

Variant FCC Test Report

Product Name : Asset Tracker
Brand Name : Samsara
Model No. : 010-2051, 010-2053
FCC ID : 2AIHD2051

Applicant : SAMSARA NETWORKS INC
Address : 1990 Alameda Street, San Francisco, CA 94103, USA

Date of Receipt : Jul. 01, 2022
Issued Date : Jul. 18, 2022
Report No. : 2270004R-RFNAOTHV02-B
Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

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

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Product Name : Asset Tracker
Applicant : SAMSARA NETWORKS INC
Address : 1990 Alameda Street, San Francisco, CA 94103, USA
Manufacturer : WISTRON NEWEB CORP.
Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C
Brand Name : Samsara
Model No. : 010-2051, 010-2053
FCC ID : 2AIHD2051
EUT Voltage : EUT 1: DC 12V from external power source
DC 3.6V or 3.65V from internal li-ion battery
EUT 2: DC 4.5V from AA battery (AA battery*3)
Testing Voltage : EUT 1: DC 12V
EUT 2: DC 4.5V
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247
ANSI C63.10: 2013
Laboratory Name : DEKRA Testing and Certification Co., Ltd.
Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County
310, Taiwan, R.O.C.
Test Result : Complied

Documented By :



(Hailey Peng / Senior Engineer)

Approved By :



(Rueyyan Lin / Supervisor)

The test results relate only to the samples tested.

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Revision History

Version	Description	Issued Date
V1.0	Initial issue of report	Jul. 18, 2022

Class II Permissive Change (C2PC)

Report No.	Version	Description	Issued Date
2240462R-RFUSBLEV01-A	V1.0	Original application.	Jun. 10, 2022
2270004R-RFNAOTHV02-B	V1.0	1. Updating software version to “v316.2” from “v0.93” 2. The EUT 1 (model: 010-2053) adding the second source of battery. The difference between first source of battery and second source of battery, please refer to the section 1.1 for detail.	Jul. 18, 2022

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1. General Information

1.1 EUT Description

Product Name	Asset Tracker
Brand Name	Samsara
Model No.	010-2051, 010-2053
Frequency Range	1 Mbps: 2402 ~ 2480 MHz 2 Mbps: 2402 ~ 2480 MHz
Channel Number	1 Mbps: 40 Channels 2 Mbps: 40 Channels
Type of Modulation	GFSK

The difference for each model is shown as below:

EUT	1		2
Model No.	010-2053		010-2051
Type	Avalanche*		Crevasse*
Key ICs			
Battery End-of-Service Monitoring	MAX17260		N/A
CAN transceiver	MCP25625 or MCP2515		N/A
ADC Input	2x		N/A
Output	1x		N/A
CAN Bus	1x		N/A
Power			
Primary Power source	1st source (EVE)	Secondary Cell (Lithium-ion) 18650 pack (3.6V)	3x Primary Cell L91
	2nd source (LISONERGY)	Secondary Cell (Lithium-ion) 18650 pack (3.65V)	
External Power source	9~36 VDC		4.5 VDC
Enclosure			
Rough dimensions	123 x 82 x 35 mm		81 x 110 x 31 mm
Ambient Temp Rating	-20°C~+60°C		-40°C~+60°C
Screw	Hexalobular socket		Phillips
The manufacturer declares that RF-related parts and software are unchanged for both models.			

The EUT 1 (model: 010-2053) has two sources of battery for marketing:

Sources of Battery	First Source	Second Source
Brand Name	EVE	LISONERGY
Model No.	A0679B	LS.11110D01
Nominal Voltage	3.6V	3.65V
Typical Capacity	3100mAh	3000mAh
MAX Charge Current	3.1A	0.9A
Typical Over Charge	4.28V	4.275V
Typical Over Charge Release	4.080V	4.075V
Typical Over Charge Delay Time	1.2s	1s
Typical Over Discharge	2.3V	2.5V
Typical Over Discharge Release	2.3V	2.9V
Typical Over Discharge Delay Time	150ms	128ms

Antenna Information				
Ant.	Brand Name	Model No.	Type	Gain (dBi)
0	WNC	Antenna-BT/WLAN	PCB	3.1

GFSK (1 Mbps/2 Mbps)

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

Note:

1. 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.
2. The above EUT information is declared by the manufacturer.

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
-----------	------------------

Test Items	Test Mode	Test EUT	Modulation	Channel	Result
AC Power Line Conducted Emission	The EUT was DC-powered, it's not necessary to apply to AC power line conducted emission test.				
Maximum Conducted Output Power	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass
Radiated Emission Below 1 GHz	Mode 1	EUT 1	GFSK (1 Mbps)	39	Pass
		EUT 2			
Radiated Emission Above 1 GHz	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass
Antenna Port Conducted Emission	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass
Radiated Emission Band Edge	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass
Occupied Bandwidth & DTS Bandwidth	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass
Maximum Power Spectral Density	Mode 1	EUT 1	GFSK (1 Mbps)	00/19/39	Pass
			GFSK (2 Mbps)	00/19/39	Pass

Note:

- Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- There are two EUTs, one is EUT 1, the other is EUT 2.
EUT 1 generated the worst test result for radiated emission below 1GHz test, thus the measurement for other test items will follow this same test configuration.
- For radiated emission below 1 GHz have performed all modes of operation were investigated and the worst-case emissions are reported.
- The EUT was performed at X axis, Y axis and Z axis position for radiated emission and band edge tests.
The worst case was found at X axis, so the measurement will follow this same test configuration.

1.3 Comments and Remarks

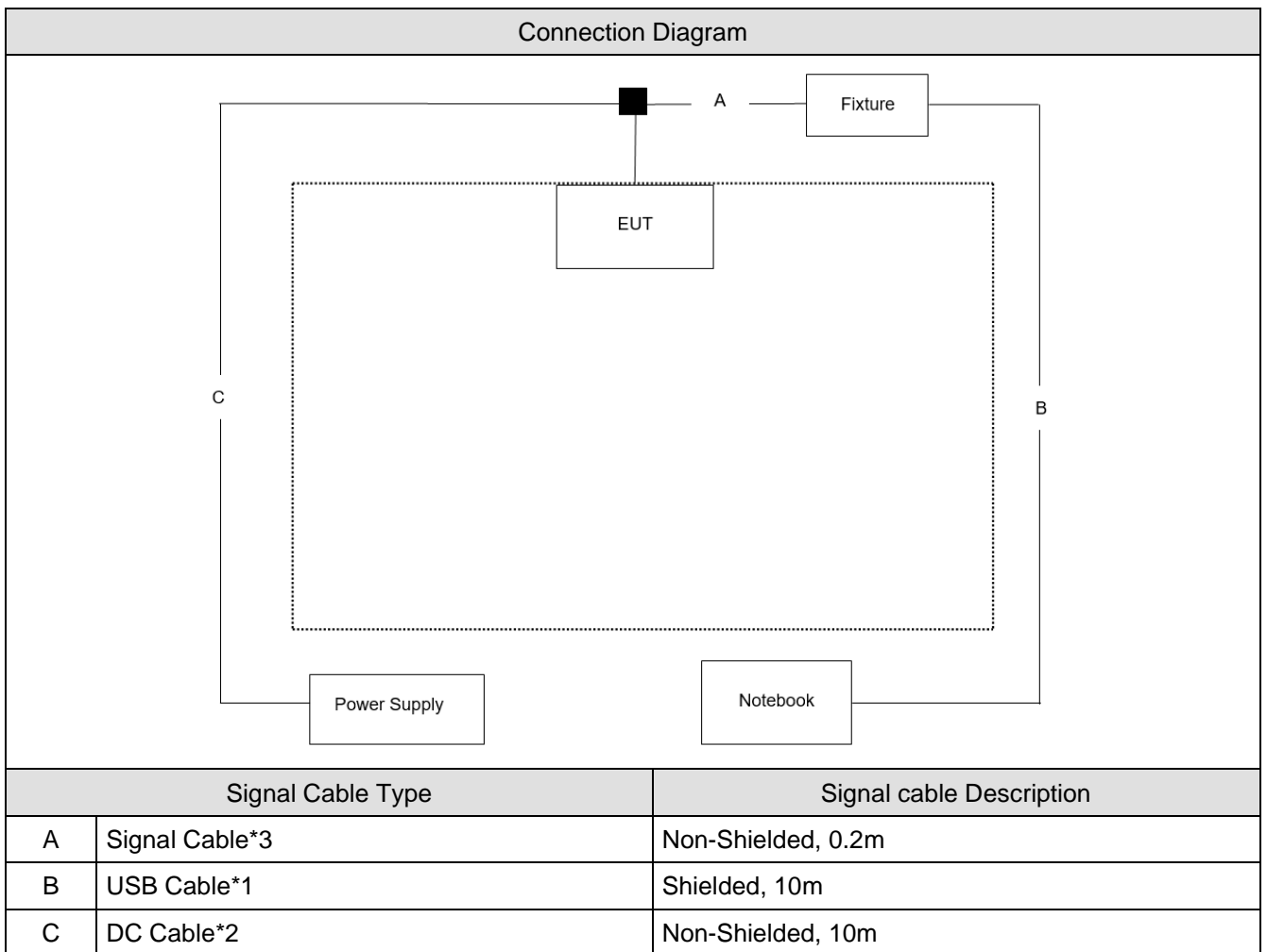
The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1.4 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

Product	Manufacturer	Model No.	Serial No.
1	Fixture	Oneping	OP-1010C18V-PBAM04D1
2	Notebook	DELL	Latitude E6320
3	Power Supply	Topward	6303D

1.5 Configuration of tested System



1.6 EUT Operation of during Test

1	Execute control command by software "Putty".
2	Configure the test mode, the test channel, and the data rate.
3	Press "Start TX" to start the continuous transmitting.
4	Verify that the EUT works properly.

1.7 Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Actually	Tested by	Test Date	Test Site
Temperature (°C)	Maximum Peak Conducted	23.5	Scott Chang	2022/07/04	HC-SR12
Humidity (%RH)	Output Power	55			
Temperature (°C)	Radiated Emission	23.9 ~ 24.5	Gary Liao	2022/07/01 ~	HC-CB04
Humidity (%RH)		58 ~ 61	Cyril Chen	2022/07/04	
Temperature (°C)	Antenna Port Conducted Emission	23.5	Scott Chang	2022/07/04	HC-SR12
Humidity (%RH)		55			
Temperature (°C)	Radiated Emission Band Edge	24.5	Gary Liao	2022/07/01	HC-CB04
Humidity (%RH)		58			
Temperature (°C)	Occupied Bandwidth &	23.5	Scott Chang	2022/07/04	HC-SR12
Humidity (%RH)	DTS Bandwidth	55			
Temperature (°C)	Maximum Power Spectral Density	23.5	Scott Chang	2022/07/04	HC-SR12
Humidity (%RH)		55			

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA : FCC Registration Number: TW3024
Canada : CAB identifier : TW3024

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

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

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
Email address	info.tw@dekra.com
Website	http://www.dekra.com.tw
Note: Test site number for address 1 includes HC-SR02. Test site number for address 2 includes HC-CB02, HC-CB03, HC-CB04, HC-SR10 and HC-SR12.	

1.8 List of Test Equipment

HC-SR12

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2021/11/12	2022/11/11
Pulse Power Sensor	Anritsu	MA2411B	1531043	2021/11/12	2022/11/11
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Pulse Power Sensor	Anritsu	MA2411B	1531044	2021/11/12	2022/11/11
Power Meter	Keysight	8990B	MY51000248	2022/05/06	2023/05/05
Power Sensor	Keysight	N1923A	MY57240005	2022/05/06	2023/05/05
Spectrum Analyzer	Agilent	N9010A	US47140172	2022/05/08	2023/05/07
Signal & Spectrum Analyzer	R&S	FSV40	101049	2022/04/25	2023/04/24

HC-CB04

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2021/10/22	2022/10/21
Signal & Spectrum Analyzer	R&S	FSV40	101049	2022/04/25	2023/04/24
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2022/01/07	2023/01/06
Trilog Broadband Antenna	Schwarzbeck	VULB 9168	1209	2022/06/14	2023/06/13
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2022/05/06	2023/05/05
Horn Antenna	Schwarzbeck	BBHA 9170	203	2022/02/23	2023/02/22
Pre-Amplifier	EMCI	EMC01820I	980365	2022/04/15	2023/04/14
Pre-Amplifier	EMEC	EM01G18GA	060741	2022/05/06	2023/05/05
Pre-Amplifier	DEKRA	AP-400C	201801231	2021/12/24	2022/12/23
EMI Test Receiver	R&S	ESR7	102260	2021/12/22	2022/12/21
Magnetic Loop Antenna	Teseq	HLA 6121	44287	2021/09/06	2022/09/05
Coaxial Cable(10m)	Suhner	SF102_SF104	HC-CB04	2021/08/09	2022/08/08
Coaxial Cable(3m)	Suhnerr,Rosnol	SF102_Rosnol	HC-CB04_1	2021/08/17	2022/08/18
Radiated Software	AUDIX	e3 V9	HC-CB04_1	N/A	N/A

