ENGINEERING TEST REPORT

VHF Uni-Directional Amplifier
Model: UDA138225
FCC ID: WDM-UDA138225

Applicant:
Comprod Communications Ltd
3405 North Benzing Road
Orchard Park, NY 14127
USA

Tested in Accordance With

Federal Communications Commission (FCC)
47 CFR, Parts 2 & 90

UltraTech's File No.: 15CMPR010_FCC90

This Test report is Issued under the Authority of Tri M. Luu Vice President of Engineering UltraTech Group of Labs Date: July 23, 2015	
Report Prepared by: Dharmajit Solanki Issued Date: July 23, 2015	Tested by: Mr. Wei Wu Test Dates: April 08 ~ 30 & July 03, 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

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

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 2 & 90
Title:	Telecommunication - Code of Federal Regulations, CFR 47, Part 2 & 90
Purpose of Test:	To gain FCC Certification Authorization for Uni-Directional Amplifier operating in the Frequency Range 150-174 & 216-222 MHz
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - 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.

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

None

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC CFR Parts 0-19, 80-End	2015	Code of Federal Regulations – Title 47, Telecommunication
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
TIA/EIA 603, Ed D	2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
RSS-131, Issue 2	2003	Zone Enhancers for the Land Mobile Service

EXHIBIT 2. PERFROMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Comprod Communications Ltd
Address:	88 Boulevard Industriel Boucherville, Quebec Canada J4B 2X2
Contact Person:	Mr. Fernando Apolinario Phone #: 450-641-1454 Fax #: 450-641-4616 Email Address: fapolinario@comprodcom.com

MANUFACTURER	
Name:	Comprod Communications Ltd
Address:	88 Boulevard Industriel Boucherville, Quebec Canada J4B 2X2
Contact Person:	Mr. Fernando Apolinario Phone #: 450-641-1454, Ext.106 Fax #: 450-641-4616 Email Address: fapolinario@comprodcom.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:	Comprod Communications Ltd
Product Name:	VHF Uni-Directional Amplifier
Model Name or Number:	UDA138225
Serial Number:	5F33812
Type of Equipment:	VHF Amplifier
Power Supply Requirement:	100-260 VAC 50/60 Hz
Transmitting/Receiving Antenna Type:	External
Primary User Functions of EUT:	Amplify Radio Frequency Signals for land mobile radio communications; in building or places where RF is unable to penetrate from the base station site

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	Commercial, Light Industry & Heavy Industry
RF Output Power Rating (Conducted):	31.31 dBm or 1.352 Watts (Single Input) 25.89 dBm (Three Inputs)
Operating Frequency Range:	138-174 & 216-222 MHz
RF Input/Output Impedance:	50 Ohm
Nominal Gain (at -40dBm input power):	76 dB Maximum
Occupied Bandwidth (99%):	Same as of Input Signal BW
Emission Designation:	F3E, F1E, F1D, F2D
Antenna Connector Type:	Antenna connector type depends to that external diplexer used
Antenna Description:	Antenna gain: 3.5 dBd or 5.65 dBi maximum
Receiver	
Equipment Type:	Base station (fixed use)
Intended Operating Environment:	Commercial, Light Industry & Heavy Industry
Power Supply Requirement:	100-260 VAC 50/60 Hz or 6V/2A and 48V/1A DC Power
RF Input Power Rating:	Single input: -45 dBm Nominal
Operating Frequency Range:	Same as Transmitter

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	AC power input	1	RCPT waterproof 3 positions, Male	Non-shielded
2	Optional DC power input	1	D-Sub 9, Male	Shielded
3	D/L VGA IN	1	N-Female	Shielded
4	D/L VGA OUT	1	N-Female	Shielded
5	D/L PA IN	1	N-Female	Shielded
6	D/L PA OUT	1	N-Female	Shielded

2.5. ASSOCIATED EQUIPMENT

None

2.6. ANCILLARY EQUIPMENT

N/A

2.7. DRAWING OF TEST SETUP

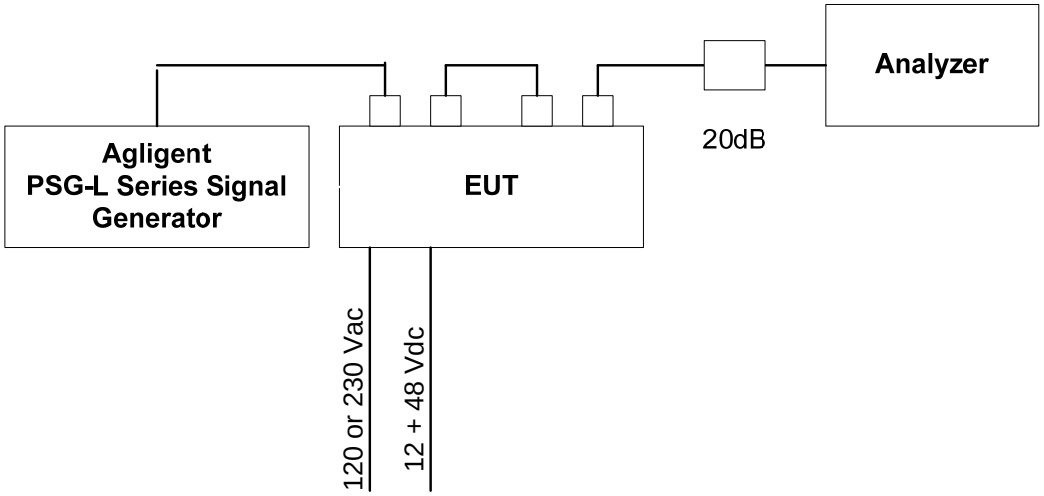


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21-24^{o}C
Humidity:	40-54%
Pressure:	100-102 kPa
Power input source:	120 VAC, 60 Hz

3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

Operating Modes:	The amplifier was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data.
Special Test Software:	N/A
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT is tested with the amplifier antenna ports terminated to a 50 Ohm RF Load.

Transmitter Test Signals	
Frequency Band(s):	138*-174 & 216-222 MHz
Frequency(ies) Tested: (Near lowest, near middle & near highest frequencies in the frequency range of operation.)	138*, 150.05 and 174 MHz & 217, 219 and 222 MHz
Transmitter Wanted Output Test Signals:	
Transmitter Power (measured maximum output power):	31.31 dBm
Normal Test Modulation:	F3E, F1E, F1D, F2D (Analog & Digital)
Modulating signal source:	External

*** Note- This test results are "Not applicable for FCC Certification" purpose.**

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)
2.1033(c)(5) & 90.35	Frequency Band/Range of Operation	Yes
2.1033, 2.1046, 90.205, 90.259 & 90.729	RF Power Output (Conducted) & Gain	Yes
1.1307, 1.1310, 2.1091/93	RF Exposure Limit	Yes
2.1055 & 90.213	Frequency Stability	N/A for Amplifier
2.1047(a)	Audio Frequency Response	N/A for Amplifier
2.1047(b) & 90.210	Modulation Limiting	N/A for Amplifier
2.1033 & 2.1047, 90.210 & 2.1049	Occupied Bandwidth & Emission Mask	Yes
2.1051 & 2.1057	Spurious Emissions at Antenna Terminals	Yes
2.1053 & 2.1057	Field Strength of Spurious Radiation	Yes
15.107(b)	AC/DC Power Line Conducted Emissions	Yes

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

4.4. DEVIATION OF STANDARD TEST PROCEDURES

None

EXHIBIT 5. TEST DATA

5.1. POWER LINE CONDUCTED EMISSIONS [[§ 15.107(b)]

5.1.1. Limits

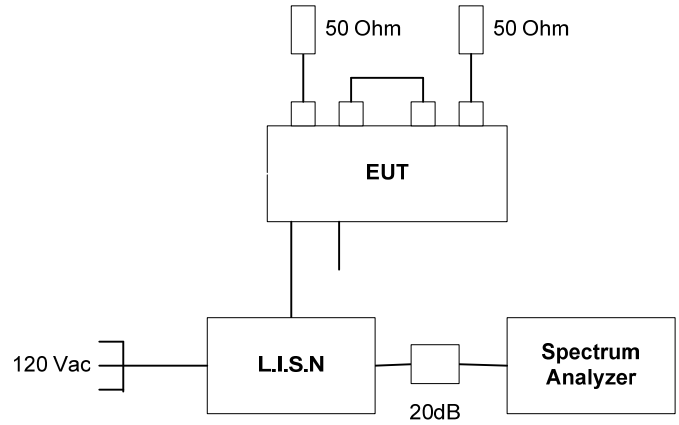
The equipment shall meet the limits of the following table:

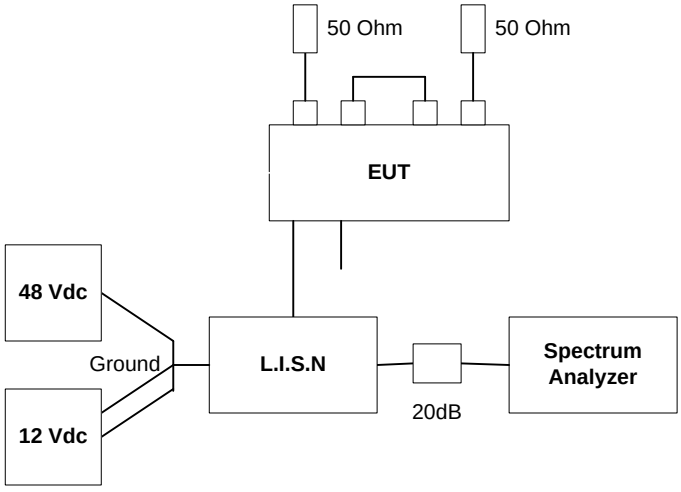
Frequency of emission (MHz)	Conducted Limits (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	79	66
0.5 - 30	73	60

5.1.2. Method of Measurements

Refer to Ultratech Test Procedures ULTR-P001-2004 & ANSI C63.4 for method of measurements.

5.1.3. Test Arrangement





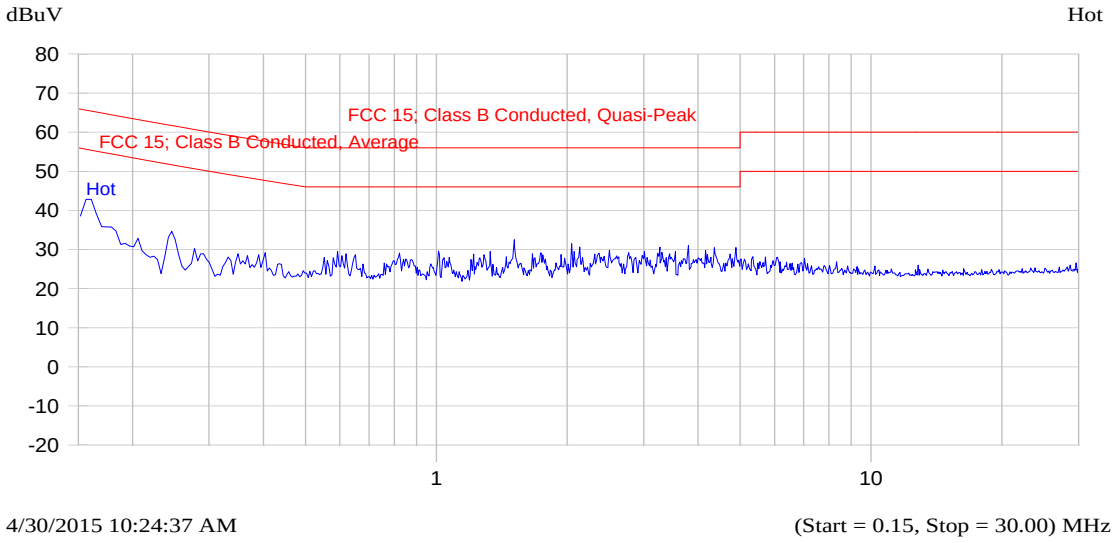
(DC Power Set-up Diagram)

5.1.4. Test Data

Plot 5.1.4.1. Power Line Conducted Emissions
Line Voltage: 120 VAC 60 Hz, Line Tested: Hot

Description: 120 VAC input, RX / Standby mode
Setup Name: FCC 15 Class B
Customer Name: Comprod Communication Ltd.
Project Number: CMPR-010Q
Operator Name: Hung Trinh
EUT Name: UDA138225 Amplifier
Date Created: 4/30/2015 10:21:08 AM

Current Graph



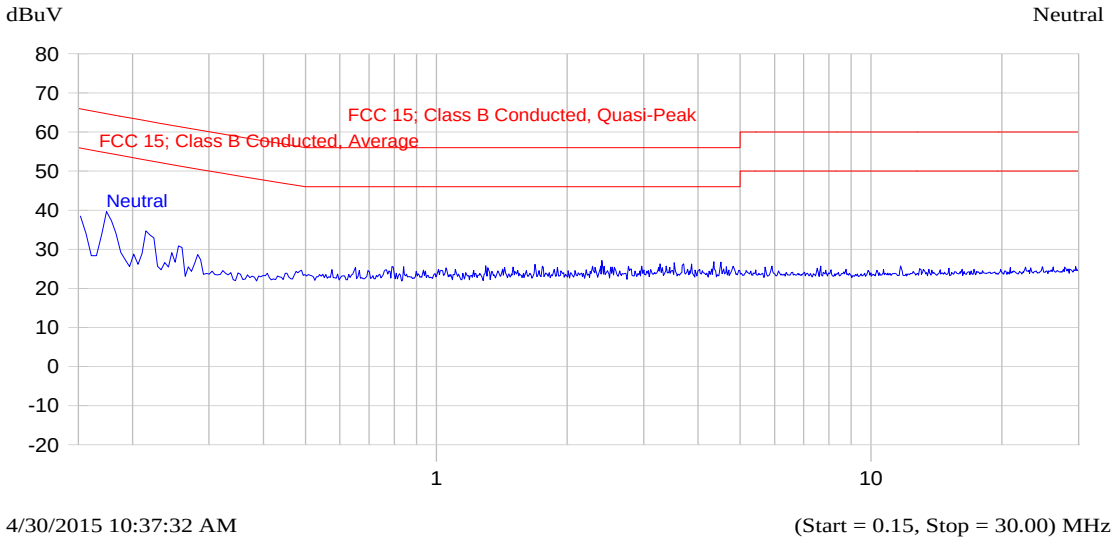
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.174	51.5	46.2	-18.6	35.7	-19.0	Hot
0.244	38.8	33.4	-28.6	27.0	-25.0	Hot
1.513	36.4	31.0	-25.0	24.5	-21.5	Hot

Plot 5.1.4.2. Power Line Conducted Emissions
Line Voltage: 120 VAC 60 Hz, Line Tested: Neutral

Description: 120 VAC input, RX / Standby mode
Setup Name: FCC 15 Class B
Customer Name: Comprod Communication Ltd.
Project Number: CMPR-010Q
Operator Name: Hung Trinh
EUT Name: Amplifier
Date Created: 4/30/2015 10:21:08 AM

Current Graph



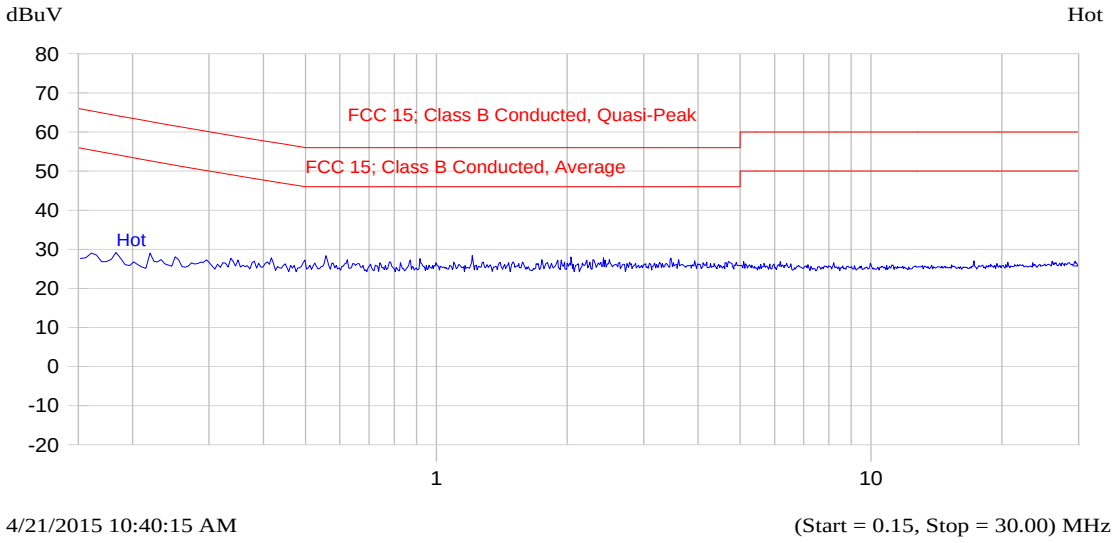
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.172	49.1	43.6	-21.3	33.1	-21.8	Neutral
0.217	40.2	34.9	-28.1	28.1	-24.8	Neutral
0.245	38.5	32.4	-29.5	25.9	-26.0	Neutral

Plot 5.1.4.3. Power Line Conducted Emissions
Line Voltage: 12 VDC & 48 VDC, Line Tested: Hot

Description: 12 VDC & 48 VDC input, RX / Standby mode
Setup Name: FCC 15 Class B
Customer Name: Comprod Communication Ltd.
Project Number: CMPR-010Q
Operator Name: Hung Trinh
EUT Name: UDA138225 Amplifier
Date Created: 4/21/2015 10:29:44 AM

Current Graph



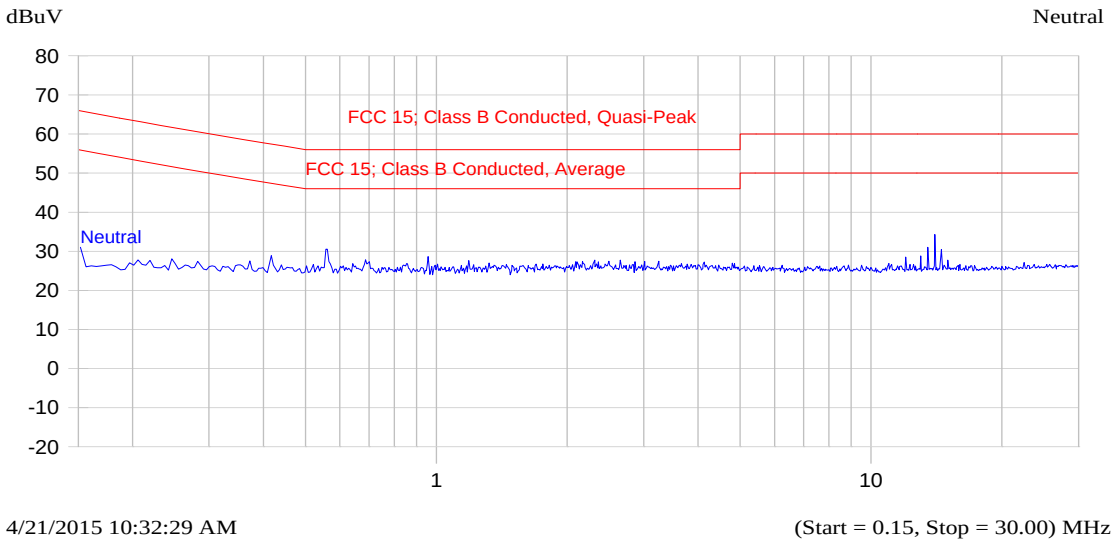
Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.181	37.9	33.2	-31.3	26.2	-28.2	Hot
0.211	37.7	32.3	-30.9	25.4	-27.7	Hot

Plot 5.1.4.4. Power Line Conducted Emissions
Line Voltage: 12 VDC & 48 VDC, Line Tested: Neutral

Description: 12 VDC & 48 VDC input, RX / Standby mode
Setup Name: FCC 15 Class B
Customer Name: Comprod Communication Ltd.
Project Number: CMPR-010Q
Operator Name: Hung Trinh
EUT Name: UDA138225 Amplifier
Date Created: 4/21/2015 10:29:44 AM

Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.557	40.4	36.9	-19.1	33.4	-12.6	Neutral
14.003	37.5	33.9	-26.1	31.2	-18.8	Neutral

5.2. RF POWER OUTPUT, NON-LINEARITY & GAIN [§§ 2.1033, 2.1046, 90.205, 90.259 & 90.729]

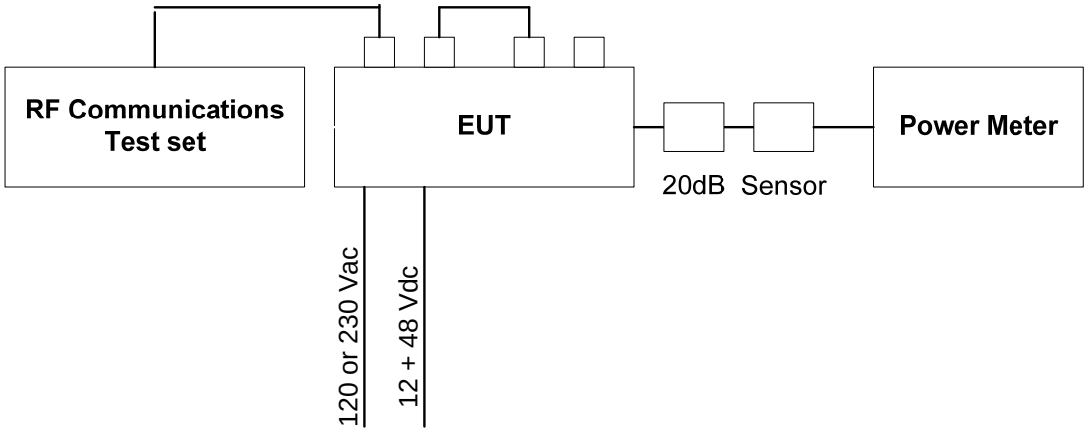
5.2.1. Limits

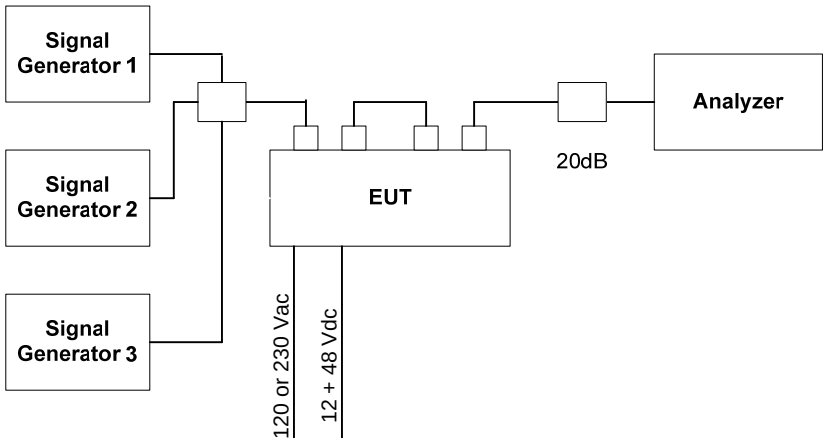
Please refer to FCC 47 CFR §§ 90.205, 90.259 and 90.729 for specification details.

5.2.2. Method of Measurements

ANSI/TIA-603-D-2010.

5.2.3. Test Arrangement





(Test Set-up for Inter-modulation)

5.2.4. Test Data

Remark: The maximum antenna gain to be used with this device is 3.5 dBd. Test results for 6.25, 12.5 & 25 kHz channel spacing were found same as shown below.

(a) 120V AC Power Supply:

Frequencies (MHz)	Bandwidth (kHz)	Power Rating (dBm)	MSA2 Setting	Input Power (dBm)	Measured (dBm)	RF Gain (dB)	Margin ± 1 dB (dB)
138.0000*	6.25/12.5/25	29	D	-45	29.30	74.30	0.30
148.0000*	6.25/12.5/25	30	D	-45	30.22	75.22	0.22
150.0500	6.25/12.5/25	30	D	-45	30.20	75.20	0.20
153.0000	6.25/12.5/25	31	C	-45	31.11	76.11	0.11
154.0000	6.25/12.5/25	31	C	-45	31.07	76.07	0.07
156.4875	6.25/12.5/25	31	C	-45	30.98	75.98	-0.02
165.0000	6.25/12.5/25	31	C	-45	30.62	75.62	-0.38
174.0000	6.25/12.5/25	31	C	-45	30.31	75.31	-0.69
217.0000	6.25/12.5/25	30	A	-45	30.36	75.36	0.36
219.0000	6.25/12.5/25	30	A	-45	30.13	75.13	0.13
222.0000	6.25/12.5/25	29	A	-45	29.66	74.66	0.66

(b) 230V AC Power Supply:

Frequencies (MHz)	Bandwidth (kHz)	Power Rating (dBm)	MSA2 Setting	Input Power (dBm)	Measured (dBm)	RF Gain (dB)	Margin ± 1 dB (dB)
138.0000*	6.25/12.5/25	29	D	-45	29.30	74.30	0.30
148.0000*	6.25/12.5/25	30	D	-45	30.22	75.22	0.22
150.0500	6.25/12.5/25	30	D	-45	30.20	75.20	0.20
153.0000	6.25/12.5/25	31	C	-45	31.11	76.11	0.11
154.0000	6.25/12.5/25	31	C	-45	31.07	76.07	0.07
156.4875	6.25/12.5/25	31	C	-45	30.98	75.98	-0.02
165.0000	6.25/12.5/25	31	C	-45	30.62	75.62	-0.38
174.0000	6.25/12.5/25	31	C	-45	30.31	75.31	-0.69
217.0000	6.25/12.5/25	30	A	-45	30.36	75.36	0.36
219.0000	6.25/12.5/25	30	A	-45	30.13	75.13	0.13
222.0000	6.25/12.5/25	29	A	-45	29.66	74.66	0.66

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

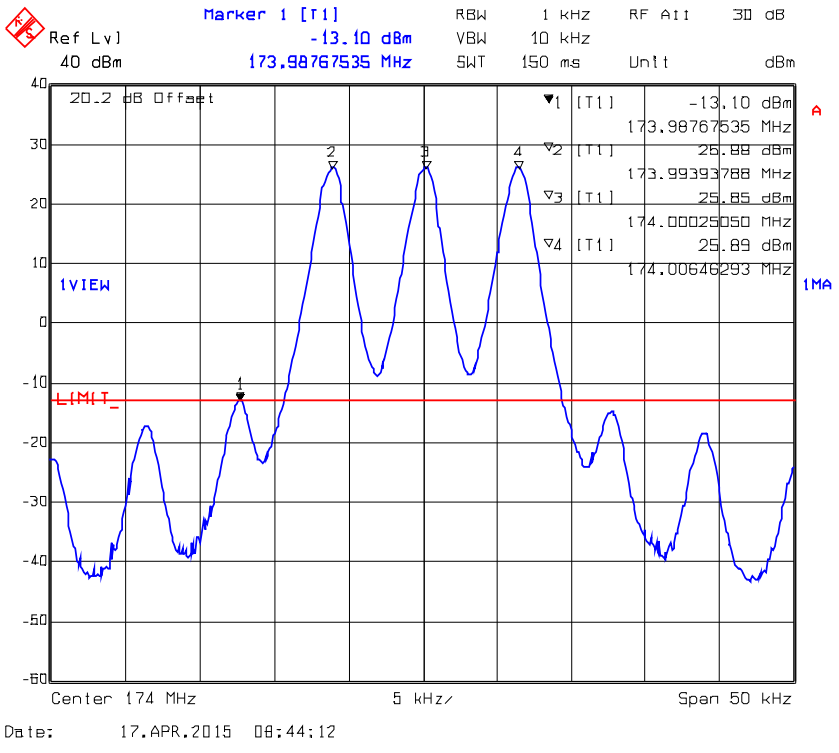
(c) 12V/48V DC Power Supply:

Frequencies (MHz)	Bandwidth (kHz)	Power Rating (dBm)	MSA2 Setting	Input Power (dBm)	Measured (dBm)	RF Gain (dB)	Margin ± 1 dB (dB)
138.0000*	6.25/12.5/25	29	D	-45	29.85	74.85	0.85
148.0000*	6.25/12.5/25	30	D	-45	30.46	75.46	0.46
150.0500	6.25/12.5/25	30	D	-45	30.42	75.42	0.42
153.0000	6.25/12.5/25	31	C	-45	31.31	76.31	0.31
154.0000	6.25/12.5/25	31	C	-45	31.28	76.28	0.28
156.4875	6.25/12.5/25	31	C	-45	31.20	76.20	0.20
165.0000	6.25/12.5/25	31	C	-45	30.89	75.89	-0.11
174.0000	6.25/12.5/25	31	C	-45	30.63	75.63	-0.37
217.0000	6.25/12.5/25	30	A	-45	30.58	75.58	0.58
219.0000	6.25/12.5/25	30	A	-45	30.34	75.34	0.34
222.0000	6.25/12.5/25	29	A	-45	29.77	74.77	0.77

*** Note- This test results are for information and "Not applicable for FCC Certification" purpose.**

5.2.4.1. Inter-modulation Measurements

Plot 5.2.4.1.1. Intermodulation, Three CW Signals of passband
Output Signal levels: 174 MHz at 25.85dBm, 173.99375 MHz at 25.88dBm and 174.00625 MHz at 25.89dBm



5.3. OCCUPIED BANDWIDTH & EMISSION MASK [§ 2.1049, 90.209 & 90.210]

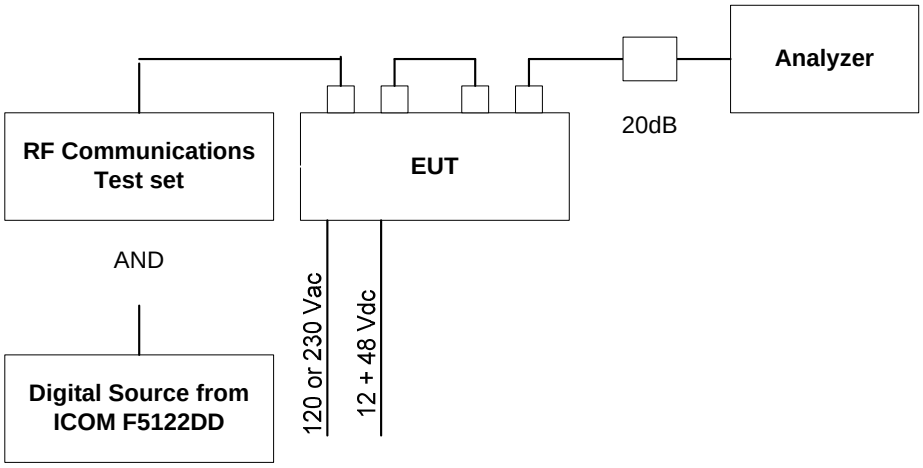
5.3.1. Limits

The spectral shape of the output should look similar to input for all modulations and within the applicable masks as per Sec 90.209 & 90.210.

