FCC 47 CFR PART 15 SUBPART C 15.247

TEST REPORT

FOR

Embedded computer

Model : EC3310, SBC3300, NSD3305, NSD3307, NSD3310, EC3305, EC3307, K920, K330, POE-MB-A01(RT7402D), WLS-020

Issued to

IC NEXUS CO., LTD.
6F-1, No. 3-2 Park Street, Nan-Kang Dist., Taipei, Taiwan Post Code: 11503

Issued by

WH Technology Corp.

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Contents

1. General Information

Applicant	:	**IC NEXUS CO., LTD.**
Address	:	**6F-1, No. 3-2 Park Street, Nan-Kang Dist., Taipei 11503, Taiwan**
Manufacturer	:	**IC NEXUS CO., LTD.**
Address	:	**6F-1, No. 3-2 Park Street, Nan-Kang Dist., Taipei, Taiwan Post Code: 11503**
EUT	:	**Embedded computer**
Model Name	:	**EC3310, SBC3300, NSD3305, NSD3307, NSD3310, EC3305, EC3307, K920, K330, POE-MB-A01(RT7402D), WLS-020**
Model Differences	:	**Panel of EC3310, SBC3300, NSD3310, K920, K330, POE-MB-A01(RT7402D) and WLS-020 are 10.1 inch. There is no difference among EC3310, SBC3300, NSD3310, K920, K330, POE-MB-A01(RT7402D) and WLS-020.** **Panel of NSD3305 and EC3305 are 5 inch. There is no difference between NSD3305 and EC3305.** **Panel of NSD3307 and EC3307 is 7 inch. There is no difference between NSD3307 and EC3307** **There is no schematics and layout difference for above models.** **Worst case of EMI is model EC3310 so testing model is EC3310.**

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.10. The said equipment in the configuration described in this report shows the maximum emission levels emanating
from equipment are within the compliance requirements.

FCC part 15 subpart C

Receipt Date : 03/23/2022 Final Test Date : 07/07/2022

Tested By: **Reviewed by:**

Jul. 07, 2022 Bing Zhang / Project Engineer **Date**

Jul. 07, 2022 Bell Wei / Manager **Date**

Designation Number: TW2954
Test Firm Registration Number: 749714

2. Report of Measurements and Examinations

2.1 List of Measurements and Examinations

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209 15.247(d)	. Radiated Emission	Pass
15.247(a)(2)	. 6dB Bandwidth	Pass
15.247(b)	. Maximum Output Power	Pass
15.247(d)	. 100kHz Bandwidth of Frequency Band Edges	Pass
15.247(e)	. Power Spectral Density	Pass

3. Test Configuration of Equipment under Test

3.1 Description of the tested samples

EUT Name	:	Embedded computer
Model Number	:	EC3310
FCCID	:	2ACLCECNSDSBC330J60
Receipt Date	:	03/23/2022
Input Voltage	:	DC 12V
Power From	:	☐Inside ☑Outside ☑Adaptor ☐Battery ☐AC Power Source ☐DC Power Source ☐Support Unit PC
Operate Frequency	:	Refer to the channel list as described below (2.412 ~2.462 GHz)
Modulation Technique	:	802.11b：11 Mbps 802.11g ：6 Mbps 802.11n HT20：6.5 Mbps
Number of Channels	:	802.11b, 802.11g, 802.11n, HT20：11
Channel spacing	:	☐N/A ☑ 5 MHz
Operating Mode	:	☐Simplex ☑ Half Duplex
Antenna Type	:	Dipole Antenna
Channel bandwidth	:	5 MHz
Antenna gain		2.7 dBi

3.2 Carrier Frequency of Channels

802.11b, 802.11g, 802.11n HT 20 (2412MHz~2462MHz)

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	---	---

3.3 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
b. The complete test system included Notebook and EUT for RF test.
c. An executive “QATEST” under XP was executed to keep transmitting and receiving data via Wireless.
d. The following test modes were performed for test:
   - 802.11b/g/n HT20: CH01: 2412MHz, CH06: 2437MHz, CH11: 2462MHz
e. Keep transmitting and receiving data via Wireless. Duty cycle is 100%.

3.4 TEST Methodology & General Test Procedures

All testing as described bellowed were performed in accordance with ANSI C63.10 and FCC CFR 47 Part 15 Subpart C.

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane acceding to clause 15.207 and requirements of ANSI C63.10. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors.

Radiated Emissions

The EUT is a placed on a turn table, which is 0.8 m above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

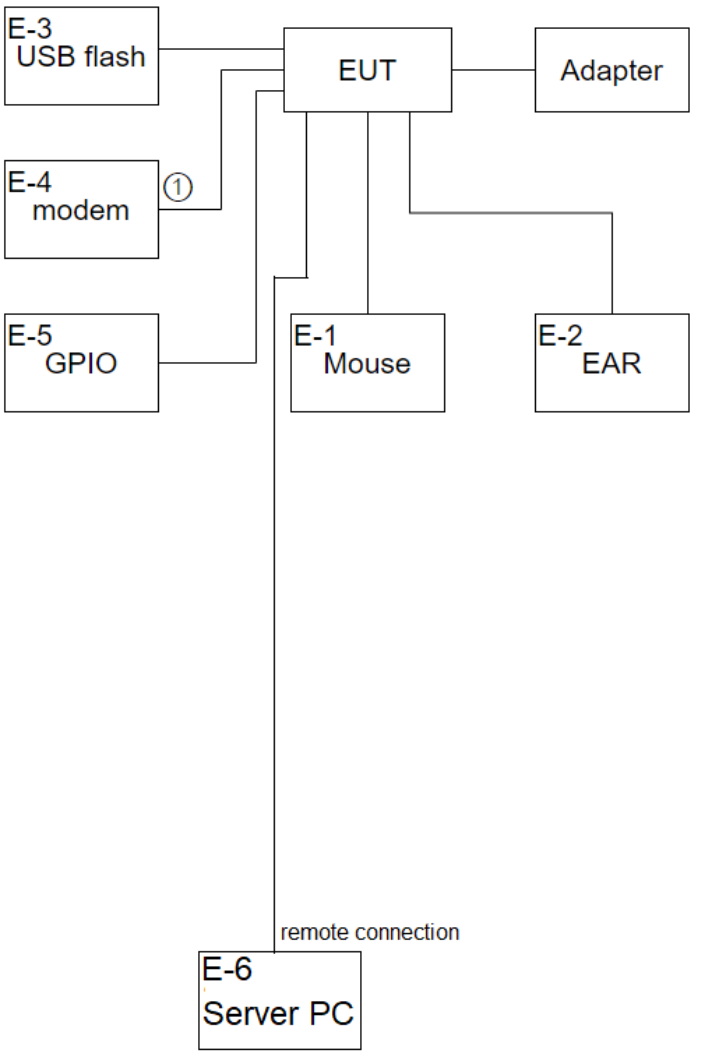
1) Putting the EUT on the platform and turning on the EUT (on/off button on the bottom of the EUT).
2) Setting test channel described as “Channel setting and operating condition”, and testing channel by channel.
3) For the maximum output power measurement, we followed the method of measurement KDB558074 D01.
4) For the spurious emission test based on ANSI(2014), at the frequency where below 1GHz
used quasi-peak detector mode; where above 1GHz used the peak and average detector mode. IF the peak value may be under average limit, the average mode will not be performed.

3.5 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated emission	±4.11dB
Peak Output Power(conducted)	±1.38dB
Peak Output Power(Radiated)	±1.70dB
Power Spectral Density	±1.39dB
Radiated emission(3m)	±4.11dB
Radiated emission(10m)	±3.89dB

3.6 Description of the Support Equipments

Setup Diagram



Support Equipment

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord/ LAN Cable
①	RS232 cable	N/A	N/A	N/A	N/A	Unshielded 1.5m	N/A
E-1	Mouse	MS116p	CN-04DW DN-73826-5CM-0120	R41108	DELL	Shielded 1.8m / USB	N/A
E-2	Ear-Phone+ Micro-Phone	EM-1120MV	N/A	N/A	i-gota	Unshielded 1m*2	N/A
E-3	USB 3.0	32G	AUC350-32G-CGD	D33A23	ADATA	Shielded 1m / USB	N/A
E-4	Modem	2FXS/2FXO	F09NH5910	N/A	NA	Unshielded 1.8m	Unshielded 1.8m
E-5	GPIO	N/A	N/A	N/A	N/A	N/A	N/A
E-6	Server PC	D19M	CYY7Y A00 DC4	R33002	DELL	N/A	Unshielded 1.8m
INSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1.	ADAPTER	LTE36E-S2-1	N/A	N/A	LTE	N/A	N/A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

Grounding: Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.

4. Test and measurement equipment

4.1 calibration

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

TABLELIST OF TEST AND MEASUREMENT EQUIPMENT

Conducted emission				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
EMI Test Receiver	R&S	ESHS10	830223/008	2022/09/14
Spectrum Analyzer	R&S	FSP3	833387/010	2023/02/14
Two-Line V-Network	R&S	NNB-2/16z	98062	2022/09/23
Test Cable	N/A	N/A	WH-CON03	2022/10/19
Measurement Software	AUDIX	e3	V6.101222a	N/A
Radiated emission Below 1GHz				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
Bilog antenna	ETC	MCTD2786B	BLB19O04027/JB-5-027	2022/11/10
LOOP Antenna	EMCO	6507	9301-1298	2023/02/16
Pre-amplifier	EMCI	EMC9135	980334	2022/07/15
Cable	EMCI	N male on end of both sides (EMI4)	30m	2023/03/20
Receiver	R&S	ESVS30	826006/002	2023/02/15
Spectrum Analyzer	R&S	FSP7	830180/006	2023/05/11
Measurement Software	AUDIX	e3	V6.101222a	N/A
Radiated emission Above 1GHz				
Instrument	Manufacturer	Model No.	Serial No.	Cali Due Date
Horn antenna	ETS LINDGREN	3117	00114397	2022/07/28
Horn antenna	com-power	AH-826	81000	2022/10/03
Horn antenna	Schwarzbeck	BBHA9170	#687	2023/05/12
Pre-amplifier	EMCI	EMC051845	980108	2023/03/30
Pre-amplifier	MITEQ	JS4-18002600-30-5A	808329	2022/09/15
Pre-amplifier	EMC INSTRUMENT	EMC264035SE	980288	2023/05/12
RF CABLE	SUCOFLEX	104PEA	27348/4PEA	2022/09/06
RF CABLE	AGILENT	EMC102-KM-KM-3000	160101	2022/09/14
RF CABLE	AGILENT	EMC102-KM-KM-600	160102	2022/09/14

Spectrum Analyzer	R&S	FSP7	830180/006	2023/05/11
Spectrum Analyzer	AGILENT	N9010A	MY51280195	2022/09/15
Spectrum Analyzer	ADVANTEST	R3182	150900201	2023/04/13
Measurement Software	AUDIX	e3	V6.101222a	N/A

***CALIBRATION INTERVAL OF INSTRUMENTS LISTED ABOVE IS ONE YEAR**

5. Antenna Requirements

5.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.2 Antenna Construction and Directional Gain

802.11b/g/n:
Antenna Type: Dipole Antenna
Antenna Gain: 2.7 dBi

6. Test of Conducted Emission

6.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

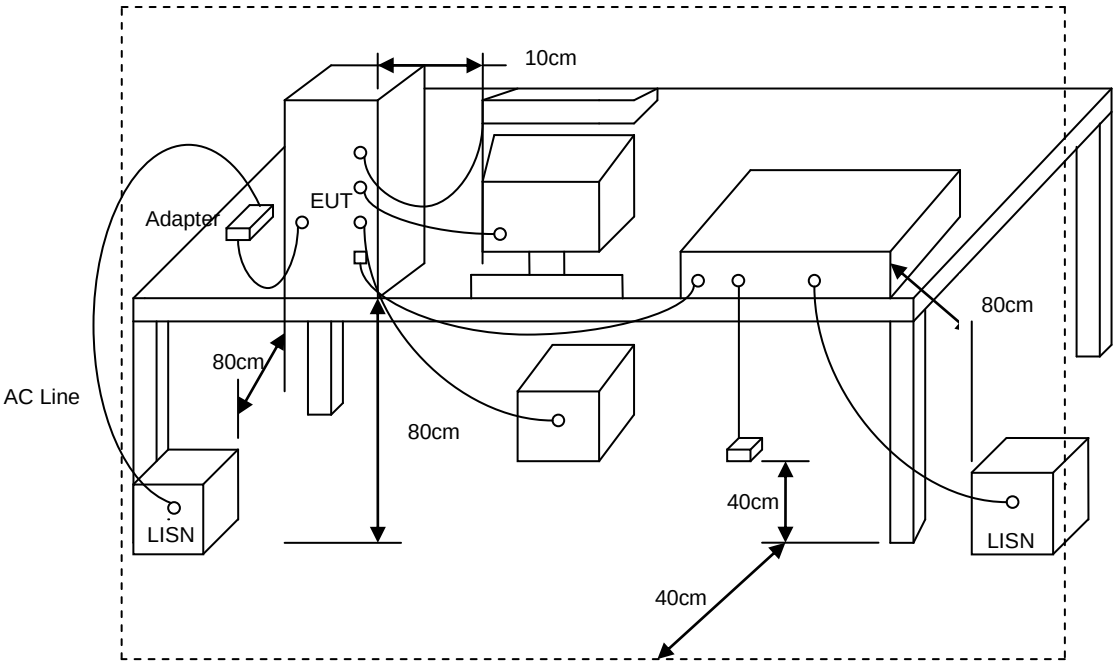
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

6.2 Test Procedures

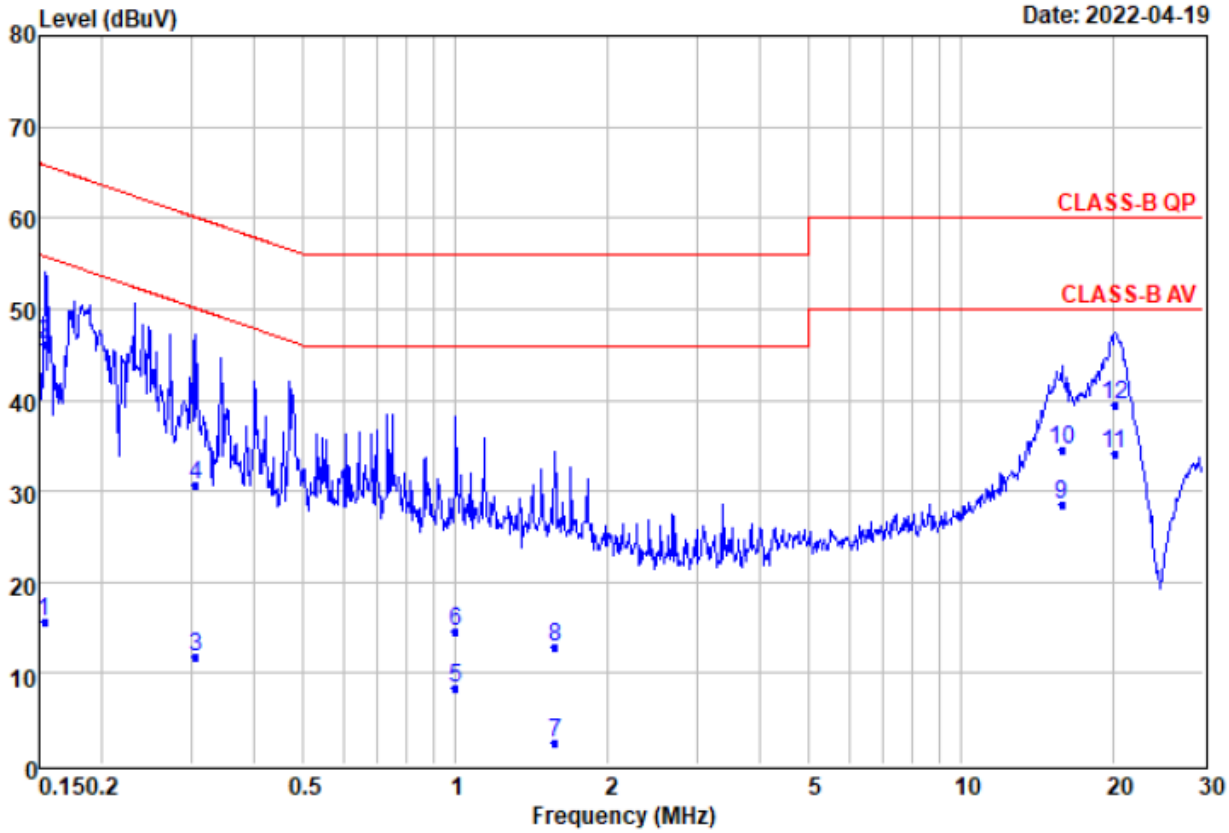
a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system and using CISPR Quasi-Peak / Average detectors and Specified Bandwidth with Maximum Hold Mode.
i. RBW=9kHz. VBW=30kHz.

6.3 Typical Test Setup



6.4 Test Result and Data

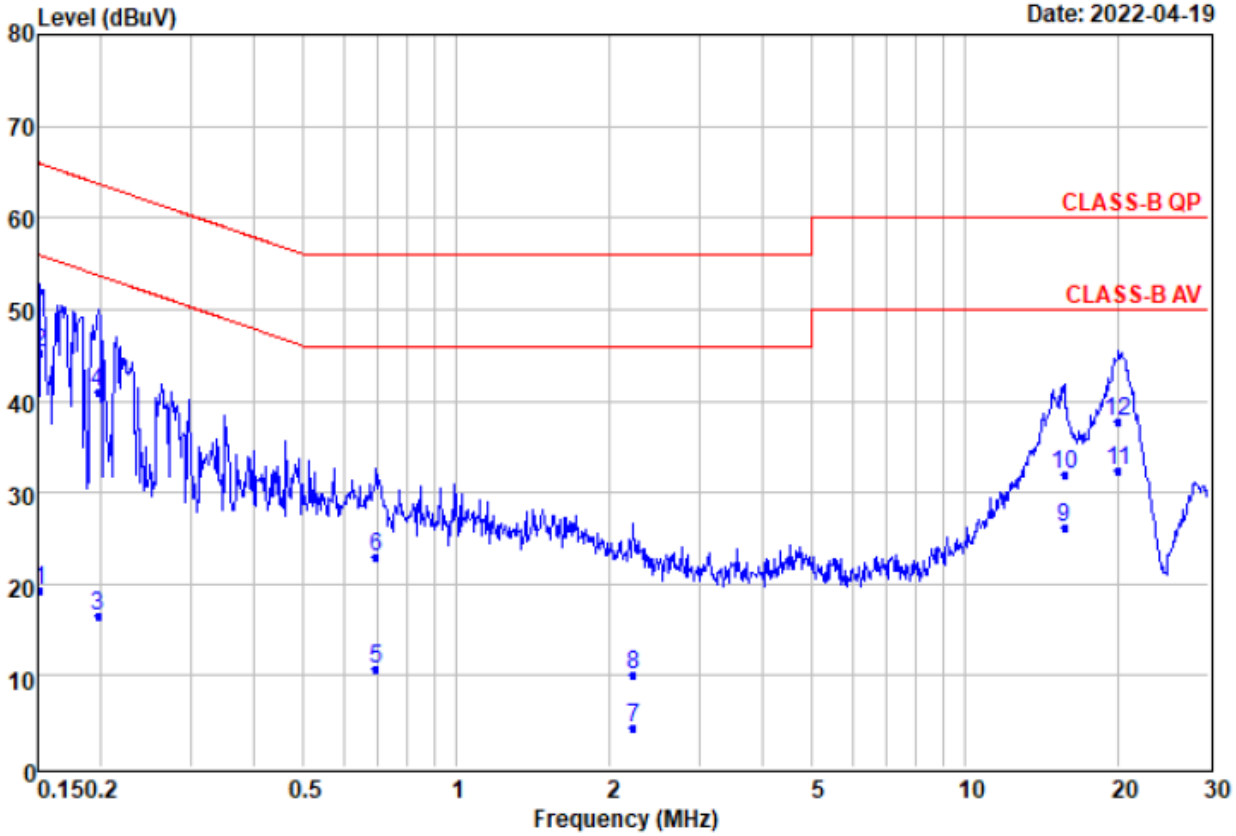
Power	:	DC 12V		Pol/Phase	:	LINE	
Temperature	:	26.3 °C		Humidity	:	52 %	



Remarks : Factor=Insertion loss+Cable loss

	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	
1	0.15	5.53	15.64	10.11	-40.14	55.78	Average
2	0.15	36.04	46.15	10.11	-19.63	65.78	QP
3	0.31	1.75	11.86	10.11	-38.20	50.06	Average
4	0.31	20.56	30.67	10.11	-29.39	60.06	QP
5	1.00	-1.84	8.31	10.15	-37.69	46.00	Average
6	1.00	4.44	14.59	10.15	-41.41	56.00	QP
7	1.57	-7.72	2.45	10.17	-43.55	46.00	Average
8	1.57	2.78	12.95	10.17	-43.05	56.00	QP
9	15.80	18.09	28.54	10.45	-21.46	50.00	Average
10	15.80	24.12	34.57	10.45	-25.43	60.00	QP
11 @	20.06	23.70	34.20	10.50	-15.80	50.00	Average
12	20.06	29.04	39.54	10.50	-20.46	60.00	QP

Power	:	DC 12V	Pol/Phase	:	NEUTRL
Temperature	:	26.3 °C	Humidity	:	52 %



Remarks : Factor=Insertion loss+Cable loss

	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	
1	0.15	9.32	19.41	10.09	-36.50	55.91	Average
2	0.15	35.20	45.29	10.09	-20.62	65.91	QP
3	0.20	6.43	16.52	10.09	-37.19	53.71	Average
4	0.20	30.92	41.01	10.09	-22.70	63.71	QP
5	0.69	0.57	10.69	10.12	-35.31	46.00	Average
6	0.69	12.84	22.96	10.12	-33.04	56.00	QP
7	2.22	-5.93	4.23	10.16	-41.77	46.00	Average
8	2.22	-0.15	10.01	10.16	-45.99	56.00	QP
9	15.63	15.82	26.24	10.42	-23.76	50.00	Average
10	15.63	21.60	32.02	10.42	-27.98	60.00	QP
11 @	19.95	21.90	32.36	10.46	-17.64	50.00	Average
12	19.95	27.28	37.74	10.46	-22.26	60.00	QP

7. Test of Radiated Emission

7.1 Test Limit

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/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

7.2 Test Procedures

a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than

average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

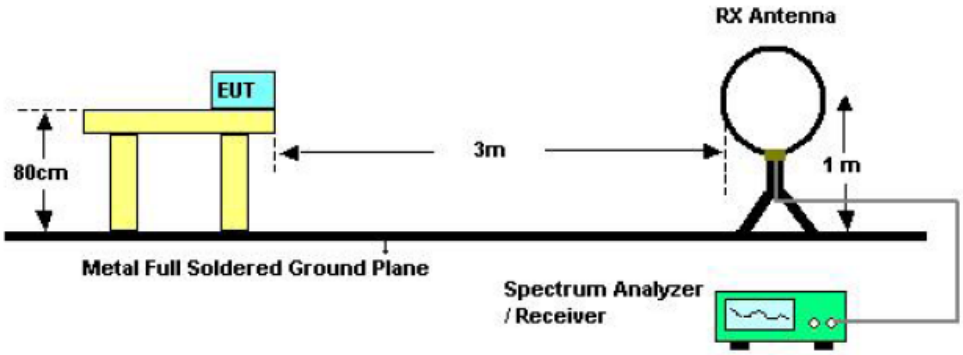
j. Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10^{th} carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 3 MHz for Peak, 1 MHz / 10Hz for Average

