FCC Part 15
EMI TEST REPORT

of

E.U.T.	:	Brydge 9.7
Model	:	BRY1011,BRY1012,BRY1013
FCC ID	:	2ADRG- BRY101

for

APPLICANT	:	BRYDGE GLOBAL
ADDRESS	:	110A Meyer Rd Singapore 43926

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 34. LIN 5, DINGFU VIL., LINKOU DIST.,
NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.
Tel:(02)26023052 Fax:(02)26010910
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Report Number : 16-11-RBF-005-01

TEST REPORT CERTIFICATION

Applicant : BRYDGE GLOBAL
110A Meyer Rd Singapore 43926

Manufacture : BRYDGE GLOBAL
110A Meyer Rd Singapore 43926

Description of Device :

a) Type of EUT : Brydge 9.7
b) Trade Name : BRYDGE
c) Model No. : BRY1011,BRY1012,BRY1013
d) Power Supply : Input: DC 5.0V, 225 mA
Battery DC 3.7V, 1.67Wh, 450mAh

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.10-2013, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of ETC.

Summary of Tests

Test	Results
Radiated Emission	**Pass**
Conducted Emission	**Pass**
Hopping Channel Separation	**Pass**
Number of Hopping frequencies used	**Pass**
Hopping Channel Bandwidth	**Pass**
Dwell Time of each frequency	**Pass**
Output Power Requirement	**Pass**
100 kHz Bandwidth of Frequency Band Edges Requirement	**Pass**
Out-of-Band Conducted Emission Requirement	**Pass**
Duty Cycle	**Pass**

Date Test Item Received	:	*Nov. 07, 2016*
Date Test Campaign Completed	:	*Nov. 22, 2016*
Date of Issue	:	*Nov. 29, 2016*

Test Engineer : Kazuma Ho

(Kazuma Ho, Engineer)

Approve & Authorized : S S Liou

S. S. Liou, Section Manager
EMC Dept. II of ELECTRONICS
TESTING CENTER, TAIWAN

EMC TESTING DEPARTMENT II
財團法人台灣電子檢驗中心電磁相容試驗二部
ELECTRONICS TESTING CENTER, TAIWAN ETC.

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Brydge 9.7
b) Trade Name : BRYDGE
c) Model No. : BRY1011,BRY1012,BRY1013
d) Power Supply : Input: DC 5.0V, 225 mA
Battery DC 3.7V, 1.67Wh, 450mAh
e) Model Difference :

Model \ Difference Item		PCB Layout	Circuit Diagram	Function	Material	Accessory	Shape & Color	Other
Main Model	BRY1011	O	O	O	O	O	O(Silver)	O
Serial Model	BRY1012	O	O	O	O	O	X(Space Grey)	O
	BRY1013	O	O	O	O	O	X(Gold)	O

Notes:
- ✧ "O" means the item is same with Test Model.
- ✧ "X" means the item is different with main model. And please explain it.

1.2 Test Methodology

Both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.10-2013. Other required measurements were illustrated in separate sections of this test report for details.

Measurement Software

Software	Version	Note
e3	Version 6.100618b	Radiated Emission Test
e3	Version 6.100421	Conducted Emission Test

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan 24442, R.O.C.
This site is FCC 2.948 listed and accepted in a letter dated Jan. 29, 2014.
Registration Number: 90589

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:
A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:
A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :
A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency MHz	Quasi Peak dBμV	Average dBμV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreases with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dBμV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(3) Antenna Requirement

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

(4) Hopping Channel Separation

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

(5) Number of Hopping frequencies used

According to 15.247(a)(1)(iii), frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

(6) Hopping Channel Bandwidth

For frequency hopping system operating in the 2400–2483.5 MHz band, there is no requirement for the maximum 20dB bandwidth of the hopping channel. The measurement of the hopping channel bandwidth is for the reference of the hopping channel separation requirement.

(7) Dwell Time of each frequency

According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5 band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

(8) Output Power Requirement

According to 15.247(b)(1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

(9) 100 kHz Bandwidth of Frequency Band Edges Requirement

According to 15.247(d), 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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

(10) Out-of-Band Conducted Emission Requirement

According to 15.247(d), 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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3360-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

3 SYSTEM TEST CONFIGURATION

3.1 Justification

For both radiated and conducted emissions below 1 GHz, the system was configured for testing in a typical fashion as a customer would normally use it. The peripherals other than EUT were connected in normally standing by situation. Measurement was performed under the condition that a computer program was exercised to simulate data communication of EUT, and the transmission rate was set to maximum allowed by EUT. Three highest emissions were verified with varying placement of the transmitting antenna connected to EUT (if applicable) to maximize the emission from EUT.

For conducted and radiated emissions, whichever RF channel is operated, the digital circuits' function identically. As the reason, measurement of emissions from digital circuits is performed with the highest, middle and the lowest channel by transmitting mode.

The following modes were invastegated and the worst cases (mode 1 and 3) were chosen for final test.

1. Basic Rate (BR) 1 Mbps uses GFSK modulation
2. Enhanced Data Rate (EDR) 2Mbps uses pi/4-DQPSK modulation
3. Enhanced Data Rate (EDR) 3Mbps uses 8DPSK modulation

For portable device, the EUT was pretested in three orthogonal plans: put on table horizontally, stands vertically and side up vertically. The worst case was chosen for final test.

3.2 Devices for Tested System

Device	Manufacture	Model / FCC ID.	Description
Brydge 9.7 *	BRYDGE GLOBAL	BRY1012,BRY1013/ 2ADRG- BRY101	0.5m Unshielded USB Cable
Notebook PC	Lenovo	7298 RN1	1.8m Unshielded AC Adapter Power Cord

Remark "*" means equipment under test.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with §15.109(a).
For intentional radiators, according to §15.247 (a), operation under this provision is limited to frequency hopping and direct sequence spread spectrum, and the out band emission shall be comply with §15.247 (d)

4.2 Measurement Procedure

A. Preliminary Measurement For Portable Devices

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

B. Final Measurement

1. Setup the configuration per figure 1(a), 1(b) and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

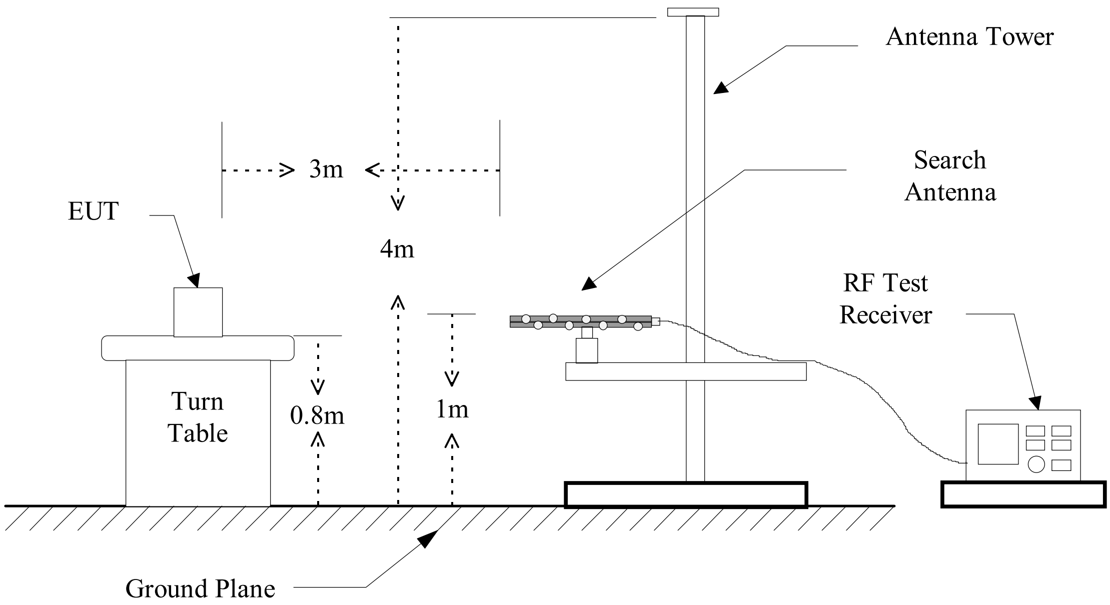
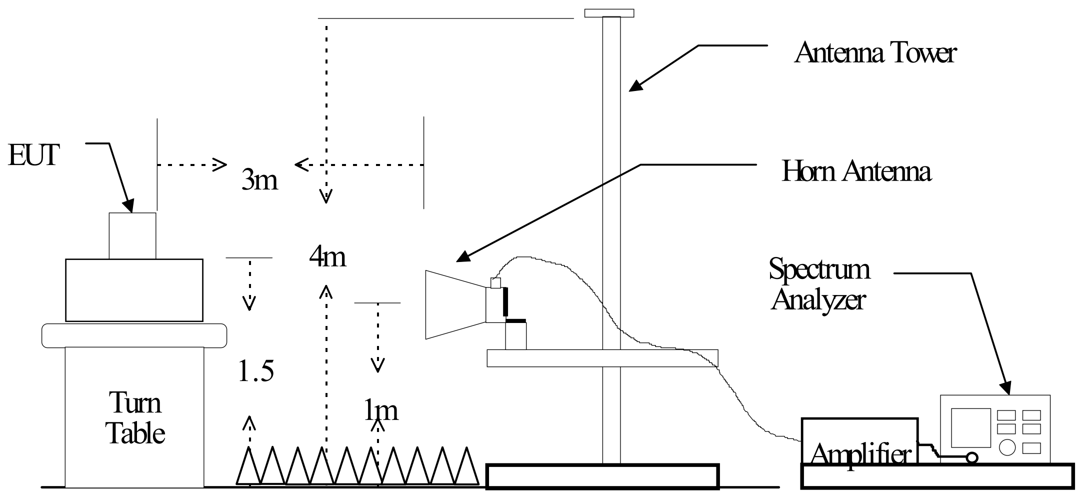


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement:

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Test Receiver	Rohde & Schwarz	ESCI	2016/09/07	2017/09/06
Bi-Log Antenna	ETC	MCTD 2786	2016/07/15	2017/07/14
Log-periodic Antenna	EMCO	3146	2016/07/05	2017/07/04
Biconical Antenna	EMCO	3110	2016/07/05	2017/07/04
Horn Antenna	EMCO	3115	2016/10/05	2017/10/04
Horn Antenna	EMCO	3116	2016/10/05	2017/10/04
Horn Antenna	ETS	3160	2016/10/05	2017/10/04
Spectrum	R&S	FSP3	2015/12/21	2016/12/20
Amplifier	HP	8447D	2015/12/17	2016/12/16
EMI Test Receiver	Rohde & Schwarz	ESU 40	2016/11/10	2017/11/09
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/11/10	2017/11/09
Attenuator	MINI-CIRCUITS	BW-S20W2+	2016/09/30	2017/09/29
Attenuator	MINI-CIRCUITS	BW-S30W2+	2016/09/30	2017/09/29
Amplifier	HP	83051A	2016/07/18	2017/07/17

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10 Hz or $\geq 1/T$ (Note 1)

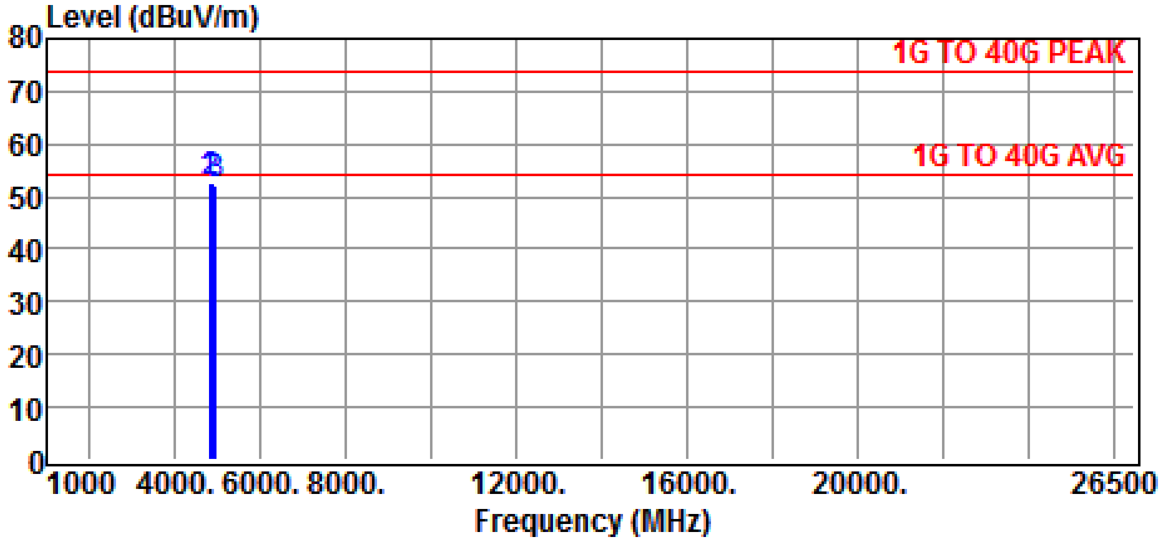
Note 1:
VBW = 10 Hz, when the duty cycle is no less than 98%.
VBW $\geq 1/T$, when duty cycle is less than 98% where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

4.4 Radiated Emission Data

4.4.1 Tx Portion

A. Bluetooth BR

Test Date : Nov. 22, 2016 Temperature : 25 °C Humidity : 58 %

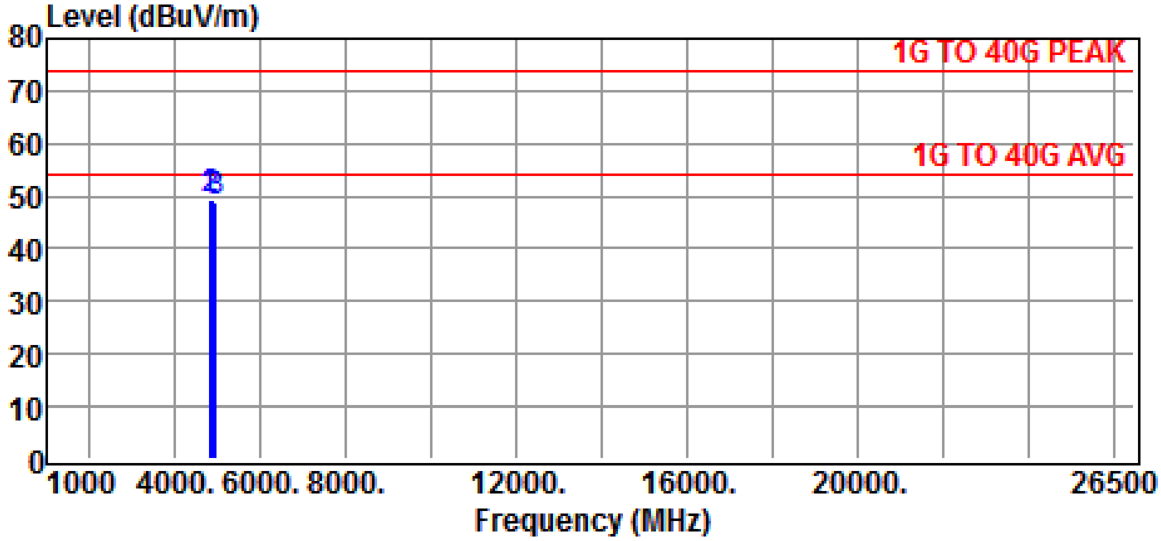


Site	:CHAMBER #2	Date	:2016-11-22
Limit	:1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BR		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
4804.0000	51.57	1.22	52.79	74.00	-21.21	Peak
4882.0000	51.11	1.44	52.55	74.00	-21.45	Peak
4960.0000	50.66	1.71	52.37	74.00	-21.63	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



Site	:CHAMBER #2	Date	:2016-11-22
Limit	:1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BR		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
4804.0000	48.01	1.22	49.23	74.00	-24.77	Peak
4882.0000	47.69	1.44	49.13	74.00	-24.87	Peak
4960.0000	47.31	1.71	49.02	74.00	-24.98	Peak

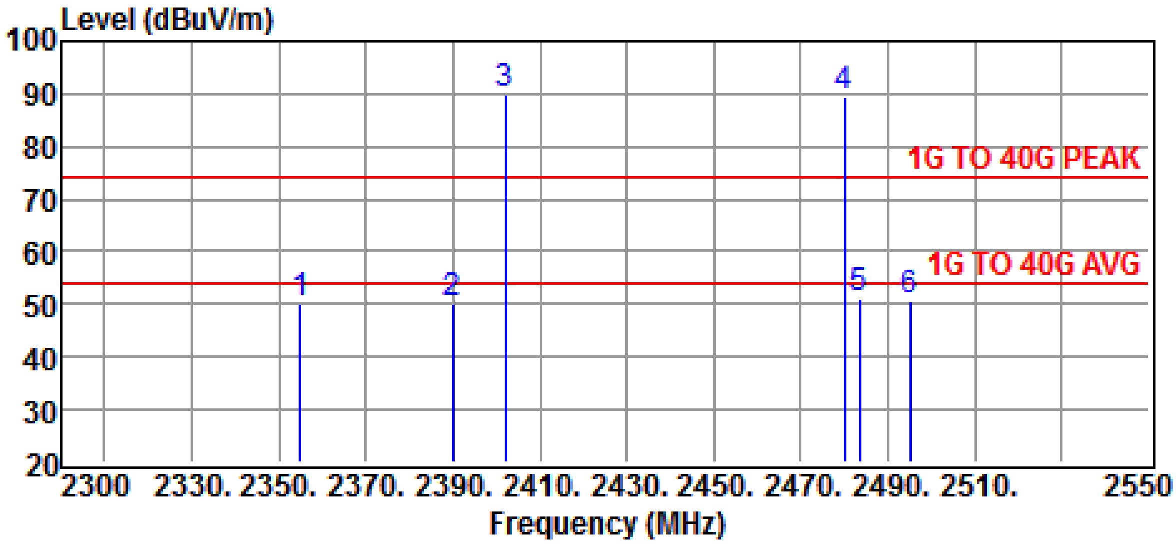
Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

4.4.2 Radiated Emissions in Restricted Bands

A. Bluetooth BR

Test Date : Nov. 22, 2016 Temperature : 25 °C Humidity : 58 %

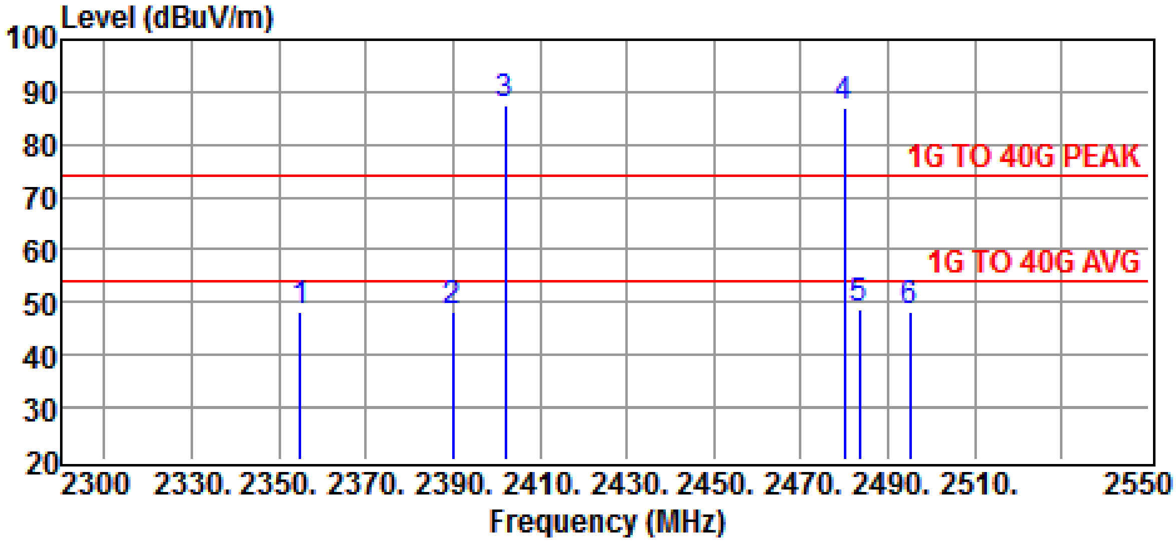


Site	:CHAMBER #2	Date	:2016-11-22
Limit	:1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BR		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
2355.0000	55.98	-5.67	50.31	74.00	-23.69	Peak
2390.0000	55.96	-5.61	50.35	74.00	-23.65	Peak
2402.0000	95.76	-5.61	90.15	74.00	---	Peak
2480.0000	94.92	-5.40	89.52	74.00	---	Peak
2483.5000	56.49	-5.40	51.09	74.00	-22.91	Peak
2495.0000	55.78	-5.36	50.42	74.00	-23.58	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result



Site	:CHAMBER #2	Date	:2016-11-22
Limit	:1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BR		
Test Mode	: EUT put on table horizontally (worst case)		