5.3.2. Method of Measurements

ANSI/TIA-603-D-2010.

5.3.3. Test Arrangement



5.3.4. Test Data

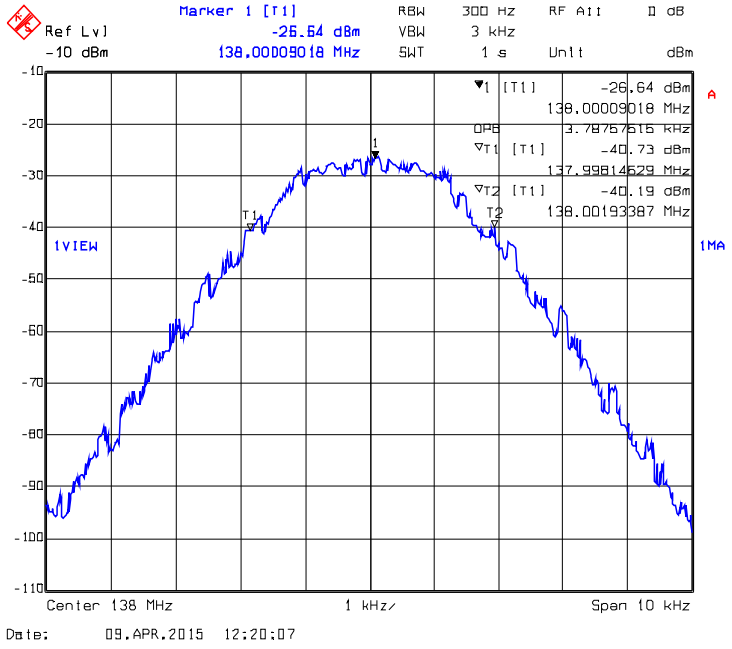
Occupied Bandwidth Measurement results of Input & Output Signals:

Frequency (MHz)	Digital (6.25 kHz) IN (kHz)	Digital (6.25 kHz) OUT (kHz)	Digital (12.5 kHz) IN (kHz)	Digital (12.5 kHz) OUT (kHz)	Analog (6.25 kHz) IN (kHz)	Analog (6.25 kHz) OUT (kHz)	Analog (12.5 kHz) IN (kHz)	Analog (12.5 kHz) OUT (kHz)	Analog (25 kHz) IN (kHz)	Analog (25 kHz) OUT (kHz)
138.0*	3.79	3.85	8.22	8.14	2.24	2.24	10.12	10.12	15.22	15.22
150.05	3.91	3.87	8.18	8.22	2.24	2.24	10.12	10.12	15.22	15.22
174.0	3.91	3.83	8.02	8.10	2.24	2.24	10.12	10.12	15.22	15.22
217.0	3.89	3.89	8.14	8.02	2.24	2.25	10.12	10.12	15.22	15.22
219.0	3.87	3.83	8.02	8.21	2.24	2.25	10.12	10.12	15.22	15.22
222.0	3.93	3.93	8.10	8.06	2.25	2.25	10.12	10.12	15.22	15.22

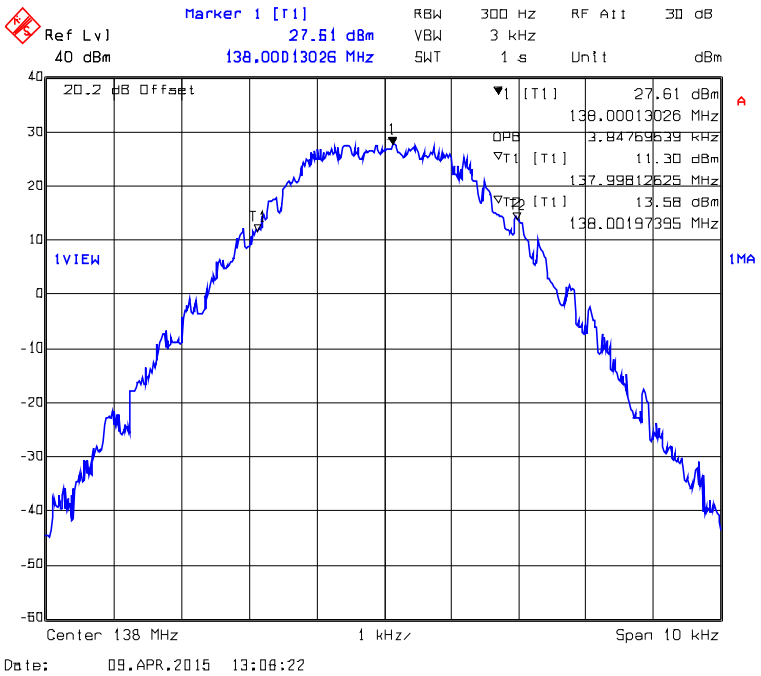
*** Note- This test results are for information and "Not applicable for FCC Certification" purpose.**

Remark: 99% OBW of the RF input and RF output signals were measured for comparison.

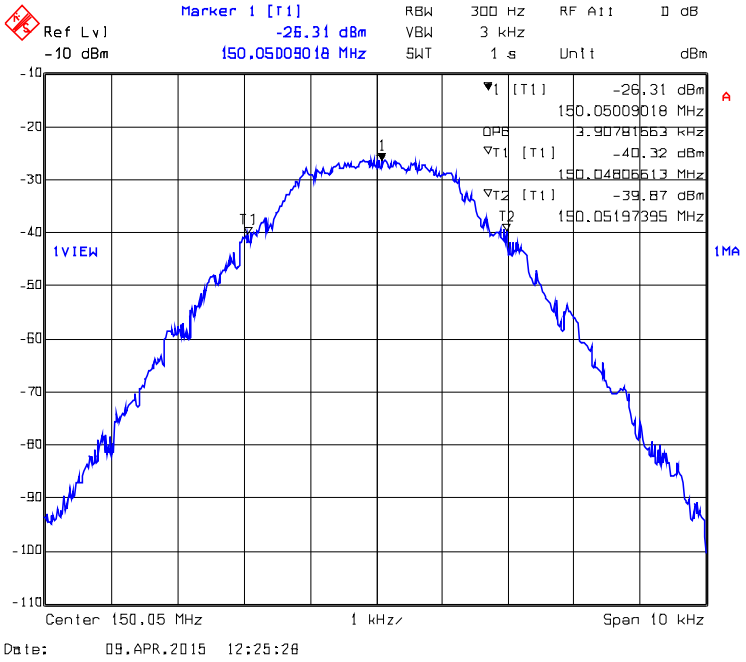
Plot 5.3.4.1.1. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 138 MHz



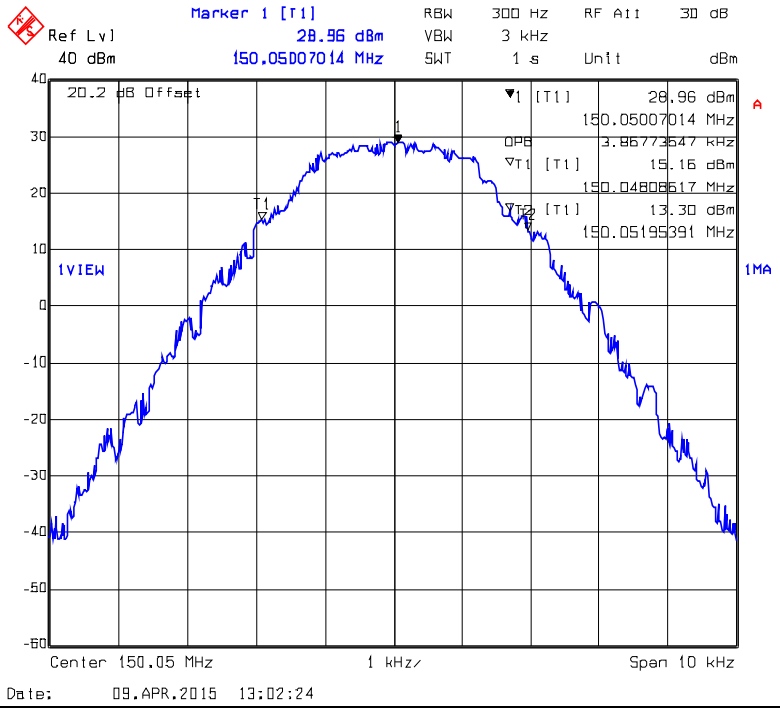
Plot 5.3.4.1.2. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 138 MHz



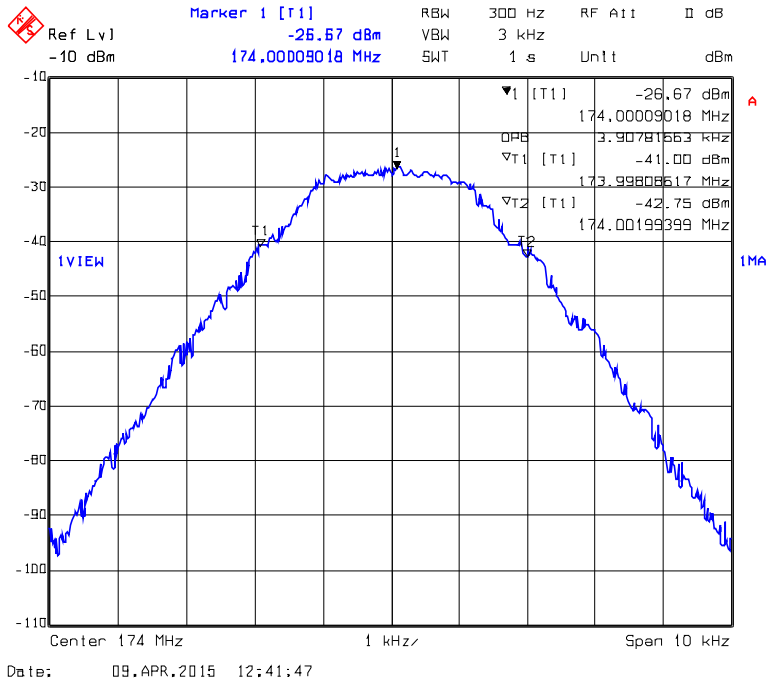
Plot 5.3.4.1.3. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



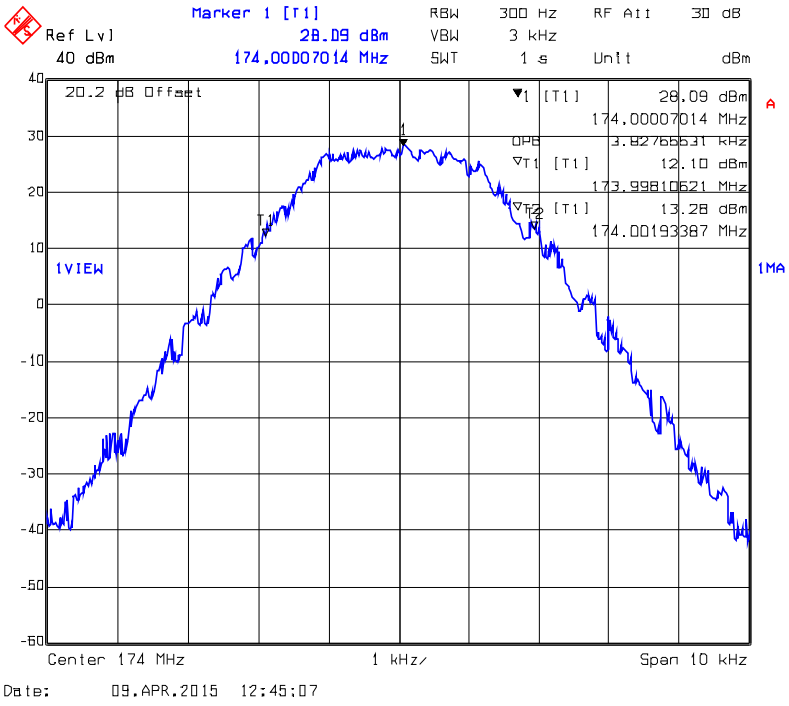
Plot 5.3.4.1.4. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



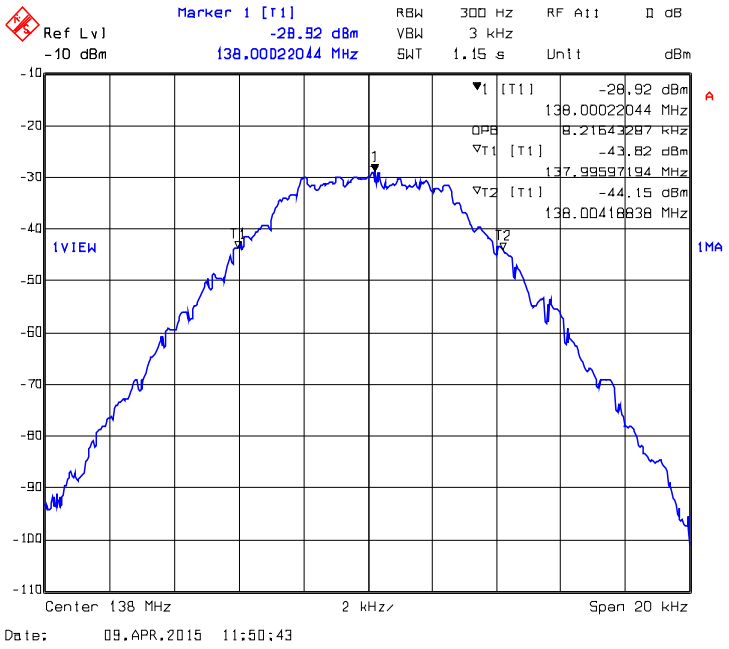
Plot 5.3.4.1.5. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



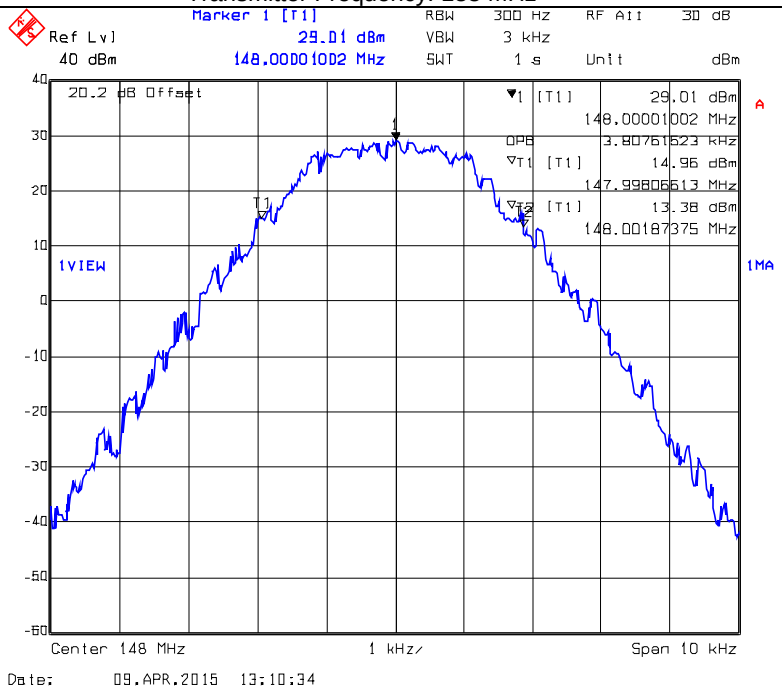
Plot 5.3.4.1.6. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



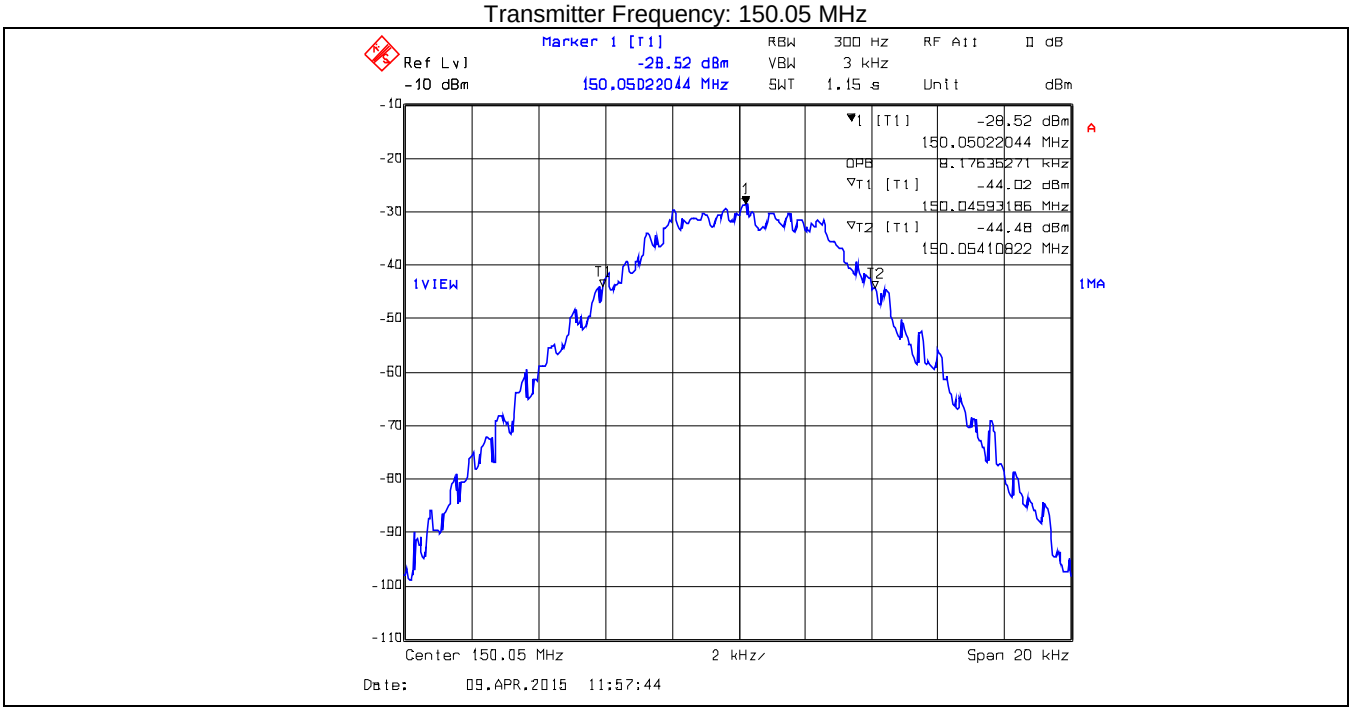
Plot 5.3.4.1.7. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 138 MHz



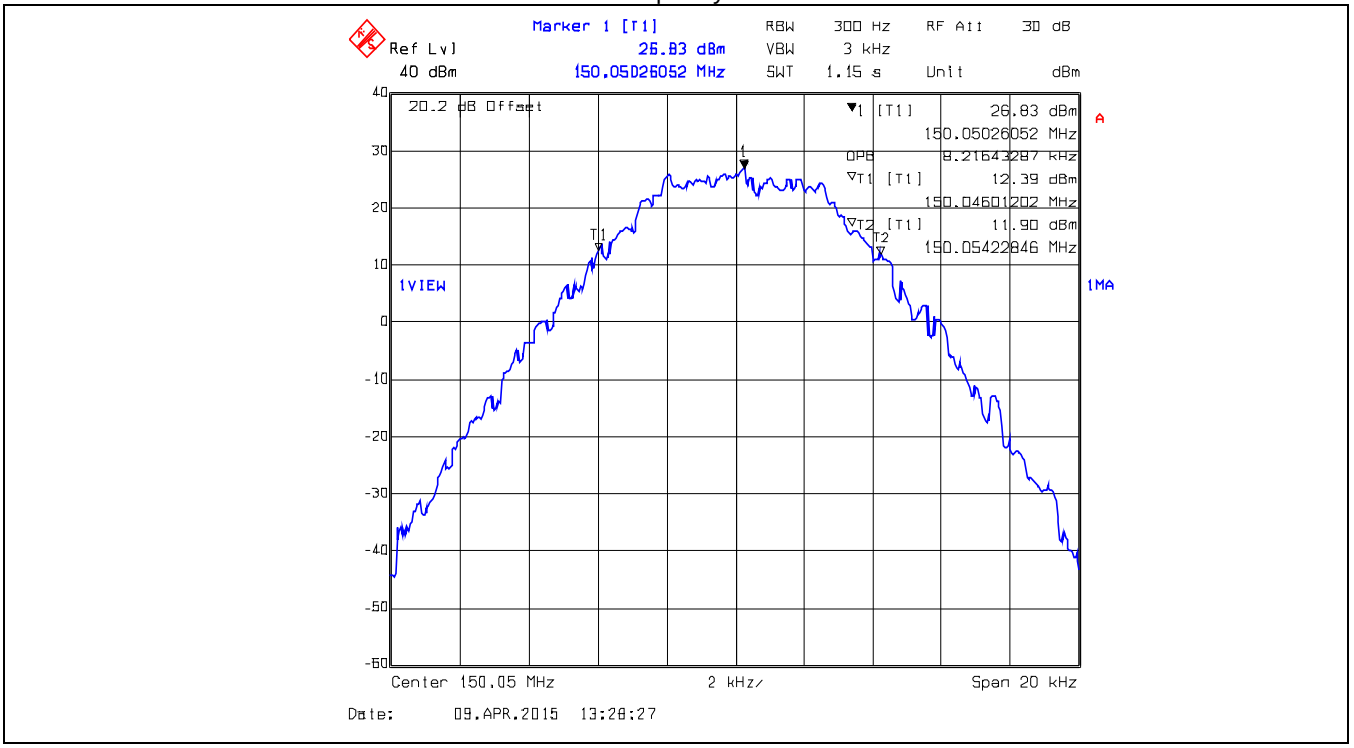
Plot 5.3.4.1.8. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 138 MHz



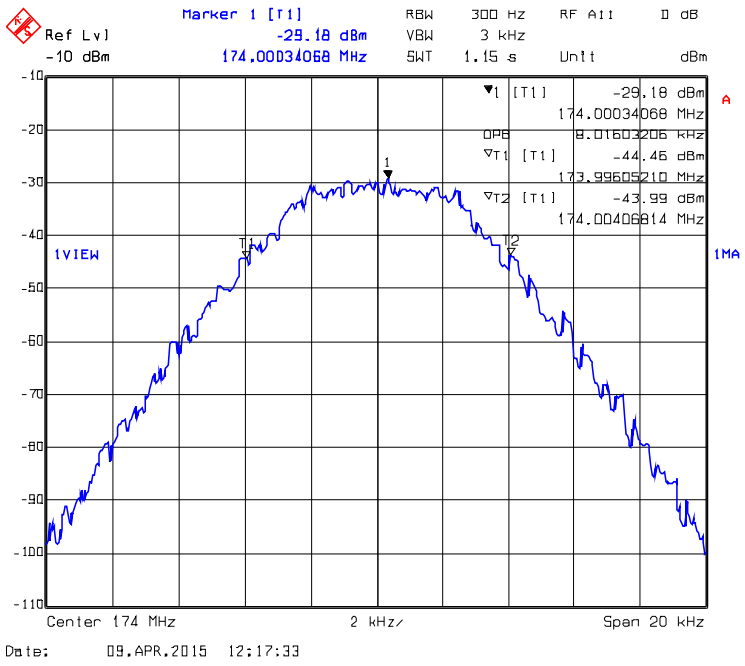
Plot 5.3.4.1.9. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



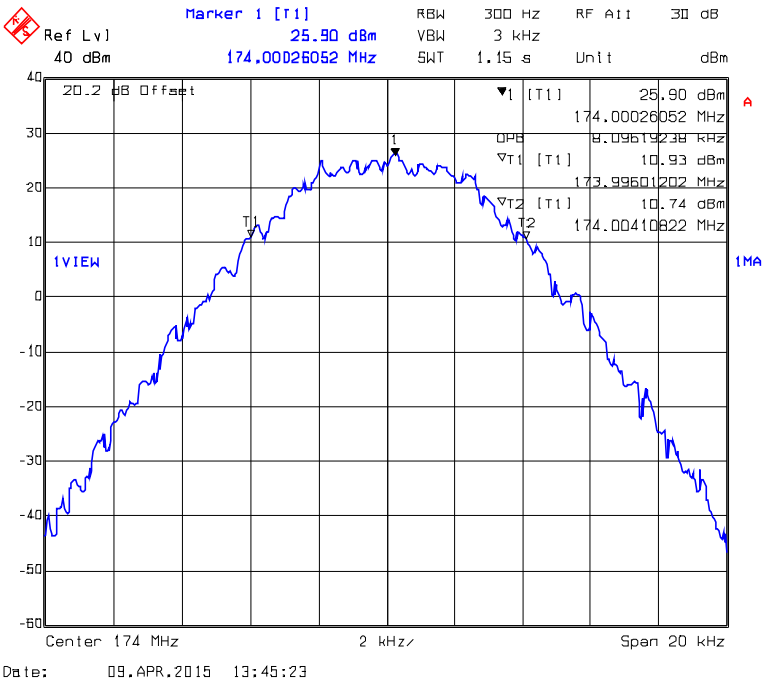
Plot 5.3.4.1.10. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



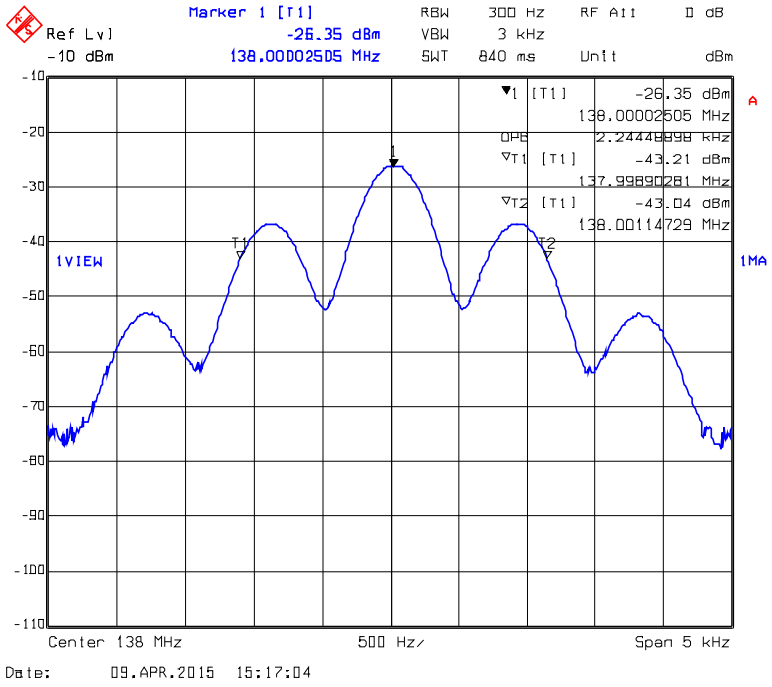
Plot 5.3.4.1.11. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



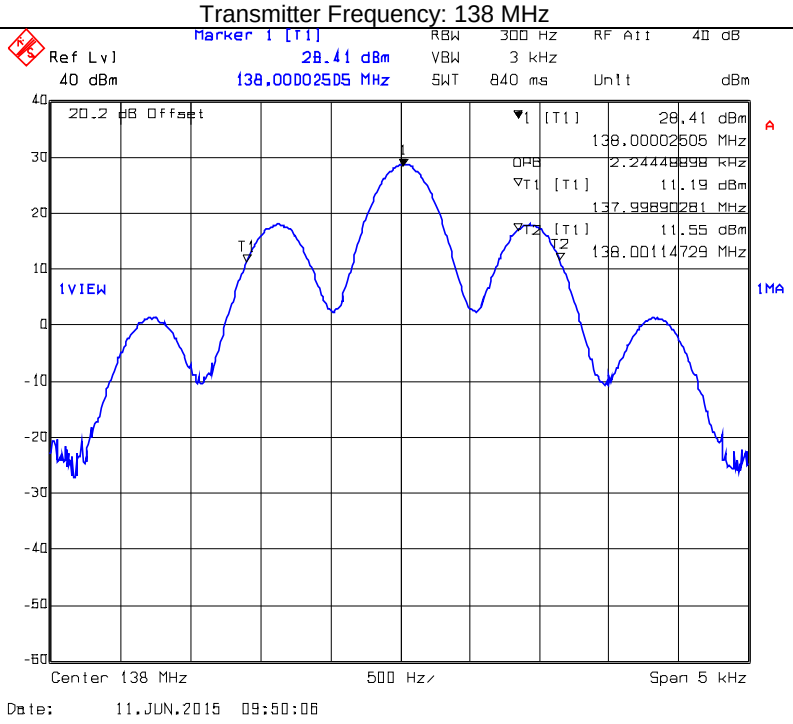
Plot 5.3.4.1.12. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