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

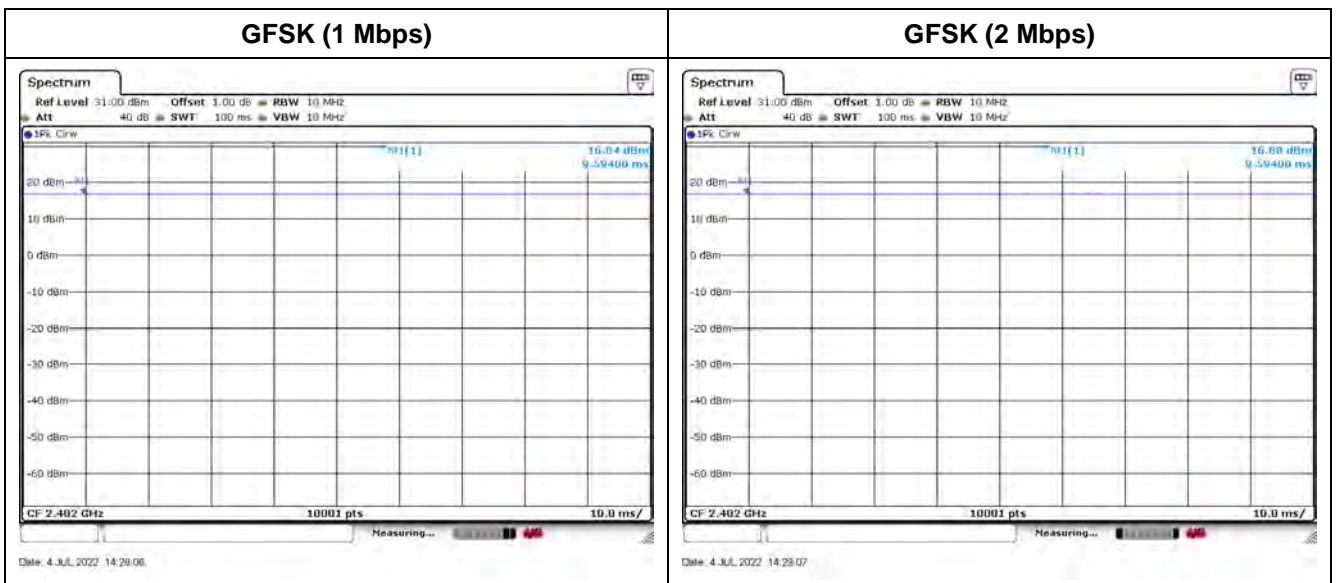
1.9 Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Test item	Uncertainty
AC Power Line Conducted Emission	± 2.10 dB
Maximum Conducted Output Power	± 1.16 dB
Radiated Emission	± 3.25 dB below 1 GHz ± 3.32 dB above 1 GHz
Antenna Port Conducted Emission	± 1.60 dB
Radiated Emission Band Edge	± 3.32 dB
Occupied Bandwidth & DTS Bandwidth	± 282.55 Hz
Maximum Power Spectral Density	± 1.60 dB

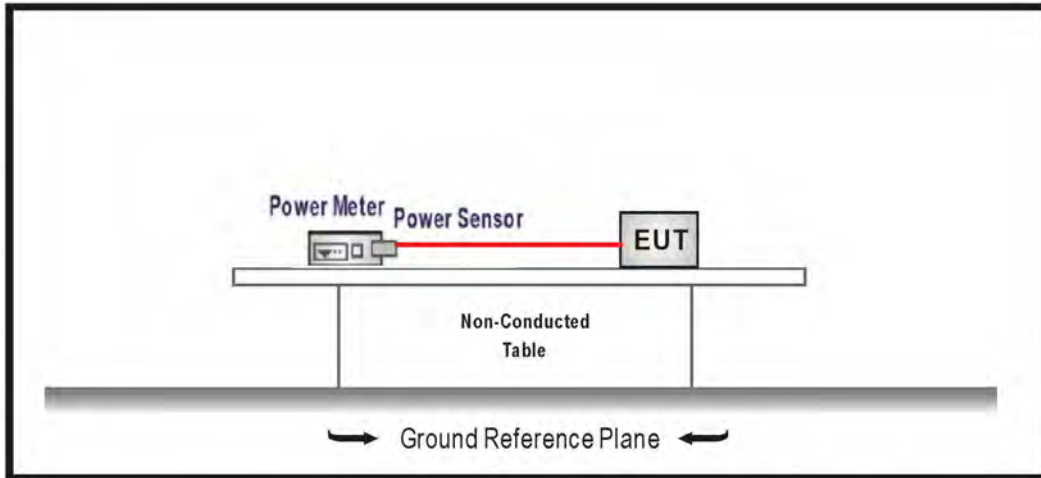
1.10 Duty Cycle

Duty cycle of test signal is ≥ 98 %, duty factor is not required.



2. Maximum Conducted Output Power

2.1 Test Setup



2.2 Test Limit

The Maximum Conducted Output Power shall be less 1 Watt.

2.3 Test procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 v05r02 for compliance to FCC 47CFR 15.247 requirements.

2.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

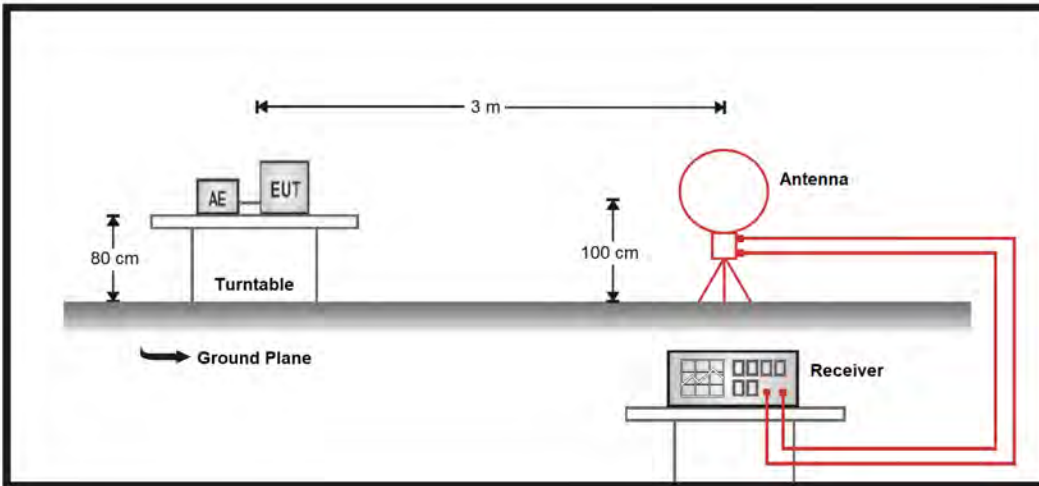
2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix A

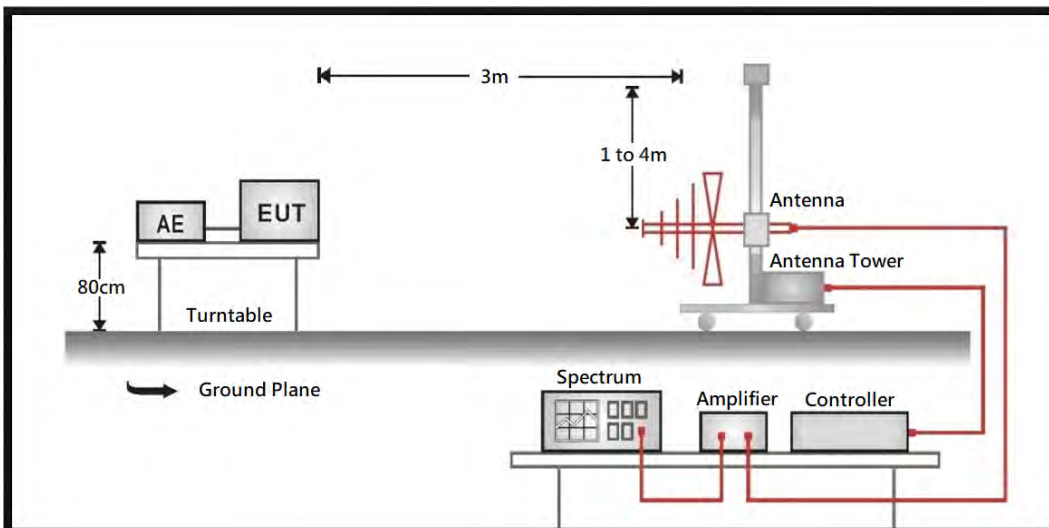
3. Radiated Emission

3.1 Test Setup

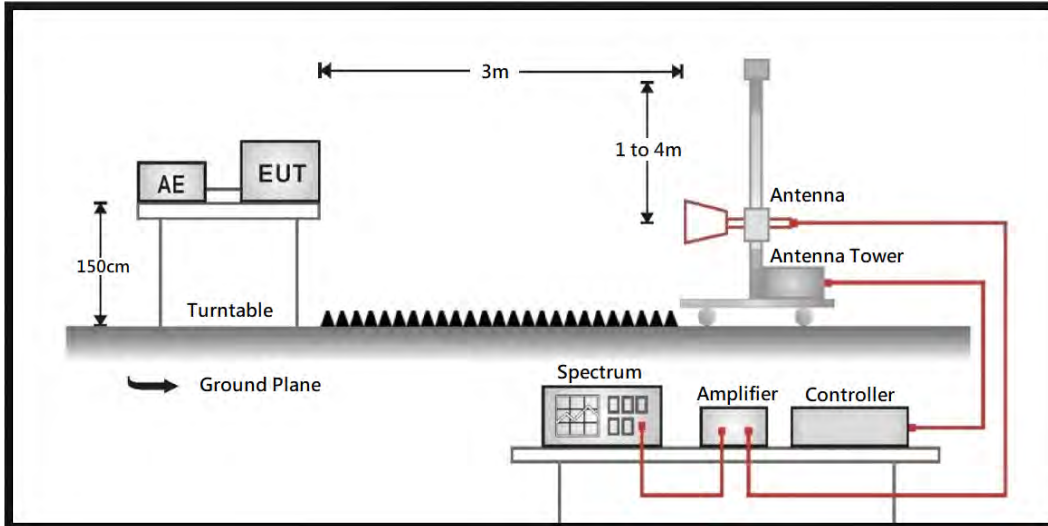
9 kHz ~ 30 MHz



30 MHz ~ 1 GHz



Above 1 GHz



3.2 Test Limit

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

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	20 log (2400/F(kHz))	300
0.490 – 1.705	24000/F(kHz)	20 log (24000/F(kHz))	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

1. Field strength (dBuV/m) = 20 log Field strength (uV/m)
2. In the Above Table, the tighter limit applies at the 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

3.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01V05r02 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 from 9 kHz (include The the lowest oscillator frequency generated within the device up to the 10th harmonic) to 1000 MHz, the limit shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limit 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 1 GHz setting on the field strength meter is 120 kHz and above 1 GHz is 1MHz.

3.4 Test Specification

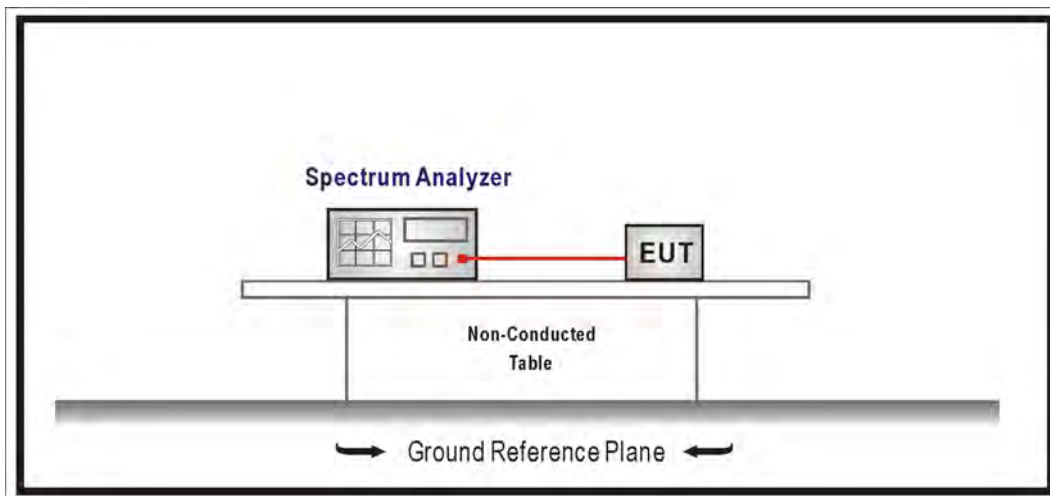
According to FCC Part 15 Subpart C Paragraph 15.247.

3.5 Test Result of Radiated Emissions

Refer as Appendix B

4. Antenna Port Conducted Emission

4.1 Test Setup



4.2 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limit. If the transmitter complies with the conducted power limit 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 limit 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 limit specified in §15.209(a) (see §15.205(c)).

4.3 Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

4.4 Test Specification

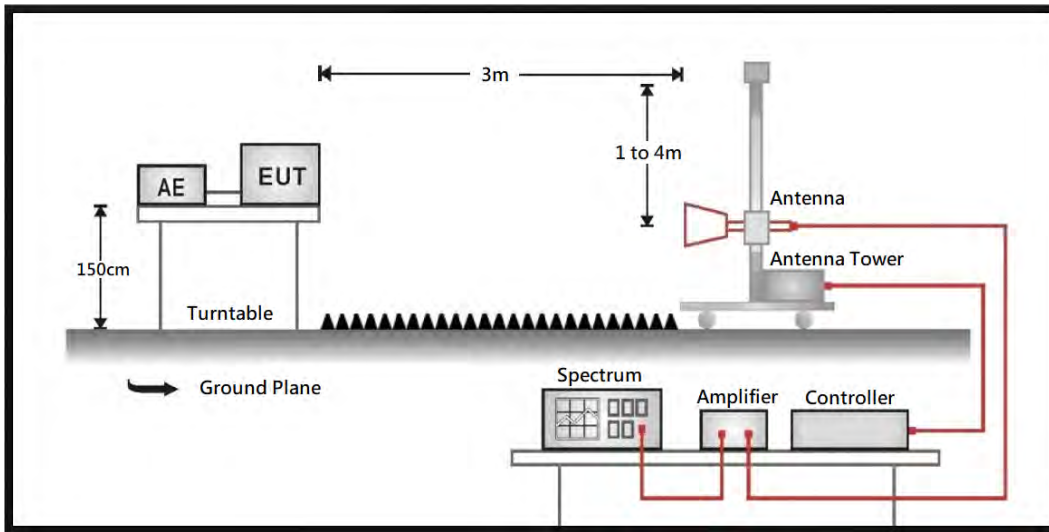
According to FCC Part 15 Subpart C Paragraph 15.247.

4.5 Test Result of Antenna Port Conducted Emission

Refer as Appendix C

5. Radiated Emission Band Edge

5.1 Test Setup



5.2 Test Limit

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

Frequency (MHz)	Field strength (uV/m)	Field strength (dBuV/m)	Measurement distance (m)
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks:

1. Field strength (dBuV/m) = 20 log Field strength (uV/m)
2. In the Above Table, the tighter limit applies at the 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 FHSS test procedure of FCC KDB 558074 D01 v05r02 for compliance to FCC 47CFR 15.247 requirements.

