

FCC Test Report

Product Name : V20 Crypto Hardware Wallet,
W20 Crypto Hardware Wallet

Trade Name : SecuX

Model No. : V20, W20

FCC ID. : 2ASNW-SX001

Applicant : SecuX Technology Inc.

Address : 5F-1, No., 27, Guanxin Rd., East Dist.,
Hsinchu City 30072, Taiwan

Date of Receipt : Mar. 05, 2019

Issued Date : Mar. 28, 2019

Report No. : 1930039R-RFUSP01V00

Report Version : V1.0



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report Certification

Issued Date : Mar. 28, 2019

Report No. : 1930039R-RFUSP01V00




Product Name : V20 Crypto Hardware Wallet, W20 Crypto Hardware Wallet
Applicant : SecuX Technology Inc.
Address : 5F-1, No., 27, Guanxin Rd., East Dist., Hsinchu City 30072, Taiwan
Manufacturer : SecuX Technology Inc.
Trade Name : SecuX
Model No. : V20, W20
FCC ID. : 2ASNW-SX001
EUT Voltage : DC 3.7V (Power by Battery)
DC 5V (Charge)
Testing Voltage : AC 120V, 60Hz (Power by PC)
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2017
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 : 

(Demi Chang / Senior Engineering Adm. Specialist)

Tested By : 

(Clemens Fang / Senior Engineer)

Approved By : 

(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
1930039R-RFUSP01V00	V1.0	Initial issue of report	Mar. 28, 2019

TABLE OF CONTENTS

Description		Page
1.	General Information.....	6
1.1.	EUT Description	6
1.2.	Test Mode	8
1.3.	Tested System Details	9
1.4.	Configuration of tested System	9
1.5.	EUT Exercise Software	9
1.6.	Test Facility.....	10
1.7.	List of Test Equipment	11
1.8.	Duty cycle.....	13
1.9.	Uncertainty	17
2.	Conducted Emission	18
2.1.	Test Setup.....	18
2.2.	Limits	18
2.3.	Test Procedure	19
2.4.	Test Specification.....	19
2.5.	Test Result.....	20
3.	Maximum peak conducted output power.....	22
3.1.	Test Setup.....	22
3.2.	Test procedures	22
3.3.	Limits	22
3.4.	Test Specification.....	22
3.5.	Test Result.....	23
4.	Radiated Emission	25
4.1.	Test Setup.....	25
4.2.	Limits	26
4.3.	Test Procedure	27
4.4.	Test Specification.....	27
4.5.	Test Result.....	28
5.	RF antenna conducted test	44
5.1.	Test Setup.....	44
5.2.	Limits	44
5.3.	Test Procedure	44
5.4.	Test Specification.....	44
5.5.	Test Result.....	45
6.	Radiated Emission Band Edge.....	53

6.1.	Test Setup.....	53
6.2.	Limits	53
6.3.	Test Procedure	53
6.4.	Test Specification.....	53
6.5.	Test Result.....	54
7.	Occupied Bandwidth & DTS Bandwidth	66
7.1.	Test Setup.....	66
7.2.	Limits	66
7.3.	Test Procedures.....	66
7.4.	Test Specification.....	66
7.5.	Test Result.....	67
8.	Power Density	75
8.1.	Test Setup.....	75
8.2.	Limits	75
8.3.	Test Procedures.....	75
8.4.	Test Specification.....	75
8.5.	Test Result.....	76
Attachment 1	80
	Test Setup Photograph.....	80
Attachment 2	83
	EUT External Photograph.....	83
Attachment 3	90
	EUT Internal Photograph.....	90

1. General Information

1.1. EUT Description

Product Name	V20 Crypto Hardware Wallet, W20 Crypto Hardware Wallet
Trade Name	SecuX
Model No.	V20, W20
Frequency Range/Channel Number	2402~2480MHz / 40 Channels
Type of Modulation	GFSK

Antenna Information	
MFR. / Model No.	WALSIN / RFANT5220110A2T
Antenna Type	Chip antenna
Antenna Gain	2 dBi

Accessories Information	
Micro B USB Cable (For W20)	Shielded, 0.55m
Type C USB Cable (For V20)	Shielded, 0.9m

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:

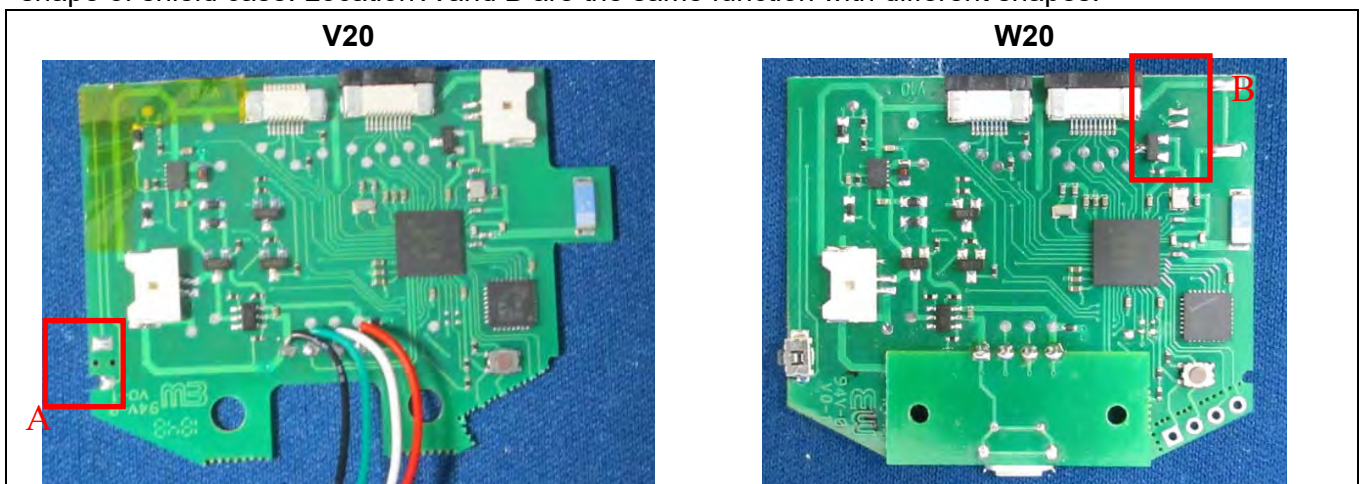
1. This device is V20 Crypto Hardware Wallet, W20 Crypto Hardware Wallet support BT5.0 transmitting and receiving function.
2. The difference between V20 and W20 is the trace length of antenna. After evaluating, V20 is the worst case and record in the report.
3. Regards to the frequency band operation; the lowest 、 middle and highest frequency of channel were selected to perform the test, and then shown on this report.

4. The different of the each model is shown as below:

Model Number	V20	W20
Product Name	V20 Crypto Hardware Wallet	W20 Crypto Hardware Wallet
Display	2.8" color touch screen	
Connectivity	USB / Bluetooth	USB / Bluetooth
Connector Type	USB Type C	USB Type Micro-B
Wireless feature	Bluetooth5.0	Bluetooth5.0
Powered by	Embedded Li-polymer Battery	Embedded Li-polymer Battery
PCB Difference	<ol style="list-style-type: none"> The length of PCB trace to BT antenna is 343mil. USB connector type is USB Type C The power switch location is at "A". 	<ol style="list-style-type: none"> The length of PCB trace to BT antenna is 145mil. USB connector type is USB Micro-B The power switch location is at "B".
Appearance	Round and with decagon edge	Rectangle
Case Materials	Aluminum frame with rubber base	Plastic housing with ultrasonic welding
Dimension	Diam: 98mm H:15mm	L: 89mm W:59mm H: 13mm
Weight	120g	62g

Additional information of power switch.

Power switch have two locations with the same function, it was apply on different location because the shape of shield case. Location A and B are the same function with different shapes.



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_V20_1M Mode 2: Transmit_V20_2M
-----------	--

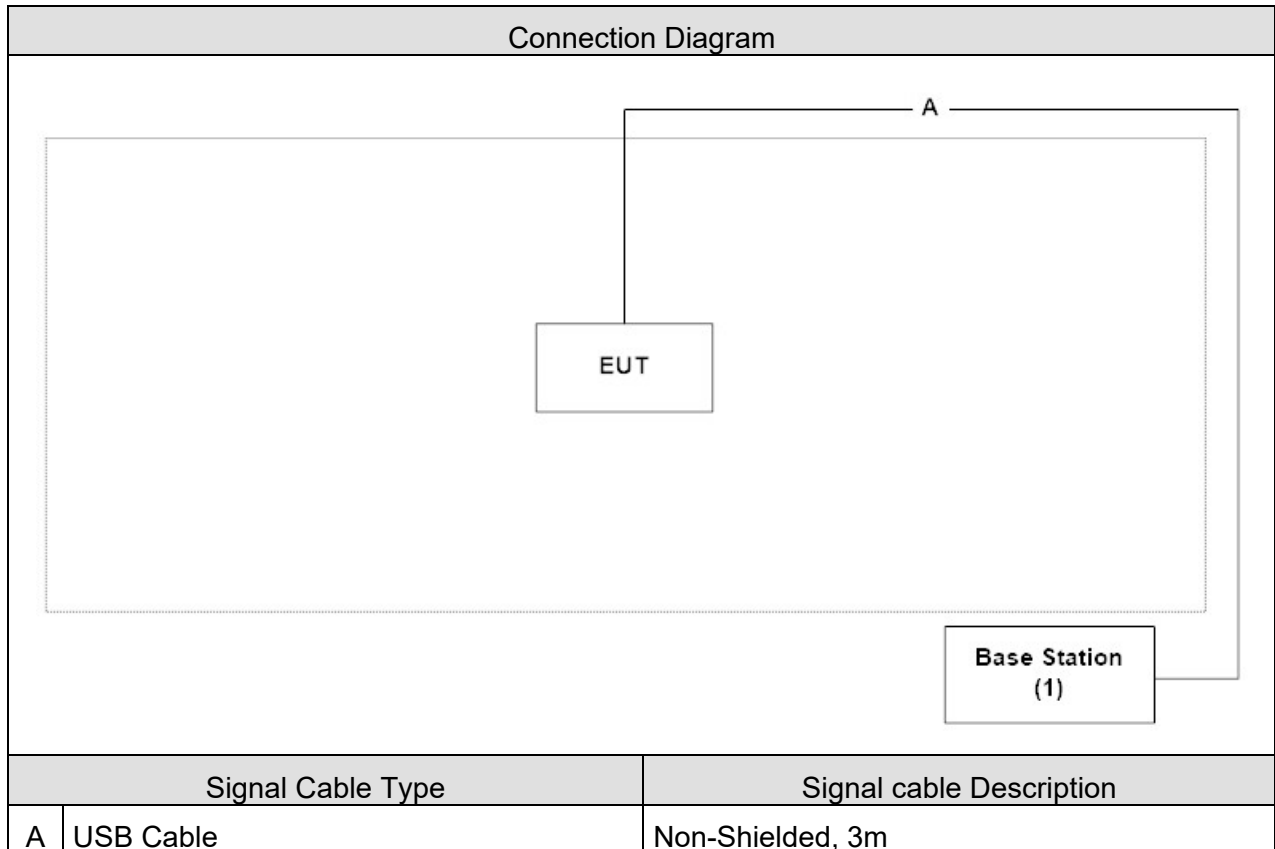
Test Items	Modulation	Channel	Result
Conducted Emission	GFSK	19	Complies
Maximum peak conducted output power	GFSK	00/19/39	Complies
Radiated Emission	GFSK	00/19/39	Complies
RF antenna conducted test	GFSK	00/39	Complies
Radiated Emission Radiated Emission Band Edge	GFSK	00/19/39	Complies
Occupied Bandwidth & 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 Base Station	R & S	CMW500	106071	DoC	Non-Shielded, 1.8m

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Turn on the power of all equipment.
3	The EUT link with base station and it will continue transmit/receive the signal.
4	Repeat the above procedure.

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	3
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.

USA : FCC, Registration Number: TW3024

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:

- No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan (R.O.C.)
TEL: +886-3-592-8858 / FAX: +886-3-592-8859 E-Mail : info.tw@dekra.com
- No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com
- No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958 E-Mail : info.tw@dekra.com

1.7. List of Test Equipment

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2018/01/22	2019/01/21
Test Receiver	R&S	ESCS 30	836858/022	2018/03/30	2019/03/29
LISN	R&S	ENV216	100092	2018/07/23	2019/07/22

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	2018/04/11	2019/04/10
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	2018/04/11	2019/04/10
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

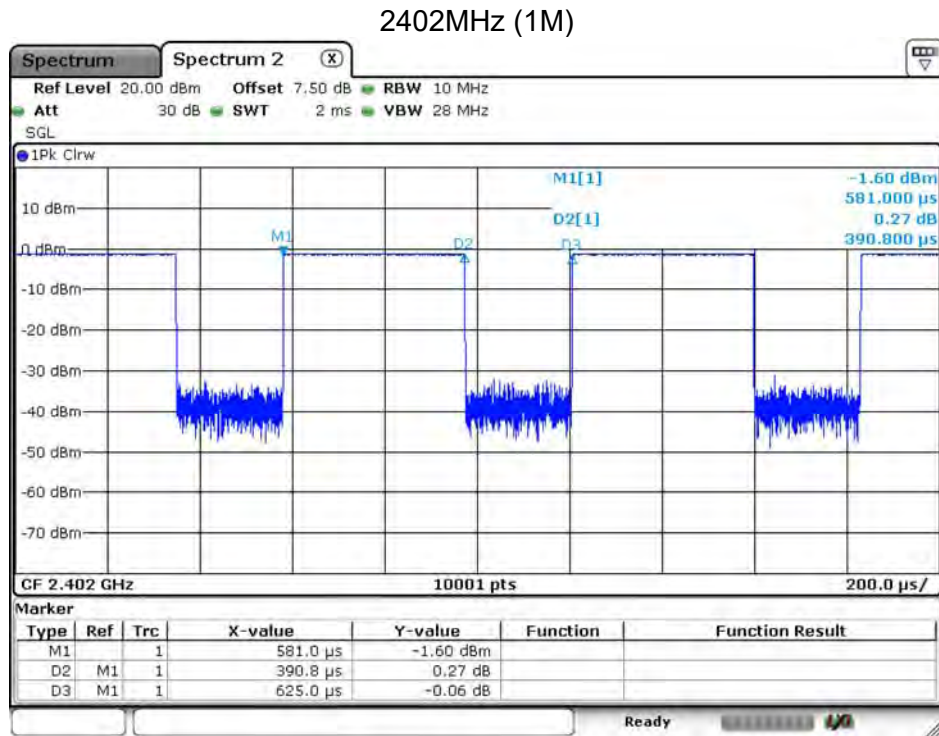
Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2018/06/26	2019/06/25
Spectrum Analyzer	Keysight	N9010B	MY57110159	2018/05/25	2019/05/24
Spectrum Analyzer	Agilent	N9010A	US47140172	2018/07/18	2019/07/17
Signal & Spectrum Analyzer	R&S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

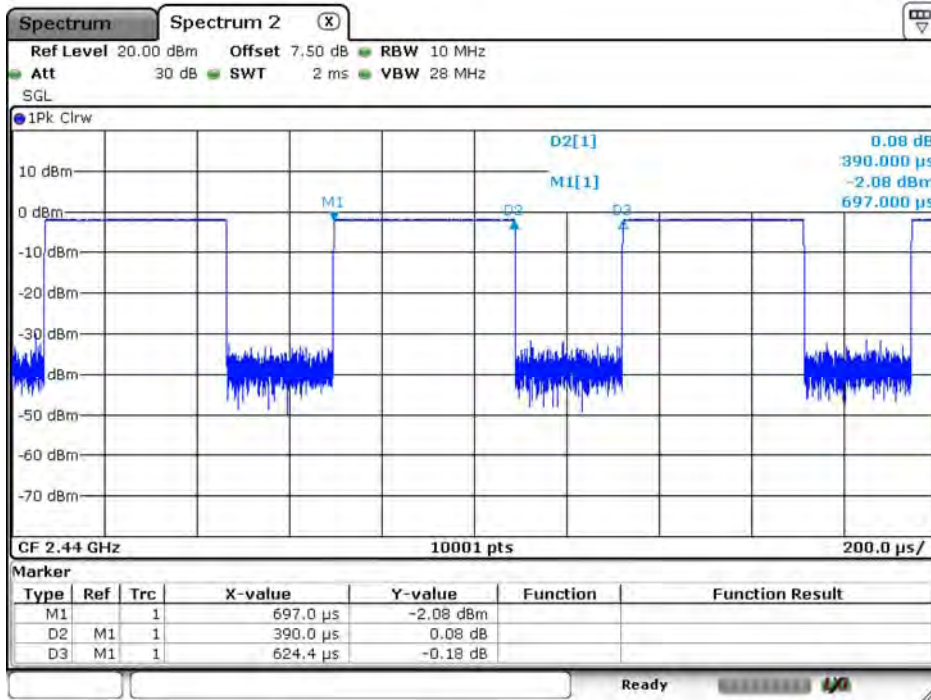
Mode 1: Transmit_V20_1M

Frequency (MHz)	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2402	0.391	0.625	62.53%	2.04	2.559
2440	0.390	0.624	62.46%	2.04	2.564
2480	0.390	0.625	62.41%	2.05	2.563



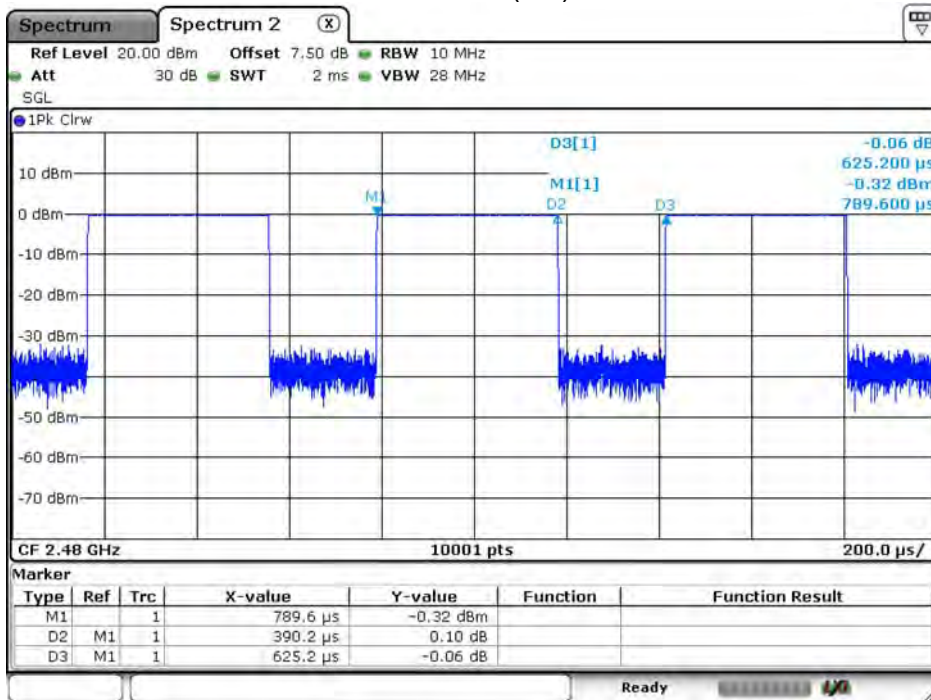
Date: 14.MAR.2019 14:29:58

2440MHz (1M)



Date: 14.MAR.2019 14:28:54

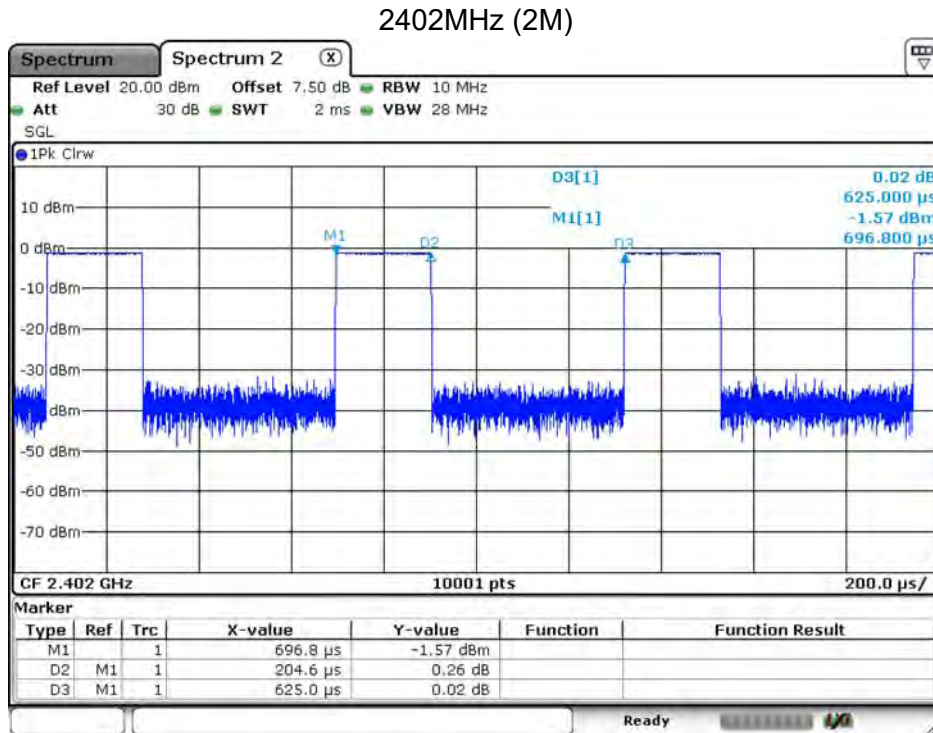
2480MHz (1M)



Date: 14.MAR.2019 14:27:40

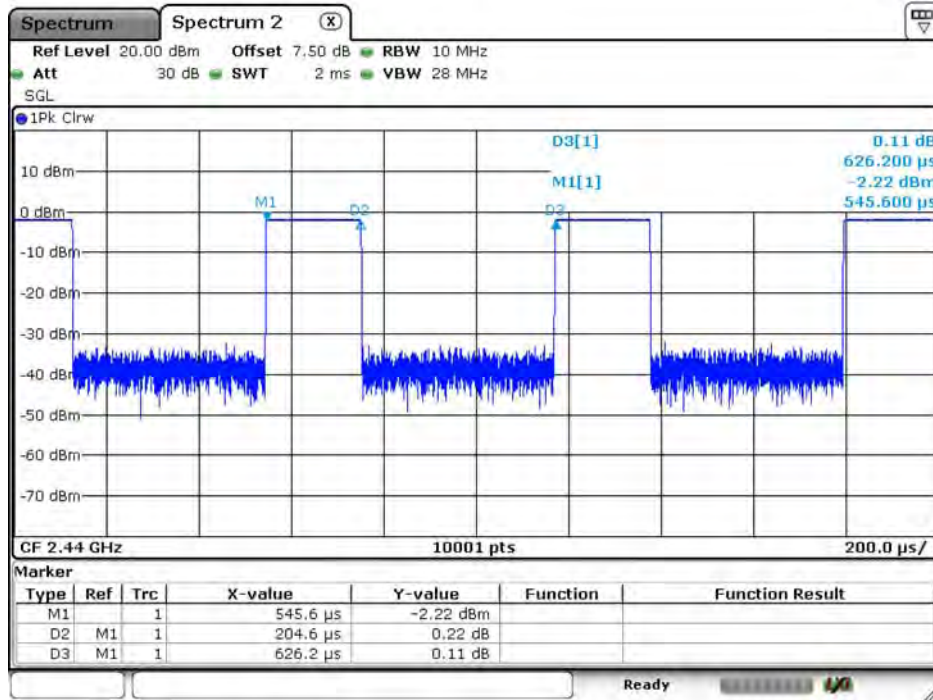
Mode 2: Transmit_V20_2M

Frequency (MHz)	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2402	0.205	0.625	32.74%	4.85	4.888
2440	0.205	0.626	32.67%	4.86	4.888
2480	0.203	0.625	32.44%	4.89	4.931