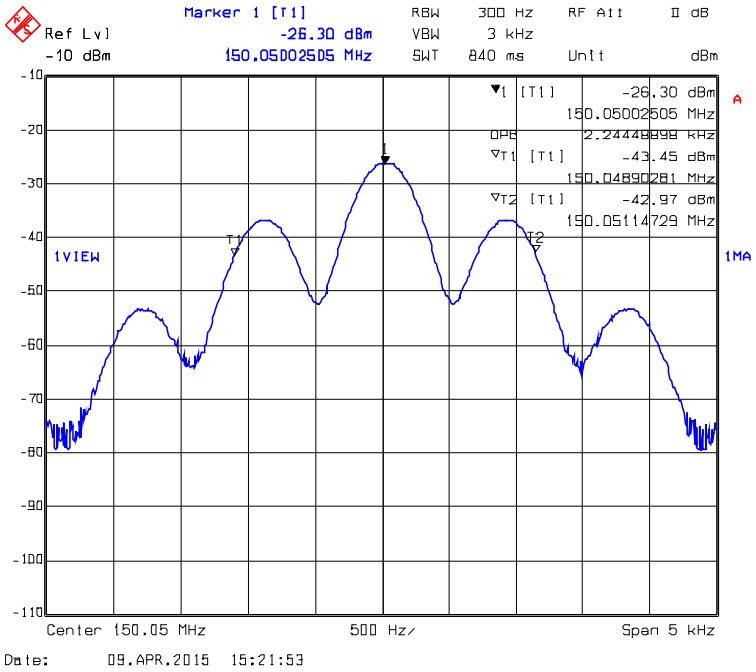
Plot 5.3.4.1.13. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 138 MHz



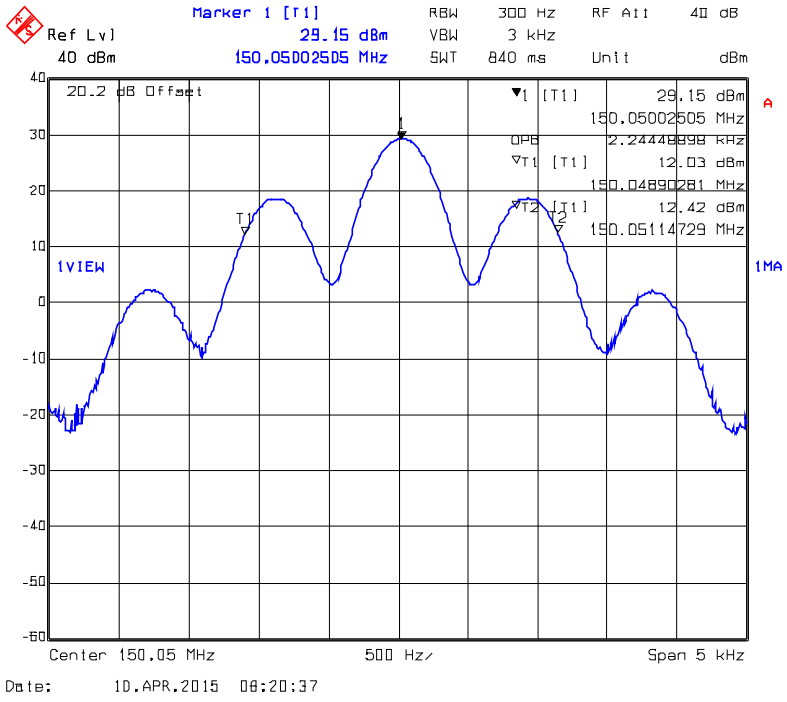
Plot 5.3.4.1.14. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 138 MHz



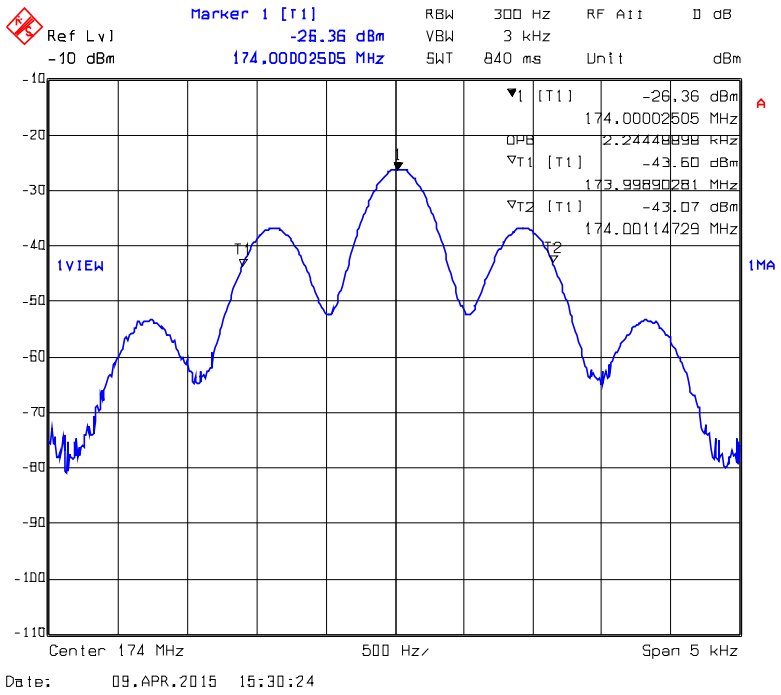
Plot 5.3.4.1.15. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



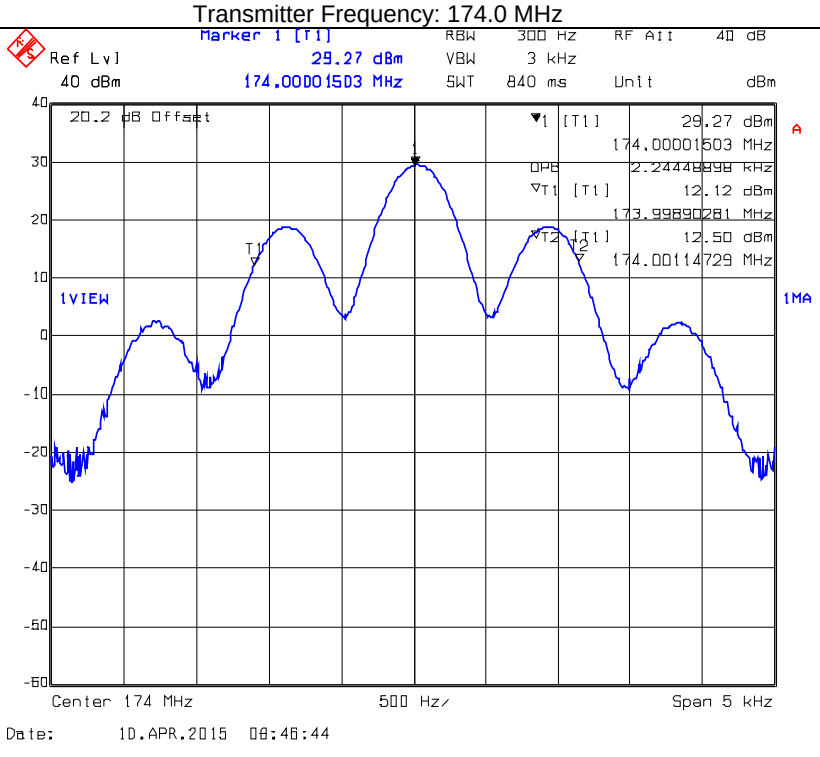
Plot 5.3.4.1.16. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



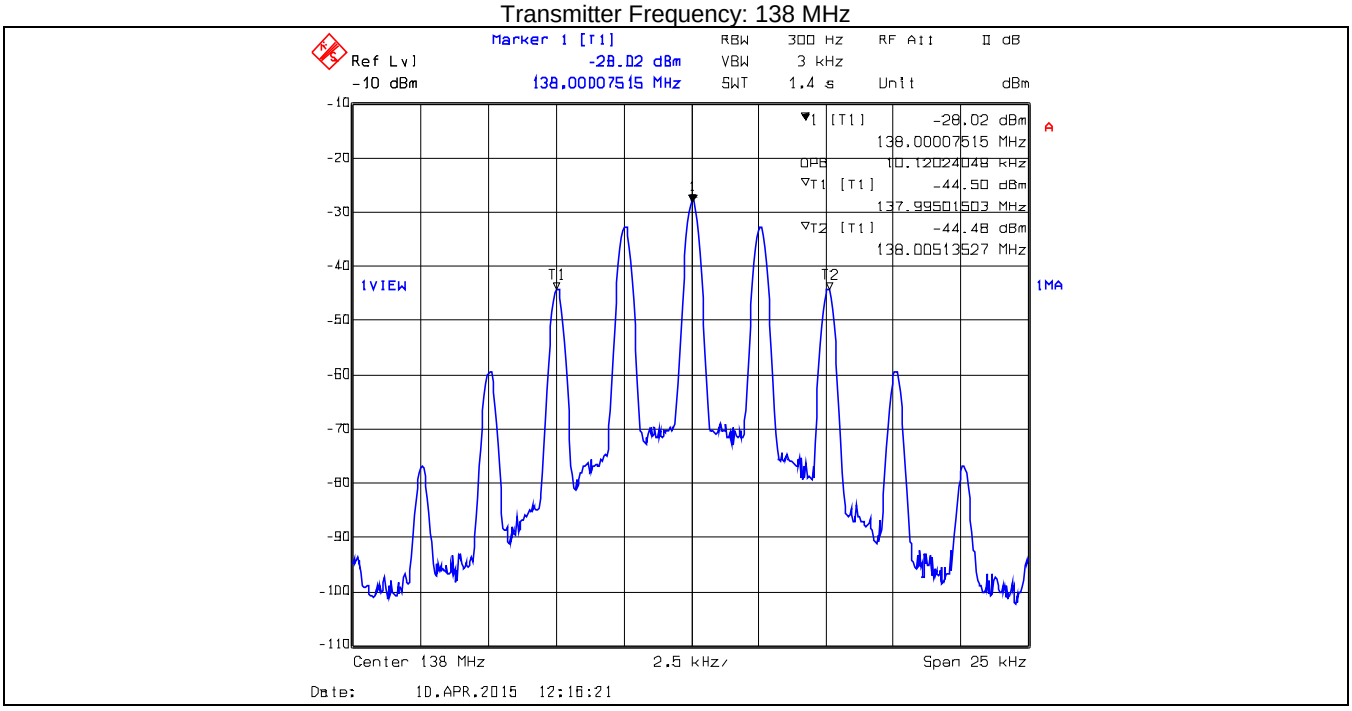
Plot 5.3.4.1.17. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



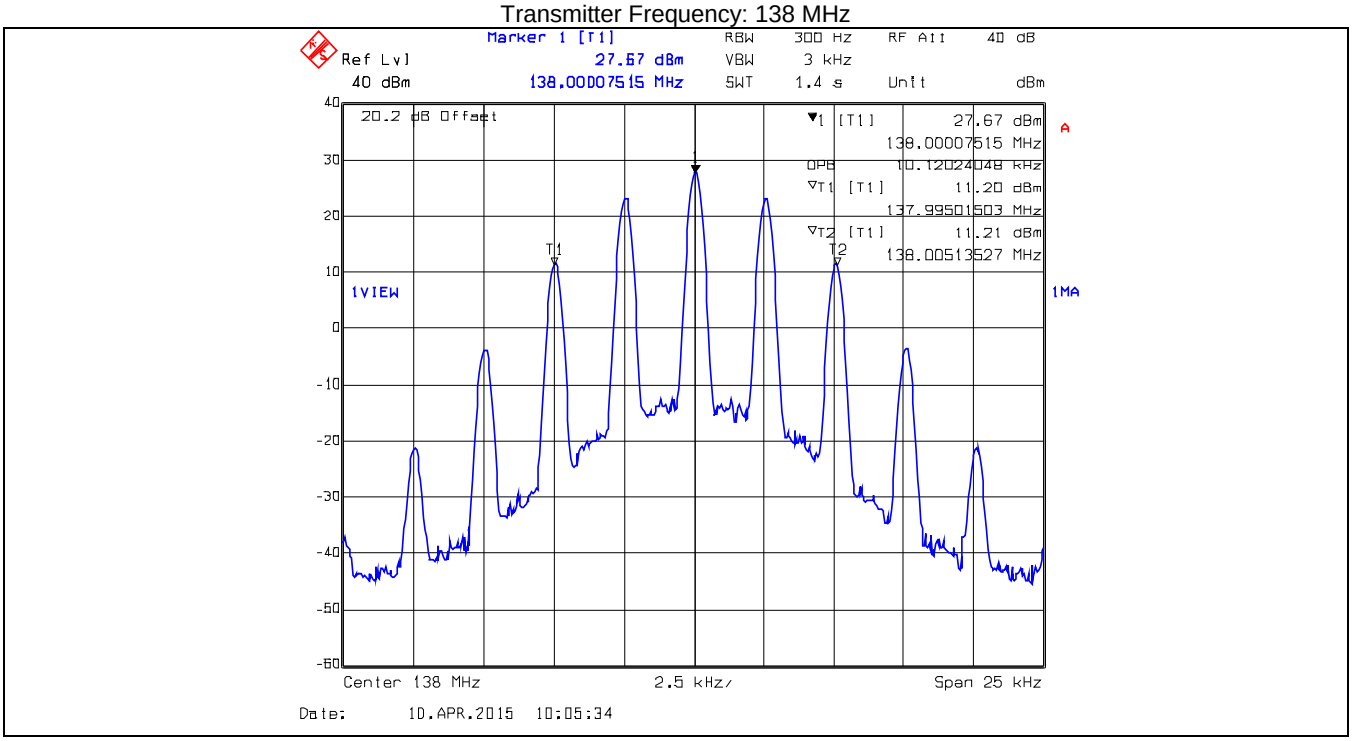
Plot 5.3.4.1.18. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



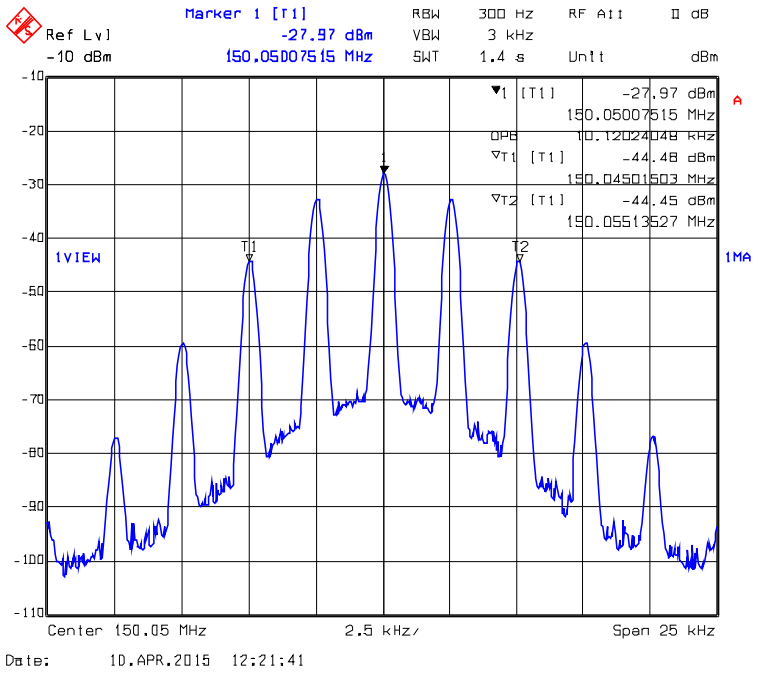
Plot 5.3.4.1.19. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 138 MHz



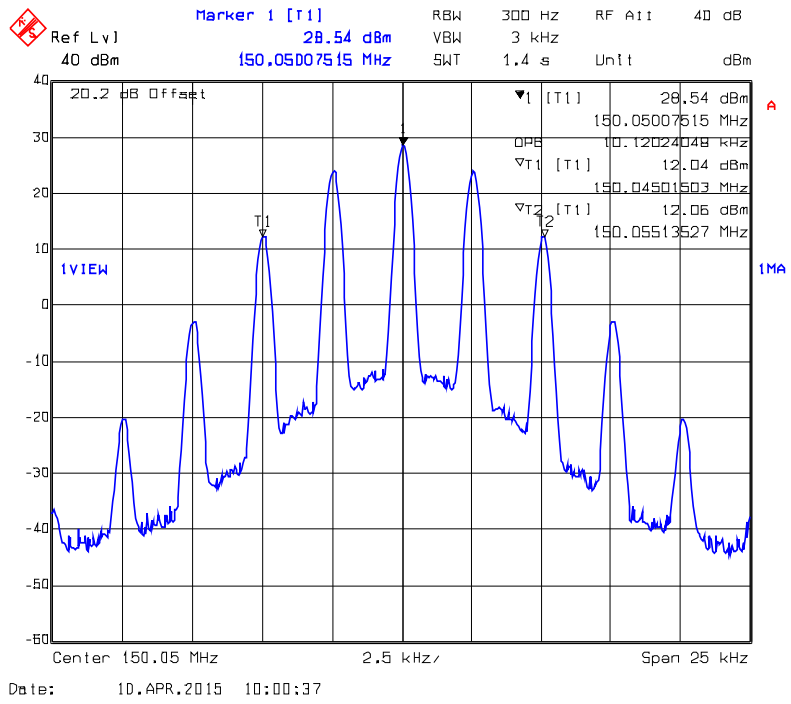
Plot 5.3.4.1.20. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 138 MHz



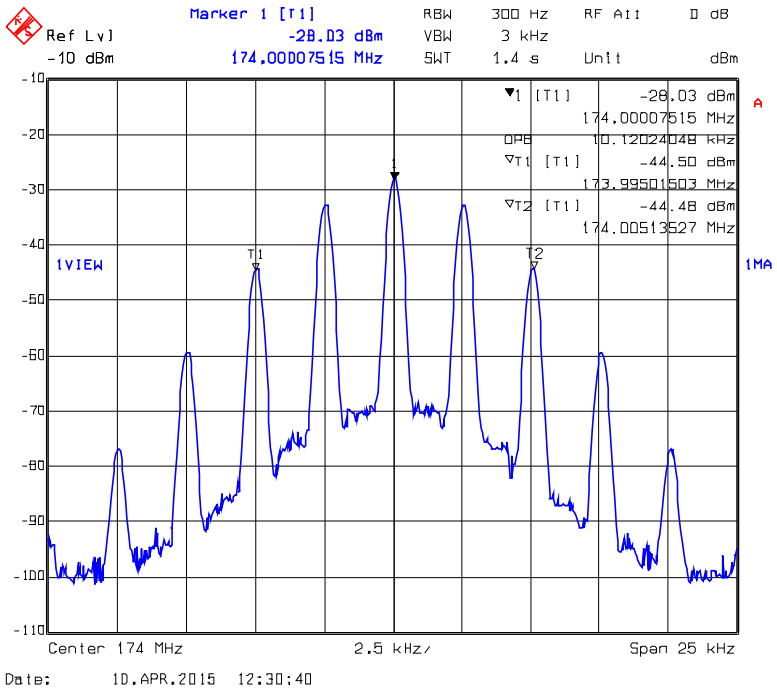
Plot 5.3.4.1.21. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



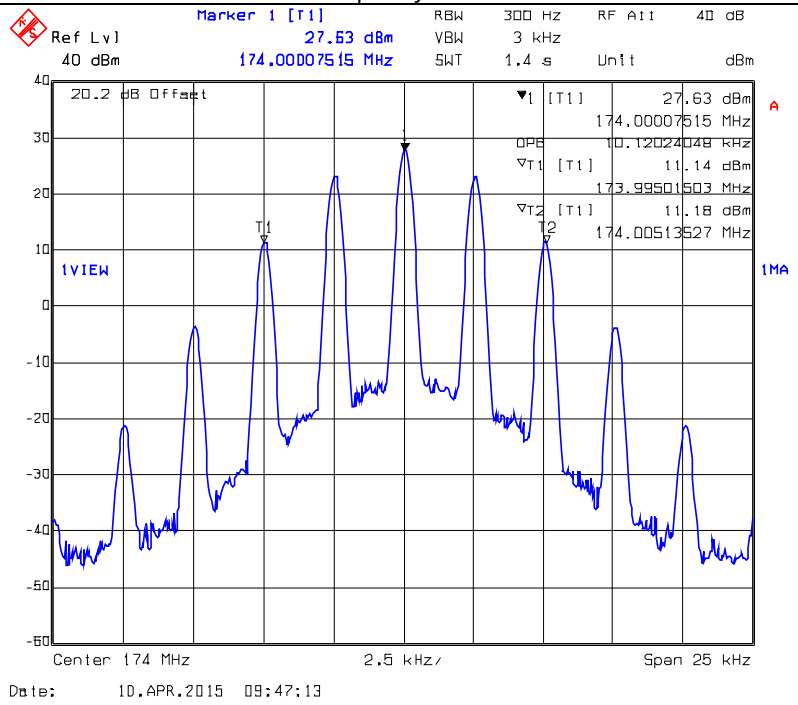
Plot 5.3.4.1.22. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



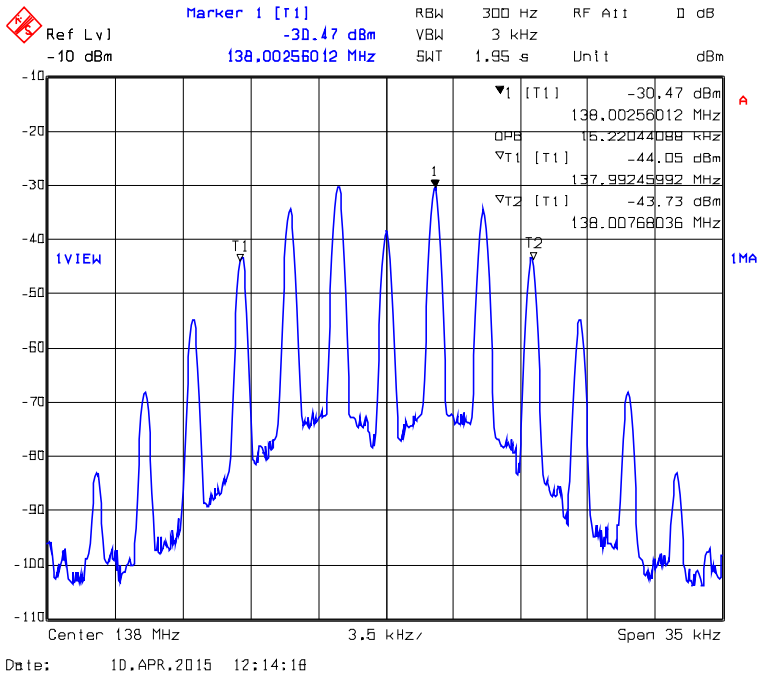
Plot 5.3.4.1.23. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



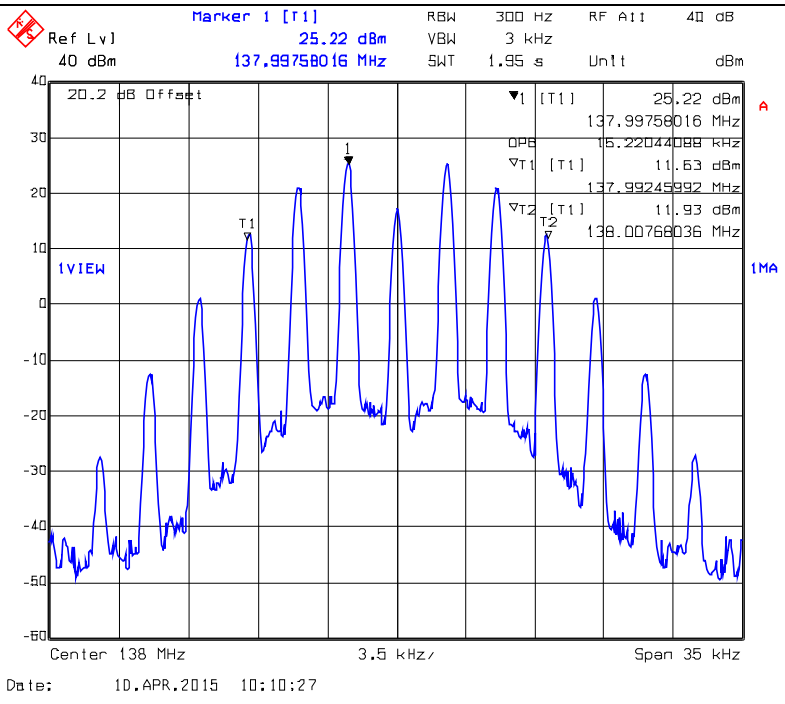
Plot 5.3.4.1.24. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



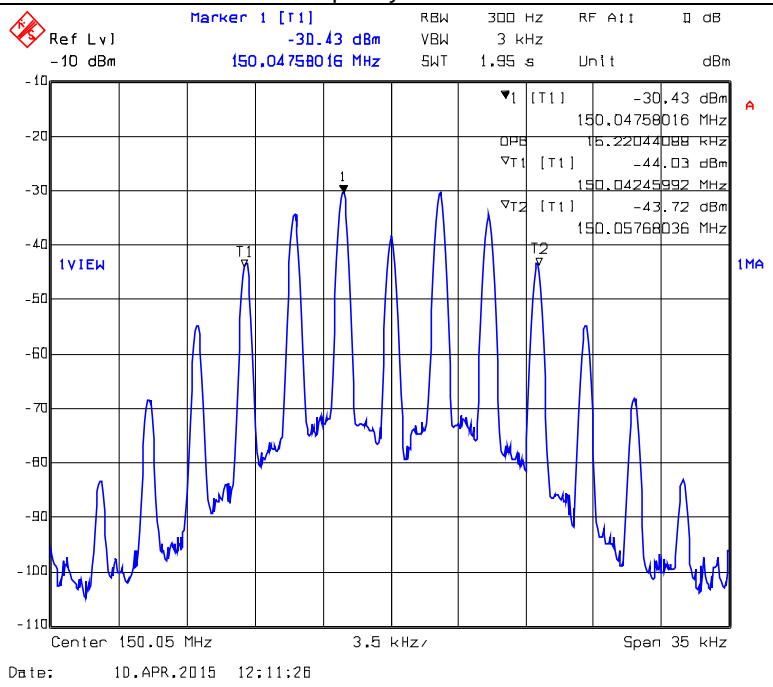
Plot 5.3.4.1.25. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 138 MHz



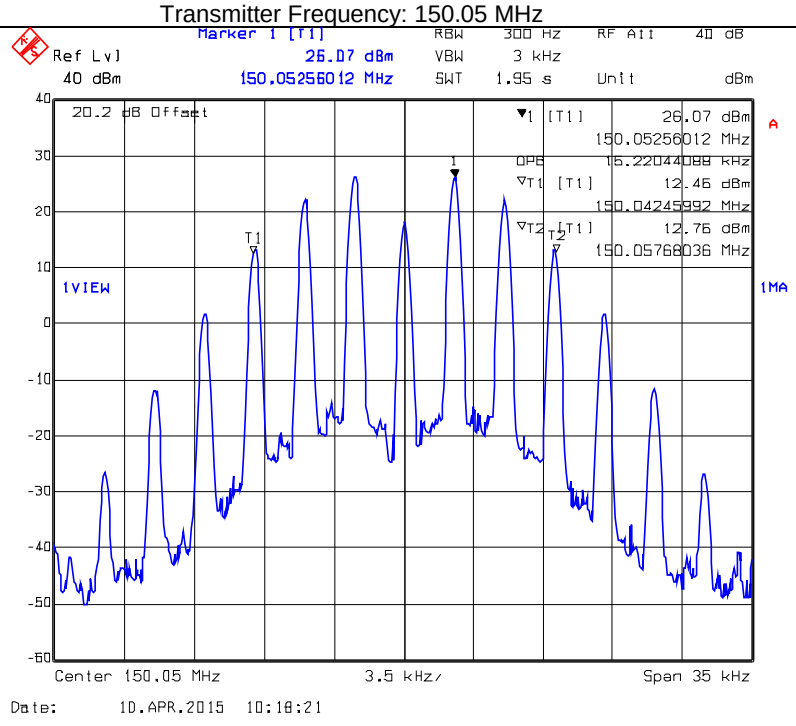
Plot 5.3.4.1.26. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 138 MHz



