RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

Harris Corporation
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Model: XG-75 VHF

FCC ID: OWDTR-0059-E
IC: 3636B-0059

July 3, 2011

Standards Referenced for this Report	
Part 2: 2010	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2010	Private Land Portable Radio Services
TIA-EIA-603-C August 2004	Land Portable FM or PM Communications Equipment – Measurement and Performance Standards
ANSI/TIA/EIA – 102.CAAA-2002	Digital C4FM/CQPSK Transceiver Measurement Methods
ANSI/TIA/EIA– 102.BAAA–1998	Project 25 FDMA Common Air Interface—New Technology Standards Project—Digital Radio Technical Standards
RSS-119 Issue 11	Land Portable and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz
SRSP-500	Technical Requirements for Land Mobile and Fixed Radio Services Operating in the Bands 138-144 MHz and 148-174 MHz

Report Prepared By: Daniel Baltzell

Document Number: 2011096

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Frequency Range (MHz)	Rated Conducted Output Power (W)	Frequency Tolerance (ppm)	Emission Designator
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	11K0F3E
136-150 (Federal) 150–174 (FCC) 138-174 (IC)	6.0	2.5	7K80F1D (2 level NB 4800)
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	7K80F1E (2 level NB 4800)
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	10K8F1D (2 level NB 9600)
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	10K8F1E (2 level NB 9600)
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	8K40F1D (P25)
136-150 (Federal) 150-174 (FCC) 138-174 (IC)	6.0	2.5	8K40F1E (P25)

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1 Test Result Summary

Test	FCC Reference	IC Reference	Result
RF Power Output	2.1046(a), 90.205	RSS-119 5.4	Complies
Spurious Emissions at Antenna Terminals	2.1046(a), 90.210	RSS-119 5.5, 5.8	Complies
Field Strength of Spurious Radiation	2.1053(a), 90.210	RSS-119 5.5, 5.8	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.210	RSS-119 5.5, 5.8	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213	RSS-119 5.3	Complies
Modulation Characteristics	2.1047(a)(b)	N/A	Complies
Transient Frequency Response	90.214	RSS-119 5.9	Complies

2 General Information

The following Type Certification Report is prepared on behalf of **Harris Corporation** in accordance with the Federal Communications Commission and Industry Canada Rules and Regulations. The Equipment Under Test (EUT) was the **XG-75 VHF, a 6 Watt Portable Radio; FCC ID: OWDTR-0059-E, IC: 3636B-0059.**

The radio is subject to FCC DoC due to the optional data connection through the UDC connector. DoC testing was performed for the aforementioned accessories and configurations, and the data is contained in a separate DoC report.

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Parts 2 and 90, and Industry Canada RSS-119. Calibration checks are performed regularly on the instruments, and all accessories including high pass filter, coaxial attenuator, preamplifier and cables.

2.1 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report submitted to, and approved by, the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

2.2 Related Submittal(s)/Grant(s)

This is a new family certification application for Industry Canada. The XG-75 VHF portable radio family includes the following model numbers: EVXG-PFV1B, EVXG-PFV1Y, EVXG-PBV1Y and EVXG-PBV1B.

2.3 Grant Notes

RF power switchable from 0.5 W to rated power (6 W).
The grant listed power is rated power.

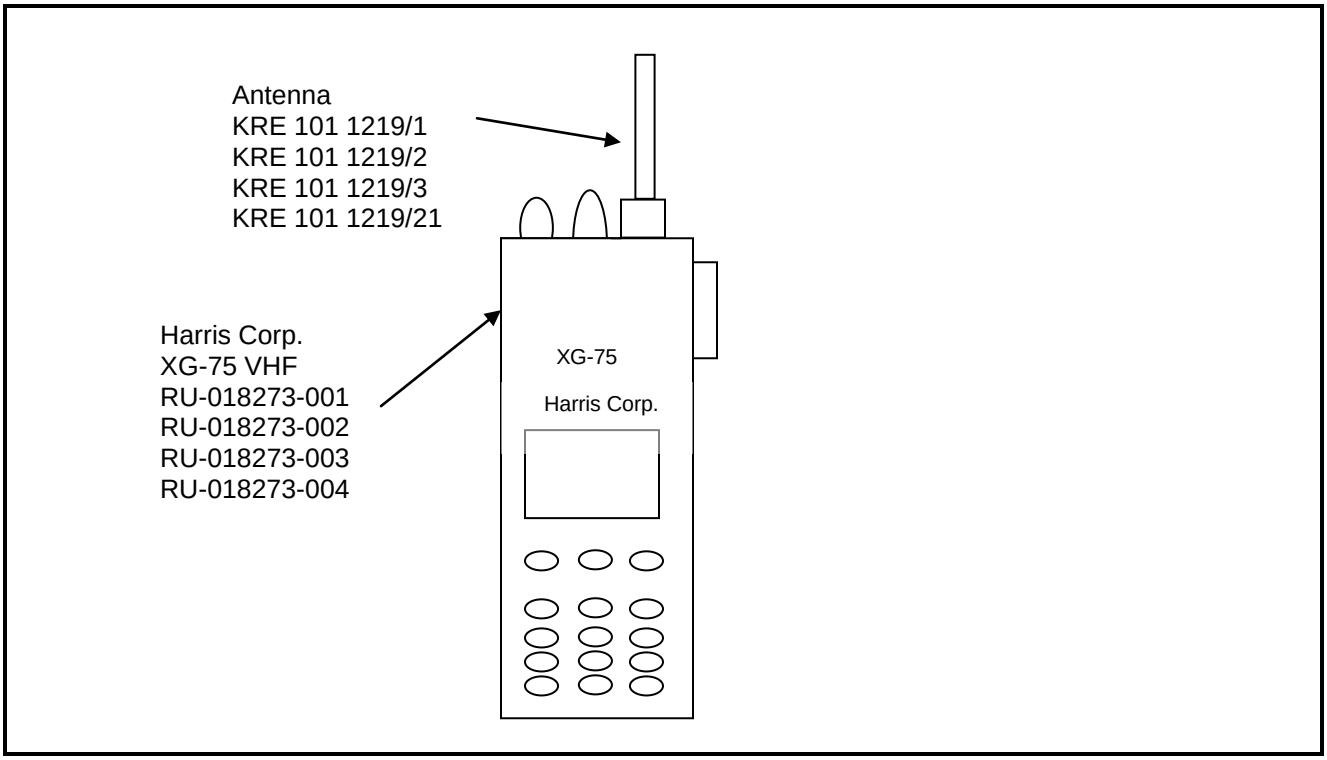
2.4 Tested System Details

The test sample was received on June 24, 2011. Listed below are the identifiers and descriptions of all equipment, cables, and internal devices used with the EUT for this test, as applicable. The device was programmed for multiple modes of operation and modulation types.

Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	Part Number	FCC ID	RTL Bar Code
XG-75 VHF 6 W Portable Radio	Harris Corporation	EVXG-PBV1B (Scan)	RU-018273-001	OWDTR-0059-E	20097
XG-75 VHF 6 W Portable Radio	Harris Corporation	EVXG-PFV1B (System)	RU-018273-002	OWDTR-0059-E	20098

Figure 2-1: Configuration of Tested System



3 FCC Rules and Regulations Part 2.1033(C)(8) Voltages and Currents Through The Final Amplifying Stage

7.5 VDC / 2.25 A

4 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.205 Transmitting Power Limits, RSS-119 5.4: Transmitter Output Power

4.1 Test Procedure

ANSI/TIA/EIA-603-2002, section 2.2.1

The EUT was connected to a coaxial attenuator having a 50 Ω load impedance.

Manufacturer's Rated Power: 6.0 W

4.2 Test Data

Table 4-1: RF Conducted Output Power - Measured

Frequency (MHz)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
136.0125	37.8	6.0	27.0	0.5
138.0	37.8	6.1	26.9	0.5
141.0	37.9	6.1	27.0	0.5
144.0	37.9	6.1	26.9	0.5
148.0	37.8	6.1	26.9	0.5
150.0	37.8	6.1	26.9	0.5
162.0	37.9	6.1	26.9	0.5
173.9875	37.8	6.0	26.9	0.5

Notes: Data presented is for analog mode. All other modes were investigated and found to have equivalent power within measurement tolerances.

Table 4-2: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901184	Agilent Technologies	E4416A	EPM-P Power Meter, single channel	GB41050573	1/20/12
901356	Agilent	E9323A	Power Sensor	31764-264	1/20/12

Test Personnel:

Daniel Baltzell		July 1, 2011
EMC Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; Part 90.210: Emission Limitations, RSS-119 5.8: Transmitter Unwanted Emissions

5.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.13

The transmitter is terminated with a 50 Ω load and interfaced with a spectrum analyzer.

Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 modes.

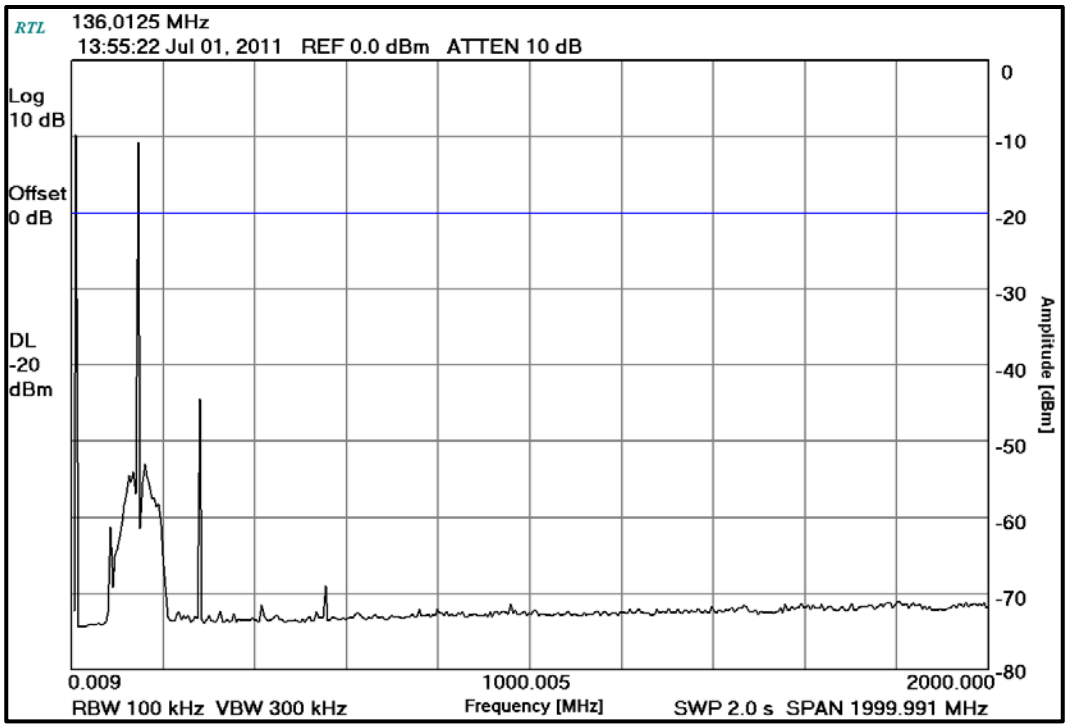
5.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

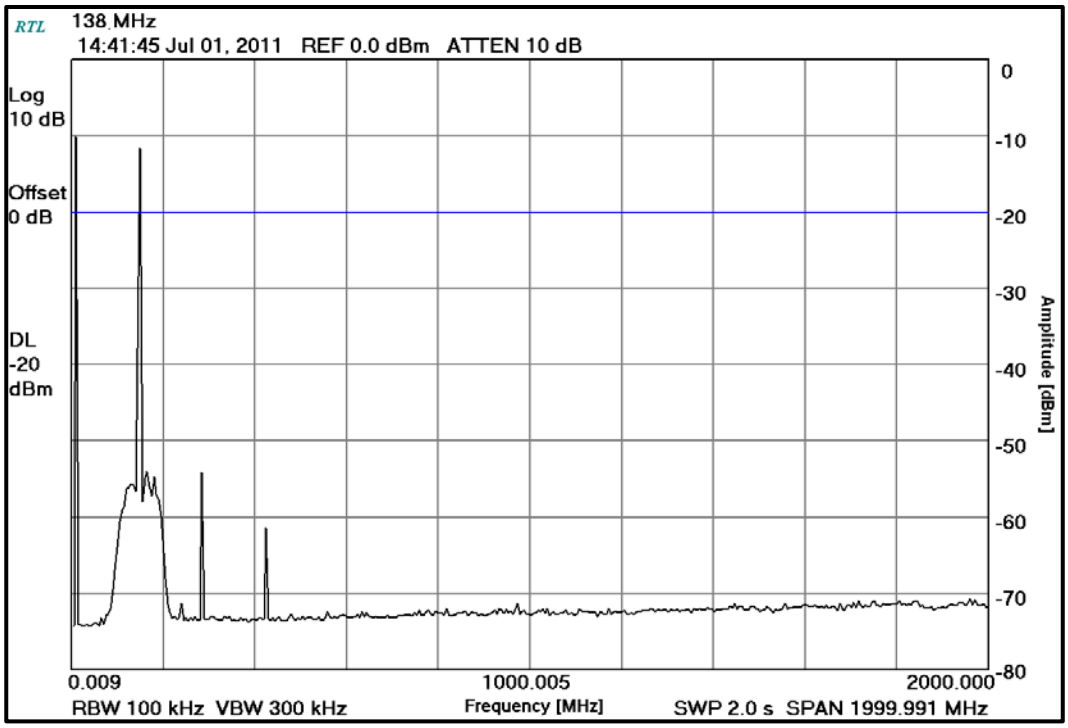
Limits: (50 + 10 LOG P(W))

The following channels (MHz) were investigated: 136.0125, 138.0, 141.0, 144.0, 148.0, 150.0, 162.0 and 173.9875. Both high and low power settings were checked; high power was found to be worst case. All modes were investigated, and analog mode is presented as representative data.

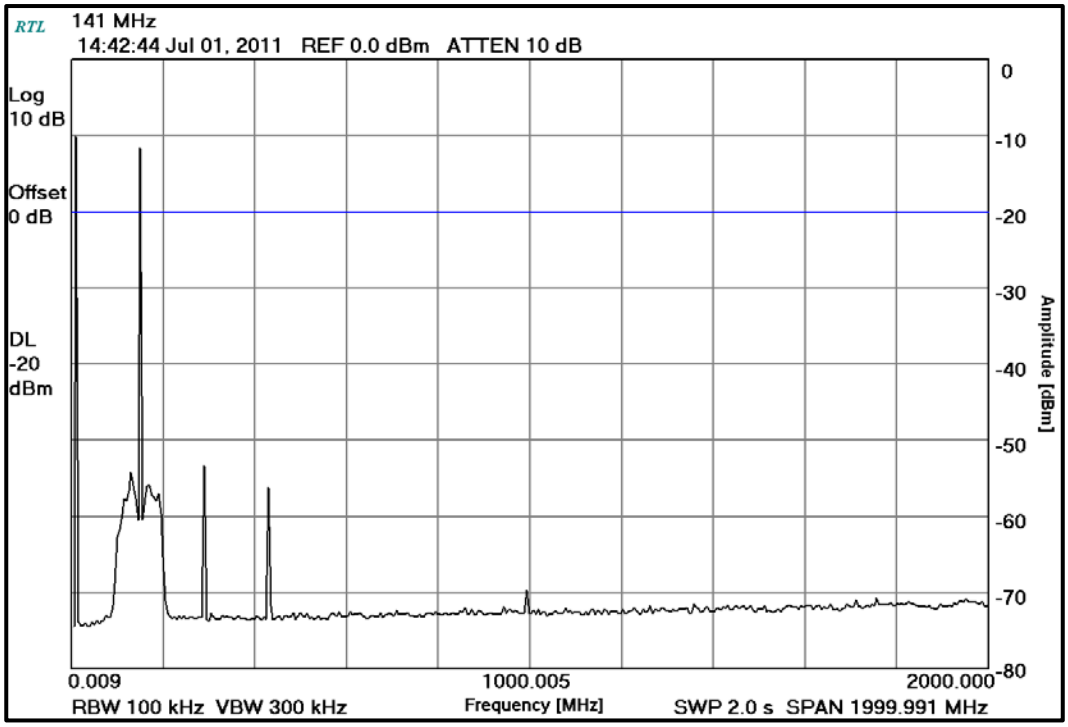
Plot 5-1: Conducted Spurious - 136.0125 MHz - Analog High Power



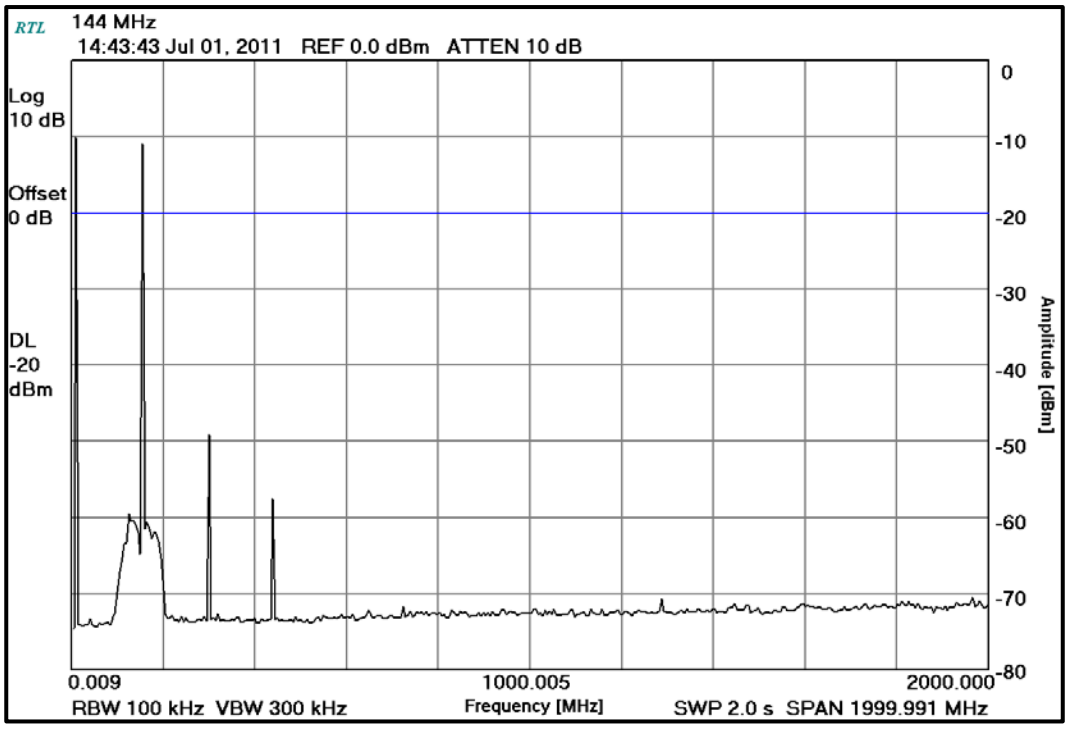
Plot 5-2: Conducted Spurious – 138.0 MHz – Analog High Power



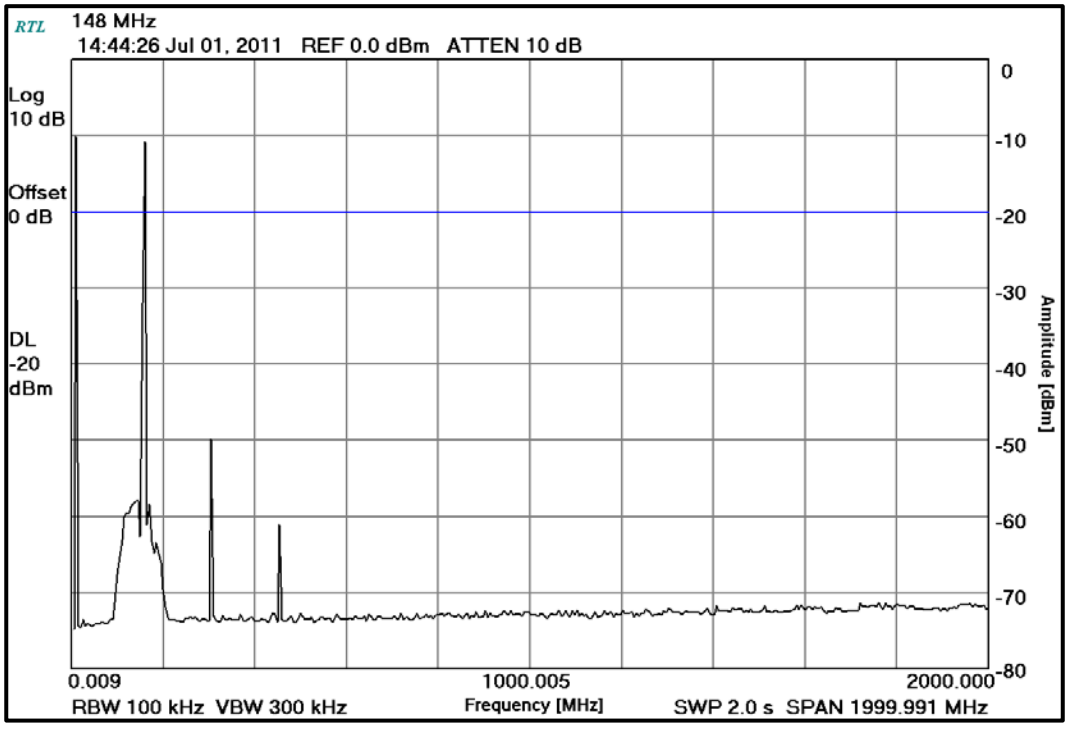
Plot 5-3: Conducted Spurious – 141 MHz – Analog High Power



