Engineering and Testing for EMC and Safety Compliance

FCC & IC Certification Report

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MODEL: M7300,378-430MHz,50W

FCC ID: OWDTR-0061-E
IC: 3636B-0061

October 31, 2010

Standards Referenced for this Report	
Part 2: 2009	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2009	Private Land Mobile Radio Services
TIA-EIA-603-C August 2004	Land Mobile 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 10	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Report Prepared By: Daniel Baltzell

Document Number: 2010129

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
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	16K0F3E
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	11K0F3E
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	14K2F1D (2 level WB)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	14K2F1E (2 level WB)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	9K90F1D (2 level NB 9600)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	9K90F1E (2 level NB 9600)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	7K10F1D (2 level NB 4800)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	7K10F1E (2 level NB 4800)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	13K1F9W (OpenSky TDMA)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	8K40F1D (OpenSky TDMA)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	8K40F1E (OpenSky TDMA)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	8K40F1D (P25)
378-406.1 (Federal) 406.1-430 (FCC/IC)	50	0.5	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 **M7300,378-430MHz,50W Mobile Radio; FCC ID: OWDTR-0061-E, IC: 3636B-0061.**

The radio can be used with a GPS, remote and front mount control heads, and is subject to FCC DoC. 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)

N/A

2.3 Grant Notes

Power is continuously variable from 10–50 W. The grant listed power is rated power and the actual measured power is 53.7 W as shown in the test report.

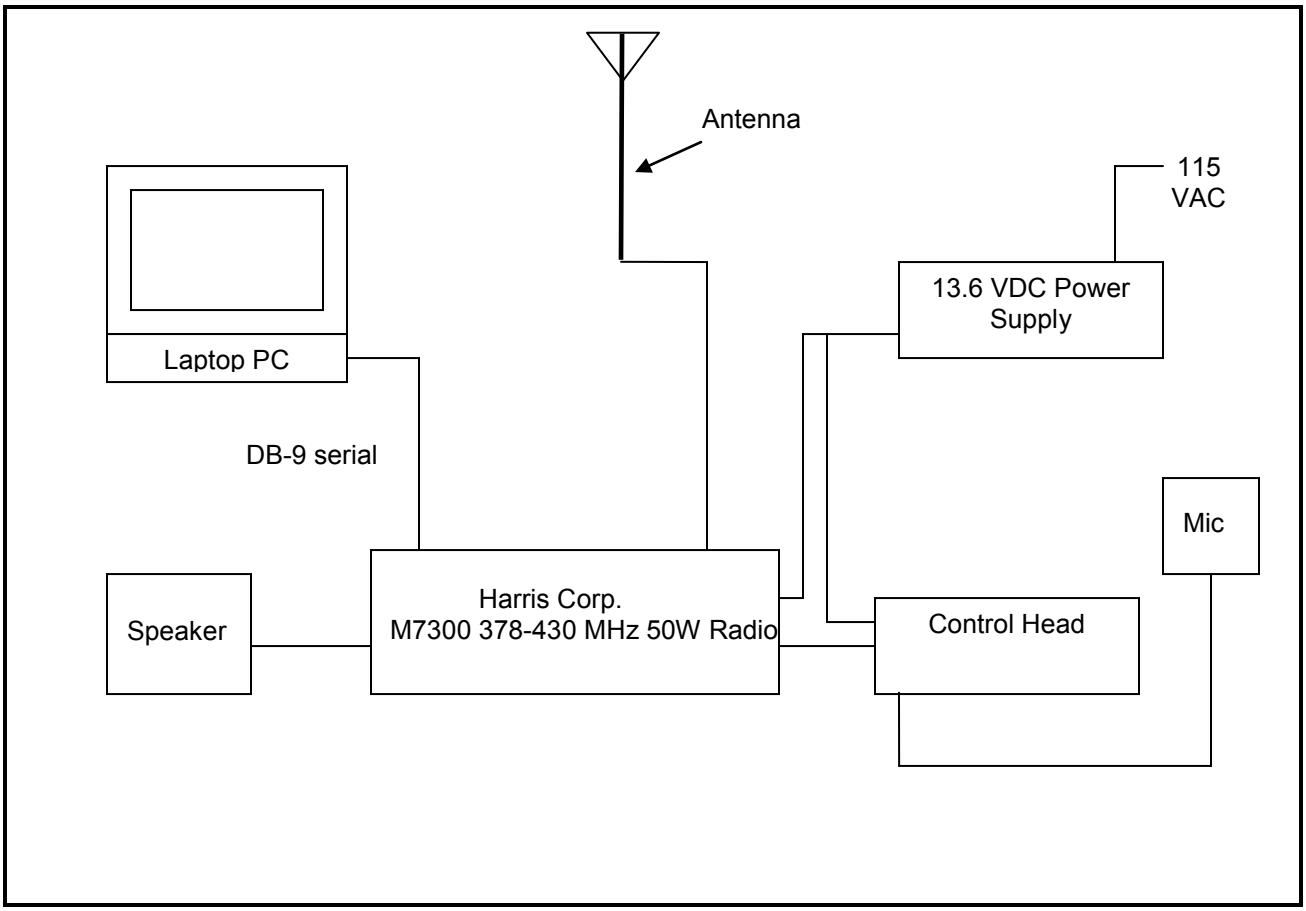
3 Tested System Details

The test sample was received on October 21, 2010. 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 3-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN	FCC ID	RTL Bar Code
UHF-L 50 W Mobile Radio	Harris Corporation	M7300	RU144750-021	OWDTR-0061-E	19783
Front Mount Control Head (Installed)	Harris Corporation	CH721	CU23218-0001	N/A	N/A
UHF-L 50 W Mobile Radio	Harris Corporation	M7300	RU144750-021	OWDTR-0061-E	19785
Remote Mount	Harris Corporation	CH721	CU23218-0004	N/A	19782
Roof Mount Base	Harris Corporation	AN-125001-005	N/A	N/A	N/A
UHF-L 378-430 MHz 0 dB Gain Antenna	Harris Corporation	AN-225003-001	N/A	N/A	19779
Speaker	Harris Corporation	N/A	LS102824V10R1A	N/A	19548
DTMF Microphone	Harris Corporation	N/A	MC-103334-041 Rev. 0945	N/A	19549
UHF-L 378-430 MHz 0 dB Gain Low Profile Antenna	Harris Corporation	AN-225003-004	N/A	N/A	N/A
Thick Roof Mount	Harris Corporation	AN-125001-003	N/A	N/A	N/A
Standard Roof Mount	Harris Corporation	AN-125001-001	N/A	N/A	N/A
UHF-L 378-430 MHz 0 dB Gain Antenna	Harris Corporation	AN-225003-001	N/A	N/A	19779
Standard Roof Mount with GPS	Harris Corporation	AN-125001-005	N/A	N/A	N/A
Microphone	Harris Corporation	MC-103334-051	N/A	N/A	N/A
Microphone	Harris Corporation	MC-101616-041-rev	N/A	N/A	N/A

Figure 3-1: Configuration of Tested System



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

13.6 V / 3.89 A

5 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

5.1 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: 50 W

5.2 Test Data

Table 5-1: RF Conducted Output Power - Measured

Frequency (MHz)	High Power (dBm)	High Power (W)
378.0125	47.3	53.7
406.1125	47.3	53.7
417.0125	47.3	53.7
429.9875	47.3	53.7

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

Table 5-2: 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	11/18/10
901356	Agilent Technologies	E9323A	Power Sensor	31764-264	11/18/10
901396	MCE Weinschel	48-40-34	Attenuator, 40 dB, DC-18 GHz, 100 W	93453	2/17/11

Test Personnel:

Daniel Baltzell		October 21, 2010
EMC Test Engineer	Signature	Date Of Test

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

6.1 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.