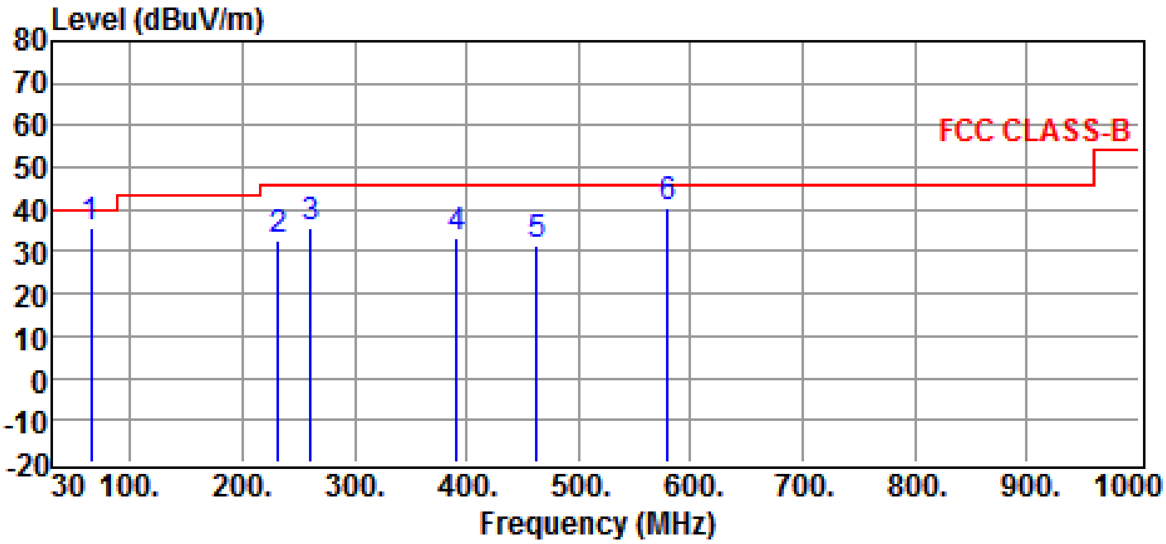
Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
2355.0000	54.02	-5.67	48.35	74.00	-25.65	Peak
2390.0000	54.00	-5.61	48.39	74.00	-25.61	Peak
2402.0000	93.26	-5.61	87.65	74.00	---	Peak
2480.0000	92.31	-5.40	86.91	74.00	---	Peak
2483.5000	53.92	-5.40	48.52	74.00	-25.48	Peak
2495.0000	53.69	-5.36	48.33	74.00	-25.67	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

4.4.3 Other Emissions

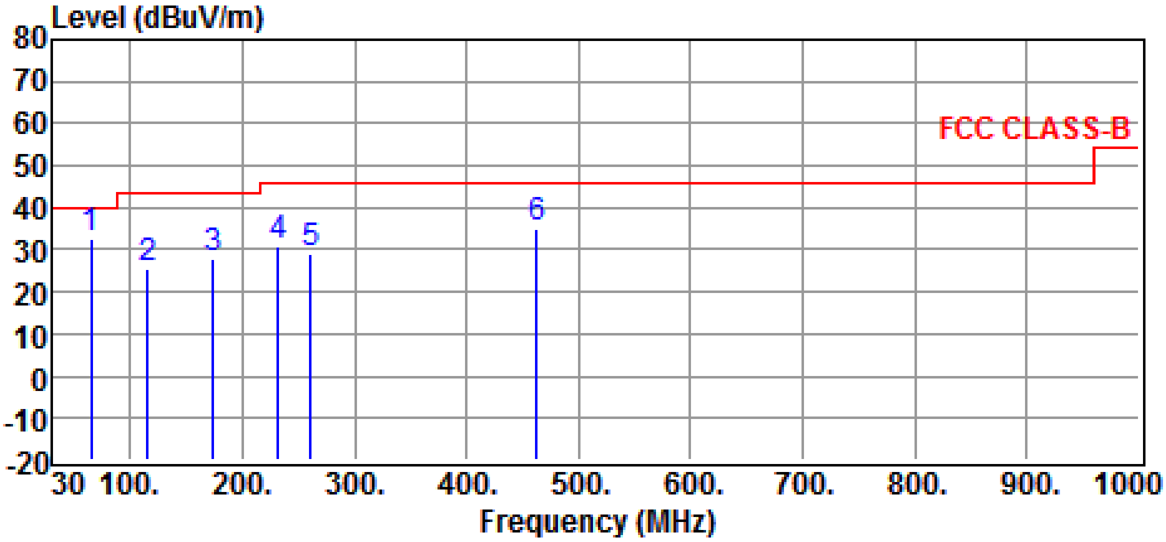
a) Emission frequencies below 1 GHz



Site	:CHAMBER #2	Date	:11-10-2016
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:Power from PC	Temp.	:24˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:Charging Mode		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
64.9200	48.87	-13.03	35.84	40.00	-4.16	QP
231.7600	39.88	-6.94	32.94	46.00	-13.06	QP
260.8600	40.41	-4.43	35.98	46.00	-10.02	QP
390.8400	34.72	-1.22	33.50	46.00	-12.50	QP
462.6200	31.91	-0.44	31.47	46.00	-14.53	QP
579.0200	39.33	1.26	40.59	46.00	-5.41	QP

Note :
1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit - Result

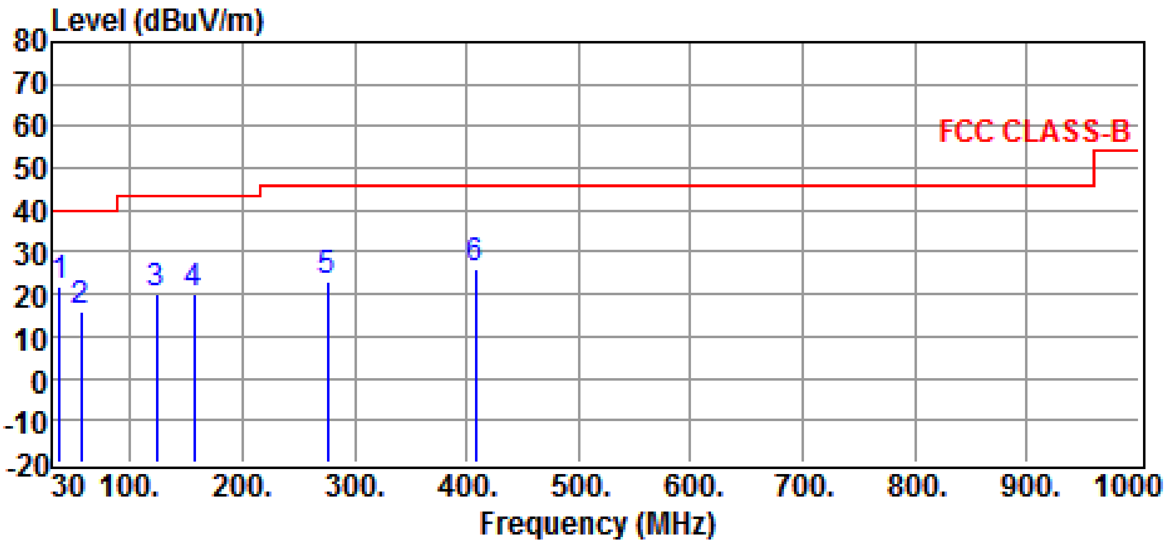


Site	:CHAMBER #2	Date	:11-10-2016
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:Power from PC	Temp.	:24˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:Charging Mode		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
64.9200	46.01	-13.03	32.98	40.00	-7.02	QP
115.3600	33.45	-7.80	25.65	43.50	-17.85	QP
173.5600	35.94	-8.20	27.74	43.50	-15.76	QP
231.7600	38.13	-6.94	31.19	46.00	-14.81	QP
260.8600	33.34	-4.43	28.91	46.00	-17.09	QP
462.6200	35.31	-0.44	34.87	46.00	-11.13	QP

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit - Result

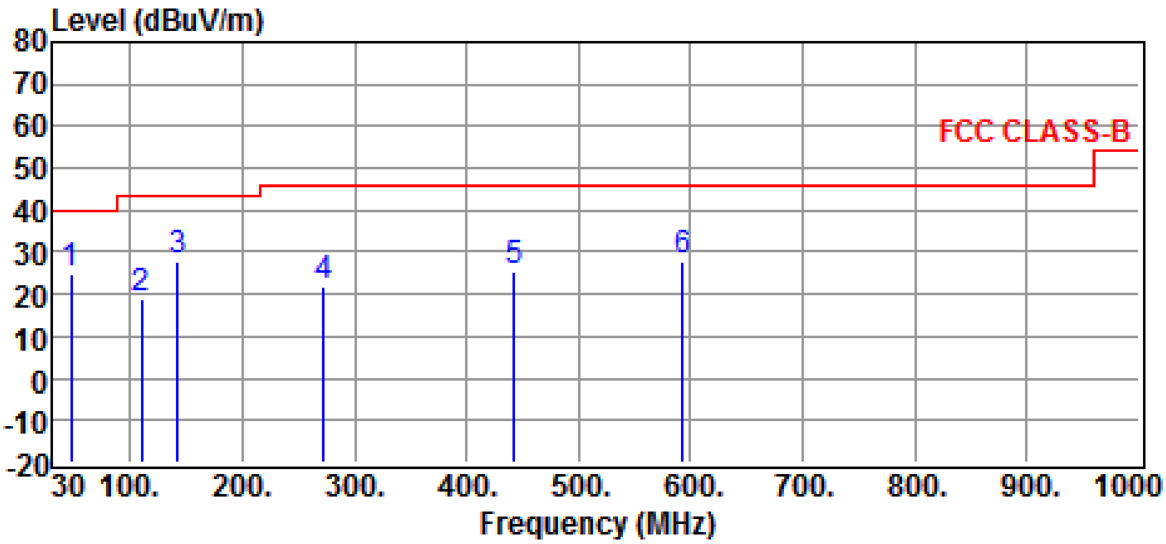


Site	:CHAMBER #2	Date	:11-10-2016
Limit	:FCC CLASS-B	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:24˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BT Mode		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
37.7600	27.34	-5.13	22.21	40.00	-17.79	QP
56.1900	28.08	-12.05	16.03	40.00	-23.97	QP
123.1200	27.28	-7.45	19.83	43.50	-23.67	QP
157.0700	27.08	-7.21	19.87	43.50	-23.63	QP
276.3800	27.48	-4.08	23.40	46.00	-22.60	QP
408.3000	27.32	-0.96	26.36	46.00	-19.64	QP

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result



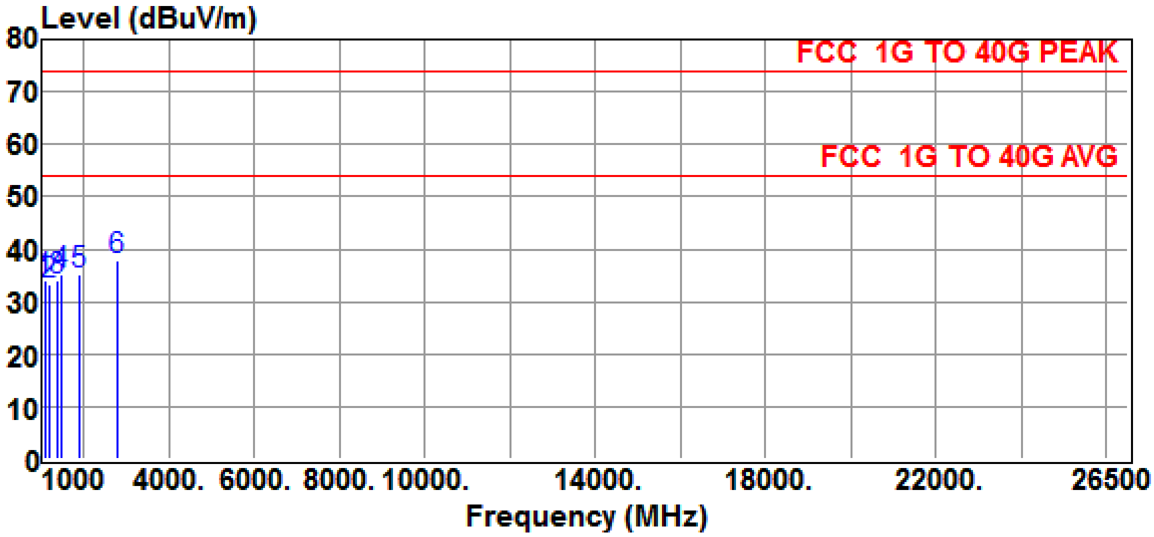
Site	:CHAMBER #2	Date	:11-10-2016
Limit	:FCC CLASS-B	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:DC3.7V Battery	Temp.	:24˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BT Mode		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
47.4600	33.73	-8.59	25.14	40.00	-14.86	QP
109.5400	27.19	-8.03	19.16	43.50	-24.34	QP
142.5200	34.68	-6.68	28.00	43.50	-15.50	QP
272.5000	26.05	-4.13	21.92	46.00	-24.08	QP
443.2200	26.52	-0.74	25.78	46.00	-20.22	QP
592.6000	26.37	1.44	27.81	46.00	-18.19	QP

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result

b) Emission frequencies above 1 GHz

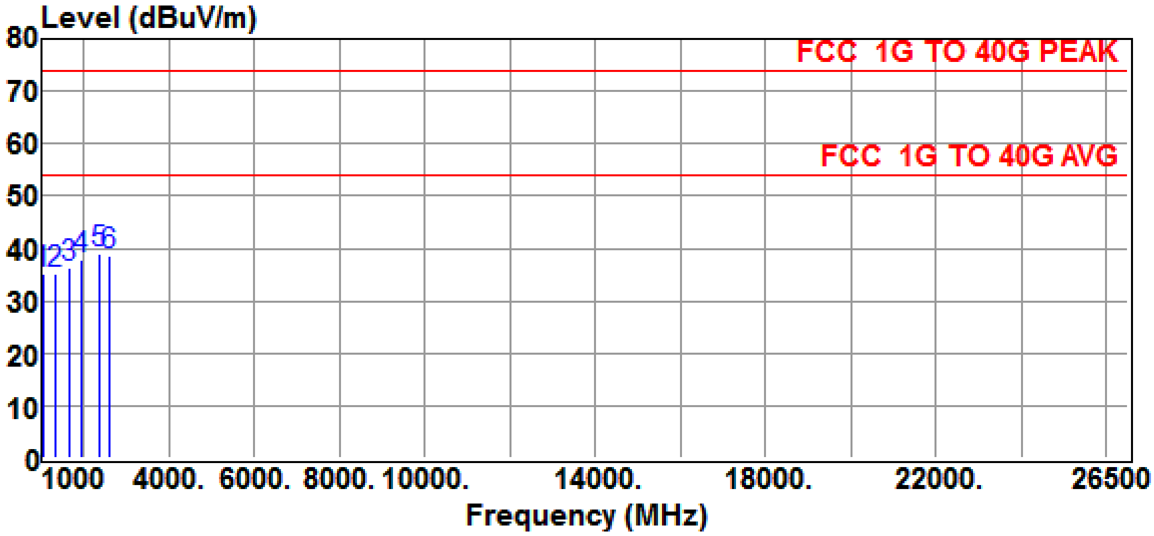


Site	:CHAMBER #2	Date	:2016-11-09
Limit	:FCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:Power from PC	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:Charging Mode		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
1086.0000	45.0	-11.0	34.0	74.0	-40.0	Peak
1198.0000	44.1	-10.7	33.4	74.0	-40.6	Peak
1370.0000	44.1	-10.2	33.9	74.0	-40.1	Peak
1454.0000	45.2	-10.0	35.2	74.0	-38.8	Peak
1908.0000	42.5	-7.1	35.4	74.0	-38.6	Peak
2788.0000	42.2	-4.3	37.9	74.0	-36.1	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

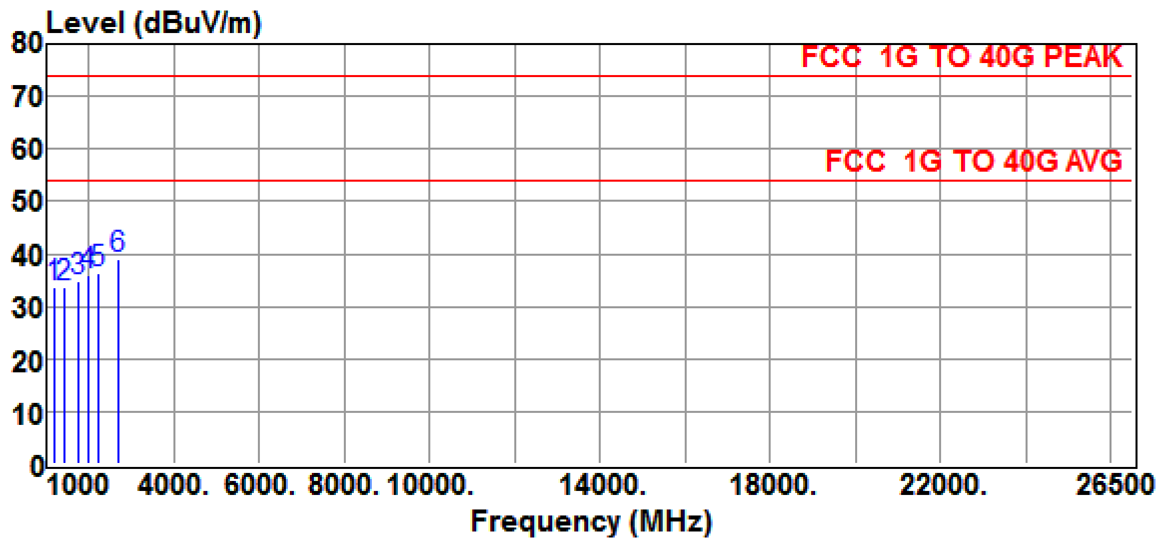


Site	:CHAMBER #2	Date	:2016-11-09
Limit	:FCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Power Rating	:Power from PC	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:Charging Mode		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
1056.0000	46.5	-11.1	35.4	74.0	-38.6	Peak
1328.0000	45.6	-10.3	35.3	74.0	-38.7	Peak
1672.0000	45.1	-8.6	36.5	74.0	-37.5	Peak
1920.0000	45.0	-7.0	38.0	74.0	-36.0	Peak
2364.0000	44.6	-5.7	38.9	74.0	-35.1	Peak
2604.0000	43.8	-5.0	38.8	74.0	-35.2	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

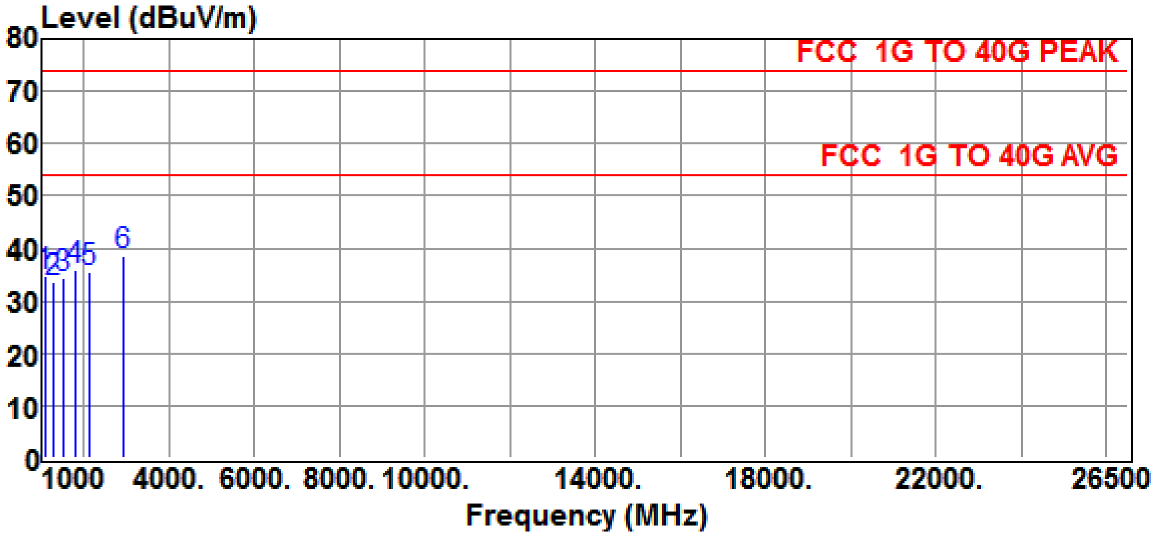


Site	:CHAMBER #2	Date	:2016-11-09
Limit	:FCC 1G TO 40G PEAK	Ant. Pol.	:HORIZONTAL
EUT	:Brydge 9.7	Model	:BRY1011
Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BT Mode		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
1198.0000	44.3	-10.7	33.6	74.0	-40.4	Peak
1426.0000	43.6	-10.0	33.6	74.0	-40.4	Peak
1738.0000	43.2	-8.3	34.9	74.0	-39.1	Peak
1966.0000	43.0	-6.8	36.2	74.0	-37.8	Peak
2222.0000	42.2	-6.0	36.2	74.0	-37.8	Peak
2704.0000	43.8	-4.6	39.2	74.0	-34.8	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.