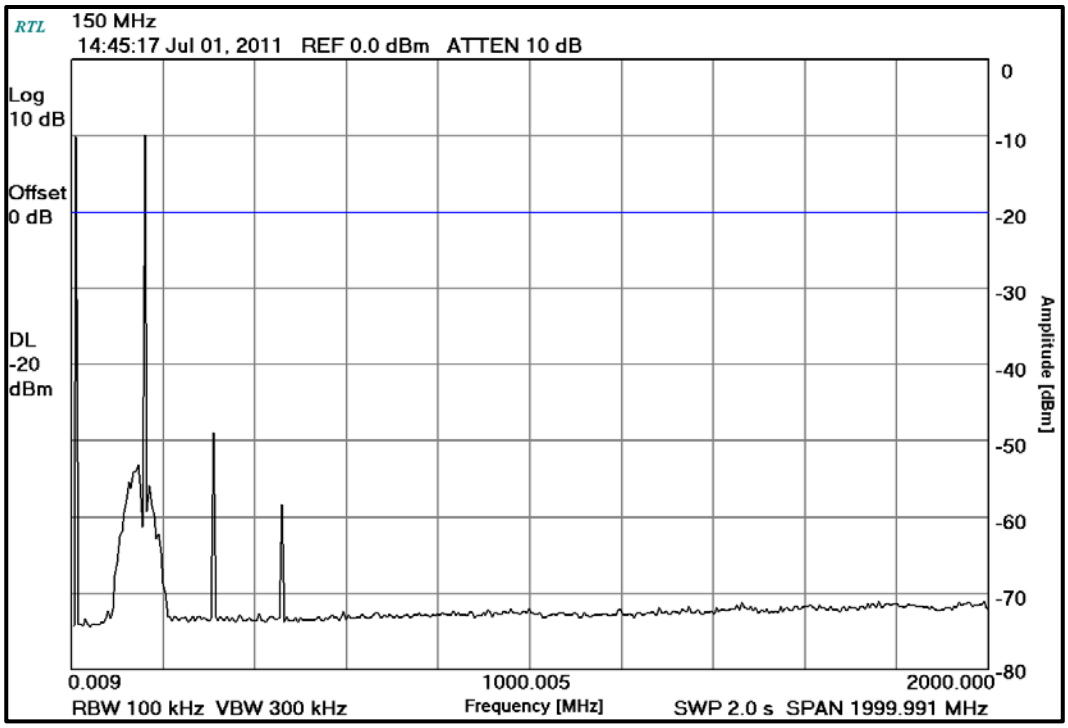
Plot 5-4: Conducted Spurious – 144 MHz – Analog High Power



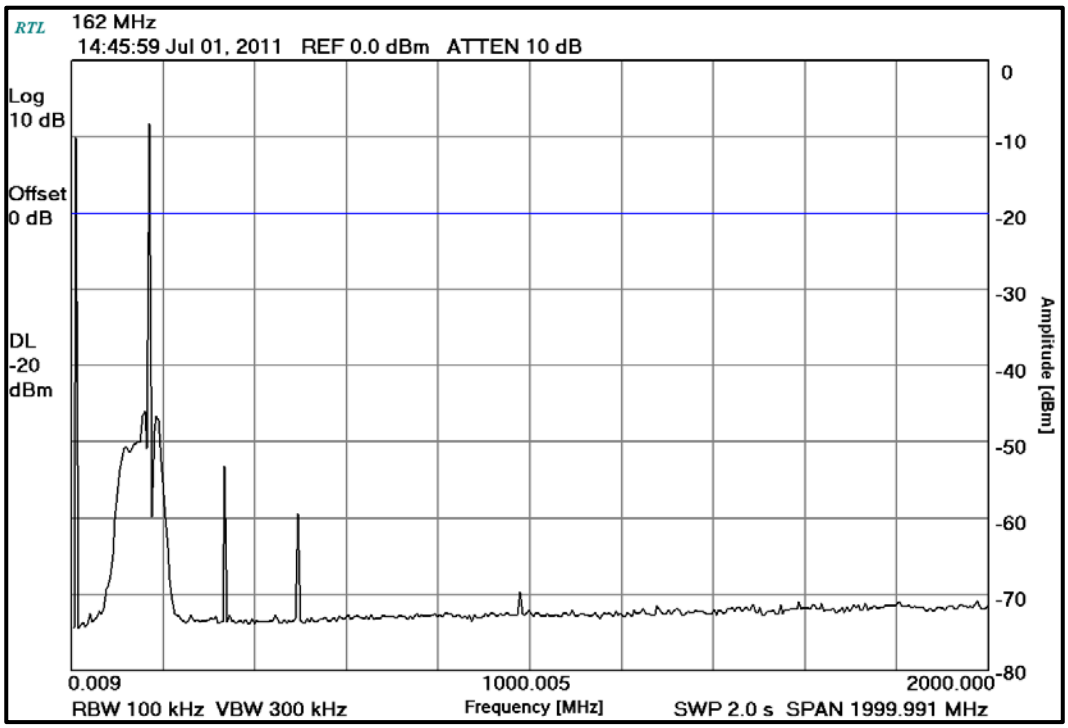
Plot 5-5: Conducted Spurious - 148 MHz - Analog High Power



Plot 5-6: Conducted Spurious – 150 MHz – Analog High Power



Plot 5-7: Conducted Spurious – 162 MHz – Analog High Power



Plot 5-8: Conducted Spurious – 173.9875 MHz – Analog High Power

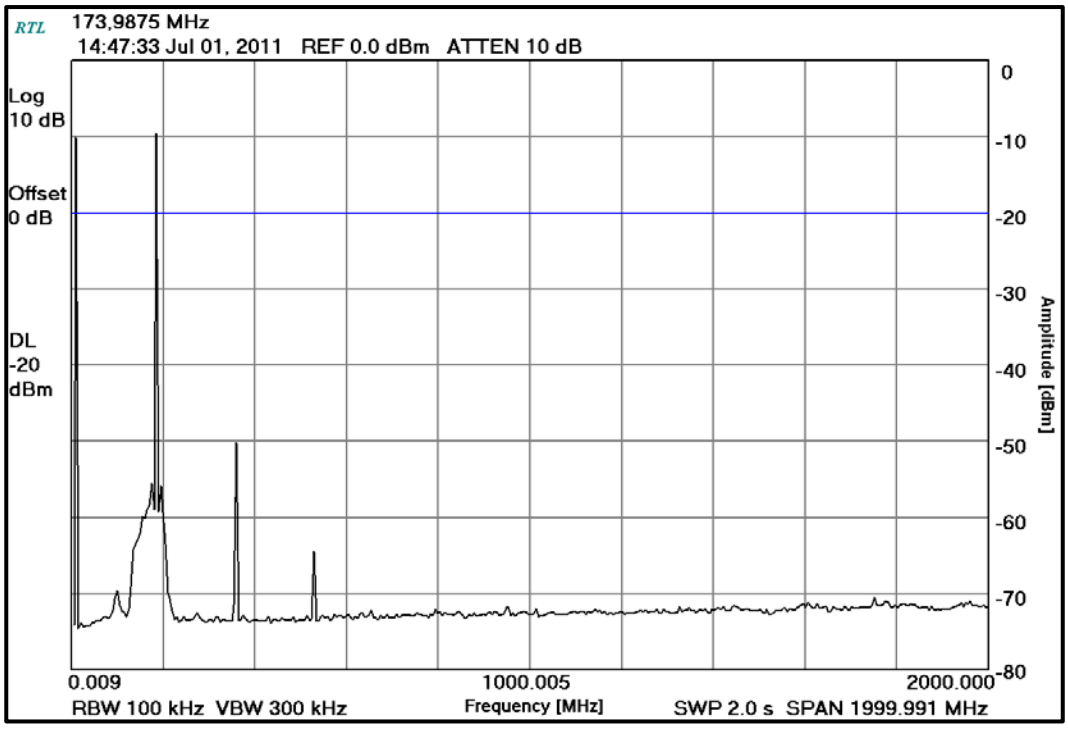


Table 5-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	1/13/12
901129	Par Electronics	118-174 (25W)	VHF Notch Filter	N/A	3/10/12
900819	Weinschel Corp	2	10 dB Attenuator; 5 W	BF0830	2/15/12

Test Personnel:

Daniel Baltzell		July 1, 2011
EMC Test Engineer	Signature	Date of Test

6 FCC Rules and Regulations Part 2.1053(a): Field Strength of Spurious Radiation; Part 90 90.210 Out of Band Emissions Limit; RSS-119 5.8: Unwanted Emissions

6.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.12

Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz. Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

The spurious emissions levels were measured, and the device under test was replaced by a substitution antenna connected to a signal generator. This signal generator level was then corrected by subtracting the cable loss from the substitution antenna to the signal generator, and the gain of the antenna was further corrected to a half wave dipole. The narrowband limit of 50+10log(P) was used.

6.2 Test Data

6.2.1 CFR 47 Part 90.210 Requirements

The worst-case emissions test data are shown.

Table 6-1: Field Strength of Spurious Radiation – 136.0125 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
272.0250	50.3	-61.4	0.6	1.7	98.2	-40.4
408.0375	53.5	-54.6	0.7	1.9	91.2	-33.4
544.0500	33.4	-71.2	0.7	0.5	109.2	-51.4
680.0625	31.1	-70.3	0.8	1.3	107.5	-49.8
816.0750	29.7	-68.3	0.9	1.1	105.9	-48.1
952.0875	29.9	-70.2	0.9	1.6	107.4	-49.6
1088.1000	25.3	-75.3	1.0	4.3	109.8	-52.0
1224.1125	27.6	-73.8	1.0	4.9	107.8	-50.0
1360.1250	30.1	-69.4	1.1	5.6	102.6	-44.9

Table 6-2: Field Strength of Spurious Radiation – 138.0 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
276.0000	49.1	-62.6	0.6	1.6	99.3	-41.5
414.0000	54.5	-53.4	0.7	1.8	90.0	-32.2
552.0000	43.8	-60.6	0.7	1.3	97.8	-40.0
690.0000	31.6	-69.5	0.8	1.3	106.8	-49.0
828.0000	23.6	-74.1	0.9	1.1	111.7	-53.8
966.0000	24.4	-76.7	0.9	1.7	113.8	-55.9
1104.0000	37.2	-65.8	1.0	4.3	100.3	-42.4
1242.0000	20.1	-81.0	1.0	4.9	114.9	-57.1
1380.0000	27.2	-71.9	1.1	5.7	105.0	-47.2

Table 6-3: Field Strength of Spurious Radiation – 141 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
282.0000	41.0	-70.6	0.6	1.6	107.5	-49.6
423.0000	53.7	-54.0	0.7	1.8	90.8	-32.9
564.0000	30.5	-73.6	0.7	1.3	110.9	-53.1
705.0000	27.1	-73.6	0.8	1.3	111.1	-53.2
846.0000	23.2	-74.1	0.9	1.1	111.8	-53.9
987.0000	19.9	-82.2	0.9	1.8	119.2	-61.4
1128.0000	24.5	-78.3	1.0	4.4	112.8	-54.9
1269.0000	15.1	-85.6	1.0	5.0	119.5	-61.6
1410.0000	12.0	-89.2	1.1	5.9	122.2	-64.4

Table 6-4: Field Strength of Spurious Radiation – 144 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
282.0000	41.0	-70.6	0.6	1.6	107.5	-49.6
423.0000	53.7	-54.0	0.7	1.8	90.8	-32.9
564.0000	30.5	-73.6	0.7	1.3	110.9	-53.1
705.0000	27.1	-73.6	0.8	1.3	111.1	-53.2
846.0000	23.2	-74.1	0.9	1.1	111.8	-53.9
987.0000	19.9	-82.2	0.9	1.8	119.2	-61.4
1128.0000	24.5	-78.3	1.0	4.4	112.8	-54.9
1269.0000	15.1	-85.6	1.0	5.0	119.5	-61.6
1410.0000	12.0	-89.2	1.1	5.9	122.2	-64.4

Table 6-5: Field Strength of Spurious Radiation – 148 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
296.0000	38.4	-72.9	0.6	1.4	109.9	-52.0
444.0000	48.5	-58.7	0.7	1.7	95.4	-37.6
592.0000	38.0	-65.4	0.8	1.2	102.7	-44.8
740.0000	28.0	-71.9	0.8	1.2	109.3	-51.4
888.0000	37.7	-59.8	0.9	1.3	97.3	-39.4
1036.0000	21.5	-82.1	1.0	4.4	116.5	-58.6
1184.0000	23.1	-79.0	1.0	4.7	113.1	-55.3
1332.0000	19.8	-80.0	1.0	5.4	113.5	-55.7
1480.0000	20.1	-78.2	1.1	6.3	110.7	-52.9

Table 6-6: Field Strength of Spurious Radiation – 150 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
300.0000	39.2	-72.0	0.6	1.4	109.1	-51.2
450.0000	48.6	-58.4	0.7	1.7	95.2	-37.3
600.0000	42.6	-60.6	0.8	1.2	97.9	-40.1
750.0000	42.4	-57.2	0.8	1.2	94.7	-36.8
900.0000	19.4	-78.7	0.9	1.3	116.1	-58.2
1050.0000	13.4	-90.1	1.0	4.4	124.5	-66.6
1200.0000	11.1	-90.7	1.0	4.8	124.8	-66.9
1350.0000	10.3	-89.4	1.1	5.5	122.7	-64.9
1500.0000	19.8	-78.7	1.1	6.5	111.1	-53.3

Table 6-7: Field Strength of Spurious Radiation – 162 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
324.0000	41.5	-69.3	0.6	1.6	106.2	-48.4
486.0000	35.6	-70.5	0.7	1.5	107.6	-49.7
648.0000	23.0	-78.9	0.8	1.3	116.3	-58.5
810.0000	29.9	-68.3	0.9	1.0	106.0	-48.1
972.0000	33.6	-67.8	0.9	1.7	104.9	-47.1
1134.0000	32.7	-70.0	1.0	4.4	104.5	-46.6
1296.0000	25.5	-74.7	1.0	5.1	108.5	-50.7
1458.0000	30.4	-67.6	1.1	6.2	100.4	-42.5
1620.0000	33.1	-65.6	1.2	6.7	98.0	-40.1

Table 6-8: Field Strength of Spurious Radiation – 173.9875 MHz – Analog High Power

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
347.9500	49.5	-60.7	0.6	1.8	97.3	-39.5
521.9250	36.6	-68.6	0.7	1.3	105.8	-48.0
695.9000	28.8	-72.2	0.8	1.3	109.5	-51.7
869.8750	39.5	-57.2	0.9	1.2	94.7	-36.9
1043.8500	26.1	-77.4	1.0	4.4	111.8	-54.0
1217.8250	14.1	-87.4	1.0	4.8	121.4	-63.6
1391.8000	27.7	-71.1	1.1	5.8	104.2	-46.4
1565.7750	31.7	-67.6	1.2	6.7	99.9	-42.1
1739.7500	14.5	-82.5	1.3	6.5	115.2	-57.4

Table 6-9: Test Equipment Used For Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	1/31/13
900932	Hewlett Packard	8449B OPT H02	Preamplifier (1 - 26.5 GHz)	3008A00505	2/22/12
900933	Hewlett Packard	11975A	Amplifier (2 - 8 GHz)	2304A00348	2/22/12
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	9/13/11
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	9/13/11
901516	Insulated Wire, Inc.	KPS-1503-2400-KPS-09302008	RF cable, 20'	NA	10/19/11
901517	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	10/19/11
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/12
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	6/14/12
900928	Hewlett Packard	83752A	Synthesized Sweeper, (0.01 - 20 GHz)	3610A00866	2/17/12
901262	ETS	3160-9	Double ridged Guide Antenna (1 - 18 GHz)	6748	5/1/12
900724	Antenna Research Associates, Inc.	LPB-2520	LOG/Bicon Antenna (25 – 1000 MHz)	1037	7/17/11
900905	Rhein Tech Laboratories	PR-1040	OATS 1 Preamplifier 40dB (30 MHz – 2 GHz)	1006	4/10/12

Test Personnel:

Daniel Baltzell		July 3, 2011
Test Engineer	Signature	Date of Test

7 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.210 Authorized Bandwidth; RSS-119 5.8: Transmitter Unwanted Emissions

Occupied Bandwidth - Compliance with the Emission Masks

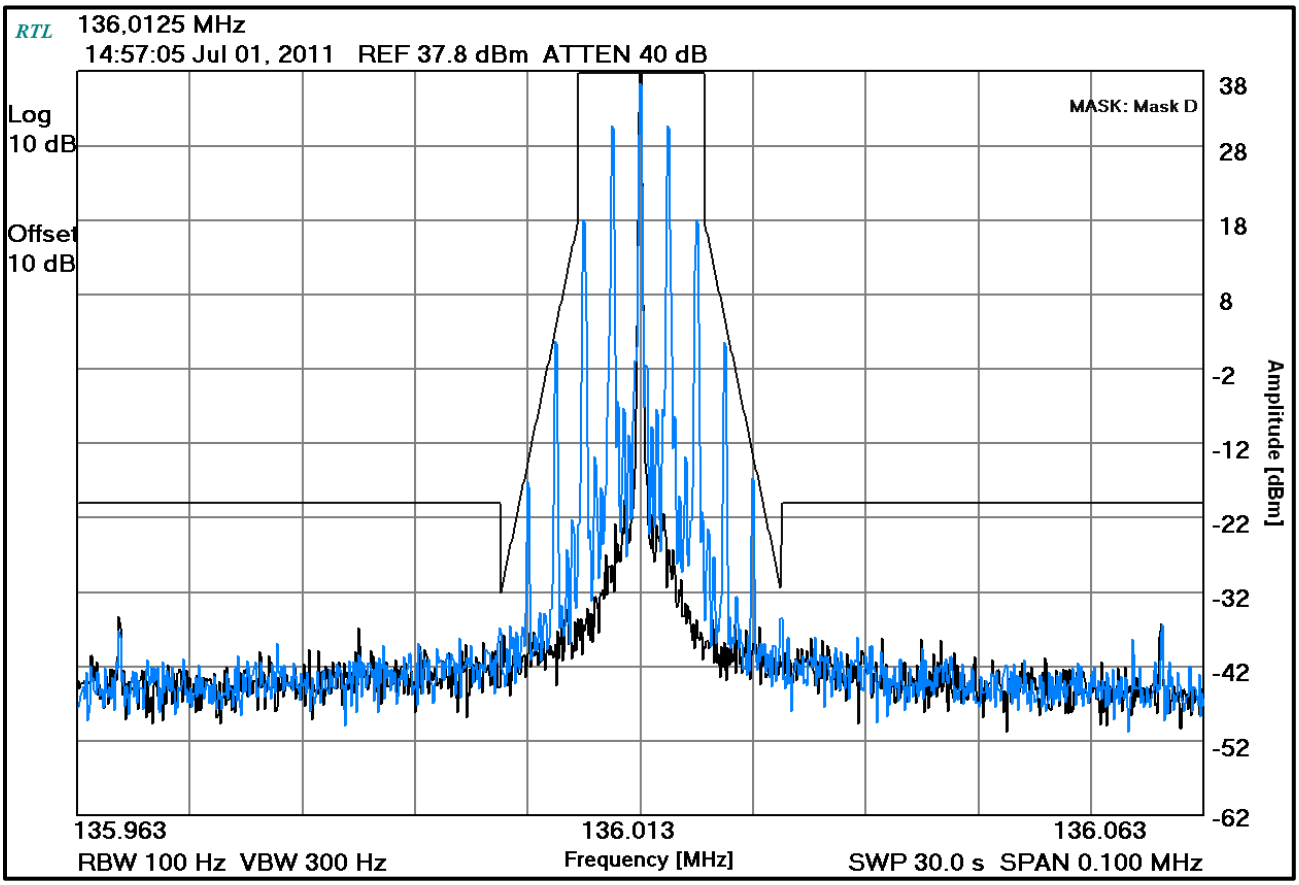
7.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.11 and TIA/EIA-102.CAAA-2002 Section 2.2.5

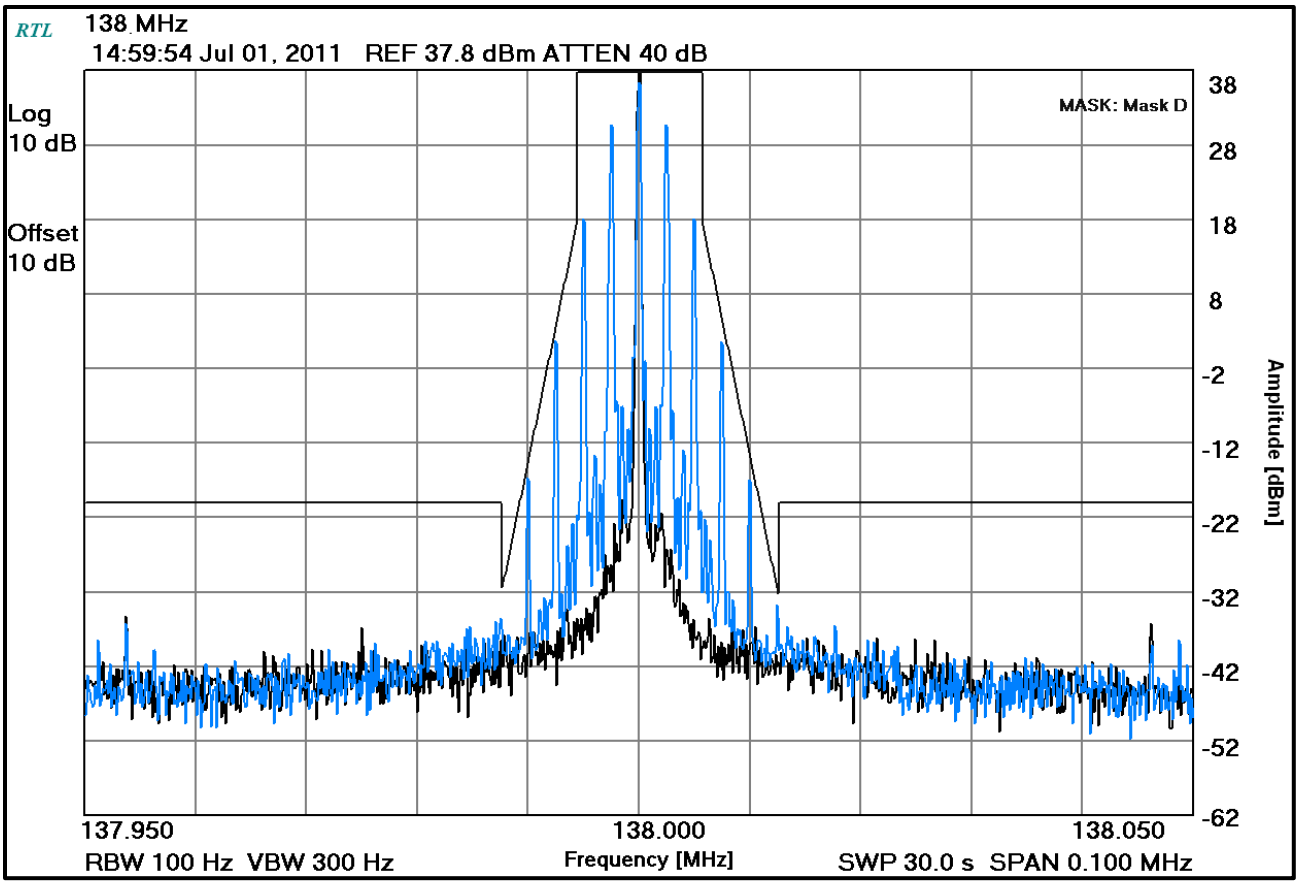
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

