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TEST REPORT

FCC PART 15 SUBPART C 15.247 & RSS-247

Report Reference No. : CTL2304242042-WF

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Product Name : RFID Module

Model(HVIN) : EC-RF200-DLT7

List Model(HVIN) : N/A

Trade Mark..... : N/A

FCC ID : 2A92Z-ECRF200DLT7

IC..... : 29863-ECRF200DLT7

Applicant's name : Complete Genomics, Inc.

Address of applicant : 2904 ORCHARD PARKWAY SAN JOSE, CA 95134

Test Firm..... : Shenzhen CTL Testing Technology Co., Ltd.

Address of Test Firm : Floor 1-A, Baisha Technology Park, No.3011, Shahehexi Road,
Nanshan District, Shenzhen, China 518055

Test specification..... :

Standard : 47 CFR FCC Part 15 Subpart C 15.247 &
RSS-247 Issue 2, February 2017

TRF Originator : Shenzhen CTL Testing Technology Co., Ltd.

Master TRF..... : Dated 2011-01

Date of receipt of test item : April 26, 2023

Date of sampling..... : April 27, 2023

Date of Test Date..... : April 27, 2023- July 12, 2023

Date of Issue : July 12, 2023

Result : Pass

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TEST REPORT

Test Report No.:	CTL2304242042-WF	July 12, 2023
		Date of issue

Equipment under Test : RFID Module

Sample No. : CTL230424204-2-S001(Normal sample)
CTL230424204-2-S002(Engineer sample)

Model (HVIN) : EC-RF200-DLT7

Listed Models(HVIN) : N/A

Applicant : **Complete Genomics, Inc.**

Address : 2904 ORCHARD PARKWAY SAN JOSE, CA 95134

Manufacturer : **Complete Genomics, Inc.**

Address : 2904 ORCHARD PARKWAY SAN JOSE, CA 95134

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified page 5.

The test results presented in this report relate only to the object tested.

This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory.

**** Modified History ****

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

[RSS-247-Issue 2](#): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

[RSS-Gen Issue 5](#): — General Requirements for Compliance of Radio Apparatus

[ANSI C63.10: 2013](#): American National Standard for Testing Unlicensed Wireless Devices

[558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules

1.2. Test Description

FCC PART 15 Subpart C		
FCC Part 15.207 RSS-Gen 8.8	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(1)(i) RSS 247 5.1 (a) RSS-Gen 4.6	20dB Bandwidth & 99% Bandwidth	PASS
FCC Part 15.247(d) RSS 247 5.5	Spurious Emission and Band Edge	PASS
FCC Part 15.247(b)(2) RSS 247 5.4 (a)	Maximum Peak Output Power	PASS
FCC Part 15.109/ 15.205/ 15.209 RSS-Gen 8.9	Radiated Emissions	PASS
FCC Part 15.247(a)(1) RSS 247 5.1 (b)	Frequency Separation	PASS
FCC Part 15.247(a)(1)(i) RSS-247 5.1 (c)	Number of hopping frequency	PASS
FCC Part 15.247(a)(1)(i) RSS-247 5.1 (c)	Time of Occupancy	PASS

Note:

1. The measurement uncertainty is not included in the test result.
2. There are three antenna connectors (ANT1, ANT2 and ANT3) on the PCB board of the RFID module which can be connected up to three external UHF antennas to achieve long reader range. The power level setting is same for all the three antenna connectors. For the test, we have used ANT1 and other two antenna connectors were terminated with 50 ohm terminators.

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shaheji Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.10 and CISPR 32/EN 55032 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L7497

Shenzhen CTL Testing Technology Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 4343.01

Shenzhen CTL Testing Technology Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9618B

CAB identifier: CN0041

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with Registration No.: 9618B on Jan. 22, 2019.

FCC-Registration No.: 399832

Designation No.: CN1216

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 399832, December 08, 2017.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 0.57 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 2.20 dB	(1)
Occupied Bandwidth	± 0.01 ppm	(1)
Radiated Emission 9KHz~30MHz	± 3.40 dB	(1)

Radiated Emission 30~1000MHz	$\pm 4.10\text{dB}$	(1)
Radiated Emission Above 1GHz	$\pm 4.32\text{dB}$	(1)
Conducted Disturbance 0.15~30MHz	$\pm 3.20\text{dB}$	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	RFID Module
Model(HVIN):	EC-RF200-DLT7
Power supply:	DC 24V from external circuit
Hardware version:	V1.0
Software version:	V1.0
UHF RFID	
Operation frequency	902.25-927.75MHz
Modulation Type	ASK
Channel number:	52
Channel separation:	0.5MHz
Antenna type:	External Planar RFID antenna
Antenna amount:	3
MIMO:	Not support
Antenna Gain:	-8.02dBi

Note1: For more details, please refer to the user's manual of the EUT.

2.3. Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
Adapter	CUIINC	SMI36-24	Input: 100-240V~ 50/60Hz 1A Max Output:24V---3A	CE/FCC	manufacturer
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

2.4. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 52 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel.

Operation Frequency:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	902.25	21	912.25	41	922.25
02	902.75	22	912.75	42	922.75
03	903.25	23	913.25	43	923.25
04	903.75	24	913.75	44	923.75
05	904.25	25	914.25	45	924.25
06	904.75	26	914.75	46	924.75
07	905.25	27	915.25	47	925.25
08	905.75	28	915.75	48	925.75
09	906.25	29	916.25	49	926.25
10	906.75	30	916.75	50	926.75
11	907.25	31	917.25	51	927.25
12	907.75	32	917.75	52	927.75
13	908.25	33	918.25	--	--
14	908.75	34	918.75	--	--
15	909.25	35	919.25	--	--
16	909.75	36	919.75	--	--
17	910.25	37	920.25	--	--
18	910.75	38	920.75	--	--
19	911.25	39	921.25	--	--
20	911.75	40	921.75	--	--

Note: The line display in grey were the channel selected for testing

Power setting during the test:

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	RRU2889 Demo V2.2		
Channel	Low channel	Mid channel	High channel
Power Level	Default	Default	Default

2.5. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
LISN	R&S	ESH2-Z5	860014/010	2023/05/04	2024/05/03
Double cone logarithmic antenna	Schwarzbeck	VULB 9168	824	2023/02/13	2026/02/12
Horn Antenna	Ocean Microwave	OBH100400	26999002	2021/12/22	2024/12/21

EMI Test Receiver	R&S	ESCI	1166.5950.0 3	2023/05/04	2024/05/03
Spectrum Analyzer	Agilent	E4407B	MY41440676	2023/05/05	2024/05/04
Spectrum Analyzer	Agilent	N9020A	US46220290	2023/05/05	2024/05/04
Spectrum Analyzer	Keysight	N9020A	MY53420874	2023/05/05	2024/05/04
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2021/12/23	2024/12/22
Active Loop Antenna	Da Ze	ZN30900A	/	2021/05/13	2024/05/12
Amplifier	Agilent	8449B	3008A02306	2023/05/04	2024/05/03
Amplifier	Agilent	8447D	2944A10176	2023/05/04	2024/05/03
Amplifier	Brief&Smart	LNA-4018	2104197	2023/05/05	2024/05/04
Temperature/Humidity Meter	Ji Yu	MC501	/	2023/05/09	2024/05/08
Power Sensor	Agilent	U2021XA	MY55130004	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY55130006	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY54510008	2023/05/05	2024/05/04
Power Sensor	Agilent	U2021XA	MY55060003	2023/05/05	2024/05/04
Spectrum Analyzer	RS	FSP	1164.4391.3 8	2023/05/05	2024/05/04
Test Software					
Name of Software			Version		
TST-PASS			V1.1.0		
EZ_EMC(Below 1GHz)			V1.1.4.2		
EZ_EMC(Above 1GHz)			V1.1.4.2		

The calibration interval was one year

2.6. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with FCC Part 15C 15.247 and Canada RSS-247 issue 2 Rules.

2.7. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

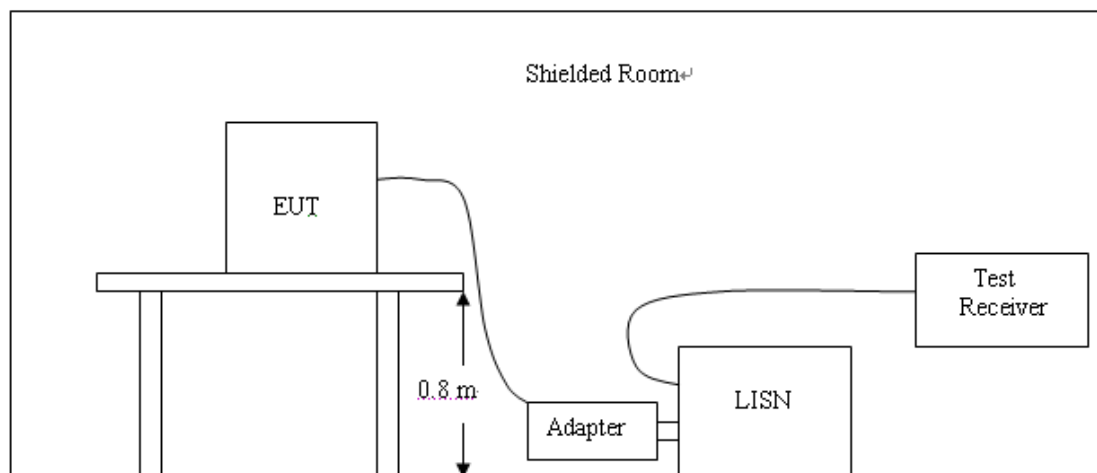
LIMIT

According to FCC CFR Title 47 Part 15 Subpart C Section 15.207 and RSS Gen 8.8, AC Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus as below:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

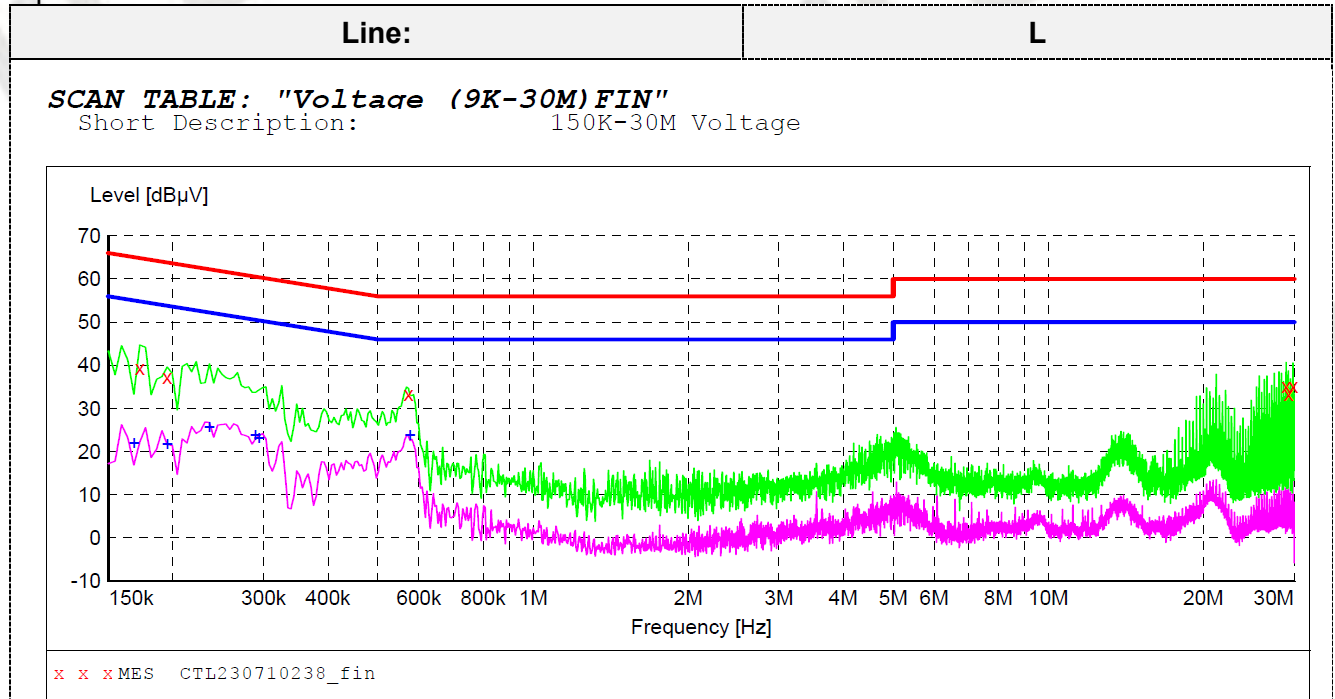


TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

Remark: All low, middle and high channel have been tested; only the worst result of high channel was reported.

