



FCC RADIO TEST REPORT

Applicant : Ubiquiti Inc.
Address : 685 Third Avenue, New York, New York 10017,
USA
Equipment : Alarm Control KeyFob
Model No. : USL-FOB
Trade Name : UBIQUITI
FCC ID. : SWX-USLF

I HEREBY CERTIFY THAT :

The sample was received on Jan. 02, 2025 and the testing was completed on Aug. 18, 2025 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory





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History of this test report

Report No.	Issued Date	Description
24120564-TRFCC01	Oct. 01, 2025	Original



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10-2020+Cor.1-2023+C63.10a-2024+Errata to C63.10a-2024

FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	PASS
15.207	. AC Power Line Conducted Emission	NA
15.209 15.205	. Radiated Spurious Emission	PASS
15.247(d)	. Conducted Spurious Emission	PASS
15.247(a)(1)	. Channel Carrier Frequencies Separation	PASS
15.247(a)(1)	. 20dB Bandwidth	PASS
15.247(a)(1)	. Dwell Time	PASS
15.247(b)	. Number of Hopping Channels	PASS
15.247(b)	. Peak Output Power Measurement Data	PASS

*The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement, measurement uncertainty evaluation is not considered.



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Operation Frequency Range	902MHz – 928MHz
Center Frequency Range	915.2MHz – 927.6MHz
Modulation Type	GFSK
Modulation Technology	FHSS
Antenna Type	PIFA Antenna
Antenna Gain	-1.0 dBi

Note:

1. For more details, please refer to the User's manual of the EUT.
2. EUT Only Support SF10, BW: 125kHz

2.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
*00	915.2	25	920.2	50	925.2
01	915.4	26	920.4	51	925.4
02	915.6	27	920.6	52	925.6
03	915.8	28	920.8	53	925.8
04	916	29	921	54	926
05	916.2	30	921.2	55	926.2
06	916.4	*31	921.4	56	926.4
07	916.6	32	921.6	57	926.6
08	916.8	33	921.8	58	926.8
09	917	34	922	59	927
10	917.2	35	922.2	60	927.2
11	917.4	36	922.4	61	927.4
12	917.6	37	922.6	62	927.6
13	917.8	38	922.8	*63	927.8
14	918	39	923		
15	918.2	40	923.2		
16	918.4	41	923.4		
17	918.6	42	923.6		
18	918.8	43	923.8		
19	919	44	924		
20	919.2	45	924.2		
21	919.4	46	924.4		
22	919.6	47	924.6		
23	919.8	48	924.8		
24	920	49	925		

Note: Channels remarked * are selected to perform test.



2.3 Test Mode & Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.10
- An executive program, "command" under Windows 10 system was executed to transmit and receive data via LoRa.
- The following test modes were performed for the test:

Radiated Emissions (30MHz ~ 1GHz)	
Test Mode 1	TX Mode, DC 3V from DC Power Supply (AC 120V/60Hz)
Radiated Emissions (1GHz ~ 10GHz)	
Test Mode 1	TX Mode, DC 3V from DC Power Supply (AC 120V/60Hz)

Modulation Type	TX CONFIGURATION
GFSK	1TX

2.4 Description of Test System

RF Conducted				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	lenovo	S1GL2W	N/A	N/A
Type-C (Blue)	kolin	KEX-DLCP08	1m / NS	N/A
Test Fixture	Luxshare	K2416018	N/A	N/A
DC Power Supply	Gwinstek	GPR-360600	N/A	N/A
Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	DELL	Latitude E5470	N/A	Adapter / 1.8m / NS
Type-C (Blue)	kolin	KEX-DLCP08	1m / NS	N/A
Test Fixture	Luxshare	K2416018	N/A	N/A
DC Power Supply	Gwinstek	GPR-360600	N/A	N/A



2.5 General Information of Test

Organization	CerpPASS Technology Corp.		
☒ Test Site	CerpPASS Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel: +886-3-3226-888 Fax: +886-3-3226-881		
	FC	TW1439, TW1079	
	IC	4934E-1, 4934E-2	
Frequency Range Investigated	Conducted: from 150kHz to 30 MHz Radiation: from 9 kHz to 10,000MHz		
Test Distance	The test distance of radiated emission from antenna to EUT is 3 M.		

Test Item	Test Site	Test Period	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2025/01/24	24.1°C / 54%	Leon Huang
RF Conducted	RFCON01-NK	2025/02/12	23.8°C / 54%	Leon Huang
Radiated Emissions	3M02-NK	2025/08/18	20.1°C / 59%	Park Chen

2.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Item	Uncertainty
Radiated Spurious Emission(9kHz~30MHz)	±3.5dB
Radiated Spurious Emission(30MHz~1GHz)	±5.1dB
Radiated Spurious Emission(1GHz~40GHz)	±5.2dB
Conducted Spurious Emission	±2.1dB
20dB Bandwidth	±4.4%
Peak Output Power(Conducted Power Meter)	±1.1dB
Dwell Time	±7.6%
Duty Cycle	±3.5%



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	369	2025/02/17	2026/02/16
Active Loop Antenna	Schwarzbeck	FMZB 1513	00414	2025/02/18	2026/02/17
Horn Antenna	EMCO	3115	31589	2025/02/20	2026/02/19
Horn Antenna	EMCO	3116	31970	2025/02/20	2026/02/19
EMI Receiver	R&S	ESR 7	101906	2025/05/19	2026/05/18
Spectrum Analyzer	R&S	FSV 40-N	102151	2024/08/22	2025/08/21
Preamplifier	Agilent	8449B	3008A01954	2025/02/12	2026/02/11
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2024/10/15	2025/10/14
Preamplifier	EM Electronics corp.	EM330	60659	2024/12/16	2025/12/15
Cable-4m (9k-3G)	EMEC	RG-223	18274M	2025/07/02	2026/07/01
Cable-3in1 (30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2025/02/21	2026/02/20
Cable-0.5m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2025/02/26	2026/02/25
Cable-3m (1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2025/02/26	2026/02/25
Cable-8m (1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2025/02/26	2026/02/25
Cable-3m (10M-40G)	HUBER SUHNER	SF102	804619/2	2024/10/14	2025/10/13
Cable-1m (10M-40G)	HUBER SUHNER	SF102	804398/2	2024/10/14	2025/10/13
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
High Pass Filter	WOKEN	WFIL-H3000-18000F-03	WR377WC2B1	2024/10/15	2025/10/14
Notch Filter	Warison	WFIL-N5925-7125F-04	WRQ4BFWC4M1	2025/02/21	2026/02/20



Test Item	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	R&S	FSP 40	100047	2024/03/01	2025/02/28
Attenuator	KEYSIGHT	8491B	MY39250703	2024/02/20	2025/02/19
Cable-0.5m (1G-26.5G)	HUBER SUHNER	SUCOFLEX 102	28422/2	2024/05/13	2025/05/12
Power Meter	Anritsu	ML2495A	1224005	2024/02/17	2025/02/16
Power Sensor	Anritsu	MA2411B	1207295	2024/02/17	2025/02/16
Switch Box	Theda	1-4	TW5451159	NA	NA



4. Antenna Requirements

4.1 Standard Applicable

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

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

4.2 Antenna Construction and Directional Gain

Antenna Type	PIFA Antenna
Antenna Gain	-1.0 dBi

Directional gain greater than 6dBi are used, the power limit shall be reduced by 1 dB.



5. Test of AC Power Line Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

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

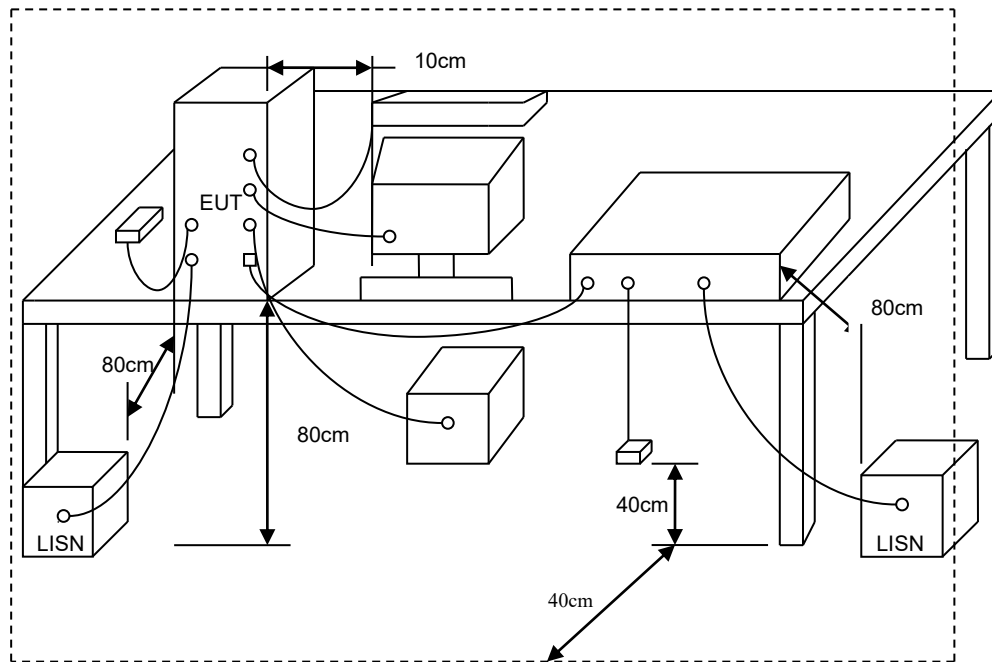
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

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



5.3 Typical Test Setup



5.4 Test Result and Data

The EUT is powered from Battery, this test item is not applicable.



6. Test of Radiated Spurious Emission

6.1 Test Limit

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

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



6.2 Test Procedures

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

Note:

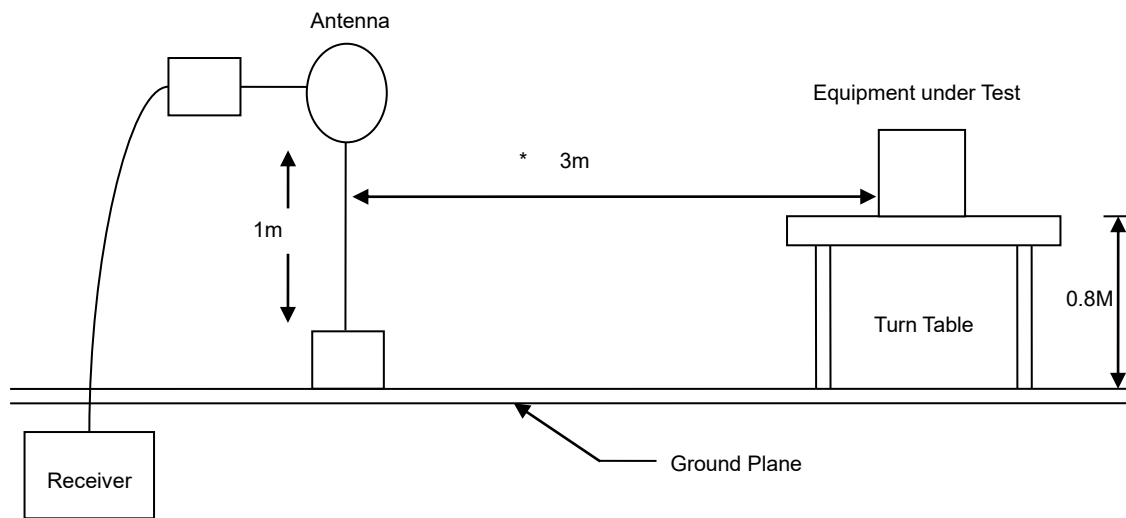
- 1.The supporting fixture shall permit orientation of the EUT in each of three orthogonal axis positions such that emissions from the EUT are maximized. (Z-AXIS is the worst.)
- 2.Due to the test software function limit the operation band setting(200dBuV/m).

