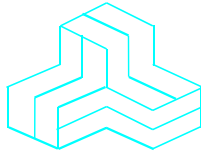# ENGINEERING TEST REPORT

2.4/5.8GHz High Speed 1W Module
Model: nMIMO2458
FCC ID: NS915NM2458

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) Operating in 2400 – 2483.5 MHz Band

UltraTech's File No.: 15MCRS079_FCC15C247DTS

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

Date: November 16, 2015

Report Prepared by: Dan Huynh	Tested by: Hung Trinh
Issued Date: November 16, 2015	Test Dates: January 13- July 25, 2015

- *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.*

UltraTech

91038	1309	46390-2049	NVLAP LAB CODE 200093-0	AT-1945	SL2-IN-E-1119R	CA2049	TL363_B	TPTDP DA1300

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3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   **November 16, 2015**
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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

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) Transmitter Operating in the Frequency Band 2400-2483.5 MHz.
Test Procedures:	▪ ANSI C63.4 ▪ ANSI C63.10 ▪ FCC KDB Publication No. 558074 D01 DTS Meas Guidance v03r02
Environmental Classification:	[x] Commercial, industrial or business environment [x] Residential environment

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

None.

1.3.   NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 0-19	2015	Code of Federal Regulations (CFR), Title 47 – Telecommunication
ANSI C63.4	2009	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
CISPR 22 & EN 55022	2008-09, Edition 6.0 2006	Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-1-2 +A1 +A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-2: Conducted disturbances
FCC, KDB Publication No. 558074 D01 DTS Meas Guidance v03r02	2014	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
FCC, KDB Publication No. 662911 D01 Multiple Transmitter Output v02r01	2013	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

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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:	2.4/5.8GHz High Speed 1W Module
Model Name or Number:	nMIMO2458
Serial Number:	Test Sample
Type of Equipment:	Digital Transmission System (DTS)
Input Power Supply Type:	External DC Power Supply
Primary User Functions of EUT:	802.11abng 2x2 module

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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:	3.3VDC Nominal
RF Output Power Rating:	1 W maximum combined conducted output power
*Software Output Power Setting:	0 to 31.5
Operating Frequency Range:	2412 - 2462 MHz 2422 - 2452 MHz
RF Output Impedance:	50 Ω
Duty Cycle:	Continuous
Modulation Type:	802.11abng 2x2 module
Antenna Connector Types:	U.FL

*Software output power setting is a factory tune-up parameter, not available to end users.

2.4.   ASSOCIATED ANTENNA DESCRIPTIONS

Antenna Type	Maximum Gain (dBi)
Rubber Ducky	2
Note: a minimum cable loss of 0.49 dBi shall be used with the listed antenna	

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)

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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:	BI Switching Power Supply
Model Name or Number:	BI30-120200-AdU
Connected to EUT's Port:	Test Jig of the EUT

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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 ^{o}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:	Special 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):	2412 - 2462 MHz 2422 - 2452 MHz
Frequency(ies) Tested:	2412 MHz, 2437 MHz, 2462 MHz 2422 MHz and 2452 MHz
RF Power Output: (measured maximum output power at antenna terminals)	30.00 dBm (1000 mW) Peak
Normal Test Modulation:	*Data Rate 1 – 15
Modulating Signal Source:	Internal

* See detailed operational description exhibit for details.

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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 FCC office (FCC File No.: 91038) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date: 2017-04-02.

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)	Band-Edge and RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	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.

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EXHIBIT 5.   TEST DATA

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

5.1.1.   Limit(s)

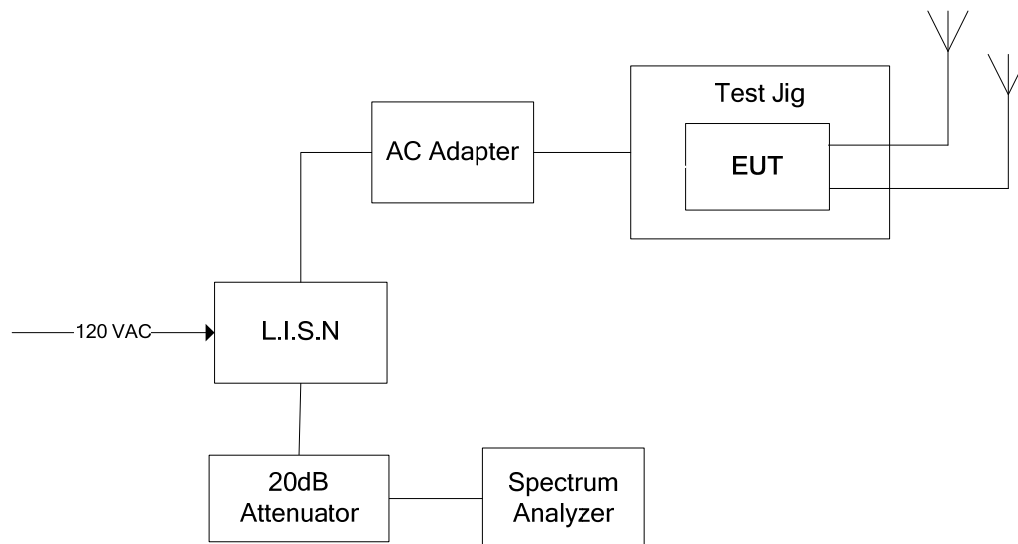The equipment shall meet the limits of the following table:

Frequency of emission (MHz)	Conducted Limits (dBμV)	
	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 C63.4-2009

5.1.3.   Test Arrangement

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5.1.4. Test Data

Plot 5.1.4.1. Power Line Conducted Emissions; Line Voltage: 120 VAC; Line Tested: Hot

Current List
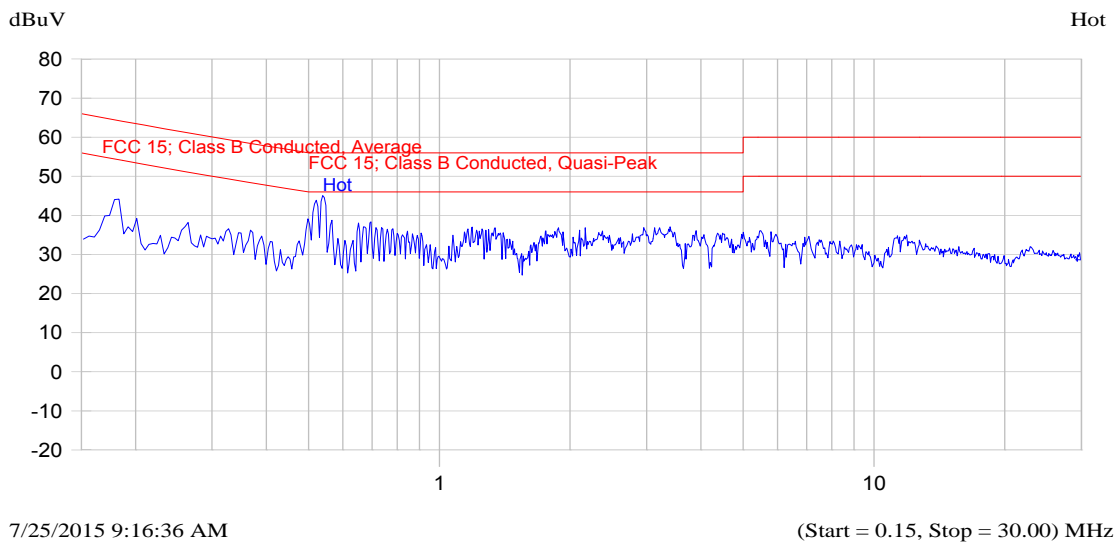
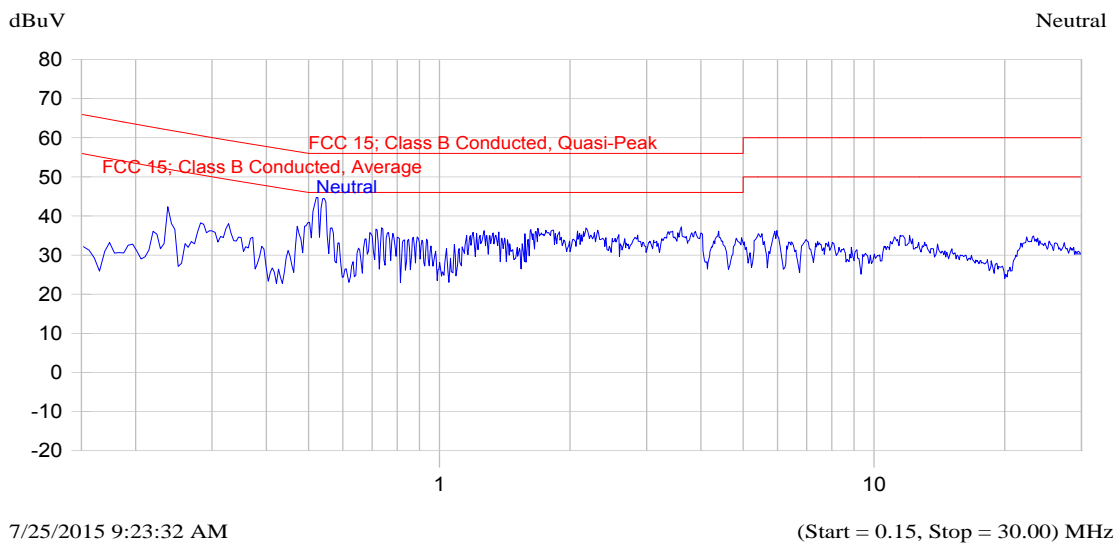| Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.182	47.6	38.3	-26.1	28.1	-26.3	Hot
0.537	46.6	43.7	-12.3	41.5	-4.5	Hot
3.402	39.4	34.8	-21.2	29.0	-17.0	Hot

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Plot 5.1.4.2. Power Line Conducted Emissions; Line Voltage120 VAC; Line Tested: Neutral

Current Graph

dBuV   Neutral

FCC 15; Class B Conducted, Quasi-Peak

FCC 15; Class B Conducted, Average

Neutral

7/25/2015 9:23:32 AM   (Start = 0.15, Stop = 30.00) MHz

Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.247	44.5	35.4	-26.5	27.4	-24.5	Neutral
0.521	46.8	44.8	-11.2	42.7	-3.3	Neutral
0.538	46.4	43.6	-12.4	41.5	-4.5	Neutral
3.603	39.1	32.8	-23.2	26.5	-19.5	Neutral

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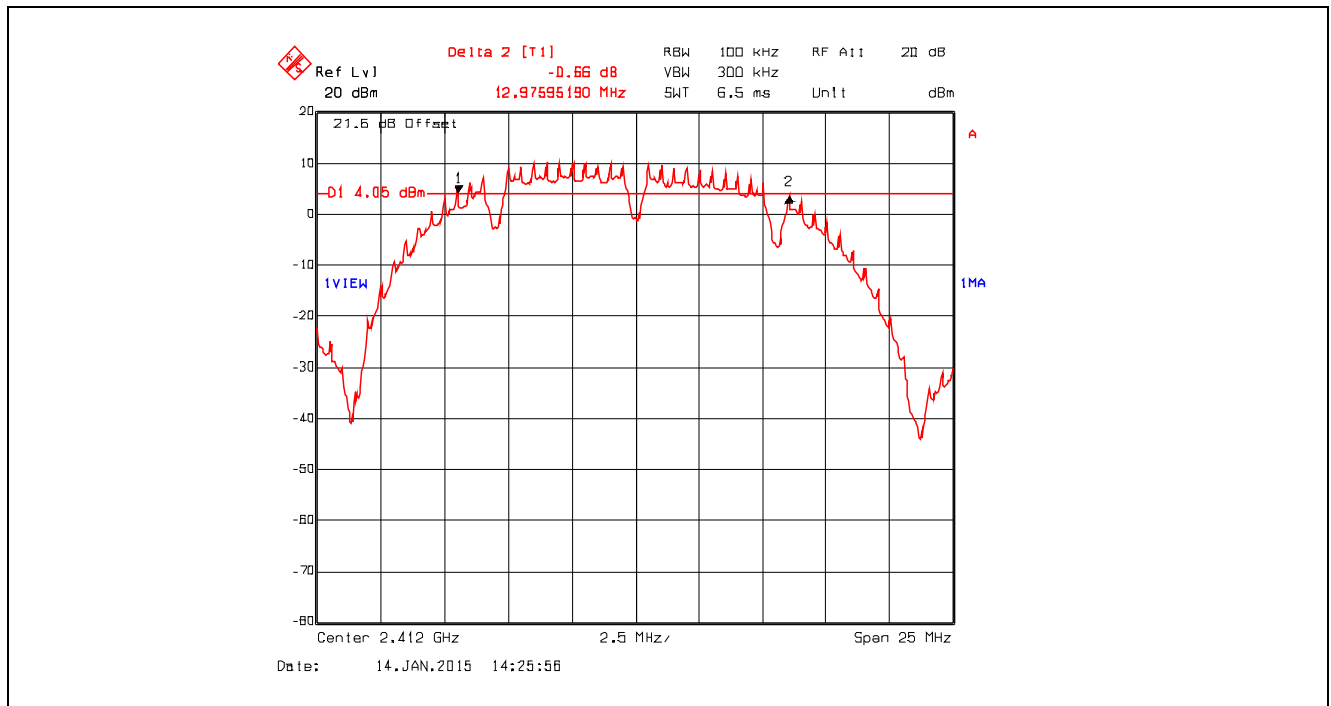**File #: 15MCRS079_FCC15C247DTS**

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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 Publication No. 558074 D01 DTS Meas Guidance V03r02, Section 8.1 Option 1

5.2.3.   Test Arrangement
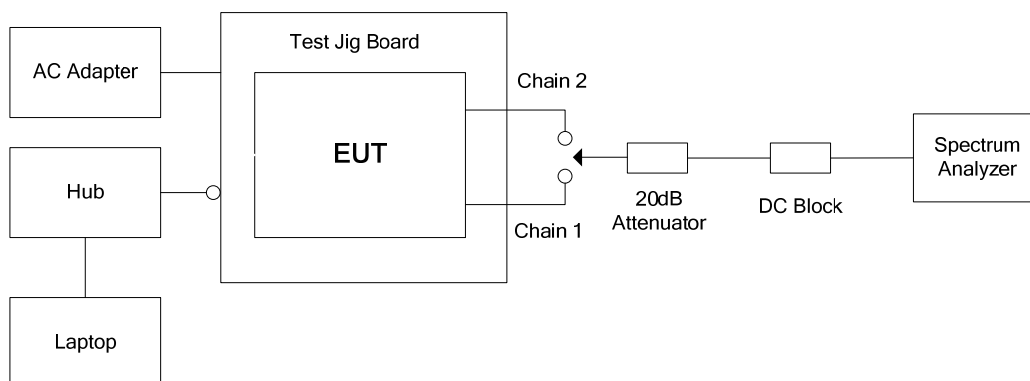
5.2.4.   Test Data

Software Output Power Setting 26					
Operating Mode	Channel Number	Frequency (MHz)	6dB BW (MHz)		Min. Limit (kHz)
			Chain # 1	Chain # 2	
Data Rate 1	1	2412	12.98	11.62	500
	6	2437	12.58	11.97	500
	11	2462	12.17	12.12	500
Data Rate 2	1	2412	12.17	11.72	500
	6	2437	12.63	11.02	500
	11	2462	12.37	12.63	500
Data Rate 3	1	2412	11.97	11.87	500
	6	2437	12.07	12.07	500
	11	2462	12.53	12.47	500

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Software Output Power Setting 18					
Operating Mode	Channel Number	Frequency (MHz)	6dB BW (MHz)		Min. Limit (kHz)
			Chain # 1	Chain # 2	
Data Rate 4	1	2412	15.87	16.29	500
	6	2437	16.47	16.47	500
	11	2462	16.41	16.47	500
Data Rate 5	1	2412	15.87	16.47	500
	6	2437	16.47	16.53	500
	11	2462	16.53	16.53	500
Data Rate 6	1	2412	16.05	16.53	500
	6	2437	16.53	16.59	500
	11	2462	16.53	16.59	500
Data Rate 7	1	2412	15.87	16.47	500
	6	2437	16.59	16.59	500
	11	2462	16.59	16.59	500

Software Output Power Setting 19					
Operating Mode	Channel Number	Frequency (MHz)	6dB BW (MHz)		Min. Limit (kHz)
			Chain # 1	Chain # 2	
Data Rate 8	1	2412	16.47	17.43	500
	6	2437	17.43	17.68	500
	11	2462	17.68	17.68	500
Data Rate 9	1	2412	16.53	17.19	500
	6	2437	17.43	17.80	500
	11	2462	17.74	17.74	500
Data Rate 10	1	2412	16.53	17.74	500
	6	2437	17.80	17.80	500
	11	2462	17.80	17.80	500
Data Rate 11	1	2412	16.53	17.56	500
	6	2437	17.80	17.86	500
	11	2462	17.86	17.86	500

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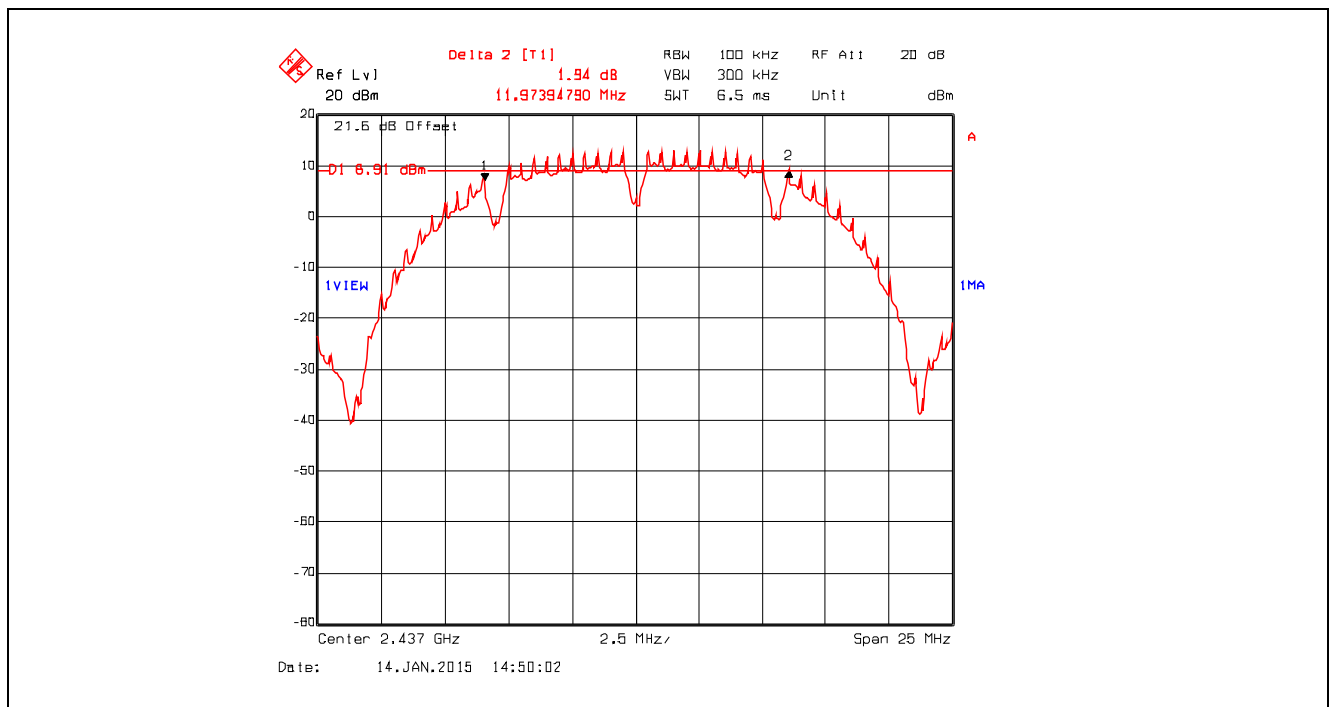
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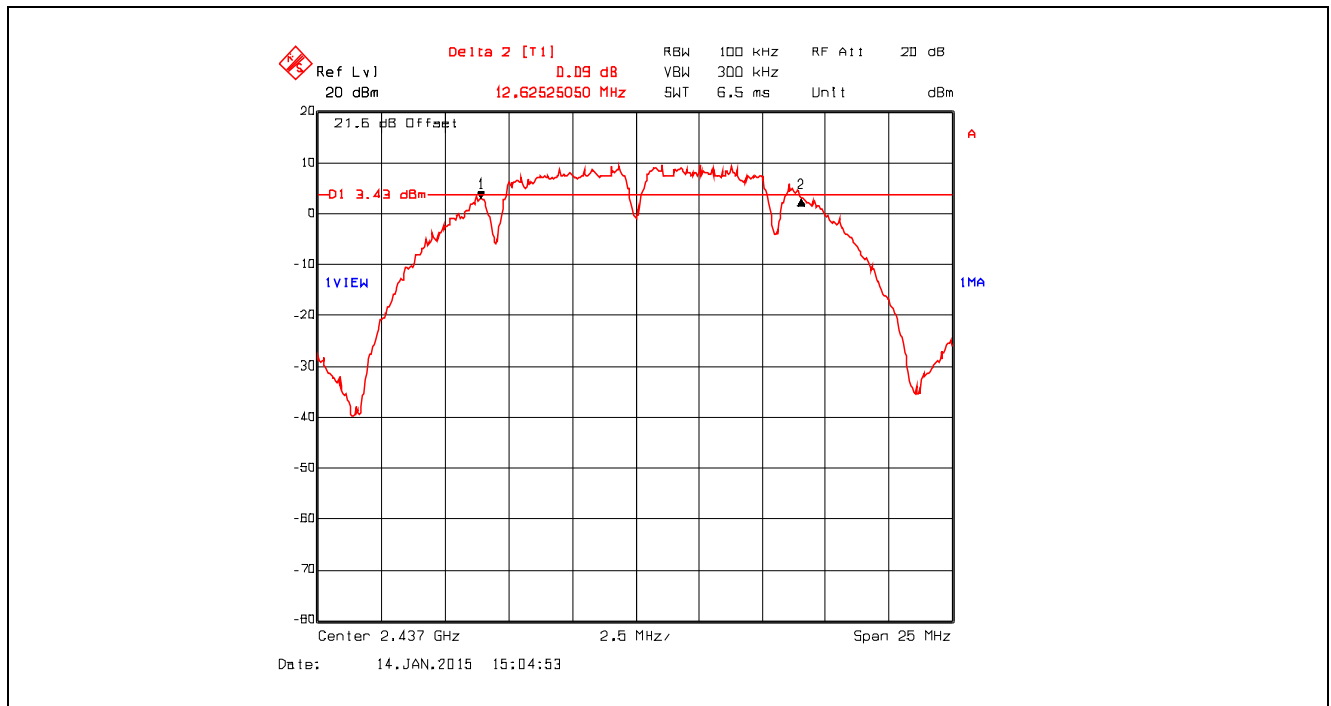
Software Output Power Setting 17					
Operating Mode	Channel Number	Frequency (MHz)	6dB BW (MHz)		Min. Limit (kHz)
			Chain # 1	Chain # 2	
Data Rate 12	3	2422	35.97	35.97	500
	6	2437	35.97	36.37	500
	9	2452	35.67	35.87	500
Data Rate 13	3	2422	35.97	36.17	500
	6	2437	35.97	36.47	500
	9	2452	35.77	35.97	500
Data Rate 14	3	2422	36.57	36.47	500
	6	2437	36.17	36.67	500
	9	2452	35.87	36.47	500
Data Rate 15	3	2422	36.47	36.57	500
	6	2437	36.07	36.67	500
	9	2452	35.97	36.57	500

See the following plots for detailed measurements.

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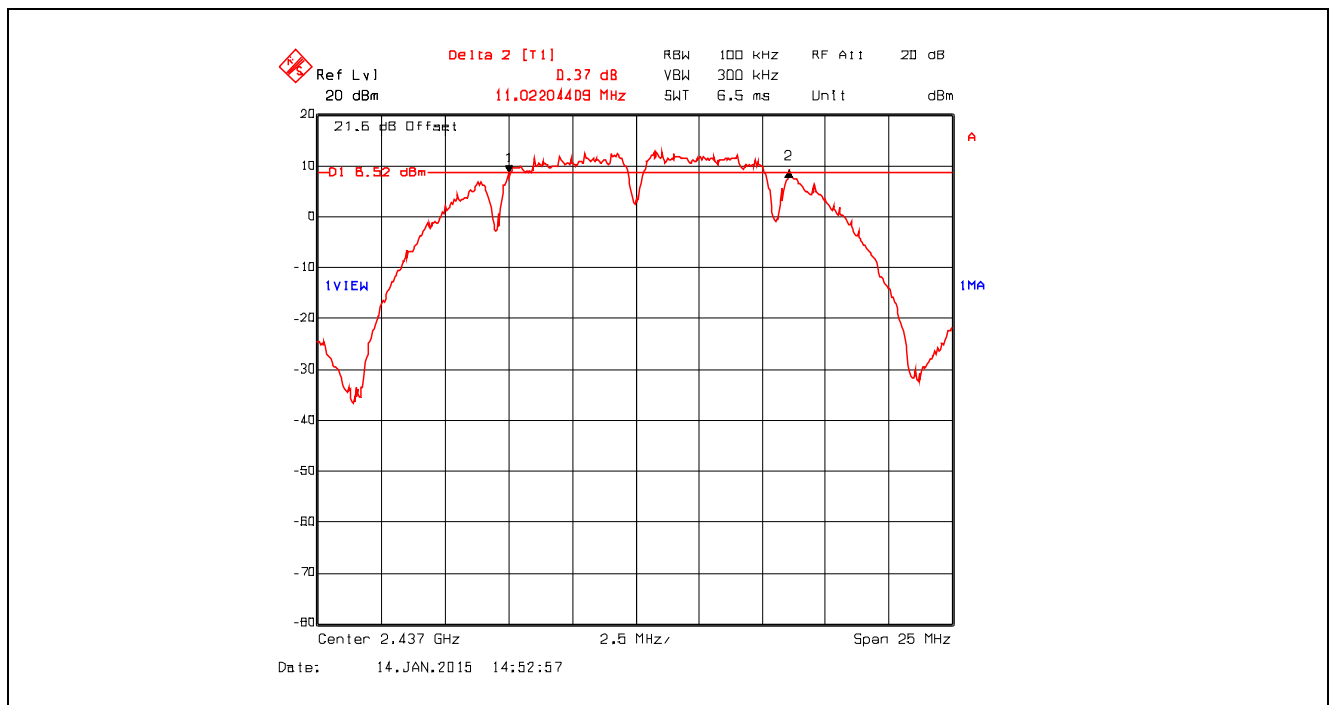**Plot 5.2.4.1.** 6 dB Bandwidth, Data Rate 1, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26

Plot 5.2.4.2. 6 dB Bandwidth, Data Rate 1, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26
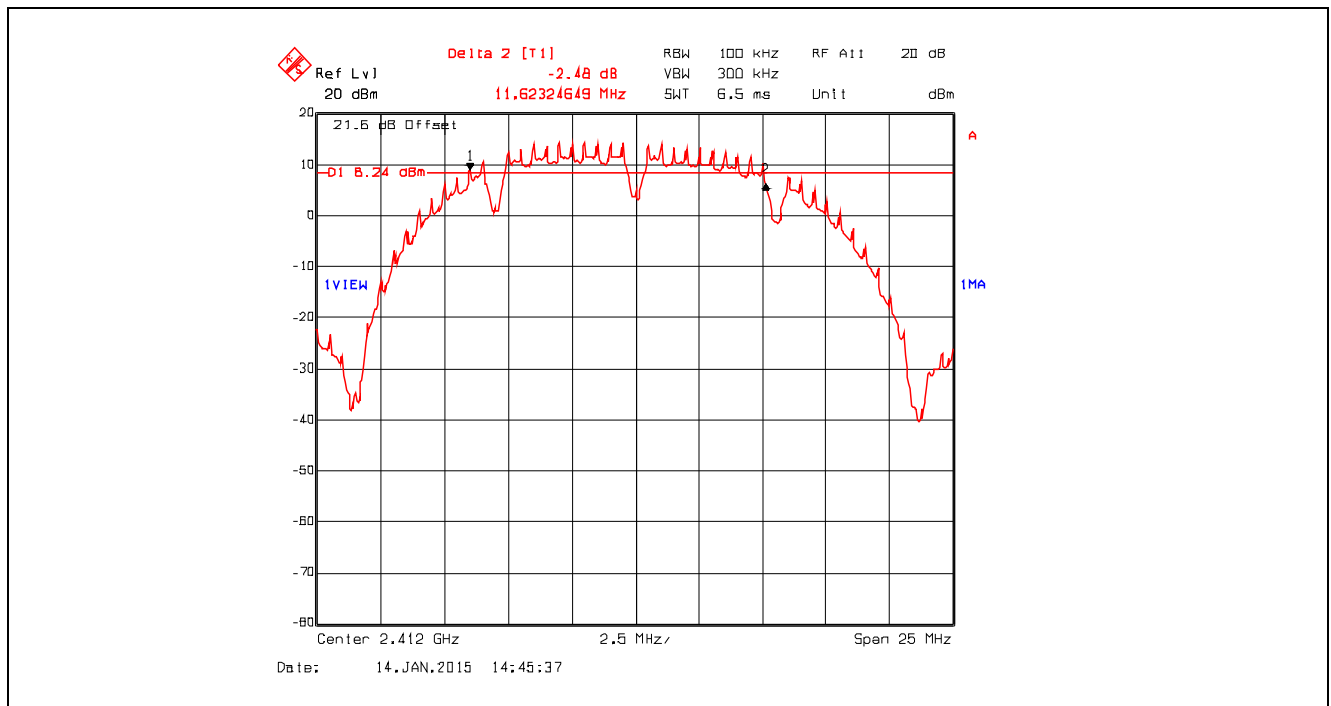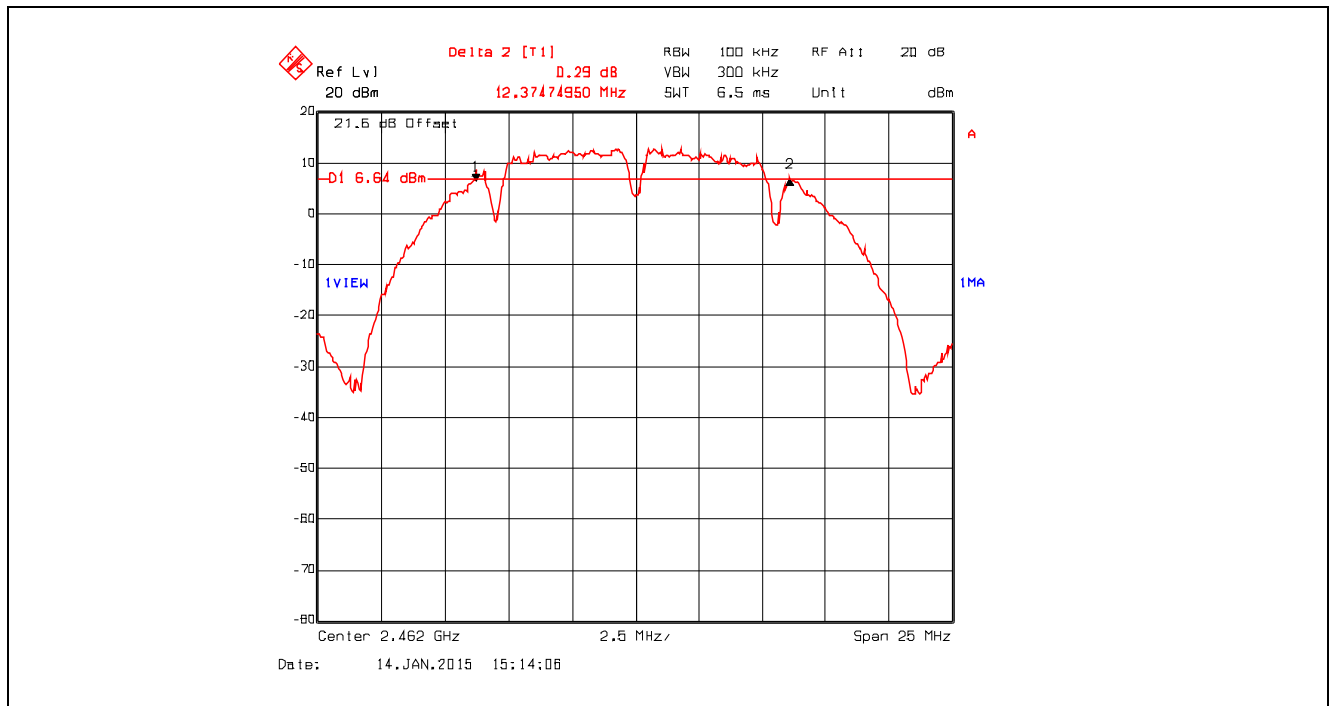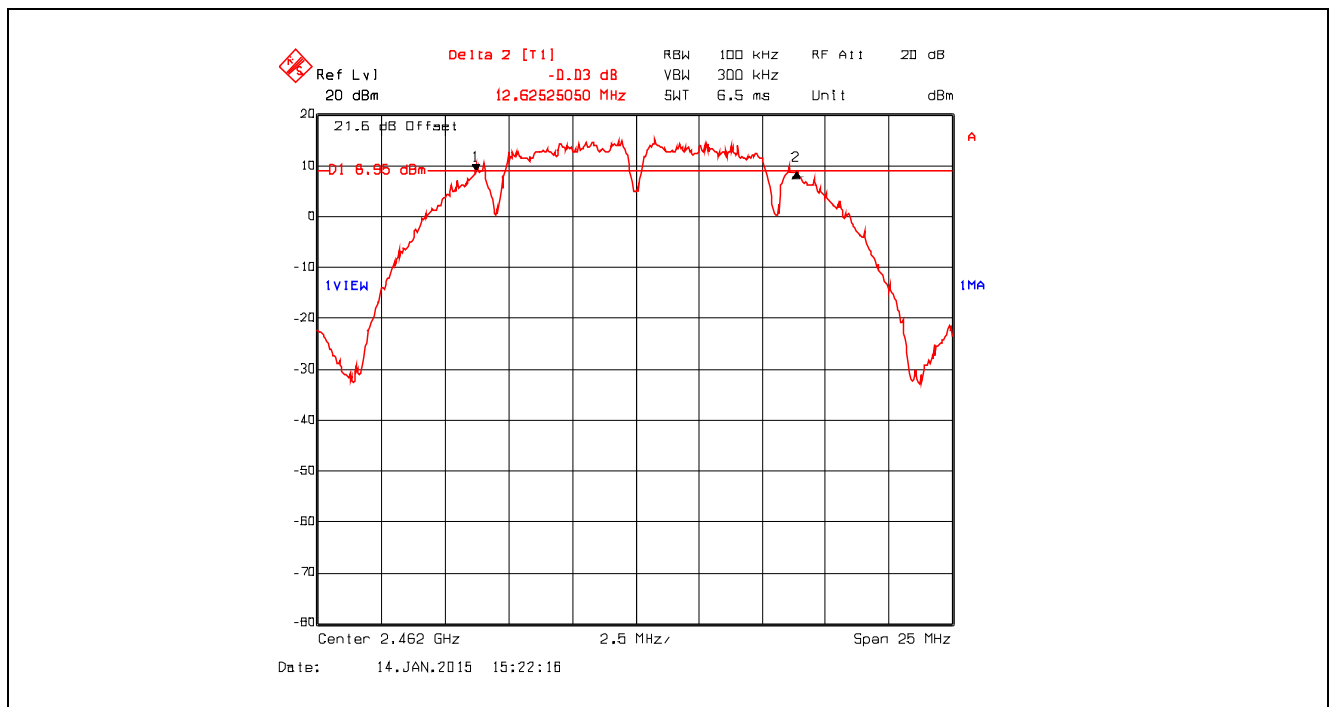
ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
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Plot 5.2.4.3. 6 dB Bandwidth, Data Rate 1, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26
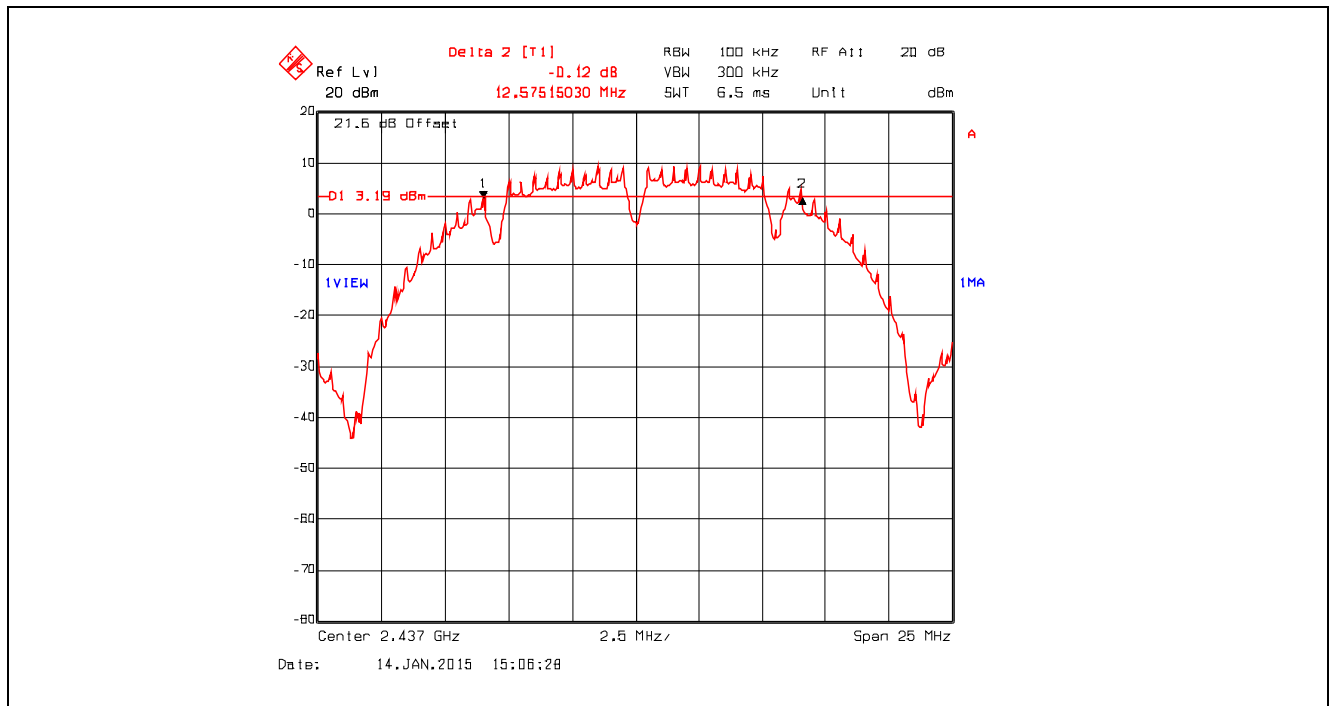
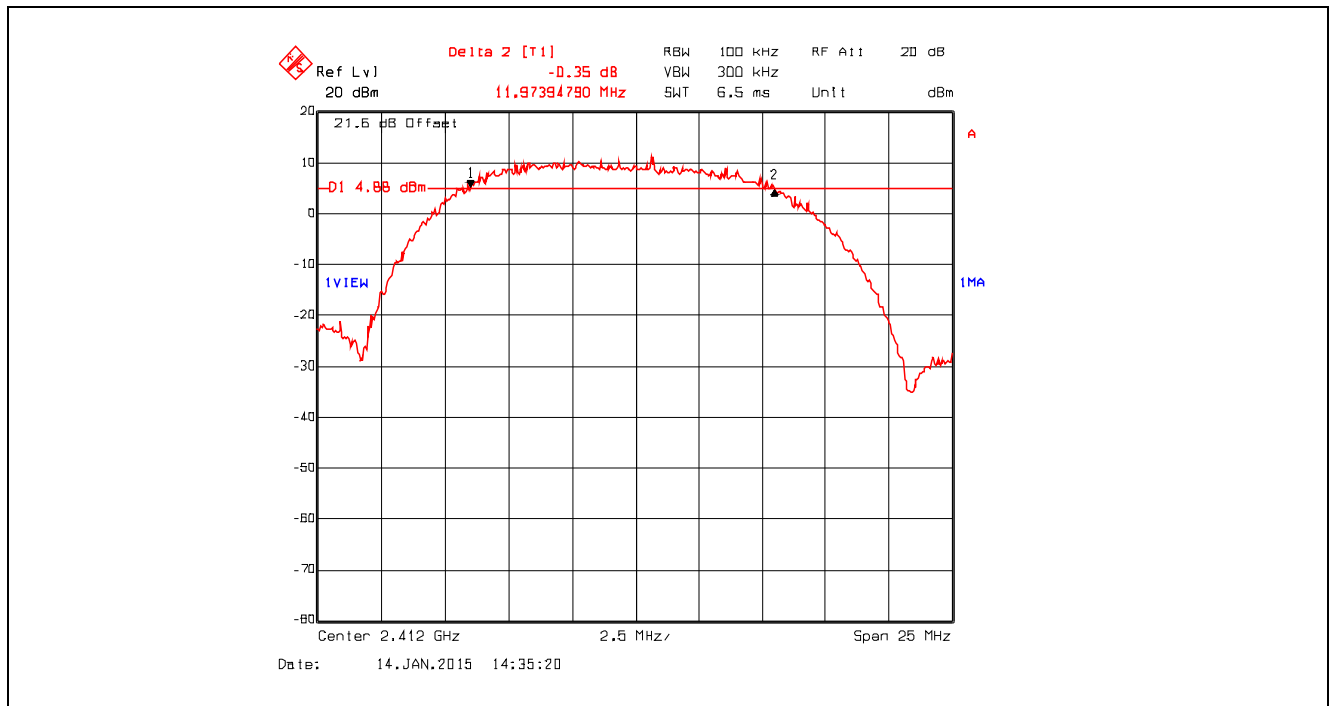**Plot 5.2.4.4.** 6 dB Bandwidth, Data Rate 1, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 26
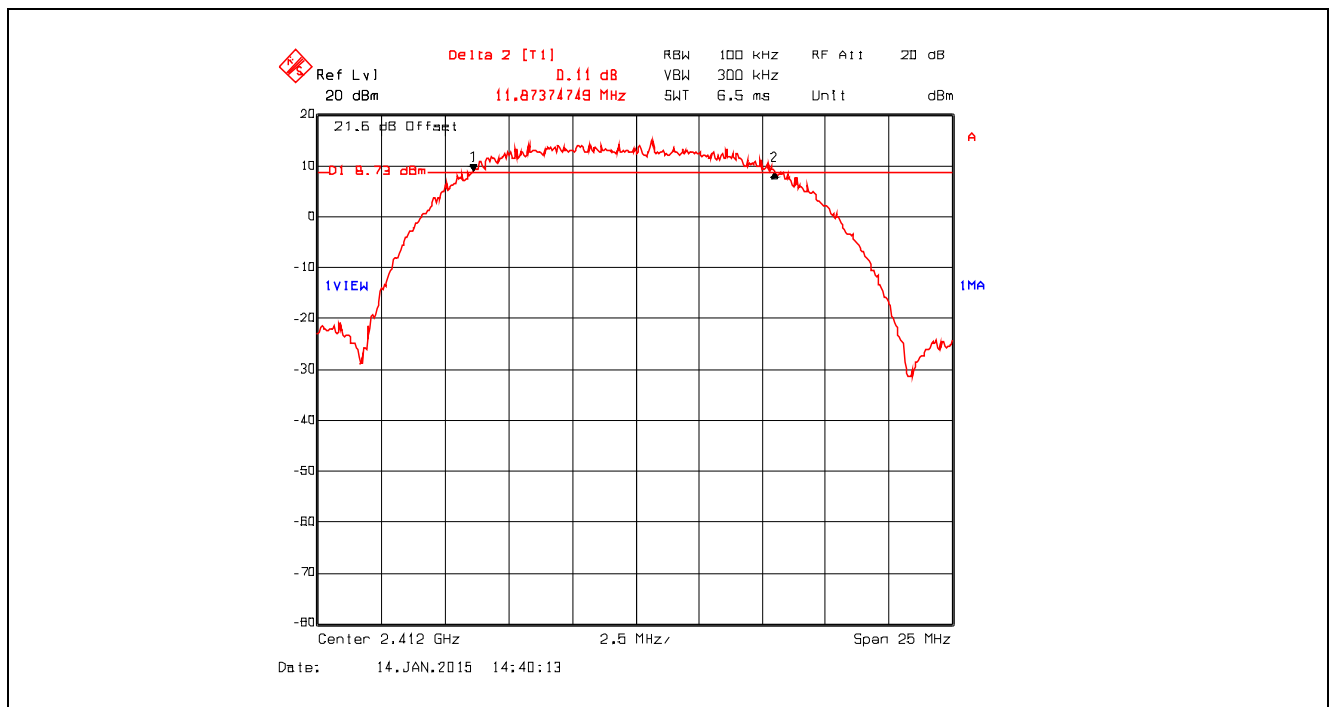
ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
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Plot 5.2.4.5. 6 dB Bandwidth, Data Rate 1, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26
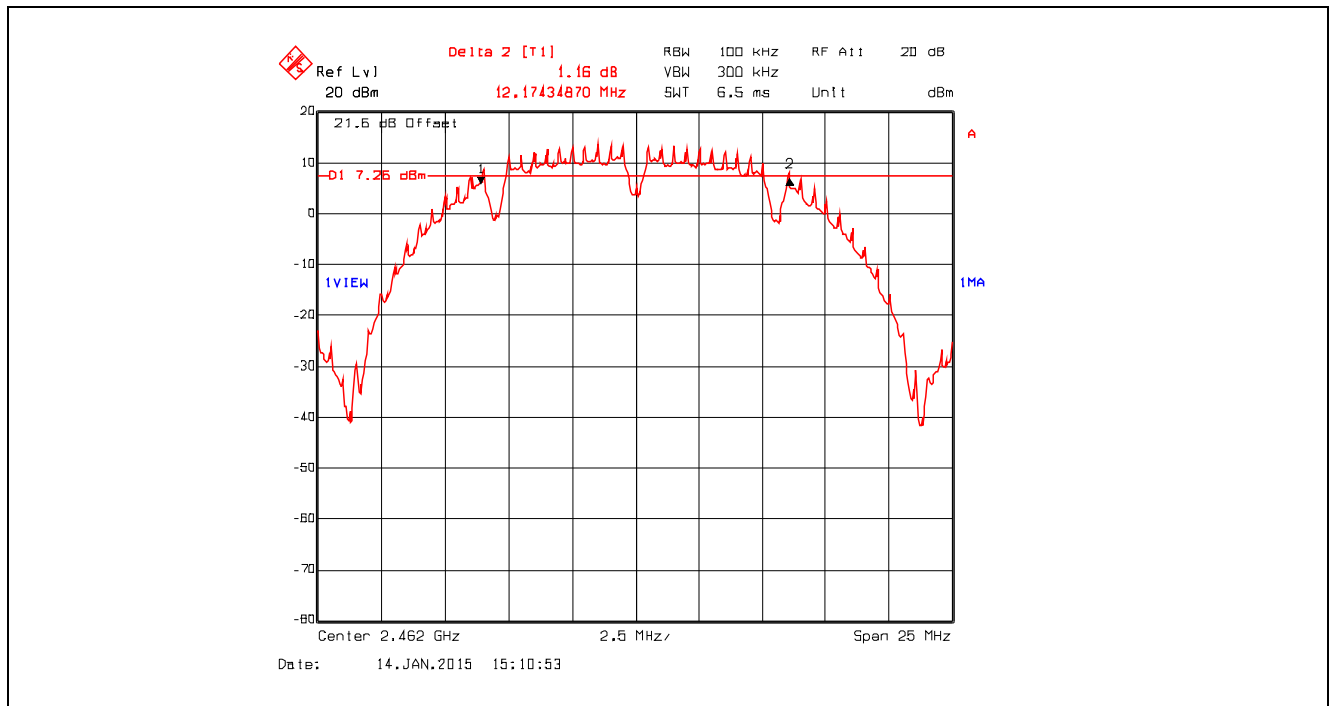
Plot 5.2.4.6. 6 dB Bandwidth, Data Rate 1, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26
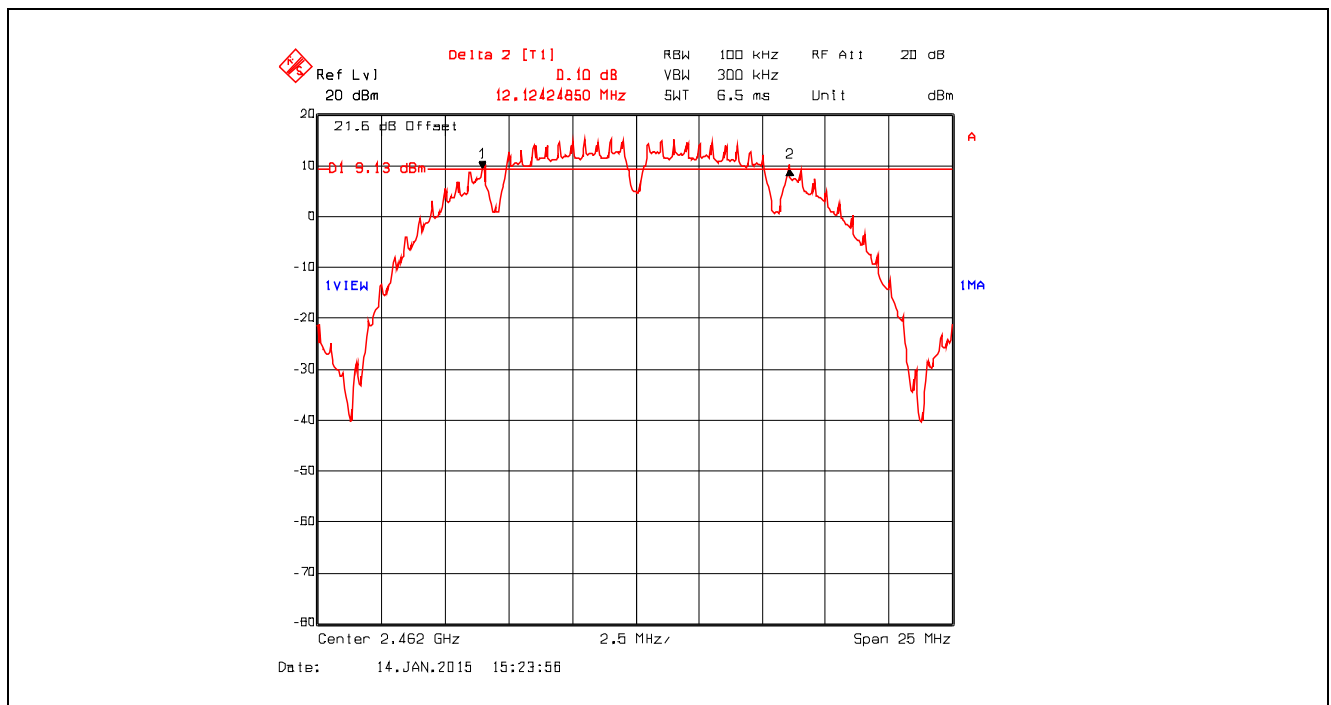
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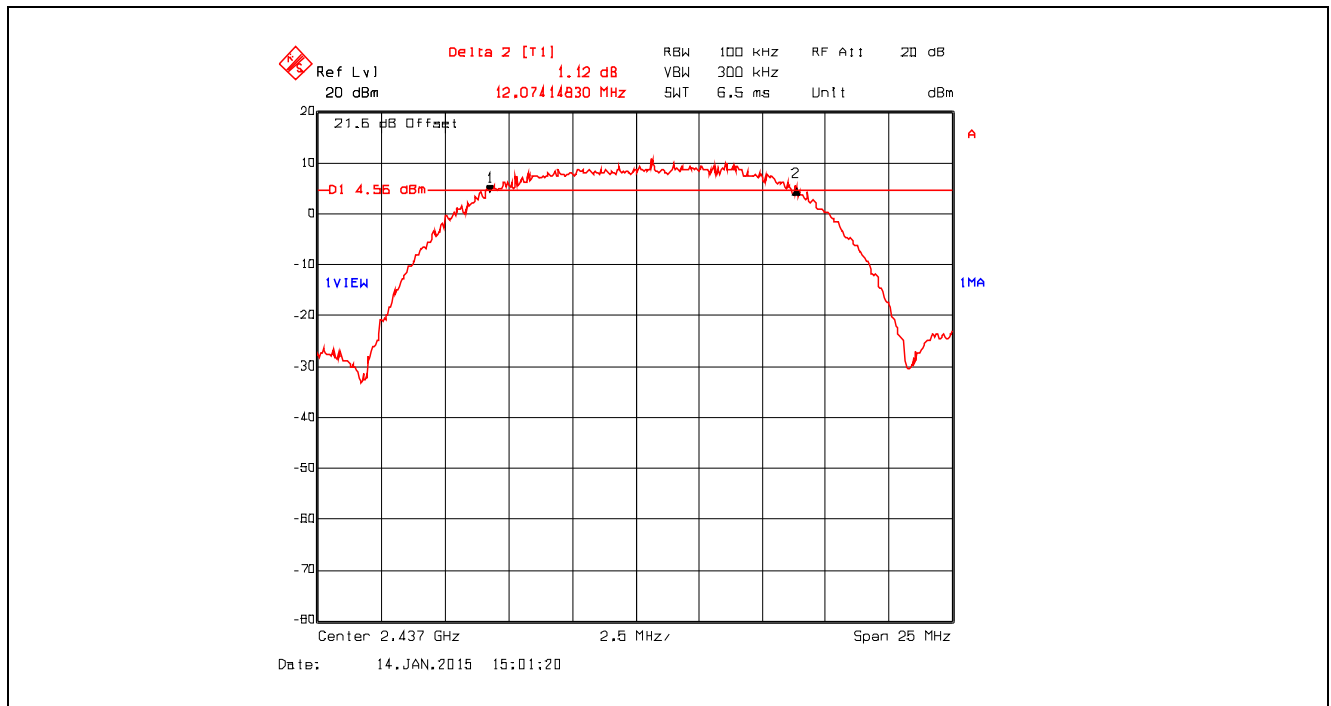**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
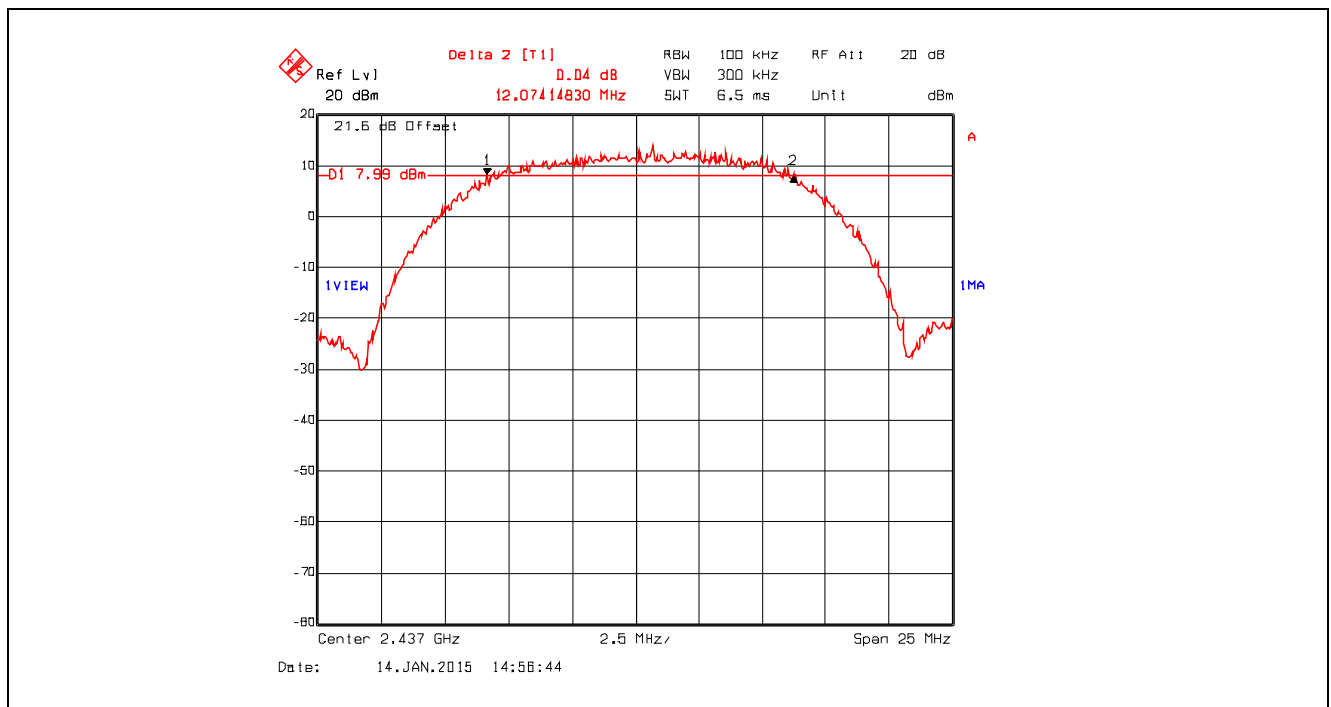**Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com**

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

Plot 5.2.4.7. 6 dB Bandwidth, Data Rate 2, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26
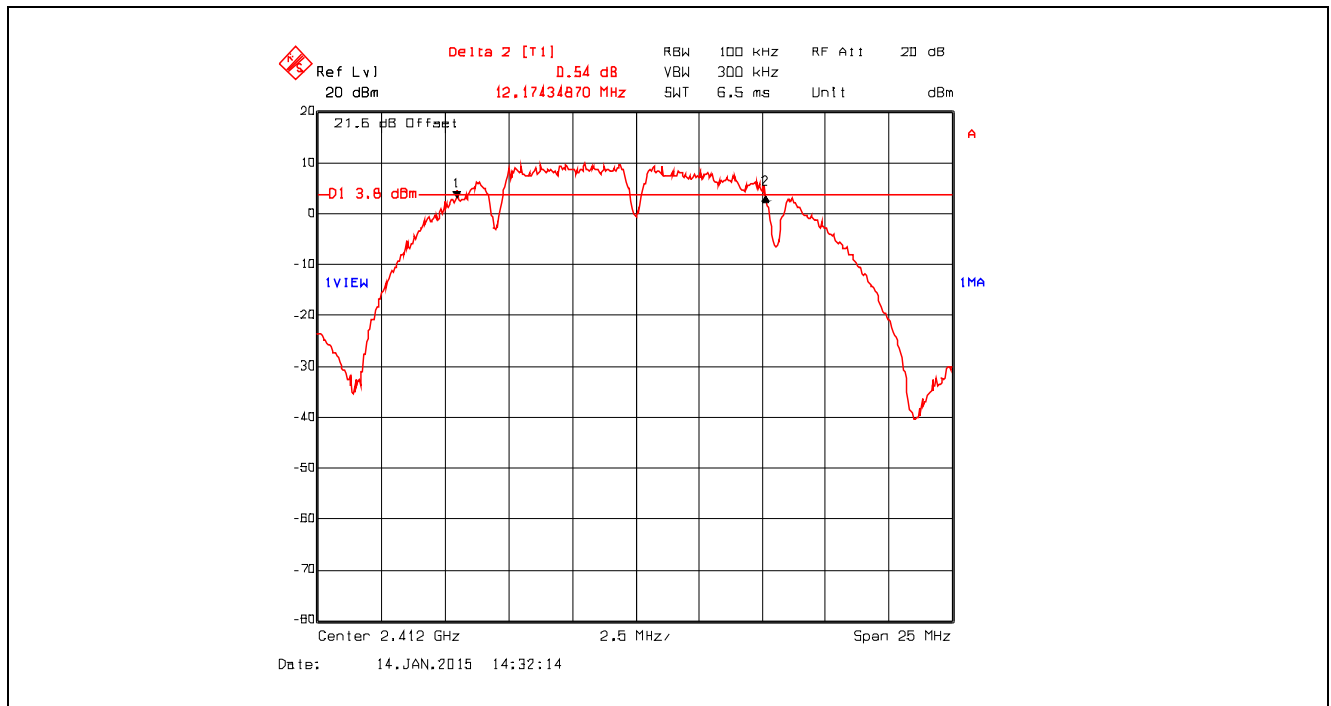
Plot 5.2.4.8. 6 dB Bandwidth, Data Rate 2, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26

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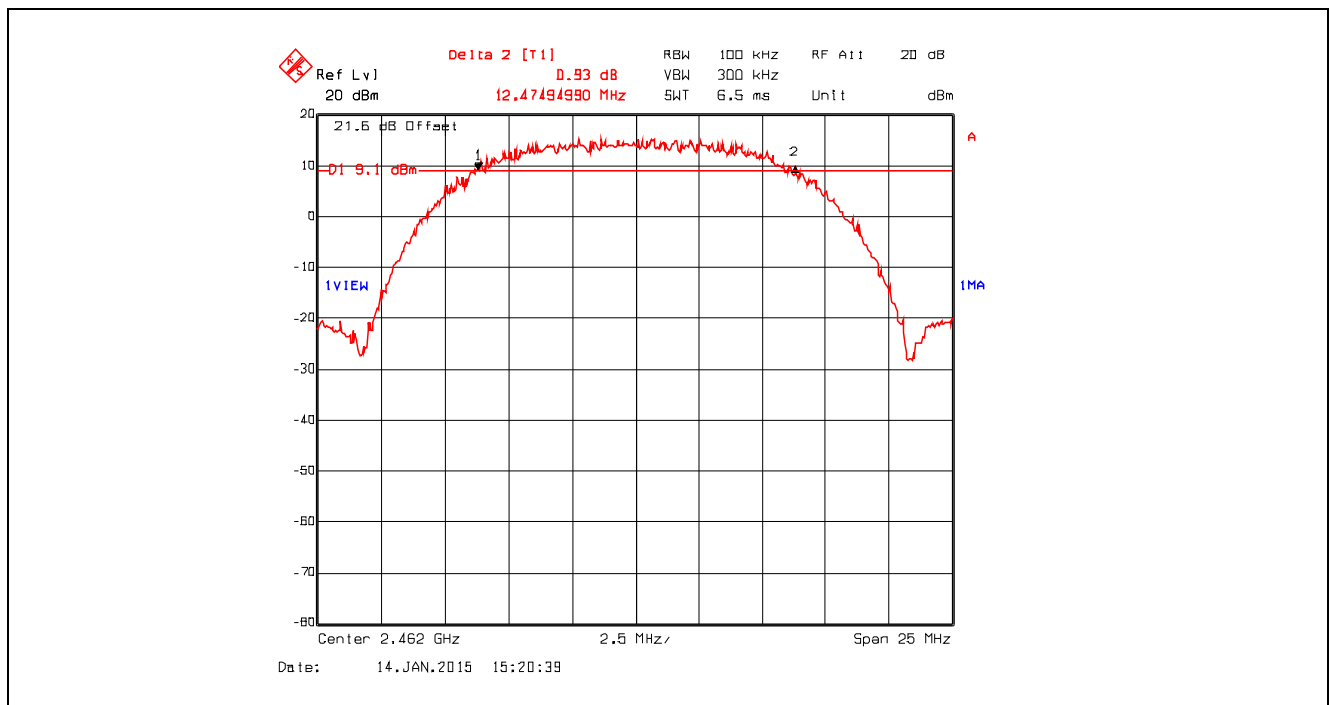
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)
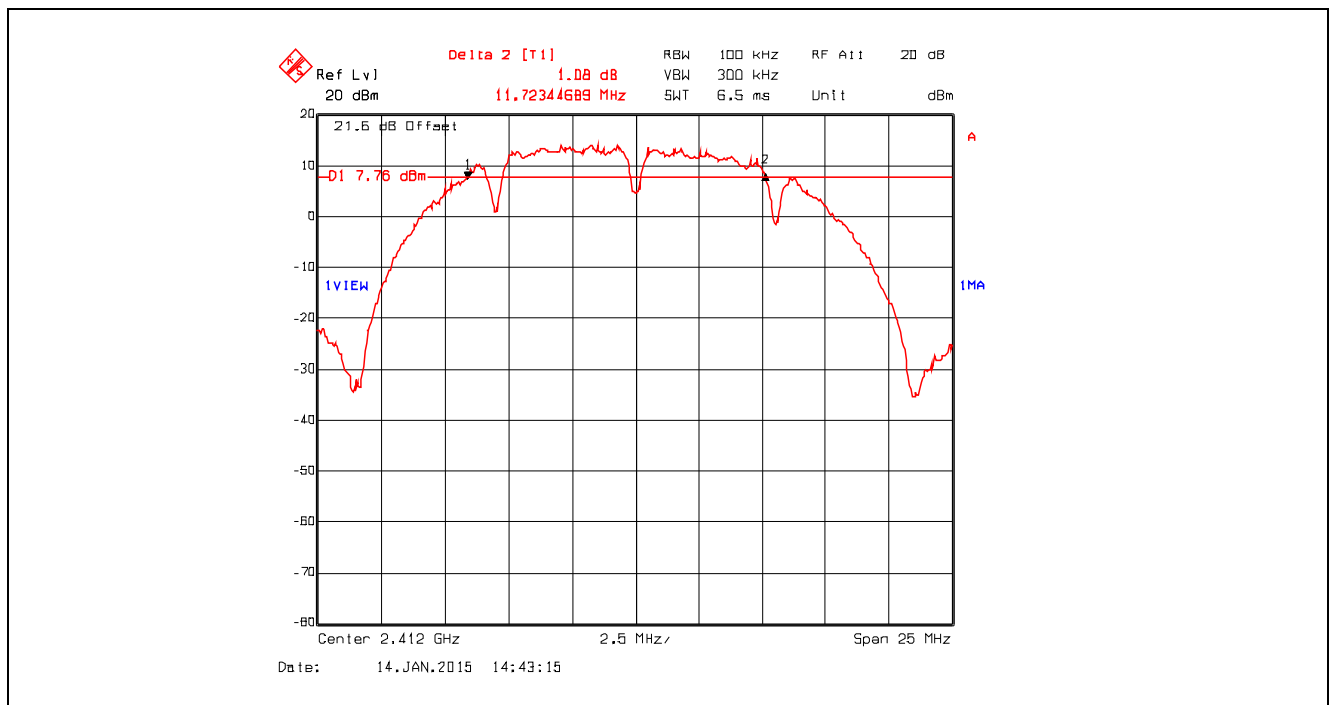
Plot 5.2.4.9. 6 dB Bandwidth, Data Rate 2, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26

Plot 5.2.4.10. 6 dB Bandwidth, Data Rate 2, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 26

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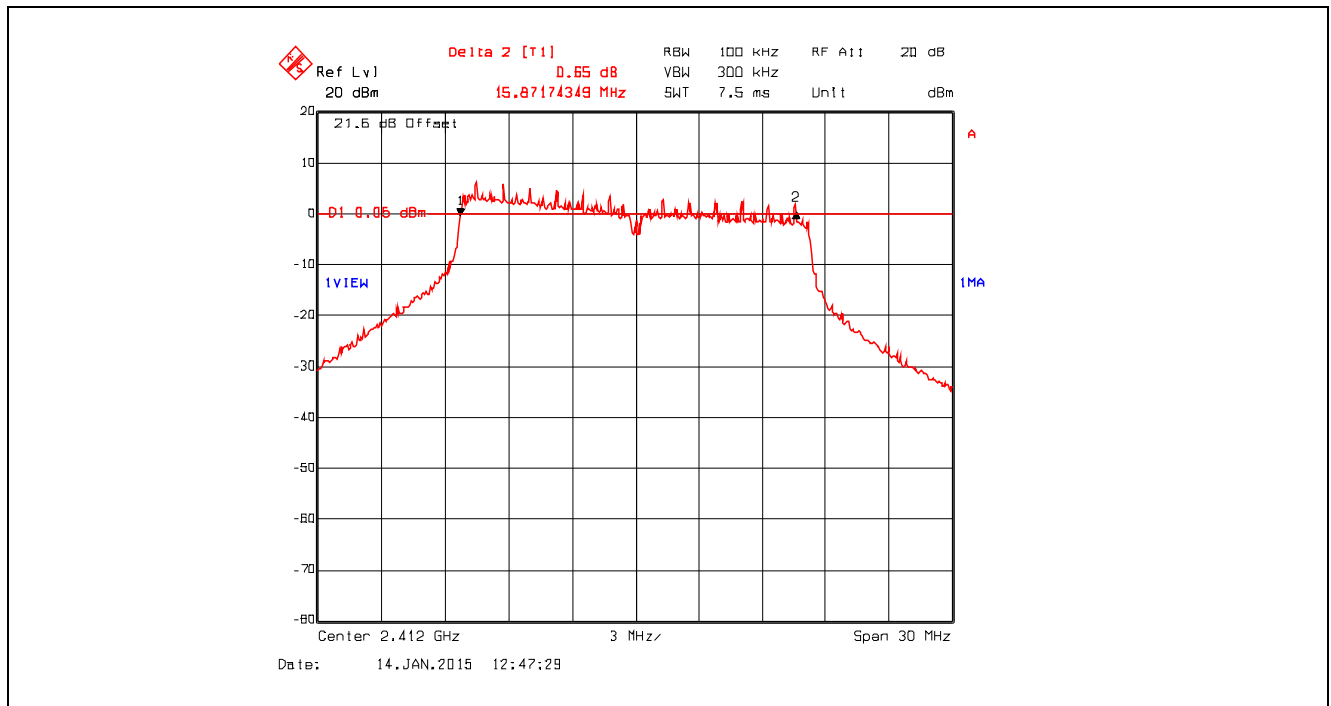
**Plot 5.2.4.11.** 6 dB Bandwidth, Data Rate 2, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26

Plot 5.2.4.12. 6 dB Bandwidth, Data Rate 2, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26

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Plot 5.2.4.13. 6 dB Bandwidth, Data Rate 3, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26

Plot 5.2.4.14. 6 dB Bandwidth, Data Rate 3, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26

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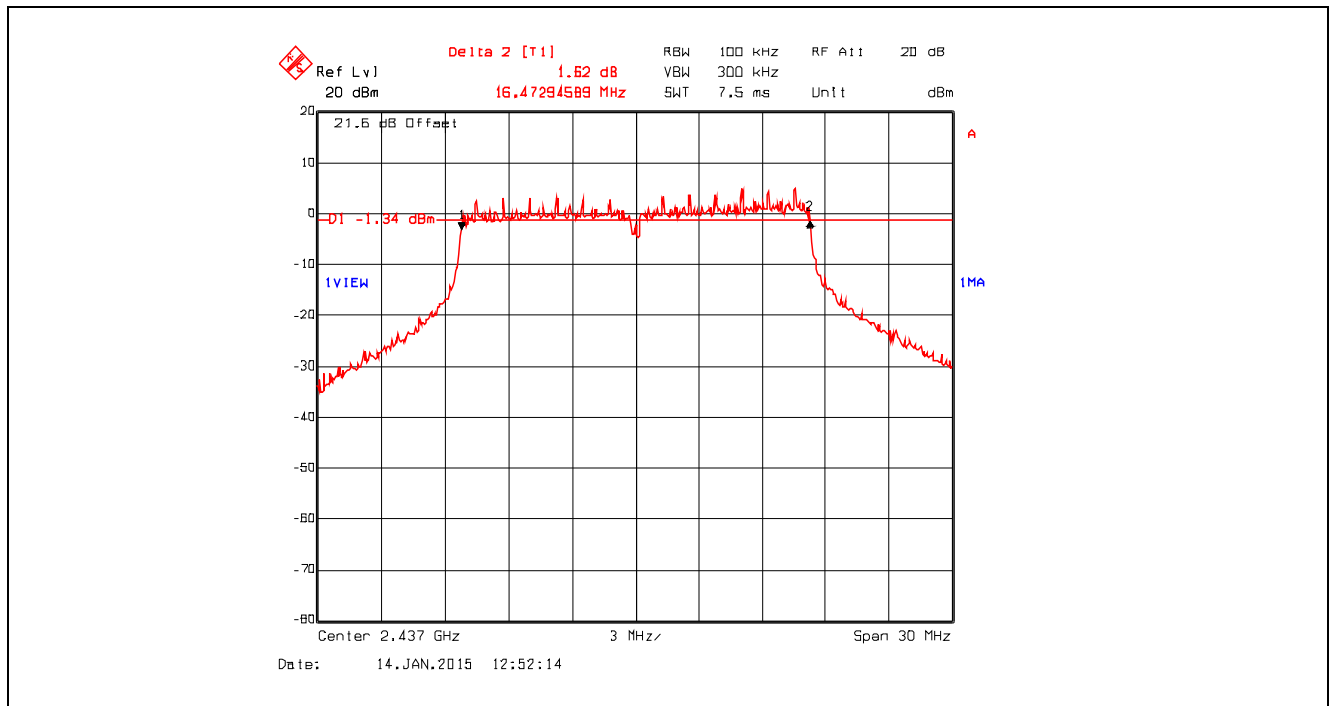
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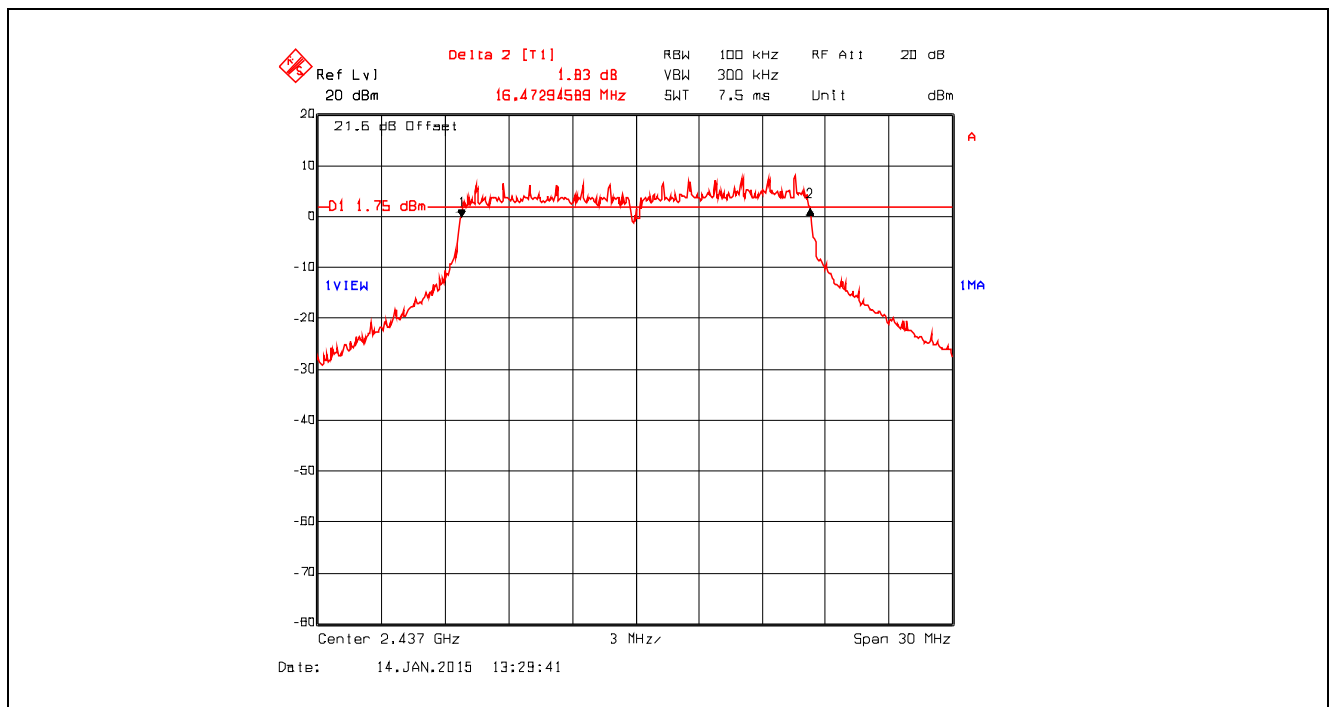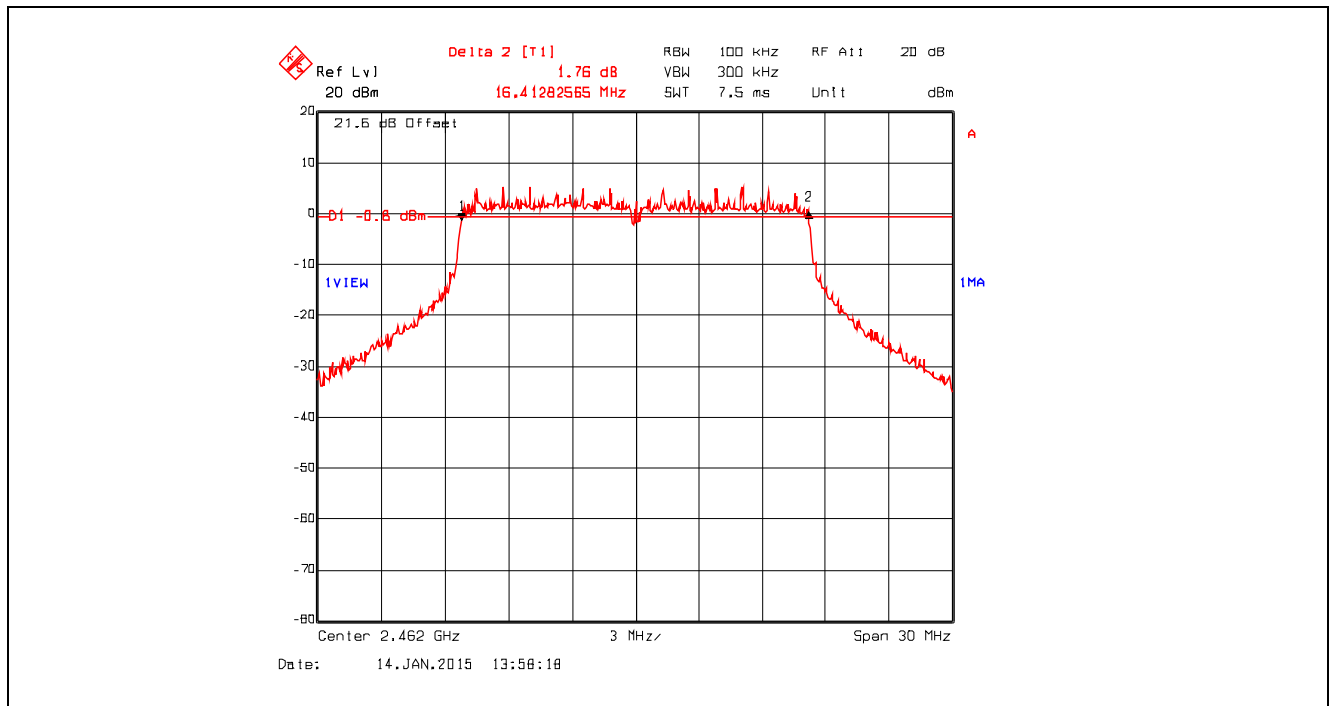*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot 5.2.4.15. 6 dB Bandwidth, Data Rate 3, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26

Plot 5.2.4.16. 6 dB Bandwidth, Data Rate 3, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 26

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Plot 5.2.4.17. 6 dB Bandwidth, Data Rate 3, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26
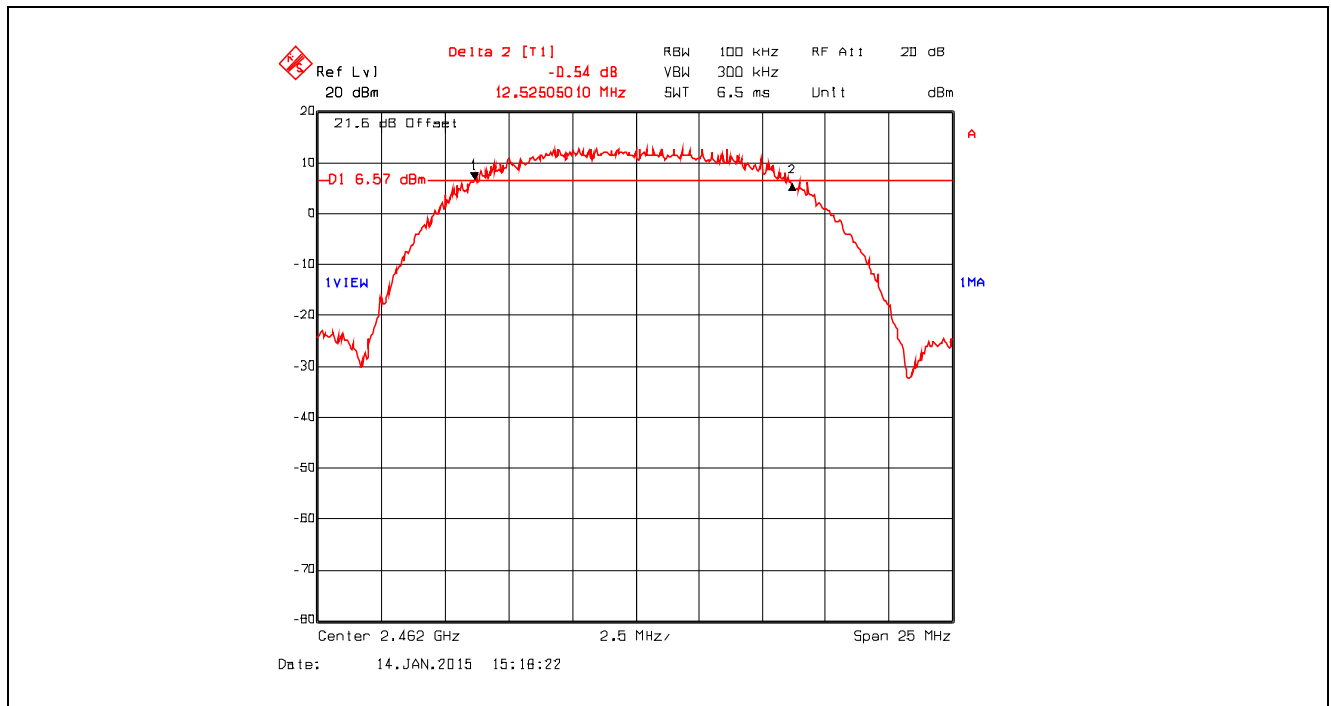
Plot 5.2.4.18. 6 dB Bandwidth, Data Rate 3, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26

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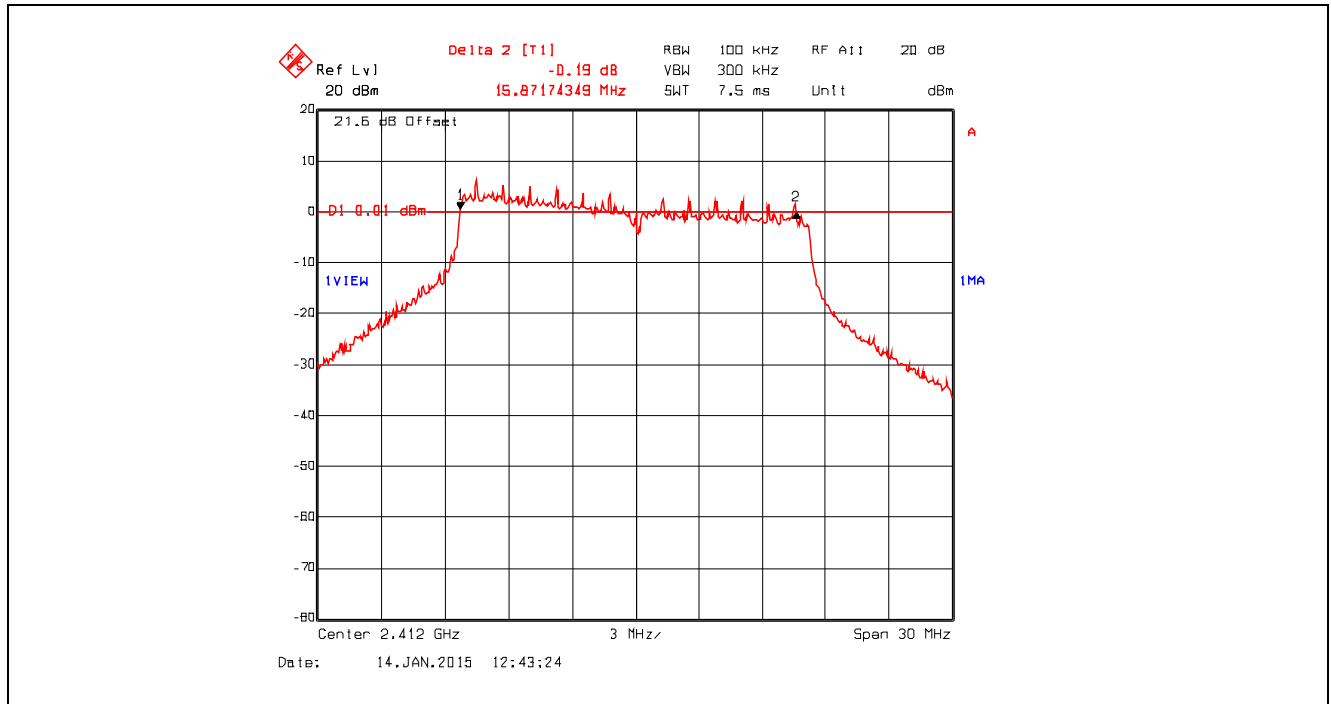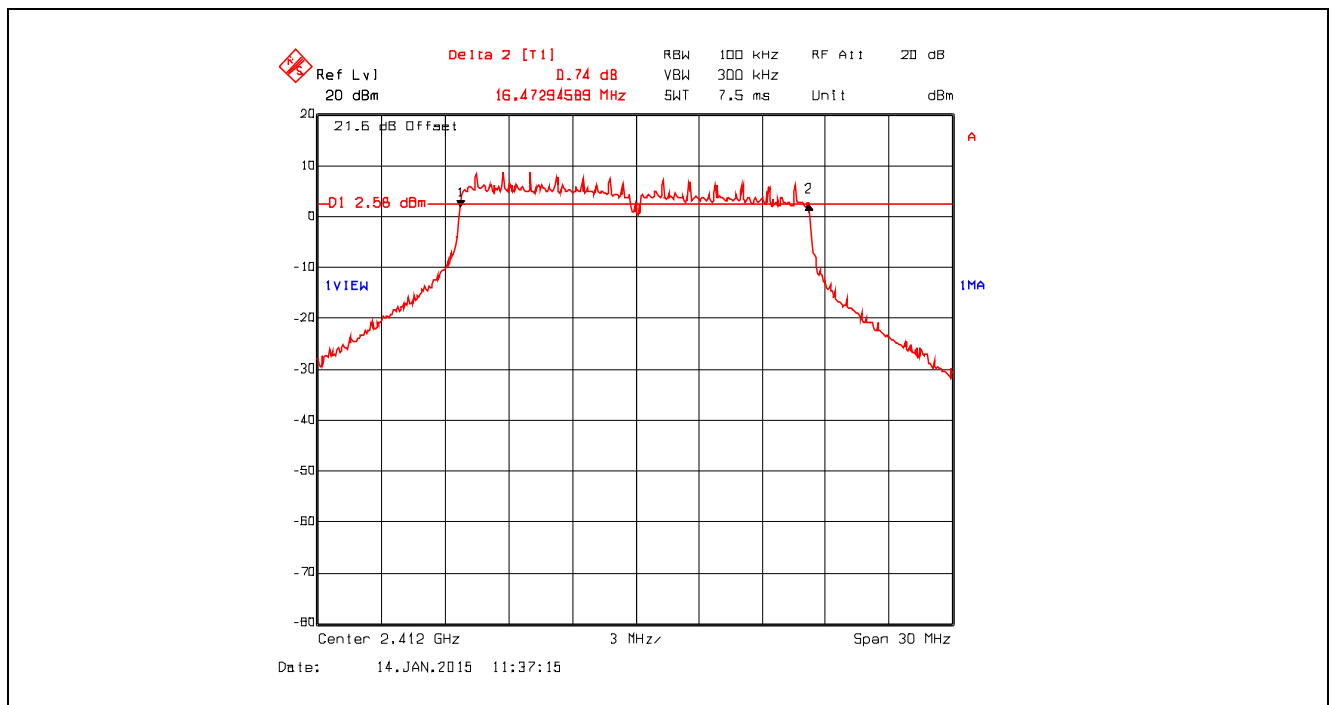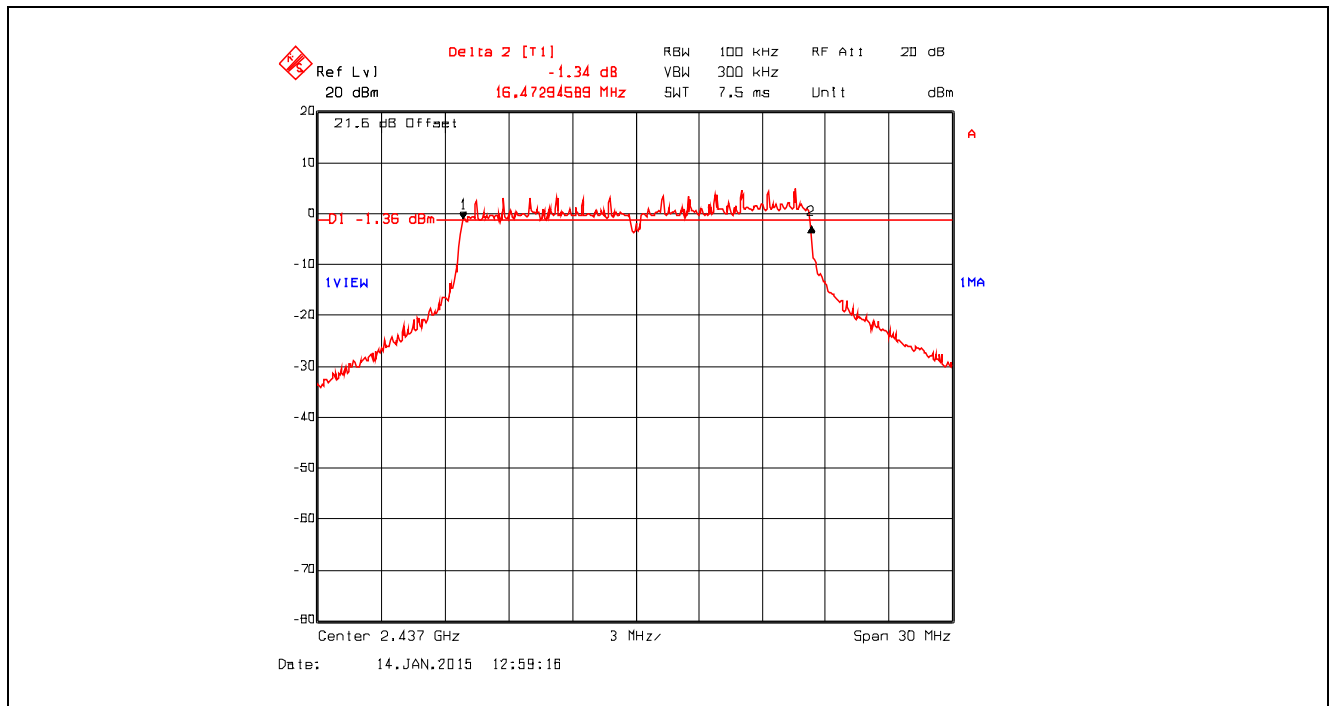**Plot 5.2.4.19.** 6 dB Bandwidth, Data Rate 4, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.2.4.20. 6 dB Bandwidth, Data Rate 4, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18
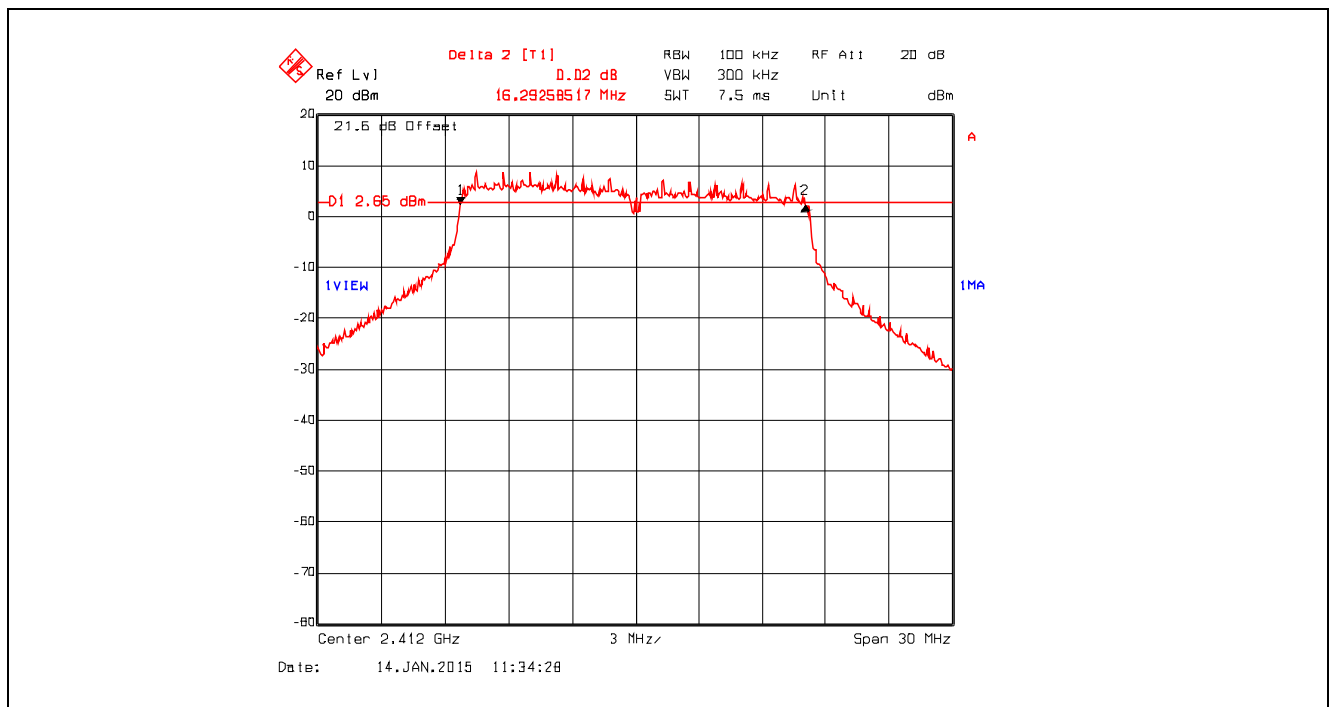
ULTRATECH GROUP OF LABS   **File #: 15MCRS079_FCC15C247DTS**
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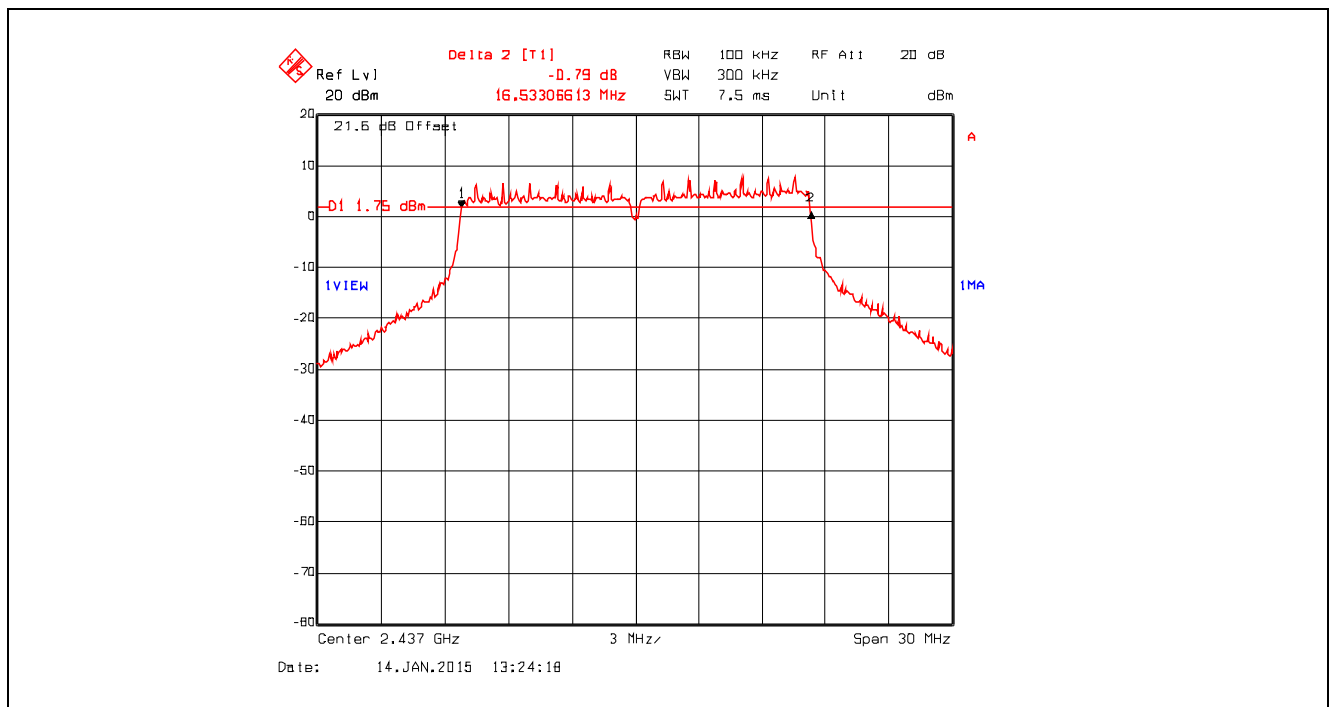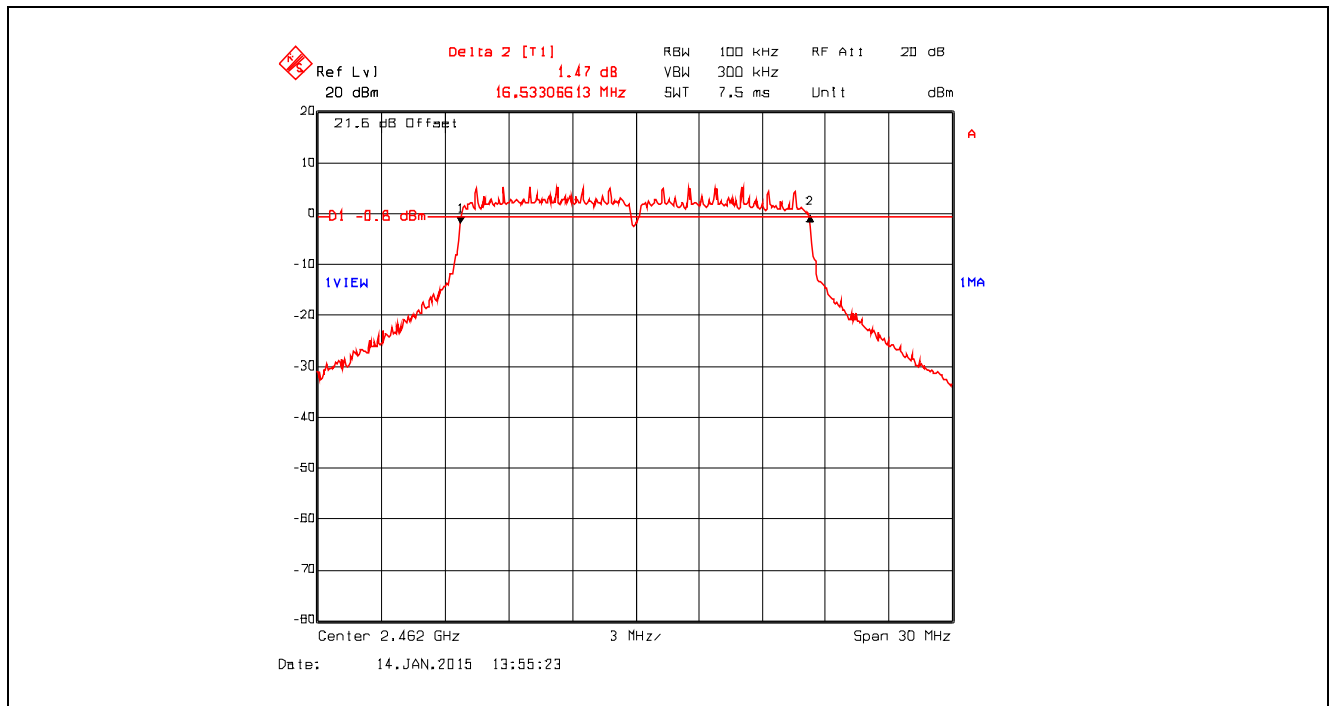
Plot 5.2.4.21. 6 dB Bandwidth, Data Rate 4, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18

Plot 5.2.4.22. 6 dB Bandwidth, Data Rate 4, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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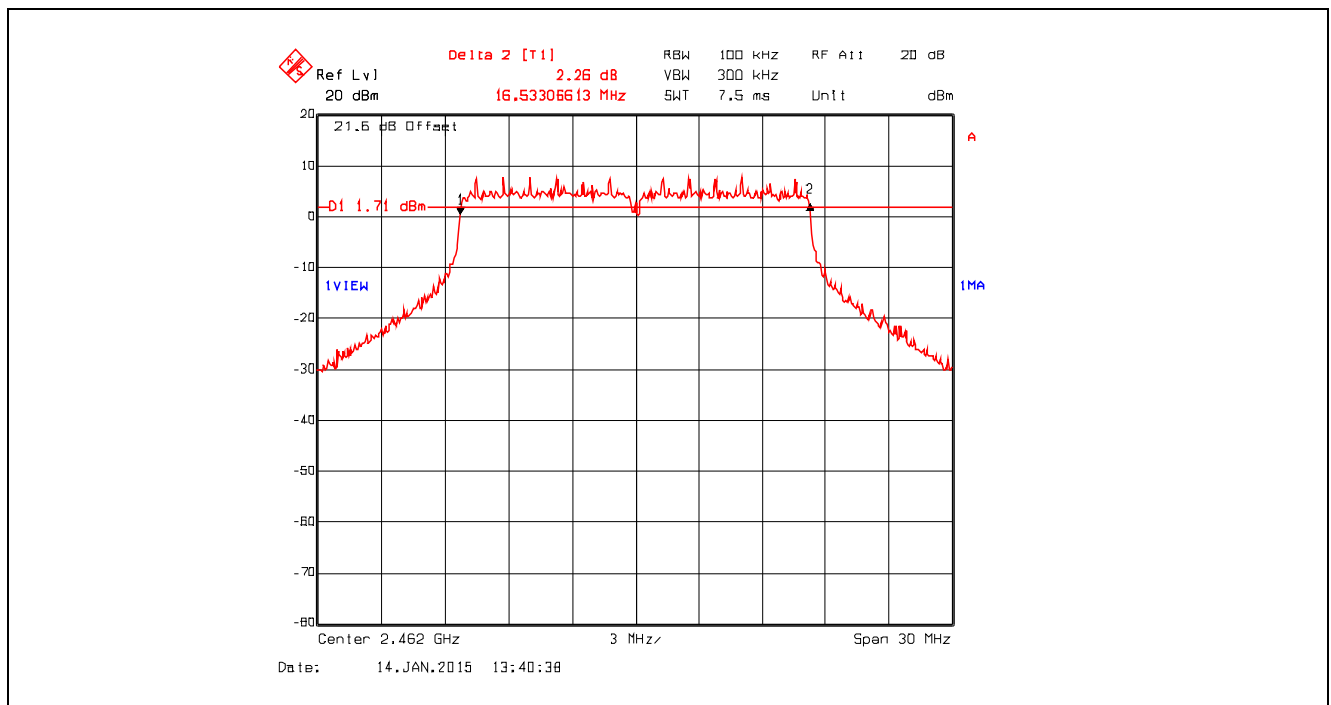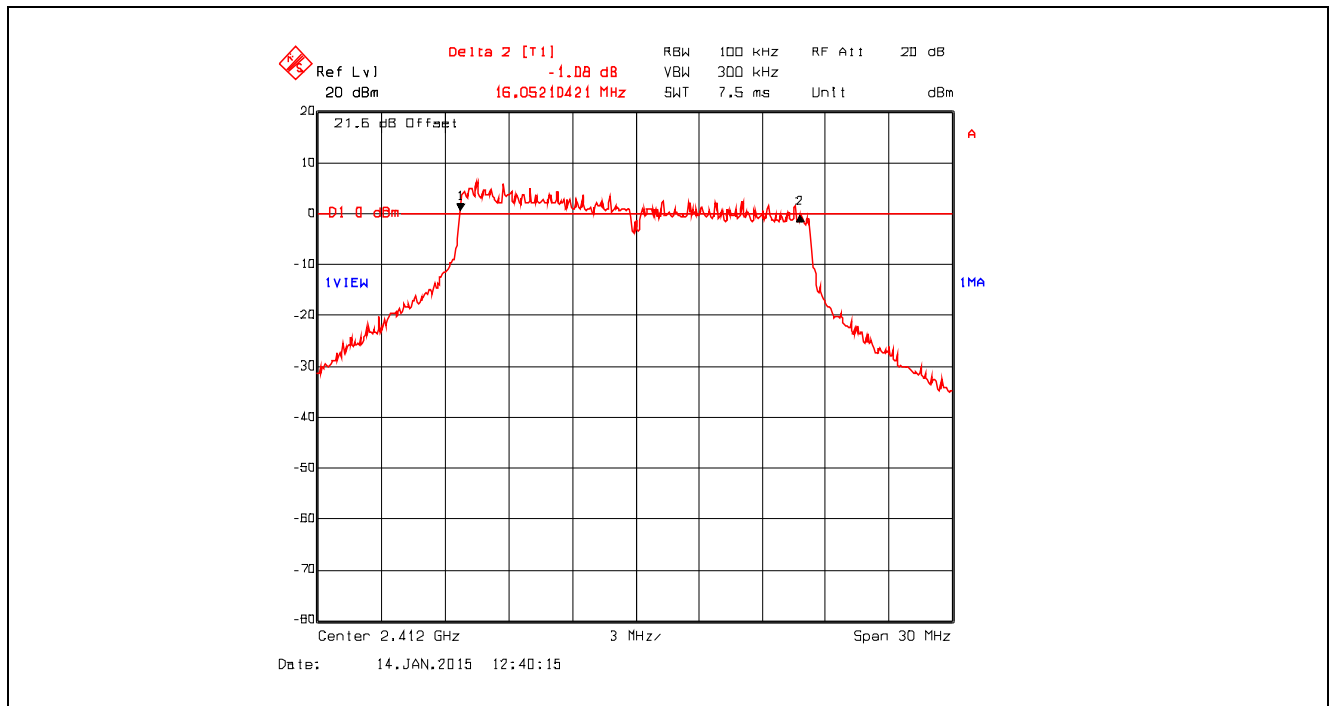
Plot 5.2.4.23. 6 dB Bandwidth, Data Rate 4, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18

Plot 5.2.4.24. 6 dB Bandwidth, Data Rate 4, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

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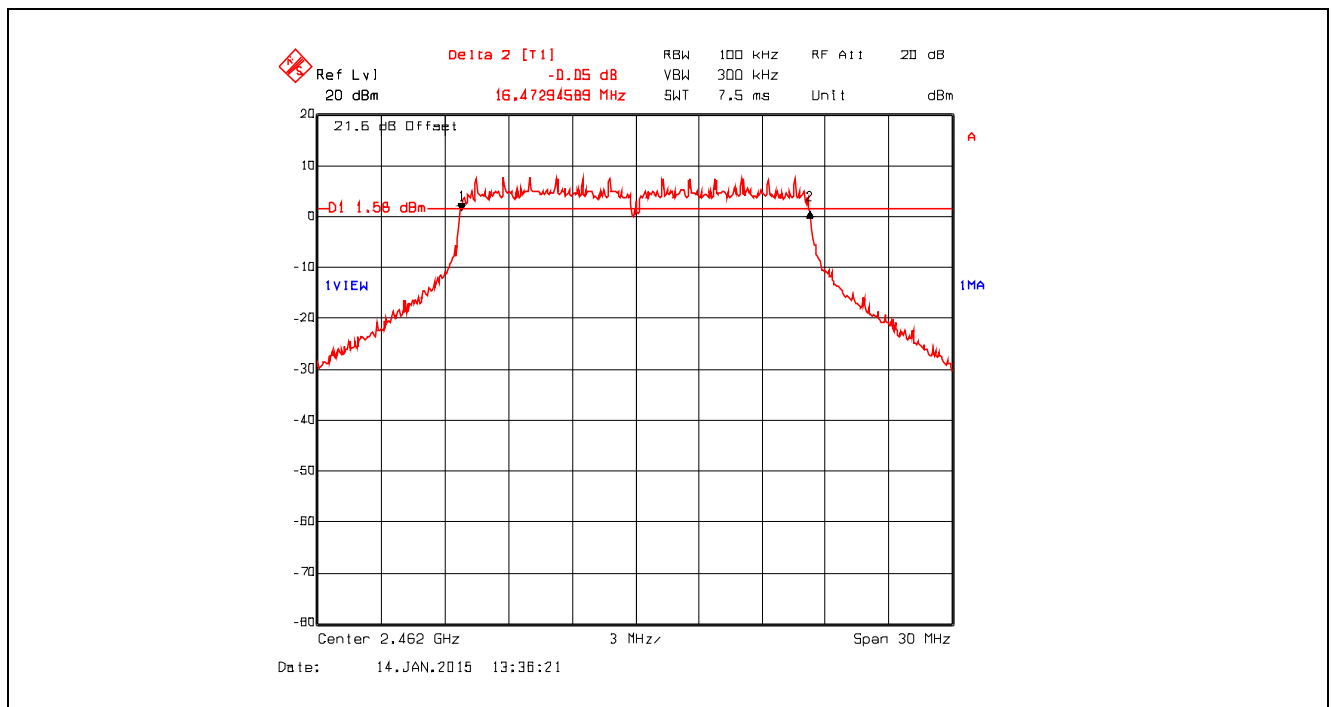
Plot 5.2.4.25. 6 dB Bandwidth, Data Rate 5, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

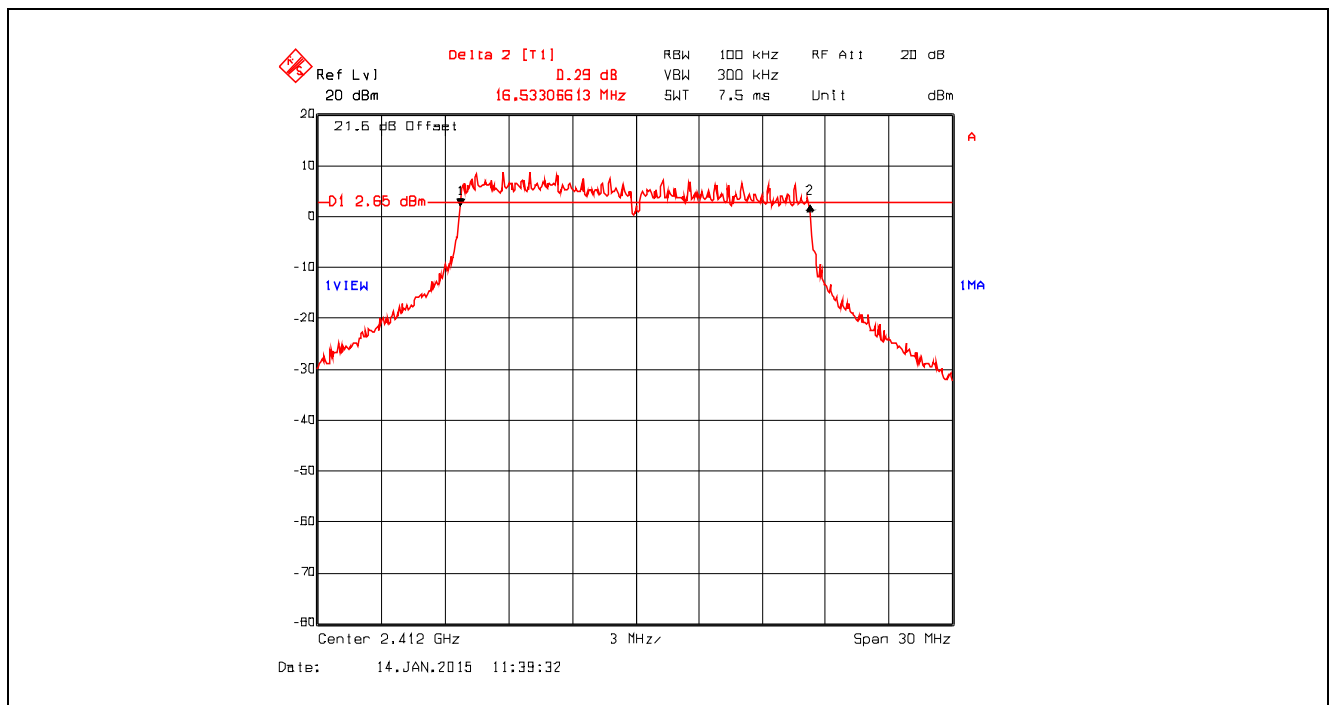**Plot 5.2.4.26.** 6 dB Bandwidth, Data Rate 5, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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Plot 5.2.4.27. 6 dB Bandwidth, Data Rate 5, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18

Plot 5.2.4.28. 6 dB Bandwidth, Data Rate 5, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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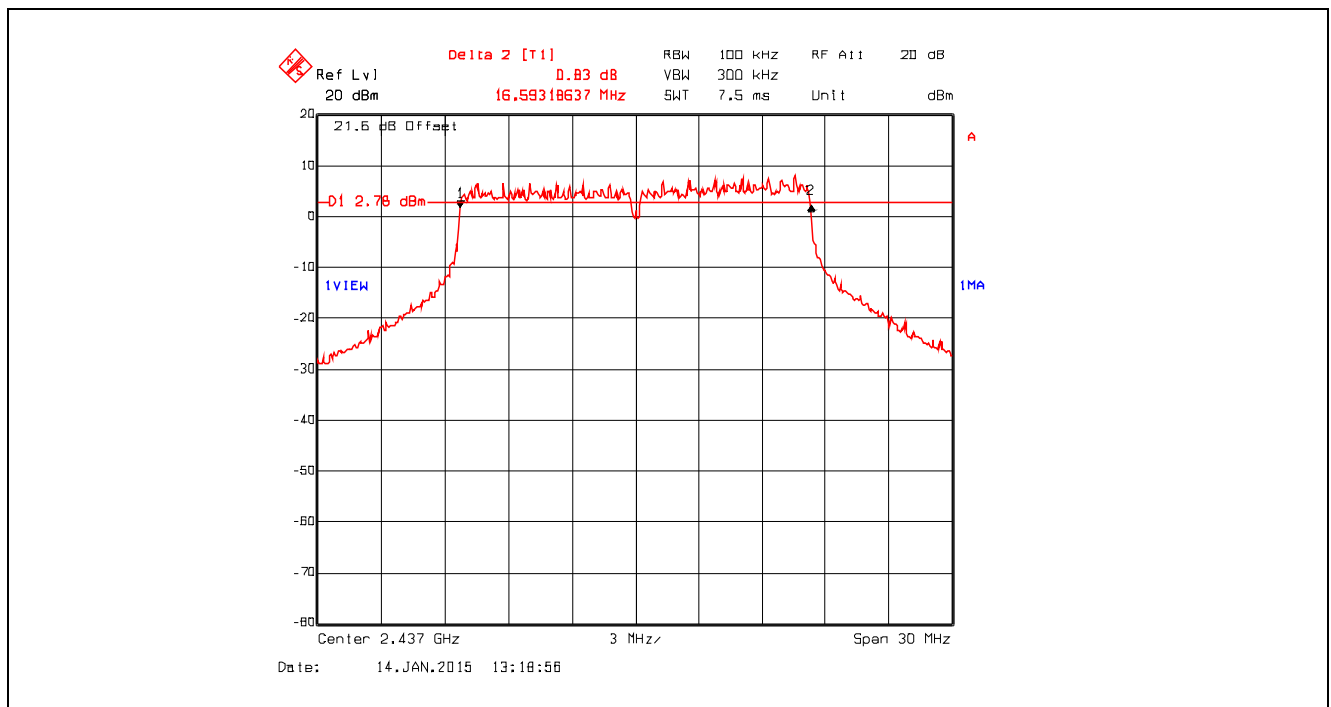**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
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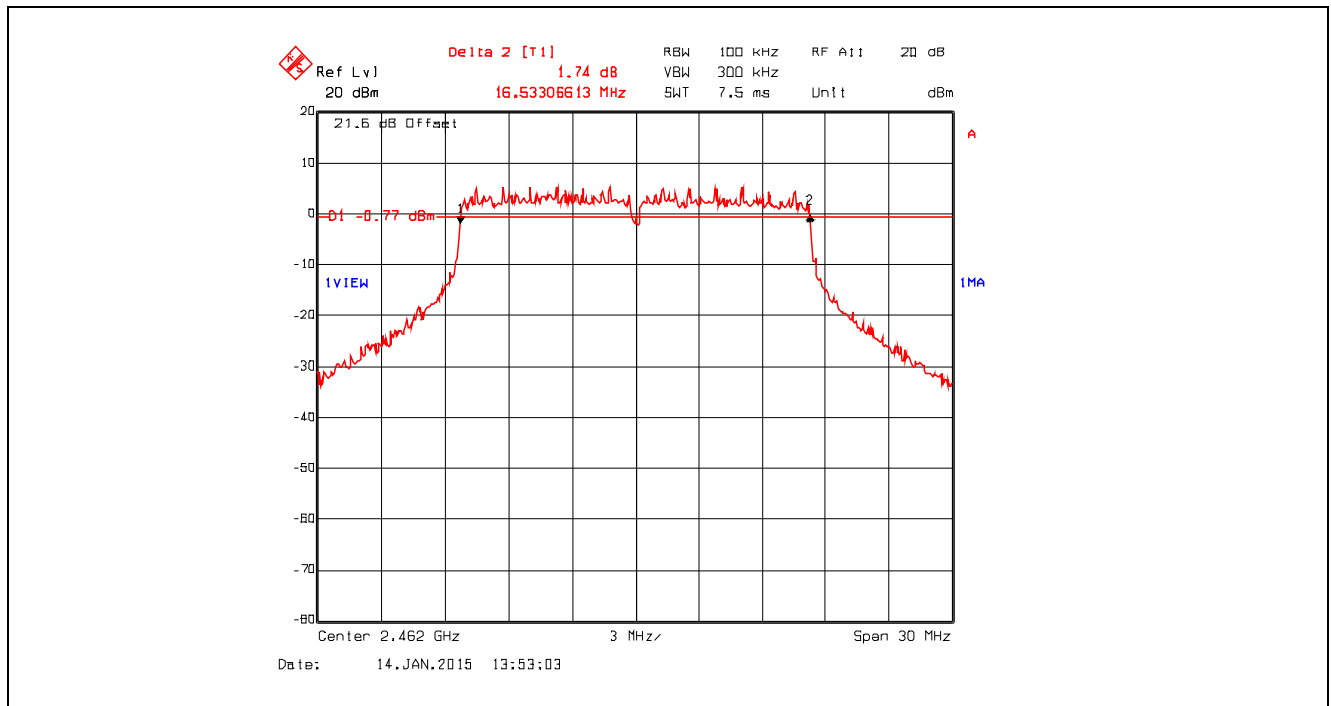
Plot 5.2.4.29. 6 dB Bandwidth, Data Rate 5, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18
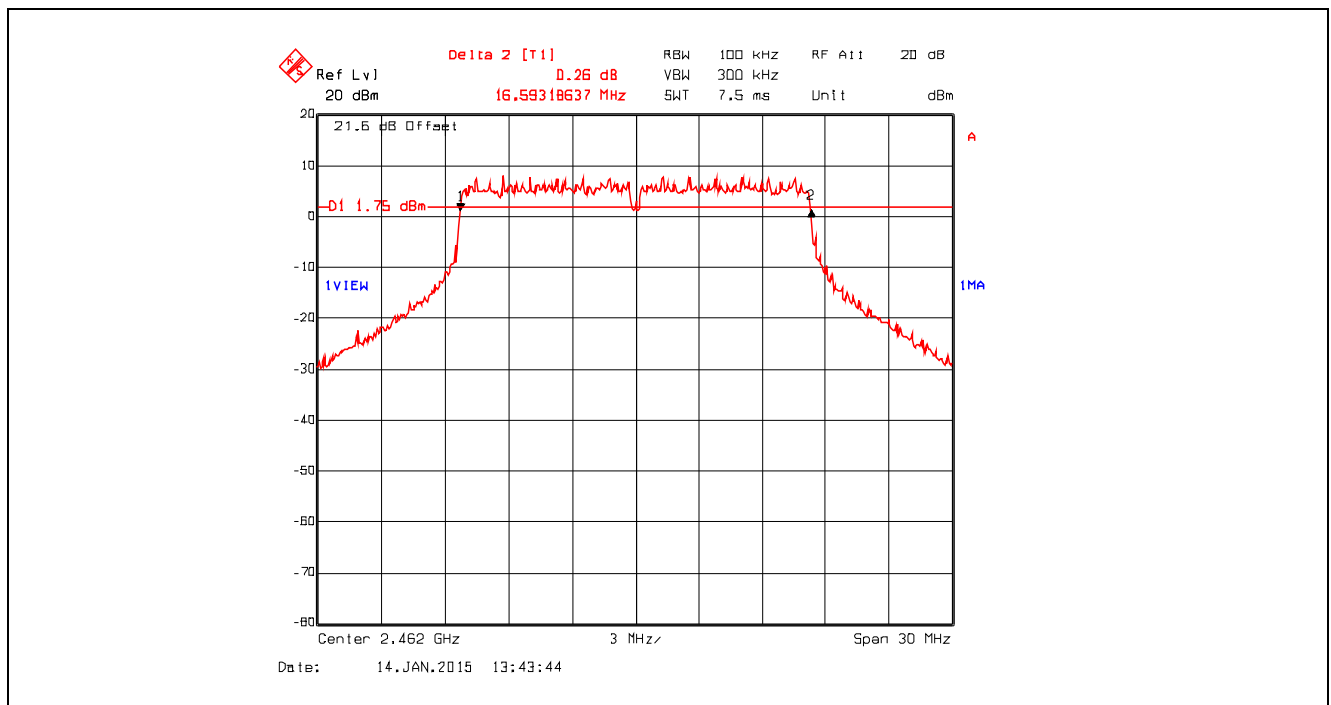

Plot 5.2.4.30. 6 dB Bandwidth, Data Rate 5, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

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Plot 5.2.4.31. 6 dB Bandwidth, Data Rate 6, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.2.4.32. 6 dB Bandwidth, Data Rate 6, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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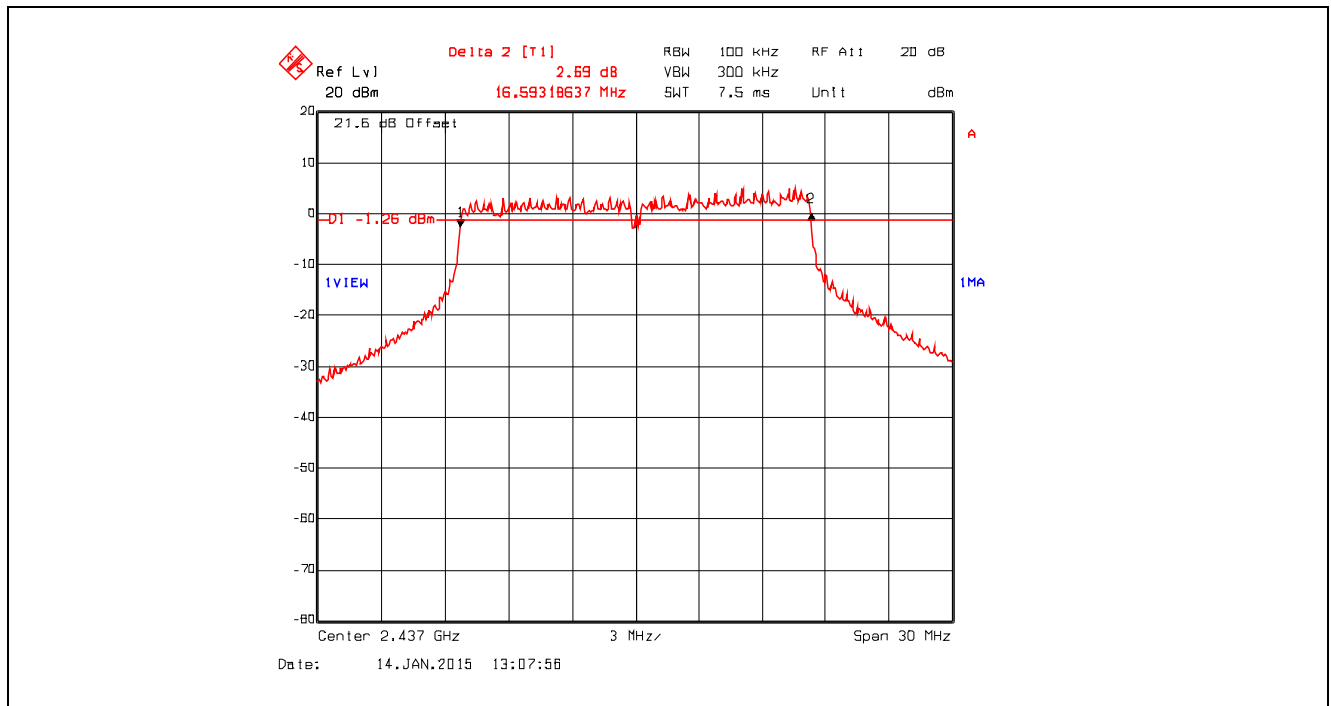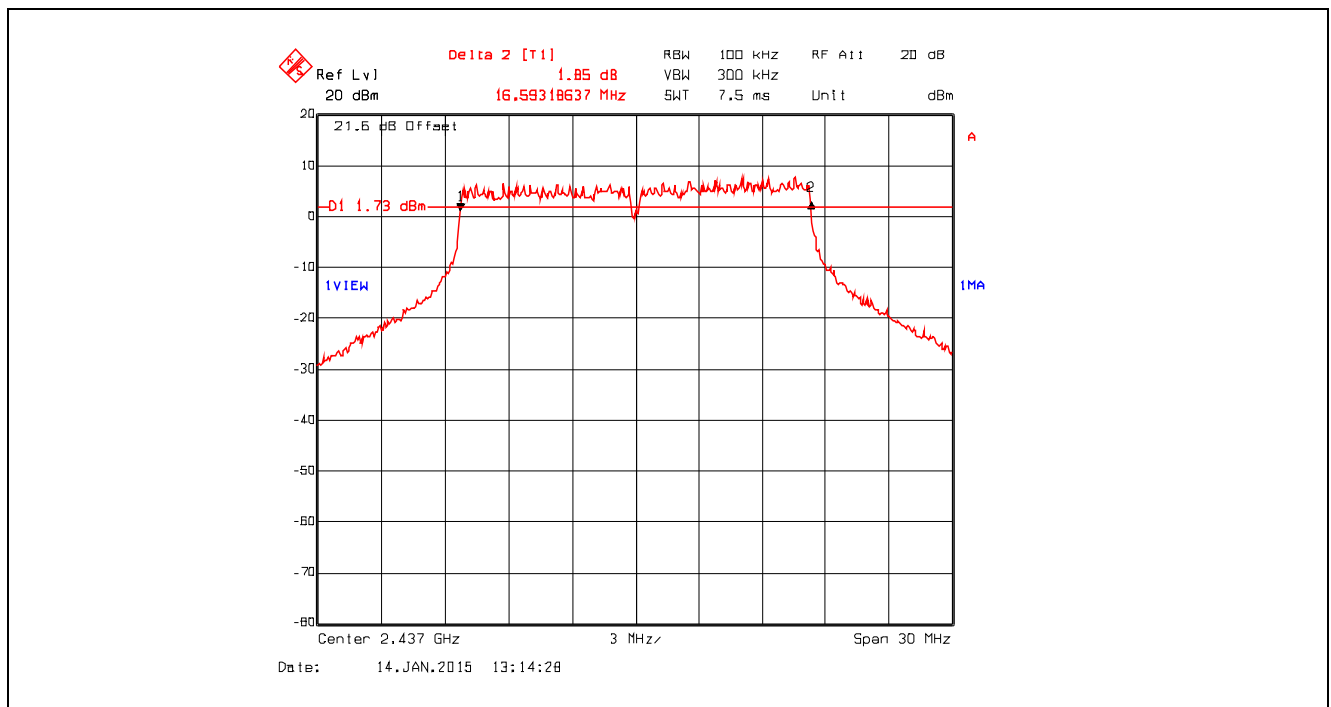
Plot 5.2.4.33. 6 dB Bandwidth, Data Rate 6, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18
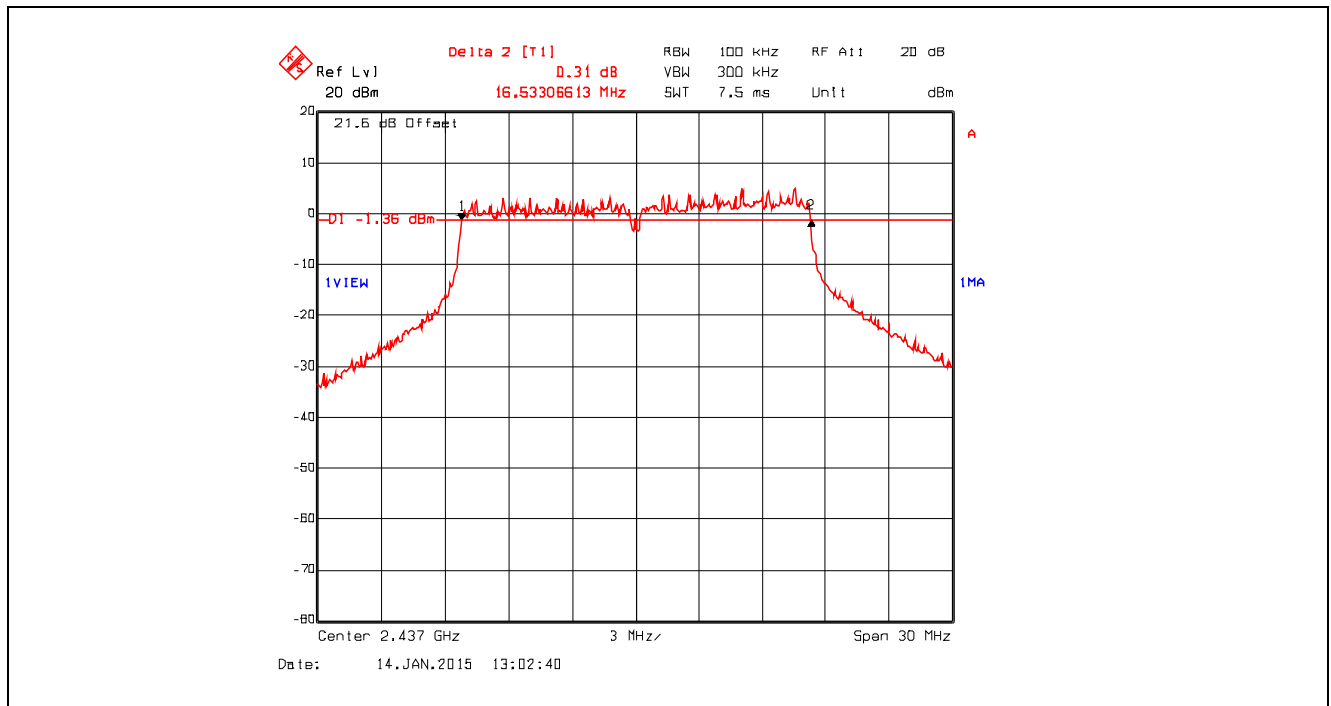
Plot 5.2.4.34. 6 dB Bandwidth, Data Rate 6, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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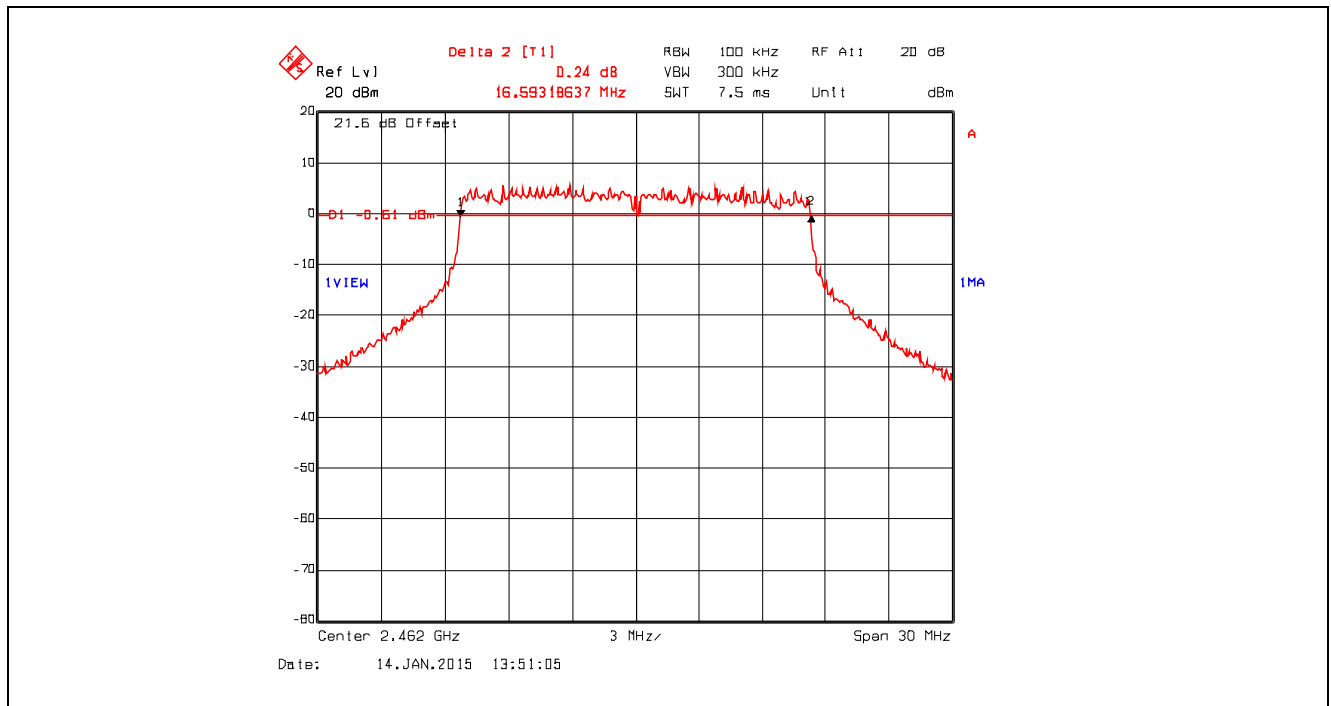
Plot 5.2.4.35. 6 dB Bandwidth, Data Rate 6, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18

