



Shenzhen Huaxin Information Technology Service Co., Ltd

FCC TEST REPORT

On Behalf of

FCC ID.:2BF7Y-VBM002R

Shenzhen Umbra Technology Co., Ltd.

Jartoo Baby Monitor

Model No.: JT-VBM002

Prepared for : Shenzhen Umbra Technology Co., Ltd.
Address : Room 702,Building 11,Tianan Yungu Industrial Park, Longgang
District, Shenzhen.

Prepared By : Shenzhen Huaxin Information Technology Service Co., Ltd
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Report Number : HX240514R001
Date of Receipt : Apr 26th,2024
Date of Test : Apr 27th,2024 ~ May 14th,2024
Date of Report : May 14th, 2024
Version Number : V0



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TEST REPORT DECLARATION

Applicant : Shenzhen Umbra Technology Co., Ltd.
 Address : Room 702,Building 11,Tianan Yungu Industrial Park, Longgang District, Shenzhen.
 Manufacturer : Shenzhen Umbra Technology Co., Ltd.
 Address : Room 702,Building 11,Tianan Yungu Industrial Park, Longgang District, Shenzhen.
 EUT Description : Jartoo Baby Monitor
 (A) Model No. : JT-VBM002
 (B) Trademark : Jartoo

Measurement Standard Used:

FCC Part 15: 2021 Subpart C 15.247

ANSI C63.10-2013

The device described above is tested by Shenzhen Huaxin Information Technology Service Co., Ltd. to determine the maximum emission levels emanating from the device. The test results are contained in this test report and Shenzhen Huaxin Information Technology Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Huaxin Information Technology Service Co., Ltd.

Tested by (name + signature).....: Eason Tan
 Project Engineer

Approved by (name + signature).....: Michael Wu
 Project Manager

Date of issue..... : May 14th, 2024





Revision History

Revision	Issue Date	Revisions	Revised By
V0	May 14th, 2024	Initial released Issue	Eason Tan



1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247, Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247 (a)(2)	6dB Bandwidth	PASS	--
15.247 (b)(3)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e)	Power Spectral Density	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

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

(2) According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.



1.1 TEST FACTORY

Company Name:	Shenzhen Huaxin Information Technology Service Co., Ltd
Address:	101, R & D Building, No.3 guansheng 4th Road, Luhuhu Community · Guanhu Street, Longhua District, Shenzhen, Guangdong, China
Telephone:	0775-21018313
Fax:	0775-21018313
FCC Test Firm Registration Number: 932271 Designation Number: CN1344 CAB ID : CN0147	

1.2 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** %.

Item	MU	Remark
Conducted Emission (9K ~ 0.15MHz)	2.18dB	
Conducted Emission (0.15M ~ 30MHz)	2.17dB	
Radiation Emission ,3m (30MHz ~ 1GHz)	4.45 dB	Polarize: V
	2.76 dB	Polarize: H
Radiation Emission, 3m (1GHz ~ 6GHz)	4.02 dB	
Radiation Emission ,3m (6GHz ~ 18GHz)	4.30 dB	
RF output power (conducted)	0.41 dB	
Power Spectral Density (conducted)	0.39 dB	
Spurious emissions (conducted)	0.59 dB	
Occupied Channel Bandwidth (conducted)	4.22%	



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Characteristics	Description
Product Name	Jartoo Baby Monitor
Model number	JT-VBM002
IEEE 802.11 WLAN Mode Supported	802.11ah(2MHz channel bandwidth)
Data Rate	802.11ah:150Kbps,32.5Mbps;
Modulation	OFDM with BPSK/QPSK/16QAM/64QAM
Operating Frequency Range	905-925MHz for 802.11ah(2MHz channel bandwidth);
Number of Channels	5 Channels for 802.11ah(2MHz channel bandwidth);
Transmit Power Max	802.11ah(2MHz channel bandwidth):27.97 dBm
Antenna:	External Antenna
Antenna Gain:	2.15 dBi
Test Voltage:	DC 5V 2A
Temperature Range	0°C ~ +40 ° C

Note:

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



2. Test Frequency and channel for 802.11ah(2MHz channel bandwidth):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	905	5	913	9	921
3	909	7	917		

Note:

The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.



2.2 DESCRIPTION OF THE TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11ah:150Kbps,32.5Mbps) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list for 802.11ah(2MHz channel bandwidth):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	905	9	921
3	909	/	/
5	913	/	/
7	917	/	/

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.



2.3 ACCESSORIES OF DEVICE (EUT)

Accessories	:	AC Power Adapter
Manufacturer	:	TEKA
Model	:	TEKA-UCA20US
Input	:	100-240V~50/60Hz 0.35A MAX
Output	:	5.0V-2.0A

2.4 TESTED SUPPORTING SYSTEM DETAILS

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1	Laptop	Lenovo	ThinkPad E460	/	/

2.5 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test software version:	SecureCRT
power level	20



2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Equipment	Manufacturer	Model No.	Firmware version	Serial No.	Last cal.	Cal. Due day
9*6*6 anechoic chamber	Mao Rui	9*6*6m	/	N/A	2022.06.15	2025.06.14
EMI receiver	R&S	ESR7	5.812	102543	2024.04.14	2025.04.15
Spectrum analyzer	R&S	FSV40-N	V7.0-4-62	101795	2024.04.14	2025.04.15
Pre-amplifier	HP	8447D	/	1616A02061	2024.04.14	2025.04.15
Pre-amplifier	Agilent	8449B	/	9008A00551	2024.04.14	2025.04.15
Bilog Antenna	Schwarzbeck	VULB 9168	/	/	2024.04.14	2025.04.15
Horn antenna	A.H. System, Inc	SAS-571	/	915	2024.04.14	2025.04.15
Loop Antenna	Schwarzbeck	FMZB 1519B	/	/	2024.04.14	2025.04.15
LISN	R&S	ENV216		101291	2024.04.14	2025.04.15
LISN	R&S	ESH3-Z5		894981/024	2024.04.14	2025.04.15
Analog signal Generato	Agilent	N5181A	A.01.87	MY47421151	2024.04.14	2025.04.15
Vector Signal Generator	Keysight	N5182A	A.01.87	MY50140428	2024.04.14	2025.04.15
Wideband Radio communication tester	R&S	CMW500	V3.7.22	157762	2024.04.14	2025.04.15
Spectrum analyzer	Agilent	N9020A	A.14.16	MY51280803	2024.04.14	2025.04.15
RF Cable	/	(10G)9m	/	/	2024.04.14	2025.04.15
RF Cable	/	(10G)10m	/	/	2024.04.14	2025.04.15
RF Cable	/	(18G)10m	/	/	2024.04.14	2025.04.15
attenuation pad	/	6dB	/	/	2024.04.14	2025.04.15
attenuation pad	/	10dB	/	16280012	2024.04.14	2025.04.15
RF Control Unit	Tehcy	TR1029-1	/	20220428C009	2024.04.14	2025.04.15

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EMC-I	SKET	V1.4.0.1
CE	EMC-I	SKET	V1.4.0.1
RF-CE	RF Test Software	TACHOY	V1.0.0



3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 – 56 *	56 – 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

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.

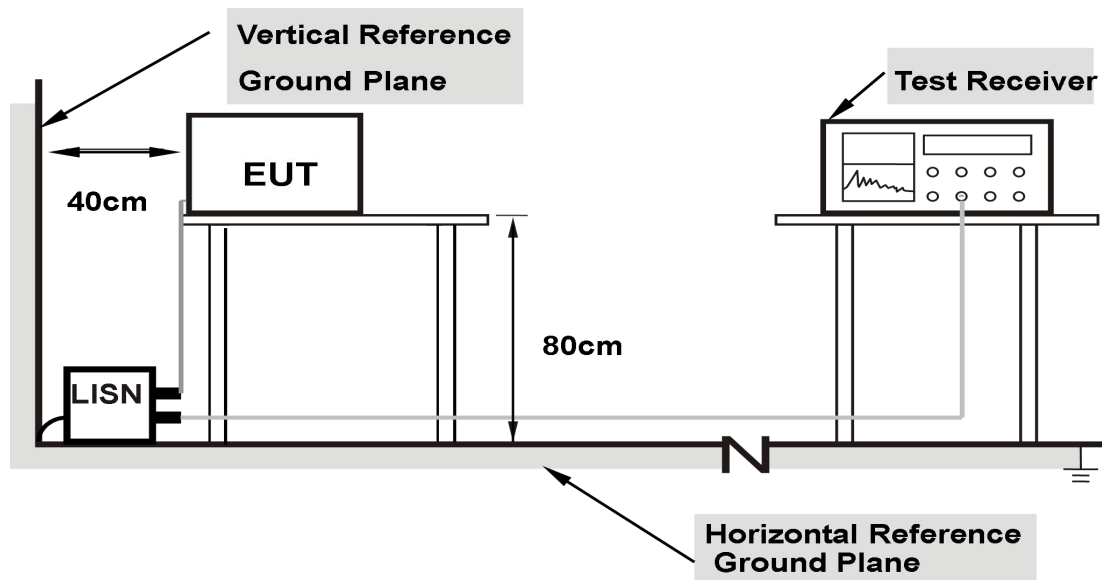
The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

- a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. 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.
- c. 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.
- d. LISN is at least 80 cm from the nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 TEST SETUP



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

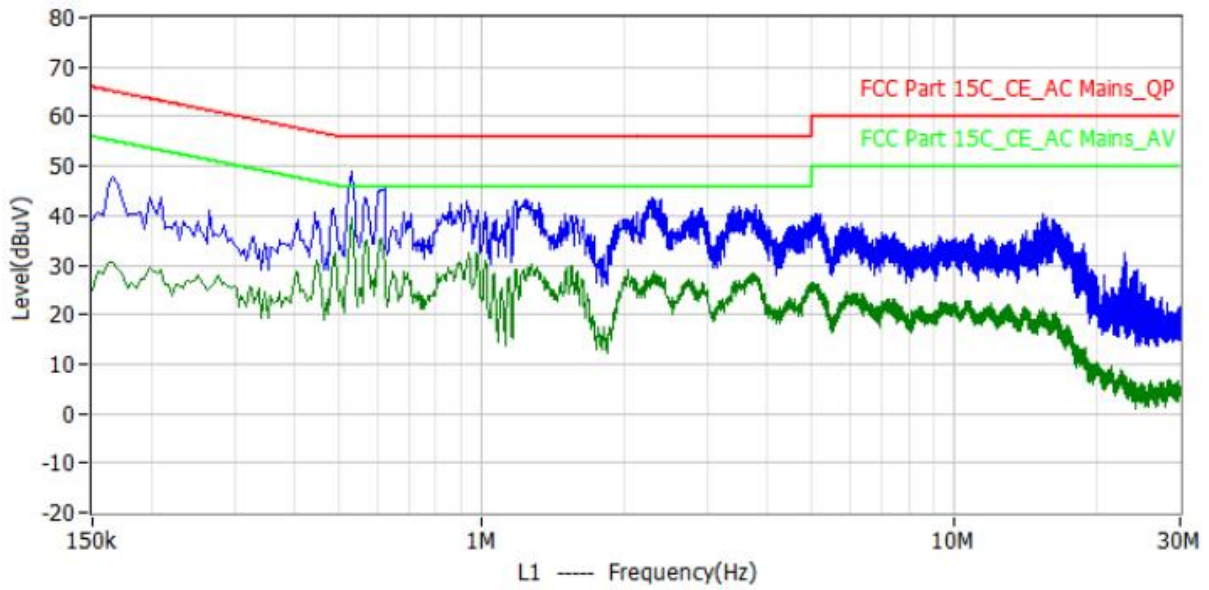
- 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes support units.**

3.1.4 EUT OPERATING CONDITIONS

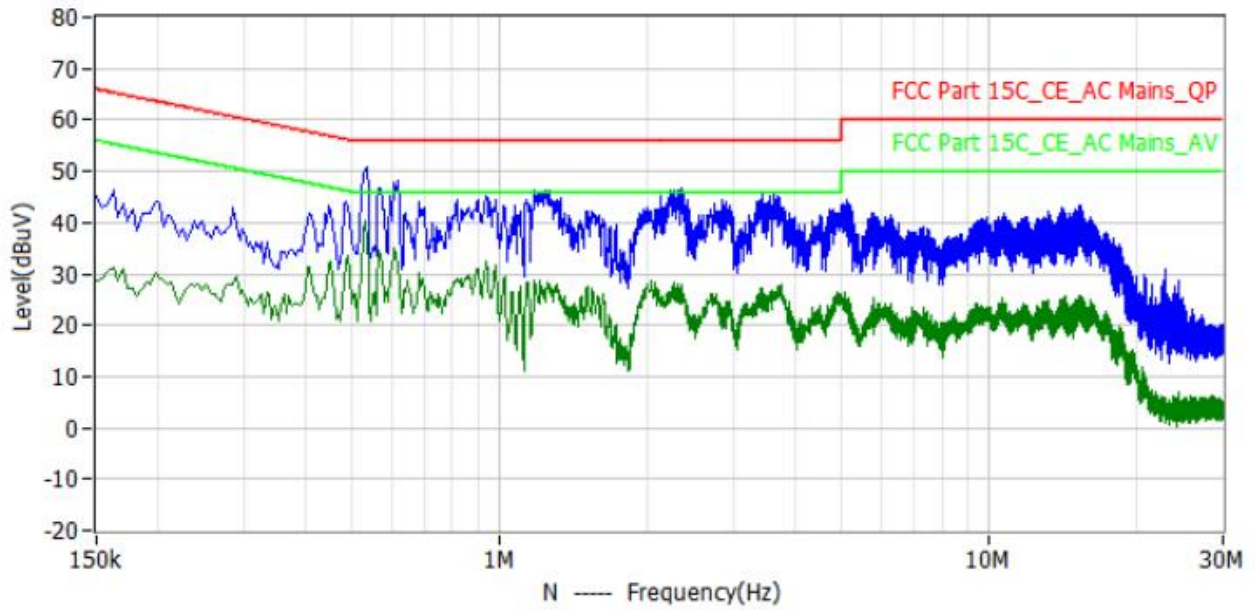
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