There's no corresponding limitation in the actual test item.

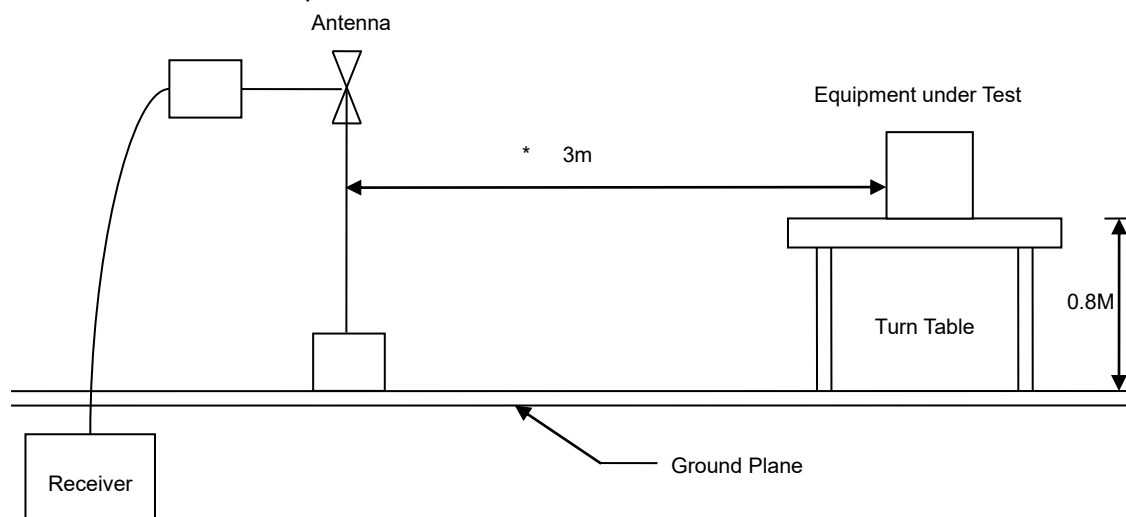


6.3 Typical Test Setup

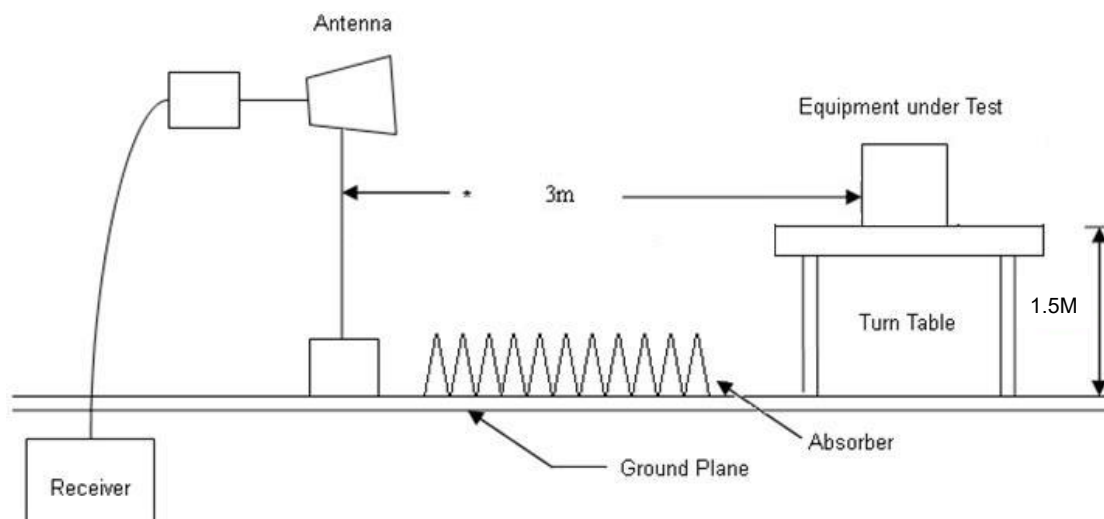
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup

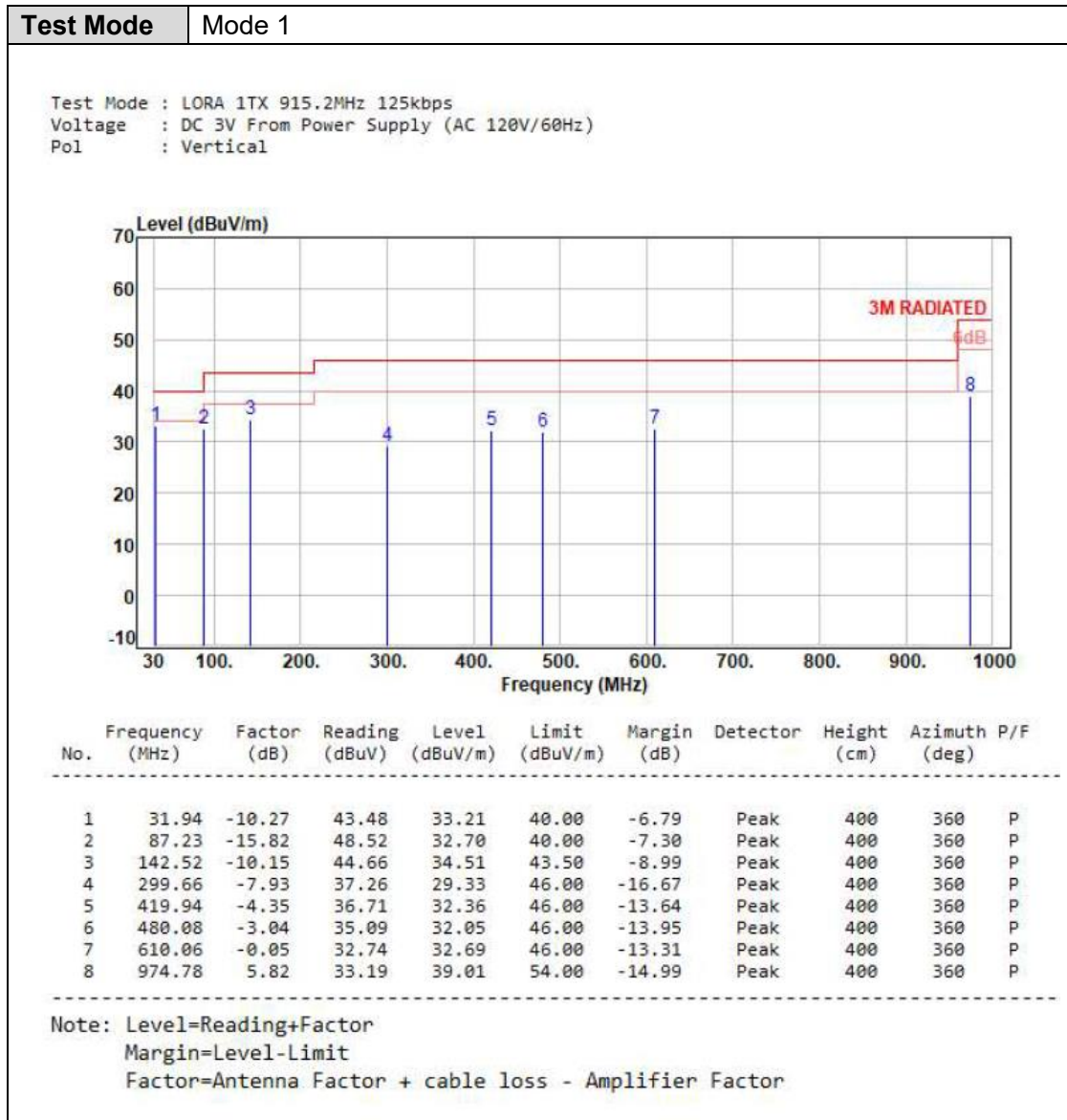


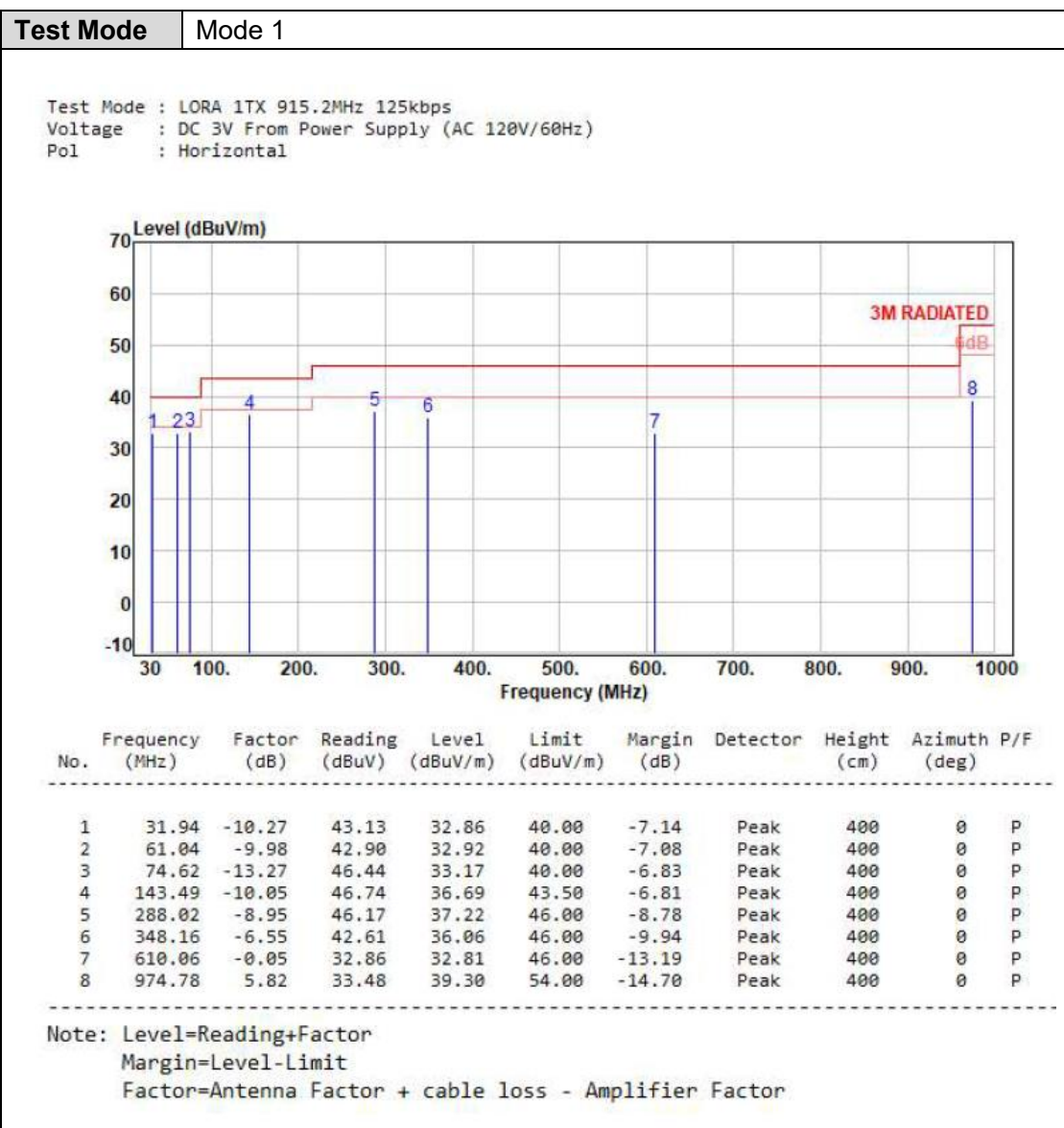


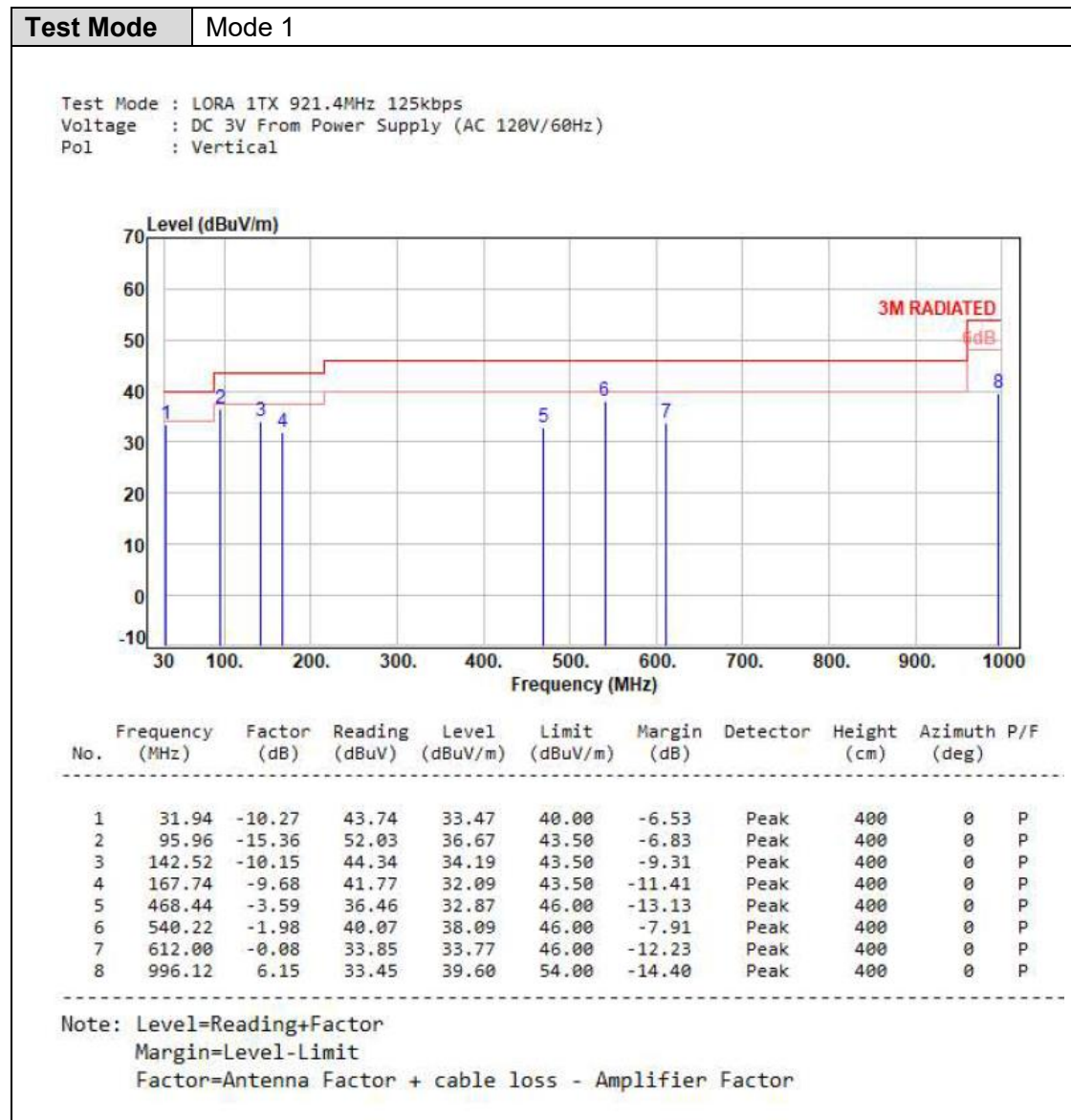
6.4 Test Result and Data (9kHz ~ 30MHz)

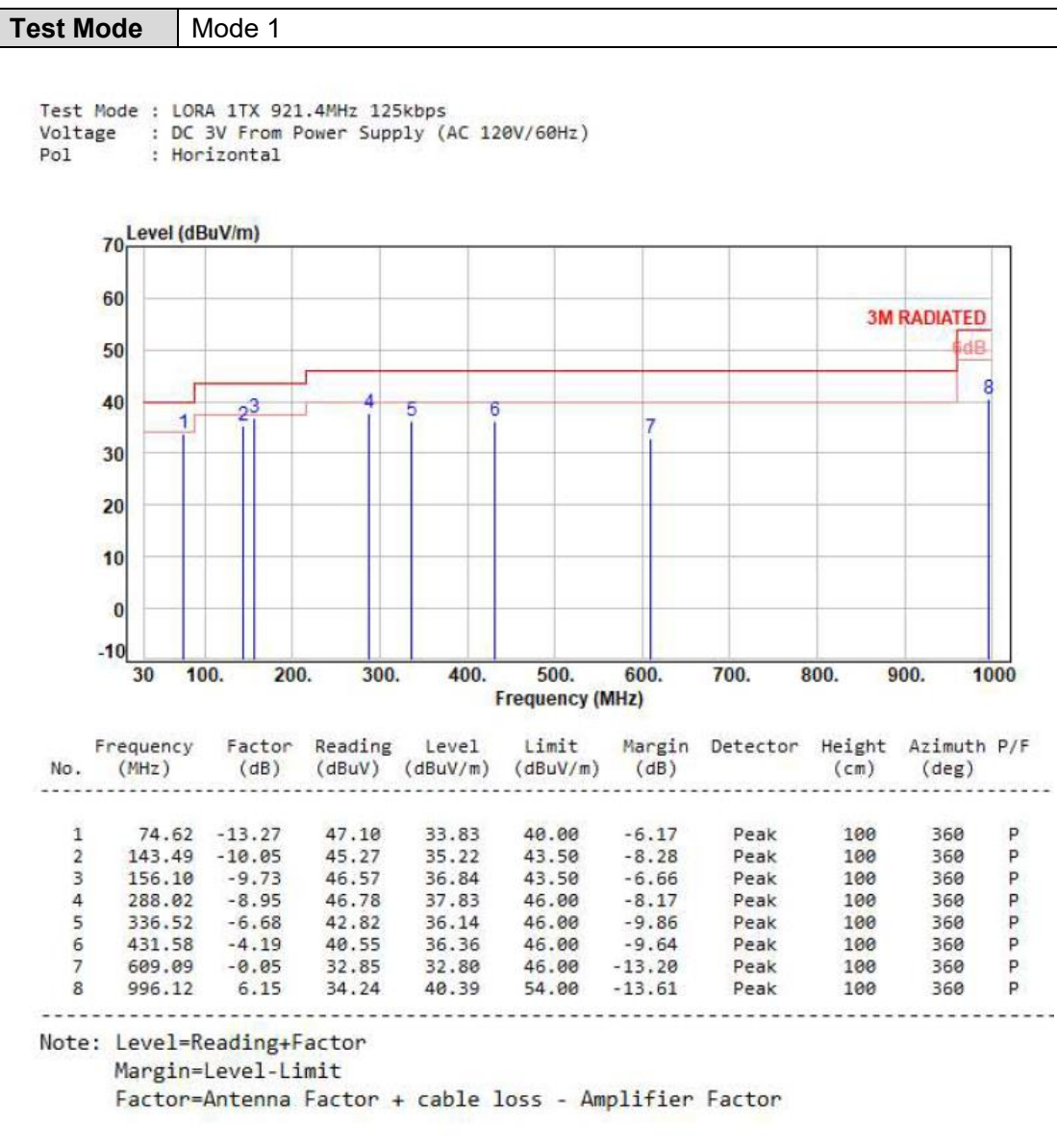
The 9kHz-30MHz spurious emission is under limit 20dB more.

