

**CFR 47 FCC PART 15 SUBPART C
ISED RSS-247 ISSUE 3**

CERTIFICATION TEST REPORT

For

Cart Andon Light

MODEL NUMBER: BAL-A00C-L-A667-C

FCC ID: 2AB2Q-BALA00CL

IC: 10256A-BALA00CL

REPORT NUMBER: 479470851-2

ISSUE DATE: October 15, 2024

Prepared for

LEEDARSON LIGHTING CO., LTD.

Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China

Tel: +86 769 22038881

Fax: +86 769 33244054

Website: www.ul.com

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	10/15/2024	Initial Issue	Fanny Huang

Summary of Test Results			
Clause	Test Items	FCC/ISED Rules	Test Results
1	20dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a) (i) RSS-247 Clause 5.1 (c) RSS-Gen Clause 6.7	Pass
2	Conducted Output Power	FCC 15.247 (b) (2) RSS-247 Clause 5.4 (a)	Pass
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1) RSS-247 Clause 5.1 (c)	Pass
4	Number of Hopping Frequency	15.247 (a)(1)(i) RSS-247 Clause 5.1 (c)	Pass
5	Time of Occupancy (Dwell Time)	15.247 (a)(1)(i) RSS-247 Clause 5.1 (c)	Pass
6	Conducted Bandedge	FCC 15.247 (d) RSS-247 Clause 5.5	Pass
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	Pass
8	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	Pass
<p>Note:</p> <ol style="list-style-type: none"> 1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China. 2. The product powered by the built-in battery, which needs to be removed when charging. 3. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C >< ISED RSS-247 > when <Simple Acceptance> decision rule is applied. 			

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	6
2. TEST METHODOLOGY	7
3. FACILITIES AND ACCREDITATION.....	7
4. CALIBRATION AND UNCERTAINTY	8
4.1. MEASURING INSTRUMENT CALIBRATION.....	8
4.2. MEASUREMENT UNCERTAINTY.....	8
5. EQUIPMENT UNDER TEST	9
5.1. DESCRIPTION OF EUT.....	9
5.2. MAXIMUM PEAK OUTPUT POWER.....	9
5.3. TEST CHANNEL CONFIGURATION.....	9
5.4. CHANNEL LIST.....	10
5.5. WORST-CASE CONFIGURATIONS	11
5.6. THE WORSE CASE POWER SETTING PARAMETER	11
5.7. DESCRIPTION OF AVAILABLE ANTENNAS.....	11
5.8. DESCRIPTION OF TEST SETUP.....	12
5.9. MEASURING INSTRUMENT AND SOFTWARE USED	13
6. ANTENNA PORT TEST RESULTS	15
6.1. ON TIME AND DUTY CYCLE.....	15
6.2. 20 dB BANDWIDTH AND 99 % OCCUPIED BANDWIDTH.....	16
6.3. CONDUCTED OUTPUT POWER.....	18
6.4. CARRIER FREQUENCY SEPARATION	19
6.5. NUMBER OF HOPPING FREQUENCIES	21
6.6. TIME OF OCCUPANCY (DWELL TIME)	23
6.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSION	25
7. RADIATED TEST RESULTS	27
7.1. SPURIOUS EMISSIONS (1 GHz ~ 10 GHz).....	33
7.1.1. SF7_125K MODE.....	33
7.1.2. SF8_125K MODE.....	39
7.1.3. SF9_125K MODE.....	45
7.1.4. SF10_125K MODE.....	51
7.2. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)	57
7.2.1. SF7_125K MODE.....	57
7.3. SPURIOUS EMISSIONS BELOW 30 MHz	59
7.3.1. SF7_125K MODE.....	59

8. ANTENNA REQUIREMENTS	62
9. Appendix	63
9.1. <i>Appendix A: 20dB Emission Bandwidth</i>	63
9.1.1. Test Result	63
9.1.2. Test Graphs.....	64
9.2. <i>Appendix B: Occupied Channel Bandwidth.....</i>	69
9.2.1. Test Result	69
9.2.2. Test Graphs.....	70
9.3. <i>Appendix C: Maximum conducted output power.....</i>	75
9.3.1. Test Result	75
9.4. <i>Appendix D: Carrier frequency separation</i>	76
9.4.1. Test Result	76
9.4.2. Test Graphs.....	77
9.5. <i>Appendix E: Time of occupancy.....</i>	79
9.5.1. Test Result	79
9.5.2. Test Graphs.....	80
9.6. <i>Appendix F: Number of hopping channels</i>	83
9.6.1. Test Result	83
9.6.2. Test Graphs.....	84
9.7. <i>Appendix G: Band edge measurements</i>	86
9.7.1. Test Result	86
9.7.2. Test Graphs.....	87
9.8. <i>Appendix F: Conducted Spurious Emission</i>	93
9.8.1. Test Result	93
9.8.2. Test Graphs.....	94
9.9. <i>Appendix G: Duty Cycle</i>	106
9.9.1. Test Result	106
9.9.2. Test Graphs.....	107

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: LEEDARSON LIGHTING CO., LTD.
Address: Xingda Road, Xingtai Industrial Zone, Changtai County,
Zhangzhou, Fujian, China

Manufacturer Information

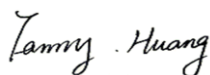
Company Name: LEEDARSON LIGHTING CO., LTD.
Address: Xingda Road, Xingtai Industrial Zone, Changtai County,
Zhangzhou, Fujian, China

EUT Information

EUT Name: Cart Andon Light
Model: BAL-A00C-L-A667-C
Sample Received Date: September 5, 2024
Sample Status: Normal
Sample ID: 7571717
Date of Tested: September 5, 2024~October 11, 2024

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 15 SUBPART C	PASS
ISED RSS-247 Issue 3	PASS
ISED RSS-GEN Issue 5	PASS


Prepared By:



Fanny Huang

Engineer Project Associate

Checked By:



Kebo Zhang

Senior Project Engineer

Approved By:



Stephen Guo

Operations Manager

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 3 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p>A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p>FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p>ISED (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.</p> <p>VCCI (Registration No.: G-20192, C-20153, T-20155 and R-20202) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20192 and R-20202 Shielding Room B, the VCCI registration No. is C-20153 and T-20155</p>
---------------------------	--

Note 1:

All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China.

Note 2:

The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3:

For below 30 MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30 MHz had been correlated to measurements performed on an OFS.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty
Conduction emission	3.62 dB
Radiated Emission (Included Fundamental Emission) (9 kHz ~ 30 MHz)	2.2 dB
Radiated Emission (Included Fundamental Emission) (30 MHz ~ 1 GHz)	4.00 dB
Radiated Emission (Included Fundamental Emission) (1 GHz to 26 GHz)	5.78 dB (1 GHz ~ 18 GHz)
	5.23 dB (18 GHz ~ 26 GHz)
Duty Cycle	±0.028%
DTS and 99% Occupied Bandwidth	±0.0196%
Maximum Conducted Output Power	±0.686 dB
Maximum Power Spectral Density Level	±0.743 dB
Conducted Band-edge Compliance	±1.328 dB
Conducted Unwanted Emissions In Non-restricted Frequency Bands	±0.746 dB (9 kHz ~ 1 GHz)
	±1.328dB (1 GHz ~ 26 GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Cart Andon Light
Model	BAL-A00C-L-A667-C
Battery	DC 3.65 V

Transmit Frequency Range	902.3 ~ 914.9 MHz
Bit Rate	125 kbps
Technology	FHSS
Number of Channels	64
Channel Separation (kHz)	200
Modulation	LoRa SF10 125kHz, LoRa SF9 125kHz, LoRa SF8 125kHz, LoRa SF7 125kHz

5.2. MAXIMUM PEAK OUTPUT POWER

Test Mode	Number of Channels	Maximum Peak Output Power (dBm)	Maximum EIRP (dBm)
SF7_125K	64	20.37	20.51
SF8_125K	64	20.27	20.41
SF9_125K	64	20.27	20.41
SF10_125K	64	20.31	20.46

5.3. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
SF7_125K	CH 1(Low Channel), CH 32(MID Channel), CH 64(High Channel)	902.3 MHz, 908.5 MHz, 914.9 MHz
SF8_125K	CH 1(Low Channel), CH 32(MID Channel), CH 64(High Channel)	902.3 MHz, 908.5 MHz, 914.9 MHz
SF9_125K	CH 1(Low Channel), CH 32(MID Channel), CH 64(High Channel)	902.3 MHz, 908.5 MHz, 914.9 MHz
SF10_125K	CH 1(Low Channel), CH 32(MID Channel), CH 64(High Channel)	902.3 MHz, 908.5 MHz, 914.9 MHz
SF7_125K	Hopping	902.3 ~ 914.9 MHz
SF8_125K	Hopping	902.3 ~ 914.9 MHz
SF9_125K	Hopping	902.3 ~ 914.9 MHz
SF10_125K	Hopping	902.3 ~ 914.9 MHz

5.4. CHANNEL LIST

Test Mode: SF7/8/9/10_125K							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	17	905.5	33	908.7	49	911.9
2	902.5	18	905.7	34	908.9	50	912.1
3	902.7	19	905.9	35	909.1	51	912.3
4	902.9	20	906.1	36	909.3	52	912.5
5	903.1	21	906.3	37	909.5	53	912.7
6	903.3	22	906.5	38	909.7	54	912.9
7	903.5	23	906.7	39	909.9	55	913.1
8	903.7	24	906.9	40	910.1	56	913.3
9	903.9	25	907.1	41	910.3	57	913.5
10	904.1	26	907.3	42	910.5	58	913.7
11	904.3	27	907.5	43	910.7	59	913.9
12	904.5	28	907.7	44	910.9	60	914.1
13	904.7	29	907.9	45	911.1	61	914.3
14	904.9	30	908.1	46	911.3	62	914.5
15	905.1	31	908.3	47	911.5	63	914.7
16	905.3	32	908.5	48	911.7	64	914.9

5.5. WORST-CASE CONFIGURATIONS

Test Mode	Modulation Technology	Modulation Type	Data Rate
SF7_125K	FHSS	LoRa	5470 bps
SF8_125K	FHSS	LoRa	3125 bps
SF9_125K	FHSS	LoRa	1760 bps
SF10_125K	FHSS	LoRa	980 bps

5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter				
Test Software		sscom5.13.1		
Test Mode	Transmit Antenna Number	Test Software Setting Value		
		Low	Middle	High
SF7_125K	1	22	22	22
SF8_125K	1	22	22	22
SF9_125K	1	22	22	22
SF10_125K	1	22	22	22

Note: raw is the test software setting description provide by customer.

5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency Band (MHz)	Antenna Type	MAX Antenna Gain (dBi)
1	903 – 914.2	Metal Helical Antenna	0.15

Test Mode	Transmit and Receive Mode	Description
SF7_125K	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
SF8_125K	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
SF9_125K	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
SF10_125K	<input checked="" type="checkbox"/> 1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

Note: 1. The value of the antenna gain was declared by customer.

2. DTS and DSS can't transmit simultaneously. (declared by client)

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	Lenovo	E14	/
2	USB TO UART	/	/	/

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	/	/	1.0	/

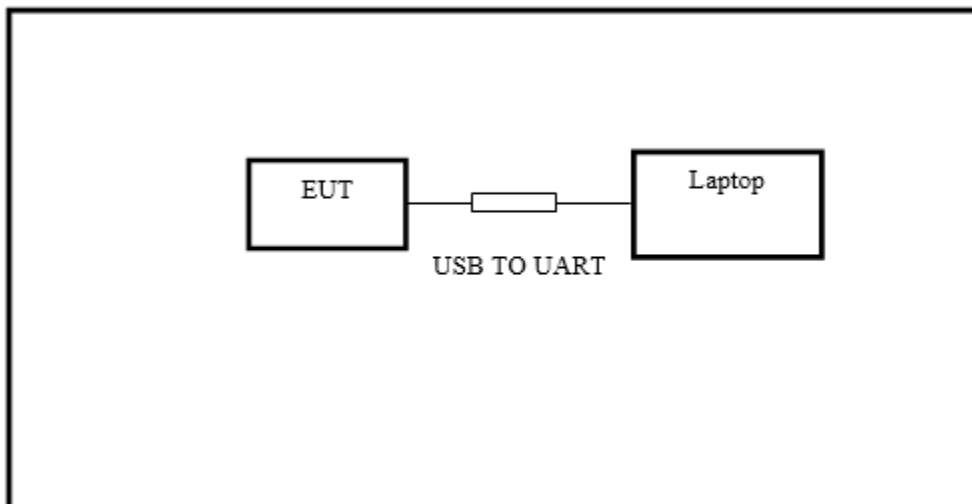
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



5.9. MEASURING INSTRUMENT AND SOFTWARE USED

R&S TS 8997 Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
Power sensor, Power Meter	R&S	OSP120	100921	Mar.25,2024	Mar.24,2025
Vector Signal Generator	R&S	SMBV100A	261637	Oct.12, 2023	Oct.11, 2024
Signal Generator	R&S	SMB100A	178553	Oct.12, 2023	Oct.11, 2024
Signal Analyzer	R&S	FSV40	101118	Oct.12, 2023	Oct.11, 2024
Software					
Description	Manufacturer		Name	Version	
For R&S TS 8997 Test System	Rohde & Schwarz		EMC 32	10.60.10	
Tonsend RF Test System					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due. Date
PXA Signal Analyzer	Keysight	N9030A	MY55410512	Oct.12, 2023	Oct.11, 2024
MXG Vector Signal Generator	Keysight	N5182B	MY56200284	Oct.12, 2023	Oct.11, 2024
MXG Vector Signal Generator	Keysight	N5172B	MY56200301	Oct.12, 2023	Oct.11, 2024
Attenuator	Aglient	8495B	2814a12853	Oct.12, 2023	Oct.11, 2024
RF Control Unit	Tonscend	JS0806-2	23B80620666	Mar.25,2024	Mar.24,2025
Software					
Description	Manufacturer	Name		Version	
Tonsend SRD Test System	Tonsend	JS1120-3 RF Test System		V3.2.22	

Conducted Emissions					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Date
EMI Test Receiver	R&S	ESR3	101961	Oct.13, 2023	Oct.12, 2024
Two-Line V-Network	R&S	ENV216	101983	Oct.13, 2023	Oct.12, 2024
Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Oct.13, 2023	Oct.12, 2024
Software					
Description		Manufacturer	Name	Version	
Test Software for Conducted Emissions		Farad	EZ-EMC	Ver. UL-3A1	

Radiated Emissions						
Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Due Date
MXE EMI Receiver	KESIGHT	N9038A	MY56400036	/	Oct.12, 2023	Oct.11, 2024
Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Aug.02, 2021	June 28, 2024	June 27, 2027
Preamplifier	HP	8447D	2944A09099	/	Oct.12, 2023	Oct.11, 2024
EMI Measurement Receiver	R&S	ESR26	101377	/	Oct.12, 2023	Oct.11, 2024
Horn Antenna	TDK	HRN-0118	130939	/	Apr.29, 2022	Apr.28, 2025
Preamplifier	TDK	PA-02-0118	TRS-305-00067	/	Oct.12, 2023	Oct.11, 2024
Horn Antenna	Schwarzbeck	BBHA9170	697	July 20, 2021	June 30, 2024	June 29, 2027
Preamplifier	TDK	PA-02-2	TRS-307-00003	/	Oct.12, 2023	Oct.11, 2024
Preamplifier	TDK	PA-02-3	TRS-308-00002	/	Oct.12, 2023	Oct.11, 2024
Loop antenna	Schwarzbeck	1519B	00008	/	Dec.14, 2021	Dec.13, 2024
Preamplifier	TDK	PA-02-001-3000	TRS-302-00050	/	Oct.12, 2023	Oct.11, 2024
High Pass Filter	Wi	WHKX10-2700-3000-18000-40SS	23	/	Oct.12, 2023	Oct.11, 2024
Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4	/	Oct.12, 2023	Oct.11, 2024
Software						
Description			Manufacturer	Name		Version
Test Software for Radiated Emissions			Farad	EZ-EMC		Ver. UL-3A1

6. ANTENNA PORT TEST RESULTS

6.1. ON TIME AND DUTY CYCLE

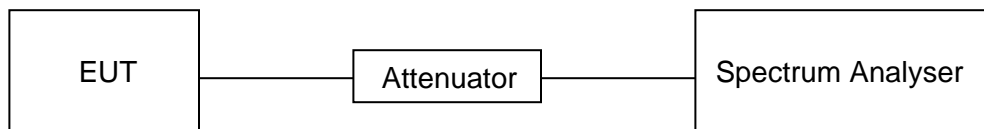
LIMITS

None; for reporting purposes only.

PROCEDURE

Refer to ANSI C63.10-2013 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix A.

6.2. 20 dB BANDWIDTH AND 99 % OCCUPIED BANDWIDTH

LIMITS

CFR 47FCC Part15 (15.247) Subpart C ISED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (i) RSS-247 Clause 5.1 (a)	20 dB Bandwidth	≤ 500 kHz	902 - 928
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	None; for reporting purposes only.	902 - 928

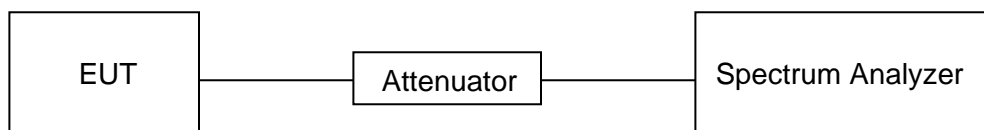
TEST PROCEDURE

Connect the EUT to the spectrum analyser and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 20 dB Bandwidth: 1 % to 5 % of the 20 dB bandwidth For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
VBW	For 20 dB Bandwidth: approximately 3×RBW For 99 % Occupied Bandwidth: $\geq 3 \times \text{RBW}$
Span	Approximately 2 to 3 times the 20dB bandwidth
Trace	Max hold
Sweep	Auto couple

a) Use the occupied bandwidth function of the instrument, allow the trace to stabilize and report the measured 99 % occupied bandwidth and 20 dB Bandwidth.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix B and C.

6.3. CONDUCTED OUTPUT POWER

LIMITS

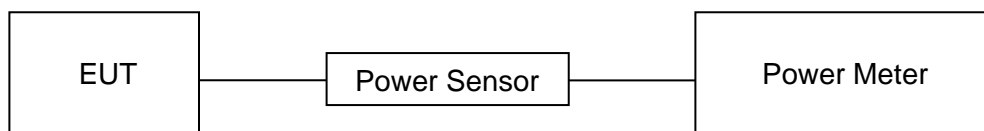
CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (b) (2) ISED RSS-247 Clause 5.4 (a)	Peak Conducted Output Power	1 watt for systems employing at least 50 hopping channels	902 - 928

TEST PROCEDURE

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix D.

6.4. CARRIER FREQUENCY SEPARATION

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISSED RSS-247 ISSUE 3			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1) ISSED RSS-247 Clause 5.1 (b)	Carrier Frequency Separation	at least 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.	902 - 928

TEST PROCEDURE

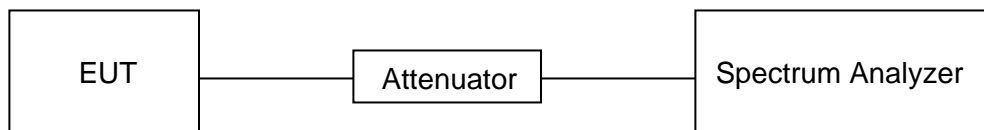
Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
RBW	Start with the RBW set to approximately 30 % of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW	≥RBW
Trace	Max hold
Sweep time	Auto couple

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

Compliance of an EUT with the appropriate regulatory limit shall be determined.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to Appendix E.

6.5. NUMBER OF HOPPING FREQUENCIES

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 15.247 (a) (i) ISED RSS-247 Clause 5.1 (c)	Number of Hopping Frequency	1. if the 20 dB bandwidth of the hopping channel is less than 250 kHz, at least 50 hopping channels 2. if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, at least 25 hopping channels

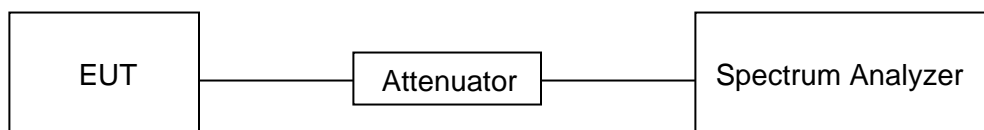
TEST PROCEDURE

Connect the EUT to the spectrum Analyzer and use the following settings:

Detector	Peak
RBW	To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
VBW	\geq RBW
Span	The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer, count the quantity of peaks to get the number of hopping channels.

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix F.

6.6. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 15.247 (a) (i) ISED RSS-247 Clause 5.1 (c)	Time of Occupancy (Dwell Time)	1.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. 2. 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.

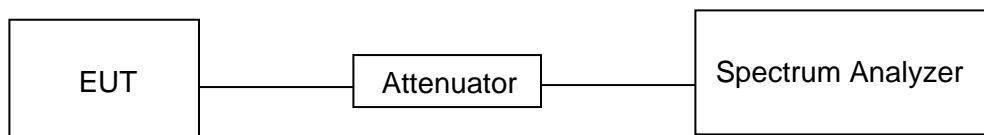
TEST PROCEDURE

Connect the EUT to the spectrum Analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	1 MHz
VBW	≥RBW
Span	Zero span, centered on a hopping channel
Trace	Max hold
Sweep time	As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel

- The transmitter output (antenna port) was connected to the spectrum analyzer
- Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- Use a video trigger with the trigger level set to enable triggering only on full pulses.
- Sweep Time is more than once pulse time.
- Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- Measure the maximum time duration of one single pulse.
- Measure the maximum time duration of one single pulse.
A Period Time = (channel number)*0.4

TEST SETUP



TEST ENVIRONMENT

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix G.

6.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSION

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C ISED RSS-247 ISSUE 3		
Section	Test Item	Limit
CFR 47 FCC §15.247 (d) ISED RSS-247 5.5	Conducted Spurious Emission	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

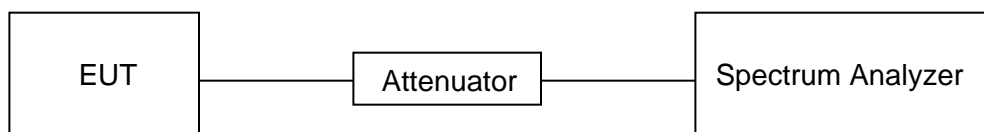
Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

Change the settings for emission level measurement:

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements.

TEST SETUP**TEST ENVIRONMENT**

Temperature	24.2 °C	Relative Humidity	59.7 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

Please refer to appendix H.

7. RADIATED TEST RESULTS

LIMITS

Please refer to CFR 47 FCC §15.205 and §15.209.

Please refer to ISSED RSS-GEN Clause 8.9 and Clause 8.10.

Radiation Disturbance Test Limit for FCC (Class B) (9 kHz-1 GHz)

Emissions radiated outside of the specified frequency bands above 30 MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m	
		Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30 MHz		
Frequency (MHz)	Field strength (microvolts/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

ISED General field strength limits at frequencies below 30 MHz

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

ISED Restricted bands please refer to ISED RSS-GEN Clause 8.10

Table 7 – Restricted frequency bands ^{Note 1}		
MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

FCC Restricted bands of operation refer to FCC §15.205 (a):

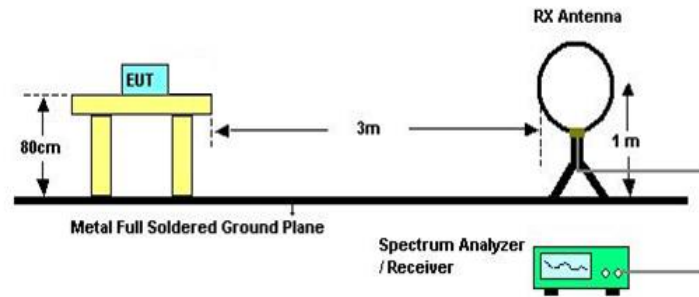
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	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	(²)
13.36-13.41			

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

²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30 MHz

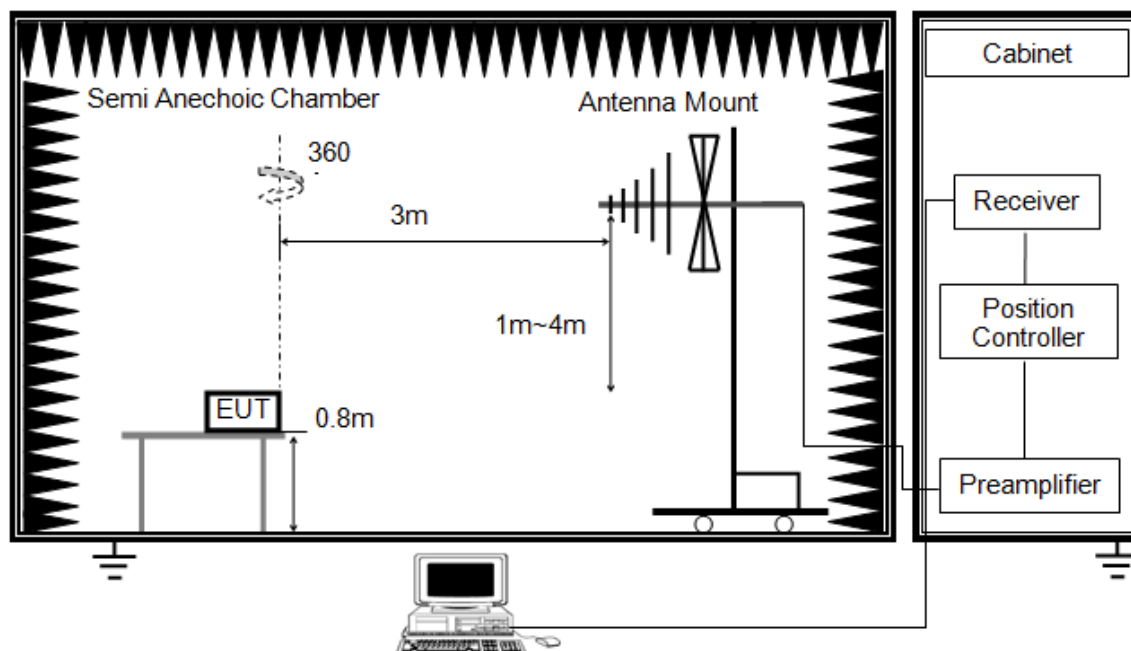


The setting of the spectrum analyzer

RBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
VBW	200 Hz (From 9 kHz to 0.15 MHz)/ 9 kHz (From 0.15 MHz to 30 MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1 m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
6. For measurement below 1 GHz, 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 then Quasi Peak and average detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.
7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω . For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to $Y-51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1 GHz and above 30 MHz

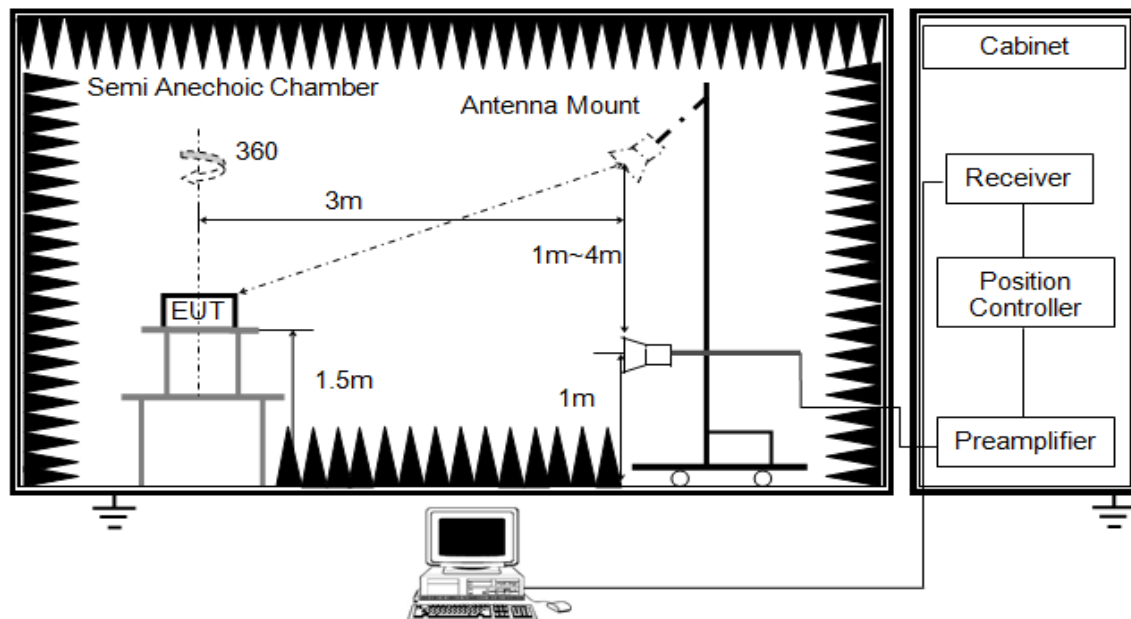


The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 80 cm above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1 GHz, 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 then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

Above 1 GHz



The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK: 3 MHz AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1 GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.

X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

Note 2: For the radiated restricted bandedge, a pre-scan was performed, and the result was 20 dB lower than the limit line, the test data was not shown in the report.

