

NCC RADIO TEST REPORT

Product name	SwitchBot Remote
Applicant	Woan Technology (Shenzhen) Co., Ltd.
Manufacture	Woan Technology (Shenzhen) Co., Ltd.
Rating(s)	DC3V from battery
Trademark	SwitchBot
Model and/or type reference	W0301700, W0301701, W0301702, W0301703, W0301704, W0301705
Standard	LP0002:2020
Test Result	Pass

Date of receipt : 02-15-2022

Date of Issue : 02-23-2022

Signature :



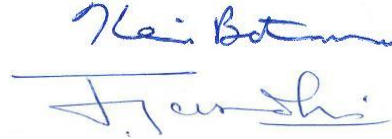
NCC RADIO TEST REPORT

Report Reference No. M220302N2

Compiled by (+ signature) Kevin Bothmann

Approved by (+ signature) Jay Gandhi

Date of issue 2022-02-23



Applicant's name Woan Technology (Shenzhen) Co., Ltd.

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Test specification:

Standard LP0002: 2020

Test procedure EIA 603、ANSI、FCC/47 CFR/2.1046、2.1047、2.1049、2.1051、2.1053
and 2.1055

Non-standard test method N/A

Test item description

Product name SwitchBot Remote

Brand name SwitchBot

Model and/or type reference W0301700

Rating(s) DC3V from battery

Testing Laboratory information

Testing Laboratory Name Electro Magnetic Test, Inc.

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CAB Identifier Number US0036

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Testing

Date of receipt of test item Feb. 15, 2022

Date (s) of performance of tests Feb. 15~ Feb. 22, 2022

Date of Issue Feb. 23, 2022

Test Result **Pass**

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Electro Magnetic Test, Inc., which is an independent testing and consulting firm. The test report is based on testing performed Electro Magnetic Test, Inc. personnel according to the measurement procedure described in the test specification given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government.

Electro Magnetic Test, Inc. is recognized by the following agencies for performing EMI/EMC testing:

COUNTRY	AGENCY	IDENTIFYING #
USA	Federal Communications Commission (FCC) (EMT's test site is recognized by the FCC)	Registration Number: 90576
USA, Canada, Taiwan, Australia/New Zealand, European Community	National Voluntary Lab Accreditation Program (NVLAP) (EMT is accredited by NVLAP. A copy of the NVLAP Scope Of Accreditation is available upon request.)	Lab Code: 200147-0
Canada	Industry Canada	File No.: IC 2804
Japan	Voluntary Control Council For Interference (VCCI)	A-0118
	Open Field Test Site "A"	-
	Mains Conducted Emissions Test Site "A"	-
	Telecom Conducted Emissions Test Site "A"	-
	3 Meter Semi-Anechoic Chamber Site "E"	-
	3 Meter Semi-Anechoic Chamber Site "E" (1GHz – 6GHz)	-
	Mains Conducted Emissions Test Site "E"	-
	Telecom Conducted Emissions Test Site "E"	-
Korea	Ministry of Information and Communication's Radio Research Laboratory (RRL) under the Asia Pacific Economic Cooperation (APEC) Mutual Recognition Arrangement (A copy of the Scope Of Accreditation is available upon request)	US0036
Taiwan	Bureau Of Standards, Metrology and Inspection (BSMI)	Reference Number: SL2-IN-E-1024
Australia / New Zealand	Australian Communications Authority (AUSTEL)	*

***THESE AGENCIES DO NOT ISSUE AN IDENTIFYING NUMBER TO TEST LABS.**

Table of Contents	Page
GENERAL REPORT SUMMARY	3
1 . SUMMARY OF TEST RESULTS	6
1.1 MEASUREMENT UNCERTAINTY	7
2 . GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF EUT	8
2.2 DESCRIPTION OF TEST MODES	10
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	10
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	11
2.5 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)	12
3 . TRANSMITTER EMISSION TEST	17
3.1 CONDUCTED EMISSION MEASUREMENT	17
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	17
3.1.2 TEST PROCEDURE	18
3.1.3 DEVIATION FROM TEST STANDARD	18
3.1.4 TEST SETUP	18
3.1.5 TEST RESULTS	19
3.2 RADIATED EMISSION MEASUREMENT	20
3.2.1 RADIATED EMISSION LIMITS	20
3.2.2 TEST PROCEDURE	21
3.2.3 TEST SETUP	21
3.2.4 EUT OPERATING CONDITIONS	22
3.2.5 TEST RESULTS (BLOW 30MHZ)	23
3.2.6 TEST RESULTS (BETWEEN30 – 1000 MHZ)	23
3.2.7 TEST RESULTS (ABOVE 1000 MHZ)	29
3.2.8 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)	57
4 . OCCUPIED BANDWIDTH TEST	64
4.1 APPLIED PROCEDURES / LIMIT	64
4.1.1 TEST PROCEDURE	64
4.1.2 TEST SETUP	64
4.1.3 EUT OPERATION CONDITIONS	64
4.1.4 TEST RESULTS	65
5 . POWER DENSITY	69
5.1 APPLIED PROCEDURES / LIMIT	69
5.1.1 TEST PROCEDURE	69
5.1.2 TEST SETUP	69
5.1.3 EUT OPERATION CONDITIONS	69

Table of Contents	Page
5.1.4 TEST RESULTS	70
6 . OUTPUT POWER TEST	74
6.1 APPLIED PROCEDURES / LIMIT	74
6.1.1 TEST PROCEDURE	74
6.1.2 DEVIATION FROM STANDARD	74
6.1.3 TEST SETUP	74
6.1.4 EUT OPERATION CONDITIONS	74
6.1.5 TEST RESULTS	75
7 . ANTENNA CONDUCTED SPURIOUS EMISSION	79
7.1 APPLIED PROCEDURES / LIMIT	79
7.1.1 TEST PROCEDURE	79
7.1.2 TEST SETUP	79
7.1.3 EUT OPERATION CONDITIONS	79
7.1.4 TEST RESULTS	80
8. ANTENNA REQUIREMENT	91
8.1 STANDARD REQUIREMENT	91
8.2 EUT ANTENNA	91
9. EUT TEST PHOTO	92
10. APPENDIX-Photographs of EUT Constructional Details	

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

LP0002 : 2020			
Standard Section	Test Item	Judgment	Remark
3.3	Conducted Emission	N/A	None
4.10.1.5/3.6	Radiated Spurious Emission	PASS	None
4.10.1.2	Peak Output Power	PASS	None
4.10.1.6	6dB Occupied Bandwidth	PASS	None
4.10.1.6	Power Density	PASS	None
4.10.1.5/3.6	Restricted Bands	PASS	None
4.10.1.3	Antenna Requirement	PASS	None

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	1.38dB
2	Radiated Emission Test	3.17dB
3	RF power,conducted	0.16dB
4	Spurious emissions,conducted	0.21dB
5	All emissions,radiated(<1G)	4.68dB
6	All emissions,radiated(>1G)	4.89dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	SwitchBot Remote	
Brand Name	SwitchBot	
Model Name	W0301700	
Serial Model Name	W0301701,W0301702,W0301703,W0301704,W0301705	
OEM Brand/Model Name	N/A	
Product Description	The EUT is a W0301700.	
	Operation Frequency:	2402~2480 MHz
	Modulation Type:	GFSK
	Bit Rate of Transmitter	1Mbps
	Number Of Channel	40
	Antenna Designation:	Please see Note 3.
	Antenna Gain(Peak)	0.3 dBi
	Output Power:	1M:-5.09dBm(Max) 2M:-5.07dBm(Max)
Channel List	Please refer to the Note 2.	
Power Rating	DC3V from battery	
Connecting I/O Port(s)	Please refer to the User's Manual	
Products Covered	N/A	
EUT Modification(s)	N/A	
Model difference	N/A	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Description of Channel:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	21	2442
02	2404	22	2444
03	2406	23	2446
04	2408	24	2448
05	2410	25	2450
06	2412	26	2452
07	2414	27	2454
08	2416	28	2456
09	2418	29	2458
10	2420	30	2460
11	2422	31	2462
12	2424	32	2464
13	2426	33	2466
14	2428	34	2468
15	2430	35	2470
16	2432	36	2472
17	2434	37	2474
18	2436	38	2476
19	2438	39	2478
20	2440	40	2480

- 3.

Table for Filed Antenna

	Manufacture	Model Name	Antenna Type	Connector	Gain (dBi)
1	Woan Technology (Shenzhen) Co., Ltd.	W1101500	PCB Antenna	N/A	0.3 dBi

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	GFSK
Mode 2	RX
Mode 3	Work

For Conducted Emission	
Final Test Mode	Description
Mode 1	GFSK
Mode 3	Work

For Radiated Emission	
Final Test Mode	Description
Mode 1	GFSK
Mode 2	RX
Mode 3	Work

Note:

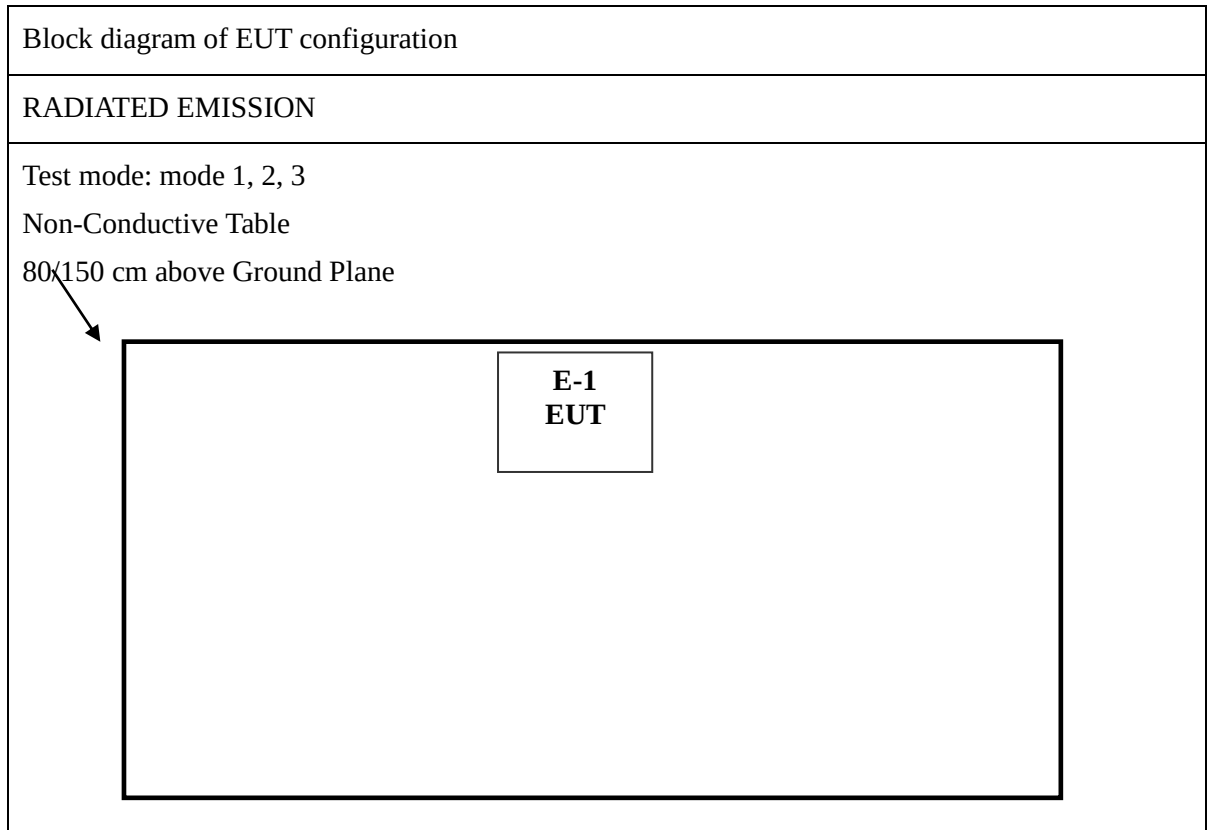
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.
- (3) For all tests the worst-case was selected as the table above, the data of the worst-case is shown in the report.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters.

Test software Version	v1.0.1.7	Test program:	RTL8762x_RFTesTool
Frequency	2402 MHz	2440 MHz	2480 MHz
Parameters(1Mbps)	Default	Default	Default
Parameters(2Mbps)	Default	Default	Default

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	SwitchBot Remote	SwitchBot	W0301700	N/A	N/A	EUT
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Item	Equipment	Mfr/Brand	Model/Type No.	Note
1	N/A	N/A	N/A	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” means “shielded” or “with ferrite core”; “NO” means “unshielded” or “without ferrite core”
- (4) “*”: In this report, the applicant did not provide the accompanying accessories with the equipment. The accessories were provided by the laboratory (or the applicant) and inspected simultaneously.

2.5.1 EQUIPMENTS LIST FOR ALL TEST ITEMS

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Spectrum Analyzer	Keysight	N9020A	MY53300466	April 29, 2021	1 Year
RF Preselector	Hewlett Packard	85685A	3010A01157	April 29, 2021	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650	2521A00584	April 29, 2021	1 Year
Preamplifier	Com Power	PA-102	1482	April 29, 2021	1 Year
RF Attenuator	Mini-Circuits	CAT-10	Asset #1000	December 08, 2021	1 Year
LISN	Com Power	LI-200	12012	September 09, 2021	1 Year
LISN	Com Power	LI-200	12214	September 09, 2021	1 Year
LISN	Com Power	LI-200	1767	September 09, 2021	1 Year
LISN	Com Power	LI-200	1768	September 09, 2021	1 Year
Biconical Antenna	Com Power	AB-100	01557	December 29, 2021	1 Year
Log Periodic Antenna	Com Power	AL-100	16037	December 22, 2021	1 Year
Horn Antenna	Com Power	AHA-118	711054	December 22, 2021	1 Year
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Dell, Inc.	DHS	DNSV641	N/A	N/A

EMI Test Equipment (Continued)

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
EMI Receiver	Rohde & Schwarz	ESU40	100127	June 12, 2021	1 Year
BiConiLog Antenna	ETS-Lindgren	3142D	00102183	August 13, 2021	1 Year
Horn Antenna (1GHz-18GHz)	ETS-Lindgren	3117	00109294	May 6, 2021	1 Year
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	May 6, 2021	1 Year
Preamplifier	Rohde & Schwarz	TS-PR18	100056	June 12, 2021	1 Year
Pre-Amplifier	Agilent	8449B	3008A00409	June 12, 2021	1 Year
Antenna Mast	ETS-Lindgren	2175	00095727	N/A	N/A
Turntable	ETS-Lindgren	2187-3.0	00118231	N/A	N/A
Computer	Acer	Aspire 8930	85100050123	N/A	N/A
Multi-Function Controller	ETS-Lindgren	2090	00102270	N/A	N/A
Loop Antenna	ARA	PLA-1030/B	1029	May 19, 2021	1 Year

3. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

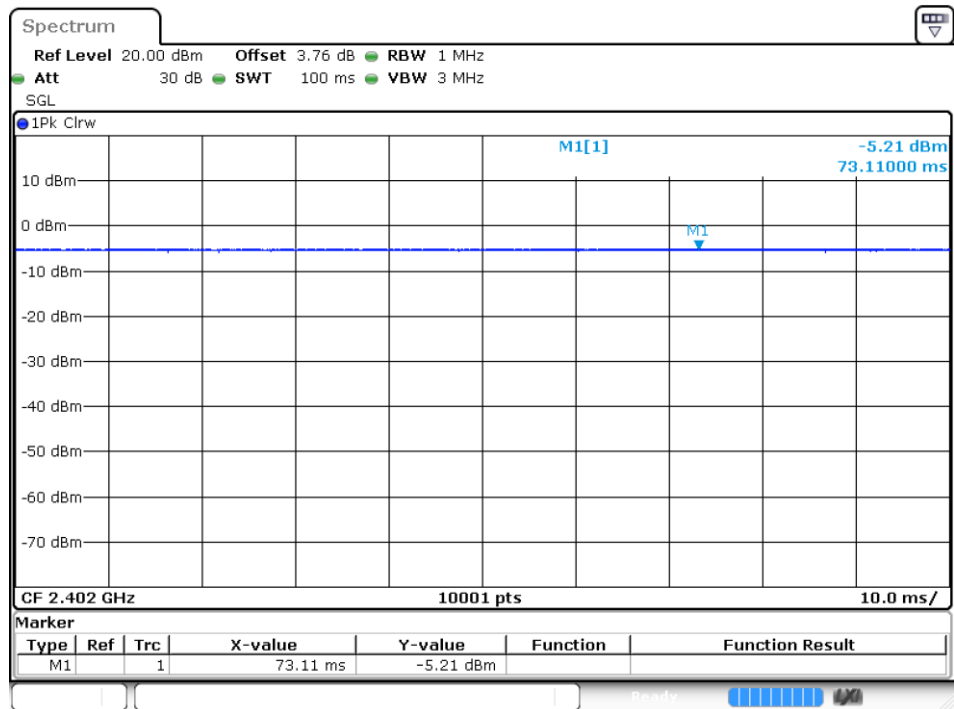
3.1 LIMITS

None; for reporting purposes only.

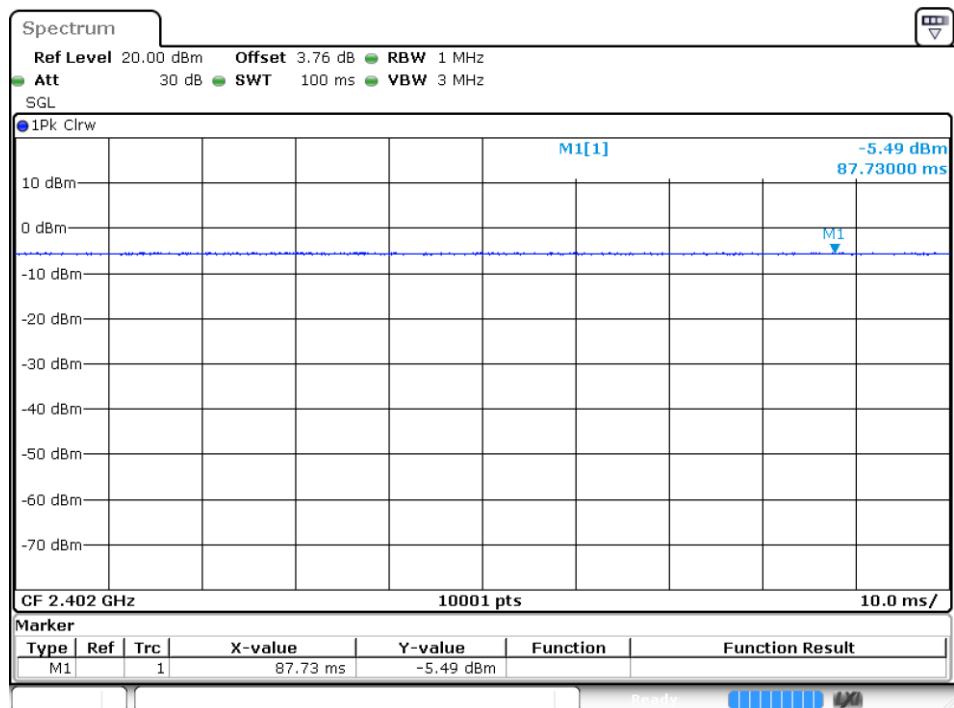
3.2 ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	$10\log(1/x)$ Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE 1M	100	100	1	100	0	0
BLE 2M	100	100	1	100	0	0

1M PHY:



2M PHY:



4. TRANSMITTER EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150kHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5			66 - 56 *	56 - 46 *	LP0002
0.50 -5.0			56.00	46.00	LP0002
5.0 -30.0			60.00	50.00	LP0002

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

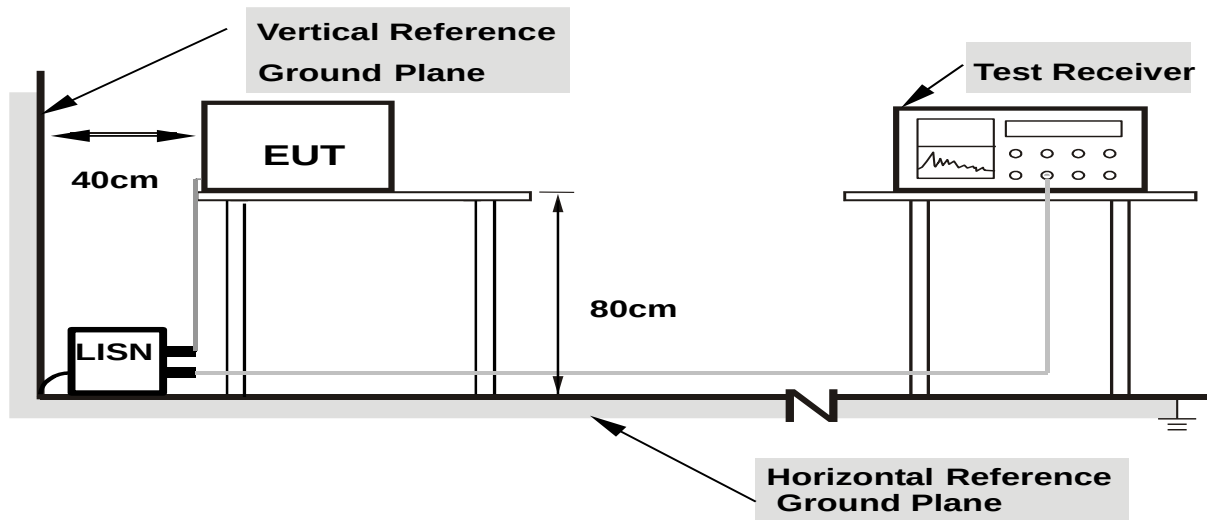
4.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

4.1.5 TEST RESULTS

Remark: The test item is not applicable

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 3.5, then the 3.6 limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micровolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	LIMITS (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to LP0002.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Frequency measurement range:

1 The spectrum shall be measured from the lowest radio frequency signal generated in the device (without going below 9 kHz), and the upper limit of the measurement range shall be decided according to the maximum operating frequency.

1.1 Maximum operating frequency less than 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

1.2 Maximum operating frequency between 10 GHz~30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

1.3 Maximum operating frequency over 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

2 Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

Spectrum Parameter		Setting	
Attenuation		Auto	
Start Frequency		1000 MHz	
Stop Frequency		10th carrier harmonic	
Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3MHz
AV	≥98%	1MHz	10Hz
	<98%	1MHz	1/T

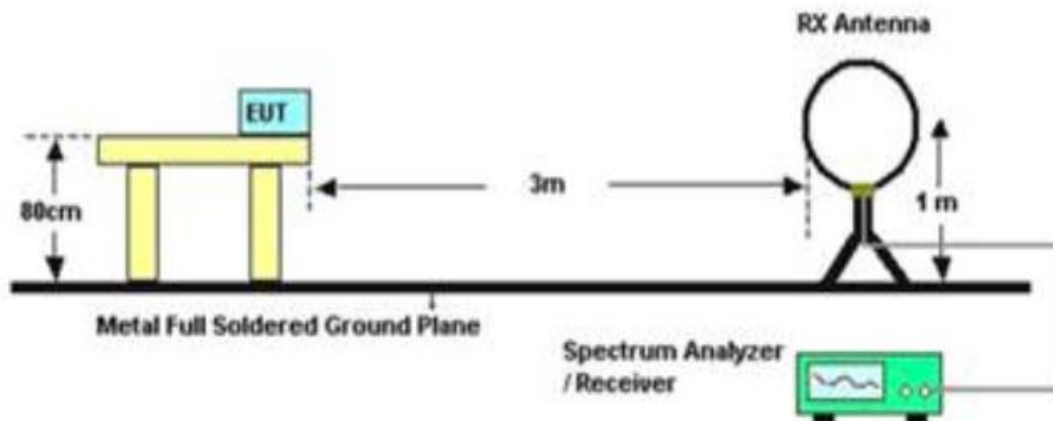
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2 TEST PROCEDURE

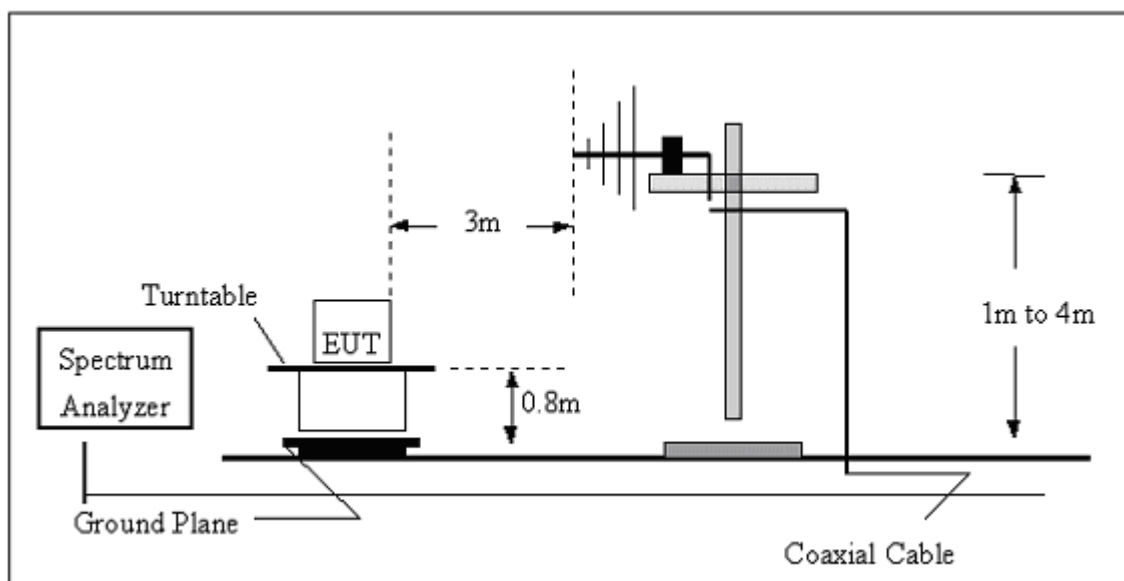
- The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- The EUT was placed on the top of a rotating table 0.8 meters (For frequencies above 1GHz, table 1.5 meters) above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.
- Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

4.2.3 TEST SETUP

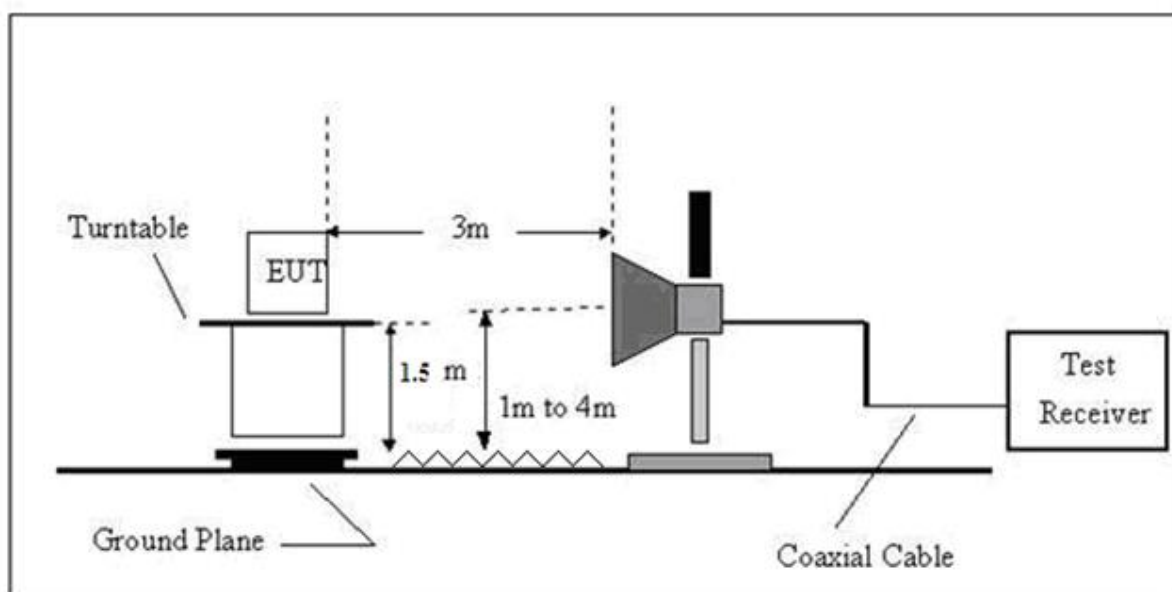
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.5 TEST RESULTS (BLOW 30MHZ)

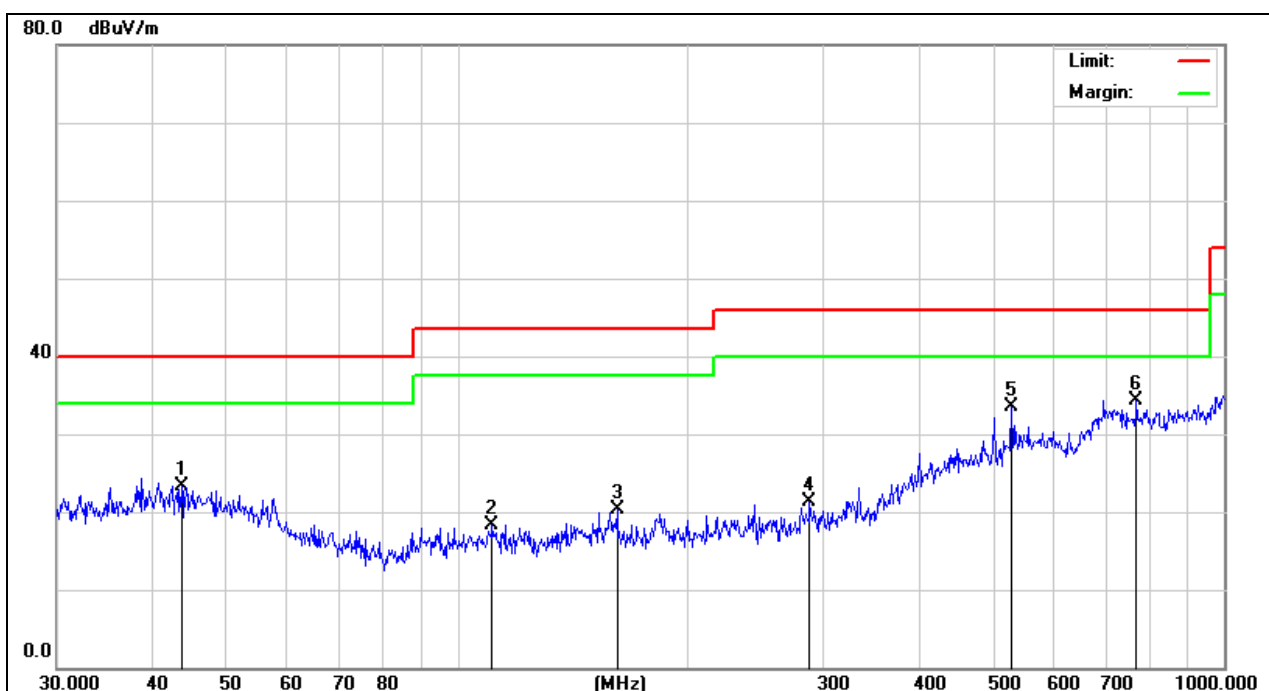
There is not detected blow 30MHz.