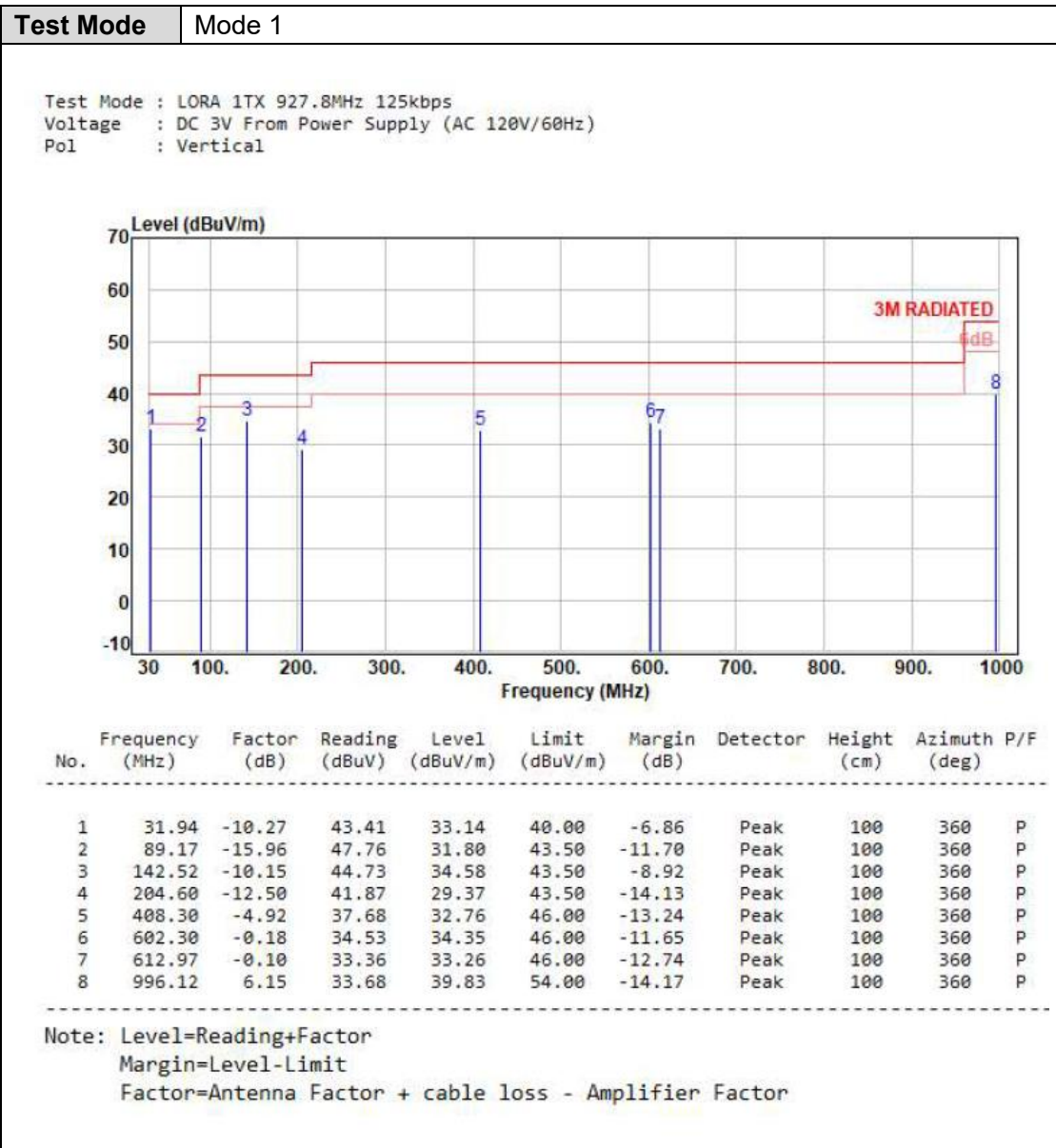
6.5 Test Result and Data (30MHz ~ 1GHz)

