



FCC REPORT

For LTE Cat NB

Report No. : **CHTEW22050123** **Report Verification:** 

Project No. : **SHT2204062801EW**

FCC ID : **2A3JW-SAPPHIRE**

Applicant : **Eitan Medical Ltd.**

Address : **29 Yad Haruzim St. P.O. Box 8639 Netanya 4250529, Israel**

Product Name : **SapphireConnect**

Trade Mark : **Sapphire Connect**

Model No. : **SapphireConnect**

Listed Model(s) : **-**

Standard : **FCC CFR Title 47 Part 2**
FCC CFR Title 47 Part 24
FCC CFR Title 47 Part 27

Date of receipt of test sample : **Apr. 22, 2022**

Date of testing : **Apr. 23, 2022- May. 19, 2022**

Date of issue : **May. 20, 2022**

Result : **Pass**

Compiled by
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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address : **1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China**

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The test report merely correspond to the test sample.

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1. TEST STANDARDS AND REPORT VERSION

1.1. Applicable Standards

The tests were performed according to following standards:

[FCC Rules Part 2:](#) FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Rules Part 24:](#) PERSONAL COMMUNICATIONS SERVICES

[FCC Rules Part 27:](#) MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[ANSI C63.26: 2015:](#) American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

[KDB 971168 D01 Power Meas License Digital Systems v03:](#) MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2022-05-20	Original

2. TEST DESCRIPTION

Section	Test Item	Section in CFR 47	Result ^{#1}	Test Engineer
	Conducted Output Power	Part 2.1046 Part 24.232(c) Part 27.50	Pass*	N/A
	Peak-to-Average Ratio	Part 24.232 Part 27.50	Pass*	N/A
	99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 24.238(b) Part 27.53	Pass*	N/A
	Band Edge	Part 2.1051 Part 24.238 Part 27.53	Pass*	N/A
	Conducted Spurious Emissions	Part 2.1051 Part 24.238 Part 27.53	Pass*	N/A
	Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 24.235 Part 27.54	Pass*	N/A
	Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 24.235 Part 27.54	Pass*	N/A
	ERP and EIRP	Part 24.232(b) Part 27.50	Pass*	N/A
5.1	Radiated Spurious Emissions	Part 2.1053 Part 24.238 Part 27.53	Pass	Pan Xie

Note:

- 1) #1: The test result does not include measurement uncertainty value
- 2) *: Refer to the module report which report No. is R2005A0283-R6 and R2005A0283-R8.
- 3) This device has installed a certified modular which FCC ID is XMR202005BG95M5, so these conducted test data directly reference the modular's data.
- 4) In this device, LTE Cat NB band 5, 13, 25, 66, 71, 85 are shielded by software, only use band 2, 4, 12.

3. SUMMARY

3.1. Client Information

Applicant:	Eitan Medical Ltd.
Address:	29 Yad Haruzim St. P.O. Box 8639 Netanya 4250529, Israel
Manufacturer:	Eitan Medical Ltd.
Address:	29 Yad Haruzim St. P.O. Box 8639 Netanya 4250529, Israel

3.2. Product Description

Main unit information:	
Product Name:	SappireConnect
Trade Mark:	SappireConnect
Model No.:	SappireConnect
Listed Model(s):	-
Power supply:	DC 3.7V from Battery
Hardware version:	1
Software version:	16
Accessory unit information:	
Battery information:	3.7Vdc, 850mAh
Adapter information:	Model:FW8000M/05 Input: AC100-240V, 50/60Hz, 300-150mA Output: 5.0Vdc, 2200mA

3.3. Radio Specification Description

Support LTE type:	☒ Cat NB1 ☐ Cat NB2
Support Operating Band:	☒ FDD Band 2 ☒ FDD Band 4 ☒ FDD Band 12
Operating Frequency Range:	Please refer to note #2
Channel bandwidth:	200kHz
Subcarrier spacing:	☒ 3.75kHz ☒ 15kHz
Uplink Modulation type:	☒ BPSK ☒ QPSK
Downlink Modulation type:	☒ BPSK ☒ QPSK
Antenna type:	SMD Antenna
Antenna gain ^{#3} :	Band 2:3.5dBi; Band 4:3.5dBi; Band 12:0.4dBi;

Note:

- ☒: means that this feature is supported; ☐: means that this feature is not supported
- #2: Operating frequency range is as follow:

LTE Band	Uplink frequency	Downlink frequency
FDD Band 2	1850.7 – 1909.3 MHz	1930.7 – 1989.3 MHz
FDD Band 4	1710.7 – 1754.3 MHz	2110.7 – 2154.3 MHz
FDD Band 12	699.7 – 715.3 MHz	729.7 – 745.3 MHz

- #3: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, HTW lab has not verified the authenticity of its information

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Connect information:	Tel: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC	762235

4. TEST CONFIGURATION

4.1. Test frequency list

FDD Band 2	Test Frequency ID	N _{UL}	M _{UL}	Frequency of Uplink [MHz]	N _{DL}	M _{DL}	Frequency of Downlink [MHz]
	Low Range	18601	0	1850.1	601	-0.5	1930.1
	Mid Range	18900	0	1880.0	900	-0.5	1960.0
	High Range	19199	0	1909.9	1199	-0.5	1989.9
	NOTE 1: Applicable to either 3.75 kHz or 15 kHz NB-IoT UL subcarrier spacing						
FDD Band 4	Test Frequency ID	N _{UL}	M _{UL}	Frequency of Uplink [MHz]	N _{DL}	M _{DL}	Frequency of Downlink [MHz]
	Low Range	19951	0	1710.1	1951	-0.5	2110.1
	Mid Range	20175	0	1732.5	2175	-0.5	2132.5
	High Range	20399	0	1754.9	2399	-0.5	2154.9
	NOTE 1: Applicable to either 3.75 kHz or 15 kHz NB-IoT UL subcarrier spacing						
FDD Band 12	Test Frequency ID	N _{UL}	M _{UL}	Frequency of Uplink [MHz]	N _{DL}	M _{DL}	Frequency of Downlink [MHz]
	Low Range	23011	0	699.1	5011	-0.5	729.1
	Mid Range	23095	0	707.5	5095	-0.5	737.5
	High Range	23179	0	715.9	5179	-0.5	745.9
	NOTE 1: Applicable to either 3.75 kHz or 15 kHz NB-IoT UL subcarrier spacing						

4.2. Descriptions of Test mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems and ANSI C63.26 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Test configuration is as follow:

Test Items	Modulation	Subcarrier spacing	N _{Tones}		
			1	Half	Full
Conducted Output Power	#4	#5	○	○	○
Peak-to-Average Ratio	#4	#5	○	-	○
99% Occupied Bandwidth & 26 dB Bandwidth	#4	#5	-	-	○
Band Edge	#4	#5	○	-	○
Conducted Spurious Emission	#4	#5	○	-	-
Frequency Stability	#4	#5	-	-	○
ERP and EIRP	#4	#5	○	○	○
Radiated Spurious Emission	#4	#5	○	-	-

Note:

- #4: Test all kind of uplink modulation in section 3.3
- #5: Test all kind of subcarrier spacing in section 3.3
- ○: means that this configuration is chosen for testing
- -: means that this configuration is not test.
- The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different modulations, Subcarrier spacing and N_{Tones} in exploratory test. Subsequently, only the worst case emissions (QPSK, 15kHz SCS, and 1@0) are reported.