4.2.6 TEST RESULTS (BETWEEN30 – 1000 MHZ)

Note:

Pre-scan all test modes, found worst case at 2402MHz, and so only show the test result of 2402MHz.

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	Mode 1(2402MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

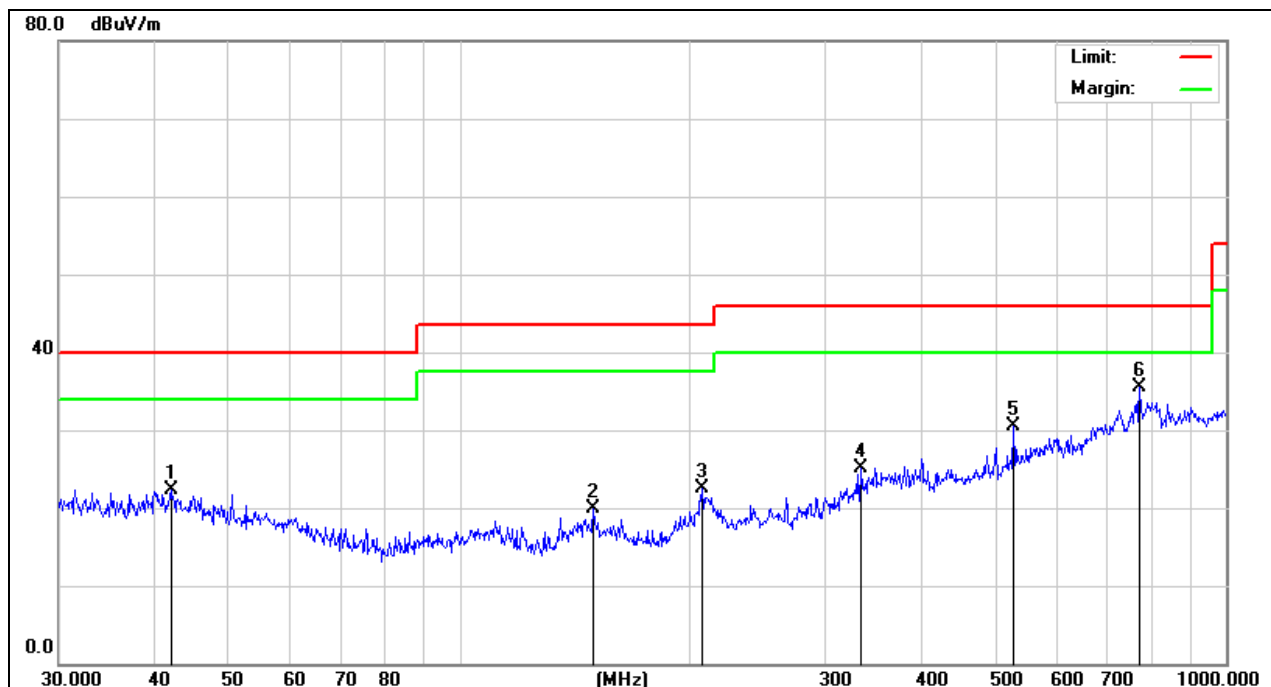


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	43.6584	25.46	-2.12	23.34	40.00	-16.66	QP
2	110.9570	25.47	-7.18	18.29	43.50	-25.21	QP
3	161.4740	27.27	-6.94	20.33	43.50	-23.17	QP
4	287.9904	26.62	-5.23	21.39	46.00	-24.61	QP
5	528.2458	30.09	3.46	33.55	46.00	-12.45	QP
6 *	768.7481	27.97	6.39	34.36	46.00	-11.64	QP

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	Mode 1(2402MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

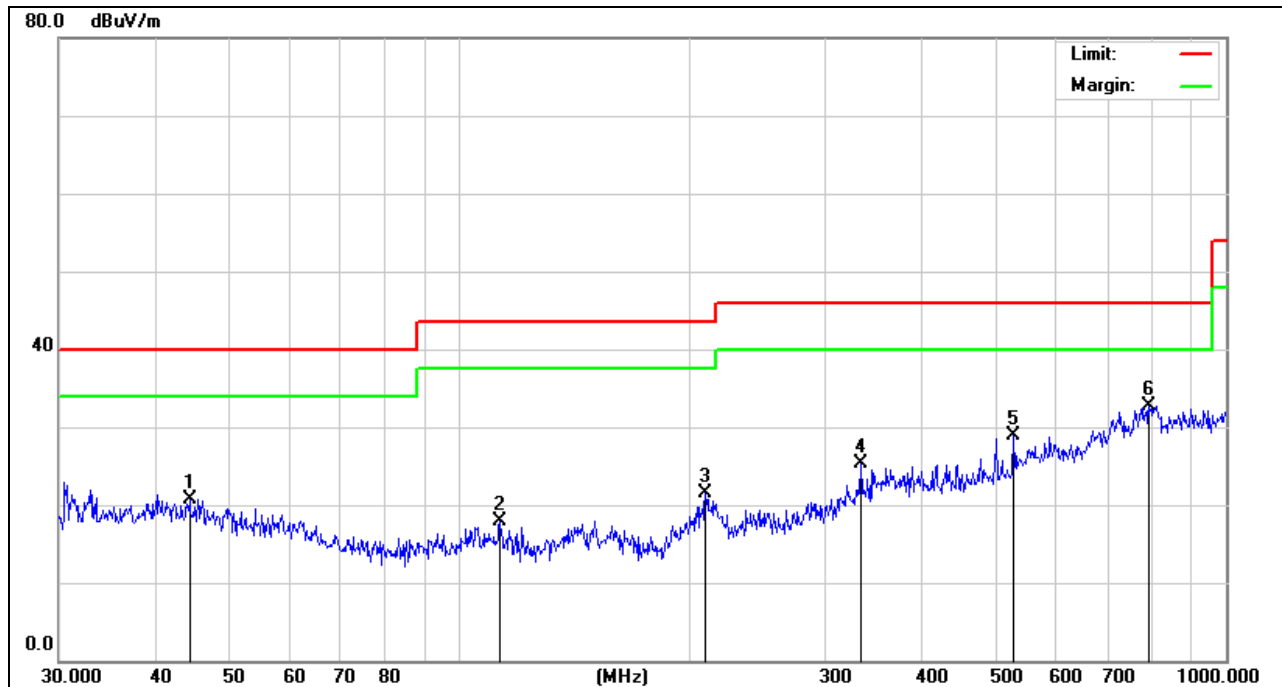


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		42.0065	26.65	-4.37	22.28	40.00	-17.72	QP
2		149.4857	27.57	-7.72	19.85	43.50	-23.65	QP
3		207.1226	27.46	-4.87	22.59	43.50	-20.91	QP
4		333.6865	27.23	-2.12	25.11	46.00	-20.89	QP
5		528.2458	30.60	-0.05	30.55	46.00	-15.45	QP
6	*	771.4486	30.14	5.27	35.41	46.00	-10.59	QP

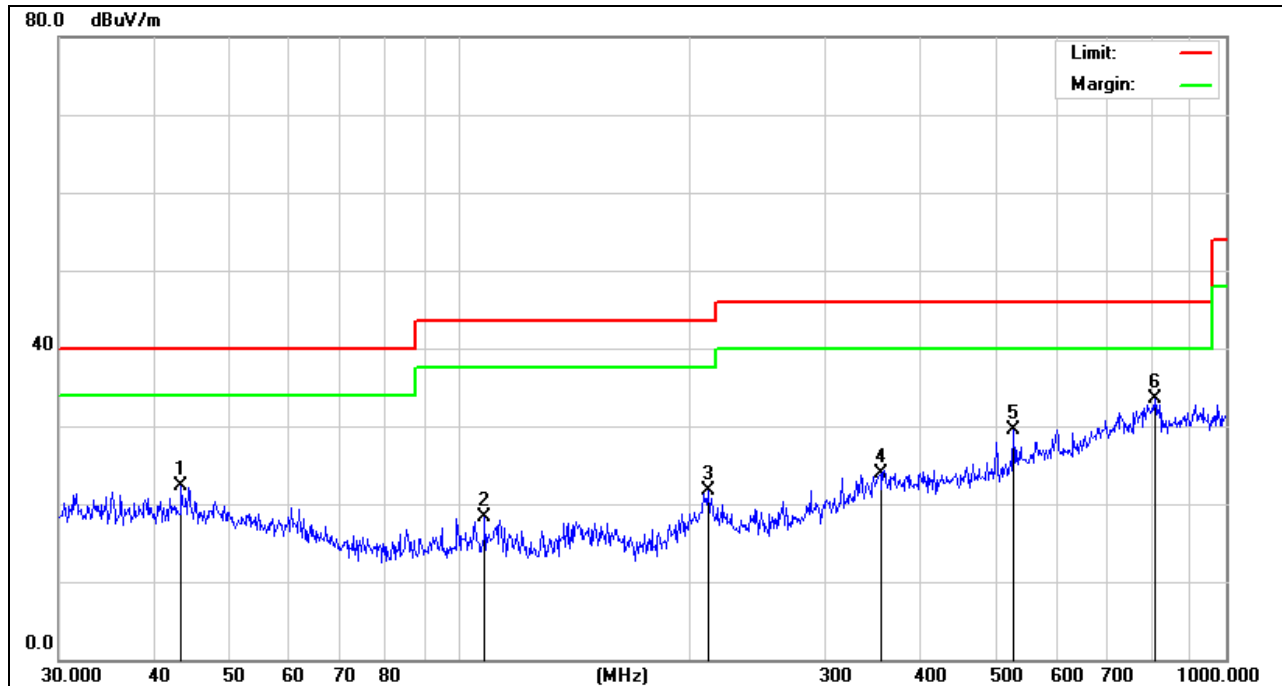
EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX	Polarization :	Horizontal
Test Power :	DC3V from battery		



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		44.4307	25.25	-4.50	20.75	40.00	-19.25	QP
2		112.9196	26.06	-8.15	17.91	43.50	-25.59	QP
3		209.3129	25.58	-4.14	21.44	43.50	-22.06	QP
4		333.6865	27.38	-2.12	25.26	46.00	-20.74	QP
5		528.2458	28.86	-0.05	28.81	46.00	-17.19	QP
6	*	793.3958	25.96	6.83	32.79	46.00	-13.21	QP

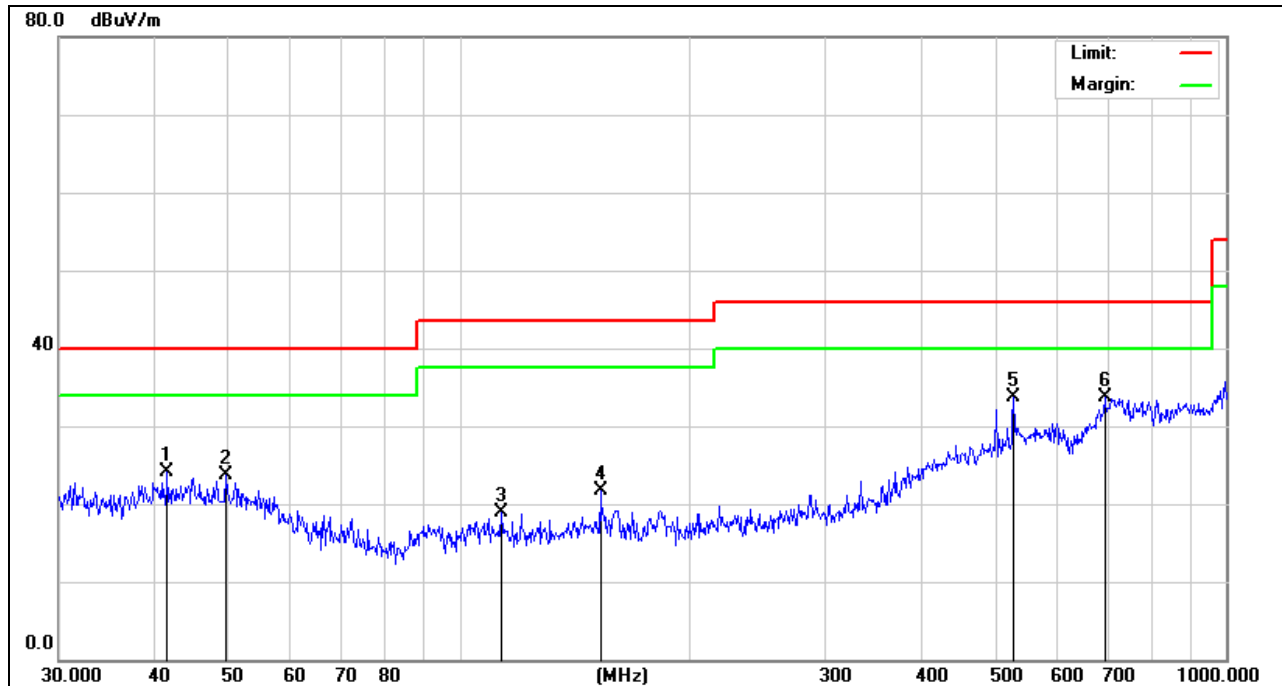
EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX	Polarization :	Vertical
Test Power :	DC3V from battery		



Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		43.3534	26.69	-4.45	22.24	40.00	-17.76	QP
2		107.8876	26.03	-7.80	18.23	43.50	-25.27	QP
3		210.7860	25.91	-4.16	21.75	43.50	-21.75	QP
4		354.1831	24.68	-0.86	23.82	46.00	-22.18	QP
5		528.2458	29.55	-0.05	29.50	46.00	-16.50	QP
6	*	807.4290	26.81	6.70	33.51	46.00	-12.49	QP

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	Mode 3	Polarization :	Horizontal
Test Power :	DC3V from battery		

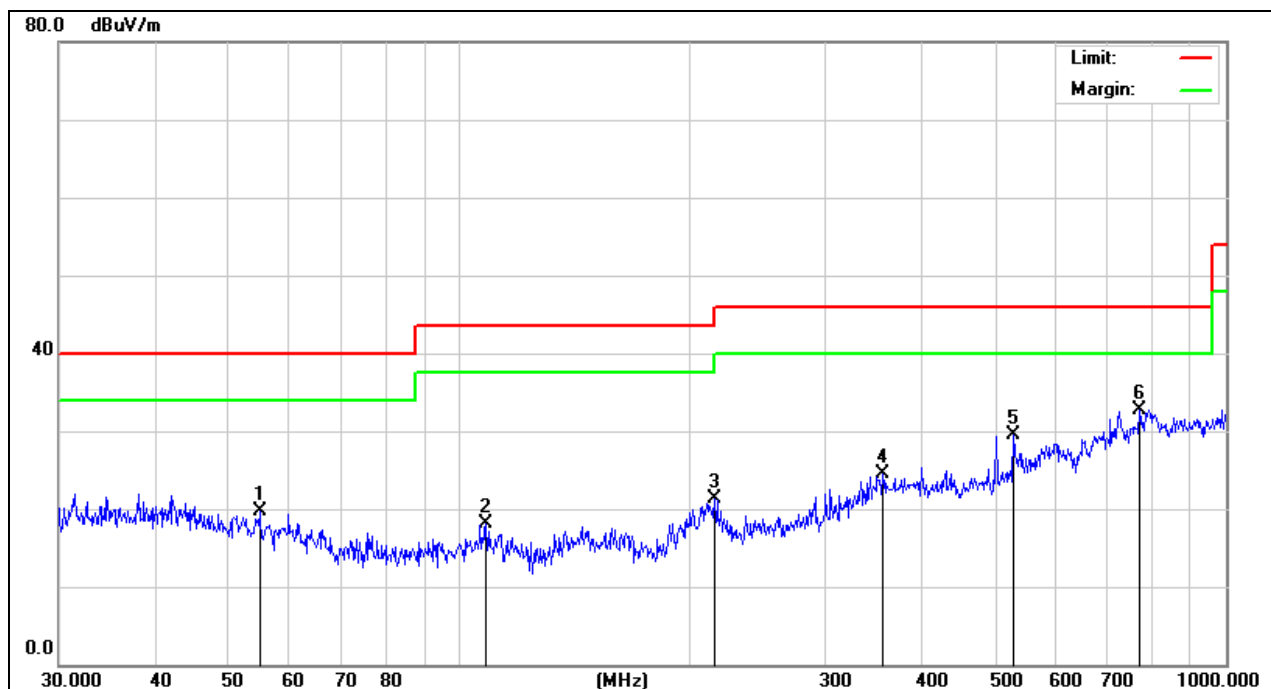


Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	41.5670	26.04	-1.93	24.11	40.00	-15.89	QP
2	49.5328	27.01	-3.22	23.79	40.00	-16.21	QP
3	113.3162	26.28	-7.35	18.93	43.50	-24.57	QP
4	152.6640	28.48	-6.79	21.69	43.50	-21.81	QP
5	528.2458	30.17	3.46	33.63	46.00	-12.37	QP
6 *	694.4174	27.53	6.24	33.77	46.00	-12.23	QP

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	Mode 3	Polarization :	Vertical
Test Power :	DC3V from battery		



Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		54.8348	26.29	-6.65	19.64	40.00	-20.36	QP
2		108.2667	25.82	-7.78	18.04	43.50	-25.46	QP
3		215.2677	26.87	-5.47	21.40	43.50	-22.10	QP
4		356.6757	25.12	-0.69	24.43	46.00	-21.57	QP
5		528.2458	29.54	-0.05	29.49	46.00	-16.51	QP
6	*	771.4486	27.51	5.27	32.78	46.00	-13.22	QP

Test result: The unit does meet the NCC requirements.

4.2.7 TEST RESULTS (ABOVE 1000 MHZ)

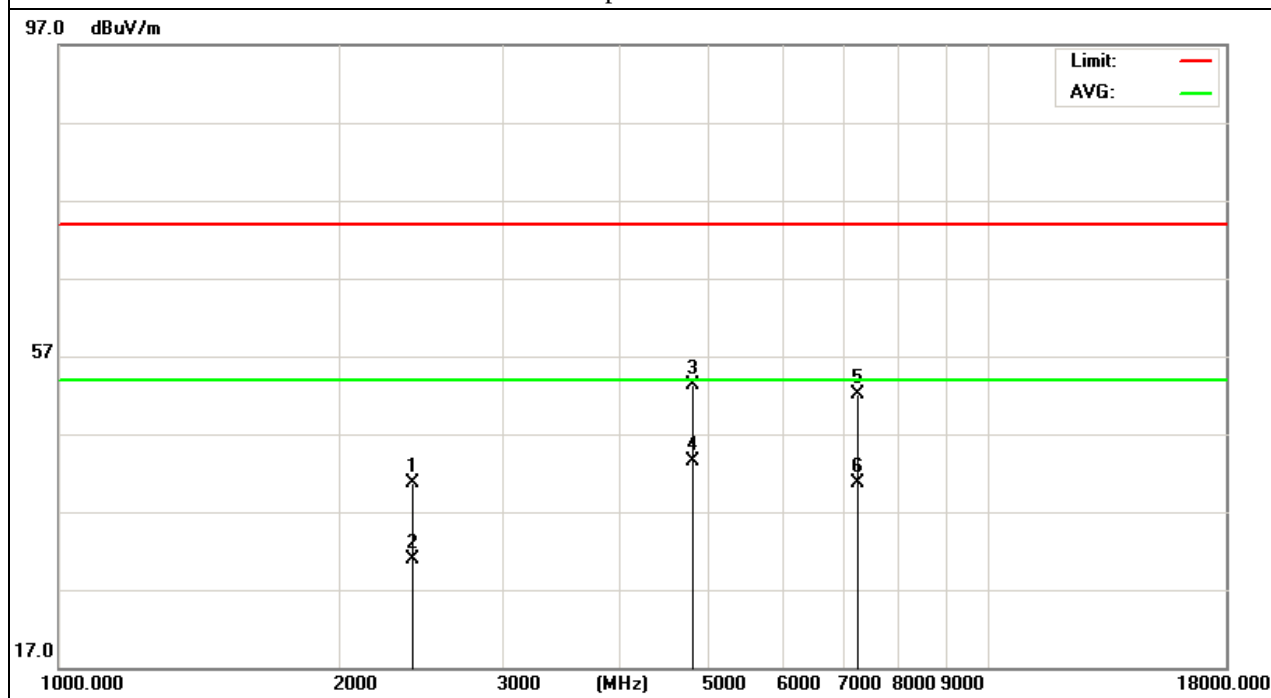
1M PHY:

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2400.000	46.49	-5.70	40.79	74.00	-33.21	peak
2400.000	36.57	-5.70	30.87	54.00	-23.13	AVG
4804.000	48.32	5.06	53.38	74.00	-20.62	peak
4804.000	38.52	5.06	43.58	54.00	-10.42	AVG
7206.000	45.11	7.03	52.14	74.00	-21.86	peak
7206.000	33.69	7.03	40.72	54.00	-13.28	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

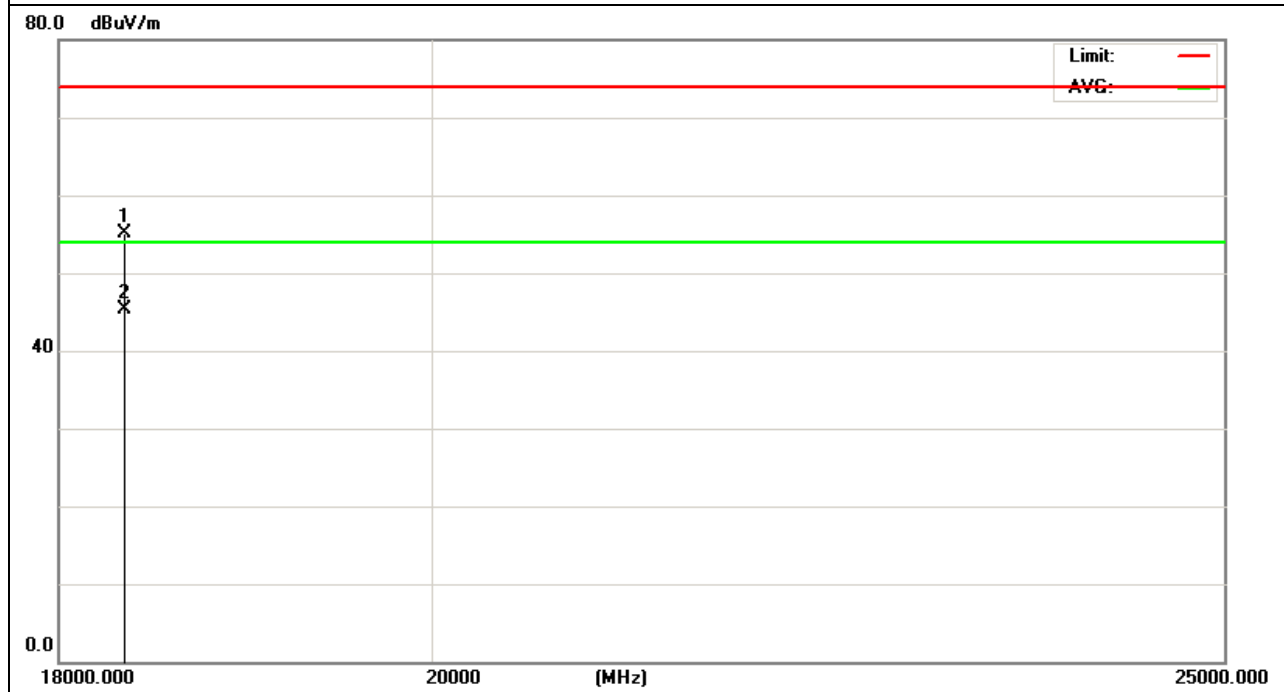


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18335.000	39.45	15.72	55.17	74.00	-18.83	peak
18335.000	29.57	15.72	45.29	54.00	-8.71	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

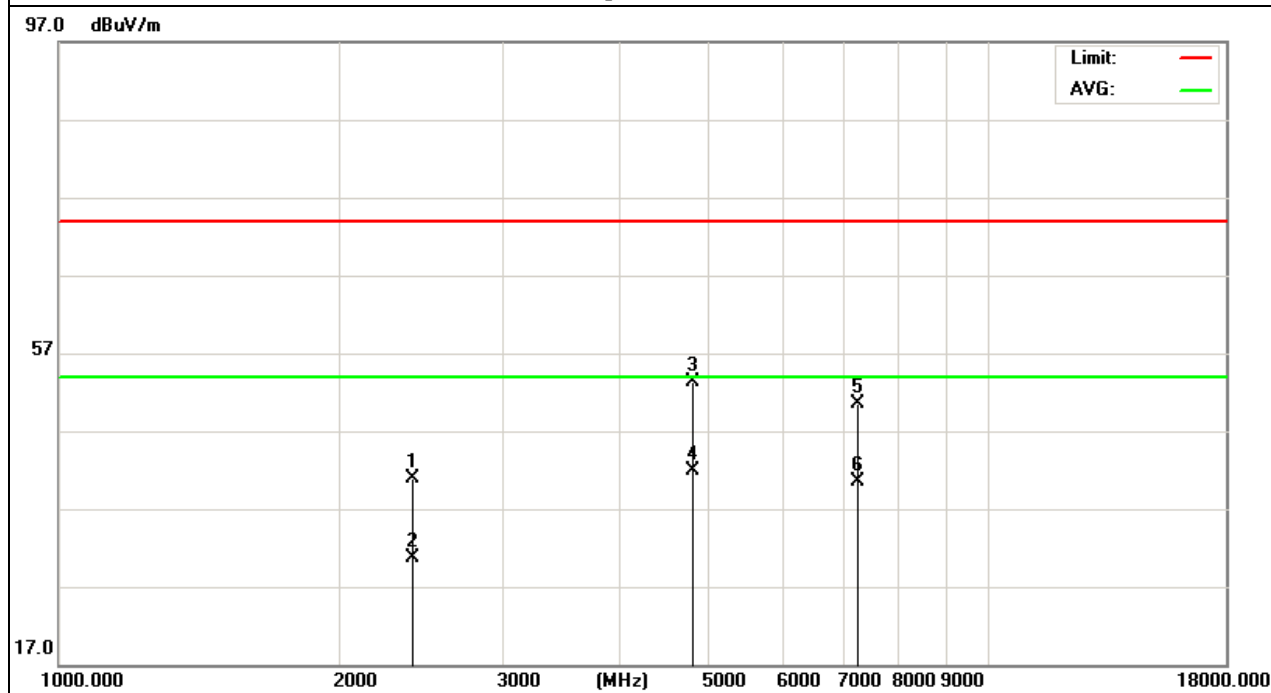


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400.000	46.63	-5.70	40.93	74.00	-33.07	peak
2400.000	36.47	-5.70	30.77	54.00	-23.23	AVG
4804.000	48.26	5.06	53.32	74.00	-20.68	peak
4804.000	36.89	5.06	41.95	54.00	-12.05	AVG
7206.000	43.53	7.03	50.56	74.00	-23.44	peak
7206.000	33.41	7.03	40.44	54.00	-13.56	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

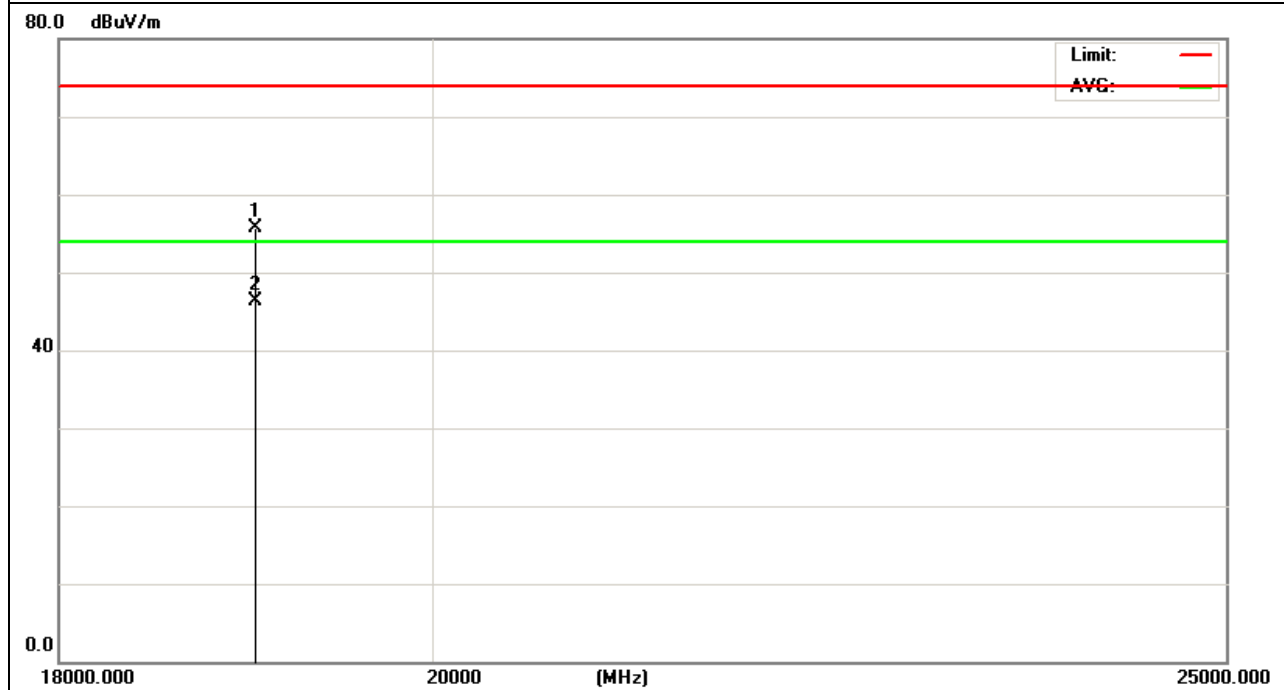


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19022.000	39.26	16.41	55.67	74.00	-18.33	peak
19022.000	29.87	16.41	46.28	54.00	-7.72	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