7.2 Test Data

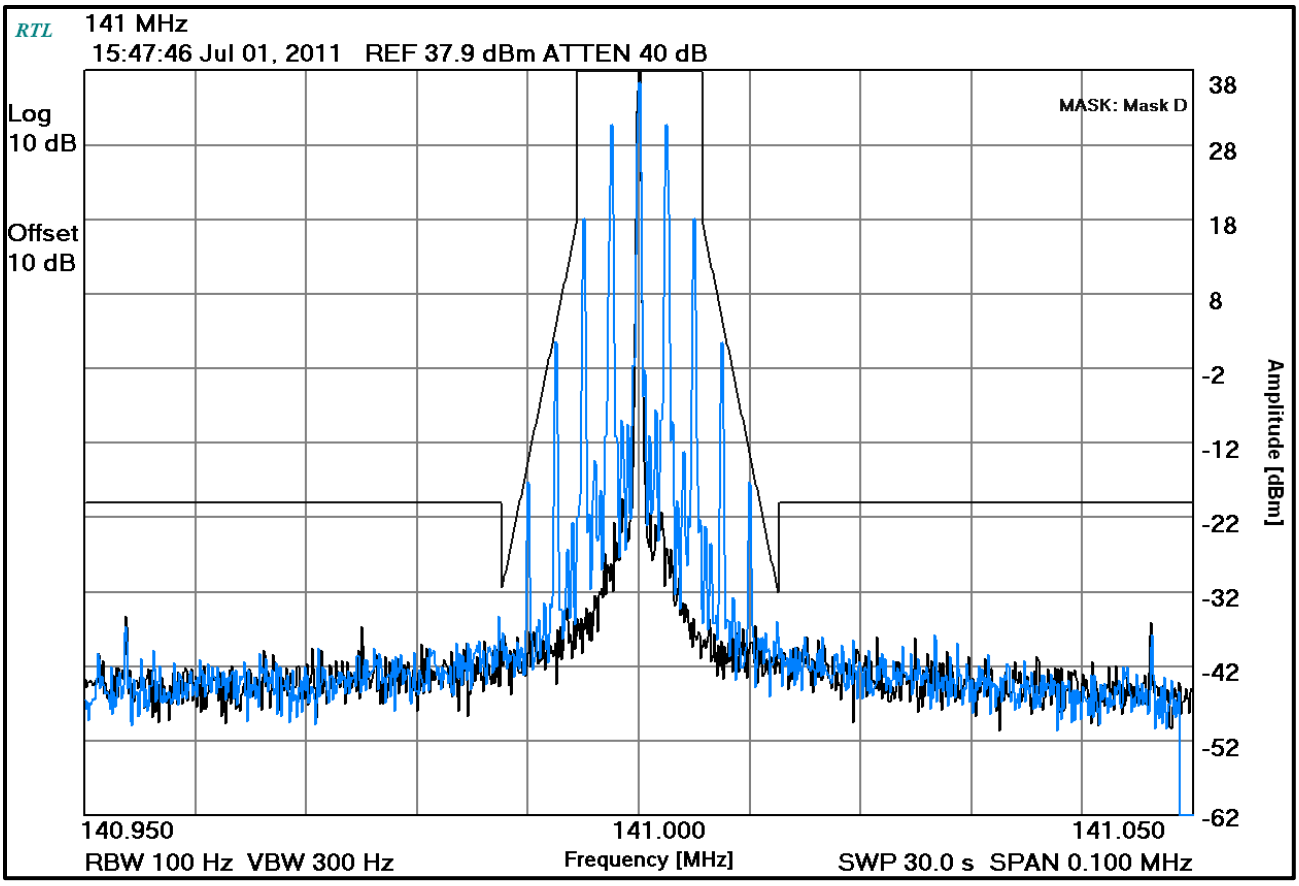
Plot 7-1: Occupied Bandwidth – 136.0125 MHz; Analog (Mask D)



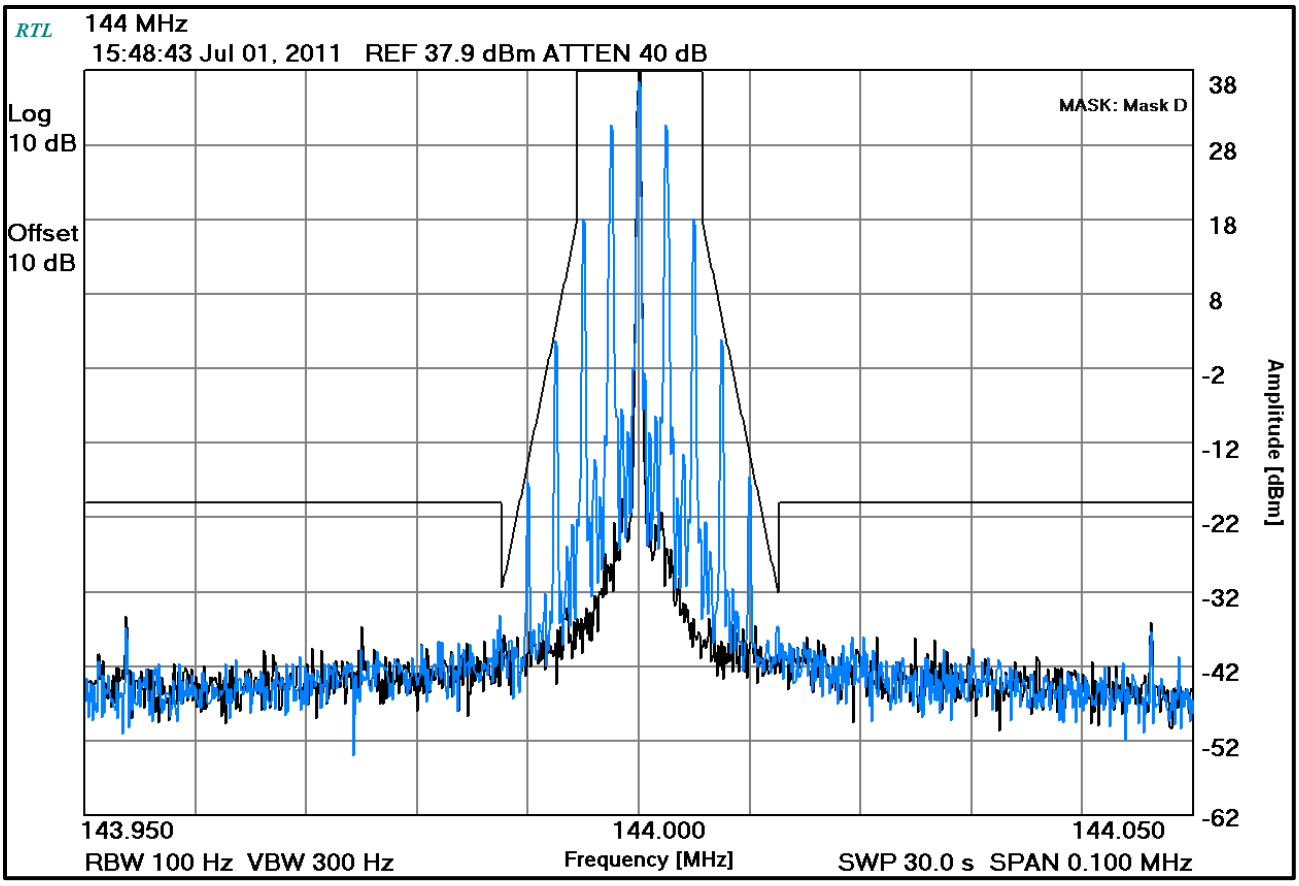
Plot 7-2: Occupied Bandwidth – 138.0 MHz; Analog (Mask D)



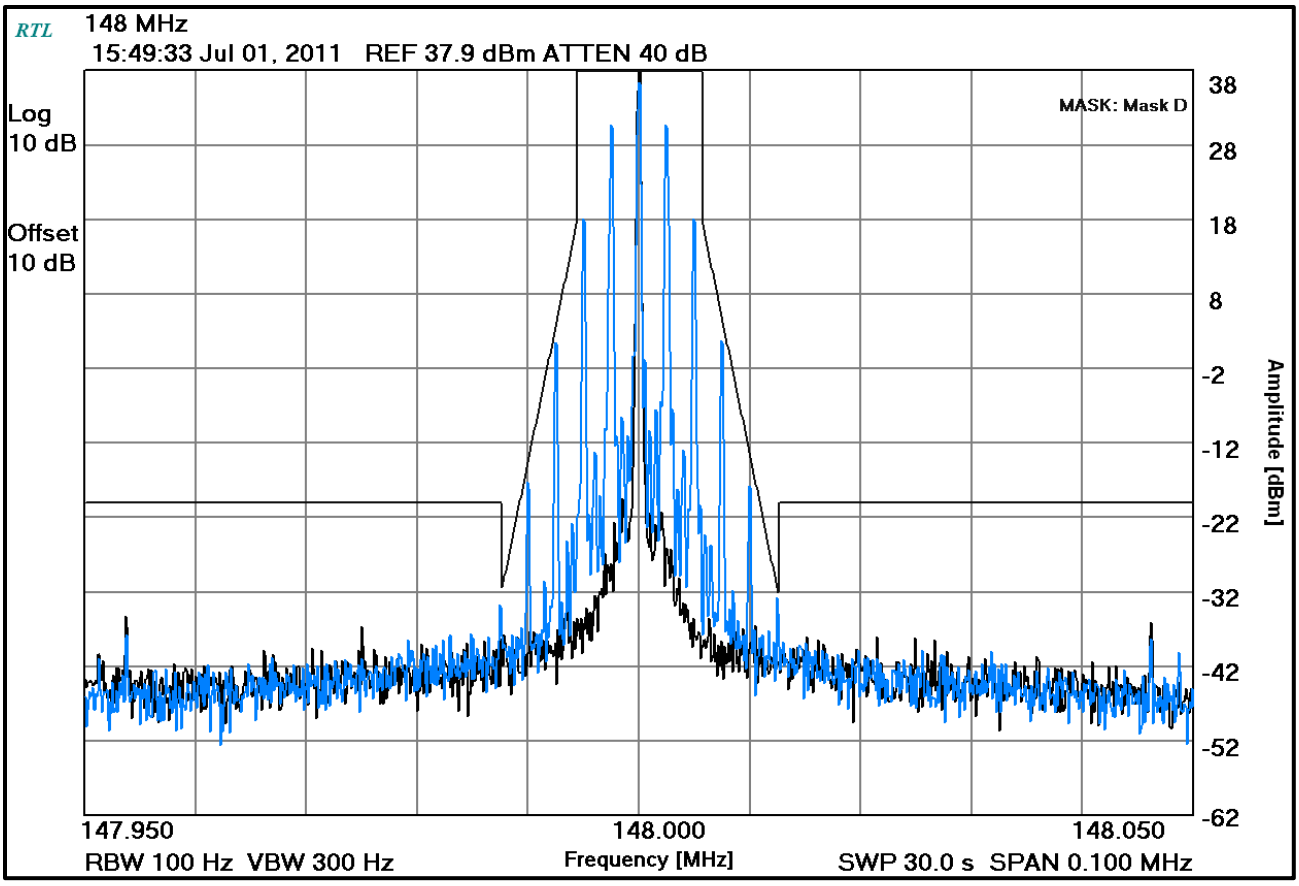
Plot 7-3: Occupied Bandwidth – 141 MHz; Analog (Mask D)



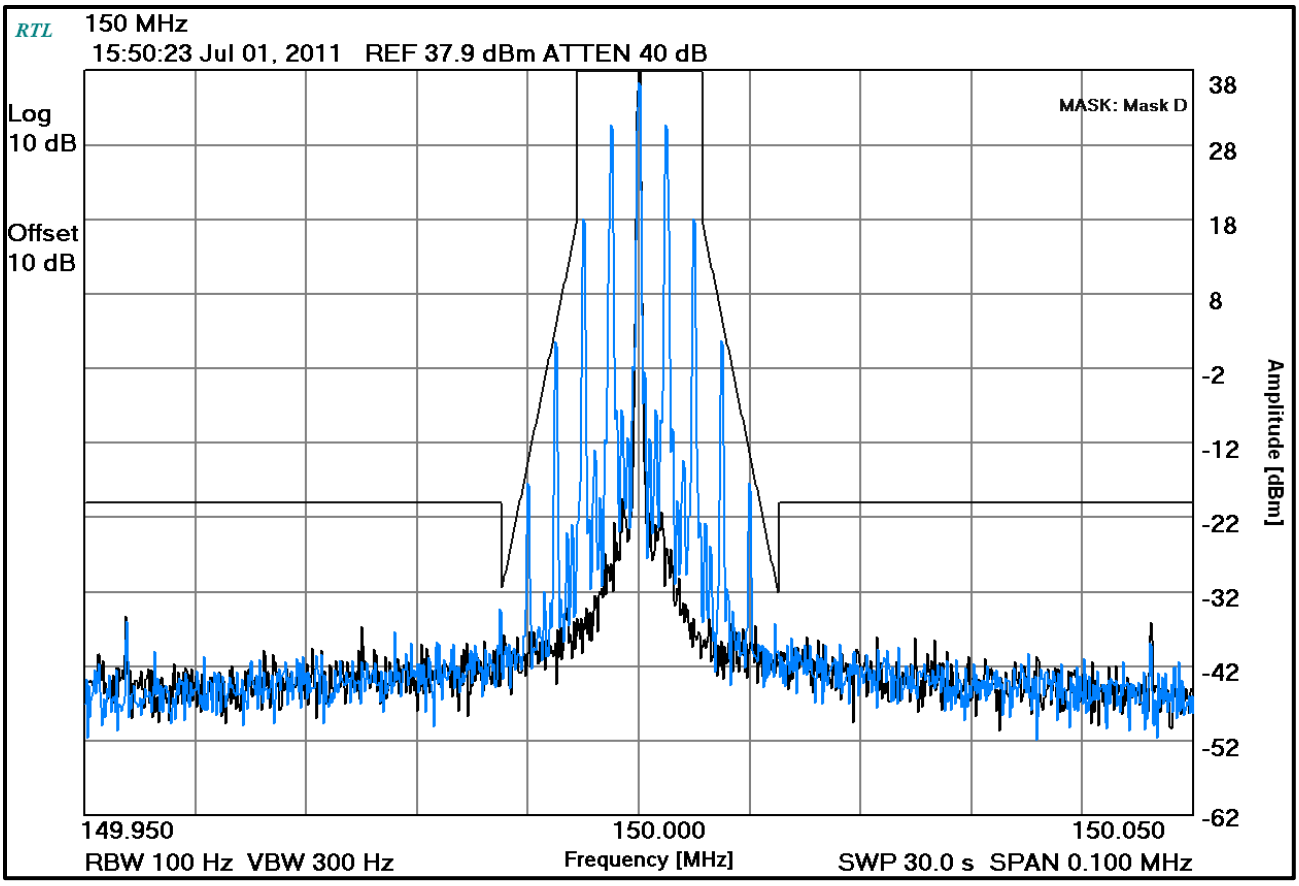
Plot 7-4: Occupied Bandwidth – 144 MHz; Analog (Mask D)



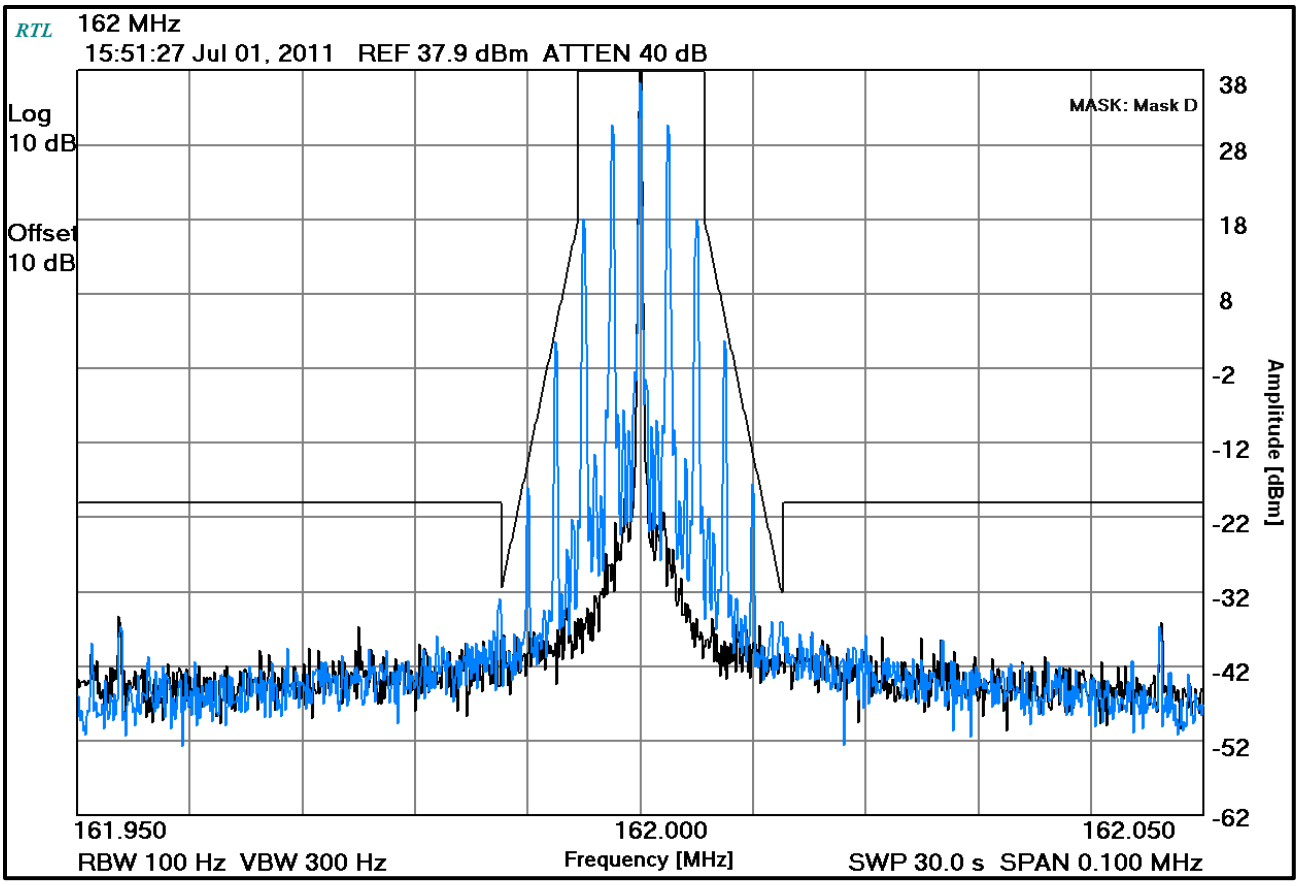
Plot 7-5: Occupied Bandwidth – 148 MHz; Analog (Mask D)



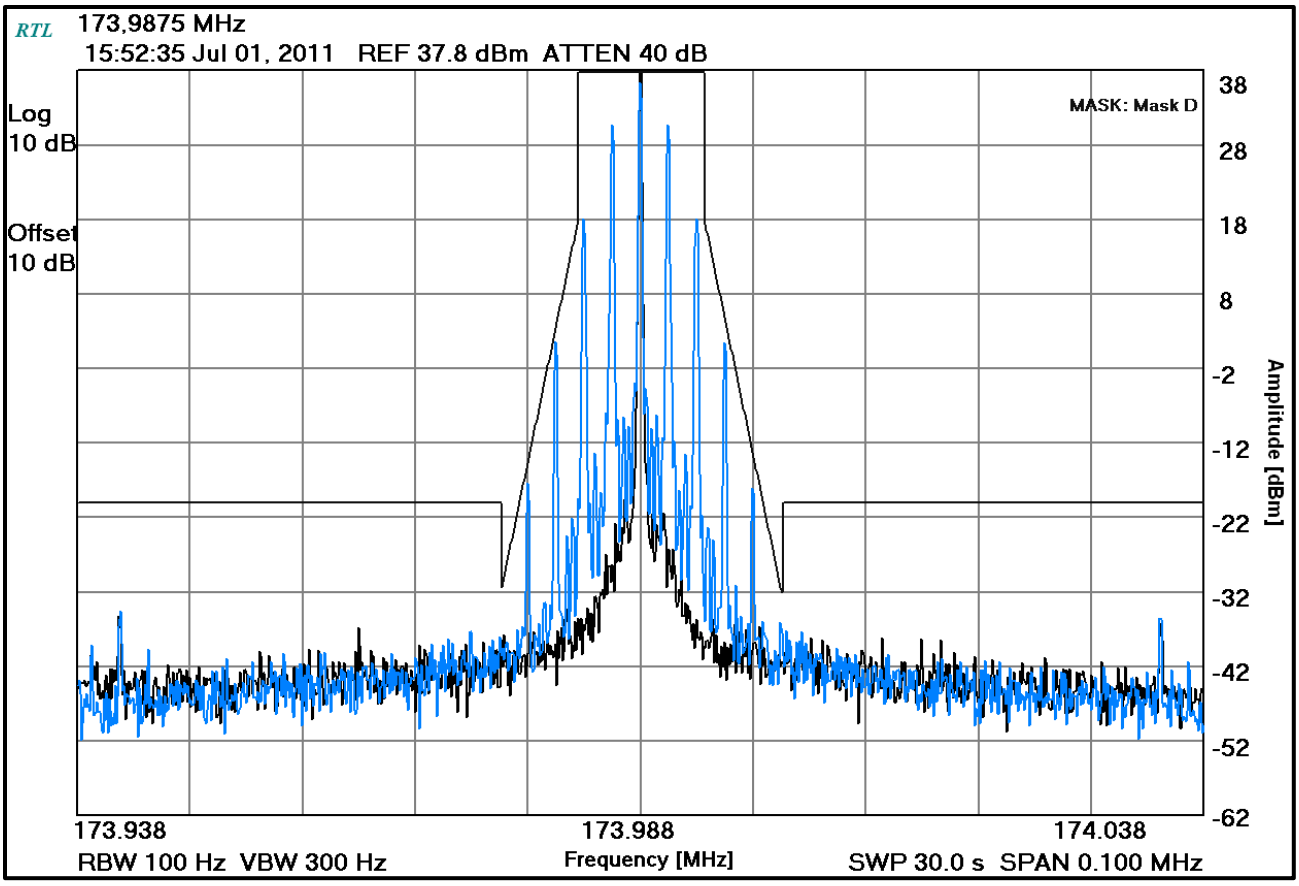
Plot 7-6: Occupied Bandwidth – 150 MHz; Analog (Mask D)



