FCC Test Report

Product Name	：	Active Mobile Gateway-with Comm
Trade Name	：	Omnitracs
Model No.	：	CV90-JE103
FCC ID.	：	2AE8ZAMGC

Applicant	：	Omnitracs, LLC
Address	：	9276 Scranton Road, Suite 200 San Diego California 92121 USA

Date of Receipt	：	Mar. 15, 2019
Issued Date	：	Apr. 18, 2019
Report No.	：	1930232R-RFUSP26V00
Report Version	：	V1.0

Testing Laboratory
3024

Test Report Certification

Issued Date : Apr. 18, 2019
Report No. : 1930232R-RFUSP26V00

Product Name	:	Active Mobile Gateway-with Comm
Applicant	:	Omnitracs, LLC
Address	:	9276 Scranton Road, Suite 200 San Diego California 92121 USA
Manufacturer	:	PCI Private Limited
Trade Name	:	Omnitracs
Model No.	:	CV90-JE103
FCC ID.	:	2AE8ZAMGC
EUT Voltage	:	DC 12V
Testing Voltage	:	DC 12V
Applicable Standard	:	FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2018 ANSI C63.10: 2013
Laboratory Name	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Documented By : Fonbo Fang

(Fonbo Fang / Engineering Adm. Specialist)

Tested By : Scott Chang

(Scott Chang / Engineer)

Approved By : Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
1930232R-RFUSP26V00	V1.0	Initial issue of report	Apr. 18, 2019

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1. General Information

1.1. EUT Description

Product Name	Active Mobile Gateway-with Comm
Trade Name	Omnitracs
Model No.	CV90-JE103
Frequency Range/Channel Number	2402~2480MHz / 40 Channels
Type of Modulation	GFSK

Antenna Information	
Antenna Type	inverted F Antenna
Antenna Gain	2.87 dBi

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00	2402 MHz	Channel 10	2422 MHz	Channel 20	2442 MHz	Channel 30	2462 MHz
Channel 01	2404 MHz	Channel 11	2424 MHz	Channel 21	2444 MHz	Channel 31	2464 MHz
Channel 02	2406 MHz	Channel 12	2426 MHz	Channel 22	2446 MHz	Channel 32	2466 MHz
Channel 03	2408 MHz	Channel 13	2428 MHz	Channel 23	2448 MHz	Channel 33	2468 MHz
Channel 04	2410 MHz	Channel 14	2430 MHz	Channel 24	2450 MHz	Channel 34	2470 MHz
Channel 05	2412 MHz	Channel 15	2432 MHz	Channel 25	2452 MHz	Channel 35	2472 MHz
Channel 06	2414 MHz	Channel 16	2434 MHz	Channel 26	2454 MHz	Channel 36	2474 MHz
Channel 07	2416MHz	Channel 17	2436 MHz	Channel 27	2456 MHz	Channel 37	2476 MHz
Channel 08	2418 MHz	Channel 18	2438 MHz	Channel 28	2458 MHz	Channel 38	2478 MHz
Channel 09	2420 MHz	Channel 19	2440 MHz	Channel 29	2460 MHz	Channel 39	2480 MHz

Note:

1. This device is a Active Mobile Gateway-with Comm including 2.4GHz b/g/n, 5GHz a/n/ac, BT2.0/BT 4.0 and WWAN 3G/4G transmitting and receiving functions.
2. This device contain module that FCC ID: 2AE8ZIVG02.
3. Regards to the frequency band operation; the lowest、middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. The laptop was used to configure the EUT to continuously transmit at a specified output power in all channels with different modes and modulations schemes, testing software power setting as below.

Mode	Power setting parameter		
	Low Channel	Middle Channel	High Channel
GFSK	Default	Default	Default

1.2. Test Mode

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Test Mode	Mode 1: Transmit Mode

Test Items	Modulation	Channel	Result
Conducted Emission	GFSK	19	N/A
Maximum peak conducted	GFSK	00/19/39	Complies
Radiated Emission	GFSK	00/19/39	Complies
RF antenna conducted test	GFSK	00/19/39	Complies
Radiated Emission Band Edge	GFSK	00/19/39	Complies
Occupied Bandwidth & DTS Bandwidth	GFSK	00/19/39	Complies
Power Density	GFSK	00/19/39	Complies

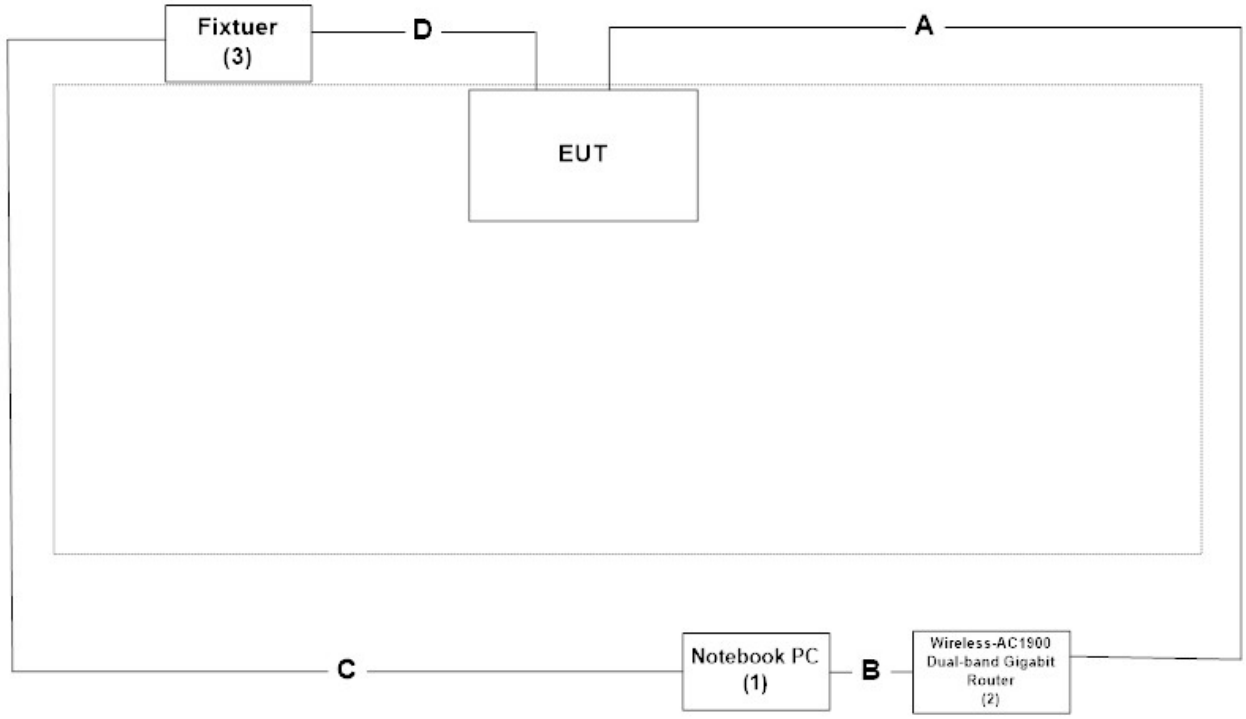
1.3. Tested System Details

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

Product		Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	Notebook PC	HP Compaq	NX6320FF	CNU7020 BXT	DoC	Non-Shielded, 1.8m
2	Wireless-AC1900 Dual-band Gigabit Router	ASUS	RT-AC68R	E31BG000 017	DoC	Non-Shielded, 1.8m
3	Fixtuer	PCI	--	--	DoC	--

1.4. Configuration of tested System

Connection Diagram



Signal Cable Type		Signal cable Description
A	RJ45 Cable	Non-Shielded, 10m
B	RJ45 Cable	Non-Shielded, 1m
C	USB Cable	Shielded, 10m
D	Signal Cable	Non-Shielded, 0.15

1.5. EUT Exercise Software

1	Set the EUT as shown in Section 1.4.
2	Execute the "Tear Term" and keyin command on the laptop.
3	Execute QCA software.
4	Configure test mode, test channel and data rate.
5	EUT start transmitting or receiving continuously.
6	Verify that the device is working properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	FCC PART 15 C 15.207 Conducted Emission	15 - 35	20	--
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Maximum peak conducted output power	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Radiated Emission	15 - 35	25	2
Humidity (%RH)		25 - 75	54	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 RF antenna conducted test	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Radiated Emission Band Edge	15 - 35	25	2
Humidity (%RH)		25 - 75	50	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Occupied Bandwidth & DTS Bandwidth	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.247 Power Density	15 - 35	24	3
Humidity (%RH)		25 - 75	45	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	**:**	**FCC Registration Number: TW3024**
Canada		**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

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

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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1.7. List of Test Equipment

Maximum peak conducted output power / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2018/12/17	2019/12/16
Pulse Power Sensor	Anritsu	MA2411B	1531043	2018/12/17	2019/12/16
Pulse Power Sensor	Anritsu	MA2411B	1531044	2018/12/17	2019/12/16
Power Meter	Keysight	8990B	MY51000248	2018/06/07	2019/06/06
Power Sensor	Keysight	N1923A	MY57240005	2018/06/07	2019/06/06

Radiated Emission / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2018/11/05	2019/11/04
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Bilog Antenna	Teseq	CBL6112D	23191	2018/06/26	2019/06/25
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2018/06/01	2019/05/31
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/01/16	2020/01/15
Pre-Amplifier	Dekra	AP-025C	201801236	2019/02/18	2020/02/17
Pre-Amplifier	EMCI	EMC11830I	980366	2018/12/21	2019/12/20
Pre-Amplifier	Dekra	AP-400C	201801231	2018/12/05	2019/12/04
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2018/10/17	2019/10/16
Band Reject Filter	Micro-Tronics	BRM50702	G192	2019/03/27	2020/03/26
Signal Analyzer	R&S	FSV40	101435	2018/07/19	2019/07/18
Coaxial Cable	Huber+Suhner	SF104_SF104_SF104_SF104(16.0m)	CB2-H	2018/08/21	2019/08/20

RF antenna conducted test / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Spectrum Analyzer	Agilent	N9010A	US47140172	2018/07/18	2019/07/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20

Radiated Emission Band Edge / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2018/11/05	2019/11/04
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Bilog Antenna	Teseq	CBL6112D	23191	2018/06/26	2019/06/25
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2018/06/01	2019/05/31
Horn Antenna	Schwarzbeck	BBHA 9170	202	2019/01/16	2020/01/15
Pre-Amplifier	Dekra	AP-025C	201801236	2019/02/18	2020/02/17
Pre-Amplifier	EMCI	EMC11830I	980366	2018/12/21	2019/12/20
Pre-Amplifier	Dekra	AP-400C	201801231	2018/12/05	2019/12/04
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2018/10/17	2019/10/16
Band Reject Filter	Micro-Tronics	BRM50702	G192	2019/03/27	2020/03/26
Signal Analyzer	R&S	FSV40	101435	2018/07/19	2019/07/18
Coaxial Cable	Huber+Suhner	SF104_SF104_SF104_SF104(16.0m)	CB2-H	2018/08/21	2019/08/20

Occupied Bandwidth & DTS Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Spectrum Analyzer	Agilent	N9010A	US47140172	2018/07/18	2019/07/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20

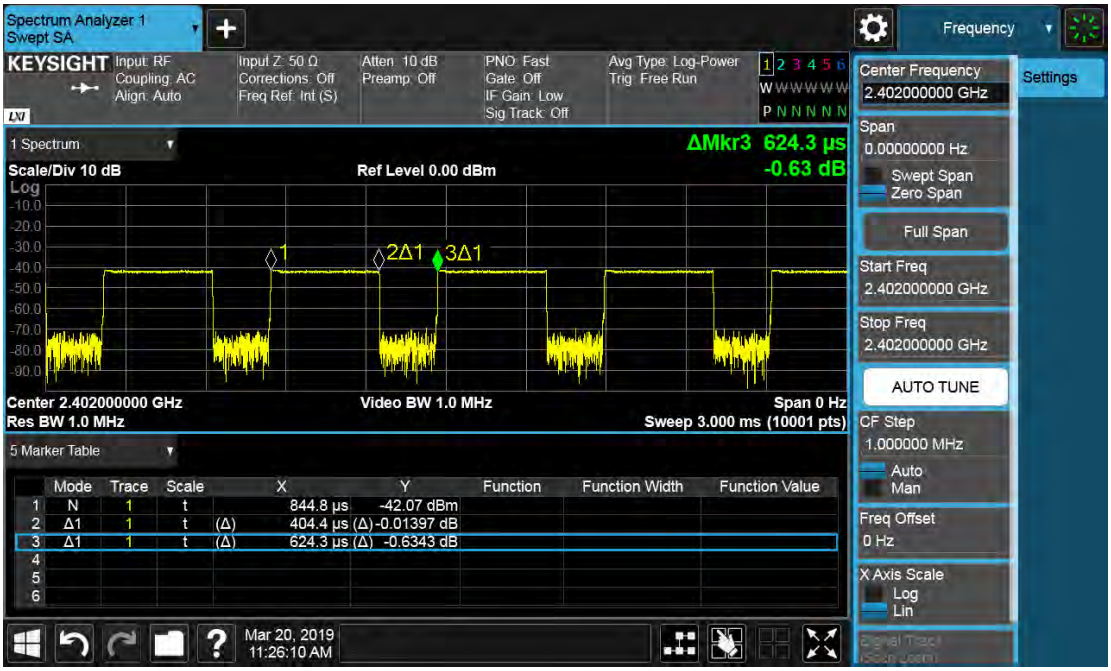
Power Density / SR10-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Spectrum Analyzer	Agilent	N9010A	US47140172	2018/07/18	2019/07/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/12/21	2019/12/20

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.8. Duty cycle

On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
0.404	0.624	64.78%	1.89	2.473