TEST ENVIRONMENT

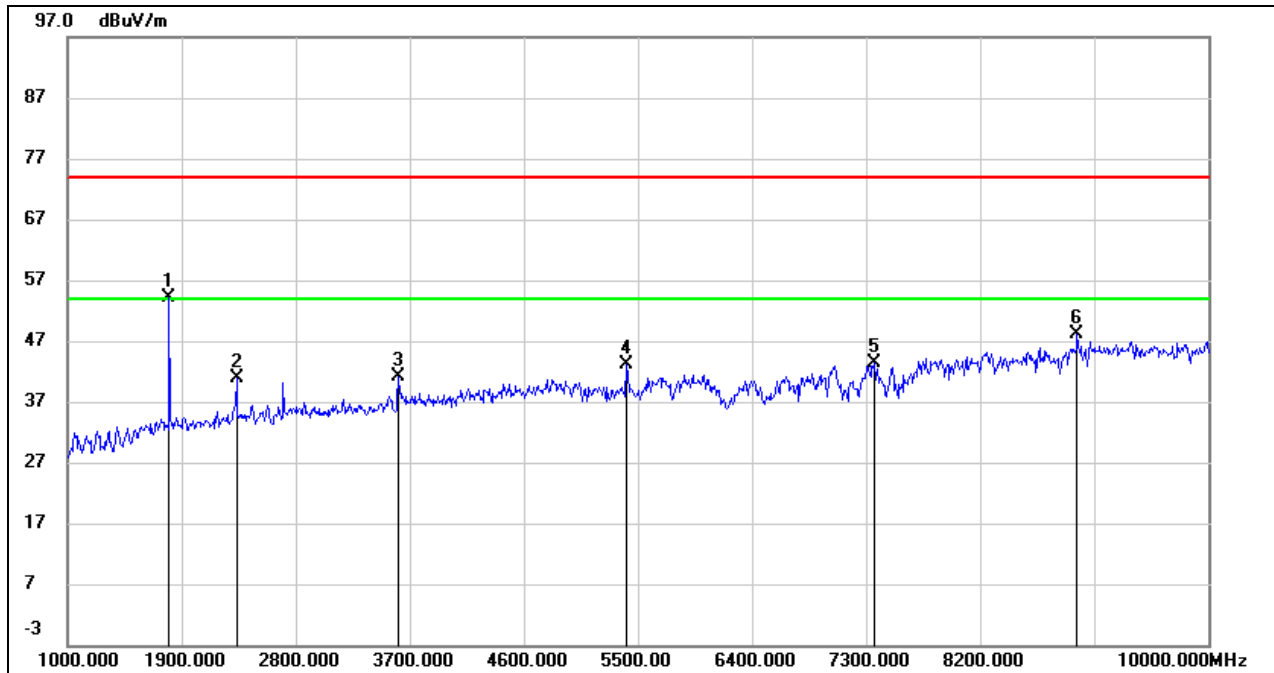
Temperature	23.9 °C	Relative Humidity	62.2 %
Atmosphere Pressure	101 kPa	Test Voltage	DC 3.65V

RESULTS

7.1. SPURIOUS EMISSIONS (1 GHz ~ 10 GHz)

7.1.1. SF7_125K MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	64.49	-10.35	54.14	/	/	peak
2	2332.000	49.26	-8.41	40.85	74.00	-33.15	peak
3	3610.000	45.05	-4.04	41.01	74.00	-32.99	peak
4	5410.000	42.02	1.08	43.10	74.00	-30.90	peak
5	7363.000	36.32	7.03	43.35	74.00	-30.65	peak
6	8965.000	37.99	10.06	48.05	74.00	-25.95	peak

Note: 1. Measurement = Reading Level + Correct Factor.

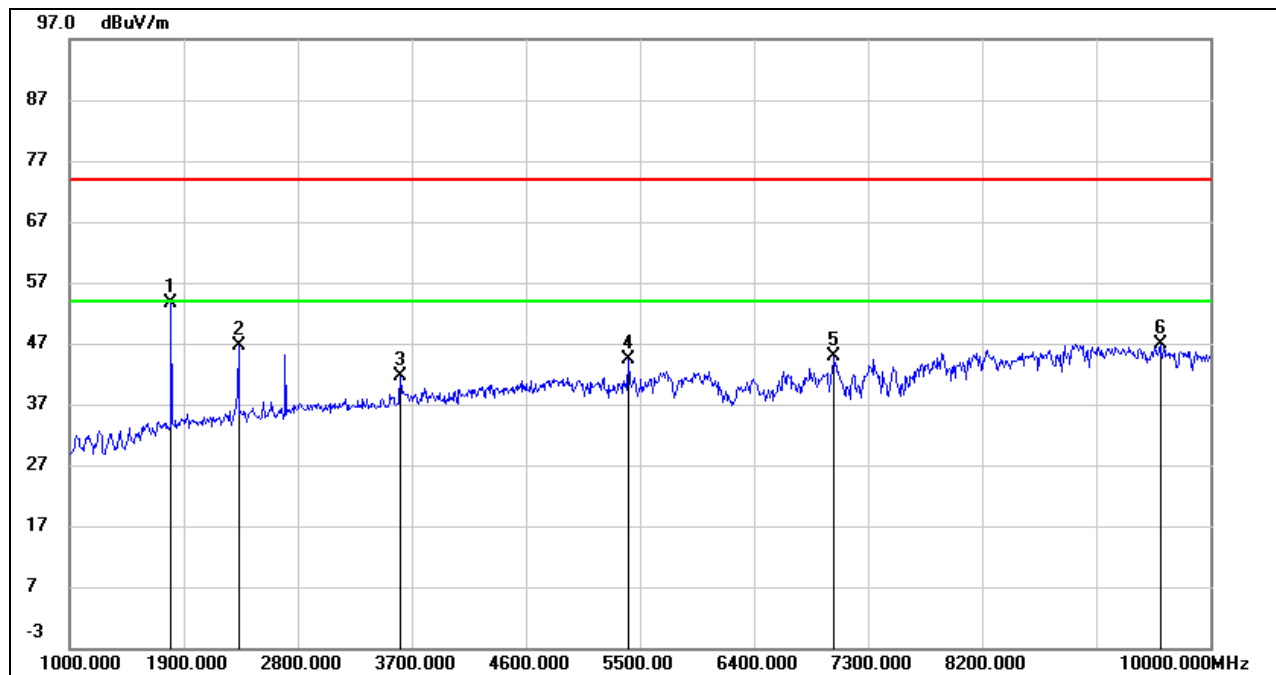
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	63.43	-9.77	53.66	/	/	peak
2	2332.000	54.31	-7.57	46.74	74.00	-27.26	peak
3	3610.000	44.55	-3.02	41.53	74.00	-32.47	peak
4	5410.000	42.12	2.28	44.40	74.00	-29.60	peak
5	7030.000	37.33	7.65	44.98	74.00	-29.02	peak
6	9604.000	36.33	10.58	46.91	74.00	-27.09	peak

Note: 1. Measurement = Reading Level + Correct Factor.

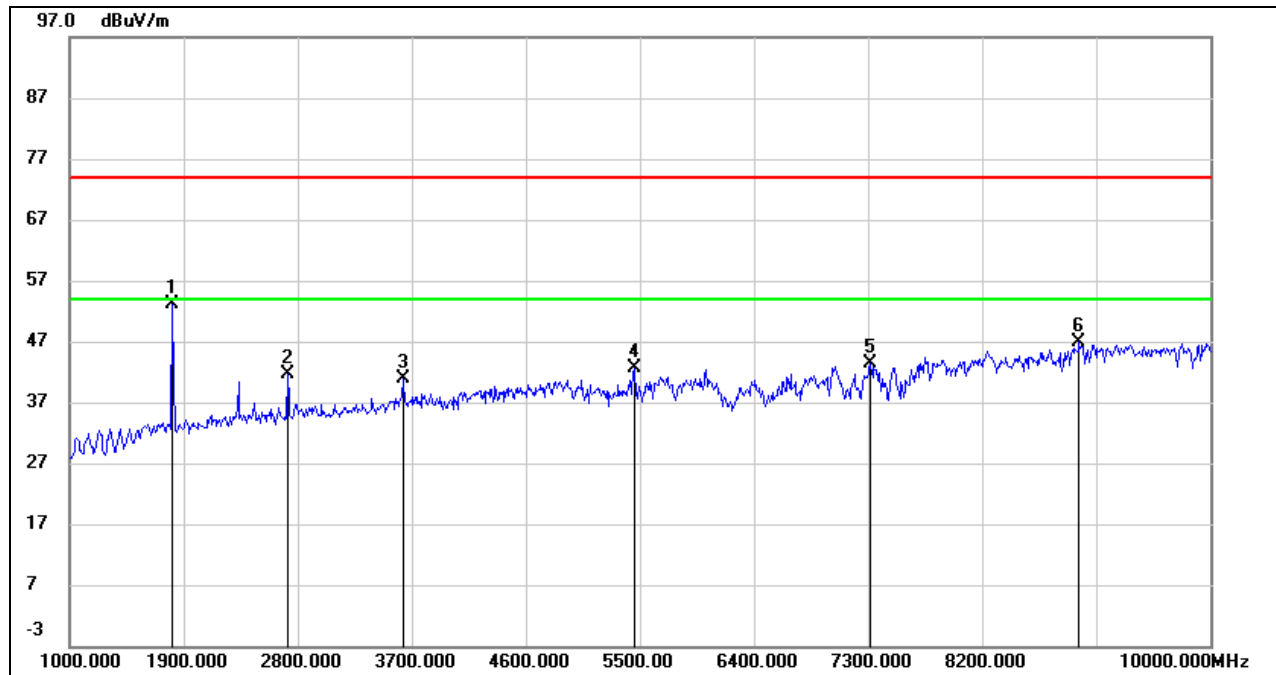
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	63.37	-10.35	53.02	/	/	peak
2	2719.000	49.10	-7.36	41.74	74.00	-32.26	peak
3	3628.000	44.85	-3.99	40.86	74.00	-33.14	peak
4	5455.000	41.35	1.31	42.66	74.00	-31.34	peak
5	7318.000	36.63	6.74	43.37	74.00	-30.63	peak
6	8965.000	36.92	10.06	46.98	74.00	-27.02	peak

Note: 1. Measurement = Reading Level + Correct Factor.

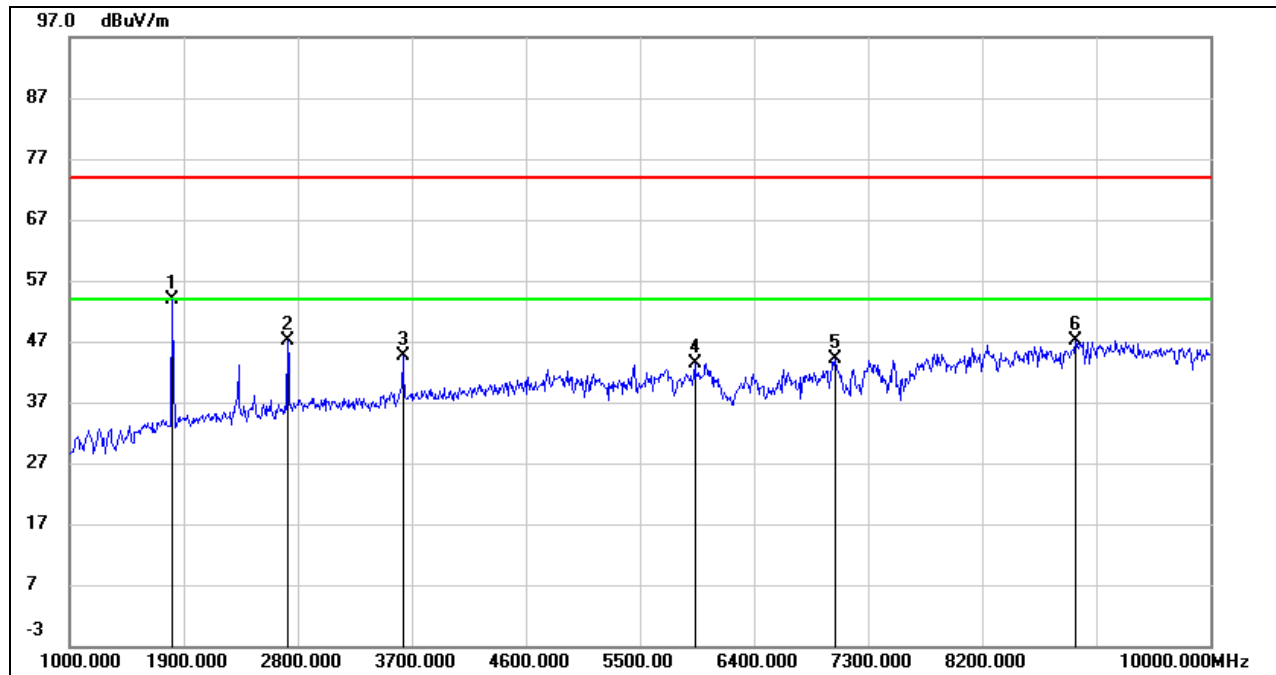
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	63.65	-9.75	53.90	/	/	peak
2	2719.000	53.35	-6.34	47.01	74.00	-26.99	peak
3	3628.000	47.56	-2.96	44.60	74.00	-29.40	peak
4	5932.000	39.87	3.61	43.48	74.00	-30.52	peak
5	7039.000	36.47	7.59	44.06	74.00	-29.94	peak
6	8938.000	37.02	10.16	47.18	74.00	-26.82	peak

Note: 1. Measurement = Reading Level + Correct Factor.

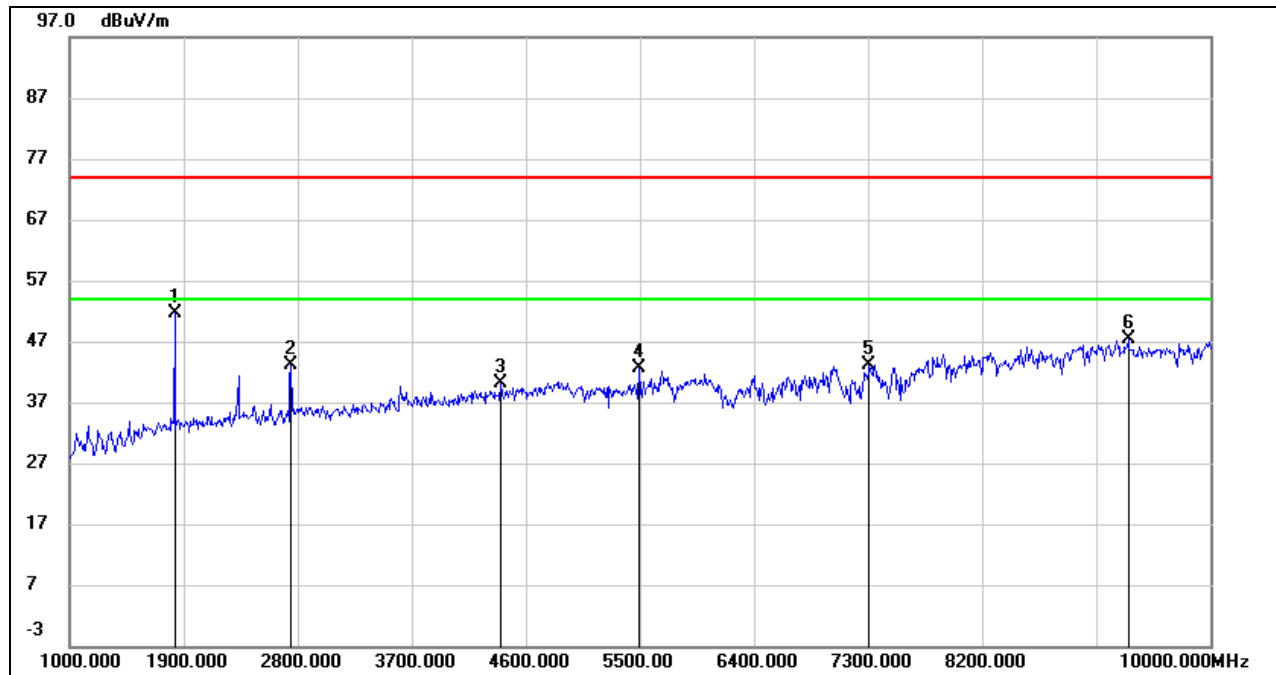
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	61.87	-10.34	51.53	/	/	peak
2	2746.000	50.34	-7.20	43.14	74.00	-30.86	peak
3	4402.000	41.81	-1.79	40.02	74.00	-33.98	peak
4	5491.000	41.18	1.48	42.66	74.00	-31.34	peak
5	7309.000	36.53	6.67	43.20	74.00	-30.80	peak
6	9352.000	37.36	9.95	47.31	74.00	-26.69	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

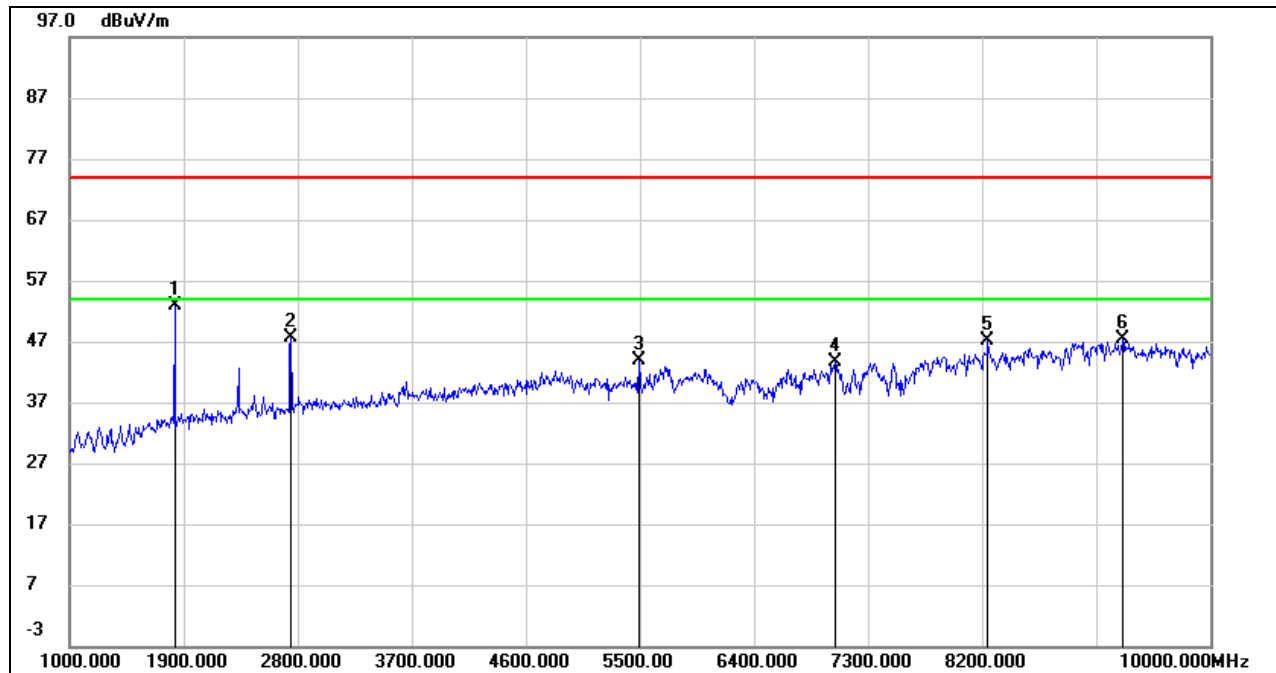
4. AVG: VBW=1/Ton where: ton is transmit duration.

5. For transmit duration, please refer to clause 6.1.

6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

7.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	62.65	-9.71	52.94	/	/	peak
2	2746.000	53.90	-6.15	47.75	74.00	-26.25	peak
3	5491.000	41.16	2.68	43.84	74.00	-30.16	peak
4	7039.000	35.95	7.59	43.54	74.00	-30.46	peak
5	8245.000	38.39	8.80	47.19	74.00	-26.81	peak
6	9307.000	37.42	10.00	47.42	74.00	-26.58	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

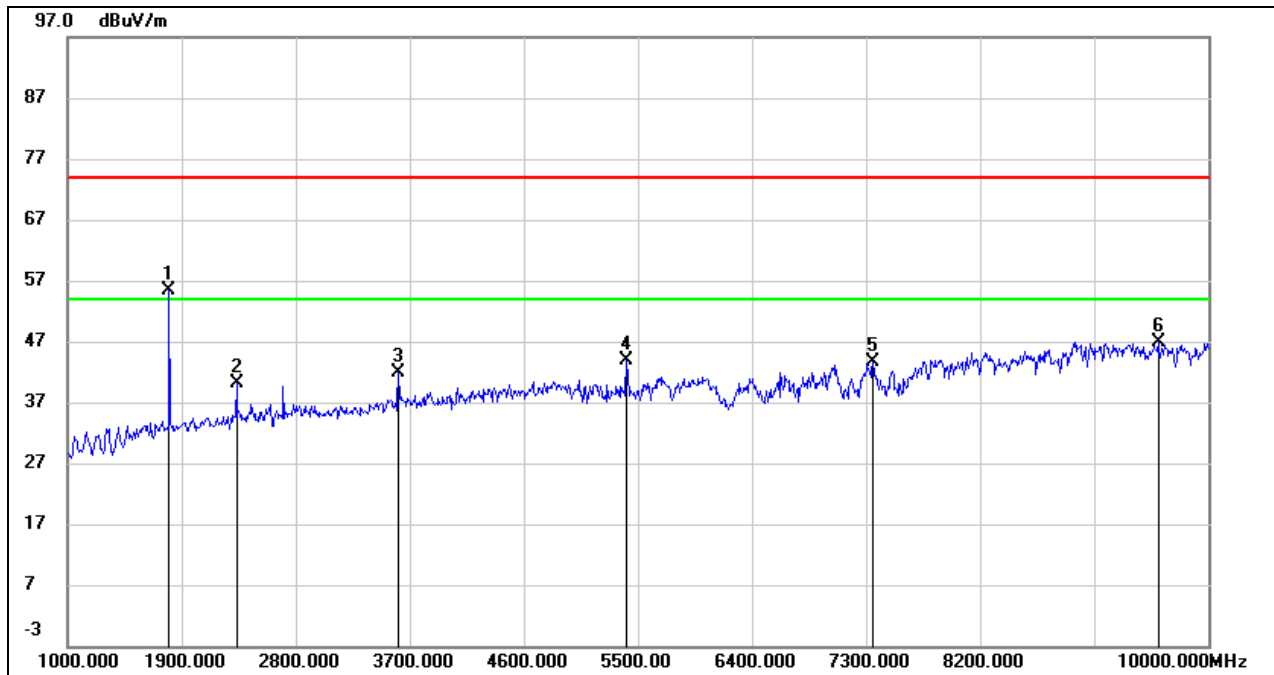
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

7.1.2. SF8_125K MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	65.75	-10.35	55.40	/	/	peak
2	2332.000	48.46	-8.41	40.05	74.00	-33.95	peak
3	3610.000	45.93	-4.04	41.89	74.00	-32.11	peak
4	5410.000	42.77	1.08	43.85	74.00	-30.15	peak
5	7354.000	36.62	6.97	43.59	74.00	-30.41	peak
6	9604.000	36.15	10.72	46.87	74.00	-27.13	peak

Note: 1. Measurement = Reading Level + Correct Factor.

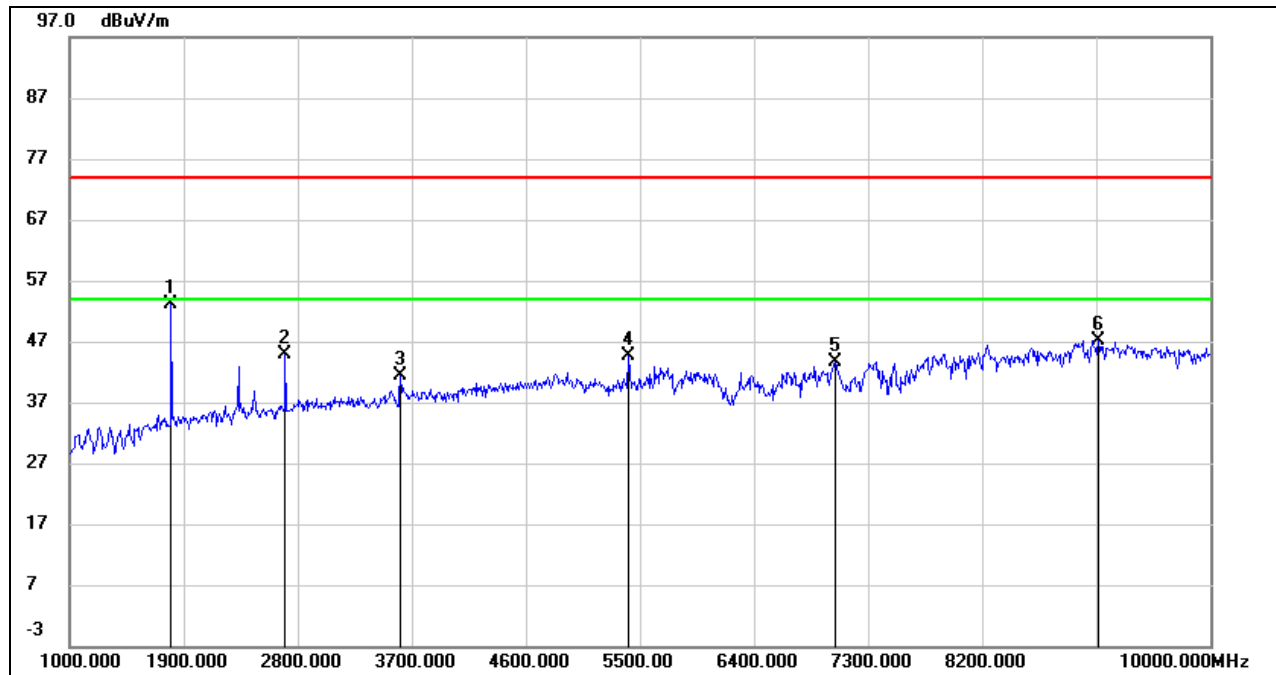
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	62.97	-9.77	53.20	/	/	peak
2	2701.000	51.38	-6.47	44.91	74.00	-29.09	peak
3	3610.000	44.40	-3.02	41.38	74.00	-32.62	peak
4	5410.000	42.29	2.28	44.57	74.00	-29.43	peak
5	7039.000	36.01	7.59	43.60	74.00	-30.40	peak
6	9118.000	36.96	10.26	47.22	74.00	-26.78	peak

Note: 1. Measurement = Reading Level + Correct Factor.

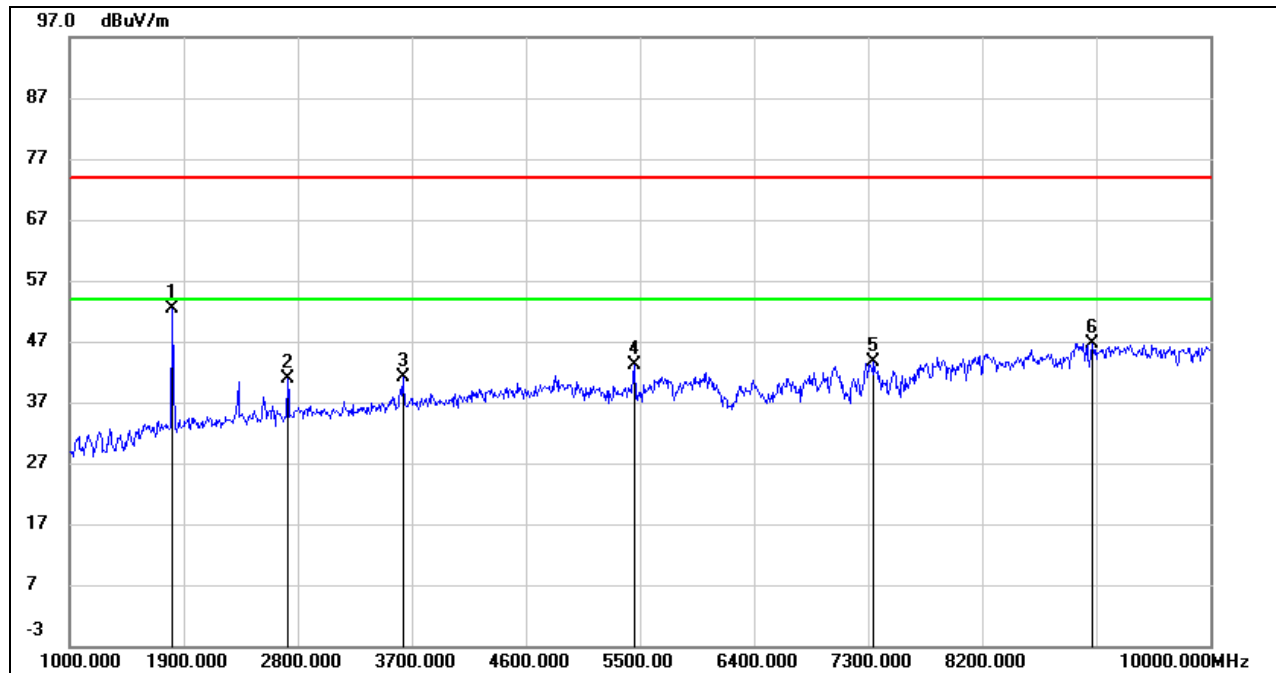
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	62.80	-10.35	52.45	/	/	peak
2	2719.000	48.27	-7.36	40.91	74.00	-33.09	peak
3	3628.000	45.09	-3.99	41.10	74.00	-32.90	peak
4	5455.000	41.81	1.31	43.12	74.00	-30.88	peak
5	7345.000	36.67	6.91	43.58	74.00	-30.42	peak
6	9073.000	36.60	10.15	46.75	74.00	-27.25	peak

Note: 1. Measurement = Reading Level + Correct Factor.