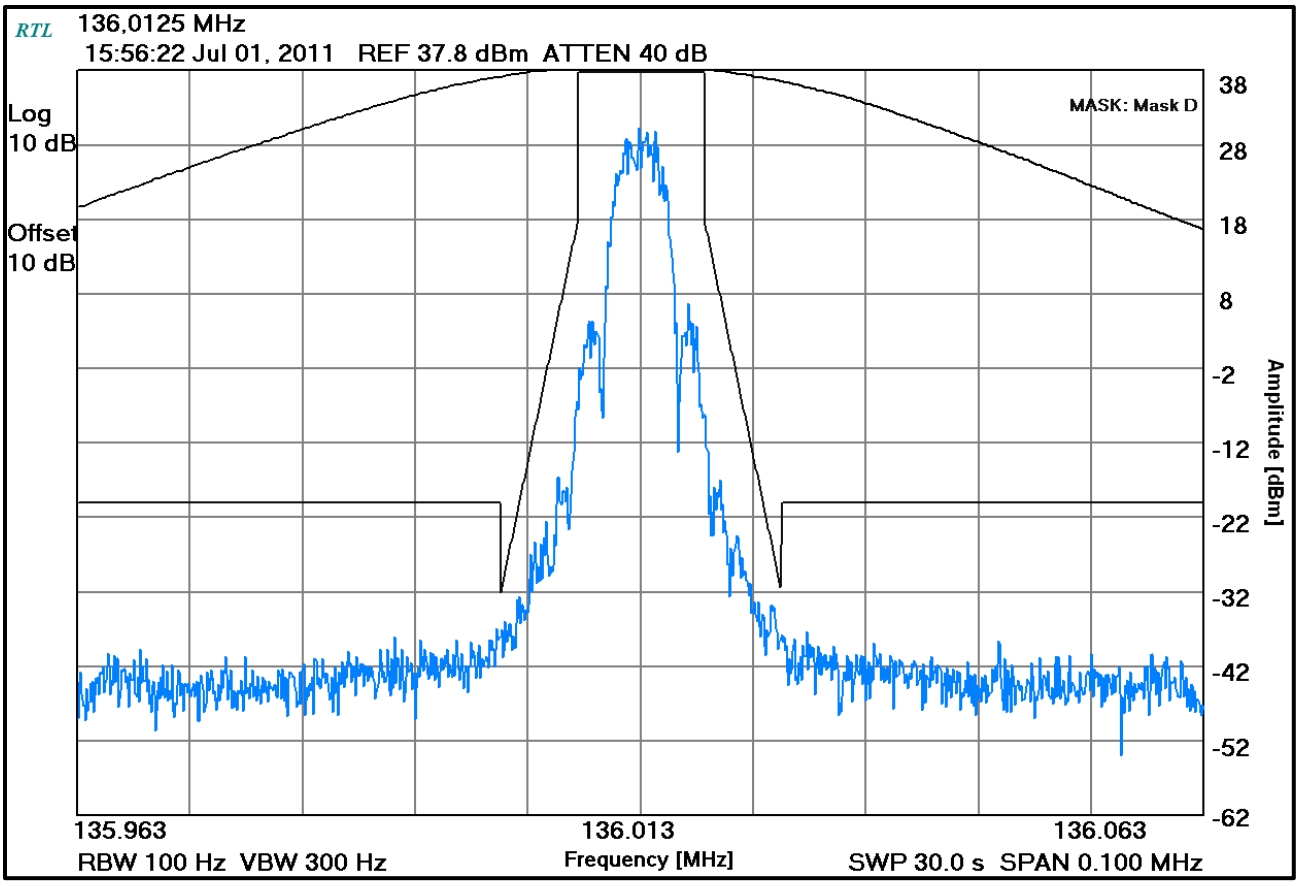
Plot 7-7: Occupied Bandwidth – 162 MHz; Analog (Mask D)



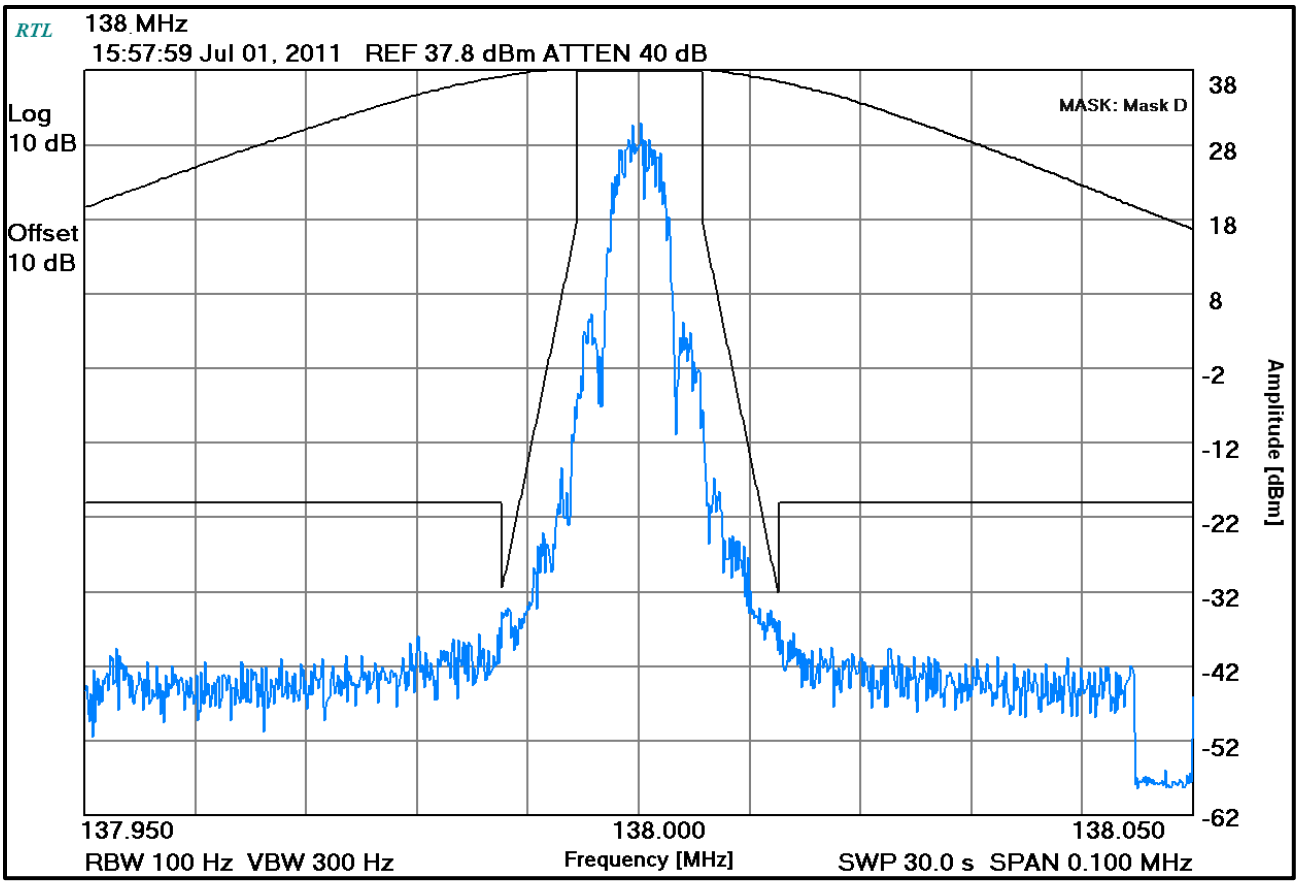
Plot 7-8: Occupied Bandwidth – 173.9875 MHz; Analog (Mask D)



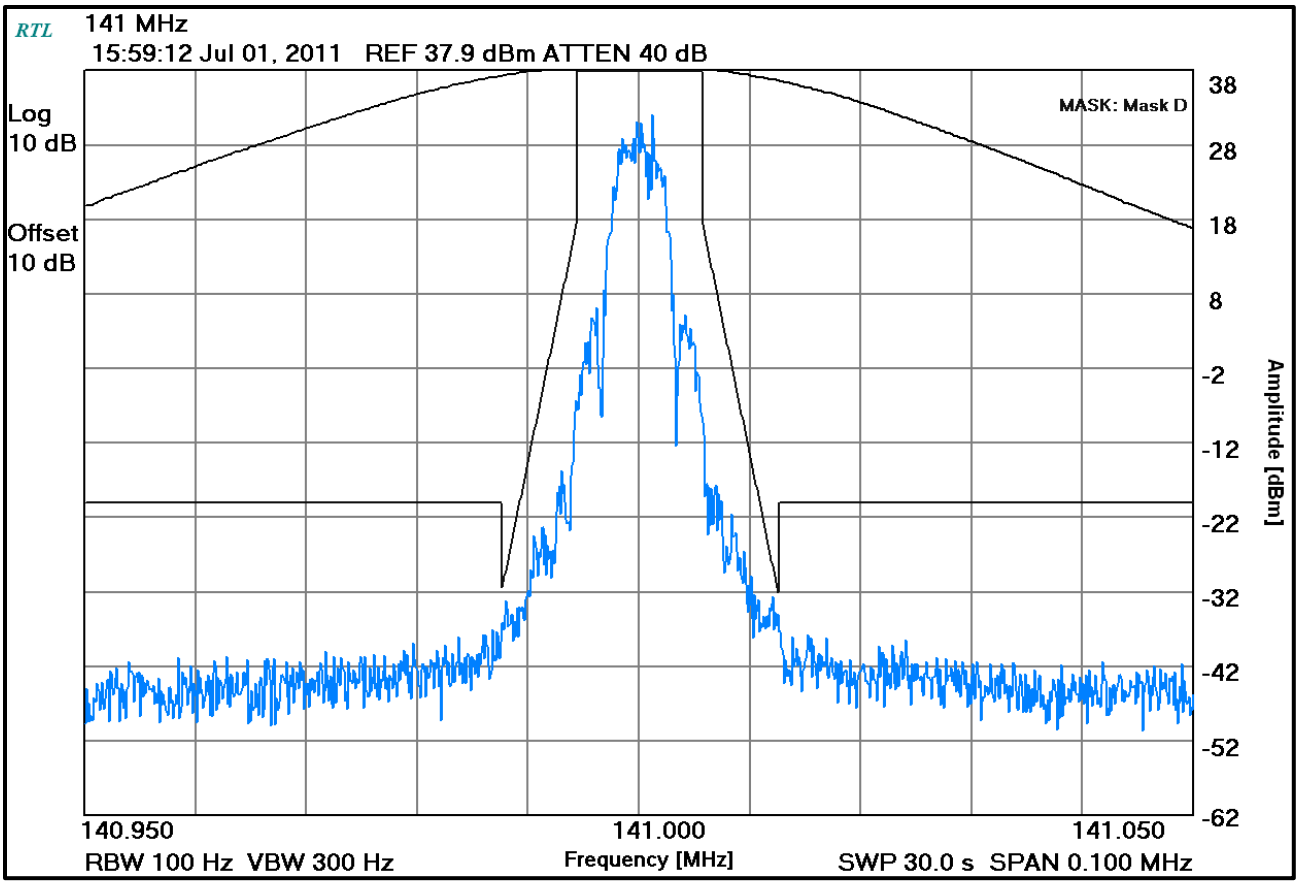
Plot 7-9: Occupied Bandwidth – 136.0125 MHz; 2 level NB 4800 (Mask D)



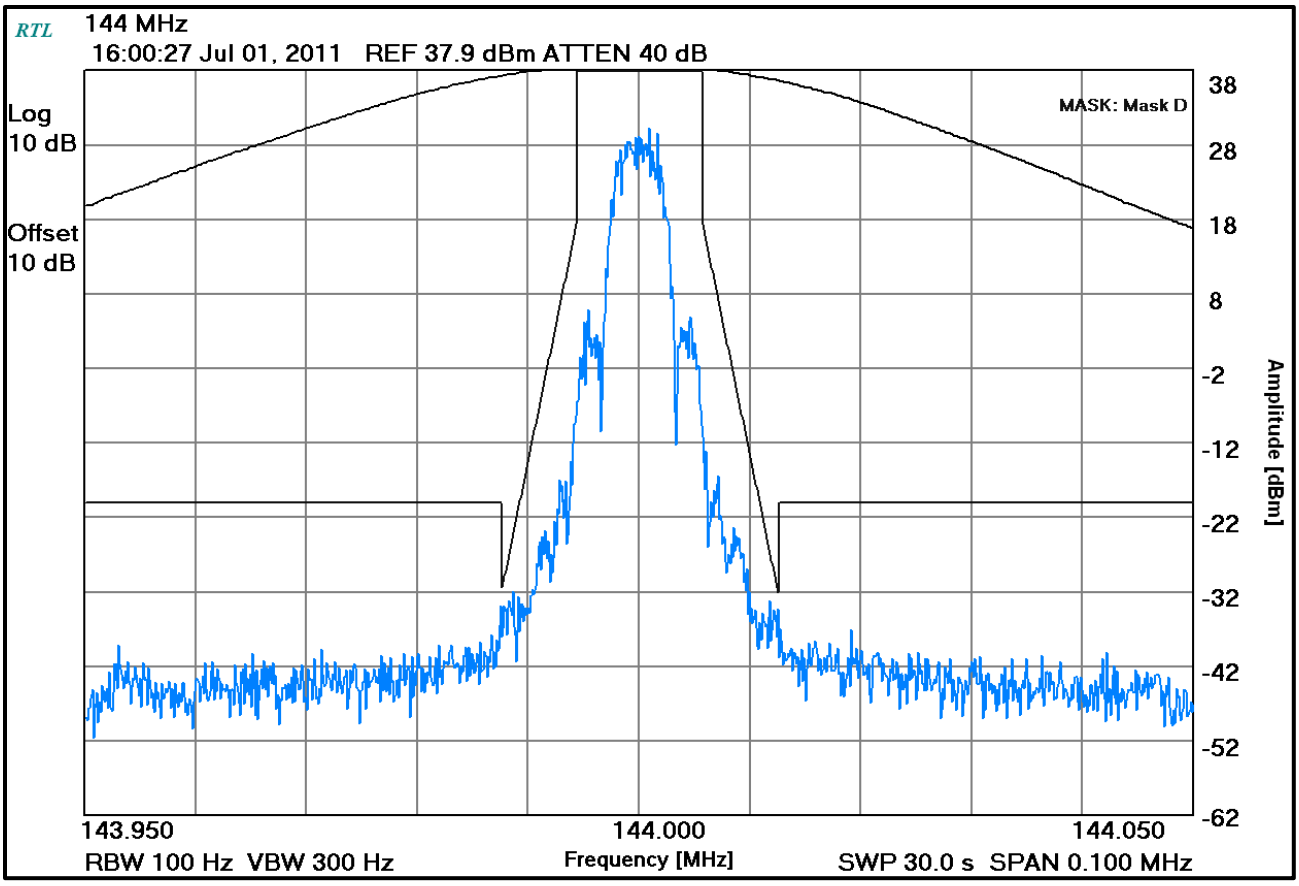
Plot 7-10: Occupied Bandwidth – 138.0 MHz; 2 level NB 4800 (Mask D)



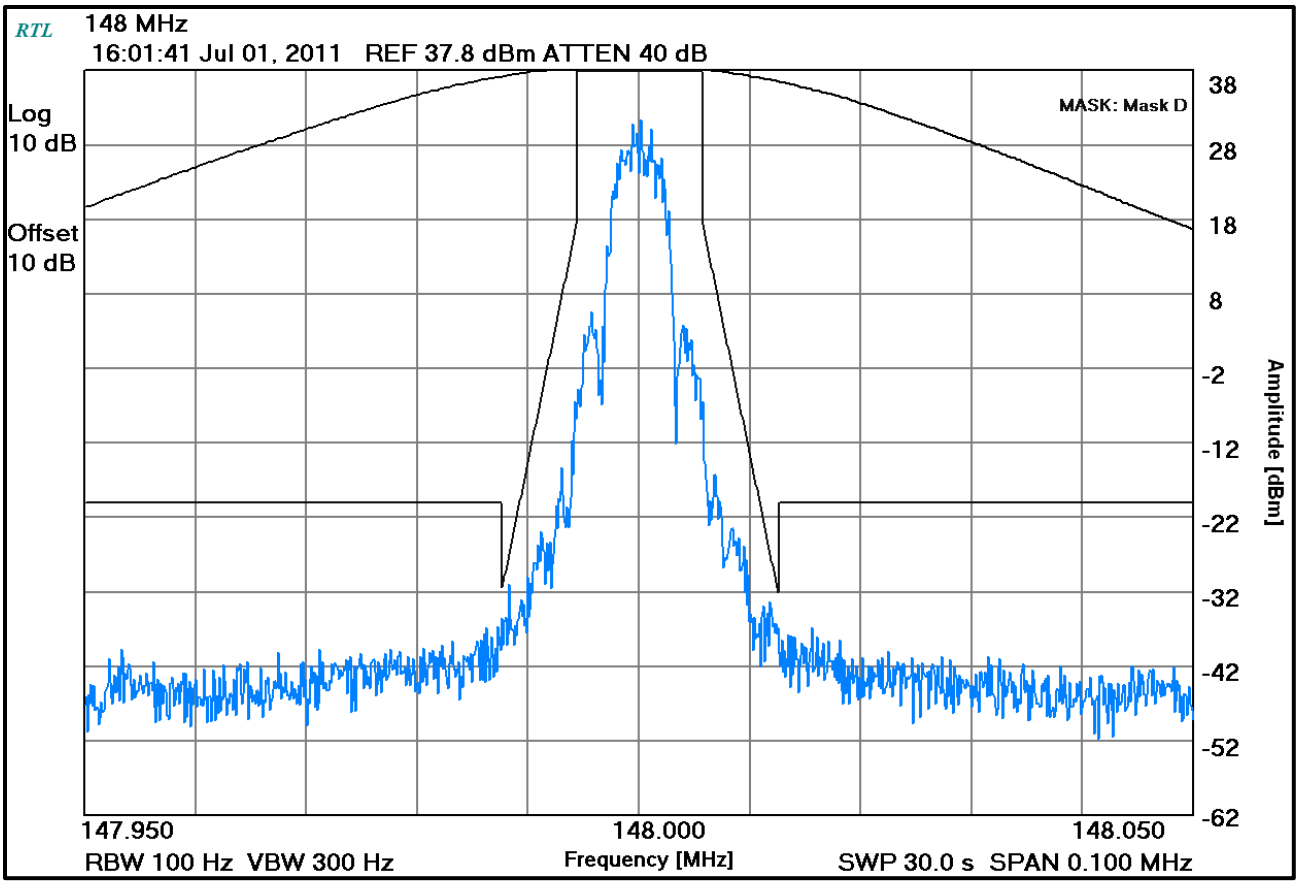
Plot 7-11: Occupied Bandwidth – 141 MHz; 2 level NB 4800 (Mask D)



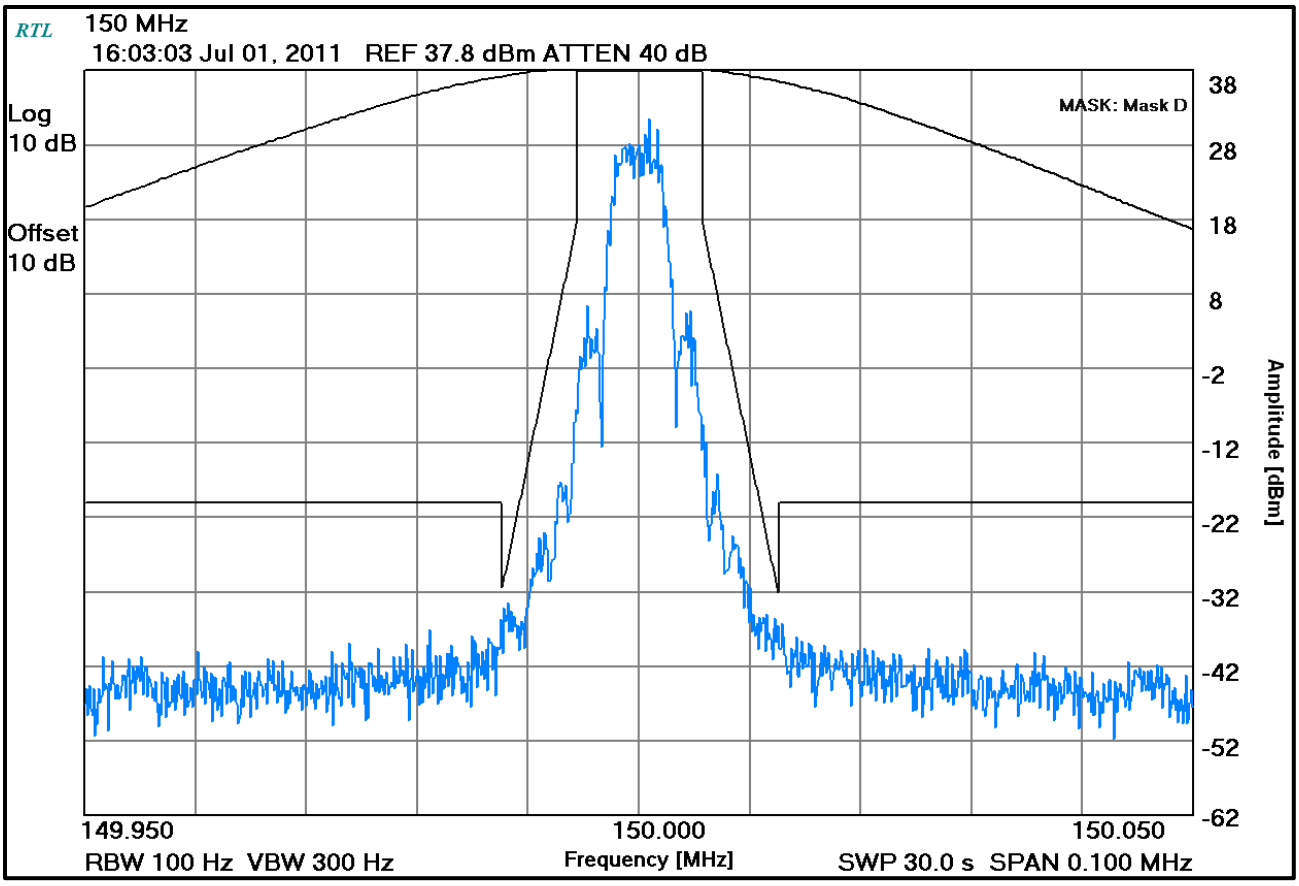
Plot 7-12: Occupied Bandwidth – 144 MHz; 2 level NB 4800 (Mask D)