6.2 Test Data

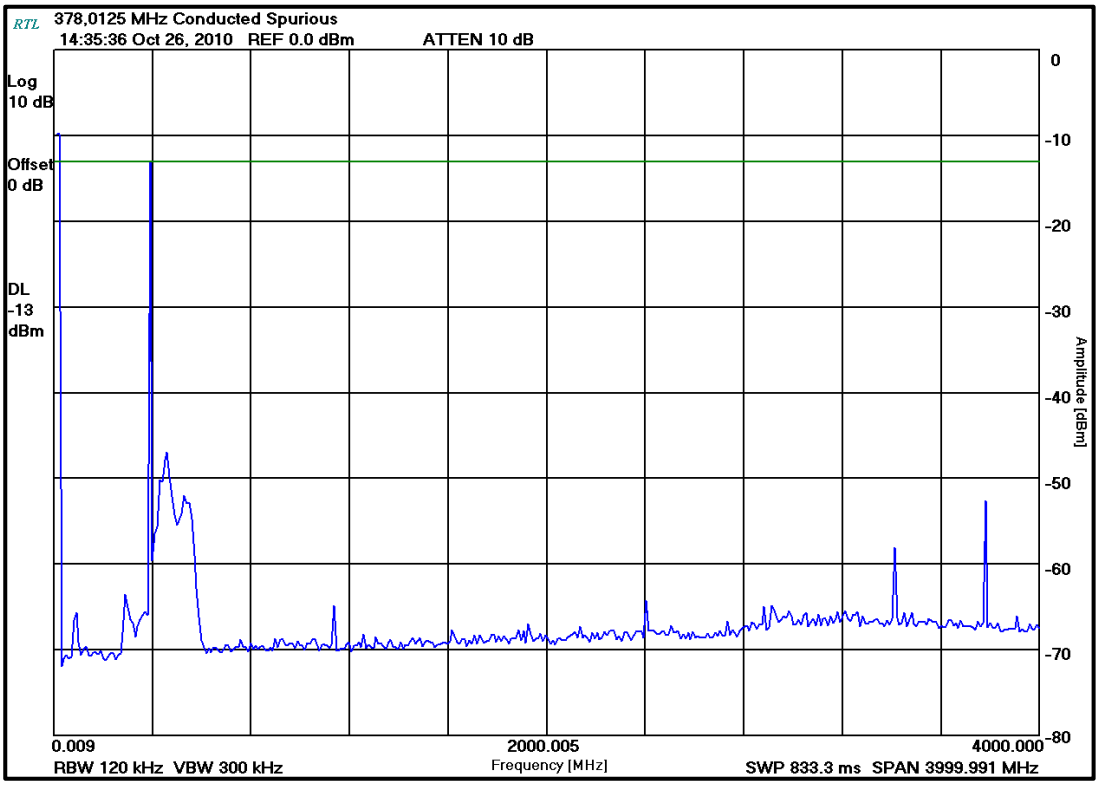
Frequency range of measurement per Part 2.1057: 9 kHz to 10 x Fc

Limits: (43 + 10 LOG P(W))

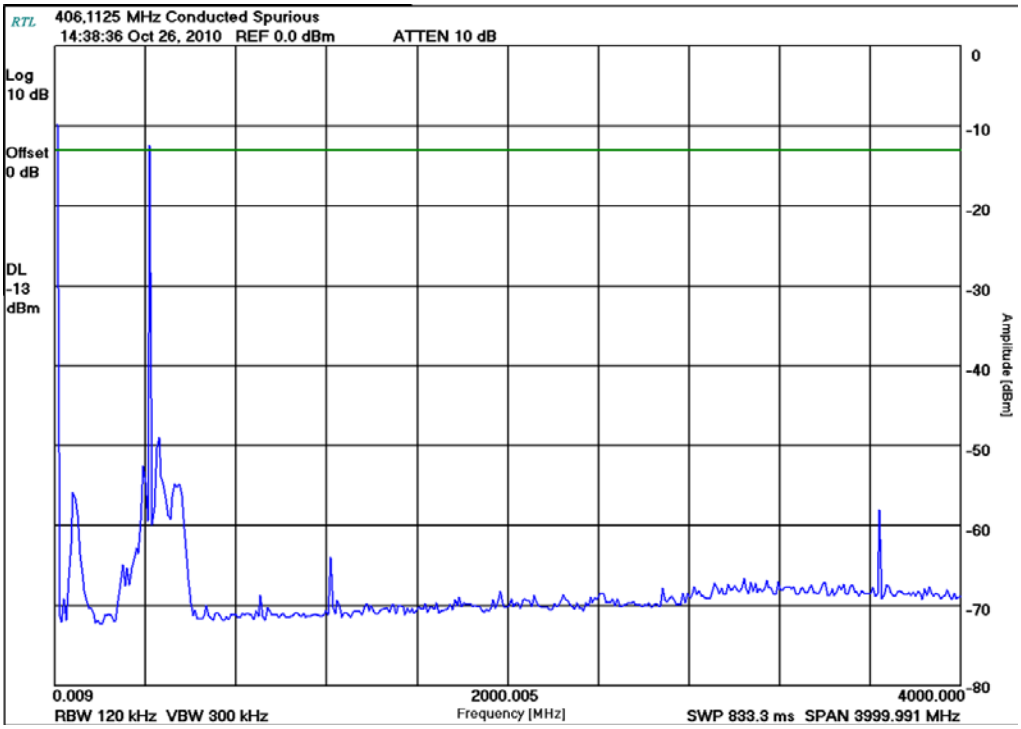
The following channels (MHz) were investigated: 378.0125, 406.1125, 417.0125, 429.9875

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.

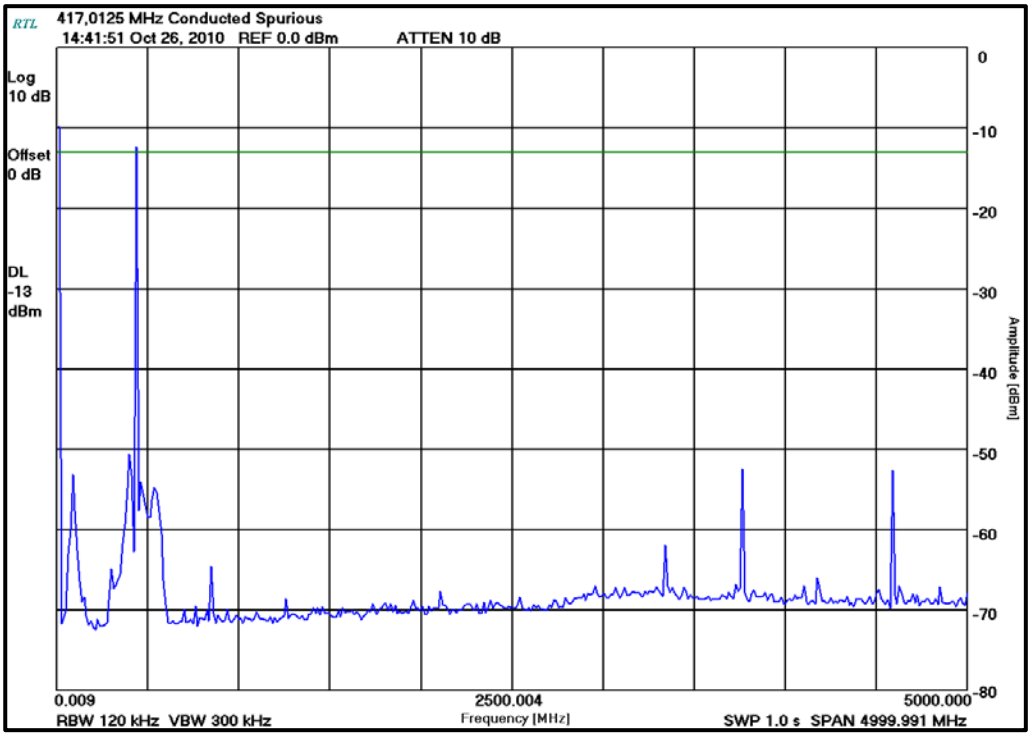
Plot 6-1: Conducted Spurious - 378.0125 MHz - Analog High Power