Plot 5.2.4.36. 6 dB Bandwidth, Data Rate 6, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18
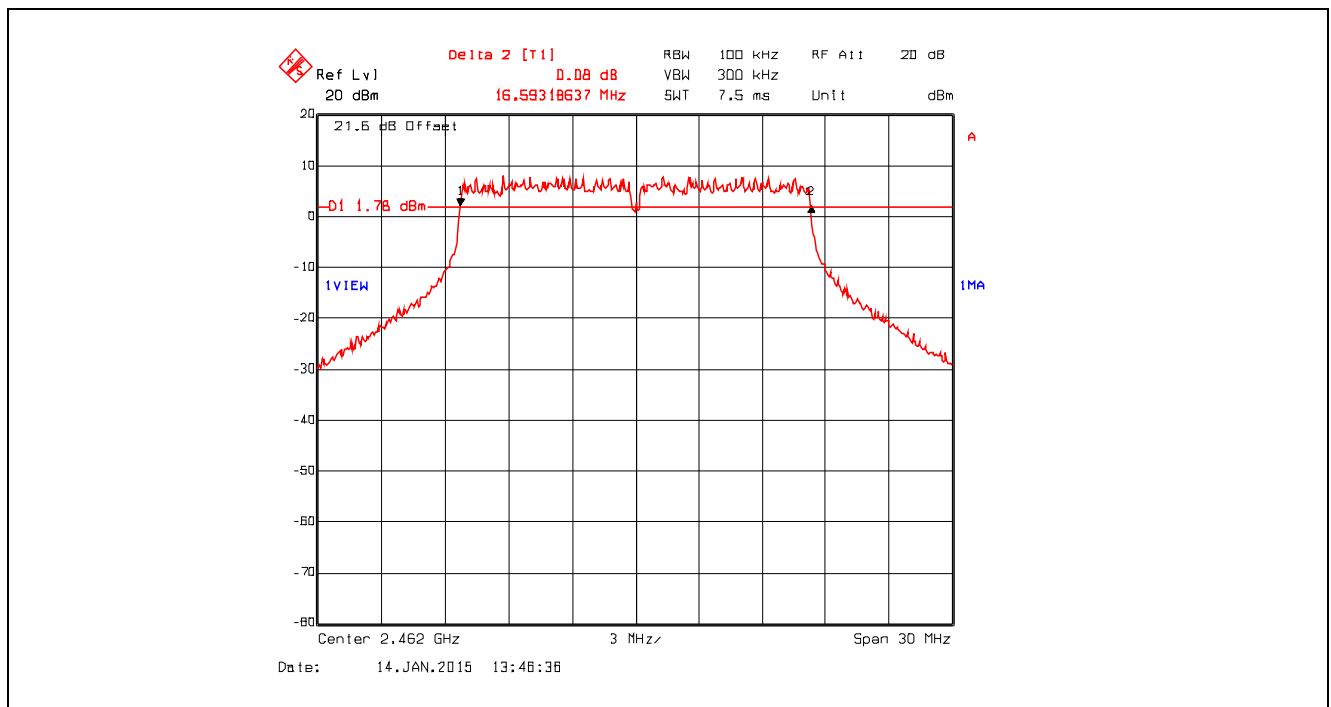
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Plot 5.2.4.37. 6 dB Bandwidth, Data Rate 7, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18
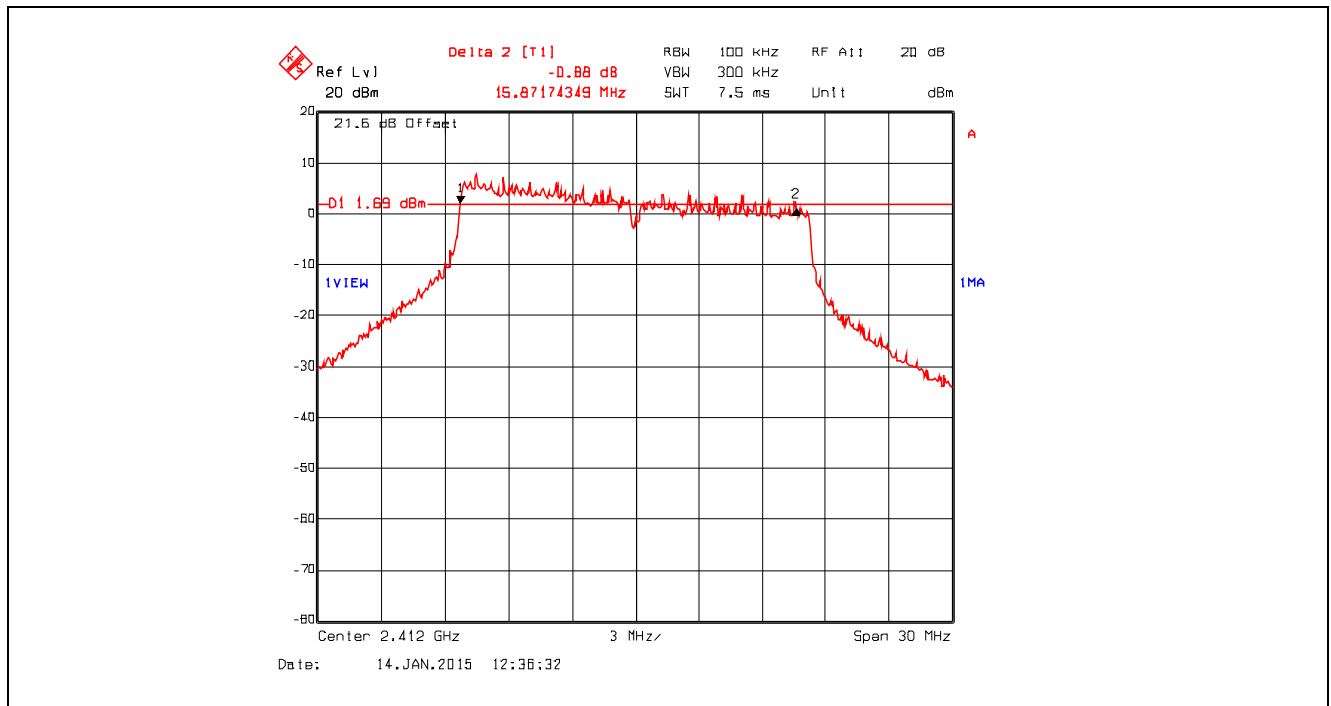
Plot 5.2.4.38. 6 dB Bandwidth, Data Rate 7, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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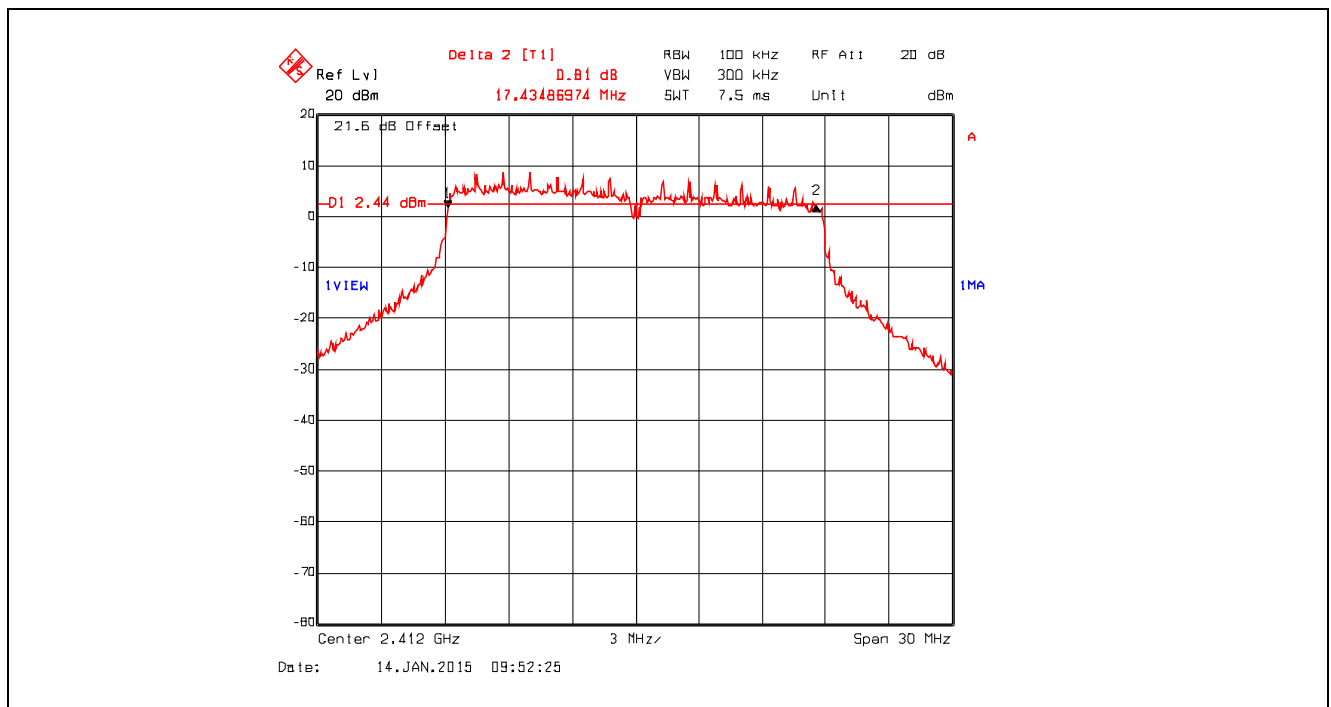**Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com**

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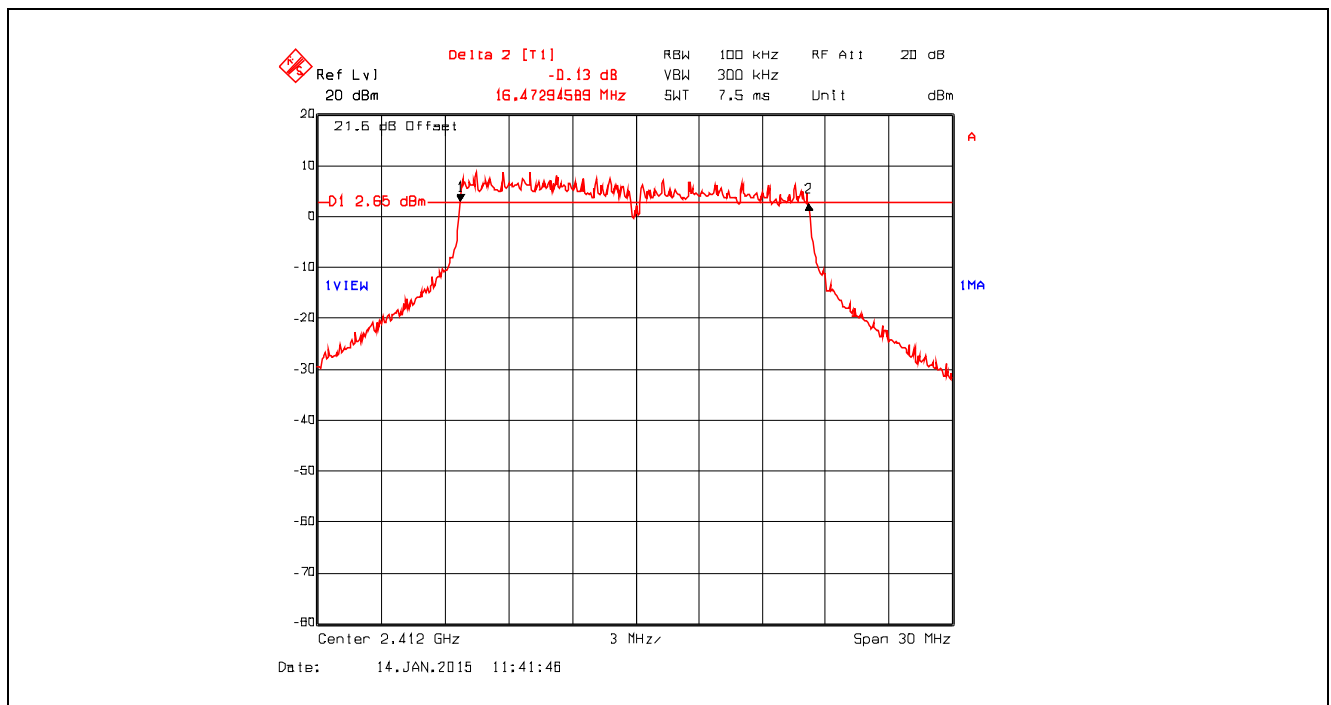
Plot 5.2.4.39. 6 dB Bandwidth, Data Rate 7, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18

Plot 5.2.4.40. 6 dB Bandwidth, Data Rate 7, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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Plot 5.2.4.41. 6 dB Bandwidth, Data Rate 7, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18

Plot 5.2.4.42. 6 dB Bandwidth, Data Rate 7, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

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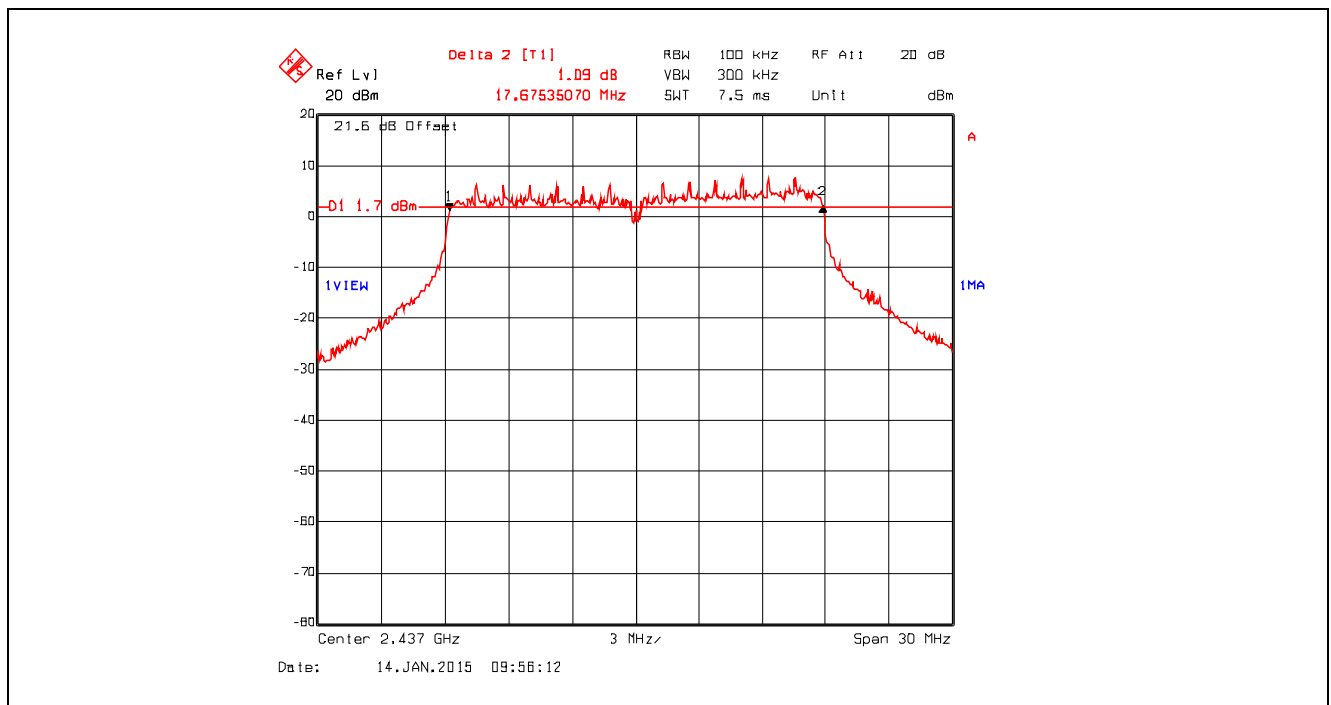**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
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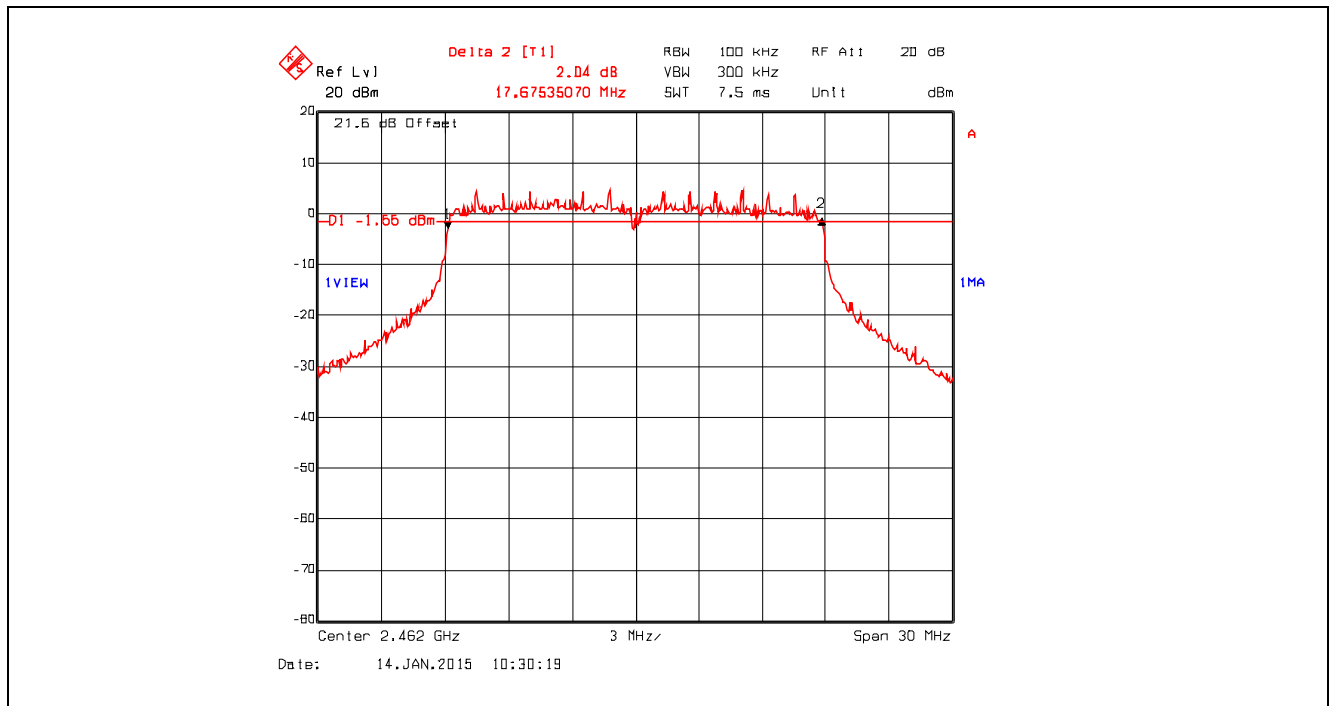
Plot 5.2.4.43. 6 dB Bandwidth, Data Rate 8, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19
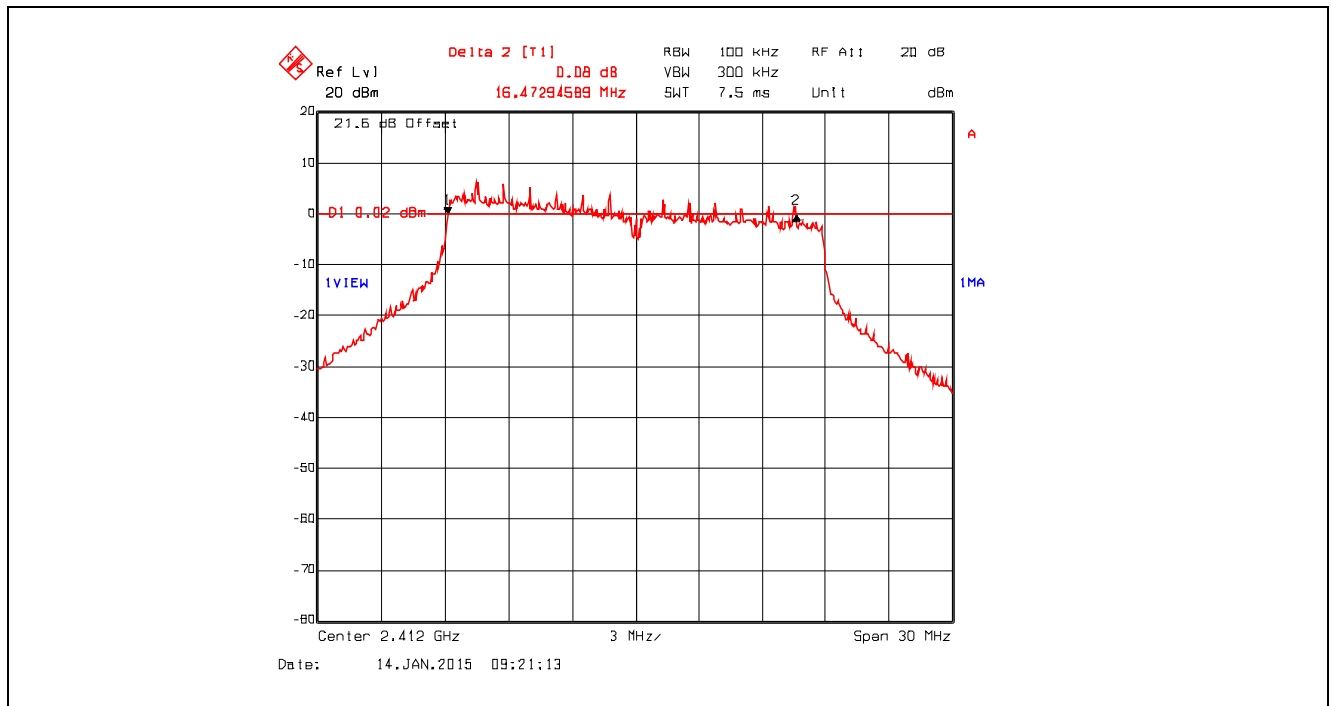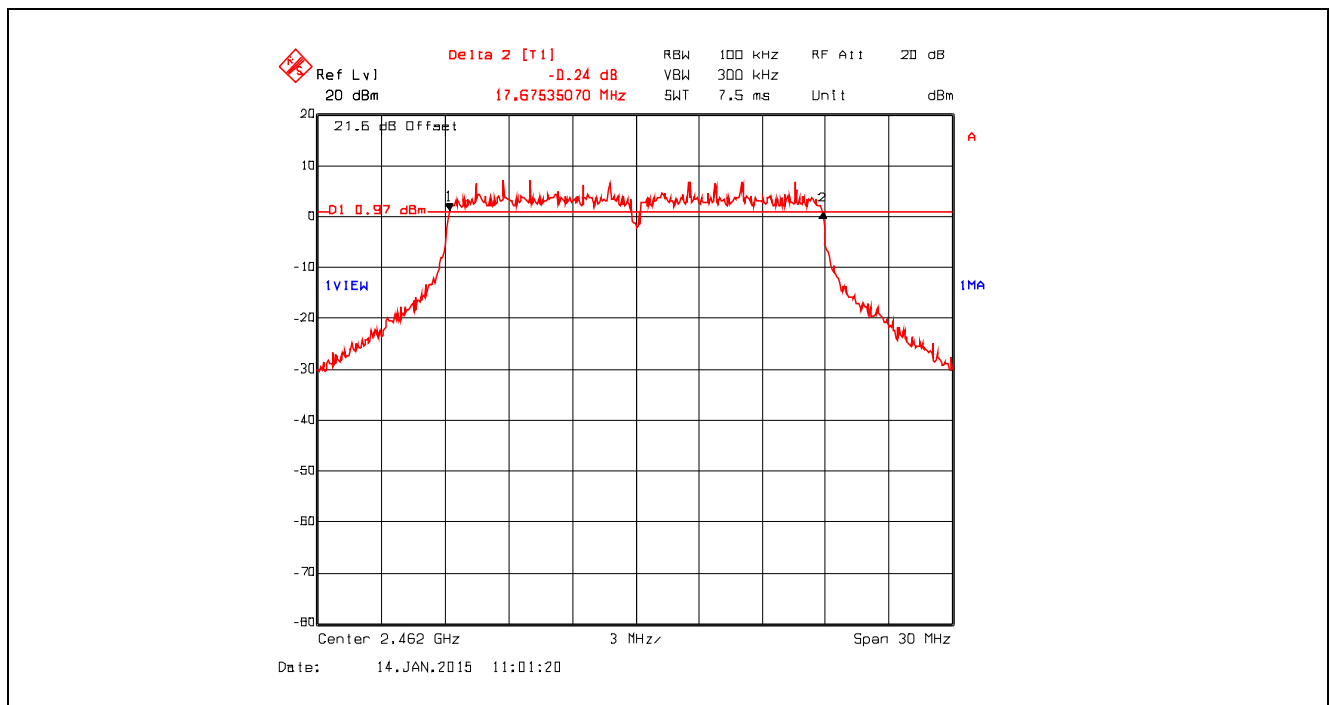

Plot 5.2.4.44. 6 dB Bandwidth, Data Rate 8, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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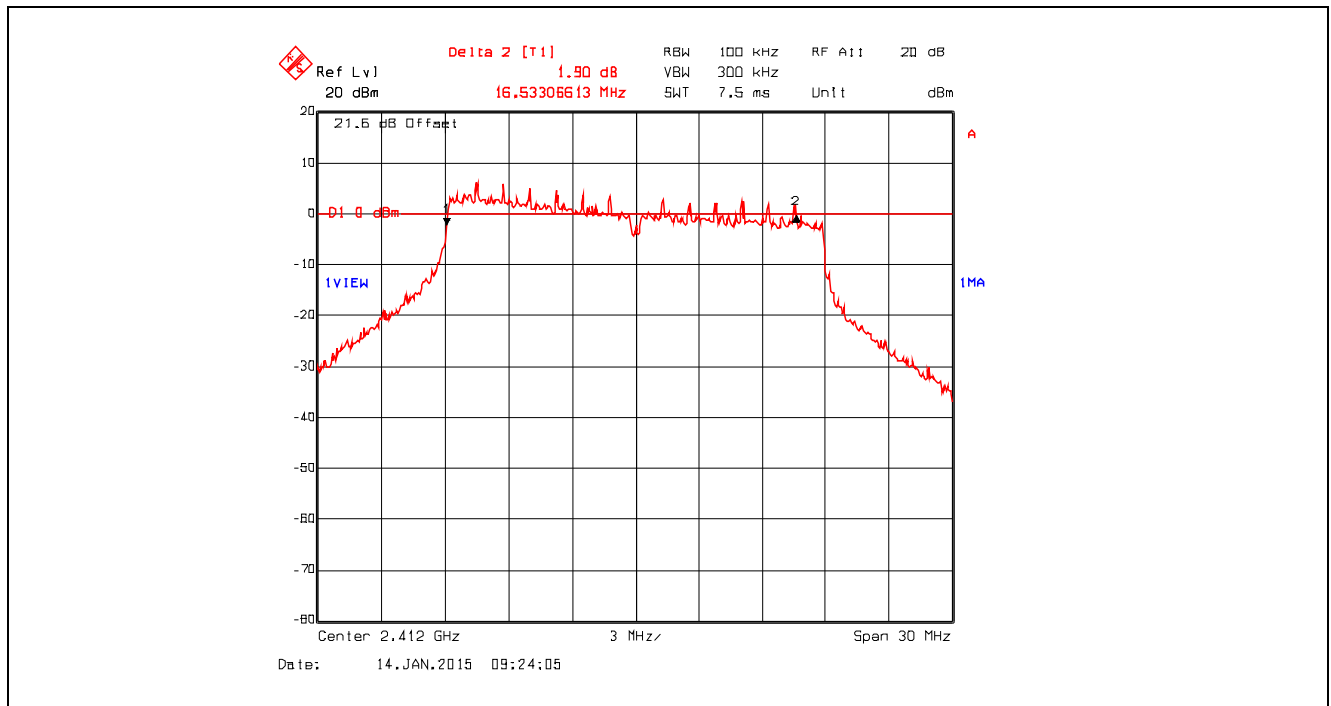**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**

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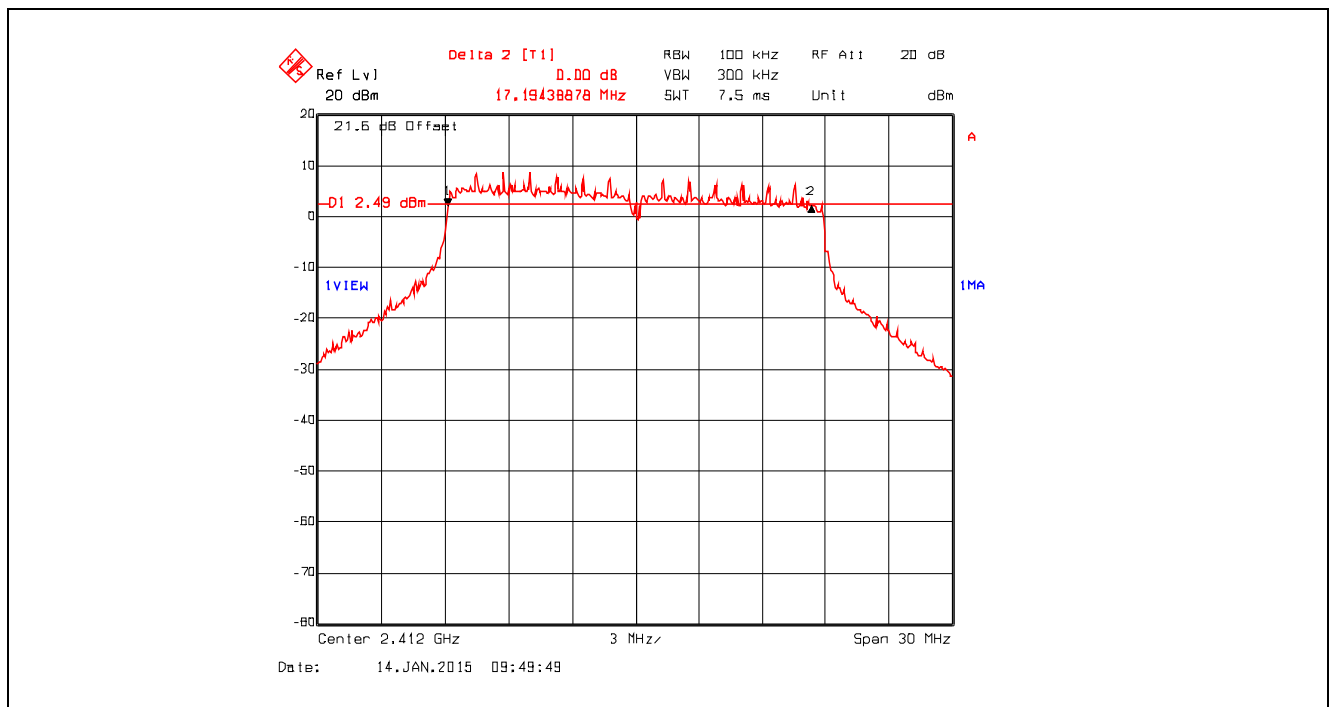**File #: 15MCRS079_FCC15C247DTS**

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Plot 5.2.4.45. 6 dB Bandwidth, Data Rate 8, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19
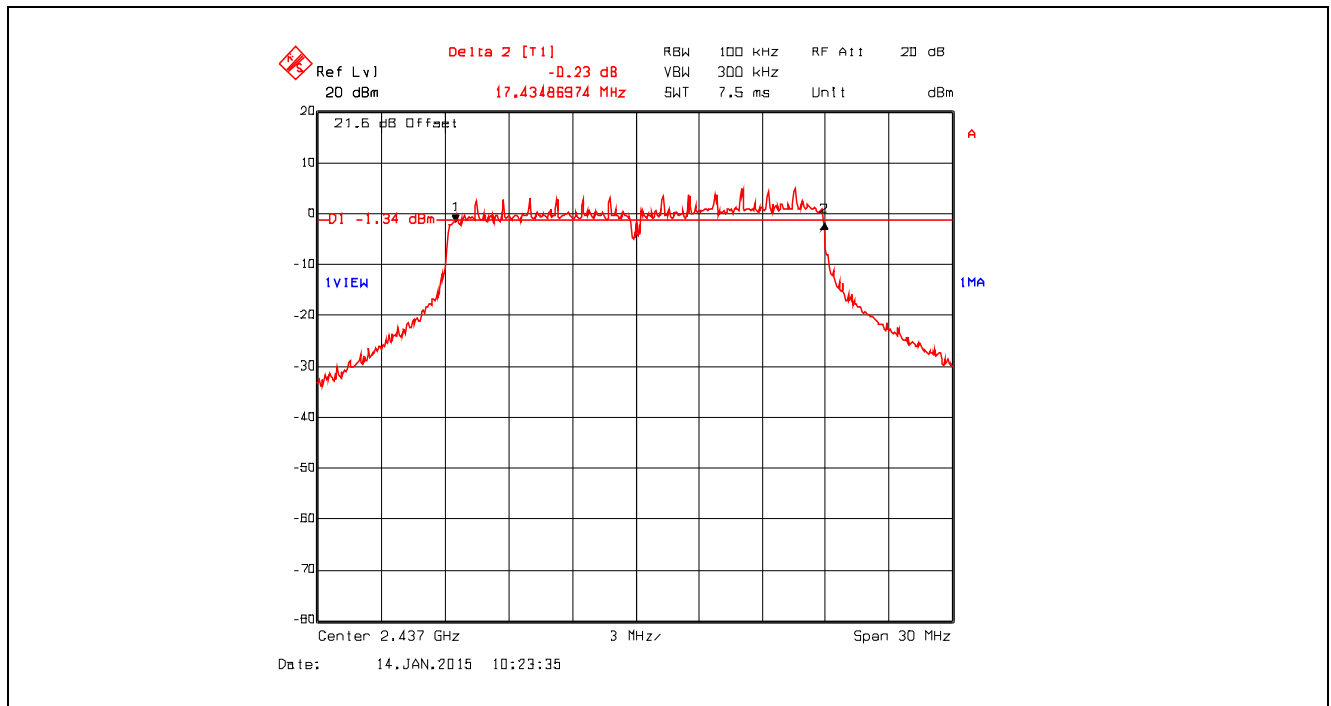
Plot 5.2.4.46. 6 dB Bandwidth, Data Rate 8, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

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Plot 5.2.4.47. 6 dB Bandwidth, Data Rate 8, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.2.4.48. 6 dB Bandwidth, Data Rate 8, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

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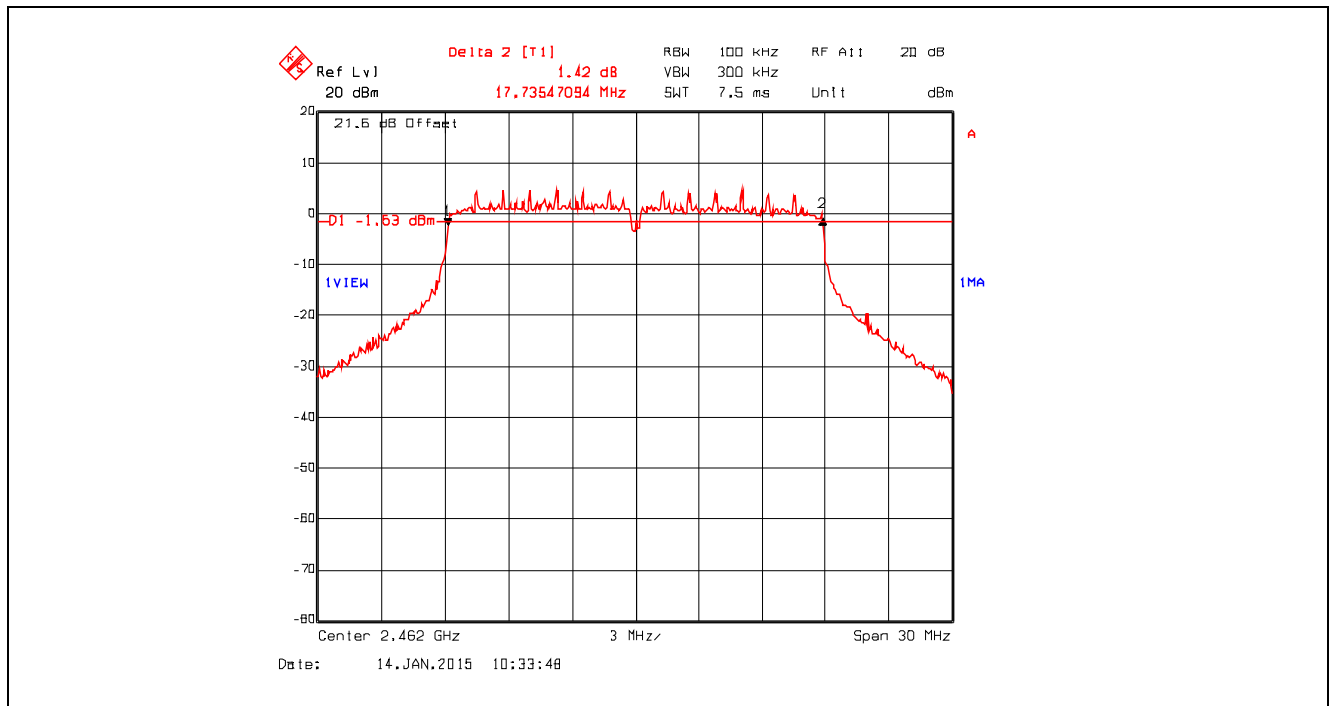**Plot 5.2.4.49.** 6 dB Bandwidth, Data Rate 9, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19

Plot 5.2.4.50. 6 dB Bandwidth, Data Rate 9, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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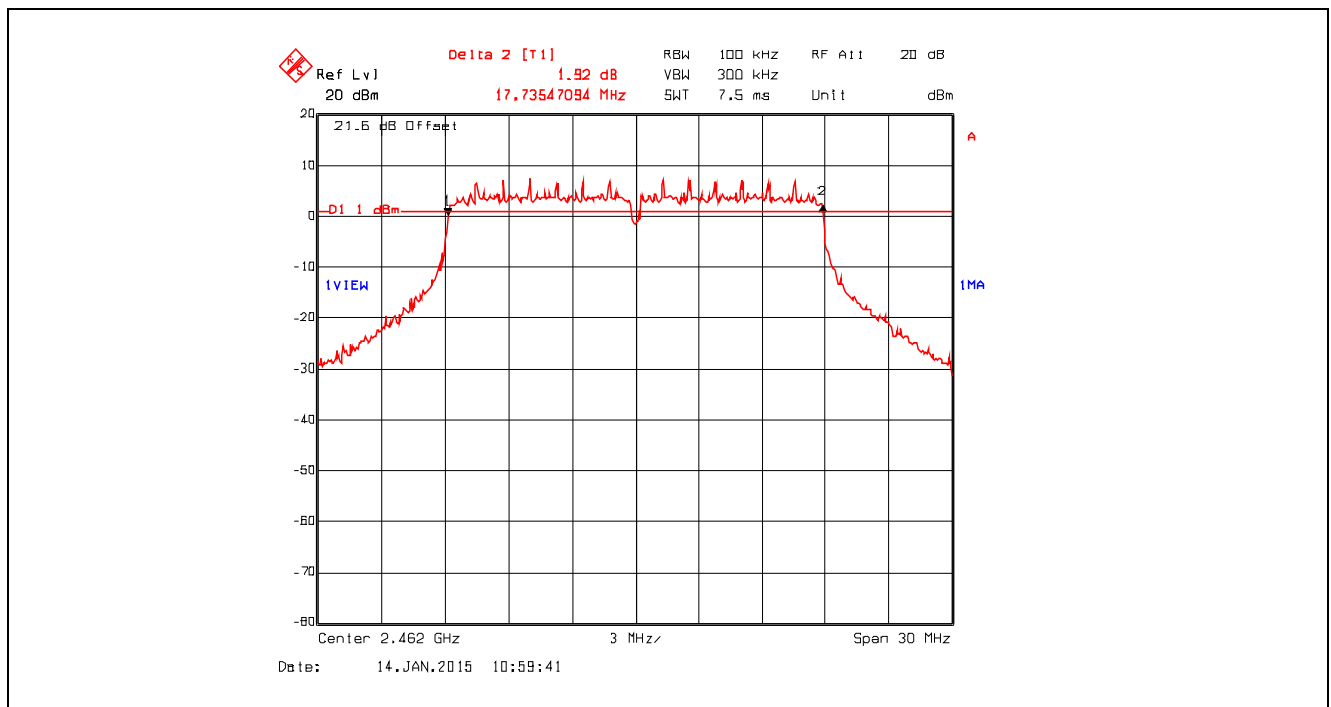
Plot 5.2.4.51. 6 dB Bandwidth, Data Rate 9, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19
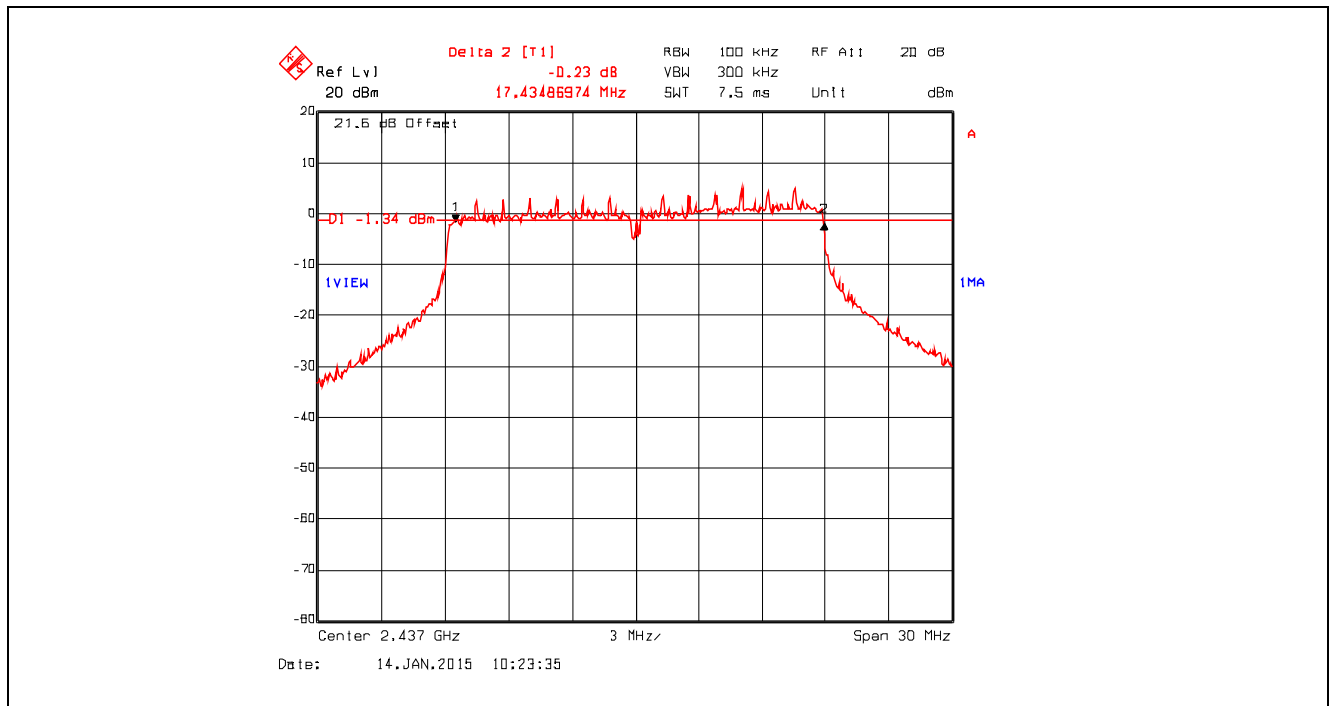
Plot 5.2.4.52. 6 dB Bandwidth, Data Rate 9, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19
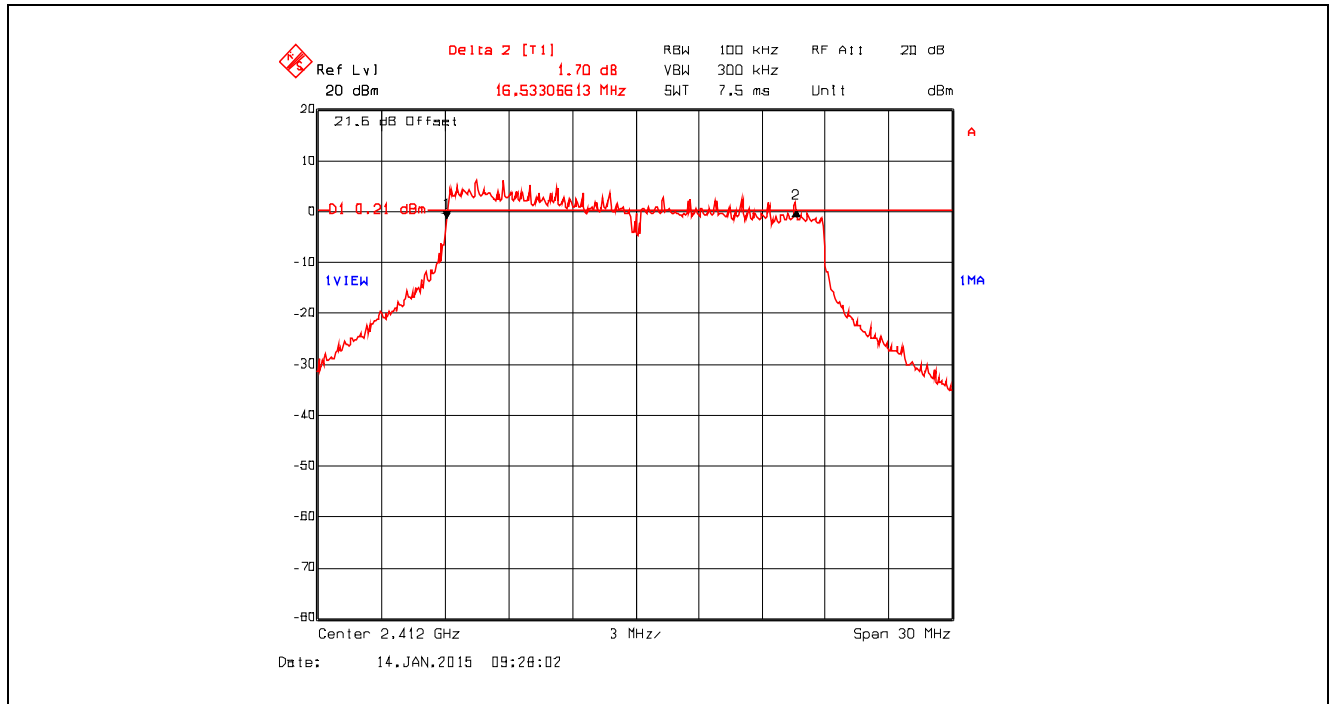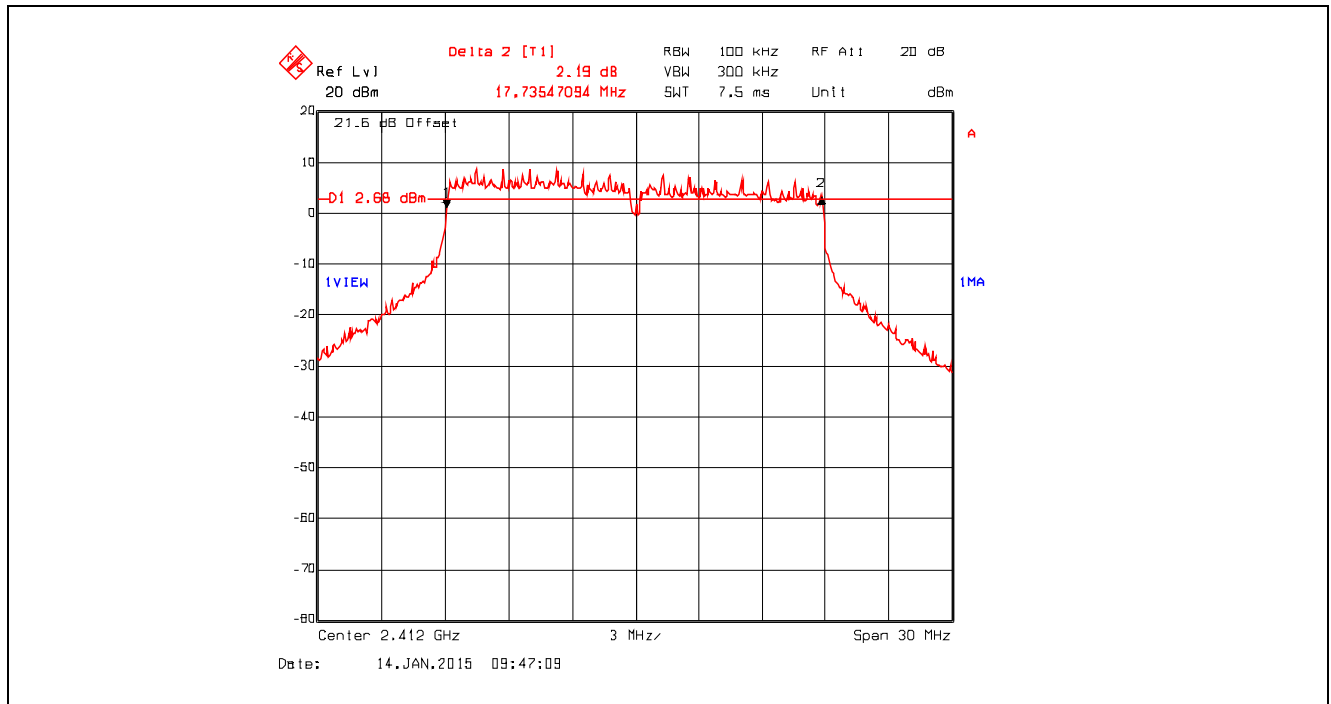
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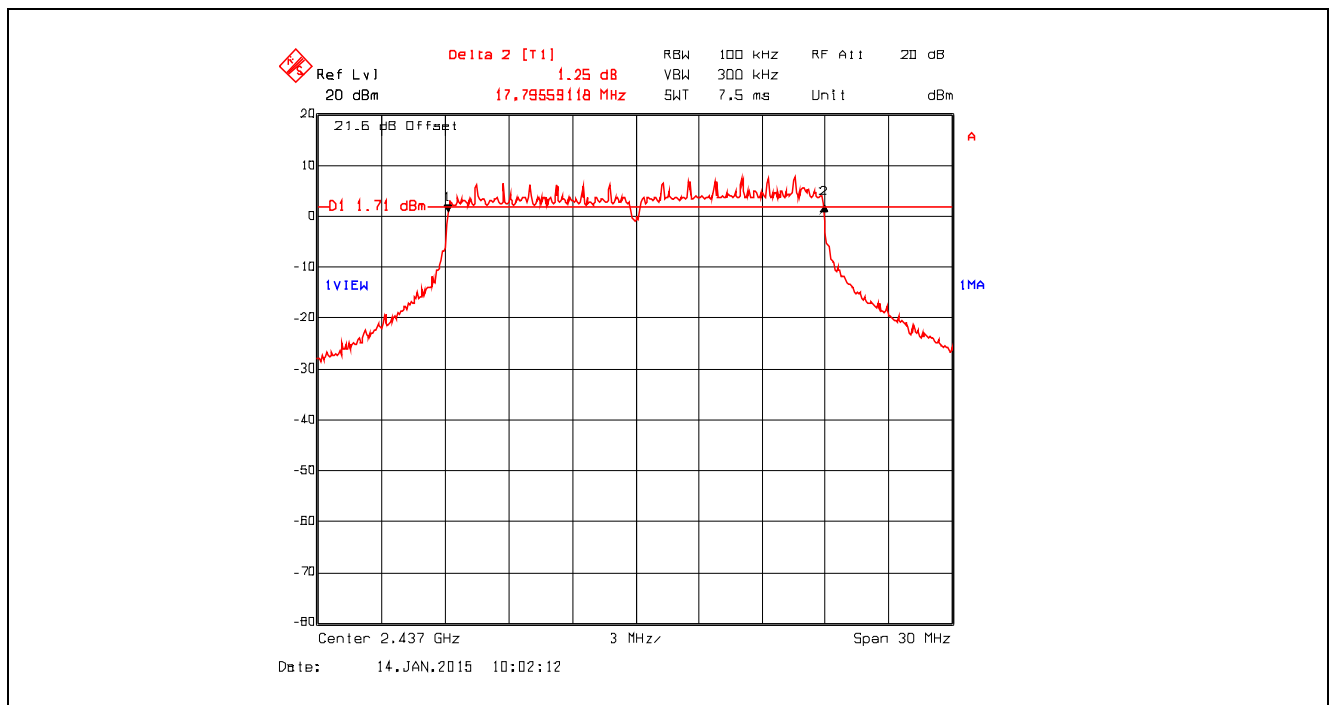
Plot 5.2.4.53. 6 dB Bandwidth, Data Rate 9, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.2.4.54. 6 dB Bandwidth, Data Rate 9, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19
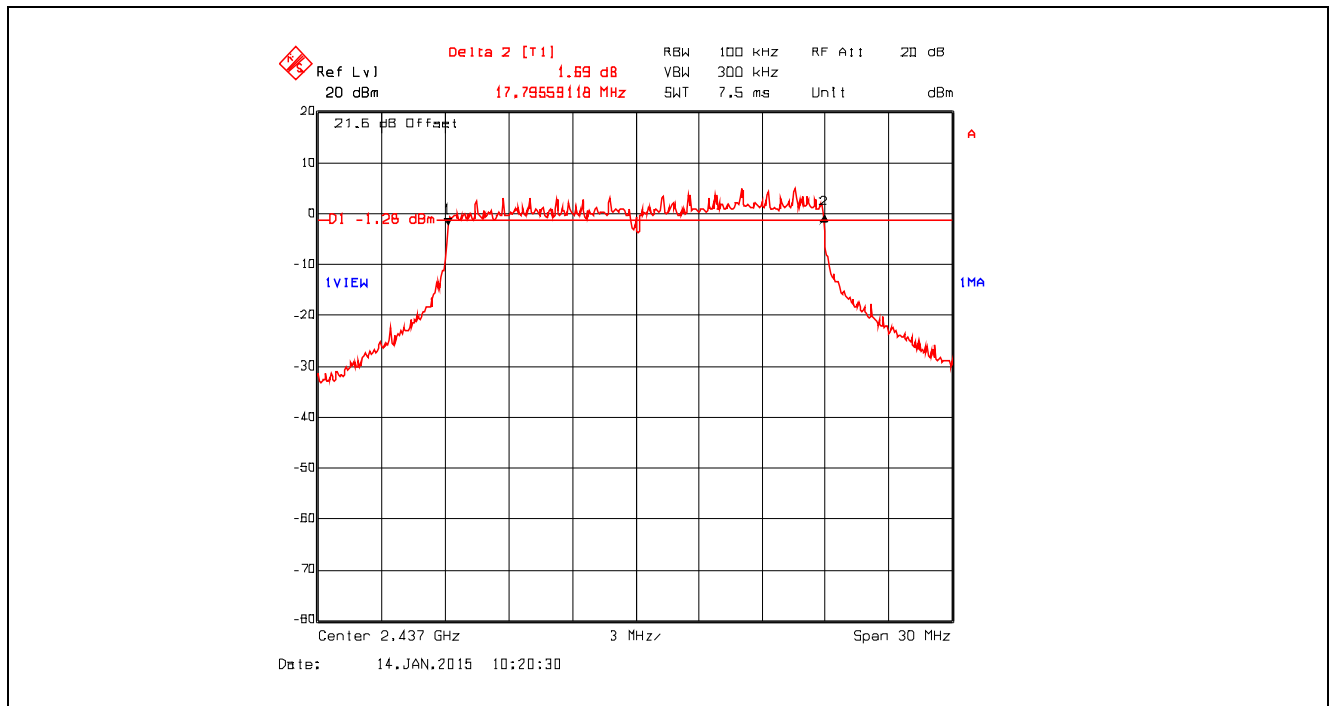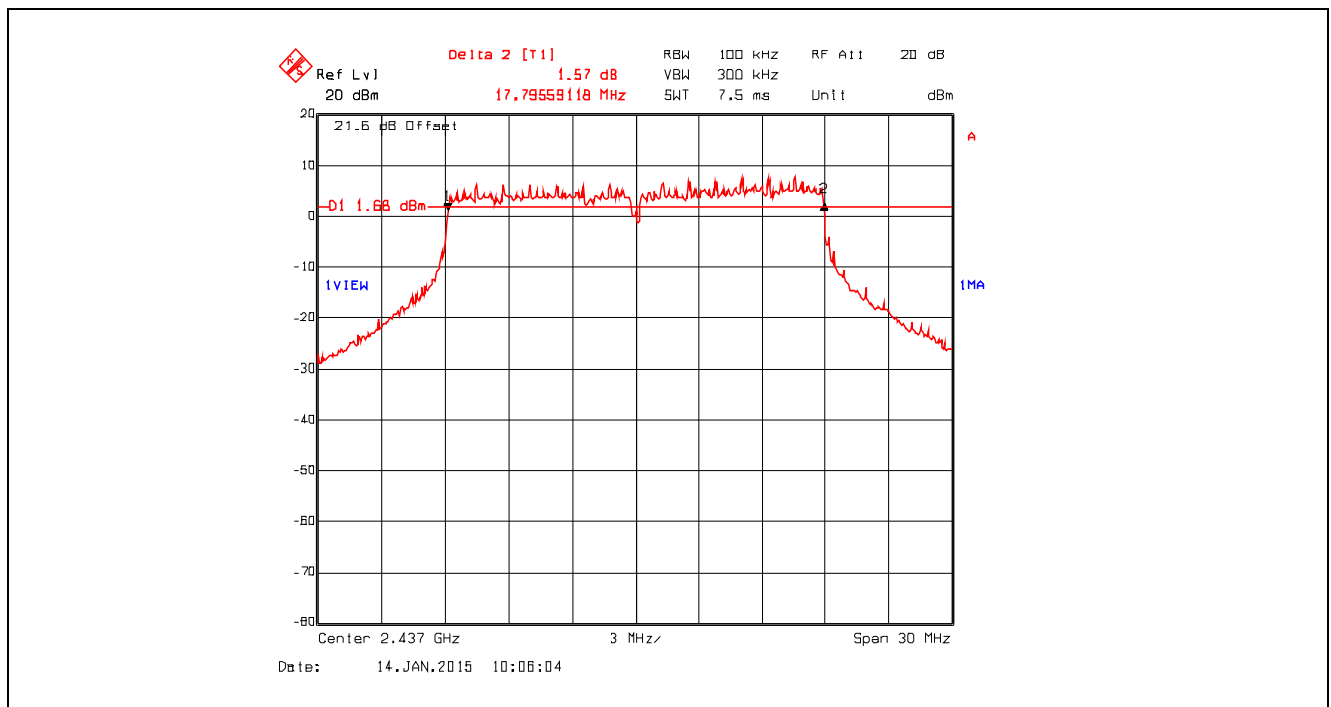

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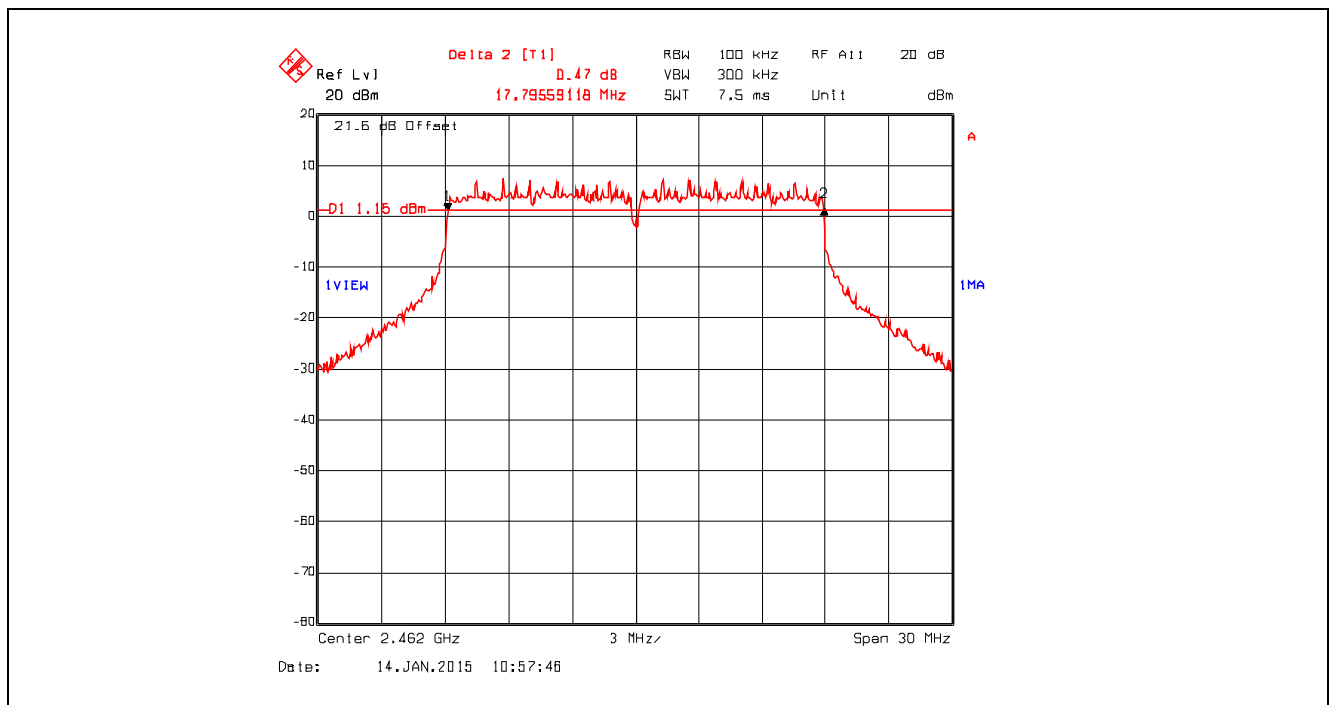
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.2.4.55. 6 dB Bandwidth, Data Rate 10, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19

Plot 5.2.4.56. 6 dB Bandwidth, Data Rate 10, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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Plot 5.2.4.57. 6 dB Bandwidth, Data Rate 10, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19

Plot 5.2.4.58. 6 dB Bandwidth, Data Rate 10, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

ULTRATECH GROUP OF LABS																																				File #: 15MCRS079_FCC15C247DTS

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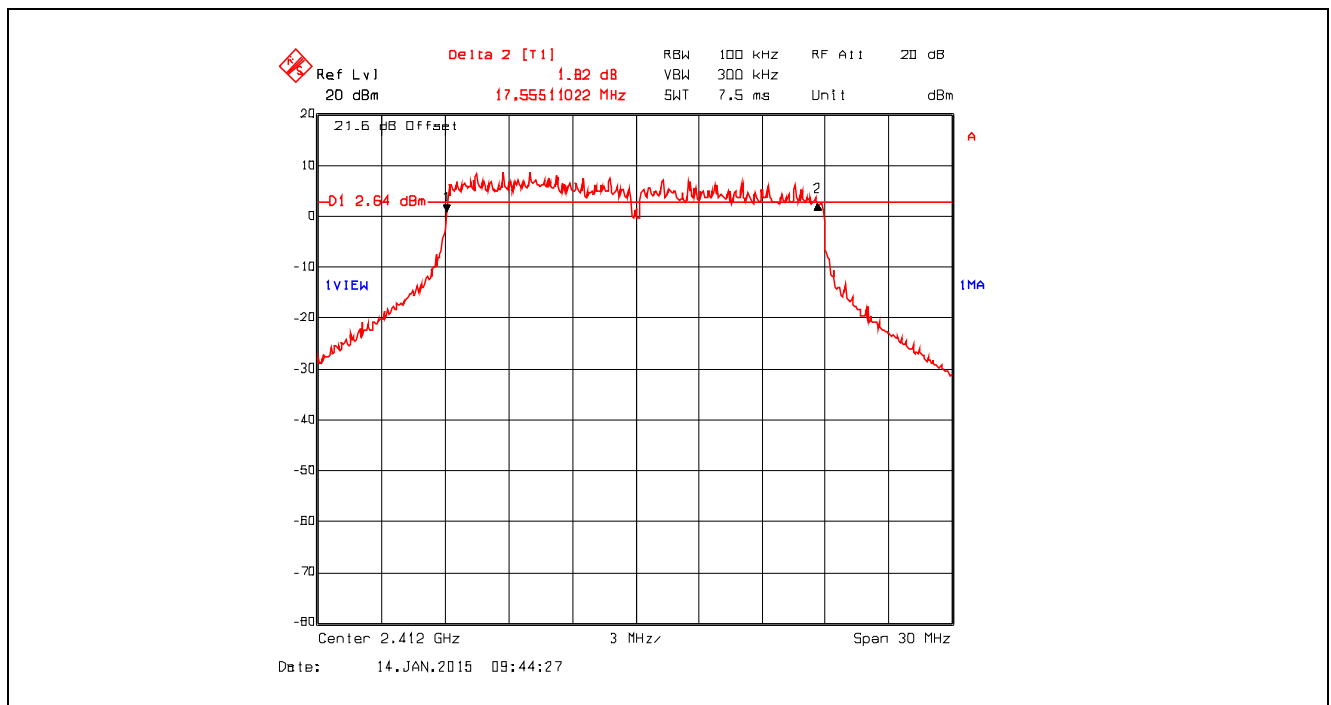**Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com**

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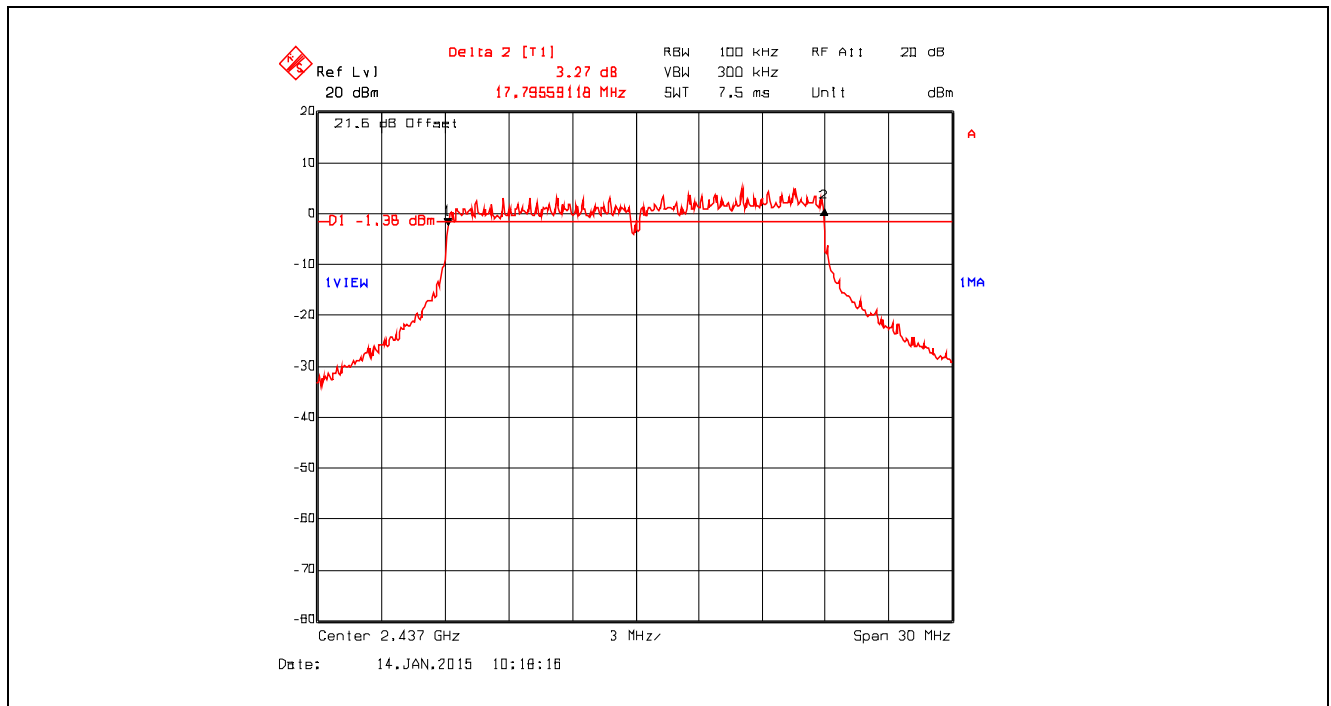
Plot 5.2.4.59. 6 dB Bandwidth, Data Rate 10, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19
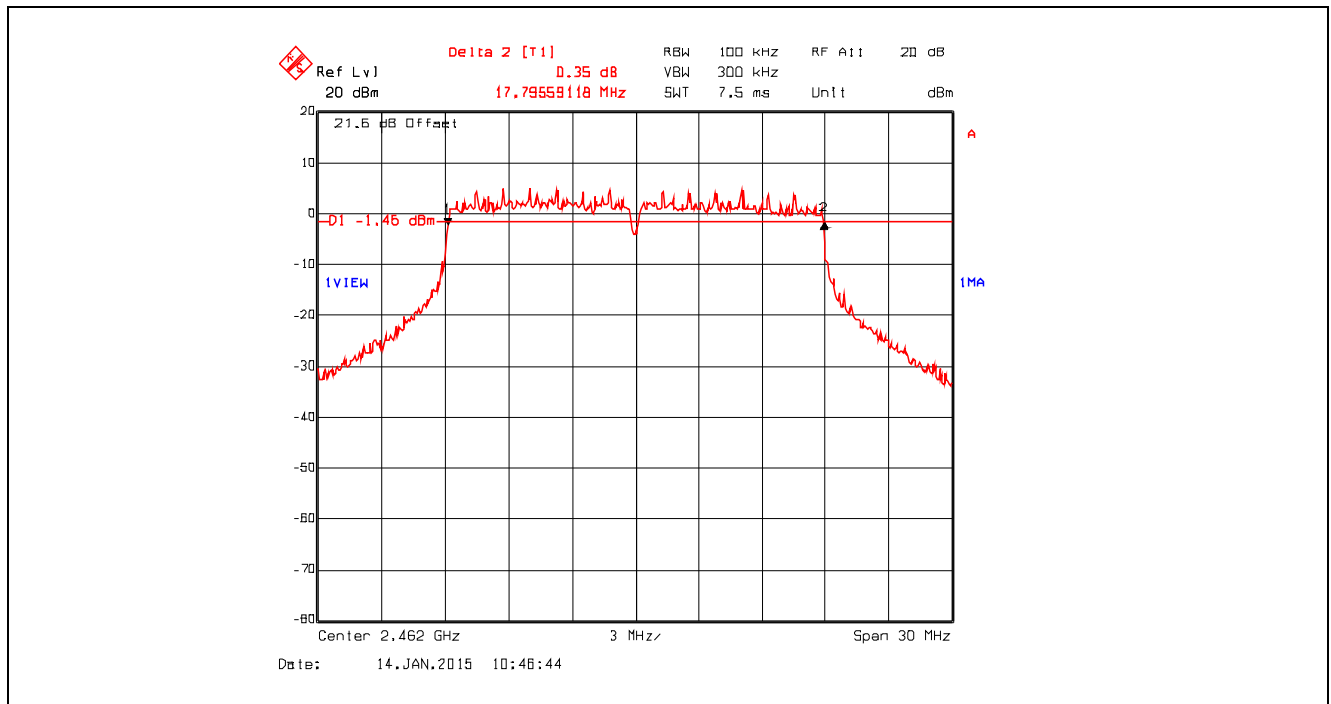
Plot 5.2.4.60. 6 dB Bandwidth, Data Rate 10, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

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Plot 5.2.4.61. 6 dB Bandwidth, Data Rate 11, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19
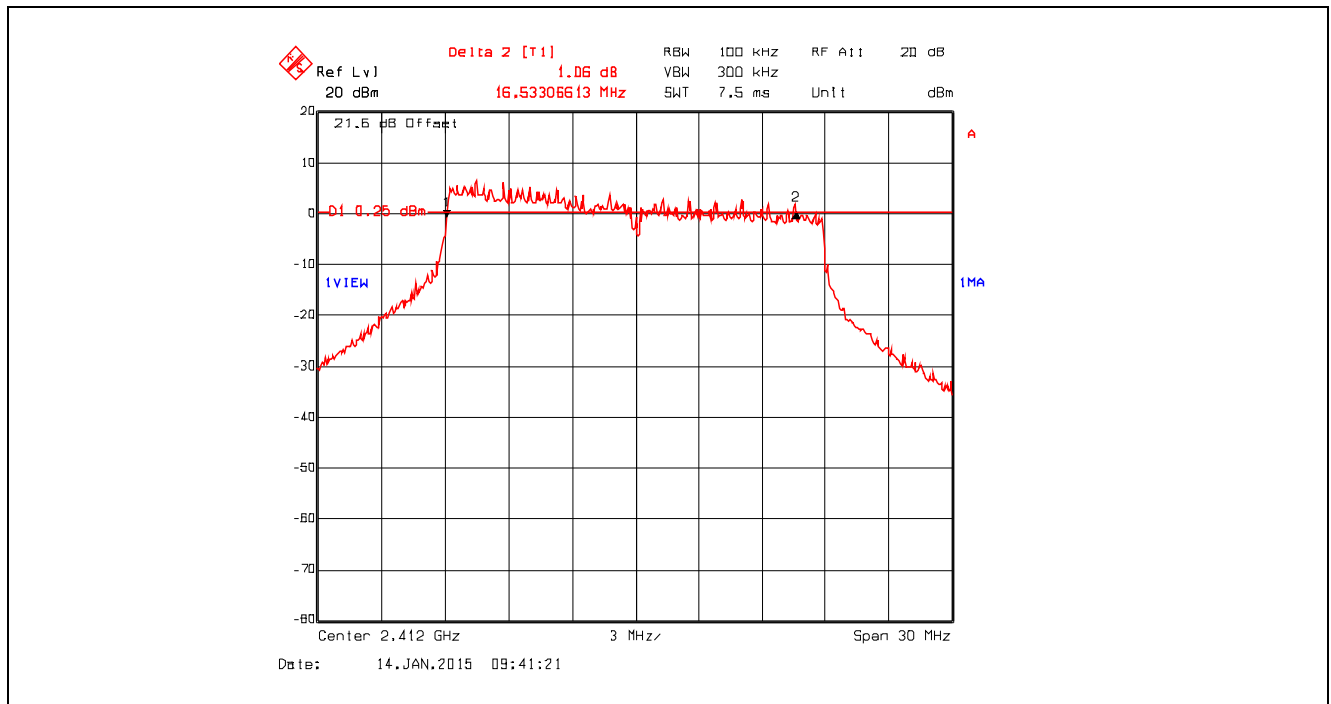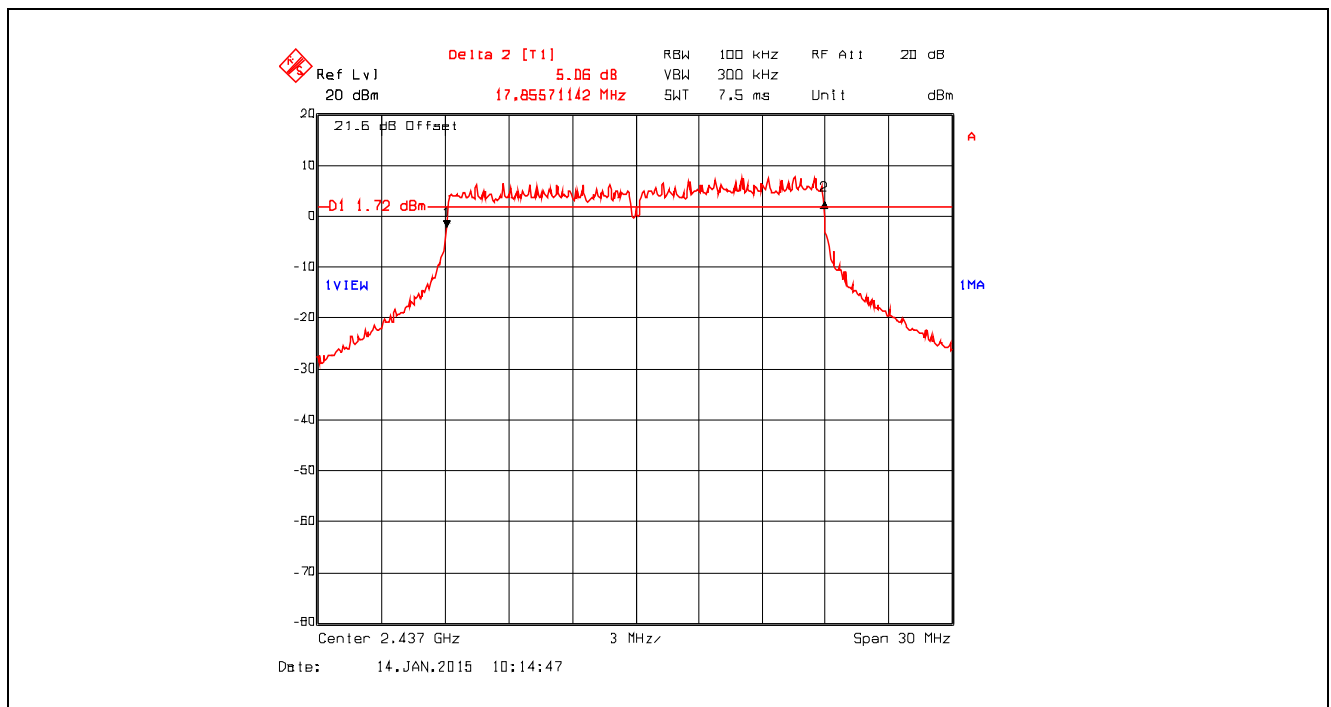

Plot 5.2.4.62. 6 dB Bandwidth, Data Rate 11, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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File #: 15MCRS079_FCC15C247DTS
3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
November 16, 2015
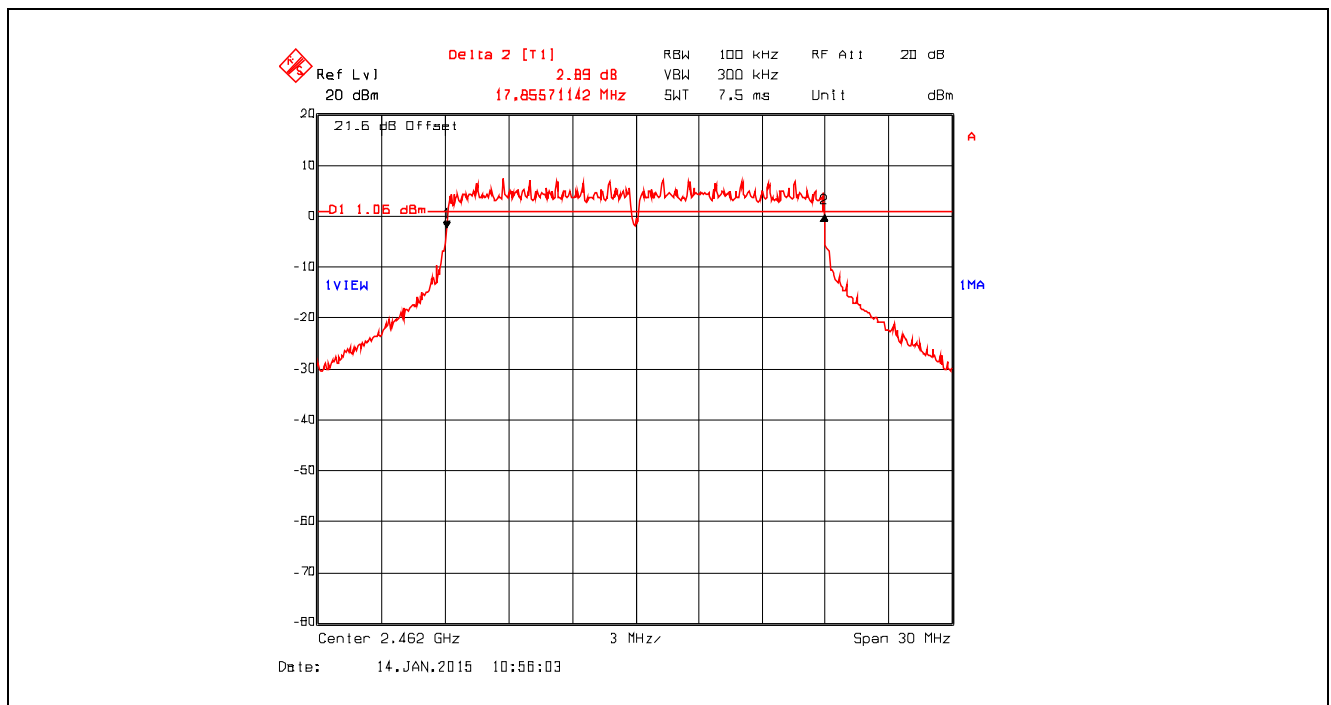Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 5.2.4.63. 6 dB Bandwidth, Data Rate 11, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19

Plot 5.2.4.64. 6 dB Bandwidth, Data Rate 11, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

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Plot 5.2.4.65. 6 dB Bandwidth, Data Rate 11, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19
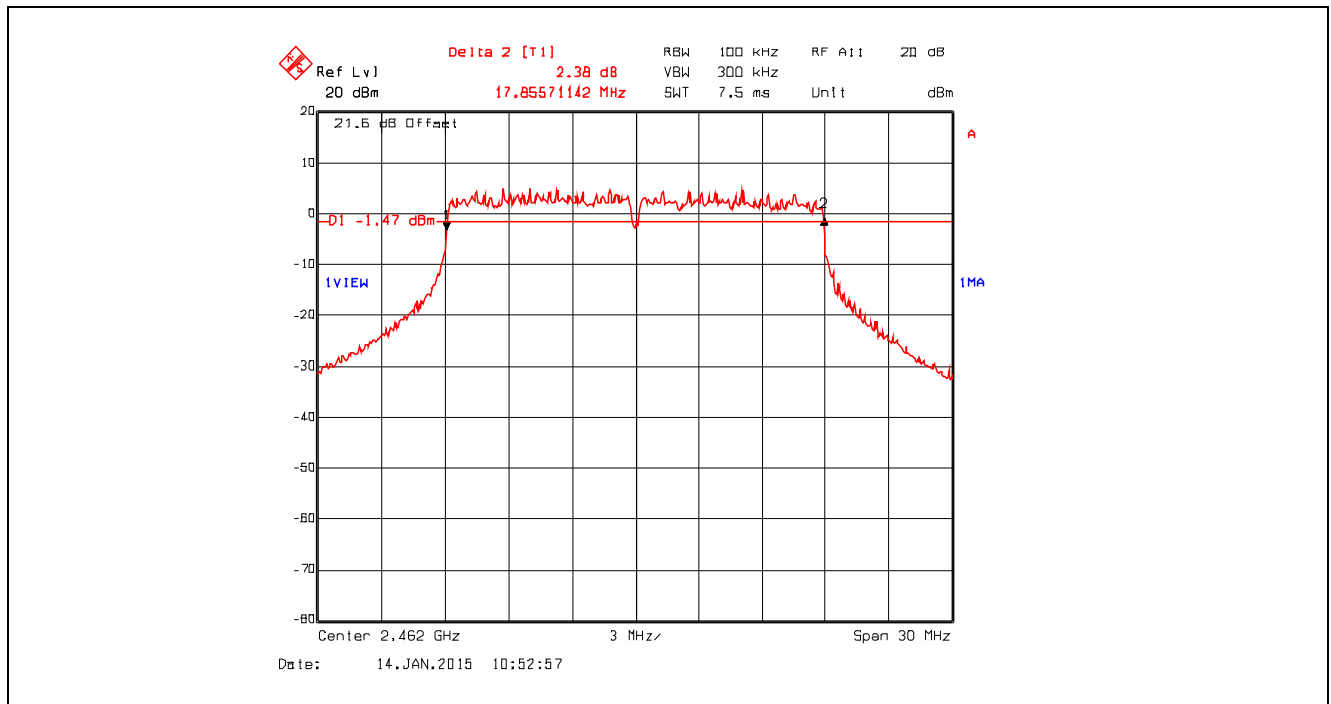
Plot 5.2.4.66. 6 dB Bandwidth, Data Rate 11, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
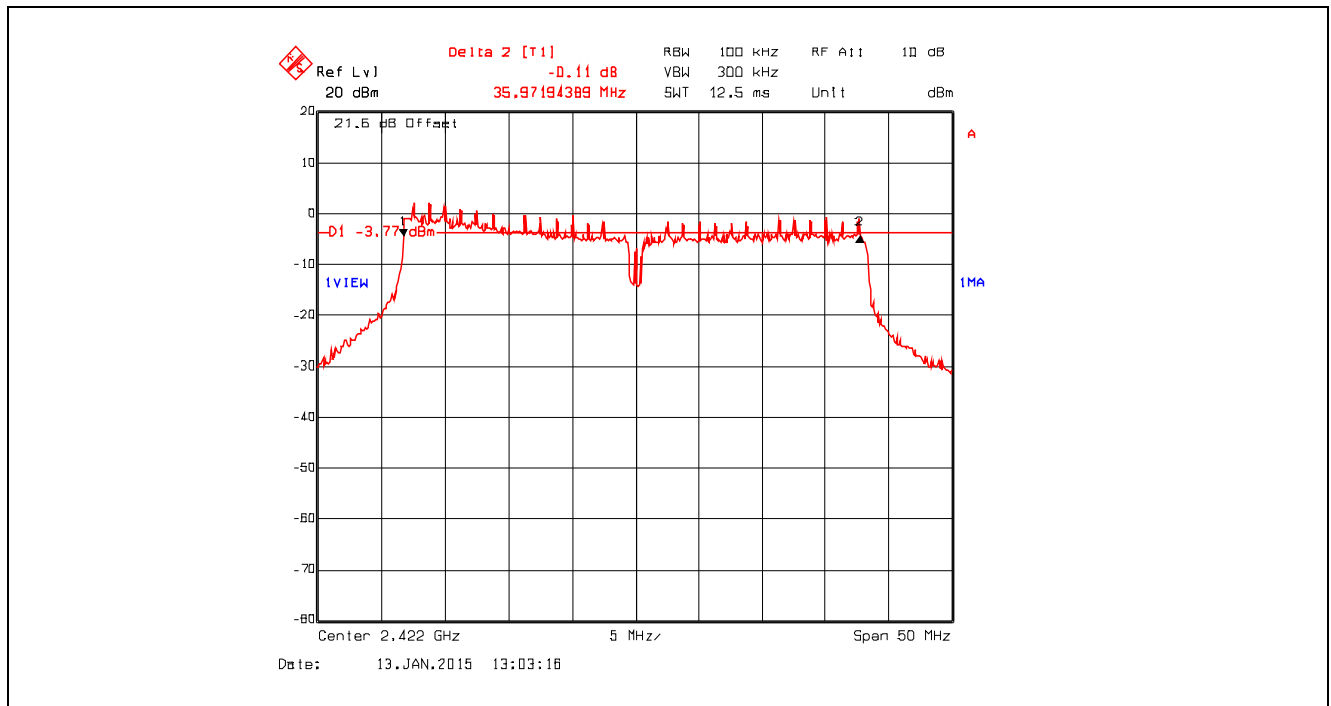3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
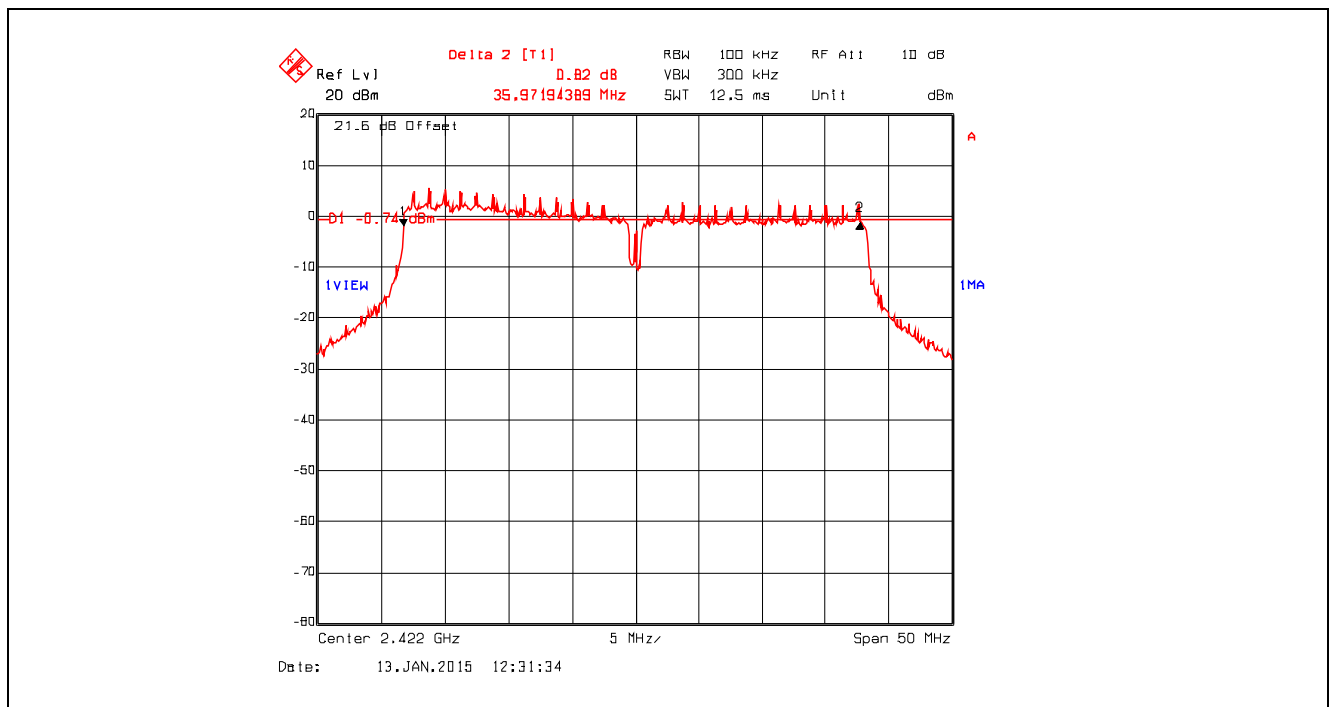Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 5.2.4.67. 6 dB Bandwidth, Data Rate 12, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

Plot 5.2.4.68. 6 dB Bandwidth, Data Rate 12, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17

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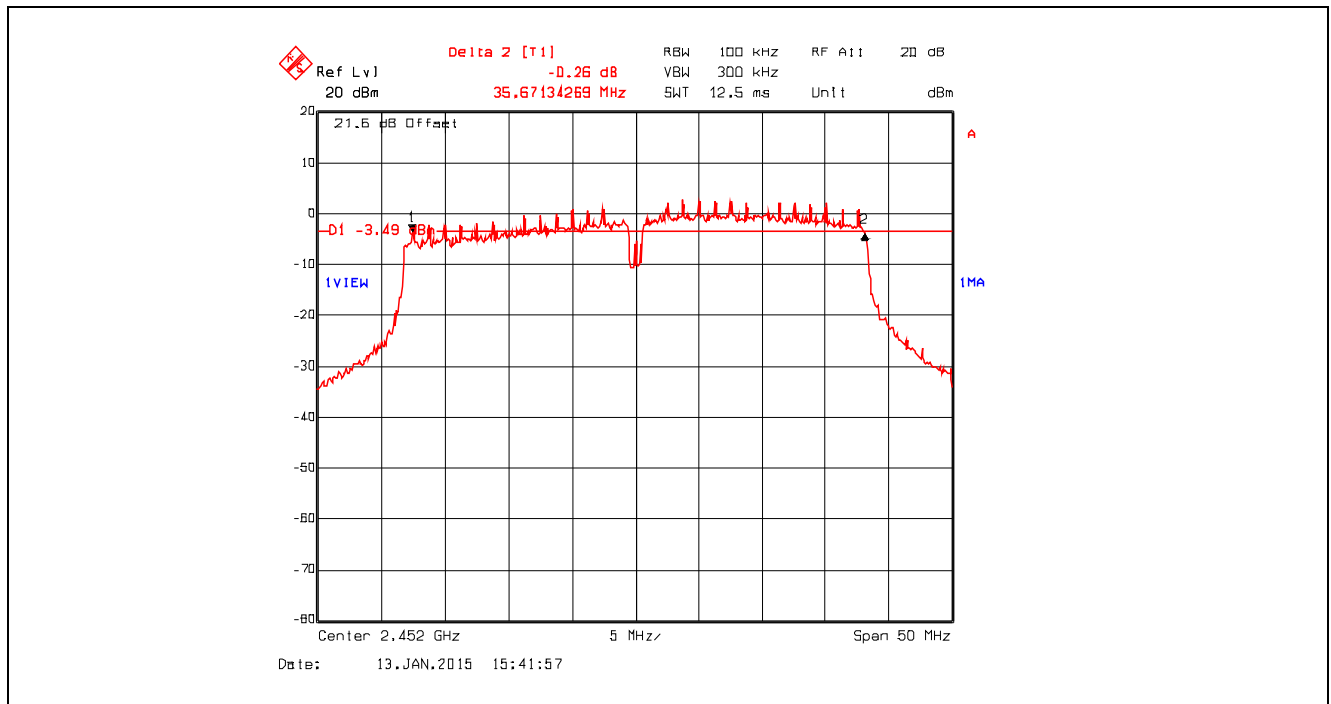
Plot 5.2.4.69. 6 dB Bandwidth, Data Rate 12, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17
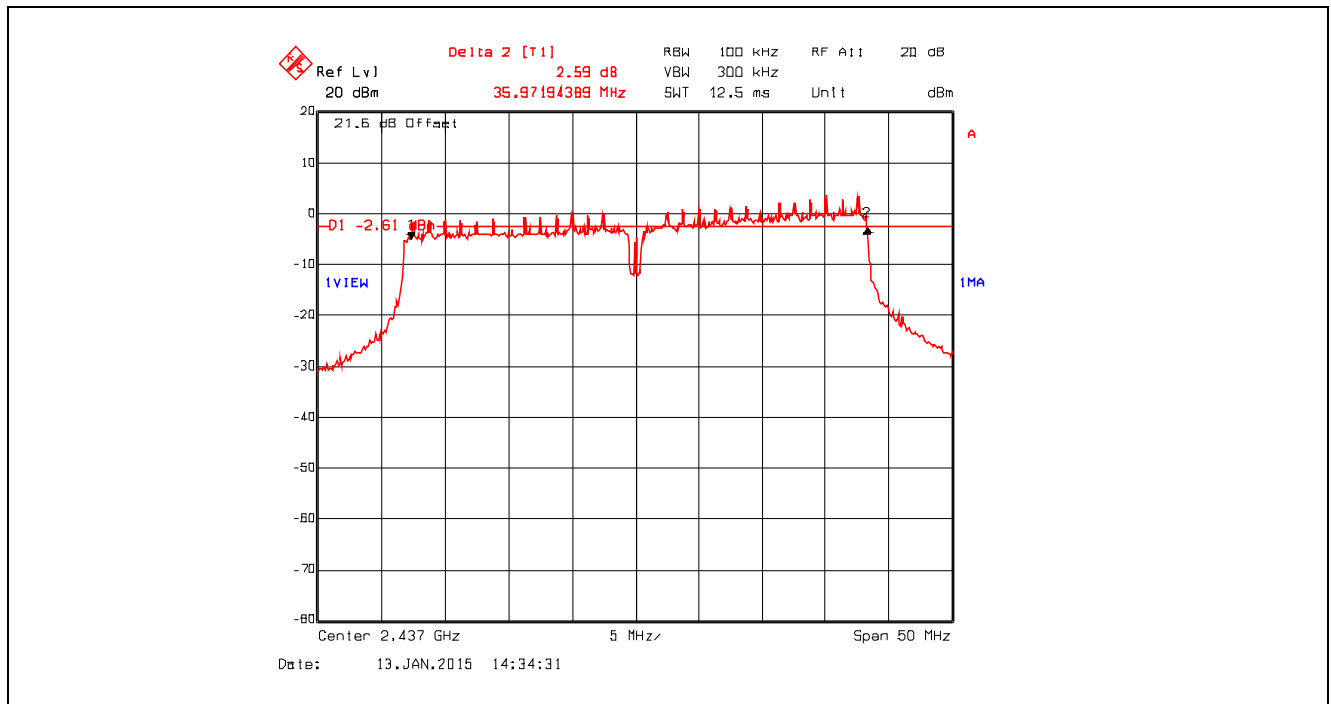
Plot 5.2.4.70. 6 dB Bandwidth, Data Rate 12, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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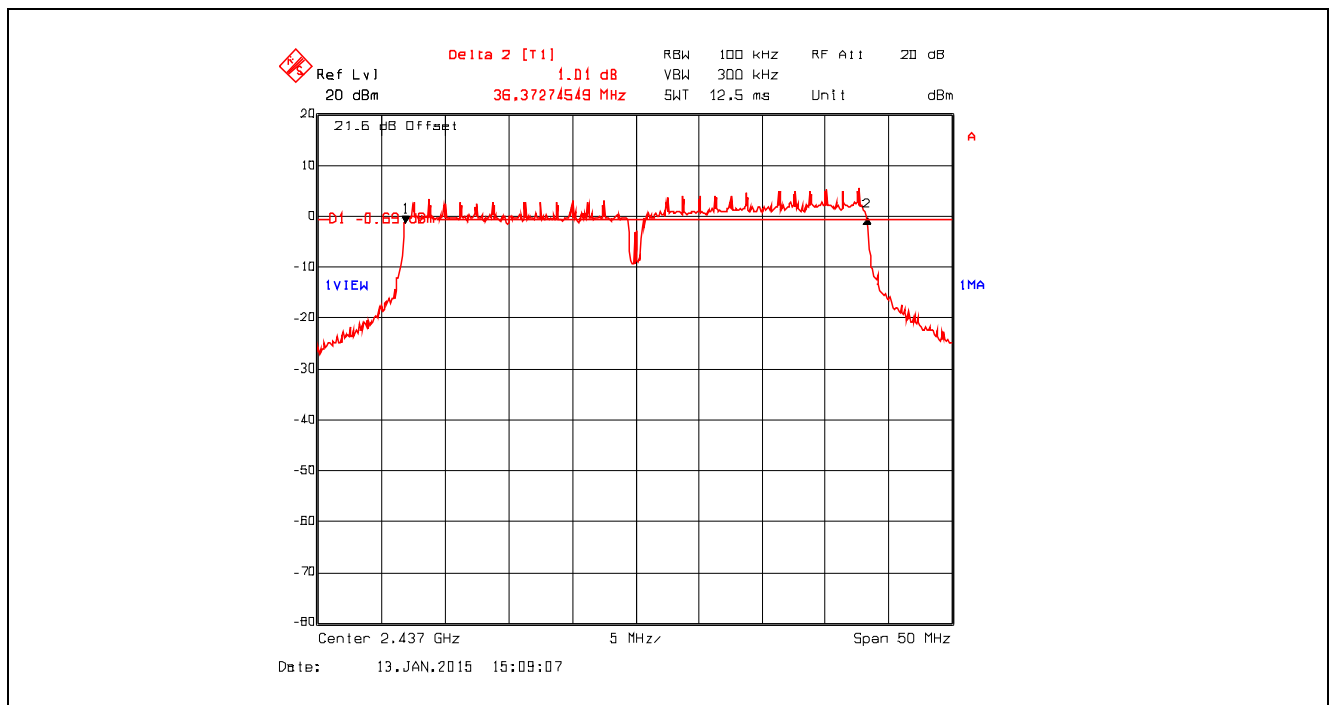
Plot 5.2.4.71. 6 dB Bandwidth, Data Rate 12, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17
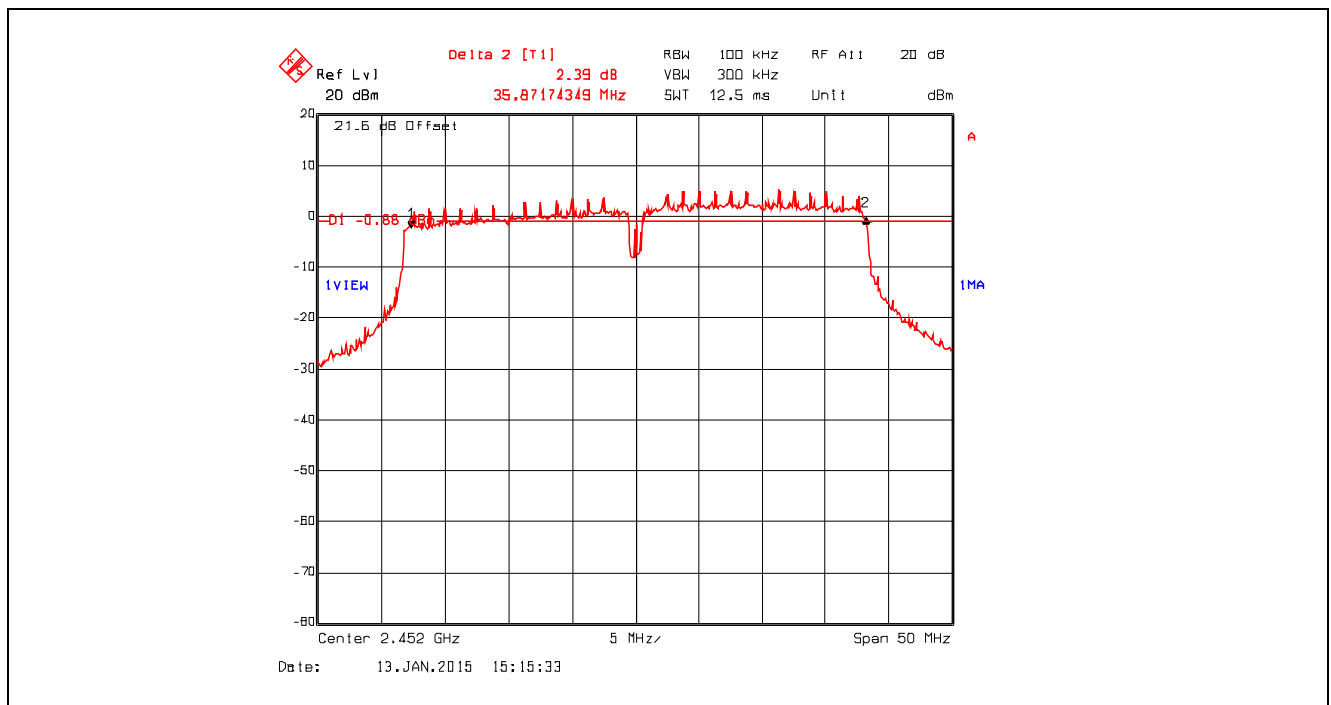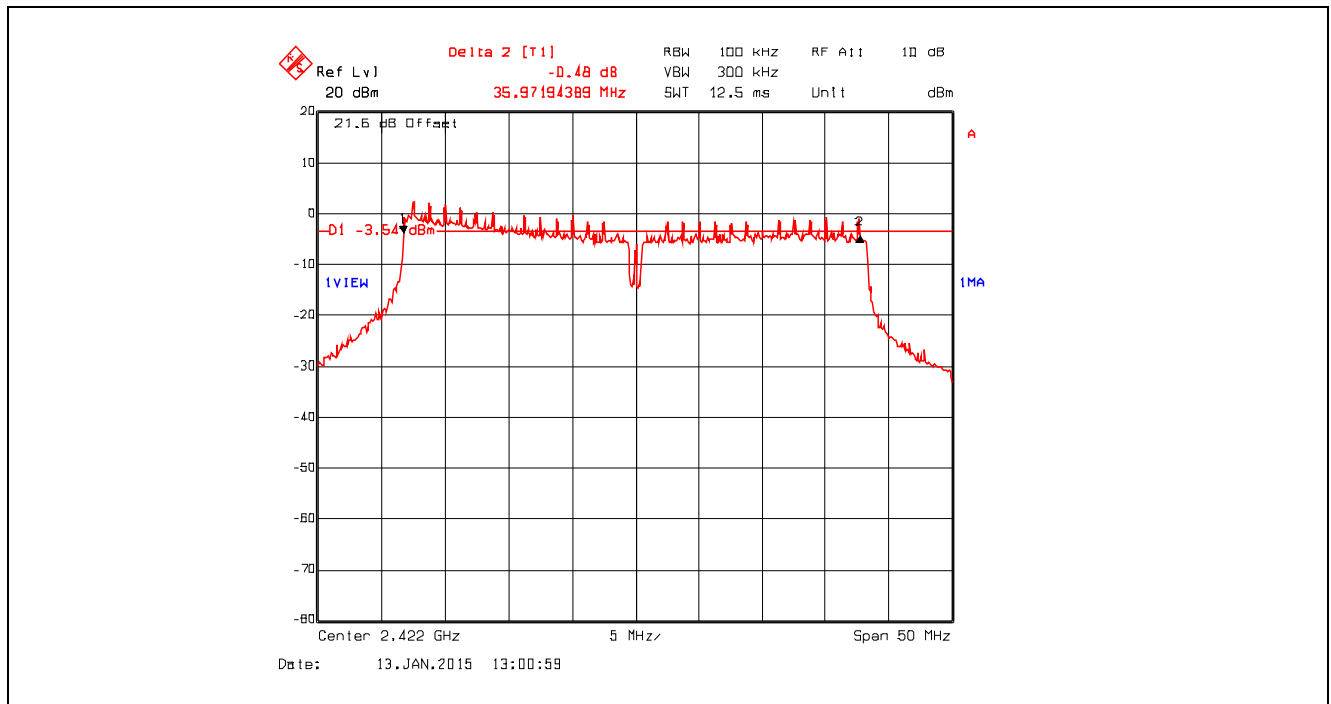

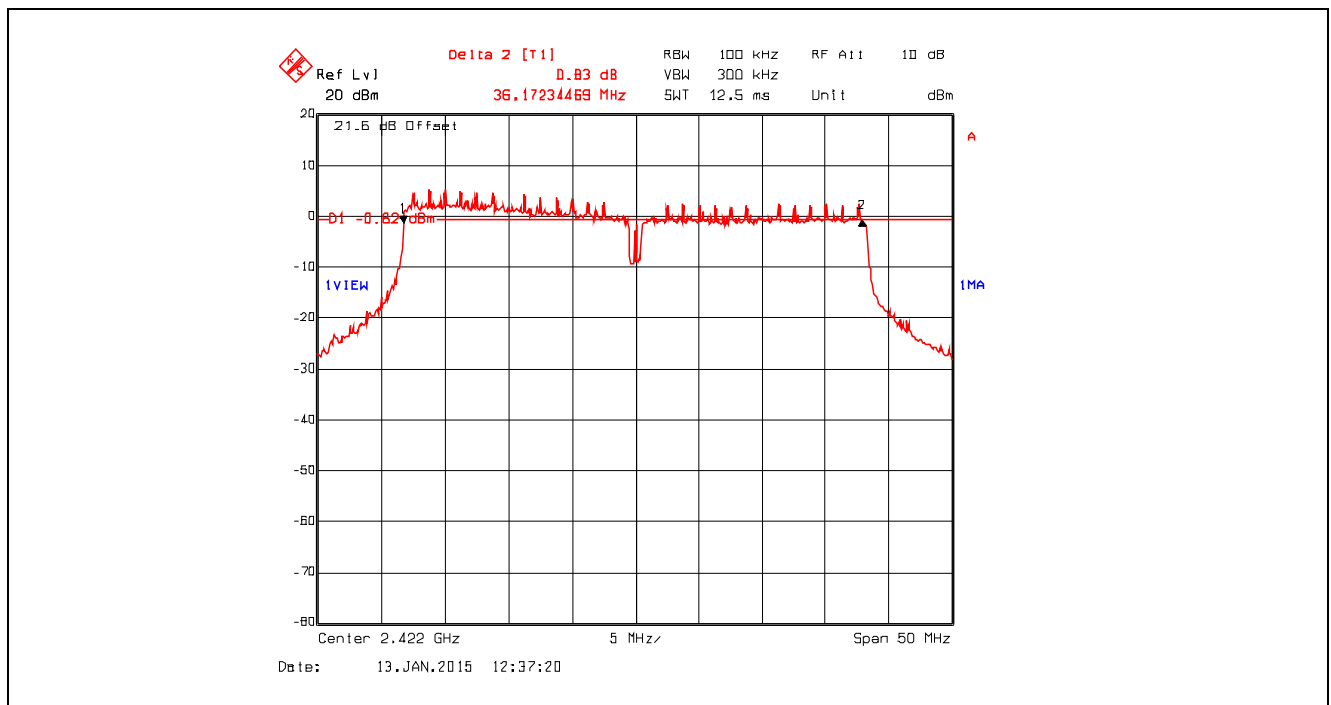**Plot 5.2.4.72.** 6 dB Bandwidth, Data Rate 12, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17

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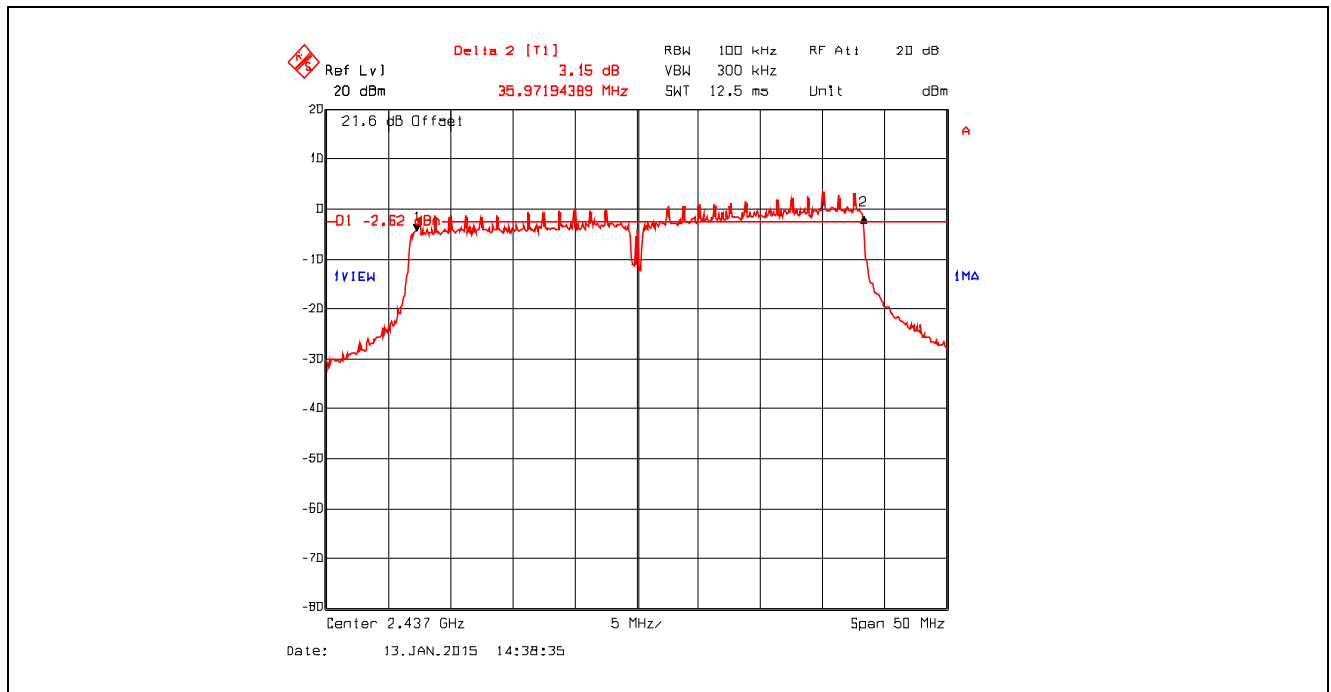
Plot 5.2.4.73. 6 dB Bandwidth, Data Rate 13, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

Plot 5.2.4.74. 6 dB Bandwidth, Data Rate 13, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17
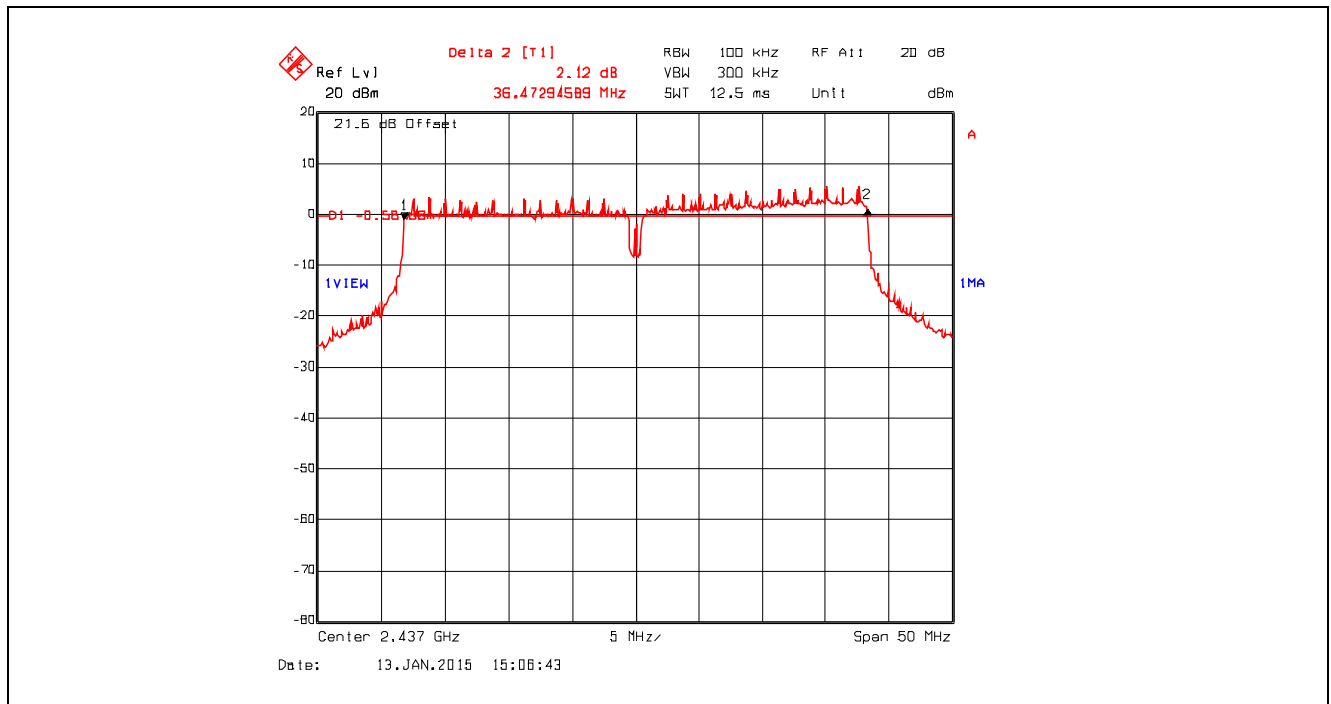

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Plot 5.2.4.75. 6 dB Bandwidth, Data Rate 13, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

Plot 5.2.4.76. 6 dB Bandwidth, Data Rate 13, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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Plot 5.2.4.77. 6 dB Bandwidth, Data Rate 13, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17
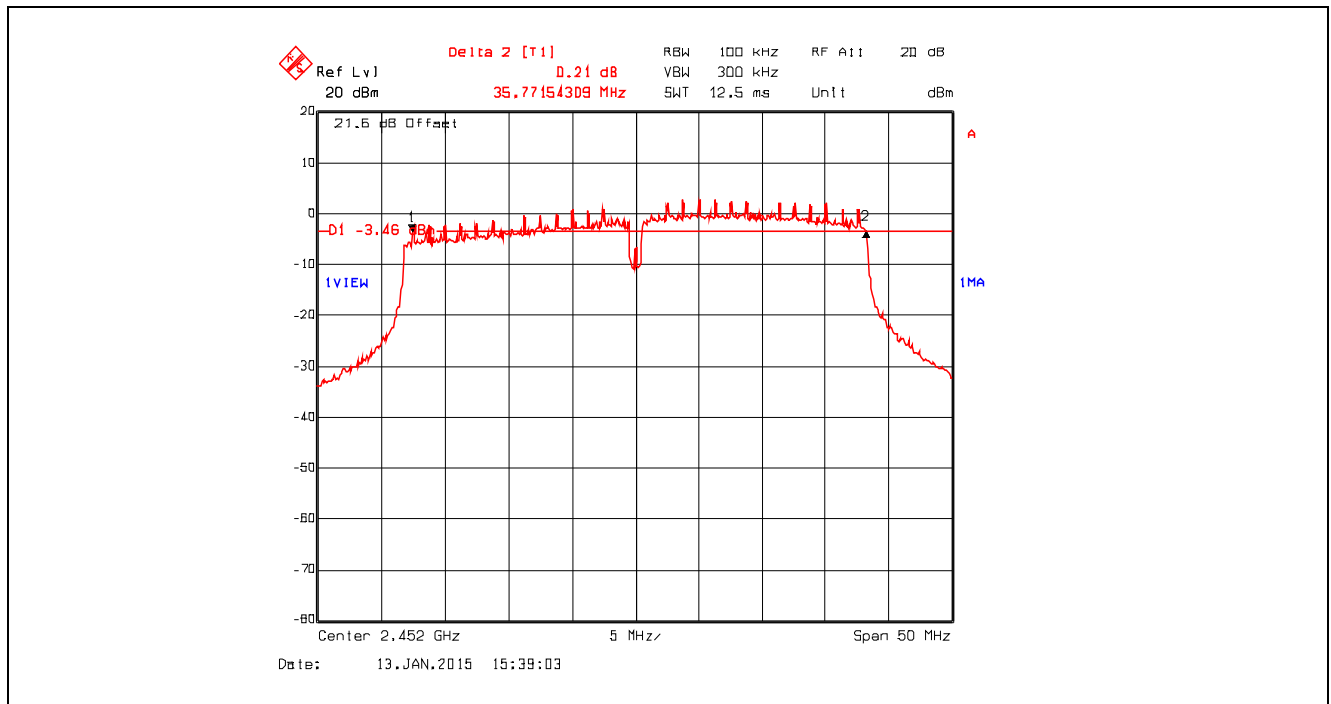
Plot 5.2.4.78. 6 dB Bandwidth, Data Rate 13, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
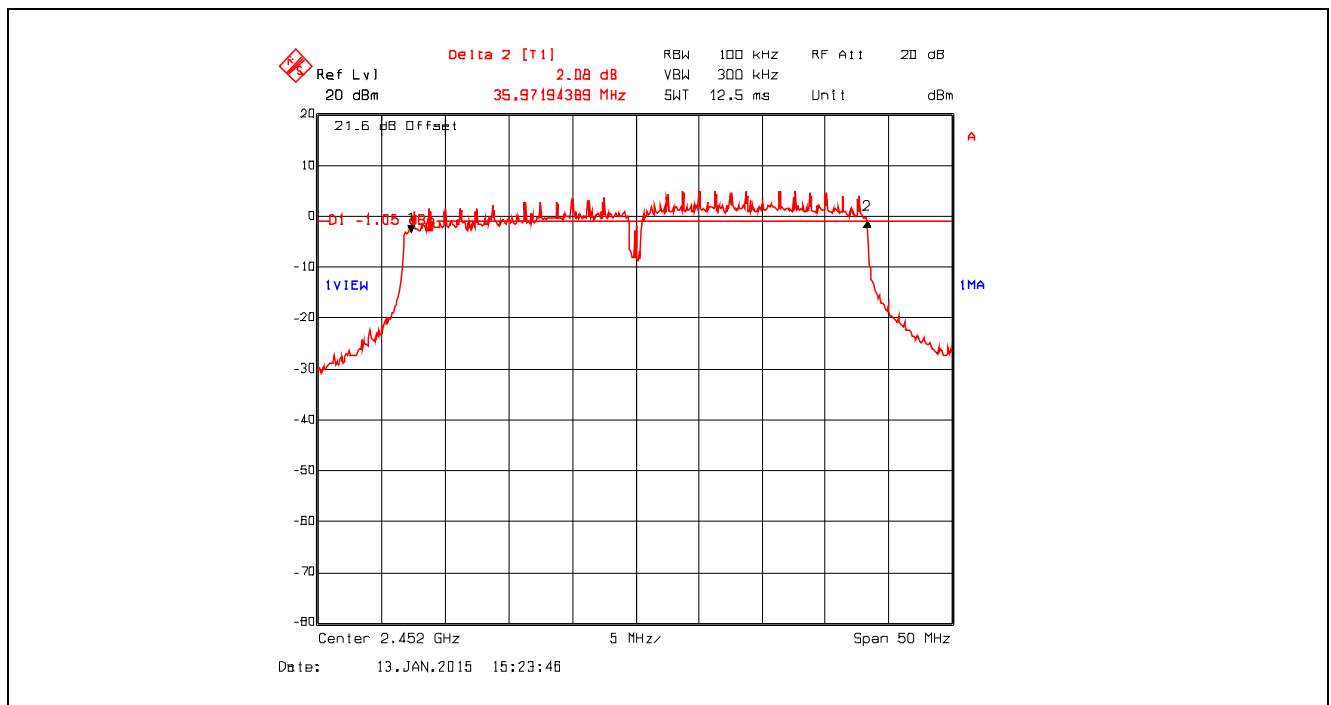**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
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Plot 5.2.4.79. 6 dB Bandwidth, Data Rate 14, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17
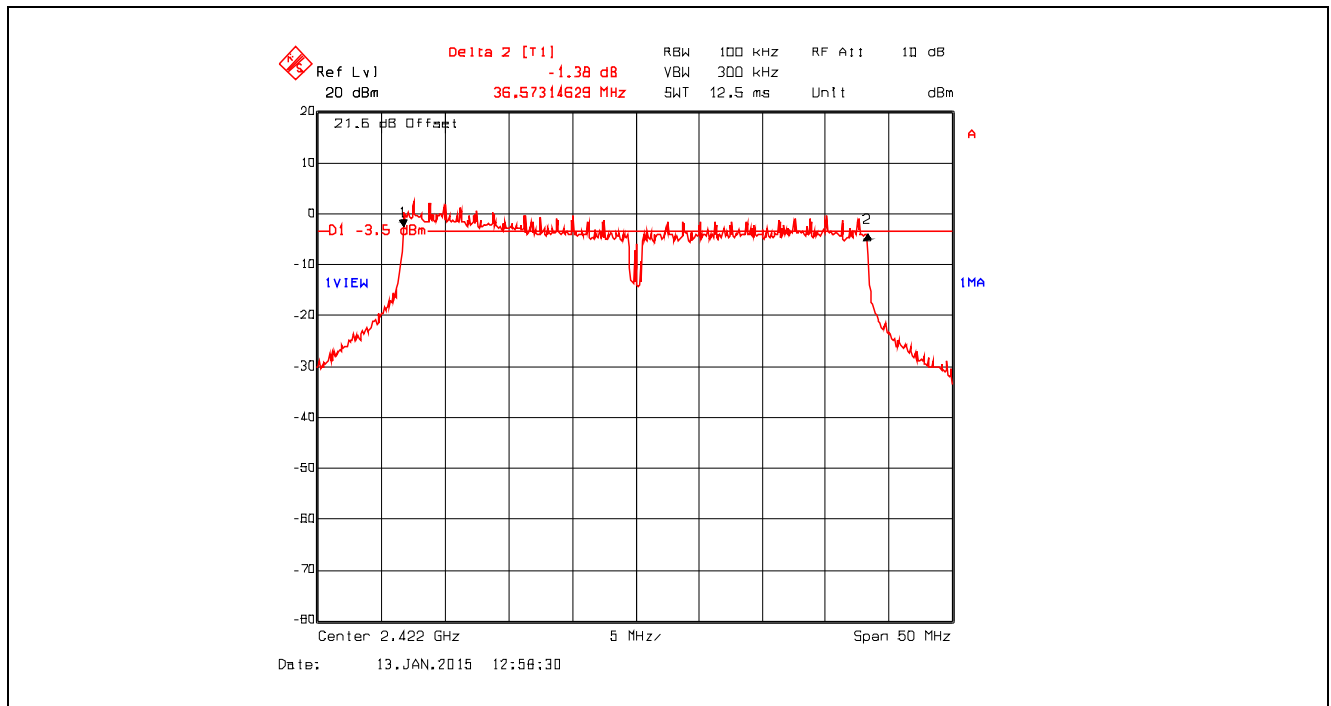
Plot 5.2.4.80. 6 dB Bandwidth, Data Rate 14, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS
File #: 15MCRS079_FCC15C247DTS
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November 16, 2015
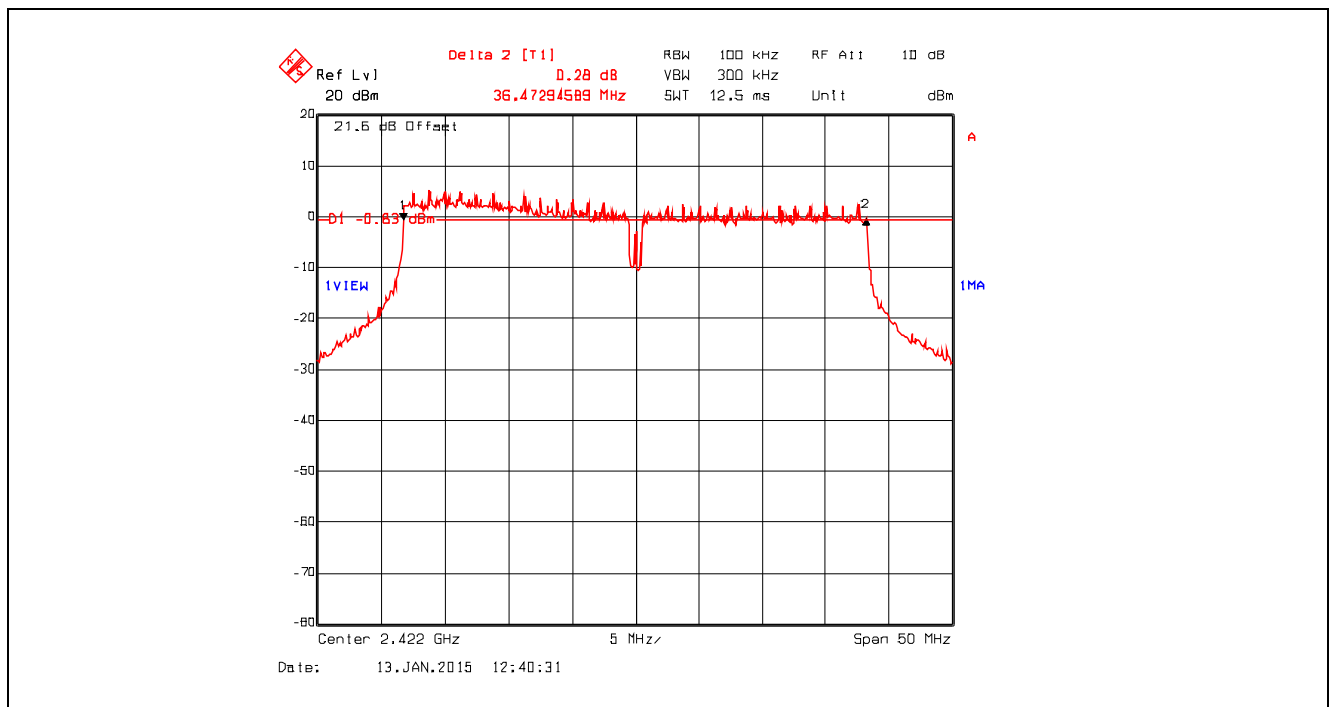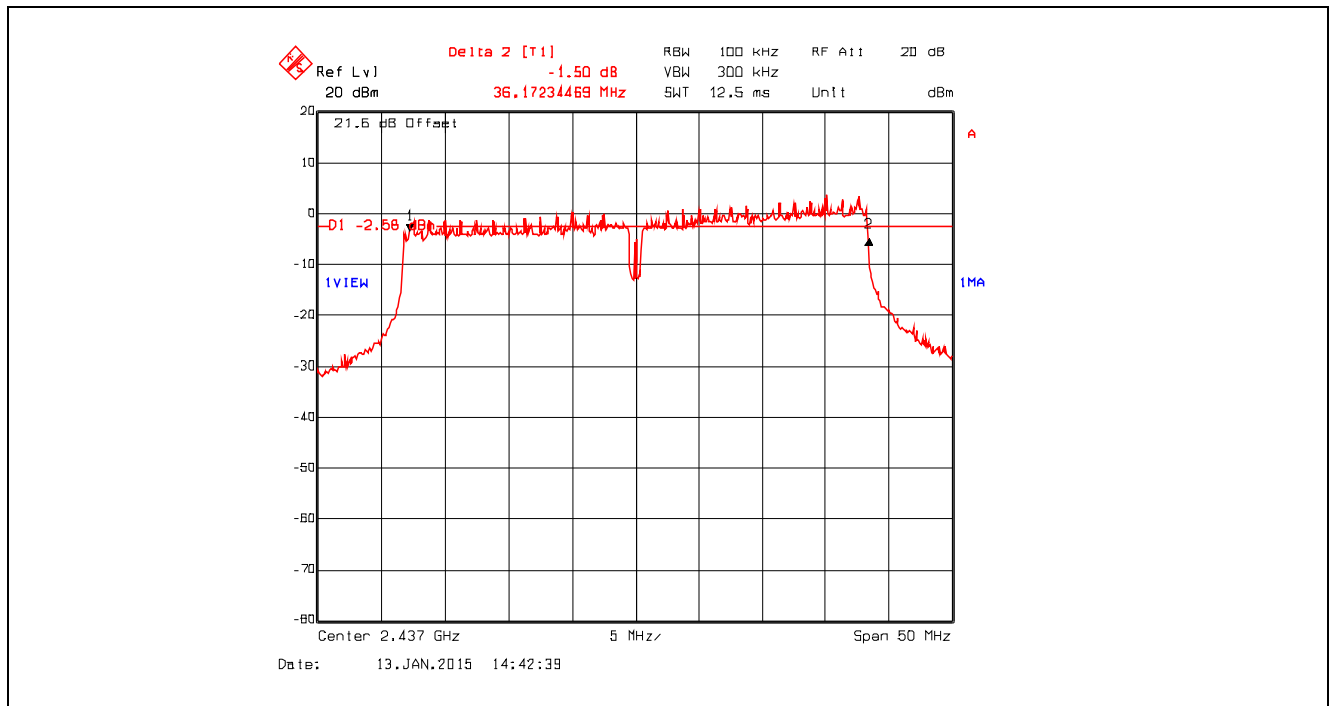**Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com**

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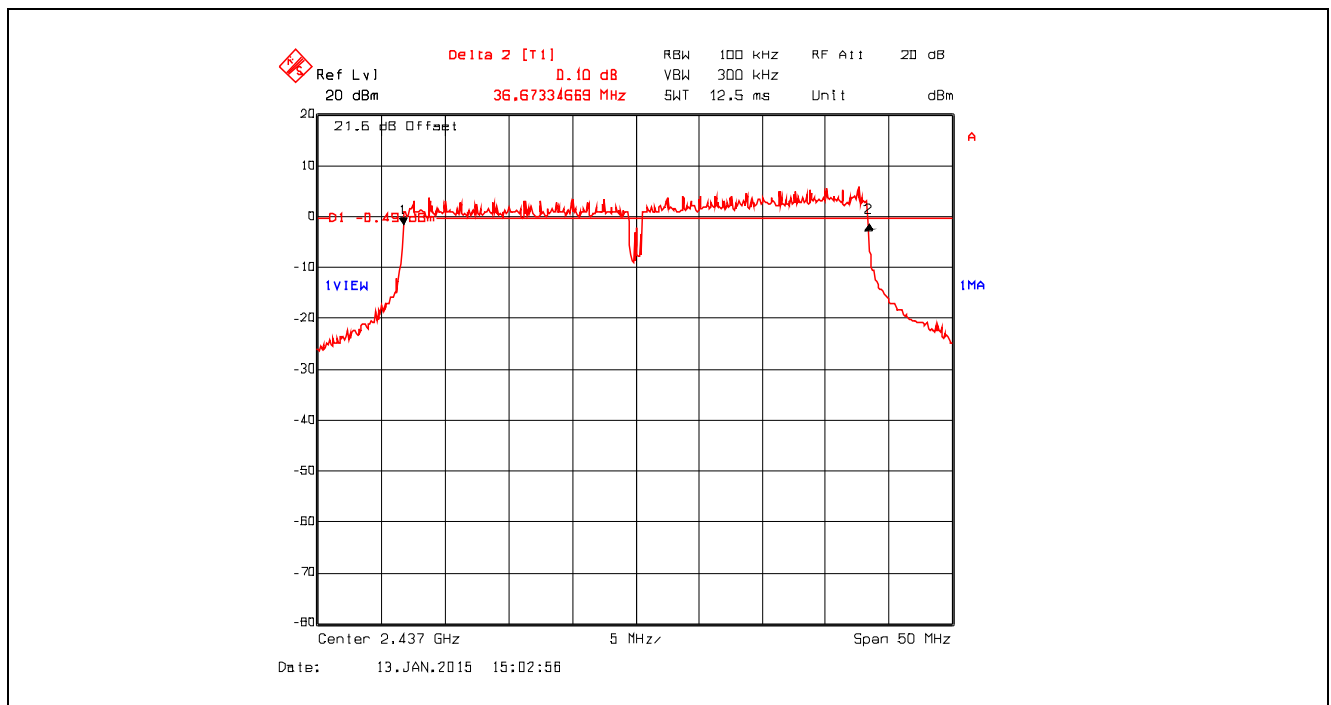**Plot 5.2.4.81.** 6 dB Bandwidth, Data Rate 14, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

Plot 5.2.4.82. 6 dB Bandwidth, Data Rate 14, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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Plot 5.2.4.83. 6 dB Bandwidth, Data Rate 14, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17

Plot 5.2.4.84. 6 dB Bandwidth, Data Rate 14, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17
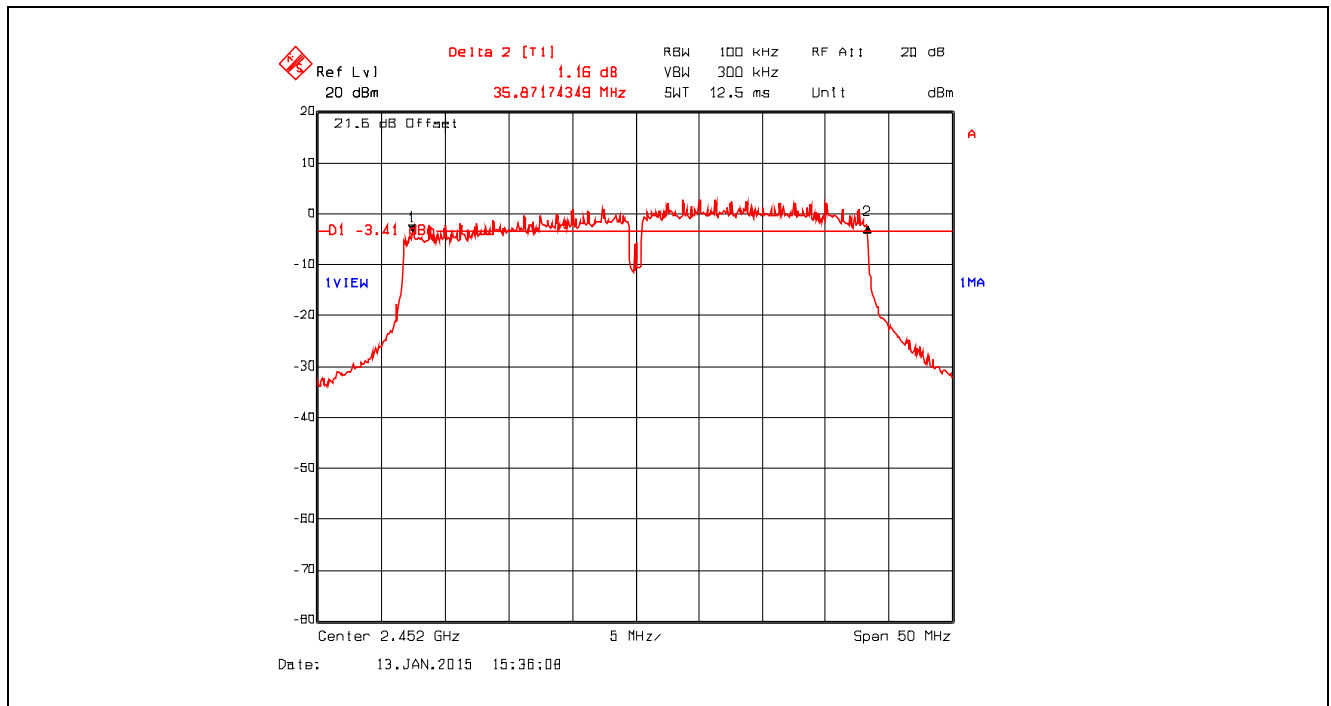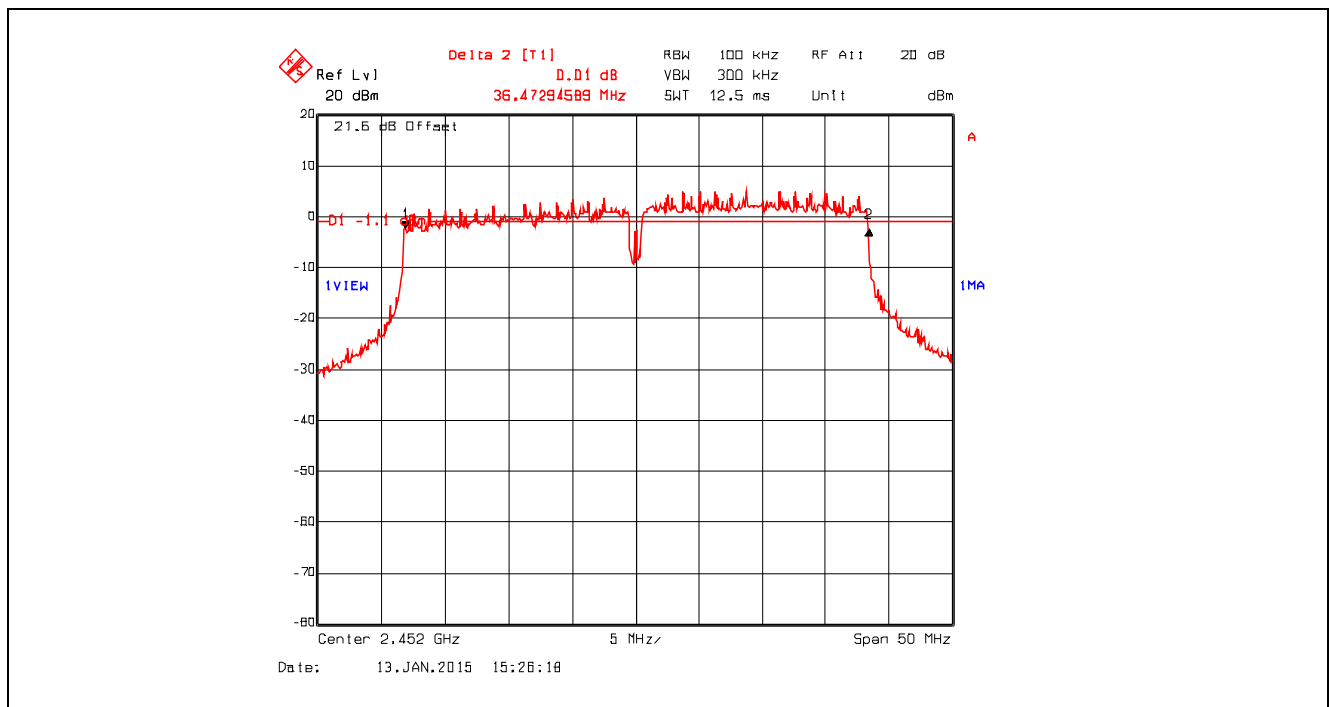
ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS

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Plot 5.2.4.85. 6 dB Bandwidth, Data Rate 15, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

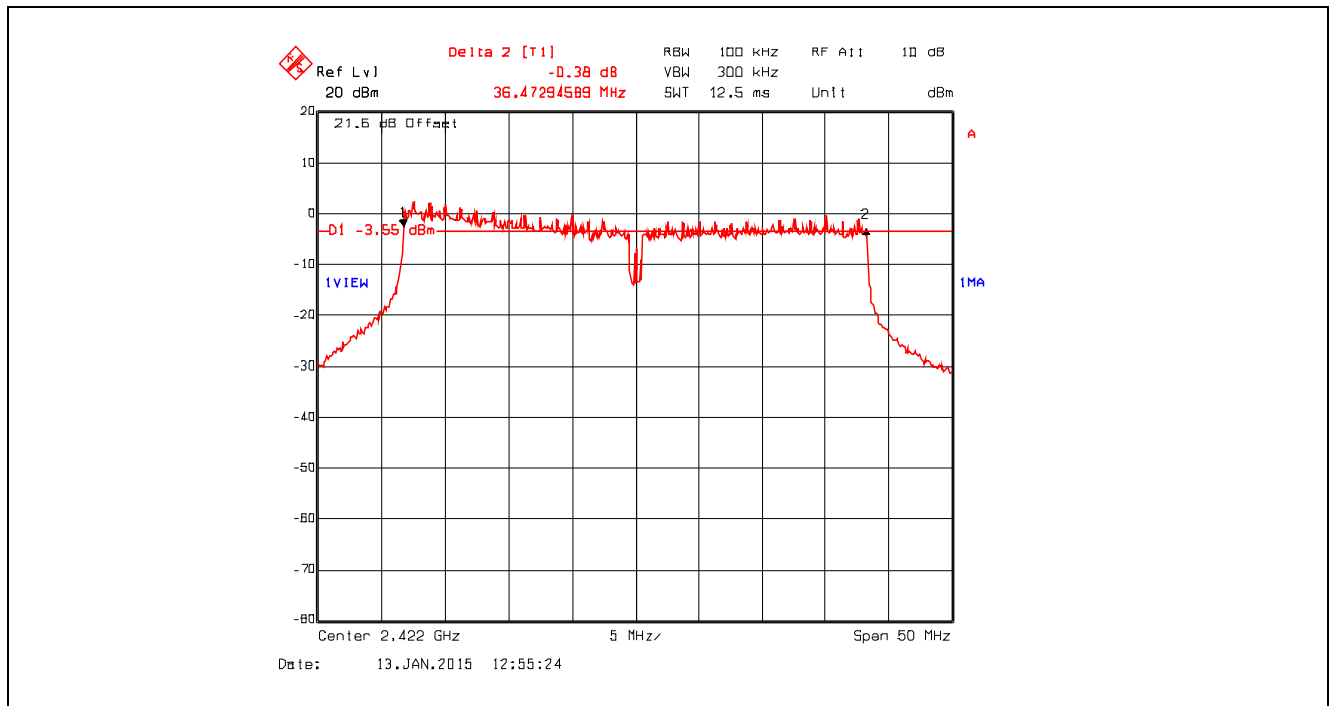**Plot 5.2.4.86.** 6 dB Bandwidth, Data Rate 15, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17
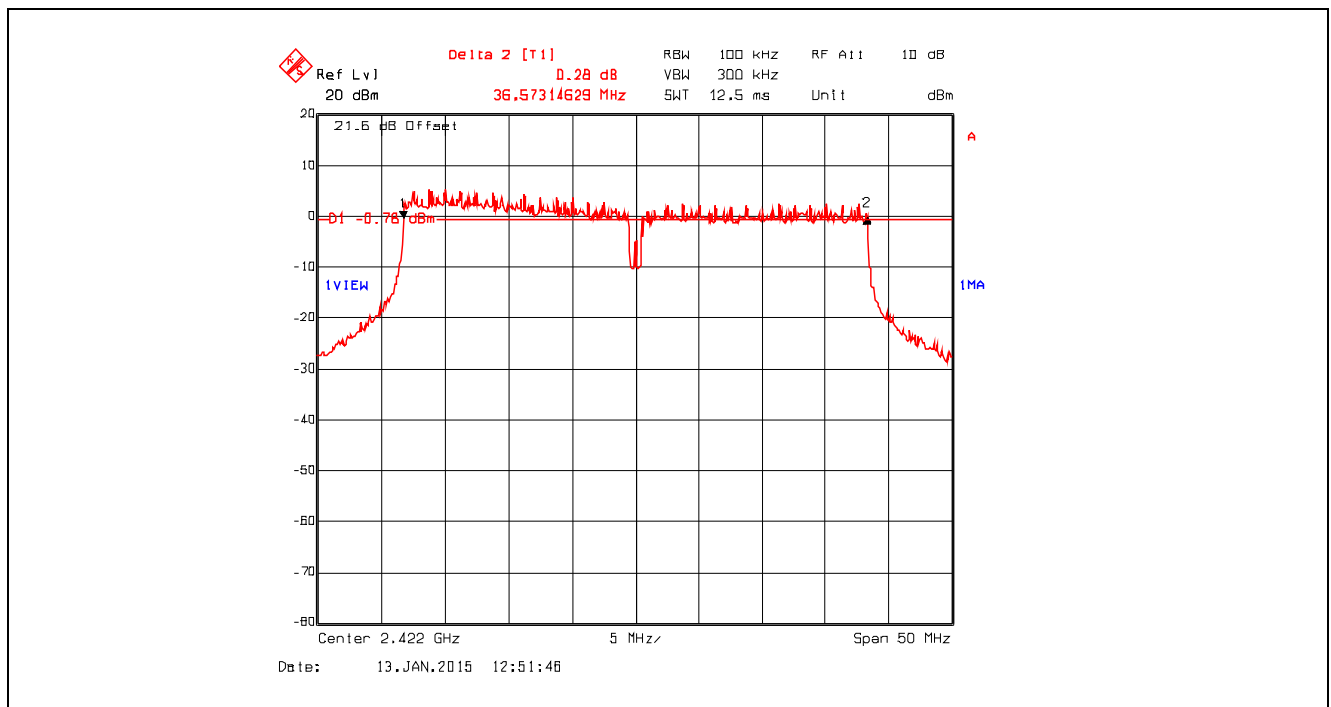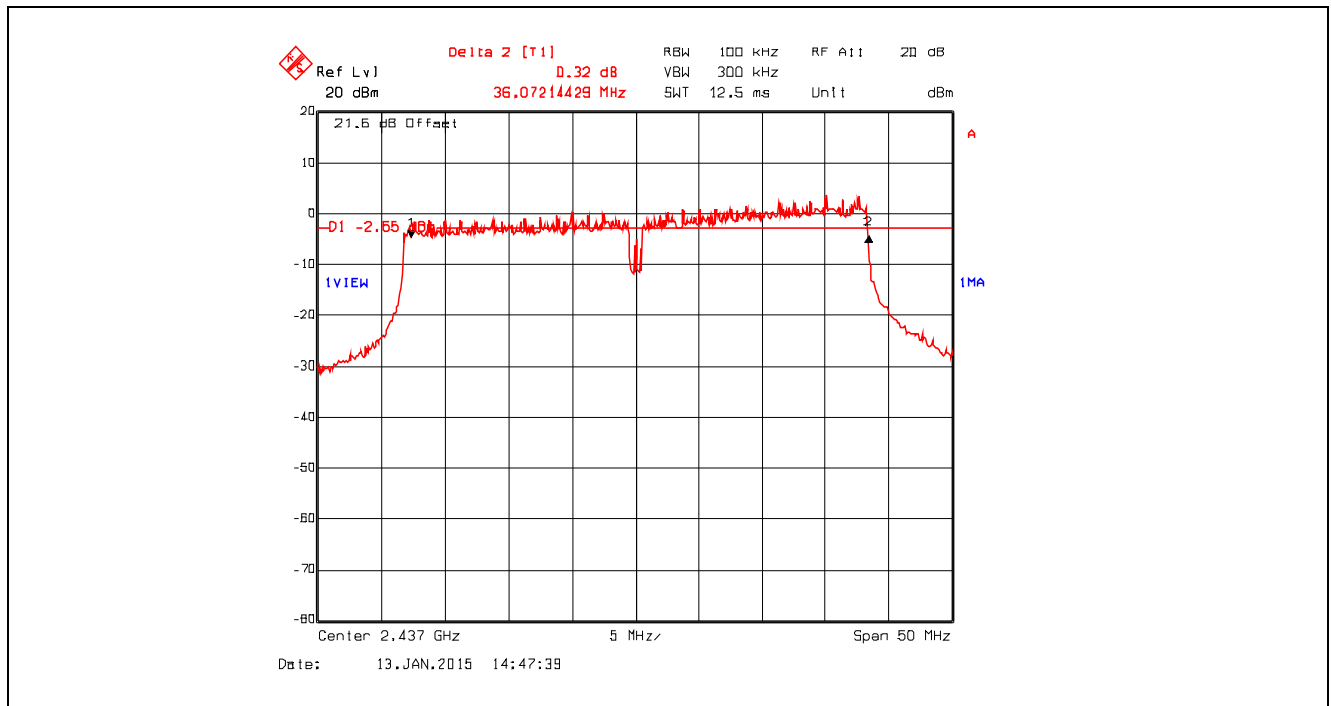

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Plot 5.2.4.87. 6 dB Bandwidth, Data Rate 15, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

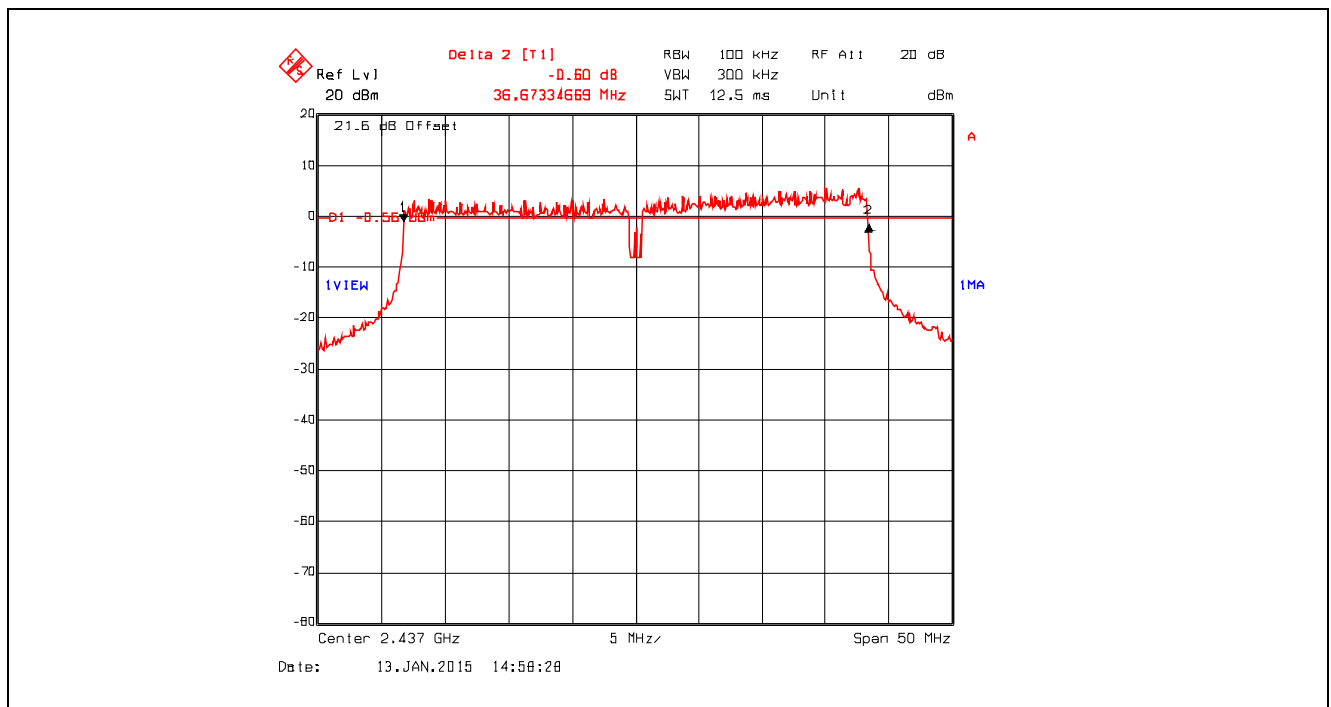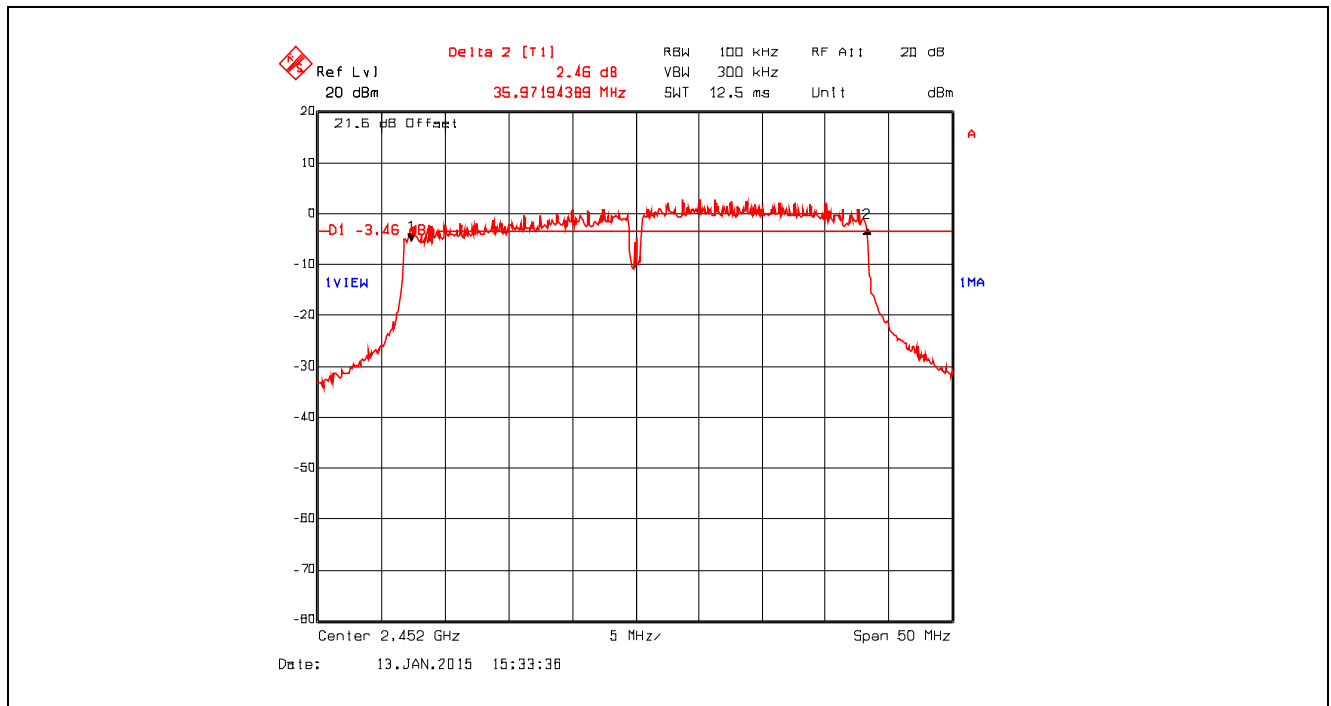**Plot 5.2.4.88.** 6 dB Bandwidth, Data Rate 15, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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Plot 5.2.4.89. 6 dB Bandwidth, Data Rate 15, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17

Plot 5.2.4.90. 6 dB Bandwidth, Data Rate 15, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17
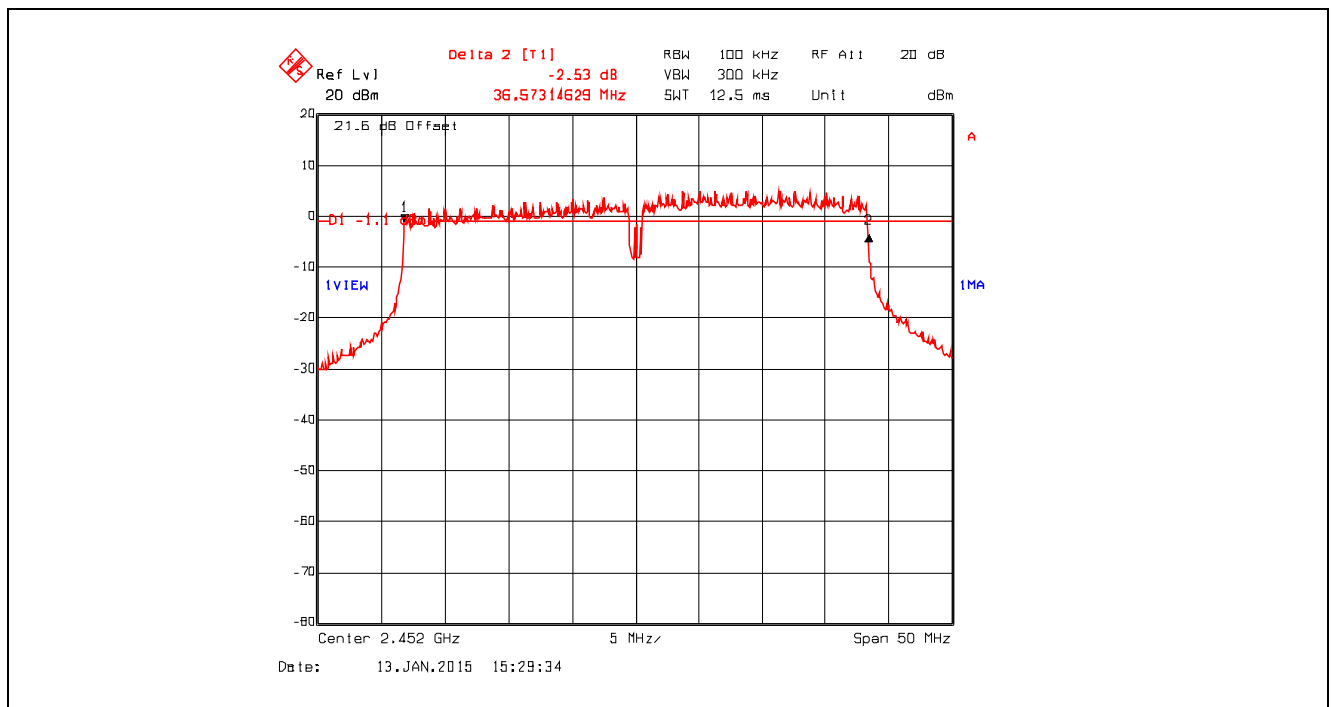
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5.3.   PEAK CONDUCTED OUTPUT POWER - DTS [§ 15.247(b)(3)]

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.