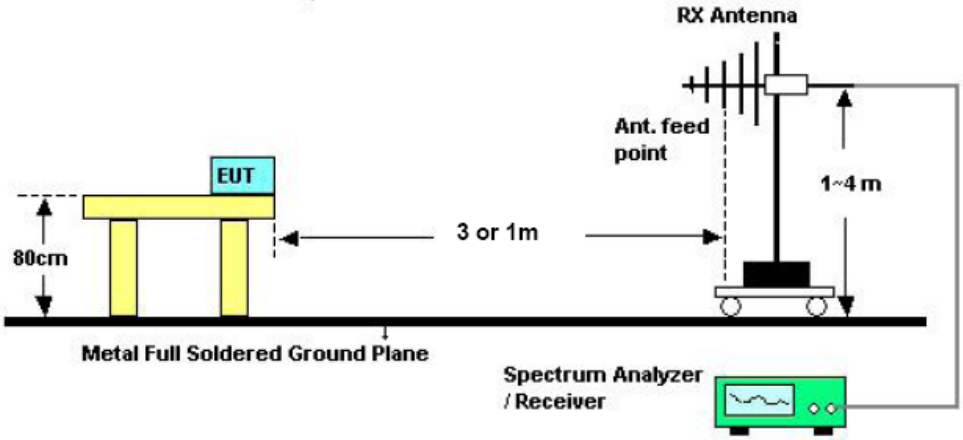
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.3 Typical Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



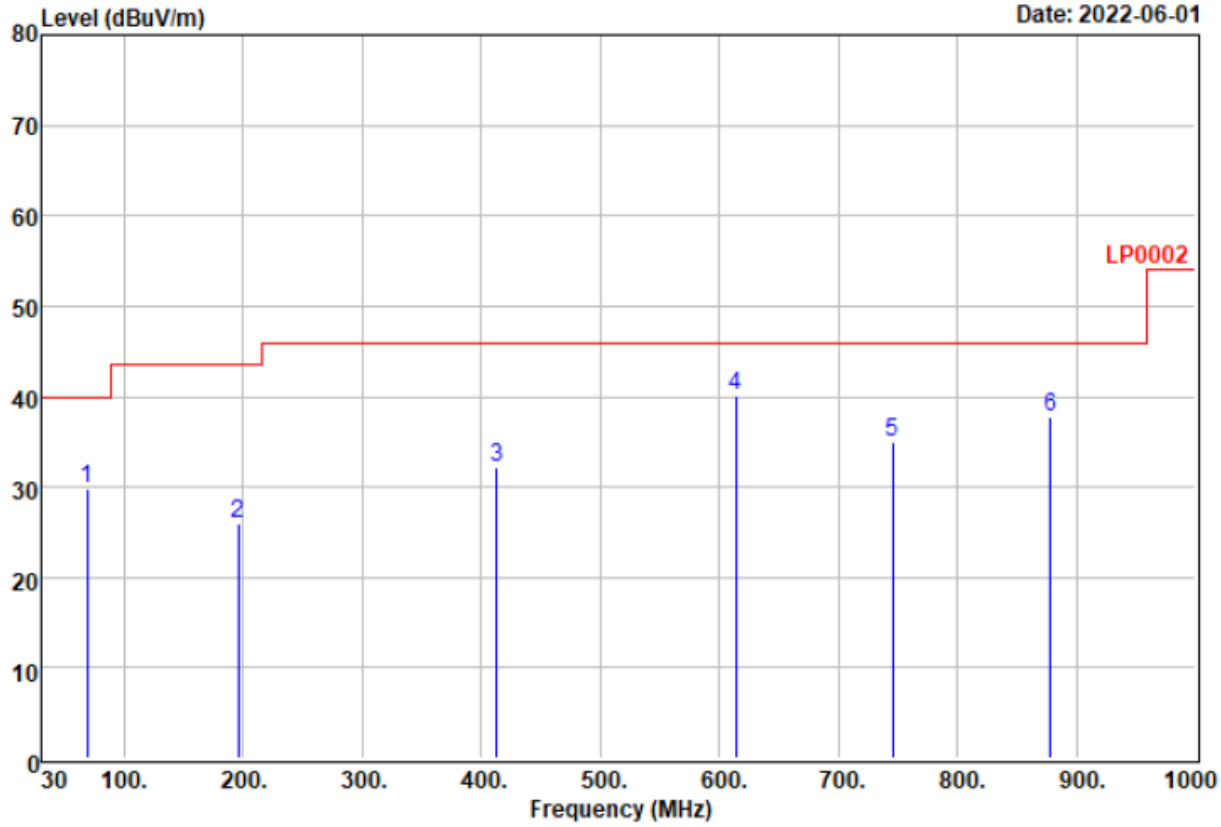
Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

7.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

7.5 Test Result and Data (30MHz ~ 1GHz, worst emissions found)

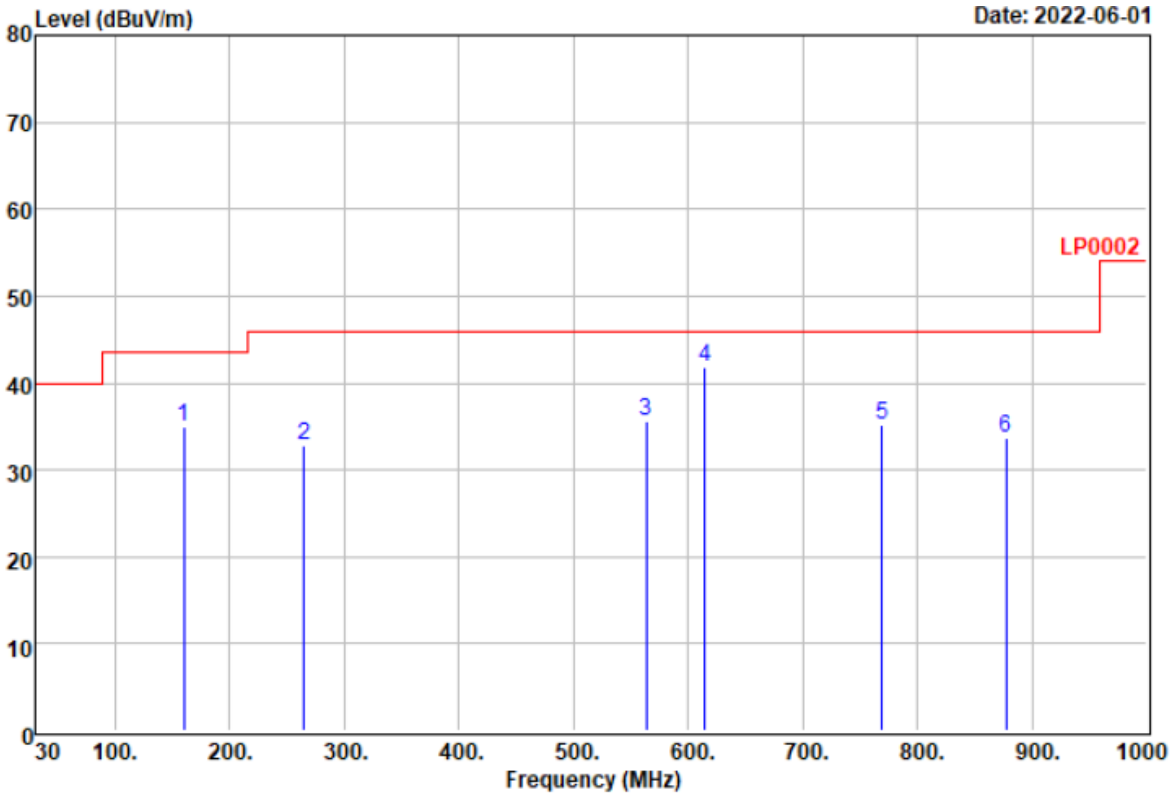
Test Mode 1	:	TX g CH6 2437MHz	Pol/Phase	:	VERTICAL
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	68.960	51.96	-22.13	29.83	40.00	-10.17	QP
2	195.700	44.86	-18.99	25.87	43.50	-17.63	QP
3	412.880	42.98	-10.80	32.18	46.00	-13.82	QP
4 @	614.020	48.63	-8.44	40.19	46.00	-5.81	QP
5	745.670	40.88	-6.02	34.86	46.00	-11.14	QP
6	878.140	41.46	-3.71	37.75	46.00	-8.25	QP

Test Mode 1	:	TX g CH6 2437MHz	Pol/Phase	:	HORIZONTAL
Humidity	:	70 %	Temperature	:	31 ˚C

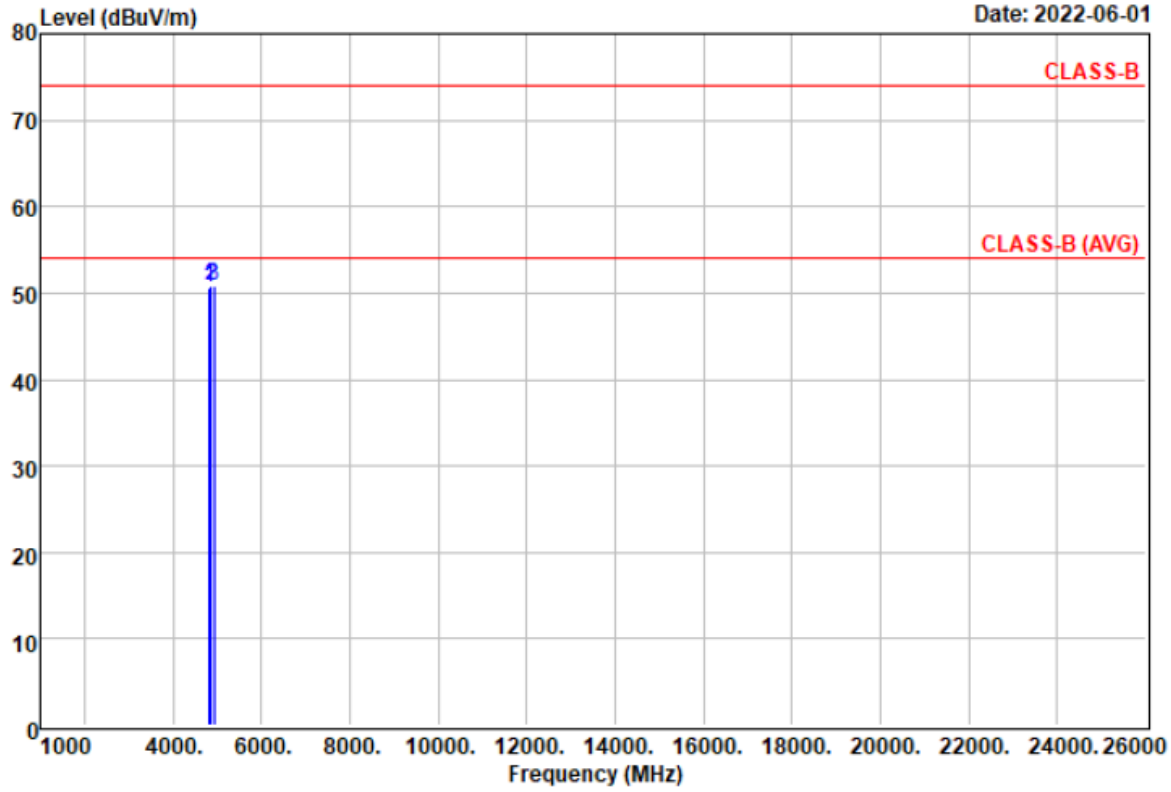


Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	159.860	52.36	-17.38	34.98	43.50	-8.52	QP
2	265.050	47.27	-14.56	32.71	46.00	-13.29	QP
3	563.780	44.38	-8.85	35.53	46.00	-10.47	QP
4 @	614.600	50.33	-8.42	41.91	46.00	-4.09	QP
5	768.960	40.78	-5.61	35.17	46.00	-10.83	QP
6	877.470	37.50	-3.72	33.78	46.00	-12.22	QP

7.6 Test Result and Data (Above 1GHz)

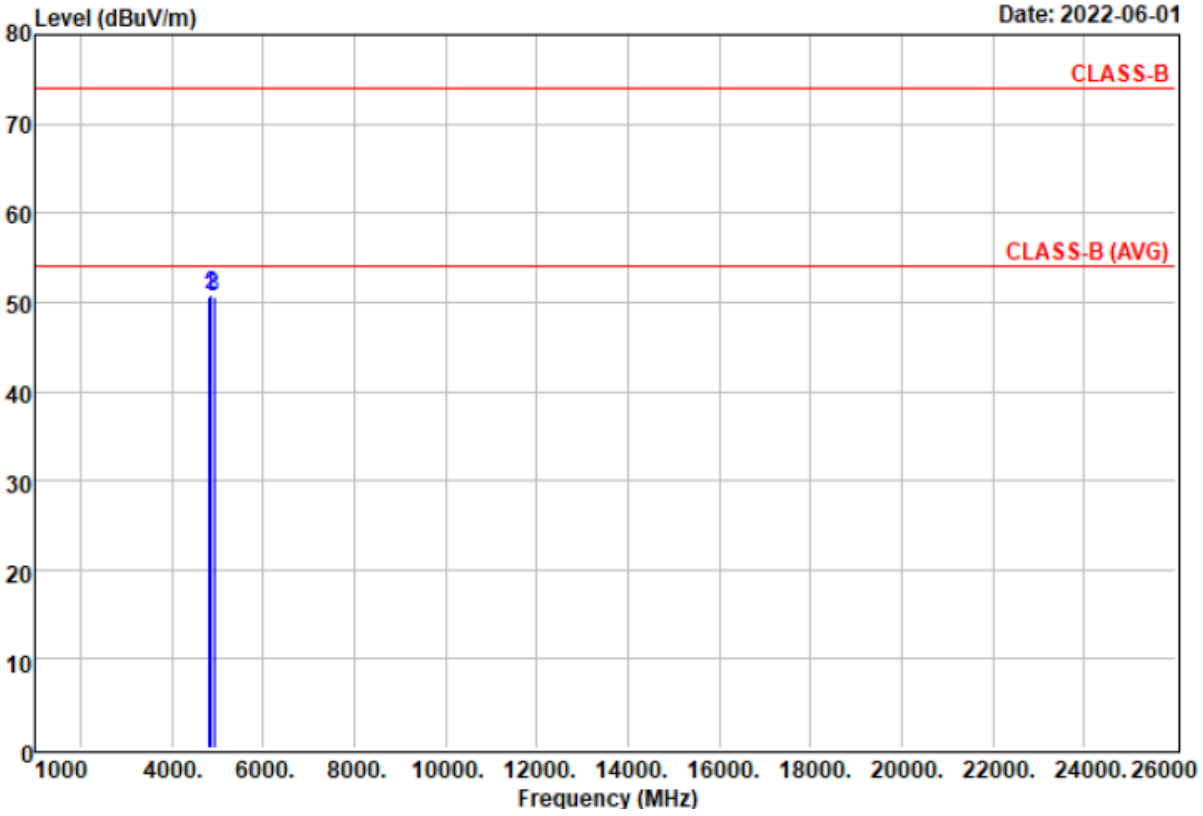
Test Mode 1	:	b - CH1 - CH6 - CH11	Pol/Phase	:	HORIZONTAL
Humidity	:	70 %	Temperature	:	31 ℃



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	54.72	-4.10	50.62	74.00	-23.38	Peak
2 @	4874.000	54.87	-4.00	50.87	74.00	-23.13	Peak
3	4924.000	54.64	-3.89	50.75	74.00	-23.25	Peak

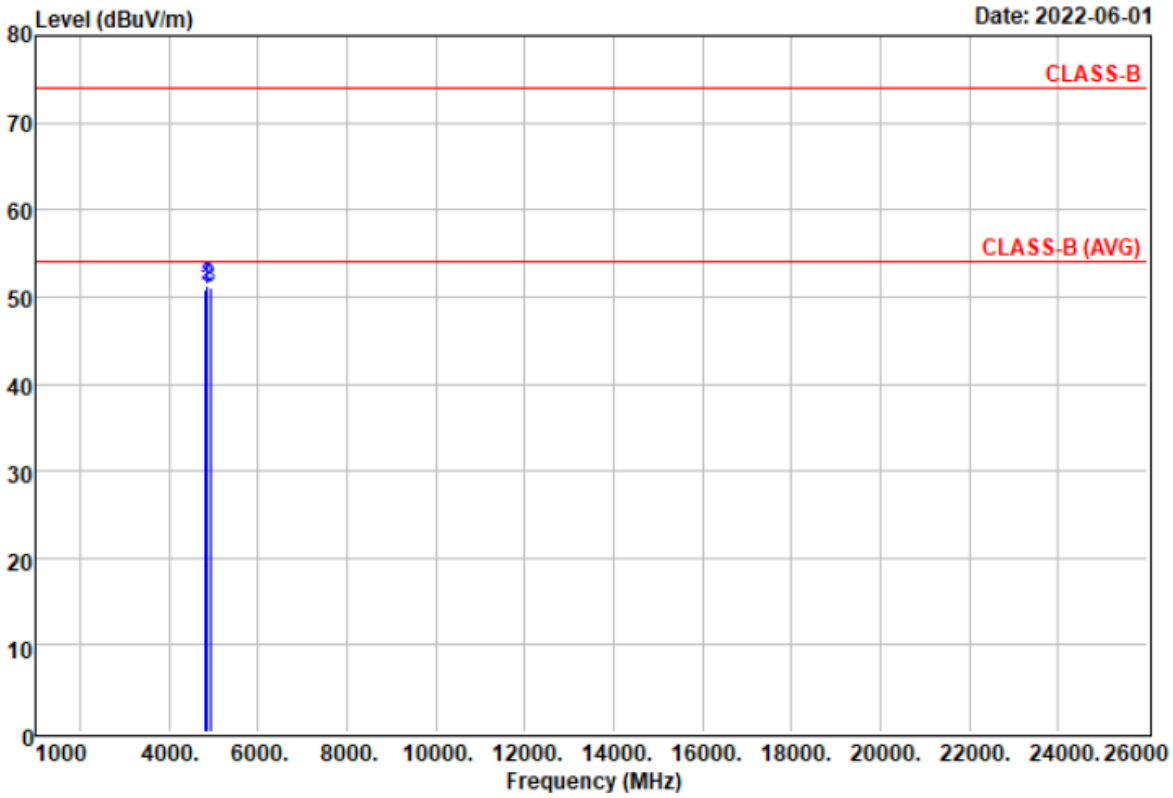
Test Mode 1	:	b - CH1 - CH6 - CH11	Pol/Phase	:	VERTICAL
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	54.67	-4.10	50.57	74.00	-23.43	Peak
2 @	4874.000	54.84	-4.00	50.84	74.00	-23.16	Peak
3	4924.000	54.59	-3.89	50.70	74.00	-23.30	Peak

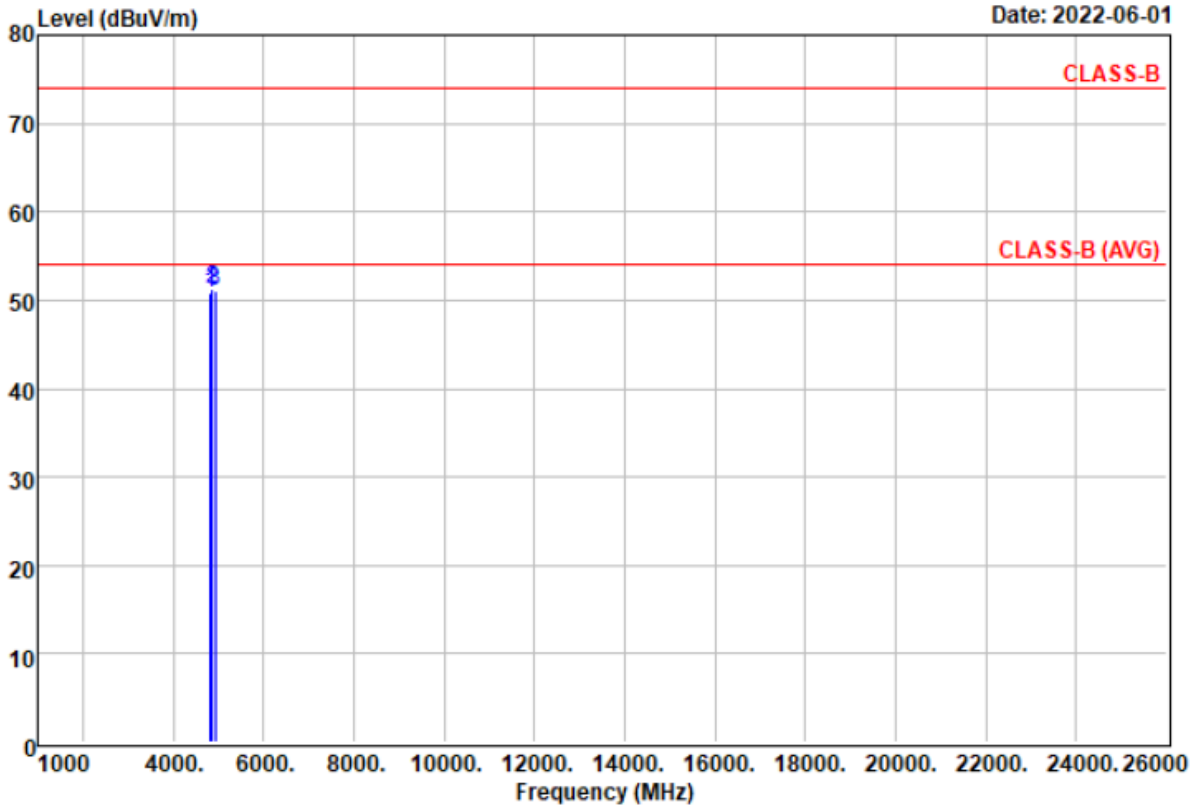
Test Mode 1	:	g - CH1 - CH6 - CH11	Pol/Phase	:	HORIZONTAL
Humidity	:	70 %	Temperature	:	31 ˚C
Memo	:		Humidity	:	63 %



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Limit Level	Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	55.03	-4.10	50.93	74.00	-23.07	Peak
2 @	4874.000	55.20	-4.00	51.20	74.00	-22.80	Peak
3	4924.000	54.98	-3.89	51.09	74.00	-22.91	Peak