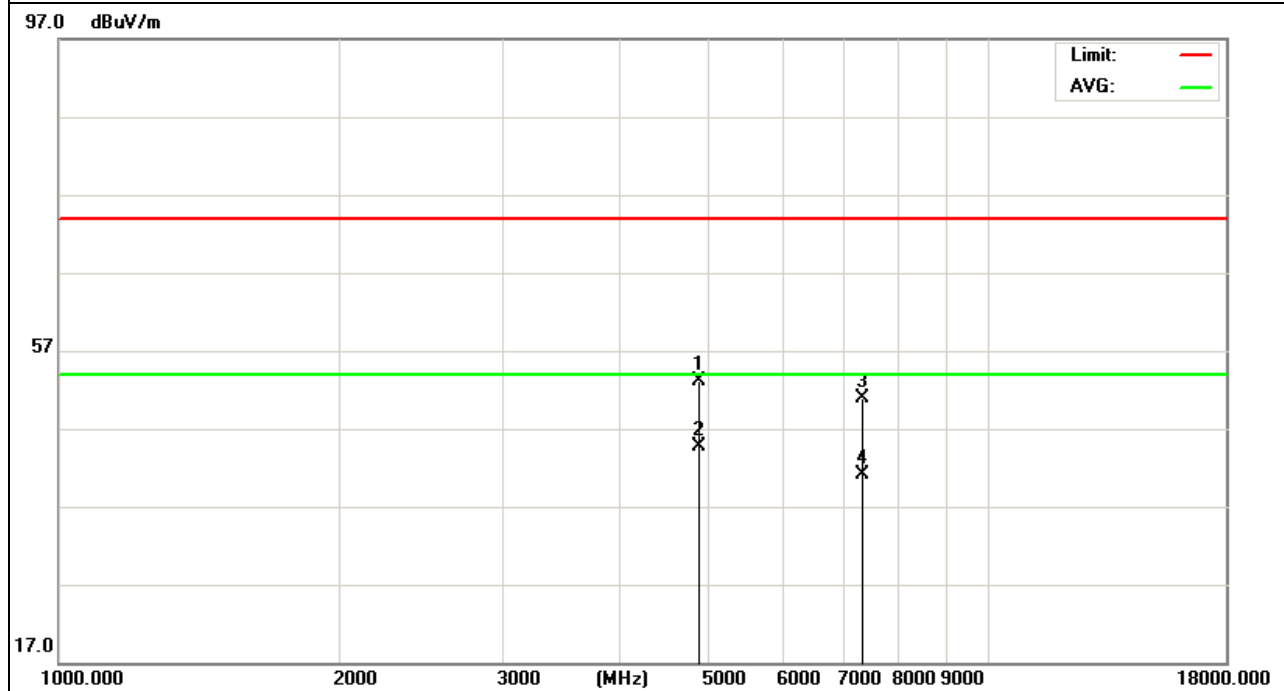


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4880.000	48.02	5.14	53.16	74.00	-20.84	peak
4880.000	39.55	5.14	44.69	54.00	-9.31	AVG
7320.000	43.46	7.52	50.98	74.00	-23.02	peak
7320.000	33.57	7.52	41.09	54.00	-12.91	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

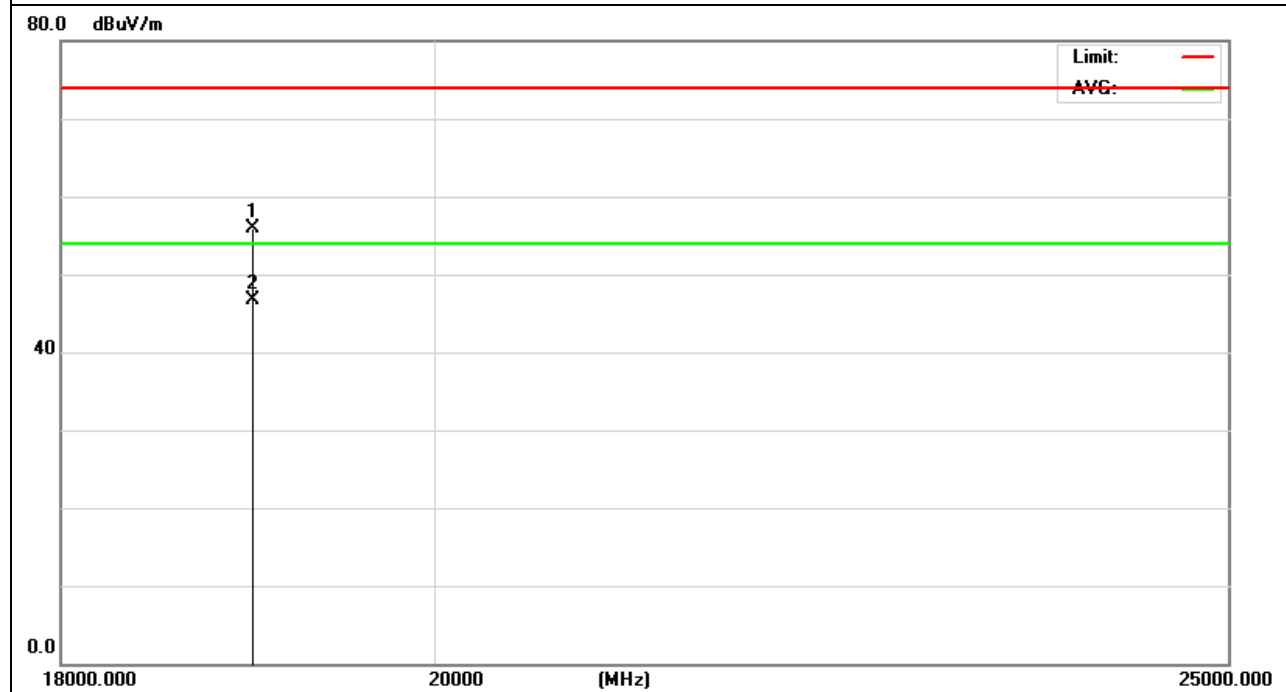


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18995.000	39.46	16.40	55.86	74.00	-18.14	peak
18995.000	30.25	16.40	46.65	54.00	-7.35	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

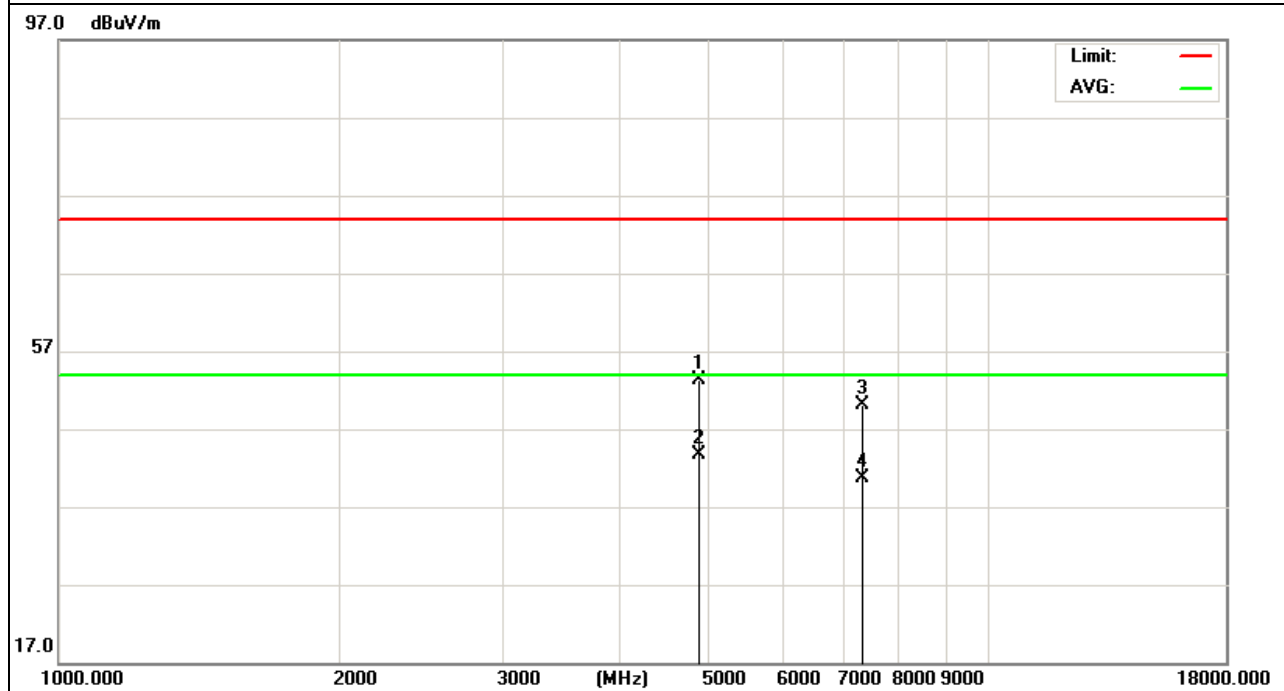


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4880.000	48.24	5.14	53.38	74.00	-20.62	peak
4880.000	38.59	5.14	43.73	54.00	-10.27	AVG
7320.000	42.67	7.52	50.19	74.00	-23.81	peak
7320.000	33.15	7.52	40.67	54.00	-13.33	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

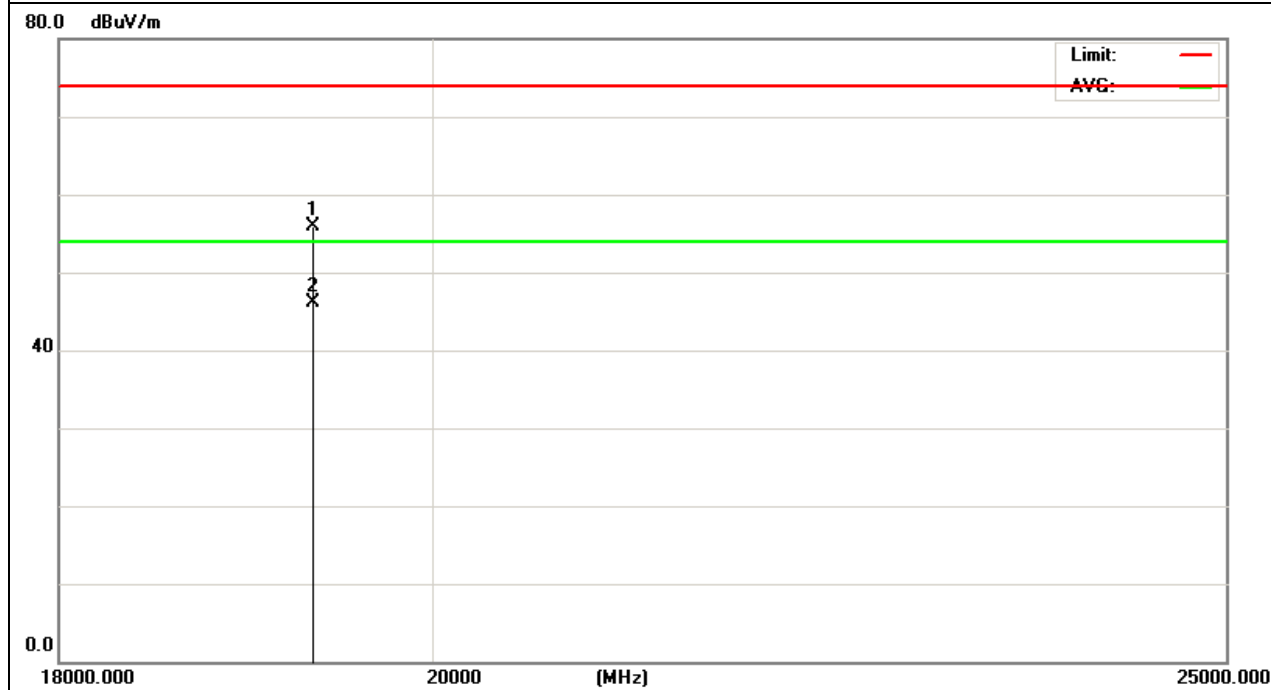


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19335.000	39.46	16.47	55.93	74.00	-18.07	peak
19335.000	29.54	16.47	46.01	54.00	-7.99	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

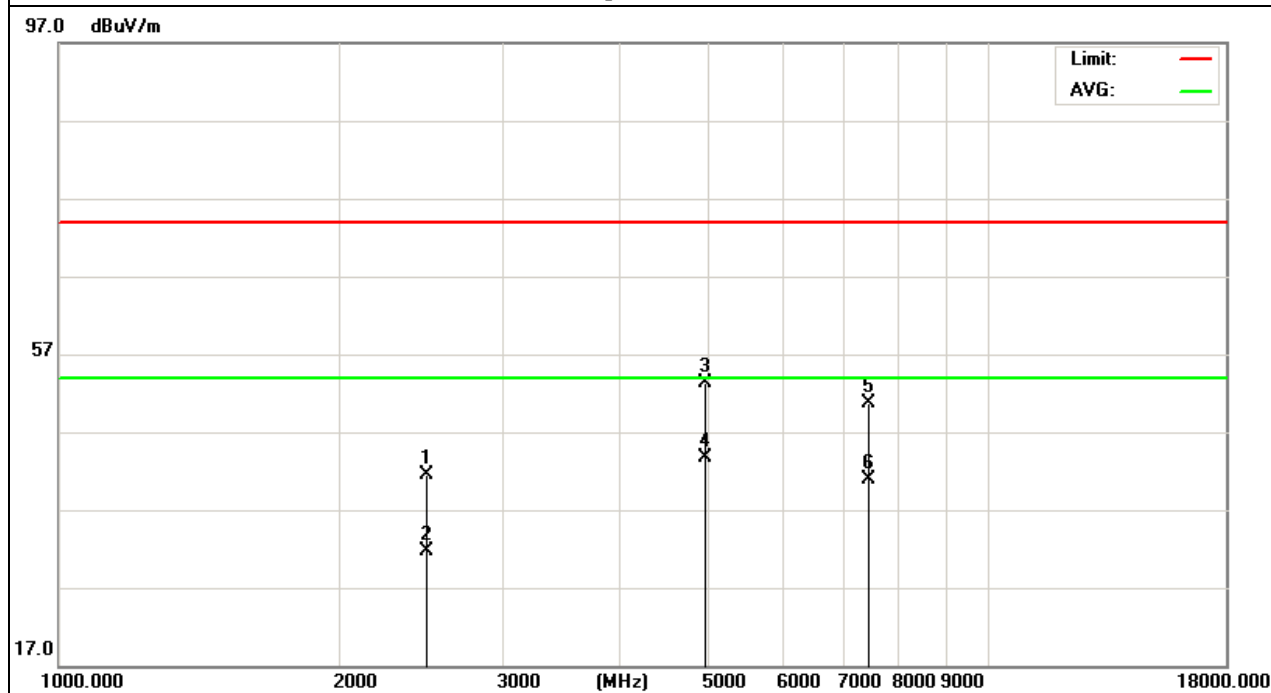


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	46.52	-4.98	41.54	74.00	-32.46	peak
2483.500	36.74	-4.98	31.76	54.00	-22.24	AVG
4960.000	48.06	5.22	53.28	74.00	-20.72	peak
4960.000	38.52	5.22	43.74	54.00	-10.26	AVG
7440.000	42.57	8.06	50.63	74.00	-23.37	peak
7440.000	32.79	8.06	40.85	54.00	-13.15	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

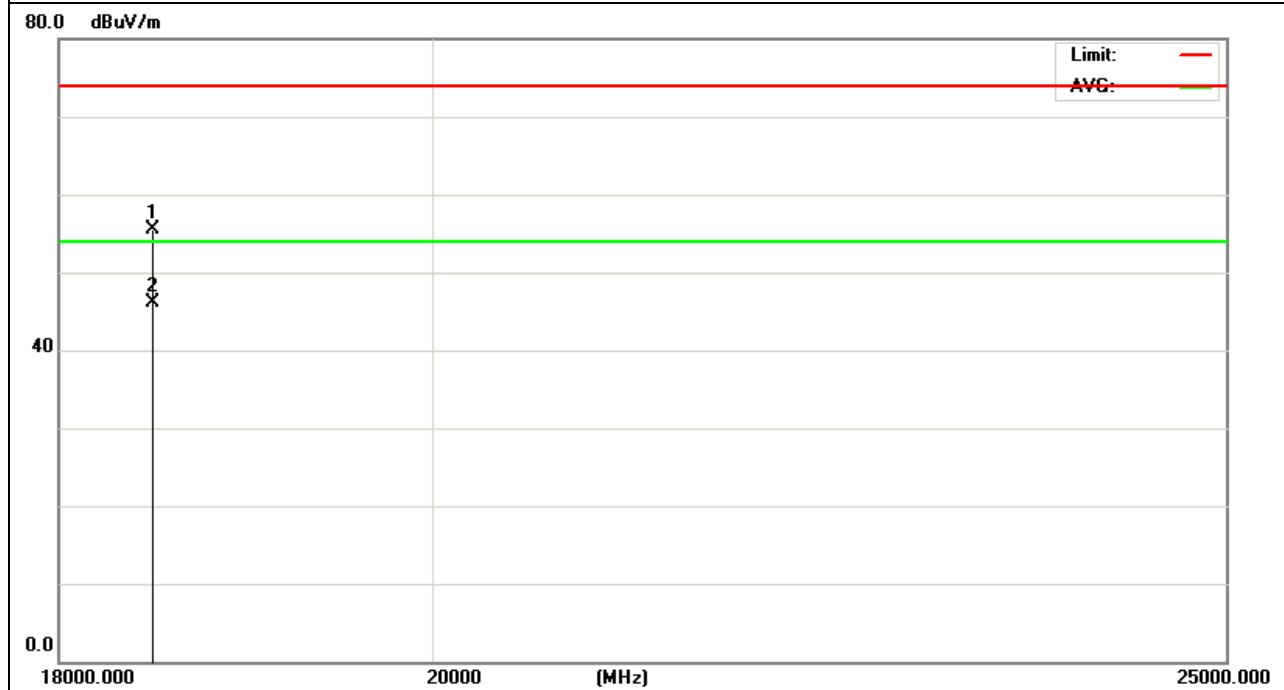


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Vertical
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18488.000	39.56	15.89	55.45	74.00	-18.55	peak
18488.000	30.18	15.89	46.07	54.00	-7.93	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

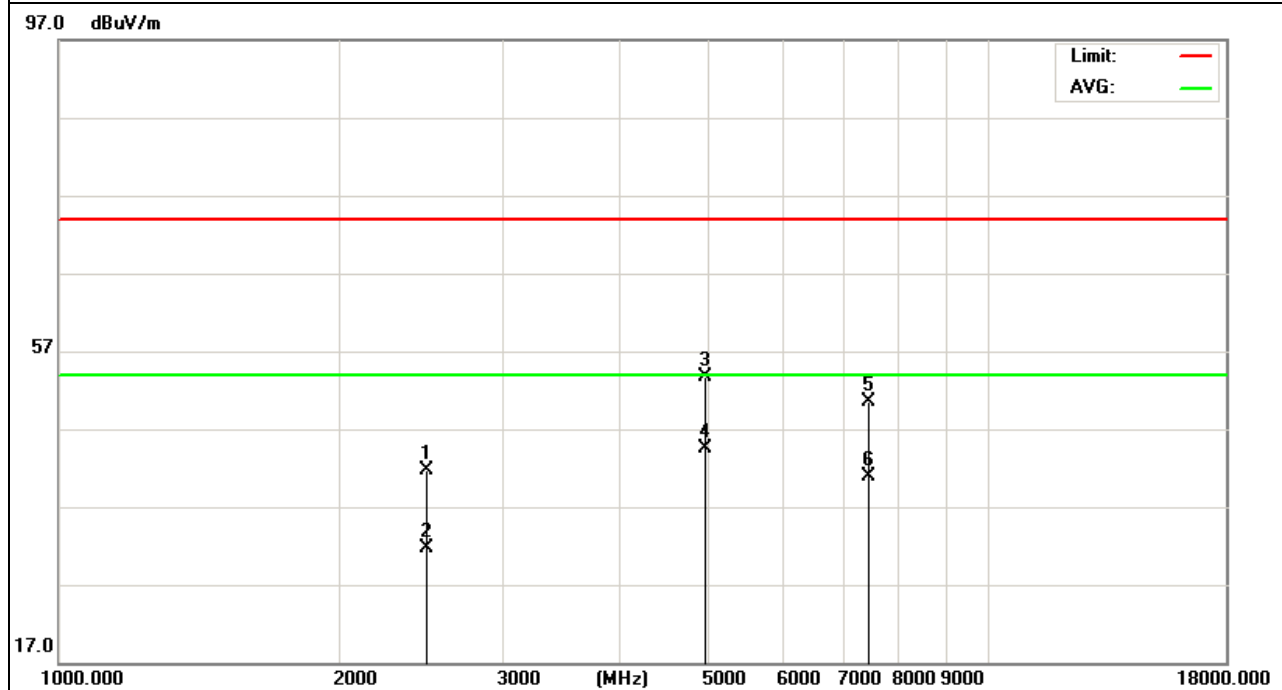


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	46.69	-4.98	41.71	74.00	-32.29	peak
2483.500	36.74	-4.98	31.76	54.00	-22.24	AVG
4960.000	48.52	5.22	53.74	74.00	-20.26	peak
4960.000	39.36	5.22	44.58	54.00	-9.42	AVG
7440.000	42.47	8.06	50.53	74.00	-23.47	peak
7440.000	32.88	8.06	40.94	54.00	-13.06	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

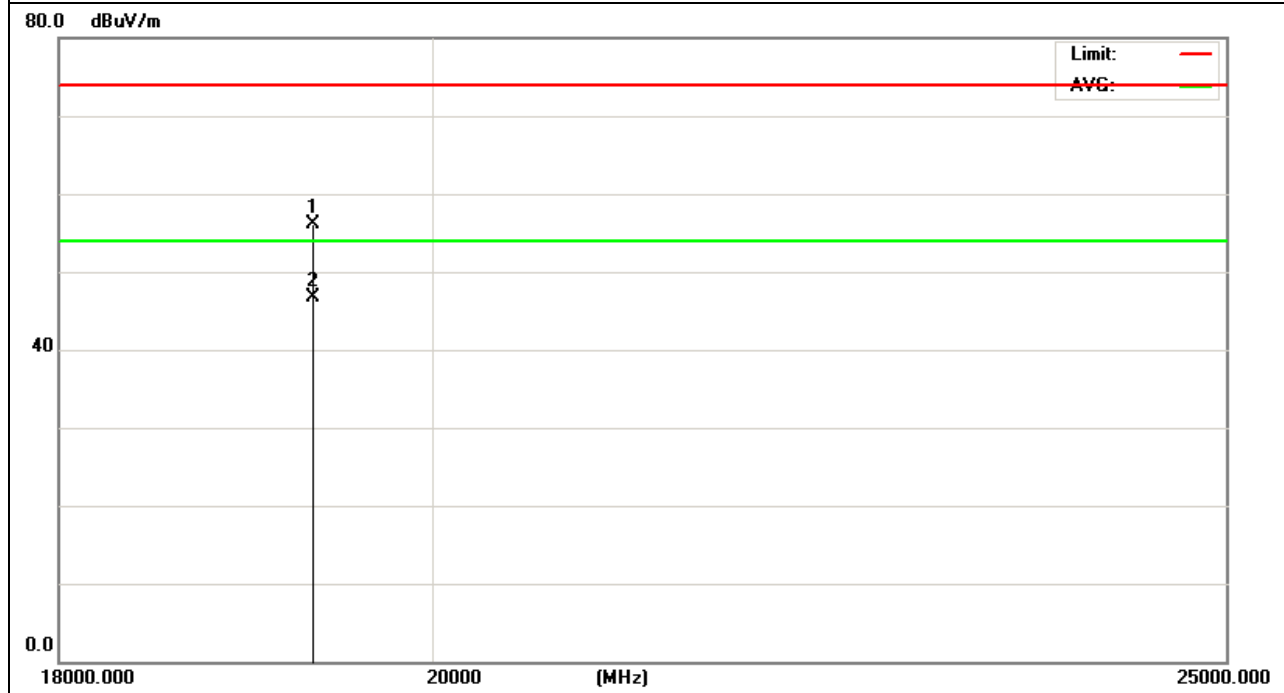


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Horizontal
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19335.000	39.64	16.47	56.11	74.00	-17.89	peak
19335.000	30.16	16.47	46.63	54.00	-7.37	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



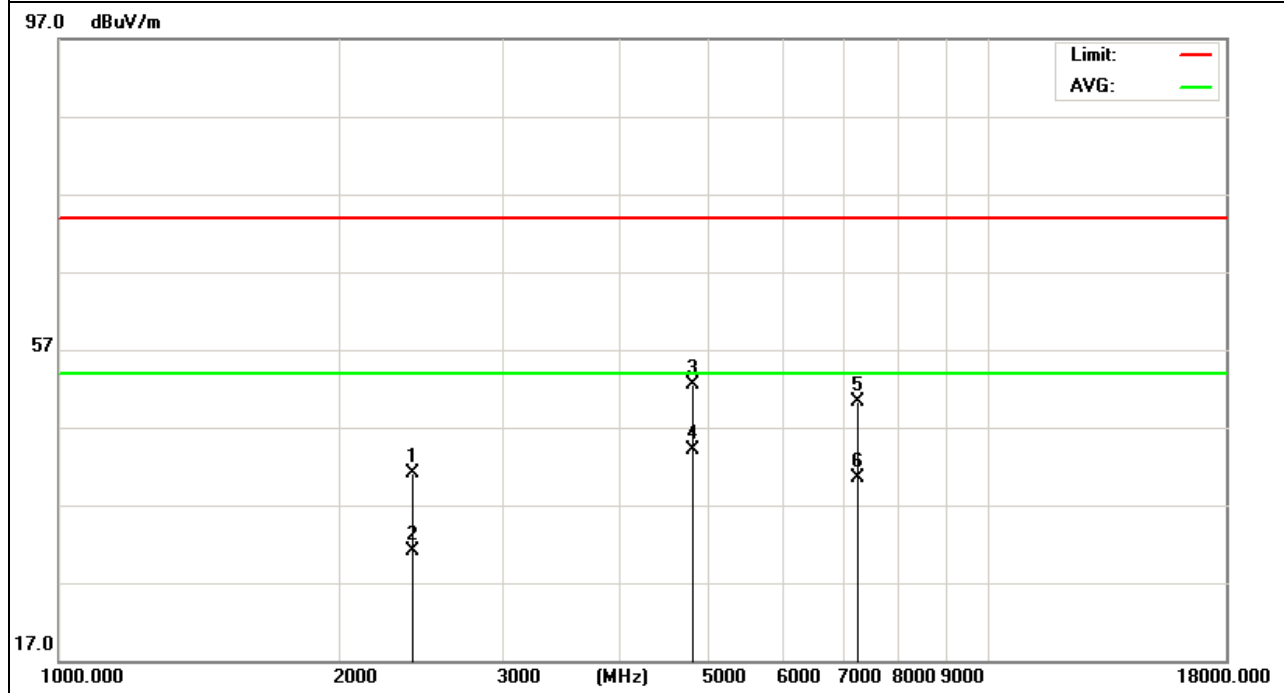
2MPHY:

EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400.000	46.82	-5.70	41.12	74.00	-32.88	peak
2400.000	36.79	-5.70	31.09	54.00	-22.91	AVG
4804.000	47.48	5.06	52.54	74.00	-21.46	peak
4804.000	38.96	5.06	44.02	54.00	-9.98	AVG
7206.000	43.36	7.03	50.39	74.00	-23.61	peak
7206.000	33.47	7.03	40.50	54.00	-13.50	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

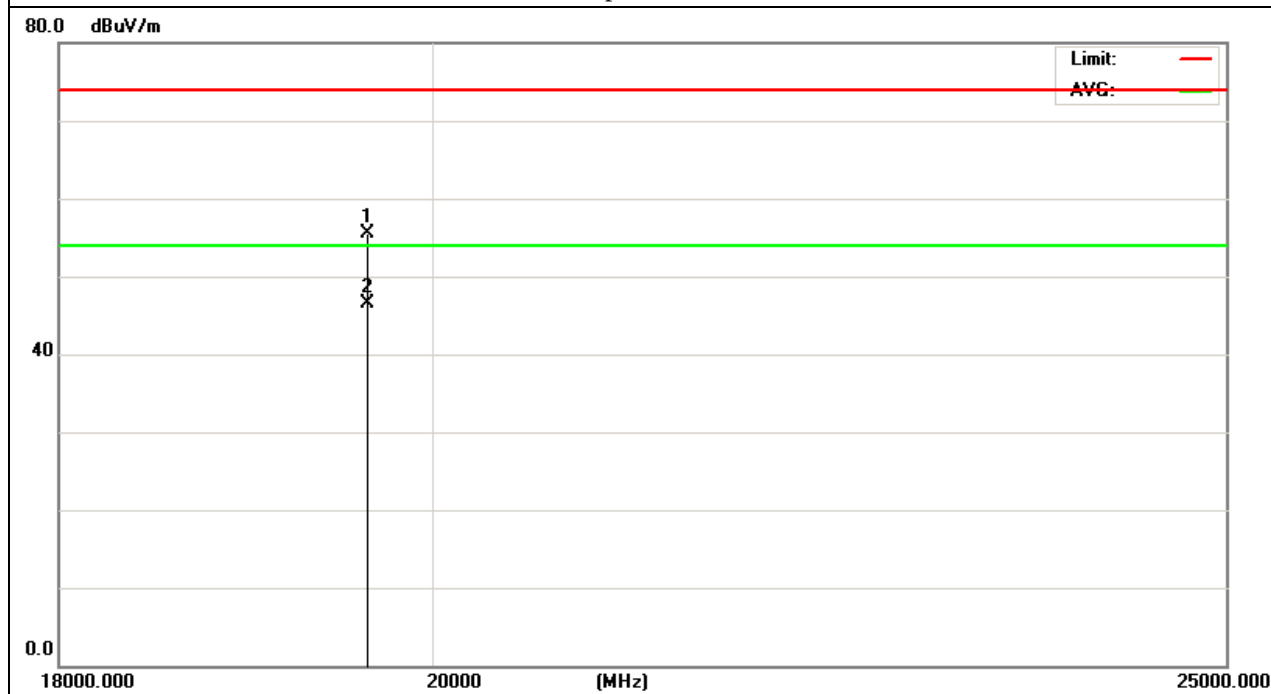


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19633.000	38.96	16.53	55.49	74.00	-18.51	peak
19633.000	30.03	16.53	46.56	54.00	-7.44	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

