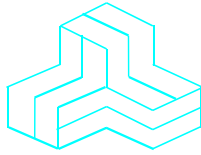


ENGINEERING TEST REPORT



2X2 MIMO 900MHz OEM DDL Module (1W)

Model: pMDDL900

FCC ID: NS9PMDDL900

Applicant:

Microhard Systems Inc.
150 Country Hills Landing NW
Calgary, Alberta
Canada T3K 5P3

In Accordance With

**Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.247 Digital Modulation Systems (DTS)**

UltraTech's File No.: 19MCRS111_FCC15C247

This Test report is Issued under the Authority of
Tri M. Luu
Vice President of Engineering
UltraTech Group of Labs

Date: May 29, 2019

Report Prepared by: Dan Huynh

Tested by: Hung Trinh

Issued Date: May 29, 2019

Test Dates: March 22 - May 3, 2019

- The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.
- This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.
- This test report shall not be reproduced, except in full, without a written approval from UltraTech

UltraTech

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4

Tel.: (905) 829-1570 Fax.: (905) 829-8050

Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com



APEC TEL CA0001



1309



CA 0001/2049



AT-1945



SL2-IN-E-1119R



Korea KCC-RRR

CA2049

TABLE OF CONTENTS

EXHIBIT 1.	INTRODUCTION	1
1.1.	SCOPE	1
1.2.	RELATED SUBMITTAL(S)/GRANT(S)	1
1.3.	NORMATIVE REFERENCES	1
EXHIBIT 2.	PERFORMANCE ASSESSMENT	2
2.1.	CLIENT INFORMATION	2
2.2.	EQUIPMENT UNDER TEST (EUT) INFORMATION	2
2.3.	EUT'S TECHNICAL SPECIFICATIONS	3
2.4.	ASSOCIATED ANTENNA DESCRIPTIONS	3
2.5.	LIST OF EUT'S PORTS	3
2.6.	ANCILLARY EQUIPMENT	4
EXHIBIT 3.	EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS	5
3.1.	CLIMATE TEST CONDITIONS	5
3.2.	OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS	5
EXHIBIT 4.	SUMMARY OF TEST RESULTS	6
4.1.	LOCATION OF TESTS	6
4.2.	APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS	6
4.3.	MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES	6
EXHIBIT 5.	TEST DATA	7
5.1.	POWER LINE CONDUCTED EMISSIONS [§15.207(a)]	7
5.2.	OCCUPIED BANDWIDTH [§ 15.247(a)(2)]	12
5.3.	PEAK CONDUCTED OUTPUT POWER - DTS [§ 15.247(b)(3)]	57
5.4.	TRANSMITTER SPURIOUS RADIATED EMISSIONS AT 3 METERS [§§ 15.247(d), 15.209 & 15.205]	72
5.5.	POWER SPECTRAL DENSITY [§ 15.247(e)]	144
5.6.	RF EXPOSURE REQUIRMENTS [§§ 15.247(i), 1.1310 & 2.1091]	147
EXHIBIT 6.	TEST EQUIPMENT LIST	150
EXHIBIT 7.	MEASUREMENT UNCERTAINTY	151
7.1.	LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY	151
7.2.	RADIATED EMISSION MEASUREMENT UNCERTAINTY	151

EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title:	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices
Purpose of Test:	Equipment Certification for Digital Modulation Systems (DTS) Operating Under §15.247
Test Procedures:	- ANSI C63.4 - ANSI C63.10 - FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r01
Environmental Classification:	☒ Commercial, industrial or business environment ☒ Residential environment

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 0-19	2018	Code of Federal Regulations (CFR), Title 47 – Telecommunication
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
FCC, KDB Publication No. 558074 D01 15.247 Meas Guidance v05r01	2019	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Microhard Systems Inc.
Address:	150 Country Hills Landing NW Calgary, Alberta Canada T3K 5P3
Contact Person:	Mr. Hany Shenouda Phone #: 403 248-0028 Fax #: 403 248 2762 Email Address: shenouda@microhardcorp.com

MANUFACTURER	
Name:	Microhard Systems Inc.
Address:	150 Country Hills Landing NW Calgary, Alberta Canada T3K 5P3
Contact Person:	Mr. Hany Shenouda Phone #: 403 248-0028 Fax #: 403 248-2762 Email Address: shenouda@microhardcorp.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Microhard Systems Inc.
Product Name:	2X2 MIMO 900MHz OEM DDL Module (1W)
Model Name or Number:	pMDDL900
Serial Number:	Test Sample
Type of Equipment:	Digital Transmission System (DTS)
Input Power Supply Type:	External DC Power Supply
Primary User Functions of EUT:	Wireless Data communication Ethernet and Serial

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter			
Equipment Type:	- Mobile - Base Station (fixed use)		
Intended Operating Environment:	- Commercial, industrial or business environment - Residential environment		
Power Supply Requirement:	3.3 VDC		
RF Output Power Rating:	14 – 30 dBm typical		
¹ Tx Gain Setting:	0-255		
Operating Frequency Range:	Bandwidth	² Data Rate 1, 2, 3	² Data Rate 4, 5, 6, 7
	4 MHz 8 MHz	905 – 925 MHz 907 – 923 MHz	905 – 925 MHz 907 – 923 MHz
RF Output Impedance:	50 Ω		
Duty Cycle:	Continuous		
Modulation Type:	COFDM		
Antenna Connector Types:	U.FL		

¹TX gain setting is a factory tune-up parameter, not available to end users

²Refer to operational description exhibit for more information on data rates and operational restrictions.

2.4. ASSOCIATED ANTENNA DESCRIPTIONS

Antenna Type	Maximum Gain (dBi)
Rubber Ducky Antenna	3
Puck Antenna	4
Patch Antenna	8
Omni Directional Antenna	8
Yagi Antenna	14

2.5. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	RF port	2	U.FL	Shielded cable
2	DC supply and I/O port	1	Pin header	Direct connection (no cable)

2.6. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	Test Jig
Brand name:	Microhard Systems Inc.
Model Name or Number:	N/A
Connected to EUT's Port:	I/O Port

Ancillary Equipment # 2	
Description:	AC/DC Adapter
Brand name:	Biron Switching Power Supply
Model Name or Number:	BI24-120200-AdU
Connected to EUT's Port:	Test Jig of the EUT

EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power Input Source:	3.3 VDC

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	Test software provided by the Applicant to operate the EUT at each channel frequency continuously and in the range of typical modes of operation.
Special Hardware Used:	Test Jig
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as non-integral antenna equipment as described with the test results.

Transmitter Test Signals	
Frequency Band(s):	905 – 925 MHz 907 – 923 MHz
Frequency(ies) Tested:	905 MHz, 915 MHz, 923 MHz, 925 MHz
RF Power Output: (measured maximum output power at antenna terminals)	30.00 dBm Total Peak Power
Normal Test Modulation:	COFDM
Modulating Signal Source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

- AC Power Line Conducted Emissions were performed in UltraTech's shielded room, 24'(L) by 16'(W) by 8'(H).
- Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with ANAB File No.: AT-1945.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
15.203	Antenna requirements	Yes
15.207(a)	AC Power Line Conducted Emissions	Yes
15.247(a)(2)	6 dB Bandwidth	Yes
15.247(b)(3)	Peak Conducted Output Power - DTS	Yes
15.247(d), 15.209 & 15.205	Transmitter Spurious Radiated Emissions	Yes
15.247(e)	Power Spectral Density	Yes
15.247(i), 1.1307, 1.1310, 2.1091	RF Exposure	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

EXHIBIT 5. TEST DATA

5.1. POWER LINE CONDUCTED EMISSIONS [§15.207(a)]

5.1.1. Limit(s)

The equipment shall meet the limits of the following table:

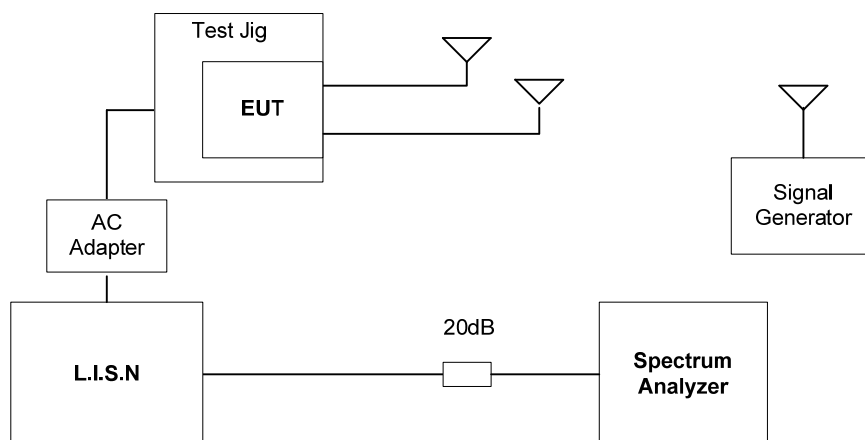
Frequency of emission (MHz)	Conducted Limits (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases linearly with the logarithm of the frequency

5.1.2. Method of Measurements

ANSI C63.4

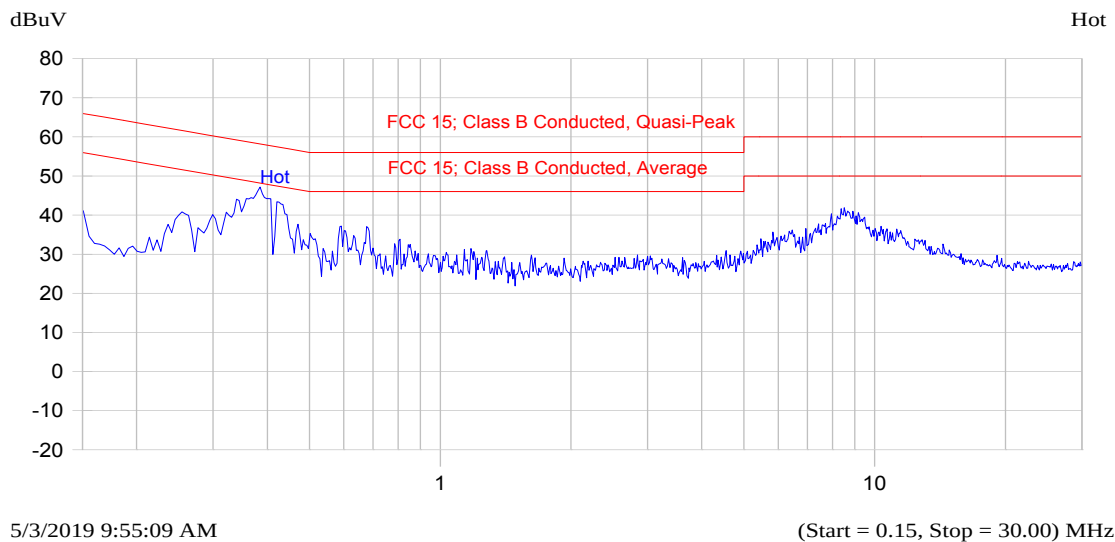
5.1.3. Test Arrangement



5.1.4. Test Data

Plot 5.1.4.1. Power Line Conducted Emissions (Test Configuration 1: Tx Mode)
Line Voltage: 120 VAC; Line Tested: Hot

Current Graph

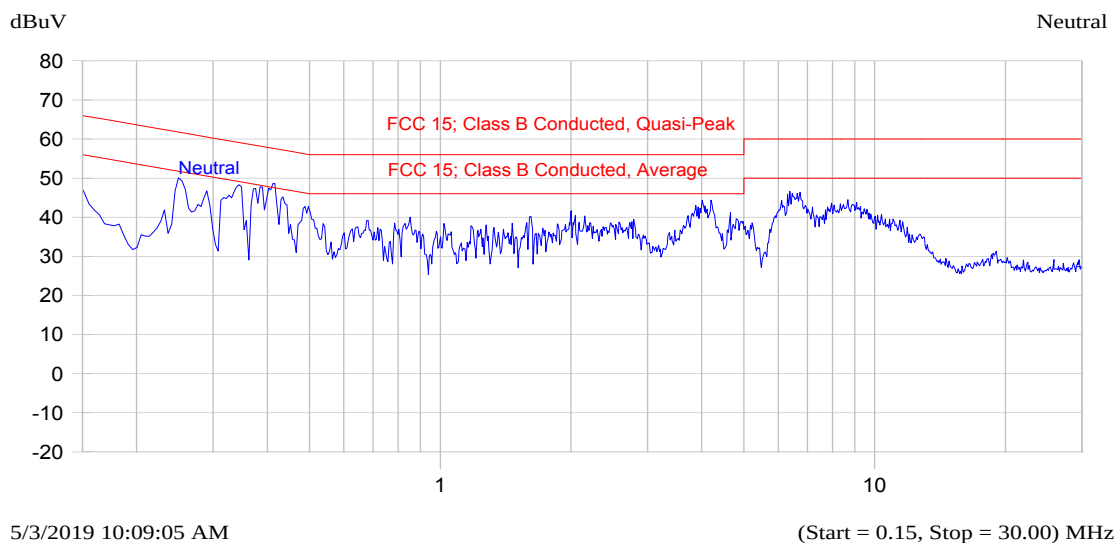


Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.253	48.9	44.1	-17.6	34.7	-16.9	Hot
0.382	46.6	44.2	-14.0	32.9	-15.3	Hot
0.425	47.4	44.4	-12.9	33.9	-13.4	Hot
0.586	37.2	30.6	-25.4	20.7	-25.3	Hot
8.509	40.4	36.6	-23.4	29.8	-20.2	Hot

Plot 5.1.4.2. Power Line Conducted Emissions (Test Configuration 1: Tx Mode)
Line Voltage 120 VAC; Line Tested: Neutral

Current Graph

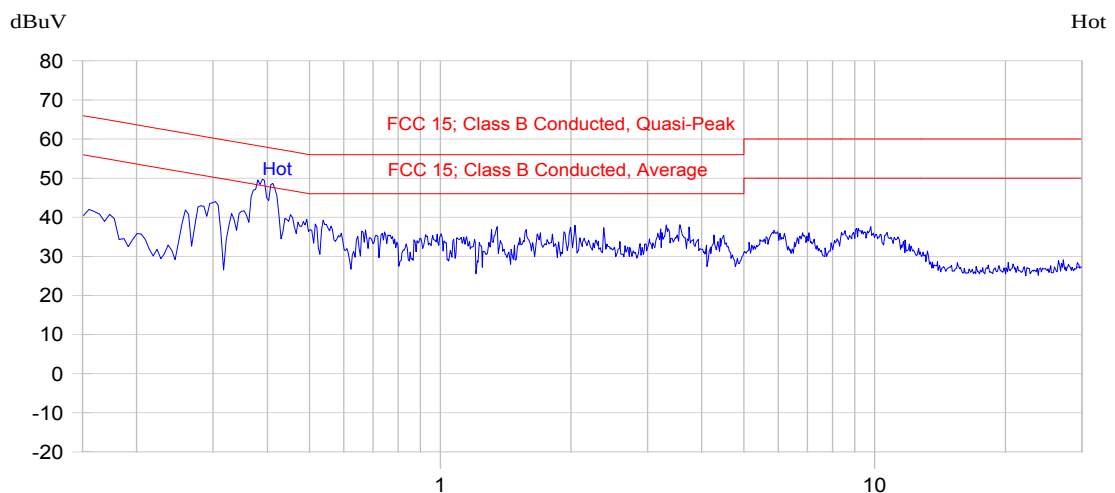


Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.242	49.7	45.1	-16.9	37.9	-14.1	Neutral
0.335	44.4	39.5	-19.8	25.4	-23.9	Neutral
0.405	48.8	47.7	-10.1	40.5	-7.3	Neutral
0.435	41.6	37.2	-19.9	28.9	-18.2	Neutral
4.204	38.8	31.0	-25.0	23.6	-22.4	Neutral
6.379	39.9	32.3	-27.7	25.5	-24.5	Neutral

Plot 5.1.4.3. Power Line Conducted Emissions (Test Configuration 2: Rx Mode)
Line Voltage 120 VAC; Line Tested: Hot

Current Graph



5/3/2019 10:37:42 AM

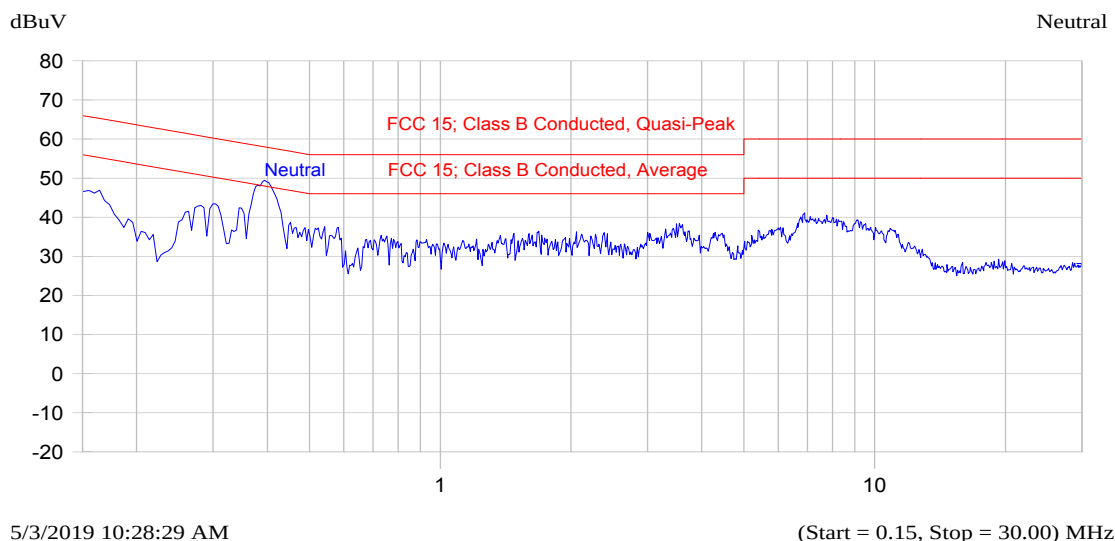
(Start = 0.15, Stop = 30.00) MHz

Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.303	46.5	43.5	-16.7	38.8	-11.3	Hot
0.398	51.0	49.7	-8.2	41.6	-6.3	Hot
0.400	50.8	49.5	-8.4	41.3	-6.6	Hot
0.533	39.0	36.7	-19.3	30.8	-15.2	Hot
2.376	34.4	30.3	-25.7	22.7	-23.3	Hot

Plot 5.1.4.4. Power Line Conducted Emissions (Test Configuration 2: Rx Mode)
Line Voltage 120 VAC; Line Tested: Neutral

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.163	49.3	45.7	-19.7	33.7	-21.7	Neutral
0.302	45.6	42.5	-17.7	37.5	-12.7	Neutral
0.394	49.8	48.5	-9.4	41.0	-7.0	Neutral
3.558	39.0	34.2	-21.8	27.7	-18.3	Neutral
6.899	39.5	36.5	-23.5	29.9	-20.1	Neutral

5.2. OCCUPIED BANDWIDTH [§ 15.247(a)(2)]

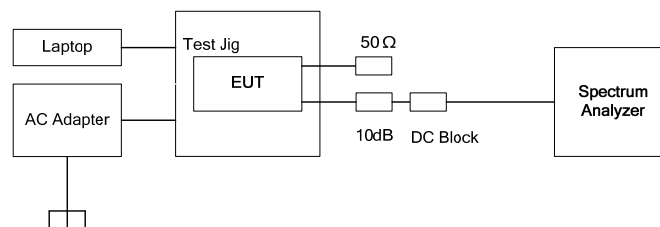
5.2.1. Limit(s)

The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2.2. Method of Measurements

KDB 558074 D01 15.247 Meas Guidance v05r01 Section.8.2,
ANSI C63.10-2013 Section 11.8.1 Option 1

5.2.3. Test Arrangement



5.2.4. Test Data

Bandwidth: 4 MHz, Data Rates: 1, 2 & 3, Power Setting: 20						
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	6dB Bandwidth(MHz)		Min. Limit (kHz)
				Antenna 1	Antenna 2	
4	20	1	905	2.61	2.59	500
			915	2.60	2.60	500
			925	2.60	2.59	500
		2	905	2.59	2.58	500
			915	2.59	2.58	500
			925	2.59	2.57	500
		3	905	2.64	2.68	500
			915	2.73	2.57	500
			925	2.73	2.72	500

Bandwidth: 8 MHz, Data Rates 1, 2 & 3, Power Setting 26						
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	6dB Bandwidth(MHz)		Min. Limit (kHz)
				Antenna 1	Antenna 2	
8	26	1	907	5.12	4.87	500
			915	5.12	5.13	500
			923	5.12	5.12	500
		2	907	5.10	4.98	500
			915	5.10	5.10	500
			923	5.10	5.02	500
		3	907	5.19	5.02	500
			915	5.31	5.46	500
			923	5.04	5.25	500

Bandwidth: 4 MHz, Data Rates: 4, 5, 6 & 7, Power Setting: 24						
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	6dB Bandwidth(MHz)		Min. Limit (kHz)
				Antenna 1	Antenna 2	
4	24	4	905	4.49	4.47	500
			915	4.47	4.47	500
			925	4.49	4.47	500
		5	905	4.50	4.49	500
			915	4.52	4.50	500
			925	4.49	4.50	500
		6	905	4.47	4.47	500
			915	4.47	4.49	500
			925	4.50	4.49	500
		7	905	4.47	4.49	500
			915	4.49	4.47	500
			925	4.50	4.47	500

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Bandwidth: 8 MHz, Data Rates: 4, 5, 6 & 7, Power Setting: 24						
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	6dB Bandwidth(MHz)		Min. Limit (kHz)
				Antenna 1	Antenna 2	
8	24	4	907	8.85	8.62	500
			915	8.88	8.91	500
			923	8.81	8.24	500
		5	907	8.88	8.78	500
			915	8.91	8.88	500
			923	8.88	8.46	500
		6	907	8.91	8.81	500
			915	8.97	8.91	500
			923	8.94	8.81	500
		7	907	8.97	8.78	500
			915	8.91	8.97	500
			923	8.94	8.81	500

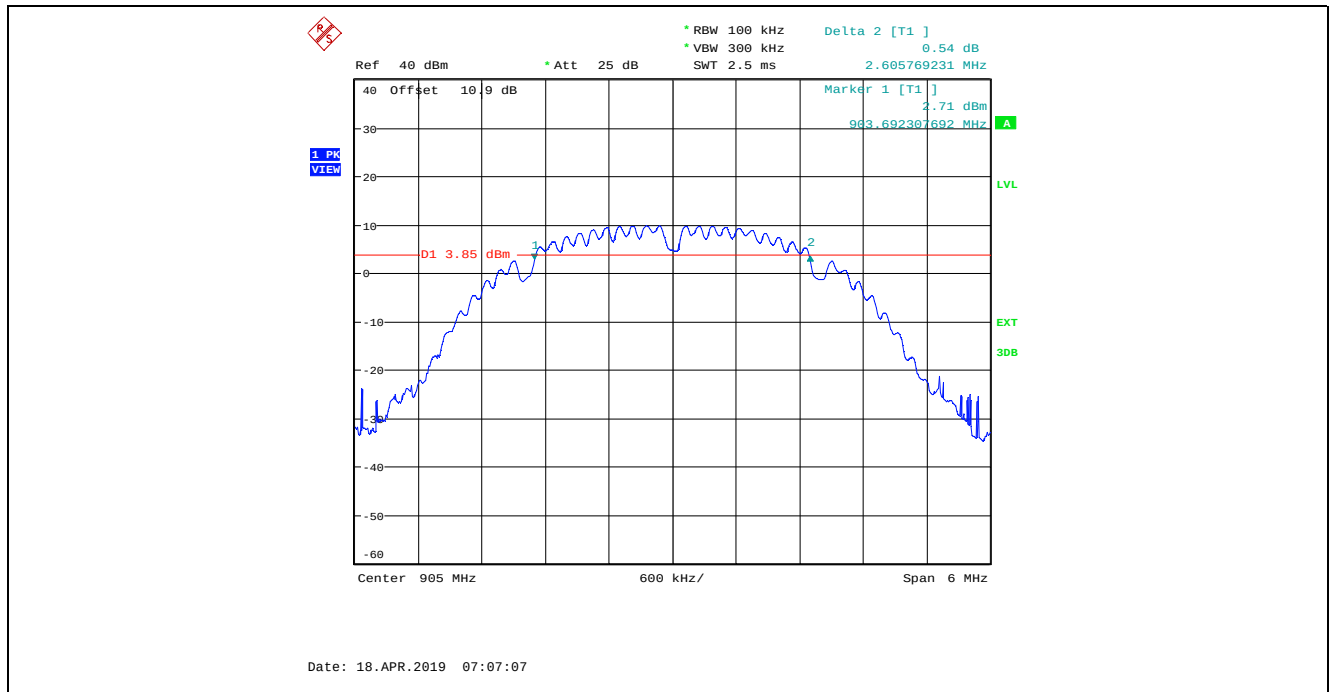
ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

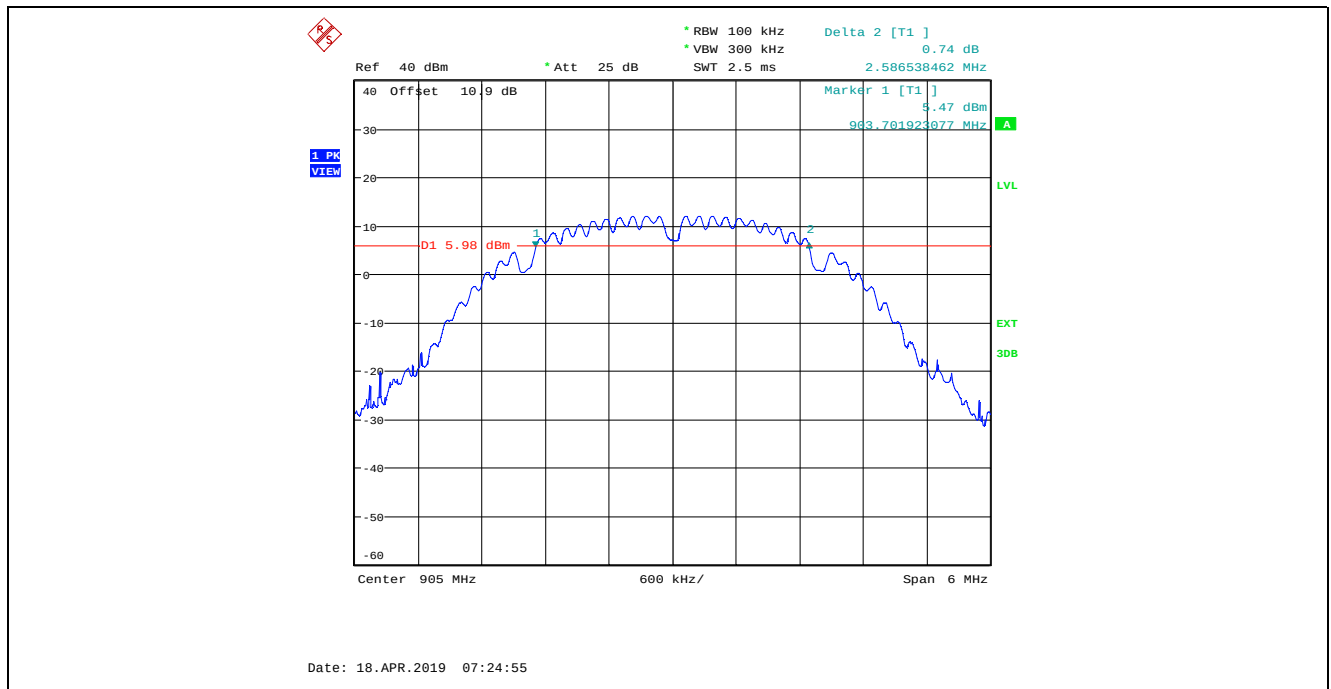
File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

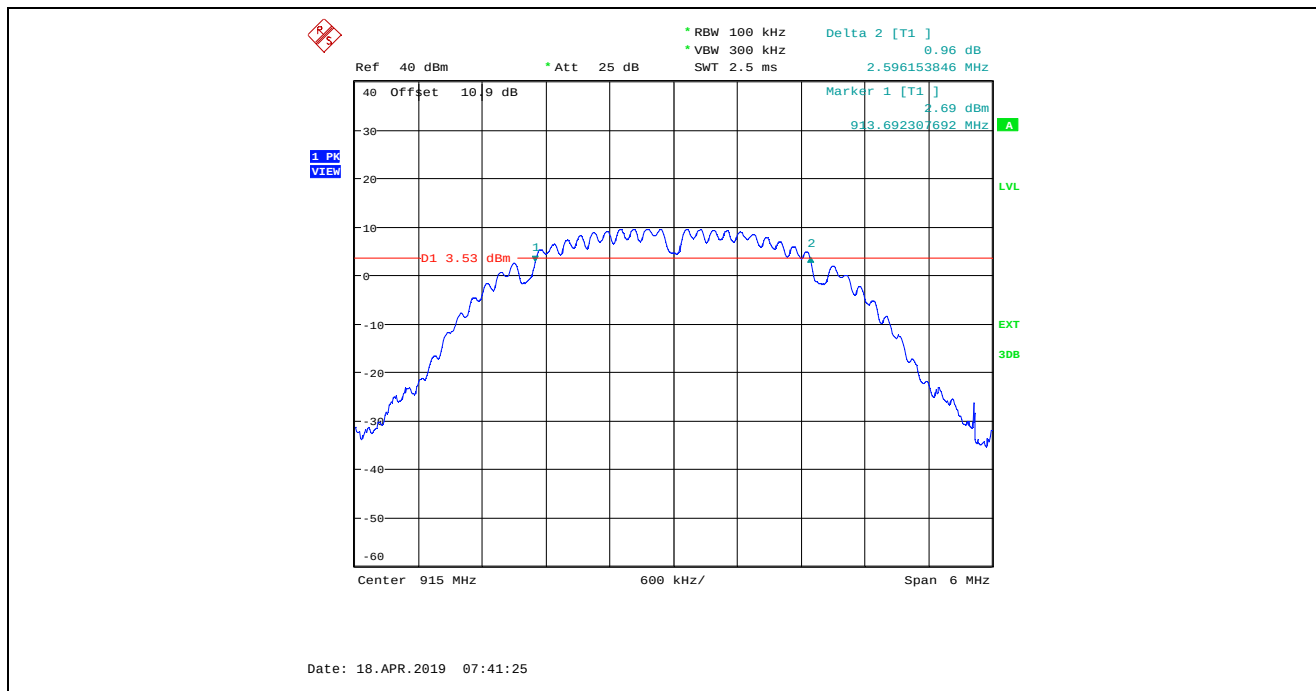
Plot 5.2.4.1. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 1, 905 MHz



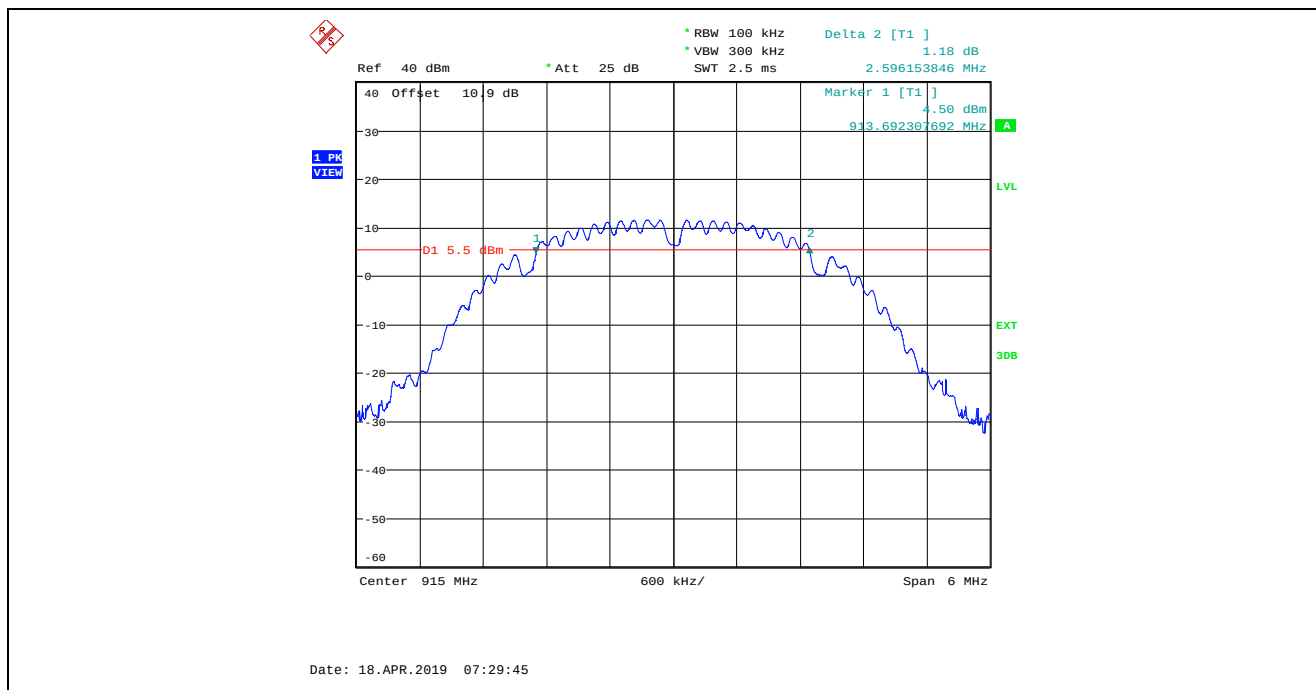
Plot 5.2.4.2. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 1, 905 MHz



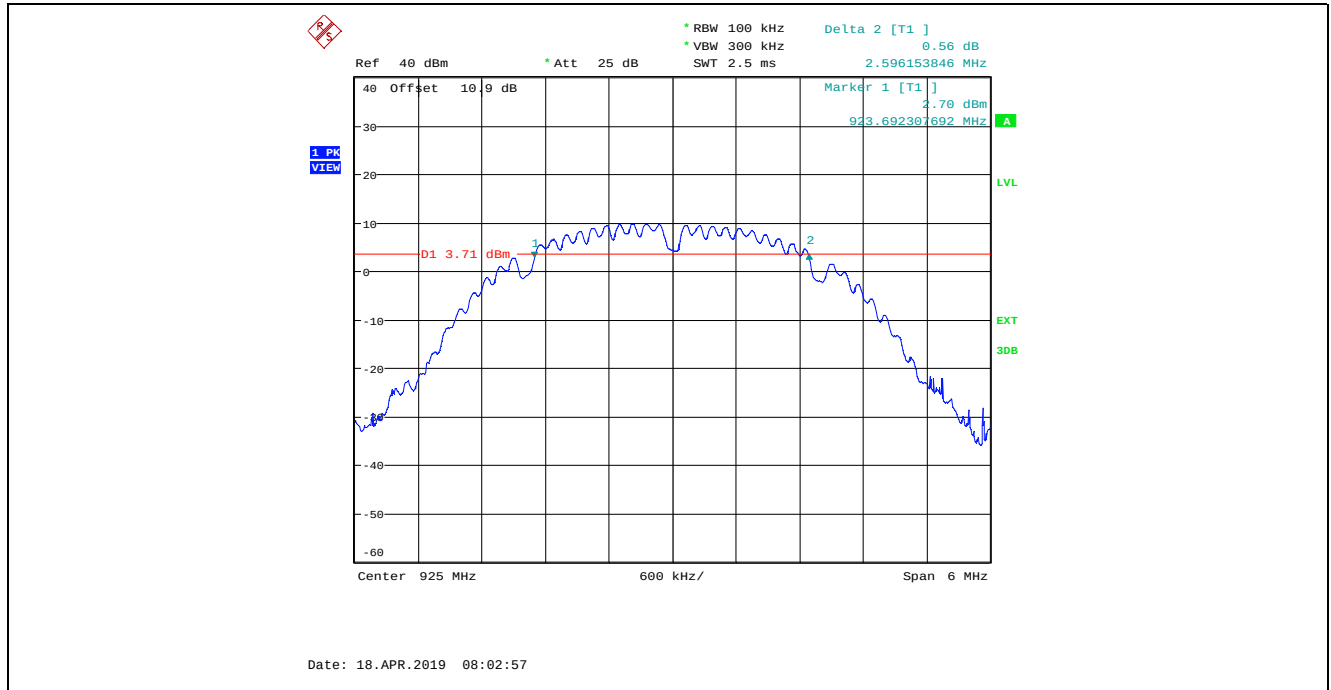
Plot 5.2.4.3. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 1, 915 MHz



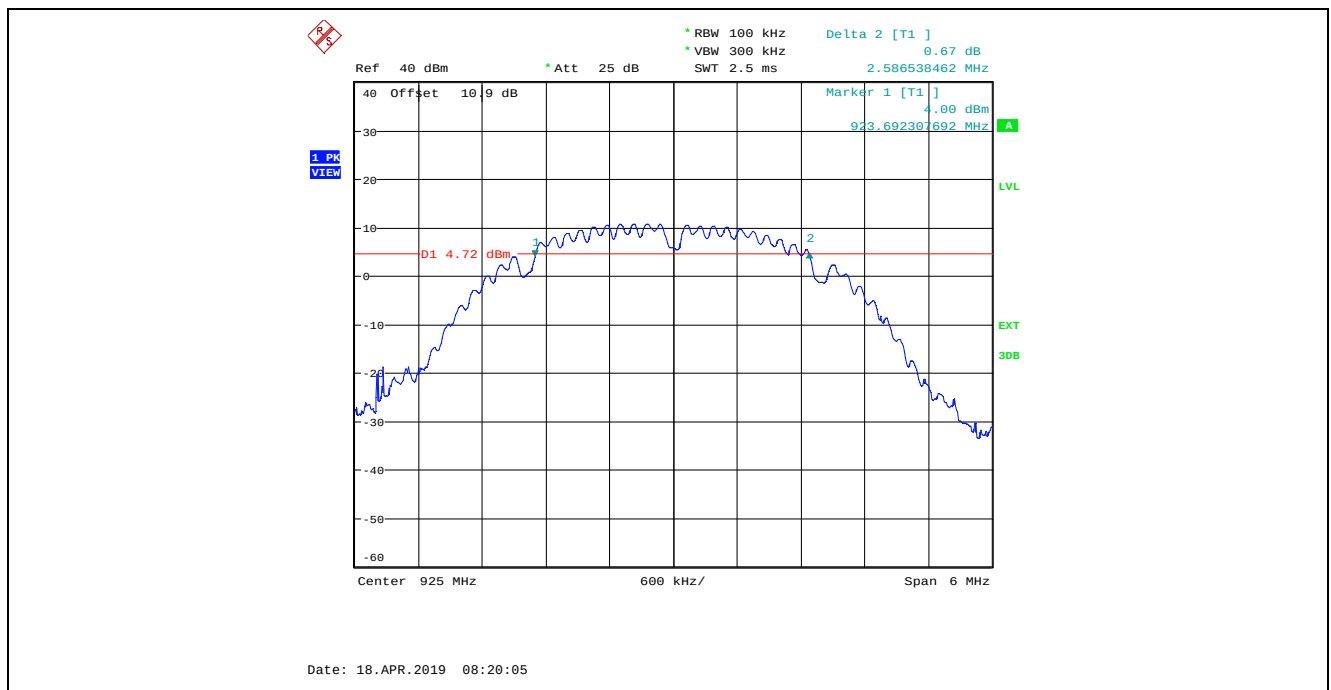
Plot 5.2.4.4. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 1, 915 MHz



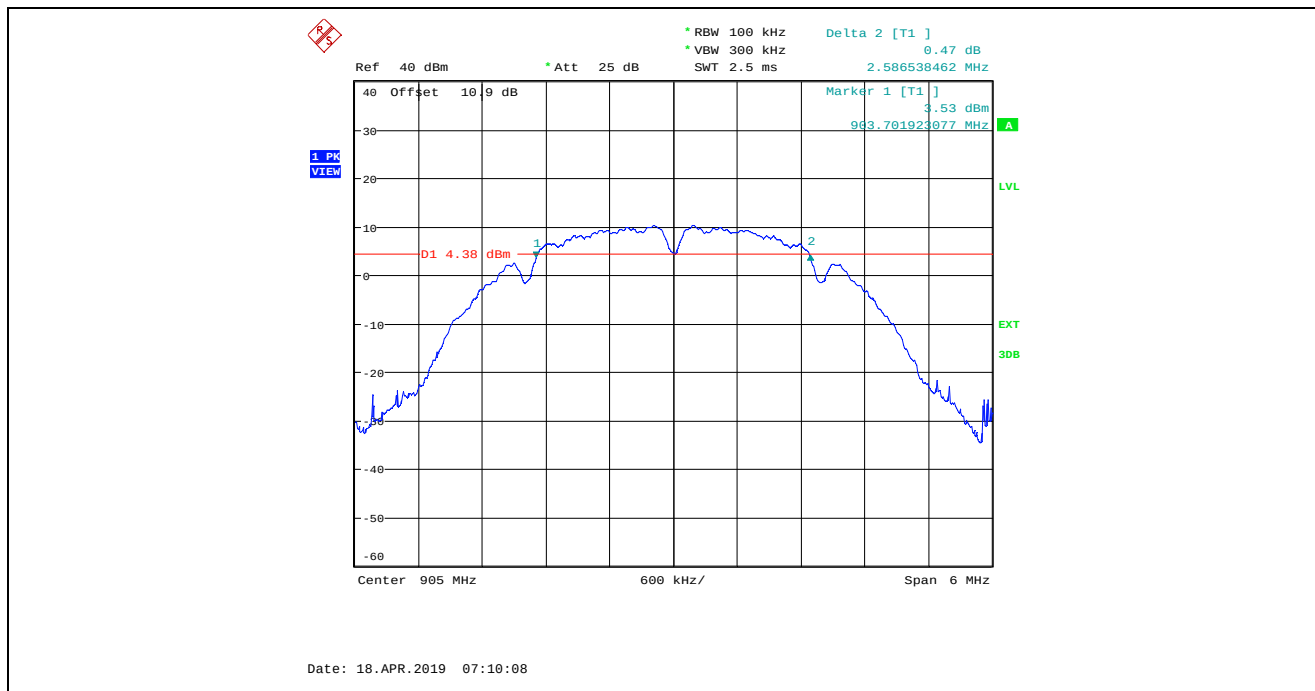
Plot 5.2.4.5. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 1, 925 MHz



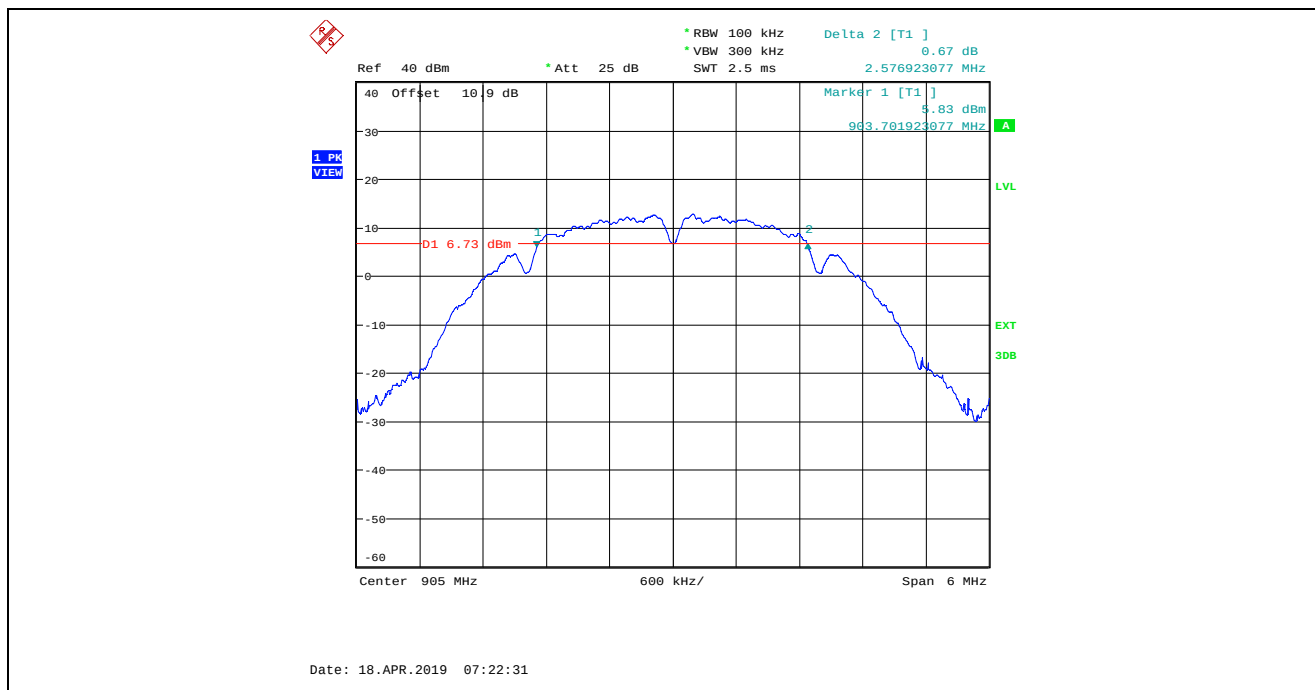
Plot 5.2.4.6. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 1, 925 MHz



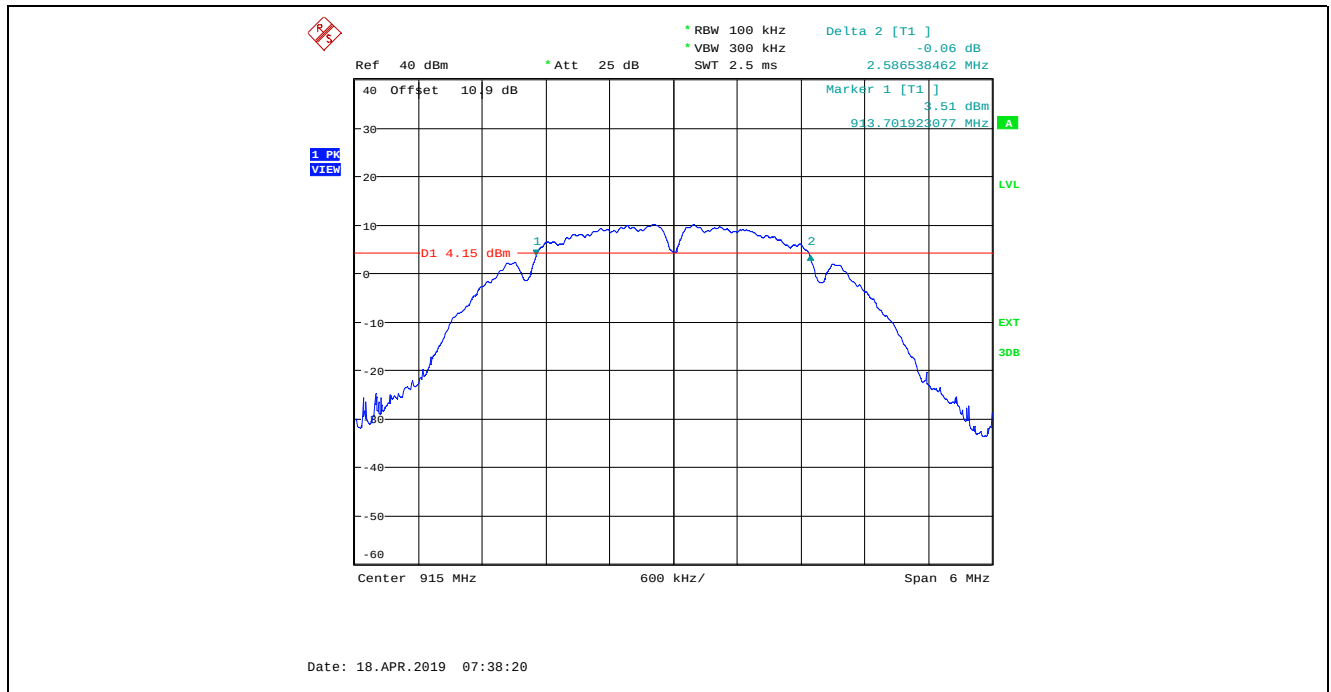
Plot 5.2.4.7. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 2, 905 MHz



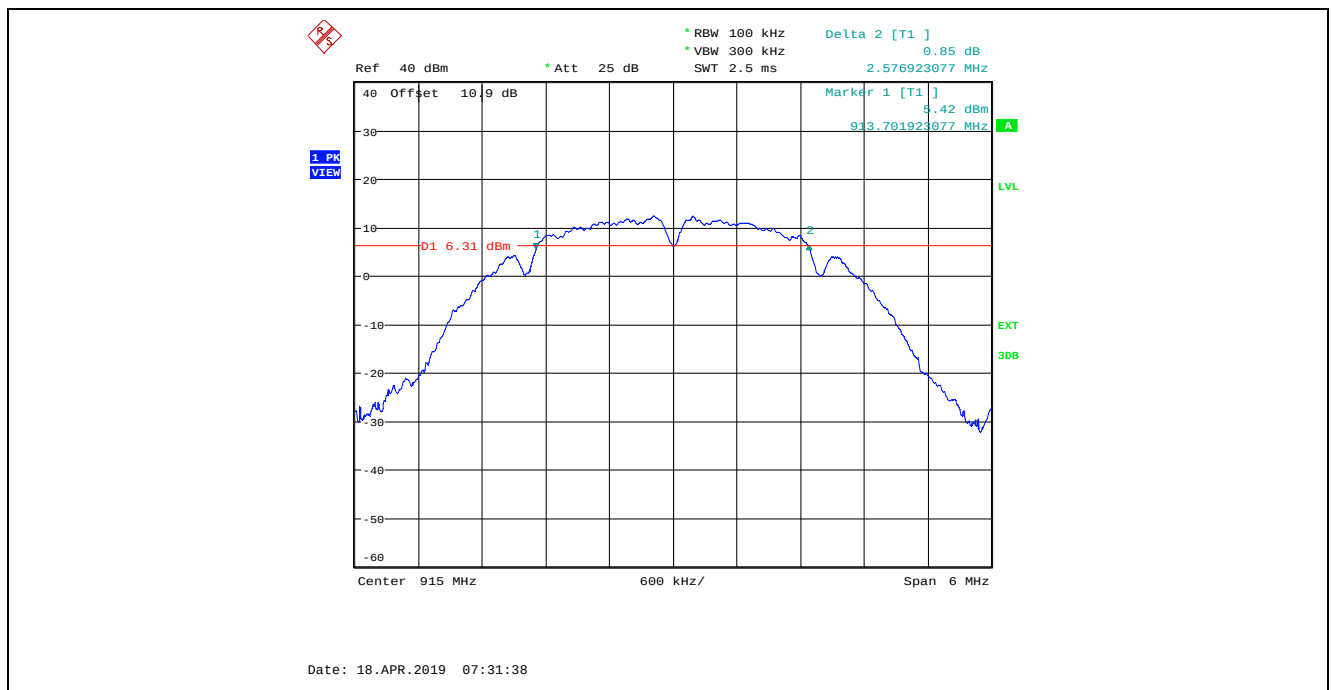
Plot 5.2.4.8. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 2, 905 MHz



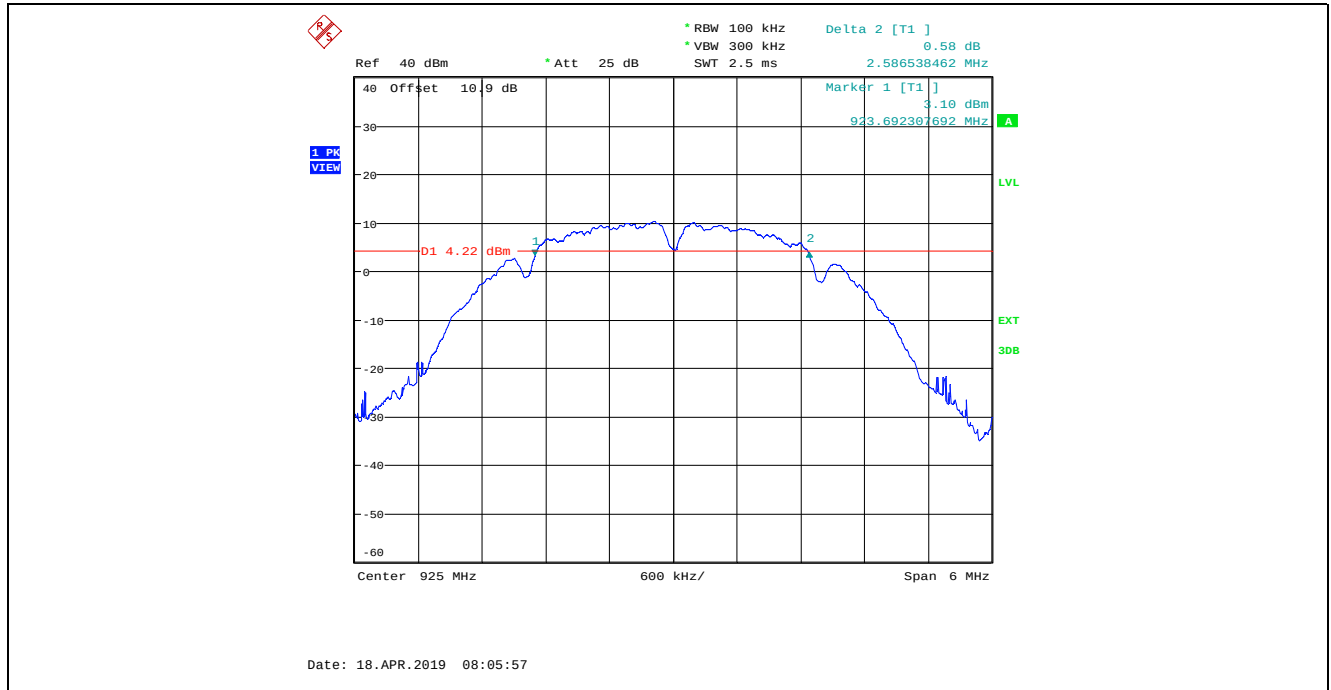
Plot 5.2.4.9. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 2, 915 MHz



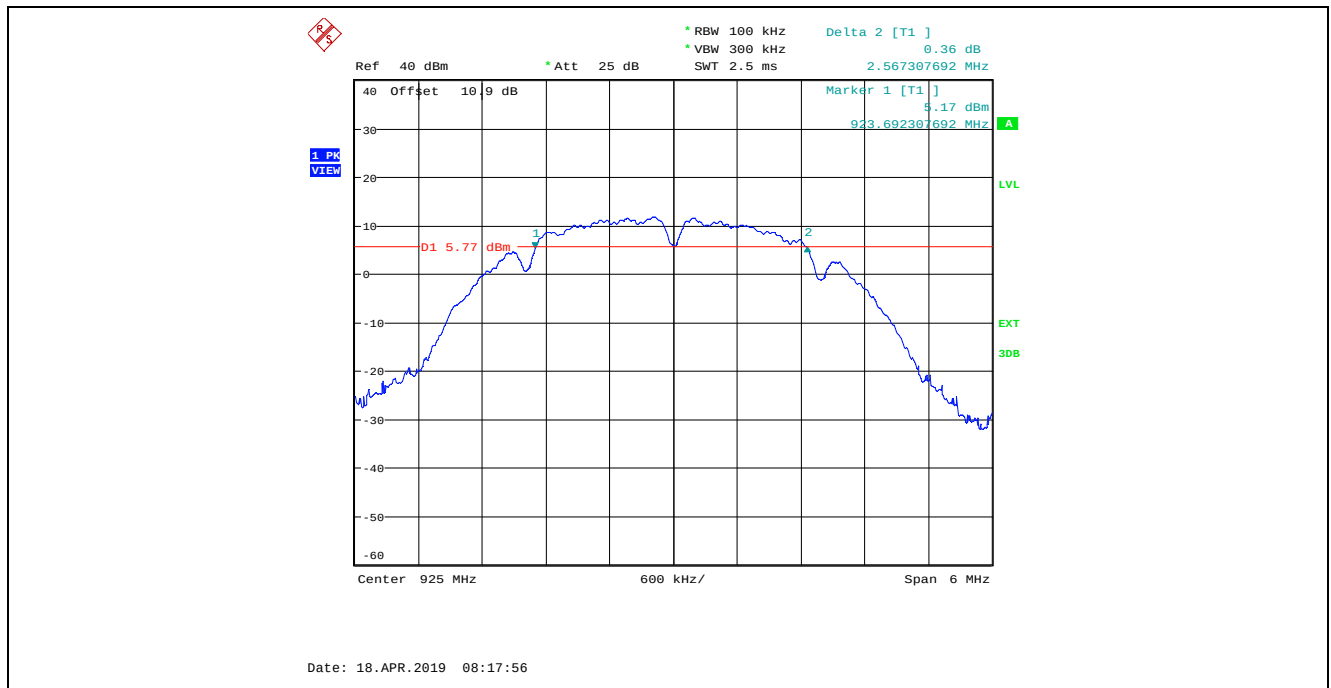
Plot 5.2.4.10. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 2, 915 MHz



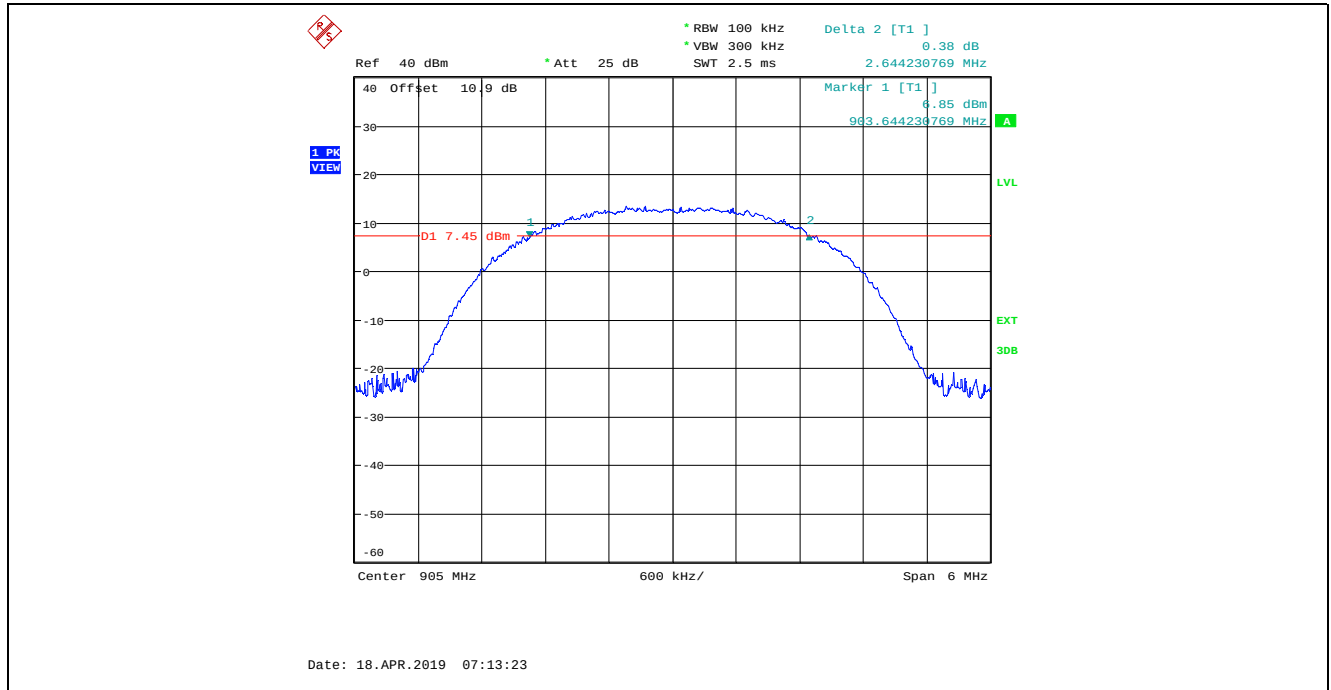
Plot 5.2.4.11. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 2, 925 MHz



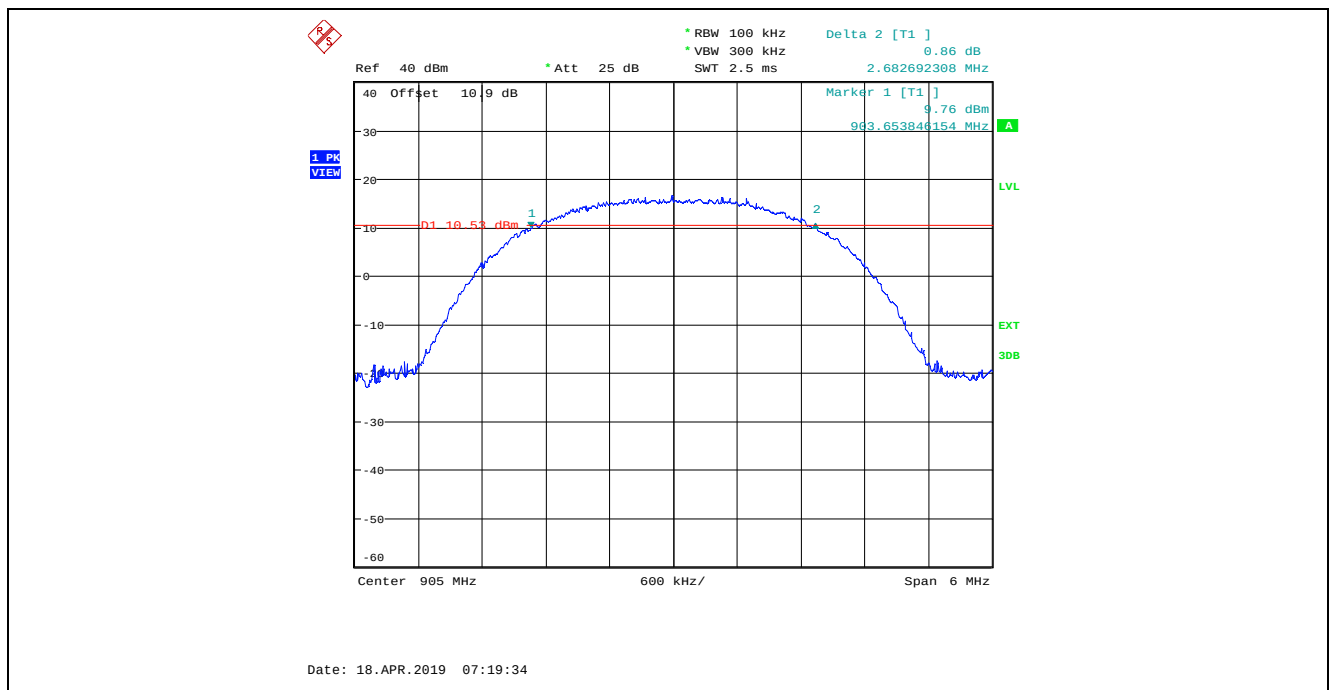
Plot 5.2.4.12. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 2, 925 MHz



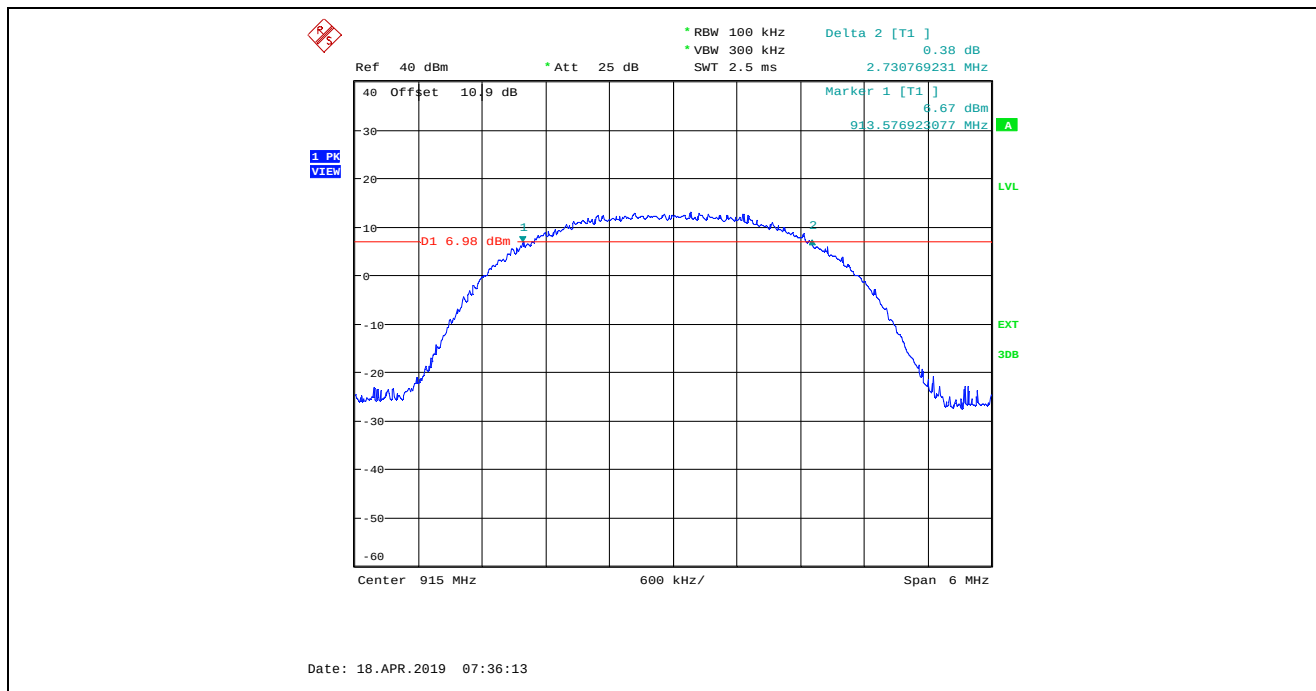
Plot 5.2.4.13. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 3, 905 MHz



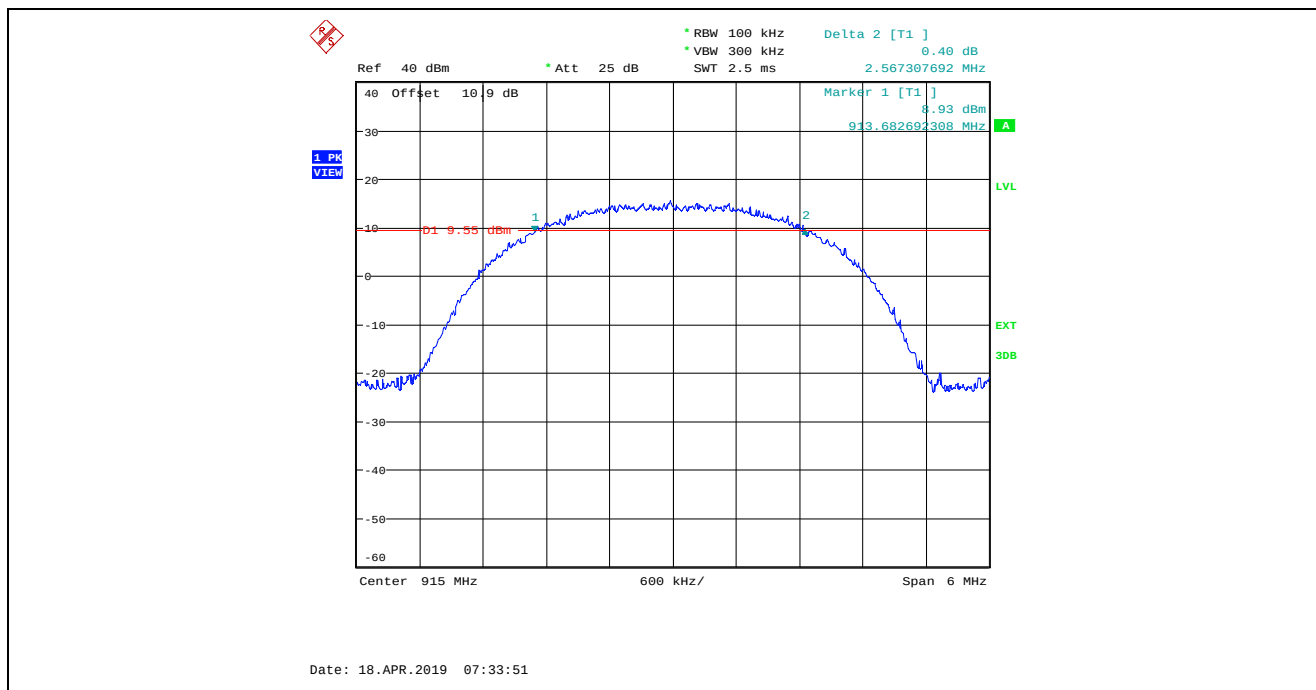
Plot 5.2.4.14. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 3, 905 MHz



