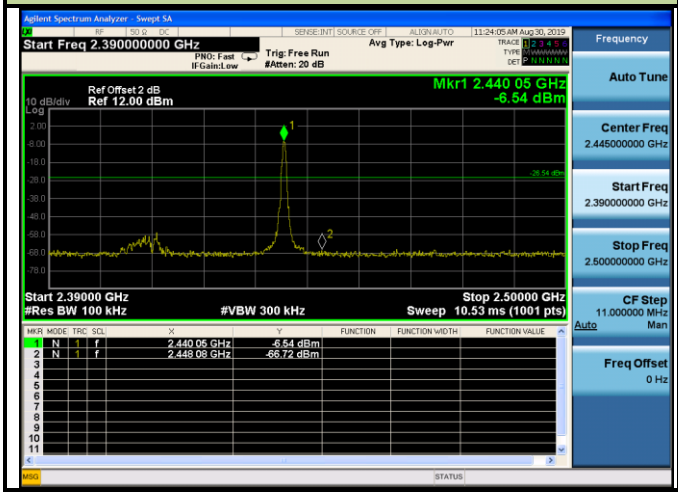
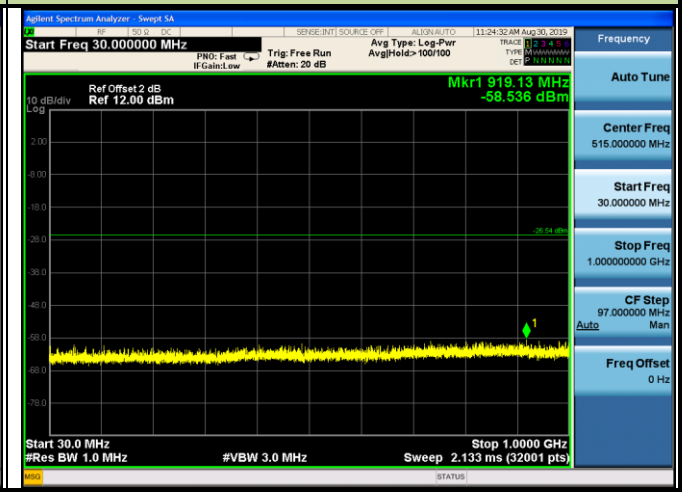
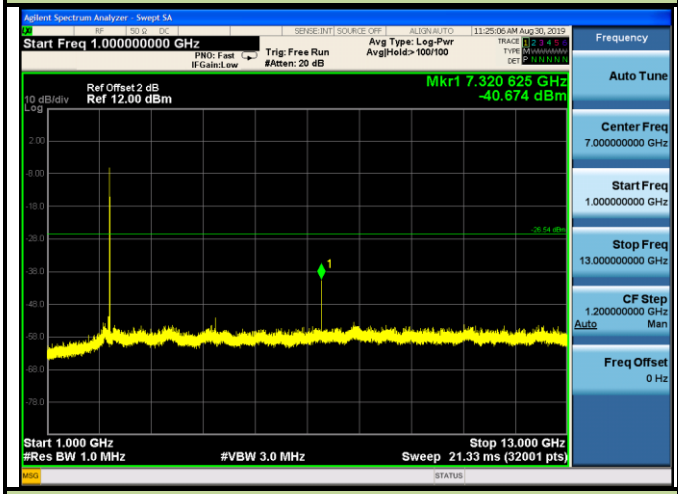
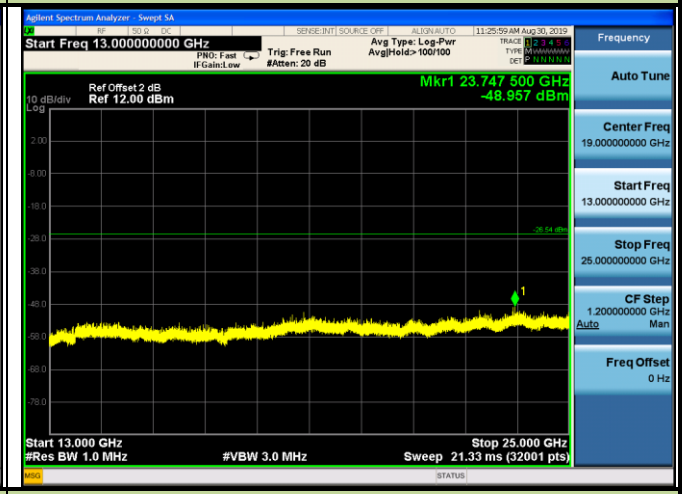
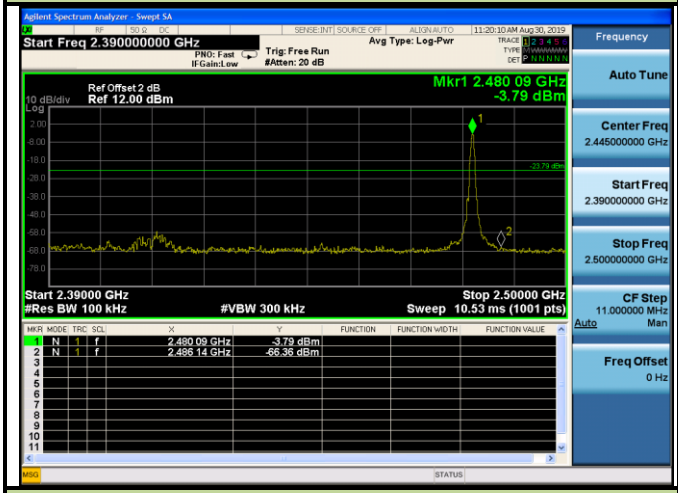
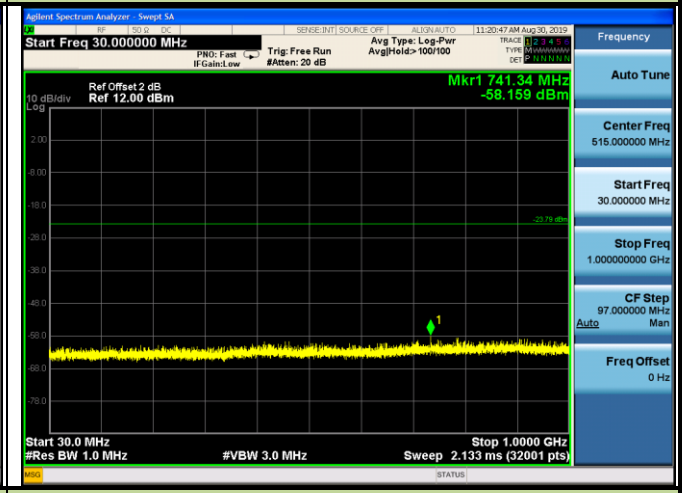
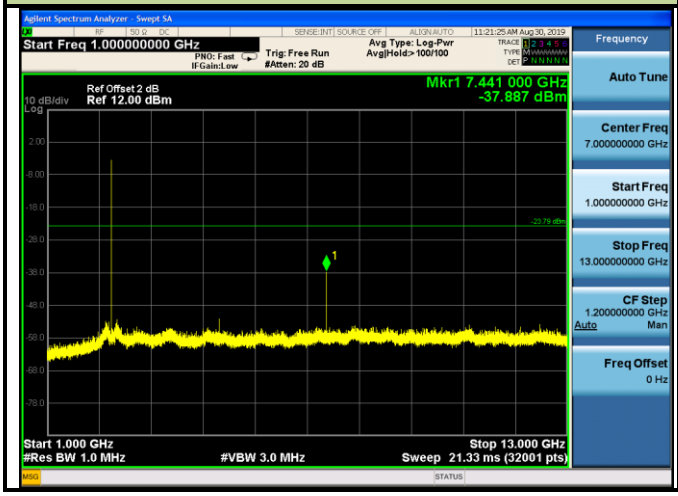
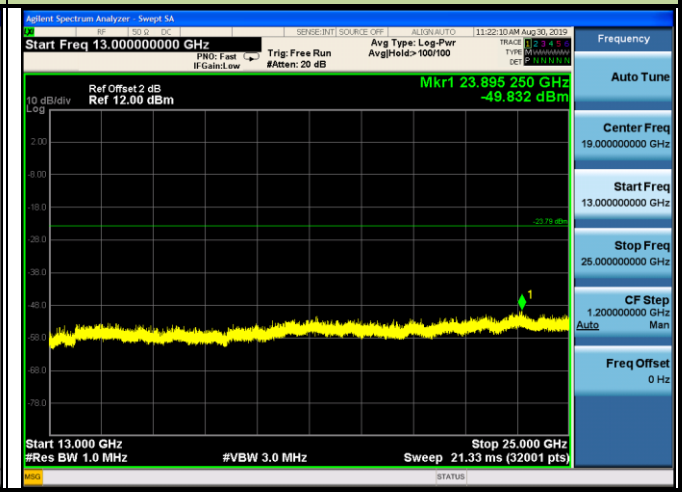
	

ANT+ CH39 (2440MHz)	ANT+ CH39 (2440MHz)
	
ANT+ CH78 (2480MHz)	**ANT+ CH78 (2480MHz)**
	
ANT+ CH78 (2480MHz)	**ANT+ CH78 (2480MHz)**
	

7.6. Radiated Spurious Emission Measurement

7.6.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209/ IC RSS-Gen Table 7.