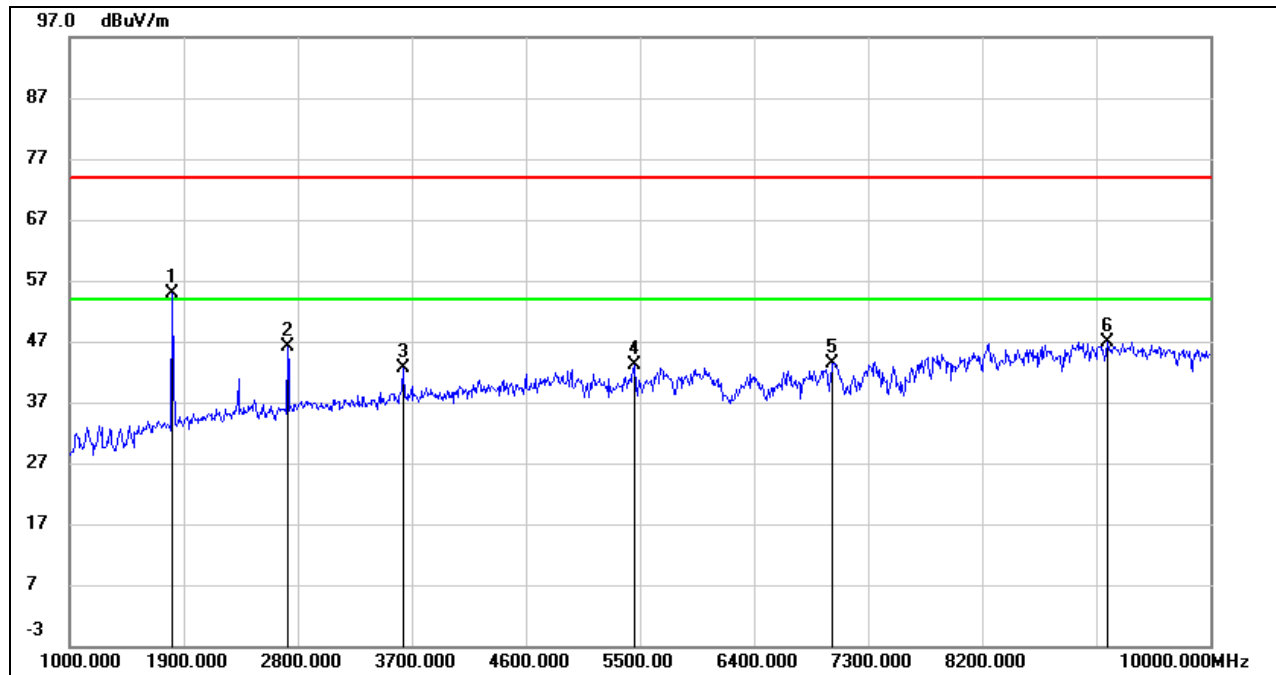
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	64.63	-9.75	54.88	/	/	peak
2	2719.000	52.57	-6.34	46.23	74.00	-27.77	peak
3	3628.000	45.69	-2.96	42.73	74.00	-31.27	peak
4	5455.000	40.72	2.51	43.23	74.00	-30.77	peak
5	7021.000	35.75	7.69	43.44	74.00	-30.56	peak
6	9190.000	37.11	9.88	46.99	74.00	-27.01	peak

Note: 1. Measurement = Reading Level + Correct Factor.

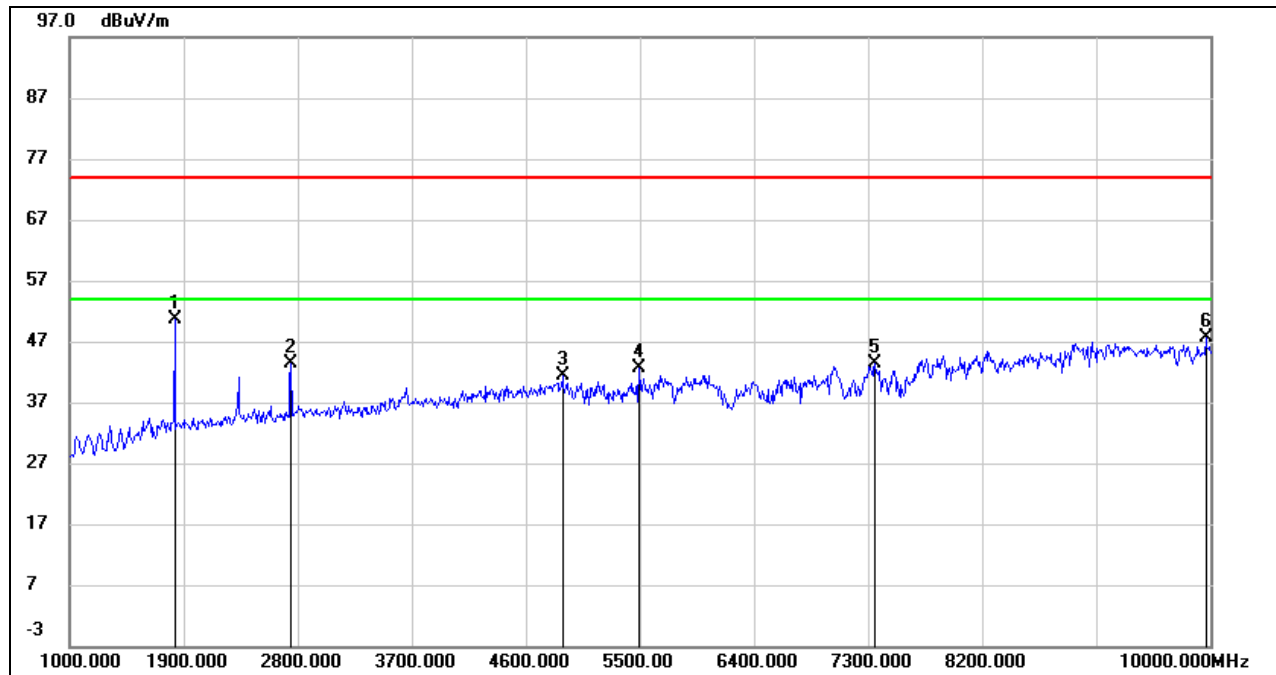
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	60.96	-10.34	50.62	/	/	peak
2	2746.000	50.49	-7.20	43.29	74.00	-30.71	peak
3	4888.000	40.99	0.27	41.26	74.00	-32.74	peak
4	5491.000	41.06	1.48	42.54	74.00	-31.46	peak
5	7354.000	36.31	6.97	43.28	74.00	-30.72	peak
6	9964.000	35.68	11.94	47.62	74.00	-26.38	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

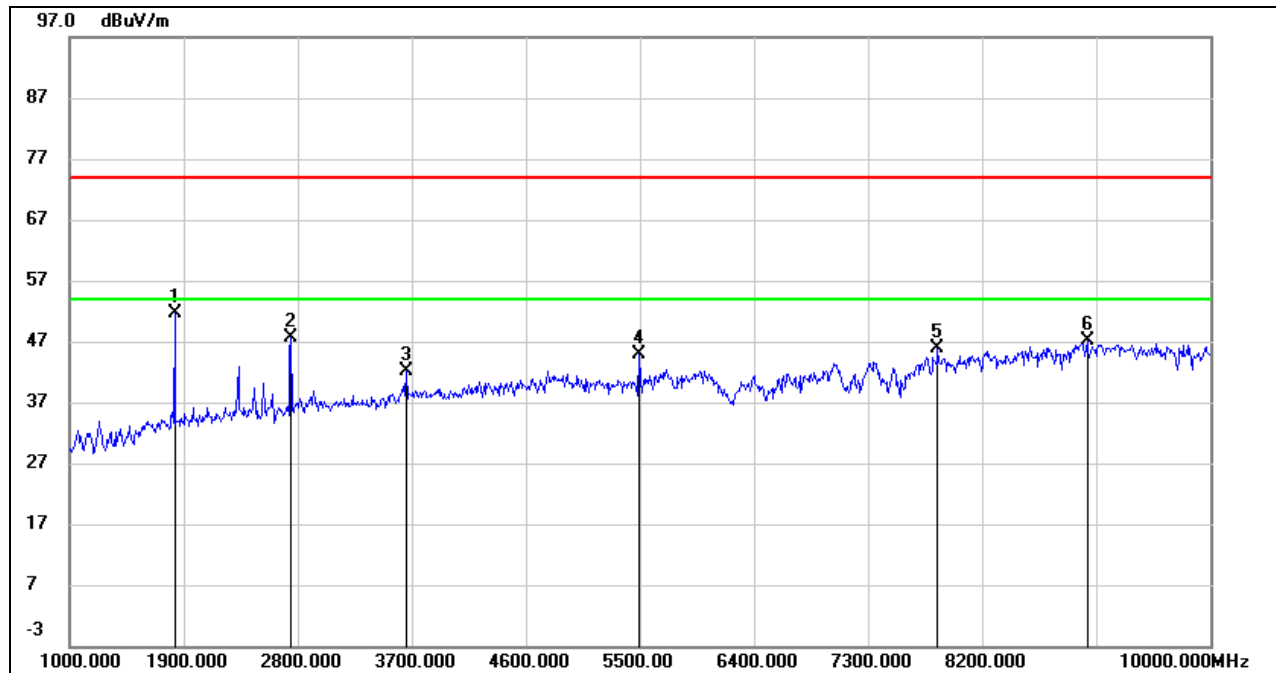
4. AVG: VBW=1/Ton where: ton is transmit duration.

5. For transmit duration, please refer to clause 6.1.

6. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

7.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	61.25	-9.71	51.54	/	/	peak
2	2746.000	53.87	-6.15	47.72	74.00	-26.28	peak
3	3655.000	45.01	-2.89	42.12	74.00	-31.88	peak
4	5491.000	42.27	2.68	44.95	74.00	-29.05	peak
5	7849.000	38.32	7.45	45.77	74.00	-28.23	peak
6	9028.000	36.36	10.73	47.09	74.00	-26.91	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

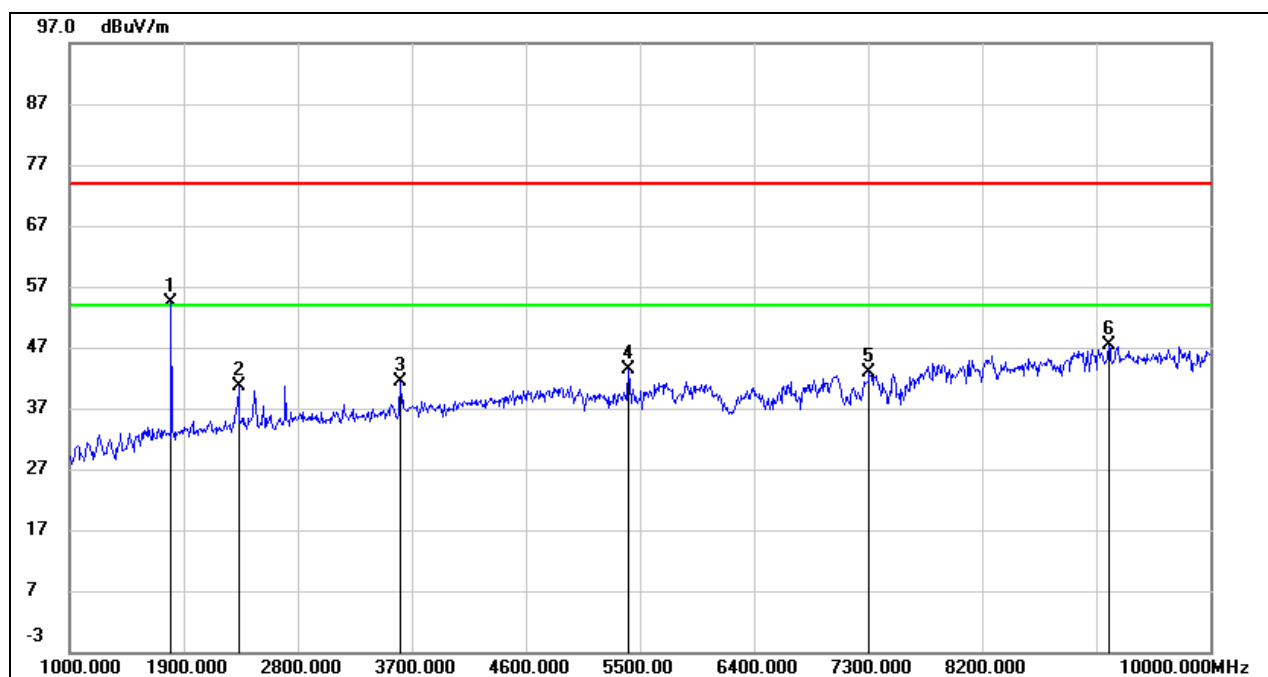
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

7.1.3. SF9_125K MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	64.76	-10.35	54.41	/	/	peak
2	2332.000	49.13	-8.41	40.72	74.00	-33.28	peak
3	3610.000	45.48	-4.04	41.44	74.00	-32.56	peak
4	5410.000	42.25	1.08	43.33	74.00	-30.67	peak
5	7309.000	36.28	6.67	42.95	74.00	-31.05	peak
6	9199.000	37.80	9.59	47.39	74.00	-26.61	peak

Note: 1. Measurement = Reading Level + Correct Factor.

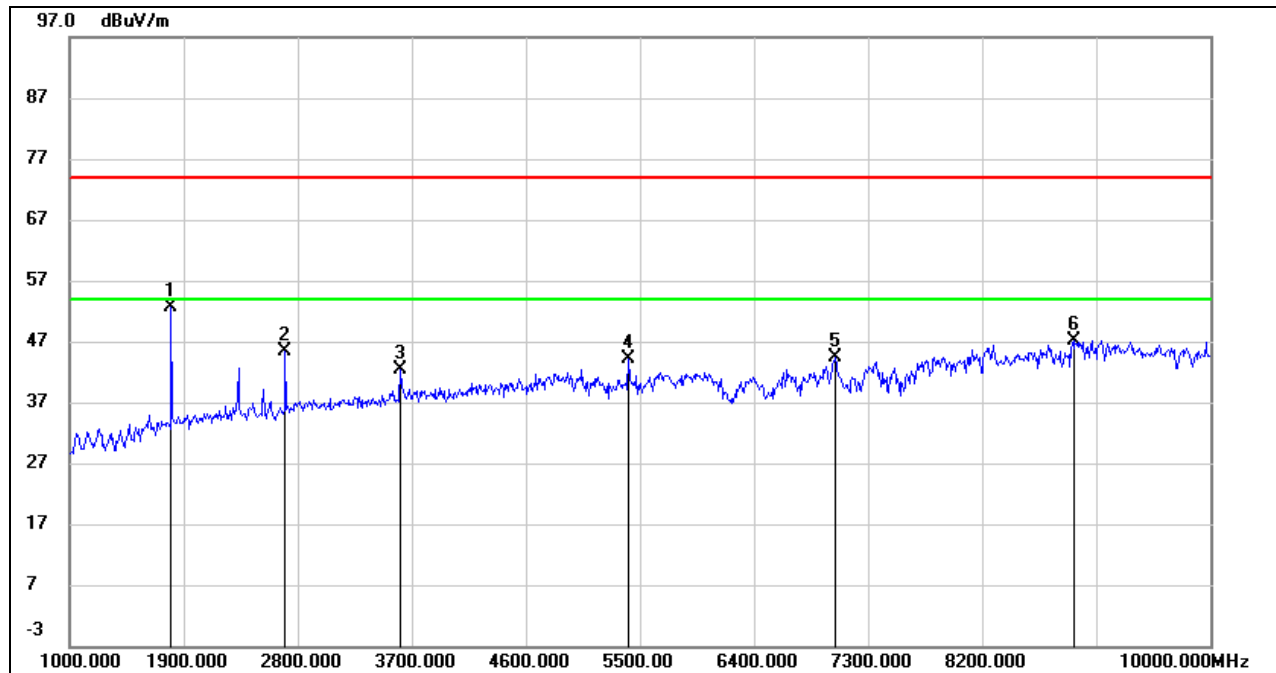
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	62.52	-9.77	52.75	/	/	peak
2	2701.000	51.94	-6.47	45.47	74.00	-28.53	peak
3	3610.000	45.33	-3.02	42.31	74.00	-31.69	peak
4	5410.000	41.94	2.28	44.22	74.00	-29.78	peak
5	7039.000	36.87	7.59	44.46	74.00	-29.54	peak
6	8929.000	37.09	10.05	47.14	74.00	-26.86	peak

Note: 1. Measurement = Reading Level + Correct Factor.

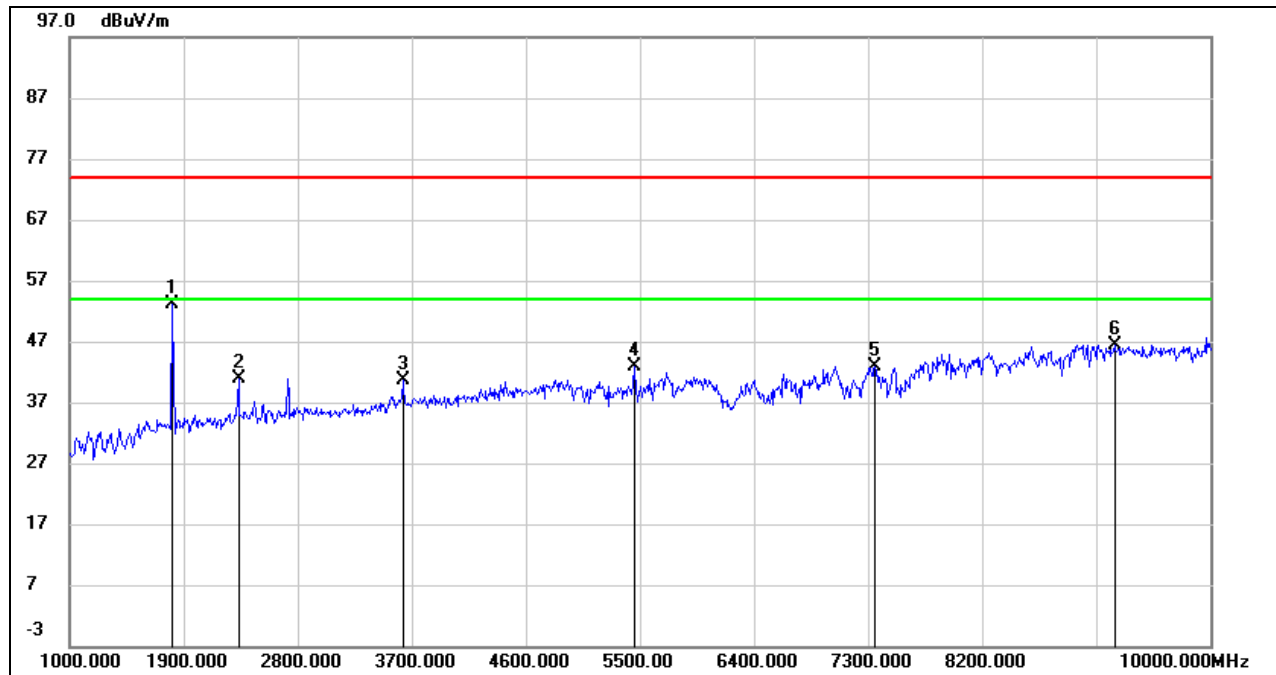
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	63.45	-10.35	53.10	/	/	peak
2	2332.000	49.32	-8.41	40.91	74.00	-33.09	peak
3	3628.000	44.66	-3.99	40.67	74.00	-33.33	peak
4	5455.000	41.55	1.31	42.86	74.00	-31.14	peak
5	7354.000	36.02	6.97	42.99	74.00	-31.01	peak
6	9244.000	36.79	9.69	46.48	74.00	-27.52	peak

Note: 1. Measurement = Reading Level + Correct Factor.

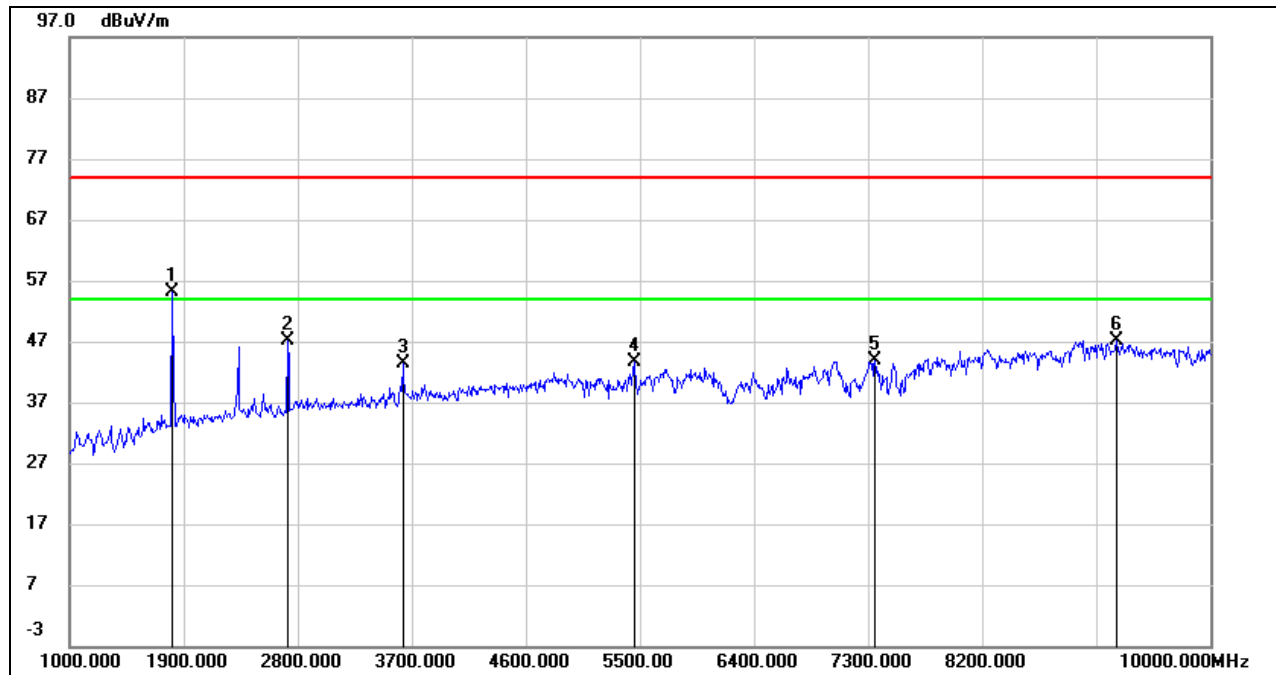
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	64.76	-9.75	55.01	/	/	peak
2	2719.000	53.49	-6.34	47.15	74.00	-26.85	peak
3	3628.000	46.38	-2.96	43.42	74.00	-30.58	peak
4	5455.000	41.06	2.51	43.57	74.00	-30.43	peak
5	7354.000	36.40	7.58	43.98	74.00	-30.02	peak
6	9262.000	37.16	9.93	47.09	74.00	-26.91	peak

Note: 1. Measurement = Reading Level + Correct Factor.

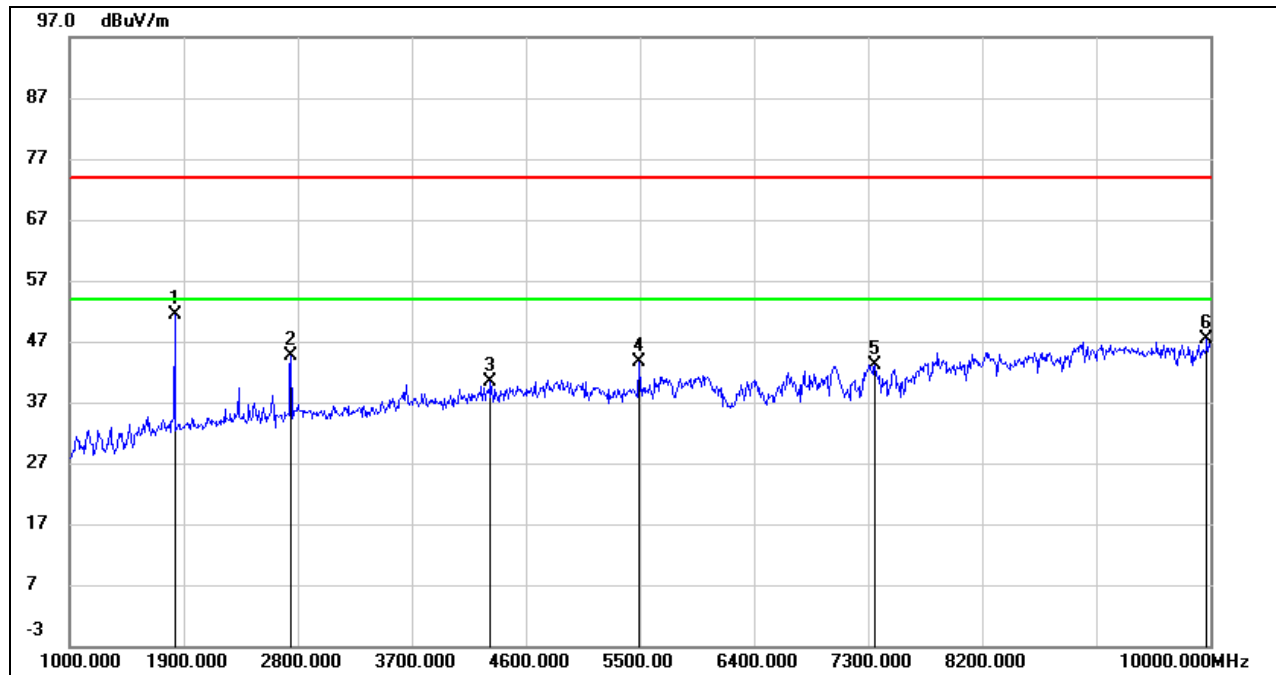
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5. *-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	61.77	-10.34	51.43	/	/	peak
2	2746.000	51.72	-7.20	44.52	74.00	-29.48	peak
3	4321.000	42.24	-1.91	40.33	74.00	-33.67	peak
4	5491.000	42.12	1.48	43.60	74.00	-30.40	peak
5	7354.000	36.25	6.97	43.22	74.00	-30.78	peak
6	9973.000	35.51	11.98	47.49	74.00	-26.51	peak

Note: 1. Measurement = Reading Level + Correct Factor.

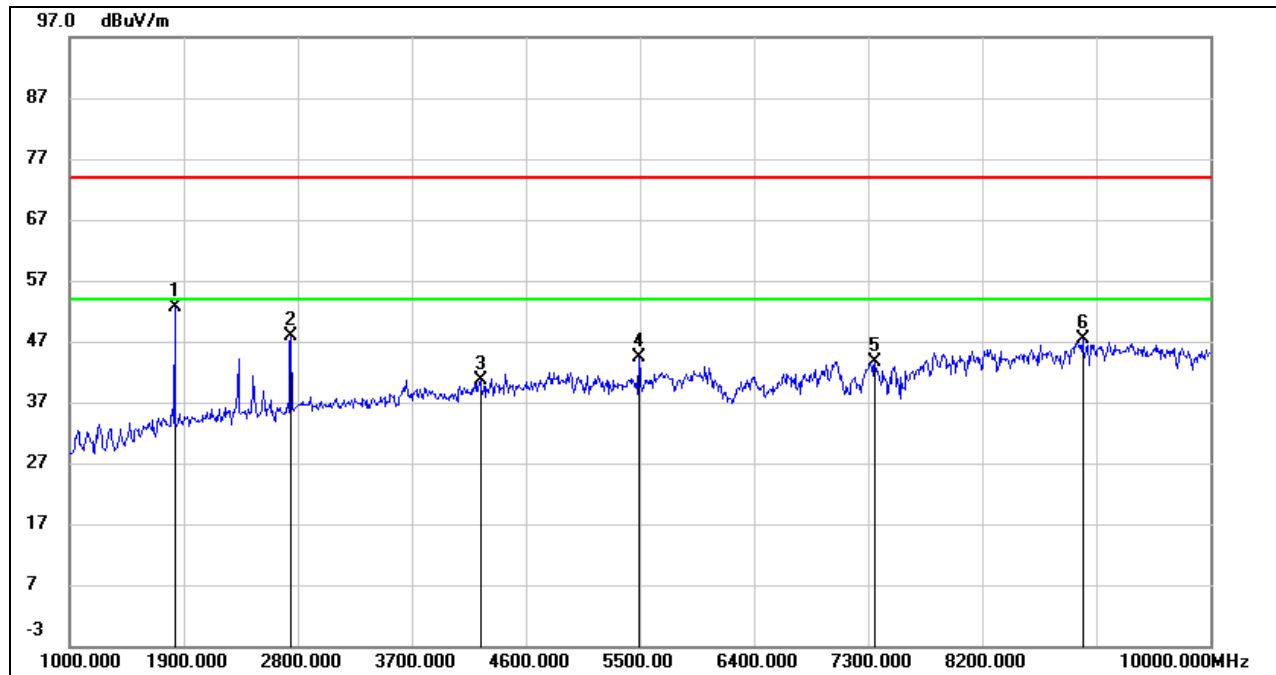
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	62.40	-9.71	52.69	/	/	peak
2	2746.000	54.00	-6.15	47.85	74.00	-26.15	peak
3	4240.000	41.73	-1.04	40.69	74.00	-33.31	peak
4	5491.000	41.78	2.68	44.46	74.00	-29.54	peak
5	7354.000	36.11	7.58	43.69	74.00	-30.31	peak
6	8992.000	36.48	10.78	47.26	74.00	-26.74	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

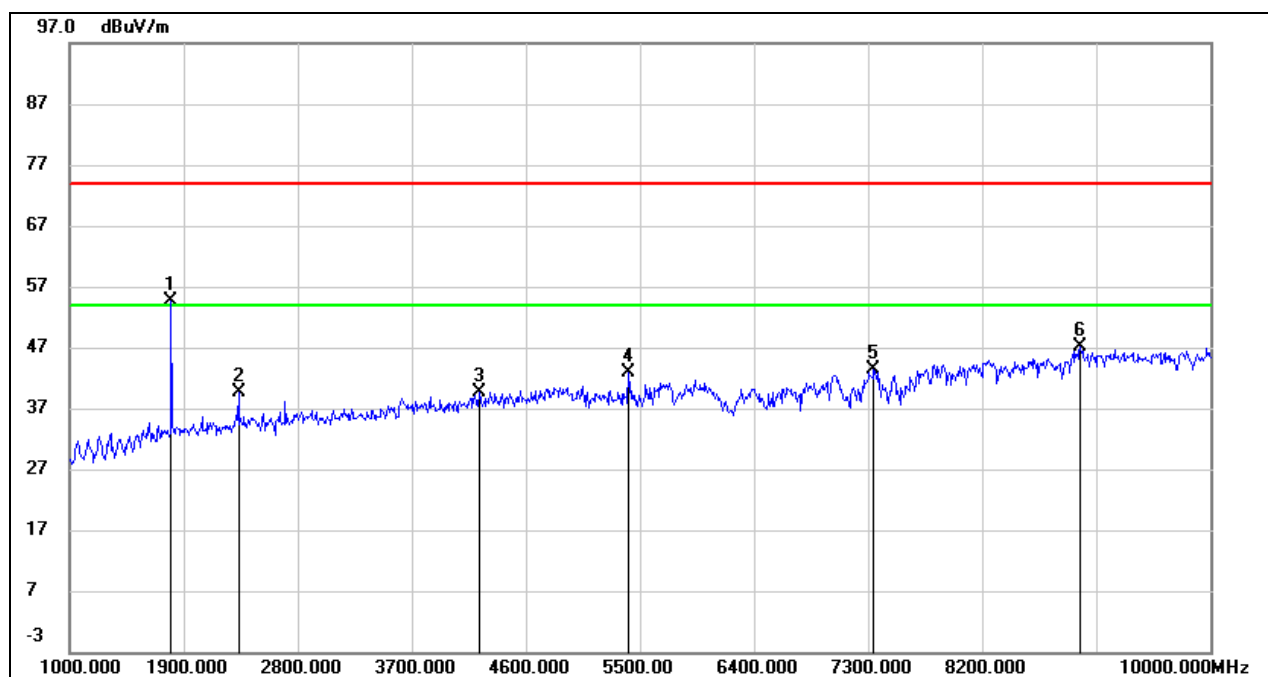
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

7.1.4. SF10_125K MODE

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	64.96	-10.35	54.61	/	/	peak
2	2332.000	48.04	-8.41	39.63	74.00	-34.37	peak
3	4231.000	41.79	-2.06	39.73	74.00	-34.27	peak
4	5410.000	41.86	1.08	42.94	74.00	-31.06	peak
5	7345.000	36.56	6.91	43.47	74.00	-30.53	peak
6	8974.000	36.99	10.16	47.15	74.00	-26.85	peak

Note: 1. Measurement = Reading Level + Correct Factor.