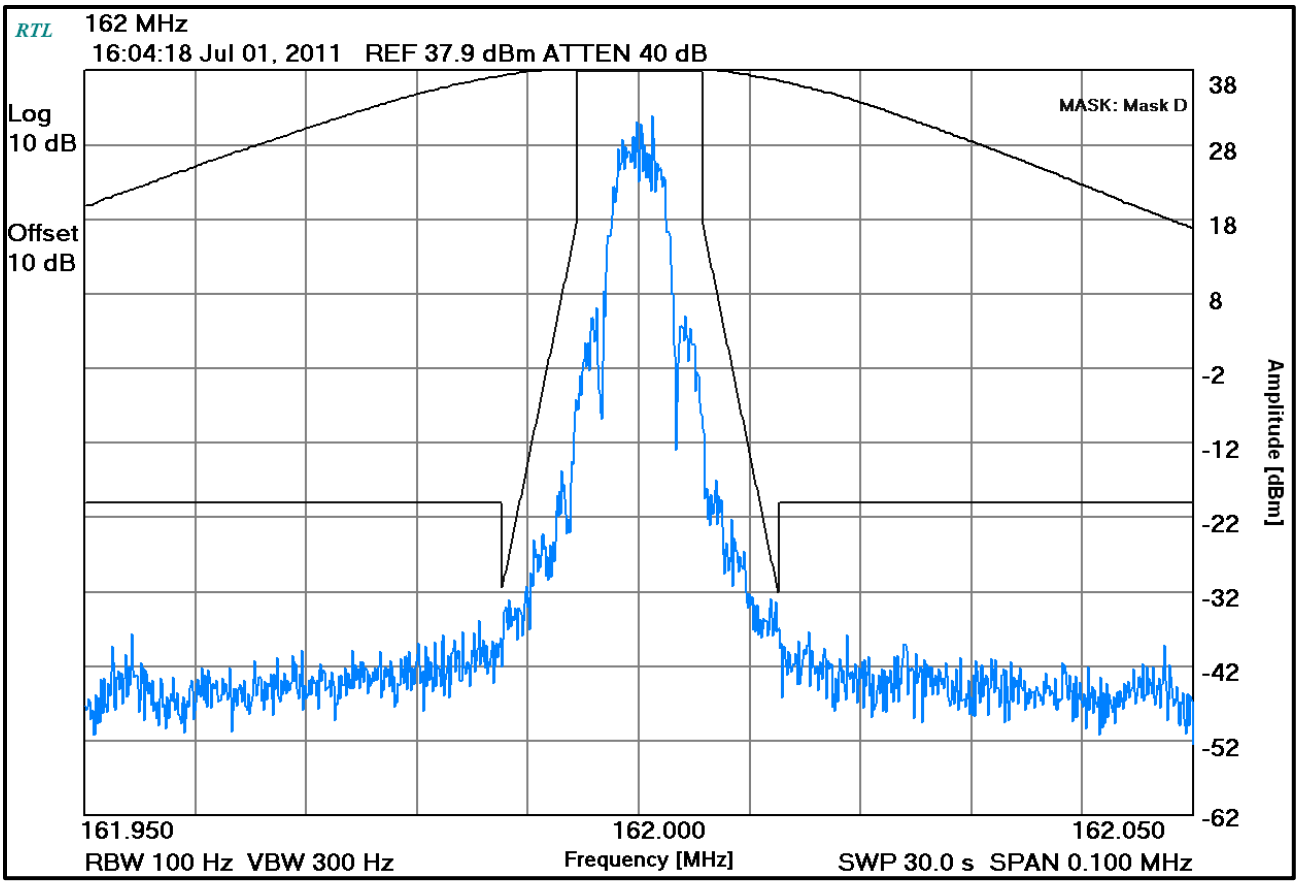
Plot 7-13: Occupied Bandwidth – 148 MHz; 2 level NB 4800 (Mask D)



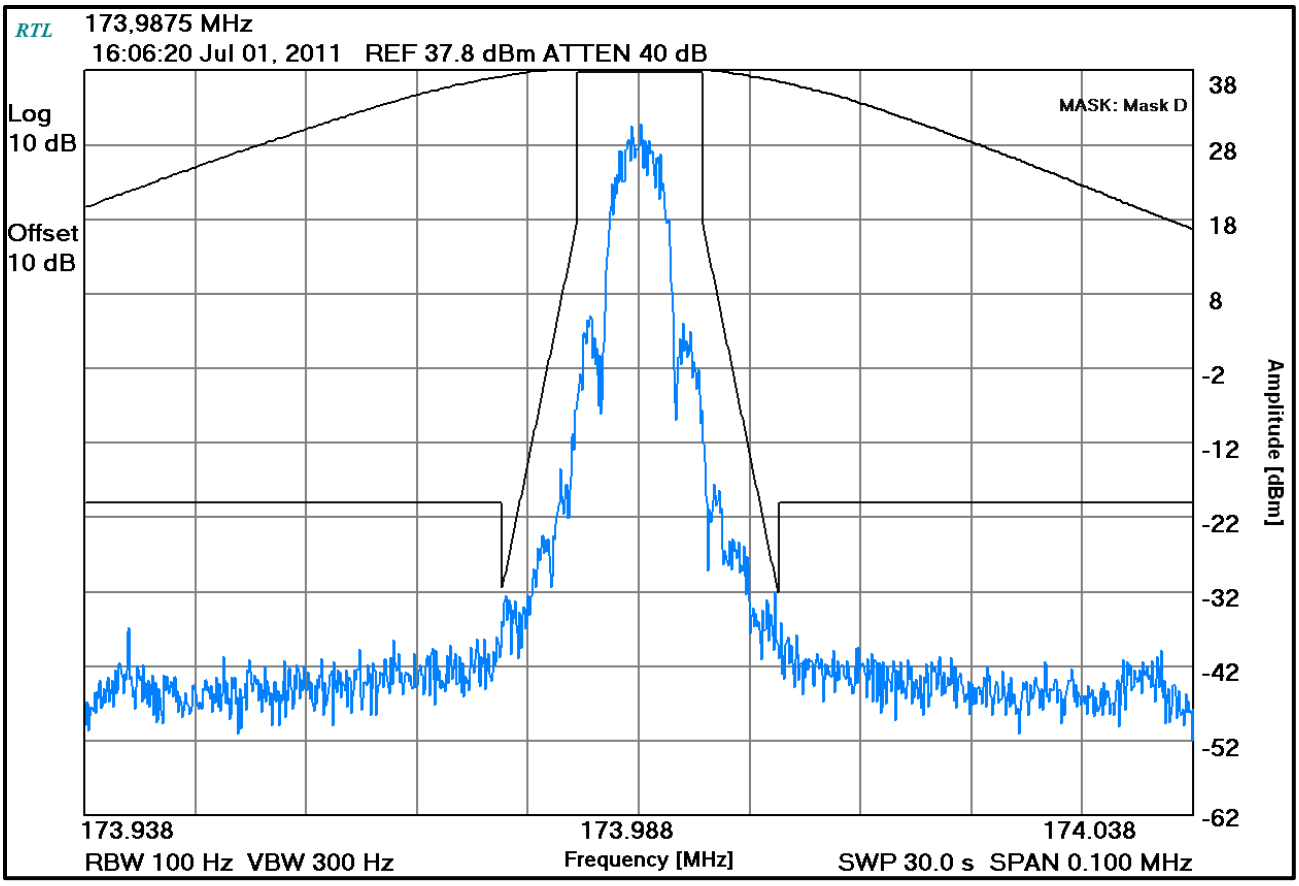
Plot 7-14: Occupied Bandwidth – 150 MHz; 2 level NB 4800 (Mask D)



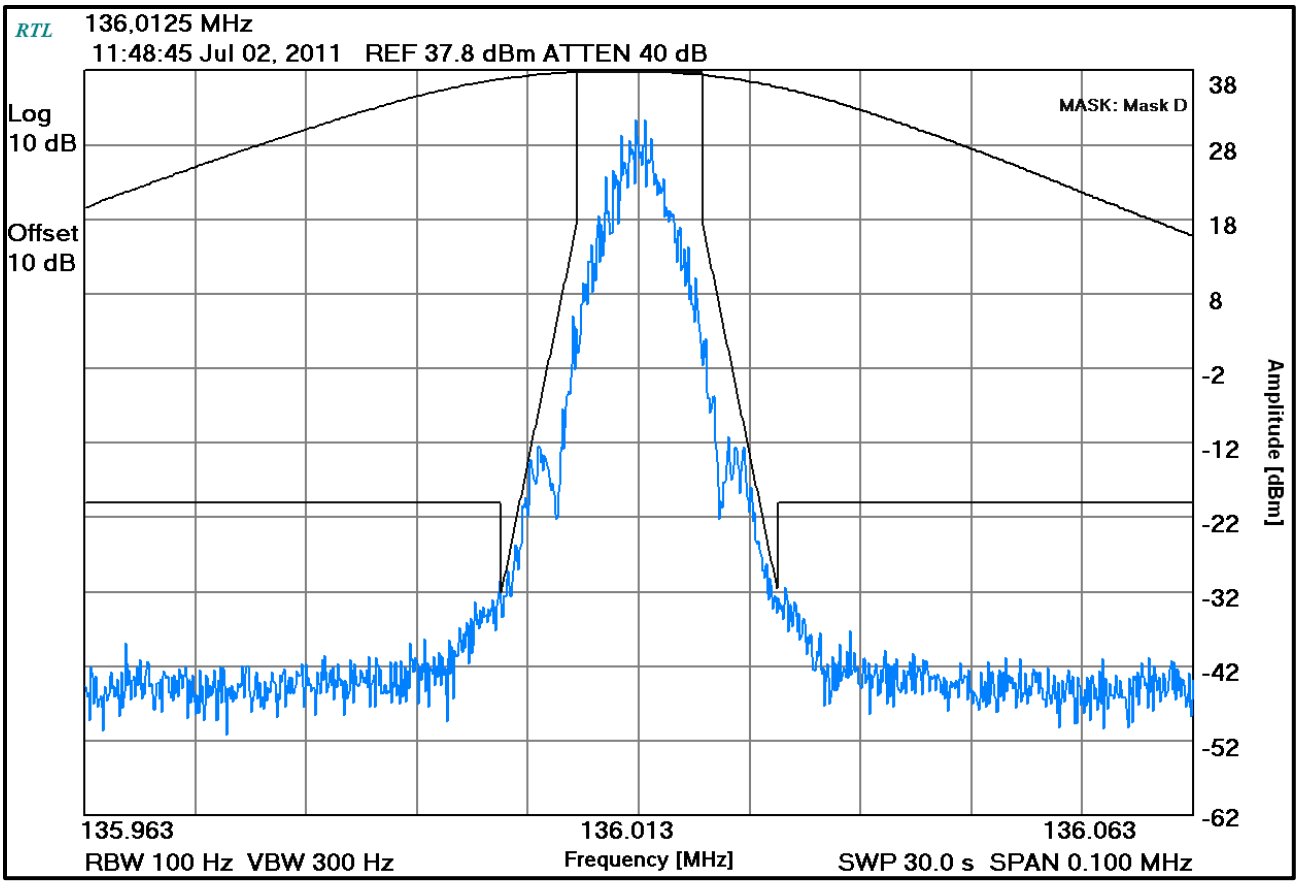
Plot 7-15: Occupied Bandwidth – 162 MHz; 2 level NB 4800 (Mask D)



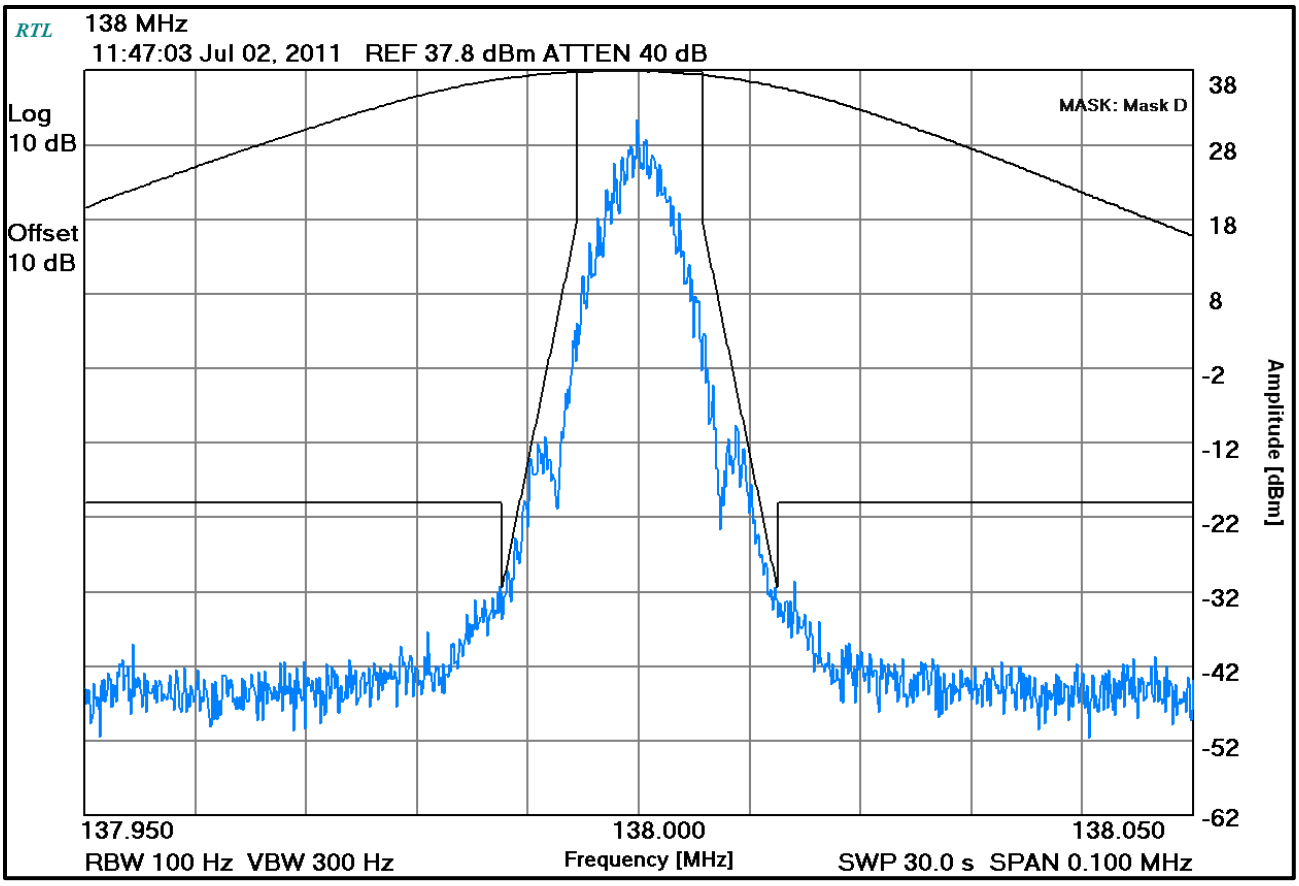
Plot 7-16: Occupied Bandwidth – 173.9875 MHz; 2 level NB 4800 (Mask D)



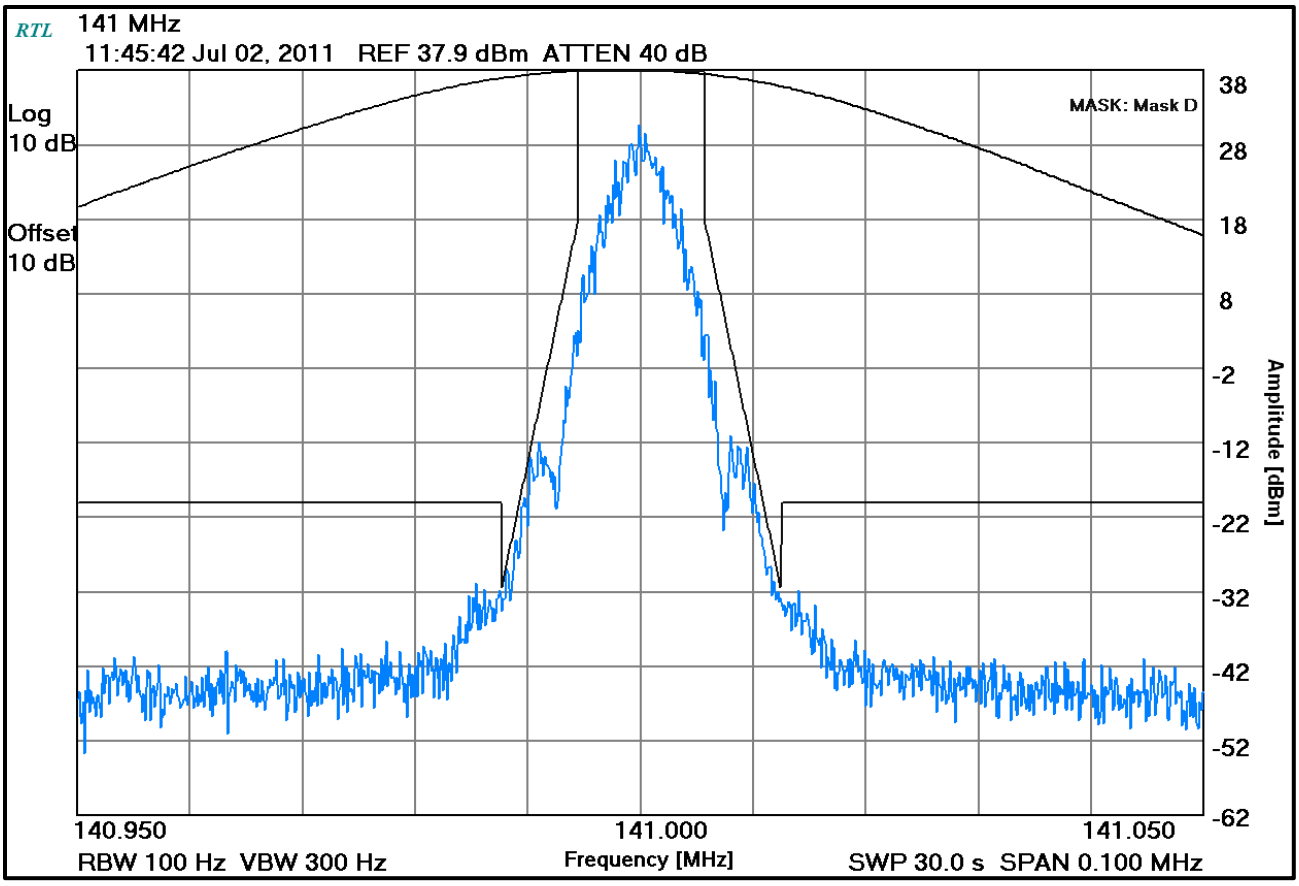
Plot 7-17: Occupied Bandwidth – 136.0125 MHz; 2 level NB 9600 (Mask D)



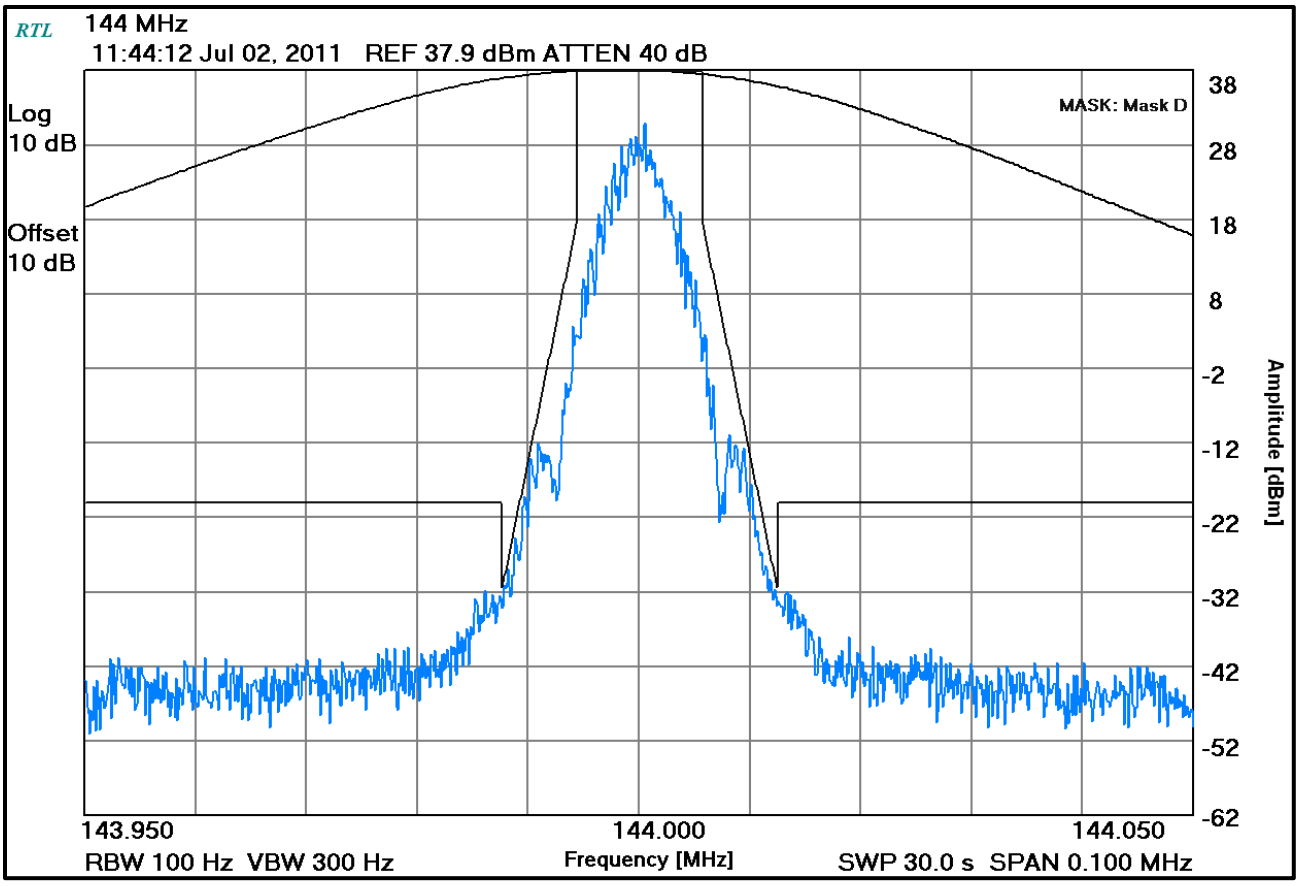
Plot 7-18: Occupied Bandwidth – 138.0 MHz; 2 level NB 9600 (Mask D)