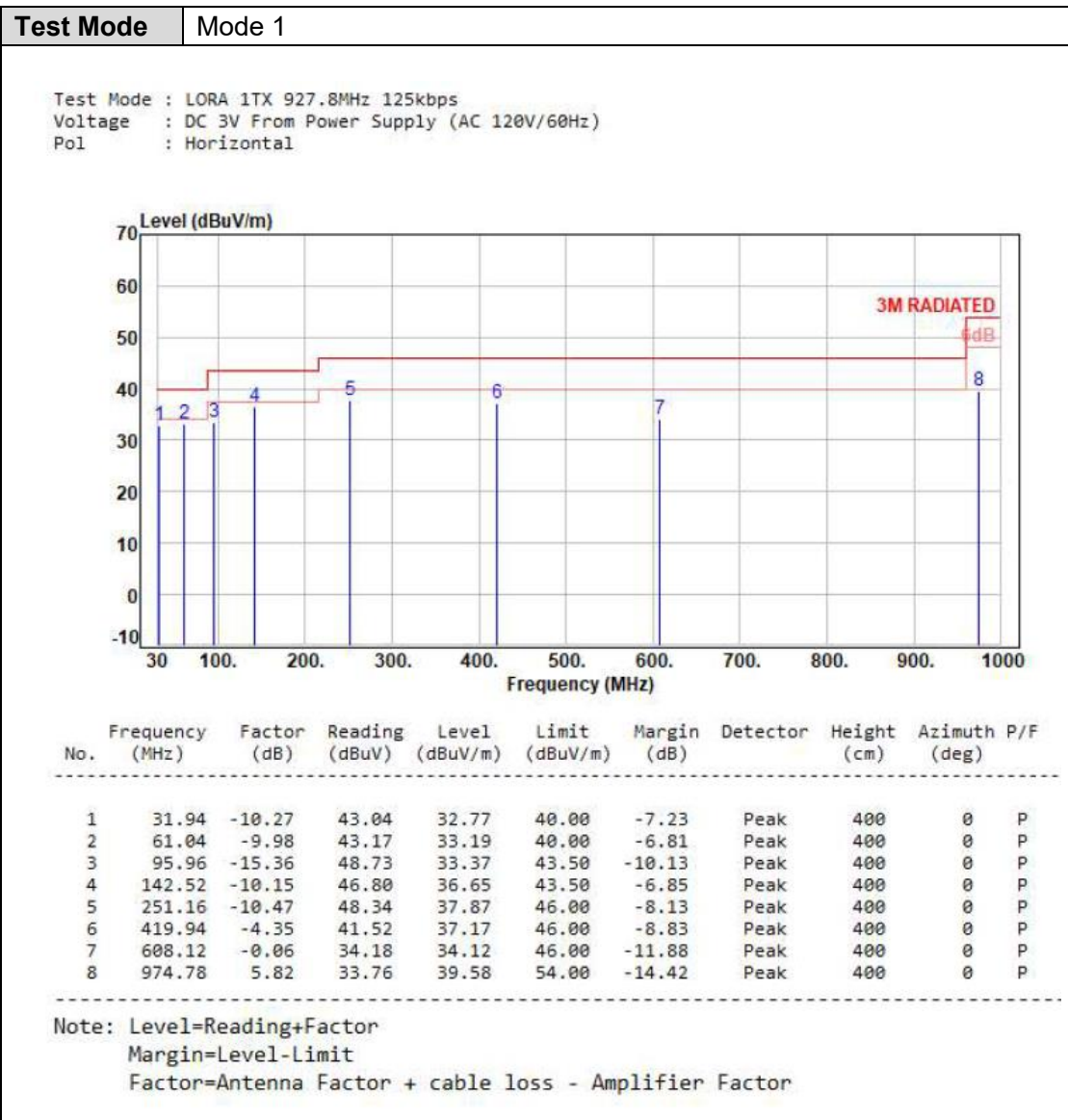






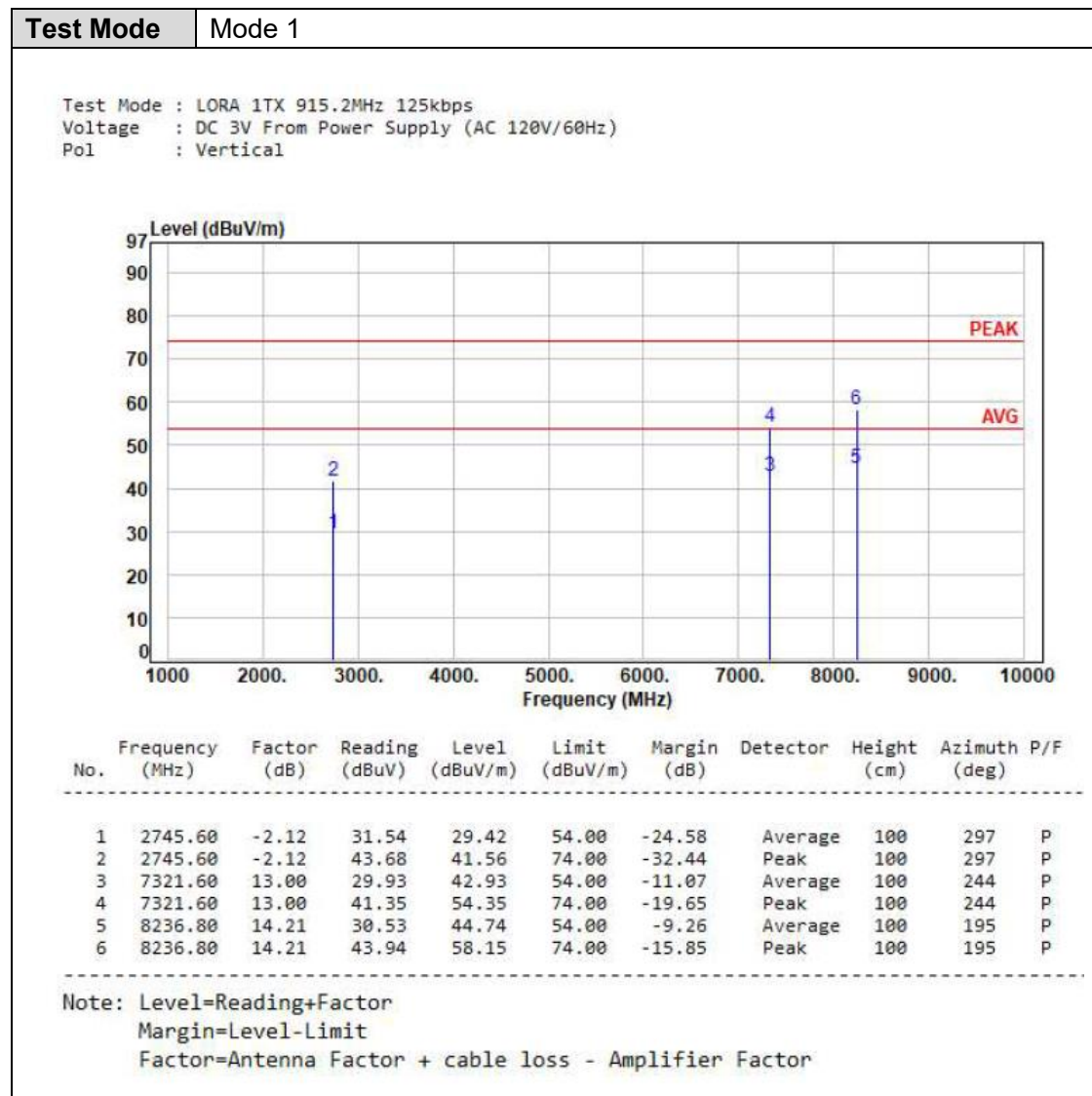


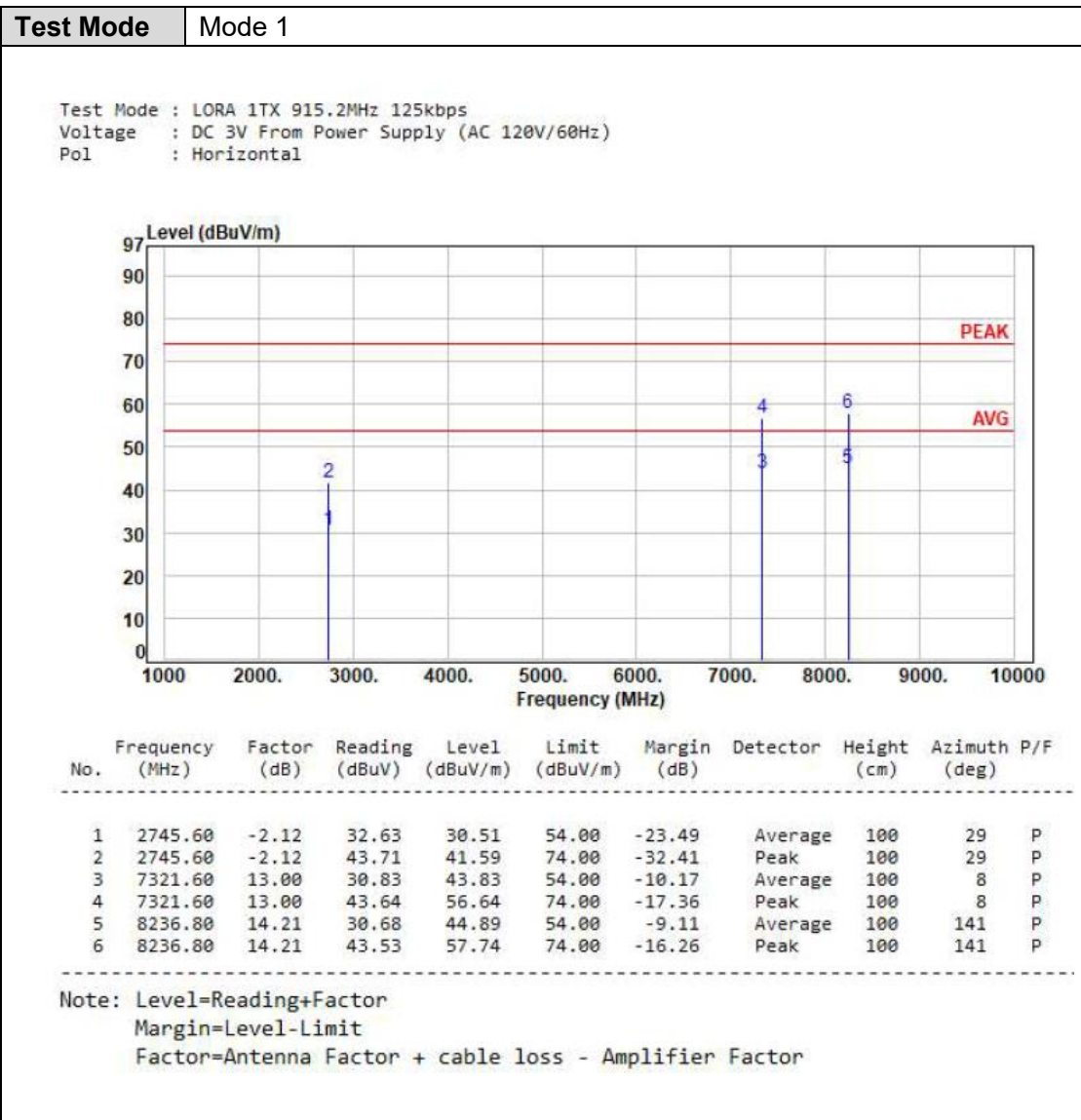


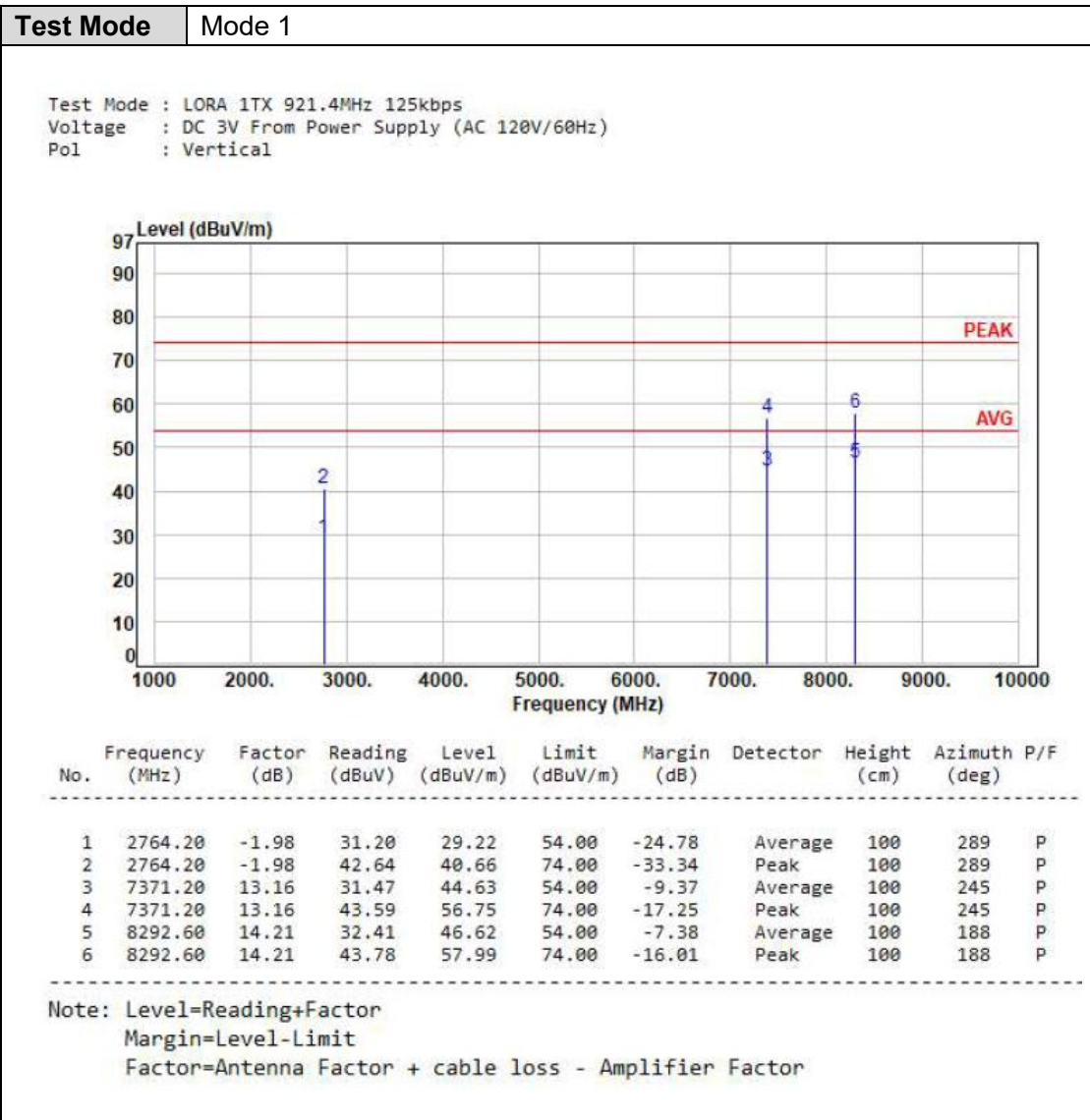


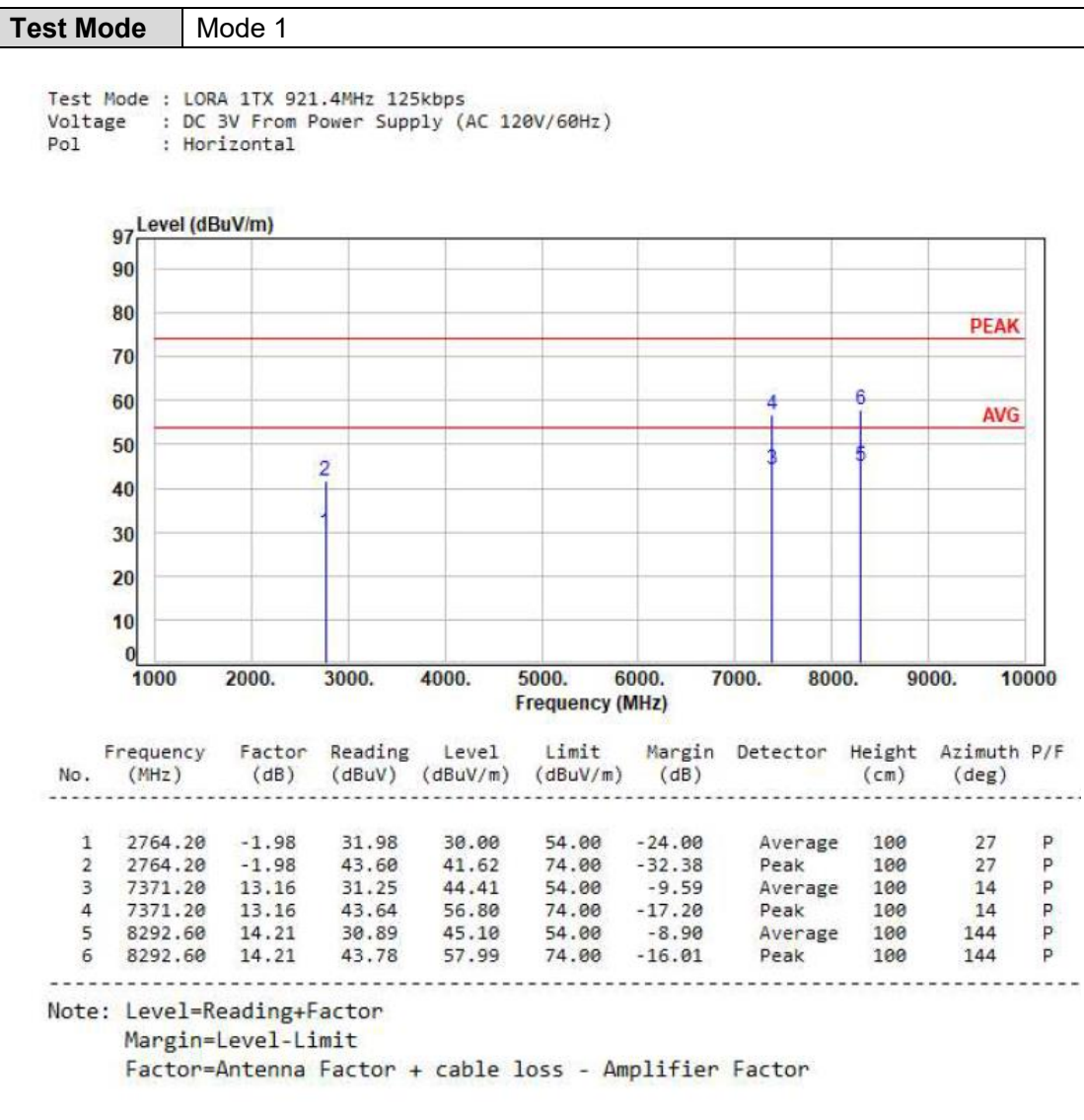


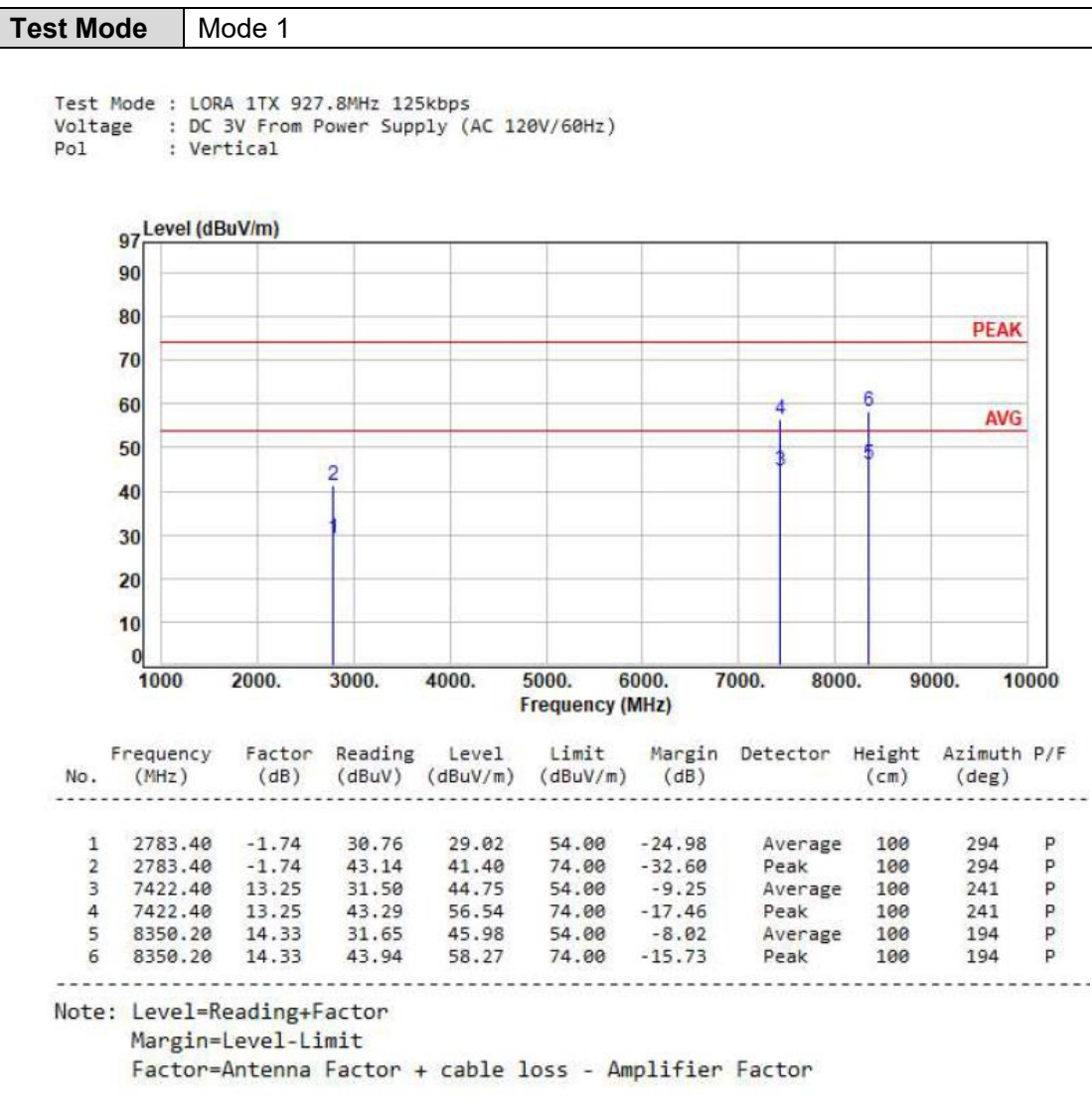
6.6 Test Result and Data (1GHz ~ 10GHz)

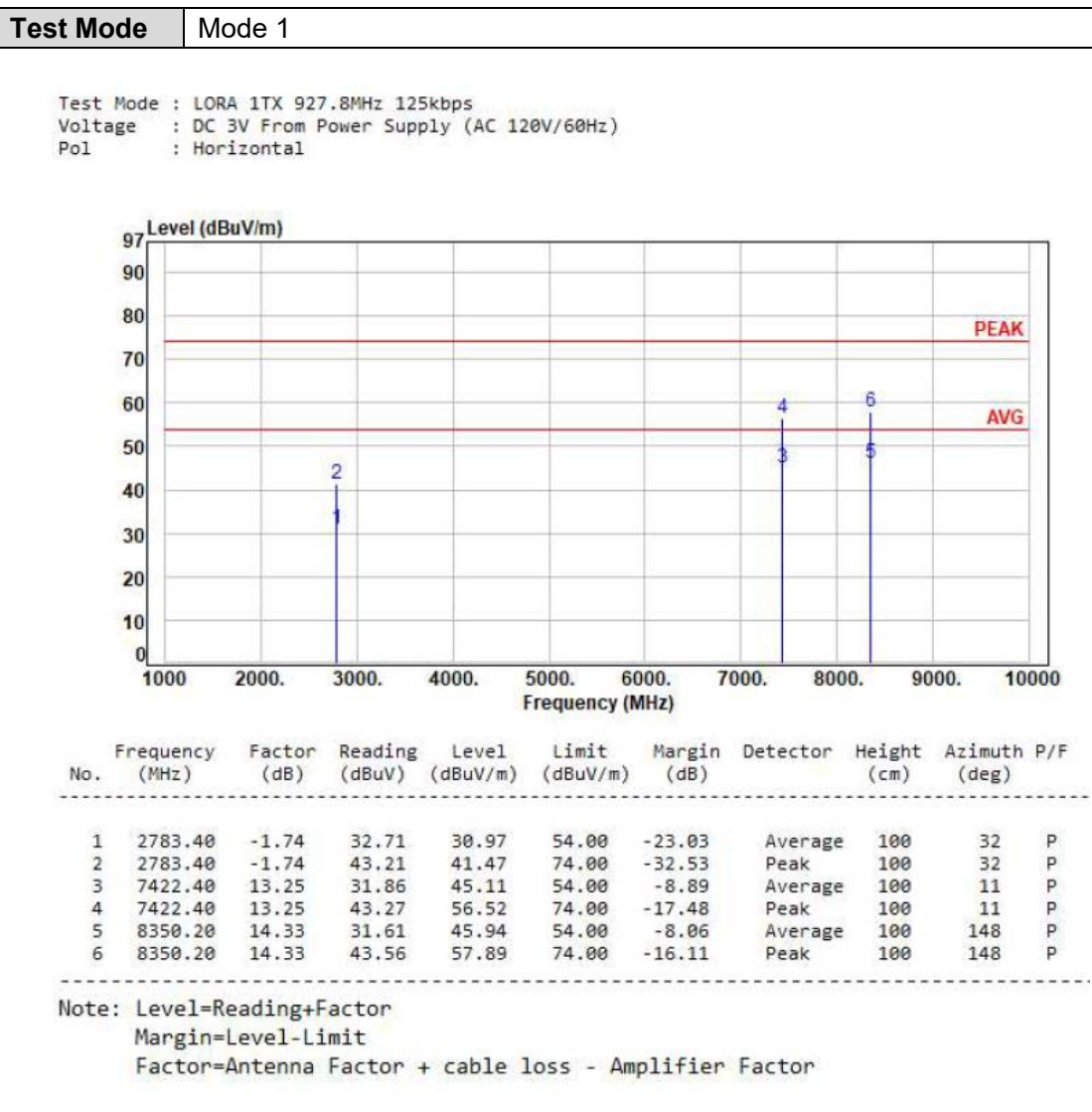














6.7 Restricted Bands of Operation

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

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

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



7. Test of Conducted Spurious Emission

7.1 Test Limit

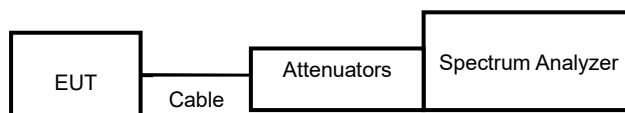