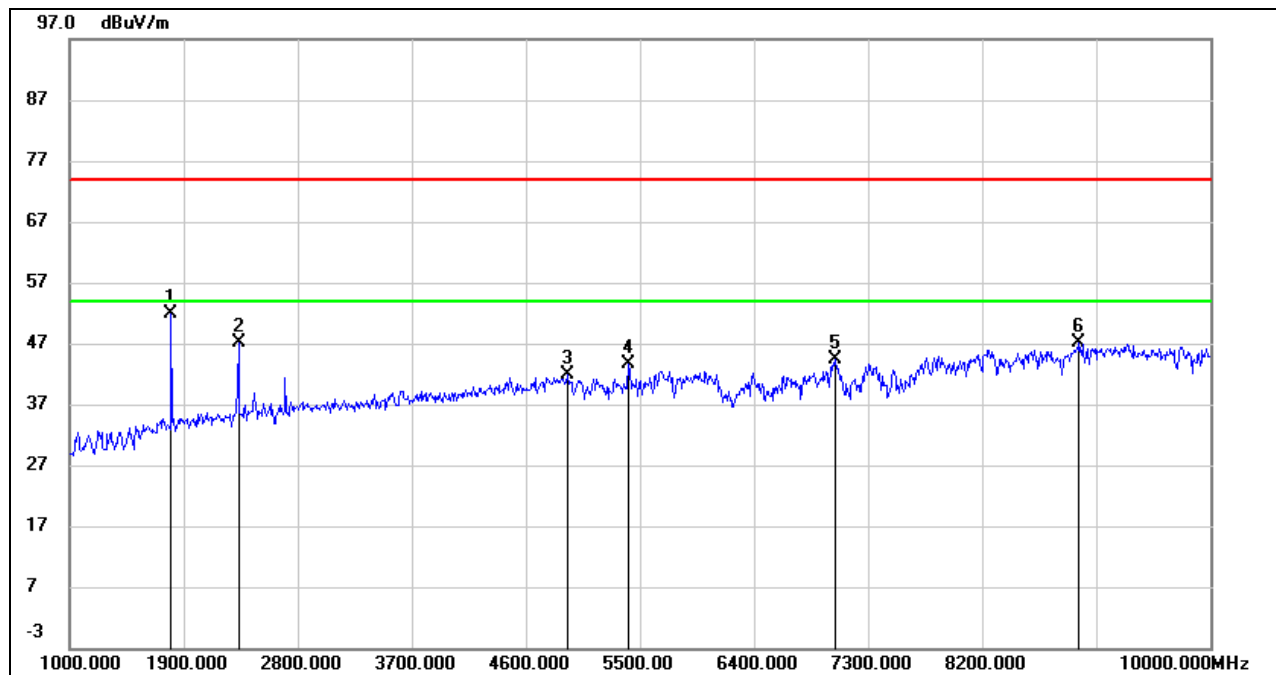
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1801.000	61.61	-9.77	51.84	/	/	peak
2	2332.000	54.65	-7.57	47.08	74.00	-26.92	peak
3	4924.000	40.33	1.54	41.87	74.00	-32.13	peak
4	5410.000	41.45	2.28	43.73	74.00	-30.27	peak
5	7039.000	36.70	7.59	44.29	74.00	-29.71	peak
6	8965.000	36.55	10.47	47.02	74.00	-26.98	peak

Note: 1. Measurement = Reading Level + Correct Factor.

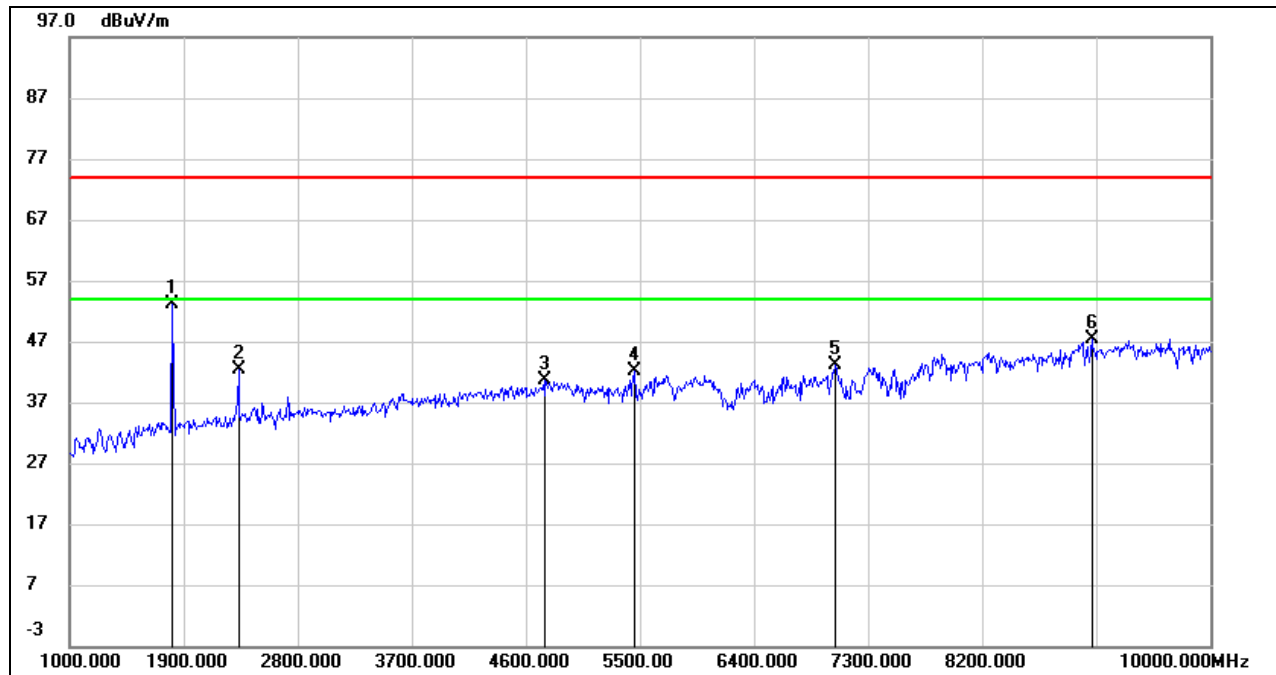
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	63.59	-10.35	53.24	/	/	peak
2	2332.000	50.72	-8.41	42.31	74.00	-31.69	peak
3	4753.000	41.04	-0.31	40.73	74.00	-33.27	peak
4	5455.000	40.72	1.31	42.03	74.00	-31.97	peak
5	7039.000	36.45	6.72	43.17	74.00	-30.83	peak
6	9064.000	37.23	10.19	47.42	74.00	-26.58	peak

Note: 1. Measurement = Reading Level + Correct Factor.

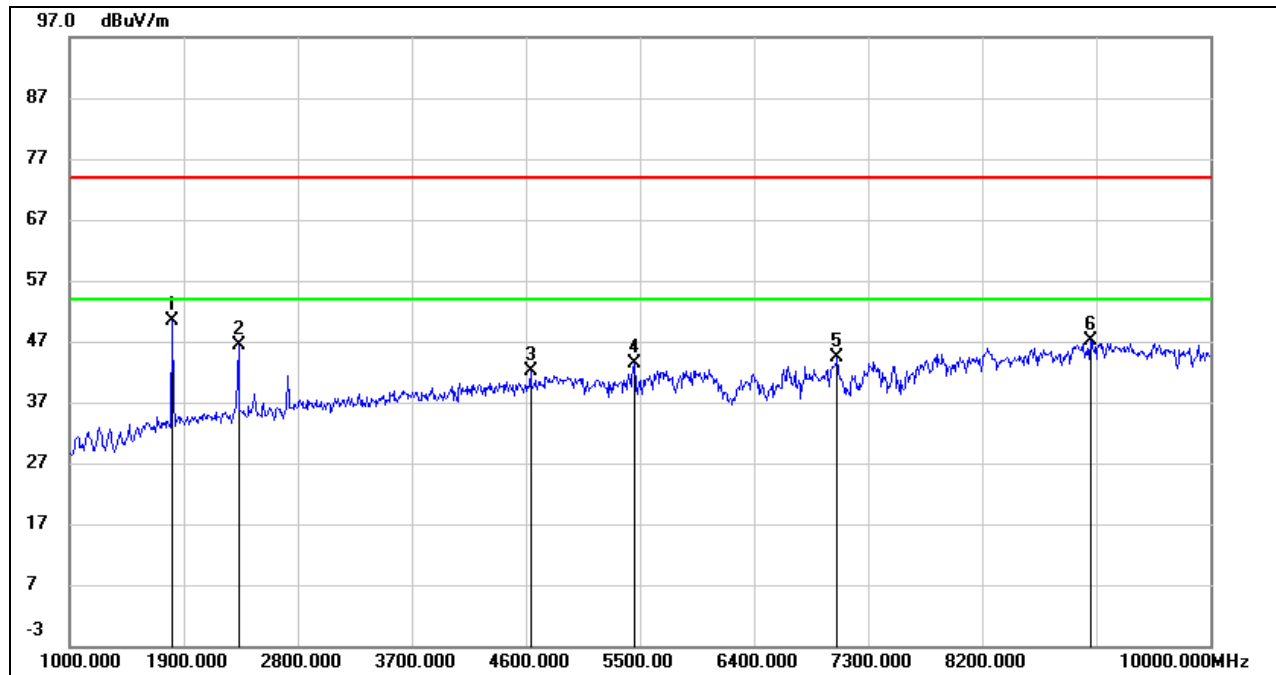
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1810.000	60.01	-9.75	50.26	/	/	peak
2	2332.000	53.87	-7.57	46.30	74.00	-27.70	peak
3	4636.000	42.14	-0.03	42.11	74.00	-31.89	peak
4	5455.000	40.85	2.51	43.36	74.00	-30.64	peak
5	7057.000	37.00	7.49	44.49	74.00	-29.51	peak
6	9055.000	36.63	10.59	47.22	74.00	-26.78	peak

Note: 1. Measurement = Reading Level + Correct Factor.

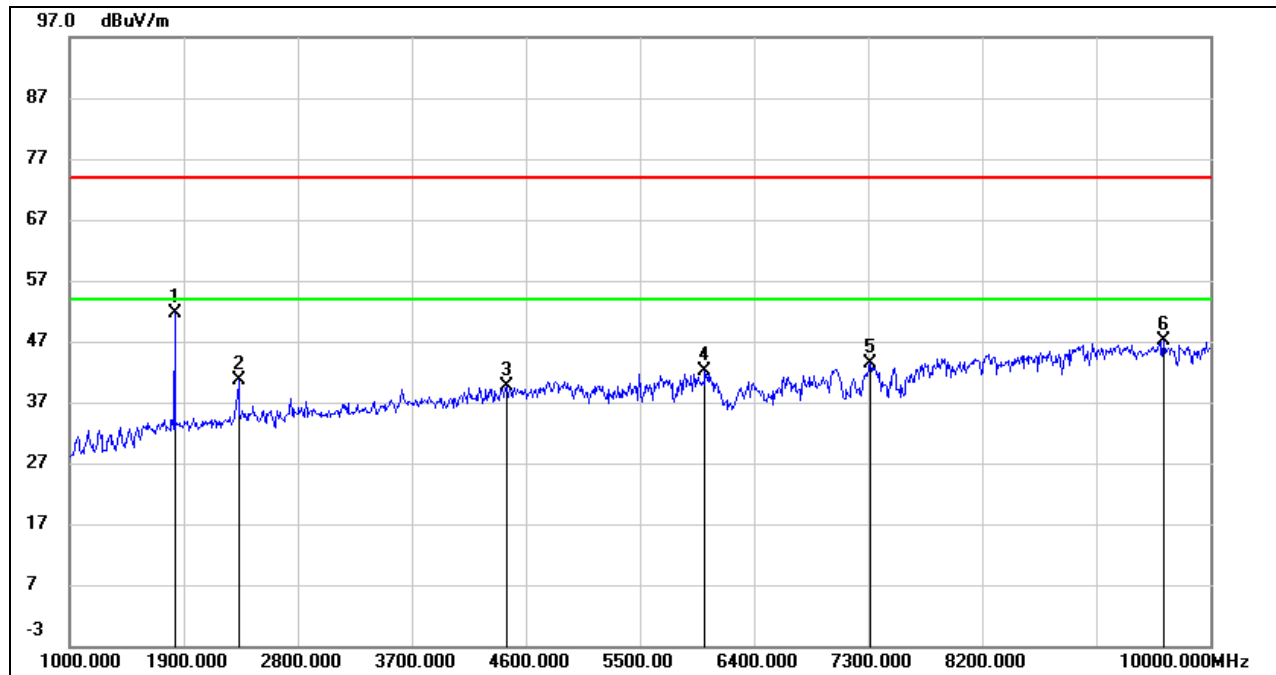
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5. *-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	62.08	-10.34	51.74	/	/	peak
2	2332.000	48.97	-8.41	40.56	74.00	-33.44	peak
3	4447.000	41.16	-1.64	39.52	74.00	-34.48	peak
4	6013.000	39.24	2.90	42.14	74.00	-31.86	peak
5	7318.000	36.74	6.74	43.48	74.00	-30.52	peak
6	9631.000	36.39	10.78	47.17	74.00	-26.83	peak

Note: 1. Measurement = Reading Level + Correct Factor.

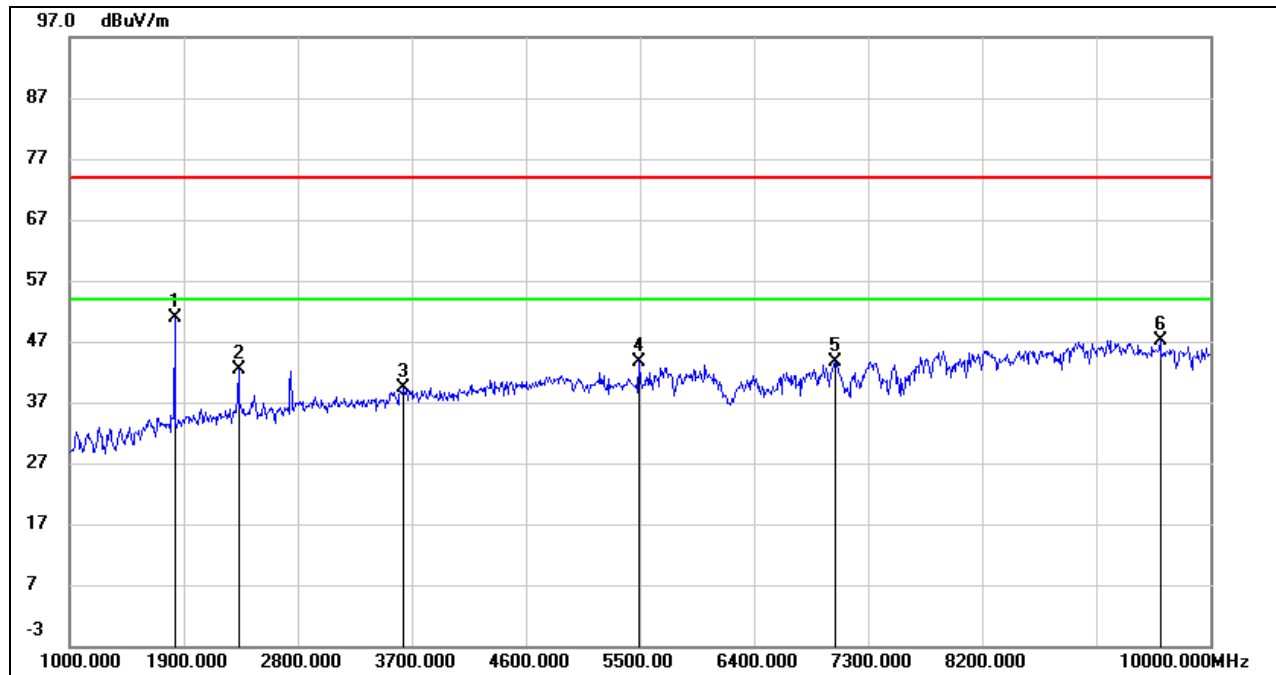
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1*	1828.000	60.67	-9.71	50.96	/	/	peak
2	2332.000	49.92	-7.57	42.35	74.00	-31.65	peak
3	3637.000	42.21	-2.94	39.27	74.00	-34.73	peak
4	5491.000	40.98	2.68	43.66	74.00	-30.34	peak
5	7039.000	35.98	7.59	43.57	74.00	-30.43	peak
6	9604.000	36.57	10.58	47.15	74.00	-26.85	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

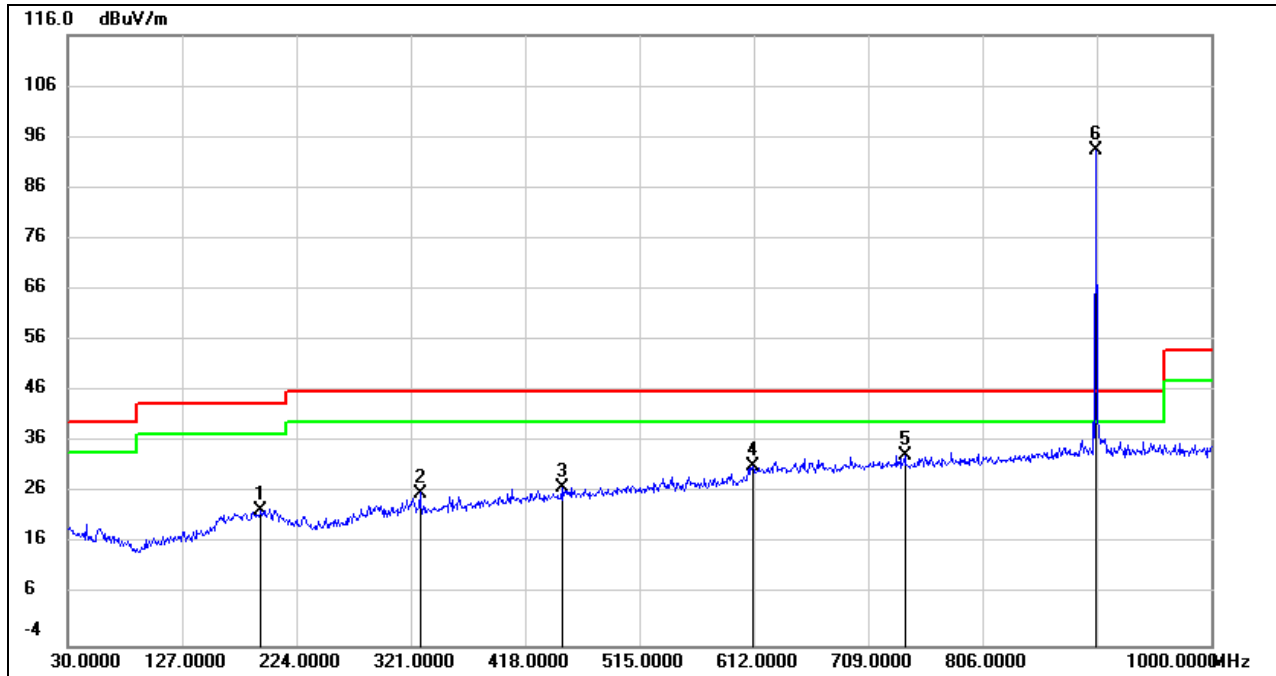
4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.

5.*-indicates frequency is out of the restricted bands and the limit is referring to 15.247 (d) and RSS-247 clause 5.5. We had already performed the conducted non-restricted bands test, please refer to clause 6.7.

7.2. SPURIOUS EMISSIONS (30 MHz ~ 1 GHz)

7.2.1. SF7_125K MODE

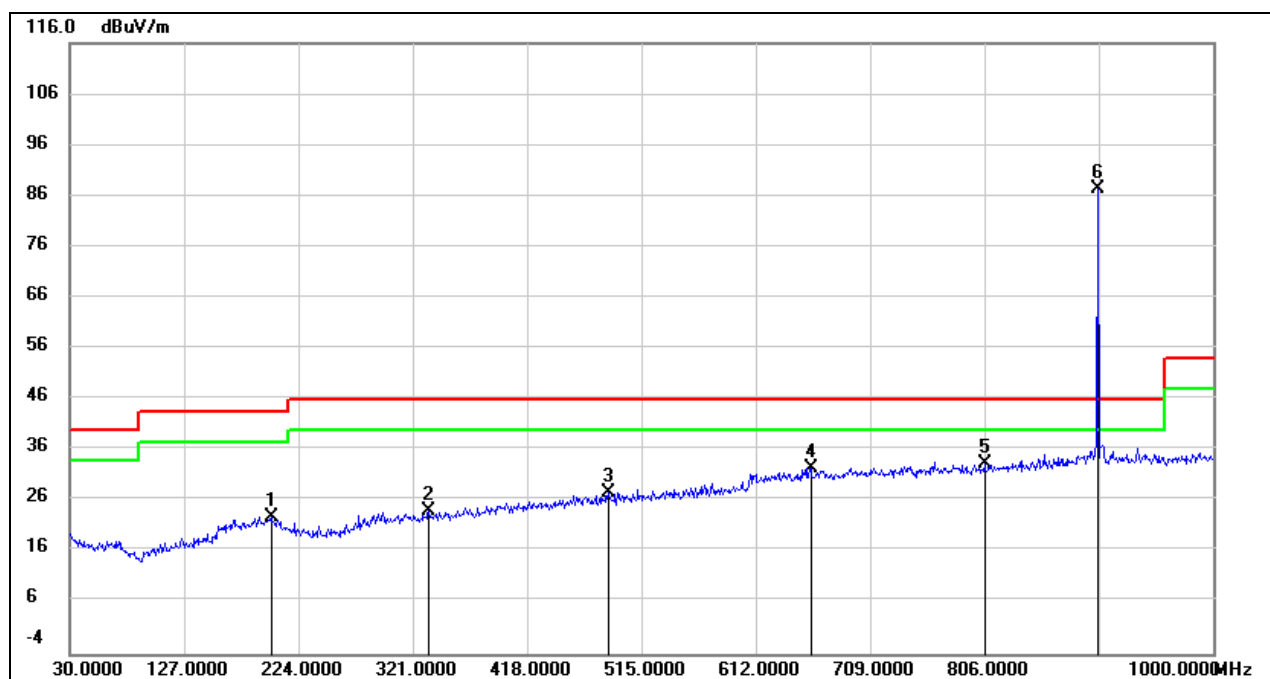
SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	193.9299	39.21	-16.51	22.70	43.50	-20.80	QP
2	328.7600	40.69	-14.69	26.00	46.00	-20.00	QP
3	449.0400	39.65	-12.50	27.15	46.00	-18.85	QP
4	611.0300	40.58	-9.41	31.17	46.00	-14.83	QP
5	740.0400	41.17	-7.90	33.27	46.00	-12.73	QP
6	902.0300	98.41	-5.16	93.25	/	/	Fundamental

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

SPURIOUS EMISSIONS (LOW CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	200.7200	39.39	-16.43	22.96	43.50	-20.54	QP
2	334.5799	38.66	-14.57	24.09	46.00	-21.91	QP
3	486.8700	39.40	-11.74	27.66	46.00	-18.34	QP
4	658.5600	41.32	-8.73	32.59	46.00	-13.41	QP
5	806.0000	40.53	-7.22	33.31	46.00	-12.69	QP
6	902.0300	95.60	-5.16	90.44	/	/	Fundamental

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

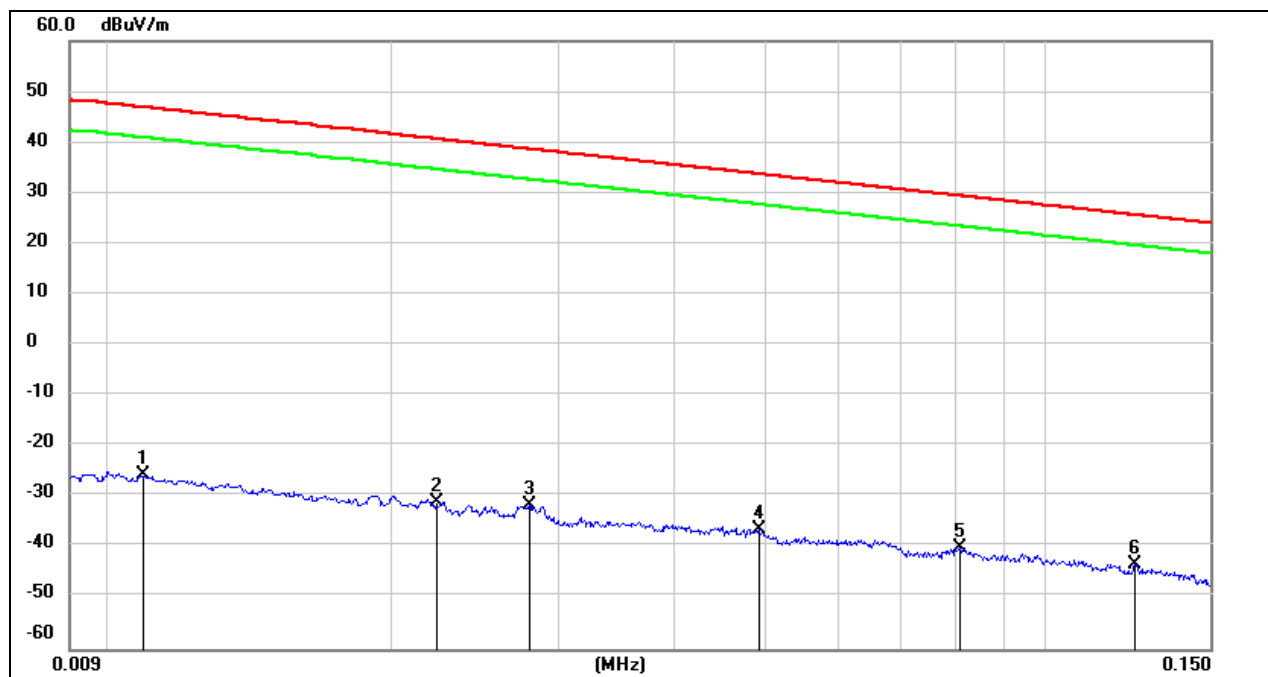
Note: All the modes and channels have been tested, only the worst data was recorded in the report.