Plot 6-2: Conducted Spurious – 406.1125 MHz – Analog High Power



Plot 6-3: Conducted Spurious – 417.0125 MHz – Analog High Power



Plot 6-4: Conducted Spurious – 429.9875 MHz – Analog High Power

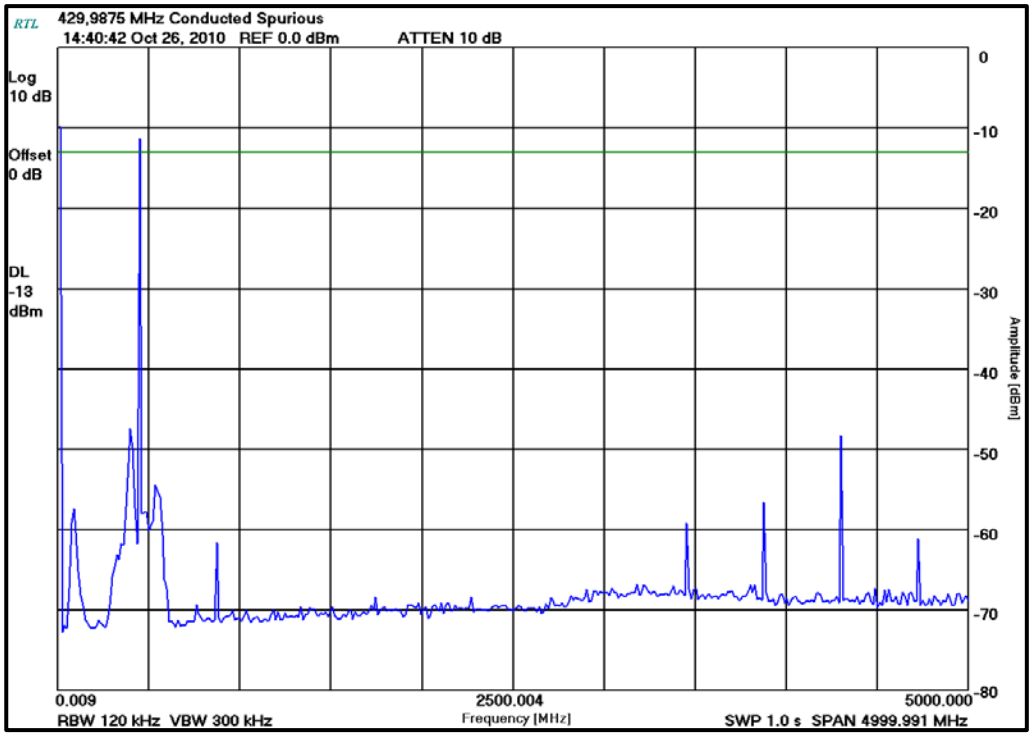


Table 6-1: Test Equipment Used For Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	11/23/10
901133	Par Electronics	400-430 (25W)	UHF Notch Filter	N/A	3/10/12

Test Personnel:

Daniel Baltzell		October 26, 2010
EMC Test Engineer	Signature	Date Of Test

7 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

7.1 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 more stringent limit of 50+10logP for narrowband was used.

7.2 Test Data

7.2.1 CFR 47 Part 90.210 Requirements

The worst-case emissions test data are shown.

Table 7-1: Field Strength of Spurious Radiation – 378.0125 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)	Limit (dBc)	Margin (dB)
756.025	37.2	-67.3	0.8	1.2	114.3	67.3	-47.0
1134.038	51.5	-49.2	1.0	4.4	93.1	67.3	-25.8
1512.050	41.6	-57.4	1.1	6.5	99.3	67.3	-32.0
1890.063	44.5	-50.9	1.4	6.2	93.5	67.3	-26.2
2268.075	33.8	-63.8	1.6	7.3	105.4	67.3	-38.1
2646.088	37.9	-57.8	1.8	7.5	99.3	67.3	-32.0
3024.100	31.1	-62.5	2.0	7.2	104.5	67.3	-37.2
3402.113	32.0	-59.0	2.0	7.6	100.7	67.3	-33.4
3780.125	32.7	-54.6	2.3	7.0	97.2	67.3	-29.9

Table 7-2: Field Strength of Spurious Radiation – 406.1125 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)	Limit (dBc)	Margin (dB)
812.225	35.7	-68.8	0.9	1.0	115.9	67.3	-48.6
1218.338	48.7	-52.3	1.0	4.8	95.8	67.3	-28.5
1624.450	32.6	-63.4	1.2	6.7	105.2	67.3	-37.9
2030.563	33.0	-63.3	1.6	6.7	105.5	67.3	-38.2
2436.675	32.5	-62.9	1.7	7.2	104.7	67.3	-37.4
2842.788	33.4	-61.8	1.9	7.9	103.1	67.3	-35.8
3248.900	32.3	-58.8	2.0	7.0	101.1	67.3	-33.8
3655.013	31.8	-56.6	2.2	7.1	99.0	67.3	-31.7
4061.125	31.3	-52.8	2.4	7.8	94.7	67.3	-27.4

Table 7-3: Field Strength of Spurious Radiation – 417.0125 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)	Limit (dBc)	Margin (dB)
834.025	33.8	-70.7	0.9	1.1	117.8	67.3	-50.5
1251.038	46.4	-54.7	1.0	5.0	98.0	67.3	-30.7
1668.050	32.8	-60.9	1.2	6.6	102.9	67.3	-35.6
2085.063	31.8	-64.5	1.6	6.7	106.6	67.3	-39.3
2502.075	33.2	-60.9	1.7	7.4	102.5	67.3	-35.2
2919.088	31.7	-63.3	2.0	7.6	105.0	67.3	-37.7
3336.100	33.4	-57.7	2.0	7.2	99.8	67.3	-32.5
3753.113	32.6	-54.3	2.2	7.0	96.9	67.3	-29.6
4170.125	32.6	-52.8	2.5	8.4	94.1	67.3	-26.8

Table 7-4: Field Strength of Spurious Radiation – 429.9875 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)	Limit (dBc)	Margin (dB)
859.975	31.1	-73.4	0.9	1.1	120.4	67.3	-53.1
1289.963	49.3	-51.9	1.0	5.1	95.1	67.3	-27.8
1719.950	34.4	-59.8	1.3	6.5	101.9	67.3	-34.6
2149.938	31.6	-66.4	1.6	7.0	108.3	67.3	-41.0
2579.925	31.6	-61.0	1.7	7.4	102.7	67.3	-35.4
3009.913	34.4	-59.1	2.0	7.3	101.2	67.3	-33.9
3439.900	32.9	-58.0	2.0	7.6	99.8	67.3	-32.5
3869.888	31.8	-56.0	2.3	7.0	98.7	67.3	-31.4
4299.875	31.5	-54.1	2.5	8.7	95.2	67.3	-27.9

Table 7-5: 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	12/12/10
901364	MITEQ	JS4-01002600-36-5P	Amplifier 0.1-26 GHz, 28 dB gain, power 5 dB	849863	2/22/11
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	11/23/10
900928	Hewlett Packard	83752A	Synthesized Sweeper, (0.01 - 20 GHz)	3610A00866	2/17/11
901426	Insulated Wire Inc.	KPS-1503-3600-KPS	RF cable, 30'	NA	10/19/11
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
901262	ETS	3160-9	Double ridged Guide Antenna (1 - 18 GHz)	6748	5/1/11
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	6/14/11
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/11
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	4/10/11

Test Personnel:

Daniel Baltzell		October 28, 2010
Test Engineer	Signature	Dates Of Test

8 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

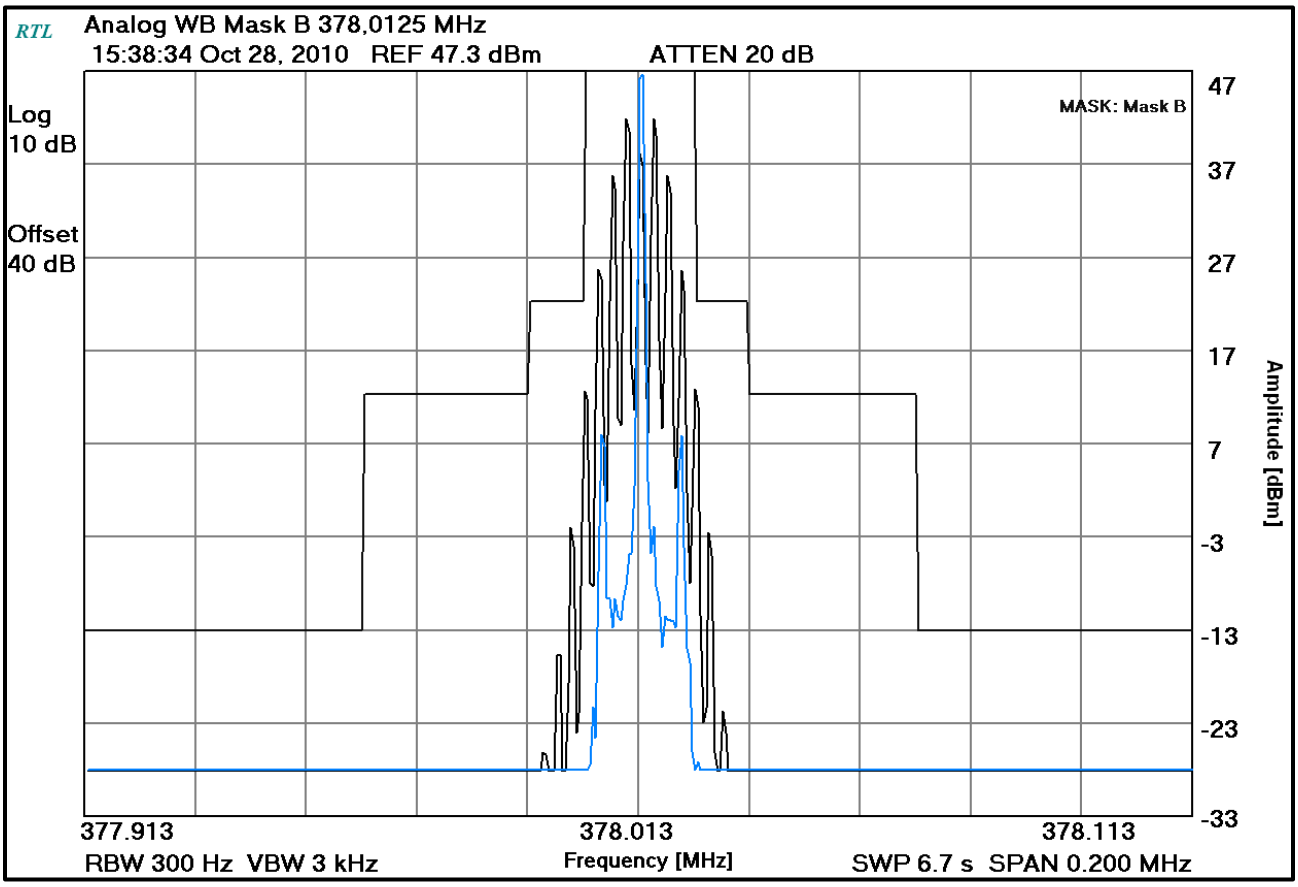
8.1 Test Procedure

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

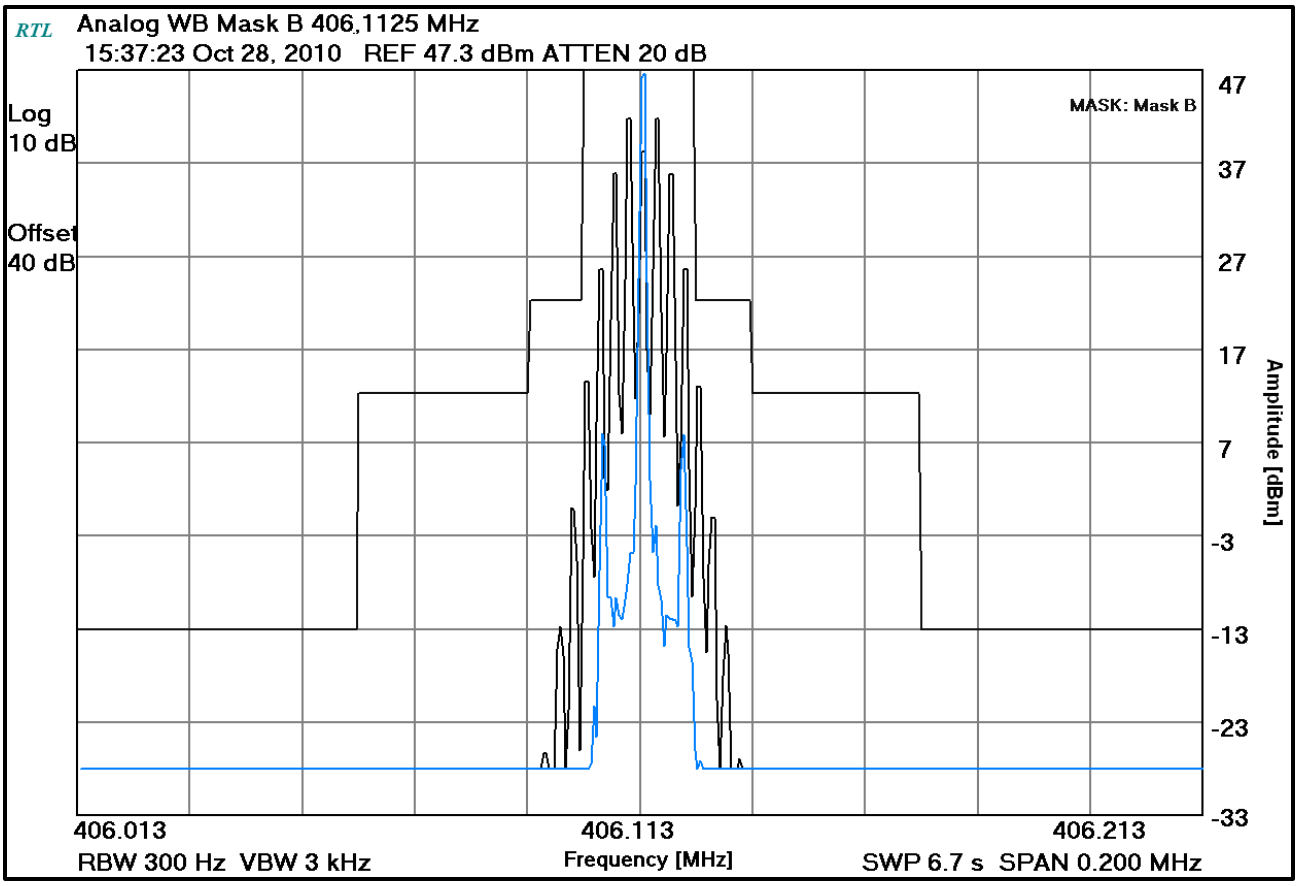
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 19,200 bps for OTP and 9,600 bps for P25 and EDACS modes.

8.2 Test Data

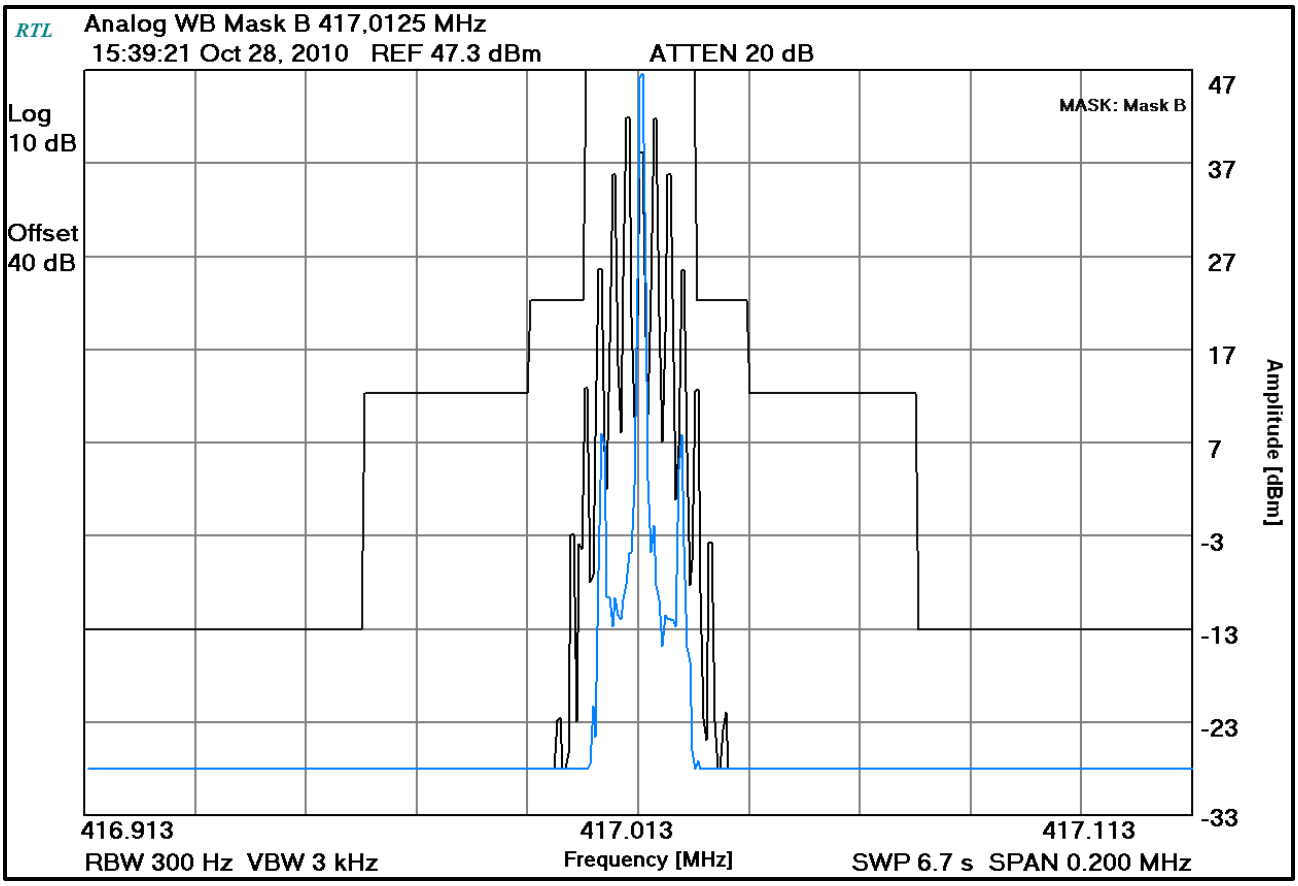
Plot 8-1: Occupied Bandwidth – 378.0125 MHz; Analog WB (Mask B)