**MEASUREMENT RESULT: "CTL230710238_fin"**

10/07/2023 19:11

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.172500	39.30	10.0	65	25.5	QP	L1	GND
0.195000	37.30	10.0	64	26.5	QP	L1	GND
0.573000	33.40	10.0	56	22.6	QP	L1	GND
28.945500	35.10	10.5	60	24.9	QP	L1	GND
29.247000	33.30	10.5	60	26.7	QP	L1	GND
29.836500	35.30	10.5	60	24.7	QP	L1	GND

MEASUREMENT RESULT: "CTL230710238_fin2"

10/07/2023 19:11

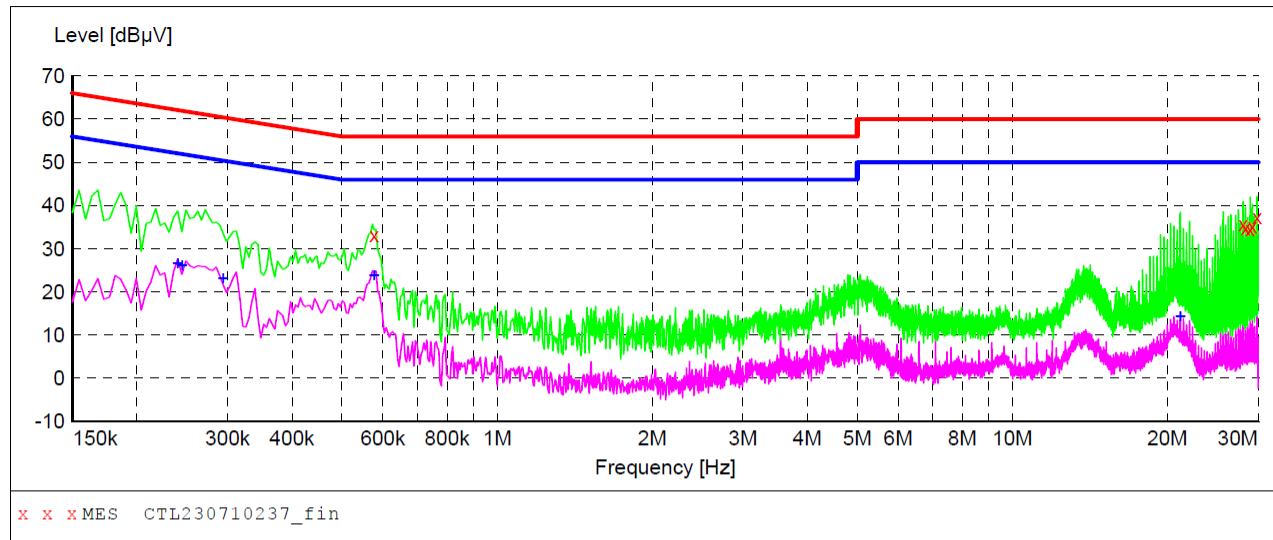
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.168000	22.00	10.0	55	33.1	AV	L1	GND
0.195000	21.80	10.0	54	32.0	AV	L1	GND
0.235500	25.70	10.0	52	26.6	AV	L1	GND
0.289500	23.90	10.0	51	26.6	AV	L1	GND
0.294000	23.10	10.0	50	27.3	AV	L1	GND
0.577500	23.90	10.0	46	22.1	AV	L1	GND

Line:

N

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL230710237_fin"**

10/07/2023 19:08

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.577500	33.20	10.0	56	22.8	QP	N	GND
28.054500	35.70	10.5	60	24.3	QP	N	GND
28.351500	34.70	10.5	60	25.3	QP	N	GND
28.954500	34.50	10.5	60	25.5	QP	N	GND
29.242500	35.10	10.5	60	24.9	QP	N	GND
29.845500	37.20	10.5	60	22.8	QP	N	GND

MEASUREMENT RESULT: "CTL230710237_fin2"

10/07/2023 19:08

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.240000	26.60	10.0	52	25.5	AV	N	GND
0.244500	26.10	10.0	52	25.8	AV	N	GND
0.294000	23.10	10.0	50	27.3	AV	N	GND
0.577500	23.90	10.0	46	22.1	AV	N	GND
21.187500	14.30	10.4	50	35.7	AV	N	GND

Remark: Level(dBuV)=Reading(dBuV) + Transd.(dB)

Margin=Limit(dBuV)- Level(dBuV)

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

For intentional device, according to RSS-Gen section 8.9, the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

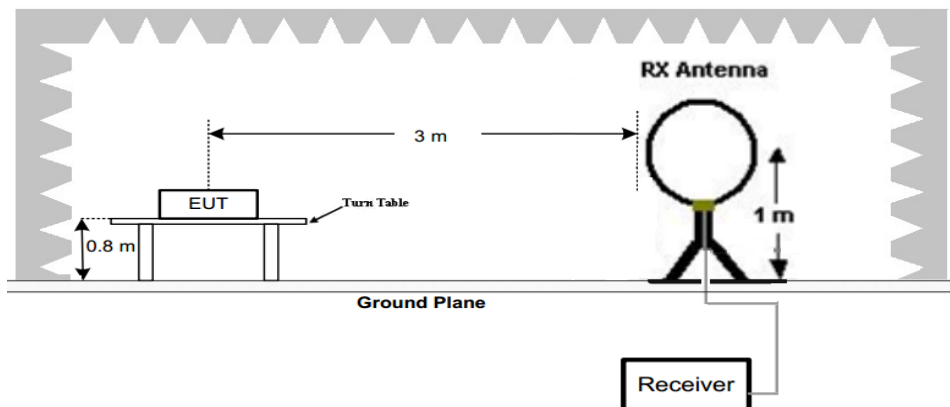
In addition, radiated emissions which fall in the restricted bands, as defined in RSS-Gen section 8.10, must also comply with the radiated emission limits specified in RSS-Gen section 8.9

Radiated emission limits

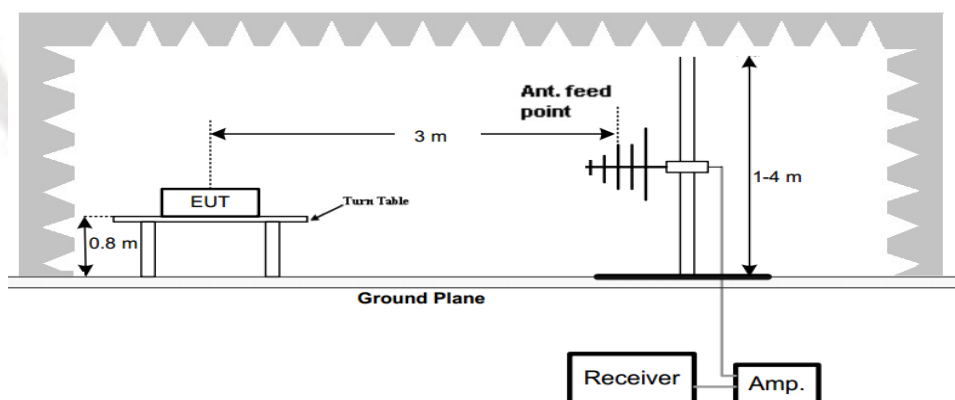
Frequency (MHz)	Distance (Meters)	Radiated (dB μ V/m)	Radiated (μ V/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

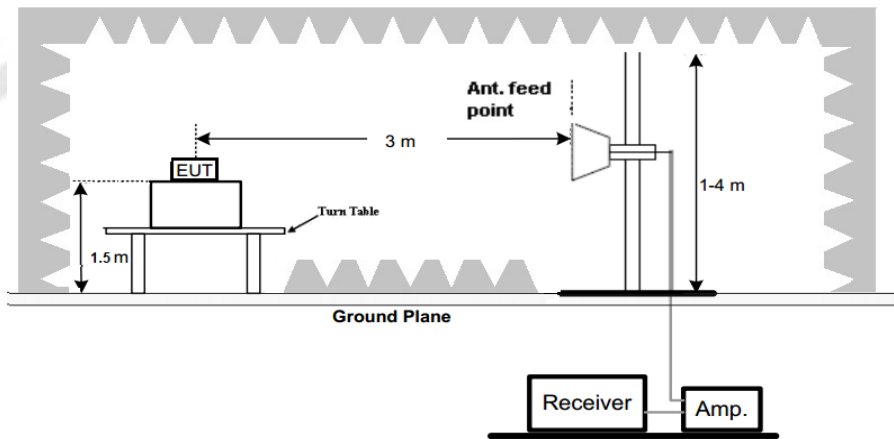
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz

**Test Procedure**

- Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measurements have been completed.
- Radiated emission test frequency band from 9KHz to 25GHz.
- The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Bilog Antenna	3
1GHz-18GHz	Horn Antenna	3
18GHz-25GHz	Horn Antenna	1

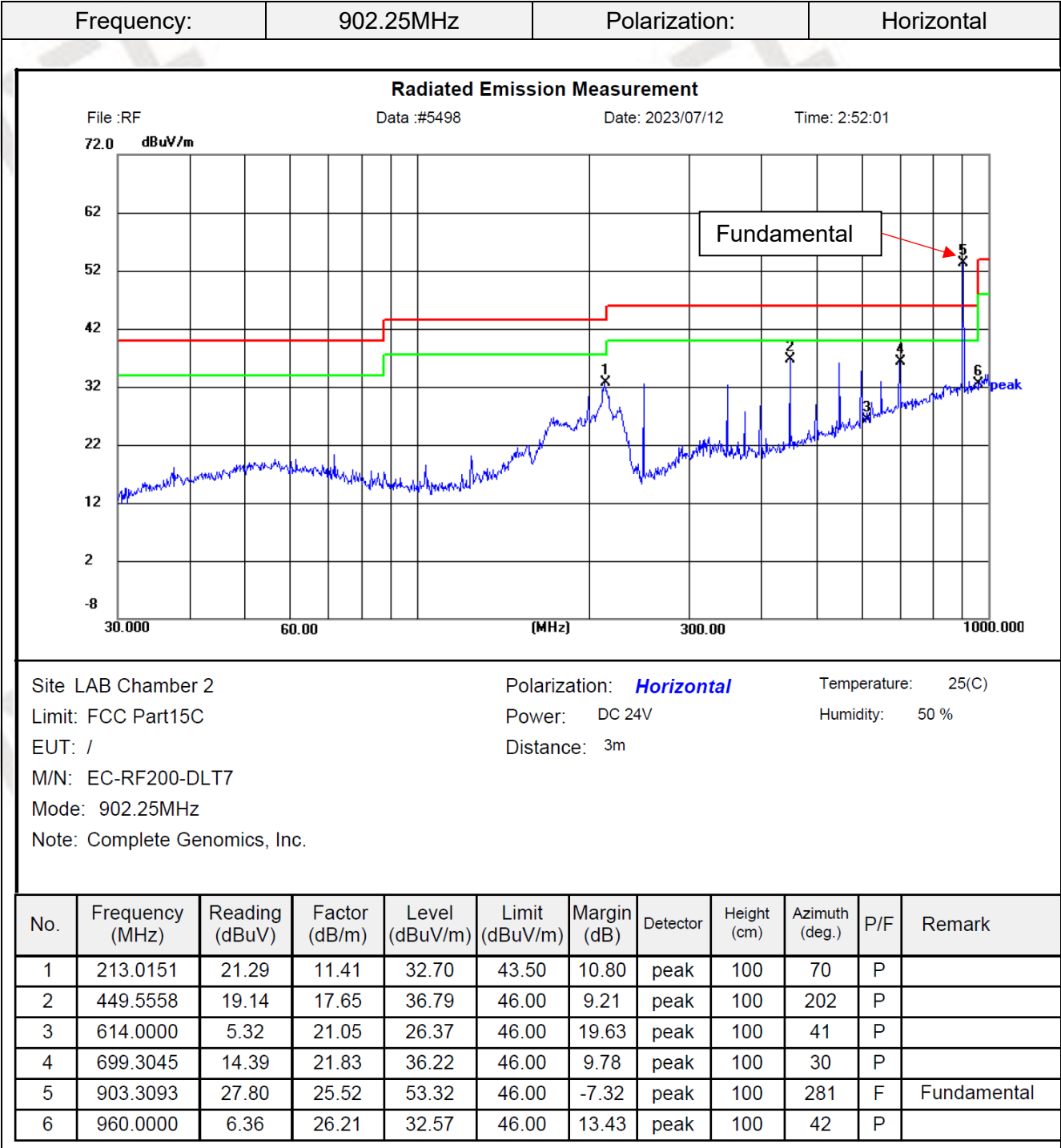
- Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto Average Value: RBW=1MHz/VBW=10Hz, Sweep time=Auto	Peak