Site	:CHAMBER #2	Date	:2016-11-09
Limit	:FCC 1G TO 40G PEAK	Ant. Pol.	:VERTICAL
EUT	:Brydge 9.7	Model	:BRY1011
Rating	:DC3.7V Battery	Temp.	:25˚C
Engineer	: Kazuma Ho	Humi.	:58 %
Test Mode	:BT Mode		
Test Mode	: EUT put on table horizontally (worst case)		

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
1114.0000	45.9	-10.9	35.0	74.0	-39.0	Peak
1284.0000	44.1	-10.4	33.7	74.0	-40.3	Peak
1512.0000	44.2	-9.7	34.5	74.0	-39.5	Peak
1796.0000	43.9	-7.9	36.0	74.0	-38.0	Peak
2108.0000	42.0	-6.3	35.7	74.0	-38.3	Peak
2930.0000	42.4	-3.8	38.6	74.0	-35.4	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

c) Emission frequencies below 30MHz (9kHz - 30MHz)

According to exploratory test no any obvious emission were detected from 9kHz to 30MHz. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

4.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss (if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

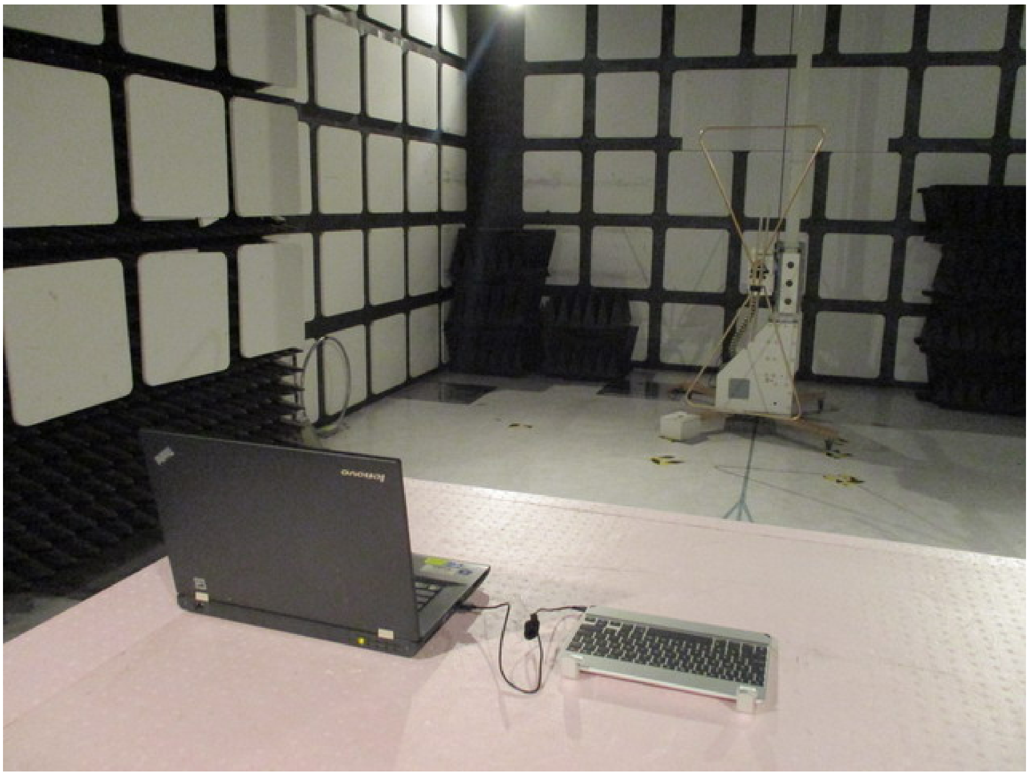
Result = Reading + Corrected Factor

where Corrected Factor

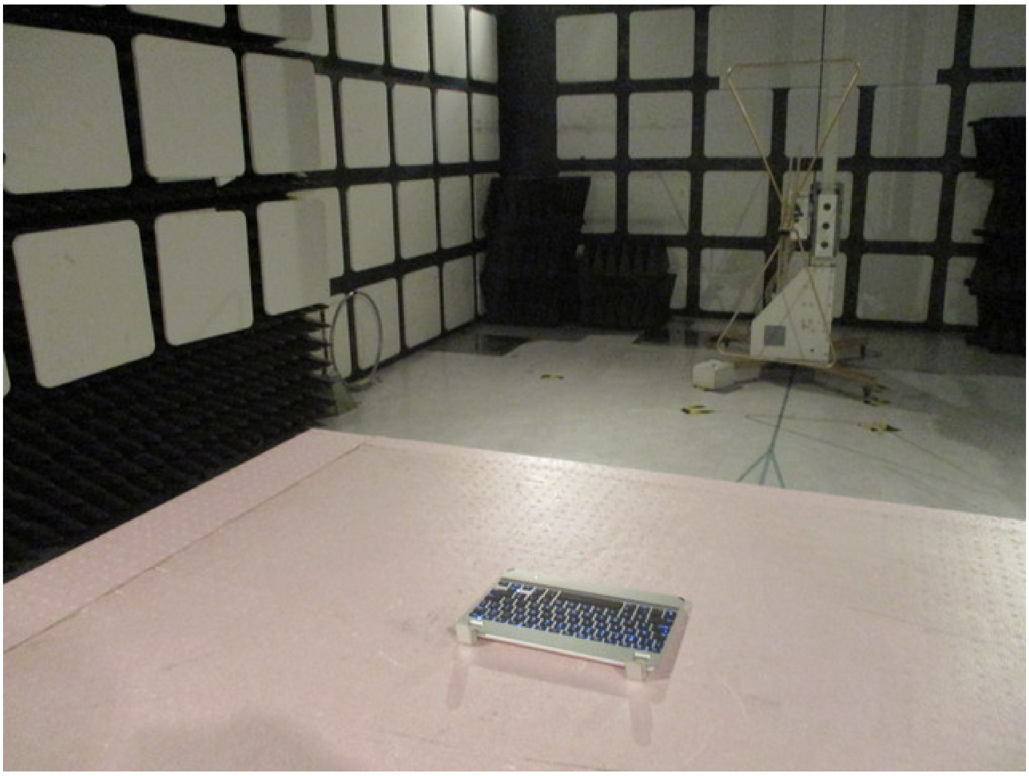
= Antenna FACTOR + Cable Loss + High Pass Filter Loss - Amplifier Gain

4.6 Photos of Radiation Measuring Setup

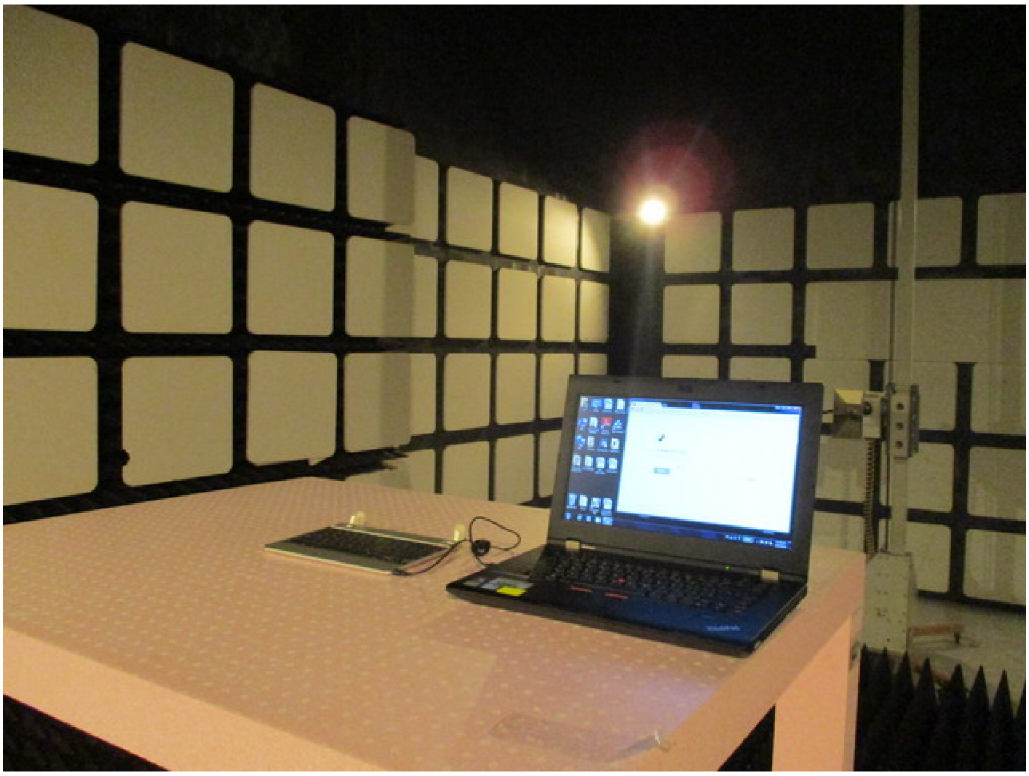
Below 1 GHz /Charging Mode



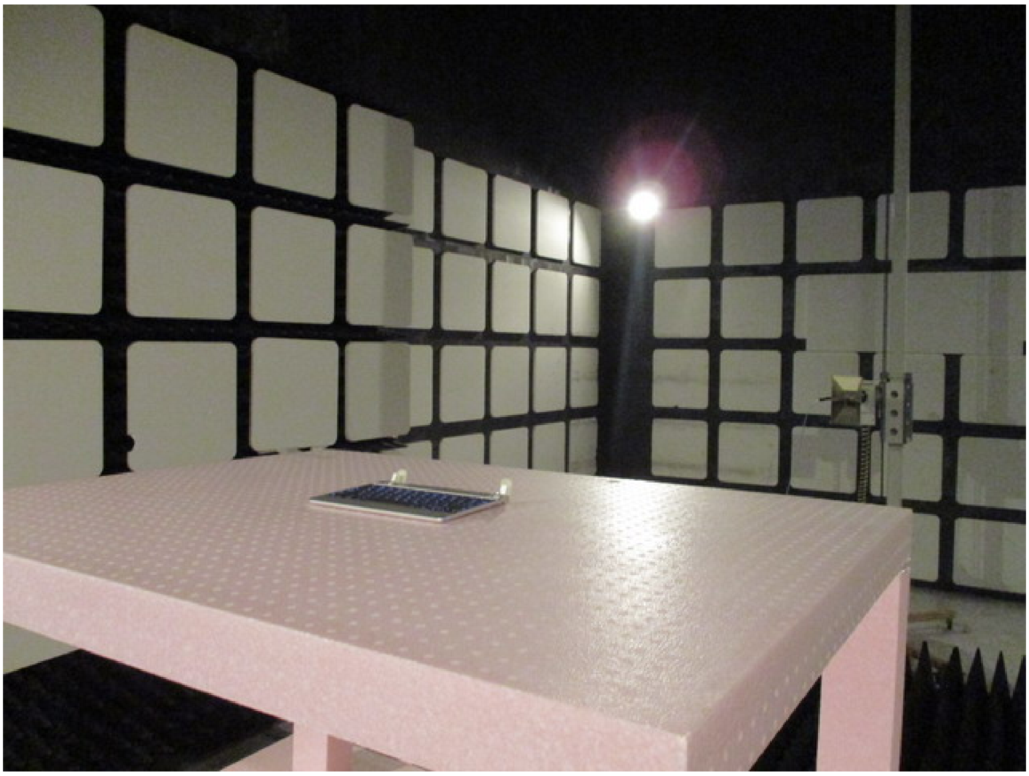
Below 1 GHz /BT Mode



Above 1GHz/Charging Mode



Above 1GHz /BT Mode



5 CONDUCTED EMISSION MEASUREMENT

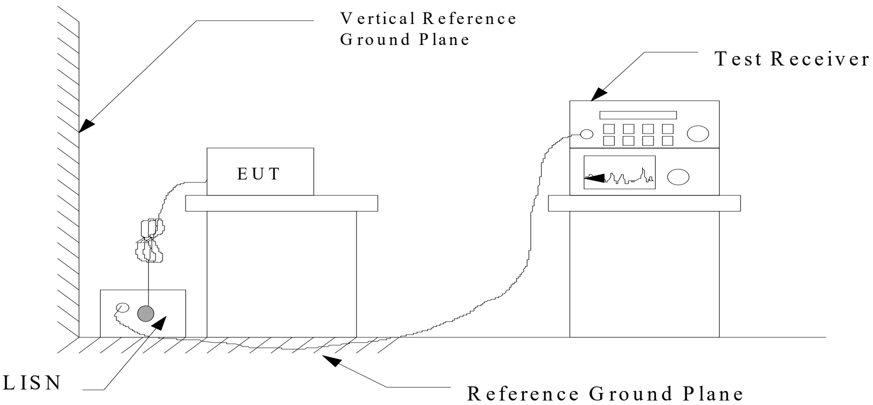
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and § 15.207(a) respectively. Both Limits are identical specification.

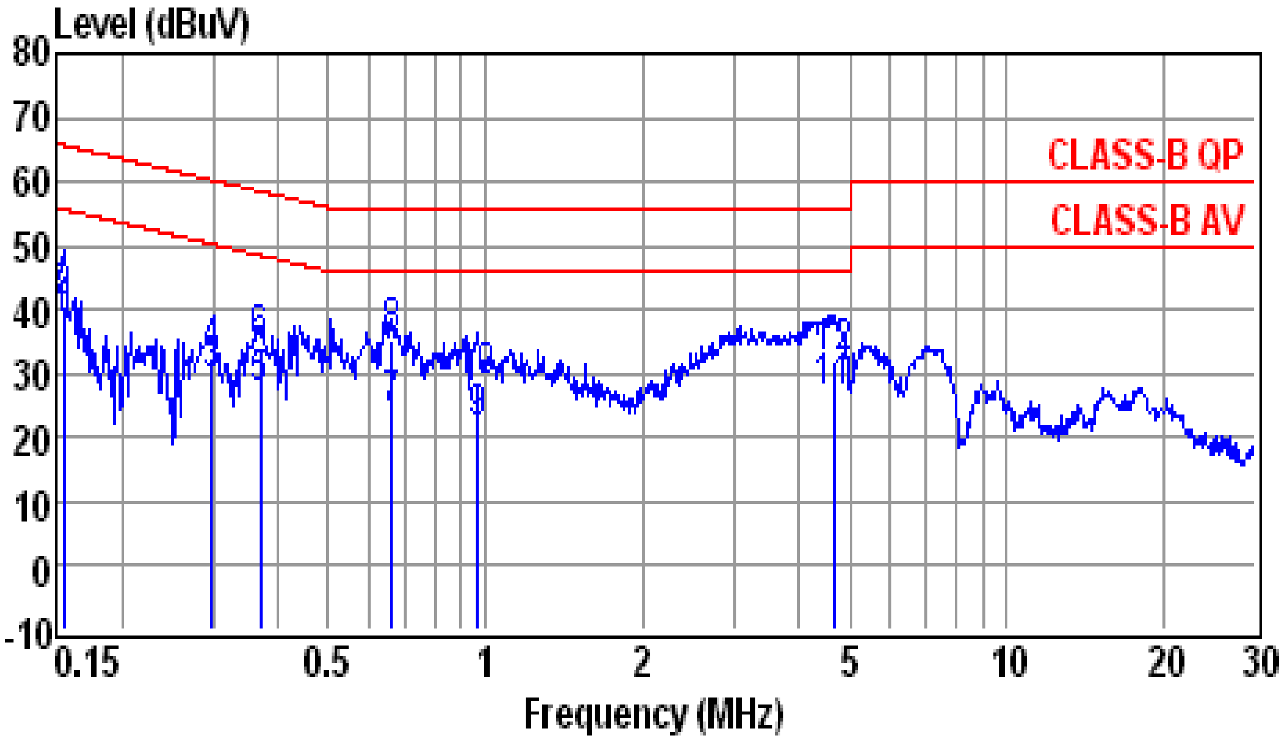
5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 3 : Conducted emissions measurement configuration



5.3 Conducted Emission Data



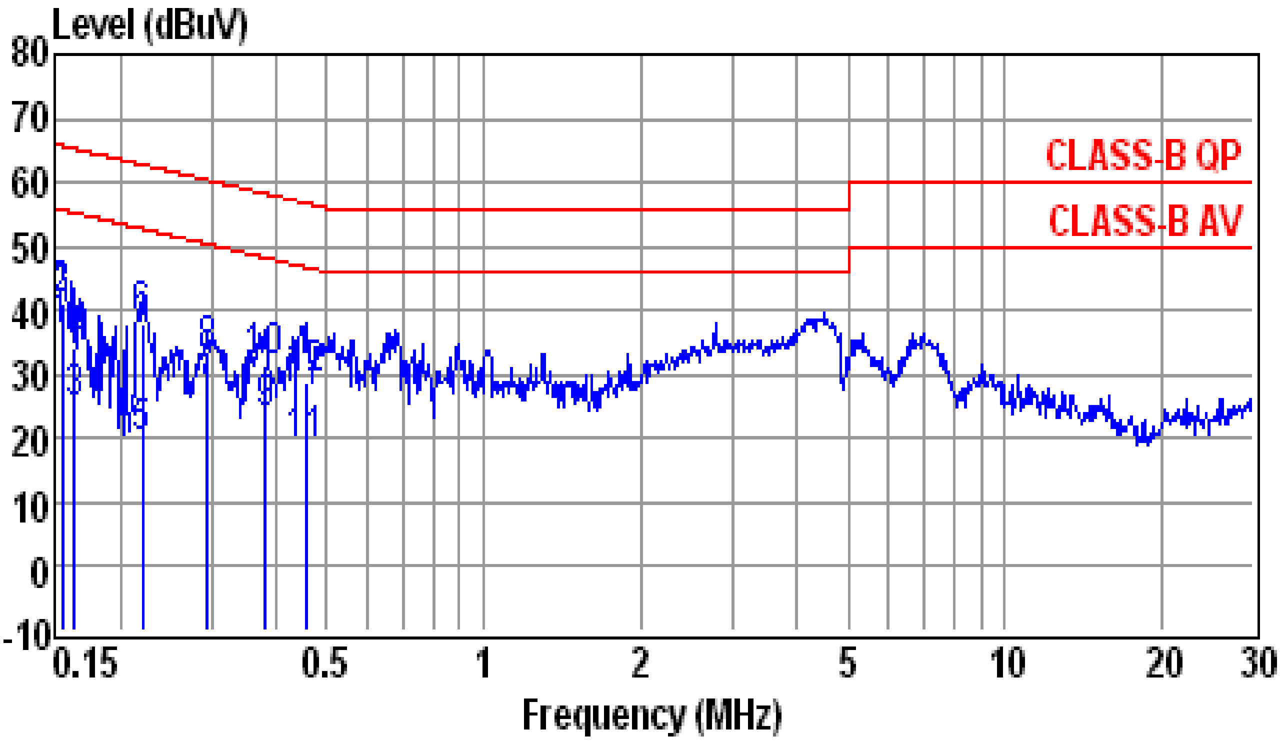
Site	: conducted #1	Date	: 11-08-2016
Condition	: CLASS-B QP	LISN	: NEUTRAL
Tem / Hum	: 24 ℃ / 58%	Test Mode	: Charging Mode
EUT	:Brydge 9.7	Power Rating:	AC120V 60Hz

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.1549	27.55	10.17	37.72	55.74	-18.02	Average
0.1549	30.43	10.17	40.60	65.74	-25.14	QP
0.2987	19.28	10.17	29.45	50.28	-20.83	Average
0.2987	22.18	10.17	32.35	60.28	-27.93	QP
0.3692	16.87	10.18	27.05	48.52	-21.47	Average
0.3692	23.83	10.18	34.01	58.52	-24.51	QP
0.6613	13.75	10.20	23.95	46.00	-22.05	Average
0.6613	25.18	10.20	35.38	56.00	-20.62	QP
0.9684	11.64	10.21	21.85	46.00	-24.15	Average
0.9684	17.79	10.21	28.00	56.00	-28.00	QP

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
4.6720	16.29	10.40	26.69	46.00	-19.31	Average
4.6720	21.52	10.40	31.92	56.00	-24.08	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site	: conducted #1	Date	: 11-08-2016
Condition	: CLASS-B QP	LISN	: LINE
Tem / Hum	: 24 ℃ / 58%	Test Mode	: Charging Mode
EUT	:Brydge 9.7	Power Rating:	AC120V 60Hz

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.1549	26.03	10.17	36.20	55.74	-19.54	Average
0.1549	31.23	10.17	41.40	65.74	-24.34	QP
0.1641	14.63	10.17	24.80	55.25	-30.45	Average
0.1641	24.23	10.17	34.40	65.25	-30.85	QP
0.2208	9.57	10.17	19.74	52.79	-33.05	Average
0.2208	27.98	10.17	38.15	62.79	-24.64	QP
0.2955	17.90	10.18	28.08	50.37	-22.29	Average
0.2955	22.36	10.18	32.54	60.37	-27.83	QP
0.3811	13.08	10.19	23.27	48.25	-24.98	Average
0.3811	21.28	10.19	31.47	58.25	-26.78	QP

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.4564	8.45	10.19	18.64	46.76	-28.12	Average
0.4564	18.69	10.19	28.88	56.76	-27.88	QP

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR

Assume a receiver reading of 22.5 dB μV is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μV.