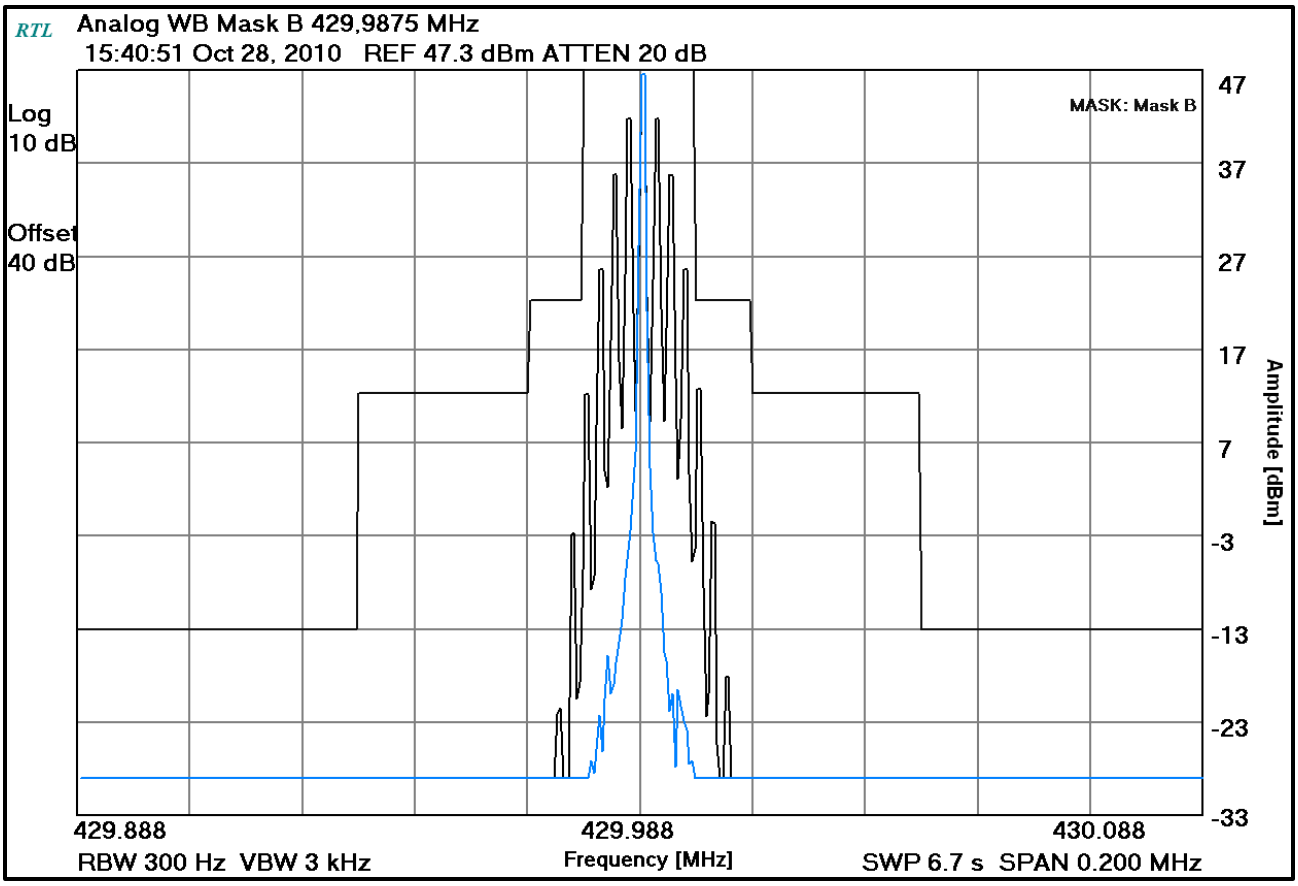
Plot 8-2: Occupied Bandwidth – 406.1125 MHz; Analog WB (Mask B)



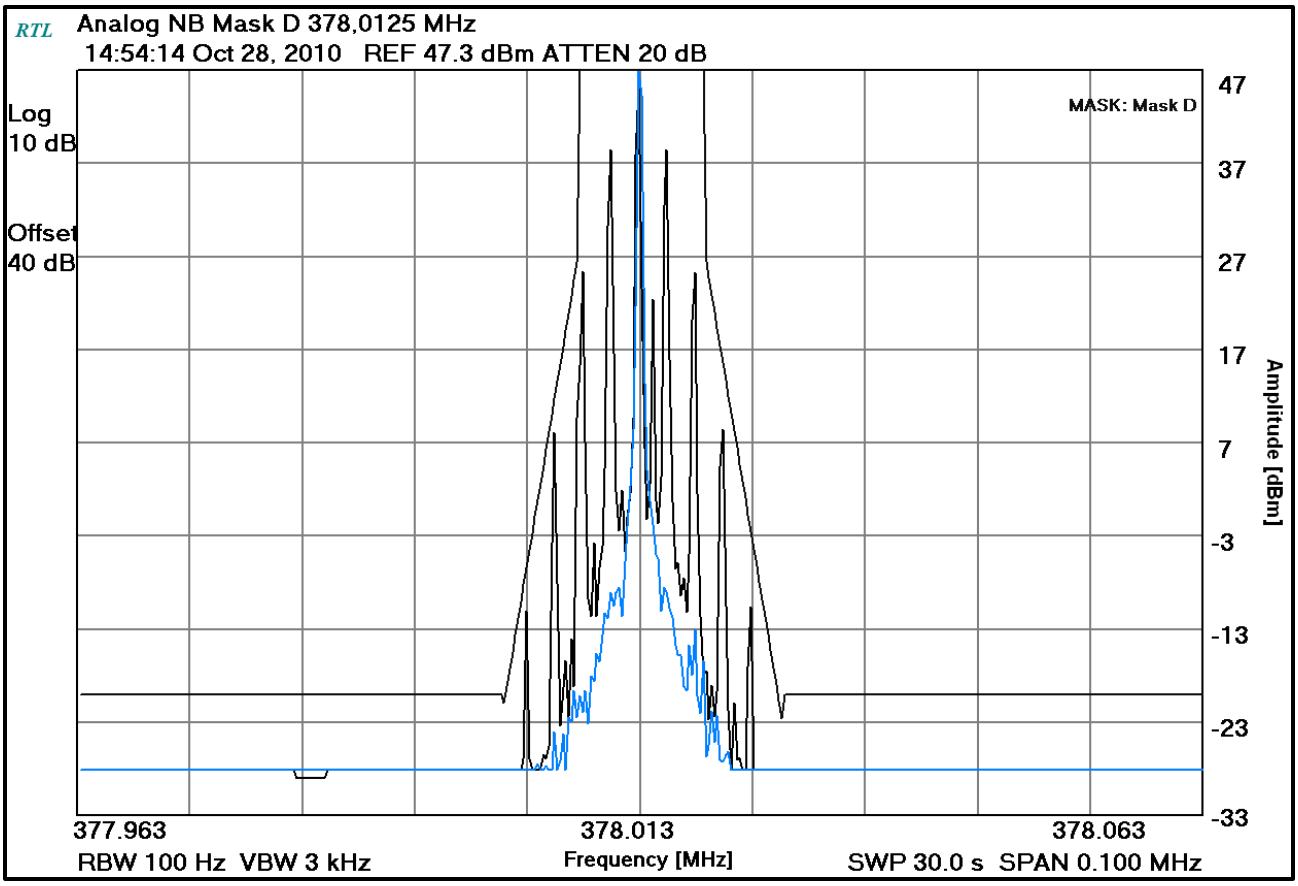
Plot 8-3: Occupied Bandwidth – 417.0125 MHz; Analog WB (Mask B)