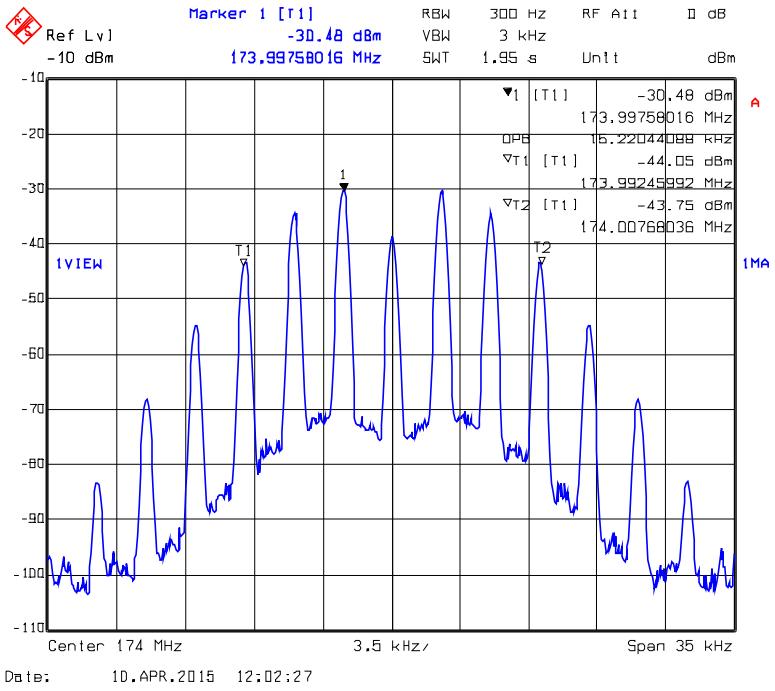
Plot 5.3.4.1.27. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



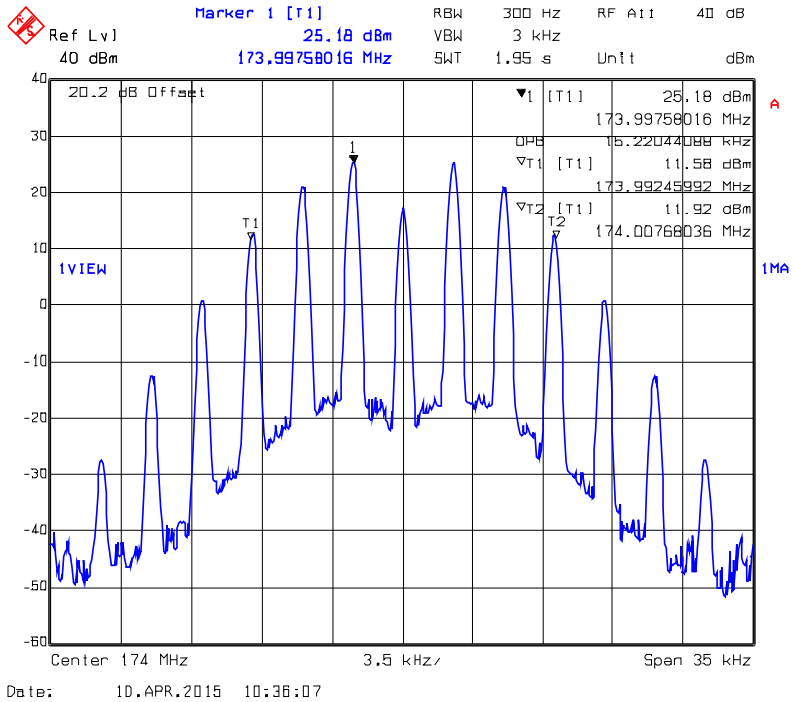
Plot 5.3.4.1.28. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 150.05 MHz



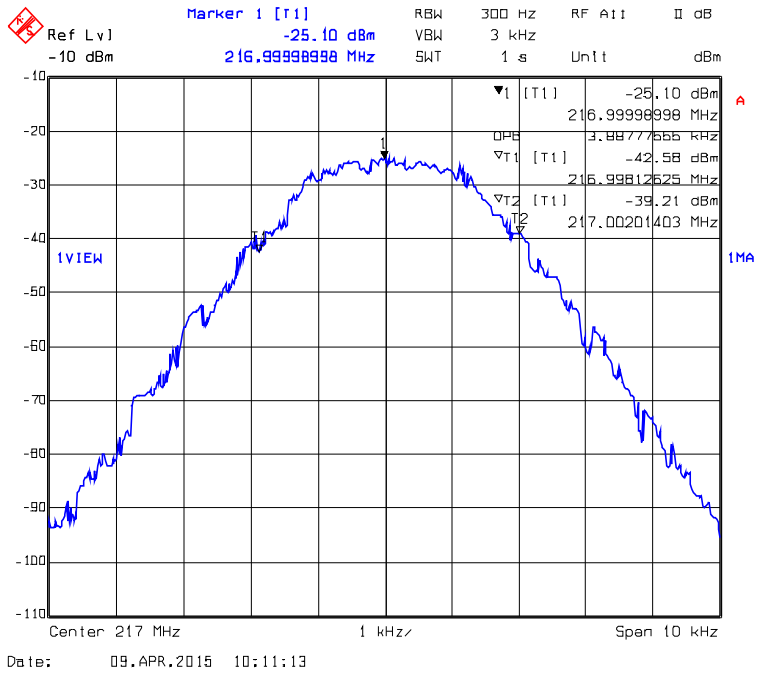
Plot 5.3.4.1.29. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



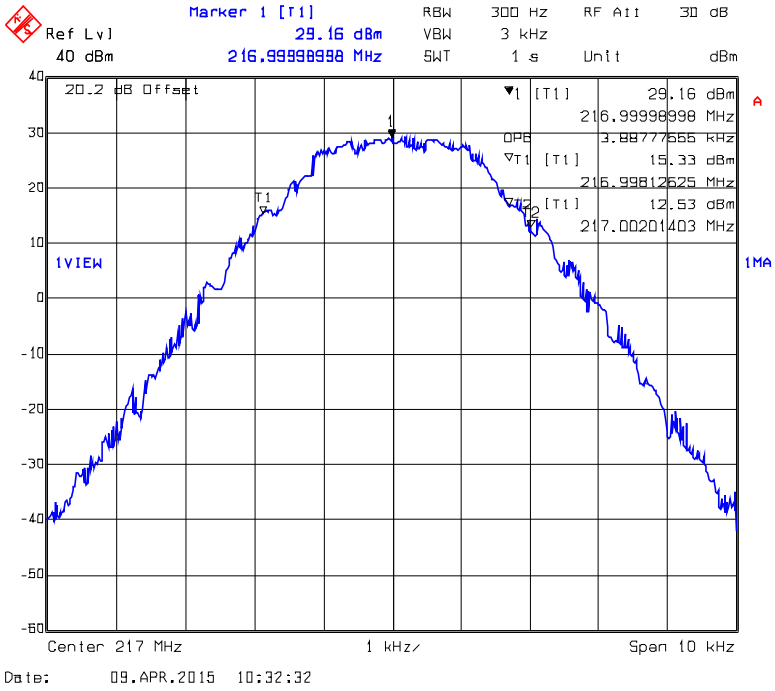
Plot 5.3.4.1.30. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 174.0 MHz



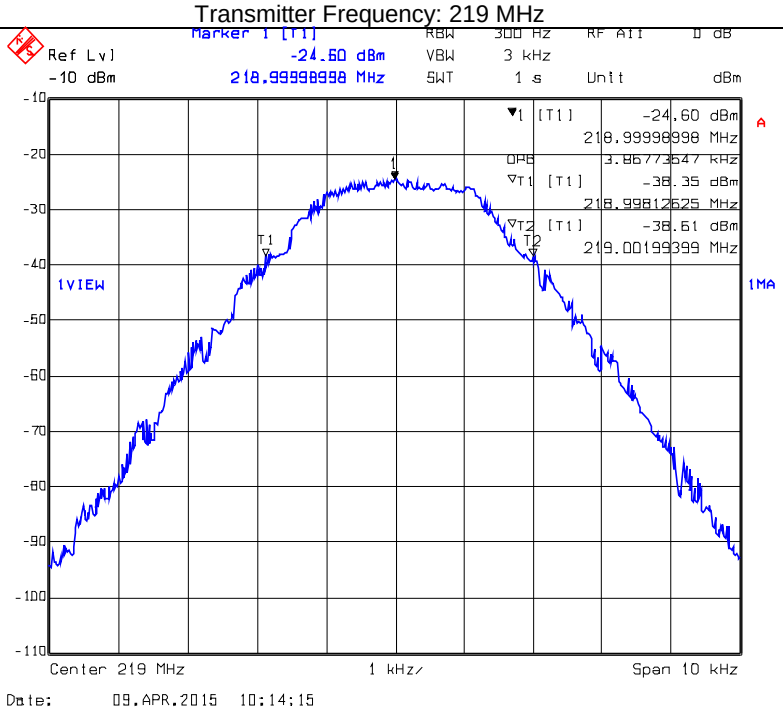
Plot 5.3.4.1.31. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 217 MHz



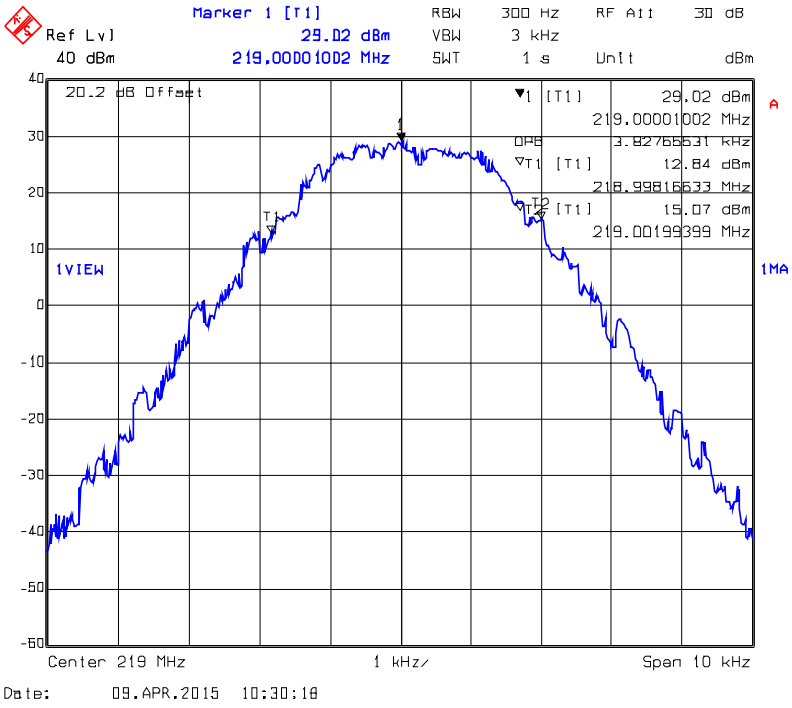
Plot 5.3.4.1.32. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 217 MHz



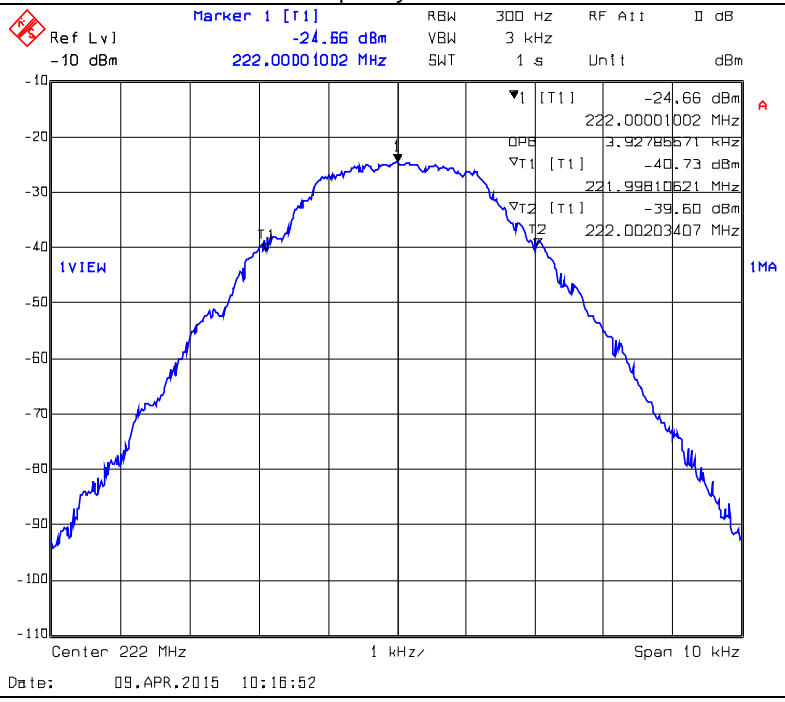
Plot 5.3.4.1.33. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



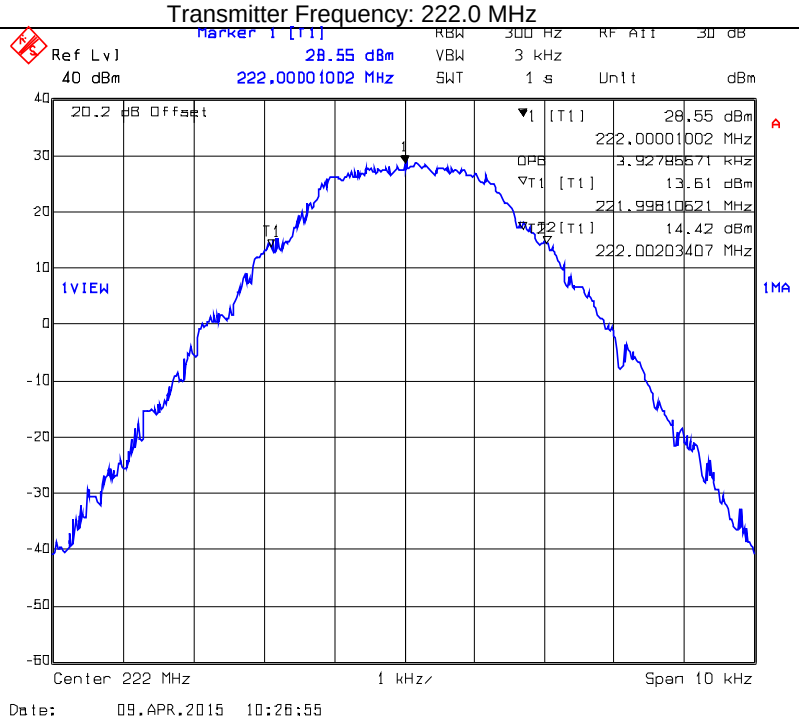
Plot 5.3.4.1.34. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



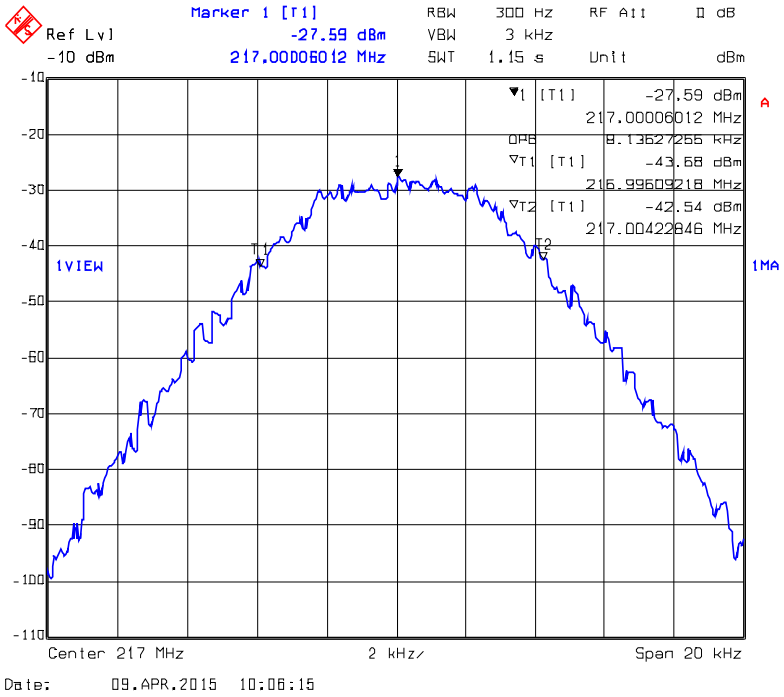
Plot 5.3.4.1.35. 99% Occupied Bandwidth – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



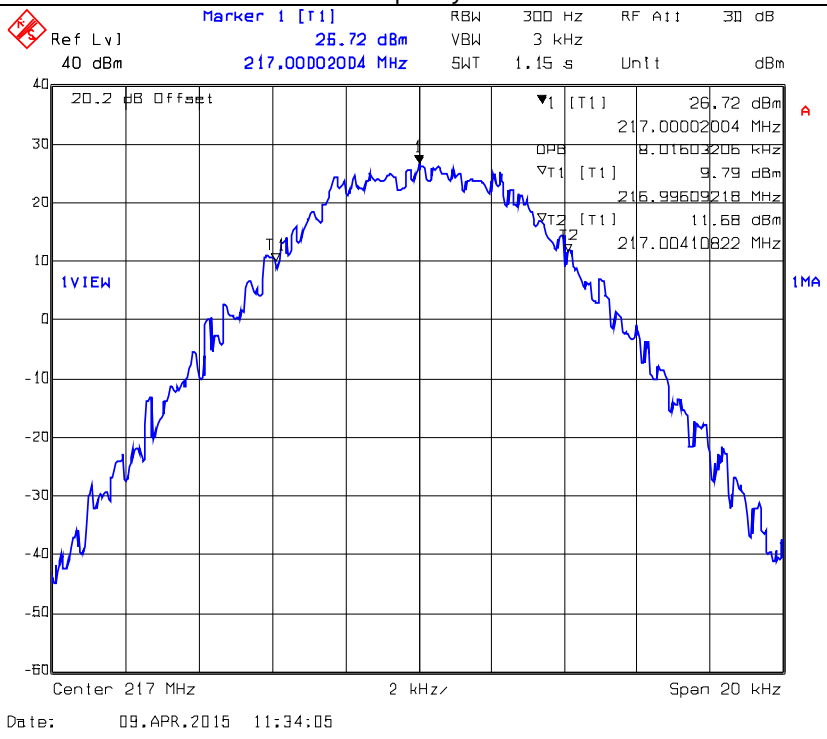
Plot 5.3.4.1.36. 99% Occupied Bandwidth – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



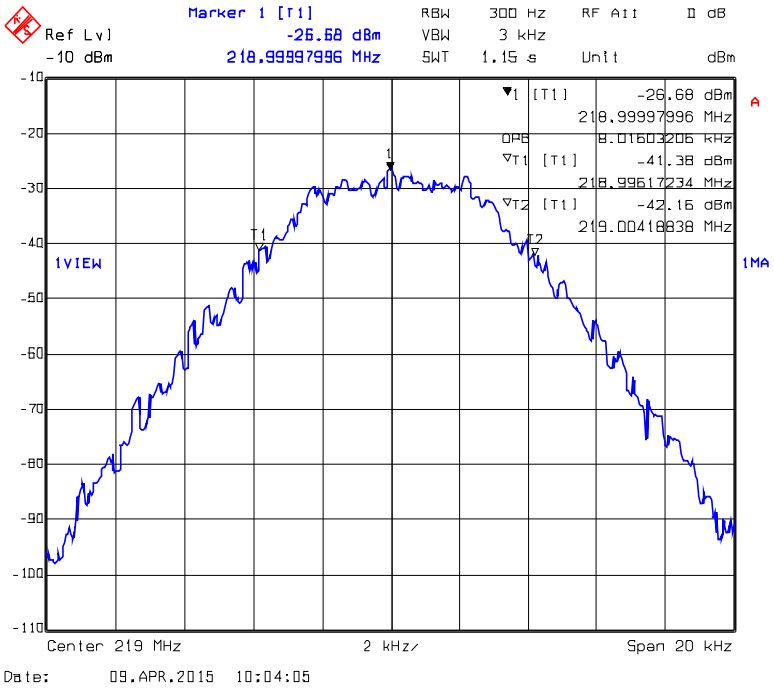
Plot 5.3.4.1.37. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 217 MHz



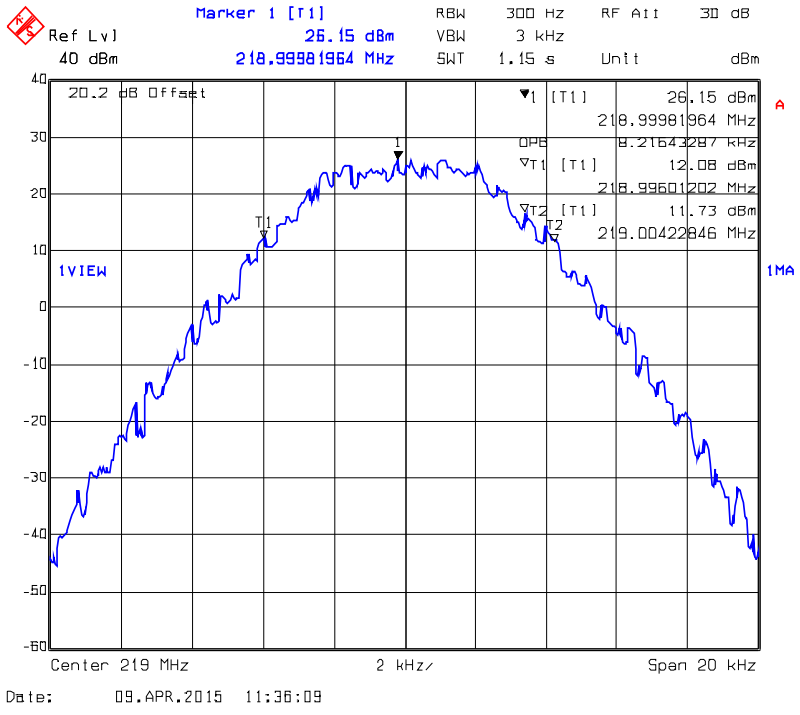
Plot 5.3.4.1.38. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 217 MHz



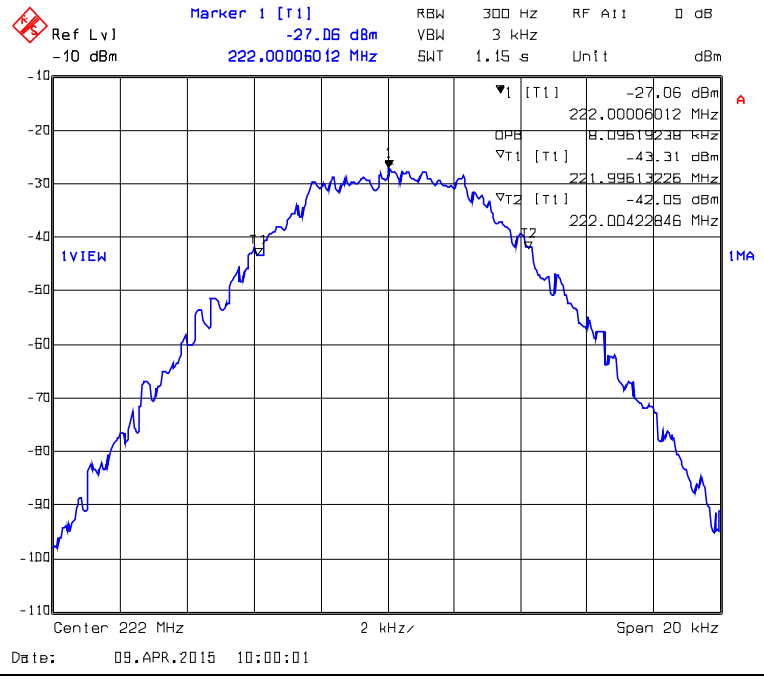
Plot 5.3.4.1.39. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



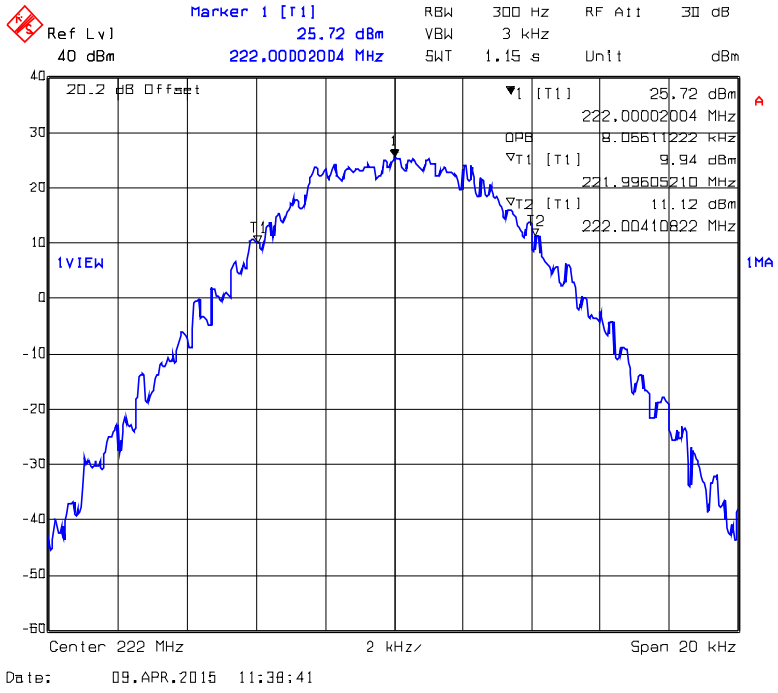
Plot 5.3.4.1.40. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



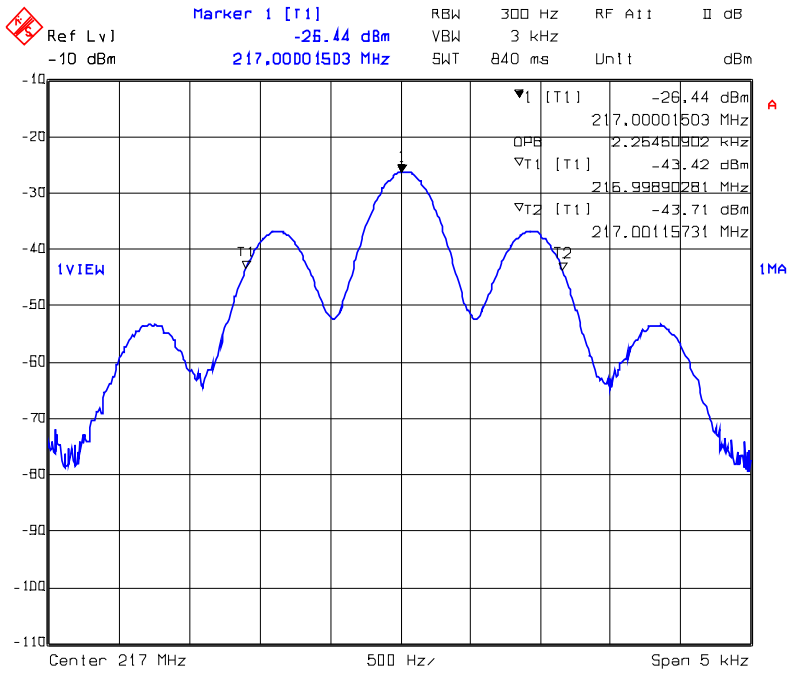
Plot 5.3.4.1.41. 99% Occupied Bandwidth – Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



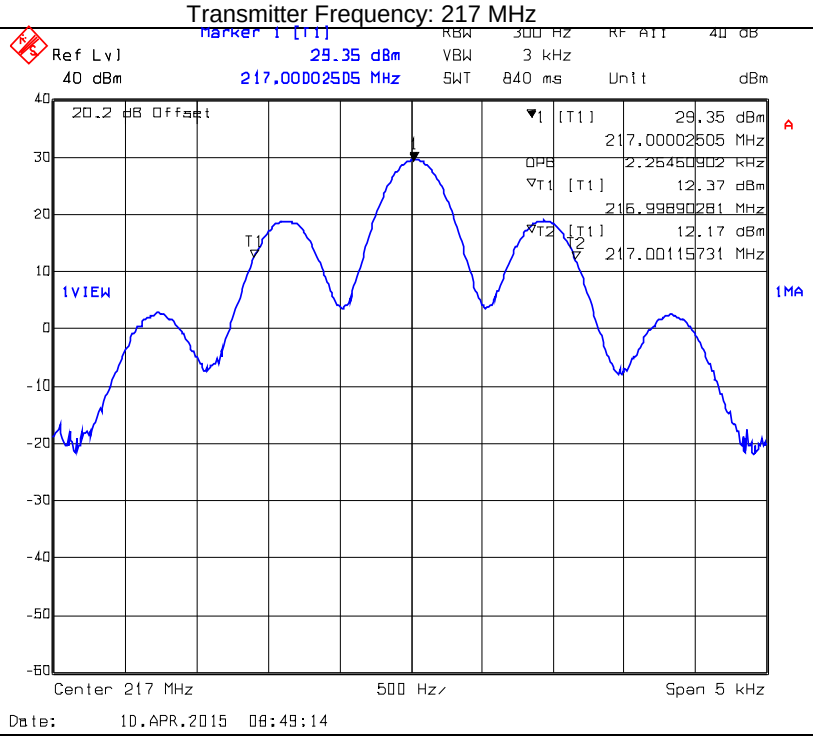
Plot 5.3.4.1.42. 99% Occupied Bandwidth – Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