The EUT and its simulators are placed on a turn table which is 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.

5.4 Test Specification

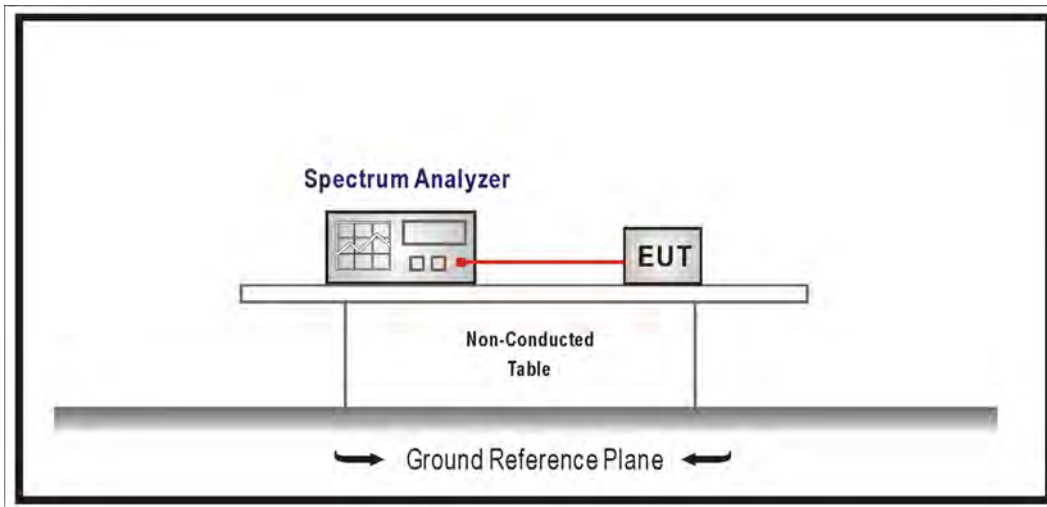
According to FCC Part 15 Subpart C Paragraph 15.247.

5.5 Test Result of Radiated Emission Band Edge

Refer as Appendix D

6. Occupied Bandwidth & DTS Bandwidth

6.1 Test Setup



6.2 Test Limit

The 6 dB bandwidth: ≥ 500 kHz.

Occupied Bandwidth: NA

6.3 Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

6.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

6.5 Test Result of Occupied Bandwidth

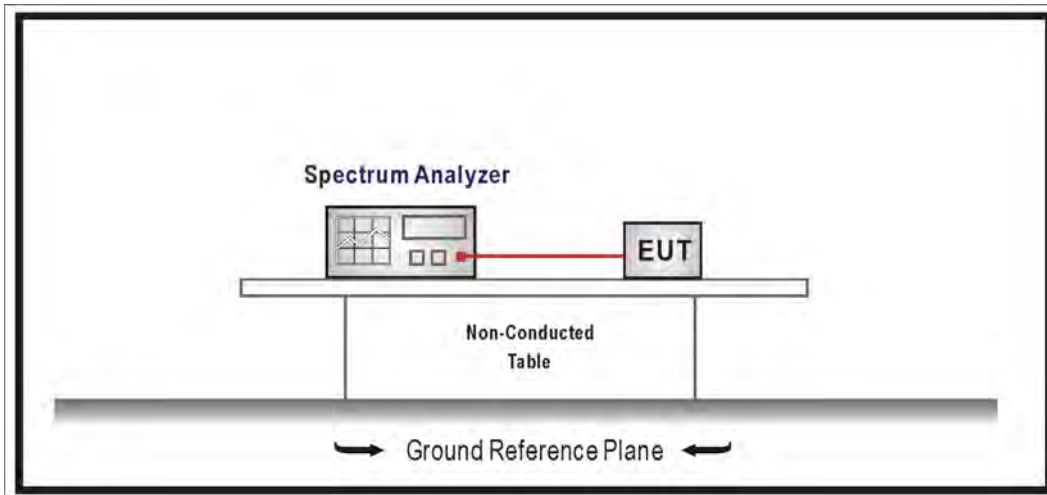
Refer as Appendix E.1

6.6 Test Result of DTS Bandwidth

Refer as Appendix E.2

7. Maximum Power Spectral Density

7.1 Test Setup



7.2 Test Limit

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

7.3 Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB 558074 D01 V05r02 for compliance to FCC 47CFR 15.247 requirements.

7.4 Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247.

7.5 Test Result of Maximum Power Spectral Density

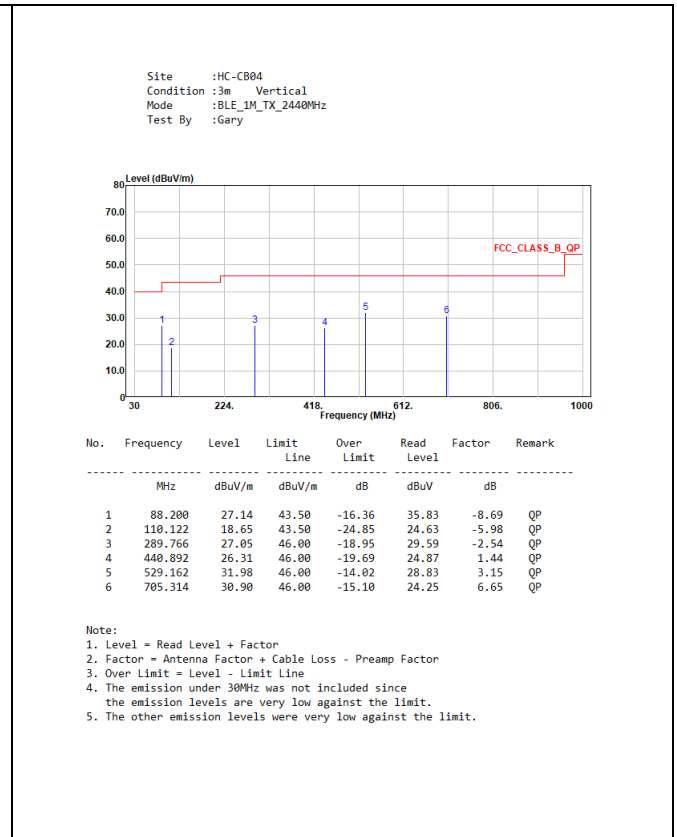
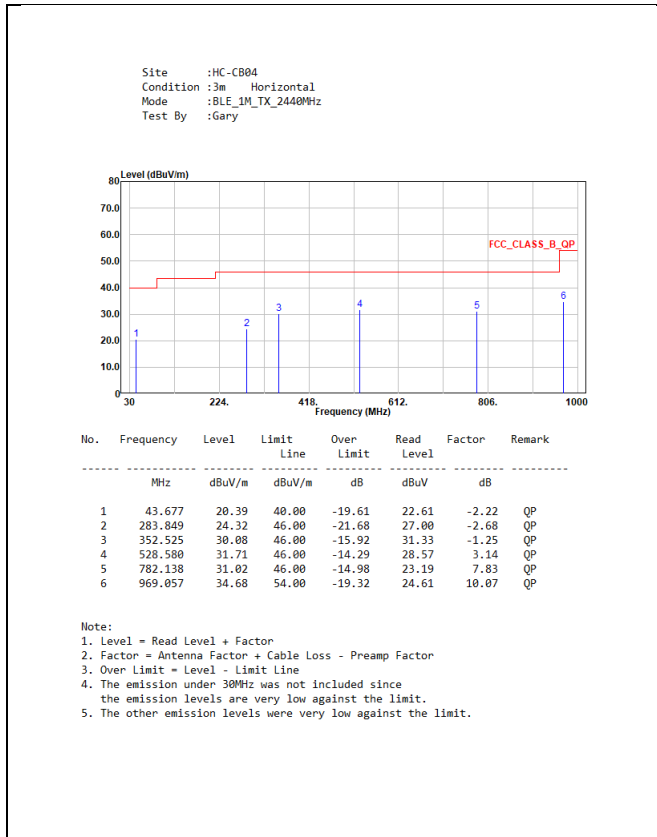
Refer as Appendix F

Appendix A. Test Result of Maximum Conducted Output Power

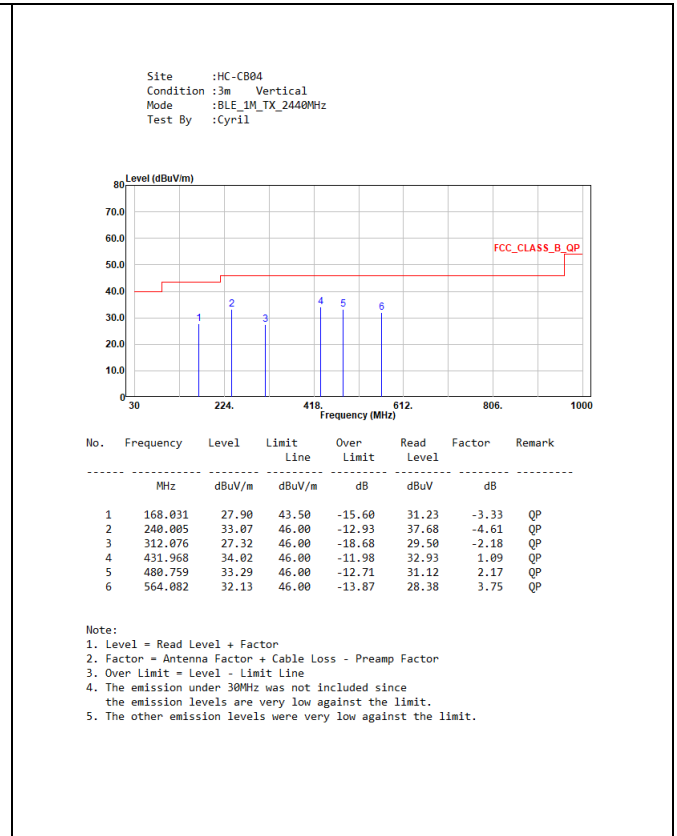
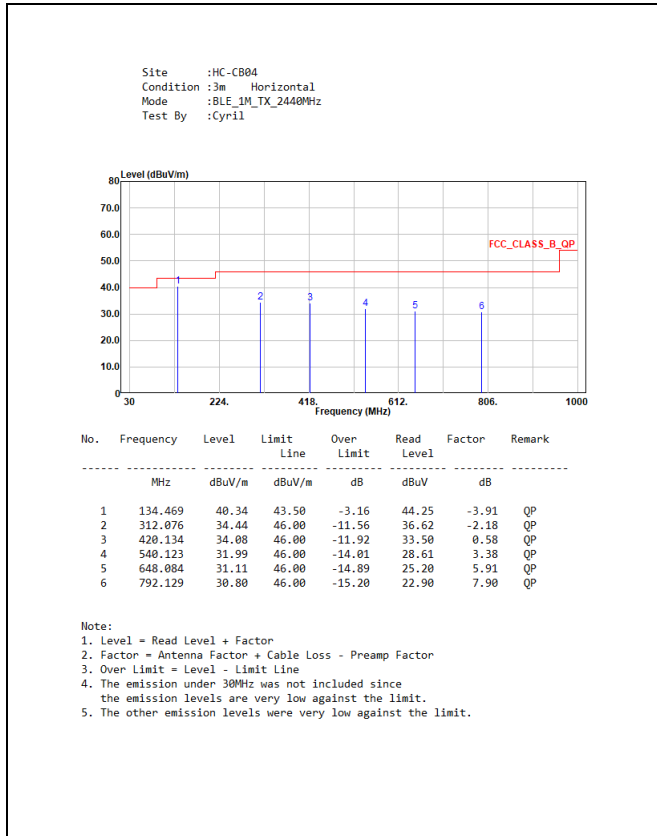
Modulation	Channel	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
GFSK (1 Mbps)	00	2402	13.080	≤ 30.00	Pass
	19	2440	15.020	≤ 30.00	Pass
	39	2480	12.640	≤ 30.00	Pass
GFSK (2 Mbps)	00	2402	15.710	≤ 30.00	Pass
	19	2440	15.520	≤ 30.00	Pass
	39	2480	6.950	≤ 30.00	Pass

Appendix B. Test Result of Radiated Emission

30 MHz ~1 GHz: EUT 1

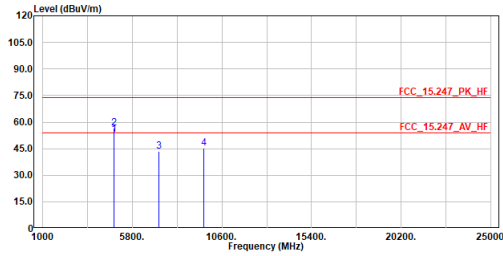


EUT 2



Above 1 GHz
EUT 1

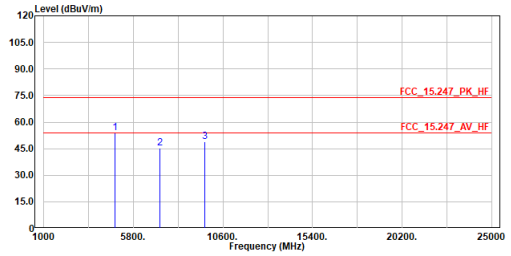
Site :HC-CB04
Condition :3m ,Horizontal
Mode :BLE_1M_TX_2402MHz
Test By :Ling



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4804.000	53.06	54.00	-0.94	67.87	-14.81	Average
2	4804.000	56.45	74.00	-17.55	71.26	-14.81	Peak
3	7206.000	43.31	74.00	-30.69	50.18	-6.87	Peak
4	9608.000	45.10	74.00	-28.90	48.11	-3.01	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

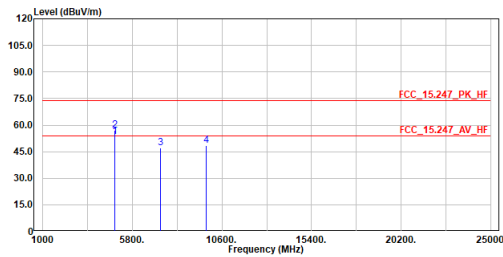
Site :HC-CB04
Condition :3m ,Vertical
Mode :BLE_1M_TX_2402MHz
Test By :Ling