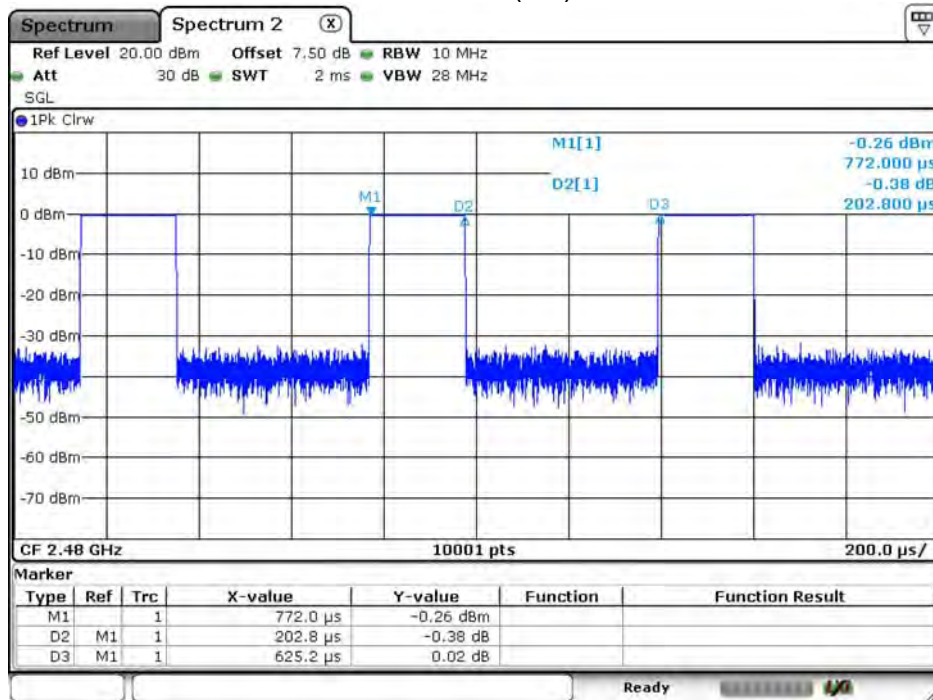
Date: 14.MAR.2019 14:30:37

2440MHz (2M)



Date: 14.MAR.2019 14:31:19

2480MHz (2M)



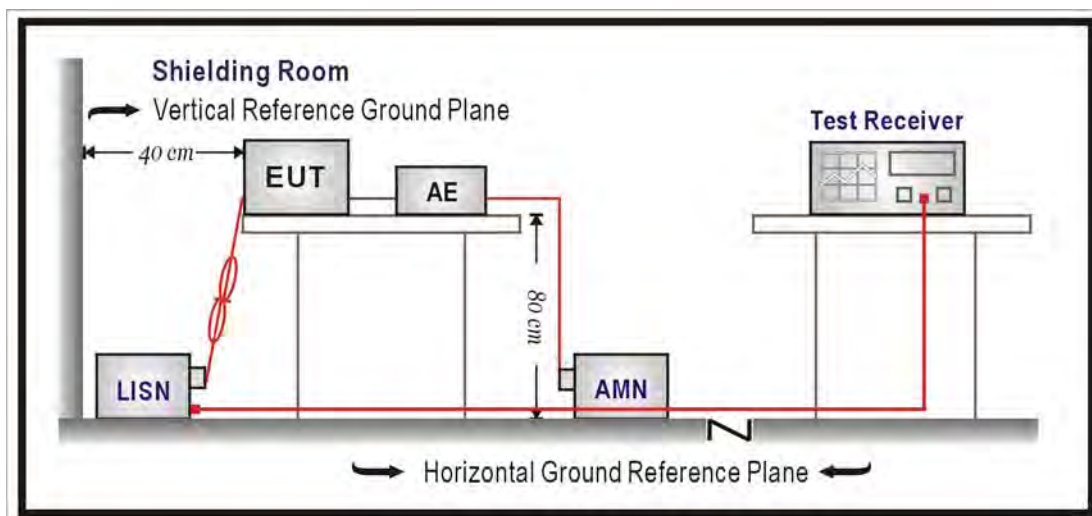
Date: 14.MAR.2019 14:31:57

1.9. Uncertainty

Test item	Uncertainty
Conducted Emission	± 2.26 dB
Maximum peak conducted output power	± 1.27 dB
Radiated Emission	30MHz~1GHz as ± 3.43 dB 1GHz~26.5GHz as ± 3.65 dB
RF antenna conducted test	± 1.27 dB
Radiated Emission Radiated Emission Band Edge	± 3.9 dB
Occupied Bandwidth	± 150 Hz
DTS Bandwidth	± 150 Hz
Power Density	± 1.27 dB

2. Conducted Emission

2.1. Test Setup



2.2. 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 Radiated Emission Band Edges.

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please 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.

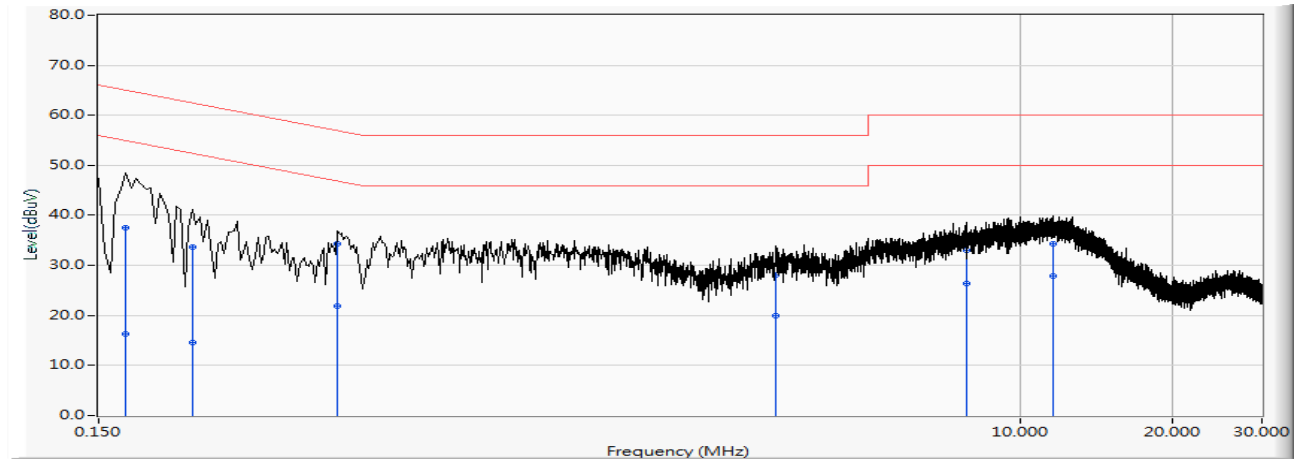
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2017

2.5. Test Result

Site : SR2-H	Time : 2019/03/22
Limit : CISPR_B_00M_QP	Margin : 0
Probe : SR2-B127_LISN(16A)-8 - Line1	Power : AC 120V/60Hz
EUT : V20 Crypto Hardware Wallet	Note : Mode 1: Transmit_V20_1M

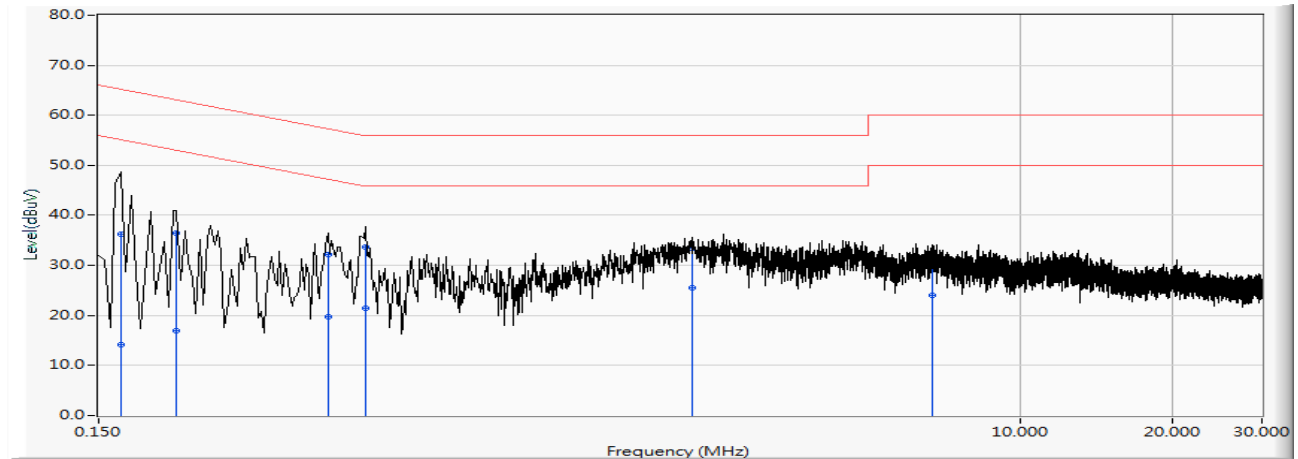


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	0.170	9.680	27.874	37.554	-27.406	64.960	QUASPEAK
2	0.170	9.680	6.571	16.251	-38.709	54.960	AVERAGE
3	0.230	9.680	23.935	33.615	-28.834	62.450	QUASPEAK
4	0.230	9.680	4.956	14.636	-37.814	52.450	AVERAGE
5	0.446	9.681	24.562	34.243	-22.707	56.949	QUASPEAK
6	0.446	9.681	12.120	21.801	-25.148	46.949	AVERAGE
7	3.286	9.806	18.320	28.126	-27.874	56.000	QUASPEAK
8	3.286	9.806	10.108	19.915	-26.085	46.000	AVERAGE
9	7.798	9.973	23.085	33.057	-26.943	60.000	QUASPEAK
10	7.798	9.973	16.392	26.365	-23.635	50.000	AVERAGE
11	11.575	10.172	24.110	34.282	-25.718	60.000	QUASPEAK
12	* 11.575	10.172	17.735	27.907	-22.093	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : SR2-H	Time : 2019/03/22
Limit : CISPR_B_00M_QP	Margin : 0
Probe : SR2-B127_LISN(16A)-8 - Line2	Power : AC 120V/60Hz
EUT : V20 Crypto Hardware Wallet	Note : Mode 1: Transmit_V20_1M



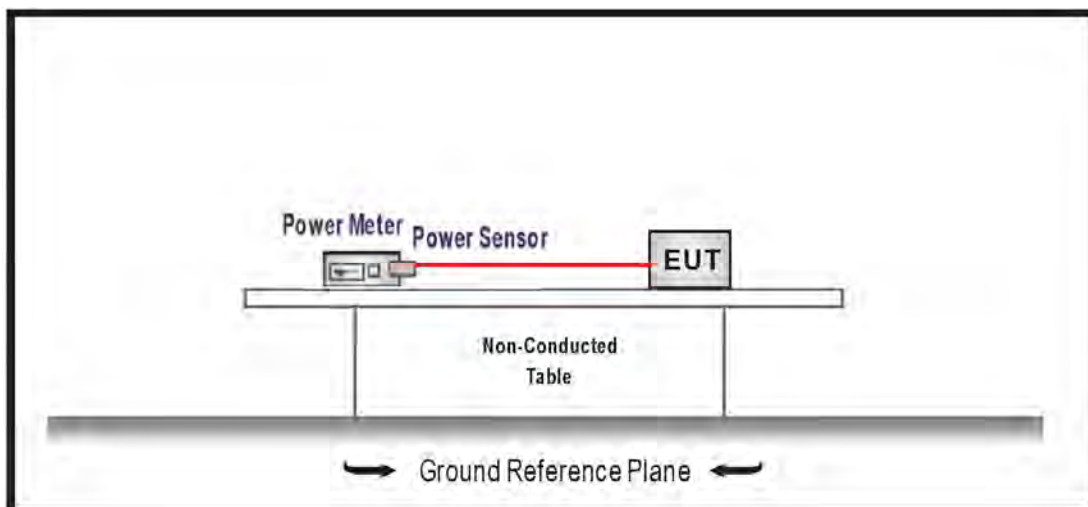
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	0.166	9.680	26.593	36.273	-28.885	65.158	QUASPEAK
2	0.166	9.680	4.396	14.076	-41.082	55.158	AVERAGE
3	0.214	9.680	26.682	36.362	-26.687	63.049	QUASPEAK
4	0.214	9.680	7.200	16.880	-36.168	53.049	AVERAGE
5	0.426	9.680	22.483	32.164	-25.166	57.330	QUASPEAK
6	0.426	9.680	10.101	19.782	-27.549	47.330	AVERAGE
7	0.506	9.684	23.917	33.600	-22.400	56.000	QUASPEAK
8	0.506	9.684	11.734	21.417	-24.583	46.000	AVERAGE
9	2.246	9.802	23.556	33.358	-22.642	56.000	QUASPEAK
10	*	9.802	15.802	25.604	-20.396	46.000	AVERAGE
11	6.694	9.915	20.433	30.348	-29.652	60.000	QUASPEAK
12	6.694	9.915	14.080	23.994	-26.006	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

3. Maximum peak conducted output power

3.1. Test Setup



3.2. Test procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V04 for compliance to FCC 47CFR 15.247 requirements.

3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2017

3.5. Test Result

Product	V20 Crypto Hardware Wallet		
Test Item	Maximum peak conducted output power		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/15	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)
00	2402	-6.920	30
19	2440	-6.560	30
39	2480	-6.310	30

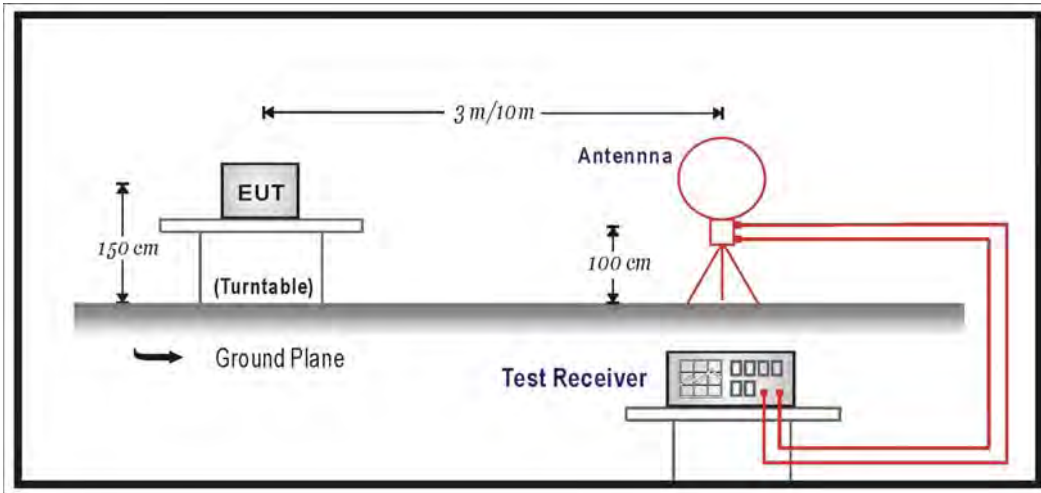
Product	V20 Crypto Hardware Wallet		
Test Item	Maximum peak conducted output power		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/15	Test Site	SR10-H

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)
00	2402	-6.910	30
19	2440	-6.560	30
39	2480	-6.310	30

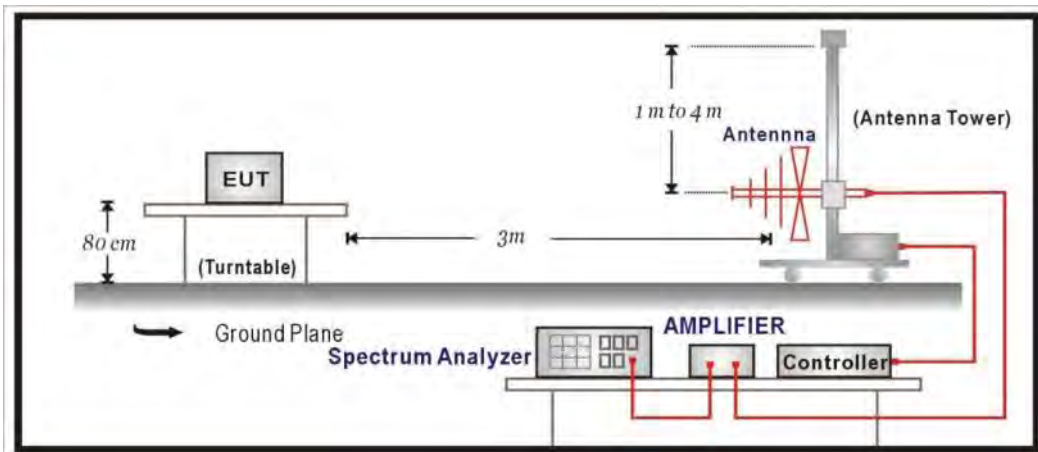
4. Radiated Emission

4.1. Test Setup

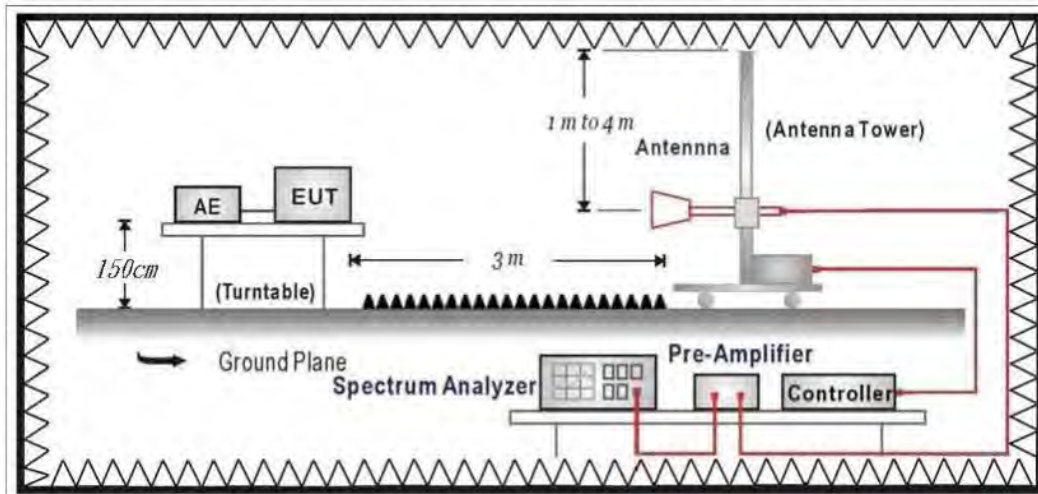
Under 30MHz Test Setup:



Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.2. 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.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V04 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 9kHz (include 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.

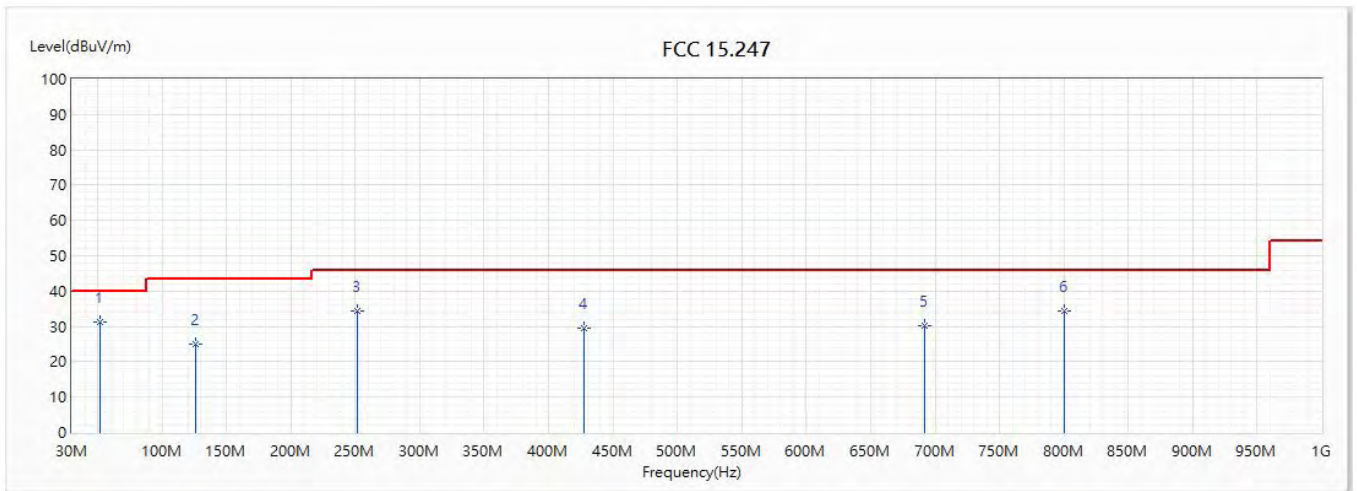
4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247:2017

4.5. Test Result

30MHz-1GHz Spurious

Site :	CB2-H	Engineer :	Clemens
Model No :	V20	Test Date :	2019/2/25
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

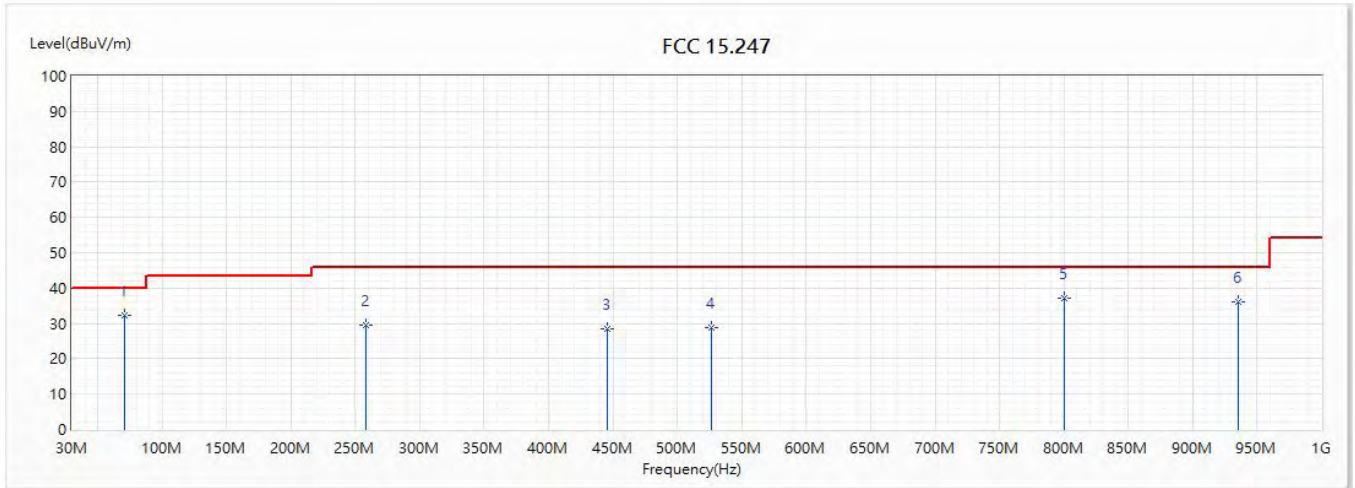


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	52.116	31.19	40.00	-8.81	50.36	-19.17	QP
2	126.03	24.87	43.50	-18.63	40.09	-15.22	QP
3	251.936	34.42	46.00	-11.58	48.97	-14.55	QP
4	427.603	29.36	46.00	-16.64	39.58	-10.22	QP
5	691.54	30.11	46.00	-15.89	36.95	-6.84	QP
6	800.083	34.40	46.00	-11.60	39.75	-5.35	QP

Note:

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

Site :	CB2-H	Engineer :	Clemens
Model No :	V20	Test Date :	2019/2/25
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