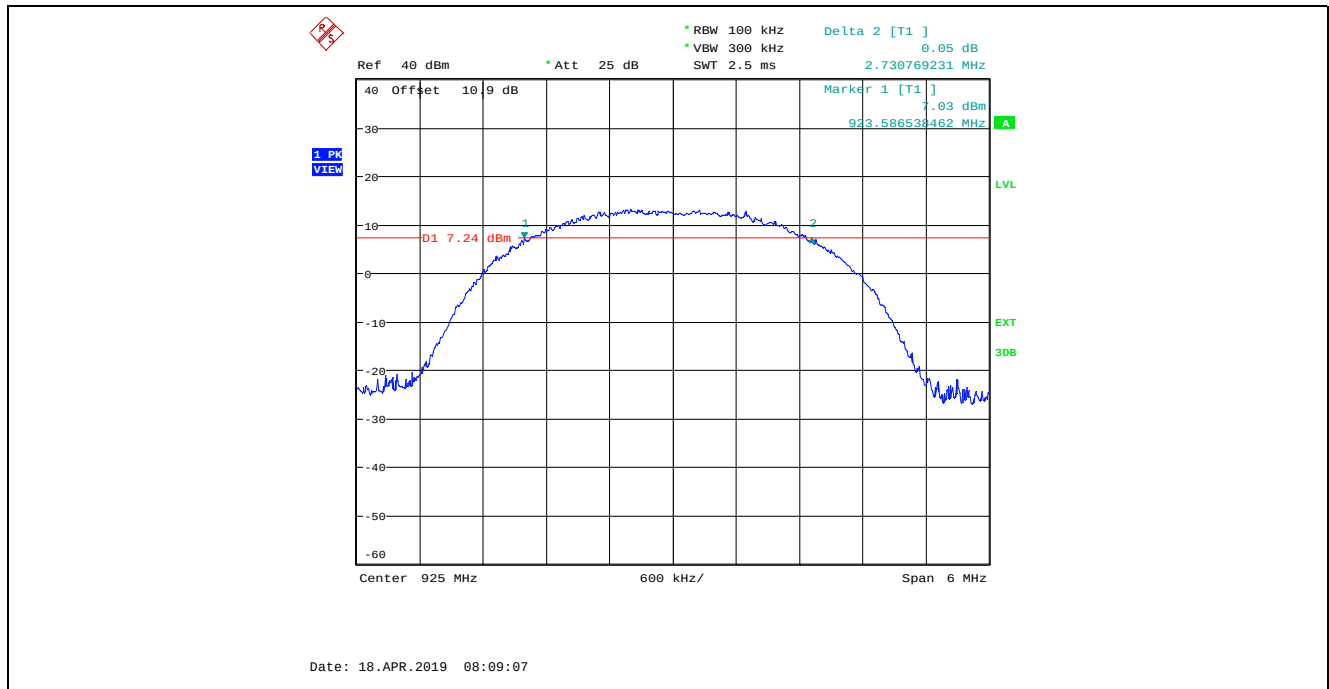
Plot 5.2.4.15. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 3, 915 MHz



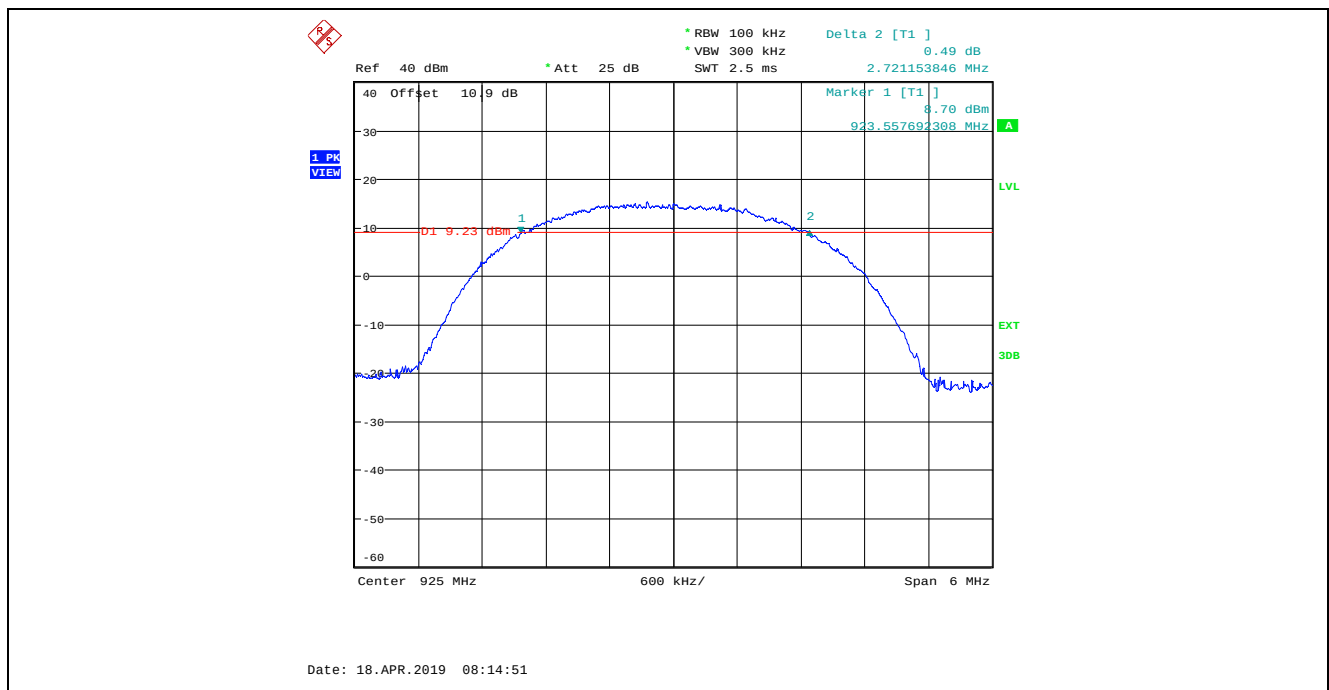
Plot 5.2.4.16. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 3, 915 MHz



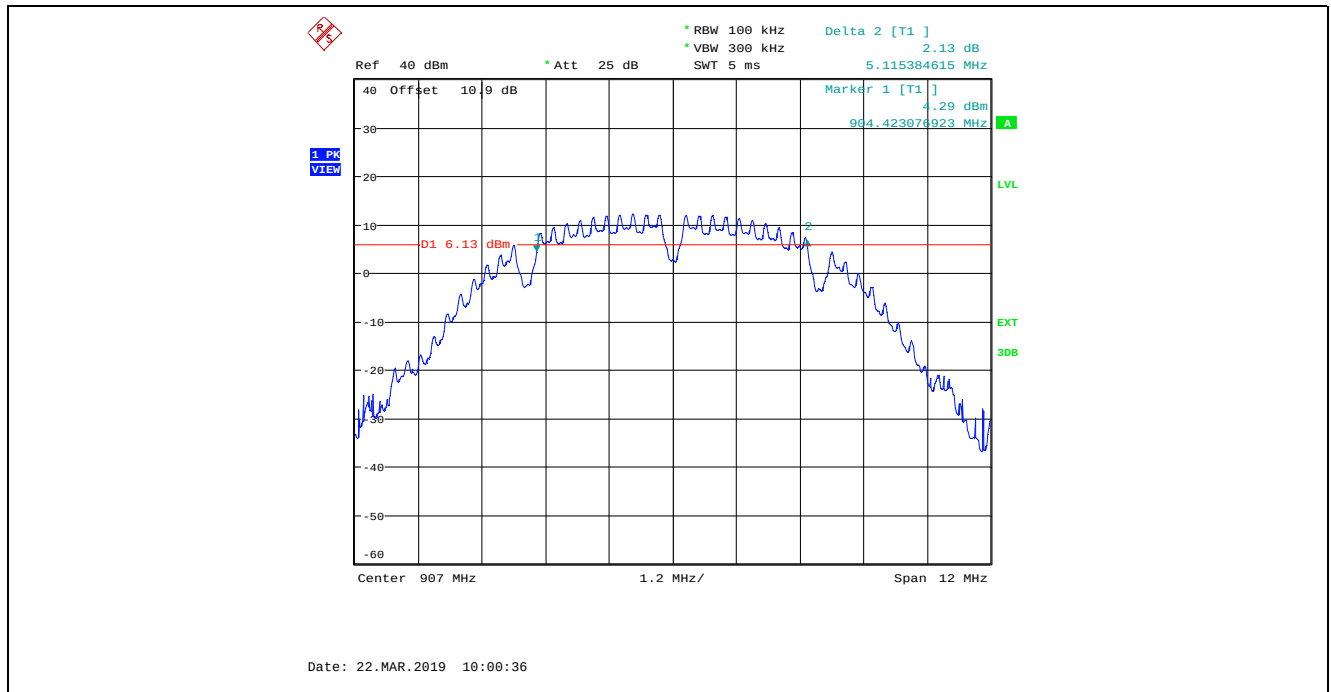
Plot 5.2.4.17. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 20, Data Rate 3, 925 MHz



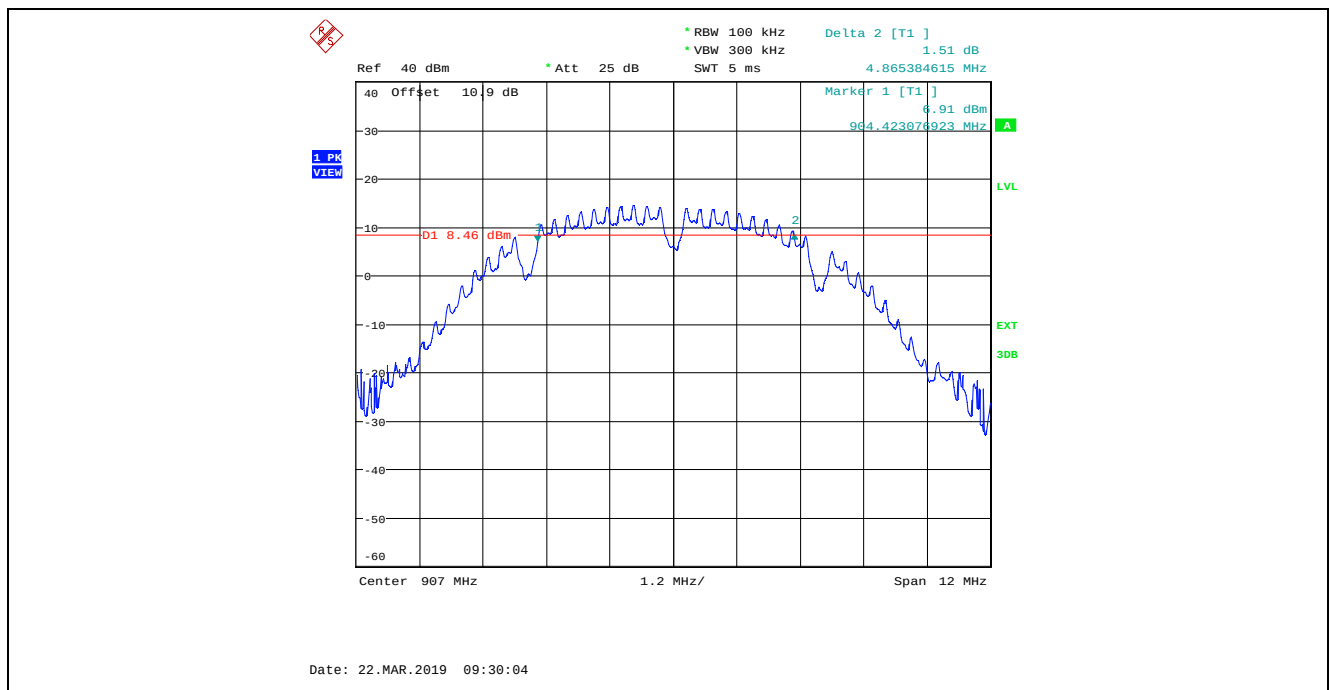
Plot 5.2.4.18. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 20, Data Rate 3, 925 MHz



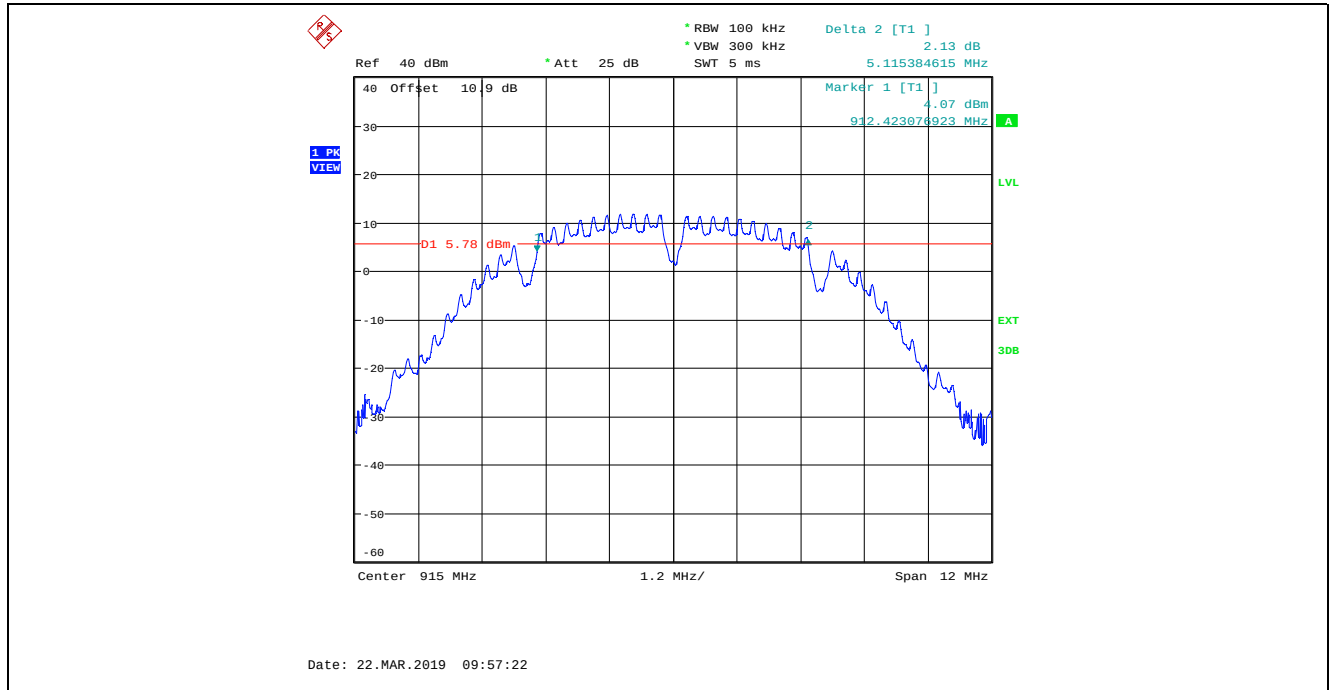
Plot 5.2.4.19. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 1, 907 MHz



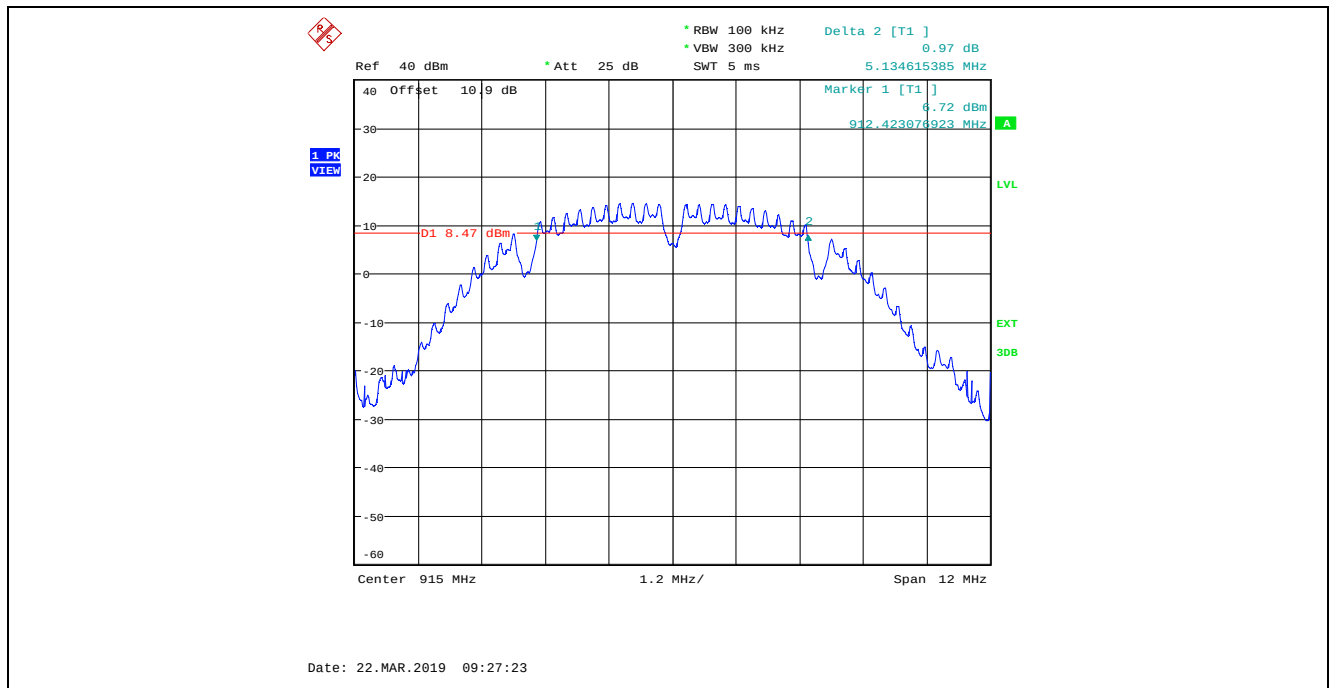
Plot 5.2.4.20. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 1, 907 MHz



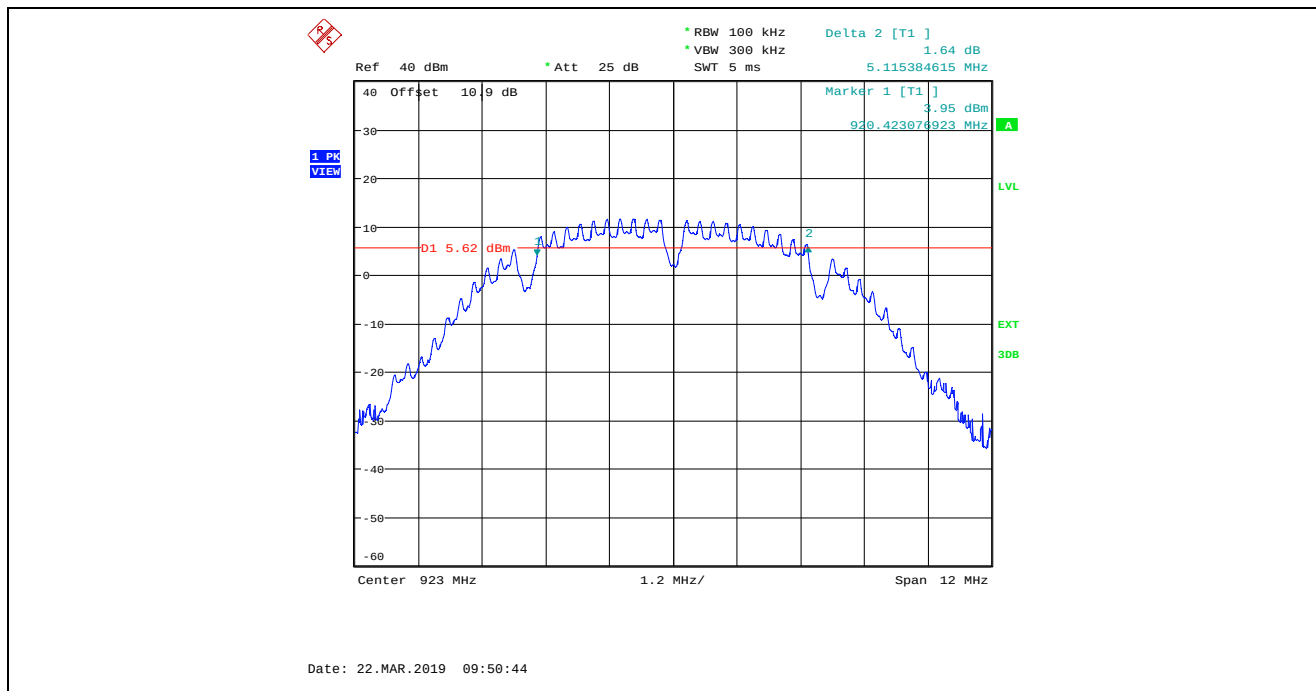
Plot 5.2.4.21. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 1, 915 MHz



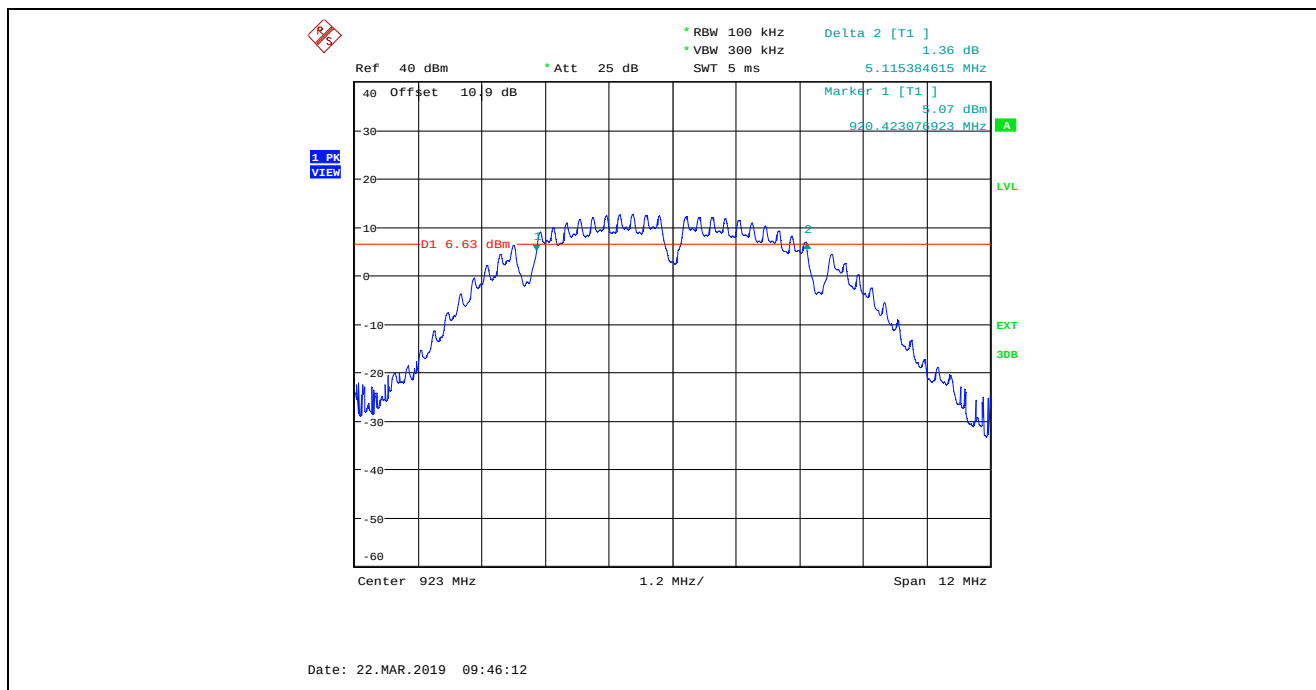
Plot 5.2.4.22. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 1, 915 MHz



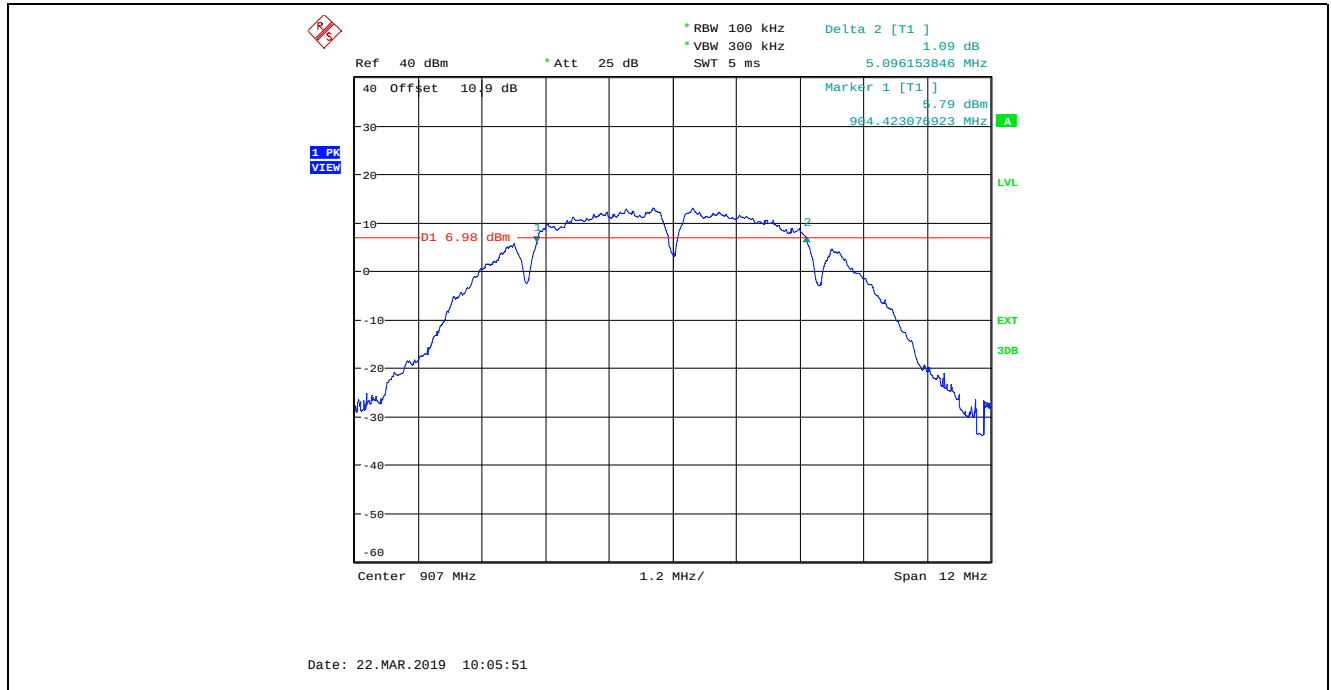
Plot 5.2.4.23. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 1, 923 MHz



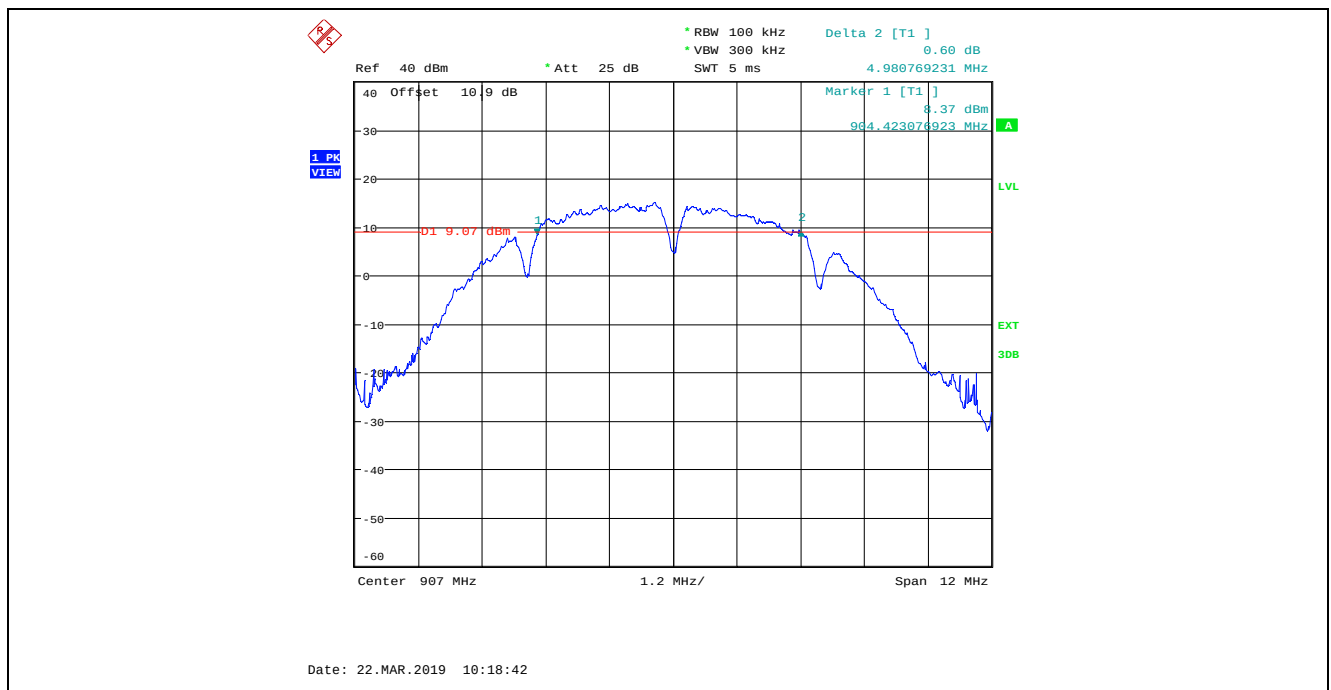
Plot 5.2.4.24. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 1, 923 MHz



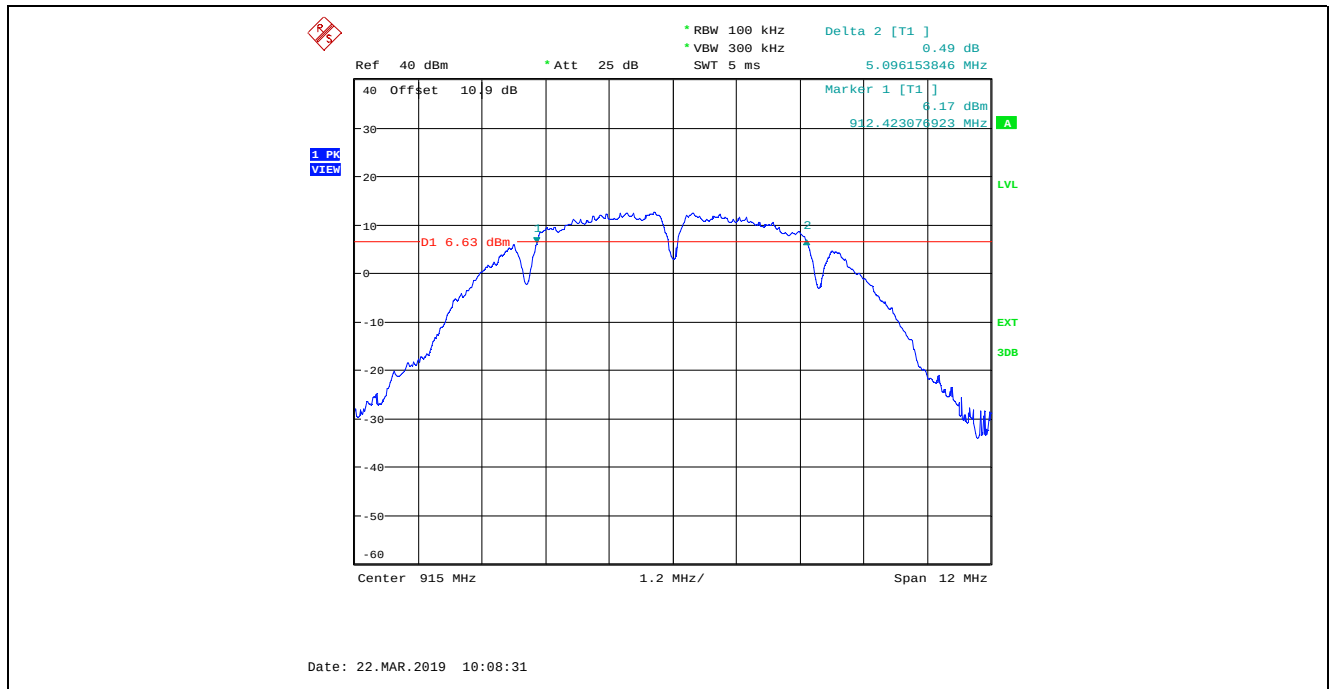
Plot 5.2.4.25. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 2, 907 MHz



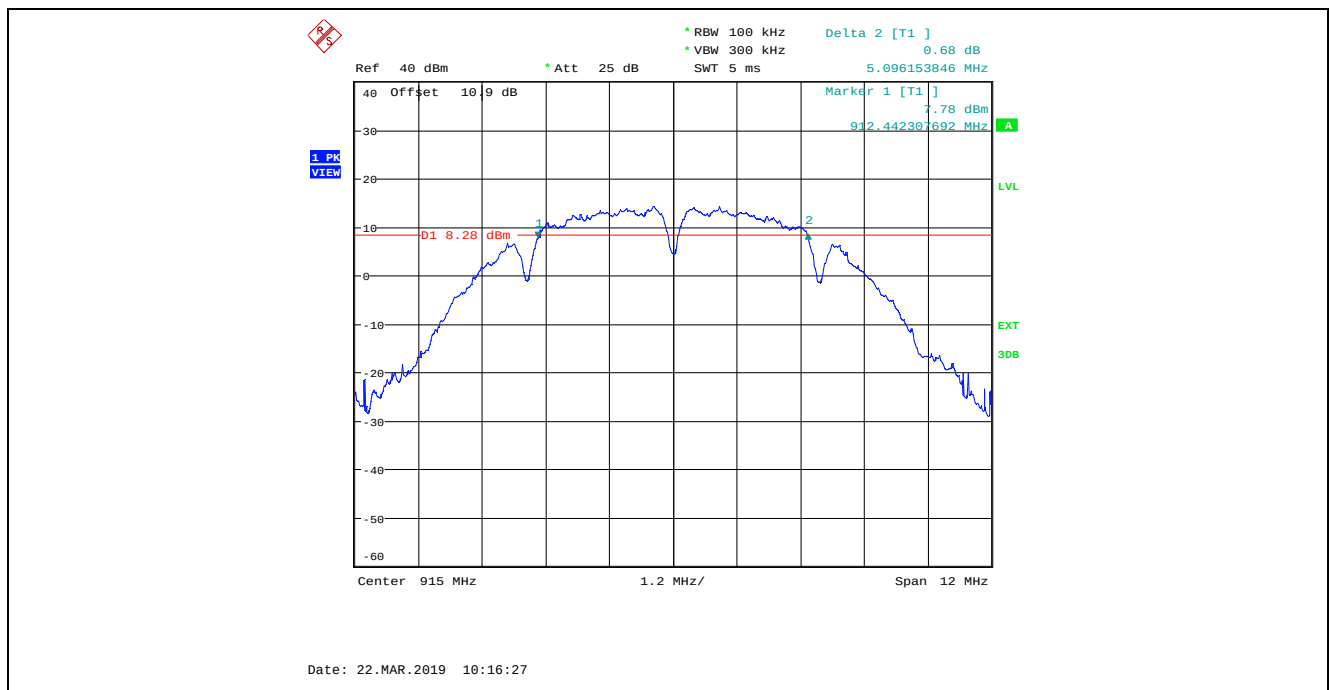
Plot 5.2.4.26. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 2, 907 MHz



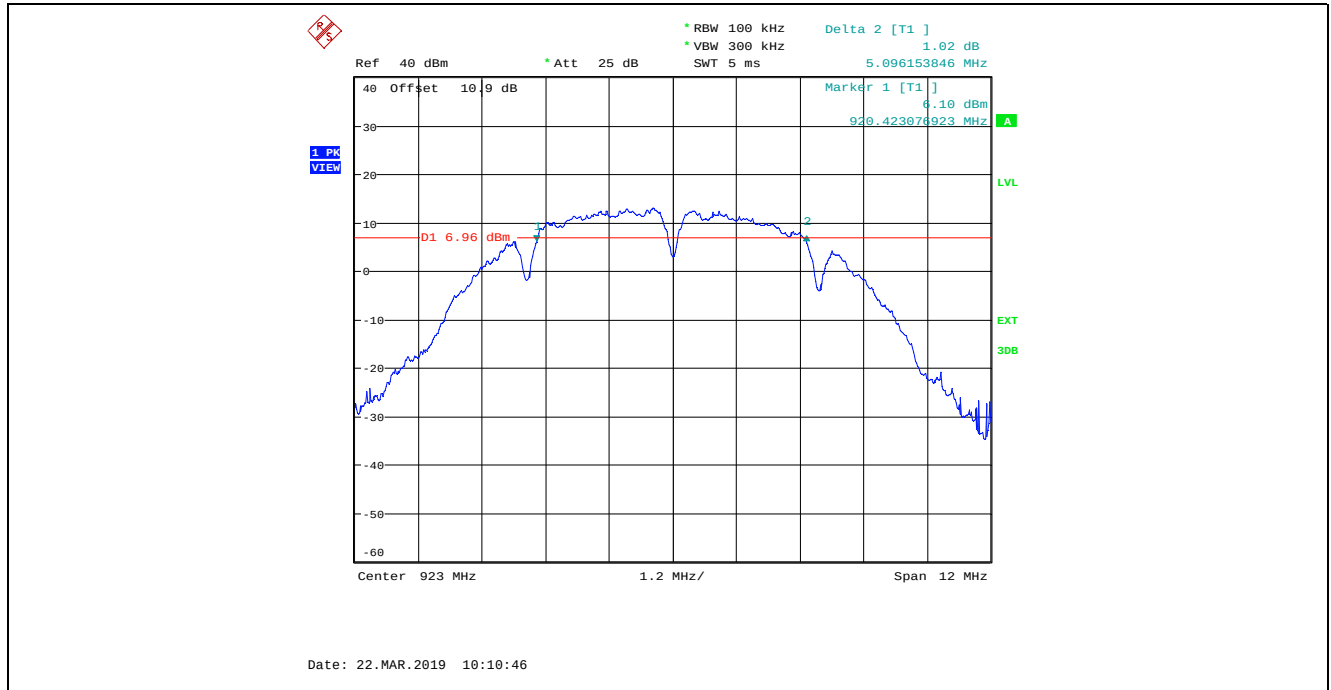
Plot 5.2.4.27. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 2, 915 MHz



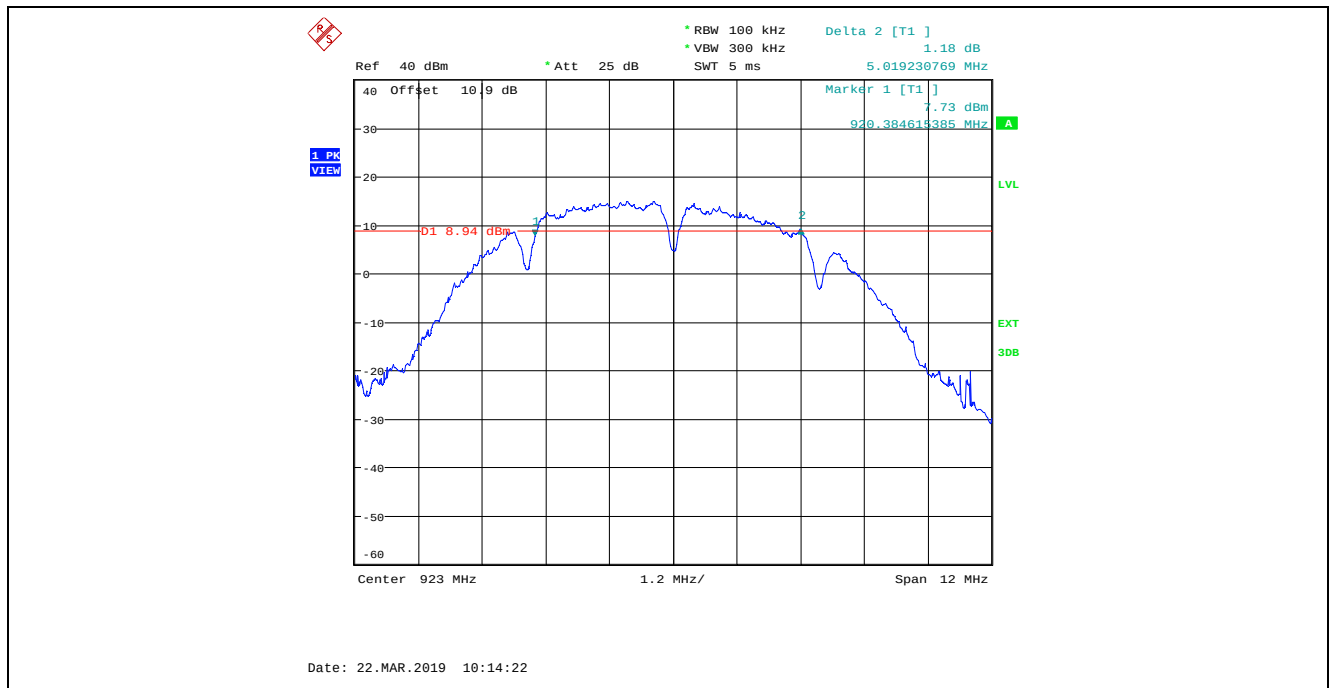
Plot 5.2.4.28. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 2, 915 MHz



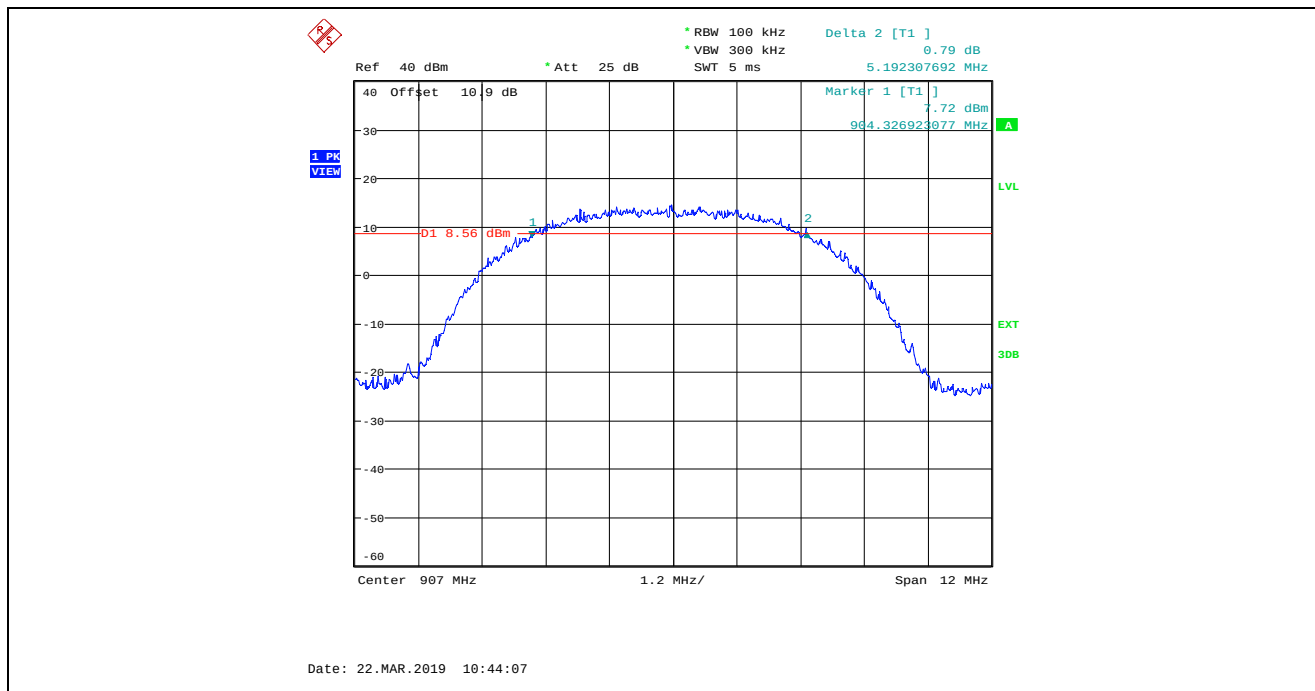
Plot 5.2.4.29. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 2, 923 MHz



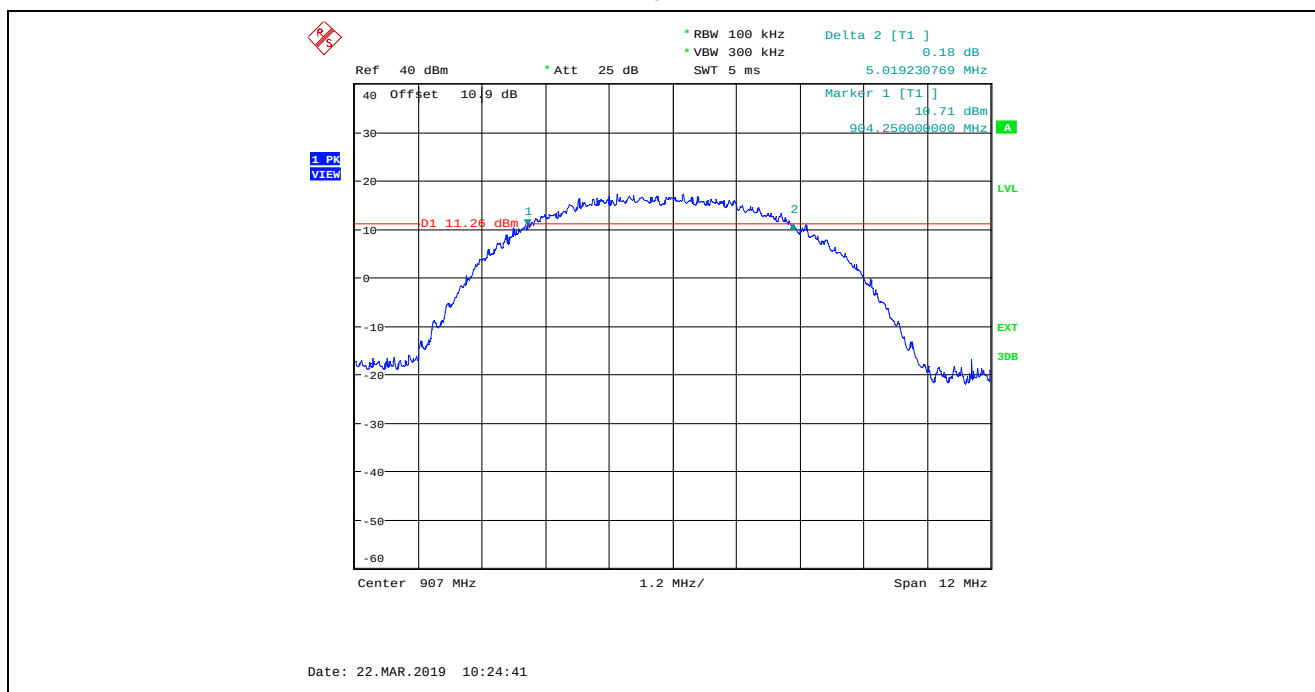
Plot 5.2.4.30. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 2, 923 MHz



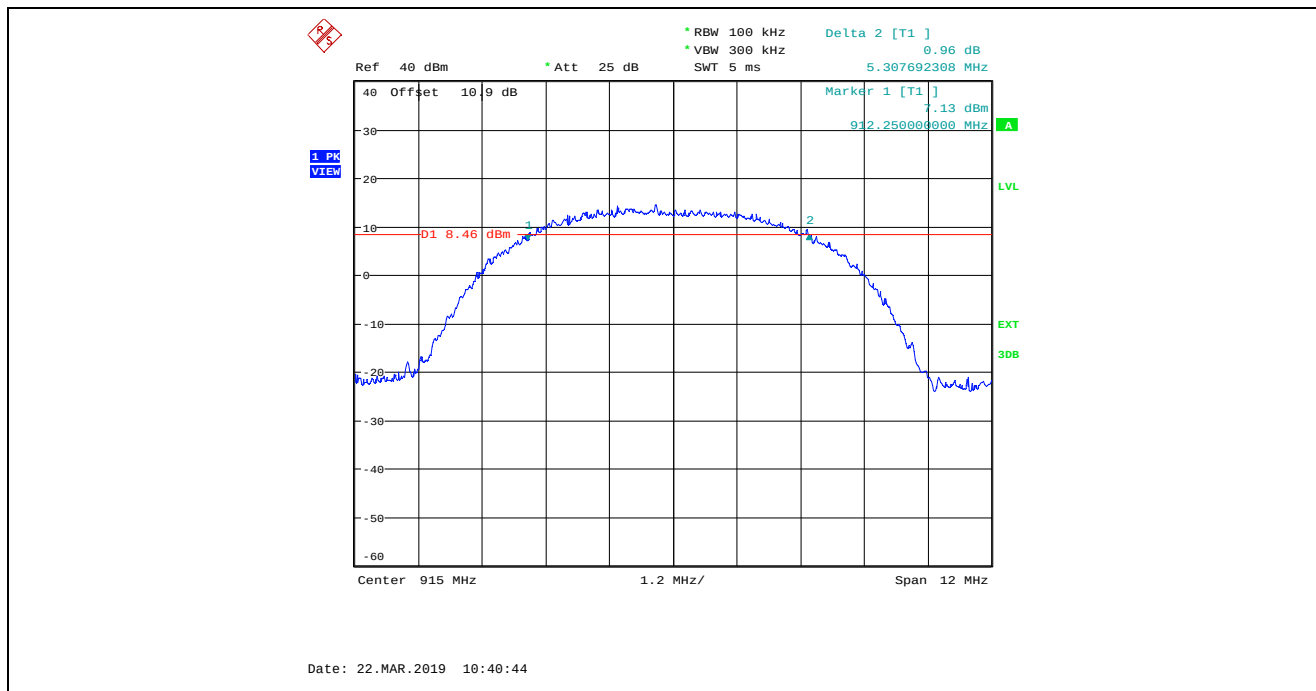
Plot 5.2.4.31. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 3, 907 MHz



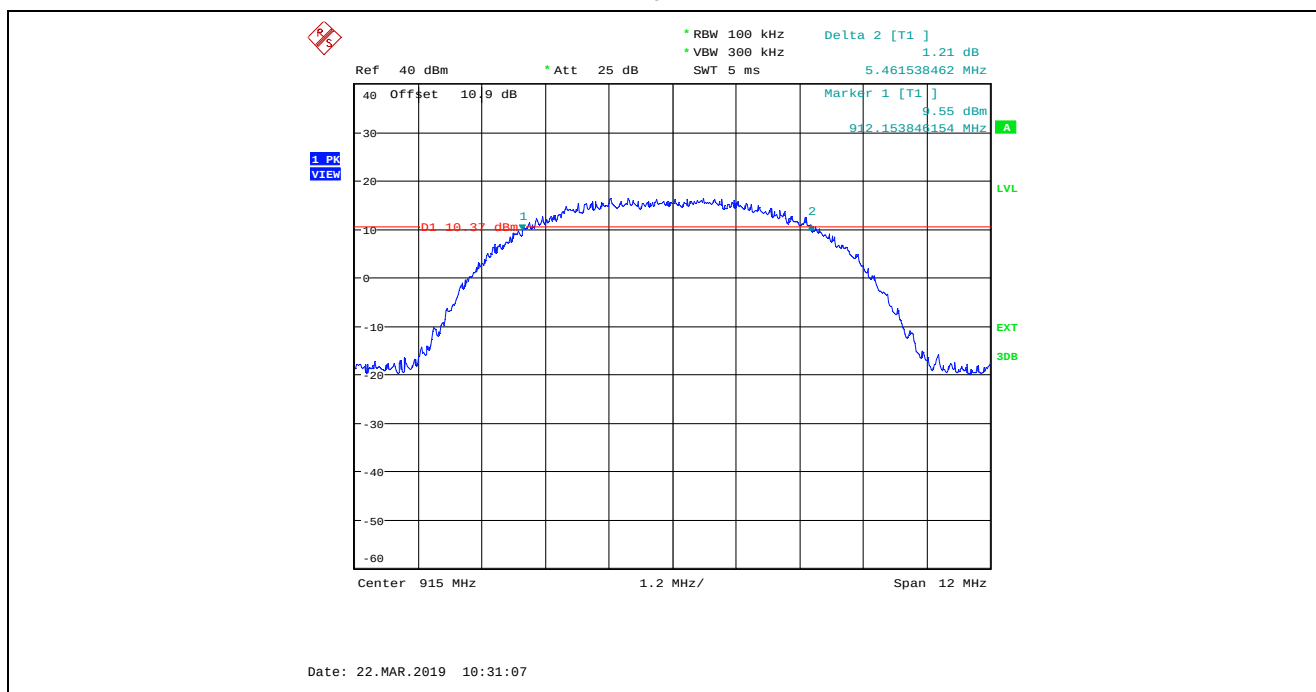
Plot 5.2.4.32. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 3, 907 MHz



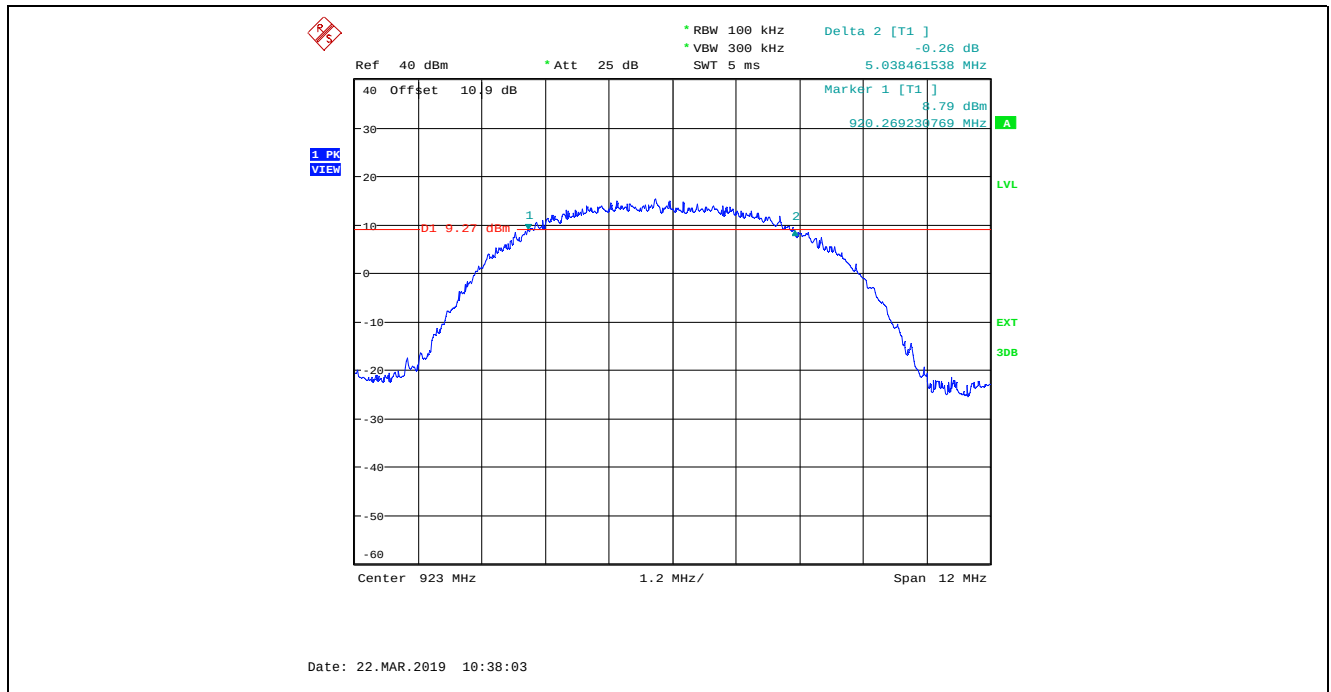
Plot 5.2.4.33. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 3, 915 MHz



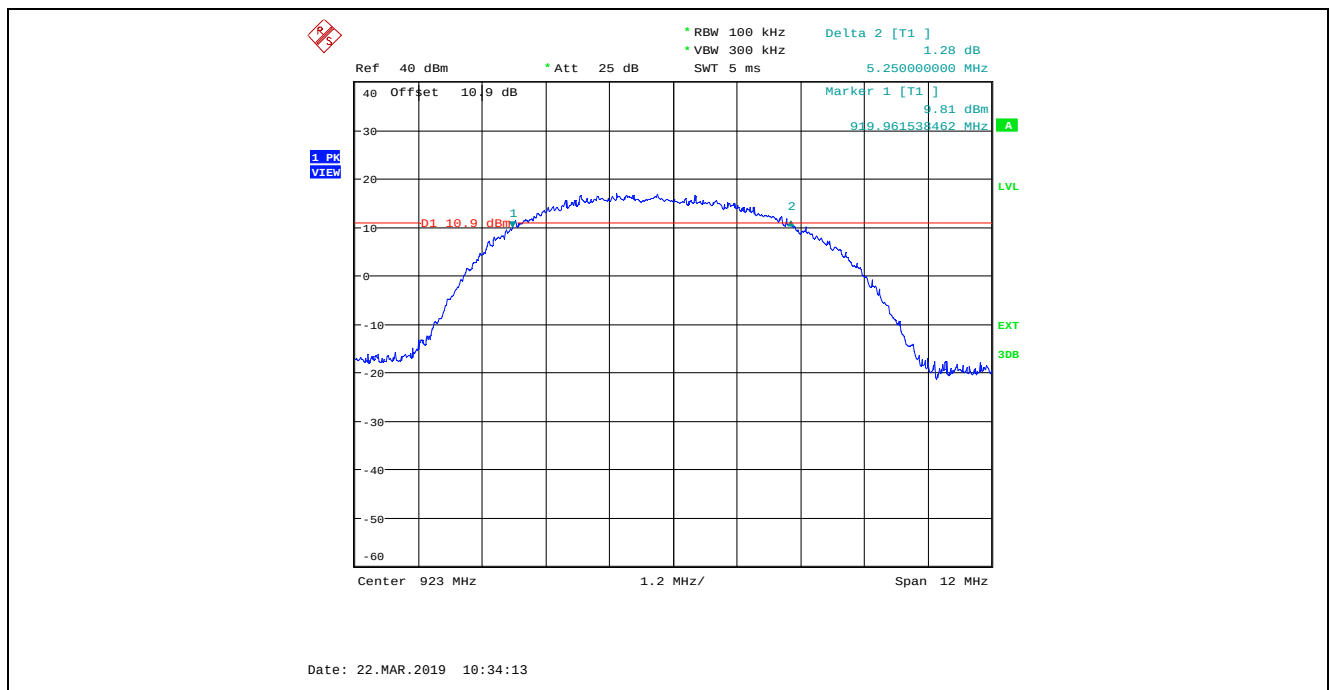
Plot 5.2.4.34. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 3, 915 MHz



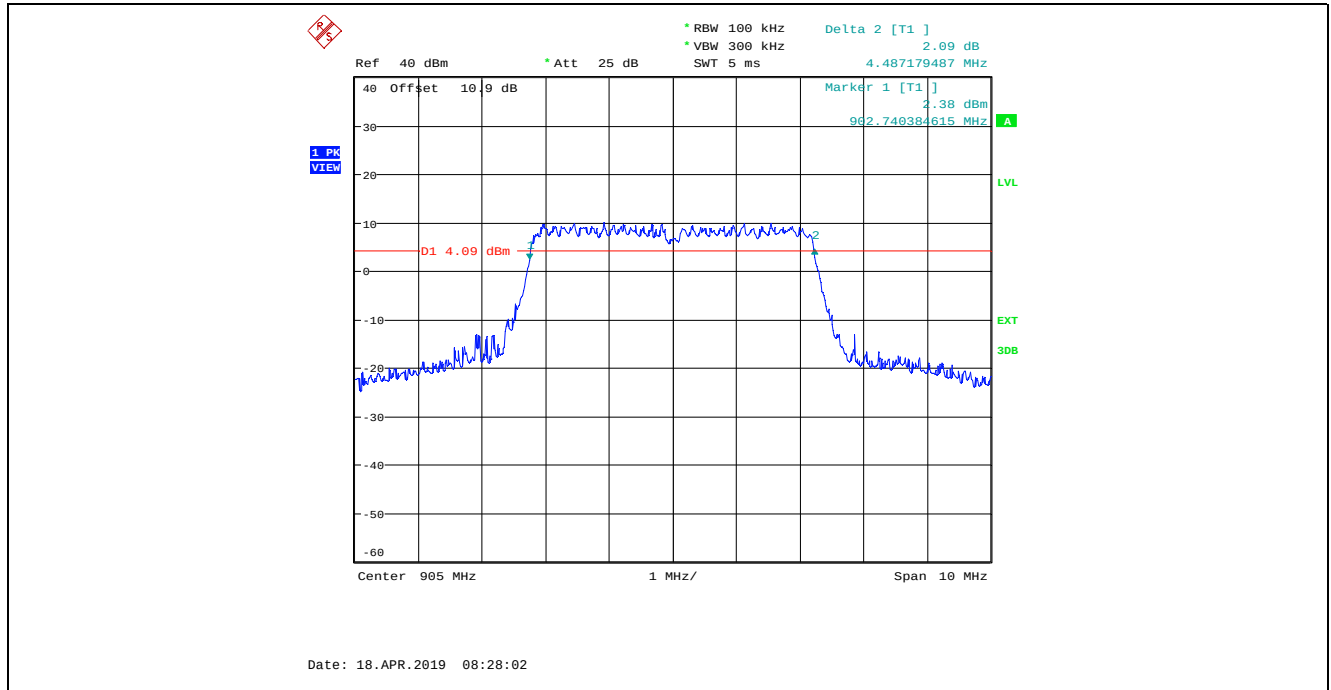
Plot 5.2.4.35. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 26, Data Rate 3, 923 MHz



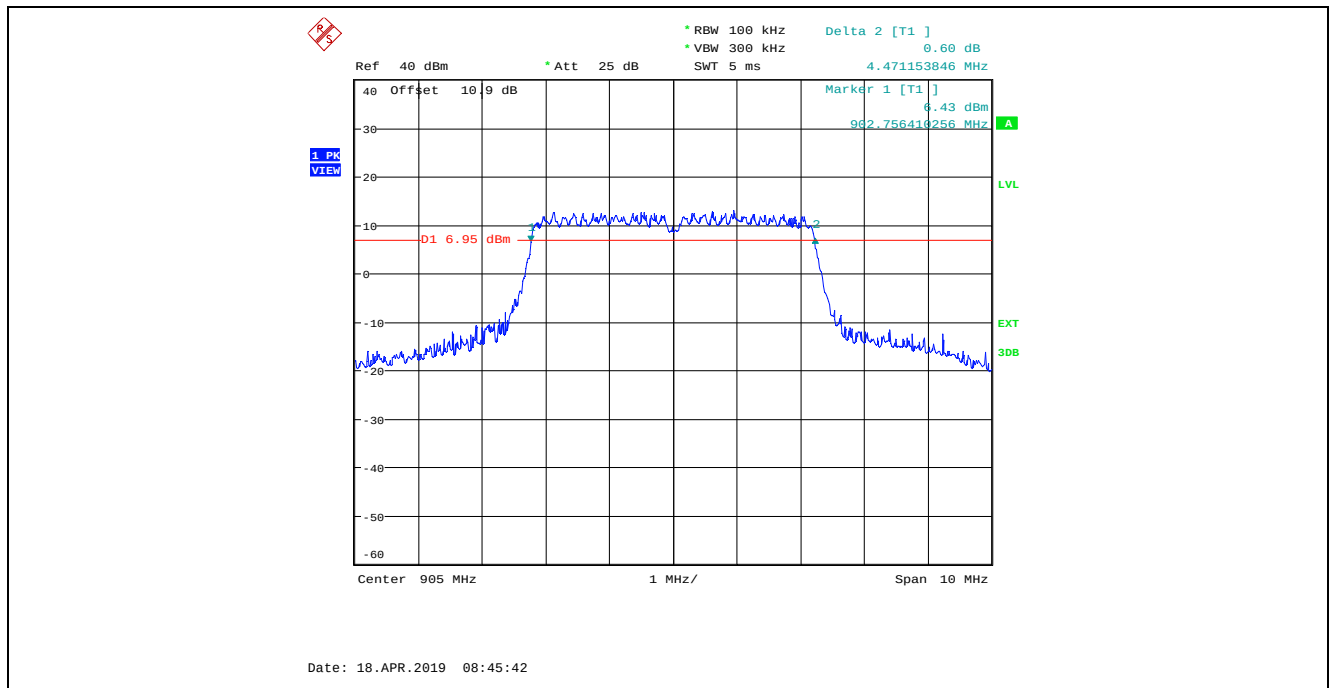
Plot 5.2.4.36. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 26, Data Rate 3, 923 MHz



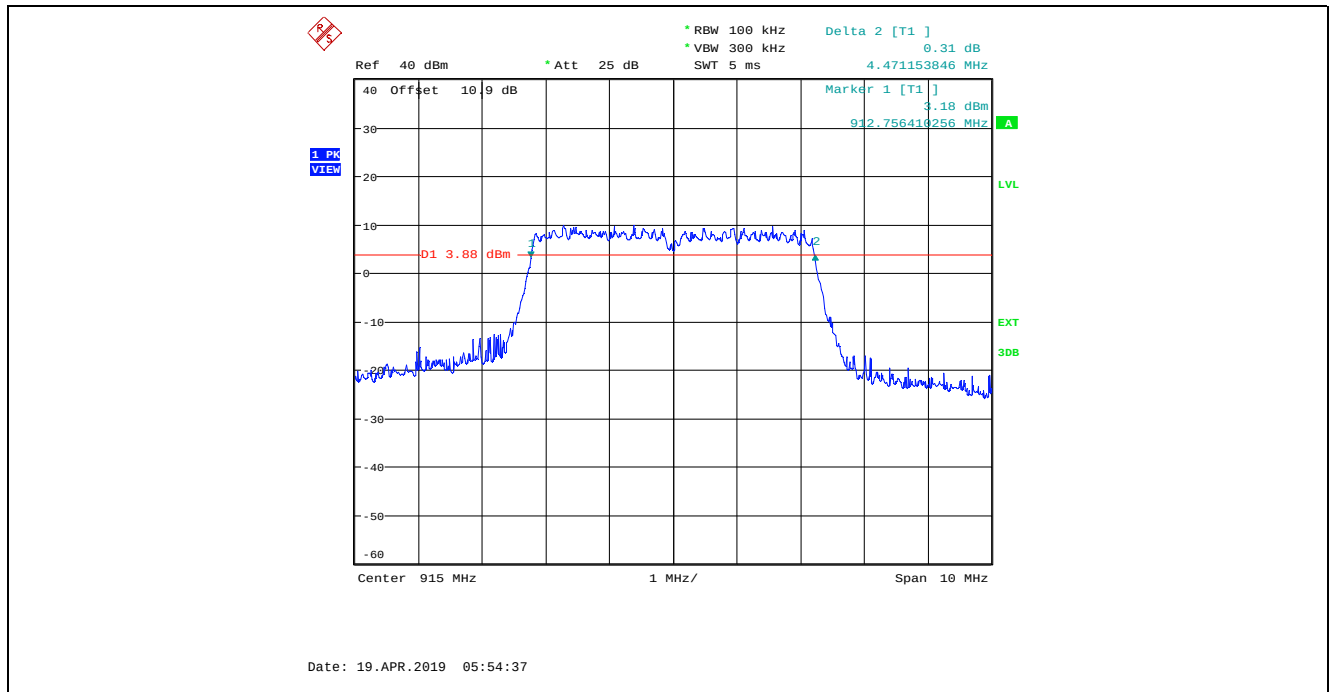
Plot 5.2.4.37. 6 dB Bandwidth, Antenna 1
 4 MHz BW, Power Setting 24, Data Rate 4, 905 MHz



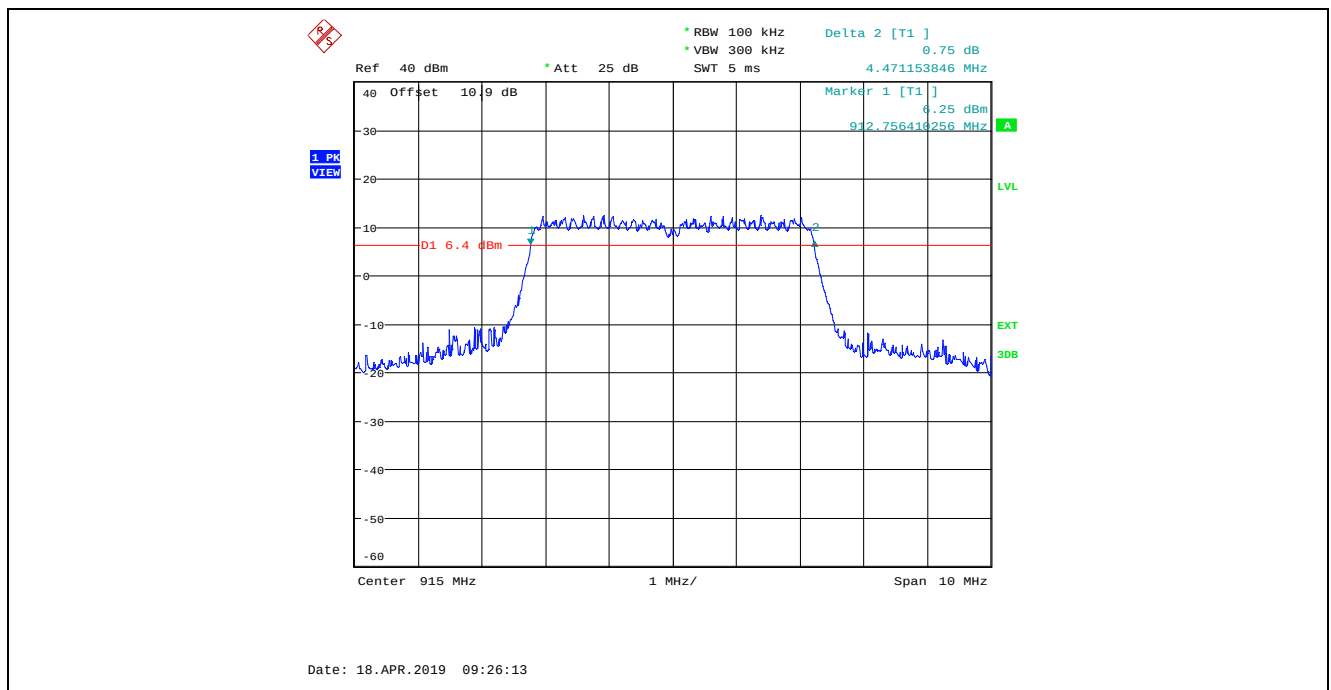
Plot 5.2.4.38. 6 dB Bandwidth, Antenna 2
 4 MHz BW, Power Setting 24, Data Rate 4, 905 MHz