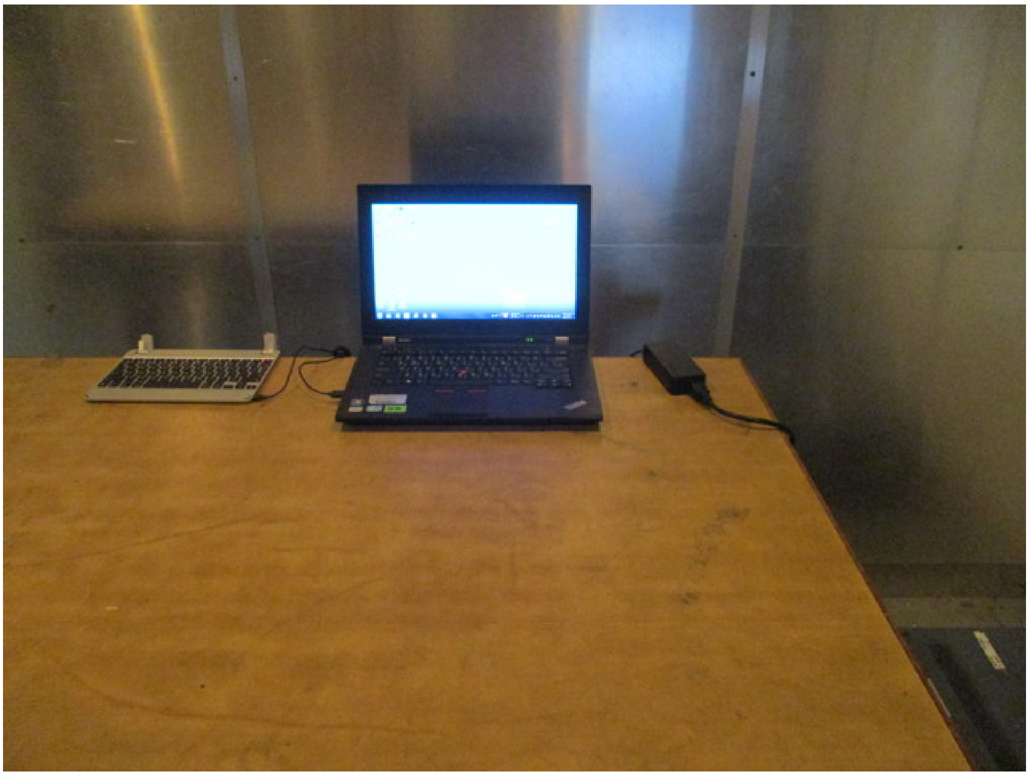
RESULT = 22.5 + 0.1 = 22.6 dB μV
Level in μV = Common Antilogarithm[(22.6 dB μV)/20]
= 13.48 μV

5.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2015/12/05	2016/12/04
LISN	EMCO	3625/2	2016/10/26	2017/10/25
LISN	Rohde & Schwarz	ESH2-Z5	2016/05/05	2017/05/04

5.6 Photos of Conduction Measuring Setup



6 ANTENNA REQUIREMENT

6.1 Standard Applicable

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

6.2 Antenna Construction

The antenna is integrated on the device. No consideration of replacement. Please refer to the construction Photo for details.

7 HOPPING CHANNEL SEPARATION

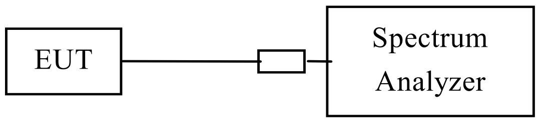
7.1 Standard Applicable

According to 15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. The EUT must have its hopping function enabled. Then set it to any one convenient frequency within its operating range.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels
   Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span
   Video (or Average) Bandwidth (VBW) ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold
4. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all frequencies measured were complete.

Figure 4 : Measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

7.4 Measurement Data

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

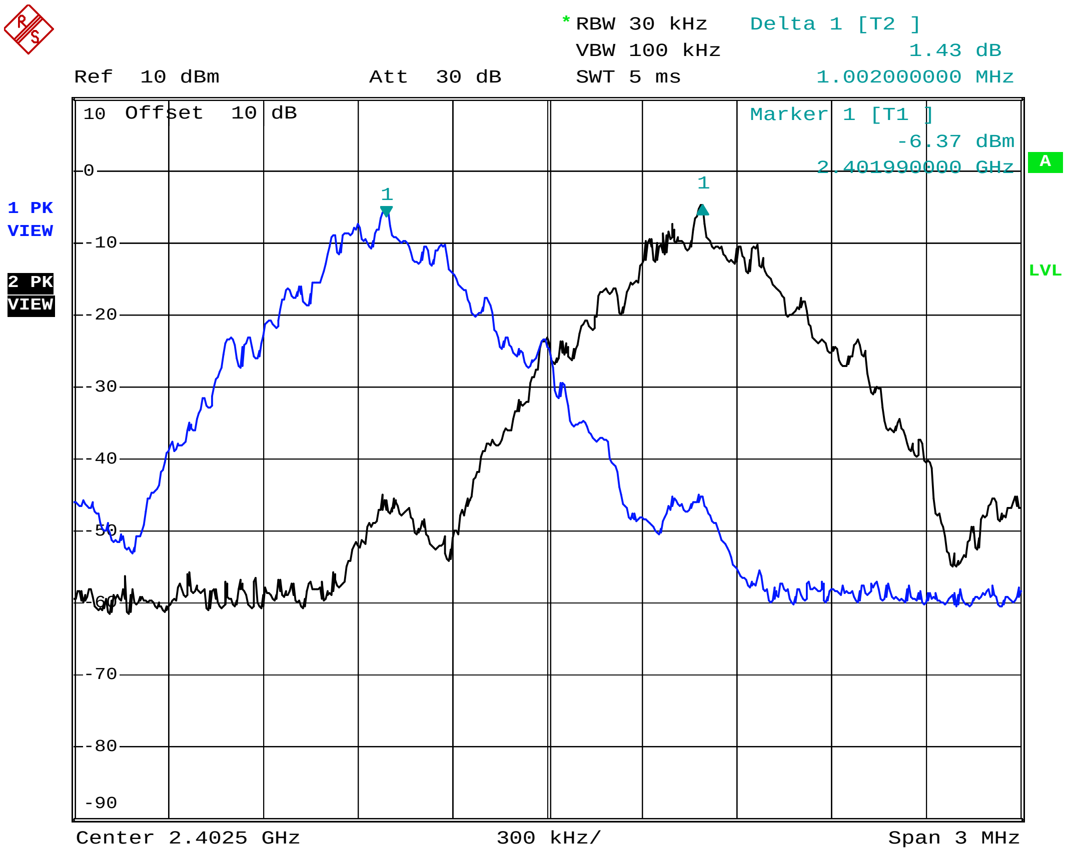
Mode: Bluetooth BR

a) Channel Low : Adjacent Hopping Channel Separation is 1.002 MHz
b) Channel Middle : Adjacent Hopping Channel Separation is 1.002 MHz
c) Channel High : Adjacent Hopping Channel Separation is 1.002 MHz

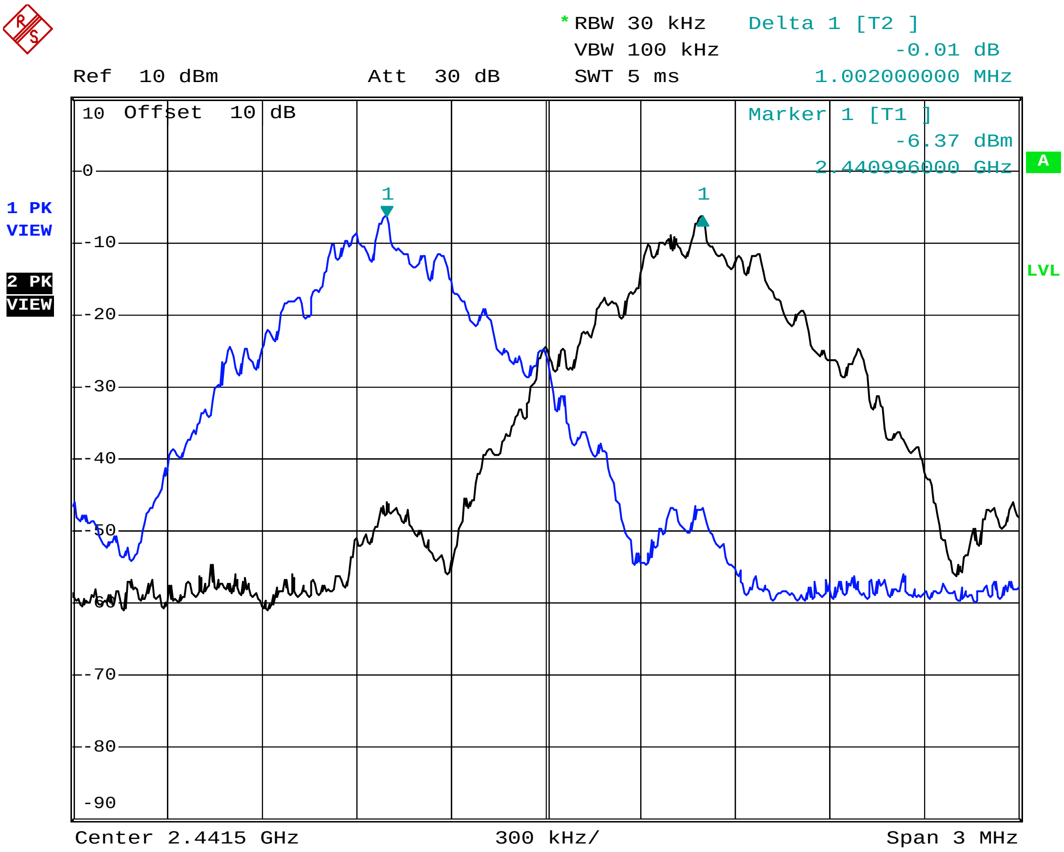
Note : The expanded uncertainty: frequency $\times 1.65 \times 10^{-6}$ (1 GHz $< f \leq$ 18 GHz).

Mode: Bluetooth BR

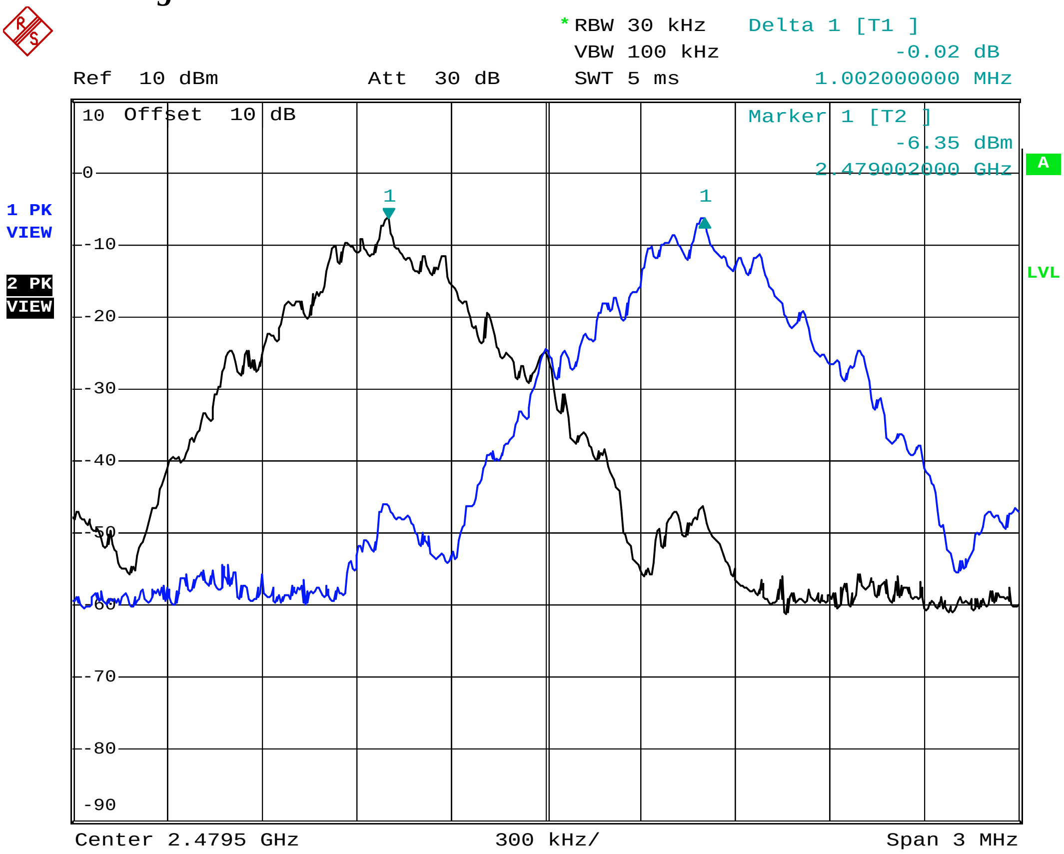
Channel Low



Channel Middle



Channel High



8 NUMBER OF HOPPING FREQUENCY USED

8.1 Standard Applicable

According to 15.247(a)(1)(iii), frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. The EUT must have its hopping function enabled.
3. Use the following spectrum analyzer settings:
   Span = the frequency band of operation
   RBW ≥ 1% of the span
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold
4. Allow the trace to stabilize. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

8.4 Measurement Data

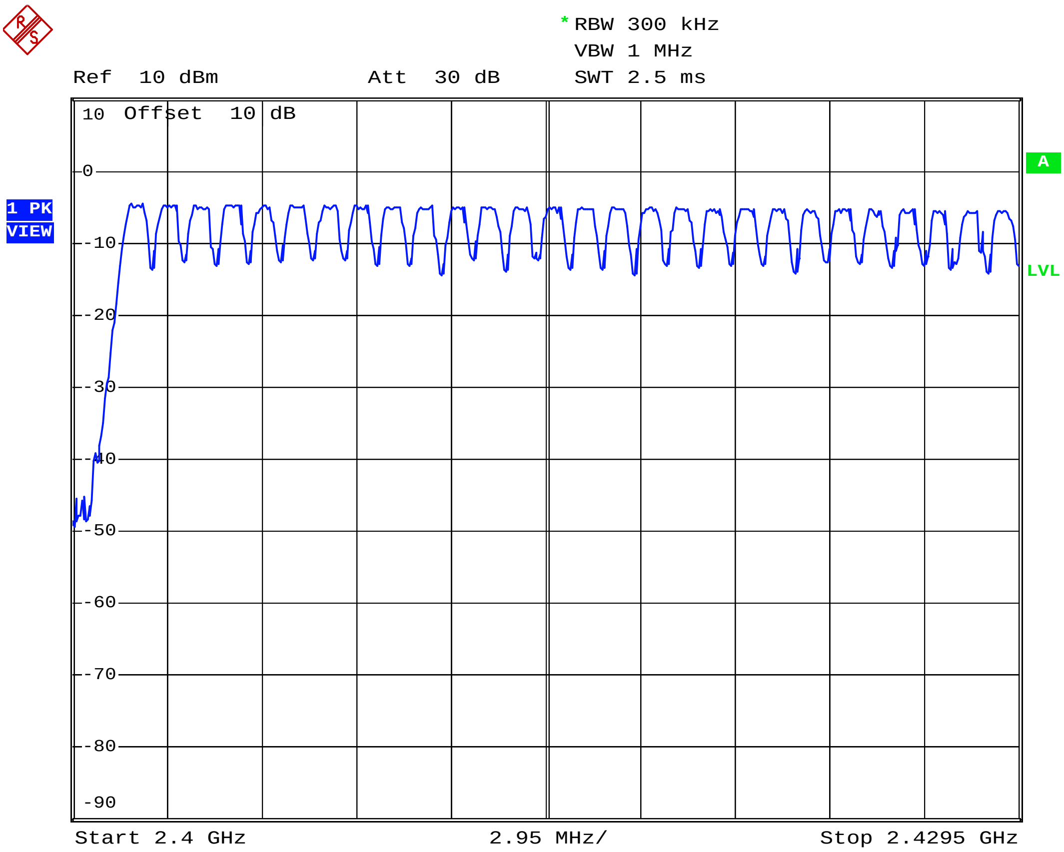
Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

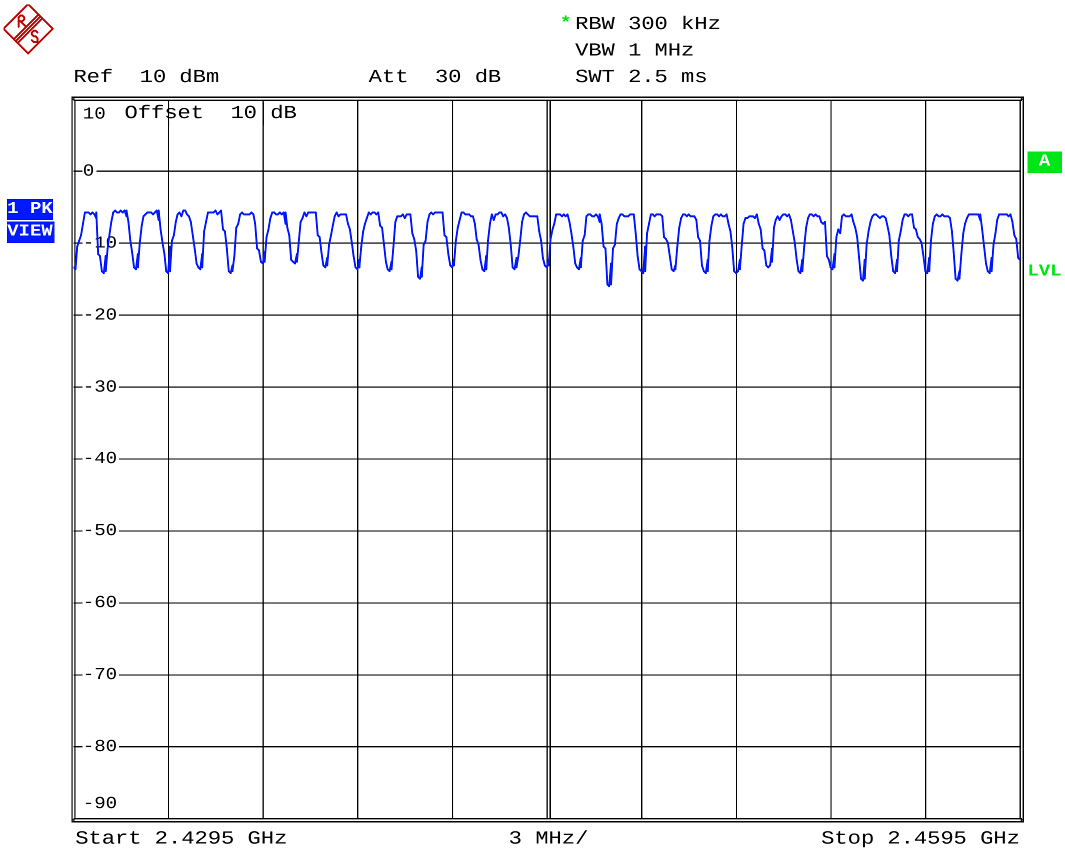
There are 79 hopping frequencies used.

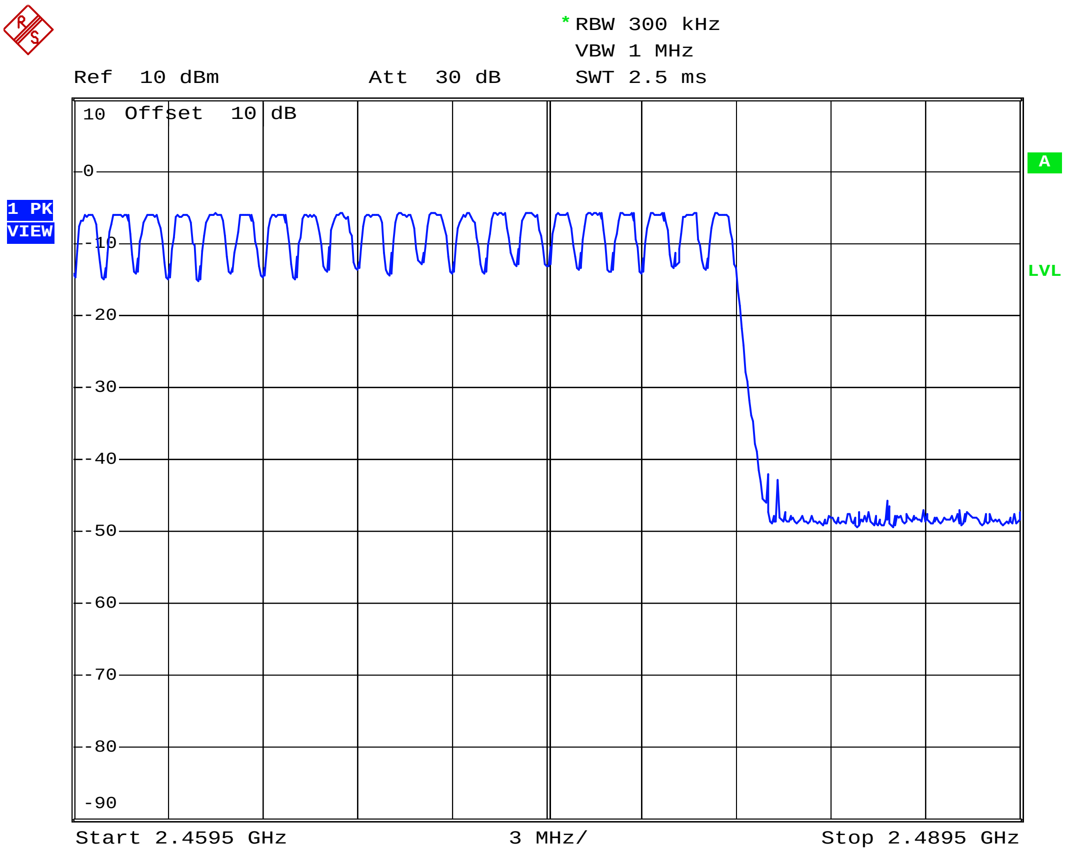
Justification on AFH mode:
Adaptive Frequency Hopping (AFH) means that a device can hop over a reduced set of frequencies. The frequencies hopped may reduced in AFH mode but at least 15 channels will be used, normally AFH mode has 20 channels.

Note : The expanded uncertainty: frequency $\times 1.65 \times 10^{-6}$ (1 GHz $< f \leq$ 18 GHz).