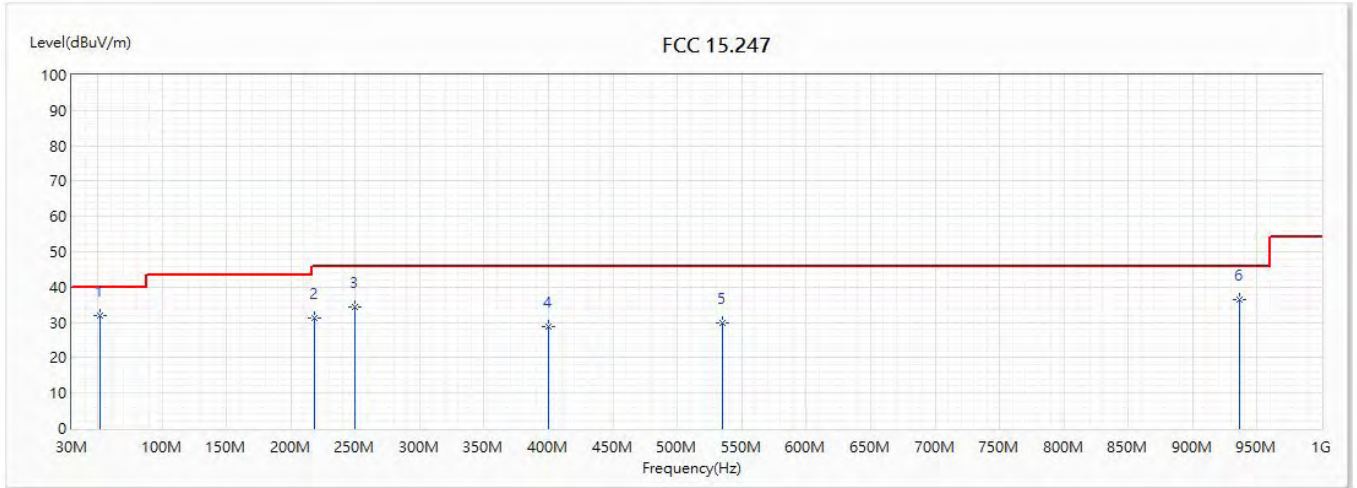


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	70.546	32.40	40.00	-7.60	53.83	-21.43	QP
2	258.144	29.45	46.00	-16.55	43.87	-14.42	QP
3	445.354	28.31	46.00	-17.69	38.28	-9.97	QP
4	526.737	28.95	46.00	-17.05	37.60	-8.65	QP
5	800.083	37.30	46.00	-8.70	42.65	-5.35	QP
6	935.786	36.19	46.00	-9.81	39.83	-3.64	QP

Note:

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

Site :	CB2-H	Engineer :	Clemens
Model No :	V20	Test Date :	2019/2/25
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		

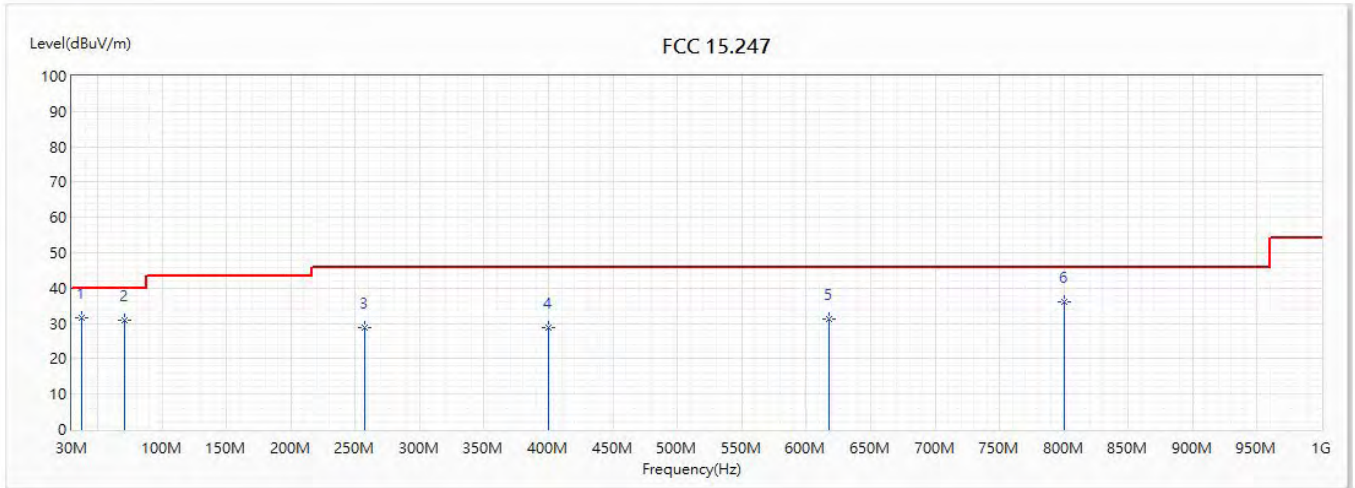


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	52.116	31.96	40.00	-8.04	51.13	-19.17	QP
2	218.665	31.28	46.00	-14.72	47.66	-16.38	QP
3	249.996	34.22	46.00	-11.78	48.82	-14.60	QP
4	399.958	28.80	46.00	-17.20	39.42	-10.62	QP
5	535.176	29.81	46.00	-16.19	38.38	-8.57	QP
6	936.271	36.35	46.00	-9.65	39.99	-3.64	QP

Note:

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

Site :	CB2-H	Engineer :	Clemens
Model No :	V20	Test Date :	2019/2/25
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		



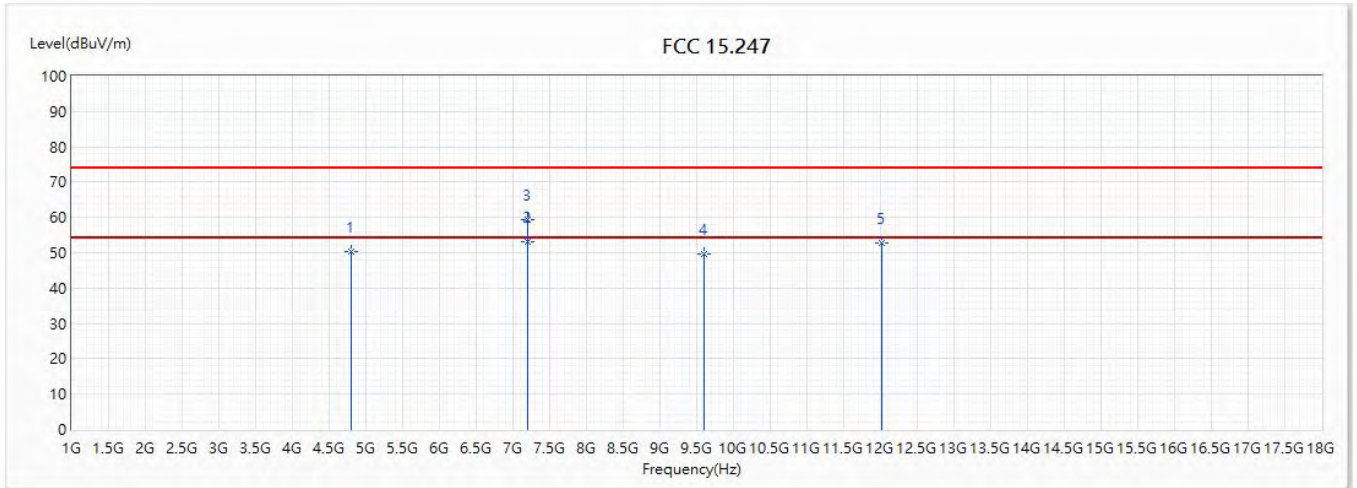
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	38.051	31.50	40.00	-8.50	42.26	-10.76	QP
2	70.449	30.87	40.00	-9.13	52.31	-21.44	QP
3	257.174	28.98	46.00	-17.02	43.42	-14.44	QP
4	399.958	28.97	46.00	-17.03	39.59	-10.62	QP
5	618.014	31.23	46.00	-14.77	38.74	-7.51	QP
6	800.083	36.15	46.00	-9.85	41.50	-5.35	QP

Note:

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

Harmonic & Spurious:

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2402MHz		

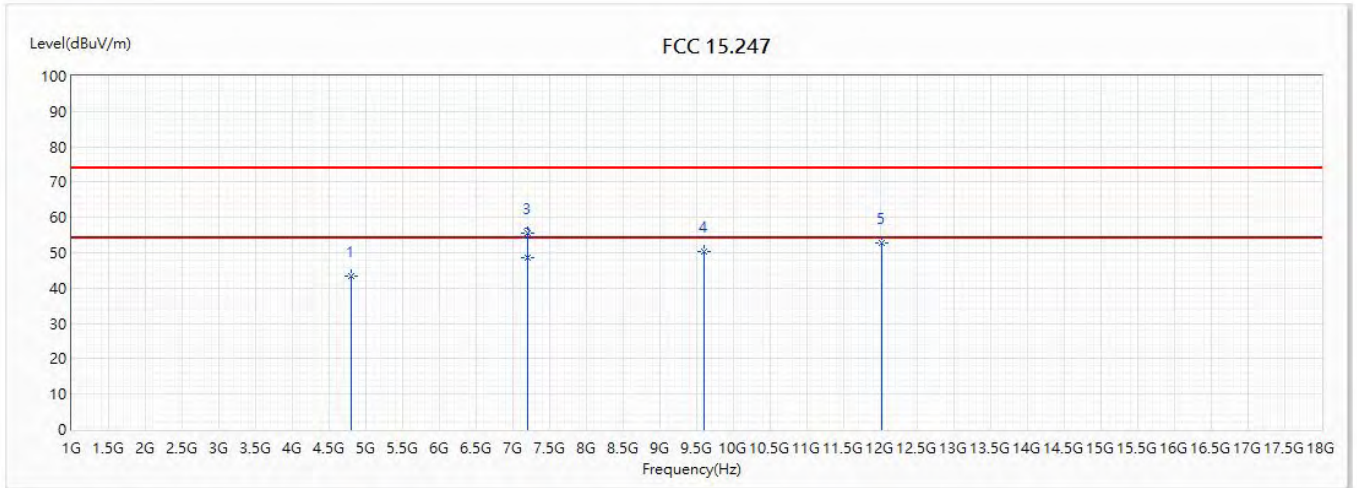


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4804	50.18	74.00	-23.82	49.67	0.51	PK
* 2	7206	53.01	54.00	-0.99	43.39	9.62	AV
3	7206	59.34	74.00	-14.66	49.72	9.62	PK
4	9608	49.71	74.00	-24.29	34.99	14.72	PK
5	12010	52.92	74.00	-21.08	34.48	18.44	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2402MHz		

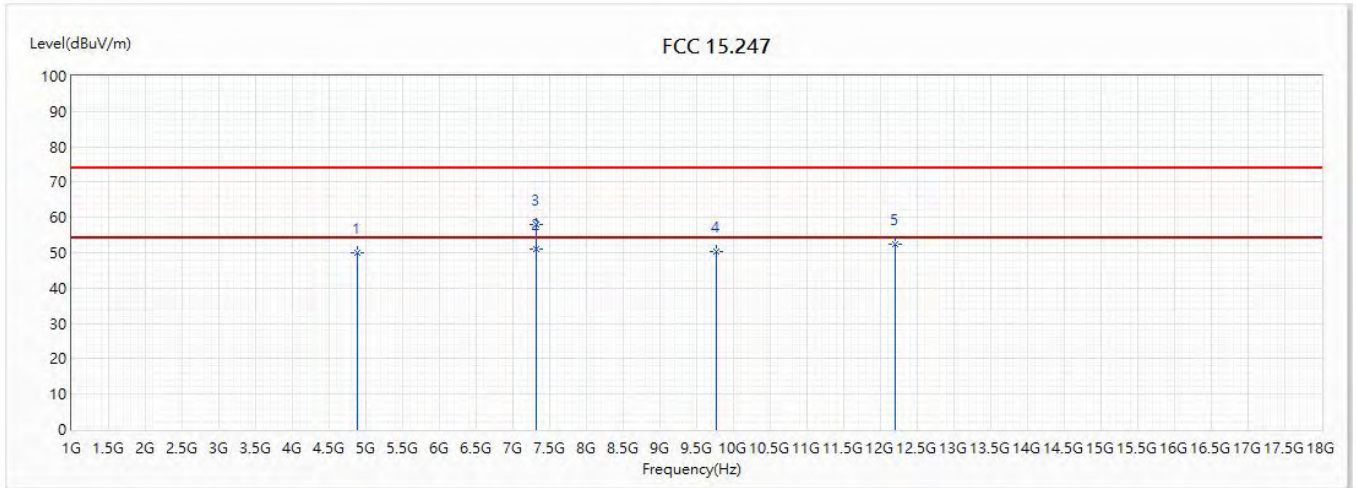


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4804	43.37	74.00	-30.63	42.86	0.51	PK
* 2	7206	48.48	54.00	-5.52	38.86	9.62	AV
3	7206	55.54	74.00	-18.46	45.92	9.62	PK
4	9608	50.27	74.00	-23.73	35.55	14.72	PK
5	12010	52.81	74.00	-21.19	34.37	18.44	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

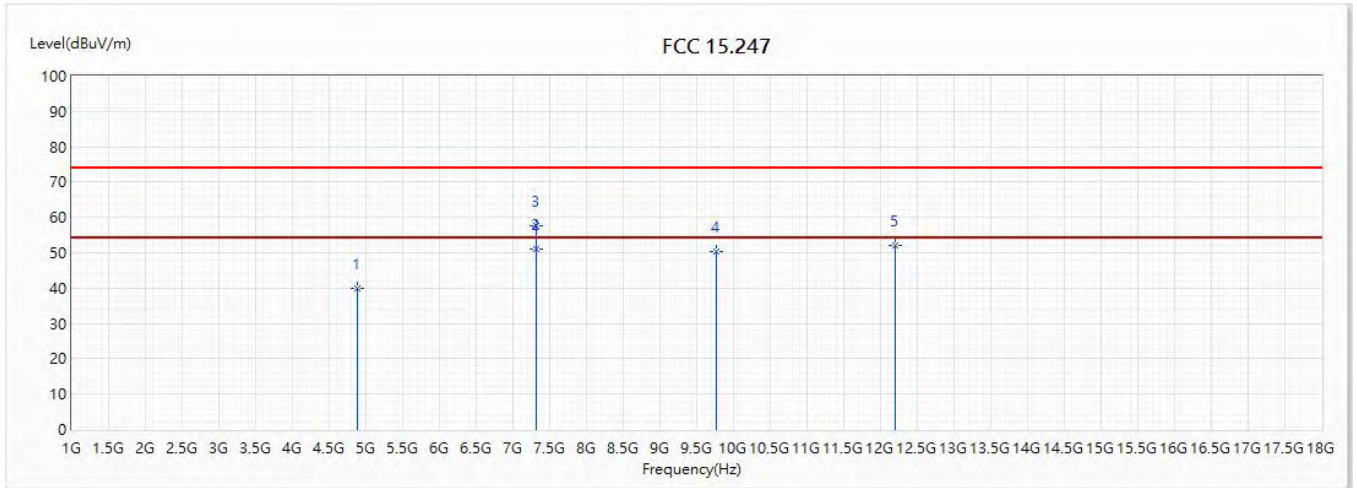


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4880	50.02	74.00	-23.98	49.19	0.83	PK
* 2	7320	51.15	54.00	-2.85	40.90	10.25	AV
3	7320	57.82	74.00	-16.18	47.57	10.25	PK
4	9760	50.36	74.00	-23.64	35.26	15.10	PK
5	12200	52.55	74.00	-21.45	34.36	18.19	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

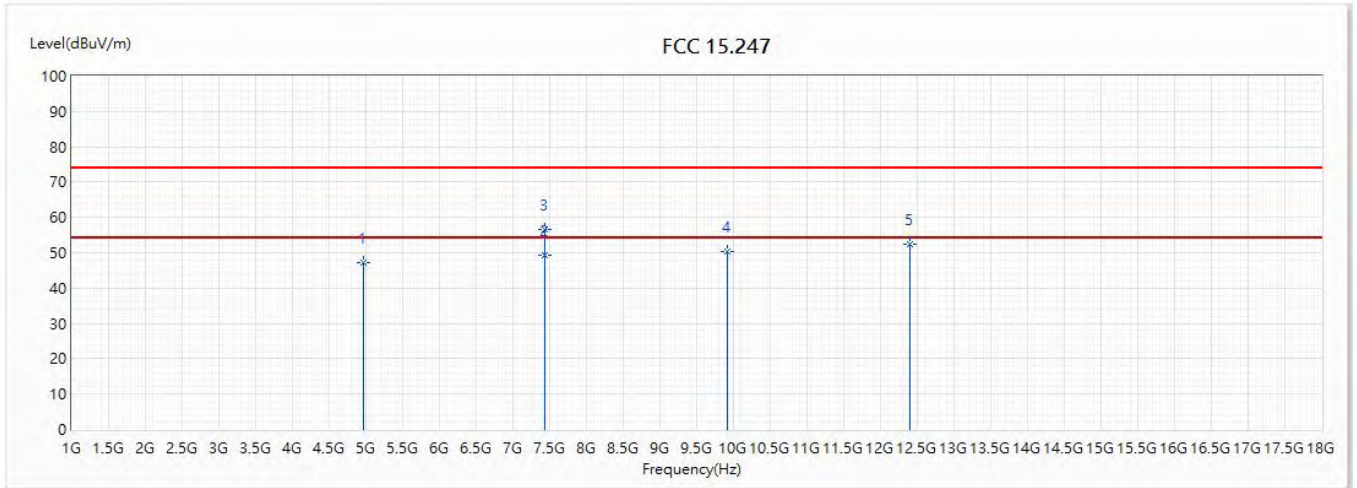


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4880	39.82	74.00	-34.18	38.99	0.83	PK
* 2	7320	50.96	54.00	-3.04	40.71	10.25	AV
3	7320	57.64	74.00	-16.36	47.39	10.25	PK
4	9760	50.40	74.00	-23.60	35.30	15.10	PK
5	12200	52.22	74.00	-21.78	34.03	18.19	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2480MHz		

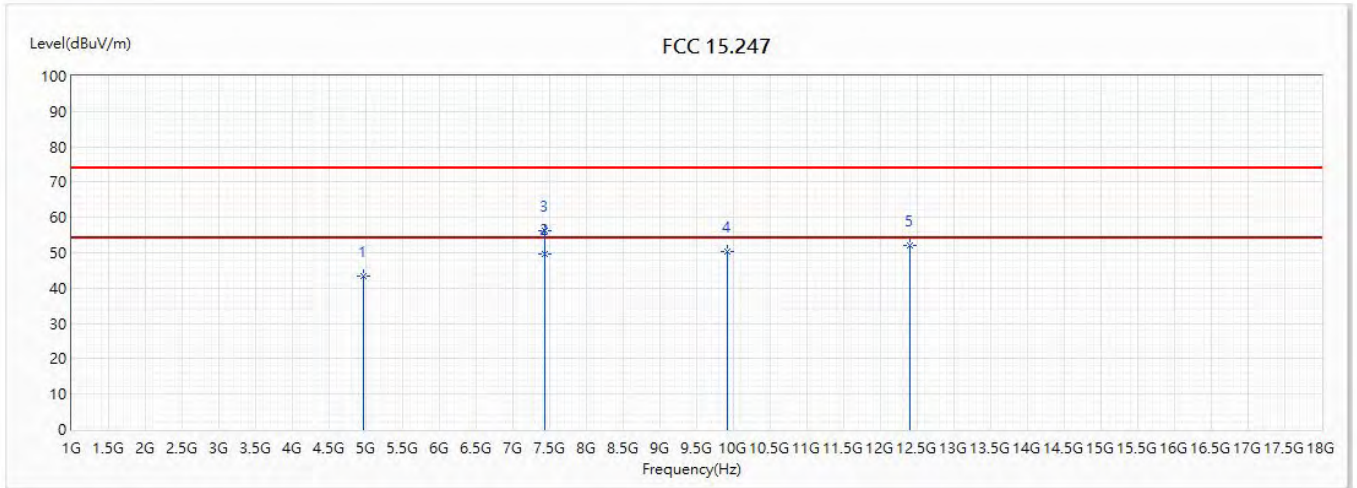


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960	47.33	74.00	-26.67	46.18	1.15	PK
* 2	7440	49.38	54.00	-4.62	38.53	10.85	AV
3	7440	56.73	74.00	-17.27	45.88	10.85	PK
4	9920	50.38	74.00	-23.62	35.02	15.36	PK
5	12400	52.35	74.00	-21.65	34.48	17.87	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2480MHz		

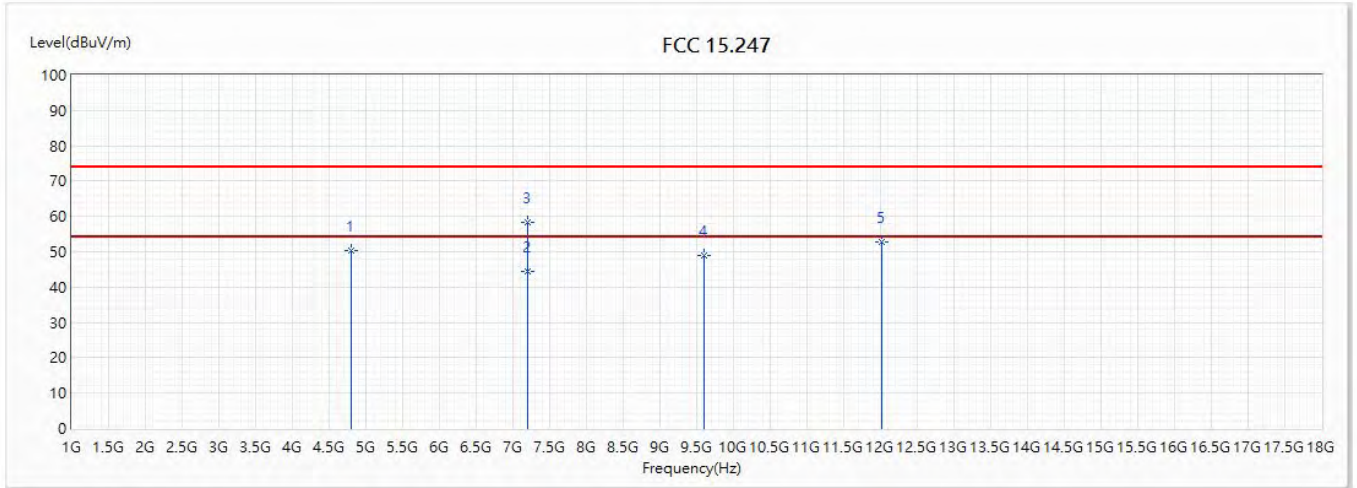


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960	43.54	74.00	-30.46	42.39	1.15	PK
* 2	7440	49.62	54.00	-4.38	38.77	10.85	AV
3	7440	56.21	74.00	-17.79	45.36	10.85	PK
4	9920	50.52	74.00	-23.48	35.16	15.36	PK
5	12400	52.05	74.00	-21.95	34.18	17.87	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2402MHz		