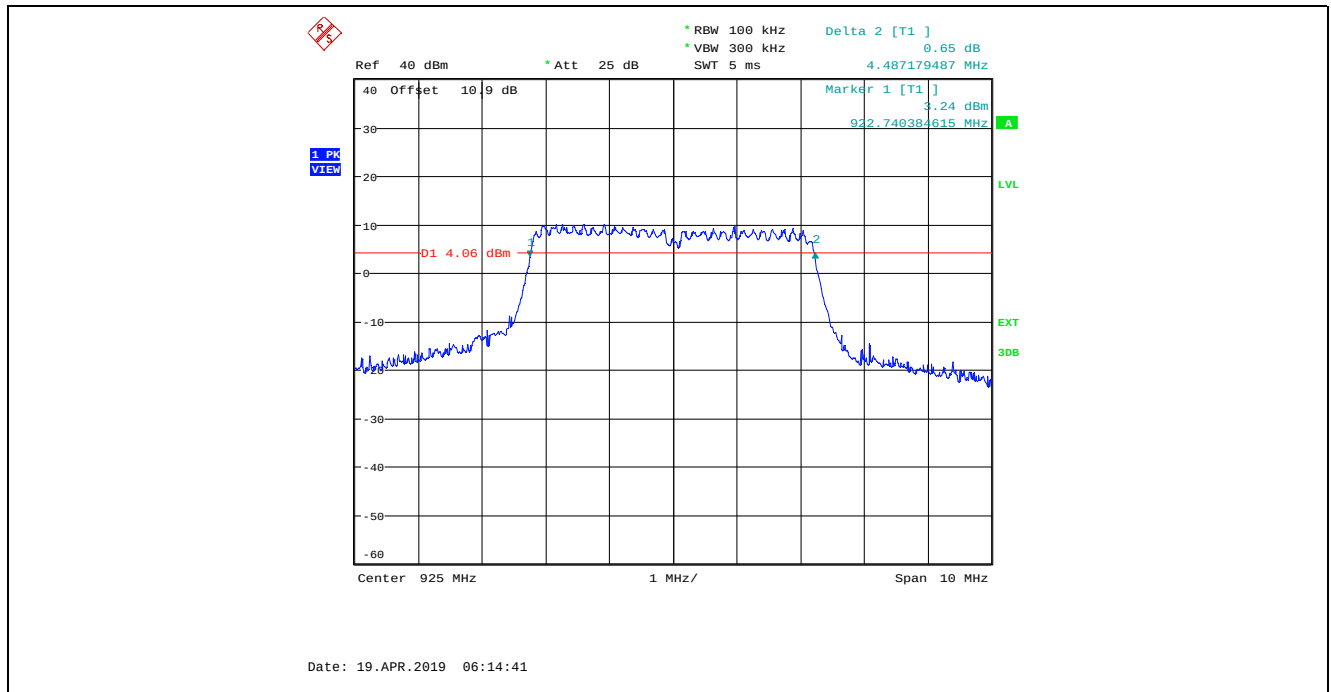
Plot 5.2.4.39. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 4, 915 MHz



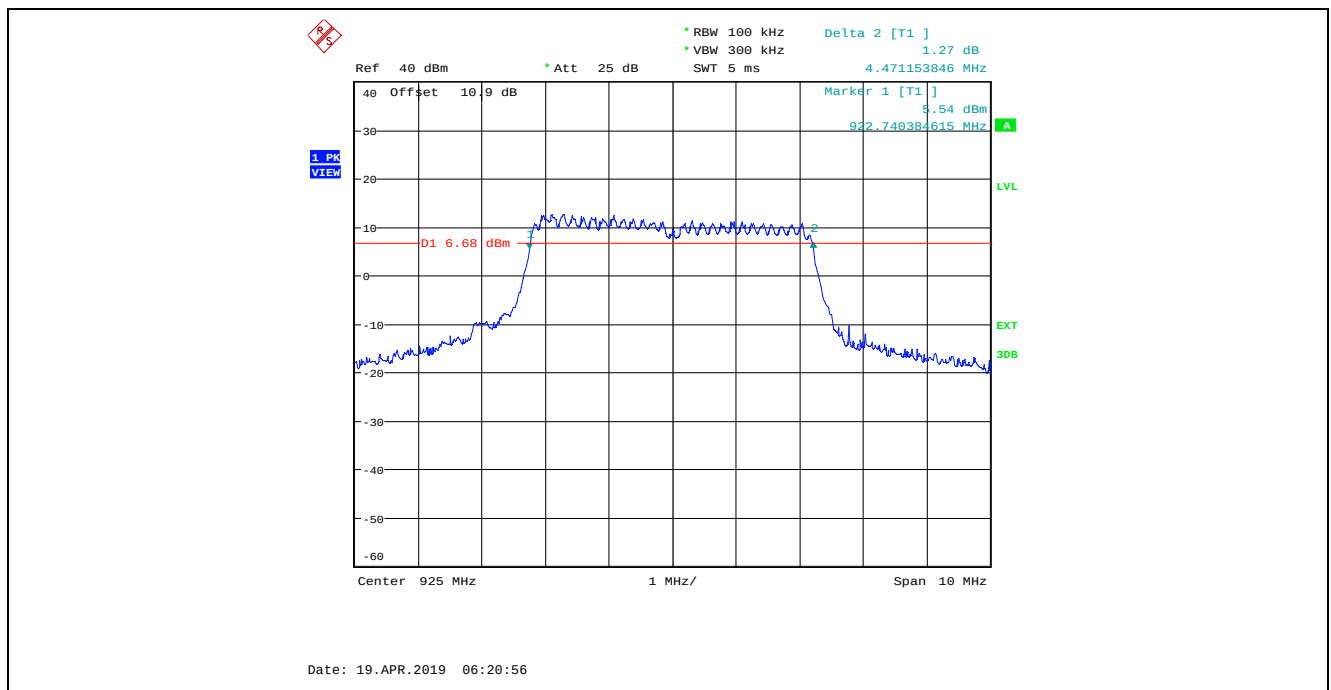
Plot 5.2.4.40. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 4, 915 MHz



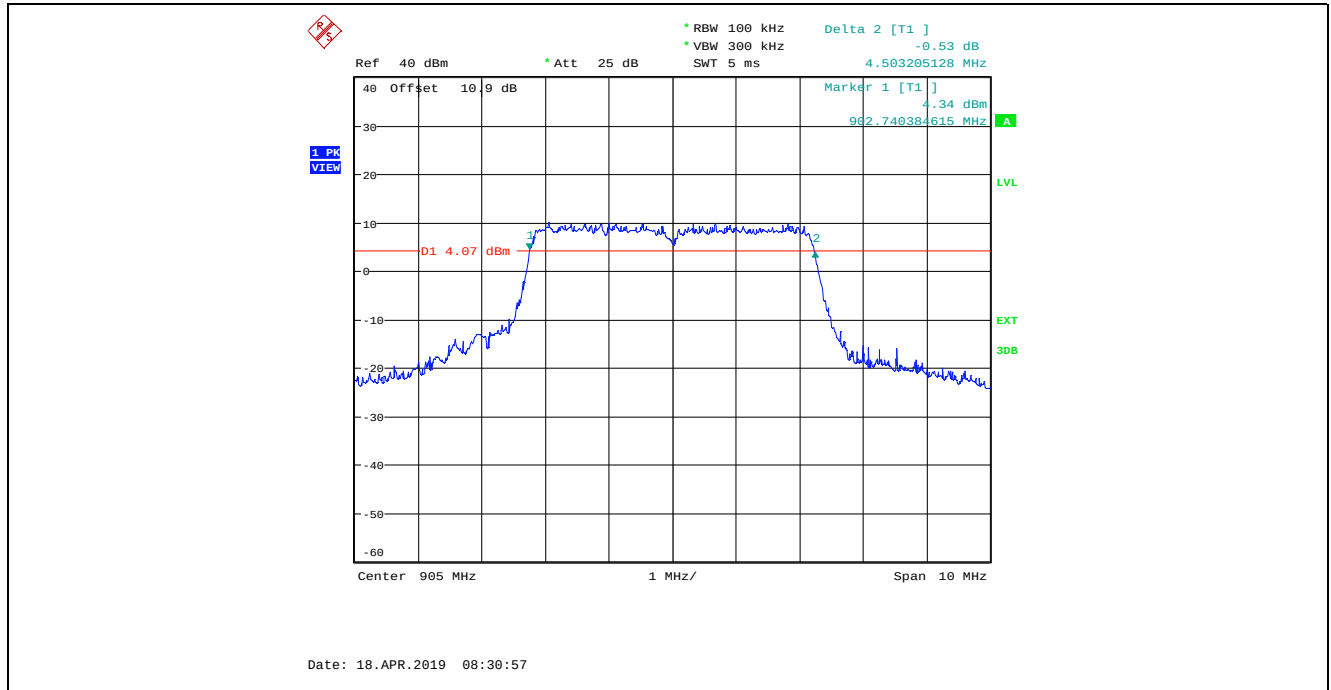
Plot 5.2.4.41. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 4, 925 MHz



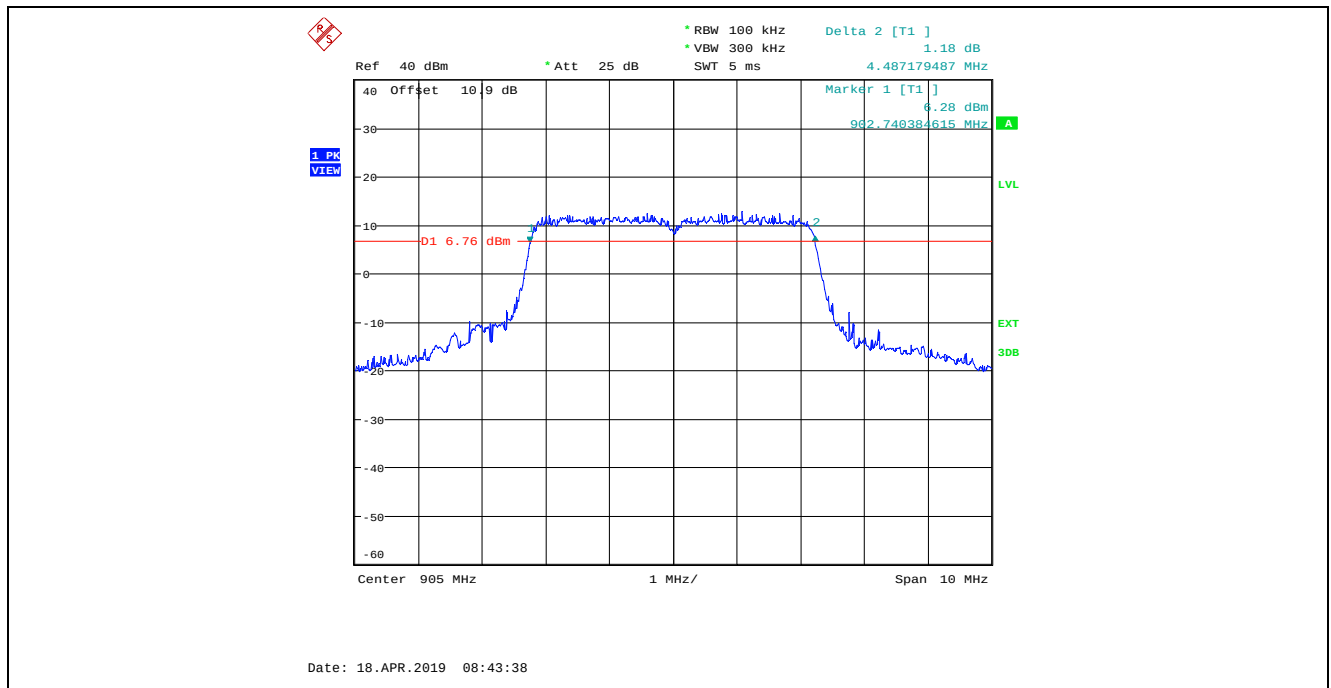
Plot 5.2.4.42. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 4, 925 MHz



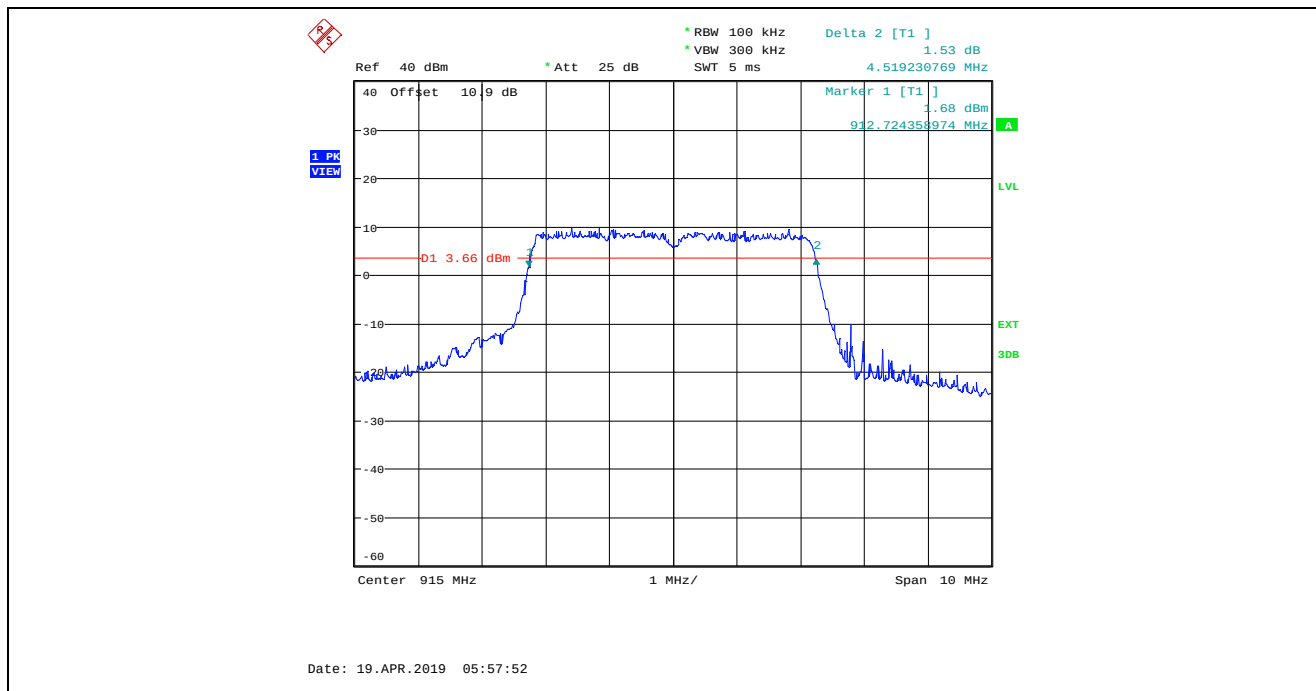
Plot 5.2.4.43. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 5, 905 MHz



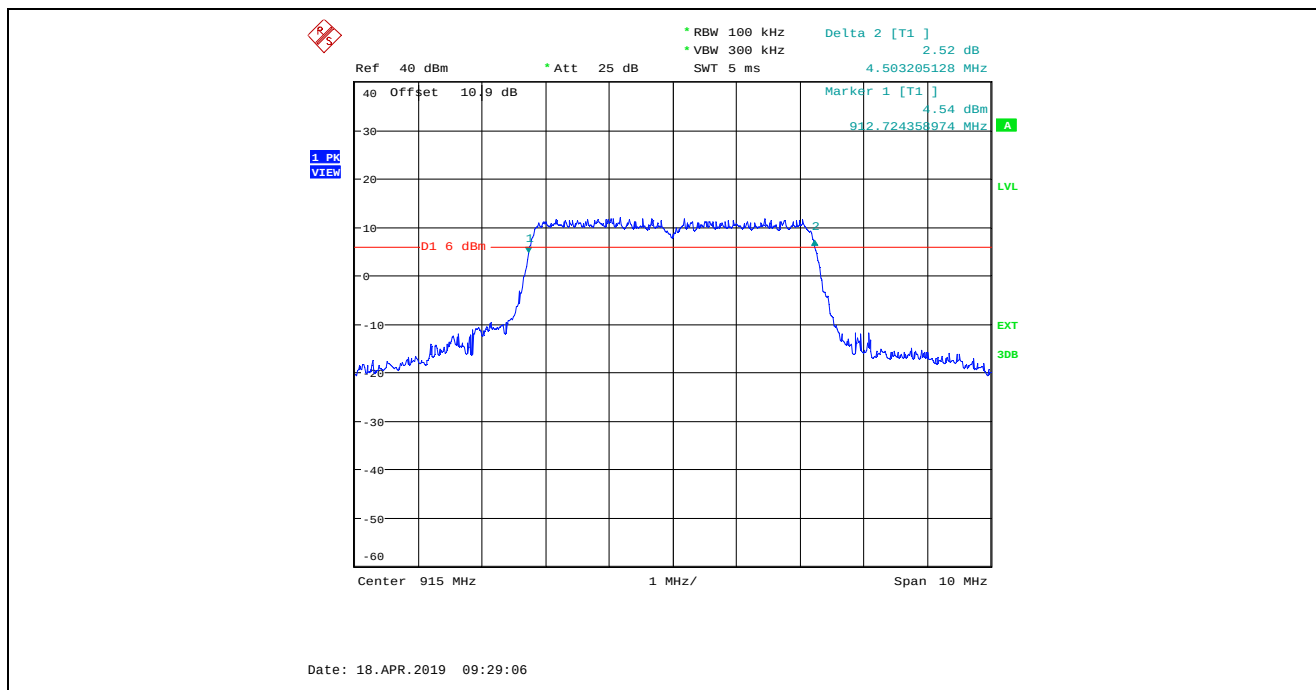
Plot 5.2.4.44. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 5, 905 MHz



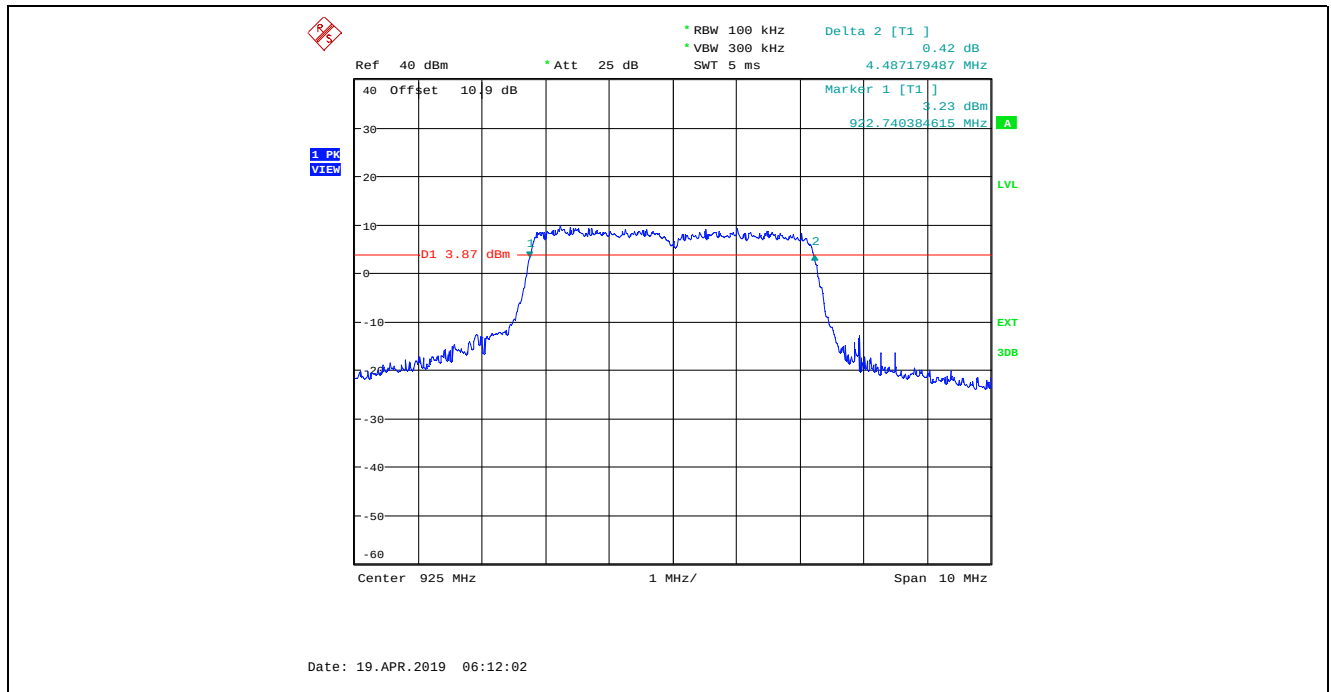
Plot 5.2.4.45. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 5, 915 MHz



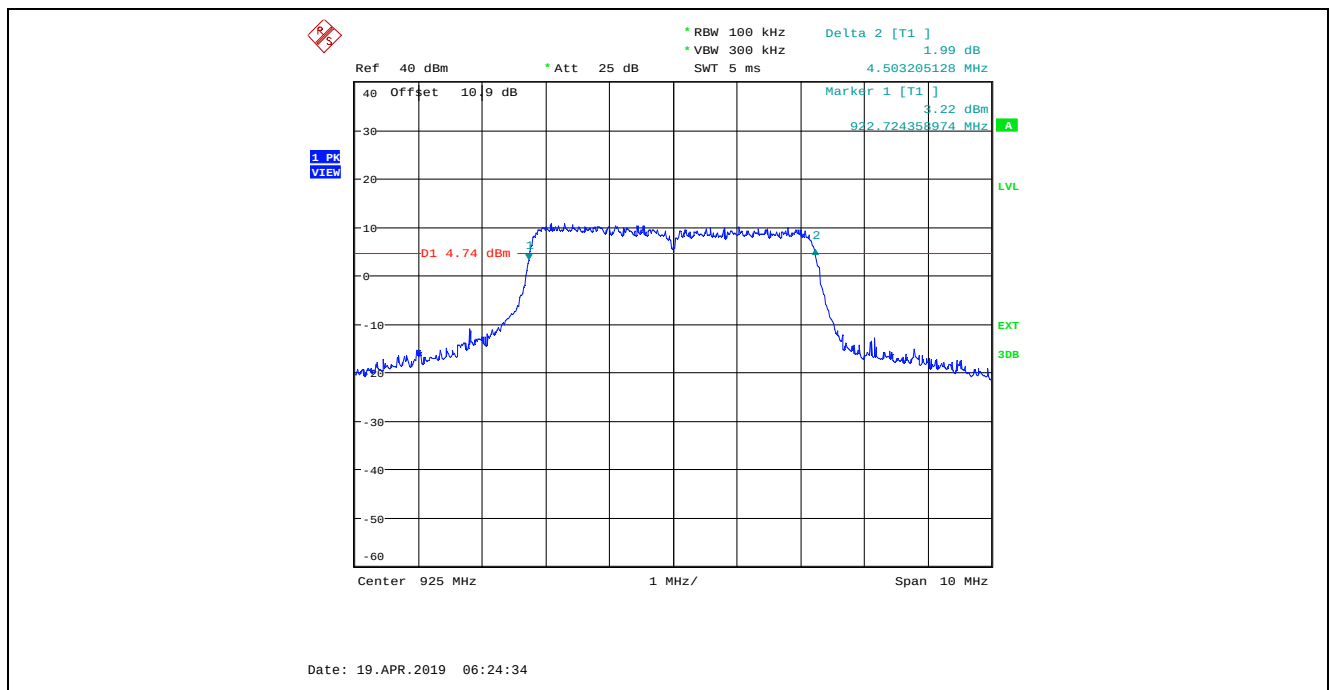
Plot 5.2.4.46. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 5, 915 MHz



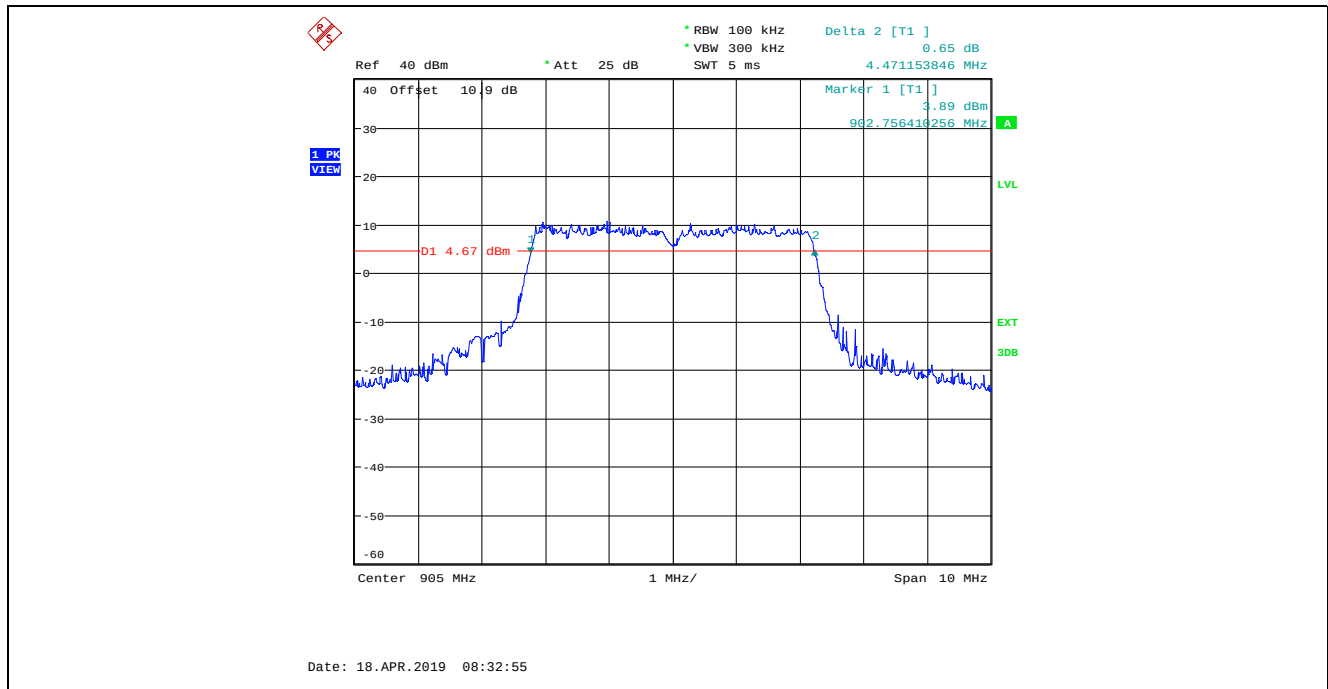
Plot 5.2.4.47. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 5, 925 MHz



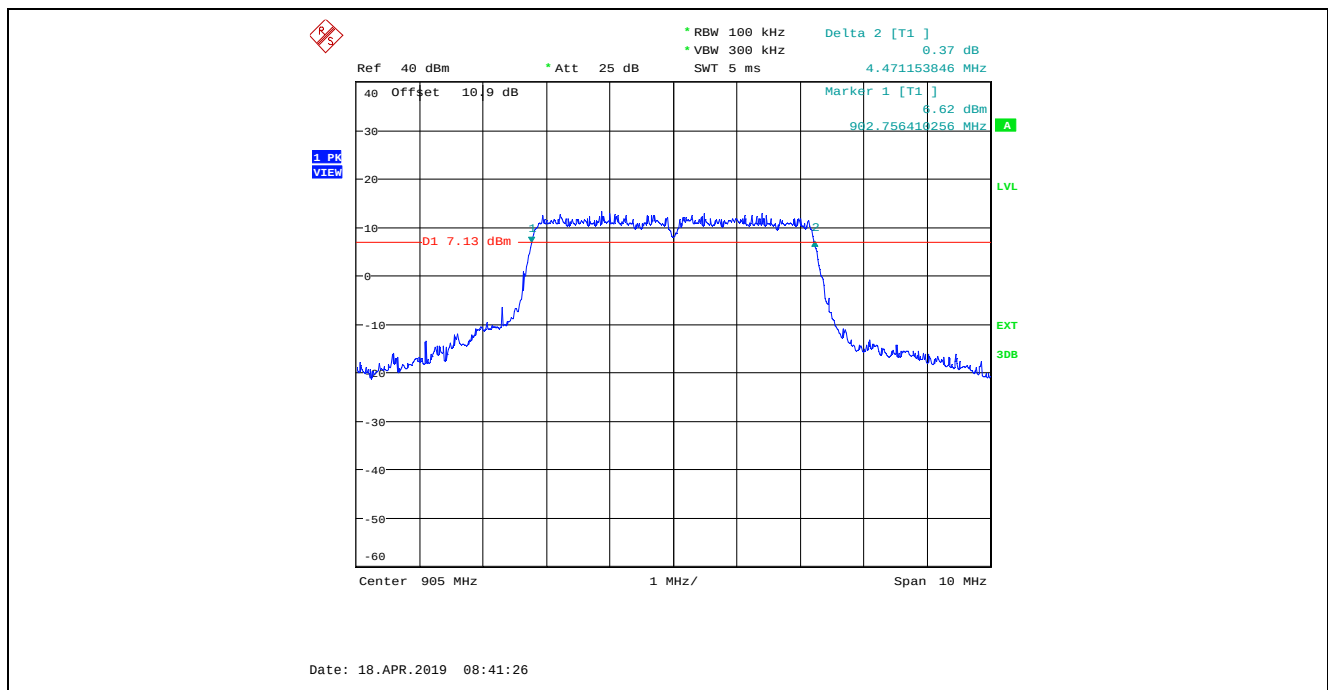
Plot 5.2.4.48. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 5, 925 MHz



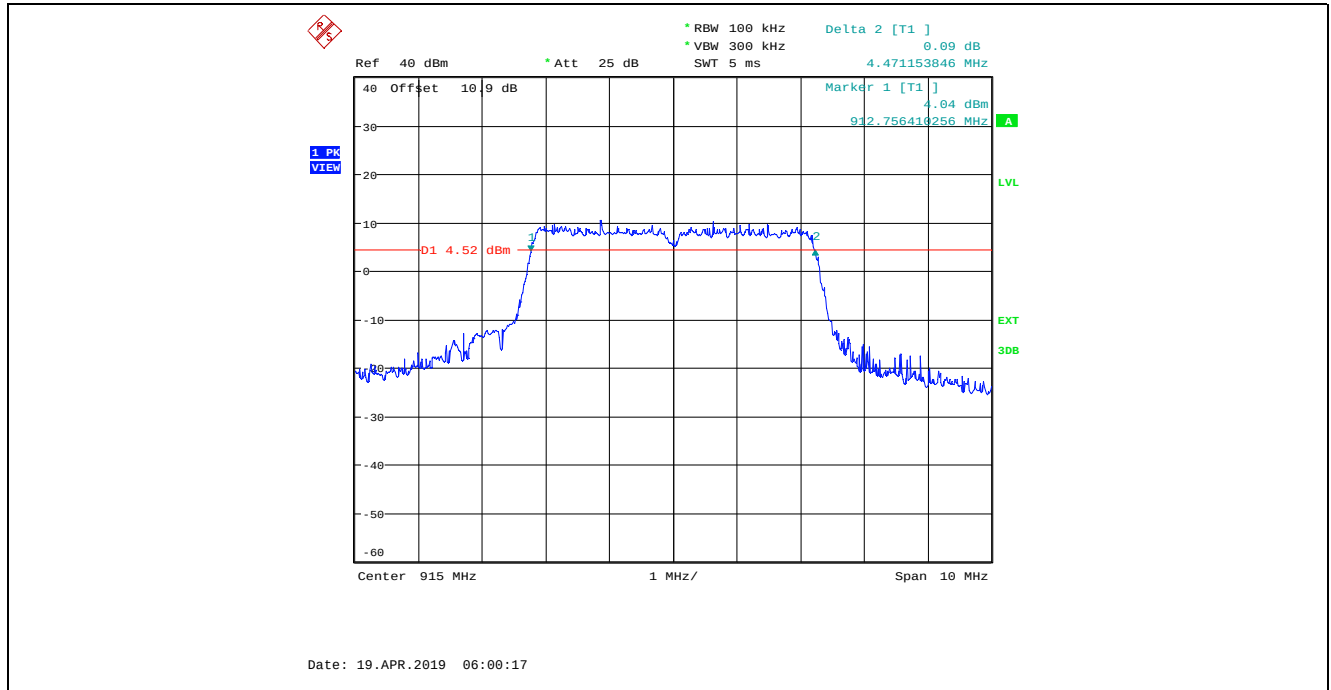
Plot 5.2.4.49. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 6, 905 MHz,



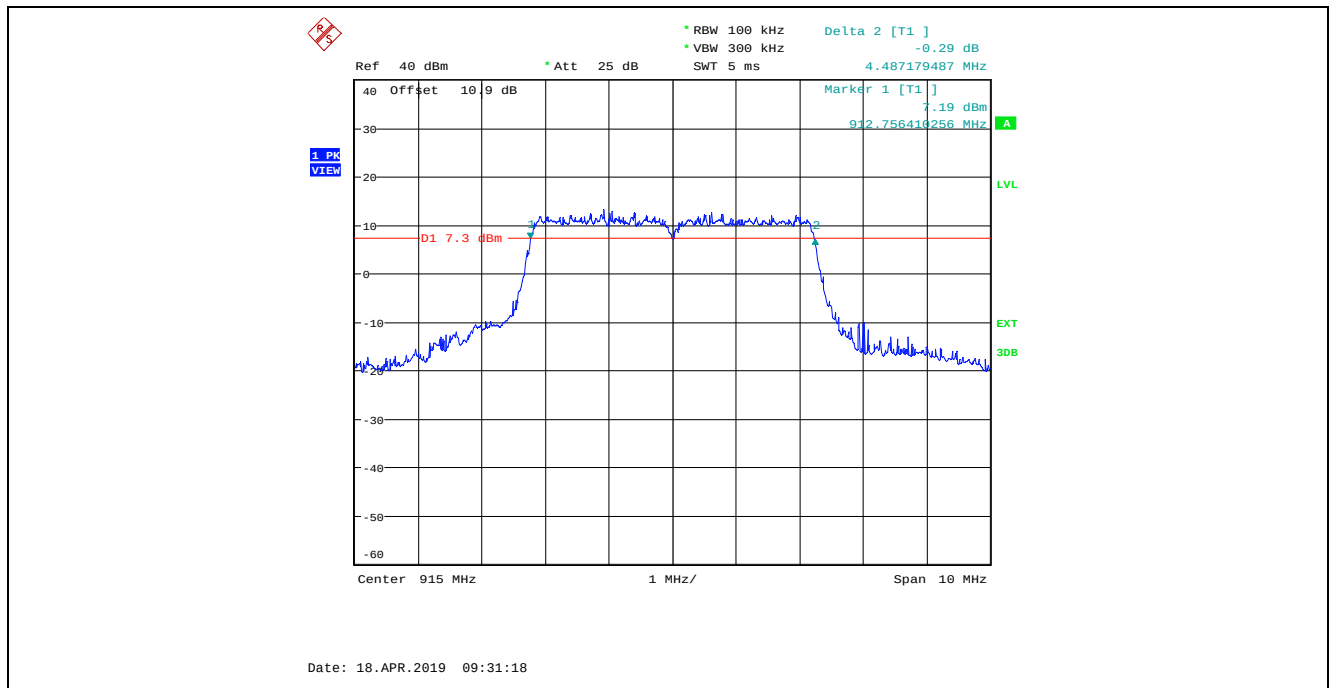
Plot 5.2.4.50. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 6, 905 MHz,



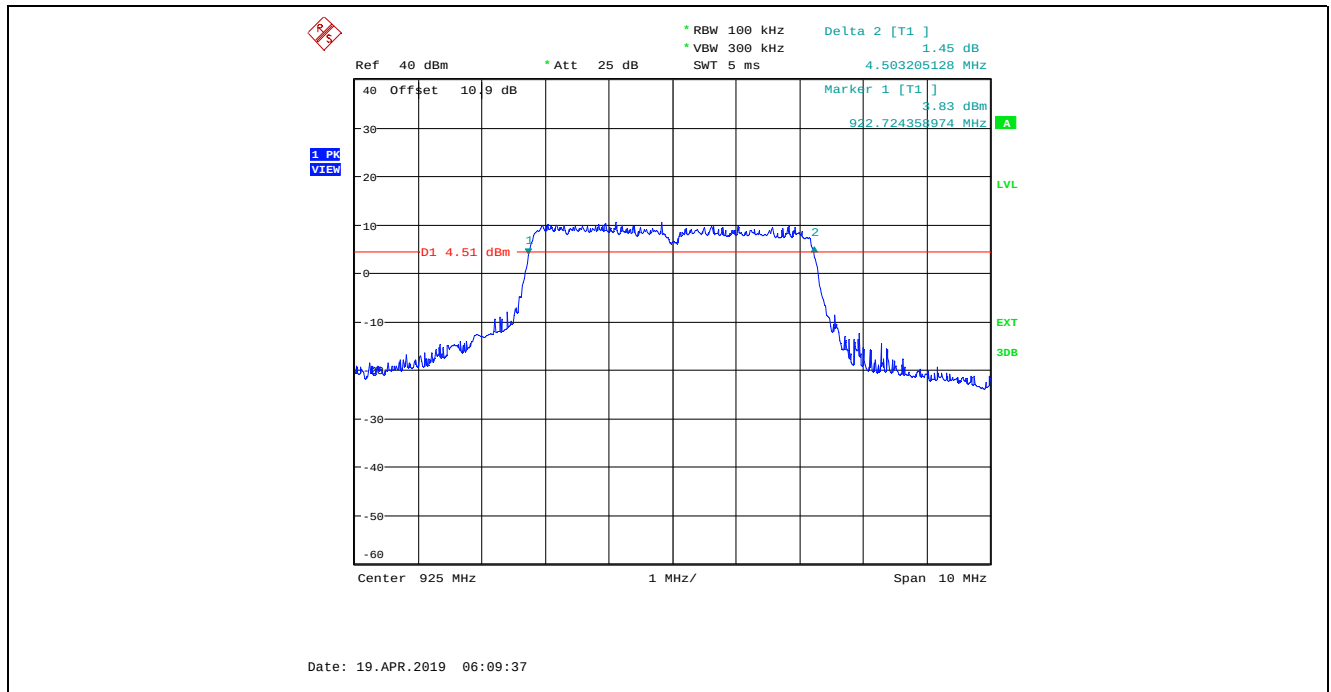
Plot 5.2.4.51. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 6, 915 MHz



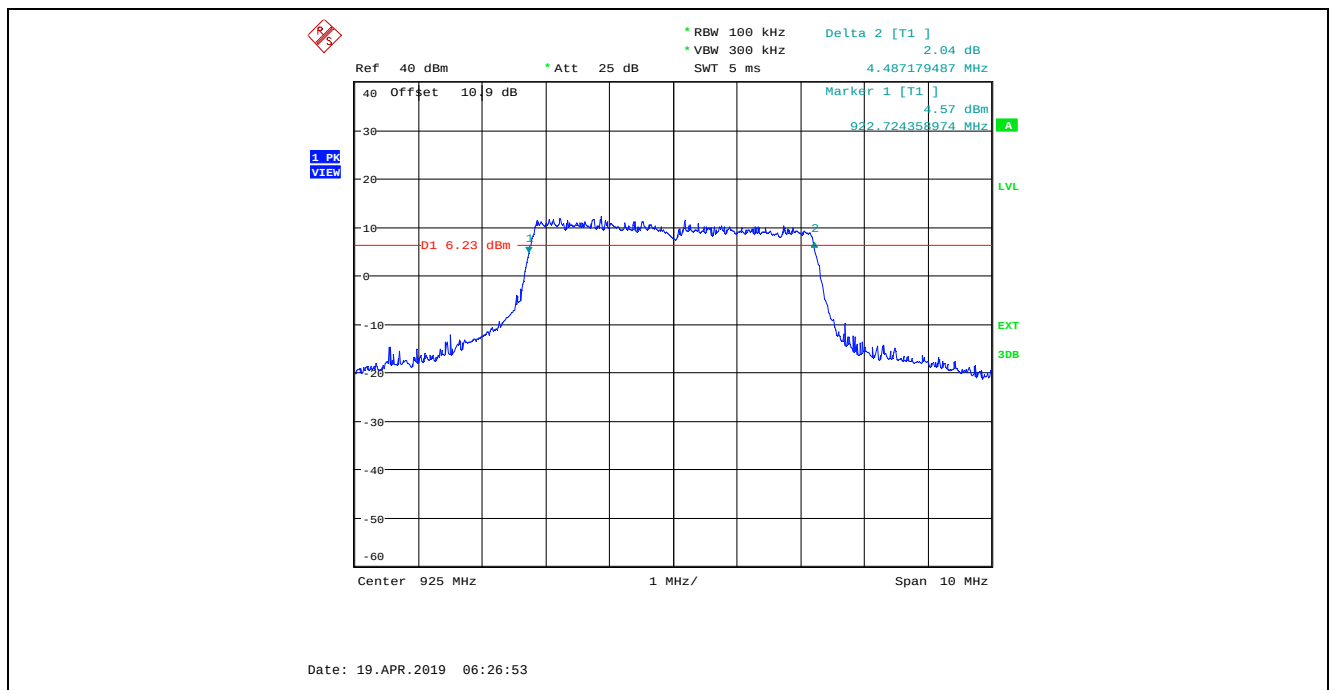
Plot 5.2.4.52. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 6, 915 MHz



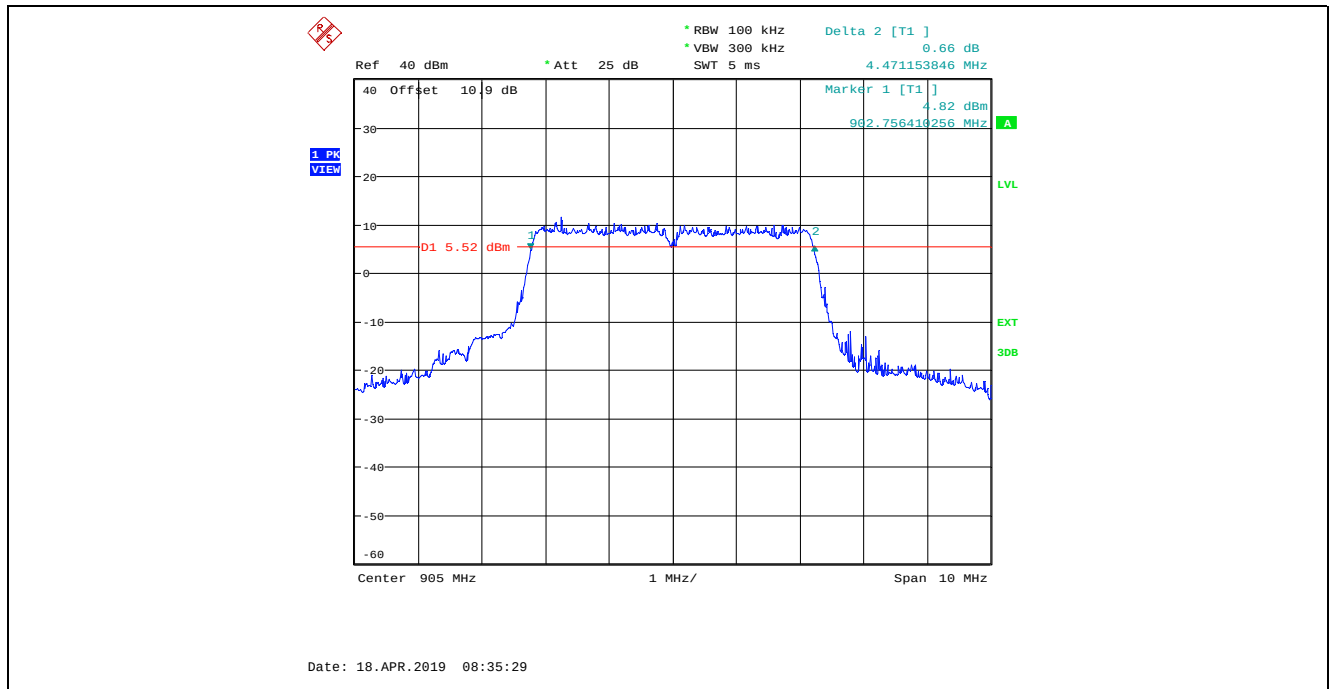
Plot 5.2.4.53. 6 dB Bandwidth, Antenna 1
 4 MHz BW, Power Setting 24, Data Rate 6, 925 MHz



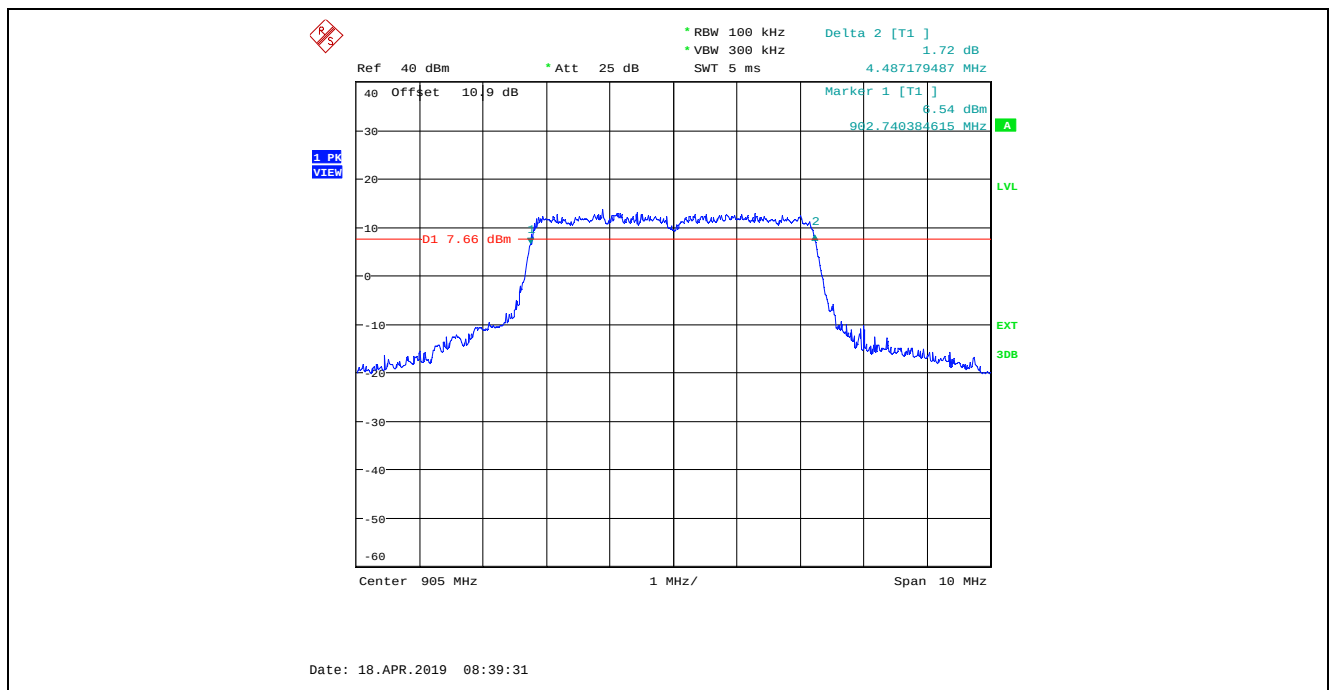
Plot 5.2.4.54. 6 dB Bandwidth, Antenna 2
 4 MHz BW, Power Setting 24, Data Rate 6, 925 MHz



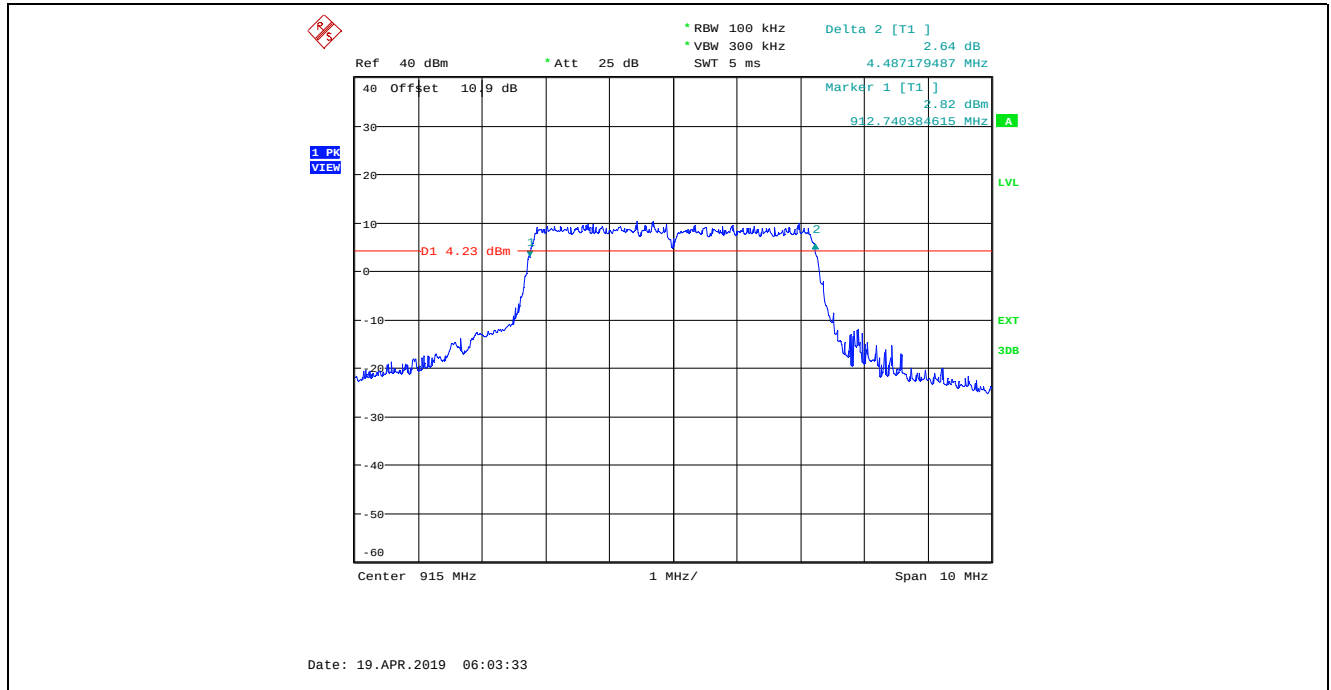
Plot 5.2.4.55. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 7, 905 MHz



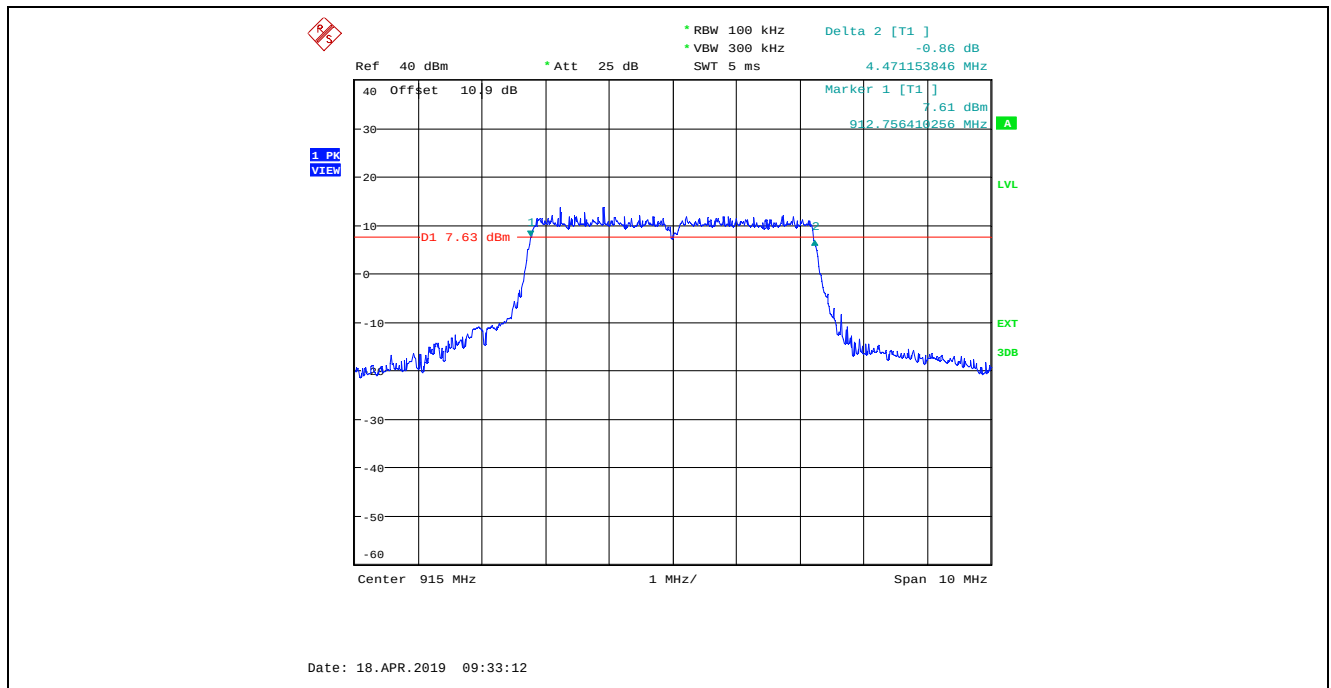
Plot 5.2.4.56. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 7, 905 MHz



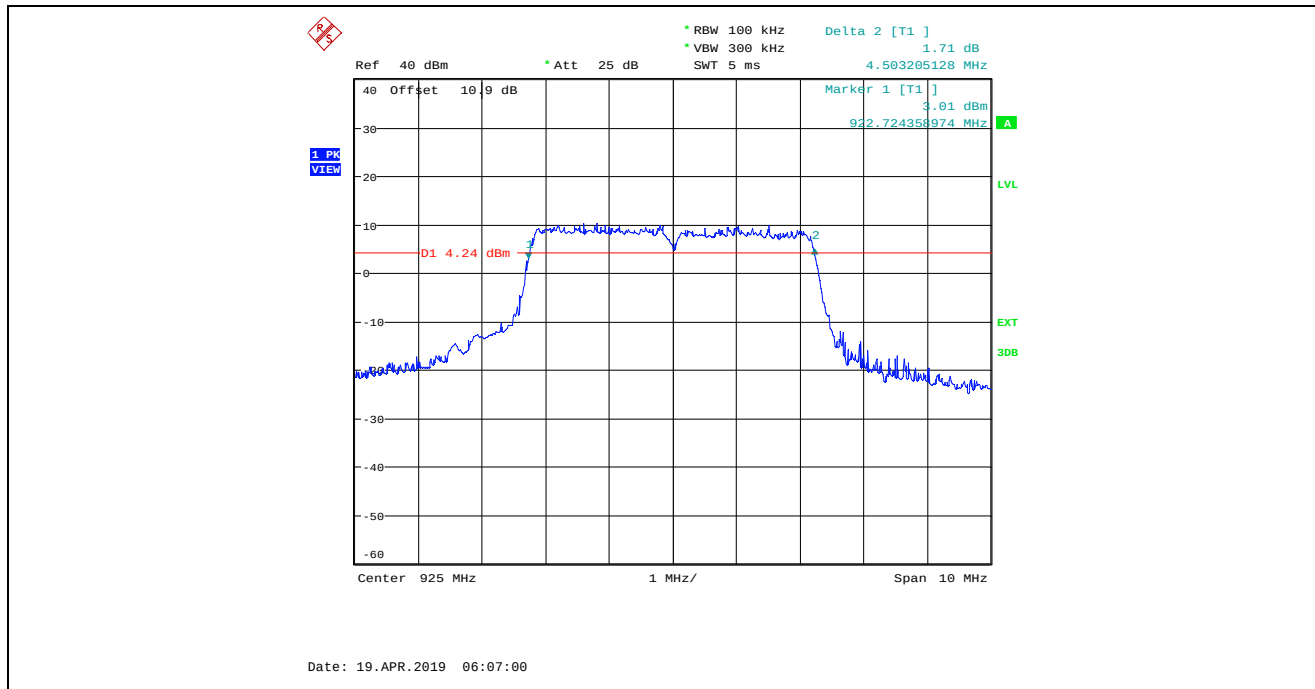
Plot 5.2.4.57. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 7, 915 MHz



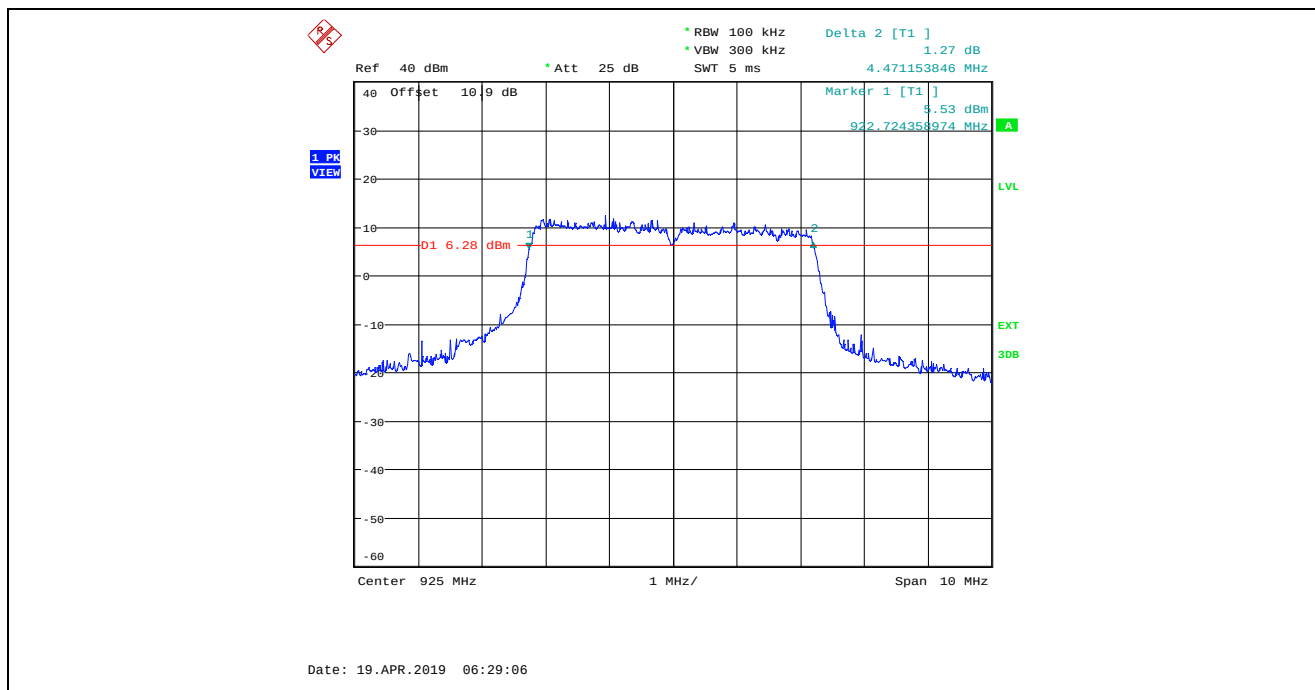
Plot 5.2.4.58. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 7, 915 MHz



Plot 5.2.4.59. 6 dB Bandwidth, Antenna 1
4 MHz BW, Power Setting 24, Data Rate 7, 925 MHz



Plot 5.2.4.60. 6 dB Bandwidth, Antenna 2
4 MHz BW, Power Setting 24, Data Rate 7, 925 MHz



The screenshot displays a spectrum analyzer interface. At the top, a red 'R' logo is visible. The main display area shows a blue signal trace on a grid. A red horizontal line is drawn across the plot at approximately 0 dBm, labeled 'D1 1.4 dBm'. The signal trace shows a flat baseline at -20 dBm, a sharp rise to a plateau at approximately -5 dBm, and a sharp fall back to -20 dBm. The plateau is labeled '2'. The signal trace is labeled '1 PK VIEW' in blue. The top status bar shows various parameters: Ref 30 dBm, Att 15 dB, RBW 100 kHz, VBW 300 kHz, SWT 10 ms, Delta 2 [T1] 1.39 dB, 8.846153846 MHz, 0.48 dBm, 962.544871795 MHz, LVL, EXT, 30B. The bottom status bar shows Center 907 MHz, 2 MHz/, and Span 20 MHz. The date and time 'Date: 22.MAR.2019 12:07:37' are displayed at the bottom left.