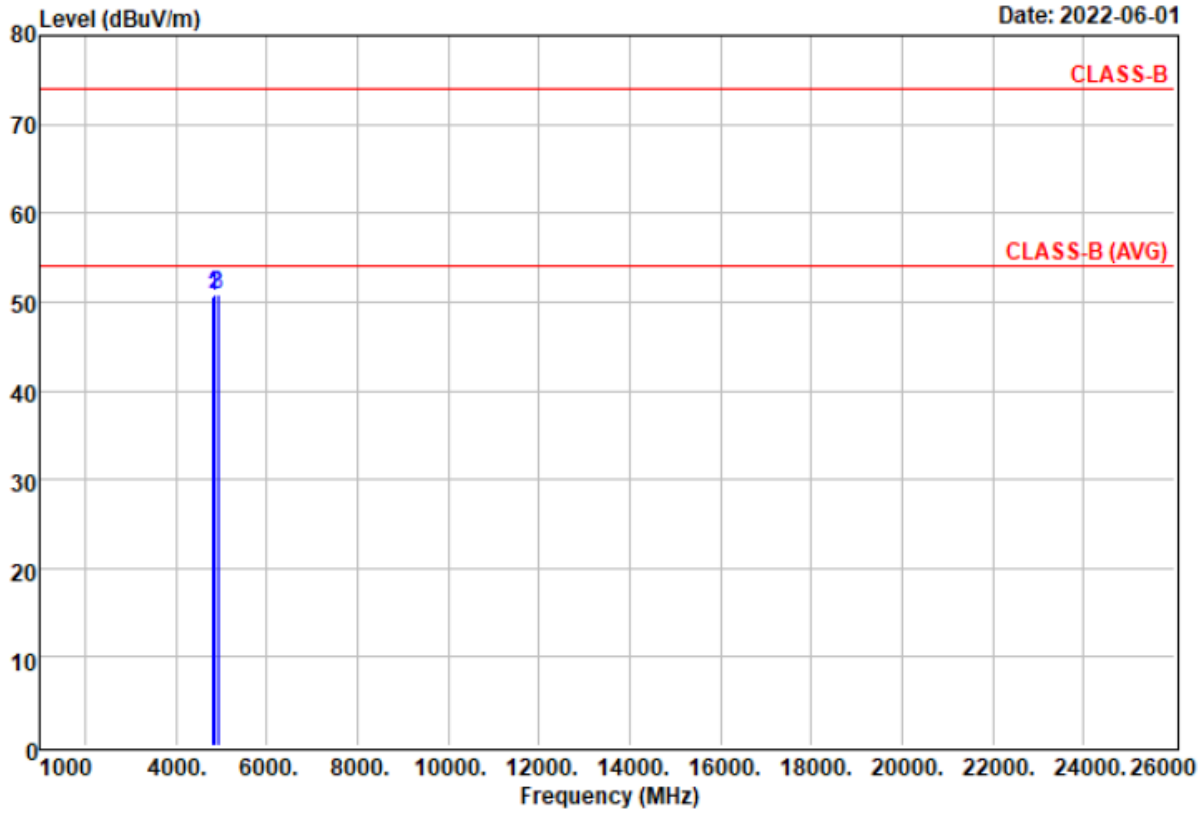
Test Mode 1	:	g - CH1 - CH6 - CH11	Pol/Phase	:	VERTICAL
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	54.99	-4.10	50.89	74.00	-23.11	Peak
2 @	4874.000	55.16	-4.00	51.16	74.00	-22.84	Peak
3	4924.000	54.94	-3.89	51.05	74.00	-22.95	Peak

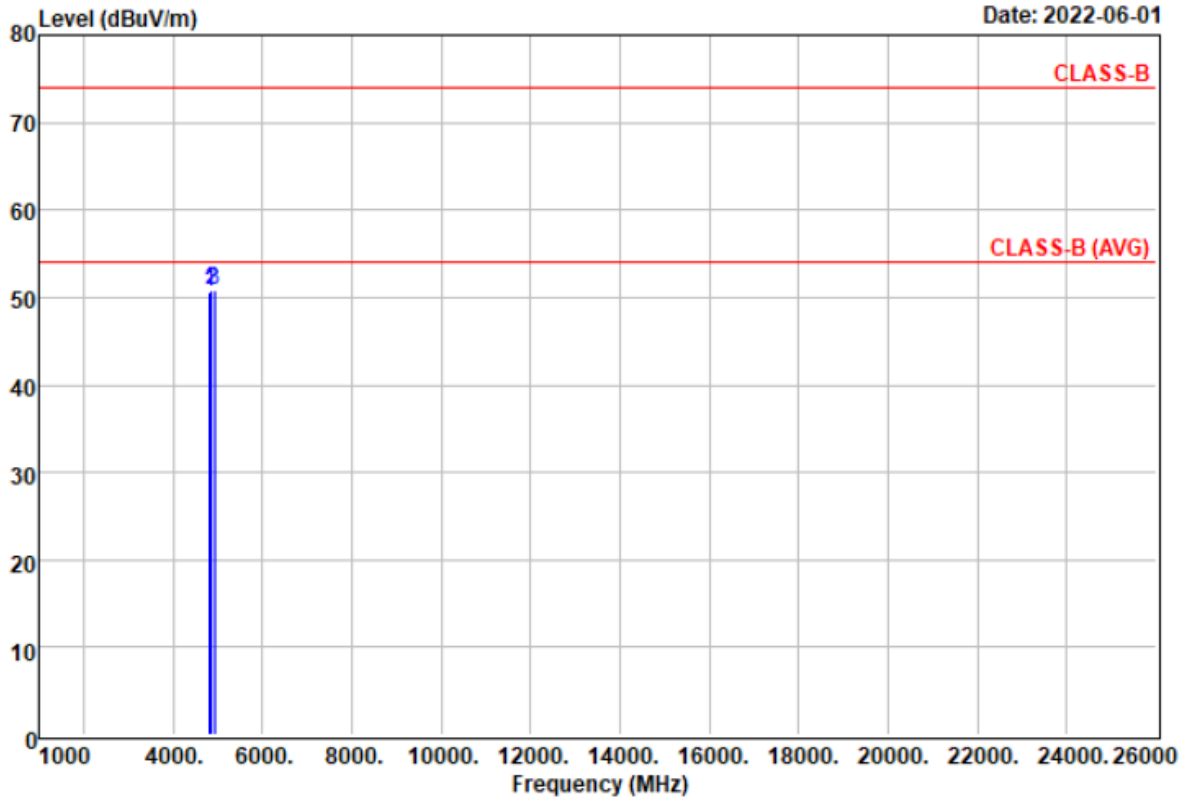
Test Mode 1	:	HT20 - CH1 - CH6 - CH11	Pol/Phase	:	HORIZONTAL
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	54.78	-4.10	50.68	74.00	-23.32	Peak
2 @	4874.000	54.90	-4.00	50.90	74.00	-23.10	Peak
3	4924.000	54.70	-3.89	50.81	74.00	-23.19	Peak

Test Mode 1	:	HT20 - CH1 - CH6 - CH11	Pol/Phase	:	VERTICAL
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	4824.000	54.73	-4.10	50.63	74.00	-23.37	Peak
2 @	4874.000	54.87	-4.00	50.87	74.00	-23.13	Peak
3	4924.000	54.66	-3.89	50.77	74.00	-23.23	Peak

8. 6dB Bandwidth Measurement Data

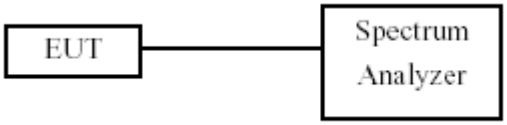
8.1 Test Limit

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

8.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 1~5% of the emission bandwidth and VBW ≥ 3x RBW.
c. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.
d. The 6dB Bandwidth was measured and recorded.

8.3 Test Setup Layout



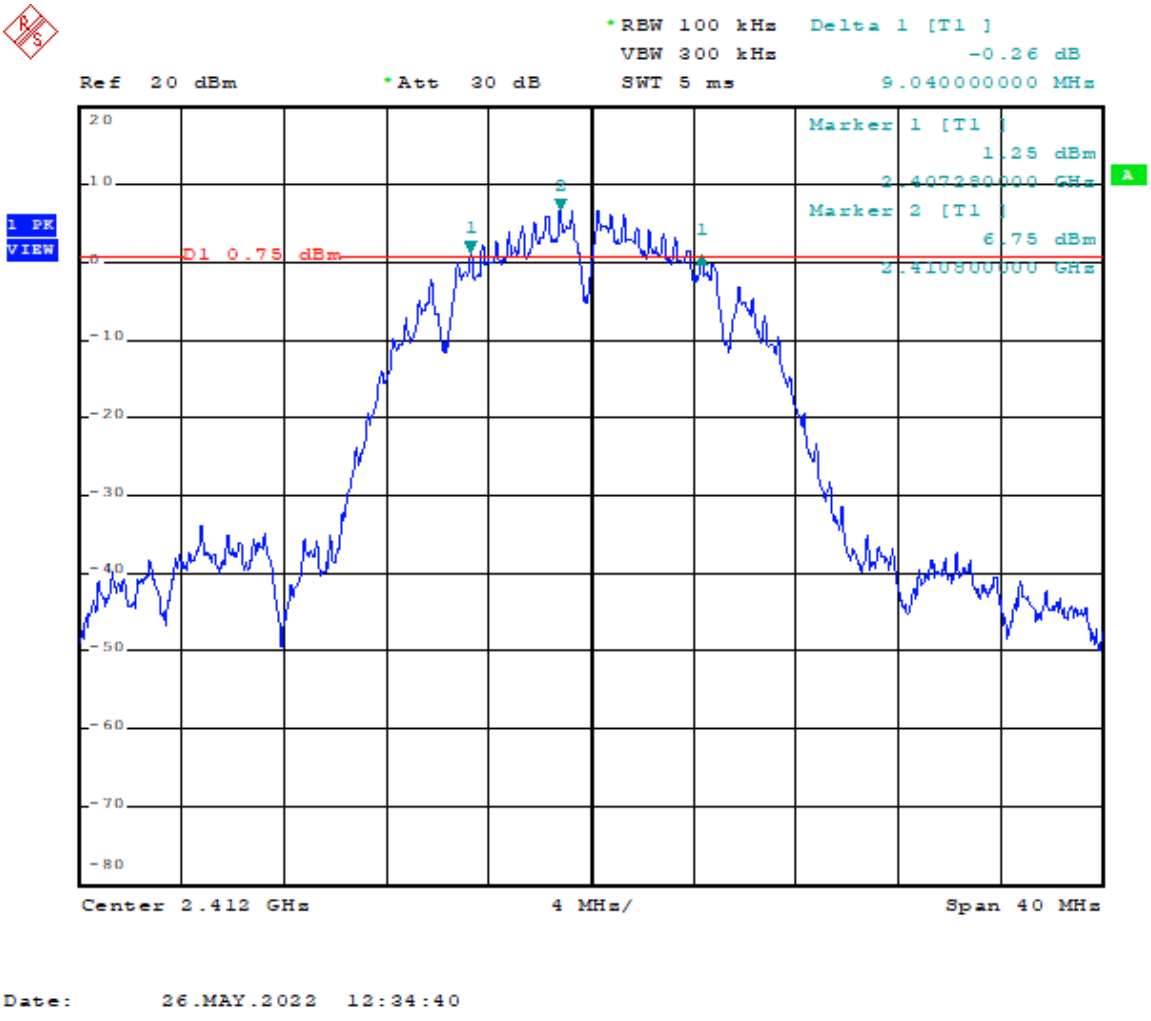
8.4 Test Result and Data

Test Date: May 26, 2022 Temperature: 27℃

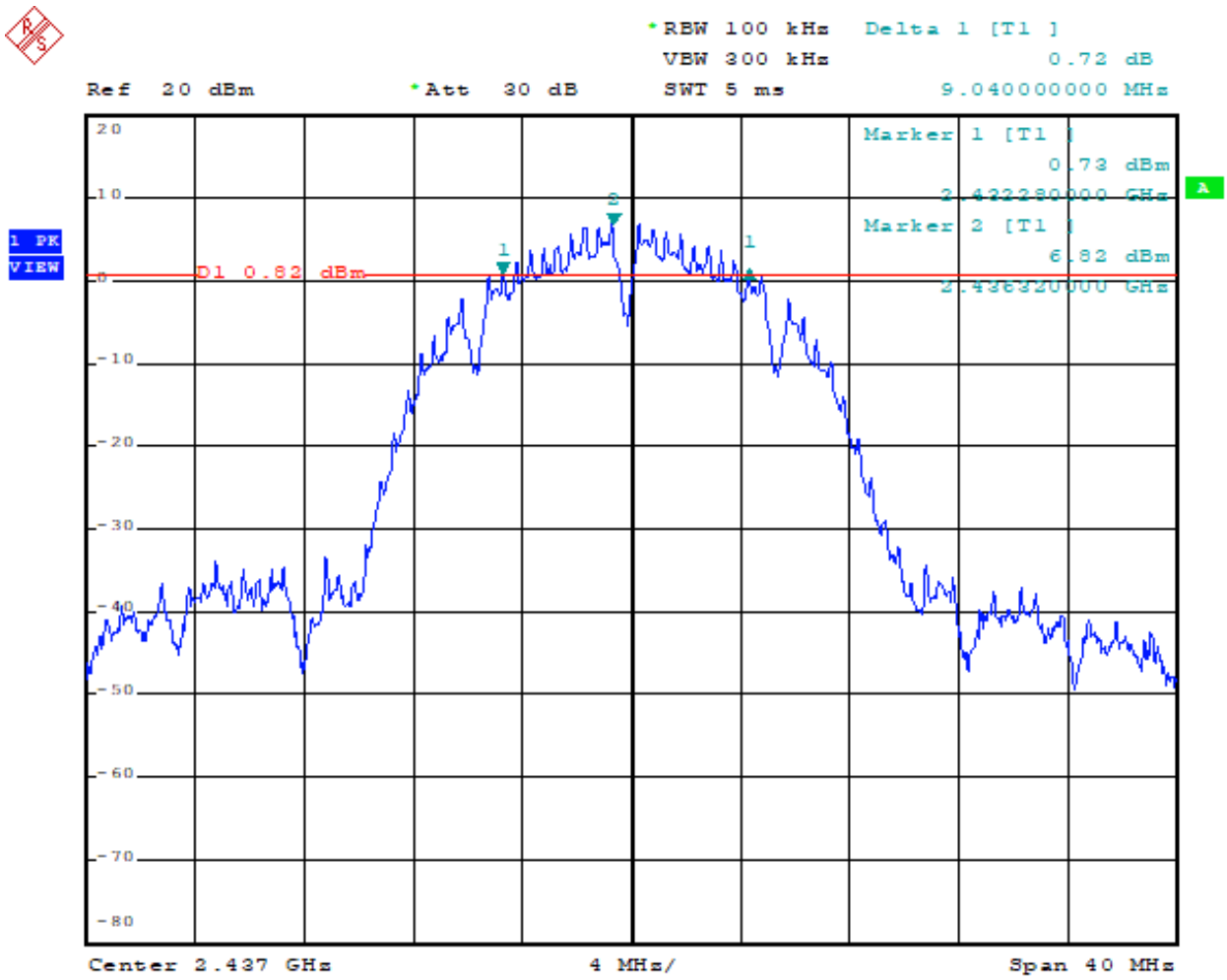
Atmospheric pressure: 1000 hPa Humidity: 55%

Modulation Standard	Channel	Frequency (MHz)	6dB Bandwidth (MHz)
802.11b (11Mbps)	01	2412	9.04
	06	2437	9.04
	11	2462	9.00
802.11g (6Mbps)	01	2412	15.12
	06	2437	15.08
	11	2462	15.12
802.11n HT20 (6.5Mbps)	01	2412	15.12
	06	2437	15.08
	11	2462	15.12

Modulation Standard: 802.11b (11Mbps)
Channel: 01

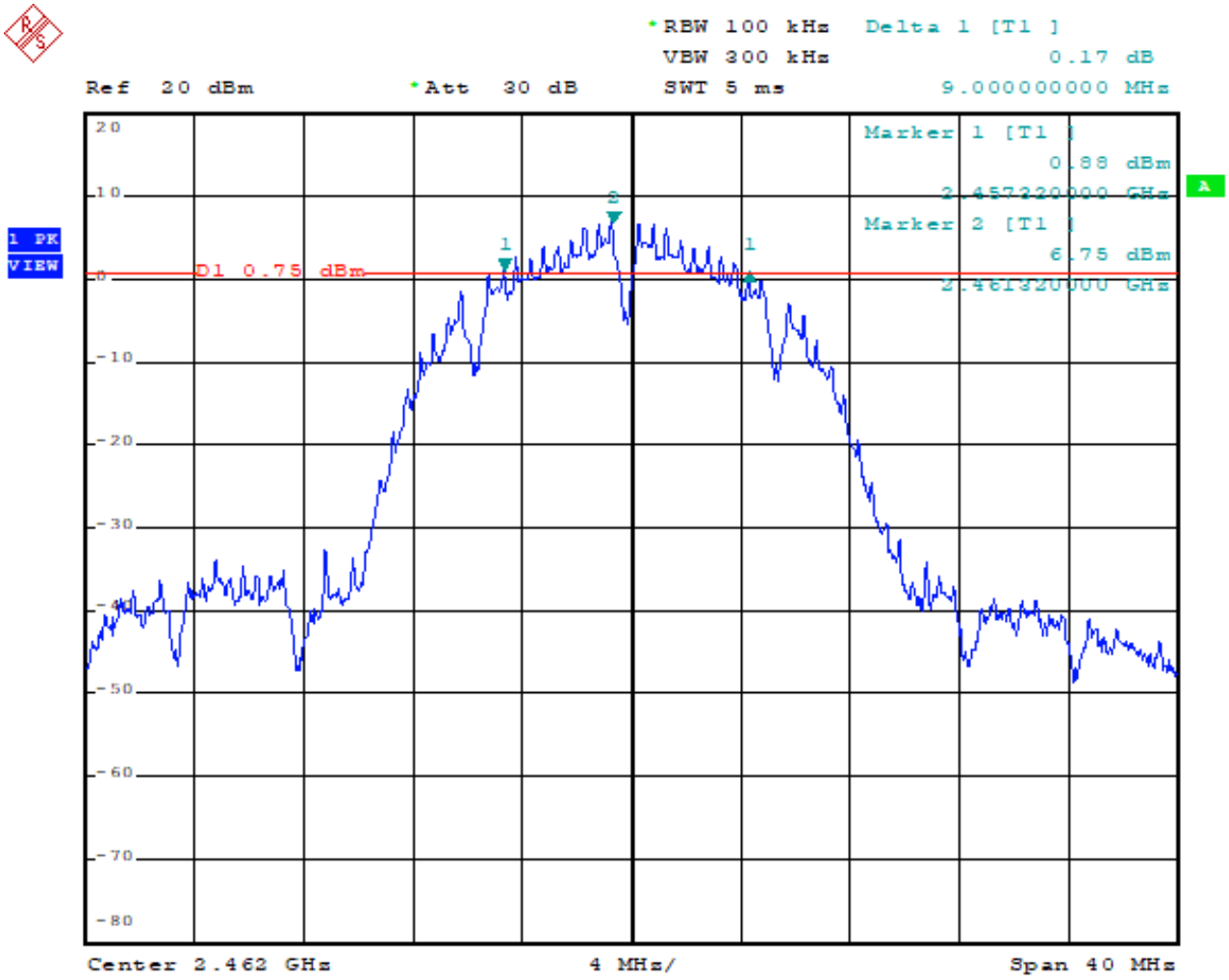


Modulation Standard: 802.11b (11Mbps)
Channel: 06

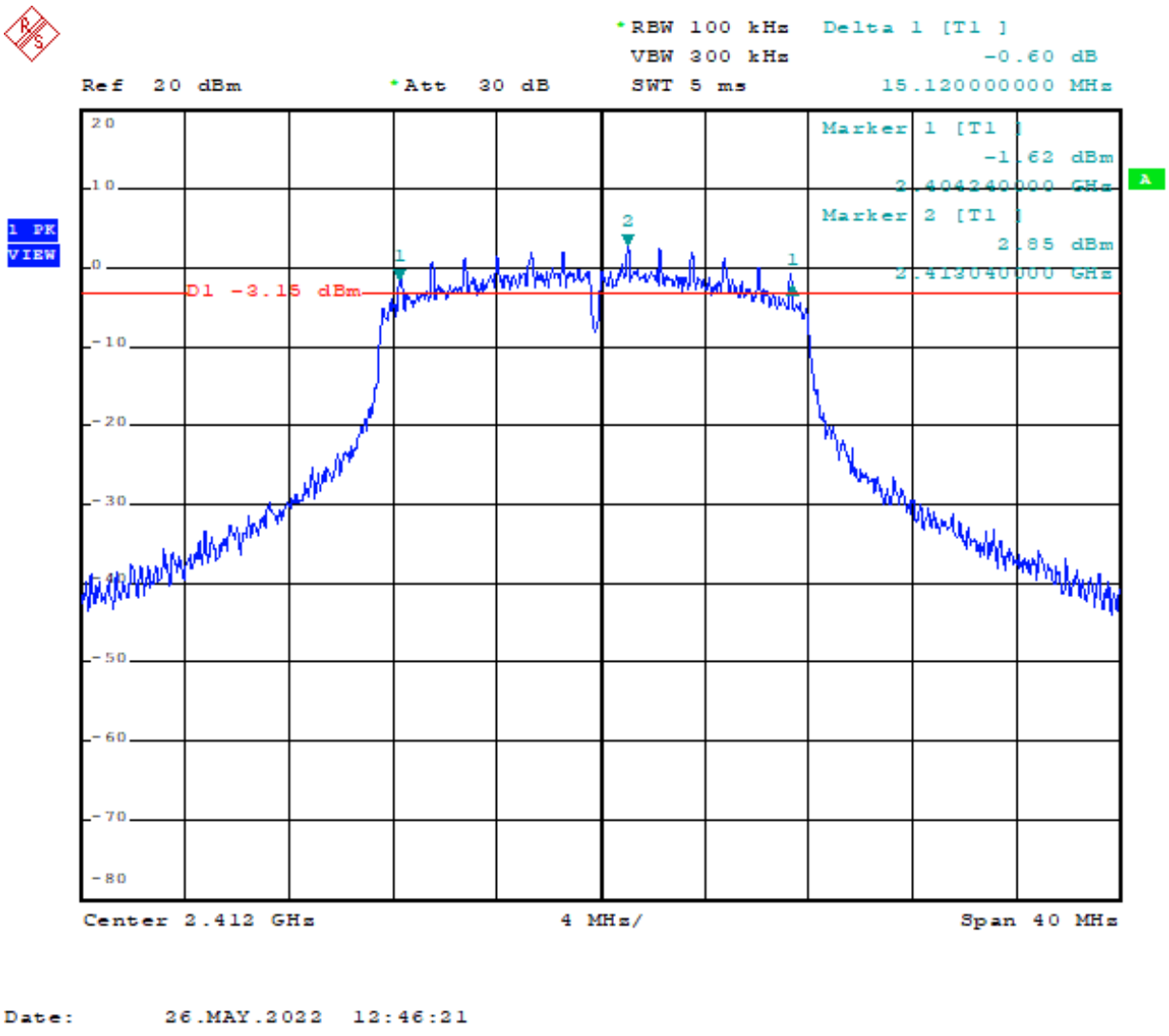


Date: 26.MAY.2022 12:41:05

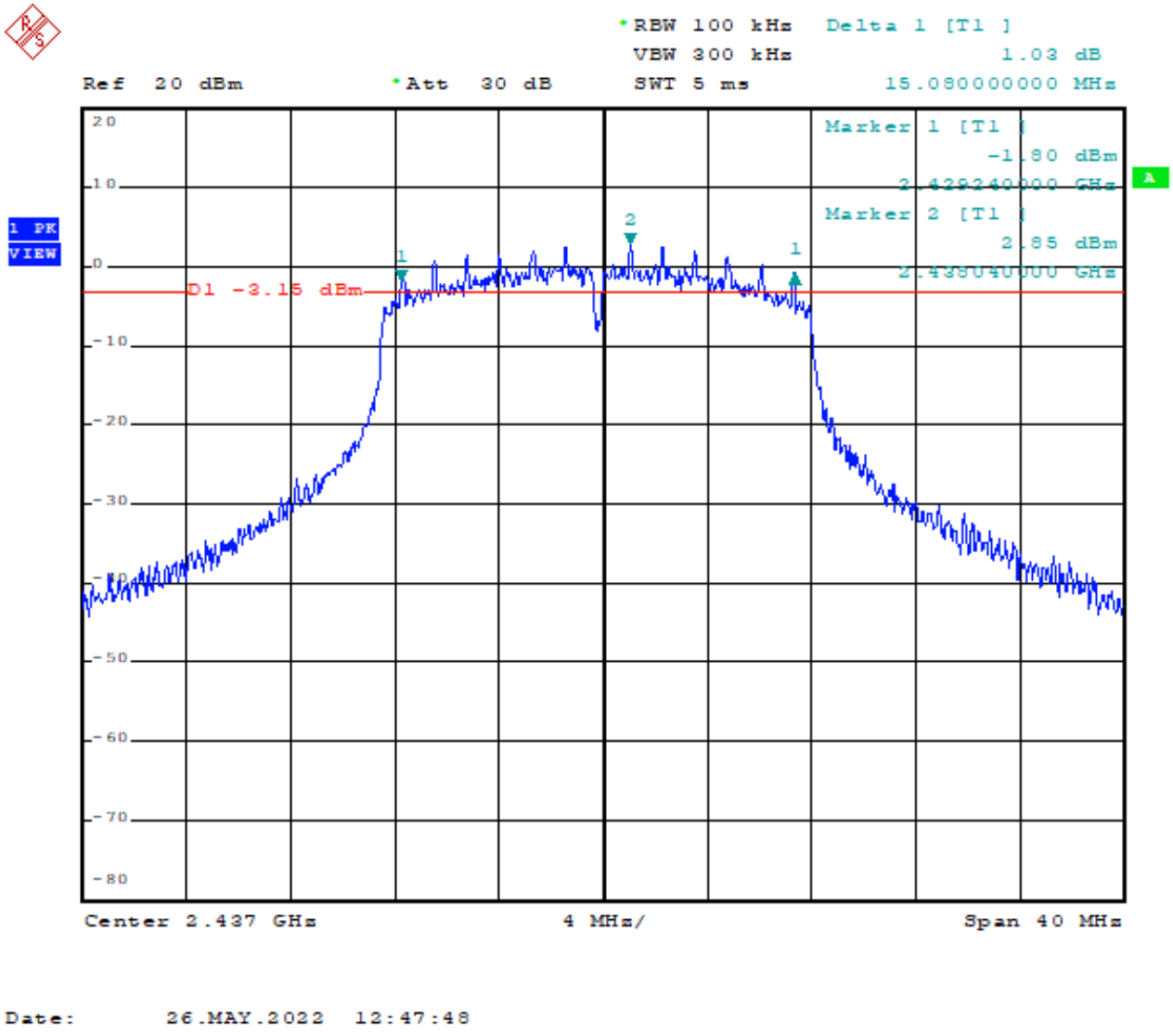
Modulation Standard: 802.11b (11Mbps)
Channel: 11