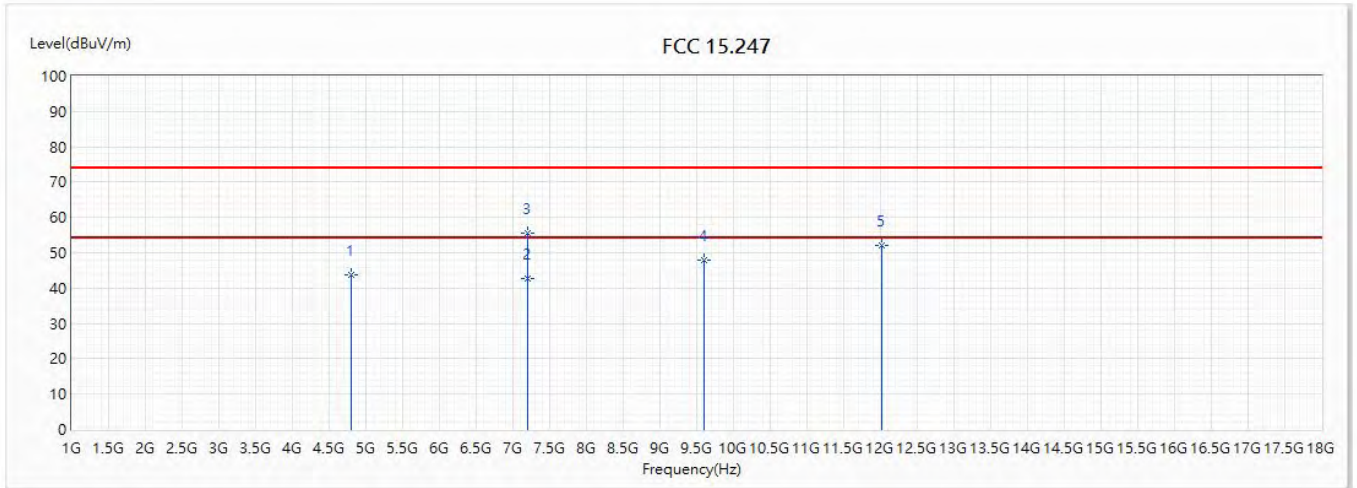


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4804	50.22	74.00	-23.78	49.71	0.51	PK
* 2	7206	44.59	54.00	-9.41	34.97	9.62	AV
3	7206	58.42	74.00	-15.58	48.80	9.62	PK
4	9608	49.06	74.00	-24.94	34.34	14.72	PK
5	12010	52.68	74.00	-21.32	34.24	18.44	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2402MHz		

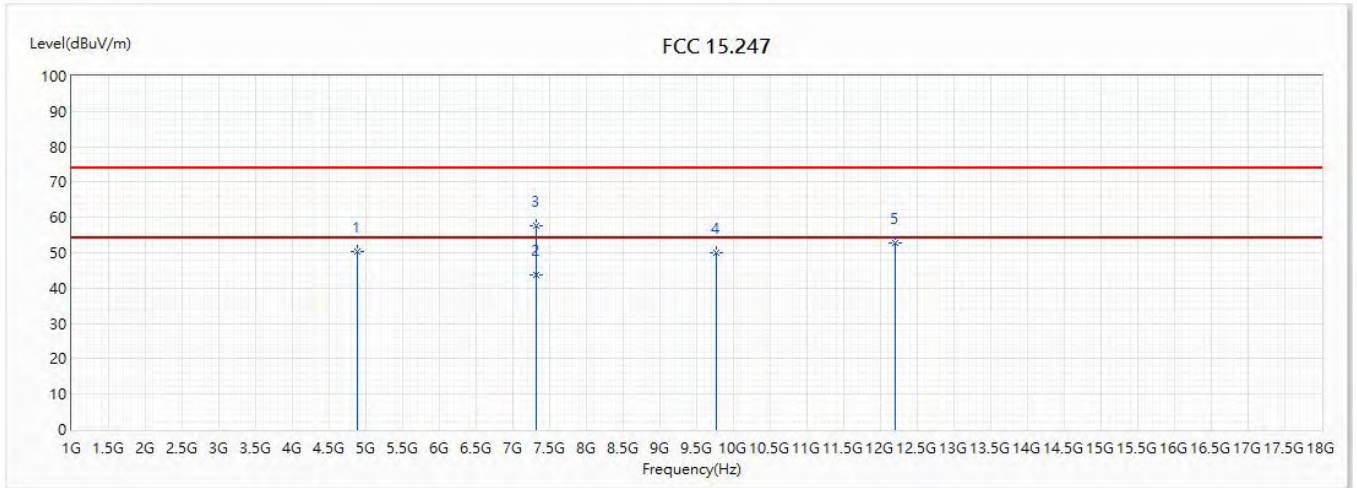


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4804	43.68	74.00	-30.32	43.17	0.51	PK
* 2	7206	42.55	54.00	-11.45	32.93	9.62	AV
3	7206	55.49	74.00	-18.51	45.87	9.62	PK
4	9608	48.05	74.00	-25.95	33.33	14.72	PK
5	12010	52.11	74.00	-21.89	33.67	18.44	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		

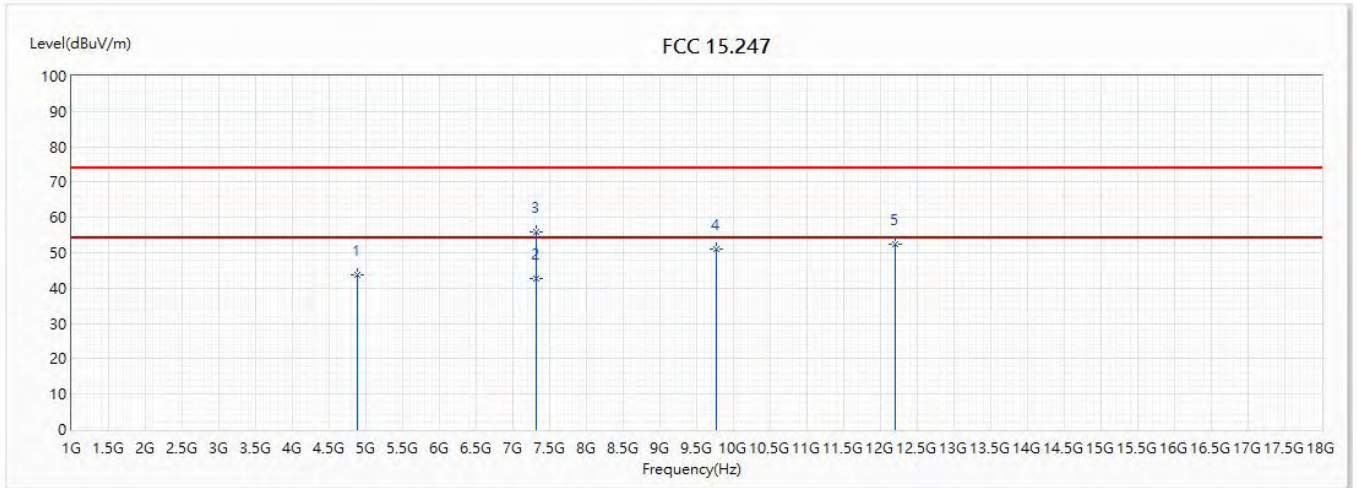


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4880	50.25	74.00	-23.75	49.42	0.83	PK
* 2	7320	43.64	54.00	-10.36	33.39	10.25	AV
3	7320	57.71	74.00	-16.29	47.46	10.25	PK
4	9760	50.13	74.00	-23.87	35.03	15.10	PK
5	12200	52.79	74.00	-21.21	34.60	18.19	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		

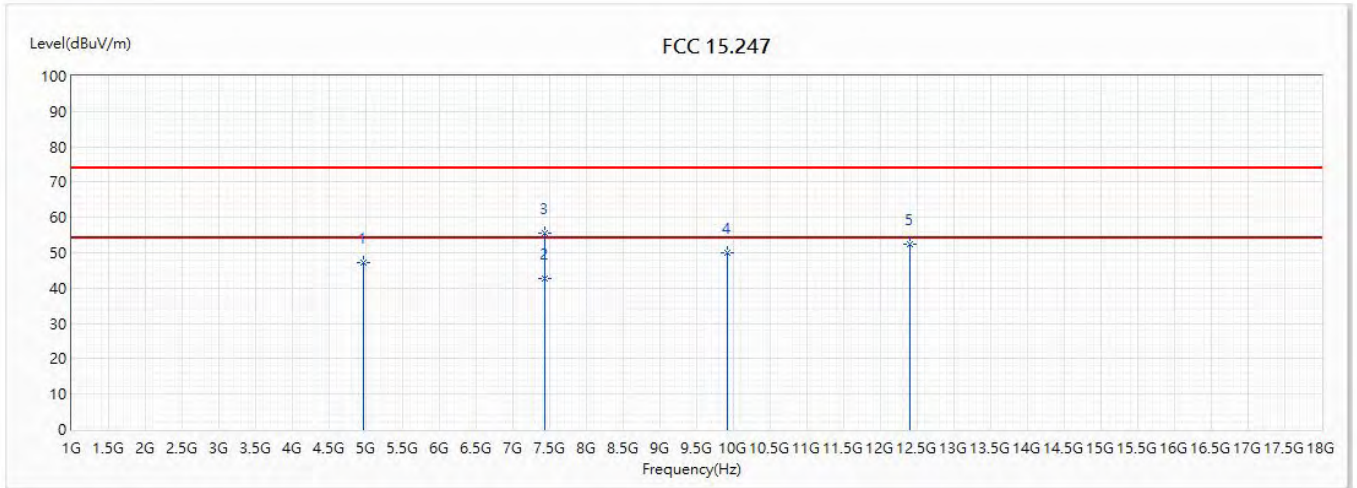


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4880	43.86	74.00	-30.14	43.03	0.83	PK
* 2	7320	42.85	54.00	-11.15	32.60	10.25	AV
3	7320	56.07	74.00	-17.93	45.82	10.25	PK
4	9760	51.21	74.00	-22.79	36.11	15.10	PK
5	12200	52.49	74.00	-21.51	34.30	18.19	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2480MHz		

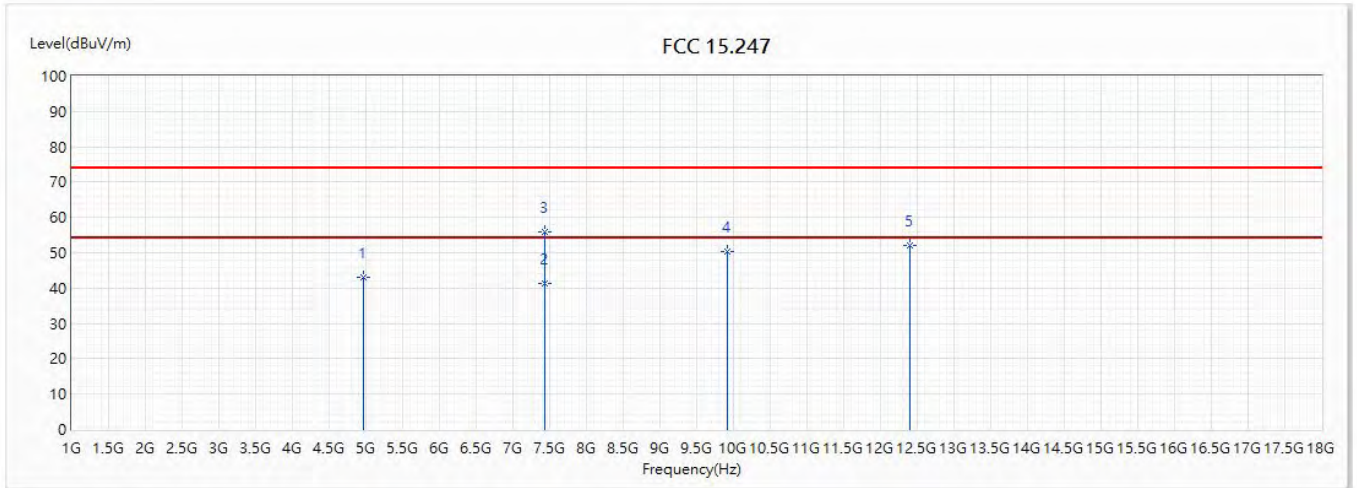


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960	47.05	74.00	-26.95	45.90	1.15	PK
2	7440	42.56	74.00	-31.44	31.71	10.85	PK
* 3	7440	55.64	74.00	-18.36	44.79	10.85	PK
4	9920	50.14	74.00	-23.86	34.78	15.36	PK
5	12400	52.35	74.00	-21.65	34.48	17.87	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

Site :	CB2-H	Engineer :	Scott
Model No :	V20	Test Date :	2019/3/6
Test Voltage :	DC 5V	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2480MHz		



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4960	43.19	74.00	-30.81	42.04	1.15	PK
* 2	7440	41.33	54.00	-12.67	30.48	10.85	AV
3	7440	55.96	74.00	-18.04	45.11	10.85	PK
4	9920	50.35	74.00	-23.65	34.99	15.36	PK
5	12400	52.01	74.00	-21.99	34.14	17.87	PK

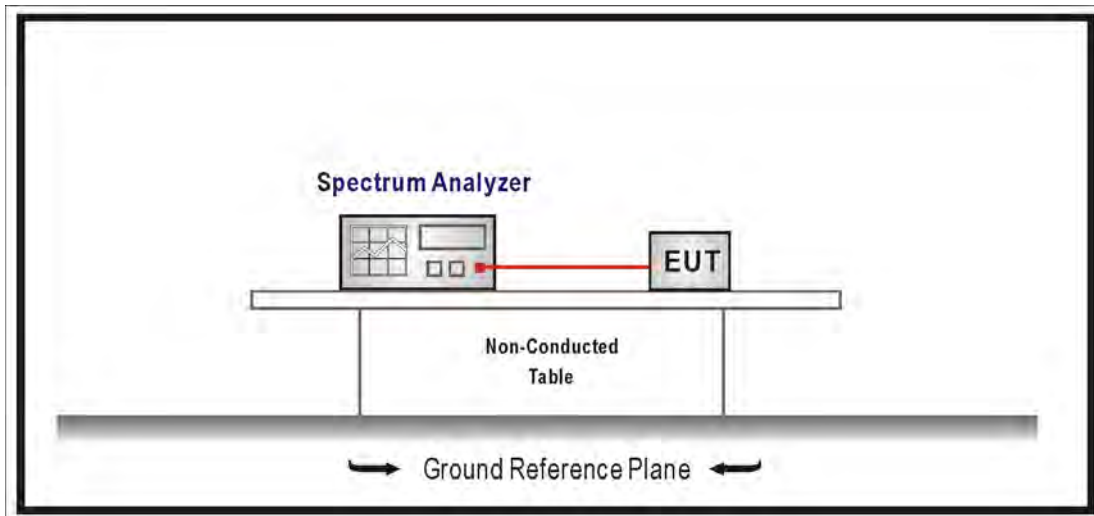
Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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 away from limit.

5. RF antenna conducted test

5.1. Test Setup

RF Conducted Measurement:



5.2. 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)).

5.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V04 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2017

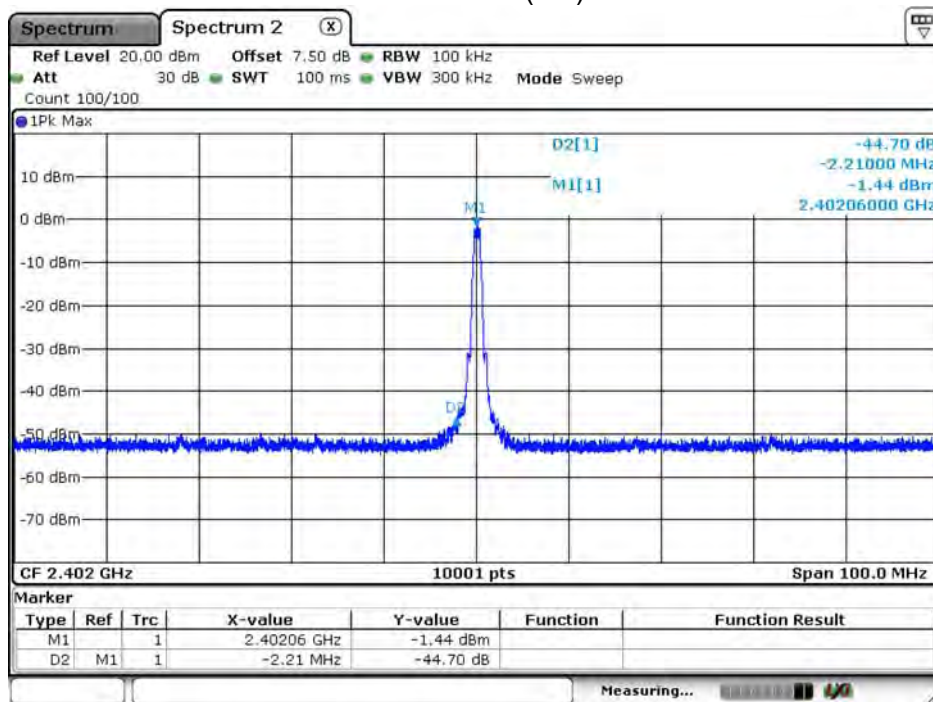
5.5. Test Result

Product	V20 Crypto Hardware Wallet		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/14	Test Site	SR10-H

GFSK

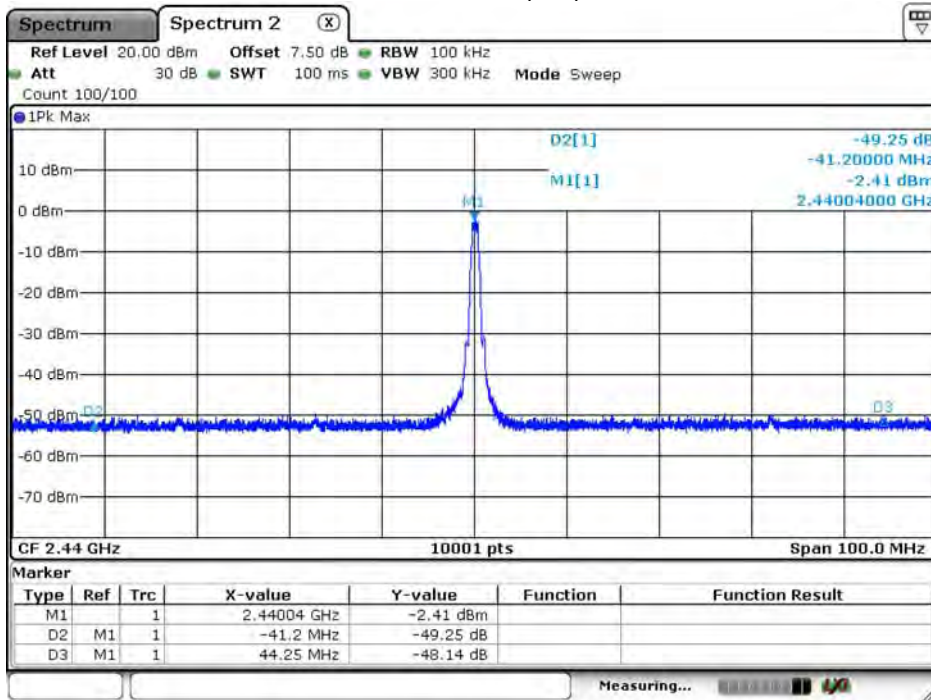
Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)
00	2402	39.450	≥ 20
19	2440	37.650	≥ 20
39	2480	41.730	≥ 20

Channel 00 (1M)



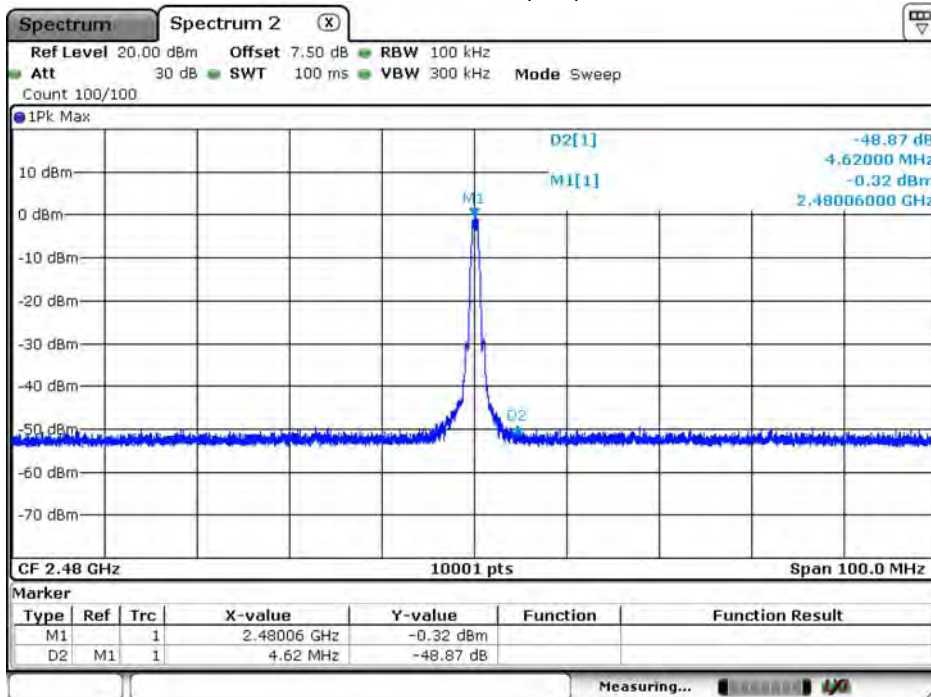
Date: 14.MAR.2019 14:13:26

Channel 19 (1M)



Date: 14.MAR.2019 14:08:07

Channel 39 (1M)

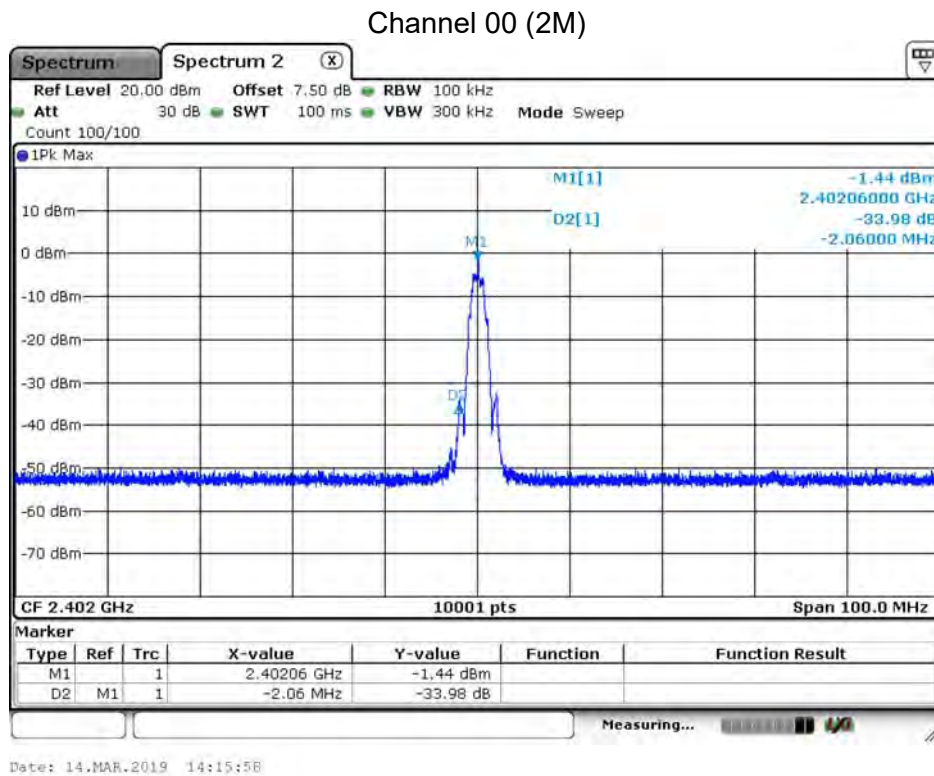


Date: 14.MAR.2019 14:11:56

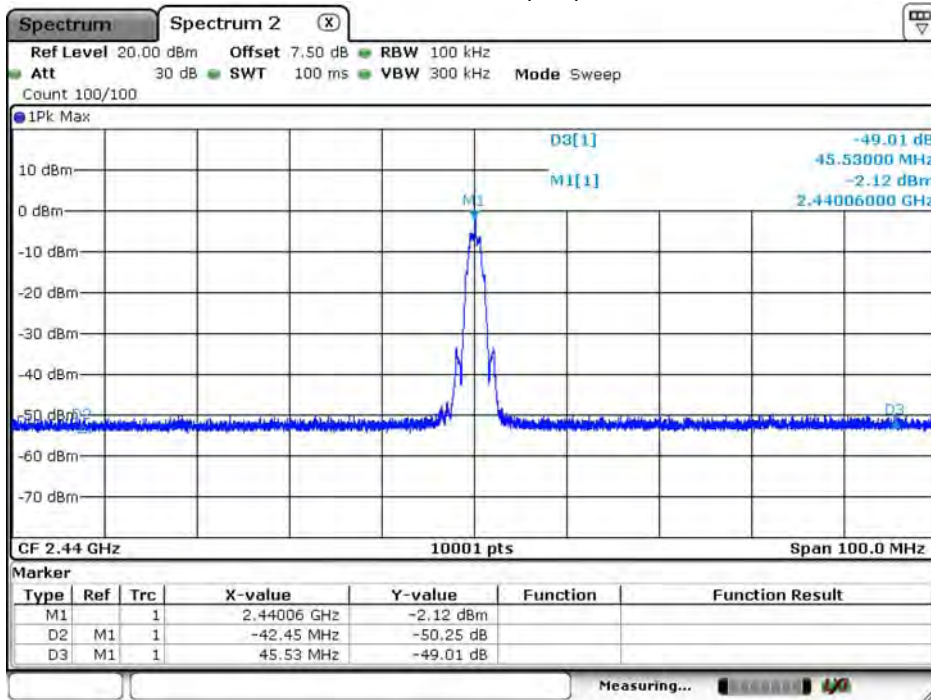
Product	V20 Crypto Hardware Wallet		
Test Item	RF antenna conducted test		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/14	Test Site	SR10-H