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4804.000	53.73	74.00	-20.27	68.54	-14.81	Peak
2	7206.000	45.40	74.00	-28.60	52.27	-6.87	Peak
3	9608.000	48.69	74.00	-25.31	51.70	-3.01	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

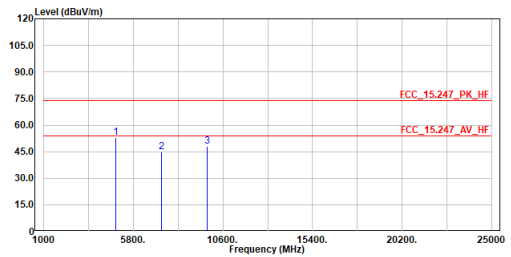
Site :HC-CB04
Condition :3m ,Horizontal
Mode :BLE_1M_TX_2440MHz
Test By :Ling



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4880.000	53.64	54.00	-0.36	68.11	-14.47	Average
2	4880.000	56.87	74.00	-17.13	71.34	-14.47	Peak
3	7320.000	47.18	74.00	-26.82	53.66	-6.48	Peak
4	9760.000	48.24	74.00	-25.76	50.84	-2.60	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

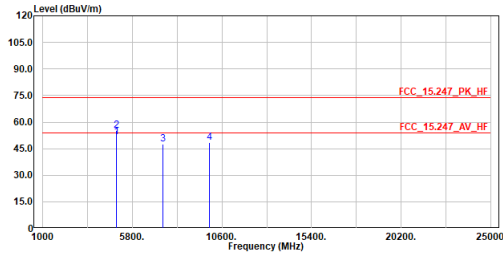
Site :HC-CB04
Condition :3m ,Vertical
Mode :BLE_1M_TX_2440MHz
Test By :Ling



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4880.000	52.98	74.00	-21.02	67.45	-14.47	Peak
2	7320.000	44.67	74.00	-29.33	51.15	-6.48	Peak
3	9760.000	47.93	74.00	-26.07	50.53	-2.60	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_1M_TX_2480MHz
 Test By :Ling

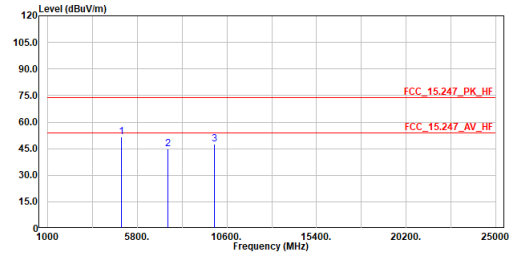


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	51.69	54.00	-2.31	65.81	-14.12	Average
2	4960.000	55.24	74.00	-18.76	69.36	-14.12	Peak
3	7440.000	47.59	74.00	-26.41	53.66	-6.07	Peak
4	9920.000	48.33	74.00	-25.67	50.57	-2.24	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_1M_TX_2480MHz
 Test By :Ling

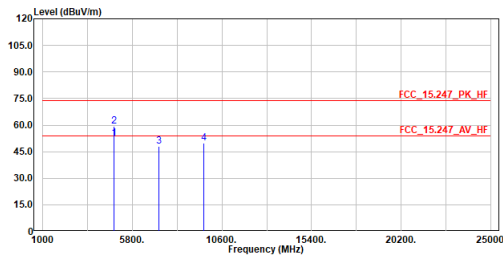


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	51.40	74.00	-22.60	65.52	-14.12	Peak
2	7440.000	44.85	74.00	-29.15	50.92	-6.07	Peak
3	9920.000	47.40	74.00	-26.60	49.64	-2.24	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_2M_TX_2402MHz
 Test by :Gary

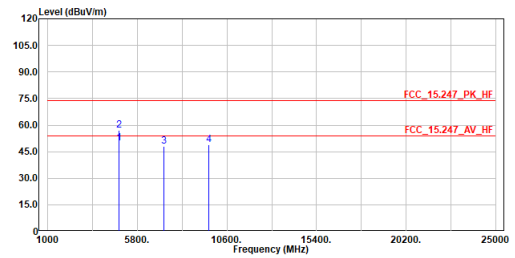


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4804.000	52.32	54.00	-1.68	67.13	-14.81	Average
2	4804.000	59.35	74.00	-14.65	74.16	-14.81	Peak
3	7206.000	47.90	74.00	-26.10	54.77	-6.87	Peak
4	9608.000	49.60	74.00	-24.40	52.61	-3.01	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_2M_TX_2402MHz
 Test by :Gary

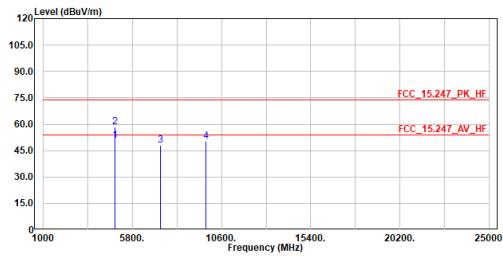


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4804.000	49.77	54.00	-4.23	64.58	-14.81	Average
2	4804.000	57.01	74.00	-16.99	71.82	-14.81	Peak
3	7206.000	48.20	74.00	-25.80	55.07	-6.87	Peak
4	9608.000	49.06	74.00	-24.94	52.07	-3.01	Peak

Note:

1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

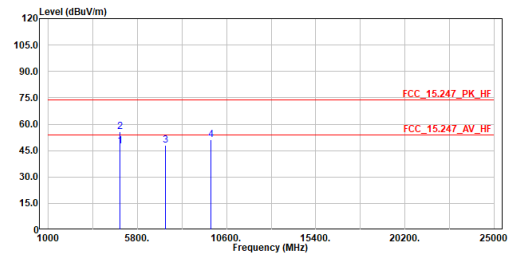
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_2M_TX_2440MHz
 Test by :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4880.000	50.78	54.00	-3.22	65.25	-14.47	Average
2	4880.000	58.45	74.00	-15.55	72.92	-14.47	Peak
3	7320.000	47.97	74.00	-26.03	54.45	-6.48	Peak
4	9760.000	50.34	74.00	-23.66	52.94	-2.60	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

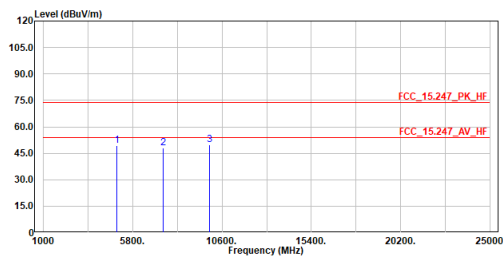
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_2M_TX_2440MHz
 Test by :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4880.000	47.46	54.00	-6.54	61.93	-14.47	Average
2	4880.000	55.51	74.00	-18.49	69.98	-14.47	Peak
3	7320.000	47.82	74.00	-26.18	54.30	-6.48	Peak
4	9760.000	51.06	74.00	-22.94	53.66	-2.60	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

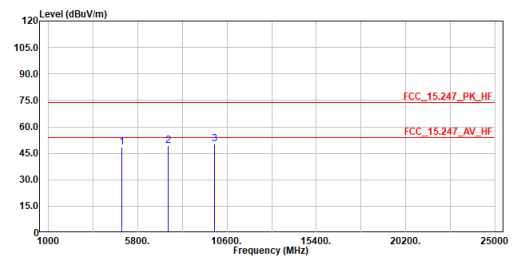
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_2M_TX_2480MHz
 Test by :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	49.24	74.00	-24.76	63.36	-14.12	Peak
2	7440.000	48.10	74.00	-25.90	54.17	-6.07	Peak
3	9920.000	50.01	74.00	-23.99	52.25	-2.24	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_2M_TX_2480MHz
 Test by :Gary

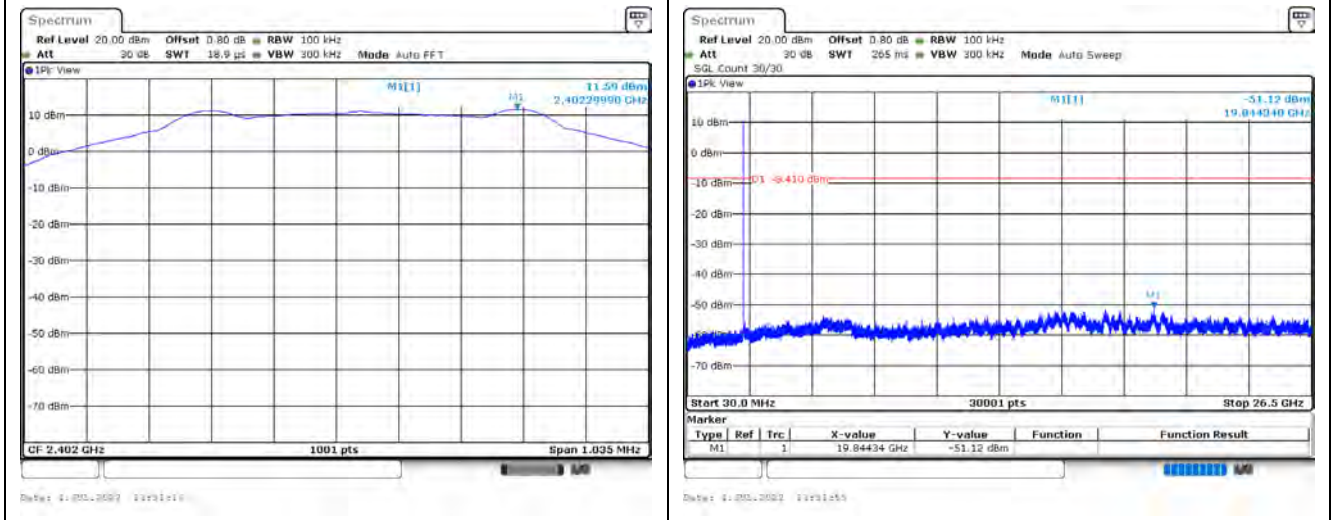


No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	4960.000	48.31	74.00	-25.69	62.43	-14.12	Peak
2	7440.000	49.43	74.00	-24.57	55.50	-6.07	Peak
3	9920.000	50.16	74.00	-23.84	52.40	-2.24	Peak

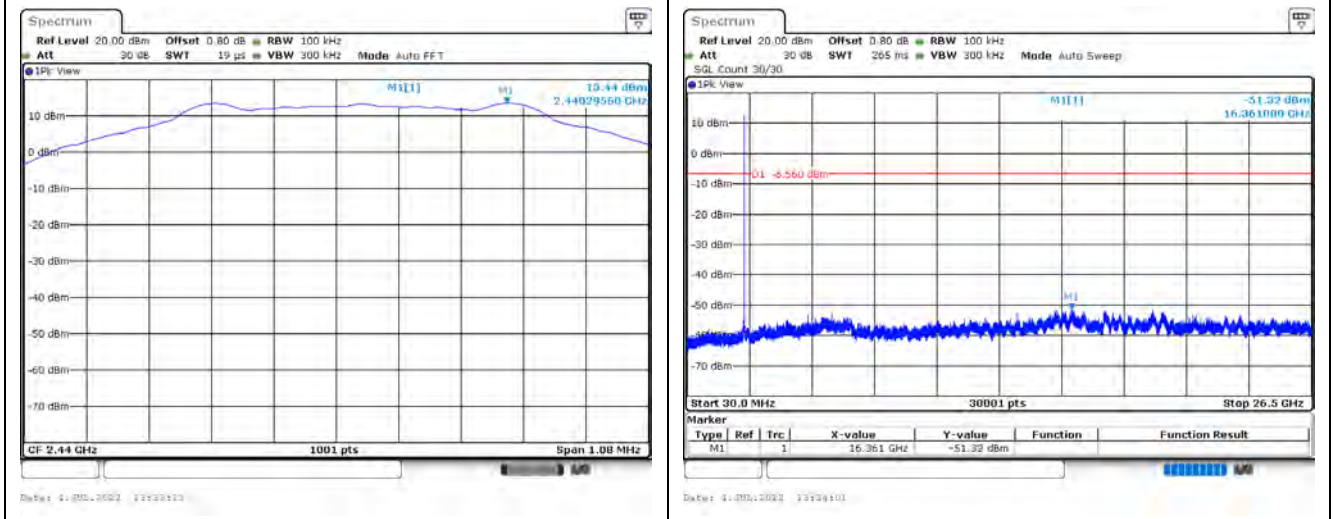
Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