FCC Part 15 Subpart C Paragraph 15.209 / IC RSS-Gen Table 5, 6		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
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

7.6.2. Test Procedure Used

ANSI C63.10- Section 11.12.2.3 (quasi-peak measurements)

ANSI C63.10- Section 11.12.2.4 (peak power measurements)

ANSI C63.10- Section 11.12.2.5 (average power measurements)

7.6.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple

6. Trace mode = max hold
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

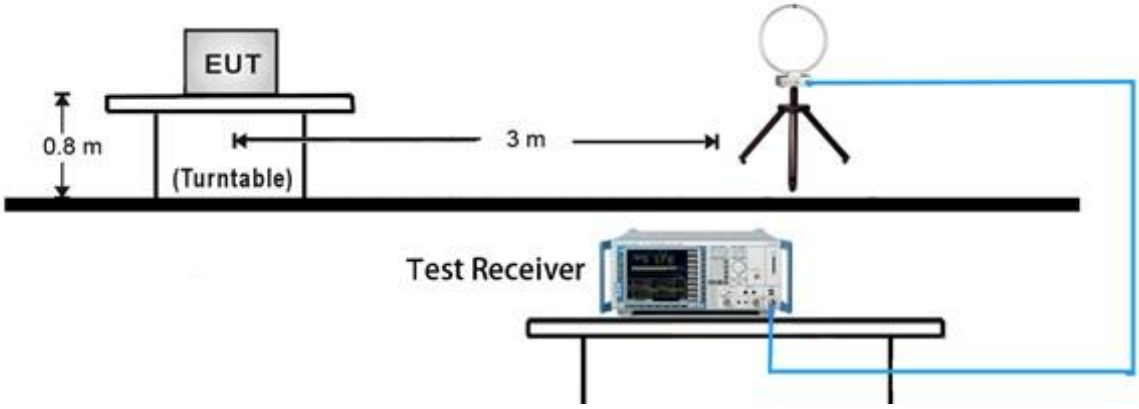
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

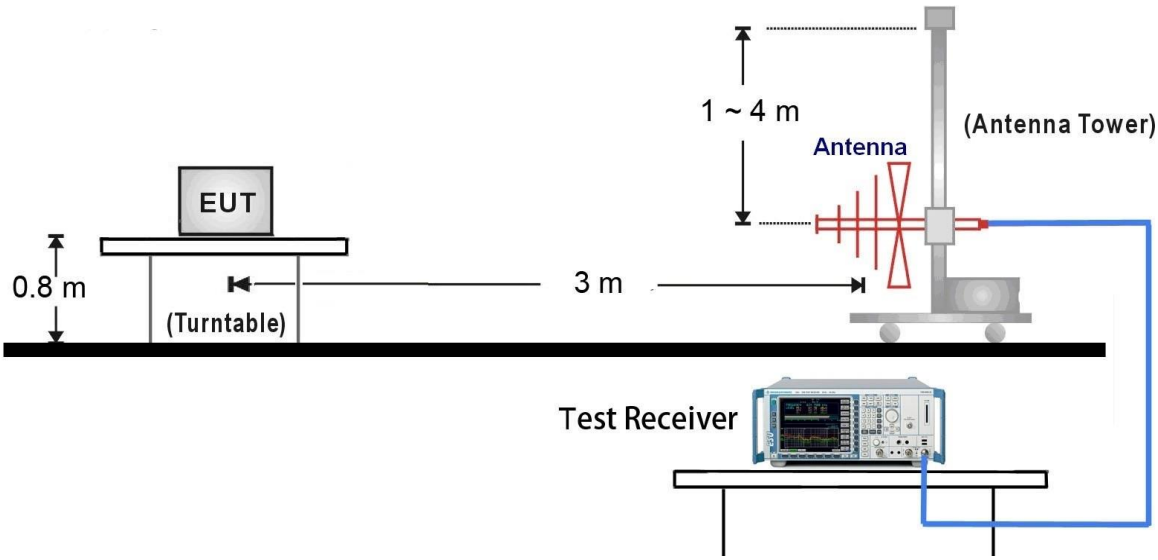
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

7.6.4. Test Setup

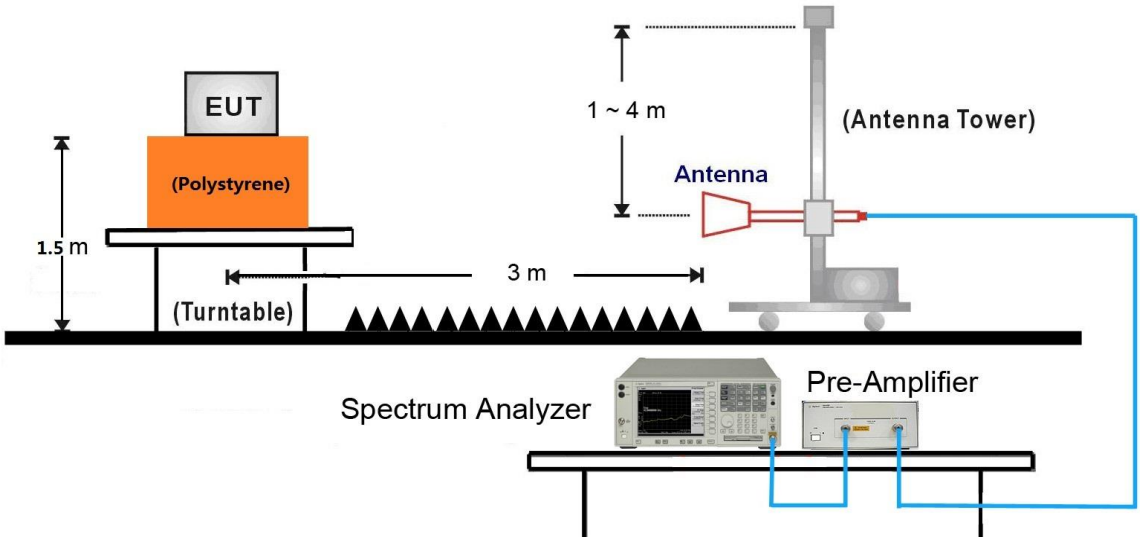
9kHz ~ 30MHz Test Setup:



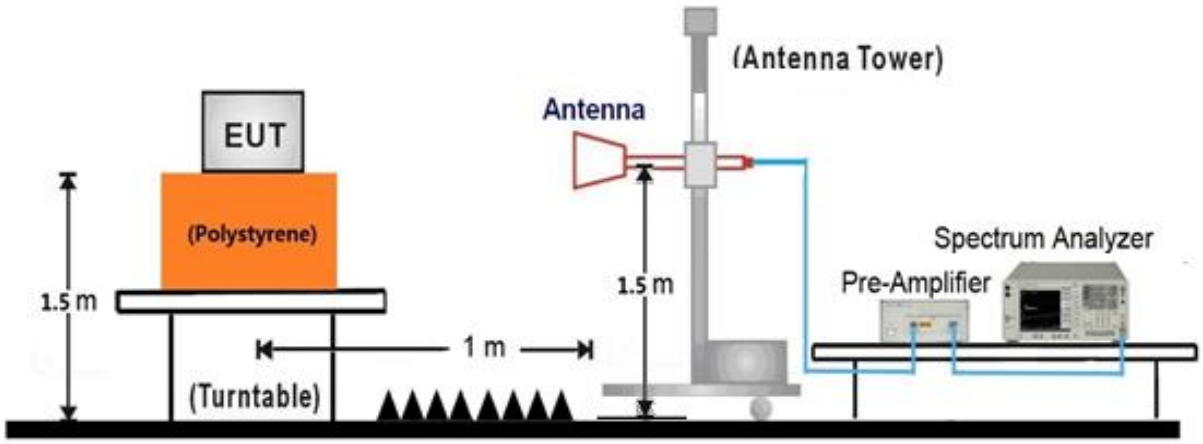
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:

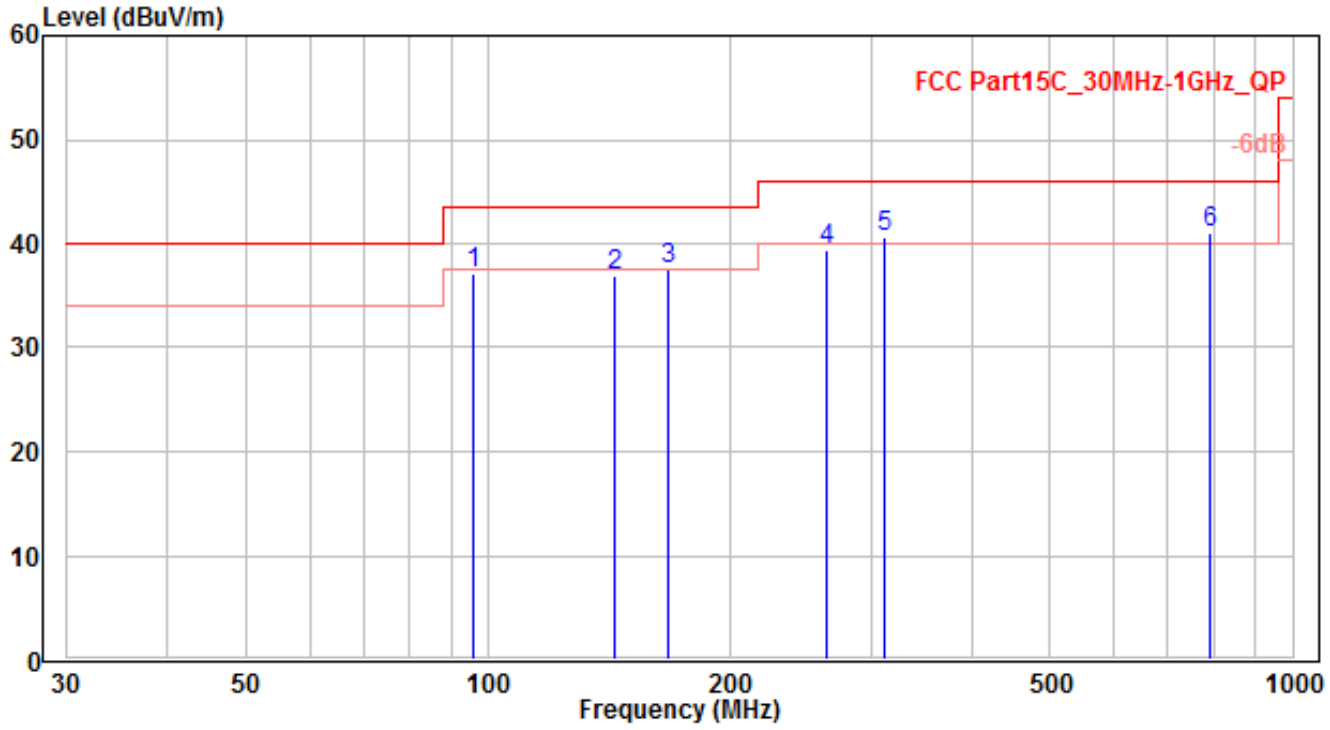


18GHz ~25GHz Test Setup:



7.6.5. Test Result

EUT	GPS BIKE COMPUTER	Test Date	2019/8/19
Factor	VULB 9162	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC 120V/60Hz

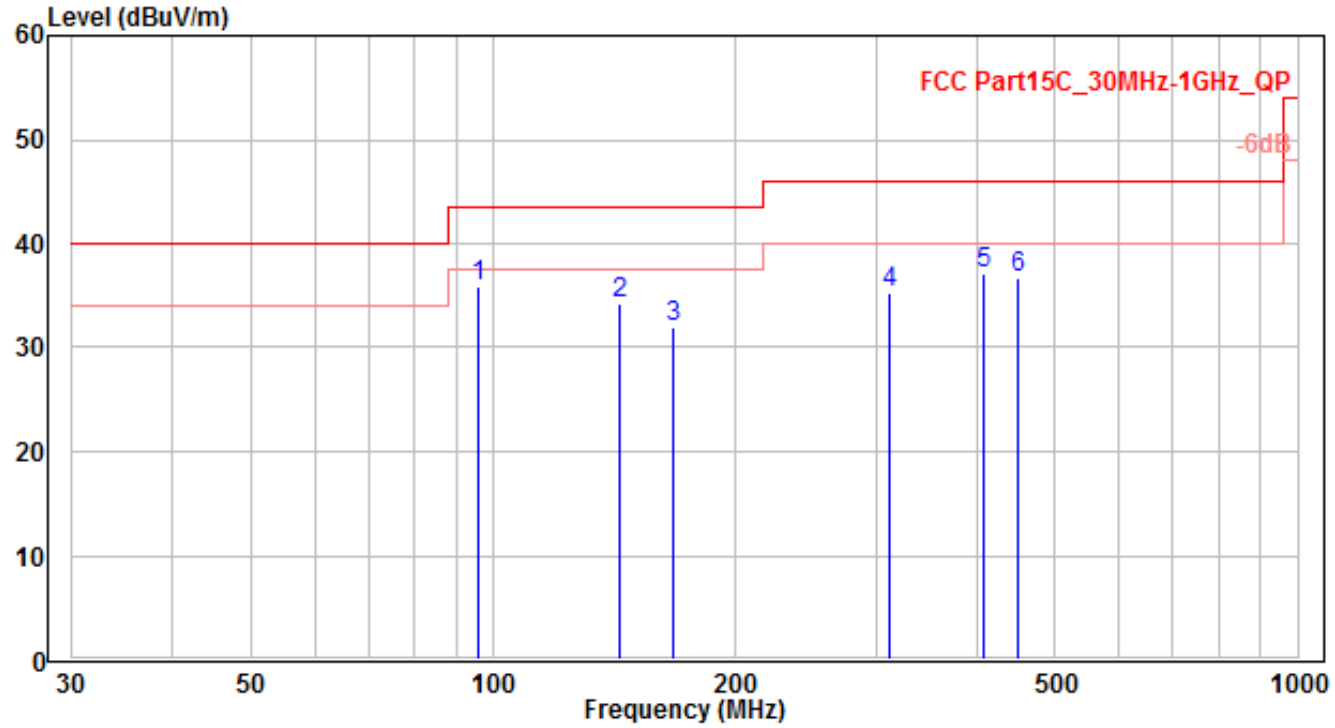


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		95.96	18.46	18.59	37.05	-6.45	43.5	100	40	QP
2		143.945	21.32	15.57	36.89	-6.61	43.5	100	50	QP
3		167.922	21.15	16.3	37.45	-6.05	43.5	100	40	QP
4		263.891	18.76	20.62	39.38	-6.62	46	100	50	QP
5		311.876	18.65	21.88	40.53	-5.47	46	110	100	QP
6	*	791.723	10.9	30.22	41.12	-4.88	46	100	120	QP

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/19
Factor	VULB 9162	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC 120V/60Hz

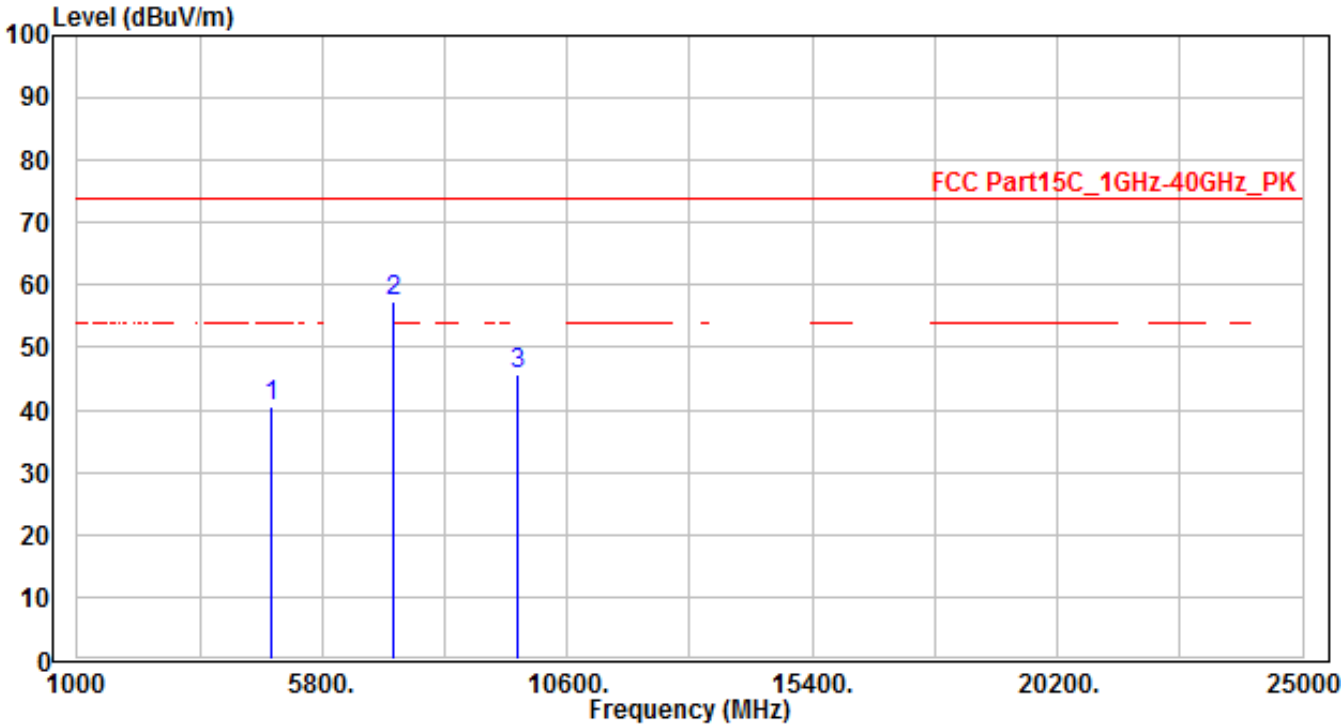


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	95.96	17.28	18.59	35.87	-7.63	43.5	100	50	QP
2		143.945	18.63	15.57	34.2	-9.3	43.5	100	50	QP
3		167.952	15.61	16.3	31.91	-11.59	43.5	100	120	QP
4		311.876	13.4	21.88	35.28	-10.72	46	120	110	QP
5		407.845	12.94	24.27	37.21	-8.79	46	105	20	QP
6		448.555	11.89	24.87	36.76	-9.24	46	110	100	QP