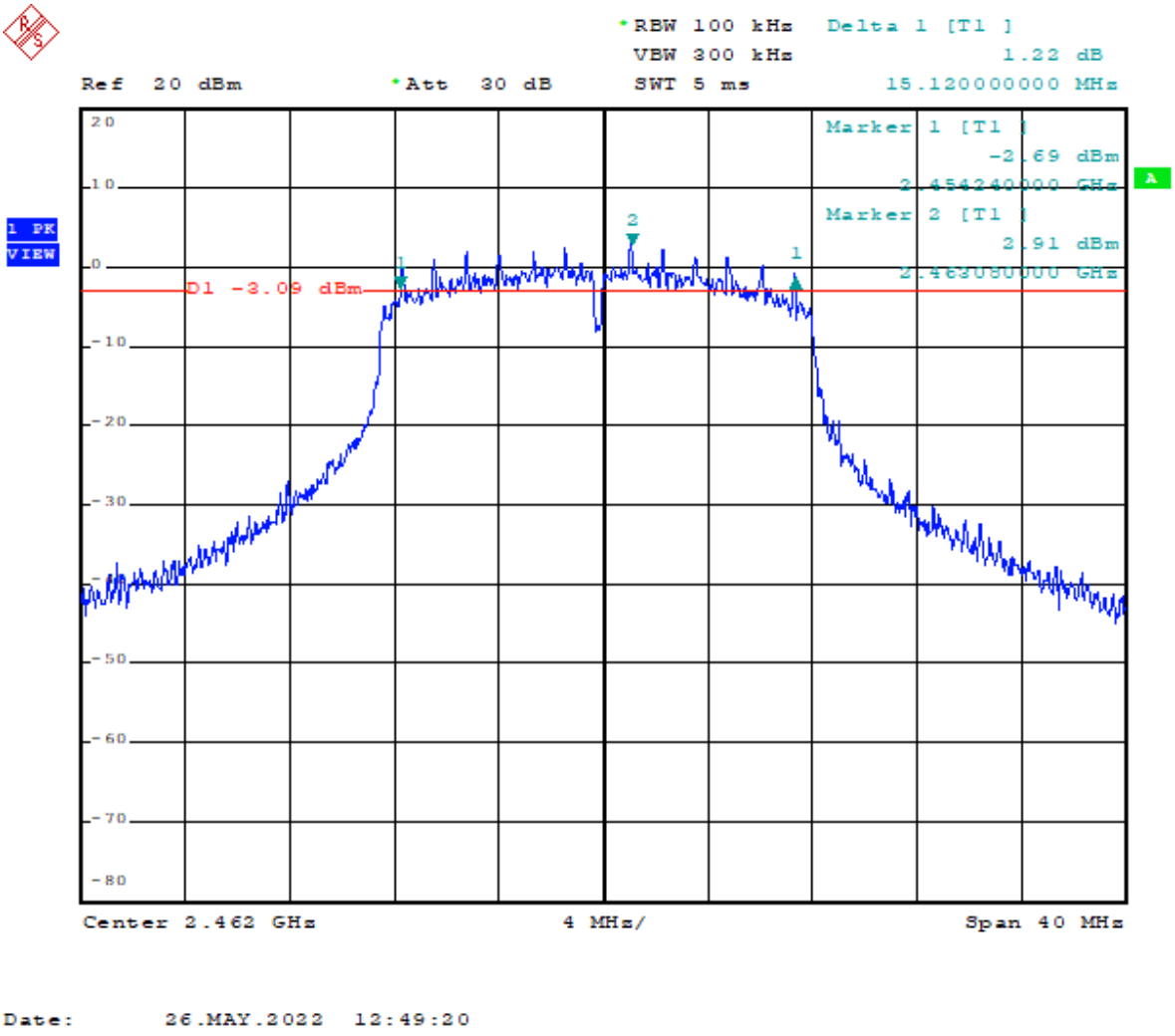
Modulation Standard: 802.11g (6Mbps)
Channel: 01



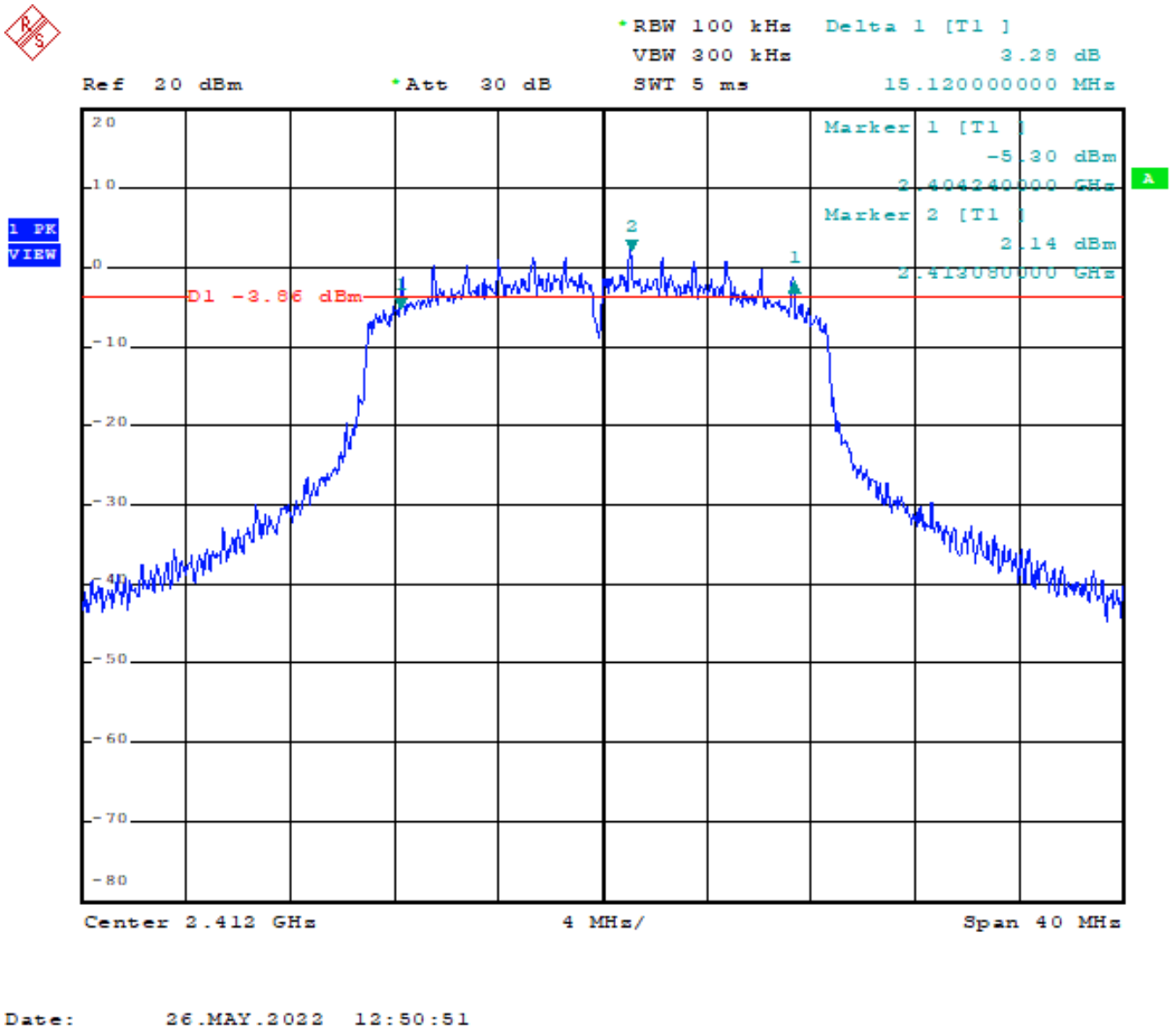
Modulation Standard: 802.11g (6Mbps)
Channel: 06



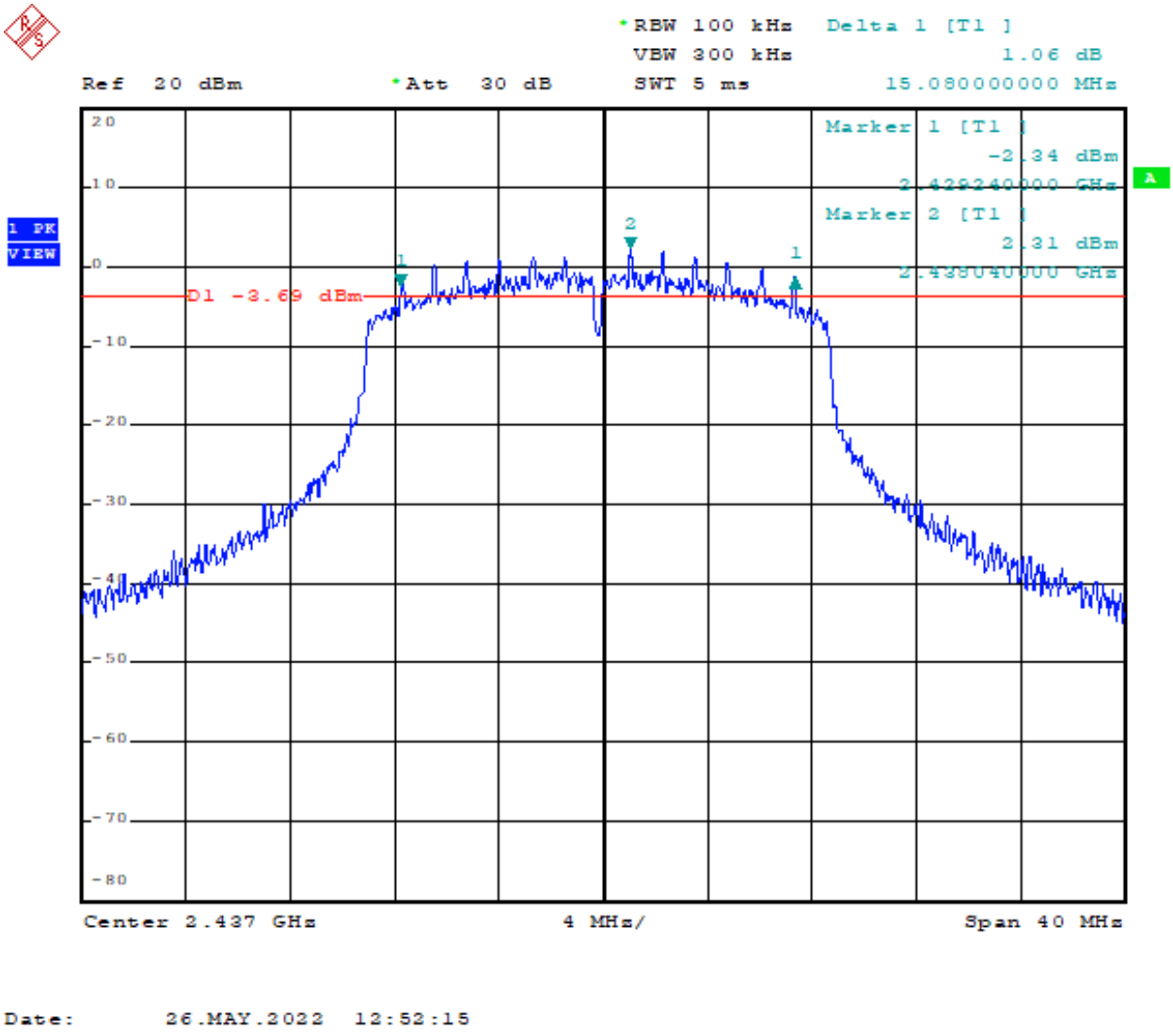
Modulation Standard: 802.11g (6Mbps)
Channel: 11



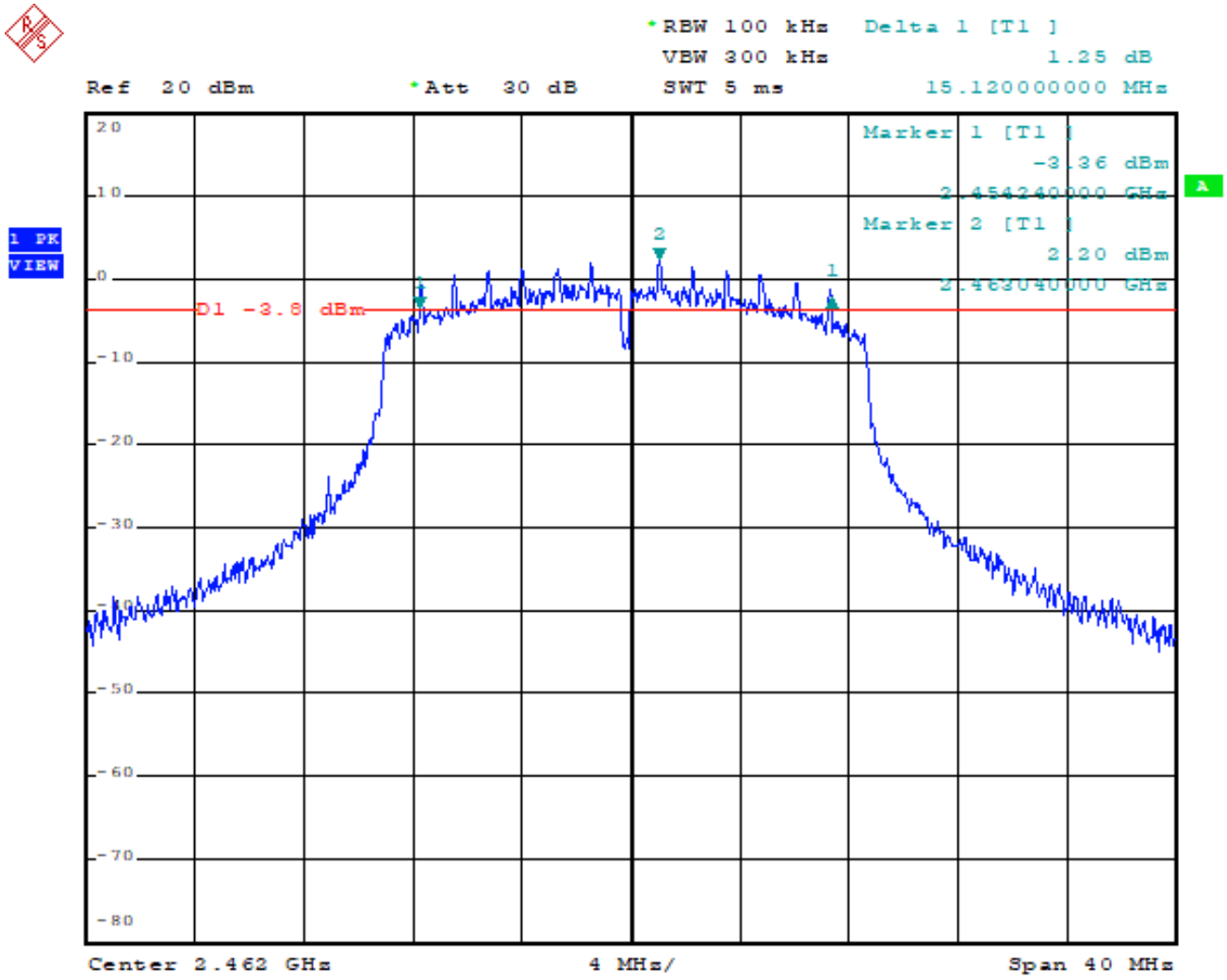
Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 06



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11



9. Maximum Output Power

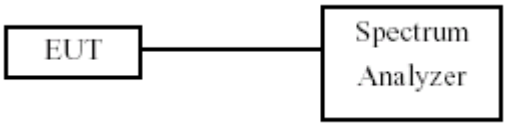
9.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

9.2 Test Procedures

a. The transmitter output was connected to spectrum analyzer.
b. The spectrum analyzer's resolution bandwidth were set at 1MHz RBW and 3MHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
c. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector).
d. Employ trace averaging in power averaging (RMS) mode over a minimum of 100 traces.
e. Use the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges.
f. The peak and average output power was measured and recorded.

9.3 Test Setup Layout



9.4 Test Result and Data

Test Date: May 24, 2022 Temperature: 27℃

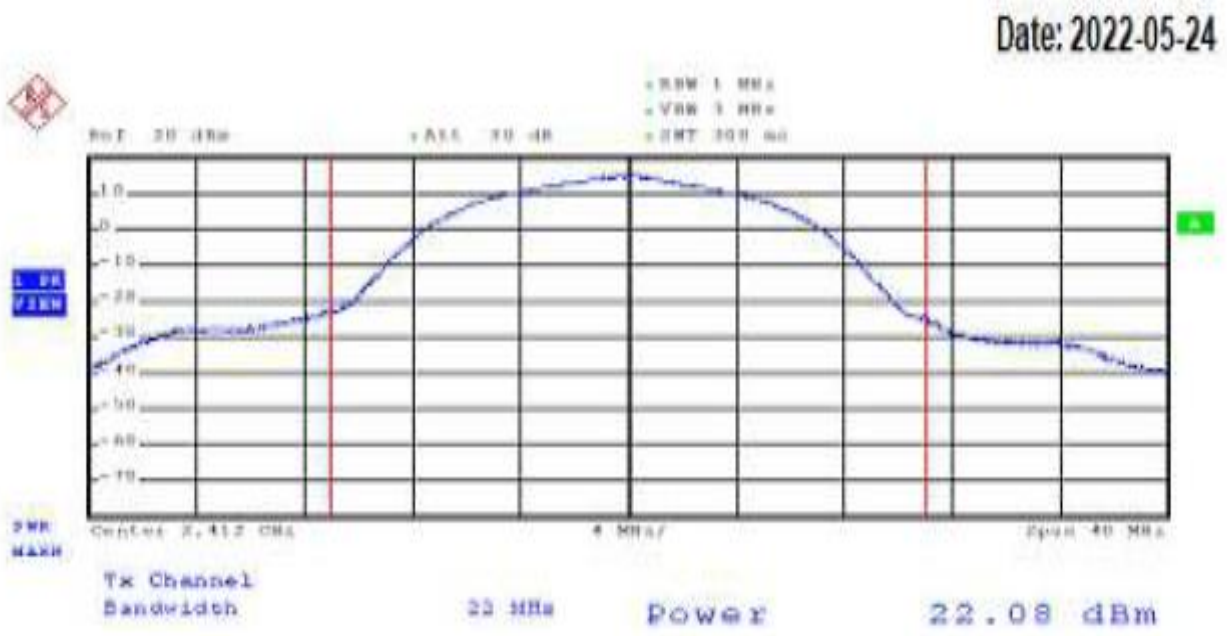
Atmospheric pressure: 1000 hPa Humidity: 55%

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (dBm)
802.11b (11Mbps)	01	2412	22.08
	06	2437	22.17
	11	2462	21.99
802.11g (6Mbps)	01	2412	23.05
	06	2437	23.37
	11	2462	23.11

Modulation Standard	Channel	Frequency (MHz)	Peak Power Output (dBm)
802.11n HT20 (6.5Mbps)	01	2412	22.13
	06	2437	22.39
	11	2462	22.19