1 PK
VIEW

Ref 30 dBm Offset 10.9 dB Att 15 dB RBW 100 kHz VBW 300 kHz SWF 10 ms Delta 2 [T1] 1.00 dB 8.621794872 MHz

30 dBm 20 dB 10 dB 0 dB -10 dB -20 dB -30 dB -40 dB -50 dB -60 dB -70 dB

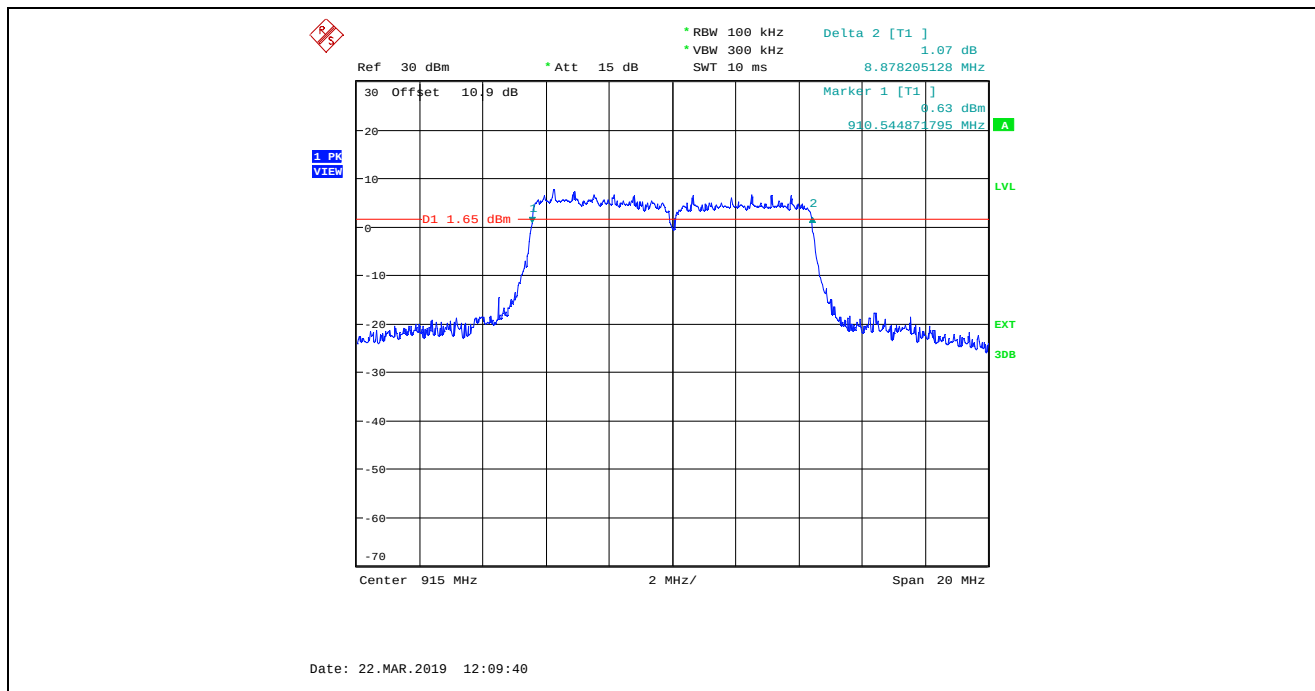
Center 907 MHz 2 MHz/ Span 20 MHz

Marker 1 [T1] 2.98 dBm 902.544871795 MHz

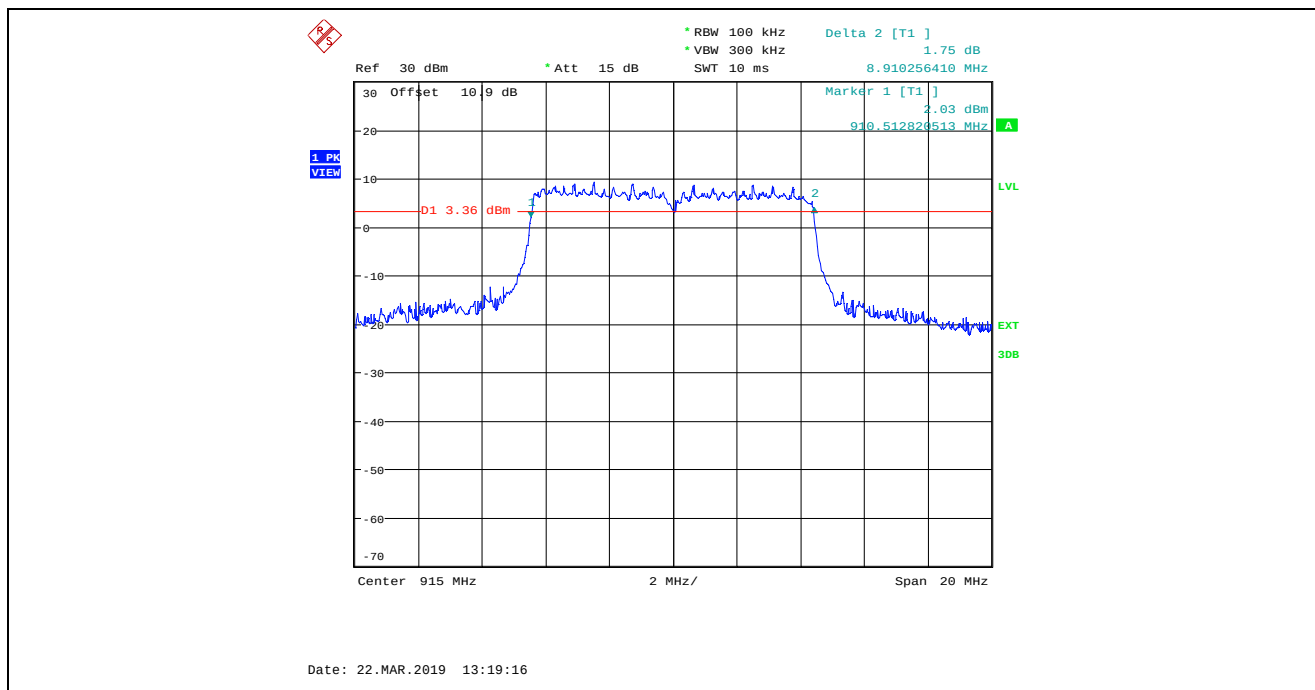
EXT 3DB

Date: 22.MAR.2019 13:21:33

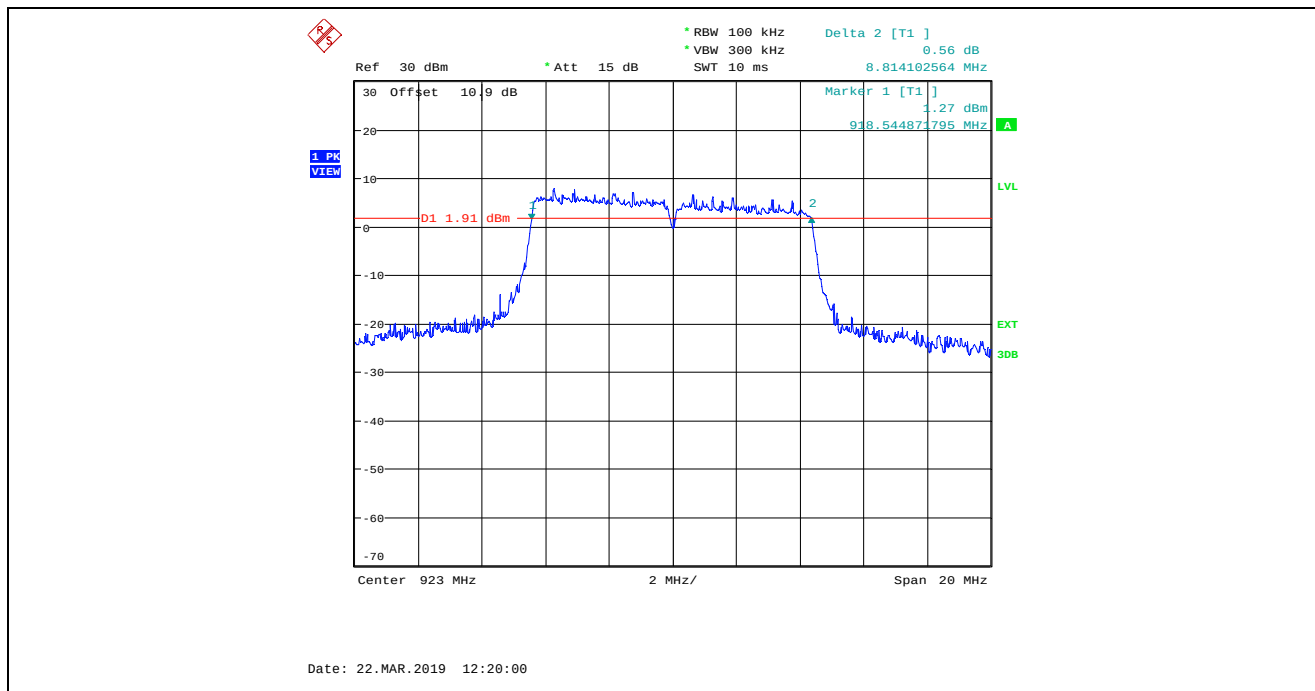
Plot 5.2.4.63. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 4, 915 MHz



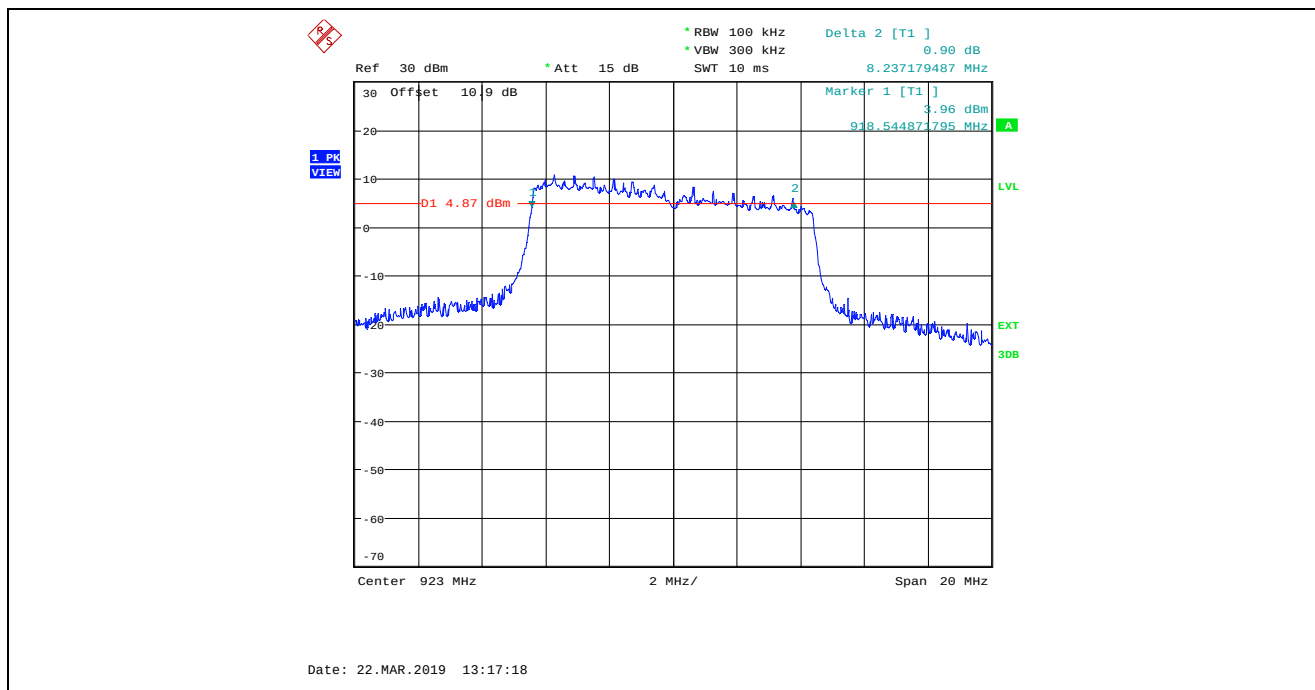
Plot 5.2.4.64. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 4, 915 MHz



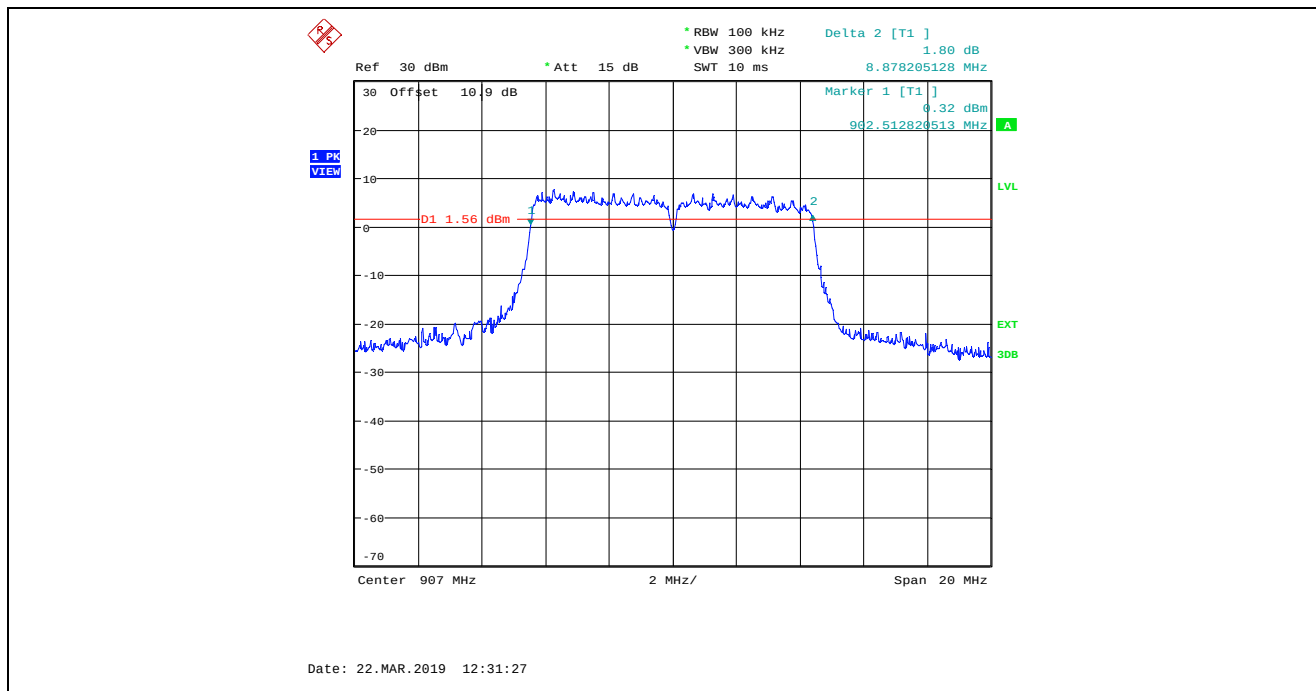
Plot 5.2.4.65. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 4, 923 MHz



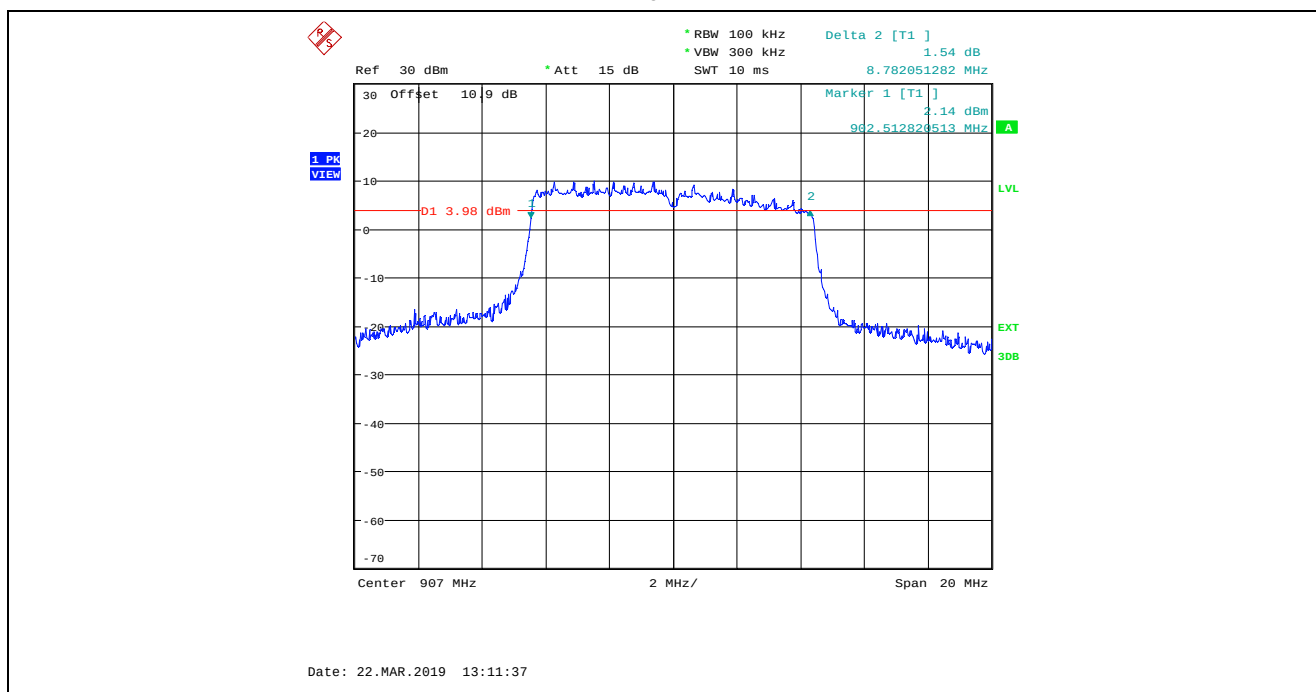
Plot 5.2.4.66. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 4, 923 MHz



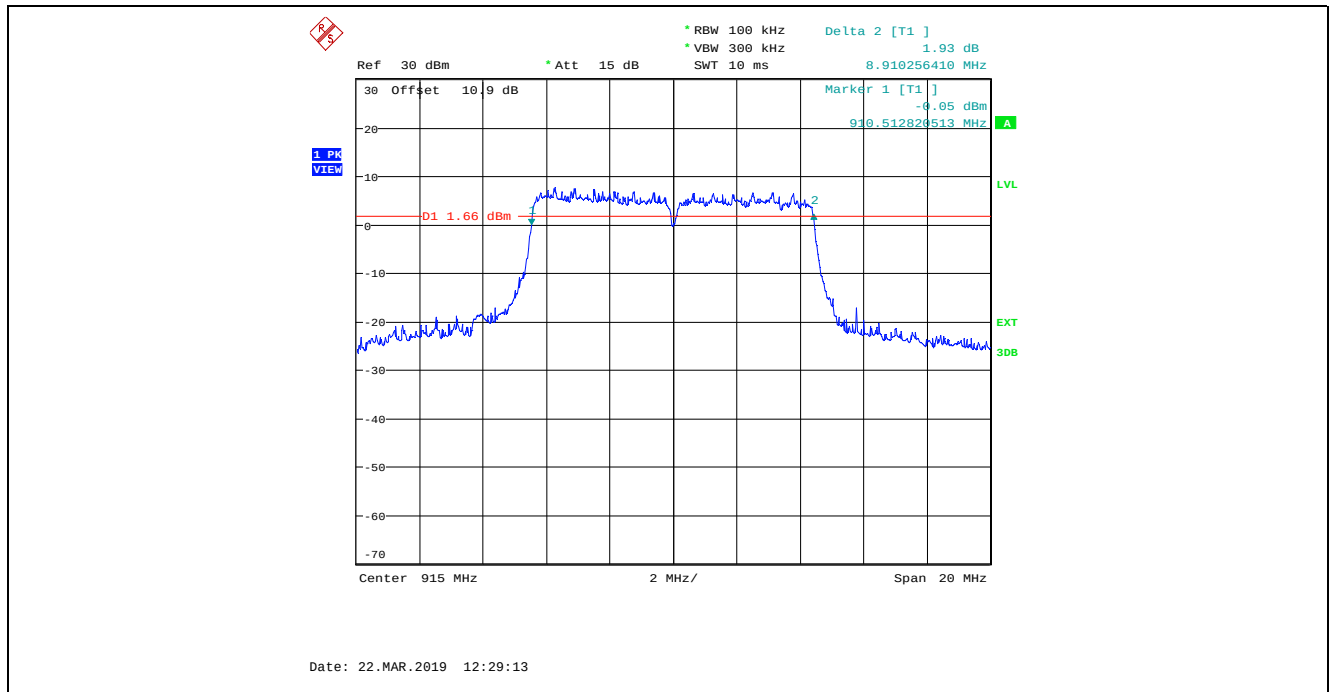
Plot 5.2.4.67. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 5, 907 MHz



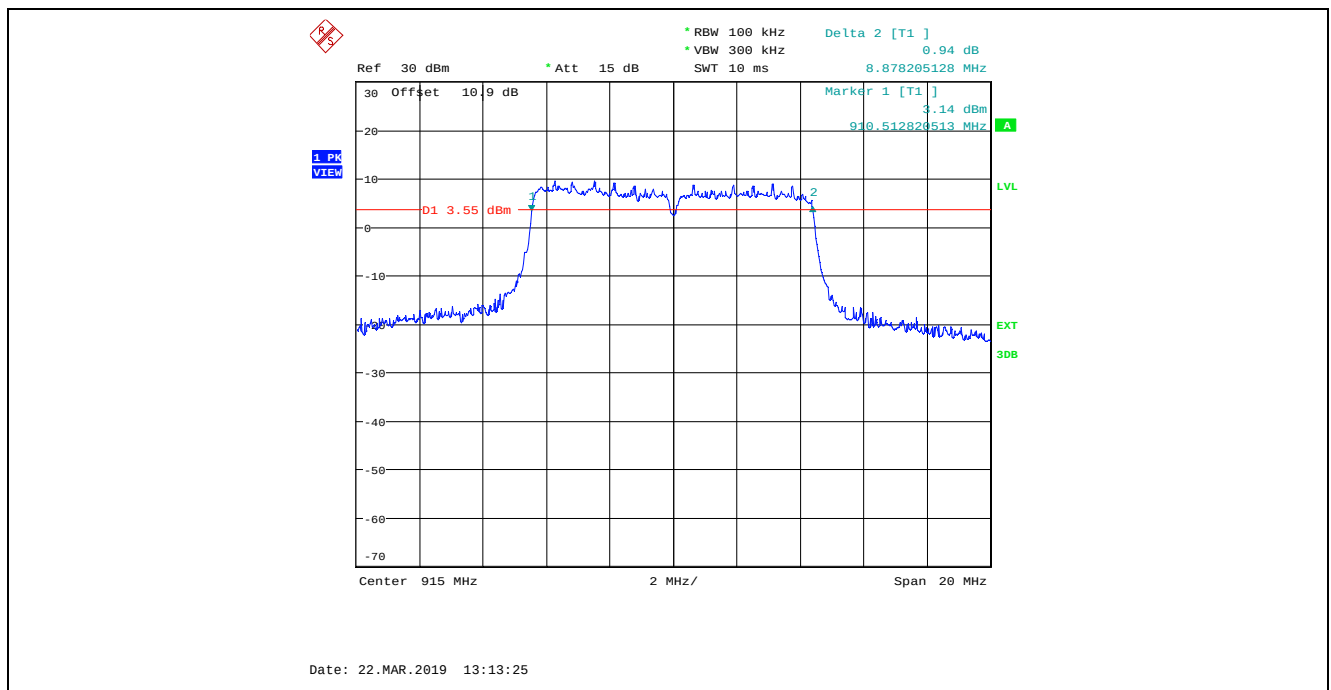
Plot 5.2.4.68. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 5, 907 MHz



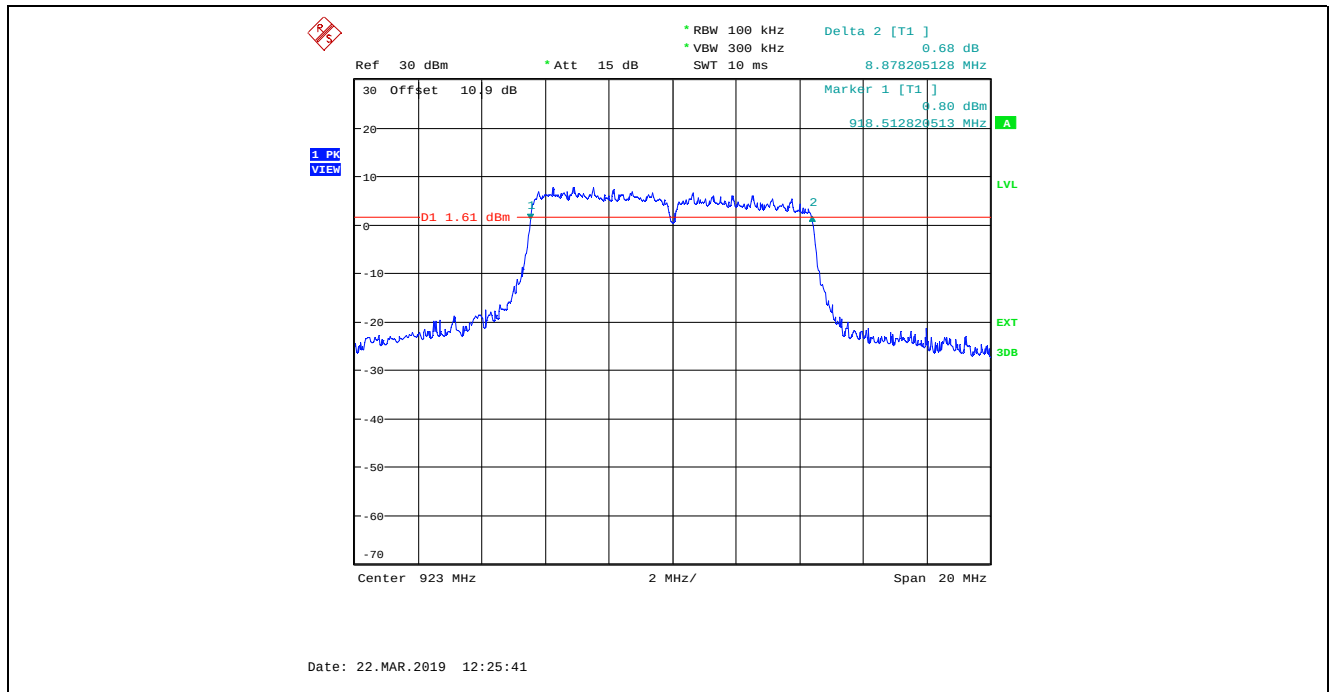
Plot 5.2.4.69. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 5, 915 MHz



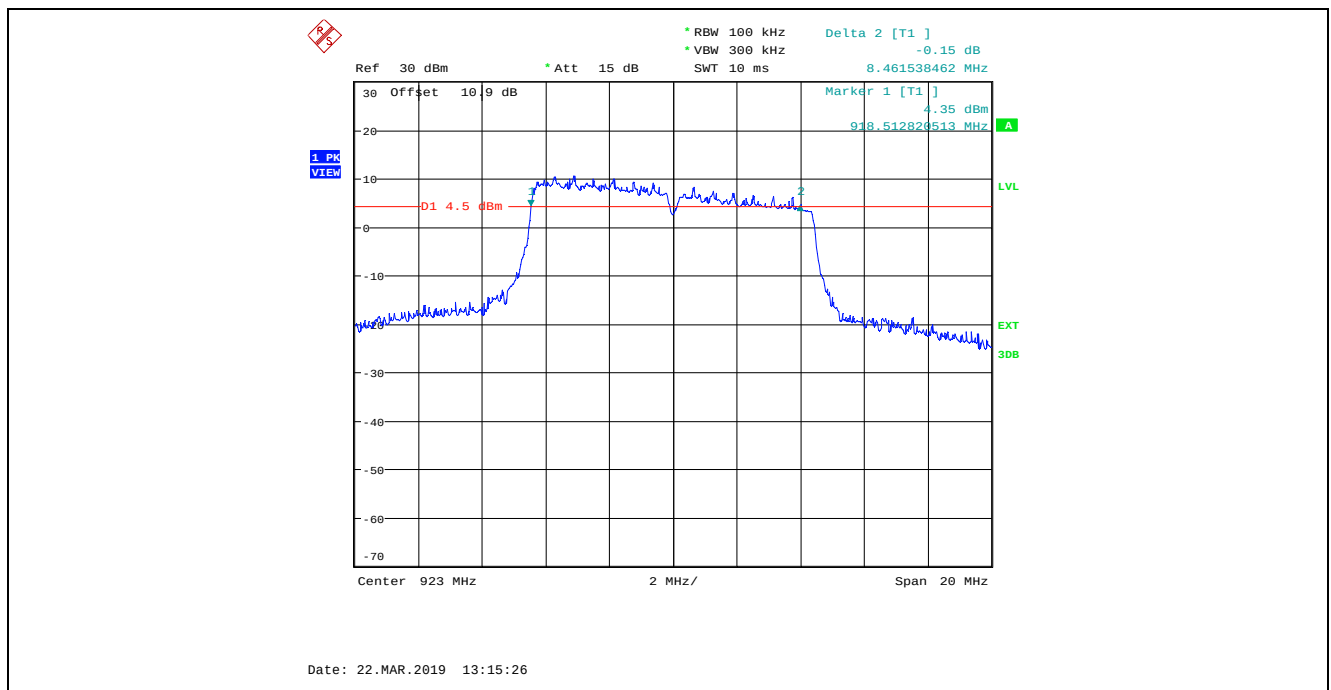
Plot 5.2.4.70. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 5, 915 MHz



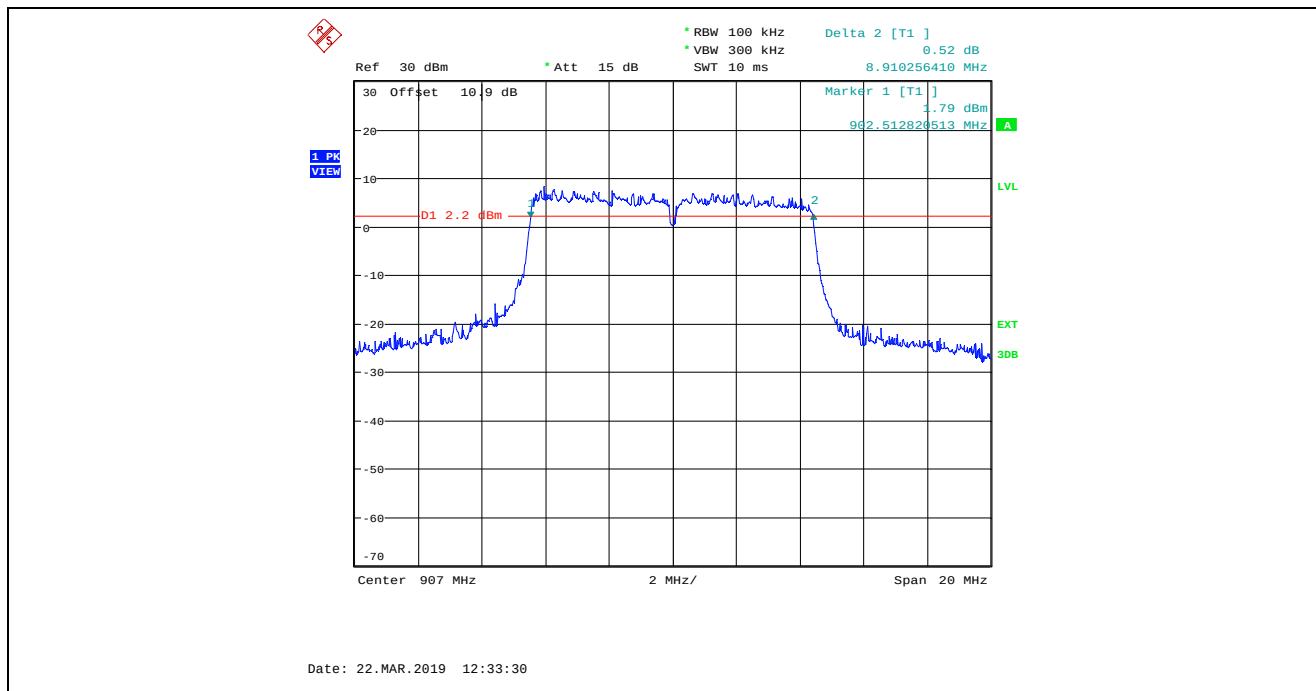
Plot 5.2.4.71. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 5, 923 MHz



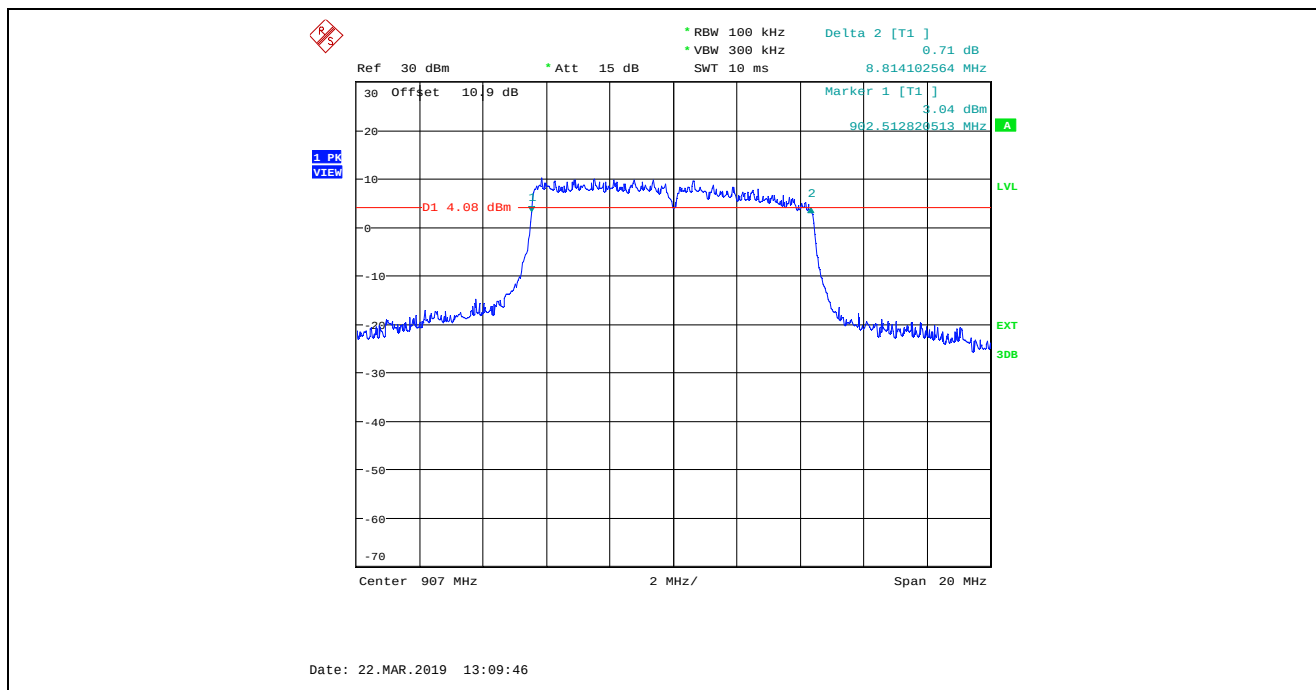
Plot 5.2.4.72. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 5, 923 MHz



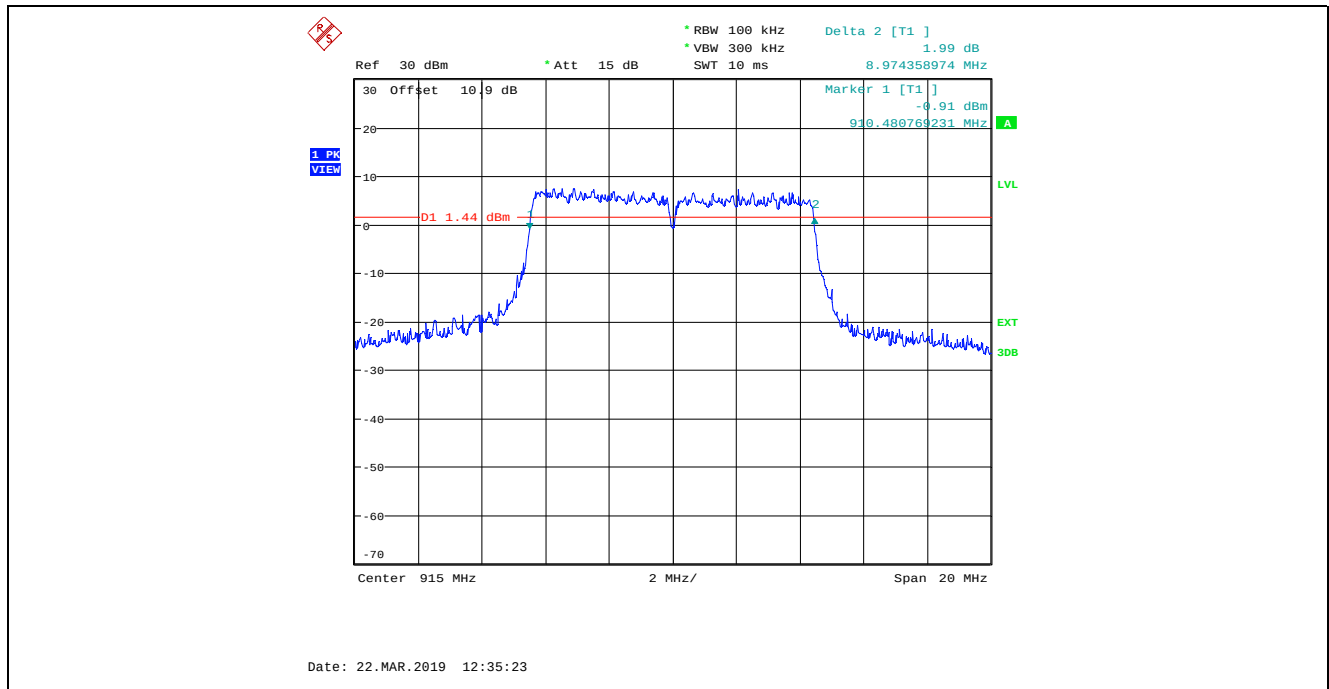
Plot 5.2.4.73. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 6, 907 MHz



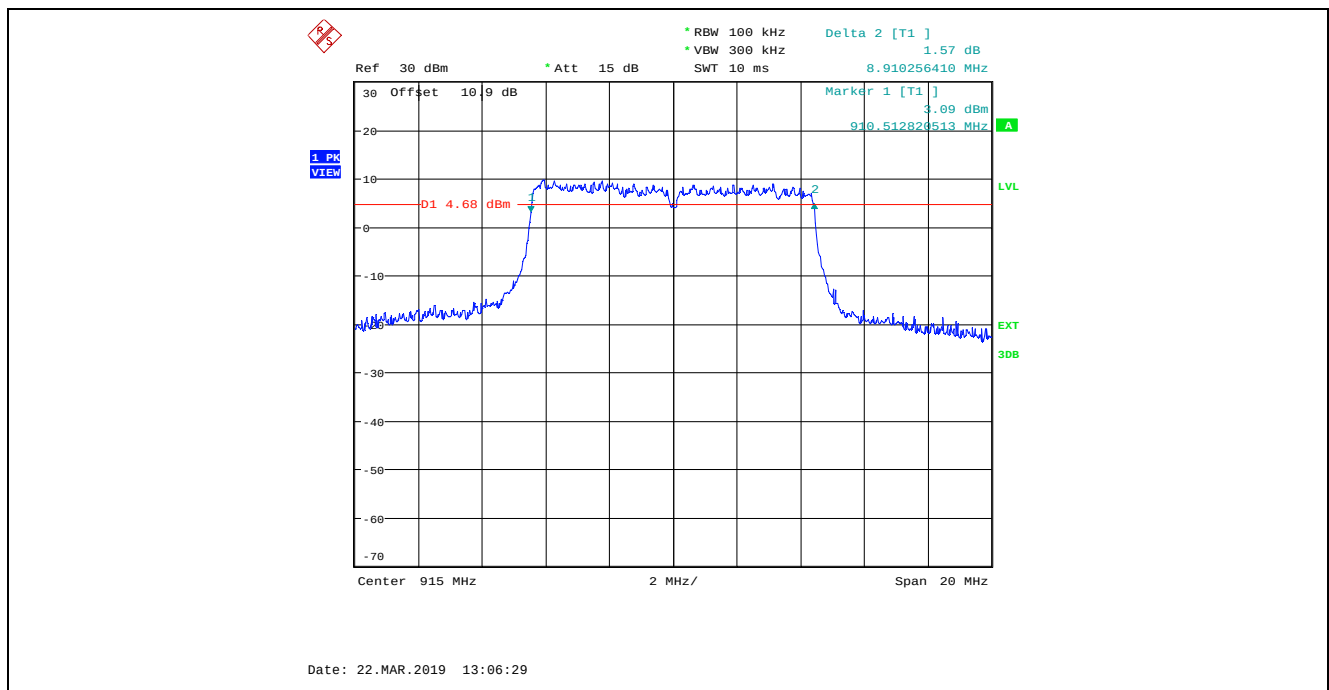
Plot 5.2.4.74. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 6, 907 MHz



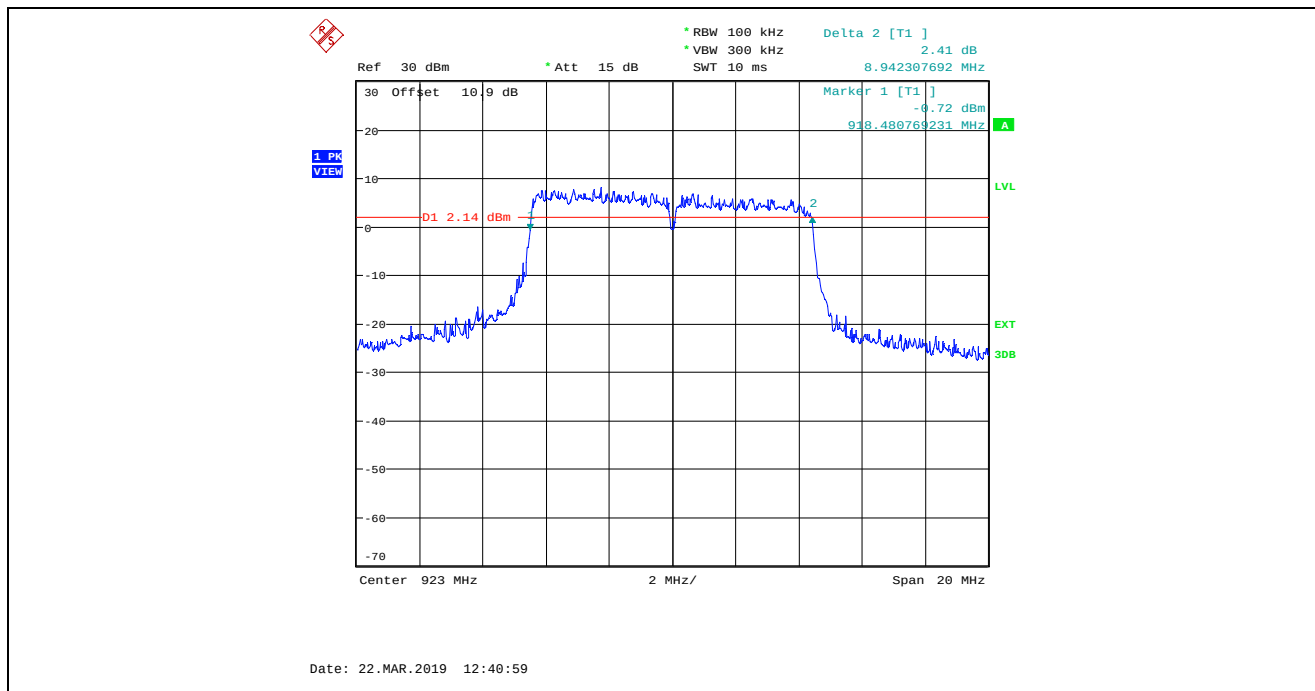
Plot 5.2.4.75. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 6, 915 MHz



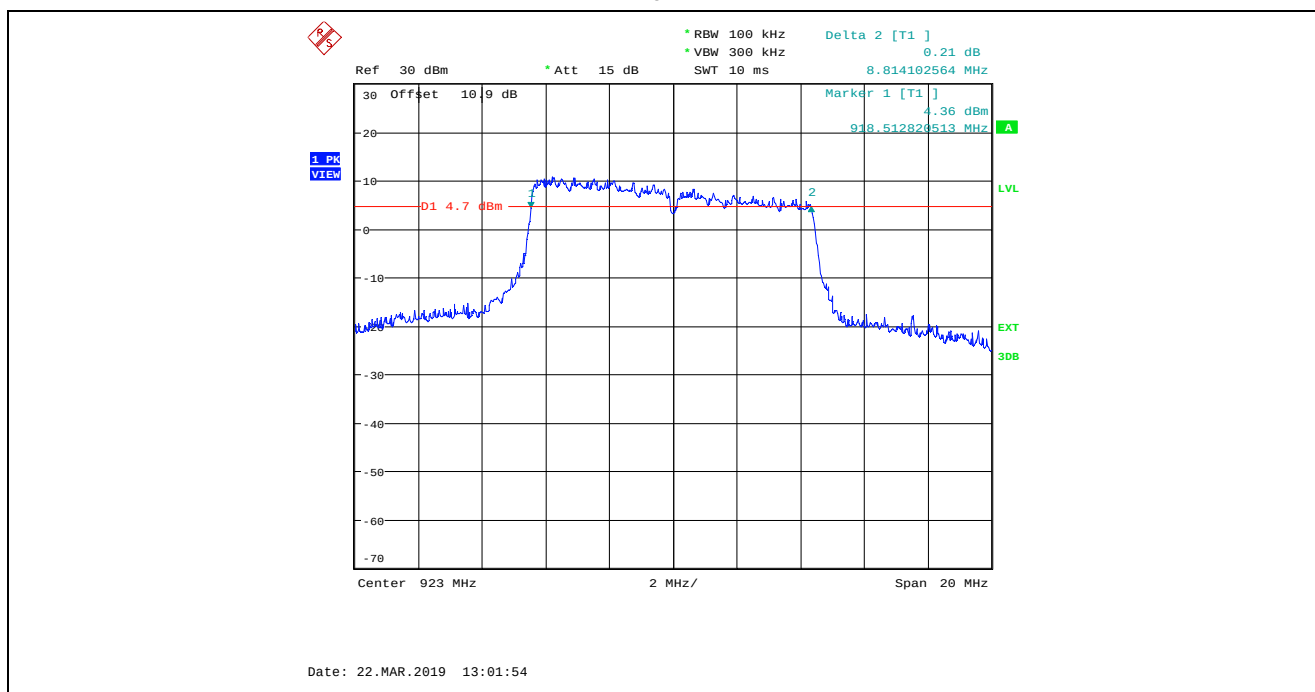
Plot 5.2.4.76. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 6, 915 MHz



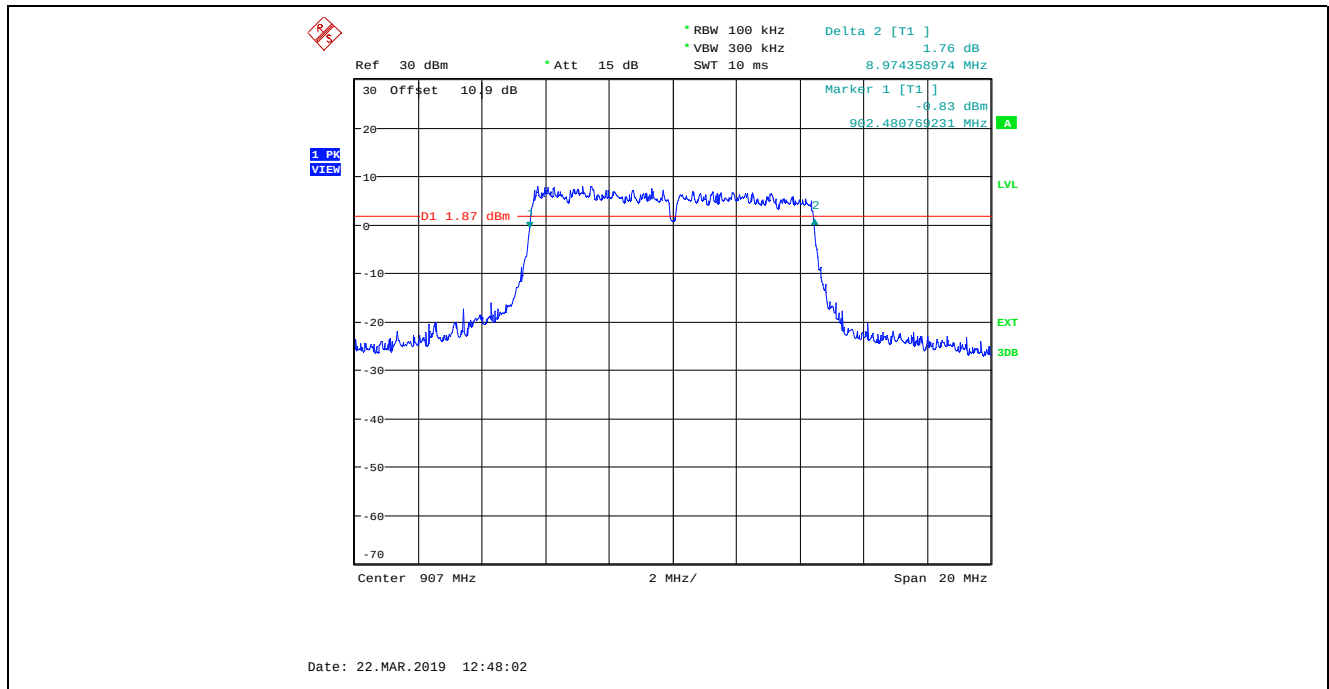
Plot 5.2.4.77. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 6, 923 MHz



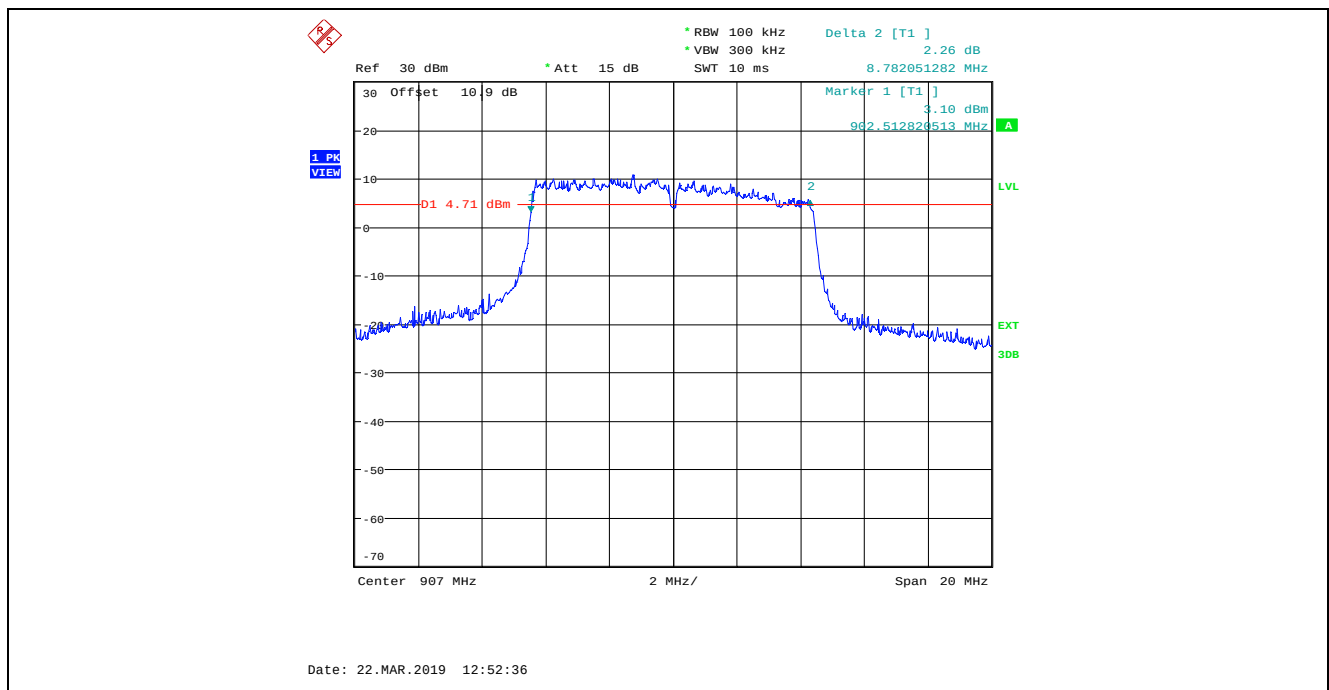
Plot 5.2.4.78. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 6, 923 MHz



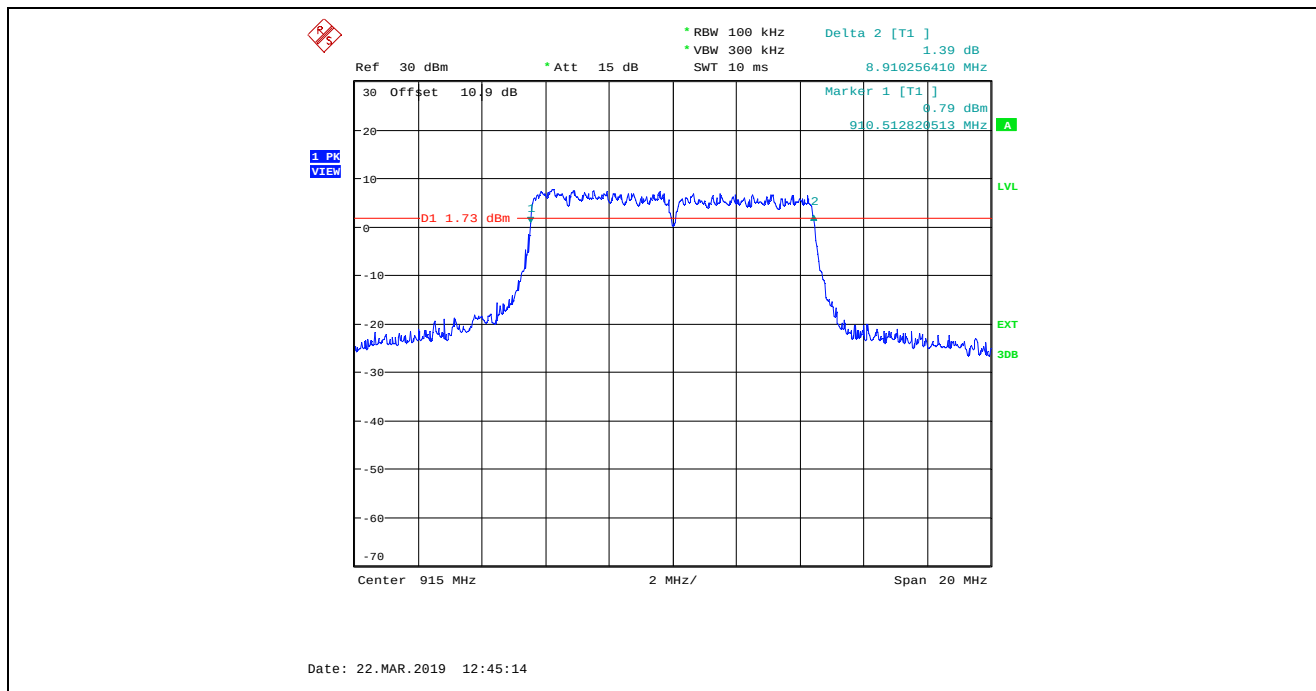
Plot 5.2.4.79. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 7, 907 MHz



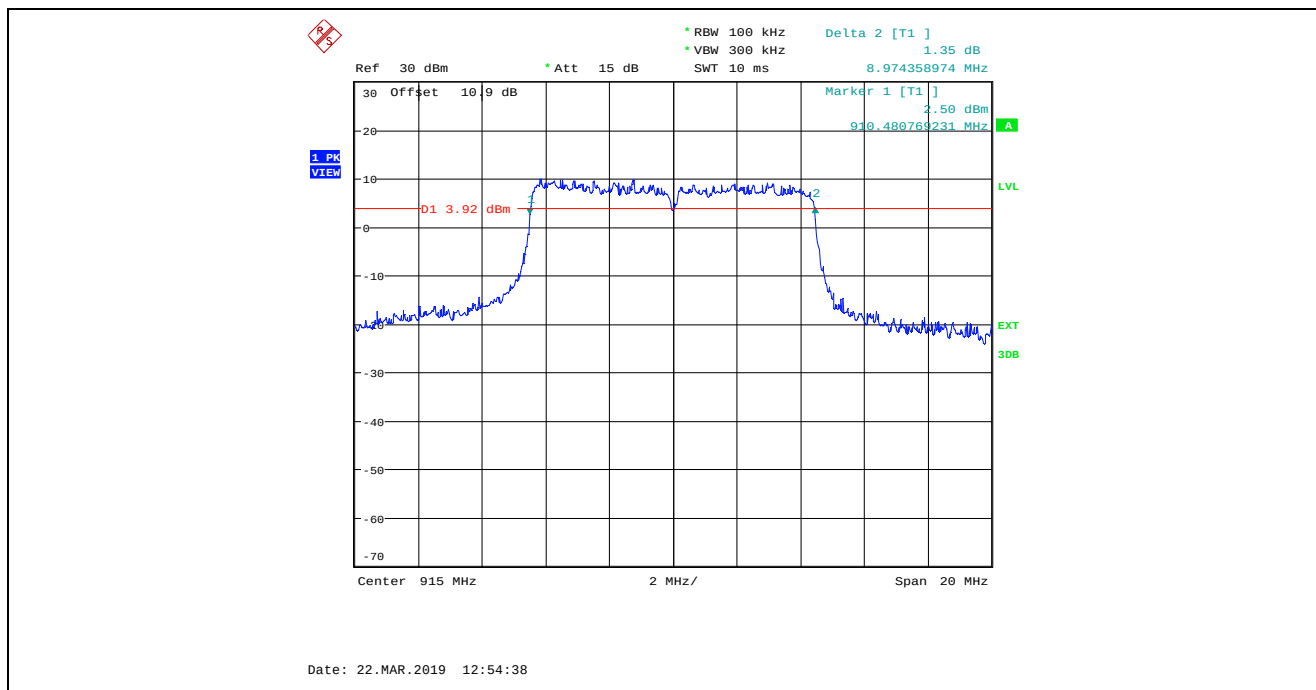
Plot 5.2.4.80. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 7, 907 MHz



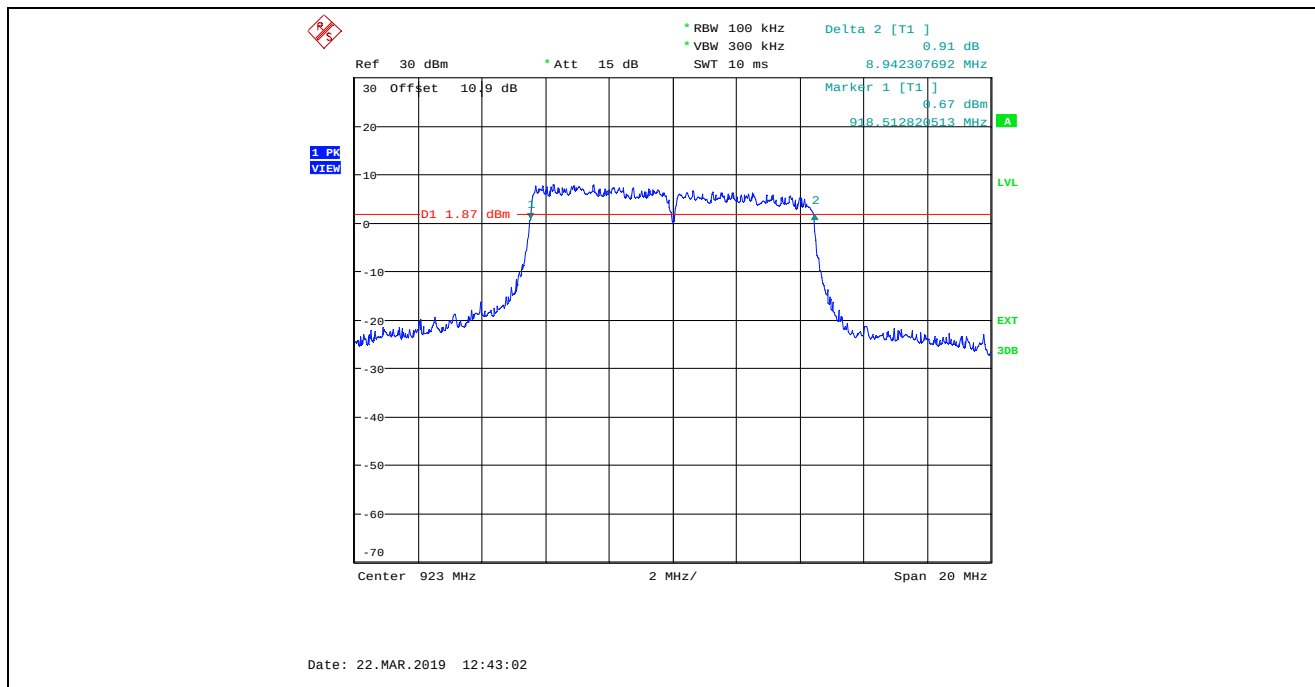
Plot 5.2.4.81. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 7, 915 MHz



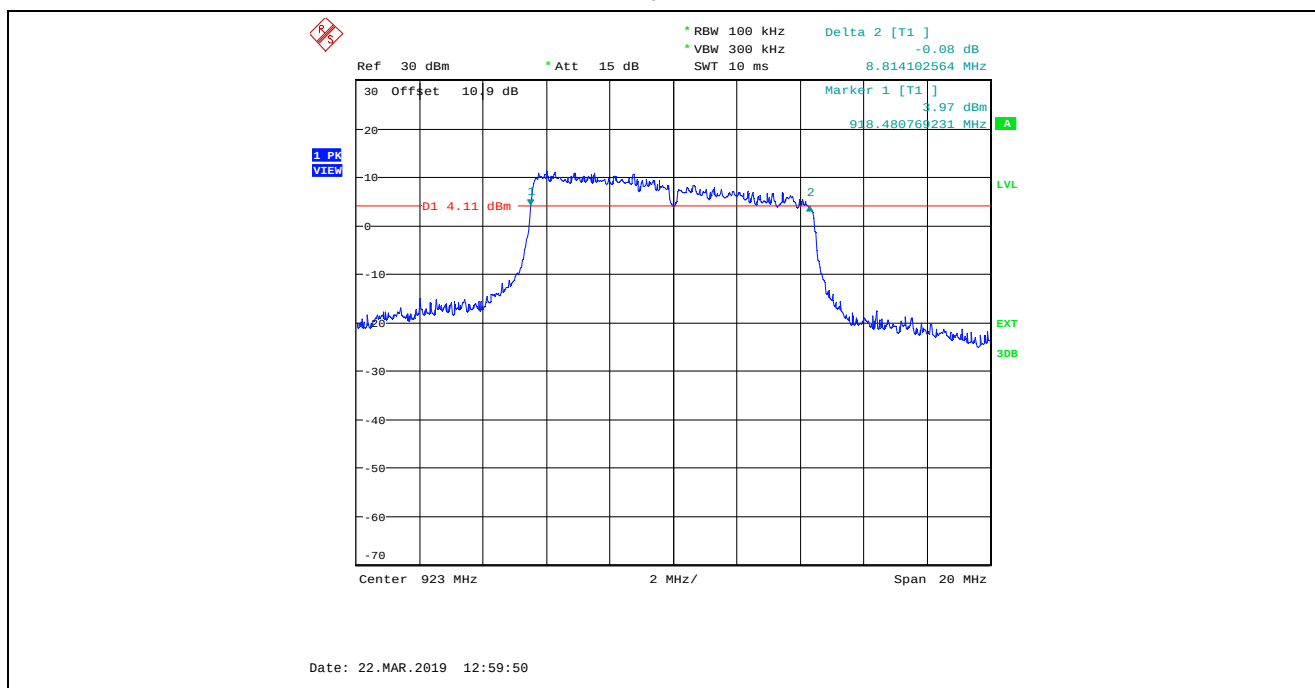
Plot 5.2.4.82. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 7, 915 MHz



Plot 5.2.4.83. 6 dB Bandwidth, Antenna 1
8 MHz BW, Power Setting 24, Data Rate 7, 923 MHz



Plot 5.2.4.84. 6 dB Bandwidth, Antenna 2
8 MHz BW, Power Setting 24, Data Rate 7, 923 MHz



5.3. PEAK CONDUCTED OUTPUT POWER - DTS [§ 15.247(b)(3)]

5.3.1. Limit(s)

§ 15.247(b)(3): For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

§ 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.

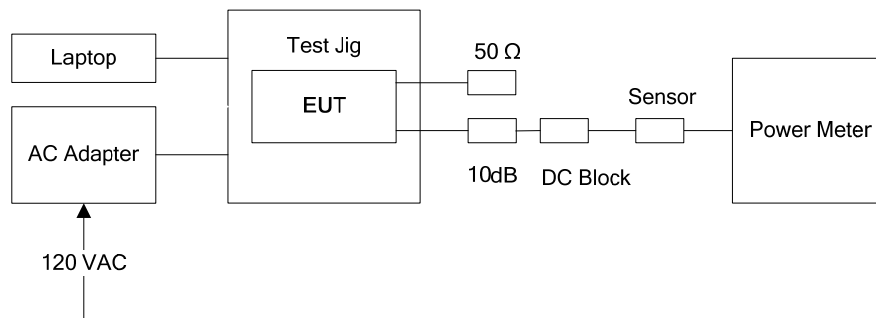
5.3.2. Method of Measurements & Test Arrangement

KDB 558074 D01 15.247 Meas Guidance v05r01, Section 8.3.1.3

ANSI C63.10 section 11.9.1.3 PKPM1 Peak-reading power meter method

KDB 662911 D01 Multiple Transmitter Output v02r01, Section (E)(1) Measure-and sum technique

5.3.3. Test Arrangement



5.3.4. Test Data

Remarks:

1. The EIRP shall be calculated based on the transmitter antenna gain (G_{dBi}), cable loss (CL_{dB}) and peak output power at antenna terminal (P_{dBm}). Calculated EIRP = $P_{dBm} + G_{dBi} - CL_{dB}$
2. If transmit antennas with an effective directional gain greater than 6 dBi are used, the conducted output power from the EUT shall be reduced by the amount in dB that the directional gain of the transmitting antenna exceeds 6 dBi, the applicable output power limit shall be calculated as follows:

$$P_{out} = P_{Limit} - (G_{Tx} - 6)$$

Where: P_{Out} is the maximum conducted output power in dBm,
 P_{Limit} is the output power limit in dBm,
 G_{Tx} is the maximum transmitting antenna directional gain in dBi.

High Power, 4 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 24 (for Data Rates 4, 5, 6 & 7)							
Operating Mode	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Peak Power Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
High Power (TX Gain Setting 20) 4 MHz Bandwidth	1	905	20.97	23.33	25.32	30	-4.68
		915	21.16	22.94	25.15	30	-4.85
		925	21.01	22.32	24.72	30	-5.28
	2	905	20.54	23.48	25.26	30	-4.74
		915	20.97	22.94	25.08	30	-4.92
		925	21.02	22.45	24.80	30	-5.20
	3	905	20.27	23.56	25.23	30	-4.77
		915	21.04	22.94	25.10	30	-4.90
		925	20.87	22.52	24.78	30	-5.22
High Power (TX Gain Setting 24) 4 MHz Bandwidth	4	905	26.91	26.95	29.94	30	-0.06
		915	26.78	27.05	29.93	30	-0.07
		925	25.97	26.18	29.09	30	-0.91
	5	905	26.42	27.10	29.78	30	-0.22
		915	26.48	27.43	29.99	30	-0.01
		925	26.26	26.45	29.37	30	-0.63
	6	905	26.54	27.40	30.00	30	0.00
		915	26.55	27.26	29.93	30	-0.07
		925	26.22	26.21	29.23	30	-0.77
	7	905	26.45	27.47	30.00	30	0.00
		915	26.29	27.05	29.70	30	-0.30
		925	26.44	26.50	29.48	30	-0.52

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
 May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

High Power, 8 MHz Bandwidth, Tx Gain Setting 26 (for Data Rates 1, 2 & 3) / 24 (for Data Rates 4, 5, 6 & 7)							
Operating Mode	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Peak Power Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
High Power (TX Gain Setting 26) 8 MHz Bandwidth	1	907	23.39	26.78	28.42	30	-1.58
		915	23.39	26.21	28.04	30	-1.96
		923	23.39	25.95	27.87	30	-2.13
	2	907	23.62	26.39	28.23	30	-1.77
		915	23.62	26.07	28.03	30	-1.97
		923	23.56	25.95	27.93	30	-2.07
	3	907	23.71	26.20	28.14	30	-1.86
		915	23.62	25.84	27.88	30	-2.12
		923	23.62	25.42	27.62	30	-2.38
High Power (TX Gain Setting 24) 8 MHz Bandwidth	4	907	25.69	27.50	29.70	30	-0.30
		915	25.16	27.46	29.47	30	-0.53
		923	25.32	27.32	29.44	30	-0.56
	5	907	25.32	27.36	29.47	30	-0.53
		915	25.63	27.02	29.39	30	-0.61
		923	25.04	27.38	29.38	30	-0.62
	6	907	25.26	27.93	29.81	30	-0.19
		915	25.19	27.42	29.46	30	-0.54
		923	25.17	27.76	29.67	30	-0.33
	7	907	25.89	27.87	30.00	30	0.00
		915	25.23	27.13	29.29	30	-0.71
		923	25.26	27.54	29.56	30	-0.44

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Low Power, 4 MHz Bandwidth, Tx Gain Setting 0 (for Data Rates 1 to 7)							
Operating Mode	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Peak Power Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
Low Power (TX Gain Setting 0) 4 MHz Bandwidth	1	905	10.77	12.85	14.94	30	-15.06
		915	10.86	12.18	14.58	30	-15.42
		925	10.86	11.61	14.26	30	-15.74
	2	905	10.86	12.86	14.98	30	-15.02
		915	10.86	12.33	14.67	30	-15.33
		925	10.86	11.71	14.32	30	-15.68
	3	905	10.97	12.78	14.98	30	-15.02
		915	10.97	12.18	14.63	30	-15.37
		925	10.72	11.61	14.20	30	-15.80
	4	905	13.13	15.14	17.26	30	-12.74
		915	13.71	14.63	17.20	30	-12.80
		925	13.98	13.91	16.96	30	-13.04
	5	905	13.25	14.76	17.08	30	-12.92
		915	13.27	13.87	16.59	30	-13.41
		925	13.08	14.36	16.78	30	-13.22
	6	905	13.05	15.29	17.32	30	-12.68
		915	13.25	14.70	17.05	30	-12.95
		925	13.54	13.96	16.77	30	-13.23
	7	905	13.14	15.23	17.32	30	-12.68
		915	13.10	14.64	16.95	30	-13.05
		925	13.17	14.07	16.65	30	-13.35

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Low Power, 8 MHz Bandwidth, Tx Gain Setting 0 (for Data Rates 1 to 7)							
Operating Mode	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Peak Power Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
Low Power (TX Gain Setting 0) 8 MHz Bandwidth	1	907	11.18	12.82	15.09	30	-14.91
		915	11.13	12.47	14.86	30	-15.14
		923	11.09	12.12	14.65	30	-15.35
	2	907	11.18	13.07	15.24	30	-14.76
		915	10.99	12.61	14.89	30	-15.11
		923	11.18	12.30	14.79	30	-15.21
	3	907	11.18	12.99	15.19	30	-14.81
		915	11.08	12.56	14.89	30	-15.11
		923	11.09	12.26	14.72	30	-15.28
	4	907	13.56	14.39	17.01	30	-12.99
		915	13.45	14.81	17.19	30	-12.81
		923	13.33	14.37	16.89	30	-13.11
	5	907	13.13	14.85	17.08	30	-12.92
		915	13.18	14.91	17.14	30	-12.86
		923	13.34	14.71	17.09	30	-12.91
	6	907	13.19	14.99	17.19	30	-12.81
		915	13.38	14.32	16.89	30	-13.11
		923	13.35	14.36	16.89	30	-13.11
	7	907	13.19	14.89	17.13	30	-12.87
		915	13.15	14.45	16.86	30	-13.14
		923	12.30	14.28	16.41	30	-13.59

Maximum Power Setting for 3 dBi Rubber Duck Antenna with 2.62 dBi Antenna Assembly Gain [4 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 24 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	905	20.97	23.33	25.32	5.67	30.99	30	36
		915	21.16	22.94	25.15	5.67	30.82	30	36
		925	21.01	22.32	24.72	5.67	30.39	30	36
	2	905	20.54	23.48	25.26	5.67	30.93	30	36
		915	20.97	22.94	25.08	5.67	30.75	30	36
		925	21.02	22.45	24.80	5.67	30.47	30	36
	3	905	20.27	23.56	25.23	5.67	30.90	30	36
		915	21.04	22.94	25.10	5.67	30.77	30	36
		925	20.87	22.52	24.78	5.67	30.45	30	36
24	4	905	26.91	26.95	29.94	5.67	35.61	30	36
		915	26.78	27.05	29.93	5.67	35.60	30	36
		925	25.97	26.18	29.09	5.67	34.76	30	36
	5	905	26.42	27.10	29.78	5.67	35.45	30	36
		915	26.48	27.43	29.99	5.67	35.66	30	36
		925	26.26	26.45	29.37	5.67	35.04	30	36
	6	905	26.54	27.40	30.00	5.67	35.67	30	36
		915	26.55	27.26	29.93	5.67	35.60	30	36
		925	26.22	26.21	29.23	5.67	34.90	30	36
	7	905	26.45	27.47	30.00	5.67	35.67	30	36
		915	26.29	27.05	29.70	5.67	35.37	30	36
		925	26.44	26.50	29.48	5.67	35.15	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 3 dBi Rubber Duck Antenna with 2.62 dBi Antenna Assembly Gain [8 MHz Bandwidth, Tx Gain Setting 26 (for Data Rates 1, 2 & 3) / 24 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
26	1	907	23.39	26.78	28.42	5.67	34.09	30	36
		915	23.39	26.21	28.04	5.67	33.71	30	36
		923	23.39	25.95	27.87	5.67	33.54	30	36
	2	907	23.62	26.39	28.23	5.67	33.90	30	36
		915	23.62	26.07	28.03	5.67	33.70	30	36
		923	23.56	25.95	27.93	5.67	33.60	30	36
	3	907	23.71	26.20	28.14	5.67	33.81	30	36
		915	23.62	25.84	27.88	5.67	33.55	30	36
		923	23.62	25.42	27.62	5.67	33.29	30	36
24	4	907	25.69	27.50	29.70	5.67	35.37	30	36
		915	25.16	27.46	29.47	5.67	35.14	30	36
		923	25.32	27.32	29.44	5.67	35.11	30	36
	5	907	25.32	27.36	29.47	5.67	35.14	30	36
		915	25.63	27.02	29.39	5.67	35.06	30	36
		923	25.04	27.38	29.38	5.67	35.05	30	36
	6	907	25.26	27.93	29.81	5.67	35.48	30	36
		915	25.19	27.42	29.46	5.67	35.13	30	36
		923	25.17	27.76	29.67	5.67	35.34	30	36
	7	907	25.89	27.87	30.00	5.67	35.67	30	36
		915	25.23	27.13	29.29	5.67	34.96	30	36
		923	25.26	27.54	29.56	5.67	35.23	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
 May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 4 dBi Puck Antenna with 3.66 dBi Antenna Assembly Gain [4 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 23 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	905	20.97	23.33	25.32	6.67	31.99	30	36
		915	21.16	22.94	25.15	6.67	31.82	30	36
		925	21.01	22.32	24.72	6.67	31.39	30	36
	2	905	20.54	23.48	25.26	6.67	31.93	30	36
		915	20.97	22.94	25.08	6.67	31.75	30	36
		925	21.02	22.45	24.80	6.67	31.47	30	36
	3	905	20.27	23.56	25.23	6.67	31.90	30	36
		915	21.04	22.94	25.10	6.67	31.77	30	36
		925	20.87	22.52	24.78	6.67	31.45	30	36
23	4	905	25.78	26.77	29.31	6.67	35.98	30	36
		915	25.92	26.57	29.27	6.67	35.94	30	36
		925	25.73	26.02	28.89	6.67	35.56	30	36
	5	905	25.47	26.89	29.25	6.67	35.92	30	36
		915	25.99	26.43	29.23	6.67	35.90	30	36
		925	25.95	26.09	29.03	6.67	35.70	30	36
	6	905	25.78	26.75	29.30	6.67	35.97	30	36
		915	25.76	26.80	29.32	6.67	35.99	30	36
		925	26.08	26.09	29.10	6.67	35.77	30	36
	7	905	26.11	26.49	29.31	6.67	35.98	30	36
		915	25.86	26.71	29.32	6.67	35.99	30	36
		925	26.09	26.11	29.11	6.67	35.78	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 4 dBi Puck Antenna with 3.66 dBi Antenna Assembly Gain [8 MHz Bandwidth, Tx Gain Setting 26 (for Data Rates 1, 2 & 3) / 23 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
26	1	907	23.39	26.78	28.42	6.67	35.09	30	36
		915	23.39	26.21	28.04	6.67	34.71	30	36
		923	23.39	25.95	27.87	6.67	34.54	30	36
	2	907	23.62	26.39	28.23	6.67	34.90	30	36
		915	23.62	26.07	28.03	6.67	34.70	30	36
		923	23.56	25.95	27.93	6.67	34.60	30	36
	3	907	23.71	26.20	28.14	6.67	34.81	30	36
		915	23.62	25.84	27.88	6.67	34.55	30	36
		923	23.62	25.42	27.62	6.67	34.29	30	36
23	4	907	25.19	27.04	29.22	6.67	35.89	30	36
		915	25.03	27.22	29.27	6.67	35.94	30	36
		923	24.99	27.00	29.12	6.67	35.79	30	36
	5	907	25.13	26.94	29.14	6.67	35.81	30	36
		915	25.19	26.88	29.13	6.67	35.80	30	36
		923	24.99	27.19	29.24	6.67	35.91	30	36
	6	907	24.86	26.96	29.05	6.67	35.72	30	36
		915	25.09	27.23	29.30	6.67	35.97	30	36
		923	24.81	26.86	28.97	6.67	35.64	30	36
	7	907	25.09	27.26	29.32	6.67	35.99	30	36
		915	25.07	26.94	29.12	6.67	35.79	30	36
		923	24.98	27.07	29.16	6.67	35.83	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 8 dBi Patch Antenna with 7.66 dBi Antenna Assembly Gain [4 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 17 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	905	20.97	23.33	25.32	10.67	35.99	30	36
		915	21.16	22.94	25.15	10.67	35.82	30	36
		925	21.01	22.32	24.72	10.67	35.39	30	36
	2	905	20.54	23.48	25.26	10.67	35.93	30	36
		915	20.97	22.94	25.08	10.67	35.75	30	36
		925	21.02	22.45	24.80	10.67	35.47	30	36
	3	905	20.27	23.56	25.23	10.67	35.90	30	36
		915	21.04	22.94	25.10	10.67	35.77	30	36
		925	20.87	22.52	24.78	10.67	35.45	30	36
17	4	905	20.26	23.66	25.29	10.67	35.96	30	36
		915	21.37	23.09	25.32	10.67	35.99	30	36
		925	21.15	23.11	25.25	10.67	35.92	30	36
	5	905	21.05	23.22	25.28	10.67	35.95	30	36
		915	21.11	23.24	25.31	10.67	35.98	30	36
		925	21.06	23.28	25.32	10.67	35.99	30	36
	6	905	21.09	23.13	25.24	10.67	35.91	30	36
		915	21.36	22.98	25.26	10.67	35.93	30	36
		925	21.05	23.19	25.26	10.67	35.93	30	36
	7	905	21.29	23.14	25.32	10.67	35.99	30	36
		915	21.31	22.99	25.24	10.67	35.91	30	36
		925	21.39	22.67	25.09	10.67	35.76	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
 May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 8 dBi Patch Antenna with 7.66 dBi Antenna Assembly Gain [8 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 17 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	907	20.33	23.34	25.10	10.67	35.77	30	36
		915	20.47	22.89	24.86	10.67	35.53	30	36
		923	20.33	22.46	24.53	10.67	35.20	30	36
	2	907	20.51	23.11	25.01	10.67	35.68	30	36
		915	20.71	22.89	24.95	10.67	35.62	30	36
		923	20.33	22.68	24.67	10.67	35.34	30	36
	3	907	20.51	22.92	24.89	10.67	35.56	30	36
		915	20.70	22.68	24.81	10.67	35.48	30	36
		923	20.70	22.26	24.56	10.67	35.23	30	36
17	4	907	21.02	23.19	25.25	10.67	35.92	30	36
		915	21.15	23.22	25.32	10.67	35.99	30	36
		923	21.23	23.18	25.32	10.67	35.99	30	36
	5	907	21.76	22.78	25.31	10.67	35.98	30	36
		915	21.66	22.85	25.31	10.67	35.98	30	36
		923	21.59	22.76	25.22	10.67	35.89	30	36
	6	907	21.38	23.05	25.31	10.67	35.98	30	36
		915	21.09	23.23	25.30	10.67	35.97	30	36
		923	21.17	23.13	25.27	10.67	35.94	30	36
	7	907	21.09	22.79	25.03	10.67	35.70	30	36
		915	21.05	23.19	25.26	10.67	35.93	30	36
		923	21.15	23.22	25.32	10.67	35.99	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 8 dBi Omni Directional Antenna with 6.98 dBi Antenna Assembly Gain [4 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 17 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	905	20.97	23.33	25.32	9.99	35.31	30	36
		915	21.16	22.94	25.15	9.99	35.14	30	36
		925	21.01	22.32	24.72	9.99	34.71	30	36
	2	905	20.54	23.48	25.26	9.99	35.25	30	36
		915	20.97	22.94	25.08	9.99	35.07	30	36
		925	21.02	22.45	24.80	9.99	34.79	30	36
	3	905	20.27	23.56	25.23	9.99	35.22	30	36
		915	21.04	22.94	25.10	9.99	35.09	30	36
		925	20.87	22.52	24.78	9.99	34.77	30	36
17	4	905	20.26	23.66	25.29	9.99	35.28	30	36
		915	21.37	23.09	25.32	9.99	35.31	30	36
		925	21.15	23.11	25.25	9.99	35.24	30	36
	5	905	21.05	23.22	25.28	9.99	35.27	30	36
		915	21.11	23.24	25.31	9.99	35.30	30	36
		925	21.06	23.28	25.32	9.99	35.31	30	36
	6	905	21.09	23.13	25.24	9.99	35.23	30	36
		915	21.36	22.98	25.26	9.99	35.25	30	36
		925	21.05	23.19	25.26	9.99	35.25	30	36
	7	905	21.29	23.14	25.32	9.99	35.31	30	36
		915	21.31	22.99	25.24	9.99	35.23	30	36
		925	21.39	22.67	25.09	9.99	35.08	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 8 dBi Omni Directional Antenna with 6.98 dBi Antenna Assembly Gain [8 MHz Bandwidth, Tx Gain Setting 20 (for Data Rates 1, 2 & 3) / 17 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
20	1	907	20.33	23.34	25.10	9.99	35.09	30	36
		915	20.47	22.89	24.86	9.99	34.85	30	36
		923	20.33	22.46	24.53	9.99	34.52	30	36
	2	907	20.51	23.11	25.01	9.99	35.00	30	36
		915	20.71	22.89	24.95	9.99	34.94	30	36
		923	20.33	22.68	24.67	9.99	34.66	30	36
	3	907	20.51	22.92	24.89	9.99	34.88	30	36
		915	20.70	22.68	24.81	9.99	34.80	30	36
		923	20.70	22.26	24.56	9.99	34.55	30	36
17	4	907	21.02	23.19	25.25	9.99	35.24	30	36
		915	21.15	23.22	25.32	9.99	35.31	30	36
		923	21.23	23.18	25.32	9.99	35.31	30	36
	5	907	21.76	22.78	25.31	9.99	35.30	30	36
		915	21.66	22.85	25.31	9.99	35.30	30	36
		923	21.59	22.76	25.22	9.99	35.21	30	36
	6	907	21.38	23.05	25.31	9.99	35.30	30	36
		915	21.09	23.23	25.30	9.99	35.29	30	36
		923	21.17	23.13	25.27	9.99	35.26	30	36
	7	907	21.09	22.79	25.03	9.99	35.02	30	36
		915	21.05	23.19	25.26	9.99	35.25	30	36
		923	21.15	23.22	25.32	9.99	35.31	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 14 dBi Yagi Antenna with 12.98 dBi Antenna Assembly Gain [4 MHz Bandwidth, Tx Gain Setting 9 (for Data Rates 1, 2 & 3) / 6 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
9	1	905	15.39	17.83	19.79	15.99	35.78	30	36
		915	15.43	17.22	19.43	15.99	35.42	30	36
		925	15.39	16.69	19.10	15.99	35.09	30	36
	2	905	15.39	18.05	19.93	15.99	35.92	30	36
		915	15.46	17.37	19.53	15.99	35.52	30	36
		925	15.36	16.86	19.18	15.99	35.17	30	36
	3	905	15.29	18.10	19.93	15.99	35.92	30	36
		915	15.32	17.37	19.48	15.99	35.47	30	36
		925	15.19	16.87	19.12	15.99	35.11	30	36
6	4	905	16.21	17.49	19.91	15.99	35.90	30	36
		915	15.61	17.24	19.51	15.99	35.50	30	36
		925	15.25	17.57	19.57	15.99	35.56	30	36
	5	905	15.45	17.63	19.69	15.99	35.68	30	36
		915	15.76	17.15	19.52	15.99	35.51	30	36
		925	15.83	16.56	19.22	15.99	35.21	30	36
	6	905	16.48	17.12	19.82	15.99	35.81	30	36
		915	15.25	17.45	19.50	15.99	35.49	30	36
		925	16.41	17.25	19.86	15.99	35.85	30	36
	7	905	15.01	17.03	19.15	15.99	35.14	30	36
		915	15.95	16.85	19.43	15.99	35.42	30	36
		925	15.27	16.69	19.05	15.99	35.04	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
 May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Maximum Power Setting for 14 dBi Yagi Antenna with 12.98 dBi Antenna Assembly Gain [8 MHz Bandwidth, Tx Gain Setting 9 (for Data Rates 1, 2 & 3) / 6 (for Data Rates 4, 5, 6 & 7)]									
TX Gain Setting (0 – 26)	Data Rate	Frequency (MHz)	Peak Power (dBm)		Total Peak Power (dBm)	Antenna Directional Gain (dBi)	EIRP (dBm)	Peak Power Limit (dBm)	EIRP Limit (dBm)
			Chain # 1	Chain # 2					
9	1	907	15.47	18.07	19.97	15.99	35.96	30	36
		915	15.60	17.37	19.58	15.99	35.57	30	36
		923	15.68	16.96	19.38	15.99	35.37	30	36
	2	907	15.48	18.11	20.00	15.99	35.99	30	36
		915	15.48	17.60	19.68	15.99	35.67	30	36
		923	15.60	17.60	19.72	15.99	35.71	30	36
	3	907	15.45	18.12	20.00	15.99	35.99	30	36
		915	15.52	17.60	19.69	15.99	35.68	30	36
		923	15.79	17.61	19.80	15.99	35.79	30	36
6	4	907	15.20	17.56	19.55	15.99	35.54	30	36
		915	15.44	17.78	19.78	15.99	35.77	30	36
		923	15.18	17.39	19.43	15.99	35.42	30	36
	5	907	15.54	17.54	19.66	15.99	35.65	30	36
		915	15.81	17.62	19.82	15.99	35.81	30	36
		923	15.91	17.79	19.96	15.99	35.95	30	36
	6	907	15.74	17.55	19.75	15.99	35.74	30	36
		915	15.72	17.74	19.86	15.99	35.85	30	36
		923	15.81	17.62	19.82	15.99	35.81	30	36
	7	907	16.04	17.58	19.89	15.99	35.88	30	36
		915	15.77	17.44	19.70	15.99	35.69	30	36
		923	15.89	17.64	19.86	15.99	35.85	30	36

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

5.4. TRANSMITTER SPURIOUS RADIATED EMISSIONS AT 3 METERS [§§ 15.247(d), 15.209 & 15.205]

5.4.1. Limit(s)

§ 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Section 15.205(a) - Restricted Bands of Operation

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	2655–2900	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			

¹ Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.