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH00	Test Voltage	AC 120V/60Hz

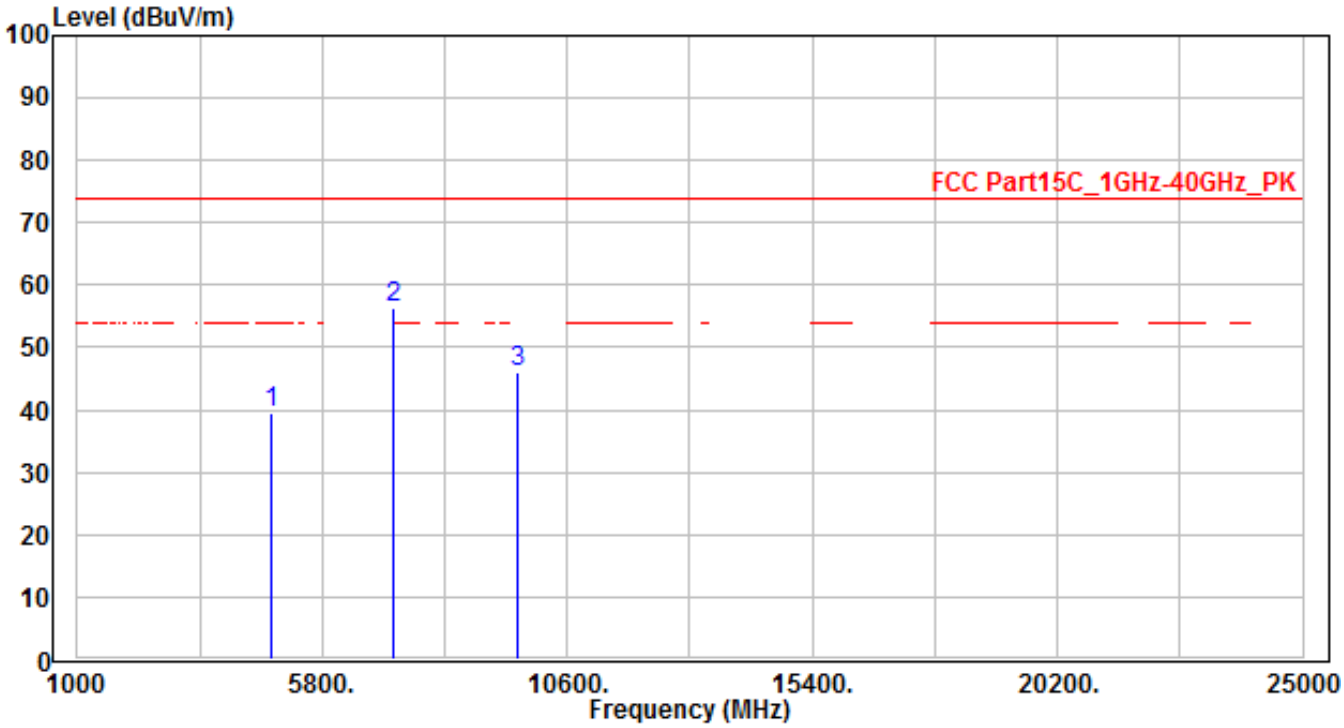


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4804	37.56	3.16	40.72	-33.28	74	150	400	Peak
2	*	7206	46.34	11.06	57.4	-16.6	74	150	400	Peak
3		9608	31.86	13.97	45.83	-28.17	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH00	Test Voltage	AC 120V/60Hz

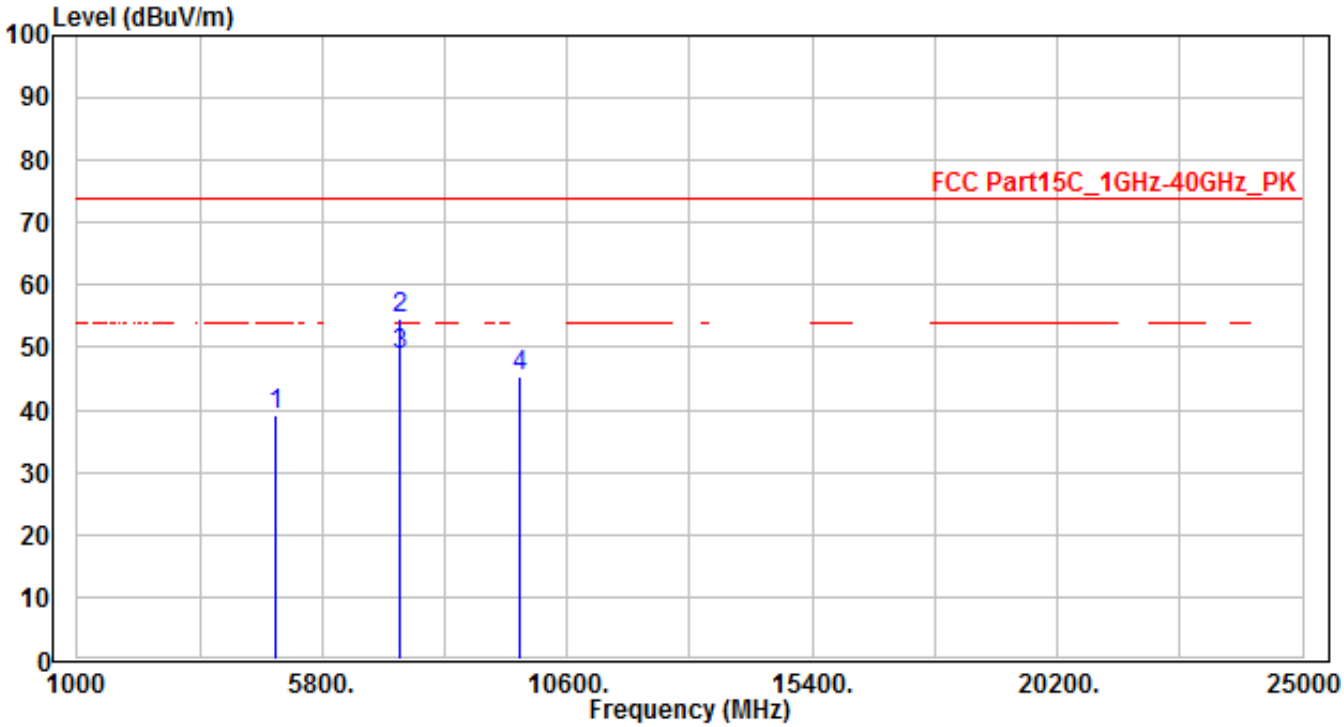


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4804	36.4	3.16	39.56	-34.44	74	150	400	Peak
2	*	7206	45.31	11.06	56.37	-17.63	74	150	400	Peak
3		9608	32	13.97	45.97	-28.03	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC 120V/60Hz