1.9. Uncertainty

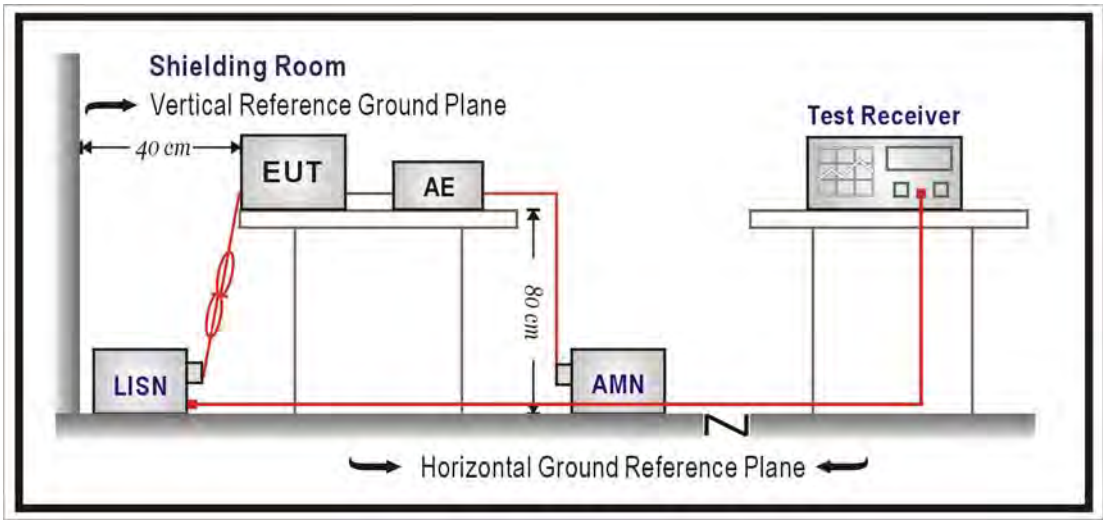
Test item	Uncertainty
Maximum peak conducted output power	± 1.27 dB
Radiated Emission	30MHz～1GHz as ±3.43dB 1GHz～26.5GHz as ±3.65dB
RF antenna conducted test	± 1.27dB
Radiated Emission Band Edge	±3.65dB
Occupied Bandwidth & DTS Bandwidth	±50 Hz
Power Density	±1.27 dB

2. Aetenna Requirements

According to FCC 47CFR 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. 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

3. Conducted Emission

3.1. Test Setup



3.2. Limits

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

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

3.3. Test Procedure

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

3.4. Test Specification

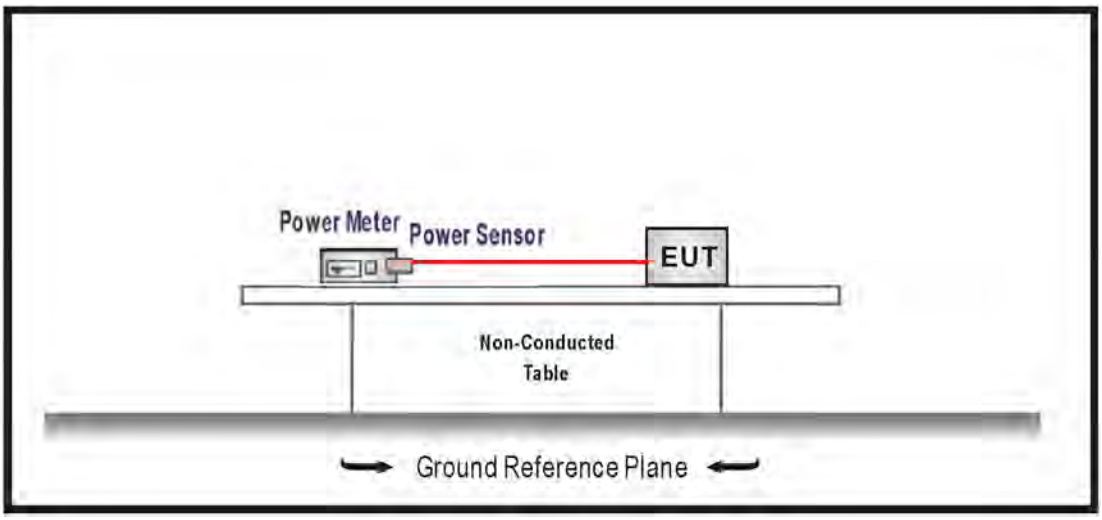
According to FCC Part 15 Subpart C Paragraph 15.207: 2018

3.5. Test Result

Owing to the DC operation of EUT, this test item is not performed.

4. Maximum peak conducted output power

4.1. Test Setup



4.2. Test procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.

4.3. Limits

The maximum peak conducted output power shall be less 1 Watt.

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2018

4.5. Test Result

Product	Active Mobile Gateway-with Comm		
Test Item	Maximum peak conducted output power		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

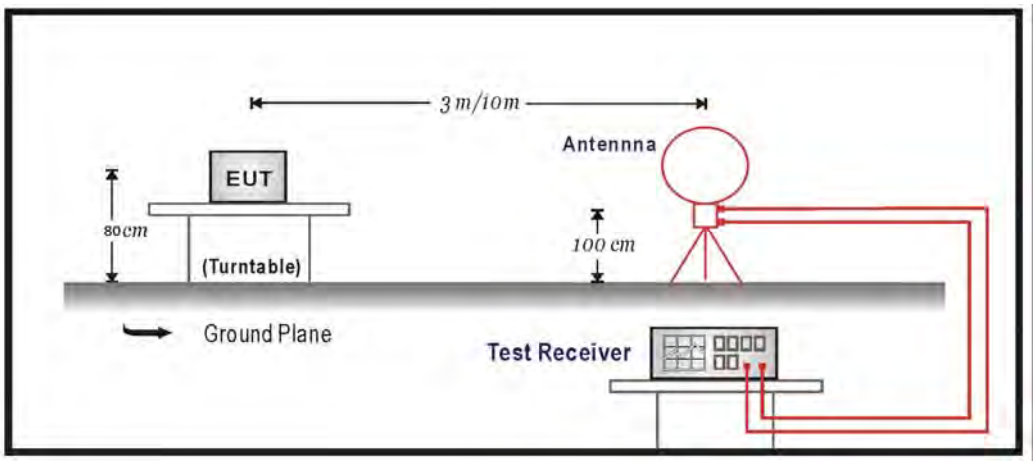
GFSK

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)
00	2402	2.820	≦30
19	2440	3.240	≦30
39	2480	3.400	≦30

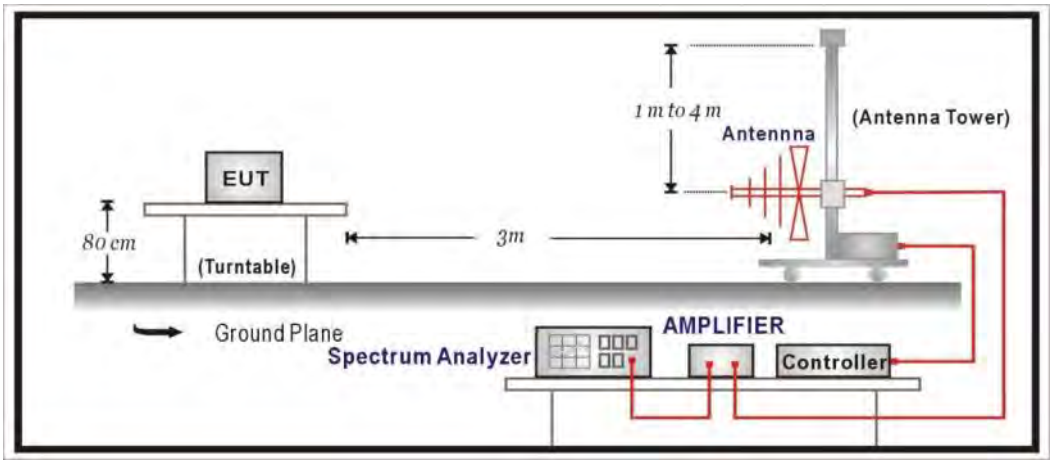
5. Radiated Emission

5.1. Test Setup

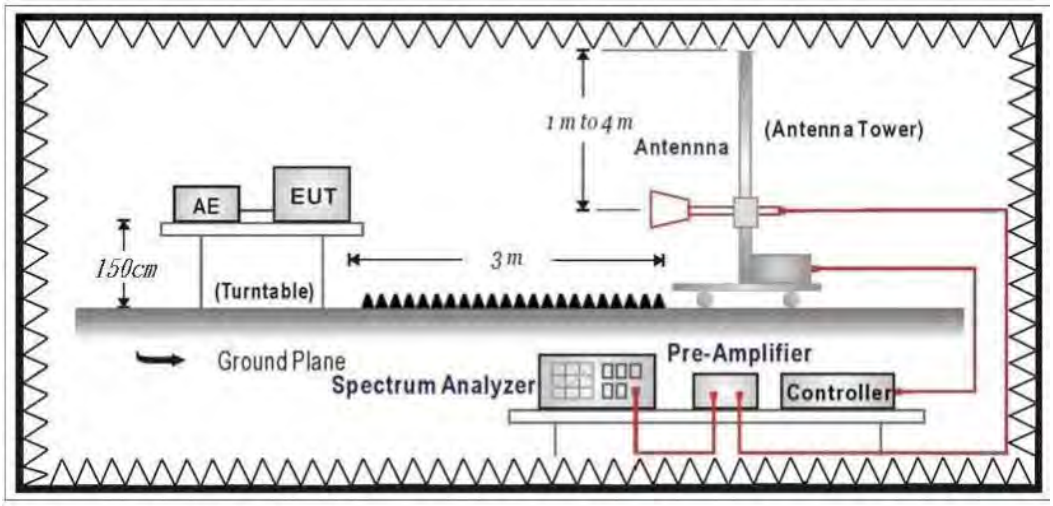
Under 30MHz Test Setup:



Under 1GHz Test Setup:



Above 1GHz Test Setup:



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency (MHz)	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the Radiated Emission Band Edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

5.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.
The EUT and its simulators are placed on a turn table which is 0.8 or 1.5 meter above ground.
The turn table can rotate 360 degrees to determine the position of the maximum emission level.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
On any frequency or frequencies form 9KHz(inculde The the lowest oscillator frequency generated within the device up to the 10th harmonic) to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

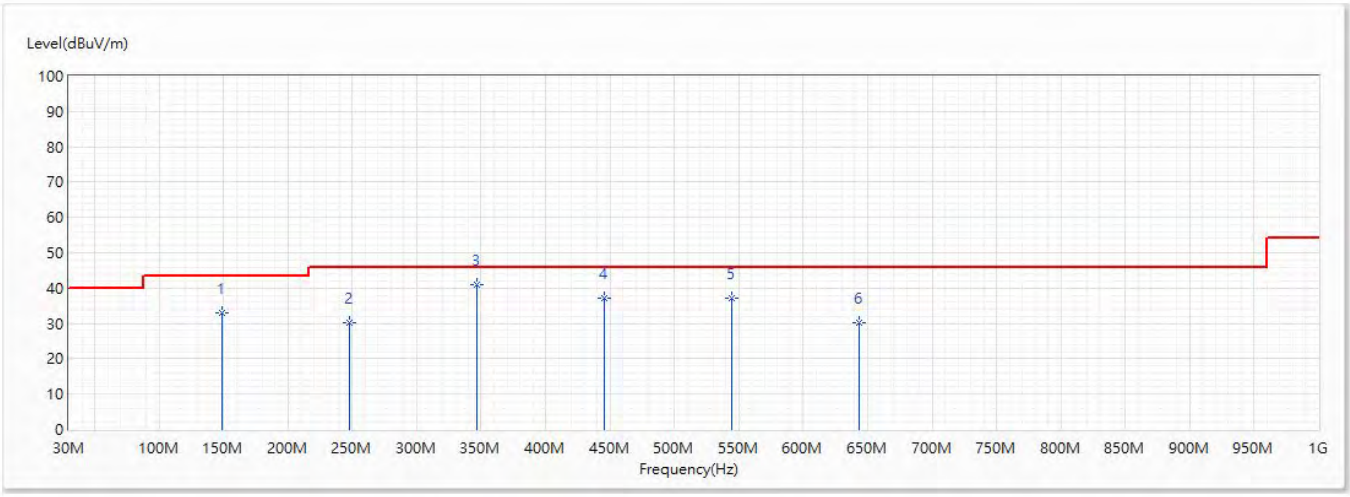
5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247:2018

5.5. Test Result

30MHz-1GHz Spurious

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/3/28
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2440MHz		

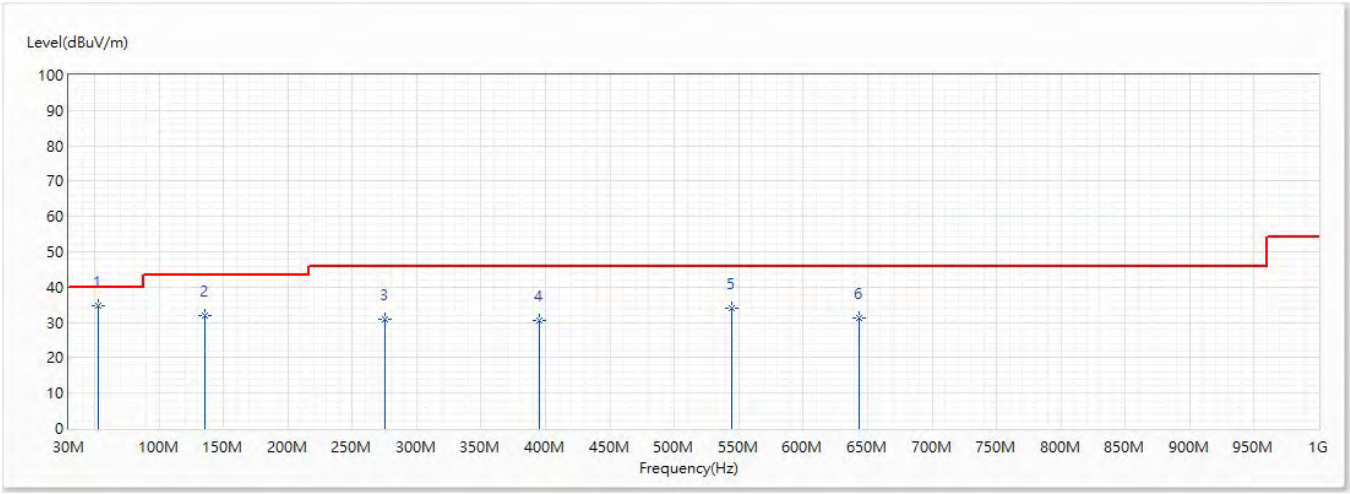


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	148.534	32.88	43.50	-10.62	55.52	-22.64	QP
2	247.474	30.29	46.00	-15.71	51.46	-21.17	QP
* 3	346.511	41.07	46.00	-4.93	59.59	-18.52	QP
4	445.451	37.17	46.00	-8.83	52.95	-15.78	QP
5	544.488	37.02	46.00	-8.98	51.39	-14.37	QP
6	643.525	30.38	46.00	-15.62	43.62	-13.24	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/3/28
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2440MHz		