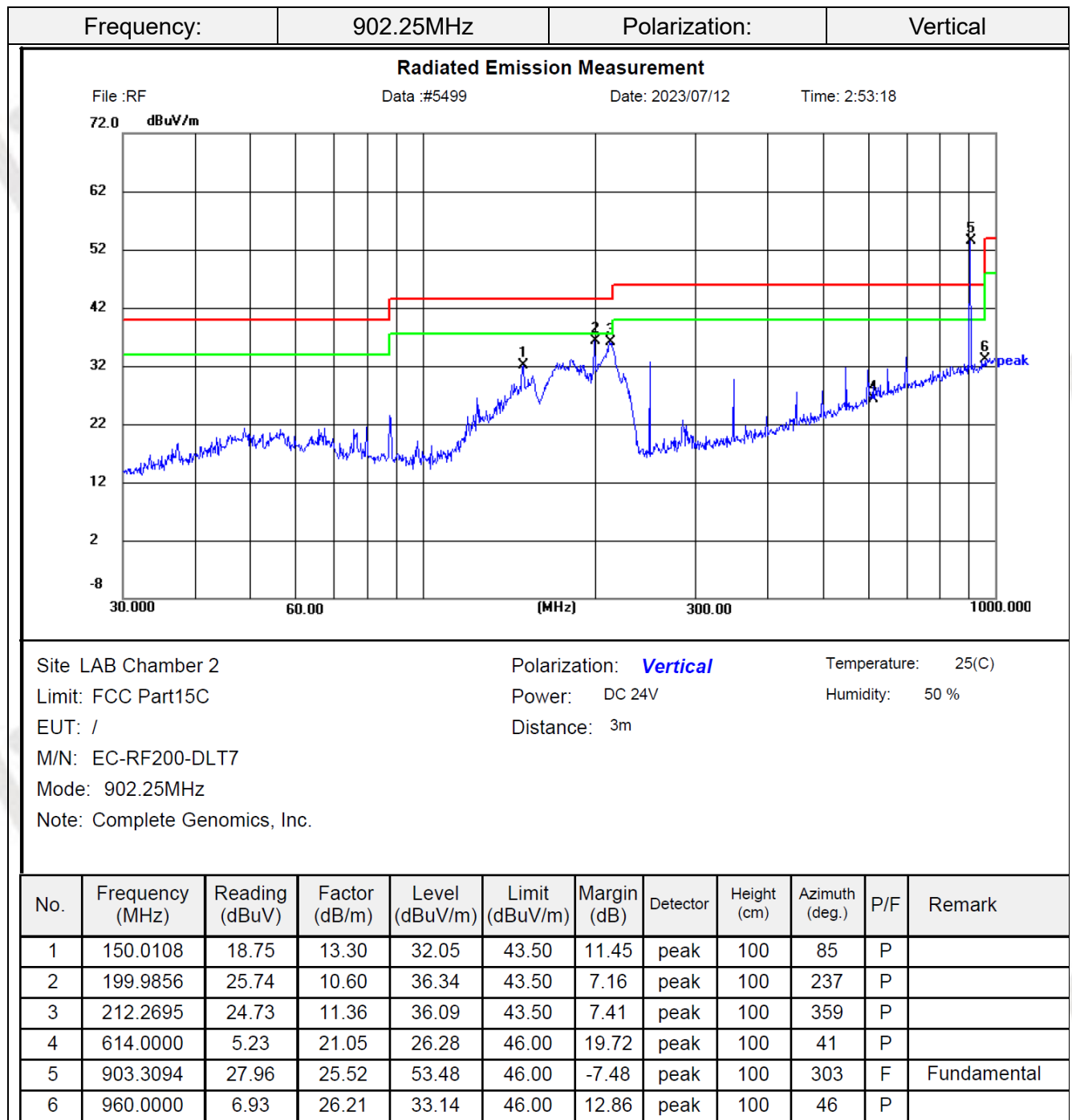
TEST RESULTS

Remark: Radiated emission test from 9 KHz to 10GHz harmonic of fundamental was verified, and the emission levels from 9kHz to 30MHz are attenuated 20dB below the limit and not recorded in report.

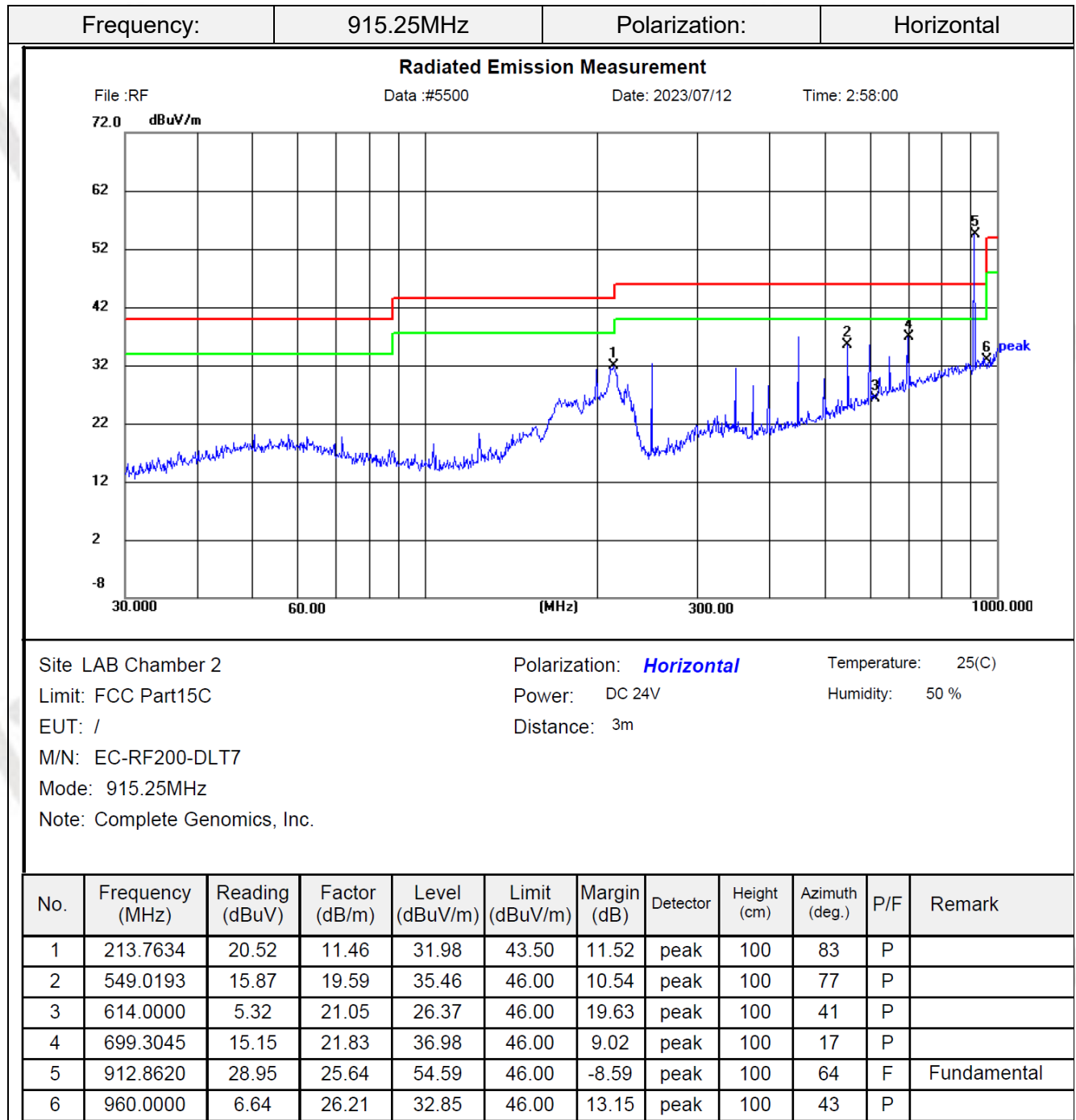
For 30MHz-1GHz



Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
 Margin= Limit(dBuV/m)- Level(dBuV/m)

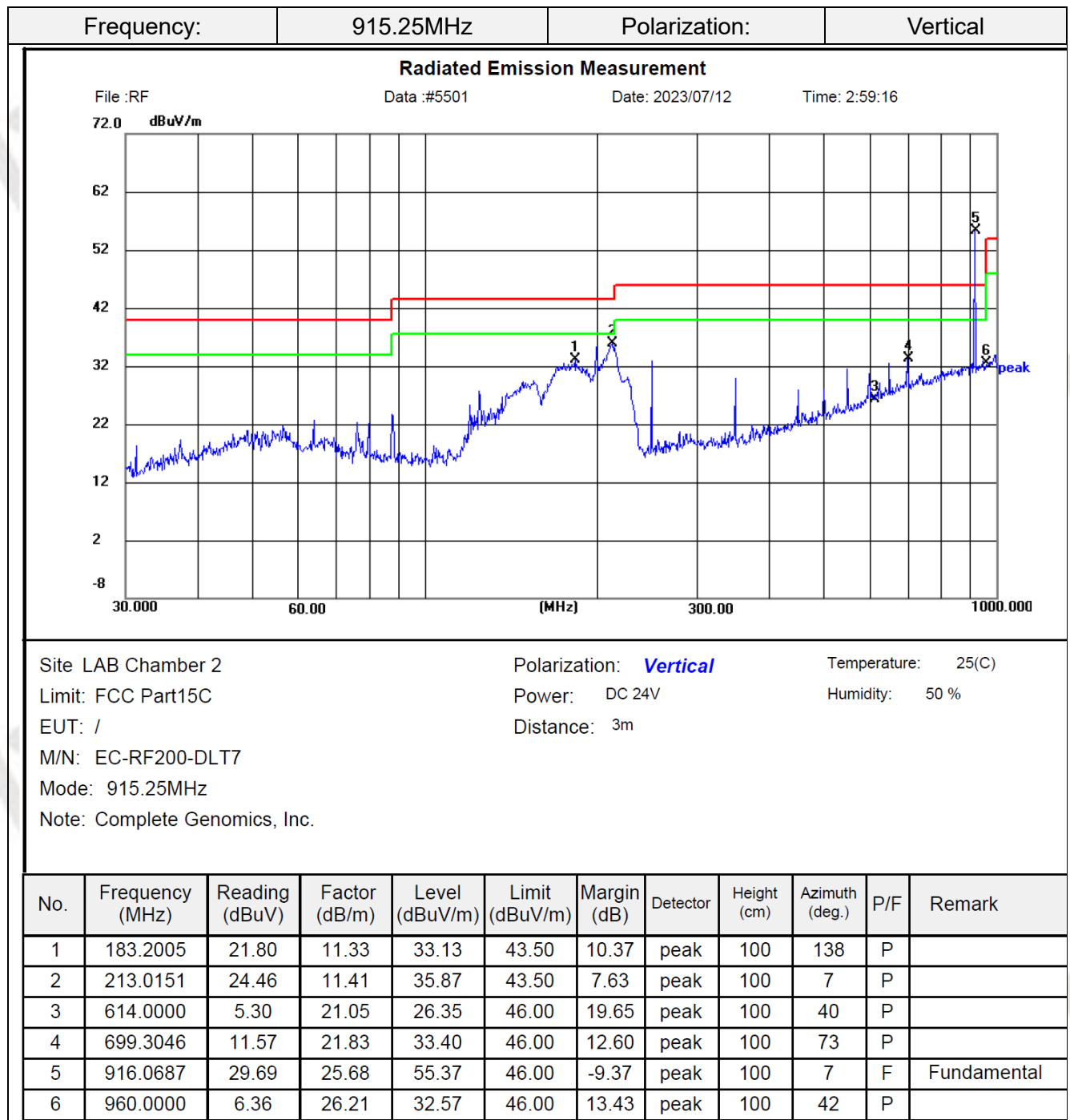


Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
 Margin= Limit(dBuV/m)- Level(dBuV/m)