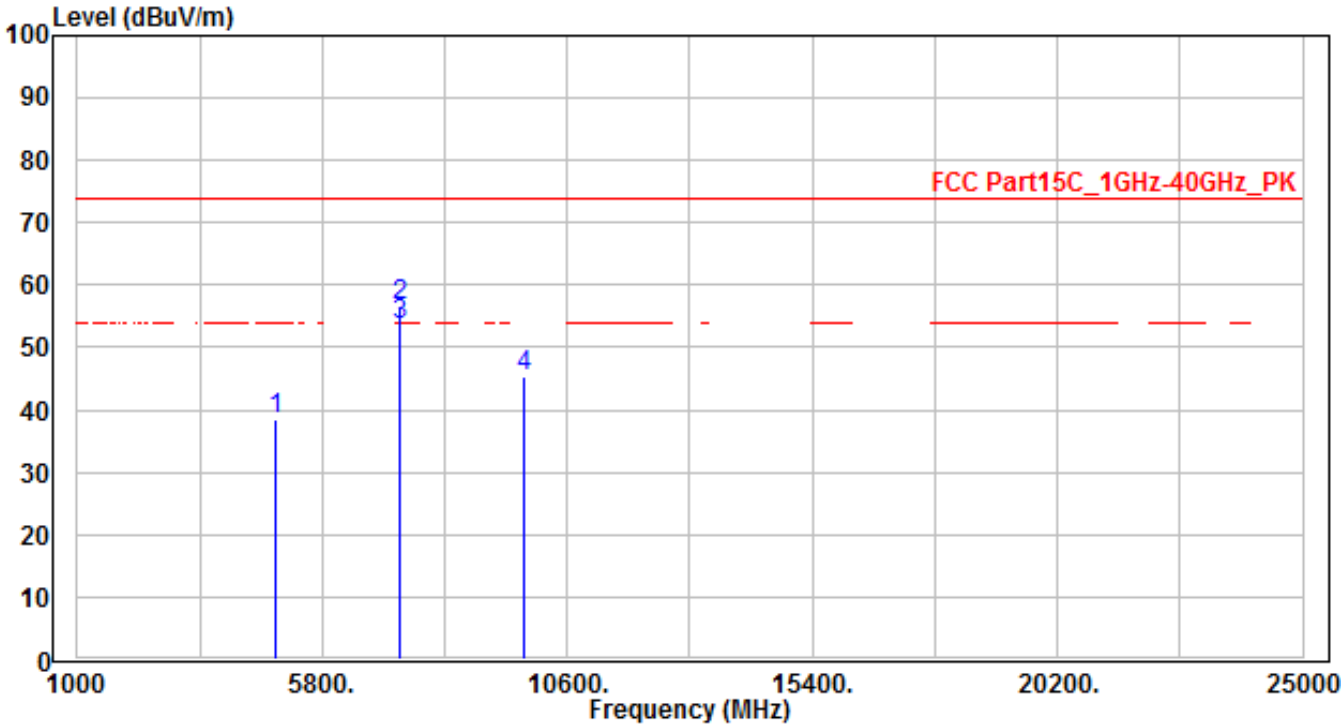


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4880	35.9	3.31	39.21	-34.79	74	150	400	Peak
2	*	7320	43.19	11.31	54.5	-19.5	74	150	375	Peak
3	*	7320	37.64	11.31	48.95	-5.05	54	150	375	Average
4		9670	31.21	14.17	45.38	-28.62	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC 120V/60Hz

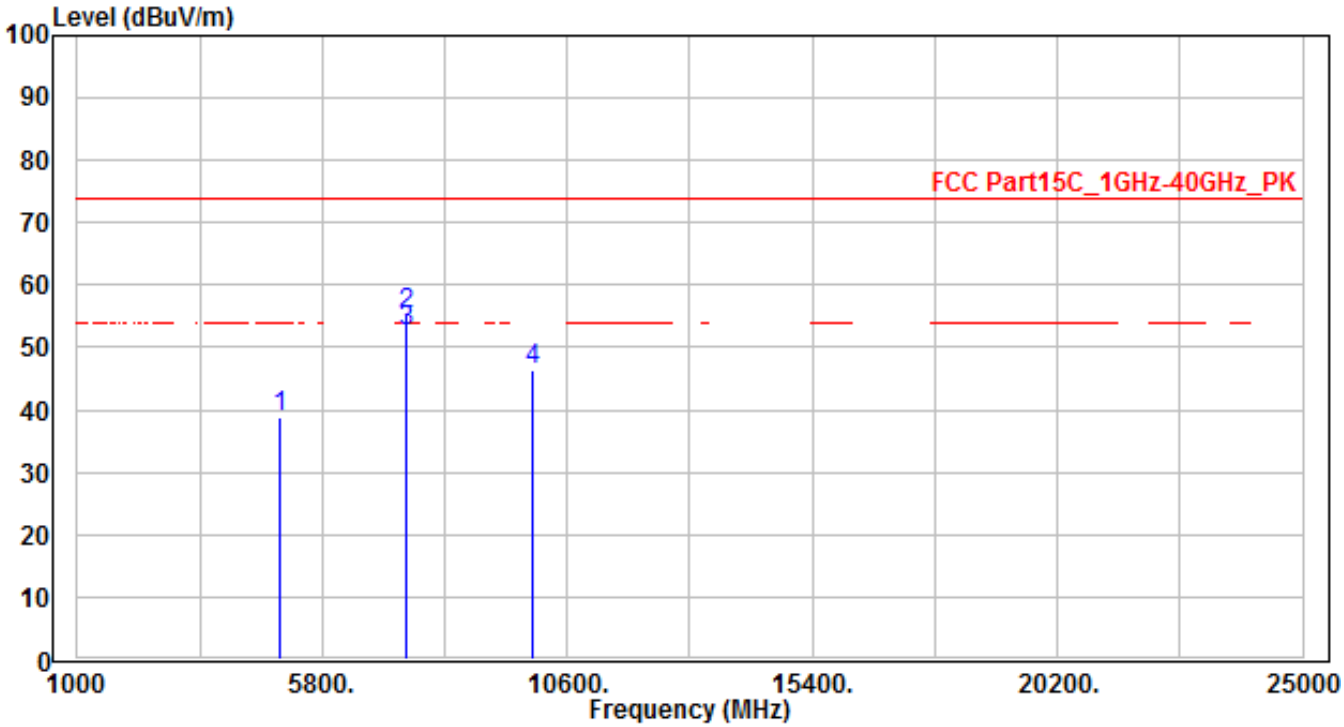


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4880	35.31	3.31	38.62	-35.38	74	150	400	Peak
2	*	7320	45.54	11.31	56.85	-17.15	74	150	-35	Peak
3	*	7320	42.15	11.31	53.46	-0.54	54	150	-35	Average
4		9760	30.83	14.47	45.3	-28.7	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH78	Test Voltage	AC 120V/60Hz

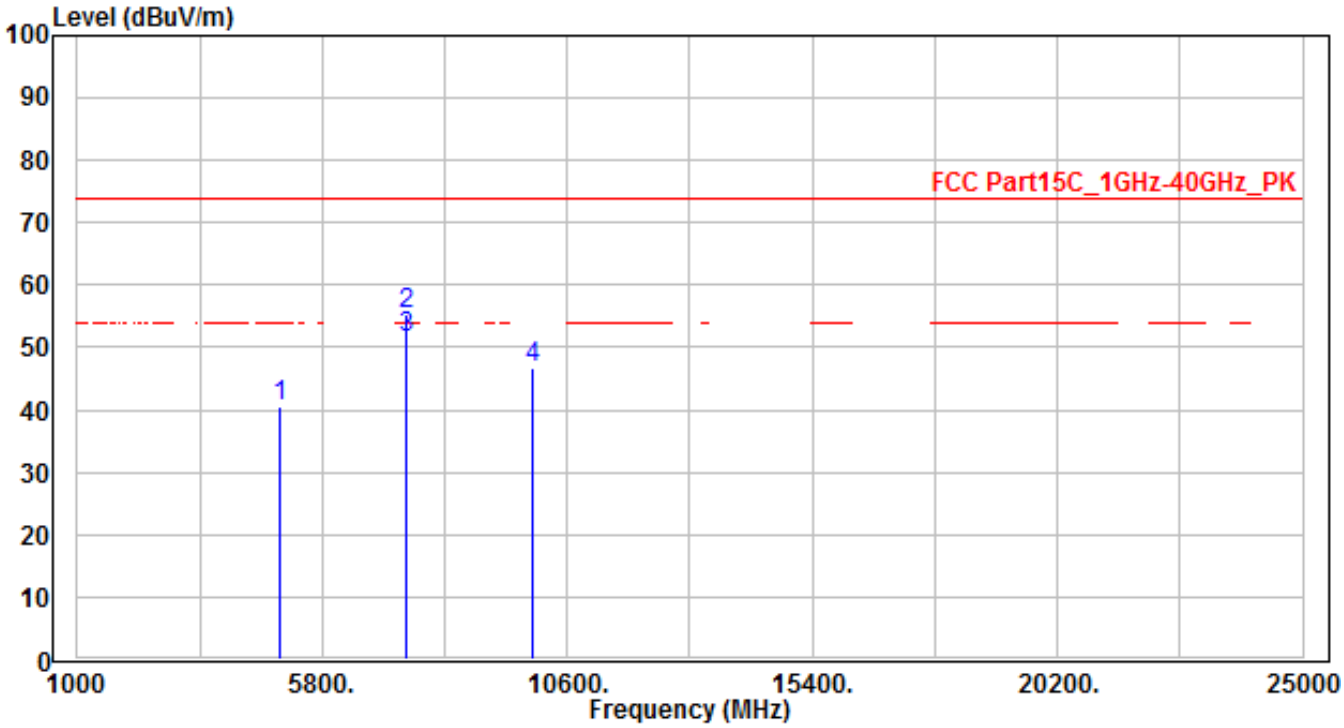


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4960	35.2	3.47	38.67	-35.33	74	150	400	Peak
2	*	7440	43.86	11.59	55.45	-18.55	74	155	380	Peak
3	*	7440	41.15	11.59	52.74	-1.26	54	155	380	Average
4		9920	31.24	14.99	46.23	-27.77	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D & BBHA 9170	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH78	Test Voltage	AC 120V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		4960	37.21	3.47	40.68	-33.32	74	150	400	Peak
2	*	7440	43.73	11.59	55.32	-18.68	74	155	-35	Peak
3	*	7440	40.11	11.59	51.7	-2.3	54	155	-35	Average
4		9920	31.66	14.99	46.65	-27.35	74	150	400	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

7.7. Radiated Restricted Band Edge Measurement

7.7.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205/ IC RSS-Gen must not exceed the limits shown in Table per Section 15.209/ IC RSS-Gen Table 5, 6.