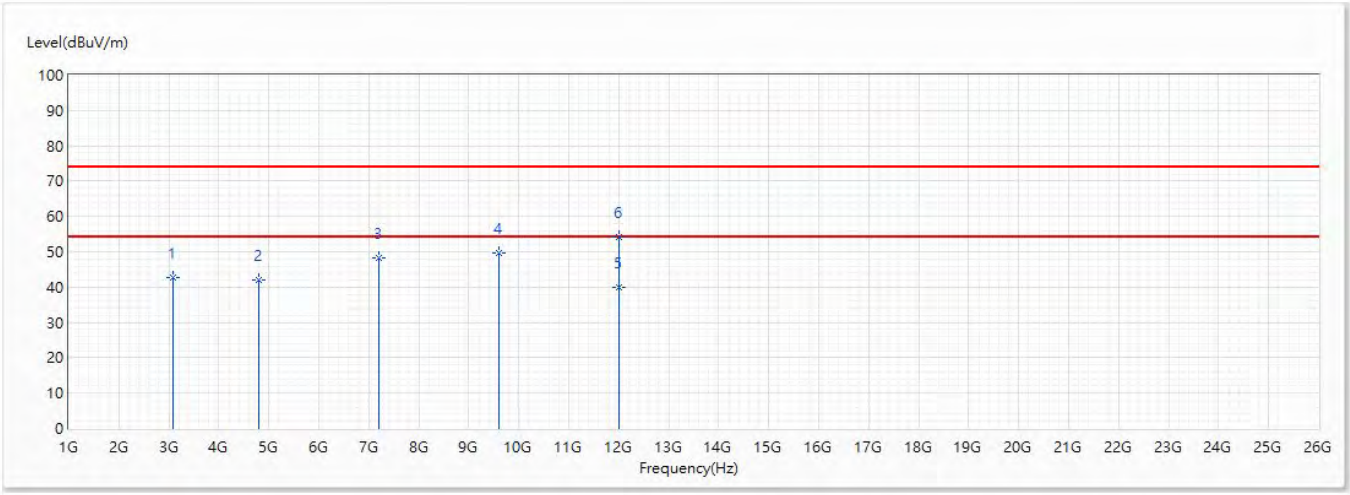
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	52.601	34.71	40.00	-5.29	61.03	-26.32	QP
2	135.148	32.03	43.50	-11.47	54.05	-22.02	QP
3	275.022	31.03	46.00	-14.97	51.56	-20.53	QP
4	395.011	30.62	46.00	-15.38	47.44	-16.82	QP
5	544.488	34.08	46.00	-11.92	48.45	-14.37	QP
6	643.525	31.28	46.00	-14.72	44.52	-13.24	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Harmonic & Spurious:

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2402MHz		

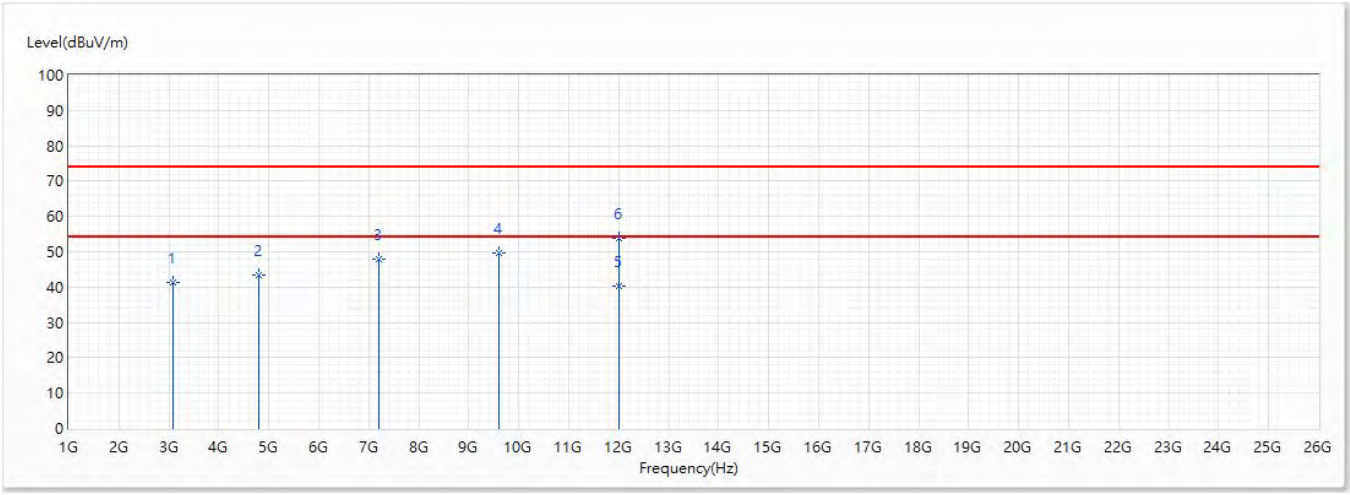


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	3072	42.58	74.00	-31.42	47.47	-4.89	PK
2	4804	41.85	74.00	-32.15	41.34	0.51	PK
3	7206	48.27	74.00	-25.73	38.65	9.62	PK
4	9608	49.58	74.00	-24.42	34.86	14.72	PK
* 5	12010	39.91	54.00	-14.09	21.47	18.44	AV
6	12010	54.00	74.00	-20.00	35.56	18.44	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2402MHz		

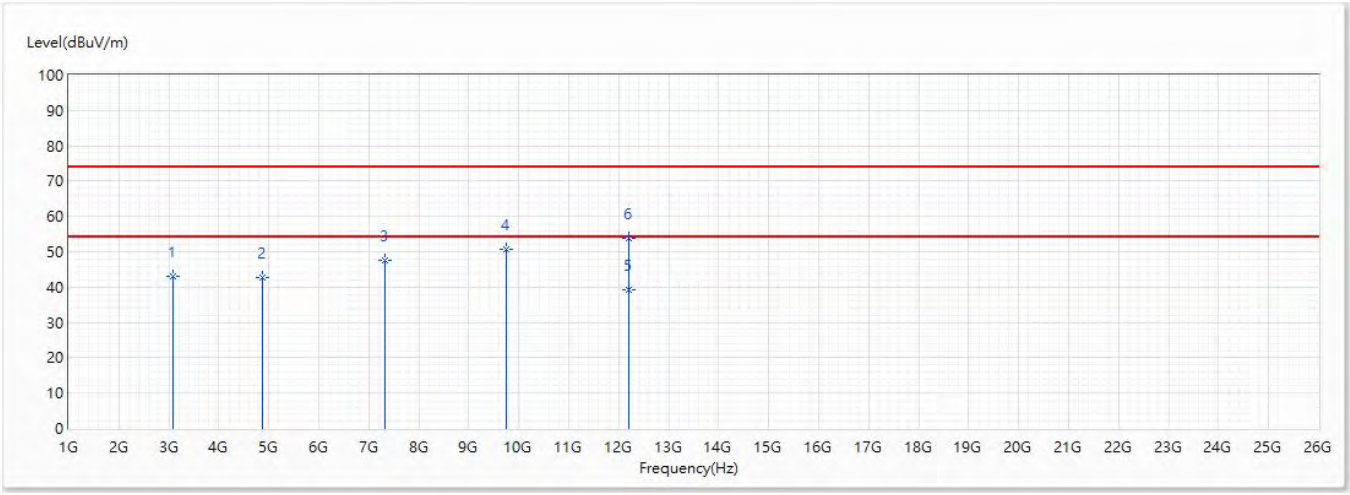


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	3072	41.49	74.00	-32.51	46.38	-4.89	PK
2	4804	43.23	74.00	-30.77	42.72	0.51	PK
3	7206	47.84	74.00	-26.16	38.22	9.62	PK
4	9608	49.56	74.00	-24.44	34.84	14.72	PK
* 5	12010	40.11	54.00	-13.89	21.67	18.44	AV
6	12010	53.95	74.00	-20.05	35.51	18.44	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2440MHz		

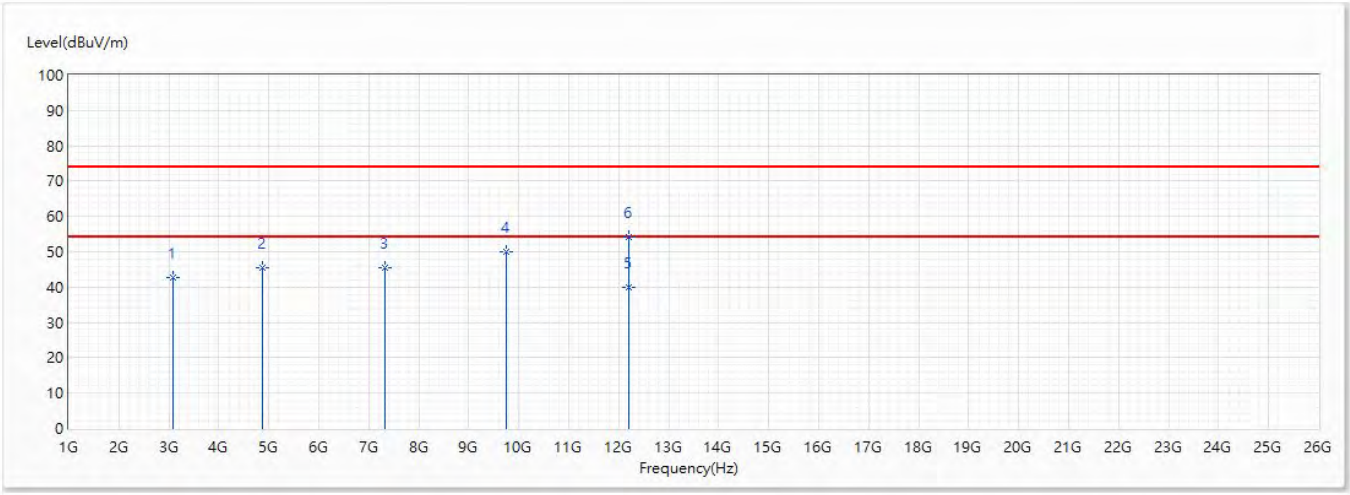


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	3072	43.07	74.00	-30.93	47.96	-4.89	PK
2	4880	42.77	74.00	-31.23	41.94	0.83	PK
3	7320	47.66	74.00	-26.34	37.41	10.25	PK
4	9760	50.67	74.00	-23.33	35.57	15.10	PK
* 5	12200	39.36	54.00	-14.64	21.17	18.19	AV
6	12200	53.67	74.00	-20.33	35.48	18.19	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2440MHz		

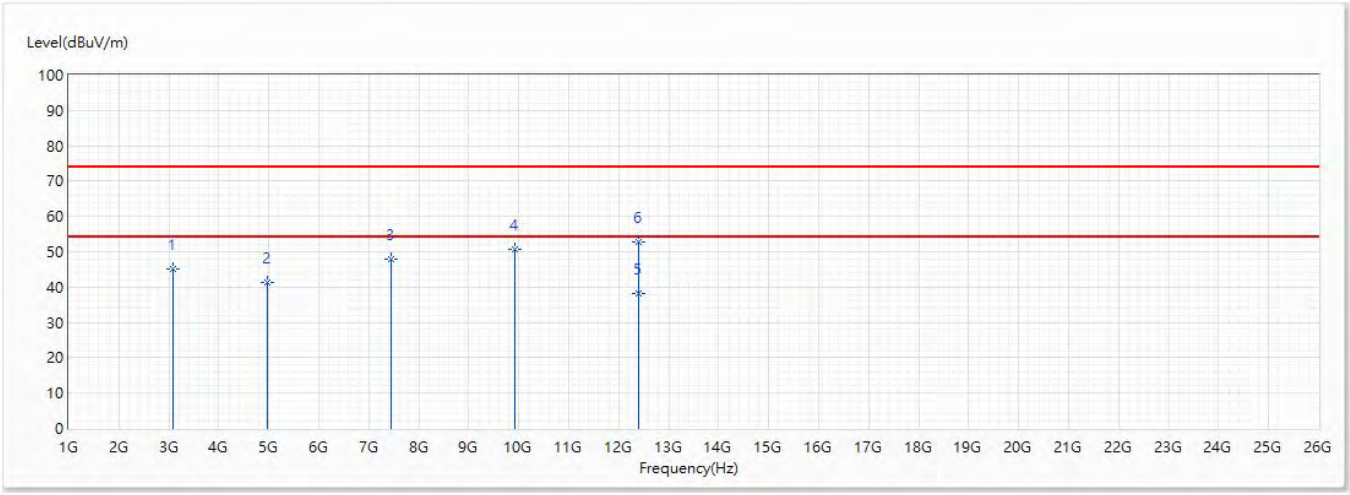


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	3072	42.85	74.00	-31.15	47.74	-4.89	PK
2	4880	45.55	74.00	-28.45	44.72	0.83	PK
3	7320	45.61	74.00	-28.39	35.36	10.25	PK
4	9760	49.95	74.00	-24.05	34.85	15.10	PK
5	12200	39.85	54.00	-14.15	21.66	18.19	AV
* 6	12200	54.04	74.00	-19.96	35.85	18.19	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2480MHz		