§ 15.247(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

   (i)   Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

   (ii)   Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

   (iii) Fixed, point-to-point operation, as used in paragraphs (c)(1)(i) and (c)(1)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

(2) In addition to the provisions in paragraphs (b)(1), (b)(3), (b)(4) and (c)(1)(i) of this section, transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers provided the emissions comply with the following:

   (i)   Different information must be transmitted to each receiver.

   (ii)   If the transmitter employs an antenna system that emits multiple directional beams but does not do emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device, *i.e.*, the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels, shall not exceed the limit specified in paragraph

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(b)(1) or (b)(3) of this section, as applicable. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as follows:

   (A) The directional gain shall be calculated as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

   (B) A lower value for the directional gain than that calculated in paragraph (c)(2)(ii)(A) of this section will be accepted if sufficient evidence is presented, e.g., due to shading of the array or coherence loss in the beamforming.
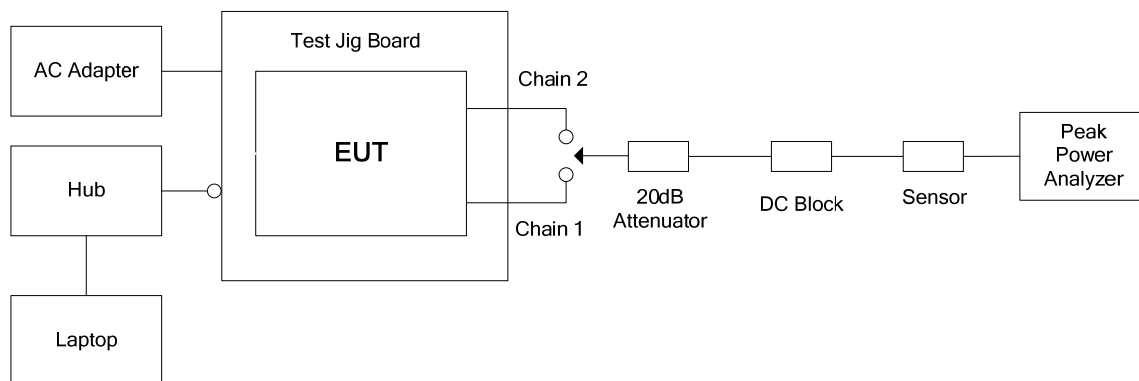
 (iii) If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the power limit specified in paragraph (c)(2)(ii) of this section. If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the limit specified in paragraph (c)(2)(ii) of this section. In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the limit specified in paragraph (c)(2)(ii) of this section by more than 8 dB.

 (iv) Transmitters that emit a single directional beam shall operate under the provisions of paragraph (c)(1) of this section.

5.3.2. Method of Measurements

KDB Publication No. 558074 D01 DTS Meas Guidance V03r02, Section 9.1.2 PKPM1 Peak power meter method.

5.3.3. Test Arrangement

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5.3.4. Test Data

Remark: Max. e.i.r.p = Max. Total Peak + Max. Antenna Assembly Gain = 30.00 dBm + 1.51 dBi = 31.51 dBm

Software Output Power Setting 26							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Total Peak Power (dBm)**	**Peak Power Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 1	1	2412	26.78	26.64	29.72	30	-0.28
	6	2437	25.84	25.68	28.77	30	-1.23
	11	2462	25.51	25.35	28.44	30	-1.56
Data Rate 2	1	2412	26.81	26.25	29.55	30	-0.45
	6	2437	26.22	25.85	29.05	30	-0.95
	11	2462	25.67	25.18	28.44	30	-1.56
Data Rate 3	1	2412	26.47	26.59	29.54	30	-0.46
	6	2437	26.22	25.85	29.05	30	-0.95
	11	2462	25.52	25.52	28.53	30	-1.47

Software Output Power Setting 18							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Total Peak Power (dBm)**	**Peak Power Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 4	1	2412	26.84	25.55	29.25	30	-0.75
	6	2437	26.57	26.05	29.33	30	-0.67
	11	2462	26.40	24.88	28.72	30	-1.28
Data Rate 5	1	2412	27.15	26.82	30.00	30	0.00
	6	2437	27.05	26.57	29.83	30	-0.17
	11	2462	26.45	25.22	28.89	30	-1.11
Data Rate 6	1	2412	26.62	25.42	29.07	30	-0.93
	6	2437	26.84	26.11	29.50	30	-0.50
	11	2462	25.86	24.88	28.41	30	-1.59
Data Rate 7	1	2412	27.10	25.92	29.56	30	-0.44
	6	2437	27.05	25.60	29.40	30	-0.60
	11	2462	26.67	25.67	29.21	30	-0.79

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Software Output Power Setting 19							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Total Peak Power (dBm)**	**Peak Power Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 8	1	2412	27.55	26.22	29.95	30	-0.05
	6	2437	27.38	26.55	30.00	30	0.00
	11	2462	26.98	26.79	29.90	30	-0.10
Data Rate 9	1	2412	26.87	27.10	30.00	30	0.00
	6	2437	27.38	26.40	29.93	30	-0.07
	11	2462	27.19	26.40	29.82	30	-0.18
Data Rate 10	1	2412	26.79	27.05	29.93	30	-0.07
	6	2437	27.38	26.22	29.85	30	-0.15
	11	2462	26.60	26.40	29.51	30	-0.49
Data Rate 11	1	2412	26.51	27.36	29.97	30	-0.03
	6	2437	27.56	26.23	29.96	30	-0.04
	11	2462	26.60	26.60	29.61	30	-0.39

Software Output Power Setting 17							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Total Peak Power (dBm)**	**Peak Power Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 12	3	2422	27.47	26.25	29.91	30	-0.09
	6	2437	27.49	26.40	29.99	30	-0.01
	9	2452	26.79	26.22	29.52	30	-0.48
Data Rate 13	3	2422	27.41	26.40	29.94	30	-0.06
	6	2437	27.19	26.79	30.00	30	0.00
	9	2452	25.79	26.60	29.22	30	-0.78
Data Rate 14	3	2422	27.19	26.60	29.92	30	-0.08
	6	2437	27.78	26.03	30.00	30	0.00
	9	2452	25.68	26.40	29.07	30	-0.93
Data Rate 15	3	2422	26.60	26.79	29.71	30	-0.29
	6	2437	27.39	26.40	29.93	30	-0.07
	9	2452	26.60	26.03	29.33	30	-0.67

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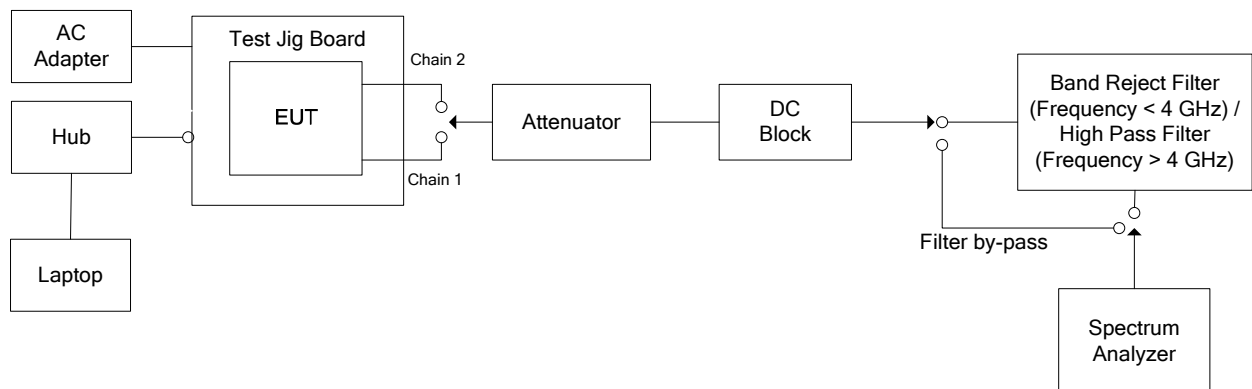## 5.4. TRANSMITTER BAND-EDGE & SPURIOUS CONDUCTED EMISSIONS [§ 15.247(d)]

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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.4.2. Method of Measurements

KDB Publication No. 558074 D01 DTS Meas Guidance V03r02, Sections 11, 12 and 13.
KDB 662911 D01 Multiple Transmitter Output V02r01, Section E(3)(b) Relative Limits

5.4.3. Test Arrangement

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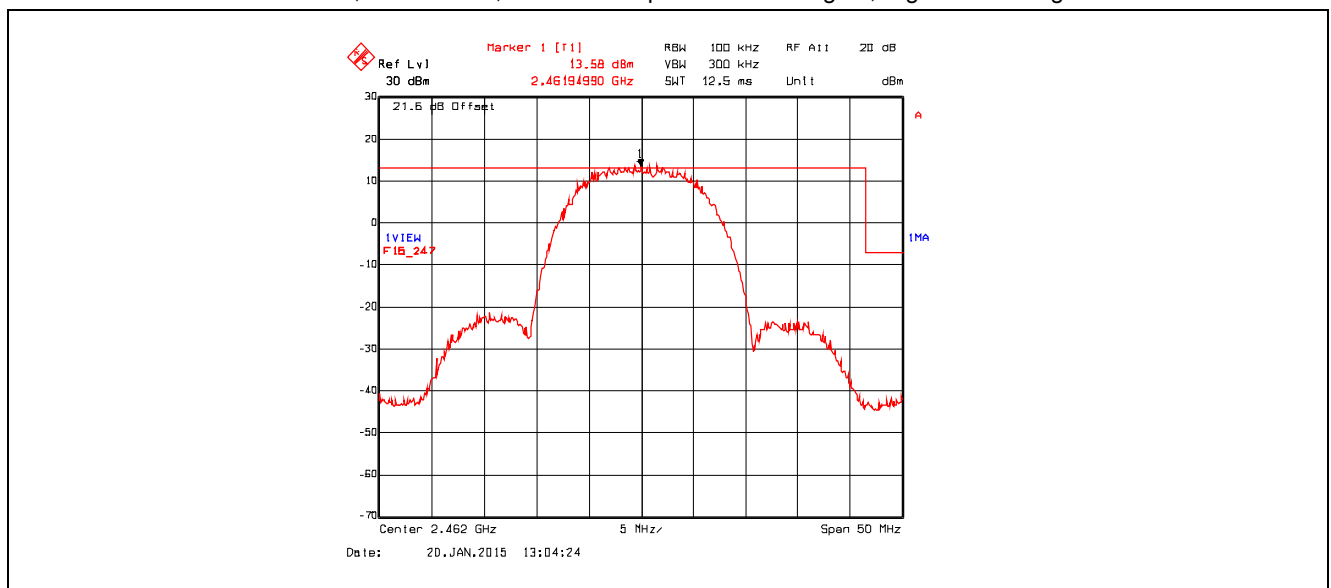
5.4.4. Test Data

Remark(s): Exploratory tests performed to determined worst-case test configurations, the following test results represent the worst-case.
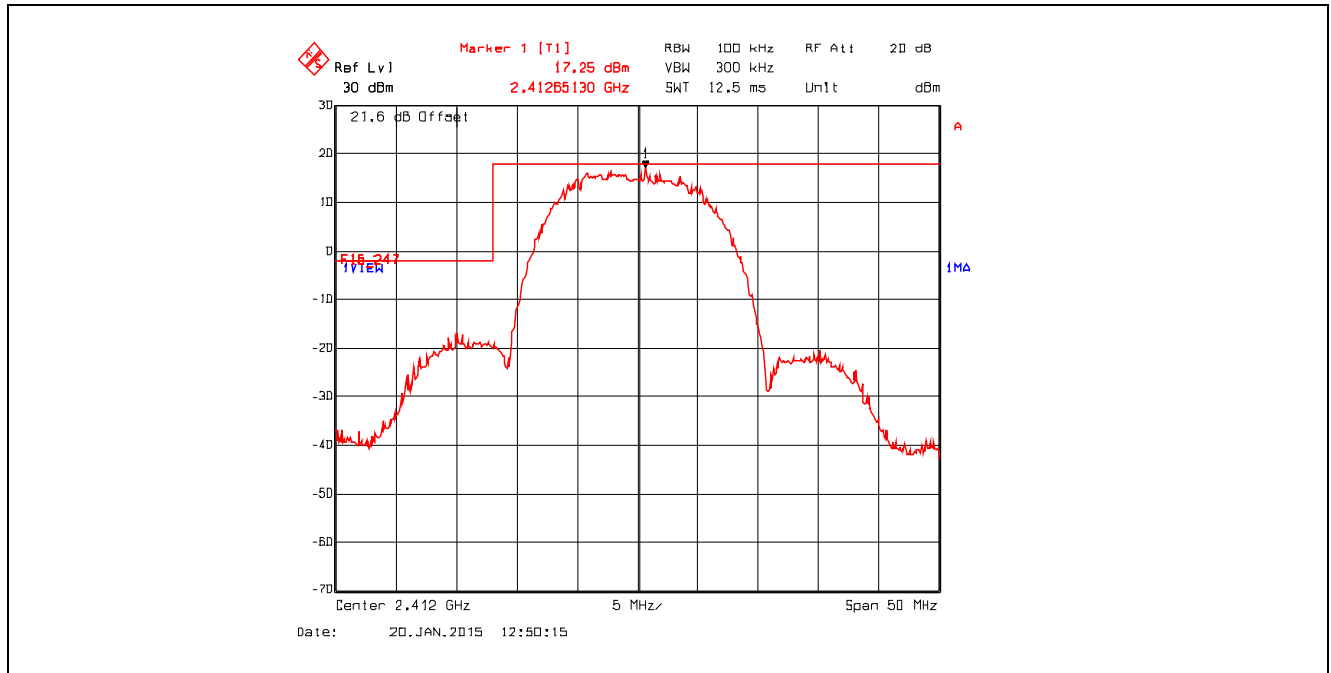
5.4.4.1. Band-Edge RF Conducted Emissions

Plot 5.4.4.1.1. Band-Edge RF Conducted Emissions
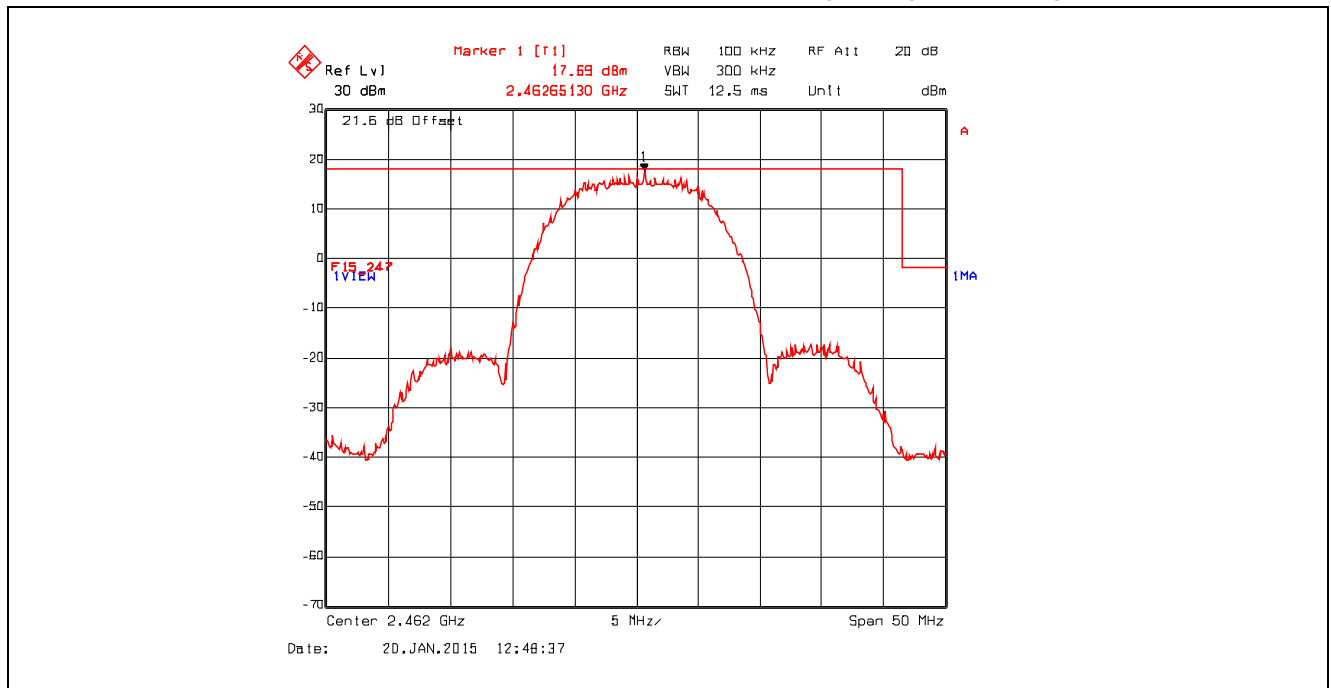Chain #1, Data Rate 3, Software Output Power Setting 26, Lower Band-edge
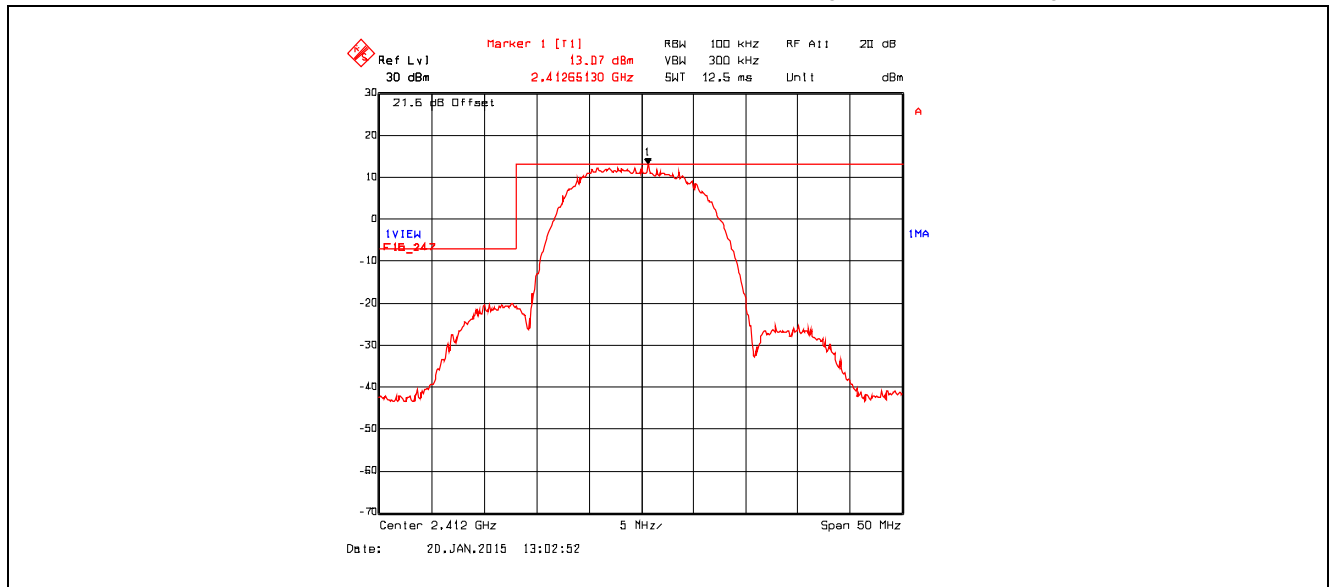
Plot 5.4.4.1.2. Band-Edge RF Conducted Emissions
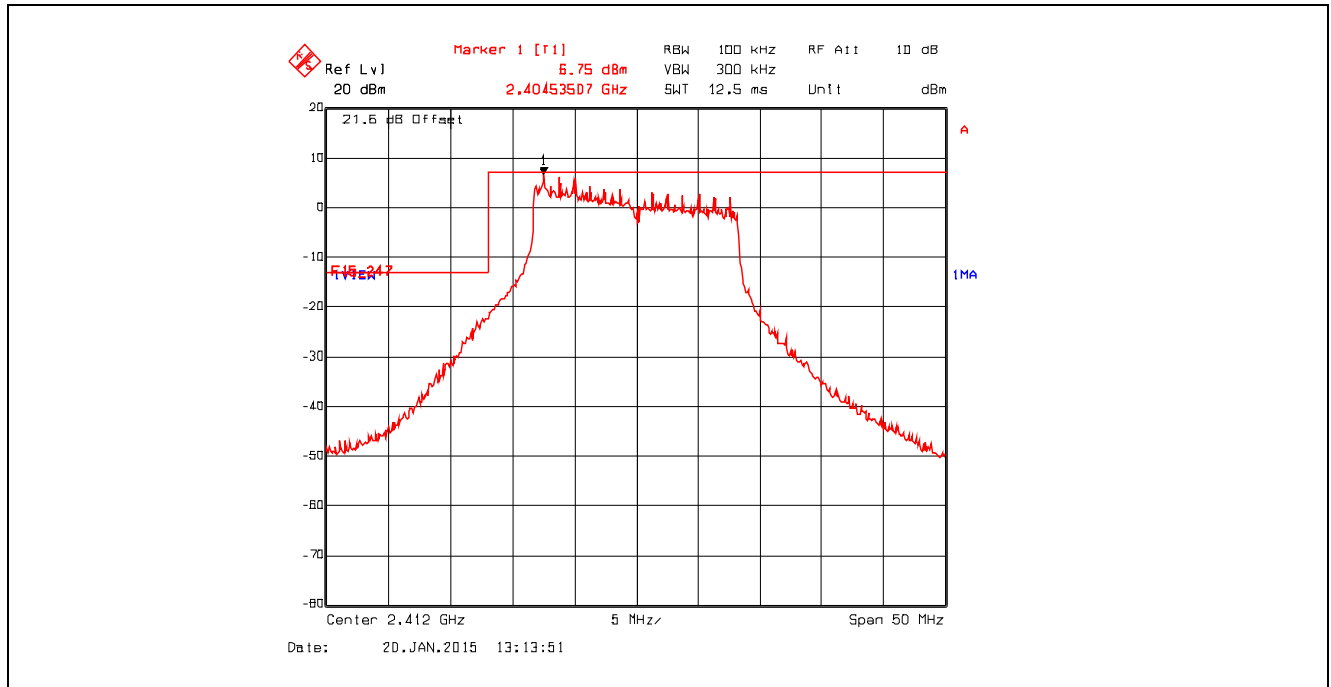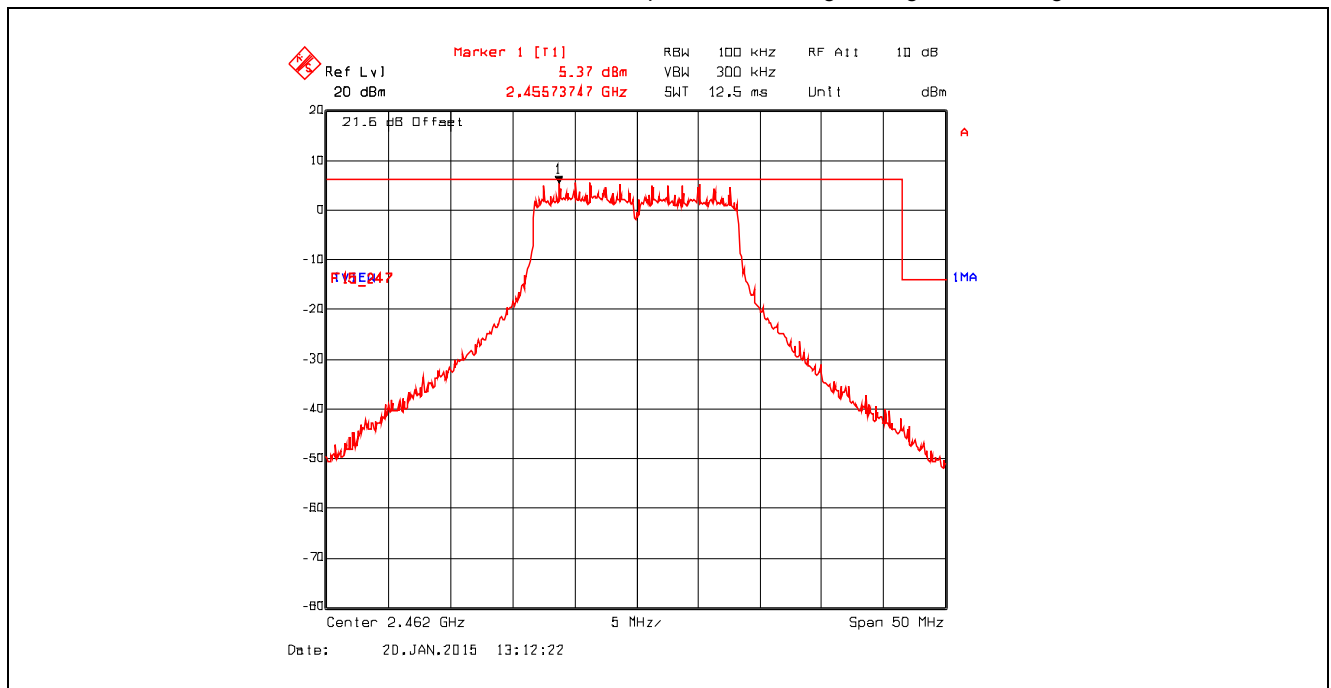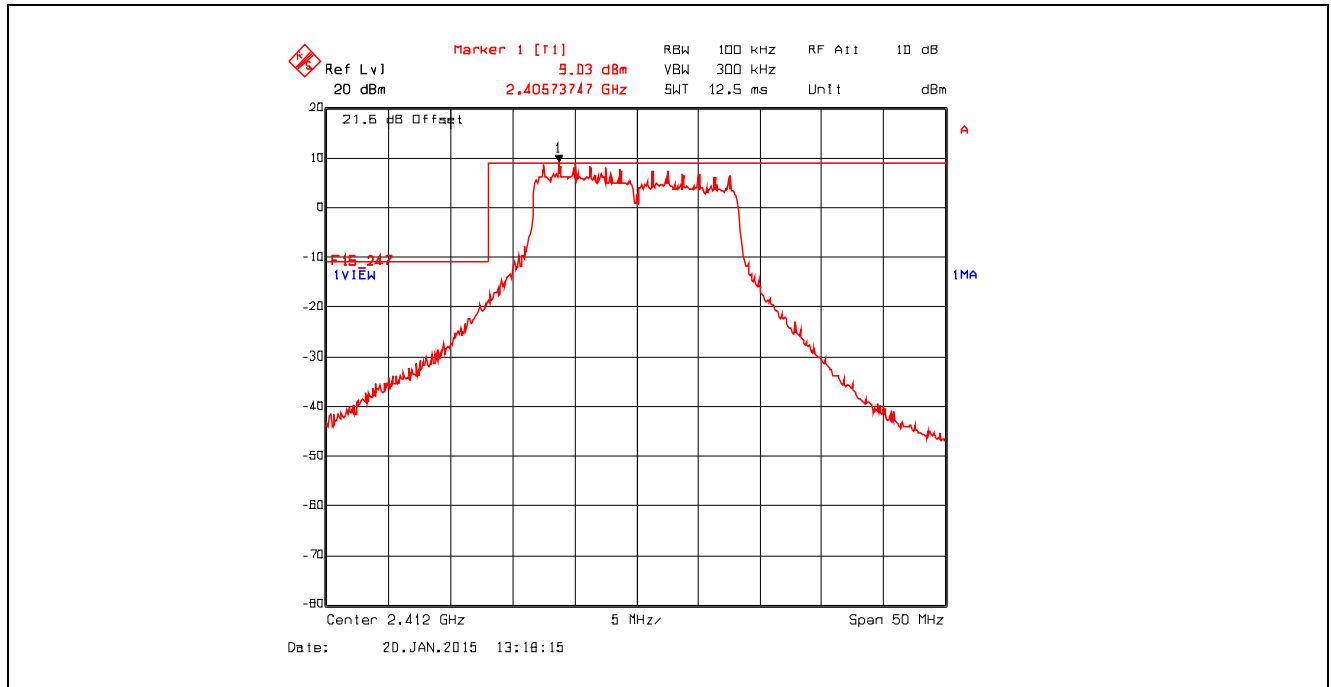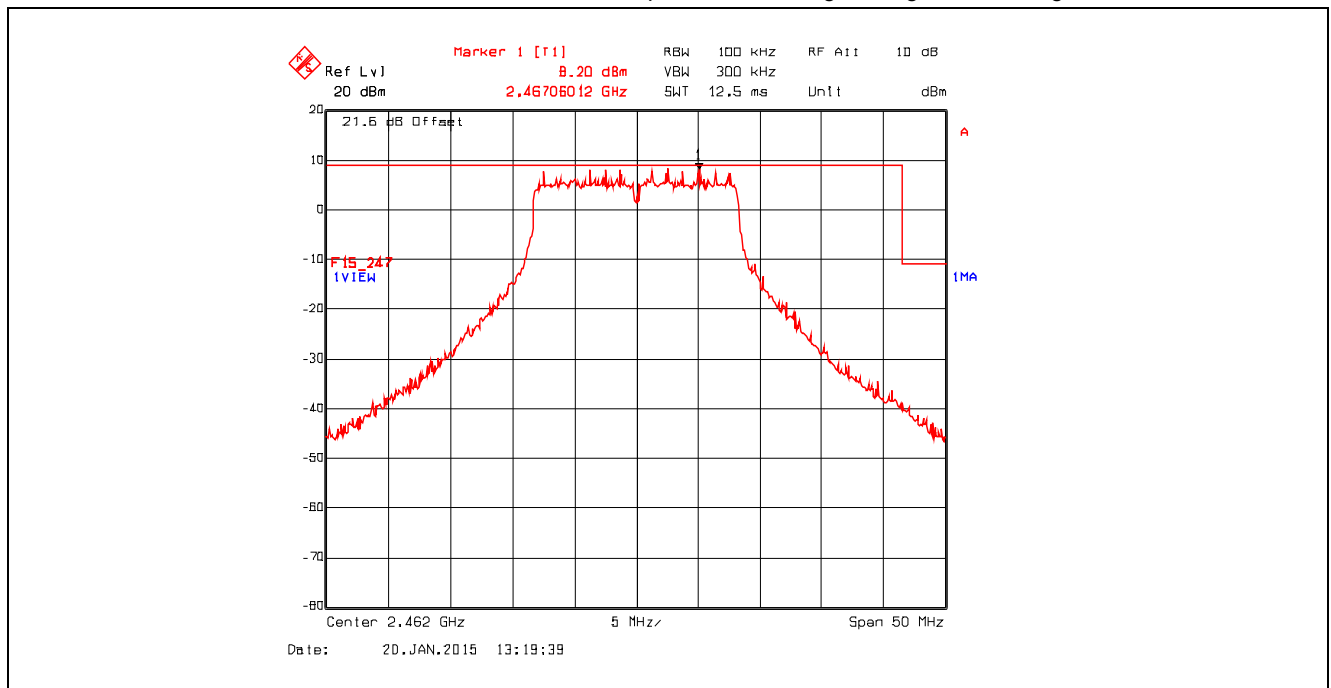Chain #1, Data Rate 3, Software Output Power Setting 26, Higher Band-edge

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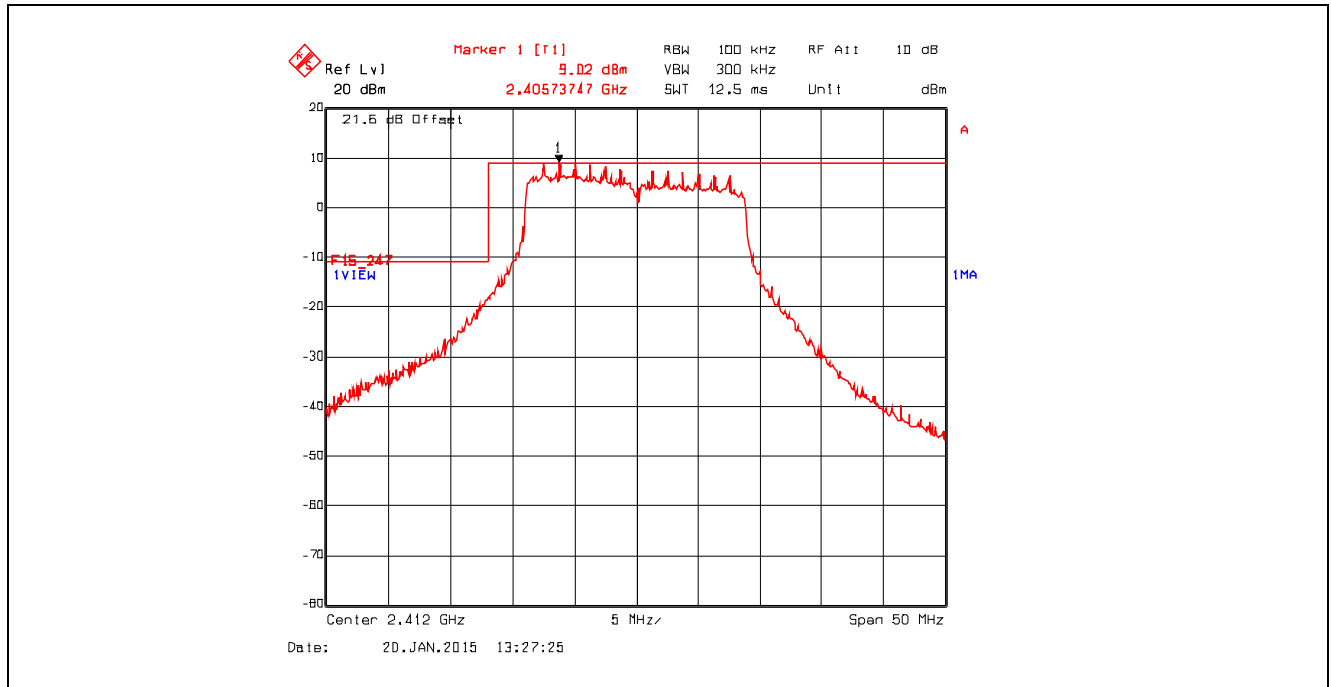
Plot 5.4.4.1.3. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 3, Software Output Power Setting 26, Lower Band-edge

Plot 5.4.4.1.4. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 3, Software Output Power Setting 26, Higher Band-edge

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Plot 5.4.4.1.5. Band-Edge RF Conducted Emissions
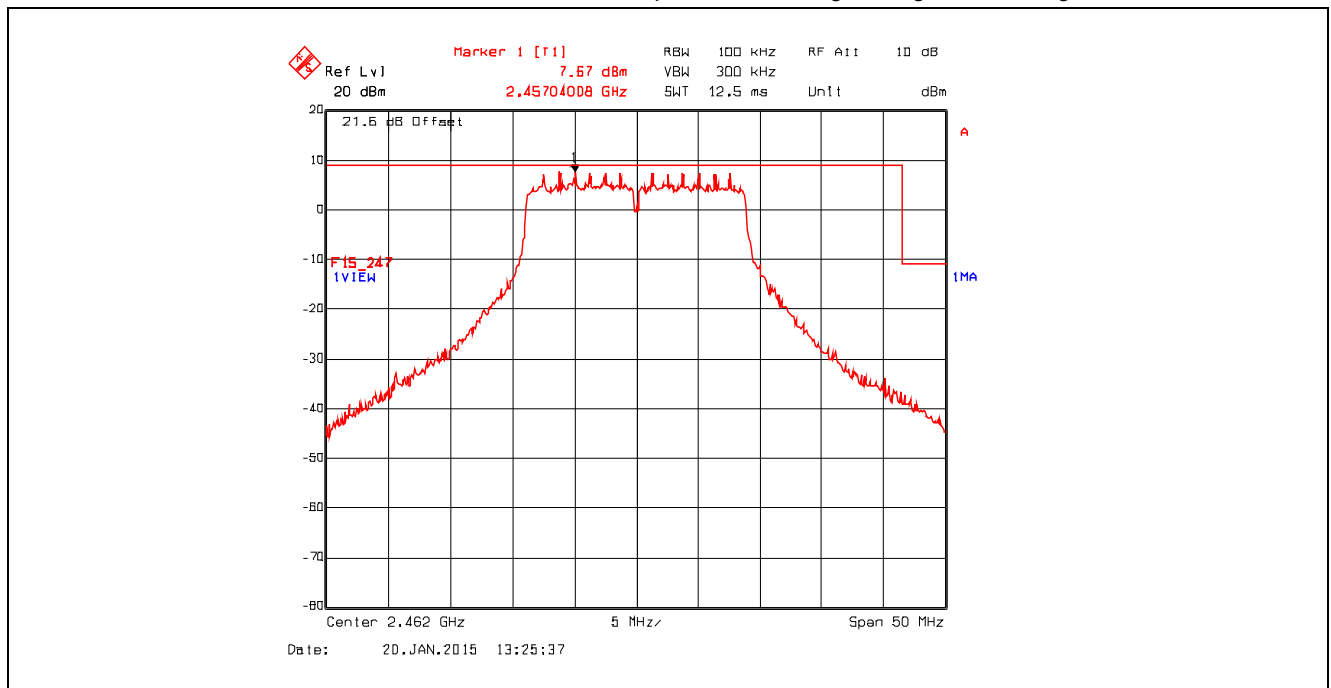Chain #1, Data Rate 7, Software Output Power Setting 18, Lower Band-edge

Plot 5.4.4.1.6. Band-Edge RF Conducted Emissions
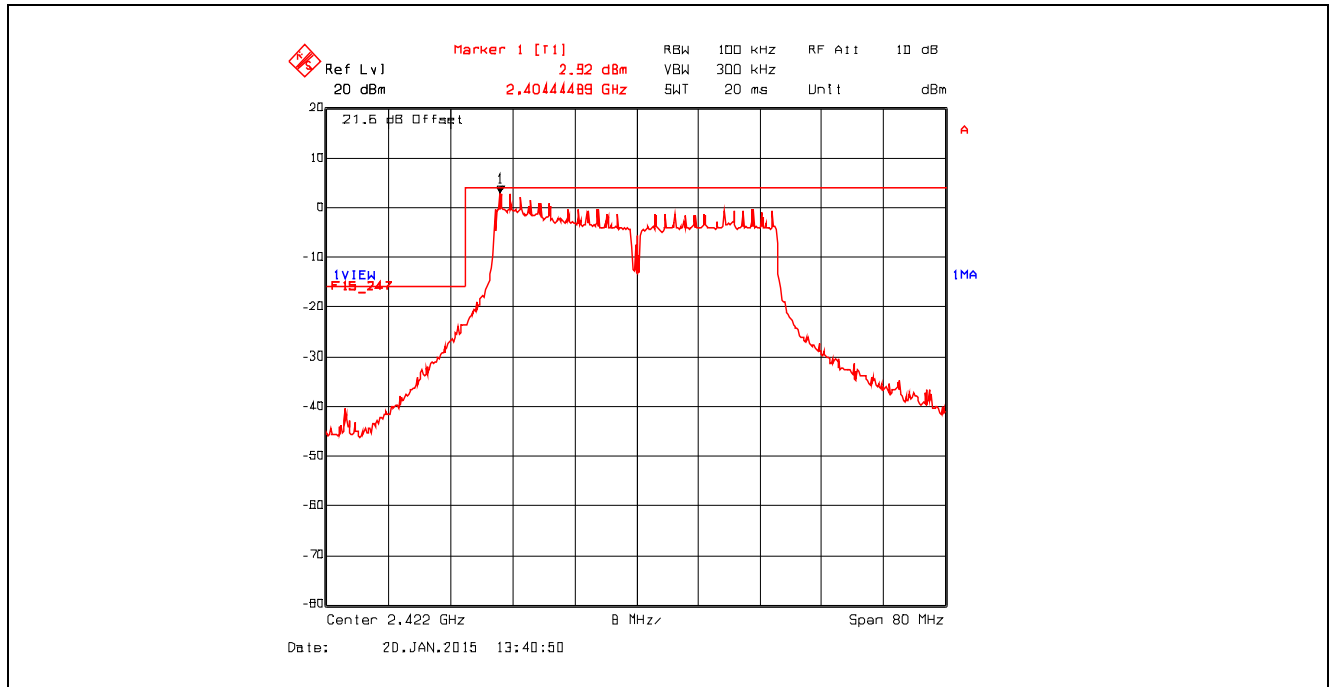Chain #1, Data Rate 7, Software Output Power Setting 18, Higher Band-edge

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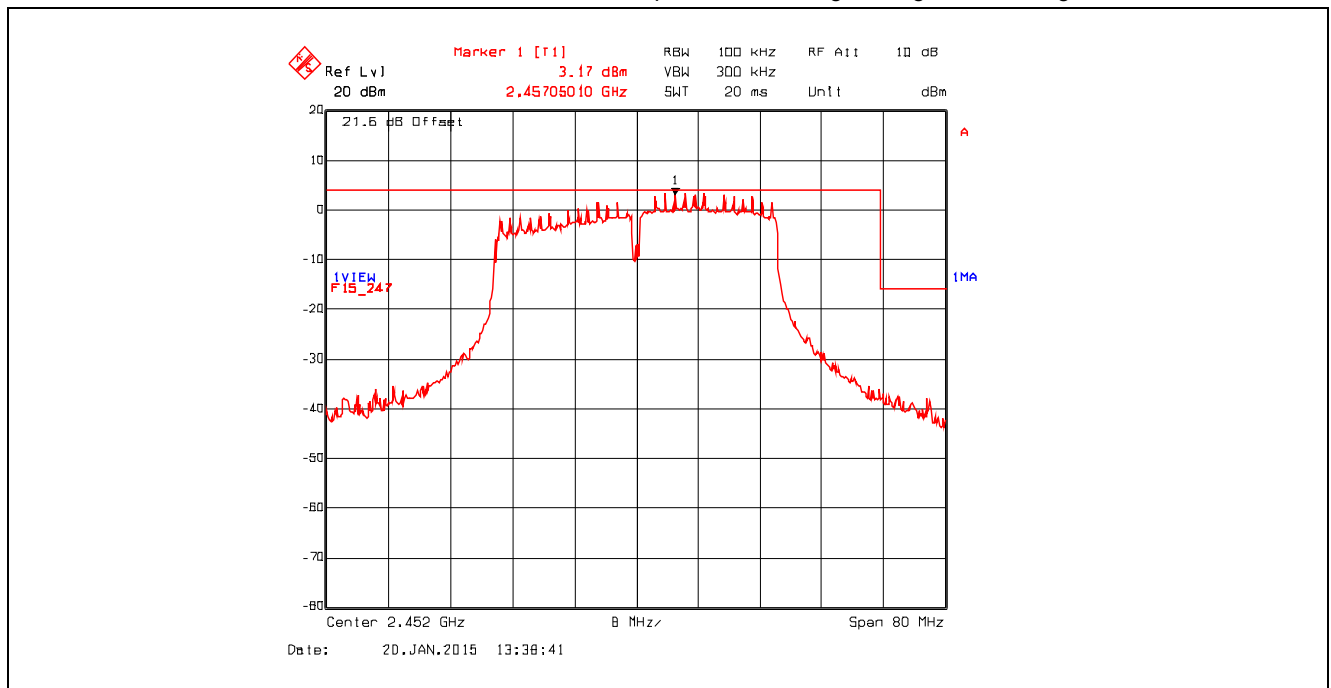
Plot 5.4.4.1.7. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 7, Software Output Power Setting 18, Lower Band-edge

Plot 5.4.4.1.8. Band-Edge RF Conducted Emissions
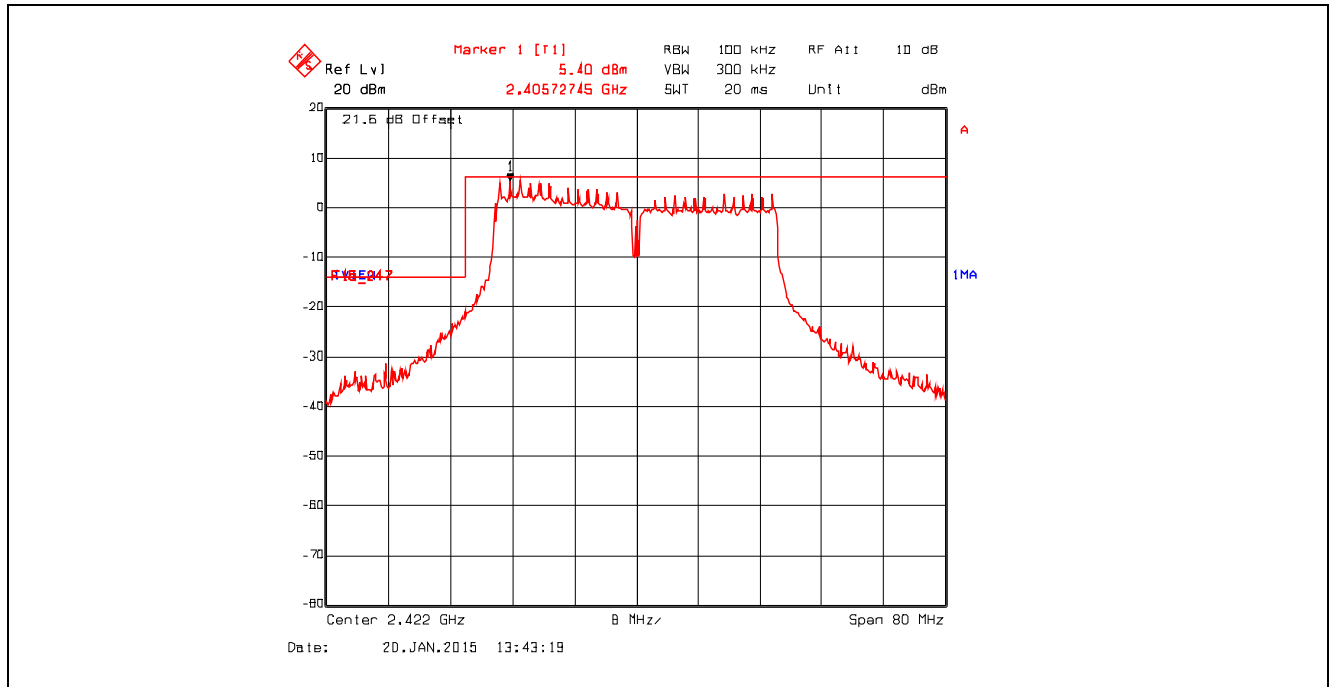Chain #2, Data Rate 7, Software Output Power Setting 18, Higher Band-edge

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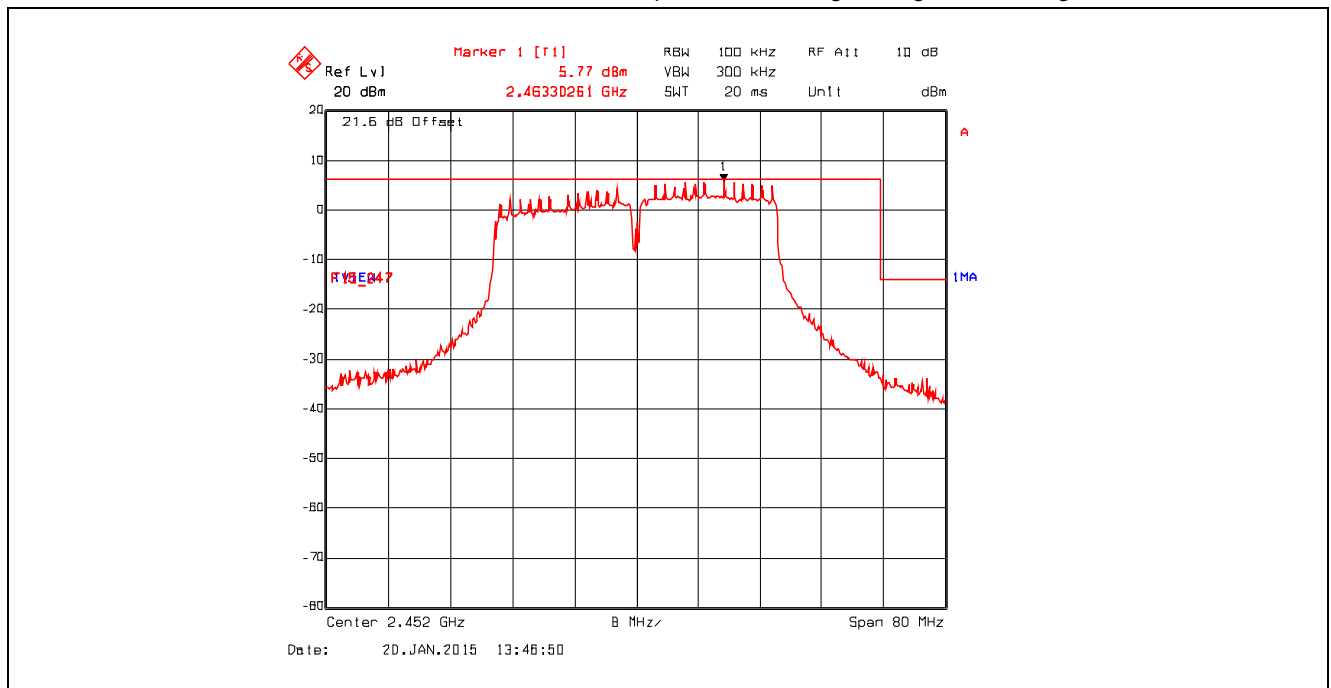
Plot 5.4.4.1.9. Band-Edge RF Conducted Emissions
Chain #1, Data Rate 11, Software Output Power Setting 19, Lower Band-edge
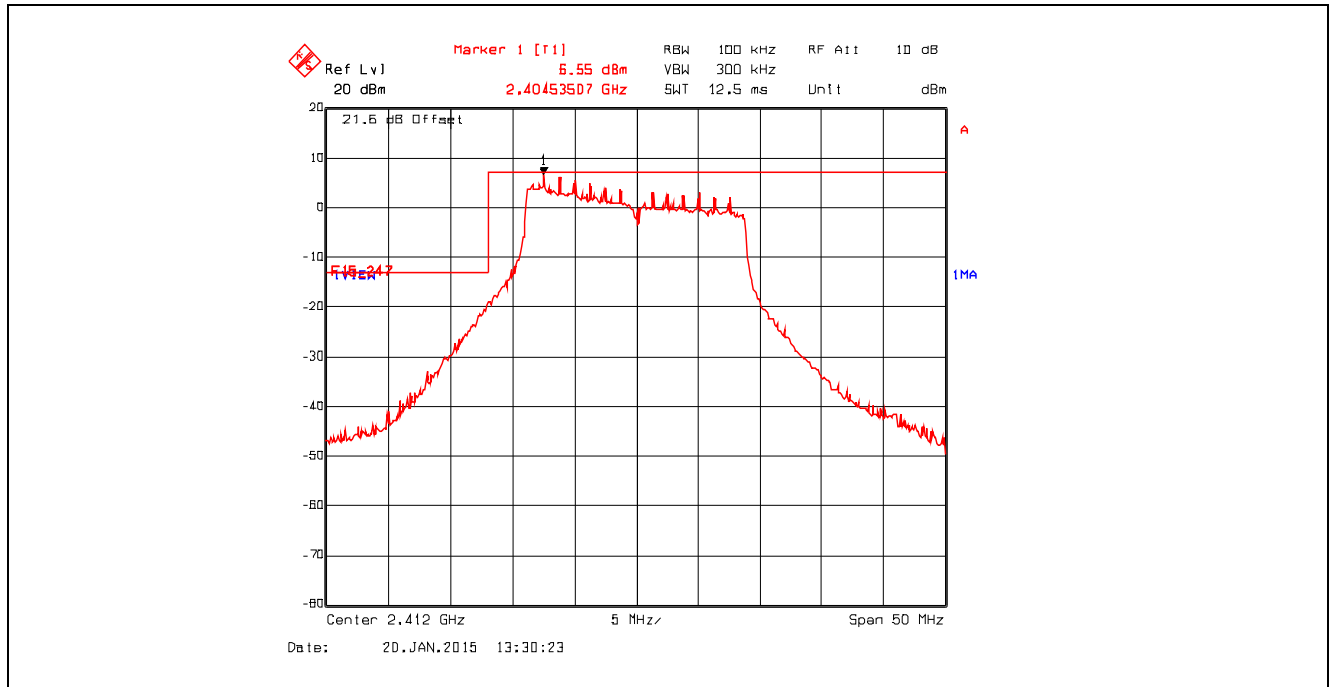
Plot 5.4.4.1.10. Band-Edge RF Conducted Emissions
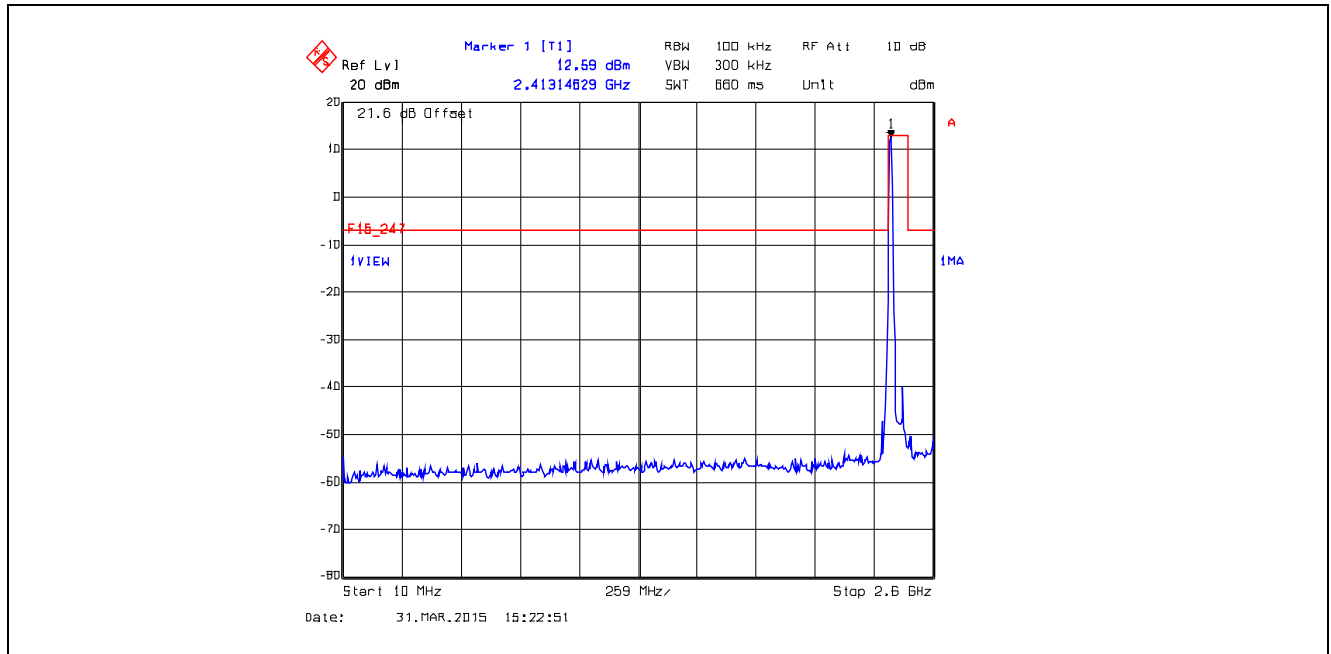Chain #1, Data Rate 11, Software Output Power Setting 19, Higher Band-edge

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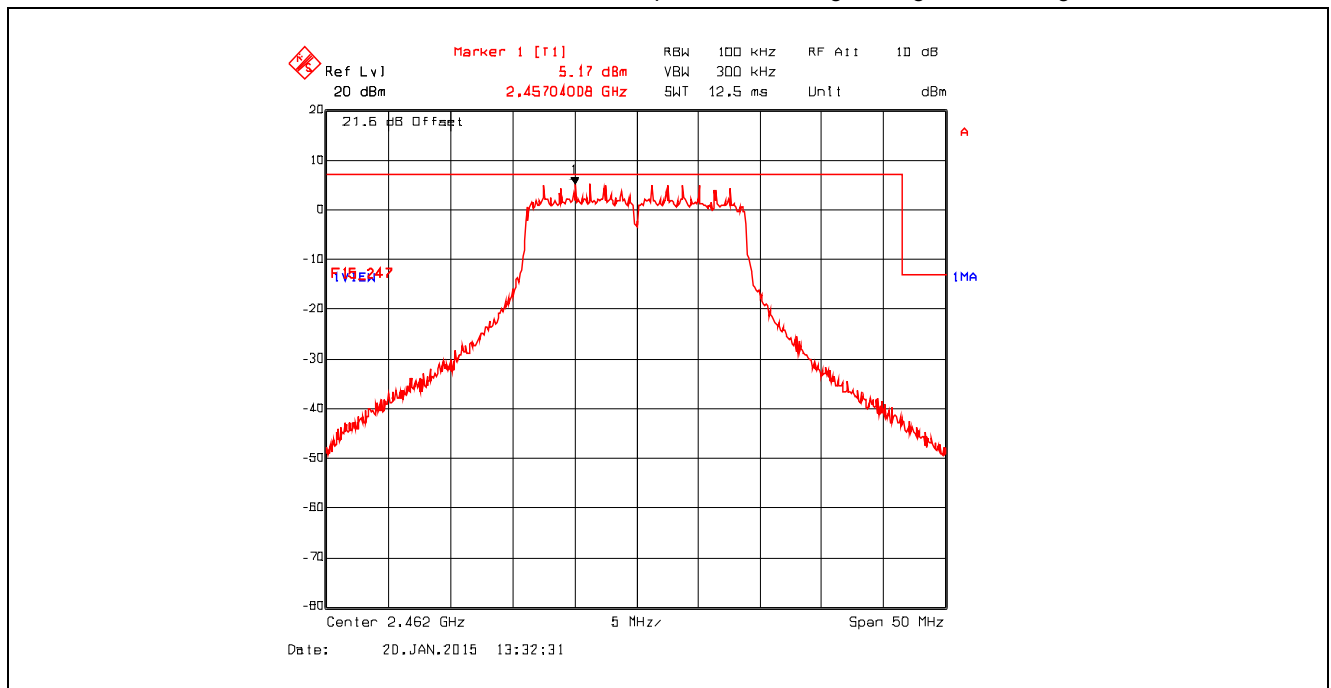
Plot 5.4.4.1.11. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 11, Software Output Power Setting 19, Lower Band-edge

Plot 5.4.4.1.12. Band-Edge RF Conducted Emissions
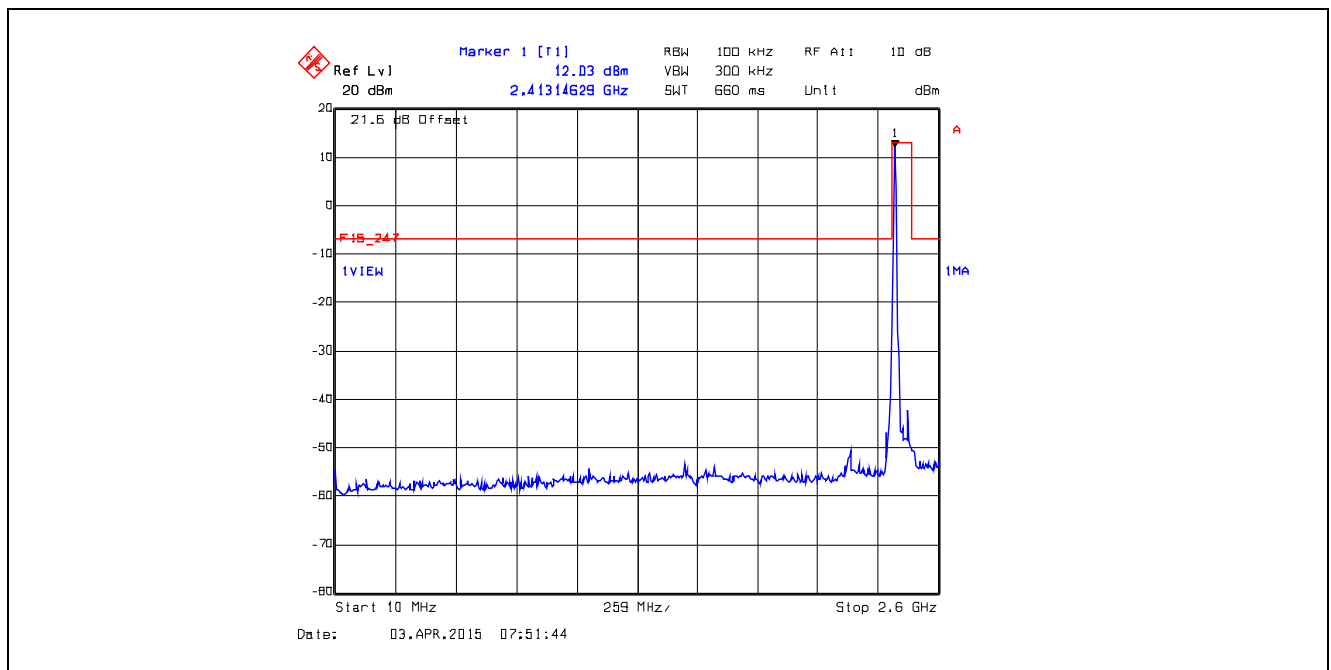Chain #2, Data Rate 11, Software Output Power Setting 19, Higher Band-edge

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Plot 5.4.4.1.13. Band-Edge RF Conducted Emissions
Chain #1, Data Rate 15, Software Output Power Setting 17, Lower Band-edge

Plot 5.4.4.1.14. Band-Edge RF Conducted Emissions
Chain #1, Data Rate 15, Software Output Power Setting 17, Higher Band-edge

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Plot 5.4.4.1.15. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 15, Software Output Power Setting 17, Lower Band-edge

Plot 5.4.4.1.16. Band-Edge RF Conducted Emissions
Chain #2, Data Rate 15, Software Output Power Setting 17, Higher Band-edge

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5.4.4.2. Spurious RF Conducted Emissions in Non-restricted Frequency Bands

Plot 5.4.4.2.1. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz
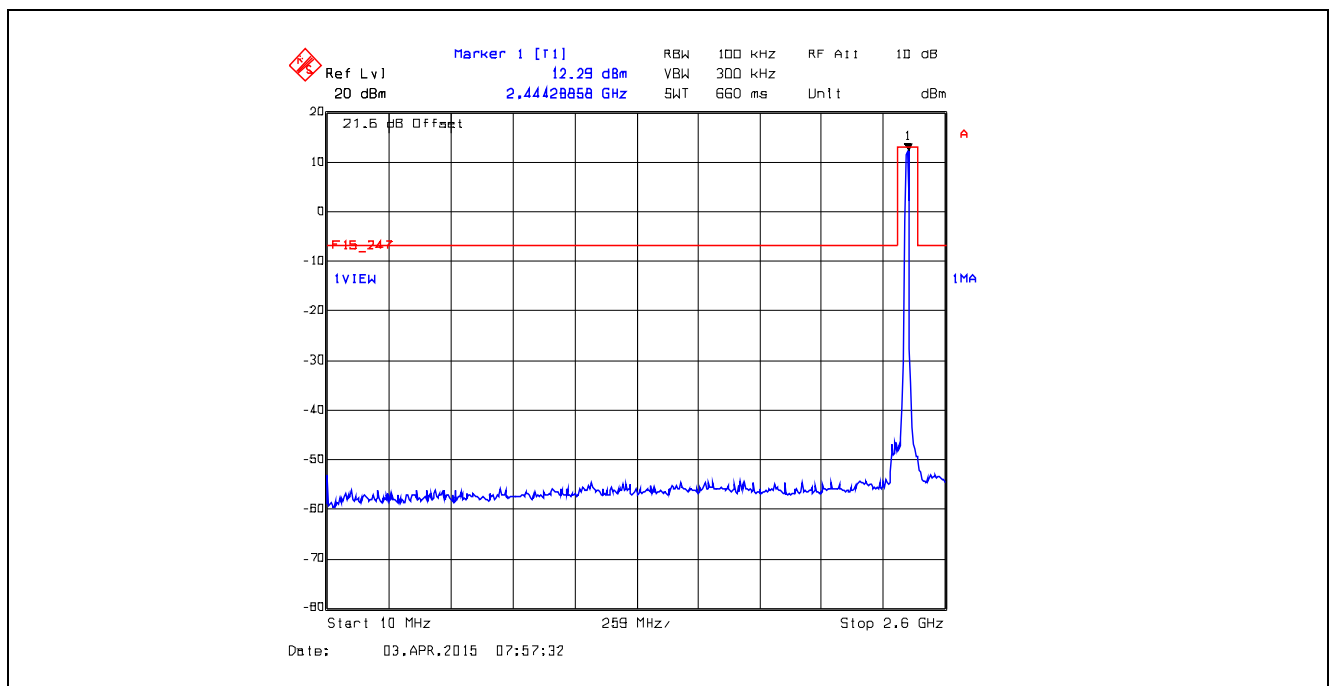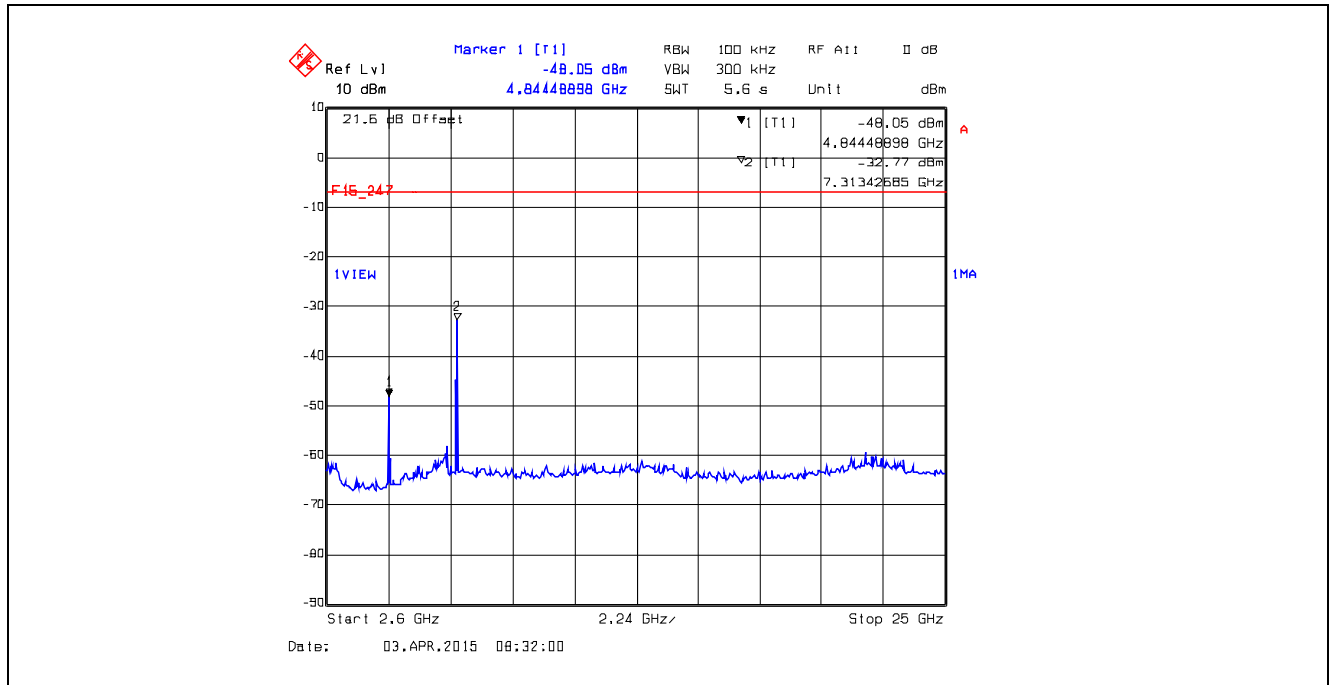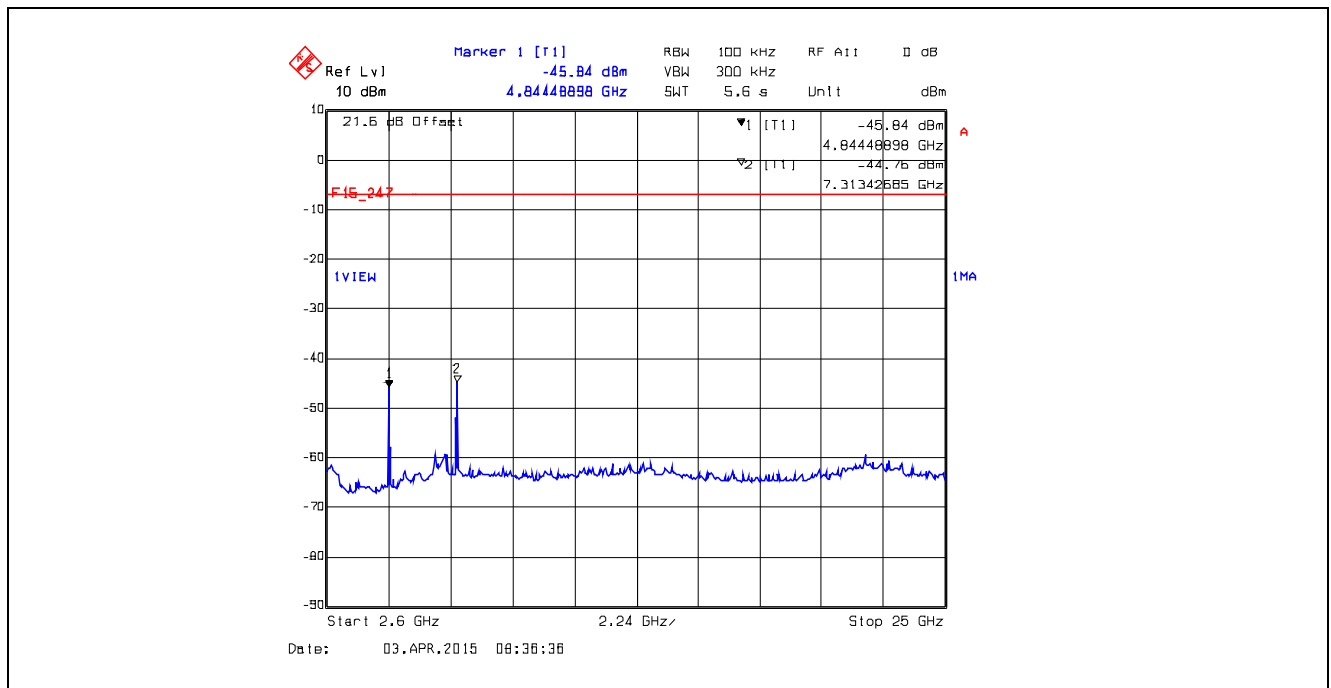

Plot 5.4.4.2.2. Conducted Spurious Emissions in Non-restricted Frequency Bands
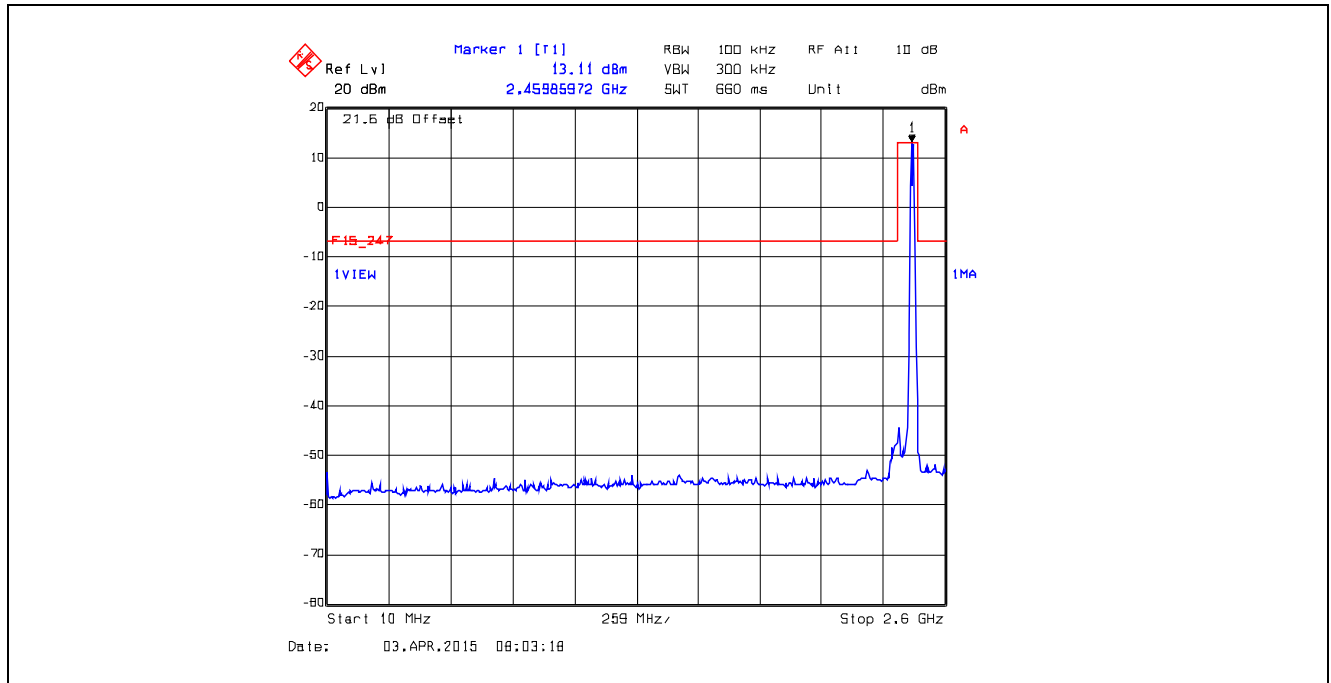Chain #2, Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.3. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz
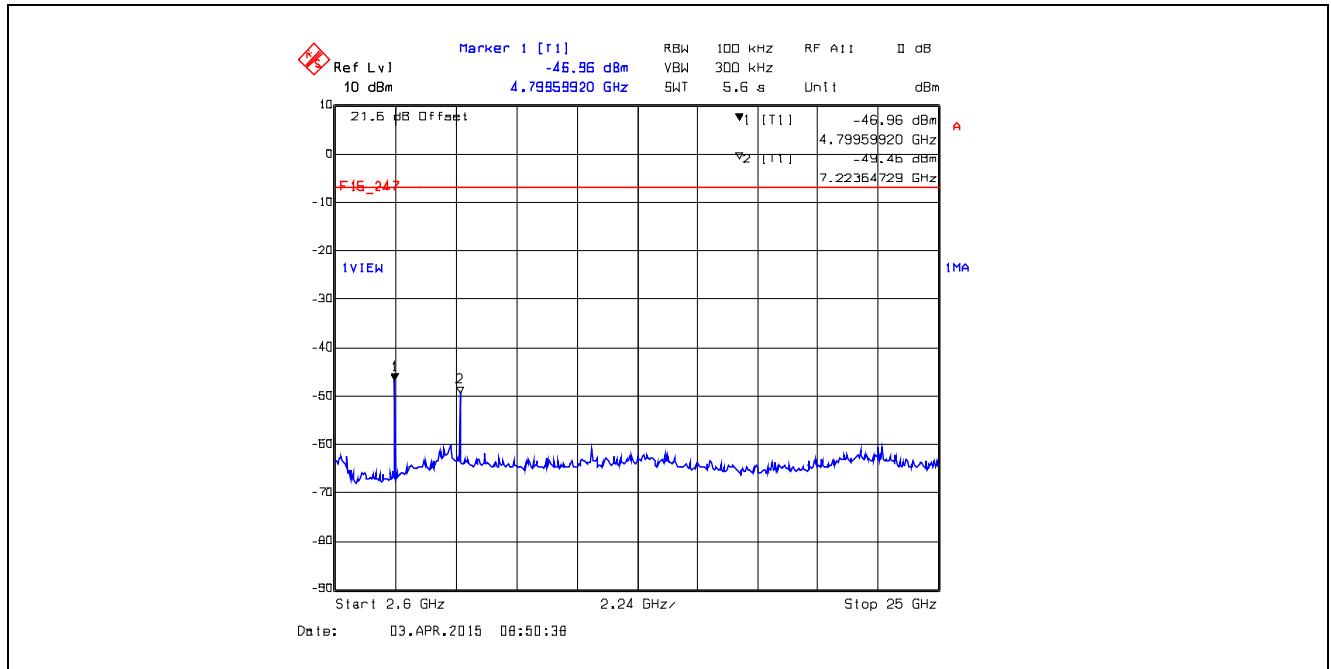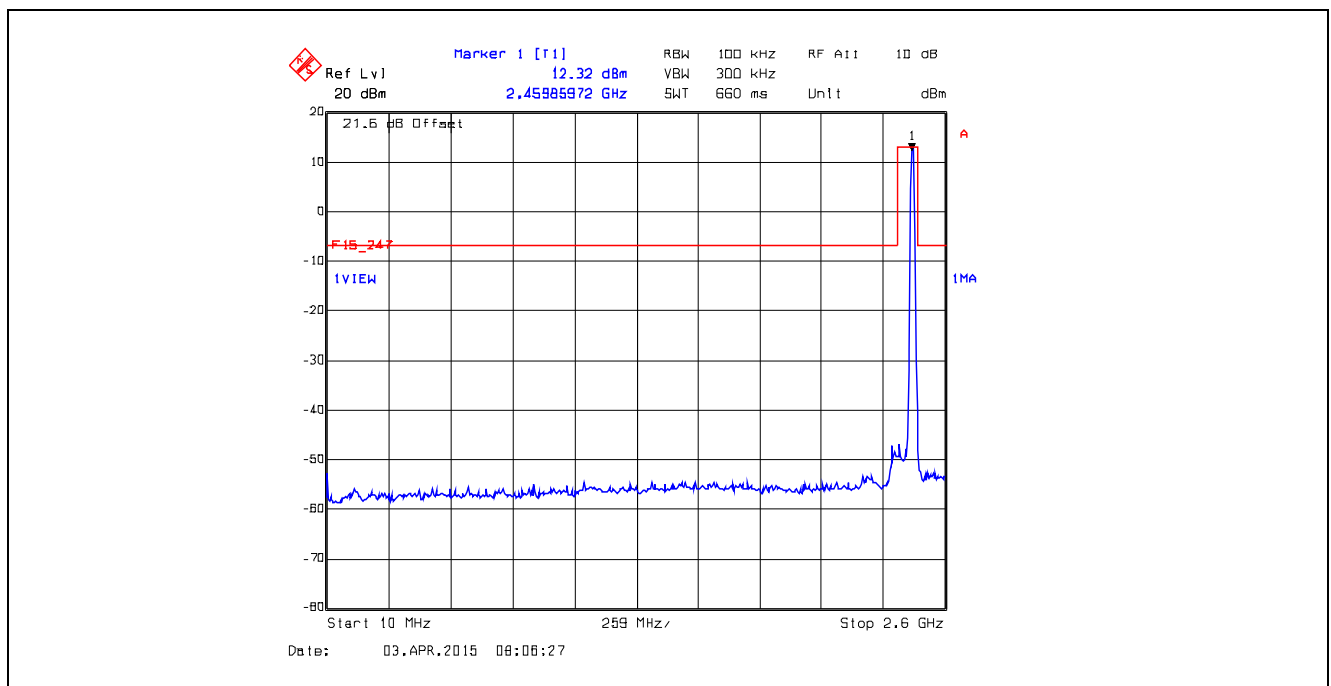

Plot 5.4.4.2.4. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz

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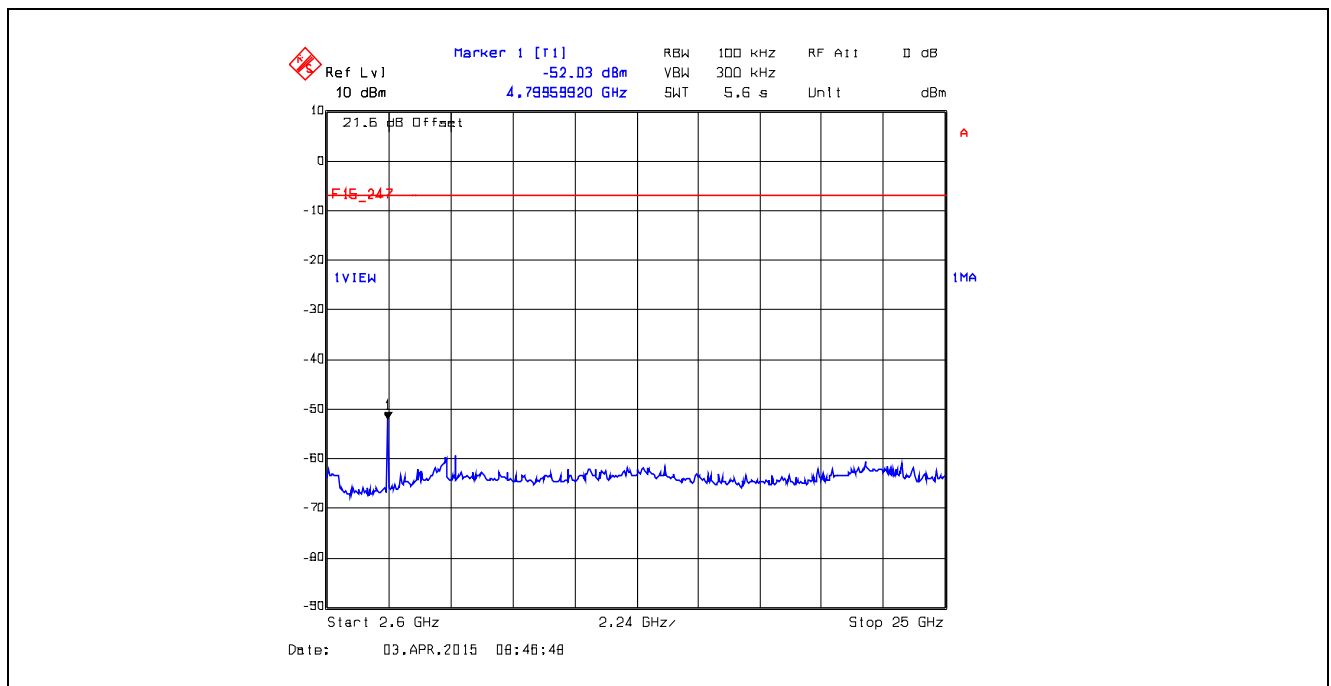
Plot 5.4.4.2.5. Conducted Spurious Emissions in Non-restricted Frequency Bands
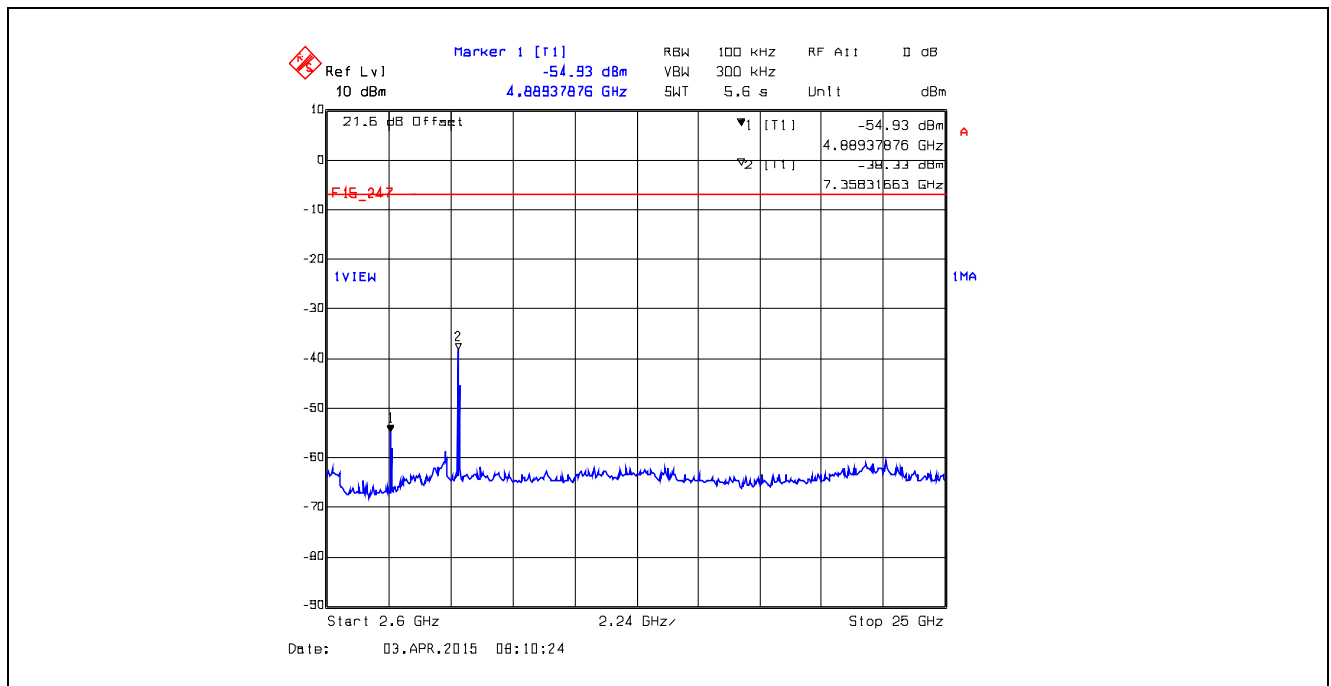Chain #1, Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz
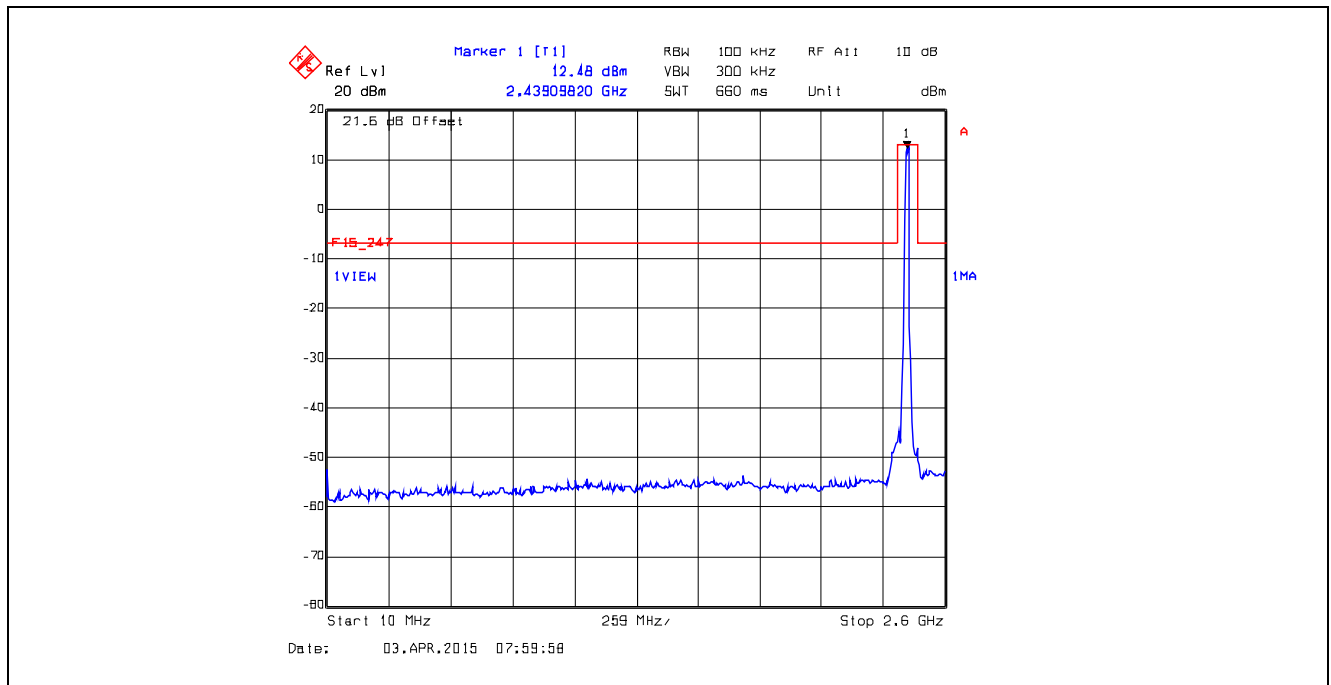
Plot 5.4.4.2.6. Conducted Spurious Emissions in Non-restricted Frequency Bands
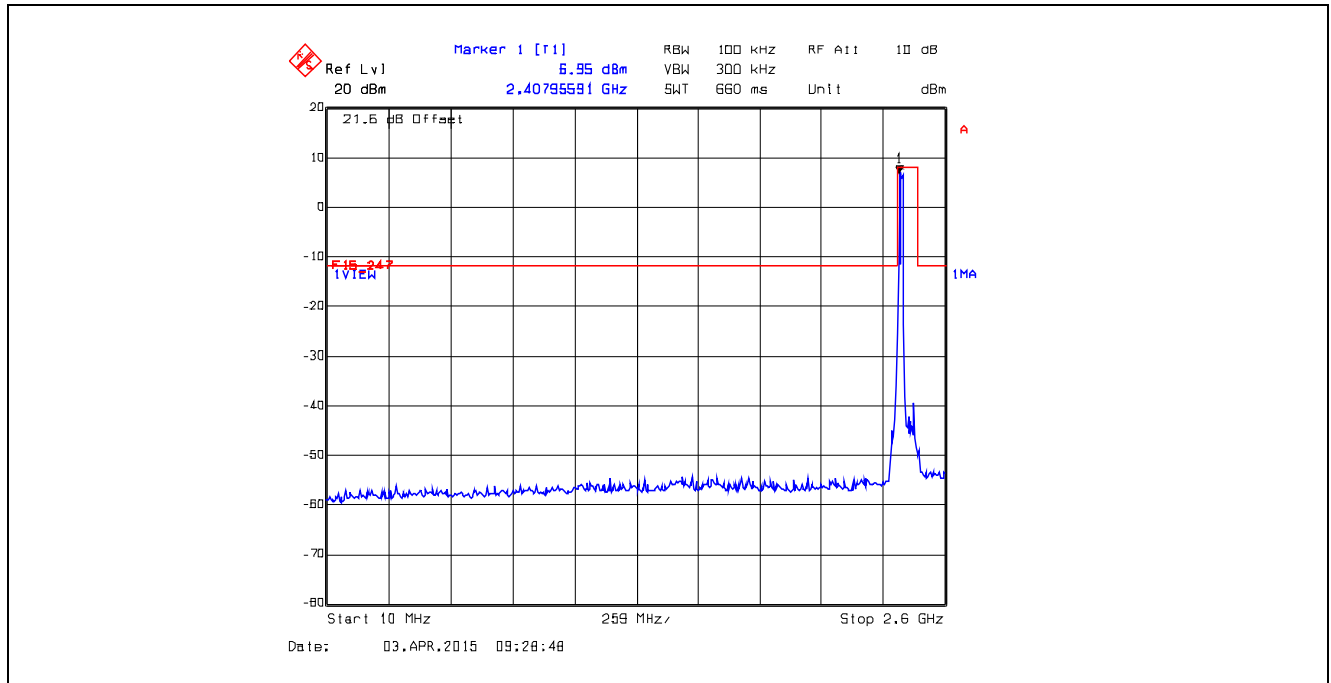Chain #2, Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.7. Conducted Spurious Emissions in Non-restricted Frequency Bands
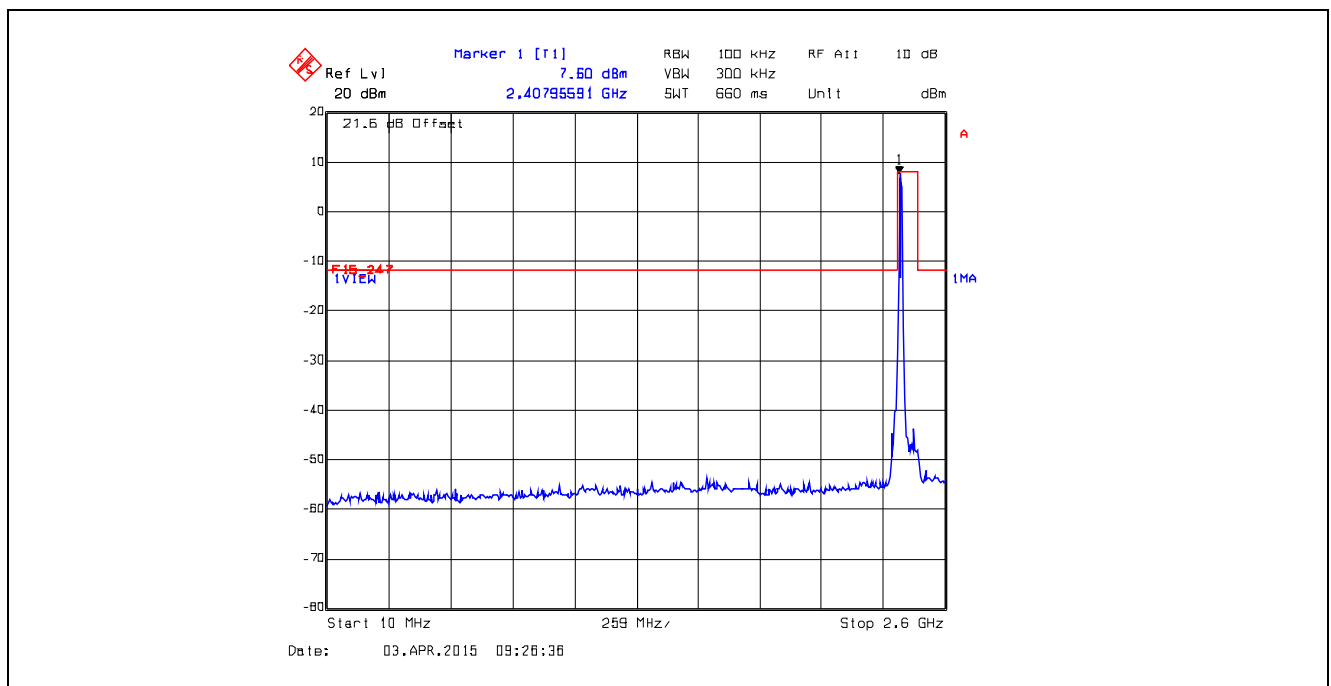Chain #1, Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz

Plot 5.4.4.2.8. Conducted Spurious Emissions in Non-restricted Frequency Bands
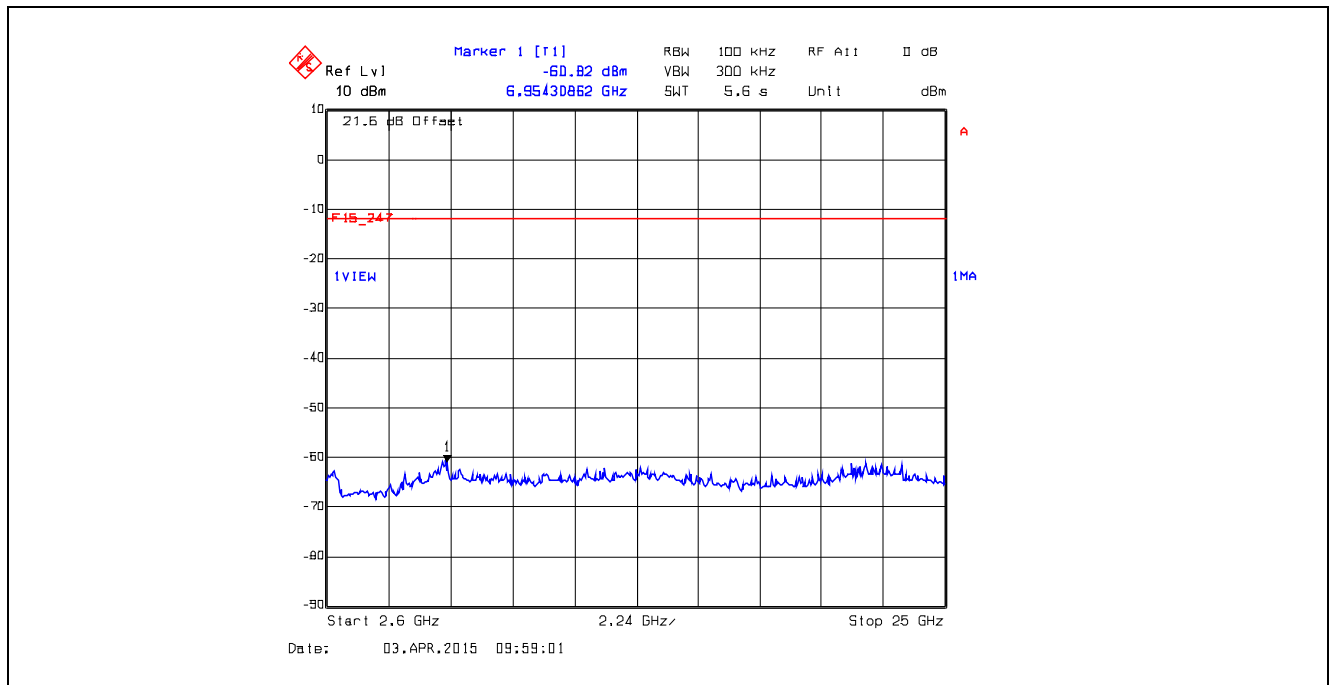Chain #2, Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.9. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz
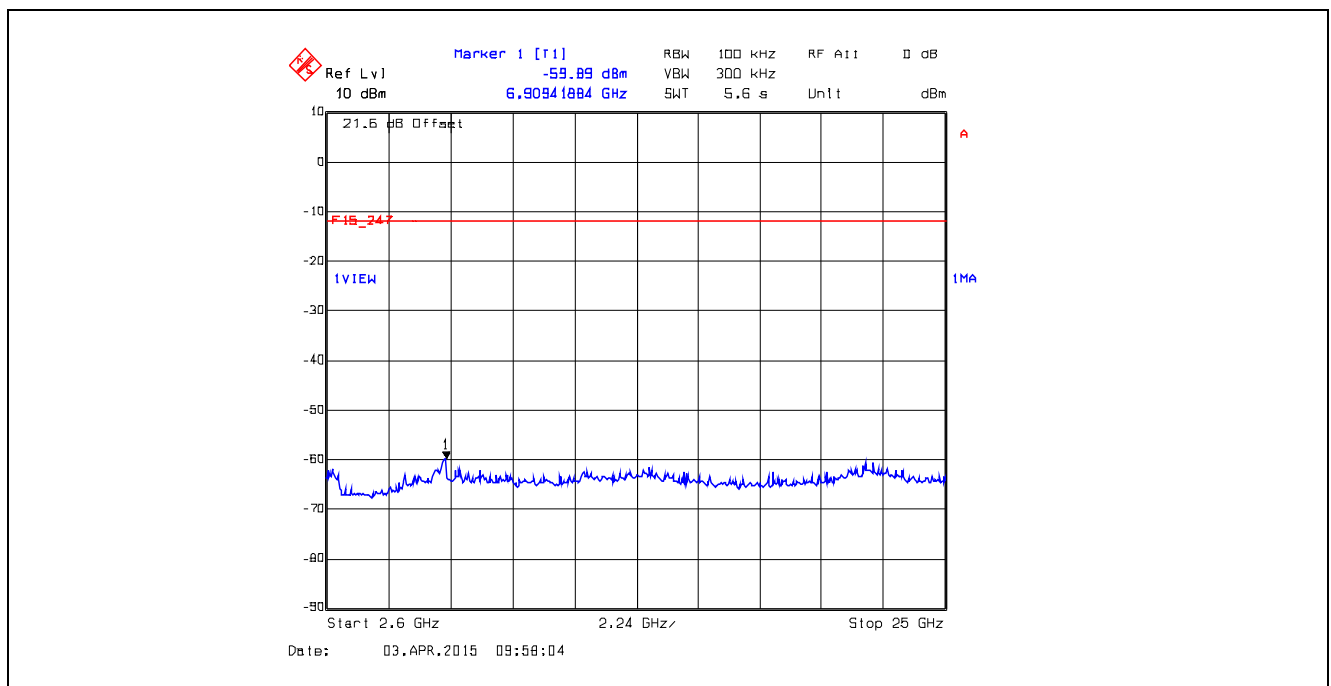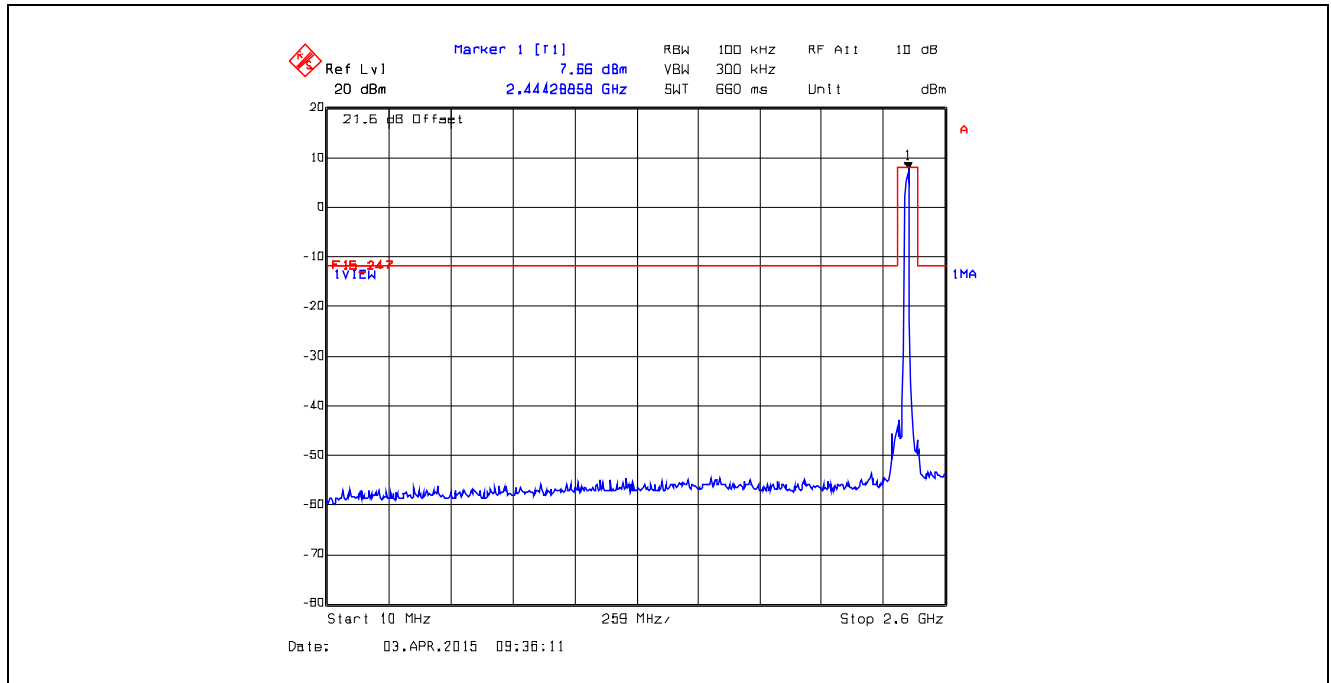

Plot 5.4.4.2.10. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.11. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz
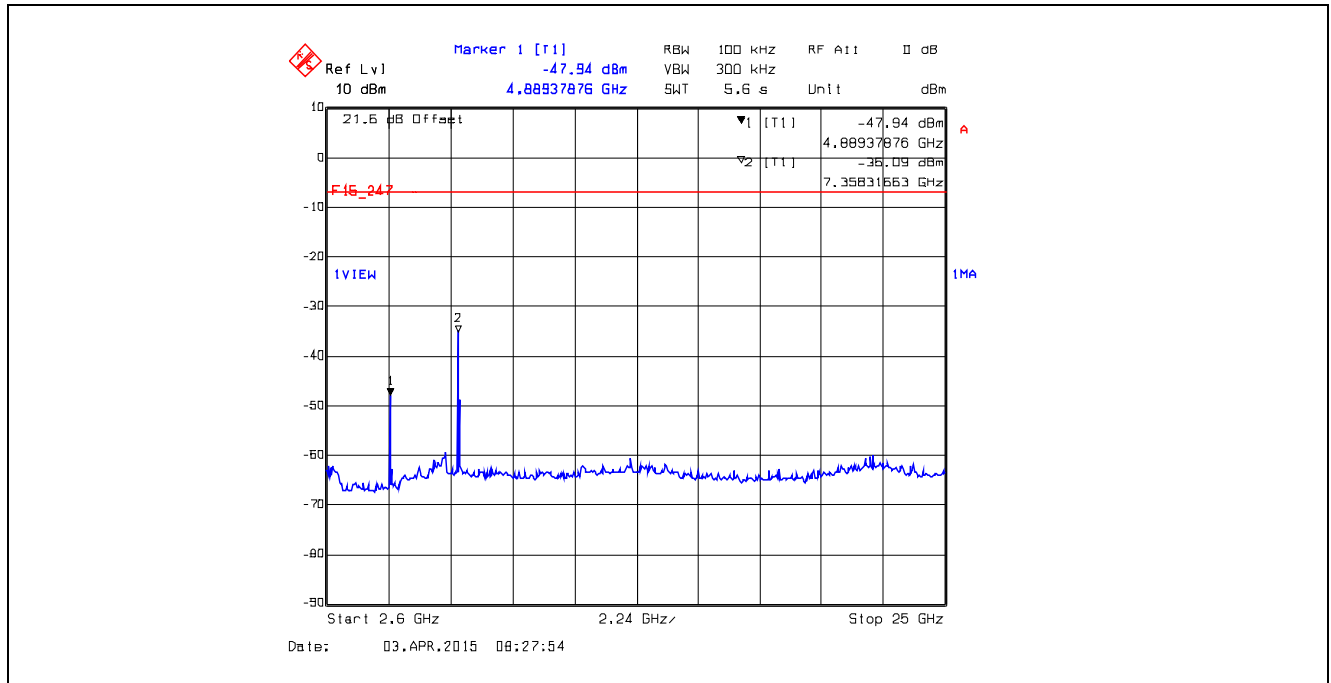
Plot 5.4.4.2.12. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 2.6 GHz – 25 GHz
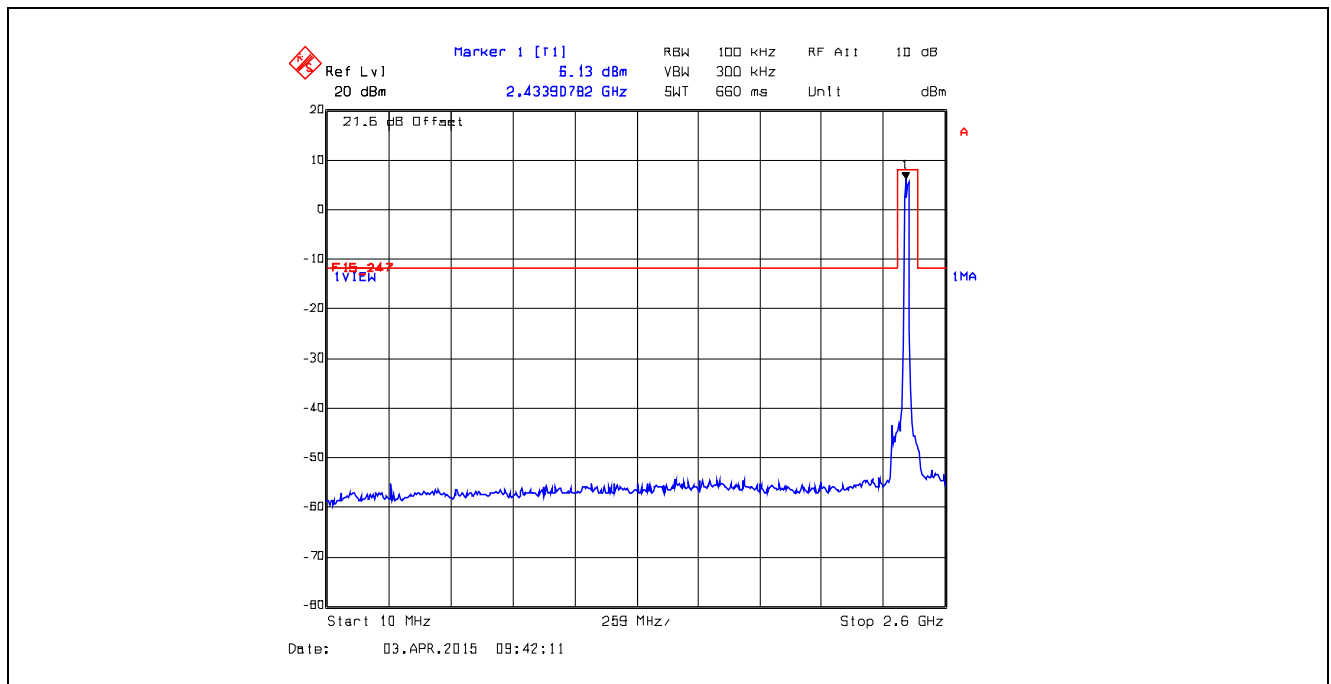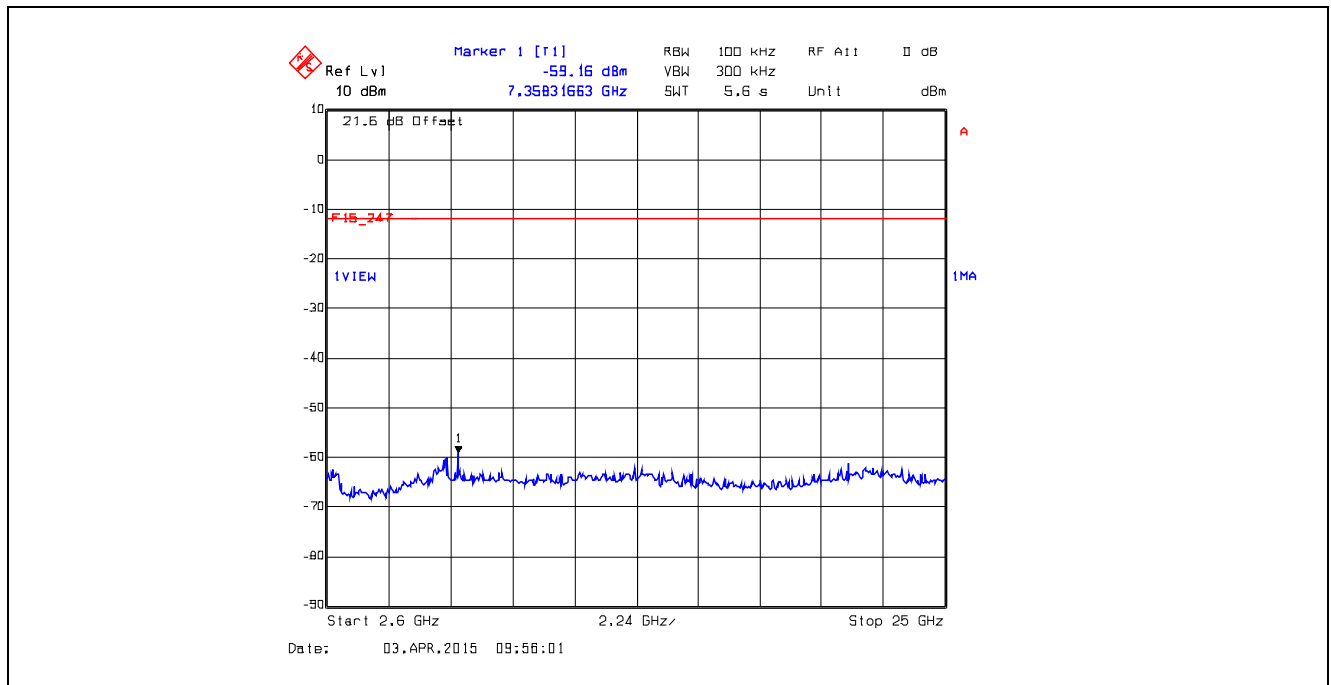
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Plot 5.4.4.2.13. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz
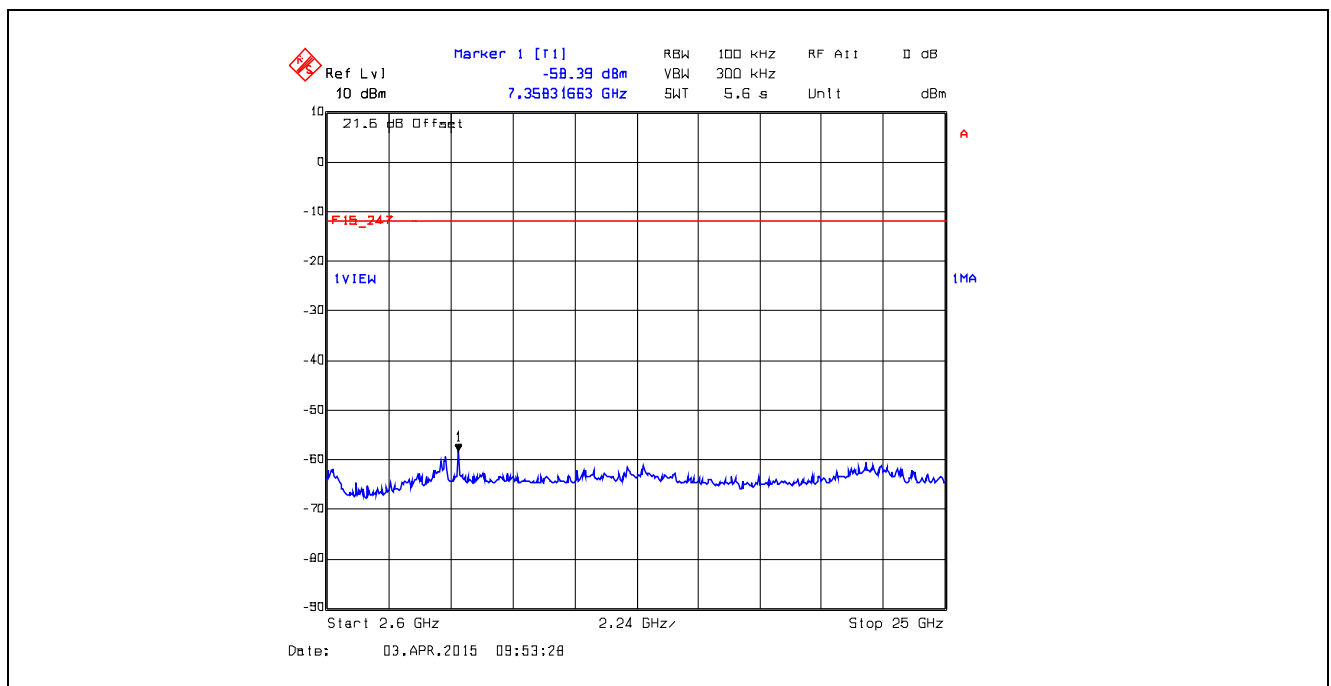

Plot 5.4.4.2.14. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz
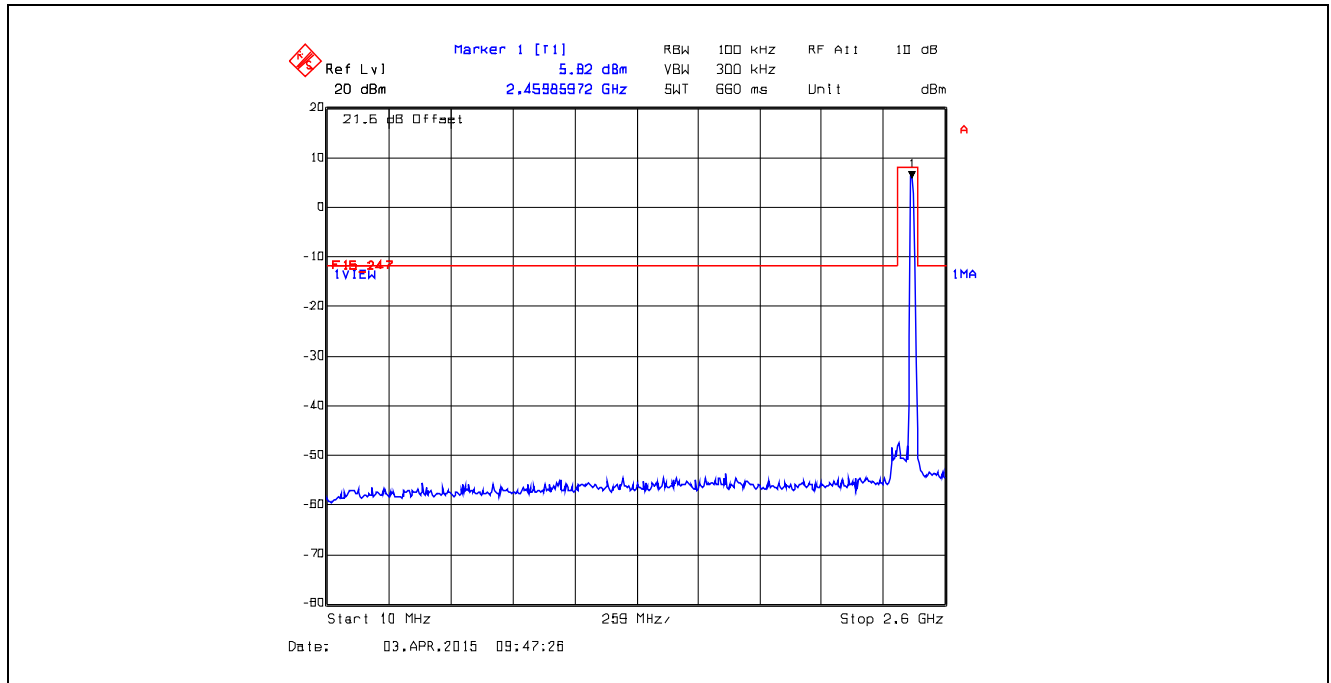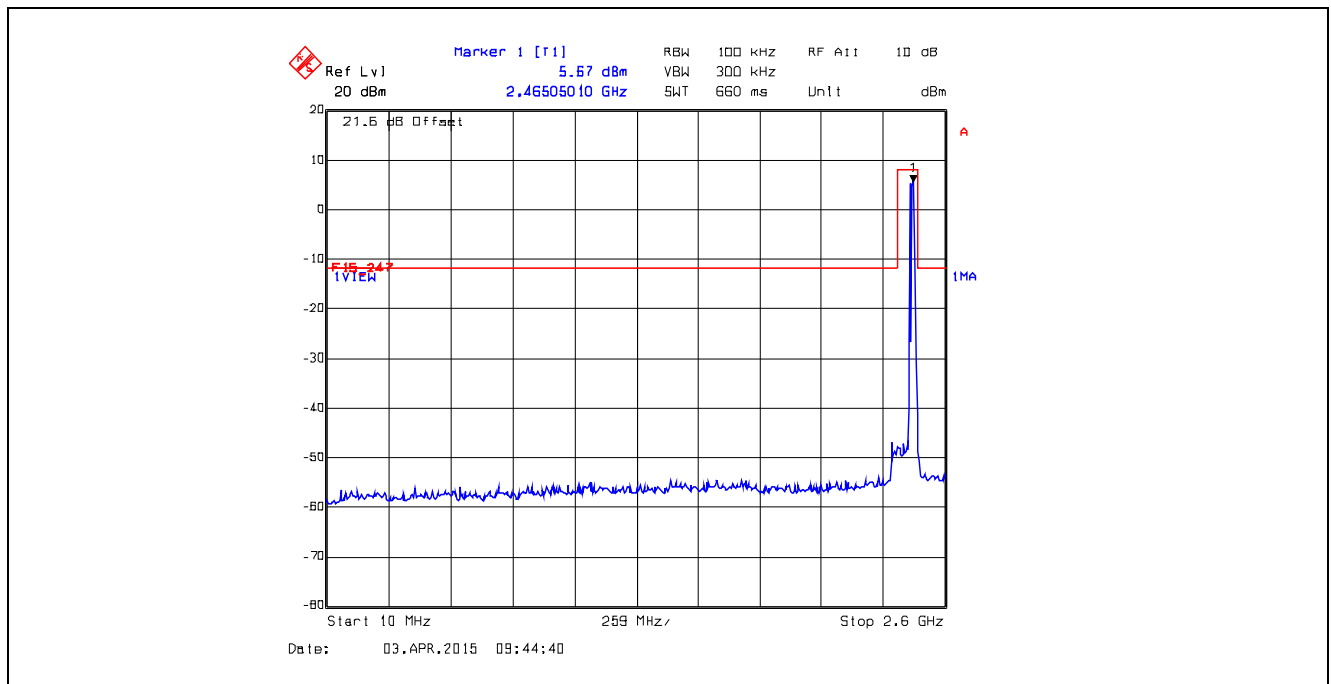
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Plot 5.4.4.2.15. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz

Plot 5.4.4.2.16. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.17. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz

Plot 5.4.4.2.18. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz

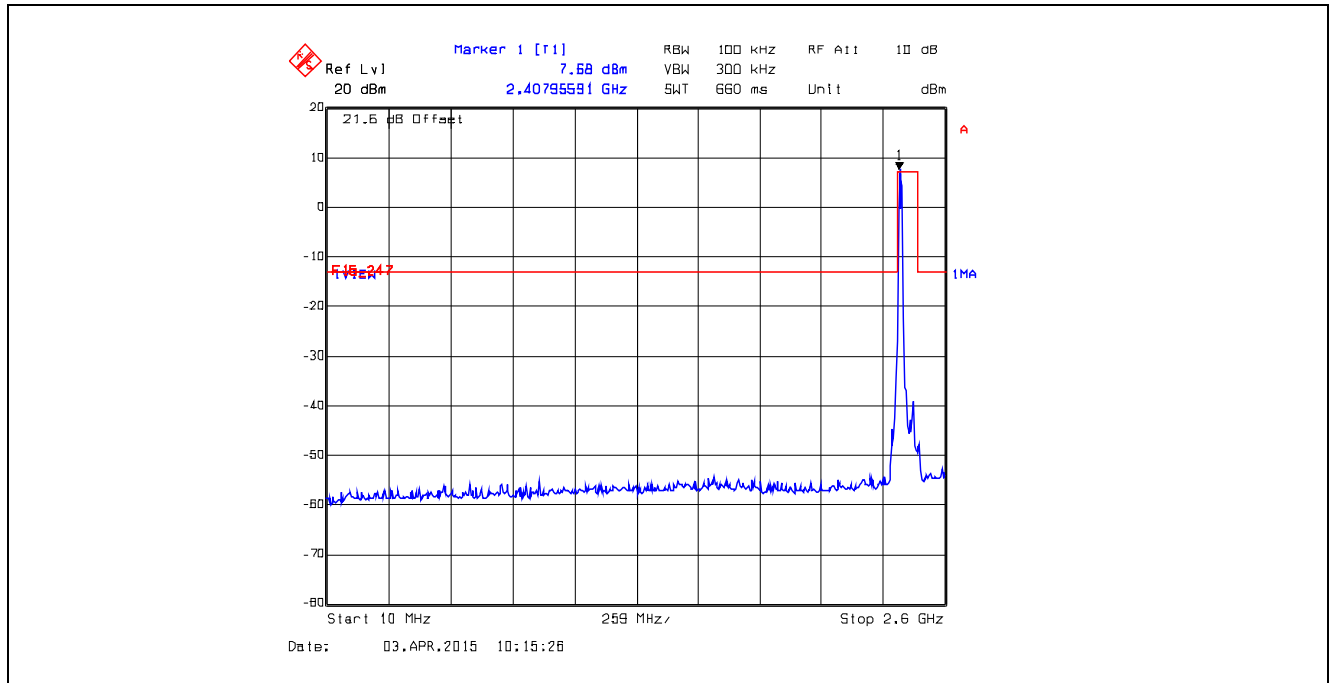**ULTRATECH GROUP OF LABS**   File #: 15MCRS079_FCC15C247DTS
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Plot 5.4.4.2.19. Conducted Spurious Emissions in Non-restricted Frequency Bands
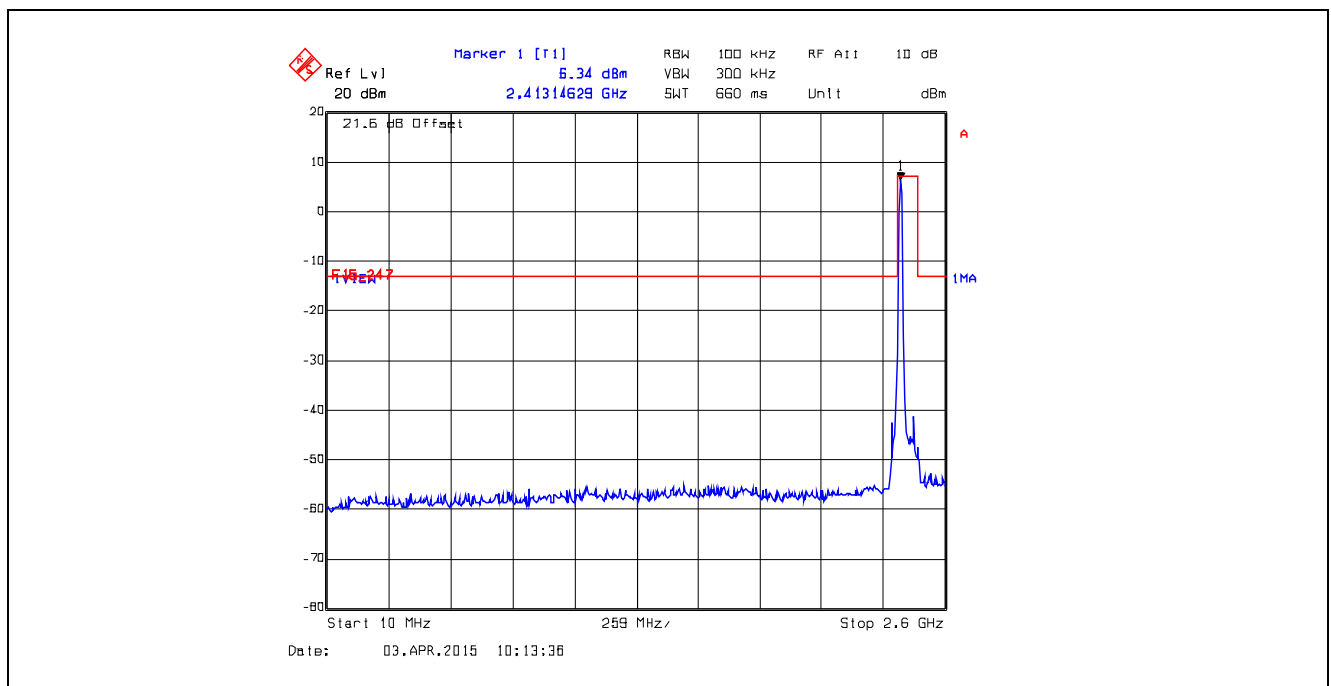Chain #1, Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz

Plot 5.4.4.2.20. Conducted Spurious Emissions in Non-restricted Frequency Bands
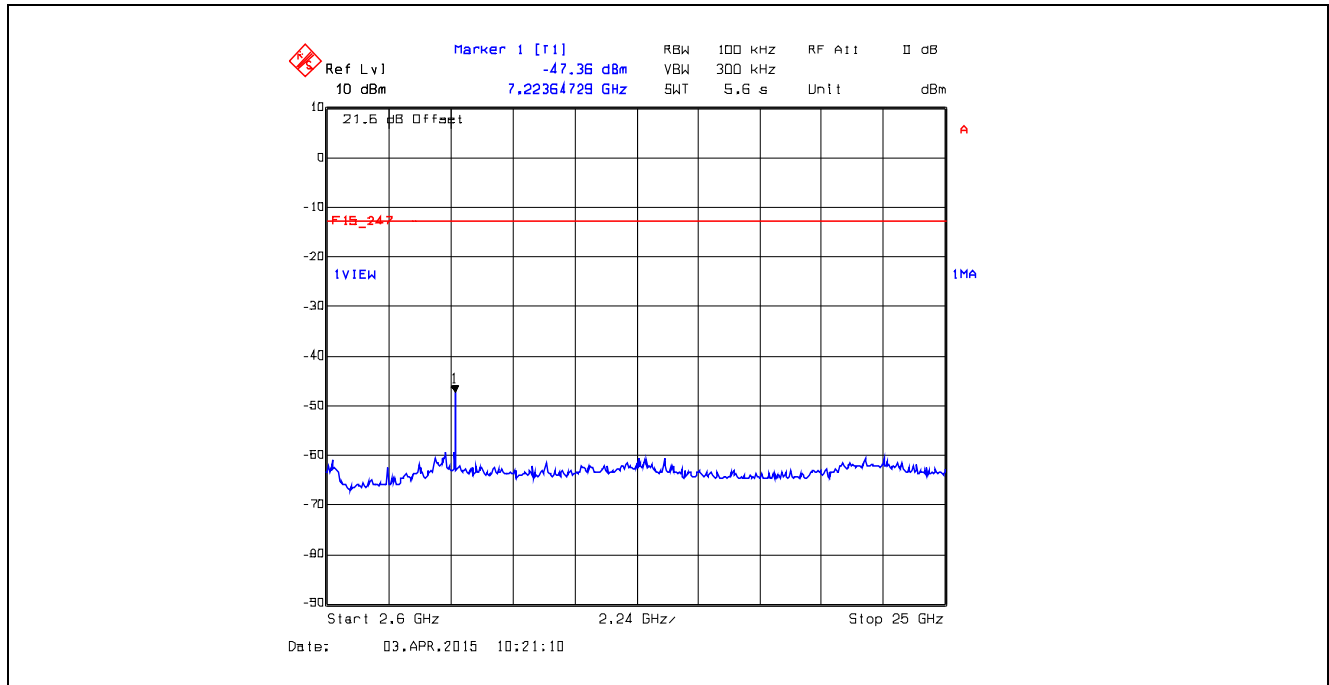Chain #2, Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.21. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz
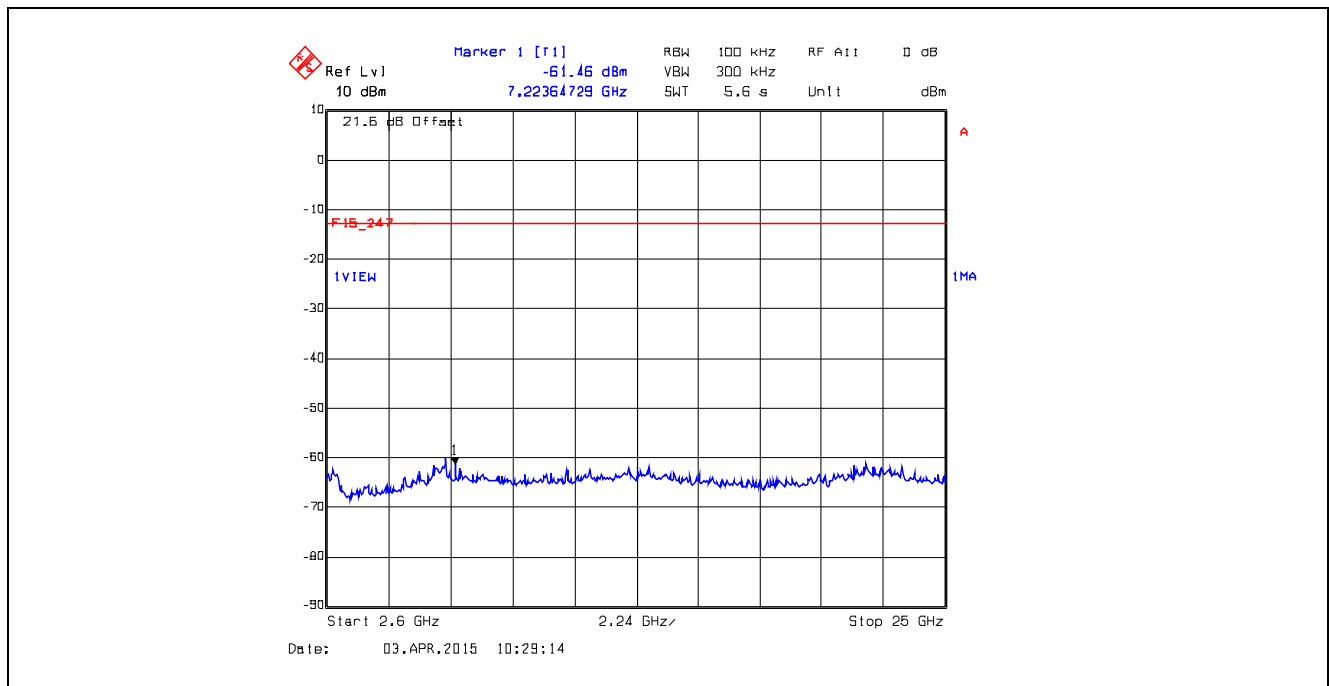

Plot 5.4.4.2.22. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.23. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz
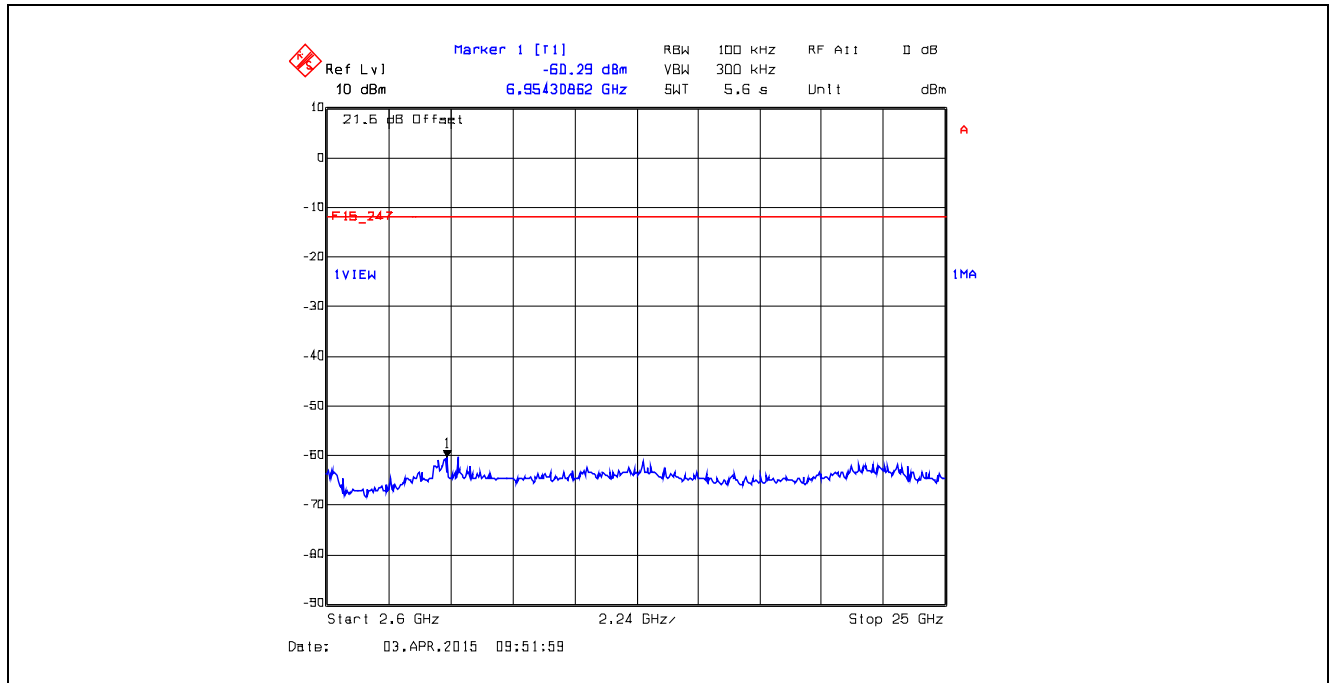
Plot 5.4.4.2.24. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 2.6 GHz – 25 GHz

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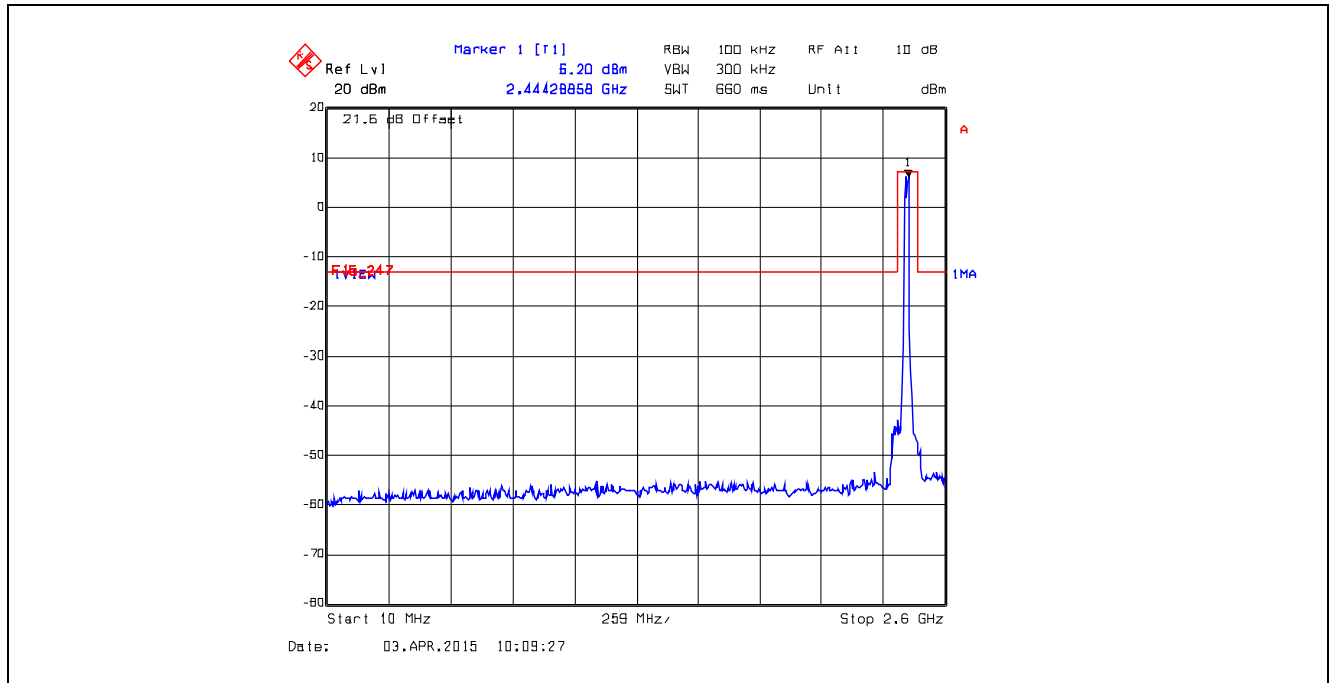**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**
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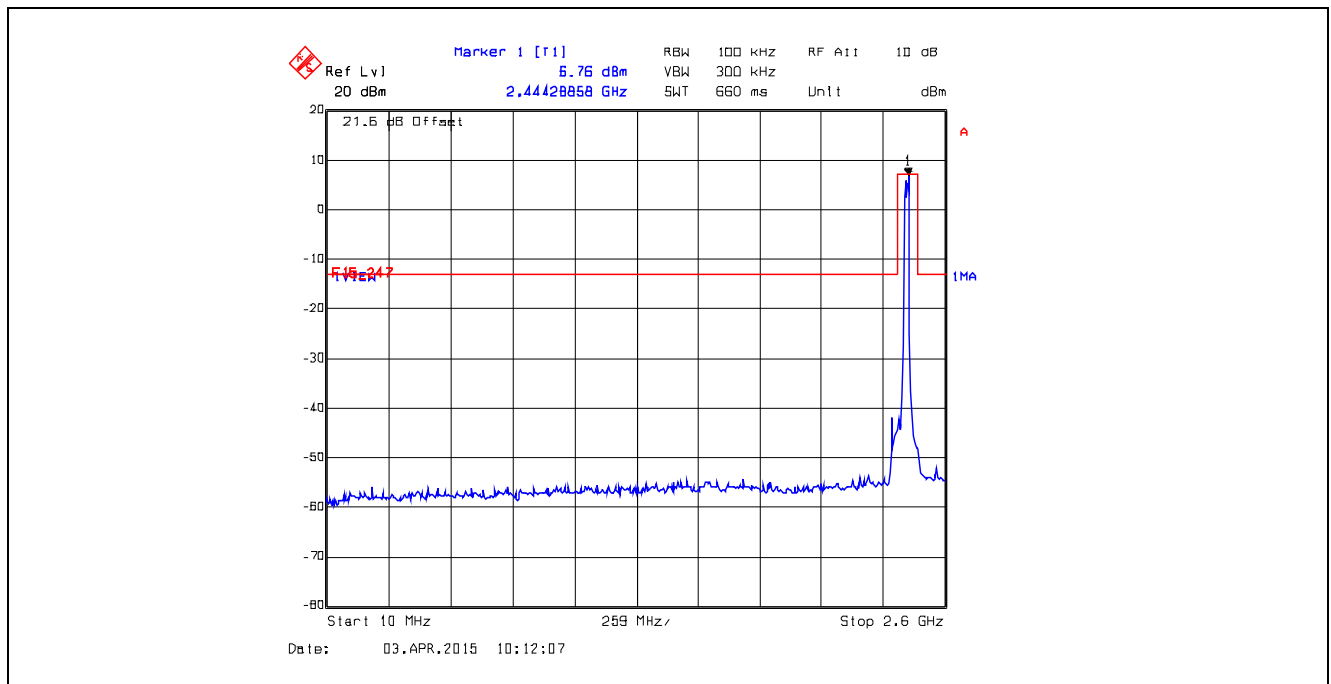**File #: 15MCRS079_FCC15C247DTS**
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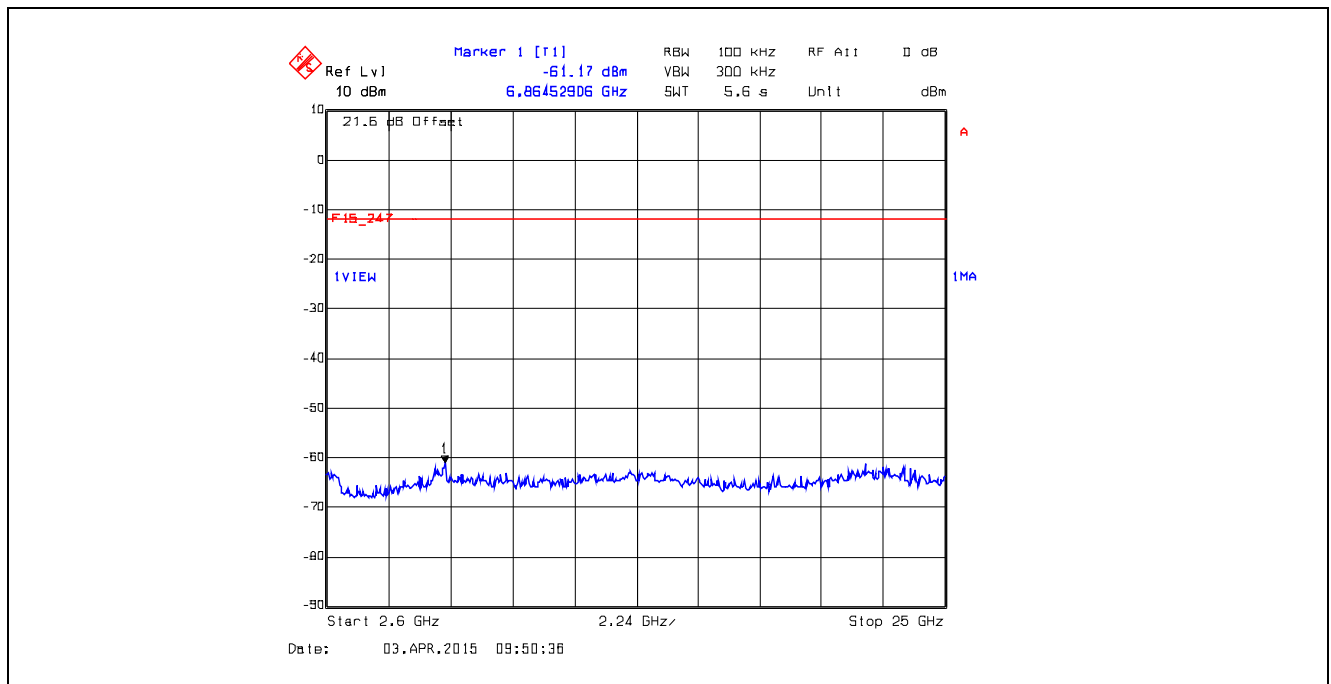
Plot 5.4.4.2.25. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz

Plot 5.4.4.2.26. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz

Plot 5.4.4.2.27. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz

Plot 5.4.4.2.28. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz

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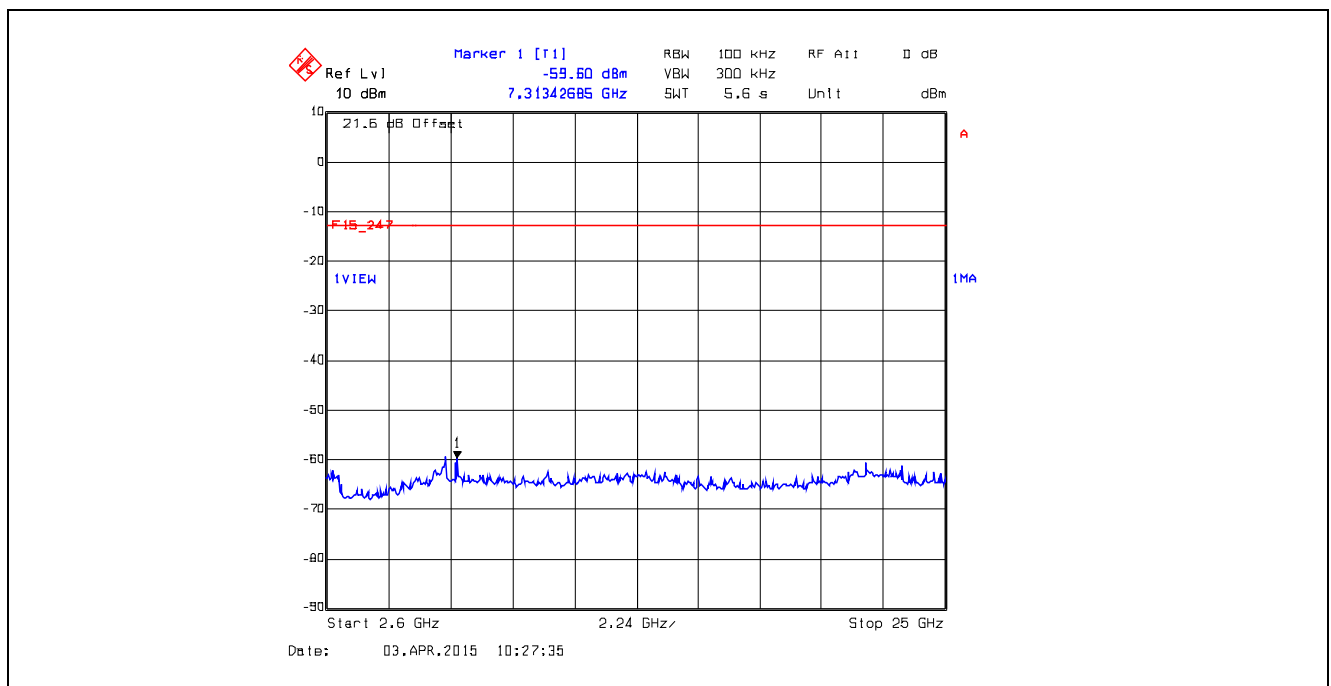**Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com**

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Plot 5.4.4.2.29. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz
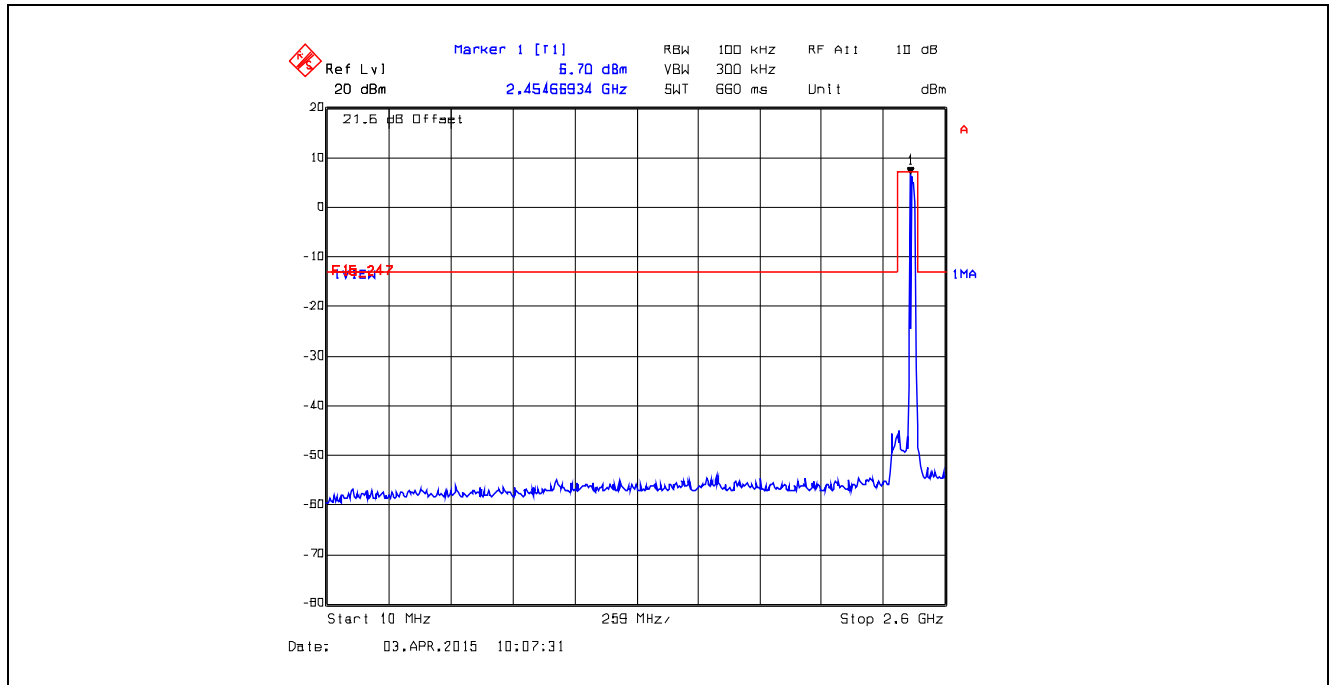

Plot 5.4.4.2.30. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.31. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz
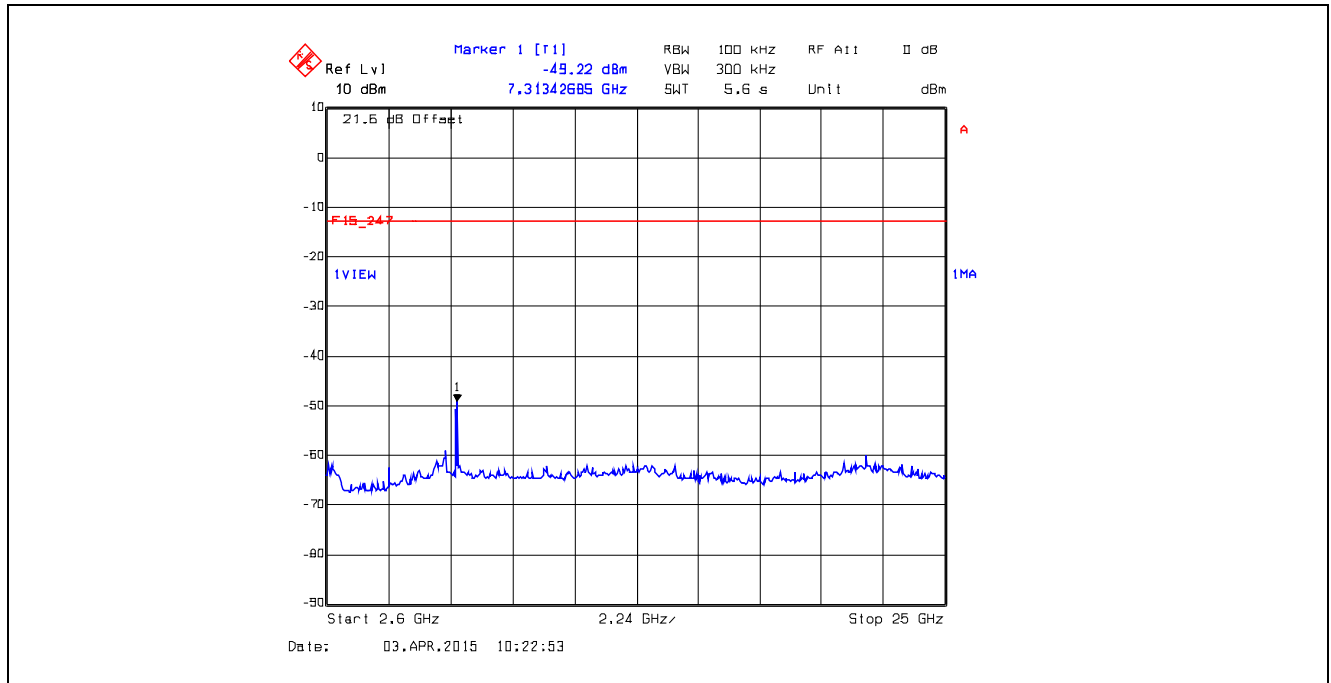
Plot 5.4.4.2.32. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz
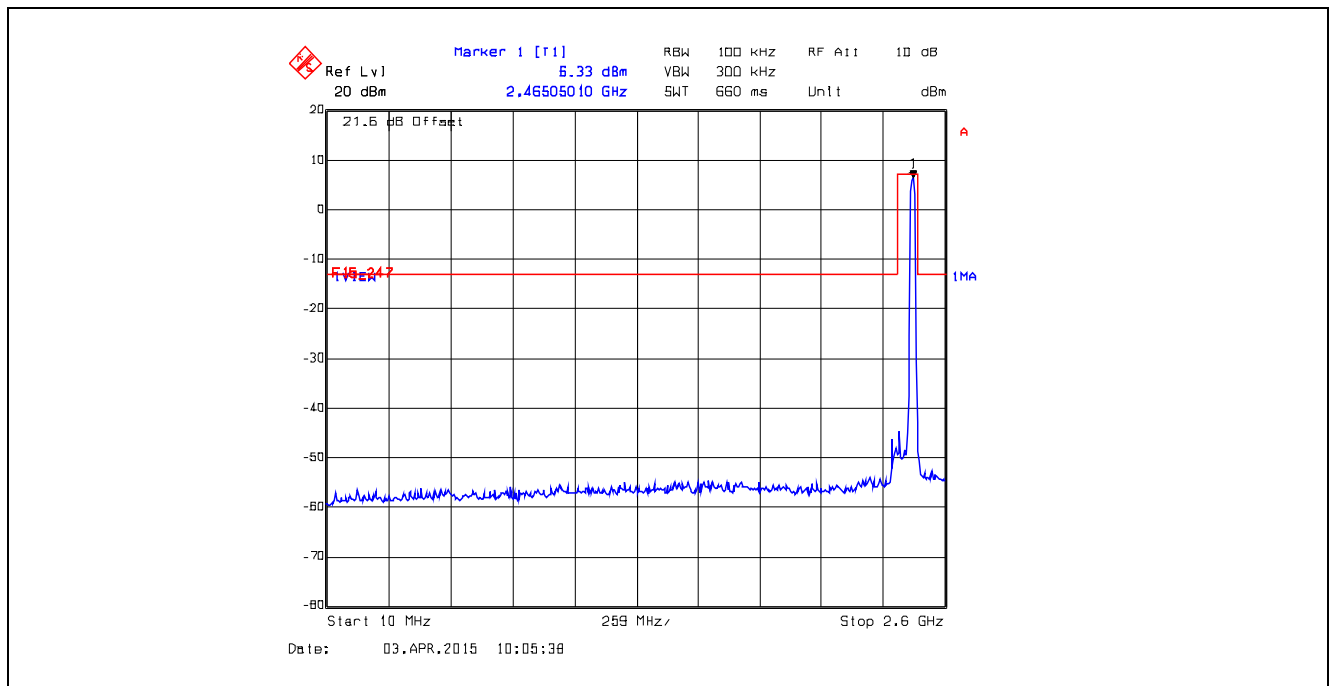
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Plot 5.4.4.2.33. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz

Plot 5.4.4.2.34. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 10 MHz – 2.6 GHz

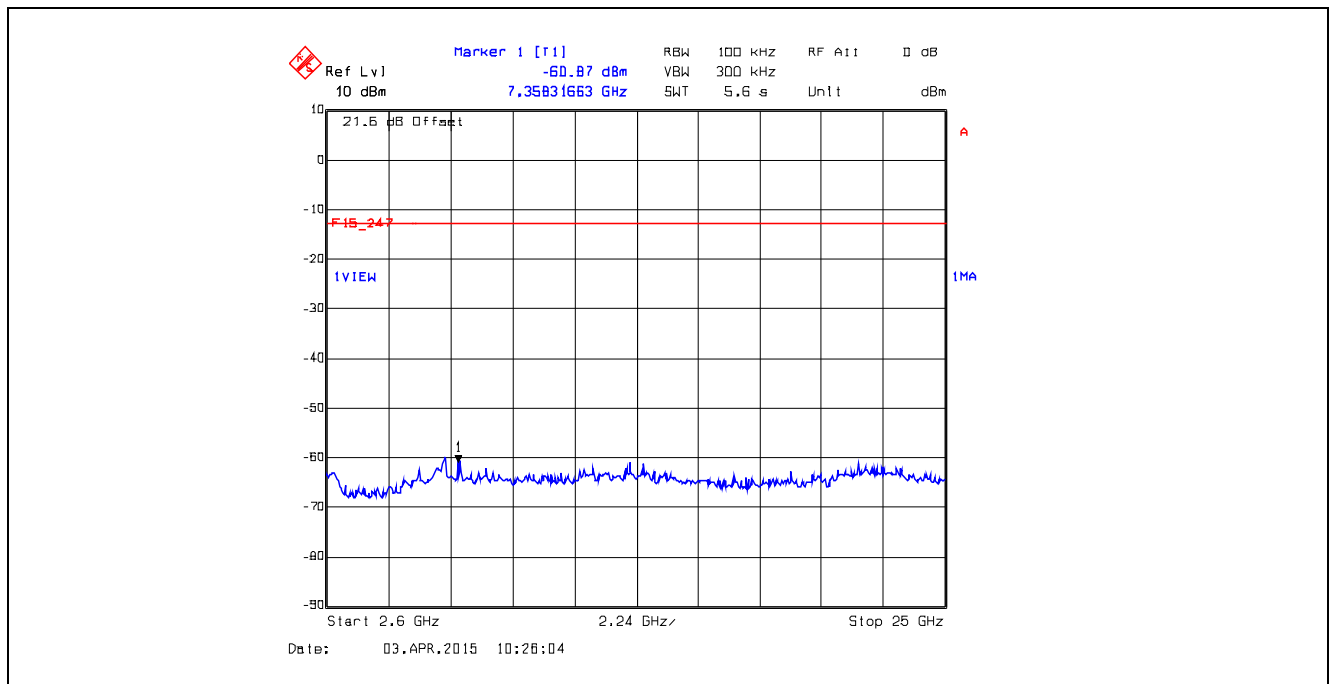*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Plot 5.4.4.2.35. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz
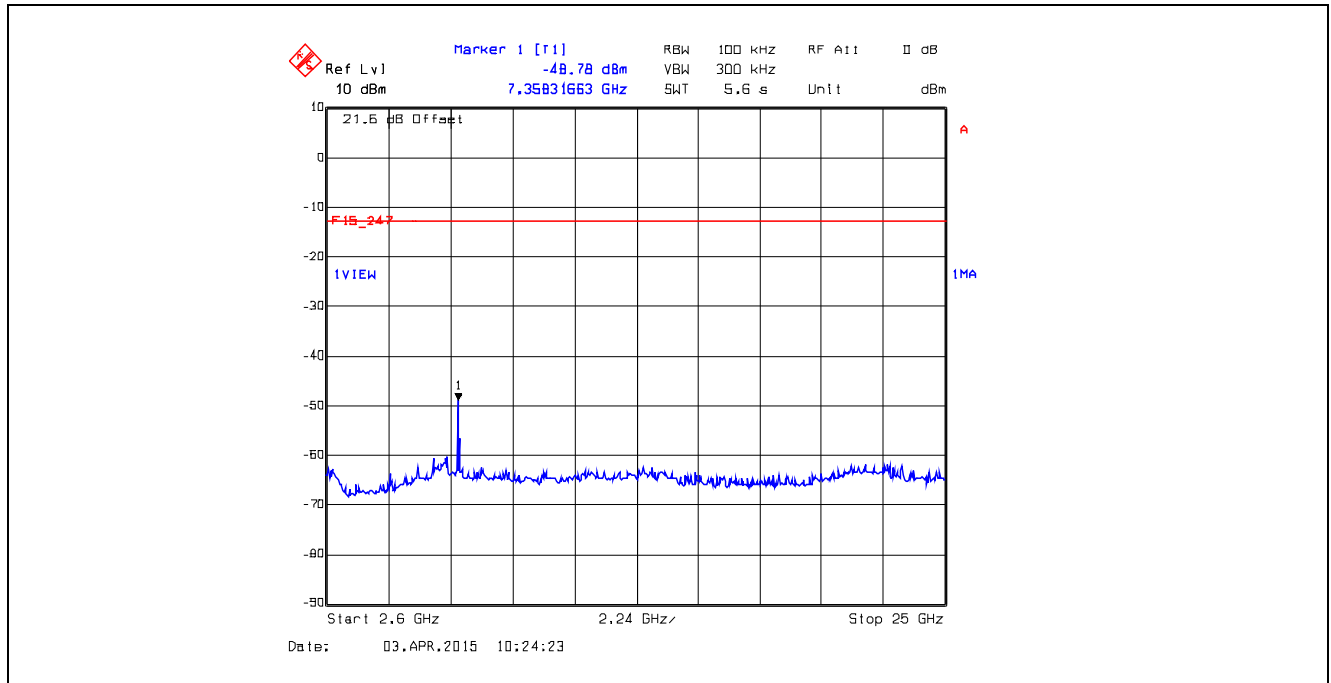
Plot 5.4.4.2.36. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.37. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz
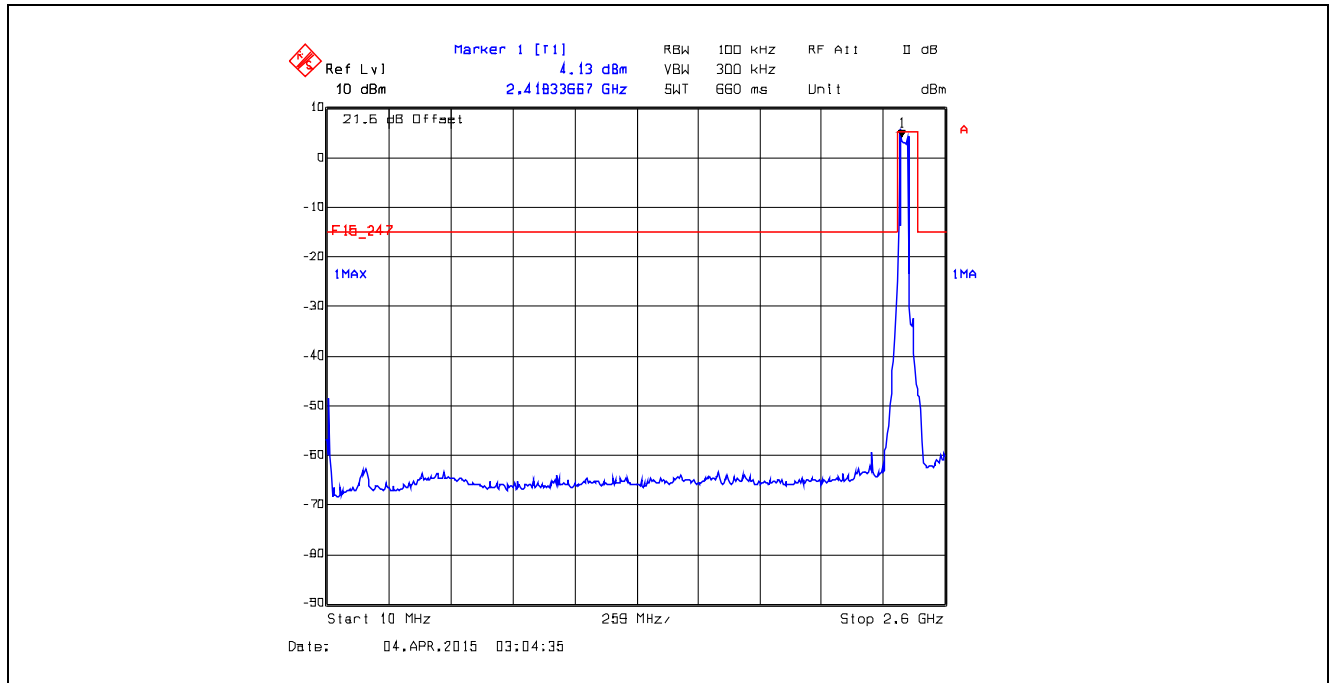
Plot 5.4.4.2.38. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz

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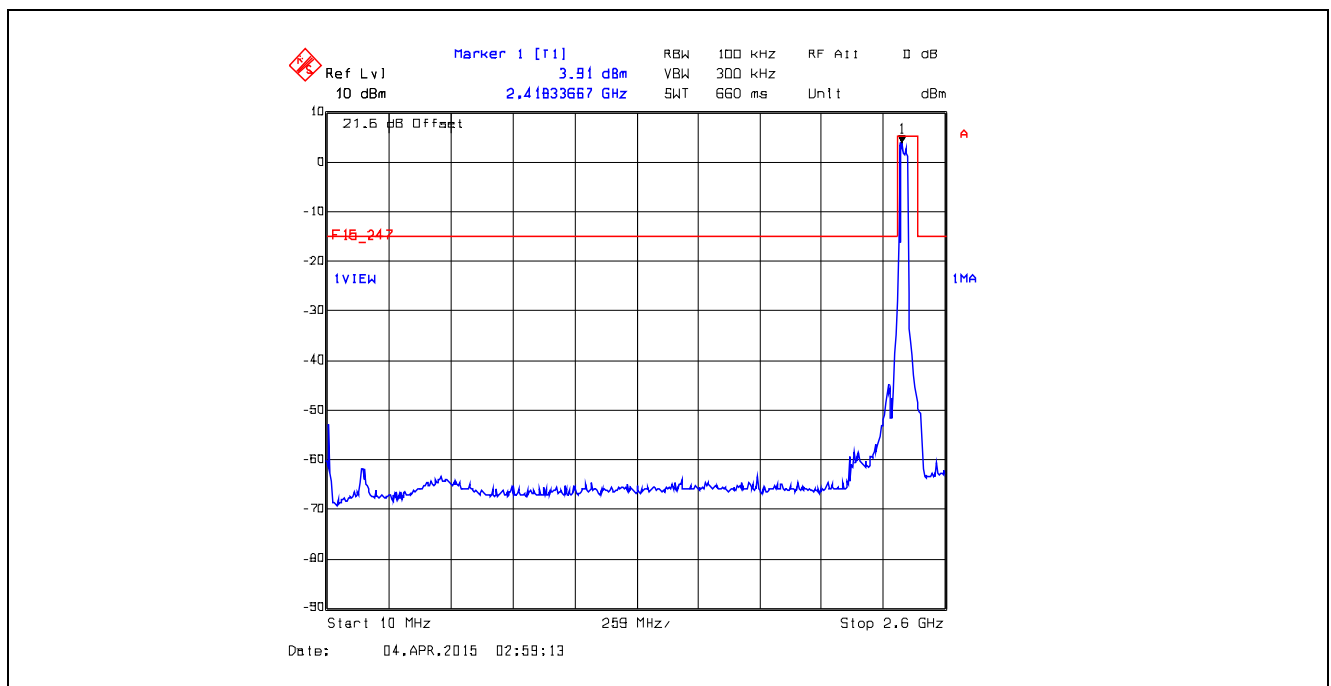
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)
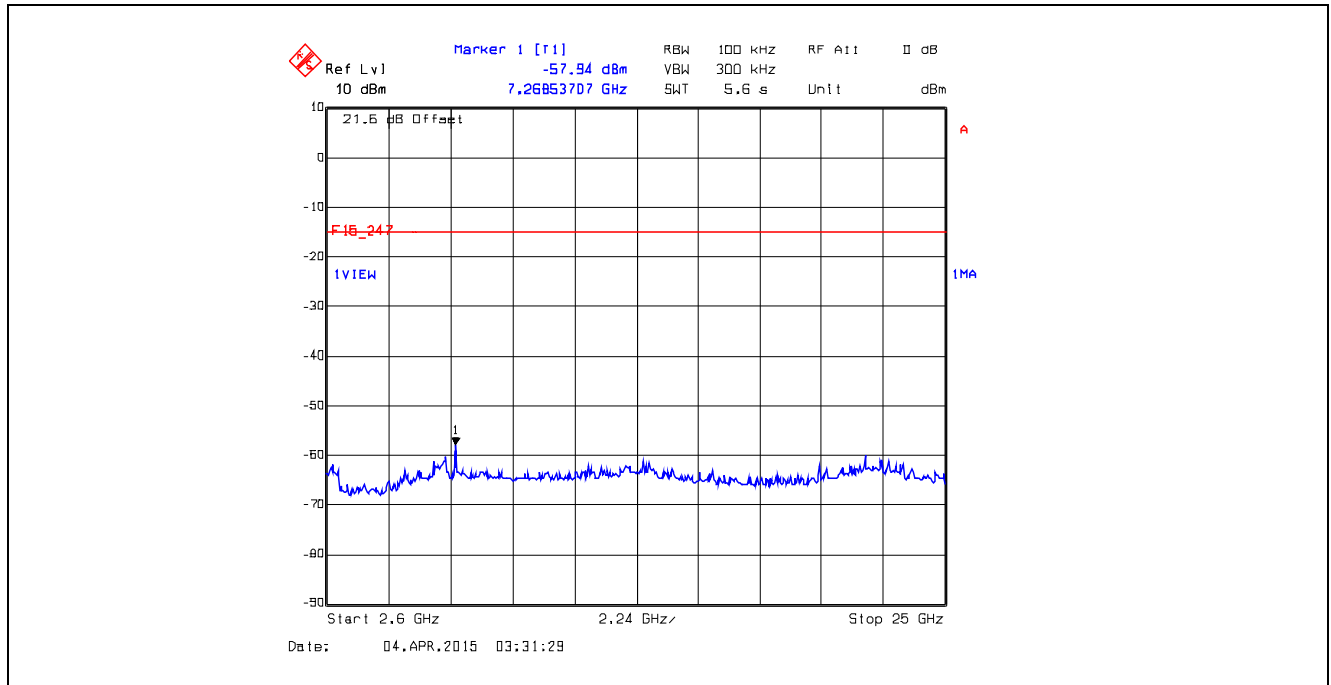
Plot 5.4.4.2.39. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz

Plot 5.4.4.2.40. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.41. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz
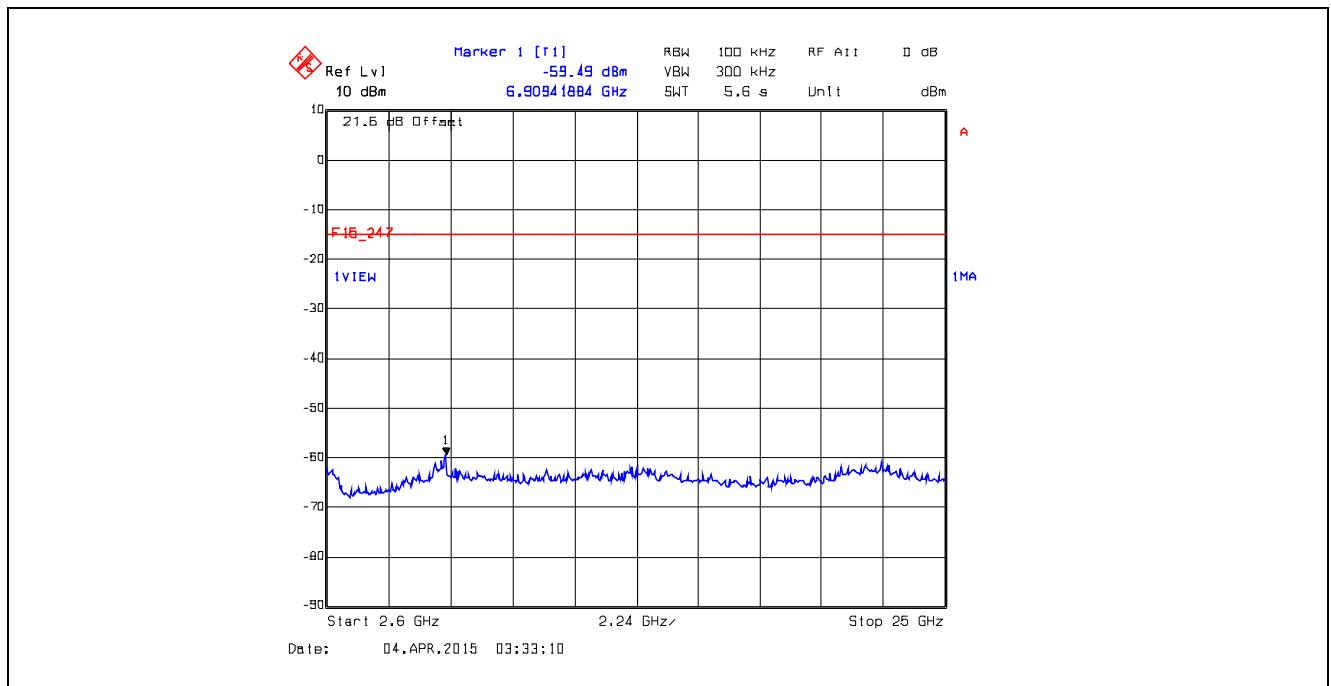

Plot 5.4.4.2.42. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz
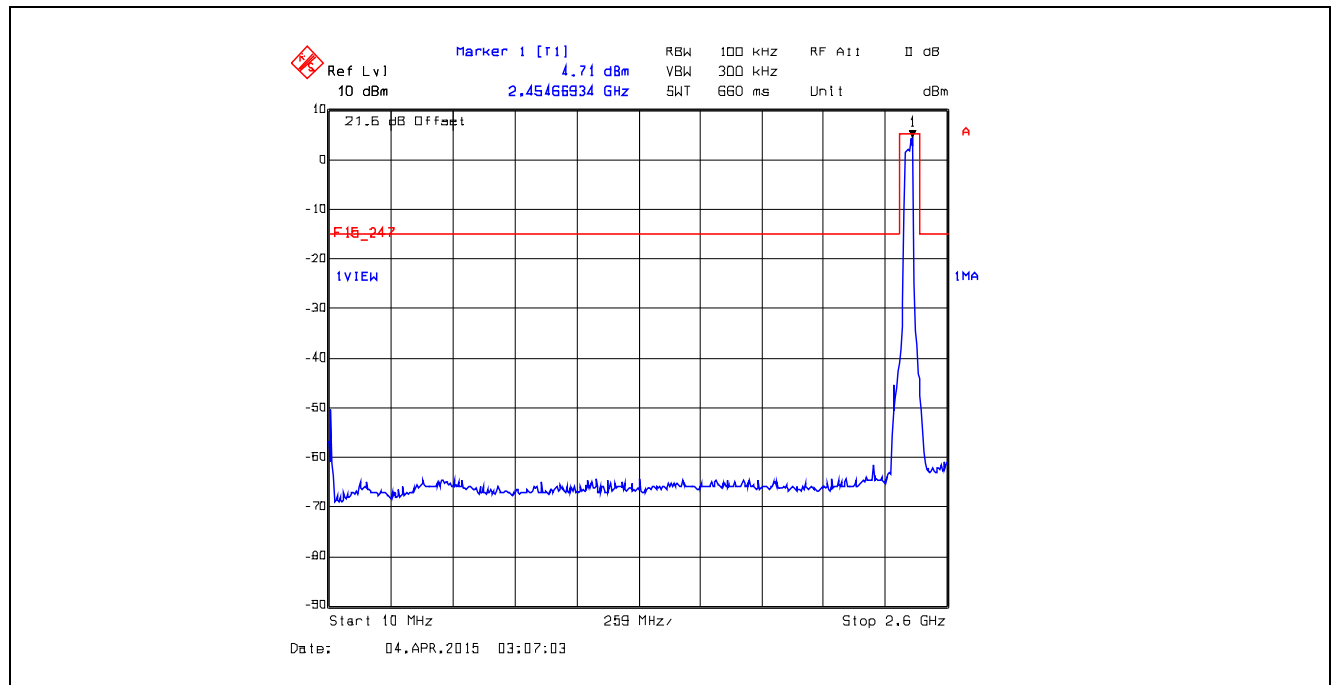

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Plot 5.4.4.2.43. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz
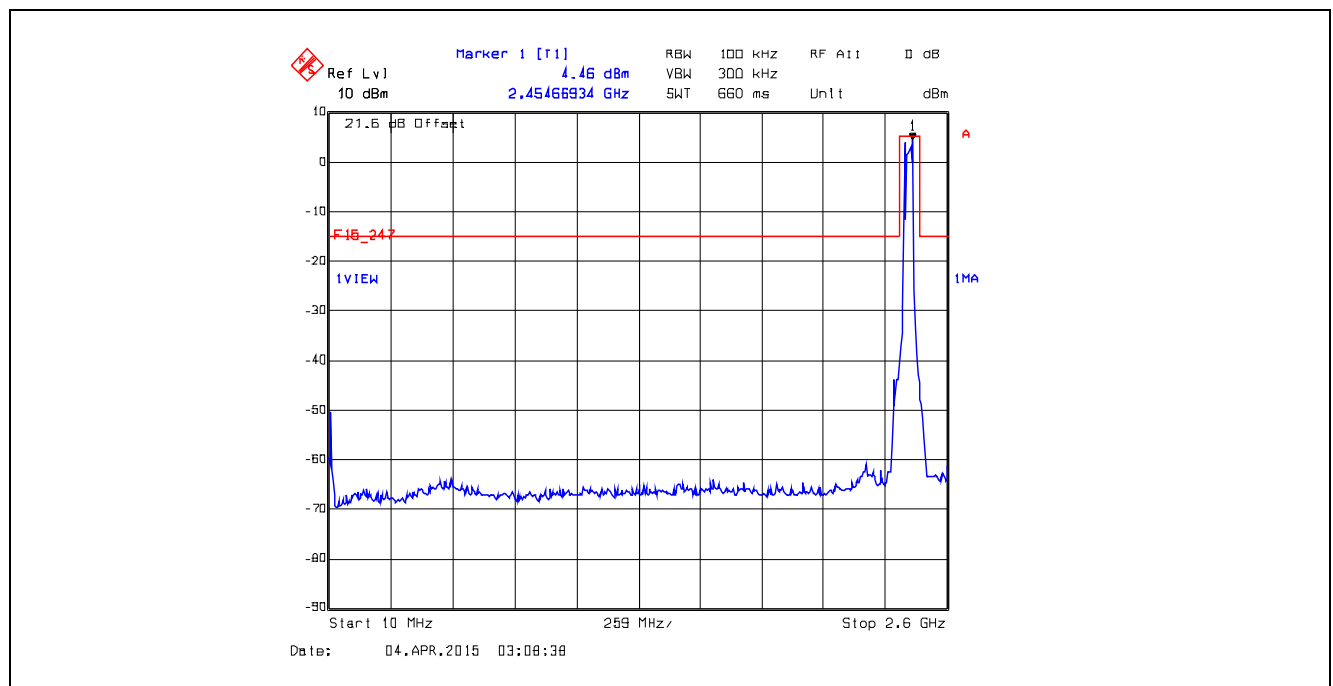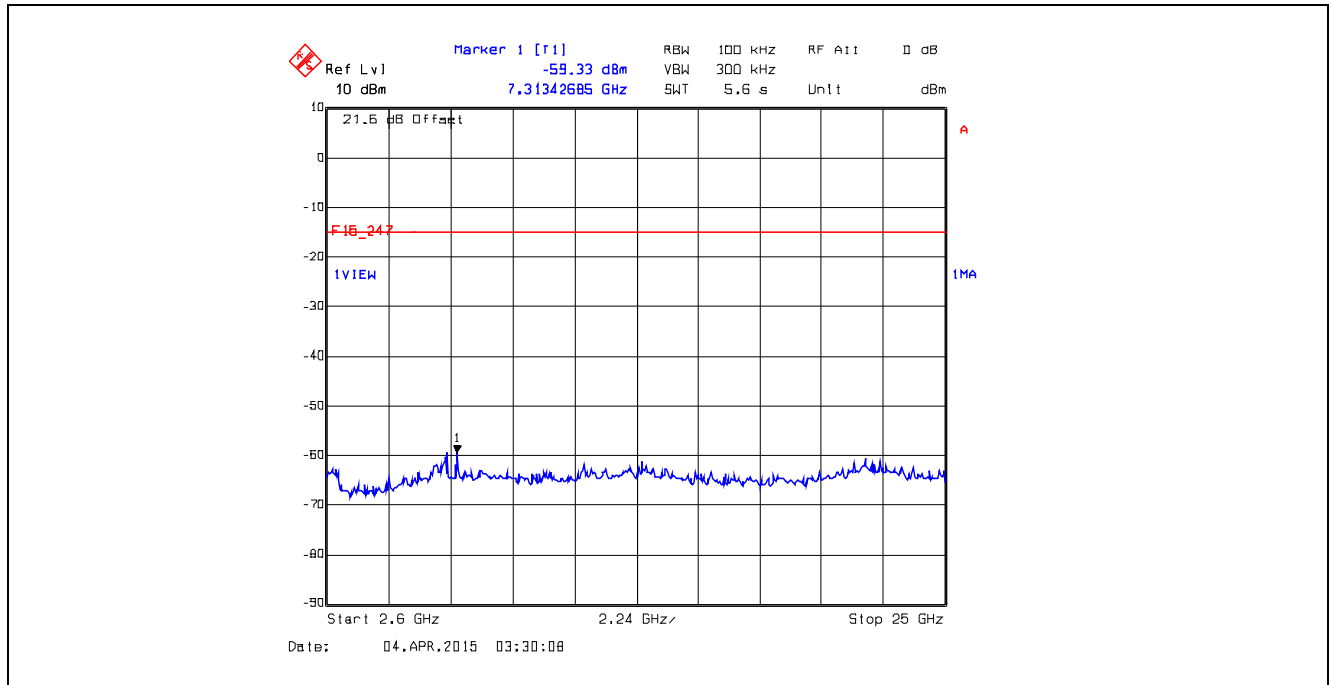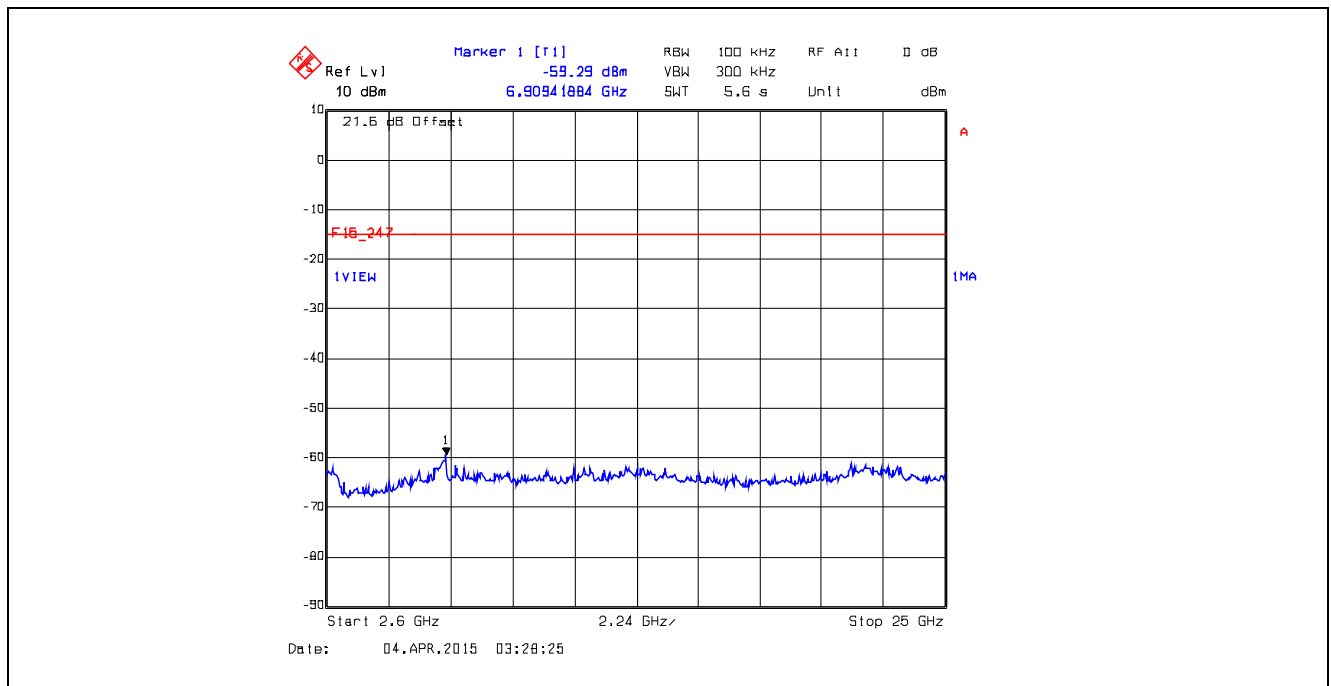

Plot 5.4.4.2.44. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz

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Plot 5.4.4.2.45. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz
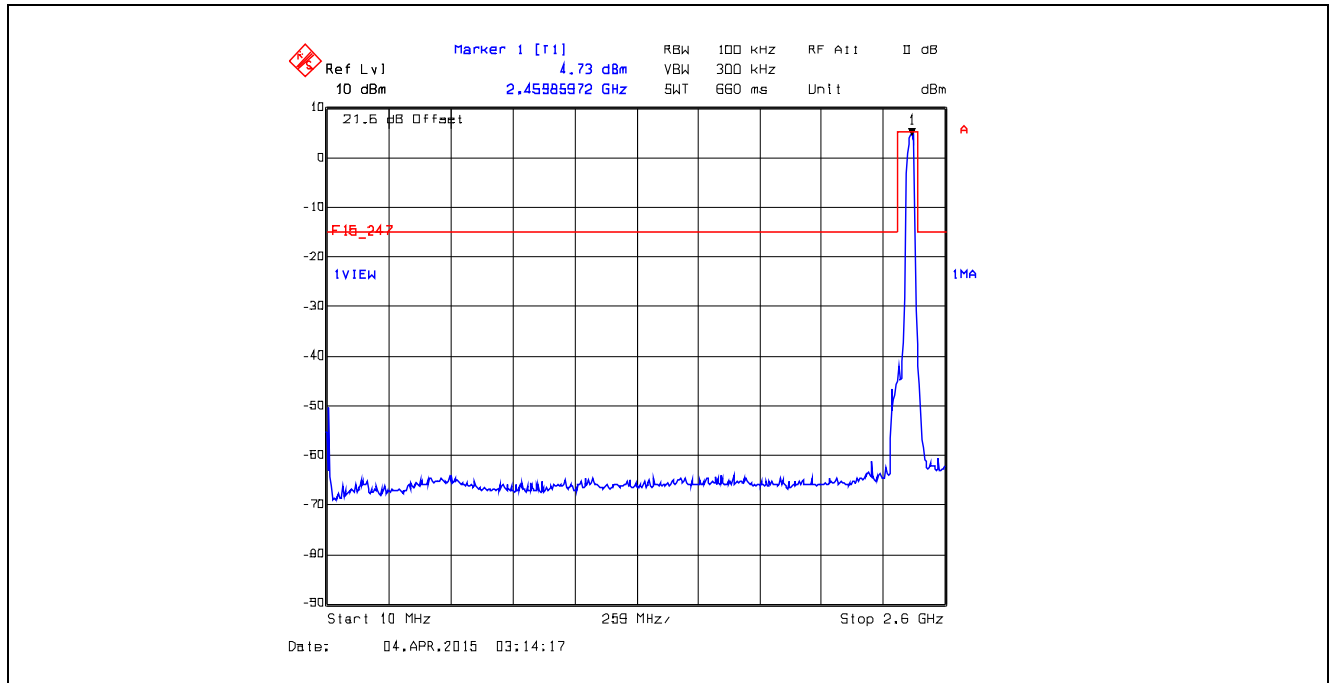
Plot 5.4.4.2.46. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 10 MHz – 2.6 GHz

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Plot 5.4.4.2.47. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #1, Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz

Plot 5.4.4.2.48. Conducted Spurious Emissions in Non-restricted Frequency Bands
Chain #2, Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 2.6 GHz – 25 GHz

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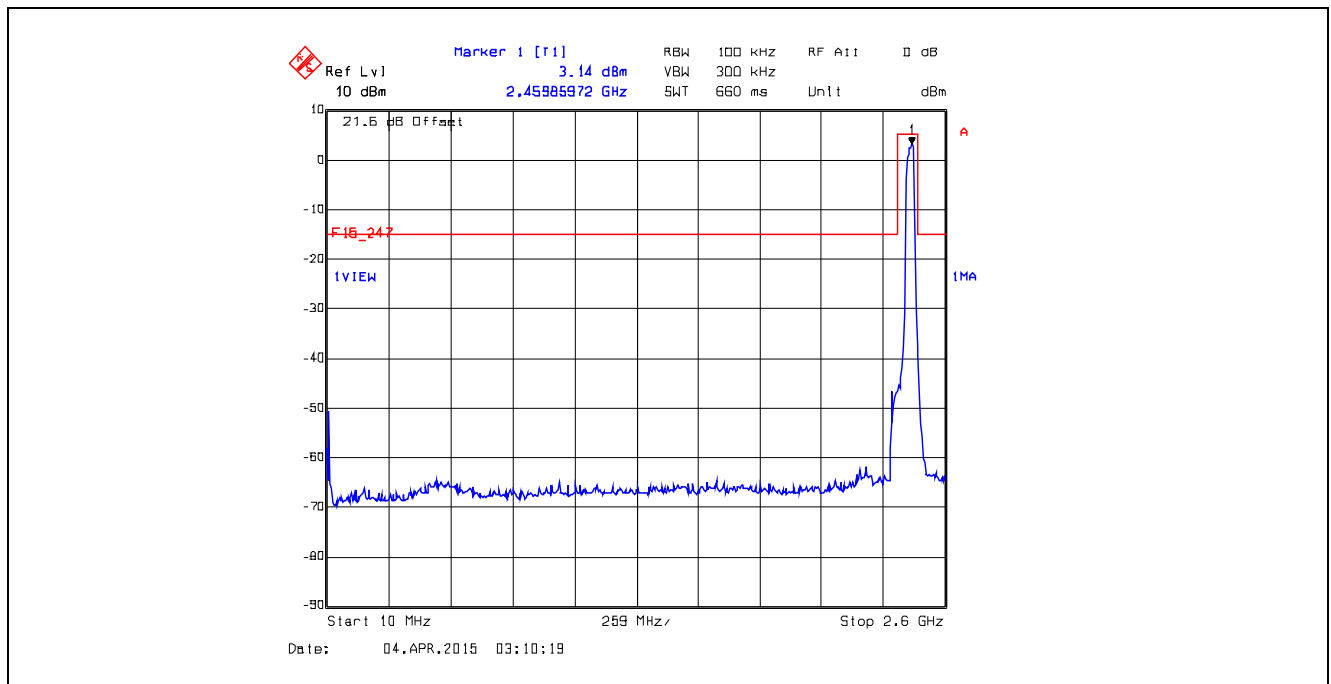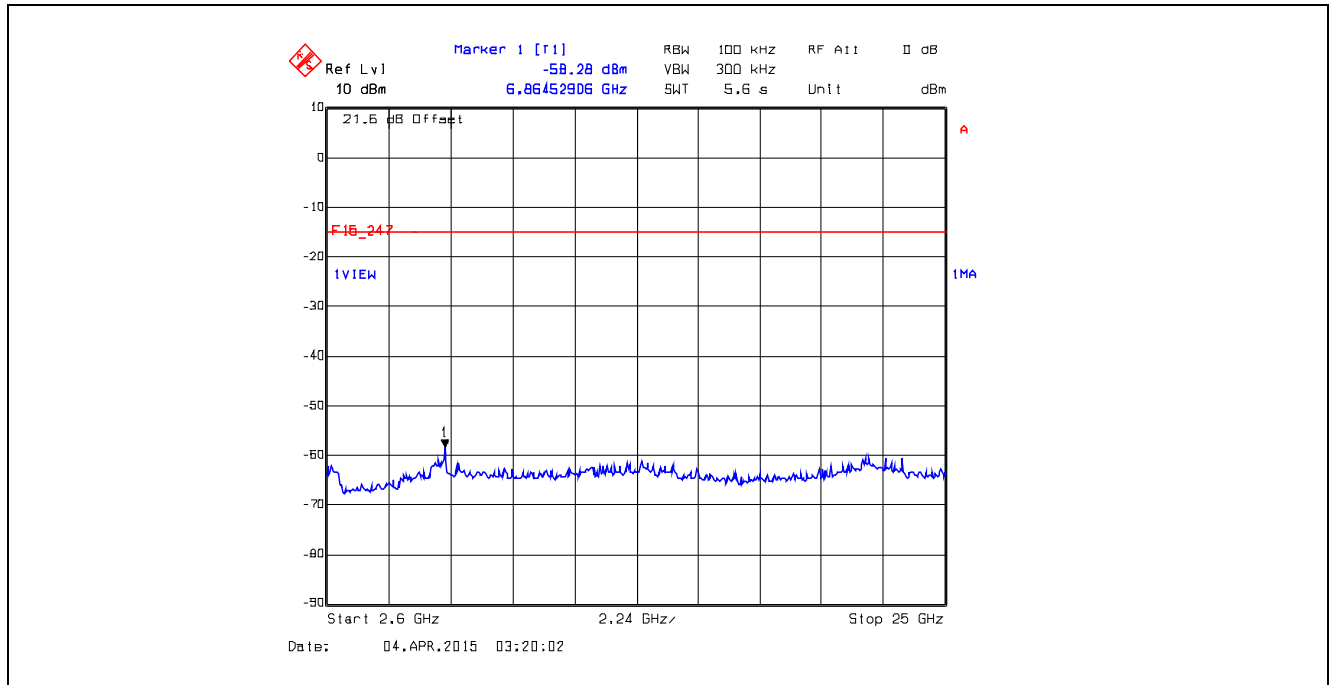Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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5.4.4.3. Conducted Spurious Emissions in Restricted Frequency Bands, 2 dBi Antenna Gain

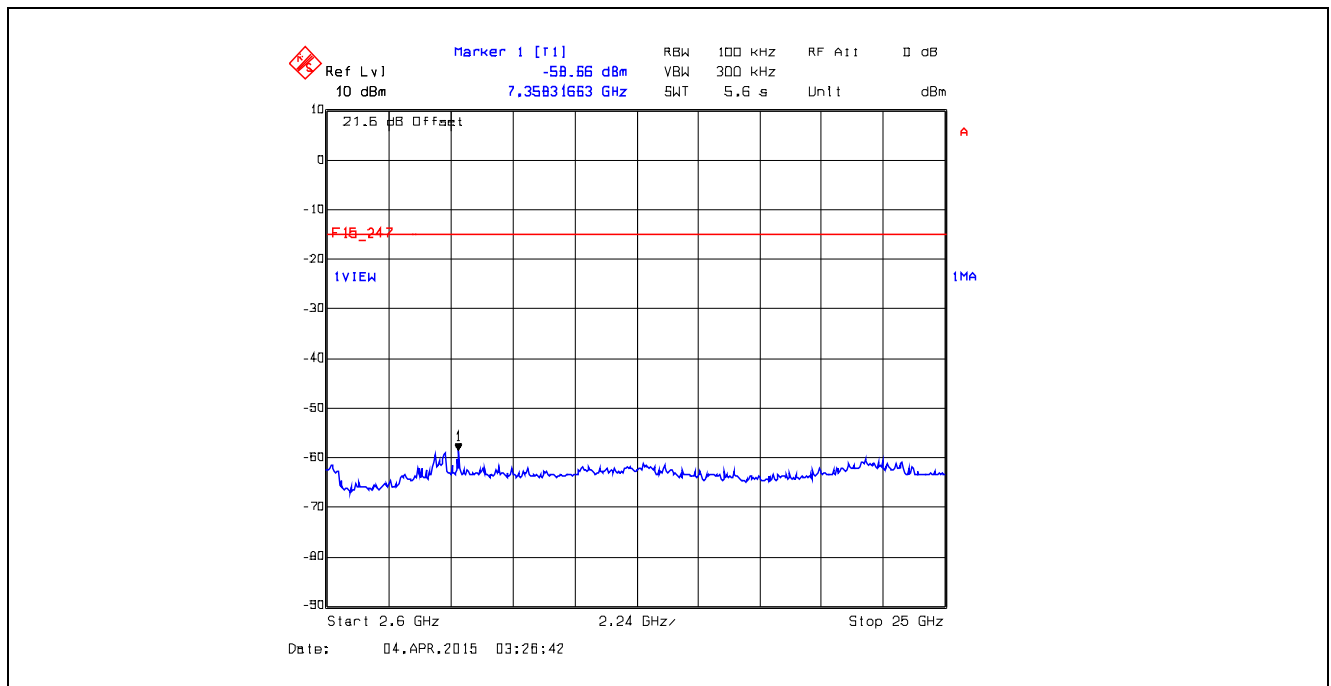**Remark**: Offset = [Insertion Loss] + [Transmit Antenna Gain (in dBi)] + [Maximum Ground Reflection Factor]

Plot 5.4.4.3.1. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector
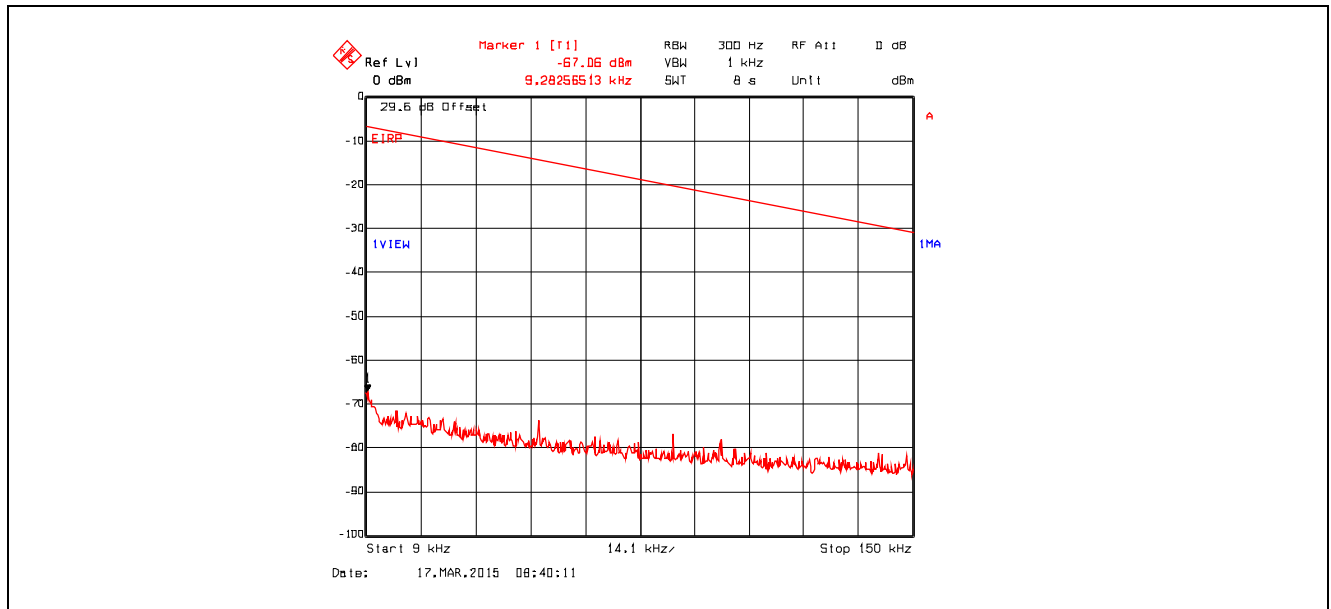
Plot 5.4.4.3.2. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.3. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector

Plot 5.4.4.3.4. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector

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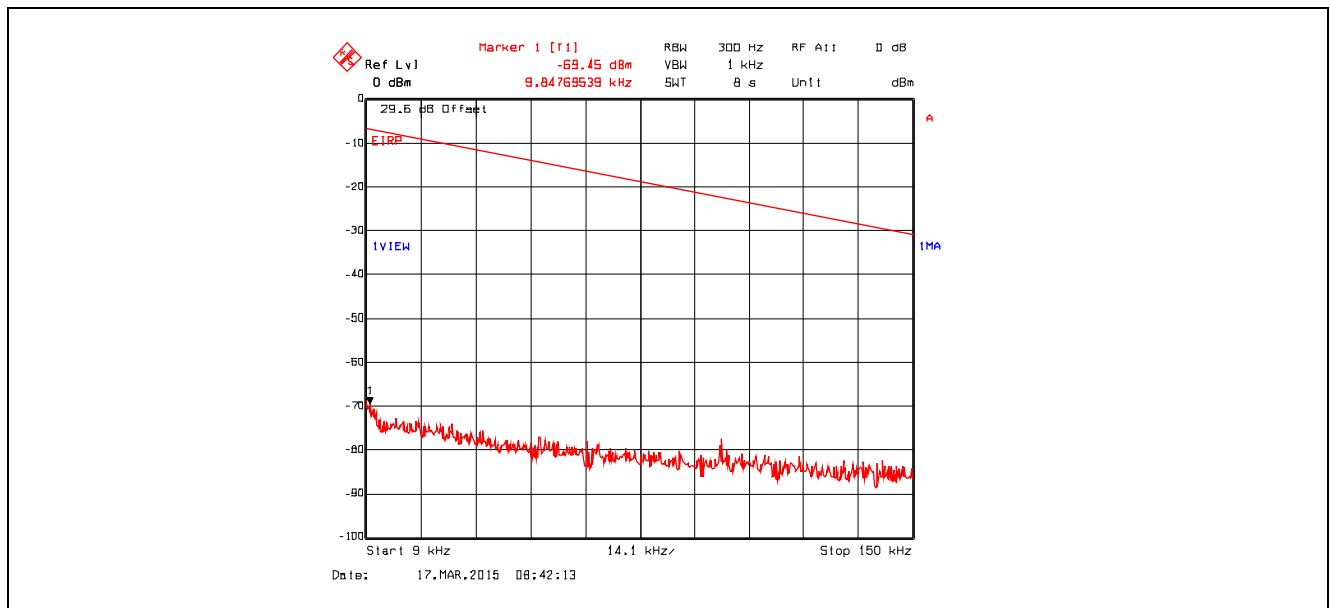
Plot 5.4.4.3.5. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector
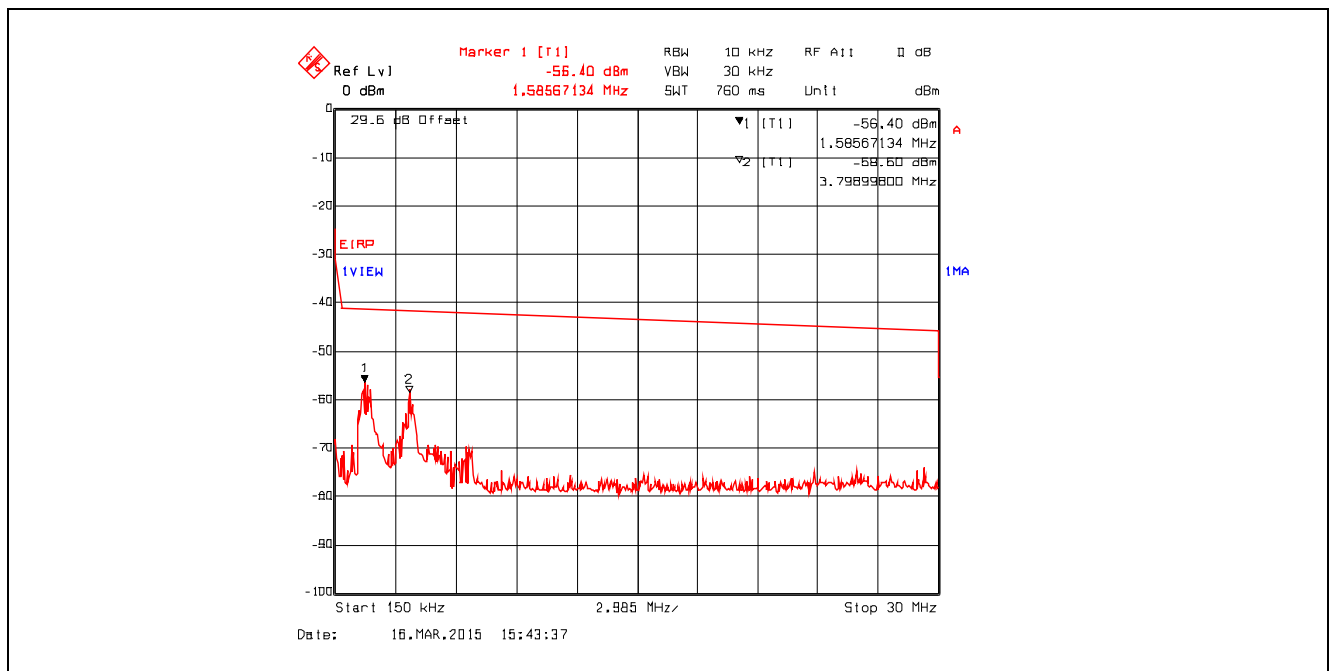

Plot 5.4.4.3.6. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector

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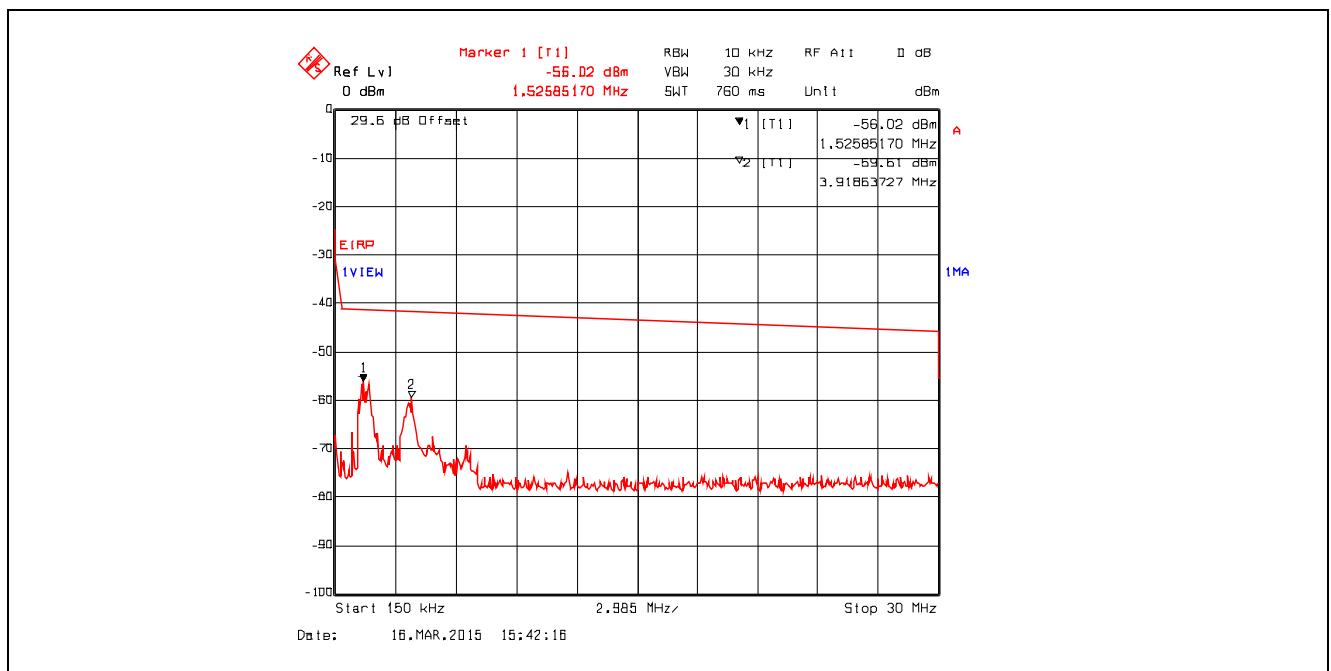
Plot 5.4.4.3.7. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector
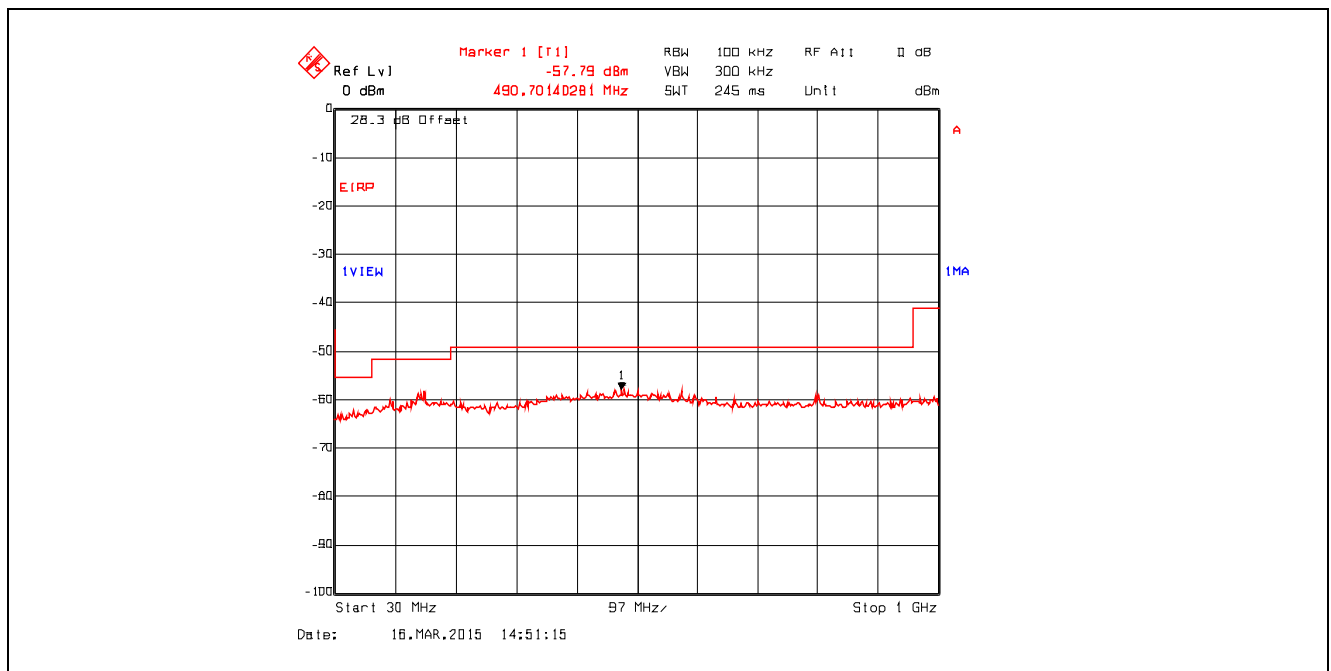

Plot 5.4.4.3.8. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector

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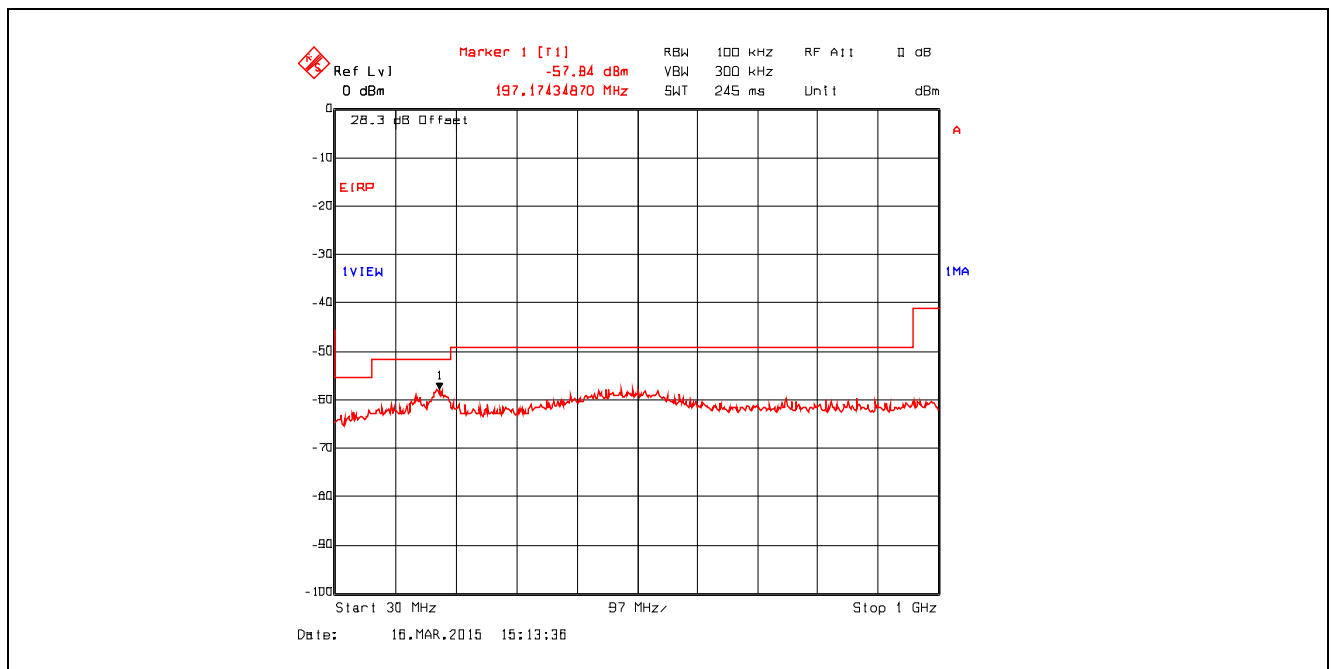
Plot 5.4.4.3.9. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector
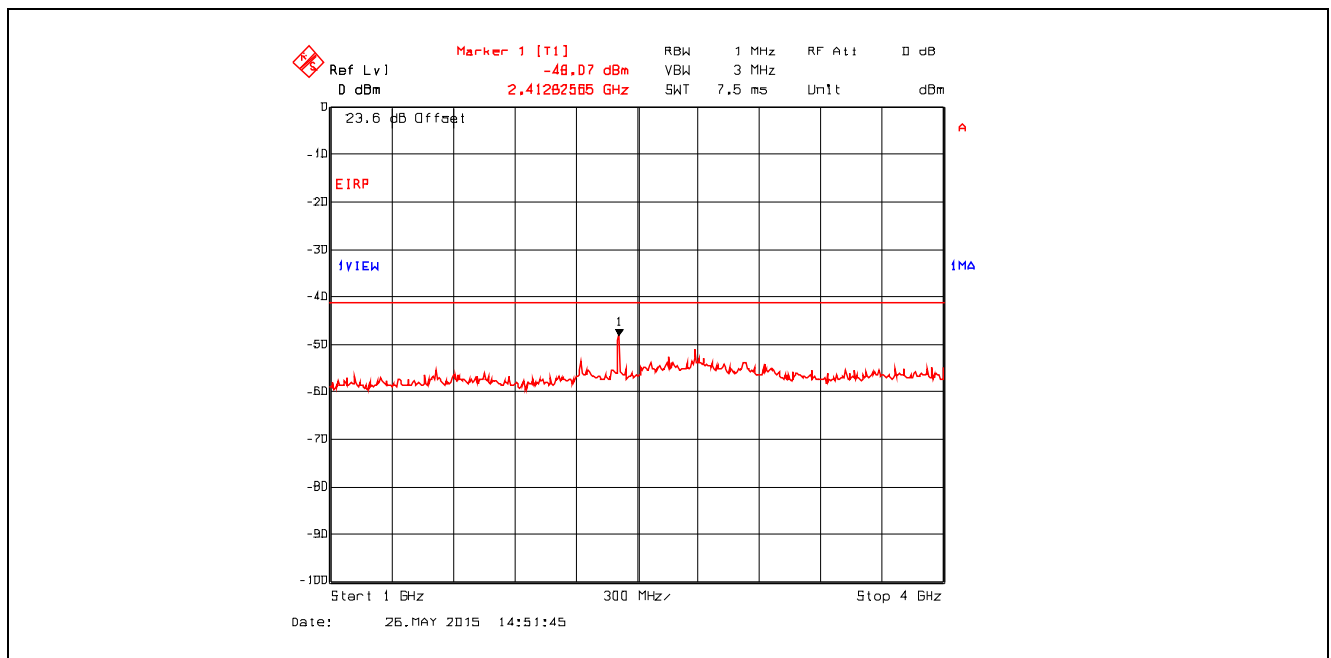

Plot 5.4.4.3.10. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 1, 2412 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector

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Plot 5.4.4.3.11. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector
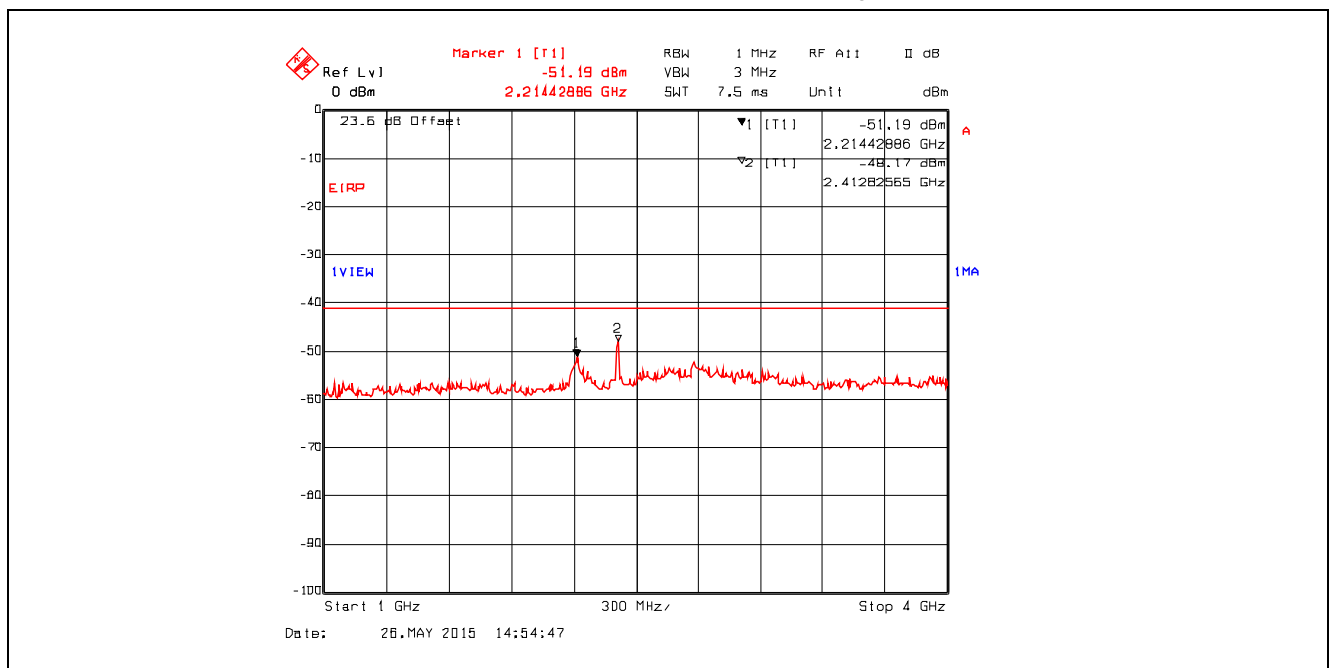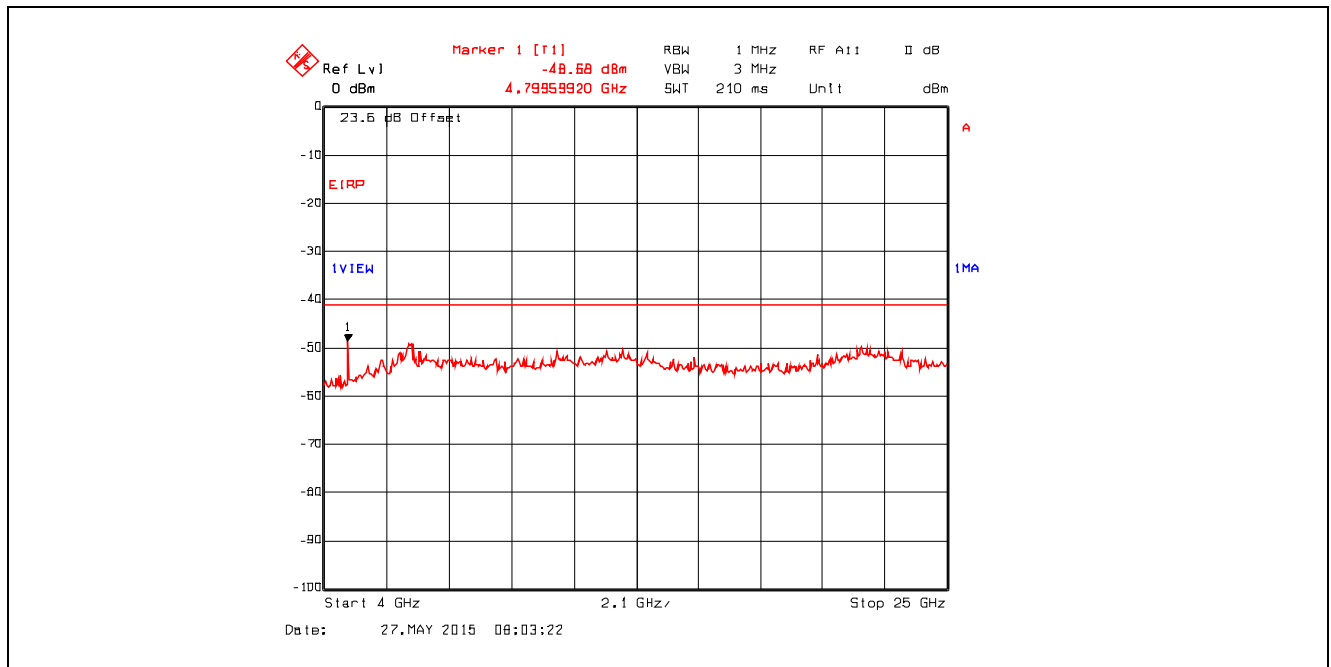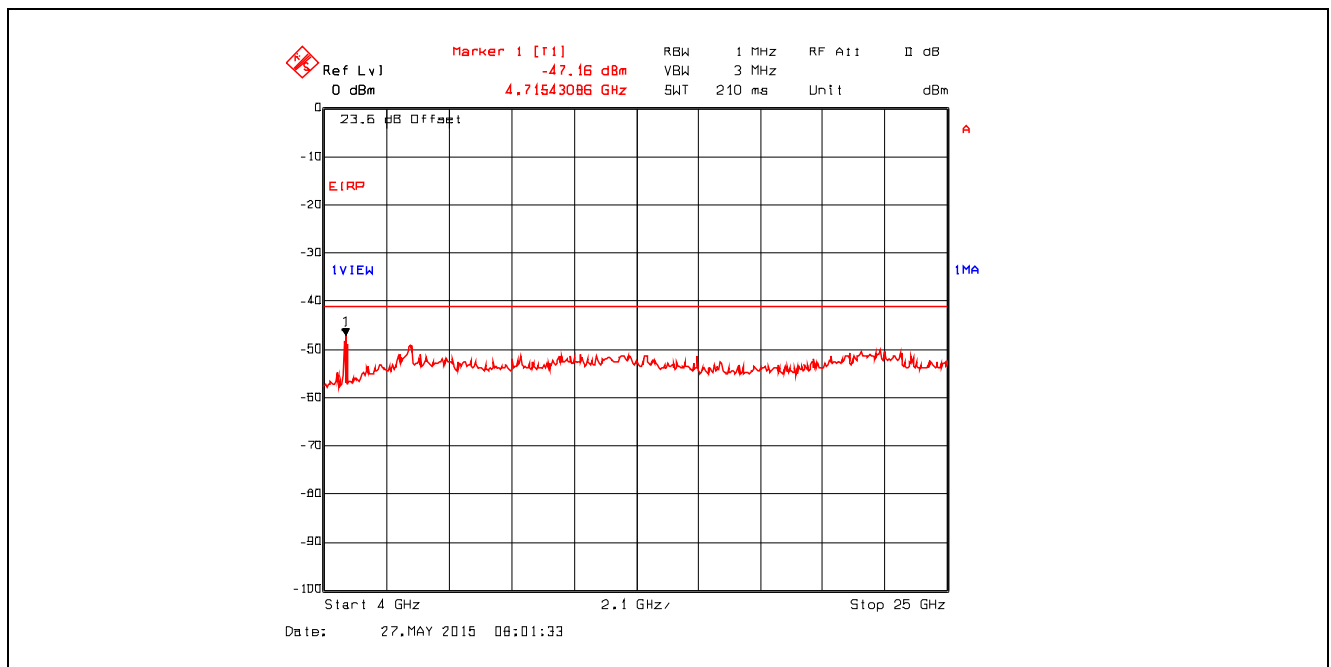

Plot 5.4.4.3.12. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.13. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector
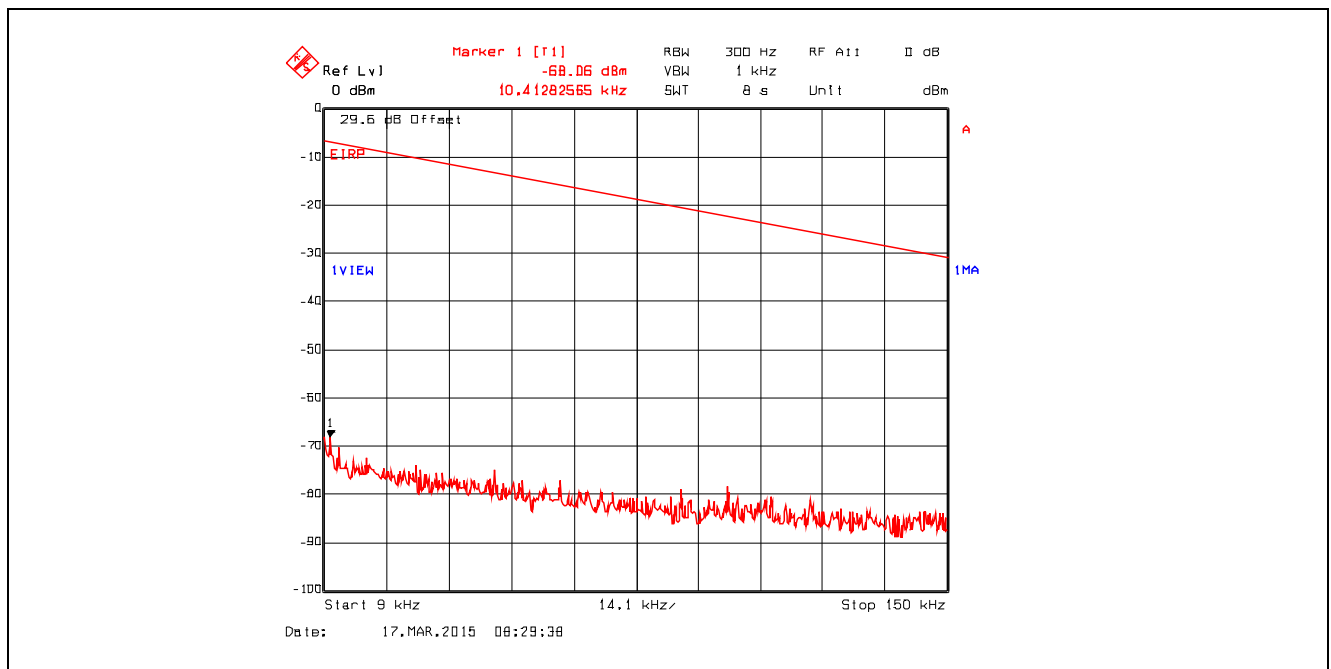

Plot 5.4.4.3.14. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector

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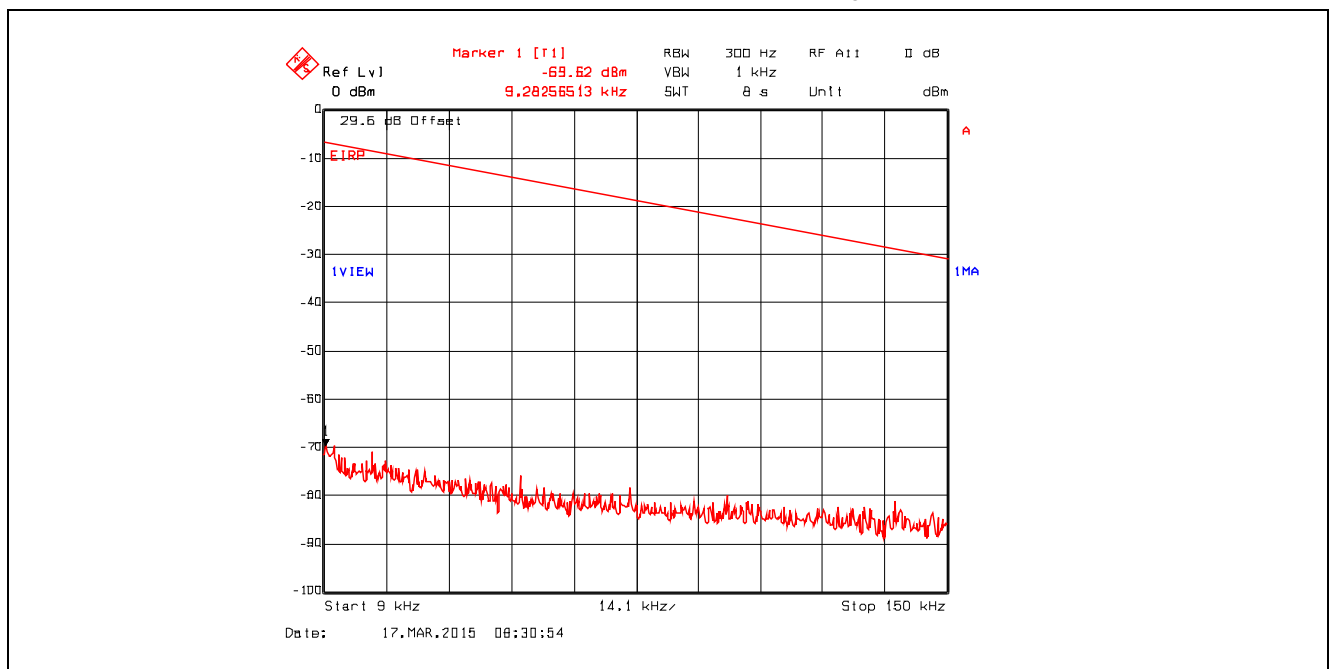
Plot 5.4.4.3.15. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector
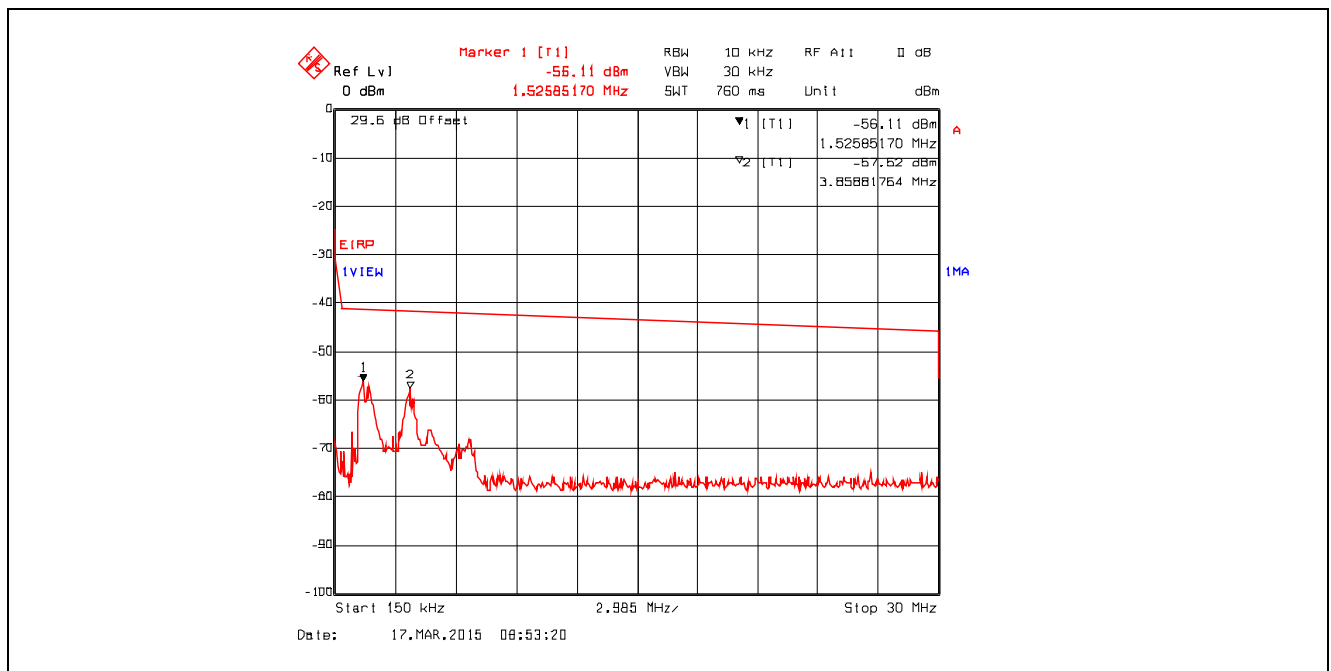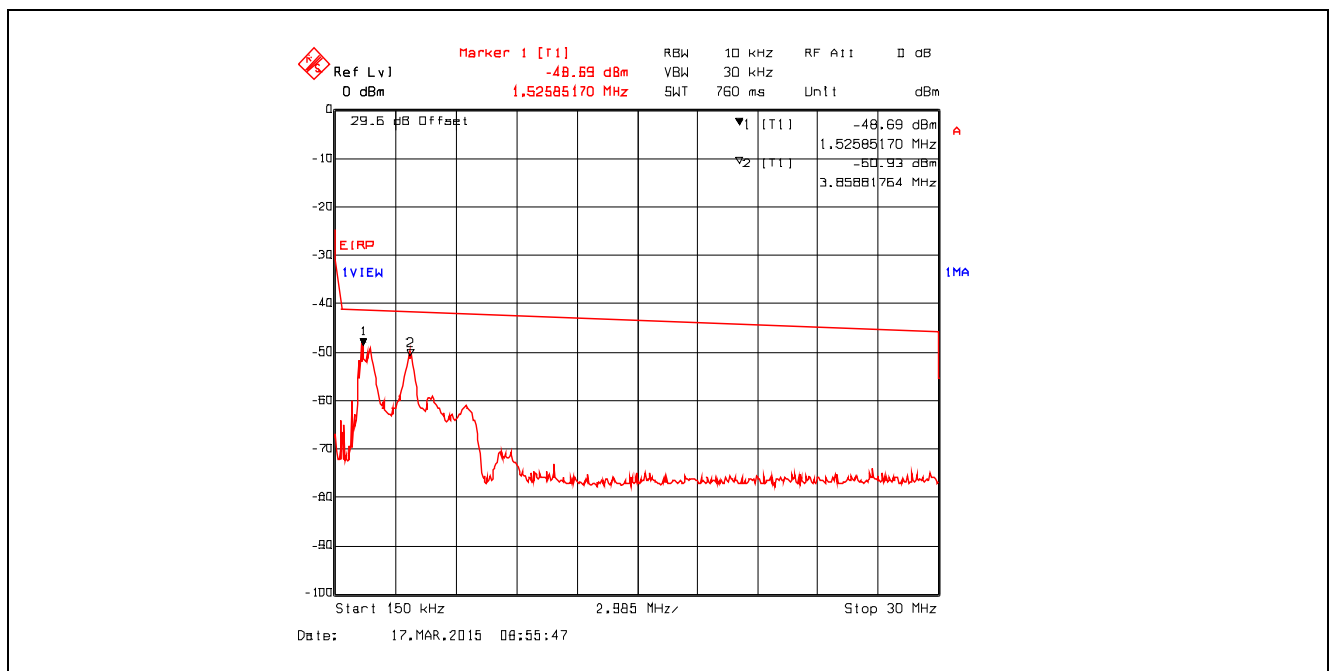

Plot 5.4.4.3.16. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector

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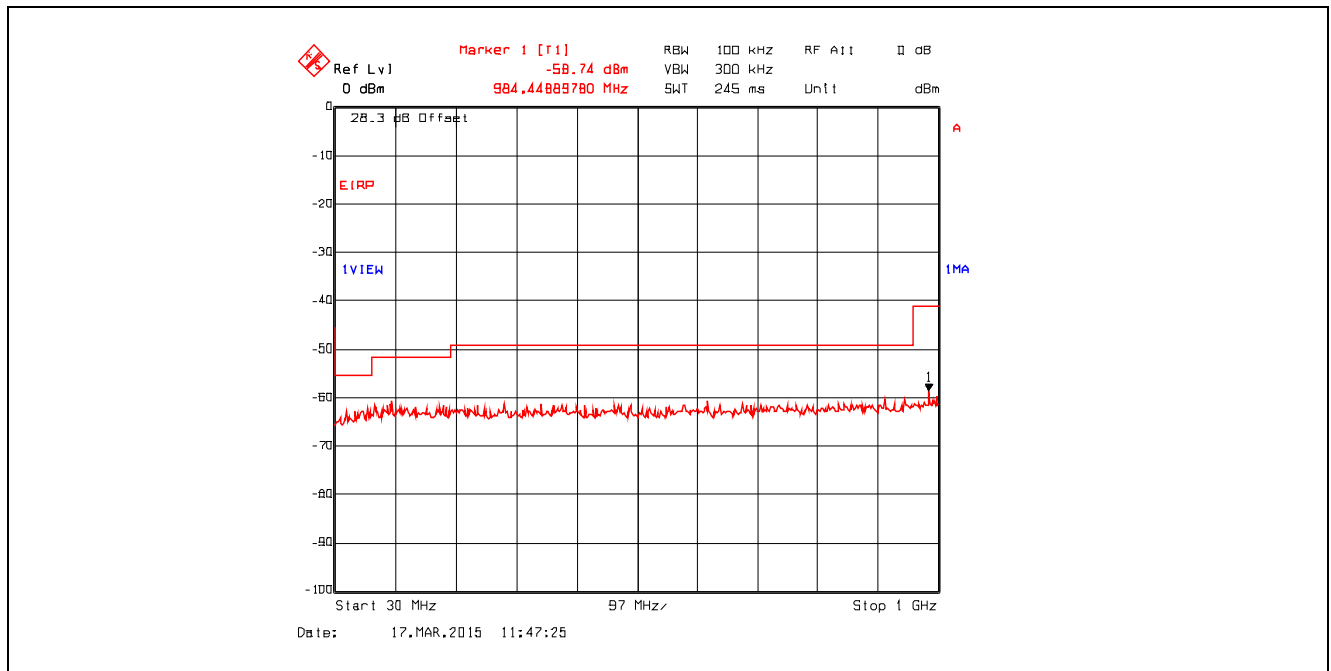
Plot 5.4.4.3.17. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector

Plot 5.4.4.3.18. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector

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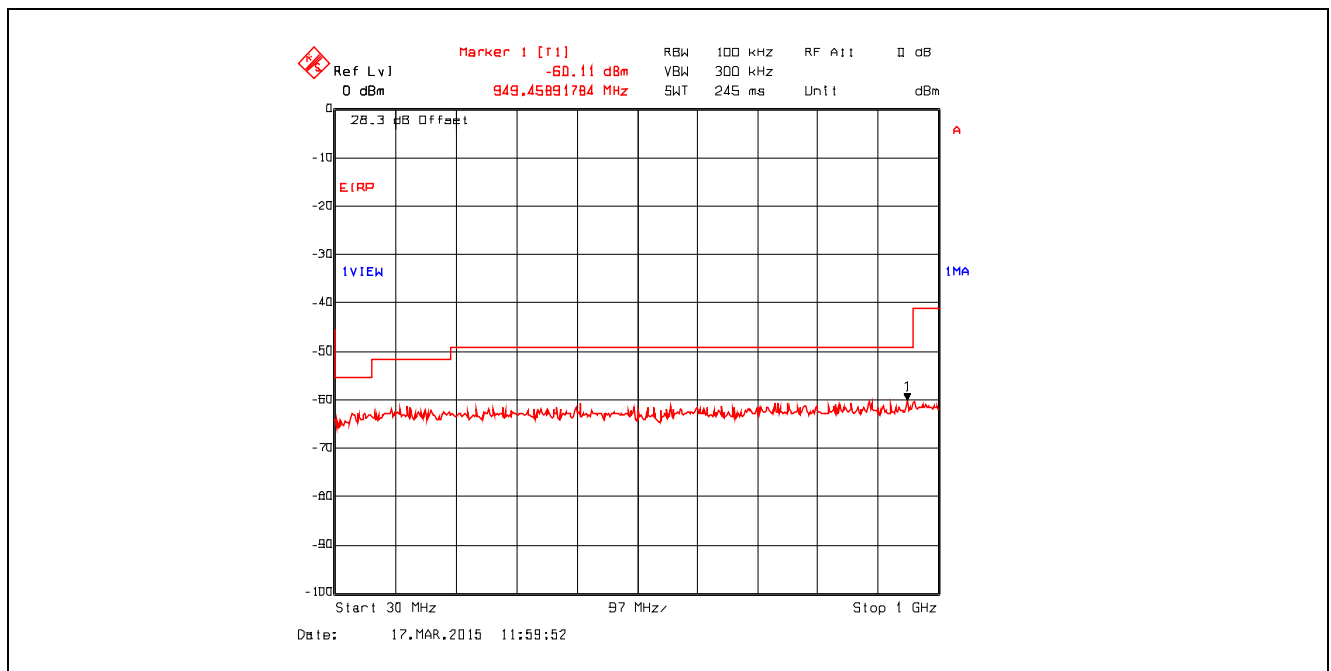
Plot 5.4.4.3.19. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector
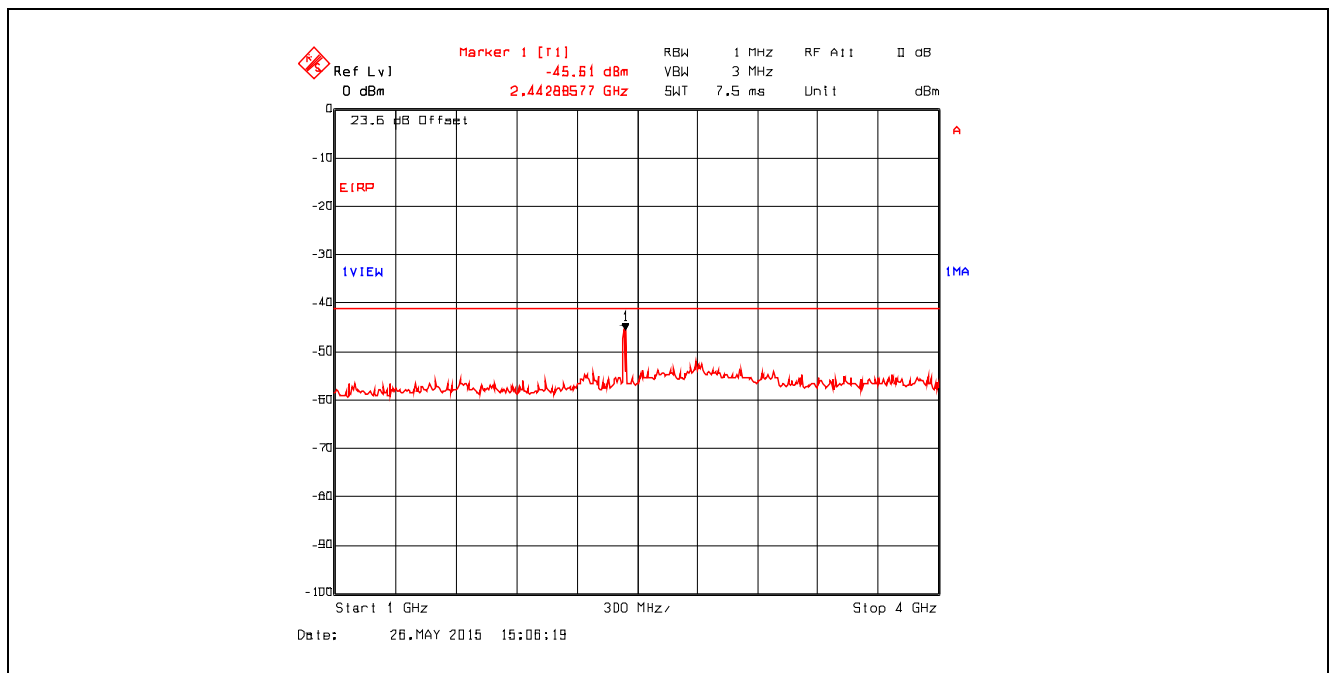

Plot 5.4.4.3.20. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 6, 2437 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector

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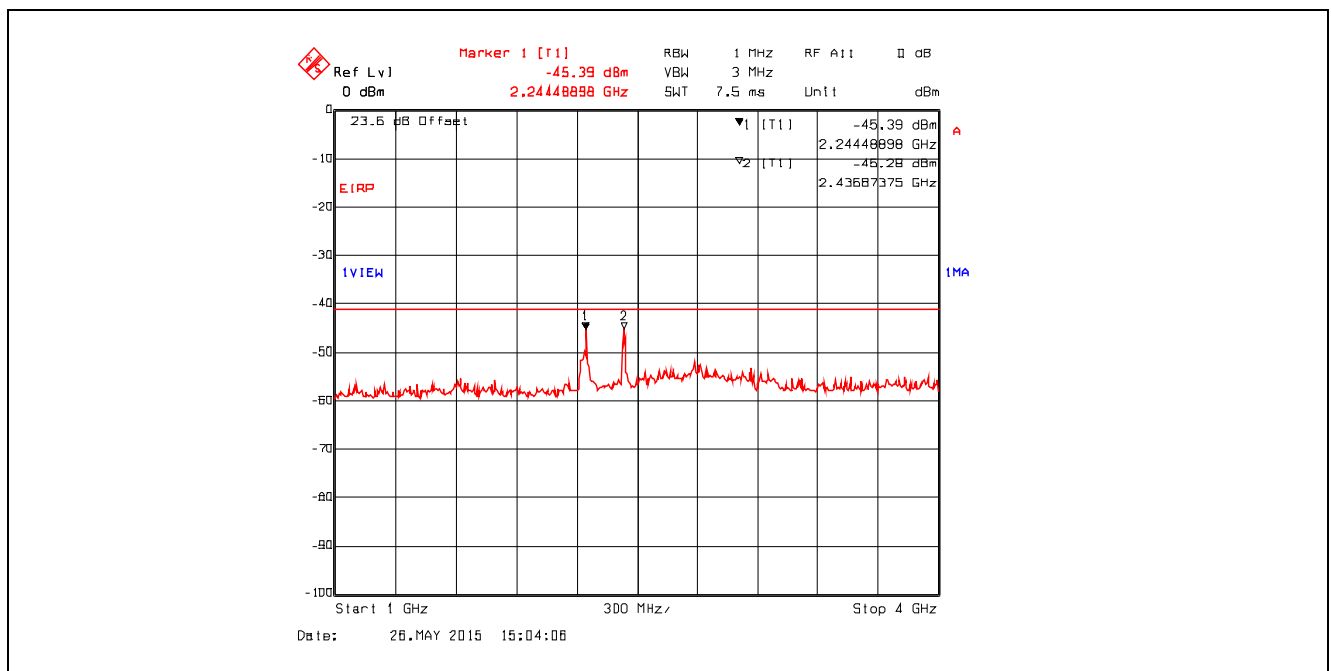
Plot 5.4.4.3.21. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector
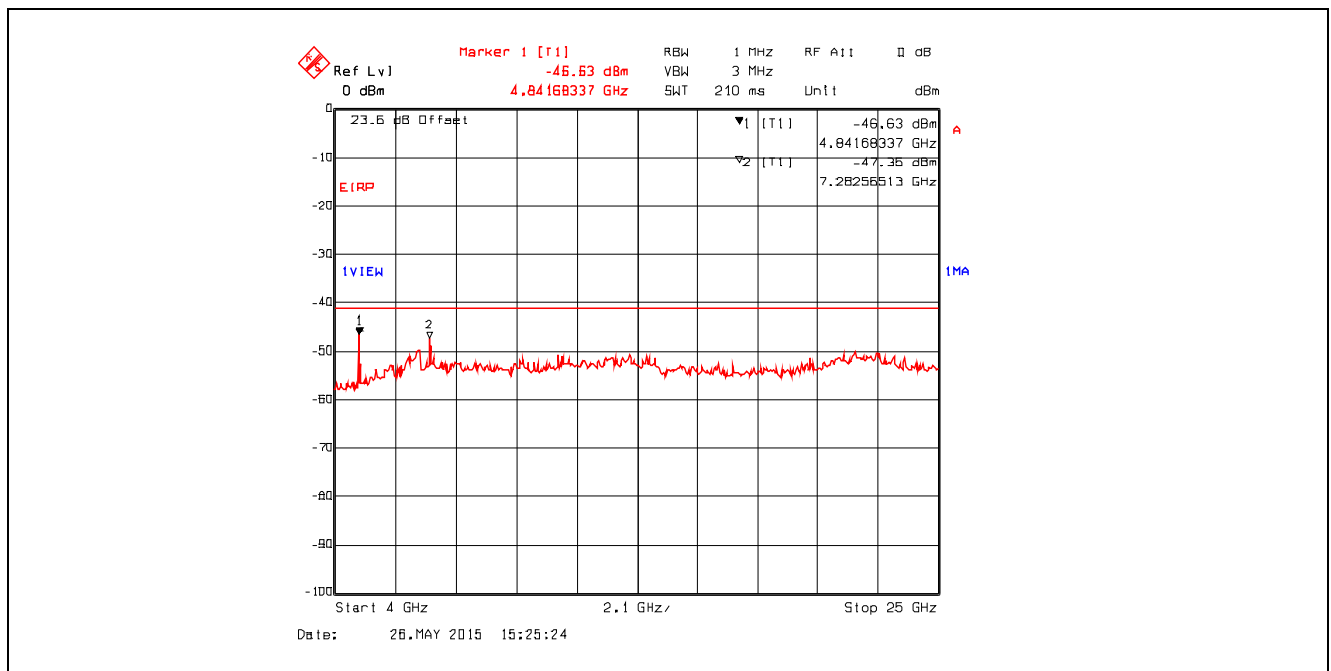

Plot 5.4.4.3.22. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 9 kHz - 150 kHz, Peak Detector

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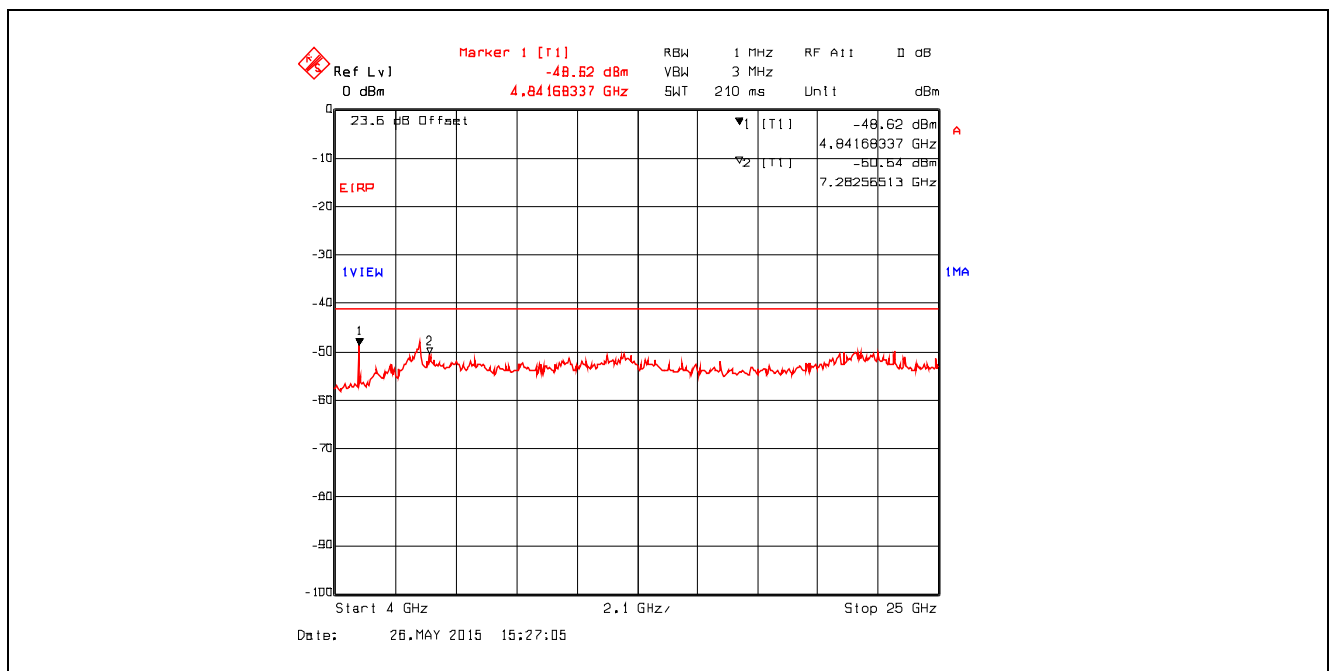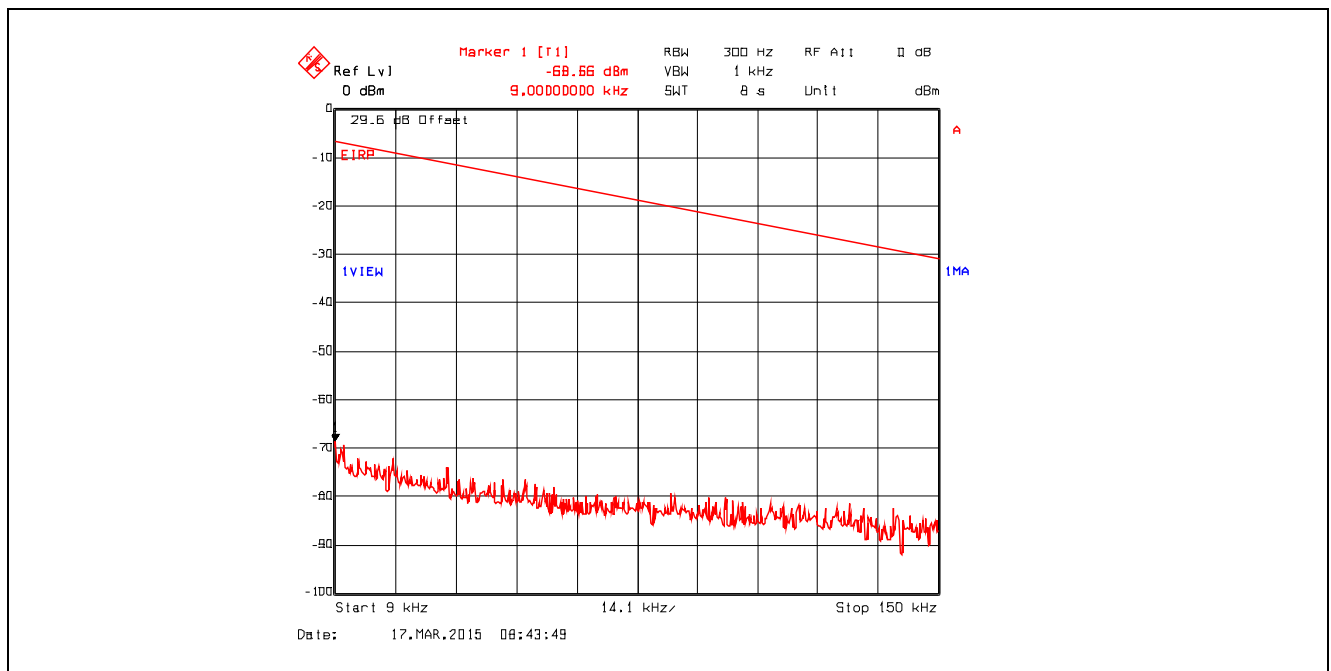
Plot 5.4.4.3.23. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector
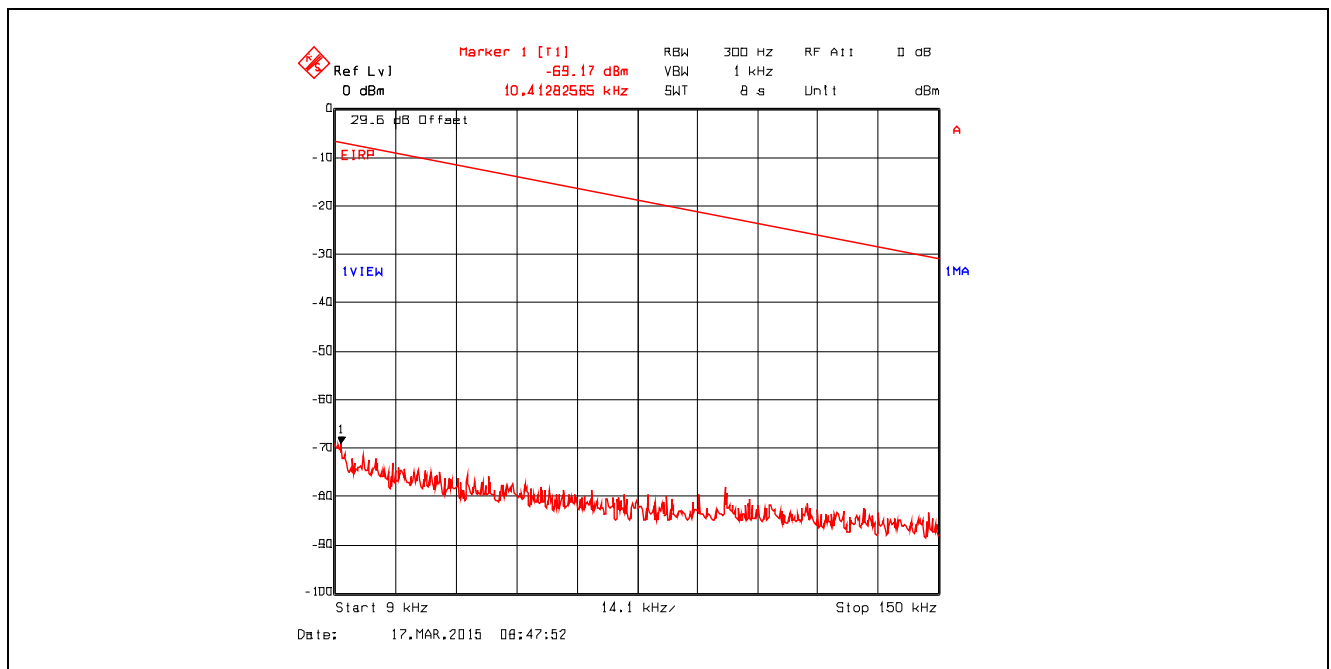