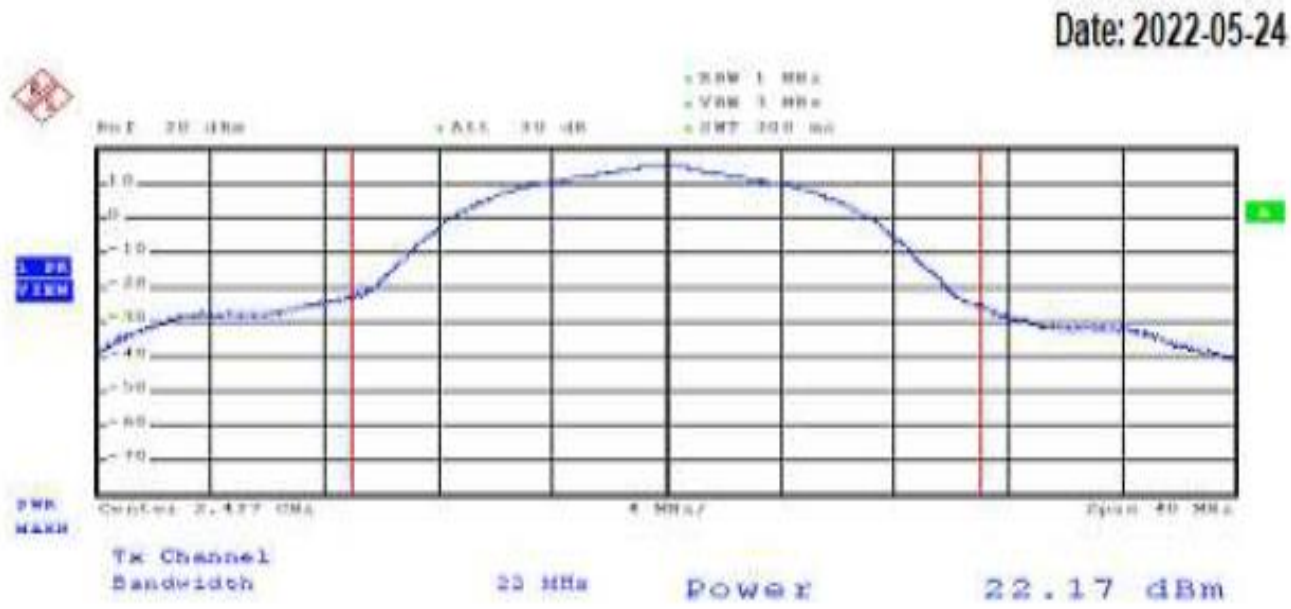
Output Power

Modulation Standard: 802.11b (11Mbps)
Channel: 01

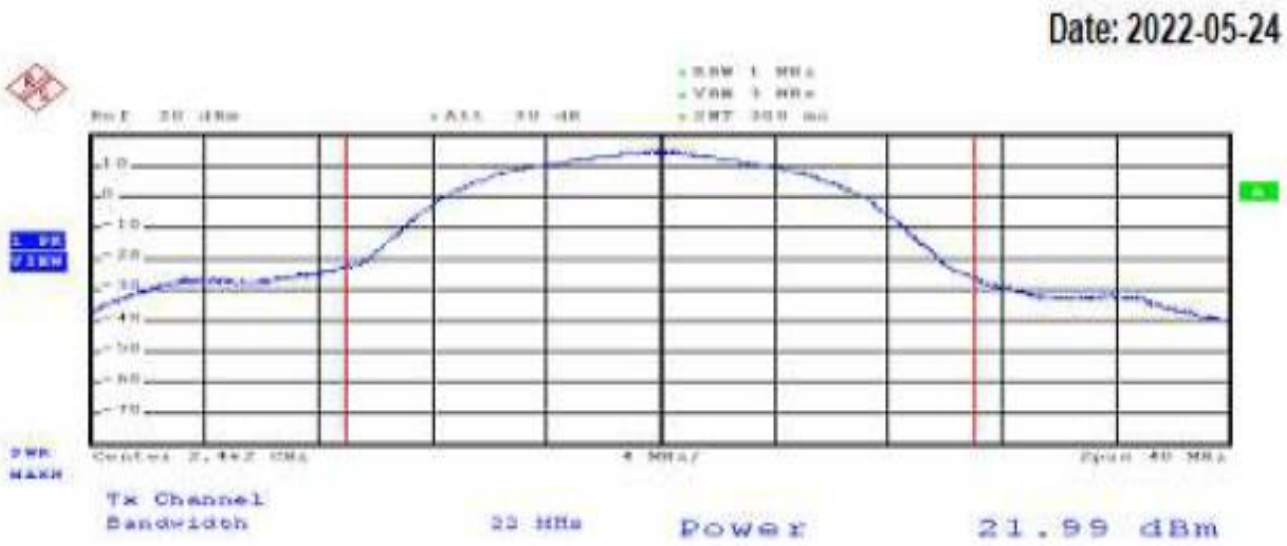


Date: 24.MAY.2022 17:40:55

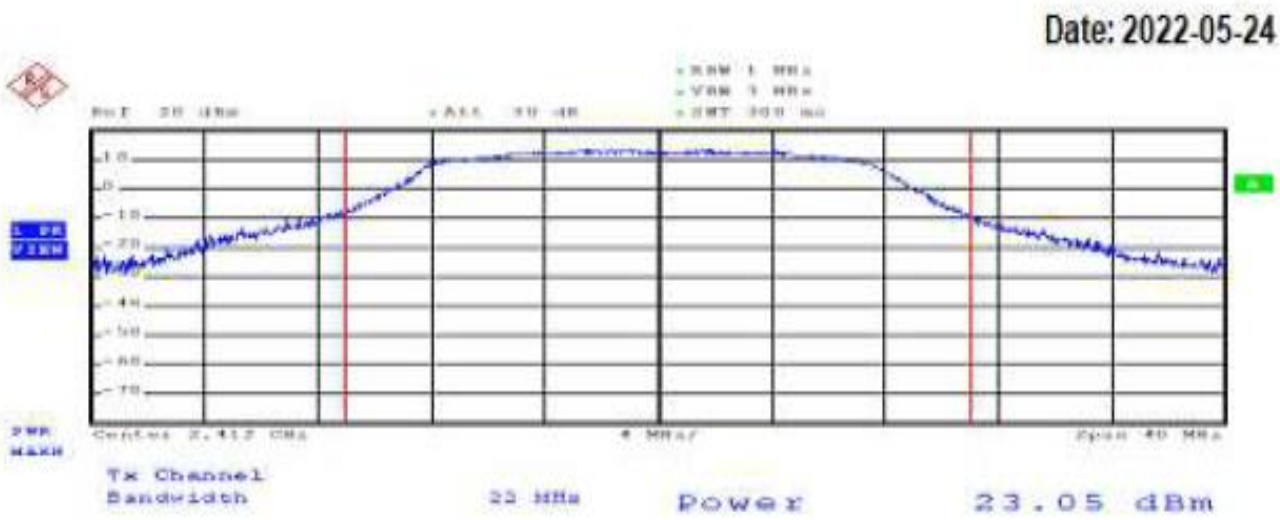
Modulation Standard: 802.11b (11Mbps)
Channel: 06



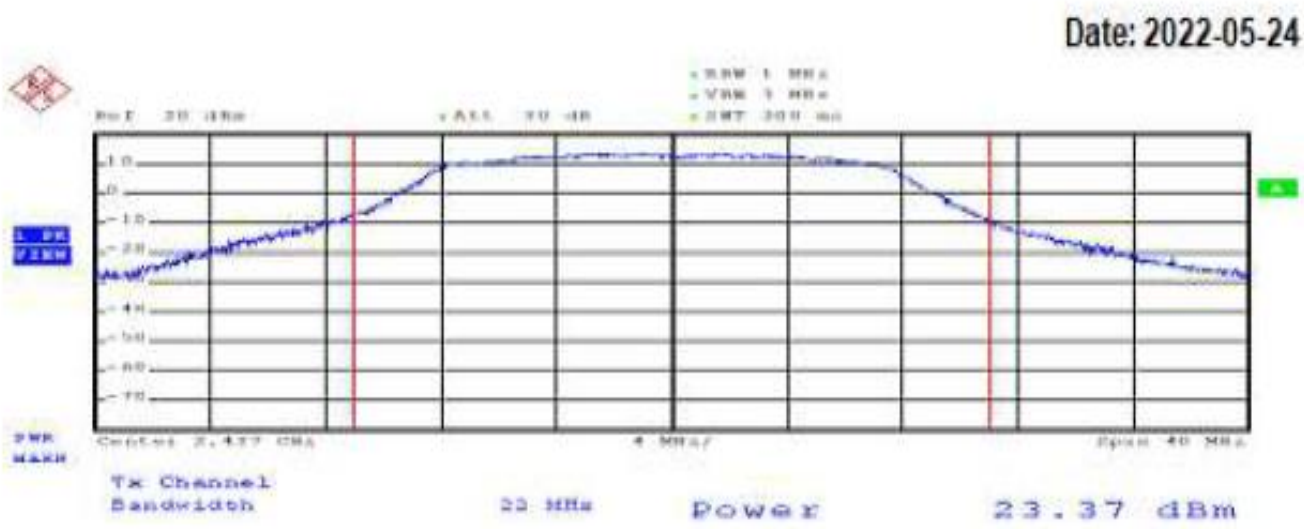
Modulation Standard: 802.11b (11Mbps)
Channel: 11



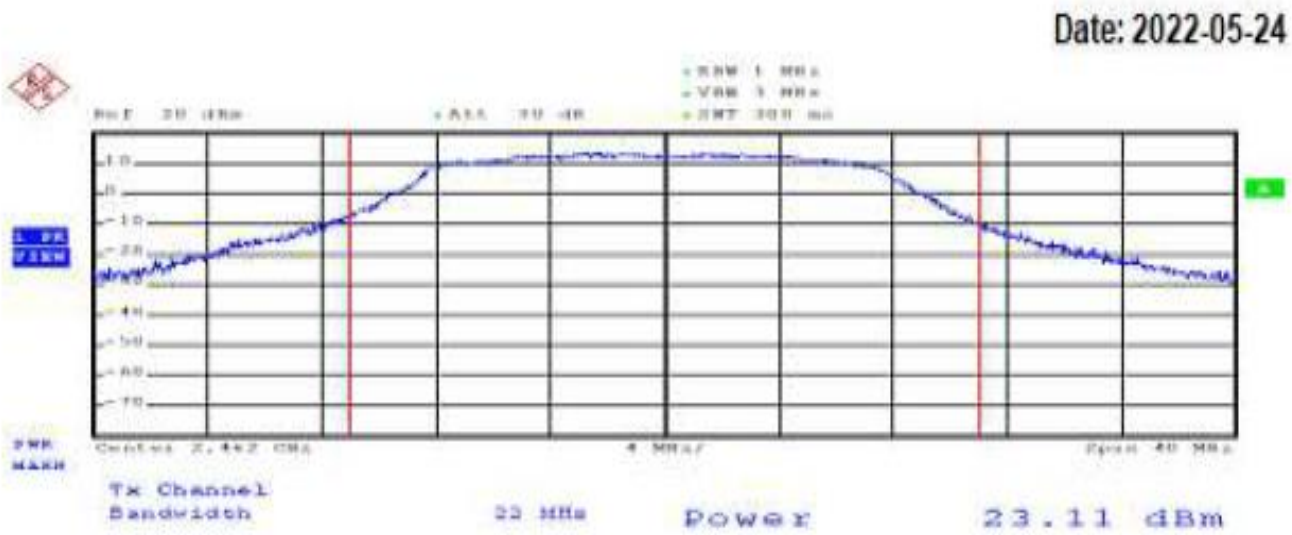
Modulation Standard: 802.11g (6Mbps)
Channel: 01



Modulation Standard: 802.11g (6Mbps)
Channel: 06



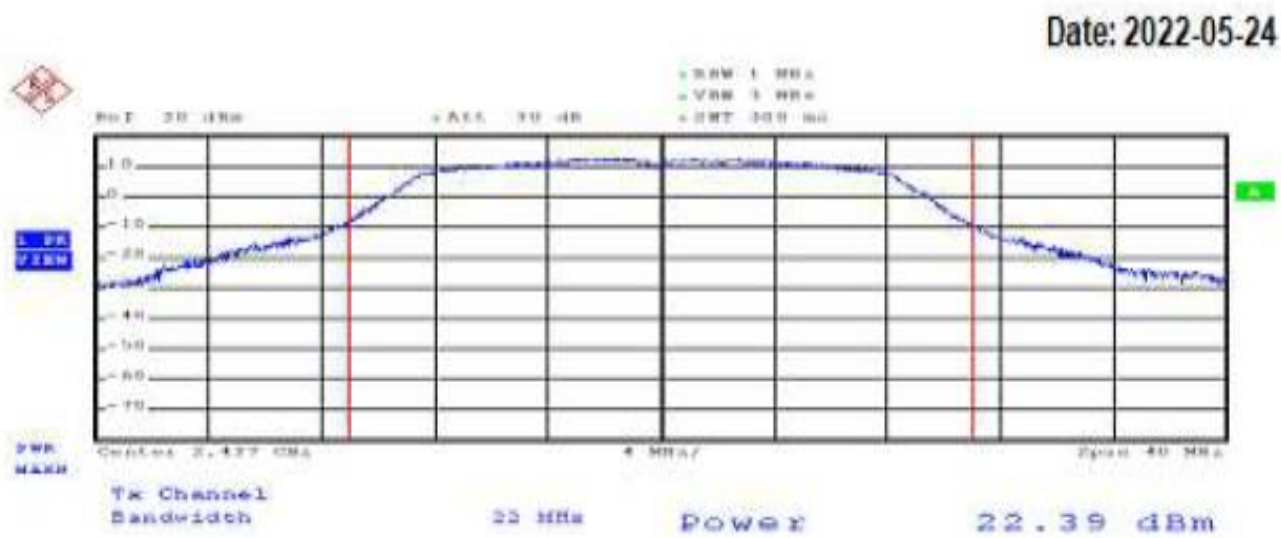
Modulation Standard: 802.11g (6Mbps)
Channel: 11



Date: 24.MAY.2022 17:46:41

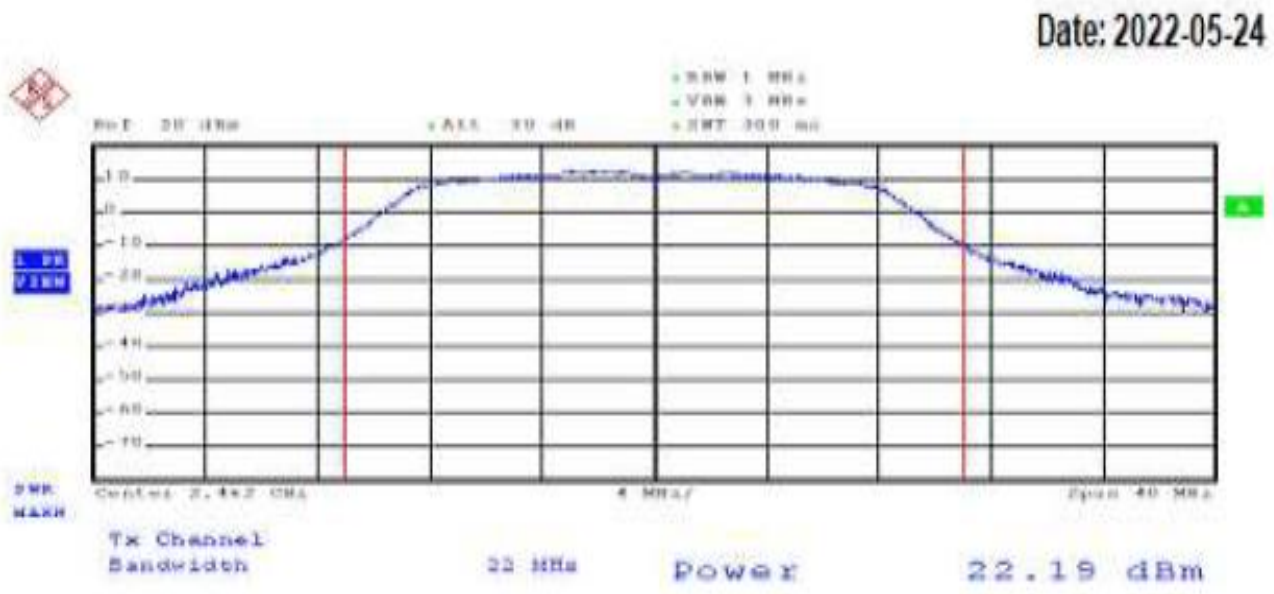
Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01

Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 06



Date: 24.MAY.2022 17:54:41

Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11



10. Power Spectral Density

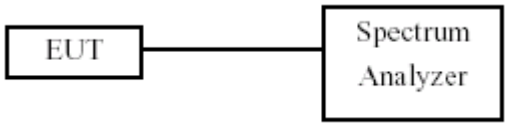
10.1 Test Limit

The Maximum of Power Spectral Density Measurement is 8dBm

10.2 Test Procedures

g. The transmitter output was connected to spectrum analyzer.
h. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=auto couple.
i. The power spectral density was measured and recorded.

10.3 Test Setup Layout



10.4 Test Result and Data

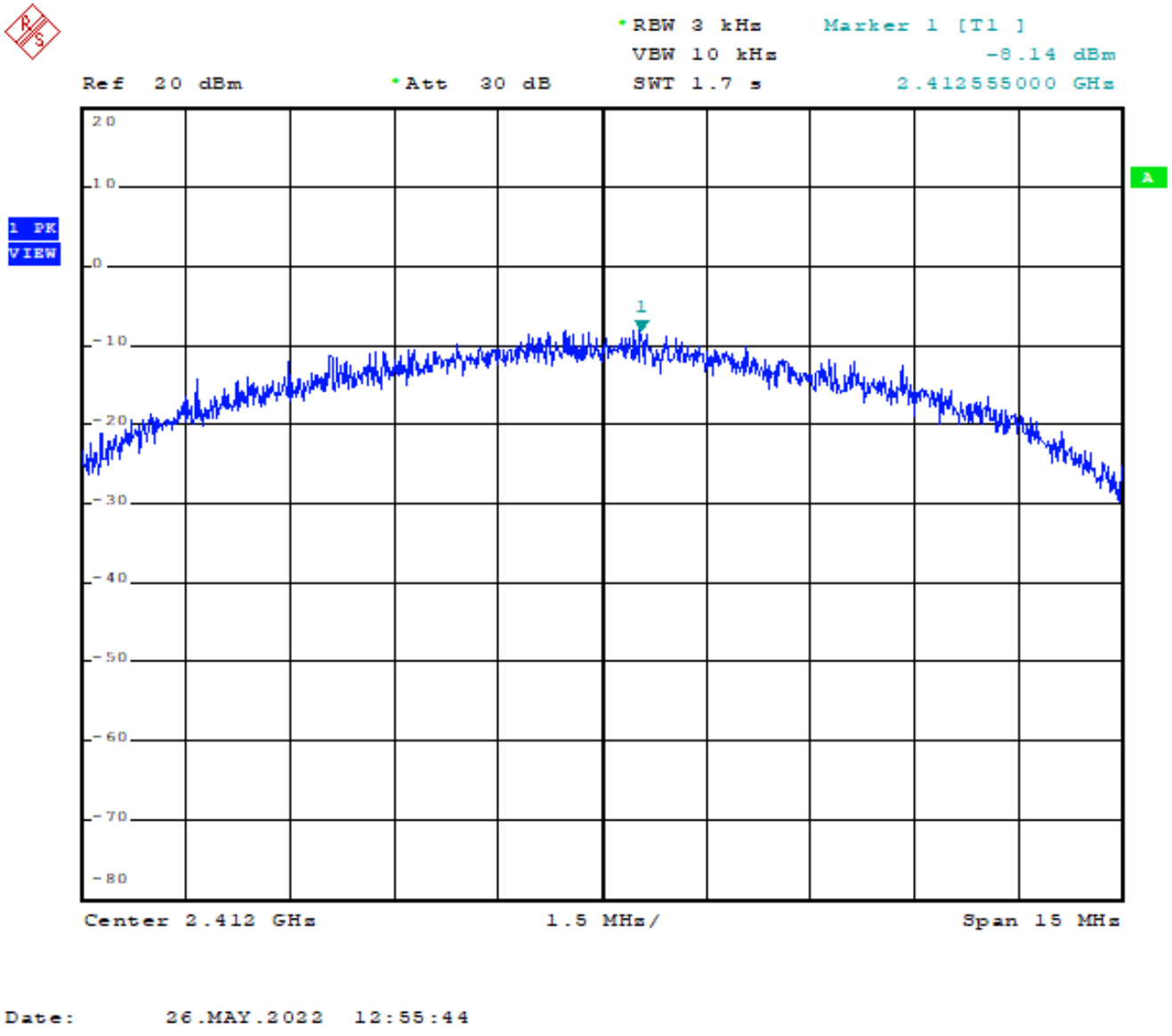
Test Date: May 26, 2022 Temperature: 27℃

Atmospheric pressure: 1000 hPa Humidity: 55%

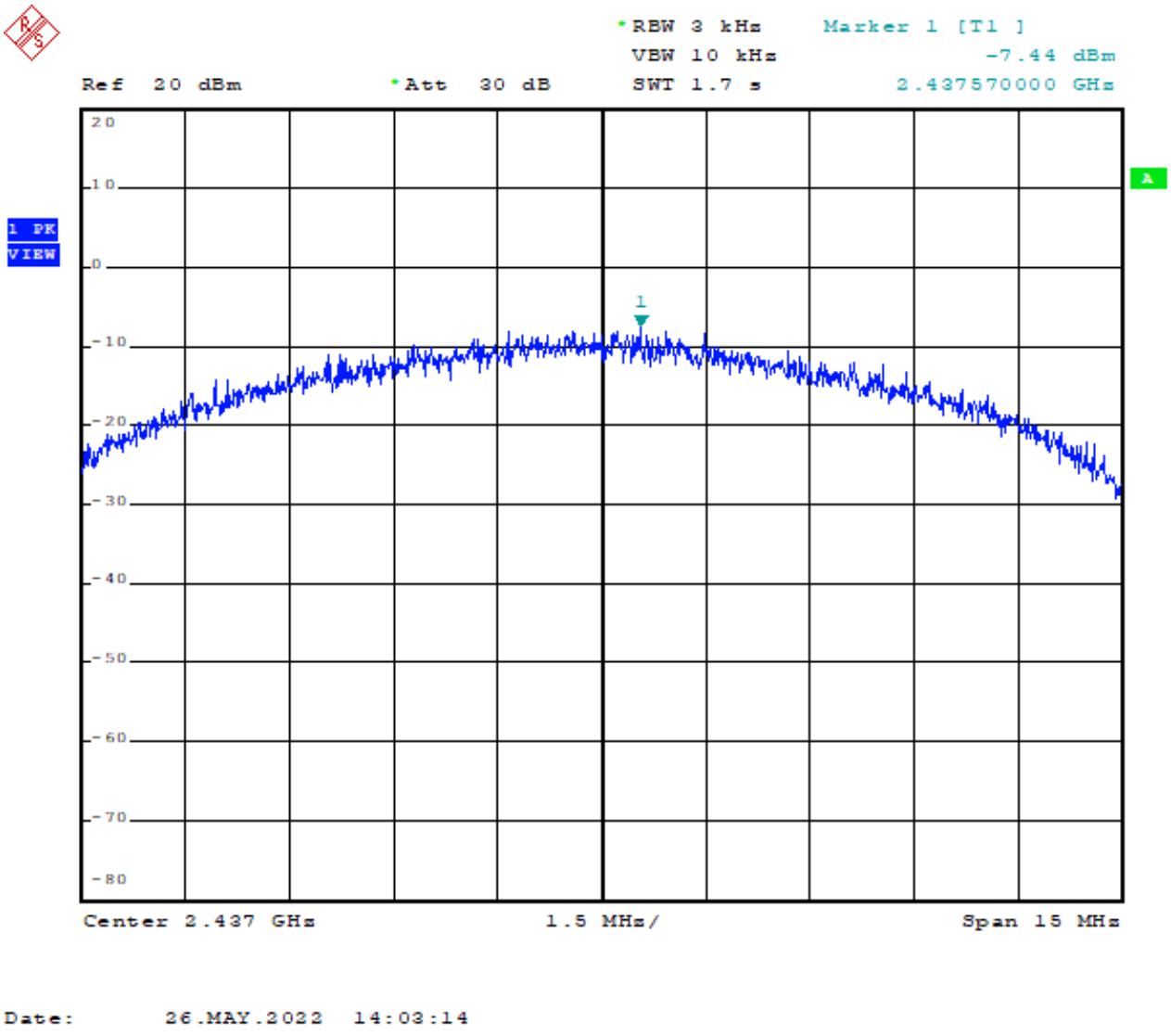
Modulation Standard	Channel	Frequency (MHz)	Measured Power Density (dBm)
802.11b (11Mbps)	01	2412	-8.14
	06	2437	-7.44
	11	2462	-7.14
802.11g (6Mbps)	01	2412	-11.01
	06	2437	-11.62
	11	2462	-11.14

Modulation Standard	Channel	Frequency (MHz)	Measured Power Density (dBm)
802.11n HT20 (6.5Mbps)	01	2412	-11.64
	06	2437	-11.63
	11	2462	-11.67