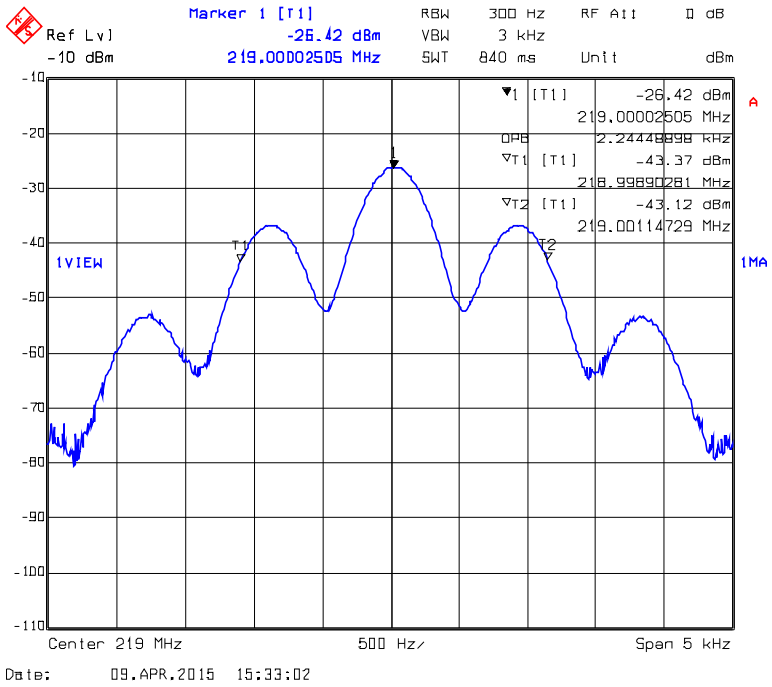
Plot 5.3.4.1.43. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 217 MHz



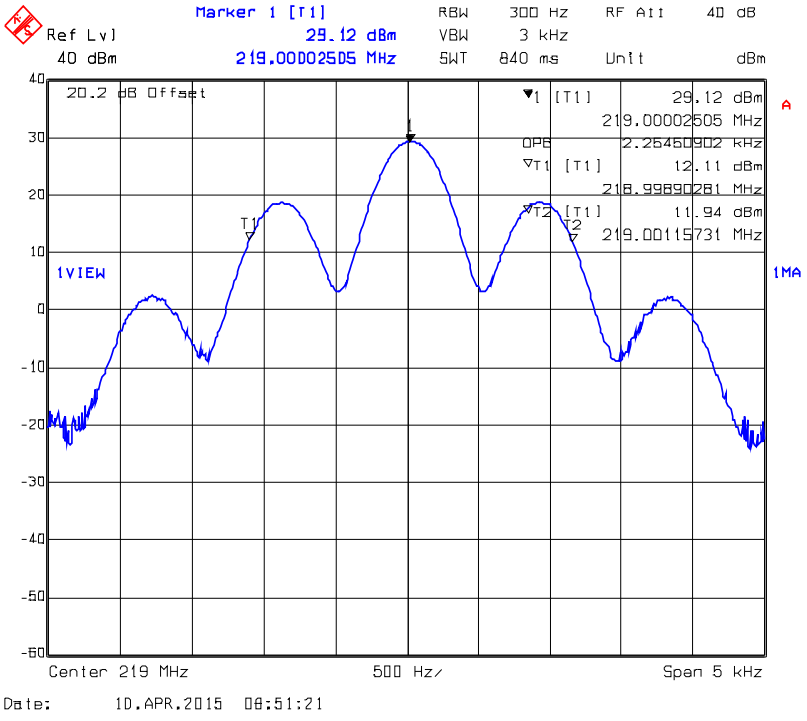
Plot 5.3.4.1.44. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 217 MHz



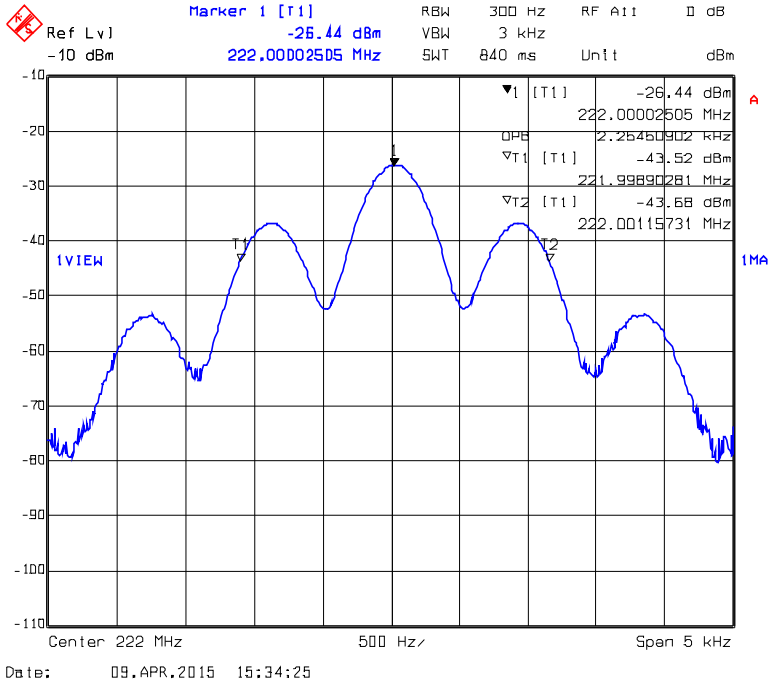
Plot 5.3.4.1.45. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



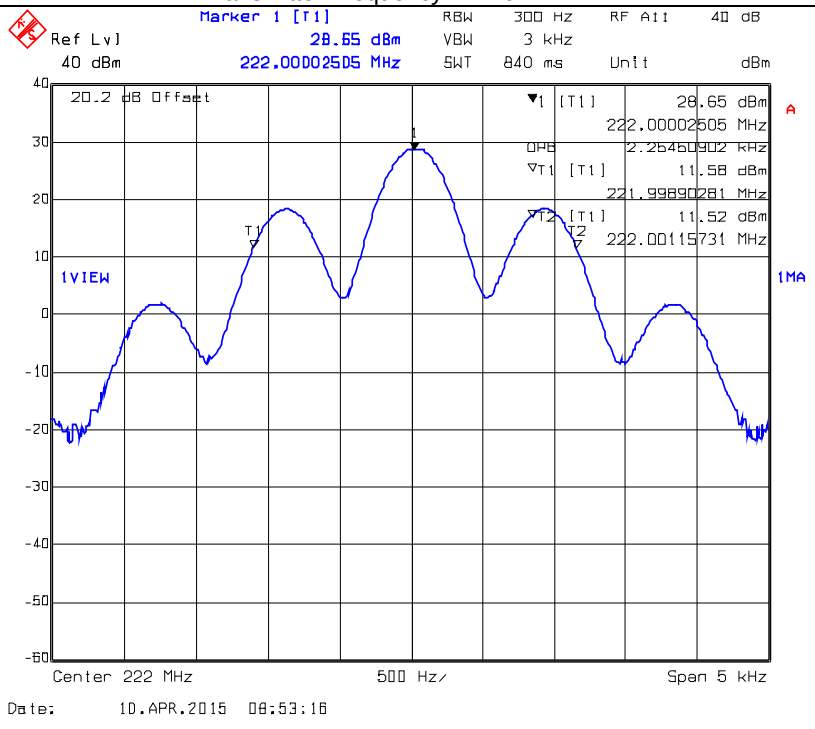
Plot 5.3.4.1.46. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



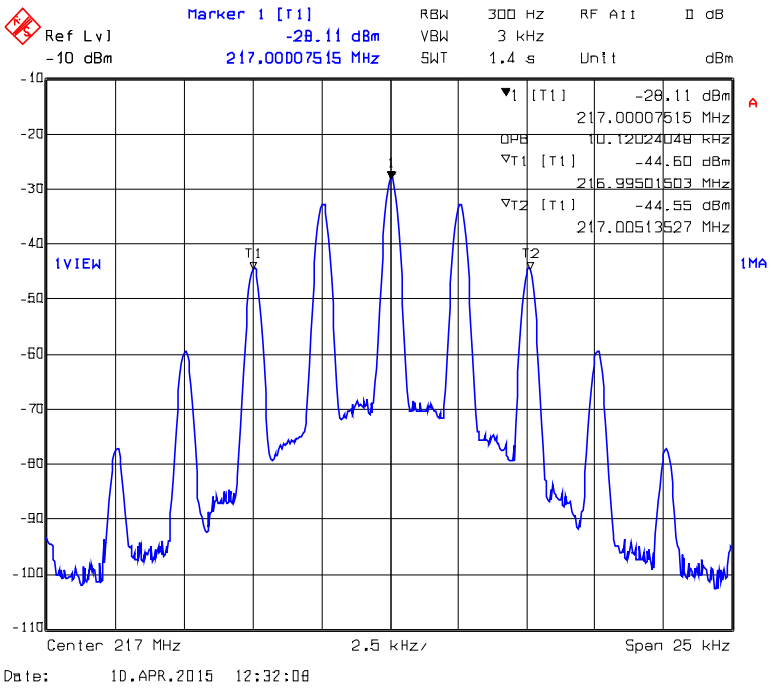
Plot 5.3.4.1.47. 99% Occupied Bandwidth – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



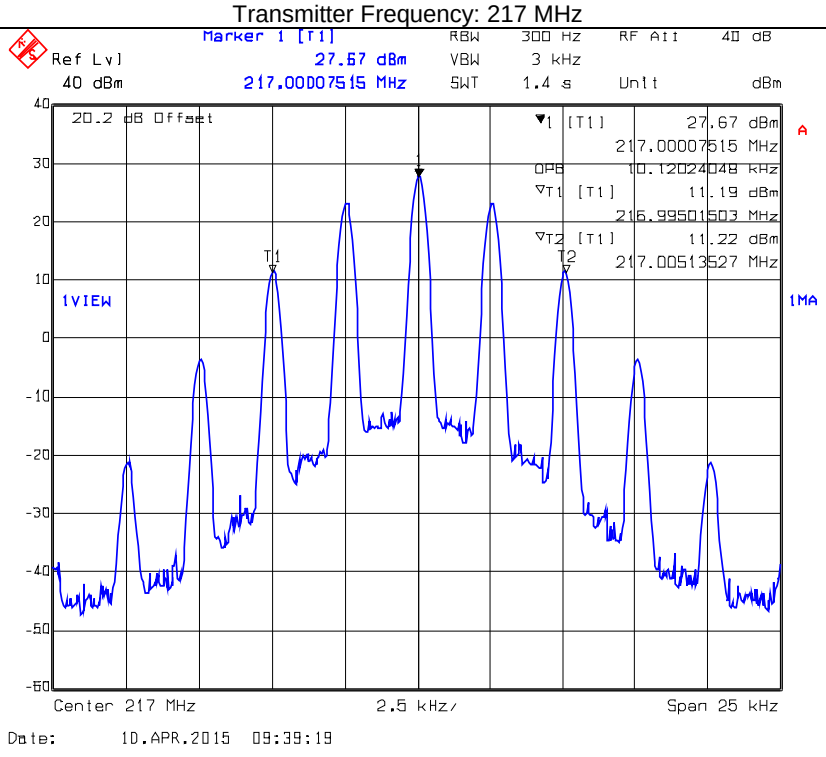
Plot 5.3.4.1.48. 99% Occupied Bandwidth – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



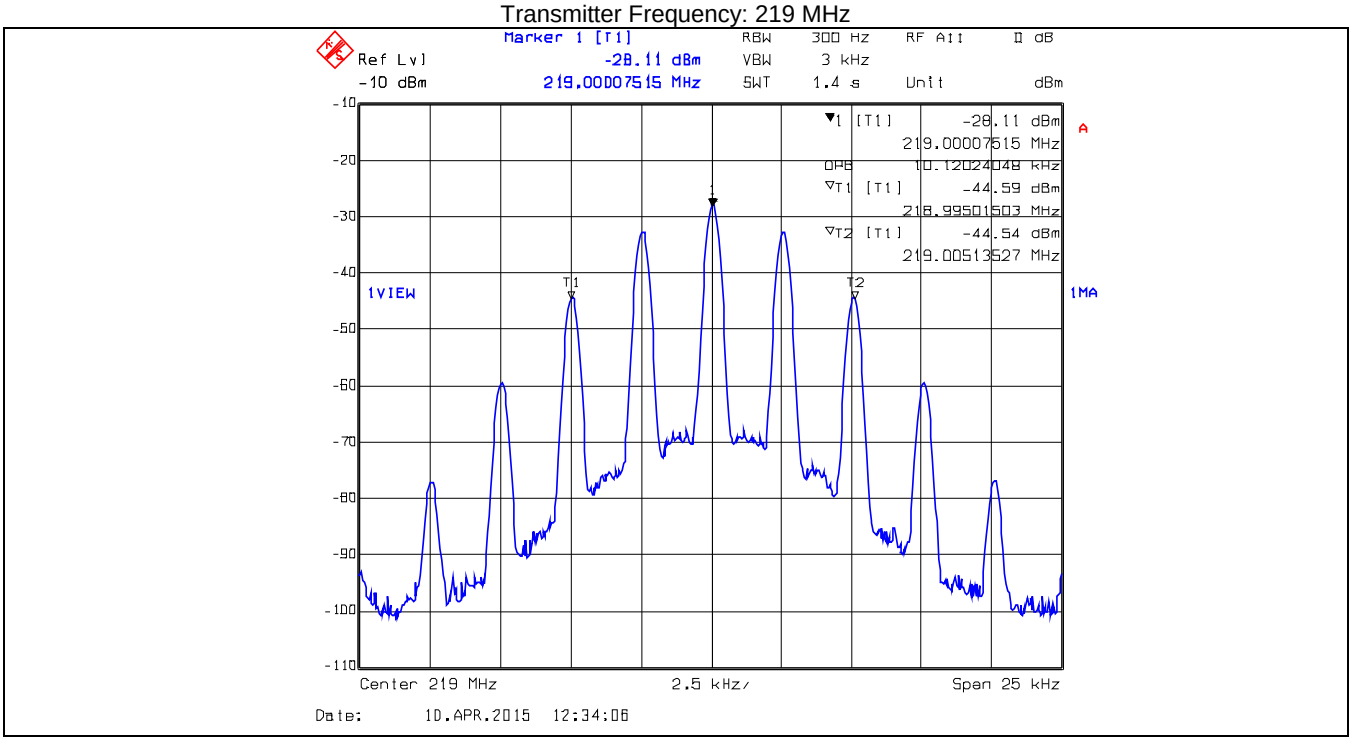
Plot 5.3.4.1.49. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 217 MHz



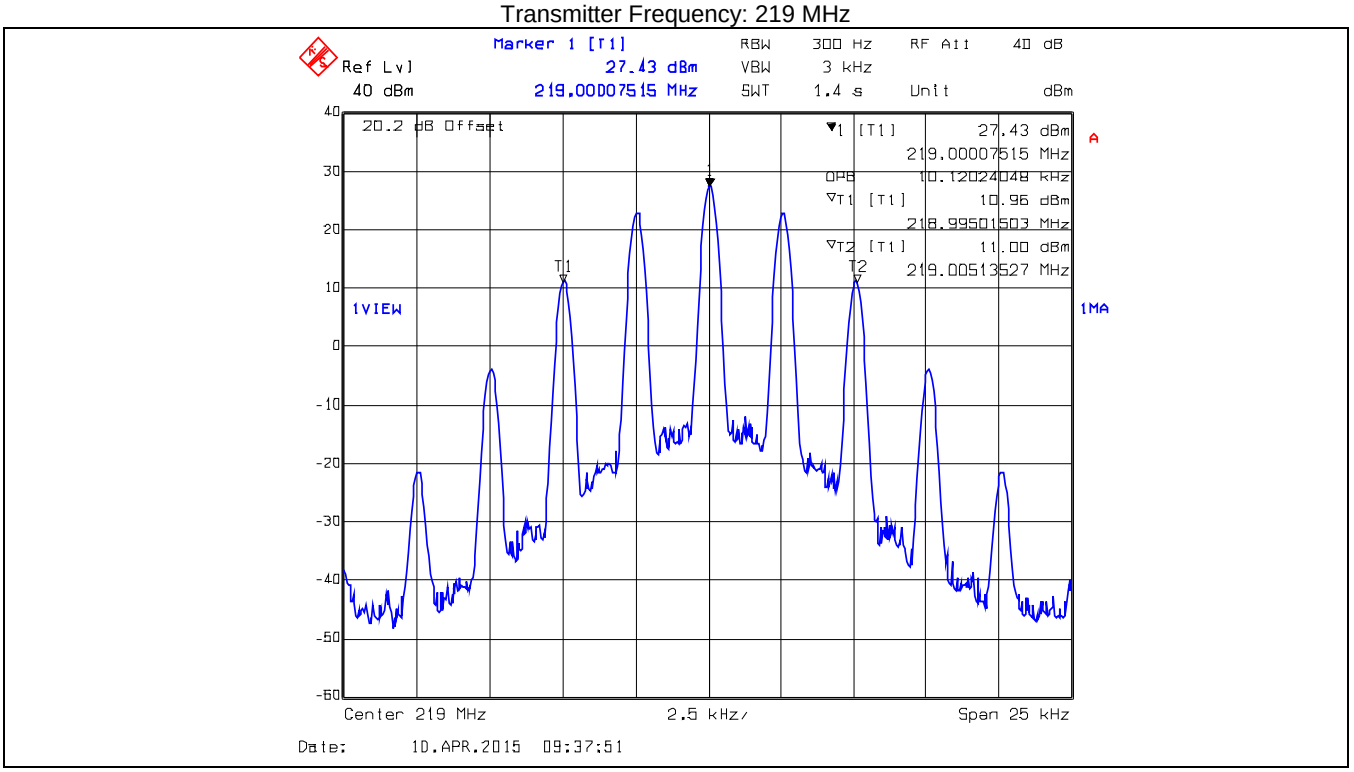
Plot 5.3.4.1.50. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 217 MHz



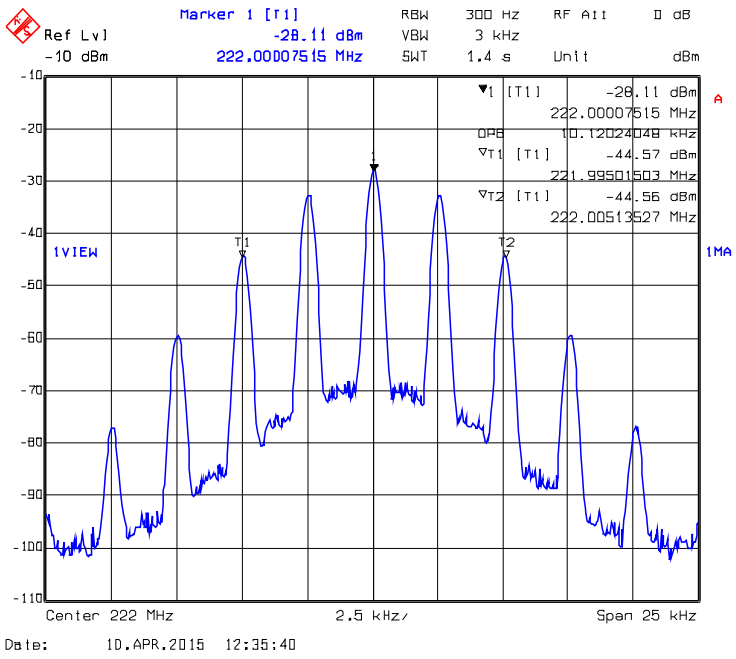
Plot 5.3.4.1.51. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



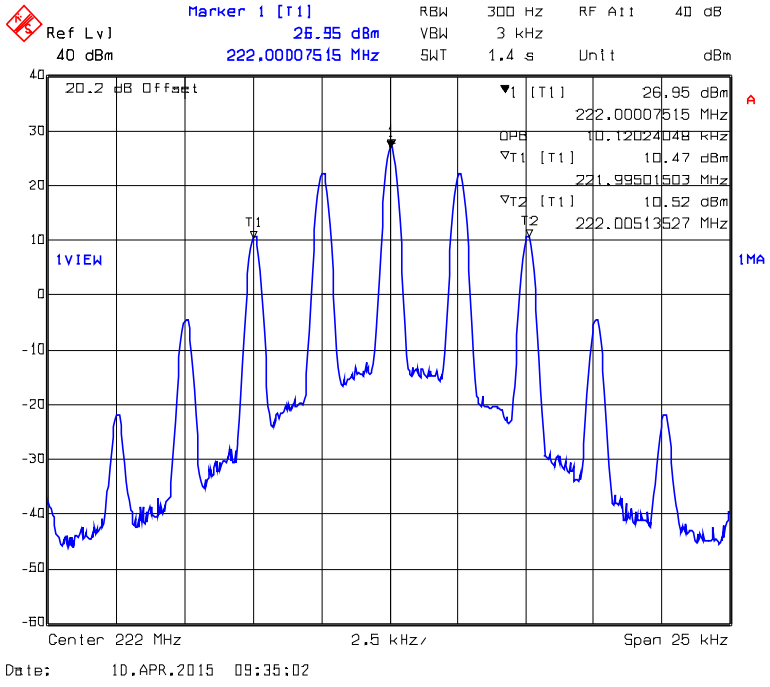
Plot 5.3.4.1.52. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



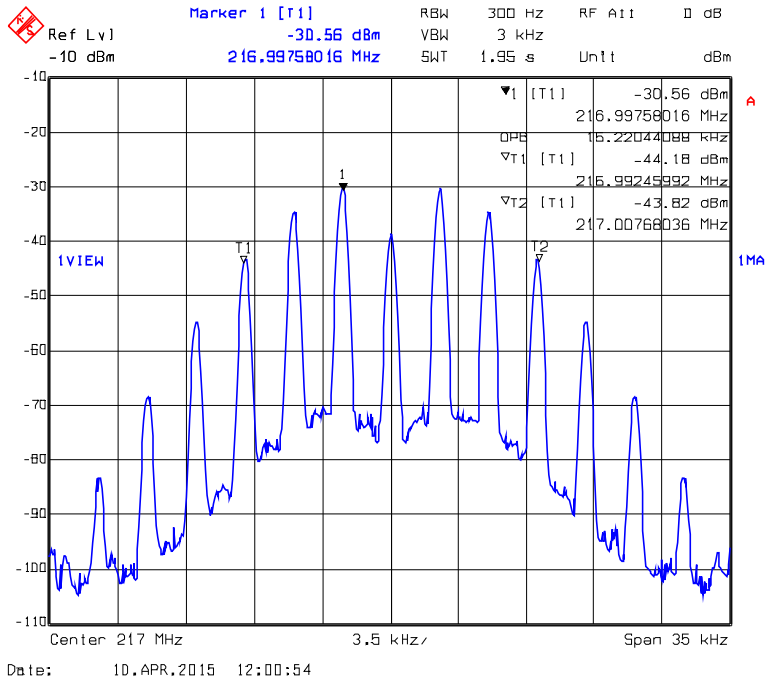
Plot 5.3.4.1.53. 99% Occupied Bandwidth – Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



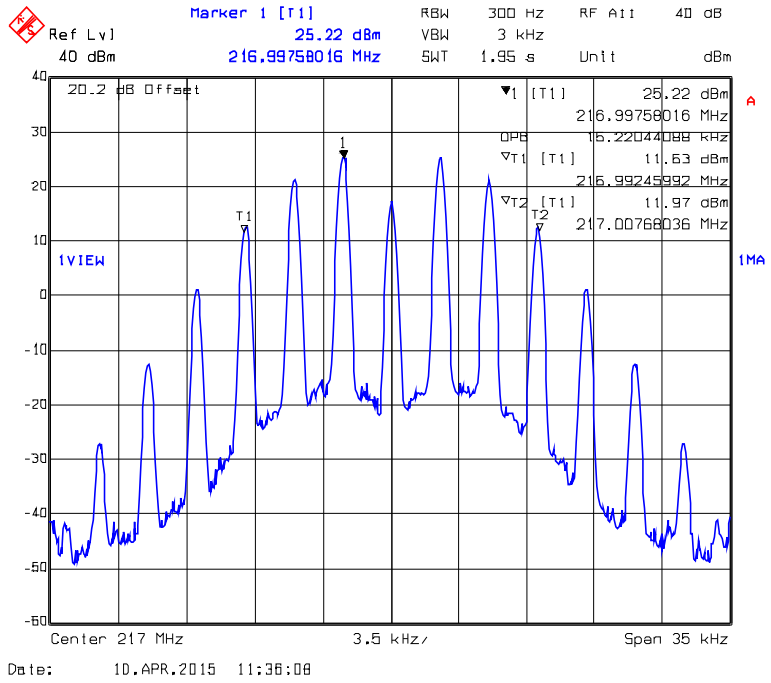
Plot 5.3.4.1.54. 99% Occupied Bandwidth – Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



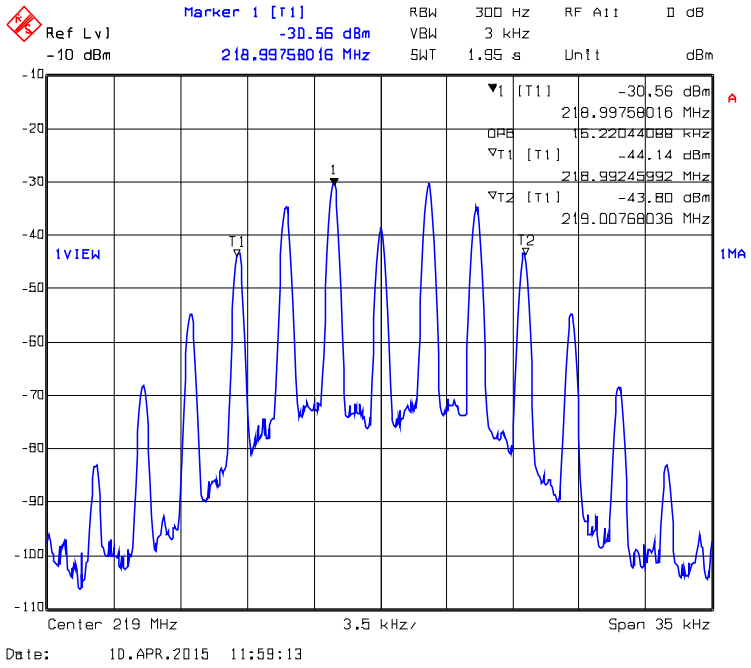
Plot 5.3.4.1.55. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 217 MHz



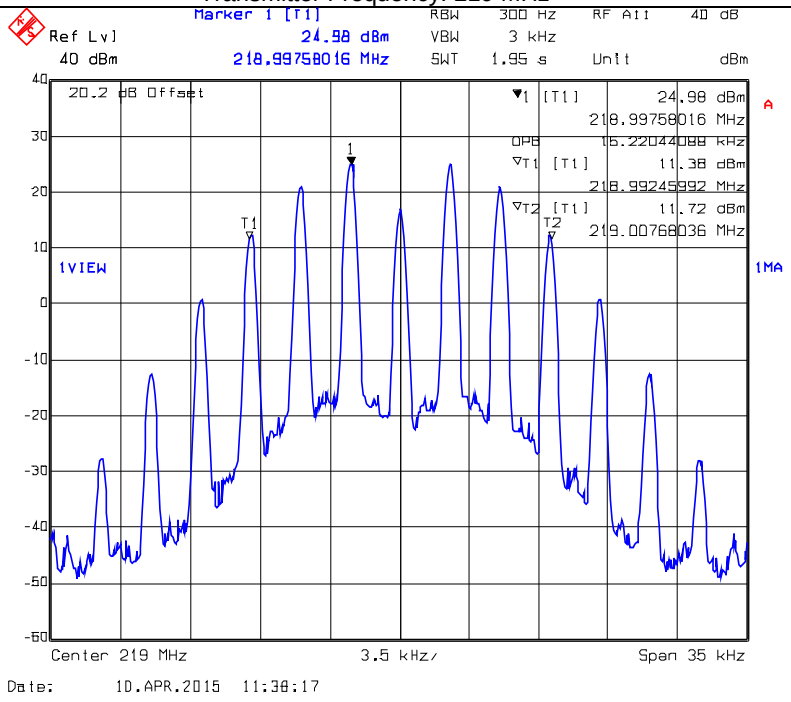
Plot 5.3.4.1.56. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 217 MHz



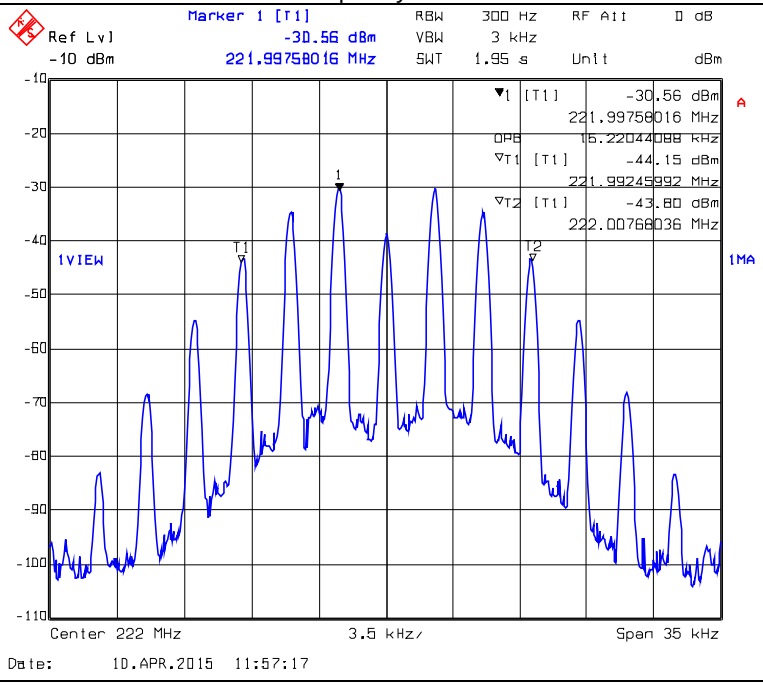
Plot 5.3.4.1.57. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 219 MHz