GFSK

Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)
00	2402	33.980	≥ 20
19	2440	39.260	≥ 20
39	2480	40.200	≥ 20

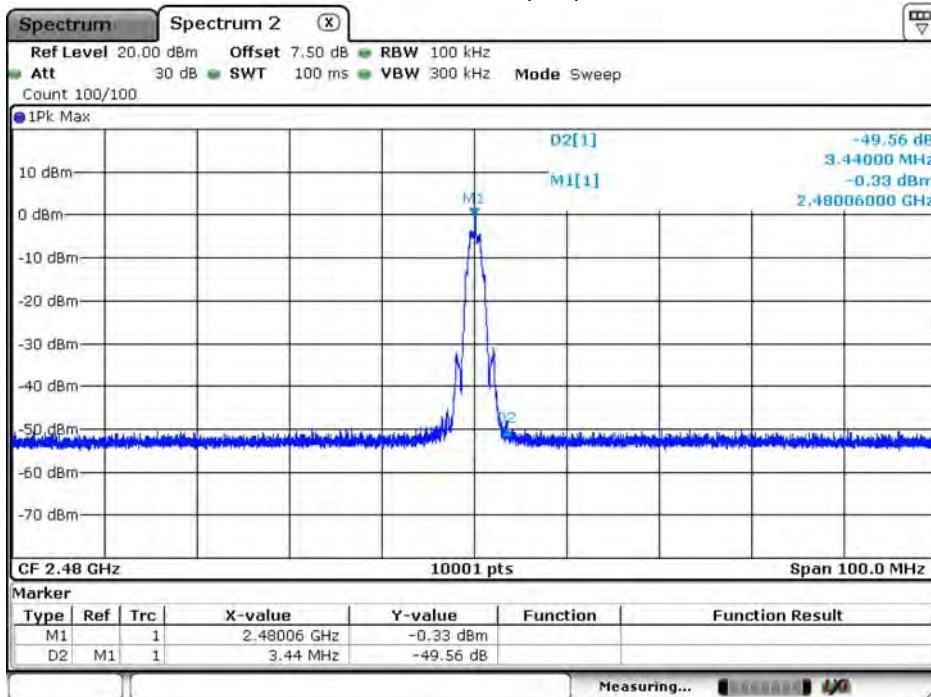


Channel 19 (2M)



Date: 14.MAR.2019 14:18:13

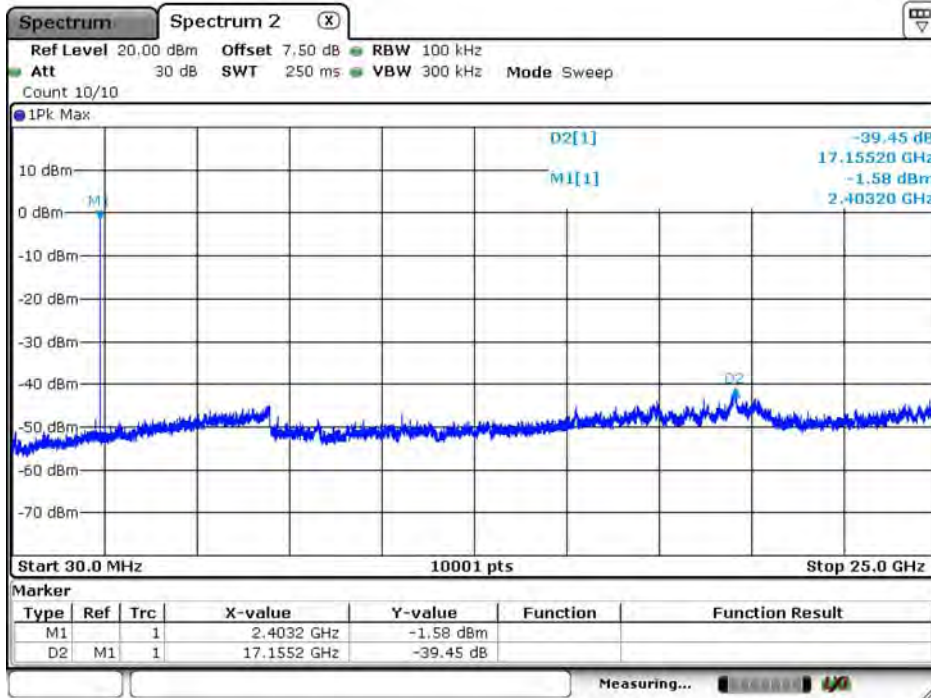
Channel 39 (2M)



Date: 14.MAR.2019 14:19:15

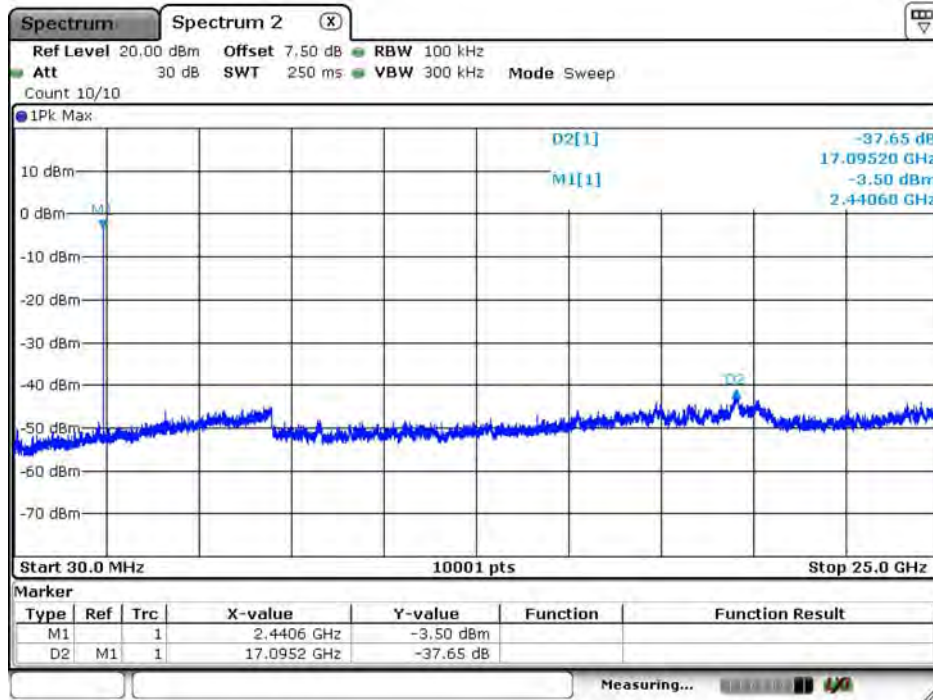
Product	V20 Crypto Hardware Wallet		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/14	Test Site	SR10-H

Channel 00 (30MHz-25GHz) (1M)

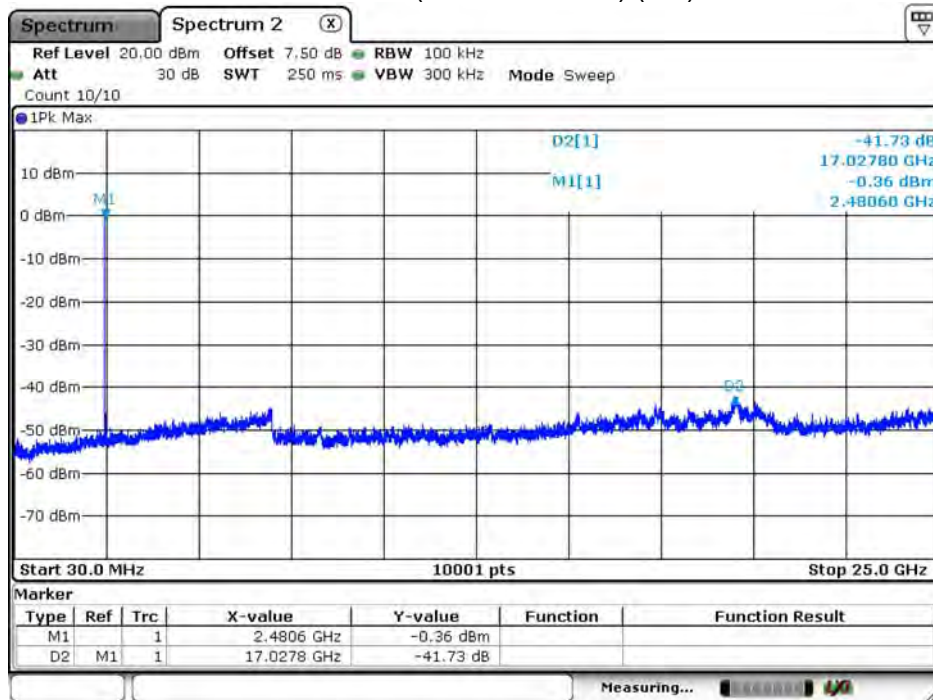


Date: 14.MAR.2019 14:24:06

Channel 19 (30MHz-25GHz) (1M)

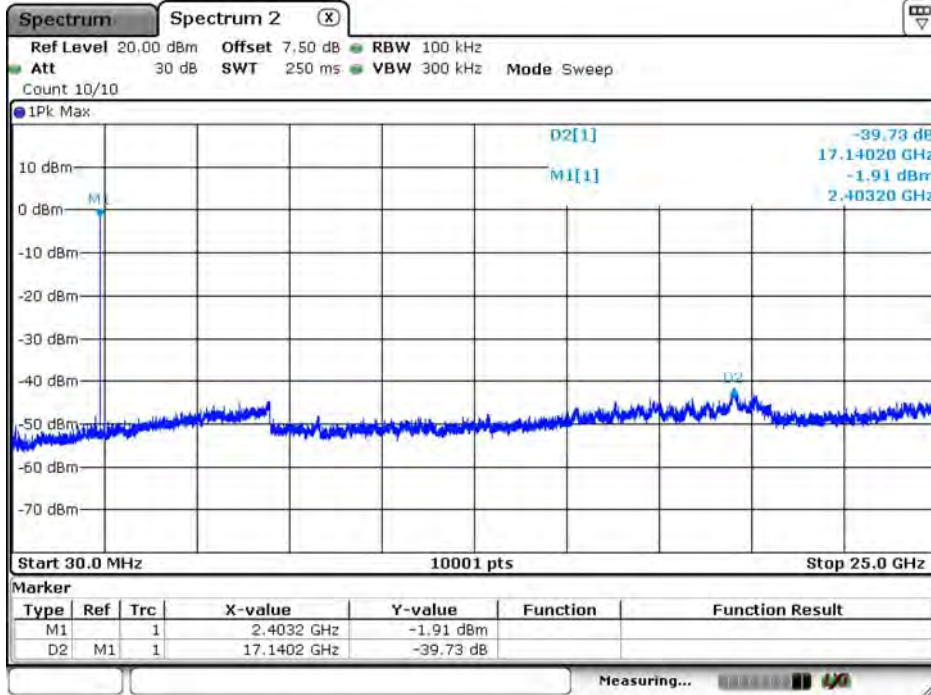


Channel 39 (30MHz-25GHz) (1M)



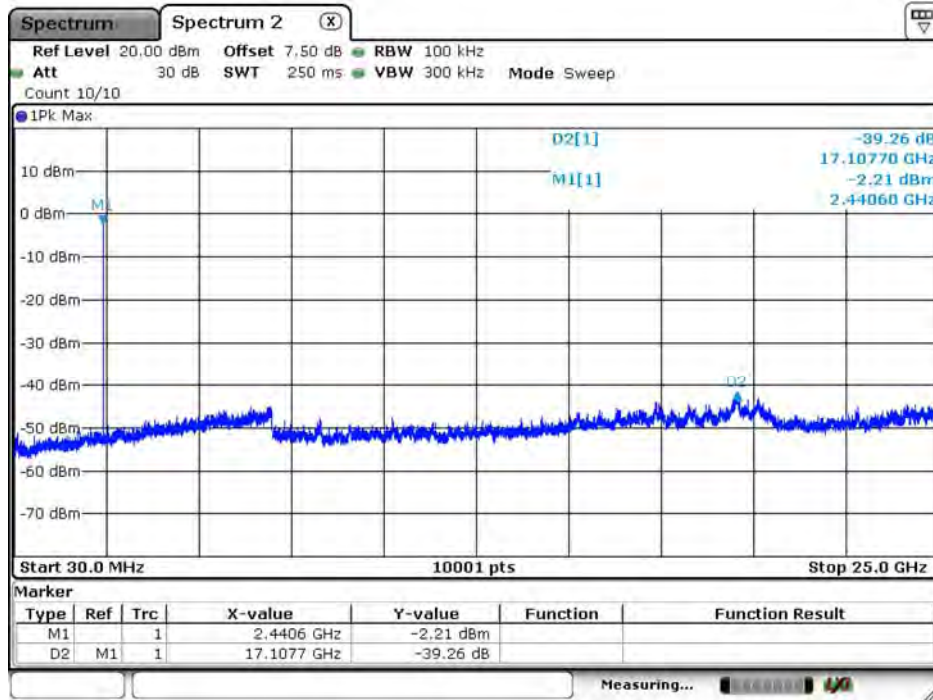
Product	V20 Crypto Hardware Wallet		
Test Item	RF antenna conducted test		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/14	Test Site	SR10-H

Channel 00 (30MHz-25GHz) (2M)

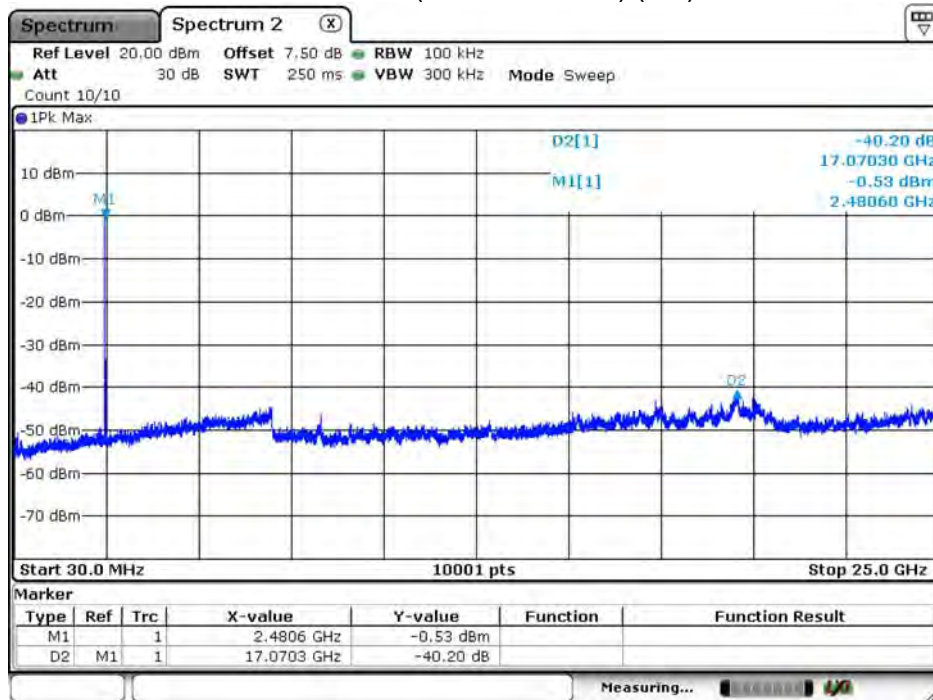


Date: 14.MAR.2019 14:23:00

Channel 19 (30MHz-25GHz) (2M)



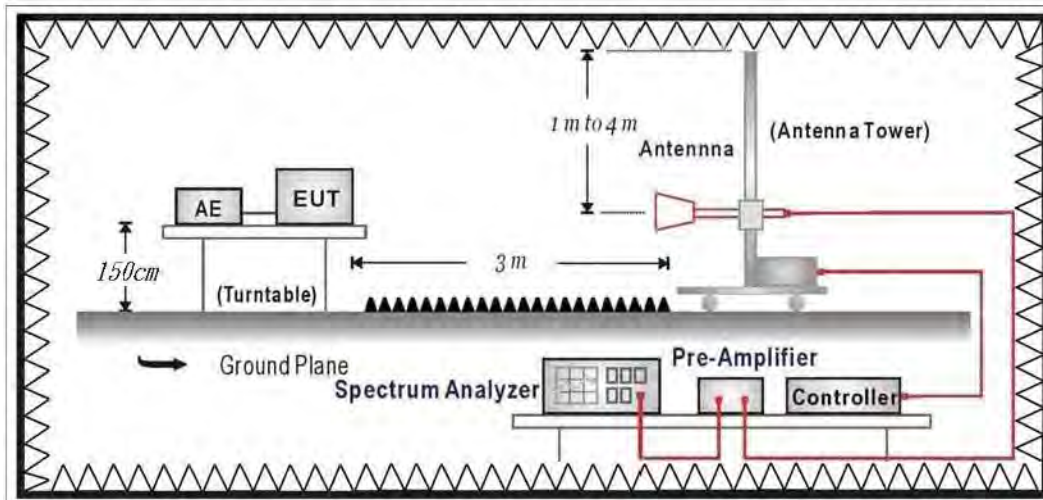
Channel 39 (30MHz-25GHz) (2M)



6. Radiated Emission Band Edge

6.1. Test Setup

RF Radiated Measurement:



6.2. 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.

6.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 D01V04 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.

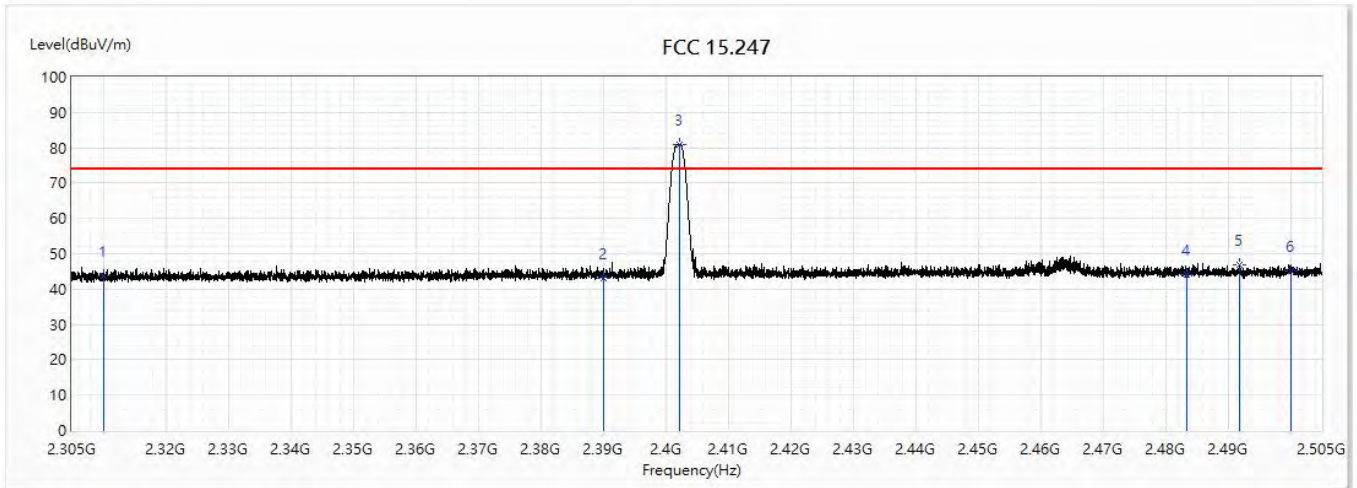
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

6.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247:2017

6.5. Test Result

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/14
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2402MHz		

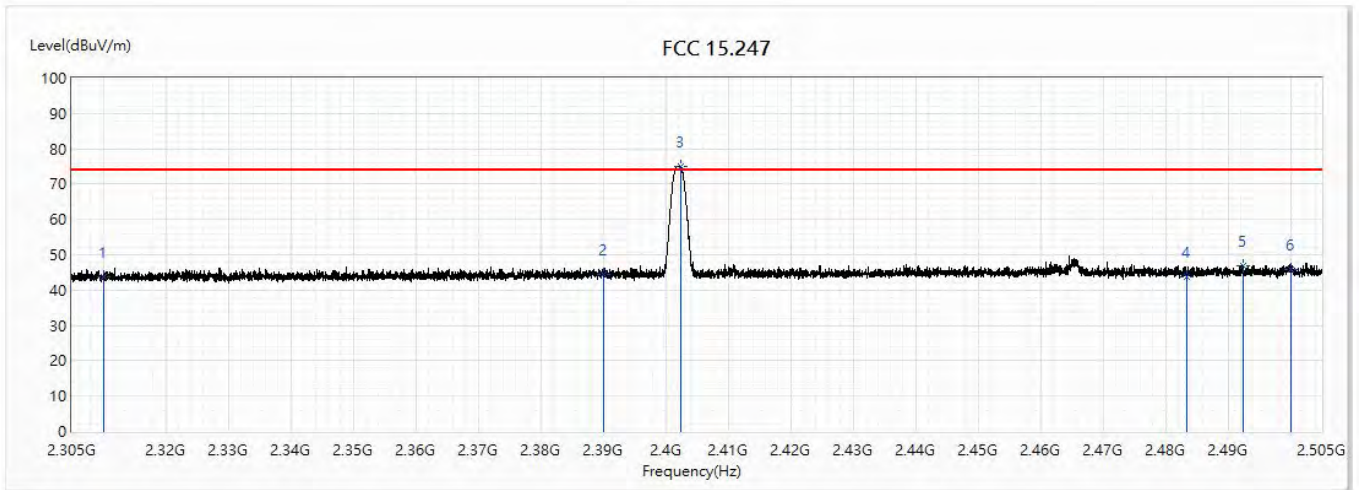


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.78	74.00	-30.22	29.54	14.24	PK
2	2390	43.20	74.00	-30.80	28.39	14.81	PK
! 3	2402.35	81.00	74.00	7.00	66.08	14.92	PK
4	2483.5	44.08	74.00	-29.92	28.60	15.48	PK
5	2491.95	46.98	74.00	-27.02	31.44	15.54	PK
6	2500	45.23	74.00	-28.77	29.64	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2402MHz		