3.1.5 TEST RESULT



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector	Polar
1*	530.000kHz	39.4	9.6	49.0	56.0	-7.0	QP	L1
2*	2.290MHz	33.8	9.7	43.5	56.0	-12.5	QP	L1
3*	1.178MHz	33.2	9.8	43.0	56.0	-13.0	QP	L1
4*	166.000kHz	38.0	9.6	47.6	65.2	-17.5	QP	L1
5*	5.122MHz	30.6	9.8	40.4	60.0	-19.6	QP	L1
6*	15.402MHz	30.0	10.3	40.3	60.0	-19.7	QP	L1
7*	530.000kHz	29.8	9.6	39.4	46.0	-6.6	AV	L1
8*	938.000kHz	22.7	9.9	32.6	46.0	-13.4	AV	L1
9*	2.034MHz	19.3	9.6	28.9	46.0	-17.1	AV	L1
10*	4.982MHz	16.6	9.8	26.4	46.0	-19.6	AV	L1
11*	166.000kHz	21.0	9.6	30.6	55.2	-24.6	AV	L1
12*	15.406MHz	10.7	10.3	21.0	50.0	-29.0	AV	L1



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector	Polar
1*	534.000kHz	41.1	9.7	50.8	56.0	-5.2	QP	N
2*	2.350MHz	36.9	9.6	46.5	56.0	-9.5	QP	N
3*	1.178MHz	36.5	9.6	46.1	56.0	-9.9	QP	N
4*	5.118MHz	34.6	9.9	44.5	60.0	-15.5	QP	N
5*	15.266MHz	33.1	10.3	43.4	60.0	-16.6	QP	N
6*	162.000kHz	36.3	9.9	46.2	65.4	-19.1	QP	N
7*	530.000kHz	30.5	9.7	40.2	46.0	-5.8	AV	N
8*	3.770MHz	18.2	9.8	28.0	46.0	-18.0	AV	N
9*	1.506MHz	17.8	9.6	27.4	46.0	-18.6	AV	N
10*	170.000kHz	21.0	9.9	30.9	55.0	-24.0	AV	N
11*	15.354MHz	15.6	10.3	25.9	50.0	-24.1	AV	N
12*	10.610MHz	15.4	9.9	25.3	50.0	-24.7	AV	N



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (micovolts/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 (1000MHz-25GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			



For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)



3.2.2 TEST PROCEDURE

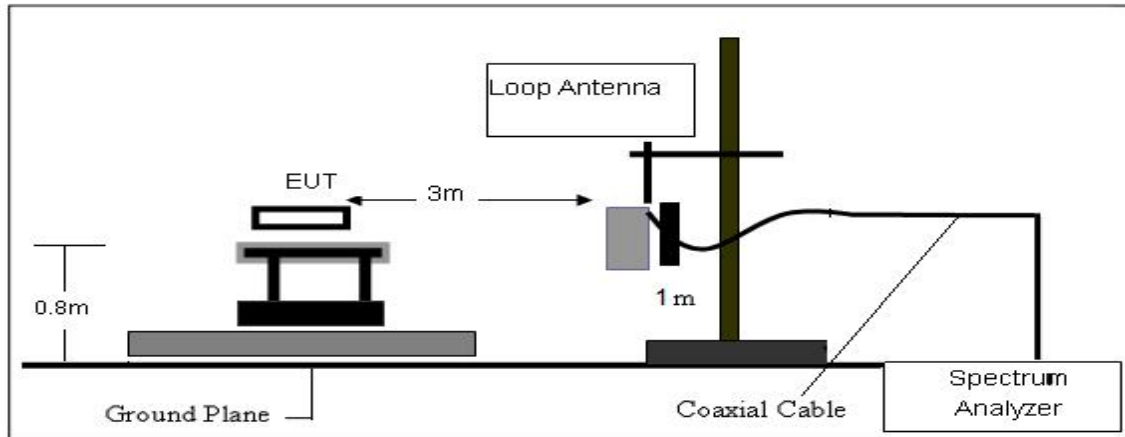
- a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
- d. 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 QuasiPeak detector mode will be re-measured.
- e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

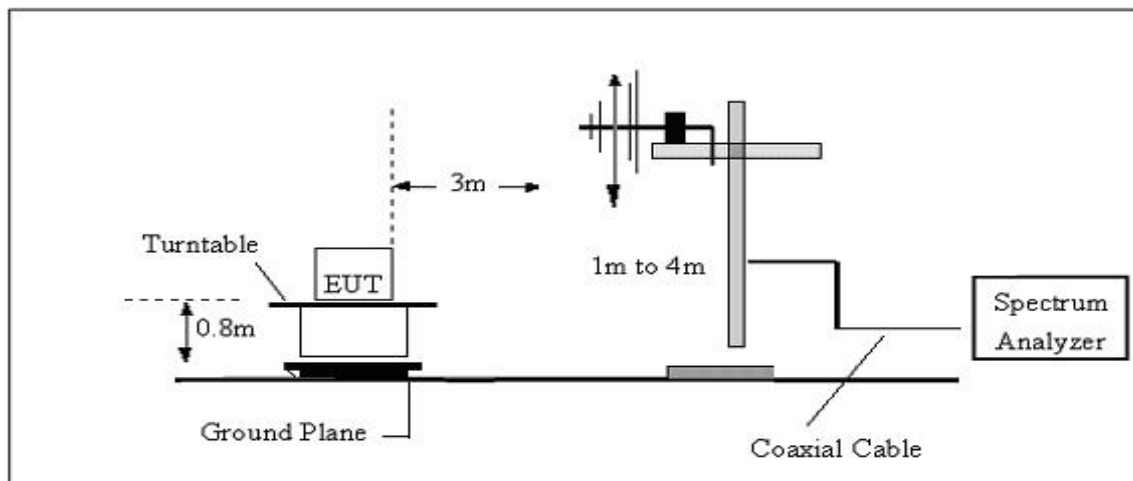
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 TEST SETUP

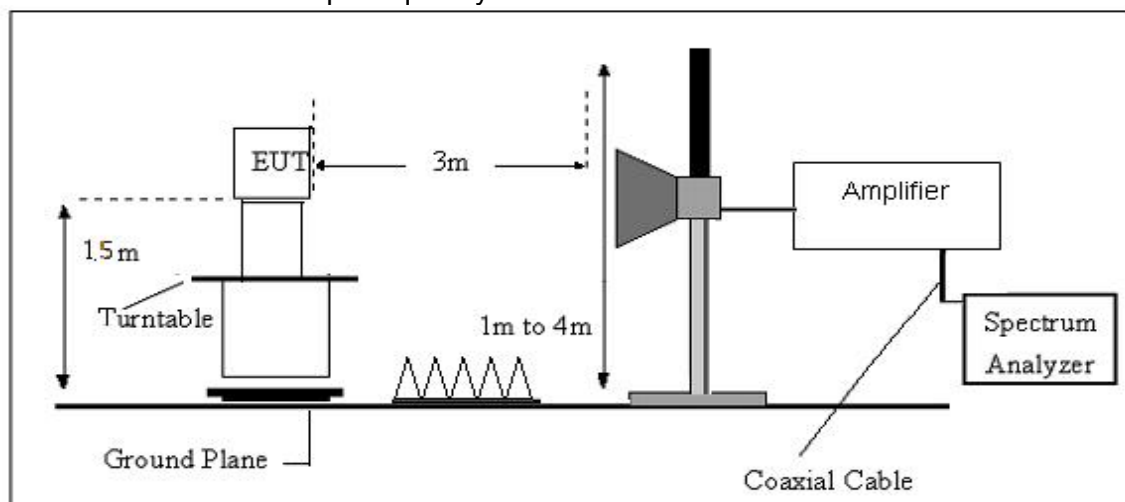
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



3.2.5 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

3.2.6 TEST RESULT

We have scanned the 10th harmonic from 9KHz to the EUT' s highest frequency.

From 9KHz to 30MHz Conclusion: PASS

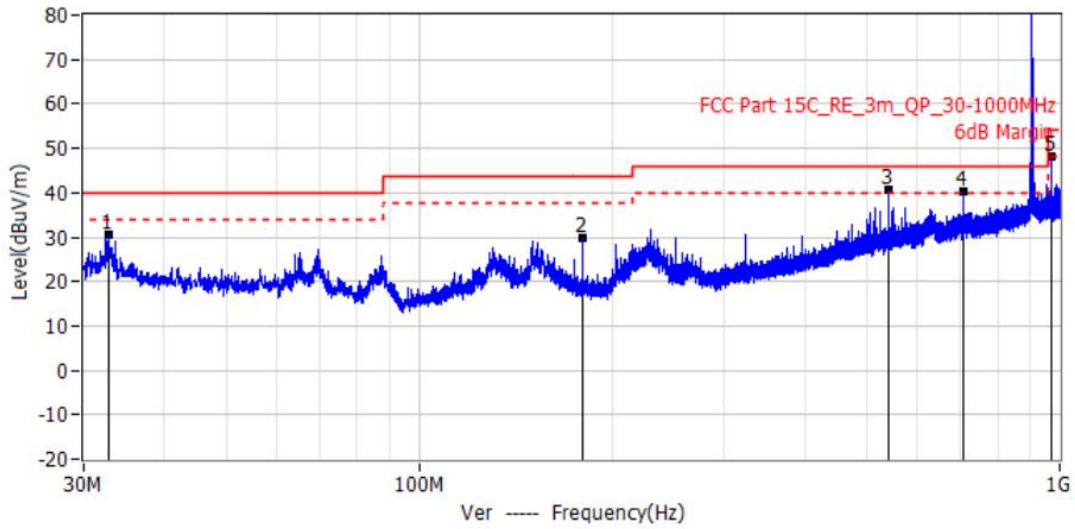
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

30M-1G Remark: All modes have been tested, and only worst data of 802.11 ah mode, Channel 921MHz was listed in this report.

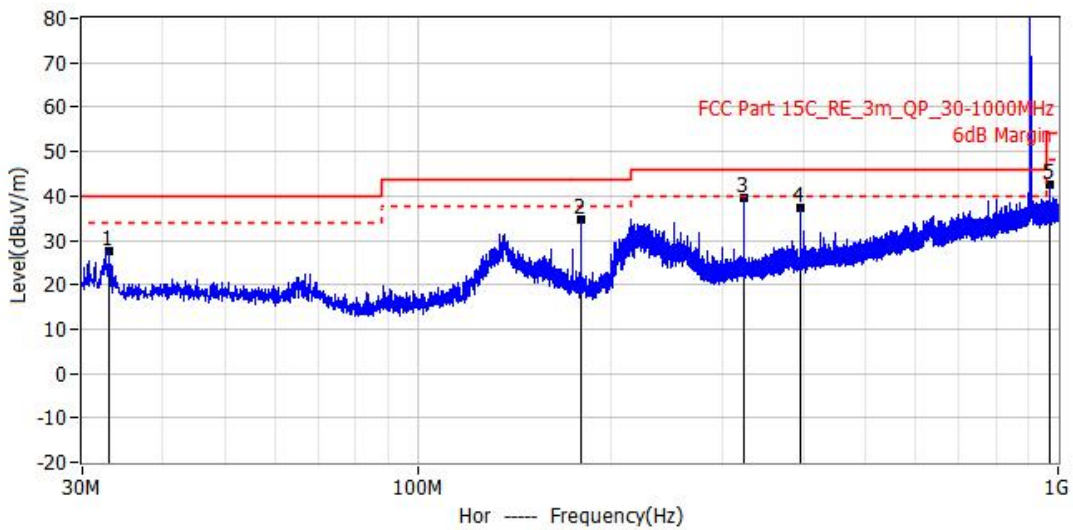
1-25G Remark: All modes have been tested, and only worst data of 802.11 ah mode, was listed in this report.



From 30M-1GHz:



No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Delta dB	Detector	Polar	Height cm	Angle deg
1*	32.820MHz	17.3	13.3	30.6	40.0	-9.4	QP	Ver	100.0	281.0
2*	180.000MHz	17.6	12.4	30.0	43.5	-13.5	QP	Ver	100.0	239.0
3*	540.000MHz	19.1	21.6	40.7	46.0	-5.3	QP	Ver	100.0	6.0
4*	705.240MHz	15.5	24.7	40.2	46.0	-5.8	QP	Ver	100.0	334.0
5*	968.280MHz	19.8	28.4	48.2	54.0	-5.8	QP	Ver	100.0	356.0



No.	Frequency	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Delta dB	Detector	Polar	Height cm	Angle deg
1*	33.060MHz	14.3	13.3	27.6	40.0	-12.4	QP	Hor	100.0	111.0
2*	180.000MHz	22.3	12.4	34.7	43.5	-8.8	QP	Hor	100.0	256.0
3*	324.000MHz	23.3	16.2	39.5	46.0	-6.5	QP	Hor	100.0	121.0
4*	396.000MHz	19.3	18.0	37.3	46.0	-8.7	QP	Hor	100.0	194.0
5*	969.300MHz	14.0	28.4	42.4	54.0	-11.6	QP	Hor	100.0	71.0



From 1G-25GHz:

Test mode: 802.11ah 2M

Frequency:

Channel 1:905MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
1808.00	V	54.63	32.16	74	54	-19.37	-21.84
2711.50	V	55.66	34.15	74	54	-18.34	-19.85
3614.00	V	54.62	30.62	74	54	-19.38	-23.38
1808.00	H	64.27	40.33	74	54	-9.73	-13.67
2711.50	H	61.38	35.28	74	54	-12.62	-18.72
3614.00	H	62.59	38.64	74	54	-11.41	-15.36

Test mode: 802.11ah 2M

Frequency:

Channel 5:913MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
1829.00	V	55.29	34.56	74	54	-18.71	-19.44
2745.50	V	53.46	31.29	74	54	-20.54	-22.71
3658.00	V	51.57	34.67	74	54	-22.43	-19.33
1829.00	H	62.39	41.47	74	54	-11.61	-12.53
2745.50	H	61.51	35.32	74	54	-12.49	-18.68
3658.00	H	60.12	30.62	74	54	-13.88	-23.38

Test mode: 802.11ah 2M

Frequency:

Channel 9:921MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
1854.00	V	57.14	35.55	74	54	-16.86	-18.45
2779.50	V	56.23	31.29	74	54	-17.77	-22.71
3705.00	V	53.24	30.64	74	54	-20.76	-23.36
1854.00	H	61.59	40.15	74	54	-12.41	-13.85
2779.50	H	60.93	38.59	74	54	-13.07	-15.41
3705.00	H	54.18	35.64	74	54	-19.82	-18.36



4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d), 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.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 905 MHz Upper Band Edge: 921 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