² Above 38.6

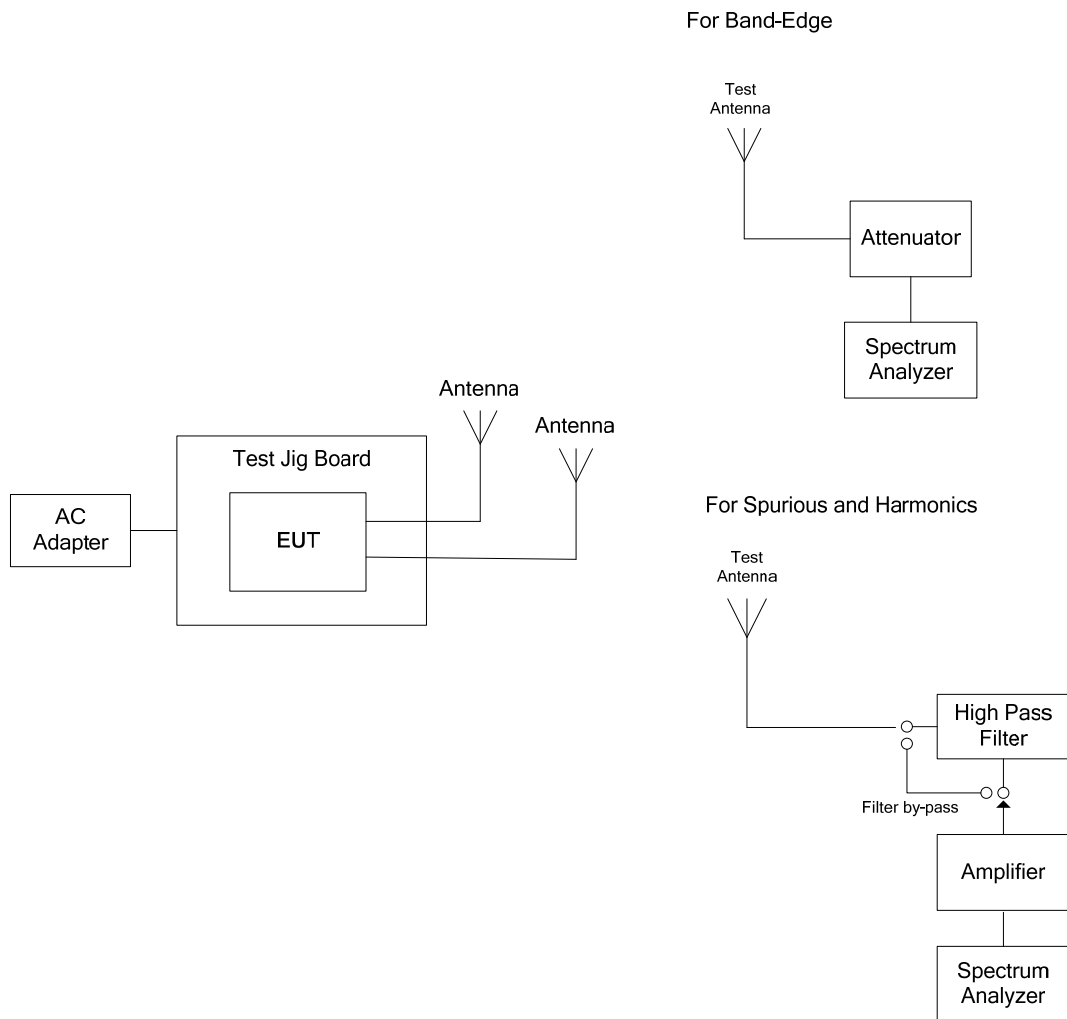
Section 15.209(a) - Field Strength Limits within Restricted Frequency Bands

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

5.4.2. Method of Measurements

KDB 558074 D01 15.247 Meas Guidance v05r01, Sections 8.5, 8.6 and 8.7.
ANSI C63.10 Subclauses 11.11, 11.12 and 11.13

5.4.3. Test Arrangement



5.4.4. Test Data

Remark(s):

- All spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- EUT shall be tested in three orthogonal positions.
- The following test data represent the worst-case derived from exploratory tests.

5.4.4.1. EUT with 3 dBi Rubber Duck Antenna, 2.62 dBi Antenna Assembly Gain

5.4.4.1.1. Spurious Radiated Emission

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	117.77	--	V	--	--	--	--
905.0	117.26	--	H	--	--	--	--
2715.0	53.34	43.32	V	54.0	97.8	-10.7	Pass*
2715.0	54.98	47.50	H	54.0	97.8	-6.5	Pass*
3620.0	46.55	34.01	V	54.0	97.8	-20.0	Pass*
4525.0	48.66	35.17	V	54.0	97.8	-18.8	Pass*
4525.0	49.39	35.69	H	54.0	97.8	-18.3	Pass*
5430.0	50.11	36.08	V	54.0	97.8	-17.9	Pass*
5430.0	50.39	36.39	H	54.0	97.8	-17.6	Pass*
8145.0	56.89	47.56	V	54.0	97.8	-6.4	Pass*
8145.0	56.20	43.06	H	54.0	97.8	-10.9	Pass*
9050.0	57.02	46.30	V	54.0	97.8	-7.7	Pass*
9050.0	56.12	41.53	H	54.0	97.8	-12.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
915.0	117.21	--	V	--	--	--	--
915.0	115.49	--	H	--	--	--	--
2745.0	50.11	42.23	V	54.0	97.2	-11.8	Pass*
2745.0	54.36	46.86	H	54.0	97.2	-7.1	Pass*
3660.0	46.15	35.17	V	54.0	97.2	-18.8	Pass*
3660.0	49.21	39.37	H	54.0	97.2	-14.6	Pass*
4575.0	47.89	34.57	V	54.0	97.2	-19.4	Pass*
4575.0	48.85	35.29	H	54.0	97.2	-18.7	Pass*
6405.0	51.22	37.33	V	54.0	97.2	-16.7	Pass*
6405.0	51.76	38.30	H	54.0	97.2	-15.7	Pass*
7320.0	56.97	46.08	V	54.0	97.2	-7.9	Pass*
7320.0	59.66	51.56	H	54.0	97.2	-2.4	Pass*
8235.0	55.73	44.09	V	54.0	97.2	-9.9	Pass*
8235.0	56.01	44.86	H	54.0	97.2	-9.1	Pass*
9150.0	57.99	46.42	V	54.0	97.2	-7.6	Pass*
9150.0	57.56	45.85	H	54.0	97.2	-8.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	114.40	--	V	--	--	--	--
925.0	118.98	--	H	--	--	--	--
2775.0	51.50	42.38	V	54.0	99.0	-11.6	Pass*
2775.0	53.47	47.03	H	54.0	99.0	-7.0	Pass*
3700.0	47.01	35.10	V	54.0	99.0	-18.9	Pass*
3700.0	49.62	39.27	H	54.0	99.0	-14.7	Pass*
4625.0	47.56	34.33	H	54.0	99.0	-19.7	Pass*
7400.0	53.87	41.03	V	54.0	99.0	-13.0	Pass*
7400.0	57.33	49.07	H	54.0	99.0	-4.9	Pass*
8325.0	54.88	42.13	V	54.0	99.0	-11.9	Pass*
8325.0	55.54	43.42	H	54.0	99.0	-10.6	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	113.16	--	V	--	--	--	--
905.0	114.43	--	H	--	--	--	--
2715.0	55.88	37.78	V	54.0	94.4	-16.2	Pass*
2715.0	56.02	39.58	H	54.0	94.4	-14.4	Pass*
3620.0	46.41	32.34	V	54.0	94.4	-21.7	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	111.58	--	V	--	--	--	--
915.0	112.92	--	H	--	--	--	--
2745.0	56.14	37.34	V	54.0	92.9	-16.7	Pass*
2745.0	56.12	39.24	H	54.0	92.9	-14.8	Pass*
7320.0	55.02	39.73	V	54.0	92.9	-14.3	Pass*
7320.0	59.05	41.31	H	54.0	92.9	-12.7	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	112.12	--	V	--	--	--	--
925.0	112.25	--	H	--	--	--	--
2775.0	50.87	35.75	V	54.0	92.3	-18.3	Pass*
2775.0	54.82	39.19	H	54.0	92.3	-14.8	Pass*
7400.0	53.61	39.20	V	54.0	92.3	-14.8	Pass*
7400.0	60.49	40.81	H	54.0	92.3	-13.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	117.05	--	V	--	--	--	--
907.0	116.87	--	H	--	--	--	--
2721.0	49.51	41.95	V	54.0	97.1	-12.1	Pass*
2721.0	54.51	48.58	H	54.0	97.1	-5.4	Pass*
3628.0	51.07	44.83	H	54.0	97.1	-9.2	Pass*
4535.0	48.98	35.85	H	54.0	97.1	-18.2	Pass*
5442.0	51.87	38.49	H	54.0	97.1	-15.5	Pass*
7256.0	54.64	42.76	V	54.0	97.1	-11.2	Pass*
7256.0	57.77	50.97	H	54.0	97.1	-3.0	Pass*
8163.0	54.79	42.04	V	54.0	97.1	-12.0	Pass*
8163.0	55.76	42.10	H	54.0	97.1	-11.9	Pass*
9070.0	56.17	42.99	V	54.0	97.1	-11.0	Pass*
9070.0	57.35	44.23	H	54.0	97.1	-9.8	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	115.12	--	V	--	--	--	--
915.0	116.28	--	H	--	--	--	--
2745.0	52.21	44.11	V	54.0	96.3	-9.9	Pass*
2745.0	53.18	46.80	H	54.0	96.3	-7.2	Pass*
3660.0	48.26	46.64	H	54.0	96.3	-7.4	Pass*
4575.0	48.58	35.12	H	54.0	96.3	-18.9	Pass*
7320.0	55.11	42.82	V	54.0	96.3	-11.2	Pass*
7320.0	58.21	50.77	H	54.0	96.3	-3.2	Pass*
8235.0	55.81	42.70	V	54.0	96.3	-11.3	Pass*
8235.0	55.82	43.30	H	54.0	96.3	-10.7	Pass*
9150.0	58.37	45.51	V	54.0	96.3	-8.5	Pass*
9150.0	57.83	48.65	H	54.0	96.3	-5.4	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	115.60	--	V	--	--	--	--
923.0	116.99	--	H	--	--	--	--
2769.0	50.89	42.58	V	54.0	97.0	-11.4	Pass*
2769.0	53.67	47.69	H	54.0	97.0	-6.3	Pass*
3692.0	49.12	40.14	H	54.0	97.0	-13.9	Pass*
4615.0	48.67	33.96	H	54.0	97.0	-20.0	Pass*
7384.0	53.43	44.07	V	54.0	97.0	-9.9	Pass*
7384.0	56.45	48.97	H	54.0	97.0	-5.0	Pass*
8307.0	55.91	42.59	V	54.0	97.0	-11.4	Pass*
8307.0	55.84	42.55	H	54.0	97.0	-11.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

5.4.4.1.2.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	113.17	--	V	--	--	--	--
907.0	111.19	--	H	--	--	--	--
2721.0	52.68	35.06	V	54.0	93.2	-18.9	Pass*
2721.0	52.62	37.97	H	54.0	93.2	-16.0	Pass*
7256.0	53.38	39.25	V	54.0	93.2	-14.8	Pass*
7256.0	54.07	39.73	H	54.0	93.2	-14.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

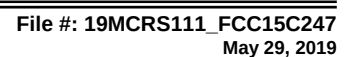
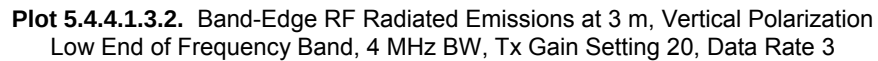
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	111.47	--	V	--	--	--	--
915.0	110.13	--	H	--	--	--	--
2745.0	51.77	34.77	V	54.0	91.5	-19.2	Pass*
2745.0	51.87	36.45	H	54.0	91.5	-17.6	Pass*
7320.0	53.71	38.86	V	54.0	91.5	-15.1	Pass*
7320.0	54.55	39.90	H	54.0	91.5	-14.1	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

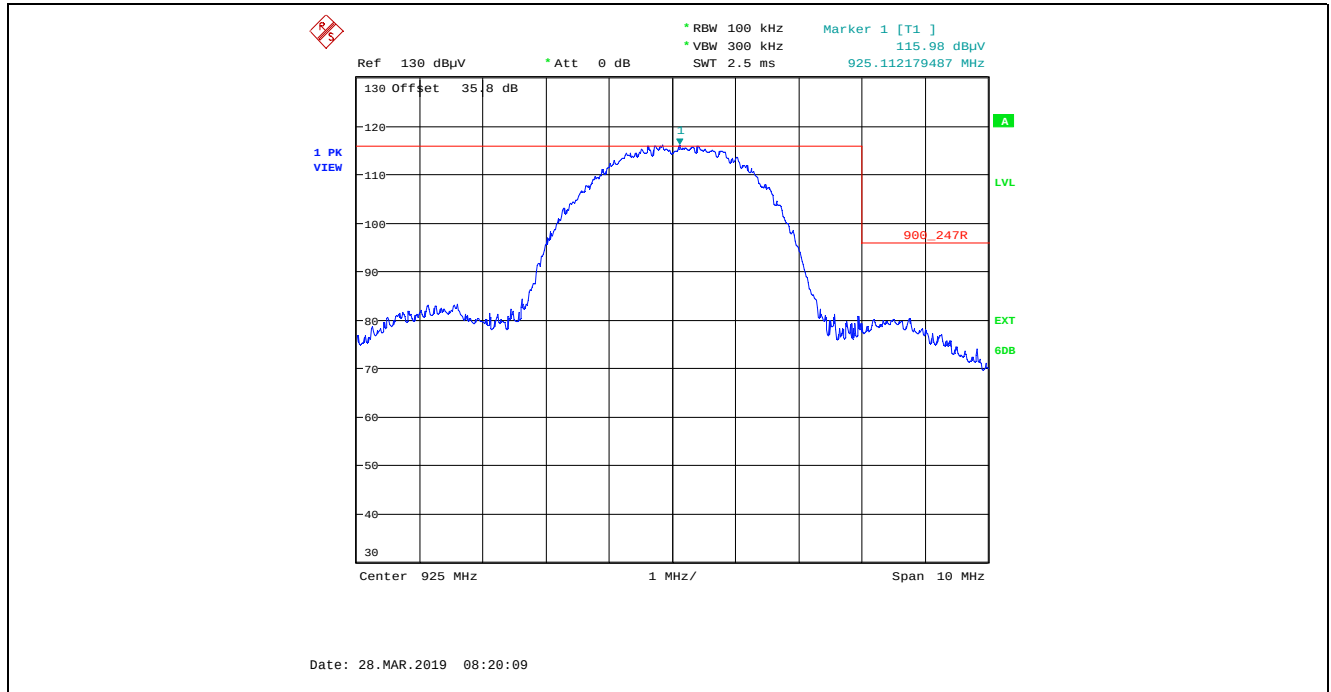
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 24, Data Rate 4					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	110.14	--	V	--	--	--	--
923.0	110.50	--	H	--	--	--	--
2769.0	50.26	34.48	V	54.0	90.5	-19.5	Pass*
2769.0	52.07	37.26	H	54.0	90.5	-16.7	Pass*
7384.0	52.41	38.75	V	54.0	90.5	-15.3	Pass*
7384.0	55.09	39.71	H	54.0	90.5	-14.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

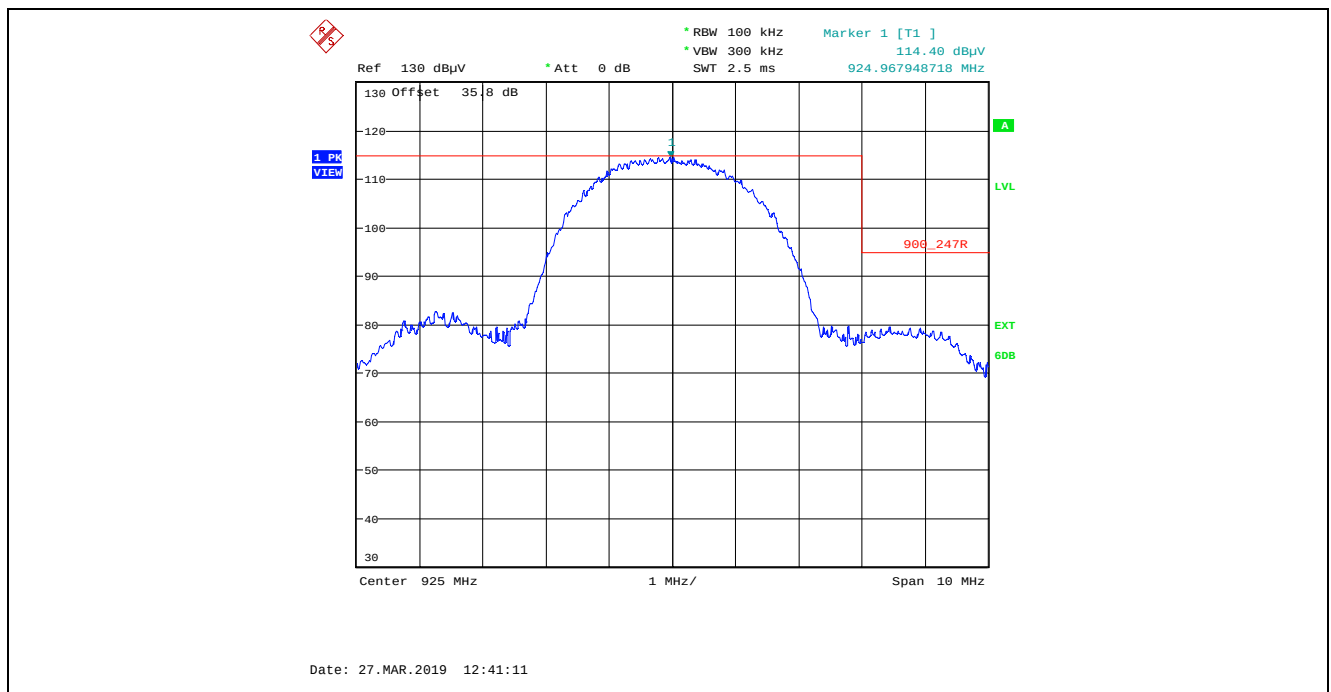
Plot 5.4.4.1.3.1. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



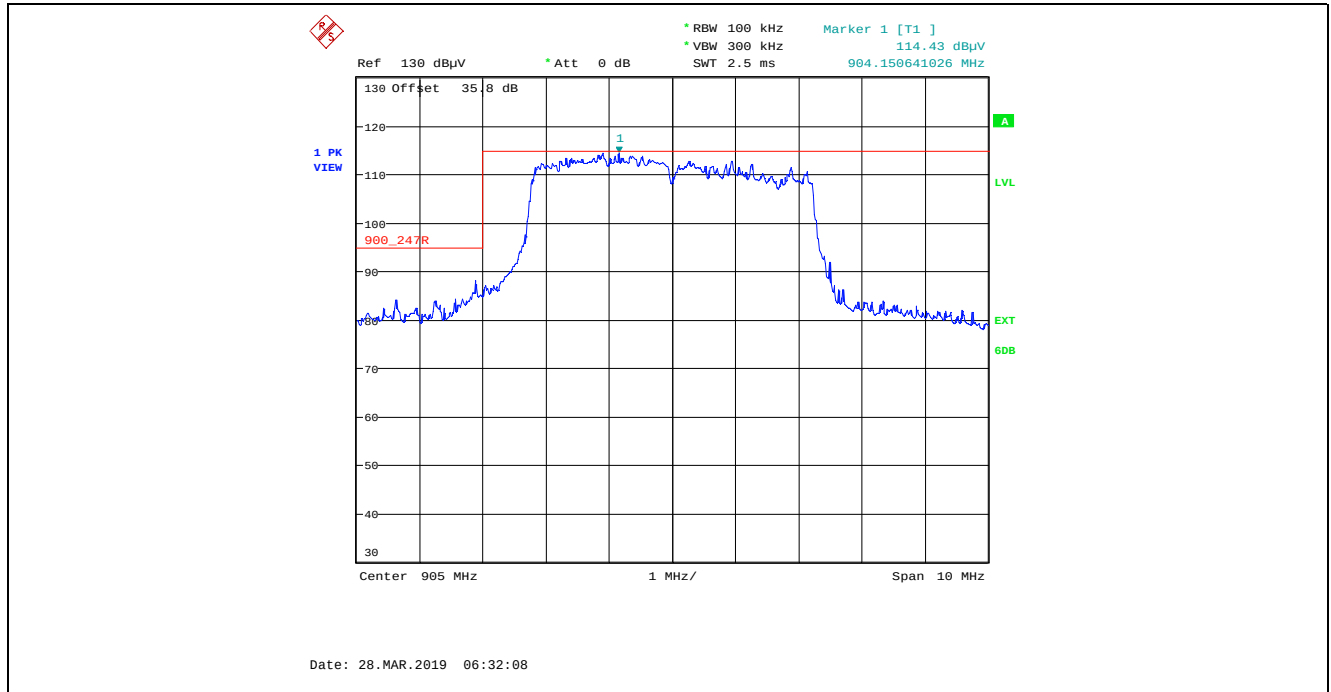
Plot 5.4.4.1.3.3. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



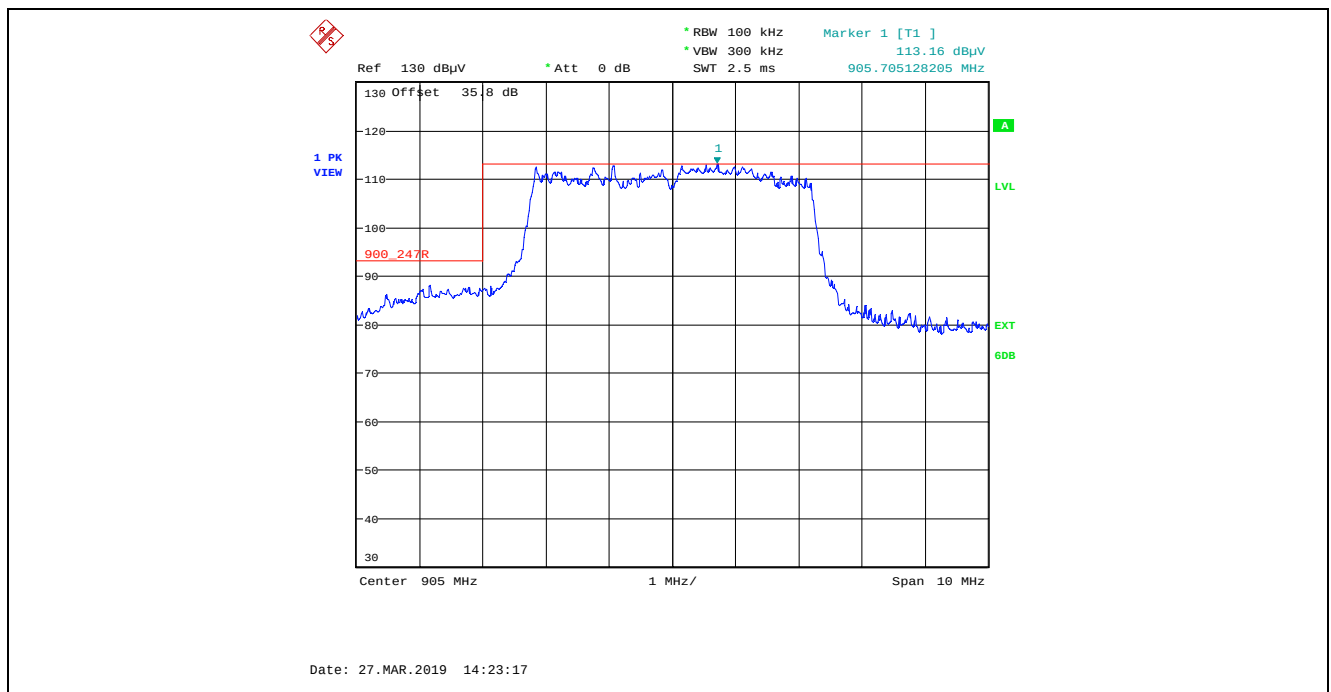
Plot 5.4.4.1.3.4. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



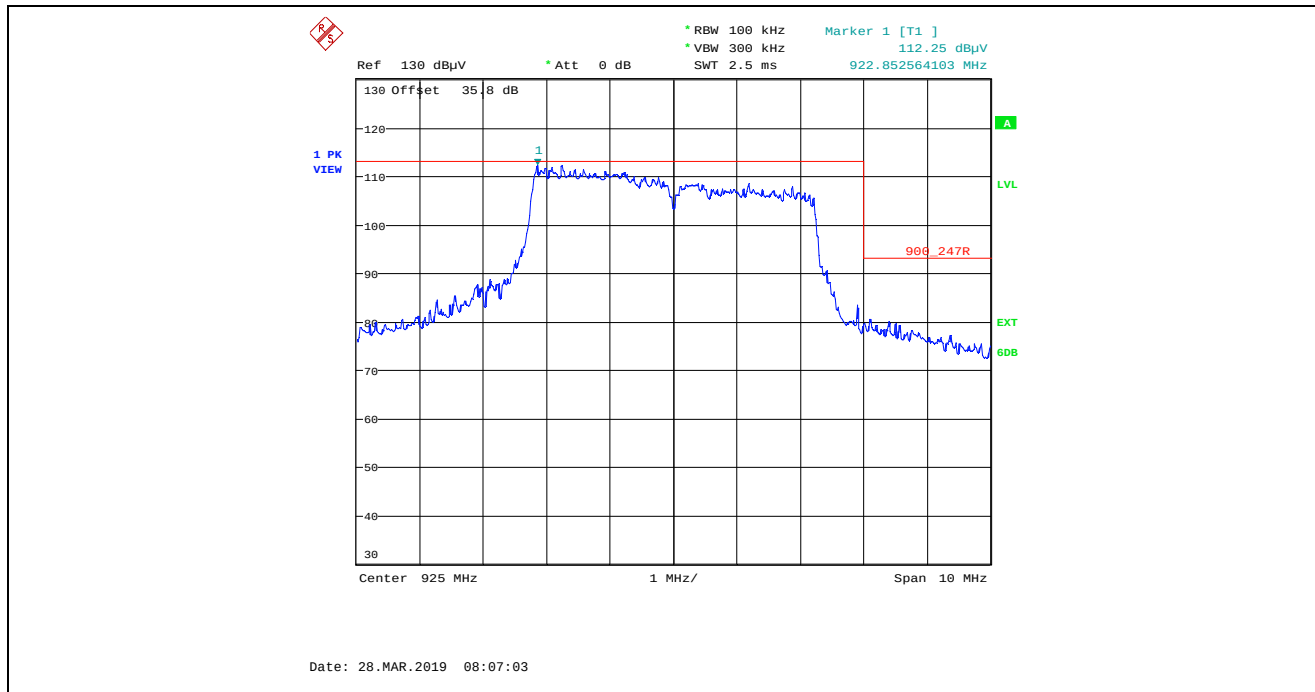
Plot 5.4.4.1.3.5. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 24, Data Rate 7



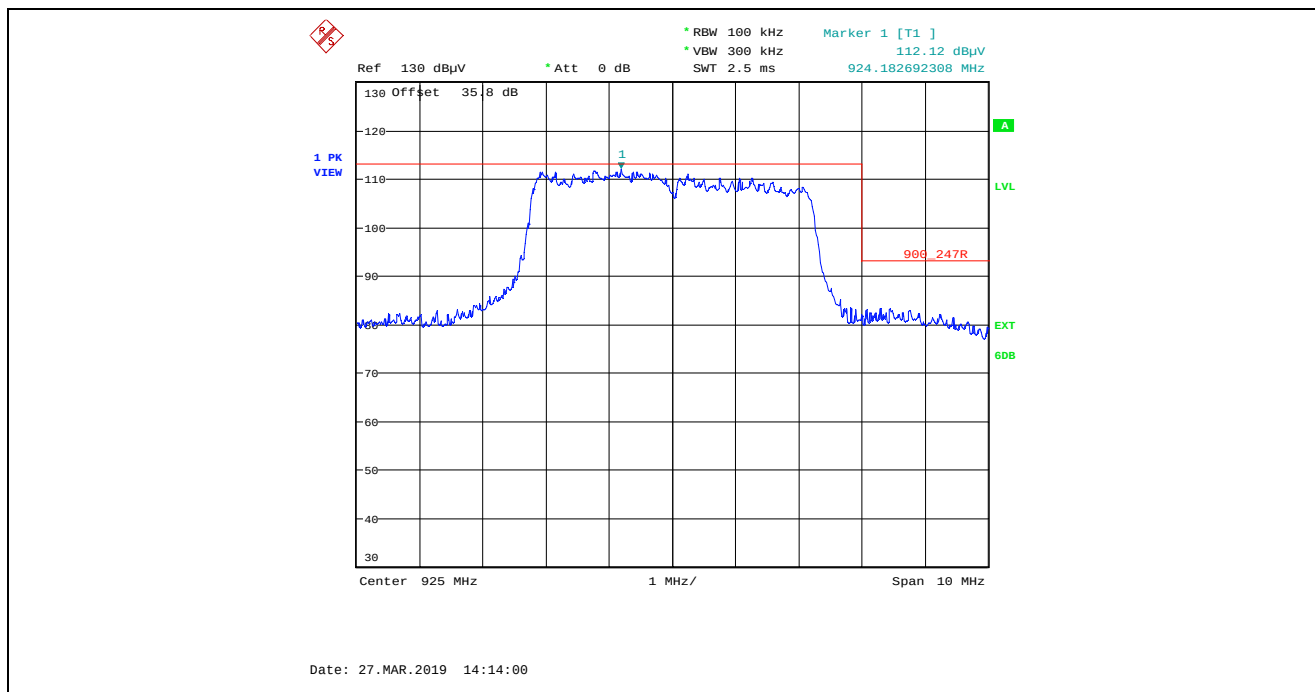
Plot 5.4.4.1.3.6. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 24, Data Rate 7



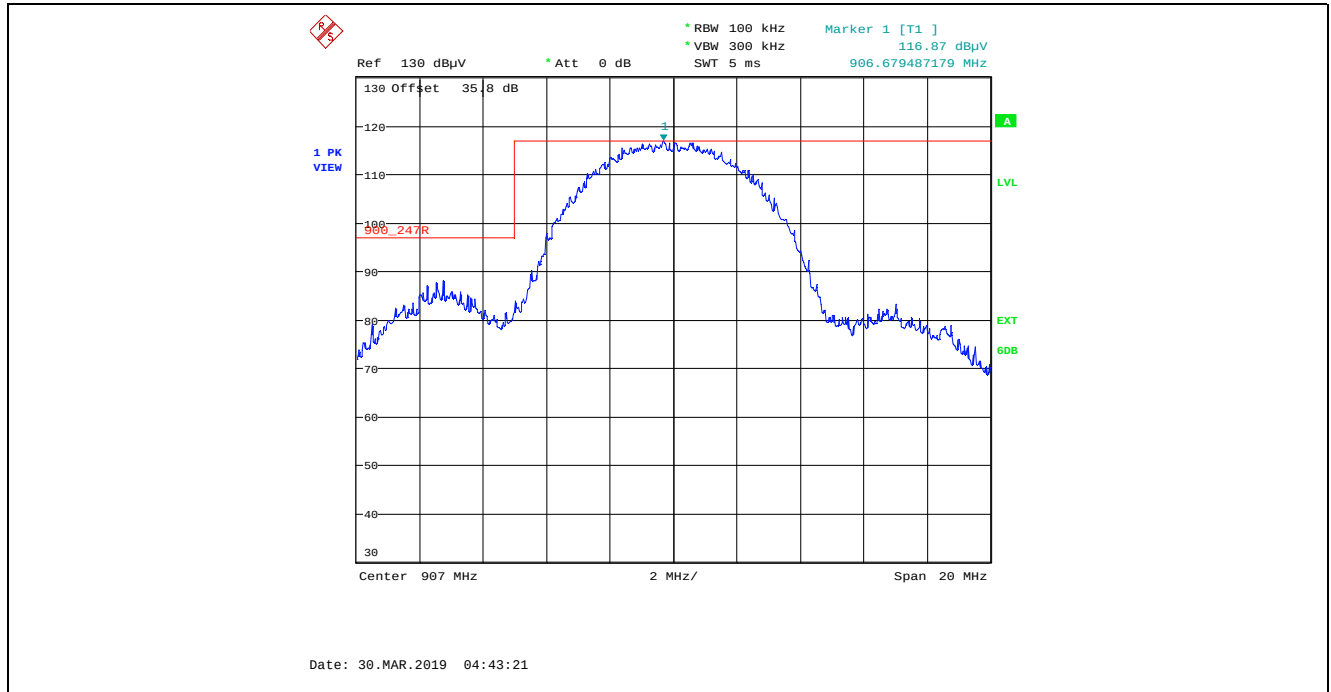
Plot 5.4.4.1.3.7. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 24, Data Rate 7



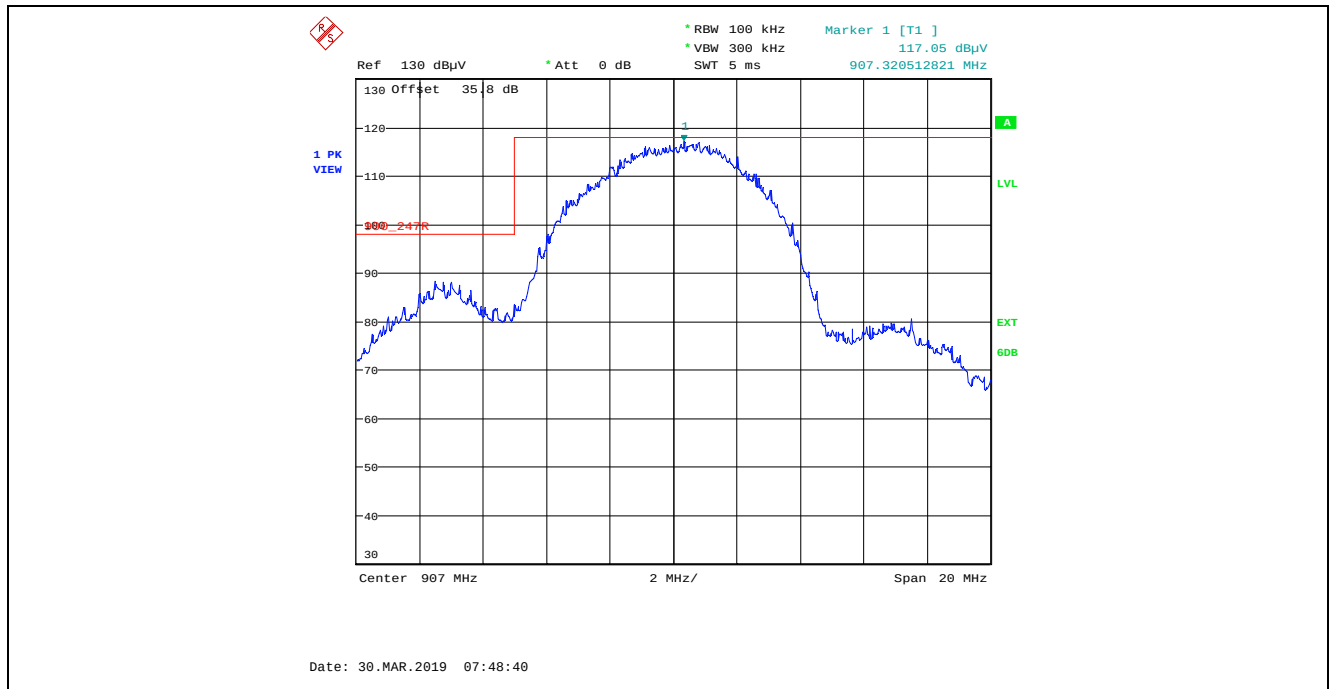
Plot 5.4.4.1.3.8. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 24, Data Rate 7



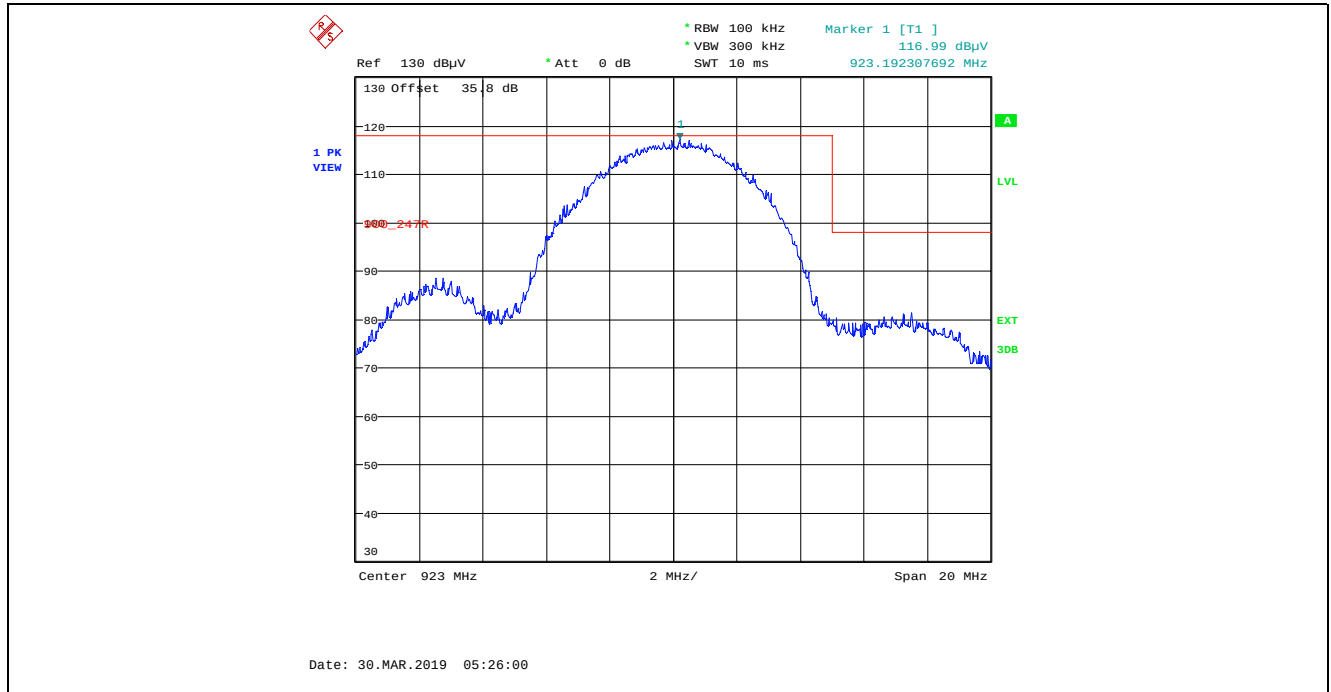
Plot 5.4.4.1.3.9. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



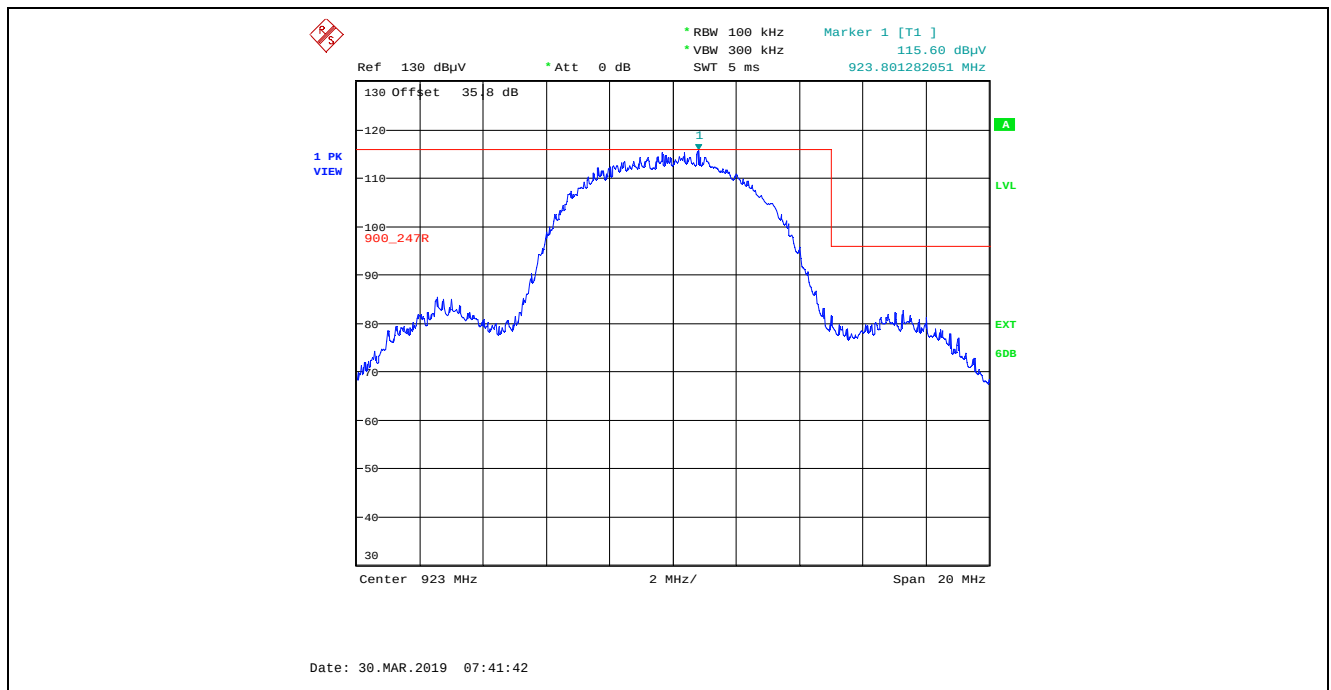
Plot 5.4.4.1.3.10. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



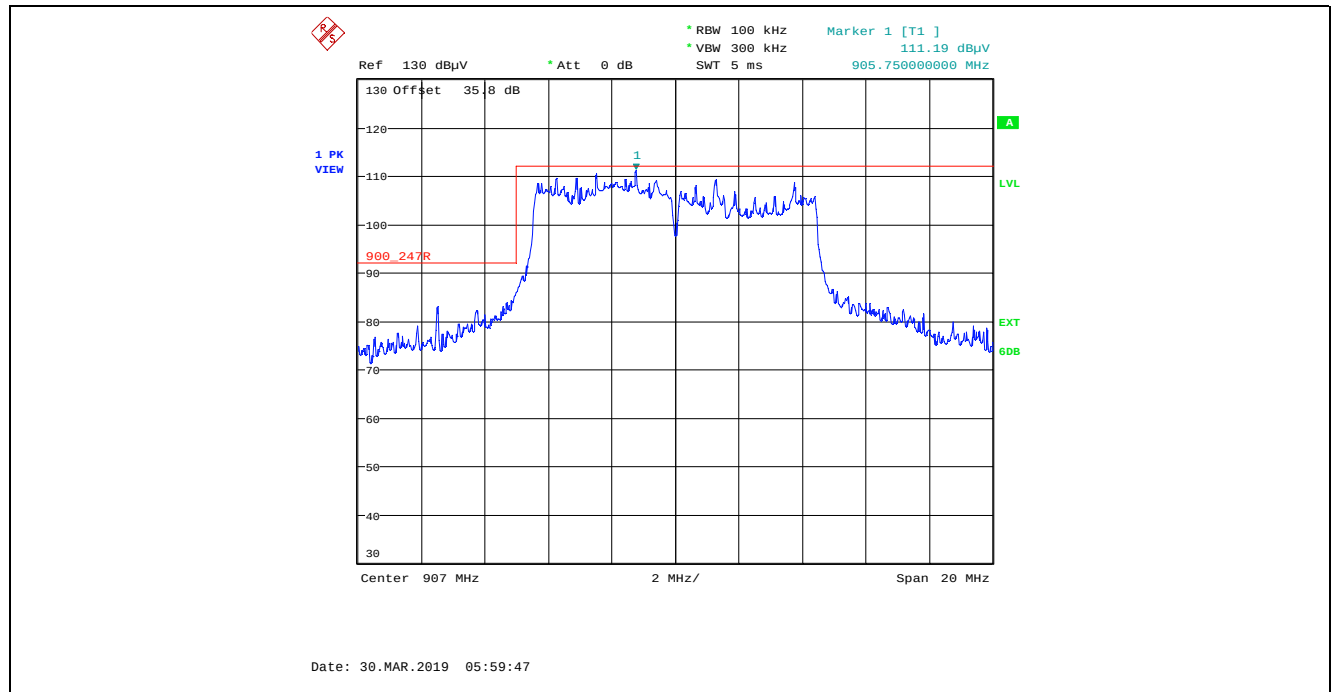
Plot 5.4.4.1.3.11. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



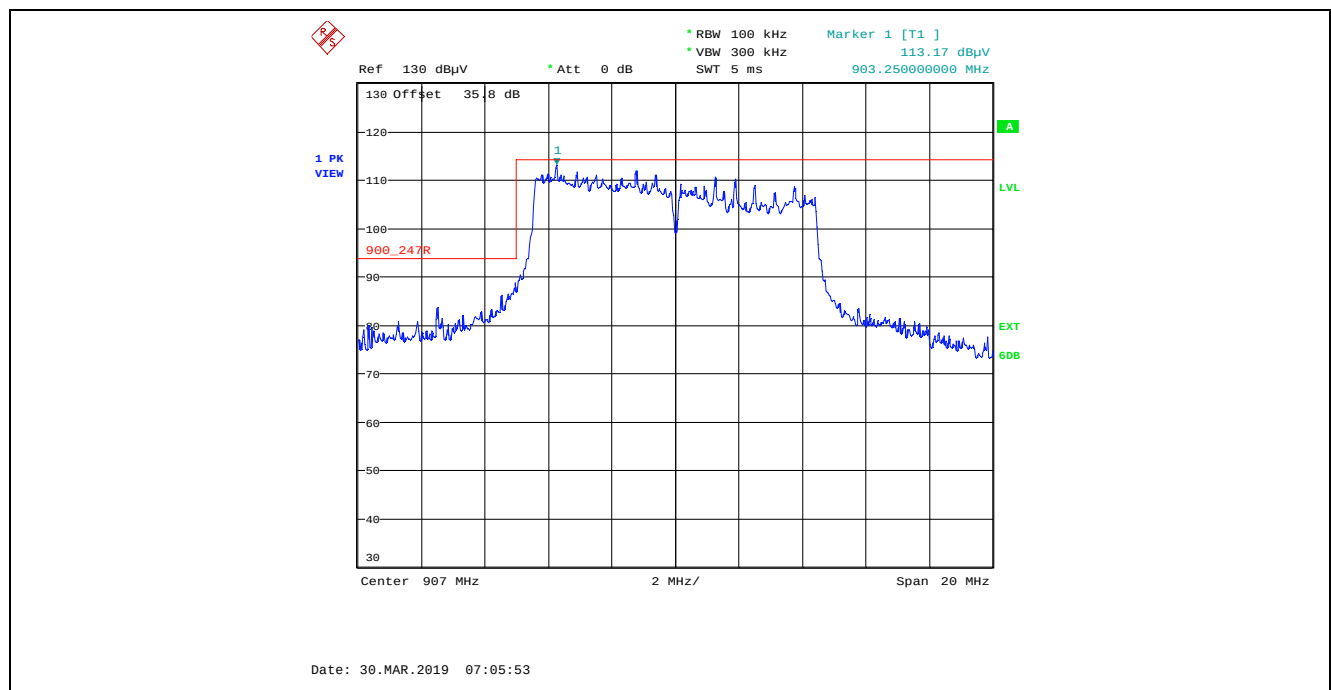
Plot 5.4.4.1.3.12. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



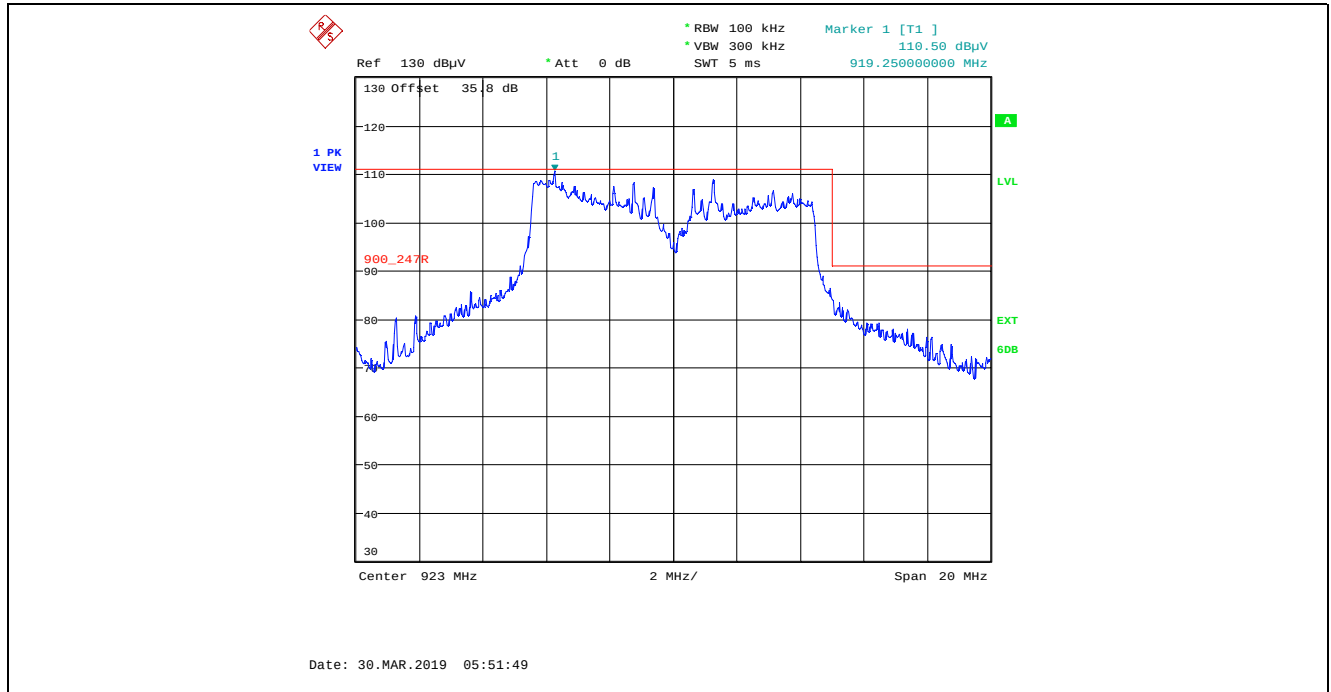
Plot 5.4.4.1.3.13. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 24, Data Rate 7



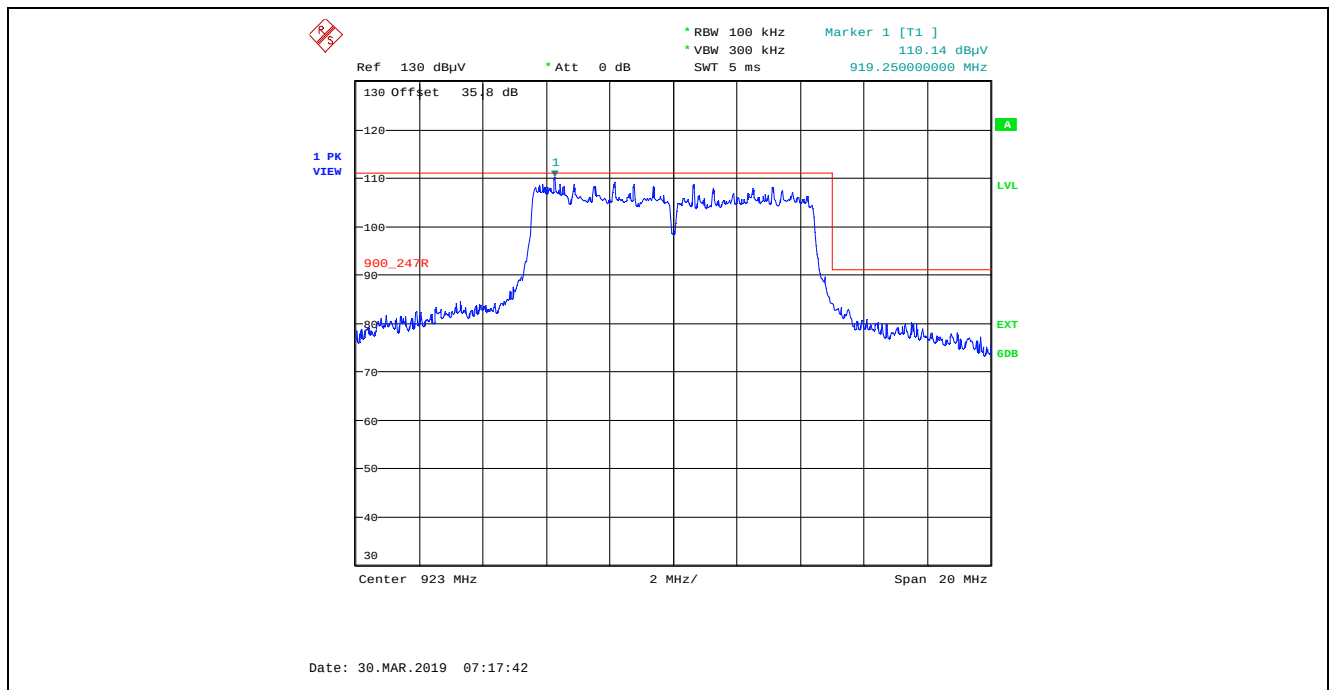
Plot 5.4.4.1.3.14. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 24, Data Rate 7



Plot 5.4.4.1.3.15. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 24, Data Rate 7



Plot 5.4.4.1.3.16. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 24, Data Rate 7



5.4.4.2. EUT with 4 dBi Puck Antenna, 3.66 dBi Antenna Assembly Gain

5.4.4.2.1. Spurious Radiated Emissions

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	113.77	--	V	--	--	--	--
905.0	112.97	--	H	--	--	--	--
2715.0	48.16	36.80	V	54.0	93.8	-17.2	Pass*
2715.0	48.48	38.58	H	54.0	93.8	-15.4	Pass*
3620.0	46.71	34.56	V	54.0	93.8	-19.4	Pass*
4525.0	48.16	34.34	V	54.0	93.8	-19.7	Pass*
5430.0	49.80	35.69	V	54.0	93.8	-18.3	Pass*
5430.0	47.83	35.25	H	54.0	93.8	-18.8	Pass*
8145.0	54.50	41.80	V	54.0	93.8	-12.2	Pass*
8145.0	56.41	44.65	H	54.0	93.8	-9.4	Pass*
9050.0	55.34	44.28	V	54.0	93.8	-9.7	Pass*
9050.0	58.13	44.49	H	54.0	93.8	-9.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
915.0	111.80	--	V	--	--	--	--
915.0	108.79	--	H	--	--	--	--
2745.0	49.79	39.58	V	54.0	91.8	-14.4	Pass*
2745.0	50.81	44.11	H	54.0	91.8	-9.9	Pass*
3660.0	47.55	34.50	V	54.0	91.8	-19.5	Pass*
3660.0	48.40	34.96	H	54.0	91.8	-19.0	Pass*
4575.0	48.64	34.68	V	54.0	91.8	-19.3	Pass*
4575.0	48.29	34.50	H	54.0	91.8	-19.5	Pass*
6405.0	51.18	37.31	V	54.0	91.8	-16.7	Pass*
6405.0	50.74	37.40	H	54.0	91.8	-16.6	Pass*
7320.0	57.55	49.23	V	54.0	91.8	-4.8	Pass*
7320.0	56.34	44.71	H	54.0	91.8	-9.3	Pass*
8235.0	55.95	47.44	V	54.0	91.8	-6.6	Pass*
8235.0	54.09	40.70	H	54.0	91.8	-13.3	Pass*
9150.0	58.32	48.62	V	54.0	91.8	-5.4	Pass*
9150.0	59.03	47.81	H	54.0	91.8	-6.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	112.02	--	V	--	--	--	--
925.0	108.85	--	H	--	--	--	--
2775.0	48.83	40.02	V	54.0	92.0	-14.0	Pass*
2775.0	49.04	40.10	H	54.0	92.0	-13.9	Pass*
7400.0	56.23	45.77	V	54.0	92.0	-8.2	Pass*
7400.0	56.95	45.40	H	54.0	92.0	-8.6	Pass*
8325.0	54.53	41.06	V	54.0	92.0	-12.9	Pass*
8325.0	56.30	43.80	H	54.0	92.0	-10.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	110.24	--	V	--	--	--	--
905.0	110.83	--	H	--	--	--	--
2715.0	51.08	36.48	H	54.0	90.8	-17.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	109.54	--	V	--	--	--	--
915.0	105.88	--	H	--	--	--	--
2745.0	52.38	34.08	H	54.0	89.5	-19.9	Pass*
7320.0	57.81	40.10	V	54.0	89.5	-13.9	Pass*
7320.0	55.14	39.28	H	54.0	89.5	-14.7	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	110.24	--	V	--	--	--	--
925.0	108.42	--	H	--	--	--	--
2775.0	52.98	34.67	H	54.0	90.2	-19.3	Pass*
7400.0	55.05	38.62	V	54.0	90.2	-15.4	Pass*
7400.0	55.74	38.82	H	54.0	90.2	-15.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	114.11	--	V	--	--	--	--
907.0	111.74	--	H	--	--	--	--
2721.0	47.62	39.85	V	54.0	94.1	-14.2	Pass*
2721.0	49.89	41.32	H	54.0	94.1	-12.7	Pass*
3628.0	47.51	35.83	H	54.0	94.1	-18.2	Pass*
4535.0	48.55	34.39	H	54.0	94.1	-19.6	Pass*
5442.0	49.75	35.84	H	54.0	94.1	-18.2	Pass*
7256.0	56.14	48.55	V	54.0	94.1	-5.5	Pass*
7256.0	56.83	46.36	H	54.0	94.1	-7.6	Pass*
8163.0	56.25	45.05	V	54.0	94.1	-9.0	Pass*
8163.0	54.59	40.82	H	54.0	94.1	-13.2	Pass*
9070.0	57.58	48.33	V	54.0	94.1	-5.7	Pass*
9070.0	56.97	44.56	H	54.0	94.1	-9.4	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	111.23	--	V	--	--	--	--
915.0	109.93	--	H	--	--	--	--
2745.0	48.52	37.76	V	54.0	91.2	-16.2	Pass*
2745.0	48.61	39.26	H	54.0	91.2	-14.7	Pass*
3660.0	49.77	37.02	V	54.0	91.2	-17.0	Pass*
4575.0	48.53	34.19	H	54.0	91.2	-19.8	Pass*
7320.0	60.69	51.39	V	54.0	91.2	-2.6	Pass*
7320.0	53.54	41.78	H	54.0	91.2	-12.2	Pass*
8235.0	55.37	43.49	V	54.0	91.2	-10.5	Pass*
8235.0	55.23	45.22	H	54.0	91.2	-8.8	Pass*
9150.0	59.57	46.82	V	54.0	91.2	-7.2	Pass*
9150.0	57.81	46.85	H	54.0	91.2	-7.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 26, Data Rate 1					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	112.84	--	V	--	--	--	--
923.0	111.69	--	H	--	--	--	--
2769.0	50.91	41.74	V	54.0	92.8	-12.3	Pass*
2769.0	48.59	39.55	H	54.0	92.8	-14.5	Pass*
3692.0	47.51	34.98	V	54.0	92.8	-19.0	Pass*
7384.0	56.44	42.92	V	54.0	92.8	-11.1	Pass*
7384.0	53.74	42.62	H	54.0	92.8	-11.4	Pass*
8307.0	54.59	40.93	V	54.0	92.8	-13.1	Pass*
8307.0	54.02	40.04	H	54.0	92.8	-14.0	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	107.11	--	V	--	--	--	--
907.0	109.22	--	H	--	--	--	--
2721.0	48.02	34.66	H	54.0	89.2	-19.3	Pass*
7256.0	54.17	39.52	V	54.0	89.2	-14.5	Pass*
7256.0	52.64	39.48	H	54.0	89.2	-14.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	106.53	--	V	--	--	--	--
915.0	106.45	--	H	--	--	--	--
2745.0	49.84	34.67	H	54.0	86.5	-19.3	Pass*
7320.0	54.78	39.72	V	54.0	86.5	-14.3	Pass*
7320.0	53.31	39.54	H	54.0	86.5	-14.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