7.3. SPURIOUS EMISSIONS BELOW 30 MHz

7.3.1. SF7_125K MODE

SPURIOUS EMISSIONS (HIGH CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)

9 kHz~ 150 kHz



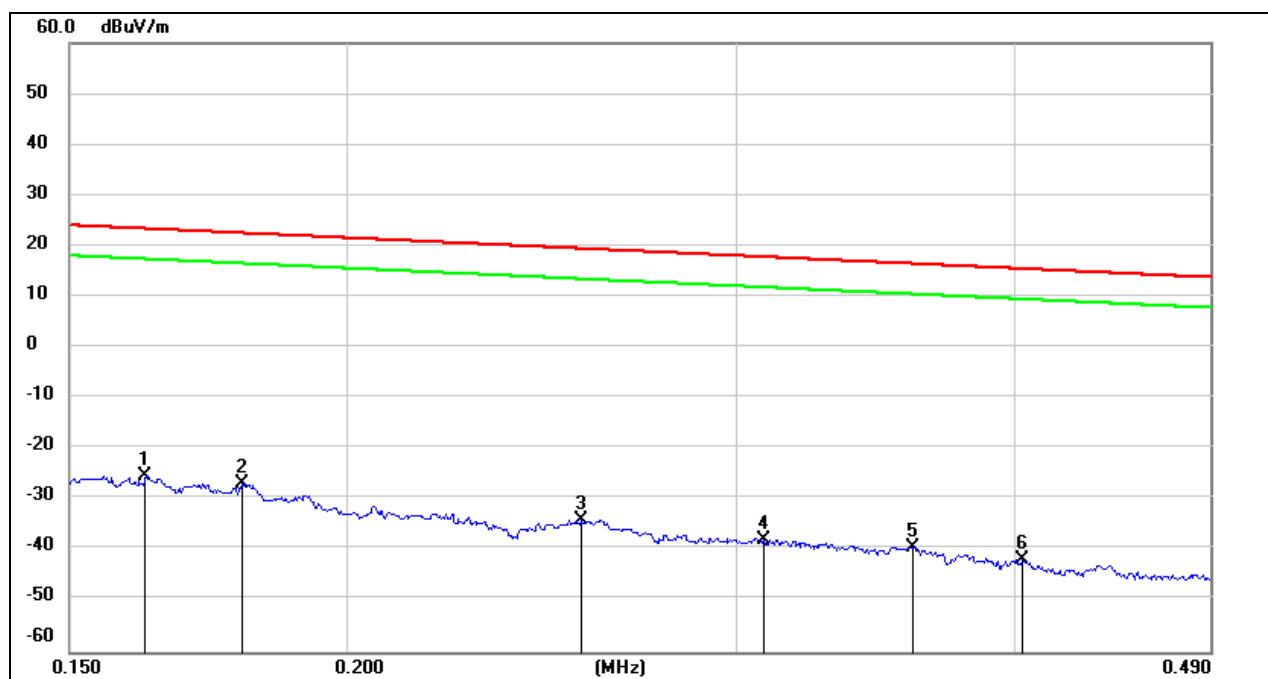
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dBuA/m)	(dBuA/m)	(dB)	
1	0.0108	75.78	-101.39	-25.61	46.93	-77.11	-4.57	-72.54	peak
2	0.0223	70.29	-101.35	-31.06	40.63	-82.56	-10.87	-71.69	peak
3	0.0280	69.78	-101.38	-31.6	38.66	-83.10	-12.84	-70.26	peak
4	0.0492	65.05	-101.47	-36.42	33.76	-87.92	-17.74	-70.18	peak
5	0.0806	61.68	-101.63	-39.95	29.47	-91.45	-22.03	-69.42	peak
6	0.1246	58.39	-101.72	-43.33	25.7	-94.83	-25.80	-69.03	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

150 kHz ~ 490 kHz



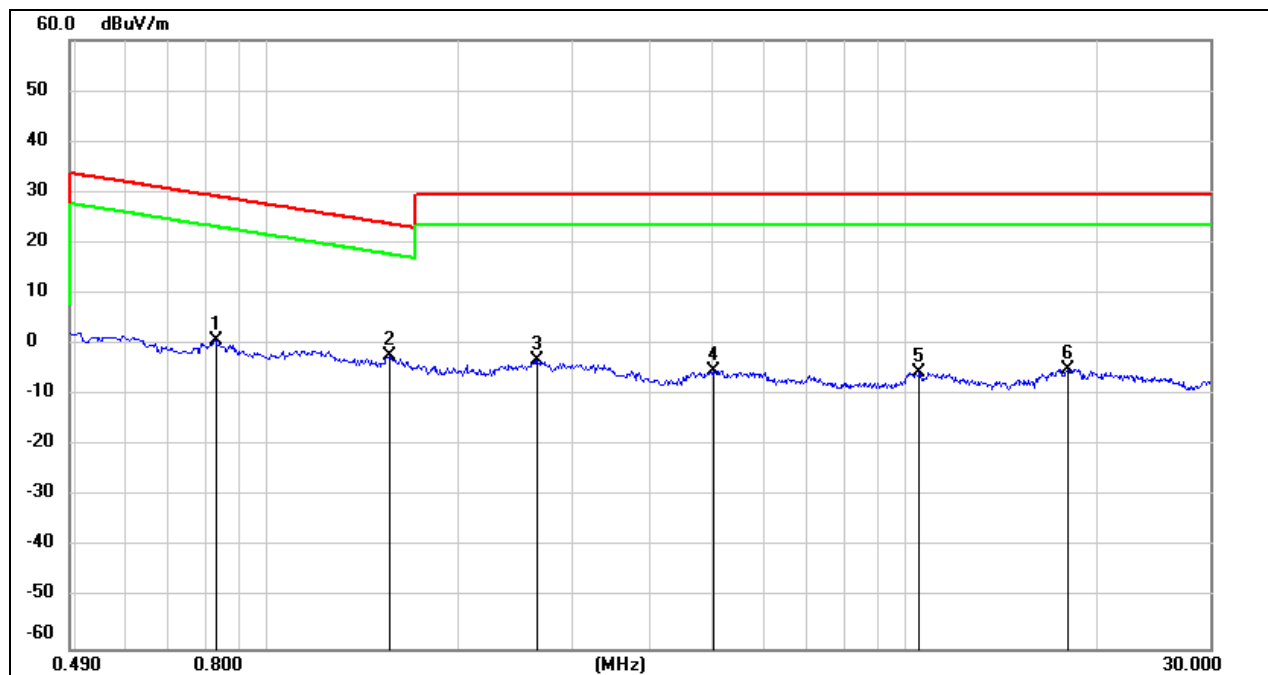
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	FCC Result (dBuV/m)	FCC Limit (dBuV/m)	ISED Result (dBuA/m)	ISED Limit (dBuA/m)	Margin (dB)	Remark
1	0.1621	76.42	-101.65	-25.23	23.41	-76.73	-28.09	-48.64	peak
2	0.1794	74.77	-101.68	-26.91	22.53	-78.41	-28.97	-49.44	peak
3	0.2550	67.74	-101.80	-34.06	19.47	-85.56	-32.03	-53.53	peak
4	0.3084	63.95	-101.86	-37.91	17.82	-89.41	-33.68	-55.73	peak
5	0.3600	62.51	-101.91	-39.4	16.48	-90.90	-35.02	-55.88	peak
6	0.4032	59.97	-101.96	-41.99	15.49	-93.49	-36.01	-57.48	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120 π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

490 kHz ~ 30 MHz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	FCC Result (dBuV/m)	FCC Limit (dBuV/m)	ISED Result (dBuA/m)	ISED Limit (dBuA/m)	Margin (dB)	Remark
1	0.8296	62.94	-62.17	0.77	29.23	-50.73	-22.27	-28.46	peak
2	1.5564	59.68	-62.02	-2.34	23.76	-53.84	-27.74	-26.10	peak
3	2.6474	58.45	-61.67	-3.22	29.54	-54.72	-21.96	-32.76	peak
4	5.0095	56.39	-61.49	-5.1	29.54	-56.60	-21.96	-34.64	peak
5	10.5234	55.31	-60.82	-5.51	29.54	-57.01	-21.96	-35.05	peak
6	17.9893	56.09	-60.91	-4.82	29.54	-56.32	-21.96	-34.36	peak

Note: 1. Measurement = Reading Level + Correct Factor (dBuA/m= dBuV/m- 20Log10[120π] = dBuV/m- 51.5).

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations (Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes and channels have been tested, only the worst data was recorded in the report.

8. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §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 shall be considered sufficient to comply with the provisions of this section. 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.

Please refer to FCC §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.

RESULTS

Complies

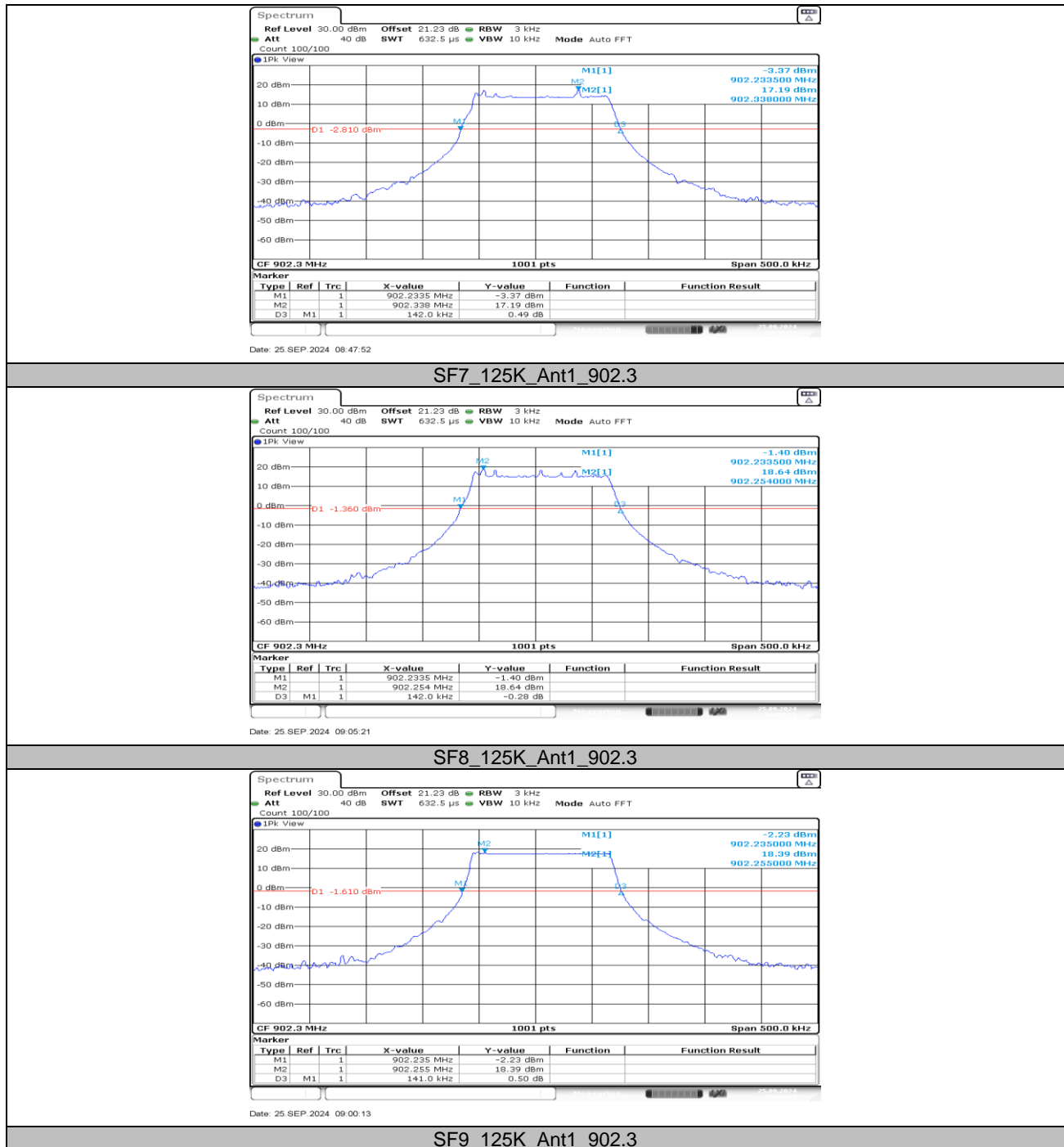
9. Appendix

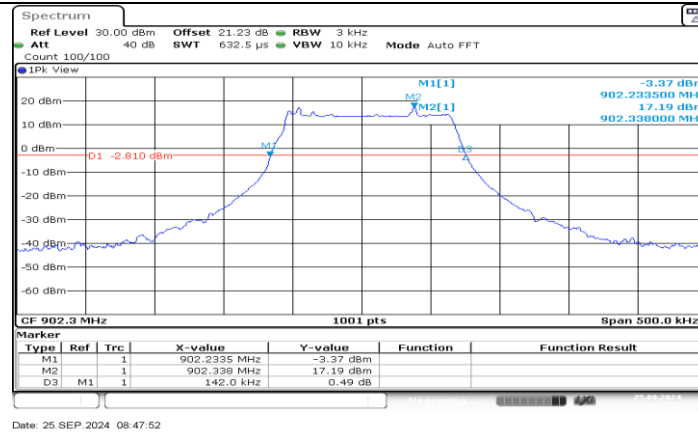
9.1. Appendix A: 20dB Emission Bandwidth

9.1.1. Test Result

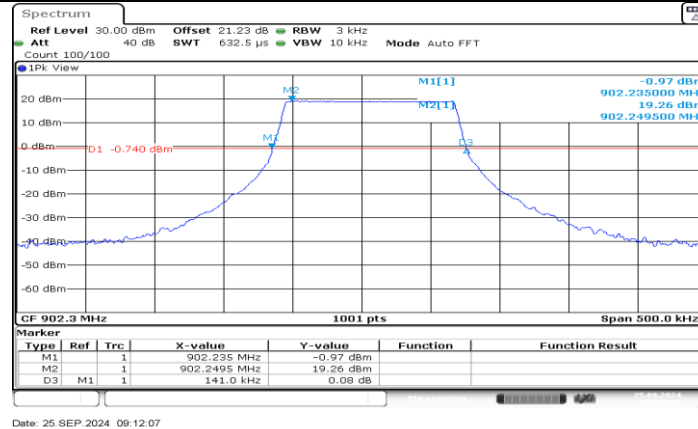
Test Mode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
SF7_125K	Ant1	902.3	0.14	902.23	902.38	≤0.25	PASS
SF8_125K	Ant1	902.3	0.14	902.23	902.38	≤0.25	PASS
SF9_125K	Ant1	902.3	0.14	902.24	902.38	≤0.25	PASS
SF10_125K	Ant1	902.3	0.14	902.24	902.38	≤0.25	PASS
SF7_125K	Ant1	908.5	0.14	908.43	908.58	≤0.25	PASS
SF8_125K	Ant1	908.5	0.14	908.43	908.58	≤0.25	PASS
SF9_125K	Ant1	908.5	0.14	908.44	908.58	≤0.25	PASS
SF10_125K	Ant1	908.5	0.14	908.44	908.58	≤0.25	PASS
SF7_125K	Ant1	914.9	0.14	914.83	914.98	≤0.25	PASS
SF8_125K	Ant1	914.9	0.14	914.83	914.98	≤0.25	PASS
SF9_125K	Ant1	914.9	0.14	914.84	914.98	≤0.25	PASS
SF10_125K	Ant1	914.9	0.14	914.84	914.98	≤0.25	PASS

9.1.2. Test Graphs

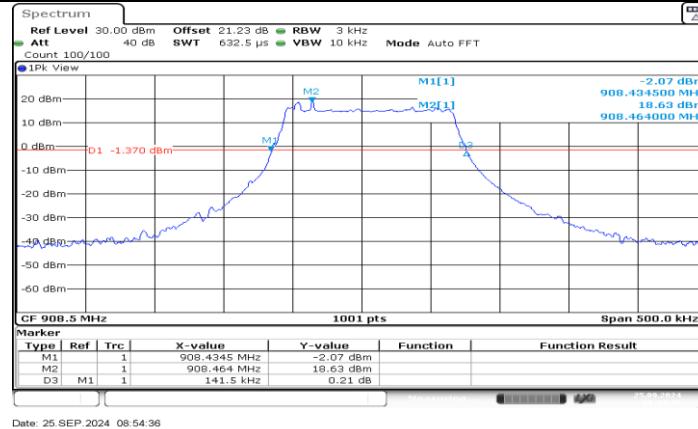




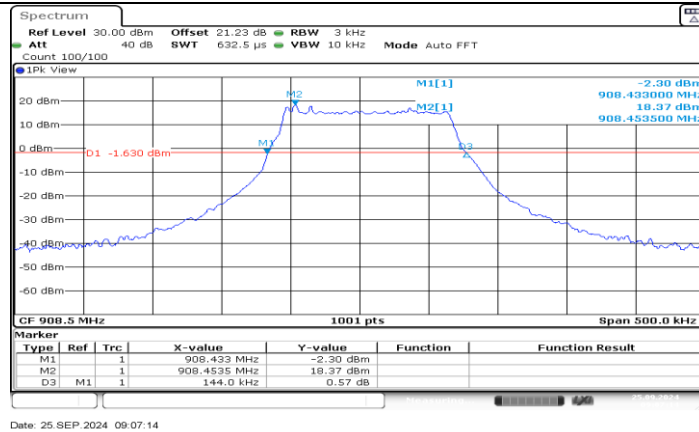
SF7_125K_Ant1_902.3



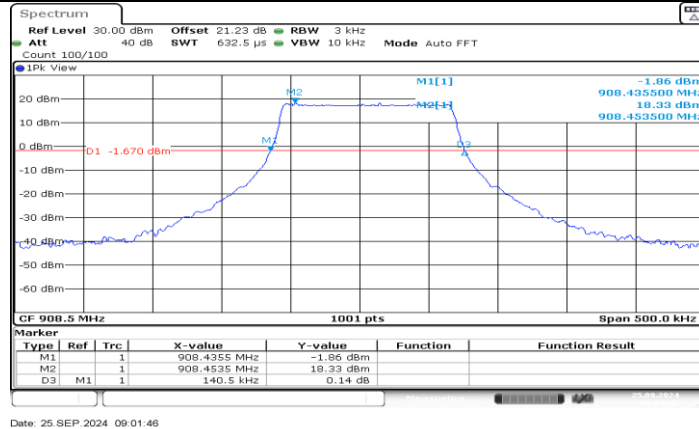
SF10_125K_Ant1_902.3



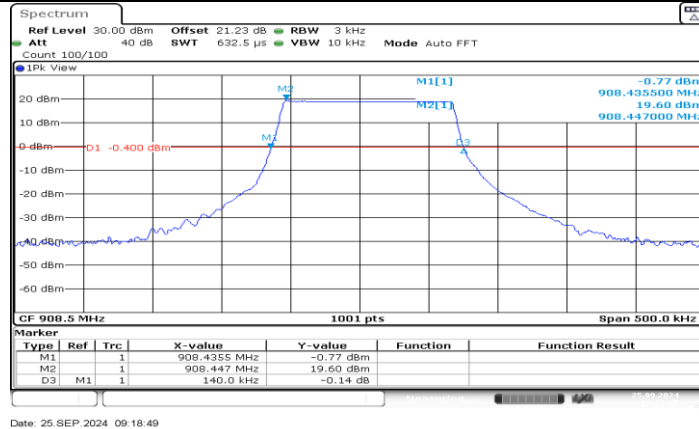
SF7_125K_Ant1_908.5



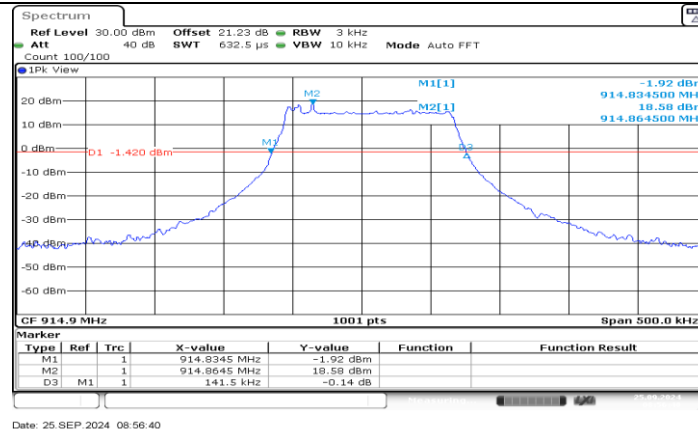
SF8_125K_Ant1_908.5



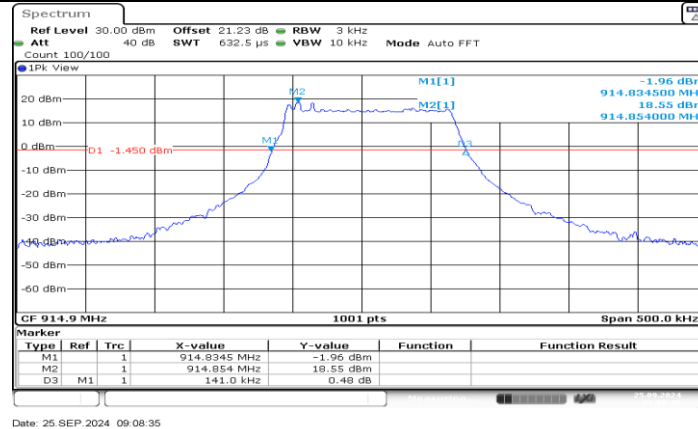
SF9_125K_Ant1_908.5



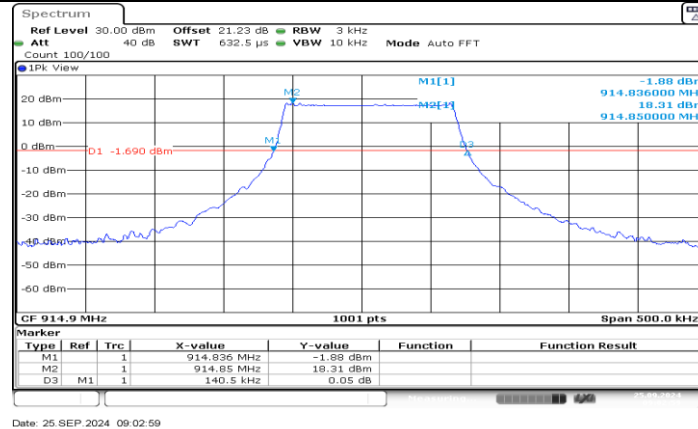
SF10_125K_Ant1_908.5



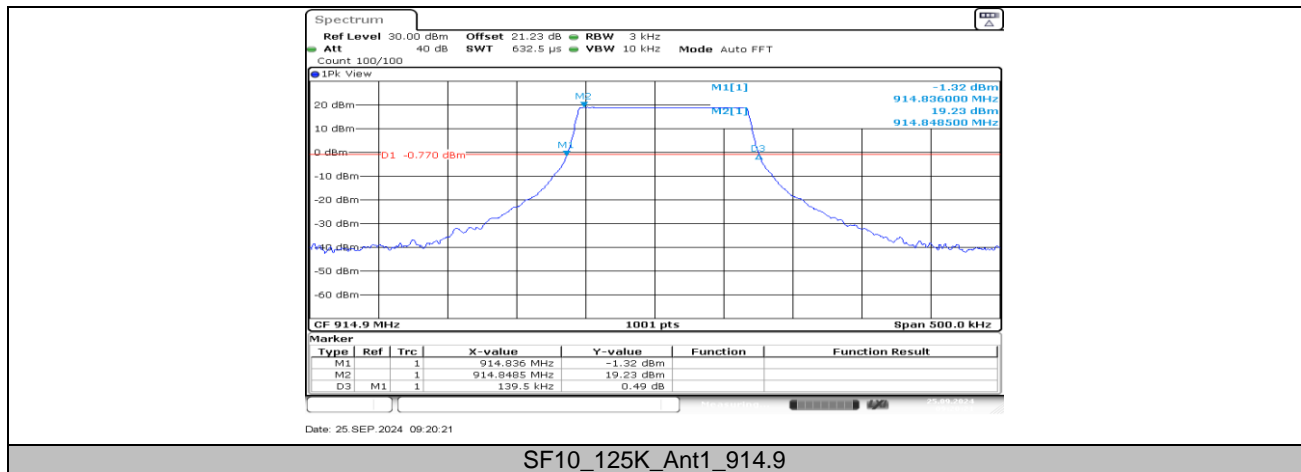
SF7_125K_Ant1_914.9



SF8_125K_Ant1_914.9



SF9_125K_Ant1_914.9

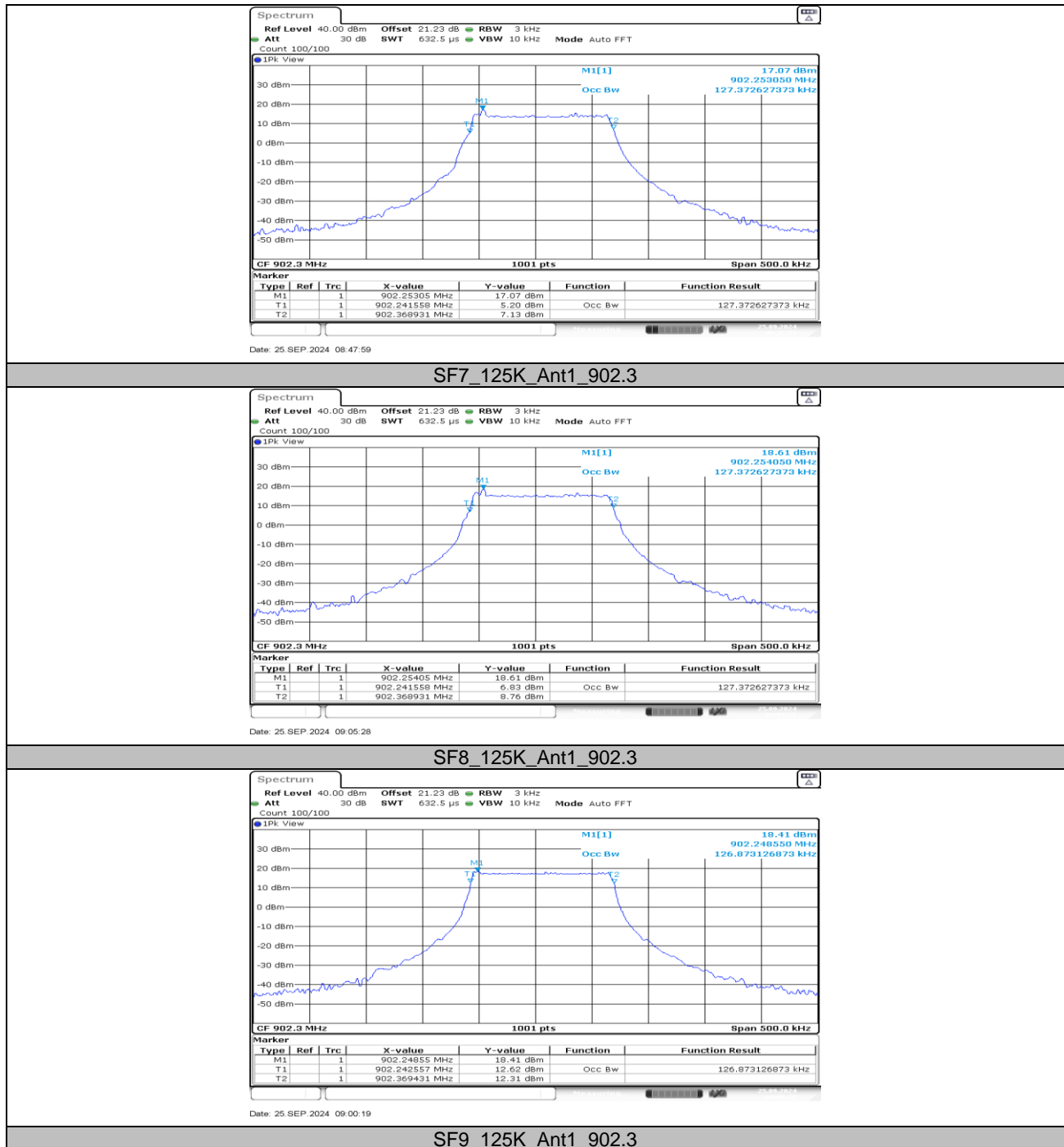


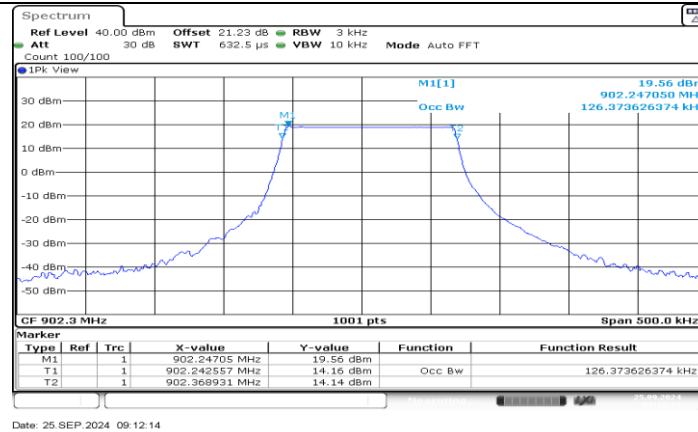
9.2. Appendix B: Occupied Channel Bandwidth