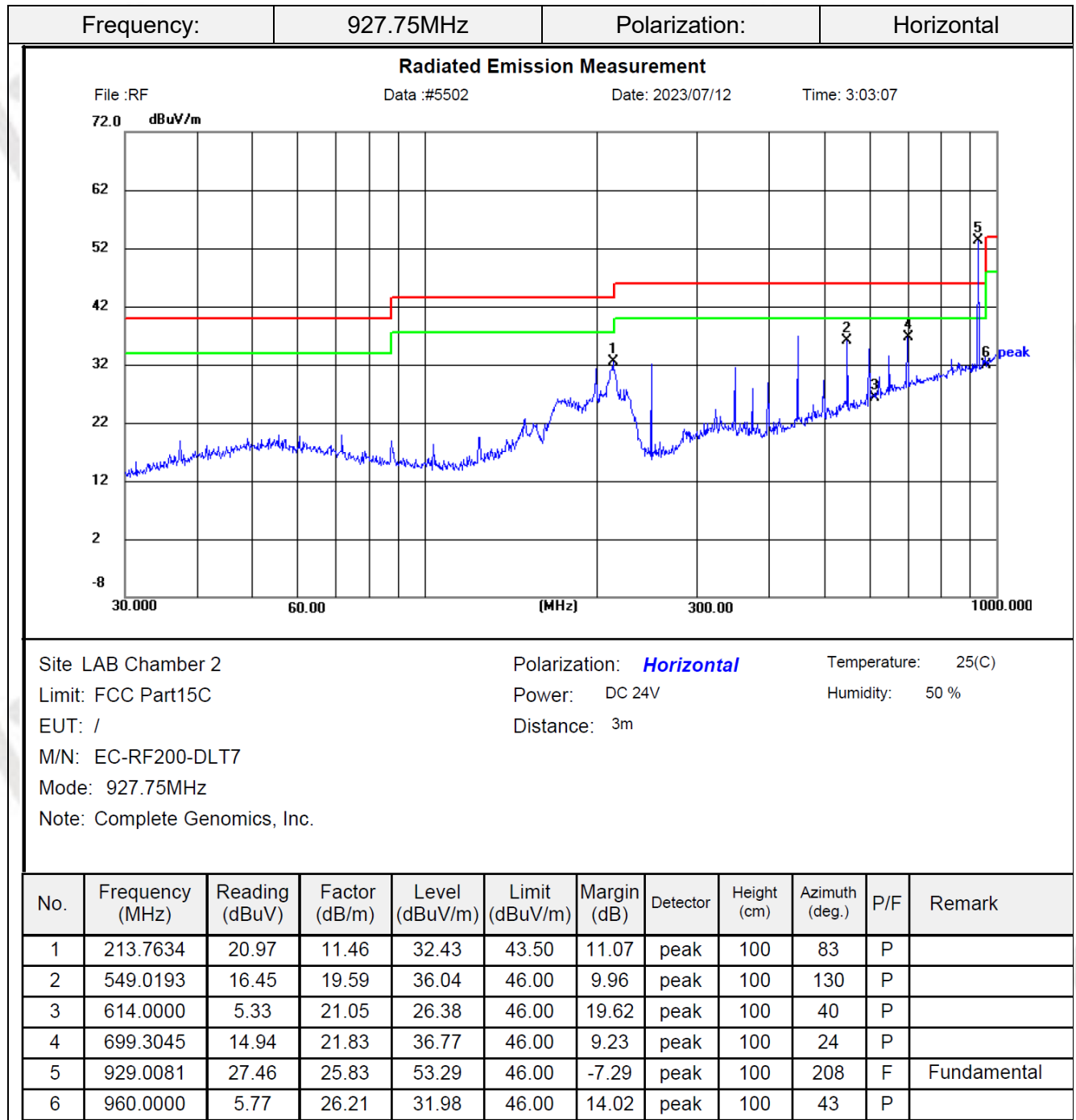


Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)

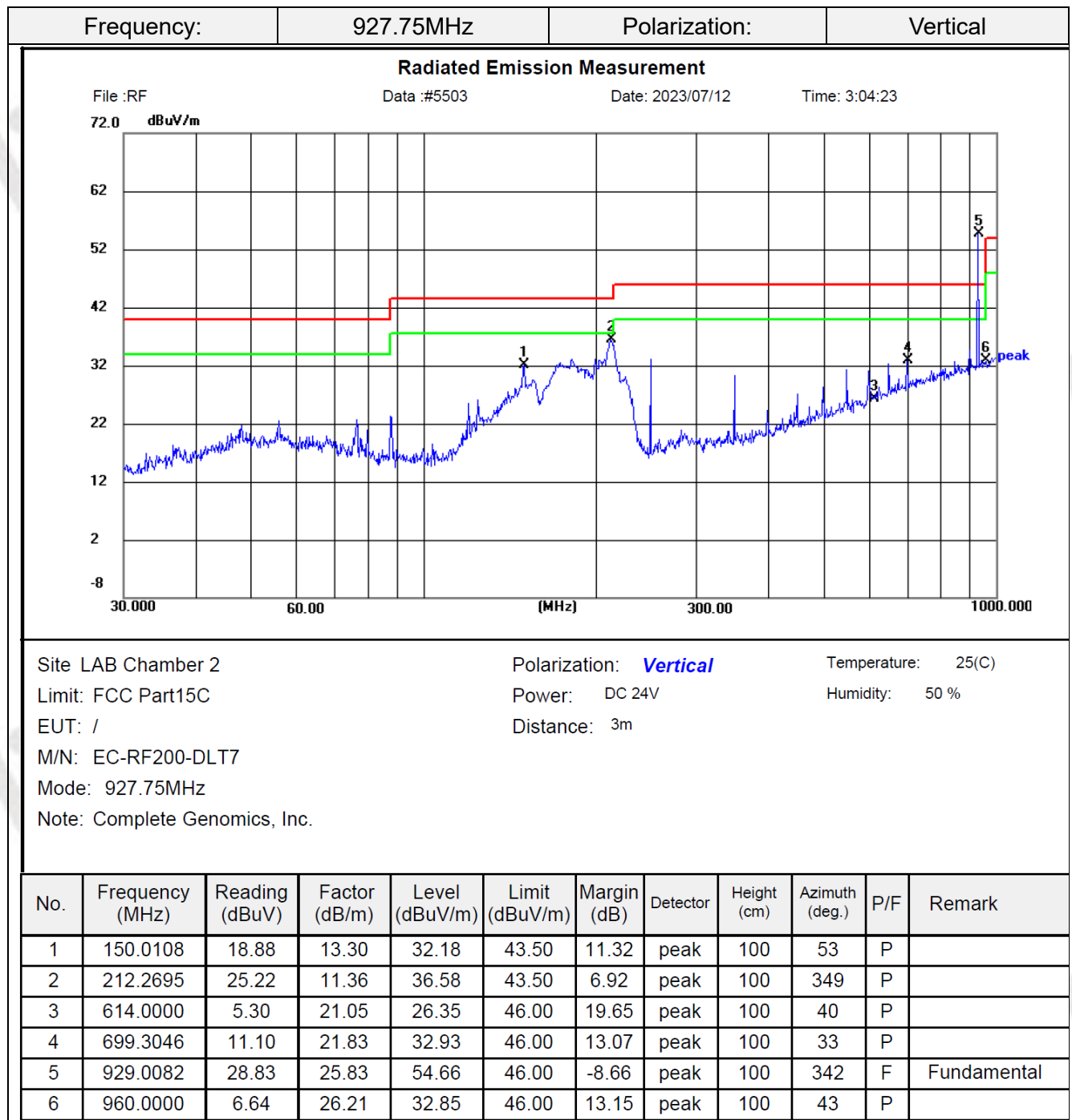
Margin= Limit(dBuV/m)- Level(dBuV/m)



Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
 Margin= Limit(dBuV/m)- Level(dBuV/m)



Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
 Margin= Limit(dBuV/m)- Level(dBuV/m)



Remark: Level(dBuV/m)=Reading(dBuV)+Factor(dB/m)
 Margin= Limit(dBuV/m)- Level(dBuV/m)

For 1GHz to 10GHz

Frequency(MHz):				902.25		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1804.50	43.62	PK	74	30.38	66.48	27.16	4.01	54.03	-22.86
1	1804.50	--	AV	54	--	--	--	--	--	--
2	2706.75	57.62	PK	74	16.38	77.95	29.33	4.94	54.60	-20.33
2	2706.75	48.15	AV	54	5.85	68.48	29.33	4.94	54.60	-20.33
3	3609.00	54.43	PK	74	19.57	71.25	32.08	5.95	54.85	-16.82
3	3609.00	46.29	AV	54	7.71	63.11	32.08	5.95	54.85	-16.82
4	4511.25	47.47	PK	74	26.53	61.62	32.88	6.73	53.76	-14.15
4	4511.25	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				902.25		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1804.50	45.77	PK	74	28.23	68.63	27.16	4.01	54.03	-22.86
1	1804.50	--	AV	54	--	--	--	--	--	--
2	2706.75	57.58	PK	74	16.42	77.91	29.33	4.94	54.60	-20.33
2	2706.75	49.15	AV	54	4.85	69.48	29.33	4.94	54.60	-20.33
3	3609.00	55.06	PK	74	18.94	71.88	32.08	5.95	54.85	-16.82
3	3609.00	47.06	AV	54	6.94	63.88	32.08	5.95	54.85	-16.82
4	4511.25	47.45	PK	74	26.55	61.60	32.88	6.73	53.76	-14.15
4	4511.25	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Frequency(MHz):				915.25		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1830.50	45.14	PK	74	28.86	67.88	27.31	4.04	54.08	-22.74
1	1830.50	--	AV	54	--	--	--	--	--	--
2	2745.75	55.60	PK	74	18.40	75.75	29.47	4.98	54.61	-20.15
2	2745.75	47.95	AV	54	6.05	68.10	29.47	4.98	54.61	-20.15
3	3661.00	51.71	PK	74	22.29	68.16	32.40	6.01	54.87	-16.45
3	3661.00	46.49	AV	54	7.51	62.94	32.40	6.01	54.87	-16.45
4	4576.25	46.27	PK	74	27.73	60.25	32.97	6.77	53.72	-13.98
4	4576.25	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				915.25		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1830.50	45.86	PK	74	28.14	68.60	27.31	4.04	54.08	-22.74
1	1830.50	--	AV	54	--	--	--	--	--	--
2	2745.75	55.96	PK	74	18.04	76.11	29.47	4.98	54.61	-20.15
2	2745.75	48.48	AV	54	5.52	68.63	29.47	4.98	54.61	-20.15
3	3661.00	53.72	PK	74	20.28	70.17	32.40	6.01	54.87	-16.45
3	3661.00	46.67	AV	54	7.33	63.12	32.40	6.01	54.87	-16.45
4	4576.25	46.41	PK	74	27.59	60.39	32.97	6.77	53.72	-13.98
4	4576.25	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Frequency(MHz):				927.75		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1855.50	44.01	PK	74	29.99	66.63	27.45	4.06	54.13	-22.62
1	1855.50	--	AV	54	--	--	--	--	--	--
2	2783.25	58.19	PK	74	15.81	78.18	29.61	5.02	54.62	-19.99
2	2783.25	48.86	AV	54	5.14	68.85	29.61	5.02	54.62	-19.99
3	3711.00	54.64	PK	74	19.36	70.74	32.71	6.07	54.88	-16.10
3	3711.00	46.72	AV	54	7.28	62.82	32.71	6.07	54.88	-16.10
4	4638.75	48.07	PK	74	25.93	61.84	33.10	6.81	53.68	-13.77
4	4638.75	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				927.75		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	1855.50	45.12	PK	74	28.88	67.74	27.45	4.06	54.13	-22.62
1	1855.50	--	AV	54	--	--	--	--	--	--
2	2783.25	60.49	PK	74	13.51	80.48	29.61	5.02	54.62	-19.99
2	2783.25	48.08	AV	54	5.92	68.07	29.61	5.02	54.62	-19.99
3	3711.00	56.75	PK	74	17.25	72.85	32.71	6.07	54.88	-16.10
3	3711.00	46.40	AV	54	7.60	62.50	32.71	6.07	54.88	-16.10
4	4638.75	47.38	PK	74	26.62	61.15	33.10	6.81	53.68	-13.77
4	4638.75	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. --Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW1MHz VBW3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