Appendix C. Test Result of Antenna Port Conducted Emission

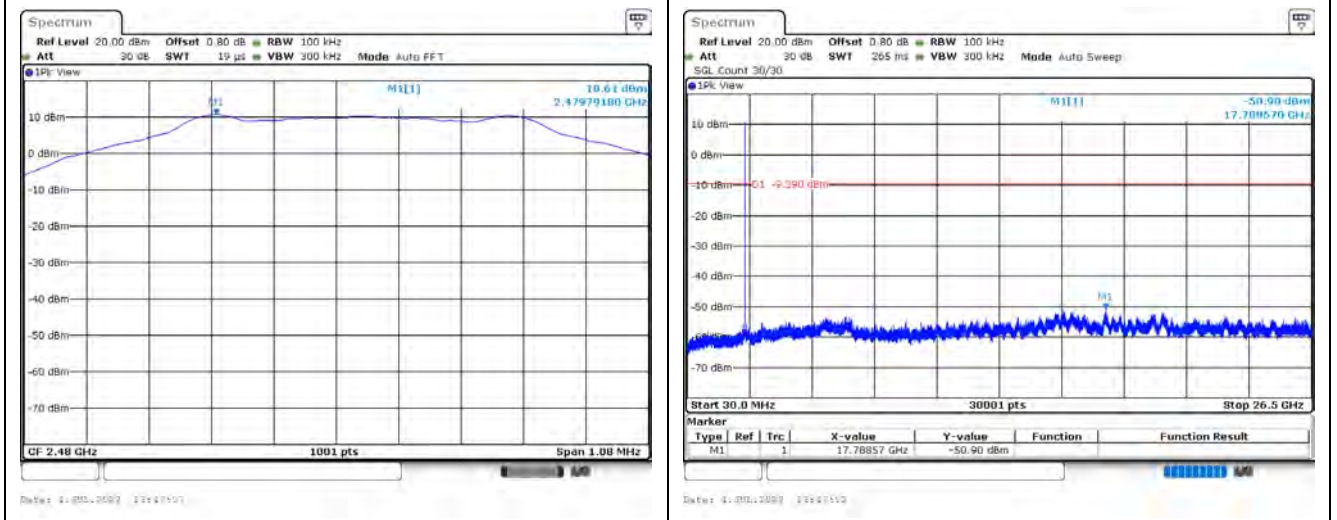
GFSK (1Mbps) / 2402 MHz



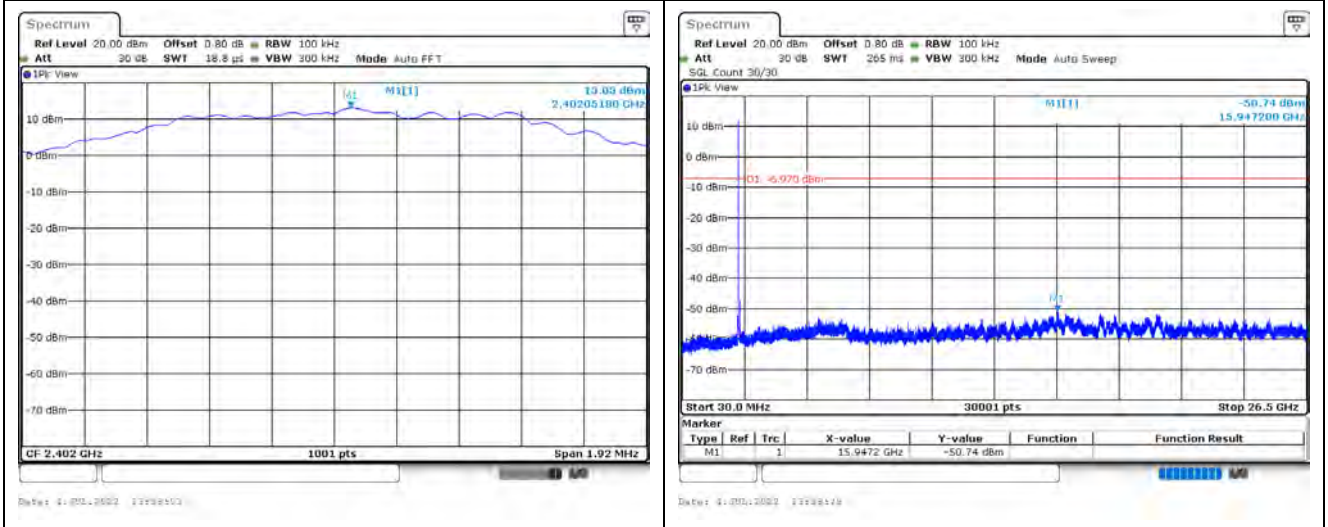
GFSK (1Mbps) / 2440 MHz



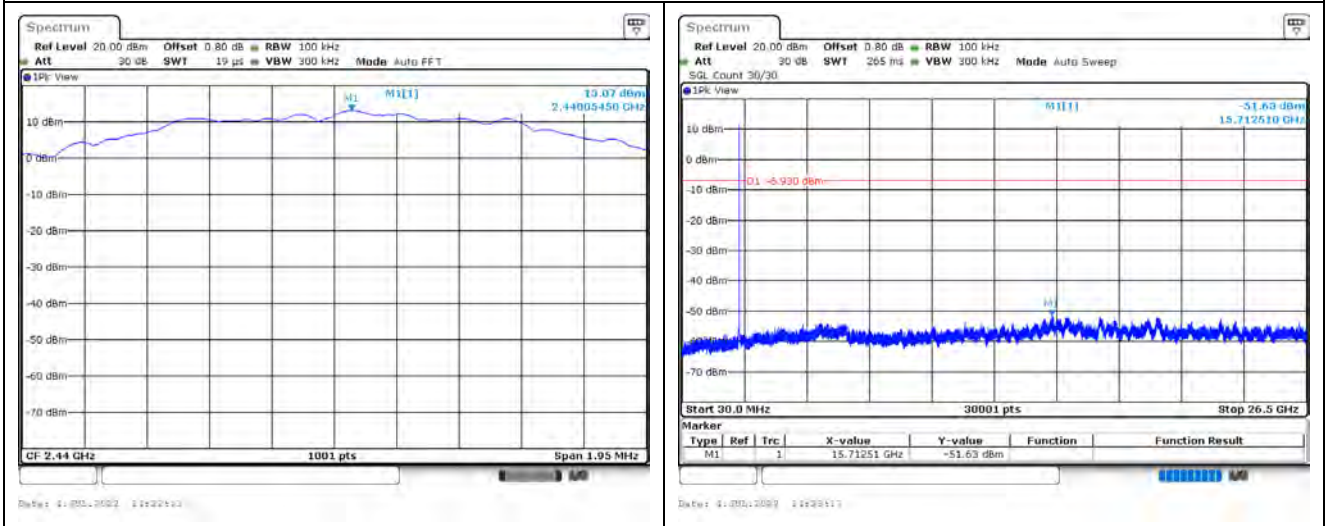
GFSK (1Mbps) / 2480 MHz



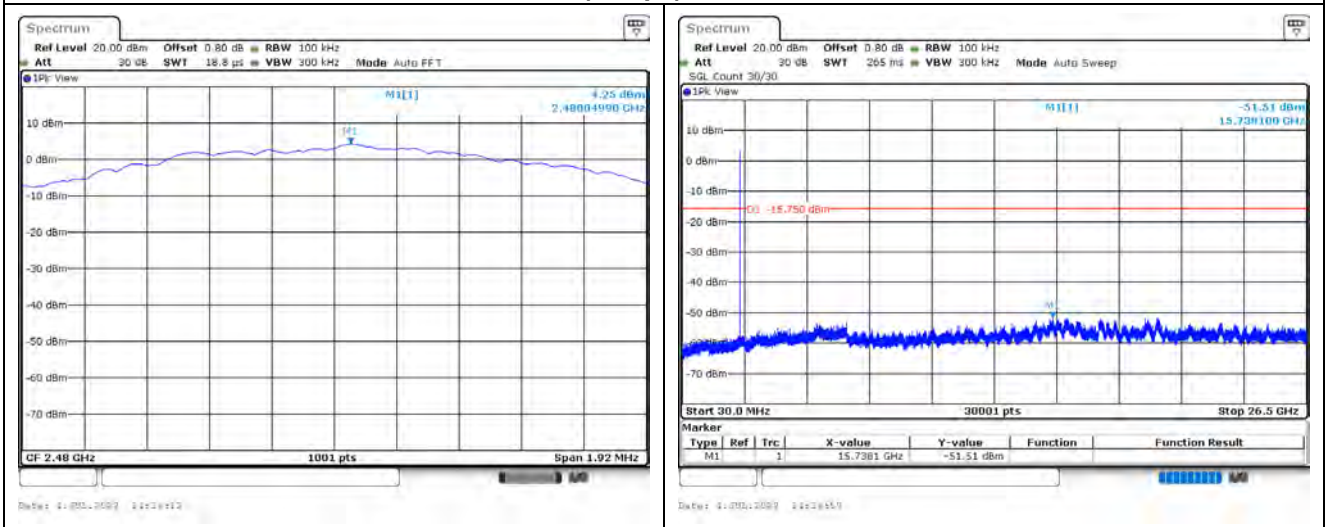
GFSK (2Mbps) / 2402 MHz



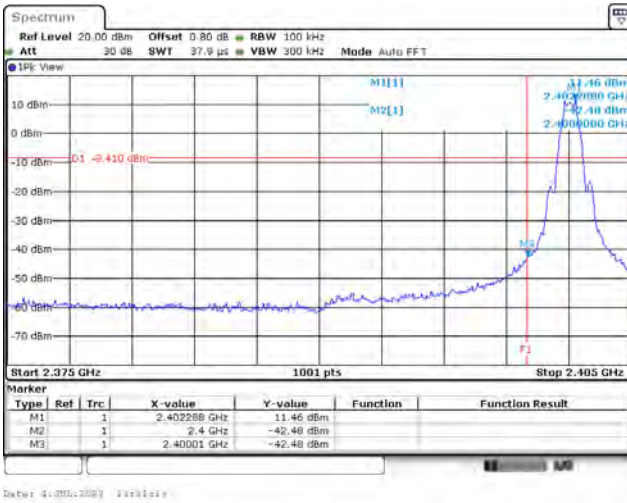
GFSK (2Mbps) / 2440 MHz



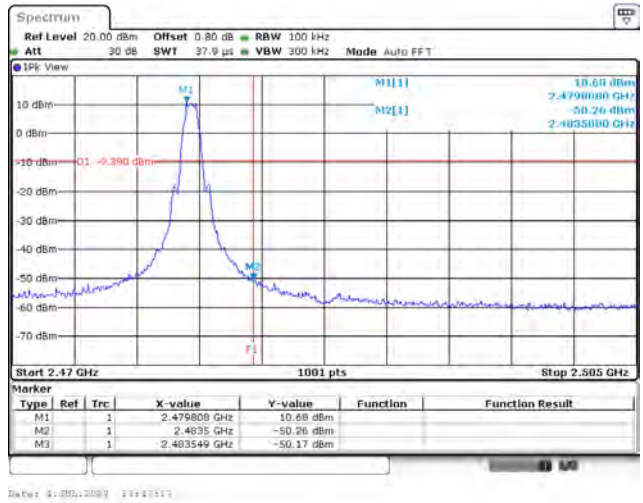
GFSK (2Mbps) / 2480 MHz



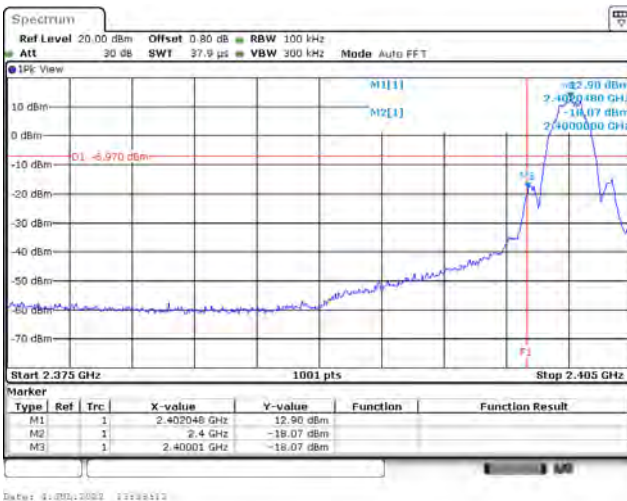
GFSK (1Mbps) / 2402 MHz (Band Edge)



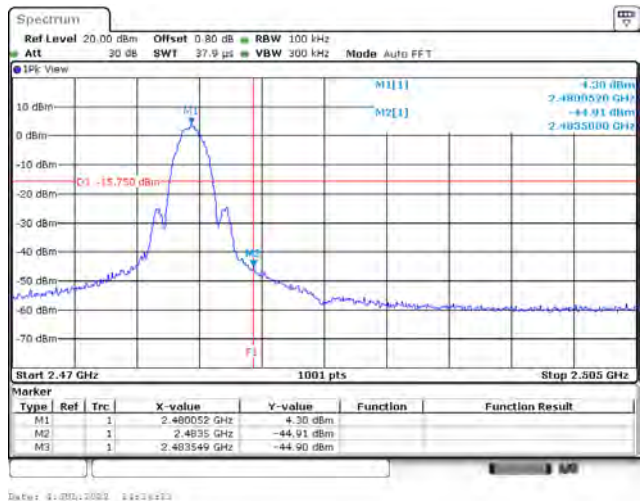
GFSK (1Mbps) / 2480 MHz (Band Edge)