9.2.1. Test Result

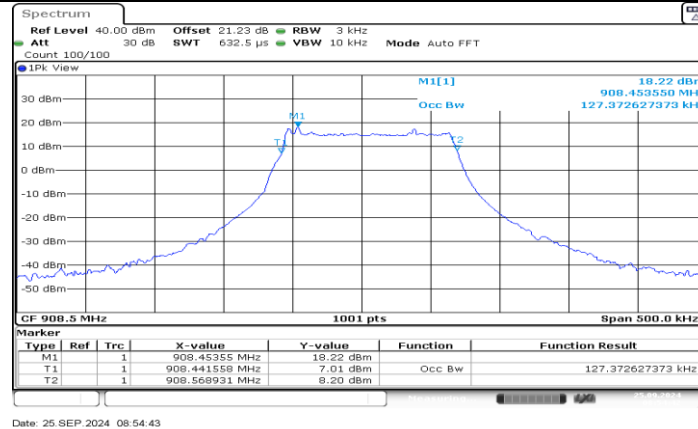
Test Mode	Antenna	Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]
SF7_125K	Ant1	902.3	0.127	902.2416	902.3689
SF8_125K	Ant1	902.3	0.127	902.2416	902.3689
SF9_125K	Ant1	902.3	0.127	902.2426	902.3694
SF10_125K	Ant1	902.3	0.126	902.2426	902.3689
SF7_125K	Ant1	908.5	0.127	908.4416	908.5689
SF8_125K	Ant1	908.5	0.127	908.4416	908.5689
SF9_125K	Ant1	908.5	0.127	908.4431	908.5699
SF10_125K	Ant1	908.5	0.127	908.4421	908.5689
SF7_125K	Ant1	914.9	0.127	914.8421	914.9694
SF8_125K	Ant1	914.9	0.126	914.8431	914.9689
SF9_125K	Ant1	914.9	0.126	914.8431	914.9689
SF10_125K	Ant1	914.9	0.126	914.8426	914.9689

9.2.2. Test Graphs

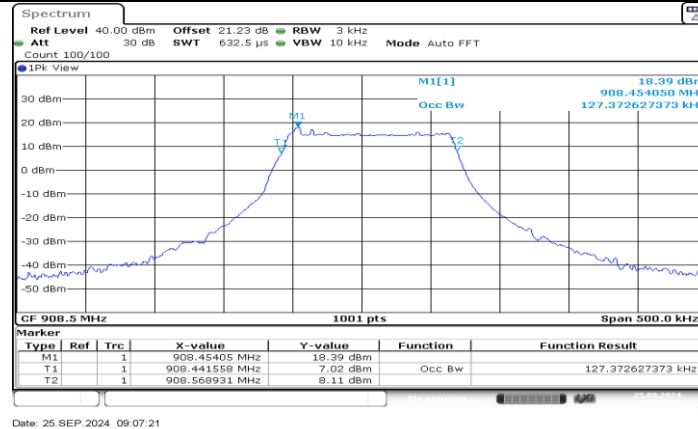




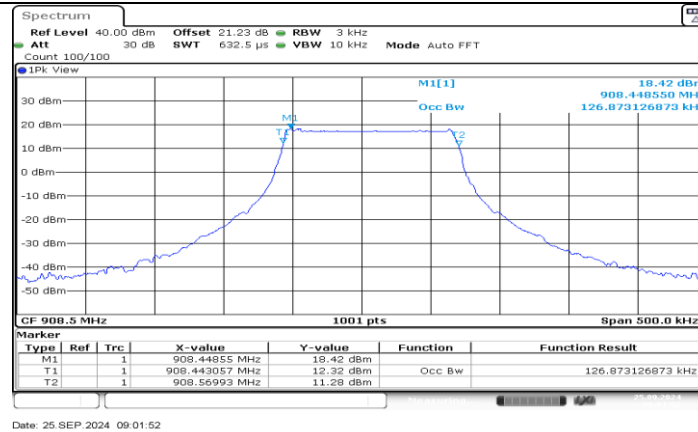
SF10_125K_Ant1_902.3



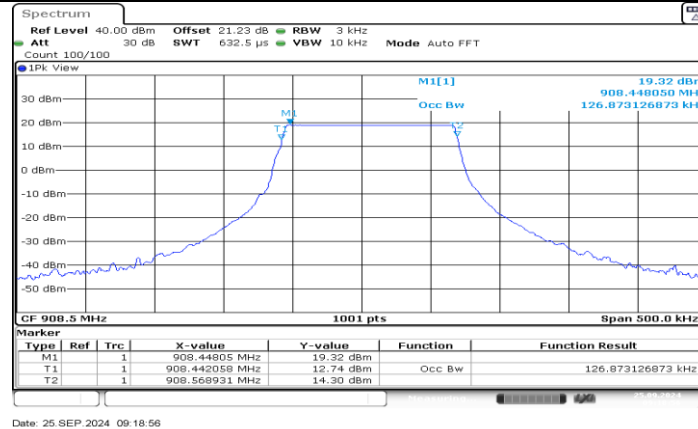
SF7_125K_Ant1_908.5



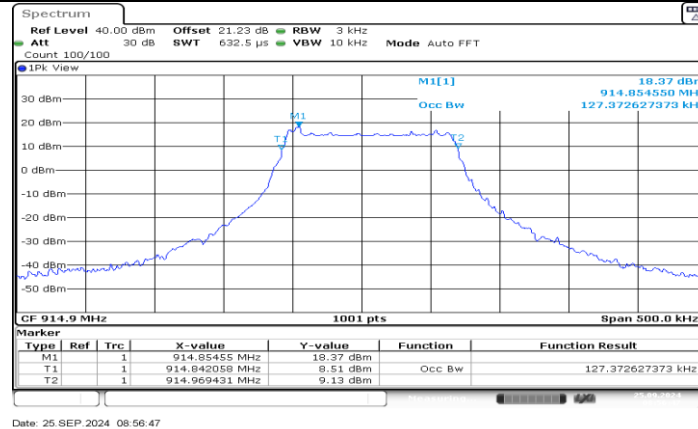
SF8_125K_Ant1_908.5



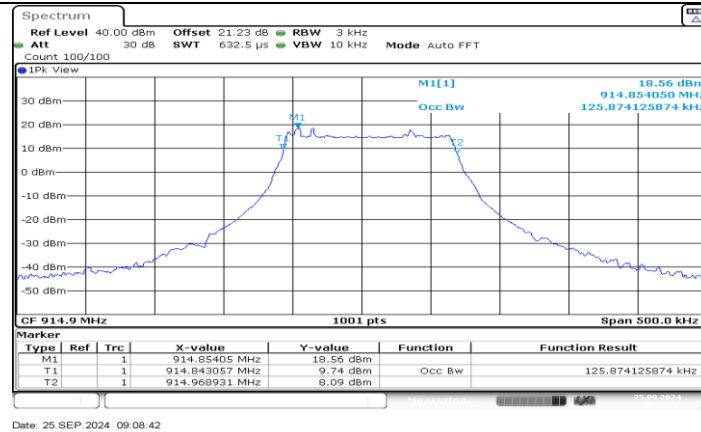
SF9_125K_Ant1_908.5



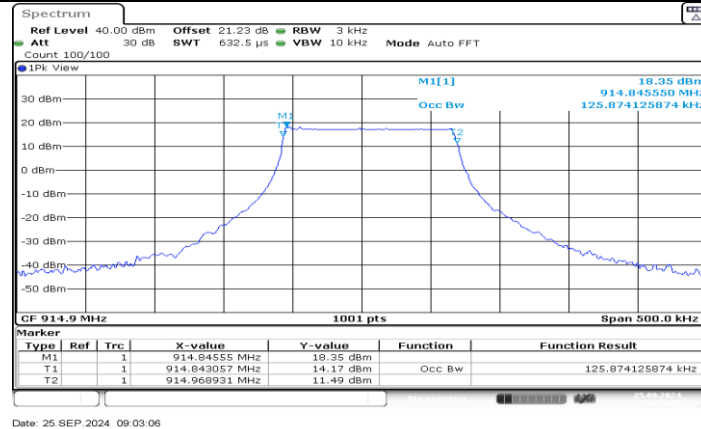
SF10_125K_Ant1_908.5



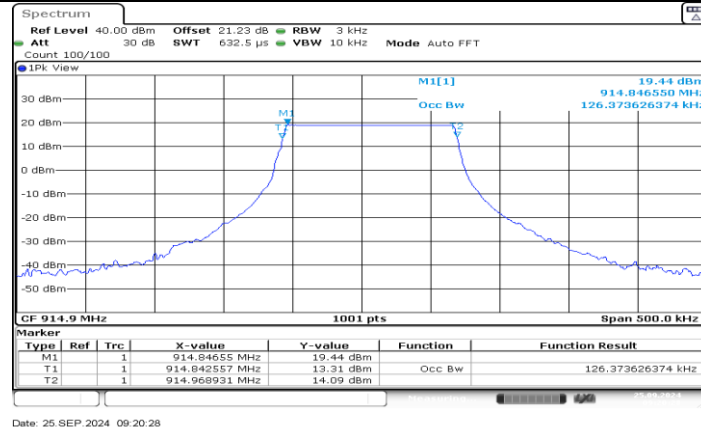
SF7_125K_Ant1_914.9



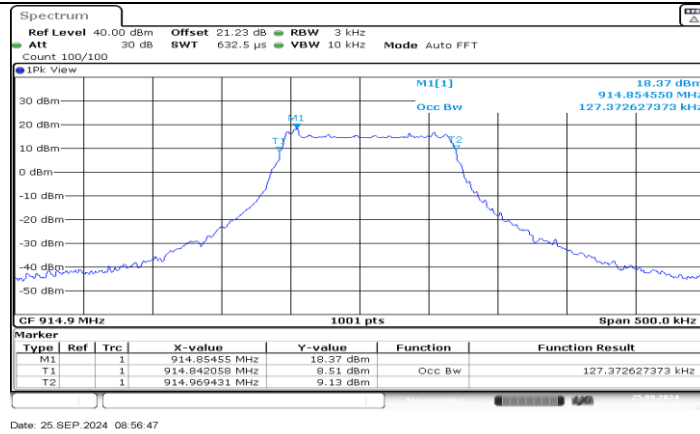
SF8_125K_Ant1_914.9



SF9_125K_Ant1_914.9



SF10_125K_Ant1_914.9



SF7_125K_Ant1_914.9

9.3. Appendix C: Maximum conducted output power

9.3.1. Test Result

Test Mode	Antenna	Frequency[MHz]	Result[dBm]	Limit[dBm]	Verdict
SF7_125K	Ant1	902.3	20.37	≤30	PASS
SF7_125K	Ant1	908.5	19.92	≤30	PASS
SF7_125K	Ant1	914.9	19.91	≤30	PASS
SF8_125K	Ant1	902.3	20.11	≤30	PASS
SF8_125K	Ant1	908.5	20.27	≤30	PASS
SF8_125K	Ant1	914.9	20.24	≤30	PASS
SF9_125K	Ant1	902.3	20.12	≤30	PASS
SF9_125K	Ant1	908.5	19.93	≤30	PASS
SF9_125K	Ant1	914.9	20.27	≤30	PASS
SF10_125K	Ant1	902.3	20.17	≤30	PASS
SF10_125K	Ant1	908.5	20.31	≤30	PASS
SF10_125K	Ant1	914.9	20.27	≤30	PASS

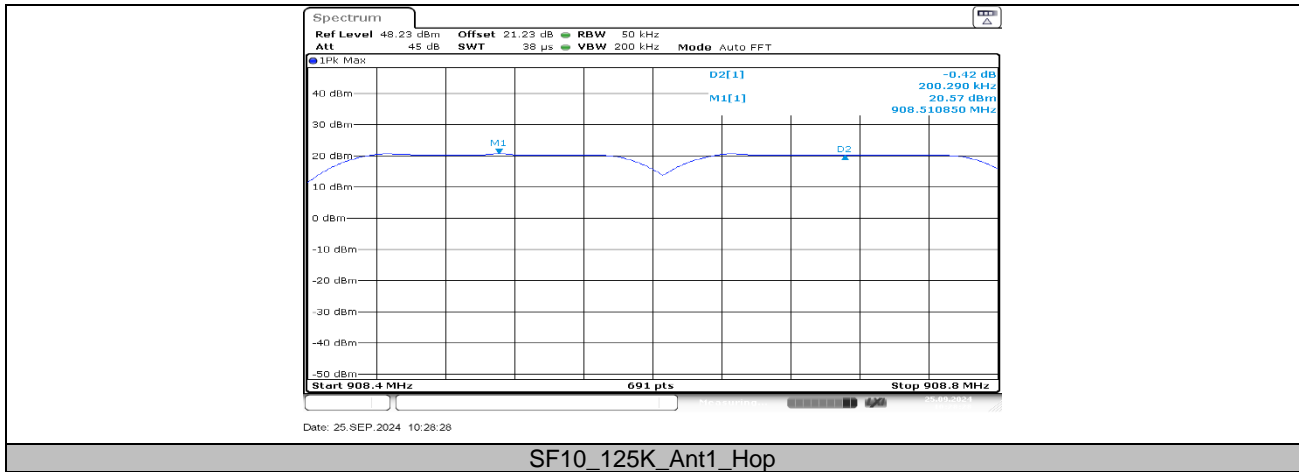
9.4. Appendix D: Carrier frequency separation

9.4.1. Test Result

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
SF7_125K	Ant1	Hop	0.20029	≥ 0.14	PASS
SF8_125K	Ant1	Hop	0.20029	≥ 0.14	PASS
SF9_125K	Ant1	Hop	0.20029	≥ 0.14	PASS
SF10_125K	Ant1	Hop	0.20029	≥ 0.14	PASS

9.4.2. Test Graphs





9.5. Appendix E: Time of occupancy

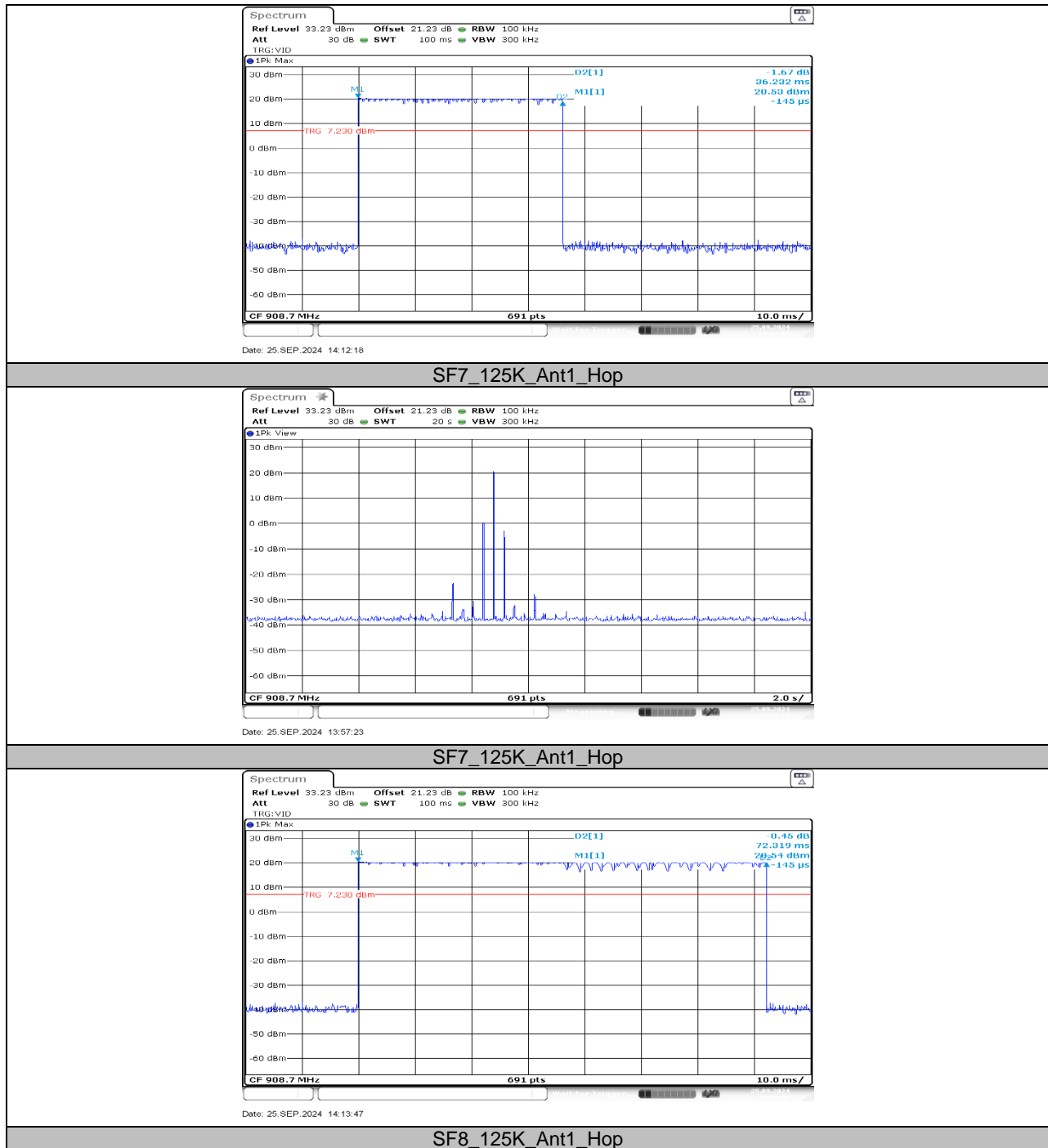
9.5.1. Test Result

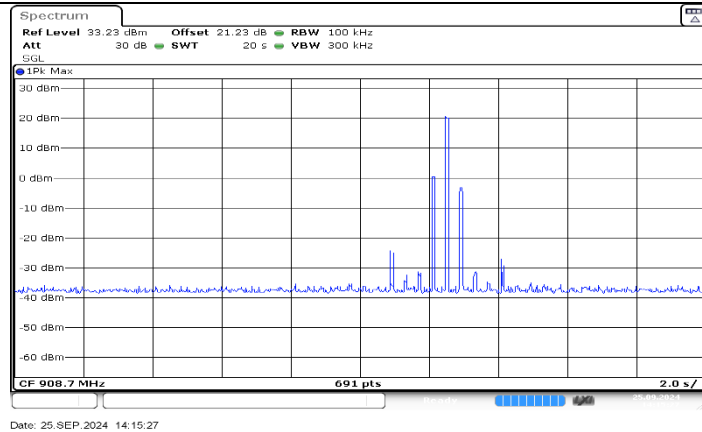
Test Mode	Antenna	Channel	Burst Width [ms/hop/ch]	The number of hop channel appear	Dwell Time [ms]	Limit [ms]	Results
SF7_125K	Ant1	Hop	36.232	1	36.232	400	PASS
SF8_125K	Ant1	Hop	72.319	1	72.319	400	PASS
SF9_125K	Ant1	Hop	124.13	1	124.13	400	PASS
SF10_125K	Ant1	Hop	248.043	1	248.043	400	PASS

Note:

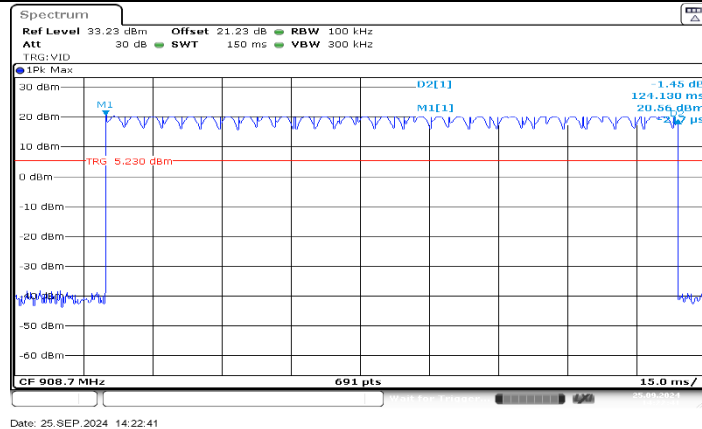
The dwell time = Time of single slot * The number of hop channel appear within 20s

9.5.2. Test Graphs

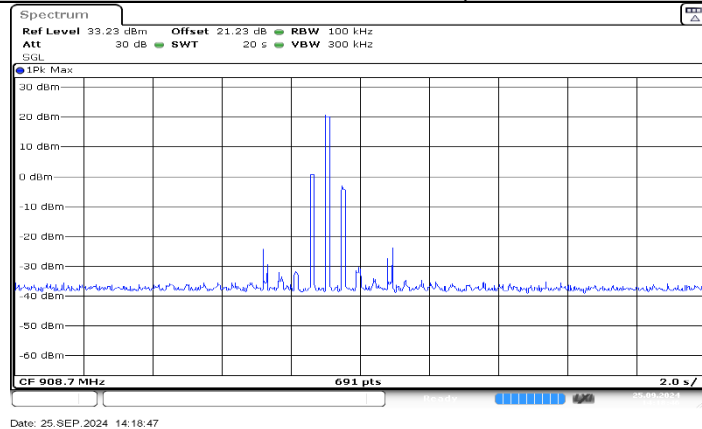




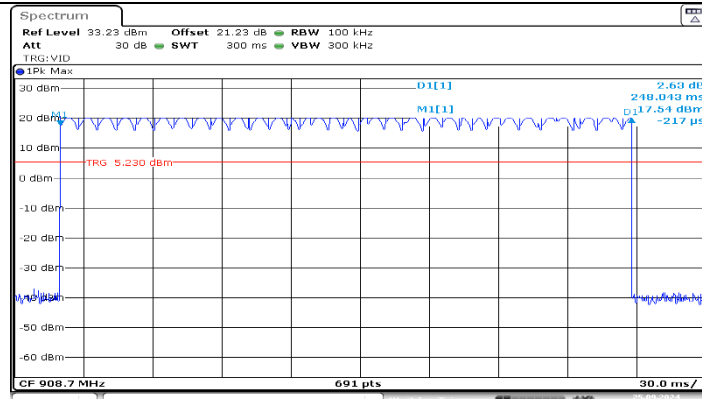
SF8_125K_Ant1_Hop



SF9_125K_Ant1_Hop

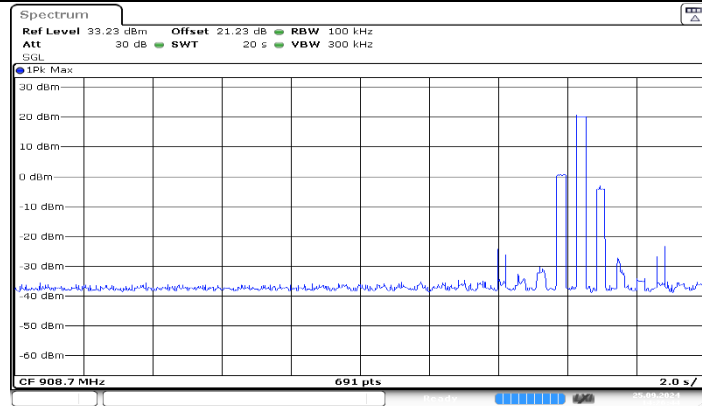


SF9_125K_Ant1_Hop



Date: 25.SEP.2024 14:25:37

SF10_125K_Ant1_Hop



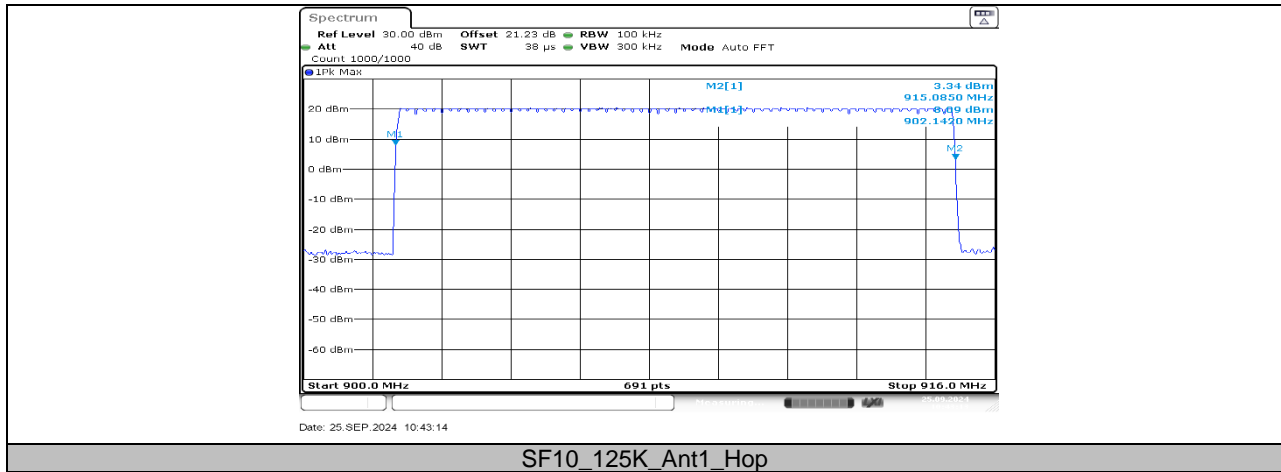
Date: 25.SEP.2024 14:26:44

SF10_125K_Ant1_Hop

9.6. Appendix F: Number of hopping channels

9.6.1. Test Result

Test Mode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
SF7_125K	Ant1	Hop	64	≥15	PASS
SF8_125K	Ant1	Hop	64	≥15	PASS
SF9_125K	Ant1	Hop	64	≥15	PASS
SF10_125K	Ant1	Hop	64	≥15	PASS

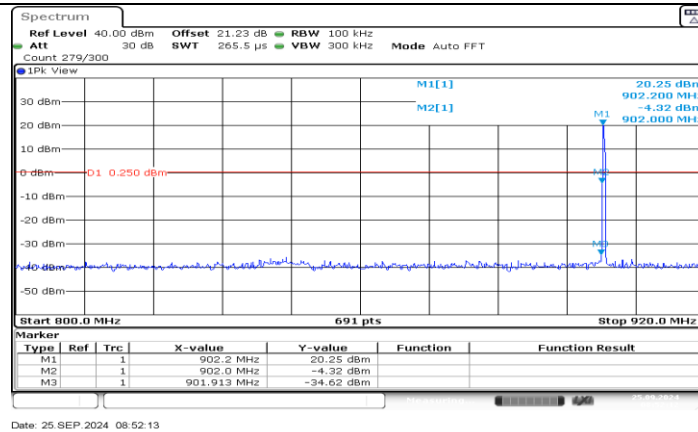


9.7. Appendix G: Band edge measurements

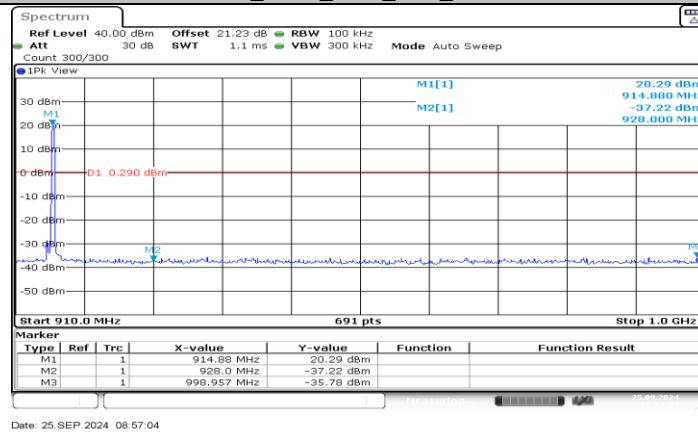
9.7.1. Test Result

Test Mode	Antenna	ChName	Channel	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
SF7_125K	Ant1	Low	902.3	20.25	-34.62	≤0.25	PASS
		High	914.9	20.29	-35.78	≤0.29	PASS
		Low	Hop_902.3	20.62	-29.91	≤0.62	PASS
		High	Hop_914.9	20.60	-47.09	≤0.6	PASS
SF8_125K	Ant1	Low	902.3	20.25	-31.61	≤0.25	PASS
		High	914.9	20.10	-33.91	≤0.1	PASS
		Low	Hop_902.3	20.65	-33.73	≤0.65	PASS
		High	Hop_914.9	20.62	-46.9	≤0.62	PASS
SF9_125K	Ant1	Low	902.3	20.25	-34.82	≤0.25	PASS
		High	914.9	20.22	-35.51	≤0.22	PASS
		Low	Hop_902.3	20.60	-23.7	≤0.6	PASS
		High	Hop_914.9	20.64	-46.06	≤0.64	PASS
SF10_125K	Ant1	Low	902.3	20.09	-31.99	≤0.09	PASS
		High	914.9	20.06	-35.47	≤0.06	PASS
		Low	Hop_902.3	20.67	-31.84	≤0.67	PASS
		High	Hop_914.9	20.62	-45.33	≤0.62	PASS