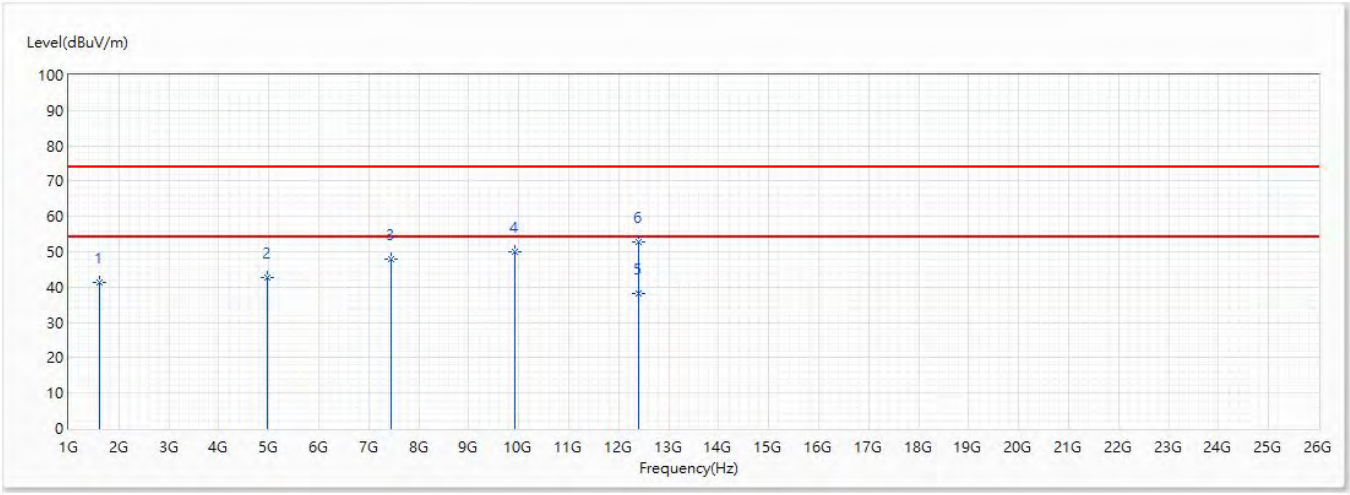


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	3072	45.19	74.00	-28.81	50.08	-4.89	PK
2	4960	41.25	74.00	-32.75	40.10	1.15	PK
3	7440	47.85	74.00	-26.15	37.00	10.85	PK
4	9920	50.53	74.00	-23.47	35.17	15.36	PK
5	12400	38.25	54.00	-15.75	20.38	17.87	AV
* 6	12400	52.71	74.00	-21.29	34.84	17.87	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

Site :	CB2-H	Engineer :	Scott
Model No :	CV90-JE103	Test Date :	2019/4/8
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1 BLE_2480MHz		



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	1601	41.23	74.00	-32.77	52.15	-10.92	PK
2	4960	42.83	74.00	-31.17	41.68	1.15	PK
3	7440	48.02	74.00	-25.98	37.17	10.85	PK
4	9920	49.89	74.00	-24.11	34.53	15.36	PK
* 5	12400	38.33	54.00	-15.67	20.46	17.87	AV
6	12400	52.94	74.00	-21.06	35.07	17.87	PK

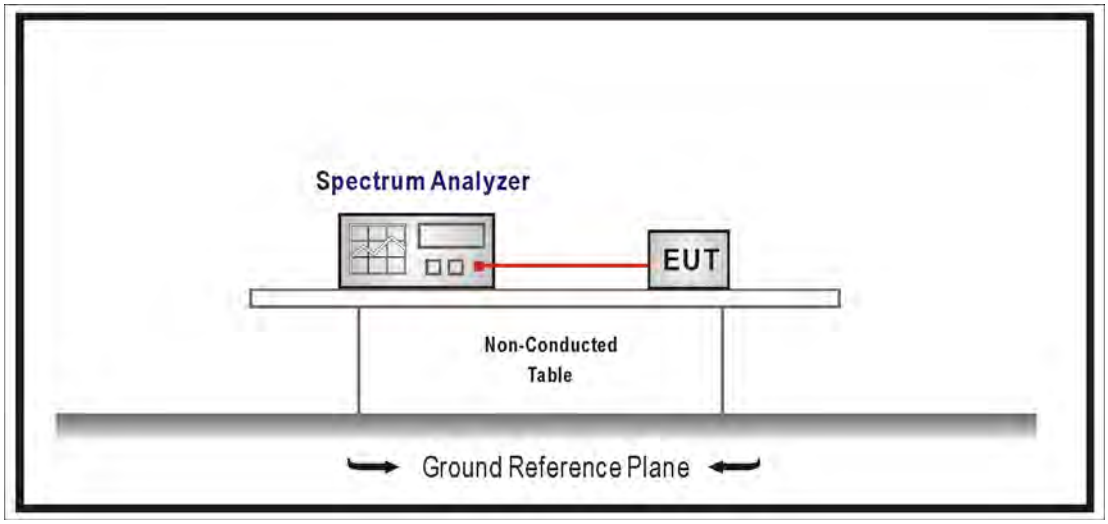
Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission above 13GHz were not included is because their levels are lower than 20dB form limit

6. RF antenna conducted test

6.1. Test Setup

RF Conducted Measurement:



6.2. Limits

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, 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

6.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2018

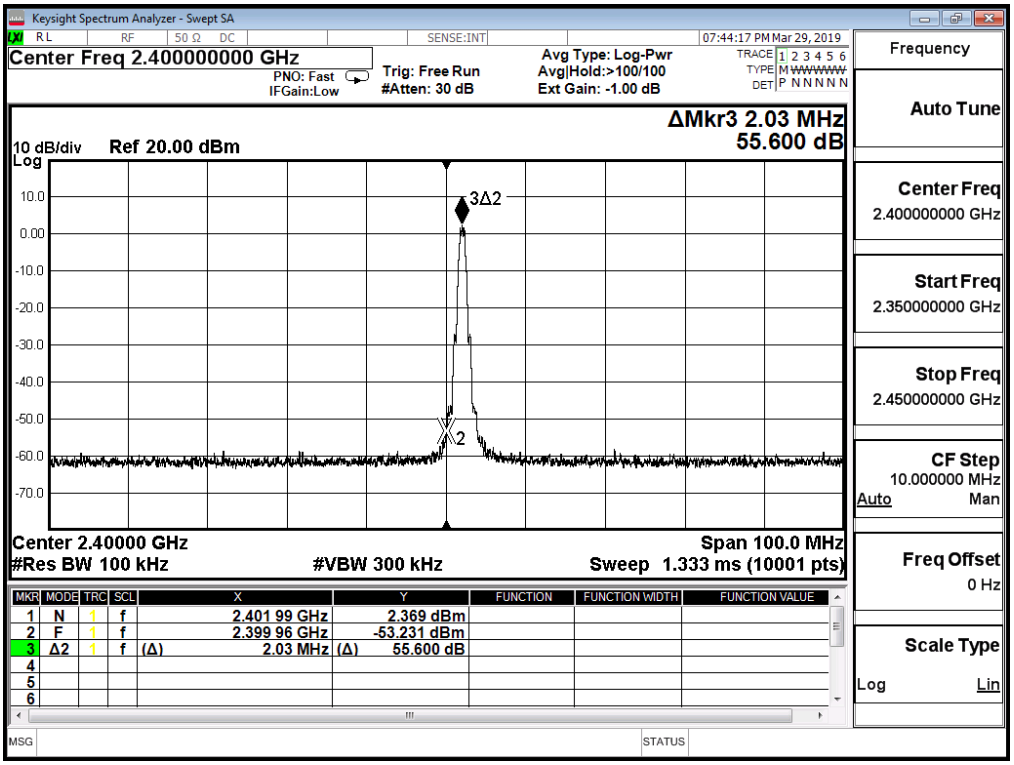
6.5. Test Result

Product	Active Mobile Gateway-with Comm		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

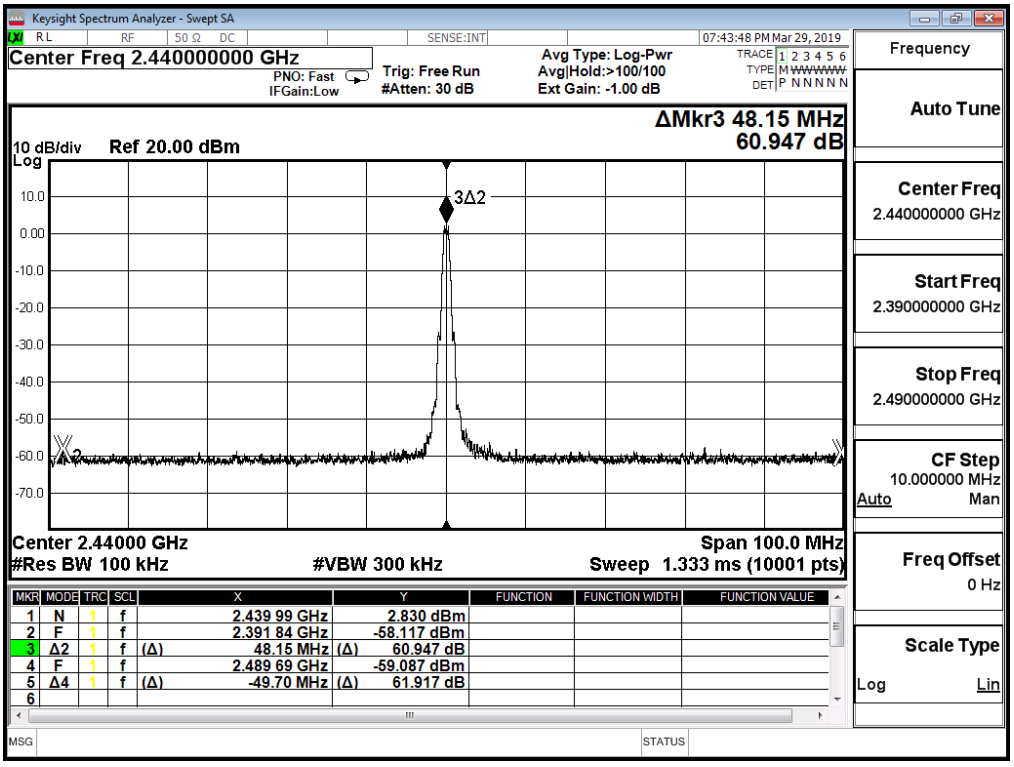
GFSK

Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)
00	2402	55.600	≥20
19	2440	55.911	≥20
39	2480	54.618	≥20