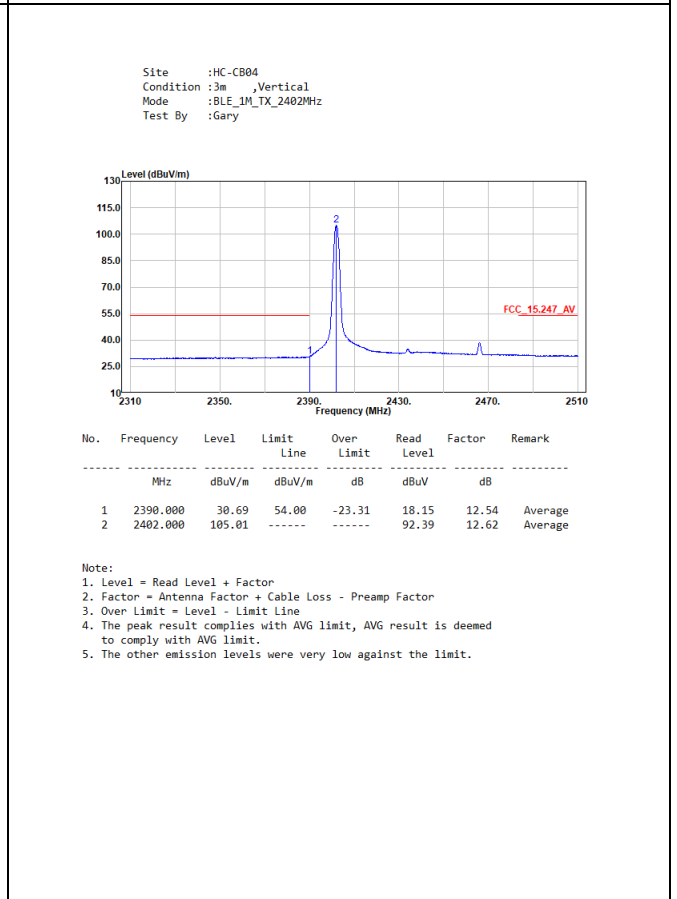
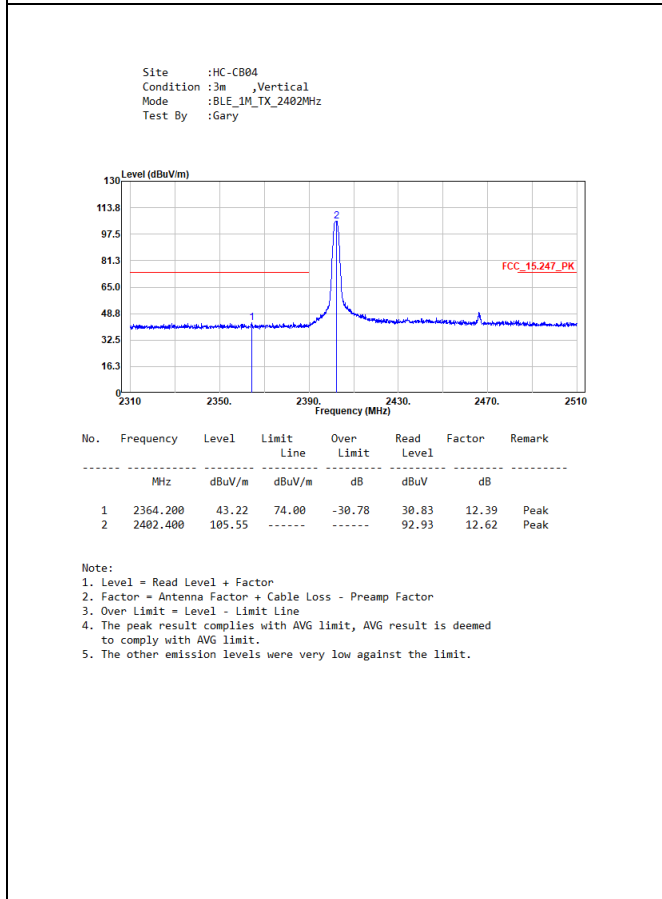
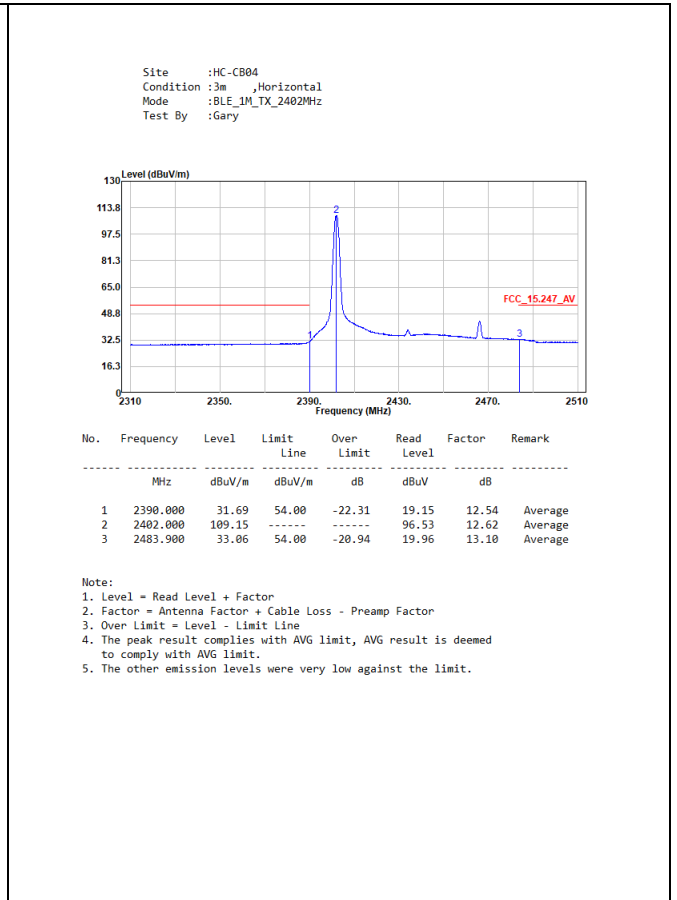
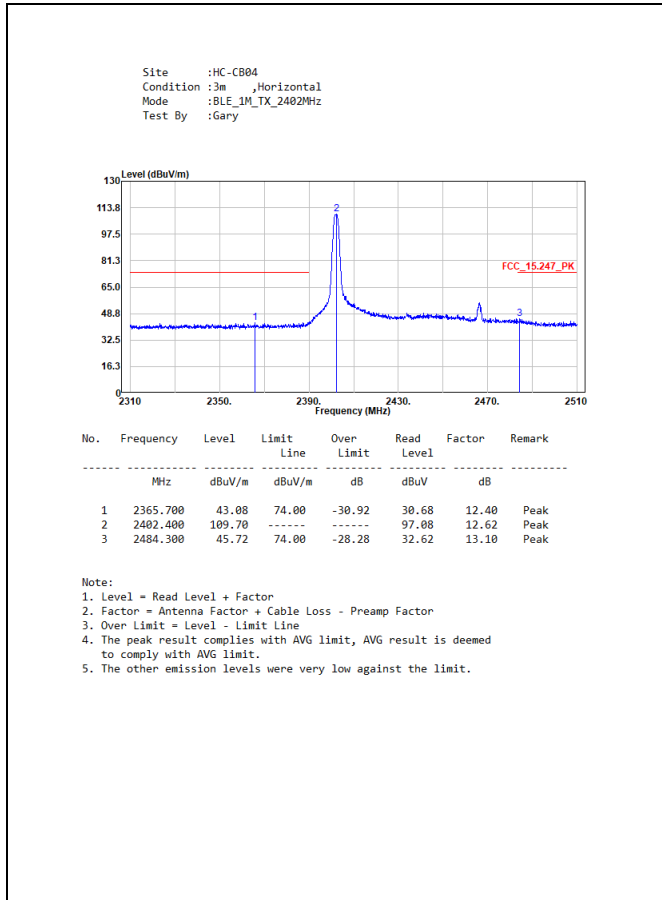
GFSK (2Mbps) / 2402 MHz (Band Edge)



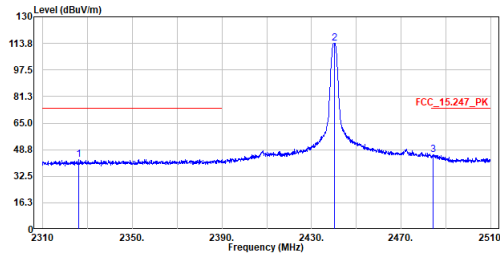
GFSK (2Mbps) / 2480 MHz (Band Edge)



Appendix D. Test Result of Radiated Emission Band Edge



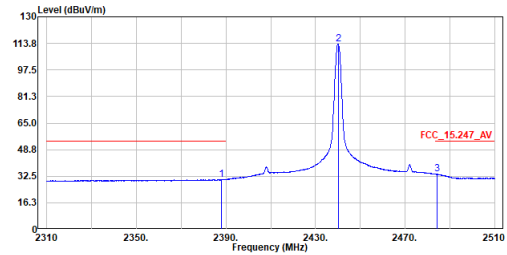
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_1M_TX_2440MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2326.000	42.68	74.00	-31.32	30.51	12.17	Peak
2	2440.400	113.68	74.00	39.68	100.84	12.84	Peak
3	2484.300	45.80	74.00	-28.20	32.70	13.10	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

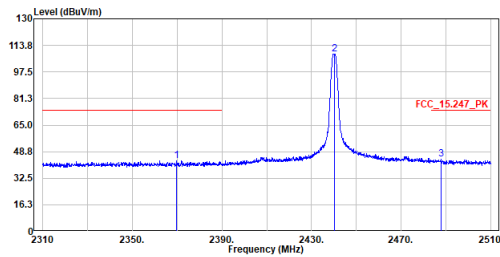
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_1M_TX_2440MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2388.100	30.63	54.00	-23.37	18.10	12.53	Average
2	2440.100	113.25	54.00	59.25	100.41	12.84	Average
3	2484.400	33.77	54.00	-20.23	20.67	13.10	Average

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

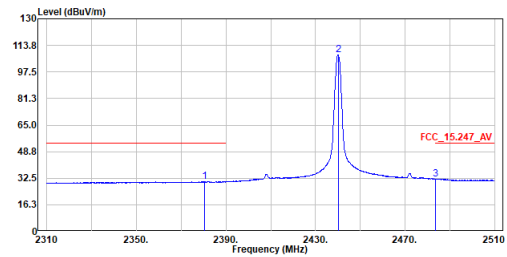
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_1M_TX_2440MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2369.800	43.29	74.00	-30.71	30.86	12.43	Peak
2	2440.400	108.54	74.00	34.54	95.70	12.84	Peak
3	2487.900	44.27	74.00	-29.73	31.14	13.13	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

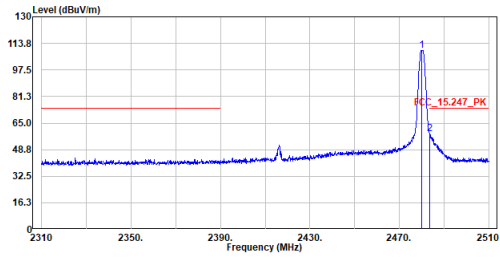
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_1M_TX_2440MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2380.500	30.52	54.00	-23.48	18.04	12.48	Average
2	2440.100	108.10	54.00	54.10	95.26	12.84	Average
3	2483.600	32.13	54.00	-21.87	19.03	13.10	Average

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

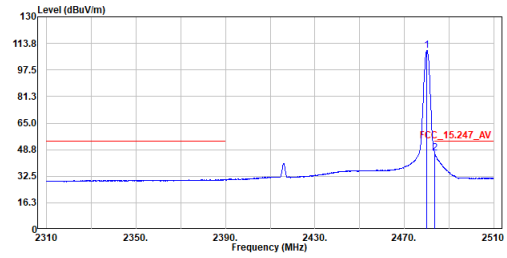
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_1M_TX_2480MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2479.900	109.61	-----	-----	96.53	13.08	Peak
2	2483.600	58.35	74.00	-15.65	45.25	13.10	Peak

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

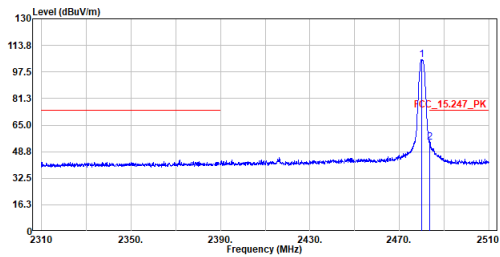
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_1M_TX_2480MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.100	109.18	-----	-----	96.10	13.08	Average
2	2483.600	46.65	54.00	-7.35	33.55	13.10	Average

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

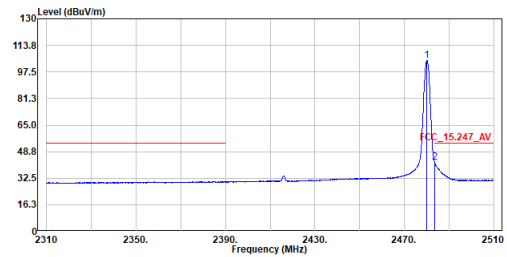
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_1M_TX_2480MHz
 Test By :Gary



No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2479.900	104.83	-----	-----	91.75	13.08	Peak
2	2483.600	54.54	74.00	-19.46	41.44	13.10	Peak