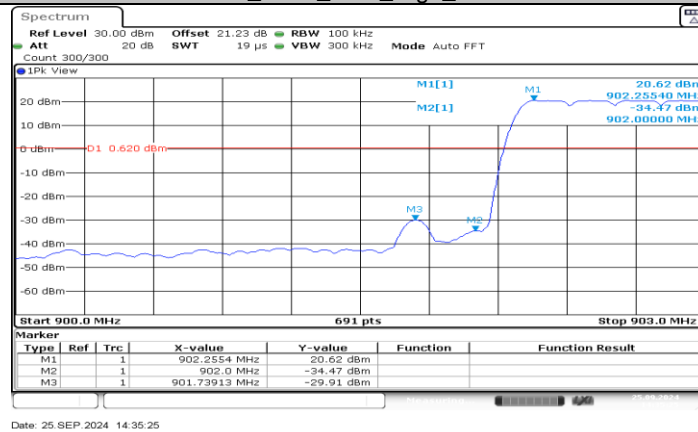
9.7.2. Test Graphs



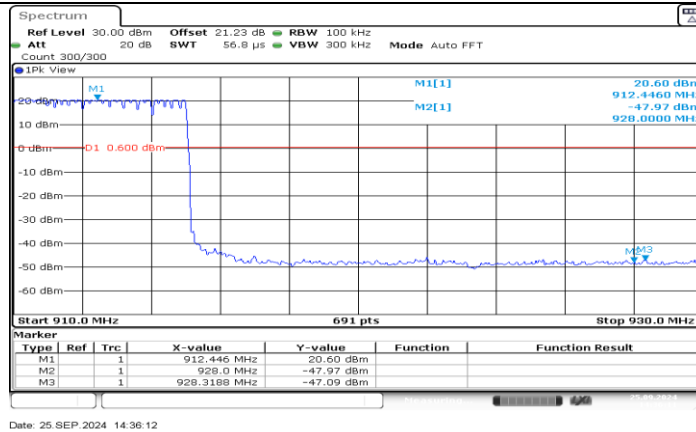
SF7_125K_Ant1_Low_902.3



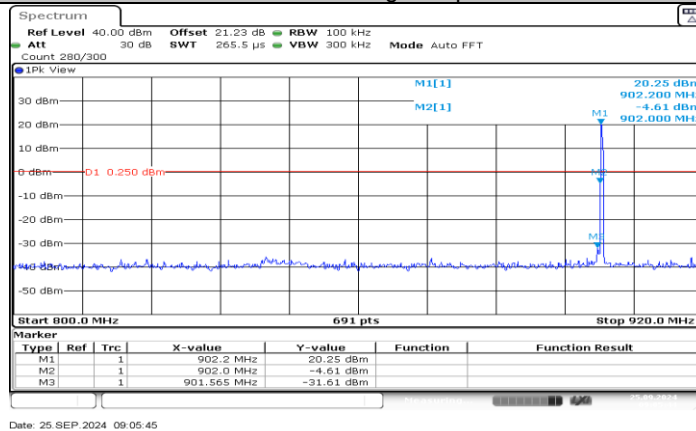
SF7_125K_Ant1_High_914.9



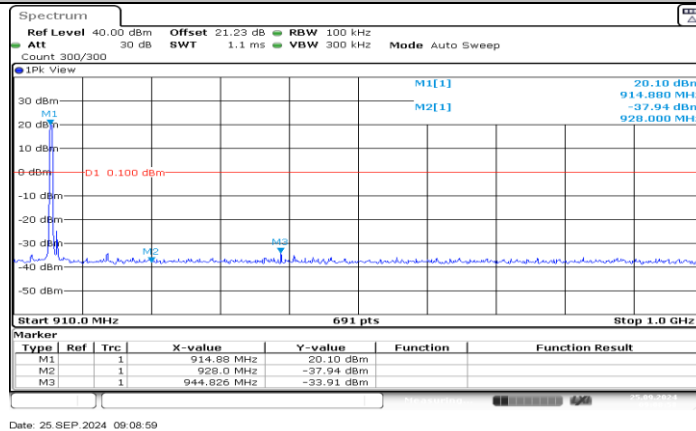
SF7_125K_Ant1_Low_Hop_903.2



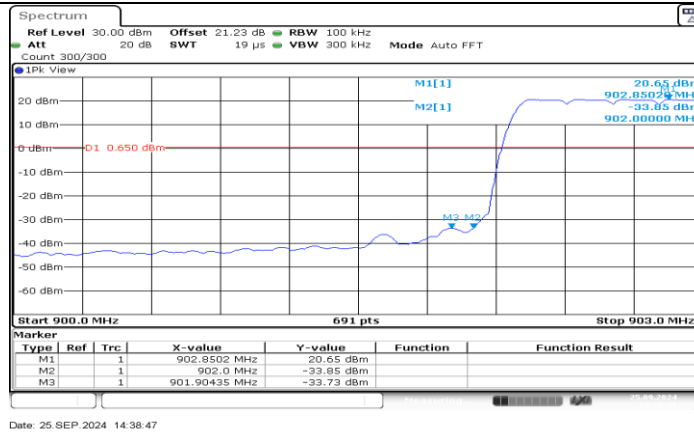
SF7_125K_Ant1_High_Hop_914.9



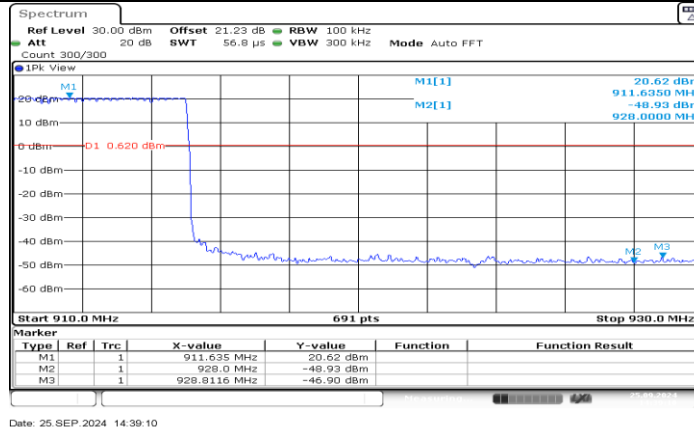
SF8_125K_Ant1_Low_902.3



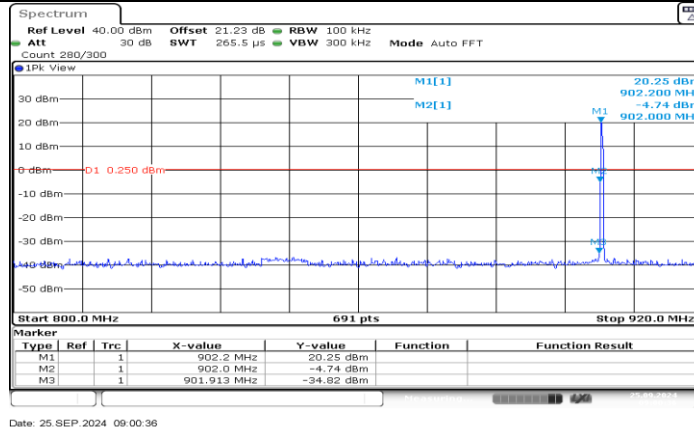
SF8_125K_Ant1_High_914.9



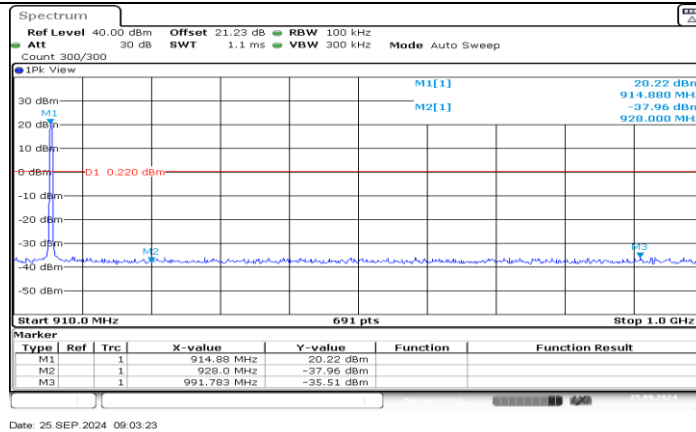
SF8_125K_Ant1_Low_Hop_903.2



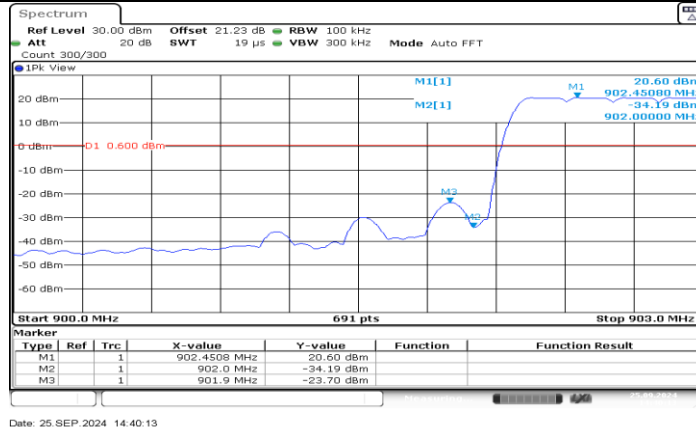
SF8_125K_Ant1_High_Hop_914.9



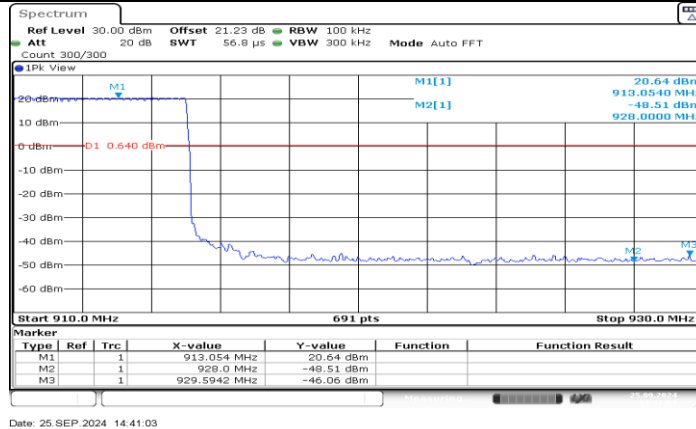
SF9_125K_Ant1_Low_902.3



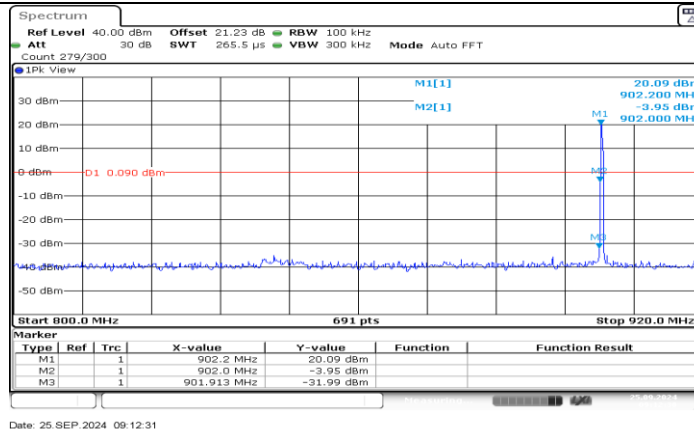
SF9_125K_Ant1_High_914.9



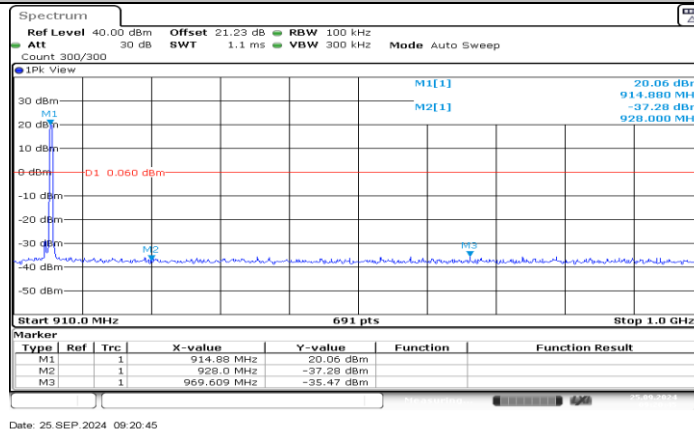
SF9_125K_Ant1_Low_Hop_903.2



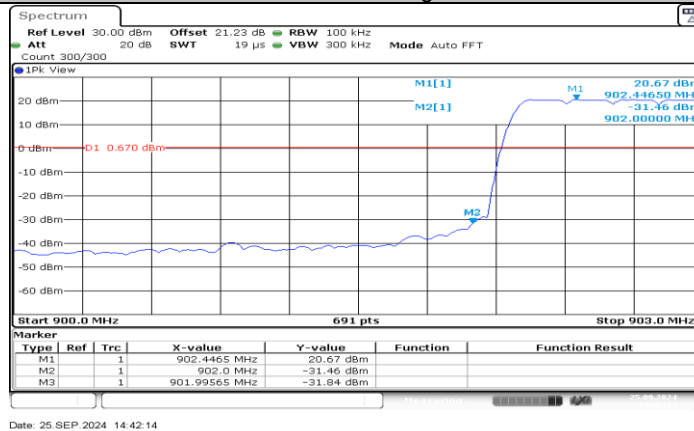
SF9_125K_Ant1_High_Hop_914.9



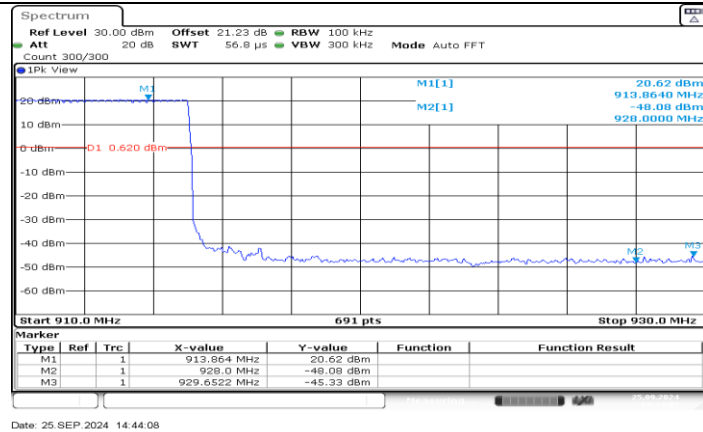
SF10_125K_Ant1_Low_902.3



SF10_125K_Ant1_High_914.9



SF10_125K_Ant1_Low_Hop_903.2



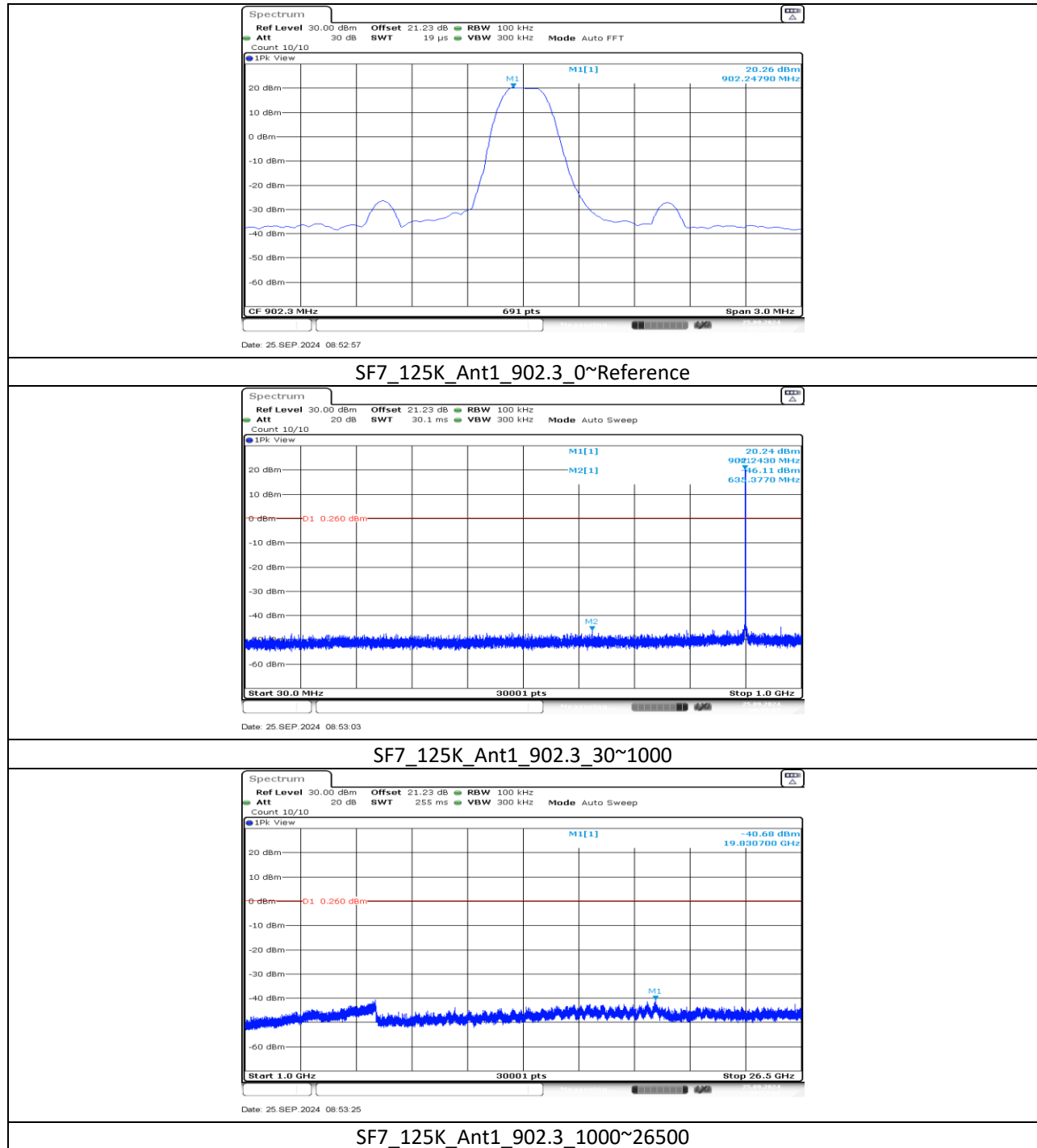
SF10_125K_Ant1_High_Hop_914.9

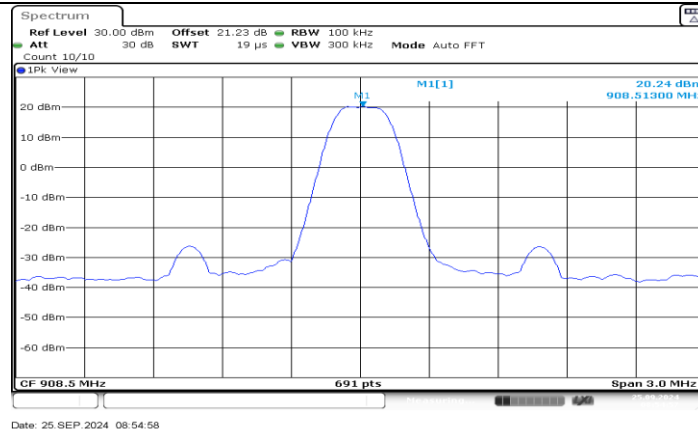
9.8. Appendix F: Conducted Spurious Emission

9.8.1. Test Result

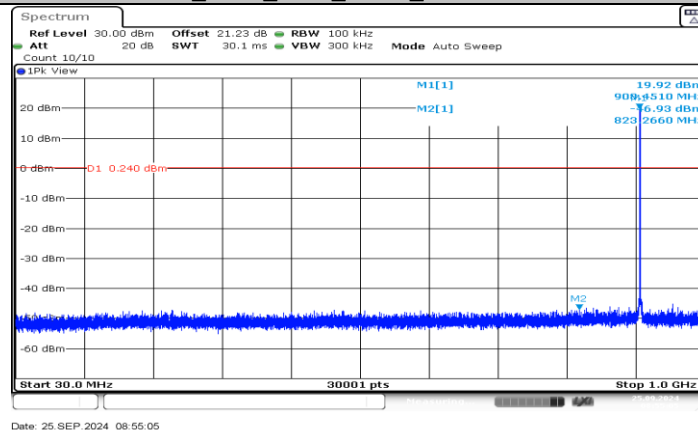
Test Mode	Antenna	Frequency[MHz]	FreqRange [MHz]	Result[dBm]	Limit[dBm]	Verdict
SF7_125K	Ant1	902.3	Reference	20.26	---	PASS
			30~1000	-46.11	≤0.26	PASS
			1000~26500	-40.68	≤0.26	PASS
		908.5	Reference	20.24	---	PASS
			30~1000	-46.93	≤0.24	PASS
			1000~26500	-41.43	≤0.24	PASS
		914.9	Reference	20.27		PASS
			30~1000	-46.57	≤0.27	PASS
			1000~26500	-41.29	≤0.27	PASS
SF8_125K	Ant1	902.3	Reference	20.21	---	PASS
			30~1000	-46.1	≤0.21	PASS
			1000~26500	-41.39	≤0.21	PASS
		908.5	Reference	20.24		PASS
			30~1000	-46.39	≤0.24	PASS
			1000~26500	-41.42	≤0.24	PASS
		914.9	Reference	20.26		PASS
			30~1000	-46.13	≤0.26	PASS
			1000~26500	-41.31	≤0.26	PASS
SF9_125K	Ant1	902.3	Reference	20.26	---	PASS
			30~1000	-45.92	≤0.27	PASS
			1000~26500	-40.6	≤0.27	PASS
		908.5	Reference	20.18		PASS
			30~1000	-45.79	≤0.18	PASS
			1000~26500	-40.9	≤0.18	PASS
		914.9	Reference	20.25		PASS
			30~1000	-45.88	≤0.25	PASS
			1000~26500	-41.2	≤0.25	PASS
SF10_125K	Ant1	902.3	Reference	20.19	---	PASS
			30~1000	-46.11	≤0.19	PASS
			1000~26500	-40.95	≤0.19	PASS
		908.5	Reference	20.25		PASS
			30~1000	-46.32	≤0.25	PASS
			1000~26500	-41.12	≤0.25	PASS
		914.9	Reference	20.27		PASS
			30~1000	-45.96	≤0.27	PASS
			1000~26500	-41.18	≤0.27	PASS