According to the methods defined in ANSI C63.10-2013 Section 11.11.1
Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

7.2 Test Procedure

According to the methods defined in ANSI C63.10-2020 Section 11.11.2 & 11.11.3

- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.
- The band edges was measured and recorded.

7.3 Test Setup Layout

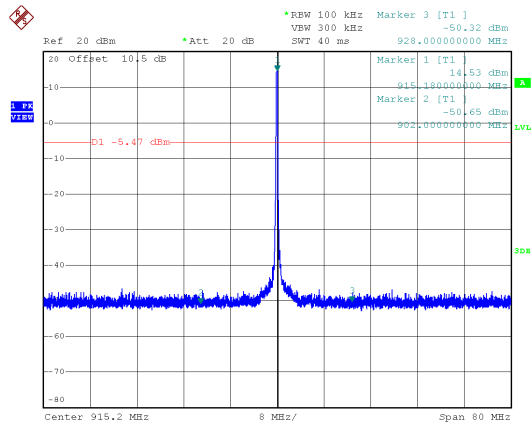


7.4 Test Result and Data

Note: Test plots refer to the following pages.

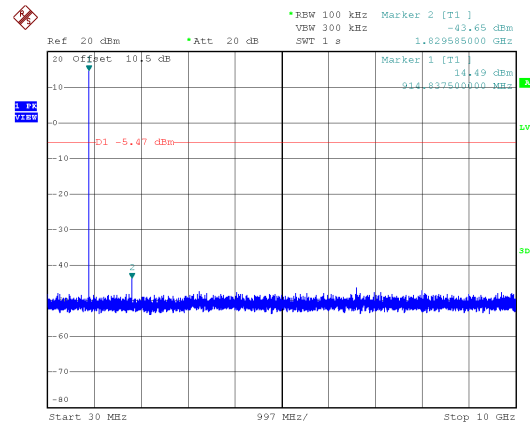


CH00



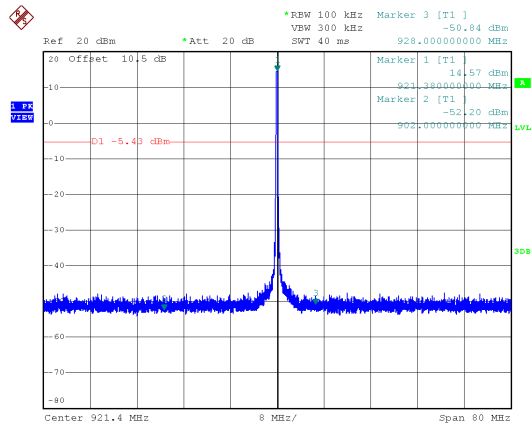
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CH00



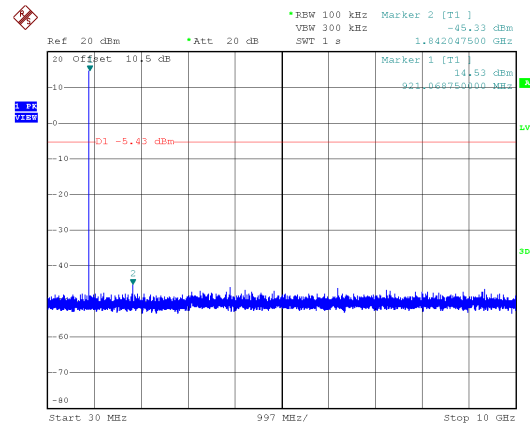
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CH31