Mode: Bluetooth BR




*RBW 300 kHz
VBW 1 MHz
Ref 10 dBm
Att 30 dB
SWT 2.5 ms
10 Offset 10 dB
1 PK
VIEW
A
LVL
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 2.4295 GHz
3 MHz/
Stop 2.4595 GHz


*RBW 300 kHz
VBW 1 MHz
Ref 10 dBm
Att 30 dB
SWT 2.5 ms
10 Offset 10 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1 PK
VIEW
A
LVL
Start 2.4595 GHz
3 MHz/
Stop 2.4895 GHz

9 CHANNEL BANDWIDTH

9.1 Standard Applicable

For frequency hopping system operating in the 2400–2483.5 MHz band, there is no requirement for the maximum 20dB bandwidth of the hopping channel. The measurement of the hopping channel bandwidth is for the reference of the hopping channel separation requirement.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
   RBW ≥ 1% of the 20 dB bandwidth
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all frequencies measured were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

9.4 Measurement Data

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

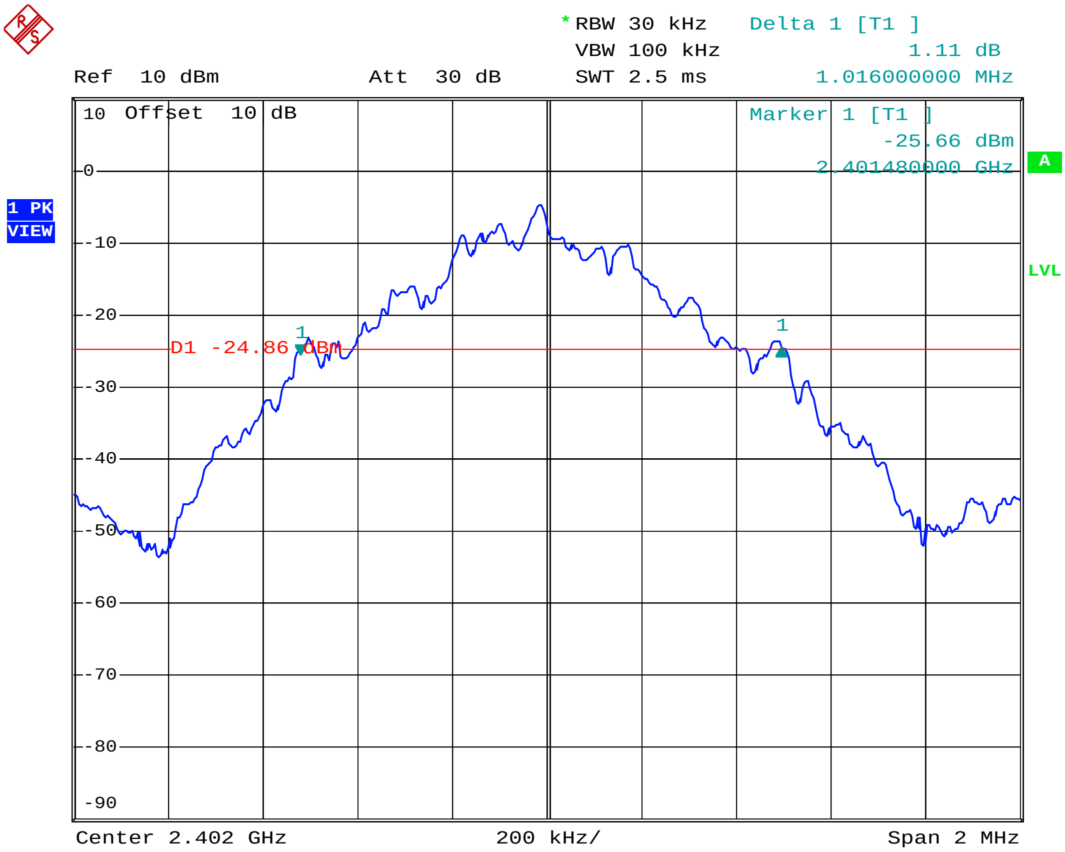
Mode: Bluetooth BR

a) Channel Low : Channel Bandwidth is 1.016 MHz
b) Channel Middle : Channel Bandwidth is 1.016 MHz
c) Channel High : Channel Bandwidth is 1.016 MHz

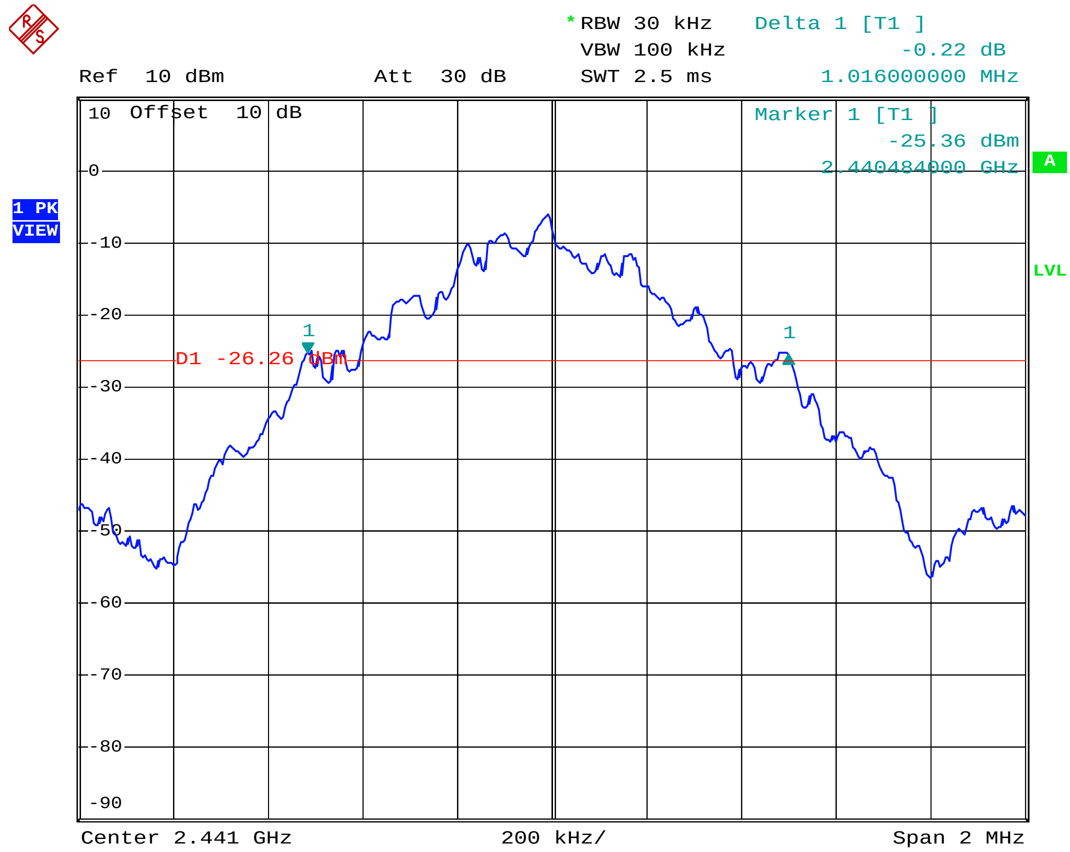
Note : The expanded uncertainty: frequency $\times 1.65\times10^{-6}$ (1 GHz $<$ f $\leq$ 18 GHz).

Mode:Bluetooth BR

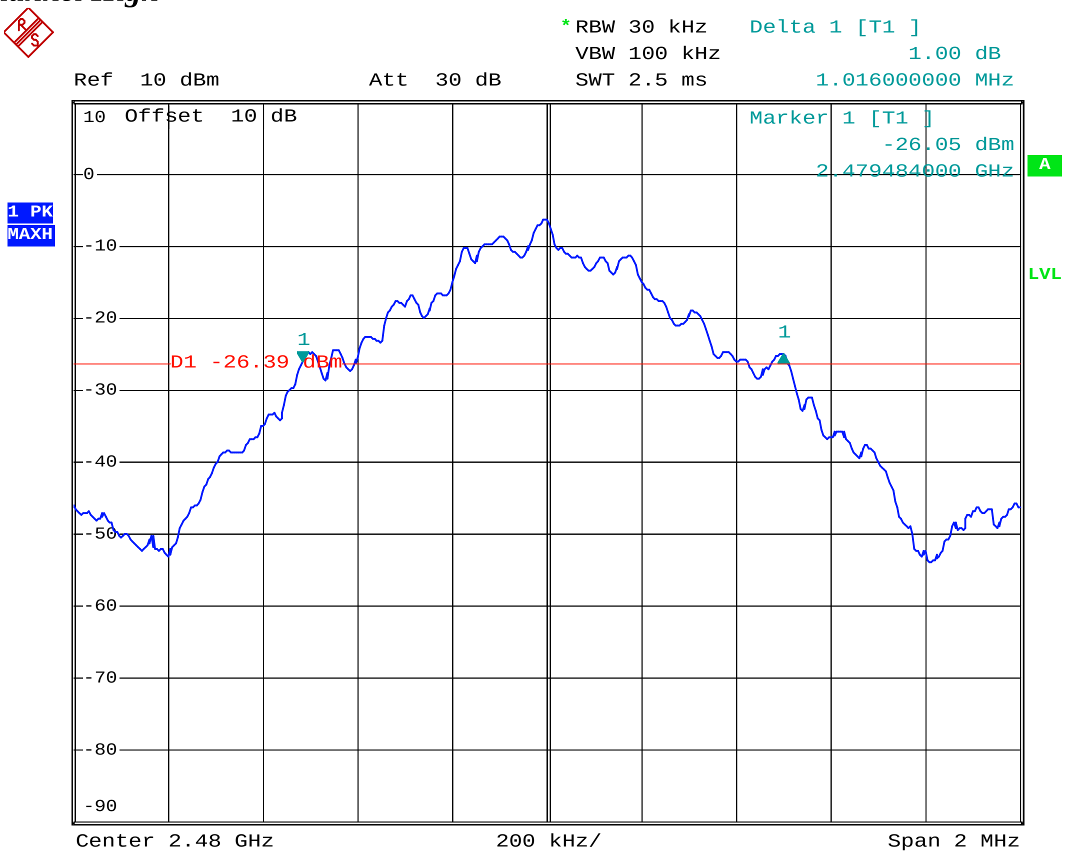
Channel Low



Channel Middle



Channel High



10 DWELL TIME ON EACH CHANNEL

10.1 Standard Applicable

According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5 band, the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. The EUT must have its hopping function enabled.
3. Use the following spectrum analyzer settings:
   Span = zero span, centered on a hopping channel
   RBW = 1 MHz
   VBW ≥ RBW
   Sweep = as necessary to capture the entire dwell time per hopping channel
   Detector function = peak
   Trace = max hold
4. Use the marker-delta function to determine the dwell time. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all frequencies measured were complete.

Justification on AFH mode:
Adaptive Frequency Hopping (AFH) means that a device can hop over a reduced set of frequencies. The frequencies hopped may reduced in AFH mode but at least 15 channels will be used, normally AFH mode has 20 channels.

10.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

10.4 Measurement Data

Test Mode: Bluetooth BR

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

Period = 0.4(seconds) x 79(channels) = 31.6 seconds

A. DH1 Mode

The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second. The DH1 data rate operates on a one-slot transmission and one-slot receiving basis. Thus there are 1600/(1+1) = 800 transmissions per second. In one period for each particular channel there are 10.13 x 31.6 = 320.1 times of transmissions.

a) Channel Low : the dwell time is 0.46 ms x 320.1 = 147.246 ms
b) Channel Middle : the dwell time is 0.45 ms x 320.1 = 144.045 ms
c) Channel High : the dwell time is 0.45 ms x 320.1 = 144.045 ms

The maximum time of occupancy for a particular channel is 147.246ms in any 31.6 second period, which is less than the 400ms allowed by the rules; therefore, it meets the requirements of this section.

B. DH3 Mode

The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second. The DH3 data rate operates on a three-slot transmission and one-slot receiving basis. Thus there are 1600/(3+1) = 400 transmissions per second. In one period for each particular channel there are 5.06 x 31.6 = 159.9 times of transmissions.

a) Channel Low : the dwell time is 1.73 ms x 159.9 = 276.627 ms
b) Channel Middle : the dwell time is 1.73 ms x 159.9 = 276.627 ms
c) Channel High : the dwell time is 1.77 ms x 159.9 = 283.023 ms

The maximum time of occupancy for a particular channel is 283.023ms in any 31.6 second period, which is less than the 400 ms allowed by the rules; therefore, it meets the requirements of this section.

C. DH5 Mode

The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second. The DH5 data rate operates on a five-slot transmission and one-slot receiving basis. Thus there are 1600/(5+1) = 266.7 transmissions per second. In one period for each particular channel there are 3.38 x 31.6 = 106.81 times of transmissions.

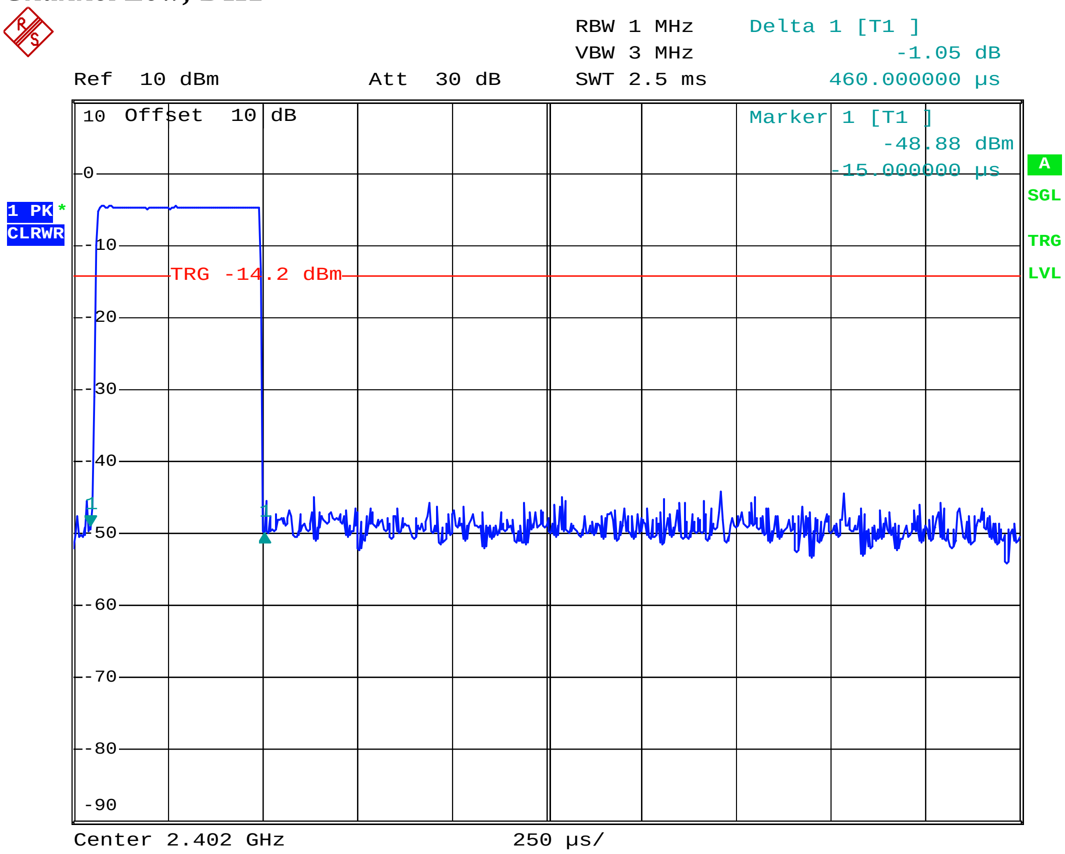
a) Channel Low : the dwell time is 2.99 ms x106.81 = 319.361 ms
b) Channel Middle : the dwell time is 3.03 ms x106.81 = 323.634 ms
c) Channel High : the dwell time is 3.00 ms x106.81 = 320.430 ms

The maximum time of occupancy for a particular channel is 323.634ms in any 31.6 second period, which is less than the 400 ms allowed by the rules; therefore, it meets the requirements of this section.

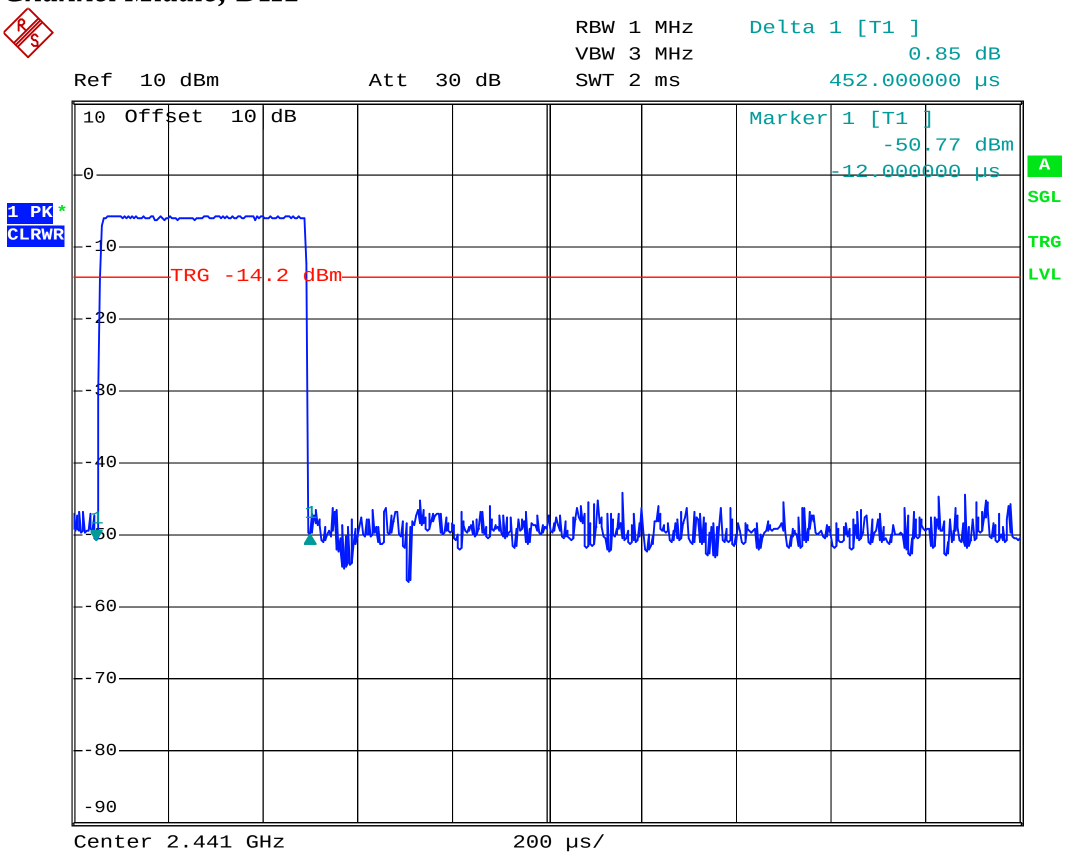
Note : The expanded uncertainty of dwell time on each channel tests is 2dB.