9.8.2. Test Graphs

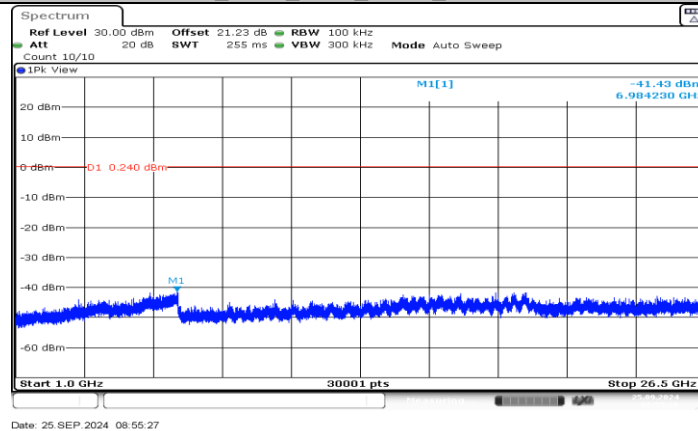




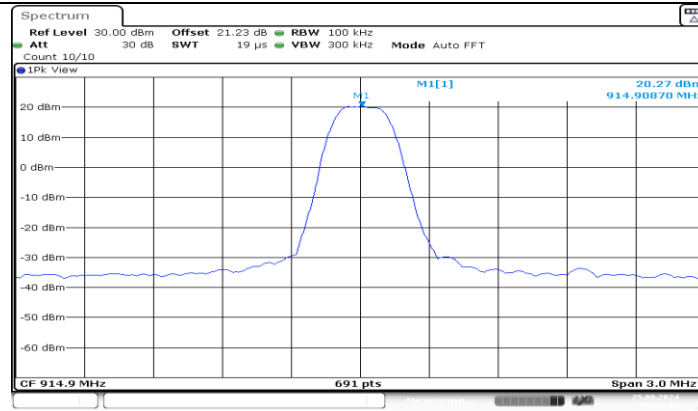
SF7_125K_Ant1_908.5_0~Reference



SF7_125K_Ant1_908.5_30~1000

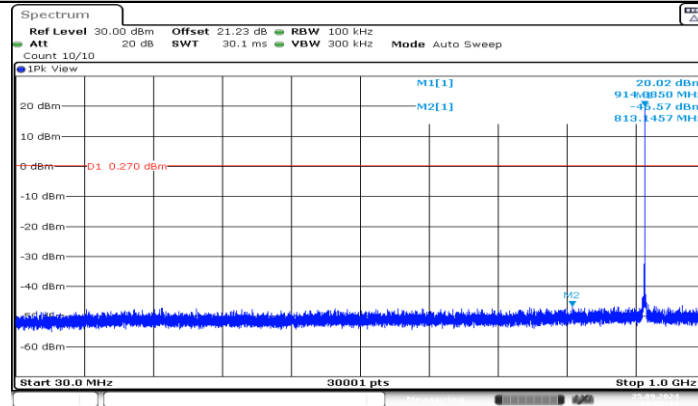


SF7_125K_Ant1_908.5_1000~26500



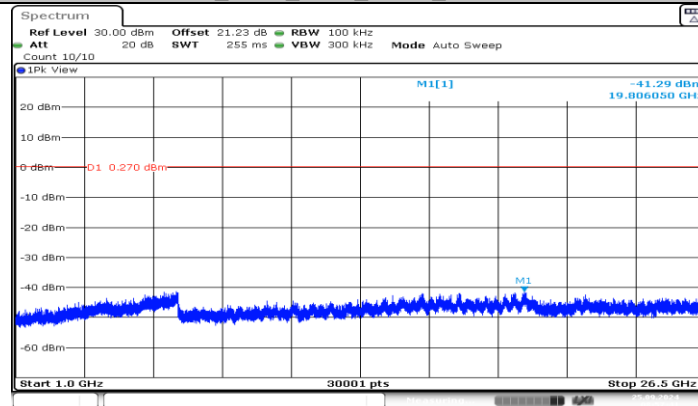
Date: 25 SEP. 2024 08:57:13

SF7_125K_Ant1_914.9_0~Reference



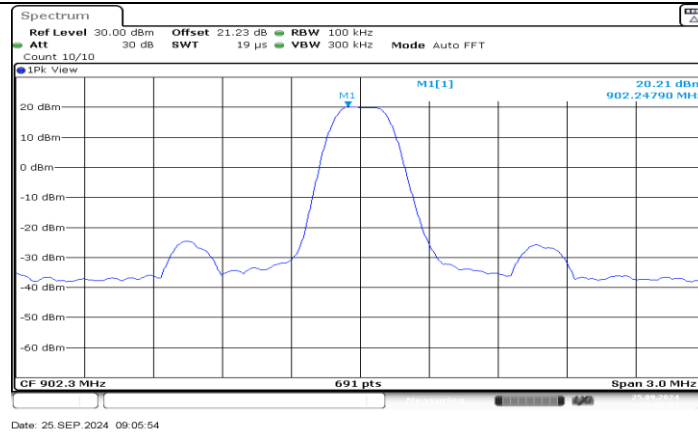
Date: 25 SEP. 2024 08:57:20

SF7_125K_Ant1_914.9_30~1000

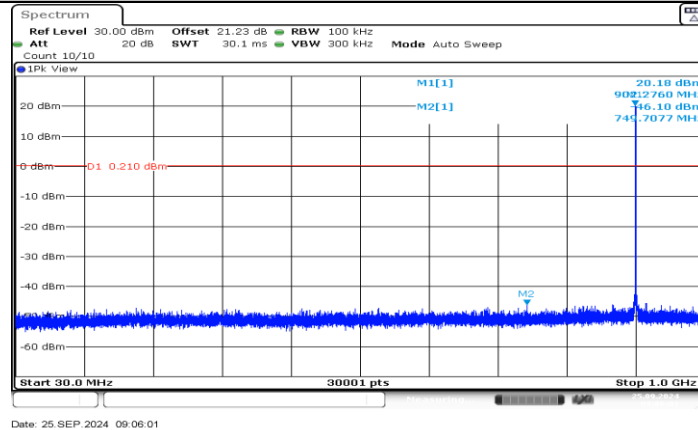


Date: 25 SEP. 2024 08:57:41

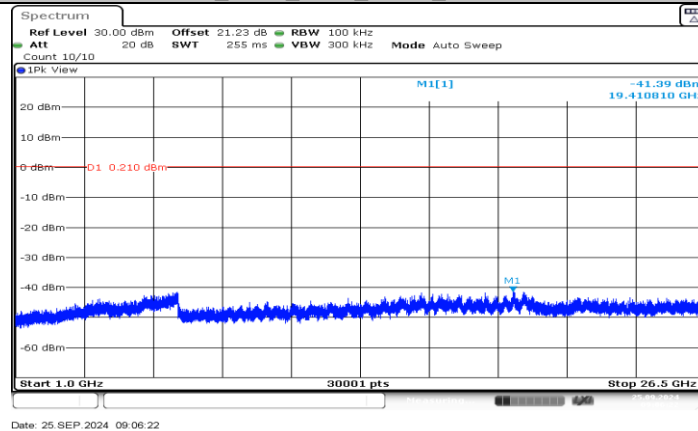
SF7_125K_Ant1_914.9_1000~26500



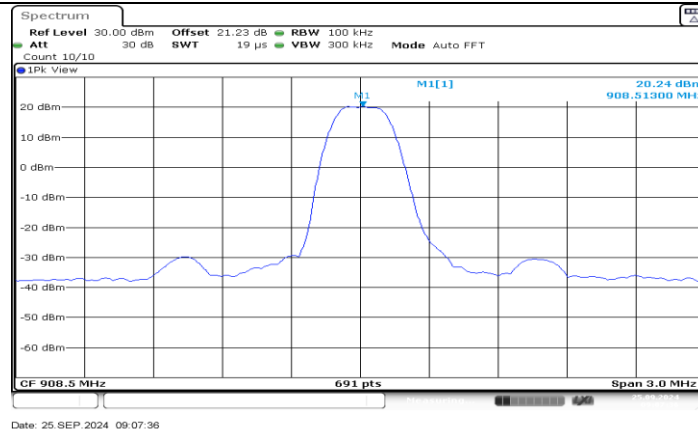
SF8_125K_Ant1_902.3_0~Reference



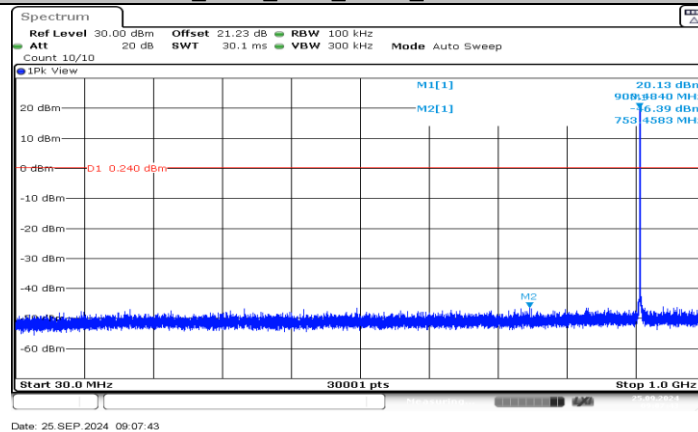
SF8_125K_Ant1_902.3_30~1000



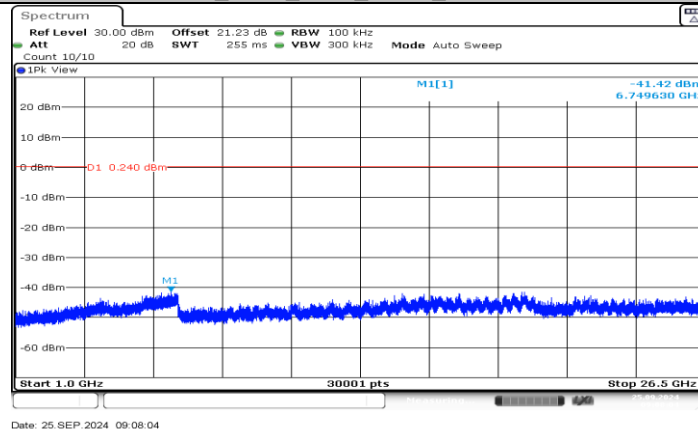
SF8_125K_Ant1_902.3_1000~26500



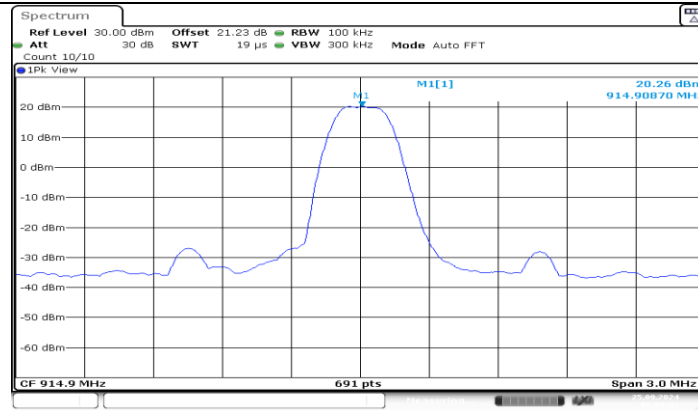
SF8_125K_Ant1_908.5_0~Reference



SF8_125K_Ant1_908.5_30~1000

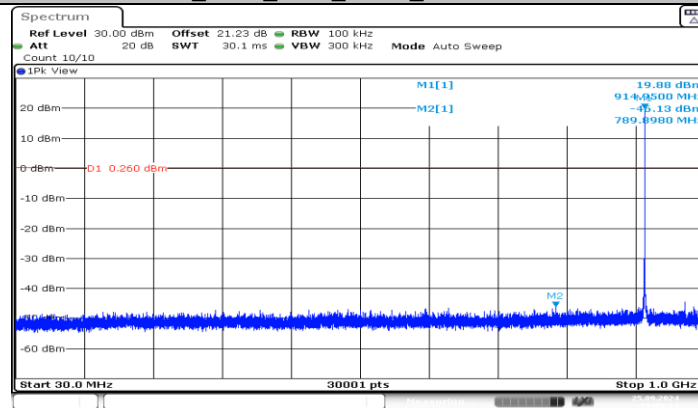


SF8_125K_Ant1_908.5_1000~26500



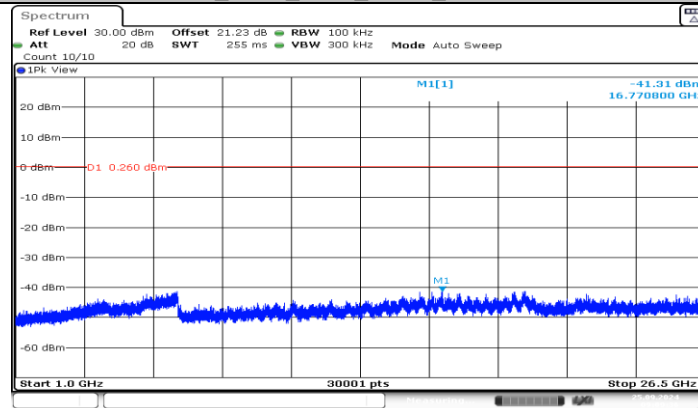
Date: 25 SEP. 2024 09:09:08

SF8_125K_Ant1_914.9_0~Reference



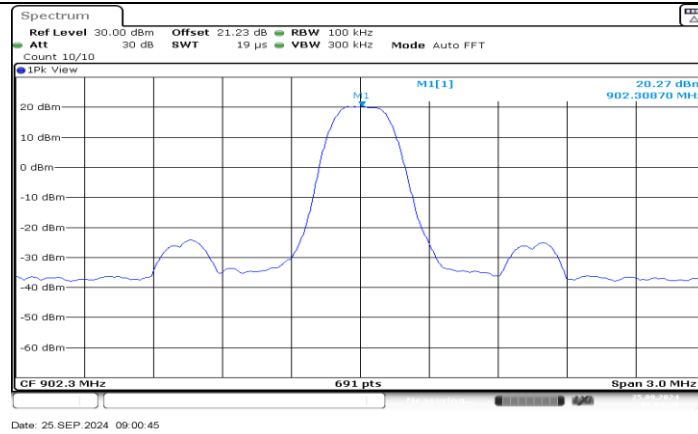
Date: 25 SEP. 2024 09:09:14

SF8_125K_Ant1_914.9_30~1000

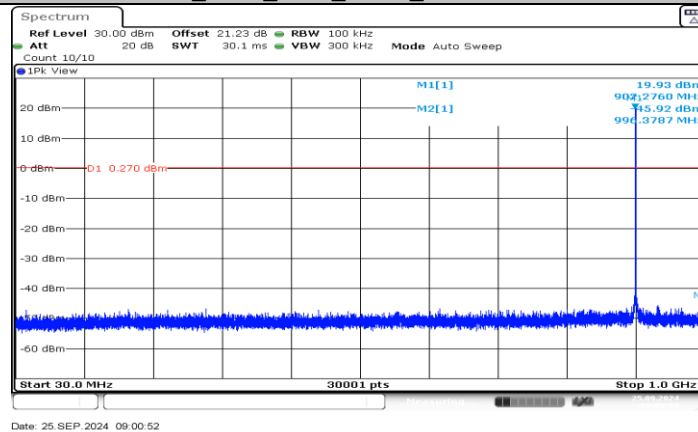


Date: 25 SEP. 2024 09:09:36

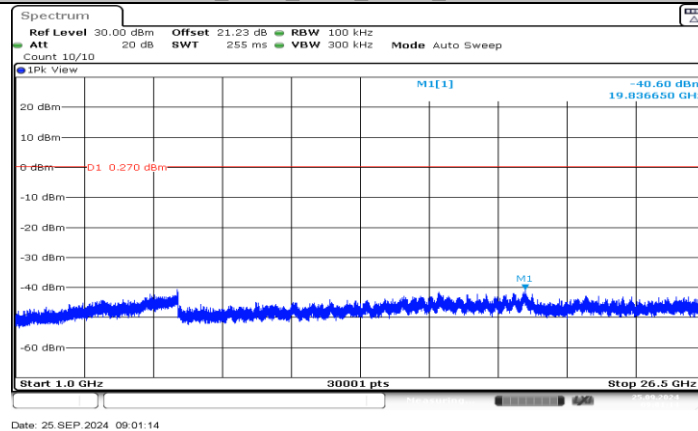
SF8_125K_Ant1_914.9_1000~26500



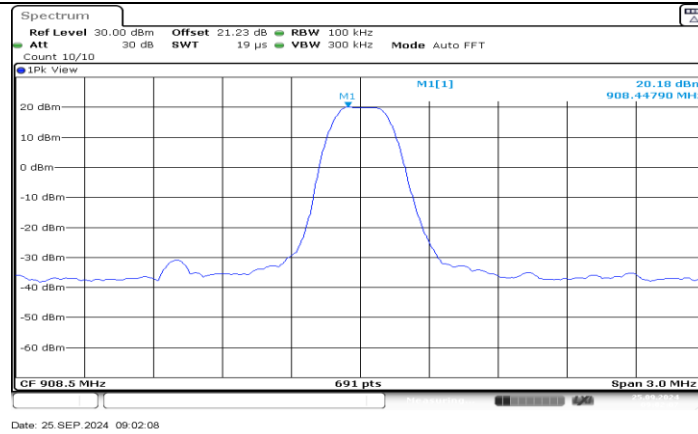
SF9_125K_Ant1_902.3_0~Reference



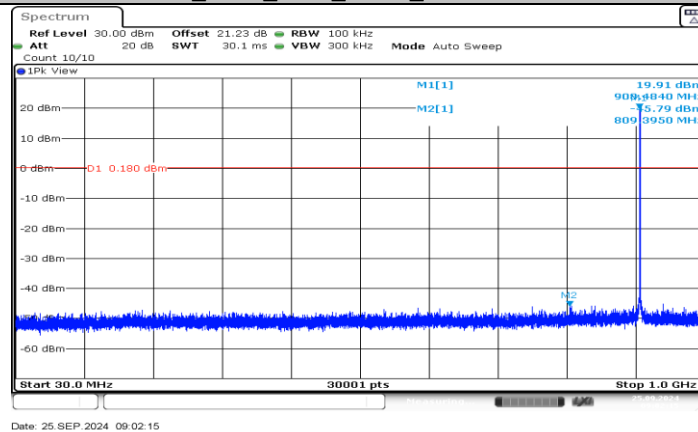
SF9_125K_Ant1_902.3_30~1000



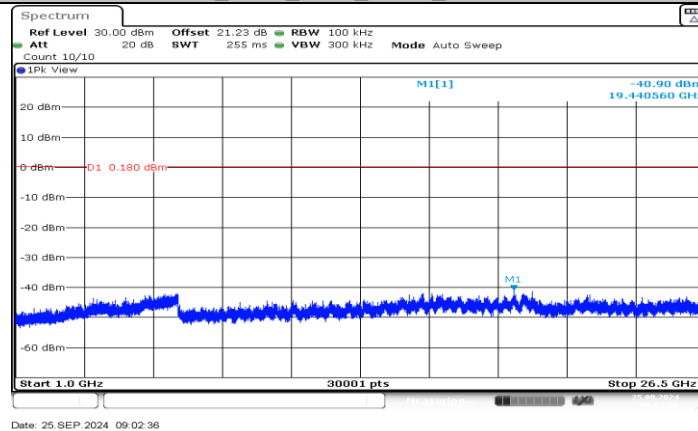
SF9_125K_Ant1_902.3_1000~26500



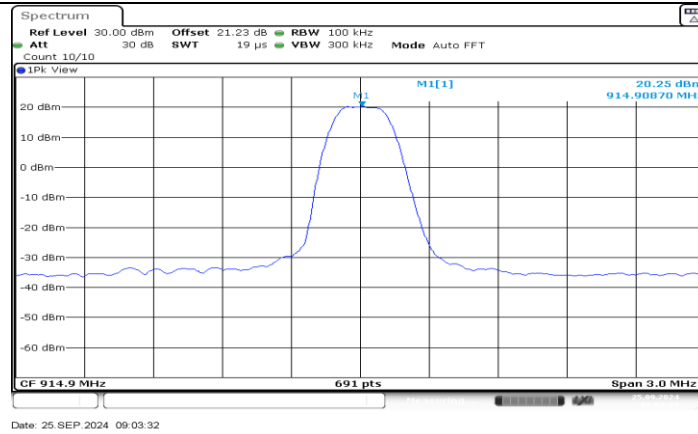
SF9_125K_Ant1_908.5_0~Reference



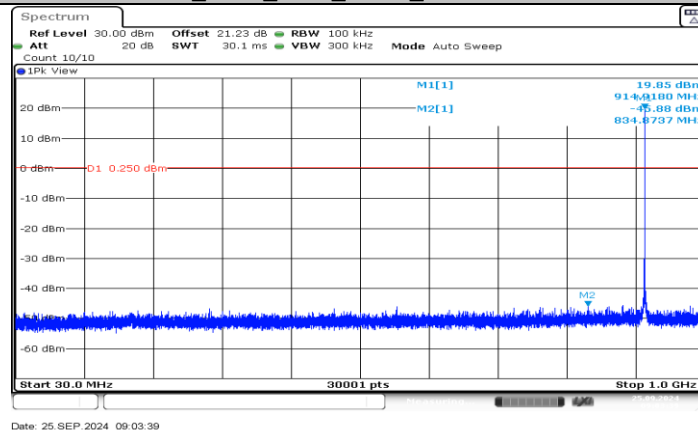
SF9_125K_Ant1_908.5_30~1000



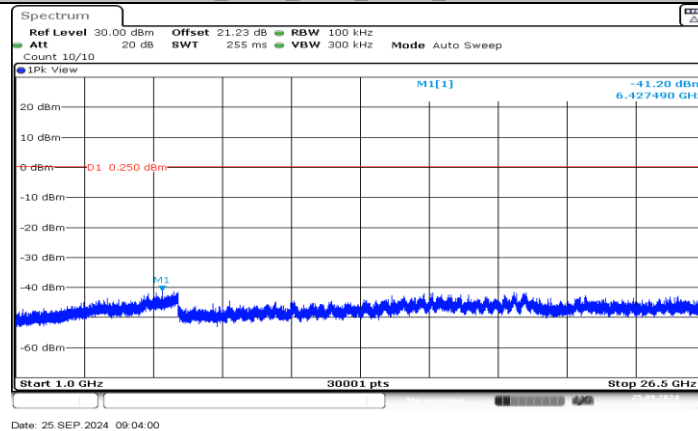
SF9_125K_Ant1_908.5_1000~26500



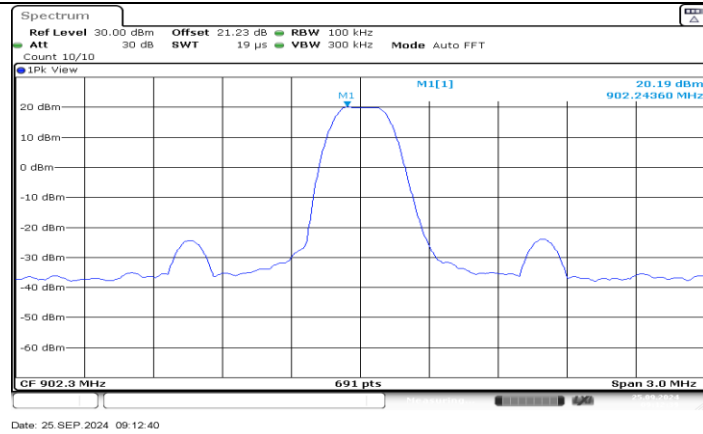
SF9_125K_Ant1_914.9_0~Reference



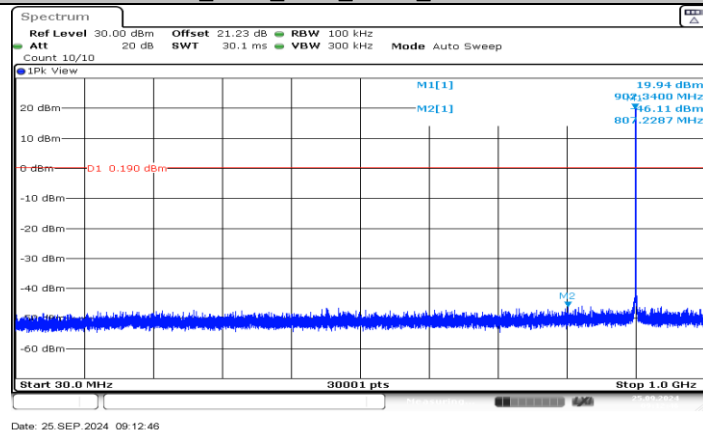
SF9_125K_Ant1_914.9_30~1000



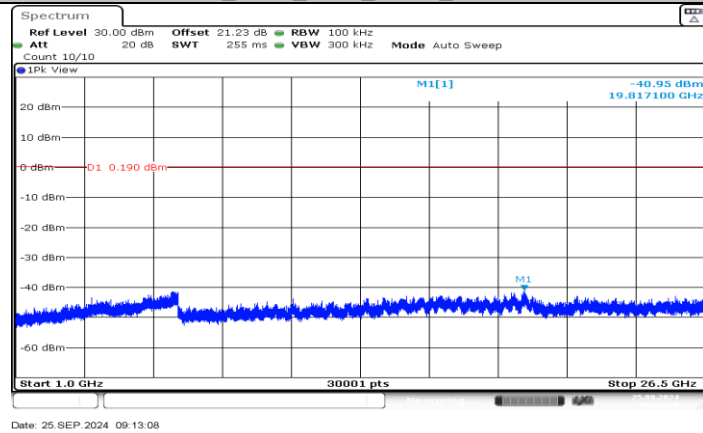
SF9_125K_Ant1_914.9_1000~26500



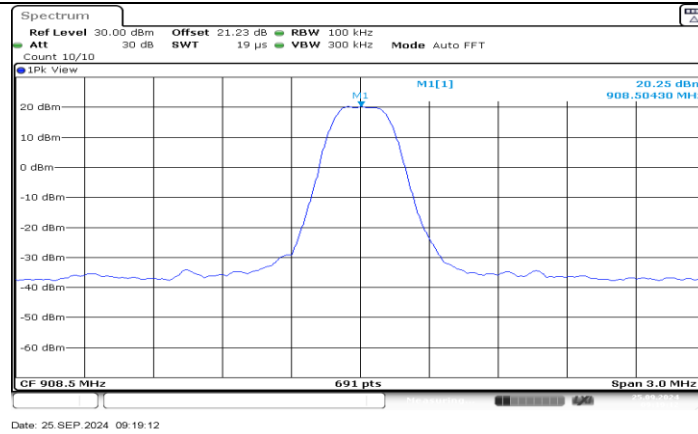
SF10_125K_Ant1_902.3_0~Reference



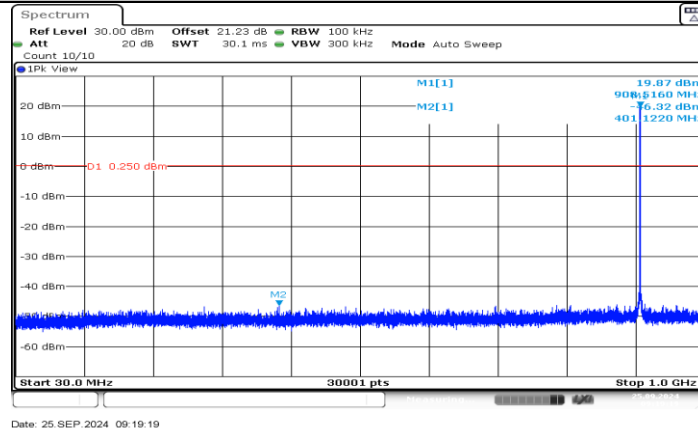
SF10_125K_Ant1_902.3_30~1000



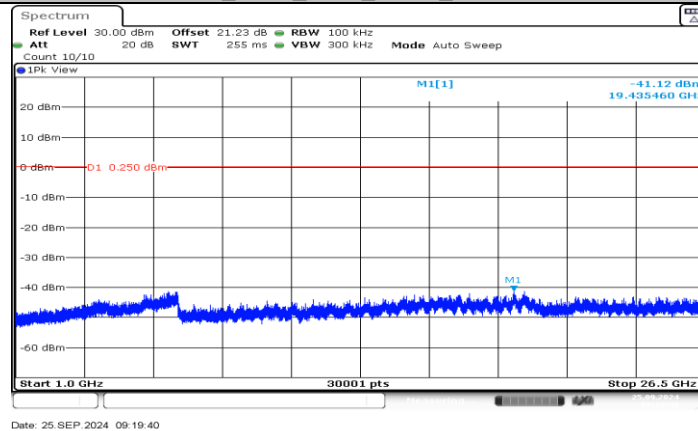
SF10_125K_Ant1_902.3_1000~26500



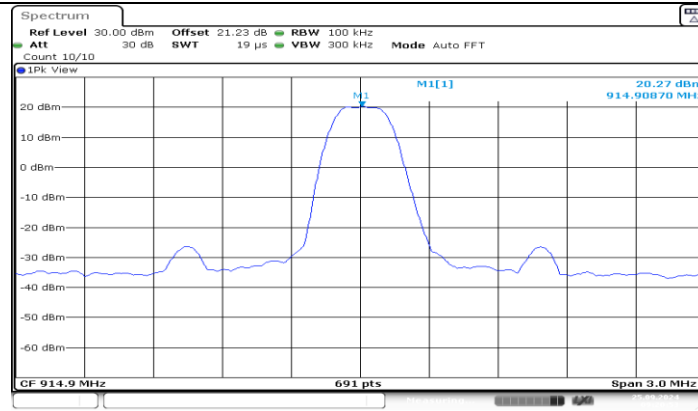
SF10_125K_Ant1_908.5_0~Reference



SF10_125K_Ant1_908.5_30~1000

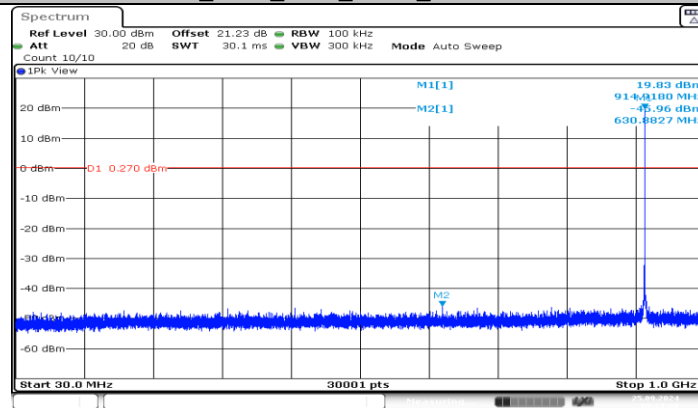


SF10_125K_Ant1_908.5_1000~26500



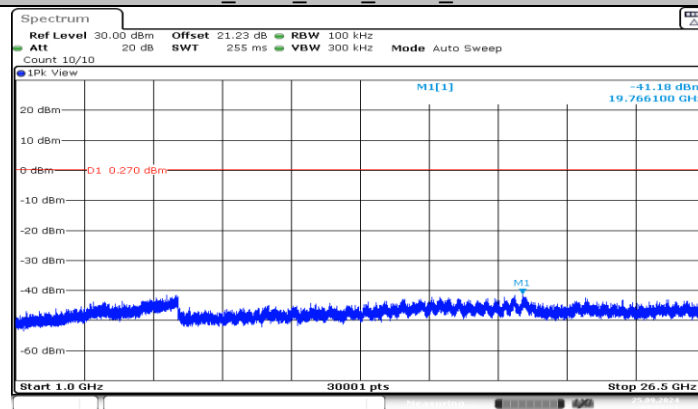
Date: 25 SEP. 2024 09:20:54

SF10_125K_Ant1_914.9_0~Reference



Date: 25 SEP. 2024 09:21:01

SF10_125K_Ant1_914.9_30~1000



Date: 25 SEP. 2024 09:21:22

SF10_125K_Ant1_914.9_1000~26500

9.9. Appendix G: Duty Cycle

9.9.1. Test Result

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
SF7_125K	72.32	184.34	0.3923	39.23	4.06	0.01	1
SF8_125K	72.32	184.96	0.3910	39.10	4.08	0.01	1
SF9_125K	124.02	238.22	0.5206	52.06	2.83	0.01	1
SF10_125K	247.90	359.98	0.6886	68.86	1.62	0.00	1

Note:

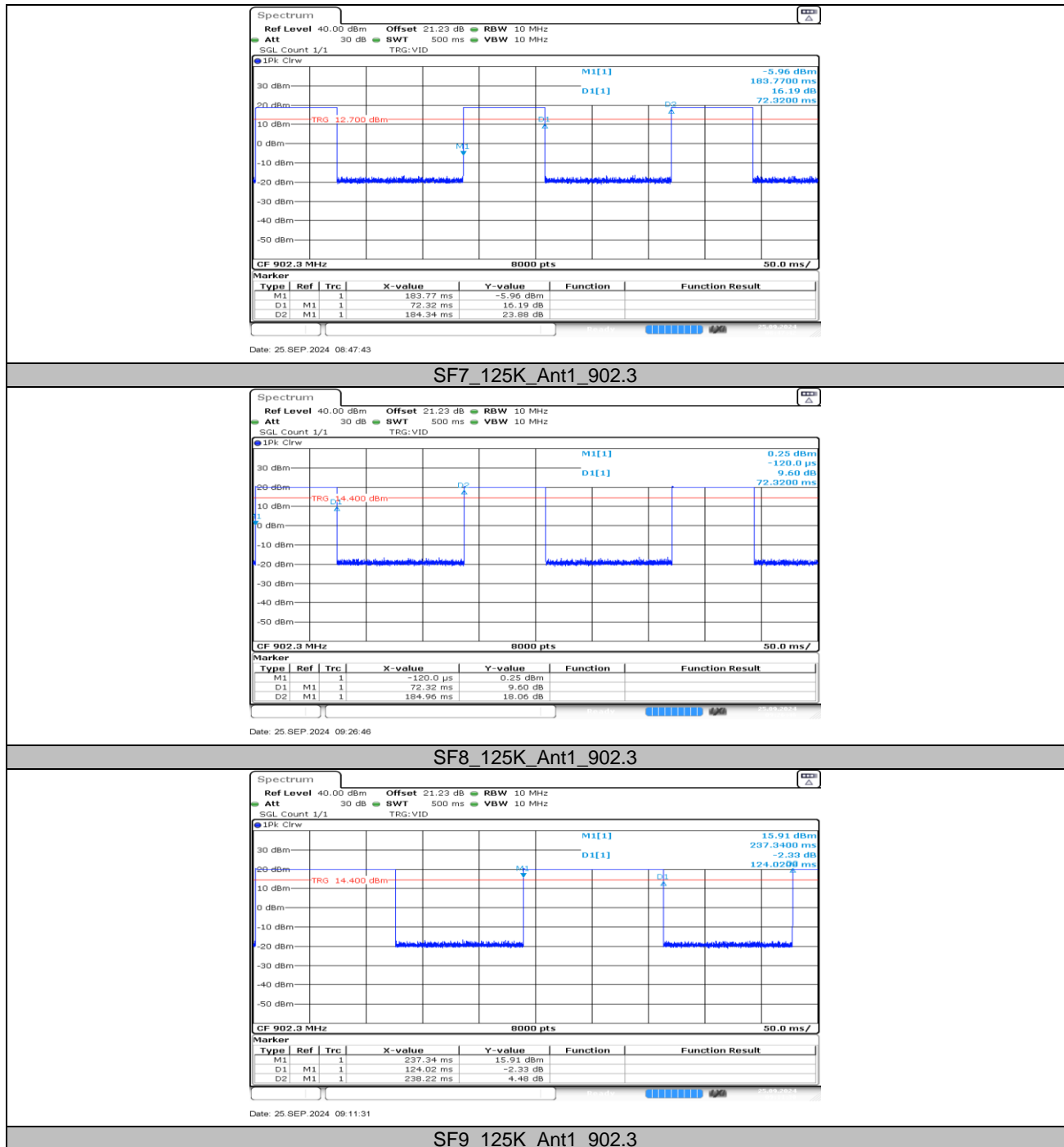
Duty Cycle Correction Factor=10log (1/x).

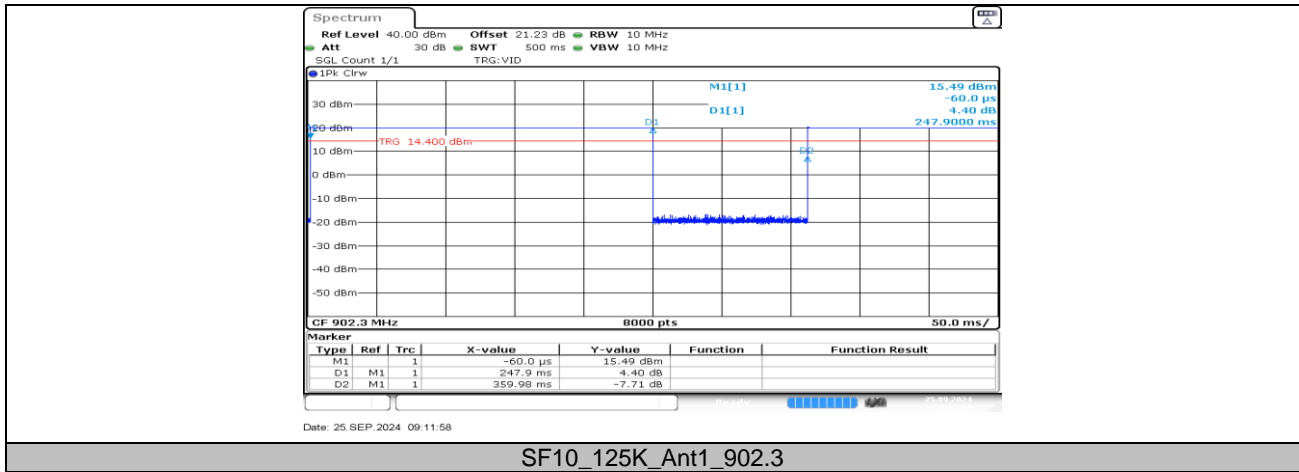
Where: x is Duty Cycle (Linear)

Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.

9.9.2. Test Graphs





END OF REPORT