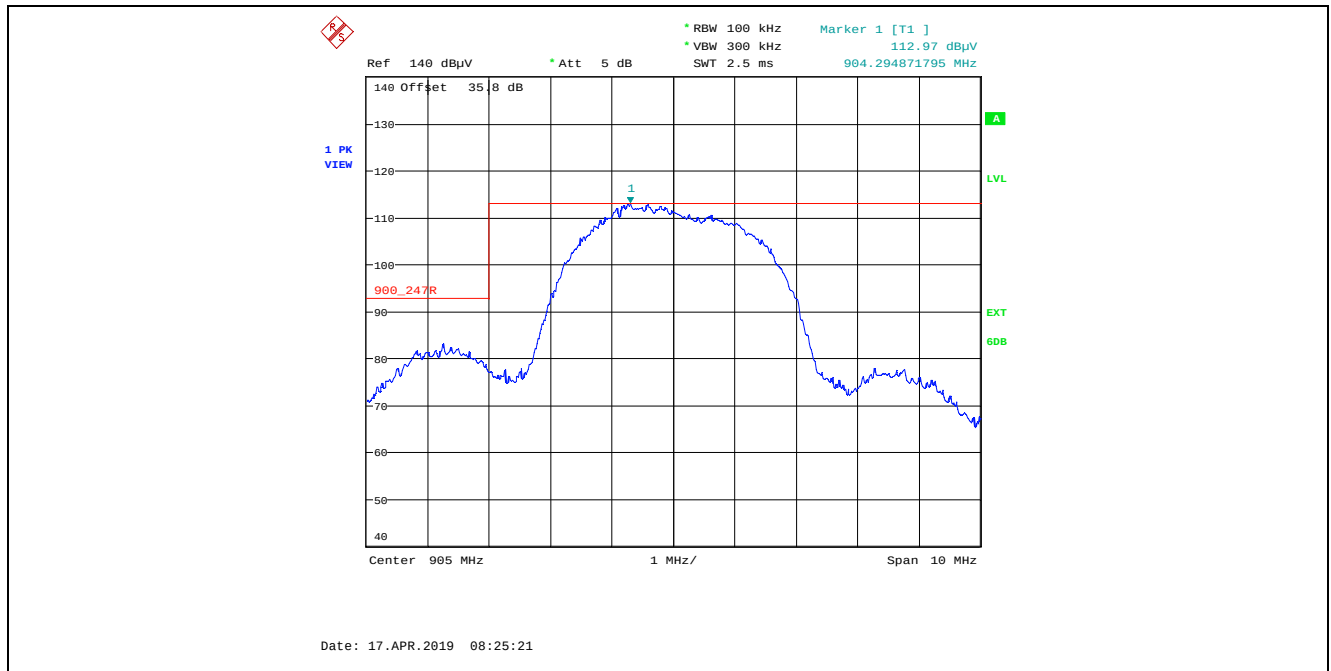
*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 23, Data Rate 4					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	106.04	--	V	--	--	--	--
923.0	105.07	--	H	--	--	--	--
2769.0	49.51	34.79	H	54.0	86.0	-19.2	Pass*
7384.0	53.07	38.81	V	54.0	86.0	-15.2	Pass*
7384.0	53.69	39.77	H	54.0	86.0	-14.2	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

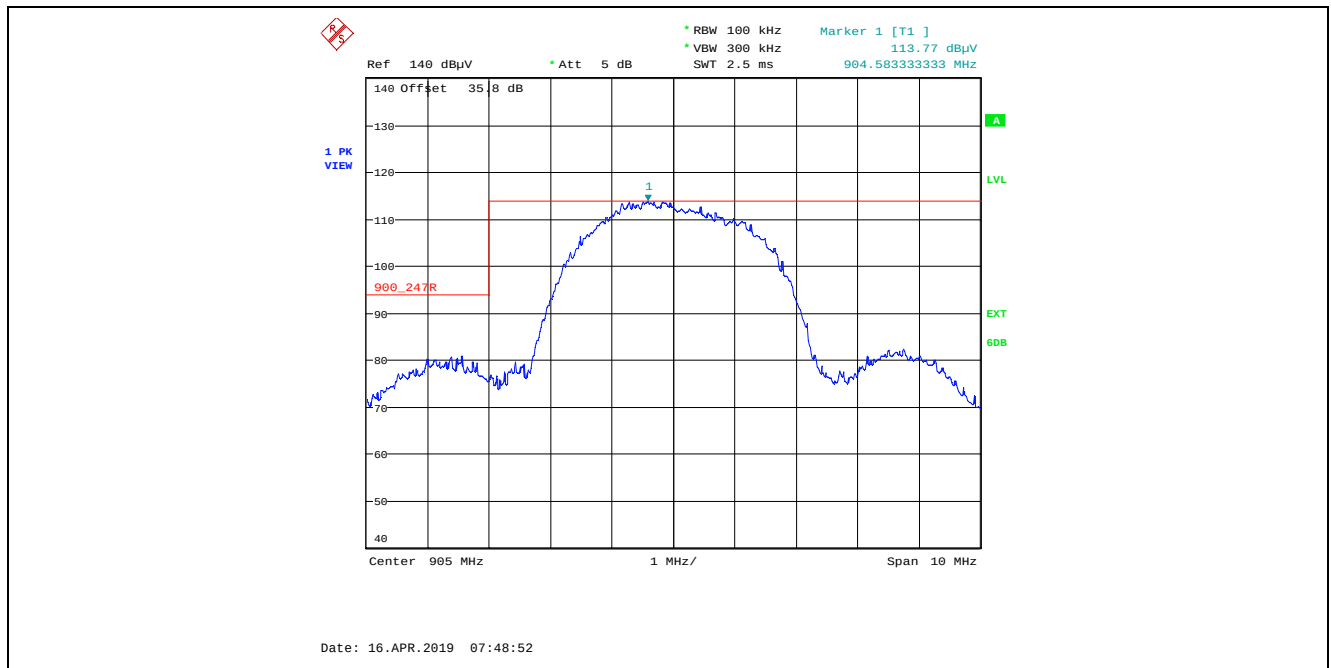
*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

5.4.4.2.2. Band-Edge RF Radiated Emissions

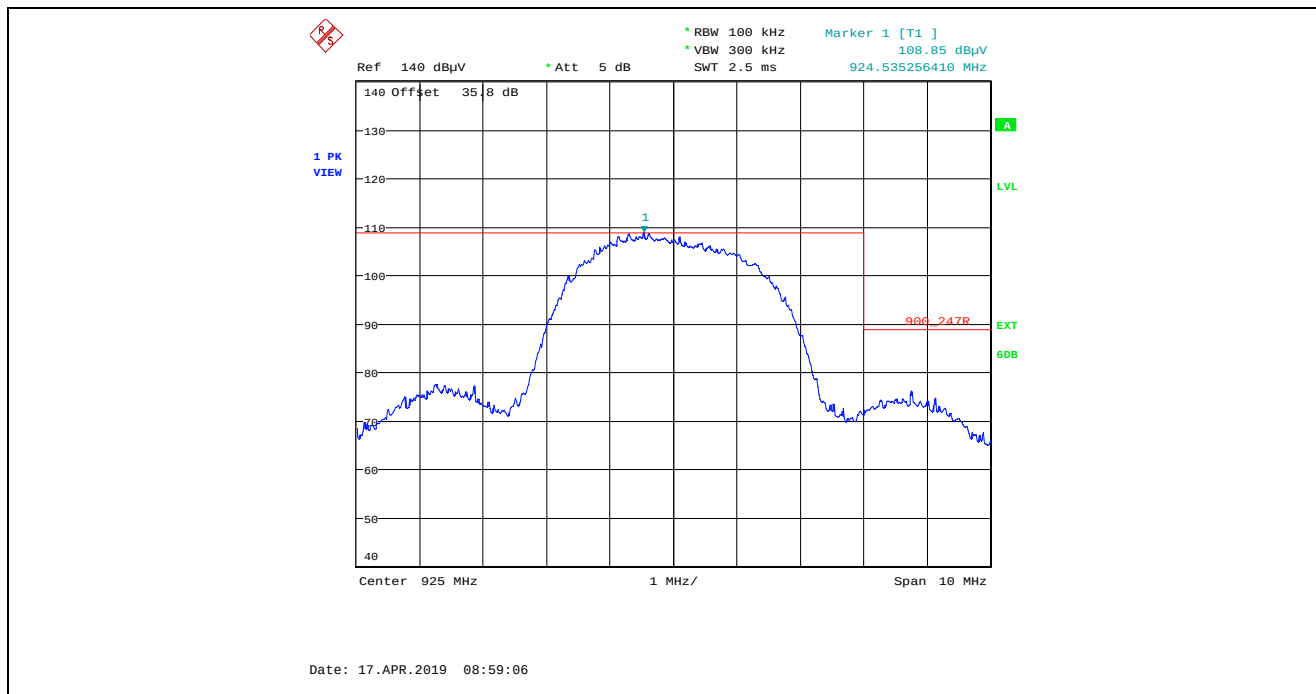
Plot 5.4.4.2.2.1. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



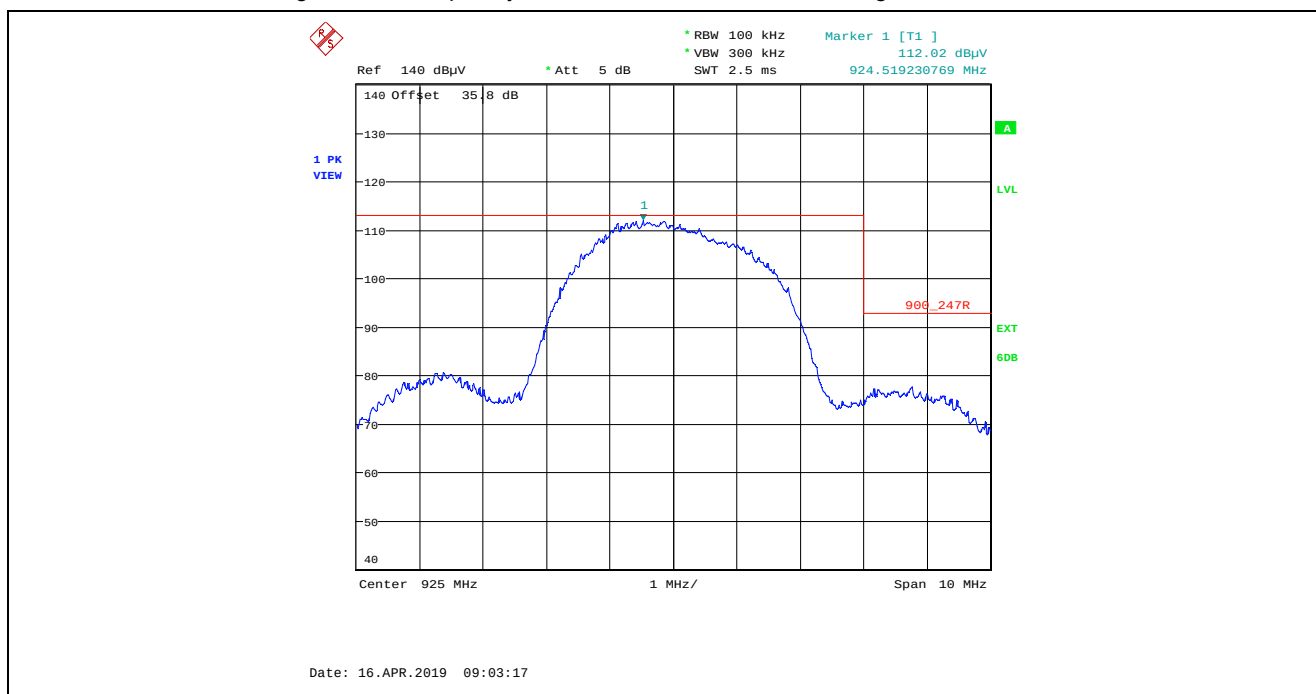
Plot 5.4.4.2.2.2. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



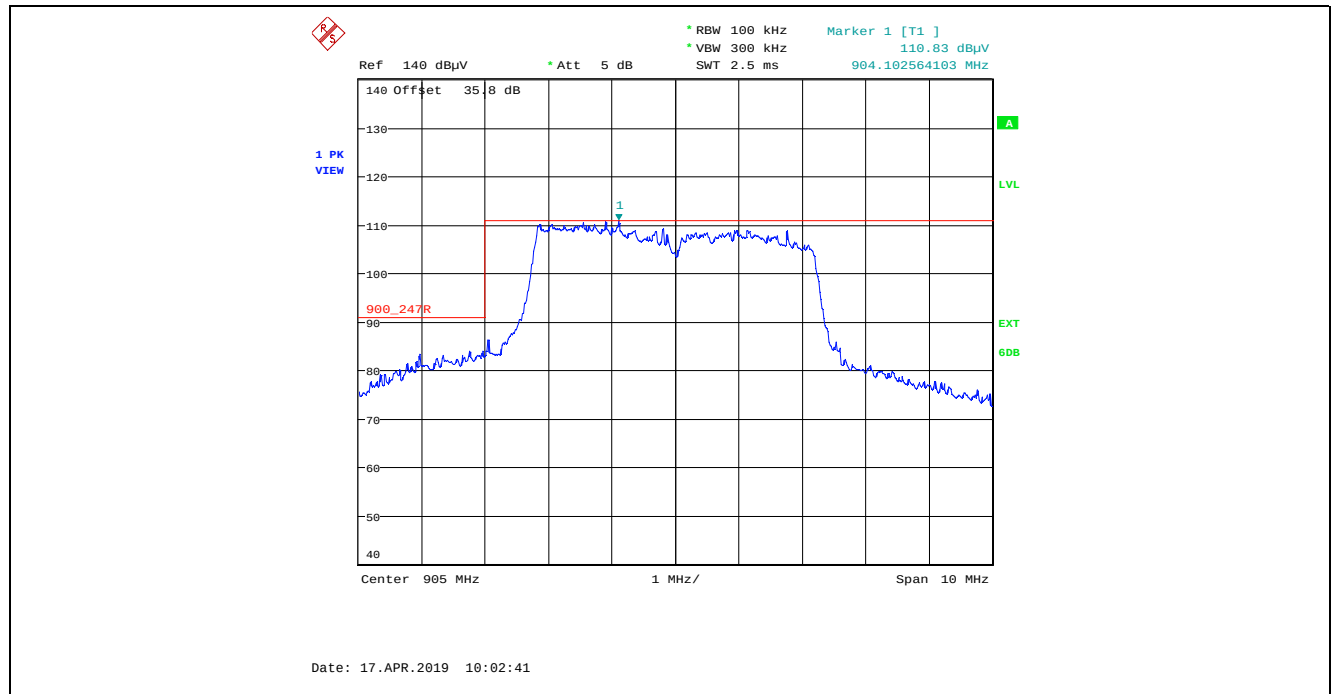
Plot 5.4.4.2.3. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



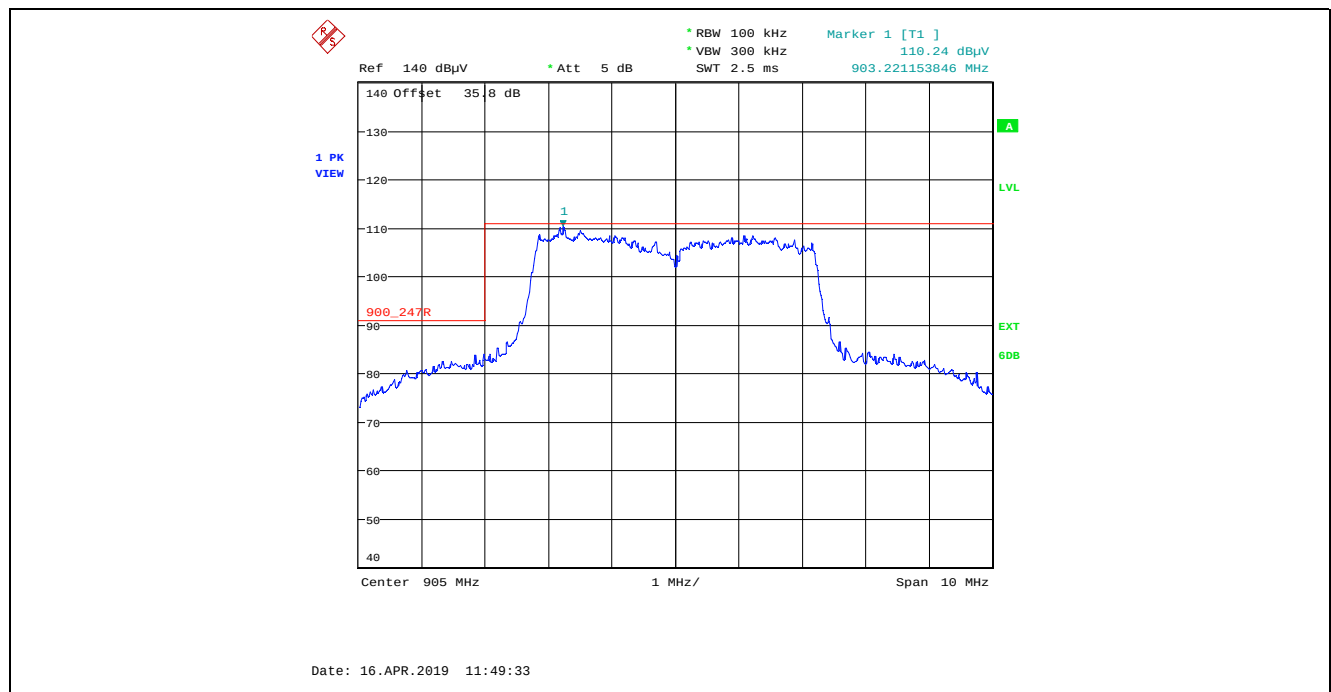
Plot 5.4.4.2.4. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



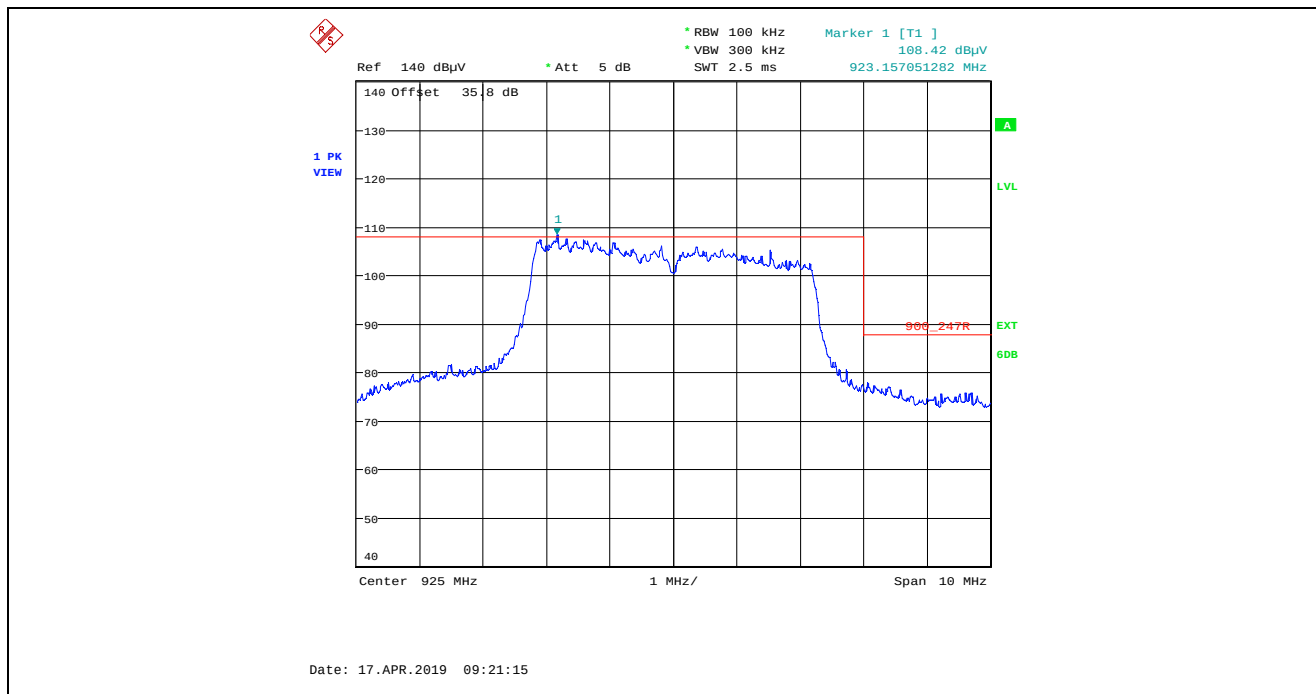
Plot 5.4.4.2.2.5. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 23, Data Rate 7



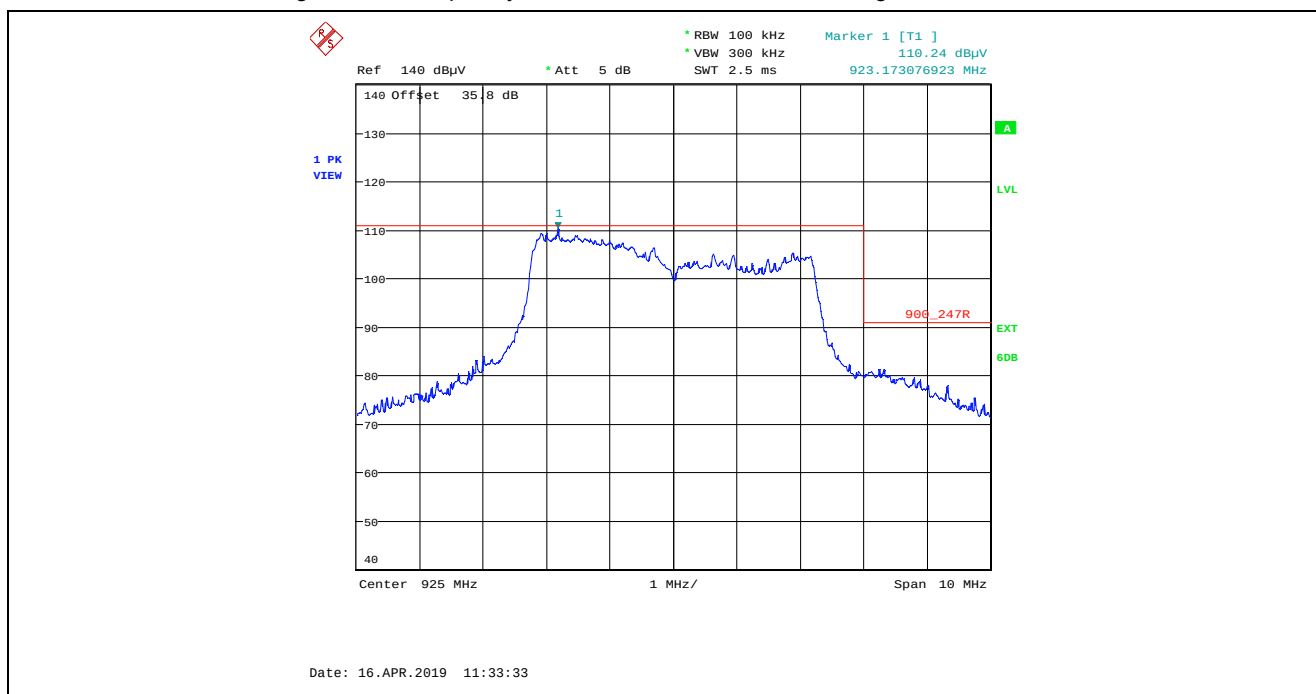
Plot 5.4.4.2.2.6. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 23, Data Rate 7



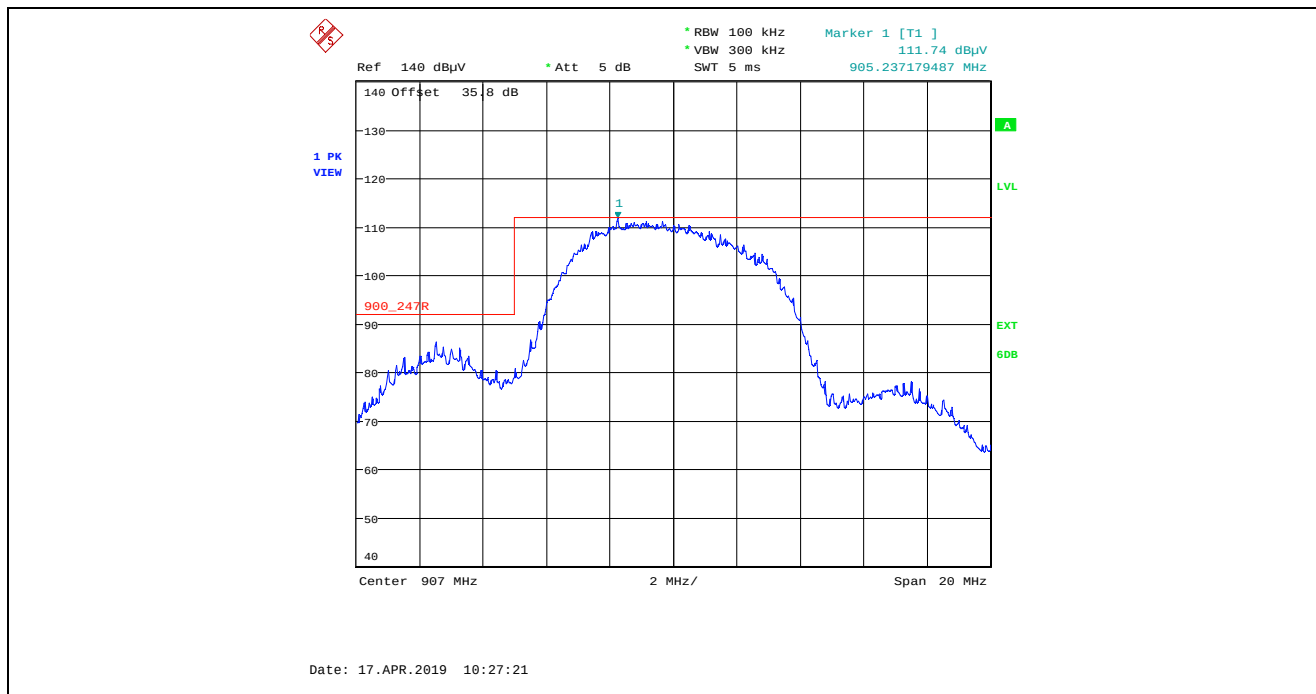
Plot 5.4.4.2.7. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 23, Data Rate 7



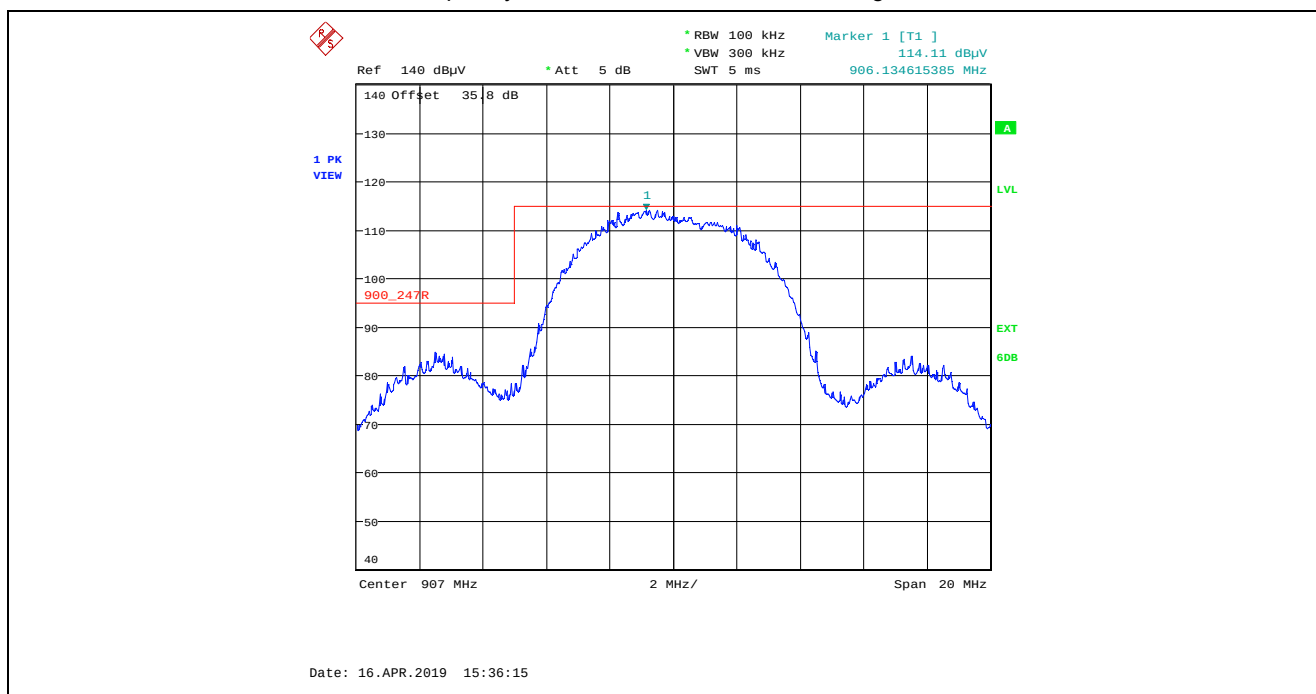
Plot 5.4.4.2.8. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 23, Data Rate 7



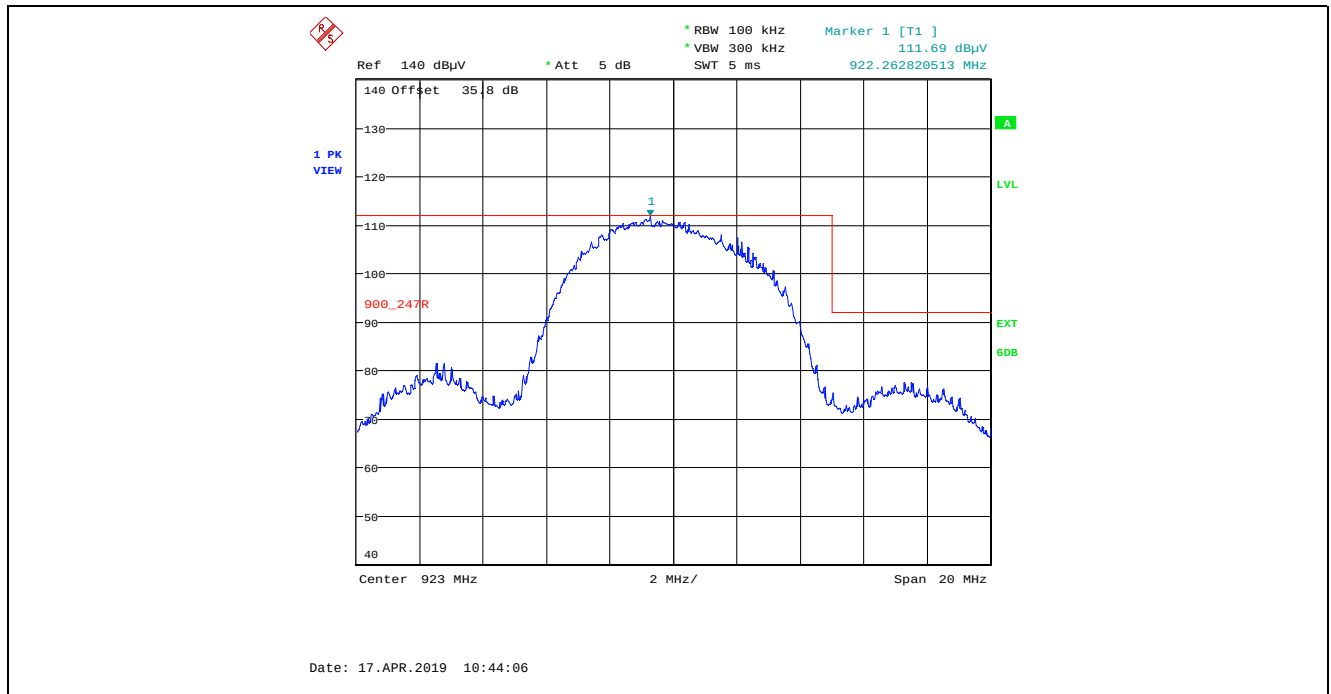
Plot 5.4.4.2.2.9. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



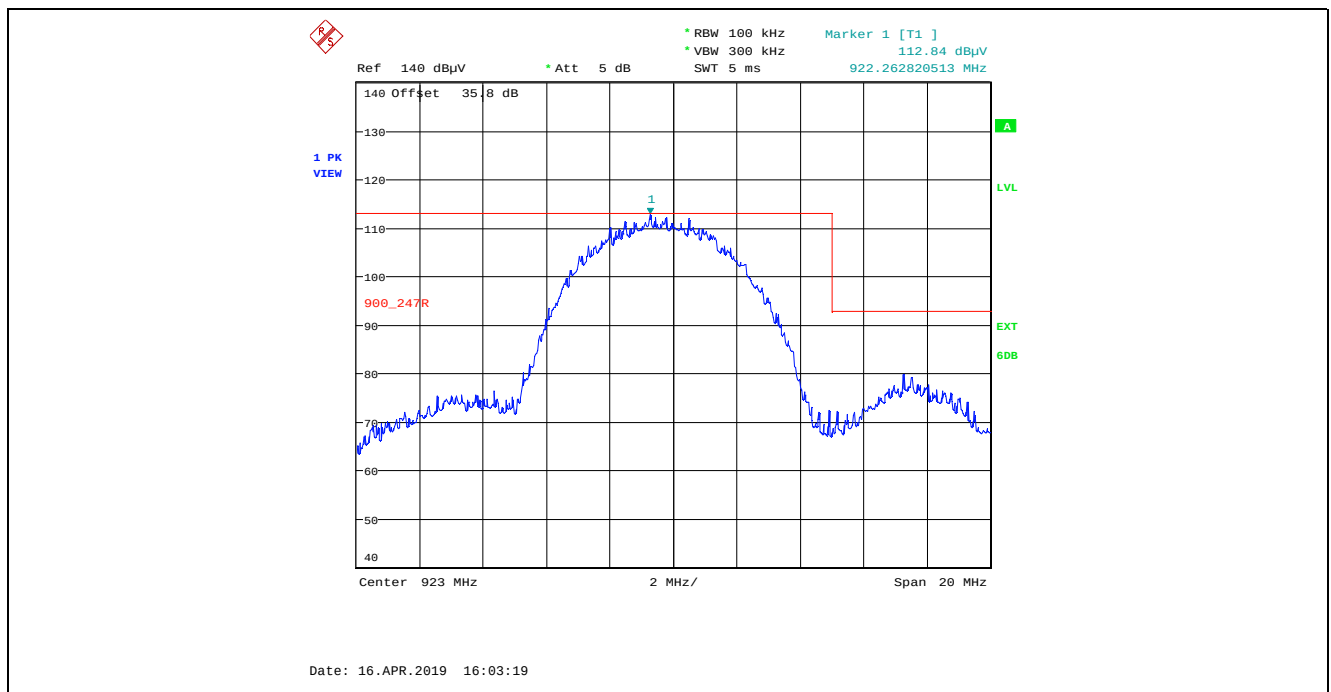
Plot 5.4.4.2.2.10. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



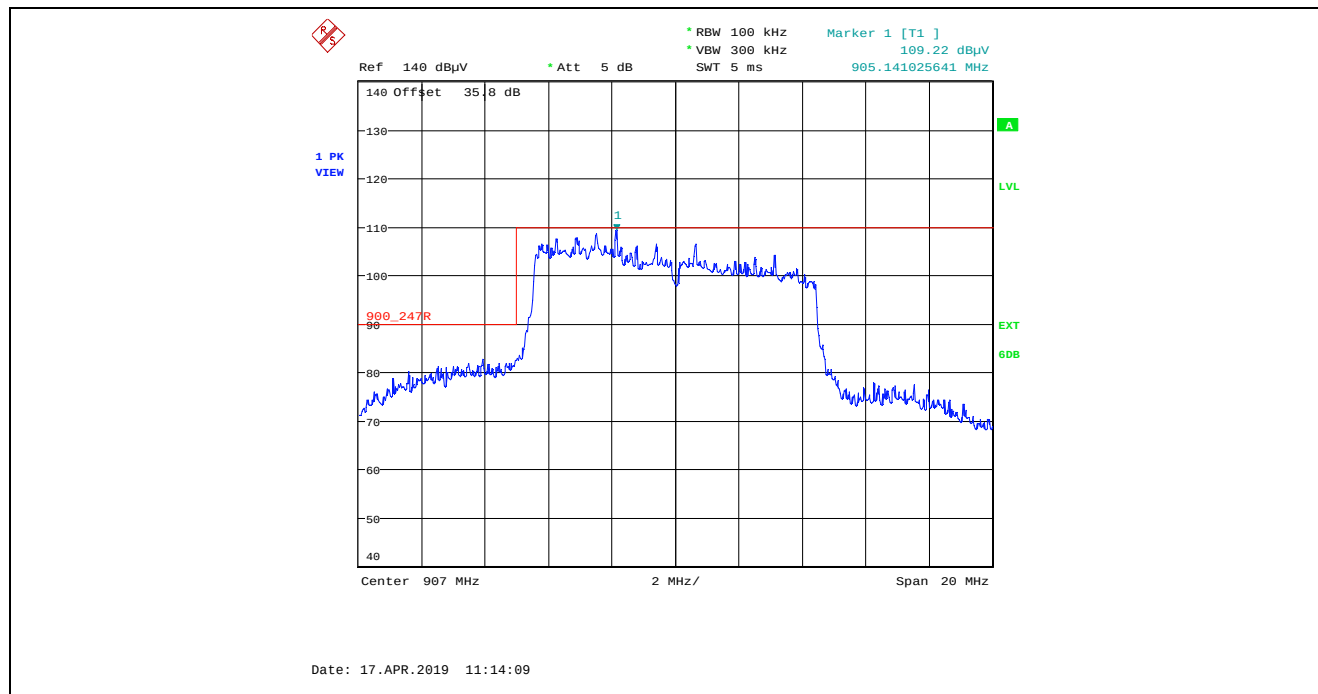
Plot 5.4.4.2.2.11. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



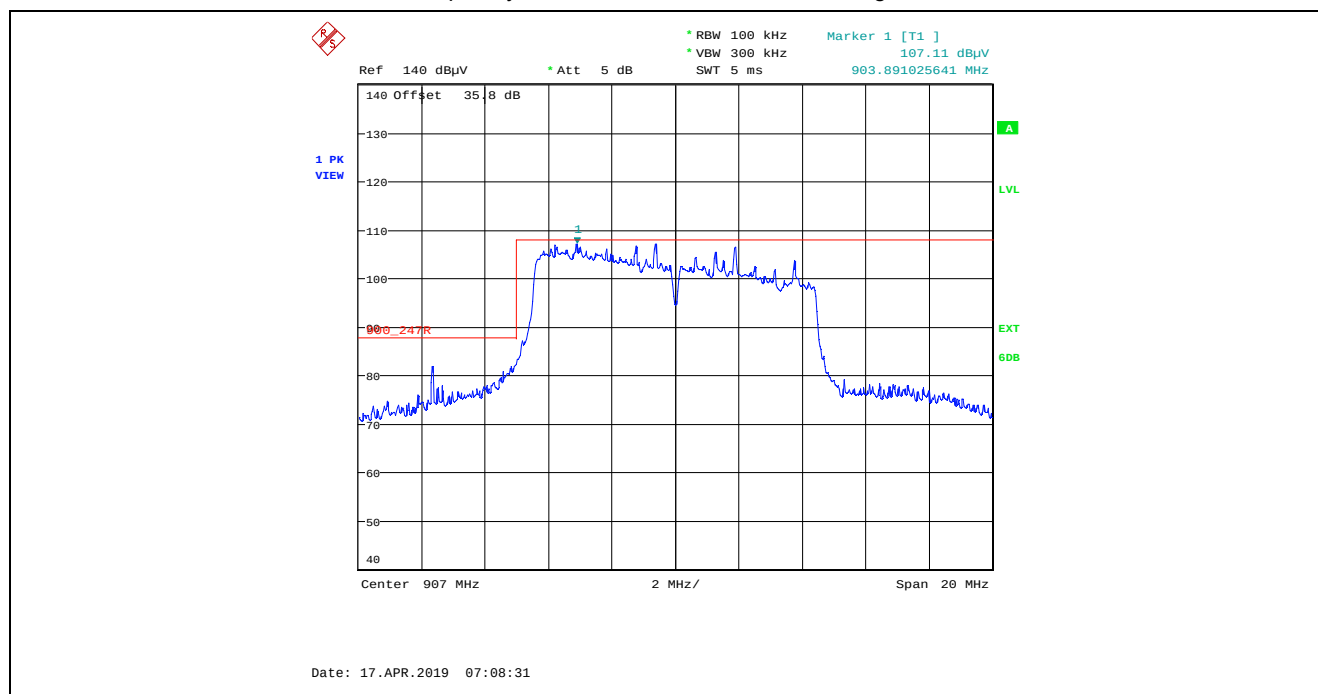
Plot 5.4.4.2.2.12. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 26, Data Rate 3



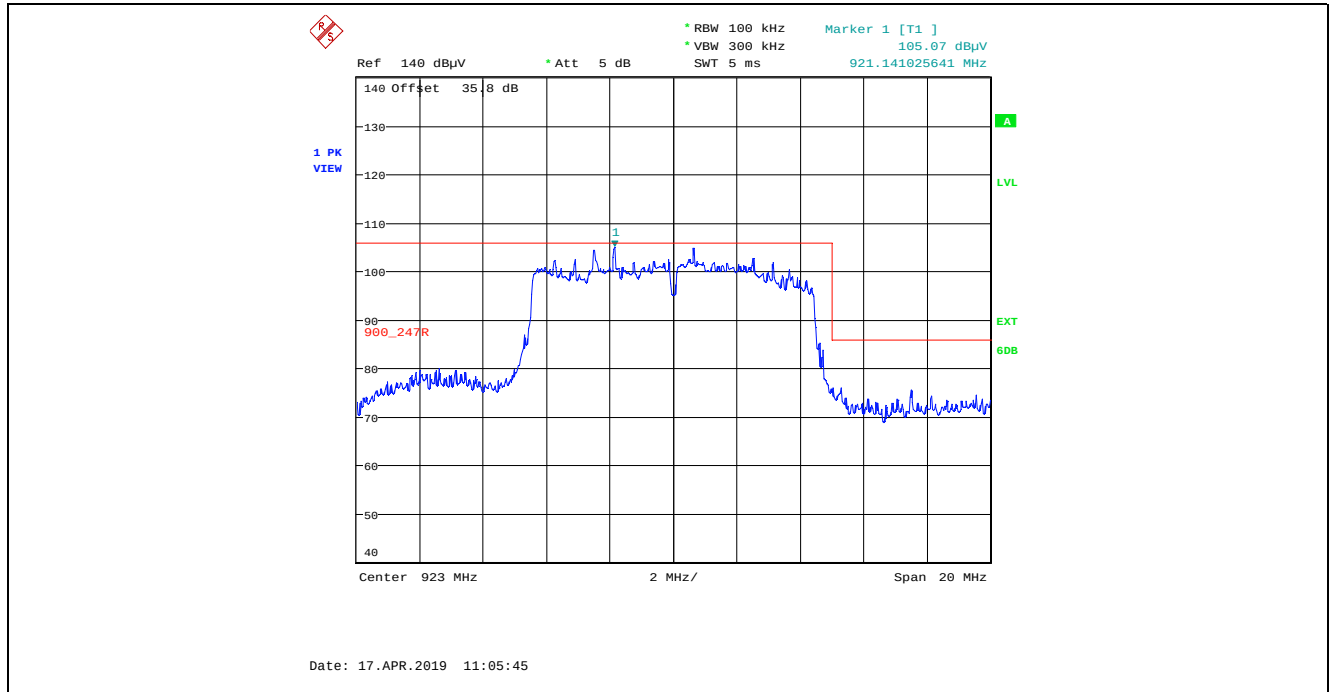
Plot 5.4.4.2.2.13. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 23, Data Rate 7



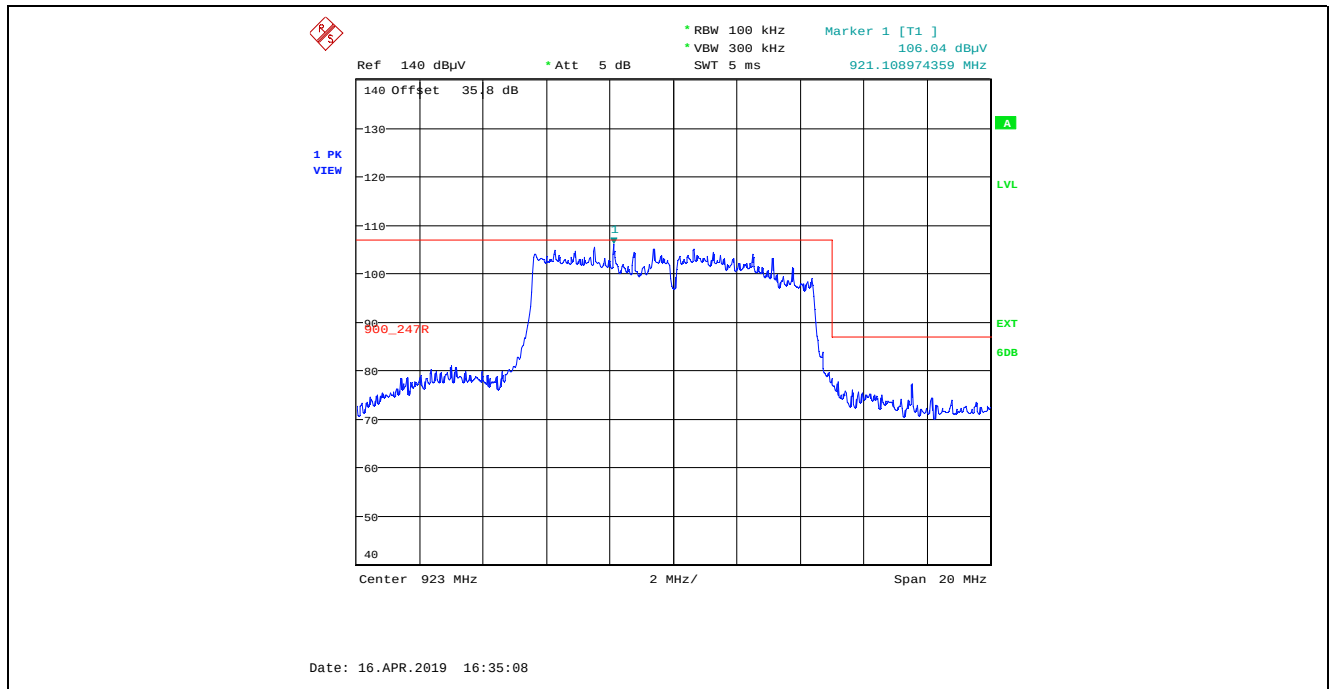
Plot 5.4.4.2.2.14. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 23, Data Rate 7



Plot 5.4.4.2.2.15. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 23, Data Rate 7



Plot 5.4.4.2.2.16. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 23, Data Rate 7



5.4.4.3. EUT with 8 dBi Patch Antenna, 7.66 dBi Antenna Assembly Gain

5.4.4.3.1. Spurious Radiated Emissions

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	121.76	--	V	--	--	--	--
905.0	121.82	--	H	--	--	--	--
2715.0	51.76	44.64	V	54.0	101.8	-9.4	Pass*
2715.0	51.08	42.42	H	54.0	101.8	-11.6	Pass*
3620.0	46.02	38.16	V	54.0	101.8	-15.8	Pass*
3620.0	47.39	36.43	H	54.0	101.8	-17.6	Pass*
4525.0	47.55	35.24	V	54.0	101.8	-18.8	Pass*
4525.0	48.43	36.10	H	54.0	101.8	-17.9	Pass*
5430.0	49.33	36.49	V	54.0	101.8	-17.5	Pass*
5430.0	50.16	36.09	H	54.0	101.8	-17.9	Pass*
8145.0	56.67	44.05	V	54.0	101.8	-10.0	Pass*
8145.0	60.64	51.89	H	54.0	101.8	-2.1	Pass*
9050.0	56.81	45.06	V	54.0	101.8	-8.9	Pass*
9050.0	59.89	51.51	H	54.0	101.8	-2.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
915.0	121.98	--	V	--	--	--	--
915.0	120.04	--	H	--	--	--	--
2745.0	49.36	39.68	V	54.0	102.0	-14.3	Pass*
2745.0	52.90	45.51	H	54.0	102.0	-8.5	Pass*
3660.0	46.52	35.03	V	54.0	102.0	-19.0	Pass*
3660.0	48.53	38.77	H	54.0	102.0	-15.2	Pass*
4575.0	49.11	34.56	V	54.0	102.0	-19.4	Pass*
4575.0	51.29	36.22	H	54.0	102.0	-17.8	Pass*
6405.0	50.84	37.87	V	54.0	102.0	-16.1	Pass*
6405.0	51.92	38.53	H	54.0	102.0	-15.5	Pass*
7320.0	56.94	44.93	V	54.0	102.0	-9.1	Pass*
7320.0	57.71	49.83	H	54.0	102.0	-4.2	Pass*
8235.0	55.71	43.37	V	54.0	102.0	-10.6	Pass*
8235.0	59.33	49.59	H	54.0	102.0	-4.4	Pass*
9150.0	58.27	47.59	V	54.0	102.0	-6.4	Pass*
9150.0	60.17	50.88	H	54.0	102.0	-3.1	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	120.74	--	V	--	--	--	--
925.0	121.19	--	H	--	--	--	--
2775.0	49.15	38.23	V	54.0	101.2	-15.8	Pass*
2775.0	52.35	44.36	H	54.0	101.2	-9.6	Pass*
3700.0	47.60	36.68	H	54.0	101.2	-17.3	Pass*
4625.0	48.84	35.29	V	54.0	101.2	-18.7	Pass*
4625.0	48.88	35.85	H	54.0	101.2	-18.2	Pass*
7400.0	53.27	45.66	V	54.0	101.2	-8.3	Pass*
7400.0	55.89	48.75	H	54.0	101.2	-5.3	Pass*
8325.0	54.22	41.63	V	54.0	101.2	-12.4	Pass*
8325.0	59.49	48.48	H	54.0	101.2	-5.5	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	114.37	--	V	--	--	--	--
905.0	114.56	--	H	--	--	--	--
2715.0	51.14	36.68	H	54.0	94.6	-17.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	114.53	--	V	--	--	--	--
915.0	113.90	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	113.09	--	V	--	--	--	--
925.0	115.52	--	H	--	--	--	--
2775.0	51.73	34.39	H	54.0	95.5	-19.6	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	118.82	--	V	--	--	--	--
907.0	119.14	--	H	--	--	--	--
2721.0	48.54	37.84	V	54.0	99.1	-16.2	Pass*
2721.0	49.41	39.75	H	54.0	99.1	-14.3	Pass*
3628.0	46.87	34.59	V	54.0	99.1	-19.4	Pass*
3628.0	48.43	35.66	H	54.0	99.1	-18.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	119.07	--	V	--	--	--	--
915.0	118.48	--	H	--	--	--	--
2745.0	48.21	35.69	V	54.0	99.1	-18.3	Pass*
2745.0	49.03	39.31	H	54.0	99.1	-14.7	Pass*
3660.0	48.69	37.22	H	54.0	99.1	-16.8	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	116.90	--	V	--	--	--	--
923.0	118.66	--	H	--	--	--	--
2769.0	48.96	37.13	V	54.0	98.7	-16.9	Pass*
2769.0	49.31	39.84	H	54.0	98.7	-14.2	Pass*
3692.0	46.96	34.93	H	54.0	98.7	-19.1	Pass*

All other spurious emissions and harmonics are more than 20 dB below the applicable limit.

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	113.52	--	V	--	--	--	--
907.0	113.22	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*

*Spurious emissions and harmonics are more than 20 dB below the applicable limit.

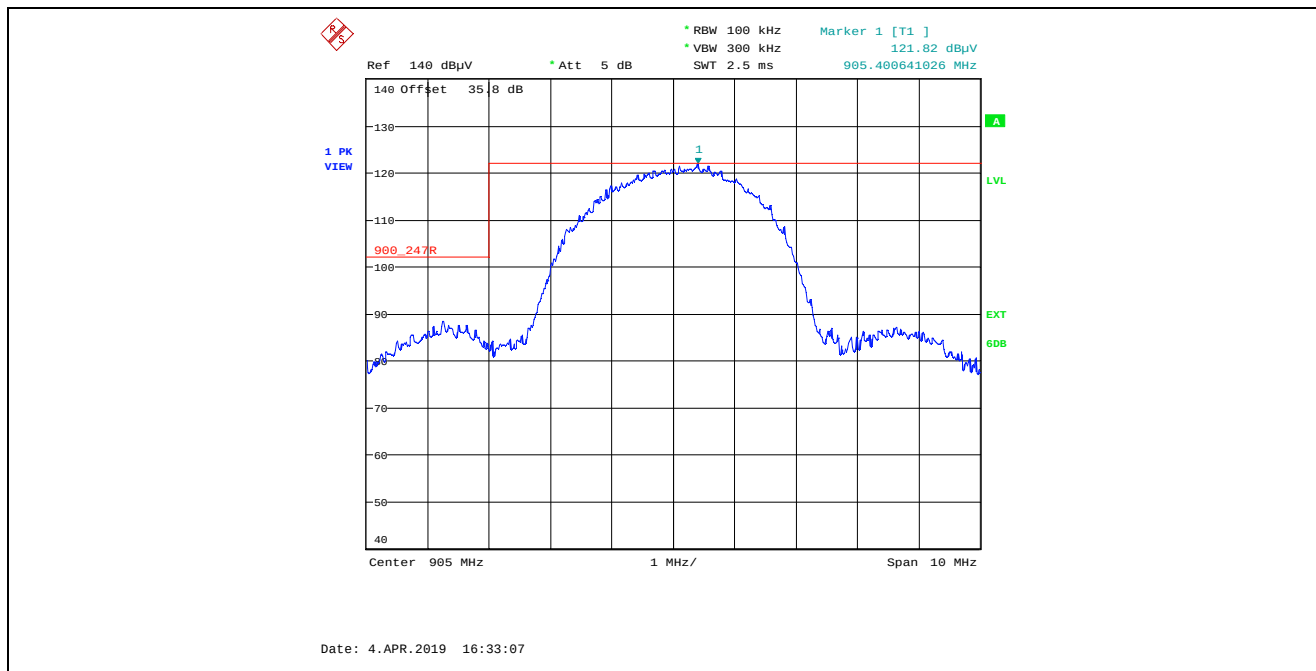
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	113.56	--	V	--	--	--	--
915.0	113.77	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*

*Spurious emissions and harmonics are more than 20 dB below the applicable limit.

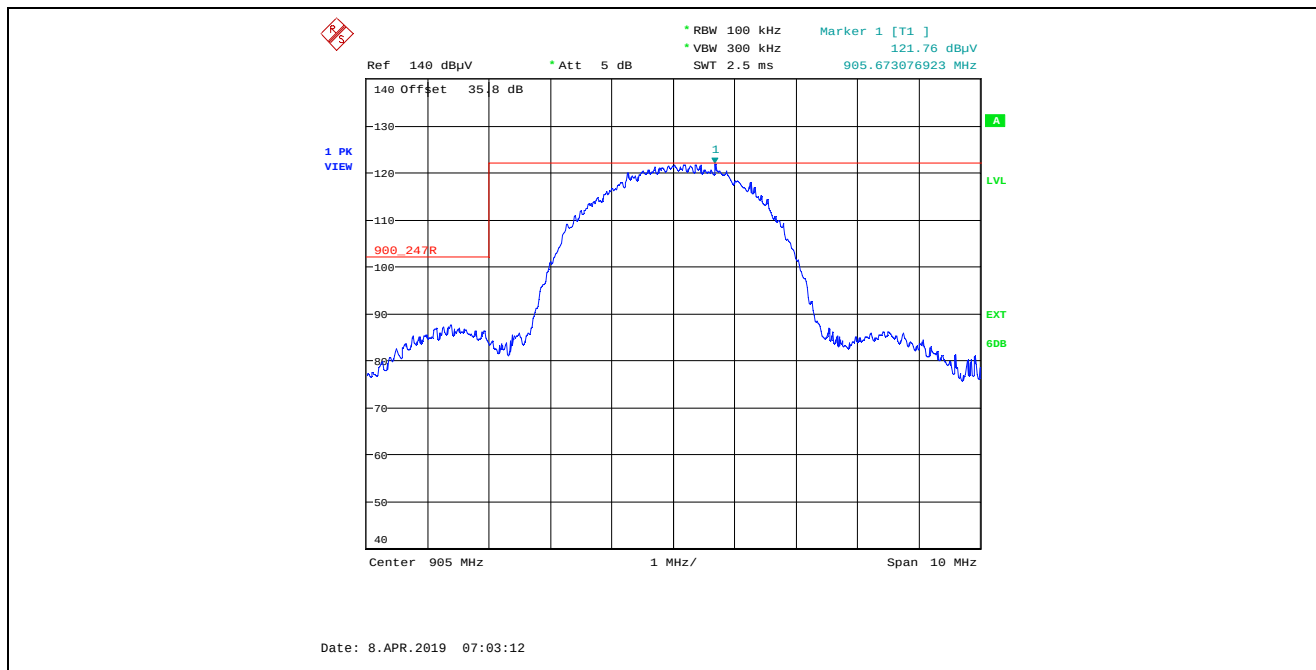
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	113.48	--	V	--	--	--	--
923.0	113.88	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

5.4.4.3.2. Band-Edge RF Radiated Emissions

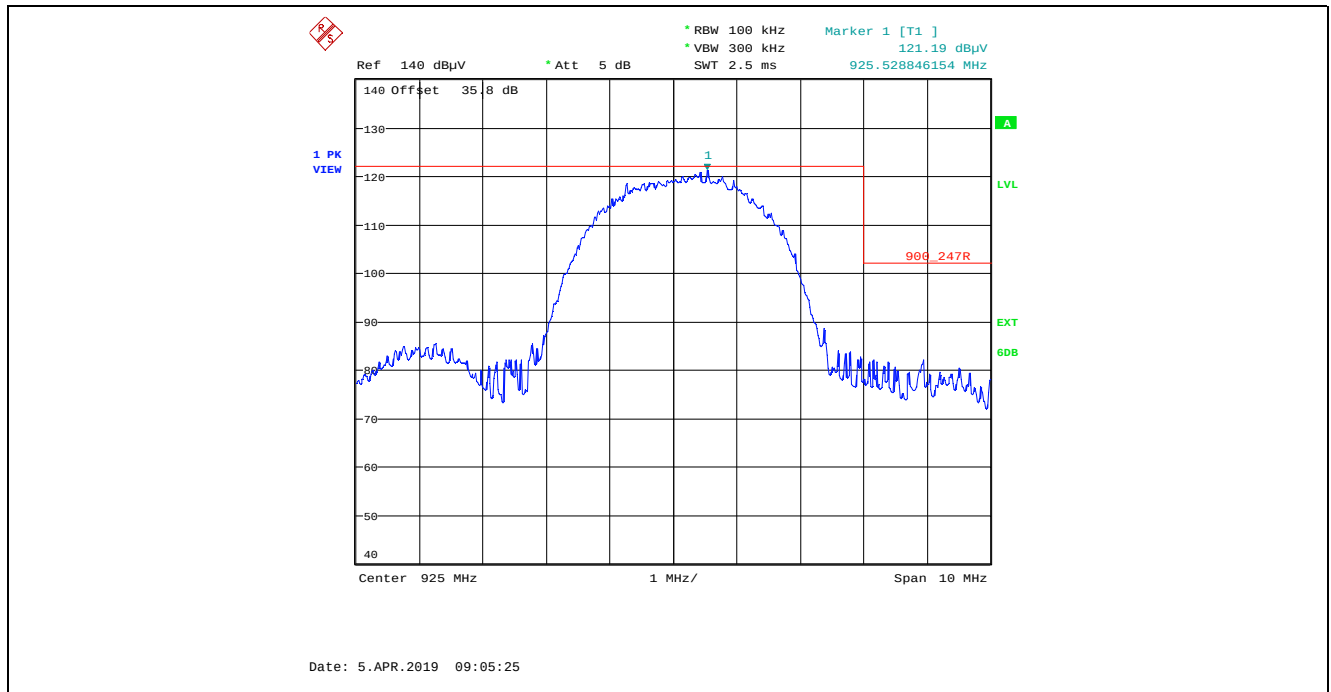
Plot 5.4.4.3.2.1. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



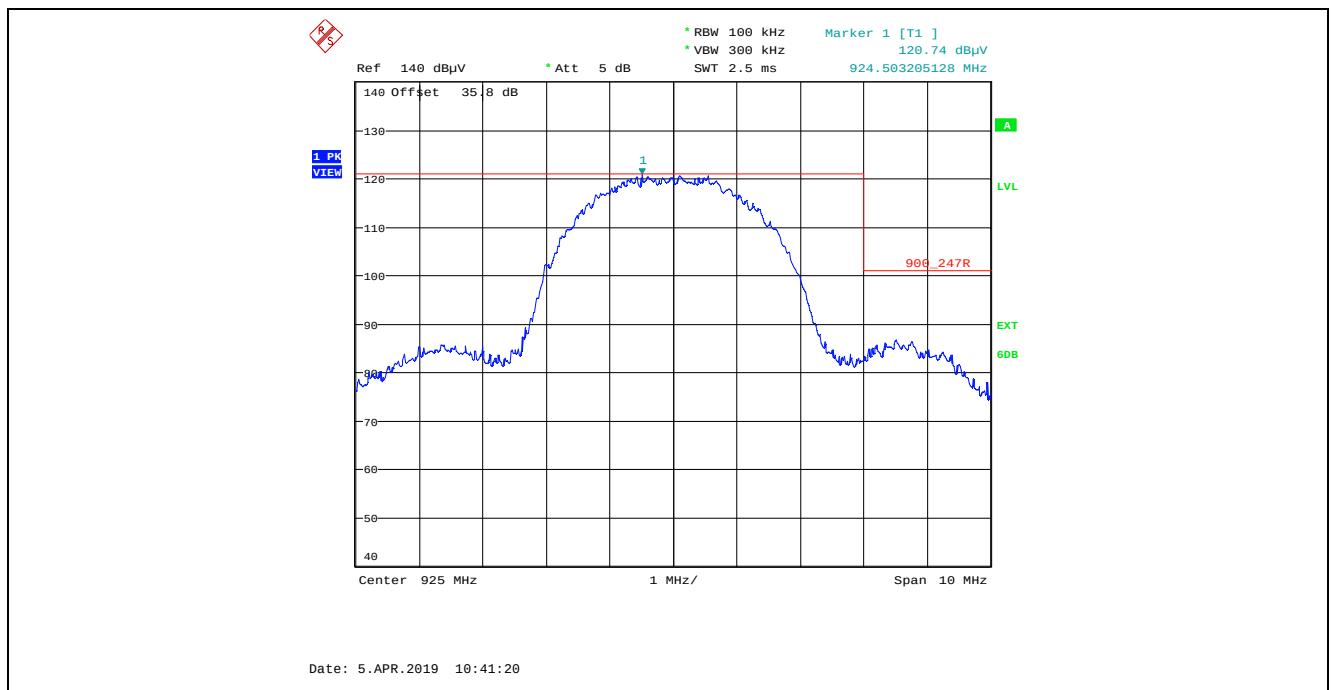
Plot 5.4.4.3.2.2. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



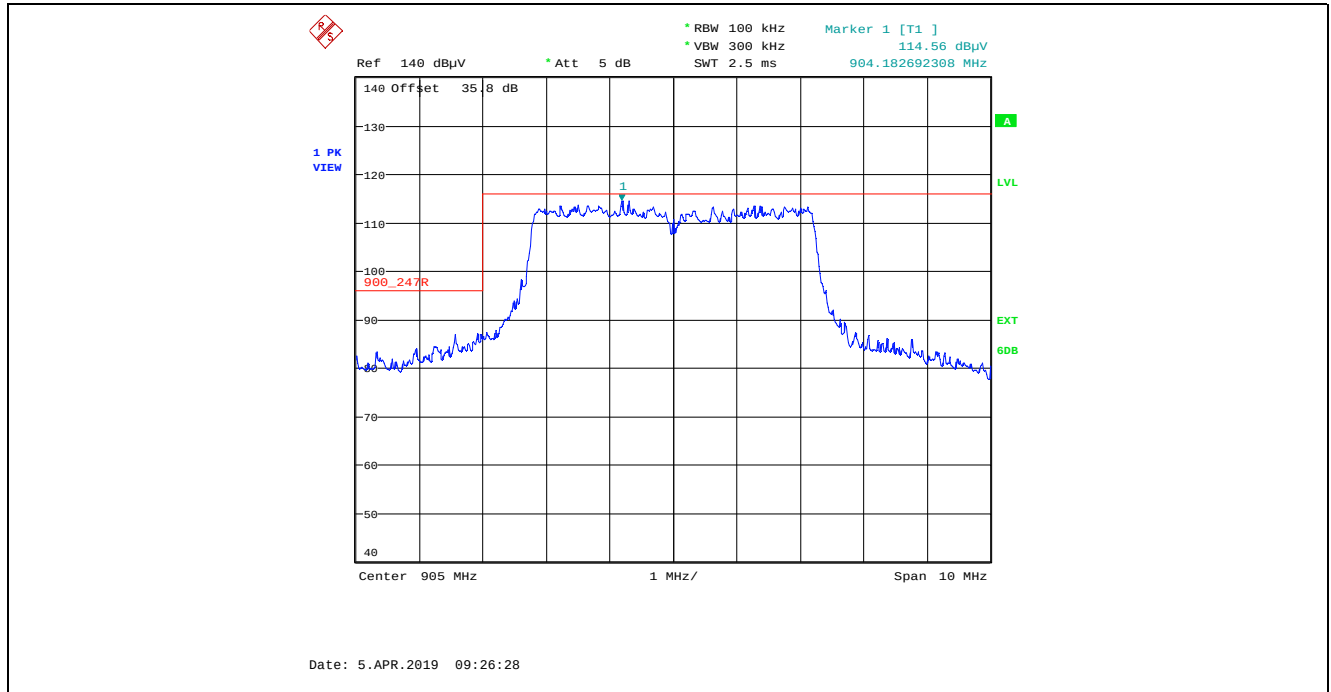
Plot 5.4.4.3.2.3. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



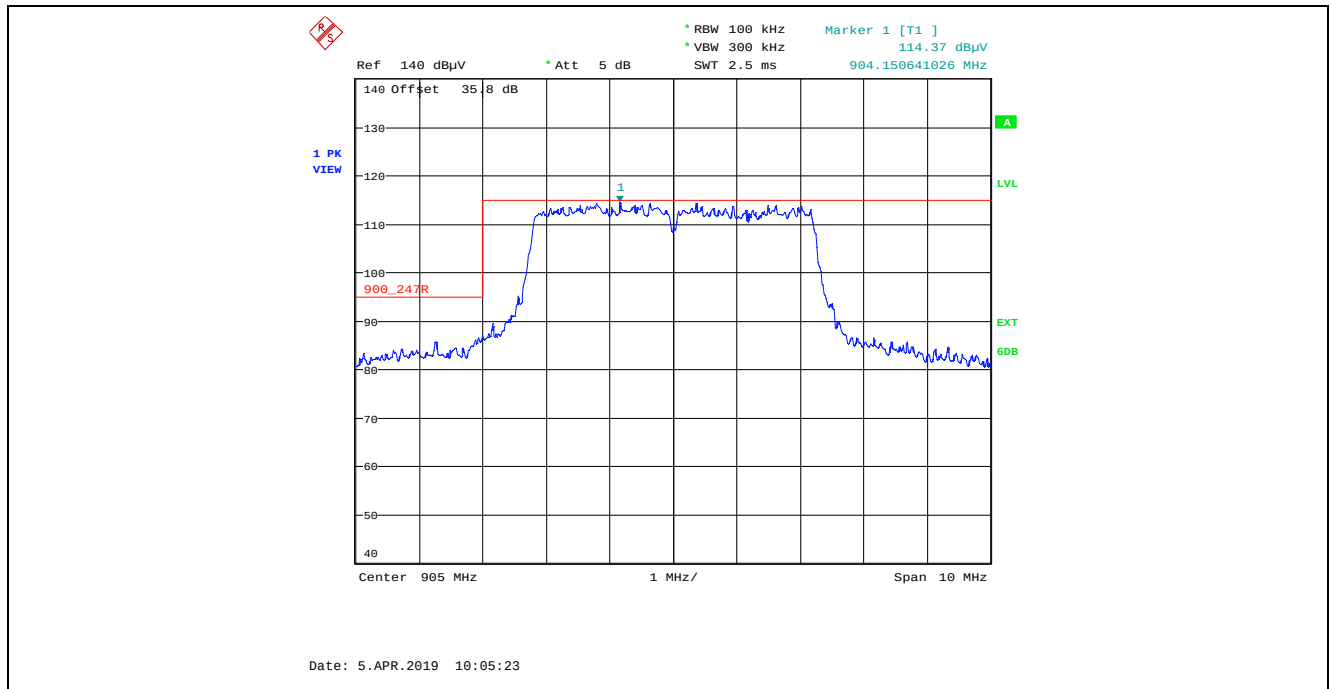
Plot 5.4.4.3.2.4. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