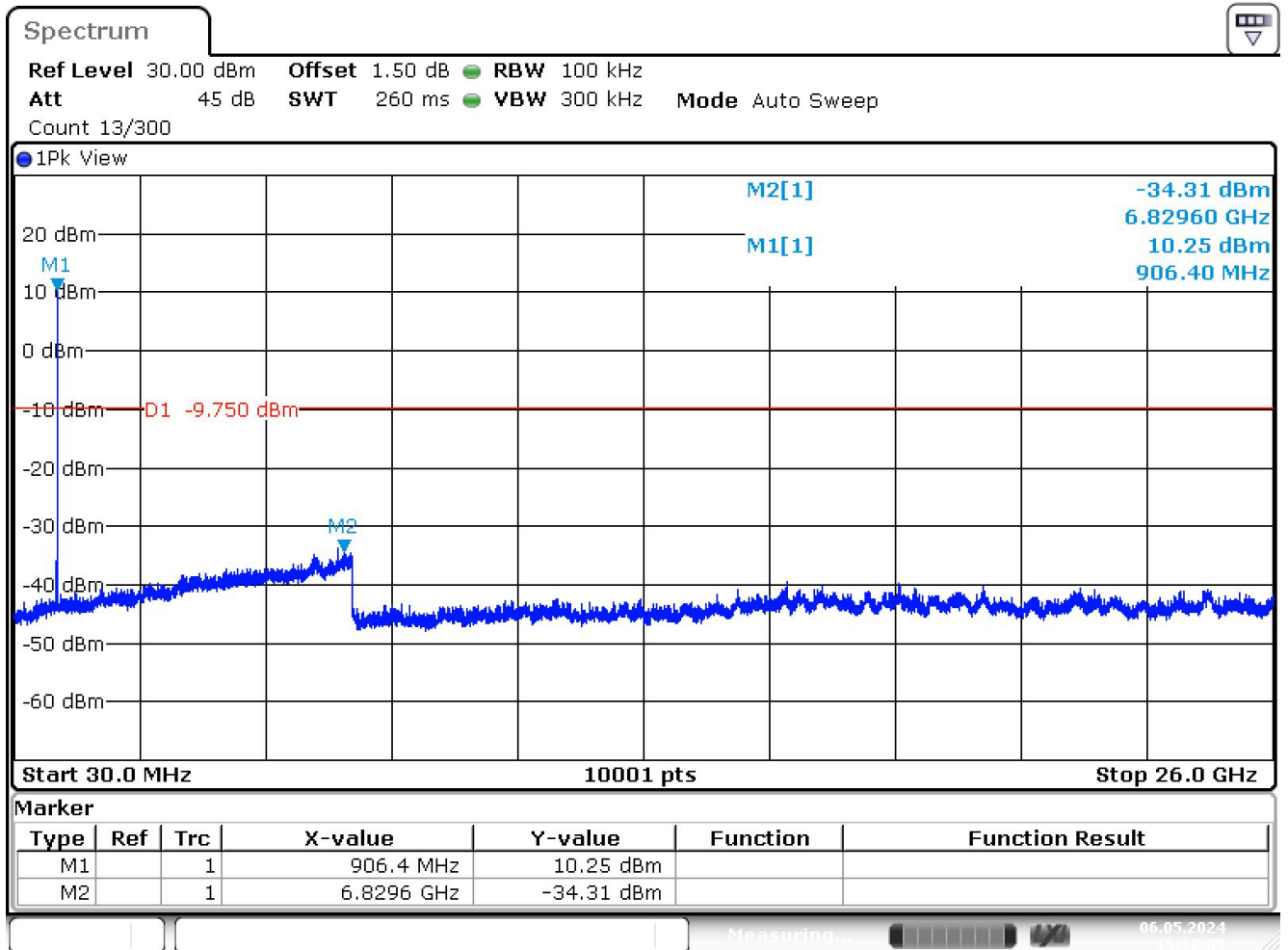
Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

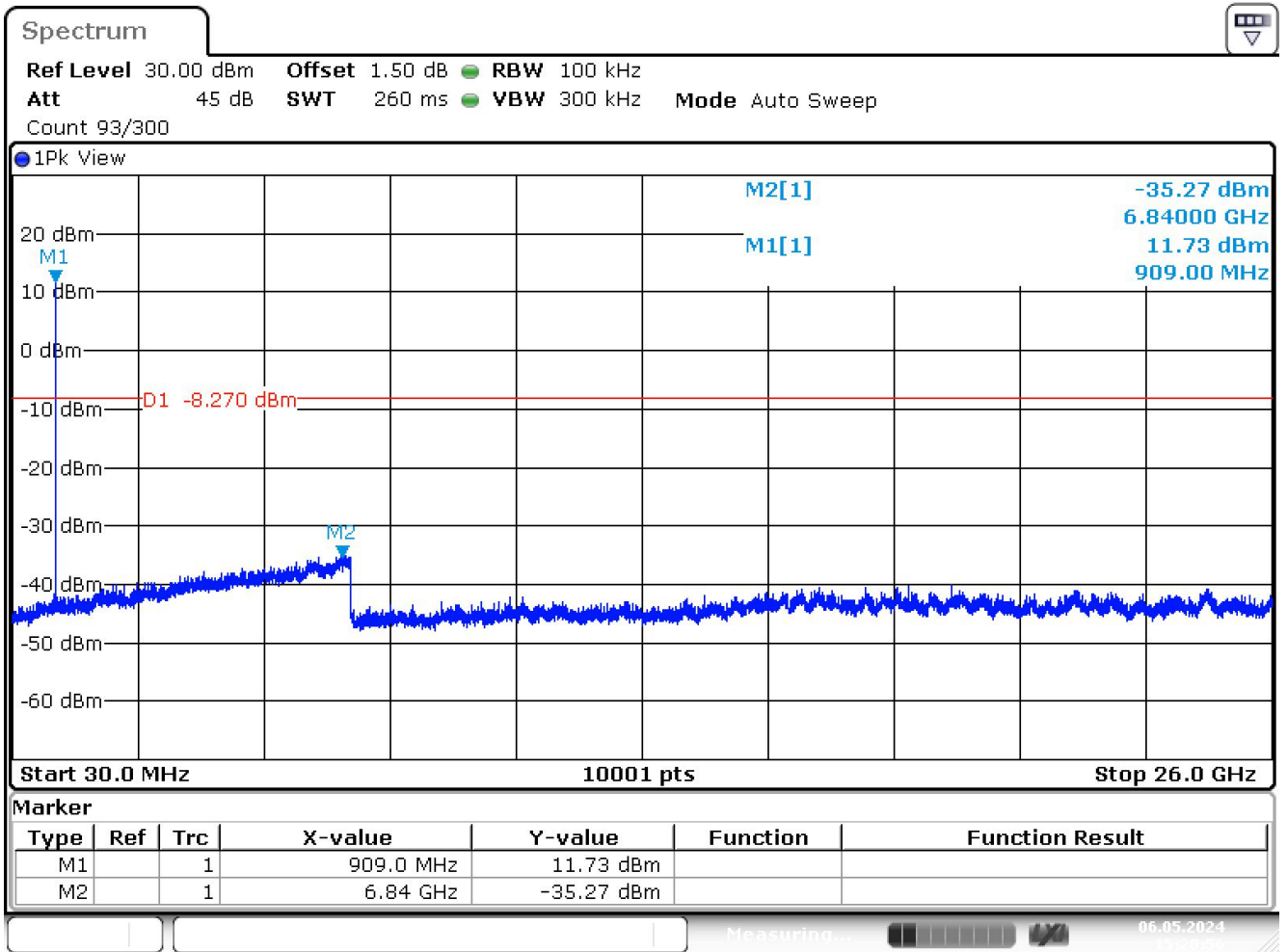


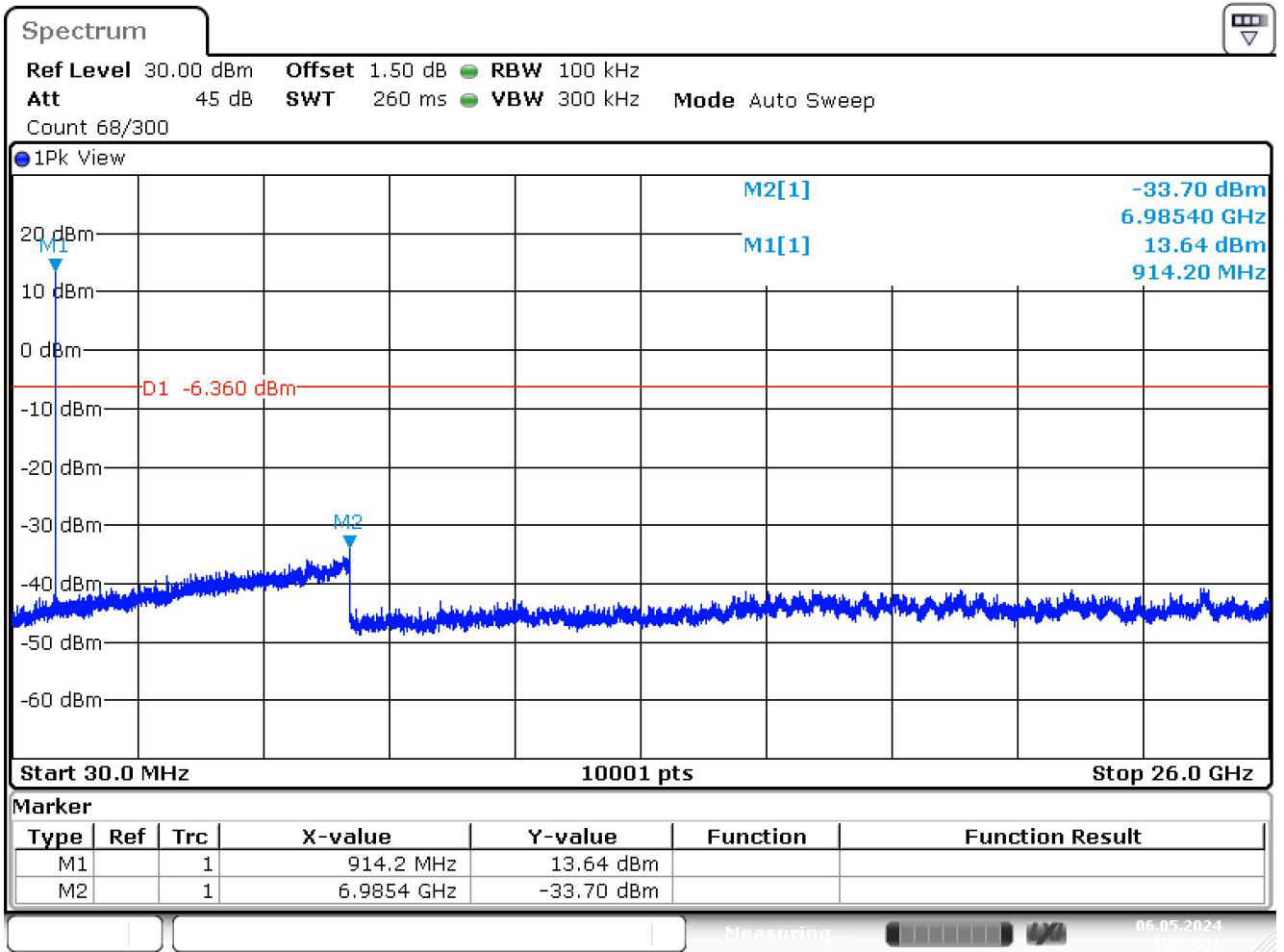
4.5 EUT OPERATION CONDITIONS

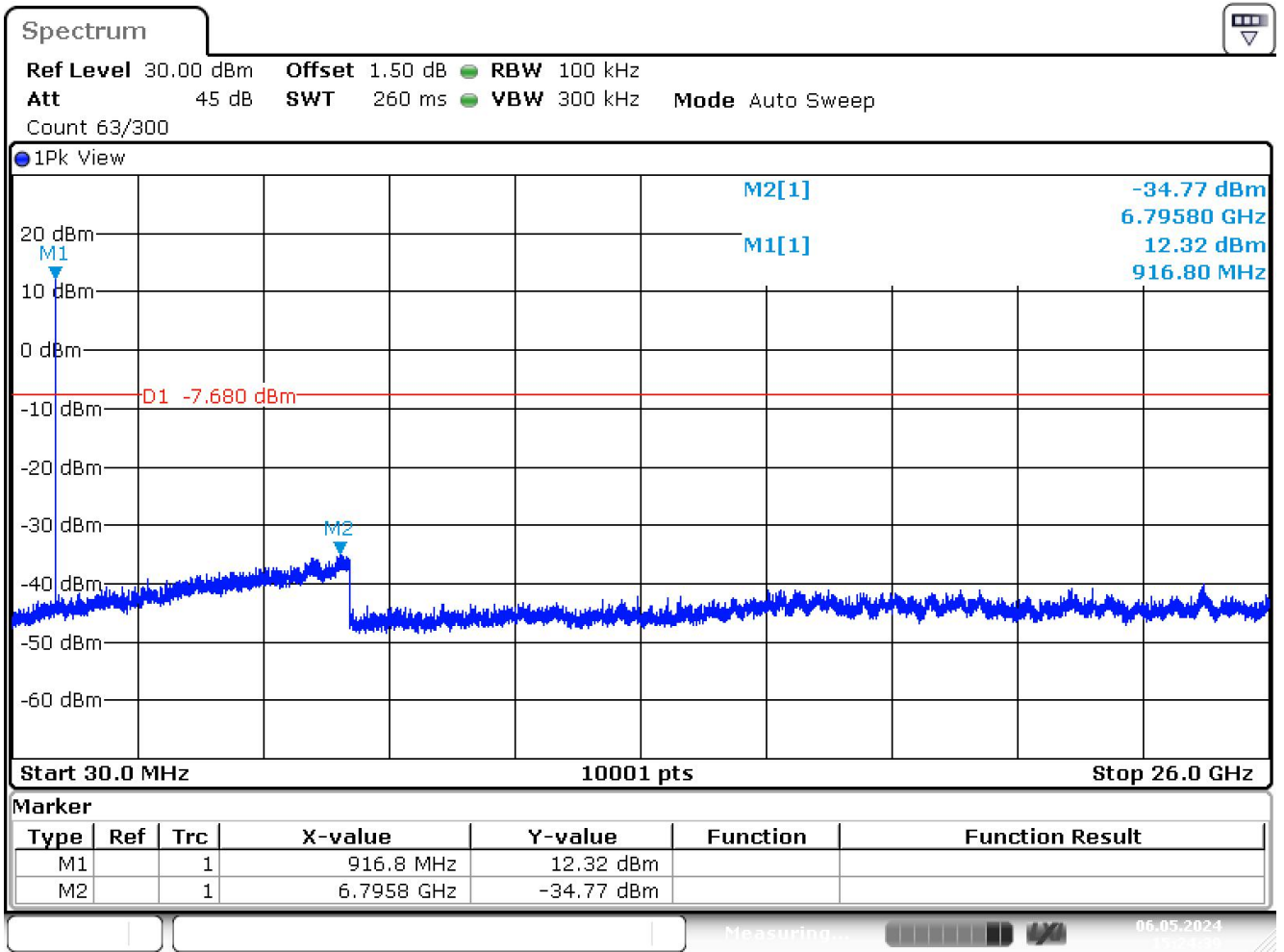
Please refer to section 3.1.4 of this report.