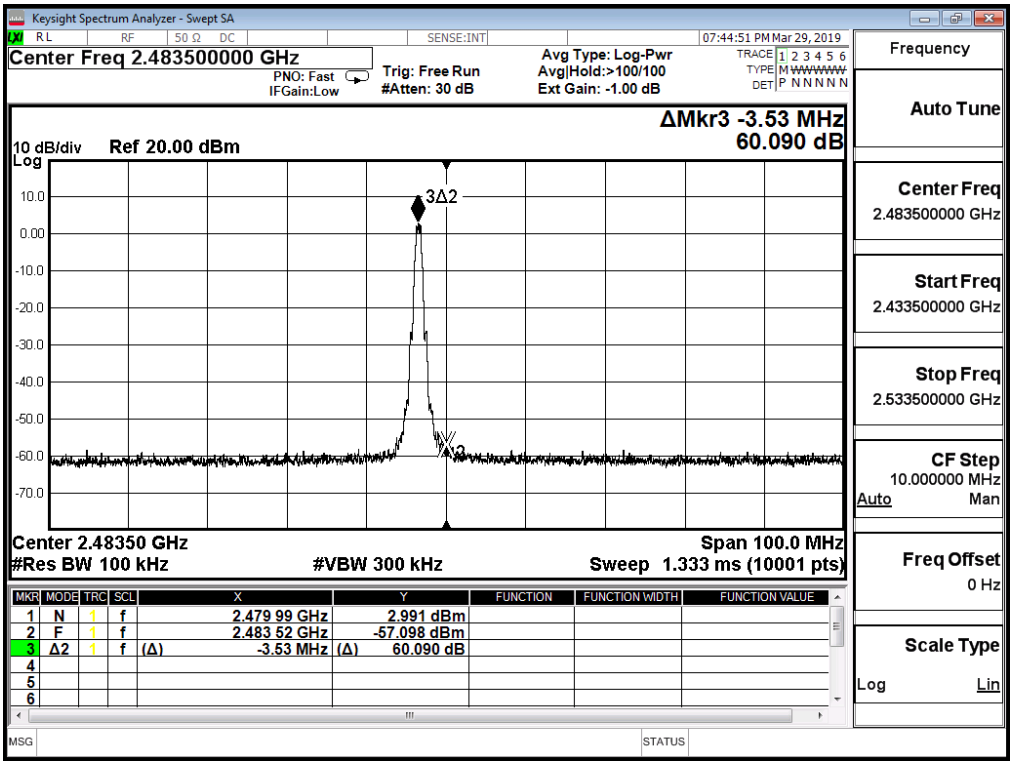
Channel 00



Channel 19

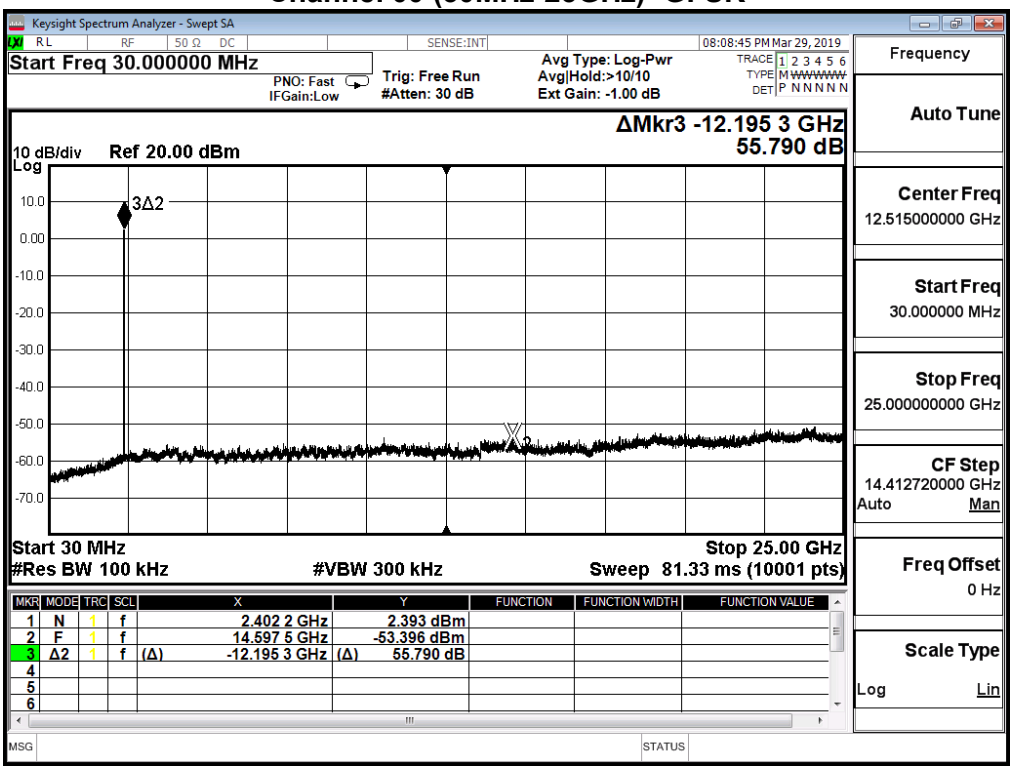


Channel 39

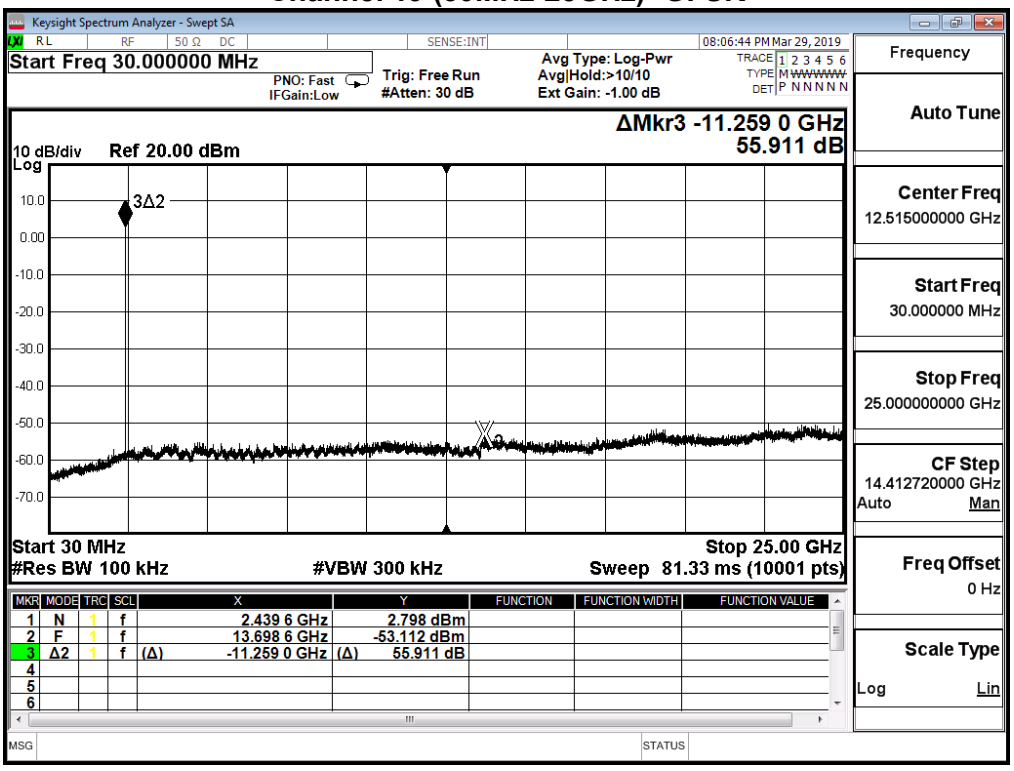


Product	Active Mobile Gateway-with Comm		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

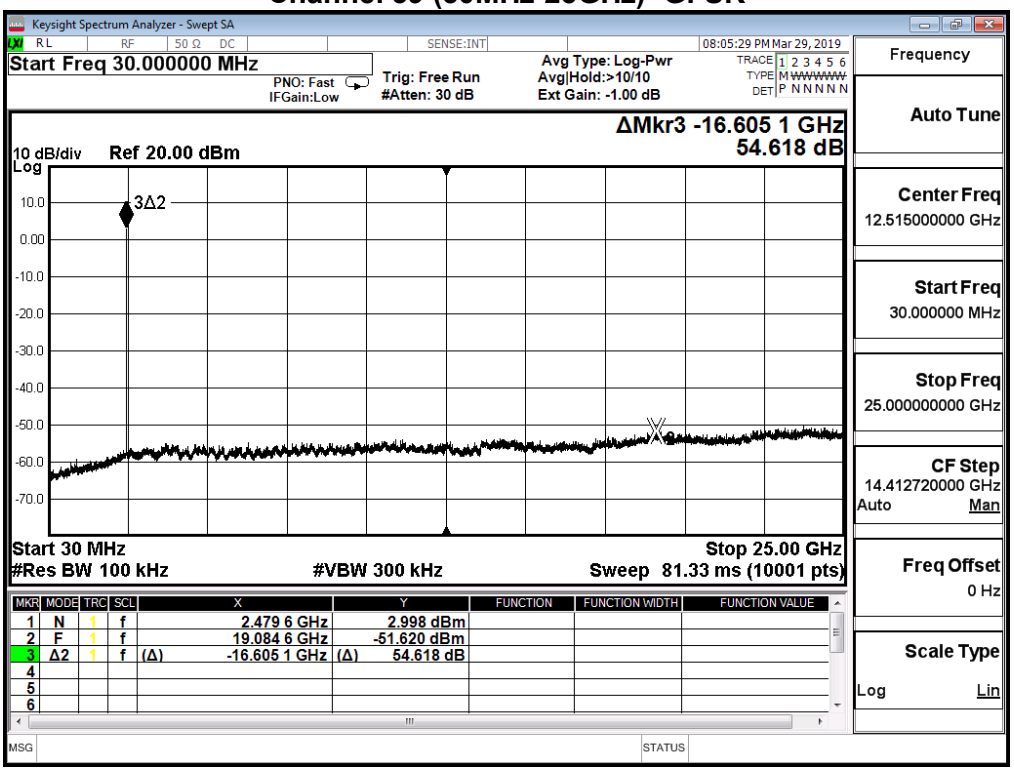
Channel 00 (30MHz-25GHz)- GFSK



Channel 19 (30MHz-25GHz)- GFSK



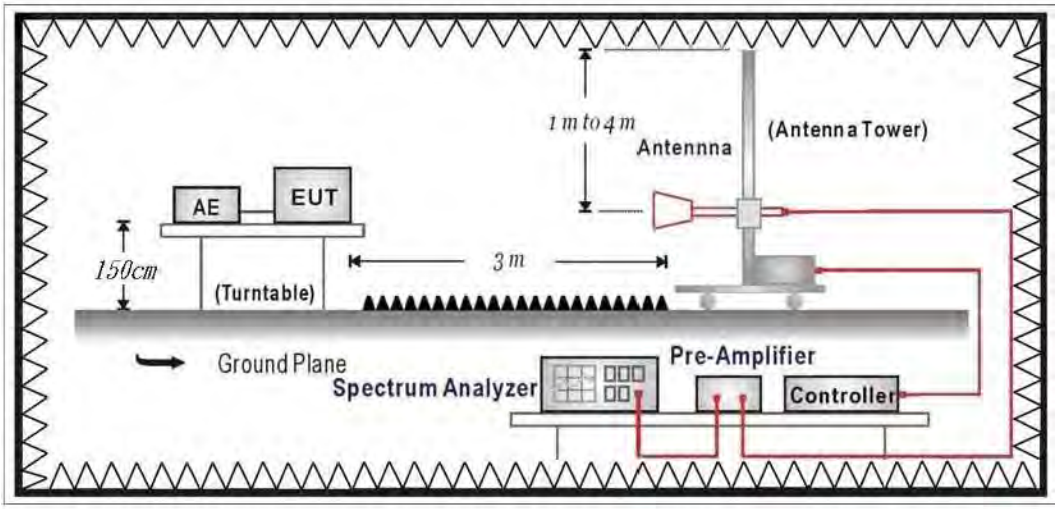
Channel 39 (30MHz-25GHz)- GFSK



7. Radiated Emission Band Edge

7.1. Test Setup

RF Radiated Measurement:



7.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

7.3. Test Procedure

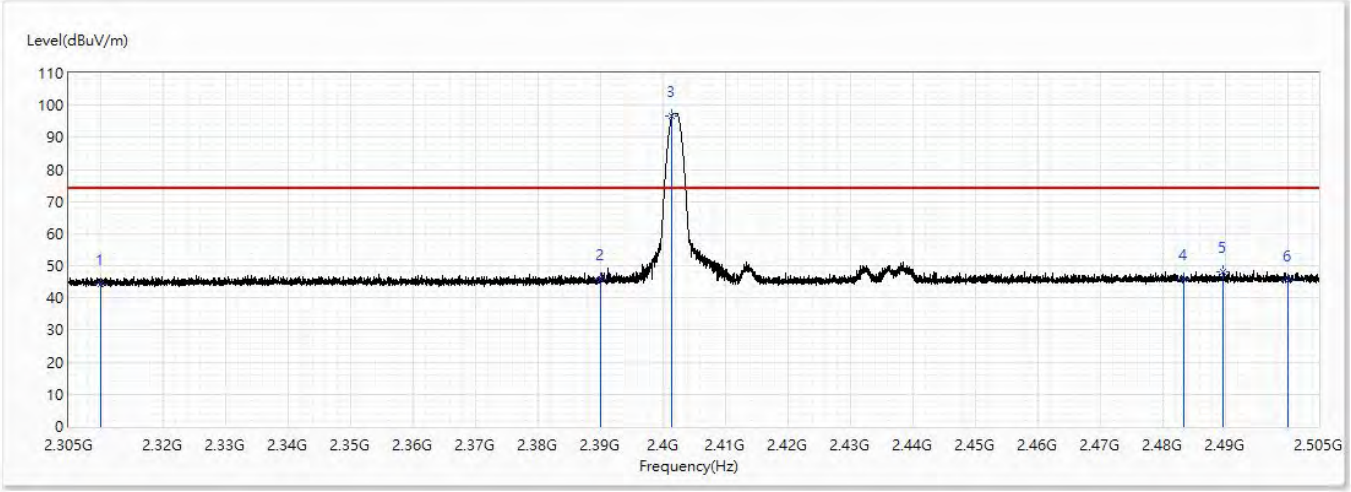
The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.
The EUT and its simulators are placed on a turn table which is 0.8 meter above ground.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

7.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247:2018

7.5. Test Result

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/28
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2402MHz		

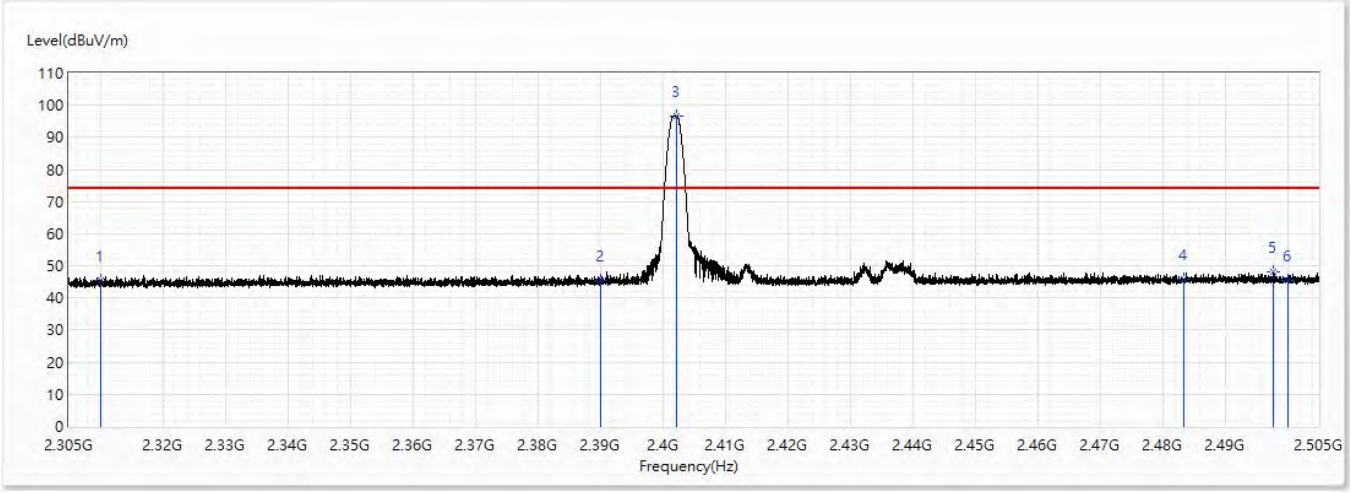


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	44.23	74.00	-29.77	29.99	14.24	PK
2	2390	45.85	74.00	-28.15	31.04	14.81	PK
! 3	2401.52	96.72	74.00	22.72	81.80	14.92	PK
4	2483.5	45.86	74.00	-28.14	30.38	15.48	PK
5	2489.8	47.96	74.00	-26.04	32.44	15.52	PK
6	2500	45.37	74.00	-28.63	29.78	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2402MHz		