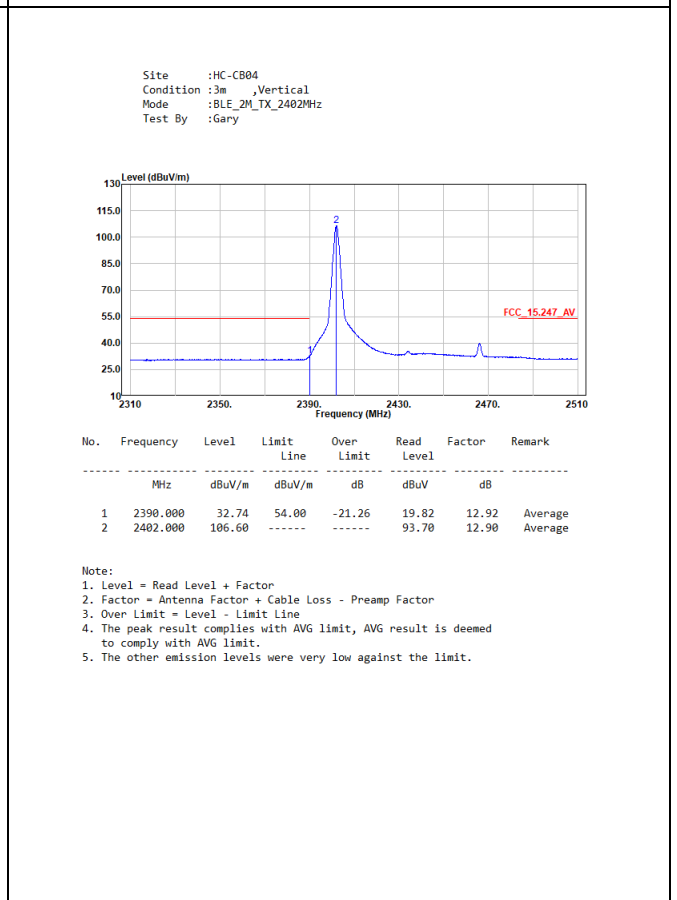
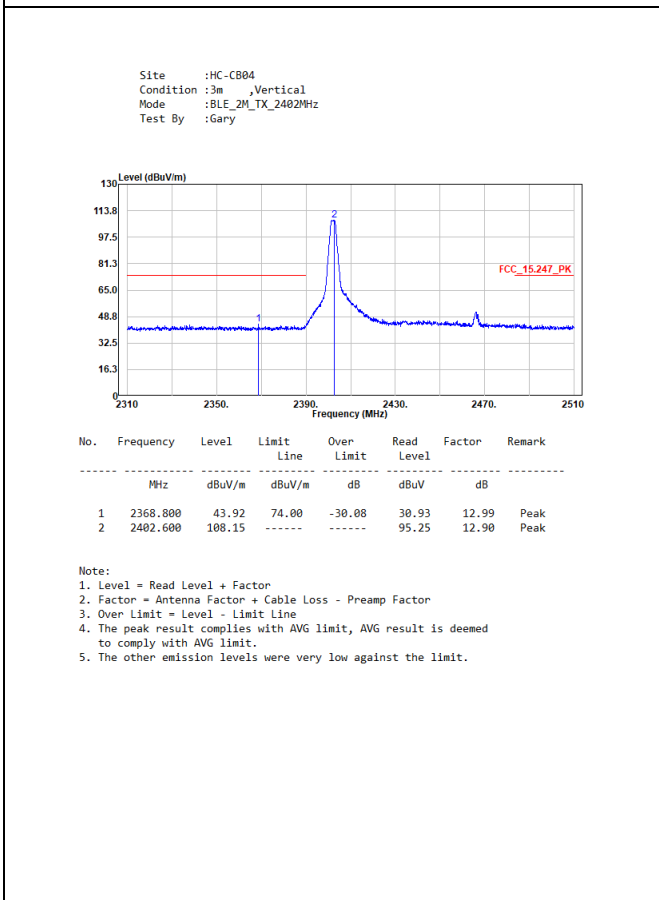
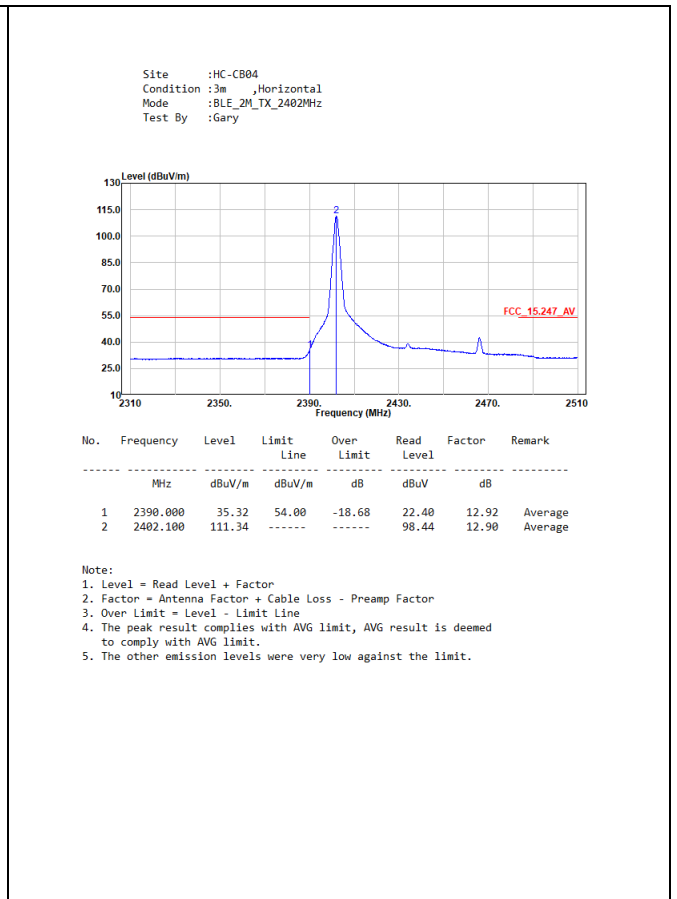
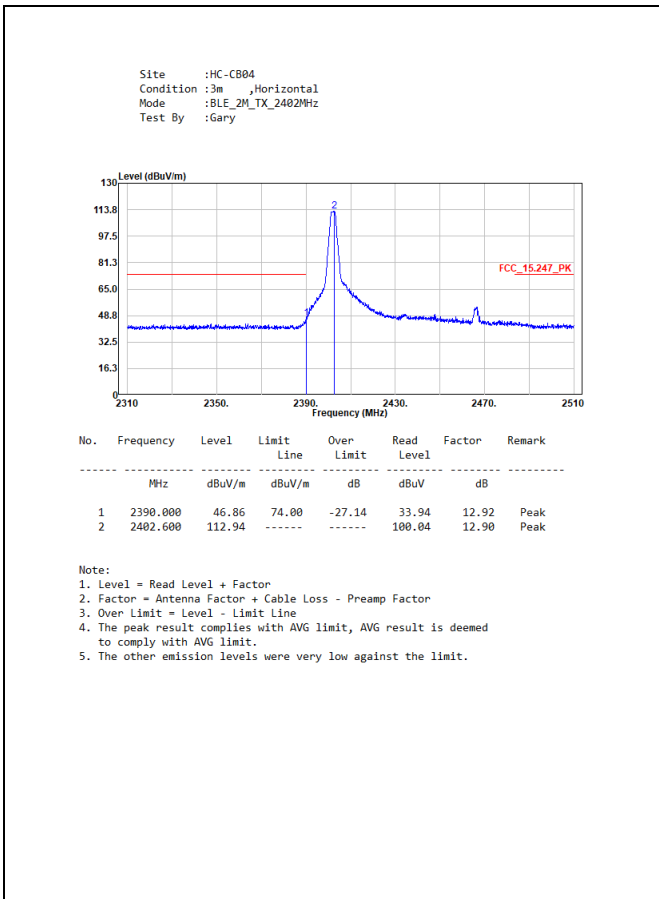
Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

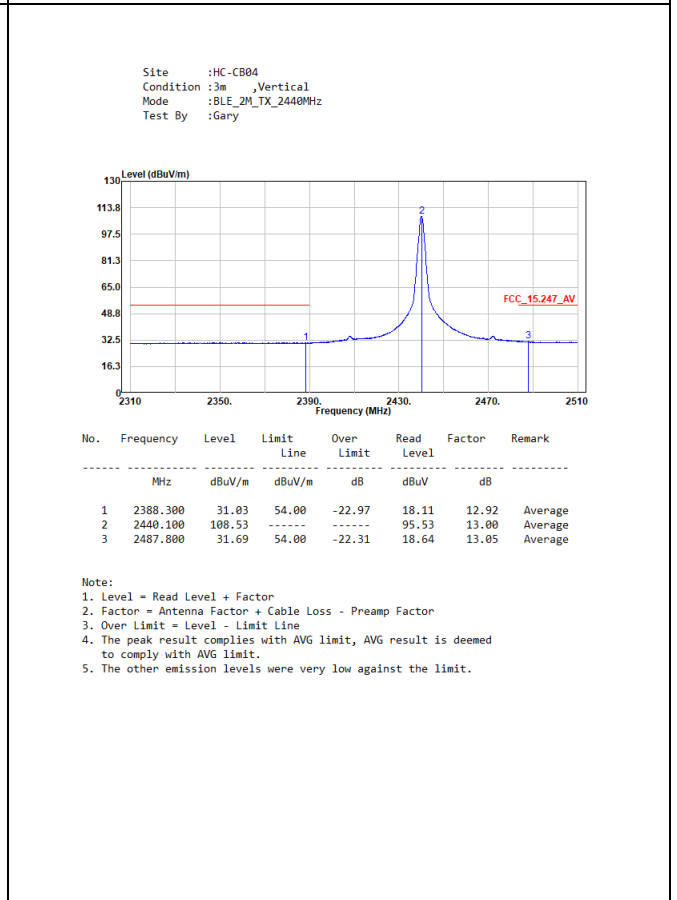
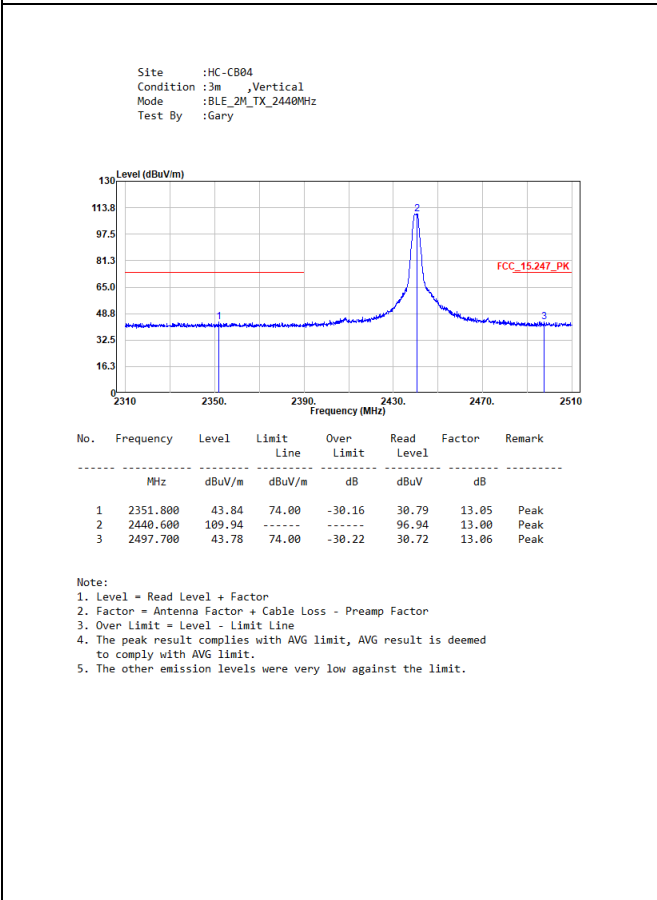
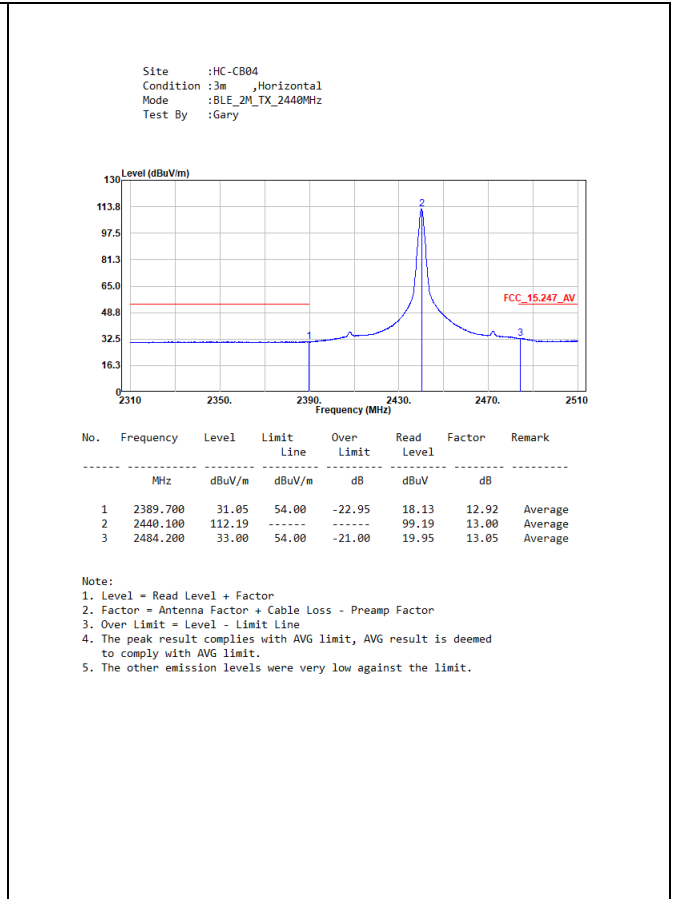
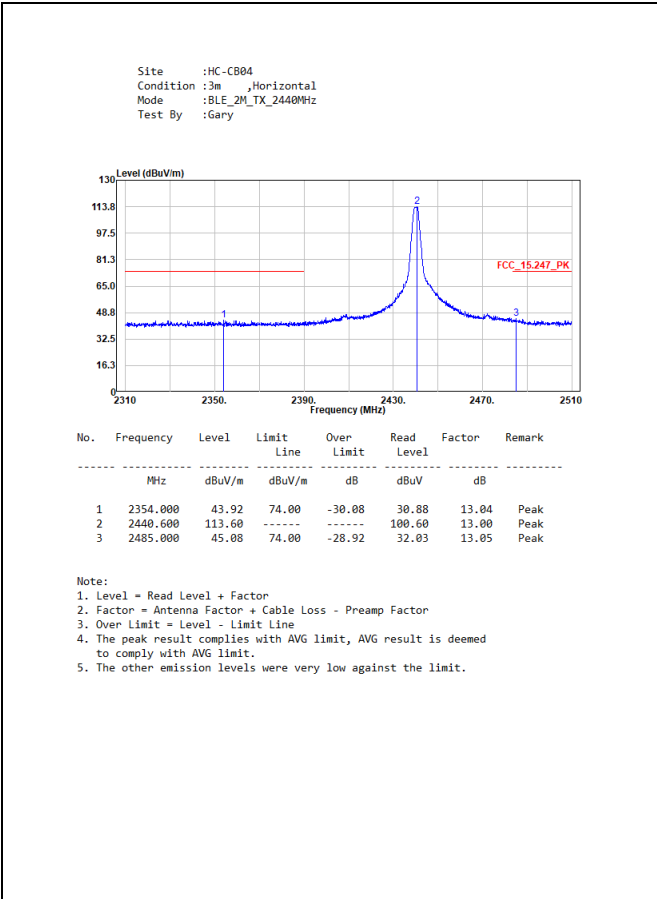
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_1M_TX_2480MHz
 Test By :Gary



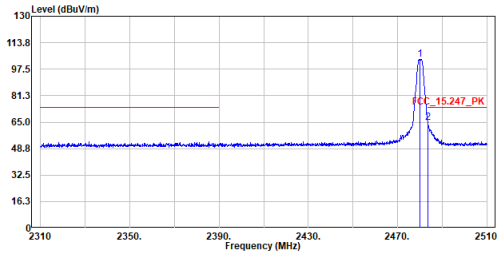
No.	Frequency MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Factor dB	Remark
1	2480.100	104.38	-----	-----	91.30	13.08	Average
2	2483.600	42.21	54.00	-11.79	29.11	13.10	Average

Note:
 1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.