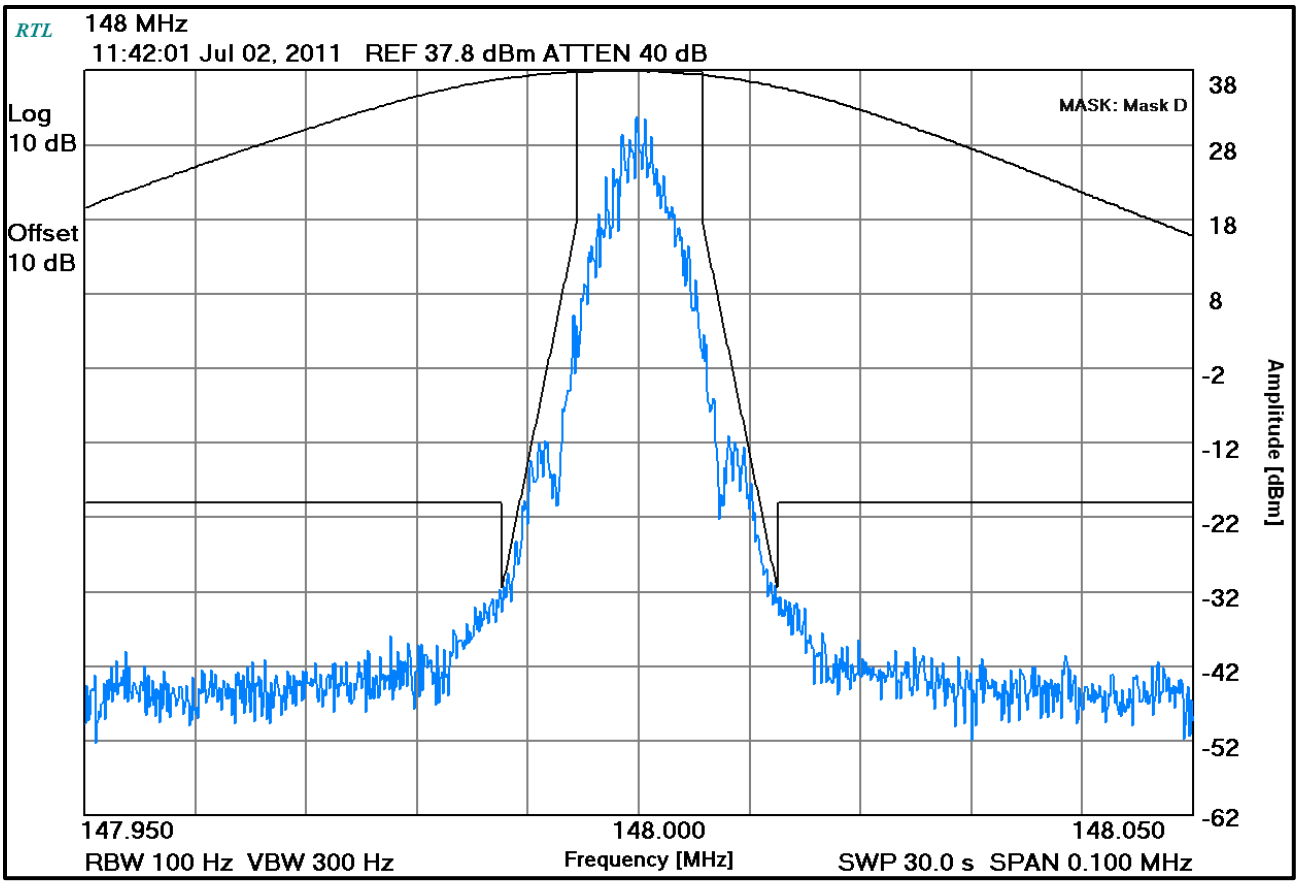
Plot 7-19: Occupied Bandwidth – 141 MHz; 2 level NB 9600 (Mask D)



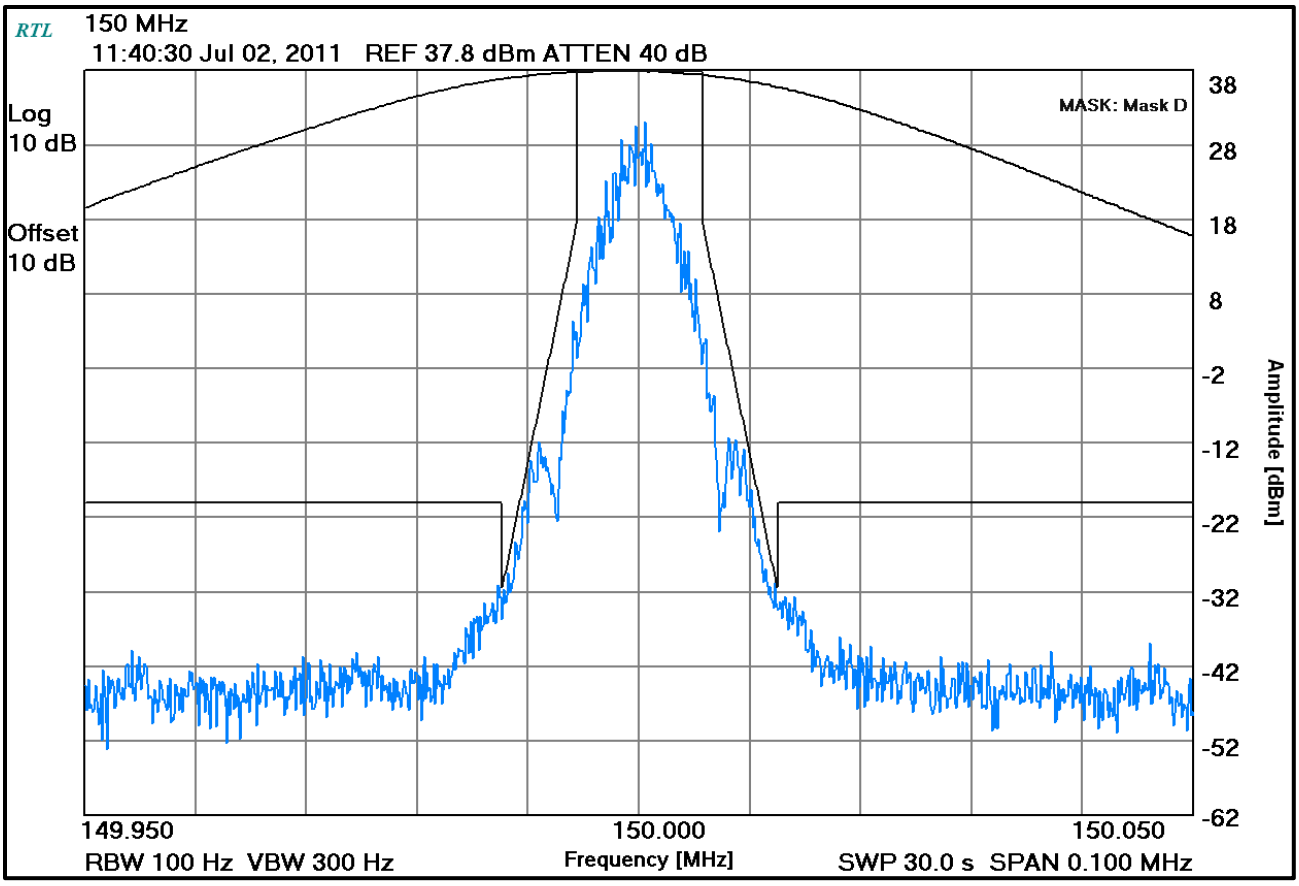
Plot 7-20: Occupied Bandwidth – 144 MHz; 2 level NB 9600 (Mask D)



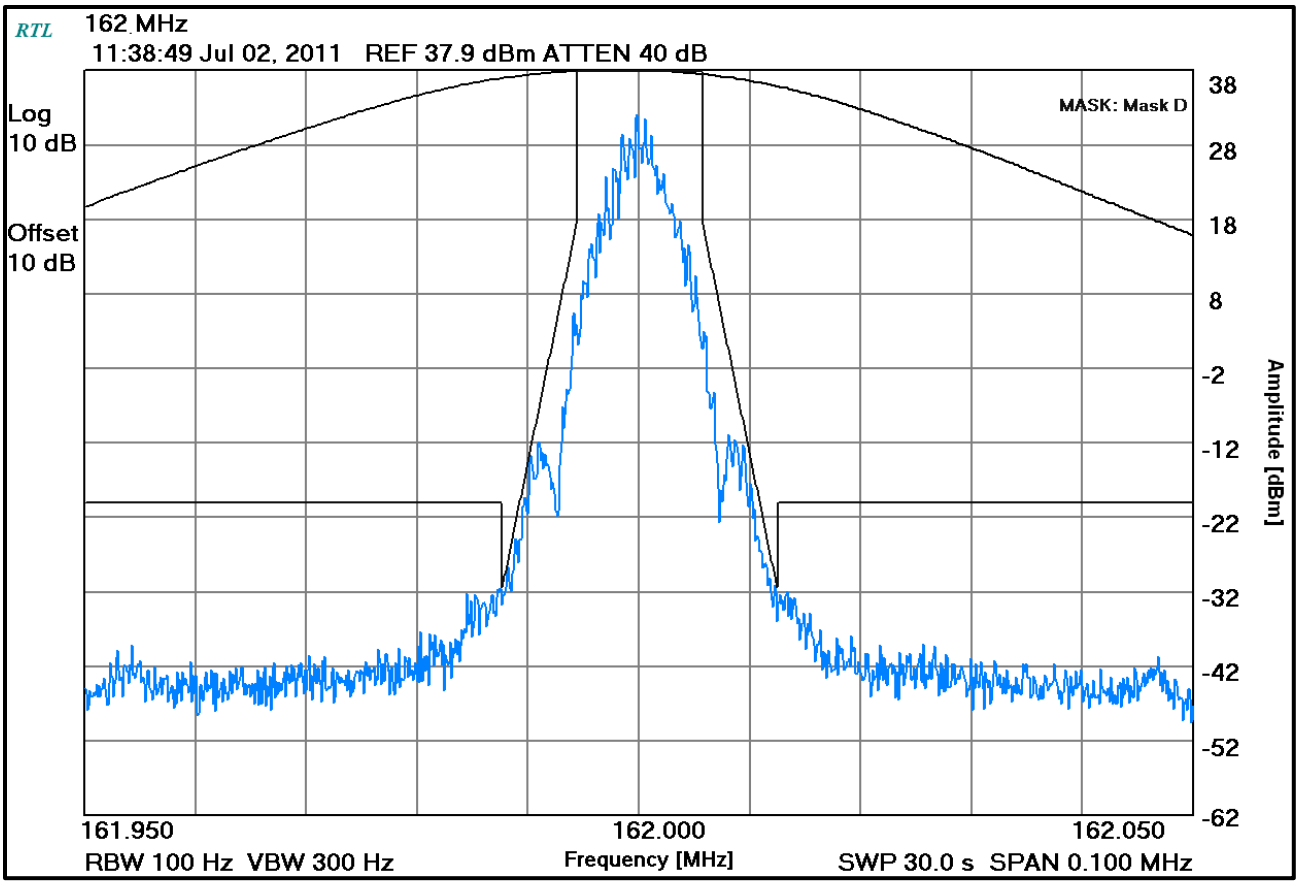
Plot 7-21: Occupied Bandwidth – 148 MHz; 2 level NB 9600 (Mask D)



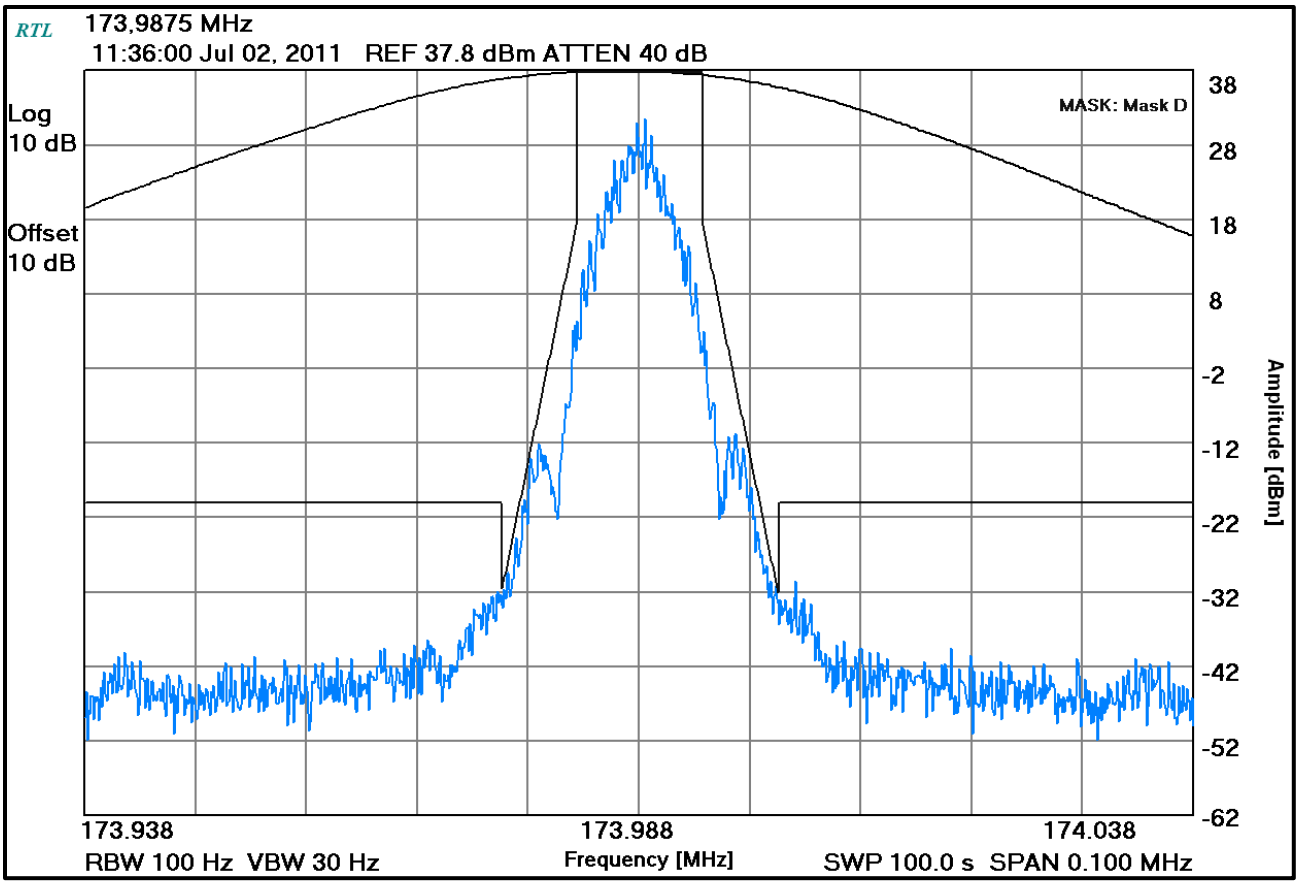
Plot 7-22: Occupied Bandwidth – 150 MHz; 2 level NB 9600 (Mask D)



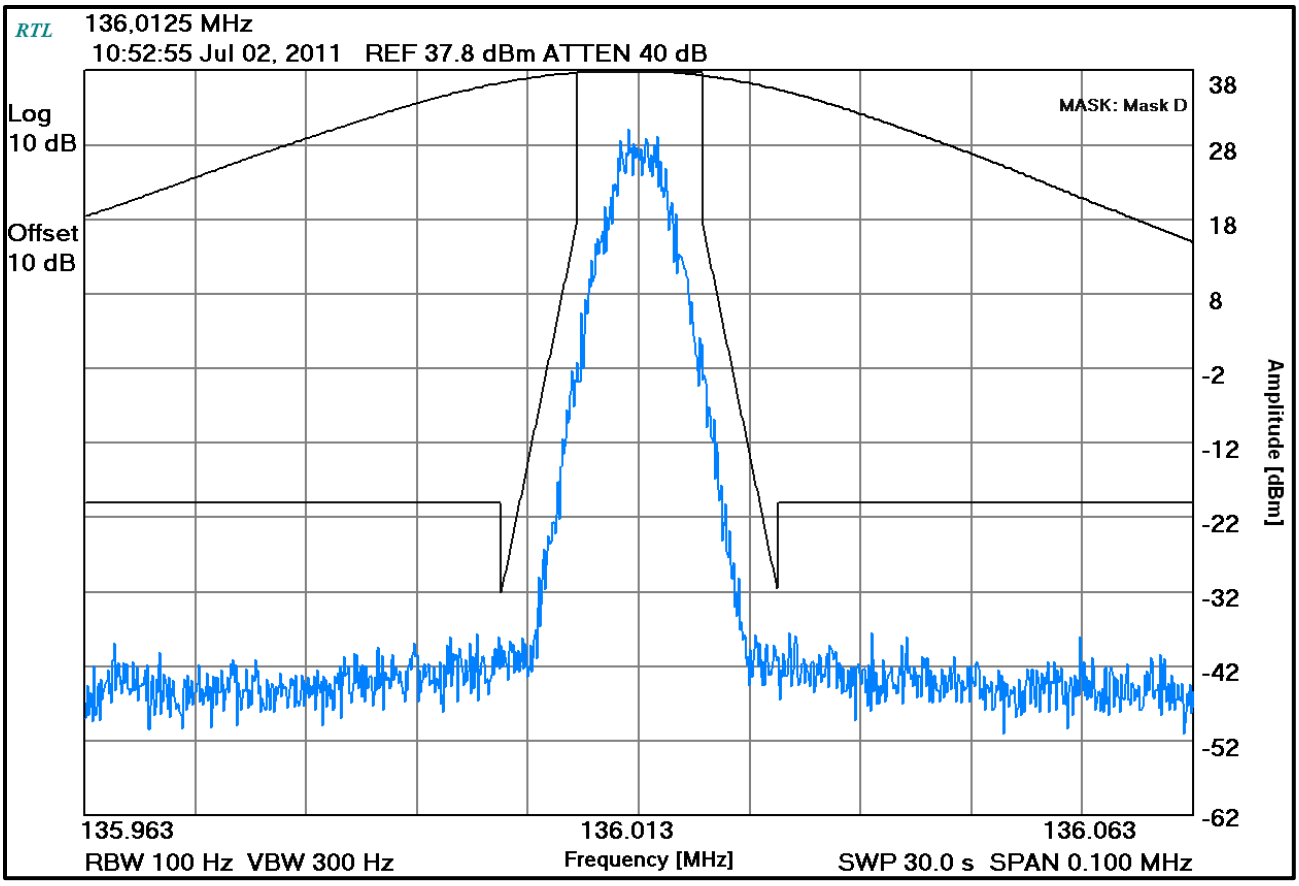
Plot 7-23: Occupied Bandwidth – 162 MHz; 2 level NB 9600 (Mask D)



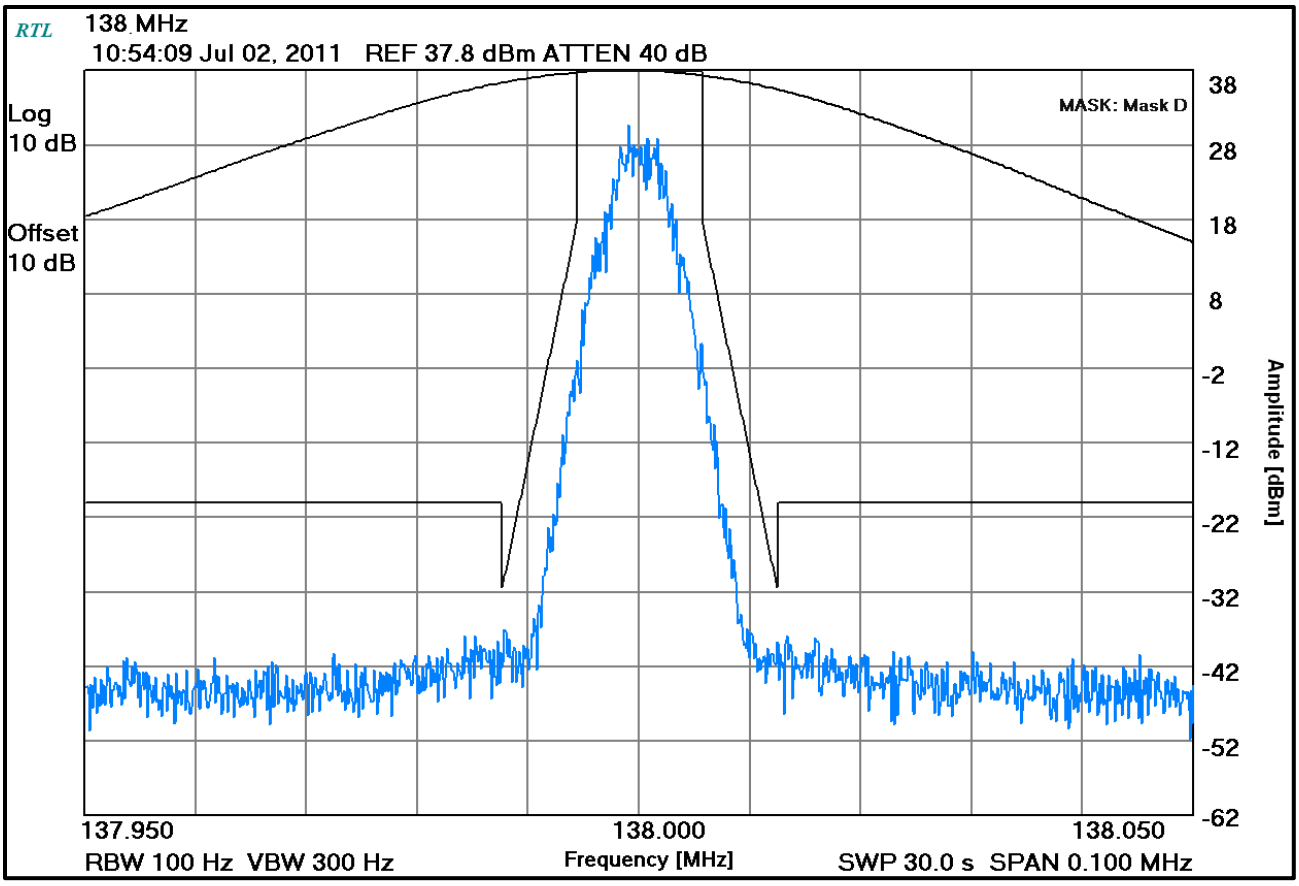
Plot 7-24: Occupied Bandwidth – 173.9875 MHz; 2 level NB 9600 (Mask D)