Mode: Bluetooth BR

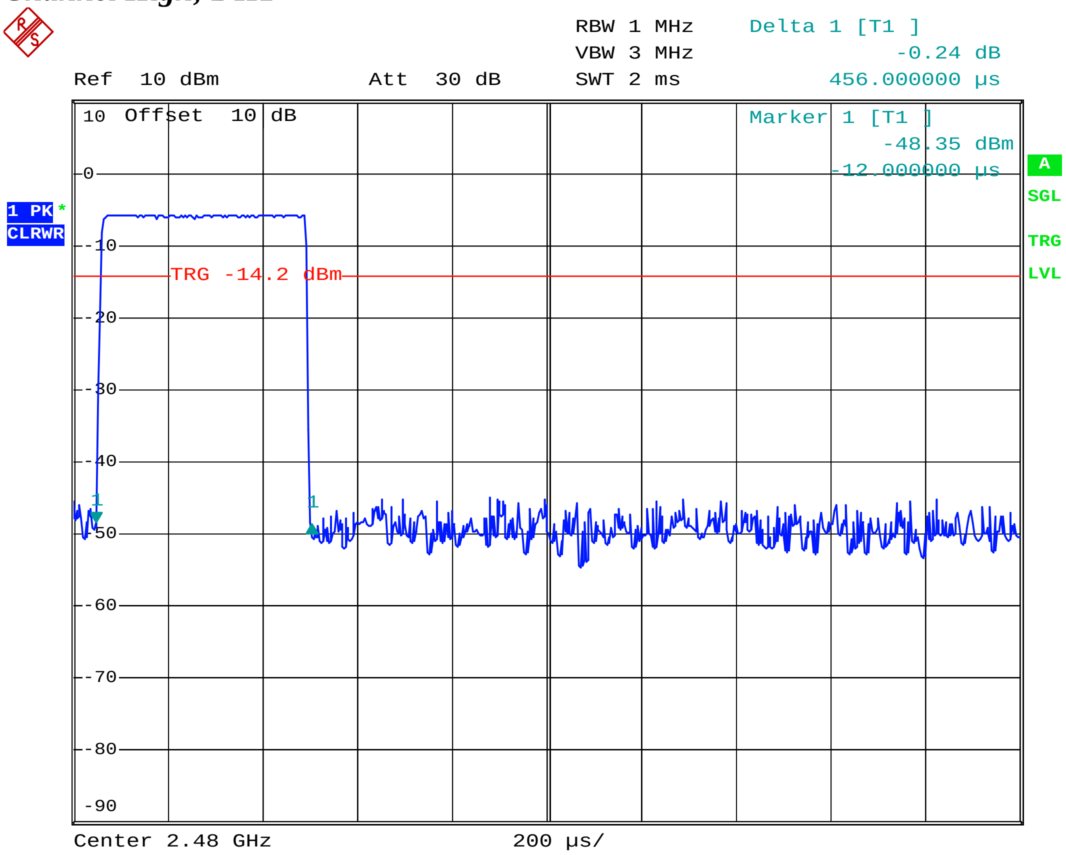
Channel Low; DH1



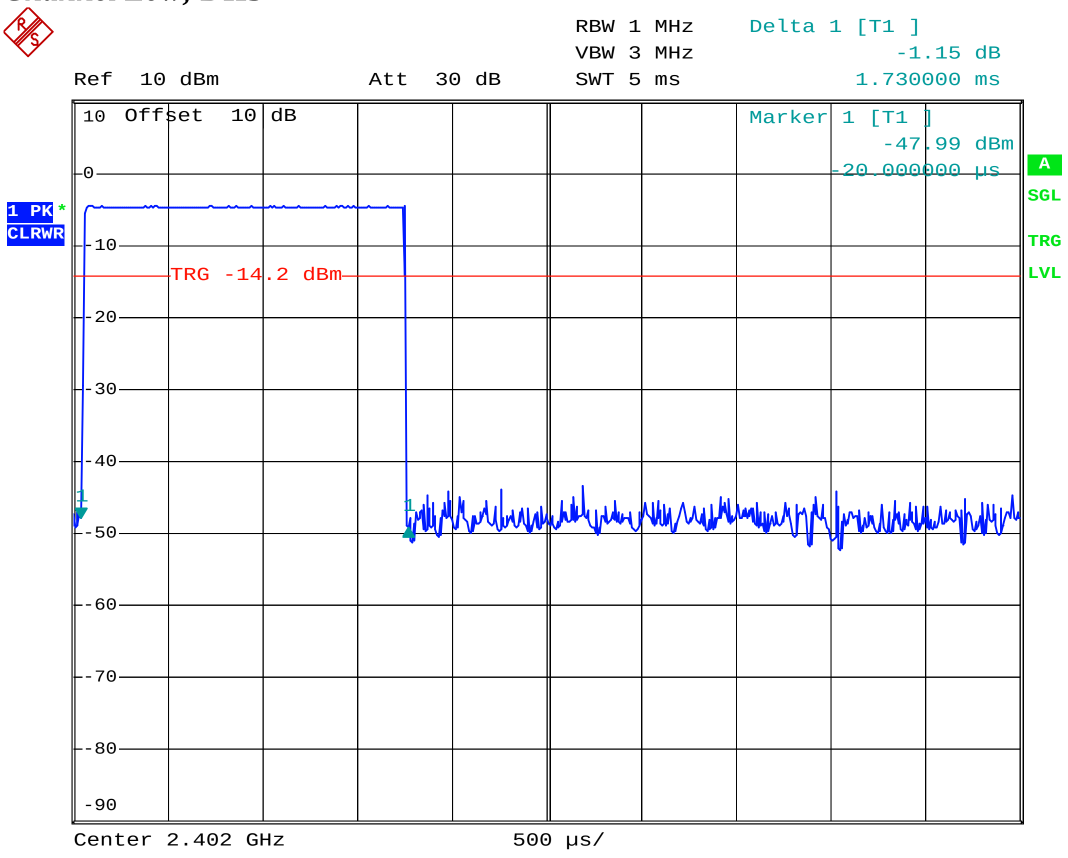
Channel Middle; DH1



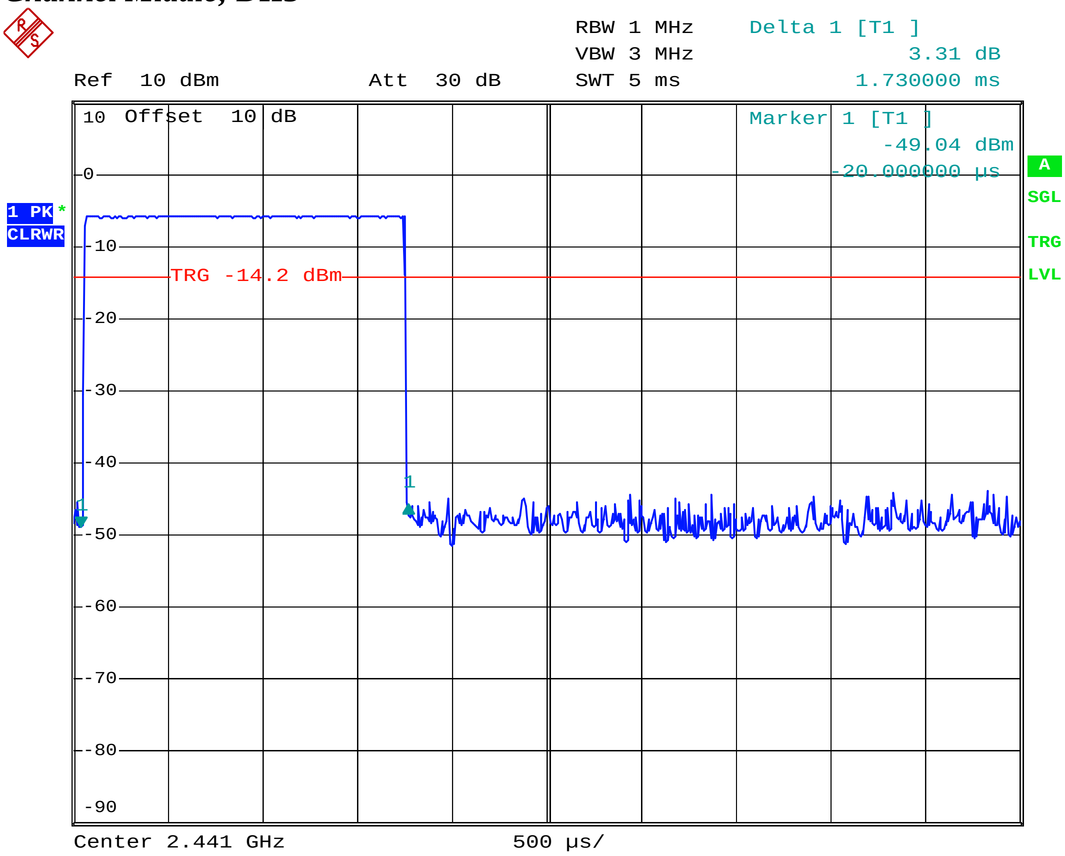
Channel High; DH1



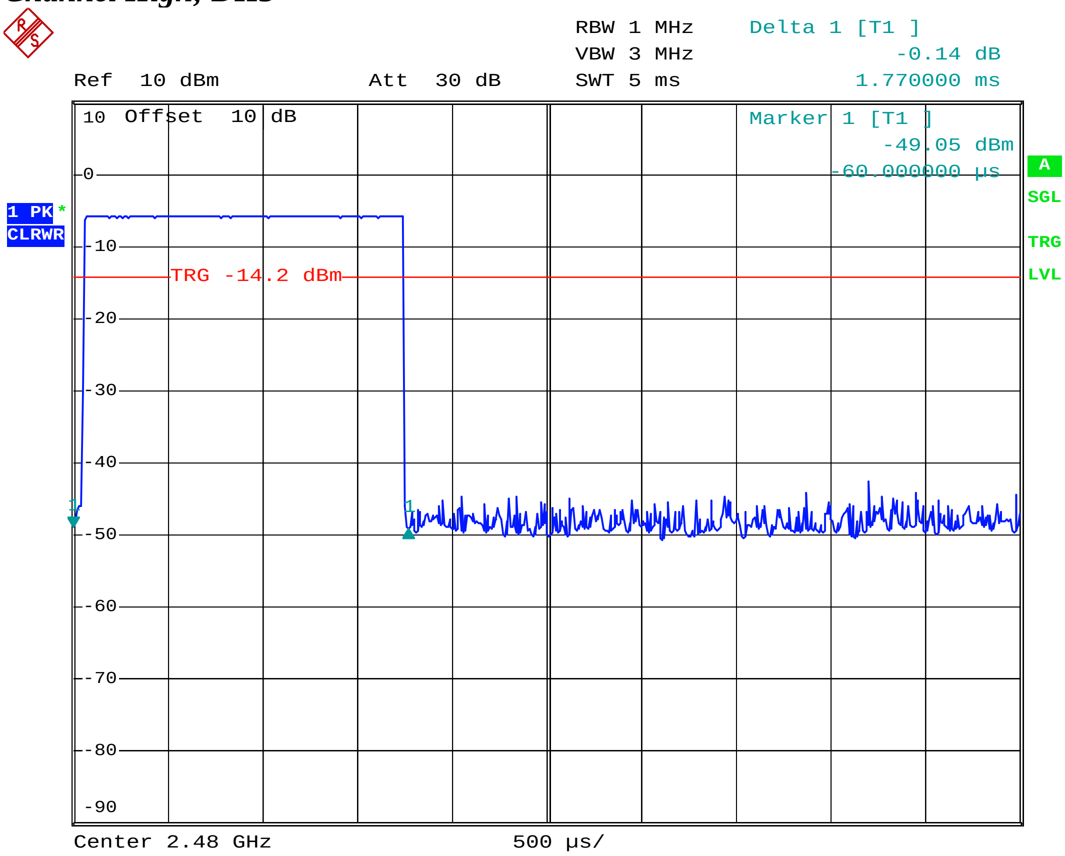
Channel Low; DH3



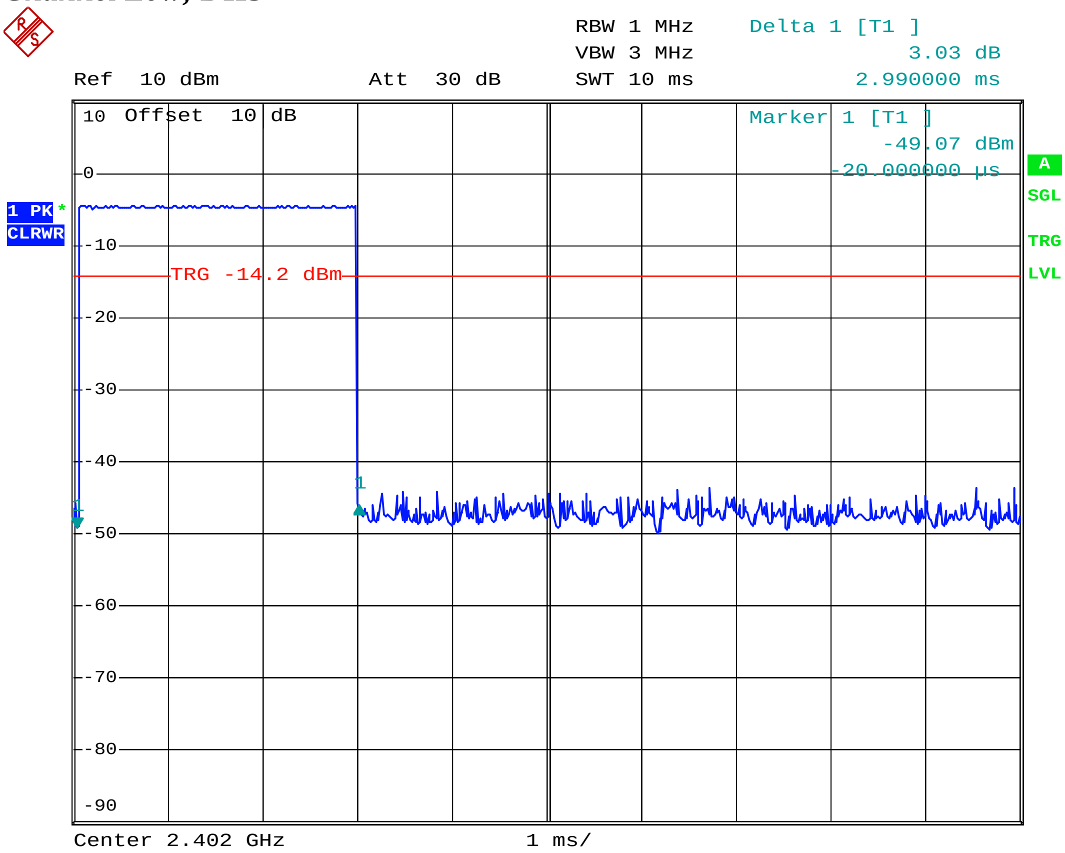
Channel Middle; DH3



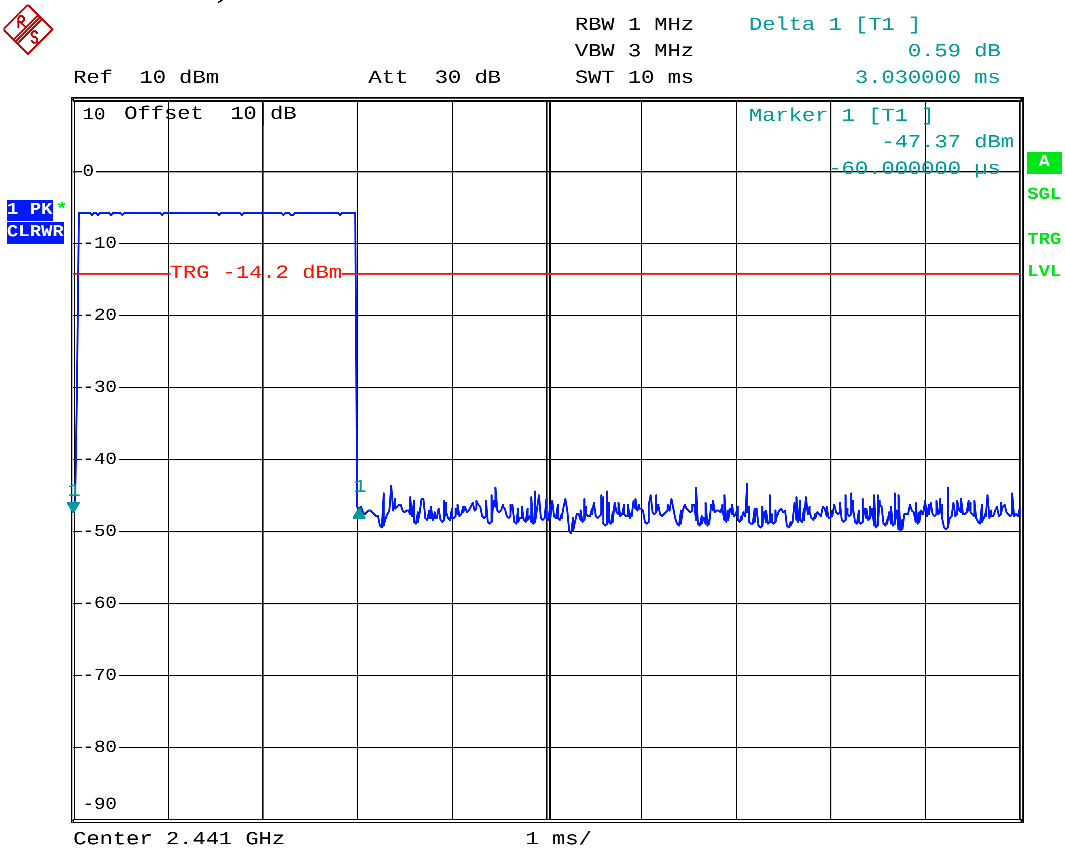
Channel High; DH3



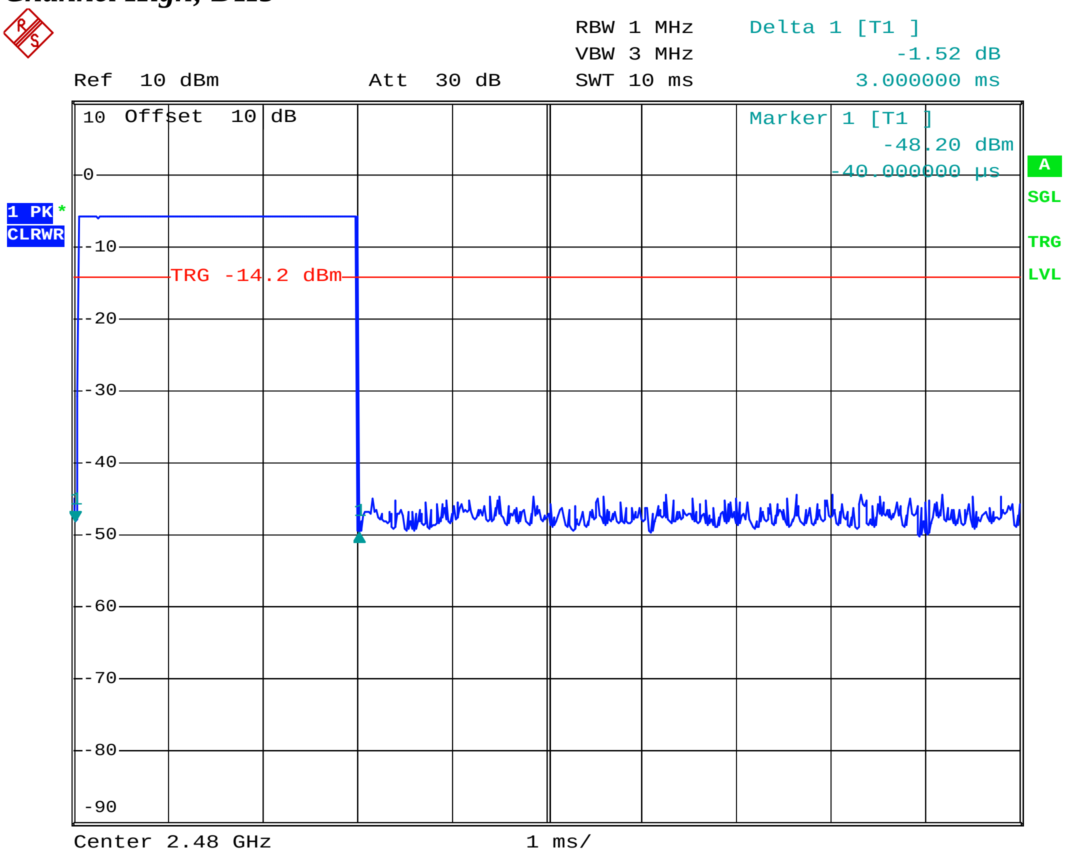
Channel Low; DH5



Channel Middle; DH5



Channel High; DH5



11 OUTPUT POWER MEASUREMENT

11.1 Standard Applicable

According to 15.247(b)(1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold
4. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all frequencies measured were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

11.4 Measurement Data

Test Date : Nov. 17, 2016 Temperature : 24 °C Humidity : 60 %

Mode: Bluetooth BR

a)	Channel Low	:	Output Peak Power is	-4.35	dBm or	0.367	mW。
b)	Channel Middle	:	Output Peak Power is	-4.38	dBm or	0.365	mW。
c)	Channel High	:	Output Peak Power is	-5.09	dBm or	0.310	mW。

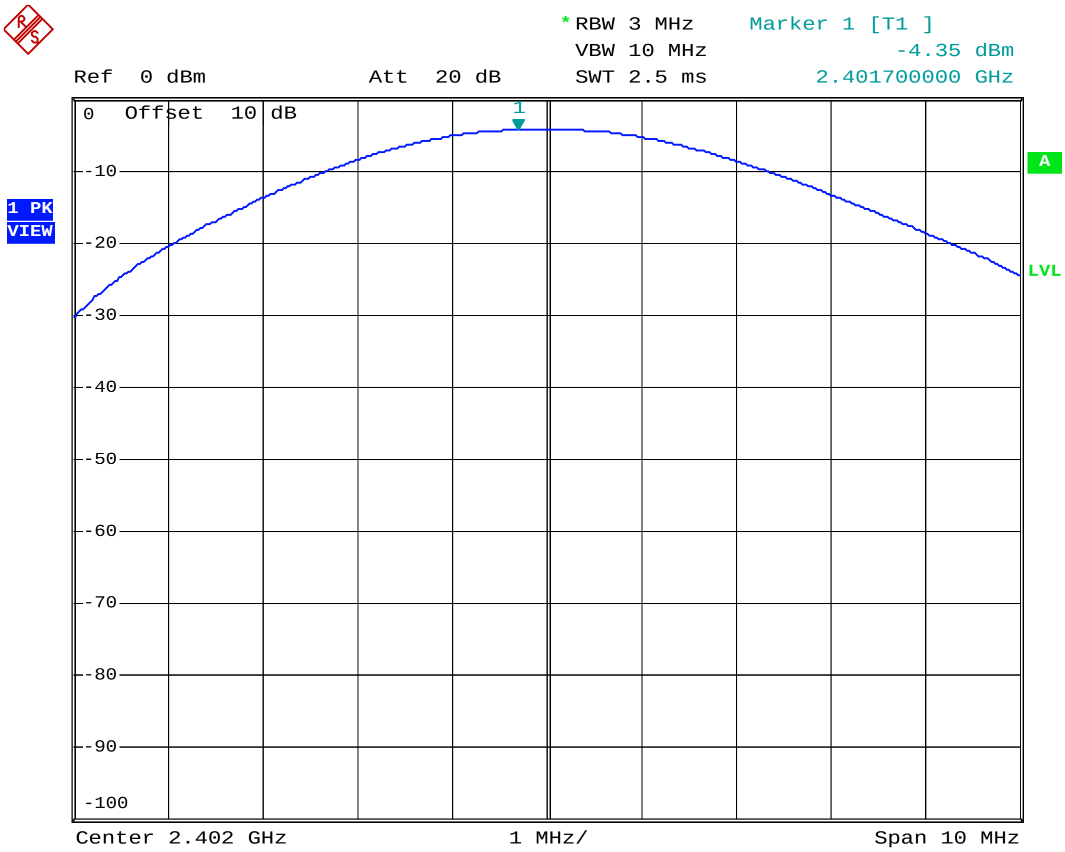
Justification on AFH mode:

Adaptive Frequency Hopping (AFH) means that a device can hop over a reduced set of frequencies. The frequencies hopped may reduced in AFH mode but at least 15 channels will be used. Hence the output power limit is 125mW.