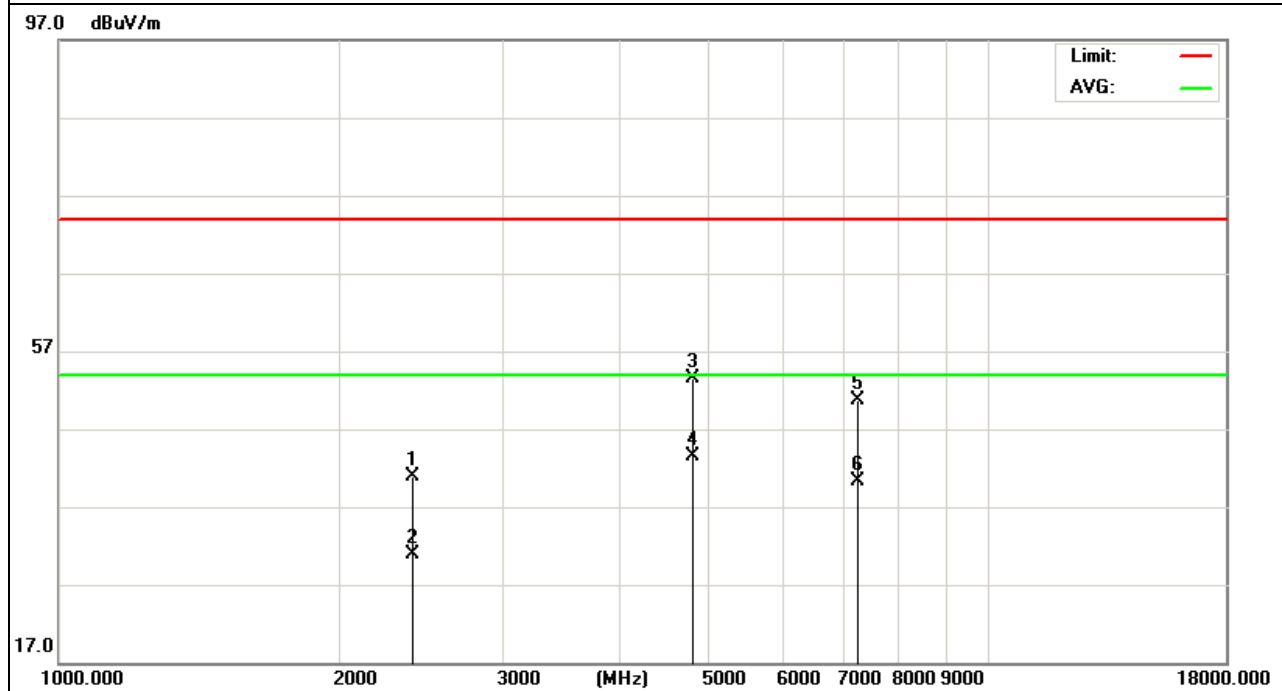


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2400.000	46.53	-5.70	40.83	74.00	-33.17	peak
2400.000	36.61	-5.70	30.91	54.00	-23.09	AVG
4804.000	48.49	5.06	53.55	74.00	-20.45	peak
4804.000	38.44	5.06	43.50	54.00	-10.50	AVG
7206.000	43.76	7.03	50.79	74.00	-23.21	peak
7206.000	33.28	7.03	40.31	54.00	-13.69	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

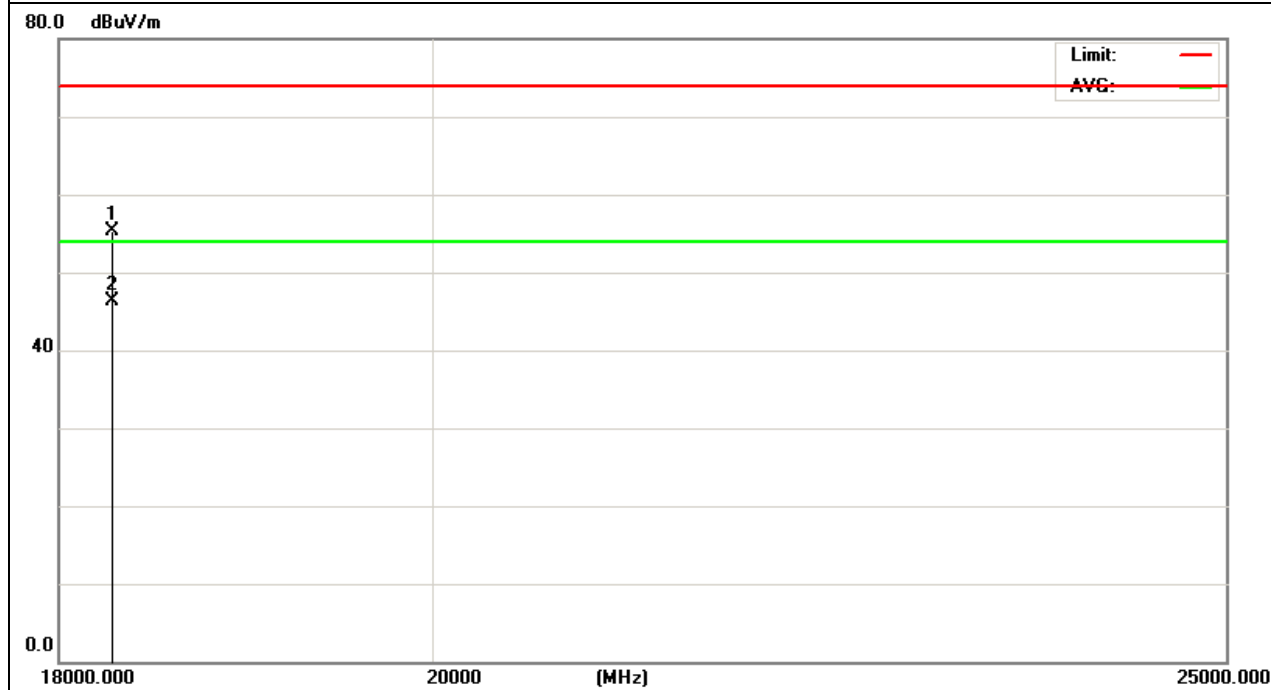


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2402MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18275.000	39.63	15.66	55.29	74.00	-18.71	peak
18275.000	30.57	15.66	46.23	54.00	-7.77	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

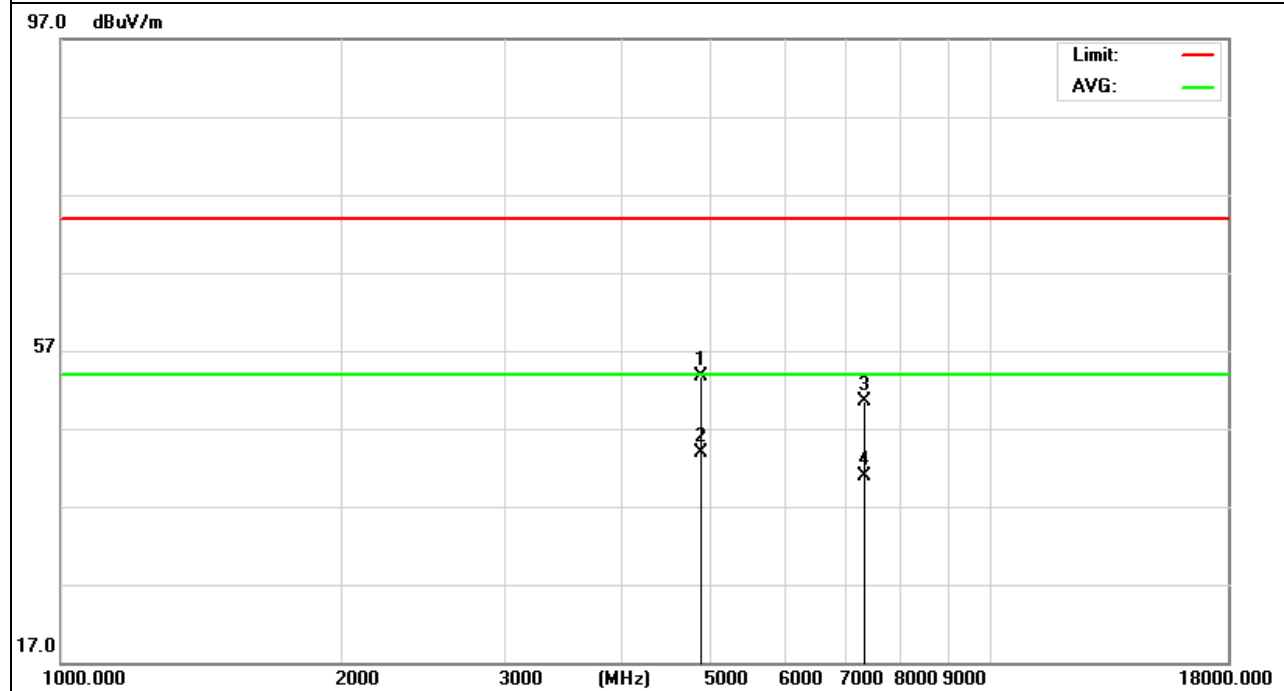


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4880.000	48.65	5.14	53.79	74.00	-20.21	peak
4880.000	38.79	5.14	43.93	54.00	-10.07	AVG
7320.000	43.06	7.52	50.58	74.00	-23.42	peak
7320.000	33.42	7.52	40.94	54.00	-13.06	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

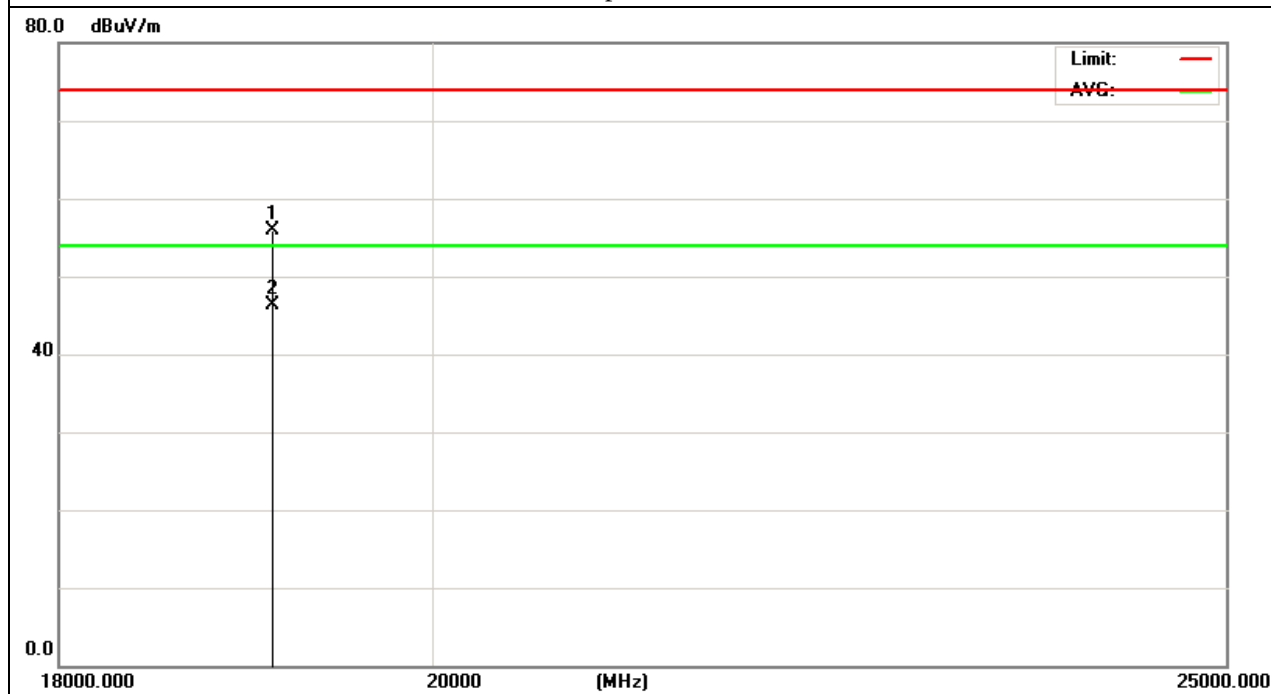


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19114.000	39.52	16.44	55.96	74.00	-18.04	peak
19114.000	29.78	16.44	46.22	54.00	-7.78	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

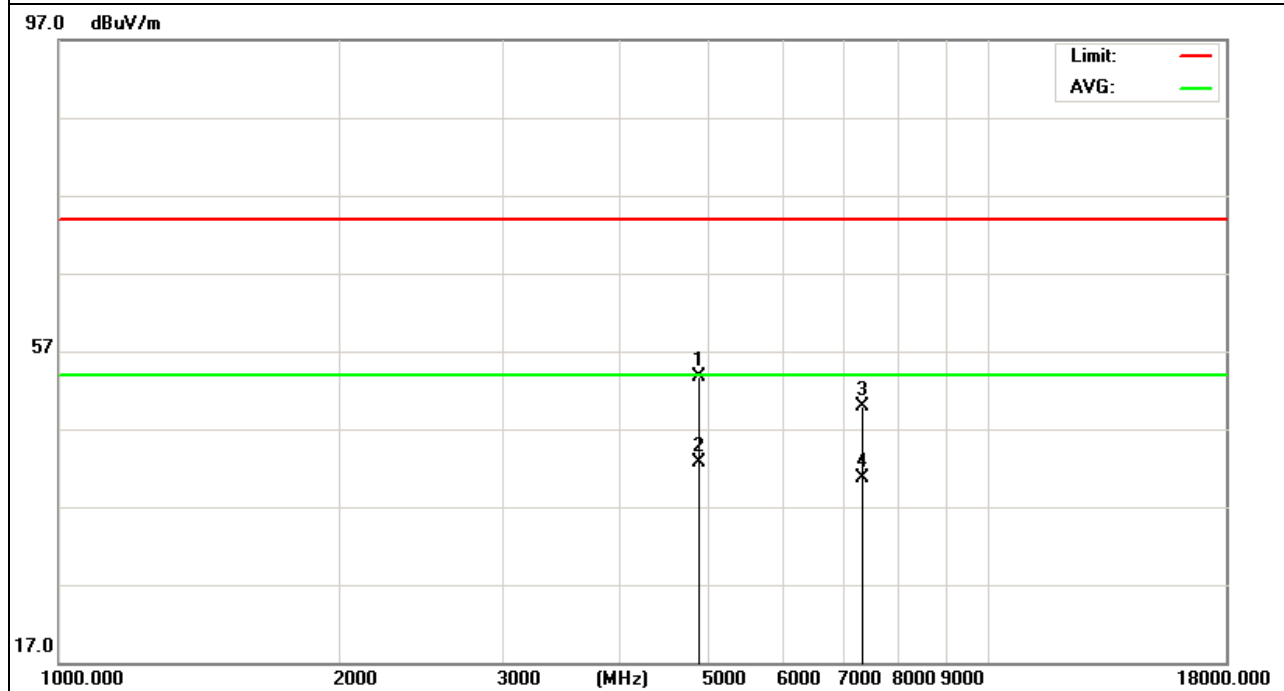


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880.000	48.63	5.14	53.77	74.00	-20.23	peak
4880.000	37.52	5.14	42.66	54.00	-11.34	AVG
7320.000	42.32	7.52	49.84	74.00	-24.16	peak
7320.000	33.14	7.52	40.66	54.00	-13.34	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

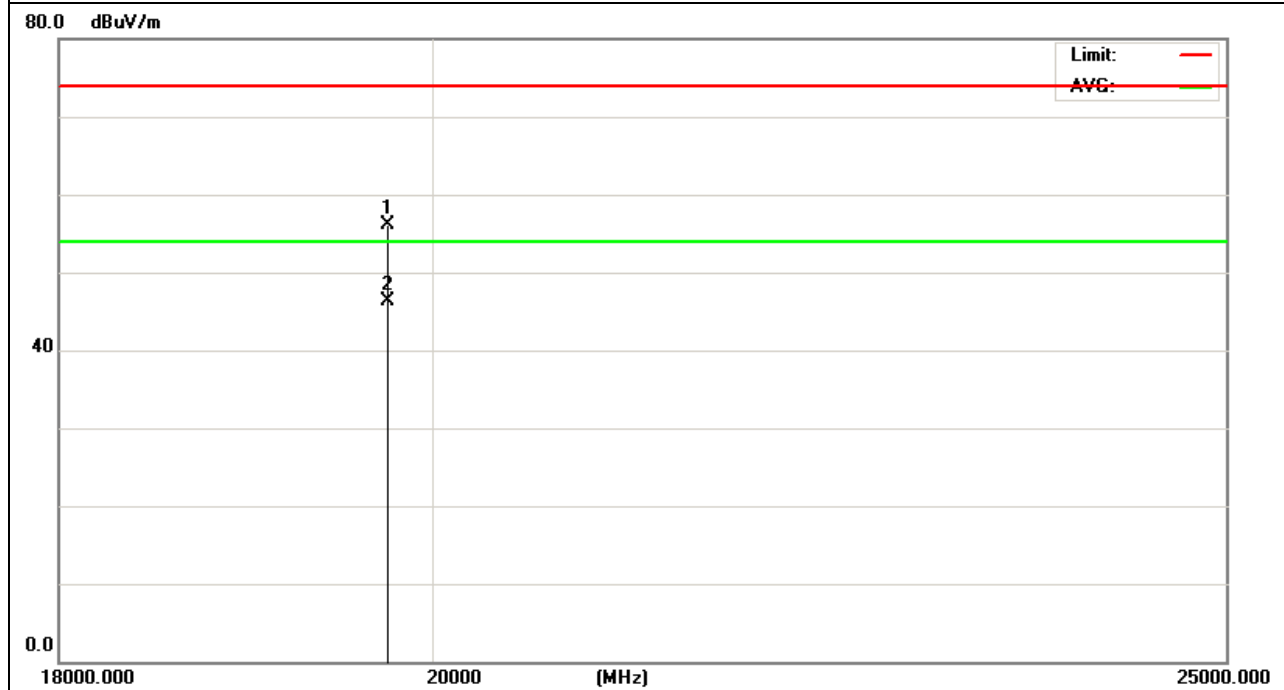


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2440MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19745.000	39.46	16.55	56.01	74.00	-17.99	peak
19745.000	29.82	16.55	46.37	54.00	-7.63	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

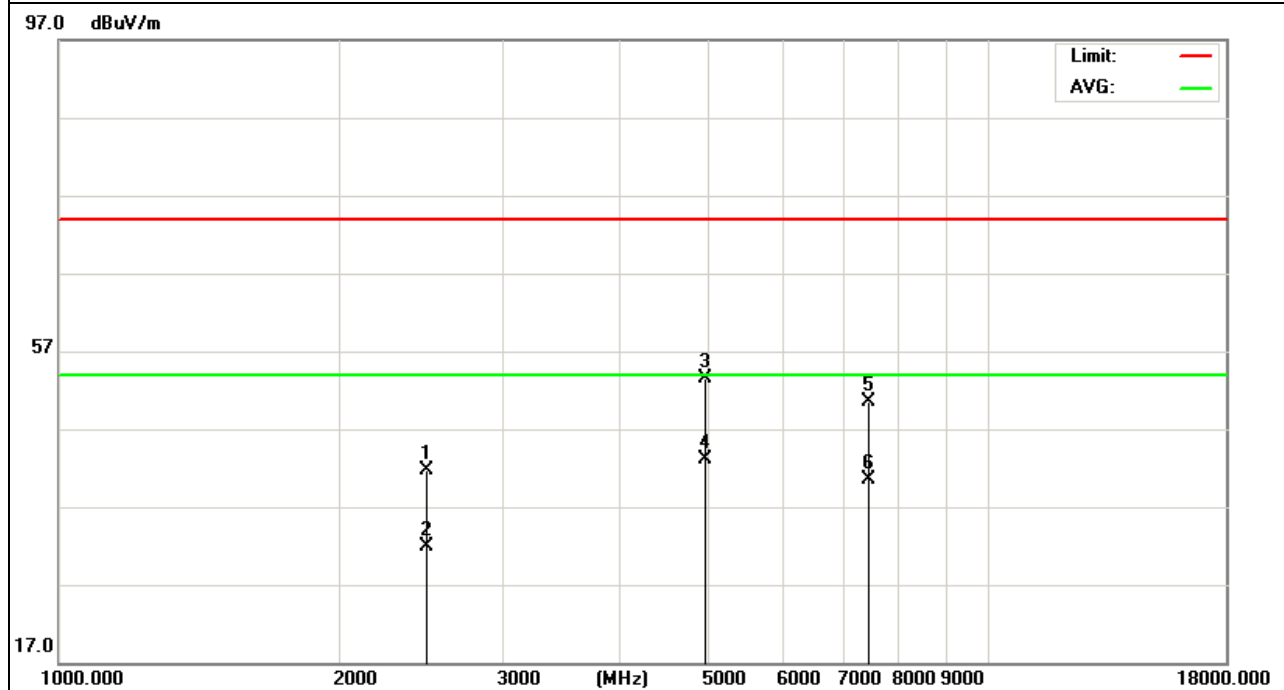


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	46.68	-4.98	41.70	74.00	-32.30	peak
2483.500	36.79	-4.98	31.81	54.00	-22.19	AVG
4960.000	48.32	5.22	53.54	74.00	-20.46	peak
4960.000	37.89	5.22	43.11	54.00	-10.89	AVG
7440.000	42.44	8.06	50.50	74.00	-23.50	peak
7440.000	32.36	8.06	40.42	54.00	-13.58	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

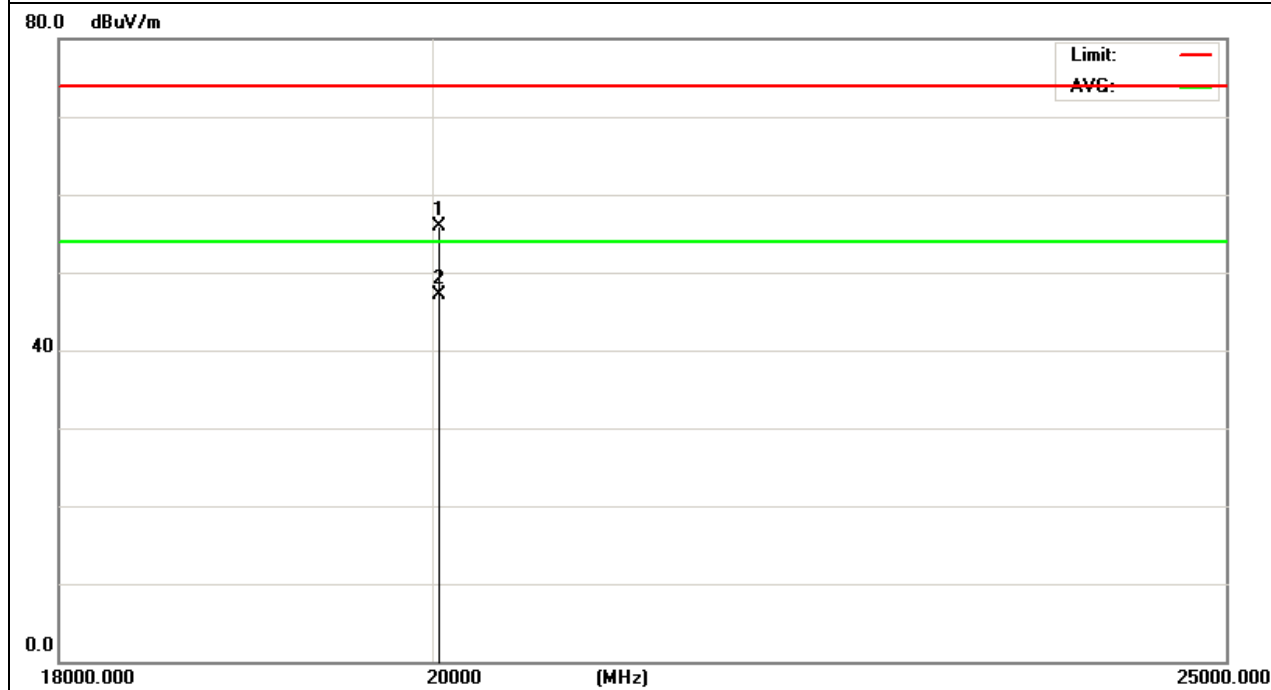


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Vertical
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
20032.000	39.23	16.61	55.84	74.00	-18.16	peak
20032.000	30.41	16.61	47.02	54.00	-6.98	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

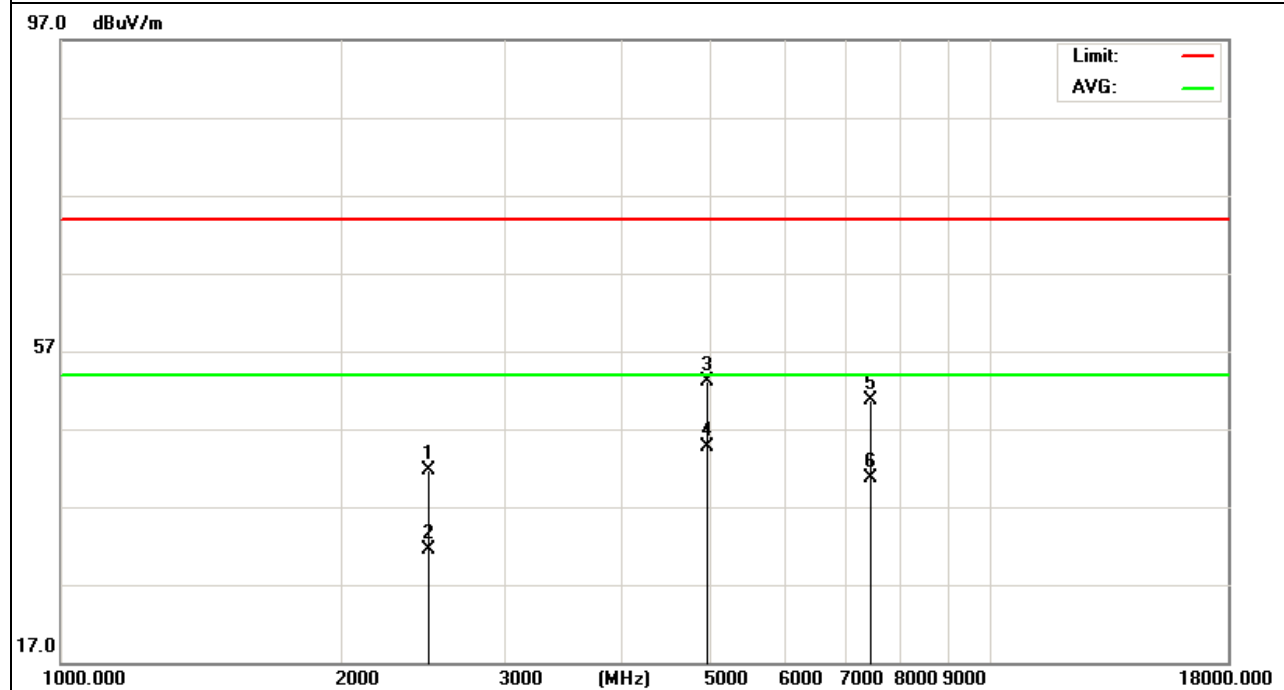


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2483.500	46.76	-4.98	41.78	74.00	-32.22	peak
2483.500	36.49	-4.98	31.51	54.00	-22.49	AVG
4960.000	47.85	5.22	53.07	74.00	-20.93	peak
4960.000	39.44	5.22	44.66	54.00	-9.34	AVG
7440.000	42.56	8.06	50.62	74.00	-23.38	peak
7440.000	32.63	8.06	40.69	54.00	-13.31	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

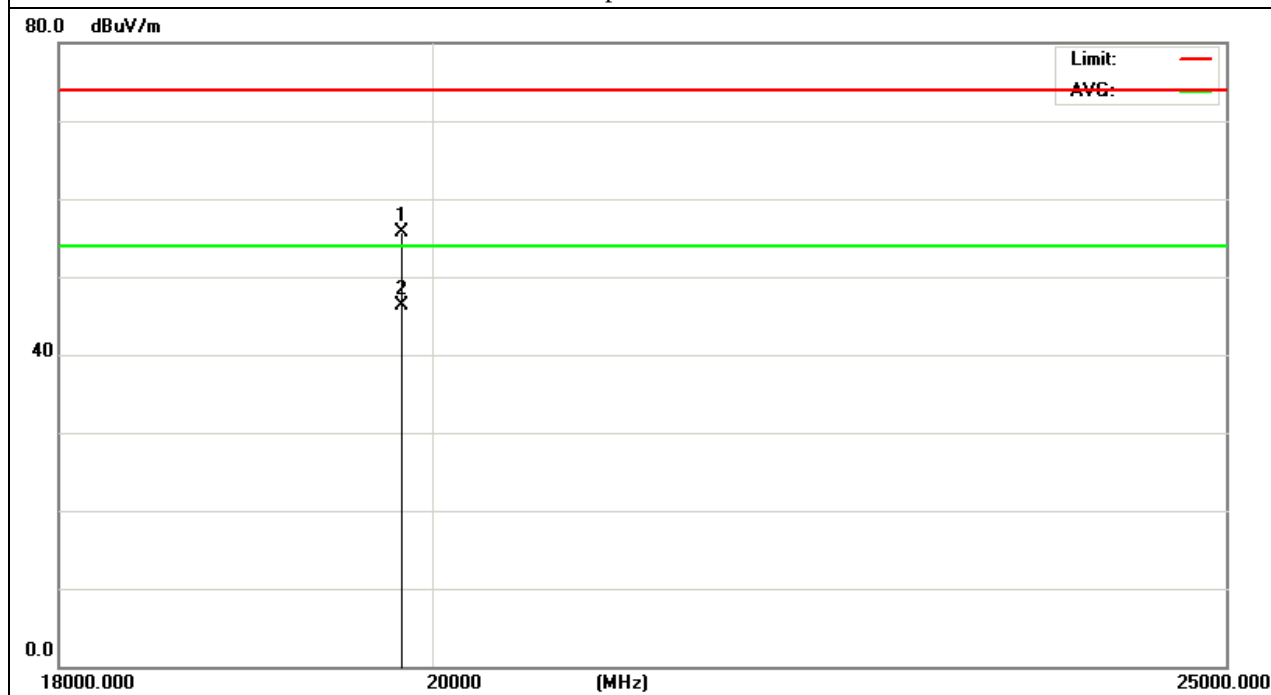


EUT :	SwitchBot Remote	Model Name :	B1
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	TX Mode1(2480MHz)	Polarization :	Horizontal
Test Power :	DC 3.7V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19825.000	39.23	16.57	55.80	74.00	-18.20	peak
19825.000	29.76	16.57	46.33	54.00	-7.67	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Remark:

All the modes had been tested, but only the worst data recorded in the report.