Plot 5.4.4.3.24. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 150 kHz - 30 MHz, Peak Detector

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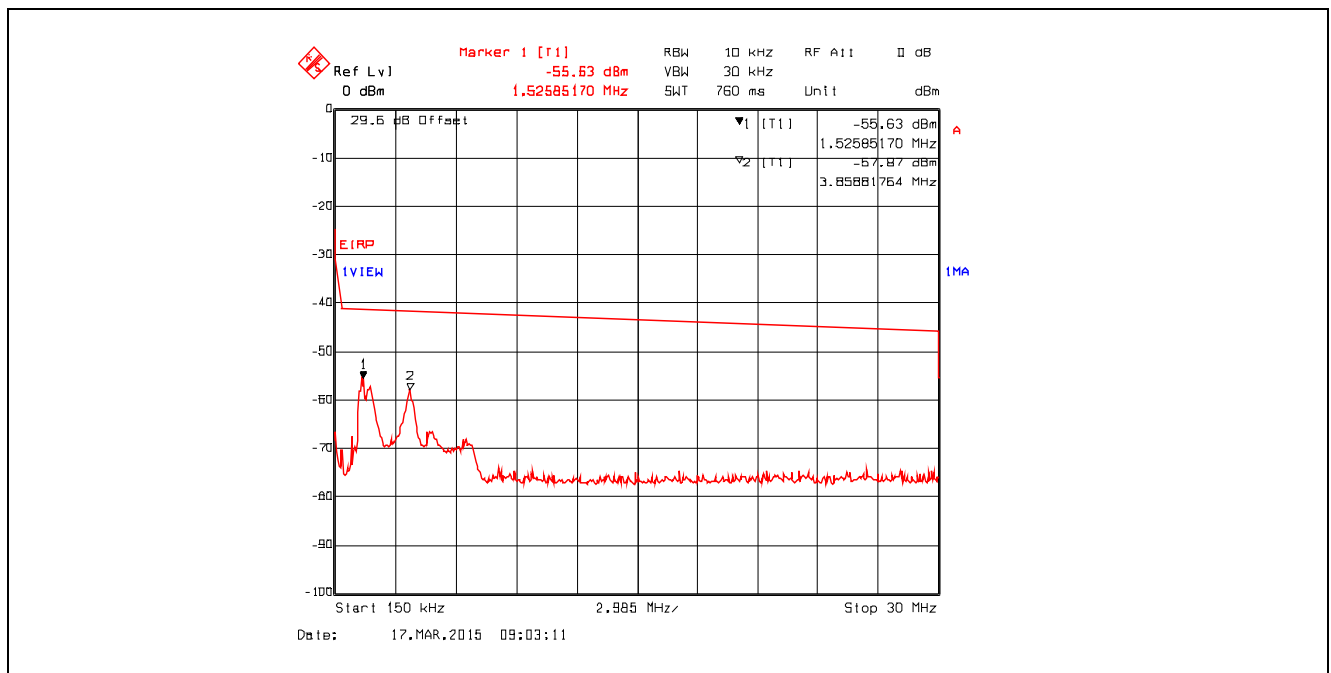
Plot 5.4.4.3.25. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector
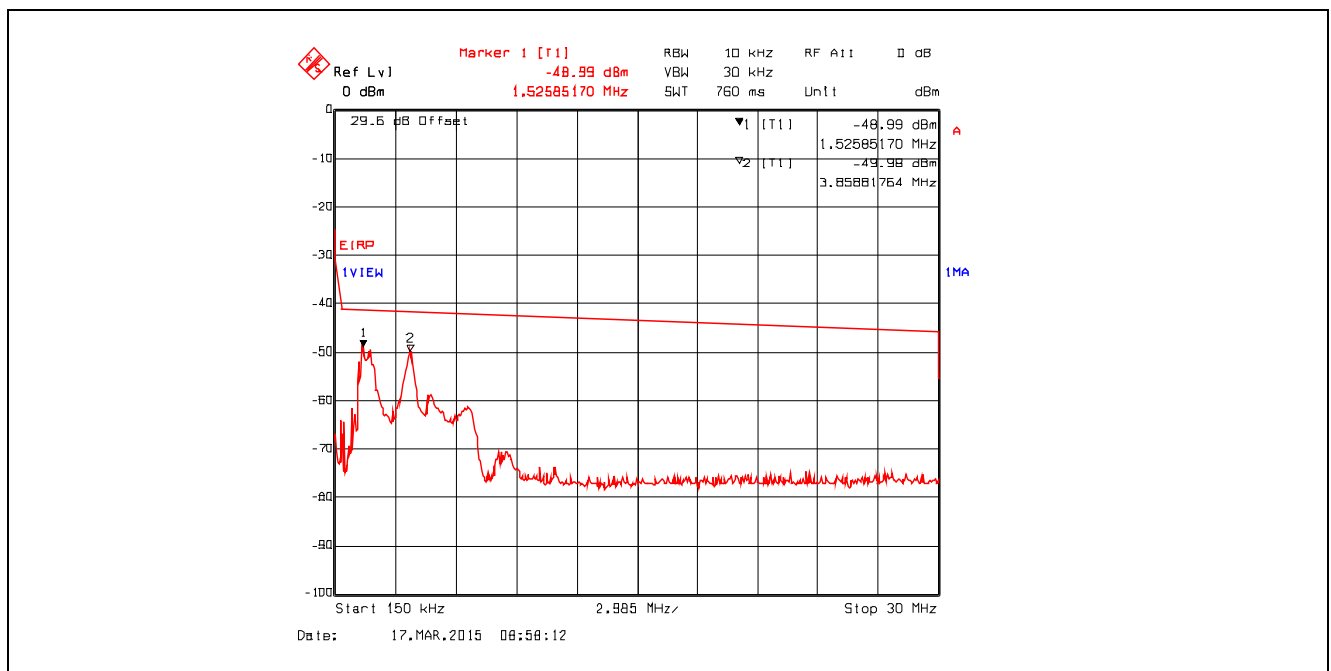

Plot 5.4.4.3.26. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 30 MHz - 1 GHz, Peak Detector

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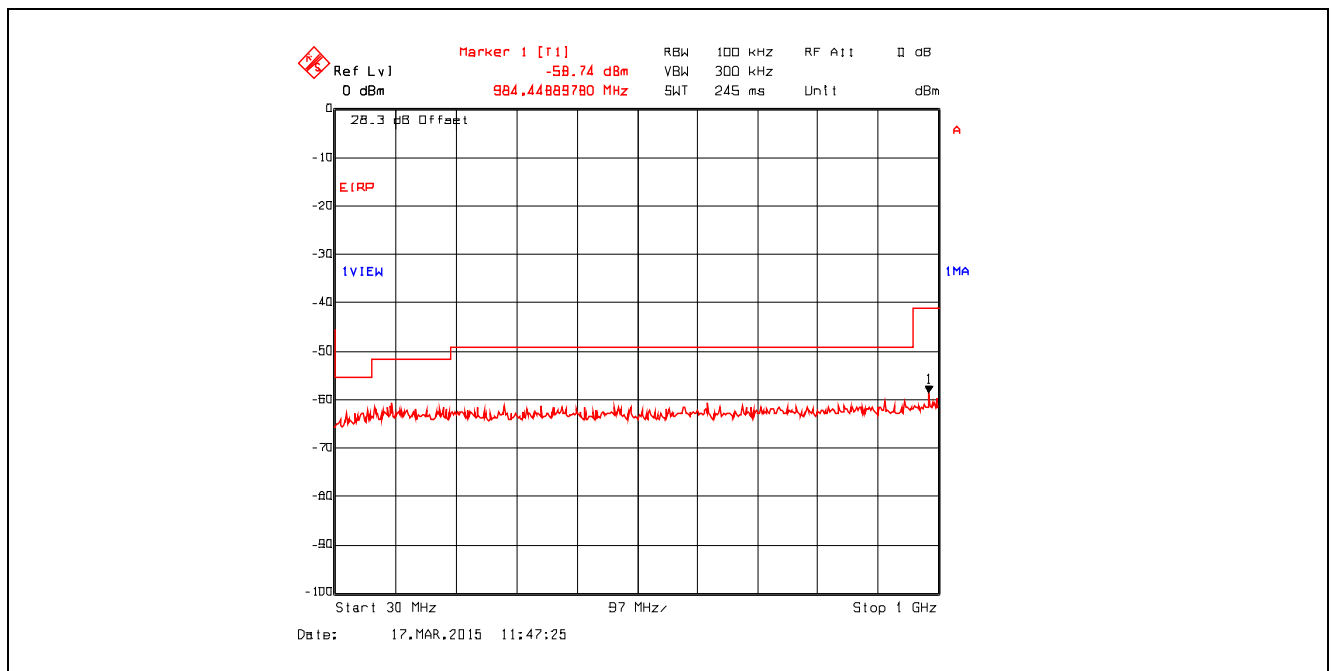
Plot 5.4.4.3.27. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector
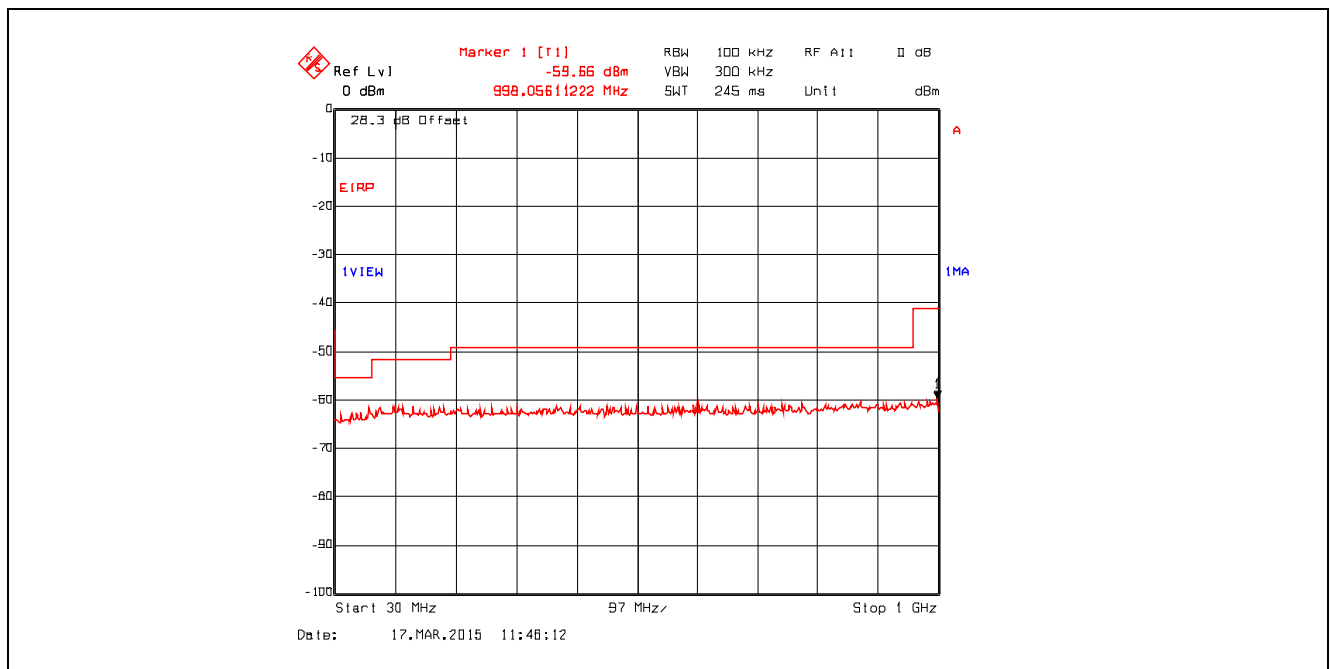

Plot 5.4.4.3.28. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 1 GHz - 4 GHz, Peak Detector

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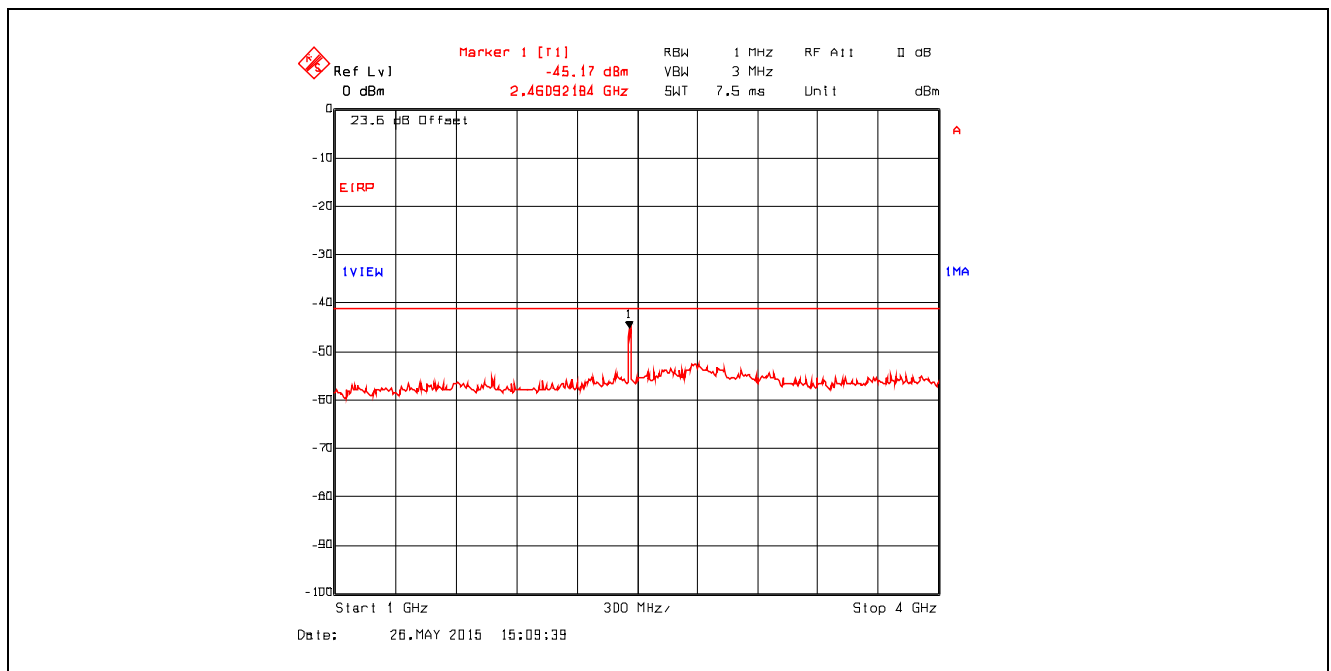
Plot 5.4.4.3.29. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector
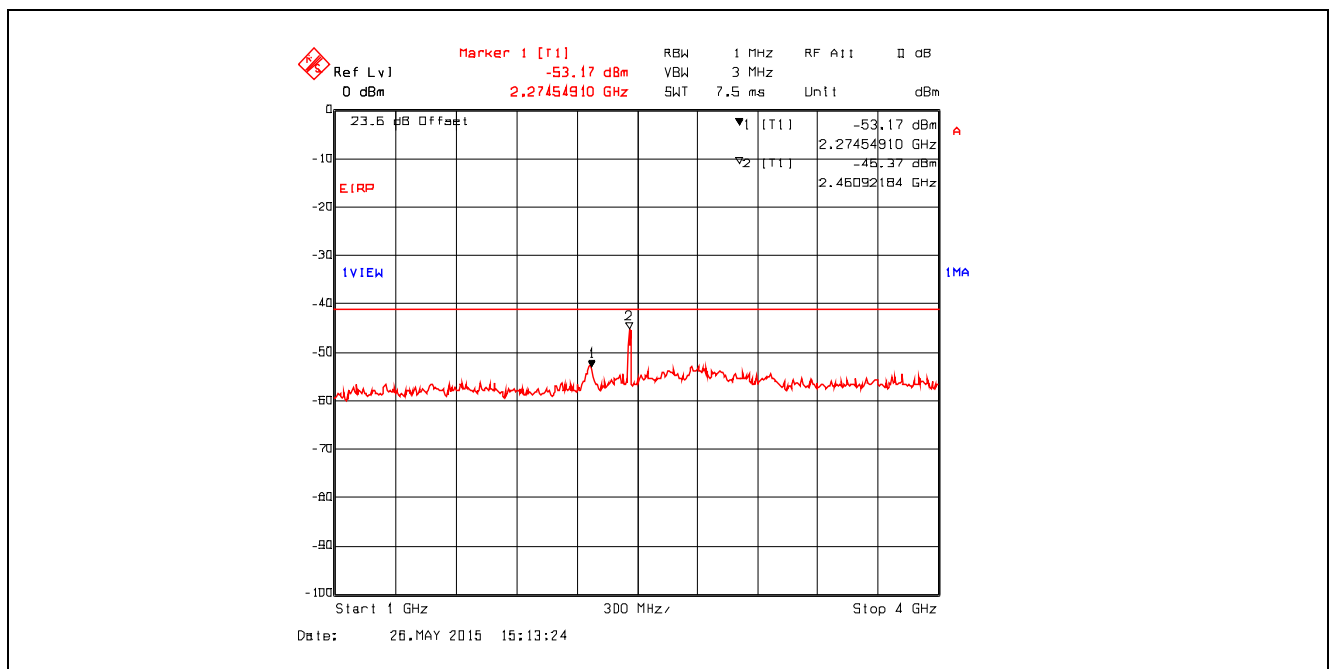

Plot 5.4.4.3.30. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 3, Ch 11, 2462 MHz, Software Output Power Setting 26, 4 GHz - 25 GHz, Peak Detector

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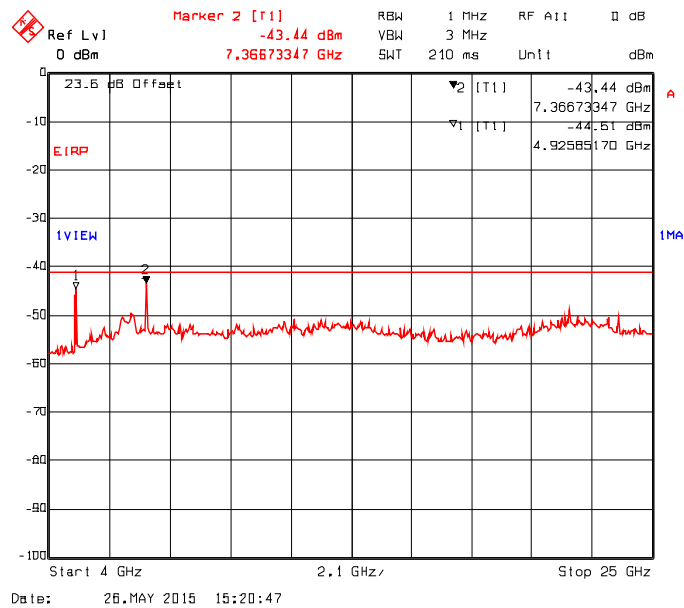
Plot 5.4.4.3.31. Conducted Spurious Emissions in Restricted Frequency Bands
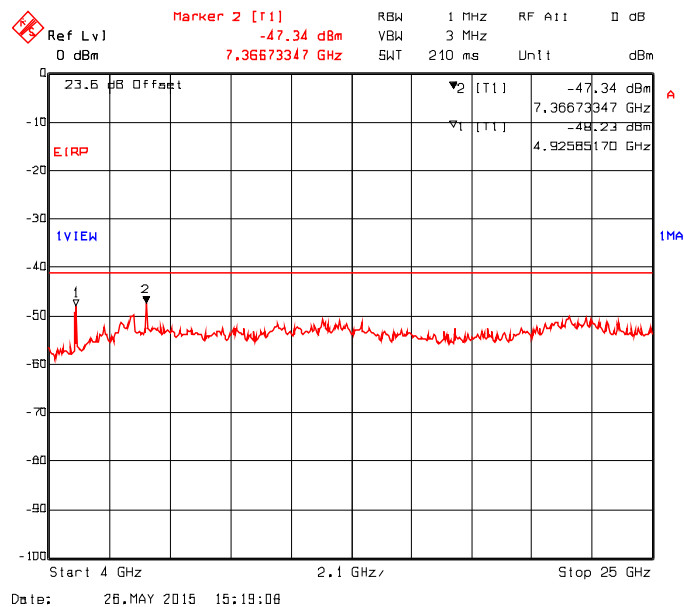Chain #1 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector
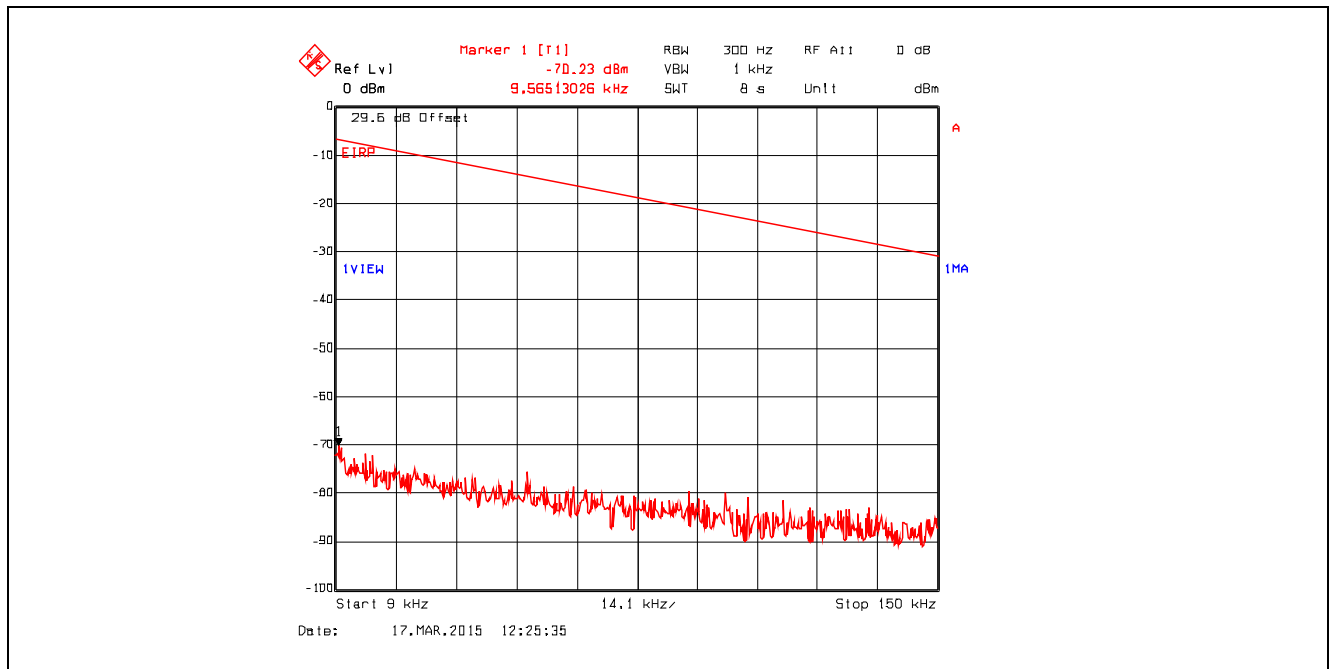
Plot 5.4.4.3.32. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.33. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector

Plot 5.4.4.3.34. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector
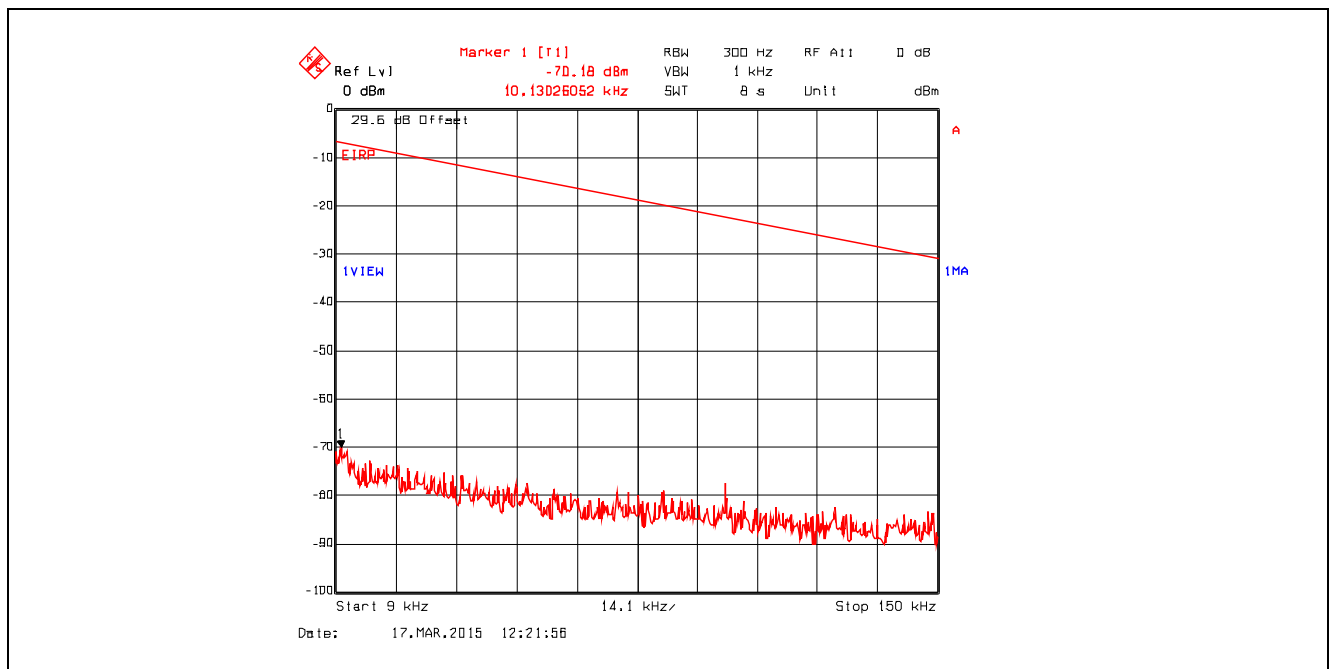
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Plot 5.4.4.3.35. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector
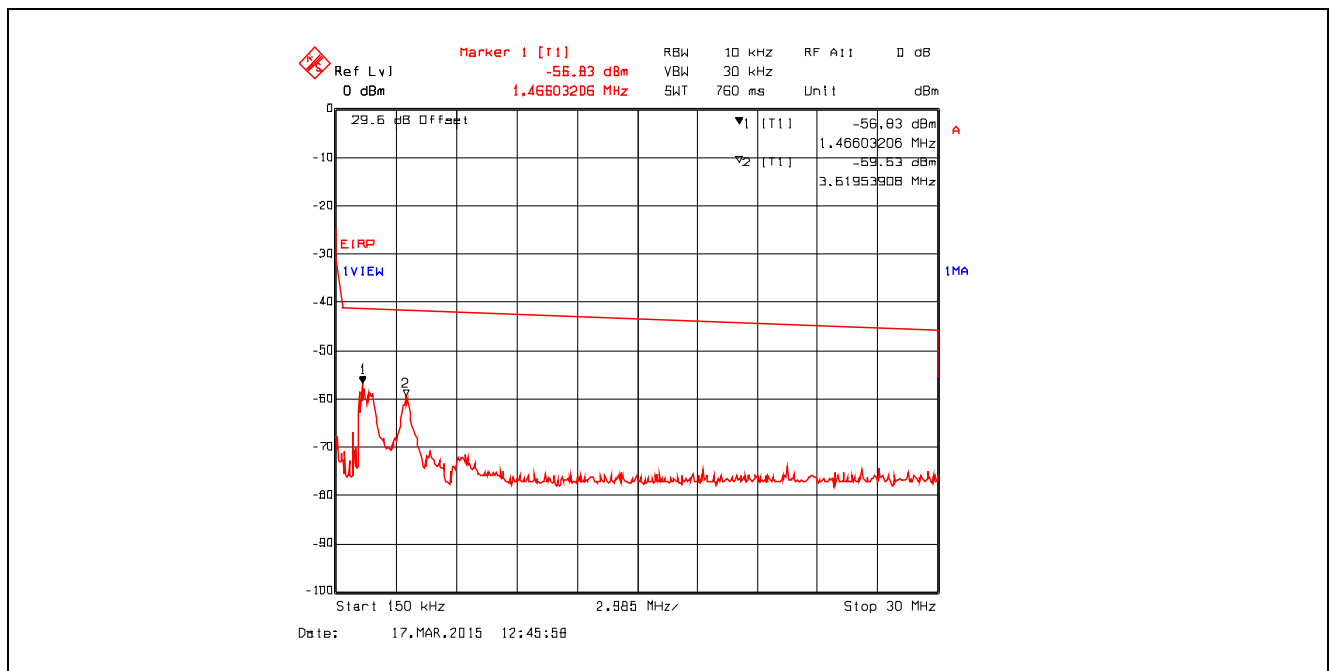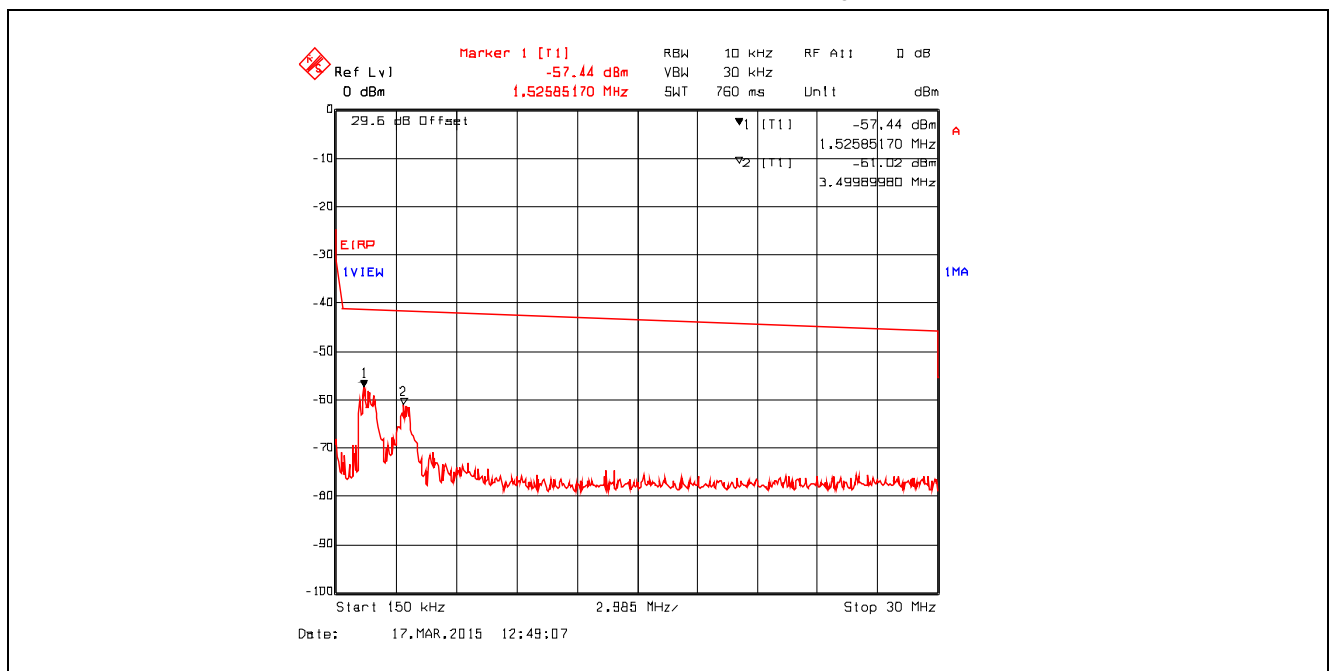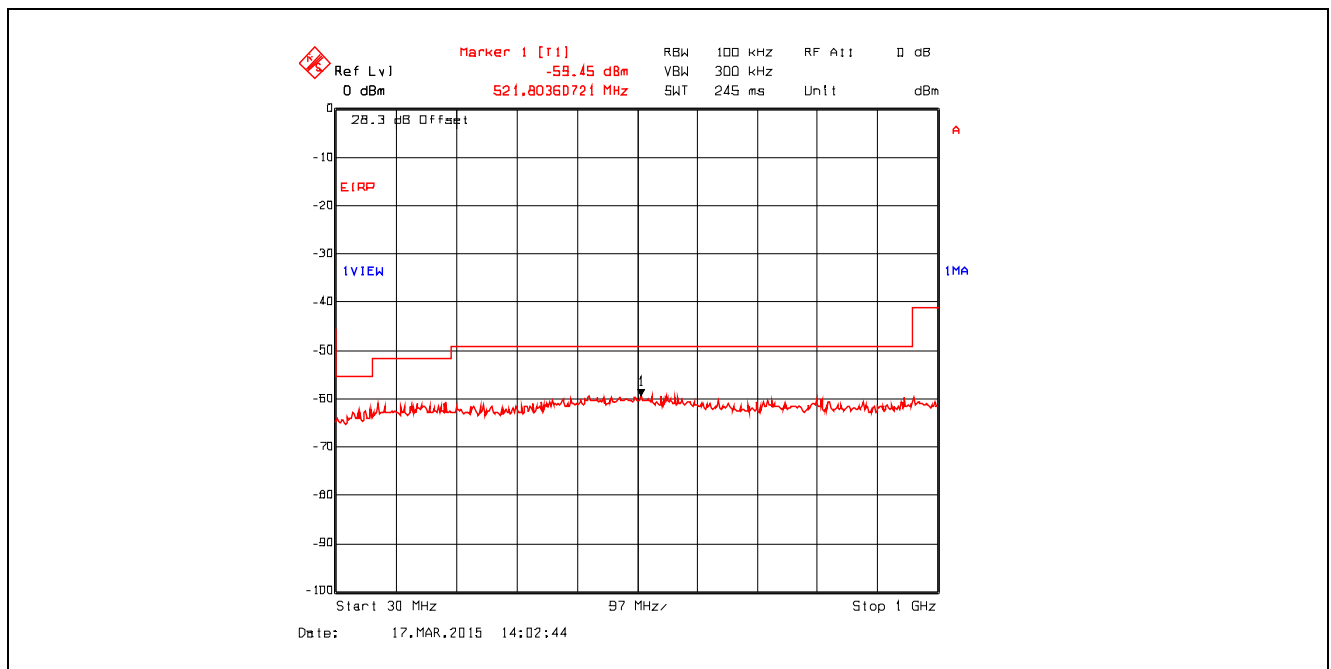

Plot 5.4.4.3.36. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector

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Plot 5.4.4.3.37. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector
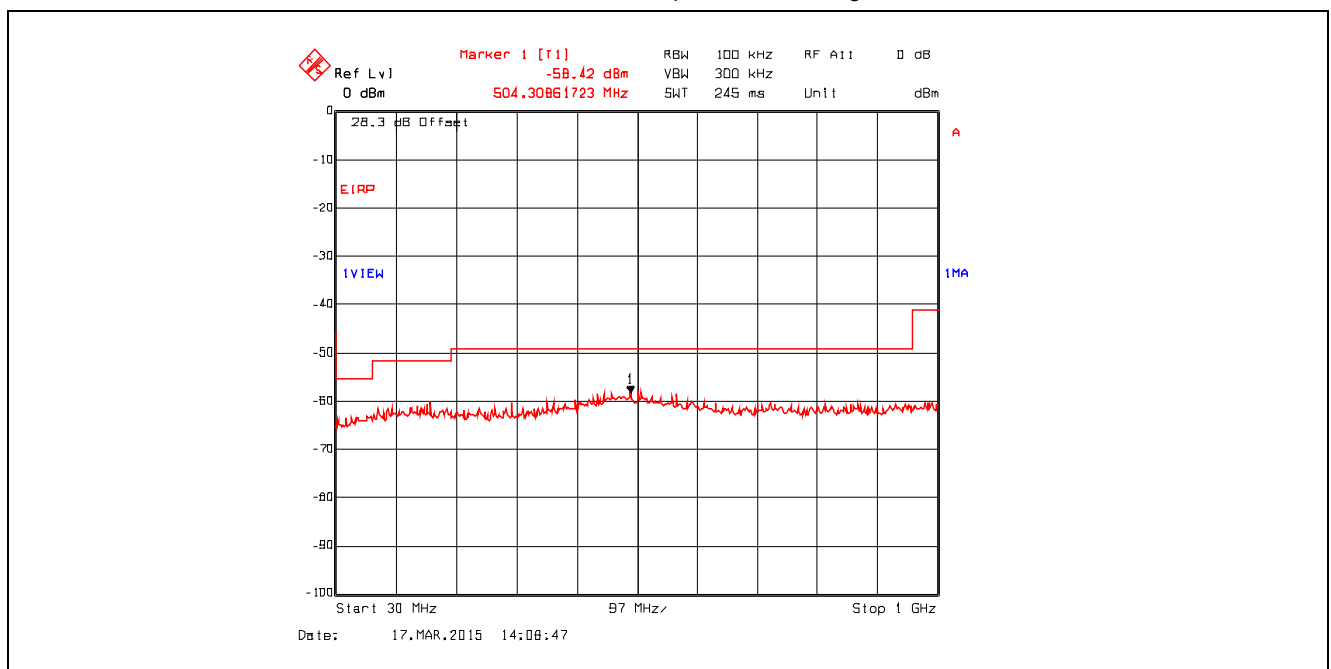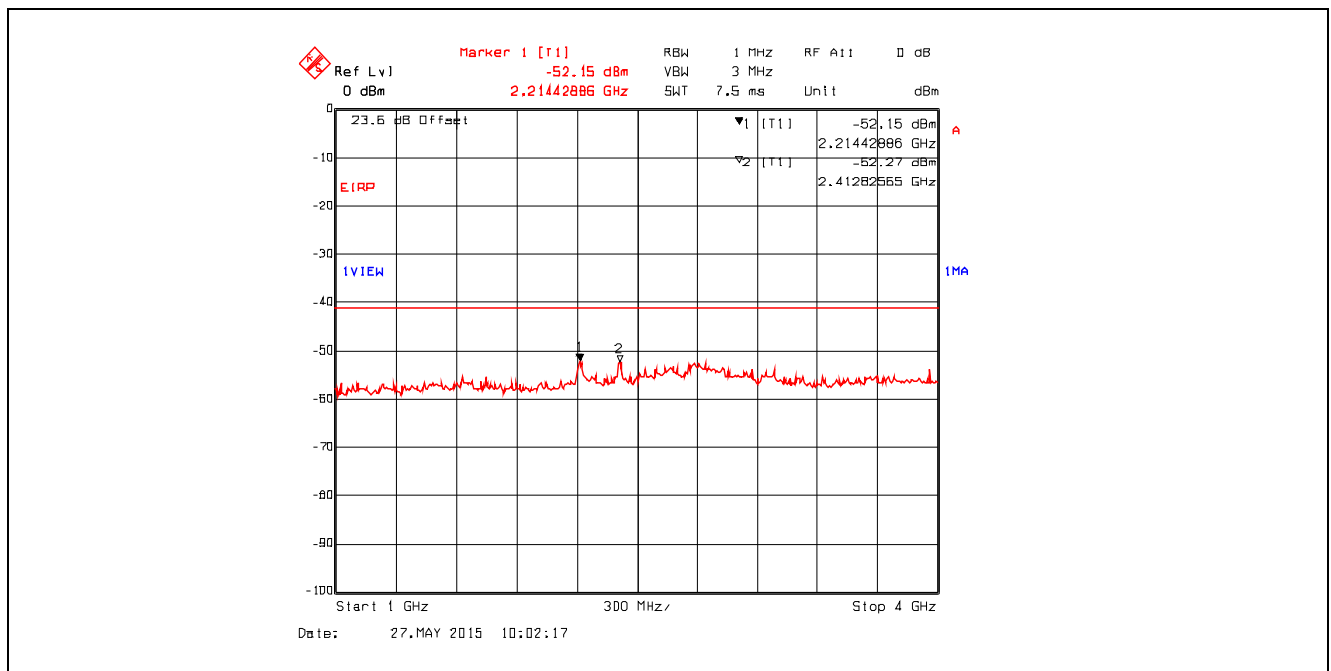

Plot 5.4.4.3.38. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector

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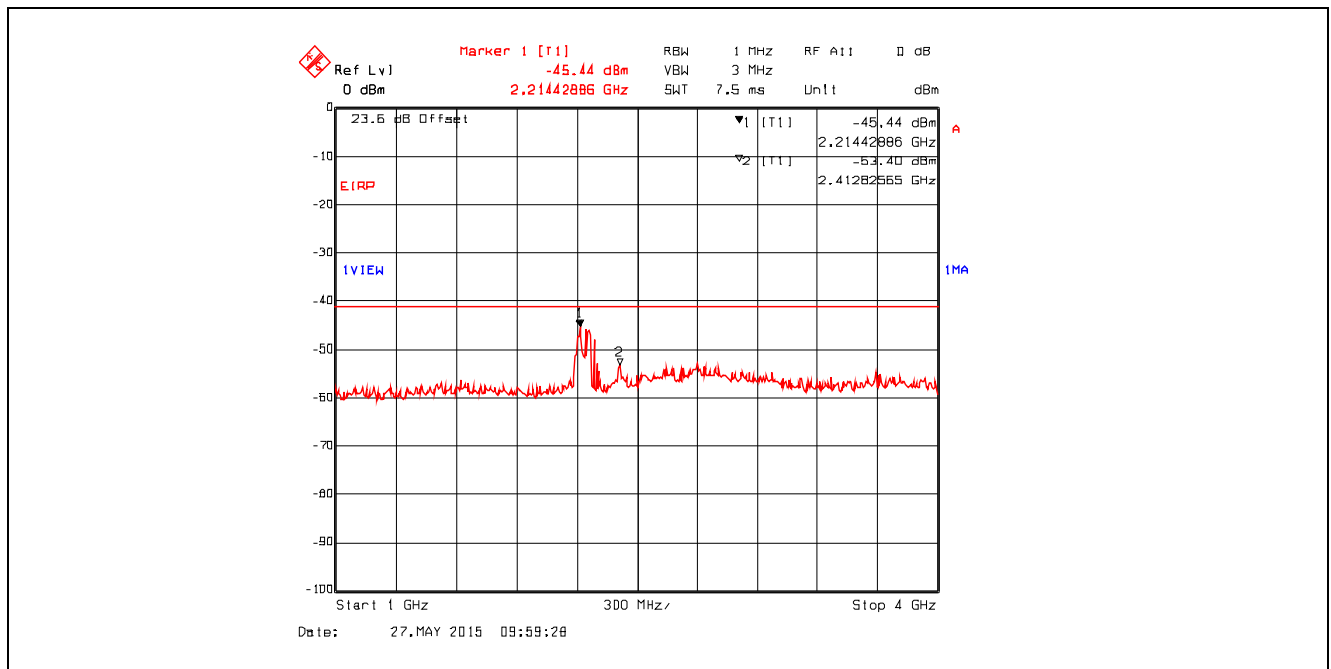
Plot 5.4.4.3.39. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector
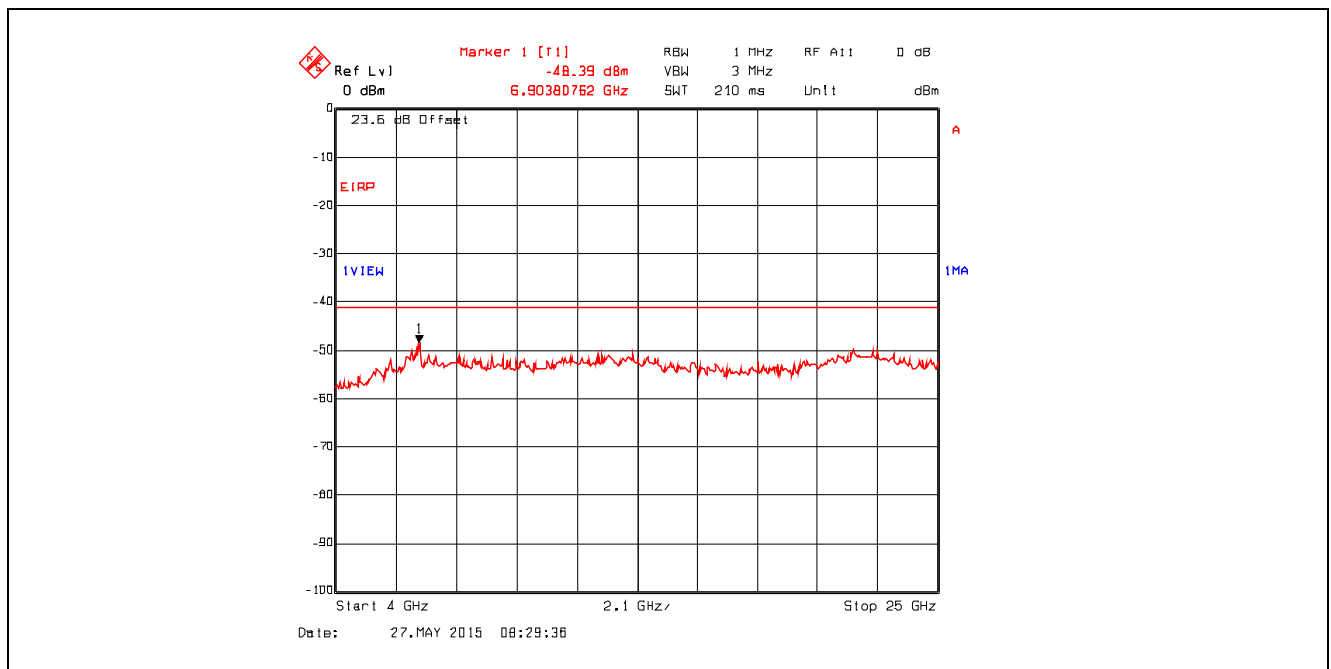

Plot 5.4.4.3.40. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 1, 2412 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector

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Plot 5.4.4.3.41. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector
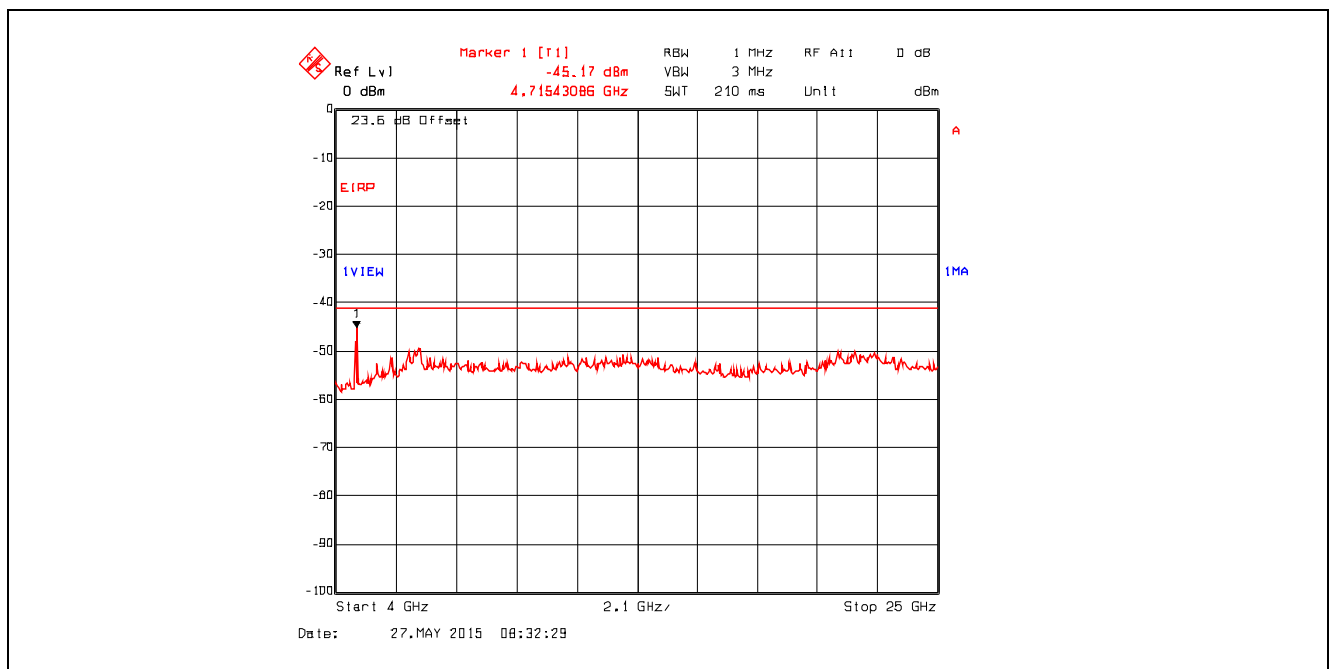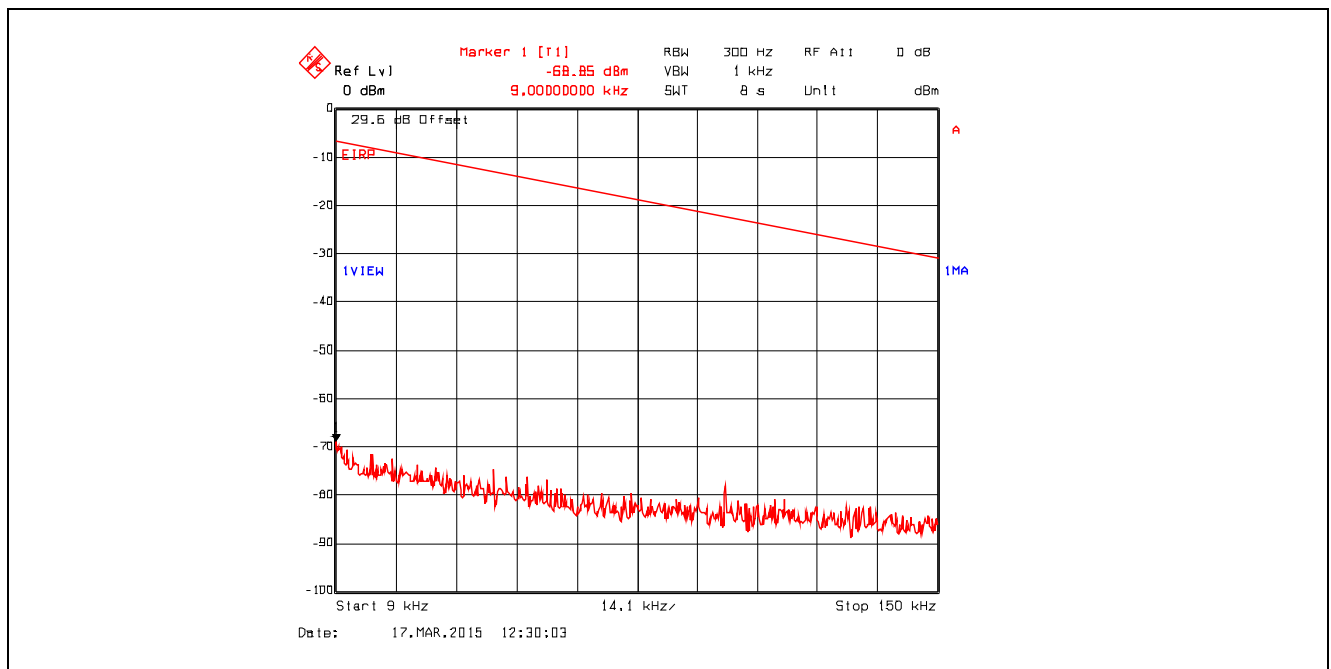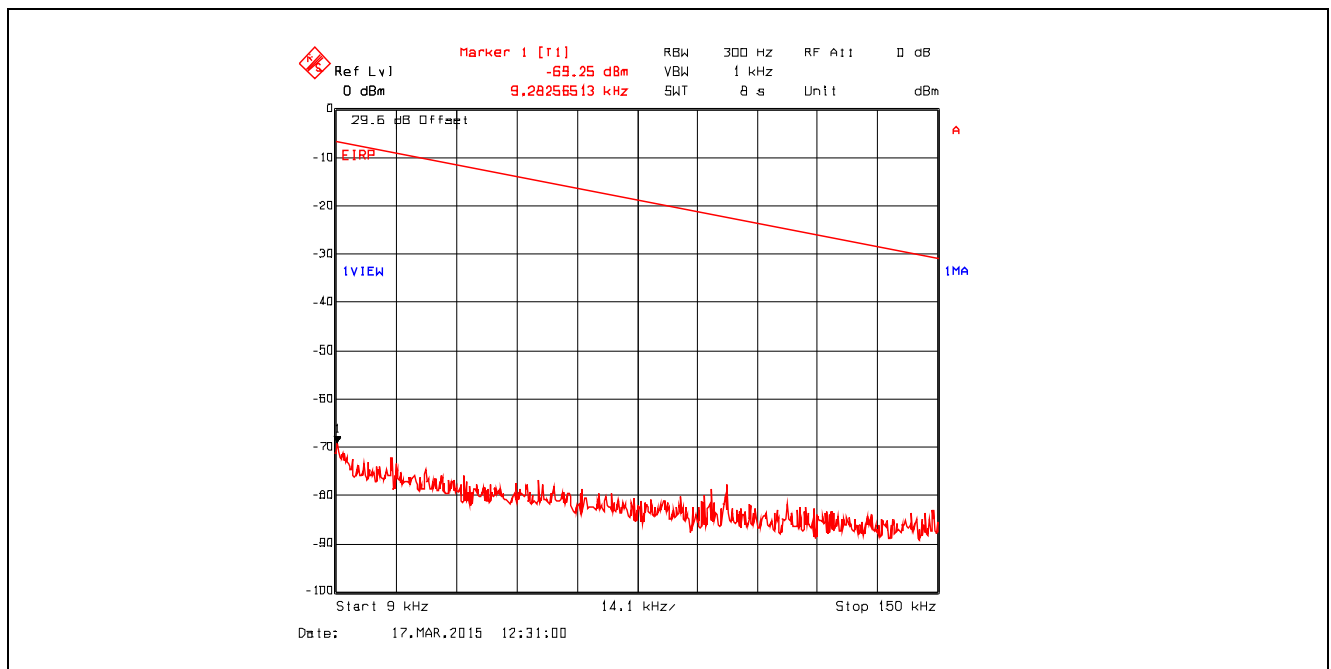

Plot 5.4.4.3.42. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.43. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector
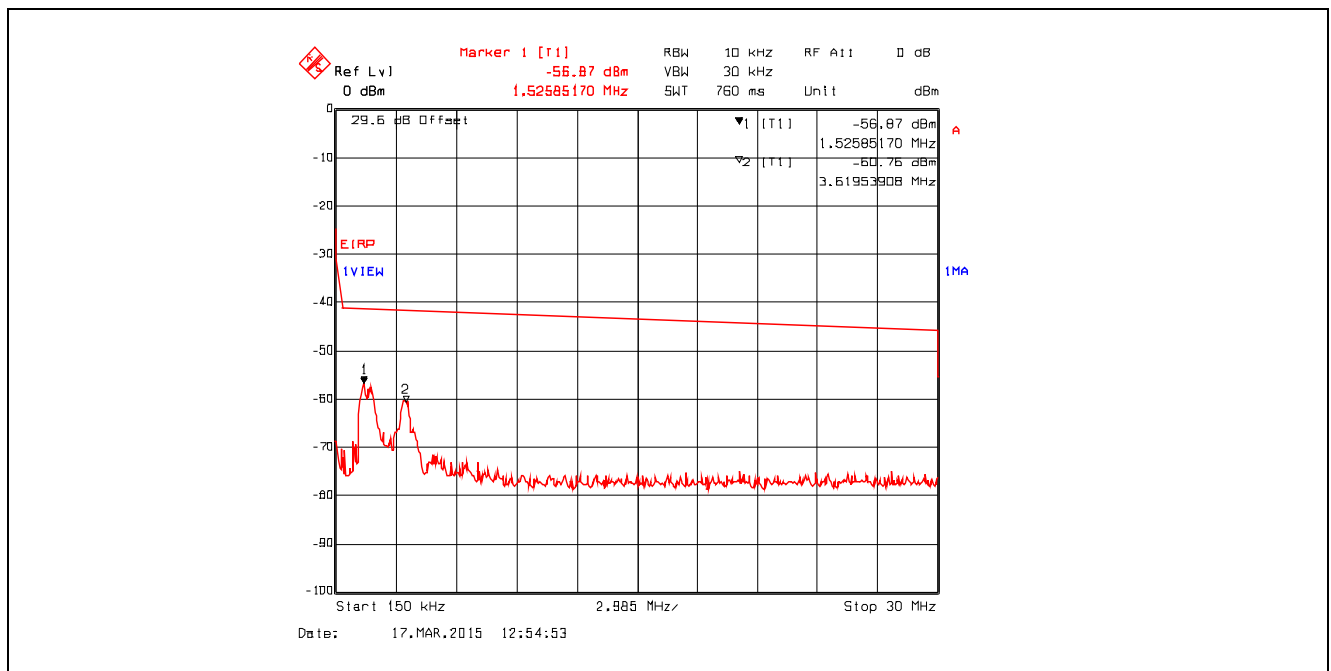

Plot 5.4.4.3.44. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector

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Plot 5.4.4.3.45. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector
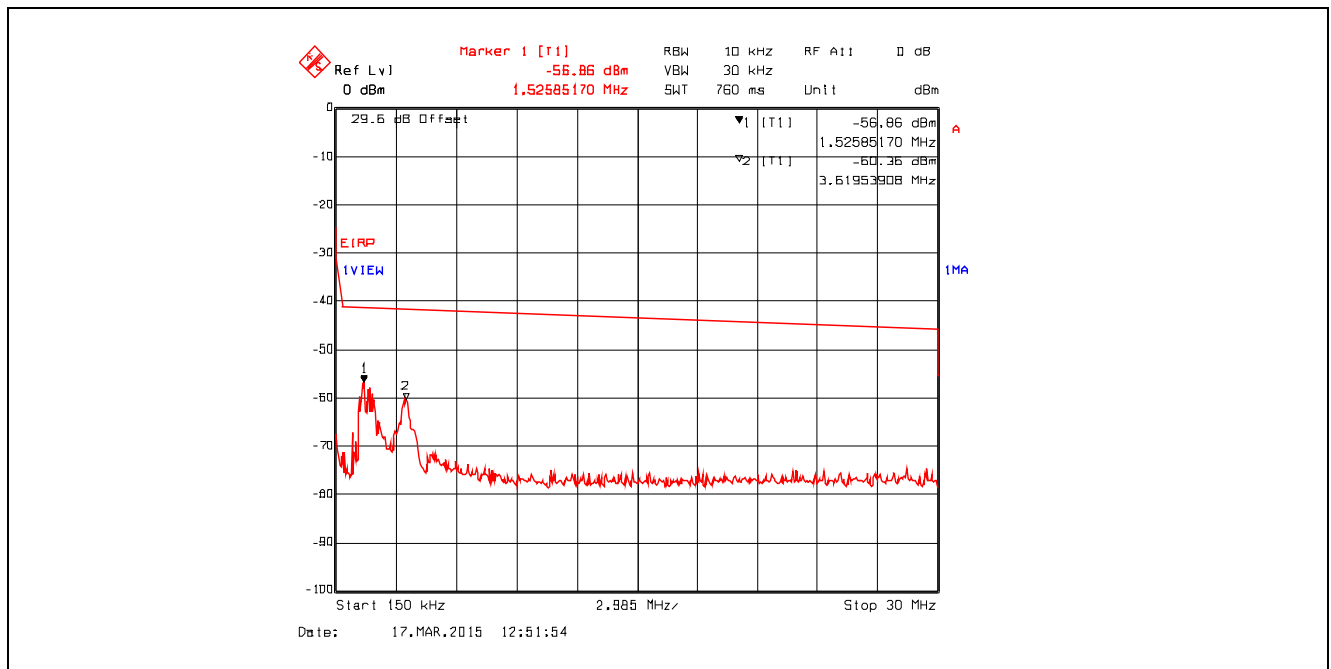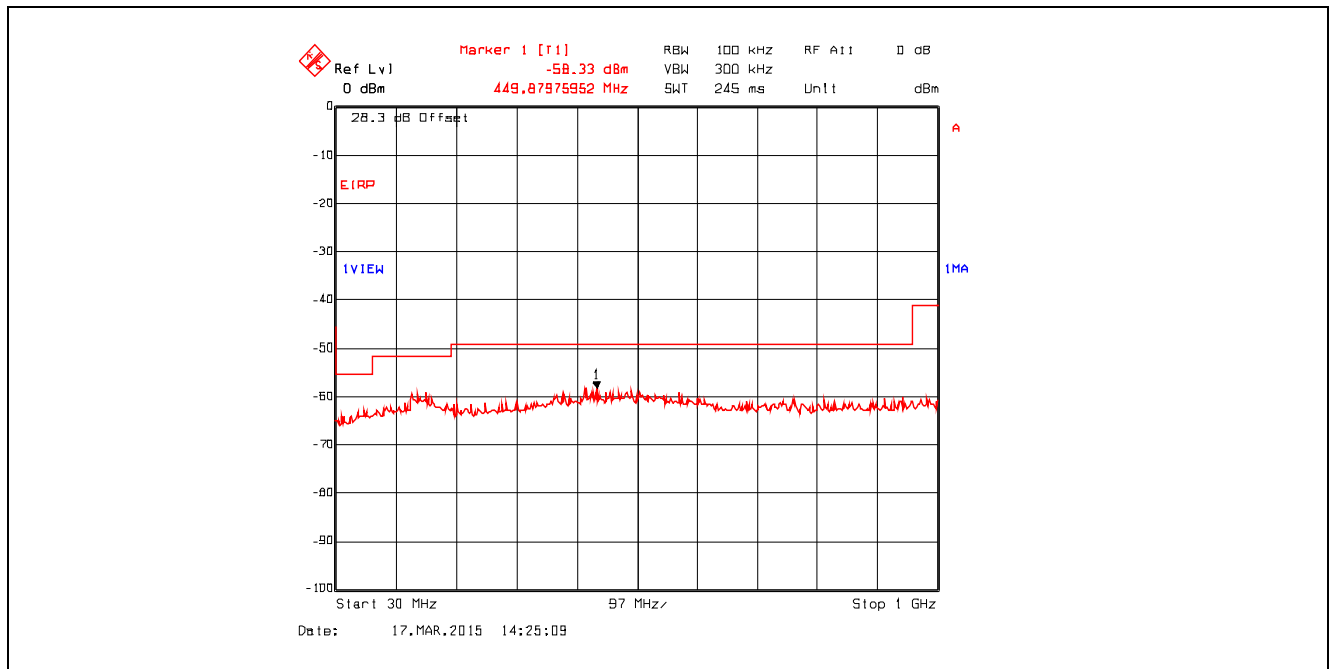

Plot 5.4.4.3.46. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector

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Plot 5.4.4.3.47. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector
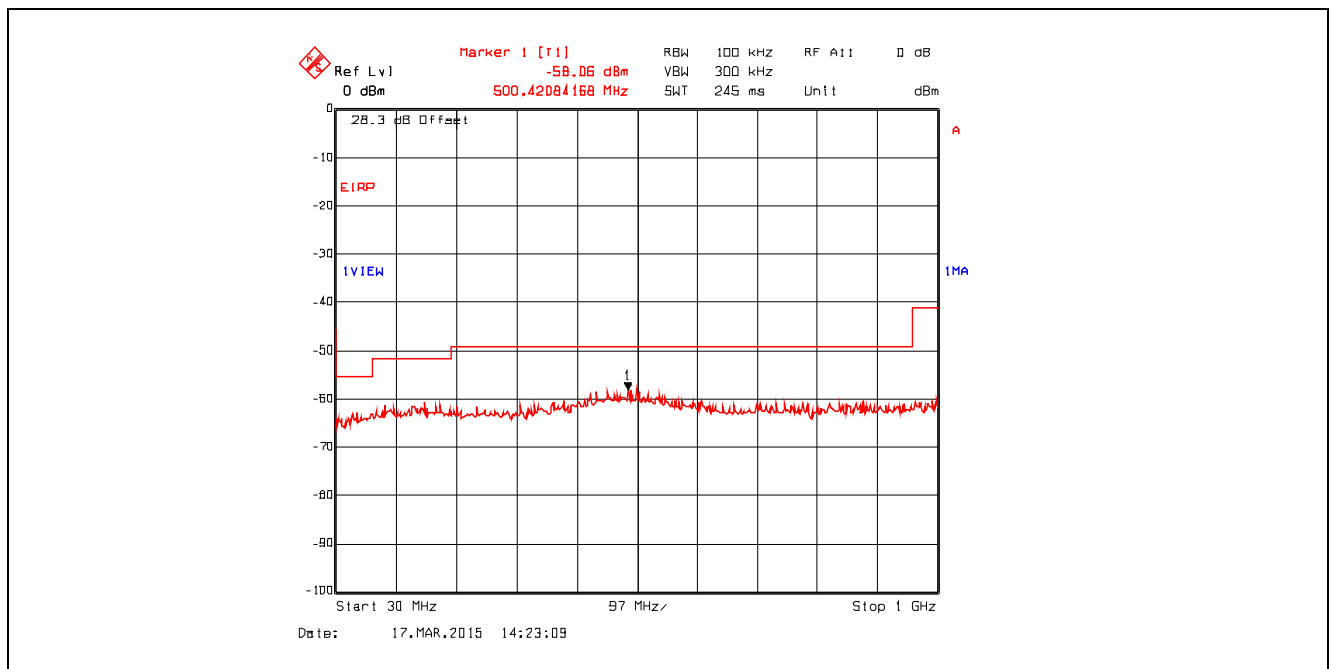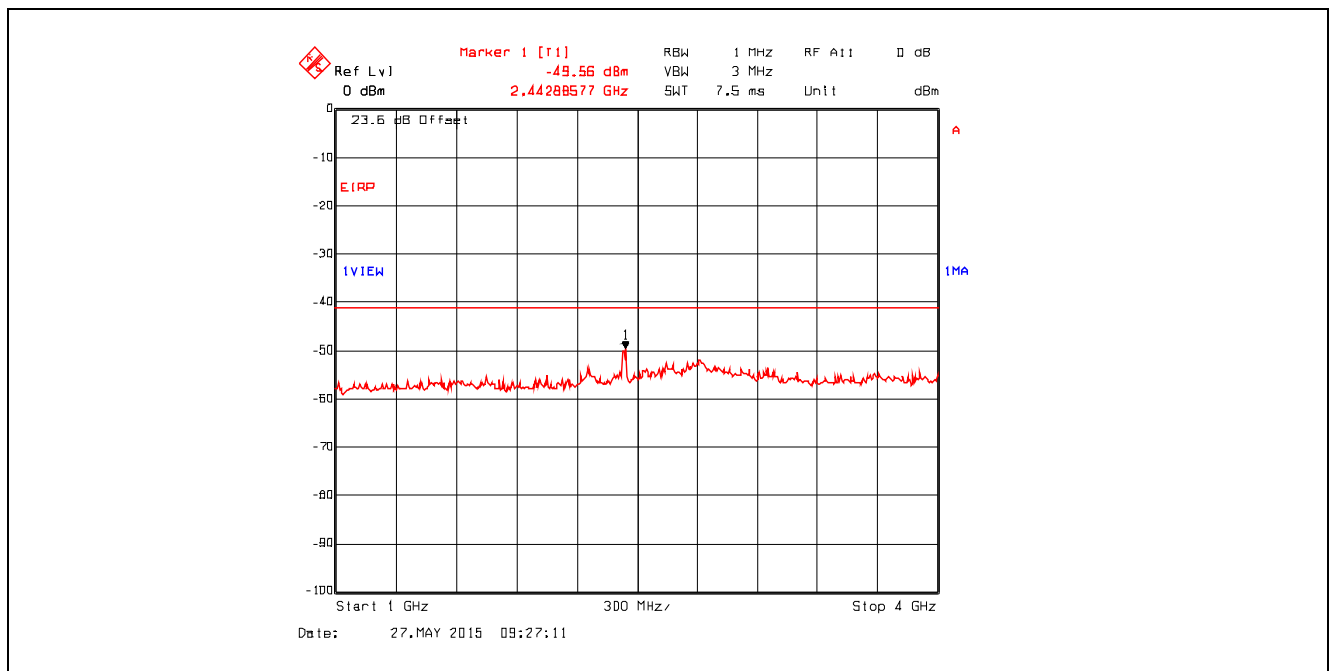

Plot 5.4.4.3.48. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector

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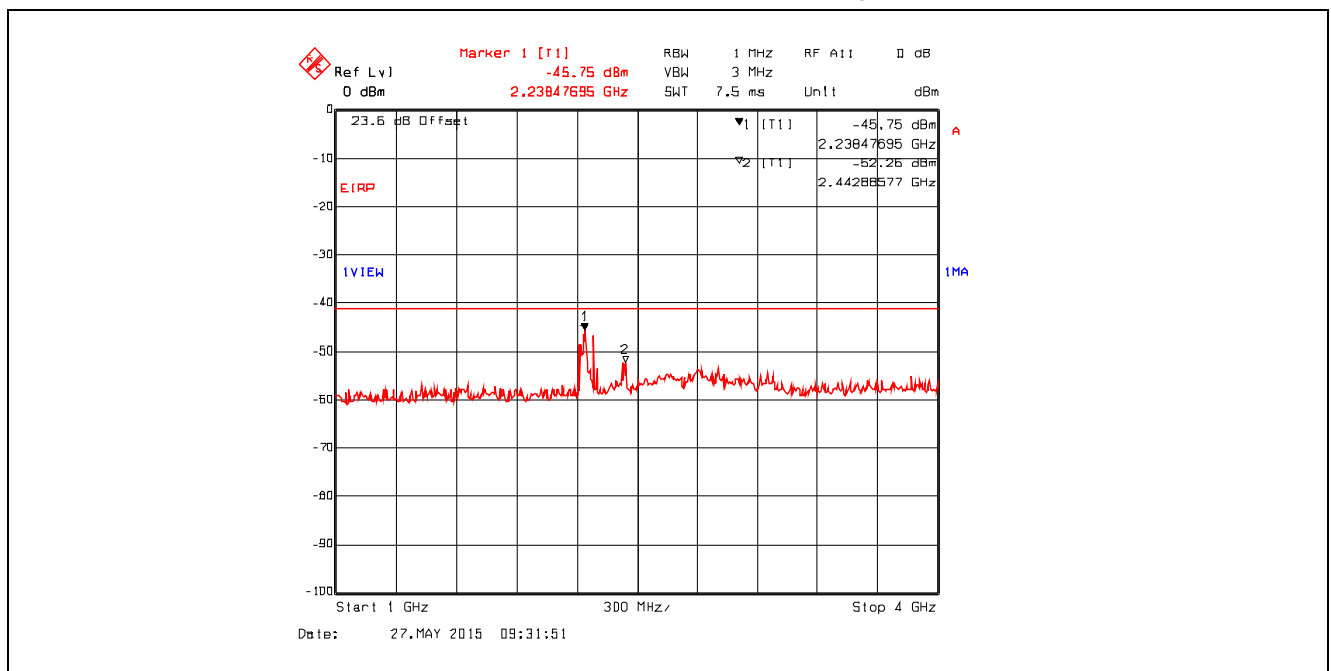
Plot 5.4.4.3.49. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector
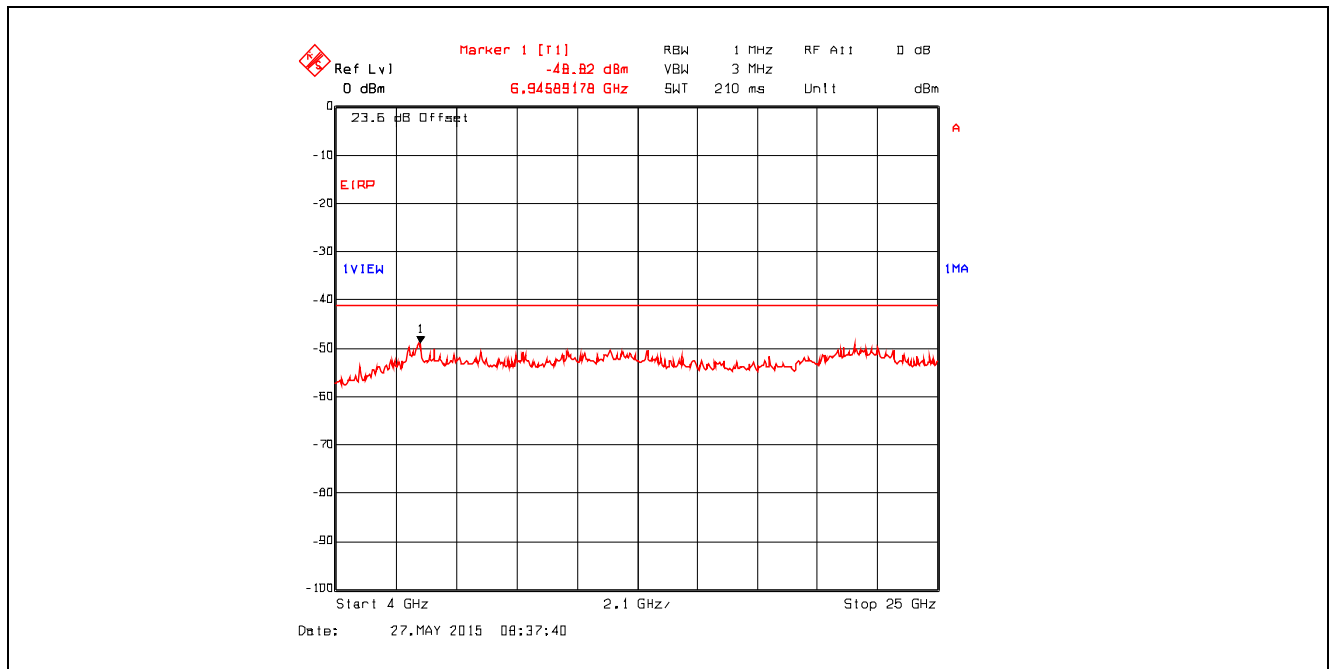

Plot 5.4.4.3.50. Conducted Spurious Emissions in Restricted Frequency Bands
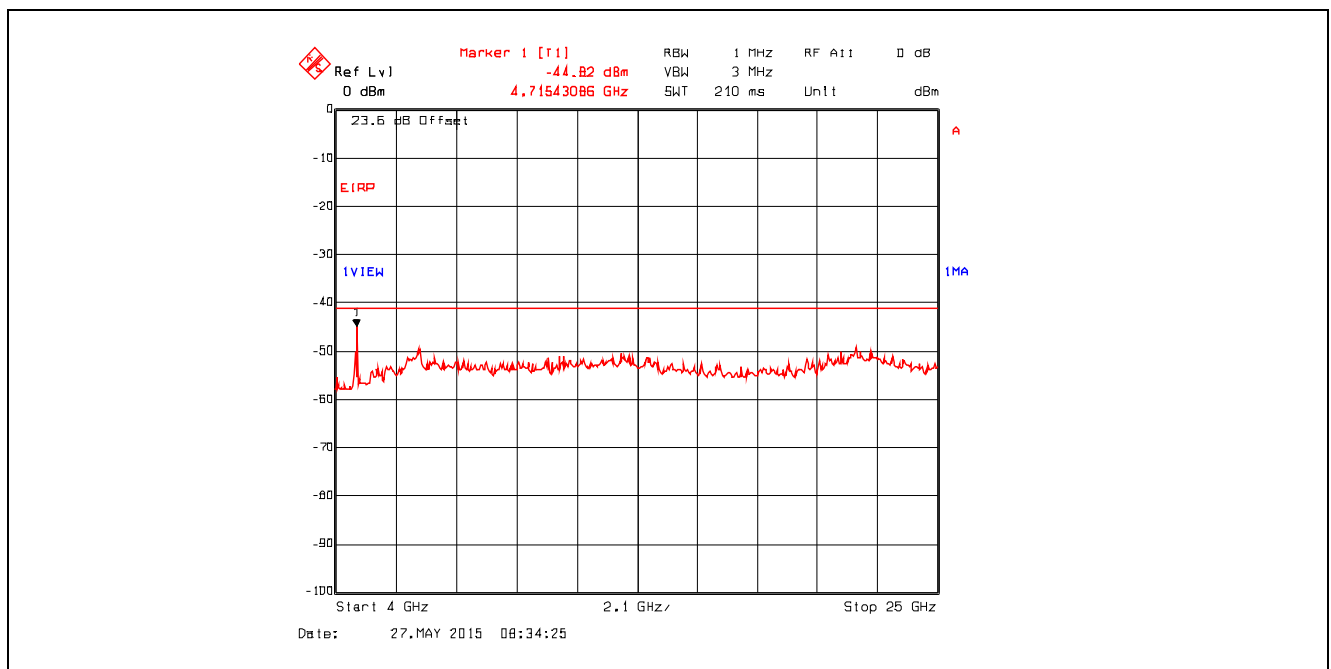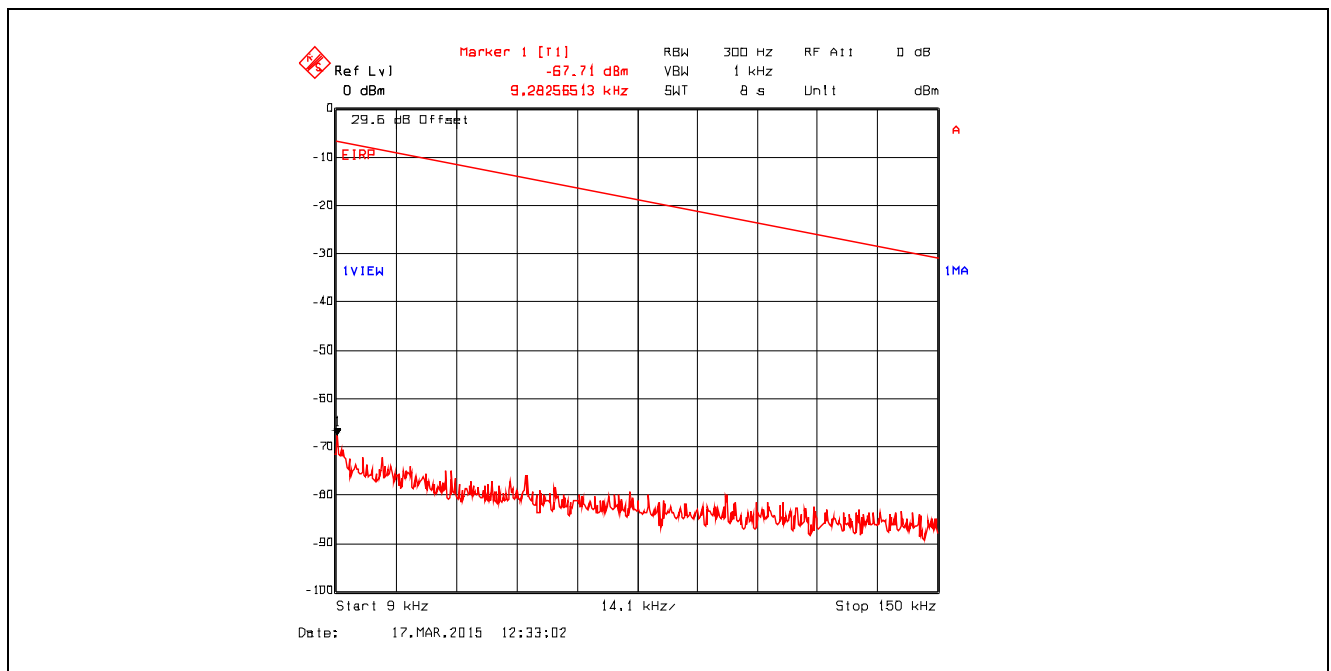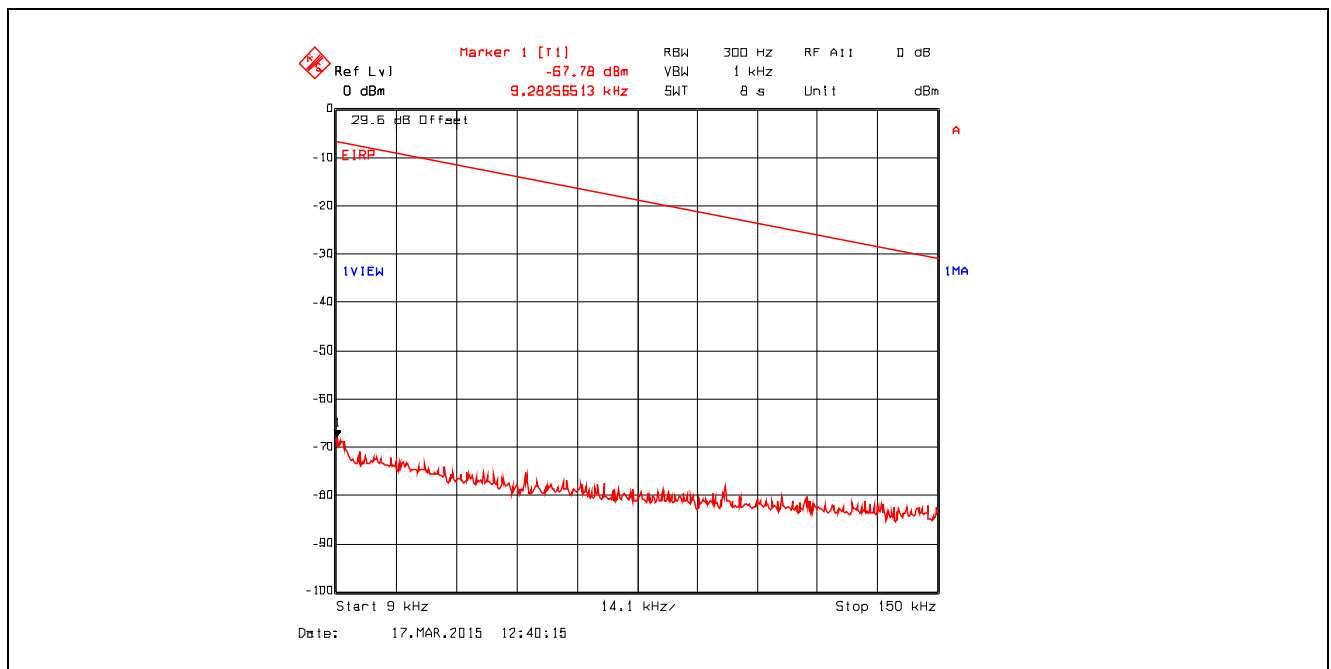Chain #2 , Data Rate 7, Ch 6, 2437 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector

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Plot 5.4.4.3.51. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector

Plot 5.4.4.3.52. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.53. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector
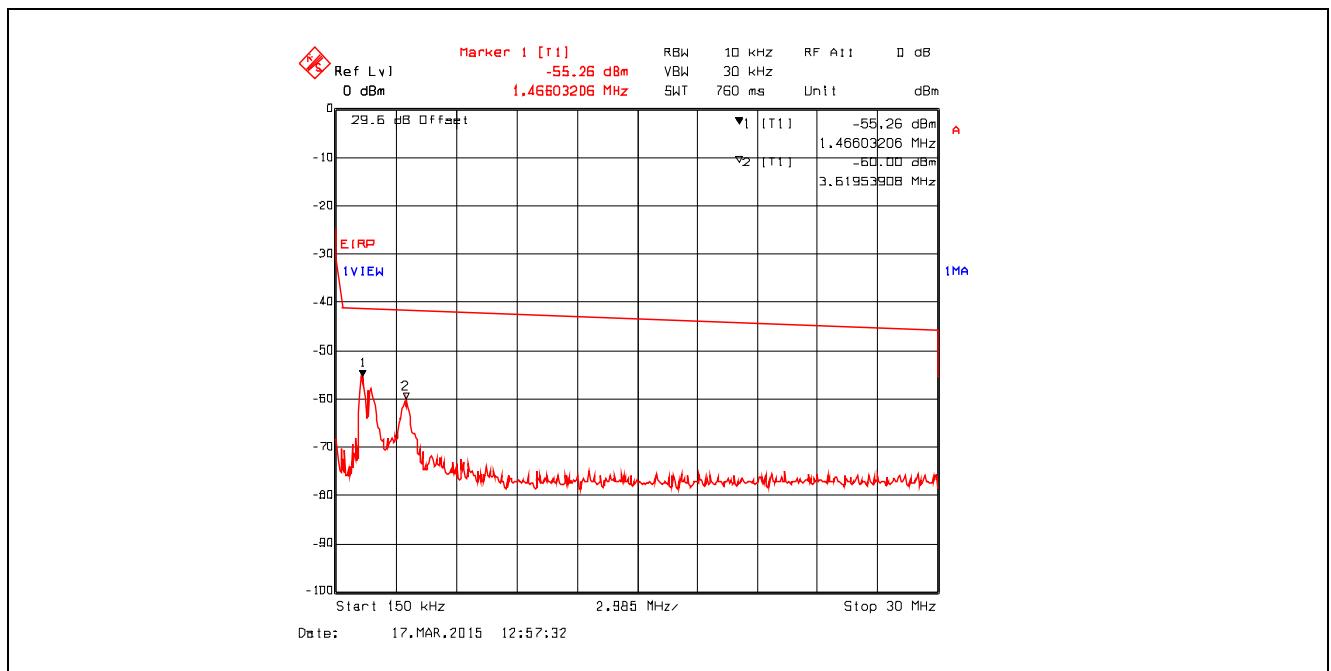

Plot 5.4.4.3.54. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 150 kHz - 30 MHz, Peak Detector

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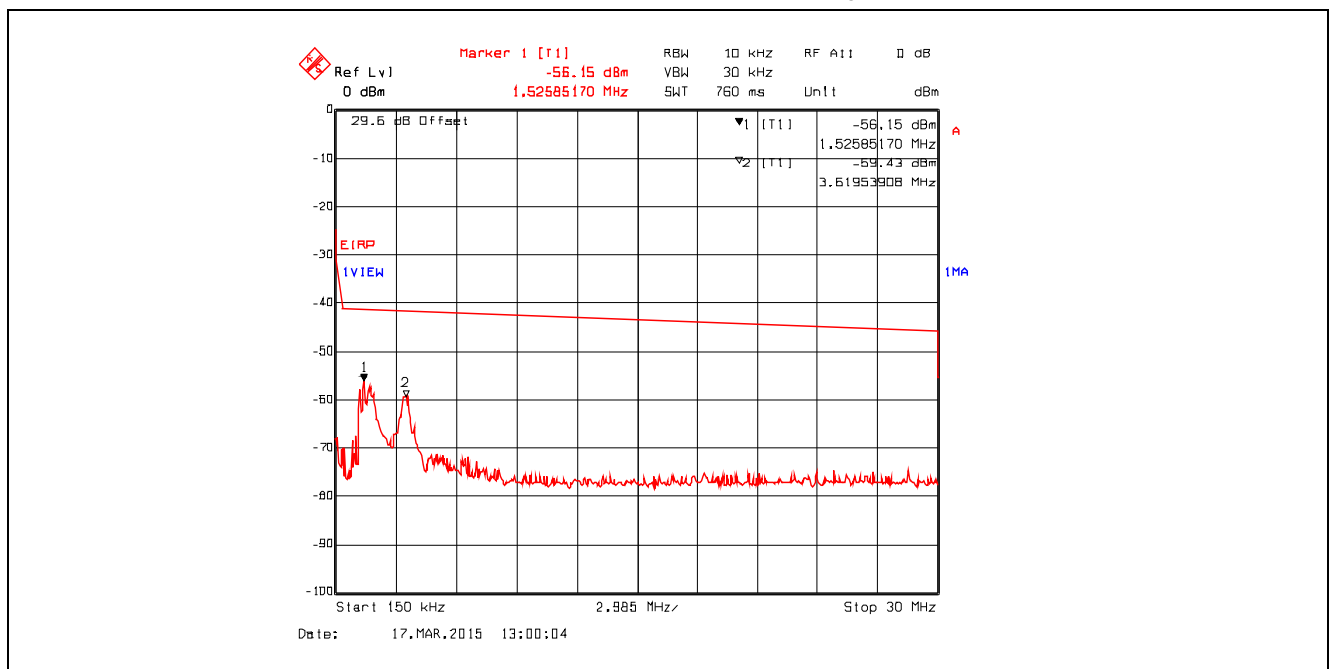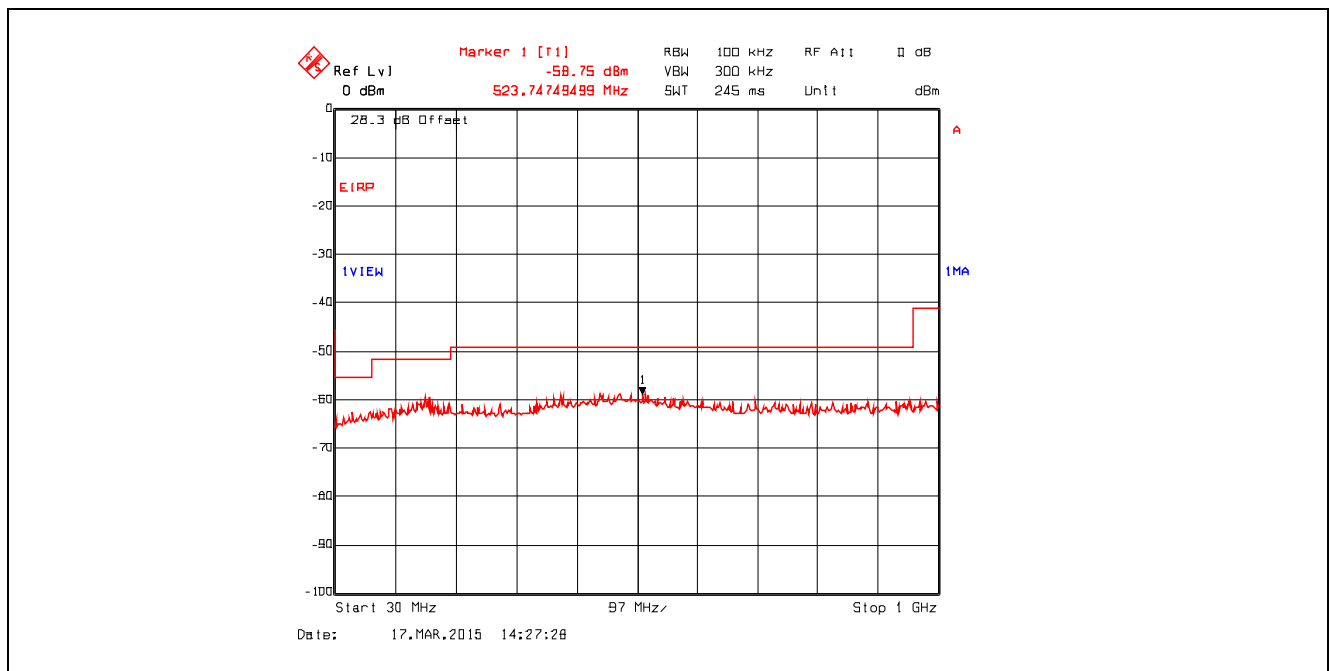
Plot 5.4.4.3.55. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector
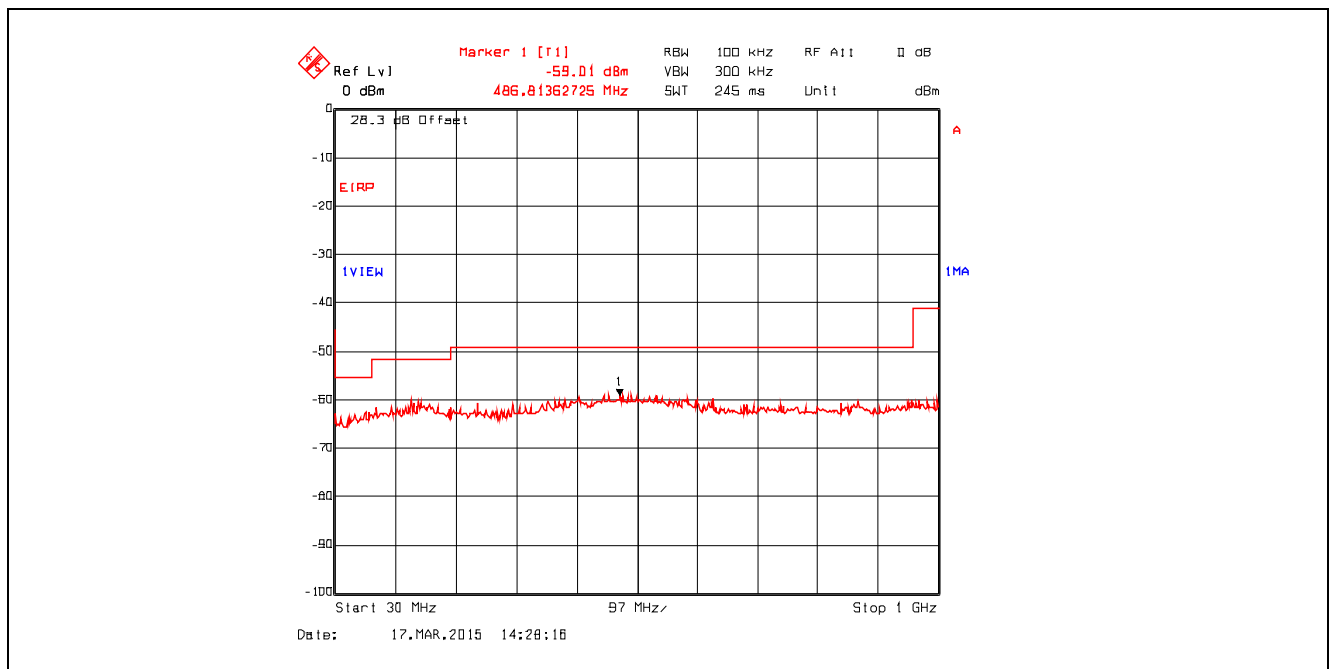

Plot 5.4.4.3.56. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 30 MHz - 1 GHz, Peak Detector

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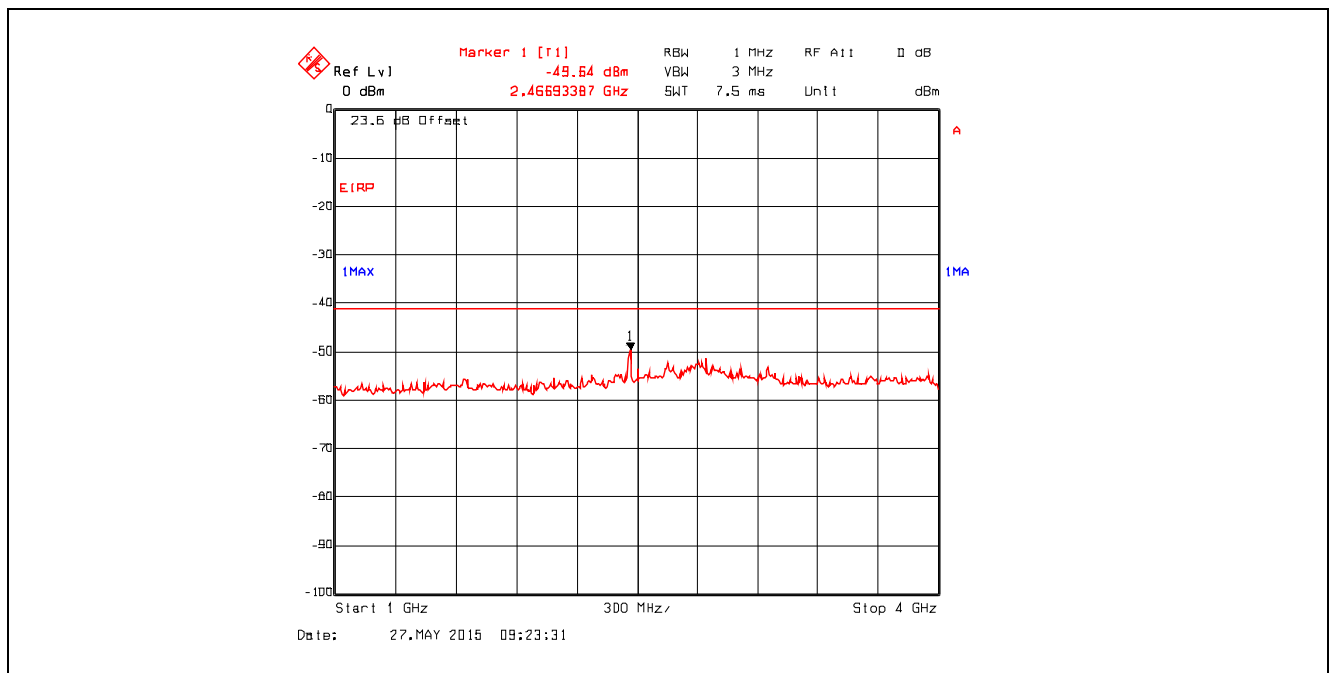
Plot 5.4.4.3.57. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector
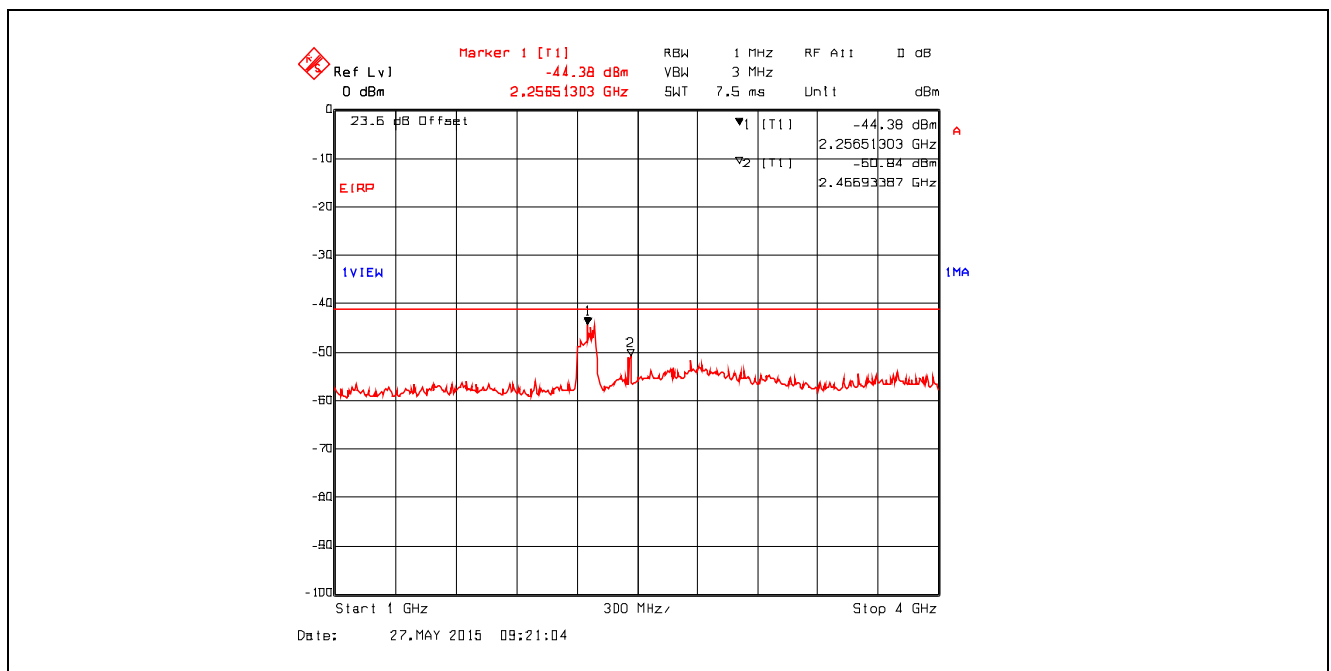

Plot 5.4.4.3.58. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 1 GHz - 4 GHz, Peak Detector

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Plot 5.4.4.3.59. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector
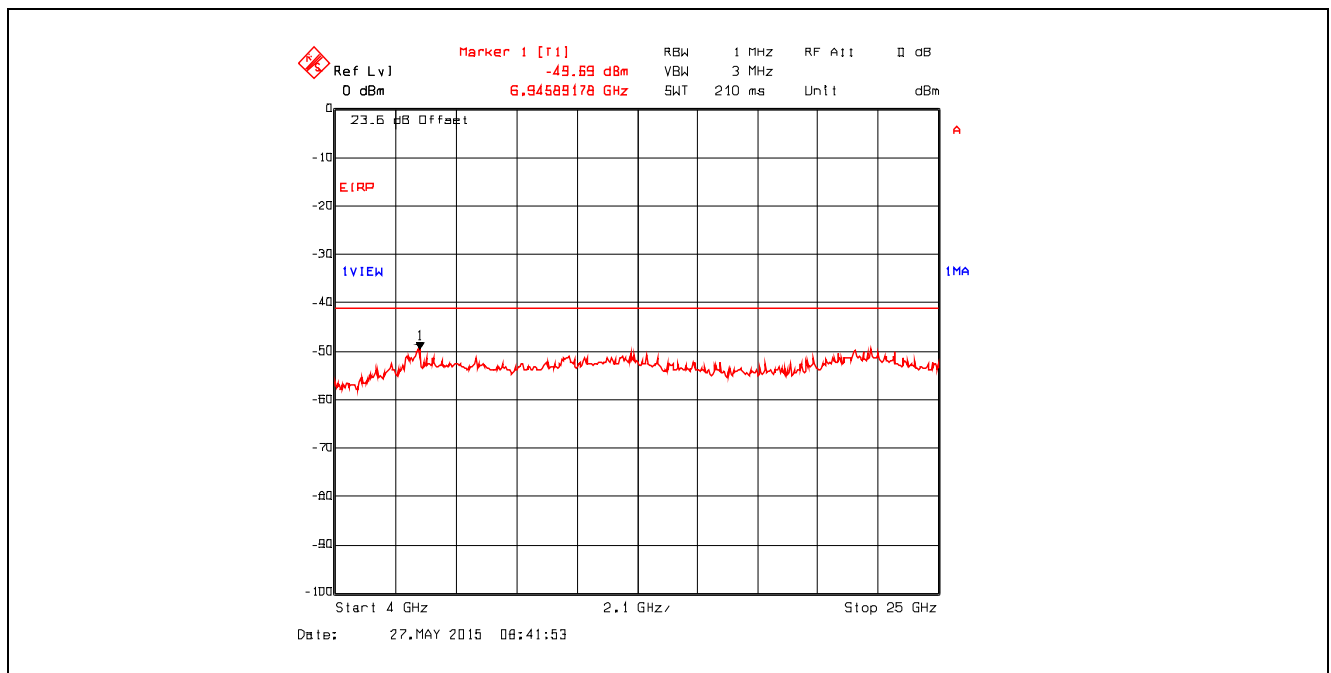

Plot 5.4.4.3.60. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 7, Ch 11, 2462 MHz, Software Output Power Setting 18, 4 GHz - 25 GHz, Peak Detector
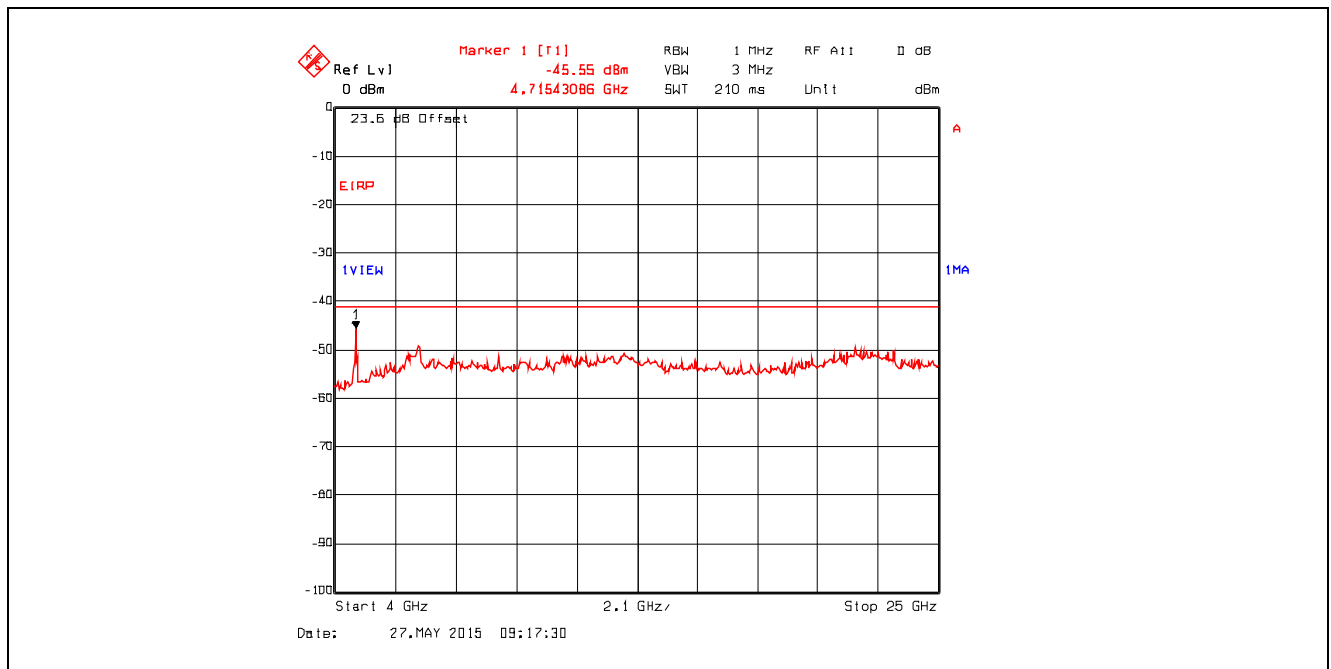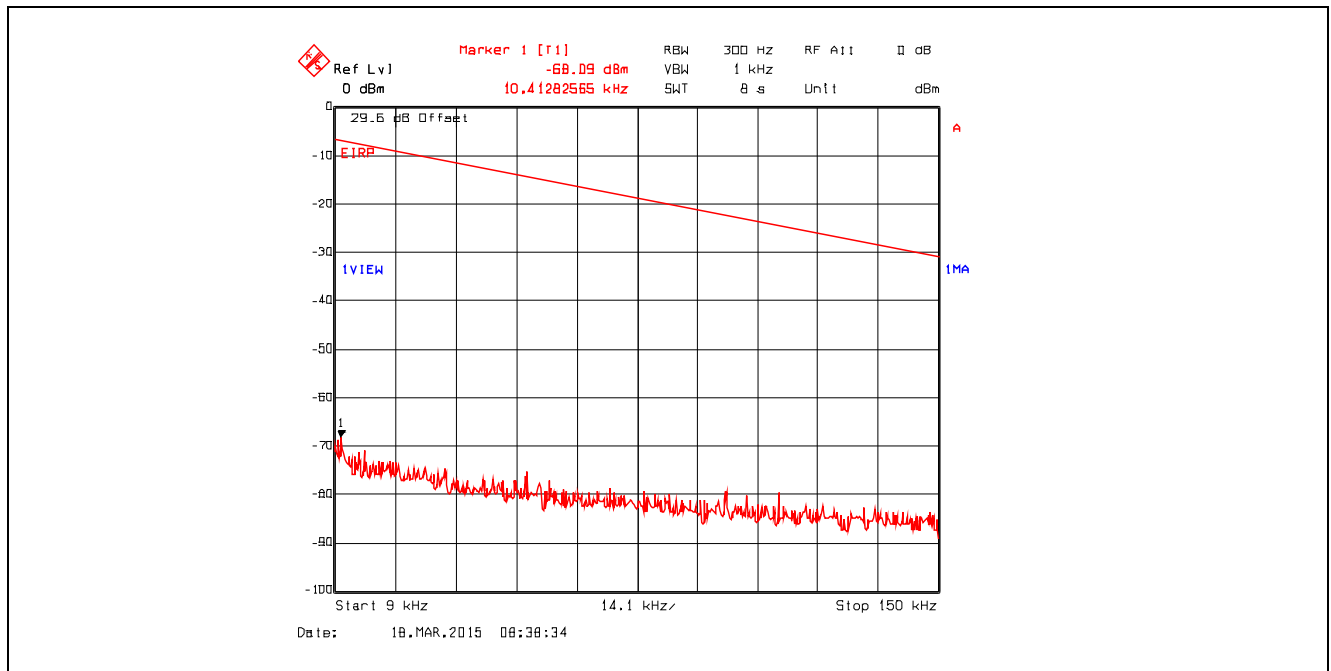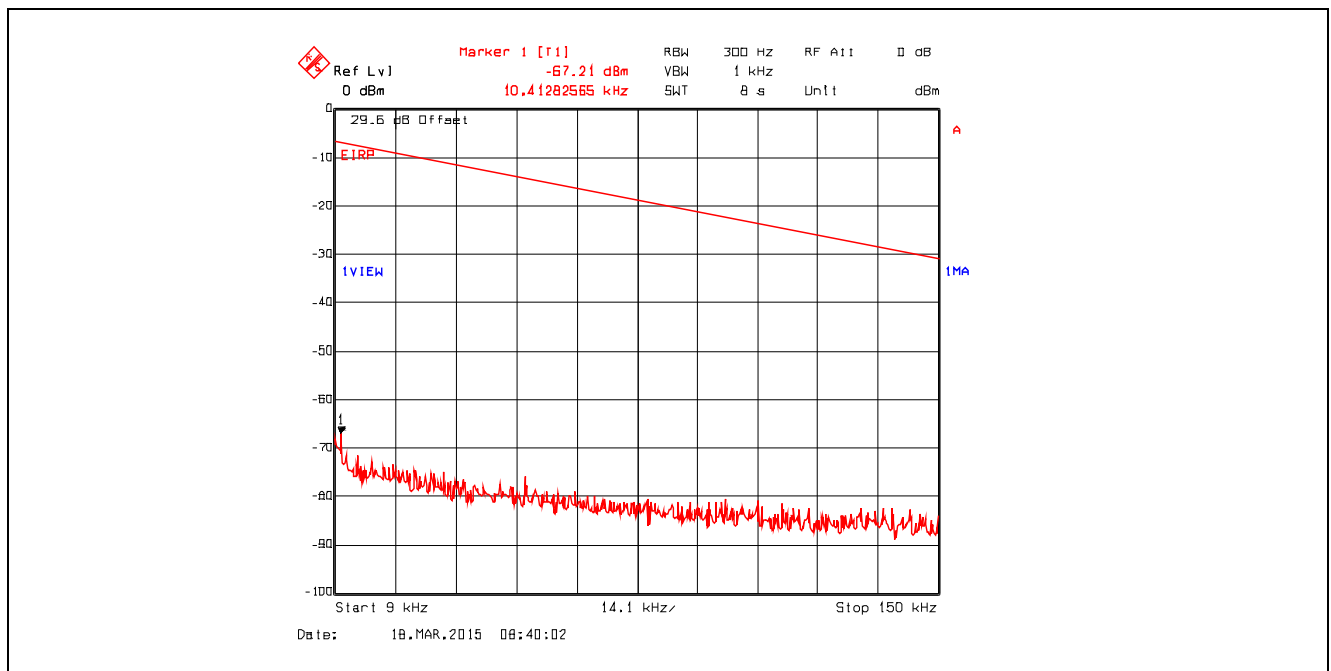
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Plot 5.4.4.3.61. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector

Plot 5.4.4.3.62. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.63. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector
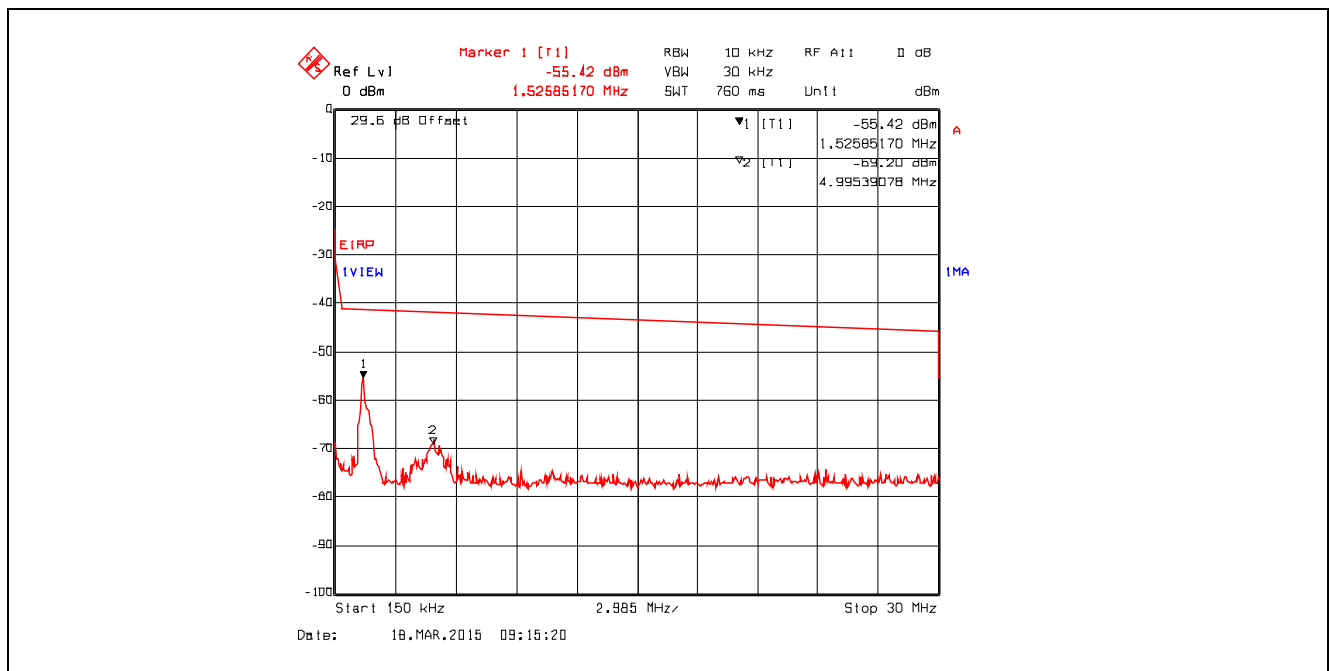

Plot 5.4.4.3.64. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector

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Plot 5.4.4.3.65. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector
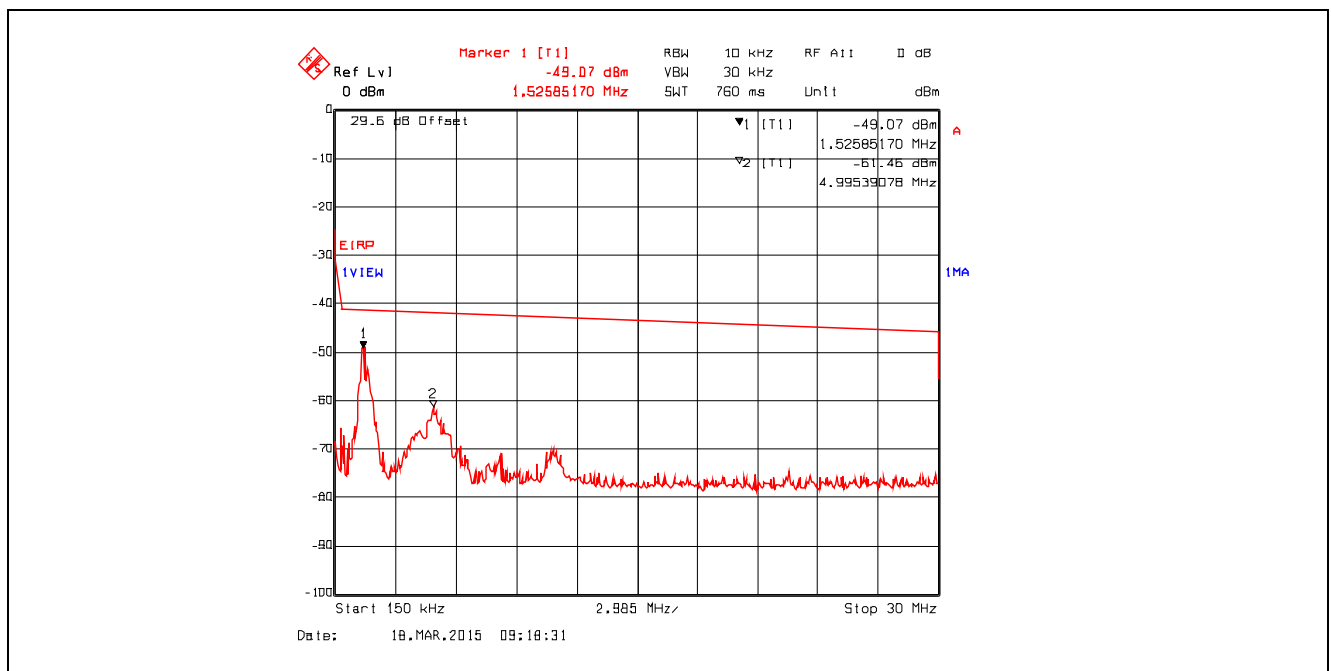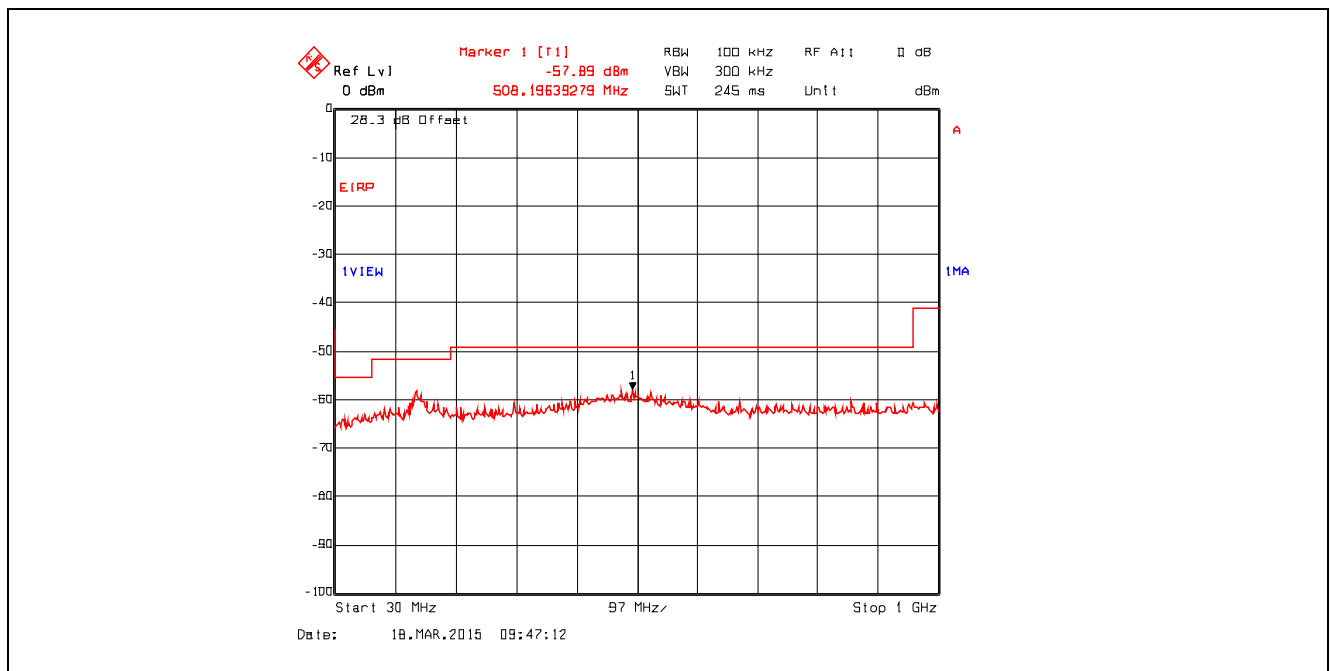

Plot 5.4.4.3.66. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector

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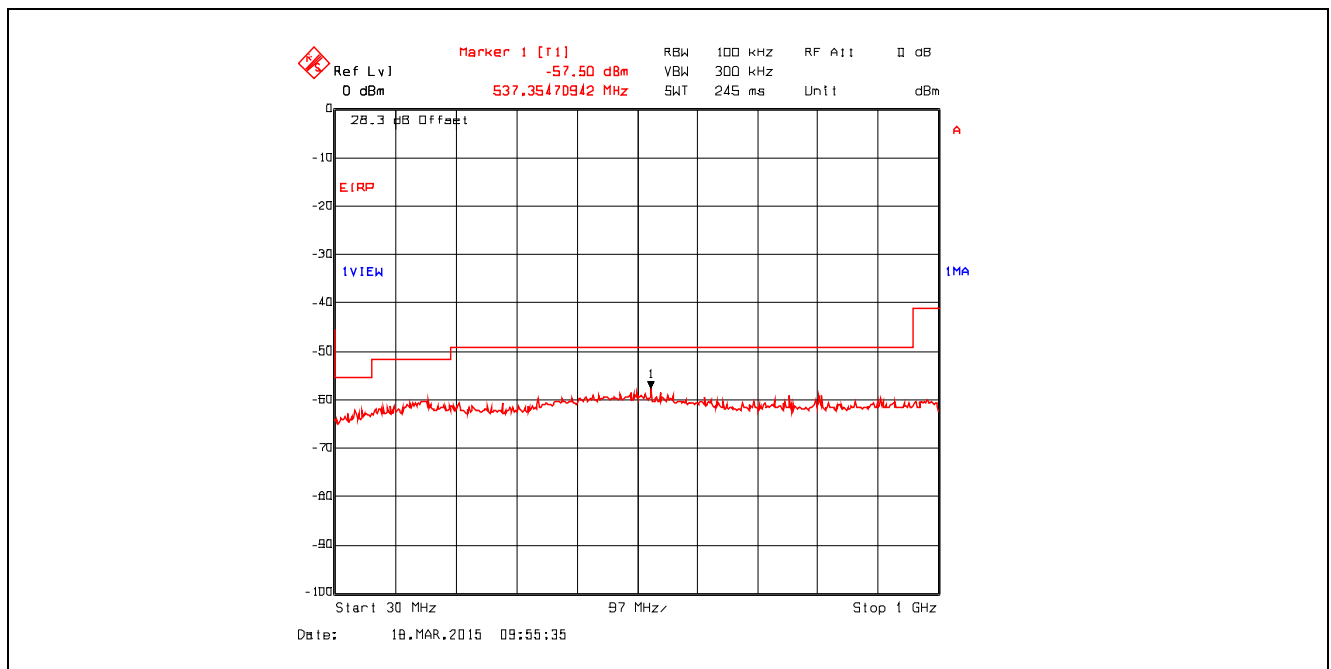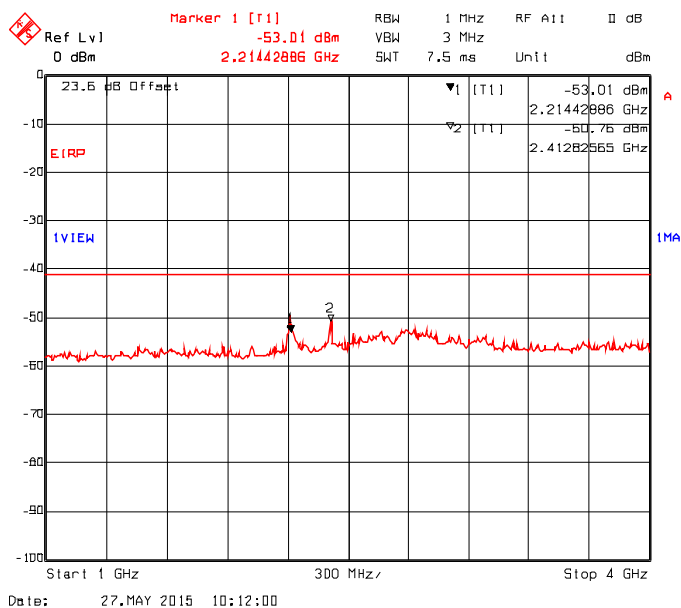
Plot 5.4.4.3.67. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector

Plot 5.4.4.3.68. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector

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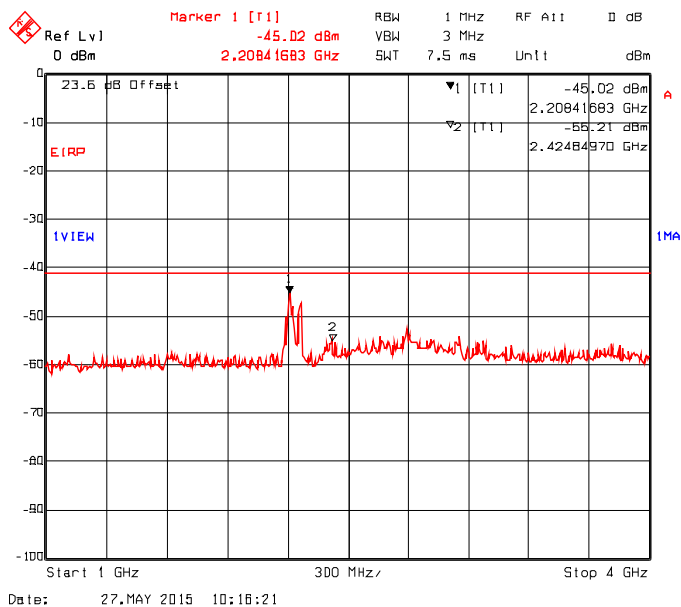
Plot 5.4.4.3.69. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector

Plot 5.4.4.3.70. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 1, 2412 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector
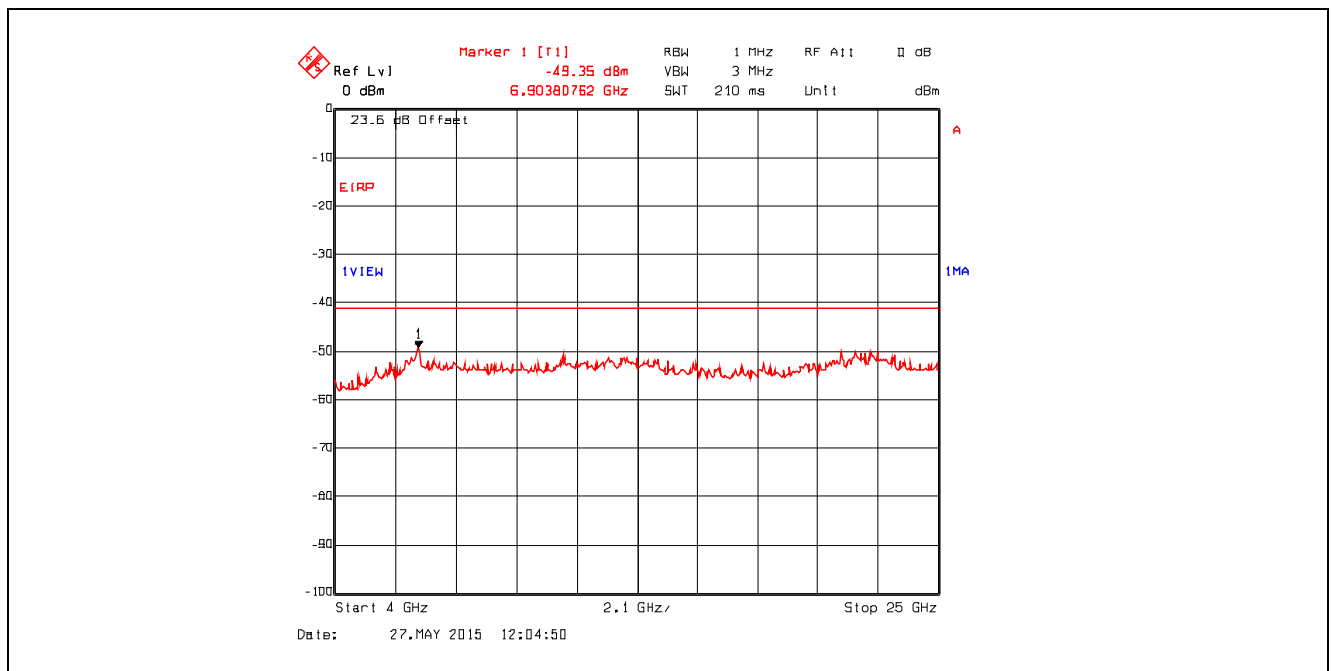
Plot 5.4.4.3.71. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector

Plot 5.4.4.3.72. Conducted Spurious Emissions in Restricted Frequency Bands
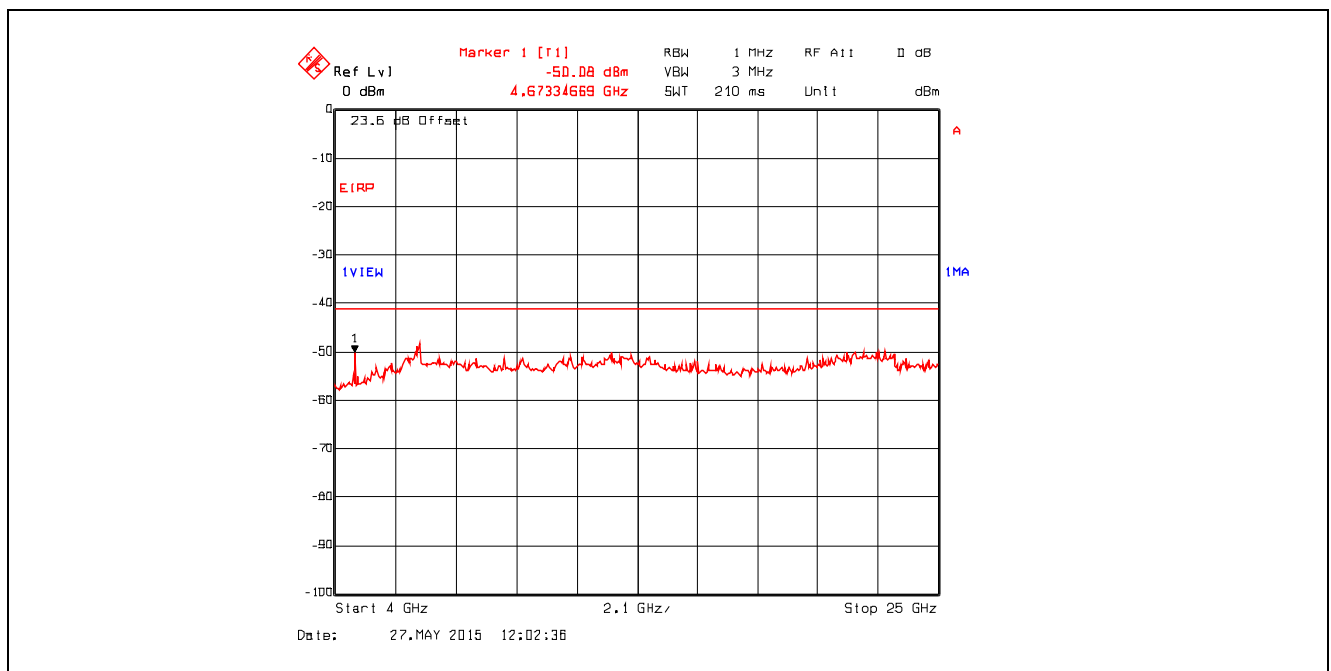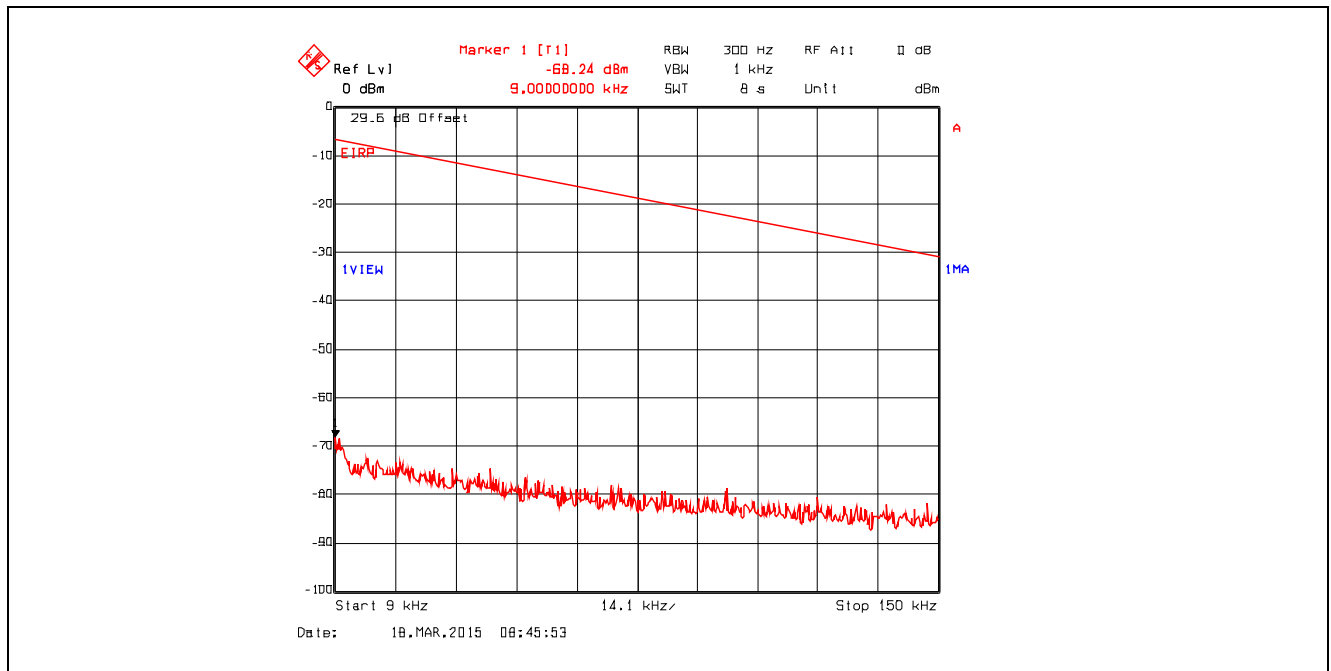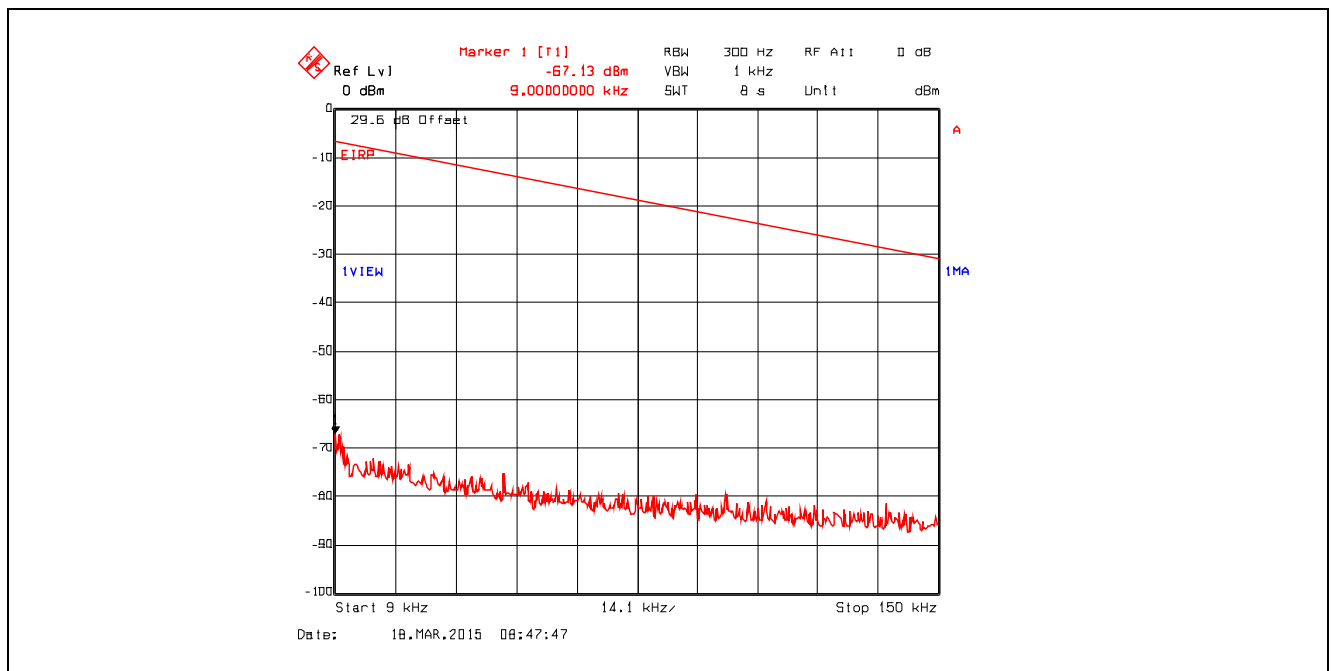Chain #2 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector

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Plot 5.4.4.3.73. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector
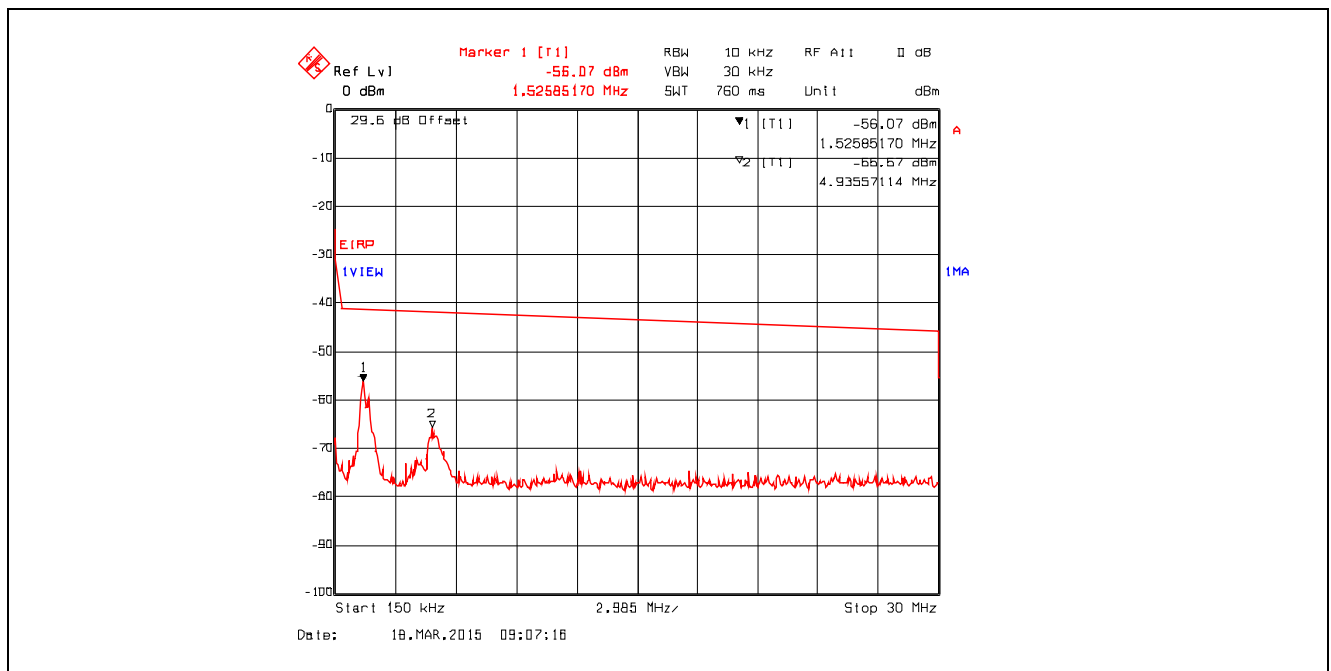

Plot 5.4.4.3.74. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector

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Plot 5.4.4.3.75. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector
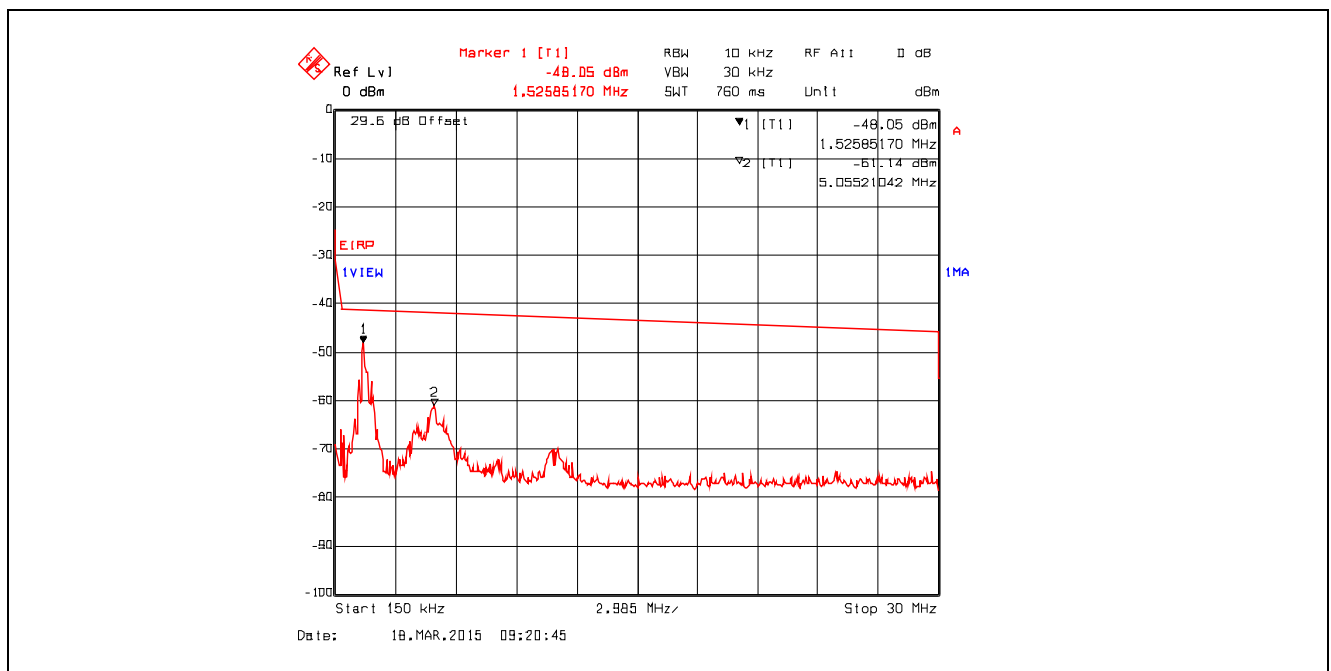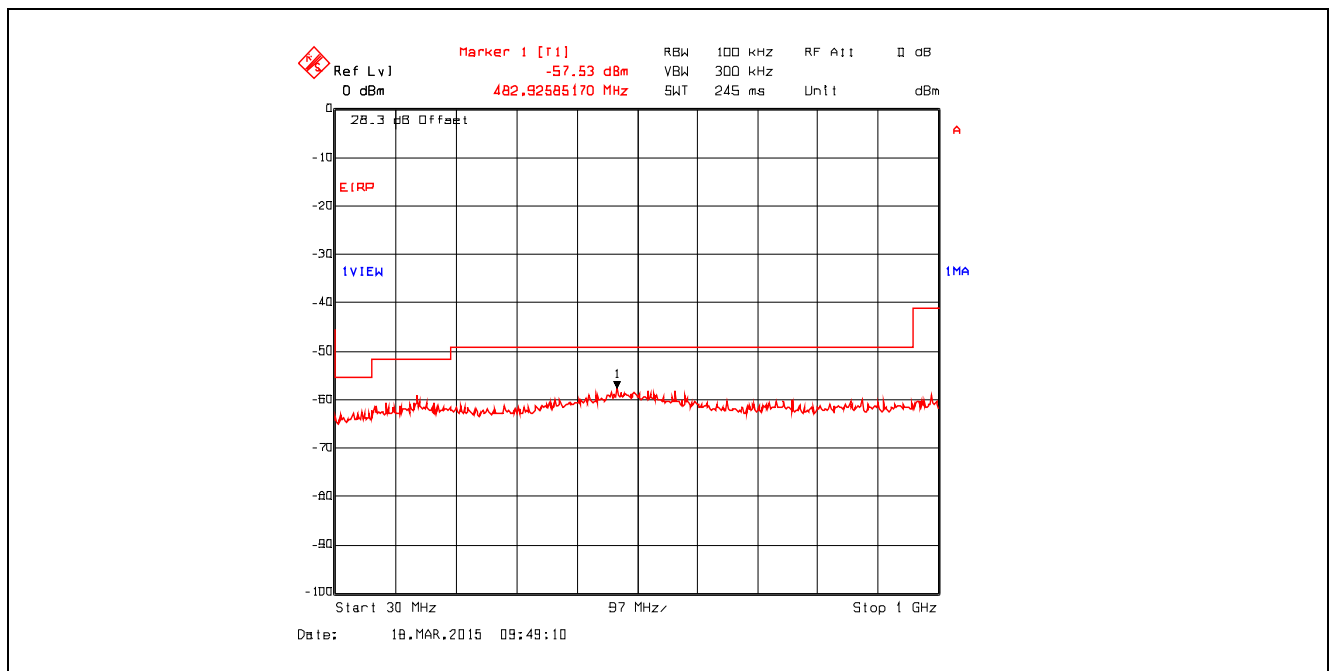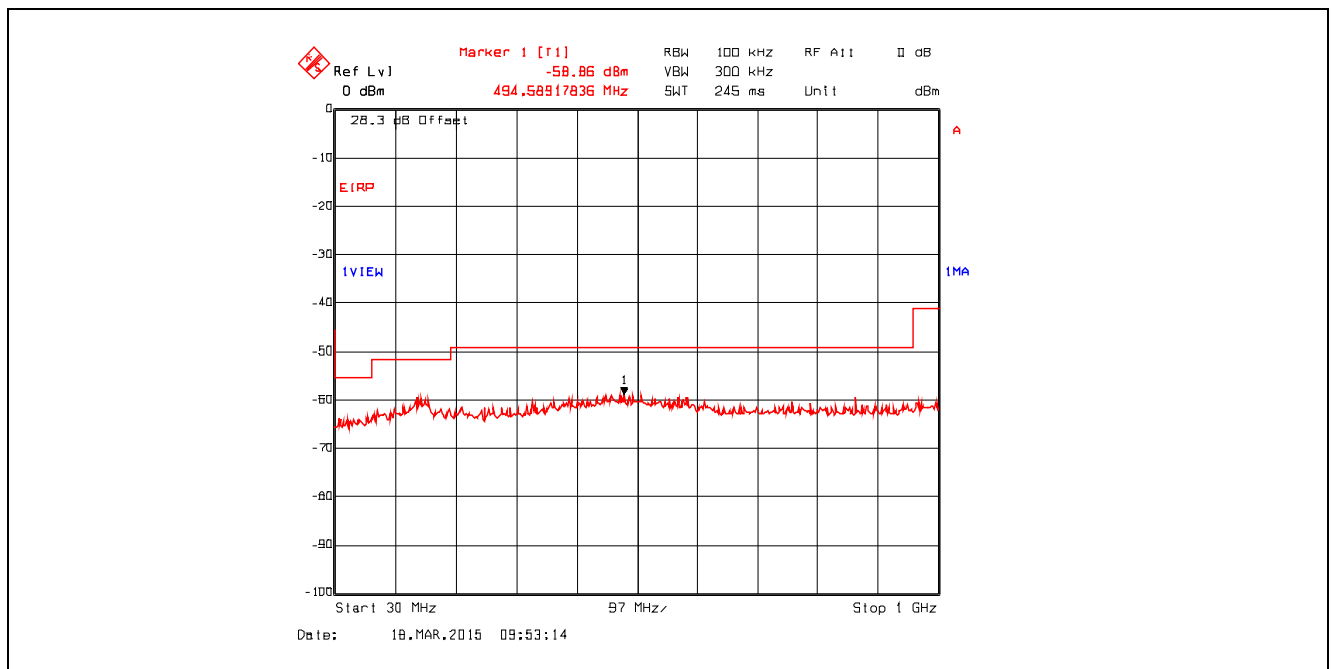

Plot 5.4.4.3.76. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector

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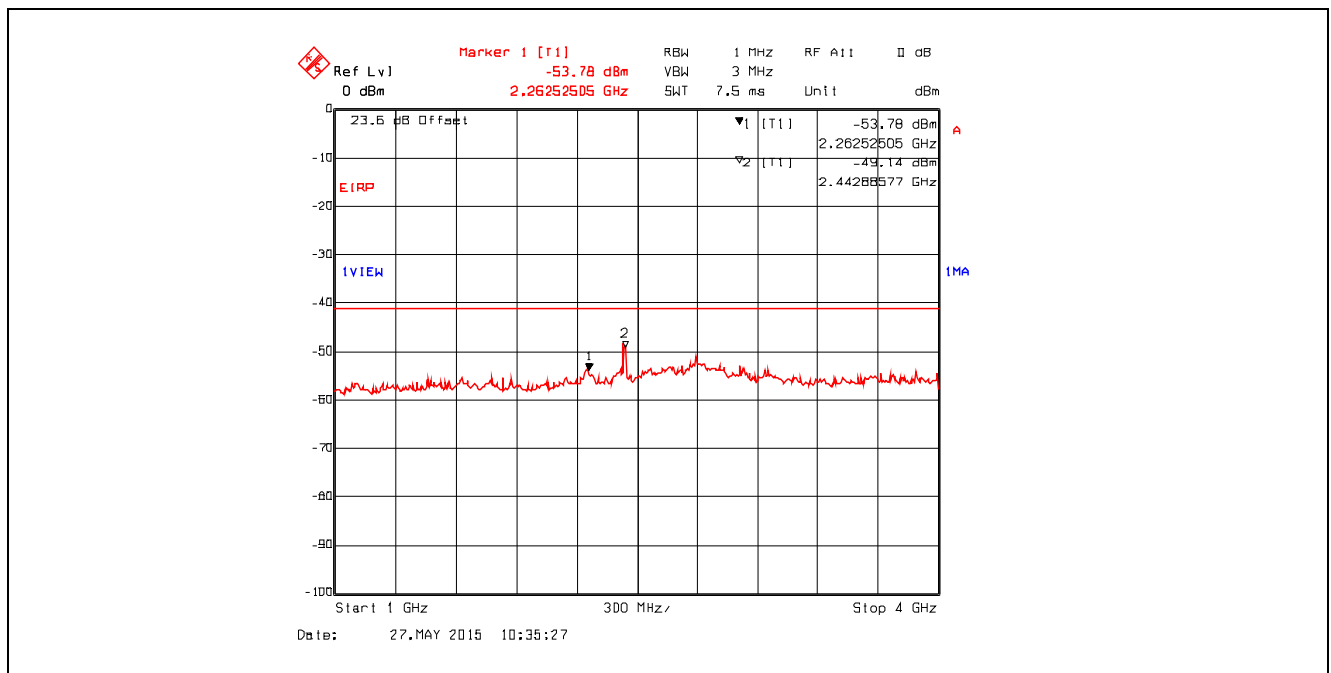
Plot 5.4.4.3.77. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector

Plot 5.4.4.3.78. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector

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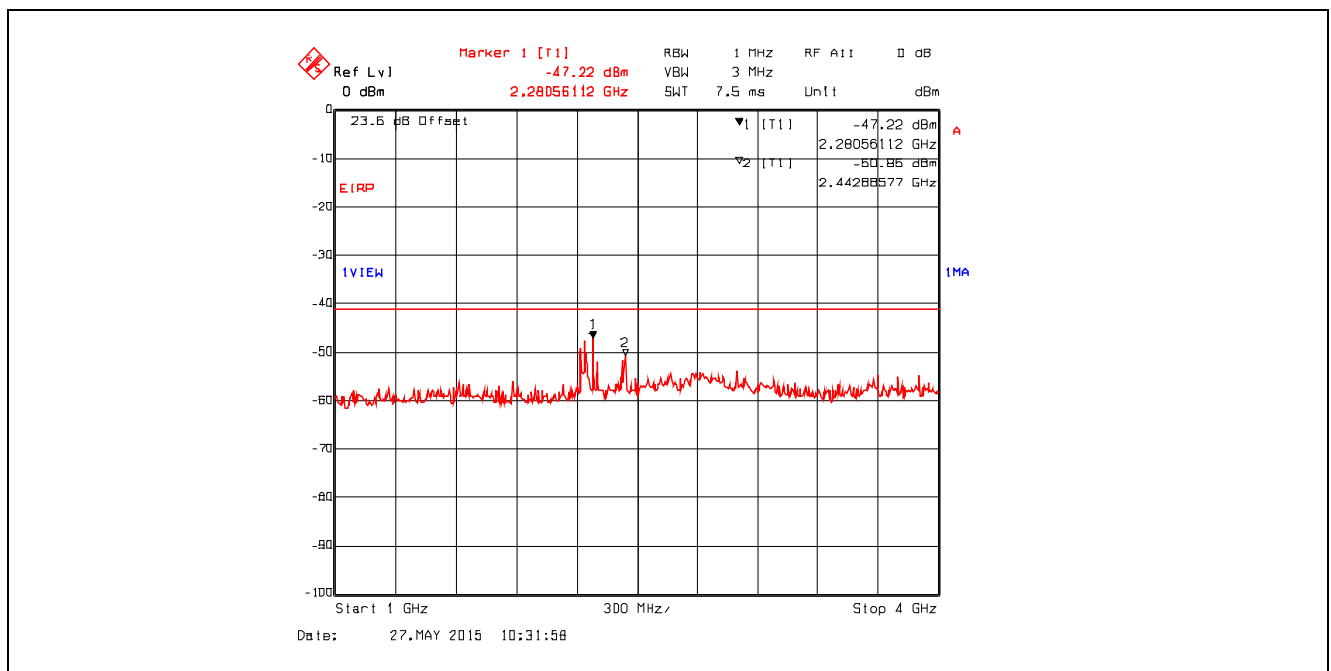
Plot 5.4.4.3.79. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector
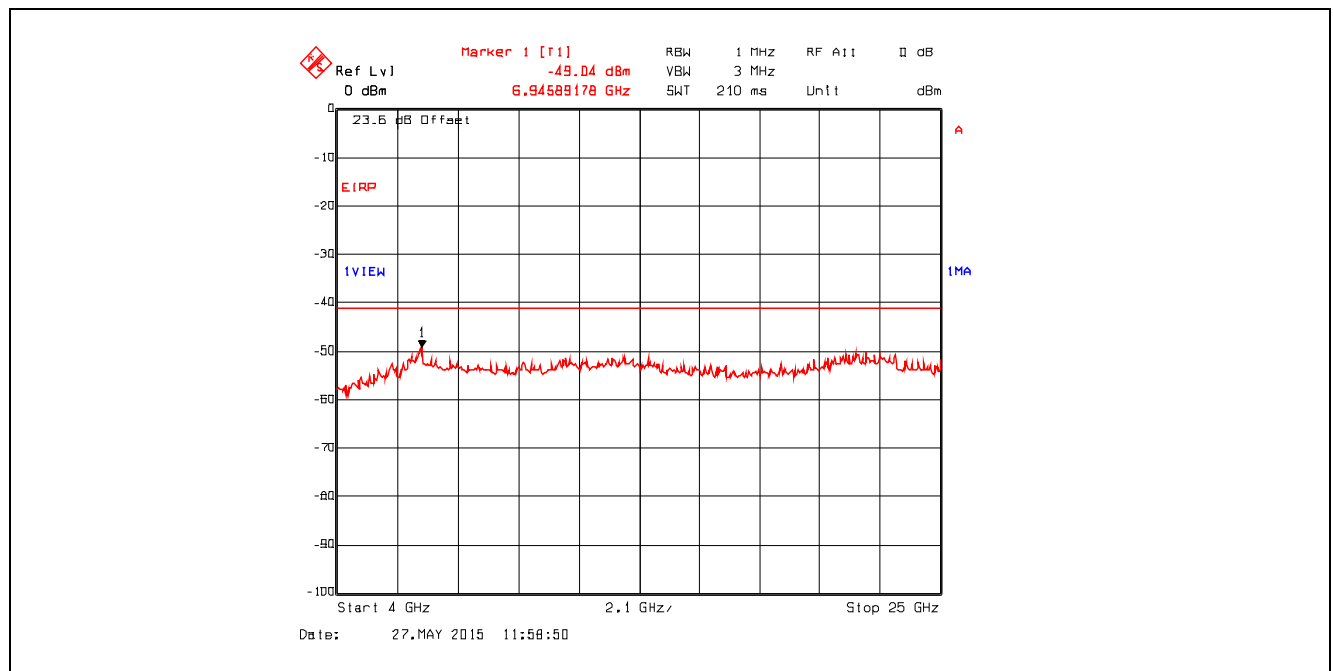

Plot 5.4.4.3.80. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 6, 2437 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector
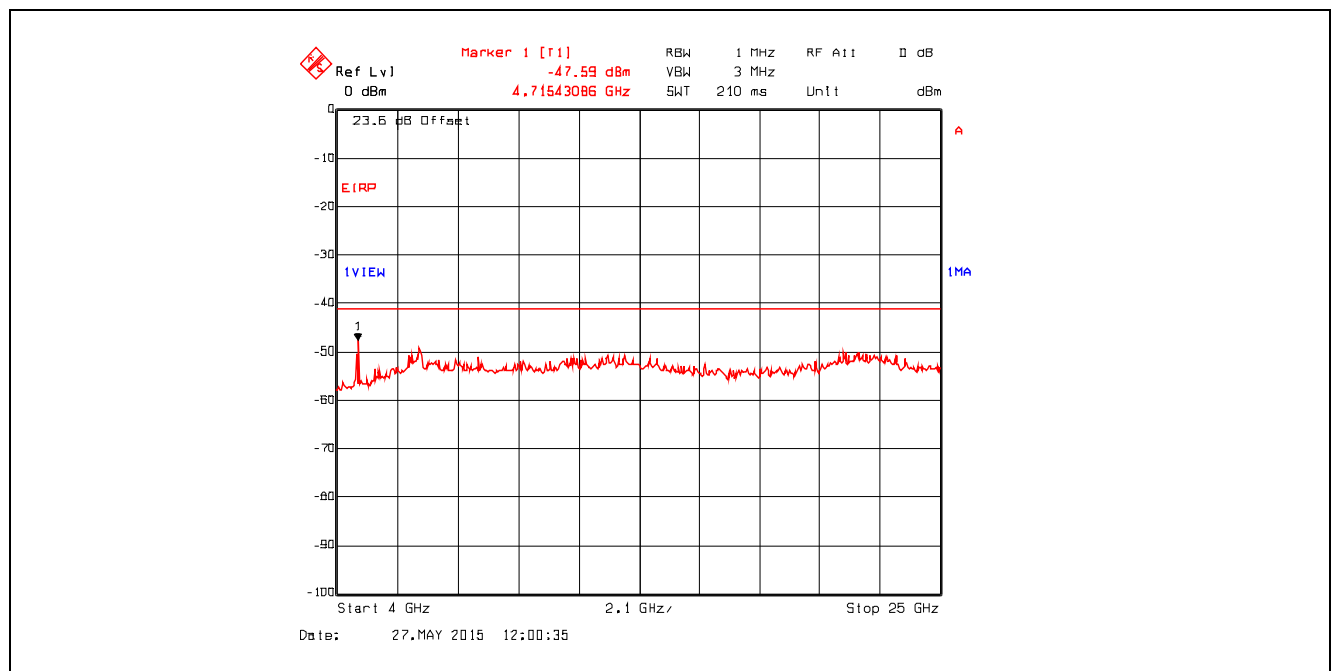
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Plot 5.4.4.3.81. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector
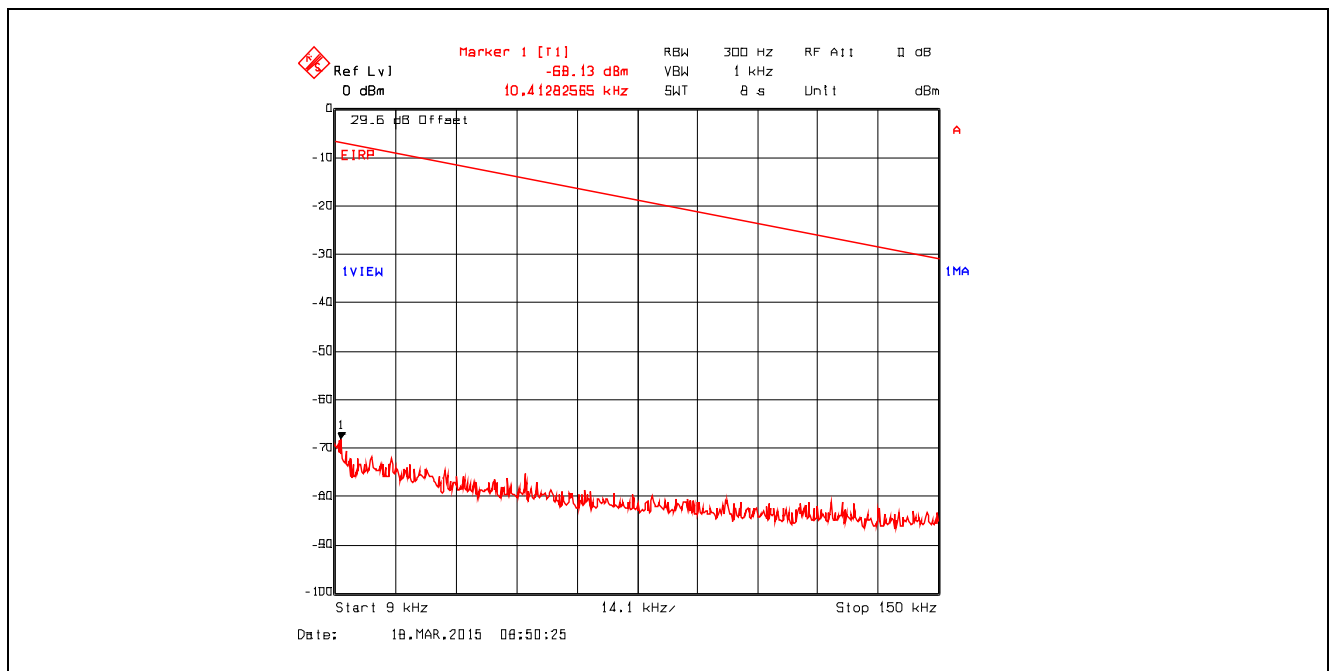

Plot 5.4.4.3.82. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 9 kHz - 150 kHz, Peak Detector

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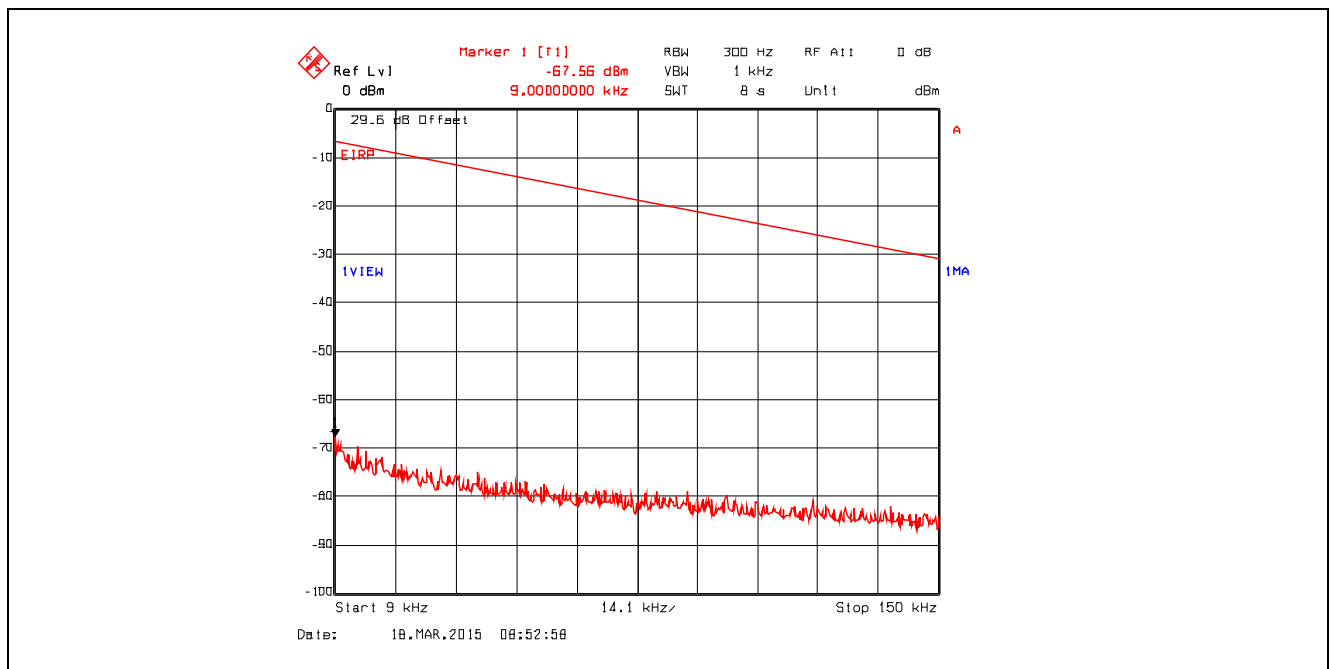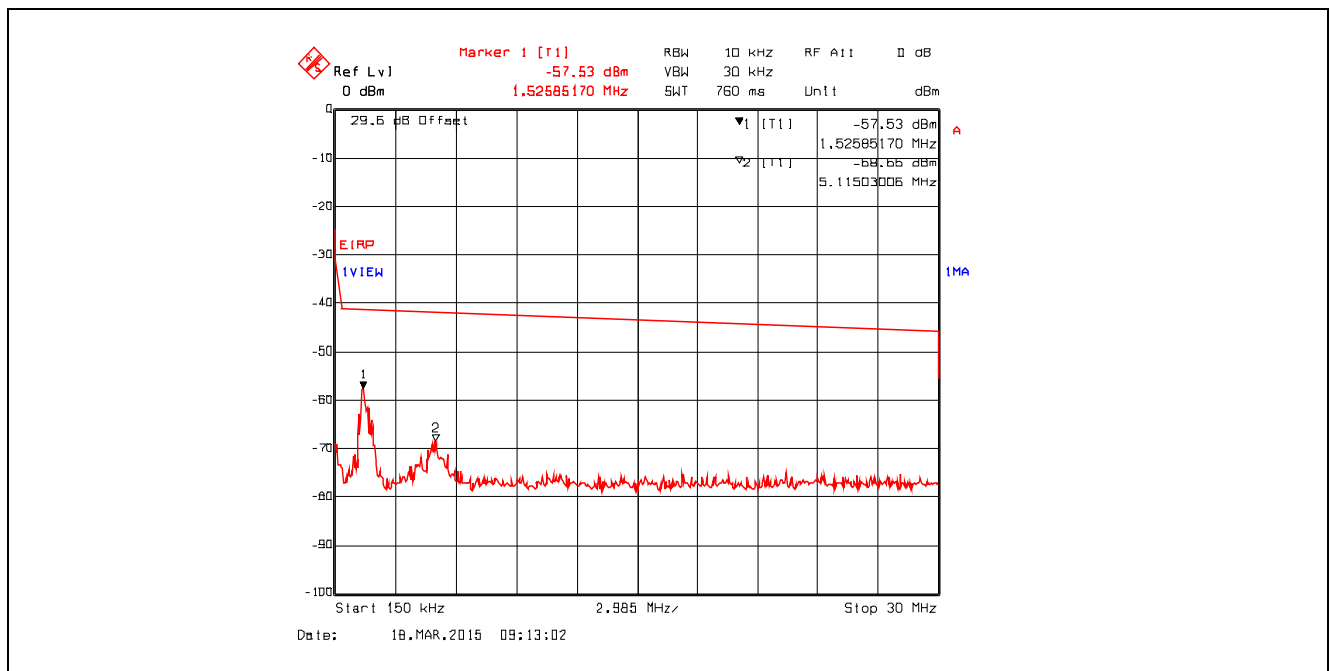
Plot 5.4.4.3.83. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector
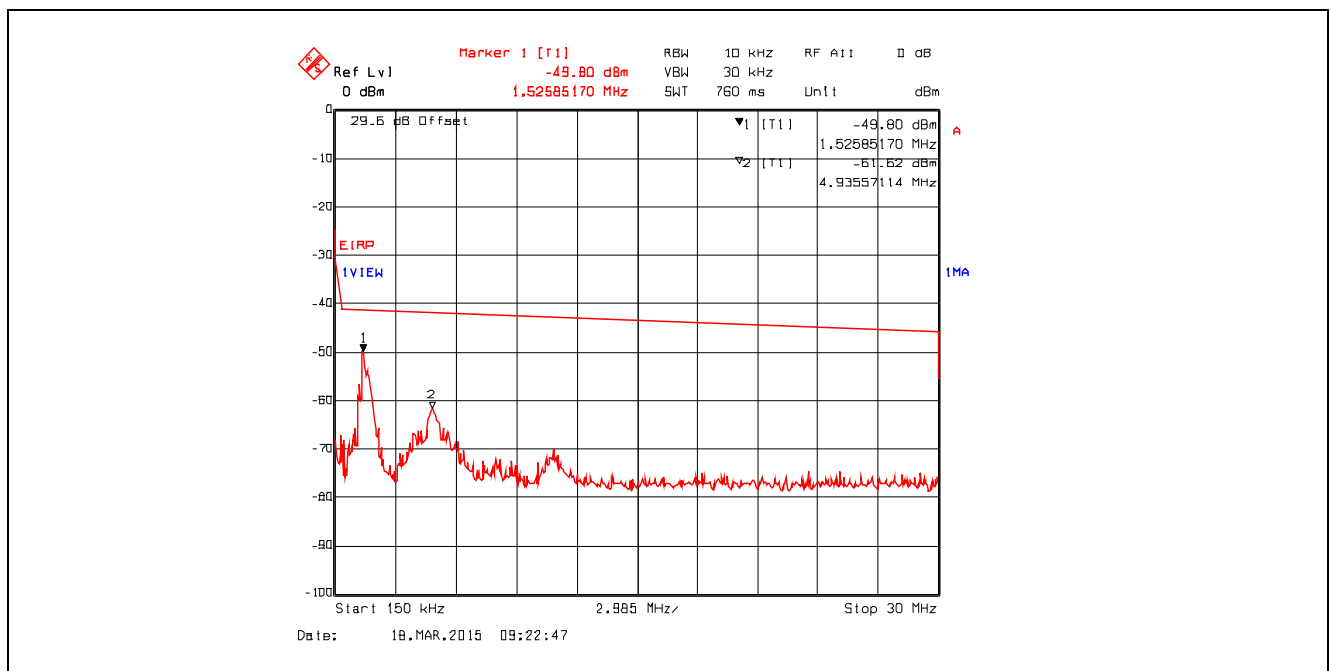

Plot 5.4.4.3.84. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 150 kHz - 30 MHz, Peak Detector

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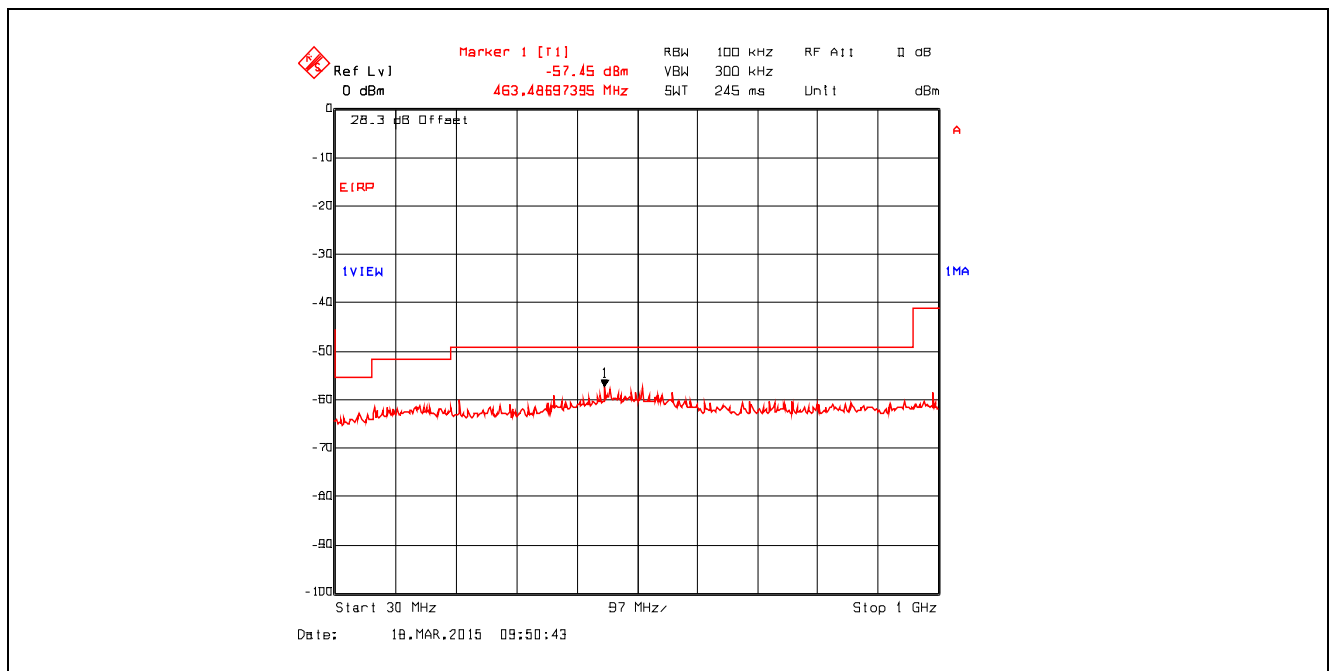
Plot 5.4.4.3.85. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector
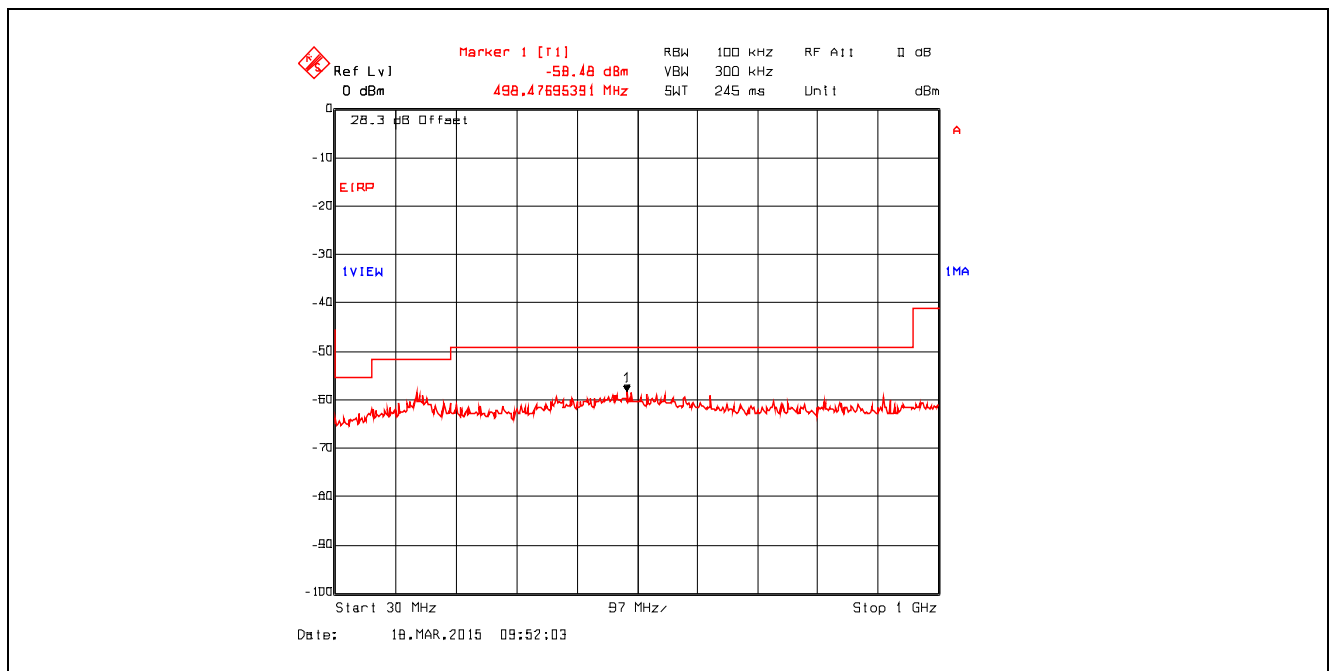

Plot 5.4.4.3.86. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 30 MHz - 1 GHz, Peak Detector

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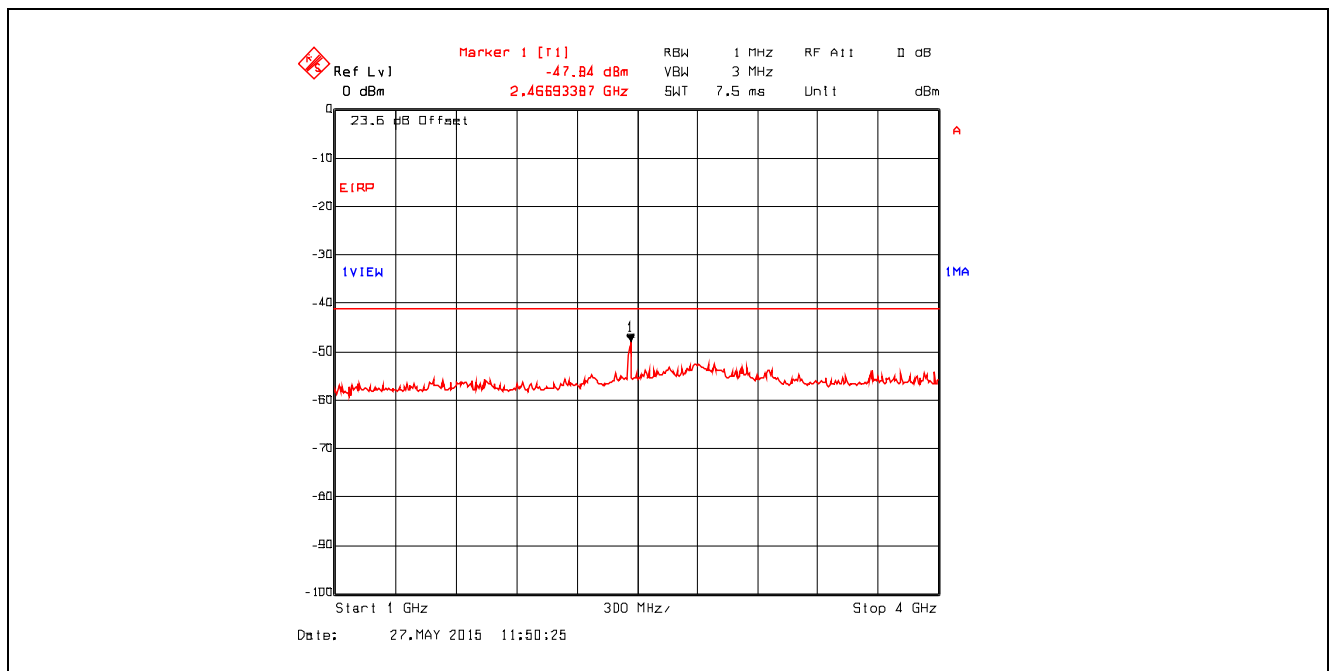
Plot 5.4.4.3.87. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector
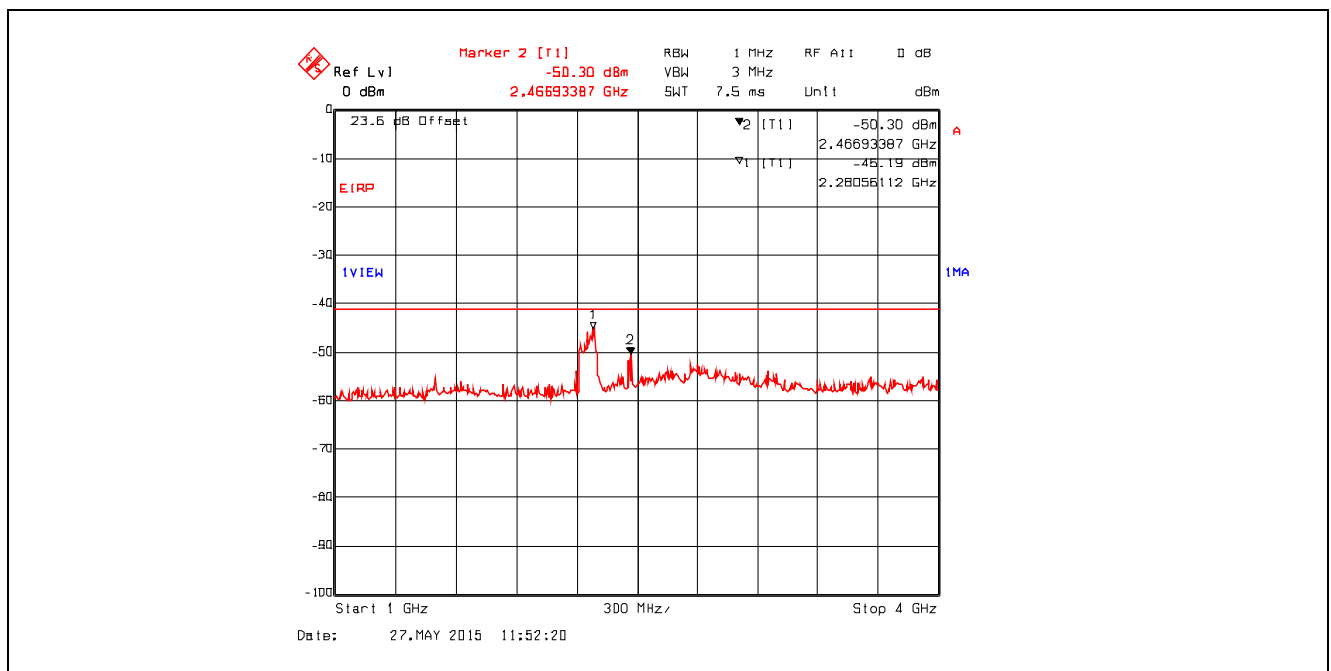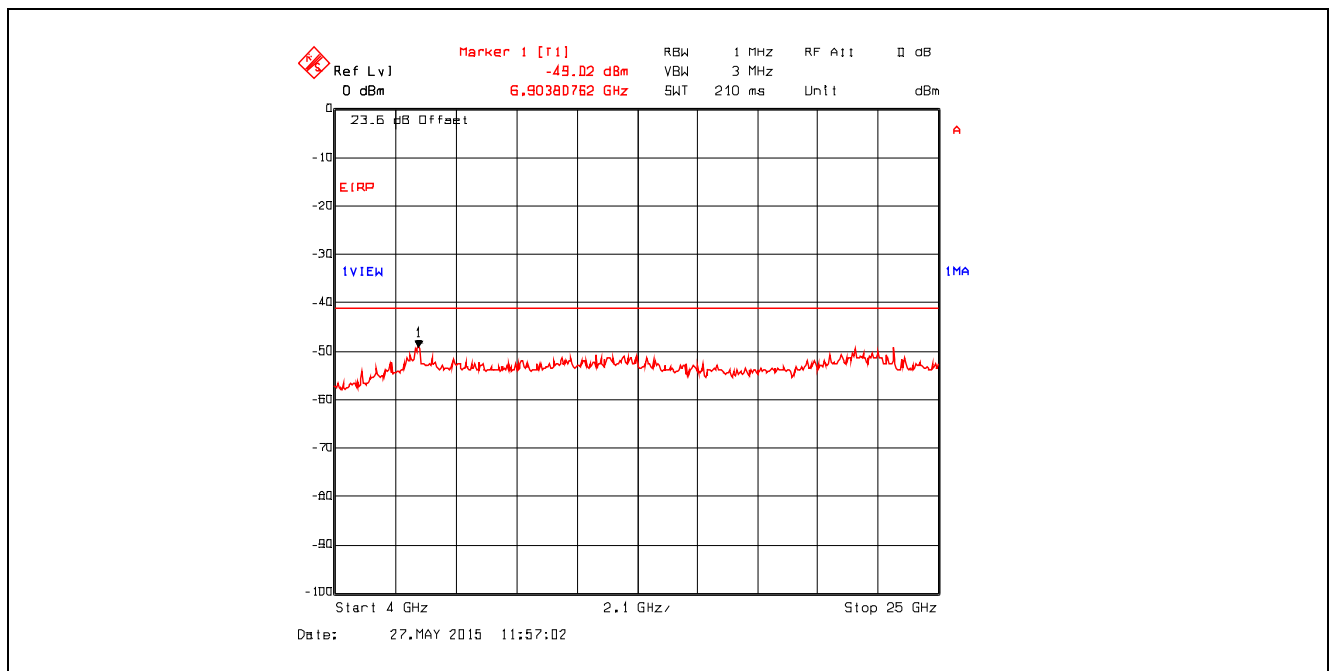

Plot 5.4.4.3.88. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 1 GHz - 4 GHz, Peak Detector

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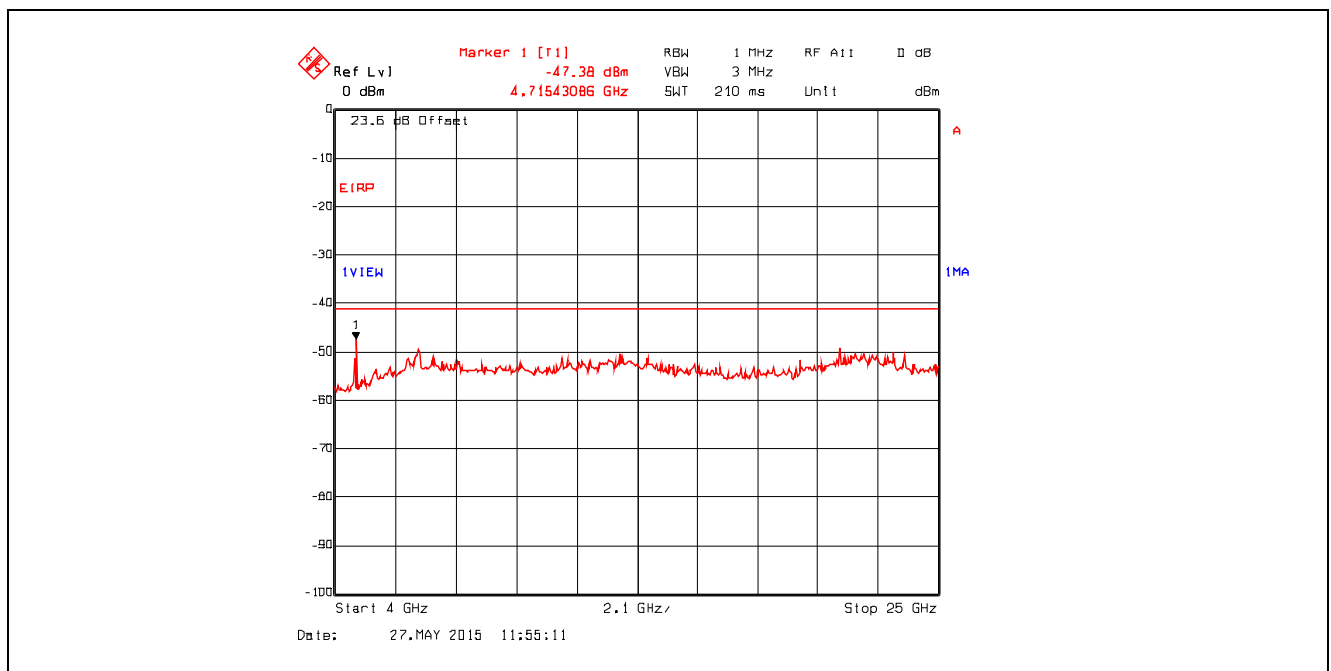
Plot 5.4.4.3.89. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector
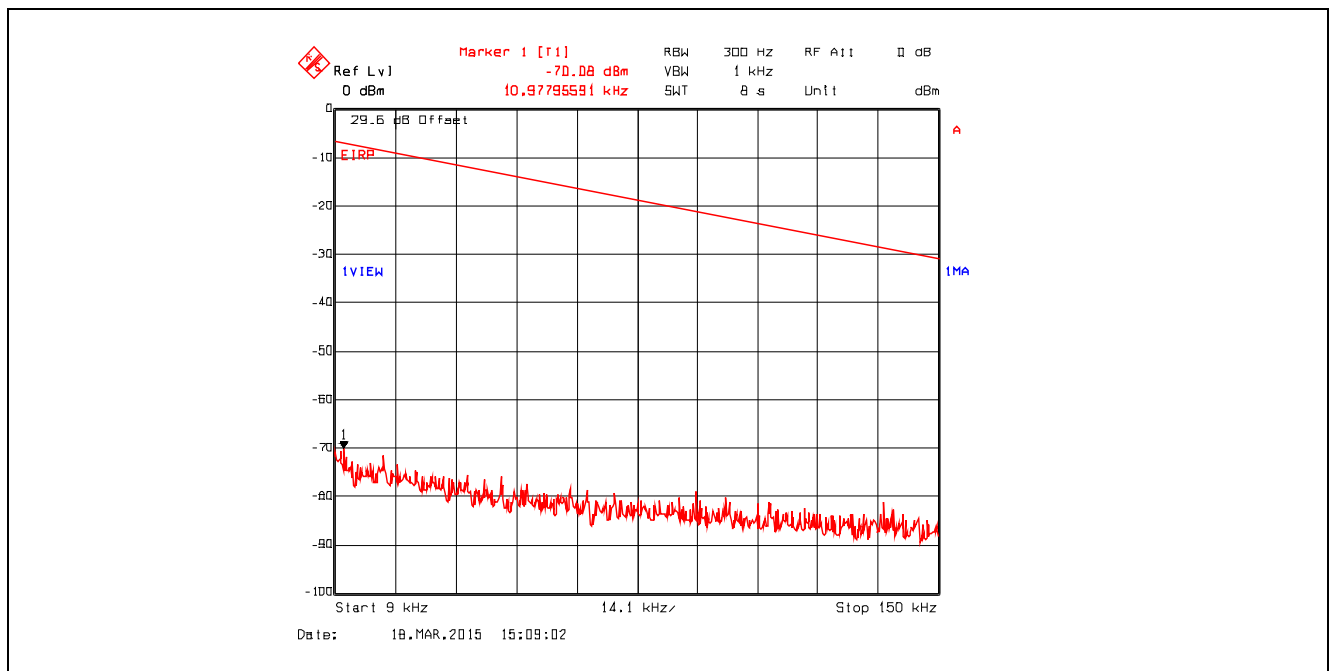

Plot 5.4.4.3.90. Conducted Spurious Emissions in Restricted Frequency Bands
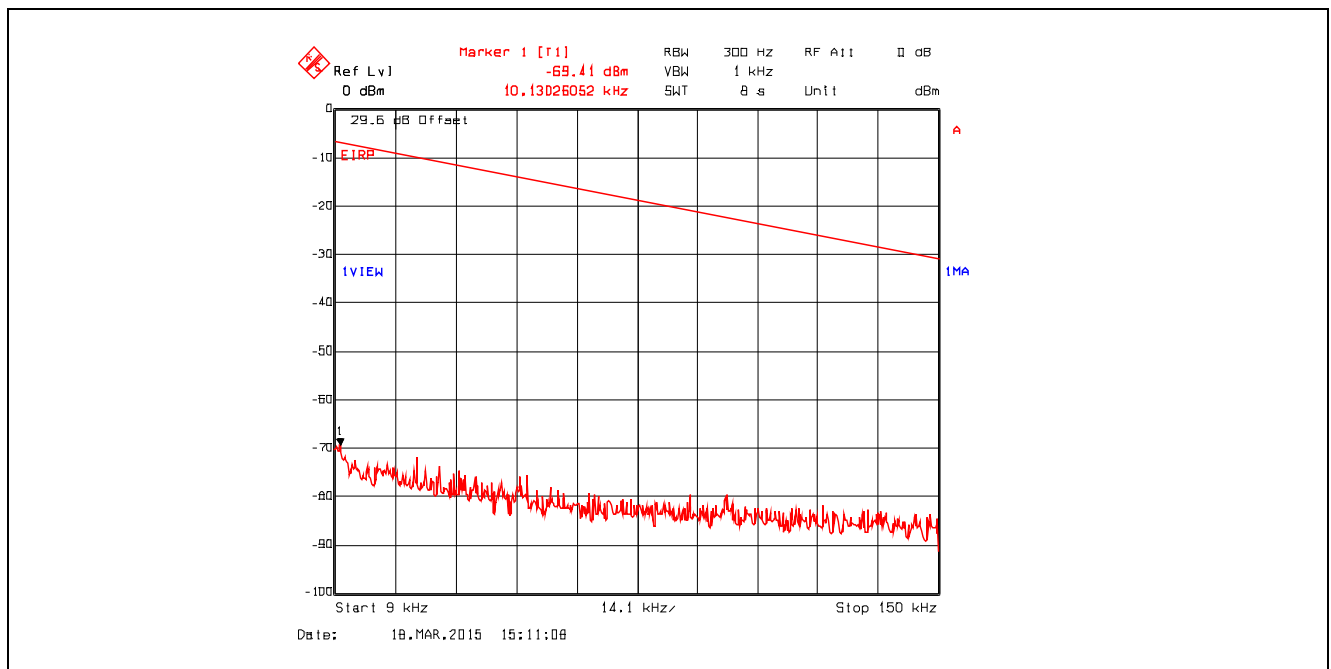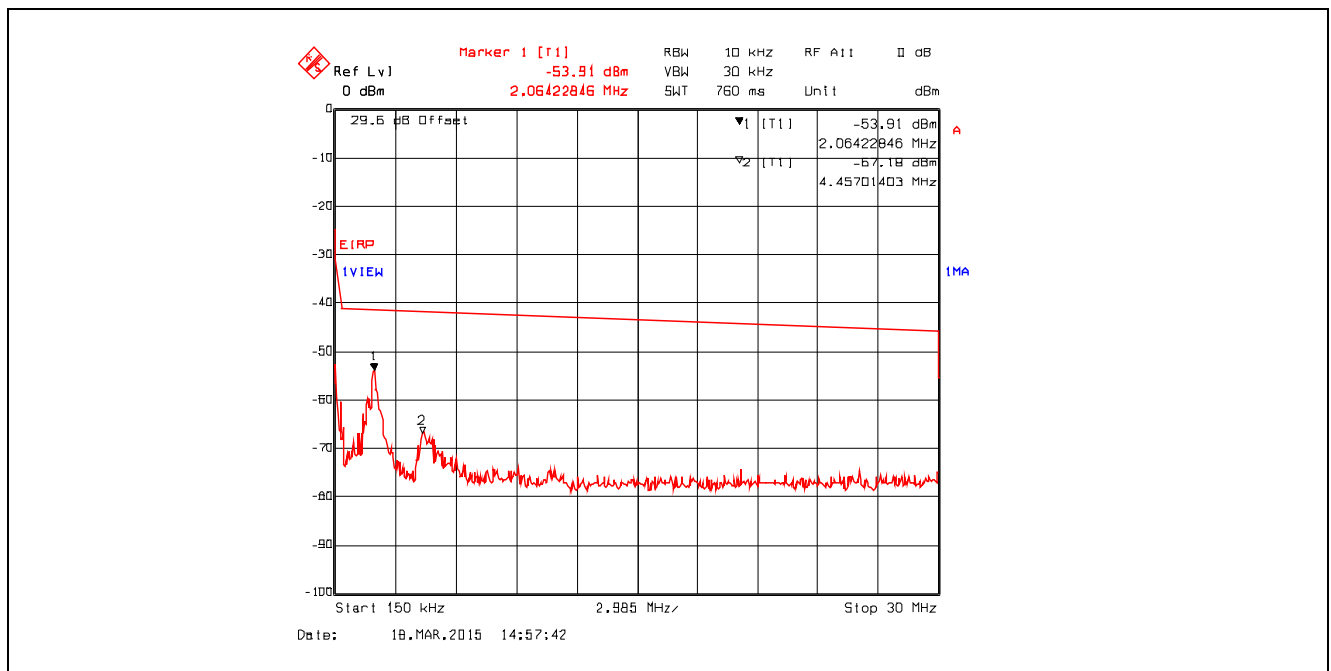Chain #2 , Data Rate 11, Ch 11, 2462 MHz, Software Output Power Setting 19, 4 GHz - 25 GHz, Peak Detector

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Plot 5.4.4.3.91. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector

Plot 5.4.4.3.92. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector

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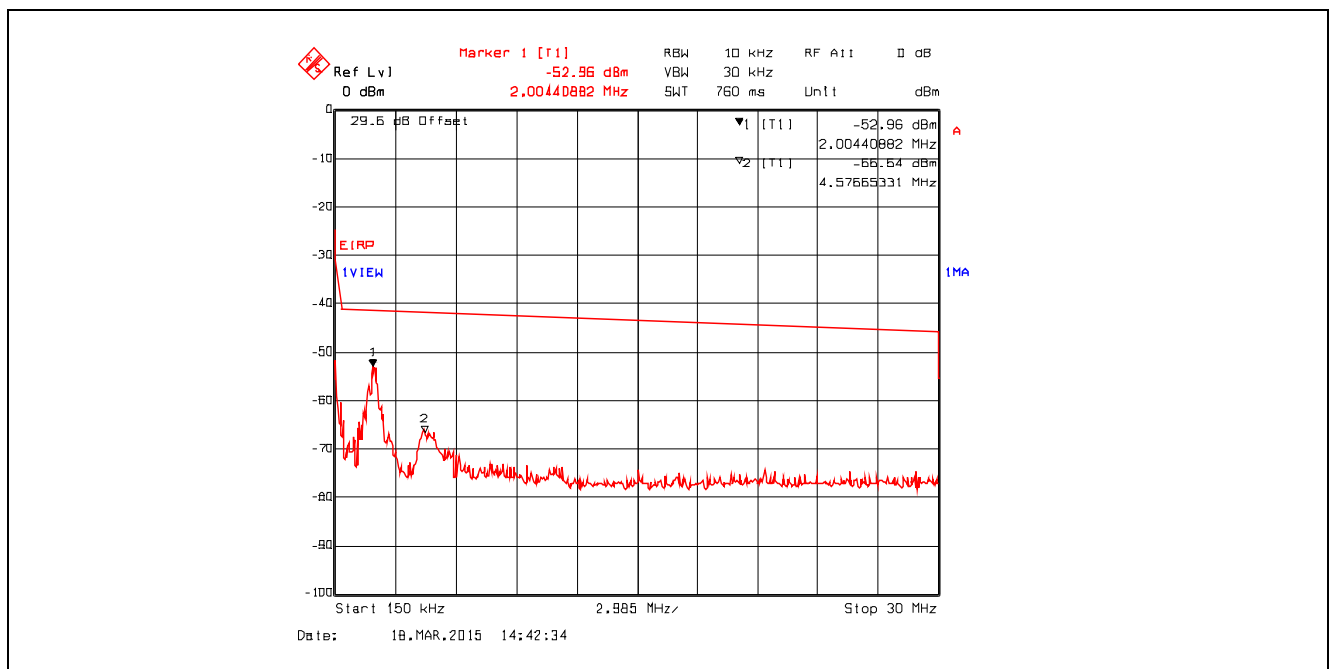
Plot 5.4.4.3.93. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector
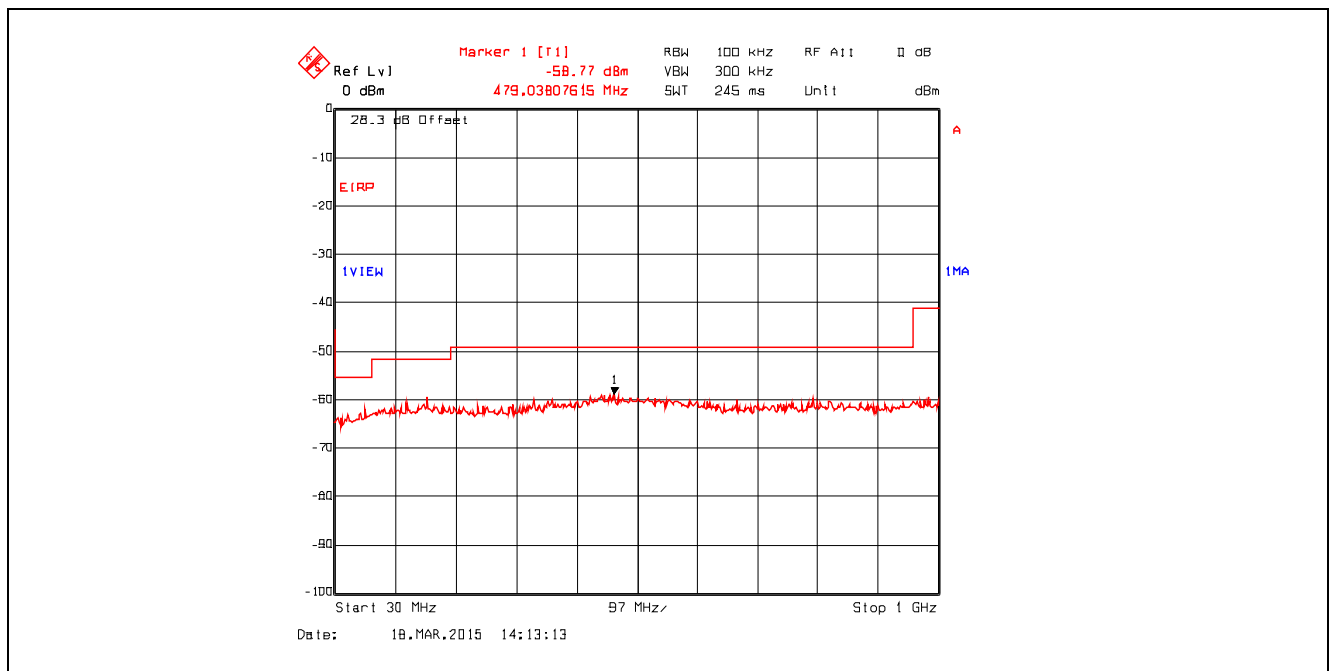

Plot 5.4.4.3.94. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector

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Plot 5.4.4.3.95. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector
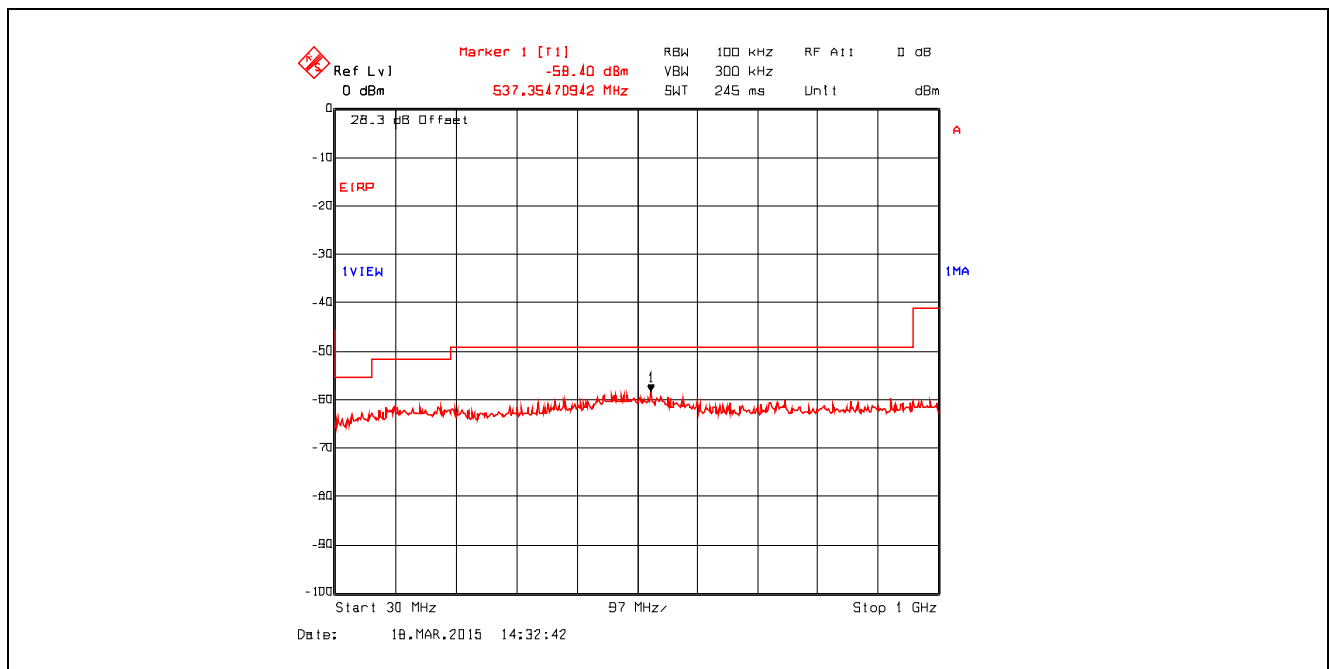

Plot 5.4.4.3.96. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector

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Plot 5.4.4.3.97. Conducted Spurious Emissions in Restricted Frequency Bands
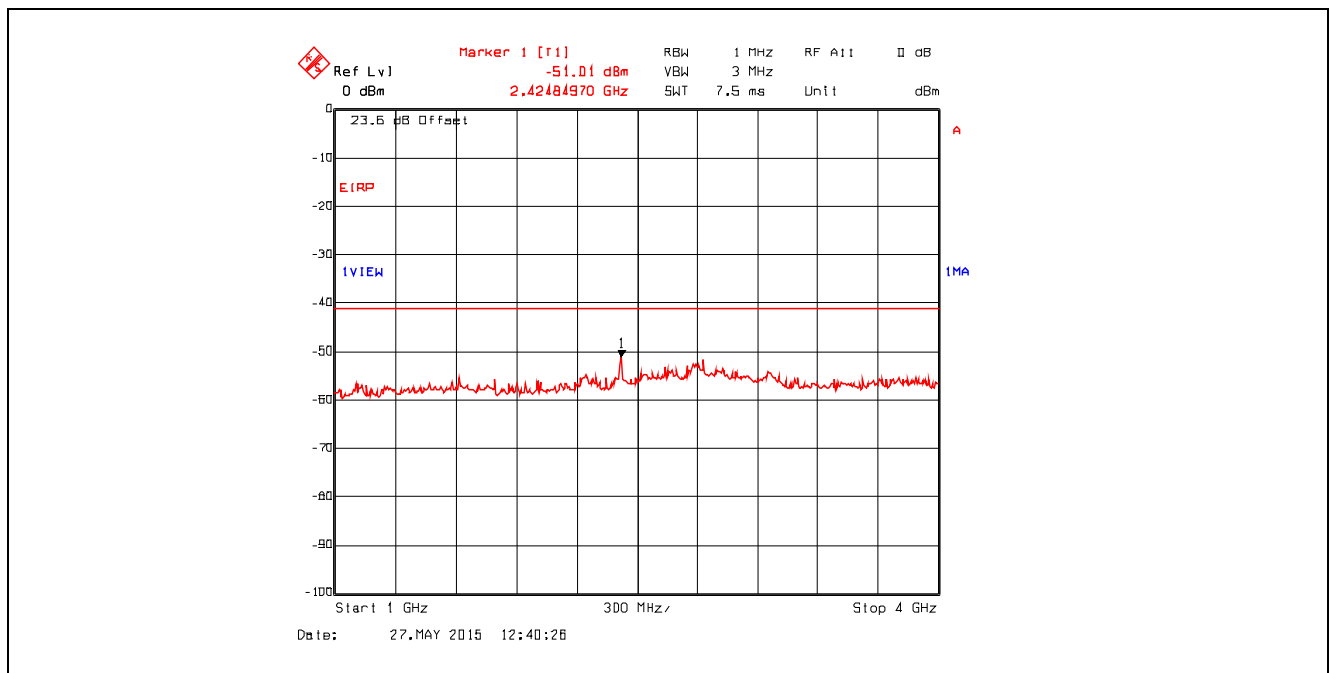Chain #1 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector
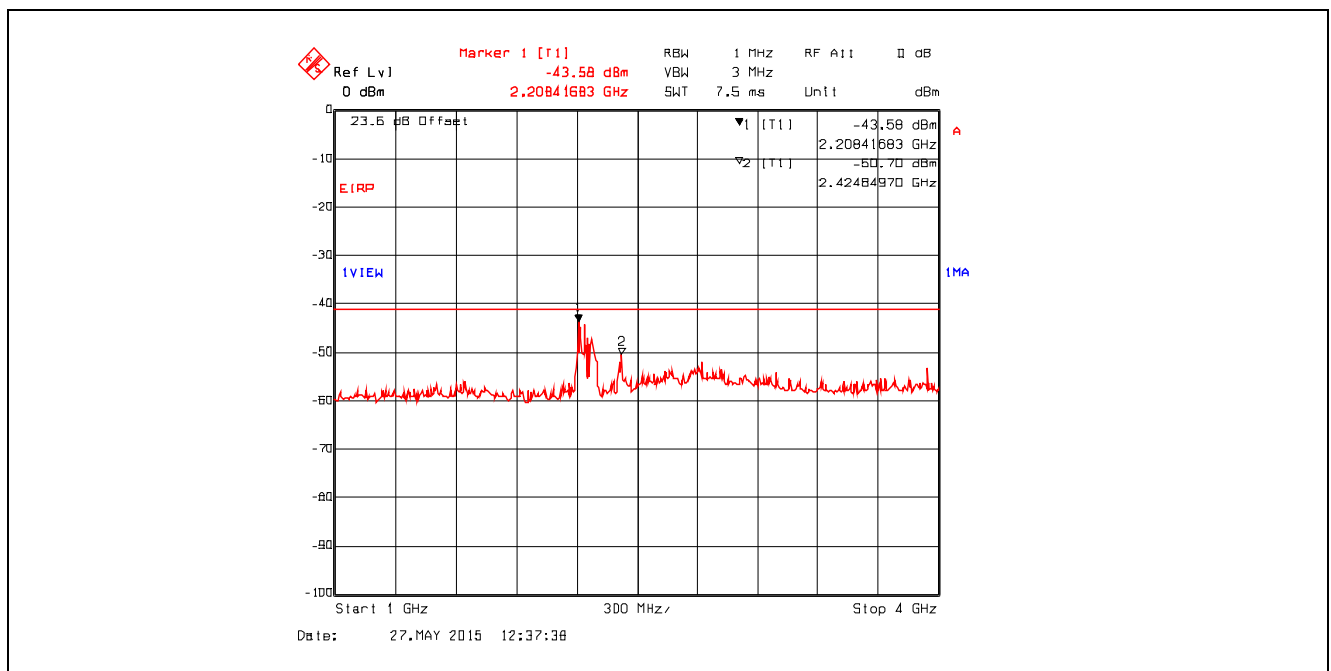

Plot 5.4.4.3.98. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector

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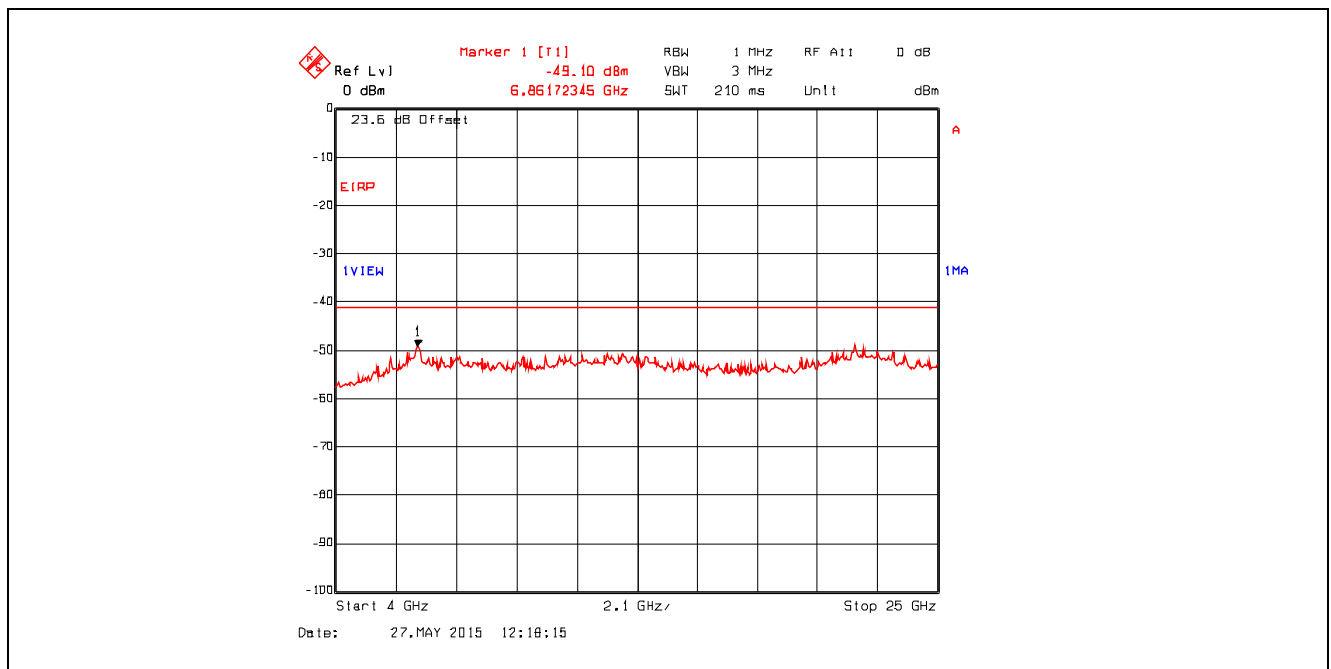
Plot 5.4.4.3.99. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector
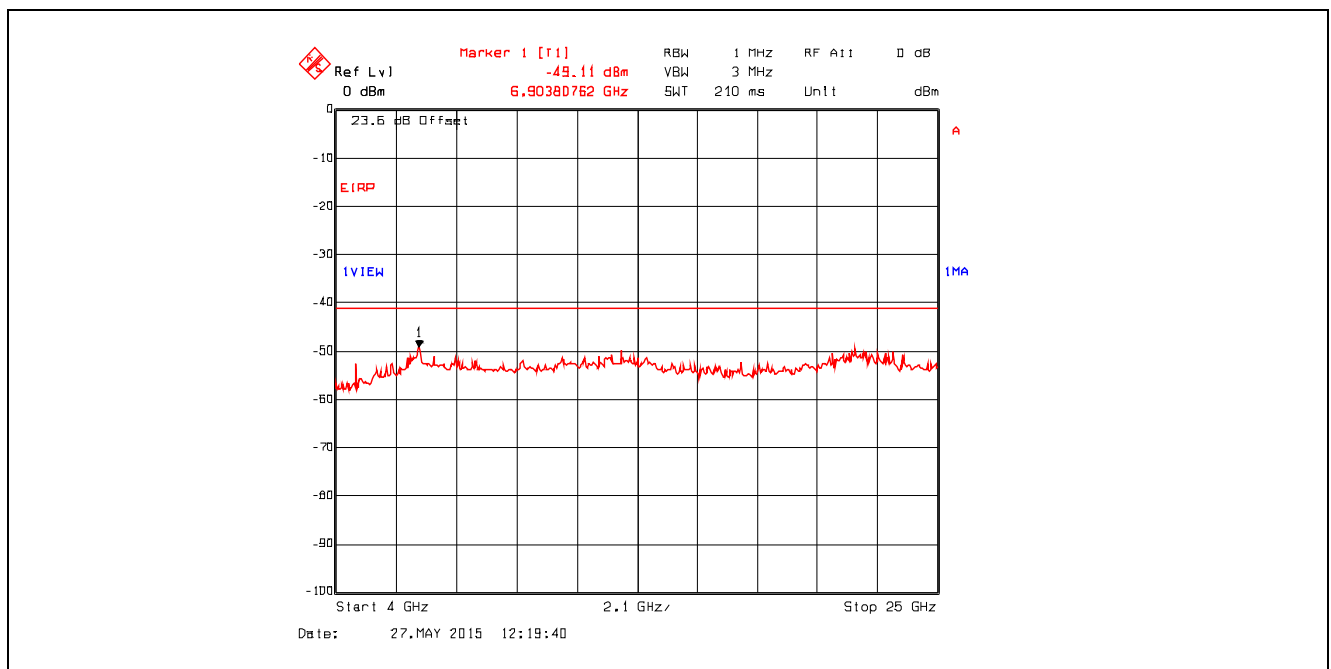

Plot 5.4.4.3.100. Conducted Spurious Emissions in Restricted Frequency Bands
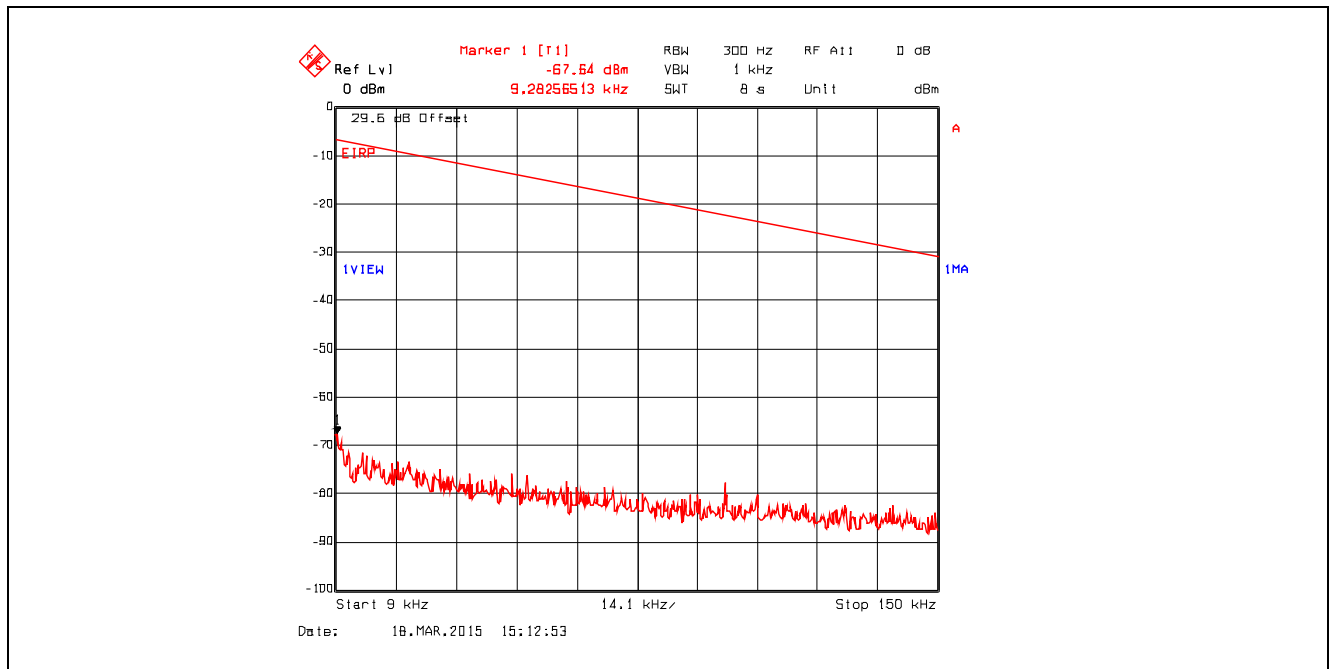Chain #2 , Data Rate 15, Ch 3, 2422 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector

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Plot 5.4.4.3.101. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector
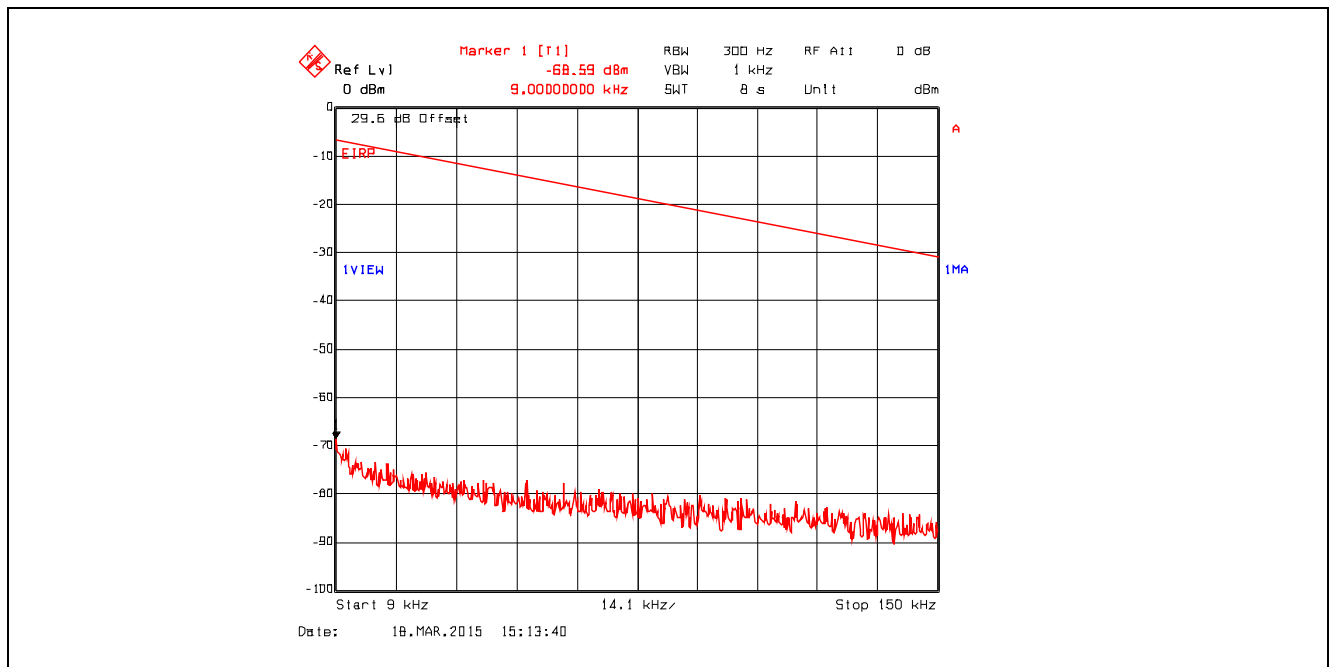

Plot 5.4.4.3.102. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector

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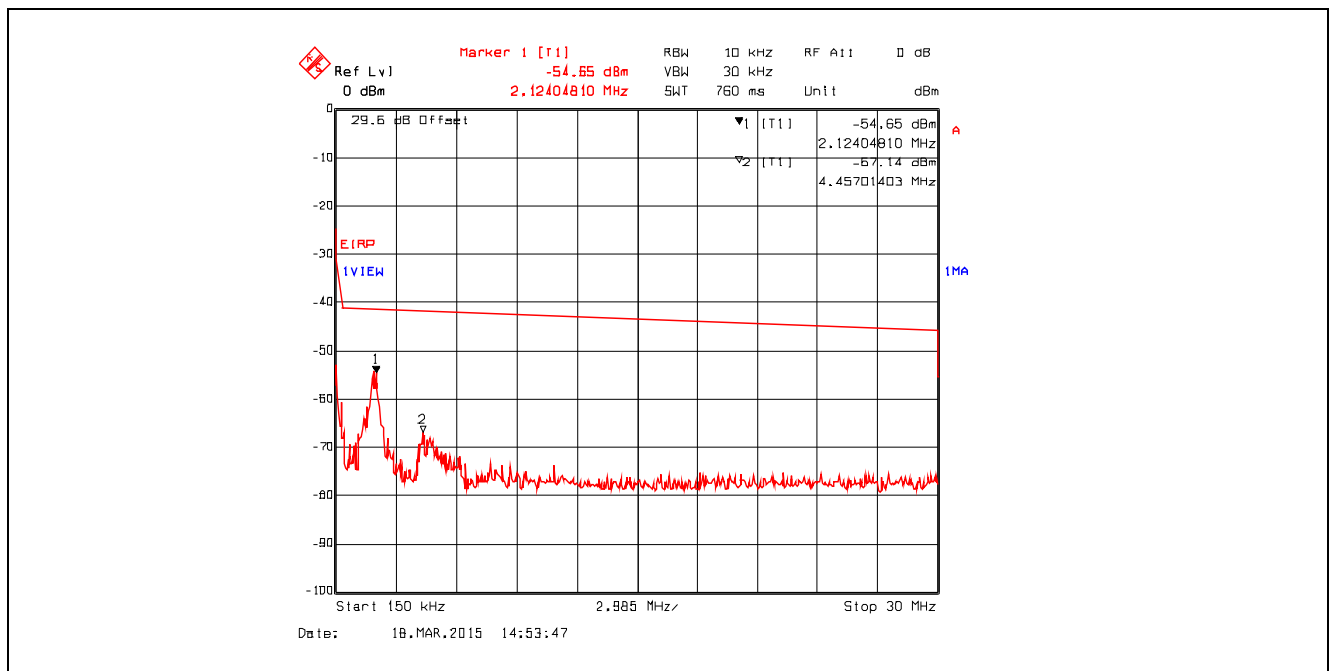
Plot 5.4.4.3.103. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector
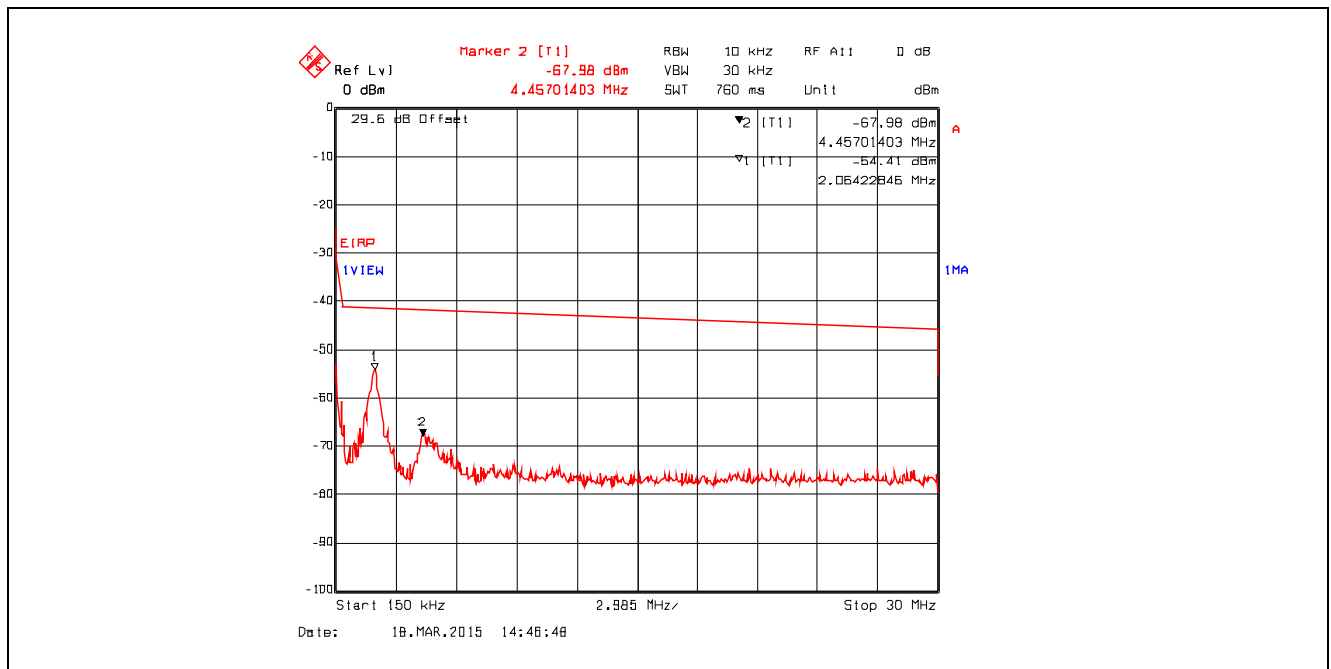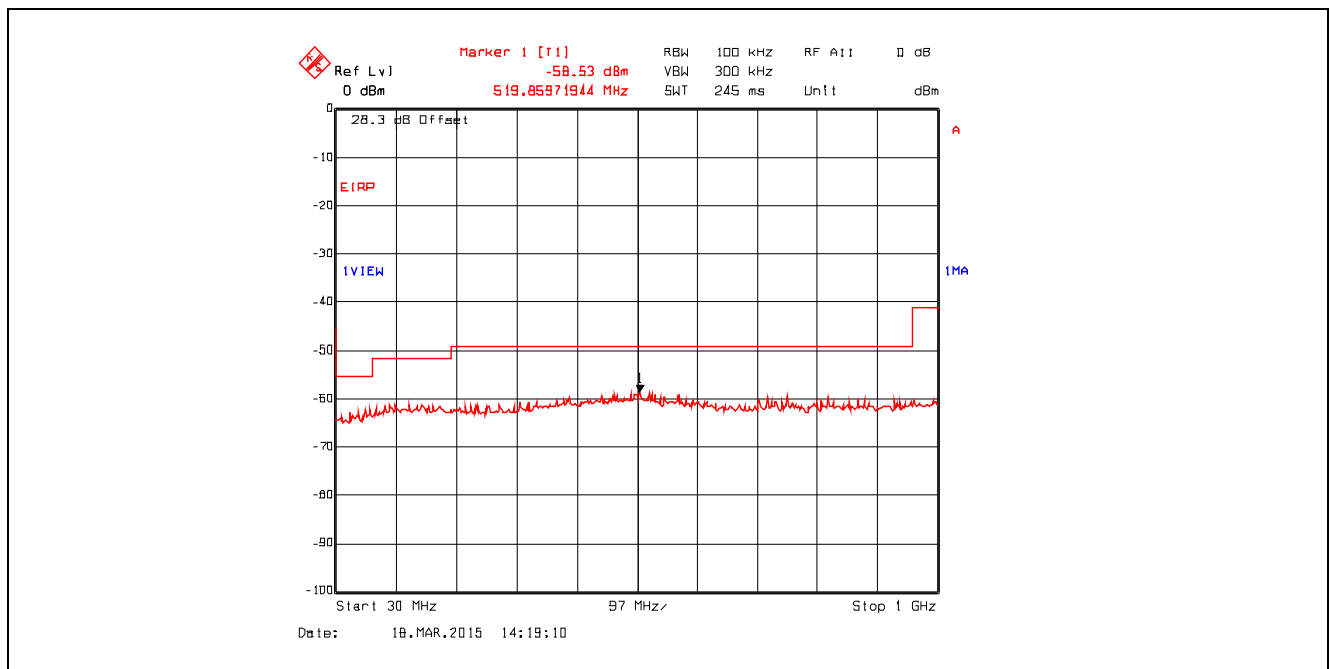

Plot 5.4.4.3.104. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector

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Plot 5.4.4.3.105. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector
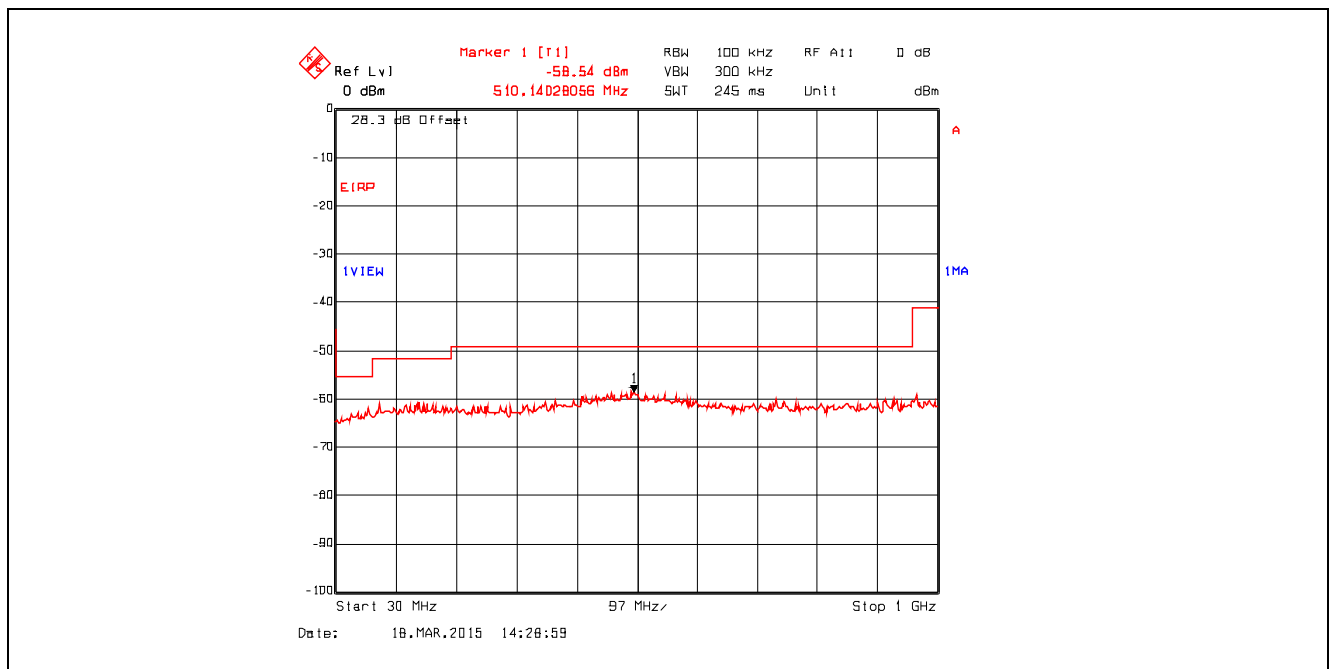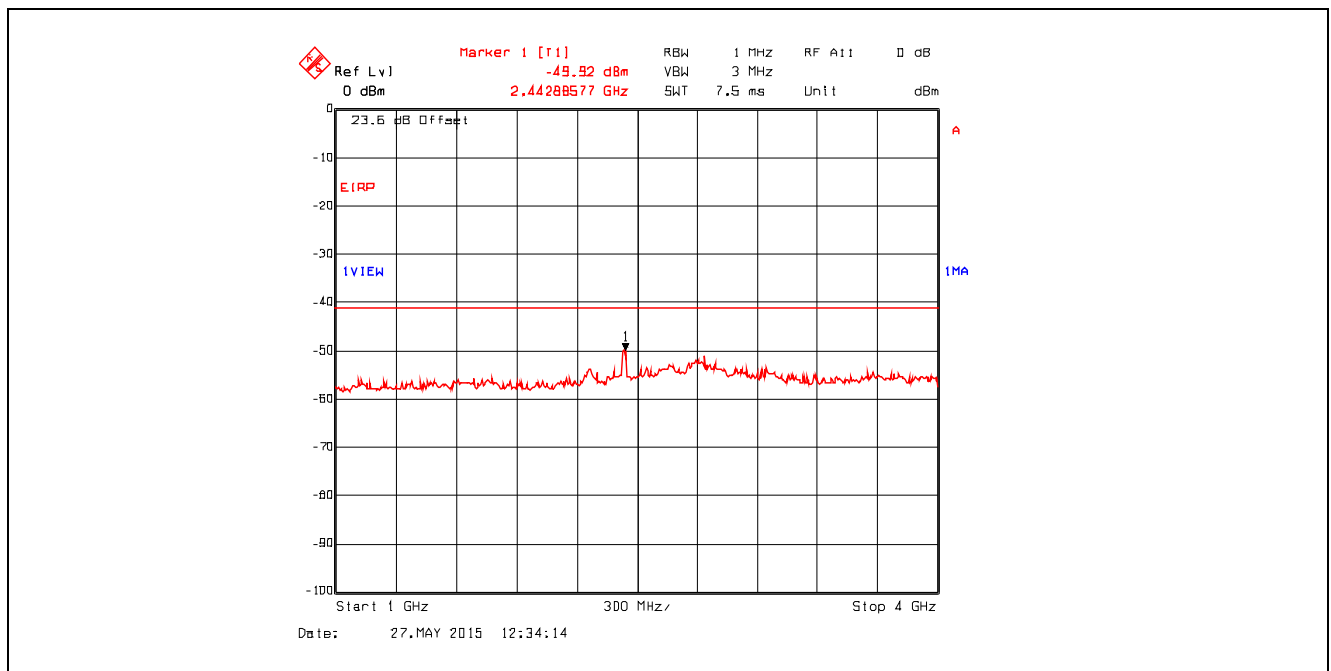

Plot 5.4.4.3.106. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector

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Plot 5.4.4.3.107. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector
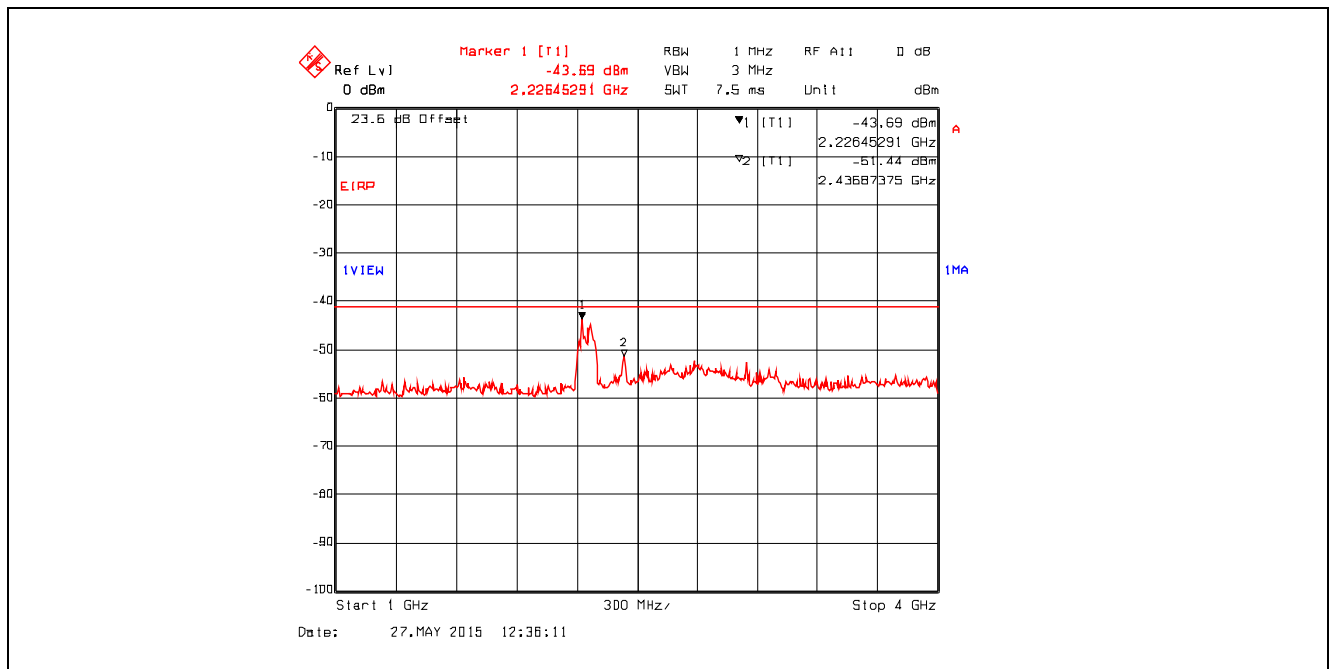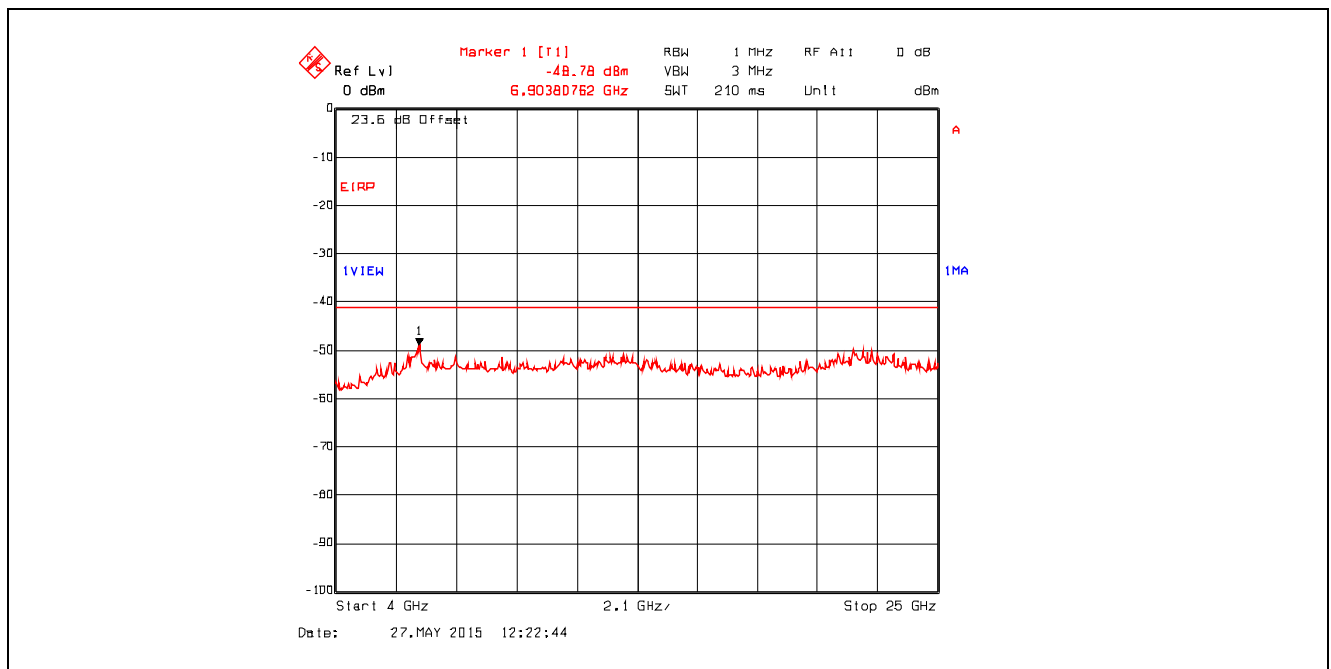

Plot 5.4.4.3.108. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector

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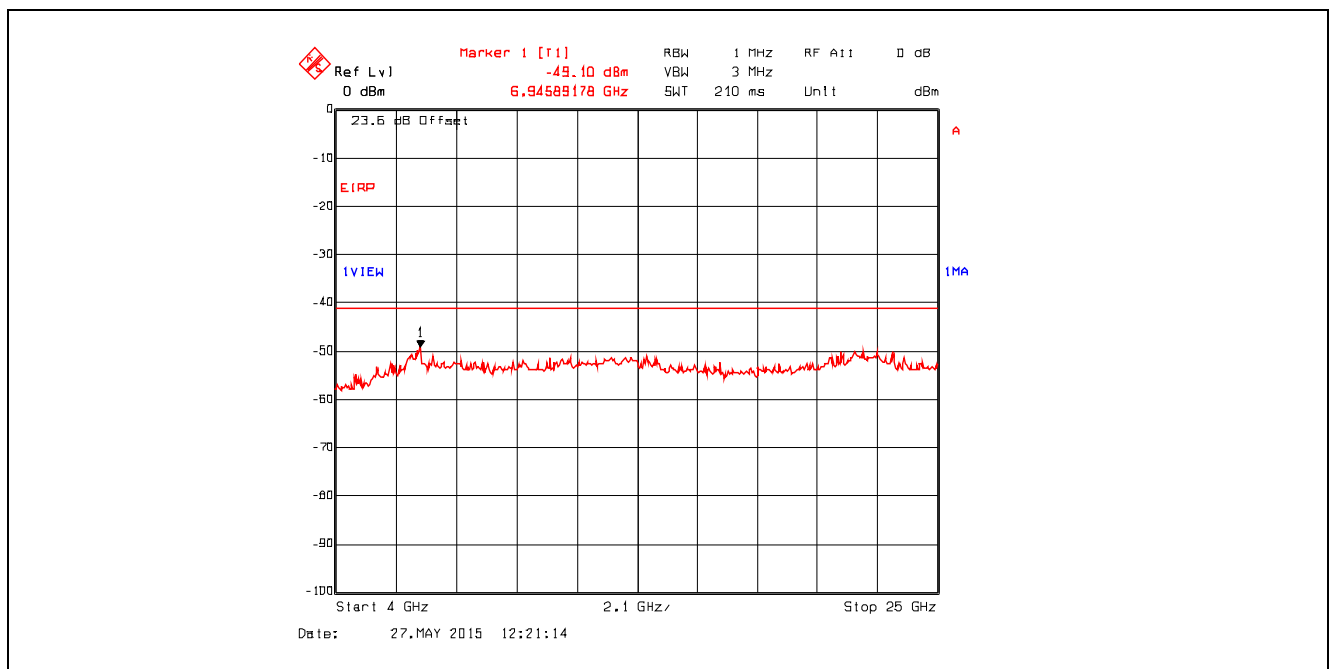
Plot 5.4.4.3.109. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector
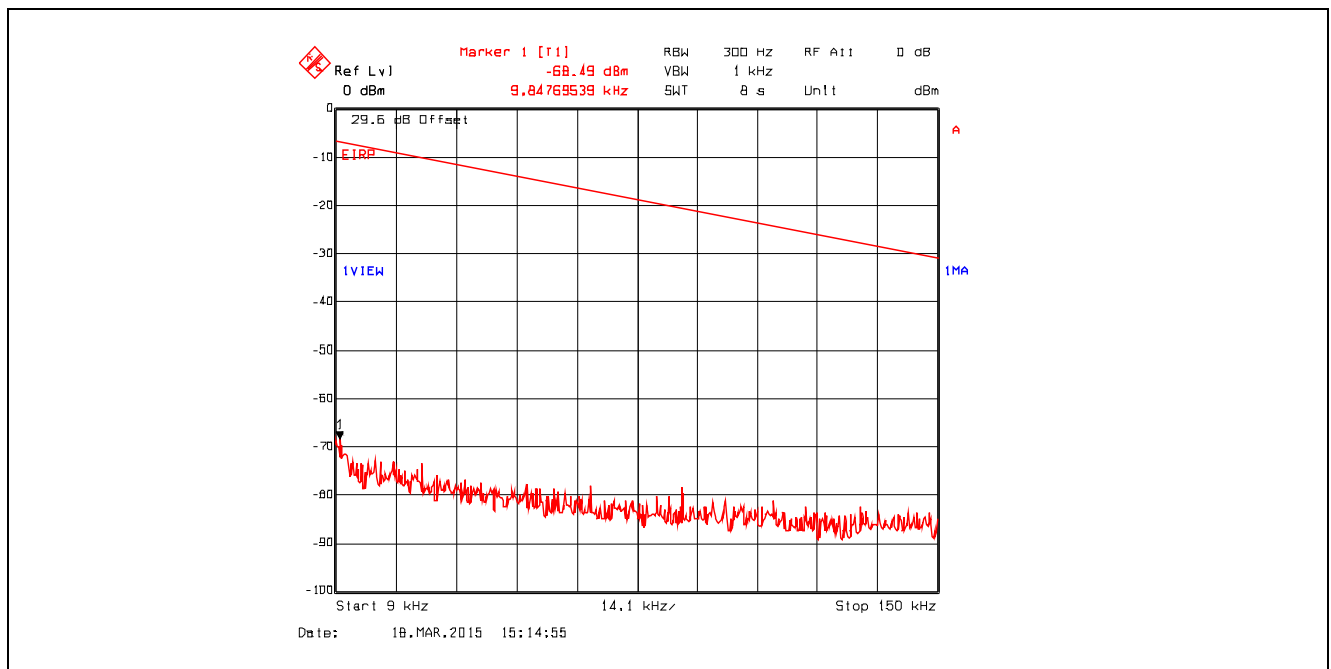

Plot 5.4.4.3.110. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 6, 2437 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector
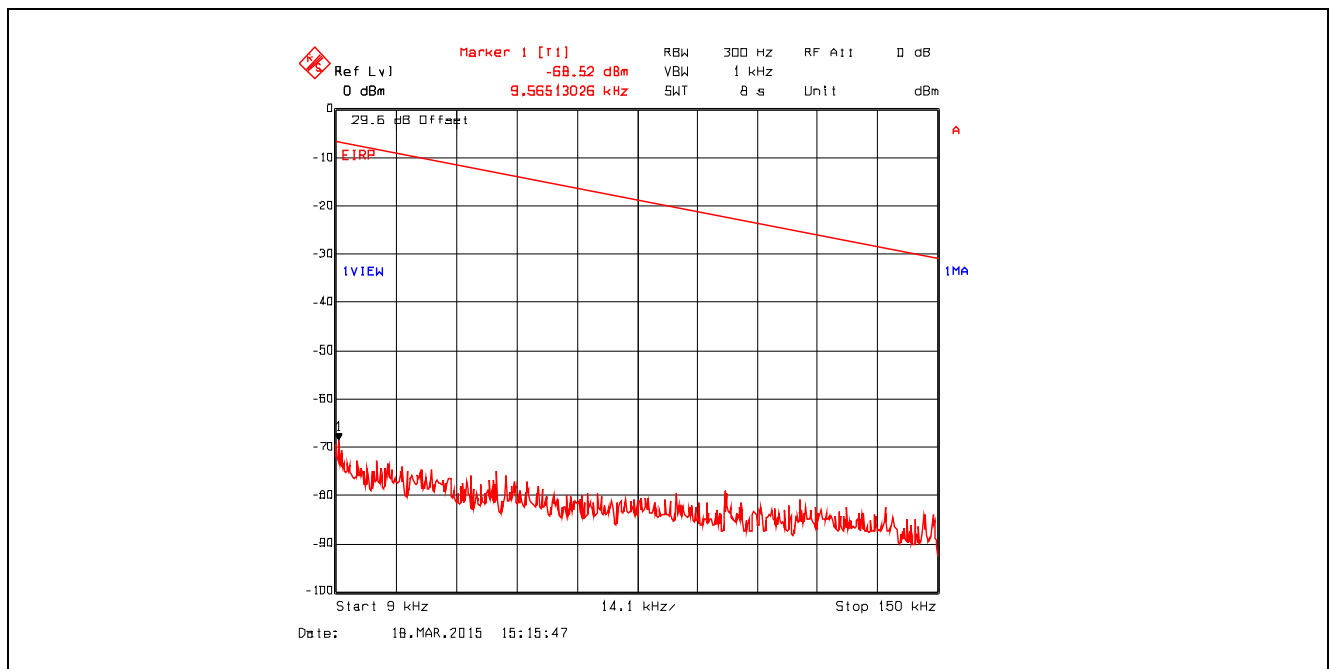
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Plot 5.4.4.3.111. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector
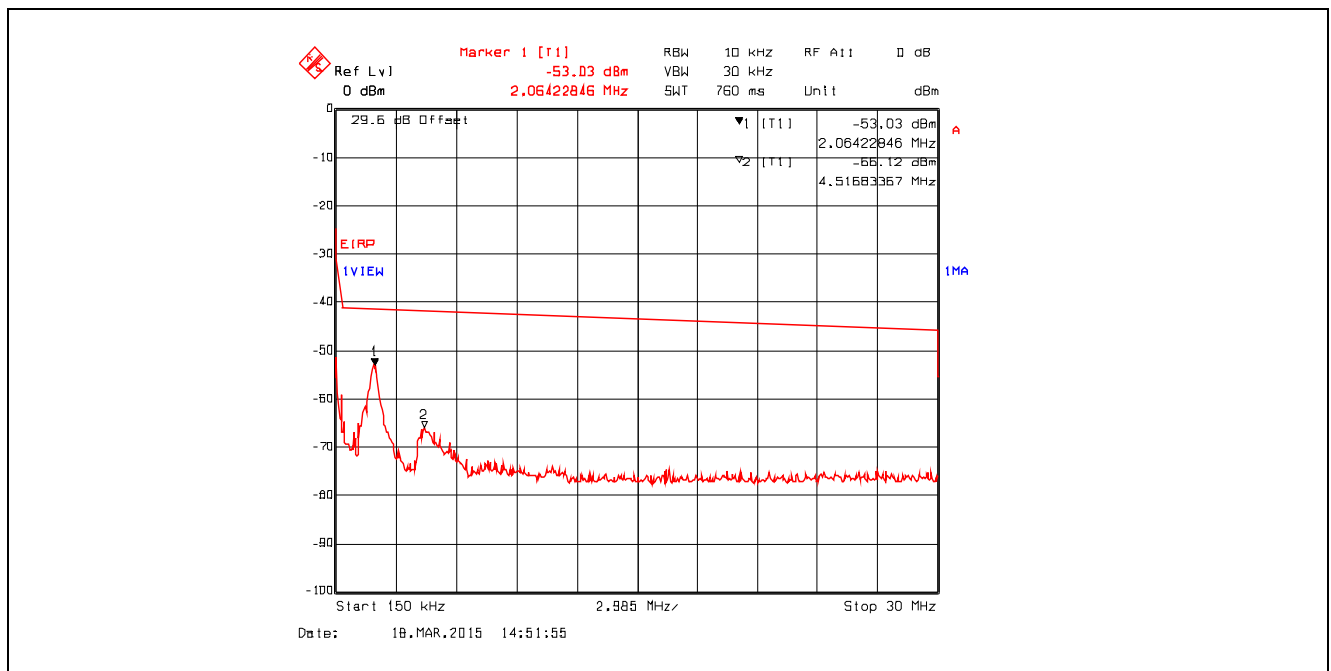

Plot 5.4.4.3.112. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 9 kHz - 150 kHz, Peak Detector

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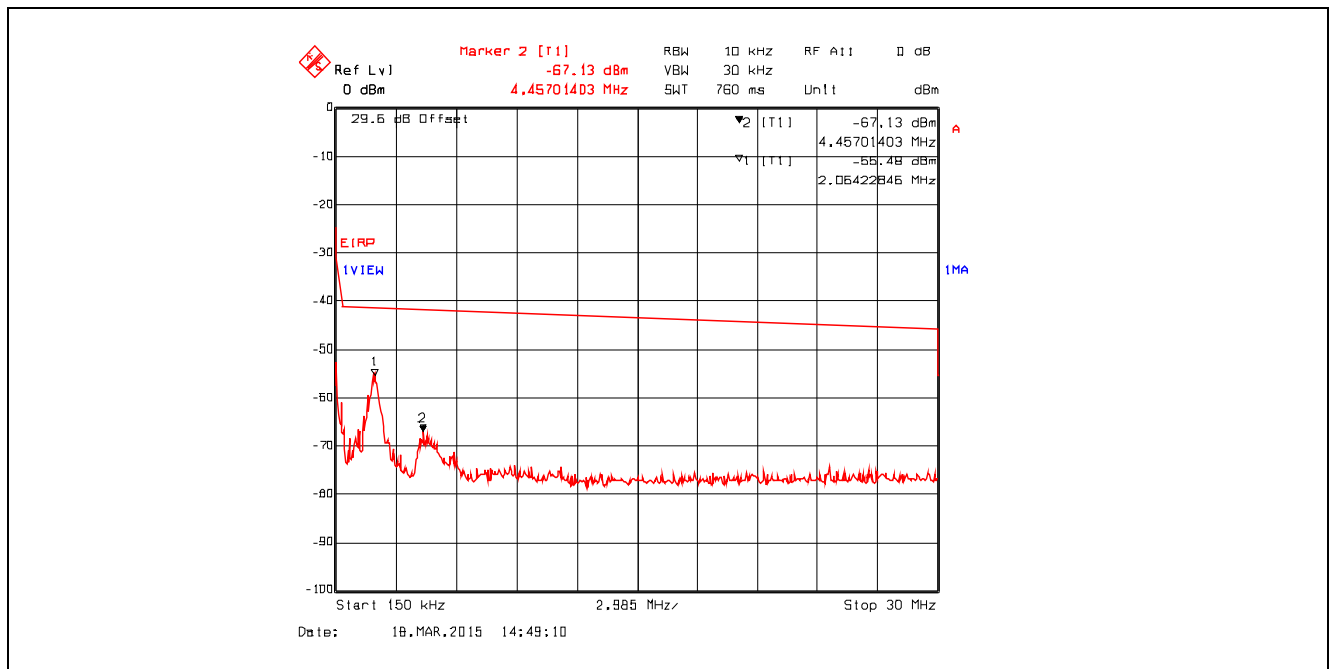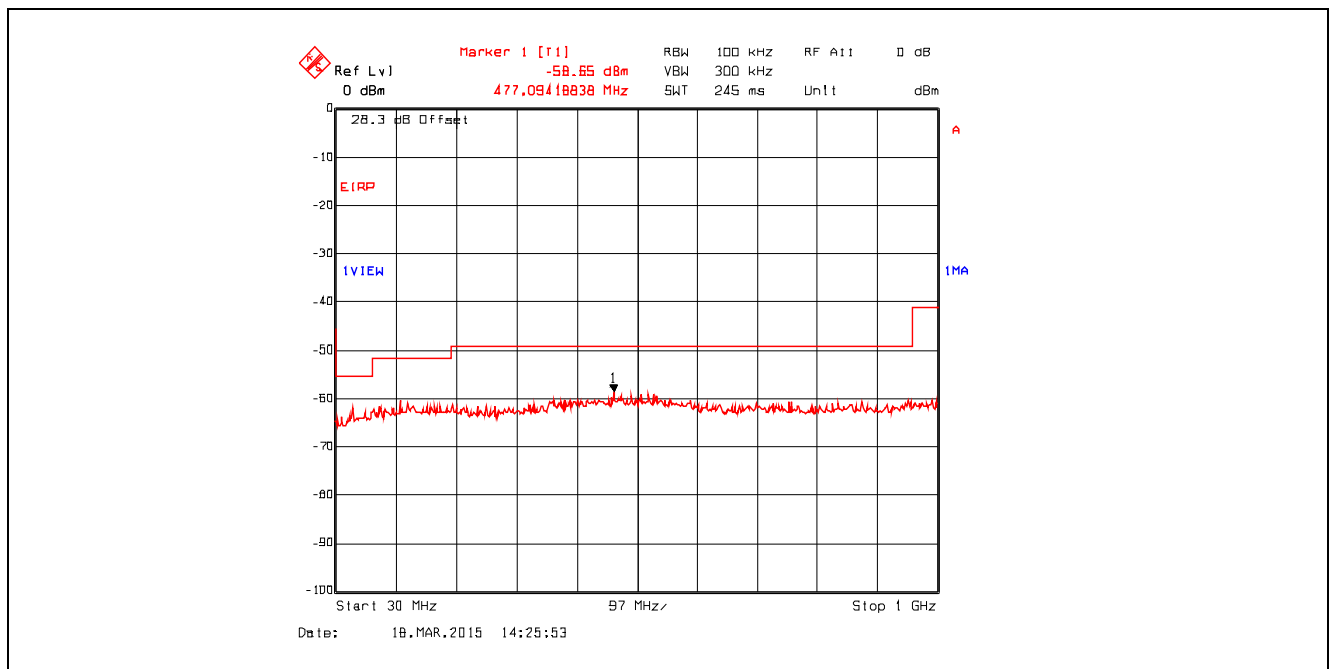
Plot 5.4.4.3.113. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector
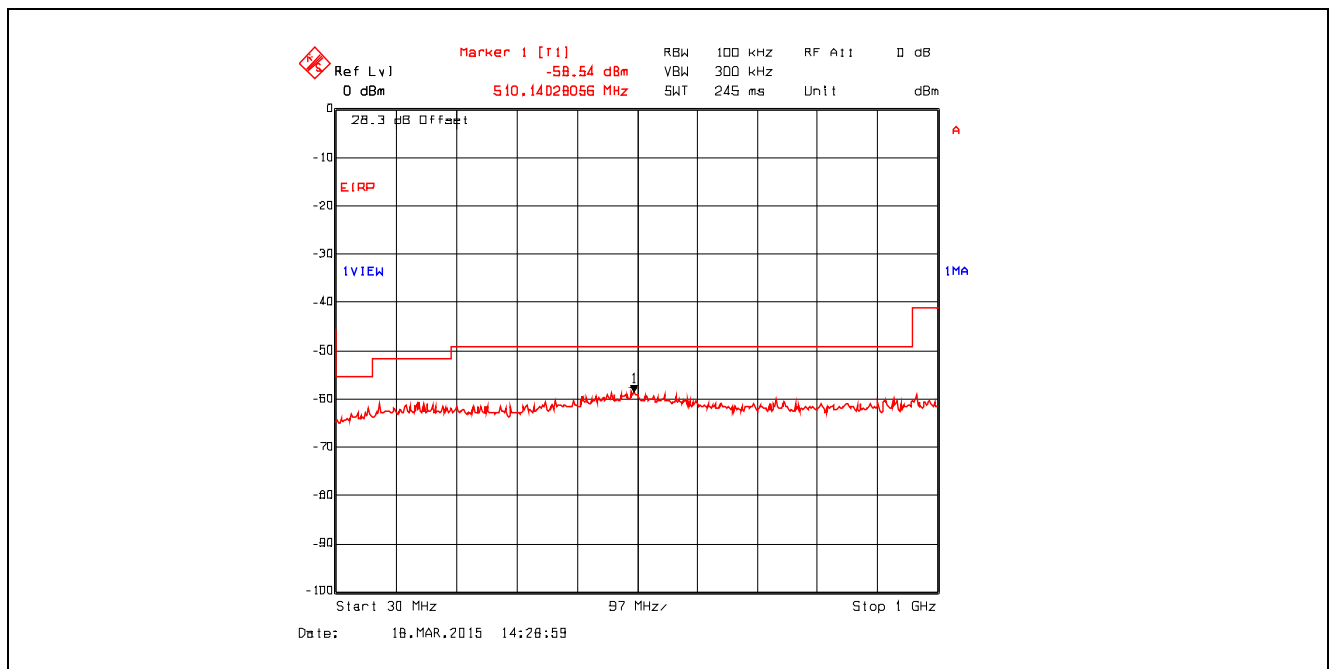

Plot 5.4.4.3.114. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 150 kHz - 30 MHz, Peak Detector

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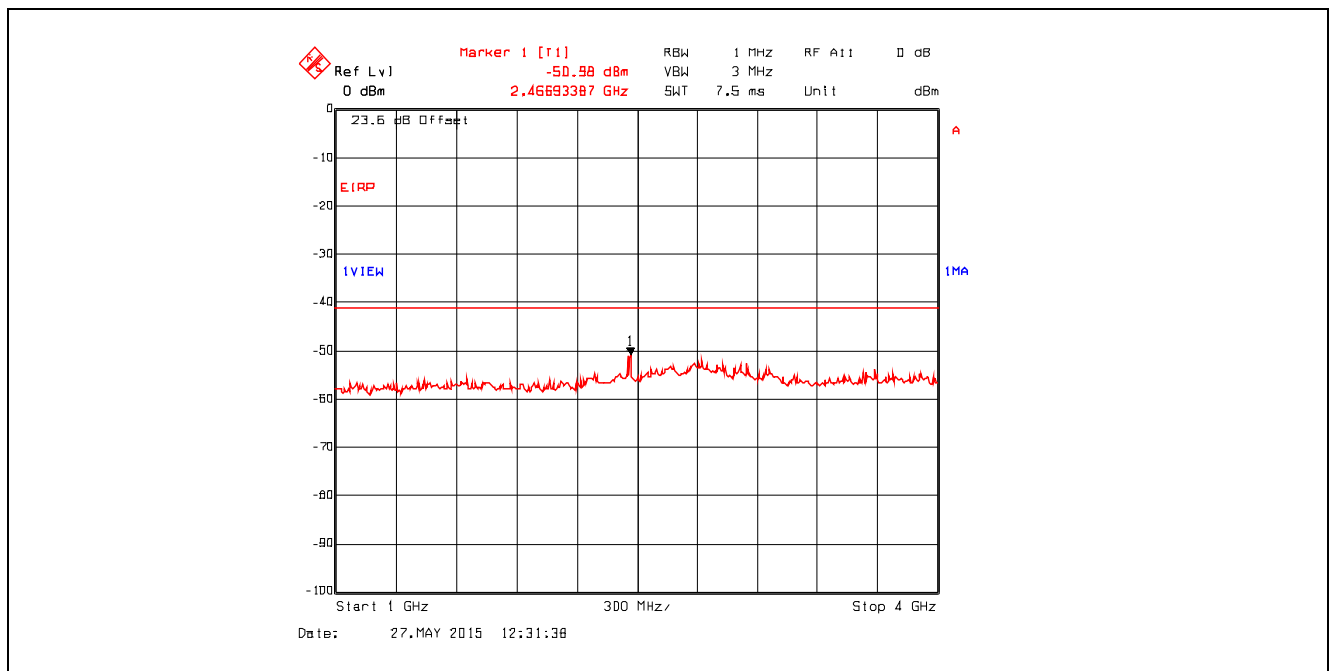
Plot 5.4.4.3.115. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector
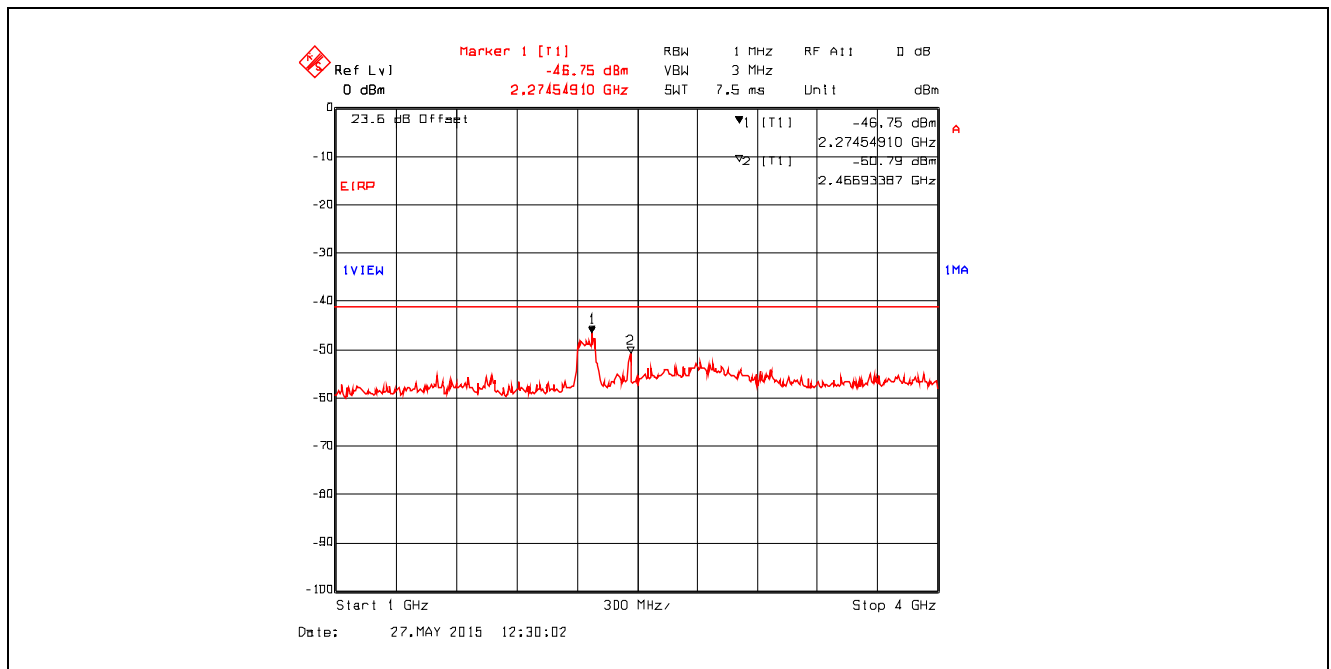

Plot 5.4.4.3.116. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 30 MHz - 1 GHz, Peak Detector

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Plot 5.4.4.3.117. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector
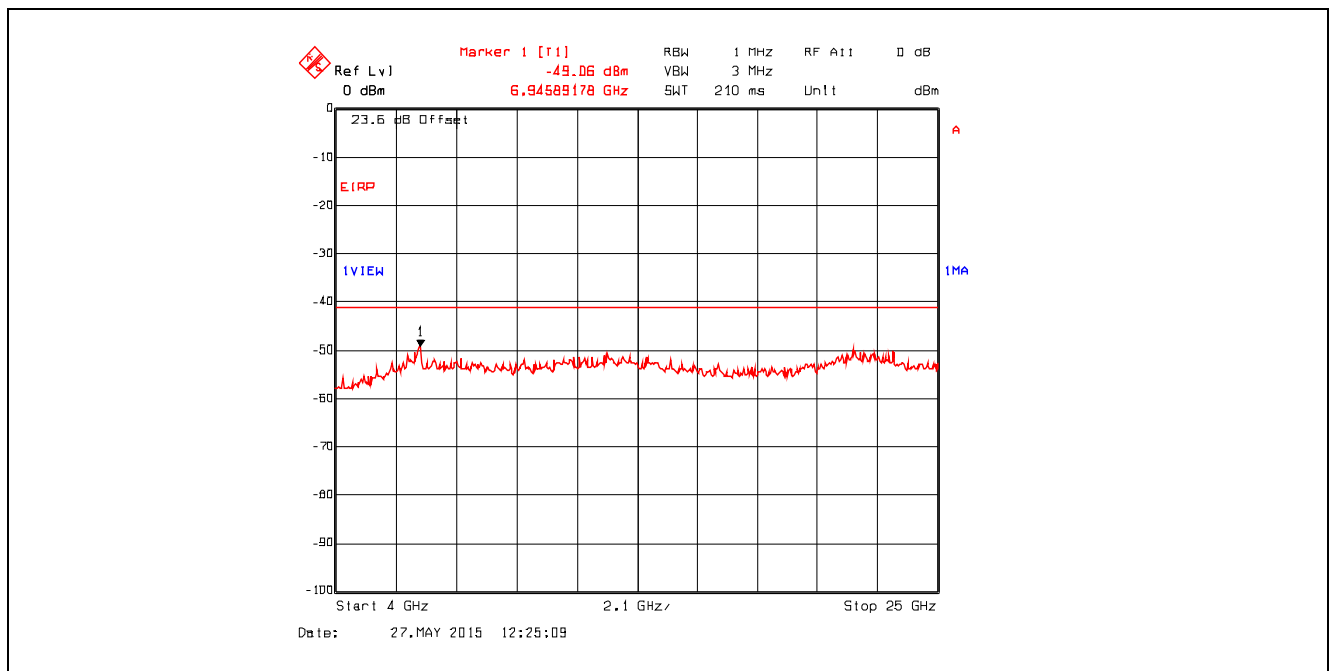

Plot 5.4.4.3.118. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 1 GHz - 4 GHz, Peak Detector
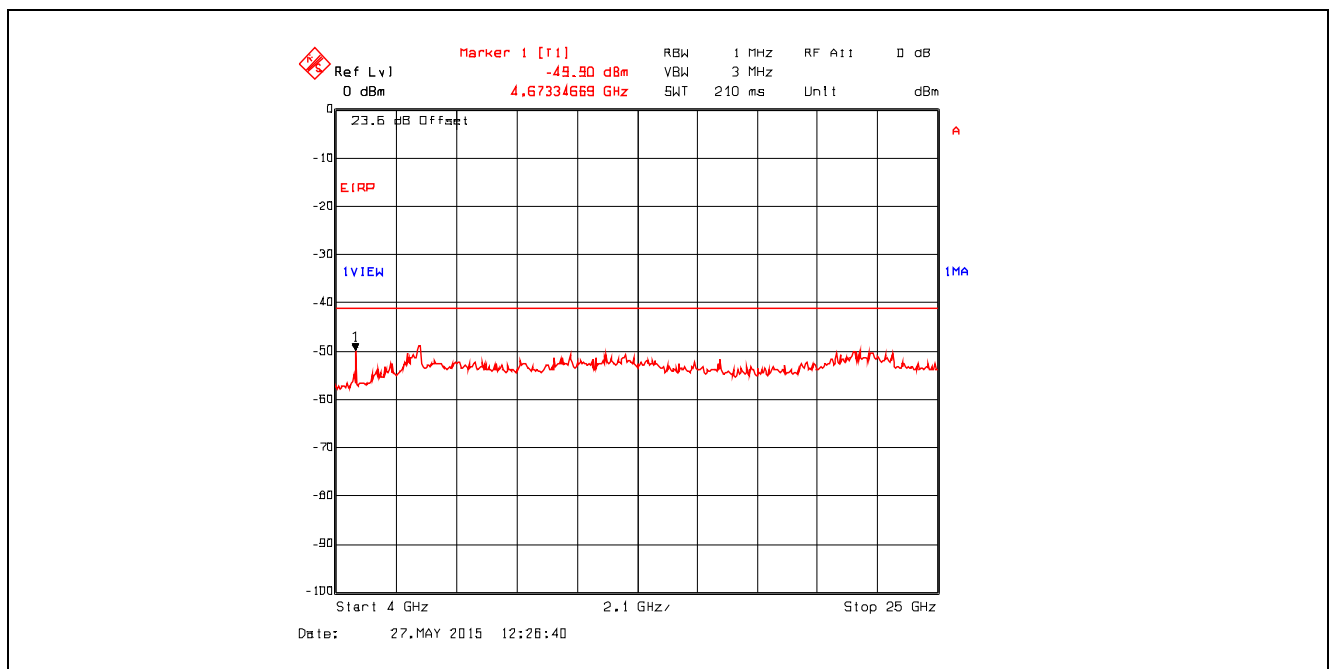
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Plot 5.4.4.3.119. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #1 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector

Plot 5.4.4.3.120. Conducted Spurious Emissions in Restricted Frequency Bands
Chain #2 , Data Rate 15, Ch 9, 2452 MHz, Software Output Power Setting 17, 4 GHz - 25 GHz, Peak Detector

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

5.5.1.   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

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5.5.2.   Method of Measurements

KDB Publication No. 558074 D01 DTS Meas Guidance V03r02, Section 12.2.7 and ANSI C63.10.