3.3. Maximum Conducted Output Power

Limit

The Maximum Peak Output Power limit is 30 dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power Meter.

Test Configuration



Test Results

Channel Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power Limit (dBm)	Result
902.25	15.247	30	PASS
915.25	15.498	30	PASS
927.75	15.735	30	PASS

Test Graphs



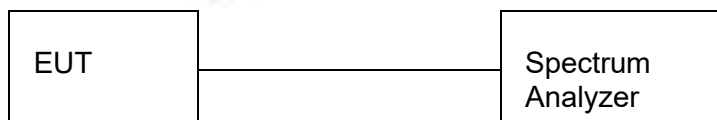
3.4. 20dB Bandwidth

Test Procedure

According to ANSI C63.10: 2013. Use the following spectrum analyzer settings: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel $RBW \geq 1\%$ of the 20dB bandwidth, $VBW \geq RBW$, Sweep = auto, Detector function = peak, Trace = max hold. The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.

Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation..

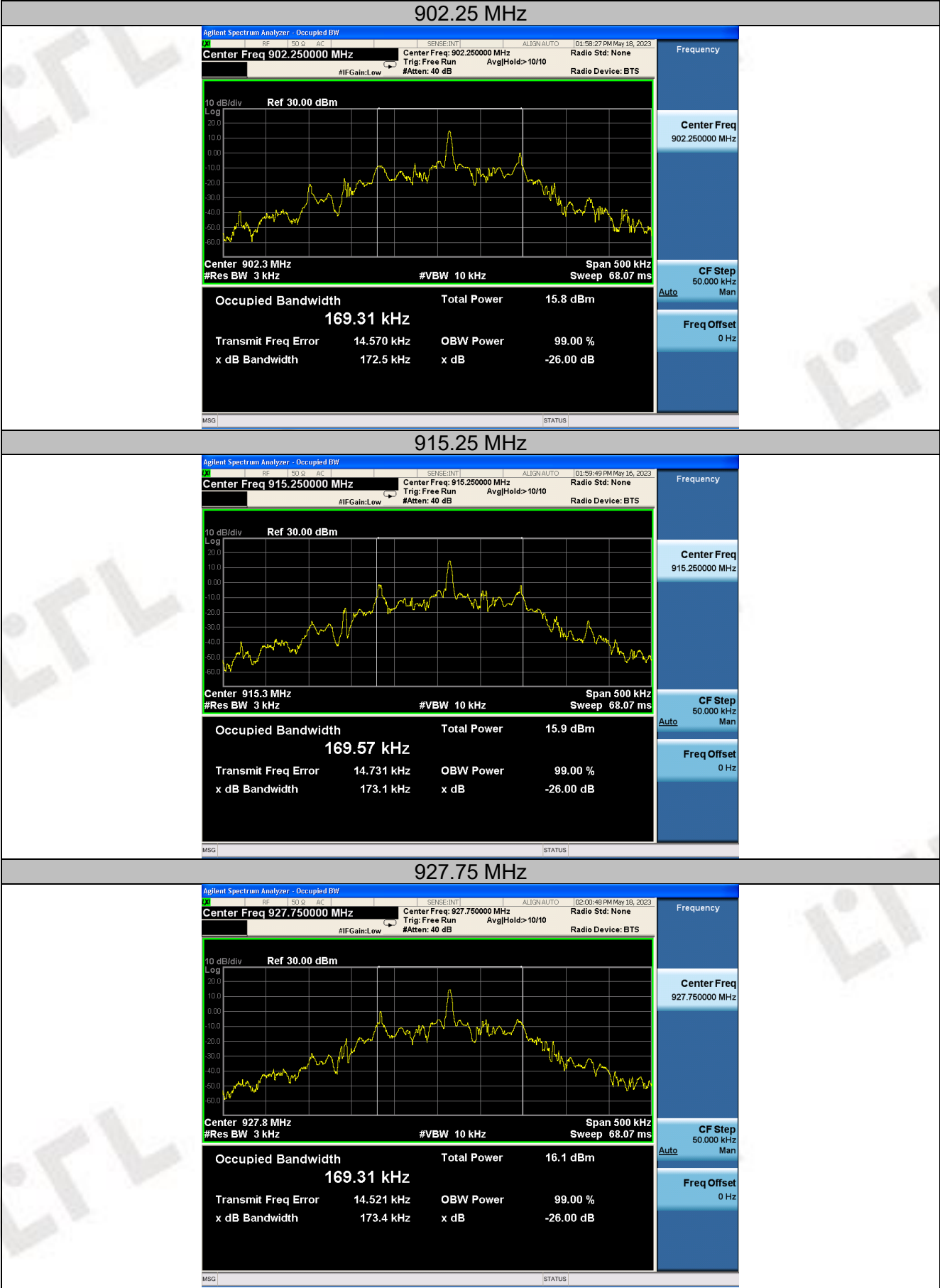
Test Configuration



Test Results

Channel Frequency (MHz)	20dB Bandwidth (KHz)	99% Bandwidth (KHz)	Limit (KHz)	Result
902.25	172.5	169.31	/	PASS
915.25	173.1	169.57	/	PASS
927.75	173.4	169.31	/	PASS

Test Graphs



3.5. Frequency Separation

Limit

Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater.

Test Procedure

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) \geq 1% of the span

Video (or Average) Bandwidth VBW \geq RBW

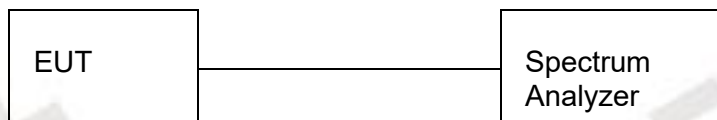
Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

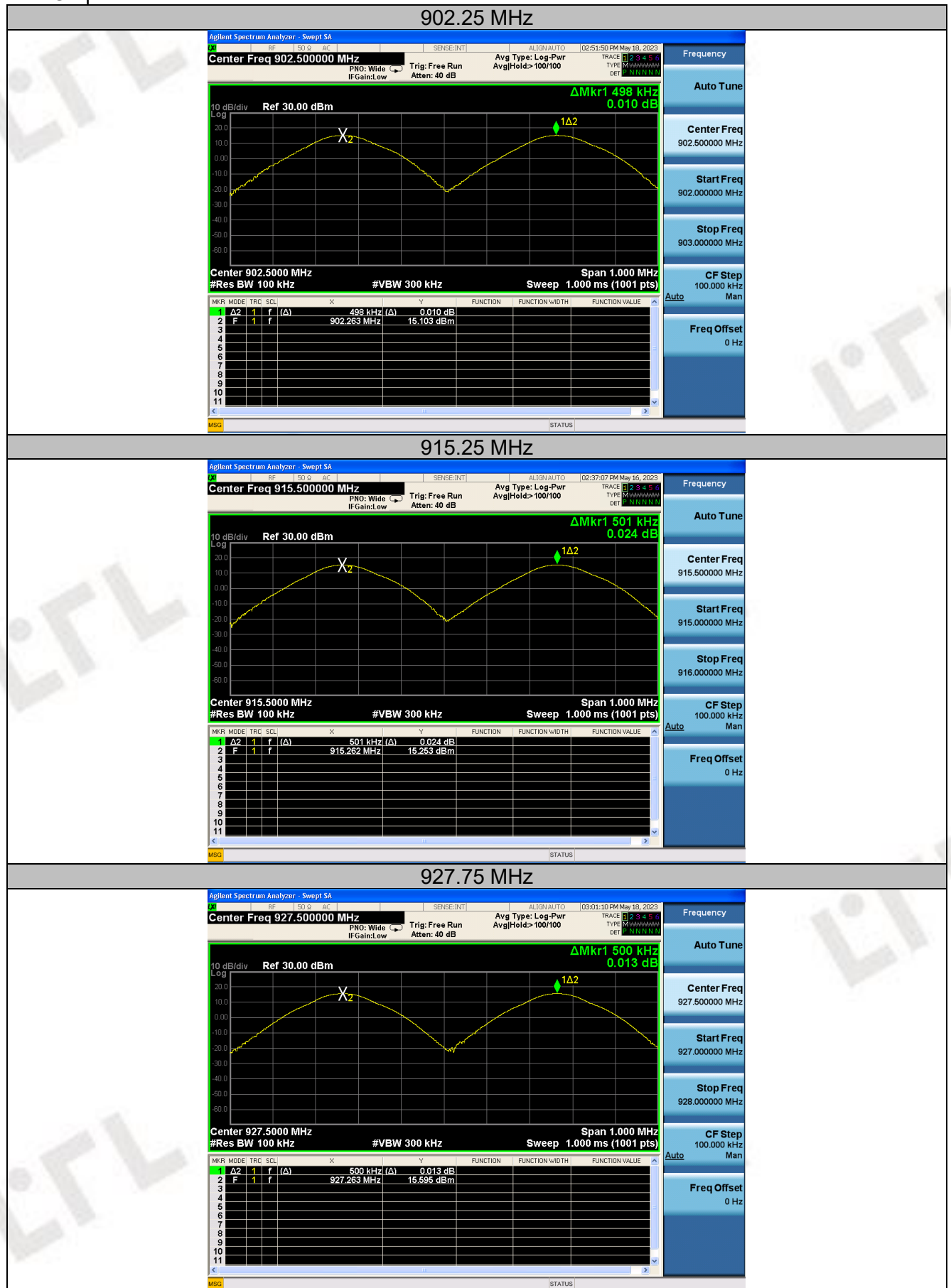
Test Configuration



Test Results

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	902.25	0.498	0.025MHz or 20dB bandwidth	Pass
Adjacency Channel	902.75			
Middle Channel	915.25	0.501	0.025MHz or 20dB bandwidth	Pass
Adjacency Channel	915.75			
High Channel	927.75	0.500	0.025MHz or 20dB bandwidth	Pass
Adjacency Channel	927.25			