No any other emissions detected which are tested to compliance with the limit. No recording in the test report.

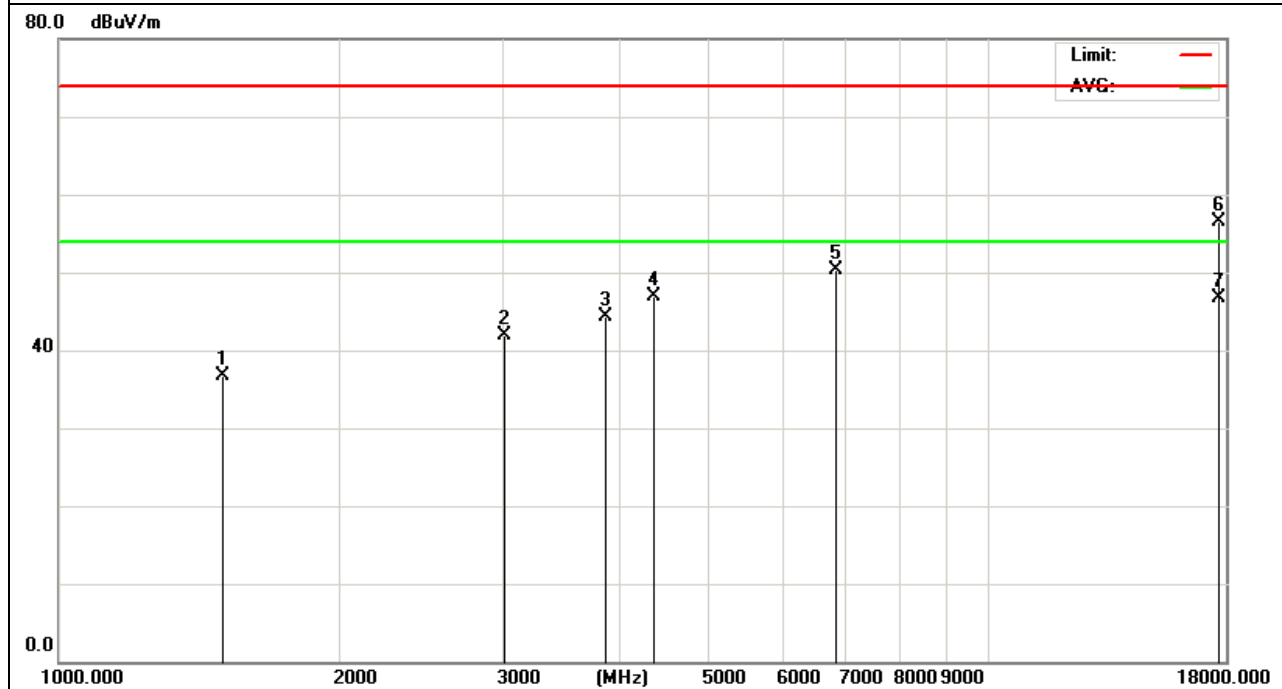
Test result: The unit does meet the NCC requirements.

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX (worst case)	Polarization :	Vertical
Measurement Distance	3 m	Frenqucy Range	1GHz to 18GHz
Test Power :	DC3V from battery		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1502.337	46.58	-9.85	36.73	74.00	-37.27	peak
3016.550	43.63	-1.64	41.99	74.00	-32.01	peak
3864.548	41.51	2.84	44.35	74.00	-29.65	peak
4361.429	42.36	4.46	46.82	74.00	-27.18	peak
6844.175	44.15	6.09	50.24	74.00	-23.76	peak
17664.239	31.58	24.92	56.50	74.00	-17.50	peak
17664.239	21.69	24.92	46.61	54.00	-7.39	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

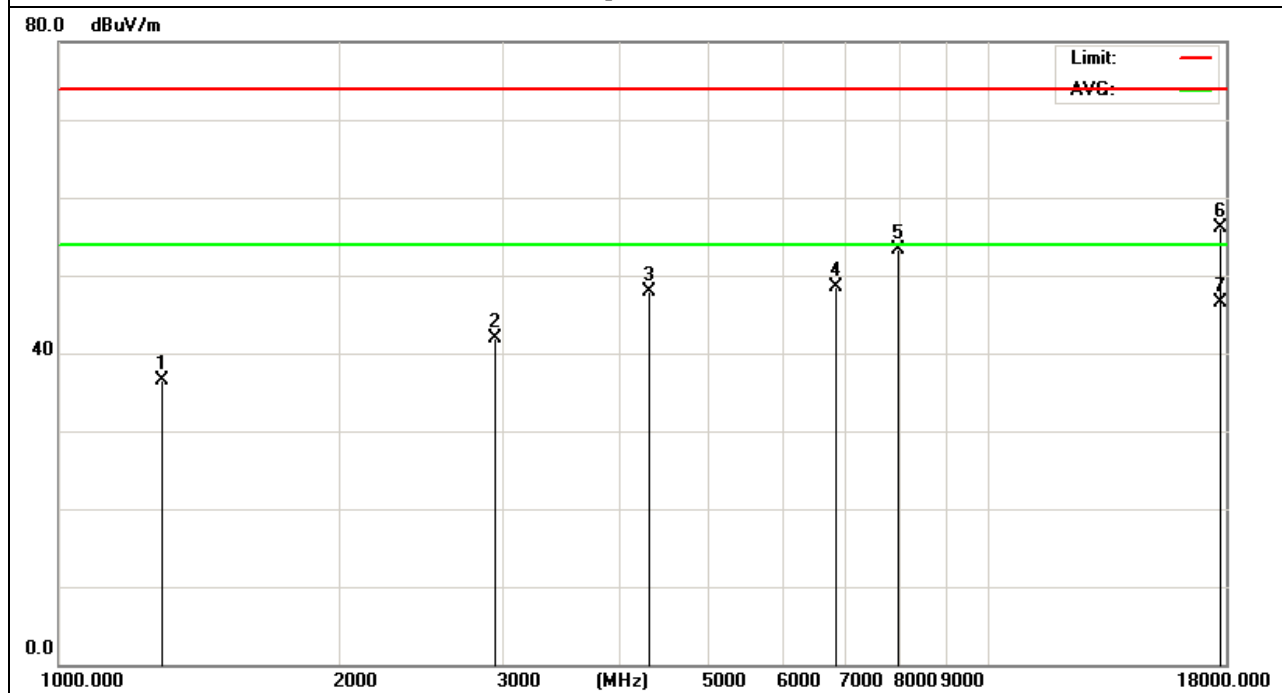


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX (worst case)	Polarization :	Horizontal
Measurement Distance	3 m	Frenqucy Range	1GHz to 18GHz
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1289.748	46.88	-10.36	36.52	74.00	-37.48	peak
2945.024	43.87	-2.06	41.81	74.00	-32.19	peak
4310.143	43.63	4.35	47.98	74.00	-26.02	peak
6844.023	42.41	6.08	48.49	74.00	-25.51	peak
7989.644	42.89	10.34	53.23	74.00	-20.77	peak
17691.558	31.28	24.90	56.18	74.00	-17.82	peak
17691.558	21.69	24.90	46.59	54.00	-7.41	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

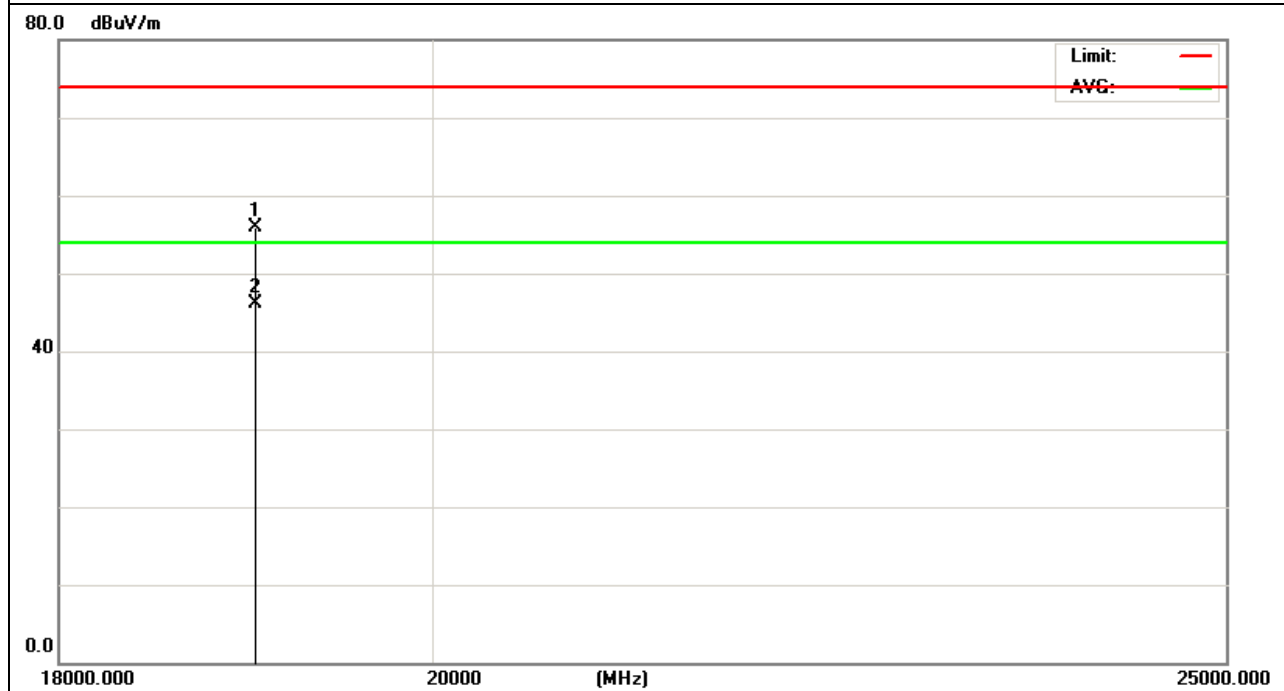


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX (worst case)	Polarization :	Vertical
Measurement Distance	3 m	Frenqucy Range	18GHz to 25GHz
Test Power :	DC3V from battery		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
19023.000	39.56	16.41	55.97	74.00	-18.03	peak
19023.000	29.78	16.41	46.19	54.00	-7.81	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

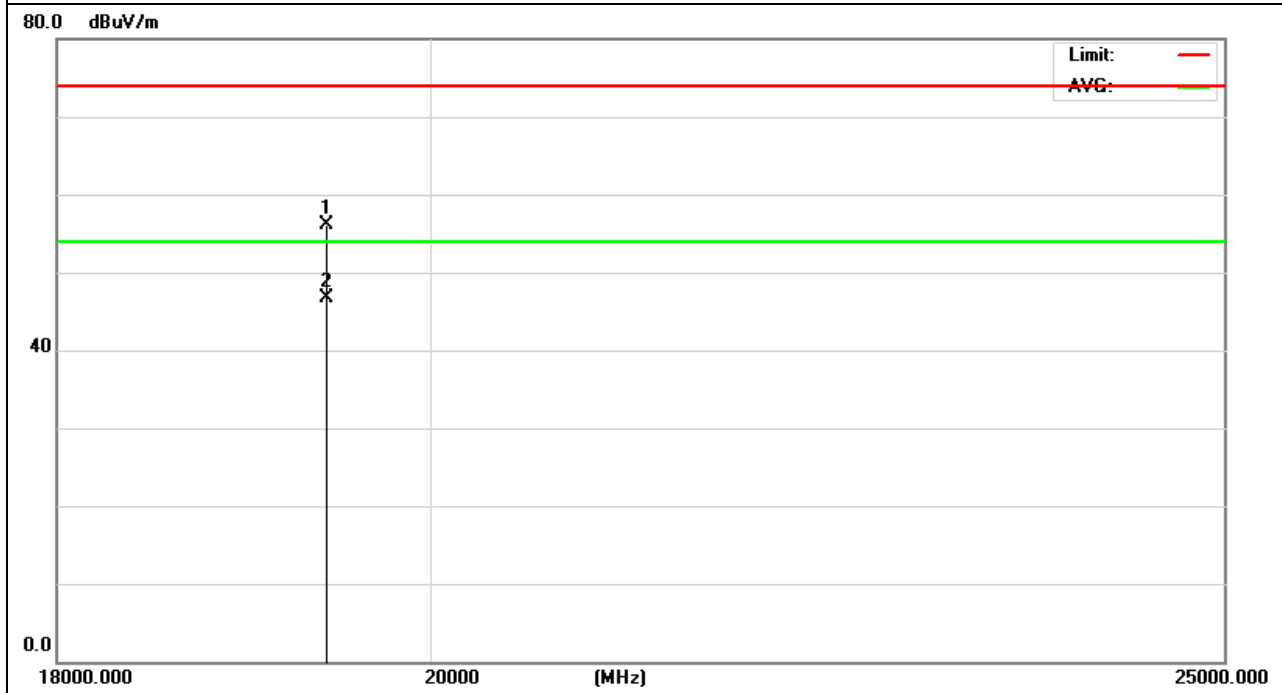


EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2022-02-15
Test Mode :	RX (worst case)	Polarization :	Horizontal
Measurement Distance	3 m	Frenqucy Range	18GHz to 25GHz
Test Power :	DC3V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19415.000	39.64	16.49	56.13	74.00	-17.87	peak
19415.000	30.25	16.49	46.74	54.00	-7.26	AVG

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Remark:

All the modes had been tested, but only the worst data recorded in the report.

No any other emissions detected which are tested to compliance with the limit. No recording in the test report.

Test result: The unit does meet the NCC requirements.

4.2.8 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

Test Procedures

According to KDB558074 D01 15.247 Meas Guidance v05r02 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

- 1). Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2). Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to an EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3). Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=1/B for AV detector.
- 4). Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5). Repeat above procedures until all measured frequencies were complete.
- 6). Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- 7). Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
- 8). Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
- 9). For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
- 10). Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = \text{EIRP} - 20\log D + 104.77 = \text{EIRP} + 95.23$$

Where:

E = electric field strength in dB μ V/m,

EIRP = equivalent isotropic radiated power in dBm

D = specified measurement distance in meters.

- 11). Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
- 12). Compare the resultant electric field strength level to the applicable regulatory limit.
- 13). Perform radiated spurious emission test duress until all measured frequencies were complete.

Remark:

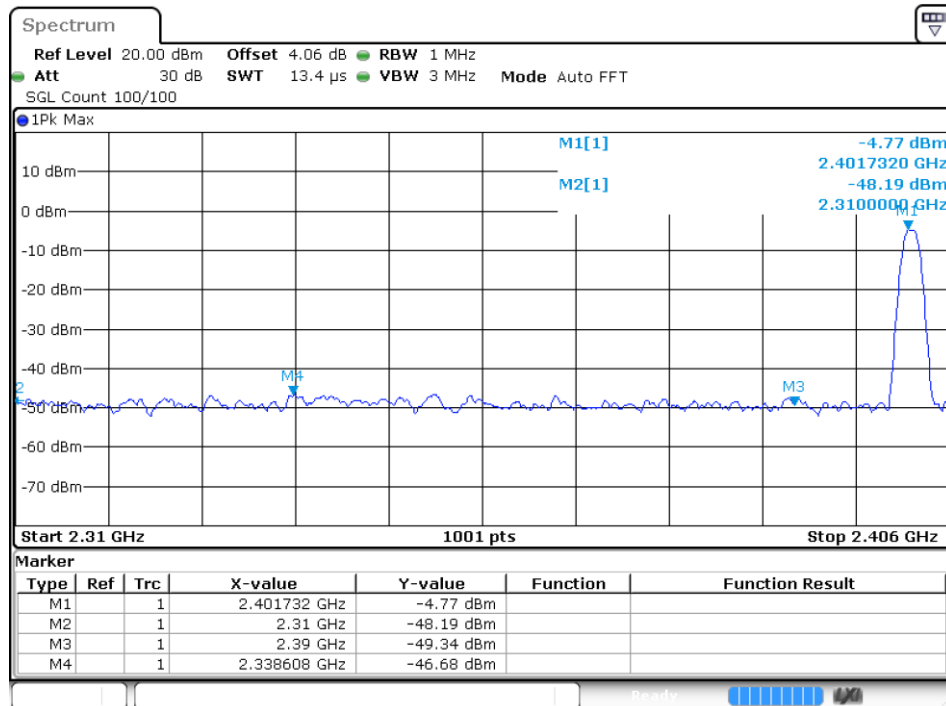
- 1). Measured Band-edge measurements for radiated emissions at difference data rate for each mode and recorded worst case for each mode.*
- 2). Test results including cable loss;*
- 3). Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20;*
- 5). No need measure Average values if Peak values meets Average limits;*
- 4). Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=10Hz/Sweep time=Auto/Detector=Peak.*
- 5). Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.*

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Test Data	2022-02-15
Pressure :	1010 hPa	Relative Humidity :	54%
Test Mode :	Mode 1	Test Voltage :	DC3V from battery
Note :	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz. 3. The data of 2390MHz and 2483.5MHz was the worst.		

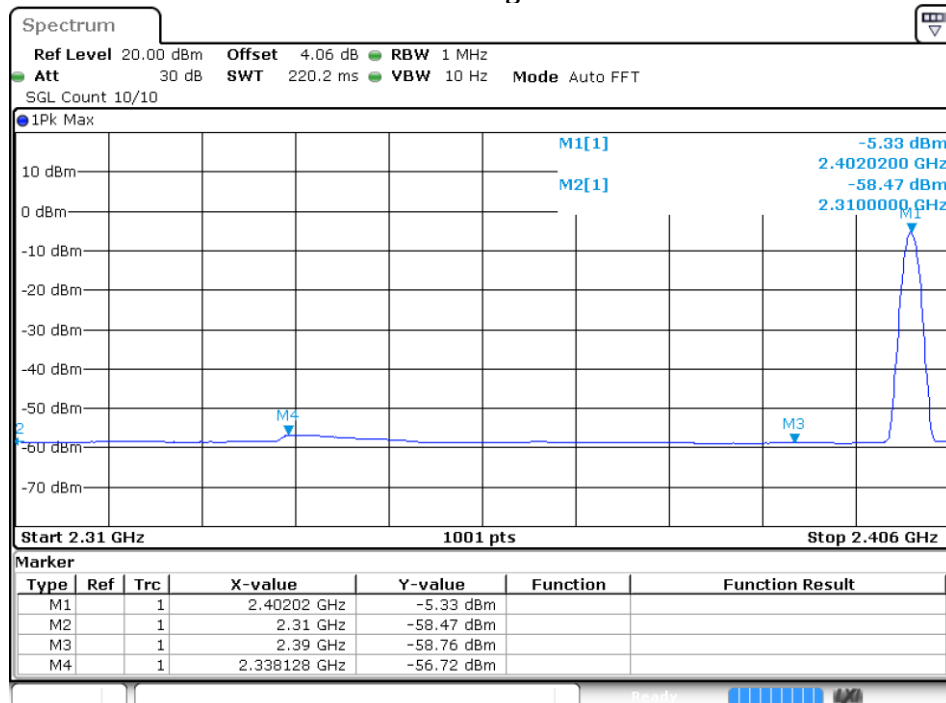
Mode	Frequency (MHz)	Spur Freq (MHz)	Power (dBm)	Gain (dBi)	E (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
BLE 1M	2402	2310	-48.19	2	49.07	Peak	74	Pass
BLE 1M	2402	2310	-58.47	2	38.79	Average	54	Pass
BLE 1M	2402	2338.608	-46.68	2	50.58	Peak	74	Pass
BLE 1M	2402	2338.128	-56.72	2	40.54	Average	54	Pass
BLE 1M	2402	2390	-49.34	2	47.92	Peak	74	Pass
BLE 1M	2402	2390	-58.75	2	38.51	Average	54	Pass
BLE 1M	2480	2483.5	-49.31	2	47.95	Peak	74	Pass
BLE 1M	2480	2483.5	-58.2	2	39.06	Average	54	Pass
BLE 1M	2480	2484.856	-46.49	2	50.77	Peak	74	Pass
BLE 1M	2480	2487.208	-58.17	2	39.09	Average	54	Pass
BLE 1M	2480	2500	-46.98	2	50.28	Peak	74	Pass
BLE 1M	2480	2500	-58.22	2	39.04	Average	54	Pass
BLE 2M	2402	2310	-49.19	2	48.07	Peak	74	Pass
BLE 2M	2402	2310	-58.46	2	38.8	Average	54	Pass
BLE 2M	2402	2345.808	-44.8	2	52.46	Peak	74	Pass
BLE 2M	2402	2338.128	-56.72	2	40.54	Average	54	Pass
BLE 2M	2402	2390	-48.99	2	48.27	Peak	74	Pass
BLE 2M	2402	2390	-58.73	2	38.53	Average	54	Pass
BLE 2M	2480	2483.5	-49.58	2	47.68	Peak	74	Pass
BLE 2M	2480	2483.5	-57.77	2	39.49	Average	54	Pass
BLE 2M	2480	2486.464	-47.53	2	49.73	Peak	74	Pass
BLE 2M	2480	2483.512	-57.77	2	39.49	Average	54	Pass
BLE 2M	2480	2500	-47.91	2	49.35	Peak	74	Pass
BLE 2M	2480	2500	-58.21	2	39.05	Average	54	Pass

1M PHY:

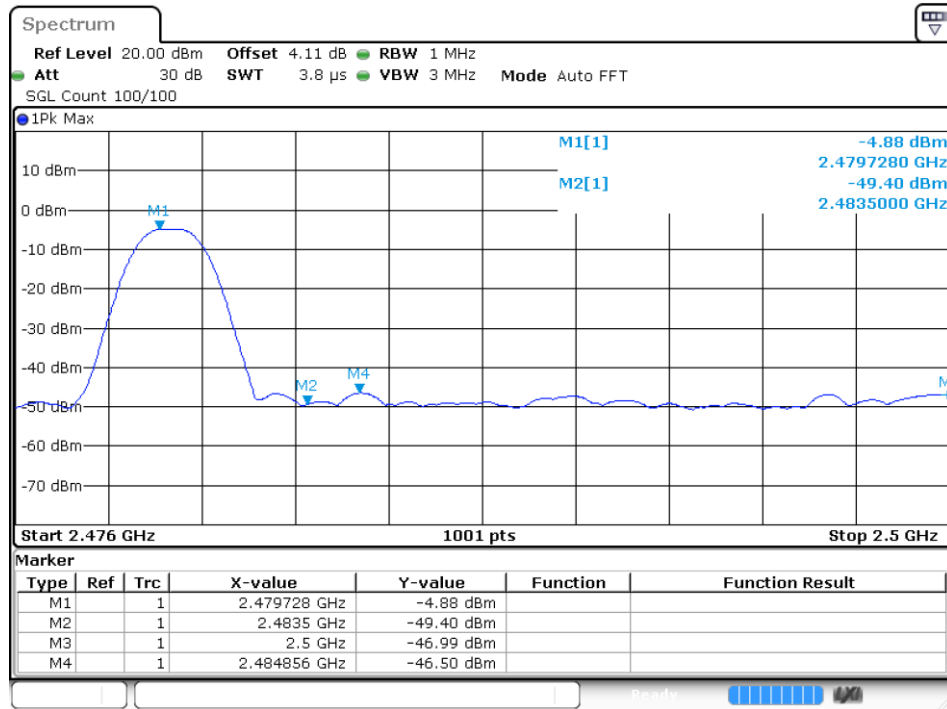
Peak



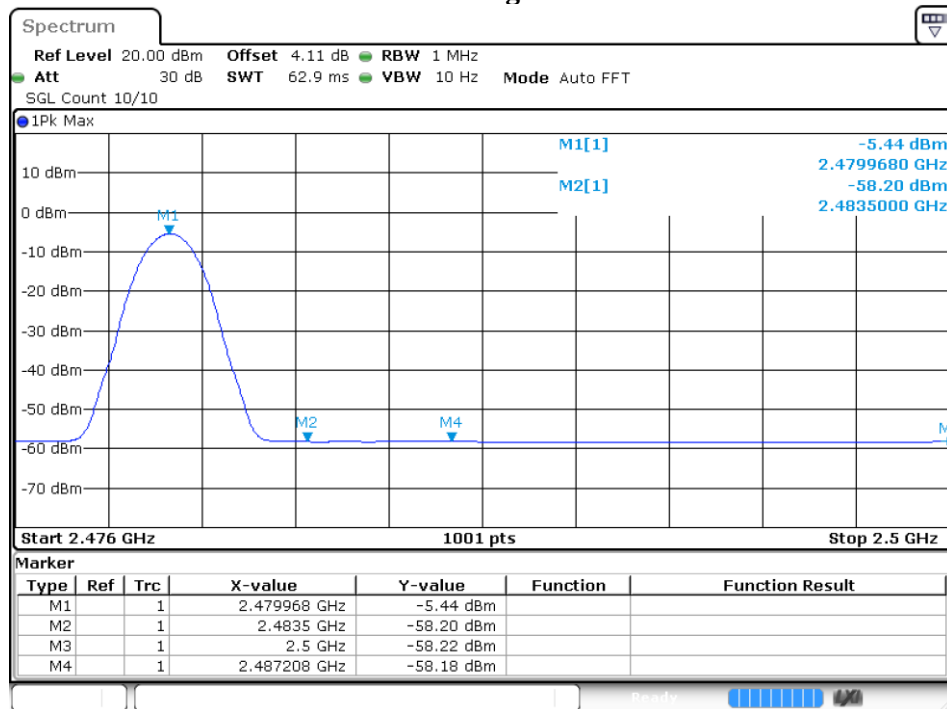
Average



Peak

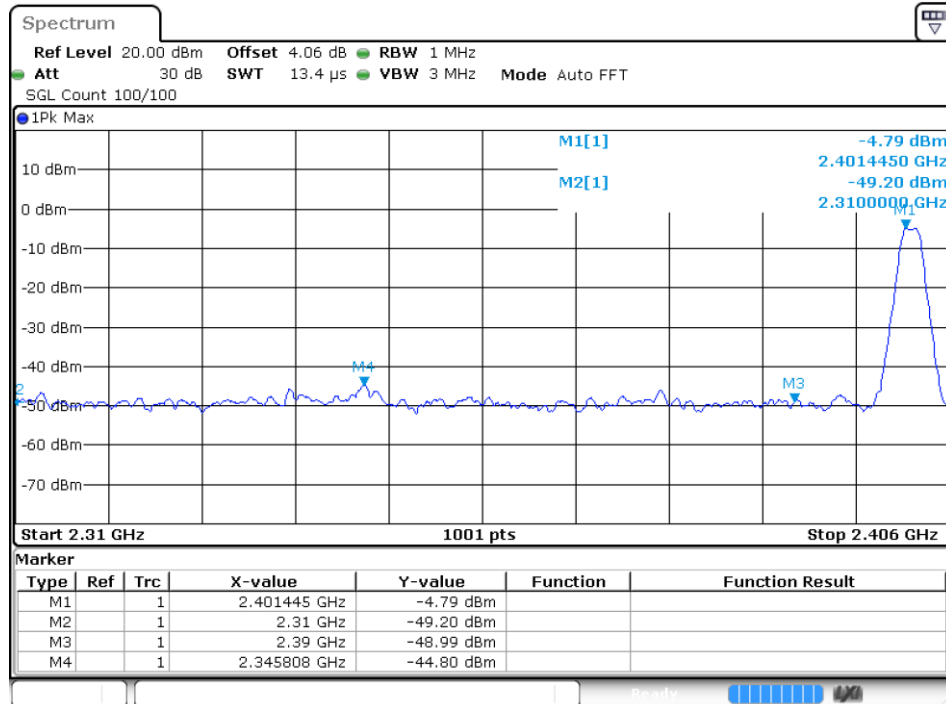


Average

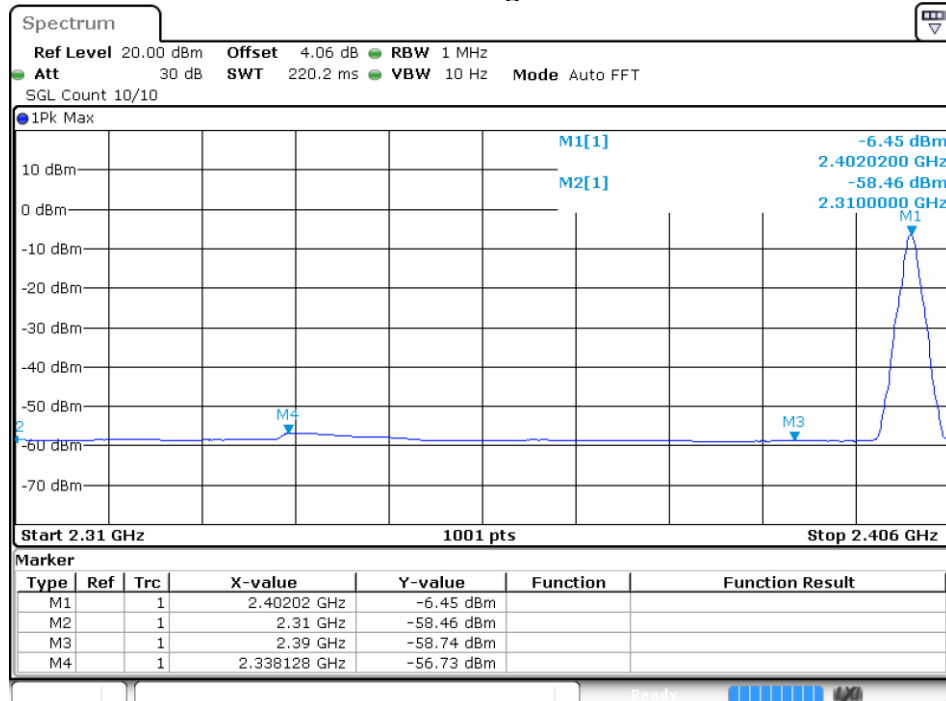


2M PHY:

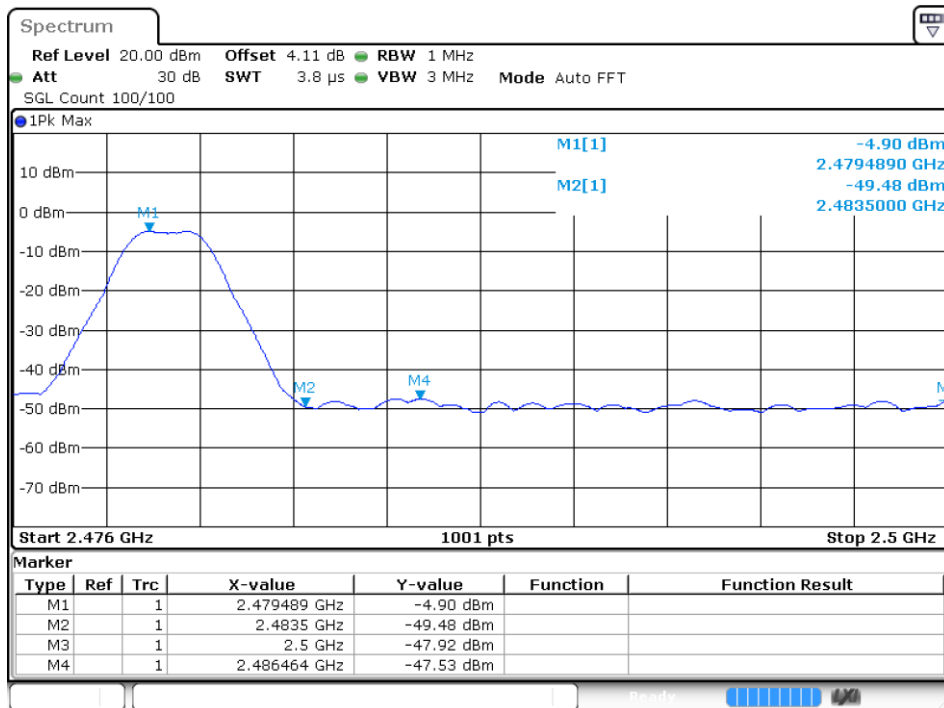
Peak



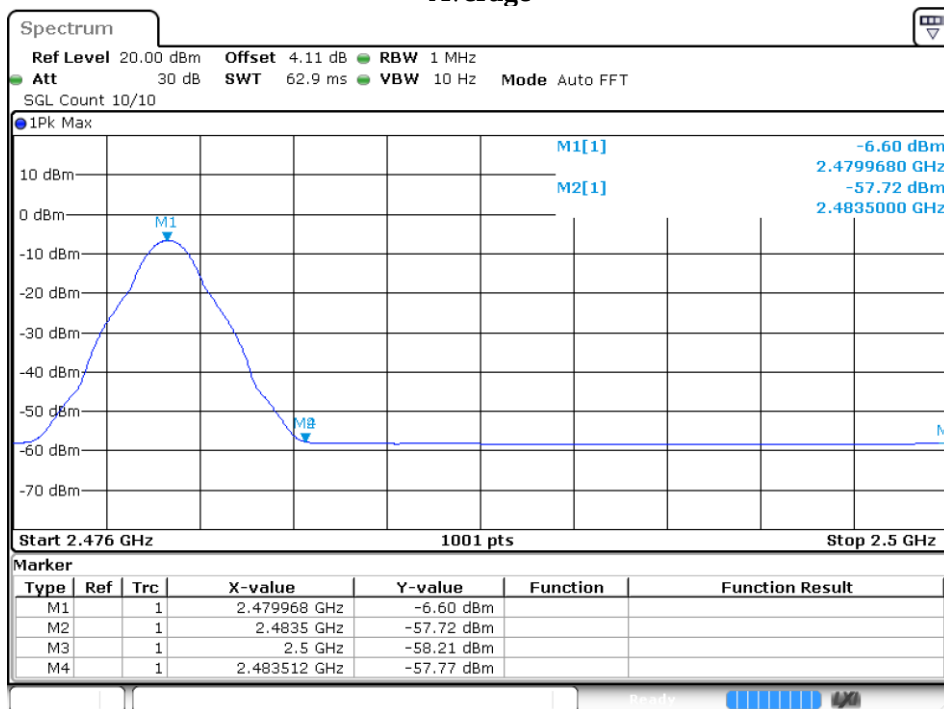
Average



Peak



Average



Test result: The unit does meet the NCC requirements.

5. OCCUPIED BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

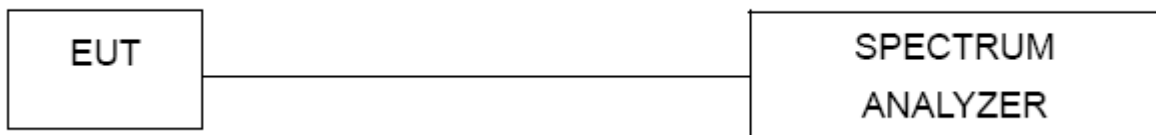
LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(6.2.1)	Bandwidth	$\geq 500\text{kHz}$ (6dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	$>$ Measurement Bandwidth or Channel Separation
RB	100 kHz (6dB Bandwidth) / 100 kHz (Channel Separation)
VB	300 kHz (6dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting: RBW= 100kHz, VBW=300kHz, Sweep time = Auto.

5.1.2 TEST SETUP



5.1.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.4 TEST RESULTS

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	53%
Pressure :	1010 hPa	Test Power :	DC3V from battery
Test Mode :	Mode 1		
Test Date :	2022-02-15		

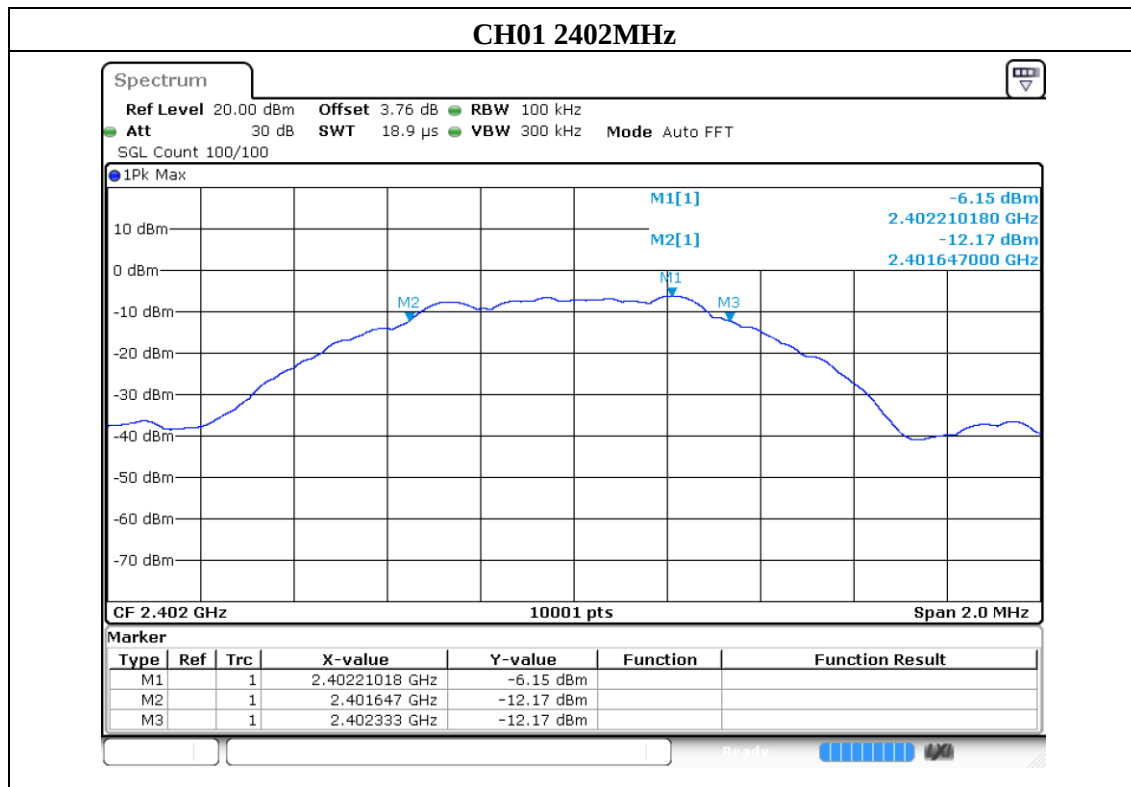
1M PHY:

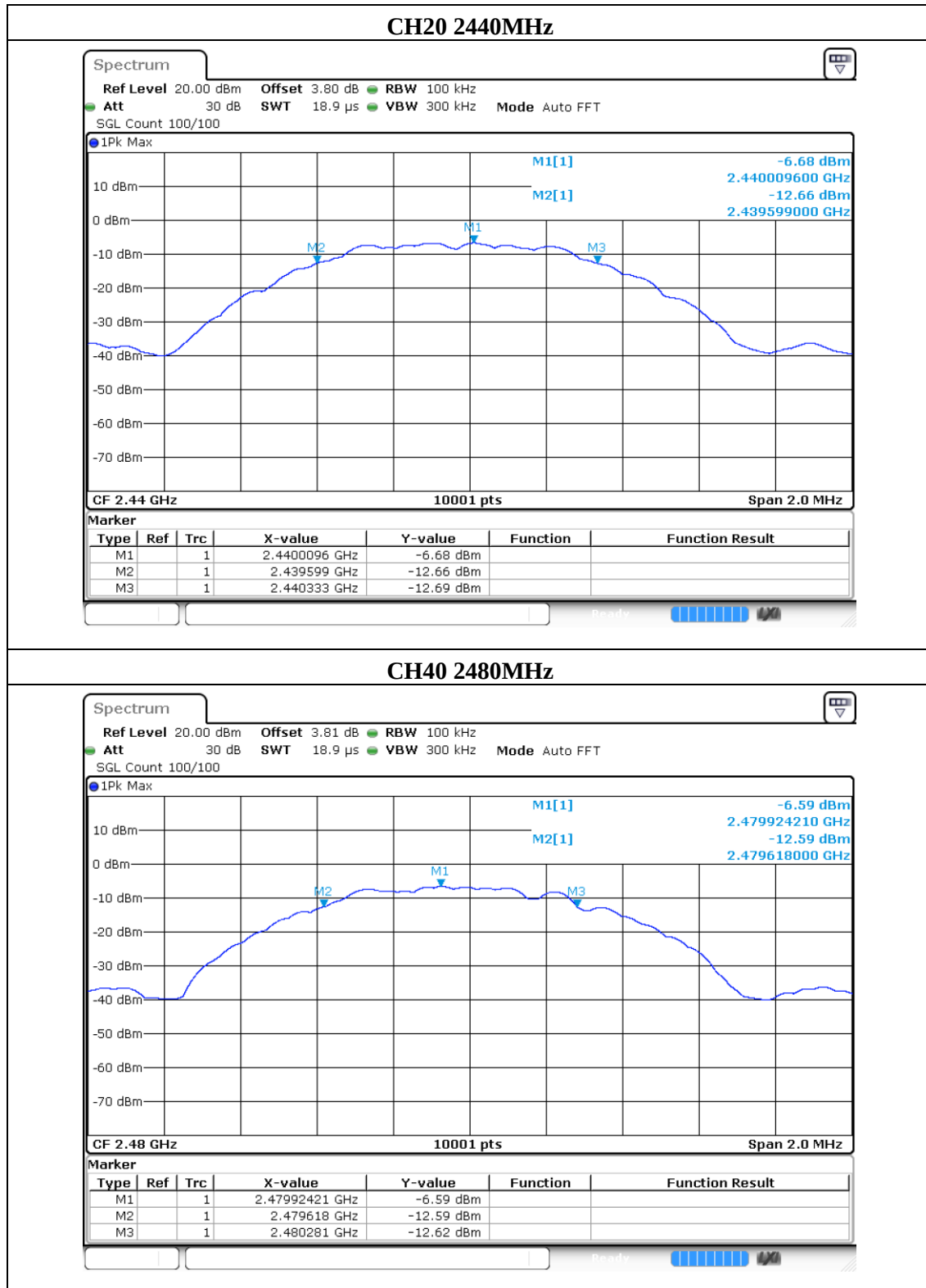
Test Mode	Test Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Limit (kHz)
Mode 1	CH01	2402	685	≥ 500
	CH20	2440	734	≥ 500
	CH40	2480	662	≥ 500

2M PHY:

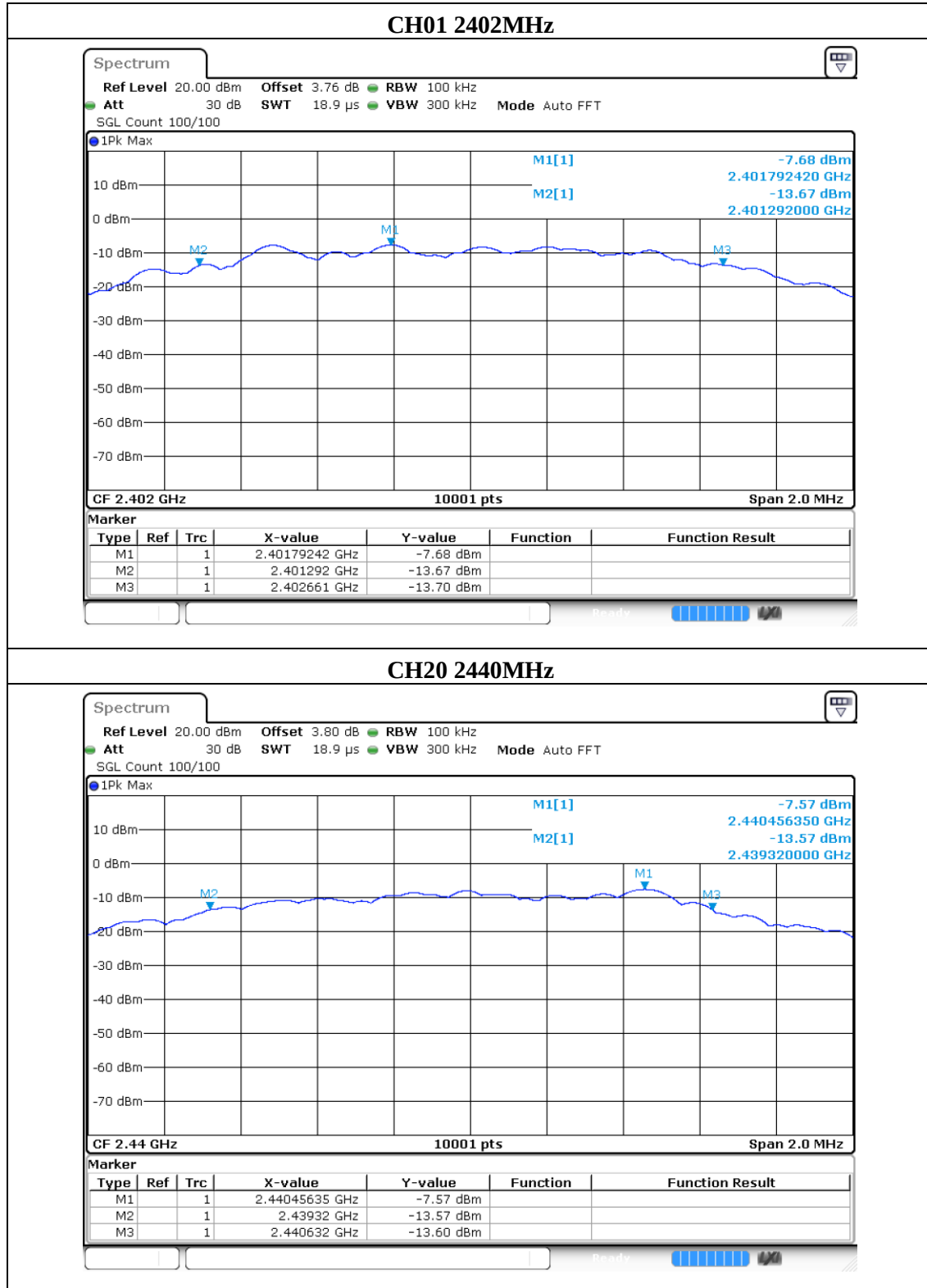
Test Mode	Test Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Limit (kHz)
Mode 1	CH01	2402	1369	≥ 500
	CH20	2440	1312	≥ 500
	CH40	2480	1272	≥ 500

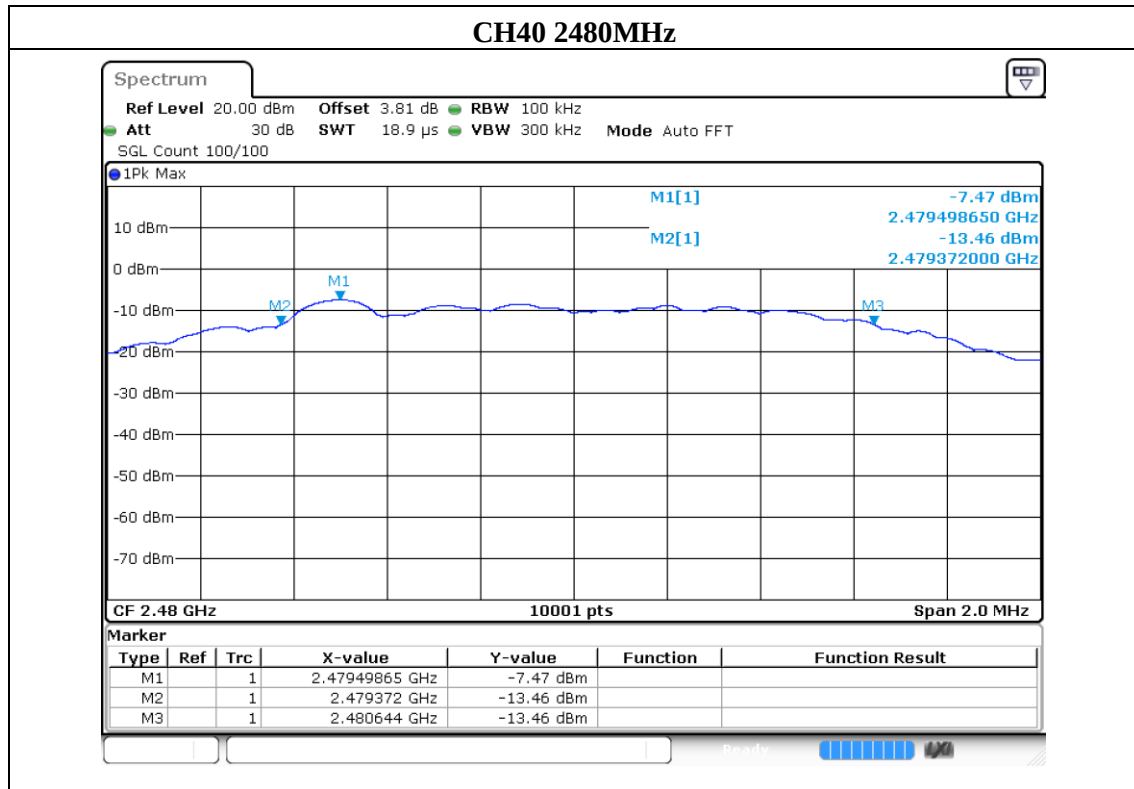
1M PHY:





2M PHY:





6. POWER DENSITY

6.1 APPLIED PROCEDURES / LIMIT

LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(6.2.2)	Power density	8dBm	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	1.5 times the DTS bandwidth
RB	3 kHz
VB	10 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 3kHz, VBW=10kHz.

6.1.2 TEST SETUP



6.1.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.4 TEST RESULTS

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	53%
Pressure :	1010 hPa	Test Voltage :	DC3V from battery
Test Mode :	Mode 1		
Test Date :	2022-02-15		

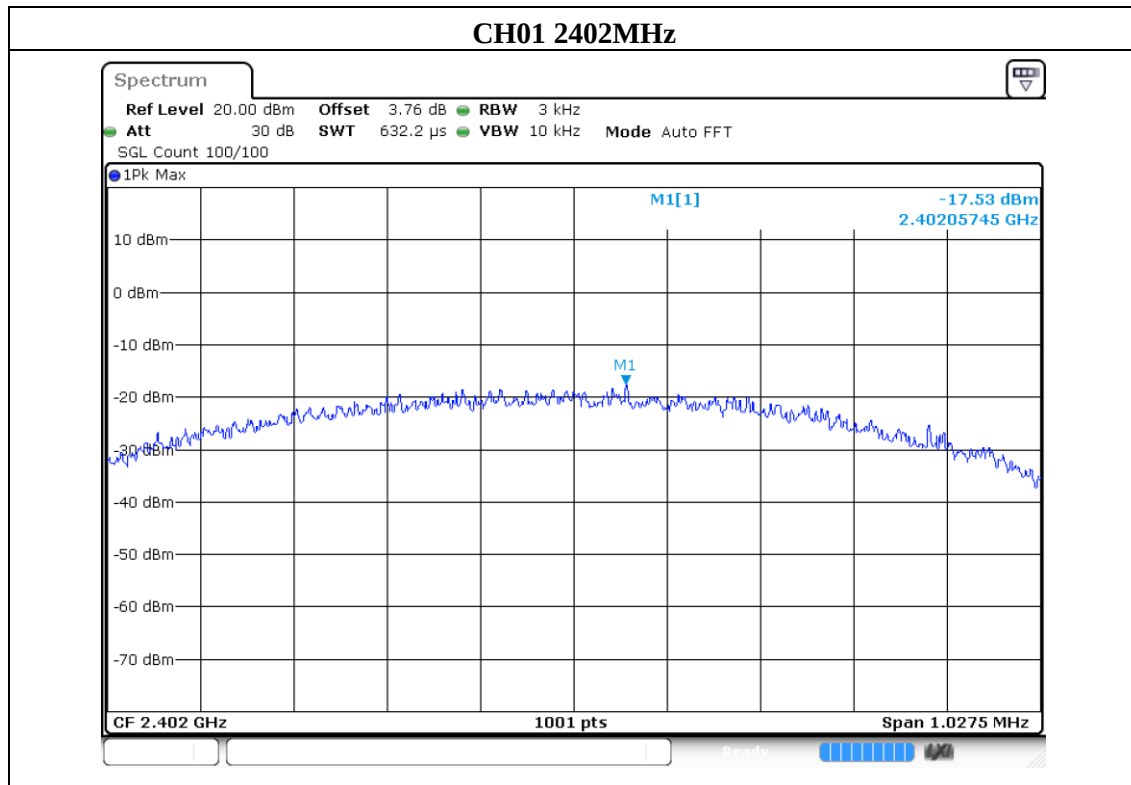
1M PHY:

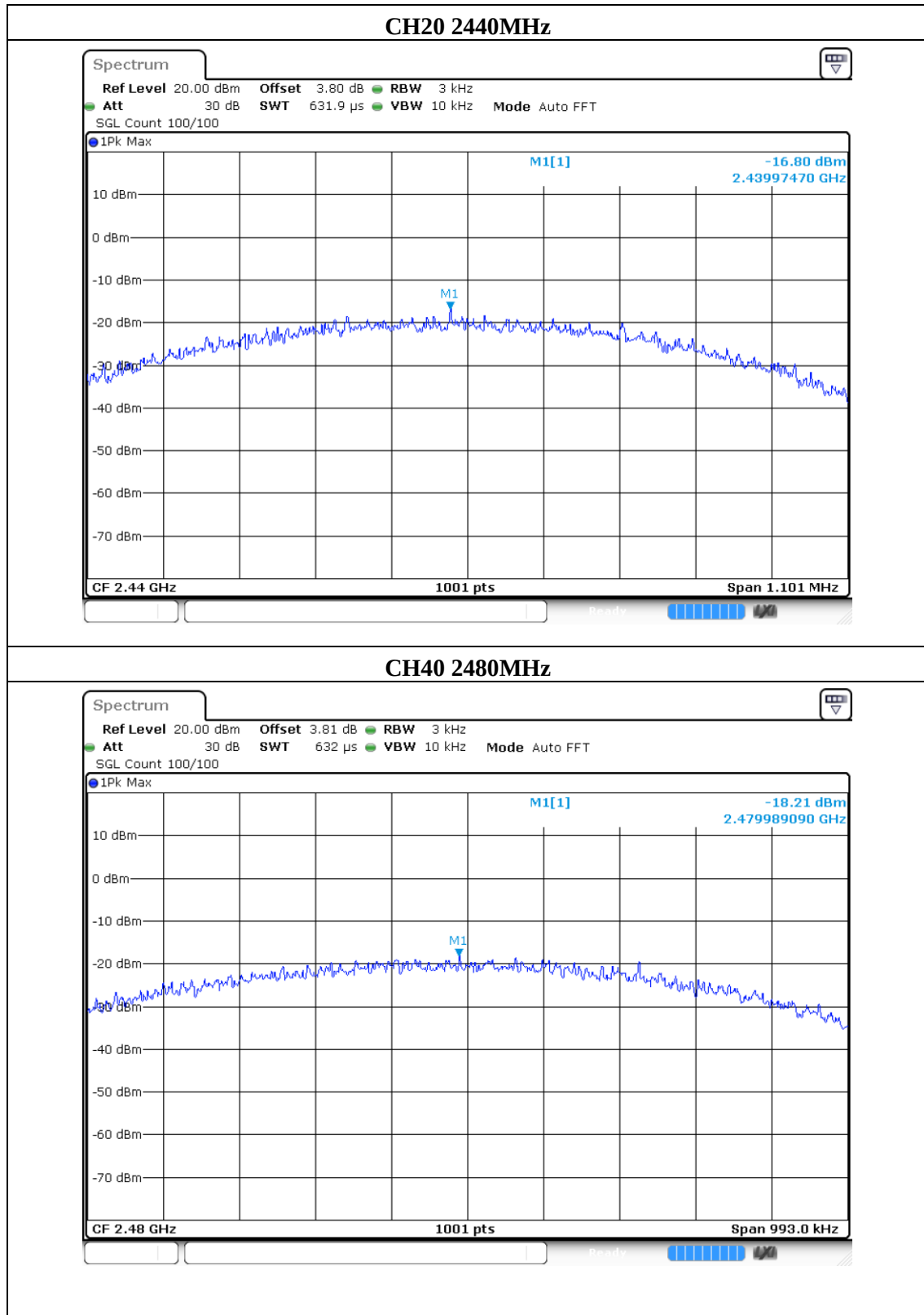
Test Channel	Frequency(MHz)	Power Density(dBm)	LIMIT(dBm)
CH01	2402 MHz	-17.53	8.00
CH20	2440 MHz	-16.8	8.00
CH40	2480 MHz	-18.21	8.00

2M PHY:

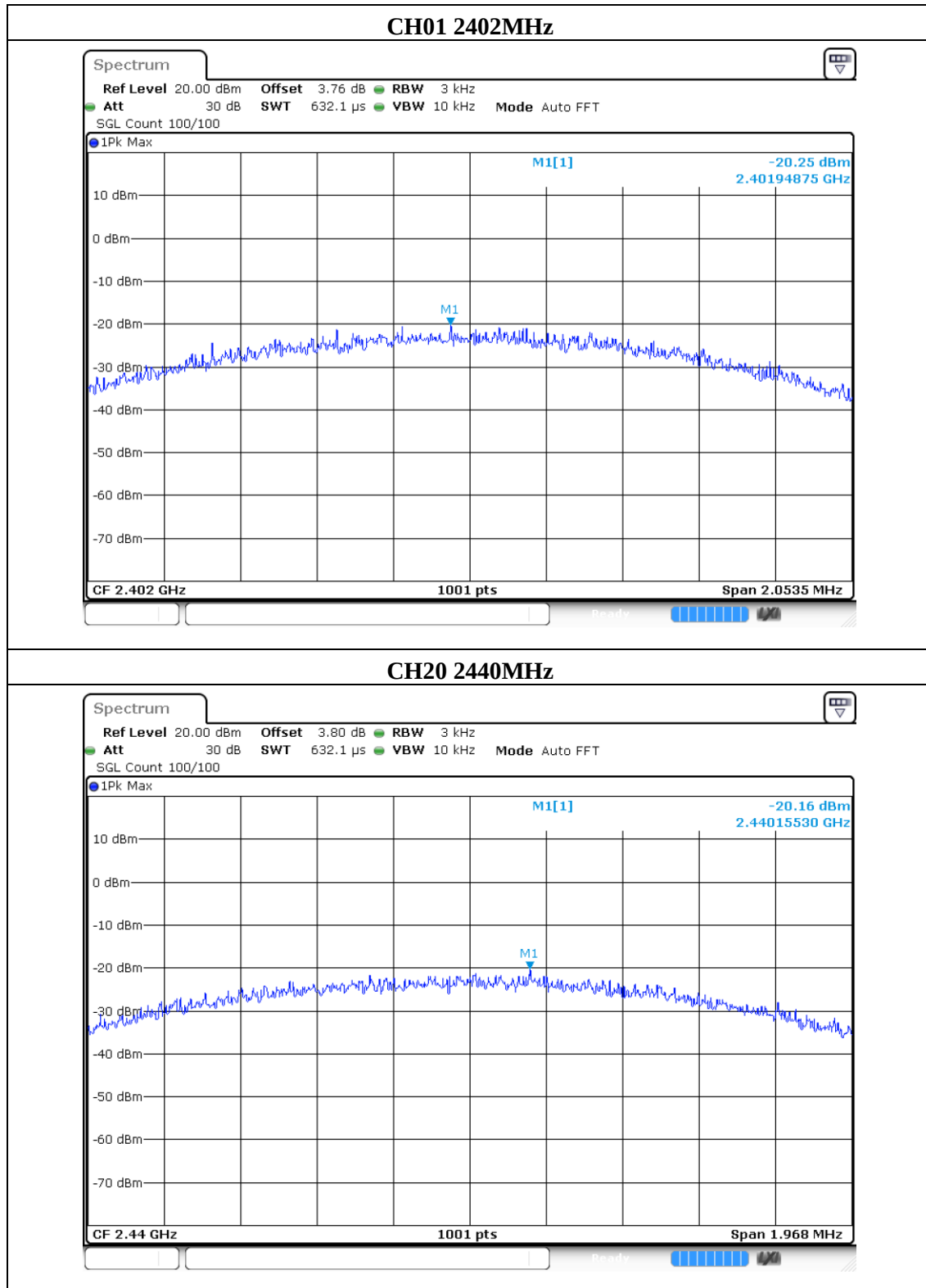
Test Channel	Frequency(MHz)	Power Density(dBm)	LIMIT(dBm)
CH01	2402 MHz	-20.25	8.00
CH20	2440 MHz	-20.16	8.00
CH40	2480 MHz	-21.01	8.00