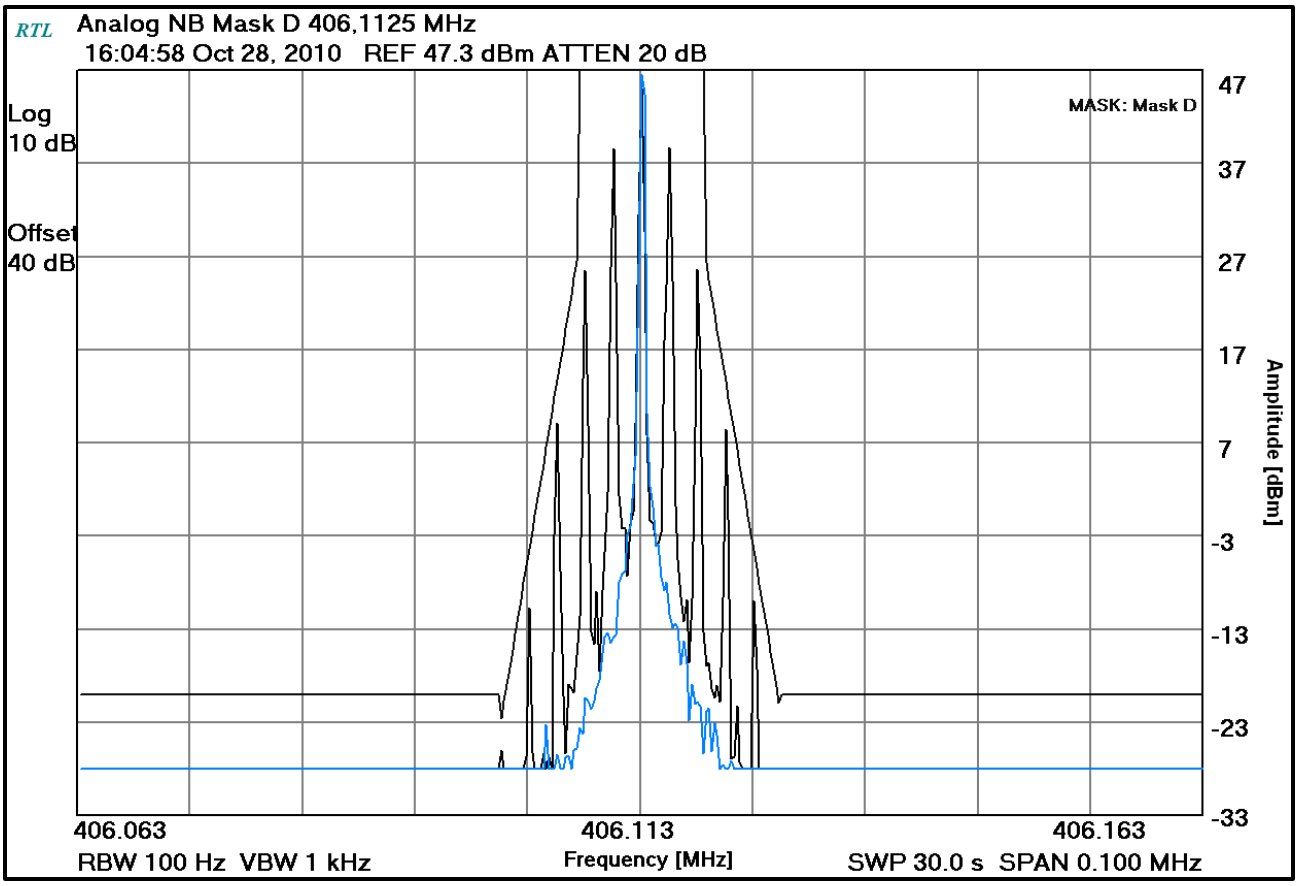
Plot 8-4: Occupied Bandwidth – 429.9875 MHz; Analog WB (Mask B)



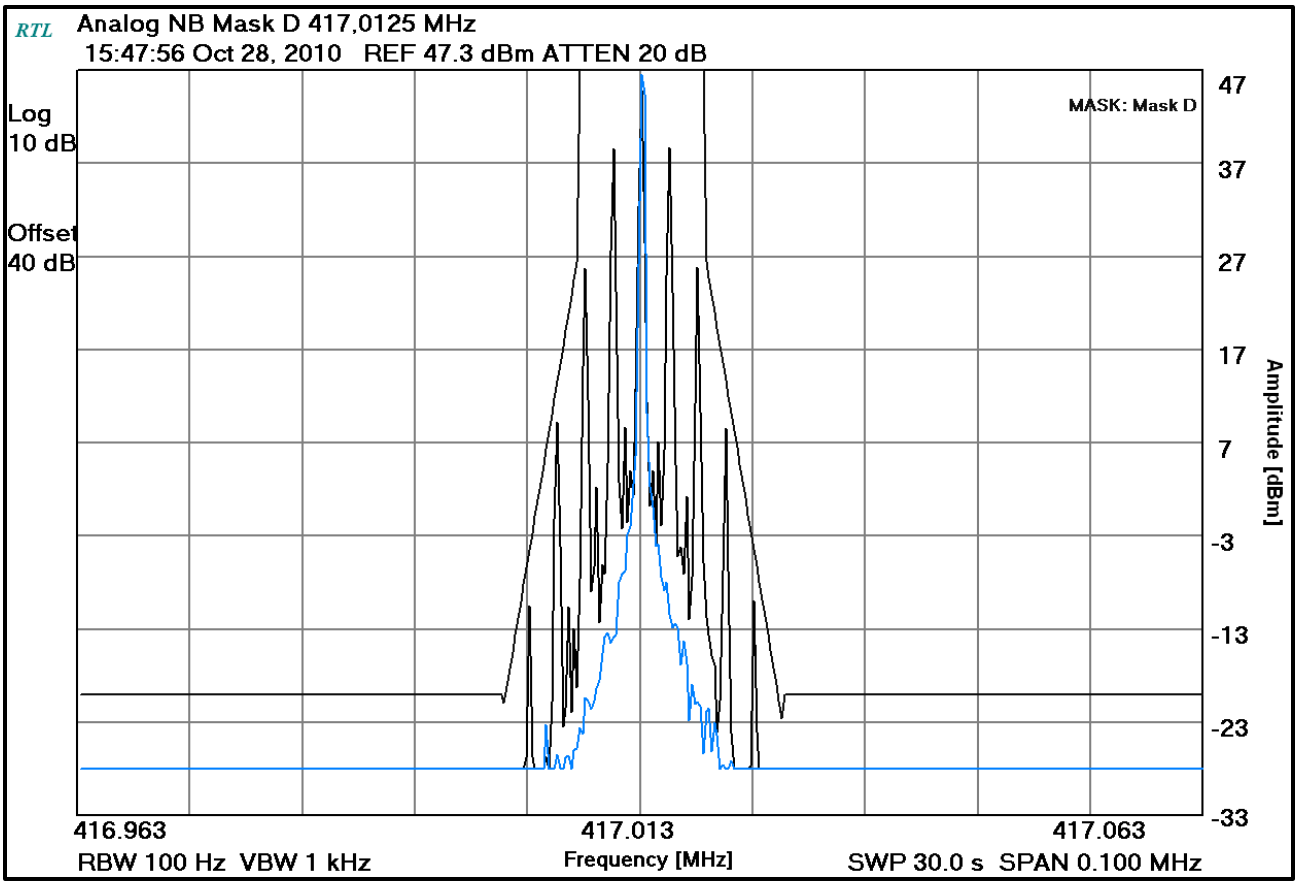
Plot 8-5: Occupied Bandwidth – 378.0125 MHz; Analog NB (Mask D)