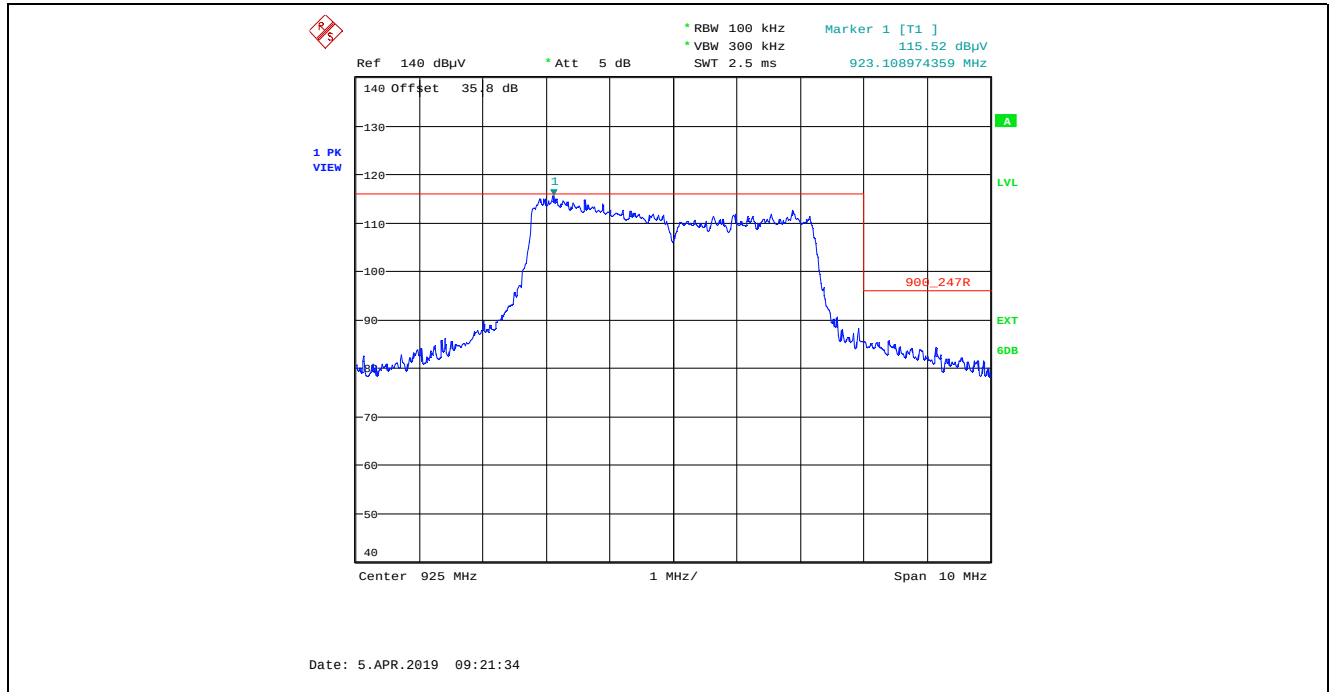
Plot 5.4.4.3.2.5. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



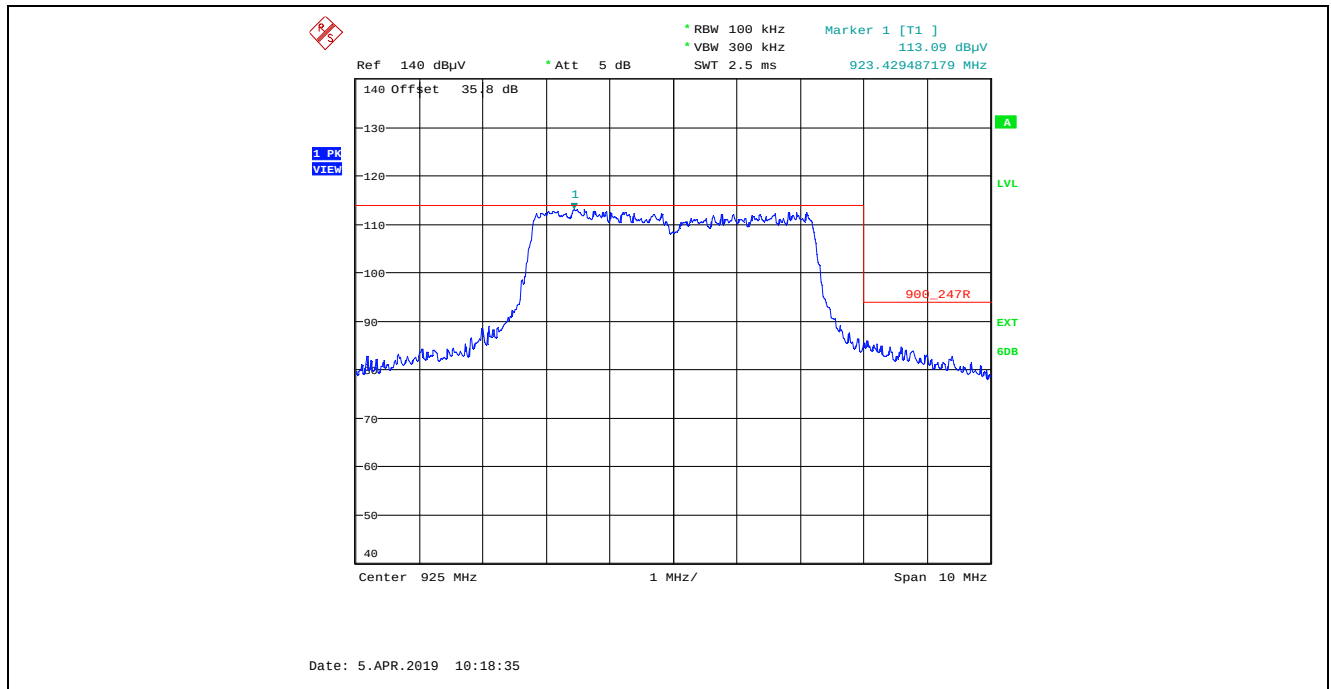
Plot 5.4.4.3.2.6. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



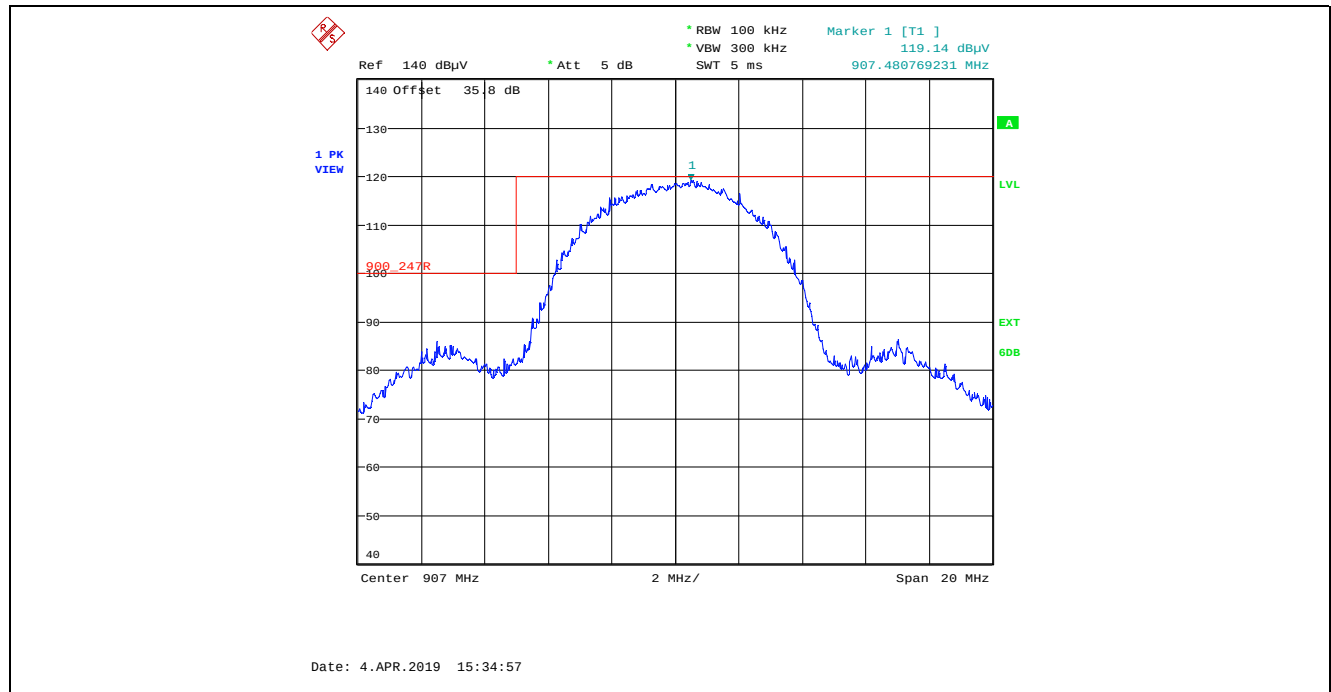
Plot 5.4.4.3.2.7. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



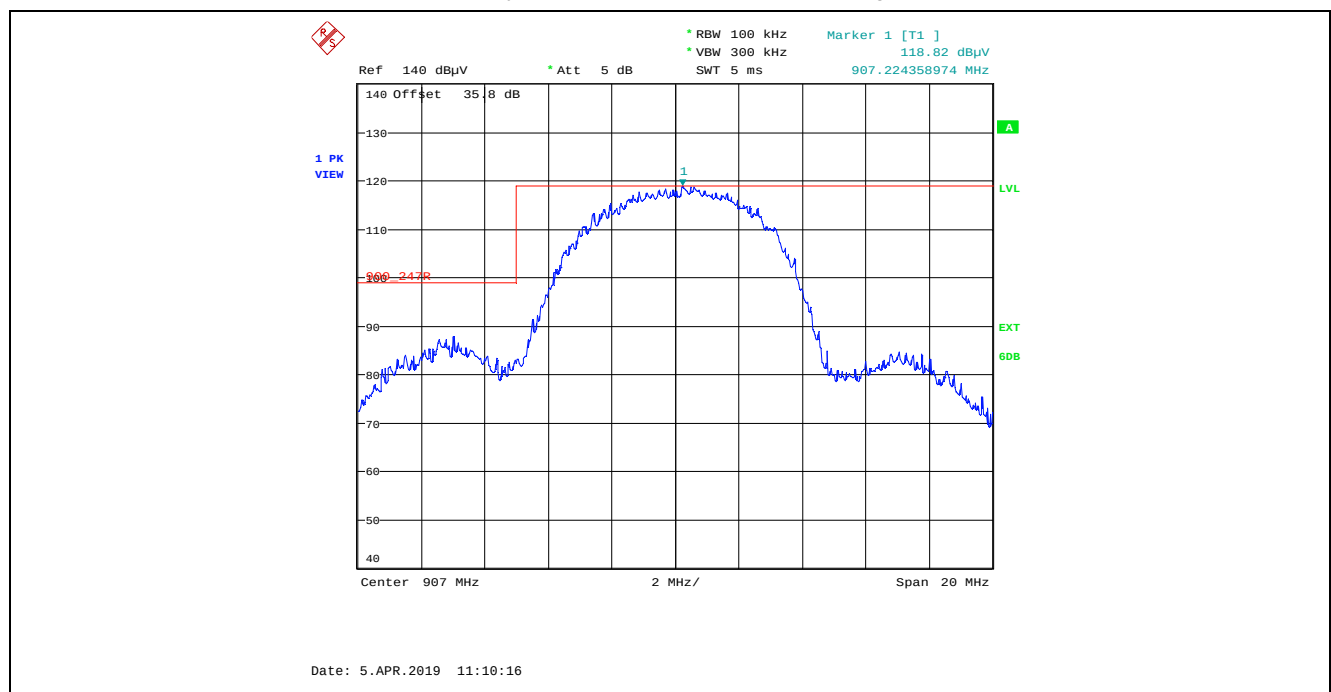
Plot 5.4.4.3.2.8. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



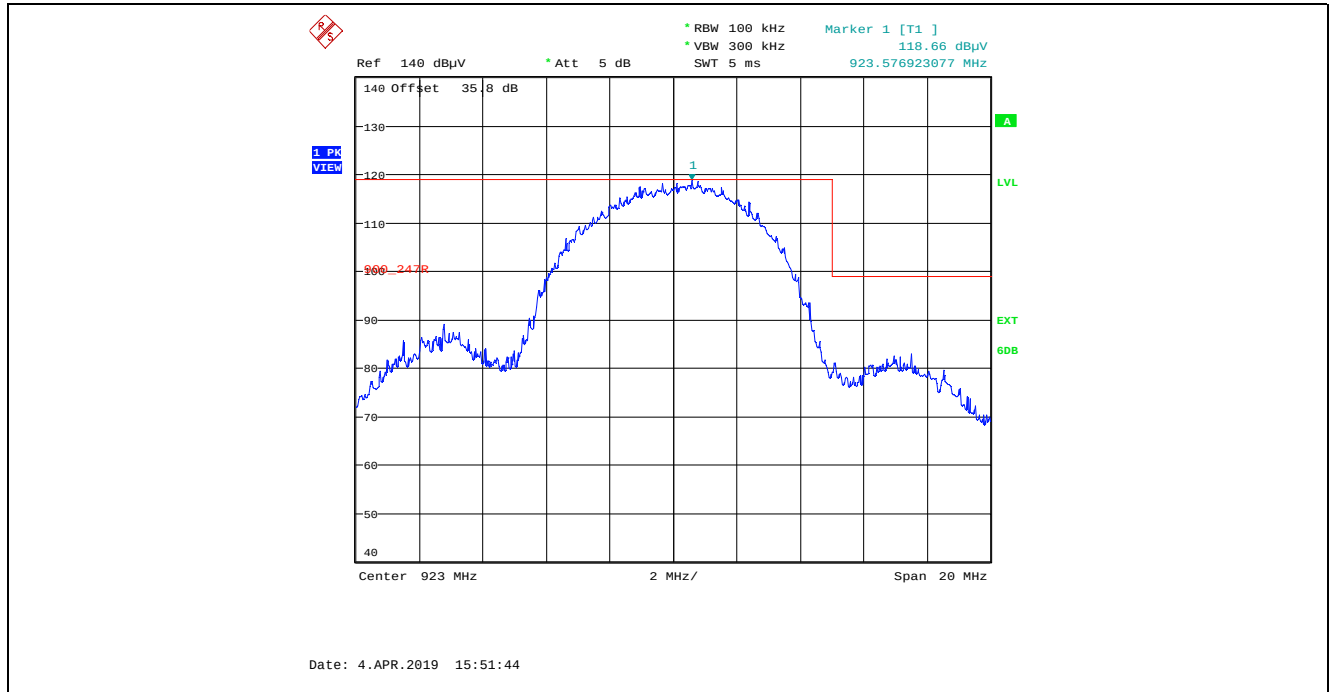
Plot 5.4.4.3.2.9. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



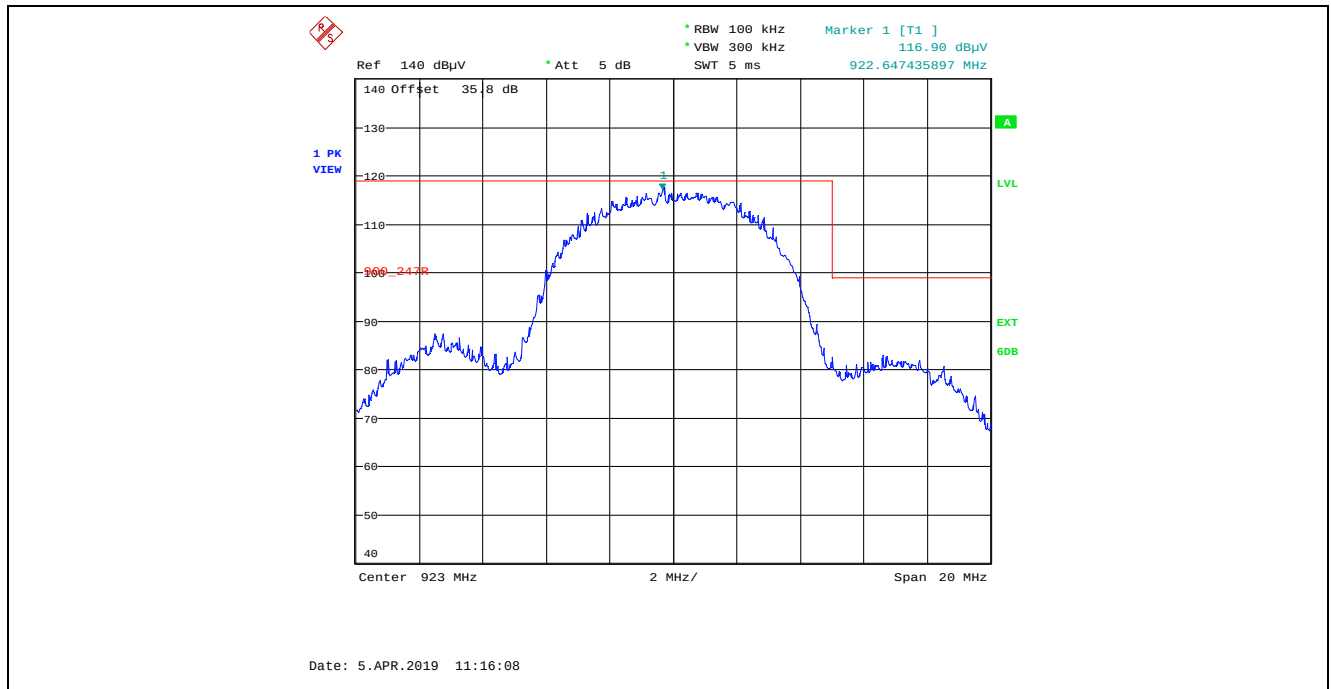
Plot 5.4.4.3.2.10. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



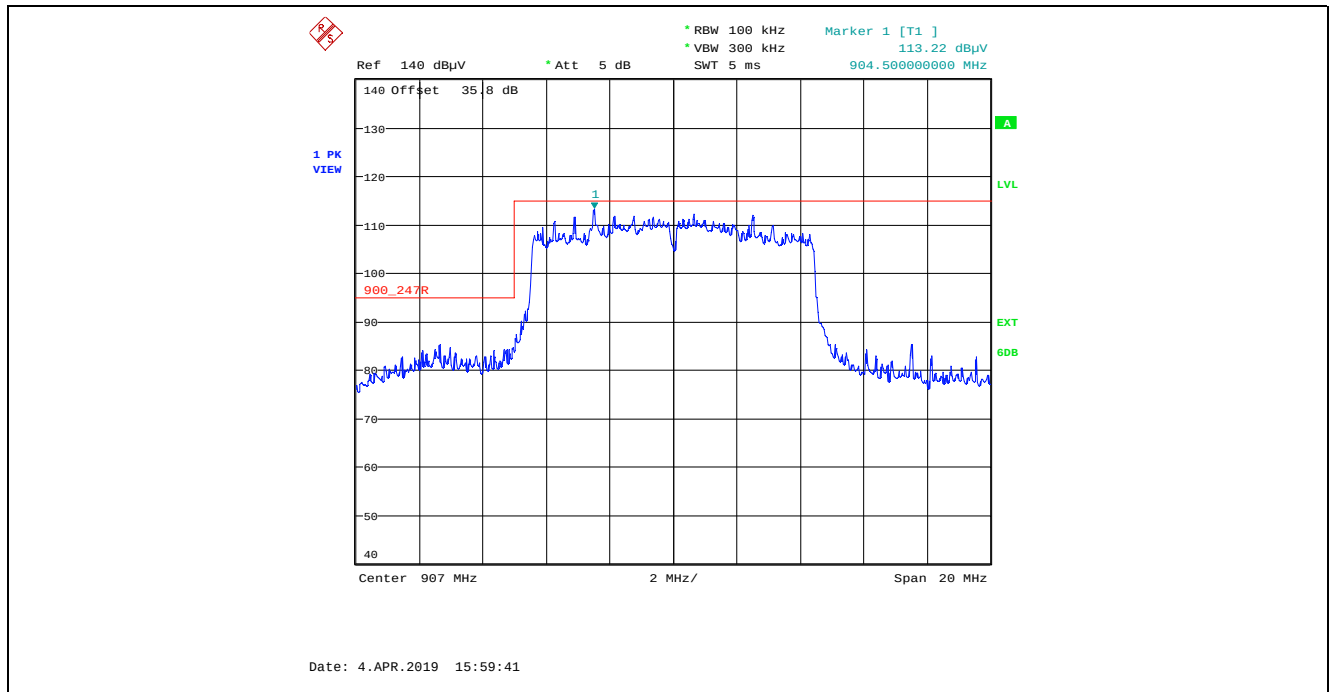
Plot 5.4.4.3.2.11. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



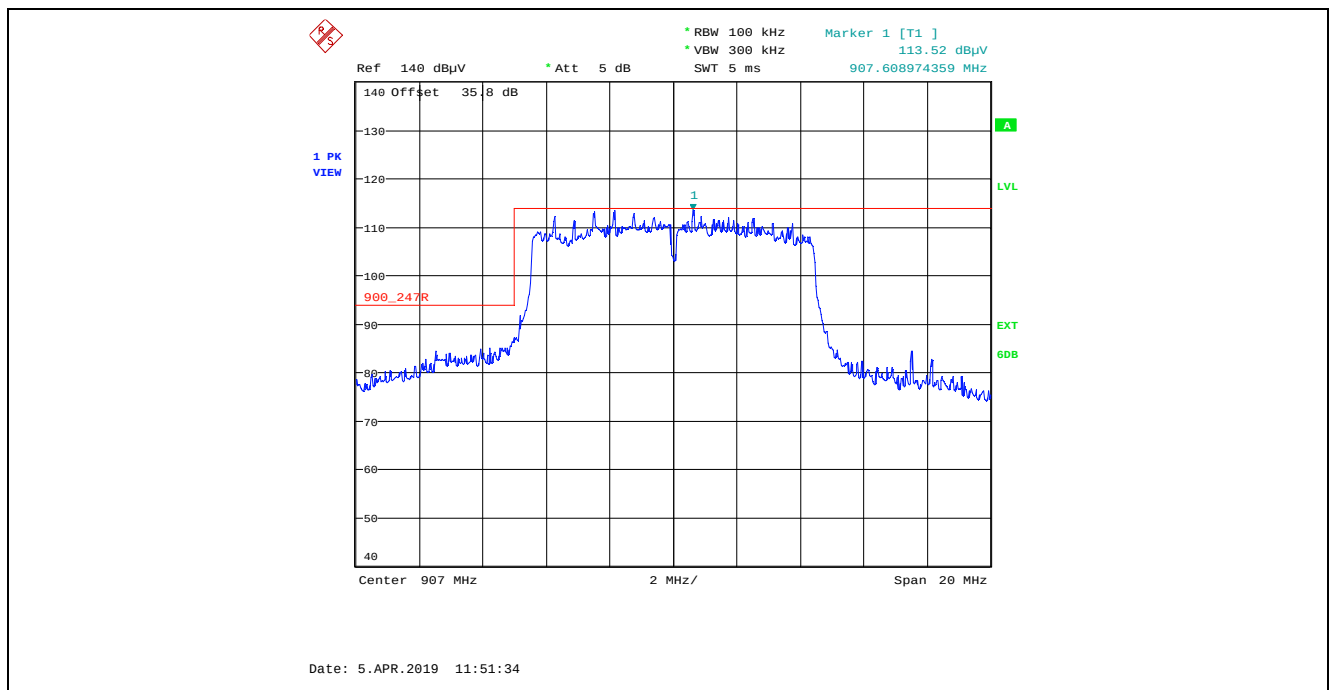
Plot 5.4.4.3.2.12. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



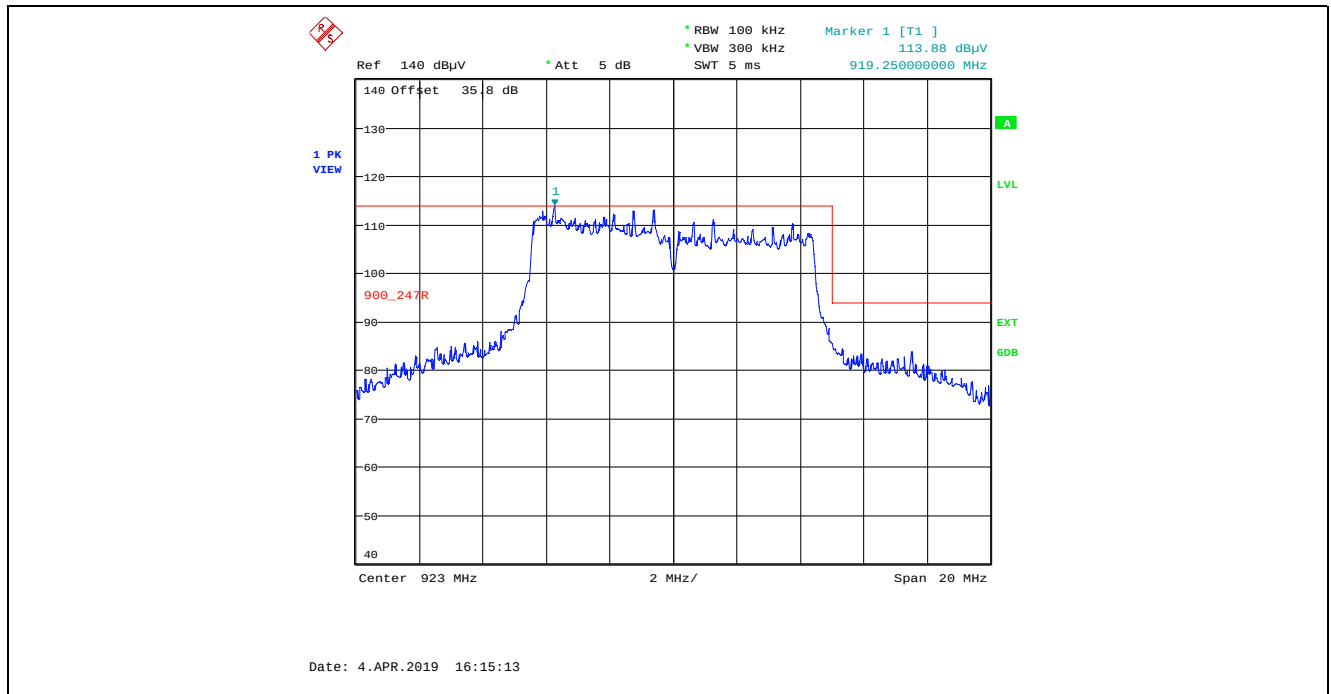
Plot 5.4.4.3.2.13. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



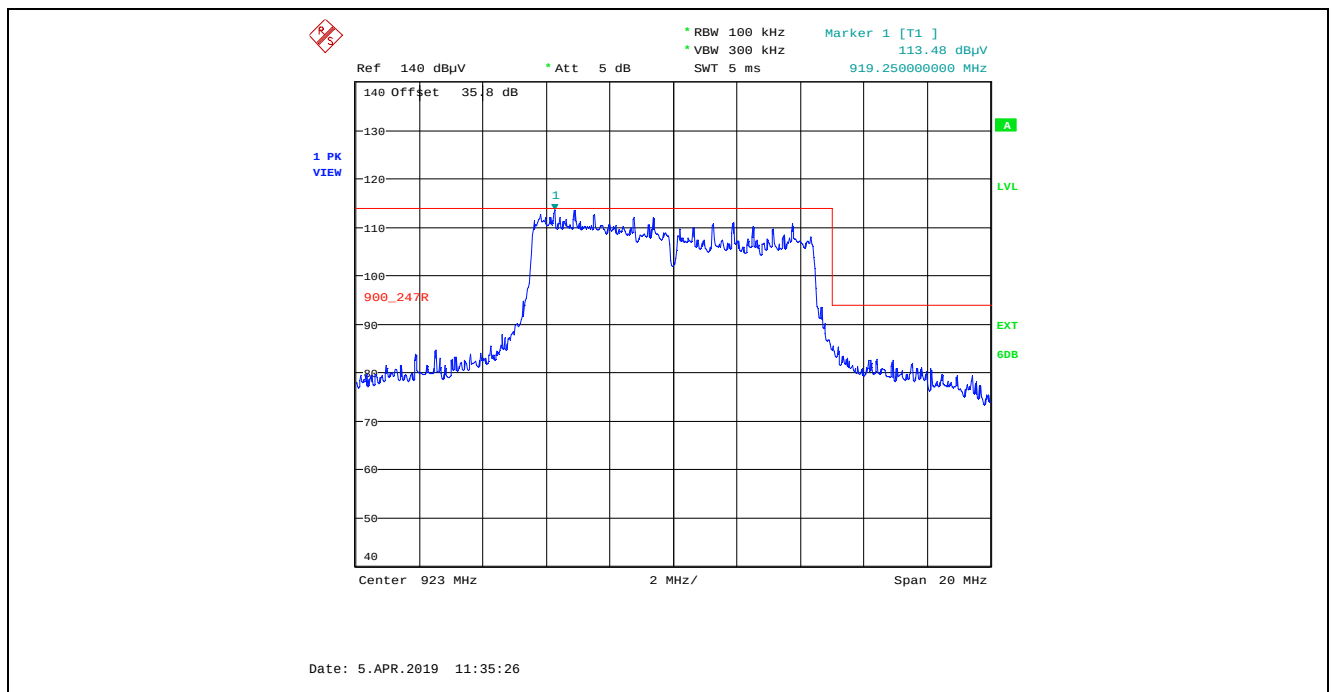
Plot 5.4.4.3.2.14. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



Plot 5.4.4.3.2.15. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



Plot 5.4.4.3.2.16. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



5.4.4.4. EUT with 8 dBi Omni Directional Antenna, 6.98 dBi Antenna Assembly Gain

5.4.4.4.1. Spurious Radiated Emissions

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	119.36	--	V	--	--	--	--
905.0	118.38	--	H	--	--	--	--
2715.0	51.44	42.33	V	54.0	99.4	-11.7	Pass*
8145.0	54.03	40.50	V	54.0	99.4	-13.5	Pass*
8145.0	54.14	39.06	H	54.0	99.4	-14.9	Pass*
9050.0	54.45	40.45	V	54.0	99.4	-13.6	Pass*
9050.0	54.66	39.02	H	54.0	99.4	-15.0	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	119.07	--	V	--	--	--	--
915.0	114.44	--	H	--	--	--	--
2745.0	47.75	38.72	V	54.0	99.1	-15.3	Pass*
2745.0	46.15	35.72	H	54.0	99.1	-18.3	Pass*
7320.0	53.44	44.56	V	54.0	99.1	-9.4	Pass*
7320.0	53.95	45.89	H	54.0	99.1	-8.1	Pass*
8235.0	53.61	40.73	V	54.0	99.1	-13.3	Pass*
8235.0	52.48	40.08	H	54.0	99.1	-13.9	Pass*
9150.0	53.98	40.56	V	54.0	99.1	-13.4	Pass*
9150.0	54.36	39.73	H	54.0	99.1	-14.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	119.11	--	V	--	--	--	--
925.0	117.38	--	H	--	--	--	--
2775.0	49.11	40.49	V	54.0	99.1	-13.5	Pass*
2775.0	47.60	38.08	H	54.0	99.1	-15.9	Pass*
7400.0	52.37	44.15	V	54.0	99.1	-9.9	Pass*
7400.0	52.25	43.22	H	54.0	99.1	-10.8	Pass*
8325.0	53.32	42.41	V	54.0	99.1	-11.6	Pass*
8325.0	51.59	37.88	H	54.0	99.1	-16.1	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	113.57	--	V	--	--	--	--
905.0	111.53	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	111.92	--	V	--	--	--	--
915.0	108.33	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	113.66	--	V	--	--	--	--
925.0	109.13	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	119.30	--	V	--	--	--	--
907.0	113.45	--	H	--	--	--	--
2721.0	47.85	38.56	V	54.0	99.3	-15.4	Pass*
2721.0	47.61	39.25	H	54.0	99.3	-14.8	Pass*
7256.0	51.96	42.92	V	54.0	99.3	-11.1	Pass*
7256.0	50.06	40.15	H	54.0	99.3	-13.9	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	117.11	--	V	--	--	--	--
915.0	111.82	--	H	--	--	--	--
2745.0	47.32	37.67	V	54.0	97.1	-16.3	Pass*
7320.0	52.23	43.18	V	54.0	97.1	-10.8	Pass*
7320.0	49.22	39.72	H	54.0	97.1	-14.3	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 20, Data Rate 1					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
923.0	118.49	--	V	--	--	--	--
923.0	114.14	--	H	--	--	--	--
2769.0	46.55	35.67	V	54.0	98.5	-18.3	Pass*
2769.0	47.24	37.46	H	54.0	98.5	-16.5	Pass*
7384.0	51.39	40.79	V	54.0	98.5	-13.2	Pass*
7384.0	50.70	40.98	H	54.0	98.5	-13.0	Pass*
All other spurious emissions and harmonics are more than 20 dB below the applicable limit.							

*Field strength of emissions appearing within restricted frequency bands shall not exceed the limits in § 15.209.

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
907.0	111.88	--	V	--	--	--	--
907.0	109.35	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBμV/m)	RF Avg Level (dBμV/m)	Antenna Plane (H/V)	Limit 15.209 (dBμV/m)	Limit 15.247 (dBμV/m)	Margin (dB)	Pass/Fail
915.0	111.28	--	V	--	--	--	--
915.0	109.01	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

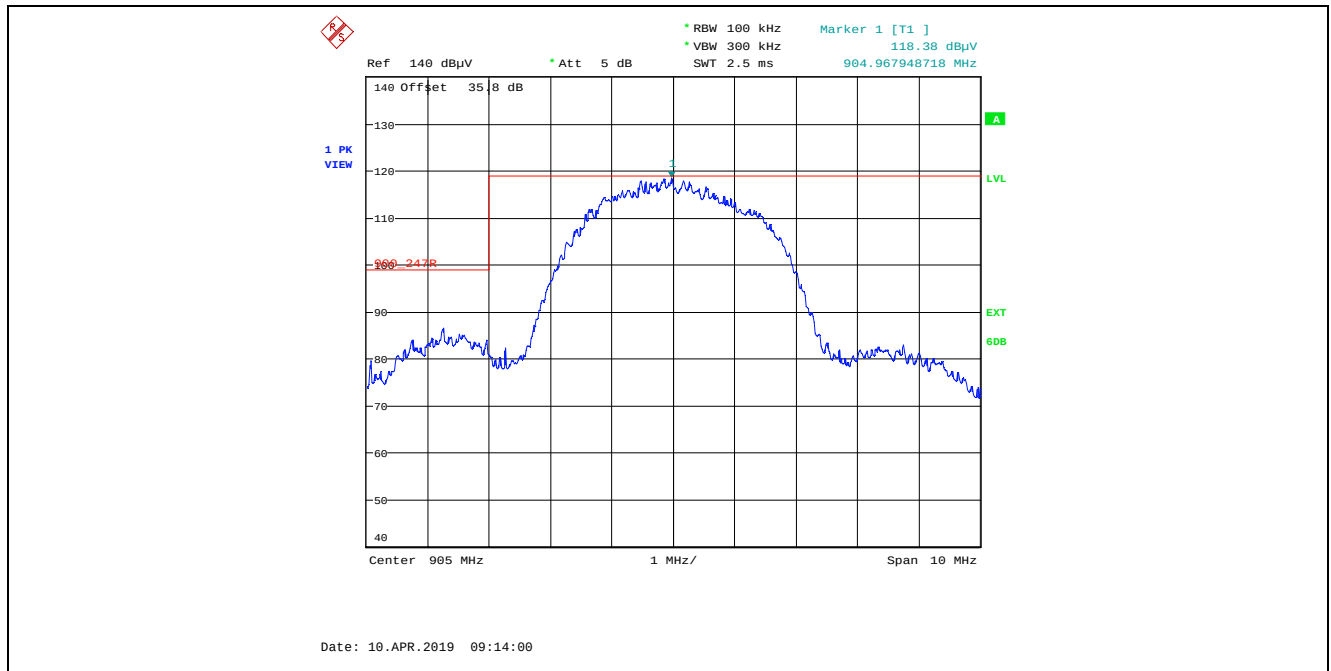
File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

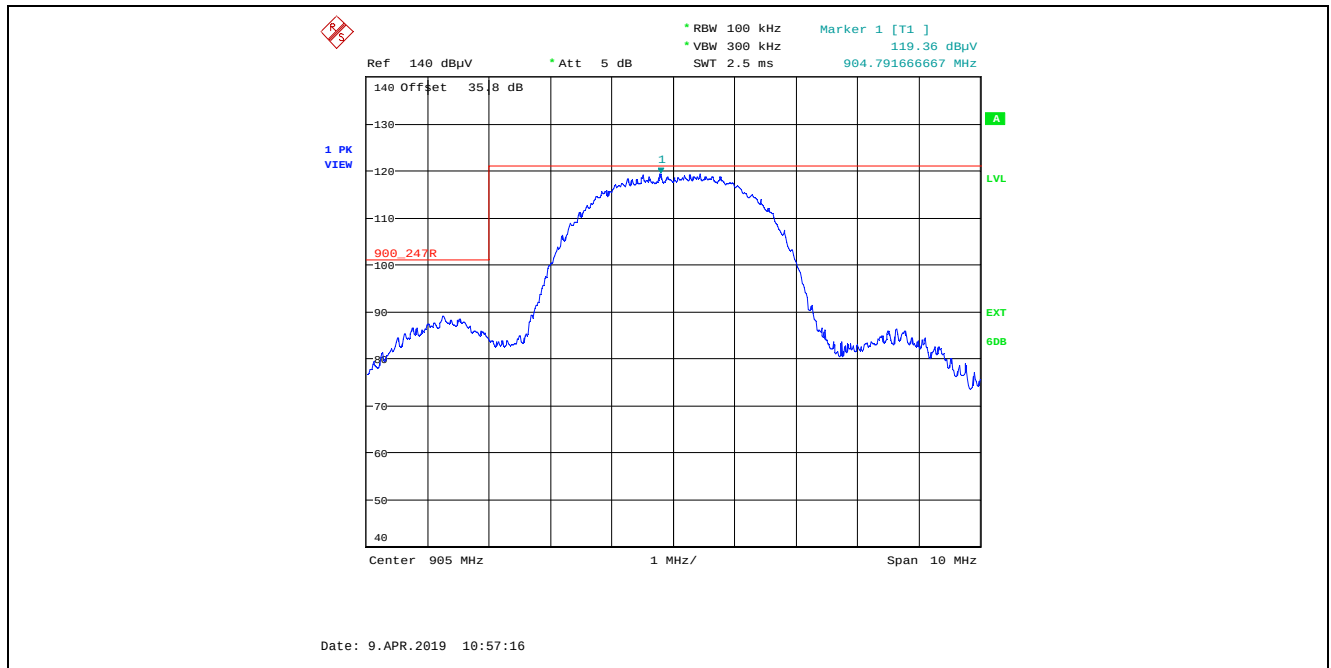
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 17, Data Rate 4					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	111.80	--	V	--	--	--	--
923.0	108.61	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

5.4.4.4.2. Band-Edge RF Radiated Emissions

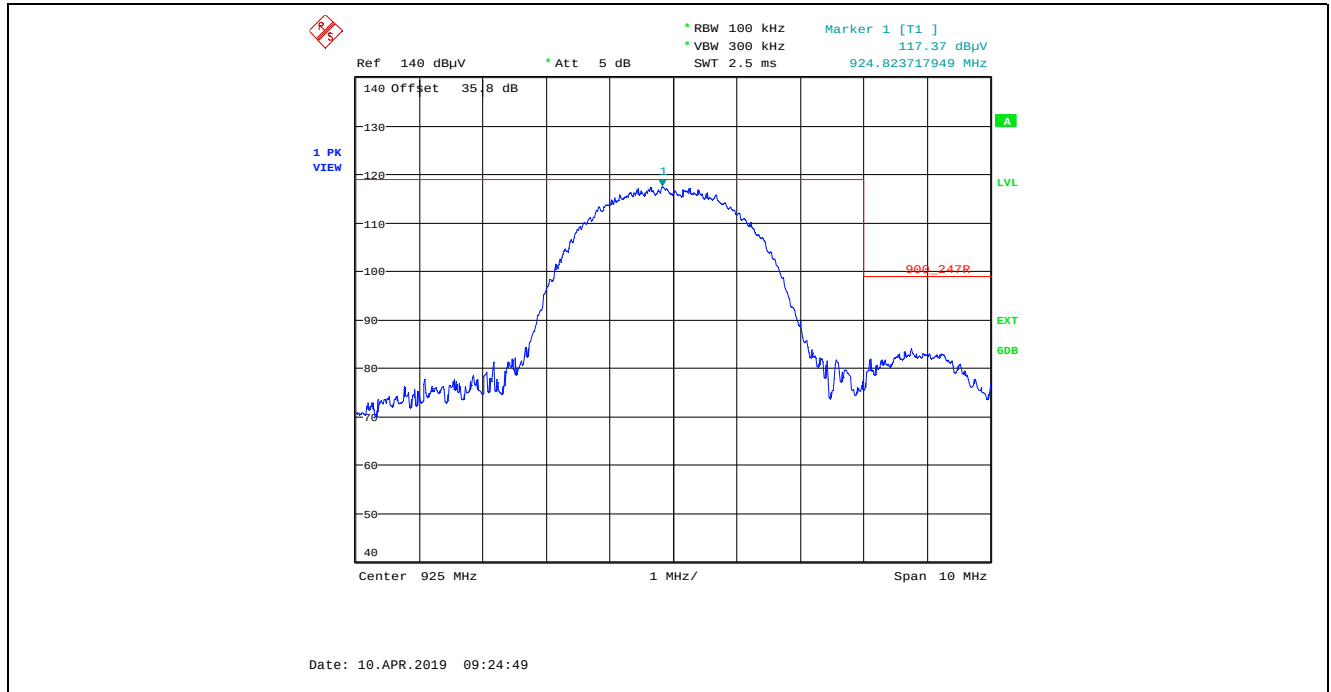
Plot 5.4.4.4.2.1. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



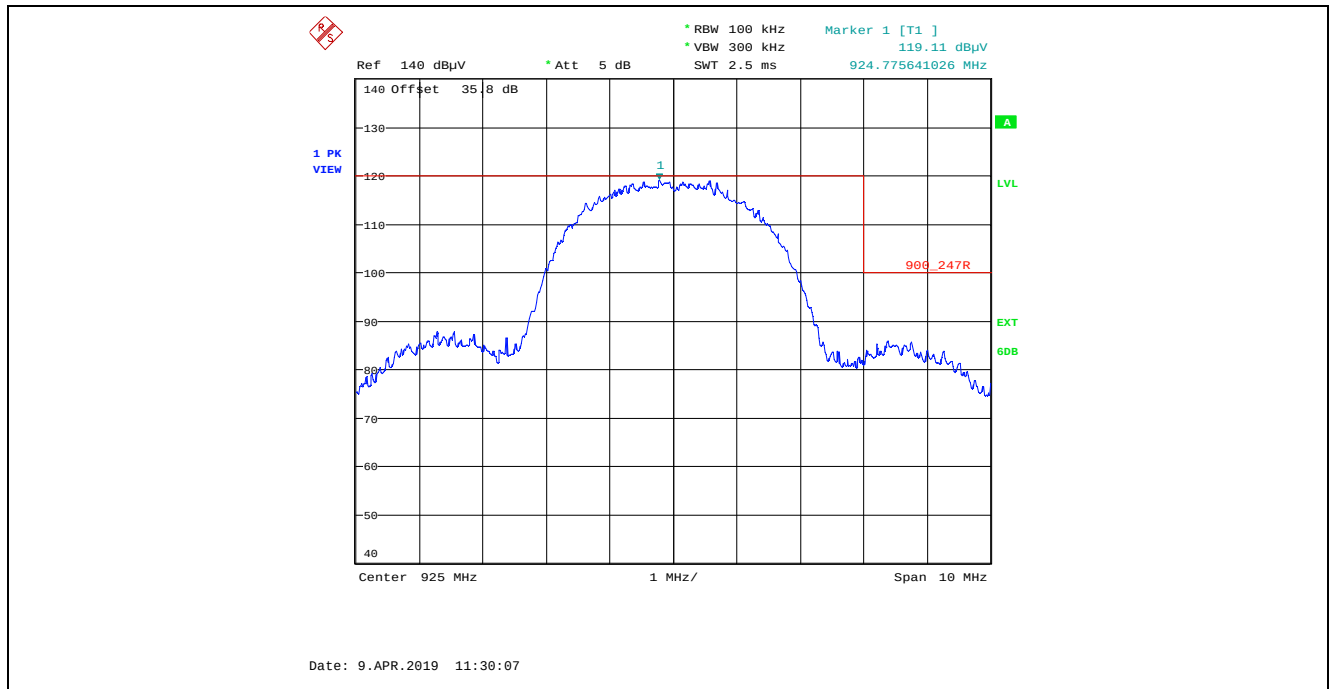
Plot 5.4.4.4.2.2. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



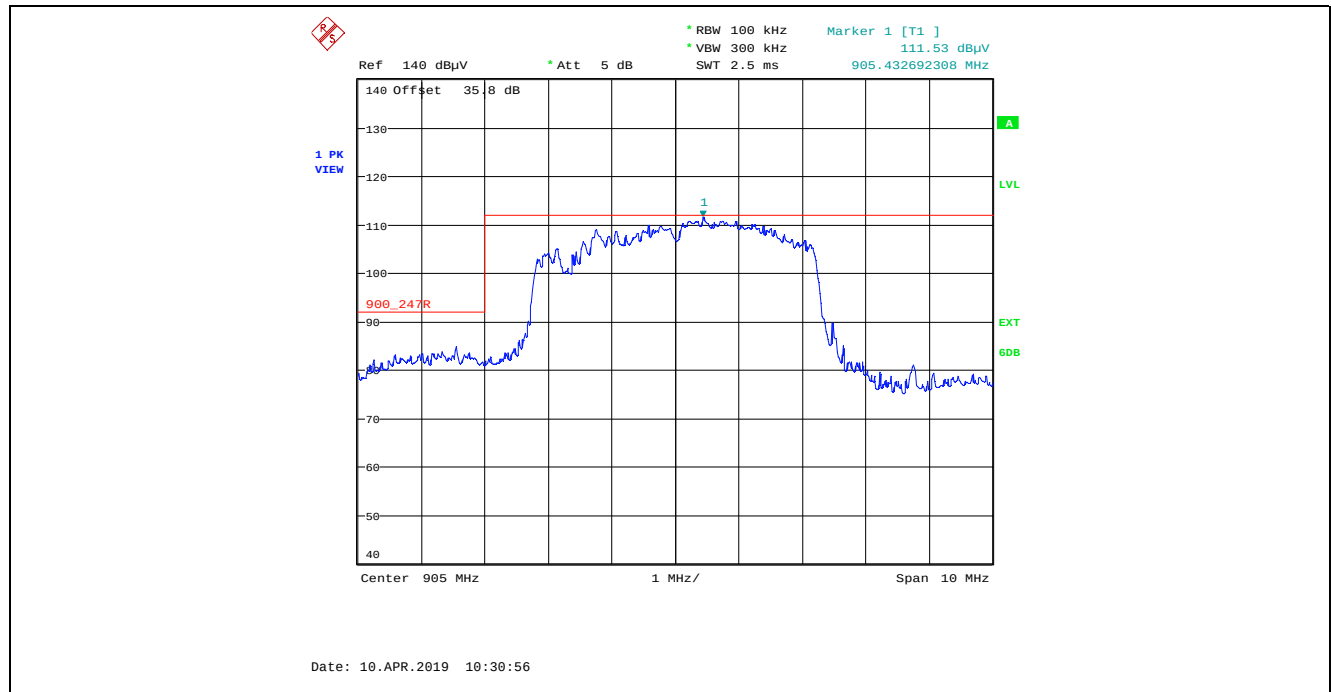
Plot 5.4.4.4.2.3. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



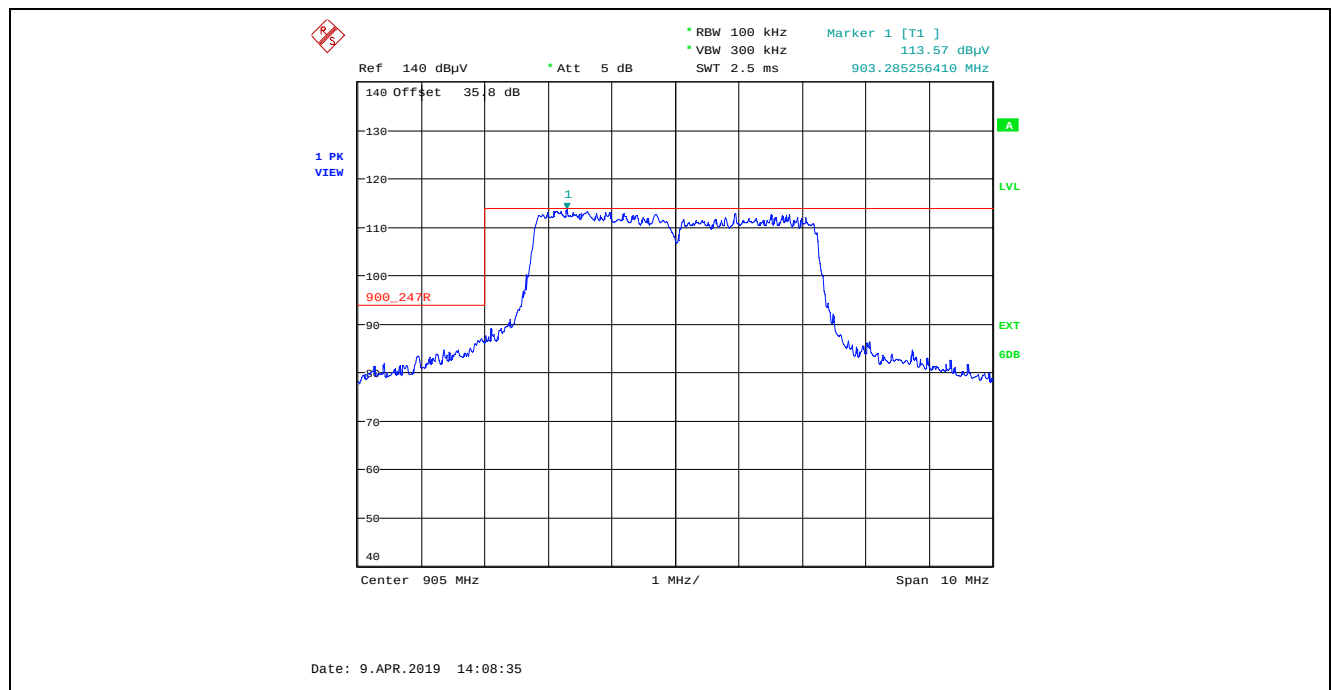
Plot 5.4.4.4.2.4. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 20, Data Rate 3



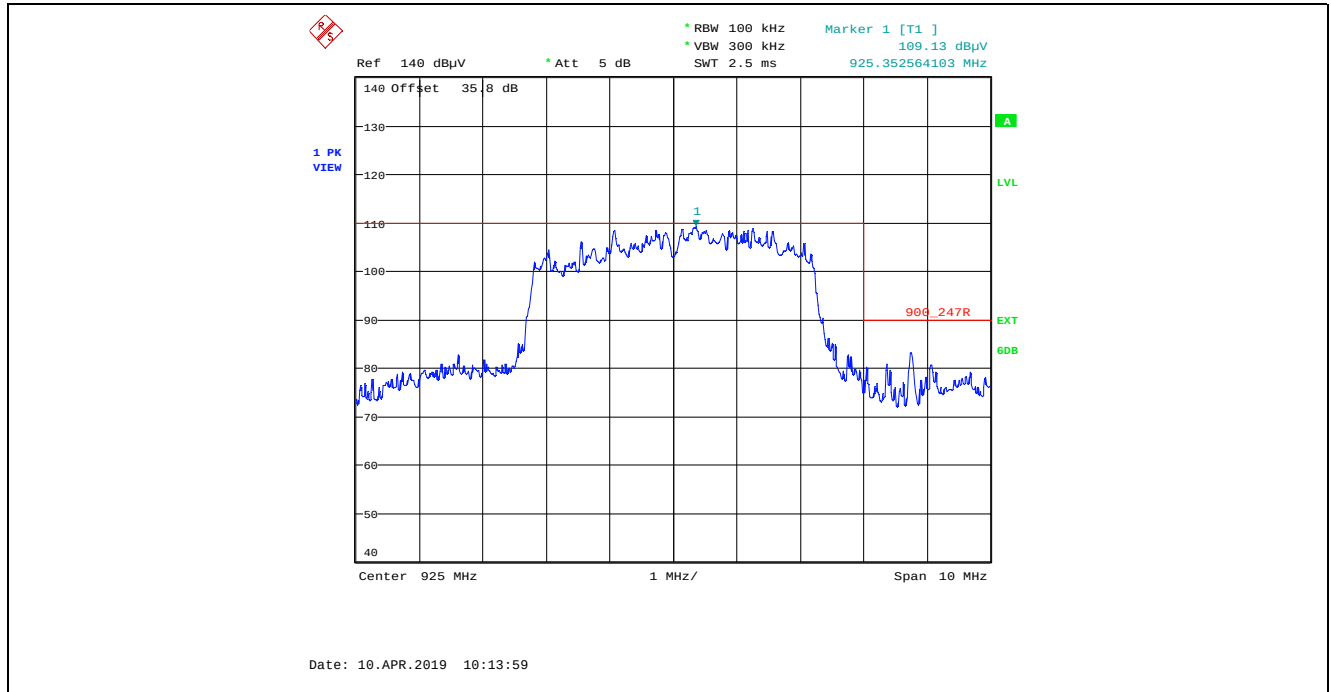
Plot 5.4.4.2.5. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



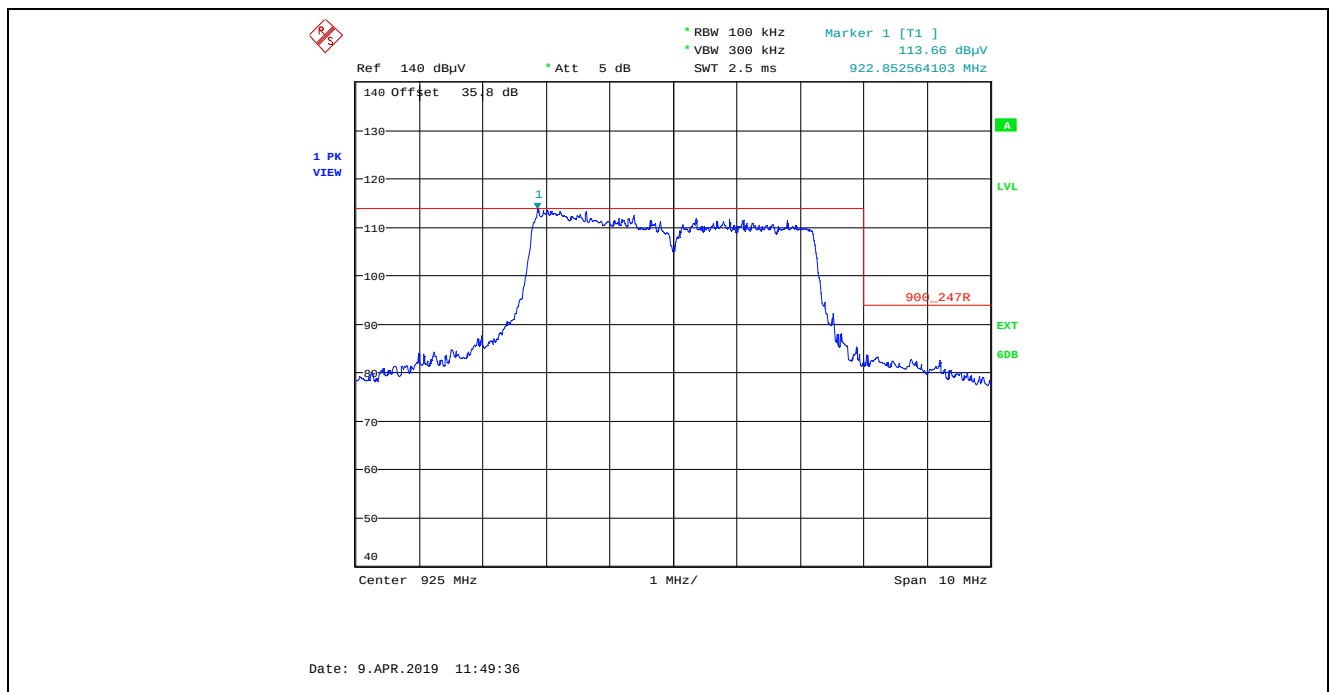
Plot 5.4.4.2.6. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



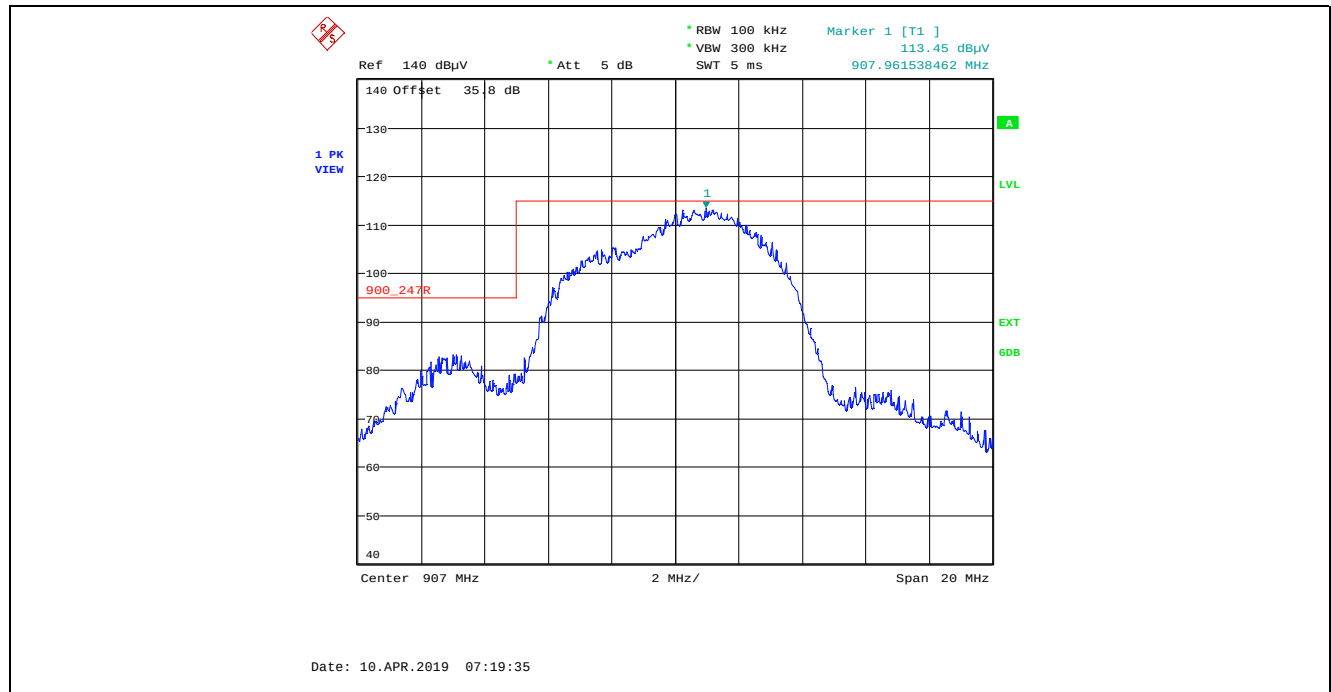
Plot 5.4.4.2.7. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



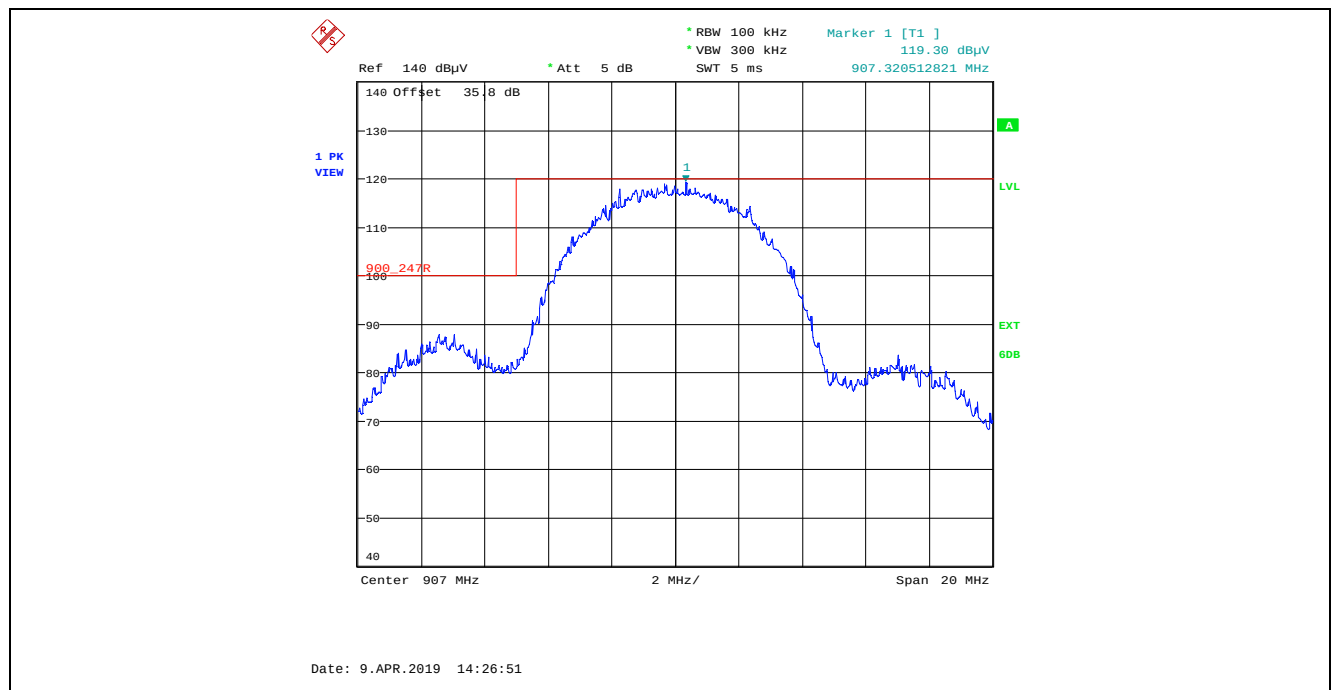
Plot 5.4.4.2.8. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 17, Data Rate 7



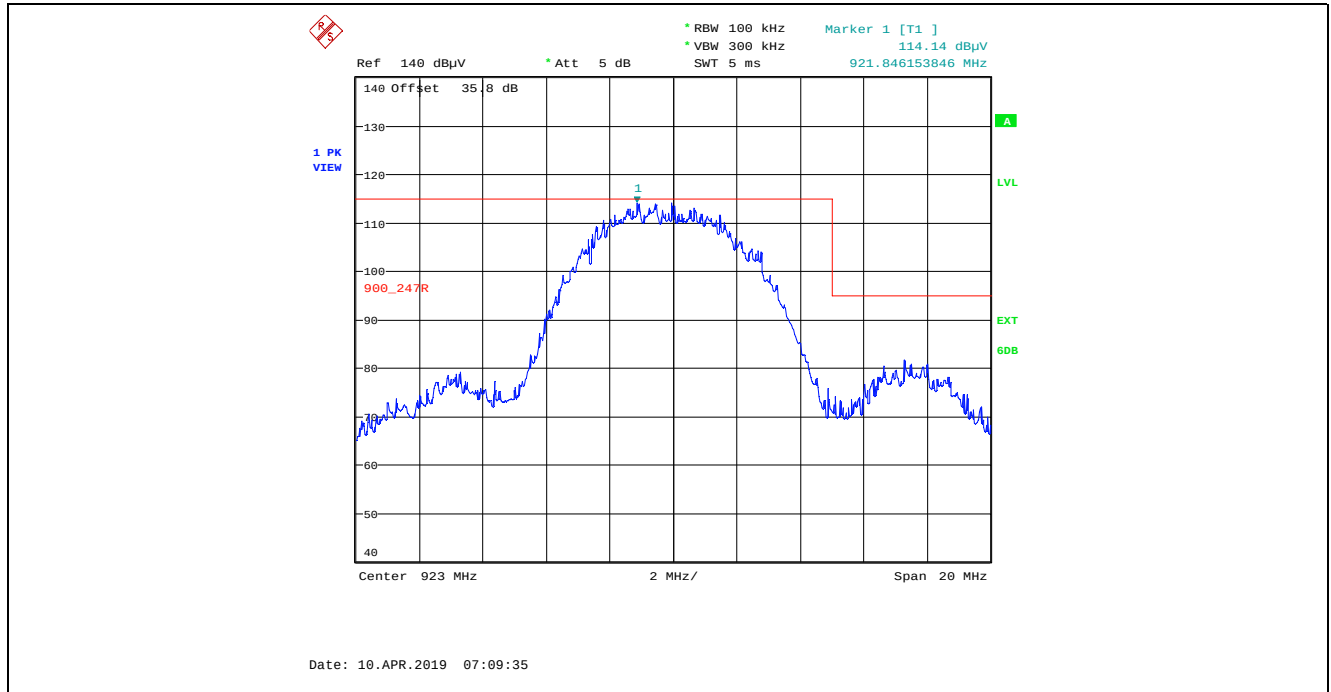
Plot 5.4.4.4.2.9. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



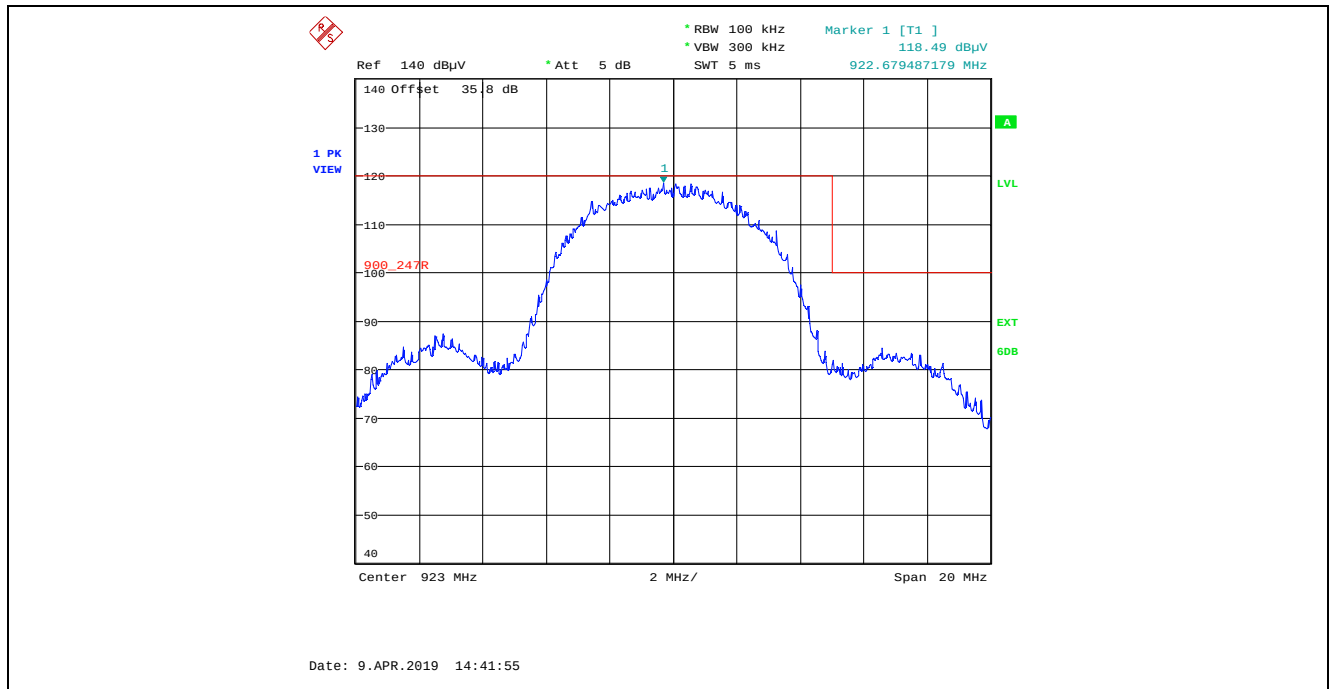
Plot 5.4.4.4.2.10. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