5.5.3.   Test Arrangement

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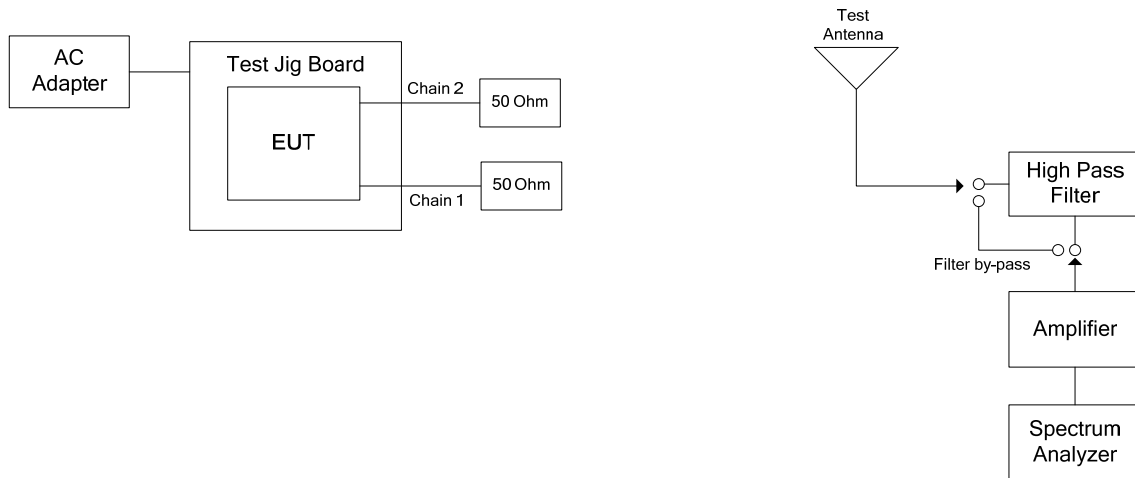
5.5.4. Test Data

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.
- § 15.247 (d) spurious emission limit: E = (EIRP - 20log(d) + 104.8) – 20 = (EIRP – 20log(3) + 104.8) - 20
- Exploratory tests performed to determined worst-case test configurations, the following test results at high power setting represent the worst-case.

5.5.4.1. Data Rate 3, Software Output Power Setting 26

Fundamental Frequency:	2412 MHz
Output Power:	31.05 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
4824	48.85	40.85	V	54.0	106.3	-13.2	Pass*
4824	49.42	39.26	H	54.0	106.3	-14.7	Pass*

*Emission within the restricted bands, limits in section 15.209 applied.

Fundamental Frequency:	2437 MHz
Output Power:	30.56 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
4874	50.86	41.68	V	54.0	105.8	-12.3	Pass*
4874	50.44	40.46	H	54.0	105.8	-13.5	Pass*

*Emission within the restricted bands, limits in section 15.209 applied.

Fundamental Frequency:	2462 MHz
Output Power:	30.04 dBm EIRP Max.
Frequency Test Range:	30 MHz – 25 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
4924	50.38	40.12	V	54.0	105.3	-13.9	Pass*
4924	50.15	42.40	H	54.0	105.3	-11.6	Pass*

*Emission within the restricted bands, limits in section 15.209 applied.

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5.5.4.2. Data Rate 7, Software Power Setting 18

Fundamental Frequency:	2412 MHz
Output Power:	31.07 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.3	*	*

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

Fundamental Frequency:	2437 MHz
Output Power:	30.91 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.2	*	*

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

Fundamental Frequency:	2462 MHz
Output Power:	30.72 dBm EIRP Max.
Frequency Test Range:	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.0	*	*

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

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5.5.4.3. Data Rate 11, Software Output Power Setting 19

Fundamental Frequency:	2412 MHz
Output Power:	31.48 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.7	*	*

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

Fundamental Frequency:	2437 MHz
Output Power:	31.47 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.7	*	*

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

Fundamental Frequency:	2462 MHz
Output Power:	31.12 dBm EIRP Max.
Frequency Test Range:	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.4	*	*

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

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5.5.4.4. Data Rate 15, Software Output Power Setting 17

Fundamental Frequency:	2422 MHz
Output Power:	31.22 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.5	*	*

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

Fundamental Frequency:	2437 MHz
Output Power:	31.44 dBm EIRP Max.
Frequency Test Range	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.7	*	*

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

Fundamental Frequency:	2452 MHz
Output Power:	30.84 dBm EIRP Max.
Frequency Test Range:	30 MHz – 25 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
30 - 25000	*	*	H/V	*	106.1	*	*

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

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

5.6.1. 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.

5.6.2. Method of Measurements

Publication No. KDB Publication No. 558074 D01 DTS Meas Guidance V03r02, Section 10.2 Method PKPSD

5.6.3. Test Arrangement
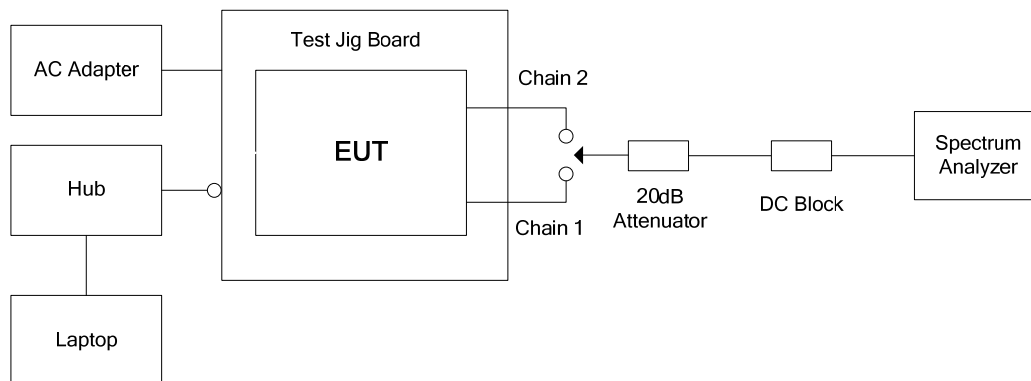
5.6.4. Test Data

Software Output Power Setting 26							
Operating Mode	Channel	Frequency (MHz)	Peak Power (dBm)		Peak PSD (dBm)	Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
Data Rate 1	1	2412	-0.95	0.07	2.60	8	-5.40
	6	2437	-0.85	-1.99	1.63	8	-6.01
	11	2462	-1.31	-1.58	1.57	8	-6.43
Data Rate 2	1	2412	-0.24	-0.26	2.76	8	-5.24
	6	2437	-1.19	-1.55	1.64	8	-6.40
	11	2462	-0.86	-2.04	1.60	8	-6.36
Data Rate 3	1	2412	-0.22	2.23	4.19	8	-3.81
	6	2437	-0.28	0.12	2.93	8	-5.07
	11	2462	-0.31	-2.12	1.89	8	-6.11

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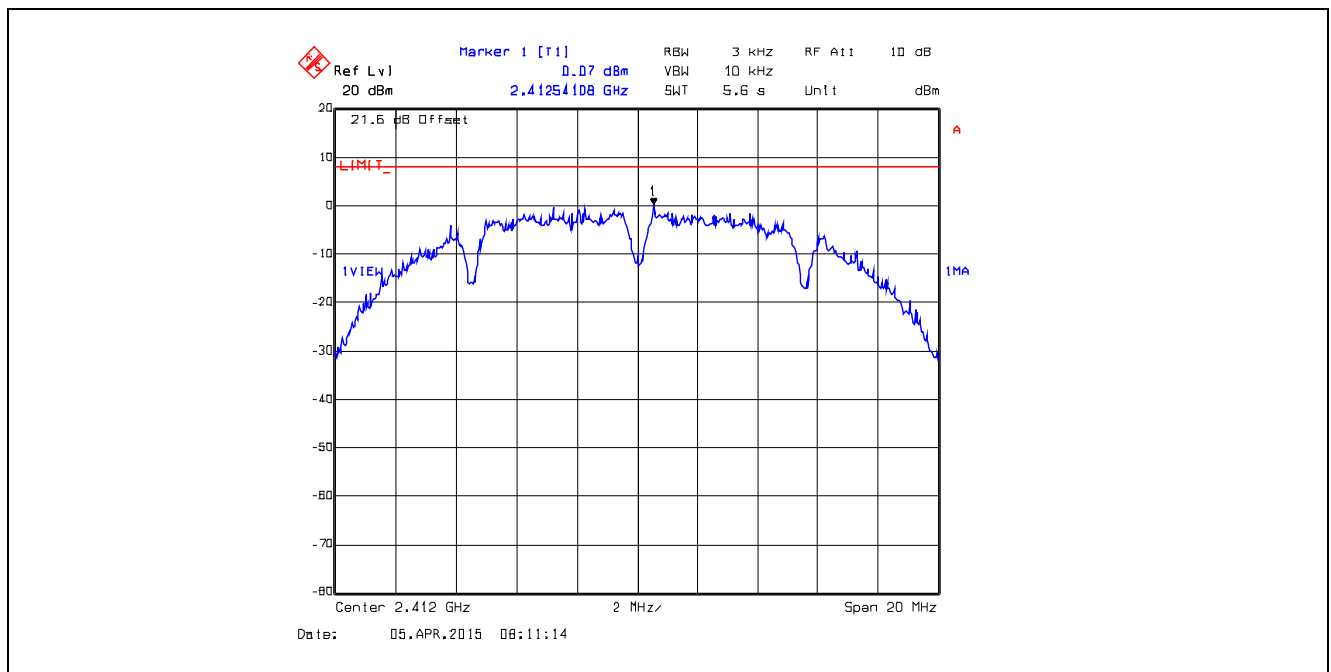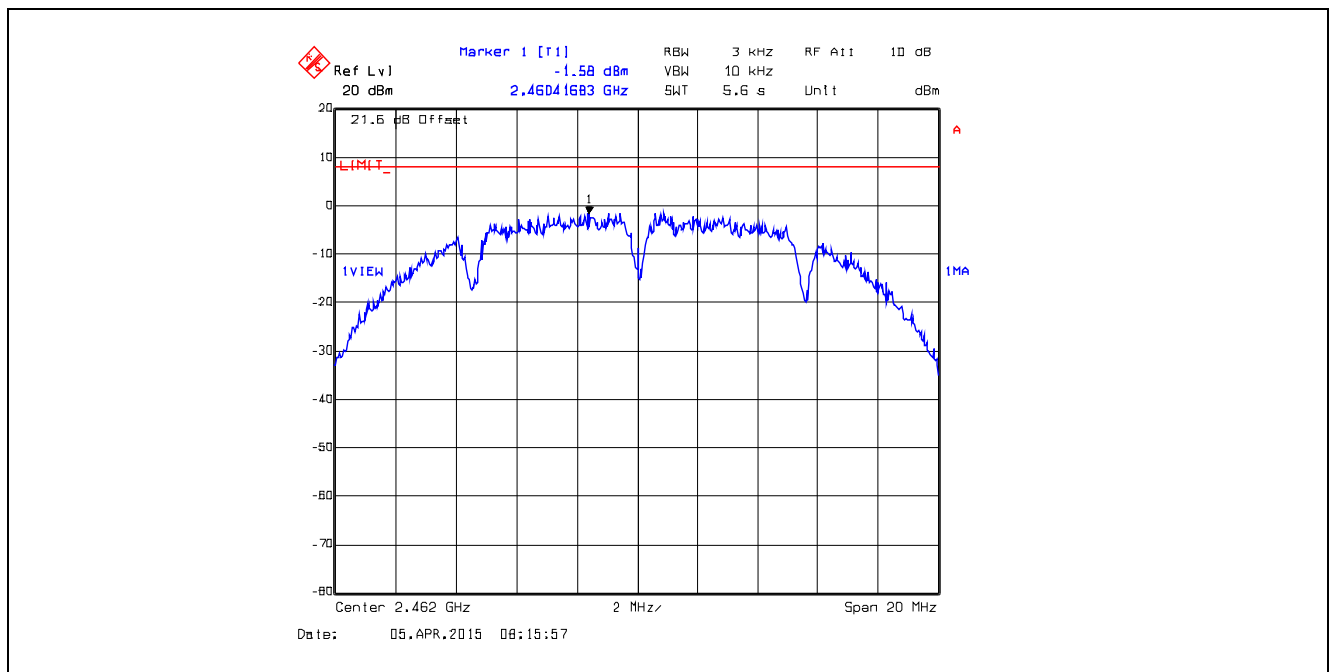
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Software Output Power Setting 18							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Peak PSD (dBm)**	**Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 4	1	2412	-2.40	-6.55	-0.99	8	-8.99
	6	2437	-6.28	-6.88	-3.56	8	-11.56
	11	2462	-6.27	-6.91	-3.57	8	-11.57
Data Rate 5	1	2412	-2.56	-5.83	-0.88	8	-8.88
	6	2437	-3.18	-6.37	-1.48	8	-9.48
	11	2462	-6.93	-8.06	-4.45	8	-12.45
Data Rate 6	1	2412	-1.74	-8.03	-0.82	8	-8.82
	6	2437	-2.23	-6.28	-0.79	8	-8.79
	11	2462	-5.69	-8.39	-3.82	8	-11.82
Data Rate 7	1	2412	-0.07	-5.97	0.92	8	-7.08
	6	2437	-3.59	-7.06	-1.98	8	-9.98
	11	2462	-7.41	-6.8	-4.08	8	-12.08

Software Output Power Setting 19							
Operating Mode	**Channel**	**Frequency (MHz)**	**Peak Power (dBm)**		**Peak PSD (dBm)**	**Limit (dBm)**	**Margin (dBm)**
			Chain # 1	**Chain # 2**			
Data Rate 8	1	2412	-4.03	-6.79	-2.18	8	-10.18
	6	2437	-6.04	-7.80	-3.82	8	-11.82
	11	2462	-7.21	-7.51	-4.35	8	-12.35
Data Rate 9	1	2412	-2.69	-7.19	-1.37	8	-9.37
	6	2437	-2.48	-8.08	-1.42	8	-9.42
	11	2462	-5.02	-7.91	-3.22	8	-11.22
Data Rate 10	1	2412	-2.97	-6.23	-1.29	8	-9.29
	6	2437	-4.22	-6.37	-2.15	8	-10.15
	11	2462	-4.36	-8.21	-2.86	8	-10.86
Data Rate 11	1	2412	-1.58	-6.15	-0.28	8	-8.28
	6	2437	-2.28	-6.94	-1.00	8	-9.00
	11	2462	-6.63	-8.26	-4.36	8	-12.36

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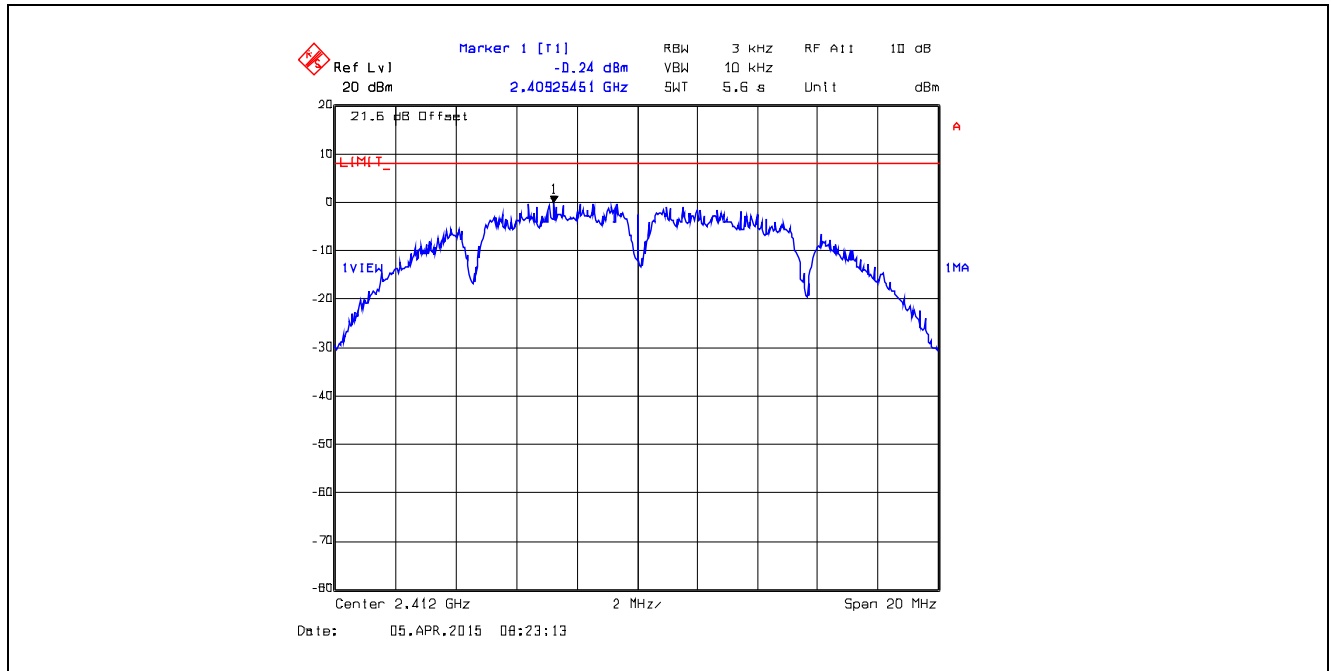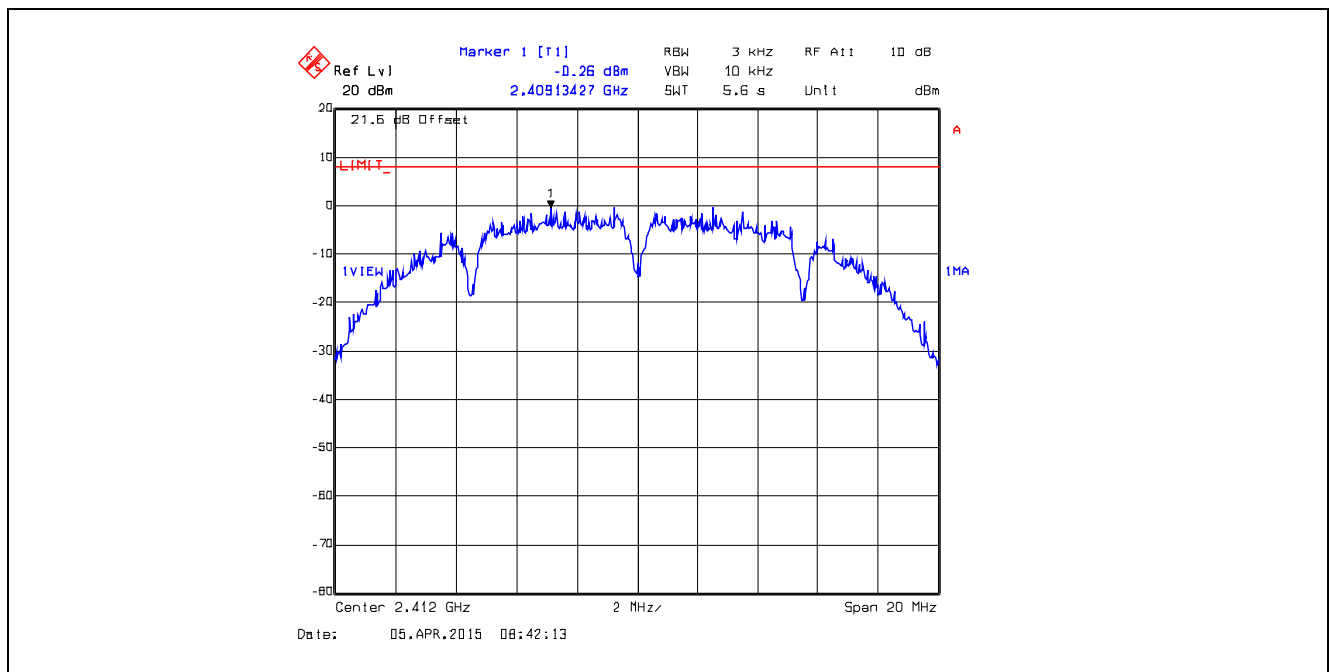*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

Software Output Power Setting 17							
Operating Mode	Channel	Frequency (MHz)	Peak Power (dBm)		Peak PSD (dBm)	Limit (dBm)	Margin (dBm)
			Chain # 1	Chain # 2			
Data Rate 12	3	2422	-2.34	-8.89	-1.49	8	-9.49
	6	2437	-1.88	-6.83	-0.67	8	-8.67
	9	2452	-3.59	-9.92	-2.68	8	-10.68
Data Rate 13	3	2422	-2.31	-9.87	-1.61	8	-9.61
	6	2437	-5.89	-10.08	-4.49	8	-12.49
	9	2452	-4.56	-10.22	-3.52	8	-11.52
Data Rate 14	3	2422	-2.59	-8.17	-1.53	8	-9.53
	6	2437	-2.45	-10.11	-1.76	8	-9.76
	9	2452	-3.33	-8.72	-2.23	8	-10.23
Data Rate 15	3	2422	-2.30	-9.74	-1.58	8	-9.58
	6	2437	-5.24	-9.34	-3.81	8	-11.81
	9	2452	-5.02	-11.32	-4.11	8	-12.11

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Plot 5.6.4.1. Power Spectral Density
Data Rate 1, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26
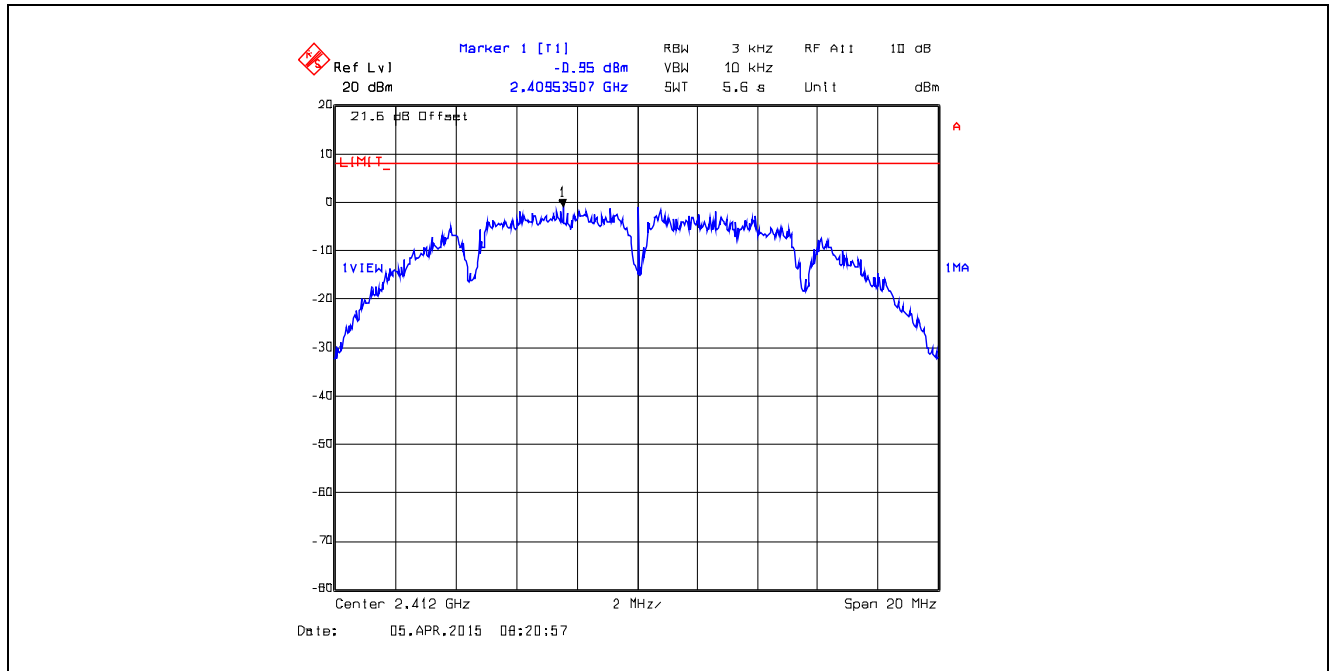
Plot 5.6.4.2. Power Spectral Density
Data Rate 1, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26

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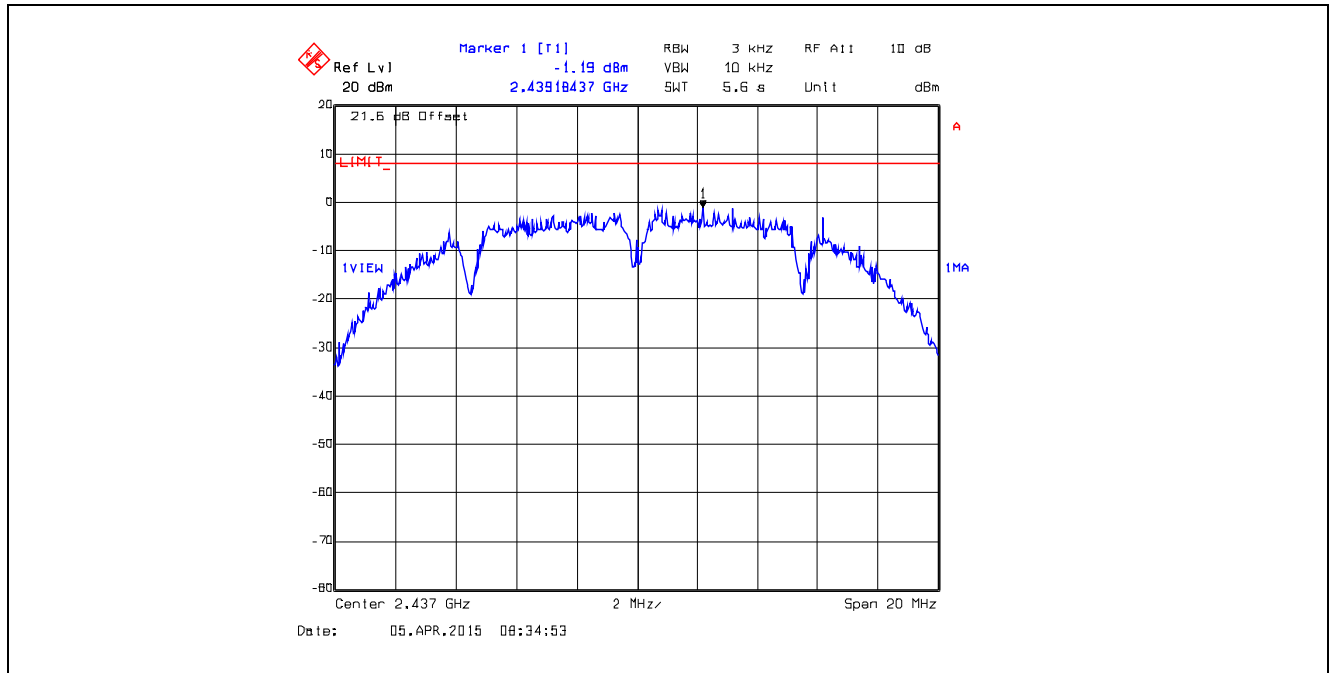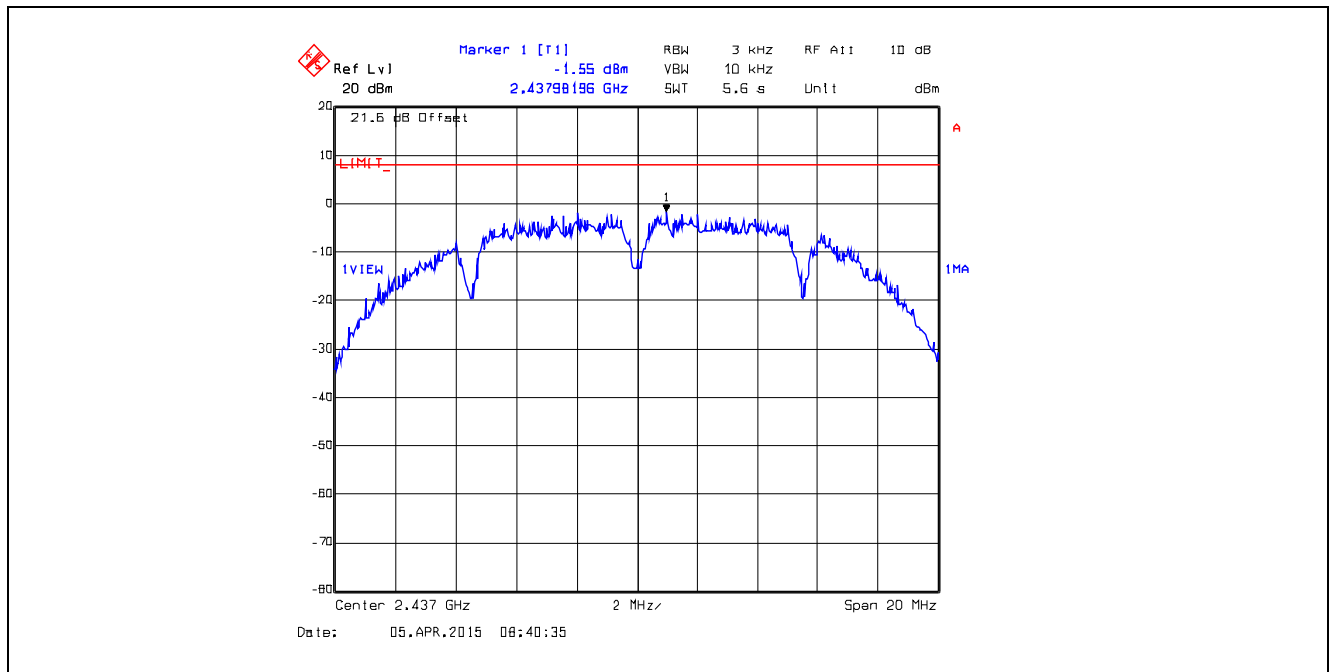3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4
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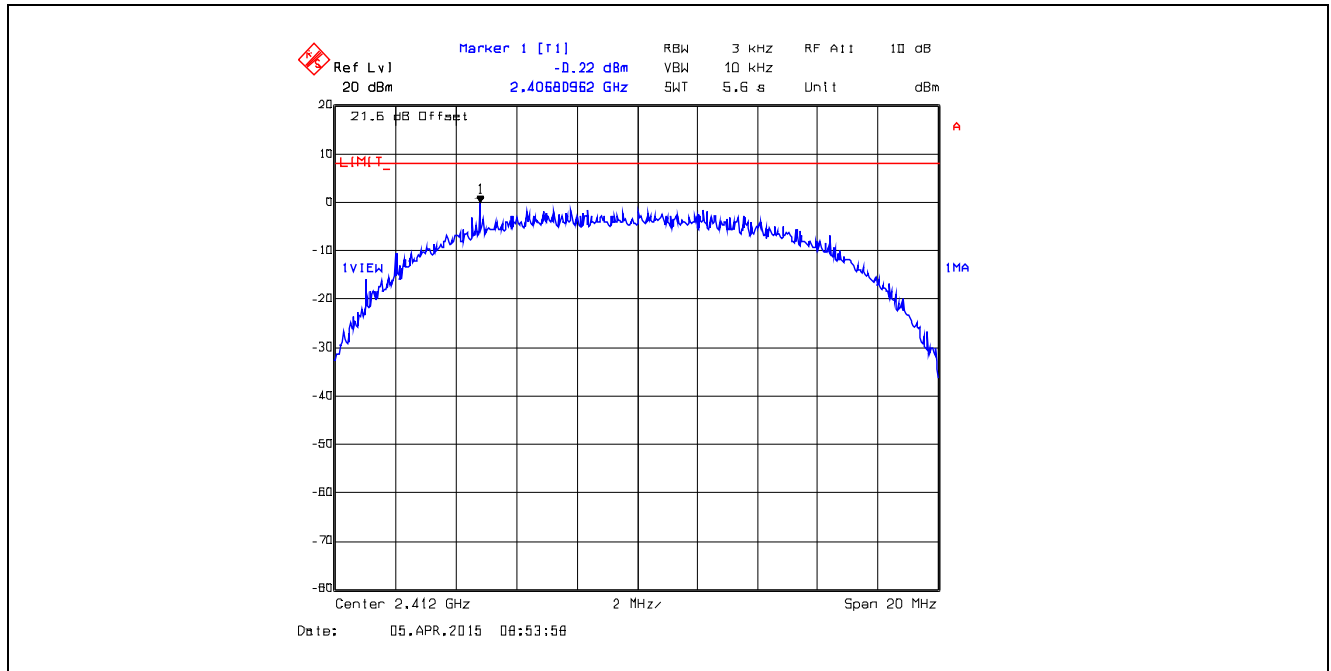
Plot 5.6.4.3. Power Spectral Density
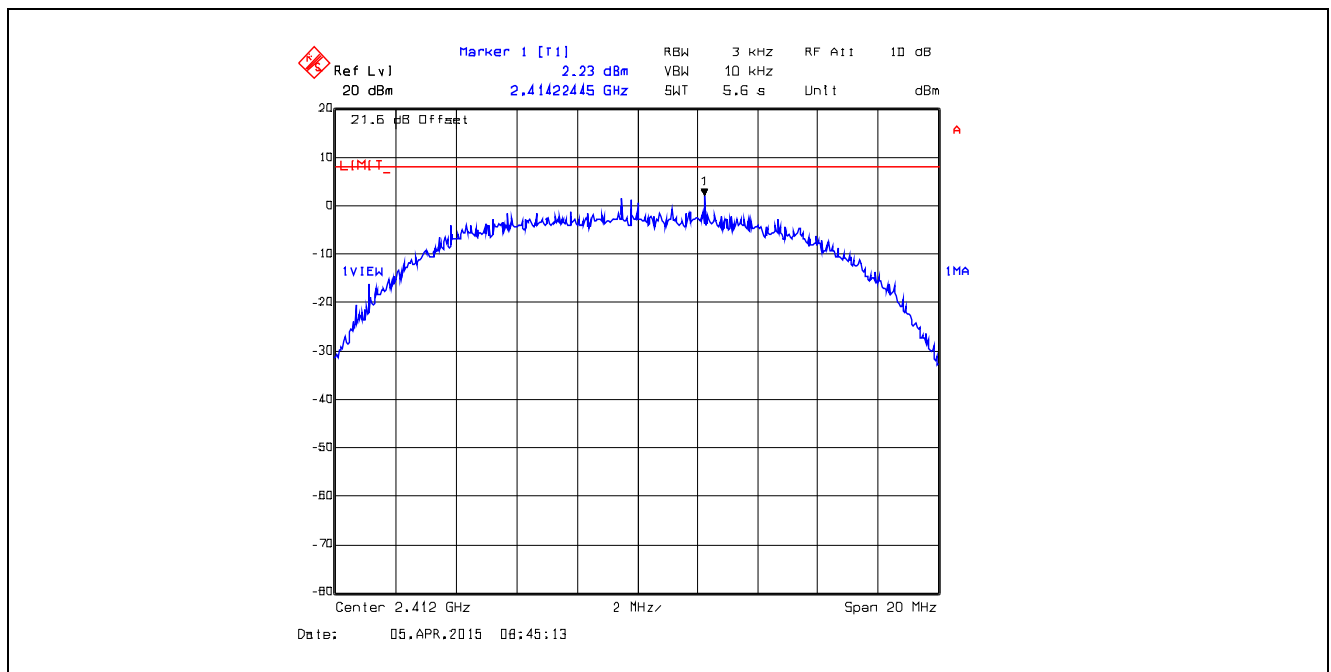Data Rate 1, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26
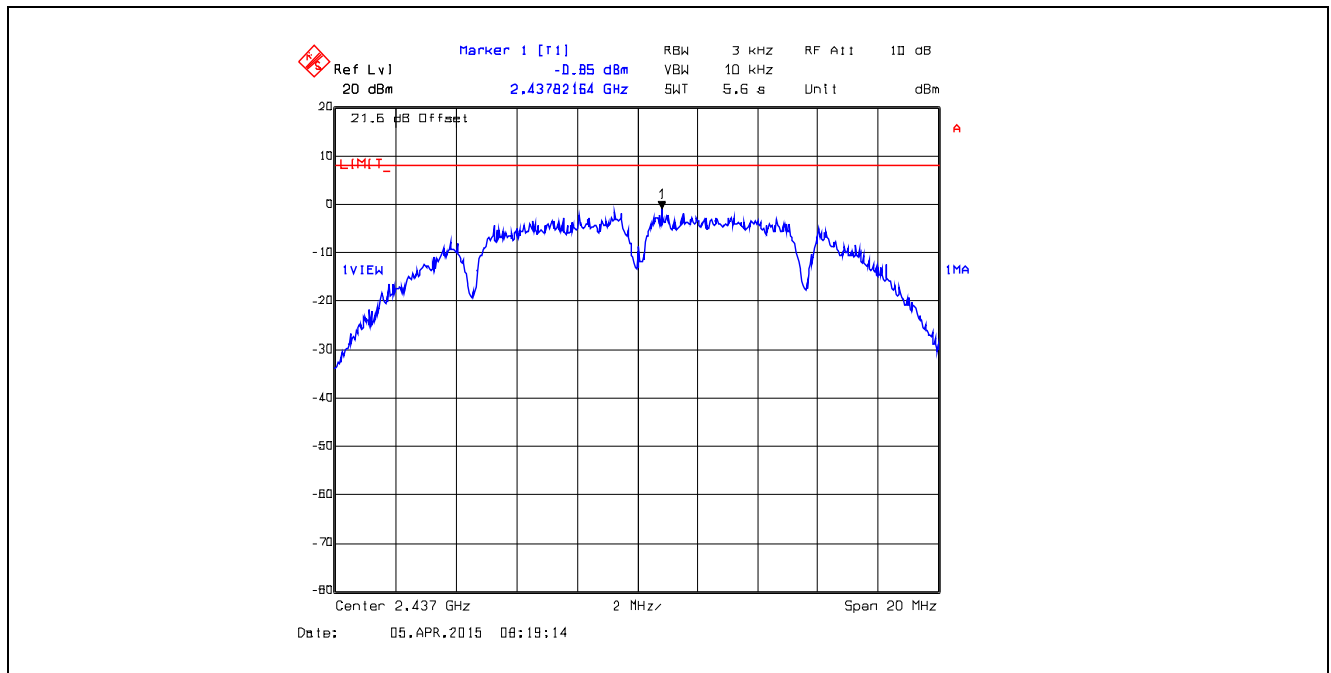
Plot 5.6.4.4. Power Spectral Density
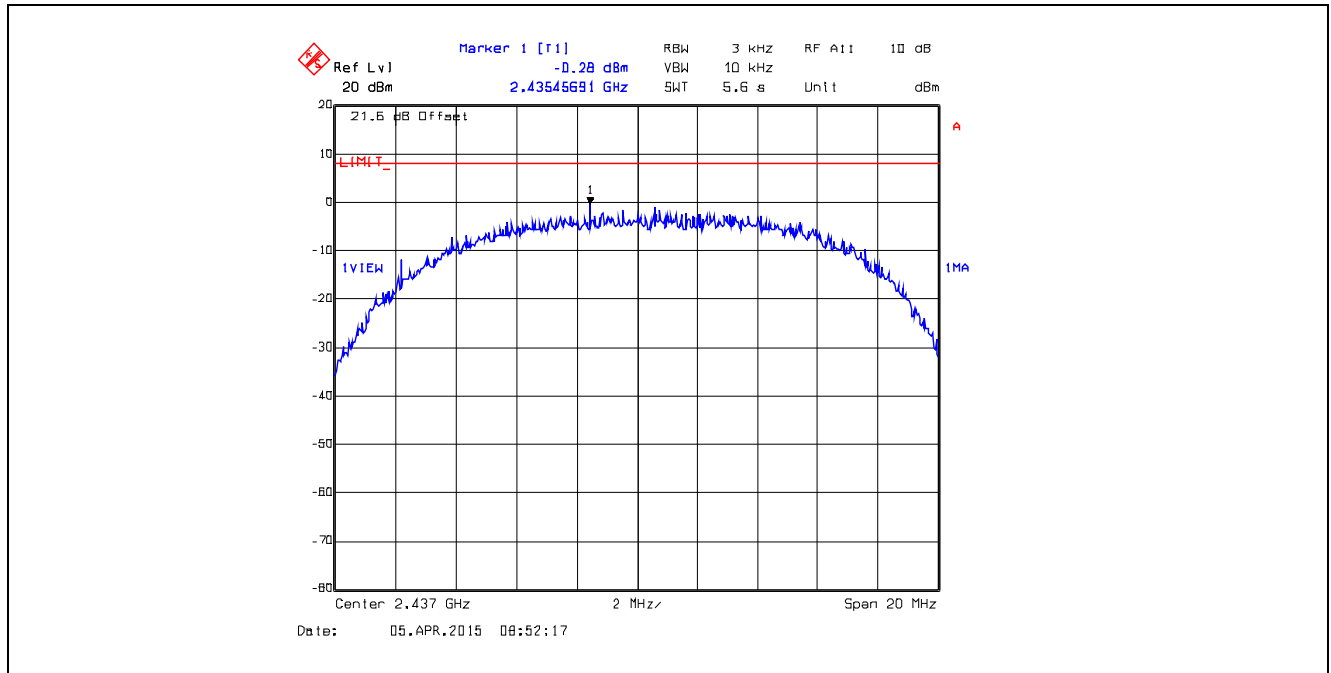Data Rate 1, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 26
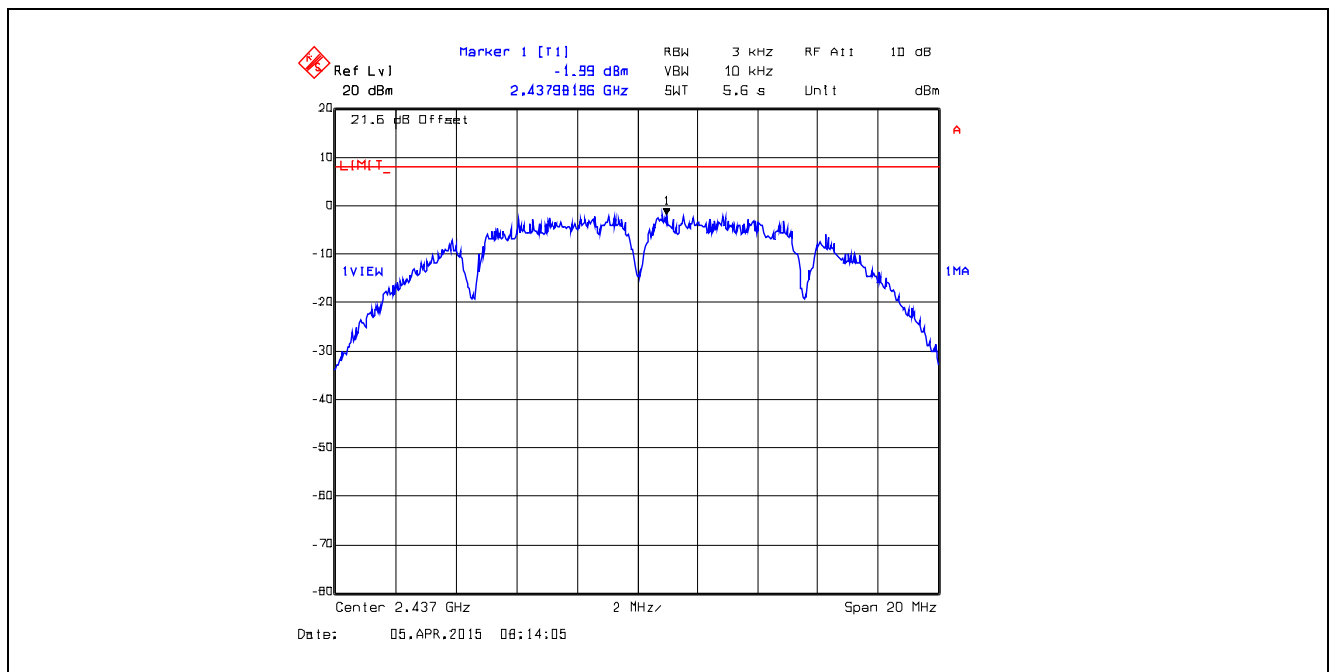
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Plot 5.6.4.5. Power Spectral Density
Data Rate 1, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26
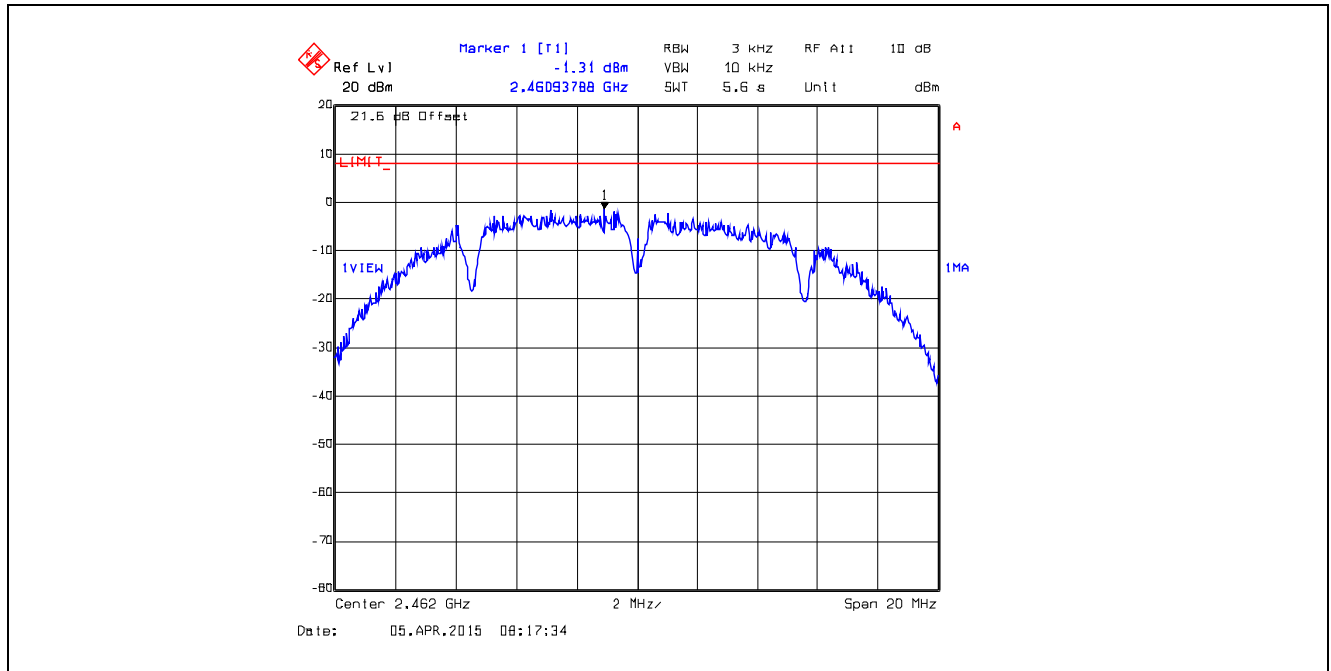
Plot 5.6.4.6. Power Spectral Density
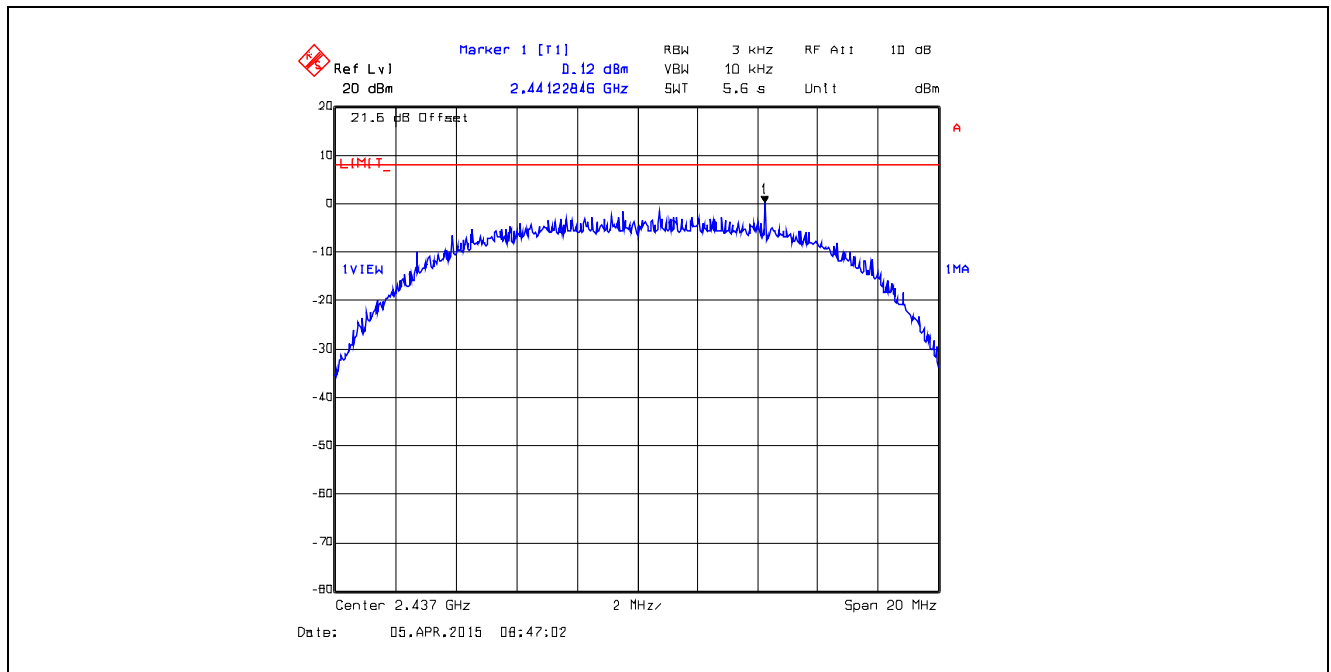Data Rate 1, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26

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Plot 5.6.4.7. Power Spectral Density
Data Rate 2, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26

Plot 5.6.4.8. Power Spectral Density
Data Rate 2, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26

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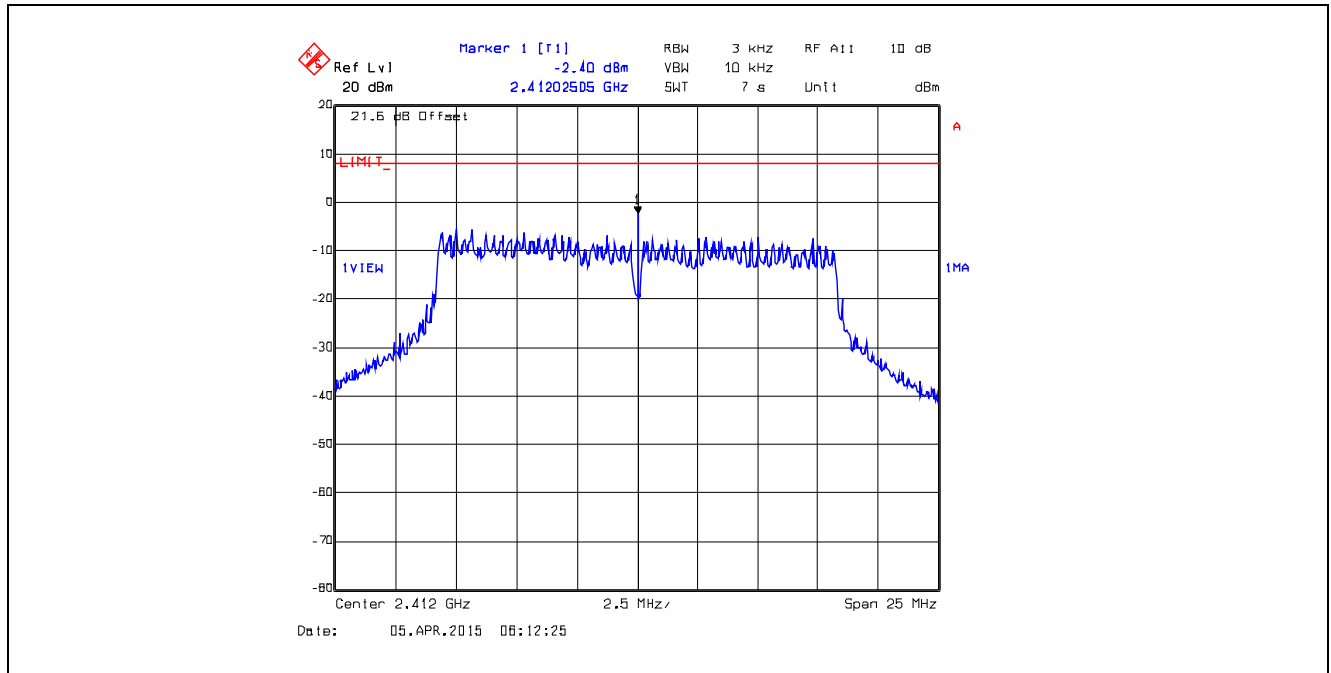
Plot 5.6.4.9. Power Spectral Density
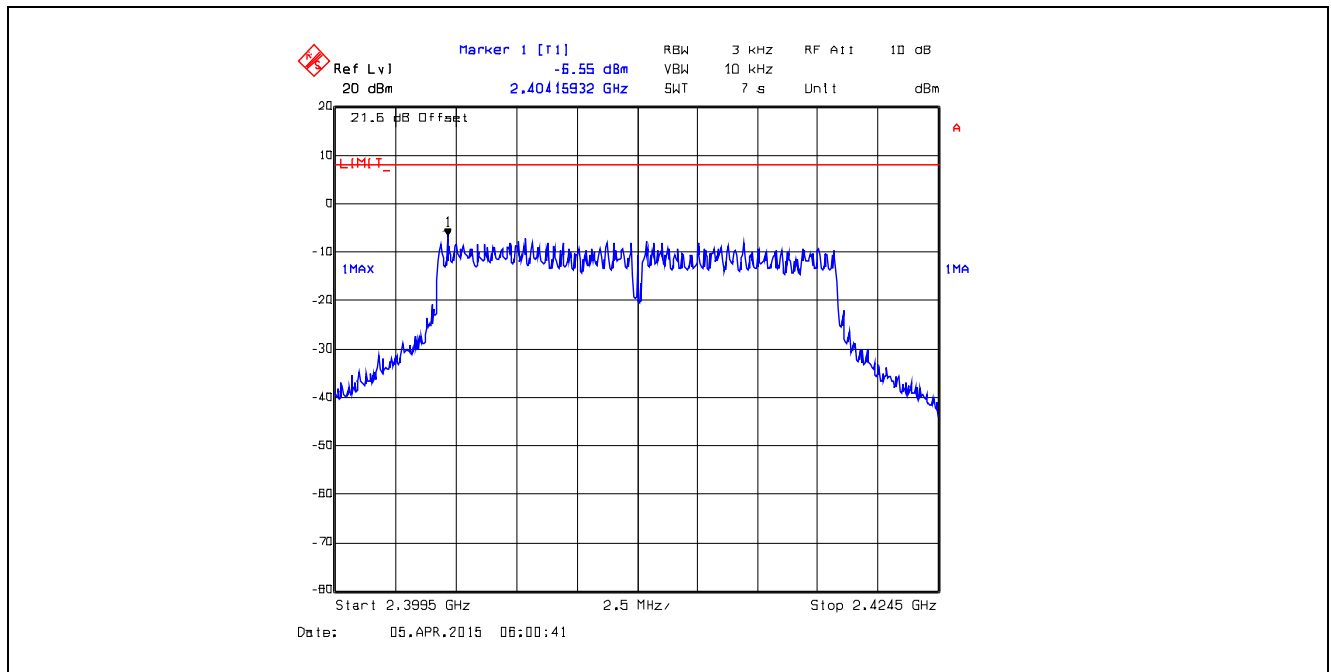Data Rate 2, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26

Plot 5.6.4.10. Power Spectral Density
Data Rate 2, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26

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Plot 5.6.4.11. Power Spectral Density
Data Rate 2, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26
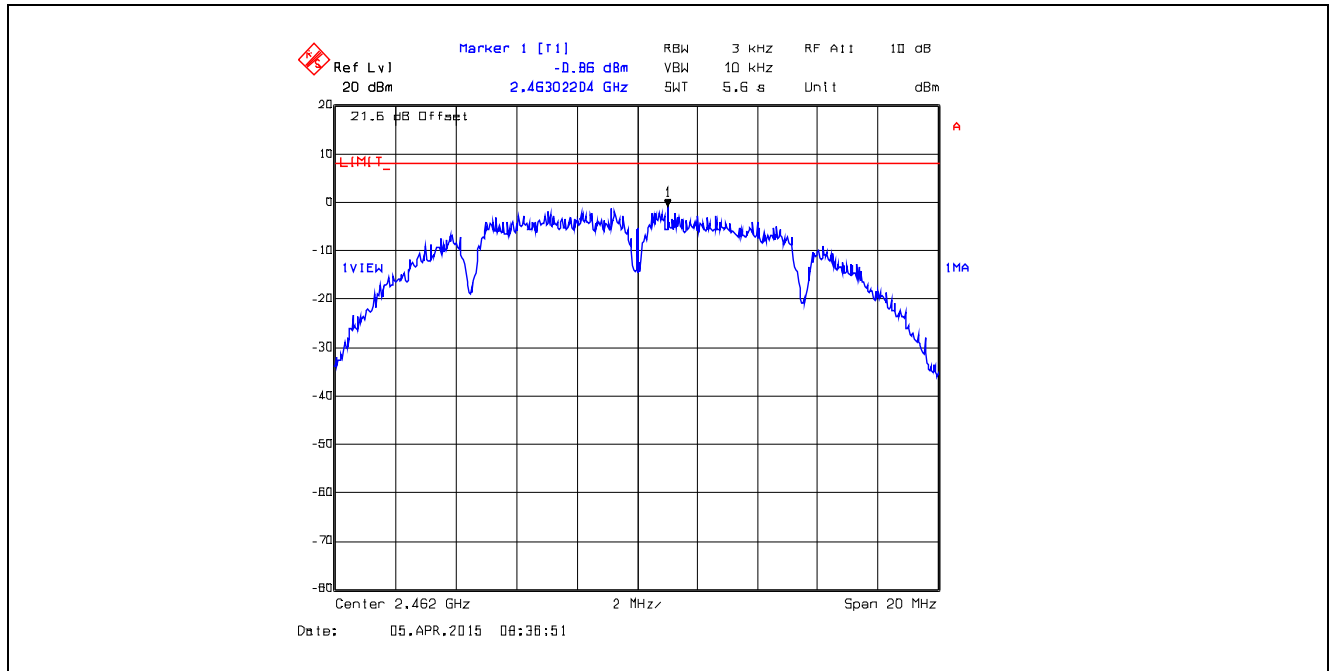
Plot 5.6.4.12. Power Spectral Density
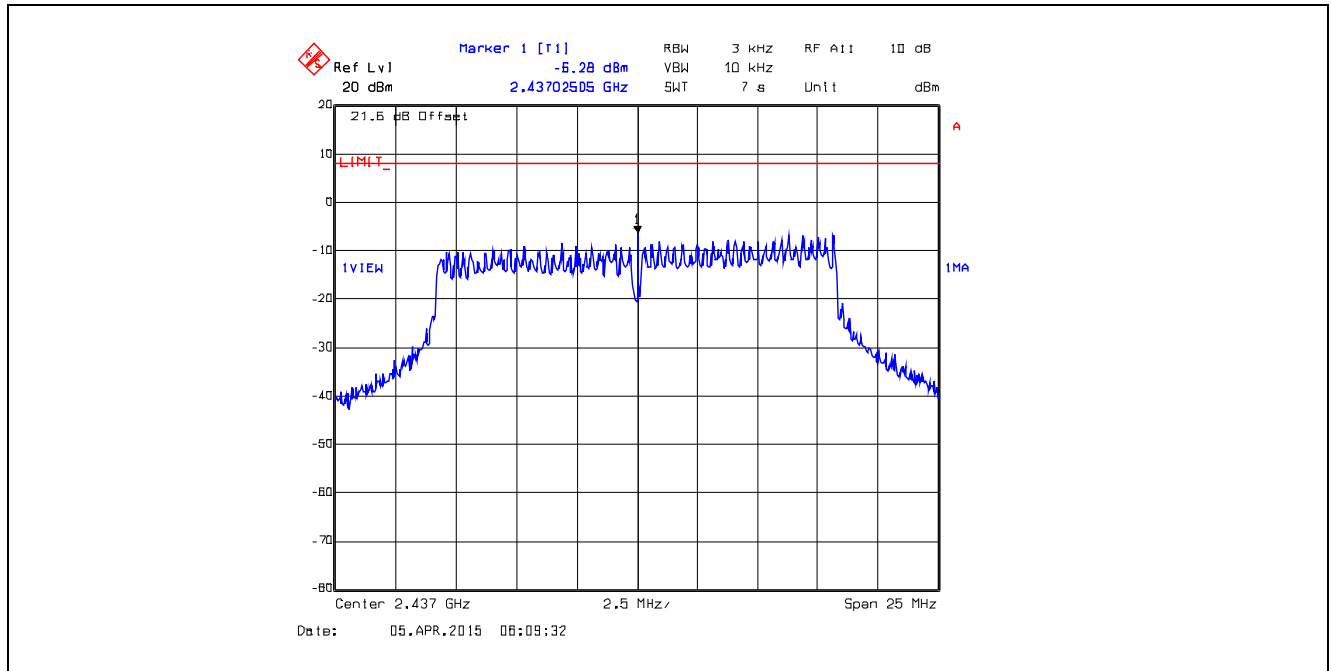Data Rate 2, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26
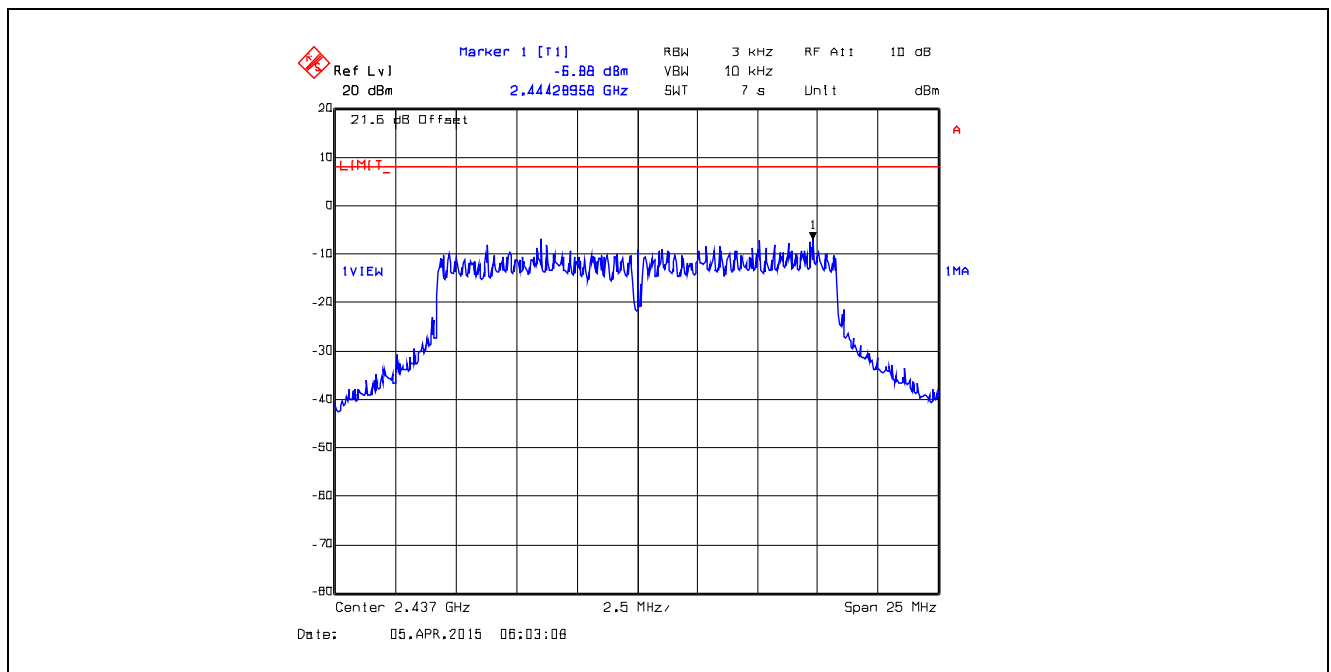
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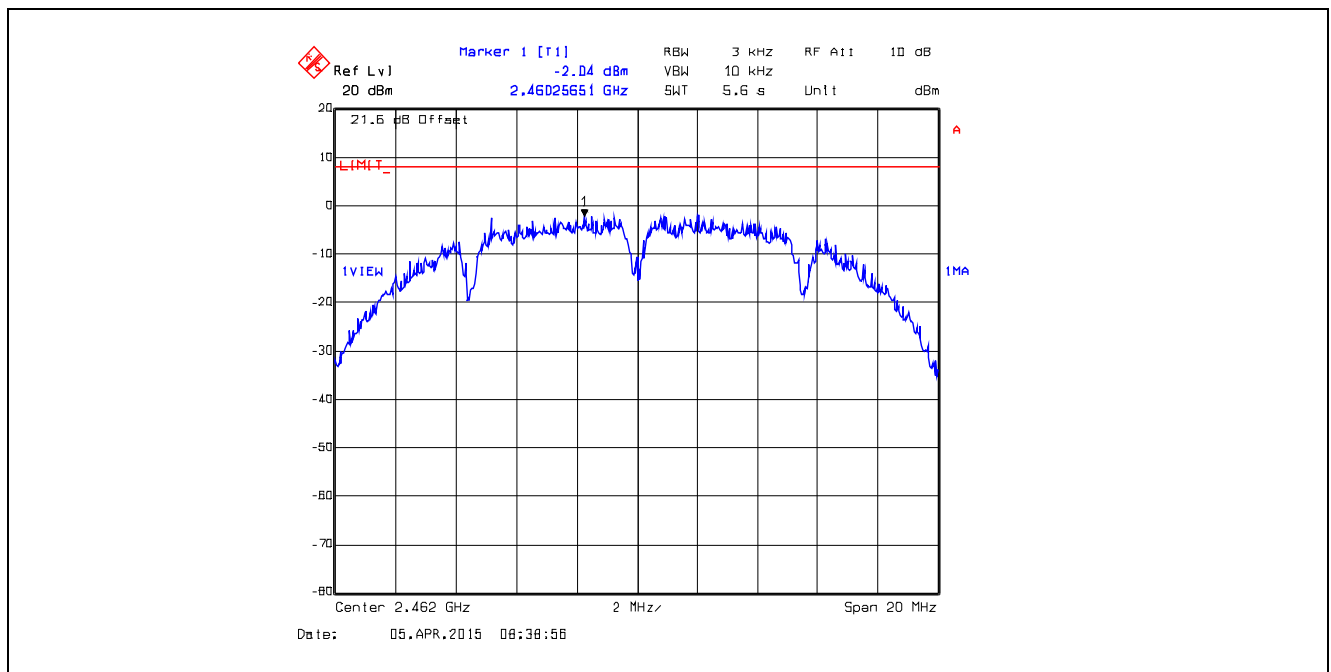
Plot 5.6.4.13. Power Spectral Density
Data Rate 3, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 26

Plot 5.6.4.14. Power Spectral Density
Data Rate 3, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 26

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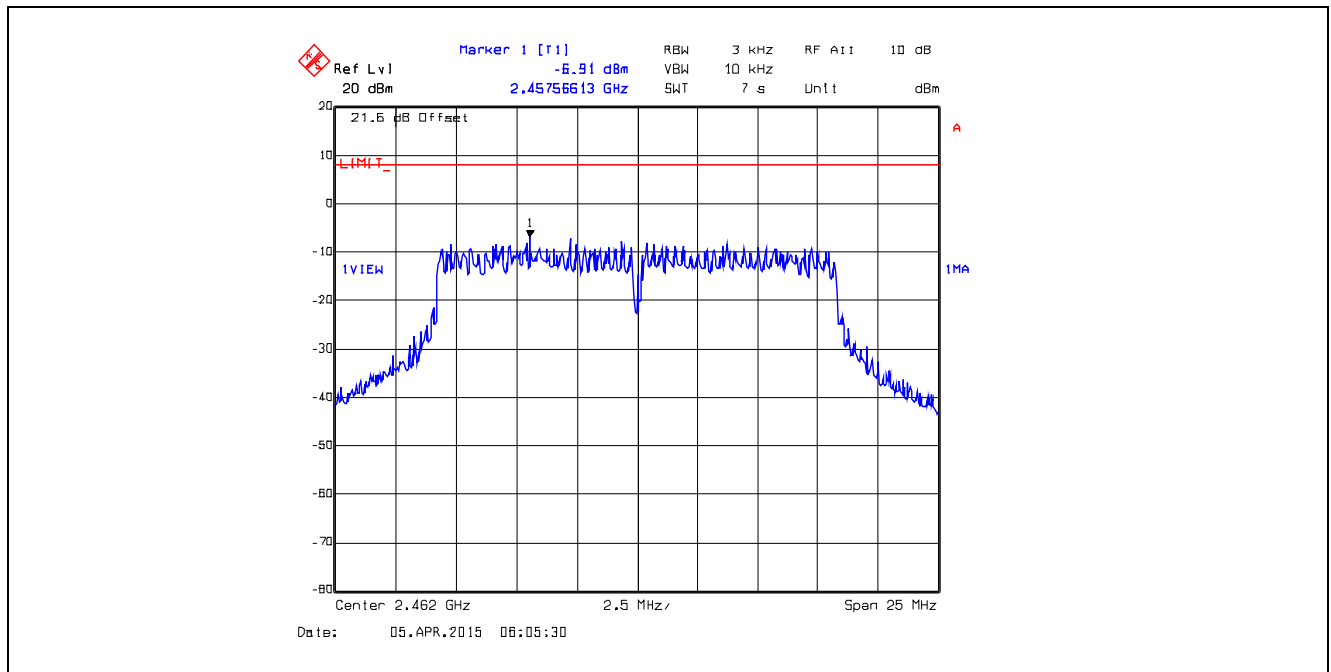
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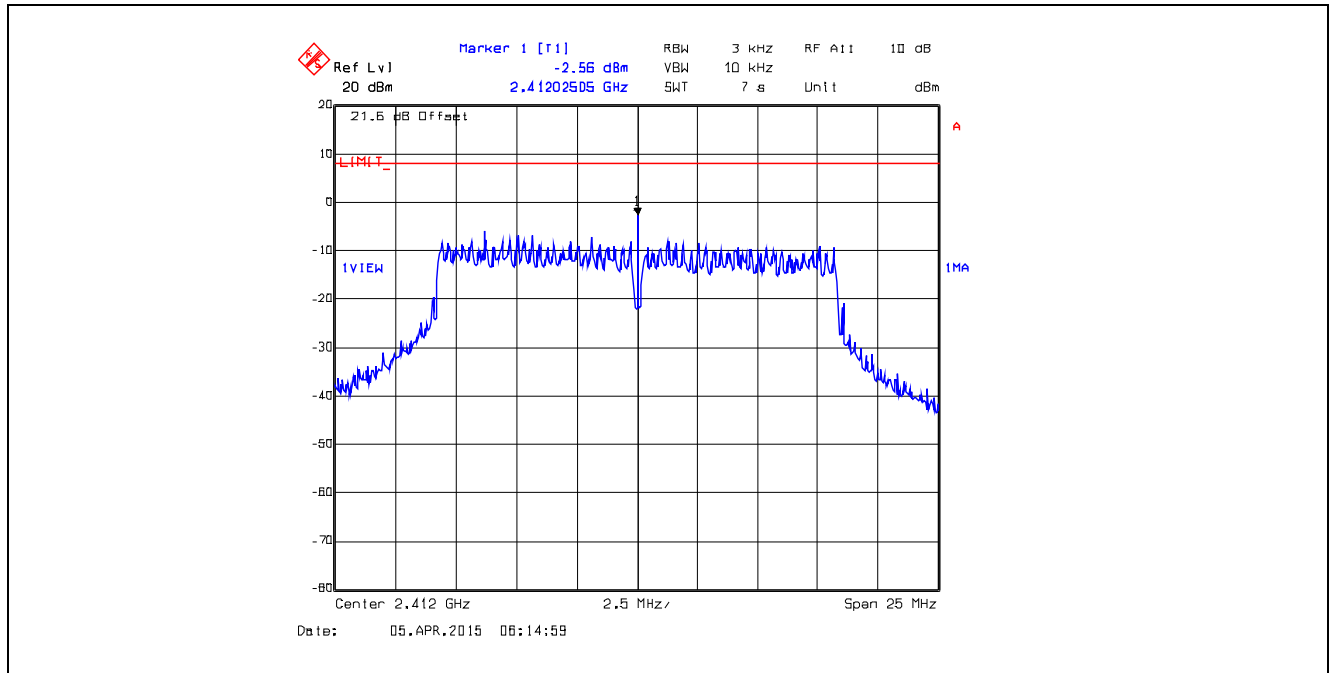
Plot 5.6.4.15. Power Spectral Density
Data Rate 3, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 26

Plot 5.6.4.16. Power Spectral Density
Data Rate 3, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 26

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Plot 5.6.4.17. Power Spectral Density
Data Rate 3, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 26
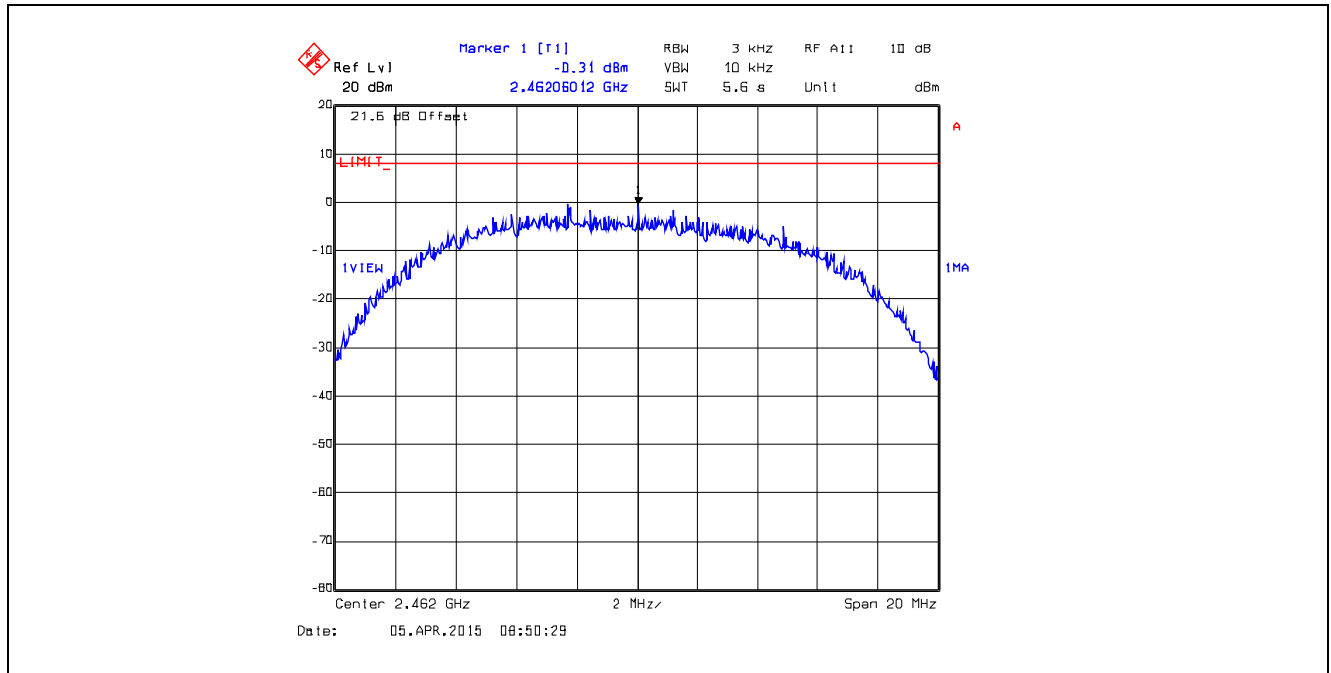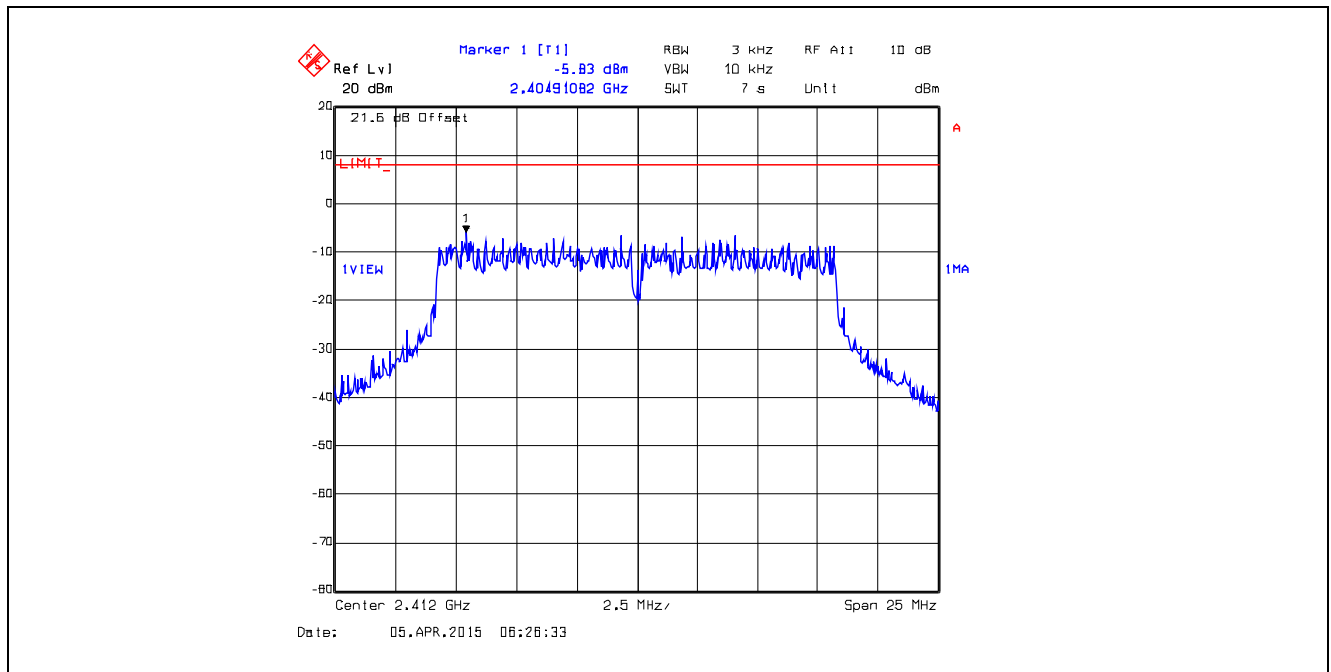

Plot 5.6.4.18. Power Spectral Density
Data Rate 3, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 26

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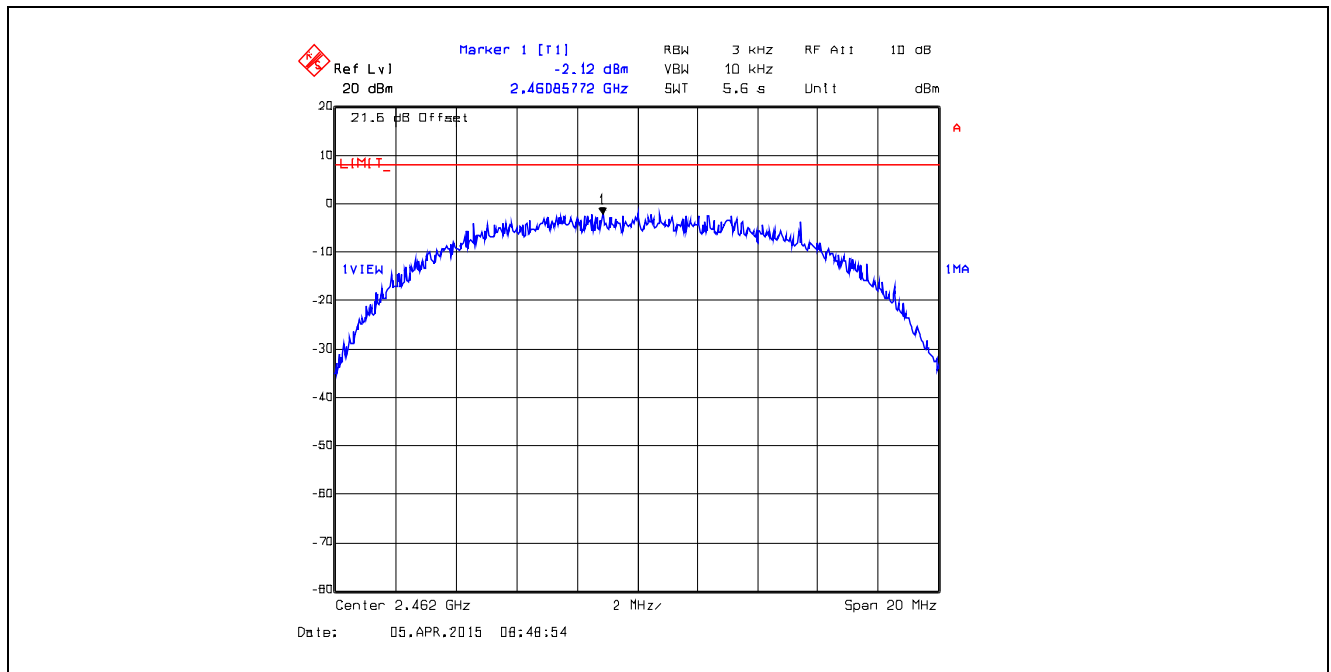
Plot 5.6.4.19. Power Spectral Density
Data Rate 4, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.6.4.20. Power Spectral Density
Data Rate 4, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

ULTRATECH GROUP OF LABS   **File #: 15MCRS079_FCC15C247DTS**
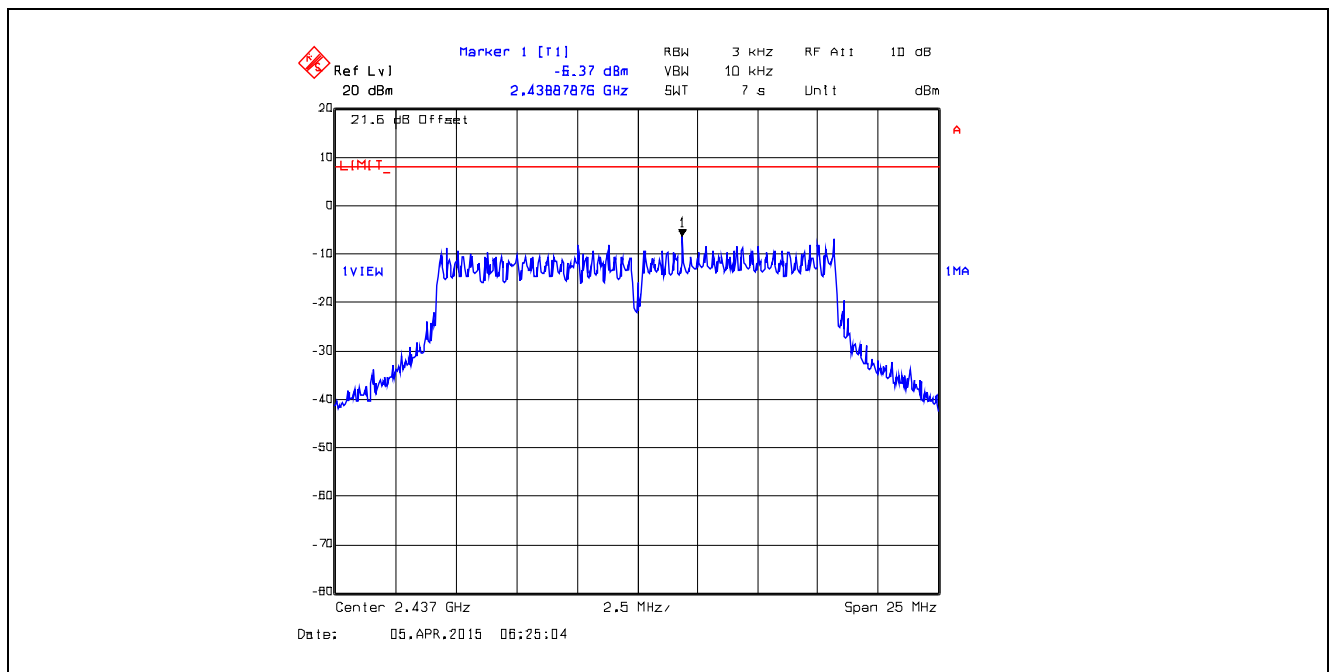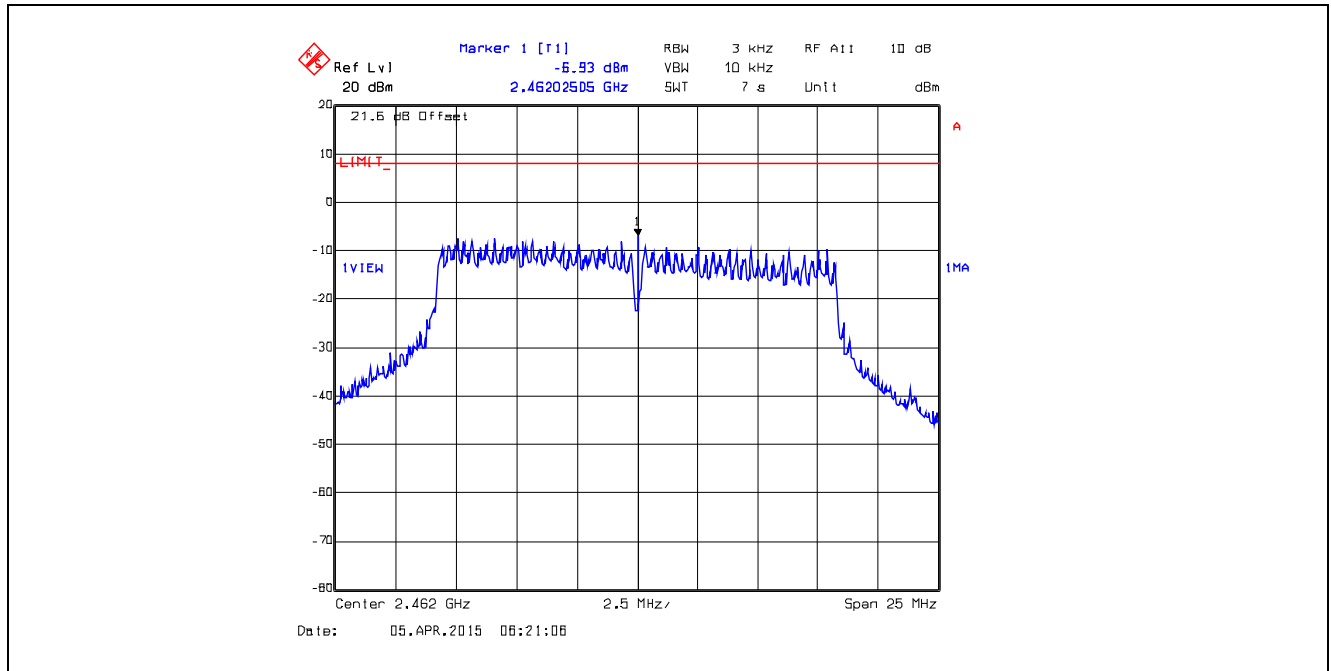**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   **November 16, 2015**
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Plot 5.6.4.21. Power Spectral Density
Data Rate 4, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18
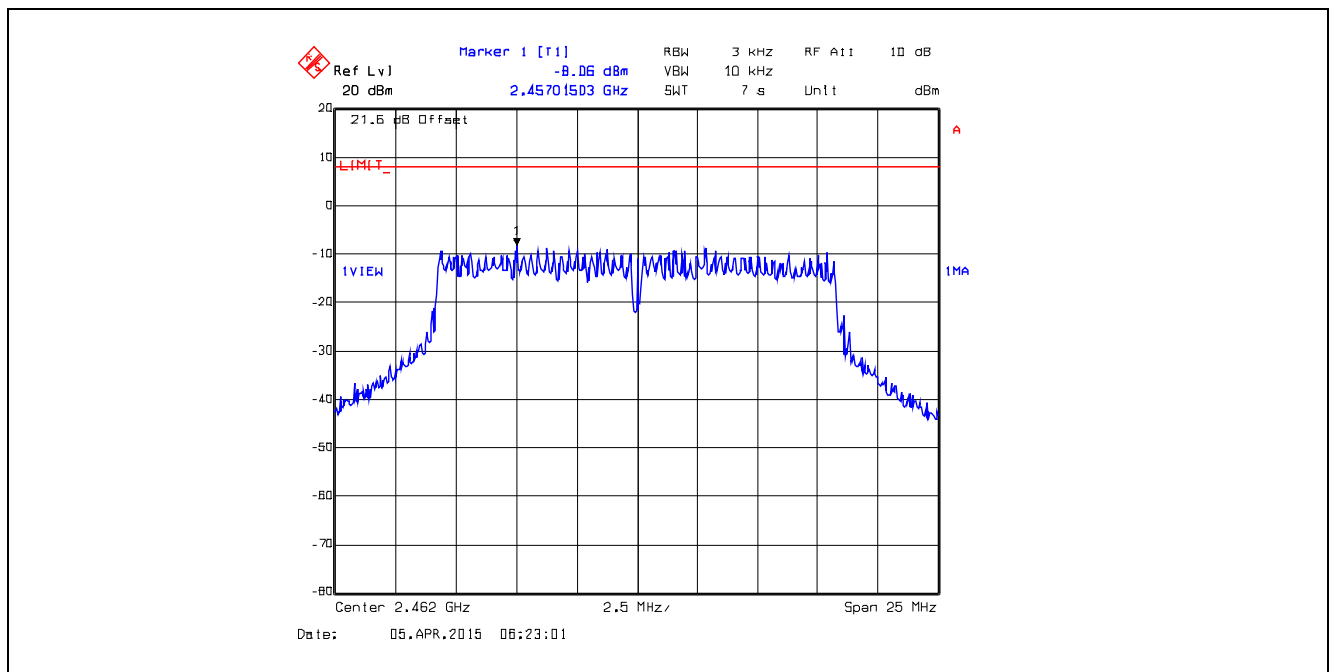

Plot 5.6.4.22. Power Spectral Density
Data Rate 4, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18
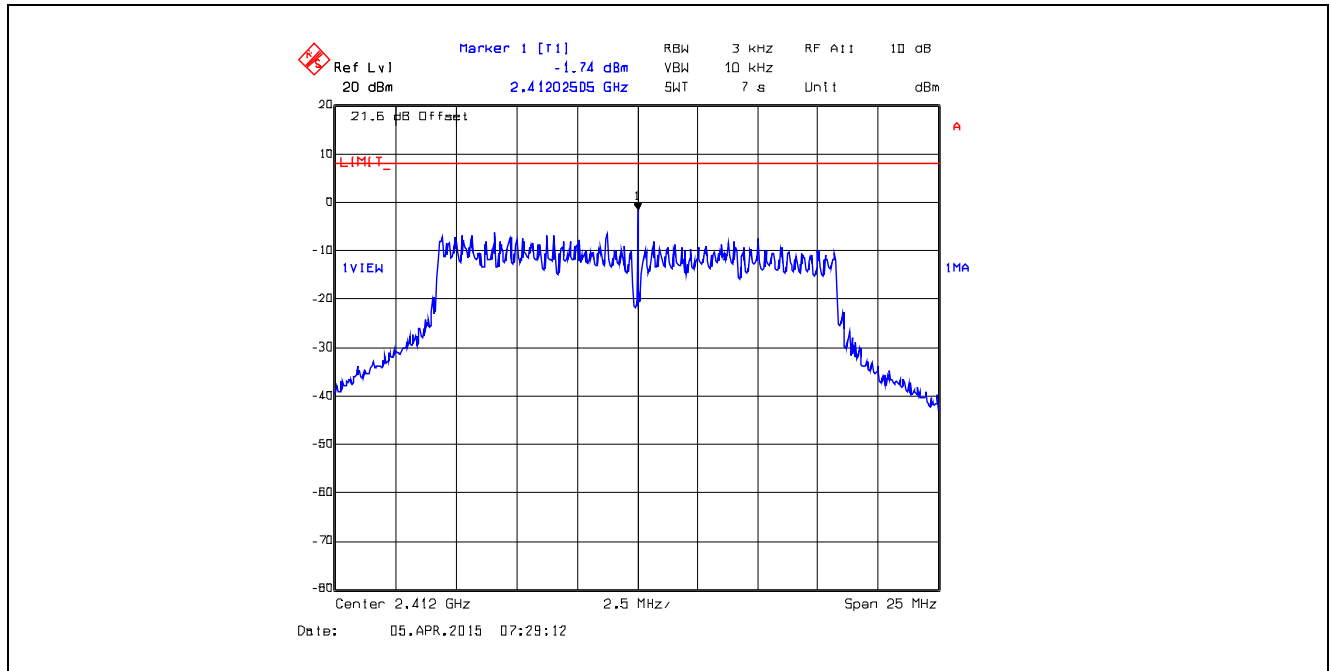
ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
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Plot 5.6.4.23. Power Spectral Density
Data Rate 4, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18
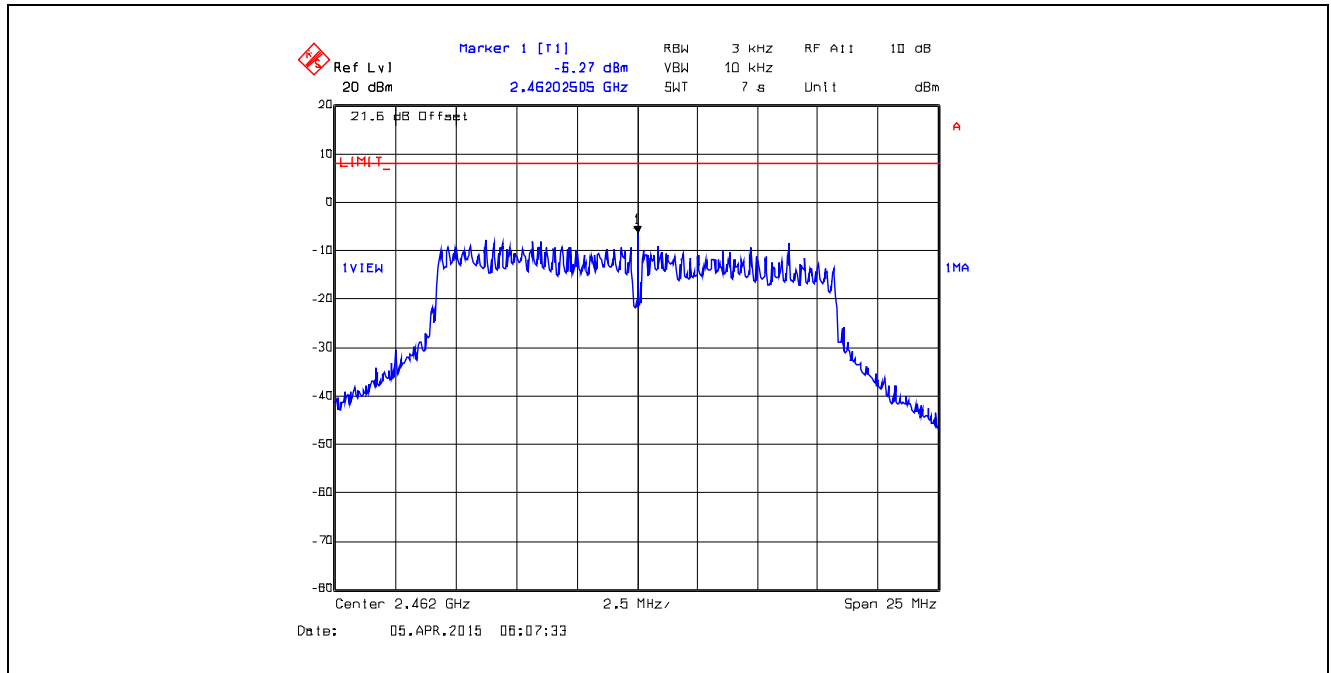
Plot 5.6.4.24. Power Spectral Density
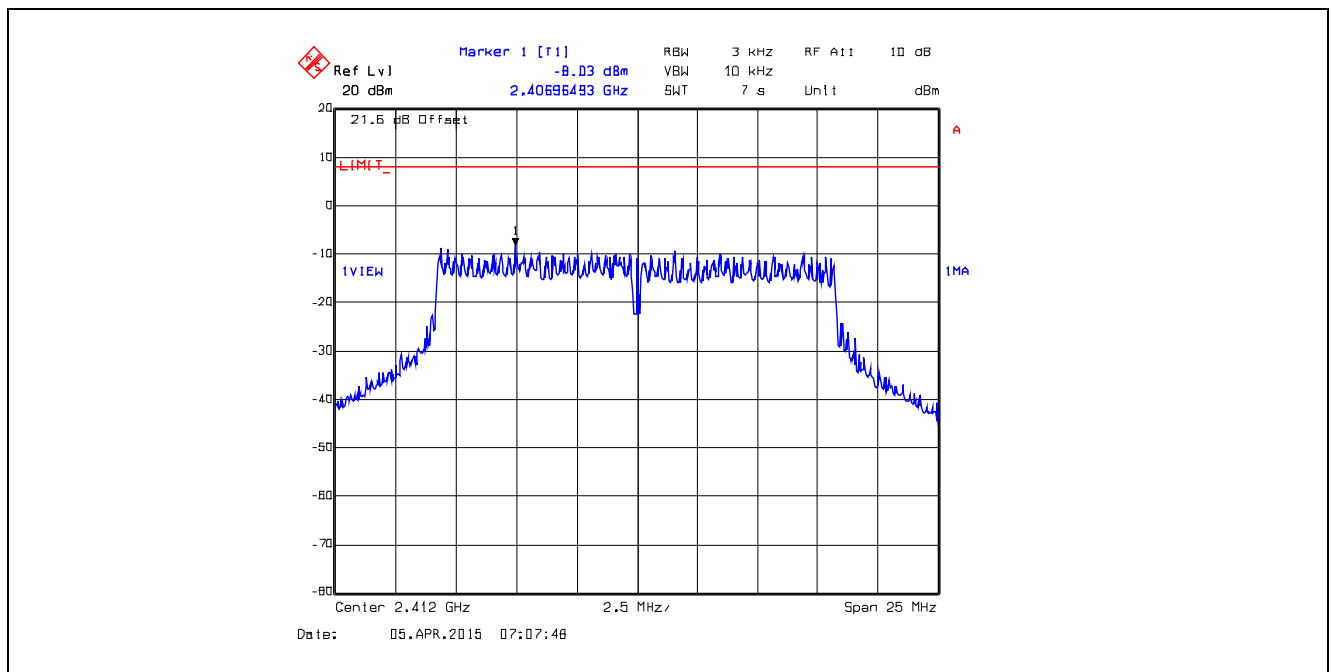Data Rate 4, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

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

Plot 5.6.4.25. Power Spectral Density
Data Rate 5, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.6.4.26. Power Spectral Density
Data Rate 5, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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Plot 5.6.4.27. Power Spectral Density
Data Rate 5, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18
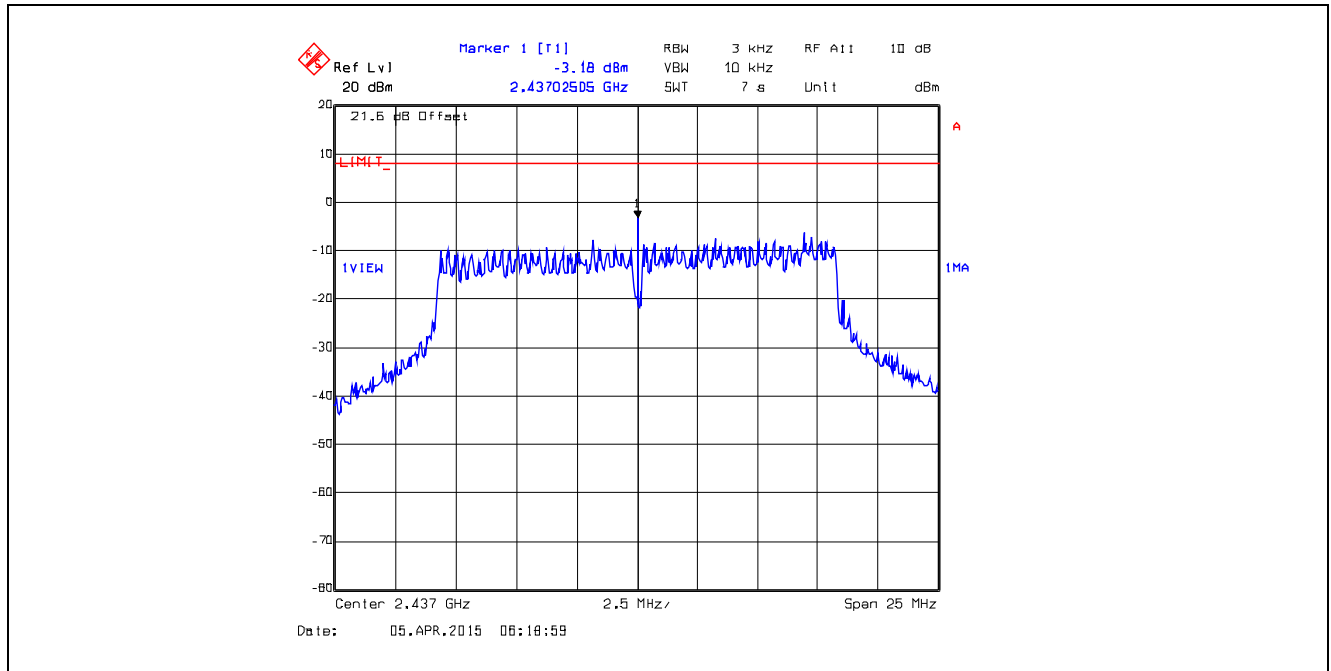
Plot 5.6.4.28. Power Spectral Density
Data Rate 5, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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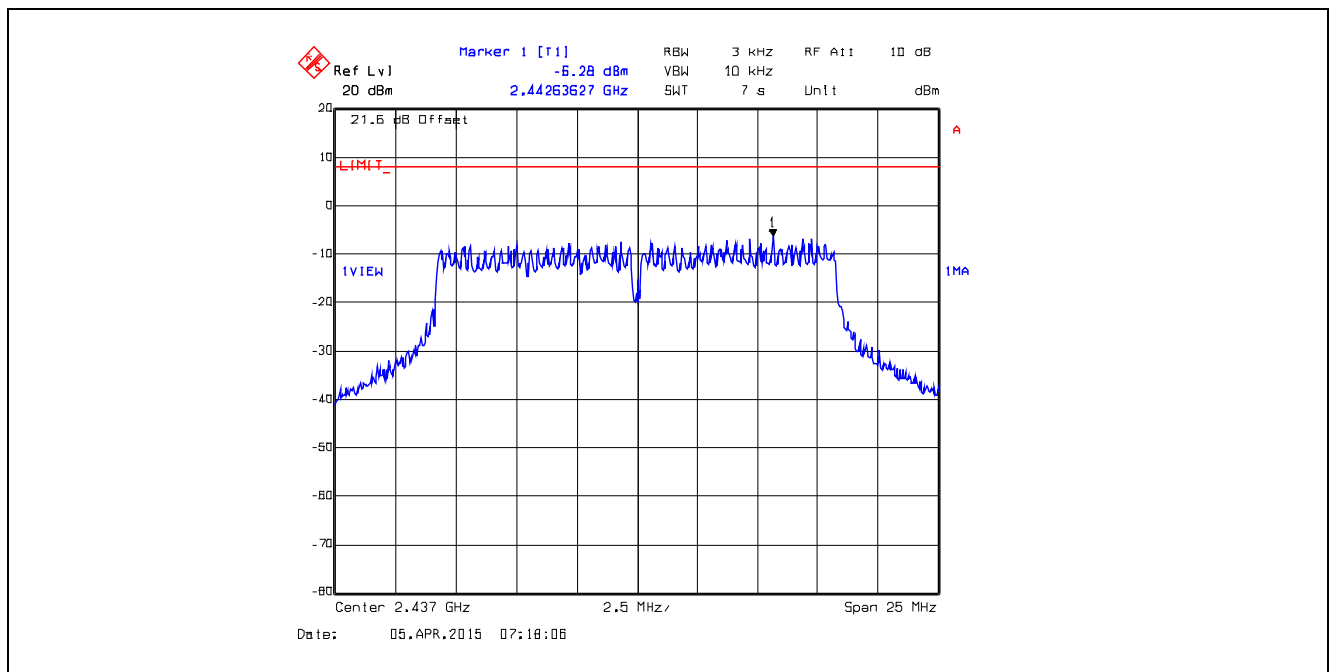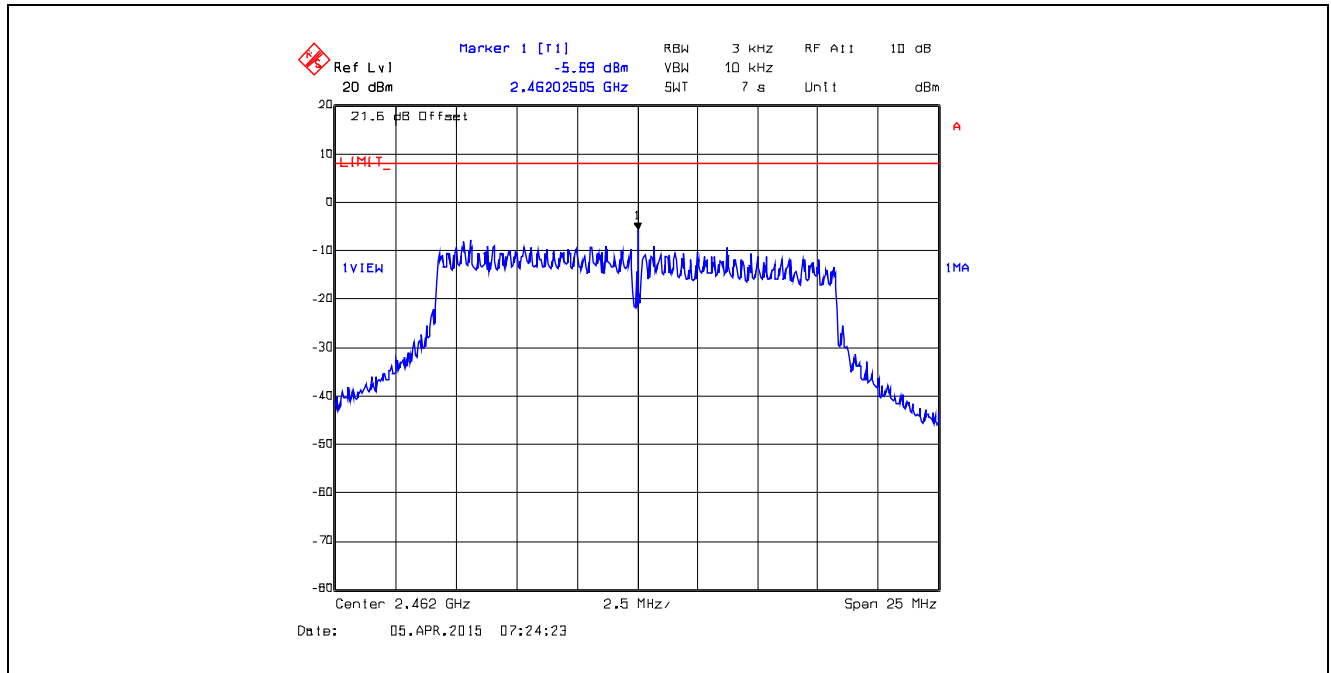3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 5.6.4.29. Power Spectral Density
Data Rate 5, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18
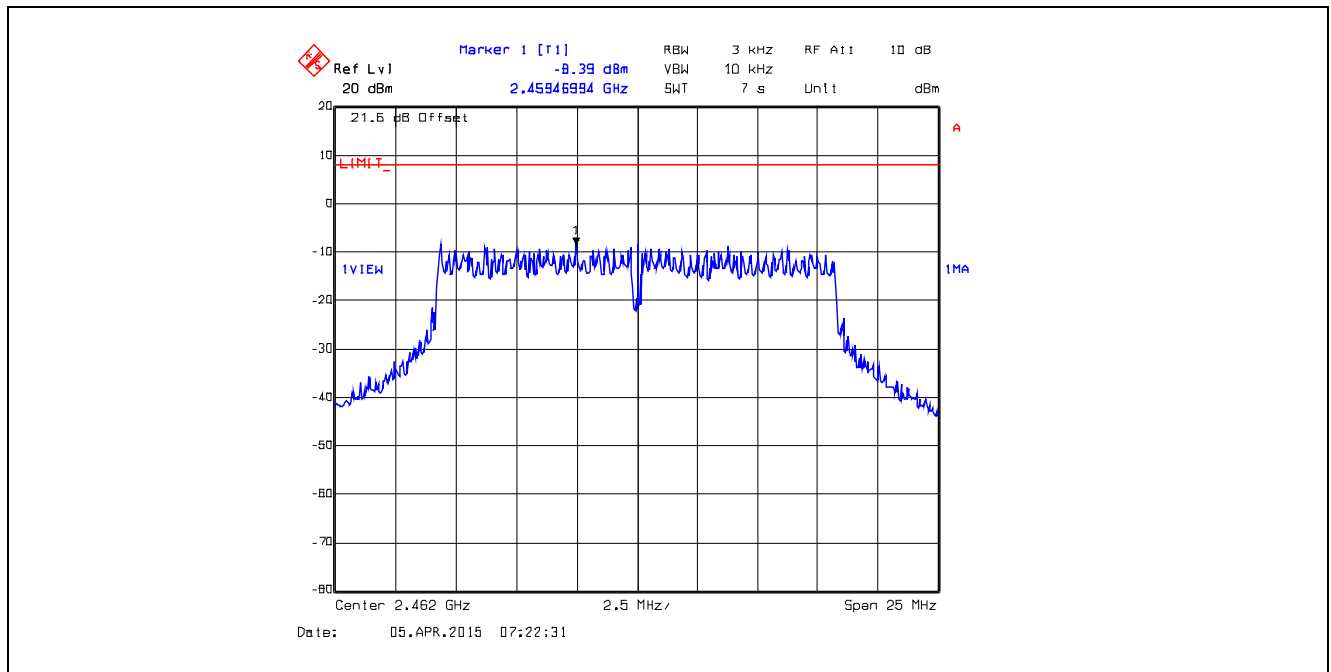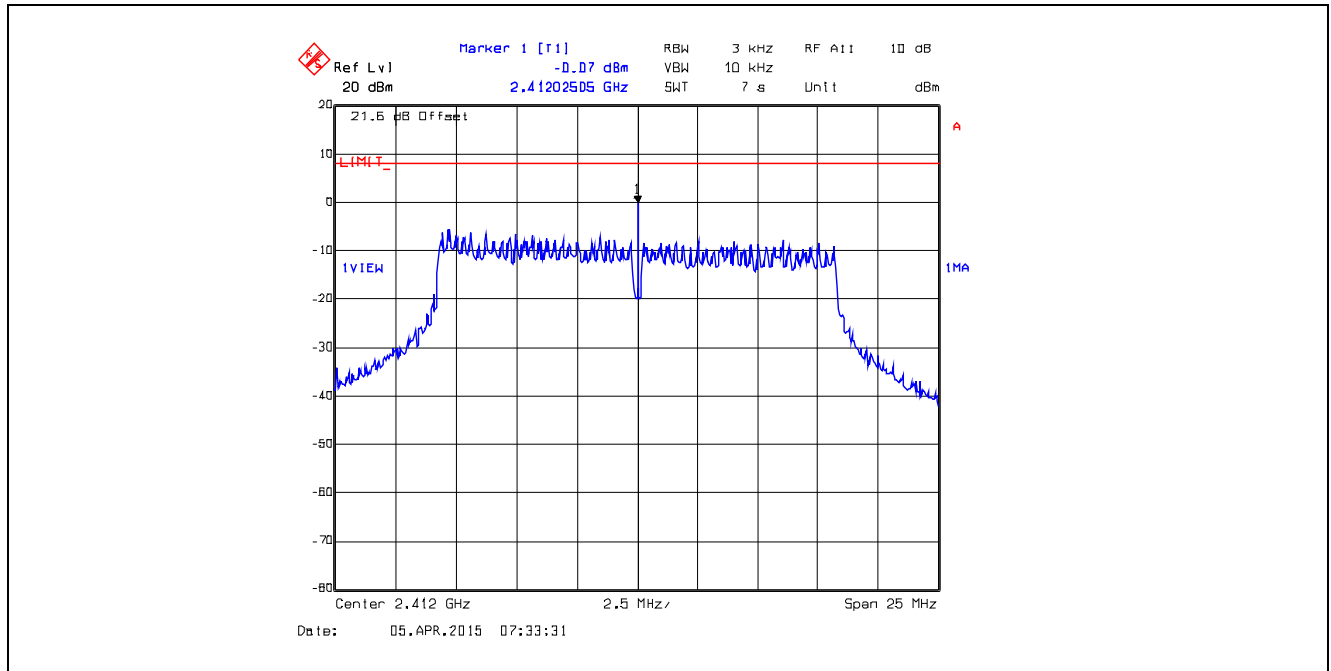

Plot 5.6.4.30. Power Spectral Density
Data Rate 5, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18
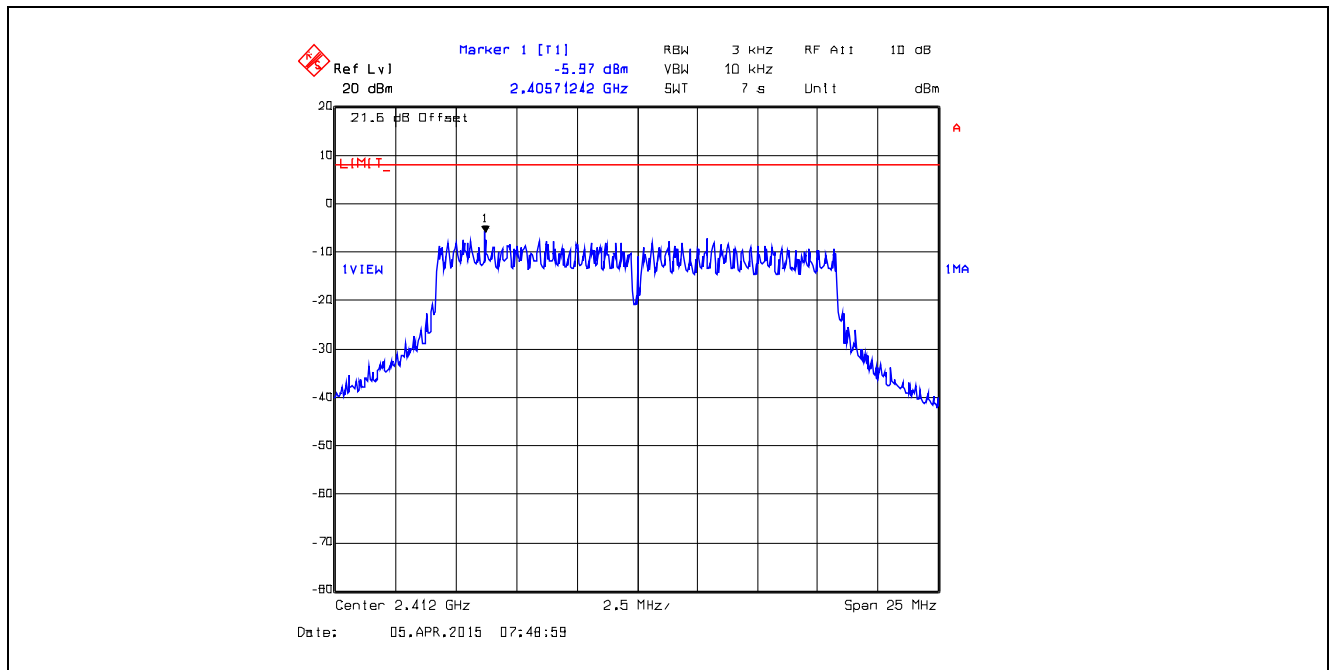
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Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com
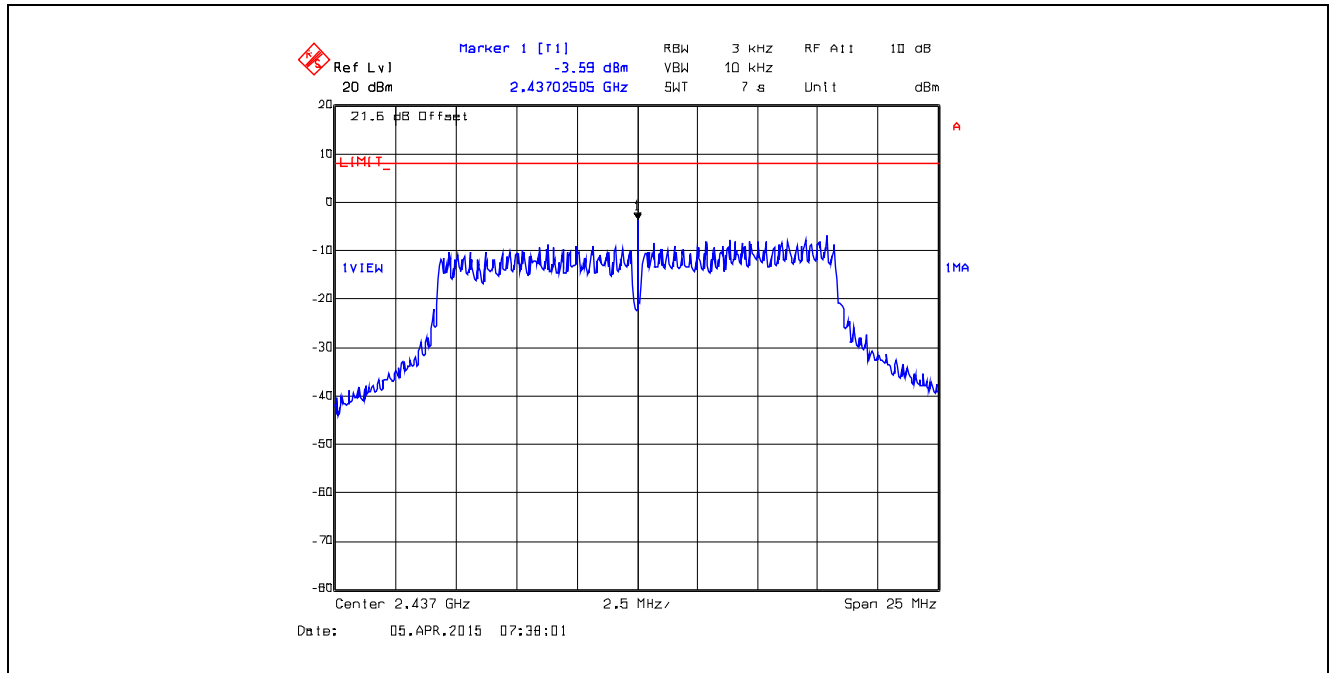
File #: 15MCRS079_FCC15C247DTS
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Plot 5.6.4.31. Power Spectral Density
Data Rate 6, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.6.4.32. Power Spectral Density
Data Rate 6, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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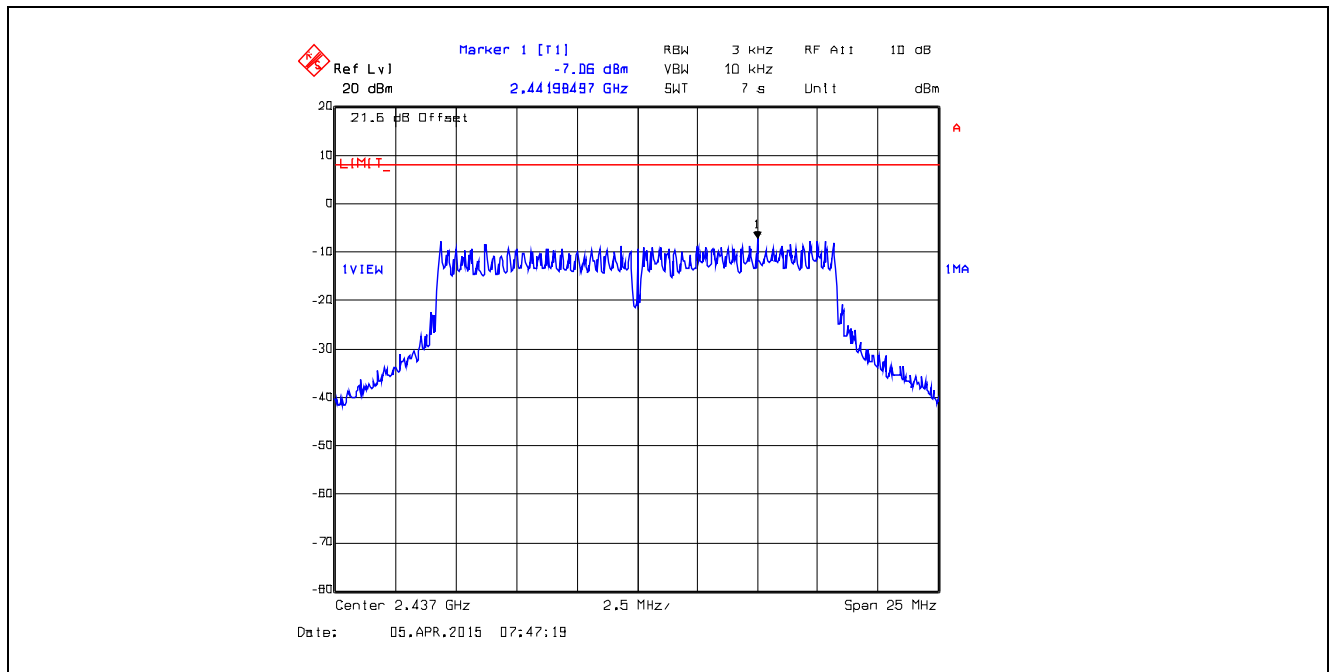Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 5.6.4.33. Power Spectral Density
Data Rate 6, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18
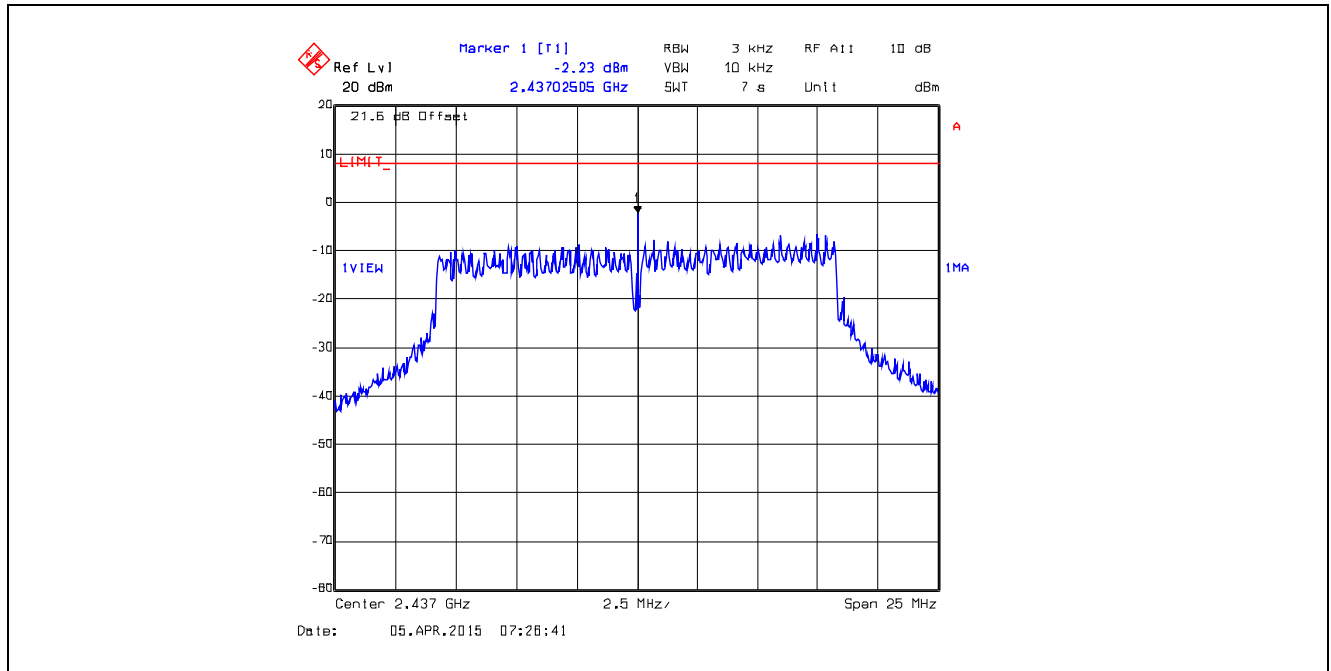
Plot 5.6.4.34. Power Spectral Density
Data Rate 6, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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Plot 5.6.4.35. Power Spectral Density
Data Rate 6, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18

Plot 5.6.4.36. Power Spectral Density
Data Rate 6, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
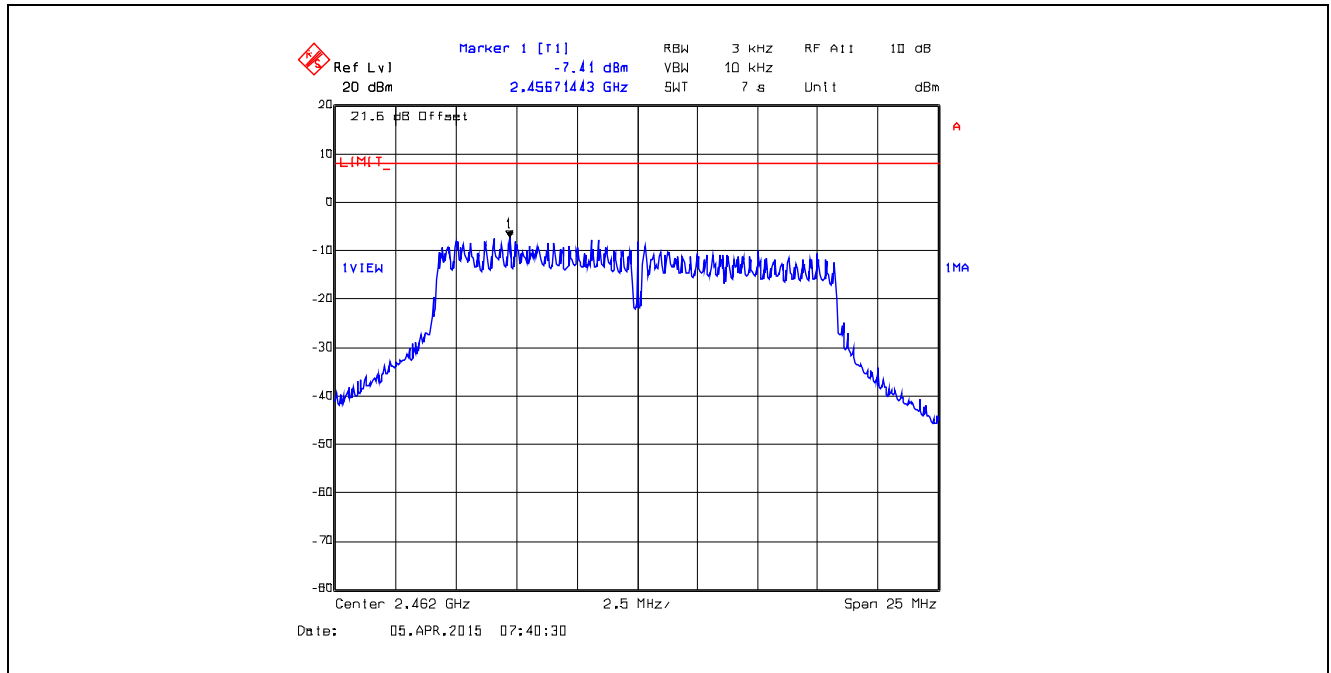**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com
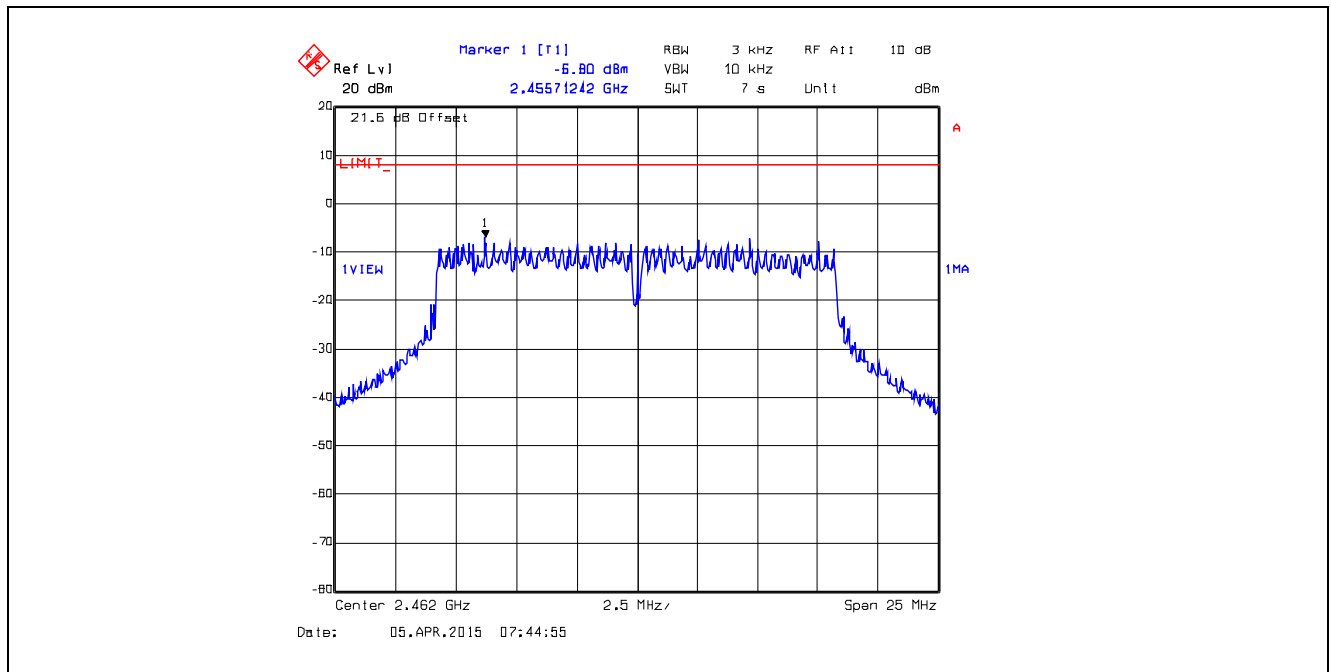
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.37. Power Spectral Density
Data Rate 7, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 18

Plot 5.6.4.38. Power Spectral Density
Data Rate 7, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 18

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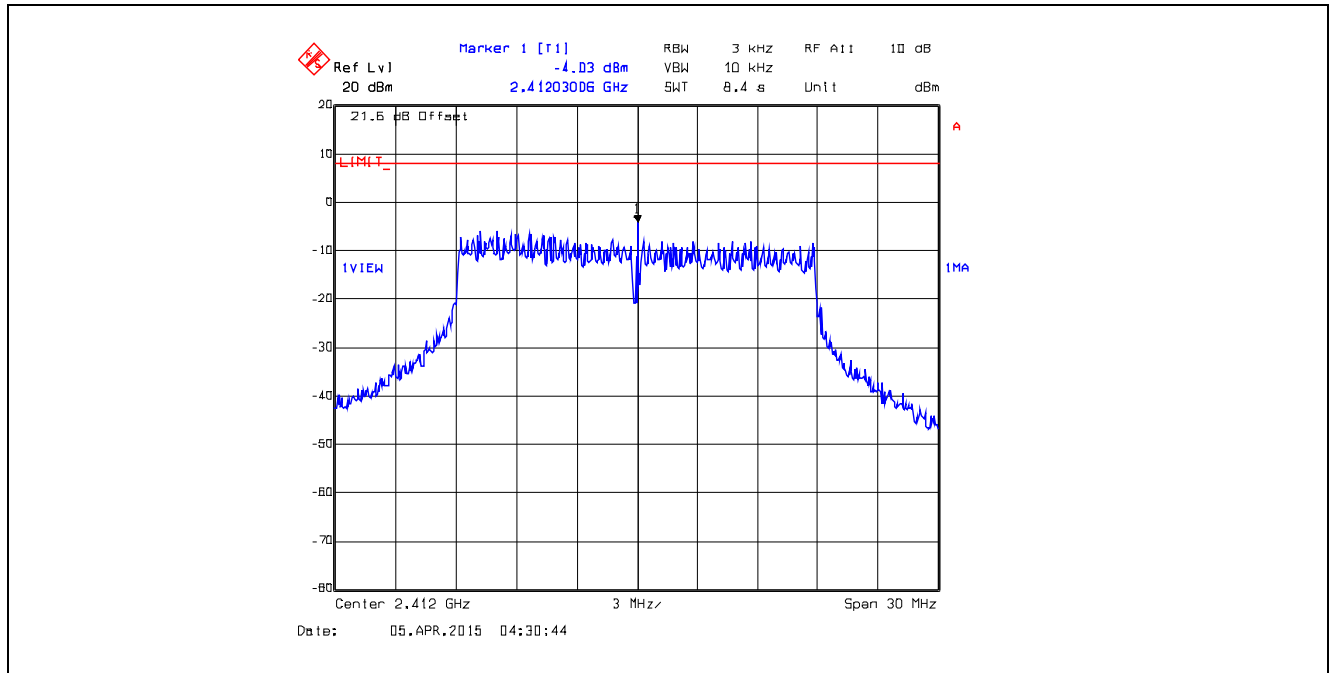
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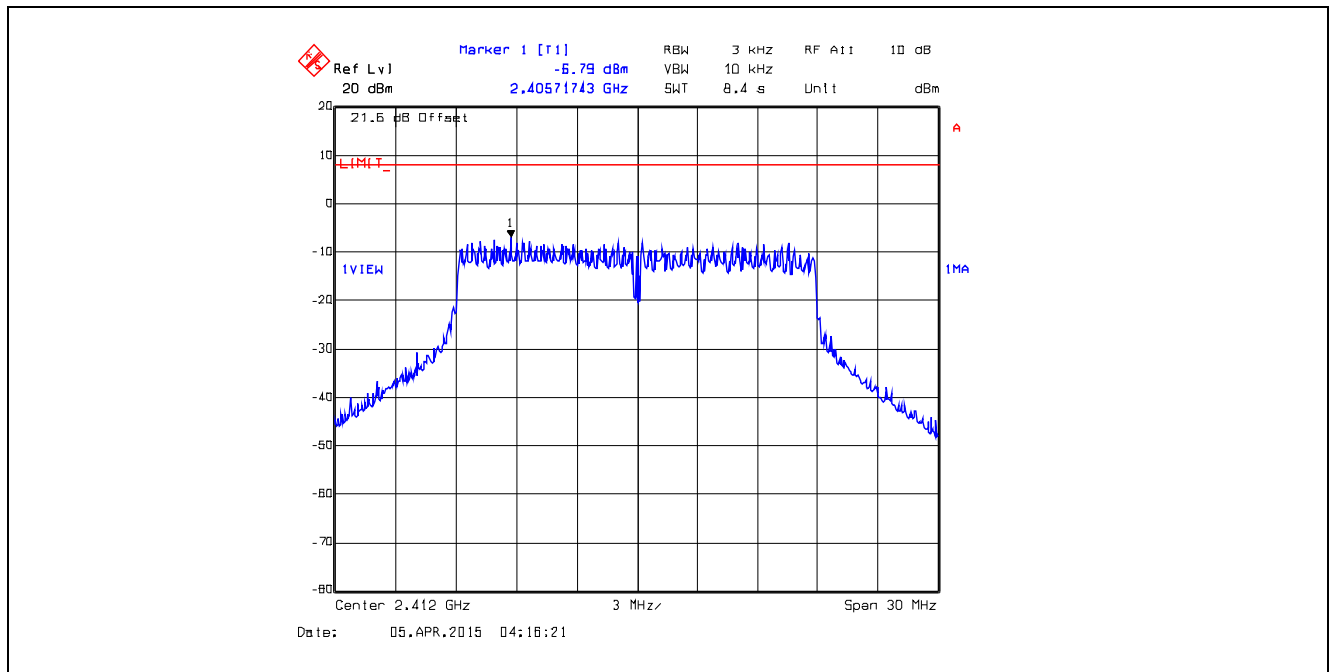
File #: 15MCRS079_FCC15C247DTS
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Plot 5.6.4.39. Power Spectral Density
Data Rate 7, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 18

Plot 5.6.4.40. Power Spectral Density
Data Rate 7, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 18

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Plot 5.6.4.41. Power Spectral Density
Data Rate 7, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 18

Plot 5.6.4.42. Power Spectral Density
Data Rate 7, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 18