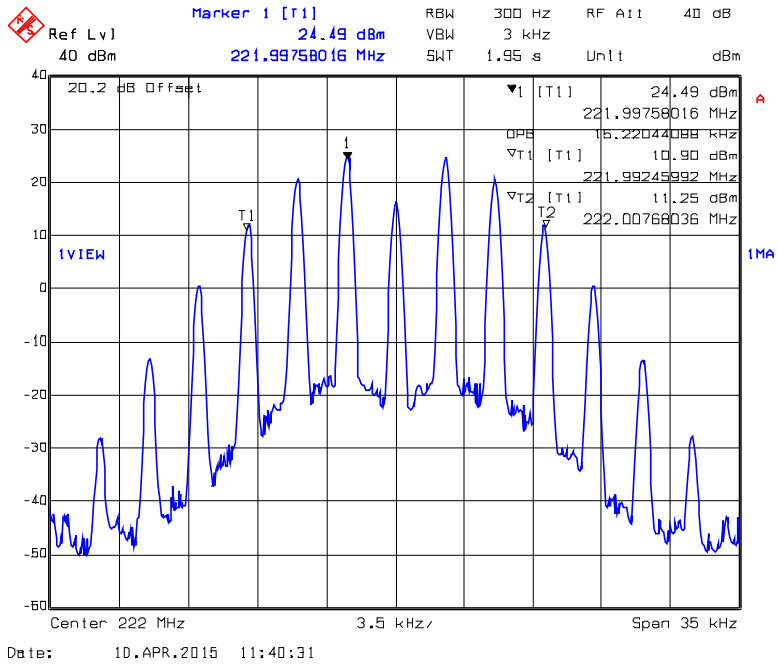
Plot 5.3.4.1.58. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 219 MHz



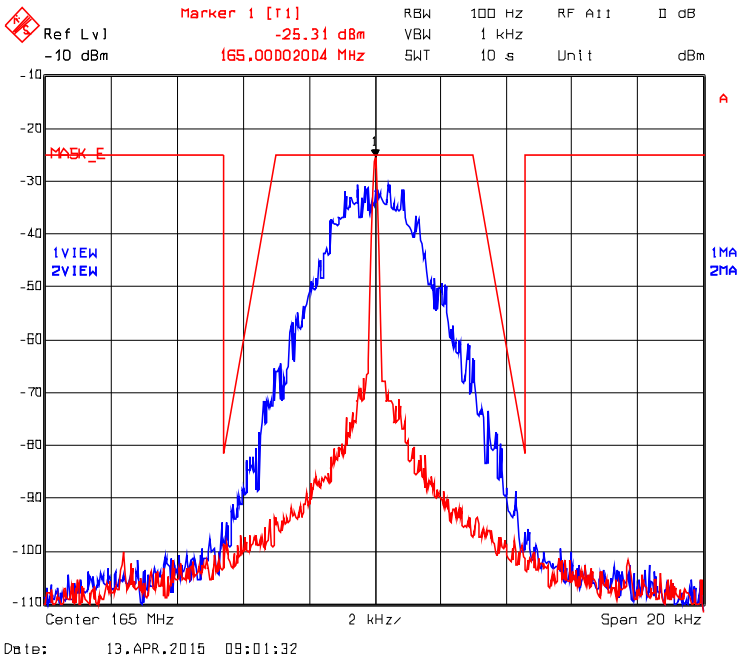
Plot 5.3.4.1.59. 99% Occupied Bandwidth – Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



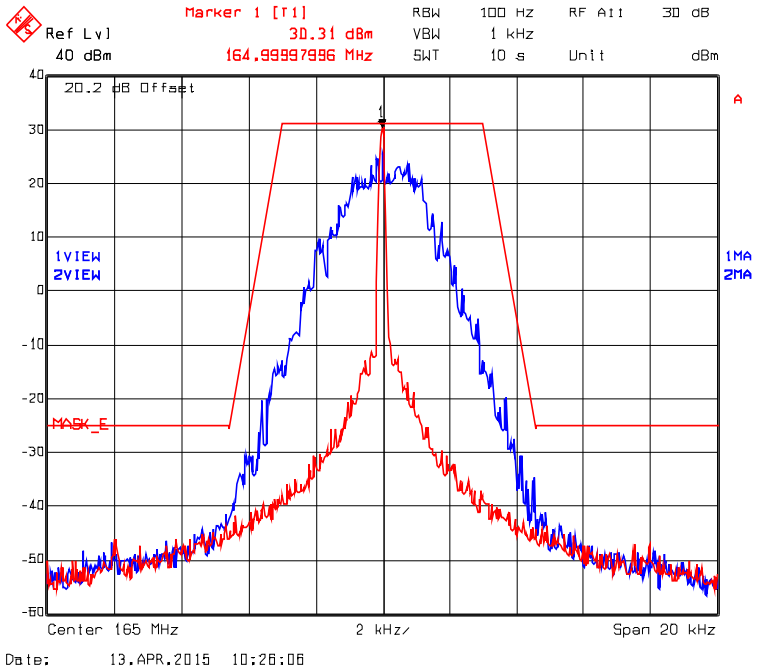
Plot 5.3.4.1.60. 99% Occupied Bandwidth – Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 222.0 MHz



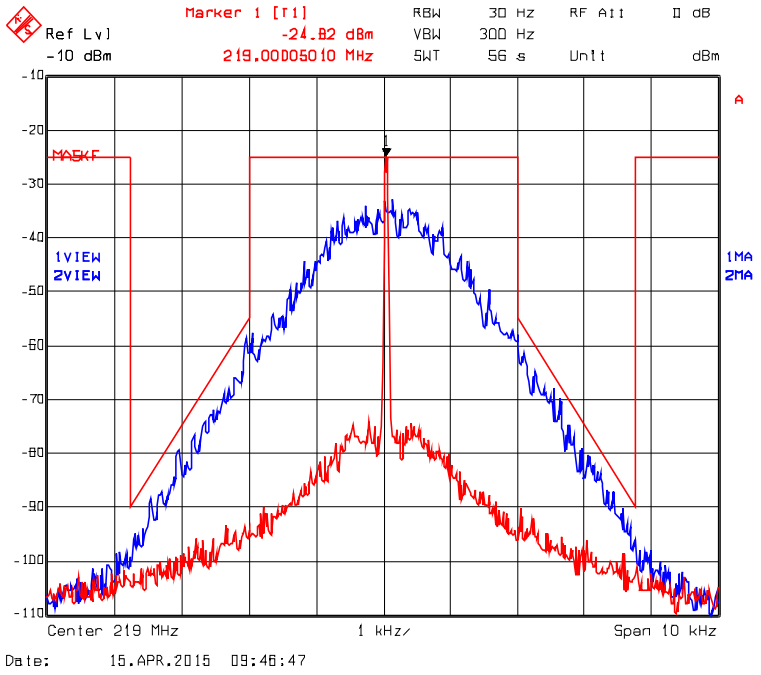
Plot 5.3.4.1.61. Emission Mask E – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 165 MHz



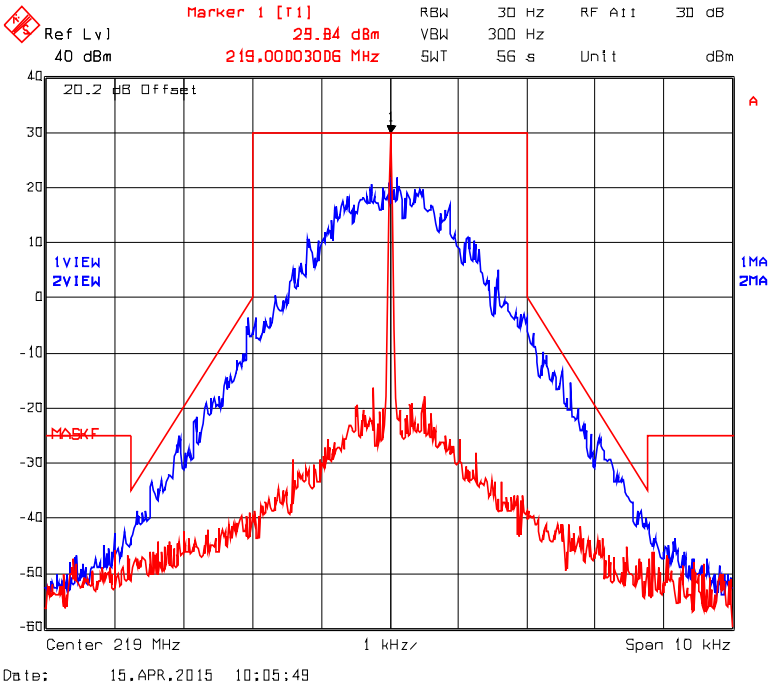
Plot 5.3.4.1.62. Emission Mask E – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 165 MHz



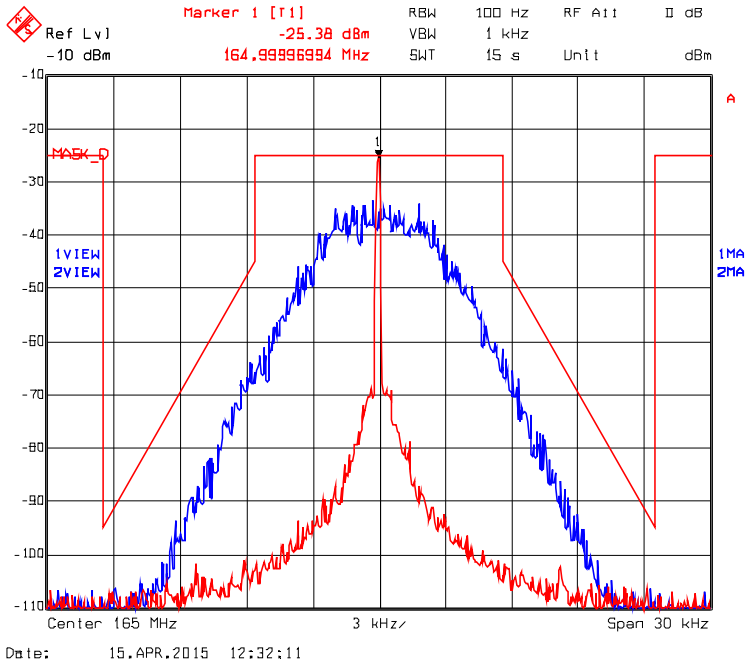
Plot 5.3.4.1.63. Emission Mask F – Input Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



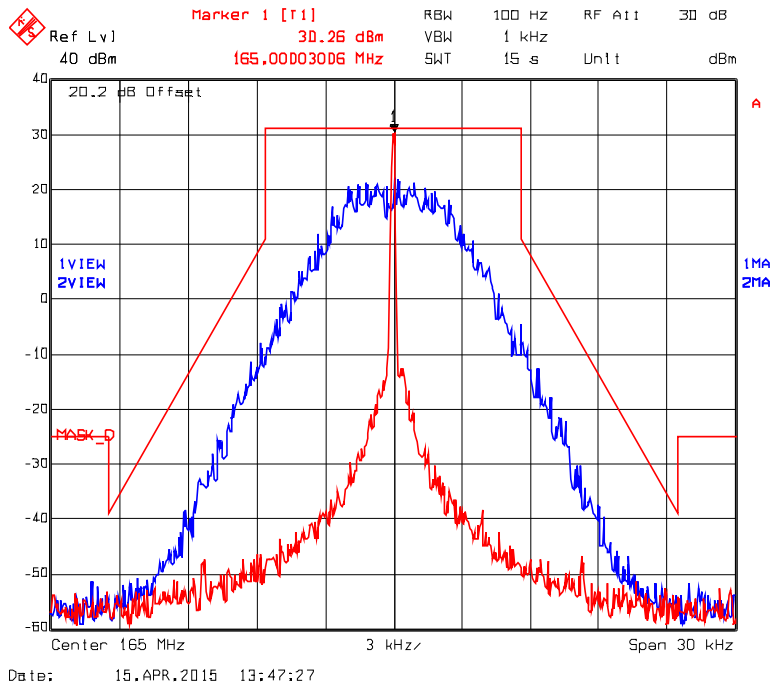
Plot 5.3.4.1.64. Emission Mask F – Output Signal, DIGITAL, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



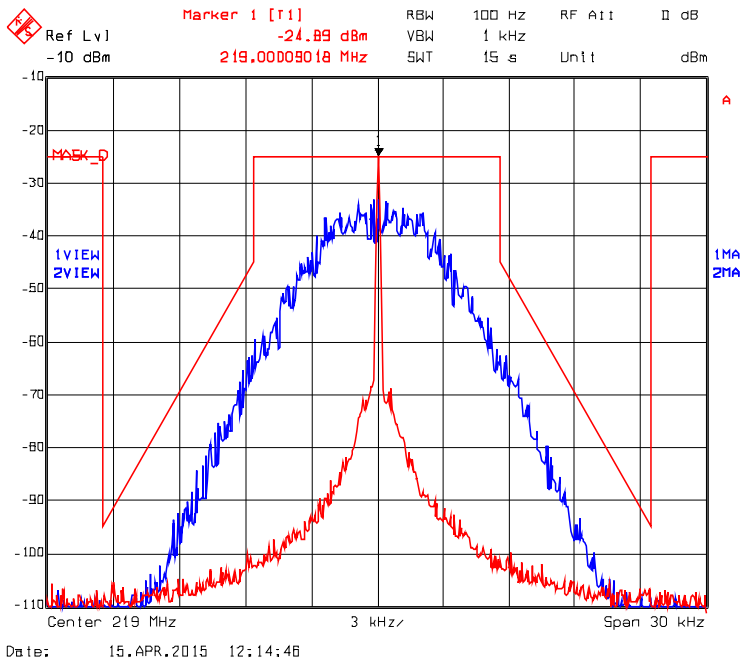
Plot 5.3.4.1.65. Emission Mask D, Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 165 MHz



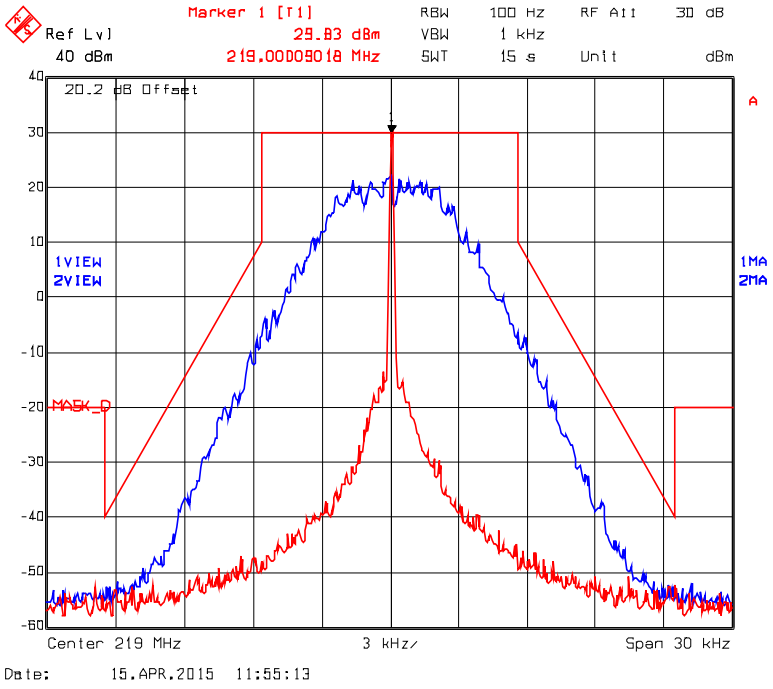
Plot 5.3.4.1.66. Emission Mask D, Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 165 MHz



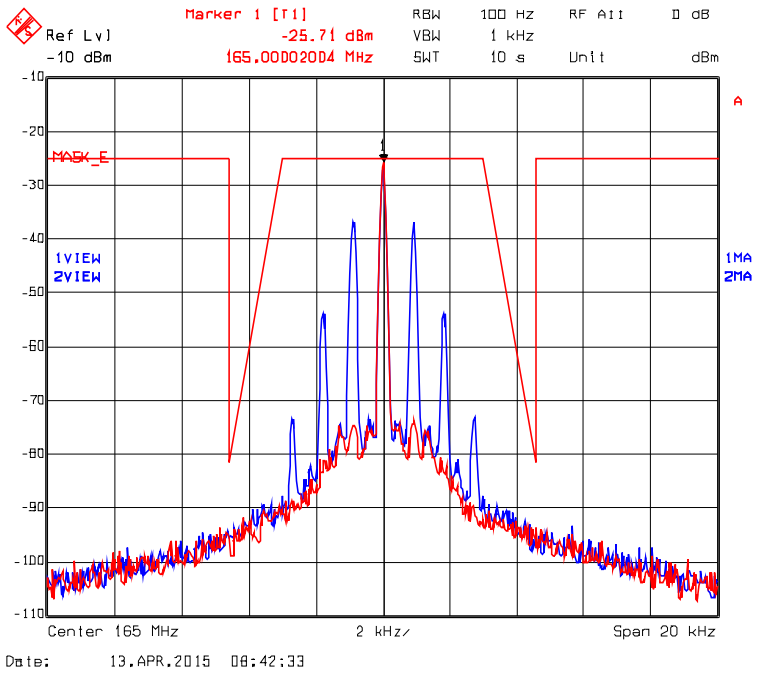
Plot 5.3.4.1.67. Emission Mask D, Input Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



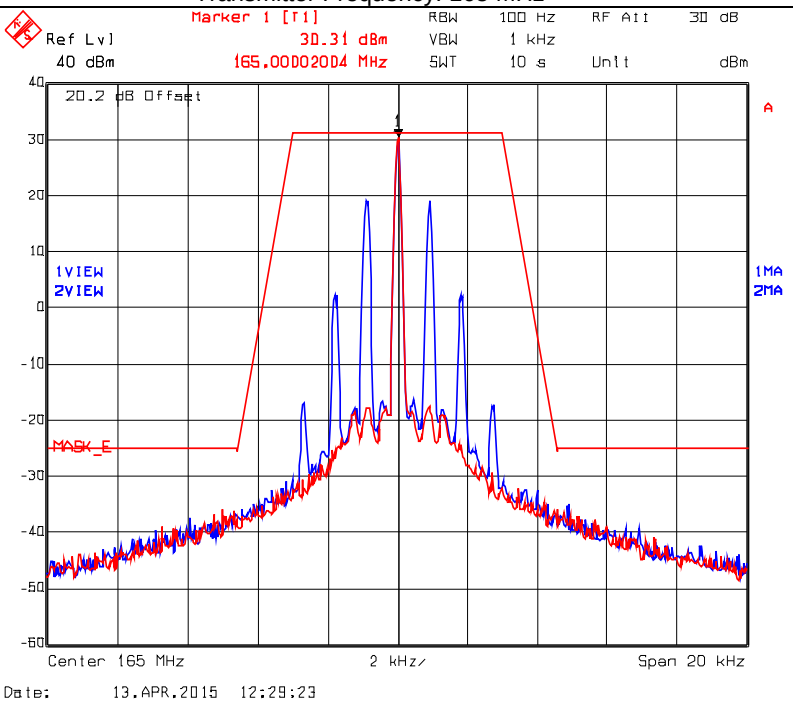
Plot 5.3.4.1.68. Emission Mask D, Output Signal, DIGITAL, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



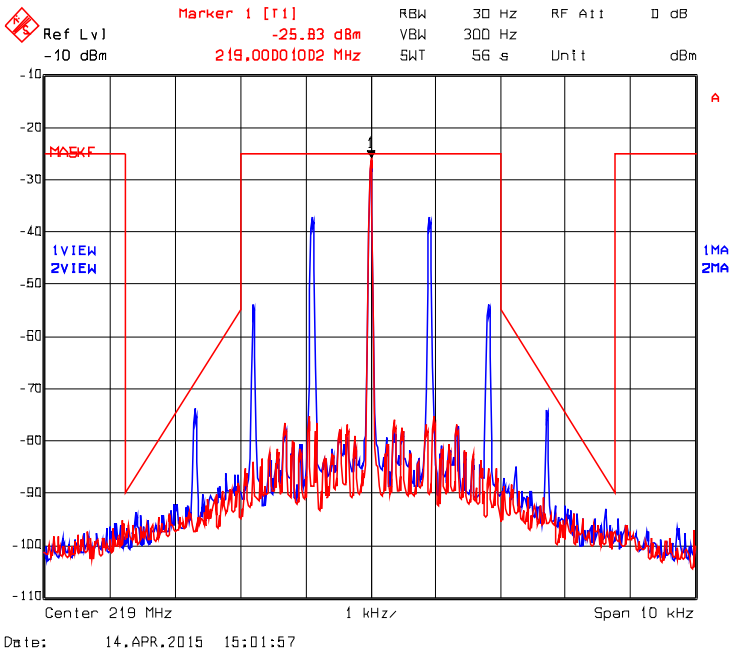
Plot 5.3.4.1.69. Emission Mask E – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 165 MHz



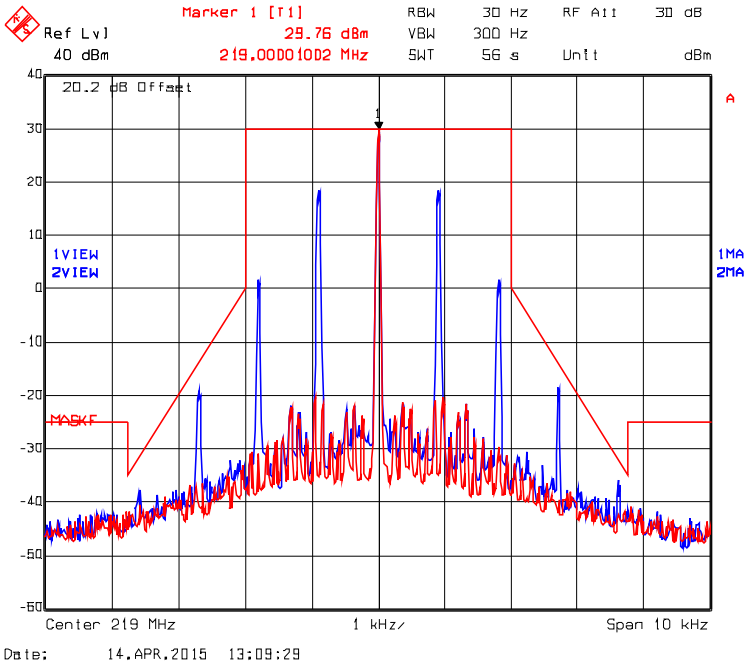
Plot 5.3.4.1.70. Emission Mask E – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 165 MHz



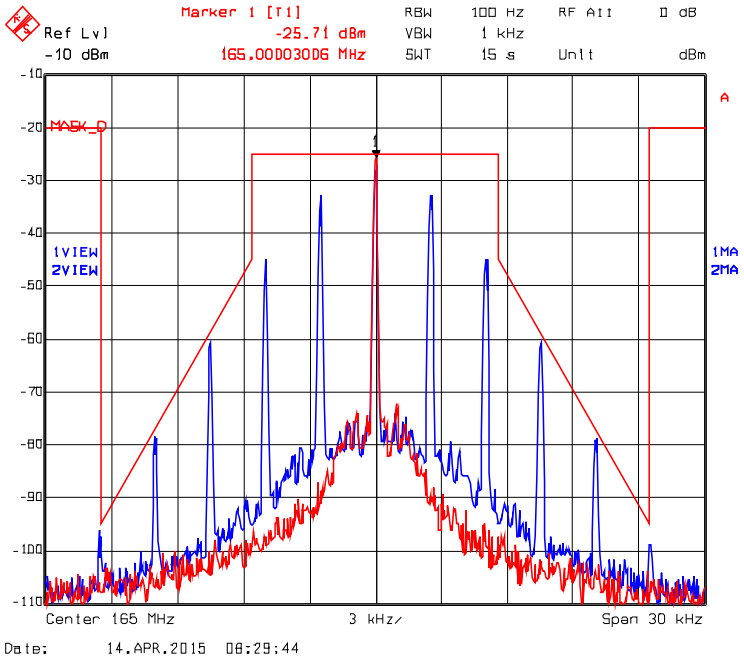
Plot 5.3.4.1.71. Emission Mask F – Input Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



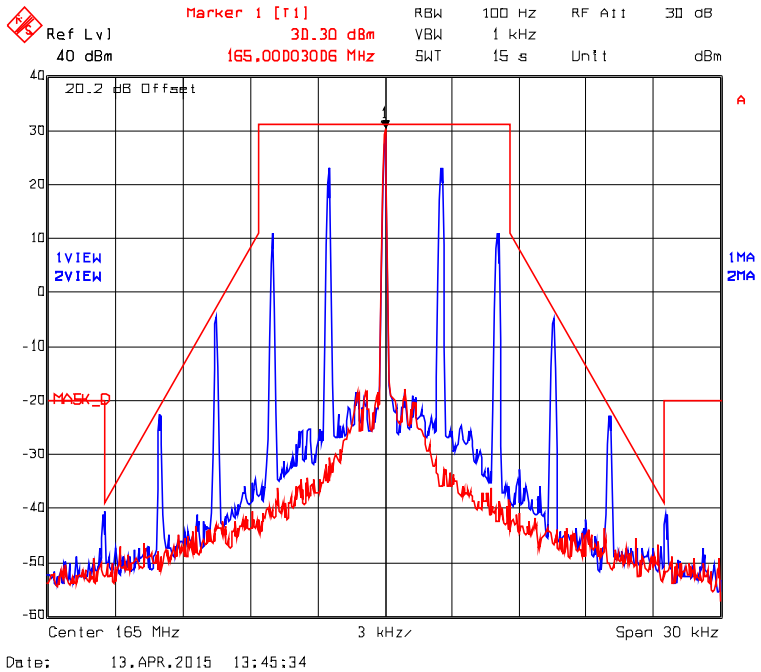
Plot 5.3.4.1.72. Emission Mask F – Output Signal, ANALOG, 6.25kHz Ch Spacing
Transmitter Frequency: 219 MHz



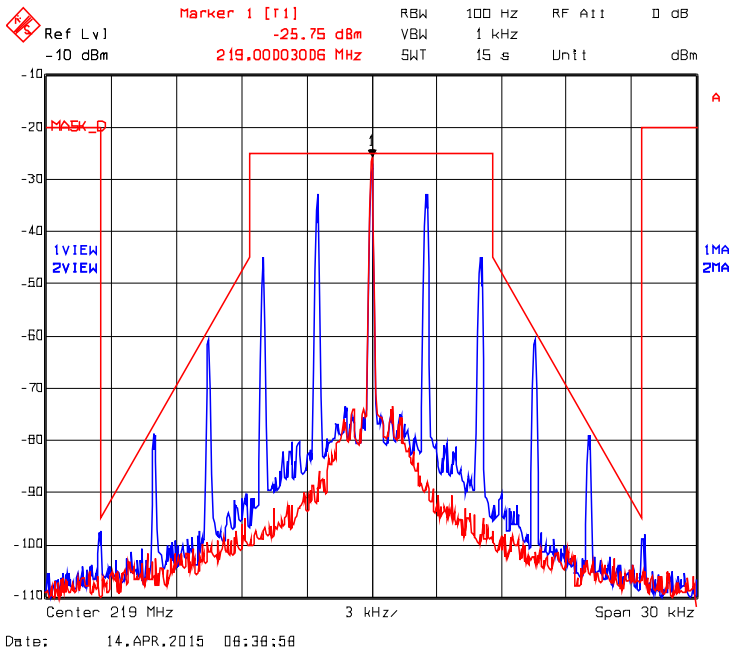
Plot 5.3.4.1.73. Emission Mask D, Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 165 MHz



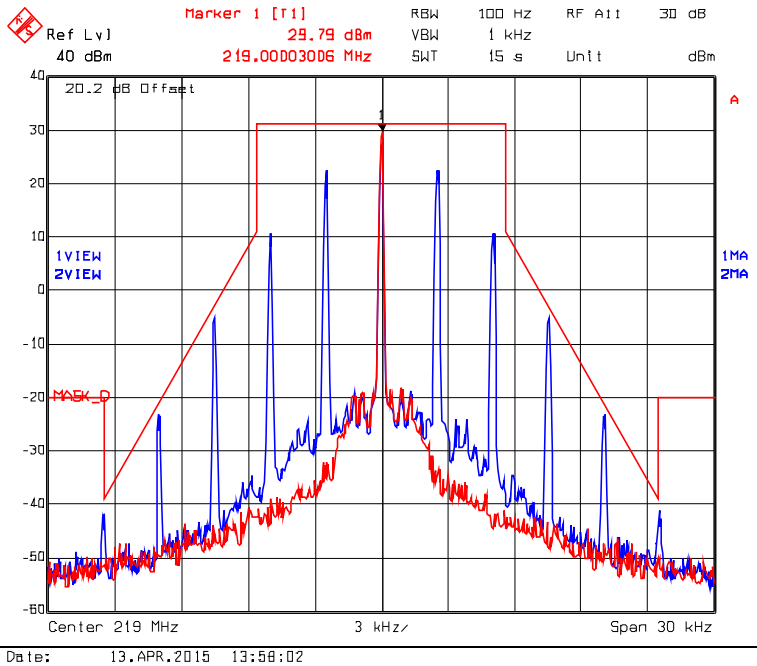
Plot 5.3.4.1.74. Emission Mask D, Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 165 MHz