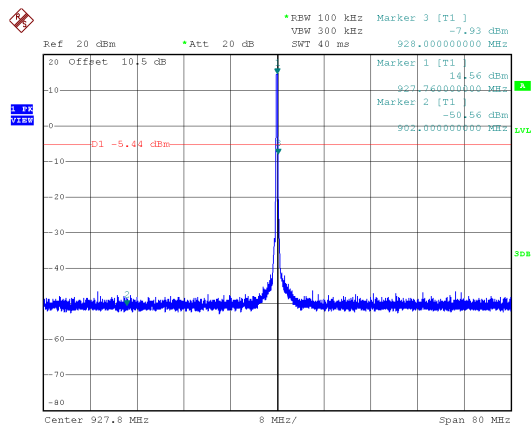
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CH31



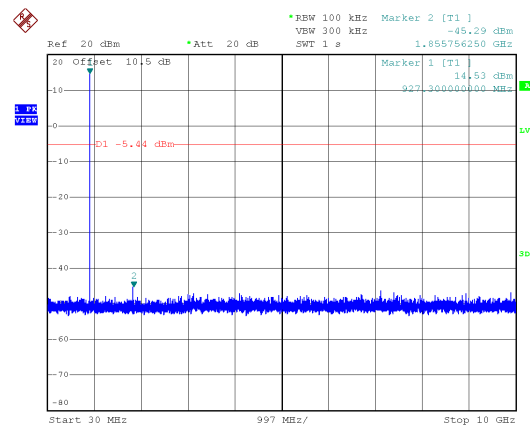
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CH63



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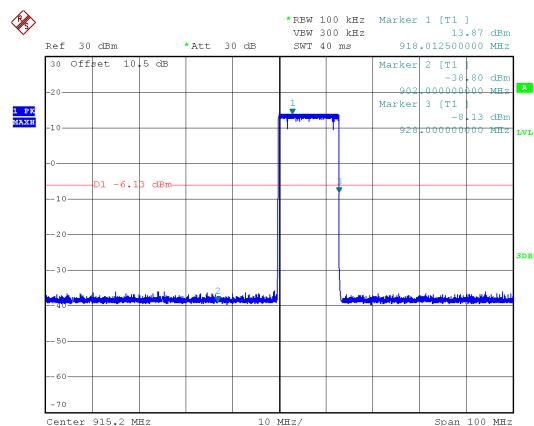
CH63



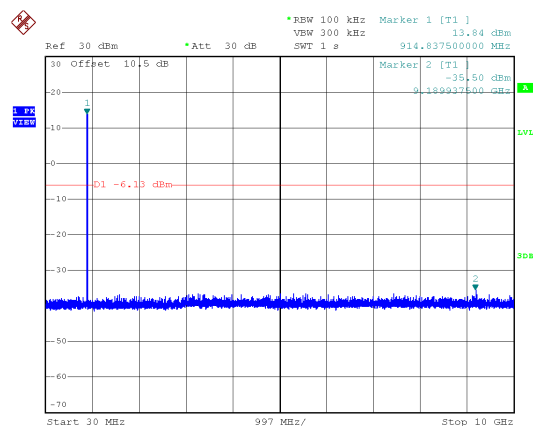
Date: 24.JAN.2025 11:08:32



Hopping



Date: 24.JAN.2025 13:46:09



Date: 24.JAN.2025 13:50:12



8. 20dB Bandwidth Measurement Data

8.1 Test Limit

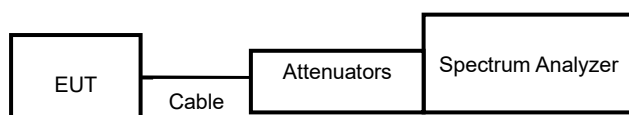
The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

8.2 Test Procedures

According to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024 Section 6.9

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.
- The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

8.3 Test Setup Layout

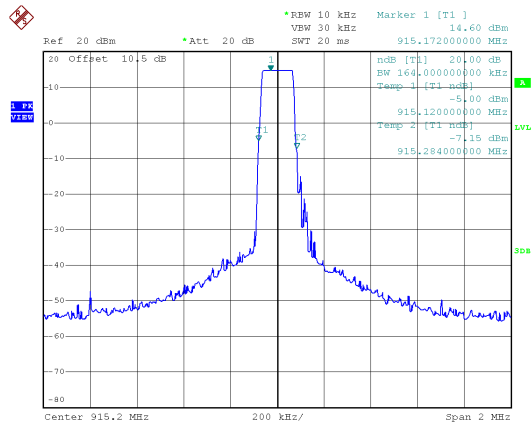


8.4 Test Result and Data

Modulation Type	Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
GFSK	0	915.2	0.164	0.500
	31	921.4	0.156	0.500
	63	927.8	0.152	0.500

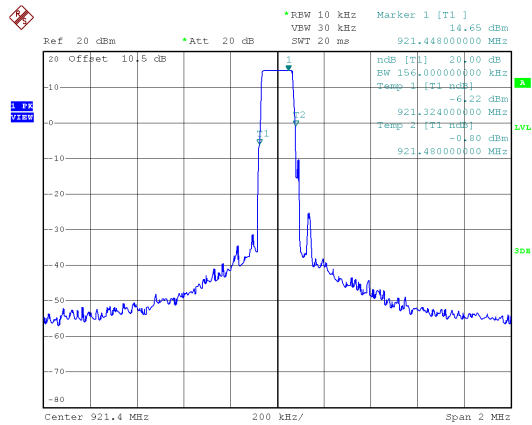


CH00



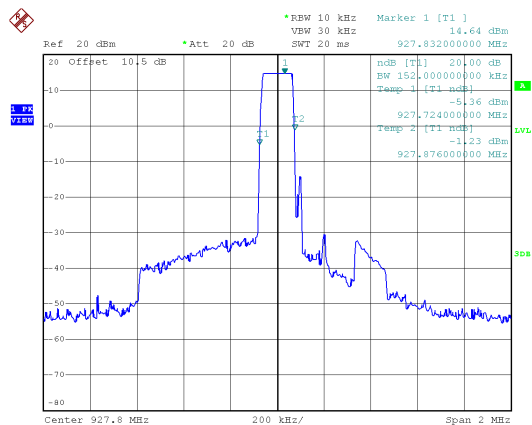
Date: 24.JAN.2025 10:52:56

CH31



Date: 24.JAN.2025 10:53:43

CH63



Date: 24.JAN.2025 10:54:30



9. Frequencies Separation

9.1 Test Limit

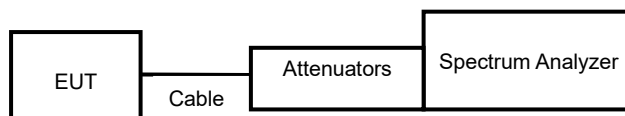
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

9.2 Test Procedures

According to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024 Section 7.8.2

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels.

9.3 Test Setup Layout

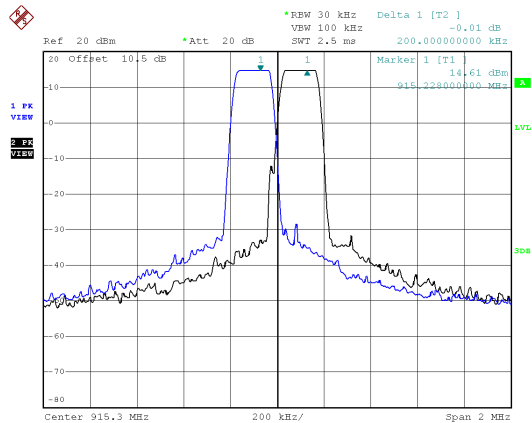


9.4 Test Result and Data

Modulation Type	Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	0	915.2	0.20	0.164
	31	921.4	0.20	0.156
	63	927.8	0.20	0.152

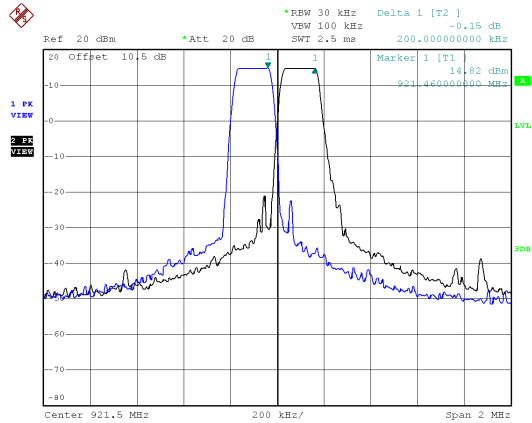


Modulation Type: GFSK
CH00



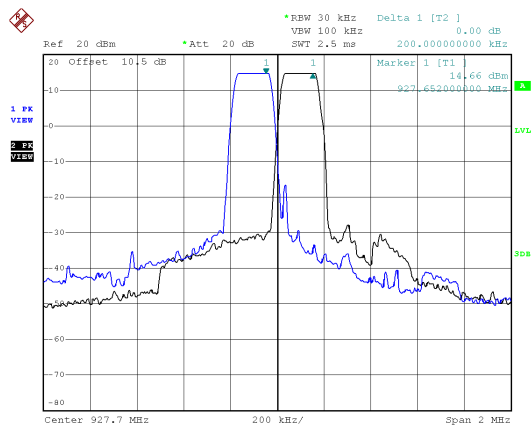
Date: 24.JAN.2025 11:13:42

CH31



Date: 24.JAN.2025 11:33:43

CH63



Date: 24.JAN.2025 11:35:18



10. Dwell Time on each channel

10.1 Test Limit

For frequency hopping systems operating in the 902-928 MHz band:

if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;

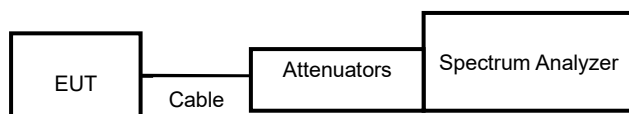
if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

10.2 Test Procedures

According to the methods defined in ANSI C63.10-2020 Section 7.8.4

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the time duration of one transmission on the measured frequency.