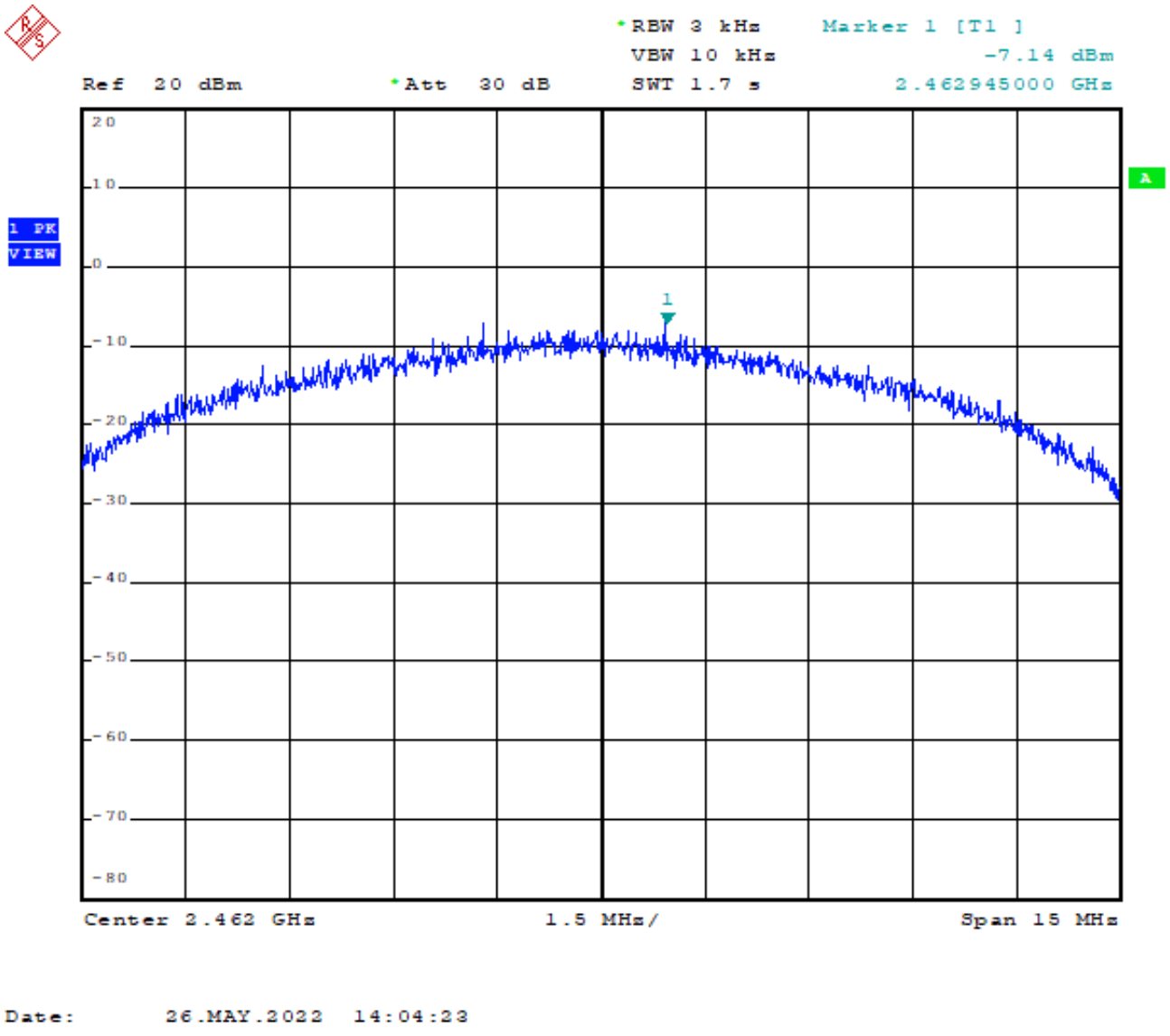
Modulation Standard: 802.11b (11Mbps)
Channel: 01



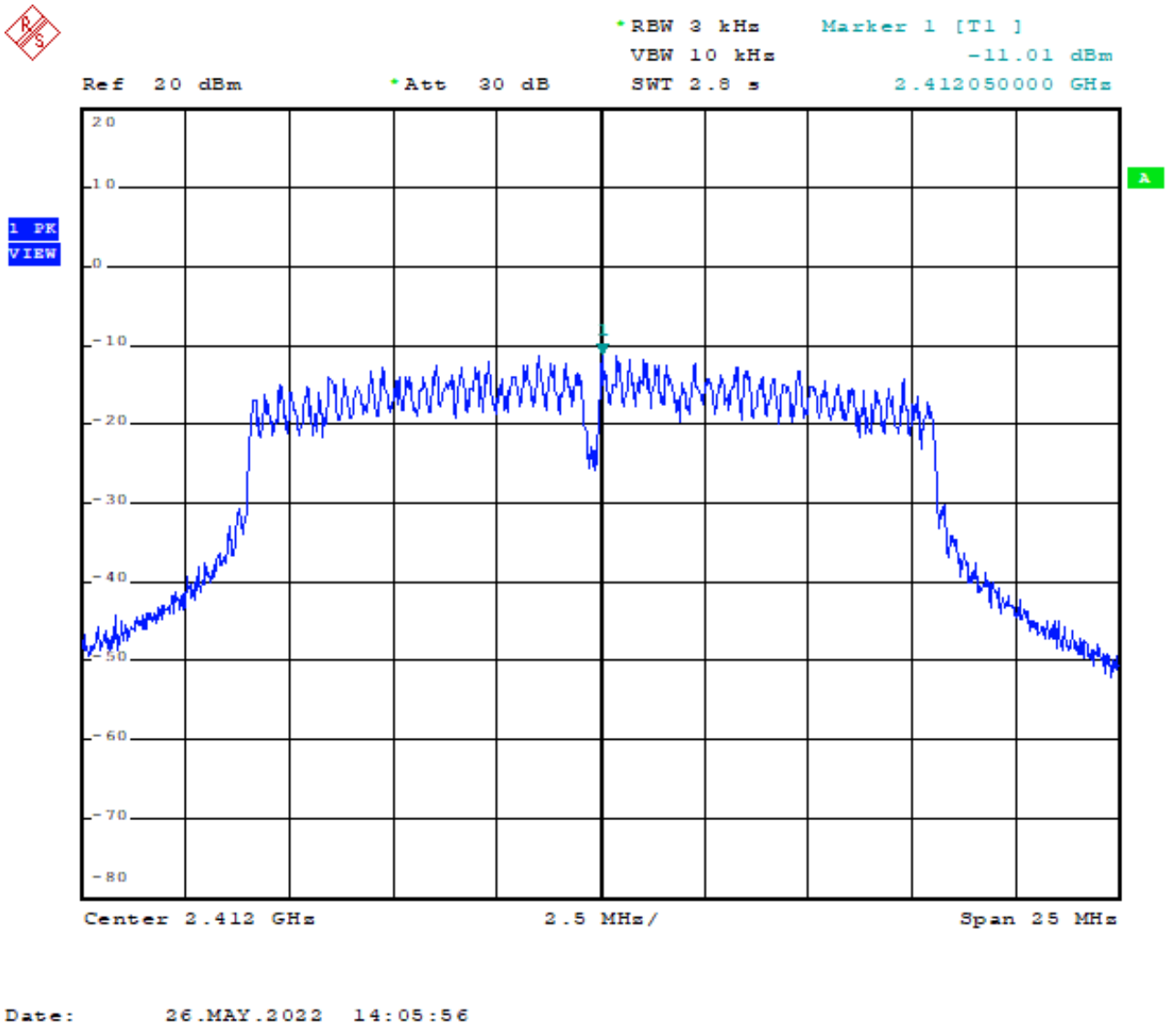
Modulation Standard: 802.11b (11Mbps)
Channel: 06



Modulation Standard: 802.11b (11Mbps)
Channel: 11

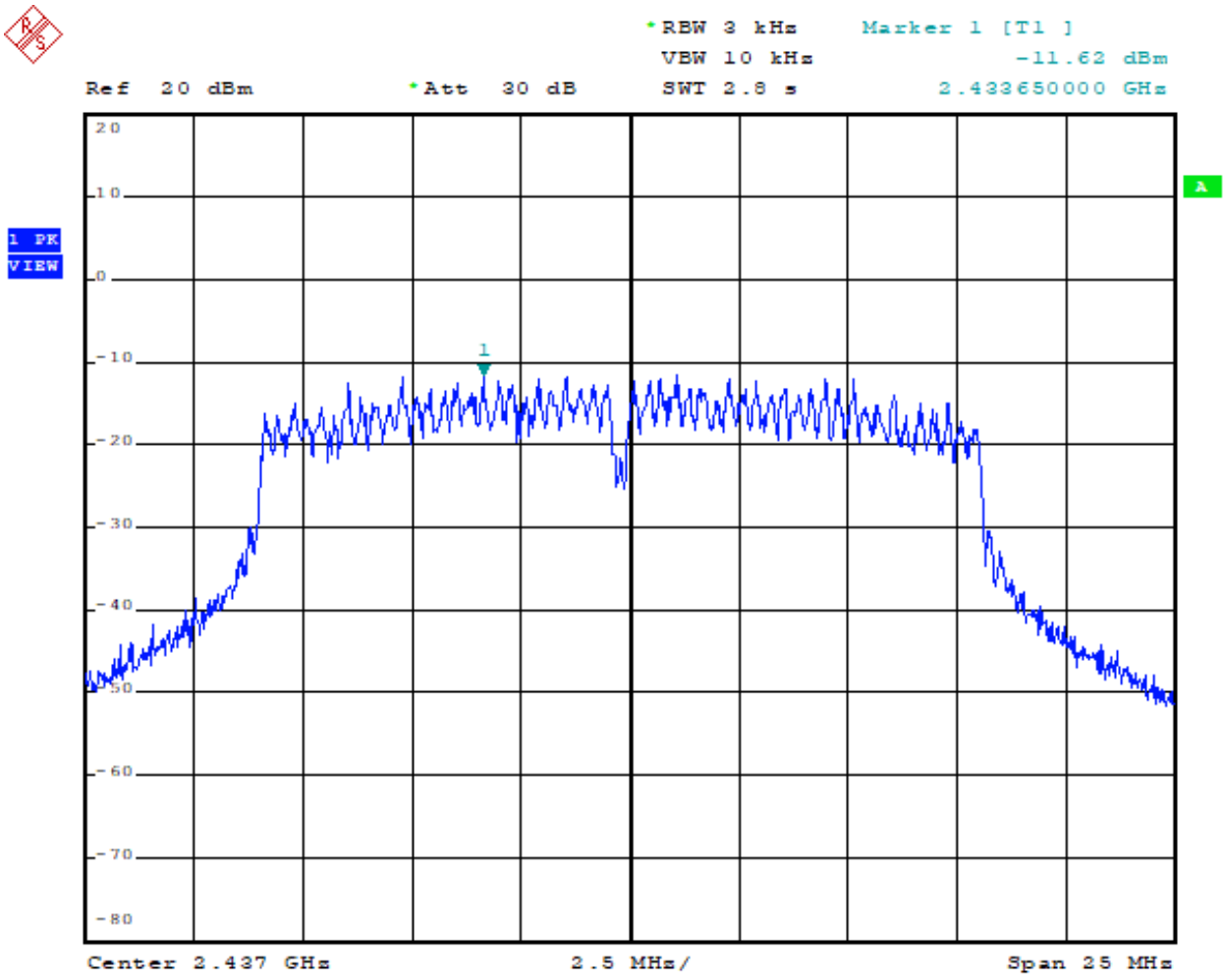


Modulation Standard: 802.11g (6Mbps)
Channel: 01

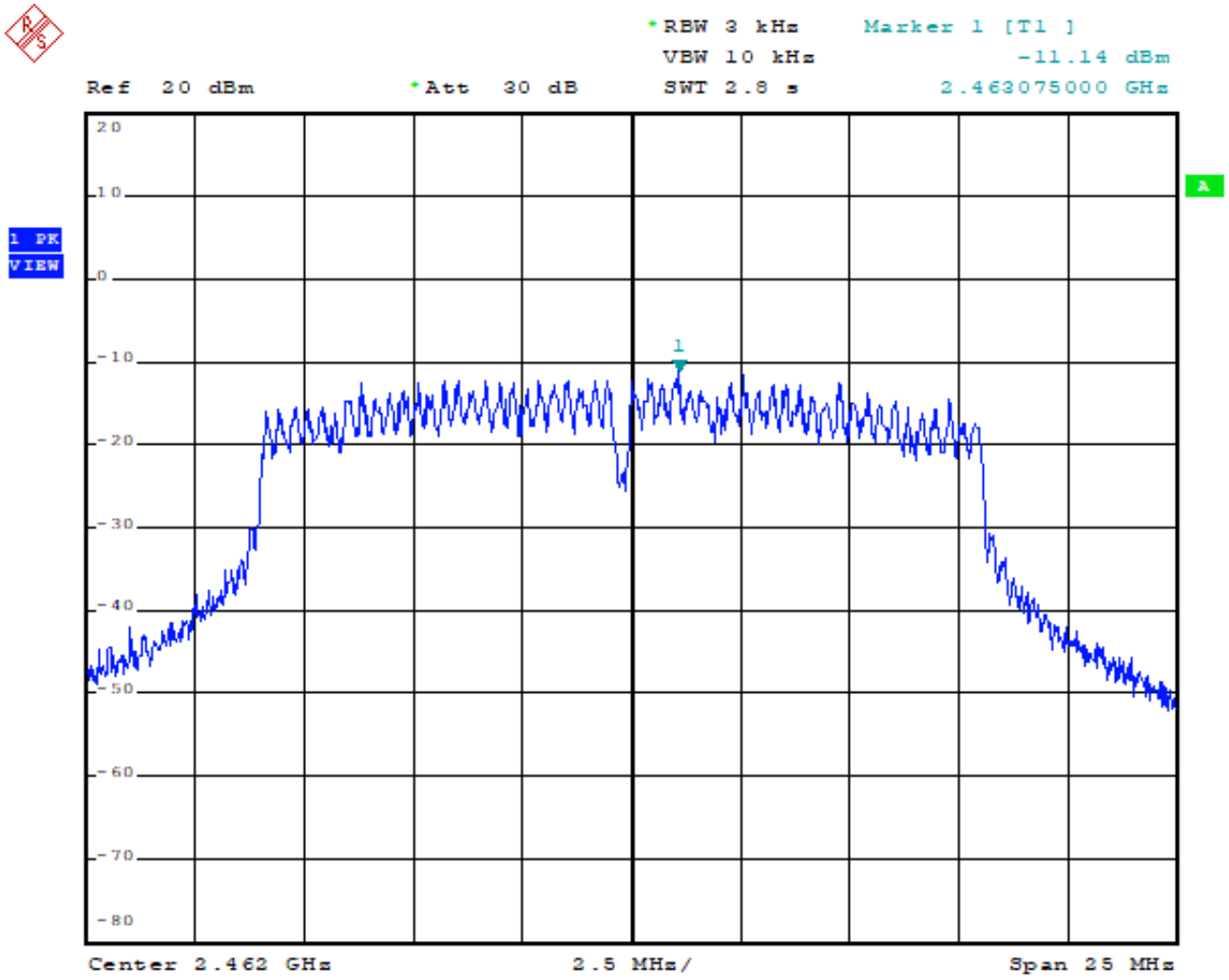


Date: 26.MAY.2022 14:05:56

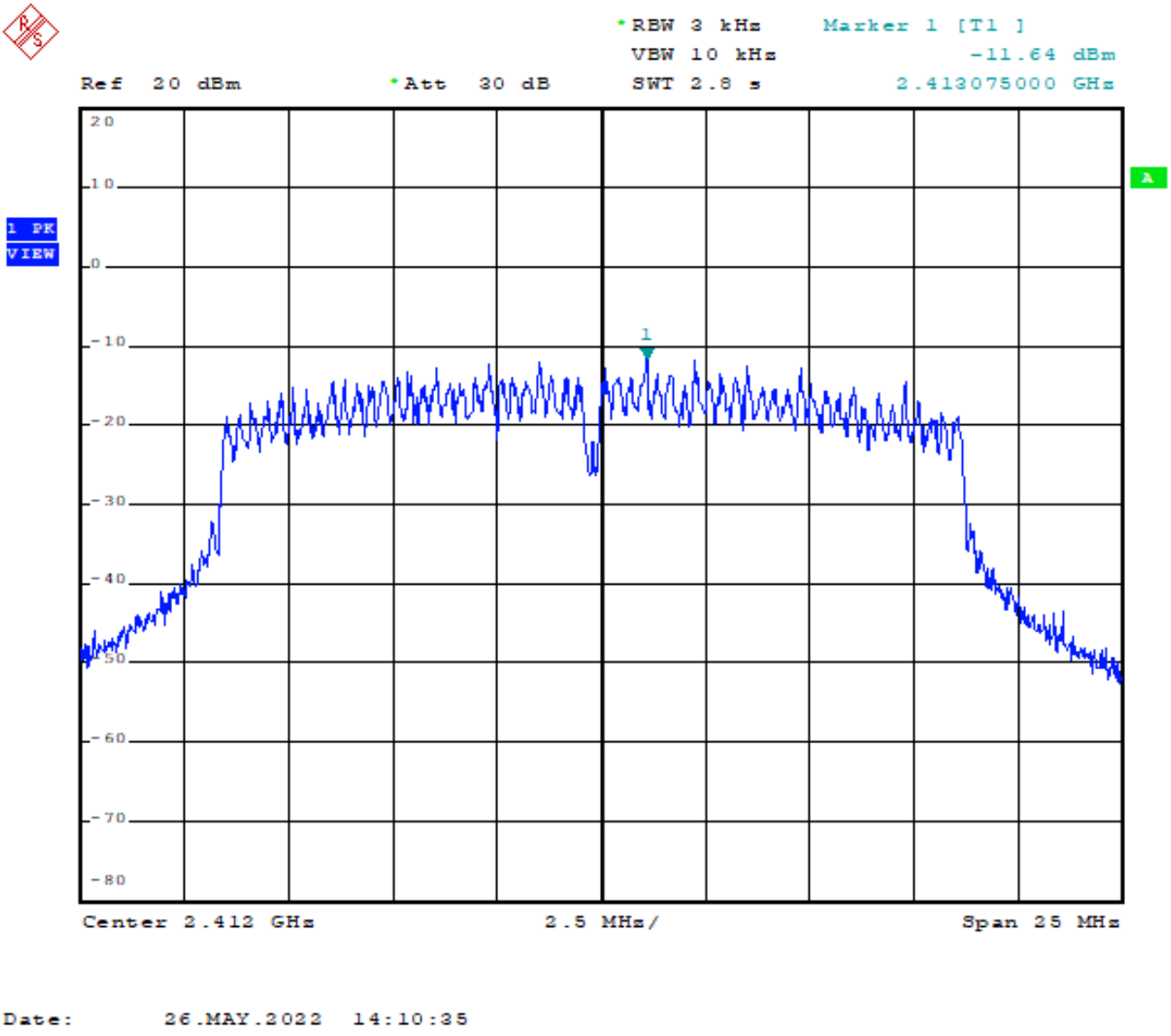
Modulation Standard: 802.11g (6Mbps)
Channel: 06



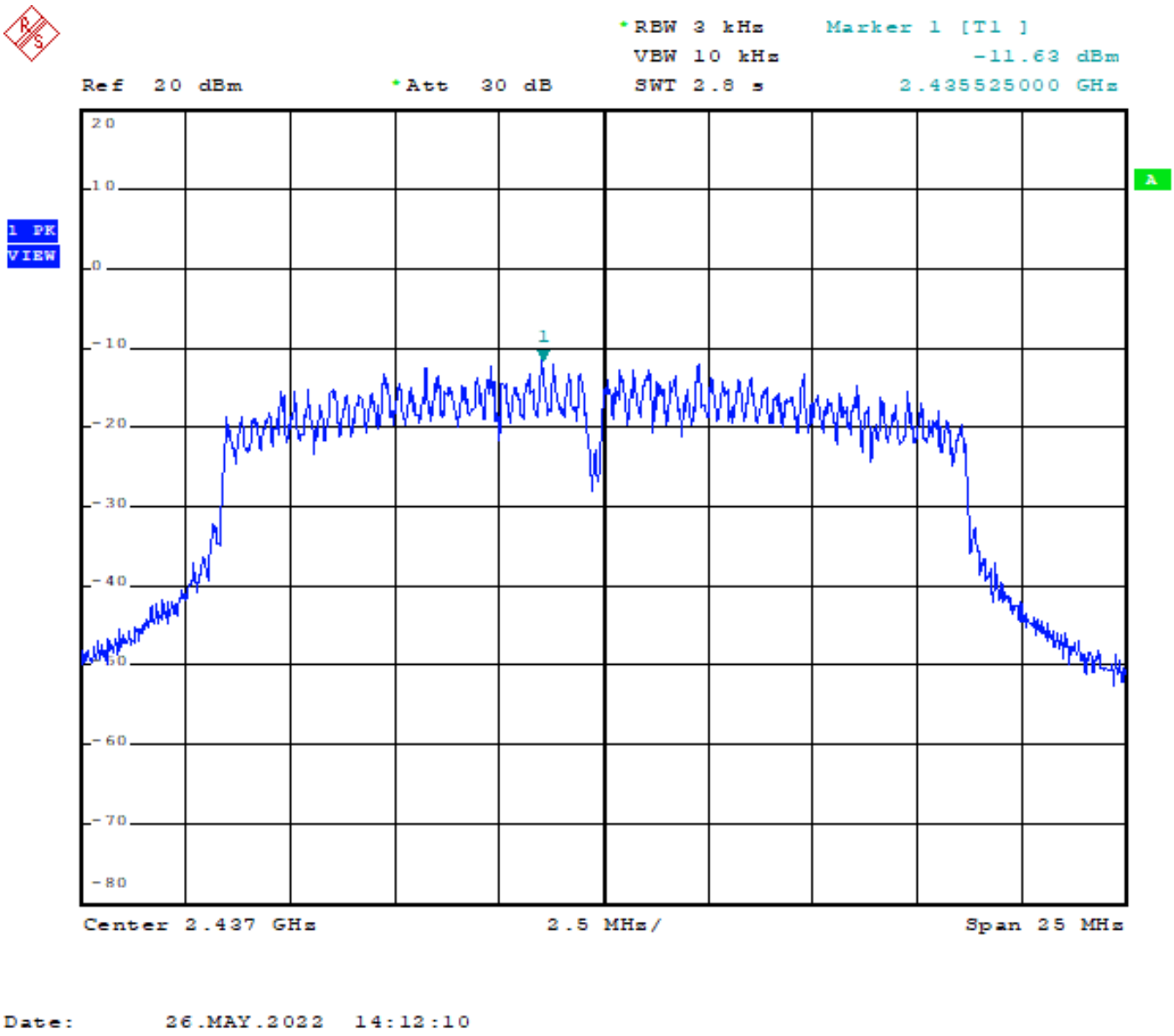
Modulation Standard: 802.11g (6Mbps)
Channel: 11



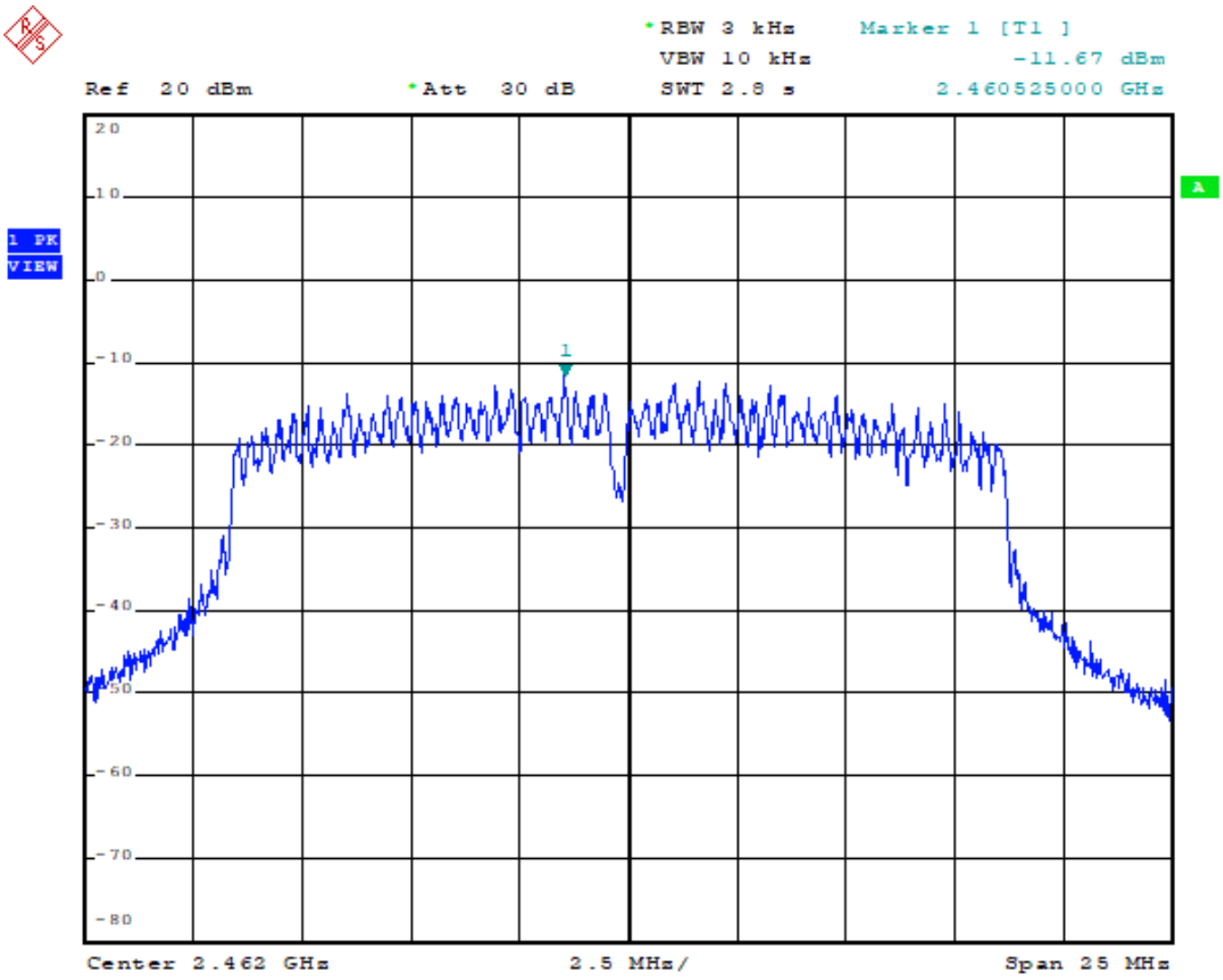
Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 06



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11



11. Band Edges Measurement

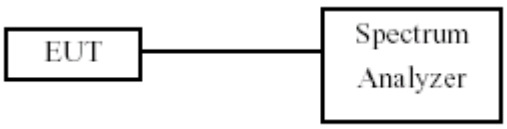
11.1 Test Limit

Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

11.2 Test Procedure

a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
b. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
c. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
d. The band edges was measured and recorded.