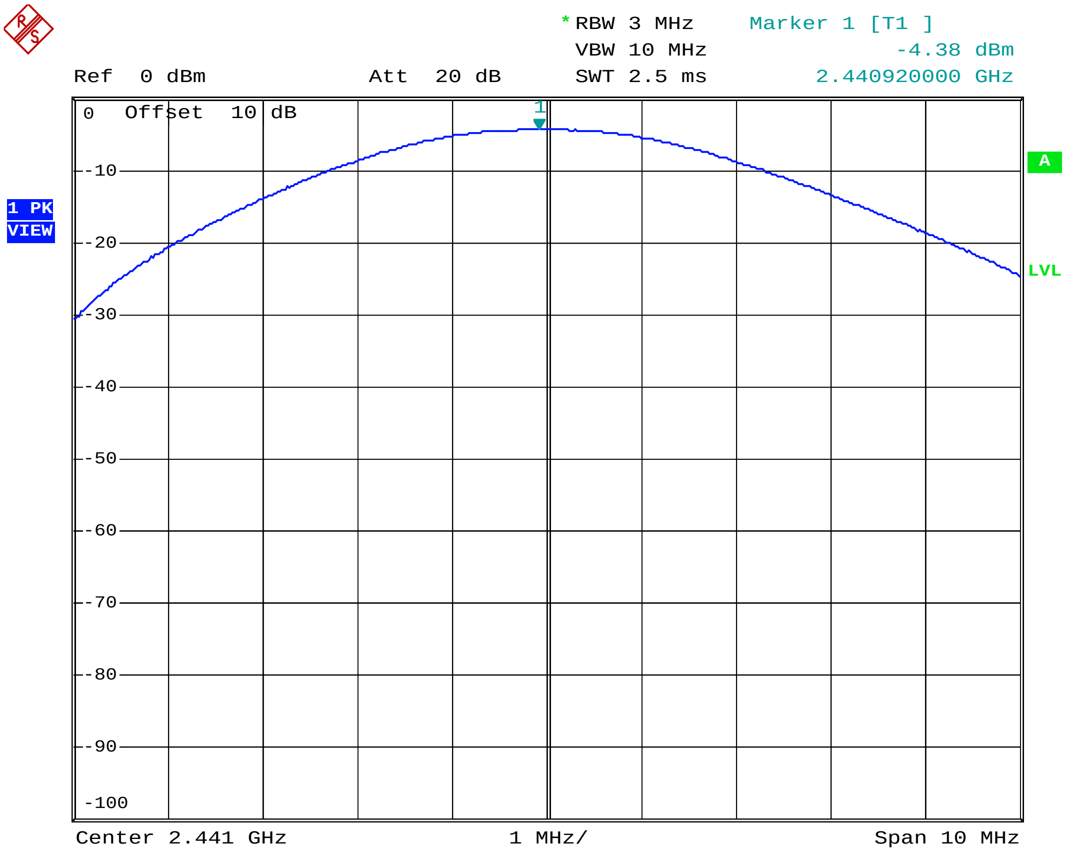
Note : The expanded uncertainty: 2dB.

Mode: Bluetooth BR

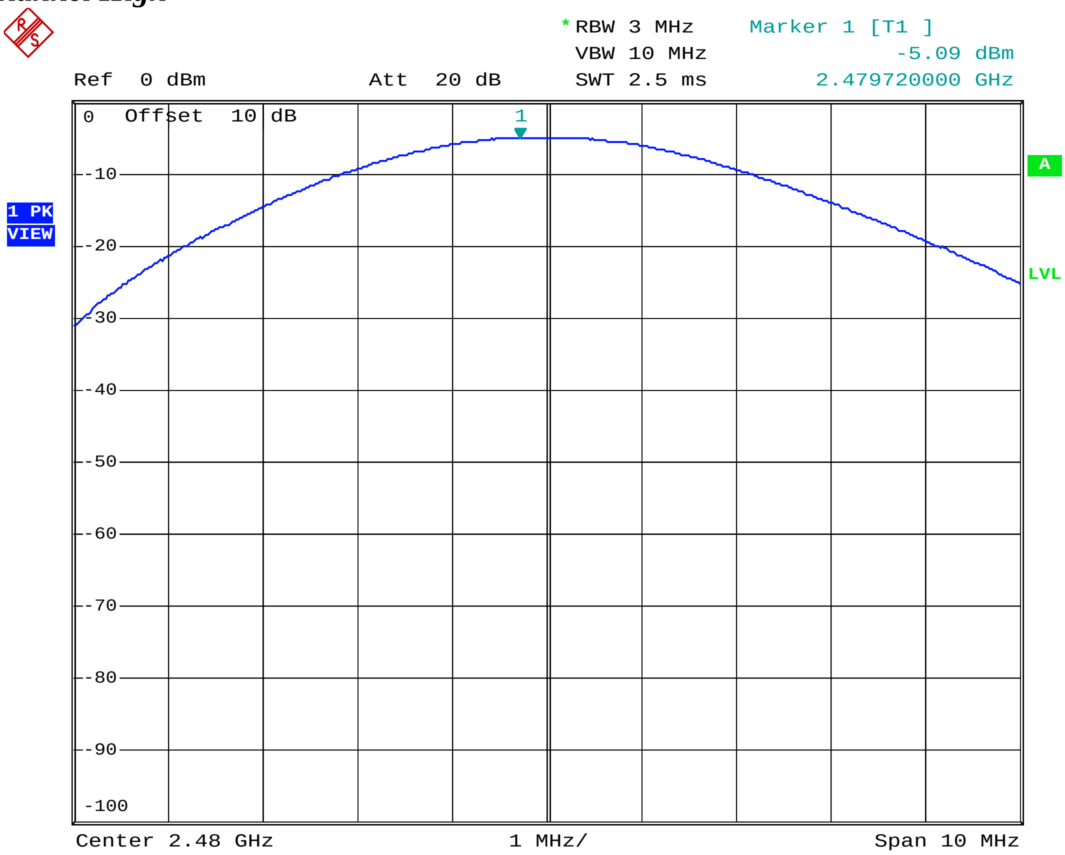
Channel Low



Channel Middle



Channel High



12 100 kHz BANDWIDTH OF BAND EDGES MEASUREMENT

12.1 Standard Applicable

According to 15.247(d), 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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
   RBW ≥ 1% of the span
   VBW ≥ RBW
   Sweep = auto
   Detector function = peak
   Trace = max hold
4. Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all measured frequencies were complete.

12.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

12.4 Measurement Data

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

Mode: Bluetooth BR

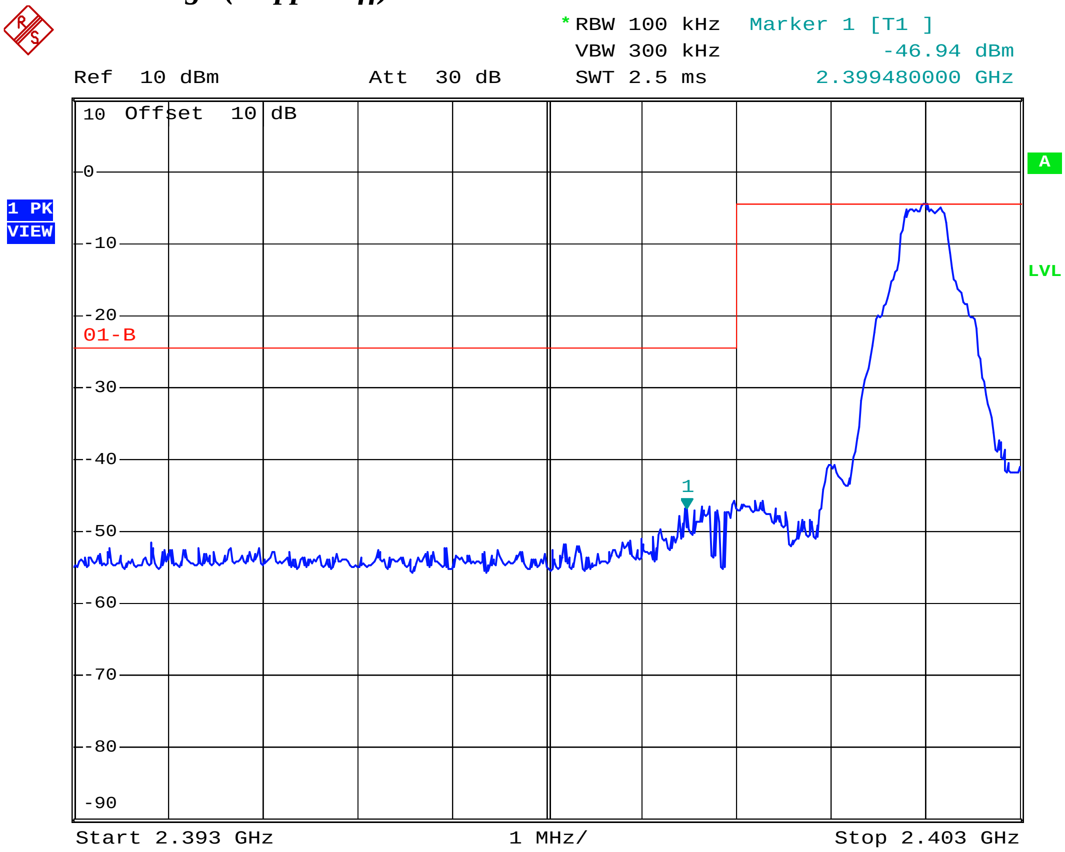
a) Lower Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 20dB from the carrier.

b) Upper Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 20dB from the carrier.

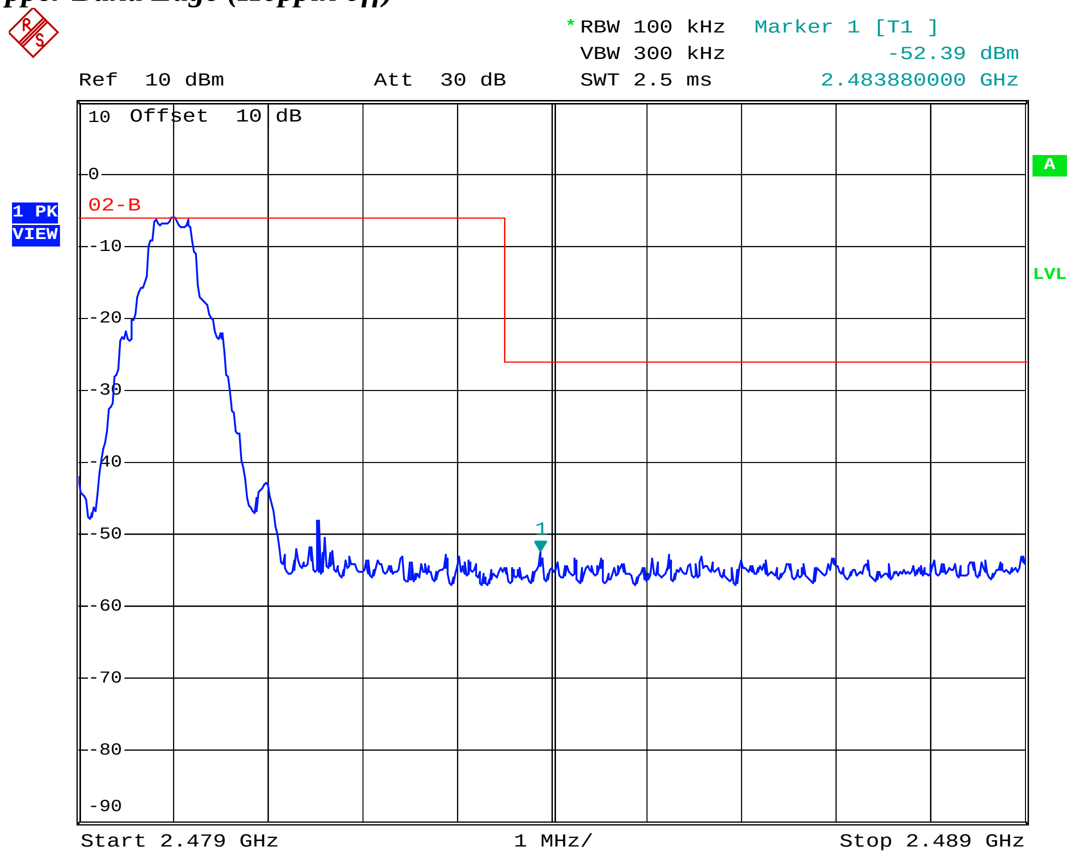
Note : The expanded uncertainty: 2dB.

Mode: Bluetooth BR

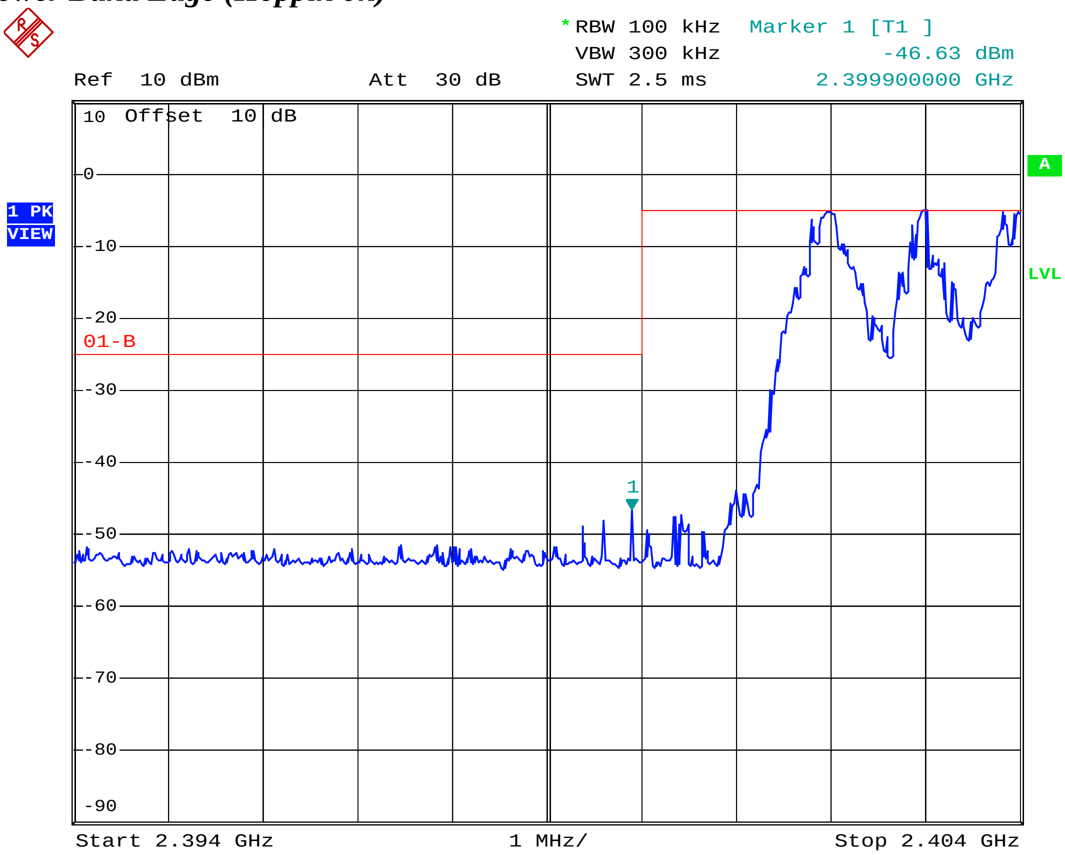
Lower Band Edge (Hoppin off)



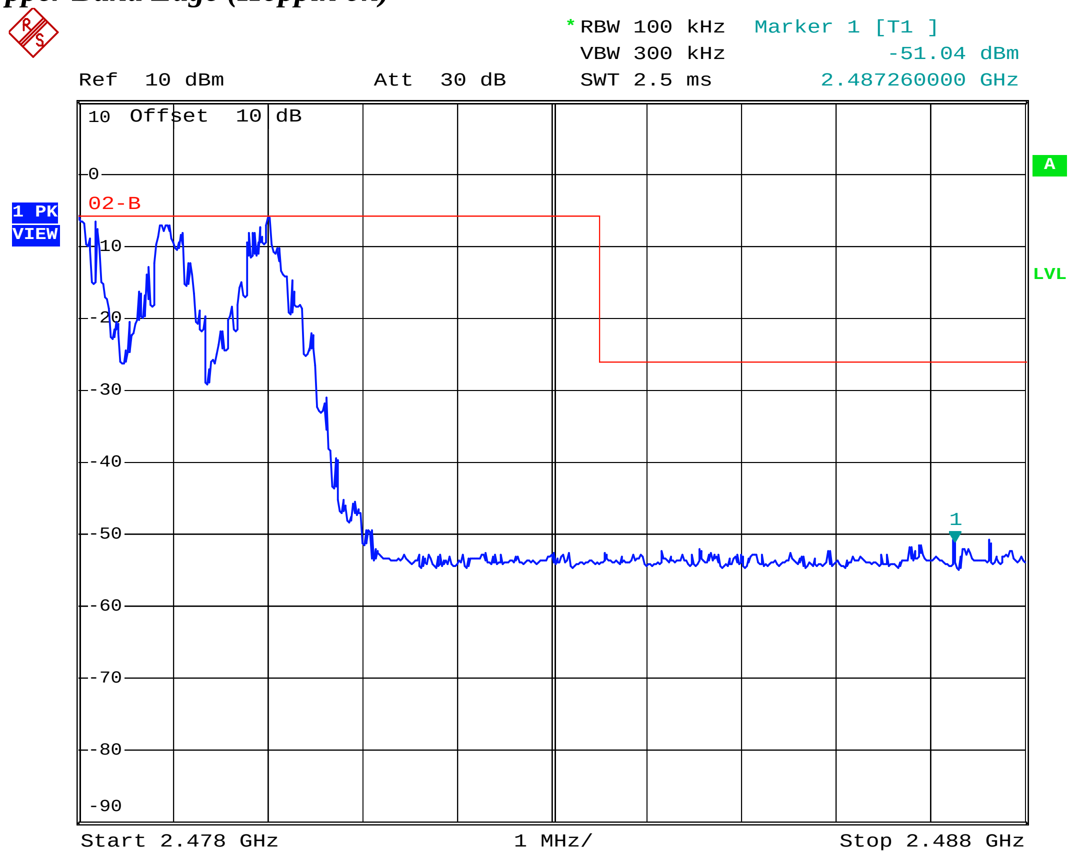
Upper Band Edge (Hoppin off)



Lower Band Edge (Hoppin on)



Upper Band Edge (Hoppin on)



13 CONDUCTED SPURIOUS EMISSION MEASUREMENT

13.1 Standard Applicable

According to 15.247(d), 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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

13.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Use the following spectrum analyzer settings:

   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

   RBW = 100 kHz

   VBW ≥ RBW

   Sweep = auto

   Detector function = peak

   Trace = max hold.
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. Plot the result on the screen of spectrum analyzer.
5. Repeat above procedures until all measured frequencies were complete.

13.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

13.4 Measurement Data

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

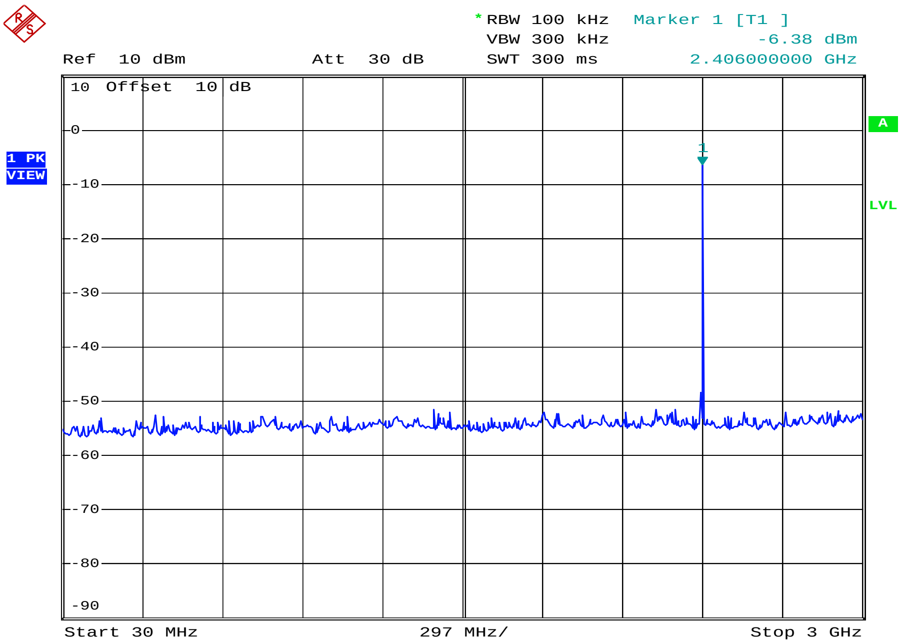
Mode: Bluetooth BR
Mode : Low Channel/ Mid Channel/ Hi Channel

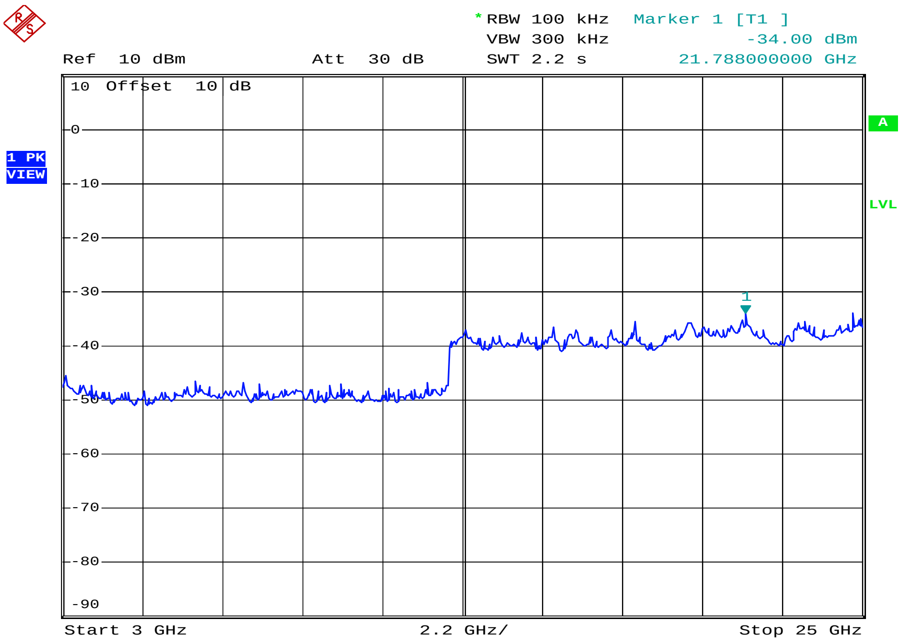
a) 1 GHz to 26.5 GHz frequency band: All emissions are attenuated more than 20dB from the carrier.