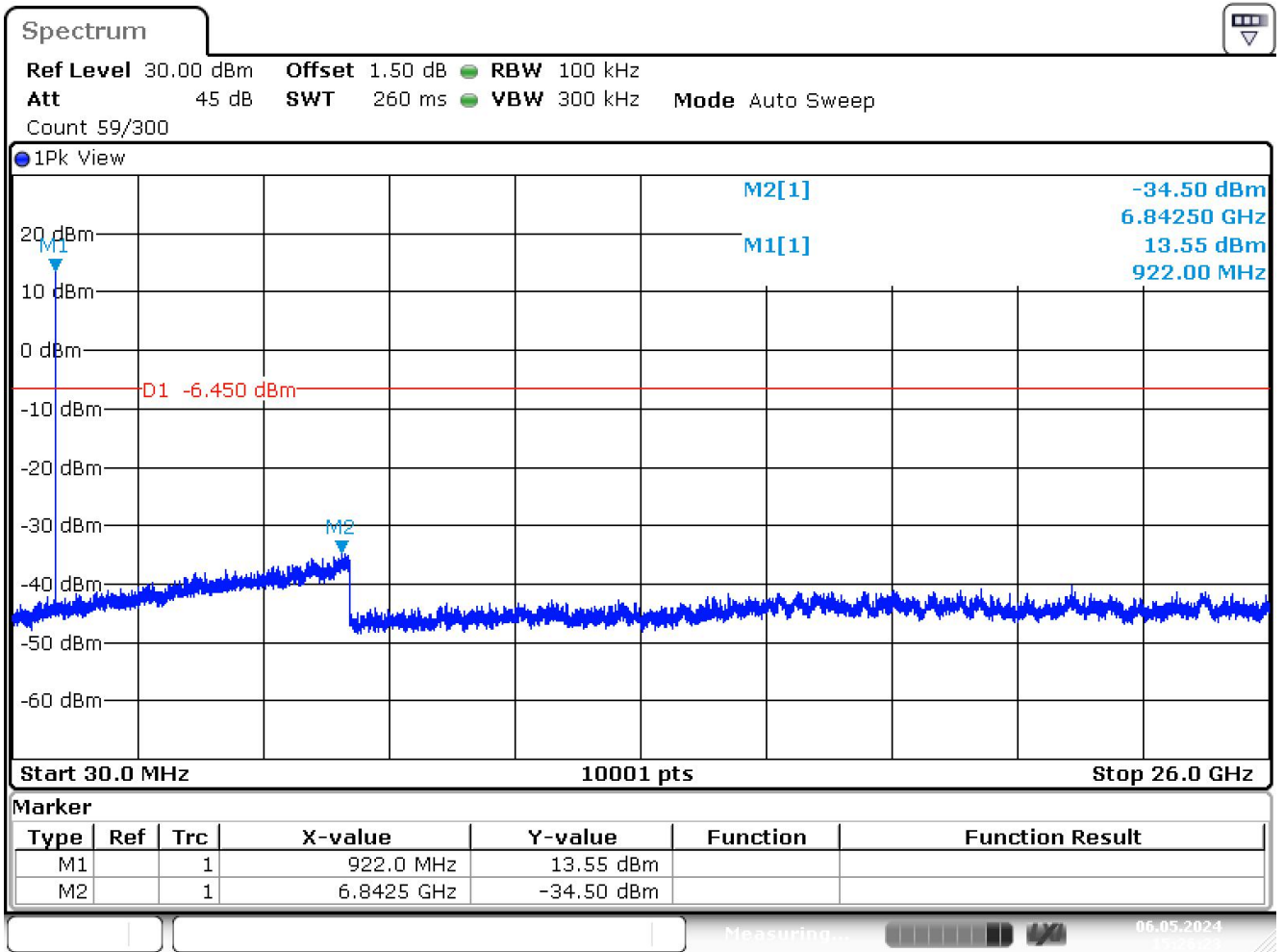
4.6 TEST RESULTS

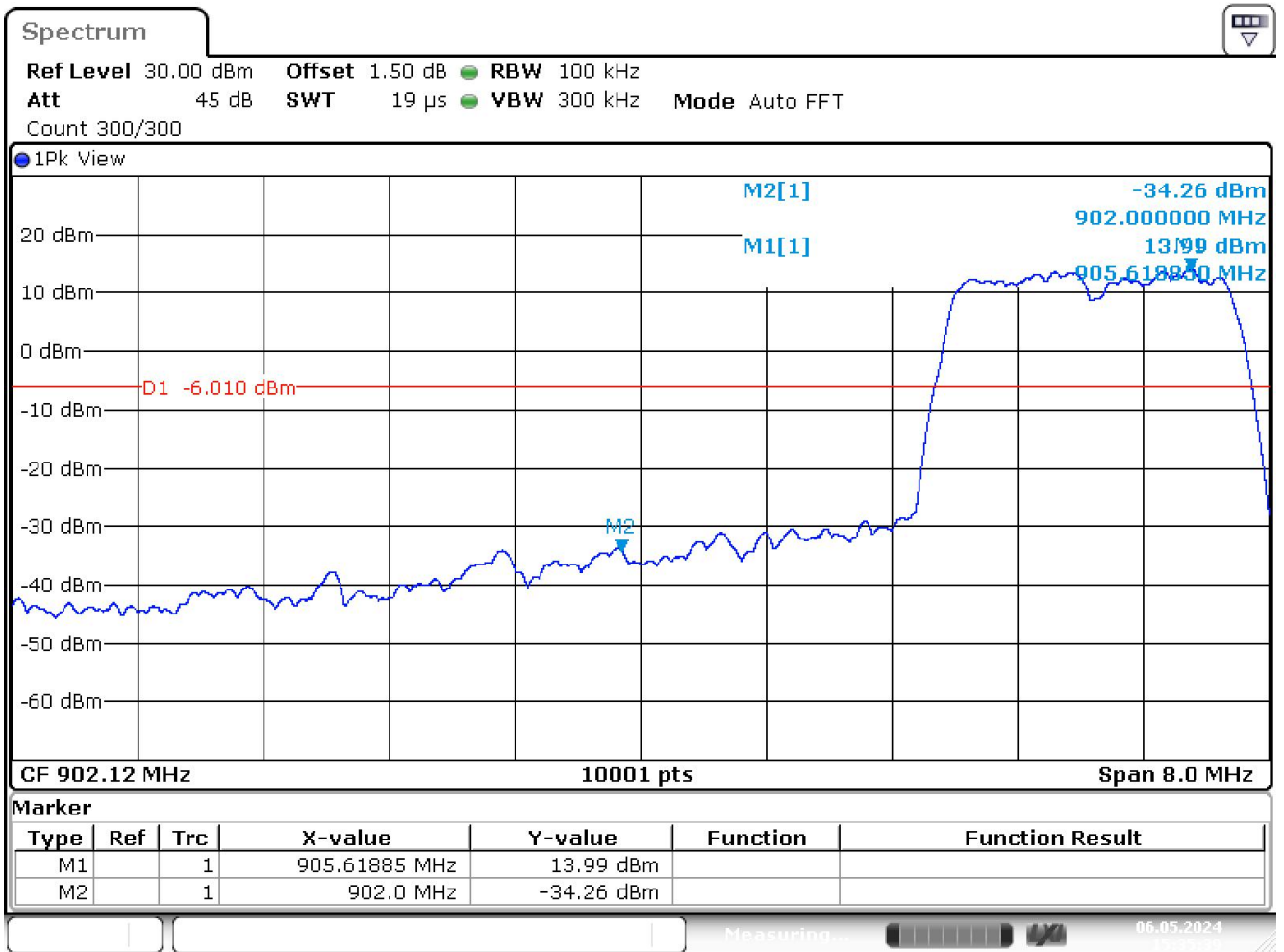


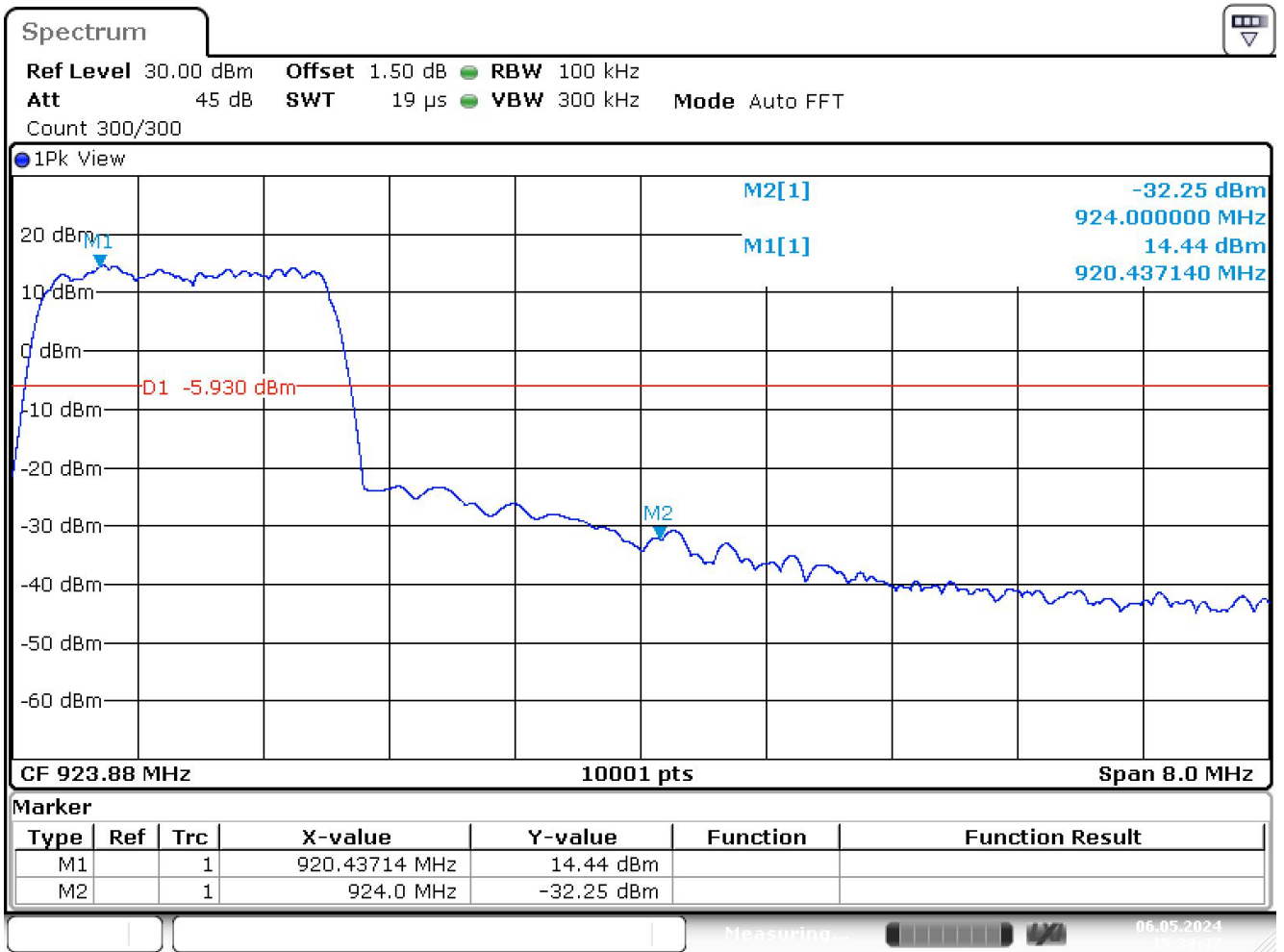














5. POWER SPECTRAL DENSITY TEST

5.1 LIMIT

FCC Part15.247 , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	≤ 8 dBm (RBW ≥ 3 KHz)	905-921	PASS

5.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
4. Set the $\text{VBW} \geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