11.3 Test Setup Layout



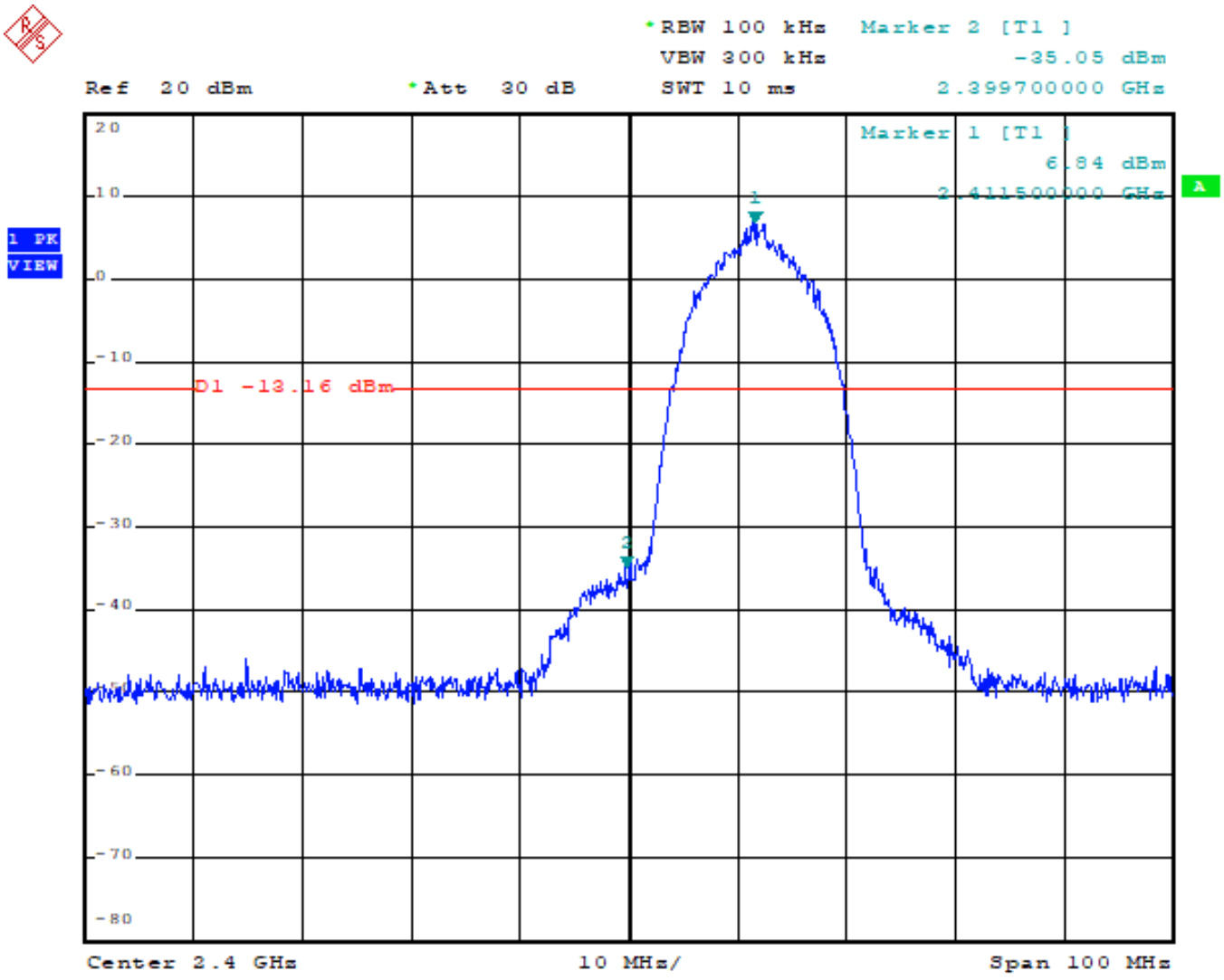
11.4 Test Result and Data

Test Date: May 26, 2022 Temperature: 27℃

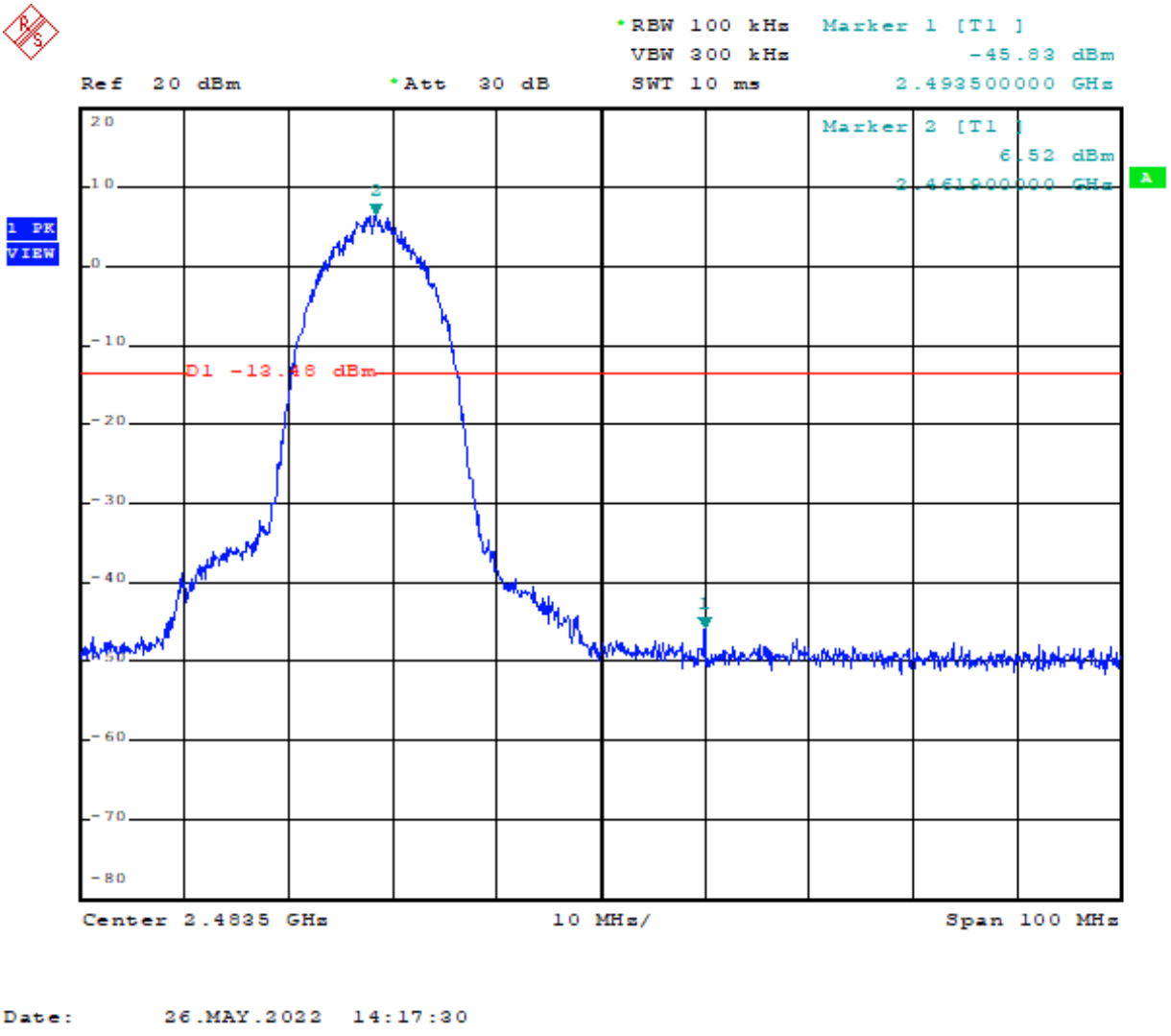
Atmospheric pressure: 1000 hPa Humidity: 55%

Modulation Standard	Channel	Frequency (MHz)	maximum value in frequency (MHz)	maximum value (dBm)
802.11b (11Mbps)	01	2412	2399.7	-35.05
	11	2462	2493.5	-45.83
802.11g (6Mbps)	01	2412	2400.0	-31.15
	11	2462	2490.6	-44.74
802.11n HT20 (6.5Mbps)	01	2412	2400.0	-29.99
	11	2462	2483.7	-44.78

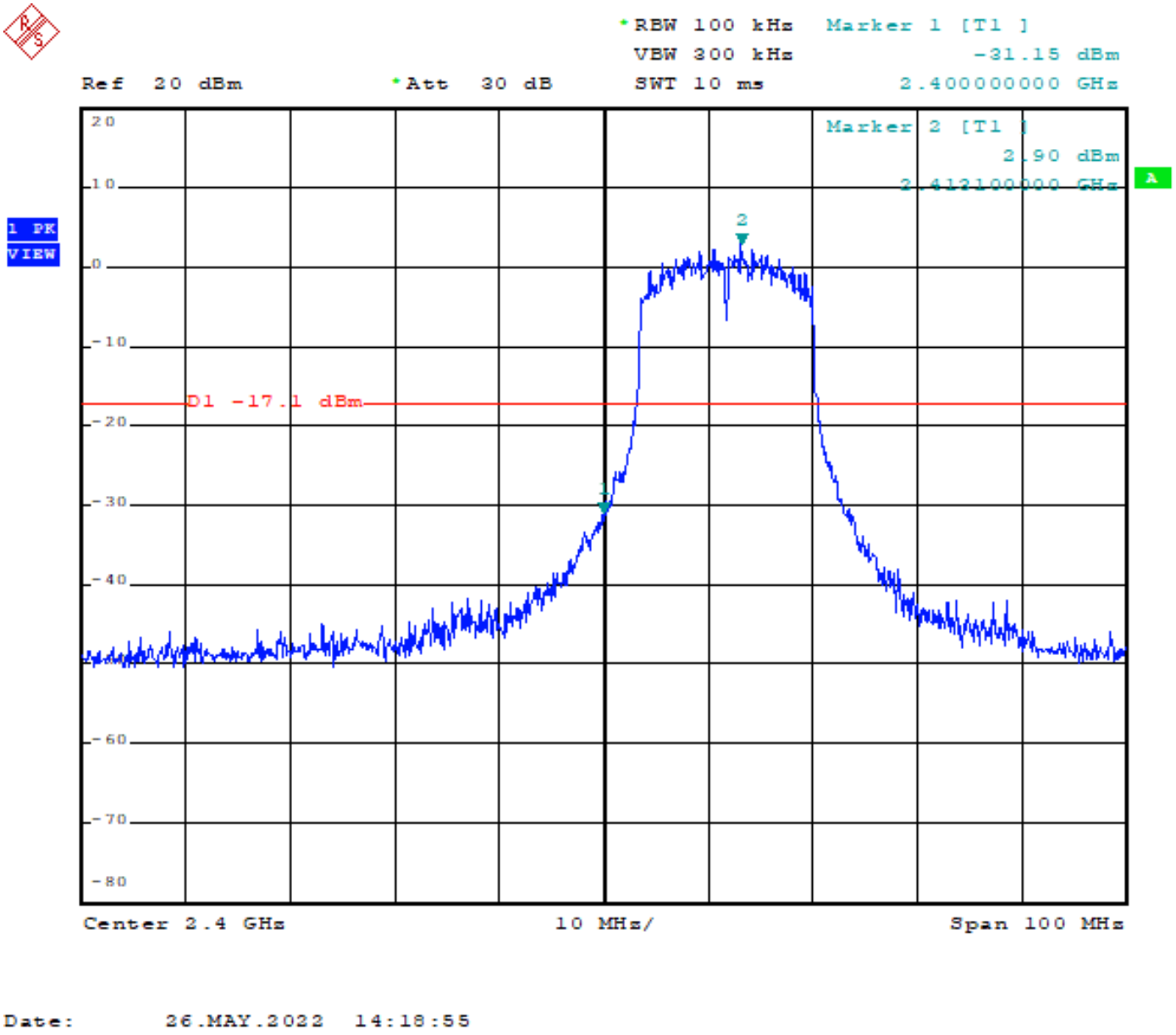
Modulation Standard: 802.11b (11Mbps)
Channel: 01



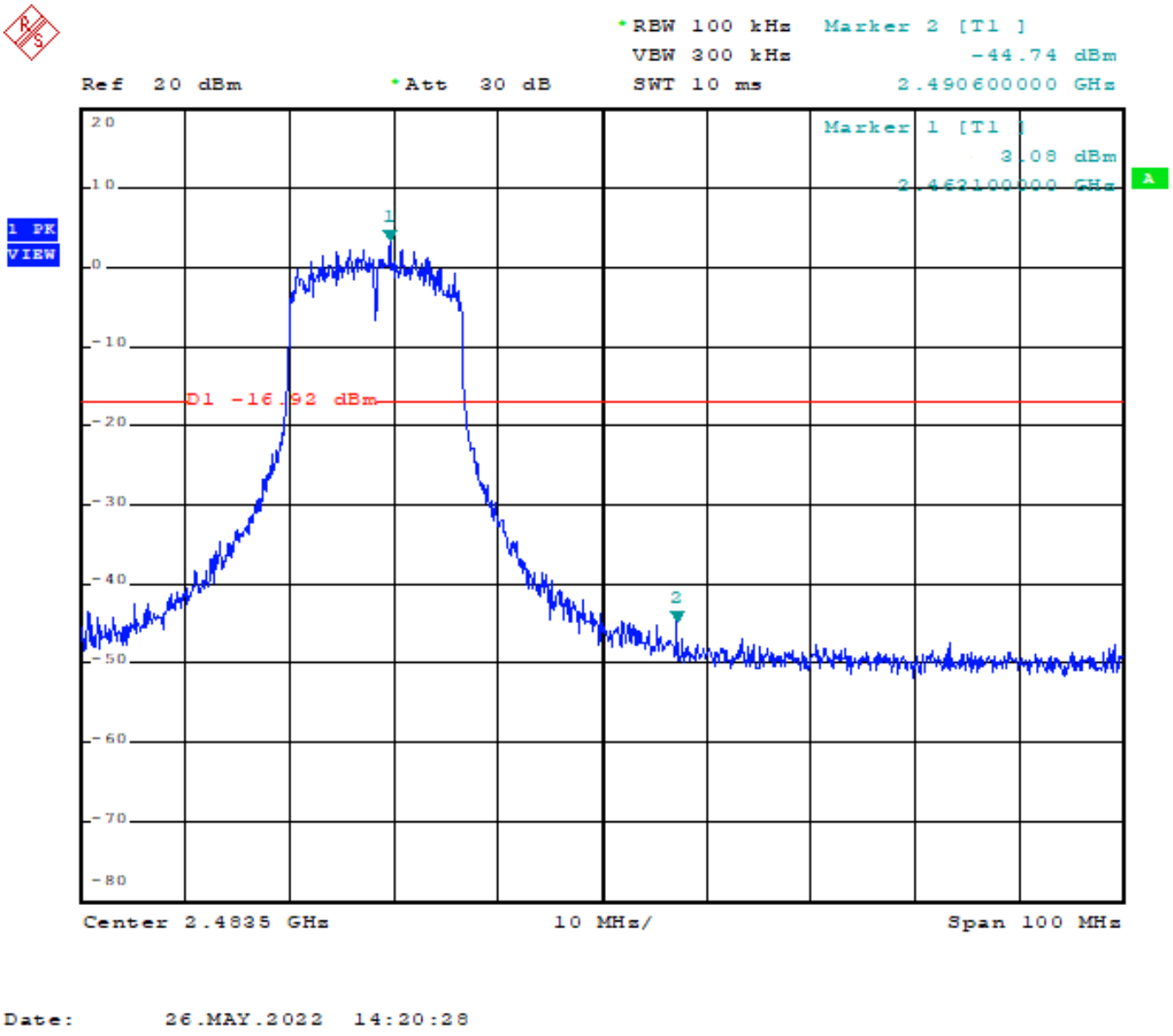
Modulation Standard: 802.11b (11Mbps)
Channel: 11



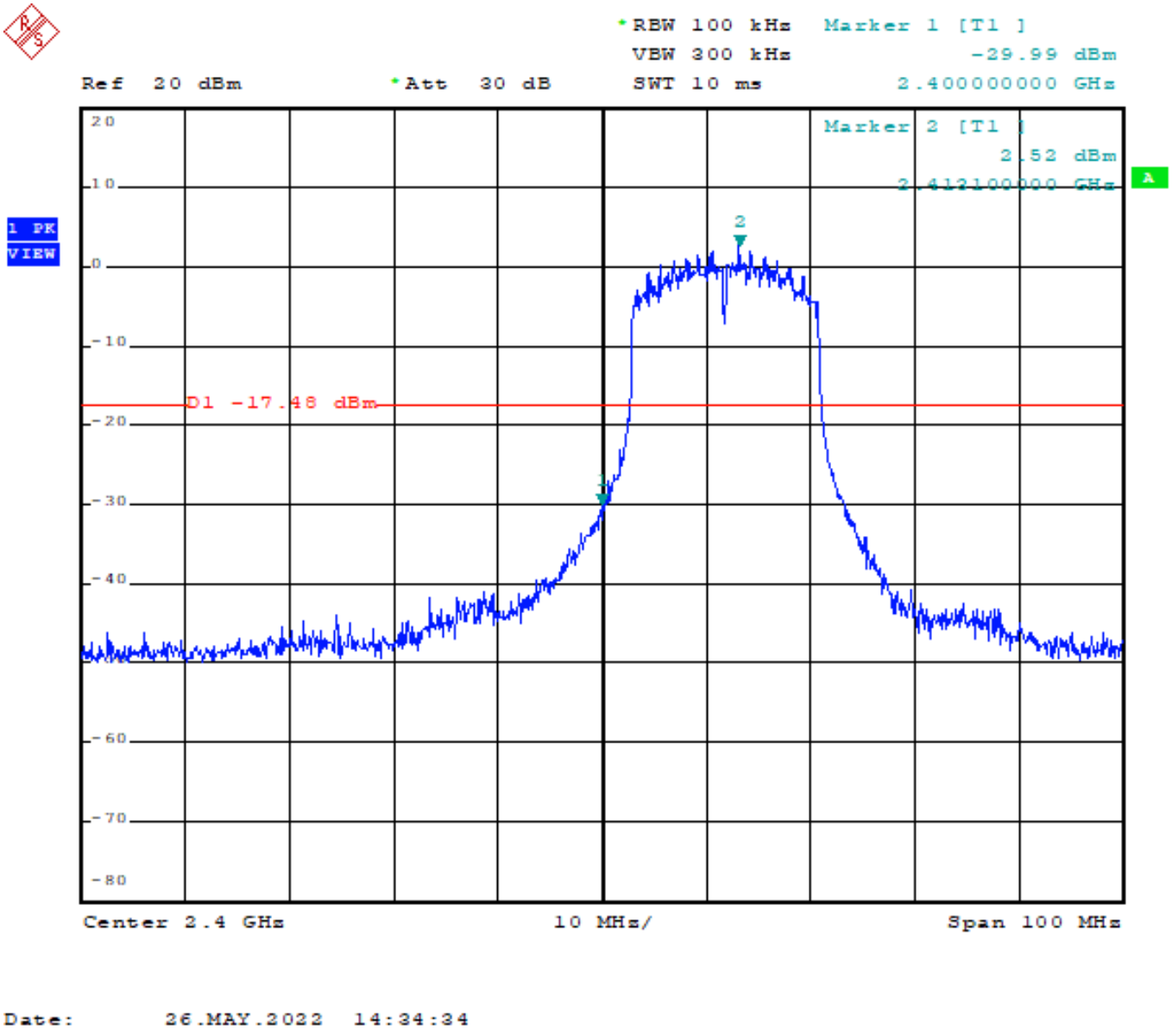
Modulation Standard: 802.11g (6Mbps)
Channel: 01