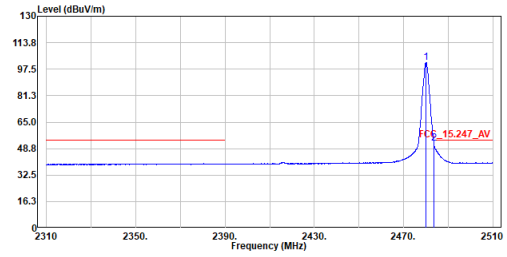
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_2M_TX_2480MHz
 Test By :Ling



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.100	103.48	-----	-----	90.40	13.08	Peak
2	2483.500	64.79	74.00	-9.21	51.69	13.10	Peak

- Note:
1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

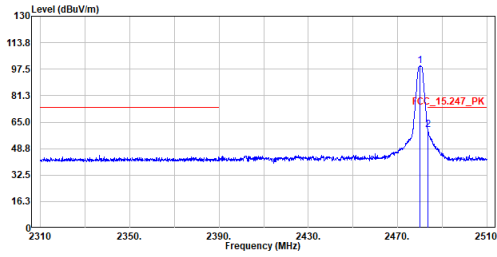
Site :HC-CB04
 Condition :3m ,Horizontal
 Mode :BLE_2M_TX_2480MHz
 Test By :Ling



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.100	101.56	-----	-----	88.48	13.08	Average
2	2483.500	52.14	54.00	-1.86	39.04	13.10	Average

- Note:
1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

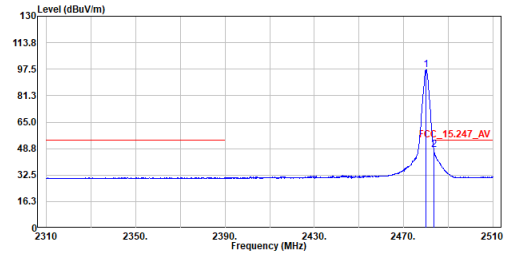
Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_2M_TX_2480MHz
 Test By :Ling



No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.100	99.42	-----	-----	86.34	13.08	Peak
2	2483.500	60.23	74.00	-13.77	47.13	13.10	Peak

- Note:
1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

Site :HC-CB04
 Condition :3m ,Vertical
 Mode :BLE_2M_TX_2480MHz
 Test By :Ling

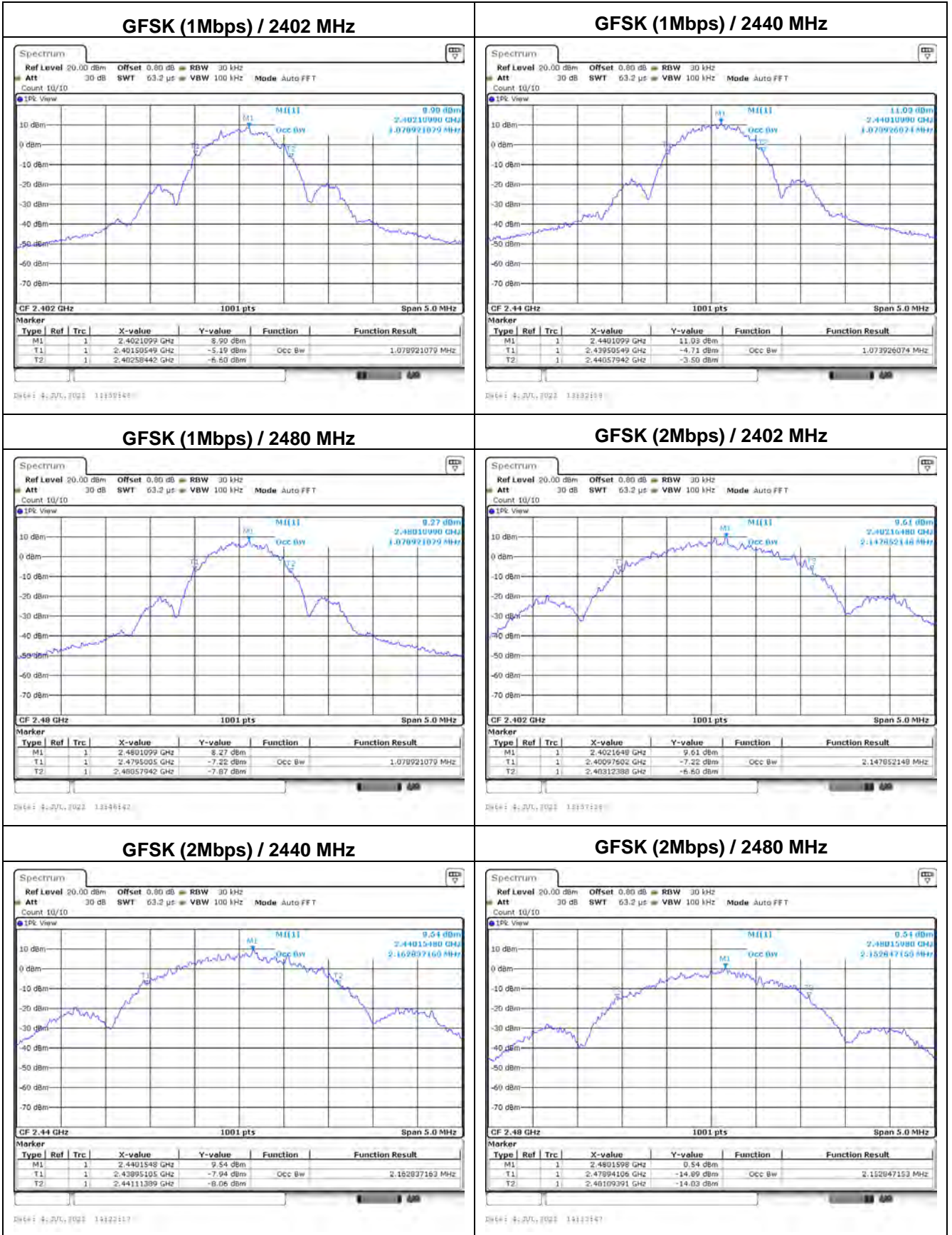


No.	Frequency	Level	Limit	Over	Read	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2480.000	97.30	-----	-----	84.22	13.08	Average
2	2483.500	48.13	54.00	-5.87	35.03	13.10	Average

- Note:
1. Level = Read Level + Factor
 2. Factor = Antenna Factor + Cable Loss - Preamp Factor
 3. Over Limit = Level - Limit Line
 4. The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
 5. The other emission levels were very low against the limit.

Appendix E.1 Test Result of Occupied Bandwidth

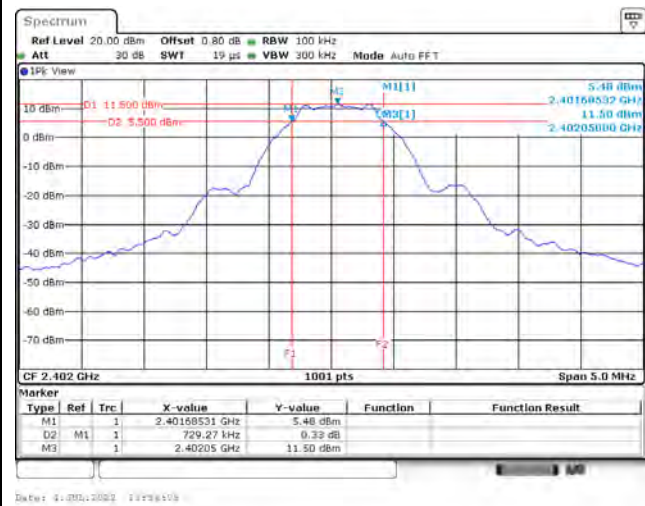
Modulation	Channel	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)	Result
GFSK (1Mbps)	00	2402	1.078	-	PASS
	19	2440	1.073	-	PASS
	39	2480	1.078	-	PASS
GFSK (2Mbps)	00	2402	2.147	-	PASS
	19	2440	2.162	-	PASS
	39	2480	2.152	-	PASS



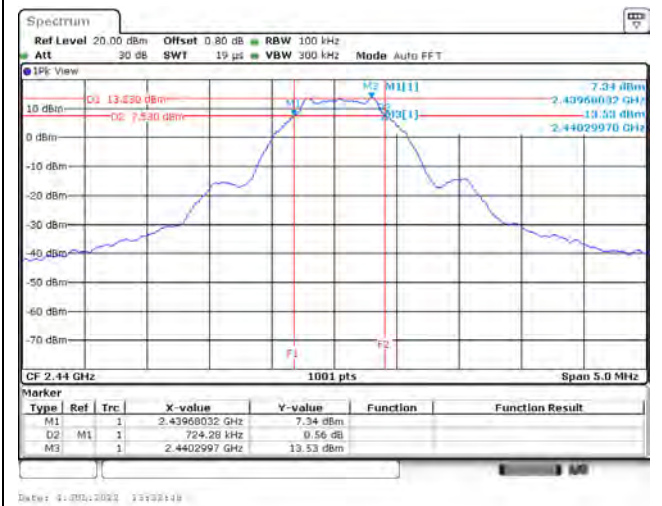
Appendix E.2 Test Result of DTS Bandwidth

Modulation	Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
GFSK (1Mbps)	00	2402	0.729	≥ 0.500	PASS
	19	2440	0.724	≥ 0.500	PASS
	39	2480	0.719	≥ 0.500	PASS
GFSK (2Mbps)	00	2402	1.283	≥ 0.500	PASS
	19	2440	1.298	≥ 0.500	PASS
	39	2480	1.283	≥ 0.500	PASS

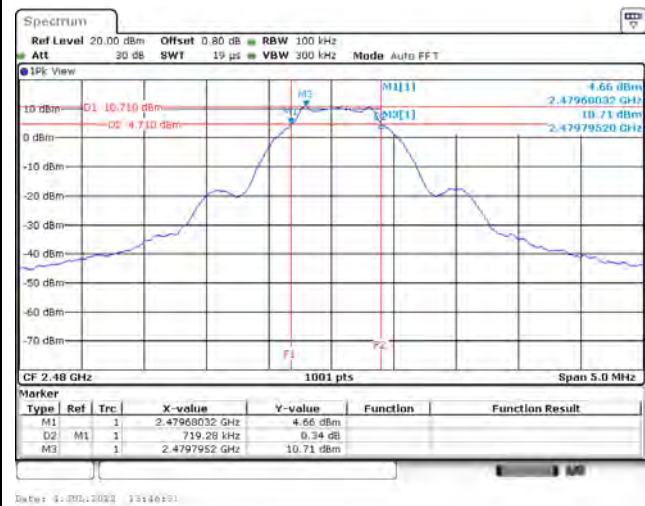
GFSK (1Mbps) / 2402 MHz



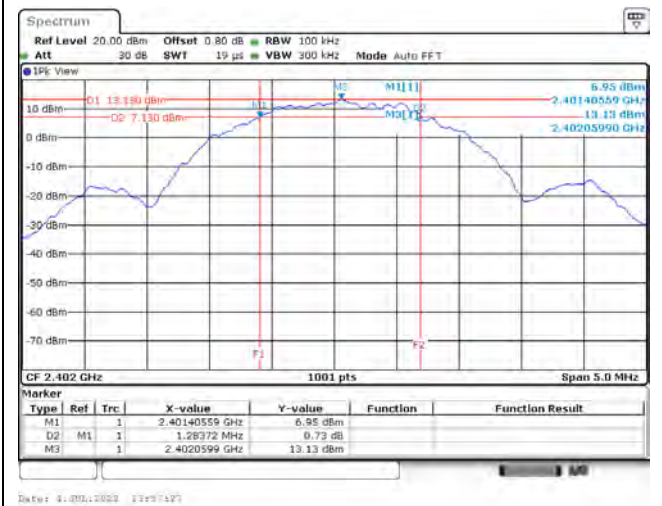
GFSK (1Mbps) / 2440 MHz



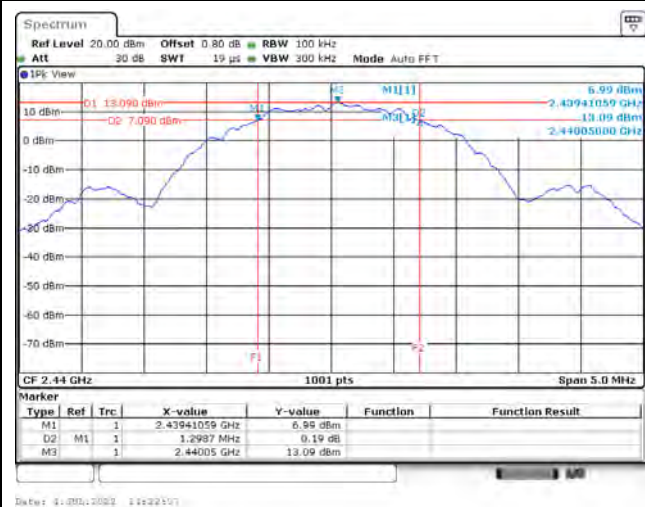
GFSK (1Mbps) / 2480 MHz



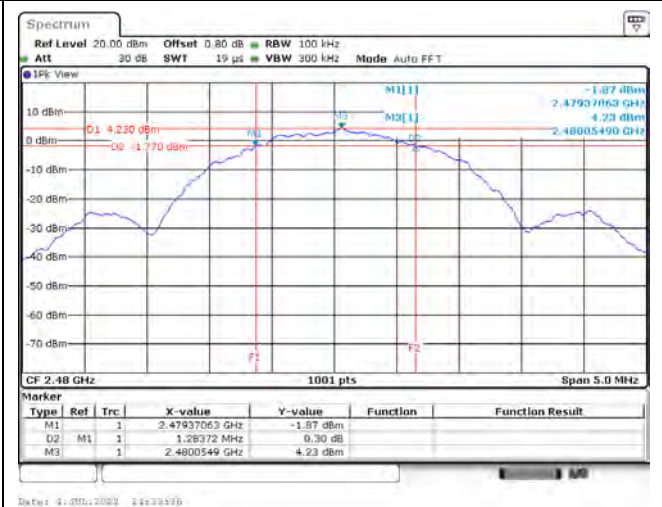
GFSK (2Mbps) / 2402 MHz



GFSK (2Mbps) / 2440 MHz



GFSK (2Mbps) / 2480 MHz



Appendix F. Test Result of Maximum Power Spectral Density

Modulation	Channel	Frequency (MHz)	Measure Value (dBm/3kHz)	Limit (dBm/3kHz)	Result
GFSK (1Mbps)	00	2402	-0.880	≤ 8.000	PASS
	19	2440	2.190	≤ 8.000	PASS
	39	2480	-1.810	≤ 8.000	PASS
GFSK (2Mbps)	00	2402	-1.610	≤ 8.000	PASS
	19	2440	-0.970	≤ 8.000	PASS
	39	2480	-9.840	≤ 8.000	PASS