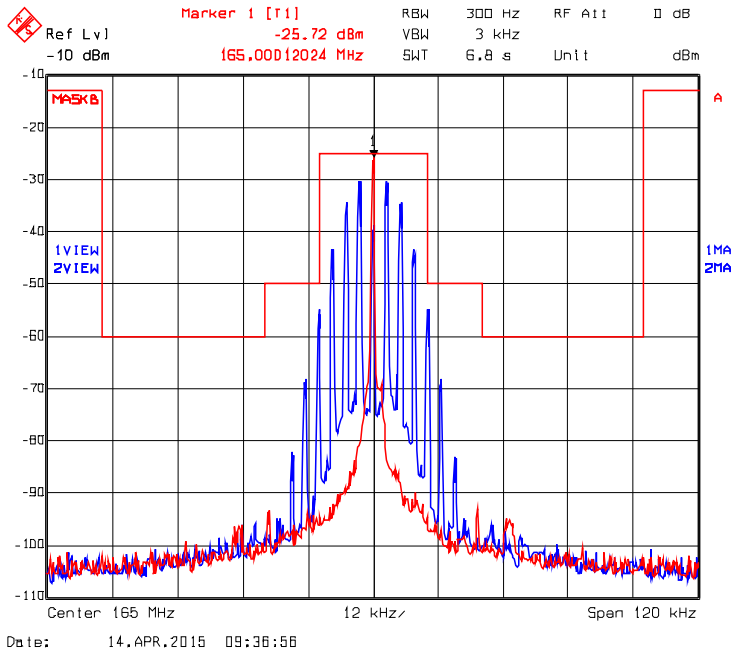
Plot 5.3.4.1.75. Emission Mask D, Input Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



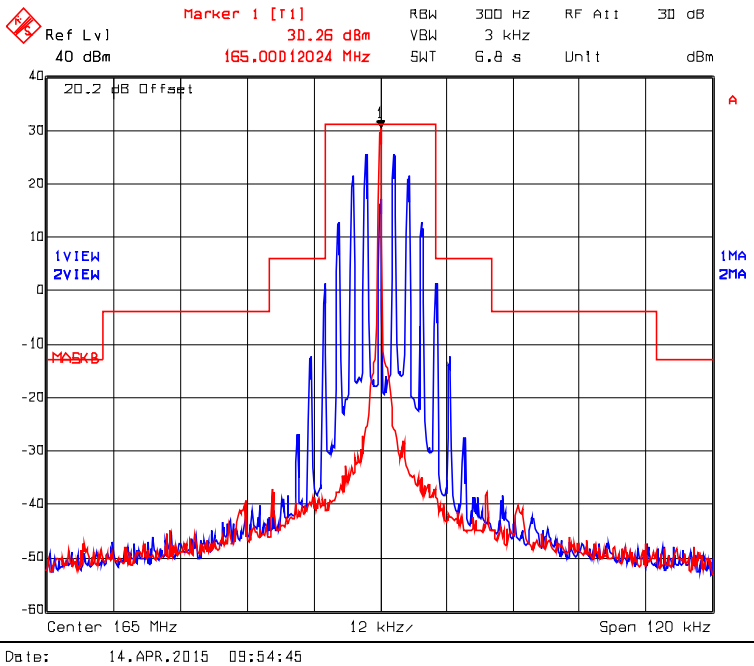
Plot 5.3.4.1.76. Emission Mask D, Output Signal, ANALOG, 12.5kHz Ch Spacing
Transmitter Frequency: 219 MHz



Plot 5.3.4.1.77. Emission Mask B, Input Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 165 MHz



Plot 5.3.4.1.78. Emission Mask B, Output Signal, ANALOG, 25kHz Ch Spacing
Transmitter Frequency: 165 MHz



5.4. SPURIOUS EMISSIONS AT ANTENNA TERMINAL AND INTERMODULATION [§§ 2.1051, 2.1057 & 90.210]

5.4.1. Limits

Emissions shall be attenuated below the mean output power of the transmitter as follows:

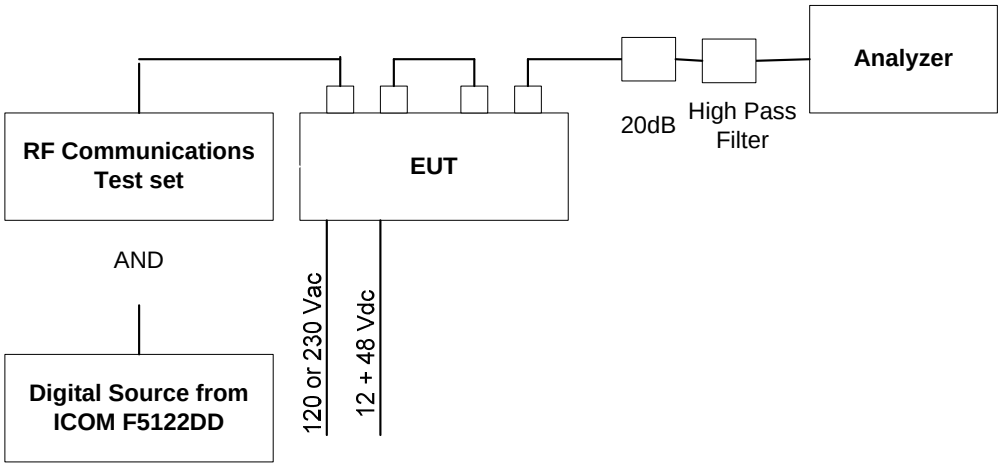
FCC Rules	Frequency Range	Attenuation Limit (dBc)
§ 90.210(b)	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	At least 43 + 10 log(P) or -13 dBm
§ 90.210(d)	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

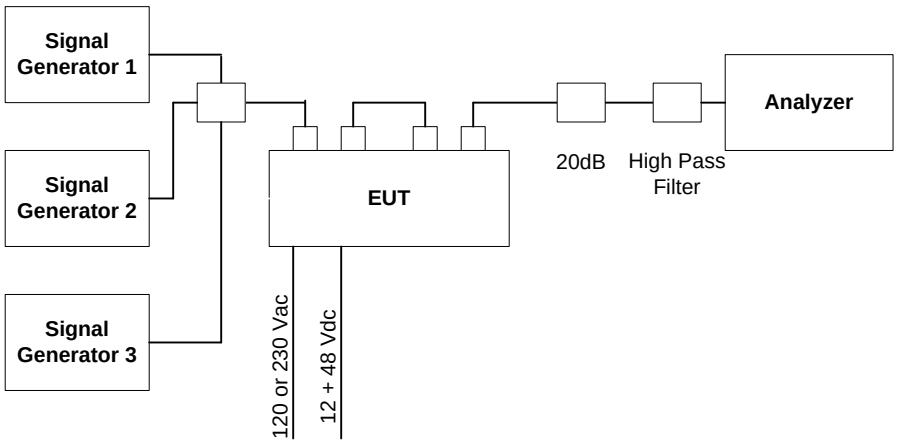
KDB 935210 - FCC guidelines for testing amplifiers, boosters and repeater:
Intermodulation limit: -13dBm conducted.

5.4.2. Method of Measurements

ANSI/TIA-603-D-2010

5.4.3. Test Arrangement



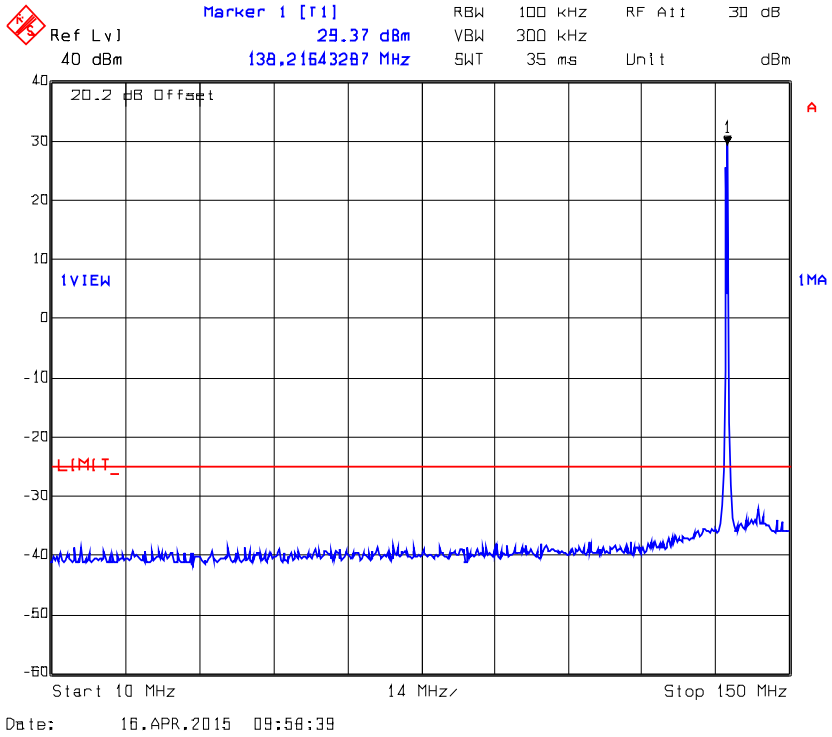

Signal Generator 1
Signal Generator 2
Signal Generator 3
EUT
120 or 230 Vac
12 + 48 Vdc
20dB
High Pass Filter
Analyzer

5.4.4. Test Data (Single & Multi Channel Inputs)

Remarks:

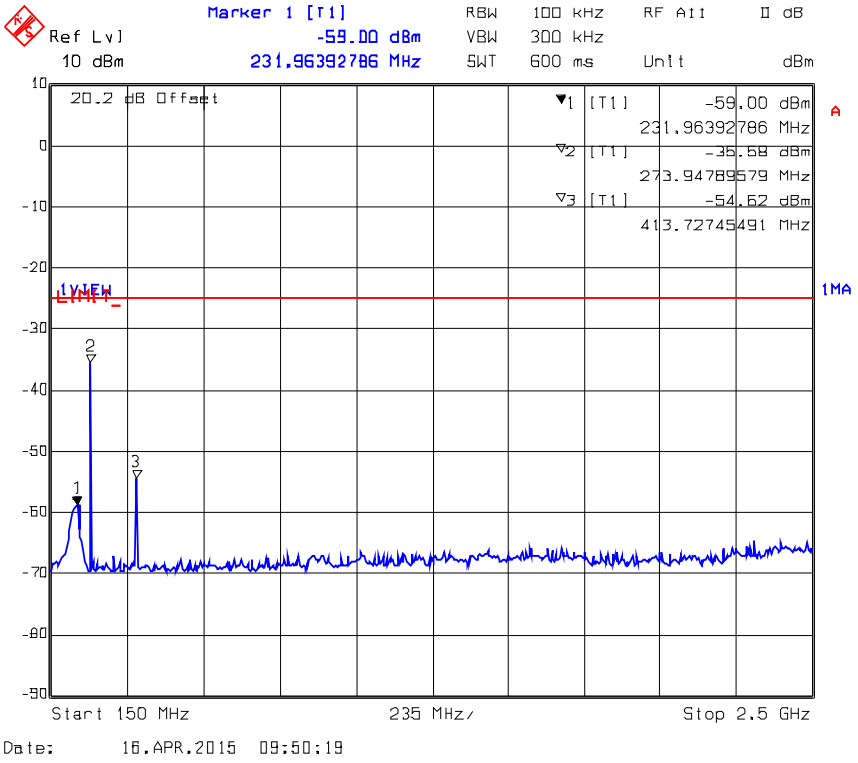
- The RF emissions were scanned with all different channel spacings and there was no discernible difference in the spurious emissions between them. Therefore, the final tests were only performed with one channel spacing to represent all different channel spacings.
- Single RF input will be tested to represent the worst case with highest input/output powers

Plot 5.4.4.1. Conducted Transmitter Spurious Emissions for 138 MHz, ANALOG, 30 - 150 MHz



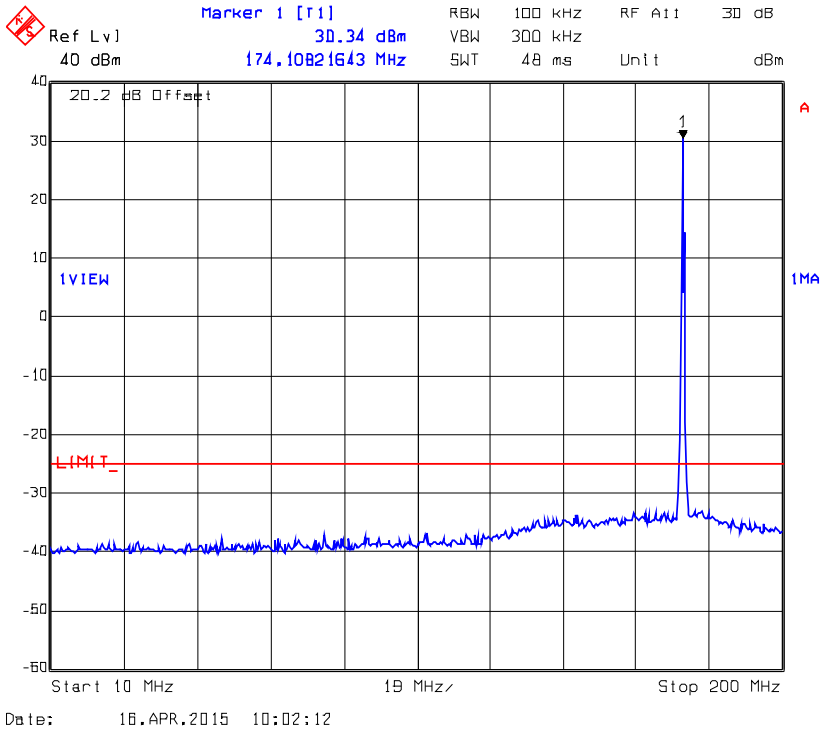
Note- This test results are for information and "Not applicable for FCC Certification" purpose.

Plot 5.4.4.2. Conducted Transmitter Spurious Emissions for 138 MHz, ANALOG, 150 MHz - 2.5 GHz

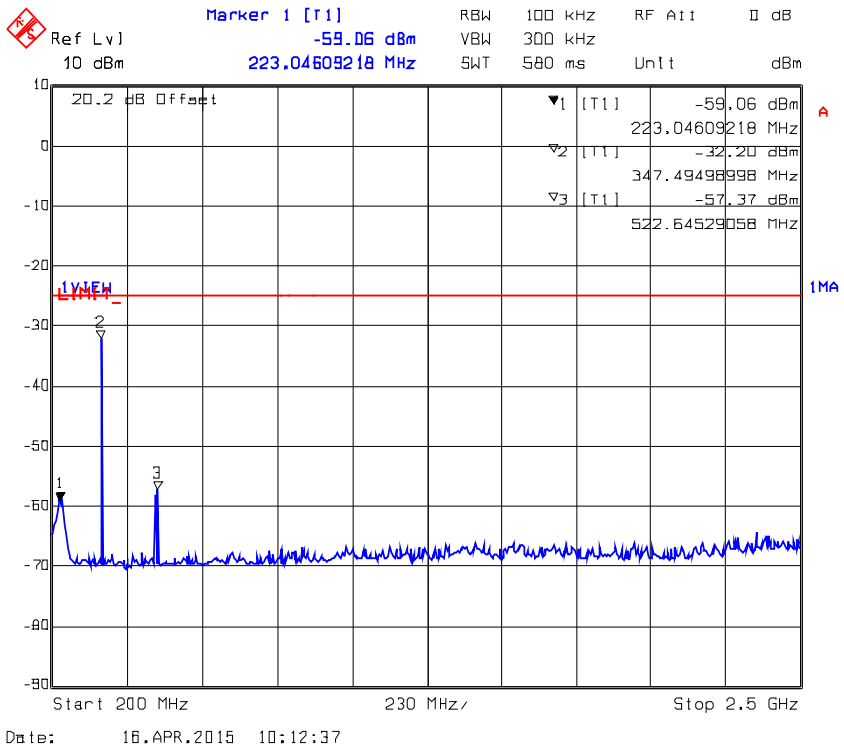


Note- This test results are for information and "Not applicable for FCC Certification" purpose.

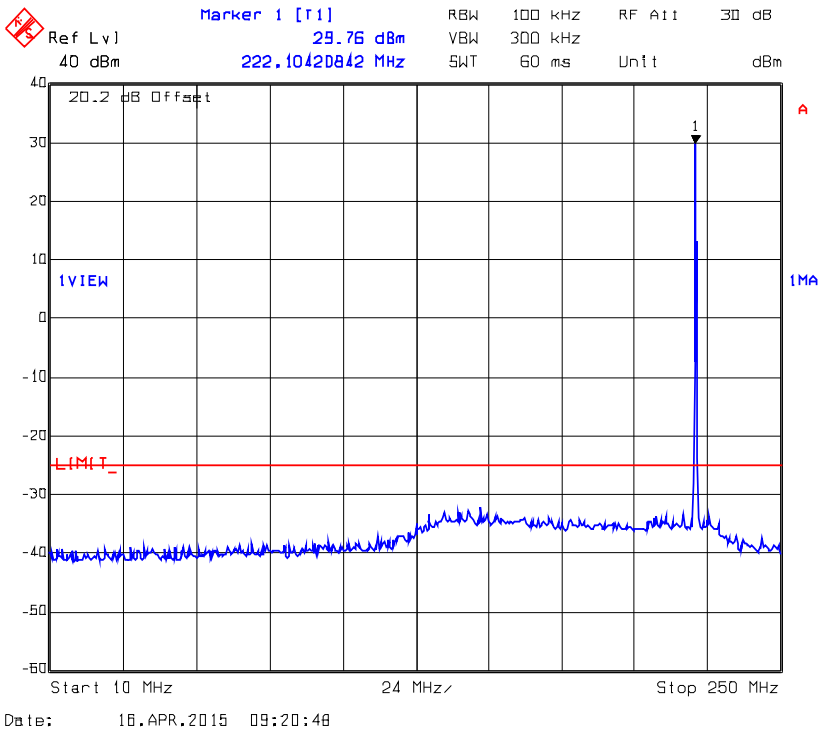
Plot 5.4.4.3. Conducted Transmitter Spurious Emissions for 174 MHz, ANALOG, 30 - 200 MHz



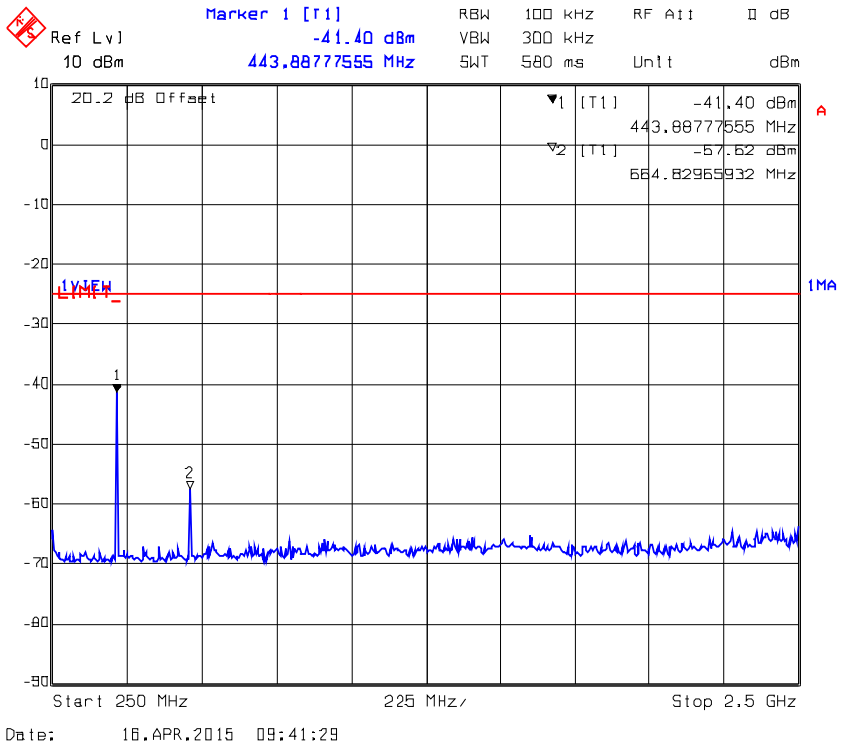
Plot 5.4.4.4. Conducted Transmitter Spurious Emissions for 174 MHz, ANALOG, 200 MHz - 2.5 GHz



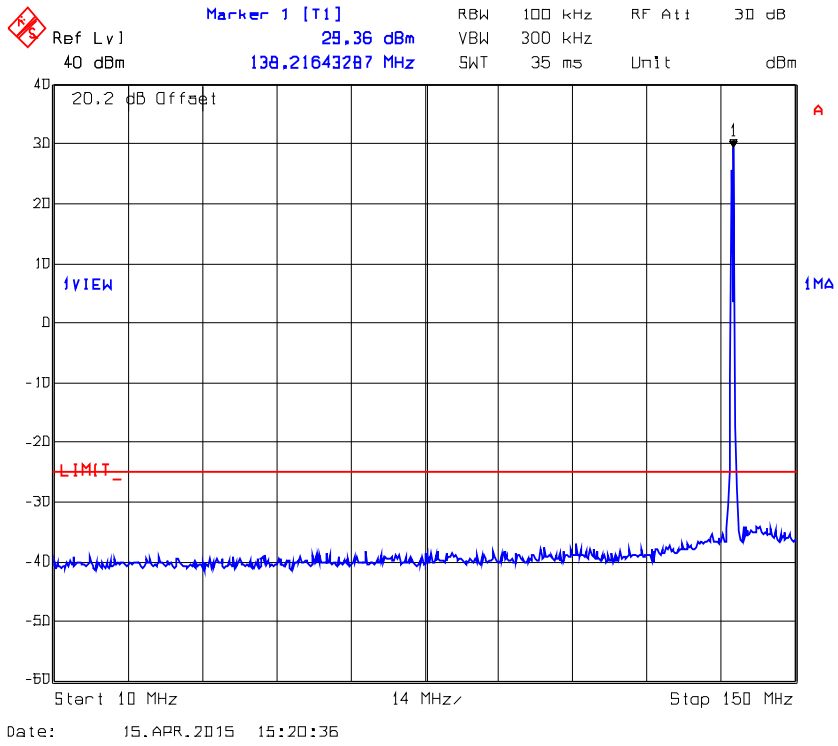
Plot 5.4.4.5. Conducted Transmitter Spurious Emissions for 222 MHz, ANALOG, 30 - 250 MHz



Plot 5.4.4.6. Conducted Transmitter Spurious Emissions for 222 MHz, ANALOG, 250 MHz - 2.5 GHz

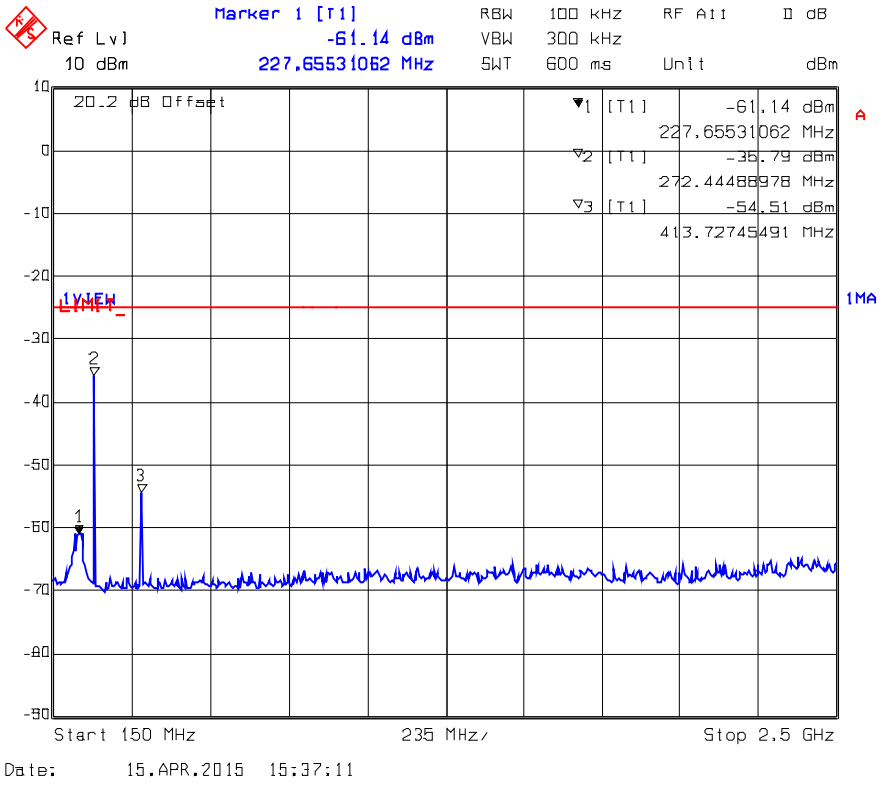


Plot 5.4.4.7. Conducted Transmitter Spurious Emissions for 138 MHz, DIGITAL, 30 - 150 MHz



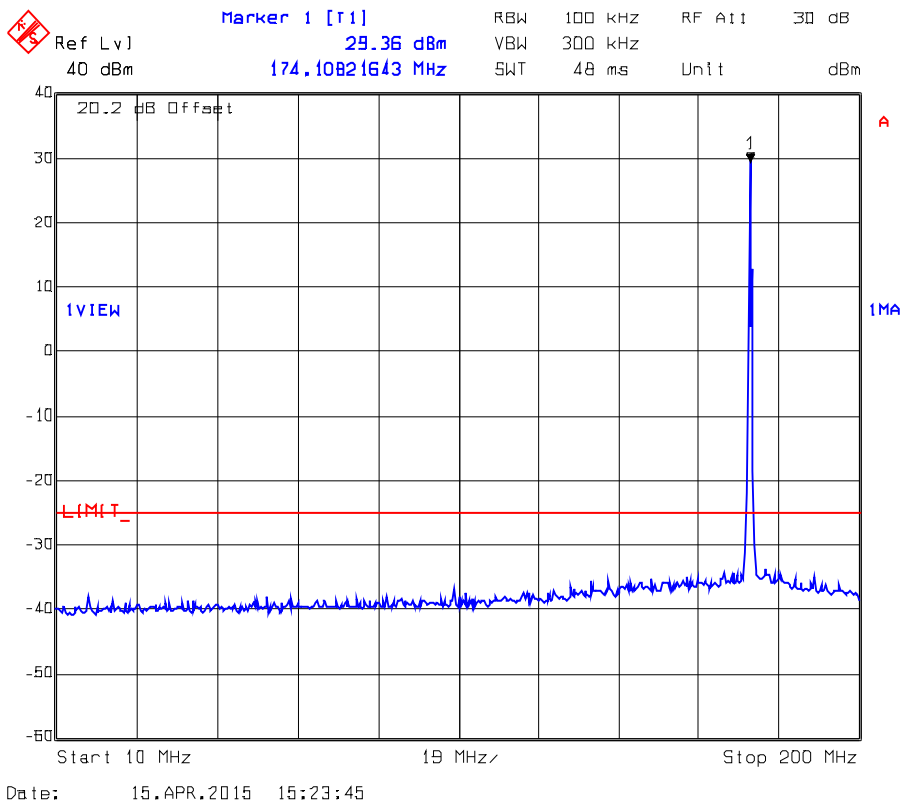
Note- This test results are for information and "Not applicable for FCC Certification" purpose.

Plot 5.4.4.8. Conducted Transmitter Spurious Emissions for 138 MHz, DIGITAL, 150 MHz - 2.5 GHz

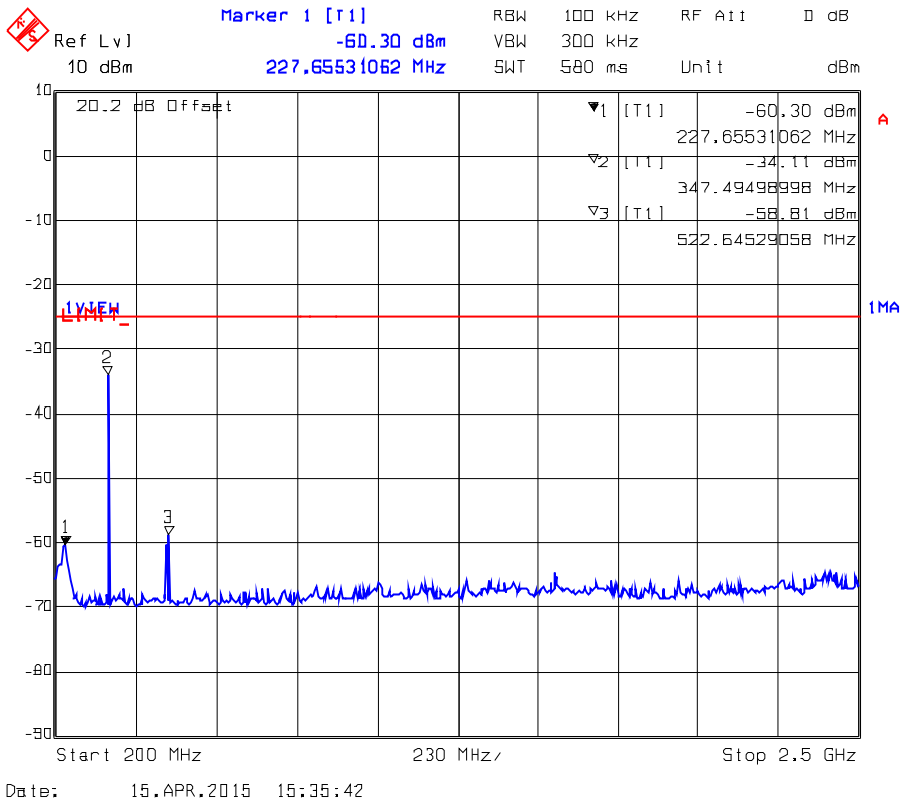


Note- This test results are for information and "Not applicable for FCC Certification" purpose.