4.3. Test sample information

Test item	HTW sample no.
Radiated test items	YPHT22040628004

Note:

Radiated test items: ERP and EIRP,Radiated Spurious Emission

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?				
✓ No				
Item	Equipment	Trade Name	Model No.	Other
1				
2				

4.5. Testing environmental condition

Voltage	VN=Nominal Voltage	DC 3.7V
	VL=Lower Voltage	DC 3.33V
	VH=Higher Voltage	DC 4.07V
Temperature	TN=Normal Temperature	25 °C
	Extreme Temperature	From -30°C to + 50°C
Humidity	30~60 %	
Air Pressure	950-1050 hPa	

4.6. Statement of the measurement uncertainty

Test Items	MeasurementUncertainty
Radio frequency	<1GHz: 0.022ppm >1GHz: 0.64ppm
Conducted output power	0.65 dB
ERP and EIRP	0.65 dB
Conducted spurious emission	0.65 dB
Radiated spurious emission	<1GHz: 2.85dB >1GHz: 3.66dB
99% Occupied Bandwidth & 26 dB Bandwidth	<1GHz: 0.022ppm >1GHz: 0.64ppm

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipments Used during the Test

● Radiated Spurious Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/27	2022/09/26
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2021/09/13	2022/09/12
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2021/04/06	2024/04/05
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2020/04/27	2023/04/26
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	538	2021/04/06	2024/04/05
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2021/11/05	2022/11/04
●	Broadband Preamplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2022/02/28	2023/02/27
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2022/02/25	2023/02/24
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2022/02/25	2023/02/24
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2022/02/25	2023/02/24
●	EMI Test Software	Audix	N/A	E3	N/A	N/A	N/A

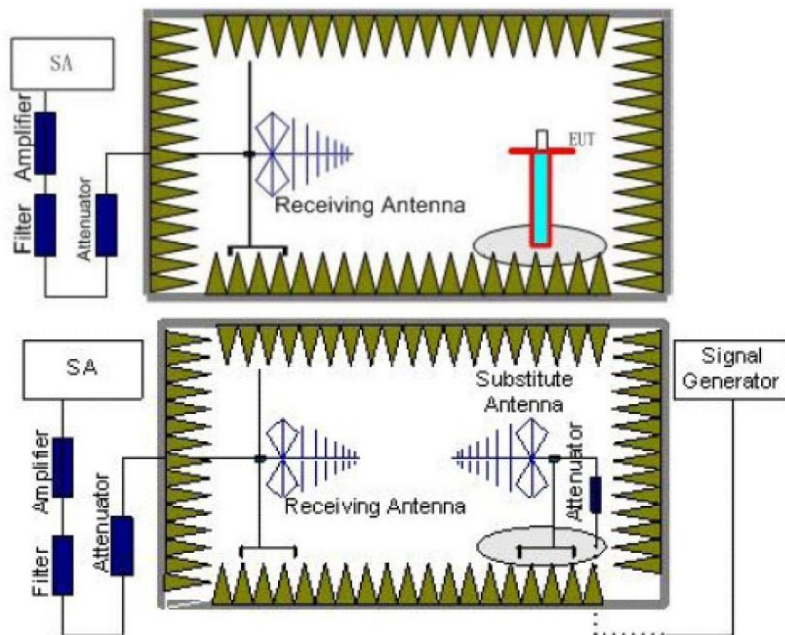
5. TEST CONDITIONS AND RESULTS

5.1. Radiated Spurious Emission

LIMIT

LTE Band 2/4/12: -13dBm

TEST CONFIGURATION



TEST PROCEDURE

1. Place the EUT in the center of the turntable.
 - a) For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, the EUT shall be placed on a RF-transparent table at a nominal height of 80 cm above the reference ground plane
 - b) For radiated measurements performed at frequencies above 1 GHz, the EUT shall be placed on an RF transparent table at a nominal height of 1.5 m above the ground plane.
2. Unless the EUT uses an integral antenna, the EUT shall be terminated with a non-radiating transmitter load. In cases where the EUT uses an adjustable antenna, the antenna shall be adjusted through typical positions and lengths to maximize emissions levels.
3. The EUT shall be tested while operating on the frequency per manufacturer specification. Set the transmitter to operate in continuous transmit mode.
4. Receiver or Spectrum set as follow:

Below 1GHz, RBW=100kHz, VBW=300kHz, Detector=Peak, Sweep time=Auto

Above 1GHz, RBW=1MHz, VBW=3MHz, Detector=Peck, Sweep time=Auto
5. Each emission under consideration shall be evaluated:
 - a) Raise and lower the measurement antenna from 1 m to 4 m, as necessary to enable detection of the maximum emission amplitude relative to measurement antenna height.
 - b) Rotate the EUT through 360° to determine the maximum emission level relative to the axial position.
 - c) Return the turntable to the azimuth where the highest emission amplitude level was observed.
 - d) Vary the measurement antenna height again through 1 m to 4 m again to find the height associated with the maximum emission amplitude.
 - e) Record the measured emission amplitude level and frequency

6. Repeat step 5 for each emission frequency with the measurement antenna oriented in both the horizontal and vertical polarizations to determine the orientation that gives the maximum emissions amplitude.
7. Set-up the substitution measurement with the reference point of the substitution antenna located as near as possible to where the center of the EUT radiating element was located during the initial EUT measurement.
8. Maintain the previous measurement instrument settings and test set-up, with the exception that the EUT is removed and replaced by the substitution antenna.
9. Connect a signal generator to the substitution antenna; locate the signal generator so as to minimize any potential influences on the measurement results. Set the signal generator to the frequency where emissions are detected, and set an output power level such that the radiated signal can be detected by the measurement instrument, with sufficient dynamic range relative to the noise floor.
10. For each emission that was detected and measured in the initial test
 - a) Vary the measurement antenna height between 1 m to 4 m to maximize the received (measured) signal amplitude.
 - b) Adjust the signal generator output power level until the amplitude detected by the measurement instrument equals the amplitude level of the emission previously measured directly in step 5 and step 6.
 - c) Record the output power level of the signal generator when equivalence is achieved in step b).
11. Repeat step 8 through step 10 with the measurement antenna oriented in the opposite polarization.
12. Calculate the emission power in dBm referenced to a half-wave dipole using the following equation:
$$P_e = P_s(\text{dBm}) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$$
where
 P_e = equivalent emission power in dBm
 P_s = source (signal generator) power in dBm
NOTE—dBd refers to the measured antenna gain in decibels relative to a half-wave dipole.
13. Correct the antenna gain of the substitution antenna if necessary to reference the emission power to a half-wave dipole. When using measurement antennas with the gain specified in dBi, the equivalent dipole-referenced gain can be determined from:
$$\text{gain (dBd)} = \text{gain (dBi)} - 2.15 \text{ dB.}$$
If necessary, the antenna gain can be calculated from calibrated antenna factor information
14. Provide the complete measurement results as a part of the test report.