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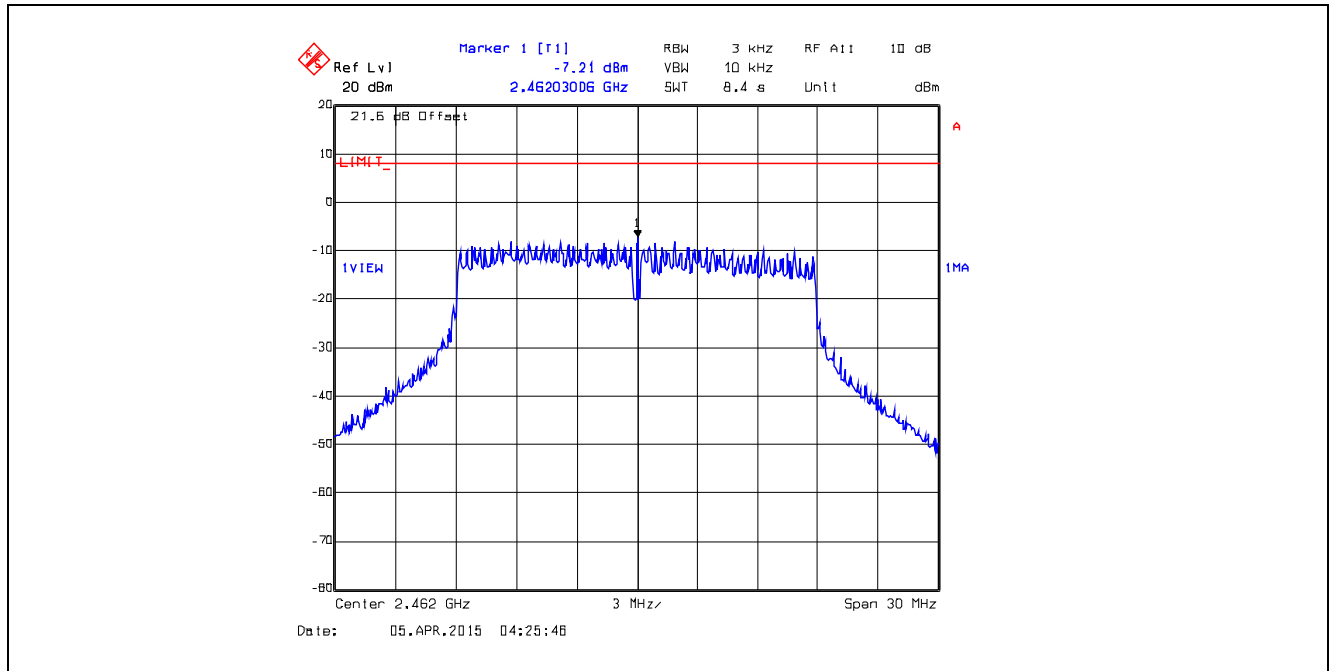
Plot 5.6.4.43. Power Spectral Density
Data Rate 8, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19
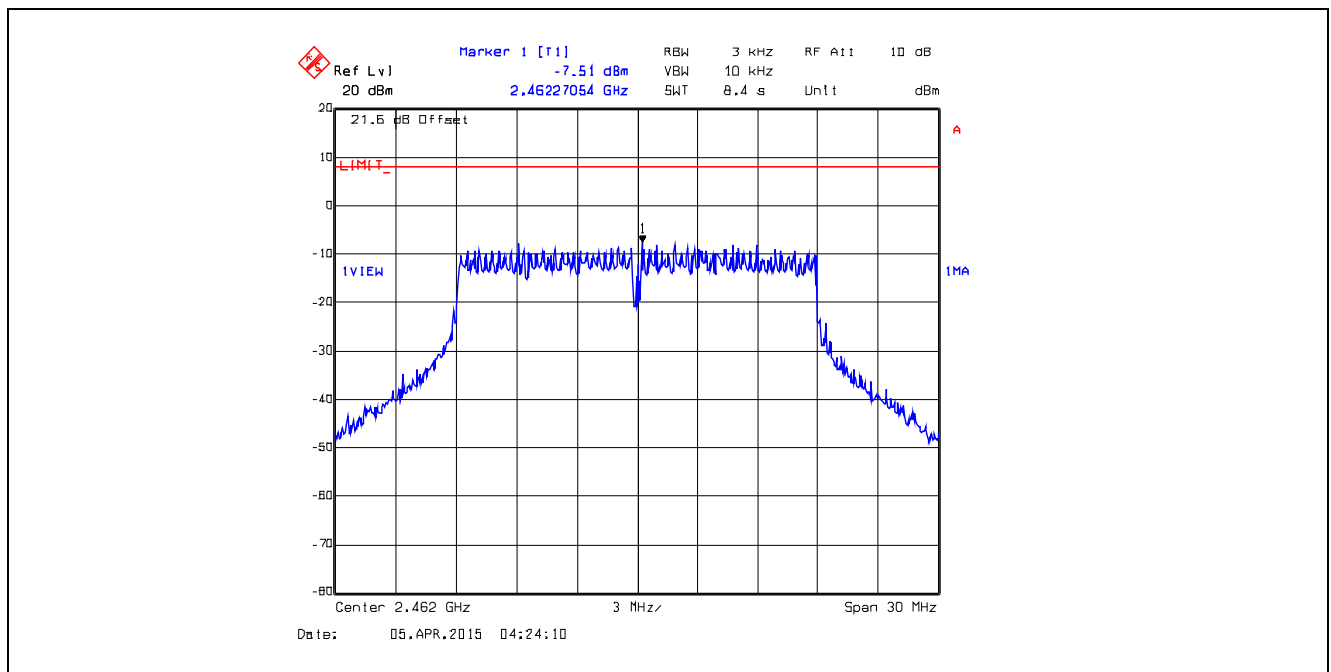

Plot 5.6.4.44. Power Spectral Density
Data Rate 8, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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Plot 5.6.4.45. Power Spectral Density
Data Rate 8, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19
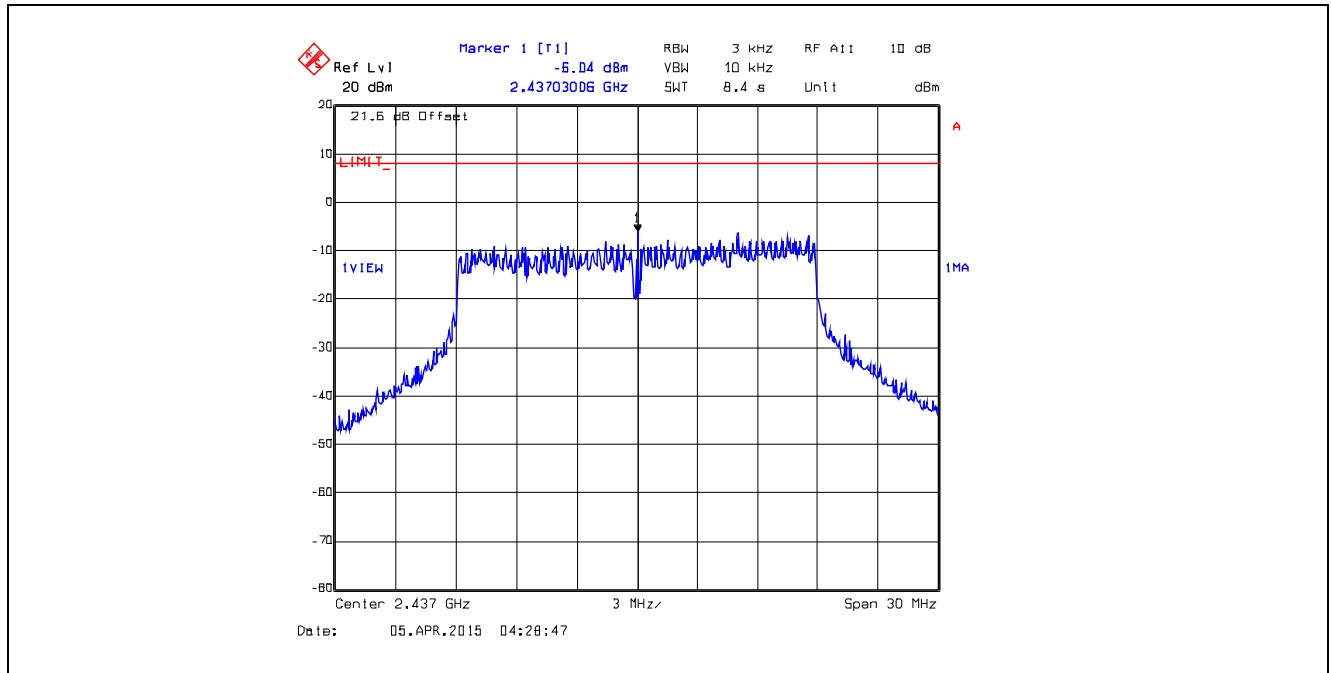
Plot 5.6.4.46. Power Spectral Density
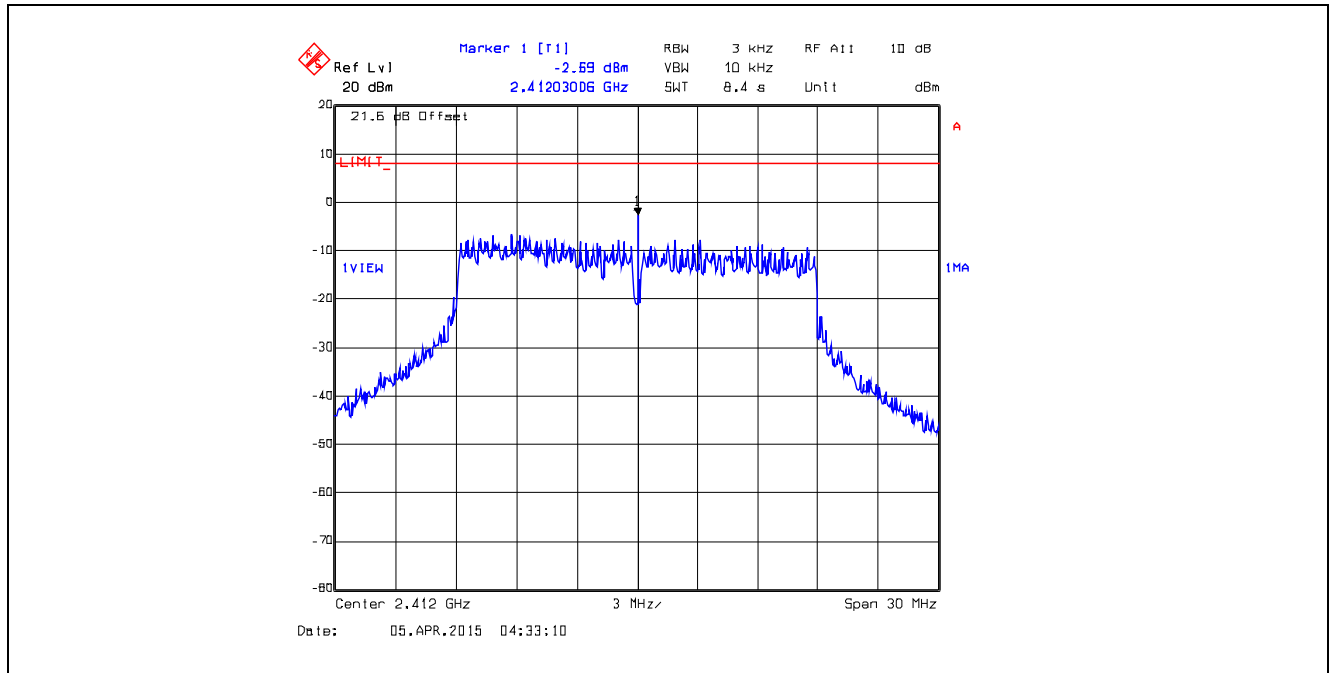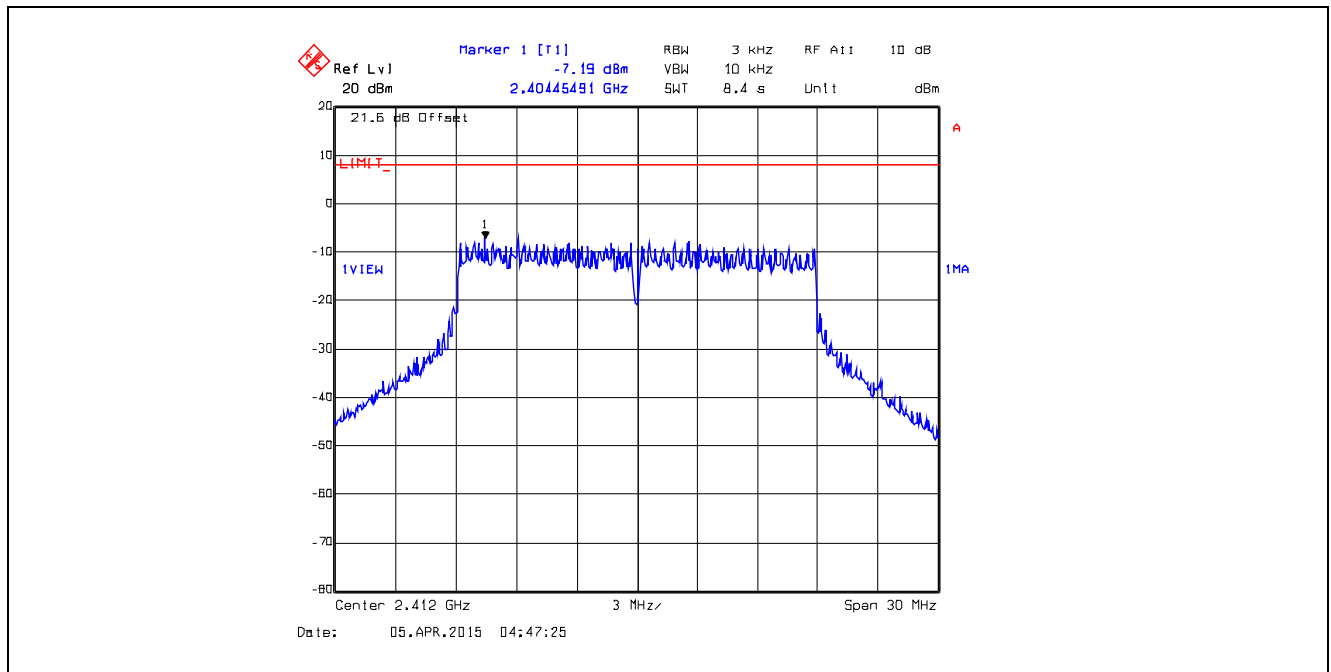Data Rate 8, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

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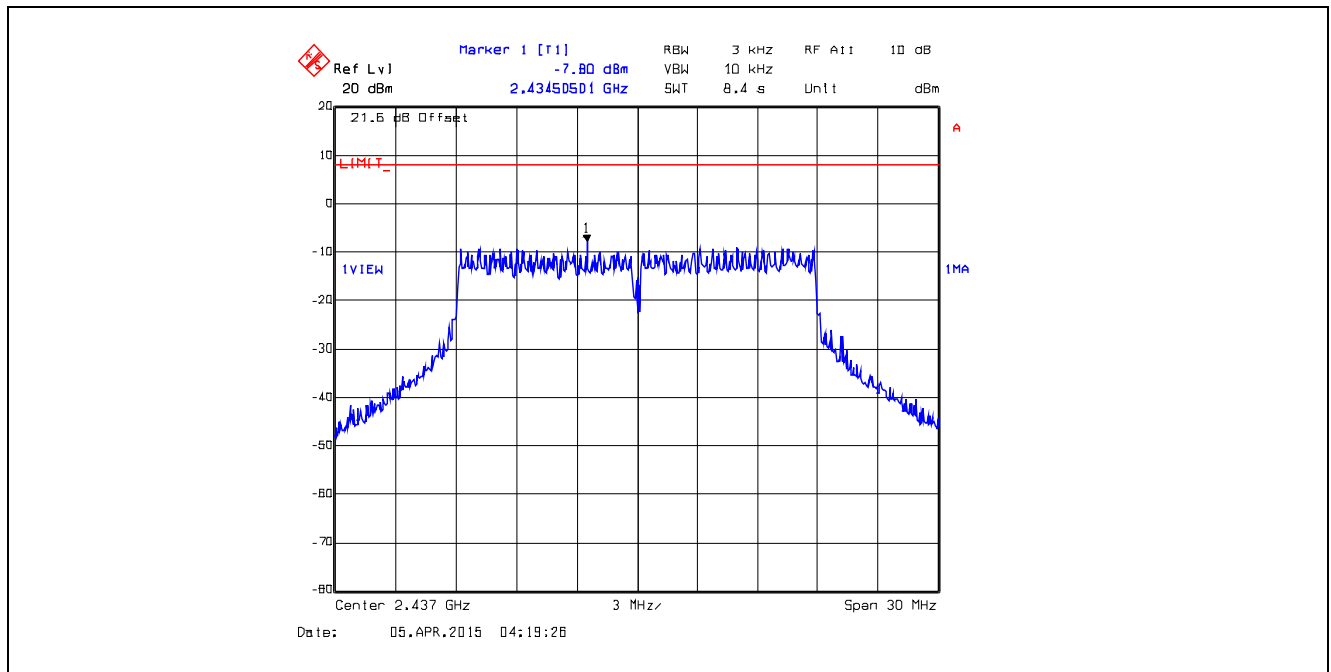
Plot 5.6.4.47. Power Spectral Density
Data Rate 8, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.6.4.48. Power Spectral Density
Data Rate 8, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
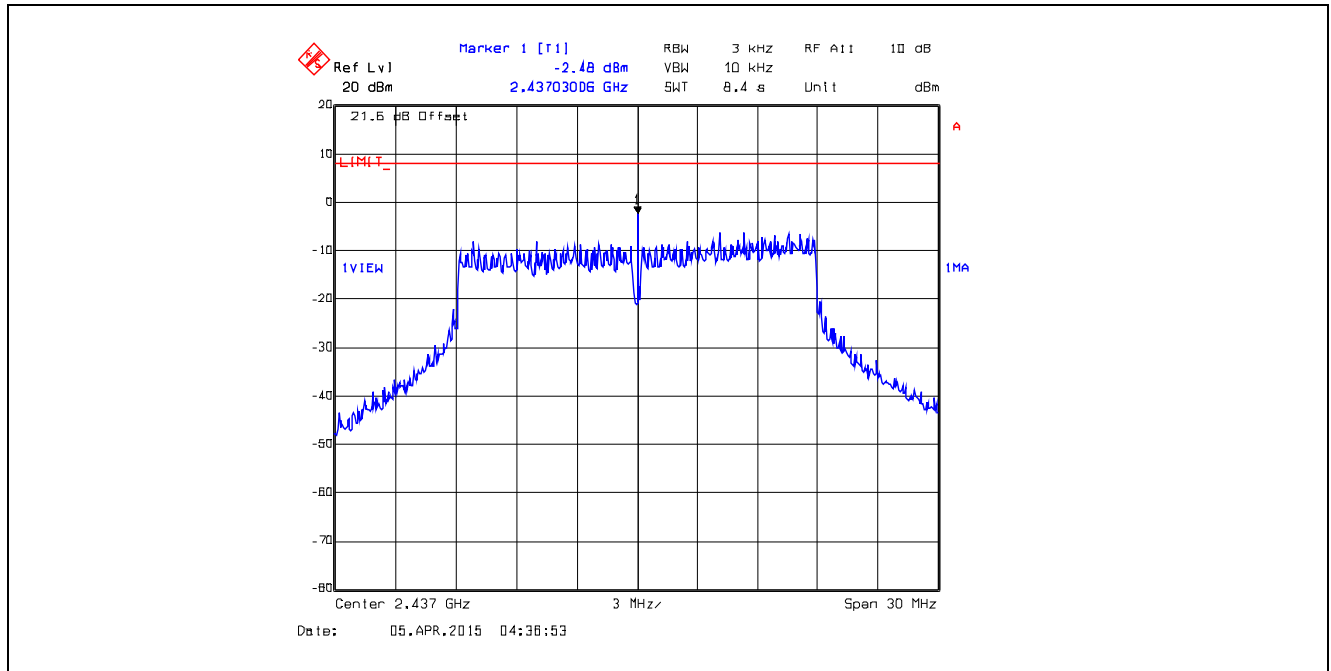3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
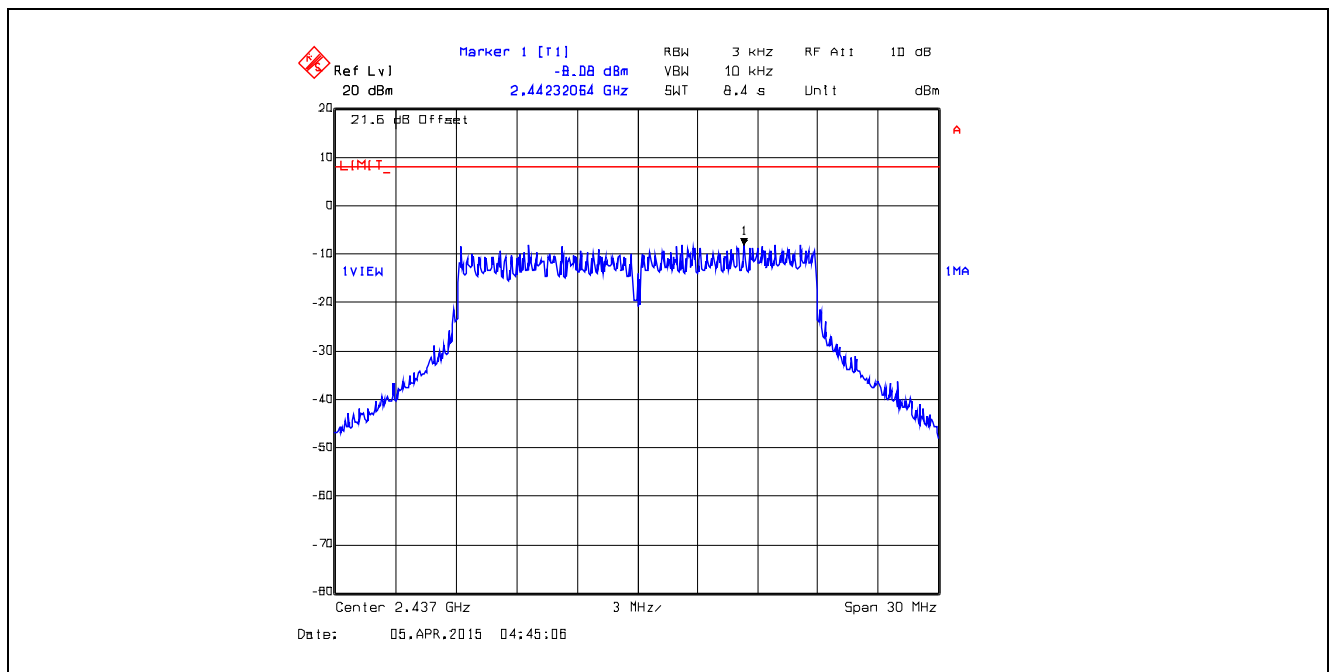Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)
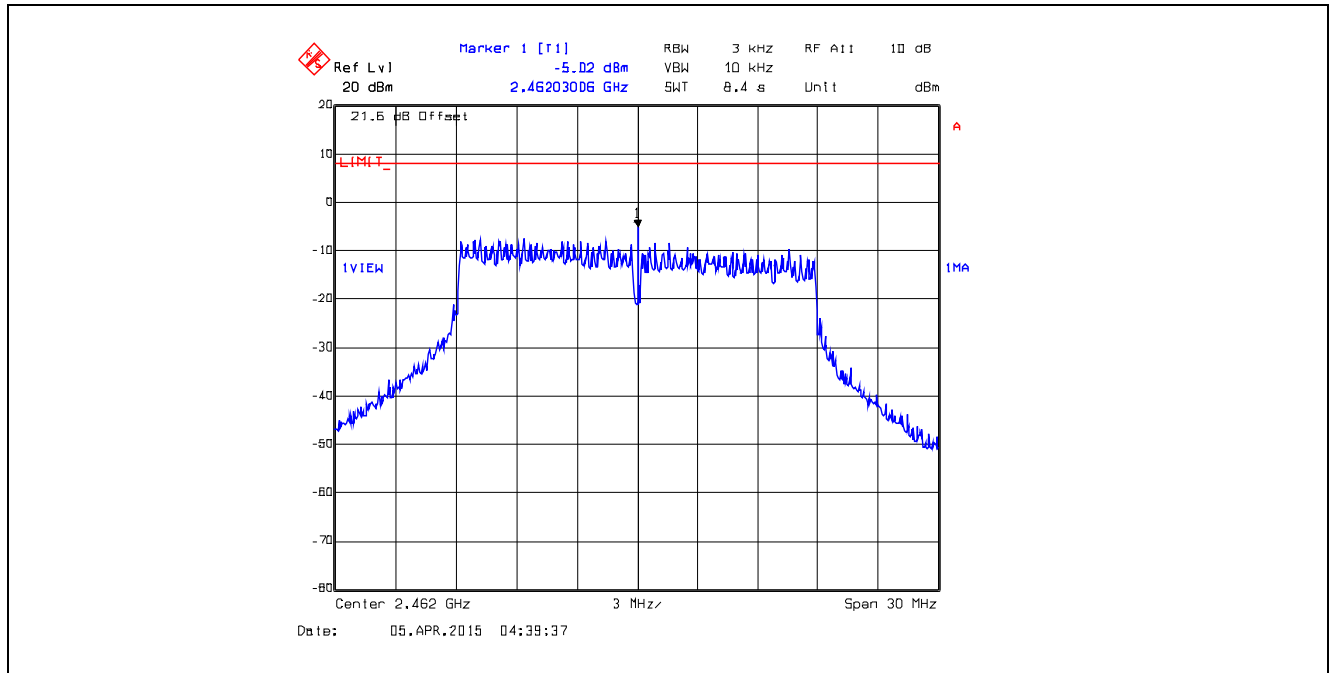
Plot 5.6.4.49. Power Spectral Density
Data Rate 9, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19
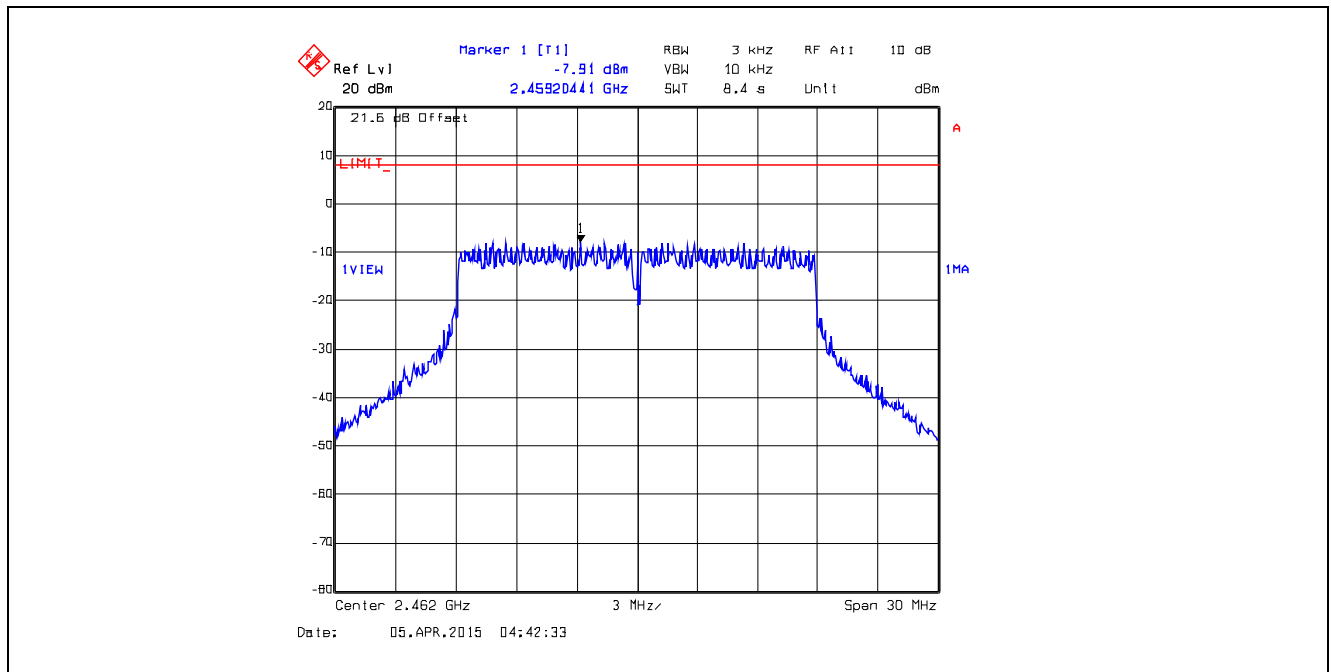

Plot 5.6.4.50. Power Spectral Density
Data Rate 9, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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Plot 5.6.4.51. Power Spectral Density
Data Rate 9, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19

Plot 5.6.4.52. Power Spectral Density
Data Rate 9, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

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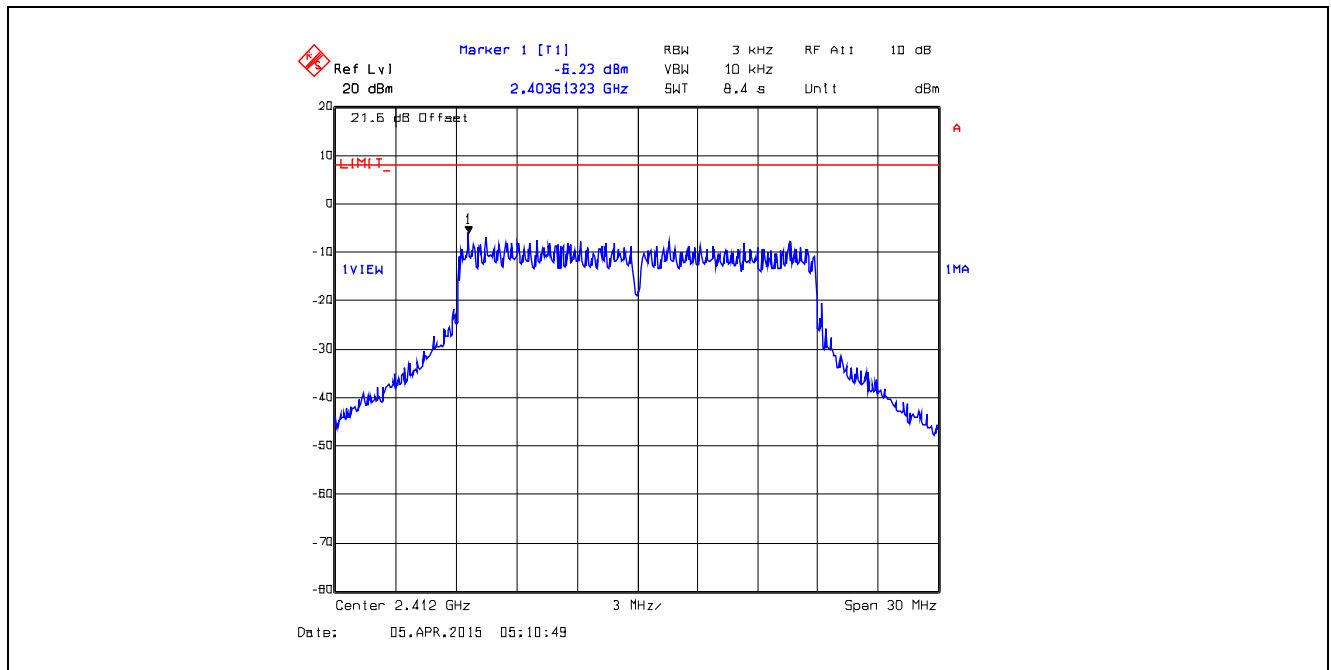
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.53. Power Spectral Density
Data Rate 9, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.6.4.54. Power Spectral Density
Data Rate 9, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

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Plot 5.6.4.55. Power Spectral Density
Data Rate 10, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19
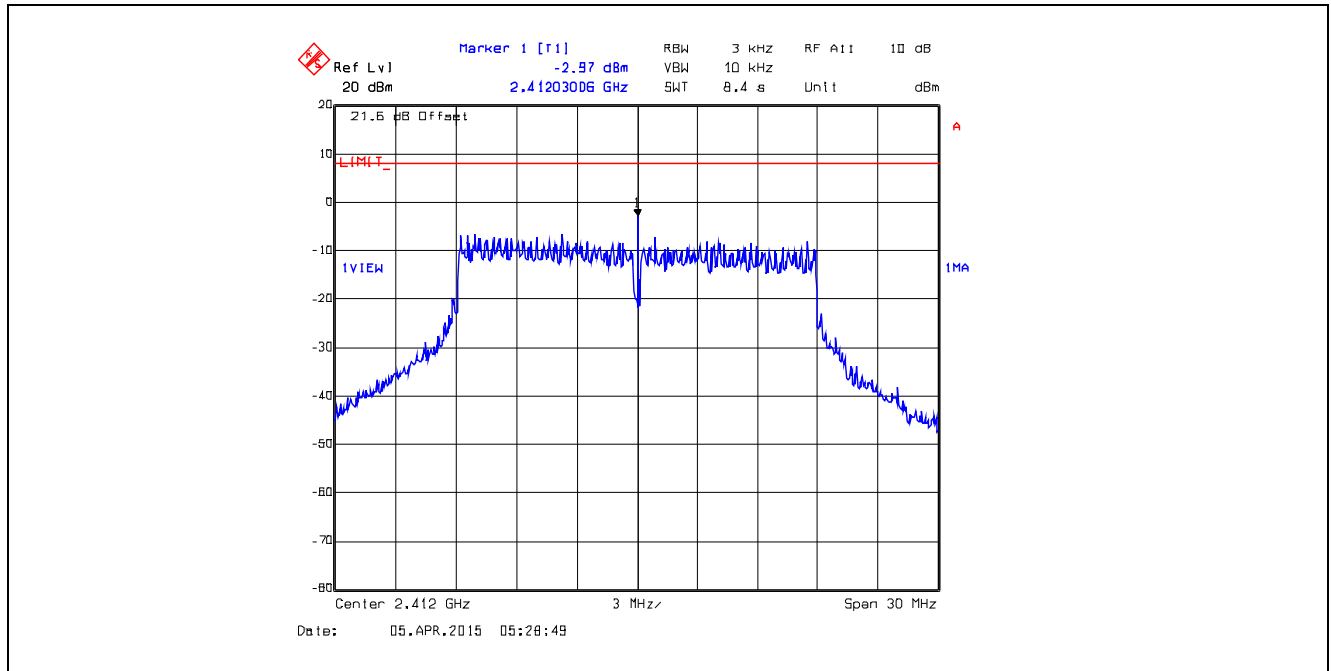
Plot 5.6.4.56. Power Spectral Density
Data Rate 10, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19

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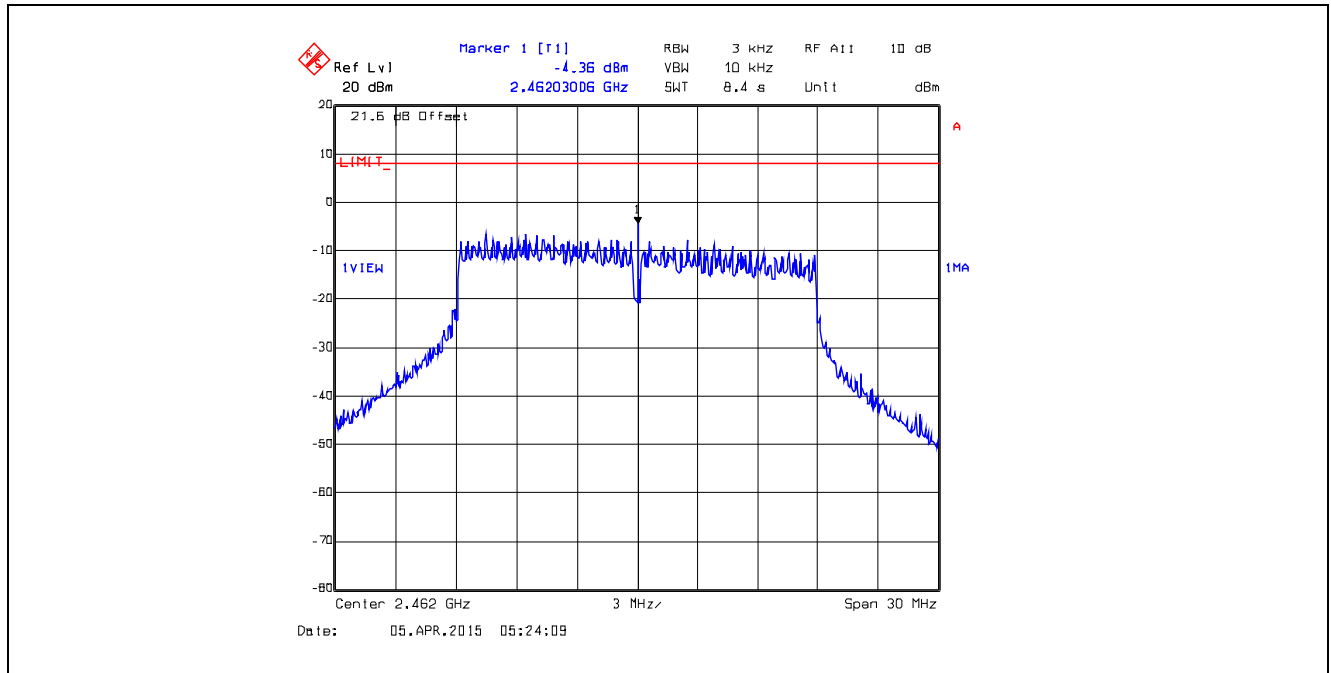
Plot 5.6.4.57. Power Spectral Density
Data Rate 10, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19
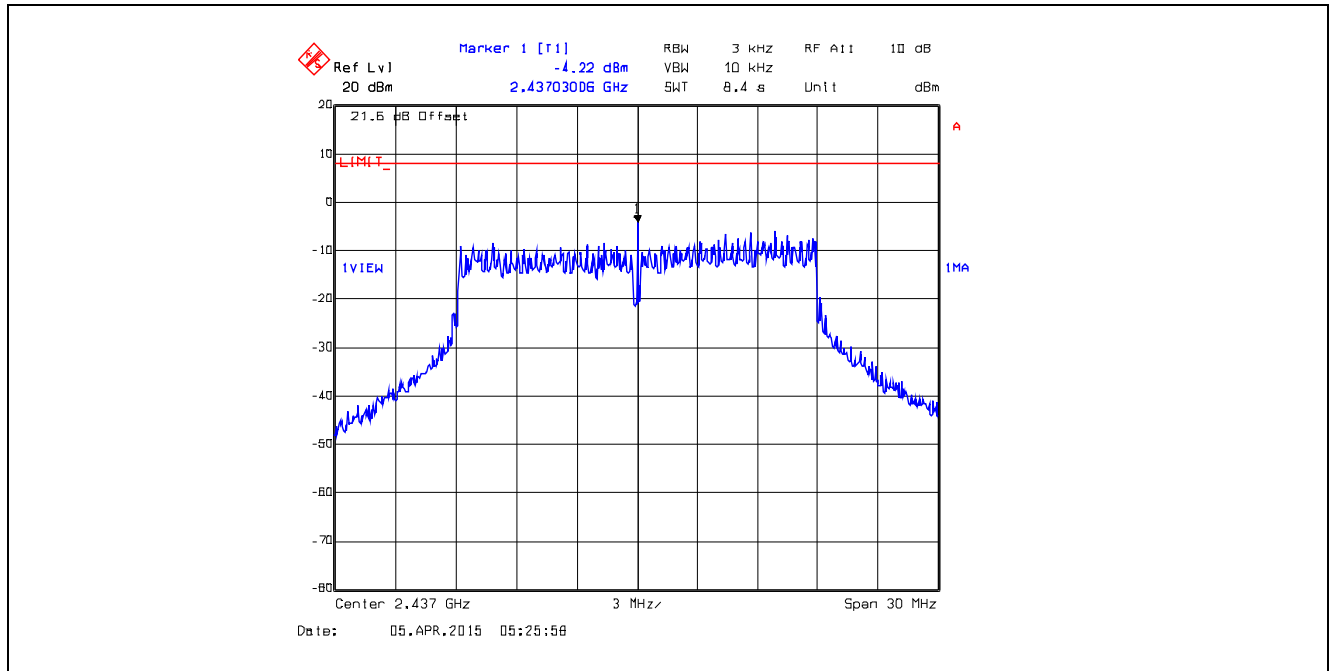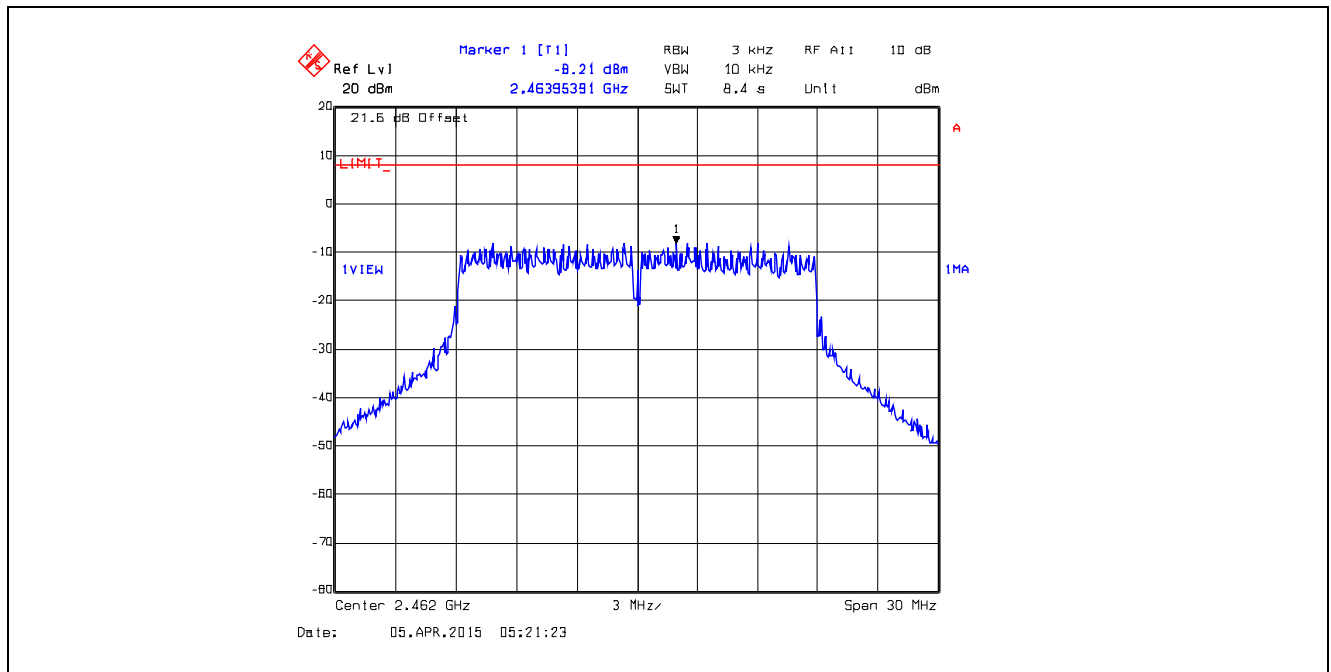

Plot 5.6.4.58. Power Spectral Density
Data Rate 10, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19

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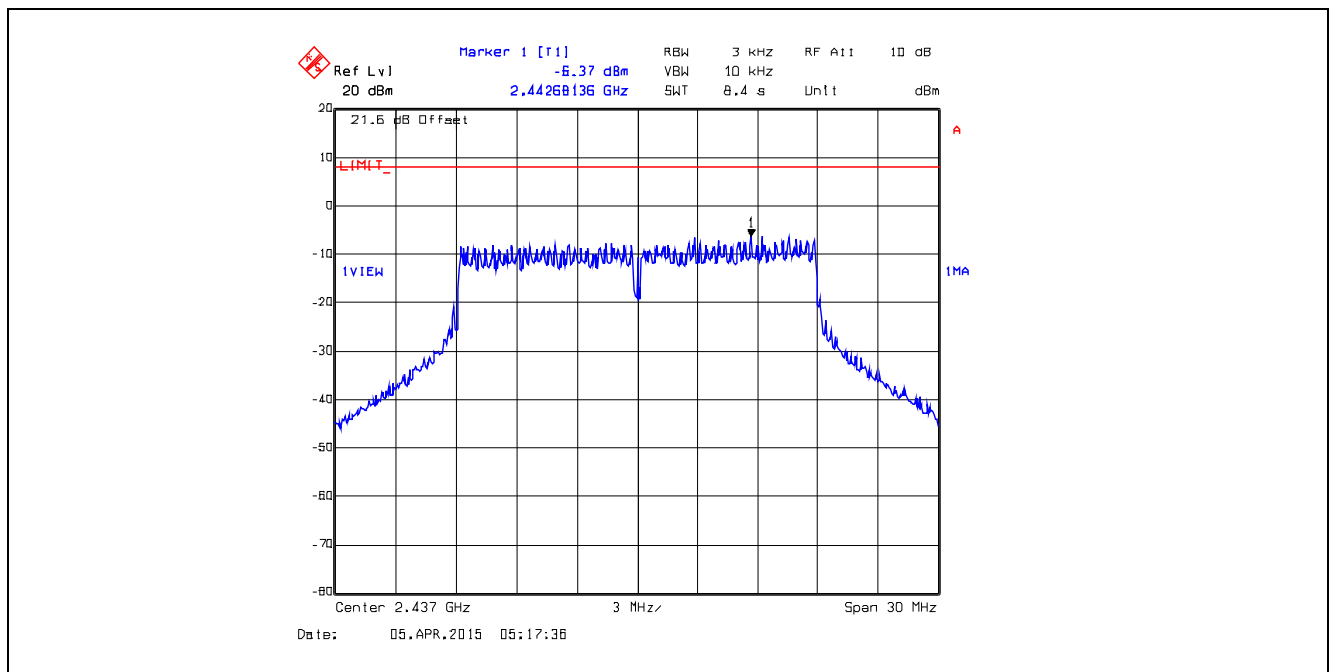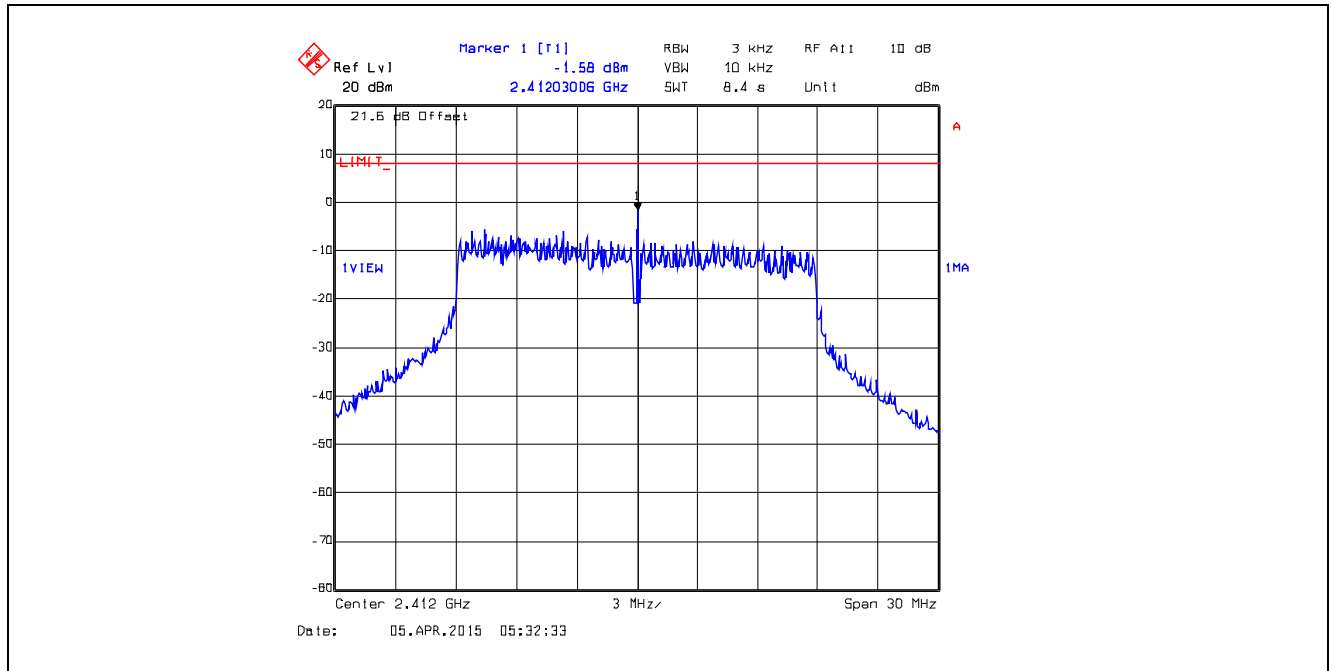
Plot 5.6.4.59. Power Spectral Density
Data Rate 10, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.6.4.60. Power Spectral Density
Data Rate 10, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19
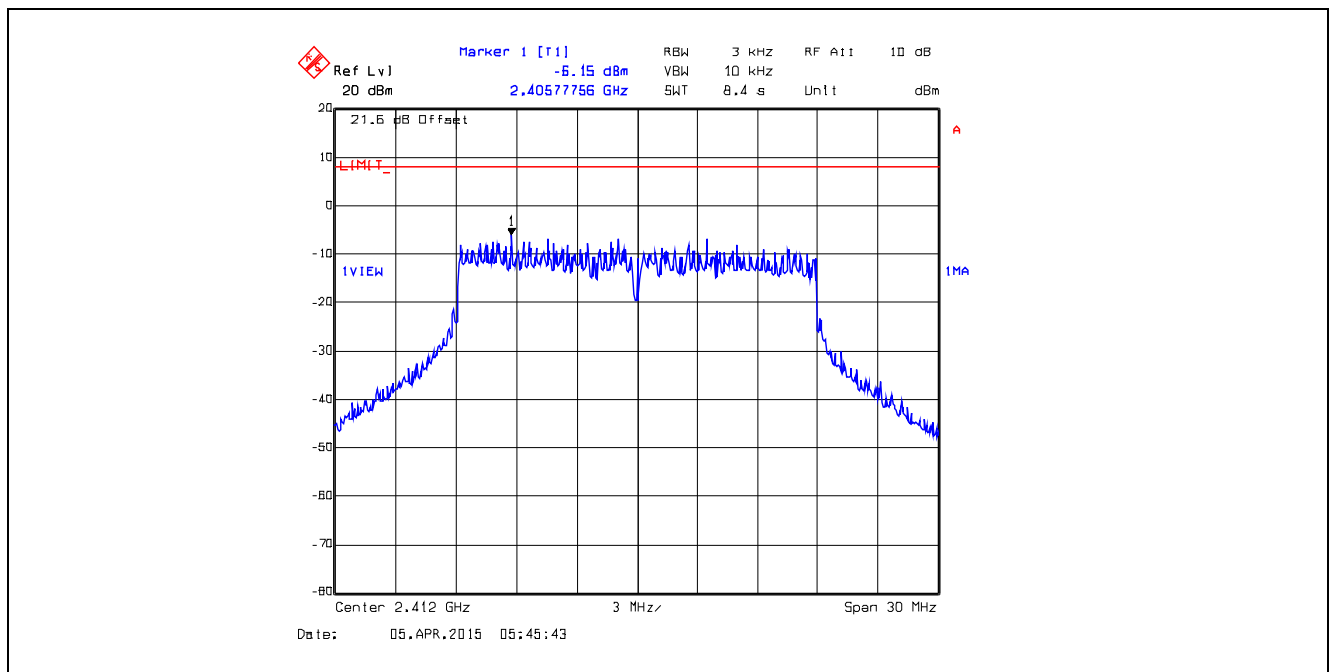
ULTRATECH GROUP OF LABS   **File #: 15MCRS079_FCC15C247DTS**

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Plot 5.6.4.61. Power Spectral Density
Data Rate 11, Chain # 1, Ch 1, 2412 MHz, Software Output Power Setting 19

Plot 5.6.4.62. Power Spectral Density
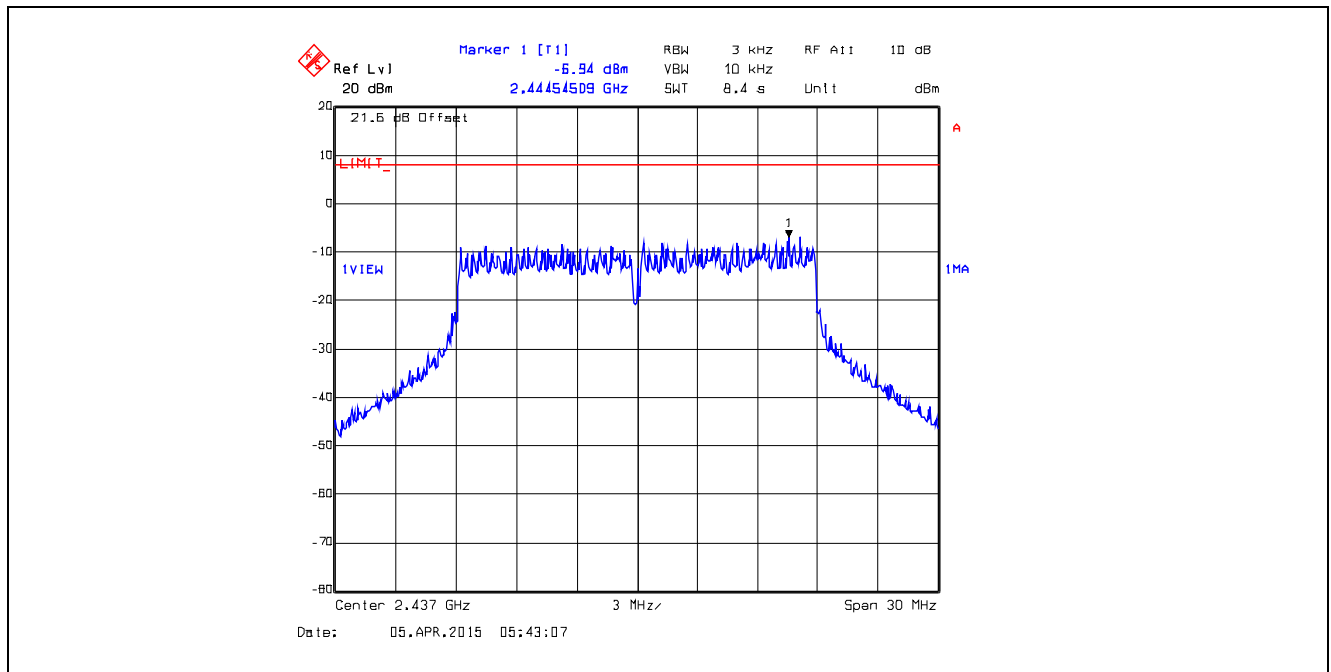Data Rate 11, Chain # 2, Ch 1, 2412 MHz, Software Output Power Setting 19
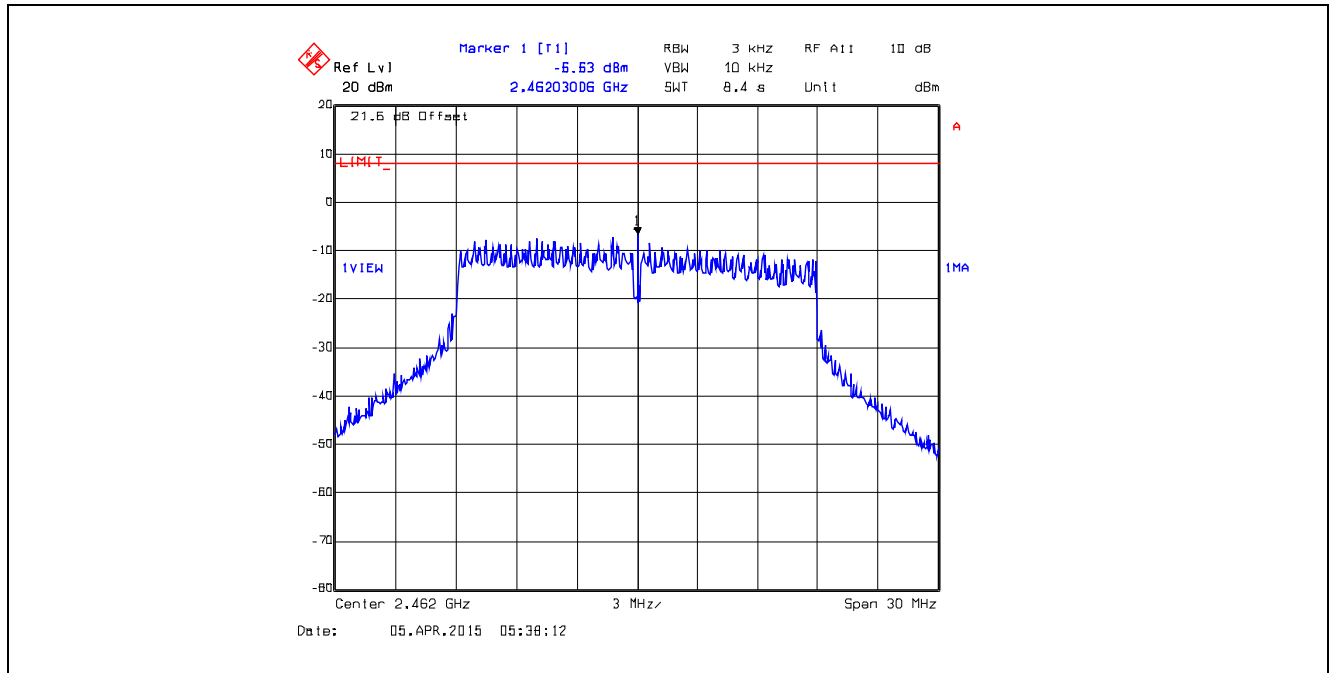
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Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com**, Website: http://www.ultratech-labs.com**

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Plot 5.6.4.63. Power Spectral Density
Data Rate 11, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 19
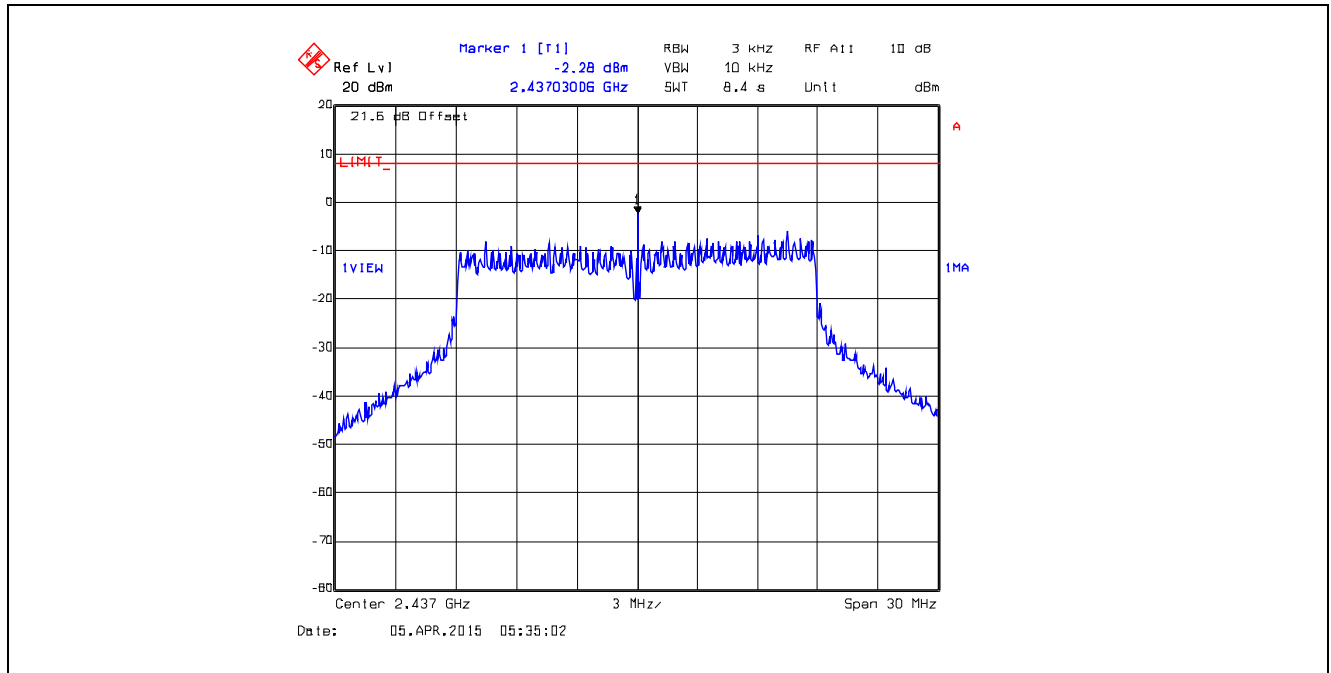
Plot 5.6.4.64. Power Spectral Density
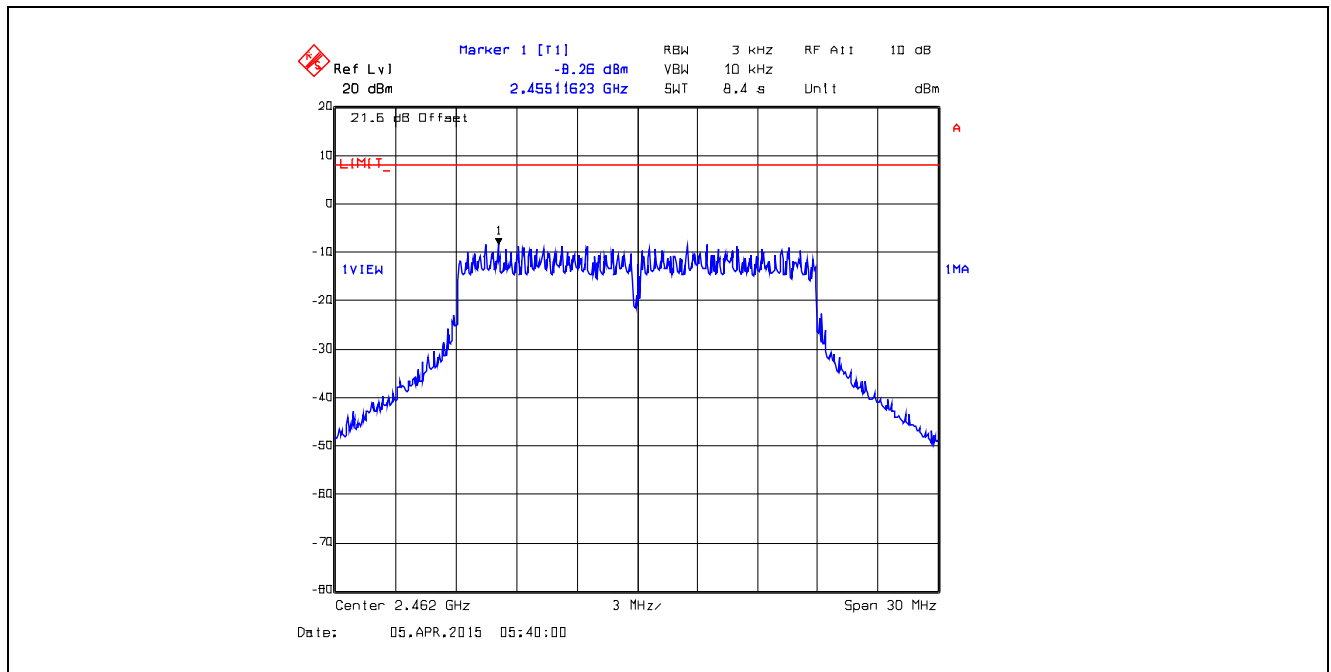Data Rate 11, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 19
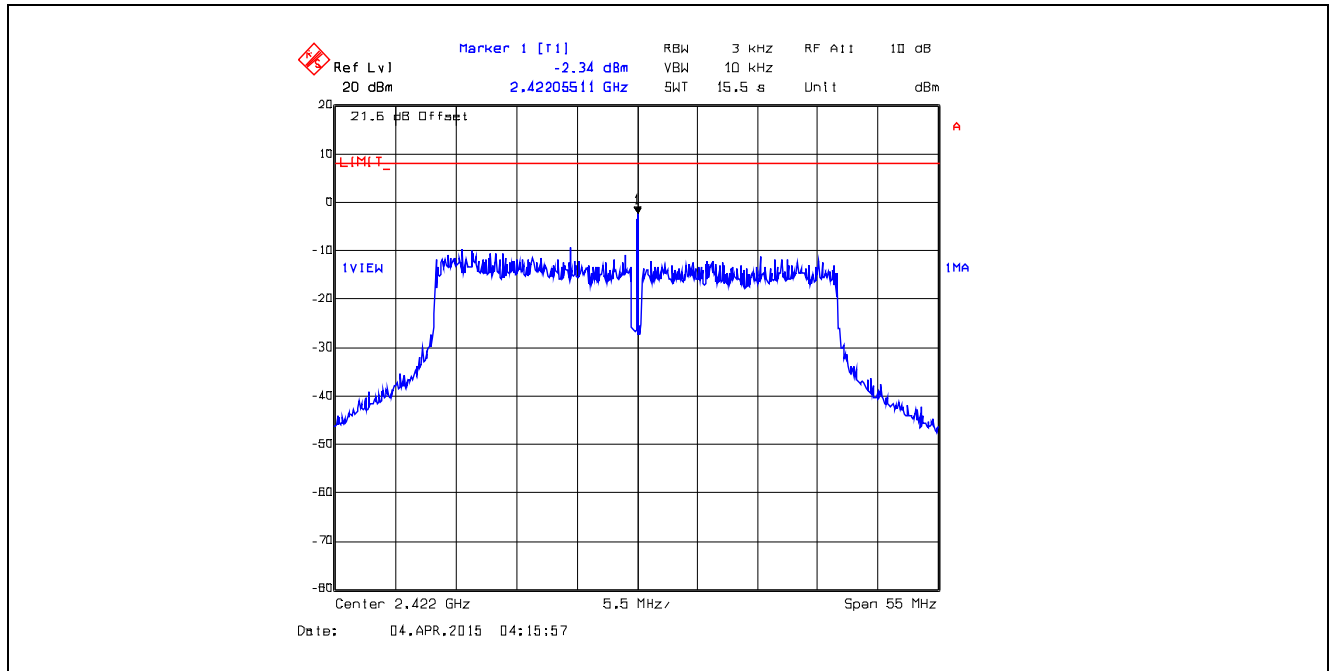
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.65. Power Spectral Density
Data Rate 11, Chain # 1, Ch 11, 2462 MHz, Software Output Power Setting 19

Plot 5.6.4.66. Power Spectral Density
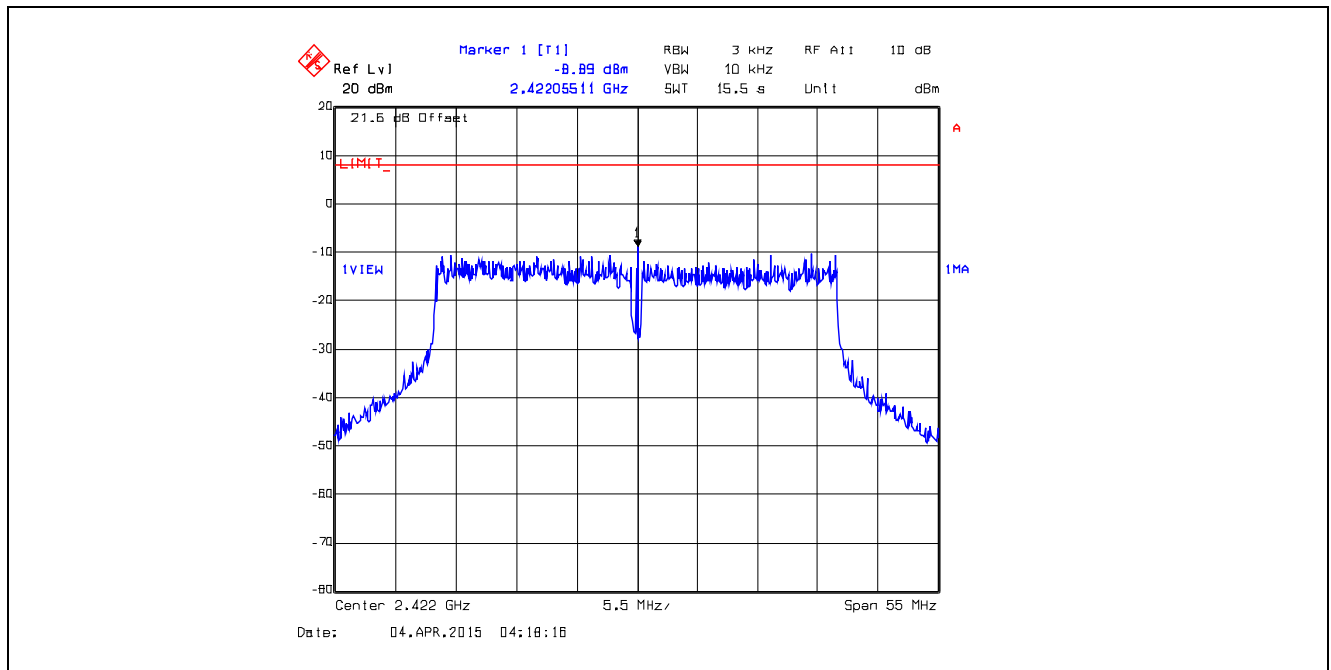Data Rate 11, Chain # 2, Ch 11, 2462 MHz, Software Output Power Setting 19

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Plot 5.6.4.67. Power Spectral Density
Data Rate 12, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

Plot 5.6.4.68. Power Spectral Density
Data Rate 12, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17

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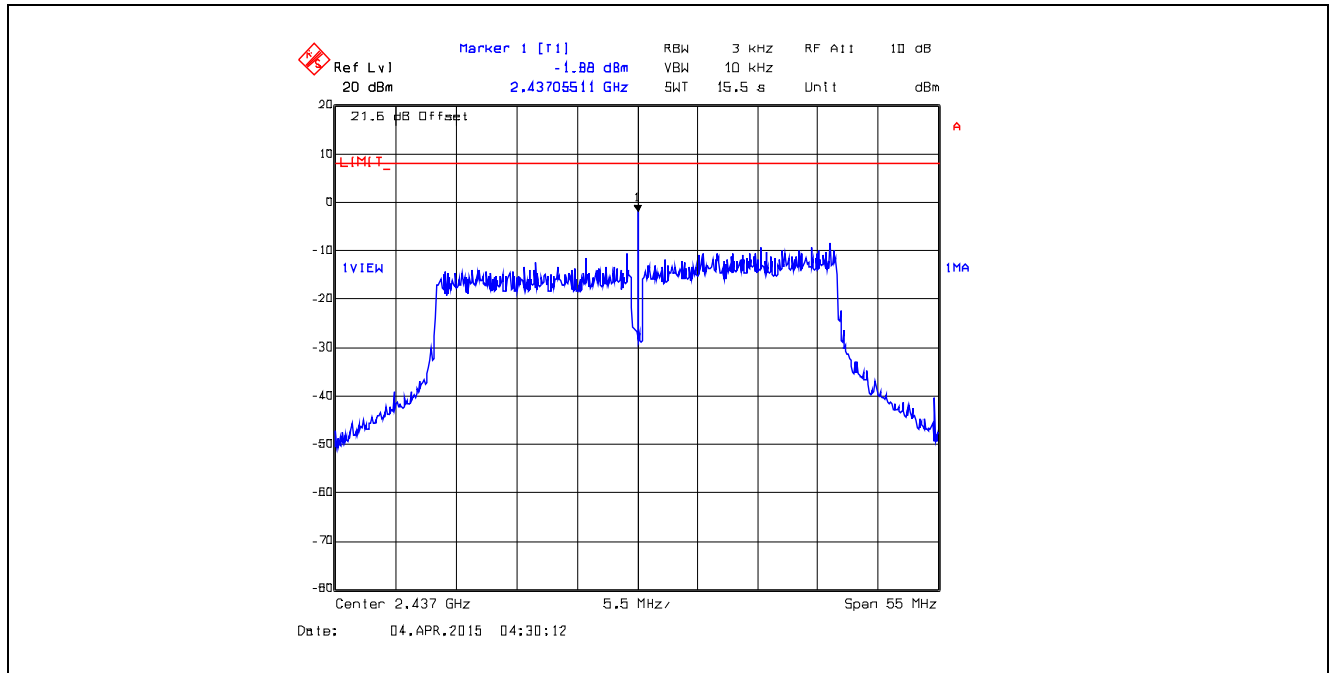3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
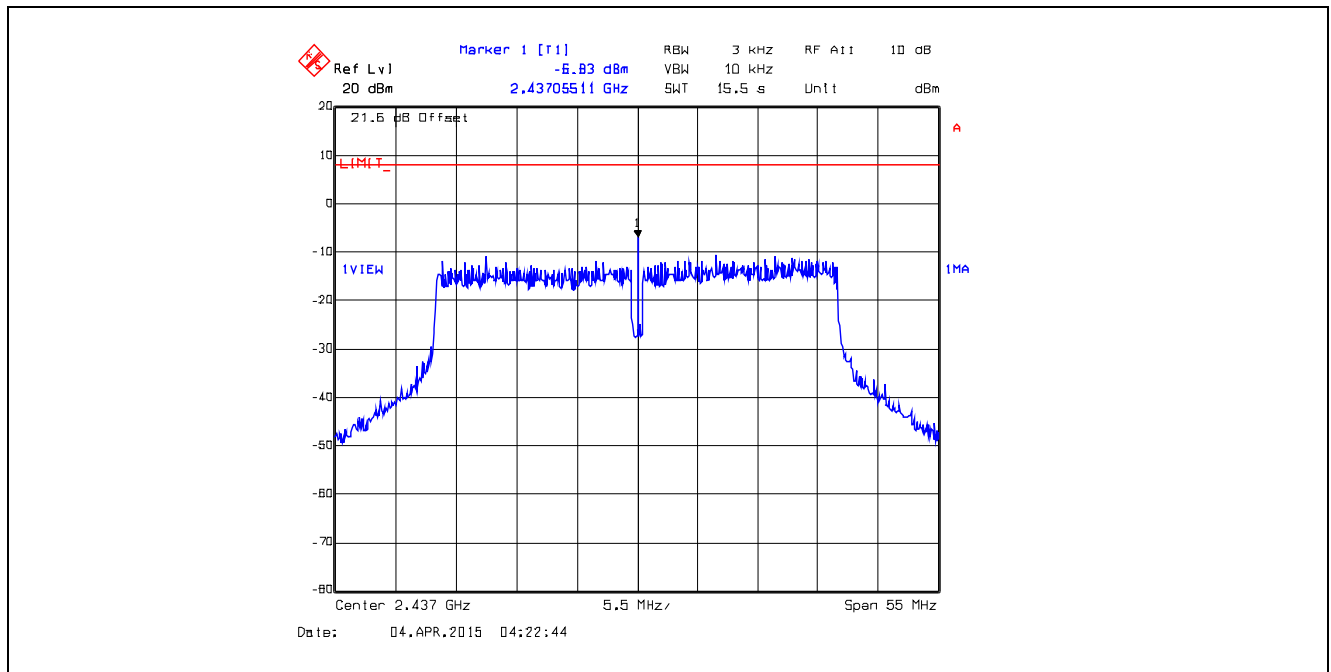Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

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Plot 5.6.4.69. Power Spectral Density
Data Rate 12, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

Plot 5.6.4.70. Power Spectral Density
Data Rate 12, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com
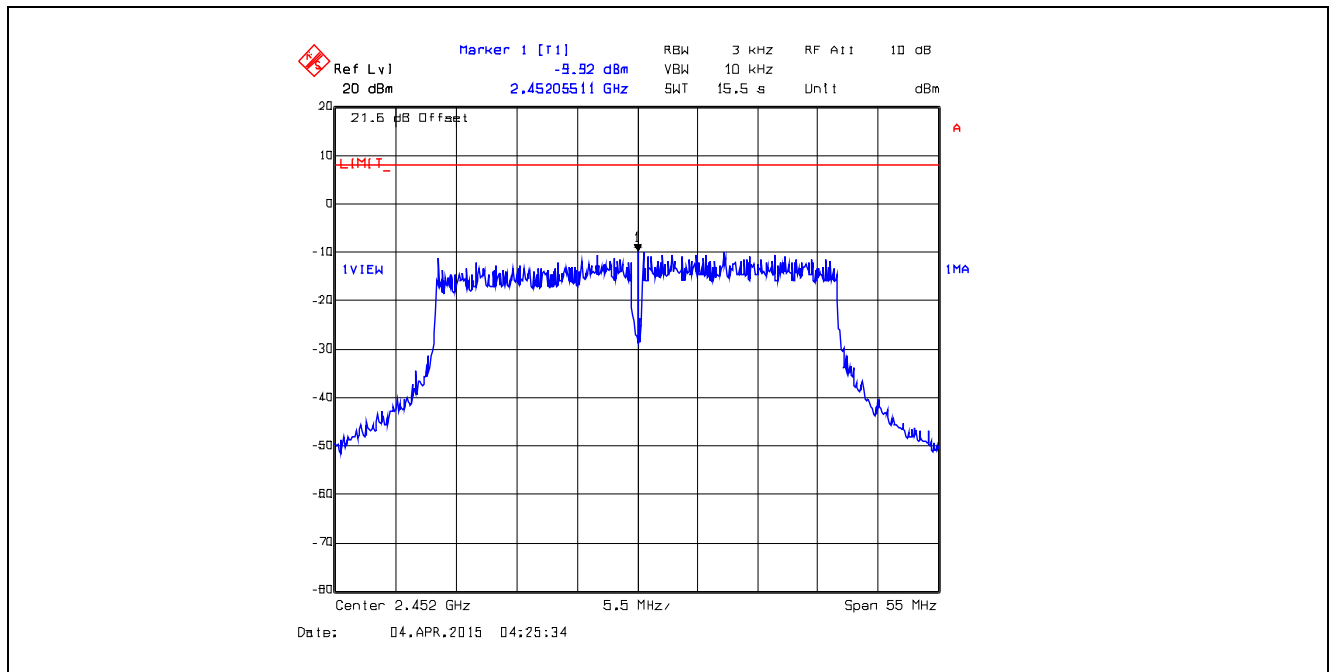
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.71. Power Spectral Density
Data Rate 12, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17
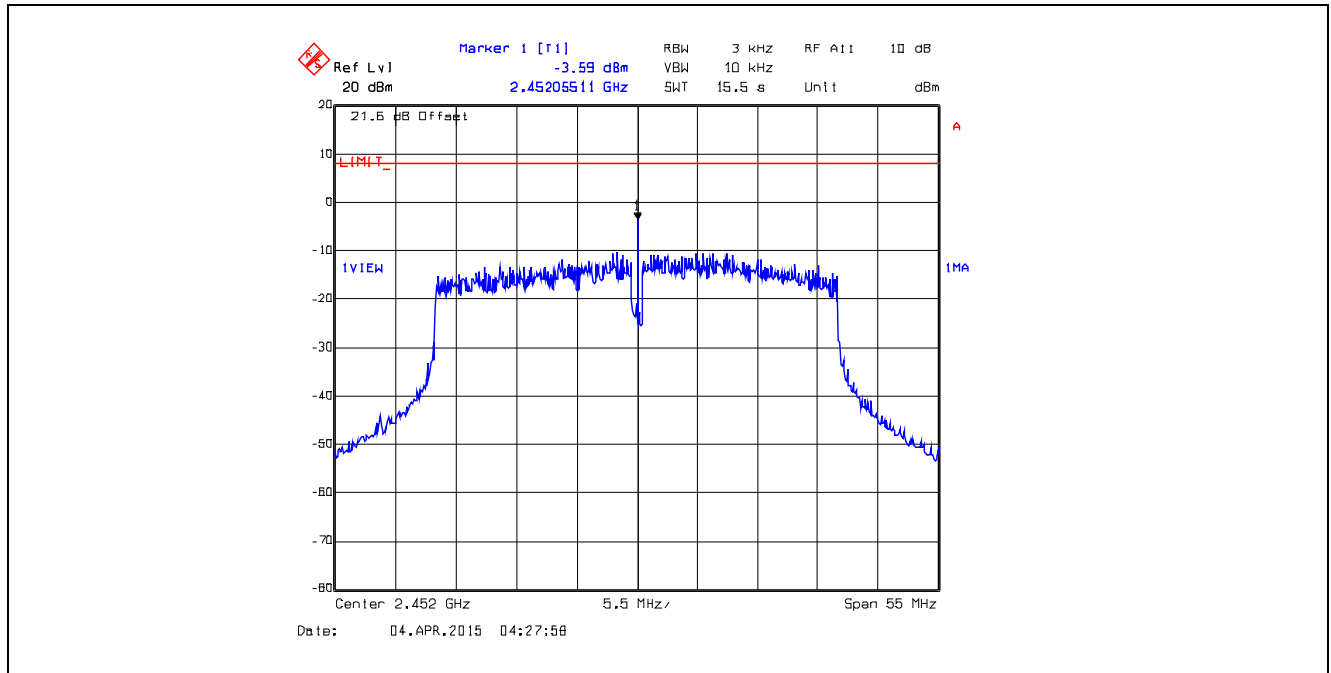
Plot 5.6.4.72. Power Spectral Density
Data Rate 12, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
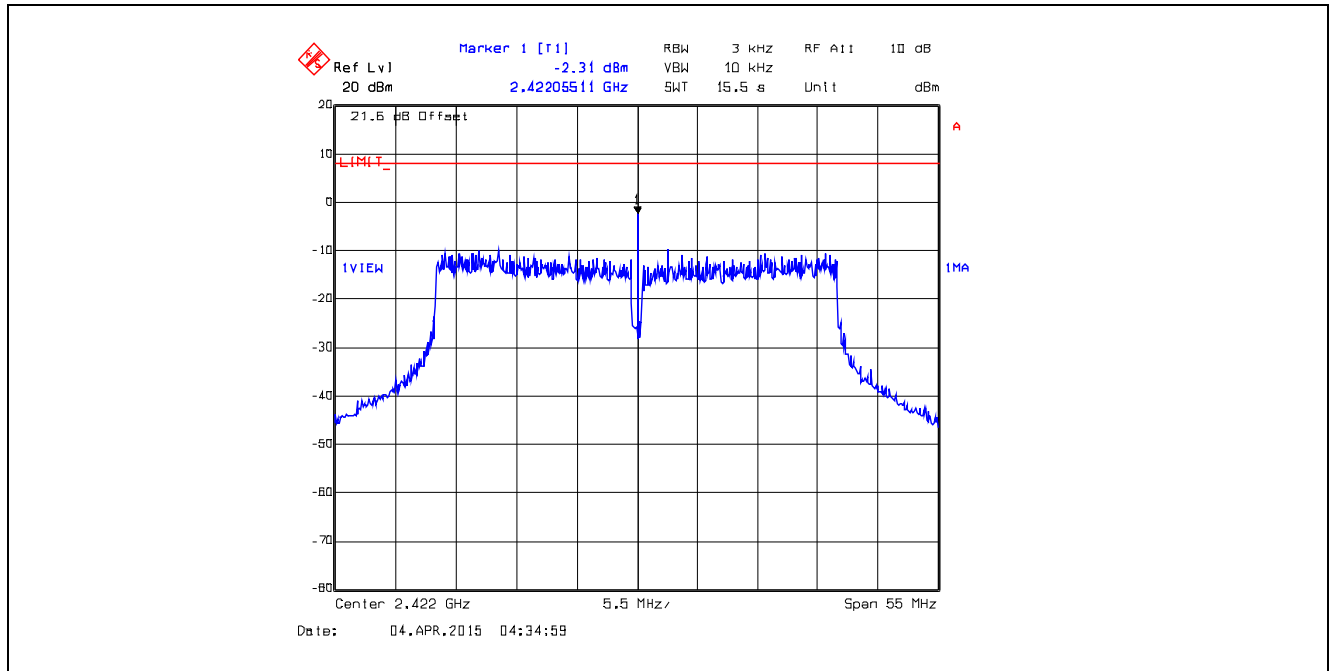3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
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Plot 5.6.4.73. Power Spectral Density
Data Rate 13, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

Plot 5.6.4.74. Power Spectral Density
Data Rate 13, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17
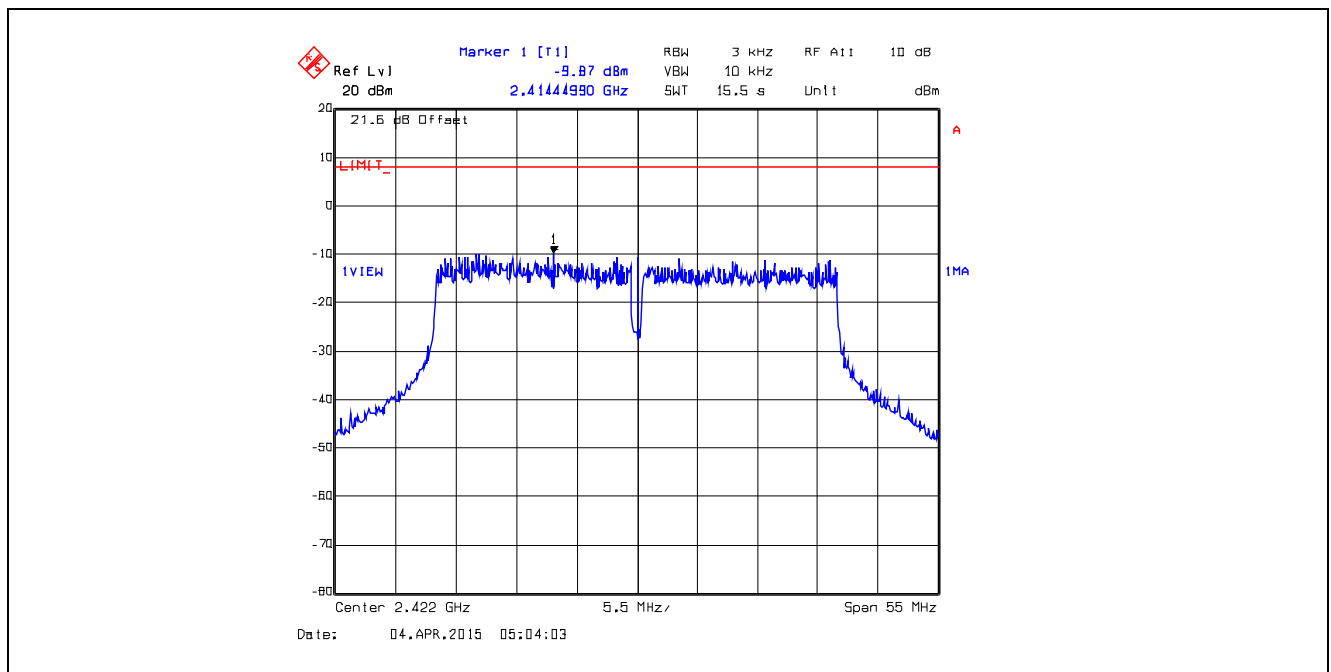
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.75. Power Spectral Density
Data Rate 13, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

Plot 5.6.4.76. Power Spectral Density
Data Rate 13, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
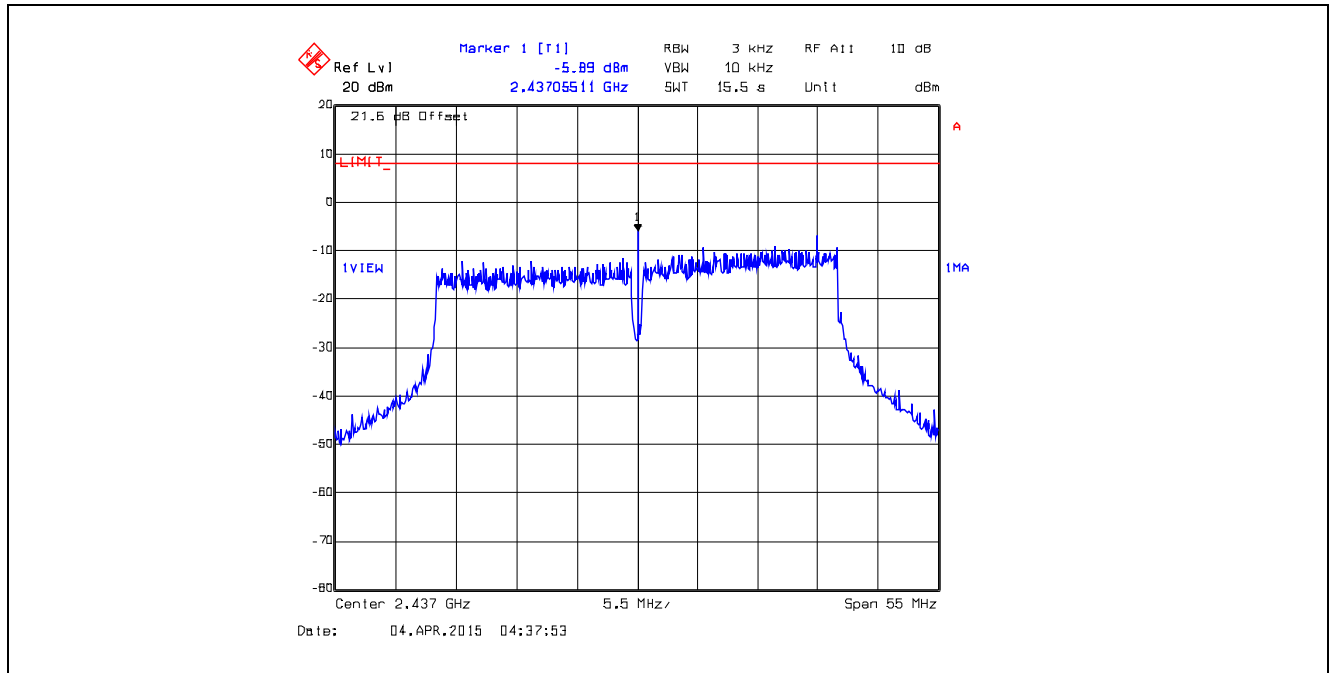3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com
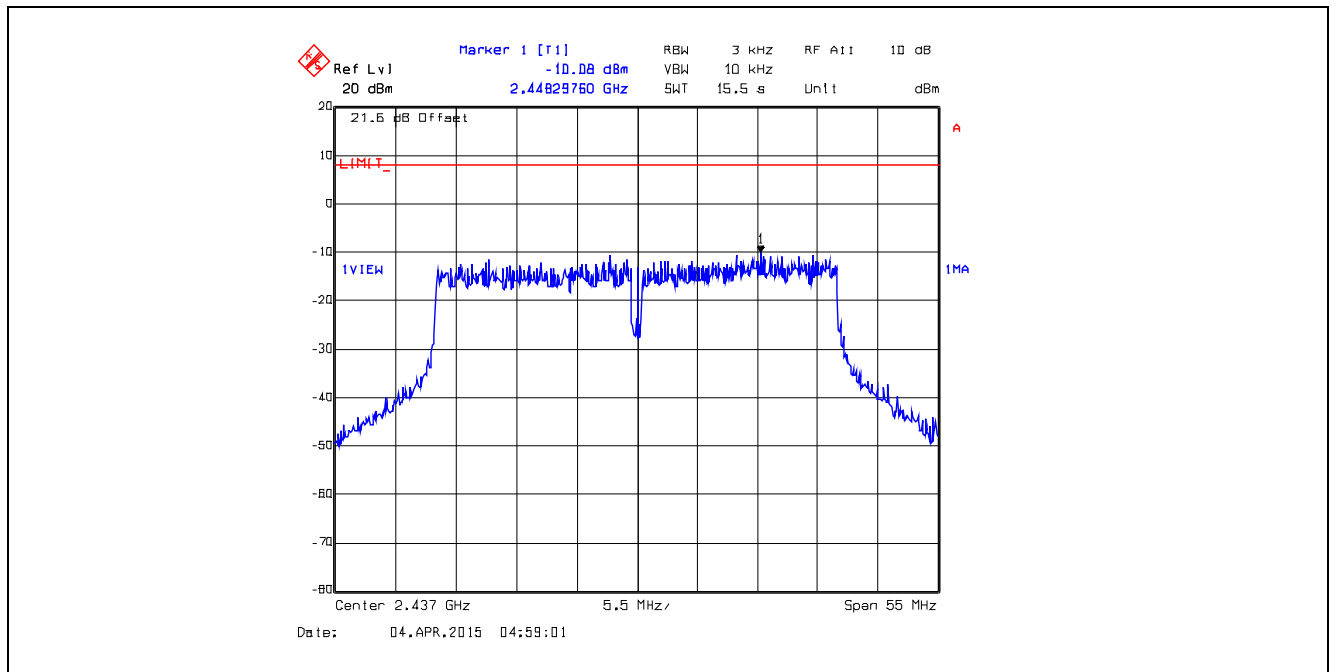
All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)

Plot 5.6.4.77. Power Spectral Density
Data Rate 13, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17

Plot 5.6.4.78. Power Spectral Density
Data Rate 13, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17

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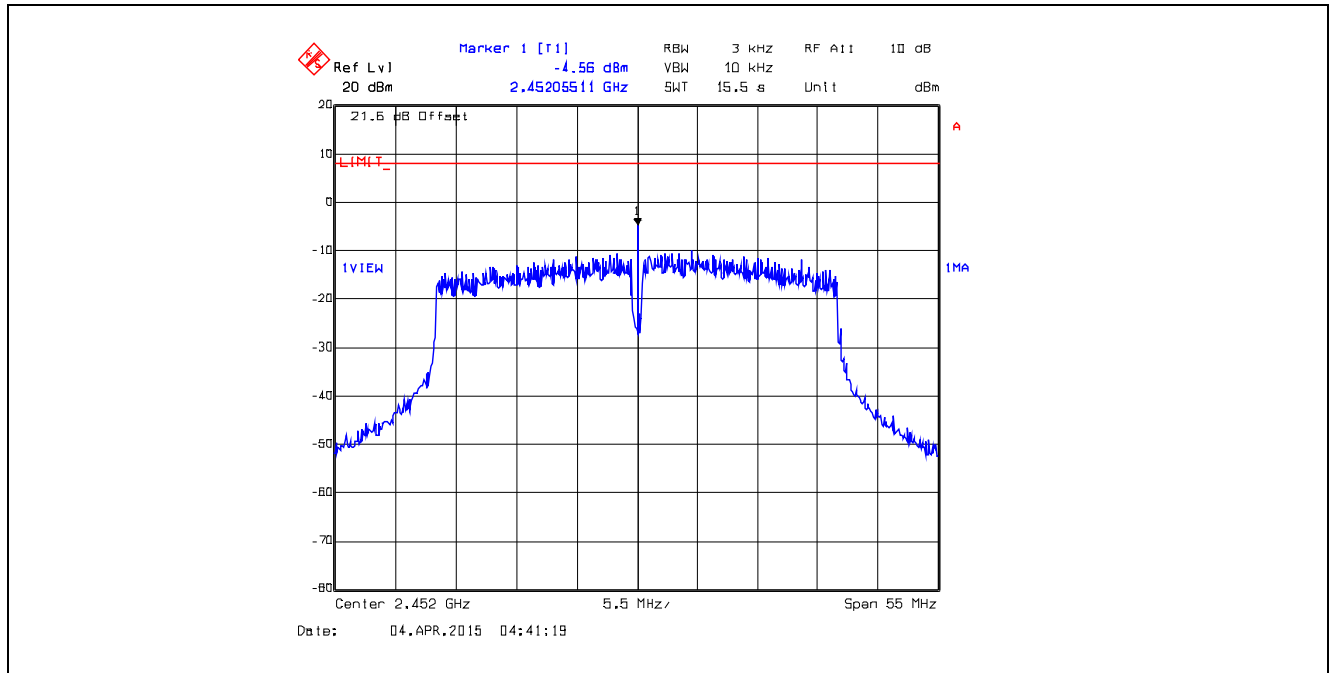
Plot 5.6.4.79. Power Spectral Density
Data Rate 14, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17
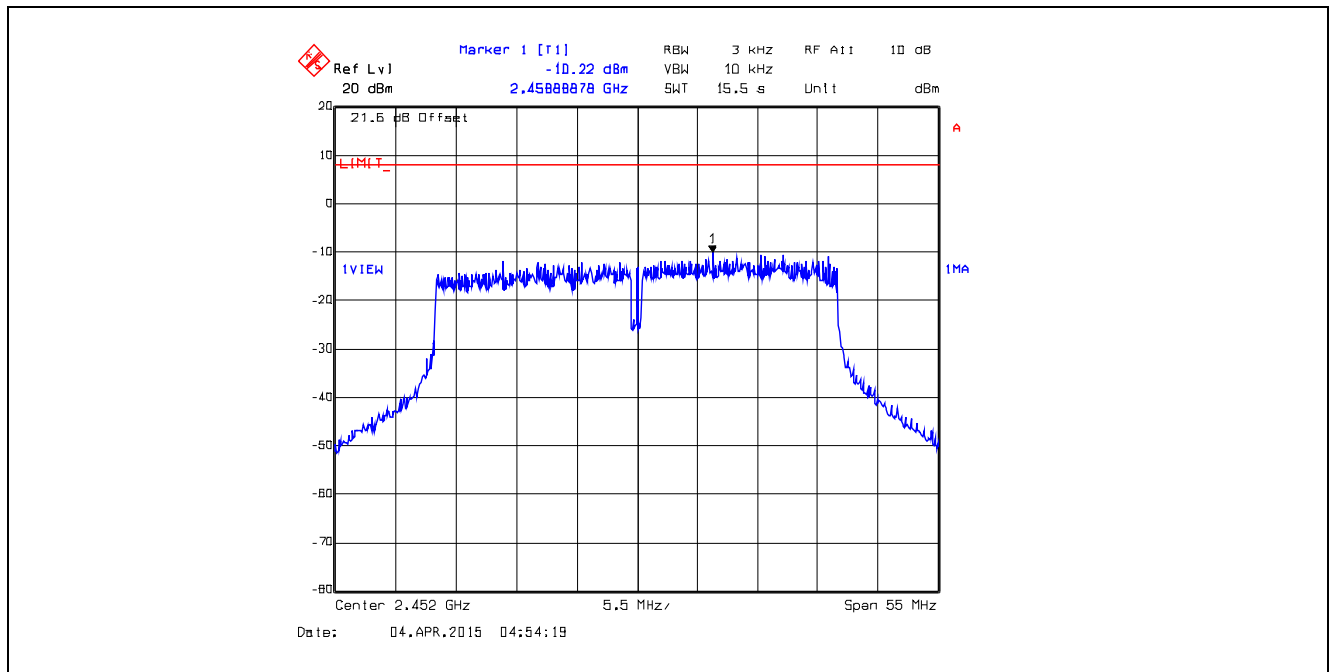

Plot 5.6.4.80. Power Spectral Density
Data Rate 14, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17
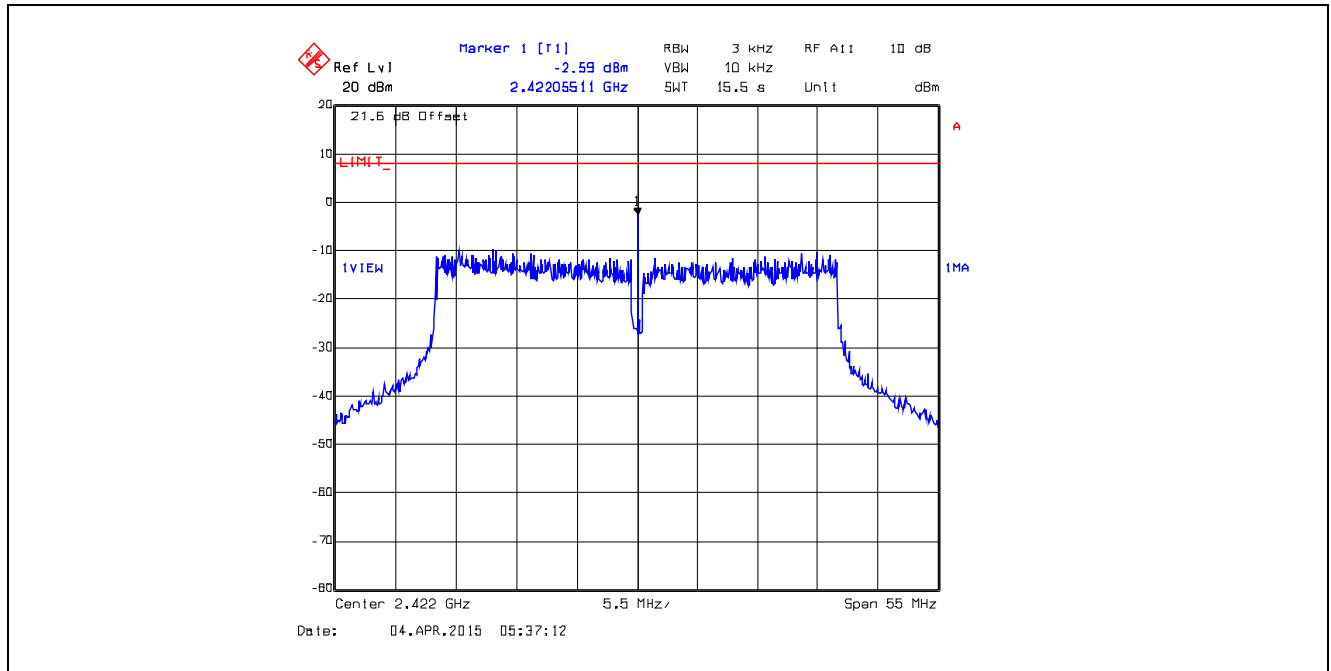
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Plot 5.6.4.81. Power Spectral Density
Data Rate 14, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17

Plot 5.6.4.82. Power Spectral Density
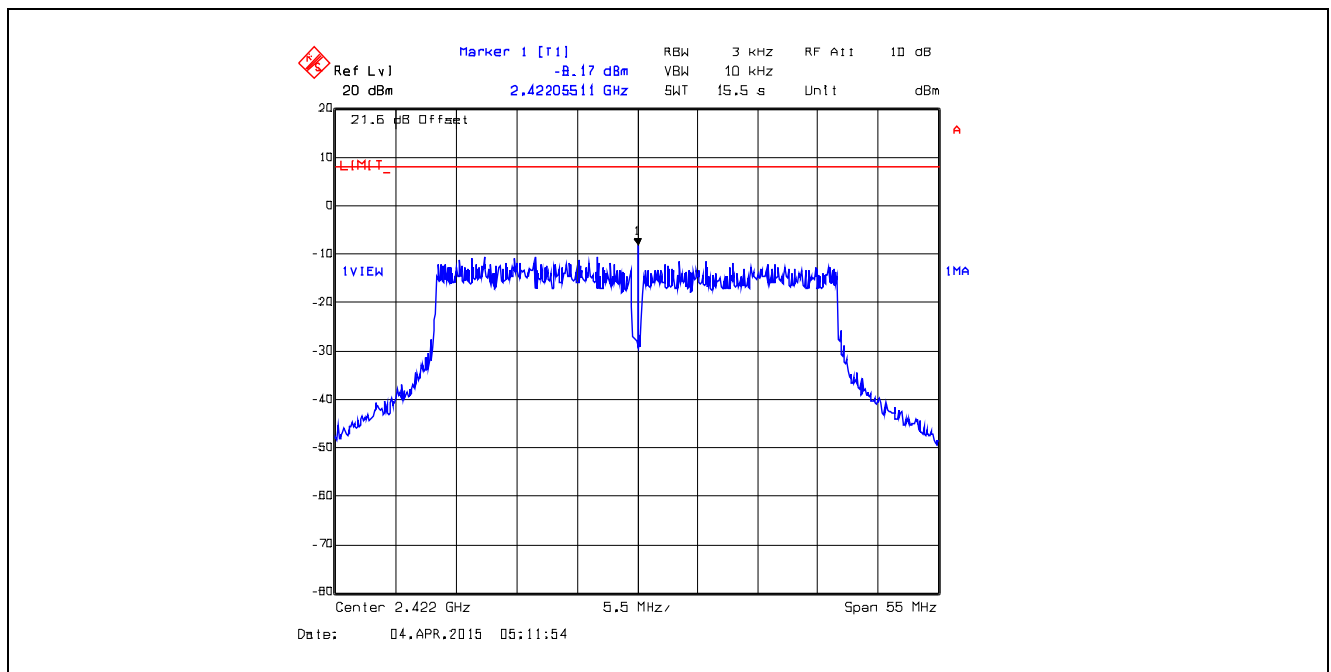Data Rate 14, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS   File #: 15MCRS079_FCC15C247DTS
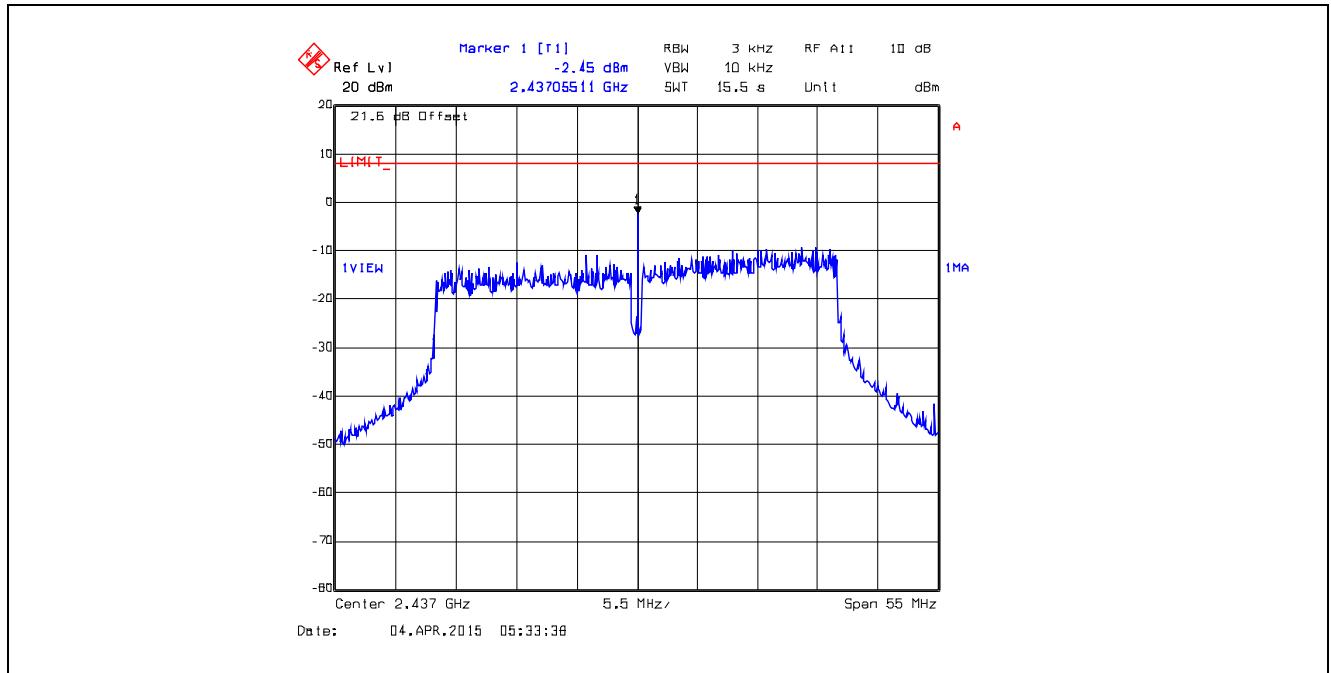**3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4**   November 16, 2015
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Plot 5.6.4.83. Power Spectral Density
Data Rate 14, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17

Plot 5.6.4.84. Power Spectral Density
Data Rate 14, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17
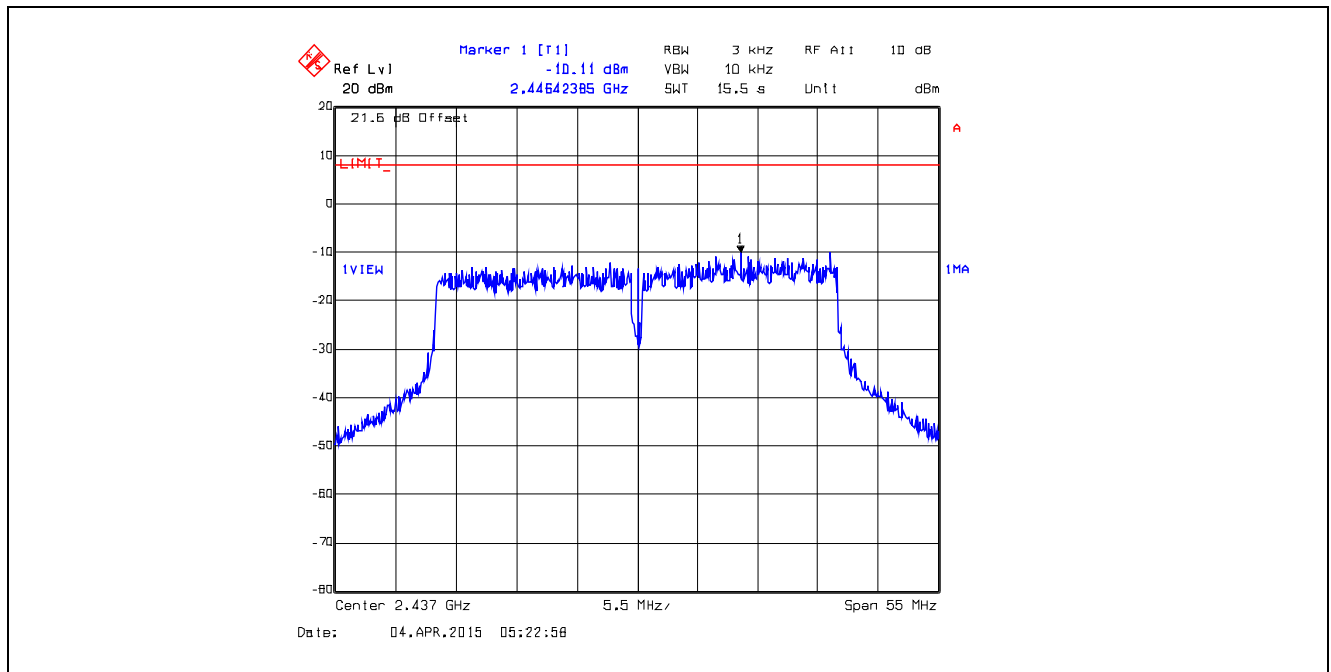
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Plot 5.6.4.85. Power Spectral Density
Data Rate 15, Chain # 1, Ch 3, 2422 MHz, Software Output Power Setting 17

Plot 5.6.4.86. Power Spectral Density
Data Rate 15, Chain # 2, Ch 3, 2422 MHz, Software Output Power Setting 17

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Plot 5.6.4.87. Power Spectral Density
Data Rate 15, Chain # 1, Ch 6, 2437 MHz, Software Output Power Setting 17
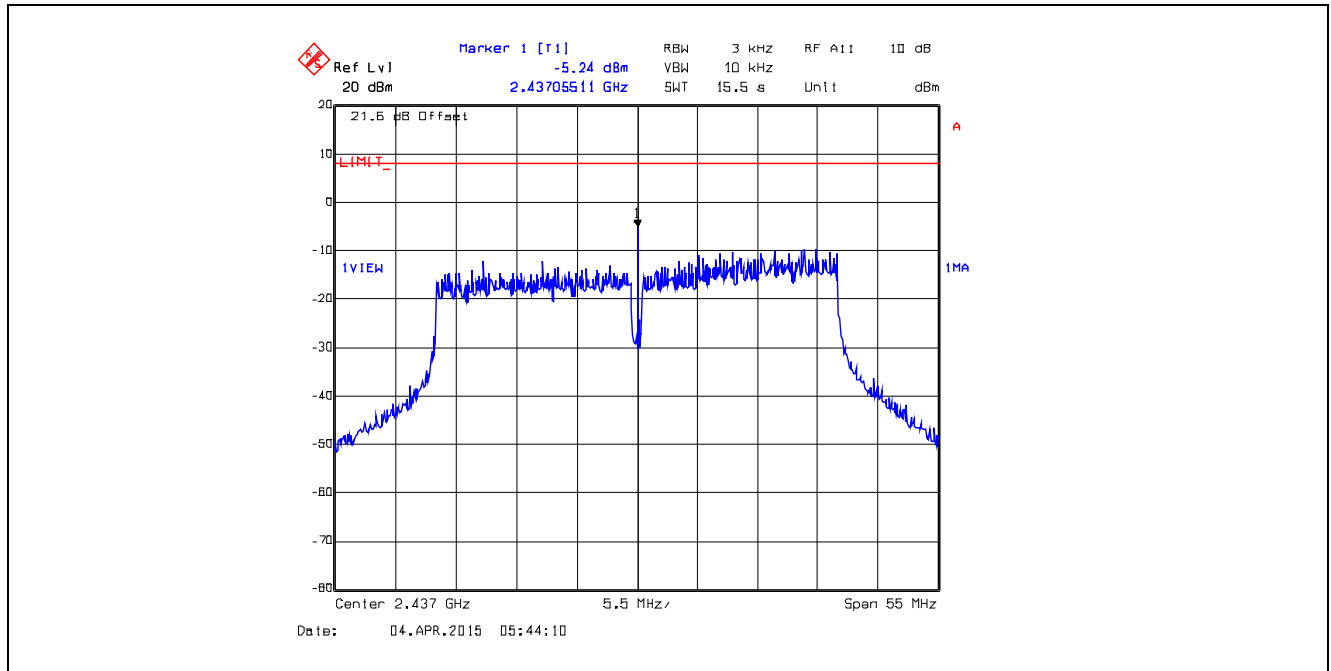
Plot 5.6.4.88. Power Spectral Density
Data Rate 15, Chain # 2, Ch 6, 2437 MHz, Software Output Power Setting 17

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Plot 5.6.4.89. Power Spectral Density
Data Rate 15, Chain # 1, Ch 9, 2452 MHz, Software Output Power Setting 17
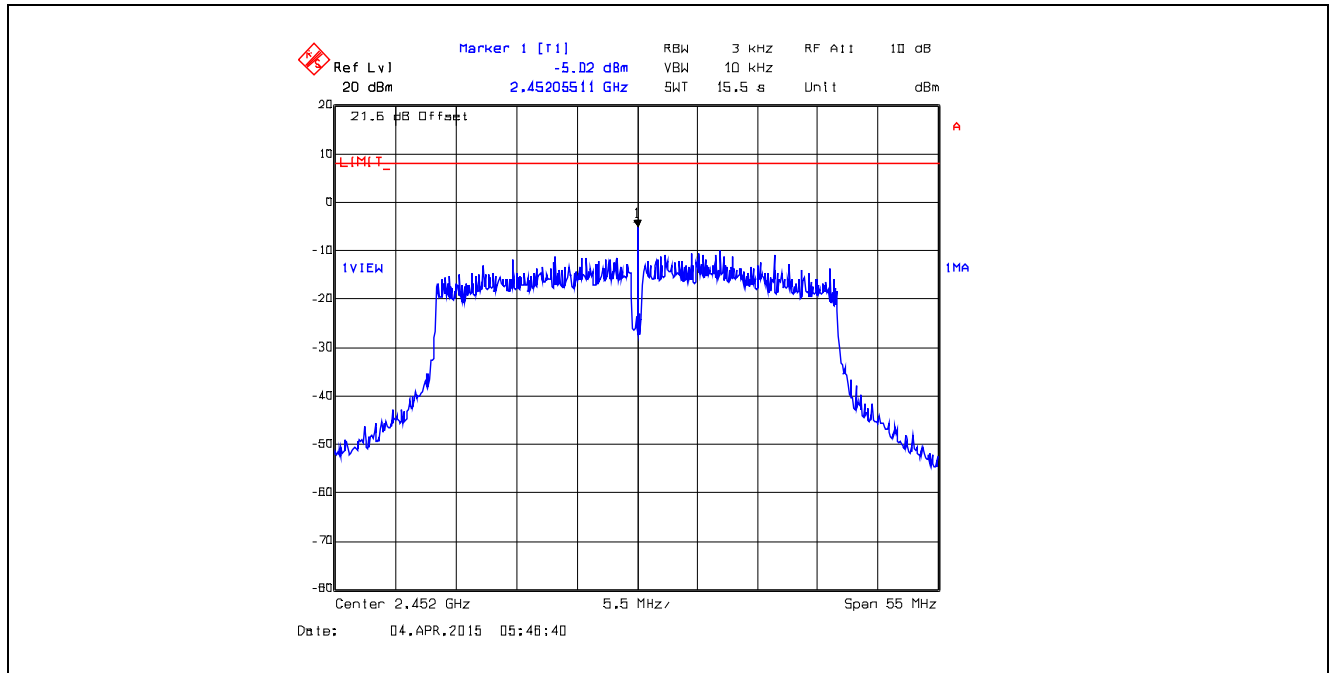
Plot 5.6.4.90. Power Spectral Density
Data Rate 15, Chain # 2, Ch 9, 2452 MHz, Software Output Power Setting 17

ULTRATECH GROUP OF LABS   **File #: 15MCRS079_FCC15C247DTS**
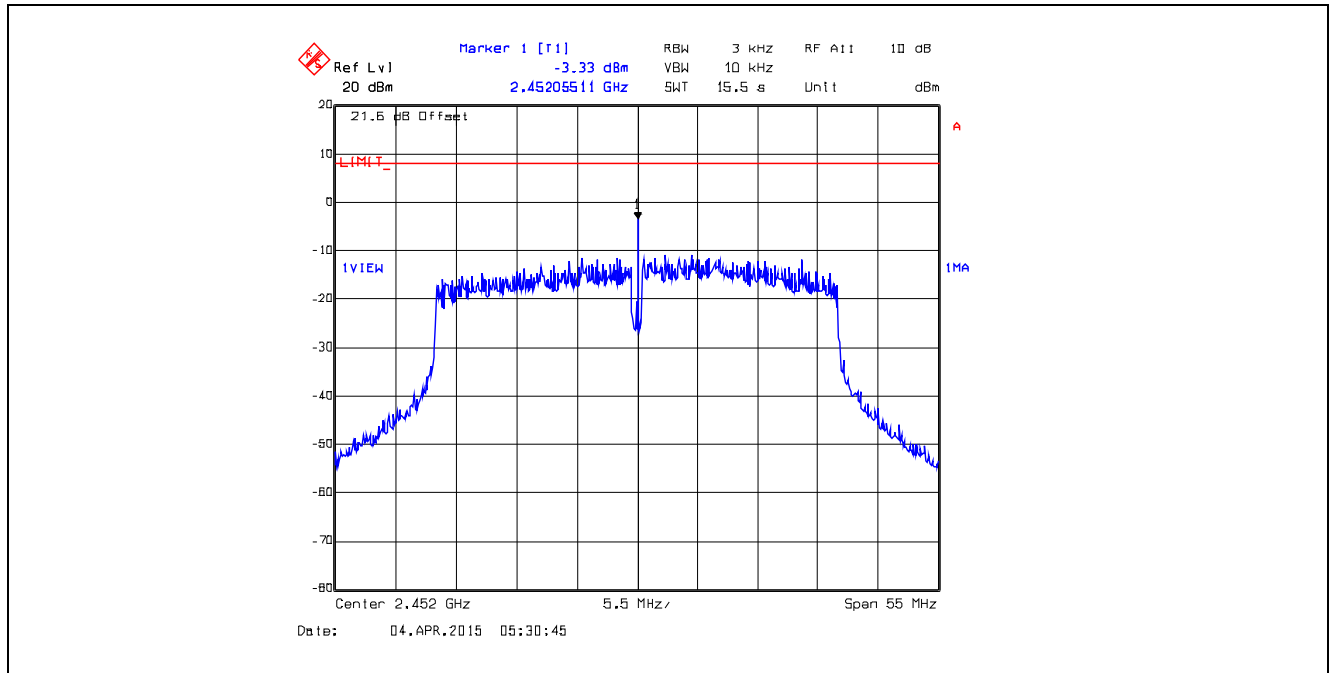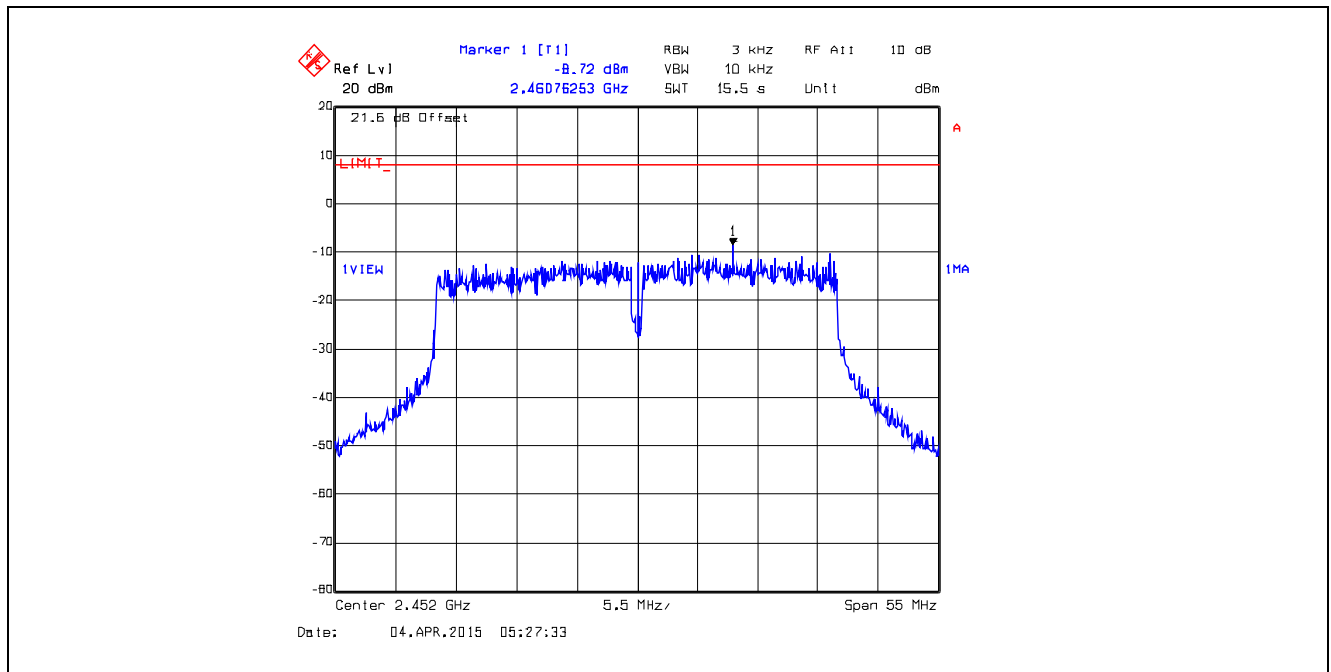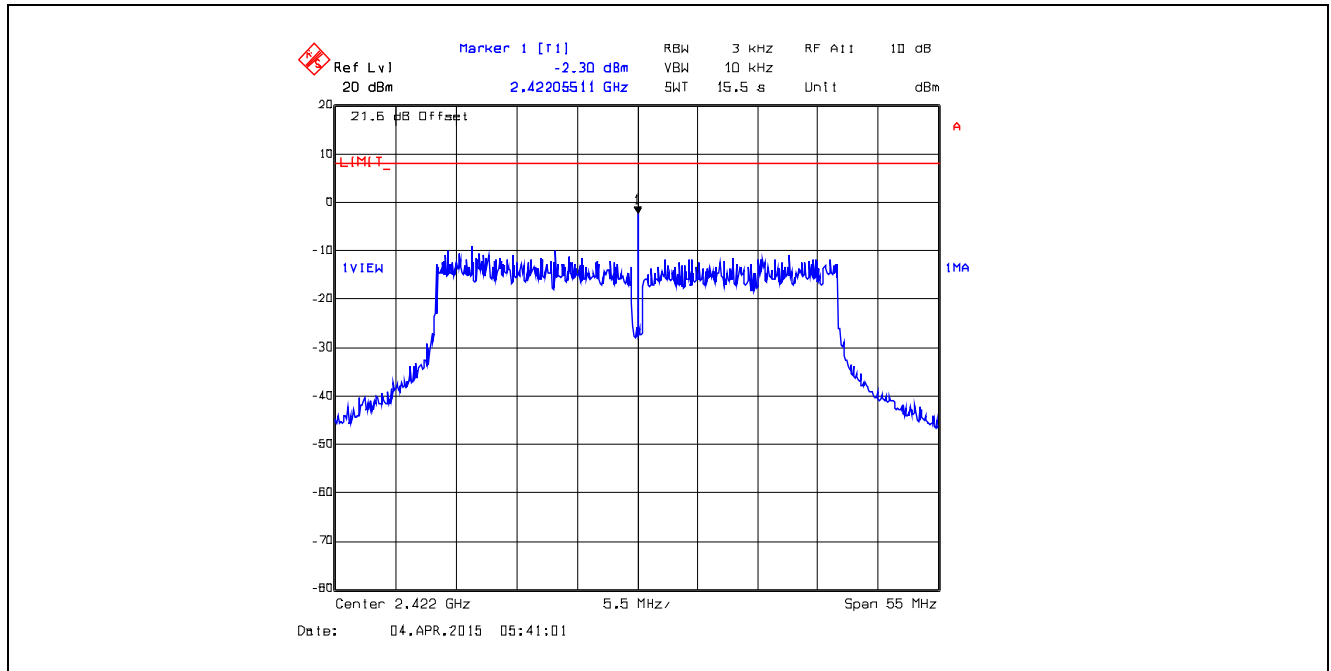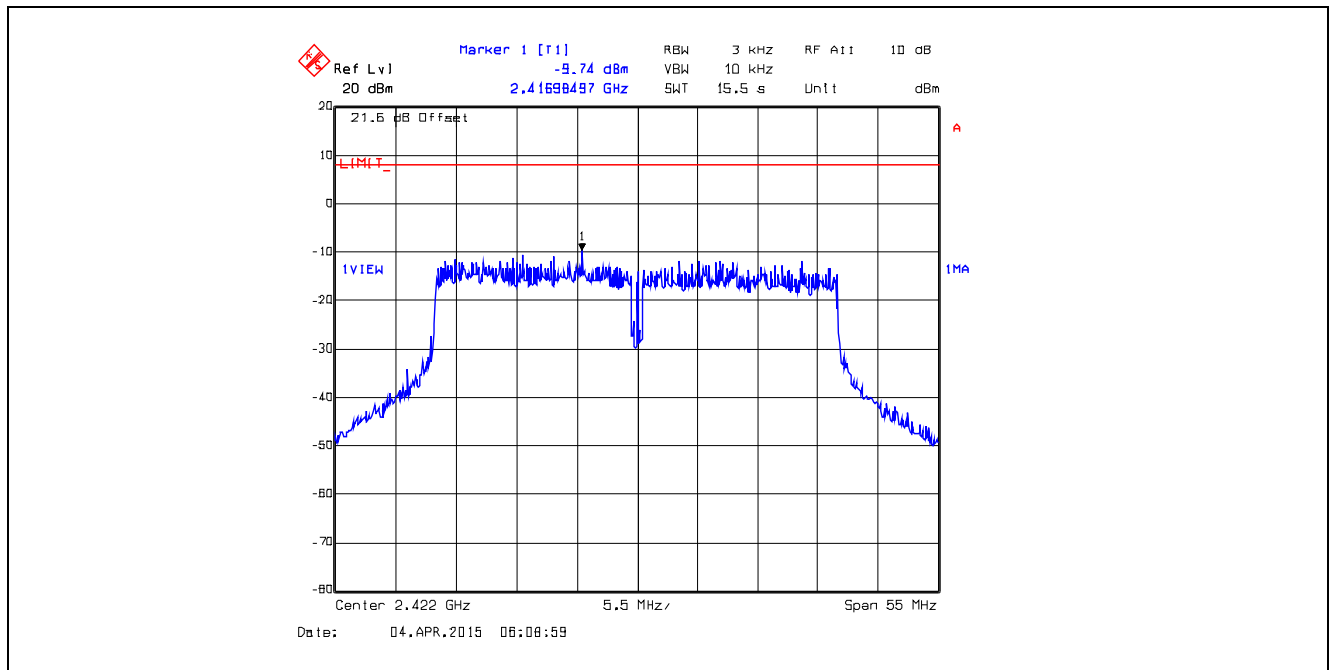3000 Bristol Circle, Oakville, Ontario, Canada L6H 6G4   November 16, 2015
Tel. #: 905-829-1570, Fax. #: 905-829-8050, Email: vic@ultratech-labs.com, Website: http://www.ultratech-labs.com

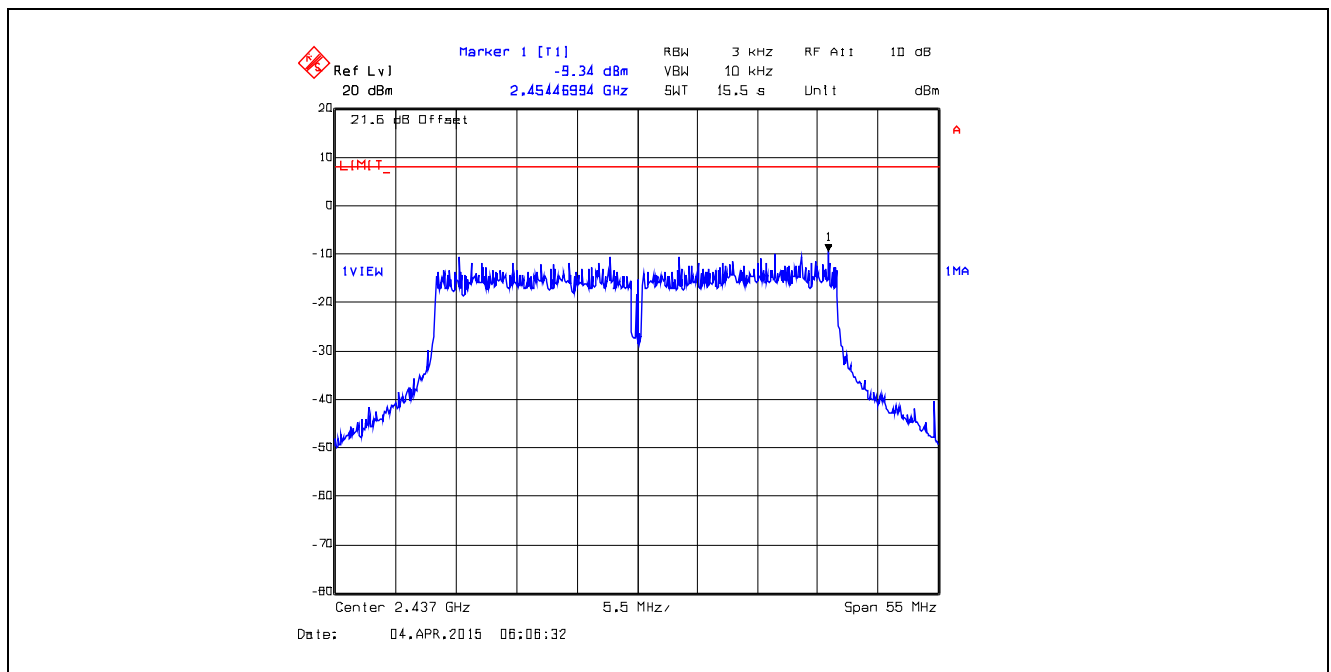*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*
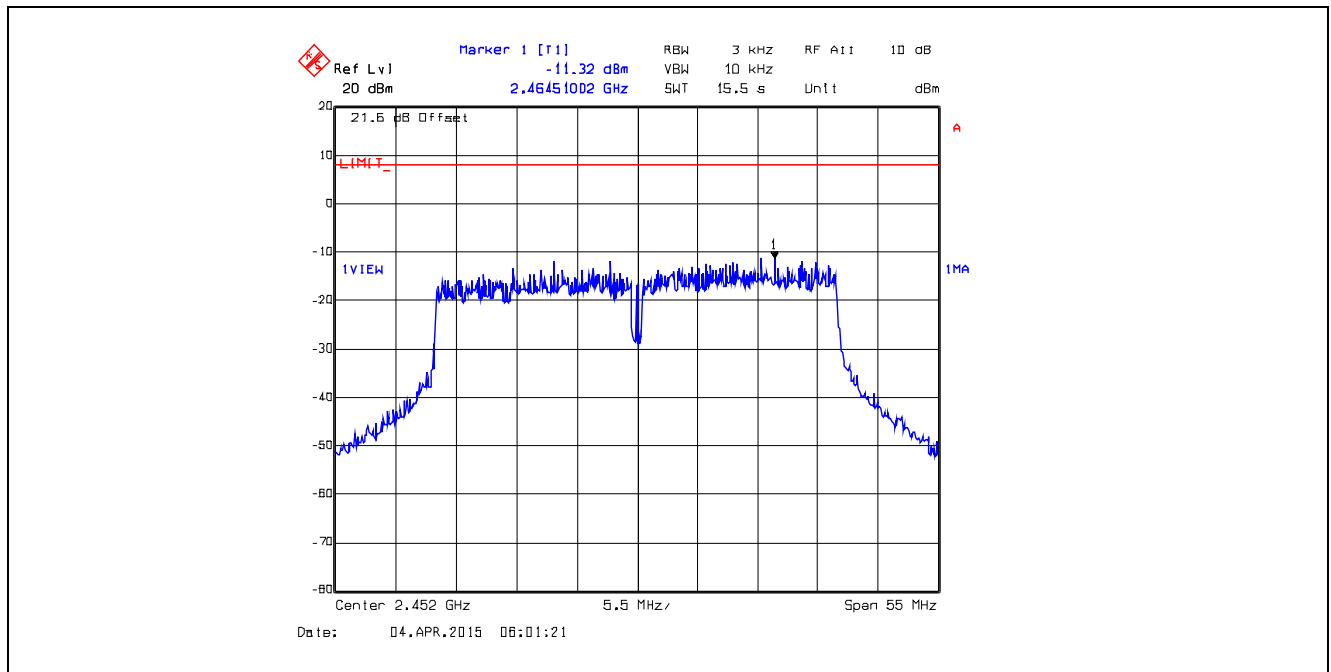
5.7.   RF EXPOSURE REQUIRMENTS [§§ 15.247(i), 1.1310 & 2.1091]

5.7.1.   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.

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5.7.2.   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/cm^2
                G: numeric gain of antenna relative to isotropic radiator
                r: distance to centre of radiation in cm

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

5.7.3.   RF Evaluation

5.7.3.1.   Standalone

Maximum EIRP, **P$_{EIRP}$[dBm]**:	31.51
MPE Limit for General Population/Uncontrolled Exposure, **S$_{uncontrolled}$[mW/cm^2]**	1.0
Calculated RF Safety Distance for General Population/Uncontrolled Exposure, **r$_{safety\ uncontrolled}$[cm]**	10.6

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5.7.3.2. Co-location

Pursuant to KDB 447498 D01 General RF Exposure Guidance v05r02, Section 7.2:

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

The worst case EIRP of 31.51 dBm will be used in co-location at the minimum 23 cm evaluation separation distance required by the operating configurations and exposure conditions of the host device.

The maximum calculated MPE ratio of the EUT

Frequency (MHz)	EUT EIRP (dBm)	EUT EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm^2)	FCC MPE Limit (mW/cm^2)	MPE Ratio
2412	31.51	1416	23	0.213	1.0	0.213

The maximum calculated MPE ratio for the EUT is 0.213, 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 - 0.213 $\leq$ 0.787. The following table addresses the co-location of the EUT with the specified radio modules.

EUT co-location with radio module indentified in this table

*Radio Module	Frequency (MHz)	EIRP (mW)	Evaluation Distance (cm)	Power Density (mW/cm^2)	FCC MPE Limit (mW/cm^2)	MPE Ratio	MPE Ratio of EUT	Sum of MPE Ratio	Verdict
Data Card Module (FCC ID: RI7LN930, IC: 5131A-LN930)	824.2	2511.89	23	0.378	0.549	0.689	0.213	0.902	Compliant
LTE Data Transmitter Module (FCC ID: R5Q-TOBYL100, IC: 8595B-TOBYL100)	782	2564.484	23	0.386	0.521	0.741	0.213	0.954	Compliant
GSM/UMTS/LTE Data Module (FCC ID: XPYTOBYL200, IC: 8595A-TOBYL200)	1909.8	2944.219	23	0.443	1.0	0.443	0.213	0.656	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 details.

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EXHIBIT 6.   TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Hewlett Packard	HP 8593EM	3412A00103	9 kHz–26.5 GHz	Apr. 9, 2017
Attenuator	Pasternack	PE7010-20	-	DC–2 GHz	Jan. 2, 2016
L.I.S.N	EMCO	3825/2	2209	0.10 -100 MHz	Sep. 3, 2015
Peak Power Analyzer	Hewlett Packard	8990A	3314A00602	0.5 - 40 GHz	Nov. 11, 2015
Peak Power Sensor	Hewlett Packard	84814A	3205A00175	0.5 - 40 GHz	Nov. 13, 2015
DC Block	Picosecond Pulse Labs	5501A	4678	0.7 kHz–26 GHz	Cal on use
Attenuator	Pasternack	7024-20	6	DC–26.5 GHz	Cal on use
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20Hz–40 GHz	Nov. 21, 2015
DC Block	Hewlett Packard	11742A	12460	0.045–26.5 GHz	Cal on use
High Pass Filter	K & L	11SH10-4000/T12000	4	Cut off 2400 MHz	Cal on use
Band Reject Filter	Micro-Tronics	BRM50701	105	Cut off 2.4-2.483 GHz	Cal on use
RF Amplifier	Hewlett Packard	84498	3008A00769	1 – 26.5 GHz	Feb. 4, 2016
RF Amplifier	Com-Power	PAM-118A	551016	0.5 – 18 GHz	Jan. 6, 2016
Biconi-Log Antenna	ETS Lindgren	3142C	26873	26 – 3000 MHz	Apr. 14, 2016
Horn Antenna	ETS Lindgren	3155	5955	1 – 18 GHz	Mar. 26, 2016
Horn Antenna	EMCO	3160-09	118385	18 – 26.5 GHz	Aug. 4, 2016

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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:** $u_c(y) = \sqrt{\sum_{l=1}^{m} u_i^2(y)}$	$\pm$ 1.44	$\pm$ 1.8
U	**Expanded uncertainty U:** $U = 2u_c(y)$	$\pm$ 2.89	$\pm$ 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:** $u_c(y) = \sqrt{\sum_{l=1}^{m} u_i^2(y)}$	$\pm$ 2.39	$\pm$ 2.6
U	**Expanded uncertainty U:** $U = 2u_c(y)$	$\pm$ 4.79	$\pm$ 5.2

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

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