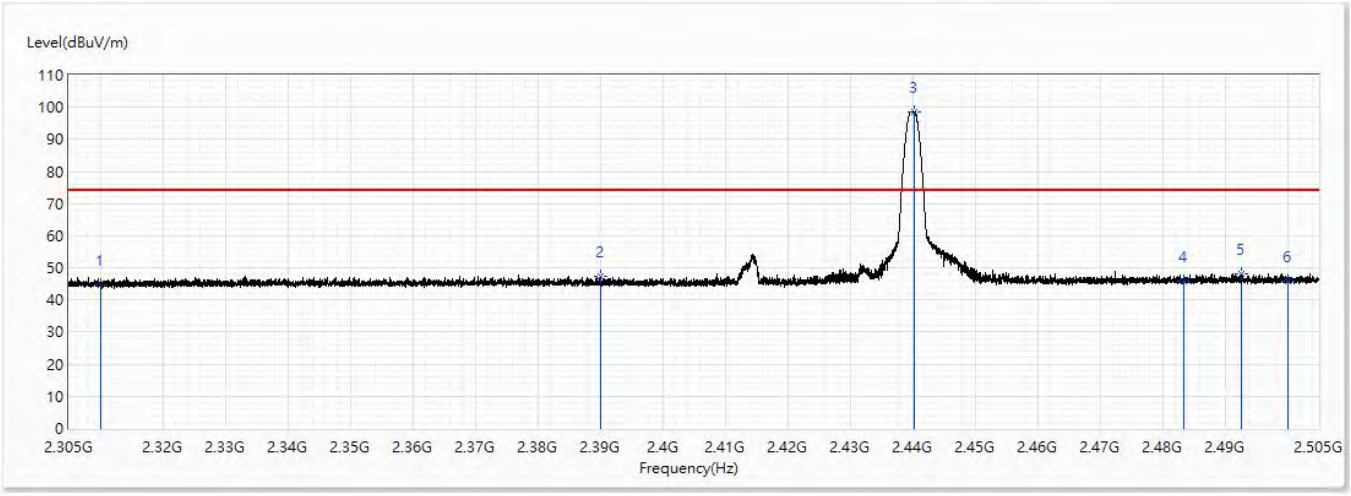


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	45.61	74.00	-28.39	31.37	14.24	PK
2	2390	45.52	74.00	-28.48	30.71	14.81	PK
! 3	2402.24	96.70	74.00	22.70	81.78	14.92	PK
4	2483.5	45.84	74.00	-28.16	30.36	15.48	PK
5	2497.68	48.13	74.00	-25.87	32.55	15.58	PK
6	2500	45.35	74.00	-28.65	29.76	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2440MHz		

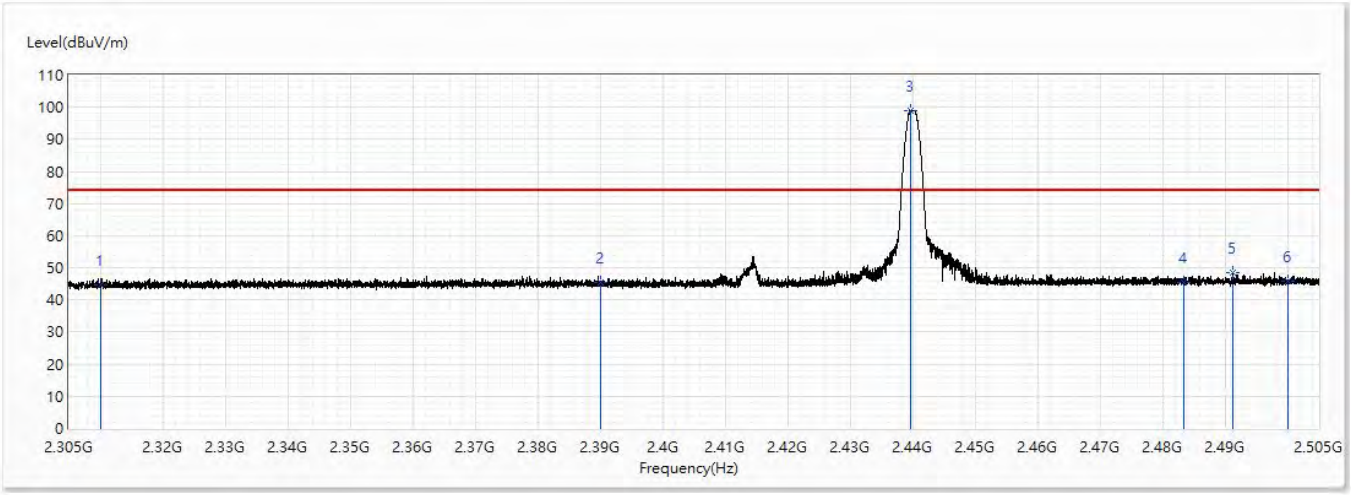


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	44.71	74.00	-29.29	30.47	14.24	PK
2	2390	47.31	74.00	-26.69	32.50	14.81	PK
! 3	2440.26	98.67	74.00	24.67	83.49	15.18	PK
4	2483.5	45.77	74.00	-28.23	30.29	15.48	PK
5	2492.72	47.96	74.00	-26.04	32.41	15.55	PK
6	2500	45.88	74.00	-28.12	30.29	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2440MHz		

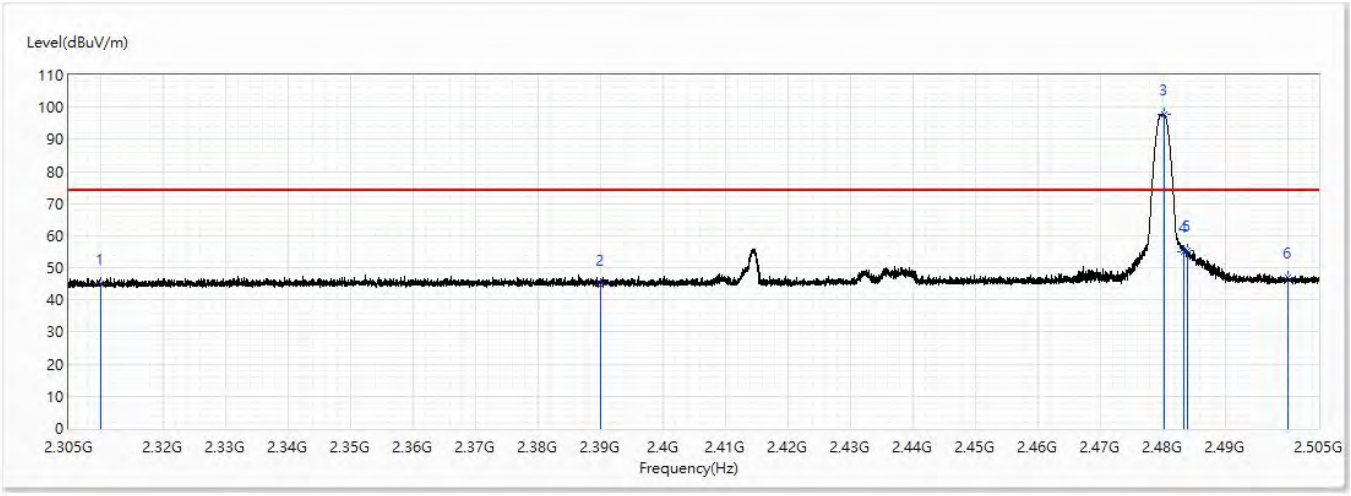


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	44.68	74.00	-29.32	30.44	14.24	PK
2	2390	45.35	74.00	-28.65	30.54	14.81	PK
! 3	2439.76	99.08	74.00	25.08	83.90	15.18	PK
4	2483.5	45.55	74.00	-28.45	30.07	15.48	PK
5	2491.22	48.40	74.00	-25.60	32.86	15.54	PK
6	2500	45.74	74.00	-28.26	30.15	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2480MHz		

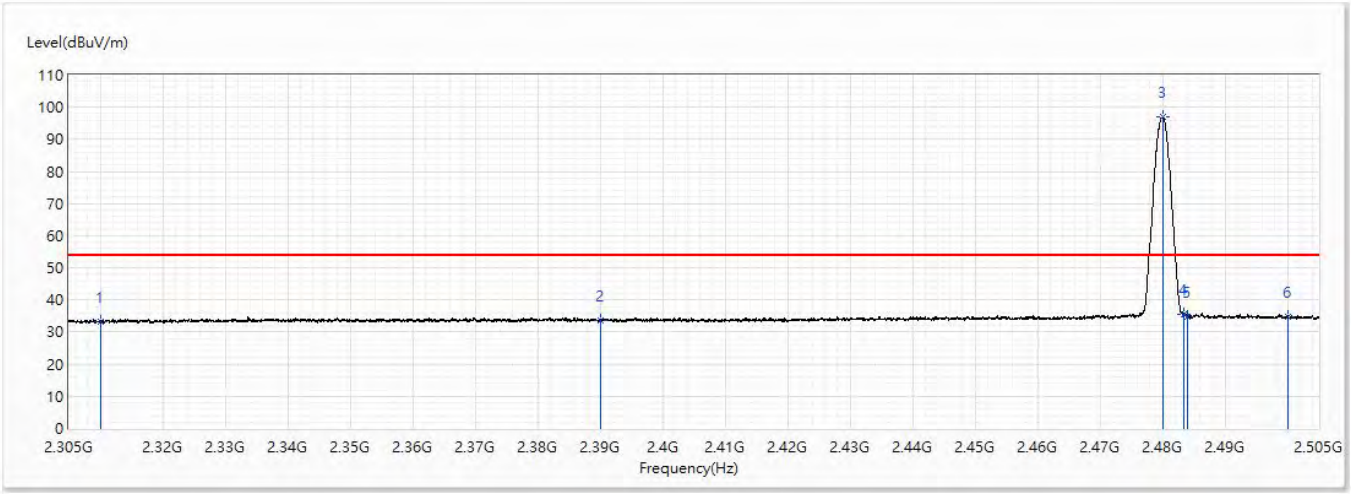


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	45.11	74.00	-28.89	30.87	14.24	PK
2	2390	44.67	74.00	-29.33	29.86	14.81	PK
! 3	2480.26	97.72	74.00	23.72	82.26	15.46	PK
4	2483.5	54.97	74.00	-19.03	39.49	15.48	PK
5	2484.06	55.48	74.00	-18.52	40.00	15.48	PK
6	2500	46.82	74.00	-27.18	31.23	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2480MHz		

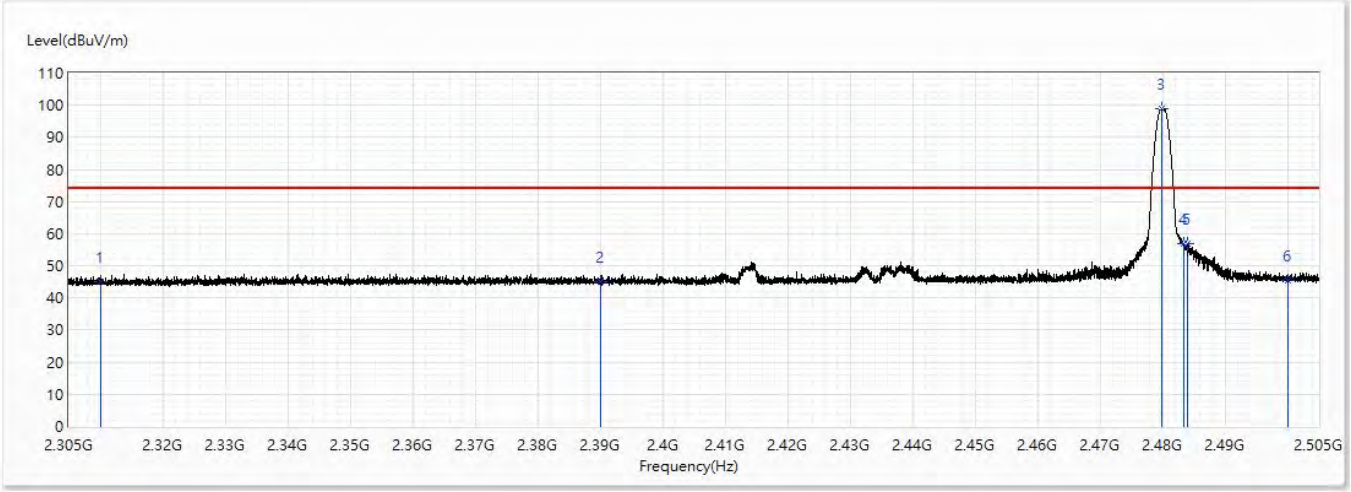


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	33.12	54.00	-20.88	18.88	14.24	AV
2	2390	33.80	54.00	-20.20	18.99	14.81	AV
! 3	2480.08	96.87	54.00	42.87	81.41	15.46	AV
4	2483.5	35.64	54.00	-18.36	20.16	15.48	AV
5	2483.94	34.84	54.00	-19.16	19.36	15.48	AV
6	2500	34.75	54.00	-19.25	19.16	15.59	AV