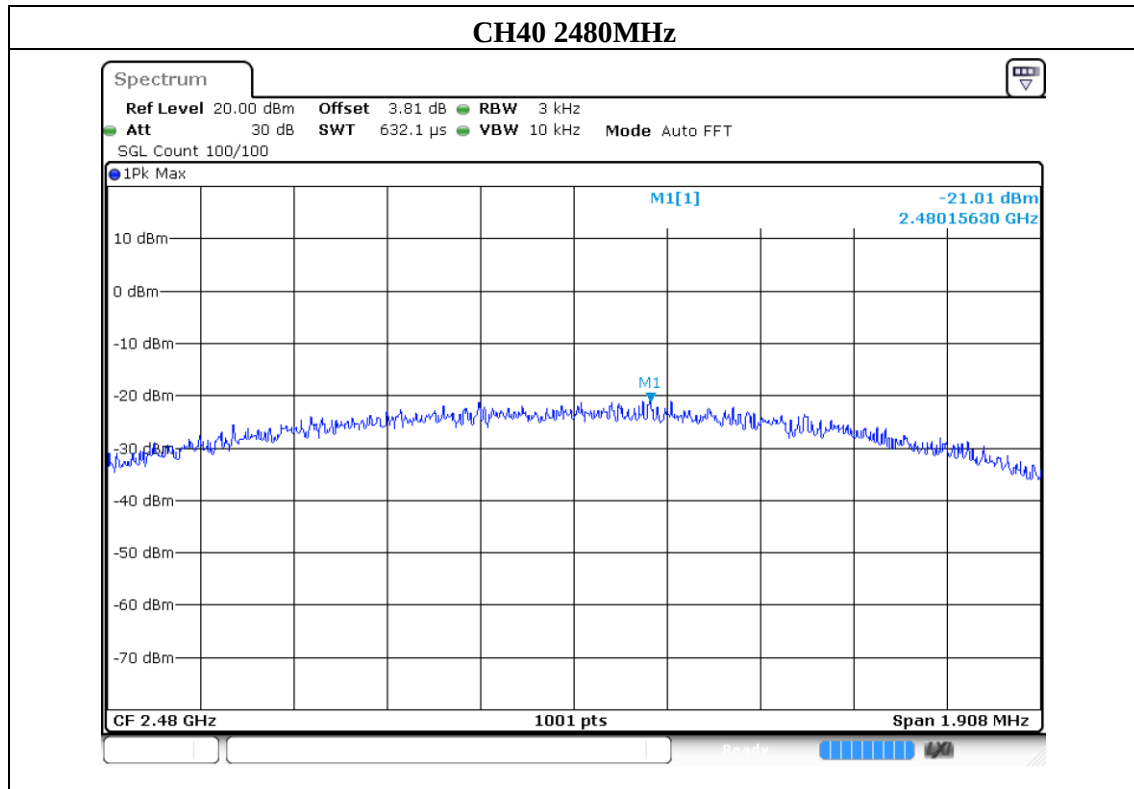
1M PHY:





2M PHY:





7. OUTPUT POWER TEST

7.1 APPLIED PROCEDURES / LIMIT

LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(2)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 1 MHz, VBW= 3 MHz, Span=5MHz,Detector=Peak,Trace mode= Max Hold ,Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

EUT :	SwitchBot Remote	Model Name :	W0301700
Temperature :	24 °C	Relative Humidity :	53%
Pressure :	1010 hPa	Test Voltage :	DC3V from battery
Test Mode :	Mode 1		
Test Date :	2022-02-15		

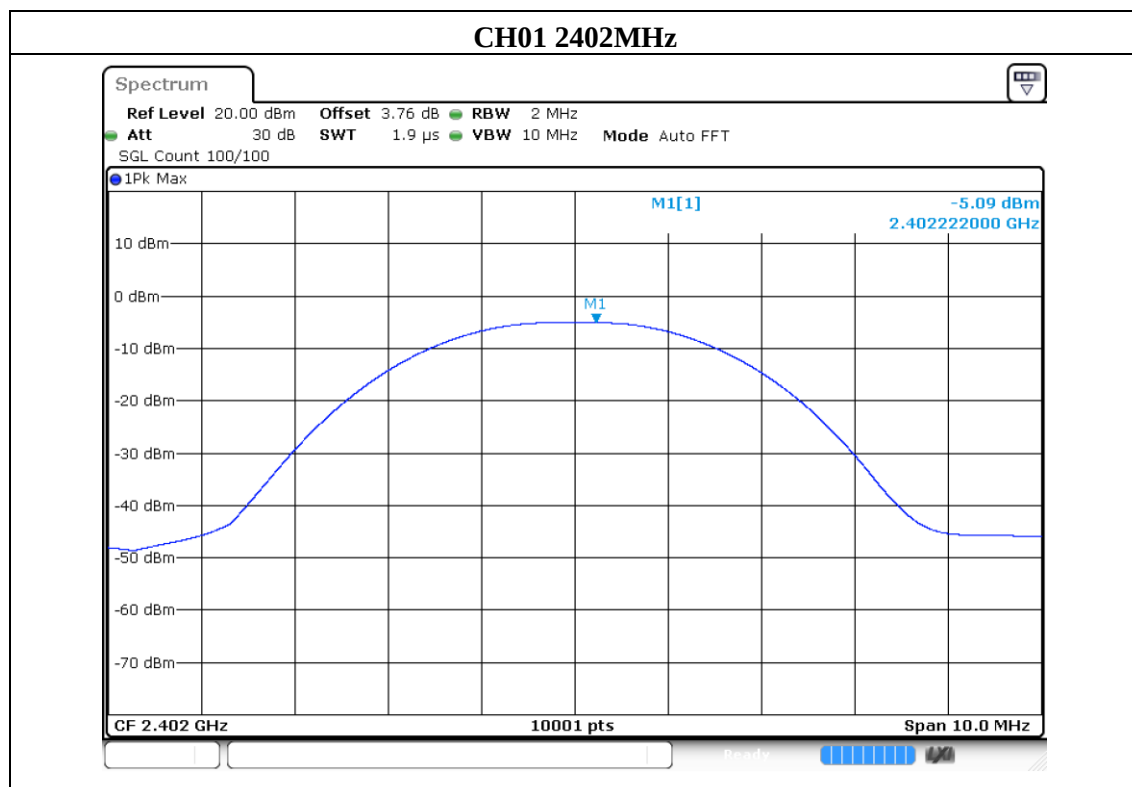
1M PHY:

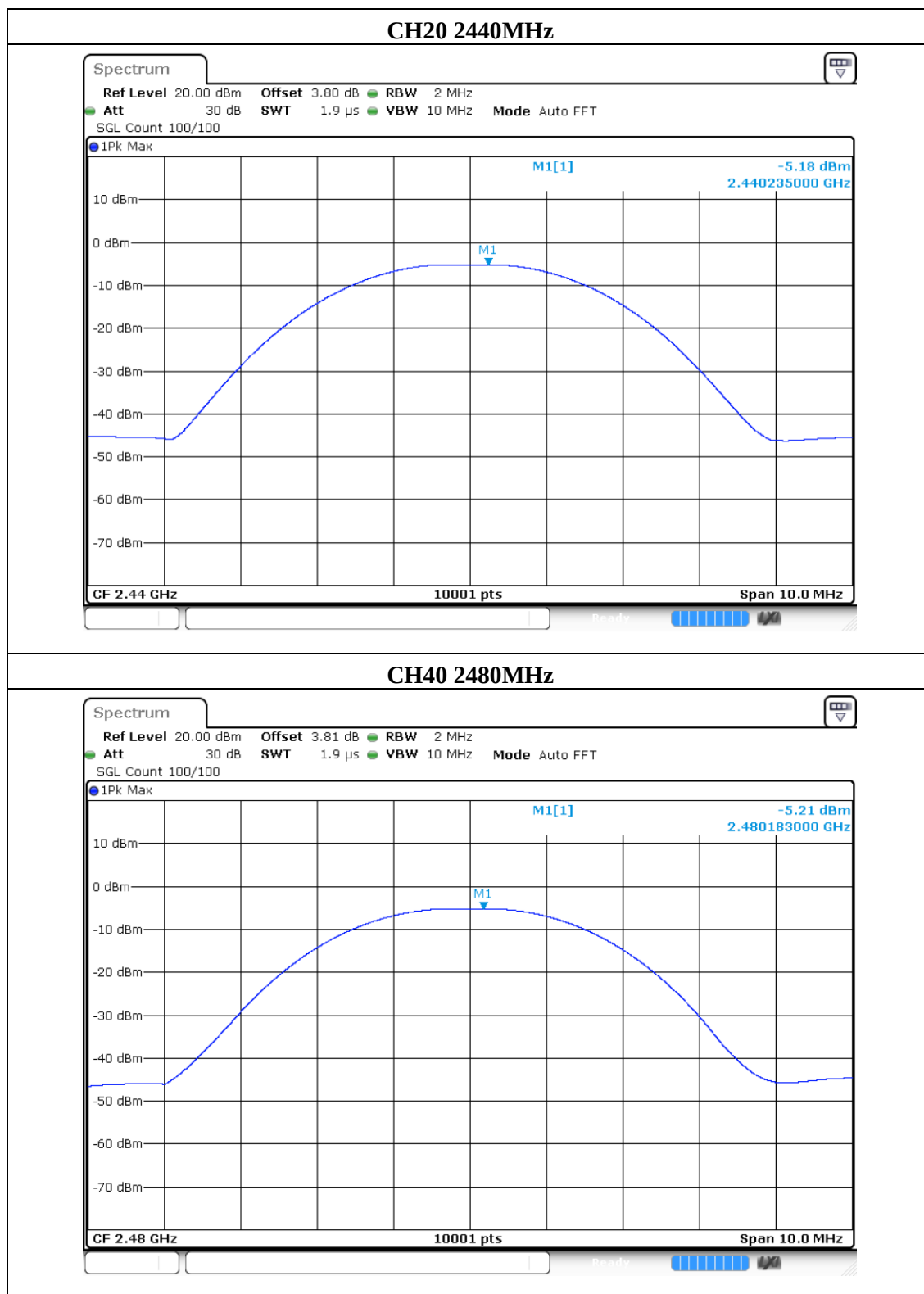
Test Channel	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
CH01	2402 MHz	-5.09	30	PASS
CH20	2440MHz	-5.18	30	PASS
CH40	2480 MHz	-5.21	30	PASS

2M PHY:

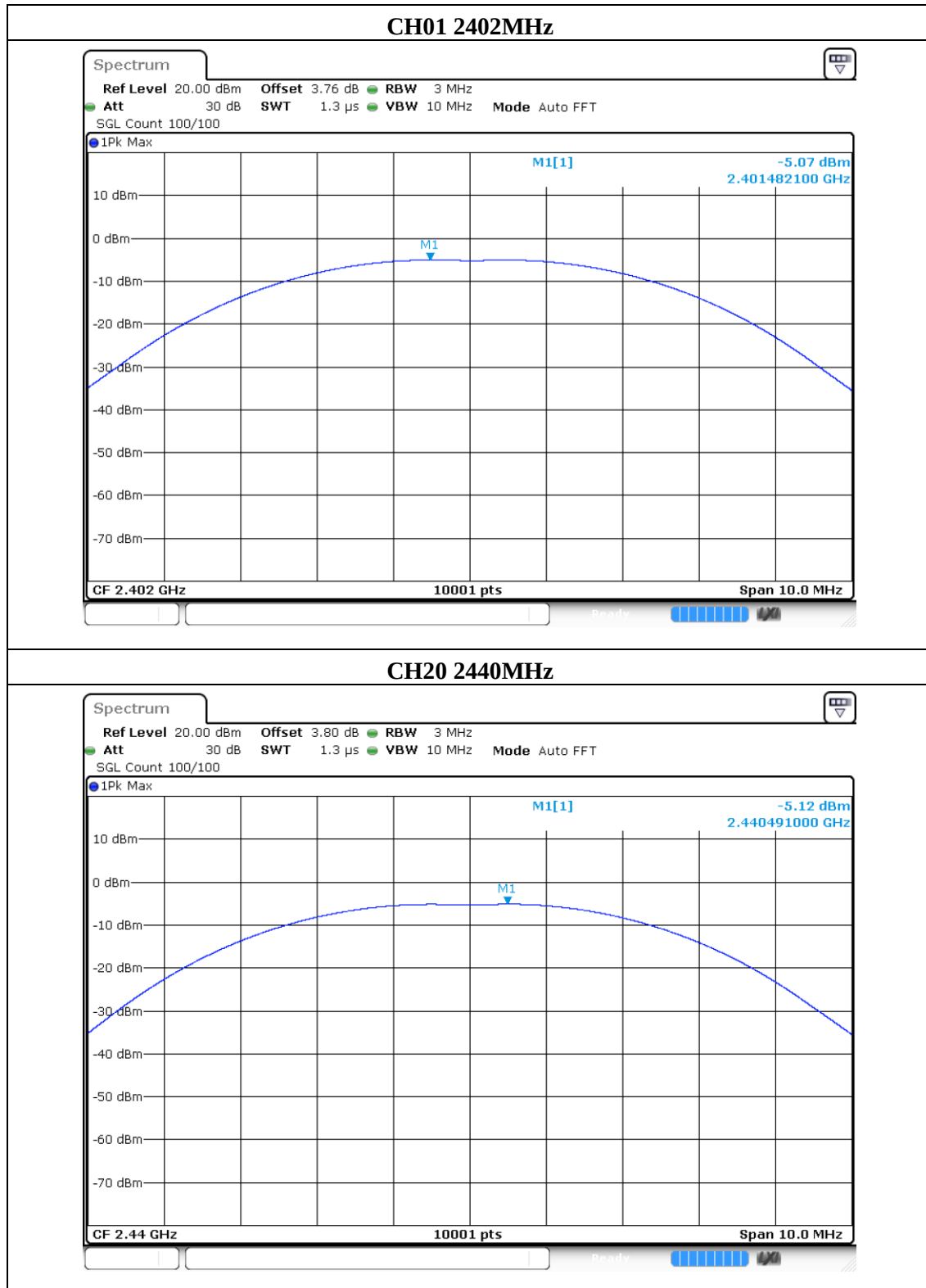
Test Channel	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
CH01	2402 MHz	-5.07	30	PASS
CH20	2440MHz	-5.12	30	PASS
CH40	2480 MHz	-5.2	30	PASS

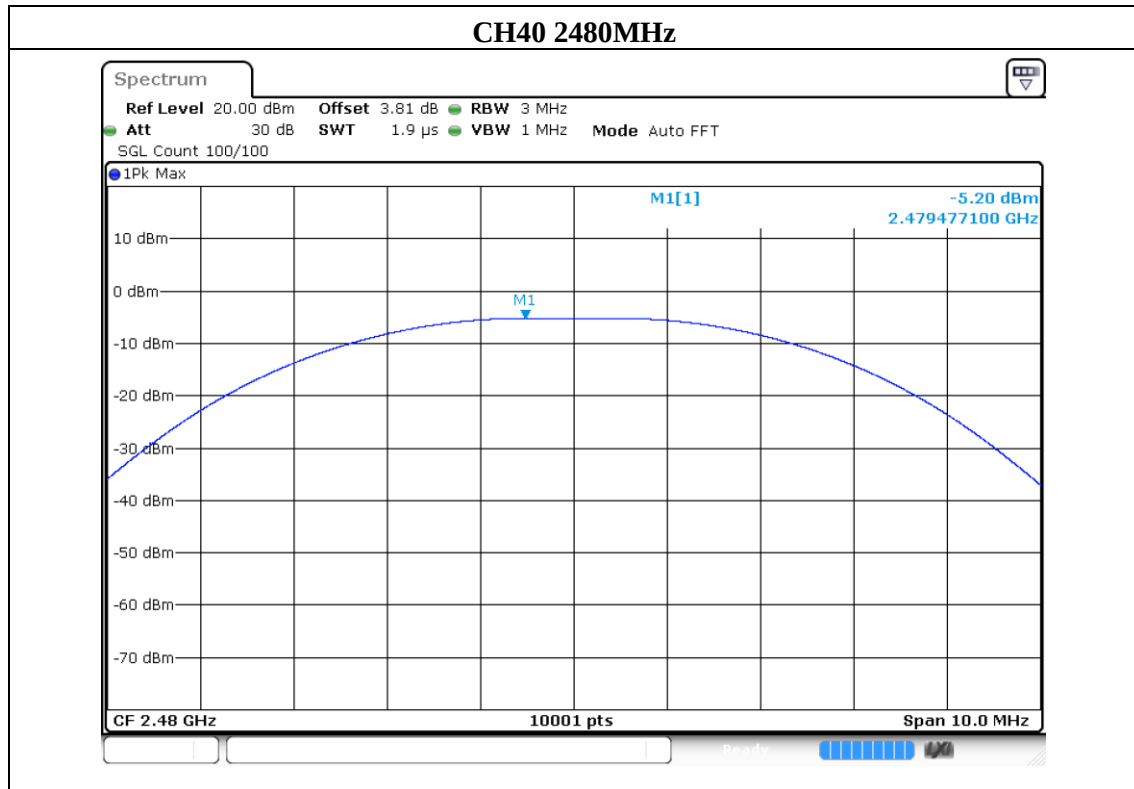
1M PHY:





2M PHY:





8. ANTENNA CONDUCTED SPURIOUS EMISSION

8.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency 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 or shall not exceed the general levels specified in Section 3.6.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 100kHz, VBW=300kHz, Sweep time = Auto.

8.1.2 TEST SETUP



8.1.3 EUT OPERATION CONDITIONS

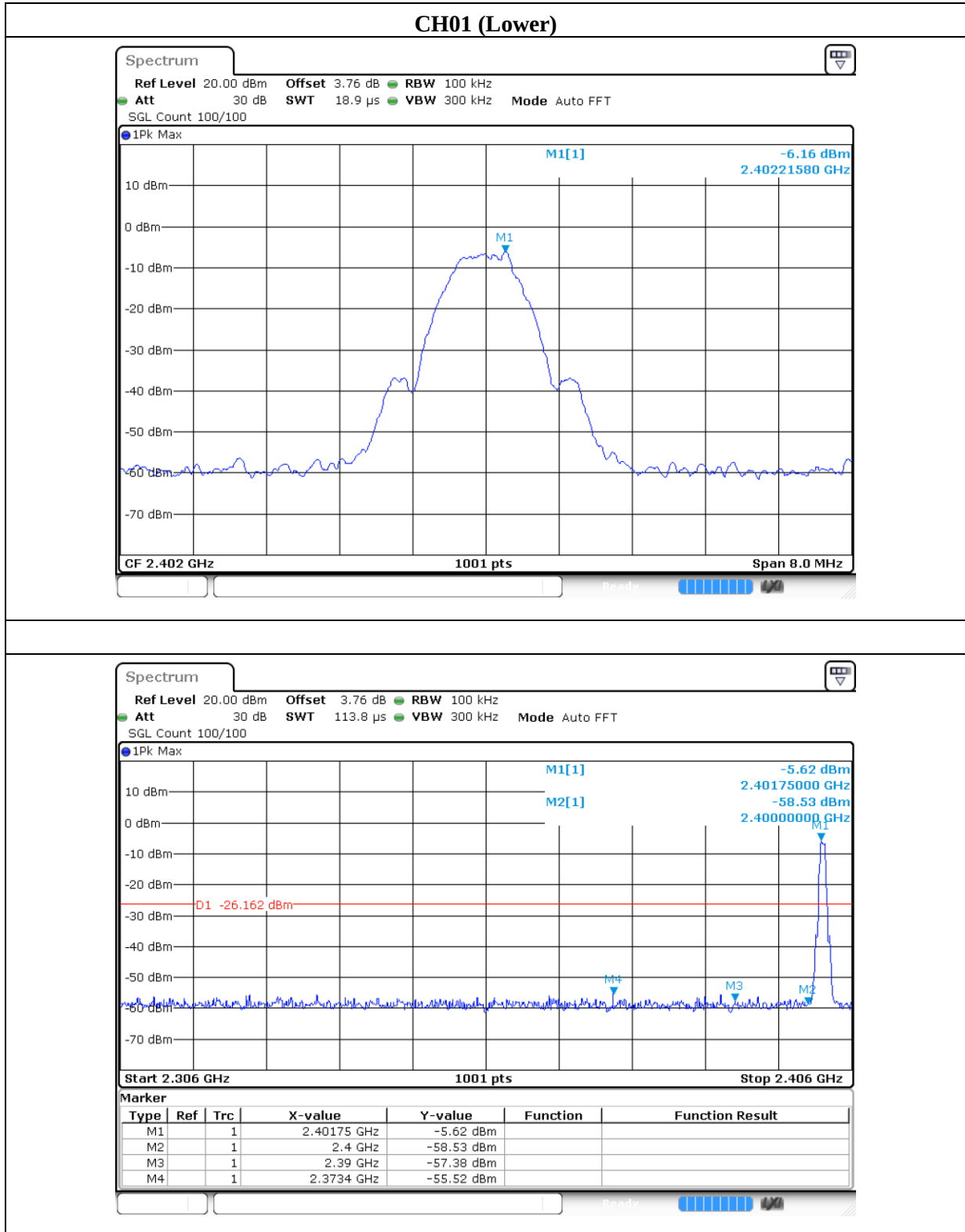
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.4 TEST RESULTS

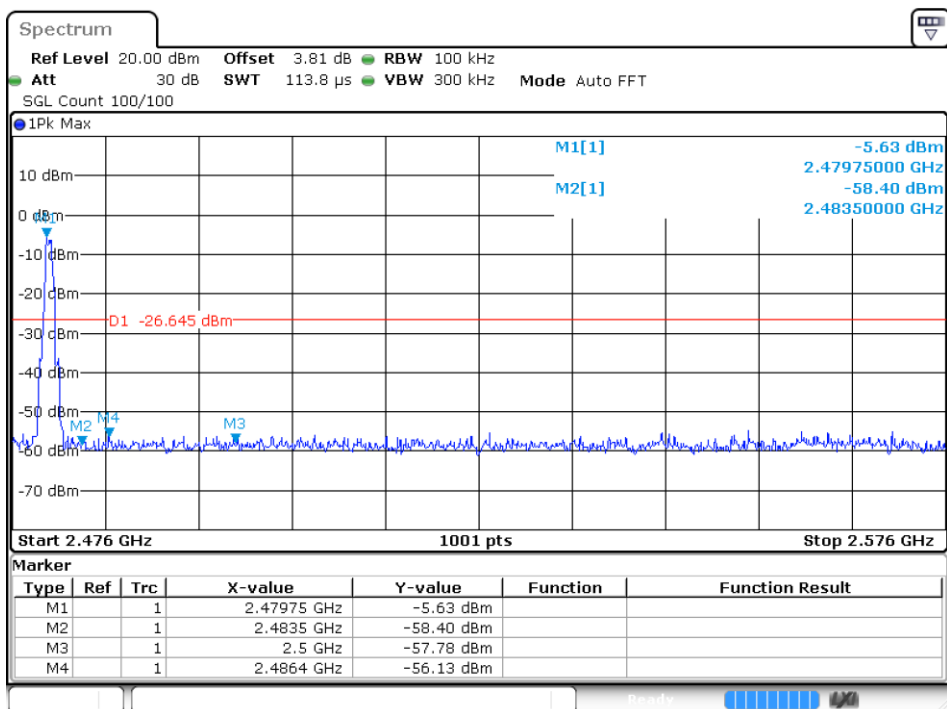
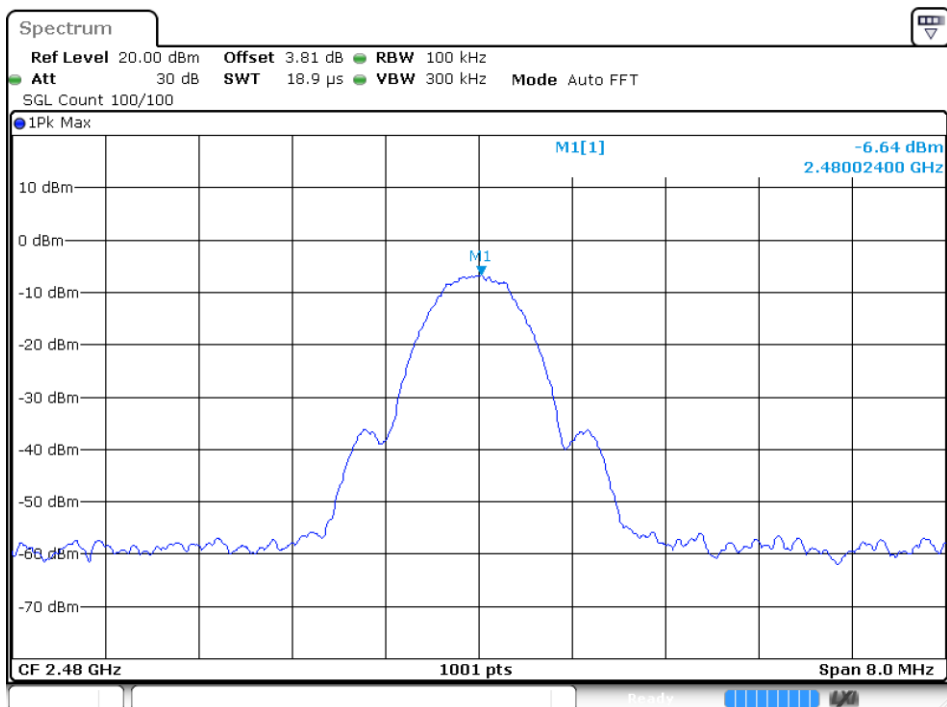
EUT :	W0301700	Model Name :	W0301700
Temperature :	25 °C	Relative Humidity :	53%
Pressure :	1010 hPa	Test Voltage :	DC3V from battery
Test Mode:	Mode 1		
Test Date :	2022-02-15		

in any 100kHz bandwidth outside the low frequency band	in any 100 kHz bandwidth outside the high frequency band
Pass	Pass
Result	
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.	