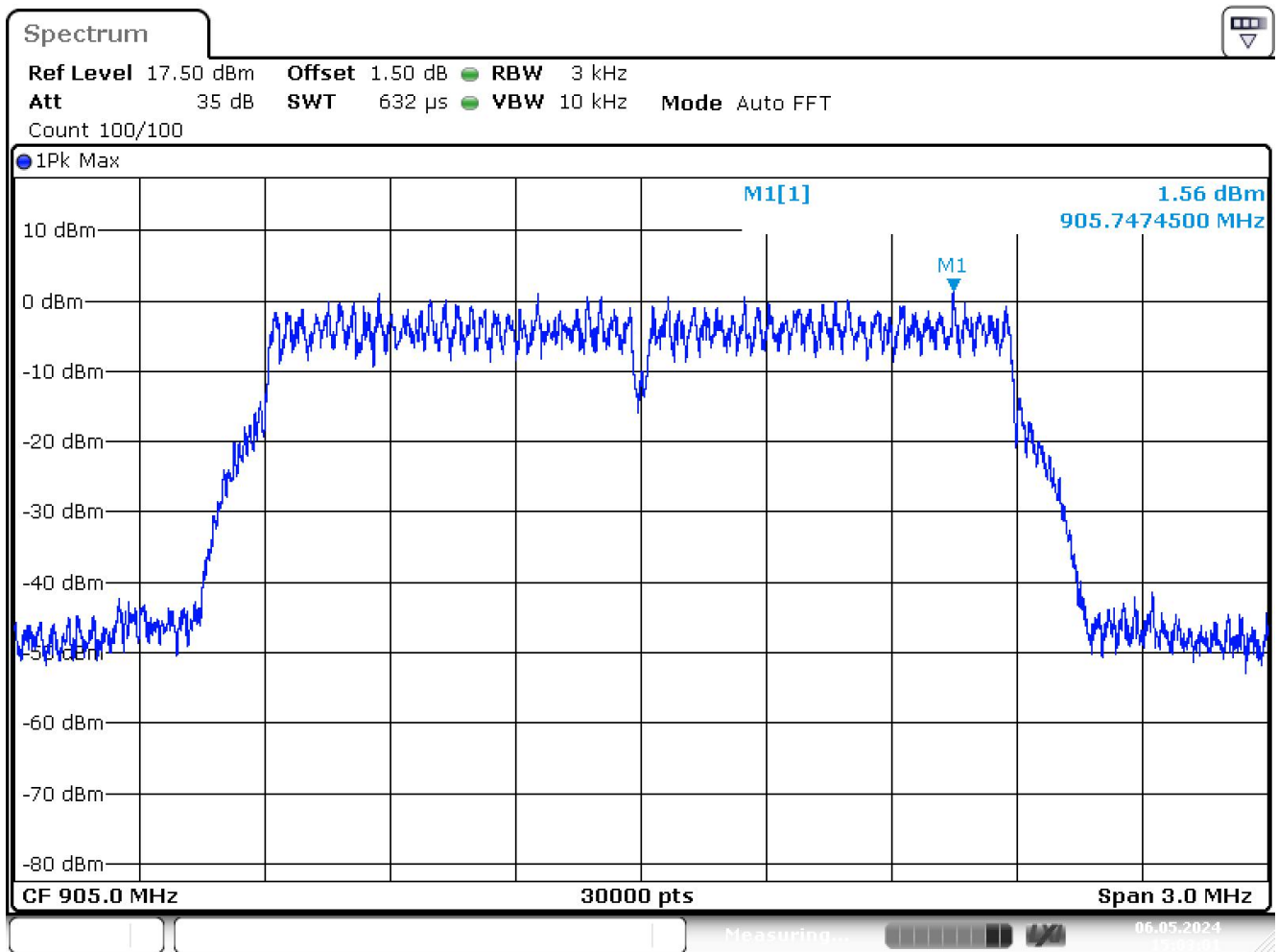
5.5 EUT OPERATION CONDITIONS

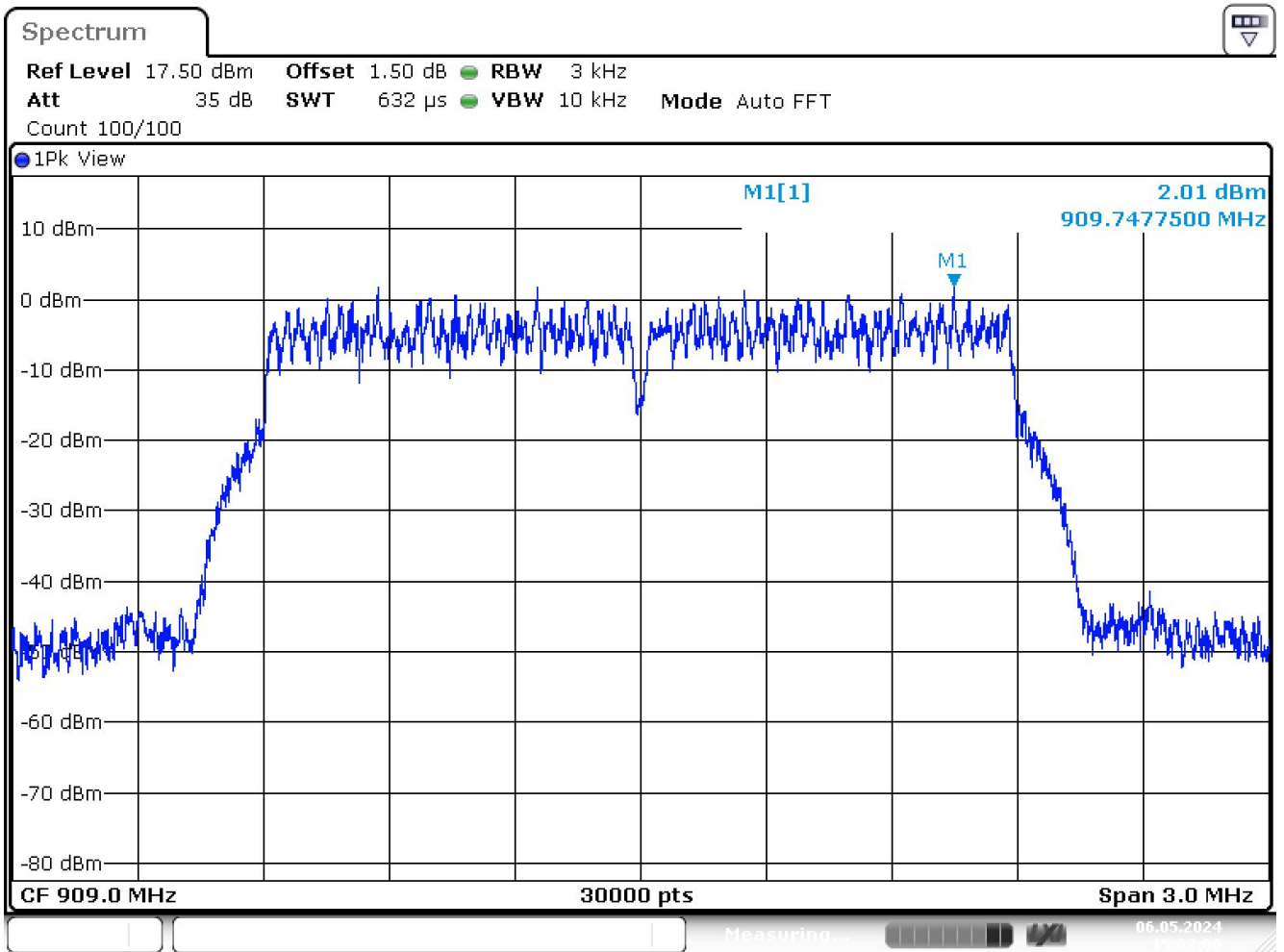
Please refer to section 3.1.4 of this report.