TEST MODE:

Please refer to the clause 4.2

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

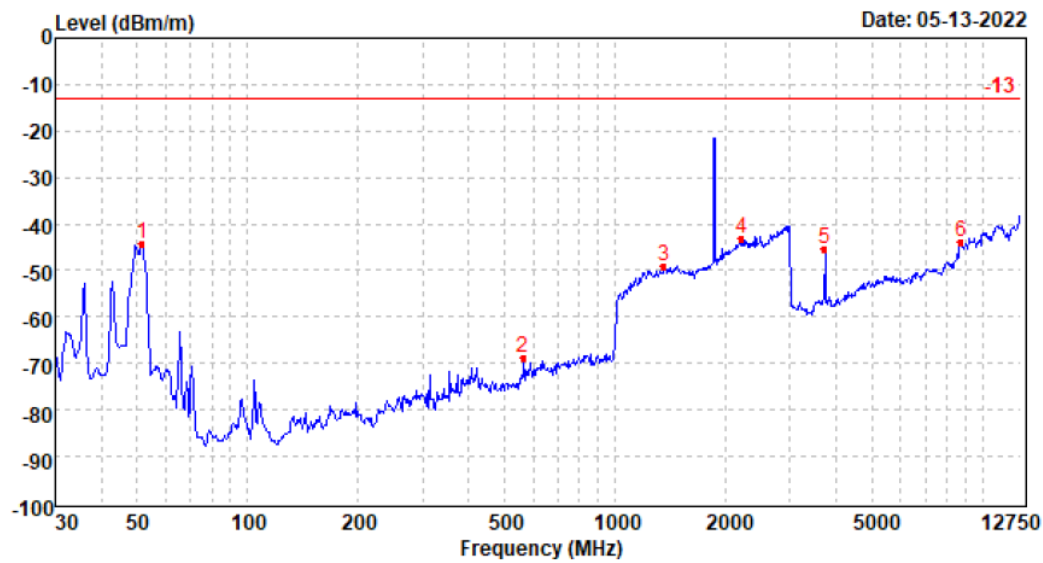
LTE-NB Band 2

Test channel:

Low

Polarization:

Horizontal



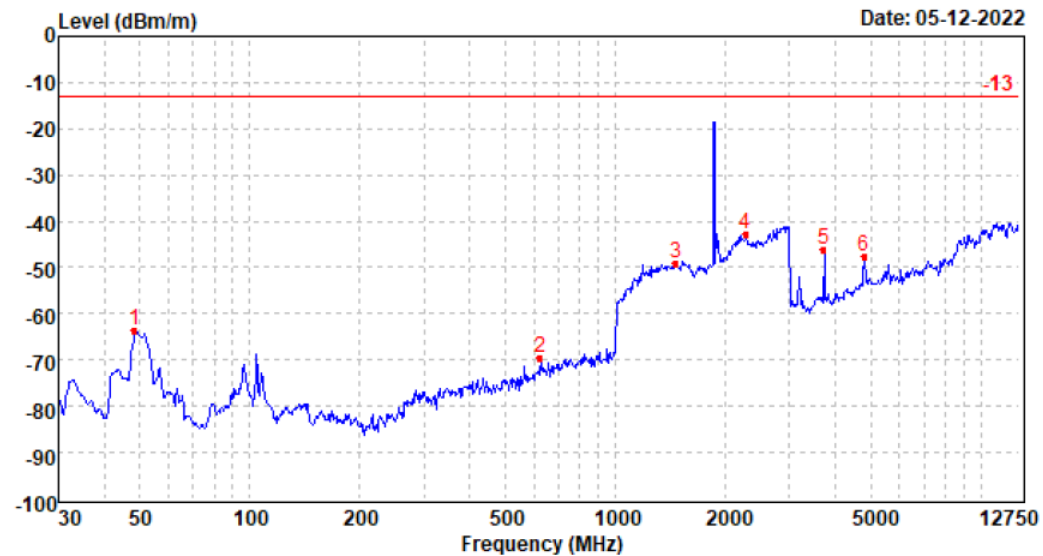
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	51.56	-43.93	23.70	7.06	31.03	-44.20	-13.00	-31.20	Peak
2	563.39	-74.45	26.06	9.79	30.35	-68.95	-13.00	-55.95	Peak
3	1361.67	-68.84	37.08	12.09	29.42	-49.09	-13.00	-36.09	Peak
4	2212.88	-68.64	40.89	14.06	29.47	-43.16	-13.00	-30.16	Peak
5	3716.61	-57.44	42.27	7.03	37.12	-45.26	-13.00	-32.26	Peak
6	8732.17	-73.92	48.35	11.97	30.14	-43.74	-13.00	-30.74	Peak

Test channel:

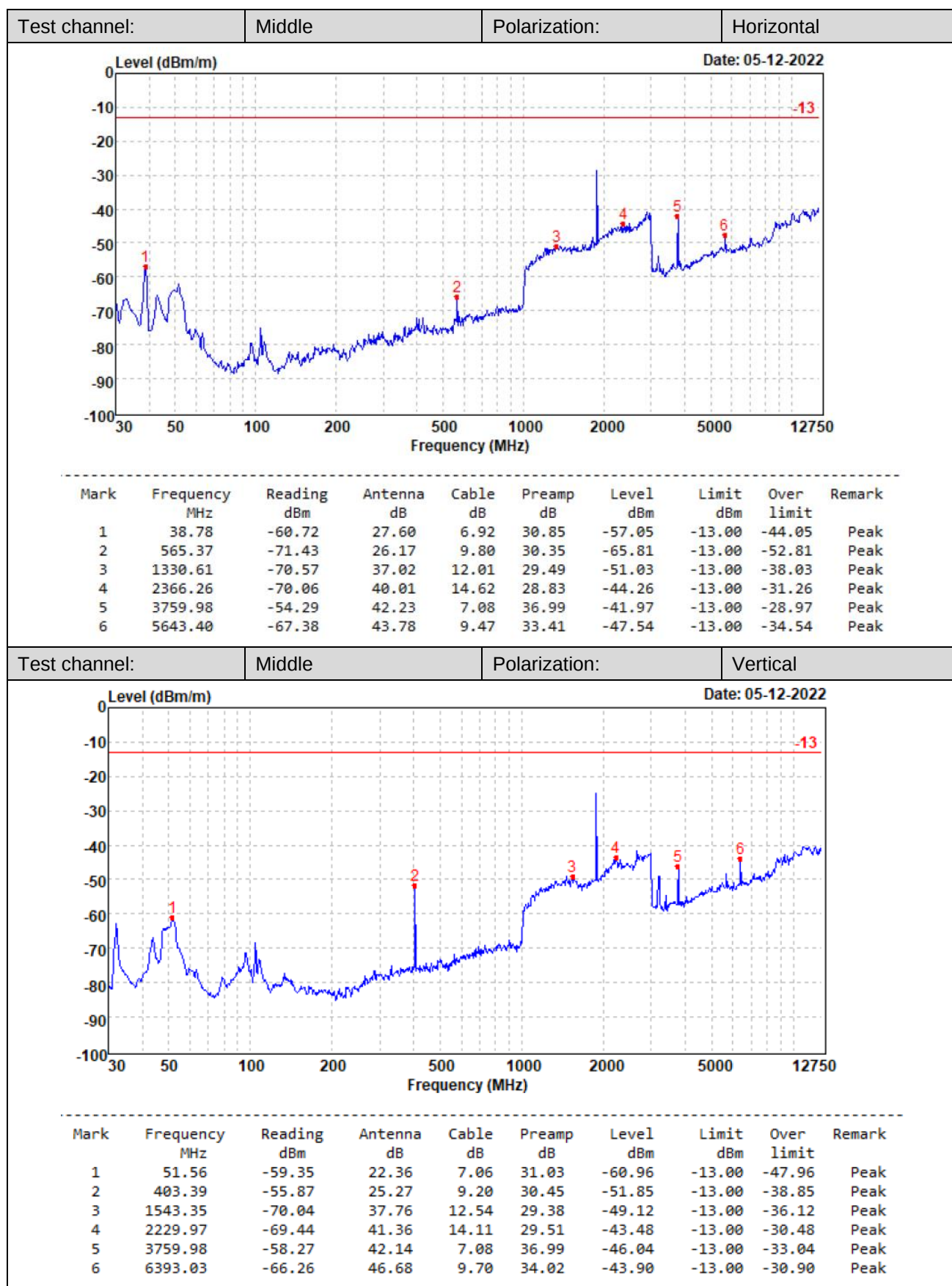
Low

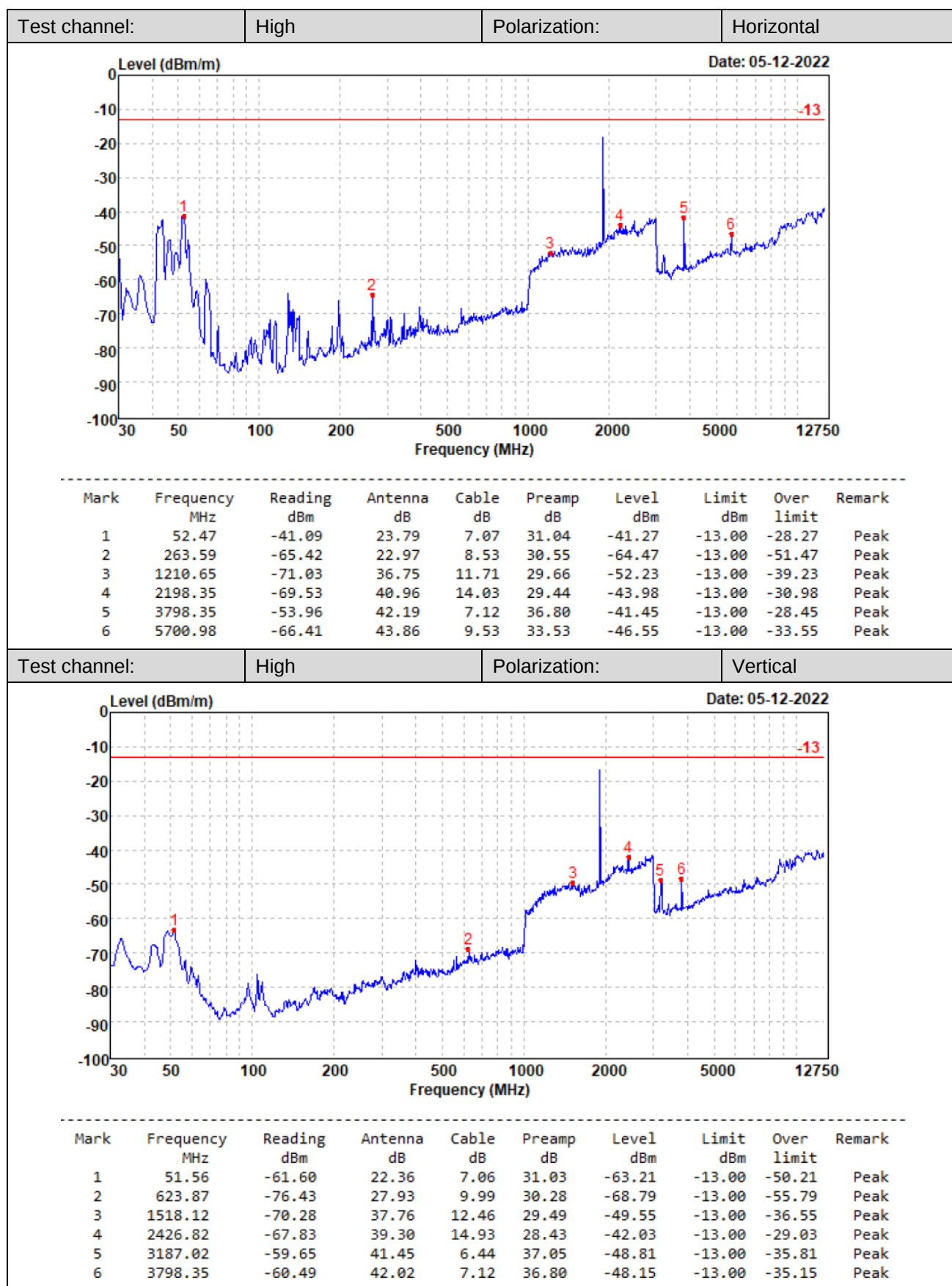
Polarization:

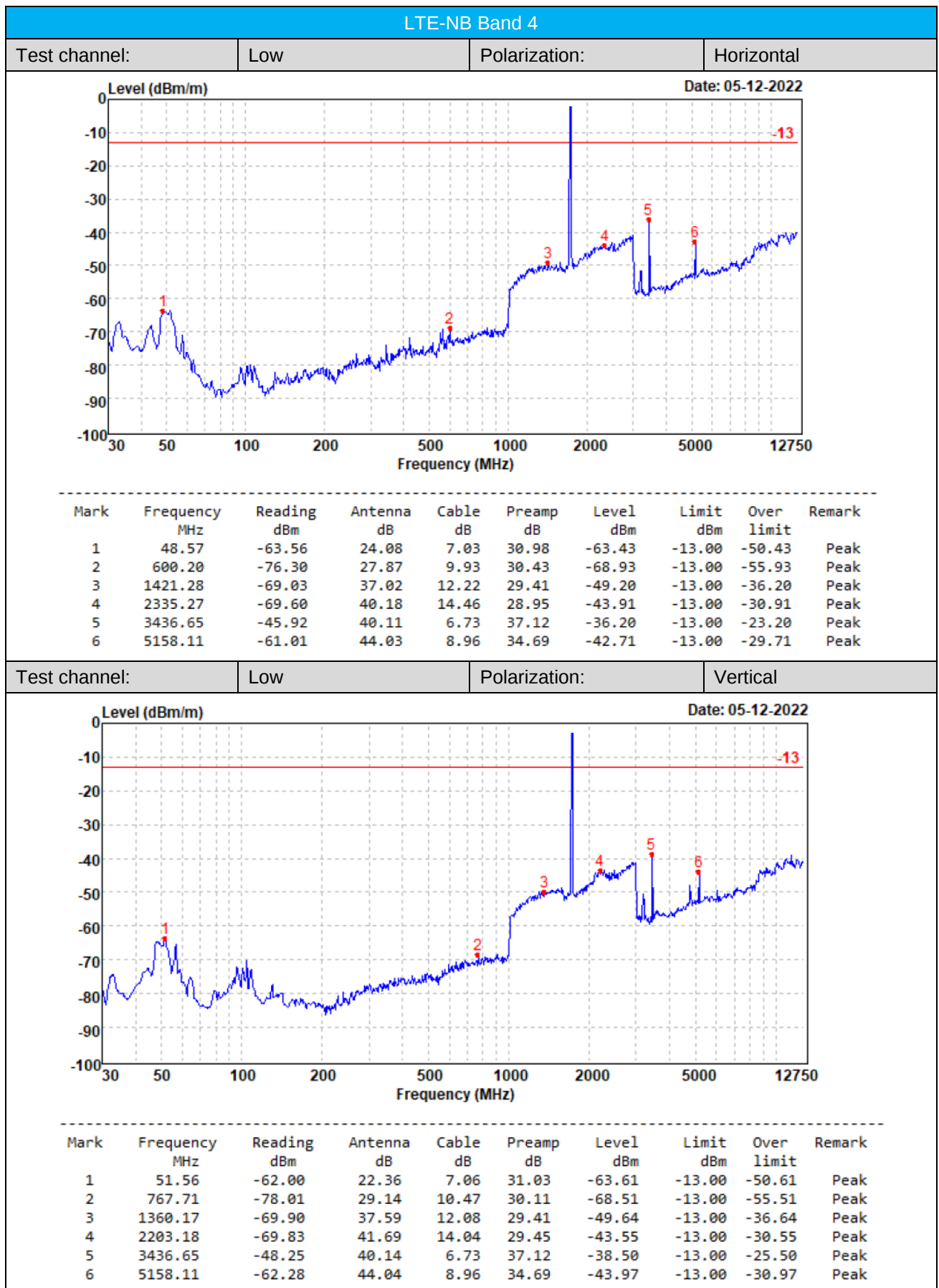
Vertical

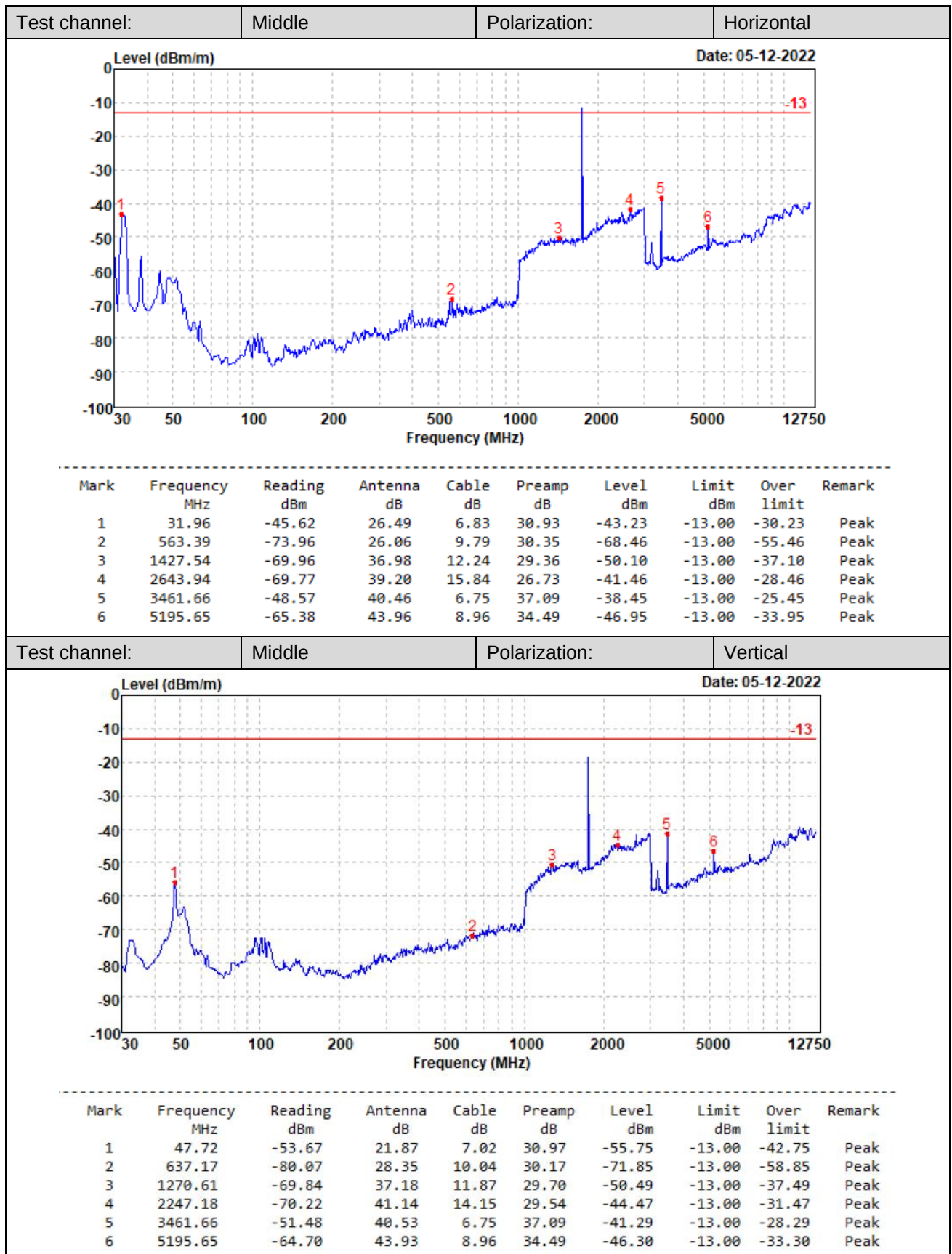


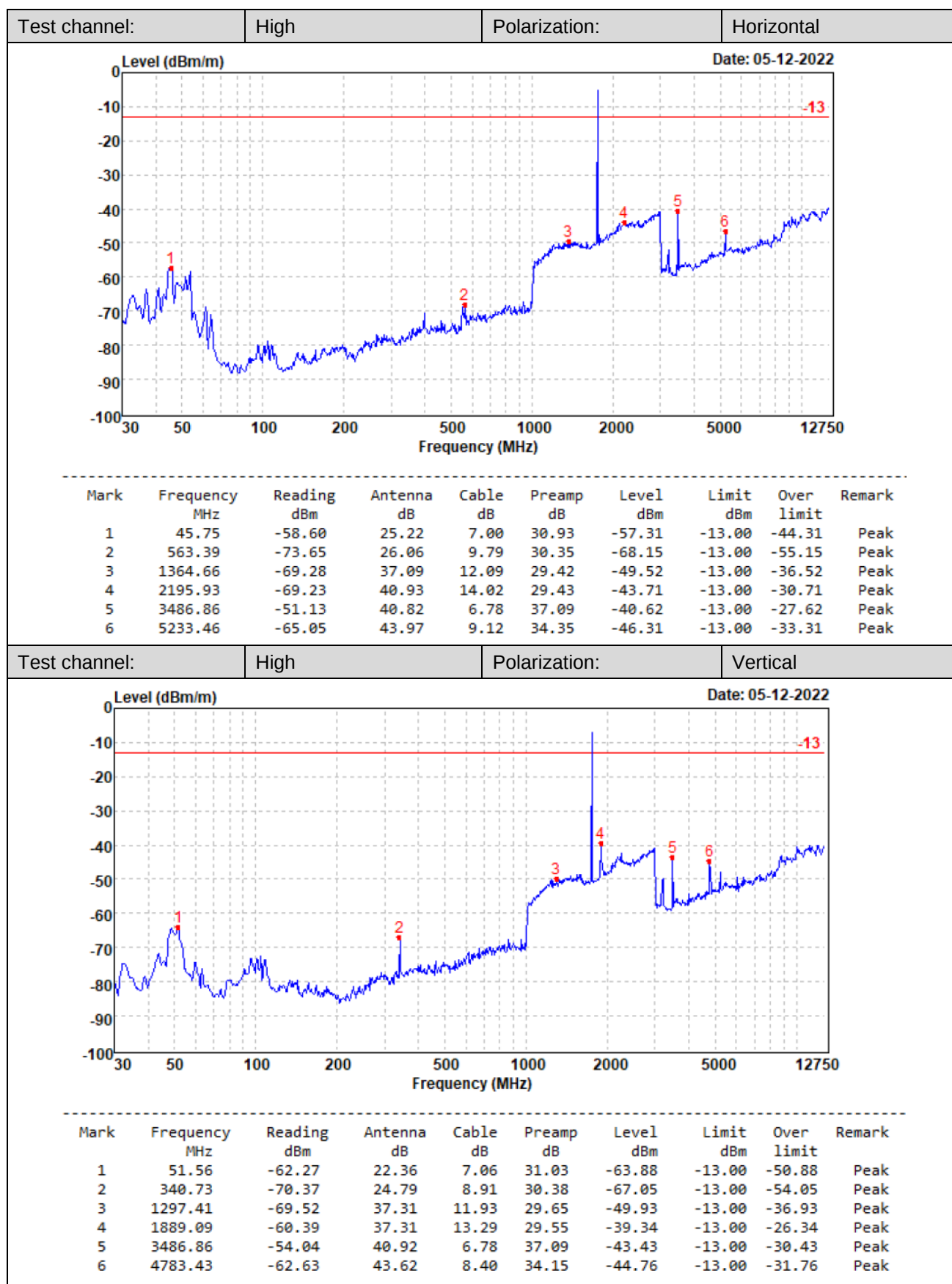
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	48.57	-61.69	21.94	7.03	30.98	-63.70	-13.00	-50.70	Peak
2	623.87	-77.16	27.93	9.99	30.28	-69.52	-13.00	-56.52	Peak