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2480MHz		

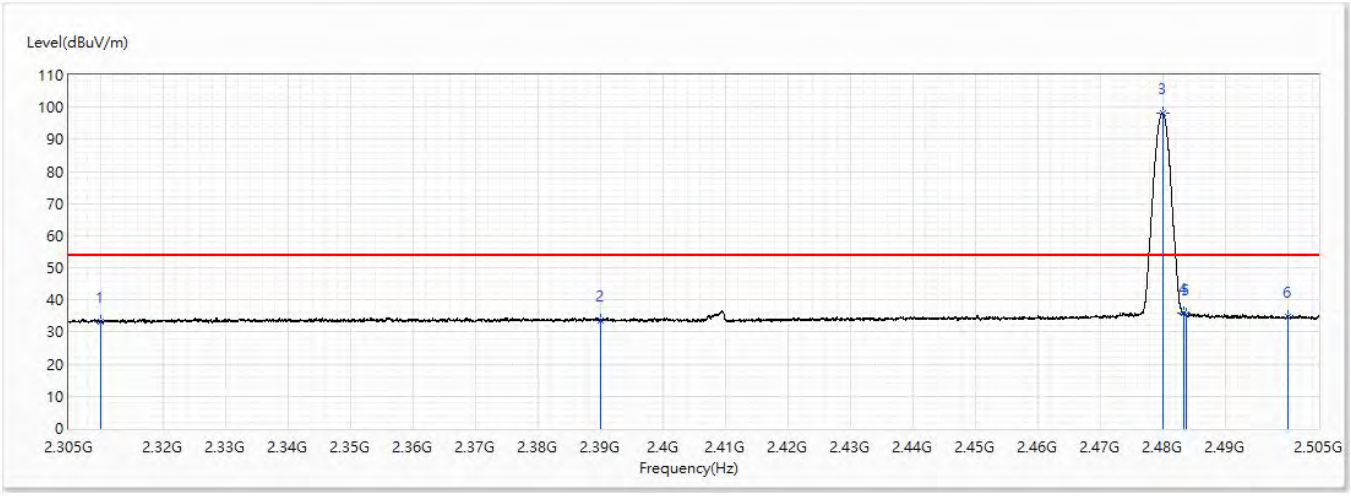


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	45.05	74.00	-28.95	30.81	14.24	PK
2	2390	45.15	74.00	-28.85	30.34	14.81	PK
! 3	2479.82	98.78	74.00	24.78	83.32	15.46	PK
4	2483.5	56.90	74.00	-17.10	41.42	15.48	PK
5	2483.98	56.92	74.00	-17.08	41.44	15.48	PK
6	2500	45.59	74.00	-28.41	30.00	15.59	PK

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	CV90-JE103	Test Date :	2019/3/29
Test Voltage :	DC 12V	Polarity :	Vertical
Test Mode :	Mode 1: Transmit Mode		
Note :	802.15.1_BLE_2480MHz		



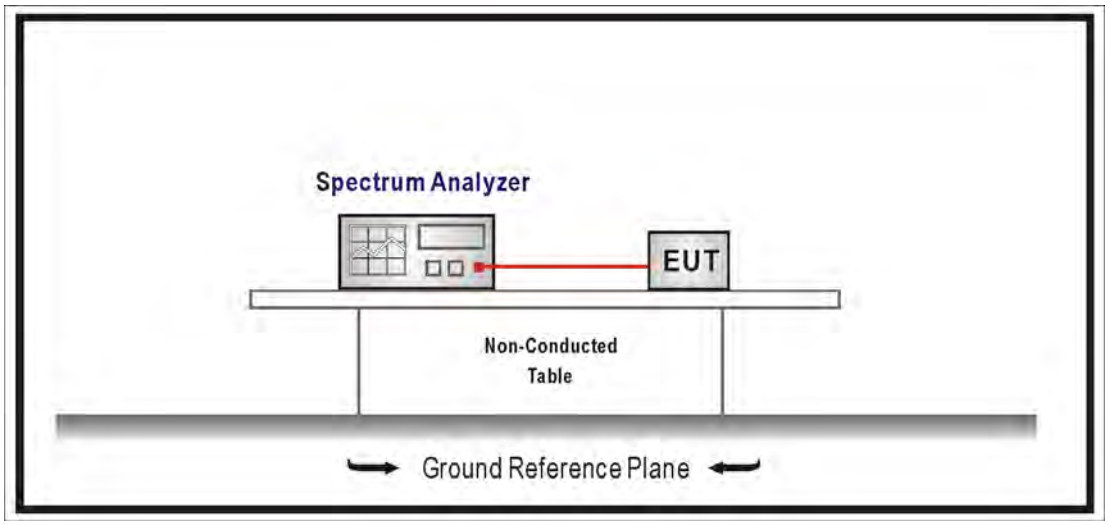
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	33.37	54.00	-20.63	19.13	14.24	AV
2	2390	33.76	54.00	-20.24	18.95	14.81	AV
! 3	2480.06	98.20	54.00	44.20	82.74	15.46	AV
4	2483.5	35.79	54.00	-18.21	20.31	15.48	AV
5	2483.76	35.40	54.00	-18.60	19.92	15.48	AV
6	2500	34.93	54.00	-19.07	19.34	15.59	AV

Note:

1. All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The Emission above 13GHz were not included is because their levels are lower than 20dB away from limit.

8. Occupied Bandwidth & DTS Bandwidth

8.1. Test Setup



8.2. Limits

The 6 dB bandwidth: ≧ 500 kHz.

Occupied Bandwidth: NA

8.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.

8.4. Test Specification

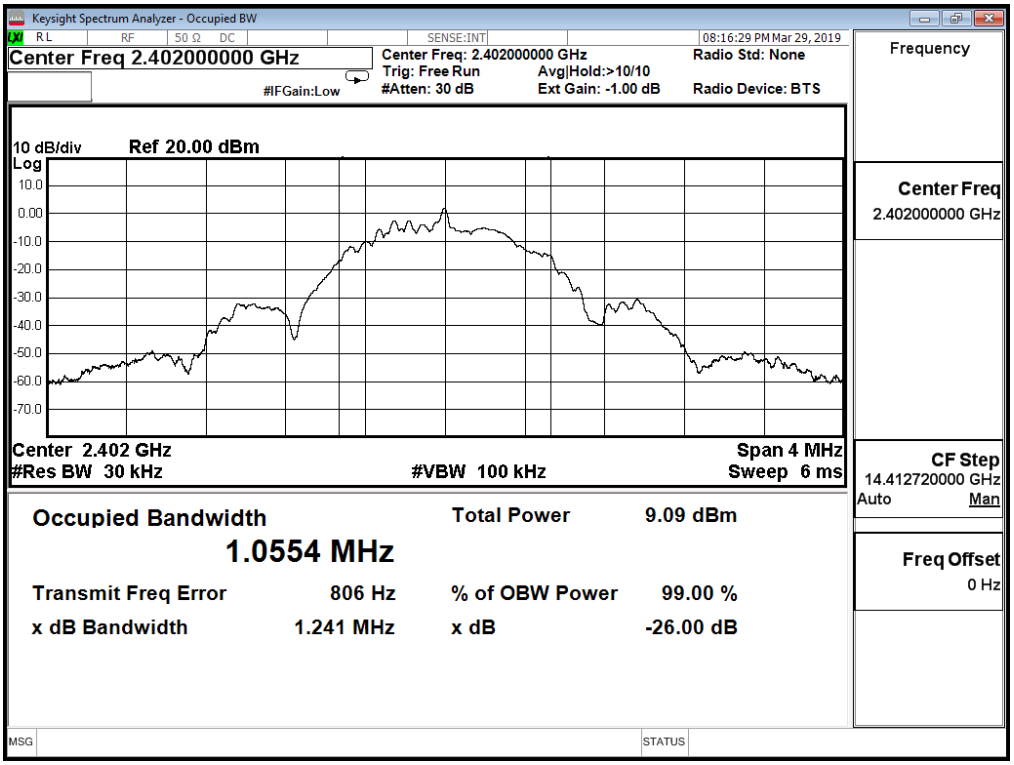
According to FCC Part 15 Subpart C Paragraph 15.247:2018

8.5. Test Result

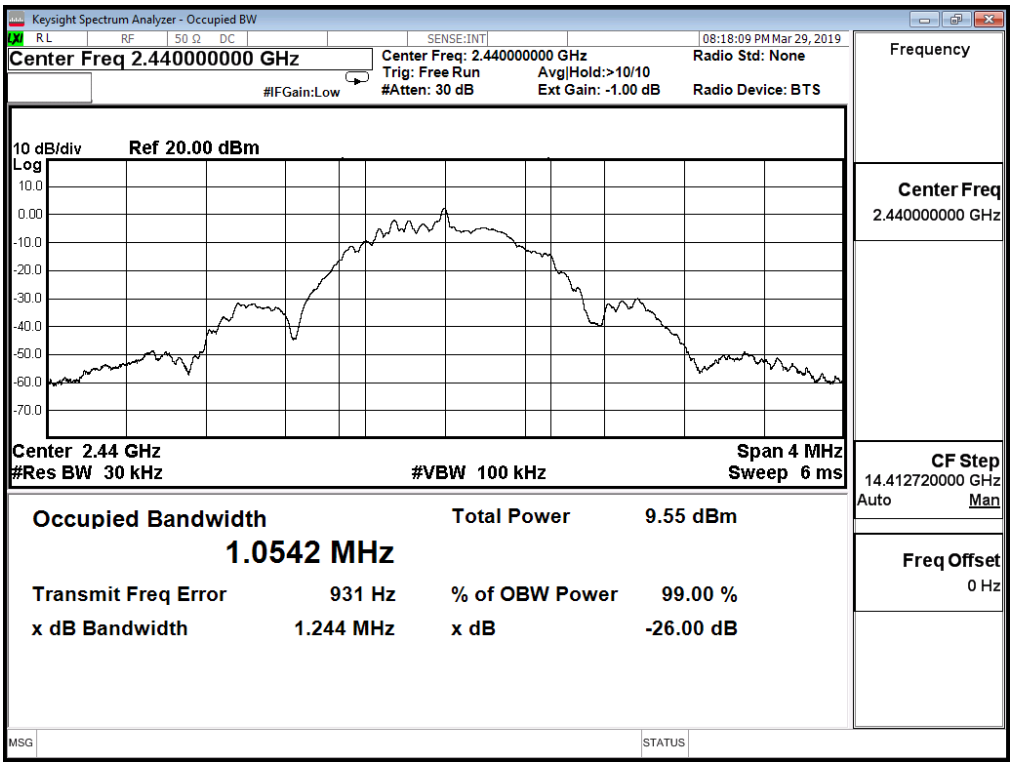
Product	Active Mobile Gateway-with Comm		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
00	2402	1.055	--
19	2440	1.054	--
39	2480	1.053	--

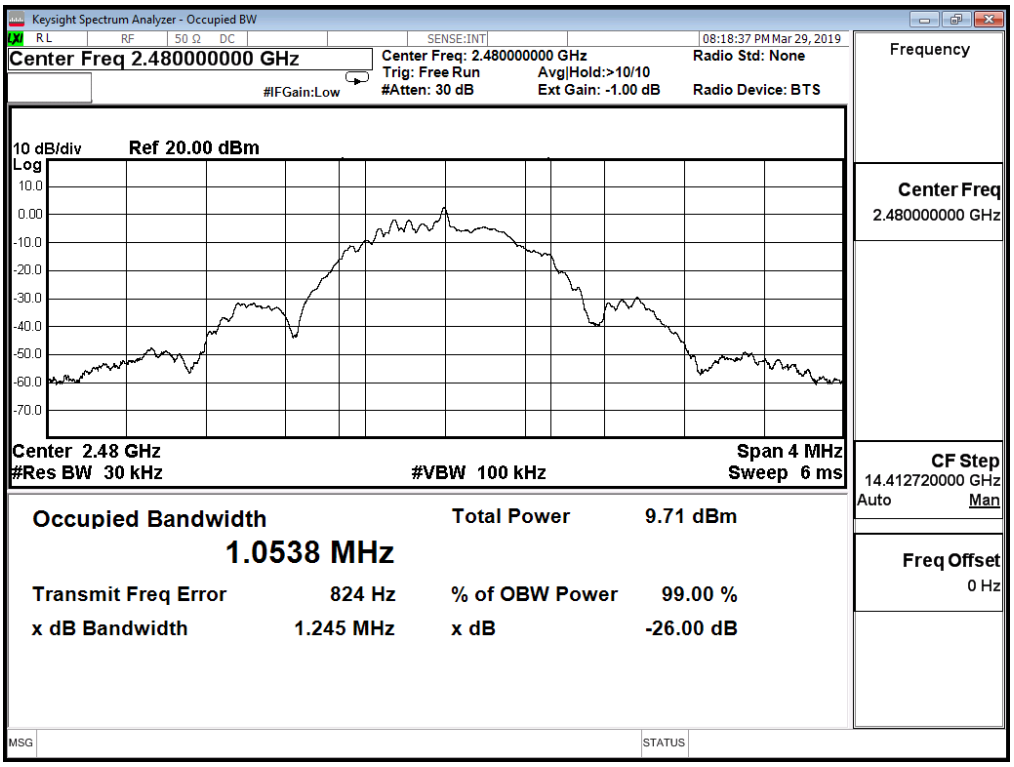
Channel 00



Channel 19



Channel 39

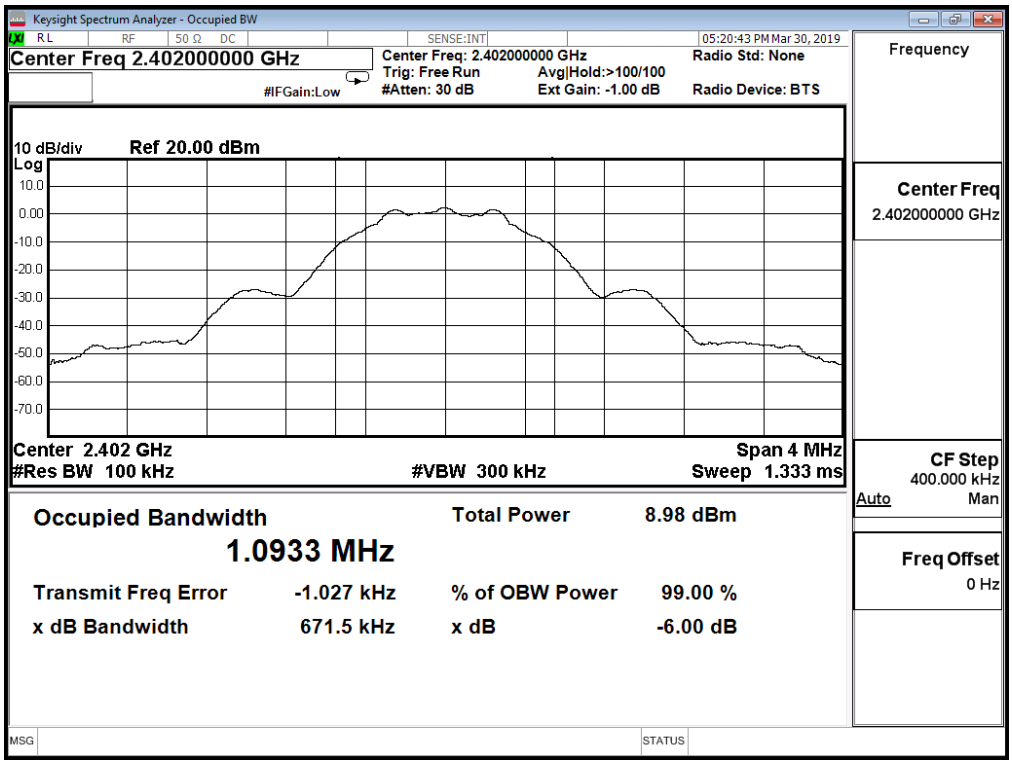


Product	Active Mobile Gateway-with Comm		
Test Item	DTS Bandwidth		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