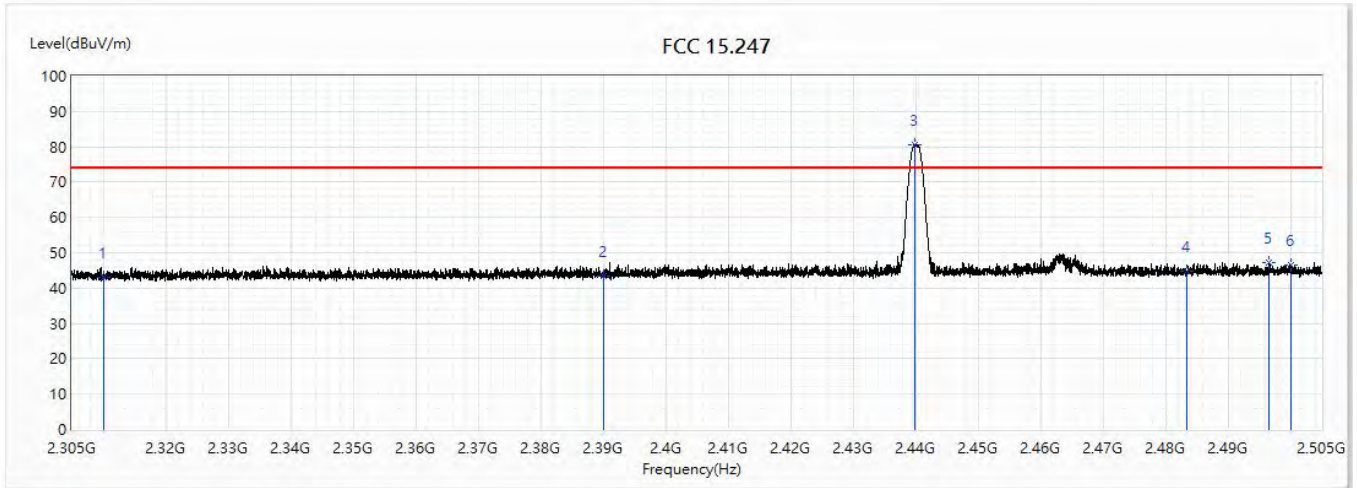


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.64	74.00	-30.36	29.40	14.24	PK
2	2390	44.40	74.00	-29.60	29.59	14.81	PK
! 3	2402.375	74.94	74.00	0.94	60.02	14.92	PK
4	2483.5	43.62	74.00	-30.38	28.14	15.48	PK
5	2492.4	46.76	74.00	-27.24	31.21	15.55	PK
6	2500	45.74	74.00	-28.26	30.15	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/14
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

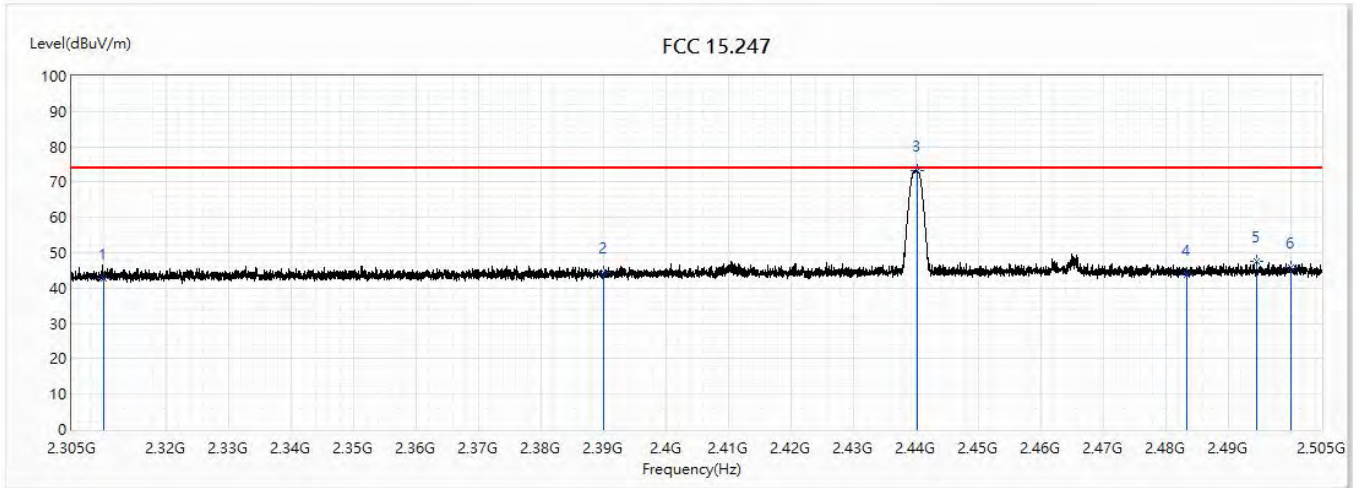


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.06	74.00	-30.94	28.82	14.24	PK
2	2390	43.52	74.00	-30.48	28.71	14.81	PK
! 3	2439.825	80.44	74.00	6.44	65.26	15.18	PK
4	2483.5	44.64	74.00	-29.36	29.16	15.48	PK
5	2496.625	47.19	74.00	-26.81	31.61	15.58	PK
6	2500	46.44	74.00	-27.56	30.85	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2440MHz		

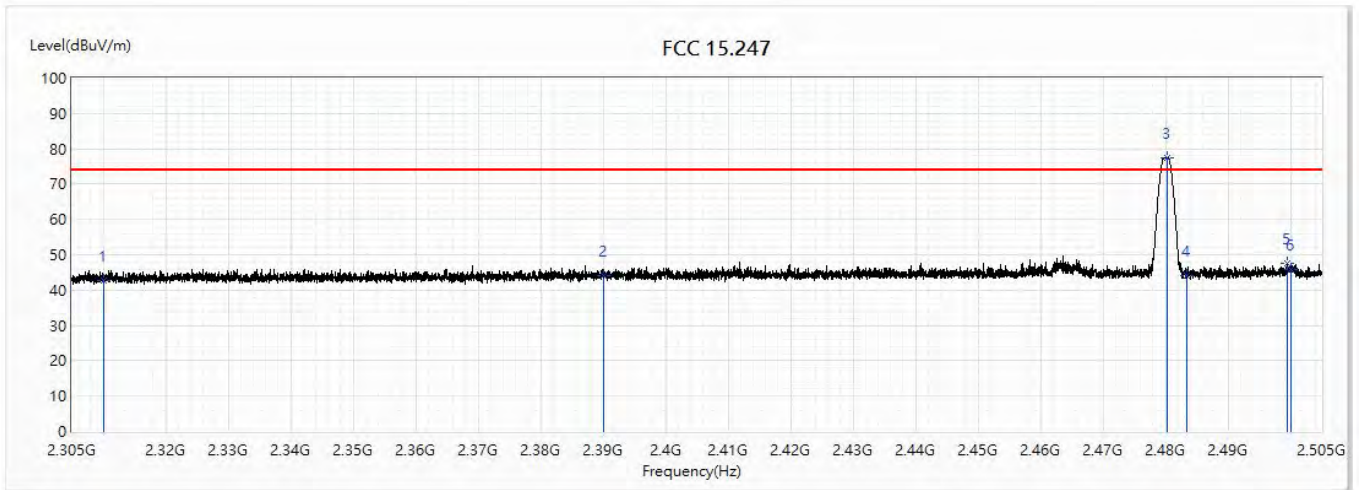


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	42.63	74.00	-31.37	28.39	14.24	PK
2	2390	44.48	74.00	-29.52	29.67	14.81	PK
* 3	2440.35	73.12	74.00	-0.88	57.93	15.19	PK
4	2483.5	43.81	74.00	-30.19	28.33	15.48	PK
5	2494.65	47.40	74.00	-26.60	31.85	15.55	PK
6	2500	45.94	74.00	-28.06	30.35	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/14
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2480MHz		

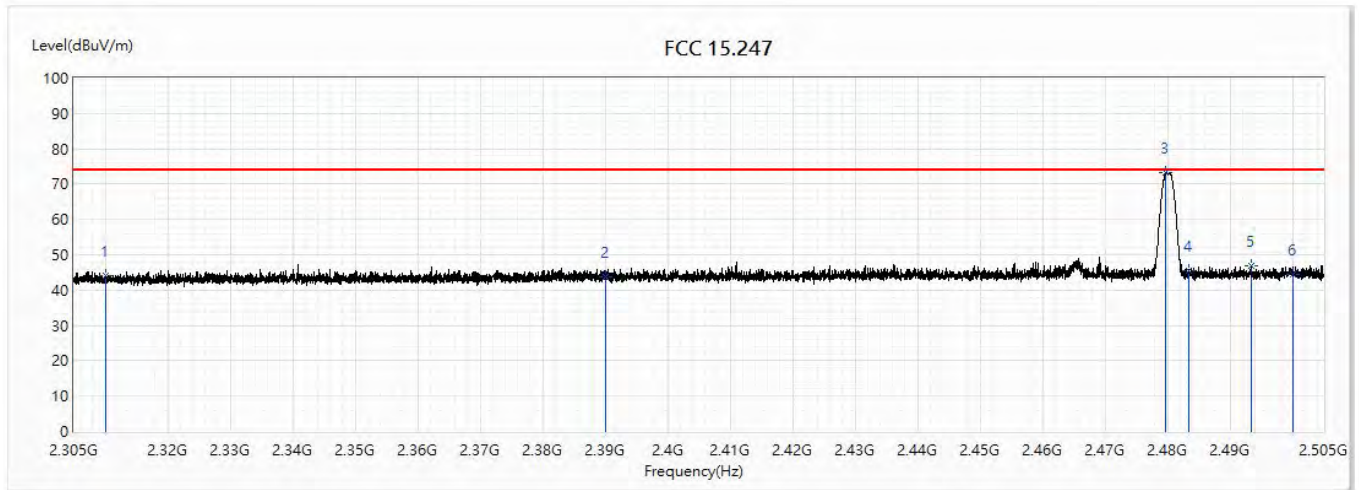


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	42.86	74.00	-31.14	28.62	14.24	PK
2	2390	44.23	74.00	-29.77	29.42	14.81	PK
! 3	2480.35	77.58	74.00	3.58	62.12	15.46	PK
4	2483.5	44.02	74.00	-29.98	28.54	15.48	PK
5	2499.525	47.56	74.00	-26.44	31.97	15.59	PK
6	2500	45.84	74.00	-28.16	30.25	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 1: Transmit_V20_1M		
Note :	BT5.0_2480MHz		

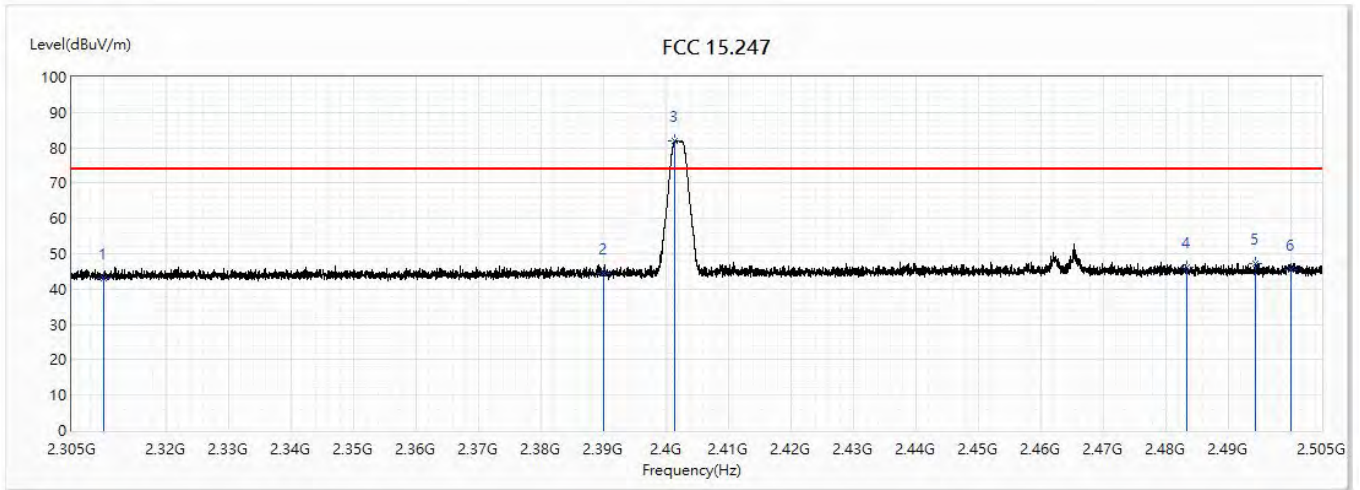


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	44.16	74.00	-29.84	29.92	14.24	PK
2	2390	43.85	74.00	-30.15	29.04	14.81	PK
* 3	2479.775	73.18	74.00	-0.82	57.73	15.45	PK
4	2483.5	45.36	74.00	-28.64	29.88	15.48	PK
5	2493.525	47.03	74.00	-26.97	31.48	15.55	PK
6	2500	44.38	74.00	-29.62	28.79	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2402MHz		

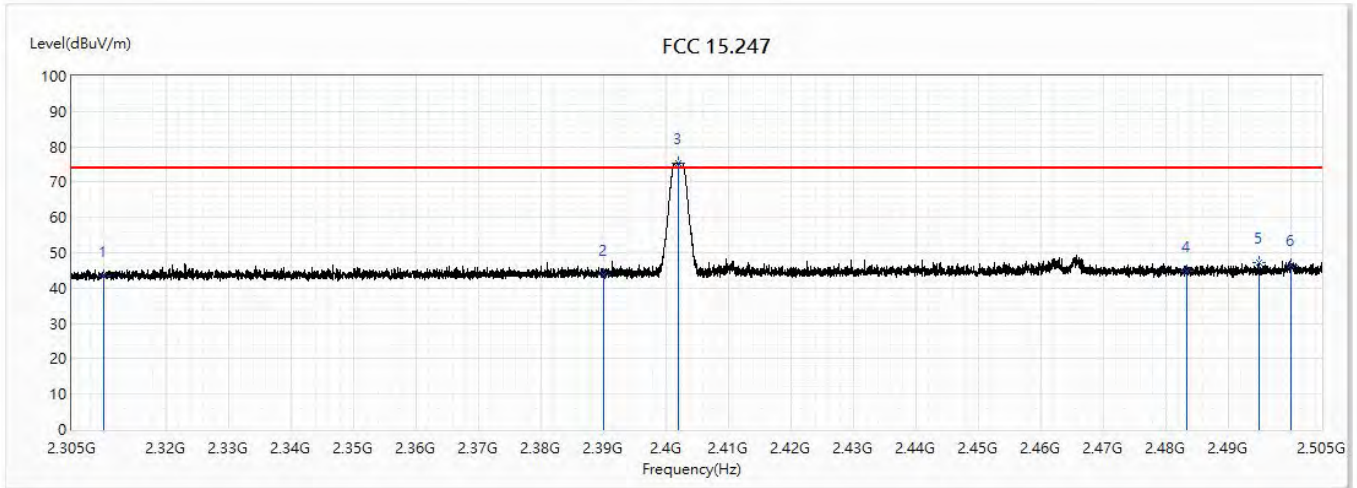


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.16	74.00	-30.84	28.92	14.24	PK
2	2390	44.52	74.00	-29.48	29.71	14.81	PK
! 3	2401.55	81.94	74.00	7.94	67.02	14.92	PK
4	2483.5	46.32	74.00	-27.68	30.84	15.48	PK
5	2494.35	47.09	74.00	-26.91	31.54	15.55	PK
6	2500	45.42	74.00	-28.58	29.83	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2402MHz		

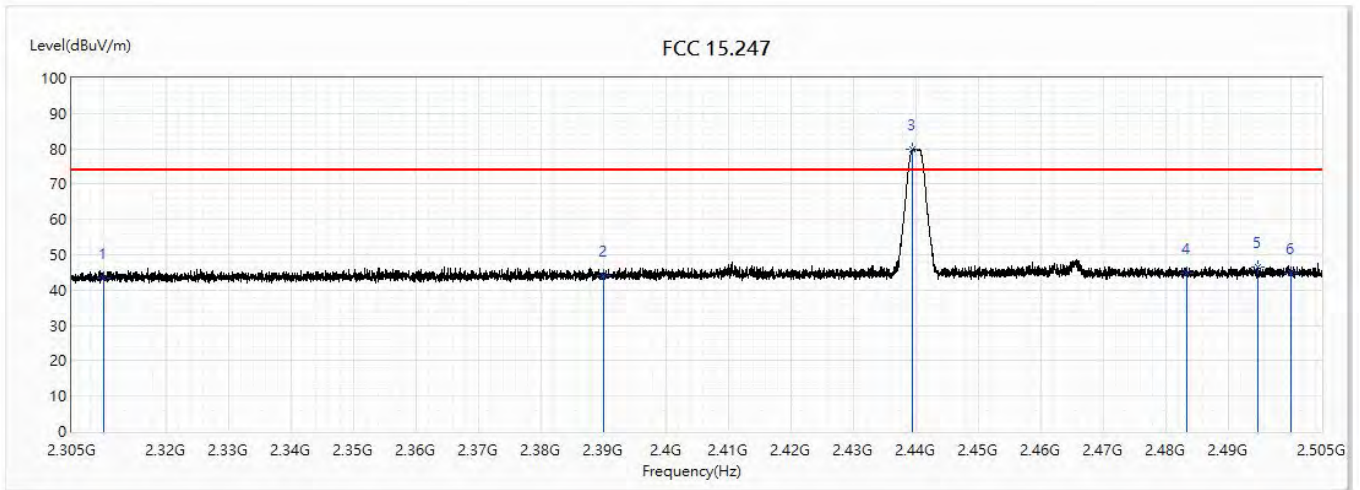


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.45	74.00	-30.55	29.21	14.24	PK
2	2390	43.79	74.00	-30.21	28.98	14.81	PK
! 3	2402.025	75.51	74.00	1.51	60.59	14.92	PK
4	2483.5	44.78	74.00	-29.22	29.30	15.48	PK
5	2494.925	47.15	74.00	-26.85	31.60	15.55	PK
6	2500	46.39	74.00	-27.61	30.80	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		

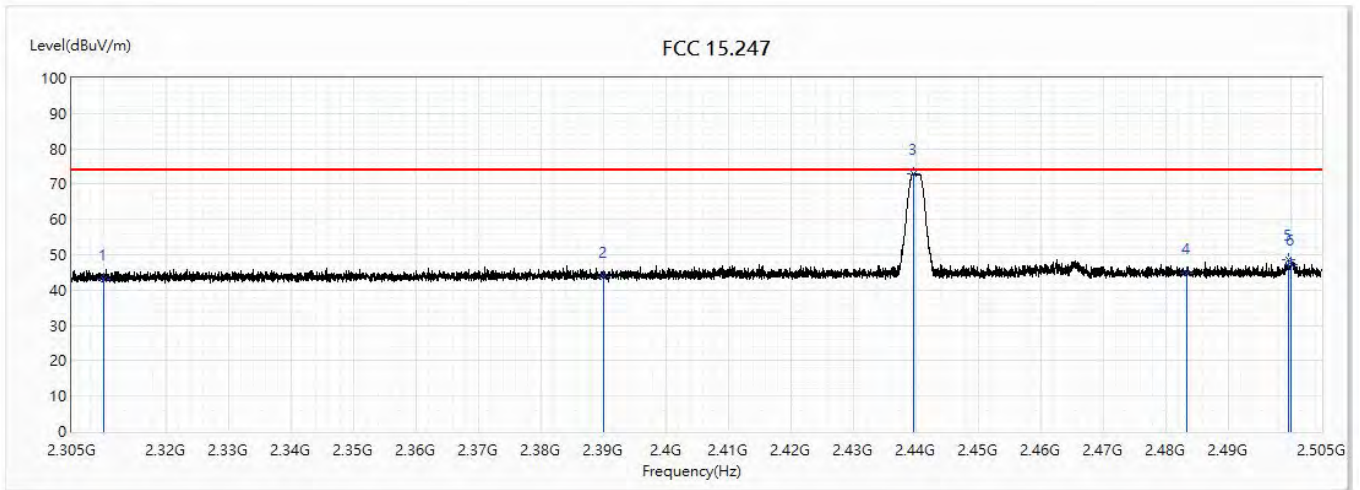


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	43.38	74.00	-30.62	29.14	14.24	PK
2	2390	44.08	74.00	-29.92	29.27	14.81	PK
! 3	2439.6	79.97	74.00	5.97	64.79	15.18	PK
4	2483.5	44.77	74.00	-29.23	29.29	15.48	PK
5	2494.825	46.47	74.00	-27.53	30.92	15.55	PK
6	2500	44.66	74.00	-29.34	29.07	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it's not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2440MHz		

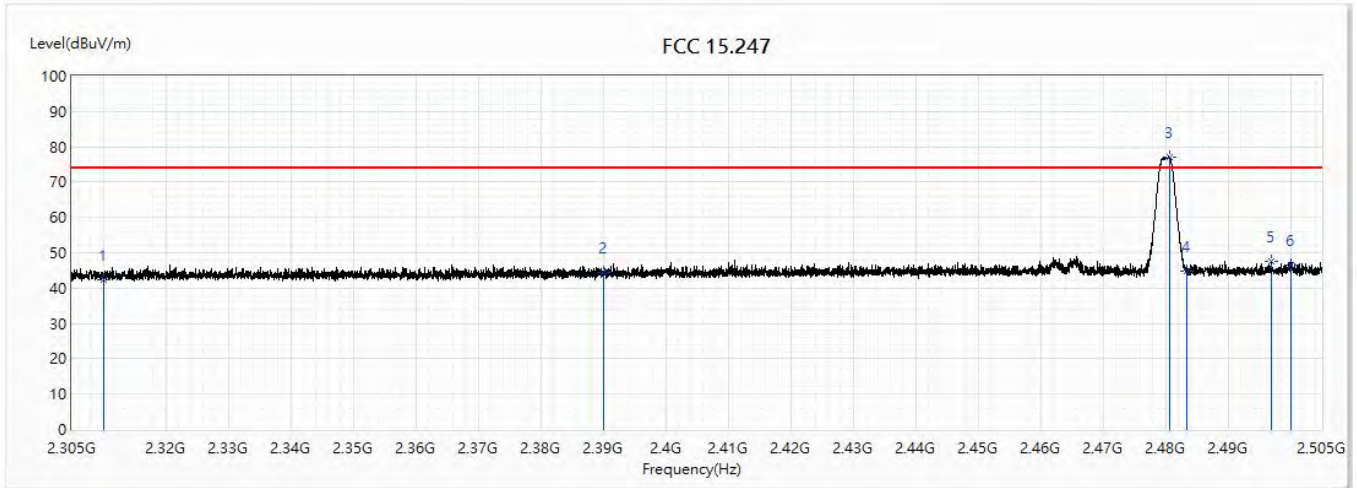


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	42.91	74.00	-31.09	28.67	14.24	PK
2	2390	43.59	74.00	-30.41	28.78	14.81	PK
* 3	2439.65	72.90	74.00	-1.10	57.72	15.18	PK
4	2483.5	44.85	74.00	-29.15	29.37	15.48	PK
5	2499.65	48.51	74.00	-25.49	32.92	15.59	PK
6	2500	47.35	74.00	-26.65	31.76	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Horizontal
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2480MHz		

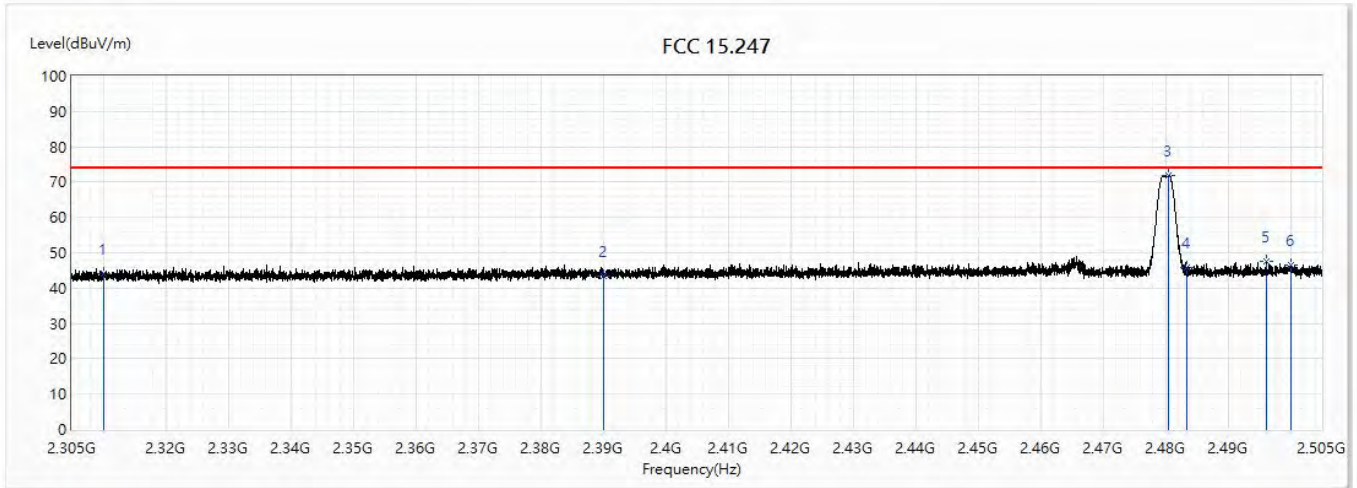


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	42.50	74.00	-31.50	28.26	14.24	PK
2	2390	44.53	74.00	-29.47	29.72	14.81	PK
! 3	2480.625	76.97	74.00	2.97	61.51	15.46	PK
4	2483.5	44.76	74.00	-29.24	29.28	15.48	PK
5	2497	47.45	74.00	-26.55	31.87	15.58	PK
6	2500	46.44	74.00	-27.56	30.85	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it’s not restricted by unwanted emission limit.