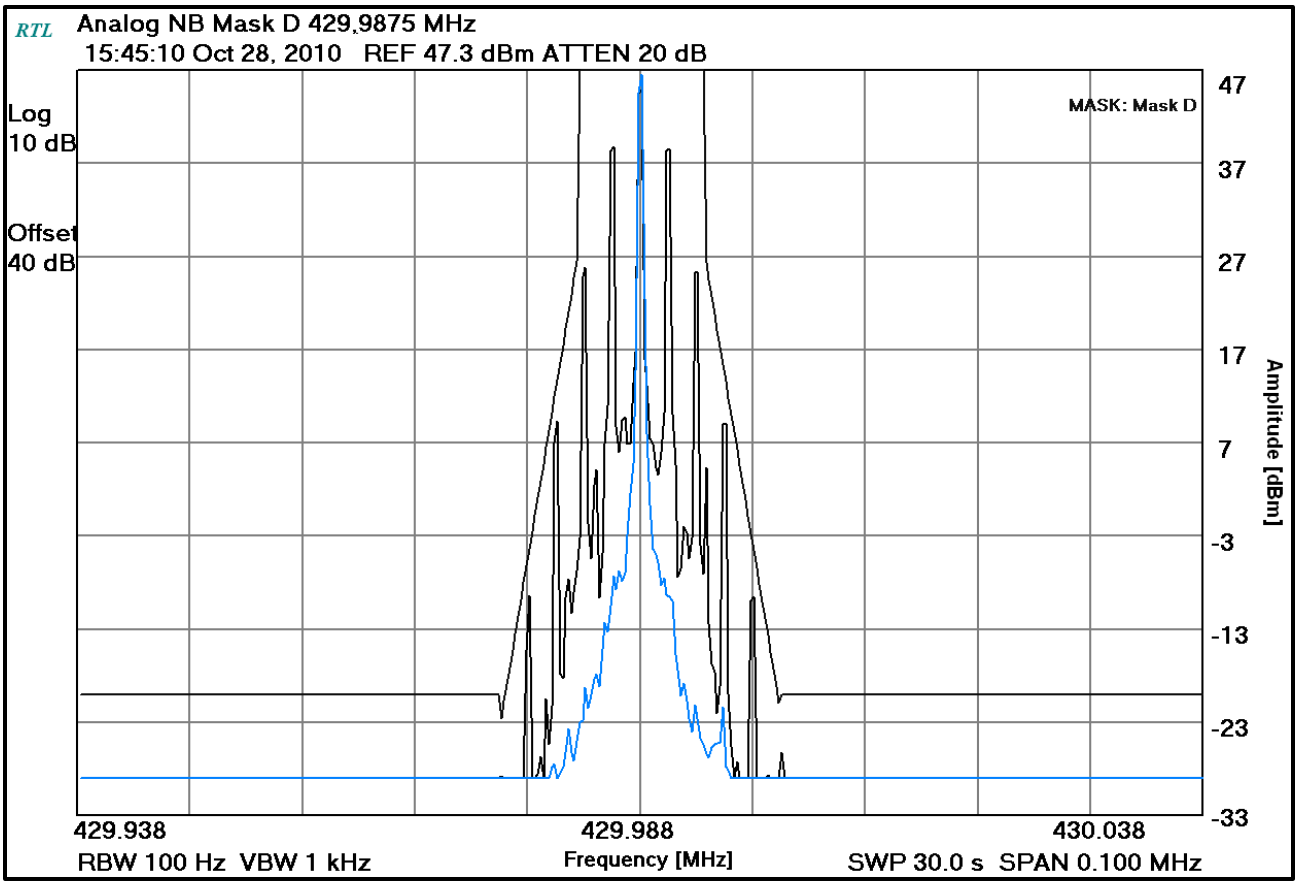
Plot 8-6: Occupied Bandwidth – 406.1125 MHz; Analog NB (Mask D)



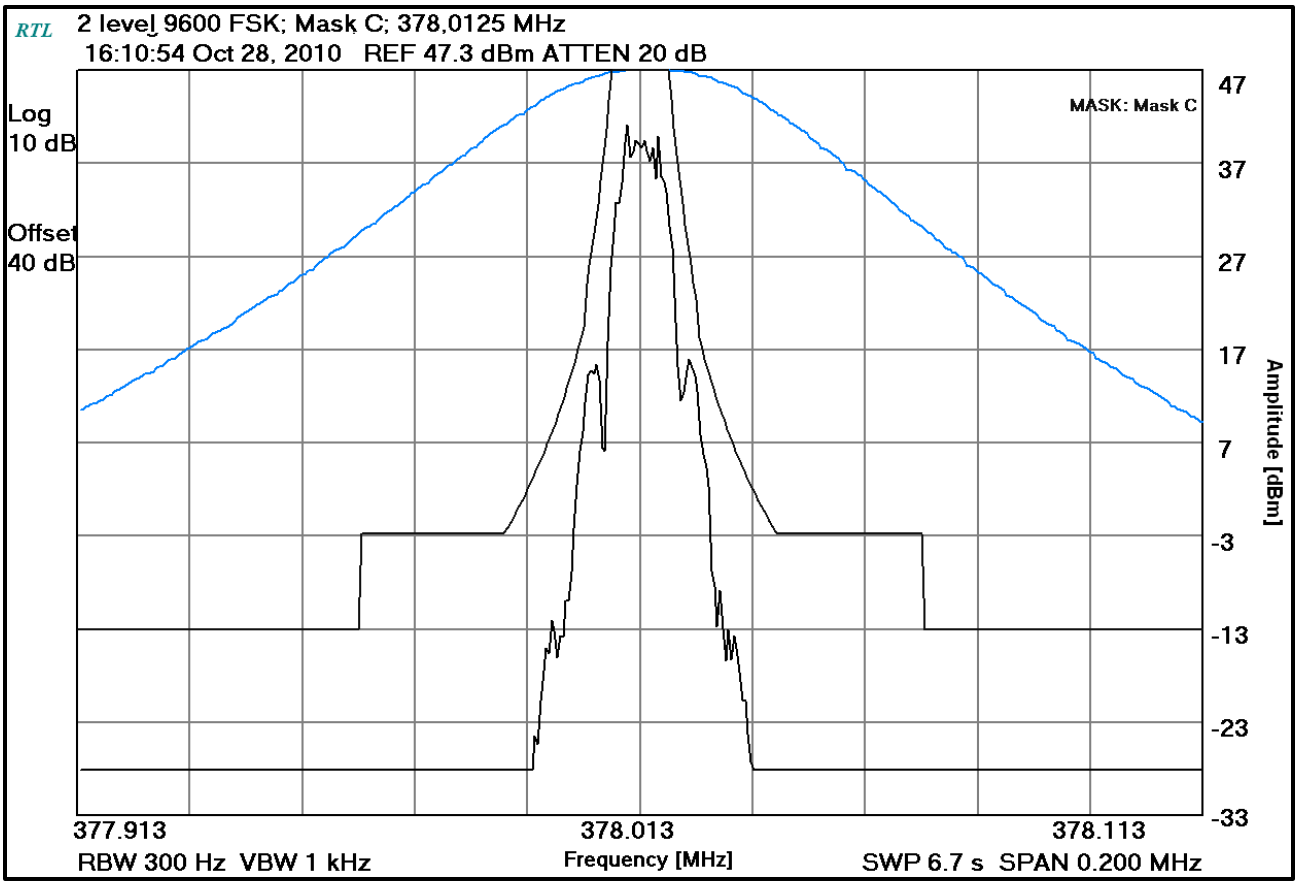
Plot 8-7: Occupied Bandwidth – 417.0125 MHz; Analog NB (Mask D)



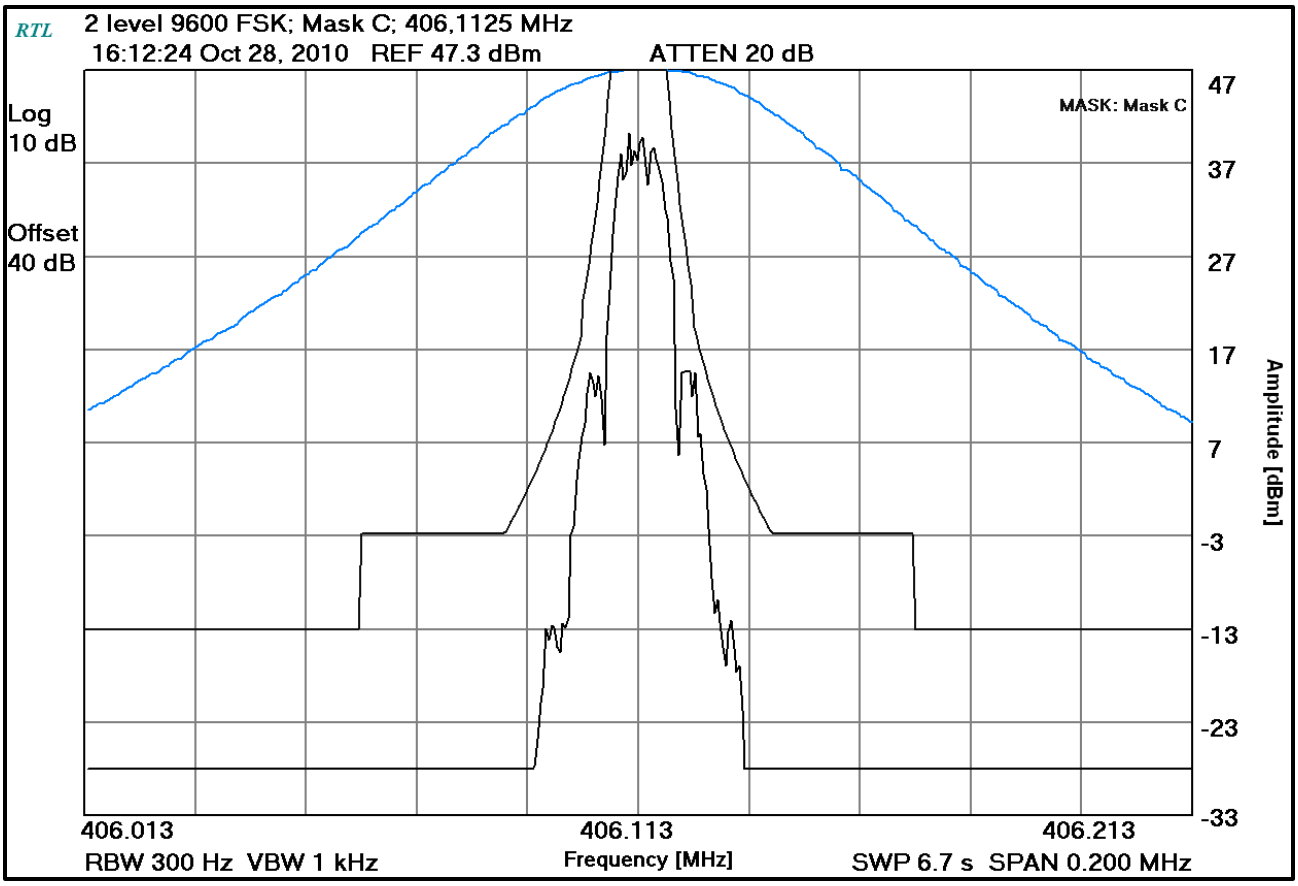
Plot 8-8: Occupied Bandwidth – 429.9875 MHz; Analog NB (Mask D)