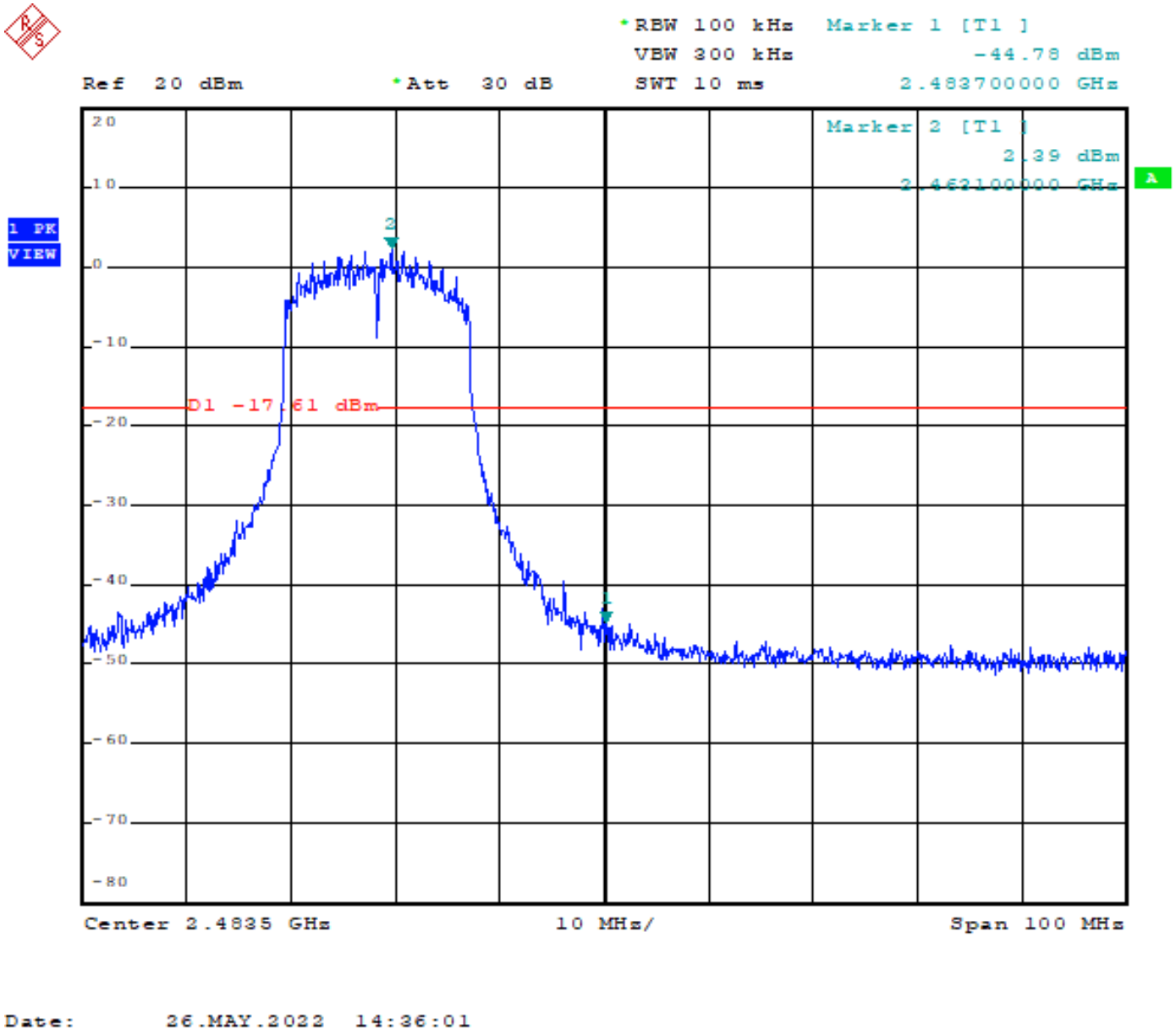
Modulation Standard: 802.11g (6Mbps)
Channel: 11



Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 01

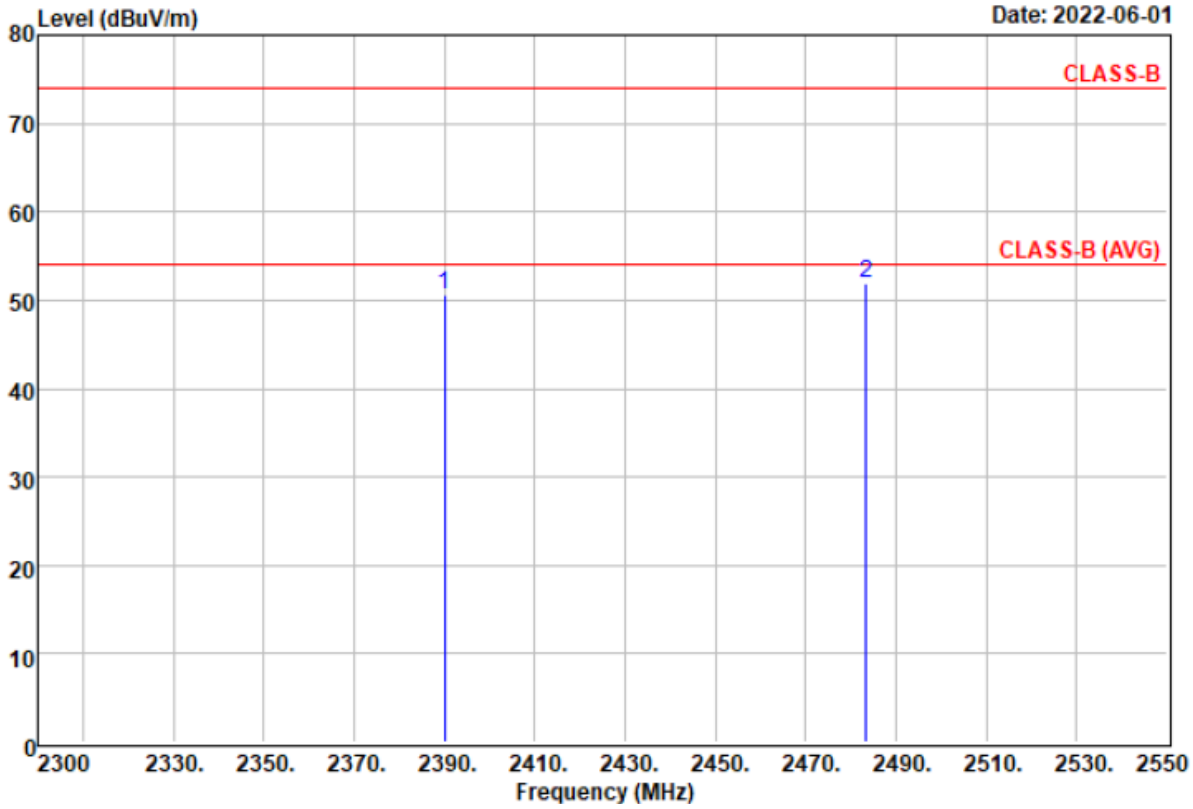


Modulation Standard: 802.11n HT20 (6.5Mbps)
Channel: 11



11.5 Restrict Band Emission Measurement Data
IEEE 802.11b

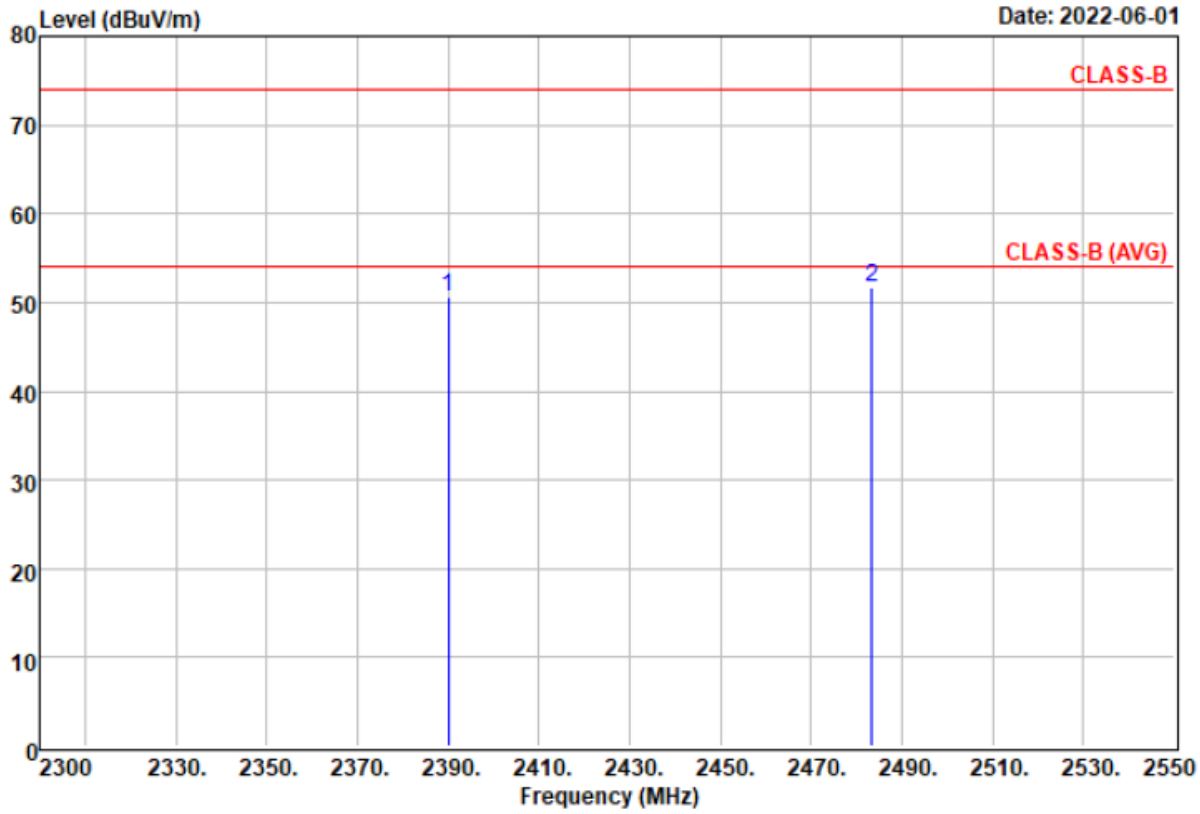
Power	:	AC 110V	Pol/Phase	:	Horizontal
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	60.41	-9.78	50.63	74.00	-23.37	Peak
2 @	2483.500	61.13	-9.24	51.89	74.00	-22.11	Peak

Power	:	AC 110V	Pol/Phase	:	Vertical
Humidity	:	70 %	Temperature	:	31 ˚C

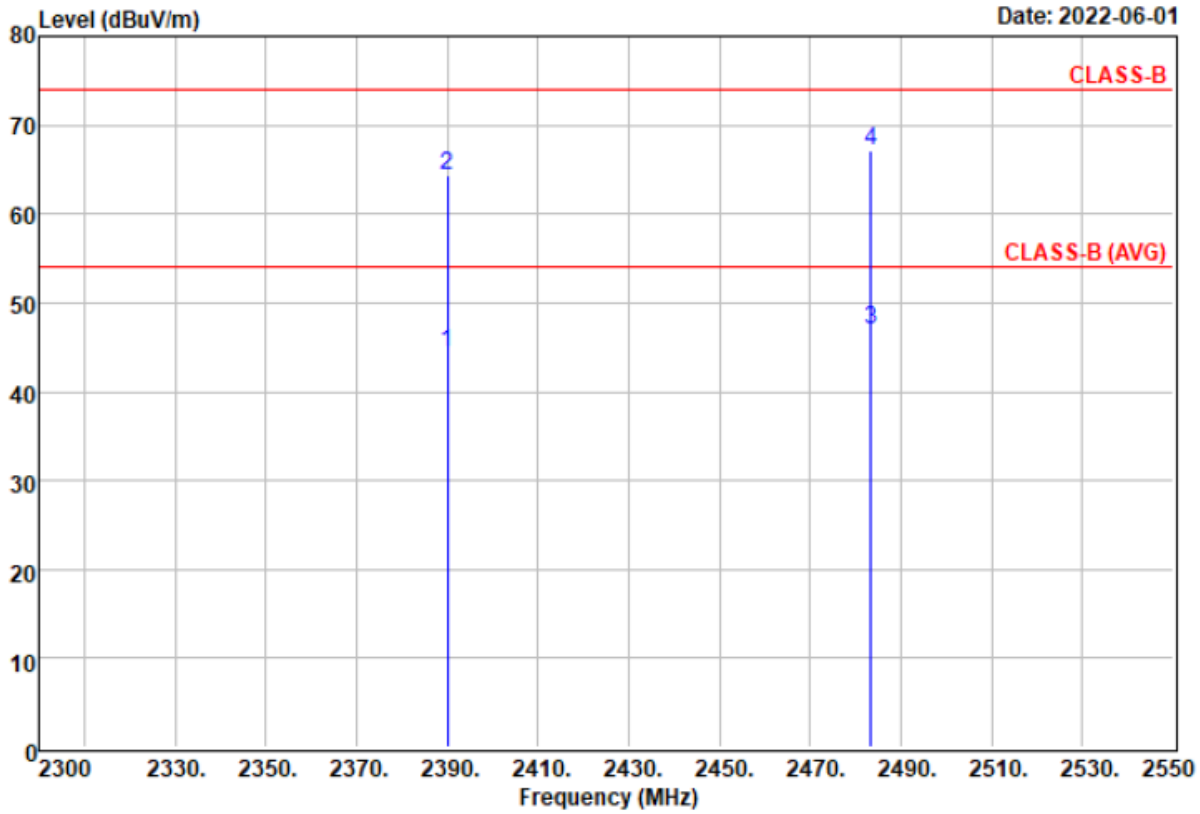


Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	60.33	-9.78	50.55	74.00	-23.45	Peak
2 @	2483.500	61.01	-9.24	51.77	74.00	-22.23	Peak

IEEE 802.11g

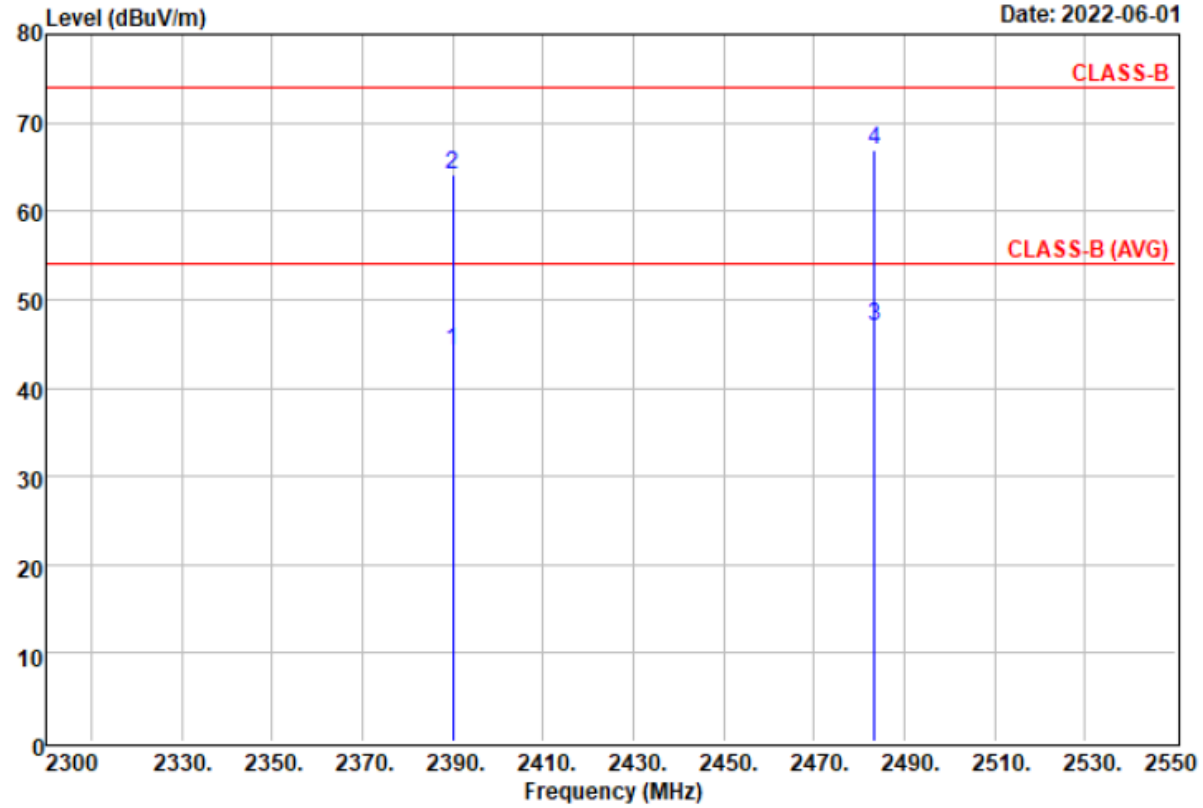
Power	:	AC 110V	Pol/Phase	:	Horizontal
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	54.11	-9.78	44.33	54.00	-9.67	Average
2	2390.000	74.15	-9.78	64.37	74.00	-9.63	Peak
3	2483.500	56.29	-9.24	47.05	54.00	-6.95	Average
4 @	2483.500	76.34	-9.24	67.10	74.00	-6.90	Peak

Power	:	AC 110V	Pol/Phase	:	Vertical
Humidity	:	70 %	Temperature	:	31 ˚C

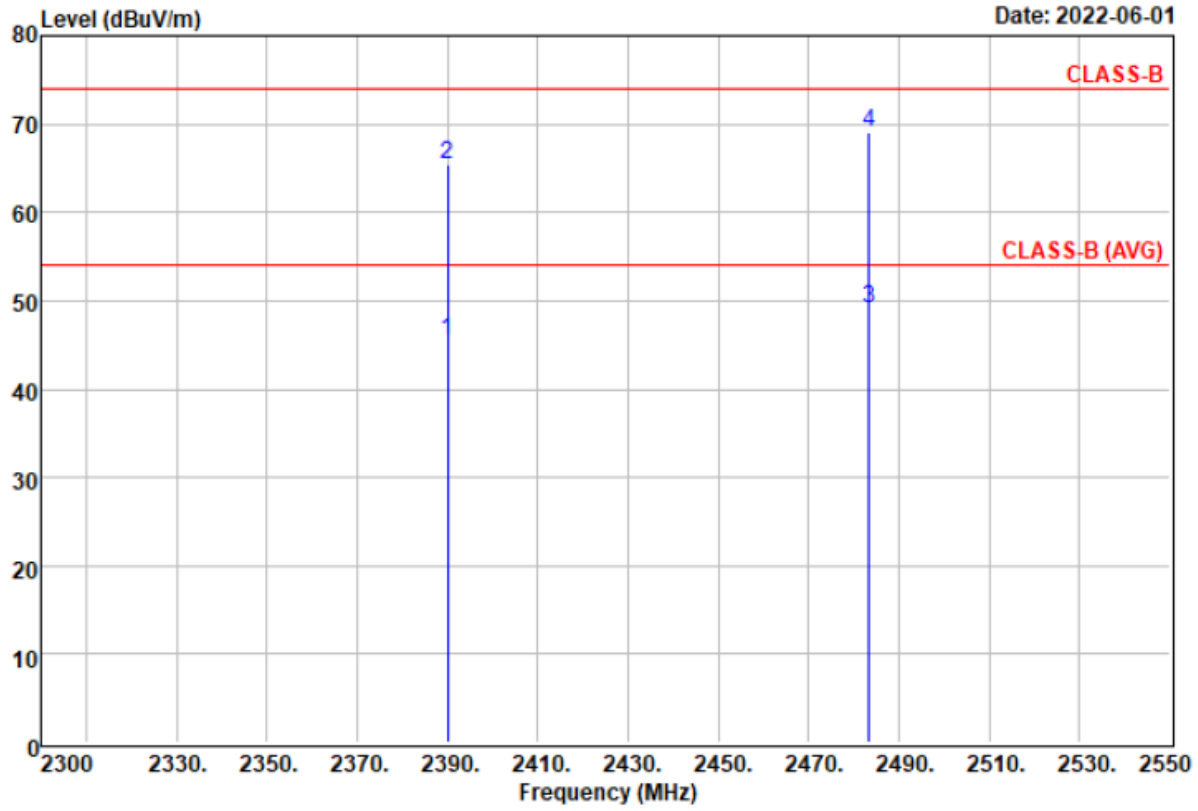


Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	53.97	-9.78	44.19	54.00	-9.81	Average
2	2390.000	74.00	-9.78	64.22	74.00	-9.78	Peak
3	2483.500	56.16	-9.24	46.92	54.00	-7.08	Average
4 @	2483.500	76.19	-9.24	66.95	74.00	-7.05	Peak

IEEE 802.11n HT20

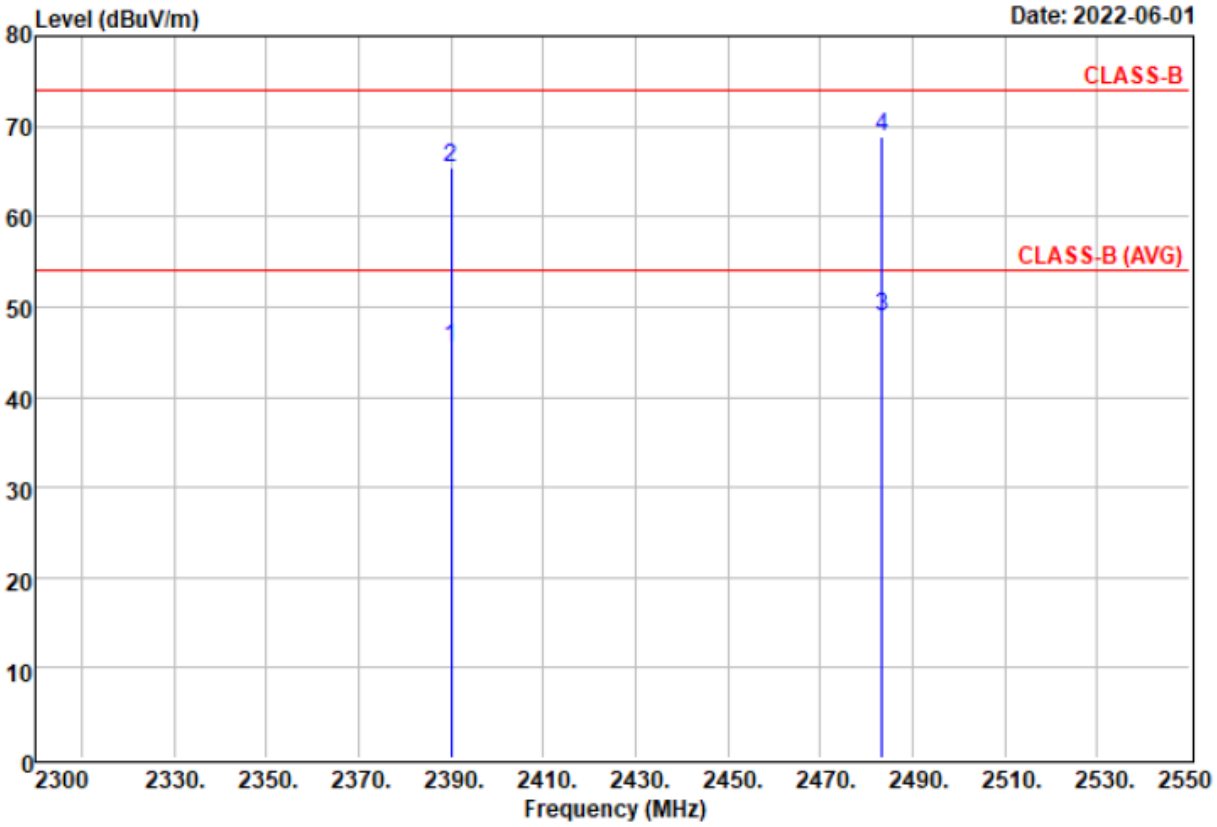
Power	:	AC 110V	Pol/Phase	:	Horizontal
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	55.25	-9.78	45.47	54.00	-8.53	Average
2	2390.000	75.29	-9.78	65.51	74.00	-8.49	Peak
3	2483.500	58.25	-9.24	49.01	54.00	-4.99	Average
4 @	2483.500	78.27	-9.24	69.03	74.00	-4.97	Peak

Power	:	AC 110V	Pol/Phase	:	Vertical
Humidity	:	70 %	Temperature	:	31 ˚C



Remarks : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor-Cable loss-
: Amplifier Factor

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	
1	2390.000	55.19	-9.78	45.41	54.00	-8.59	Average
2	2390.000	75.22	-9.78	65.44	74.00	-8.56	Peak
3	2483.500	58.16	-9.24	48.92	54.00	-5.08	Average
4 @	2483.500	78.18	-9.24	68.94	74.00	-5.06	Peak

12. Restricted Bands of Operation

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

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

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

12.1 Labeling Requirement

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