Site :	CB2-H	Engineer :	Elwin
Model No :	V20	Test Date :	2019/3/15
Test Voltage :	AC 120V, 60Hz	Polarity :	Vertical
Test Mode :	Mode 2: Transmit_V20_2M		
Note :	BT5.0_2480MHz		



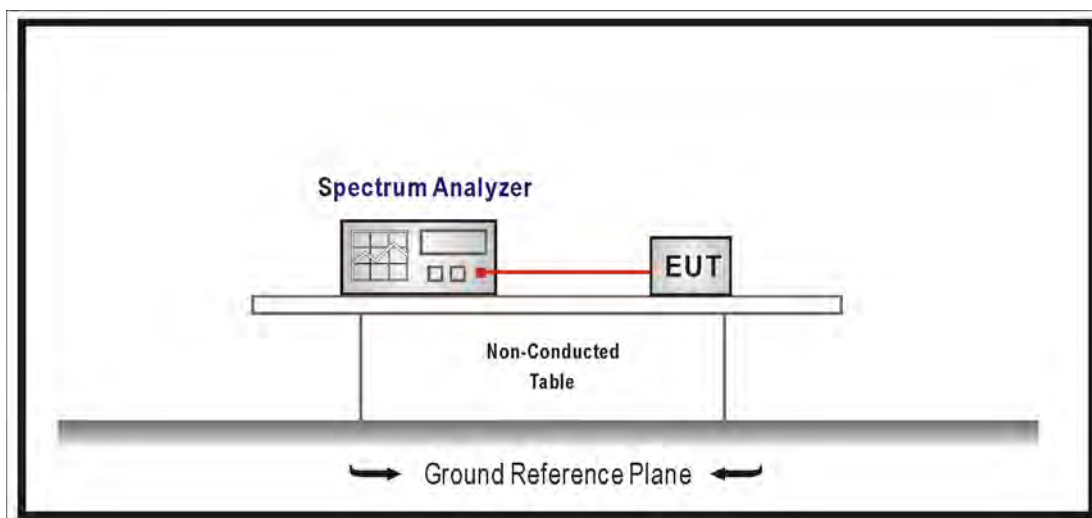
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	2310	44.24	74.00	-29.76	30.00	14.24	PK
2	2390	43.57	74.00	-30.43	28.76	14.81	PK
* 3	2480.525	71.92	74.00	-2.08	56.46	15.46	PK
4	2483.5	45.74	74.00	-28.26	30.26	15.48	PK
5	2496.15	47.41	74.00	-26.59	31.84	15.57	PK
6	2500	46.39	74.00	-27.61	30.80	15.59	PK

Note:

1. All reading above 1GHz is performed with peak measurements as necessary.
2. “ * ”, means this data is the worst emission level.
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. If the readings given are average, peak measurement should also be supplied.
5. The fundamental for reference only, it’s not restricted by unwanted emission limit.

7. Occupied Bandwidth & DTS Bandwidth

7.1. Test Setup



7.2. Limits

The 6 dB bandwidth: ≥ 500 kHz.

Occupied Bandwidth: NA

7.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V04 for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Specification

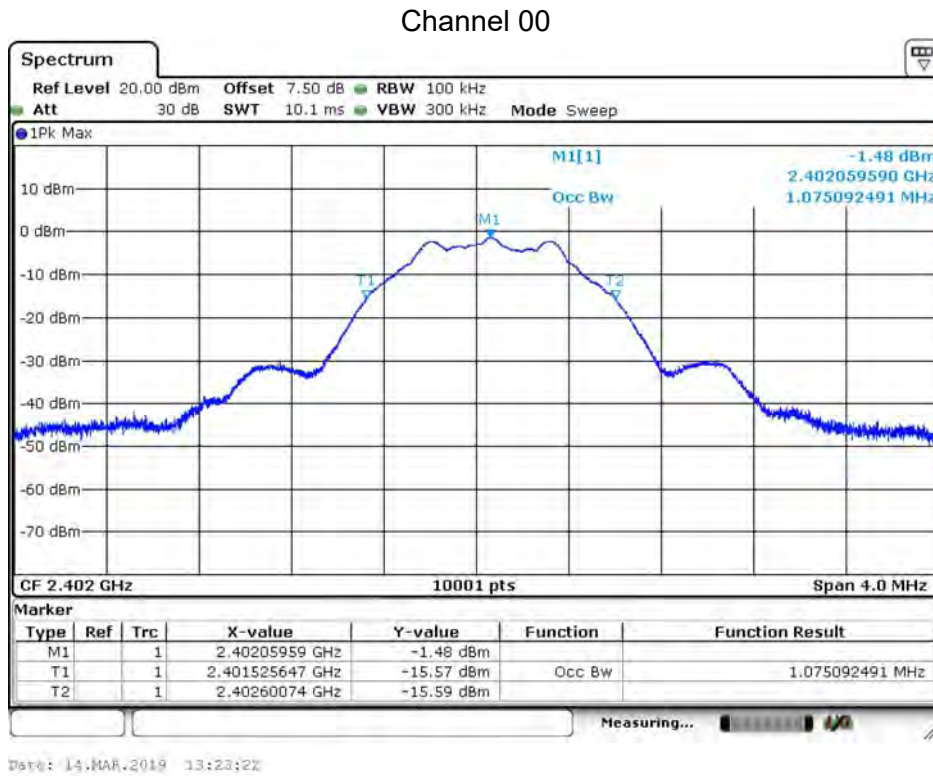
According to FCC Part 15 Subpart C Paragraph 15.247:2017

7.5. Test Result

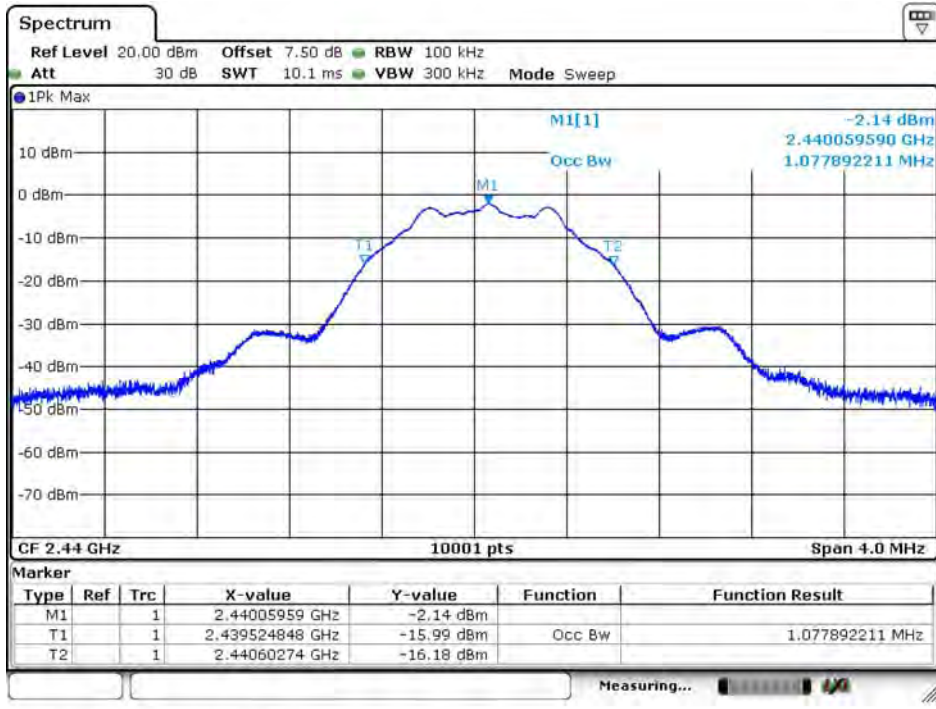
Product	V20 Crypto Hardware Wallet		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/14	Test Site	SR10-H

Occupied Bandwidth:

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
00	2402	1.075	--
19	2440	1.078	--
39	2480	1.079	--

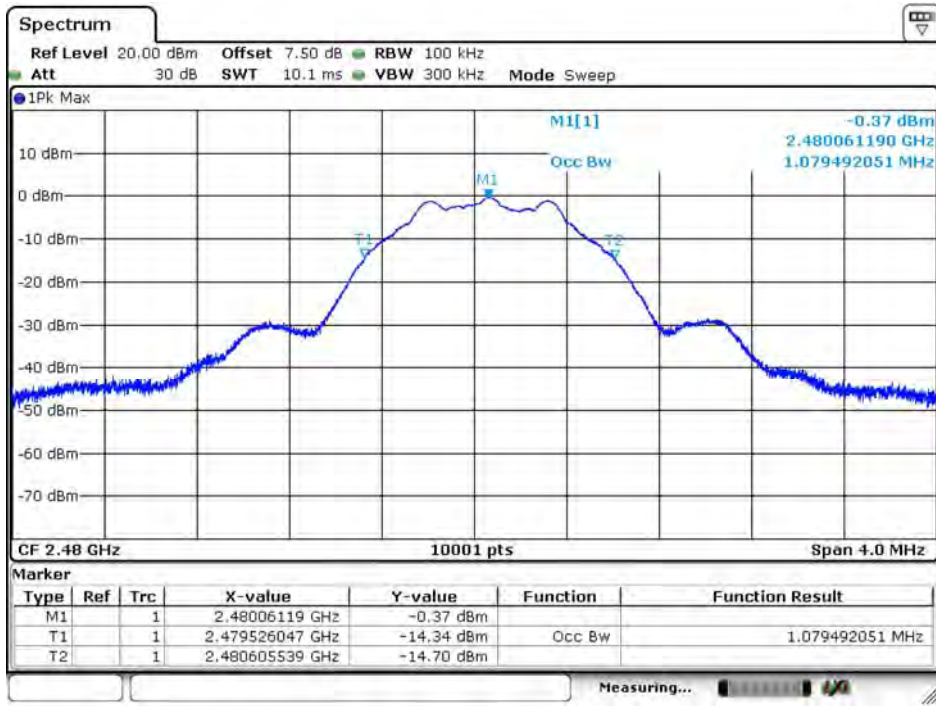


Channel 19



Date: 14.MAR.2019 13:22:30

Channel 39

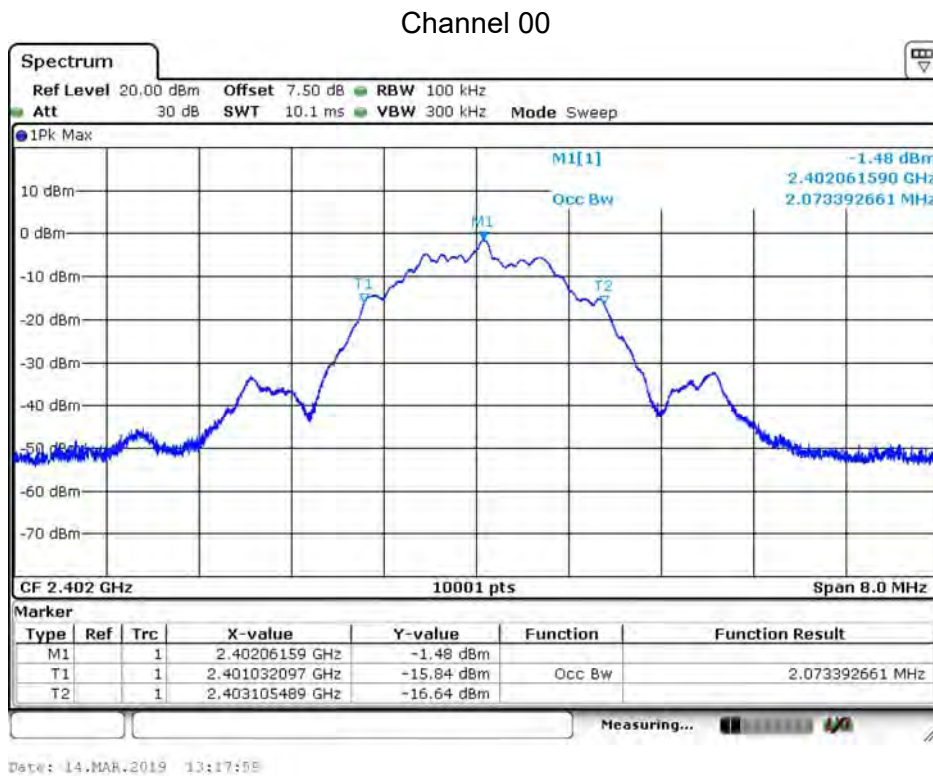


Date: 14.MAR.2019 13:21:51

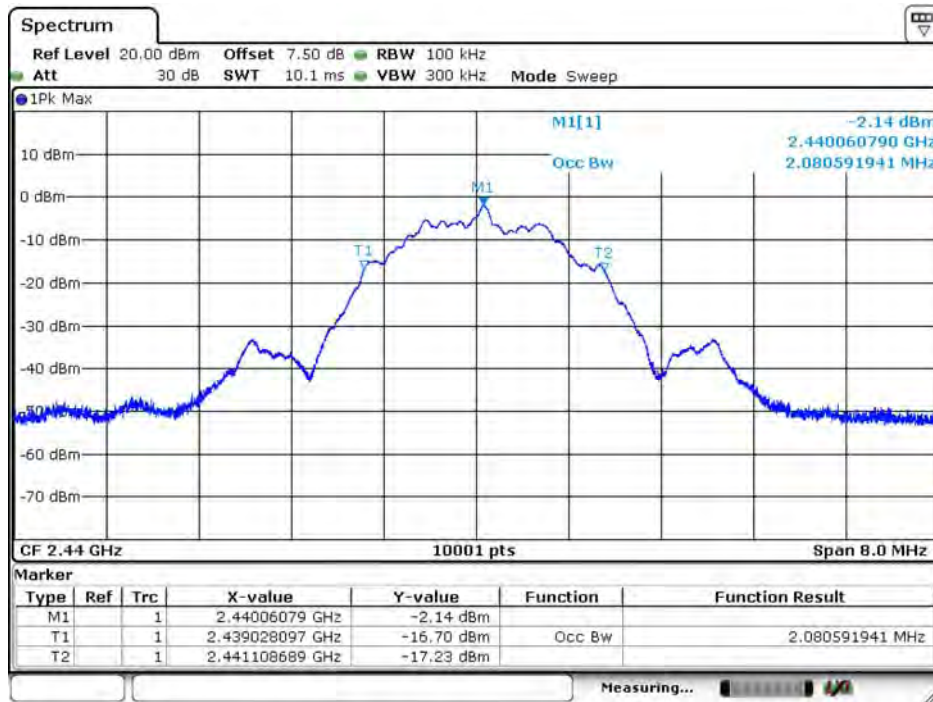
Product	V20 Crypto Hardware Wallet		
Test Item	Occupied Bandwidth		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/14	Test Site	SR10-H

Occupied Bandwidth:

Channel No.	Frequency (MHz)	Measure Level (MHz)	Limit (MHz)
00	2402	2.073	--
19	2440	2.081	--
39	2480	2.079	--

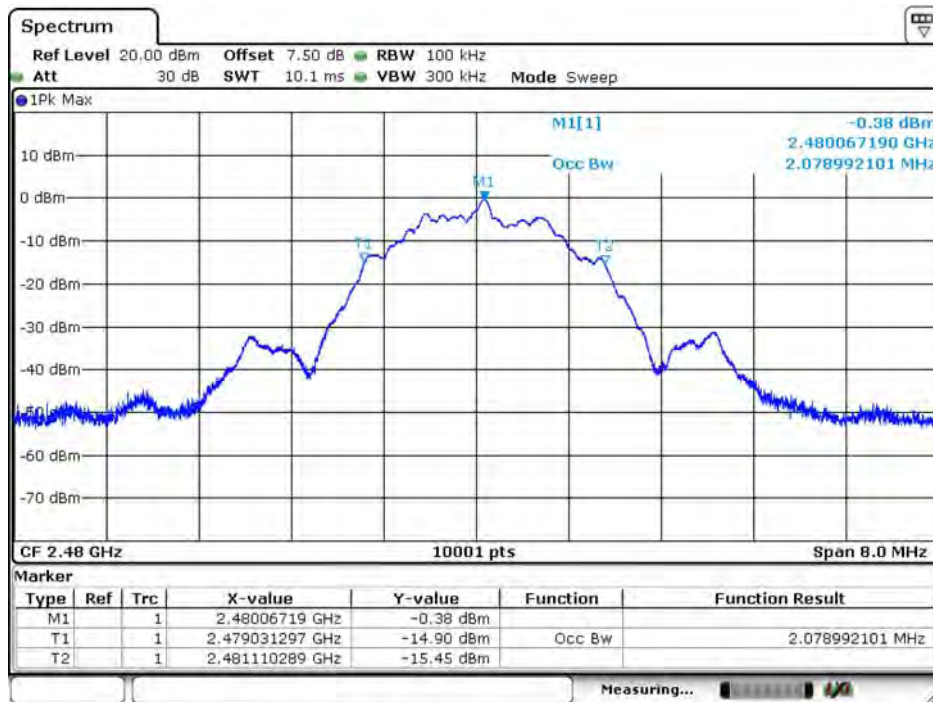


Channel 19



Date: 14.MAR.2019 13:19:30

Channel 39



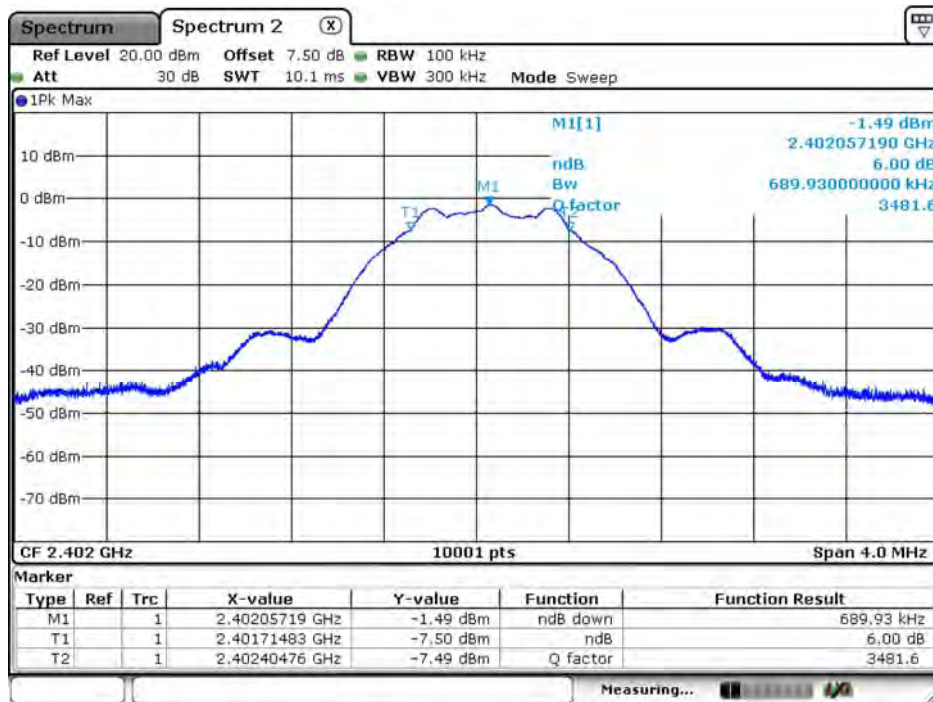
Date: 14.MAR.2019 13:21:09

Product	V20 Crypto Hardware Wallet		
Test Item	DTS Bandwidth		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/14	Test Site	SR10-H

DTS Bandwidth:

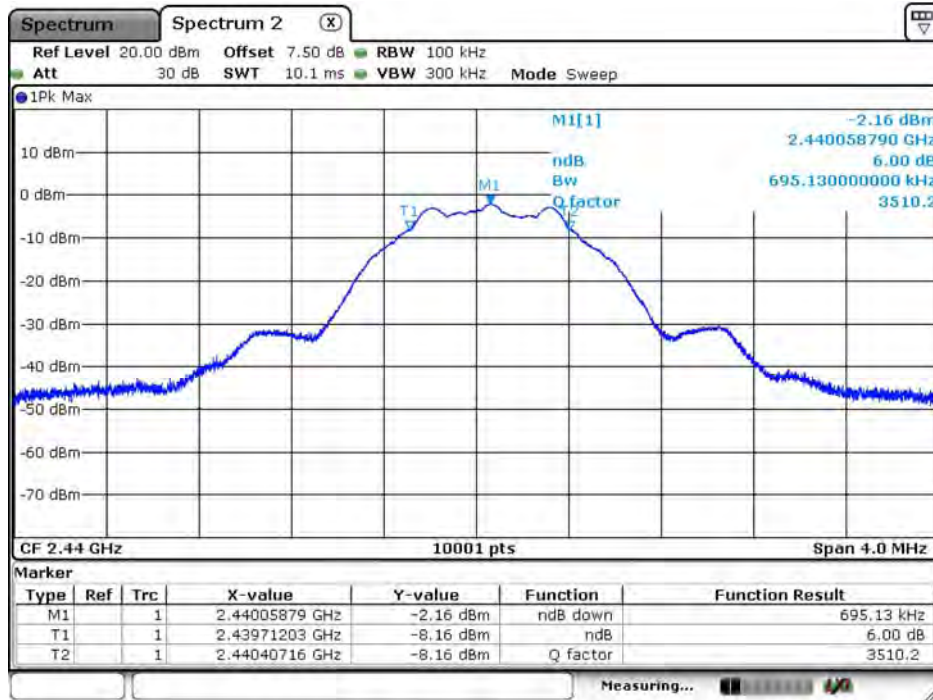
Channel No.	Frequency (MHz)	Measure Level (kHz)	Limit (kHz)
00	2402	0.690	≥ 500
19	2440	0.695	≥ 500
39	2480	0.694	≥ 500