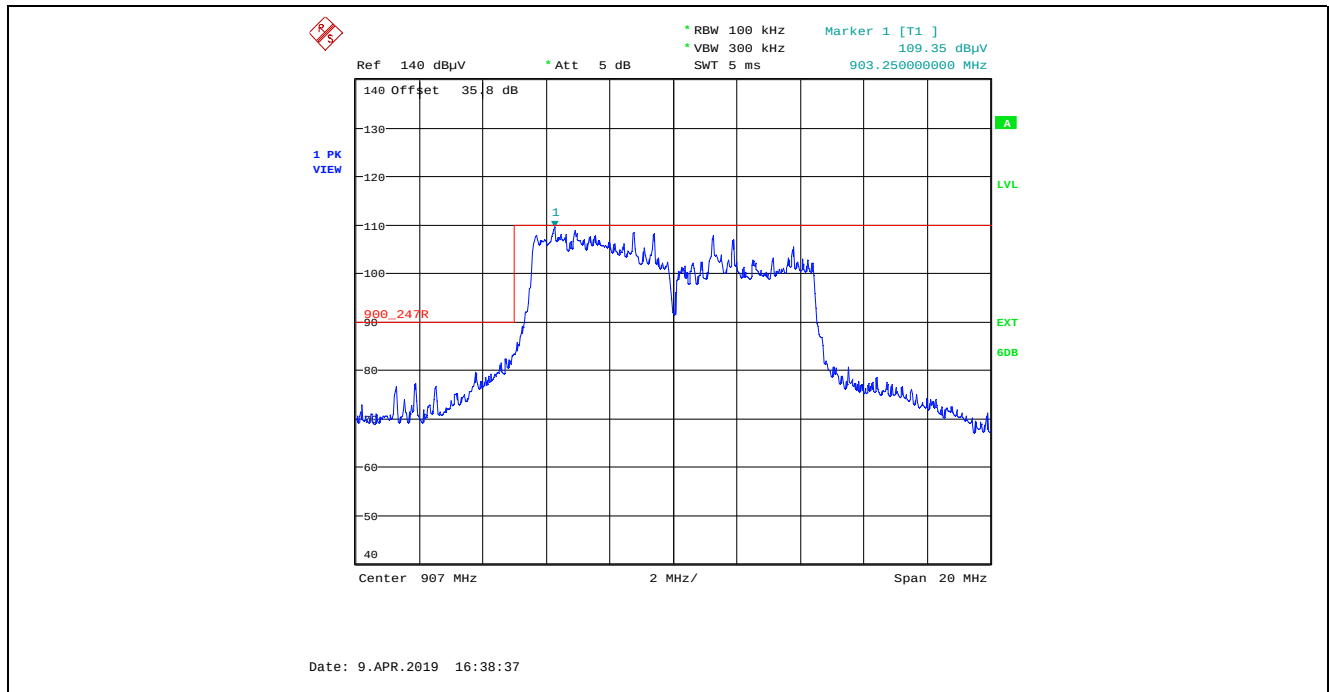
Plot 5.4.4.4.2.11. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



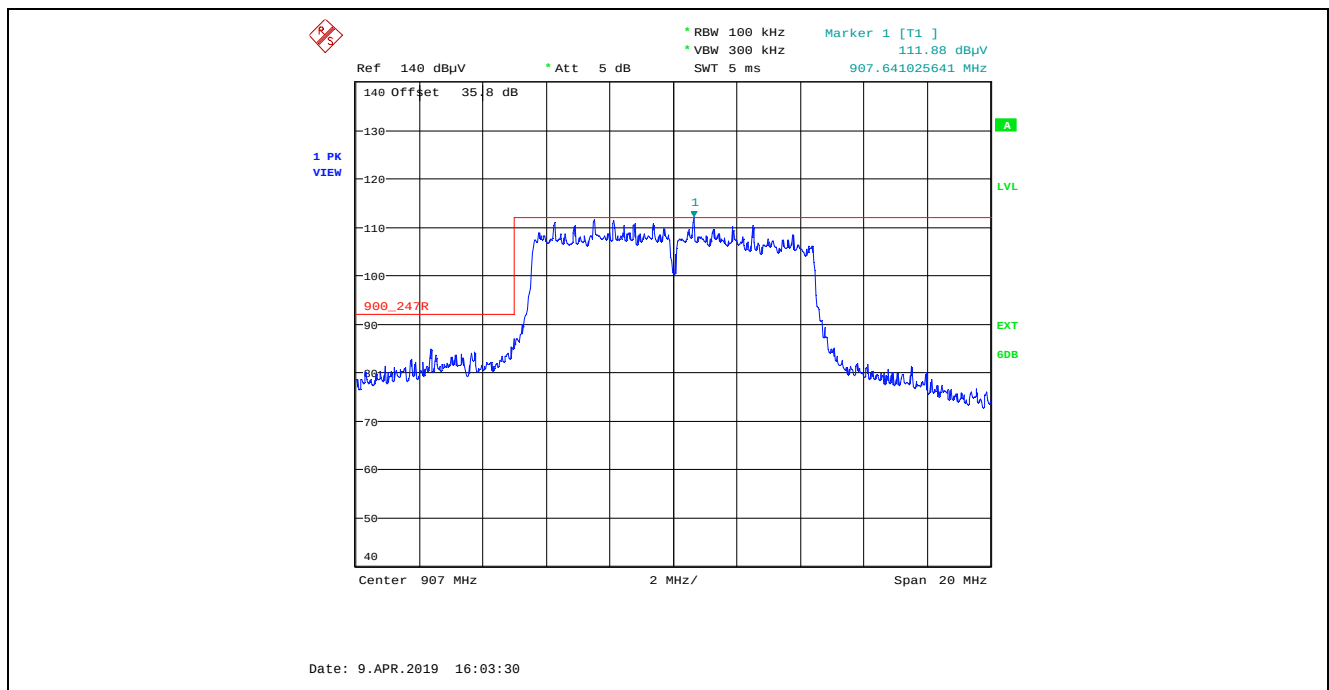
Plot 5.4.4.4.2.12. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 20, Data Rate 3



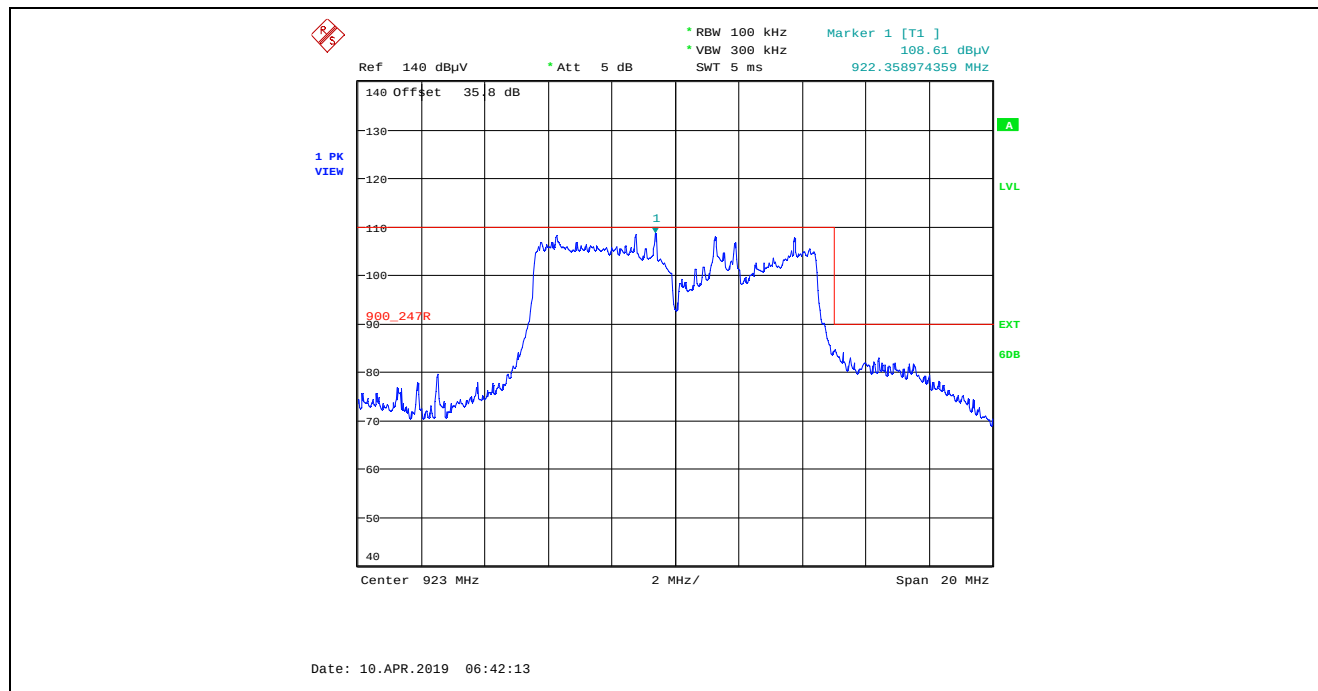
Plot 5.4.4.4.2.13. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



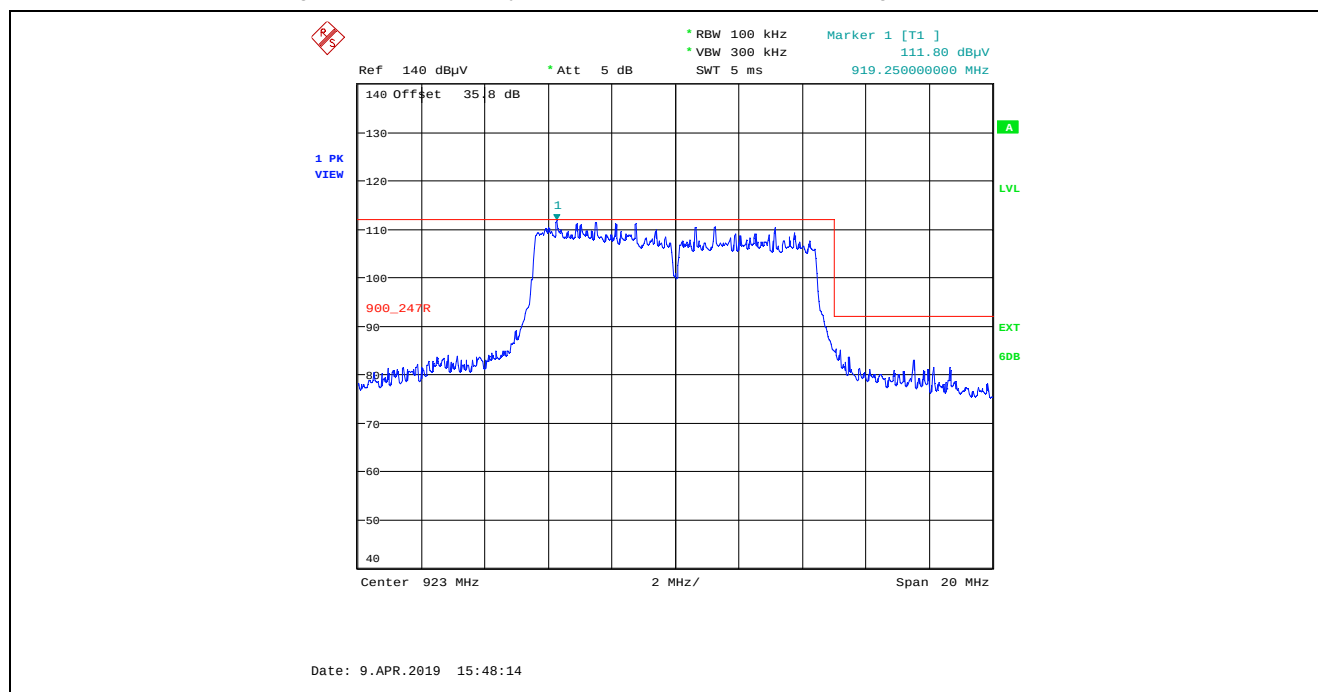
Plot 5.4.4.4.2.14. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



Plot 5.4.4.4.2.15. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



Plot 5.4.4.4.2.16. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 17, Data Rate 7



5.4.4.5. EUT with 14 dBi Yagi Antenna, 12.98 dBi Antenna Assembly Gain

5.4.4.5.1. Spurious Radiated Emissions

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	123.43	--	V	--	--	--	--
905.0	122.93	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	122.59	--	V	--	--	--	--
915.0	122.10	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	121.74	--	V	--	--	--	--
925.0	121.23	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		905 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
905.0	114.91	--	V	--	--	--	--
905.0	114.53	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	114.10	--	V	--	--	--	--
915.0	113.70	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		4 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		925 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
925.0	114.14	--	V	--	--	--	--
925.0	113.56	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	121.05	--	V	--	--	--	--
907.0	120.93	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	119.42	--	V	--	--	--	--
915.0	121.41	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 9, Data Rate 1					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	120.02	--	V	--	--	--	--
923.0	119.27	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

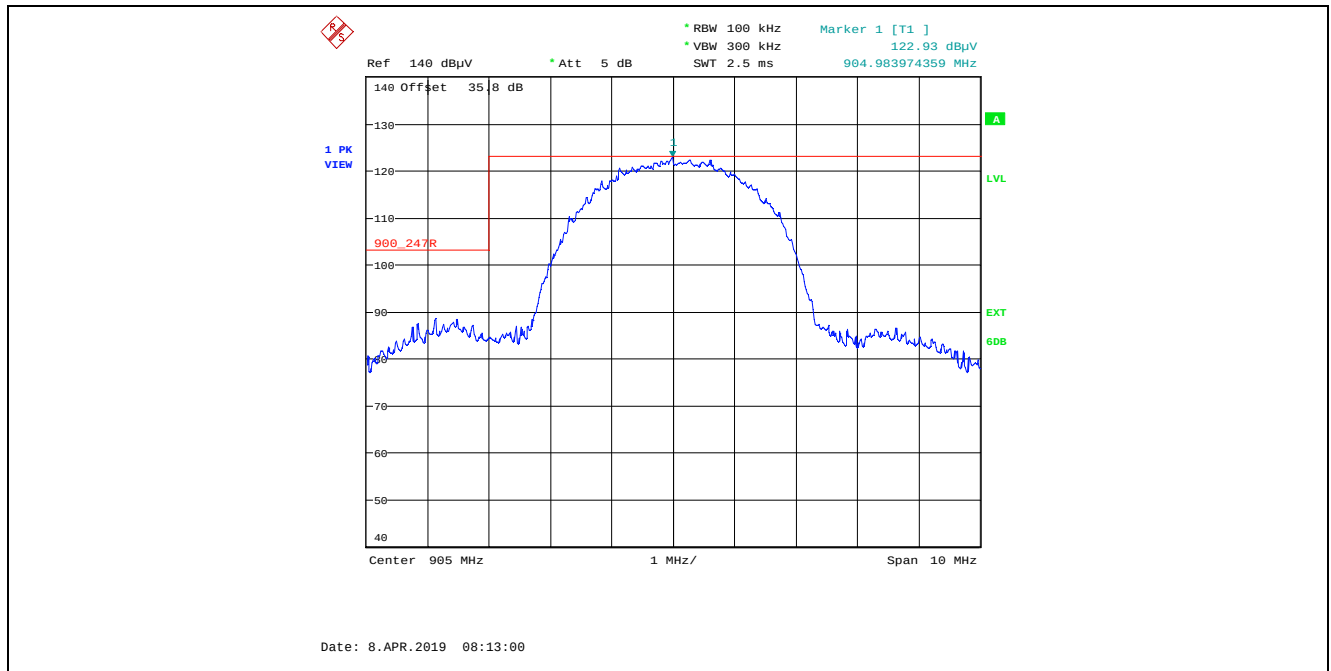
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		907 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
907.0	113.41	--	V	--	--	--	--
907.0	112.83	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		915 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
915.0	113.93	--	V	--	--	--	--
915.0	113.03	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

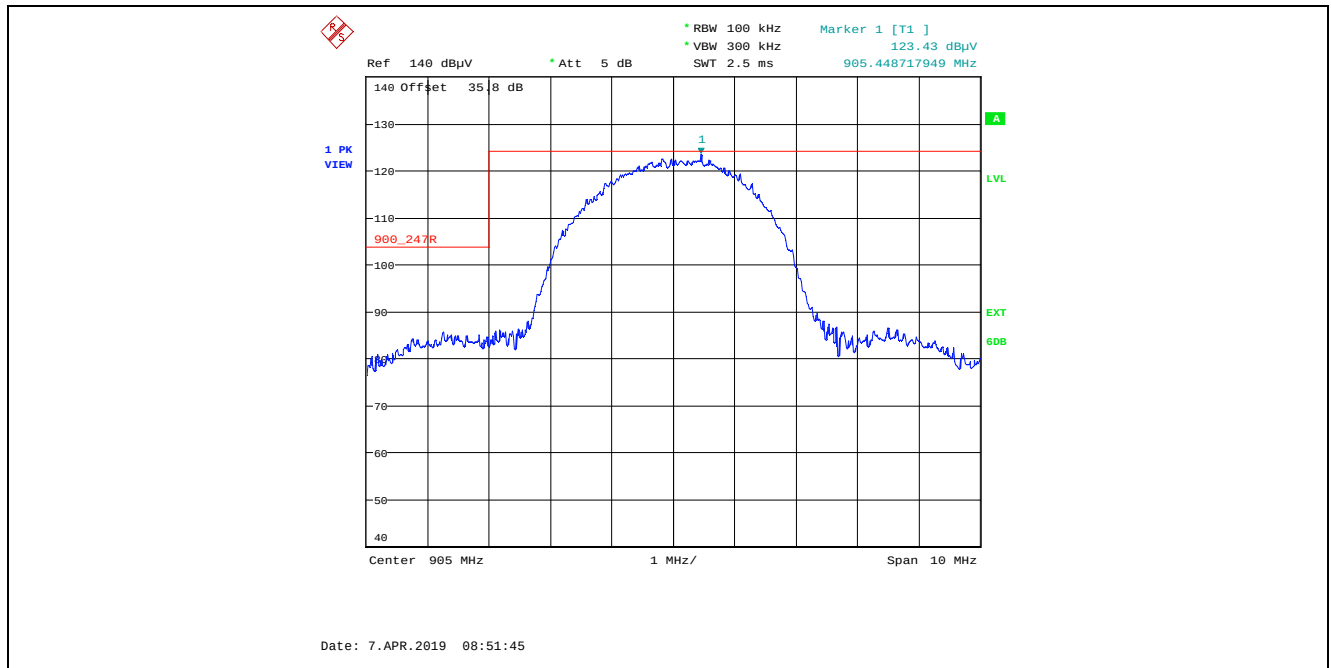
Test Configuration:		8 MHz Bandwidth, Tx Gain Setting 6, Data Rate 4					
Fundamental Frequency:		923 MHz					
Test Frequency Range:		30 MHz – 10 GHz					
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/Fail
923.0	113.71	--	V	--	--	--	--
923.0	113.75	--	H	--	--	--	--
30 - 10000	*	*	V/H	*	*	*	*
*Spurious emissions and harmonics are more than 20 dB below the applicable limit.							

5.4.4.5.2. Band-Edge RF Radiated Emissions

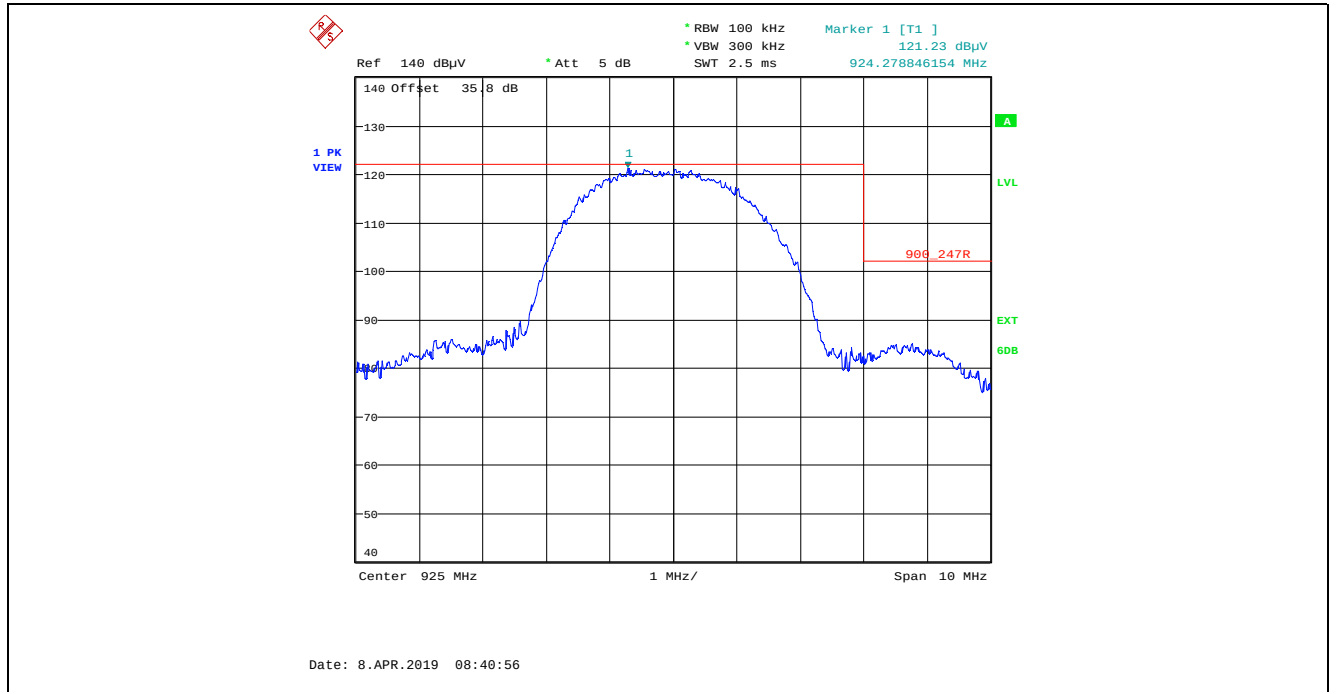
Plot 5.4.4.5.2.1. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 9, Data Rate 3



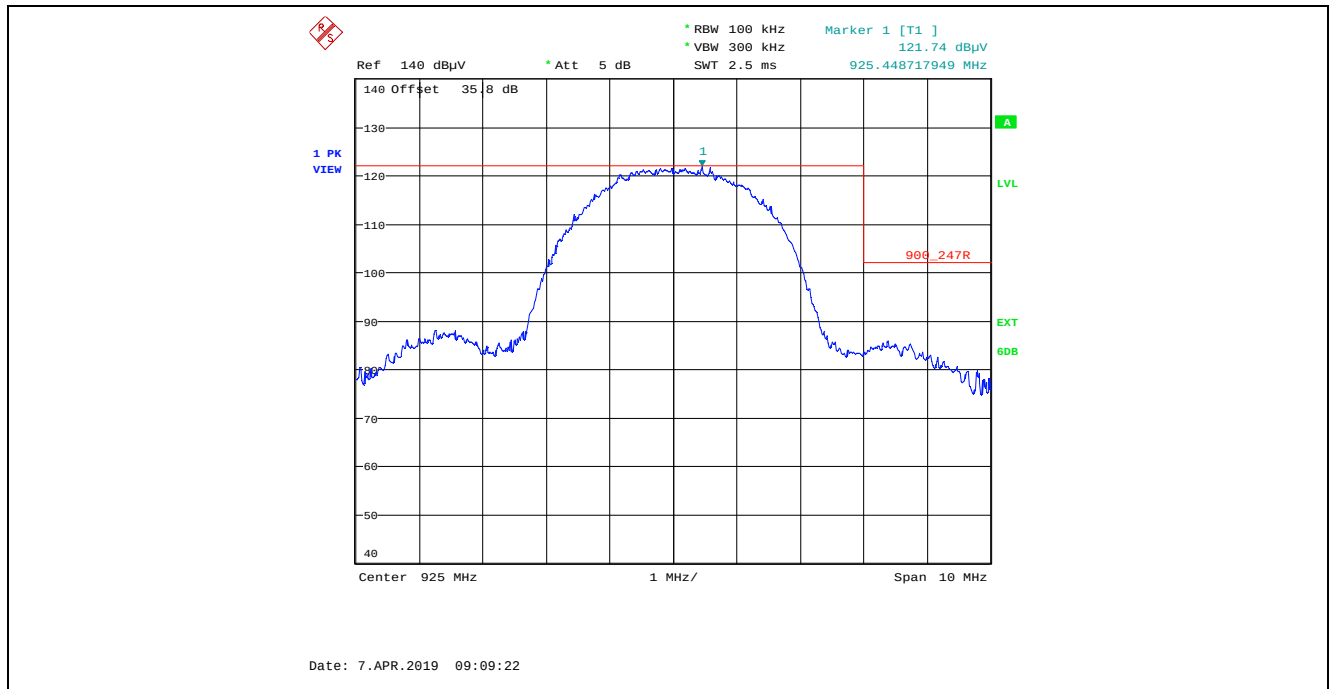
Plot 5.4.4.5.2.2. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 9, Data Rate 3



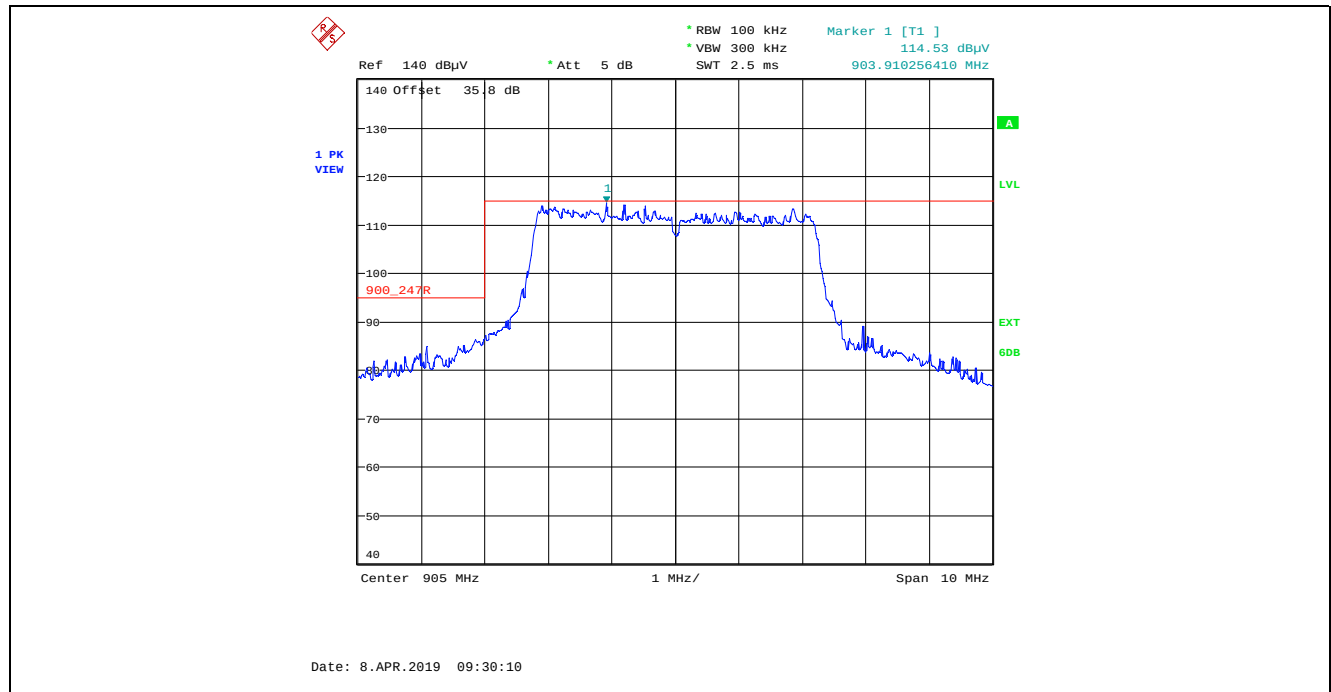
Plot 5.4.4.5.2.3. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 9, Data Rate 3



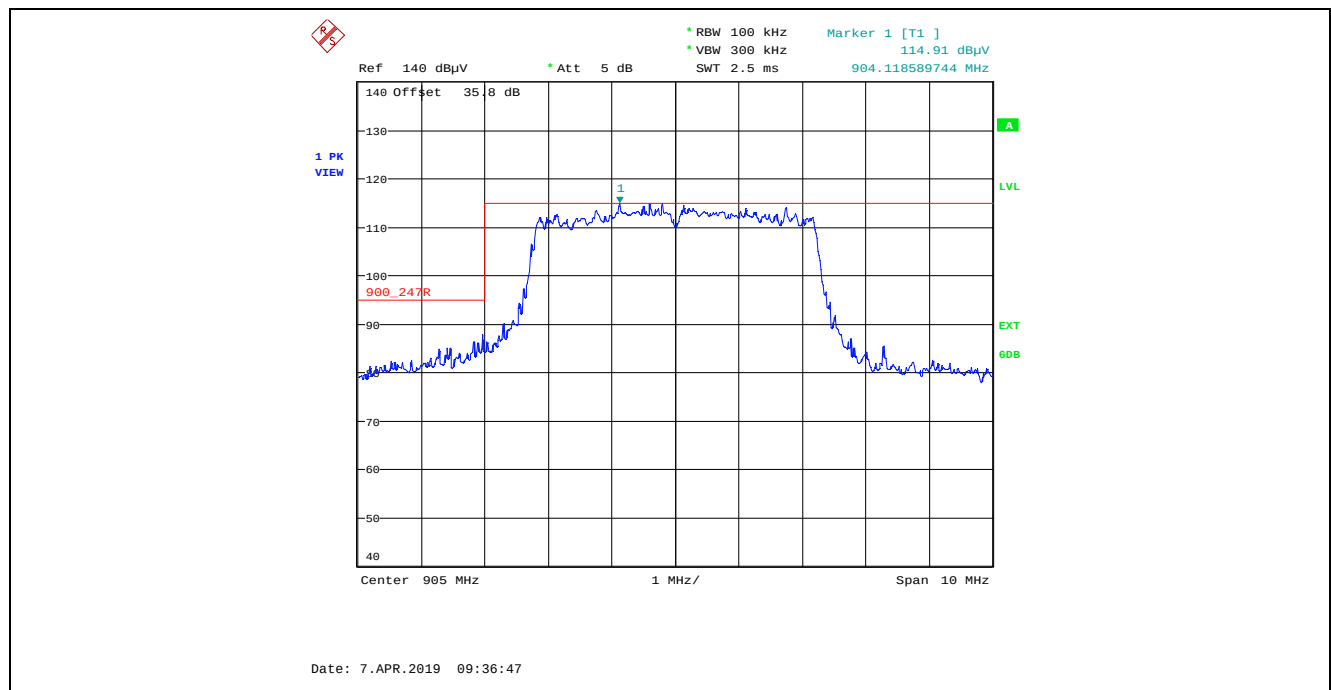
Plot 5.4.4.5.2.4. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 9, Data Rate 3



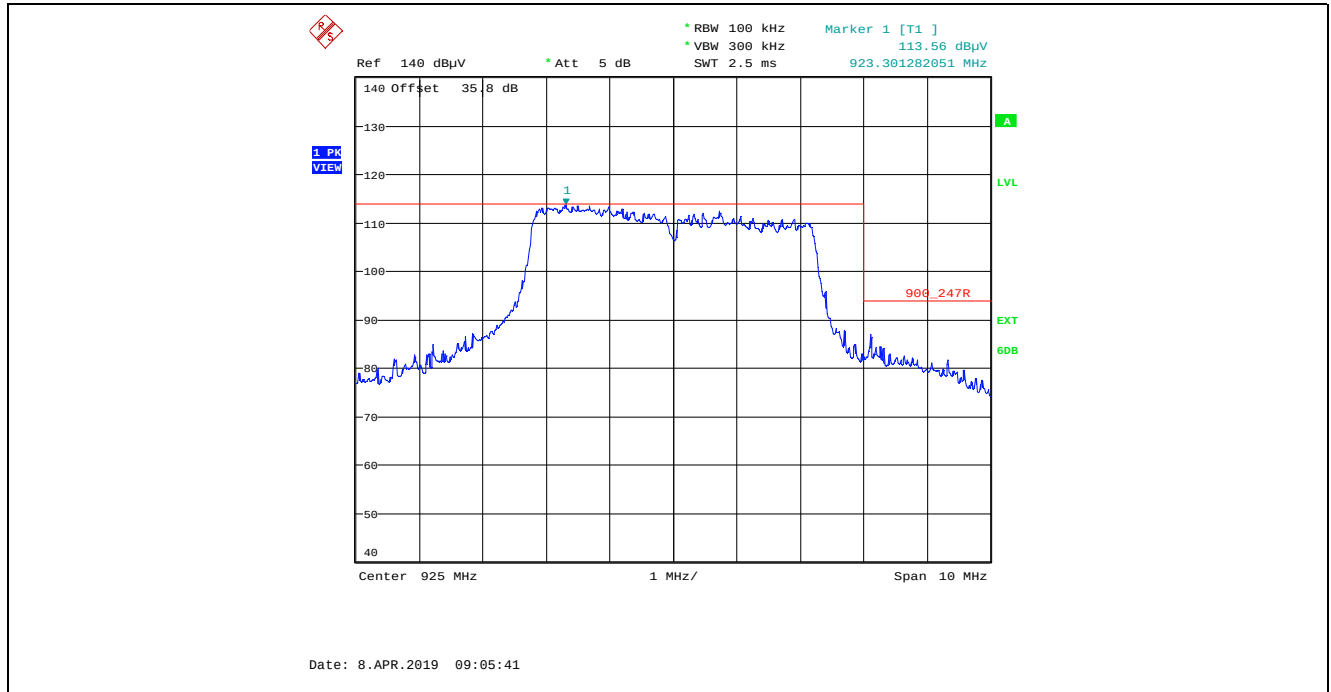
Plot 5.4.4.5.2.5. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 6, Data Rate 7



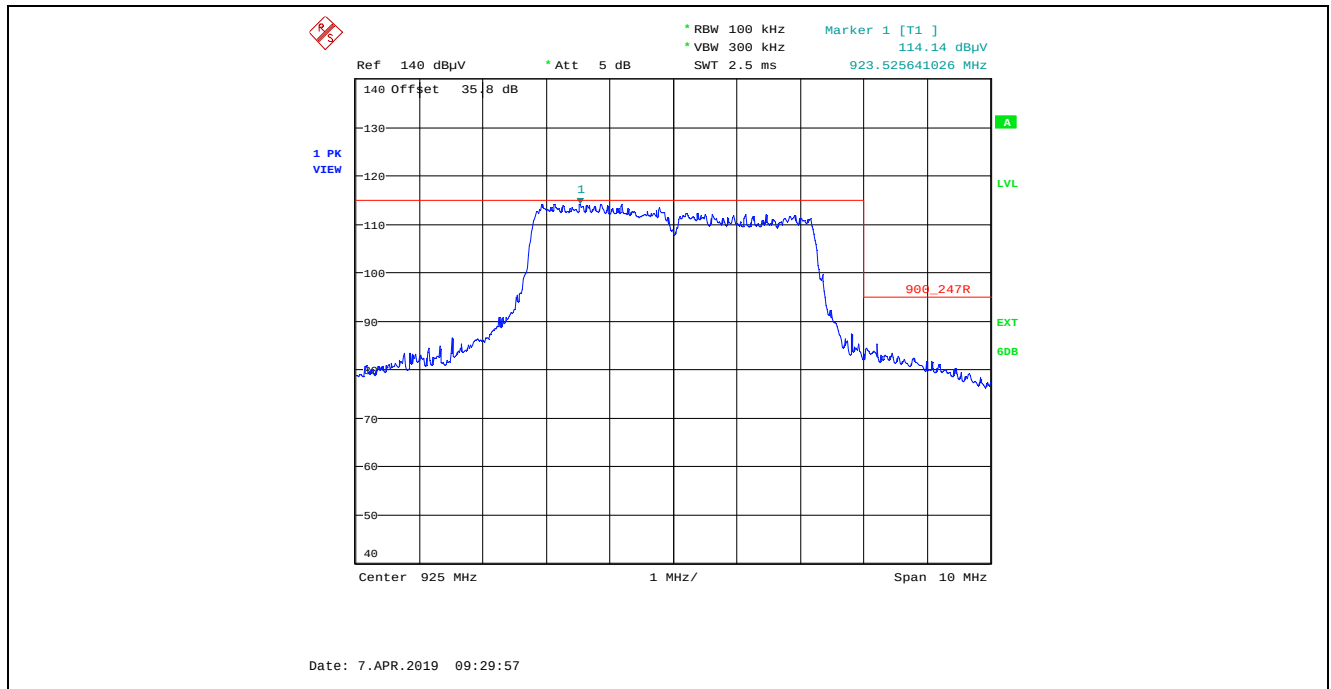
Plot 5.4.4.5.2.6. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 4 MHz BW, Tx Gain Setting 6, Data Rate 7



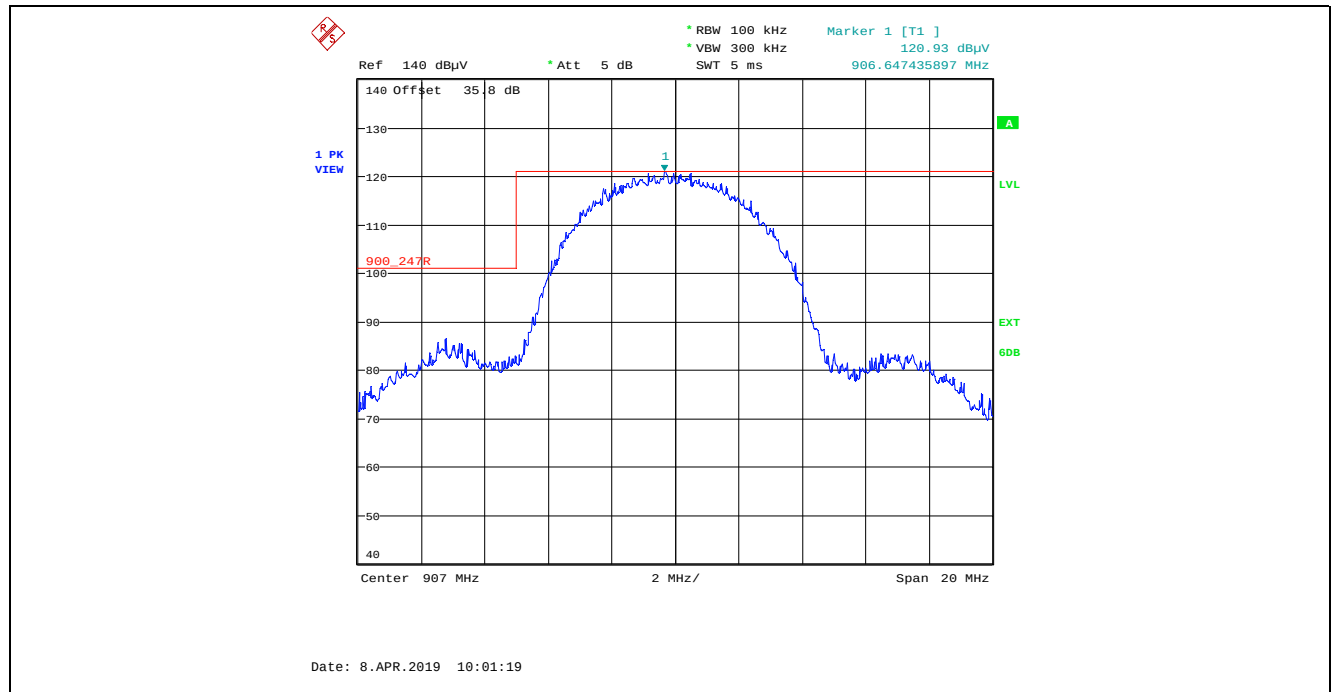
Plot 5.4.4.5.2.7. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 6, Data Rate 7



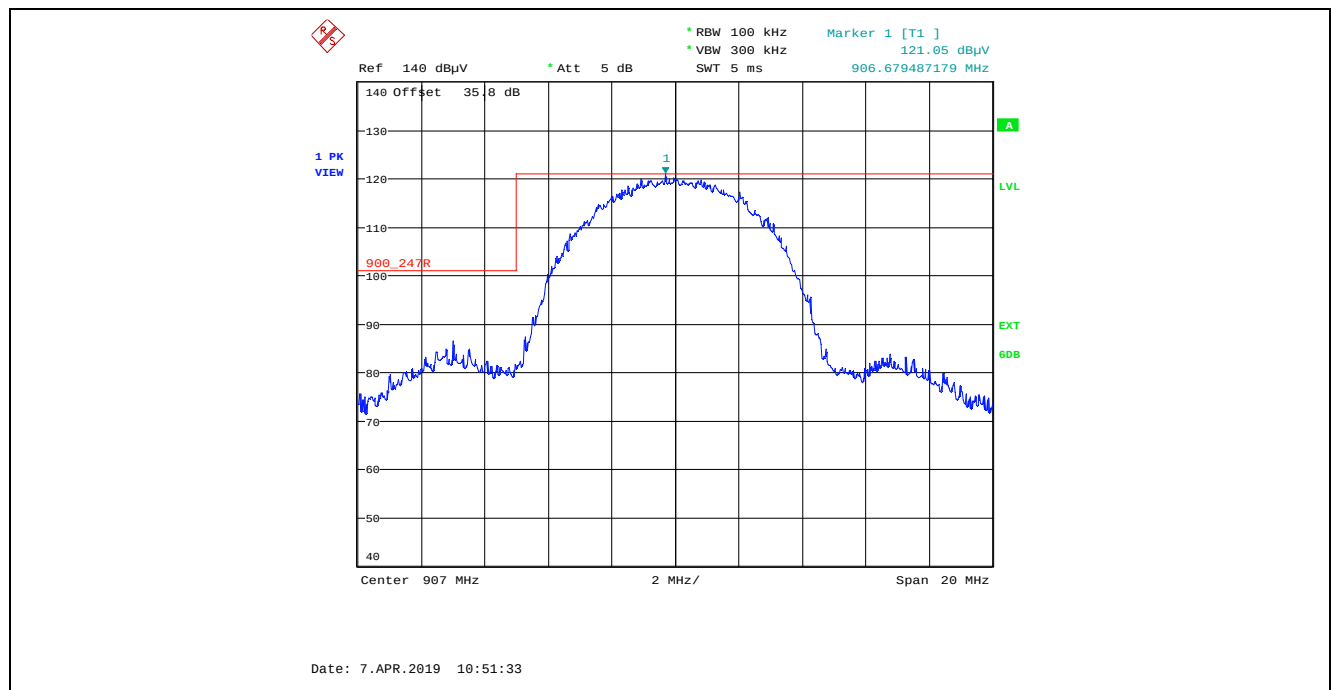
Plot 5.4.4.5.2.8. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 4 MHz BW, Tx Gain Setting 6, Data Rate 7



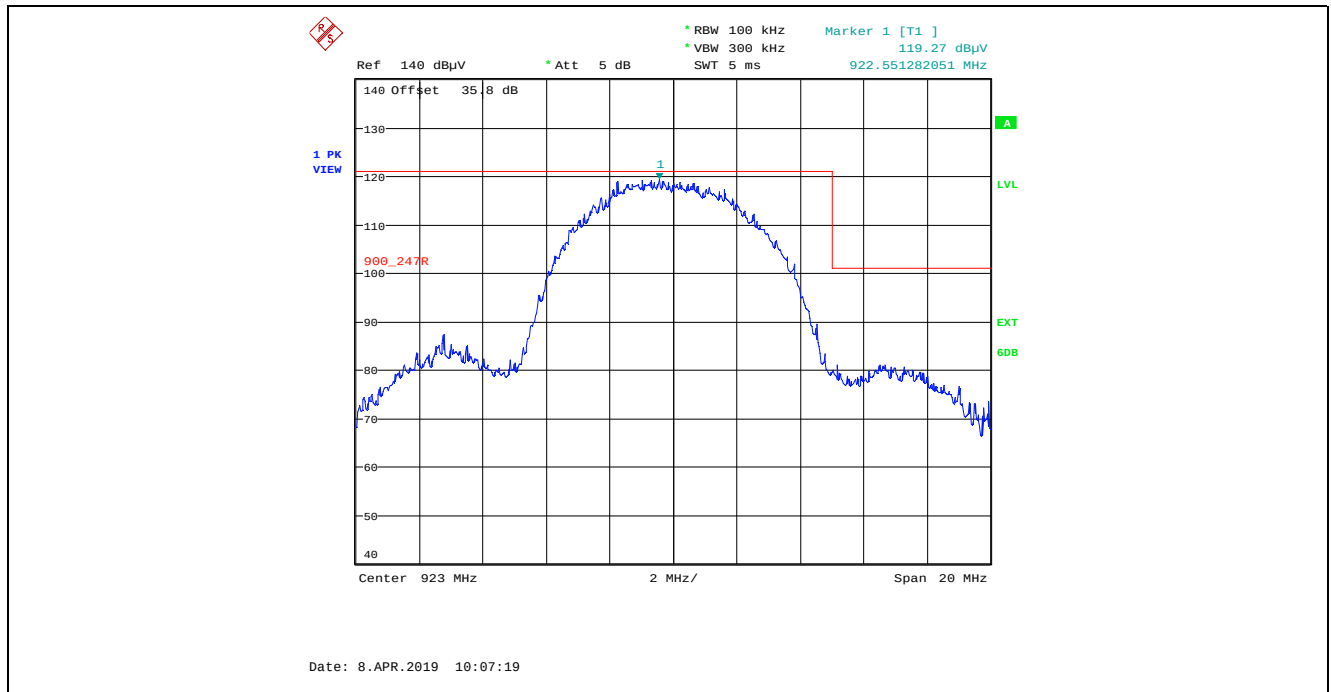
Plot 5.4.4.5.2.9. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 9, Data Rate 3



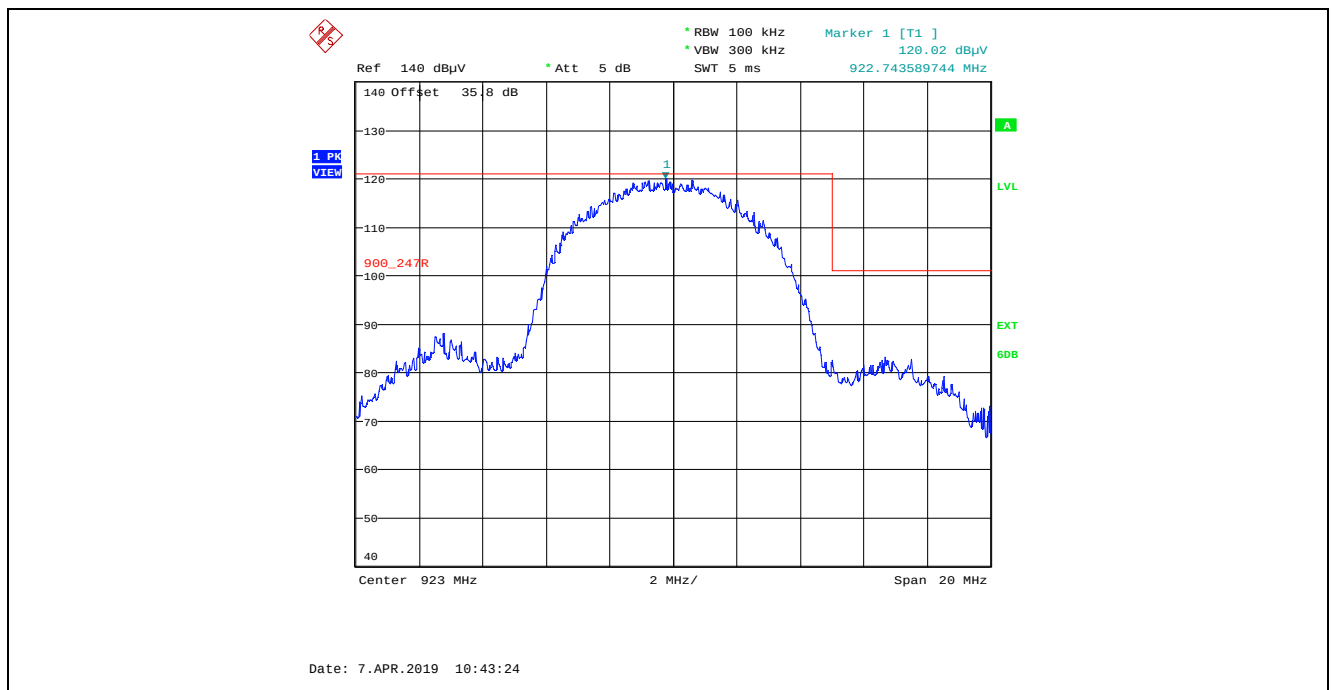
Plot 5.4.4.5.2.10. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 9, Data Rate 3



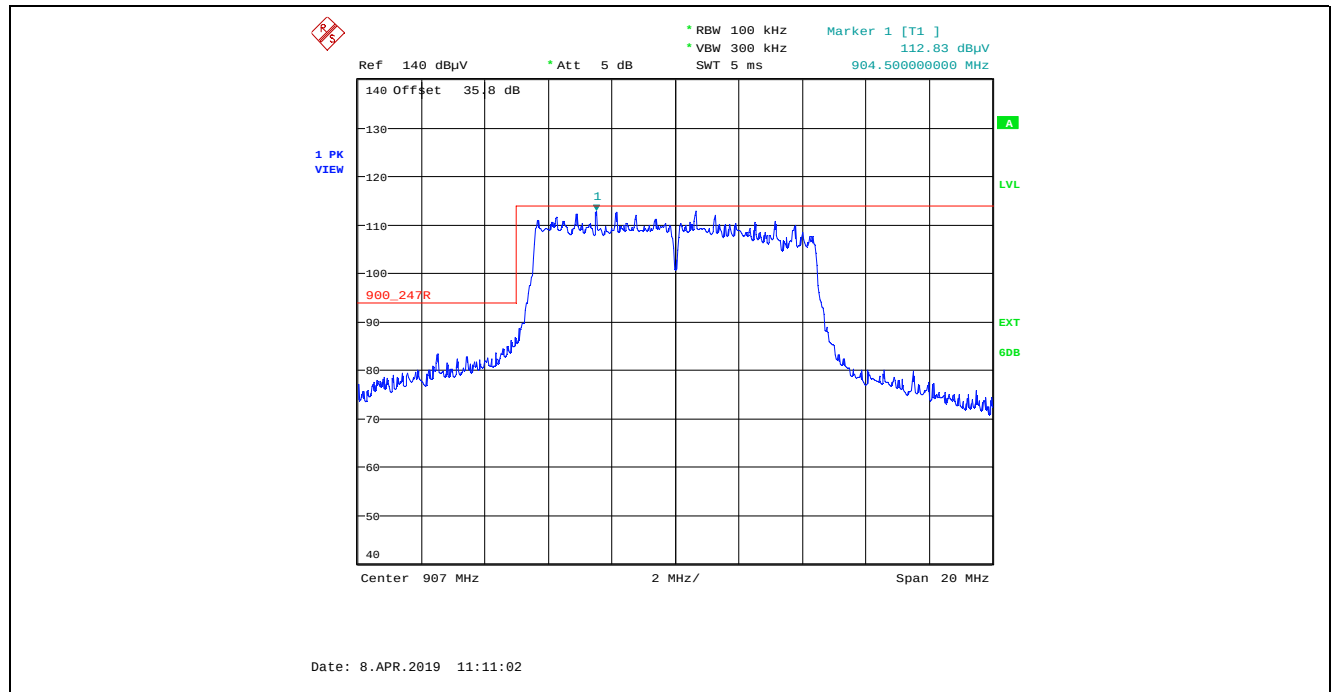
Plot 5.4.4.5.2.11. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 9, Data Rate 3



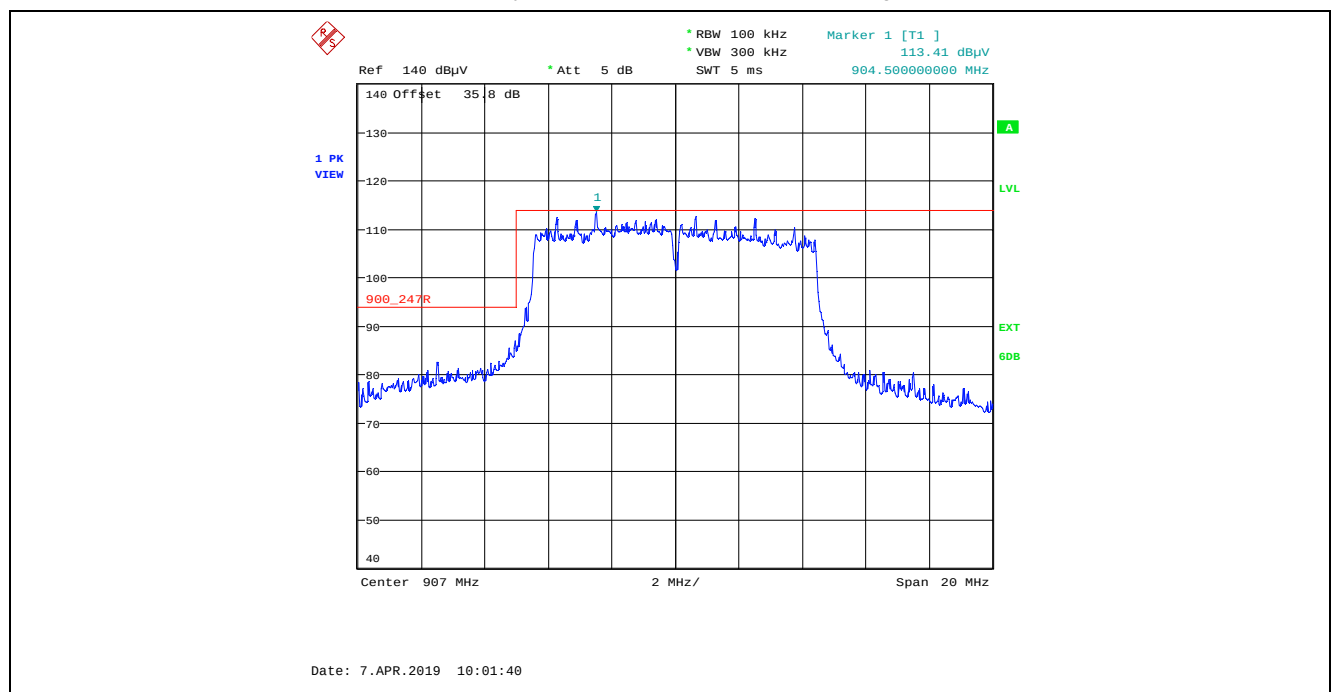
Plot 5.4.4.5.2.12. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
 High End of Frequency Band, 8 MHz BW, Tx Gain Setting 9, Data Rate 3



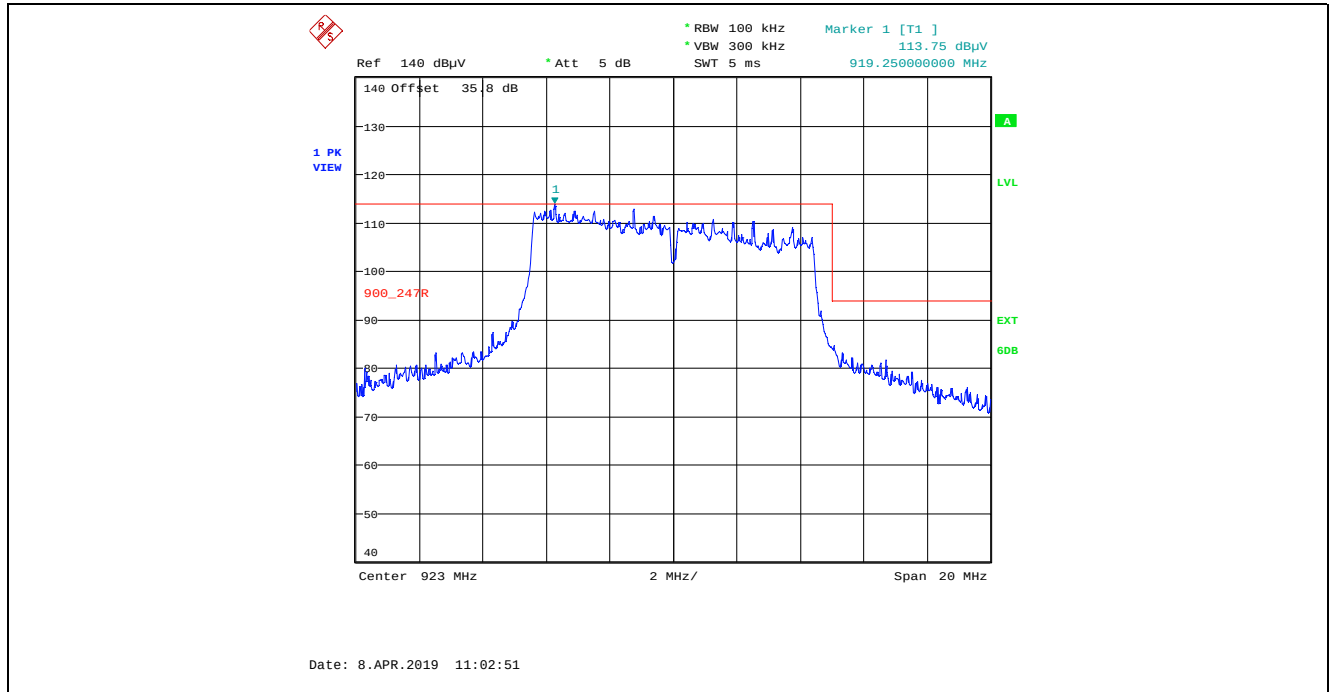
Plot 5.4.4.5.2.13. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 6, Data Rate 7



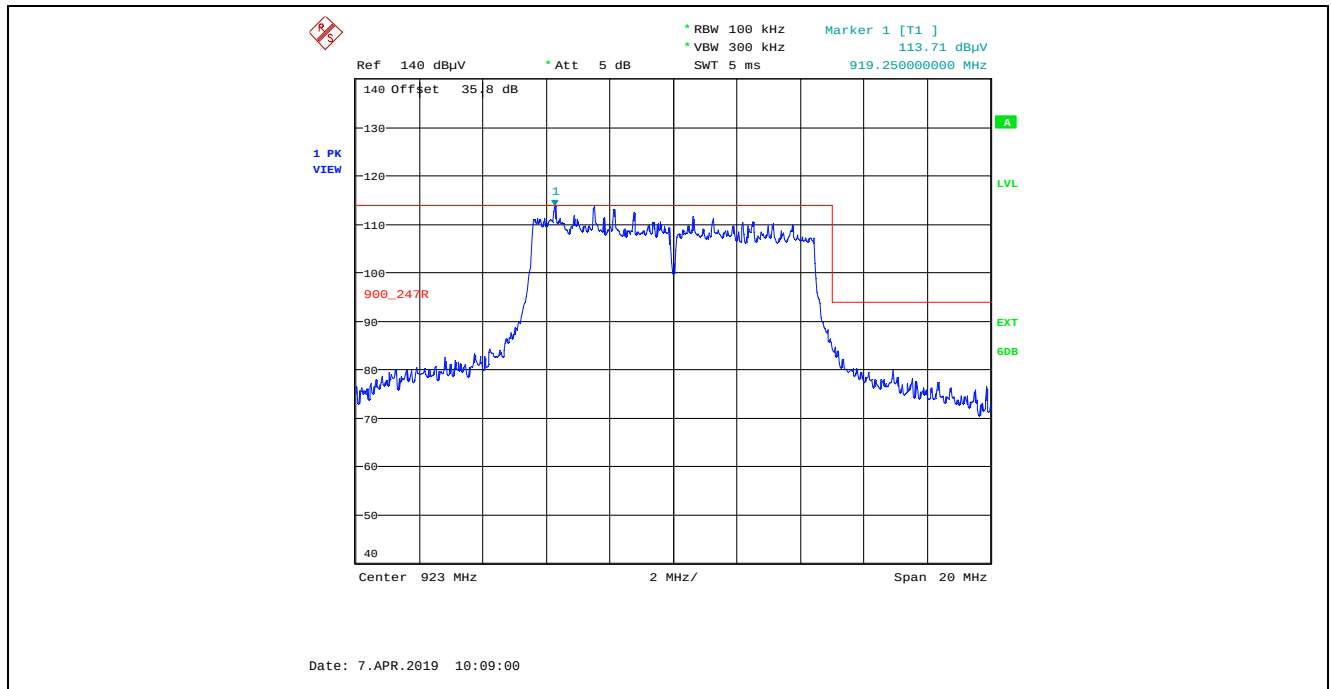
Plot 5.4.4.5.2.14. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
Low End of Frequency Band, 8 MHz BW, Tx Gain Setting 6, Data Rate 7



Plot 5.4.4.5.2.15. Band-Edge RF Radiated Emissions at 3 m, Horizontal Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 6, Data Rate 7



Plot 5.4.4.5.2.16. Band-Edge RF Radiated Emissions at 3 m, Vertical Polarization
High End of Frequency Band, 8 MHz BW, Tx Gain Setting 6, Data Rate 7



5.5. POWER SPECTRAL DENSITY [§ 15.247(e)]

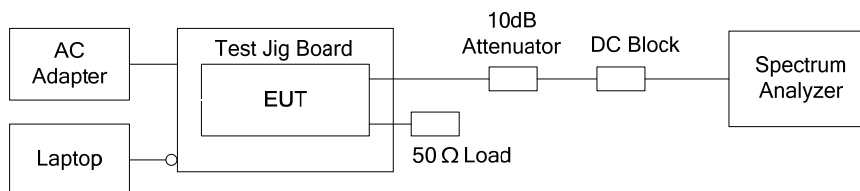
5.5.1. Limit(s)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.5.2. Method of Measurements

KDB 558074 D01 15.247 Meas Guidance v05r01 Section.8.4,
ANSI C63.10-2013 Section 11.10.2 Method PKPSD
KDB 662911 D01 Multiple Transmitter Output v02r01, Section (E)(2)(a)

5.5.3. Test Arrangement



5.5.4. Test Data

Bandwidth: 4 MHz, Data Rates: 1, 2 & 3, Power Setting: 20							
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	Combine PSD (dBm)	Array Gain (dB)	PSD (dBm)	Max. Limit (dBm)
4	20	1	905	4.53	3.01	7.54	8
			915	4.58	3.01	7.59	8
			925	4.19	3.01	7.20	8
		2	905	4.90	3.01	7.91	8
			915	4.70	3.01	7.71	8
			925	4.70	3.01	7.71	8
		3	905	4.38	3.01	7.39	8
			915	3.45	3.01	6.46	8
			925	3.45	3.01	6.46	8

Bandwidth: 8 MHz, Data Rates 1, 2 & 3, Power Setting: 26							
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	Combine PSD (dBm)	Array Gain (dB)	PSD (dBm)	Max. Limit (dBm)
8	26	1	907	4.72	3.01	7.73	8
			915	4.66	3.01	7.67	8
			923	4.52	3.01	7.54	8
		2	907	4.93	3.01	7.94	8
			915	3.95	3.01	6.96	8
			923	4.21	3.01	7.22	8
		3	907	4.67	3.01	7.68	8
			915	3.16	3.01	6.17	8
			923	4.90	3.01	7.91	8

Bandwidth: 4 MHz, Data Rates: 4, 5, 6 & 7, Power Setting: 24							
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	Combine PSD (dBm)	Array Gain (dB)	PSD (dBm)	Max. Limit (dBm)
4	24	4	905	2.96	3.01	5.97	8
			915	2.45	3.01	5.46	8
			925	1.88	3.01	4.89	8
		5	905	1.31	3.01	4.32	8
			915	1.56	3.01	4.57	8
			925	1.57	3.01	4.58	8
		6	905	1.77	3.01	4.78	8
			915	1.70	3.01	4.71	8
			925	1.83	3.01	4.84	8
		7	905	1.70	3.01	4.71	8
			915	0.80	3.01	3.81	8
			925	1.63	3.01	4.64	8

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
 Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
 May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Bandwidth: 8 MHz, Data Rates: 4, 5, 6 & 7, Power Setting: 24							
Bandwidth Setting (MHz)	Power Setting	Data Rate	Frequency (MHz)	Combine PSD (dBm)	Array Gain (dB)	PSD (dBm)	Max. Limit (dBm)
8	24	4	907	-0.96	3.01	2.05	8
			915	-0.50	3.01	2.51	8
			923	-0.62	3.01	2.39	8
		5	907	-0.13	3.01	2.88	8
			915	-0.73	3.01	2.28	8
			923	0.20	3.01	3.21	8
		6	907	-0.79	3.01	2.23	8
			915	-0.76	3.01	2.25	8
			923	0.47	3.01	3.48	8
		7	907	-0.73	3.01	2.28	8
			915	-1.05	3.01	1.96	8
			923	-0.49	3.01	2.52	8

5.6. RF EXPOSURE REQUIRMENTS [§§ 15.247(i), 1.1310 & 2.1091]

5.6.1. Limits

§ 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Note 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

5.6.2. Method of Measurements

Calculation Method of Power Density/RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where,
P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm²
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

5.6.3. RF Evaluation

5.6.3.1. Standalone

Frequency (MHz)	EIRP (dBm)	EIRP (mW)	Evaluation Distance, r (cm)	Power Density, S (mW/cm ²)	MPE Limit (mW/cm ²)	Margin (mW/cm ²)
905	36	3981.072	45	0.156	0.603	-0.447

5.6.3.2. Co-location

Pursuant to KDB 447498 D01 General RF Exposure Guidance v06, Section 7.2:

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0 , according to calculated/estimated, numerically modeled, or measured field strengths or power density.

Co-location will only applies to EUT with 3 dBi dipole antenna, worst case EIRP of 36 dBm will be used in co-location at the minimum 45 cm evaluation separation distance required by the operating configurations and exposure conditions of the host device.

The maximum calculated MPE ratio of the EUT with 3 dBi dipole antenna (rubber ducky antenna)

Frequency (MHz)	EUT EIRP (dBm)	EUT EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm ²)	FCC MPE Limit (mW/cm ²)	MPE Ratio
905	36	3981.072	45	0.156	0.603	0.259

The maximum calculated MPE ratio for the EUT with 3 dBi dipole antenna is 0.259, this configuration can be co-located with other antennas provided the sum of the MPE ratios for all the other simultaneous transmitting antennas incorporated in a host device is $\leq 1.0 - 0.259 \leq 0.741$.

The following table addresses the co-location of the EUT with 3 dBi antenna with the specified radio modules.

EUT with 3 dBi dipole antenna co-location with radio module identified in this table

*Radio Module	Frequency (MHz)	EIRP (dBm)	EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm ²)	FCC MPE Limit (mW/cm ²)	MPE Ratio	MPE Ratio of EUT with 3 dBi antenna	Sum of MPE Ratio	Verdict
LTE-A Cat 12 M.2 Module (FCC ID: XMR201901EM12G, IC 10224A-201901EM12G)	814.7	30.50	1122.018	45	0.044	0.543	0.081	0.259	0.340	Compliant
LTE Module (FCC ID: XMR201903EG25G, IC 10224A-201903EG25G)	824.2	34.41	2760.578	45	0.108	0.549	0.197	0.259	0.456	Compliant
SARA-R410M LTE Cat-M1 Module (FCC ID: XPY2AGQN4NNN, IC: 8595A-2AGQN4NNN)	1850.0	32.12	1629.296	45	0.064	1.000	0.064	0.259	0.323	Compliant
L850 LTE Module (FCC ID: ZMOL850GL, IC: 21374-L850GL)	826.4	--	501.19	45	0.020	0.551	0.036	0.259	0.295	Compliant

* The test data of the radio modules represented in this table is the worst-case configuration (maximum MPE ratio) derived from the original radio modules MPE reports. Refer to these reports for detail.

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Agilent	E7405A	US39440181	9 kHz–26.5 GHz	18 May 2019
Attenuator	Pasternack	PE7010-20	ATT14	DC–2 GHz	07 Aug 2019
LISN Used	EMCO	3825/2R	1165	10 kHz–30 MHz	18 Oct 2019
Signal Generator	Marconi Instruments	2024	112255/164	9 kHz – 2.4 GHz	29 Aug 2019
Spectrum Analyzer	Rohde & Schwarz	FSU26	200946	20Hz–26.5 GHz	25 Jul 2020
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	See Note 1
Attenuator	Hewlett Packard	8493C	0465	DC–26.5 GHz	See Note 1
Laptop	Lenovo	0578	IS057882ULRBXKGB	---	---
Peak Power Analyzer	Hewlett Packard	8991A	3342A00657	0.5 - 40 GHz	18 Aug 2019
Peak Power Sensor	Hewlett Packard	84814A	3205A00175	0.5 - 40 GHz	18 Aug 2019
Log Periodic	ETS-Lindgren	3148	23845	200-2000 MHz	02 Aug 2020
EMI Receiver	Rohde & Schwarz	ESU40	100037	20Hz–40 GHz	15 Mar 2020
RF Amplifier	Com-Power	PAM-0118A	551052	0.5 – 18 GHz	26 Jul 2019
RF Amplifier	Hewlett Packard	84498	3008A00769	1 – 26.5 GHz	01 Oct 2019
Biconilog	EMCO	3142B	1575	26-2000 MHz	10 May 2020
Horn Antenna	EMCO	3155	6570	1 – 18 GHz	11 Oct 2020
Horn Antenna	ETS-Lindgren	3160-09	001183858	18 – 26.5 GHz	27 Oct 2020
High Pass Filter	K & L	11SH10-4000/T12000	4	Cut off 2.4 GHz	See Note 1
Band Reject Filter	Micro-Tronics	BRM50701	105	Cut off 2.4-2.483 GHz	See Note 1
Note 1: Internal Verification/Calibration check					

ULTRATECH GROUP OF LABS

3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: <http://www.ultratech-labs.com>

File #: 19MCRS111_FCC15C247
May 29, 2019

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

7.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

	Line Conducted Emission Measurement Uncertainty (9 kHz – 30 MHz):	Measured	Limit
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 1.44	± 1.8
U	Expanded uncertainty U: $U = 2u_c(y)$	± 2.89	± 3.6

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 2.39	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.79	± 5.2

	Radiated Emission Measurement Uncertainty @ 3m, Vertical (30-1000 MHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 2.39	± 2.6
U	Expanded uncertainty U: $U = 2u_c(y)$	± 4.78	± 5.2

	Radiated Emission Measurement Uncertainty @ 3 m, Horizontal & Vertical (1 – 18 GHz):	Measured (dB)	Limit (dB)
u_c	Combined standard uncertainty: $u_c(y) = \sqrt{\sum_{i=1}^m u_i^2(y)}$	± 1.87	Under consideration
U	Expanded uncertainty U: $U = 2u_c(y)$	± 3.75	Under consideration