Test Graphs



3.6. Number of hopping frequency

Limit

if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Test Procedure

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW \geq 1% of the span

VBW \geq RBW

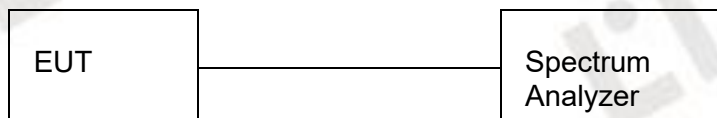
Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

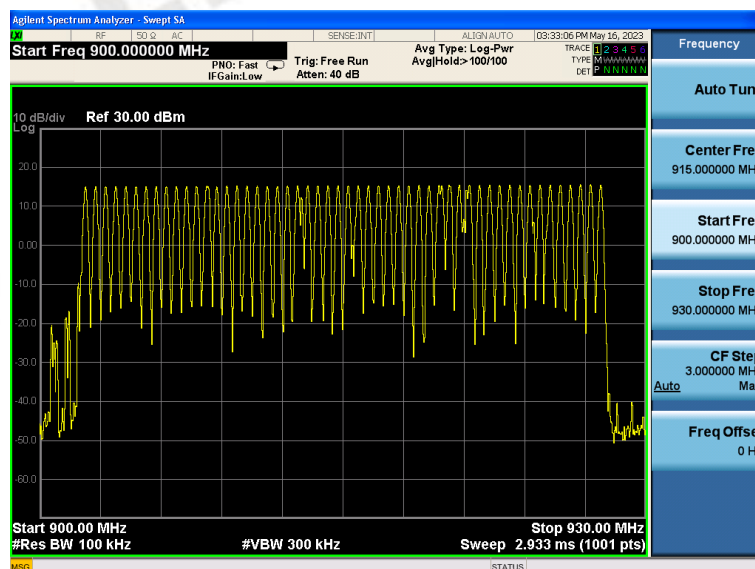
Test Configuration



Test Results

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Limit
902-928	52	≥ 50

Test Graphs



3.7. Time Of Occupancy(Dwell Time)

Limit

if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period.

Test Procedure

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 100KHz

VBW \geq RBW

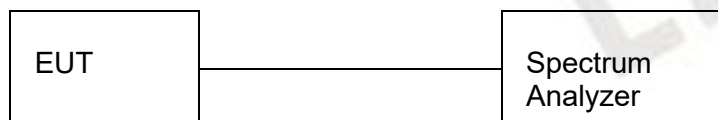
Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

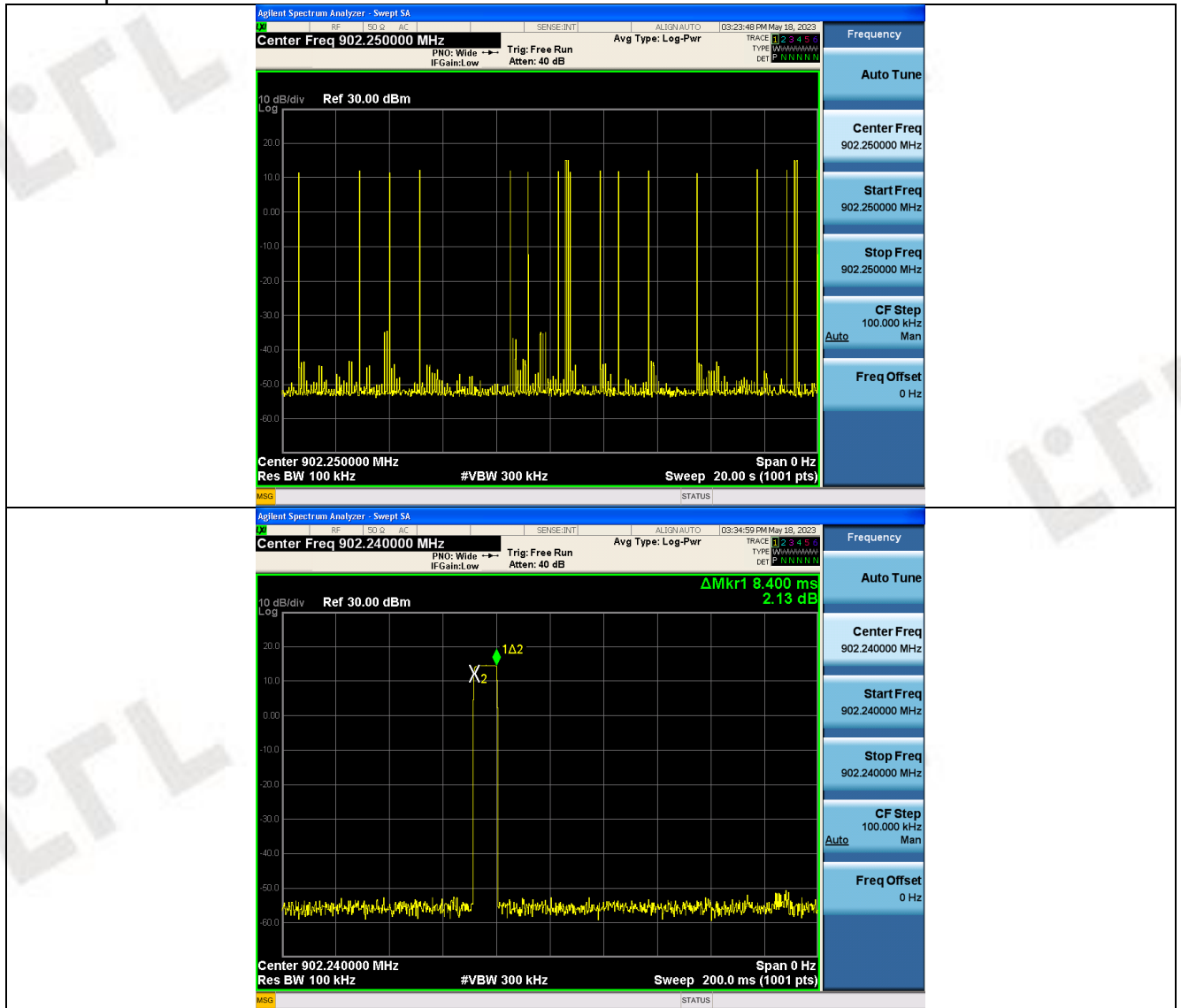
Test Configuration



Test Results

Frequency (MHz)	No. of burst	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
902.25	19	8.40	159.6	400	Pass

Test Graphs



3.8. Spurious RF Conducted Emissions and bandedge

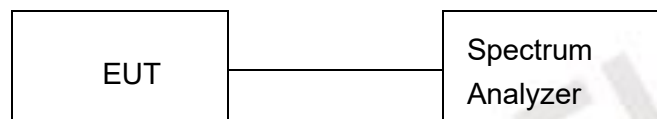
Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

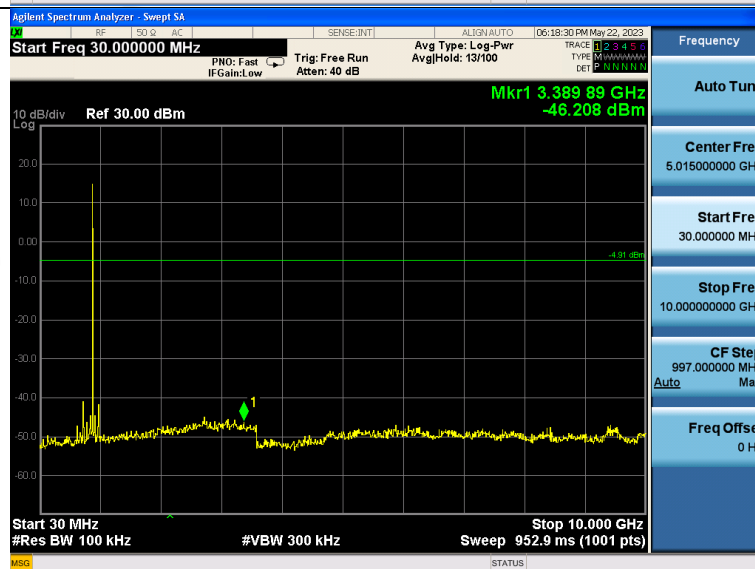
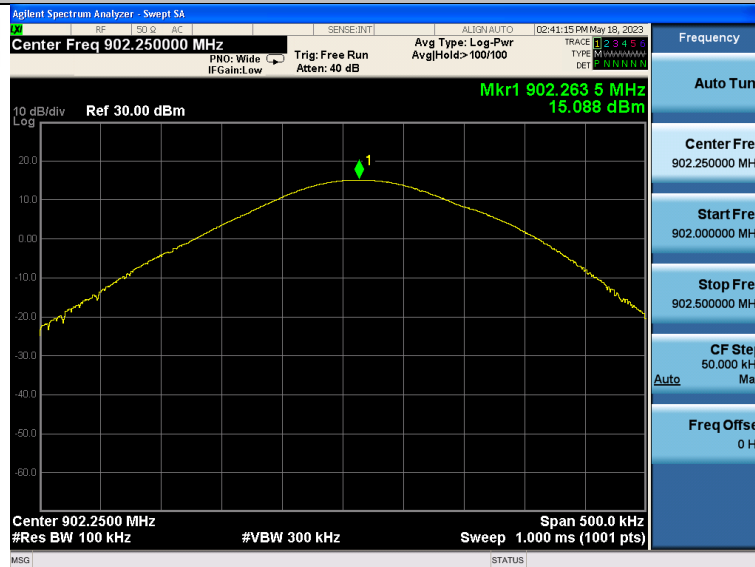
Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration

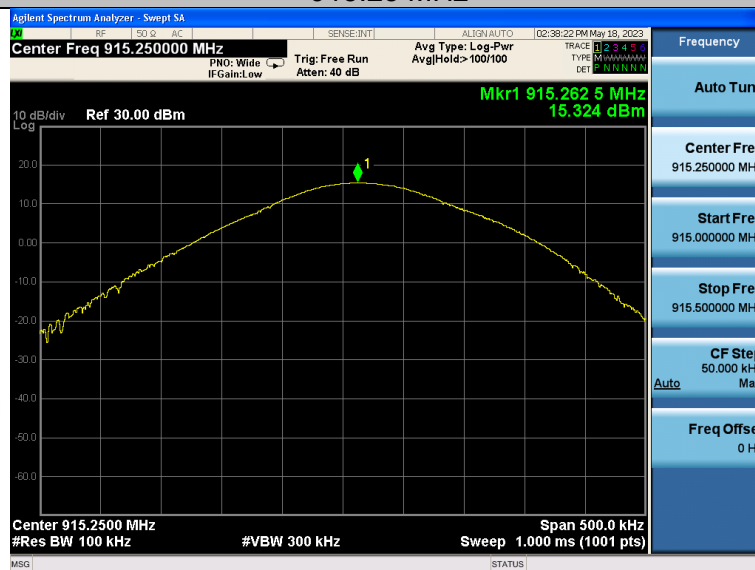


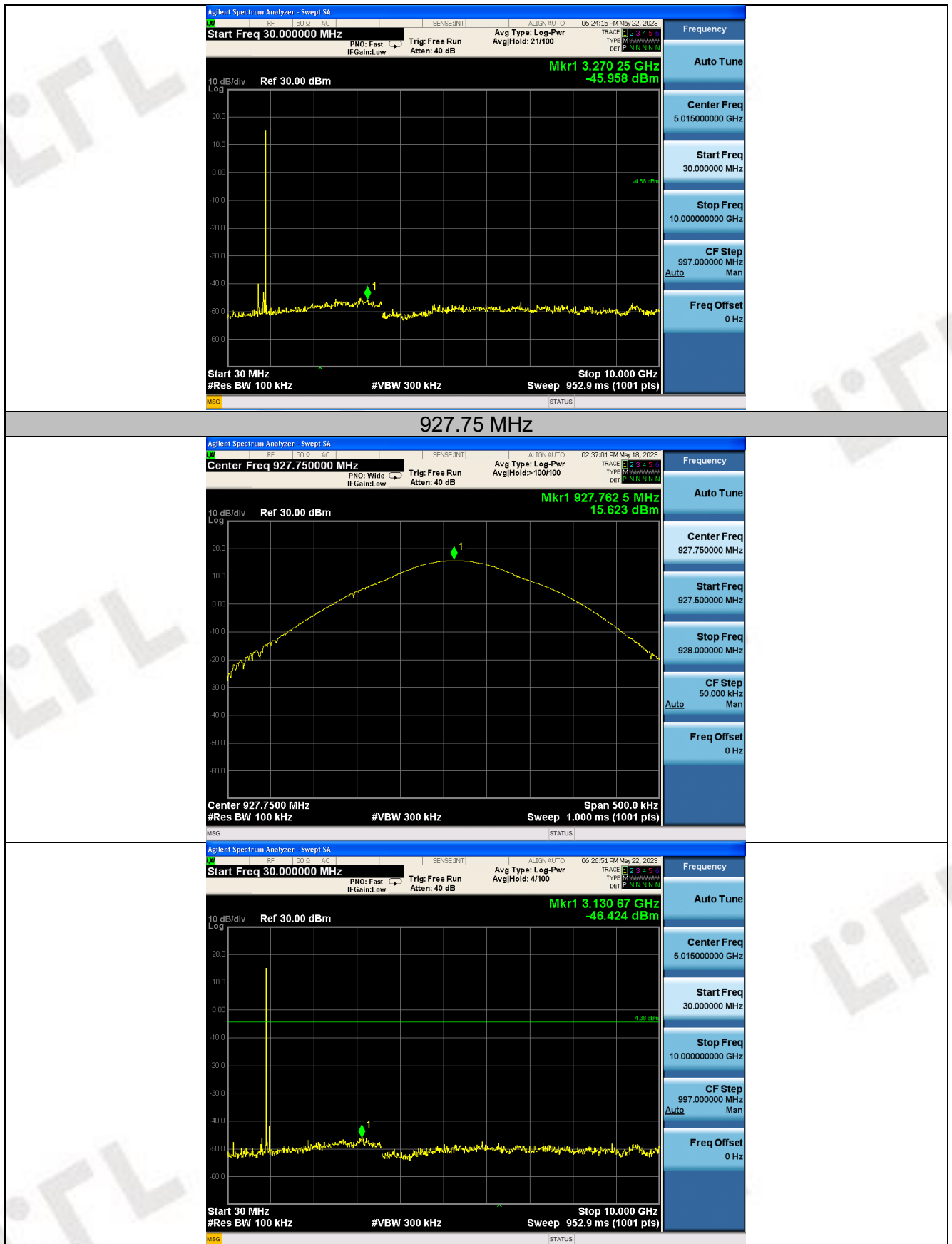
Test Results

902.25 MHz

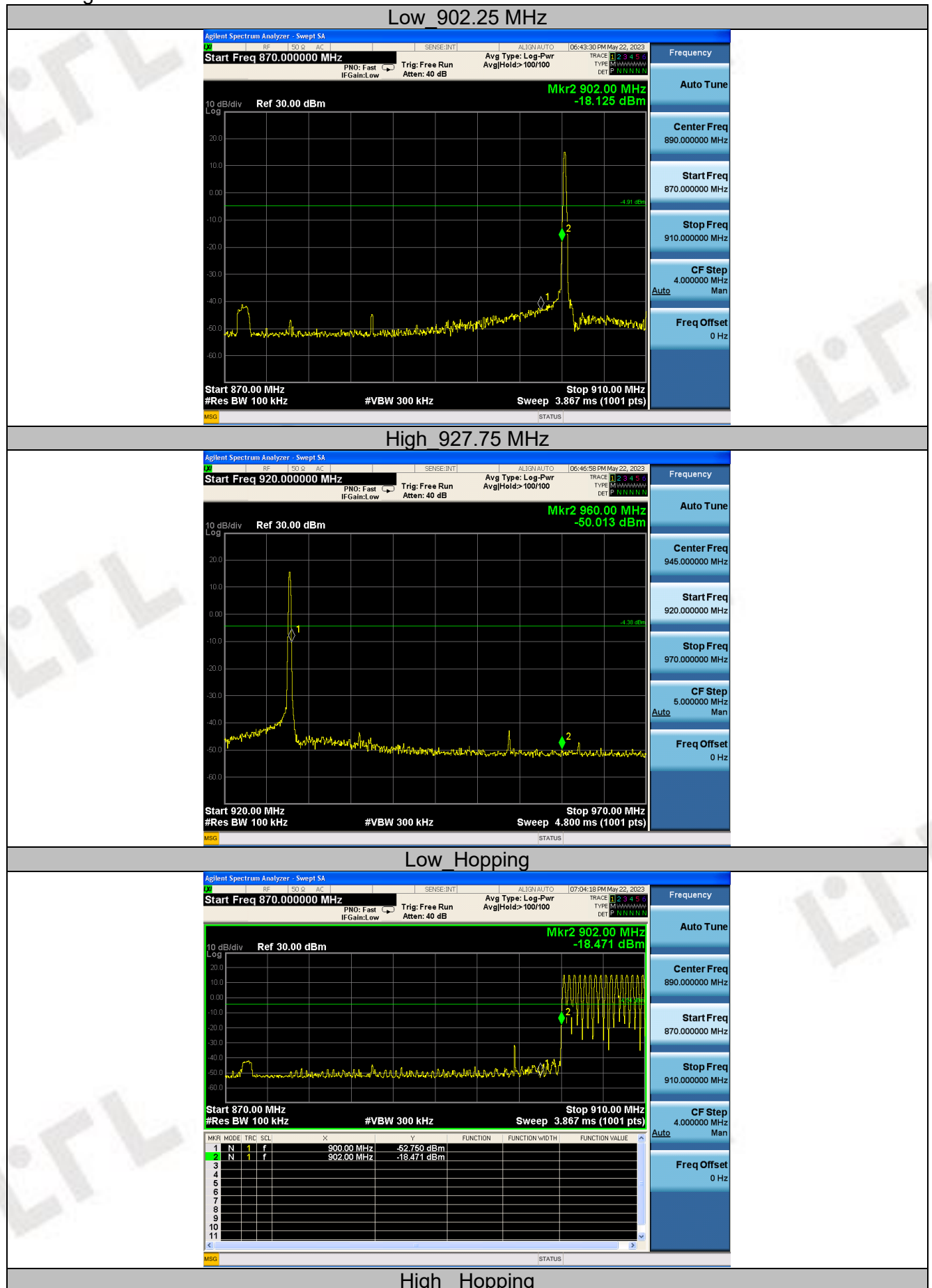


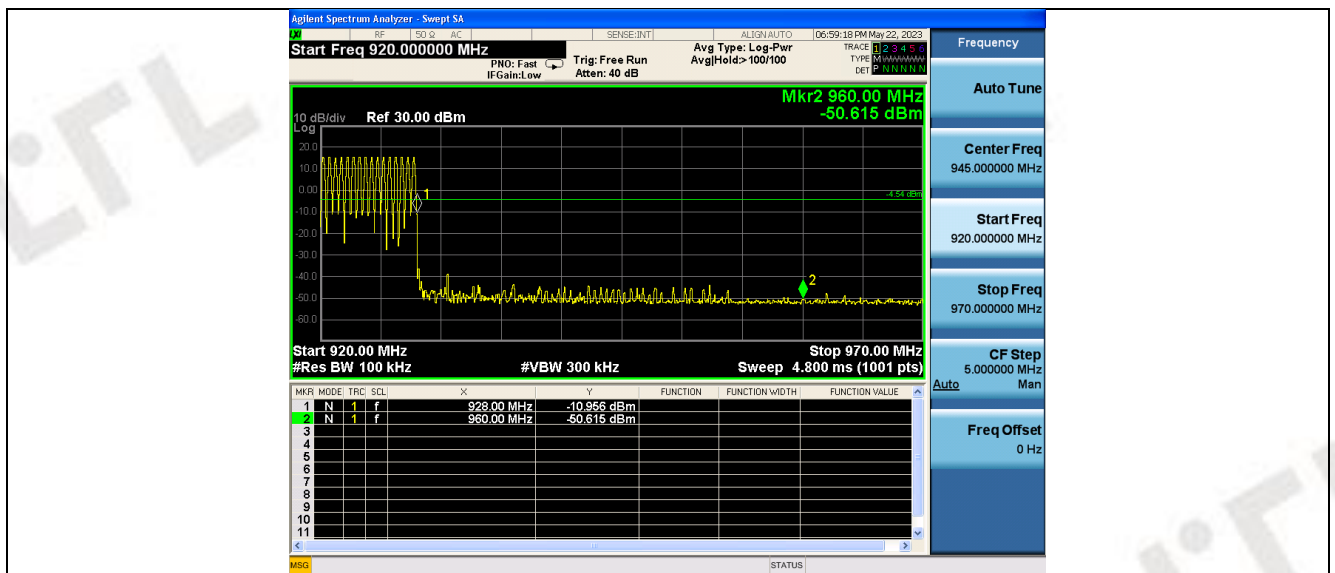
915.25 MHz





Band edge measurements





3.9. Antenna Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(b)(4):

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Result:

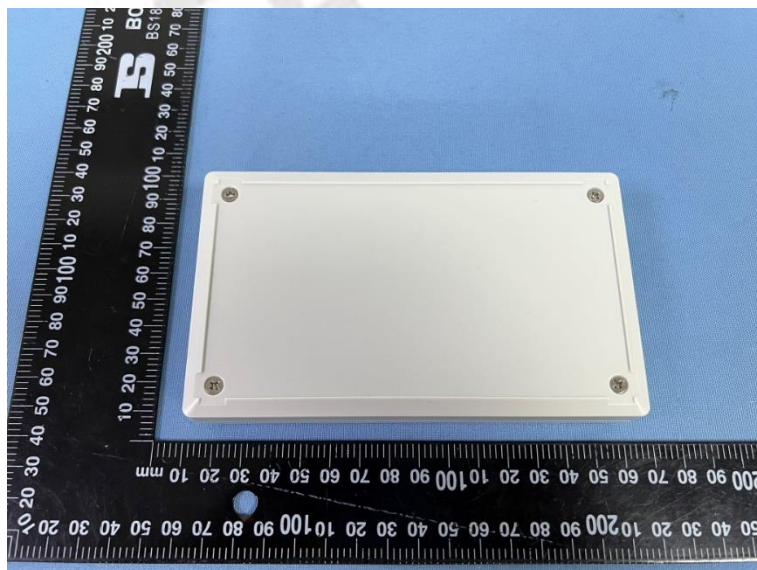
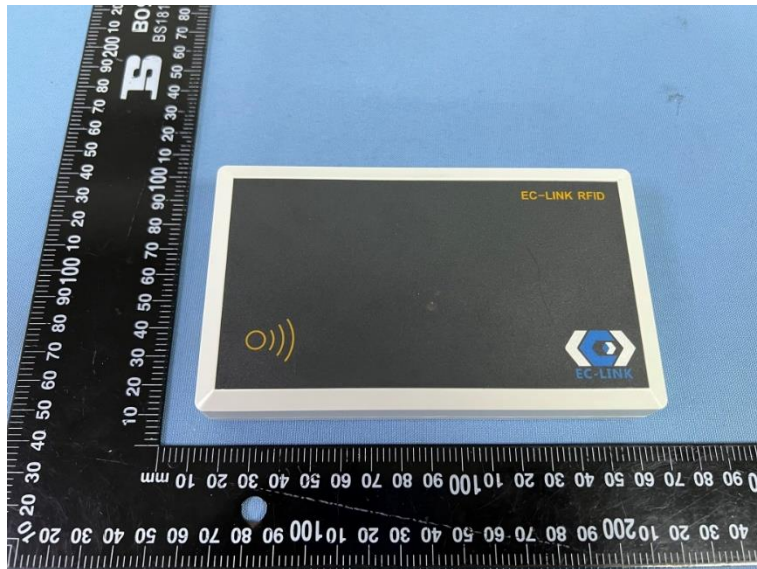
Antenna information:

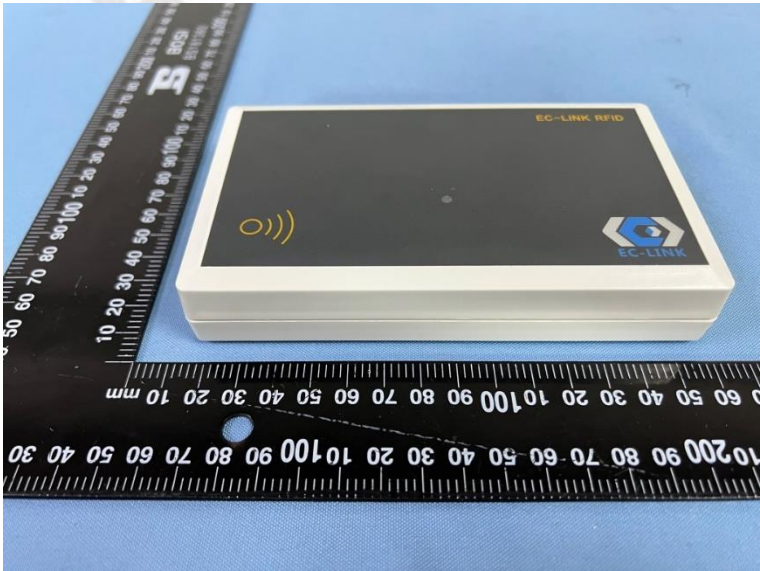
Type	Antenna type	Frequency Range	Antenna Gain
EC-UHF-ANT-NF0003	External Planar RFID antenna	840-960MHz	-8.02dBi

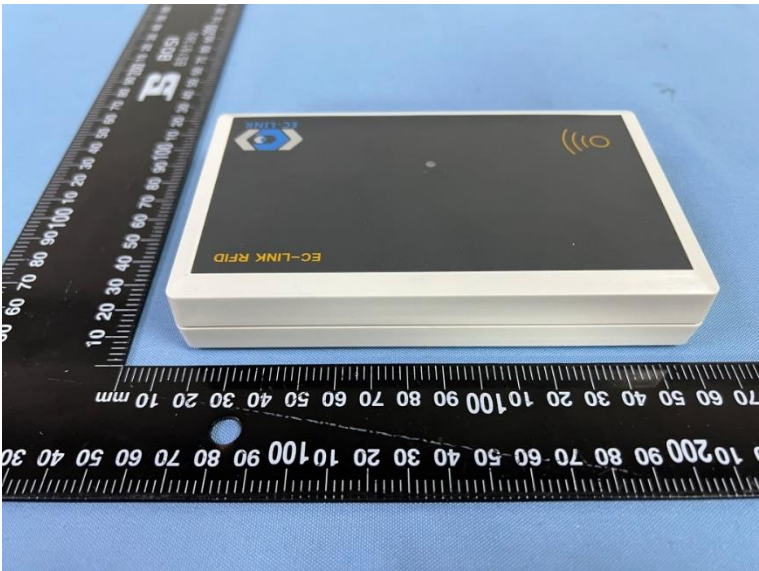
4. Test Setup Photos of the EUT



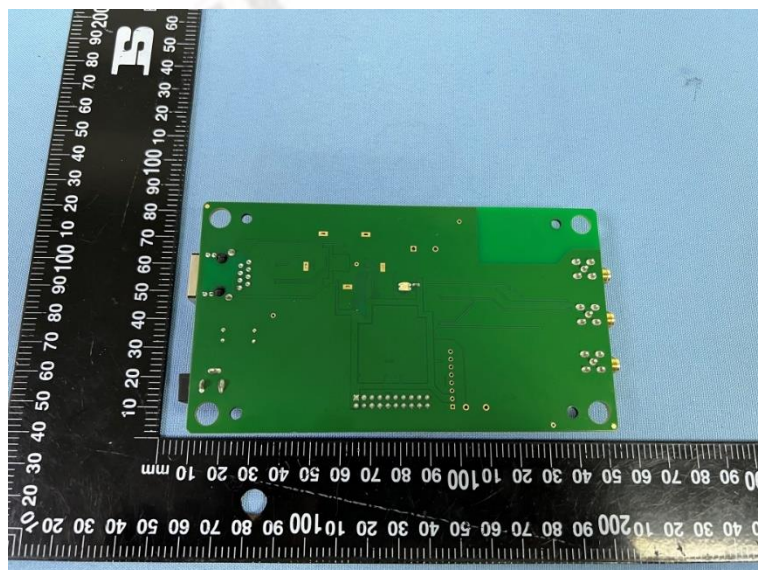
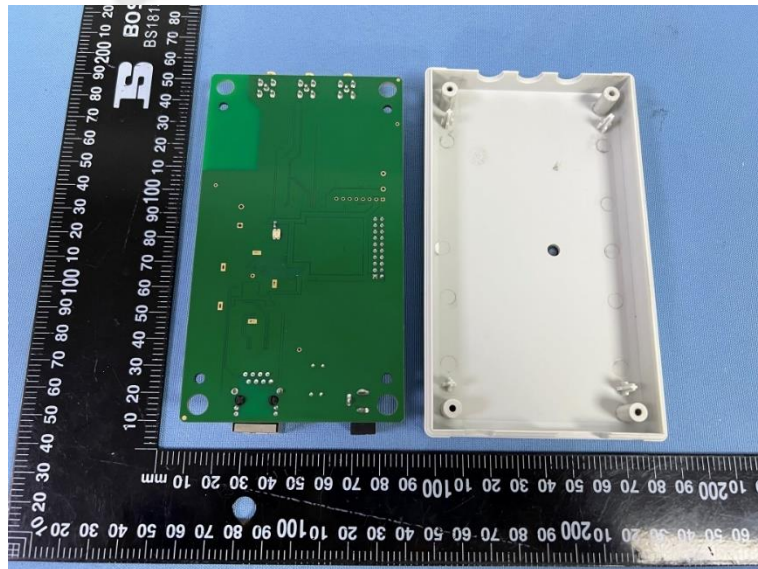
5. Photos of the EUT

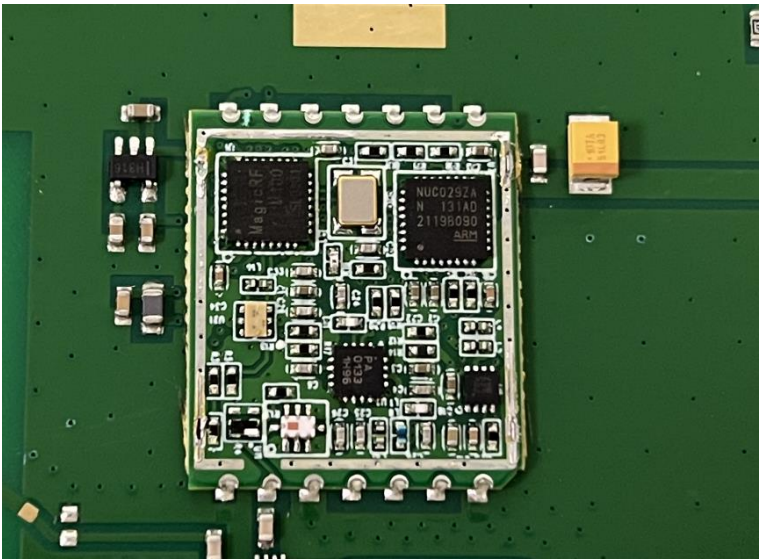
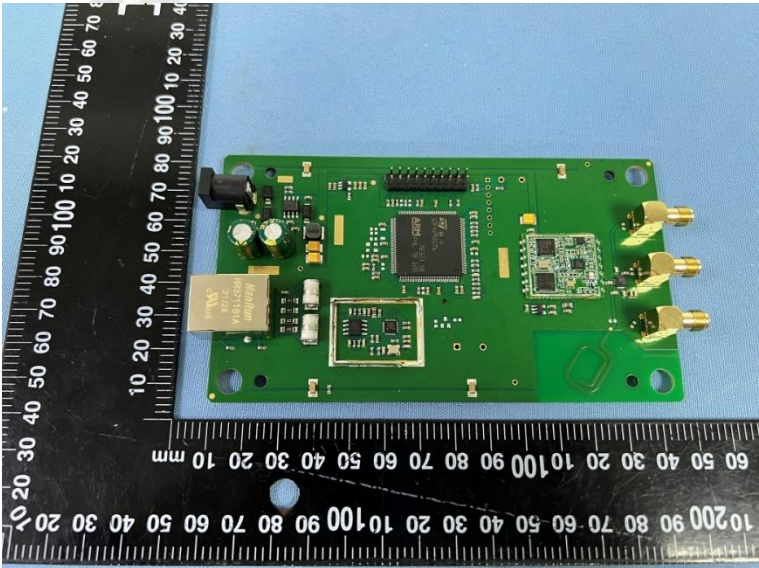
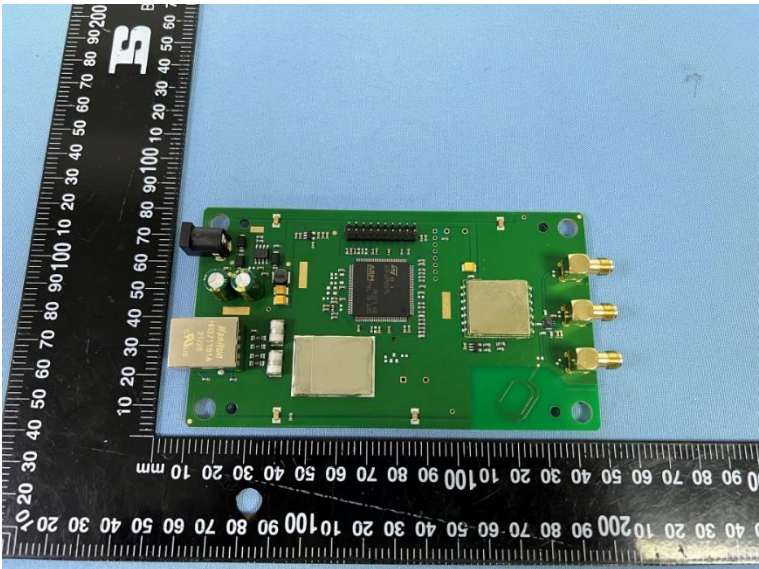


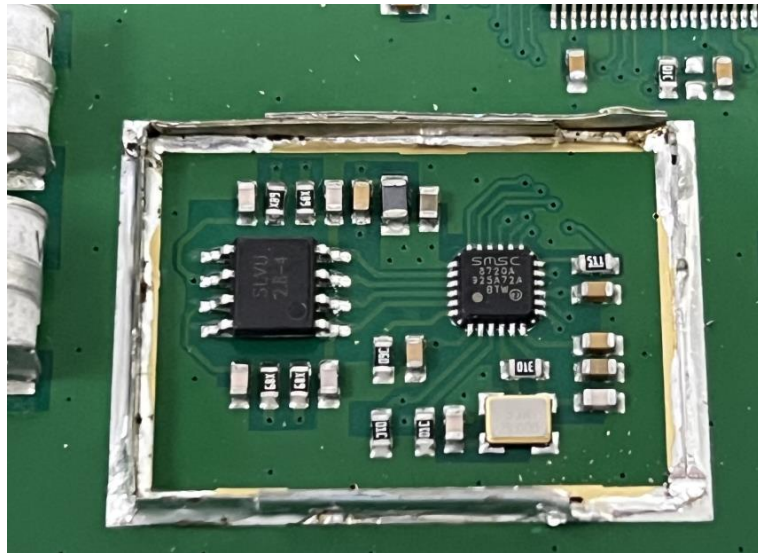




Internal photos







***** End of Report *****