Channel 00



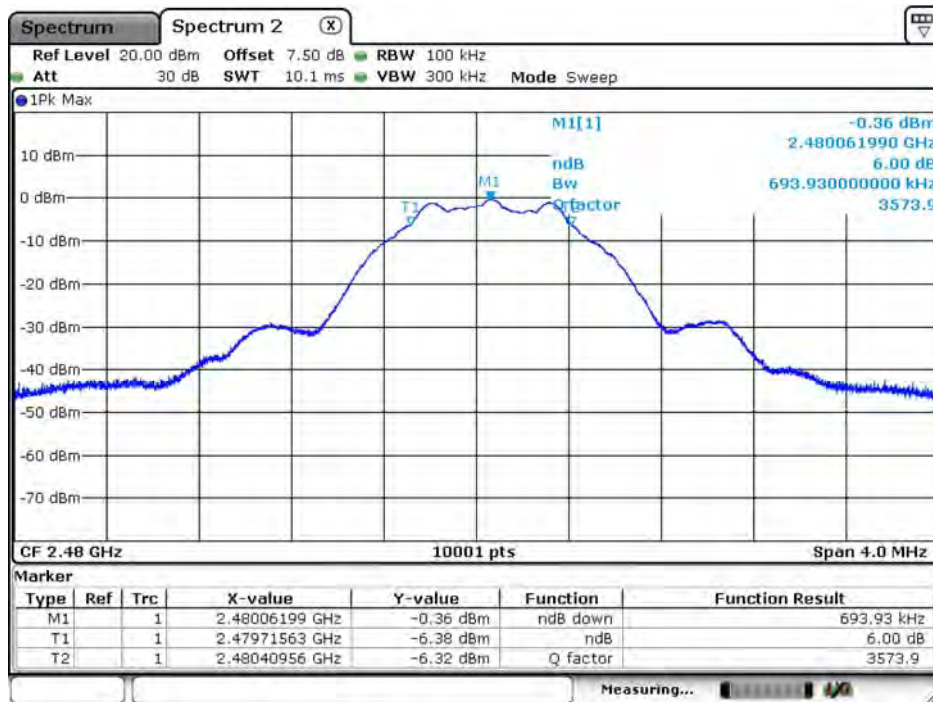
Date: 14.MAR.2019 13:35:00

Channel 19



Date: 14.MAR.2019 13:36:48

Channel 39

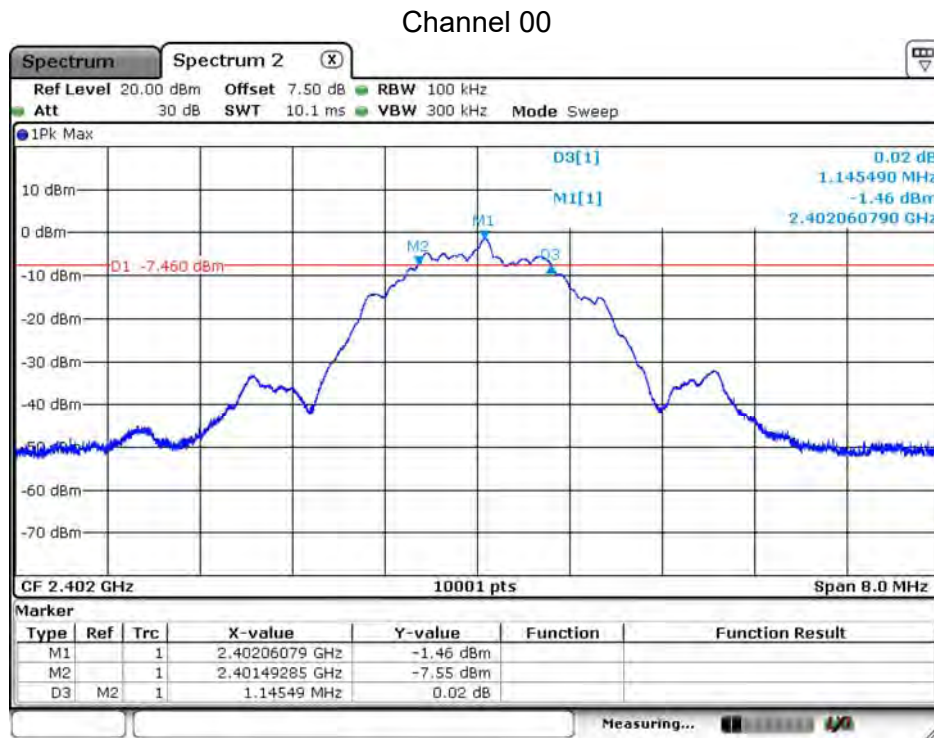


Date: 14.MAR.2019 13:39:10

Product	V20 Crypto Hardware Wallet		
Test Item	DTS Bandwidth		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/14	Test Site	SR10-H

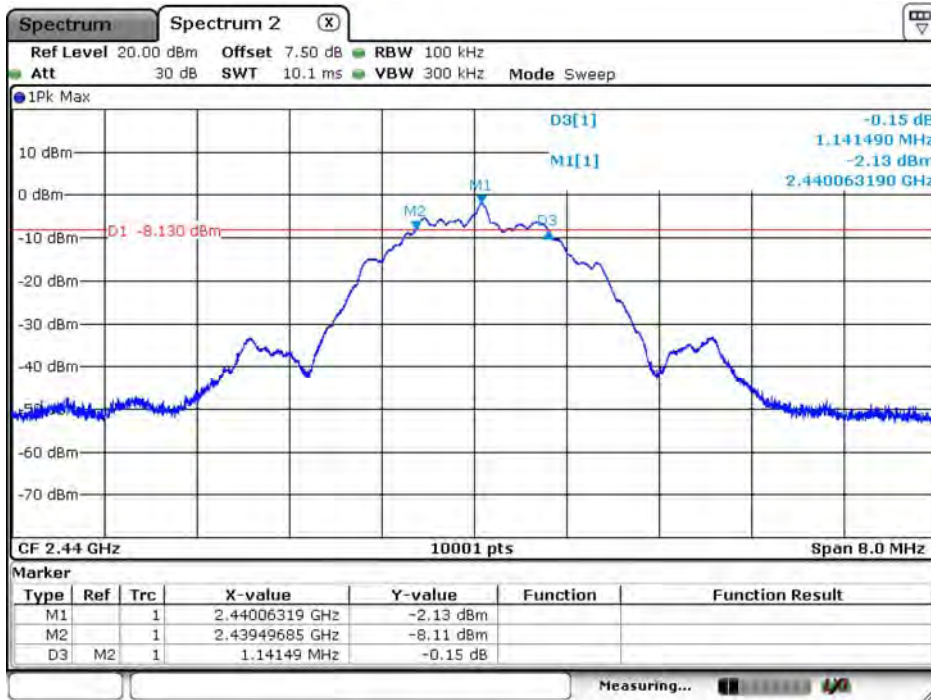
DTS Bandwidth:

Channel No.	Frequency (MHz)	Measure Level (kHz)	Limit (kHz)
00	2402	1.145	≥ 500
19	2440	1.141	≥ 500
39	2480	1.145	≥ 500



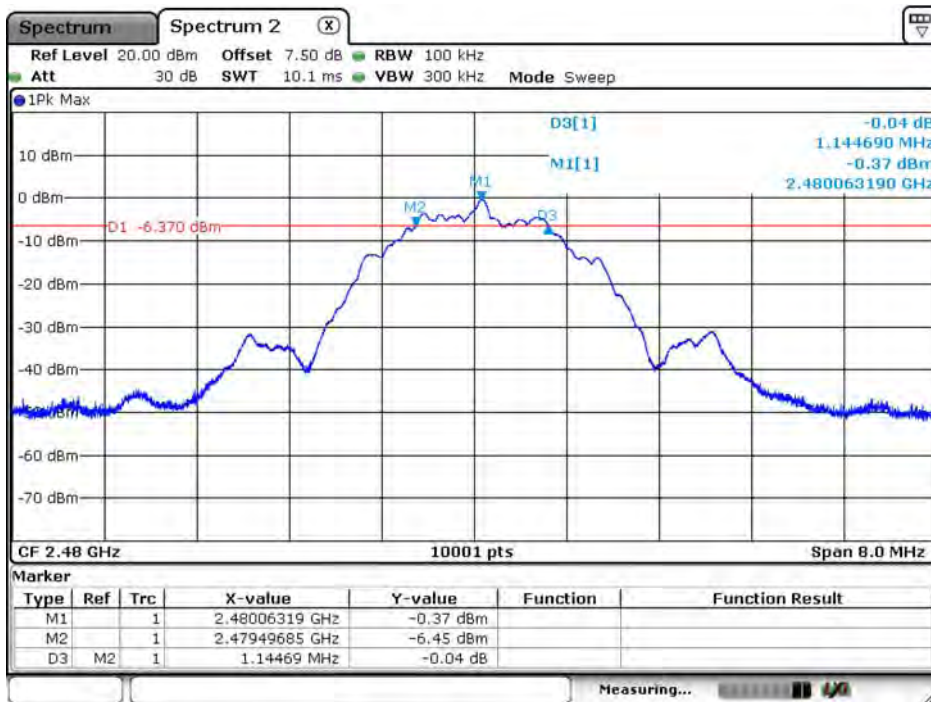
Date: 14.MAR.2019 13:49:42

Channel 19



Date: 14.MAR.2019 13:45:14

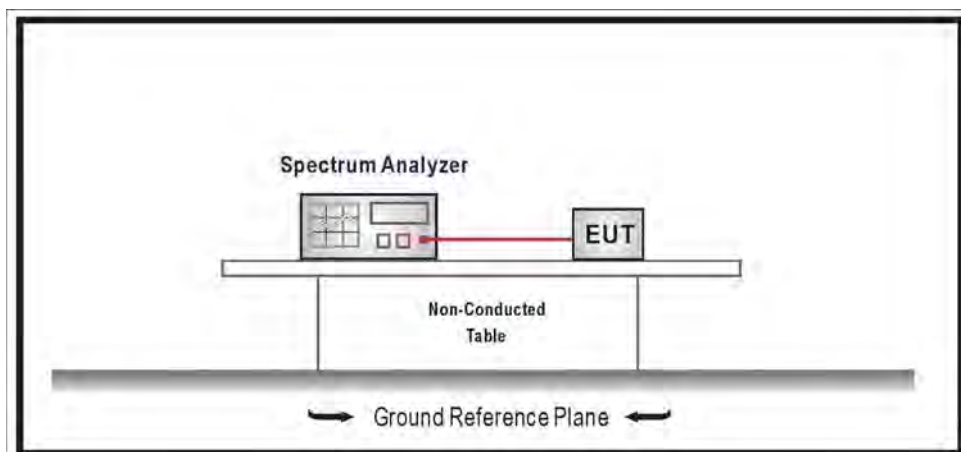
Channel 39



Date: 14.MAR.2019 13:42:43

8. Power Density

8.1. Test Setup



8.2. 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.

8.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure of KDB558074 D01V04 for compliance to FCC 47CFR 15.247 requirements.

8.4. Test Specification

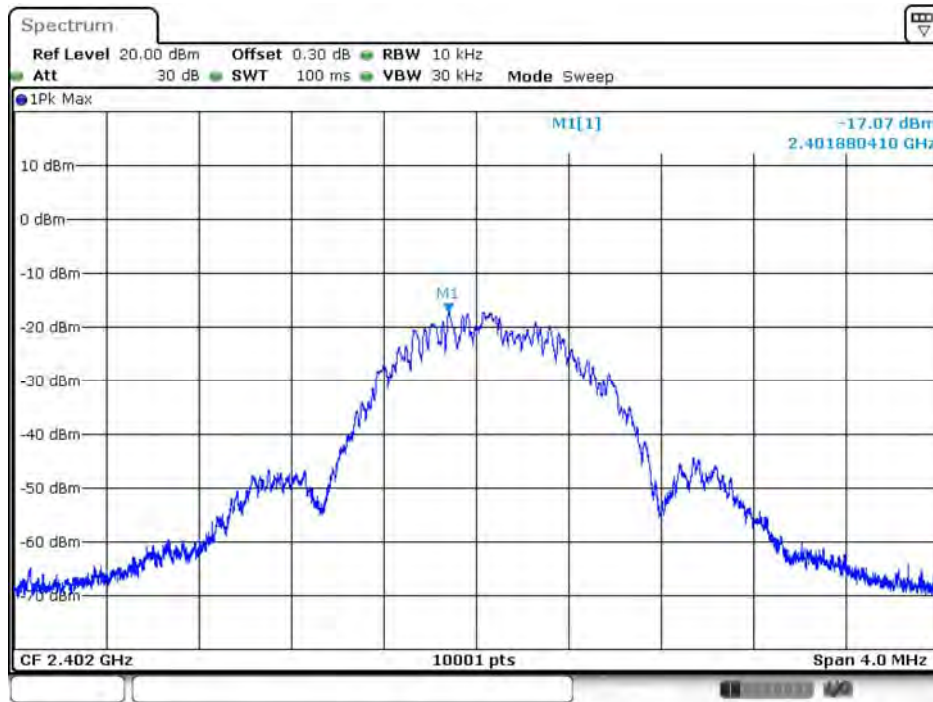
According to FCC Part 15 Subpart C Paragraph 15.247

8.5. Test Result

Product	V20 Crypto Hardware Wallet		
Test Item	Power Density		
Test Mode	Mode 1: Transmit_V20_1M		
Date of Test	2019/03/14	Test Site	SR10-H

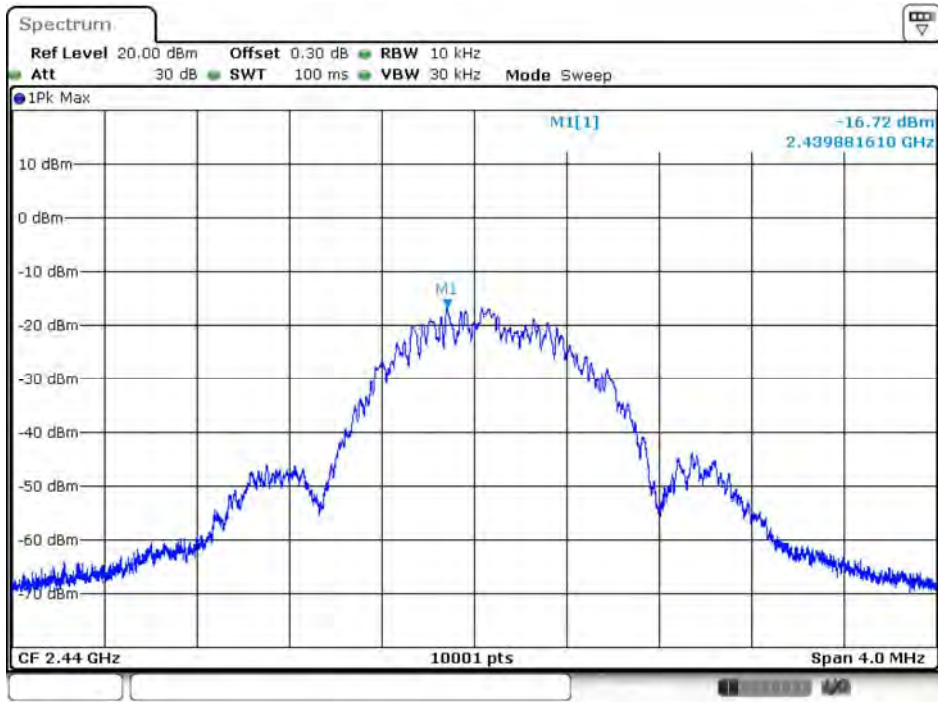
Channel No.	Frequency (MHz)	Measure Level (dBm/10kHz)	Limit (dBm/3kHz)
00	2402	-17.07	≤ 8
19	2440	-16.72	≤ 8
39	2480	-16.53	≤ 8

Channel 00



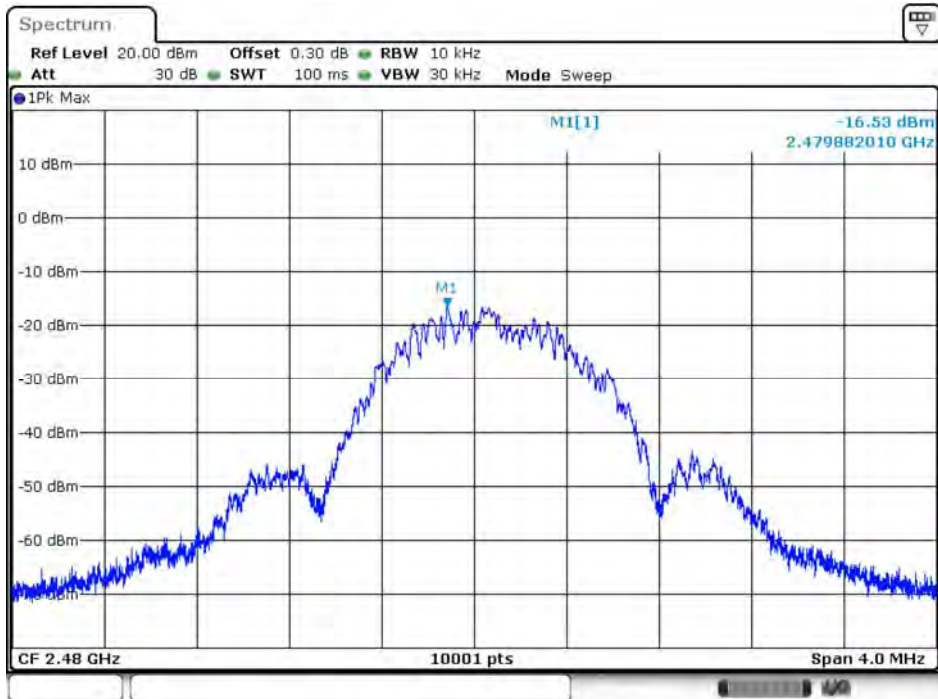
Date: 26.MAR.2019 14:03.49

Channel 19



Date: 26.MAR.2019 14:07:25

Channel 39

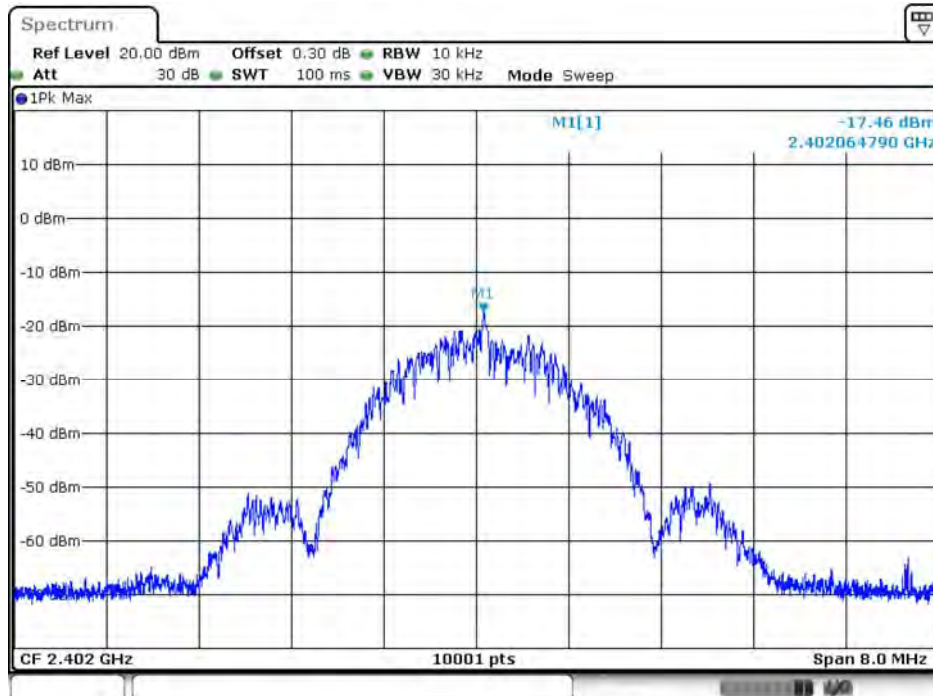


Date: 26.MAR.2019 14:08:23

Product	V20 Crypto Hardware Wallet		
Test Item	Power Density		
Test Mode	Mode 2: Transmit_V20_2M		
Date of Test	2019/03/14	Test Site	SR10-H

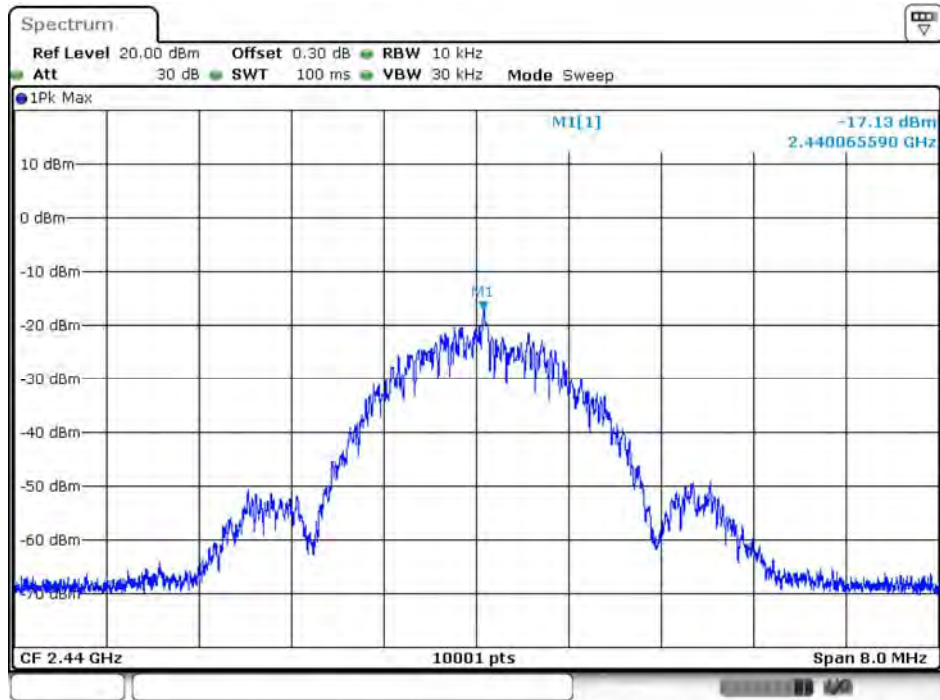
Channel No.	Frequency (MHz)	Measure Level (dBm/10kHz)	Limit (dBm/3kHz)
00	2402	-17.46	≤ 8
19	2440	-17.13	≤ 8
39	2480	-16.92	≤ 8

Channel 00



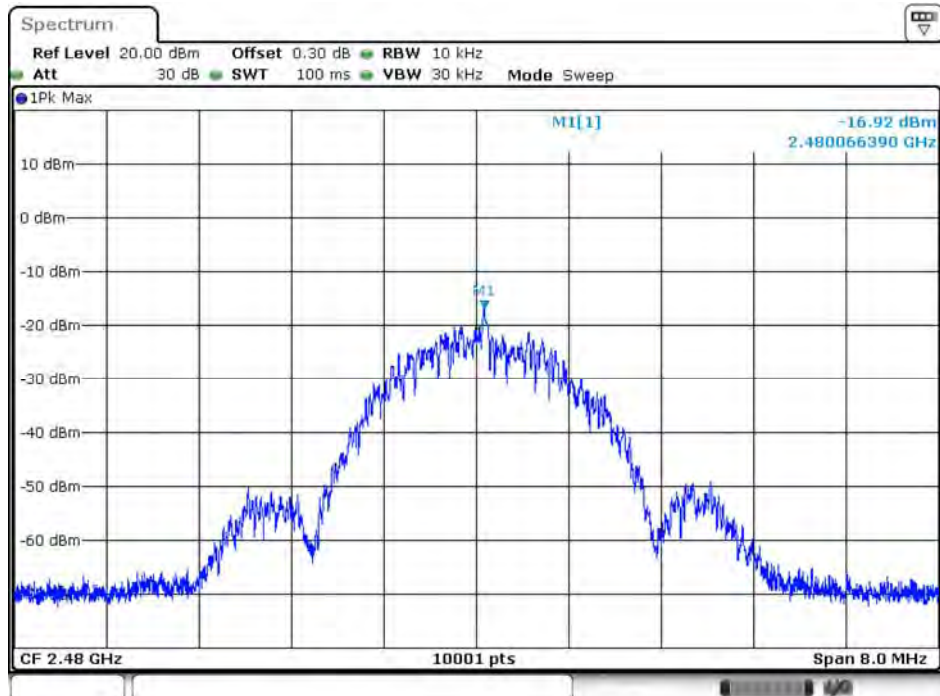
Date: 26.MAR.2019 14:27:46

Channel 19



Date: 26.MAR.2019 14:24:00

Channel 39



Date: 26.MAR.2019 14:12:35