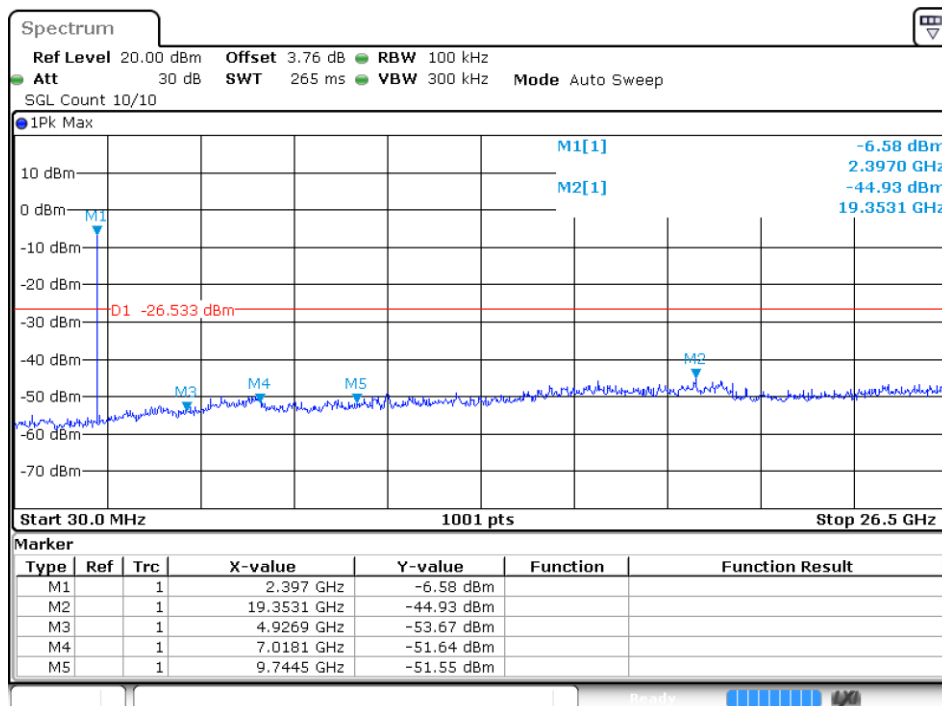
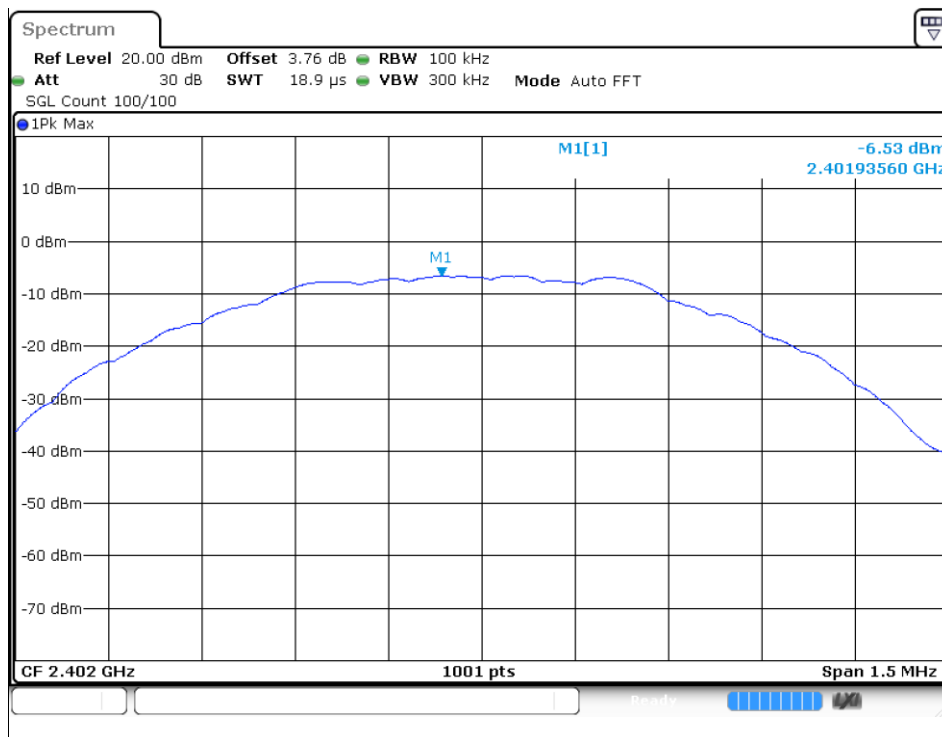
1M PHY:



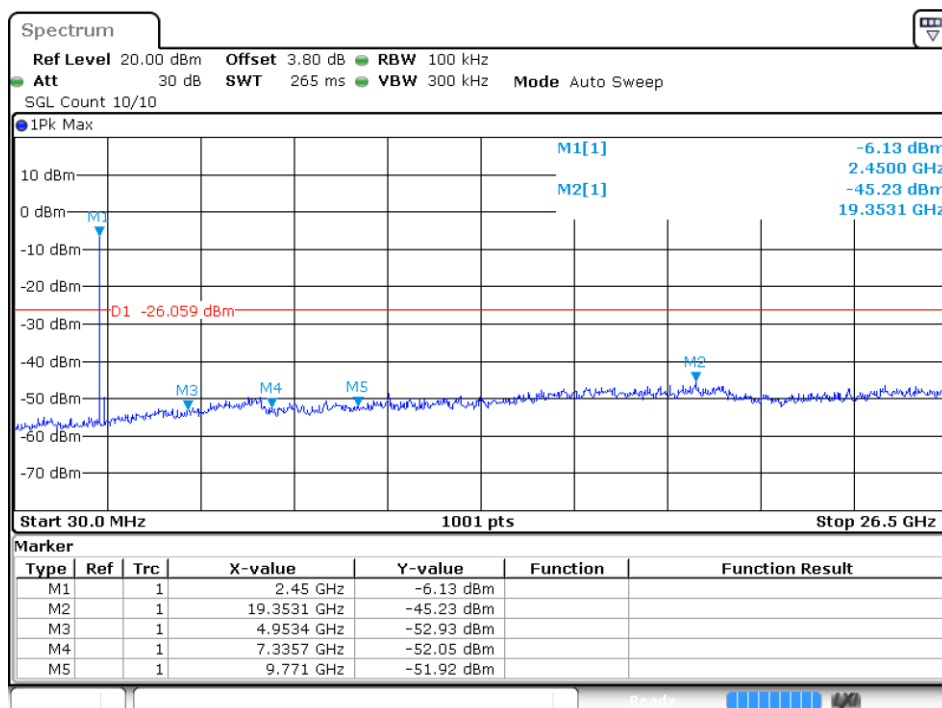
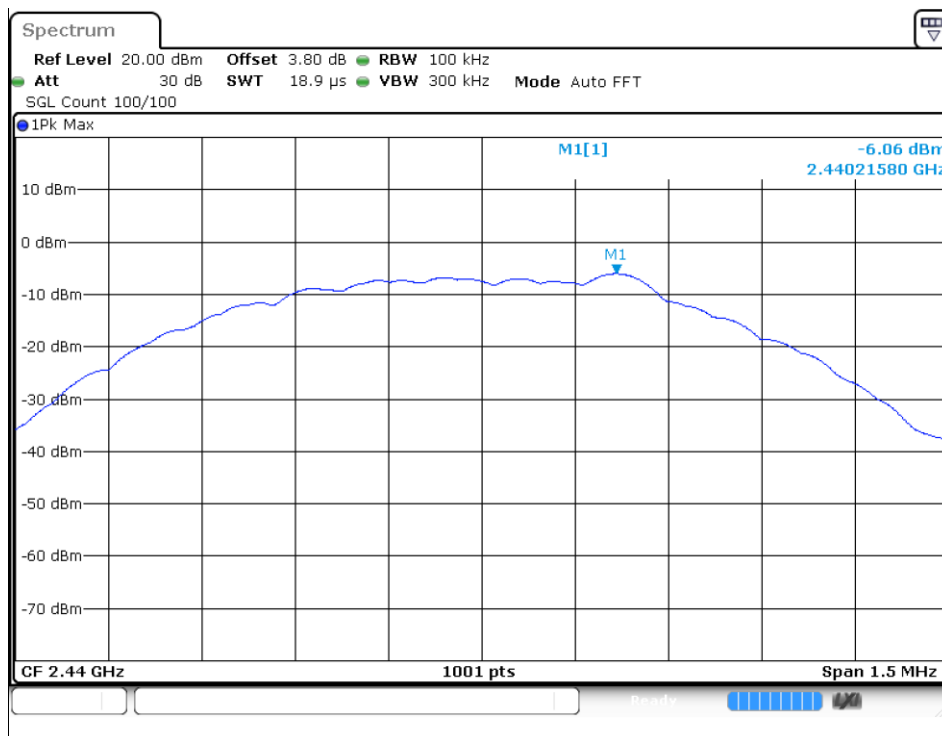
CH40 (Upper)



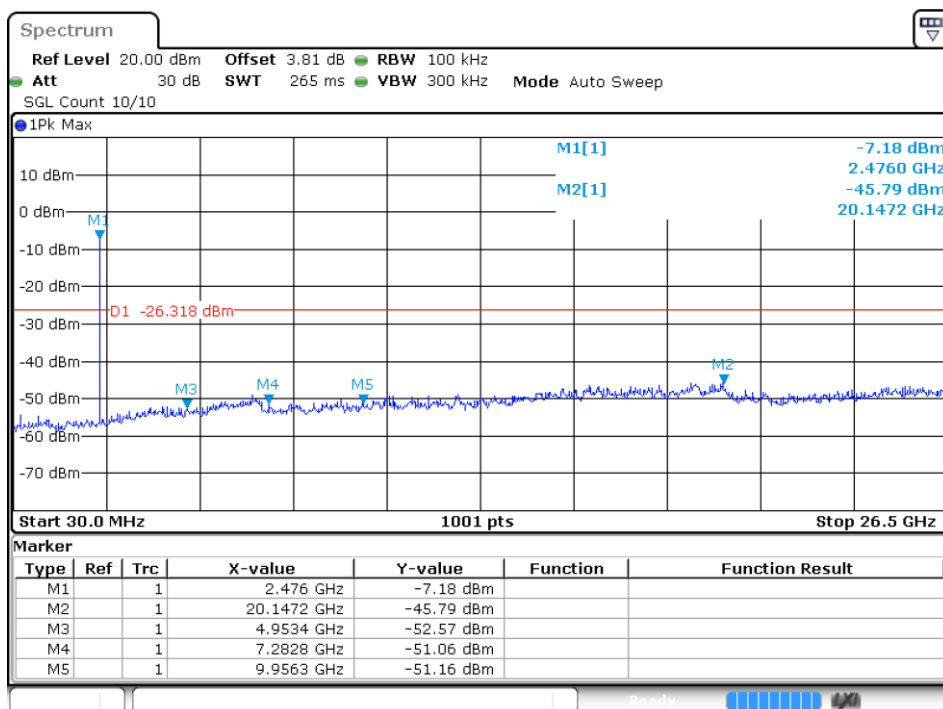
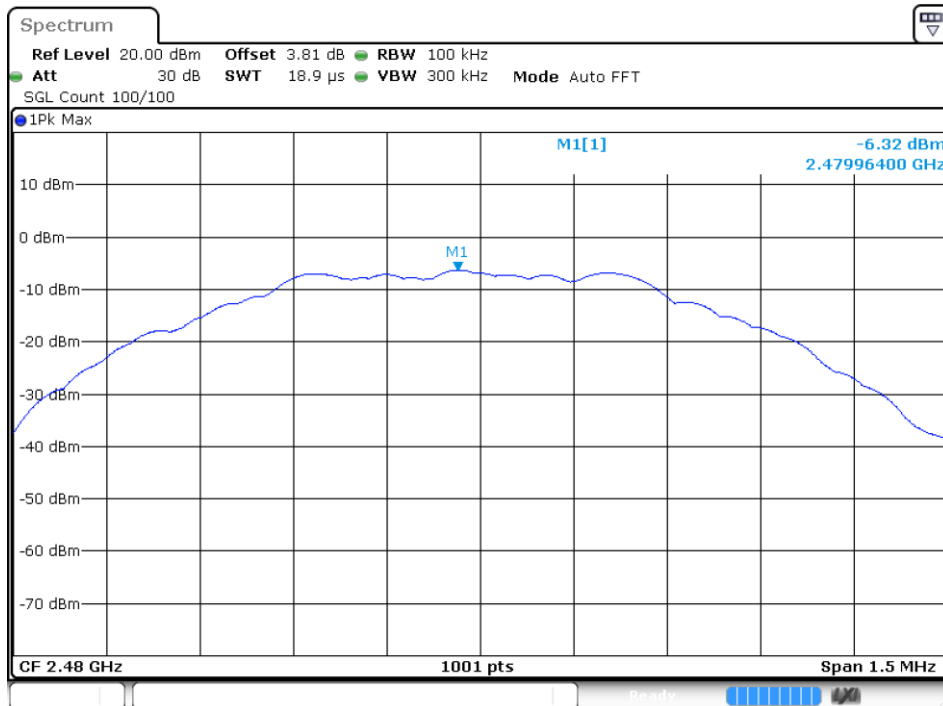
CH01



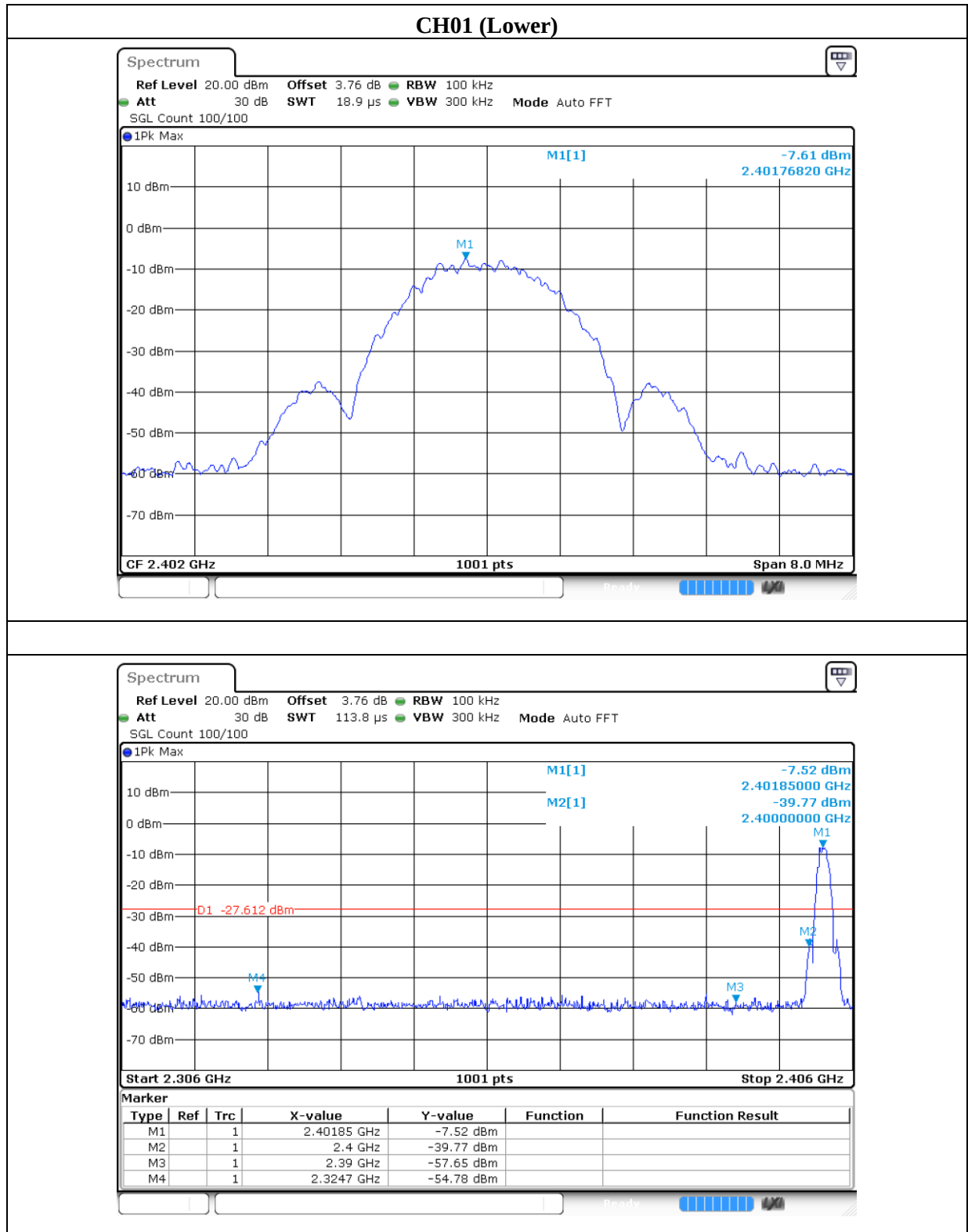
CH20

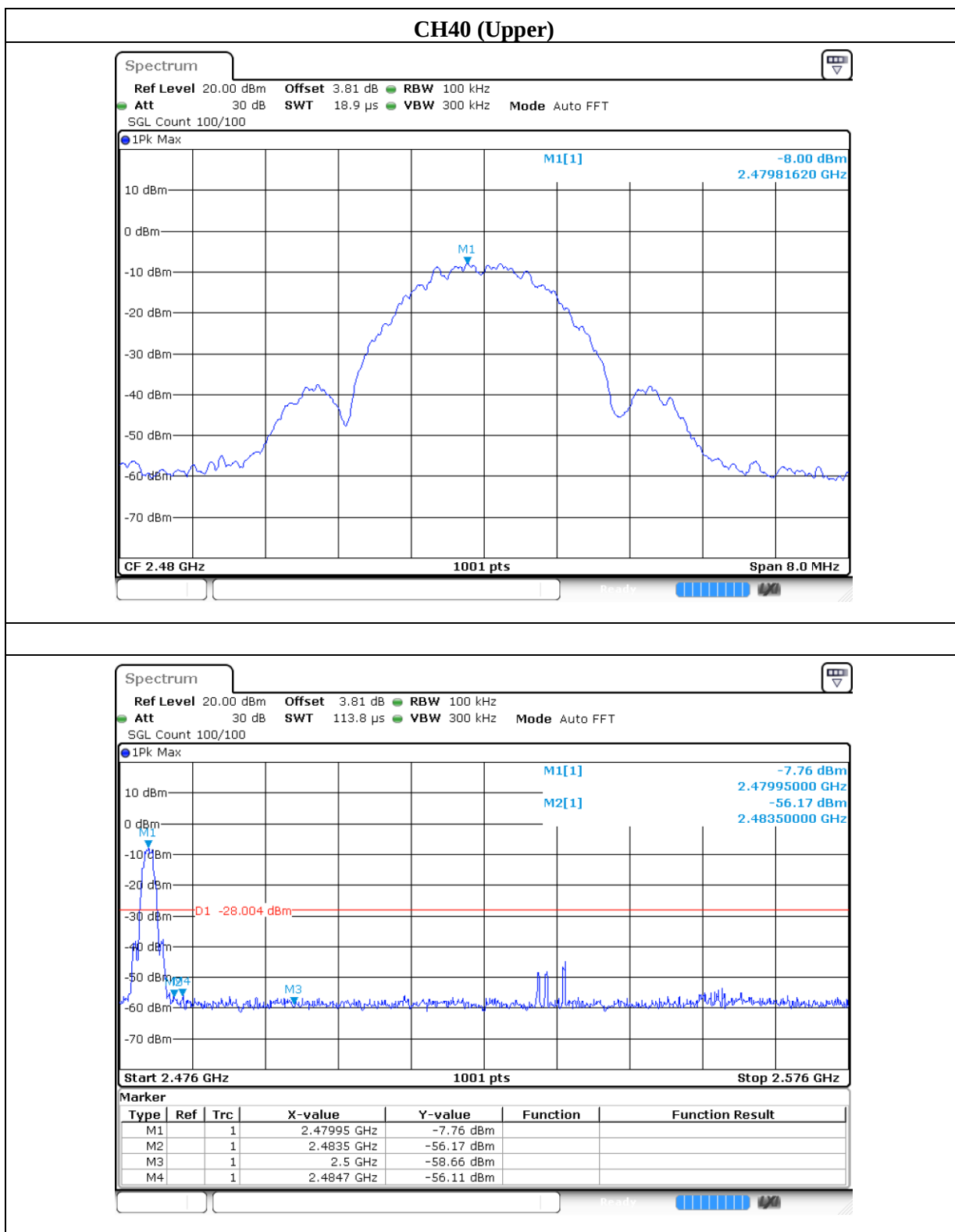


CH40

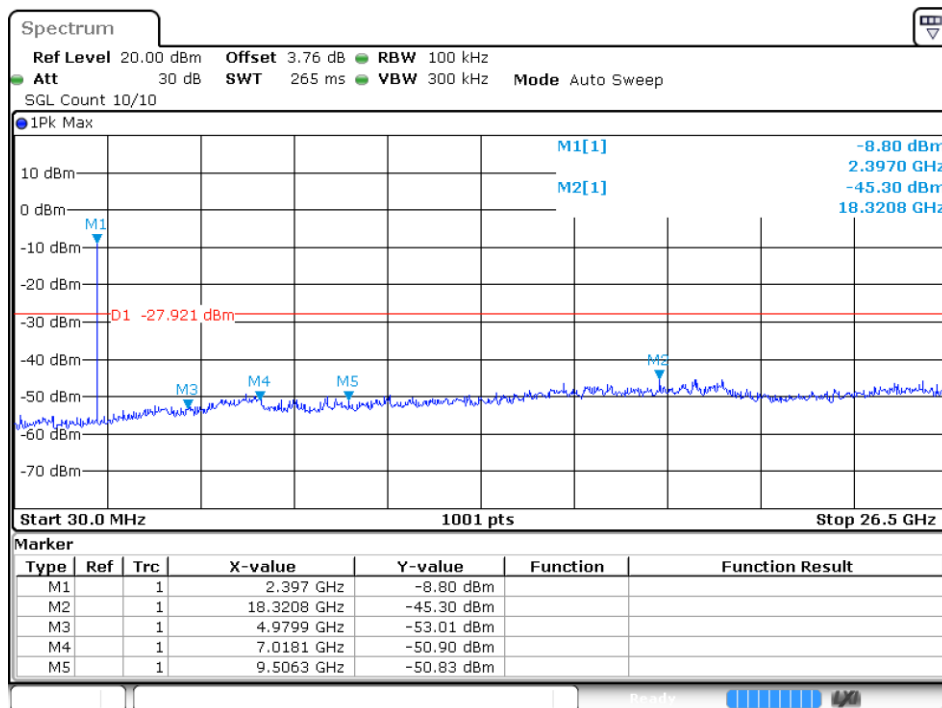
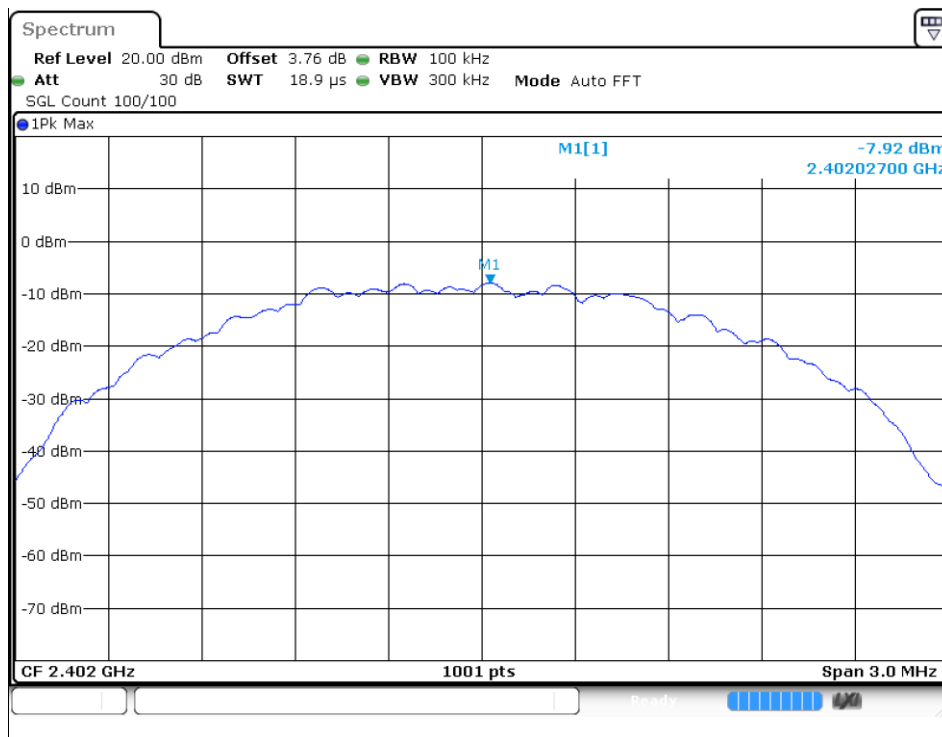


2M PHY:

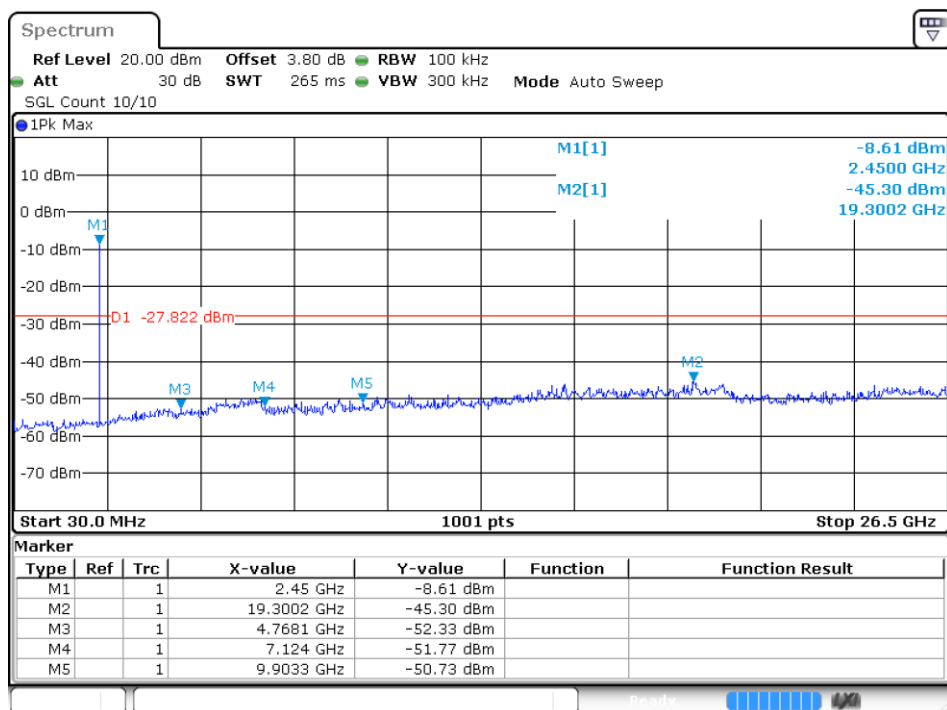
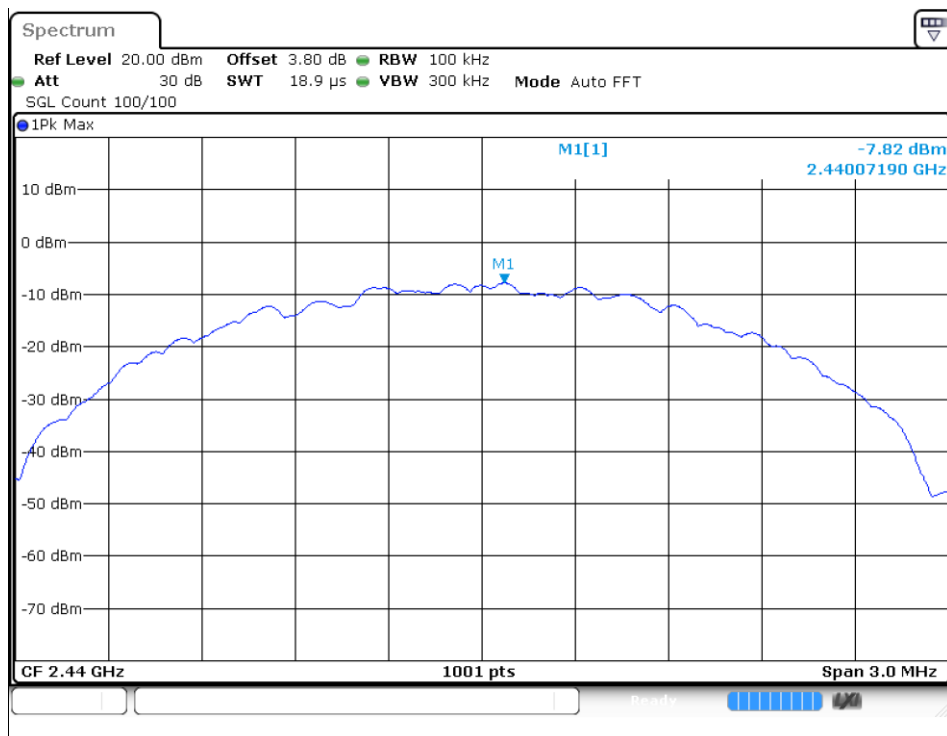




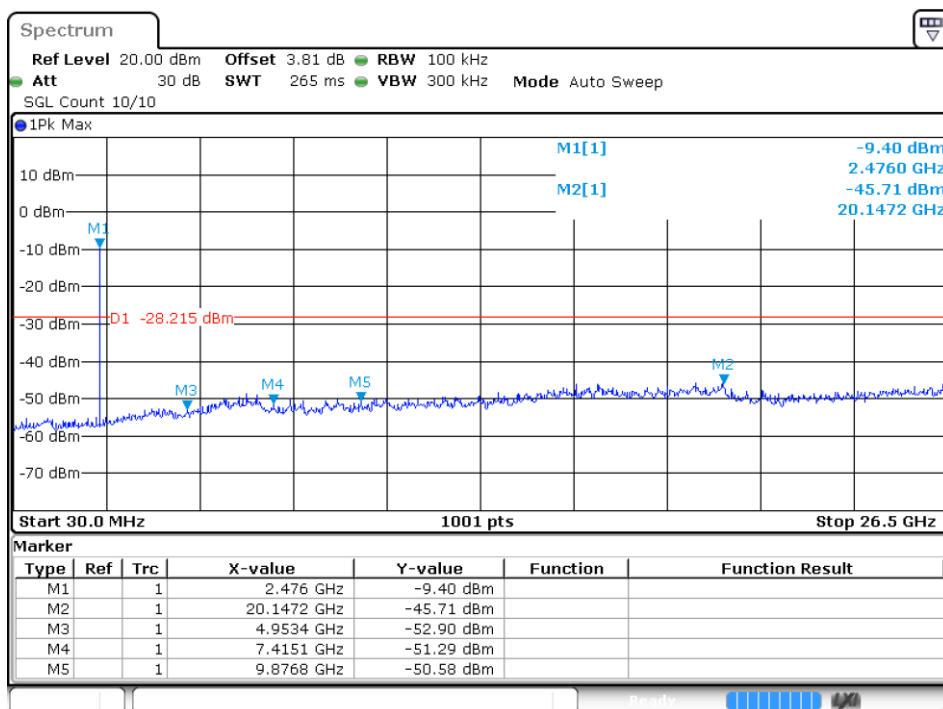
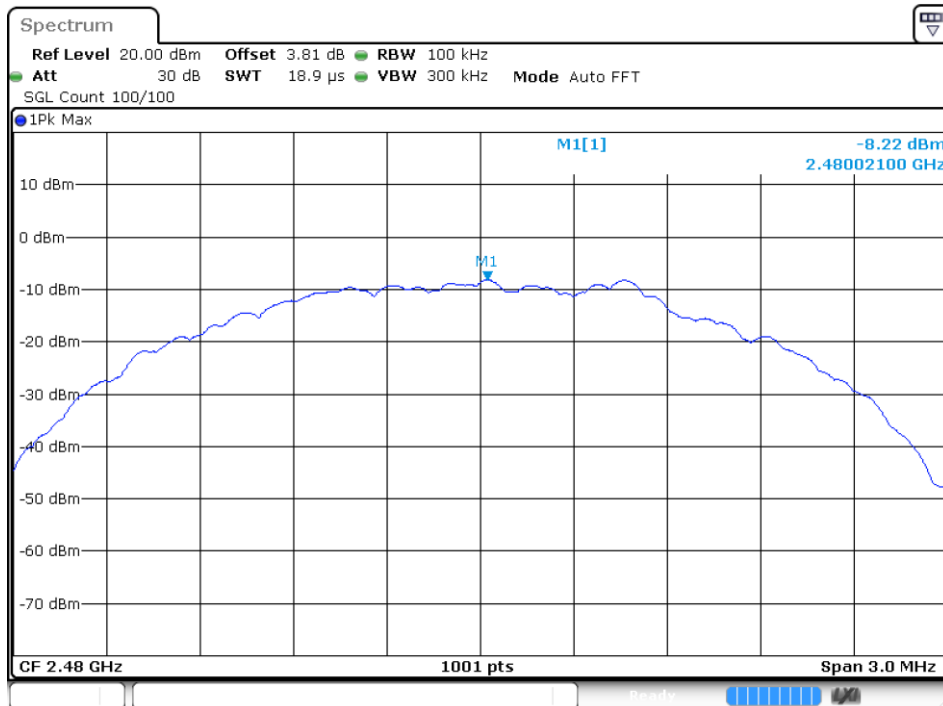
CH01



CH20



CH40



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

4.10.3.1.1 requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

8.2 EUT ANTENNA

The antenna is a PCB antenna and no consideration of replacement. Antenna max gain is 0.3 dBi from 2.4GHz to 2.5GHz.

9. EUT TEST PHOTO

Radiated Measurement Photos 30MHz-1GHz



**Radiated Measurement Photos
Above 1GHz**



10. APPENDIX-Photographs of EUT Constructional Details

Please refer to **APPENDIX**.

****End of the report****