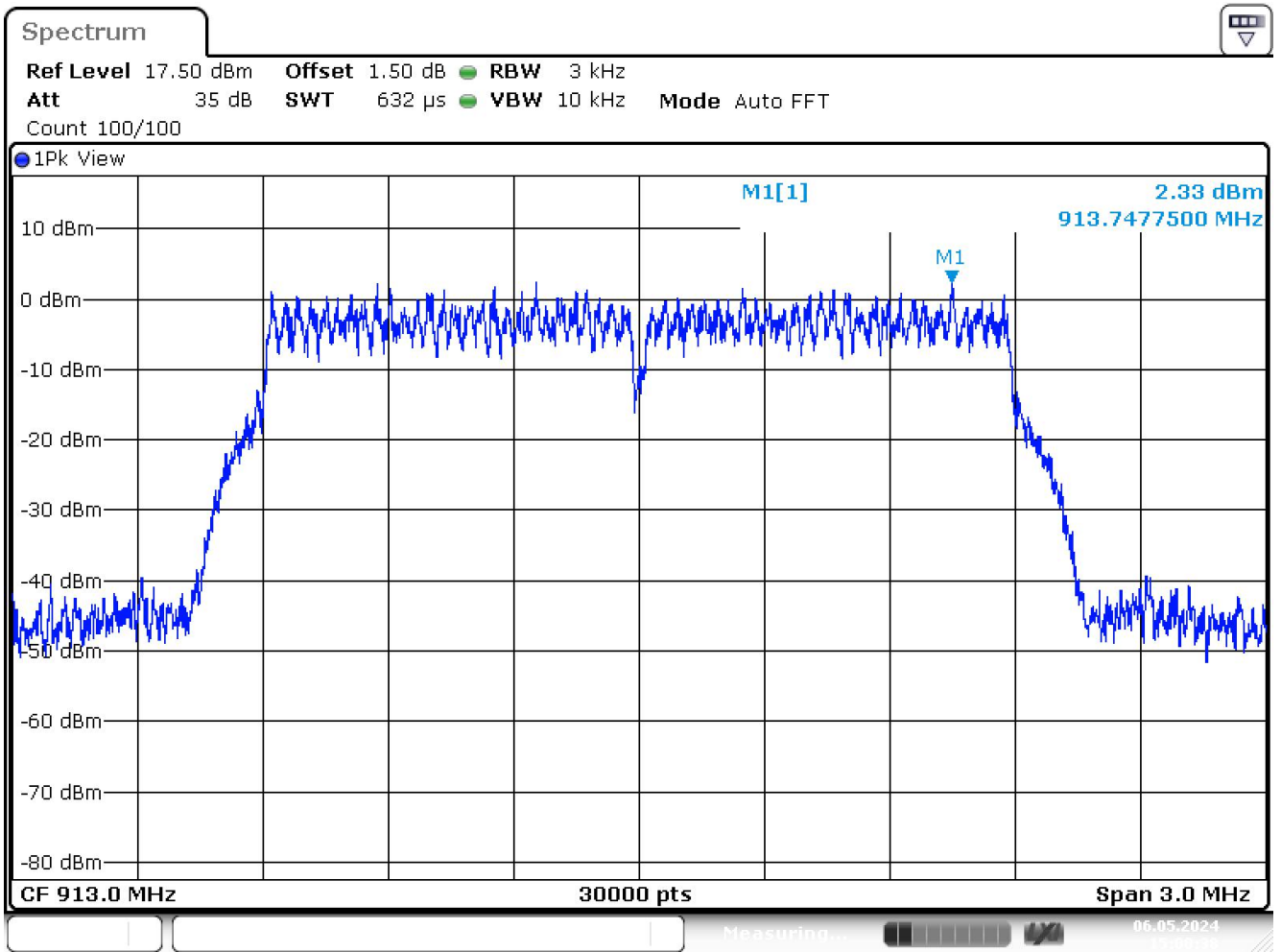


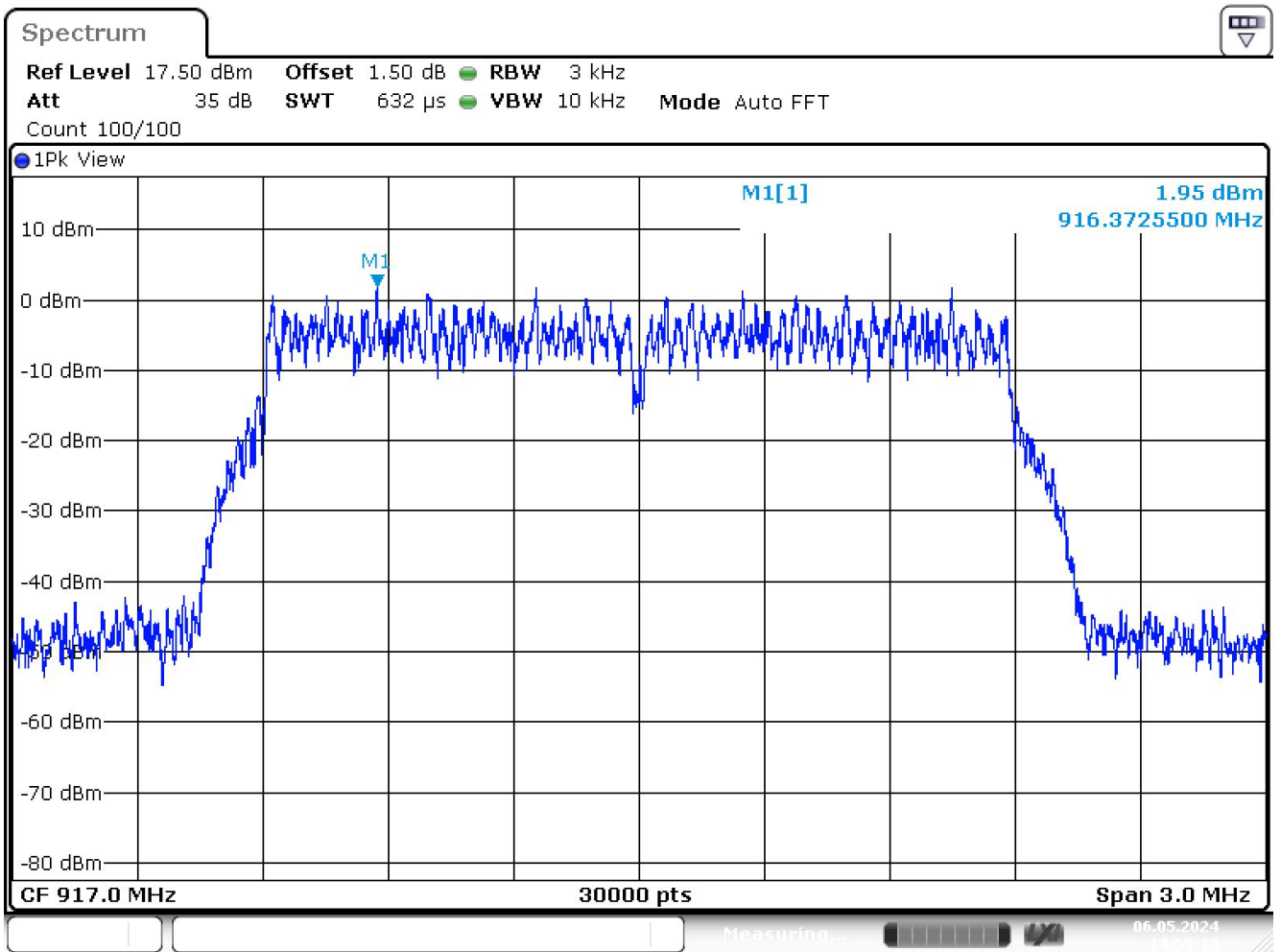
5.6 TEST RESULTS

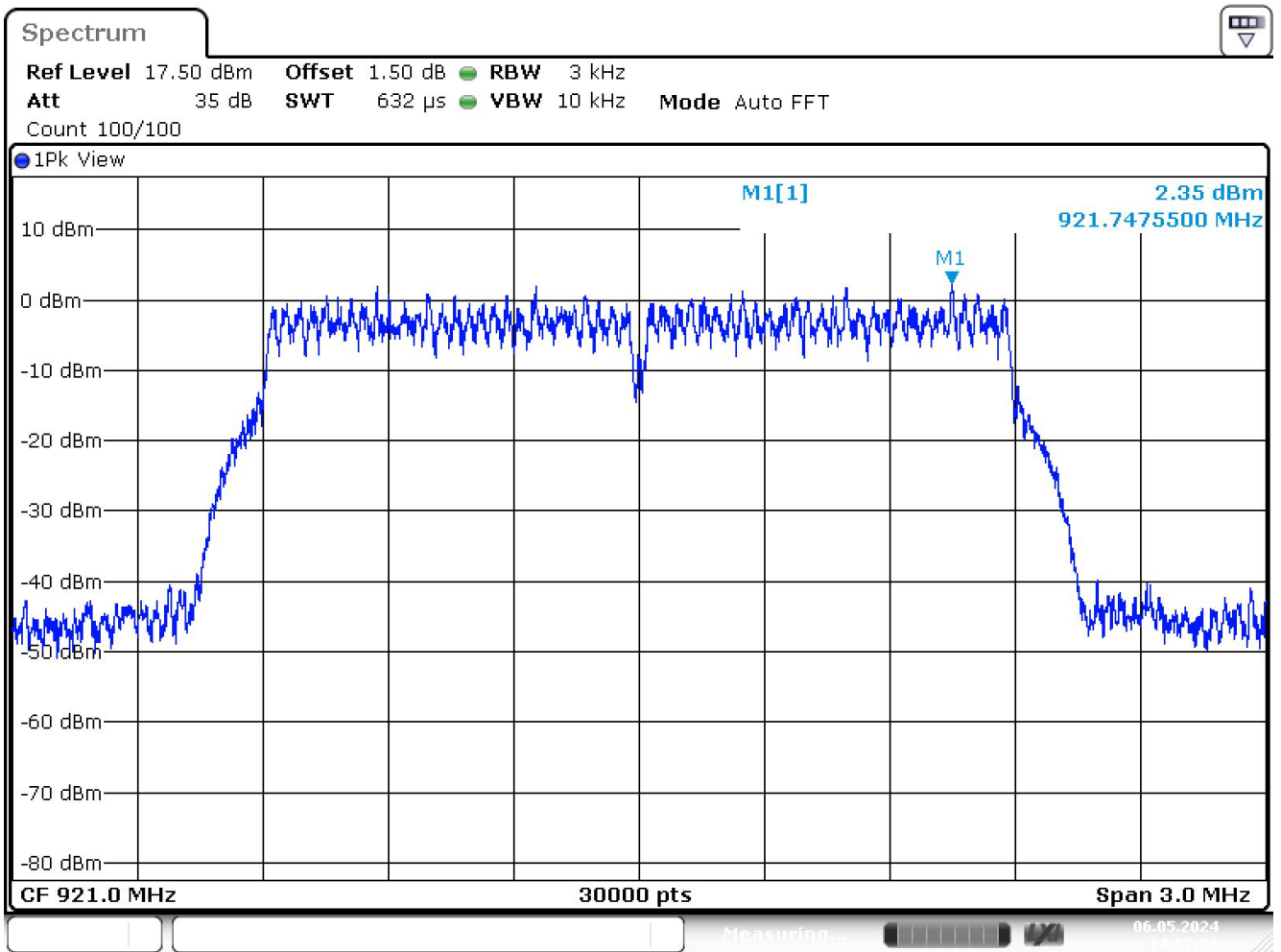
Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11ah 2M	1	905	1.56	8	PASS
	3	909	2.01	8	PASS
	5	913	2.33	8	PASS
	7	917	1.95	8	PASS
	9	921	2.35	8	PASS













6. BANDWIDTH TEST

6.1 LIMIT

FCC Part15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	905-921	PASS

6.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW \geq 3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 6 dB.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



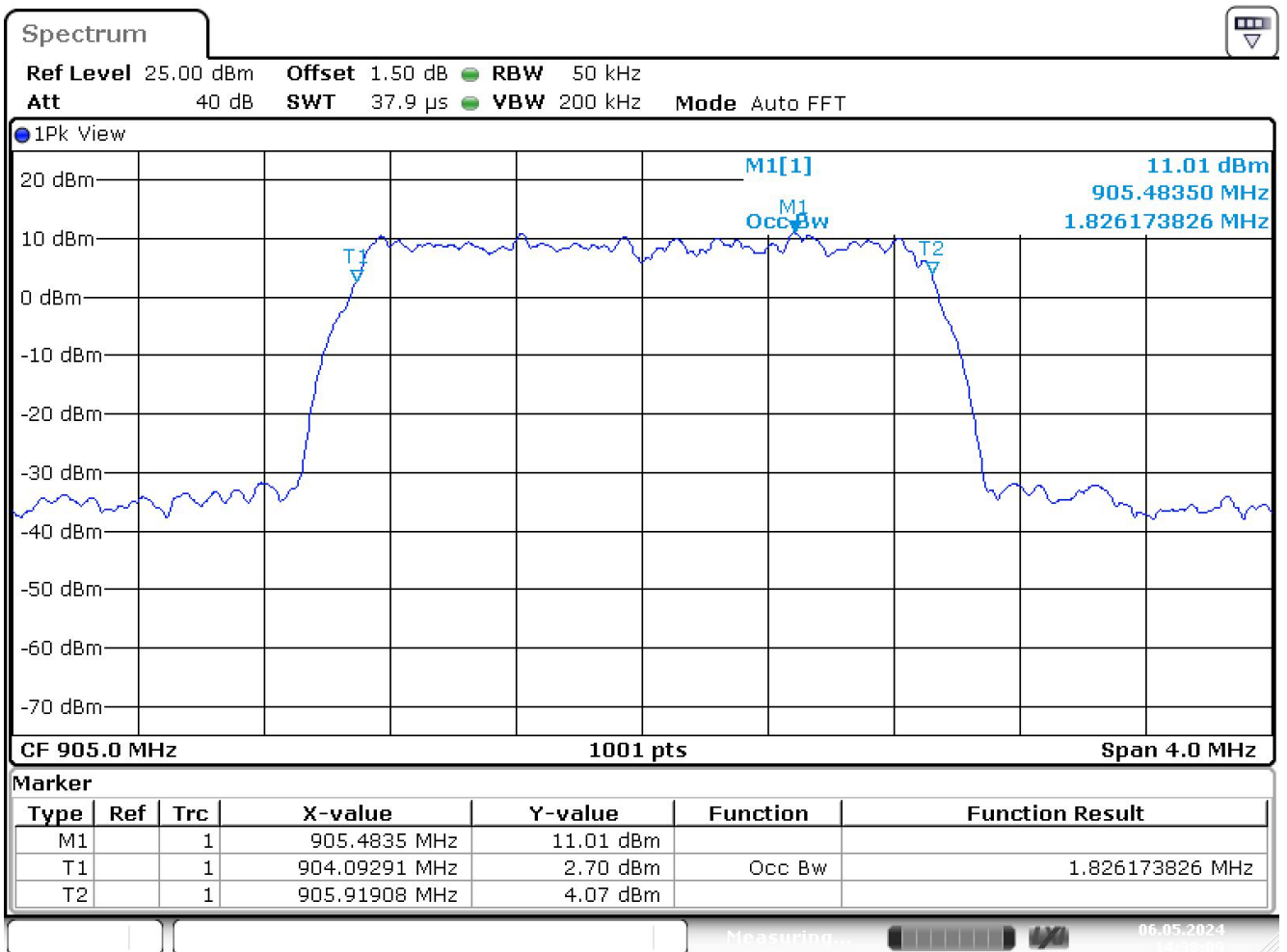
6.5 EUT OPERATION CONDITIONS

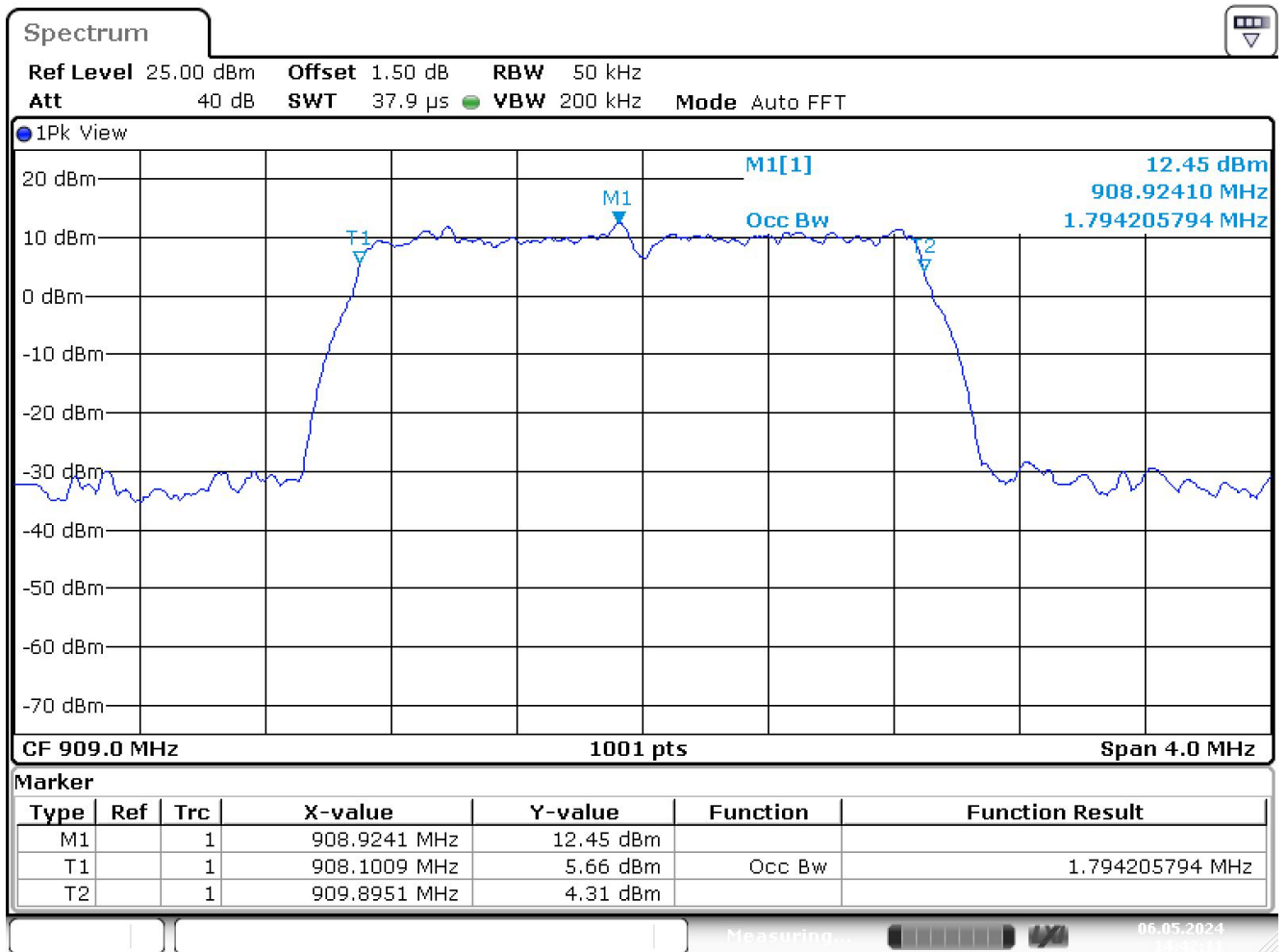
Please refer to section 3.1.4 of this report.