FCC Part 15 Subpart C Paragraph 15.209 / IC RSS-Gen Table 5, 6		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
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

7.7.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.13

7.7.3. Test Setting

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in Table 1
3. VBW = 3 * RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

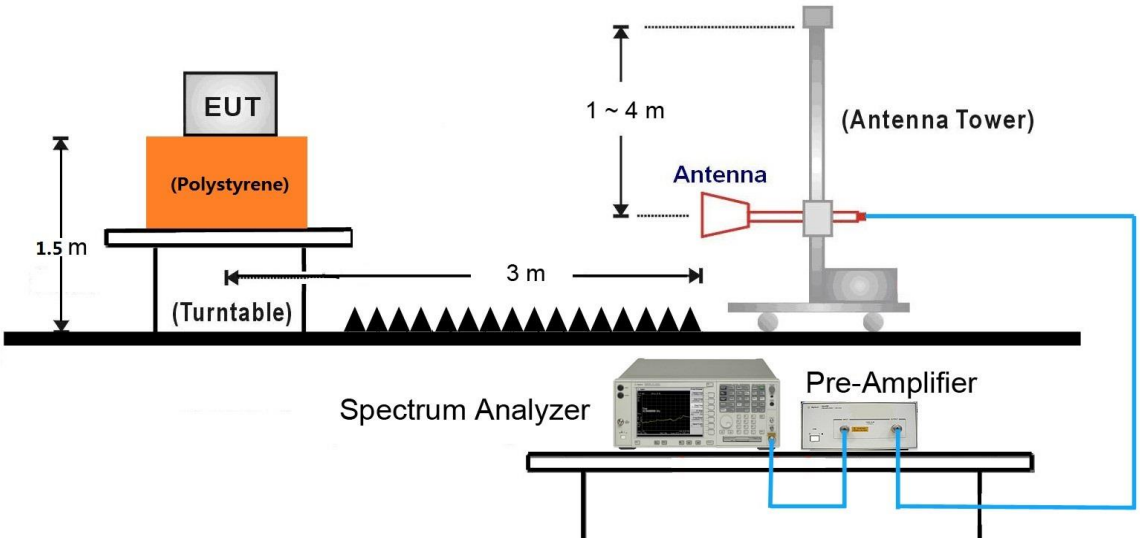
Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW ≥ 1/T
4. De As an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow max hold to run for at least 50 times (1/duty cycle) traces

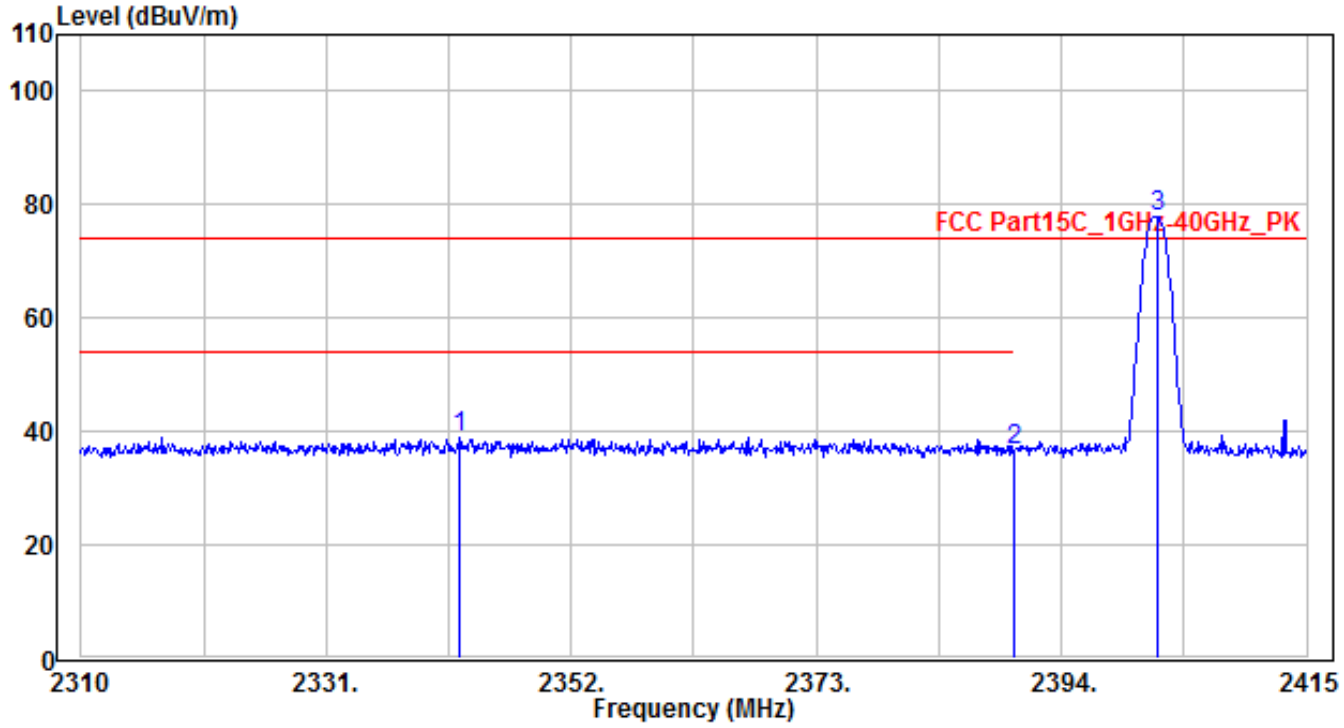
7.7.4. Test Setup

1GHz ~ 18GHz Test Setup:



7.7.5. Test Result

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D	Temp. / Humidity	21°C / 57%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH00	Test Voltage	AC 120V/60Hz

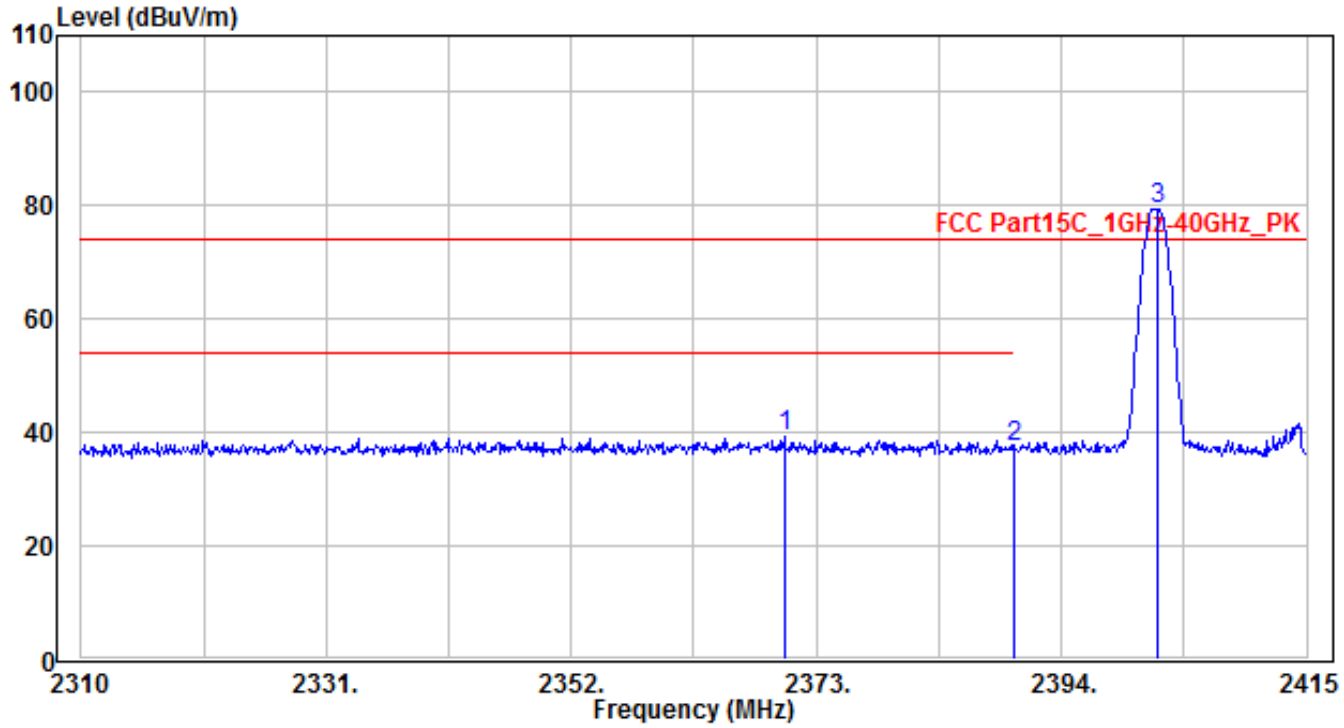


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	2342.34	41.89	-2.95	38.94	-35.06	74	130	50	Peak
2		2390	39.28	-2.72	36.56	-37.44	74	130	50	Peak
3		2402.295	80.48	-2.67	77.81	3.81	74	130	50	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D	Temp. / Humidity	21°C / 57%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH00	Test Voltage	AC 120V/60Hz