Note : The expanded uncertainty: 2dB.

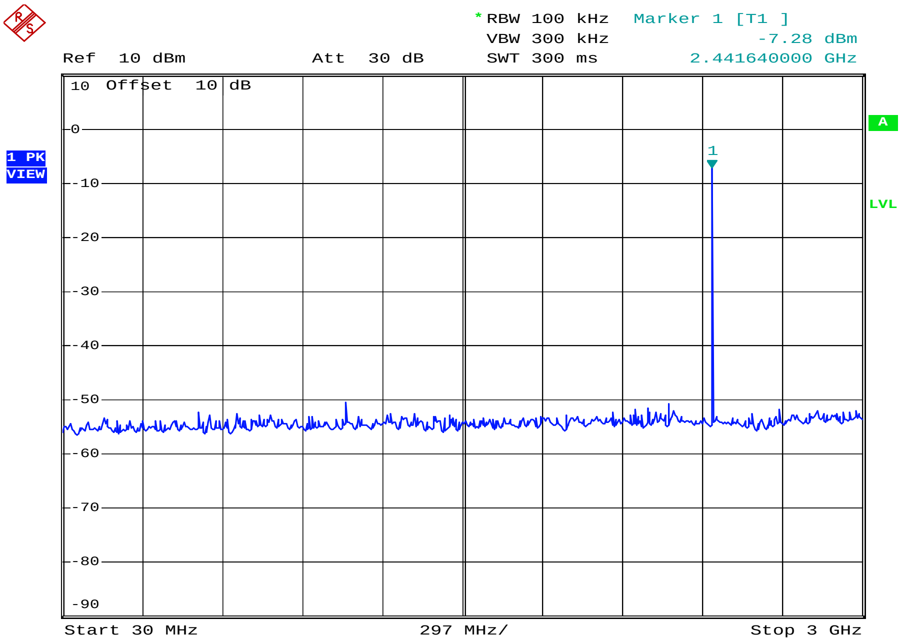
Mode: Bluetooth BR

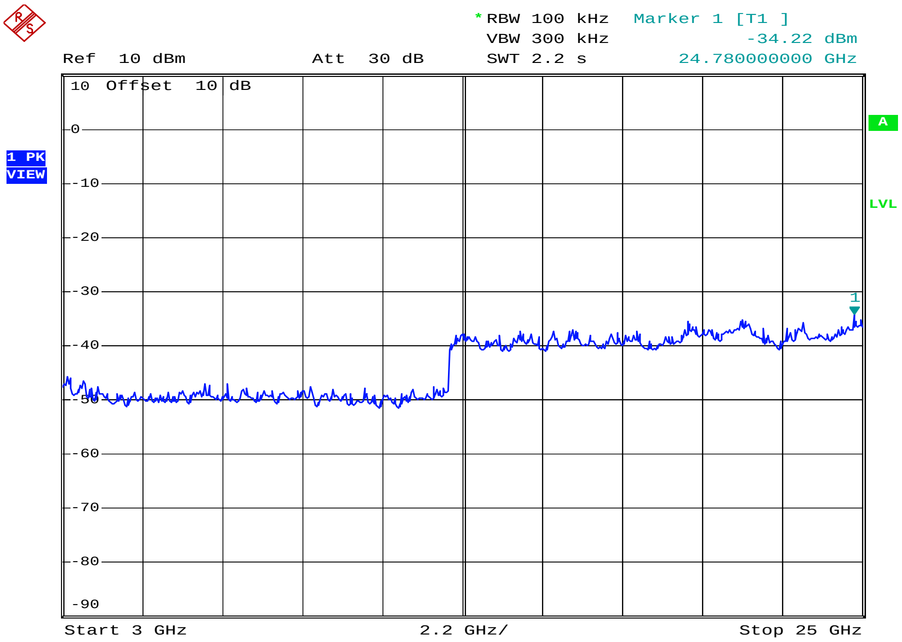
Mode : Low Channel



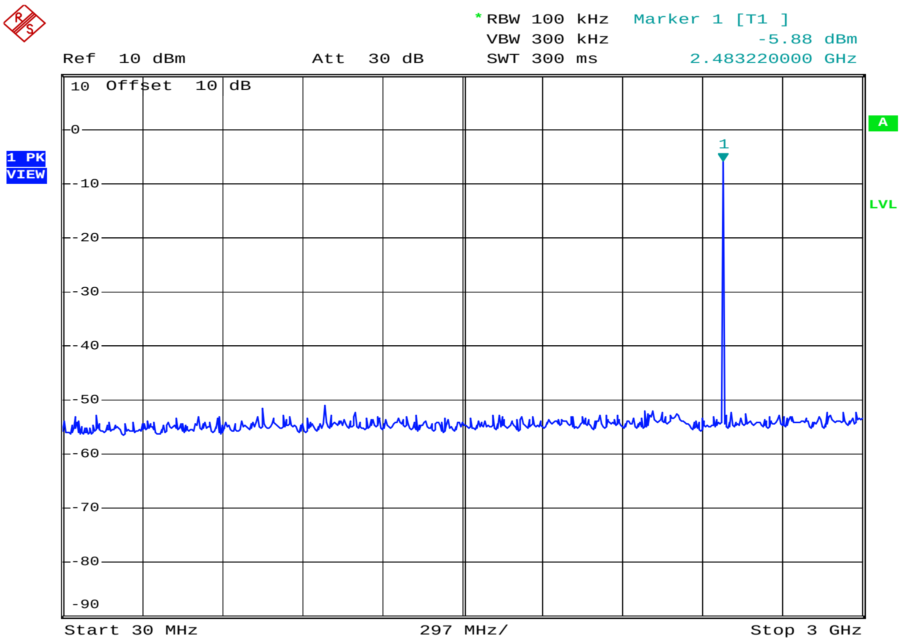


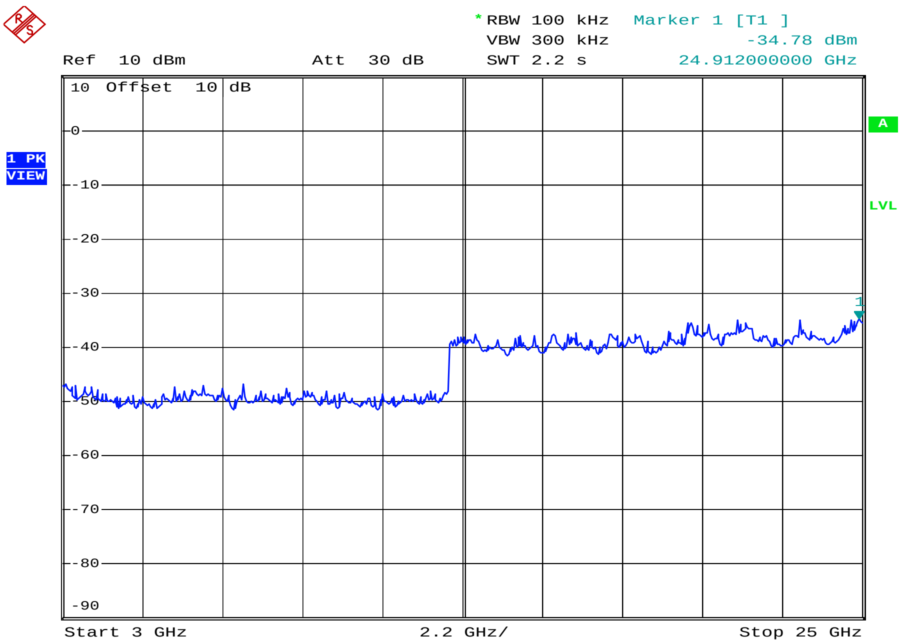
Mode : Mid Channel





Mode : Hi Channel





14. DYTY CYCLE

14.1 Standard Applicable

None. Refereency only.

14.2 Measurement Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/10/03	2017/10/02
Attenuator	MINI-CIRCUITS	BW-S10W2+	2016/09/30	2017/09/29

14.3 Measurement Data

Test Date : Nov. 15, 2016 Temperature : 24 °C Humidity : 60 %

Duty Cycle Calculation

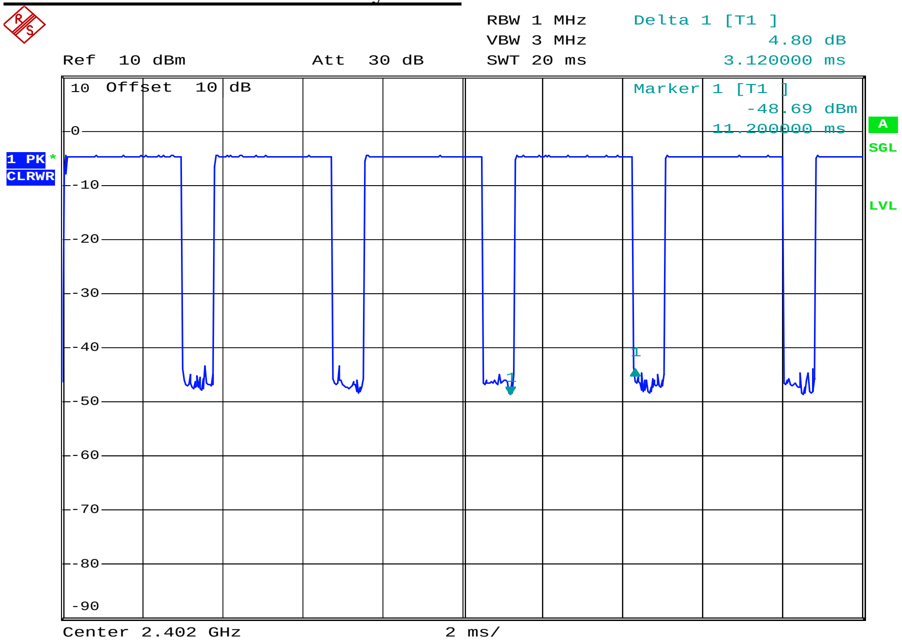
Mode	Period (ms)	Transmission duration (T) (ms)	Duty Cycle (%)	1/T (kHz)	VBW setting (kHz)
BR / DH5	3.80	3.12	82.1	0.320	1

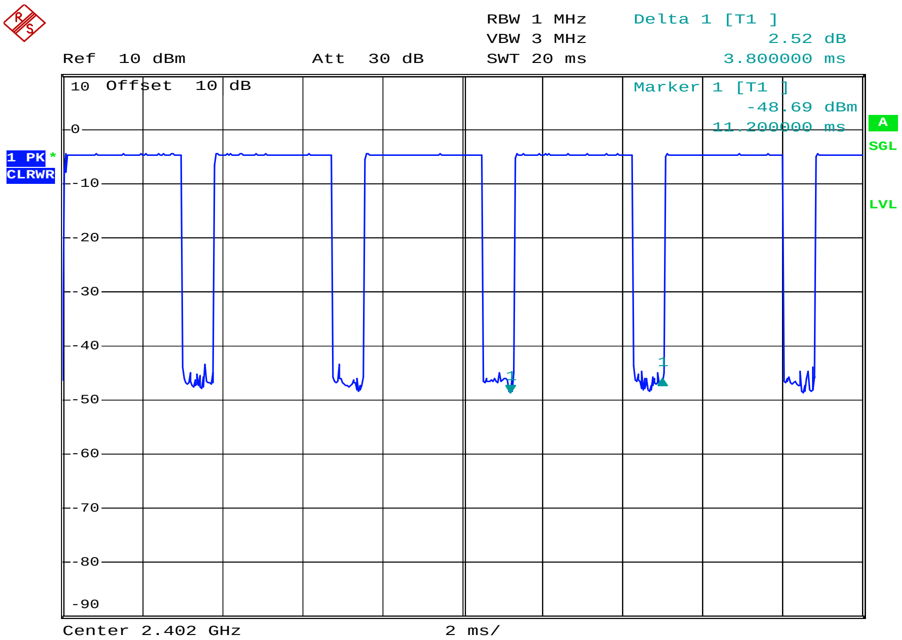
Note:

1. DH5 has the highest duty cycle worst case and is reported.
2. When the duty cycle is less than 98%, for the average measurement of the radiated emission test, the VBW setting is >1/T where the T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Refer to the following page for data plots.

Mode: Bluetooth BR / Duty-DH5





CONSTRUCTION PHOTOS OF EUT

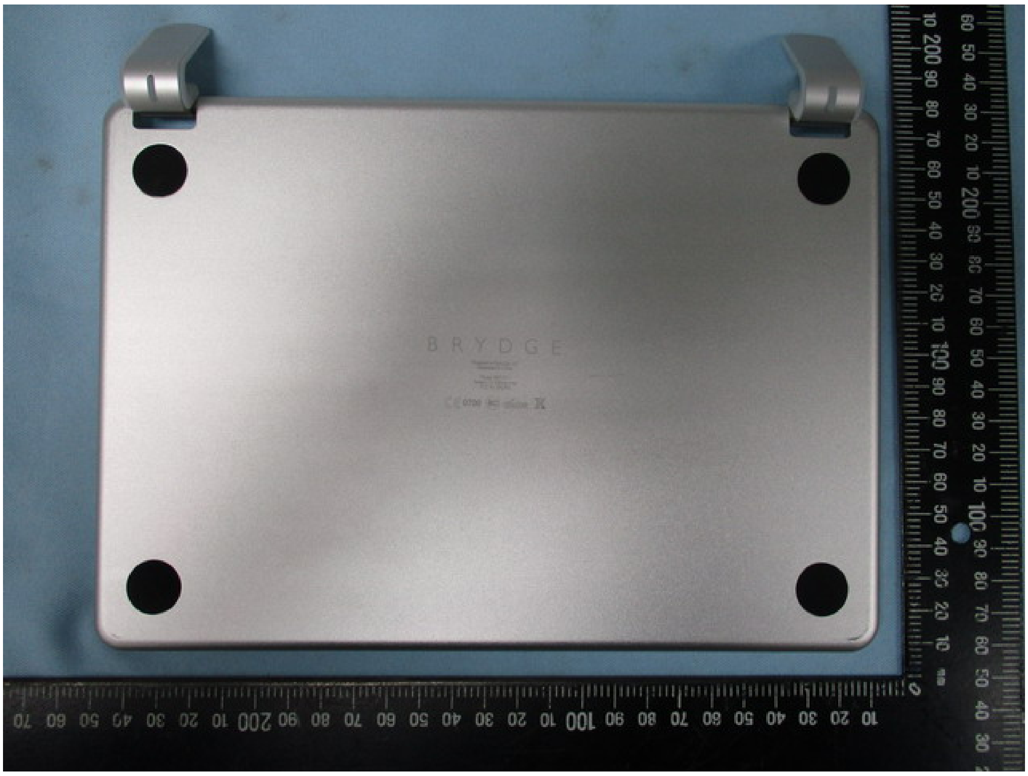
1.

2.

CONSTRUCTION PHOTOS OF EUT

3.

4.



CONSTRUCTION PHOTOS OF EUT

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CONSTRUCTION PHOTOS OF EUT

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CONSTRUCTION PHOTOS OF EUT

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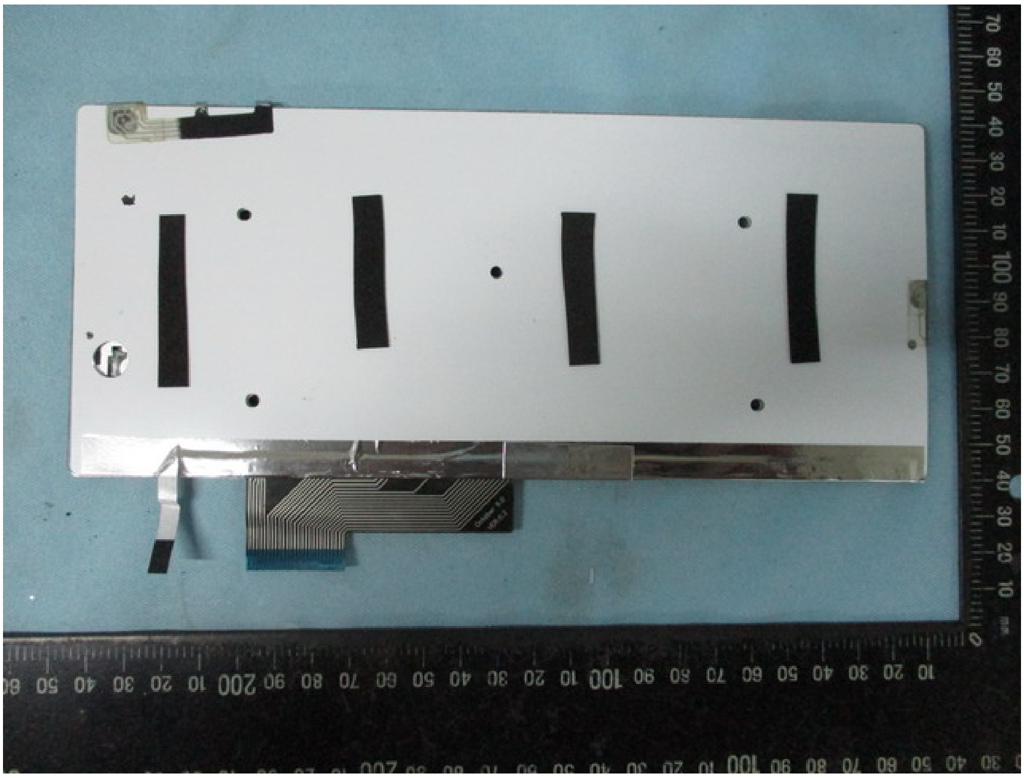
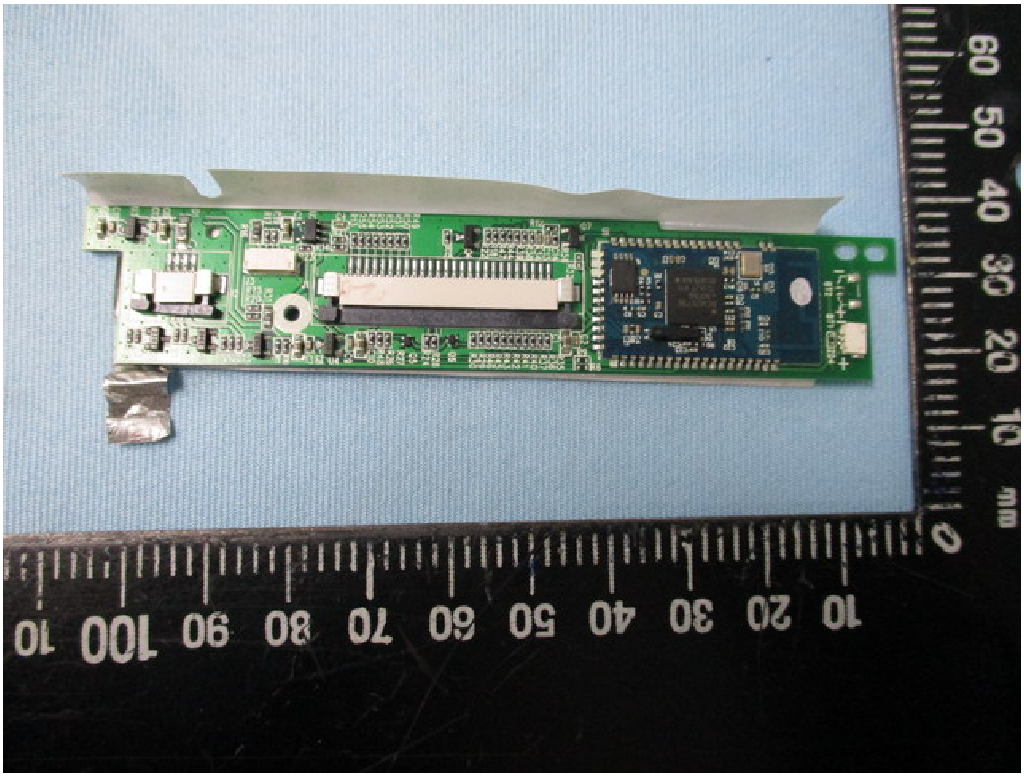
10.



CONSTRUCTION PHOTOS OF EUT

11.



12.