10.3 Test Setup Layout

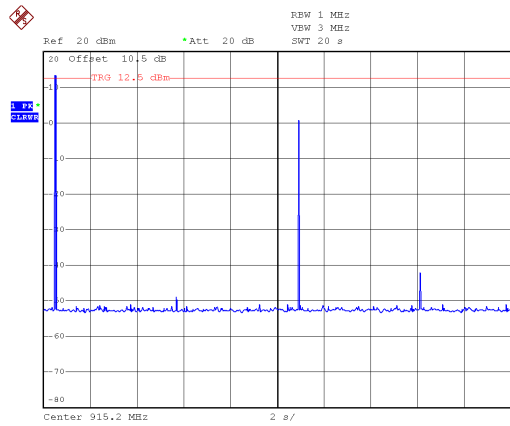


10.4 Test Result and Data

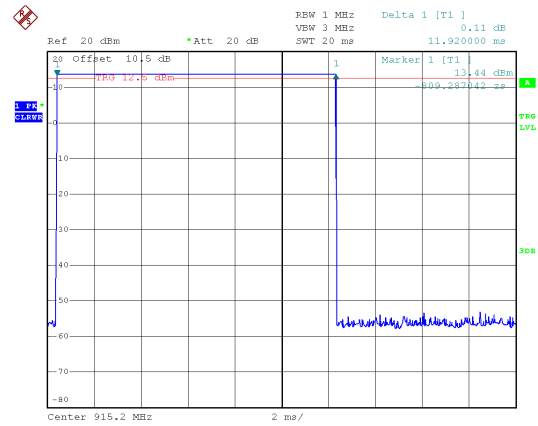
Channel	Channel Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 20s	Dwell Time (ms)	Limit (ms)
0	915.2	11.920	1	11.92	400
31	921.4	11.880	1	11.88	400
63	927.8	11.880	1	11.88	400



CH00

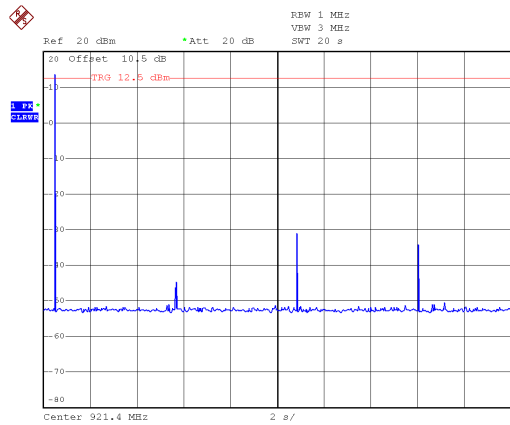


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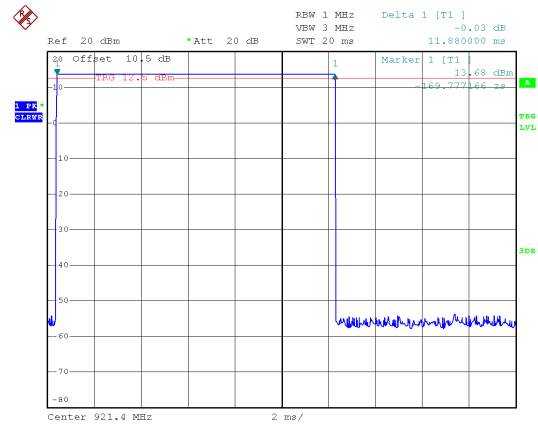


Date: 24.JAN.2025 15:38:19

CH31

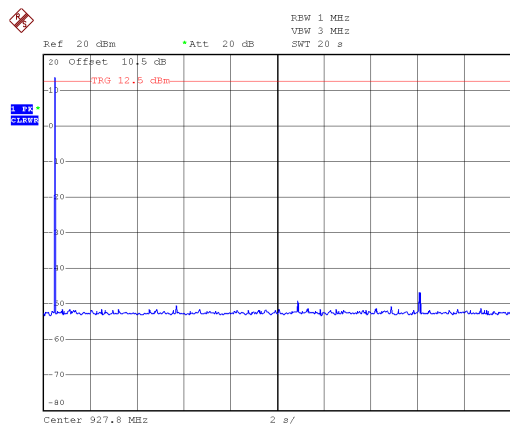


Date: 24.JAN.2025 15:43:22

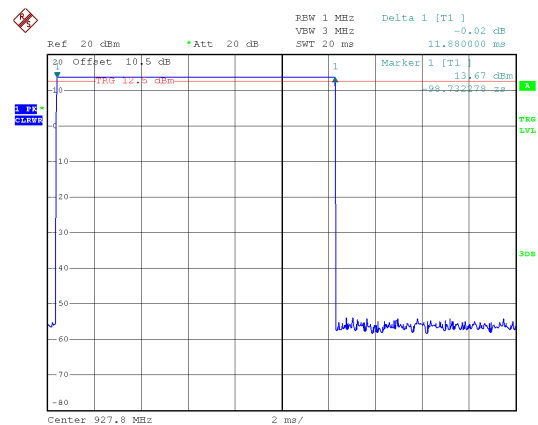


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CH63



Date: 24.JAN.2025 15:50:28



Date: 24.JAN.2025 15:51:49



11. Number of Hopping Channels

11.1 Test Limit

For frequency hopping systems operating in the 902-928 MHz band:

if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies

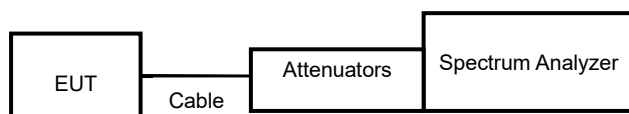
if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies

11.2 Test Procedures

According to the methods defined in ANSI C63.10-2020+Cor.1-2023 and ANSI C63.10a-2024 Section 7.8.3

- The transmitter output was connected to the spectrum analyzer.
2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.
3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

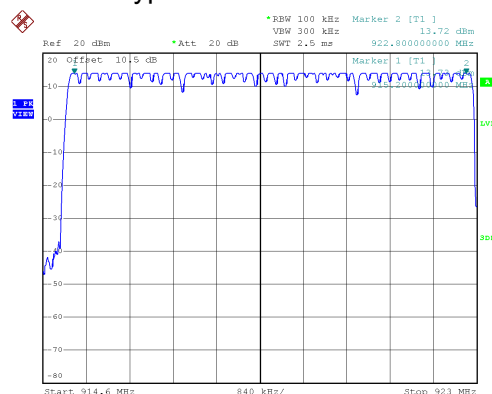
11.3 Test Setup Layout



11.4 Test Result and Data

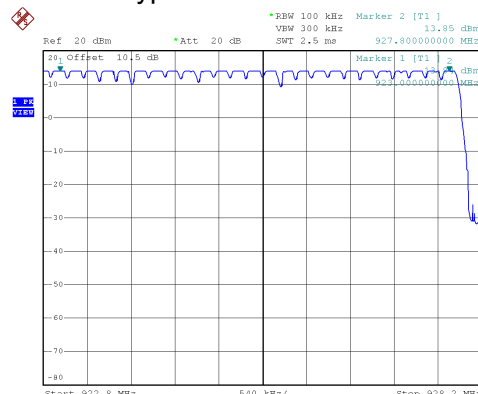
Modulation Type	Hopping Channels	Limit
GFSK	64	50

Modulation Type: GFSK



Date: 24.JAN.2025 12:15:30

Modulation Type: GFSK



Date: 24.JAN.2025 13:00:48



12. Maximum Peak Output Power

12.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

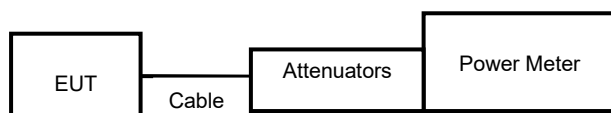
12.2 Test Procedures

According to the methods defined in ANSI C63.10-2020 Section 7.8.5

The antenna port(RF output)of the EUT was connected to the input(RF input)of a power meter.

Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

12.3 Test Setup Layout



12.4 Test Result and Data

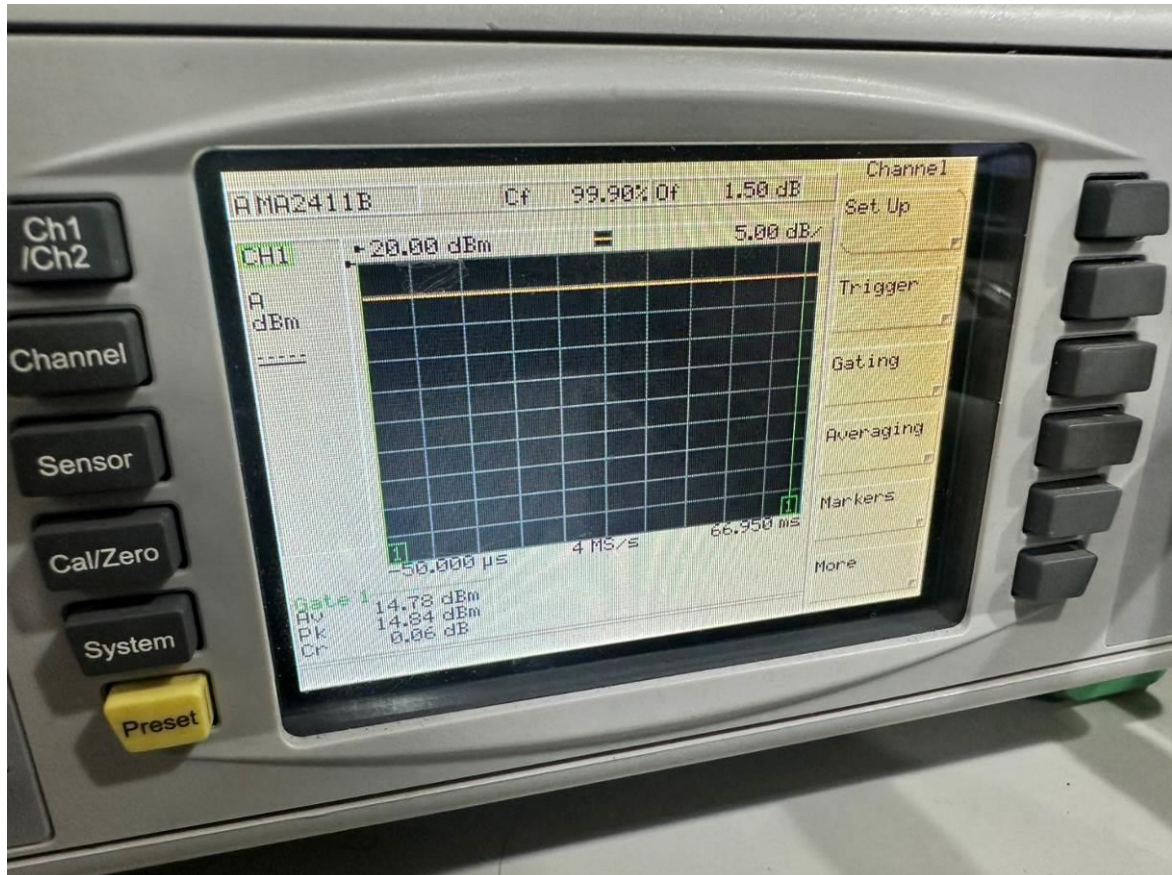
Setting	Modulation Type	Channel	Channel Frequency (MHz)	PK Output Power (dBm)	PK Output Power (mW)
15	GFSK	0	915.2	14.96	31.333
15		31	921.4	14.91	30.974
15		63	927.8	14.89	30.832

Setting	Modulation Type	Channel	Channel Frequency (MHz)	AV Output Power (dBm)	AV Output Power (mW)
15	GFSK	0	915.2	14.88	30.761
15		31	921.4	14.85	30.549
15		63	927.8	14.86	30.620

Note: Average power is for reference only.



Gate setup plot:



-----THE END OF REPORT-----