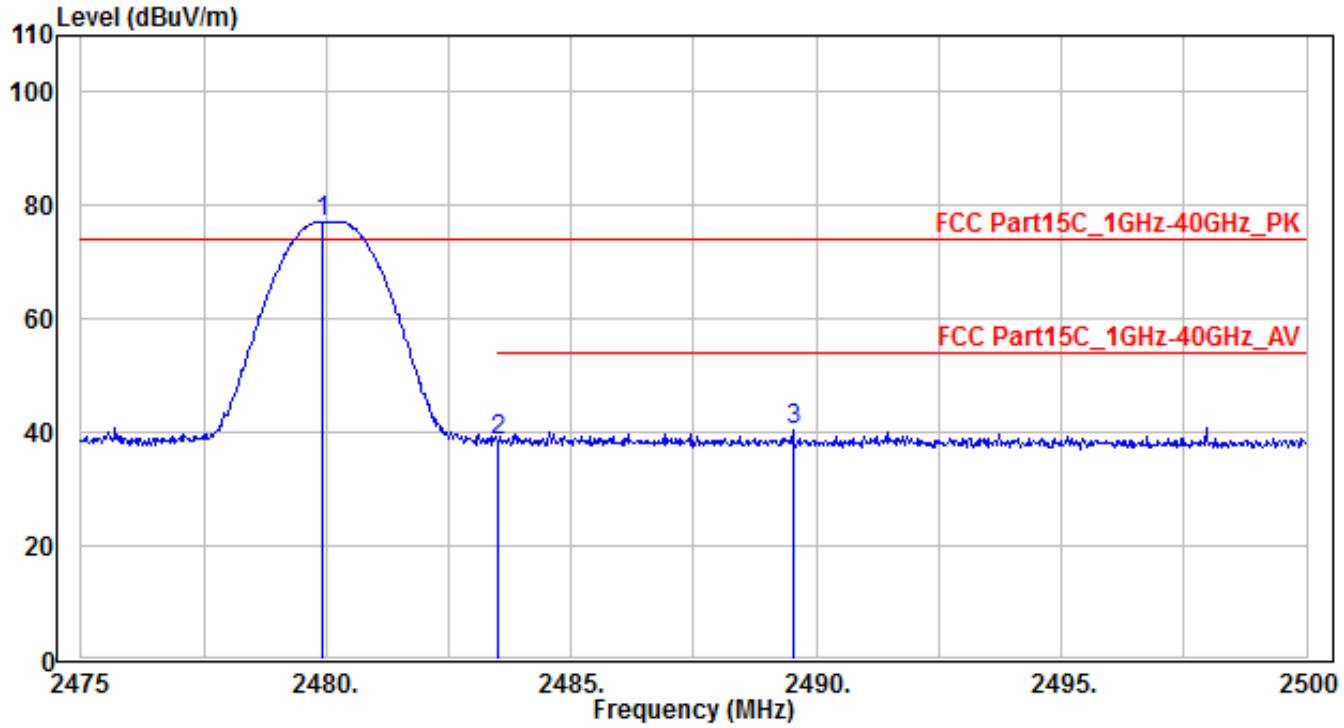


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	2370.27	42.23	-2.82	39.41	-34.59	74	140	255	Peak
2		2390	40.15	-2.72	37.43	-36.57	74	140	255	Peak
3		2402.295	82.06	-2.67	79.39	5.39	74	140	255	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D	Temp. / Humidity	21°C / 57%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH78	Test Voltage	AC 120V/60Hz

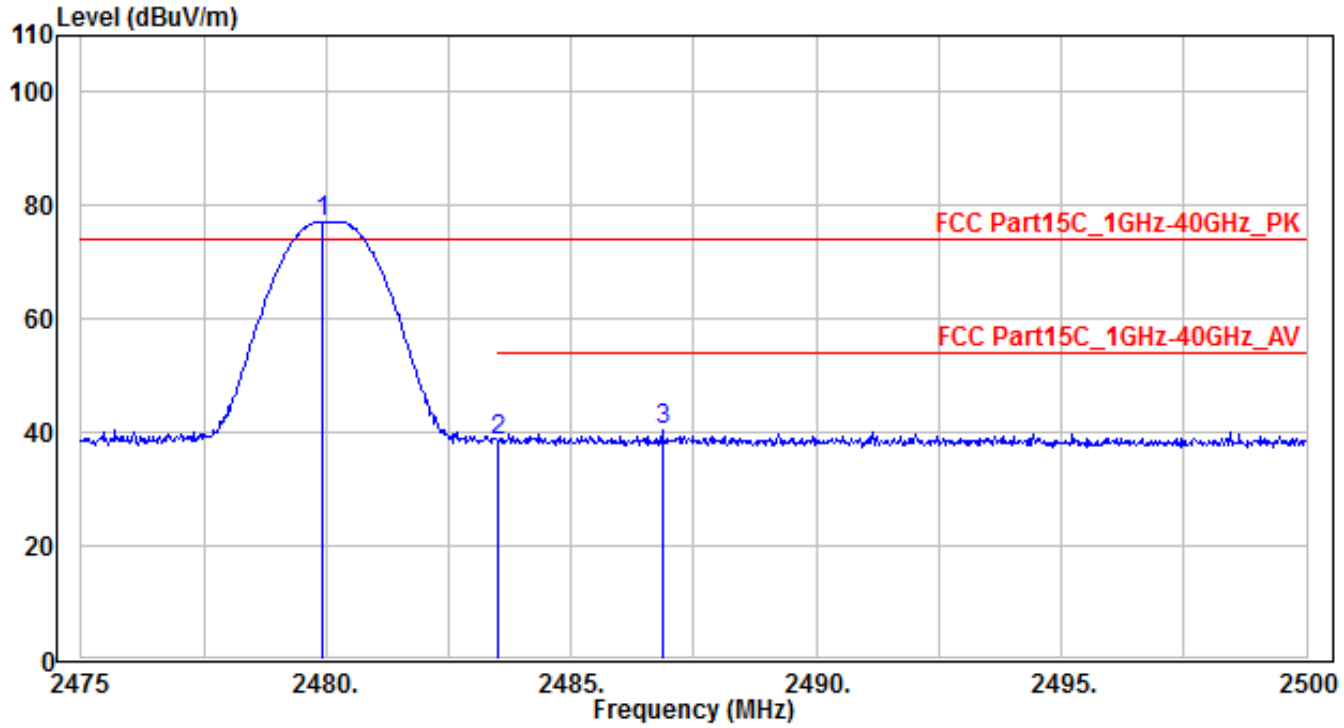


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		2479.9	79.59	-2.31	77.28	3.28	74	150	245	Peak
2		2483.5	40.81	-2.3	38.51	-35.49	74	150	245	Peak
3	*	2489.525	42.62	-2.27	40.35	-33.65	74	150	245	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/28
Factor	BBHA 9120D	Temp. / Humidity	21°C / 57%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH78	Test Voltage	AC 120V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		2479.9	79.56	-2.31	77.25	3.25	74	135	250	Peak
2		2483.5	40.87	-2.3	38.57	-35.43	74	135	250	Peak
3	*	2486.85	42.83	-2.28	40.55	-33.45	74	135	250	Peak

Note: The EUT Power Charge by USB Adapter

1. " * " means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB) - Preamplifier (dB).
3. Measurement (dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

7.8. AC Conducted Emissions Measurement

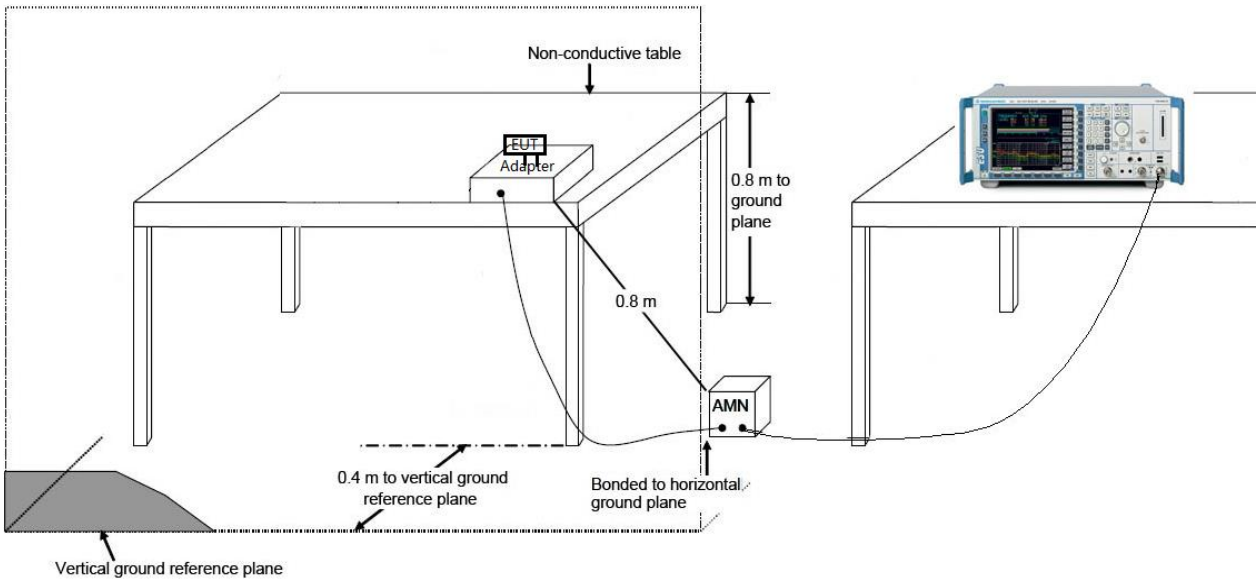
7.8.1. Test Limit

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

Note 1: The lower limit shall apply at the transition frequencies.