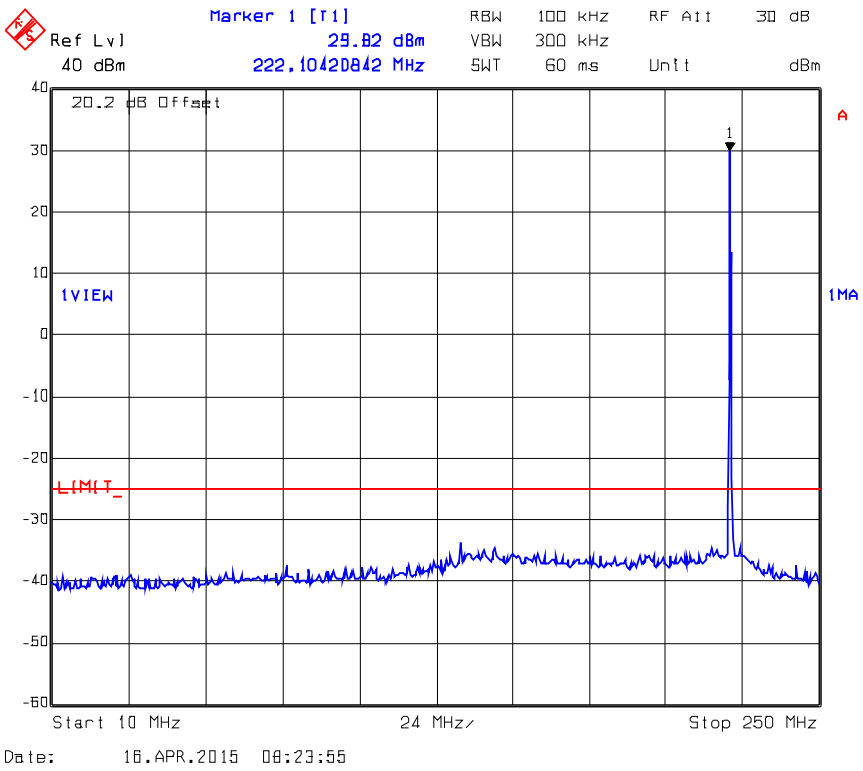
Plot 5.4.4.9. Conducted Transmitter Spurious Emissions for 174 MHz, DIGITAL, 30 - 200 MHz



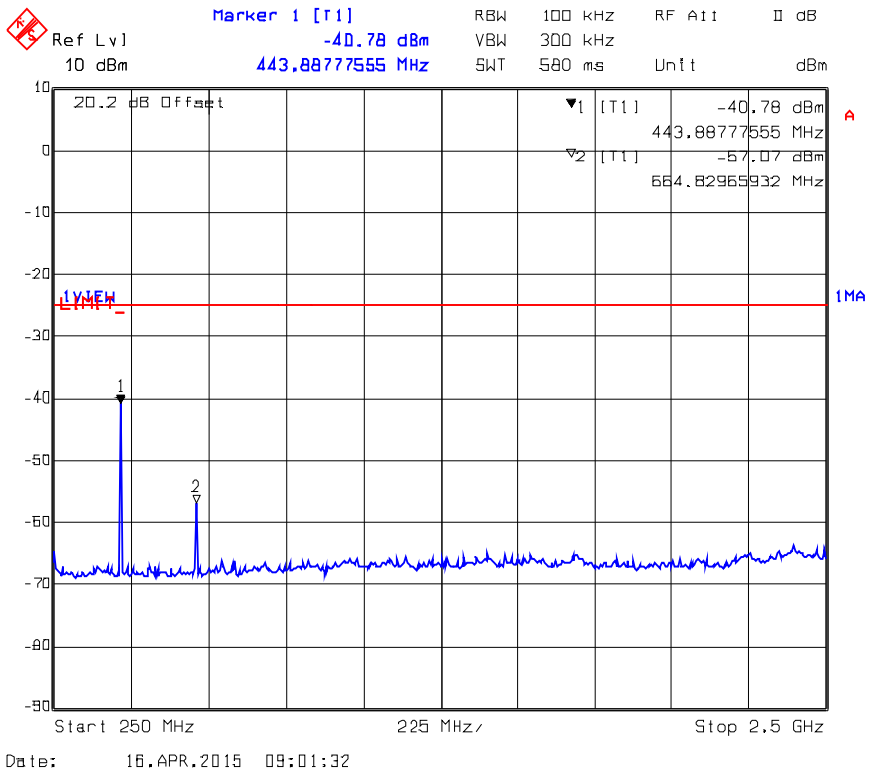
Plot 5.4.4.10. Conducted Transmitter Spurious Emissions for 174 MHz, ANALOG, 200 MHz - 2.5 GHz



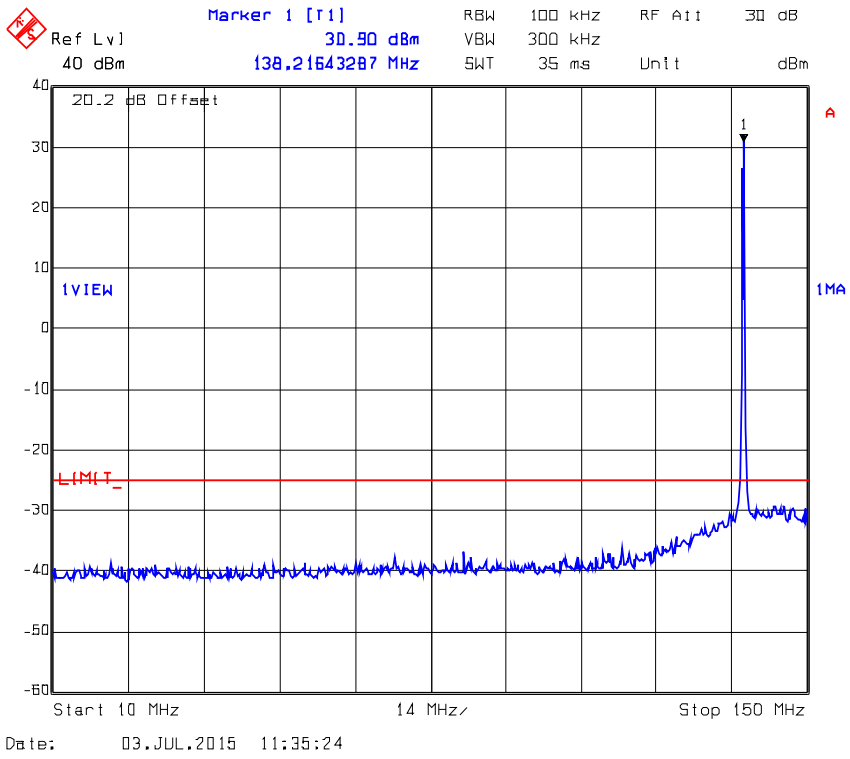
Plot 5.4.4.11. Conducted Transmitter Spurious Emissions for 222 MHz, ANALOG, 30 - 250 MHz



Plot 5.4.4.12. Conducted Transmitter Spurious Emissions for 222 MHz, ANALOG, 250 MHz - 2.5 GHz

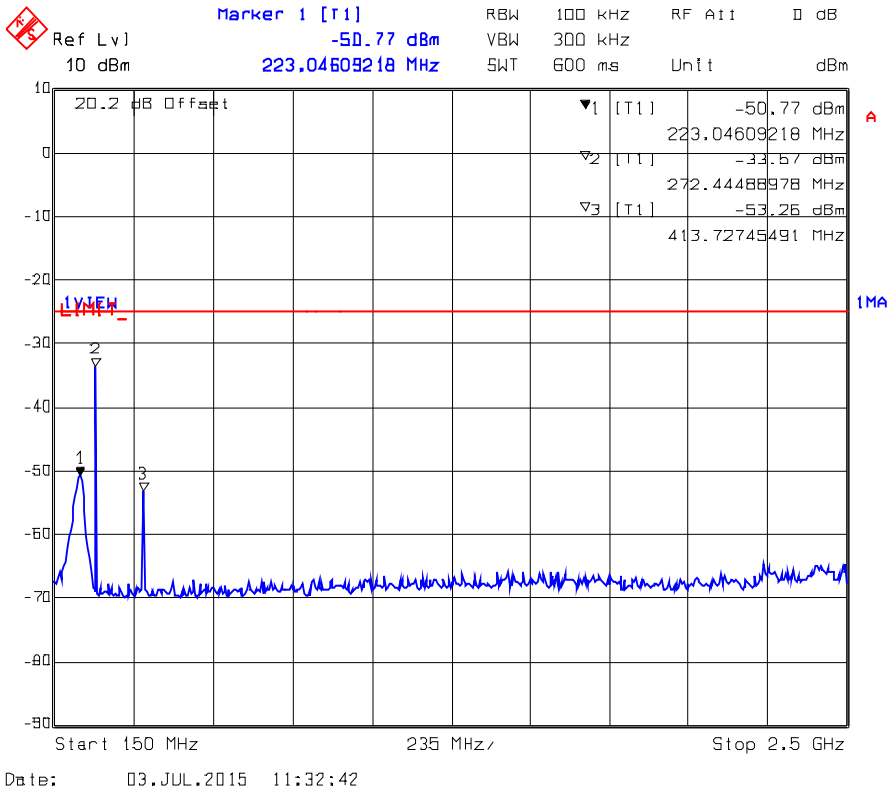


Plot 5.4.4.13. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels) 138, 137.99375 & 138.00625 MHz, 30 - 150 MHz



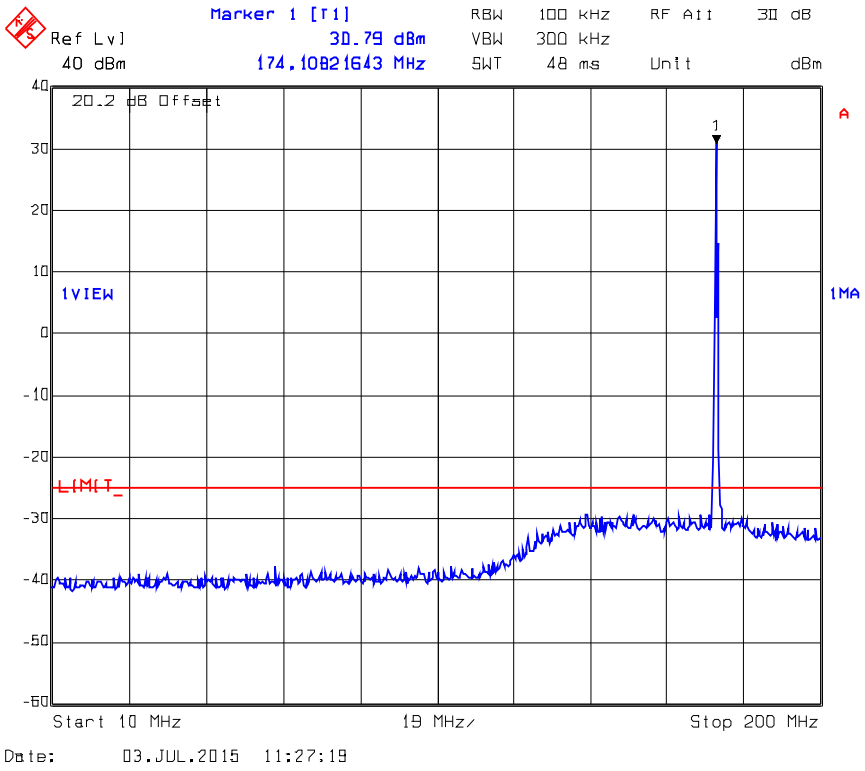
Note- This test results are for information and "Not applicable for FCC Certification" purpose.

Plot 5.4.4.14. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels) 138, 137.99375 & 138.00625 MHz, 150 MHz - 2.5 GHz

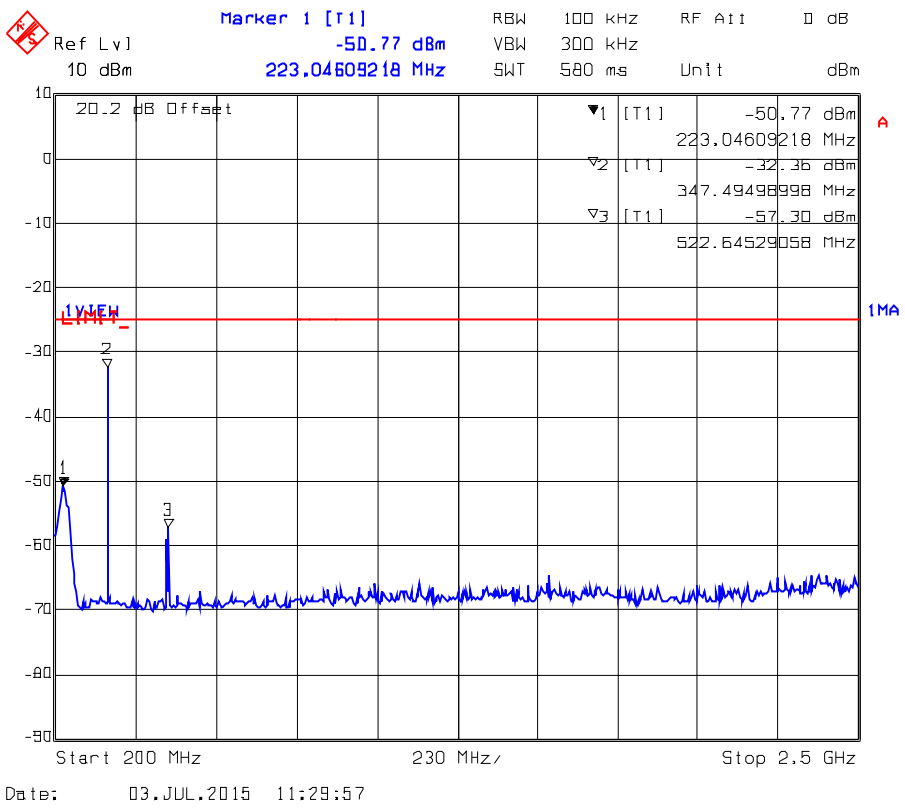


Note- This test results are for information and "Not applicable for FCC Certification" purpose.

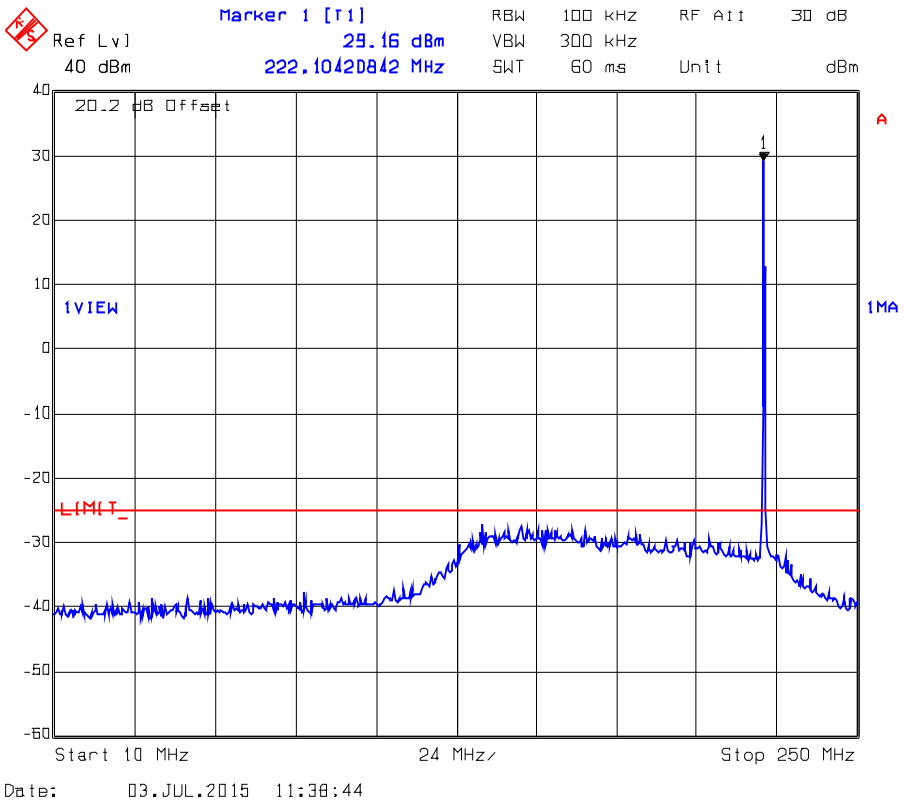
Plot 5.4.4.15. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels)
174, 173.99375 & 174.00625 MHz, 30 - 200 MHz



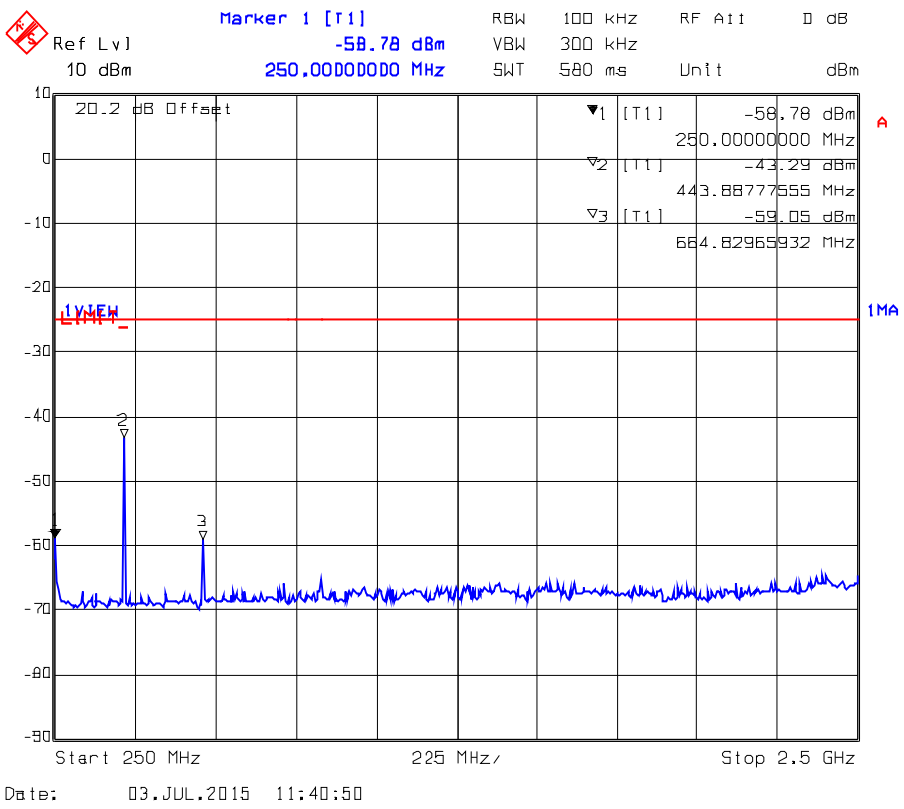
Plot 5.4.4.16. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels)
174, 173.99375 & 174.00625 MHz, 200 MHz - 2.5 GHz



Plot 5.4.4.17. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels)
222, 221.99375 & 222.00625 MHz, 30 - 250 MHz



Plot 5.4.4.18. Conducted Transmitter Spurious Emissions for Multi Channel Inputs (3 Adjacent Channels)
222, 221.99375 & 222.00625 MHz, 250 MHz - 2.5 GHz



5.5. FIELD STRENGTH OF SPURIOUS RADIATION [§§ 90.210, 2.1053 & 2.1057]

5.5.1. Limits

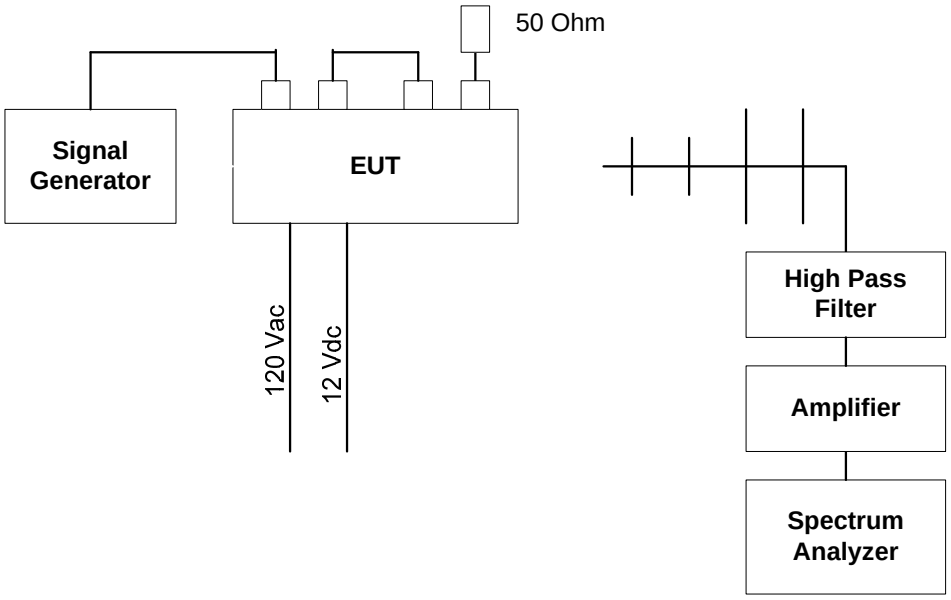
Emissions shall be attenuated below the mean output power of the transmitter as follows:

FCC Rules	Frequency Range	Attenuation Limit (dBc)
§ 90.210(b)	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	At least 43 + 10 log(P) or -13 dBm
§ 90.210(d)	10 MHz to Lowest frequency of the radio to 10th harmonic of the highest frequency of the radio	At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

5.5.2. Method of Measurements

The test shall be performed using substitution method specified in ANSI TIA-603-D-2010.

5.5.3. Test Arrangement



5.5.4. Test Data (Single & Multi-Channel Inputs)

Remarks:

- The RF spurious/harmonic emission characteristics for different channel spacing are similar. Therefore, the following radiated emissions were performed at 25 kHz channel spacing and the results were compared with the more stringent limit for the worst-case.
- The radiated emissions were performed at high power setting with single RF input signal at 3 m distance to represents the worst-case test configuration.
- The emissions were scanned from at least 30 MHz to 10th harmonics; all spurious emissions that are in excess of 20dB below the specified limit shall be recorded.

5.5.4.1. Near Lowest Frequency (138 MHz)

Test Frequency (MHz):	138*					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

*** Note- This test results are for information and "Not applicable for FCC Certification" purpose.**

5.5.4.2. Near Middle Frequency (174 MHz)

Test Frequency (MHz):	174					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

5.5.4.3. Near Highest Frequency (222 MHz)

Test Frequency (MHz):	222					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

5.5.4.4. Near Lowest Frequency (138, 137.99375, 138.00625 MHz)

Test Frequency (MHz):	138*					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

*** Note- This test results are for information and "Not applicable for FCC Certification" purpose.**

5.5.4.5. Near Middle Frequency (174, 173.99375, 174.00625 MHz)

Test Frequency (MHz):	174					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

5.5.4.6. Near Highest Frequency (222, 221.99375, 222.00625 MHz)

Test Frequency (MHz):	222					
Limit (dBm):	-25					
Frequency (MHz)	**E-Field (dBµV/m)**	**EMI Detector (Peak/QP)**	**Antenna Polarization (H/V)**	**ERP measured (dBm)**	**Limit (dBm)**	**Margin (dB)**
30-6000	*	Peak	V/H	*	-25	*
* Spurious emissions are more than 20dB below the specified limit.						

5.6. RF EXPOSURE REQUIRMENTS [§§ 1.1310 & 2.1091]

The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation.

FCC 47 CFR § 1.1310:

TABLE 1—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 TO TABLE 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 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

5.6.1. Method of Measurements

Refer to Sections 1.1310, 2.1091

In order to demonstrate compliance with MPE requirements (see Section 2.1091), the following information is typically needed:

(1) Calculation that estimates the minimum separation distance (20 cm or more) between an antenna and persons required to satisfy power density limits defined for free space.
(2) Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement
(3) Any caution statements and/or warning labels that are necessary in order to comply with the exposure limits
(4) Any other RF exposure related issues that may affect MPE compliance

Calculation Method of RF Safety Distance:

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

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

5.6.2. RF Evaluation

EVALUATION OF RF EXPOSURE COMPLIANCE REQUIREMENTS	
RF Exposure Requirements	**Compliance with FCC Rules**
Minimum calculated separation distance between antenna and persons required: ***44.5 cm**	Manufacturer' instruction for separation distance between antenna and persons required: **66 cm.**
Antenna installation and device operating instructions for installers (professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement	Antenna installation and device operating instructions shall be provided to installers to maintain and ensure compliance with RF exposure requirements.
Caution statements and/or warning labels that are necessary in order to comply with the exposure limits	Refer to User's Manual for RF Exposure Information.
Any other RF exposure related issues that may affect MPE compliance	None.

*The minimum separation distance between the antenna and bodies of users are calculated using the following formula:

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

S = 0.2 mW/cm^2
EIRP = $P_{(Max)}$ + 5.65 dB = 31.31 dBm + 5.65 dB = 36.96 dBm = 4966 W (Worst Case)

(Minimum Safe Distance, r) = $\sqrt{\frac{EIRP}{4 \cdot \pi \cdot S}} = \sqrt{\frac{4966}{4 \cdot \pi \cdot (0.2)}} \approx 44.5cm$

EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20Hz–40 GHz	Nov 21, 2015
Signal Generator 1	Anritsu	6377B	010112	10 MHz – 50 GHz	Mar 30, 2017
Signal Generator 2	Hewlett Packard	8648C	3443U00391	100 kHz – 3.2 GHz	Feb 02, 2017
Signal Generator 3	Hewlett Packard	8920B	US39064699	250 kHz – 1 GHz	Jan 30, 2017
Splitter/Combiner	Mini-Circuits	ZFSC-3-4	15542	1-1000 MHz	Cal on use
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	Cal on use
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	May 08, 2017
RF Amplifier	Com-Power	PAM-0118	551016	500 MHz – 18 GHz	Jan 06, 2016
Biconi-Log Antenna	ETS Lindgren	3142C	26873	26 – 3000 MHz	Apr 14, 2016
Horn Antenna	ETS Lindgren	3115	6570	26 – 3000 MHz	Sep 11, 2015
Power Meter	Hewlett Packard	436A	2016A7747	10K--50G sensor dependent	Mar 06, 2016
Power Sensor	Hewlett Packard	8481A	2237A33409	10 MHz-18GHZ	Mar 05, 2016
RF Communication Test Set	Hewlett Packard	8920B	US39064699	250 kHz – 1 GHz	Jan 30, 2017
High Pass Filter	Mini Circuit	SHP-300	10427	Cut off VHF band	Cal on use
DC Power Supply	Tenma	72-7295	490300270	1 – 40 Vdc	Cal on use
DC Power Supply	Xantrex	HPD 60-5SX	63903	0 – 60 Vdc	Cal on use
Attenuator (10dB)	Aeroflex/Weinschel	46-10-34	BS4336	DC-18 GHz	Cal on use
Attenuator	Weinschel	46-20-34	BM1347	DC–18 GHz	Cal on use
Signal Generator	Agilent	E8241A	US42110625	250 kHz – 20 GHz	Aug 04, 2015
Spectrum Analyzer	Hewlett Packard	HP 8593EM	3412A00103	9 kHz–26.5 GHz	Apr 09, 2017
Attenuator	Pasternack	PE7010-20	-	DC–2 GHz	Jan 02, 2016
L.I.S.N	EMCO	3825/2	2209	0.10 -100 MHz	Sep 03, 2015

Note: All testing for this model was completed on July 03, 2015

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 (150 kHz – 30 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 1.57**	**± 1.8**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 3.14**	**± 3.6**

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

	Radiated Emission Measurement Uncertainty @ 3m, Horizontal (30-1000 MHz):	**Measured**	**Limit**
u_c	**Combined standard uncertainty:** $u_c(y) = \sqrt{\sum_{i=1}^{m} u_i^2(y)}$	**± 2.15**	**± 2.6**
U	**Expanded uncertainty U:** $U = 2u_c(y)$	**± 4.30**	**± 5.2**

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

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