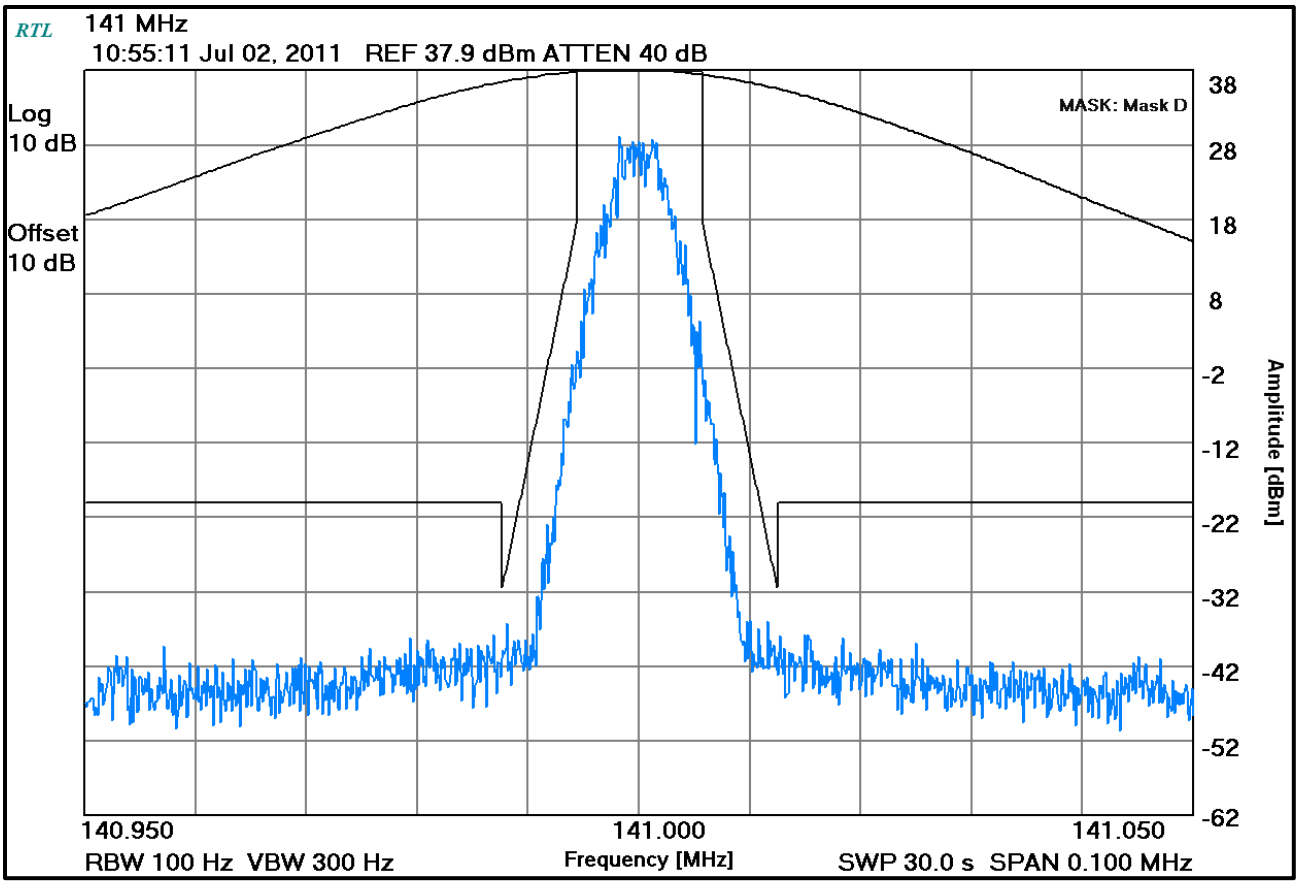
Plot 7-25: Occupied Bandwidth – 136.0125 MHz; P25 (Mask D)



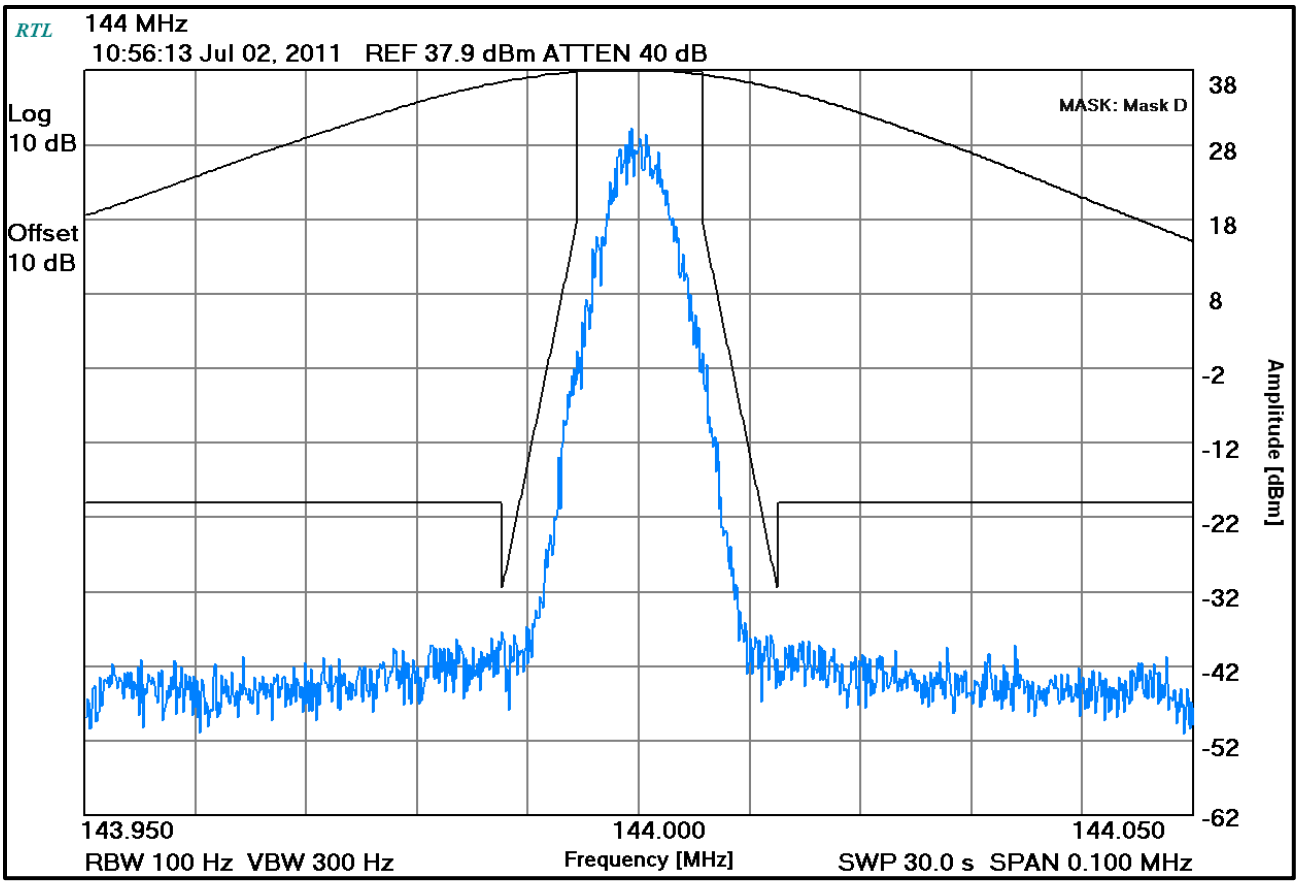
Plot 7-26: Occupied Bandwidth – 138.0 MHz; P25 (Mask D)



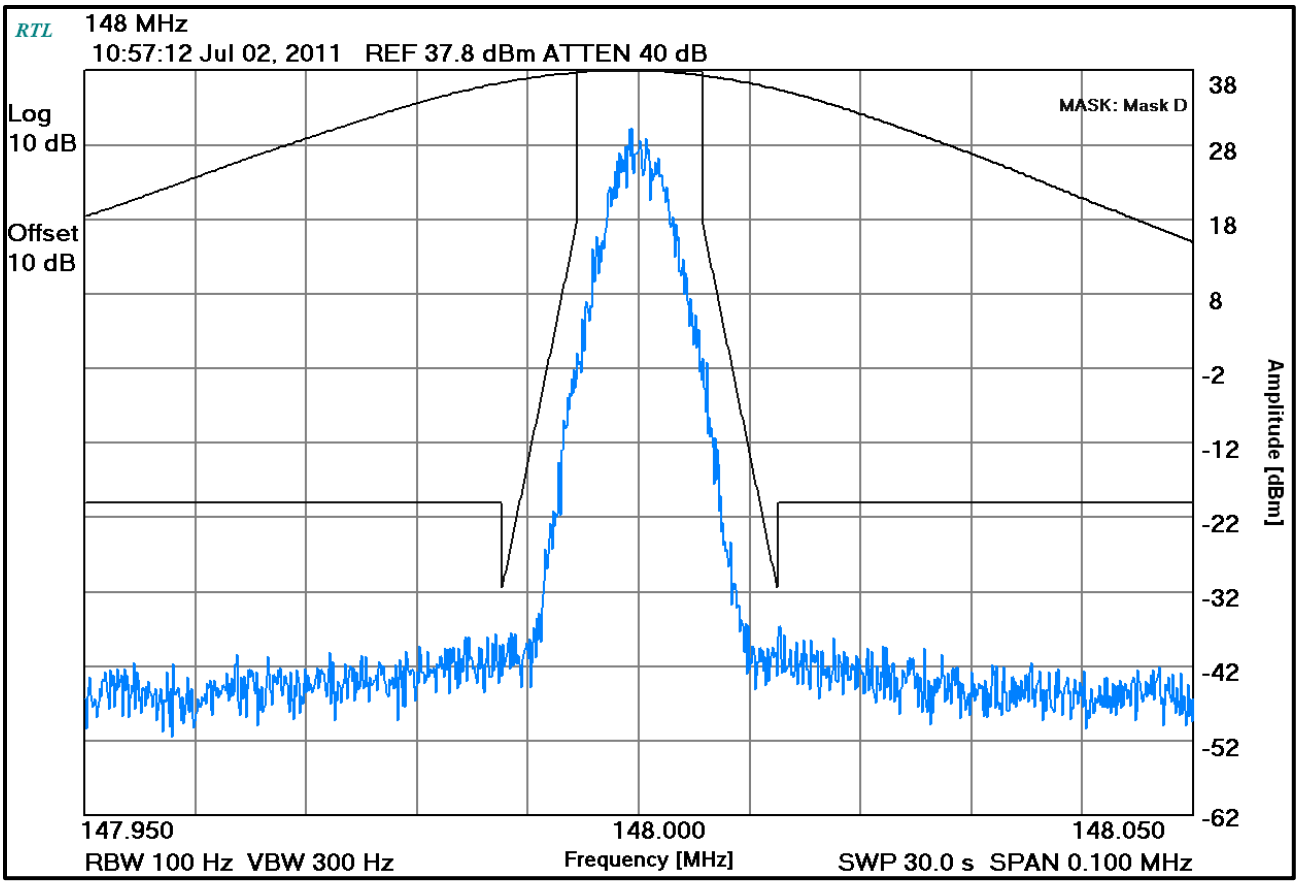
Plot 7-27: Occupied Bandwidth – 141 MHz; P25 (Mask D)



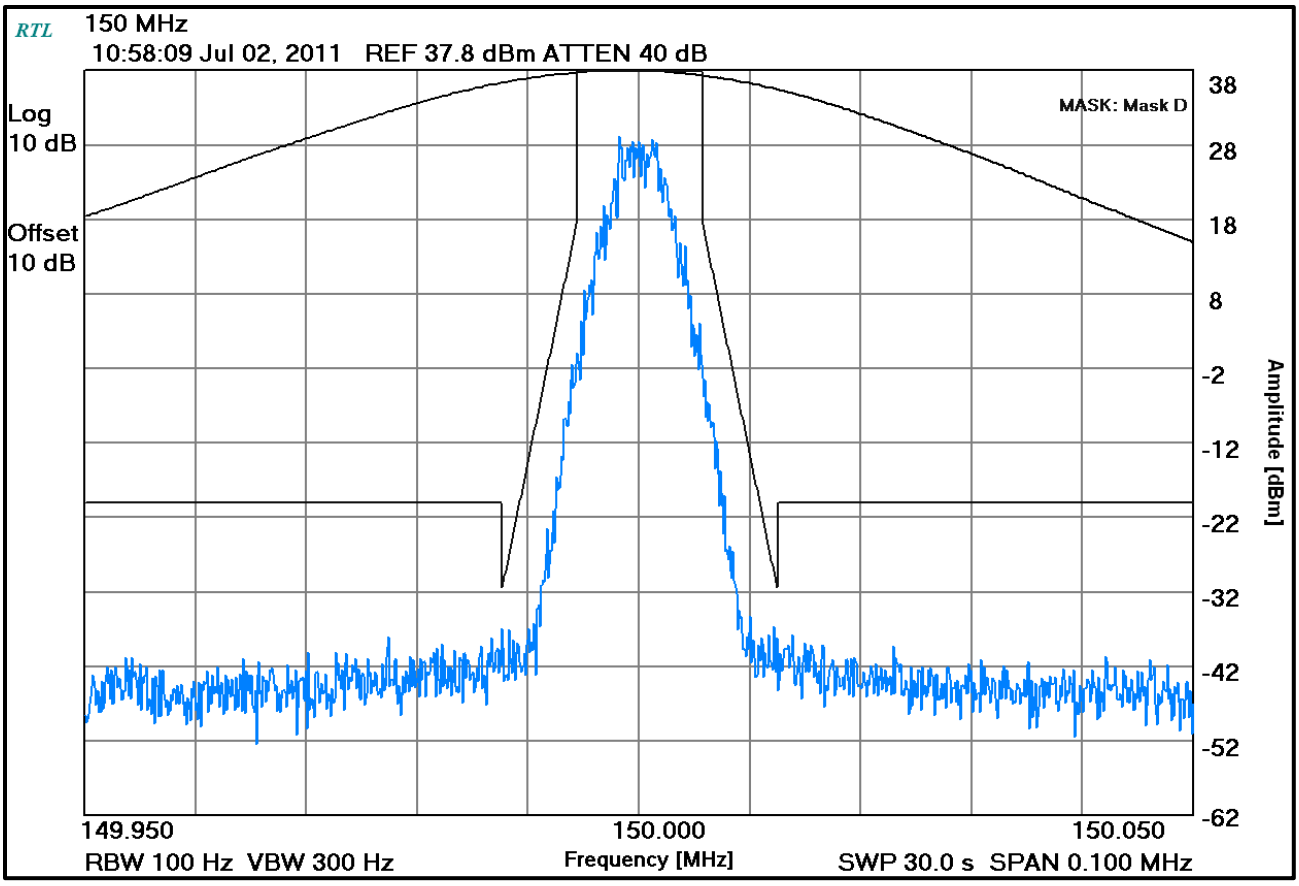
Plot 7-28: Occupied Bandwidth – 144 MHz; P25 (Mask D)



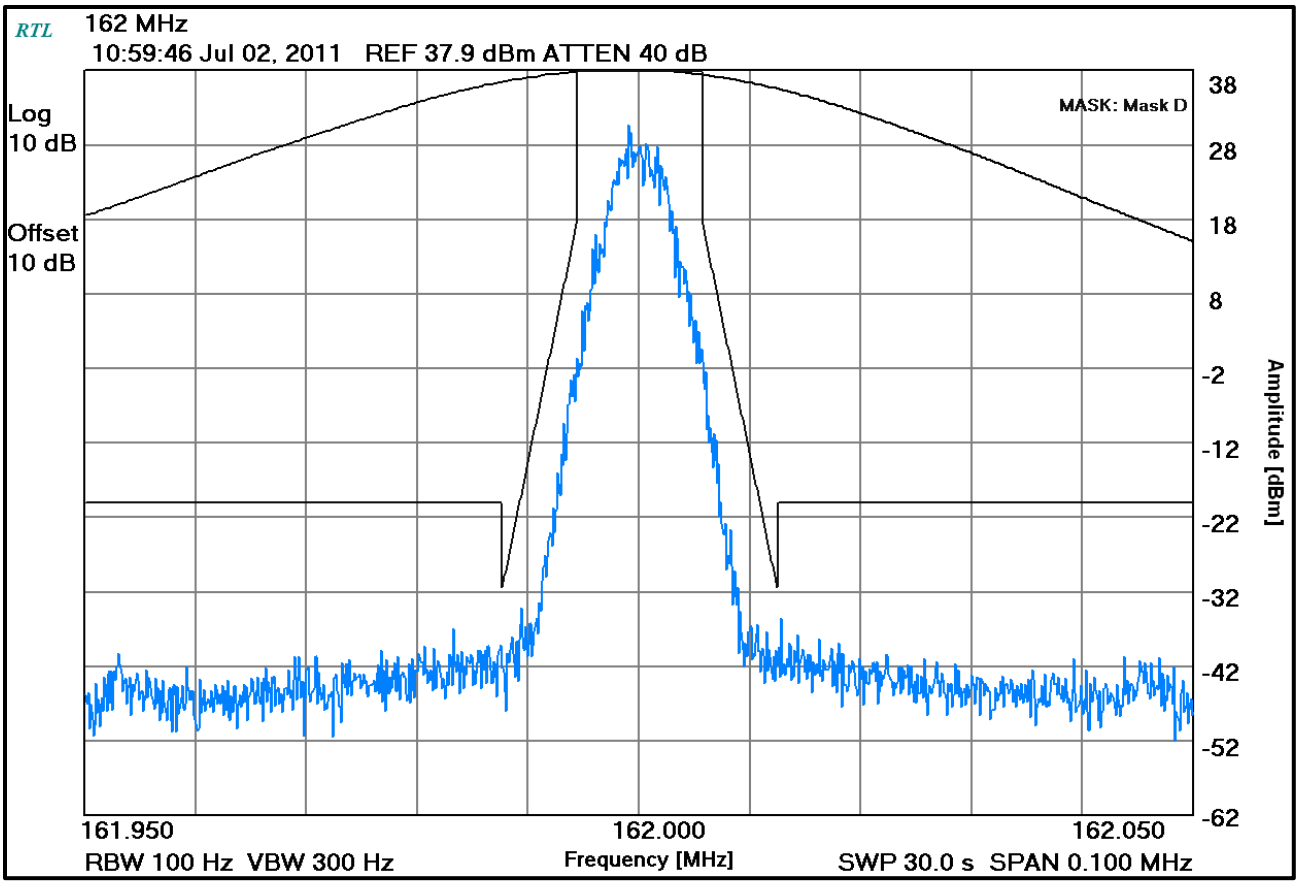
Plot 7-29: Occupied Bandwidth – 148 MHz; P25 (Mask D)



Plot 7-30: Occupied Bandwidth – 150 MHz; P25 (Mask D)



Plot 7-31: Occupied Bandwidth – 162 MHz; P25 (Mask D)



Plot 7-32: Occupied Bandwidth – 173.9875 MHz; P25 (Mask D)

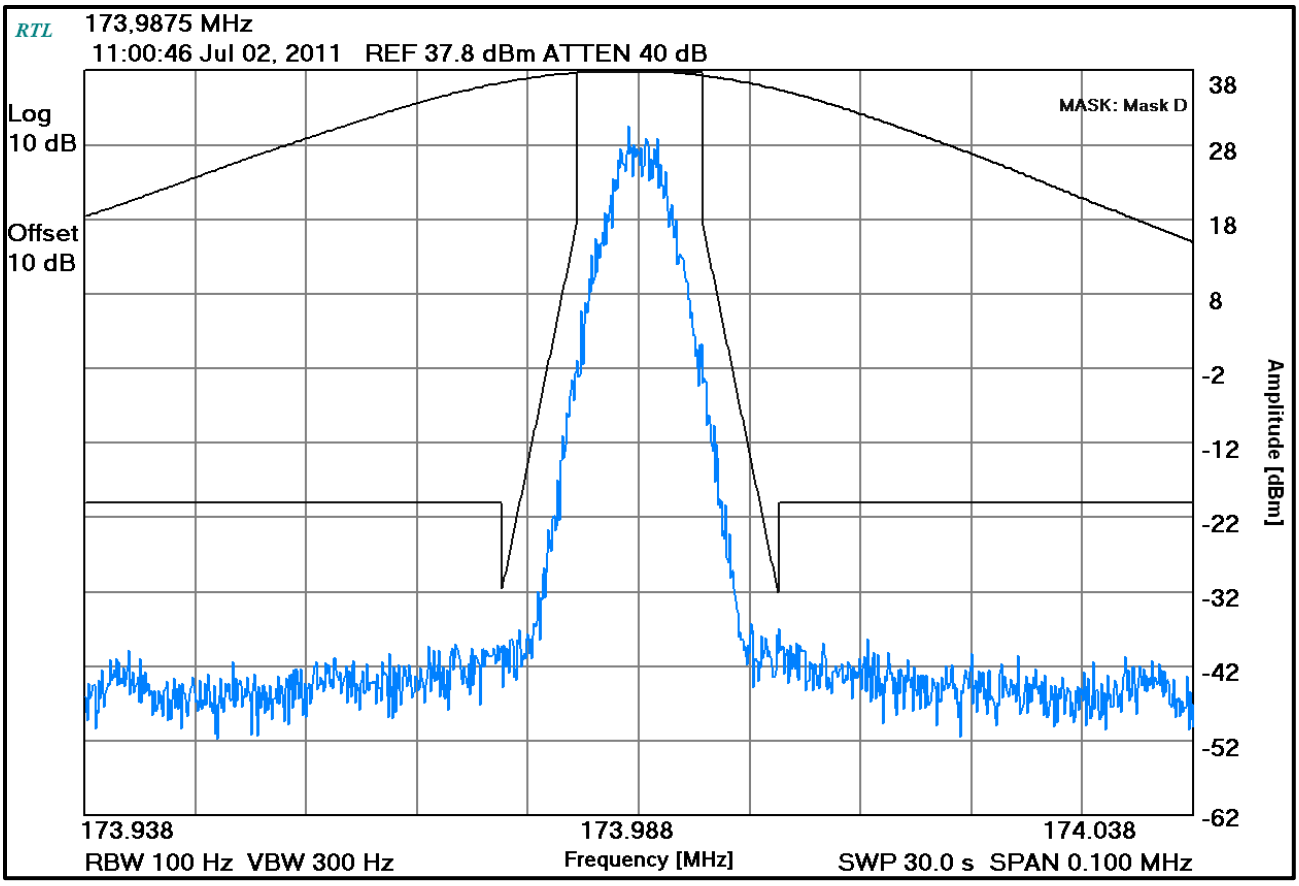


Table 7-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900930	Hewlett Packard	85662A	Spectrum Analyzer Display Section	3144A20839	9/13/11
900931	Hewlett Packard	8566B	Spectrum Analyzer (100 Hz - 22 GHz)	3138A07771	9/13/11
900819	Weinschel Corp	2	10 dB Attenuator; 5 W	BF0830	2/15/12

Test Personnel:

Daniel Baltzell		July 1-2, 2011
Test Engineer	Signature	Dates of Test

8 FCC Rules and Regulation Part 2.1055: Frequency Stability; Part 90.213: Frequency Stability; RSS-119 5.3: Transmitter Frequency Stability

8.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.2

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency. The EUT was evaluated over the temperature range -30°C to +60°C. The temperature was initially set to -30°C and a 2-hour period was observed for stabilization of the EUT. The frequency stability was measured within one minute after application of primary power to the transmitter. The temperature was raised at intervals of 10 degrees centigrade through the range. A ½-hour period was observed to stabilize the EUT at each measurement step and the frequency stability was measured within one minute after application of primary power to the transmitter. The measurement was noted and normalized to 20°C. The voltage stability was measured at +/- 15% and normalized to 20°C.

Limit: 5 ppm for mobile stations (including portables) designed to operate with a 12.5 kHz channel bandwidth

8.2 Test Data

Table 8-1: Temperature Frequency Stability – 148.0 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	148.000083	1.08
-20	148.000037	0.77
-10	148.000008	0.57
0	147.999957	0.23
10	147.999934	0.07
20 (reference)	147.999923	**0.00**
30	147.999912	0.07
40	147.999891	0.22
50	147.999868	0.37
60	147.999865	0.39

8.2.1 Frequency Stability/Voltage Variation

Table 8-2: Frequency Stability/Voltage Variation – 148.0 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
6 (Battery End-Point)	147.999924	0.01
6.375	147.999922	0.01
7.5 (reference)	**147.999923**	**0.00**
8.625	147.999922	0.01

The worst-case deviation was found to be 1.08 ppm.