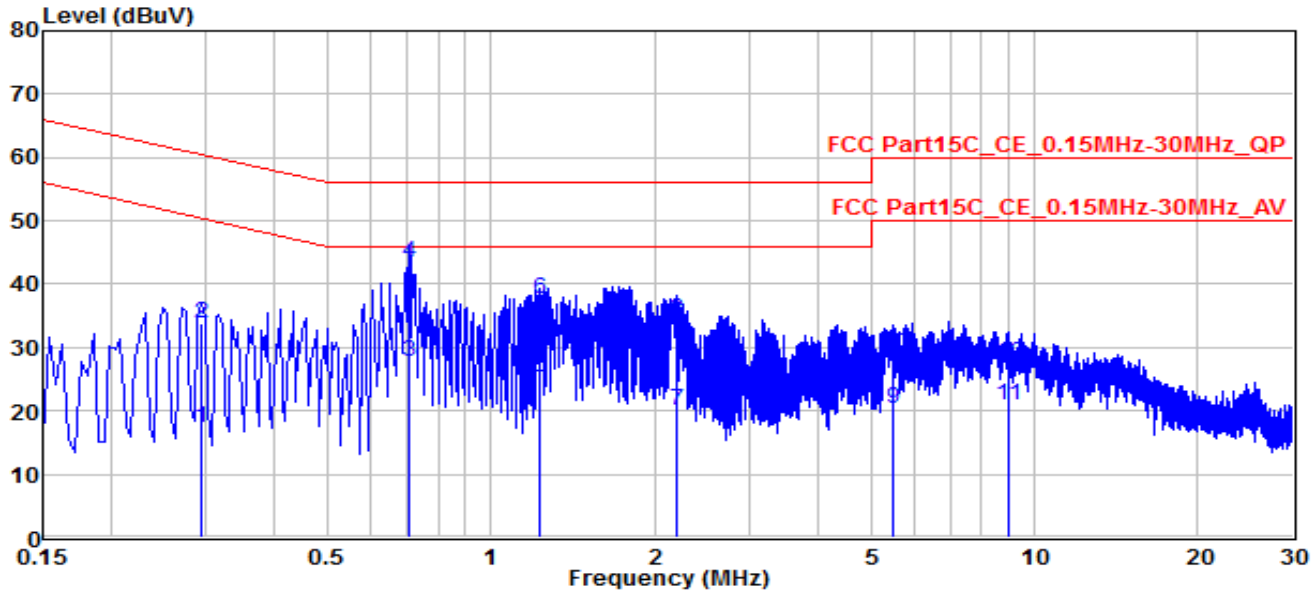
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.8.2. Test Setup



7.8.3. Test Result

EUT	GPS BIKE COMPUTER	Test Date	2019/8/14
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	24°C / 55%
Polarity	Line1	Site / Engineer	SR2 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC120V/60Hz

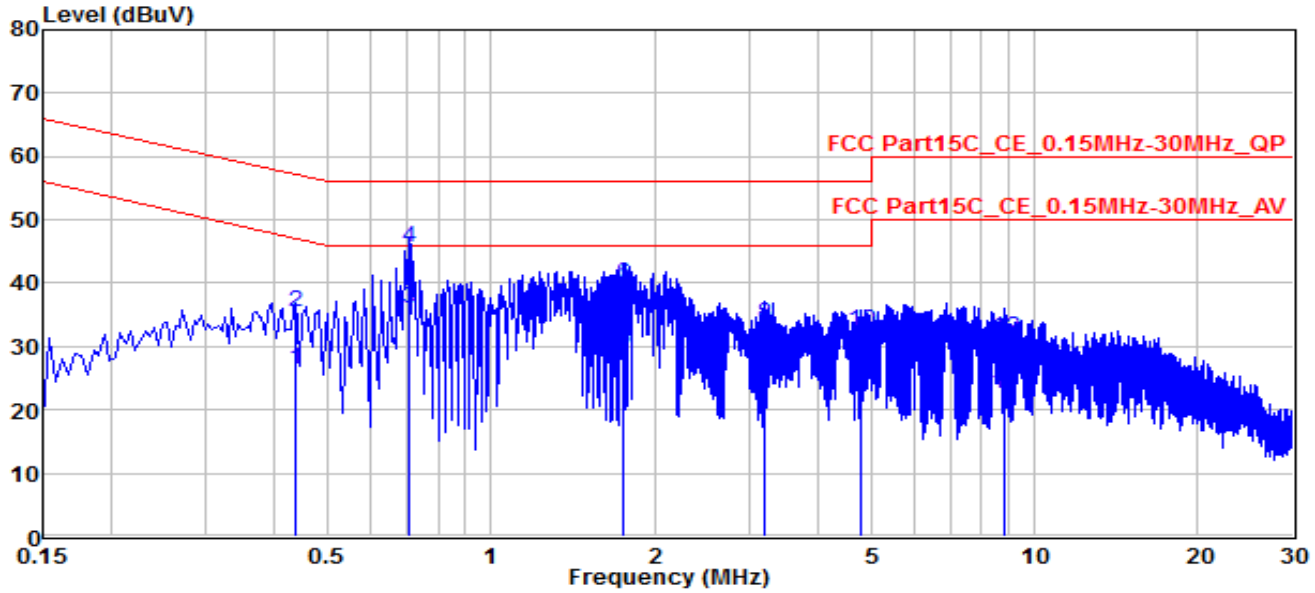


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.29399	7.62	9.61	17.23	-33.18	50.41	Average
2		0.29399	24.21	9.61	33.82	-26.59	60.41	QP
3	*	0.70794	18	9.63	27.63	-18.37	46	Average
4	*	0.70794	33.71	9.63	43.34	-12.66	56	QP
5		1.234	15.61	9.66	25.27	-20.73	46	Average
6		1.234	27.99	9.66	37.65	-18.35	56	QP
7		2.206	10.42	9.69	20.11	-25.89	46	Average
8		2.206	24.55	9.69	34.24	-21.76	56	QP
9		5.5	10.64	9.75	20.39	-29.61	50	Average
10		5.5	19.11	9.75	28.86	-31.14	60	QP
11		8.956	10.99	9.84	20.83	-29.17	50	Average
12		8.956	17.73	9.84	27.57	-32.43	60	QP

Note: The EUT Power Charge by USB Adapter

1. " * ", means this data is the worst emission level.
2. C.F (Correction Factor) = Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV) = Reading(dBuV)+ C.F (Correction Factor).

EUT	GPS BIKE COMPUTER	Test Date	2019/8/14
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	24°C / 55%
Polarity	Neutral	Site / Engineer	SR2 / Peter
Test Mode	MODE1-CH39	Test Voltage	AC120V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV)	Remark (QP/PK/AV)
1		0.43797	16.78	9.61	26.39	-20.71	47.1	Average
2		0.43797	25.76	9.61	35.37	-21.73	57.1	QP
3	*	0.70794	26.36	9.63	35.99	-10.01	46	Average
4	*	0.70794	35.9	9.63	45.53	-10.47	56	QP
5		1.752	19.78	9.68	29.46	-16.54	46	Average
6		1.752	30.23	9.68	39.91	-16.09	56	QP
7		3.178	14.74	9.7	24.44	-21.56	46	Average
8		3.178	23.73	9.7	33.43	-22.57	56	QP
9		4.821	13.83	9.73	23.56	-22.44	46	Average
10		4.821	22.67	9.73	32.4	-23.6	56	QP
11		8.807	12.61	9.85	22.46	-27.54	50	Average
12		8.807	21.54	9.85	31.39	-28.61	60	QP

Note: The EUT Power Charge by USB Adapter

1. " * ", means this data is the worst emission level.
2. C.F (Correction Factor) = Factor (dB)+ Cable Loss (dB).
3. Measurement (dBuV) = Reading(dBuV)+ C.F (Correction Factor).

8. CONCLUSION

The data collected relate only the item(s) tested and show that the **GPS BIKE COMPUTER,** is in compliance with Part 15C & IC RSS-247 of the FCC Rules & IC Rules.

The End