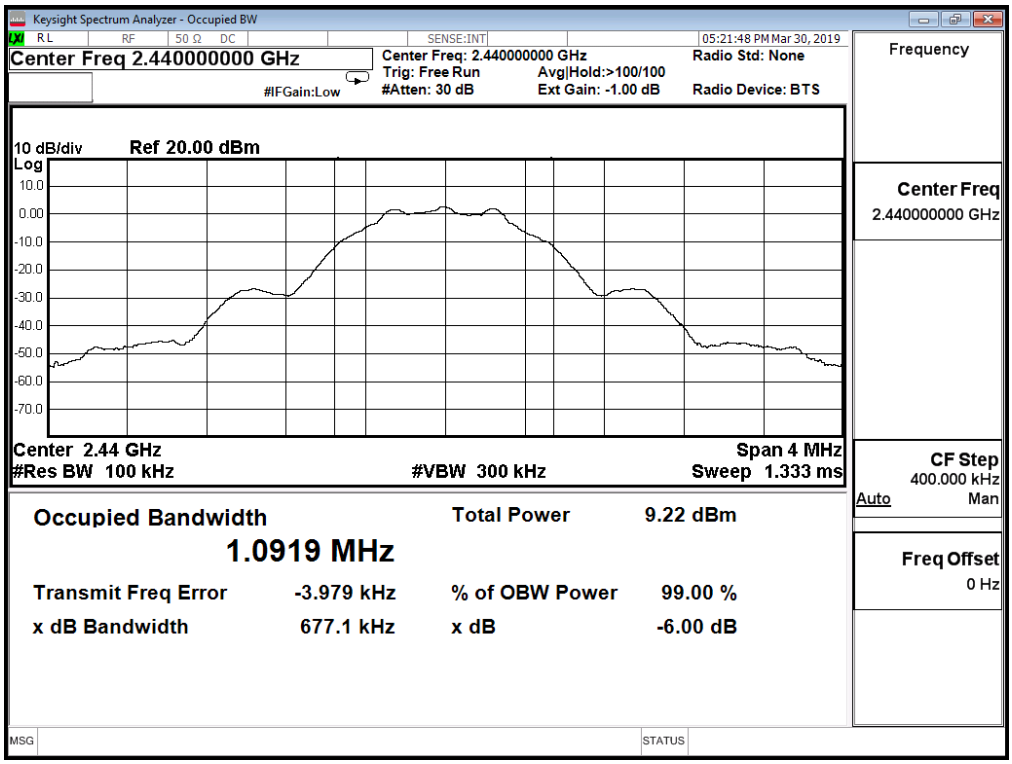
DTS Bandwidth:

Channel No.	Frequency (MHz)	Measure Level (KHz)	Limit (KHz)
0	2402	671.5	≧500
19	2440	677.1	≧500
39	2480	682.3	≧500

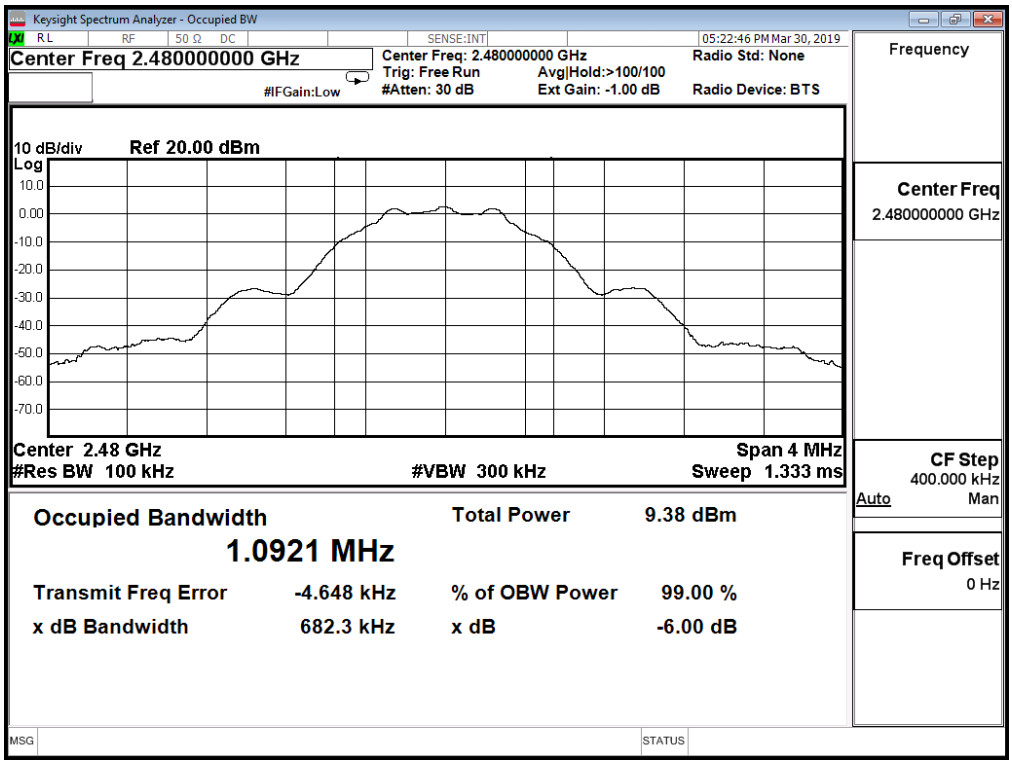
Channel 00



Channel 19

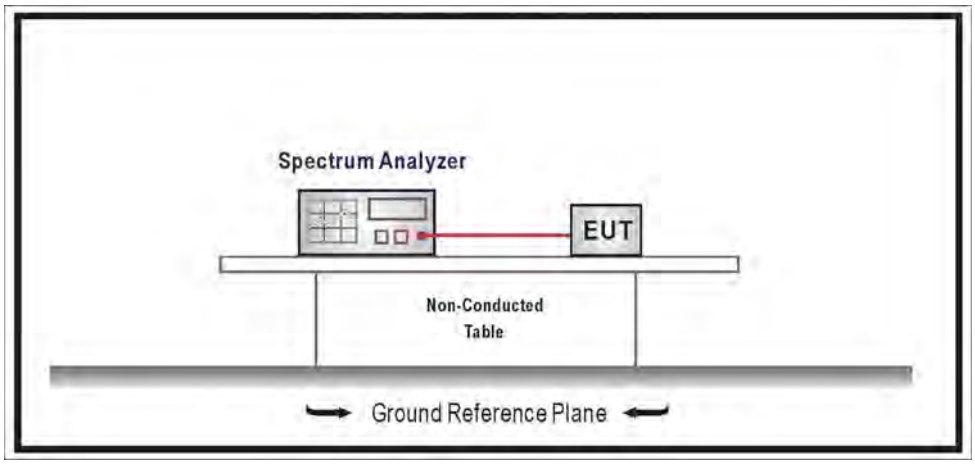


Channel 39



9. Power Density

9.1. Test Setup



9.2. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

9.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V05 for compliance to FCC 47CFR 15.247 requirements.

9.4. Test Specification

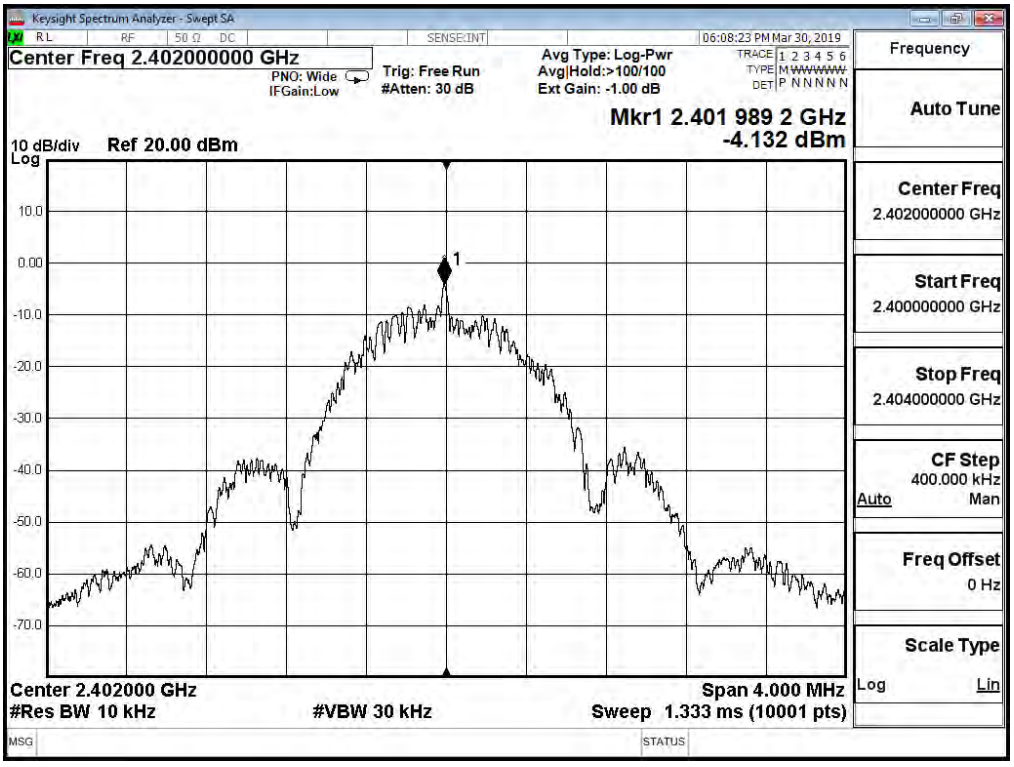
According to FCC Part 15 Subpart C Paragraph 15.247

9.5. Test Result

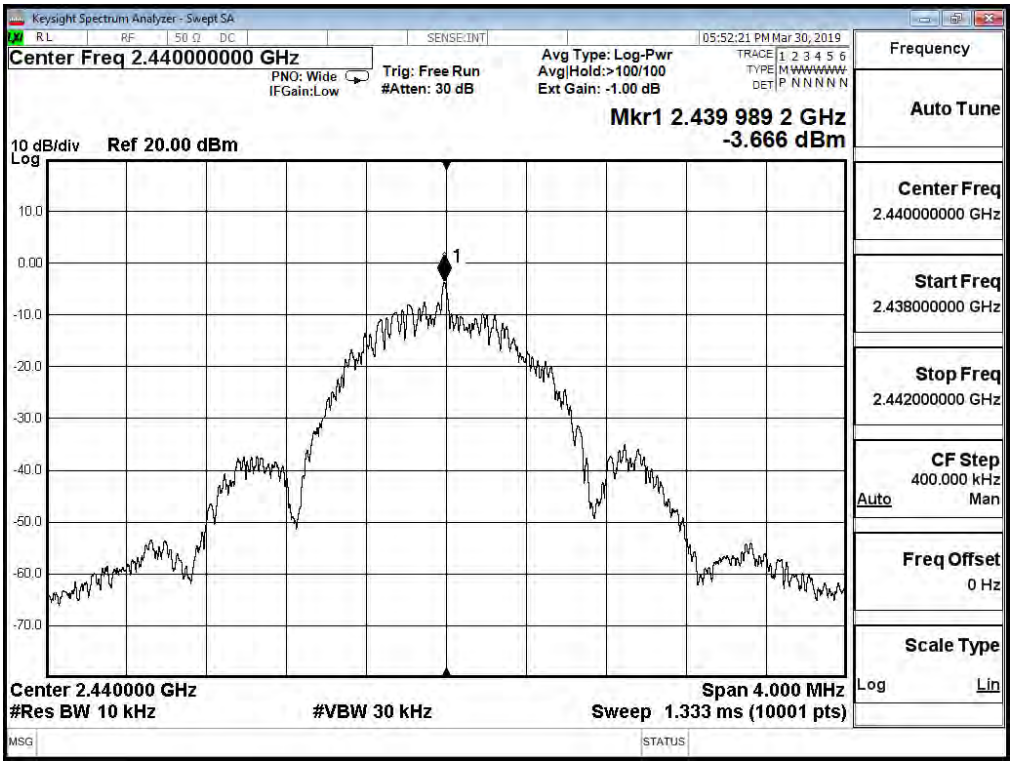
Product	Active Mobile Gateway-with Comm		
Test Item	Power Density		
Test Mode	Mode 1: Transmit Mode		
Date of Test	2019/04/10	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Vaule (dBm/3KHz)	Limit (dBm/3KHz)
00	2402	-4.132	≦8
19	2440	-3.666	≦8
39	2480	-3.609	≦8

Channel 00



Channel 19



Channel 39