Result: The EUT is compliant.

Table 8-3: Test Equipment Used For Testing Frequency Stability

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
900946	Tenney Engineering, Inc.	TH65	Temperature Chamber with Humidity	11380	01/13/13
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	07/29/11
901350	Meterman	33XR	Multimeter	040402802	12/28/12

Test Personnel:

Daniel Baltzell		July 3, 2011
Test Engineer	Signature	Date of Test

9 FCC Part 2.1047(a): Modulation Characteristics - Audio Frequency Response

9.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.6

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.

The input audio level at 1000 Hz was set to produce 20% of the rated system deviation. This point is shown as the 0 dB reference level, noted DEVref. The audio signal generator was varied from 100 Hz to 5 kHz with the input level held constant. The deviation in kHz was recorded using a modulation analyzer as DEVfreq. The response in dB relative to 1 kHz was calculated as follows:

Audio Frequency Response = 20 LOG (DEVfreq/DEVref)

9.2 Test Data

Plot 9-1: Modulation Characteristics - Audio Frequency Response

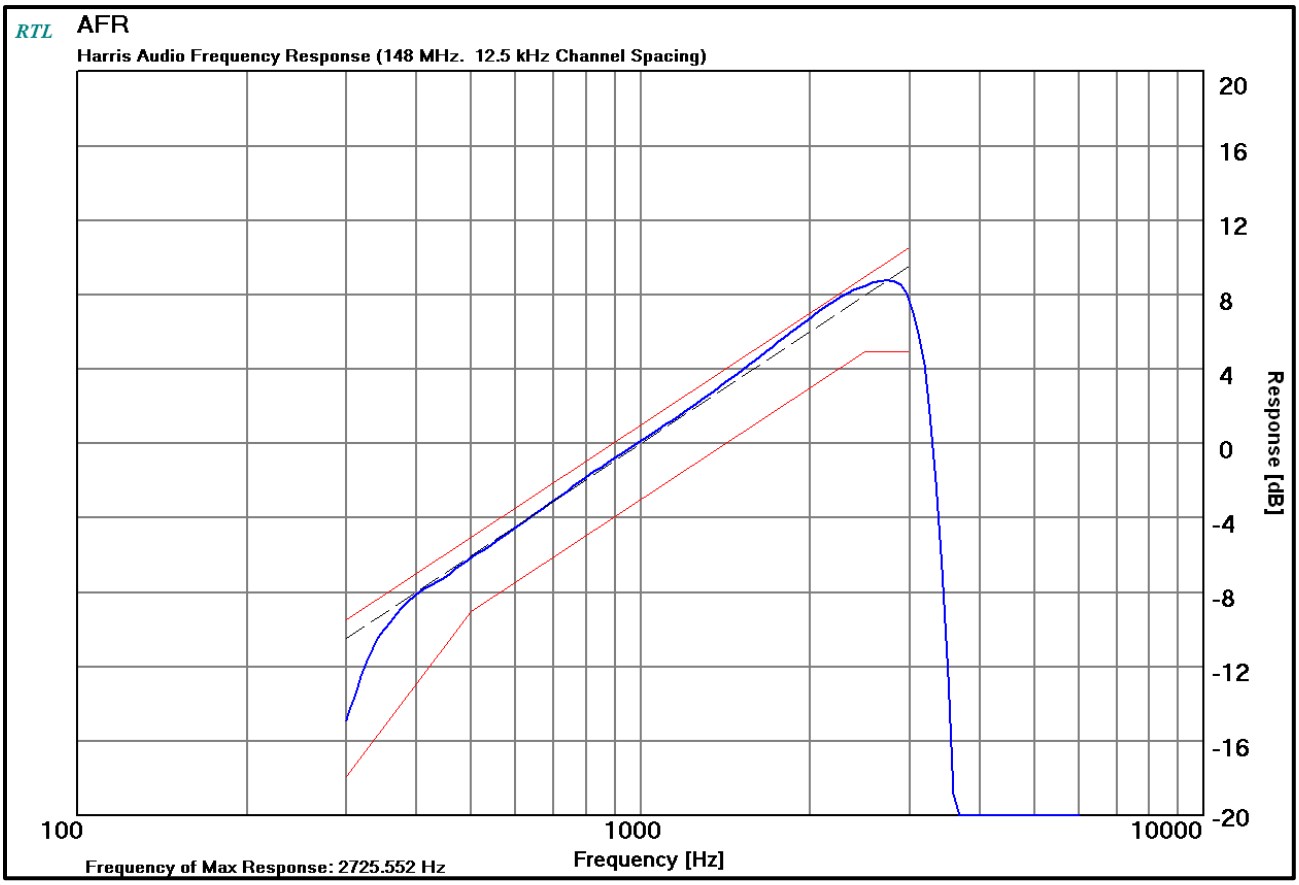


Table 9-1: Test Equipment Used For Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/12

Test Personnel:

Daniel Baltzell		July 2, 2011
Test Engineer	Signature	Date of Test

10 FCC Part 2.1047(a): Modulation Characteristics – Audio Low Pass Filter

10.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.15

The Audio Low Pass Filter Response is the response of the post limiter low pass filter circuit above 3000 Hz.

10.2 Test Data

Plot 10-1: Modulation Characteristics – Audio Low Pass Filter

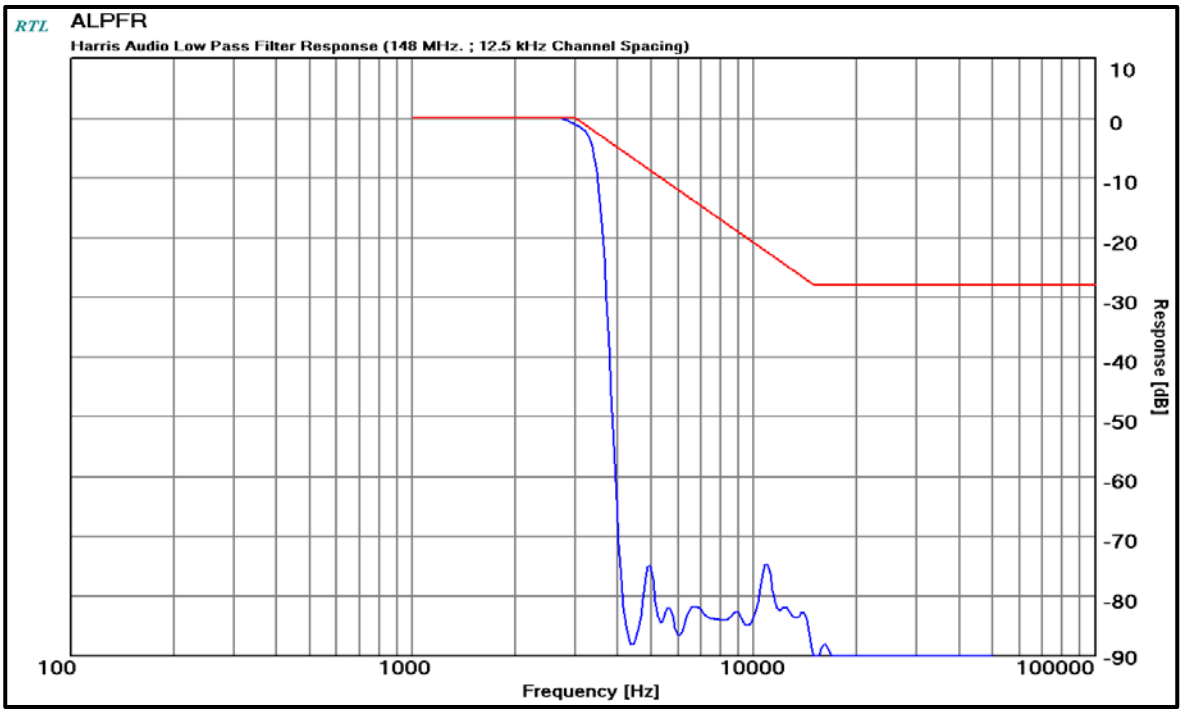


Table 10-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/12

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	July 2, 2011
Test Engineer	Signature	Date of Test

11 FCC Rules and Regulations Part 2.1047(b): Modulation Characteristics - Modulation Limiting

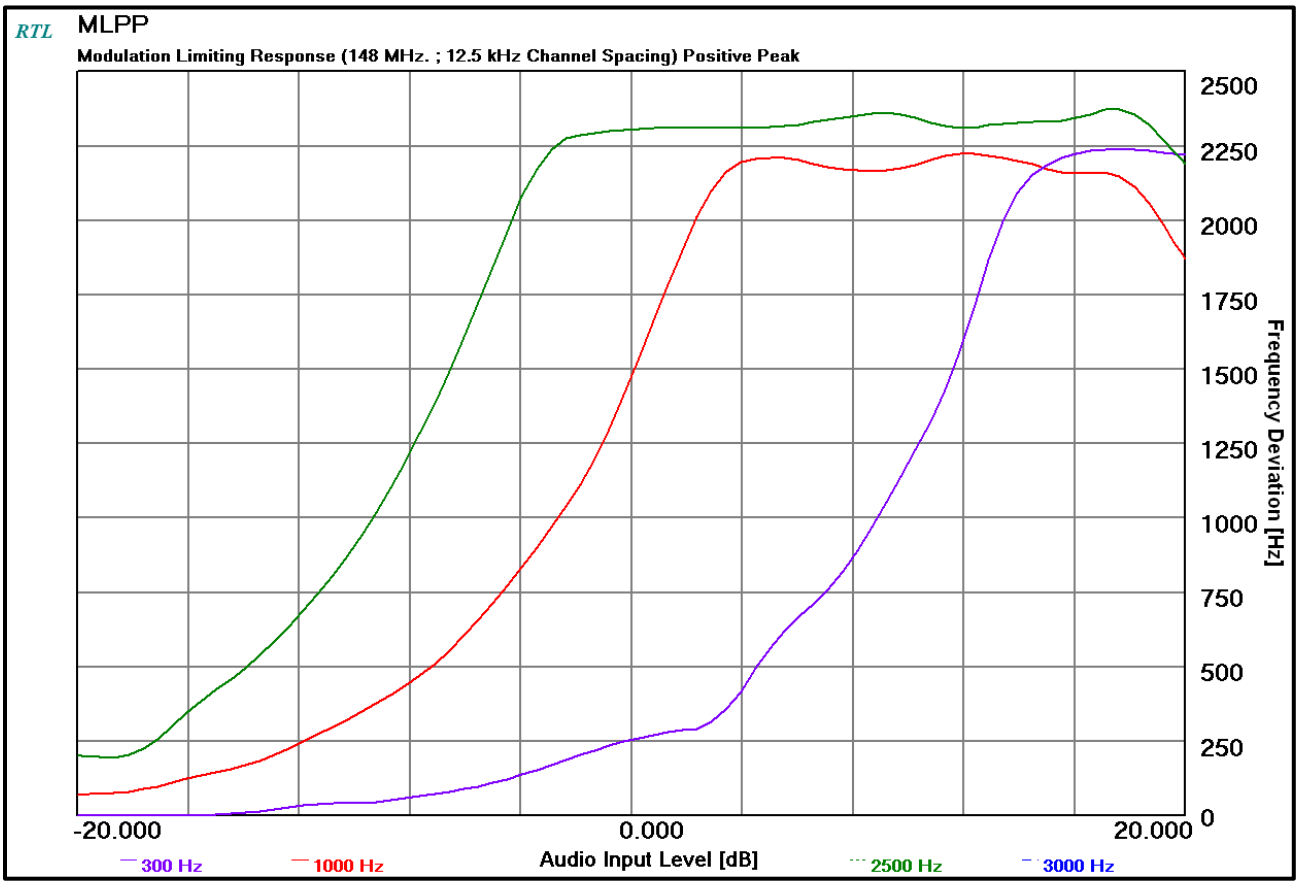
11.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.3

The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500 Hz. The system deviation obtained as a function of the input level was recorded. Both positive and negative peak deviations were recorded.

11.2 Test Data

Plot 11-1: Modulation Characteristics – Modulation Limiting; Positive Peak



Plot 11-2: Modulation Characteristics – Modulation Limiting; Negative Peak

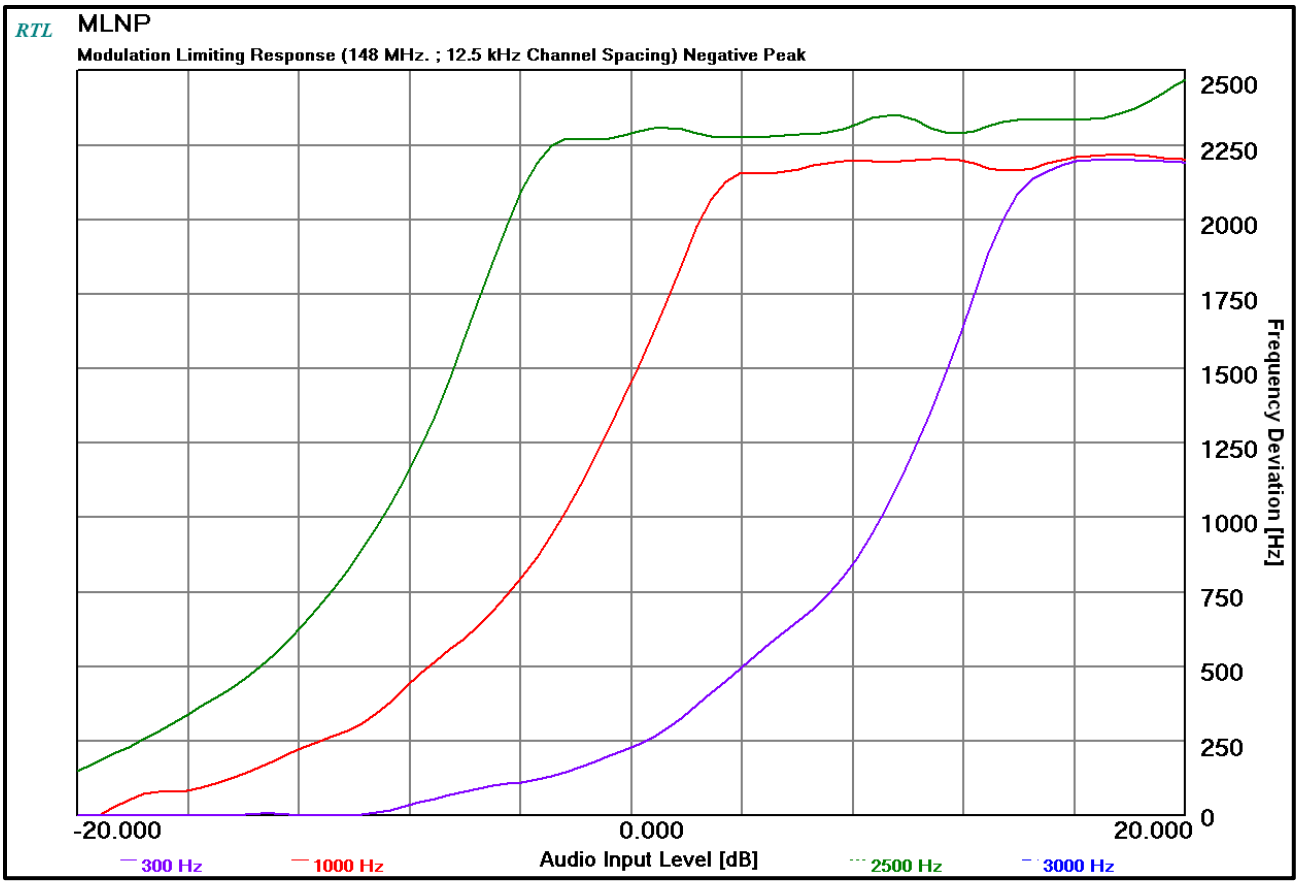


Table 11-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/12

Test Personnel:

Daniel Baltzell		July 2, 2011
Test Engineer	Signature	Date of Test

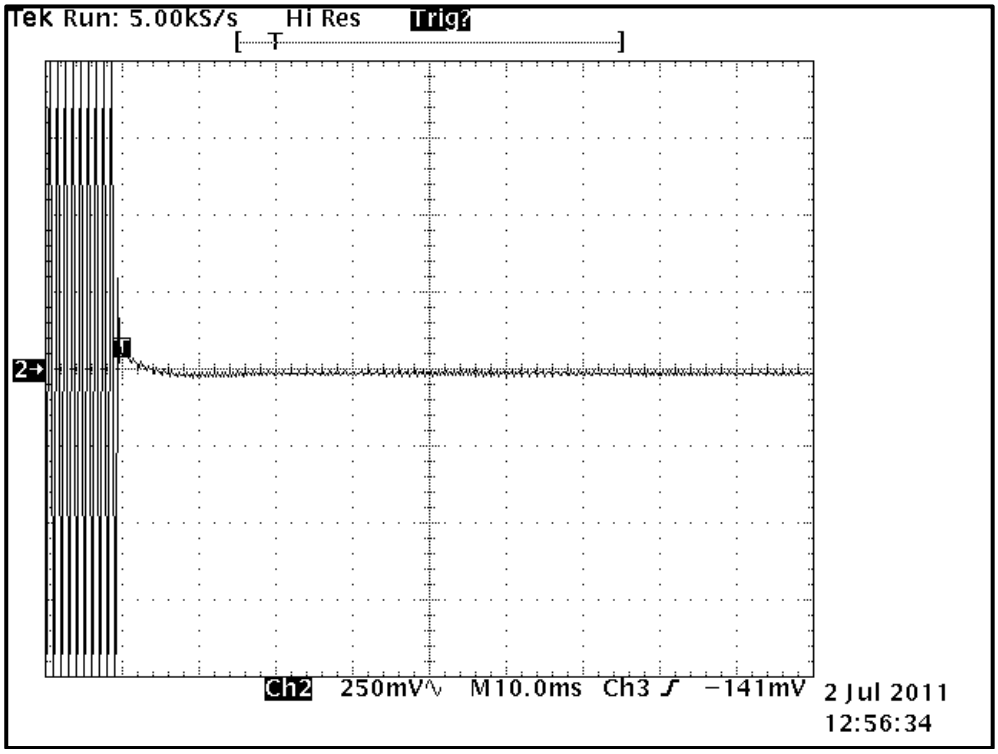
12 FCC Rules and Regulations Part 90.214; IC RSS-119 5.9: Transient Frequency Response

12.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.3

12.2 Test Data

Plot 12-1: Transient Frequency Behavior – Narrow Band; Carrier On Time



Plot 12-2: Transient Frequency Behavior – Narrow Band; Carrier Off Time

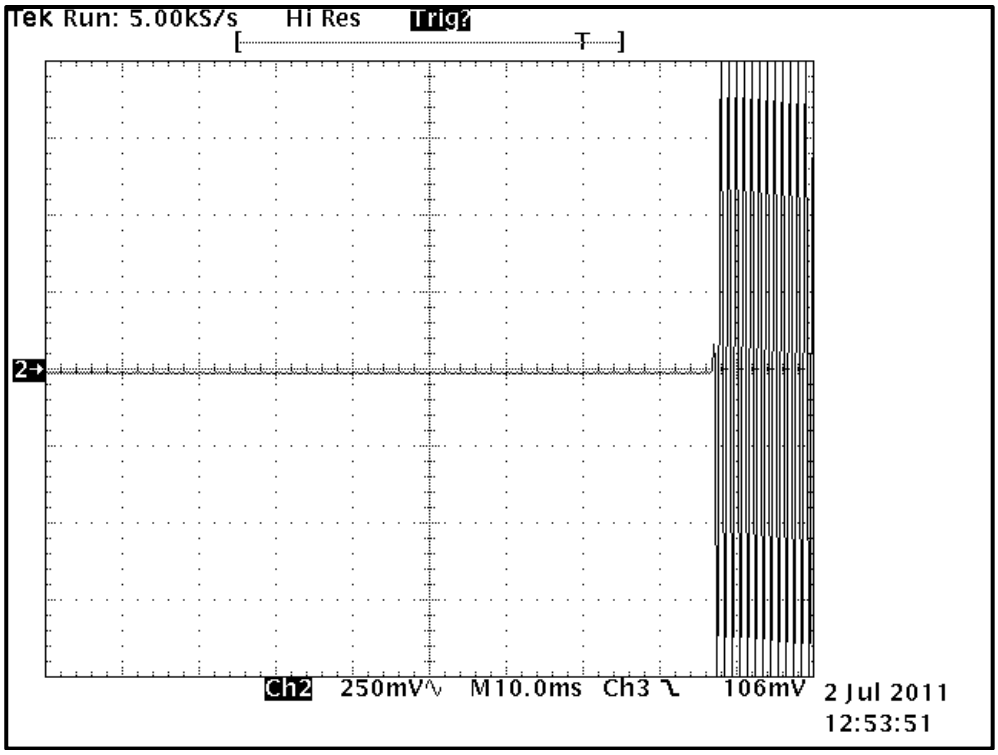


Table 12-1: Test Equipment Used For Testing Transient Frequency Behavior

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
901514	Tektronix	TDS7404B	Oscilloscope	B010161	11/12/11
900917	Hewlett Packard	8648C	Synthesized. Signal Generator (9 kHz - 3200 MHz)	3537A01741	10/20/11
900948	Weinschel	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/17/12
901511	Pasternack	PE 2003	Power Divider (10 MHz - 1 GHz)	NA	N/A
901463	Werlatone Inc.	C1795	Directional Coupler, 100W, 40 dB, 1 - 1000 MHz	4067	2/18/12
901263	Agilent Technologies	.01-12 GHz	SMA Detector	2936A05505	N/A

Test Personnel:

Daniel Baltzell		July 2, 2011
Test Engineer	Signature	Date of Test

13 FCC Rules and Regulations Part 2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emission: F3E, F1D, F1E

Voice – 12.5 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 2.5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 11.0 kHz
Emission designator: 11K0F3E

Digital Voice and Data (9600N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 2130
Bn = 3.86D + 0.27RK = 3.86(2130) + 0.27(9600)(1) = 10,814 kHz
Emission designator: 10K8F1D, 10K8F1E

Digital Voice and Data (4800N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 4800
Peak deviation of carrier (D) = 1685
Bn = 3.86D + 0.27RK = 3.86(1350) + 0.27(4800)(1) = 7.800 kHz
Emission designator: 7K80F1D, 7K80F1E

P25 – 4-level FSK 9600 sps:
Calculation:
Data rate in bps (R) = 4800
Peak deviation of carrier (D) = 1800
Bn = $[4800/\log_2(2) + 2 (1800) (1) = 8.400$ kHz
Emission designator: 8K40F1D, 8K40F1E

14 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **XG-75 VHF, FCC ID: OWDTR-0059-E, IC: 3636B-0059,** complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119.