3	1467.29	-69.79	37.76	12.33	29.29	-48.99	-13.00	-35.99	Peak
4	2277.00	-68.41	40.78	14.22	29.33	-42.74	-13.00	-29.74	Peak
5	3716.61	-58.11	42.27	7.03	37.12	-45.93	-13.00	-32.93	Peak
6	4797.32	-65.48	43.63	8.44	34.13	-47.54	-13.00	-34.54	Peak











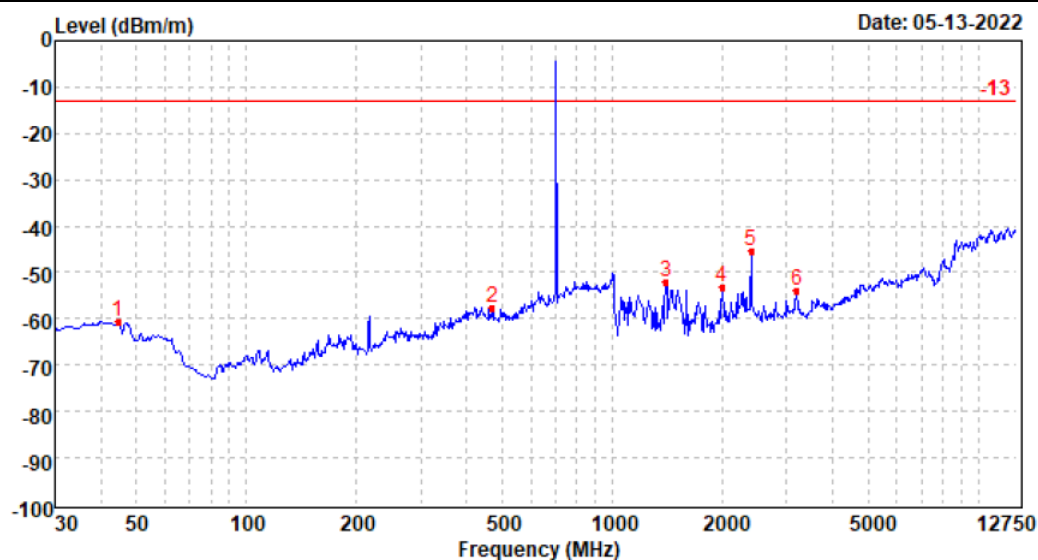
LTE-NB Band 12

Test channel:

Low

Polarization:

Horizontal



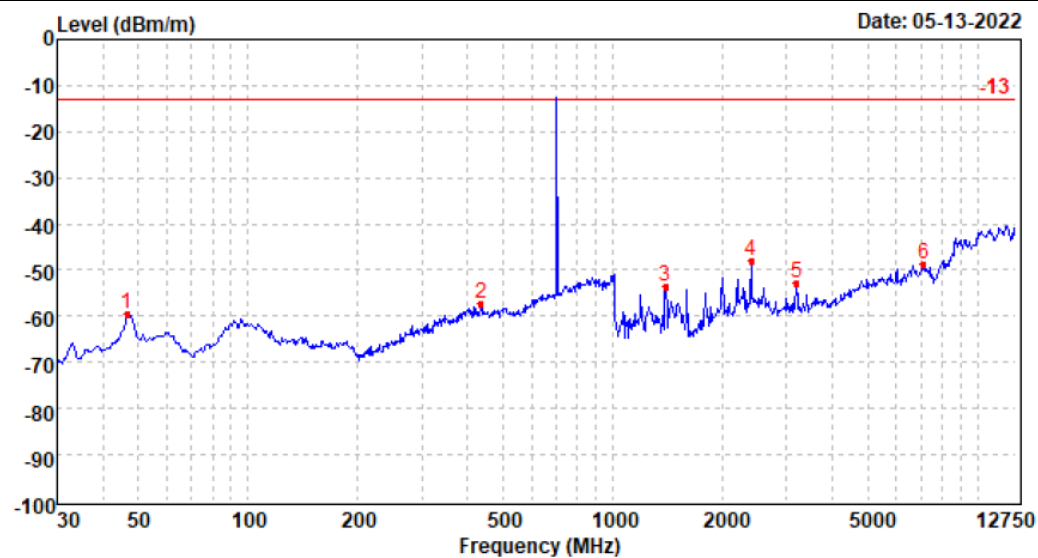
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	44.64	-93.17	25.69	6.99	0.00	-60.49	-13.00	-47.49	Peak
2	470.89	-92.39	25.48	9.46	0.00	-57.45	-13.00	-44.45	Peak
3	1406.50	-56.69	37.12	4.18	36.61	-52.00	-13.00	-39.00	Peak
4	1993.40	-60.12	39.03	5.01	37.22	-53.30	-13.00	-40.30	Peak
5	2394.36	-53.66	39.85	5.53	37.22	-45.50	-13.00	-32.50	Peak
6	3192.37	-64.74	41.36	6.45	37.08	-54.01	-13.00	-41.01	Peak

Test channel:

Low

Polarization:

Vertical



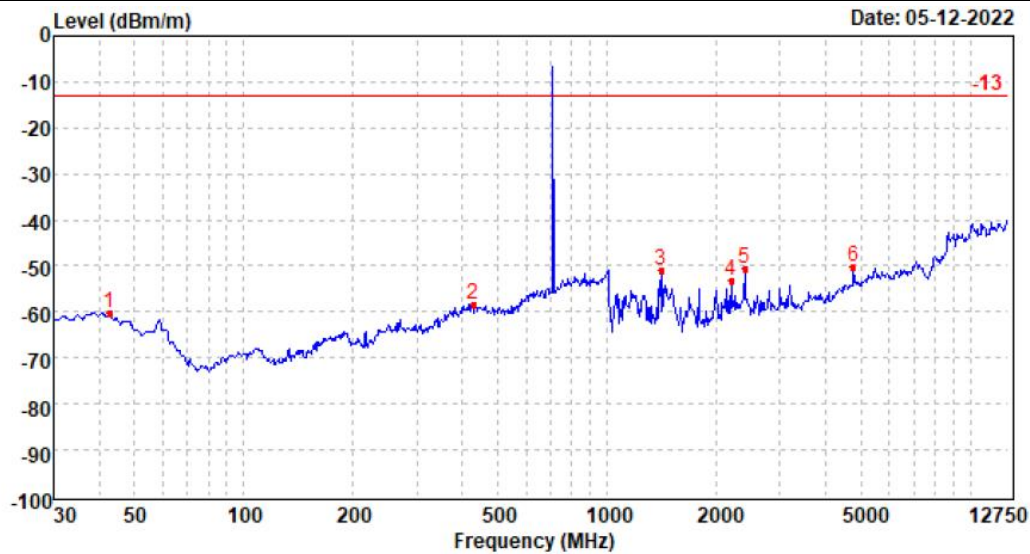
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	46.72	-88.16	21.78	7.01	0.00	-59.37	-13.00	-46.37	Peak
2	437.37	-92.29	25.58	9.32	0.00	-57.39	-13.00	-44.39	Peak
3	1395.80	-59.08	37.74	4.17	36.55	-53.72	-13.00	-40.72	Peak
4	2394.36	-55.82	39.39	5.53	37.22	-48.12	-13.00	-35.12	Peak
5	3192.37	-63.74	41.46	6.45	37.08	-52.91	-13.00	-39.91	Peak
6	7117.84	-73.87	48.11	10.02	33.12	-48.86	-13.00	-35.86	Peak

Test channel:

Middle

Polarization:

Horizontal



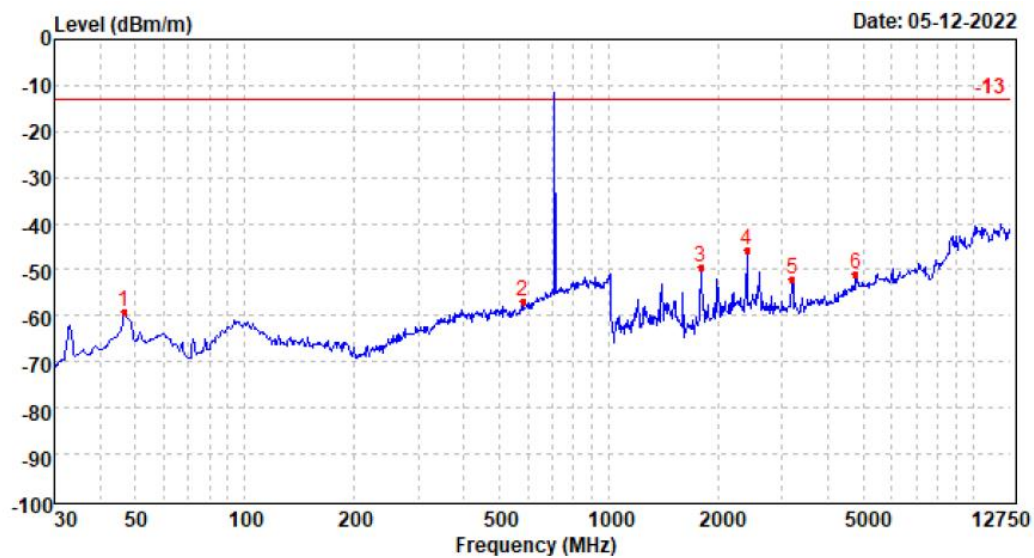
Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	42.79	-93.56	26.49	6.96	0.00	-60.11	-13.00	-47.11	Peak
2	428.24	-93.65	26.01	9.28	0.00	-58.36	-13.00	-45.36	Peak
3	1413.67	-55.66	37.07	4.19	36.65	-51.05	-13.00	-38.05	Peak
4	2201.45	-61.69	40.96	5.31	37.57	-52.99	-13.00	-39.99	Peak
5	2394.36	-58.54	39.85	5.53	37.22	-50.38	-13.00	-37.38	Peak
6	4785.08	-68.07	43.64	8.41	34.15	-50.17	-13.00	-37.17	Peak

Test channel:

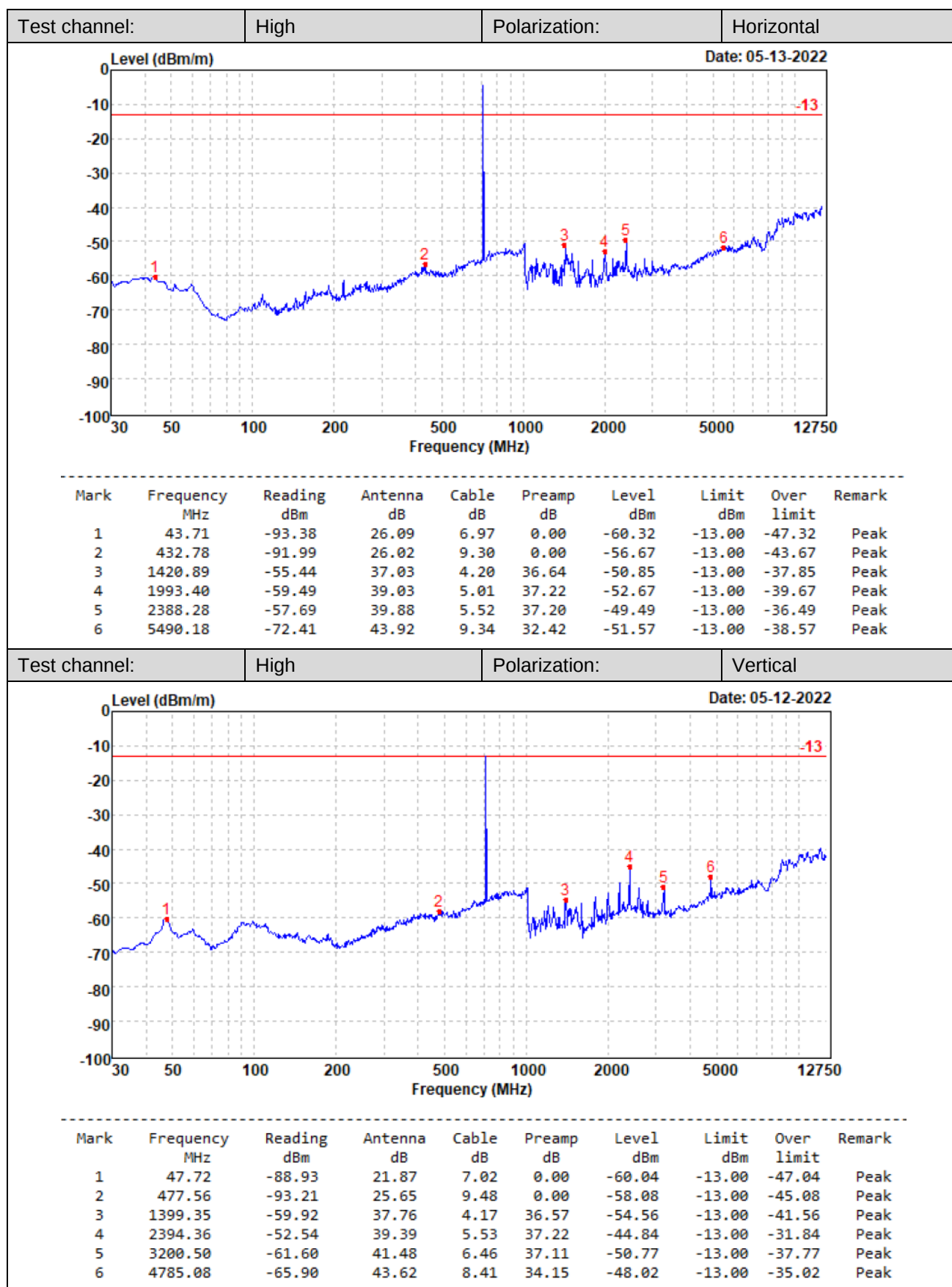
Middle

Polarization:

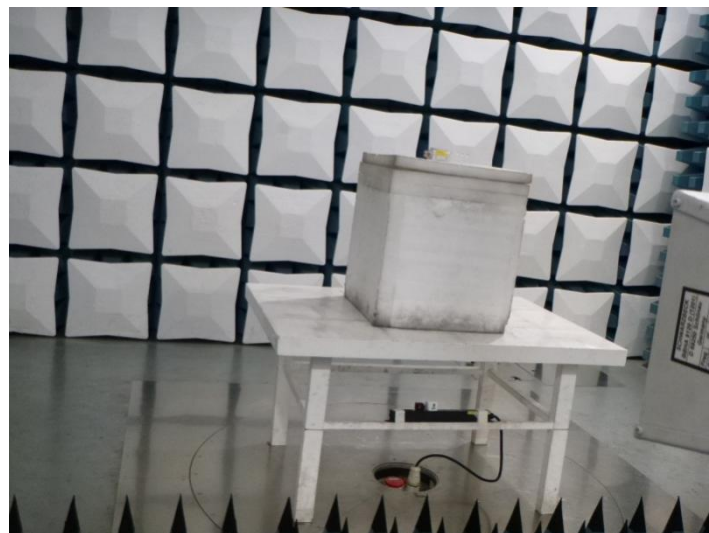
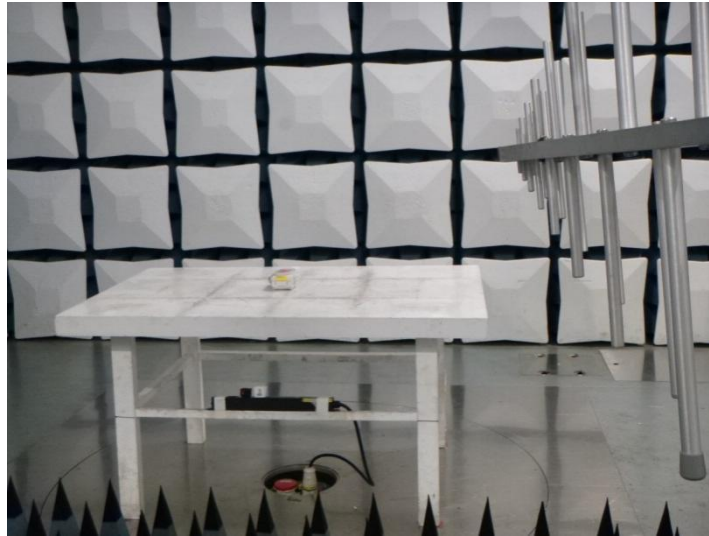
Vertical



Mark	Frequency MHz	Reading dBm	Antenna dB	Cable dB	Preamp dB	Level dBm	Limit dBm	Over limit	Remark
1	46.72	-87.97	21.78	7.01	0.00	-59.18	-13.00	-46.18	Peak
2	581.50	-93.57	26.73	9.87	0.00	-56.97	-13.00	-43.97	Peak
3	1795.84	-53.47	36.46	4.75	37.12	-49.38	-13.00	-36.38	Peak
4	2394.36	-53.41	39.39	5.53	37.22	-45.71	-13.00	-32.71	Peak
5	3200.50	-62.94	41.48	6.46	37.11	-52.11	-13.00	-39.11	Peak
6	4785.08	-68.86	43.62	8.41	34.15	-50.98	-13.00	-37.98	Peak



6. TEST SETUP PHOTOS OF THE EUT



7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Refer to the test report No.: CHTEW22050121

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