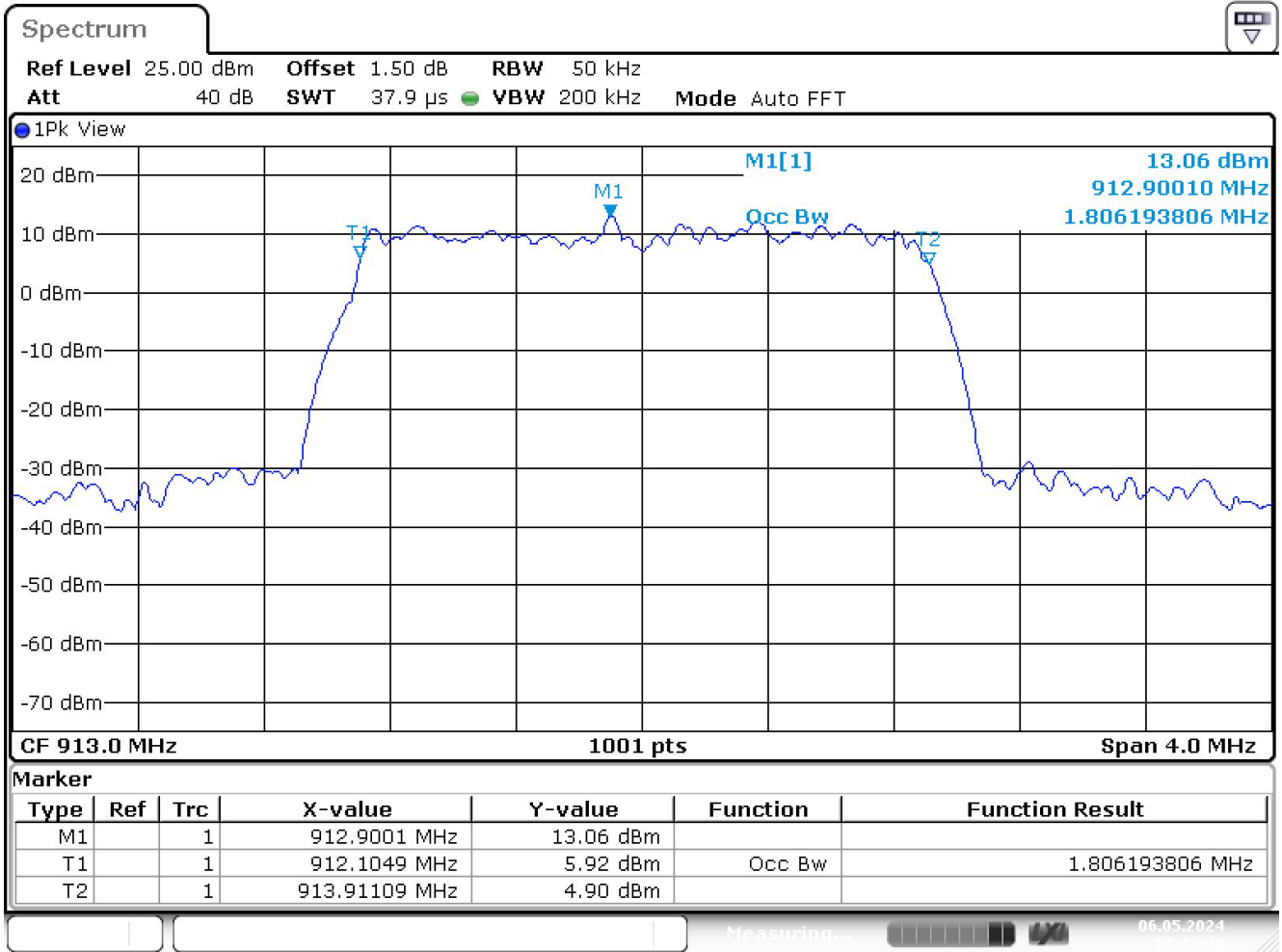


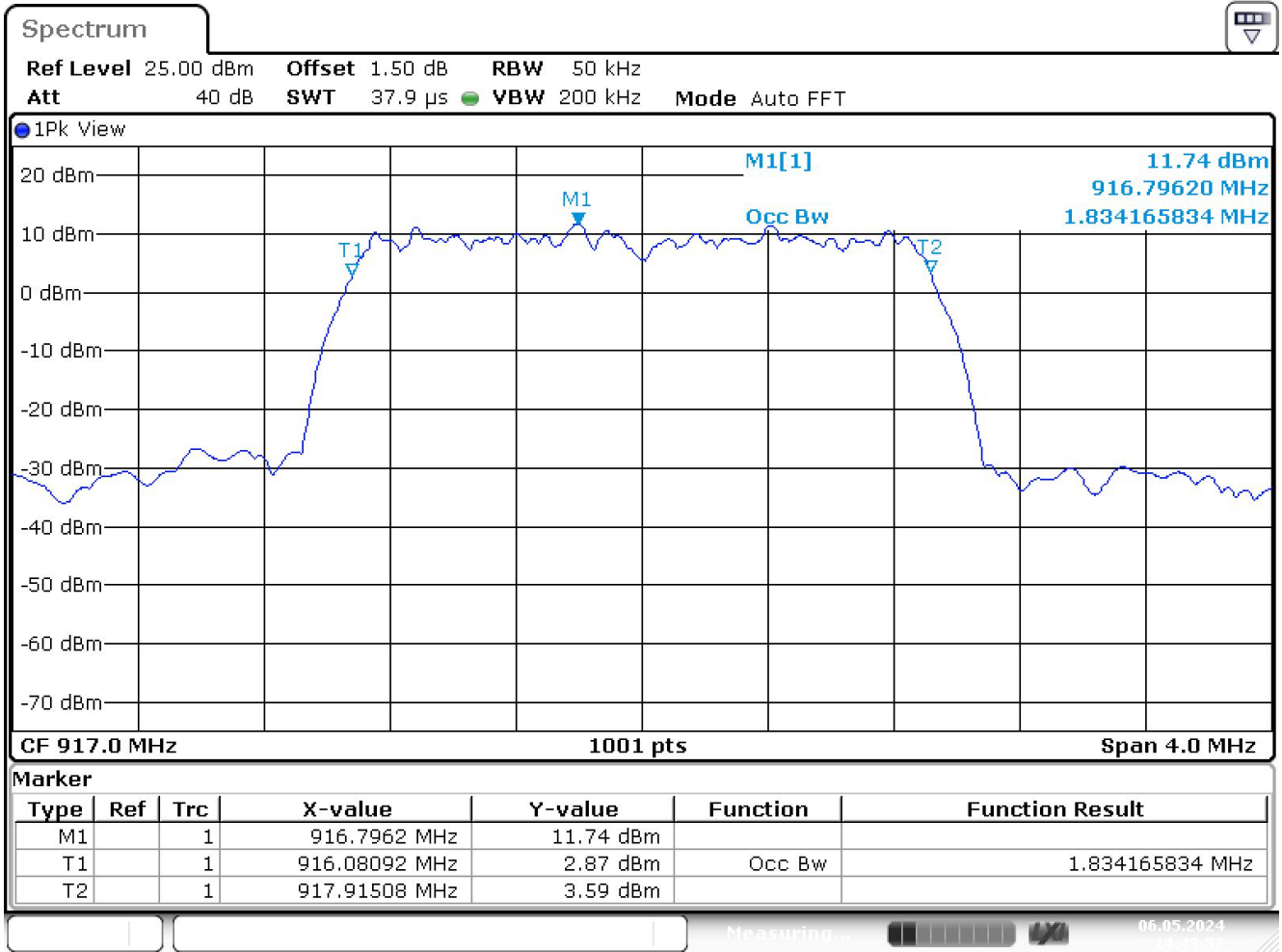
6.6 TEST RESULTS

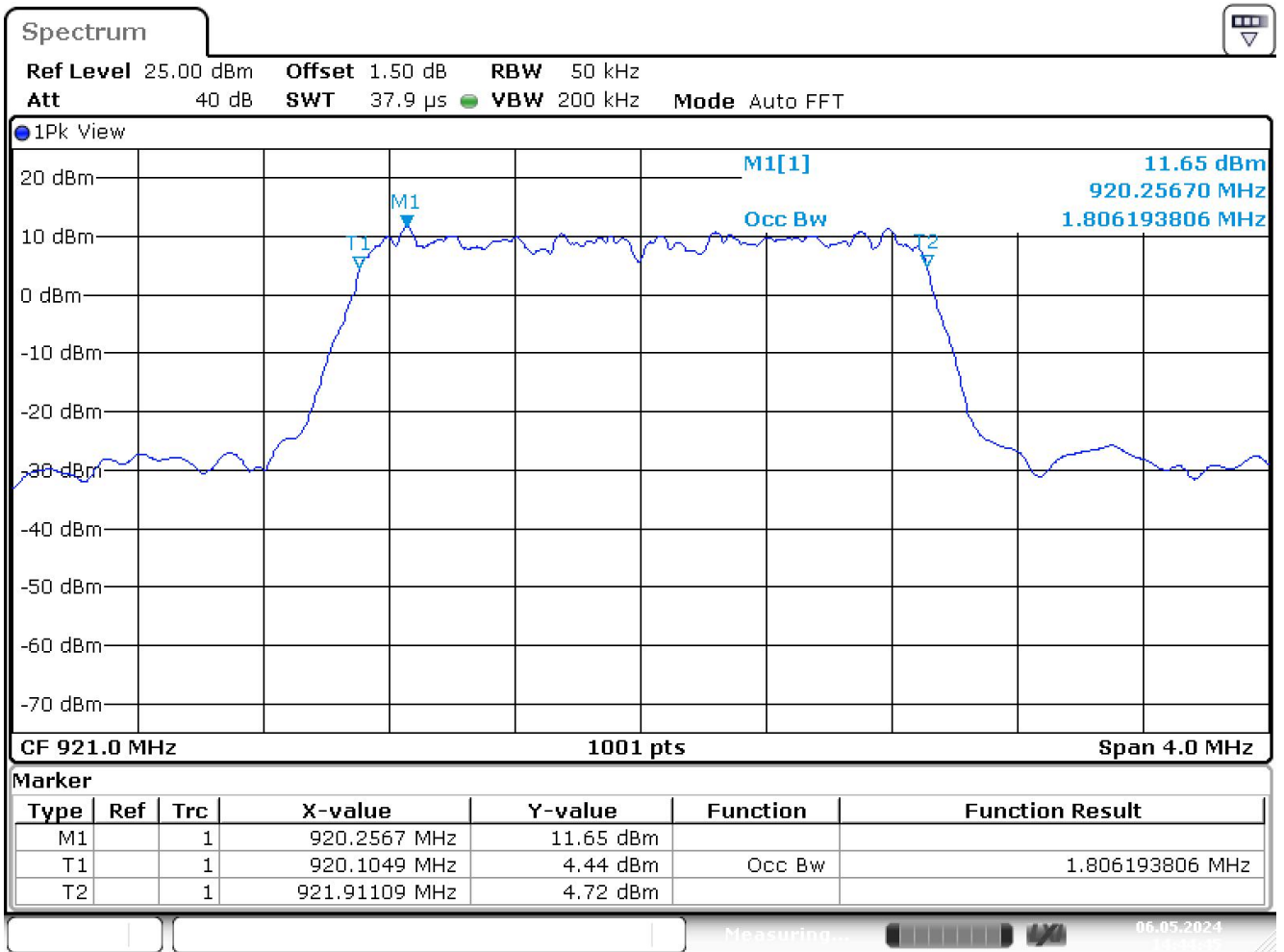
Operation Mode	Channel Number	Channel Frequency (MHz)	6 dB Bandwidth (kHz)	Limit (kHz)	Verdict
802.11ah 2M	1	905	1826.2	>500	PASS
	3	909	1794.2	>500	PASS
	5	913	1806.2	>500	PASS
	7	917	1834.2	>500	PASS
	9	921	1806.2	>500	PASS













7. PEAK OUTPUT POWER TEST

7.1 LIMIT

FCC Part15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Output Power	1 watt or 30dBm	905-921	PASS

7.2 TEST PROCEDURE

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

RBW \geq DTS bandwidth

The following procedure shall be used when an instrument with a resolution bandwidth that is greater than the DTS bandwidth is available to perform the measurement:

- Set the RBW \geq DTS bandwidth.
- Set VBW \geq [3 \times RBW].
- Set span \geq [3 \times RBW].
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

Integrated band power method:

The following procedure can be used when the maximum available RBW of the instrument is less than the

DTS bandwidth:

- Set the RBW = 1 MHz.
- Set the VBW \geq [3 \times RBW].
- Set the span \geq [1.5 \times DTS bandwidth].
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

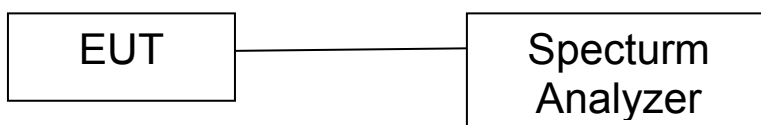
PKPM1 Peak power meter method:

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



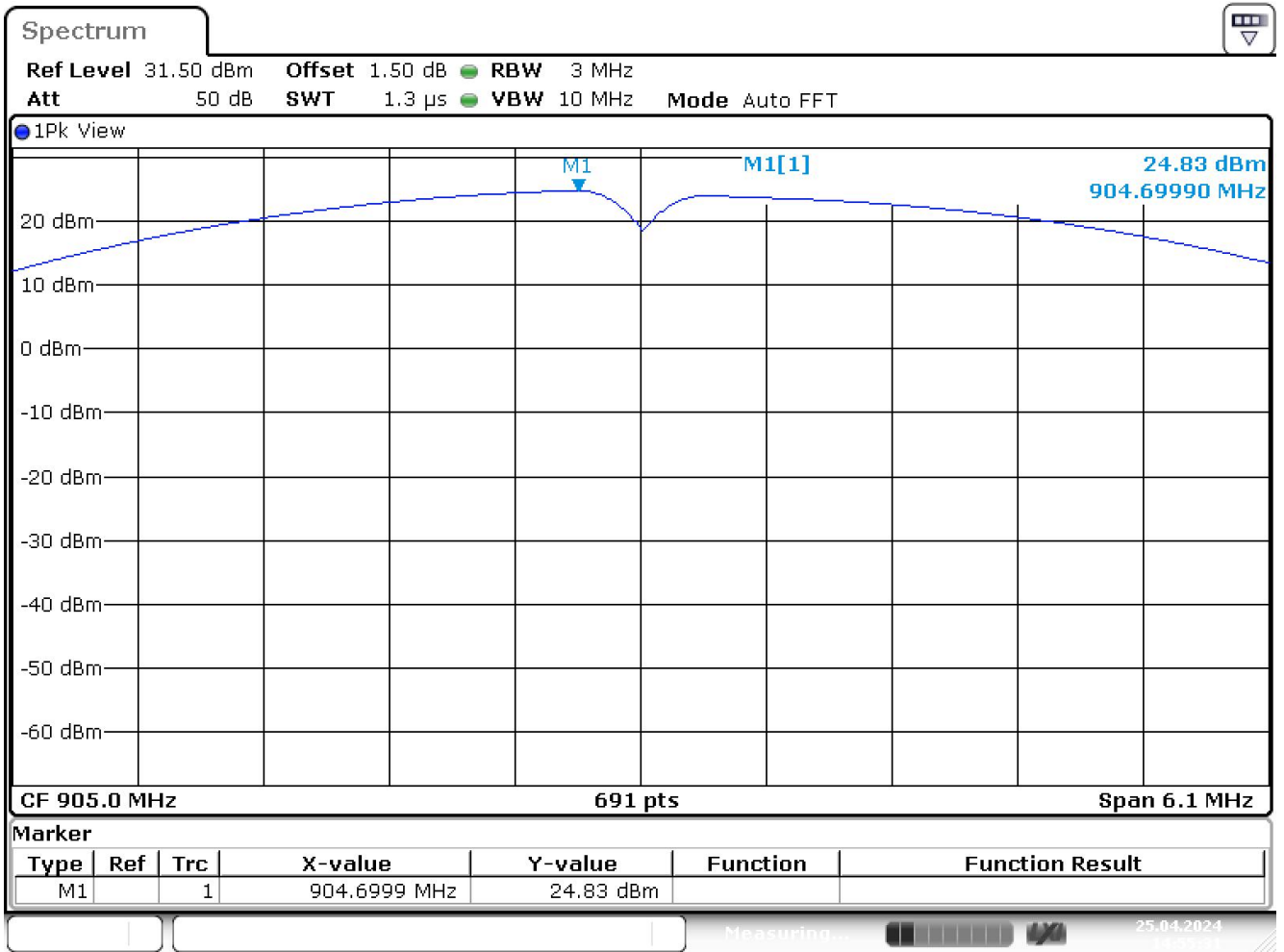
7.5 EUT OPERATION CONDITIONS

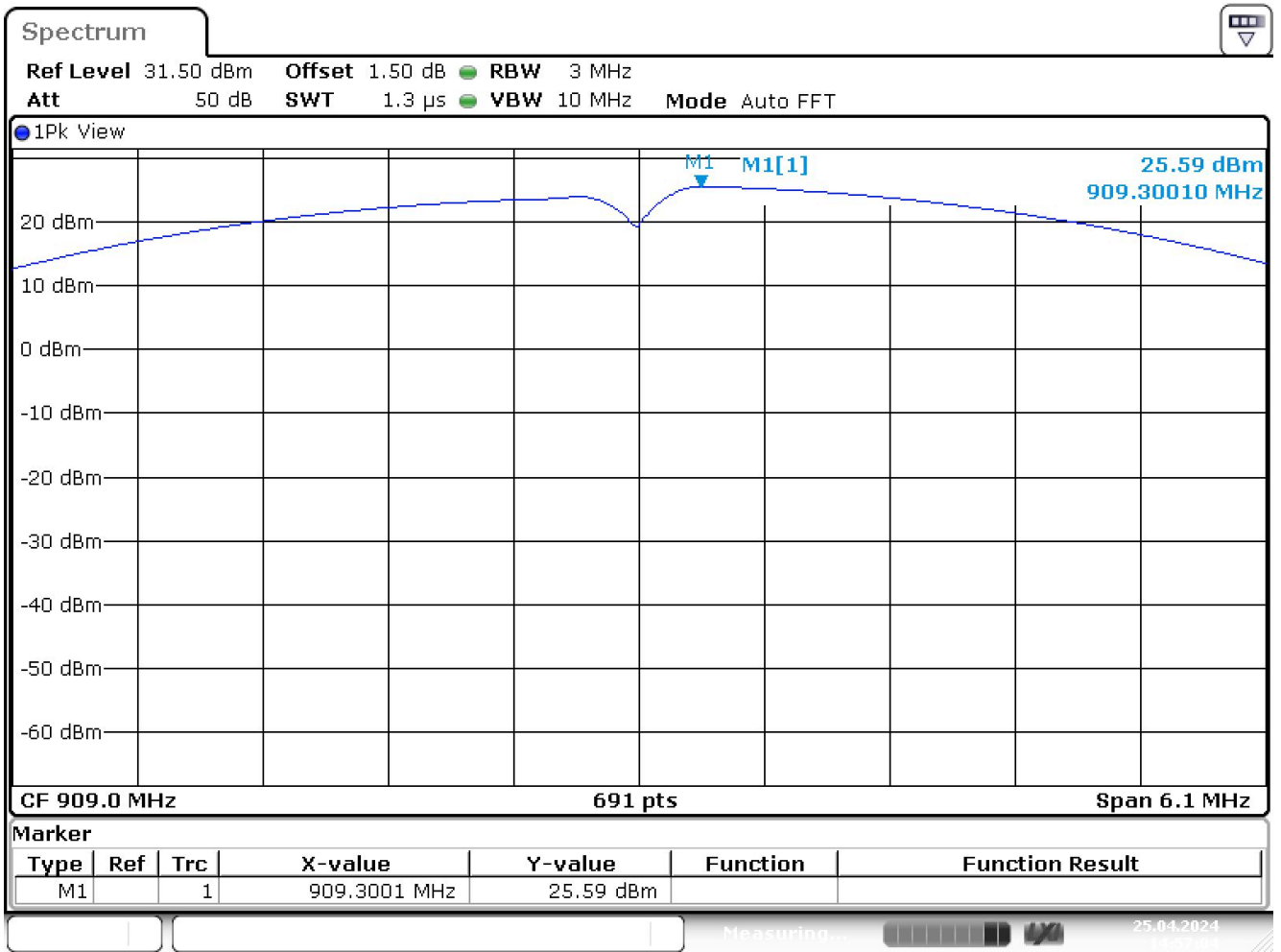
Please refer to section 3.1.4 of this report.

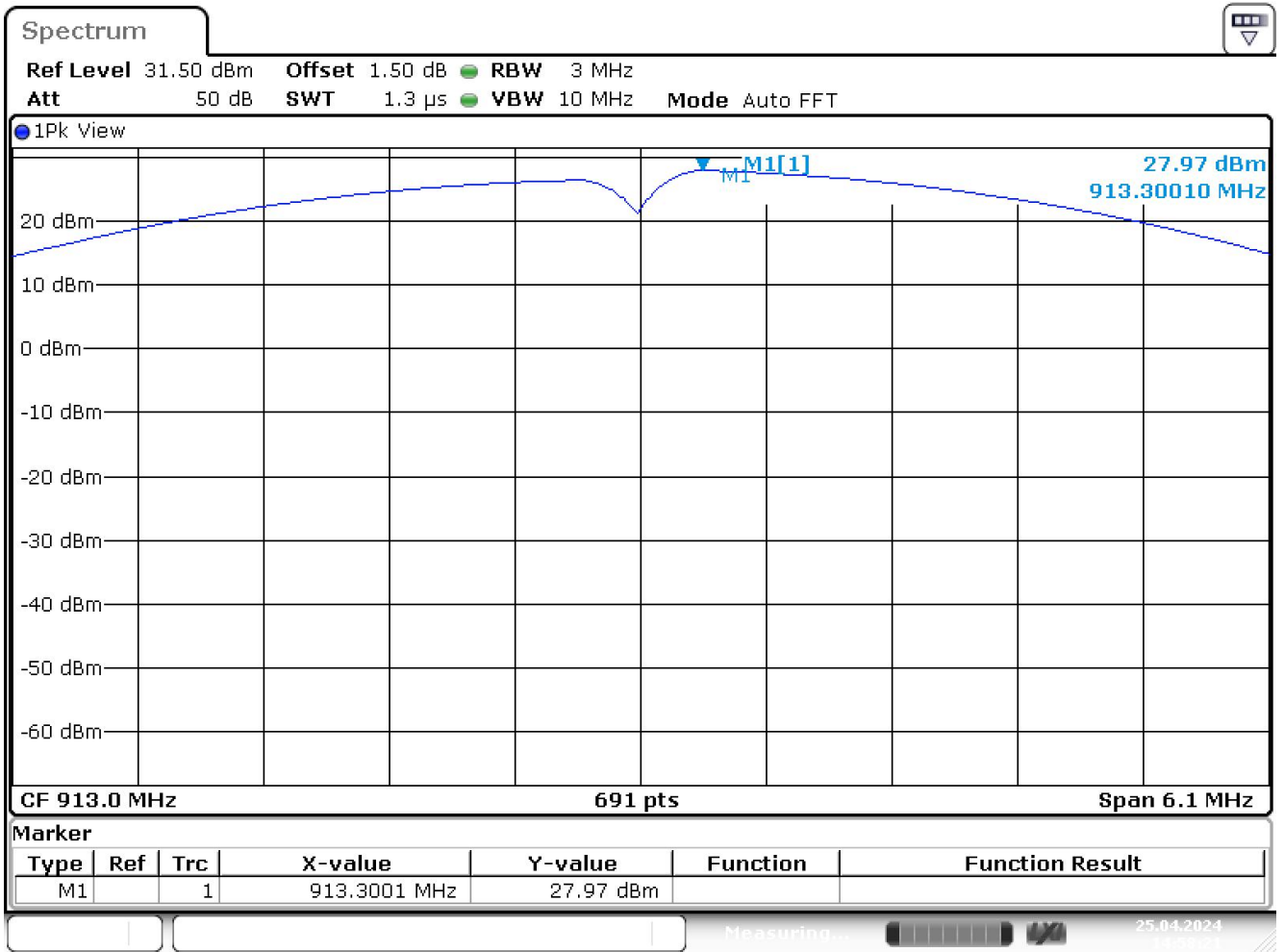


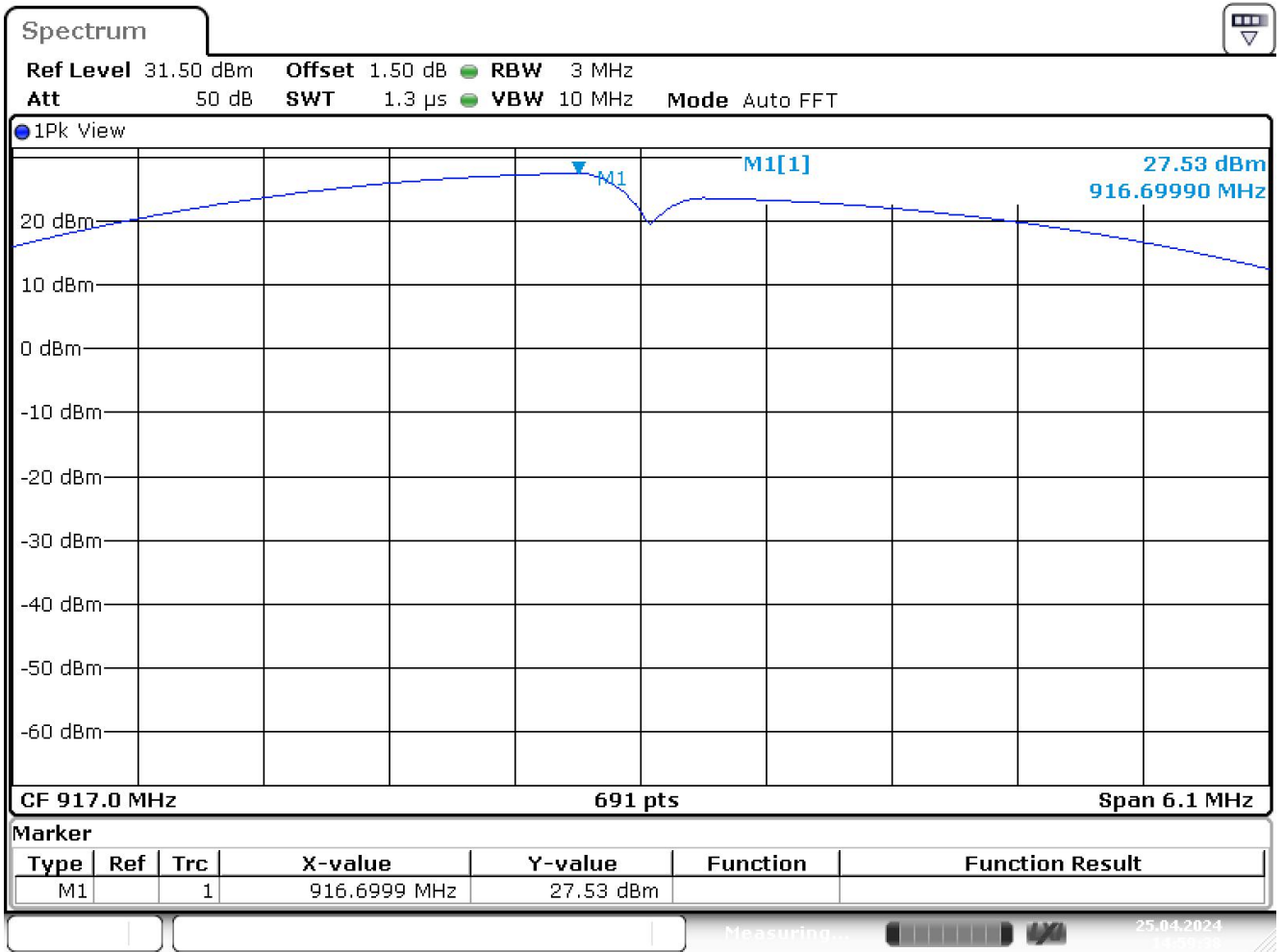
7.6 TEST RESULTS

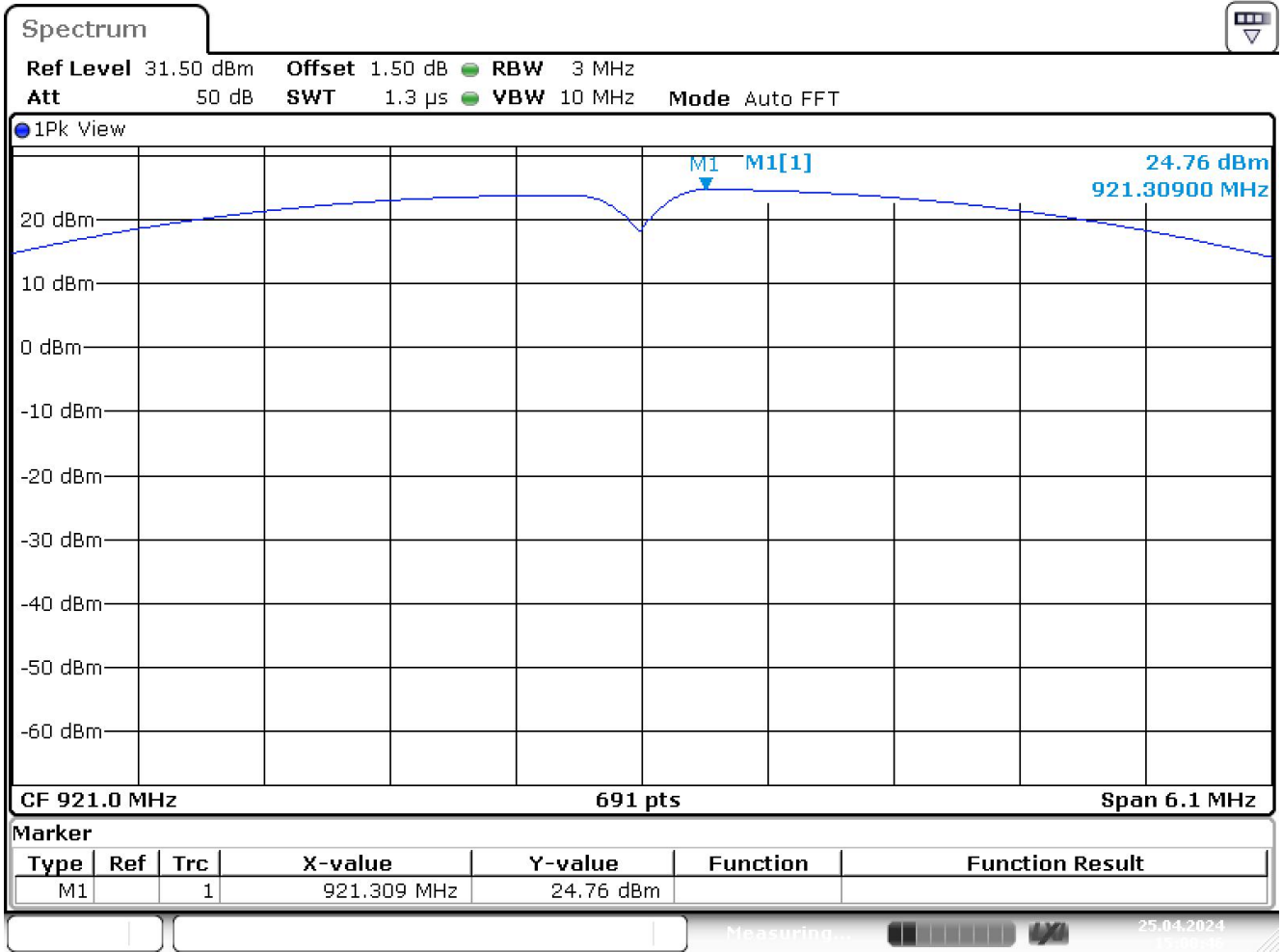
Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
802.11ah 2M	1	905	24.83	30	PASS
	3	909	25.59	30	PASS
	5	913	27.97	30	PASS
	7	917	27.53	30	PASS
	9	921	24.76	30	PASS













8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

8.2 RESULT

The EUT antenna is External Antenna. It comply with the standard requirement.



APPENDIX I AND APPENDIX II : EUT Photos

Please refer to separated files for APPENDIX I and APPENDIX II EUT Photos.



APPENDIX III :Test Setup Photos

Please refer to separated files for APPENDIX III Test Setup Photos.

*****END OF THE REPORT*****