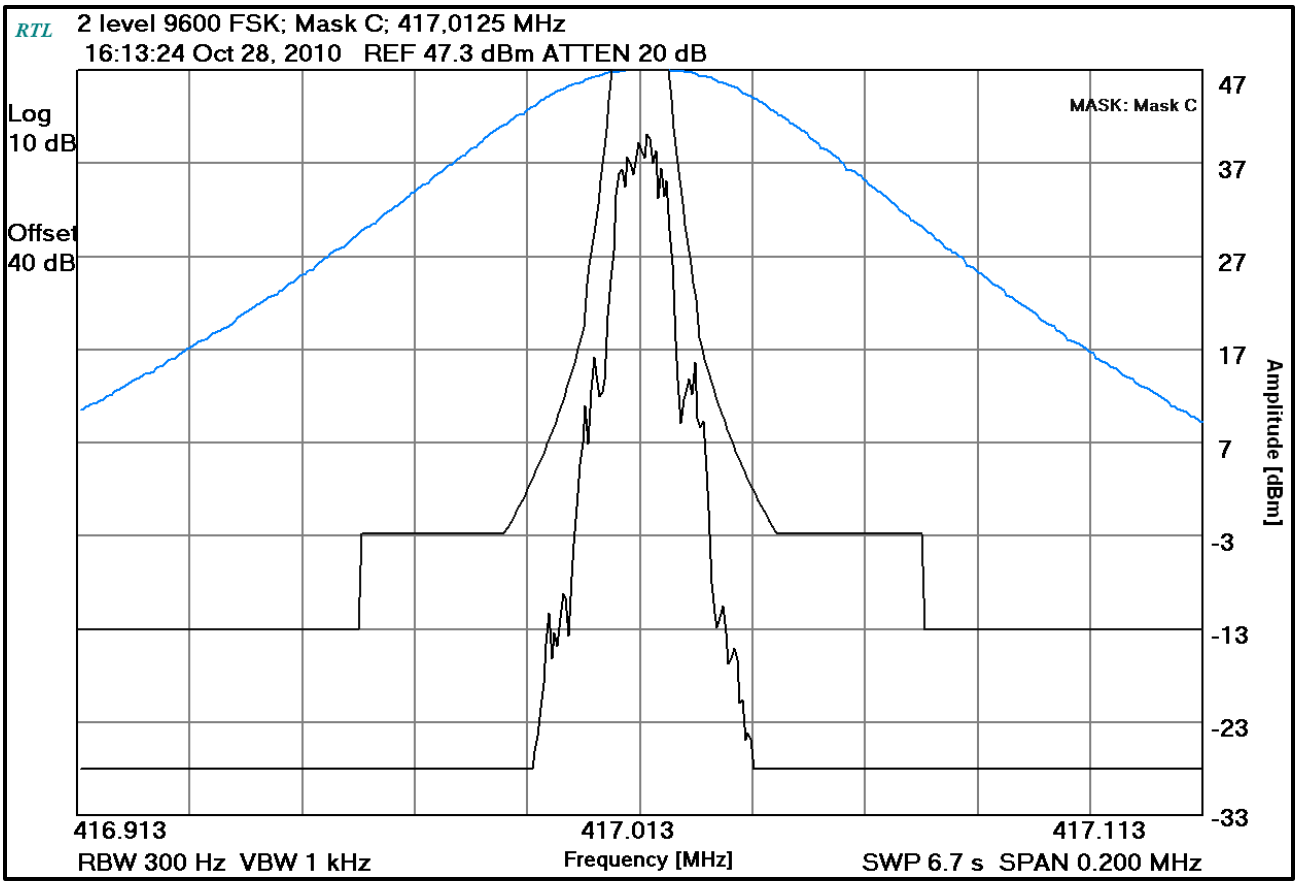
Plot 8-9: Occupied Bandwidth – 378.0125 MHz; 2-Level 9600 FSK WB (Mask C)



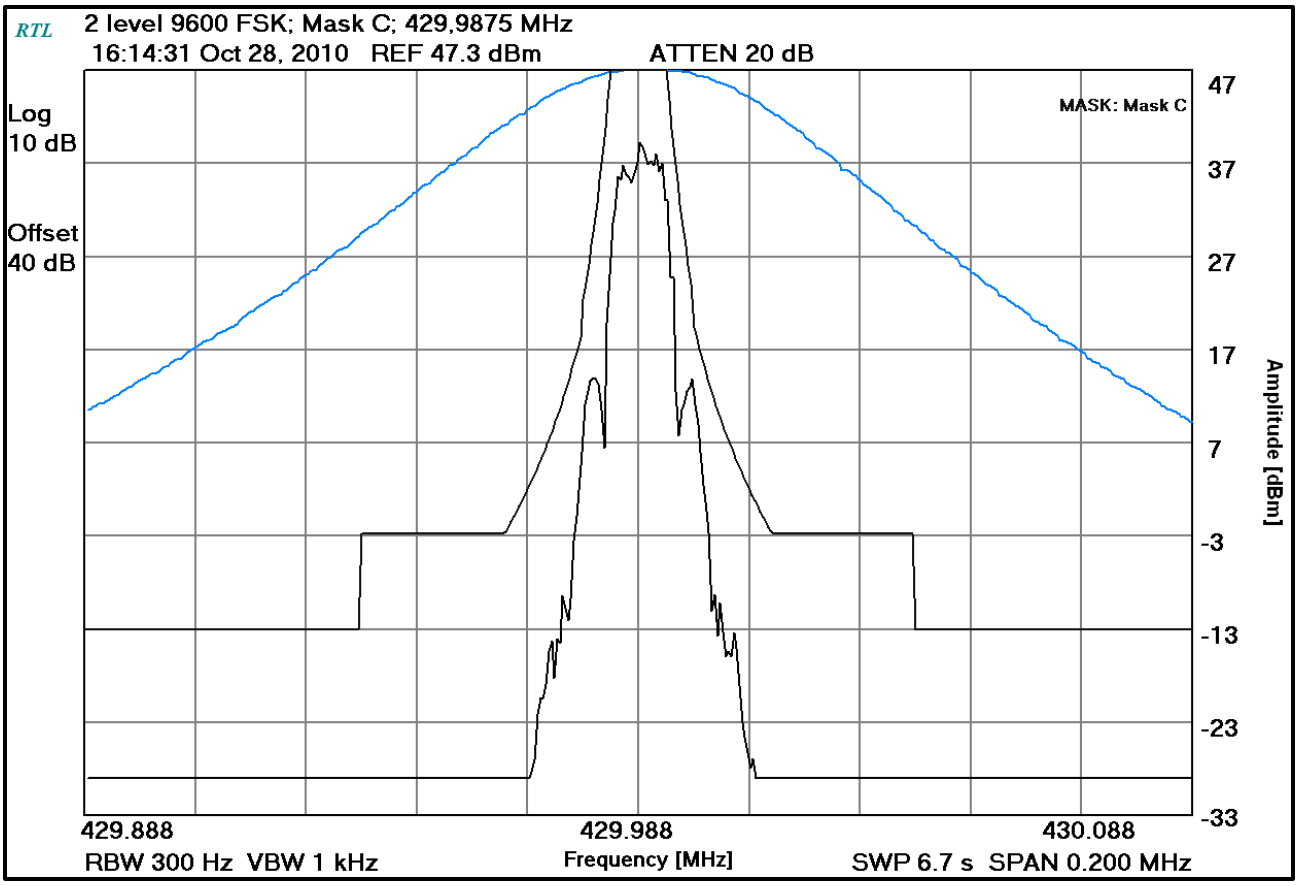
Plot 8-10: Occupied Bandwidth – 406.1125 MHz; 2-Level 9600 FSK WB (Mask C)



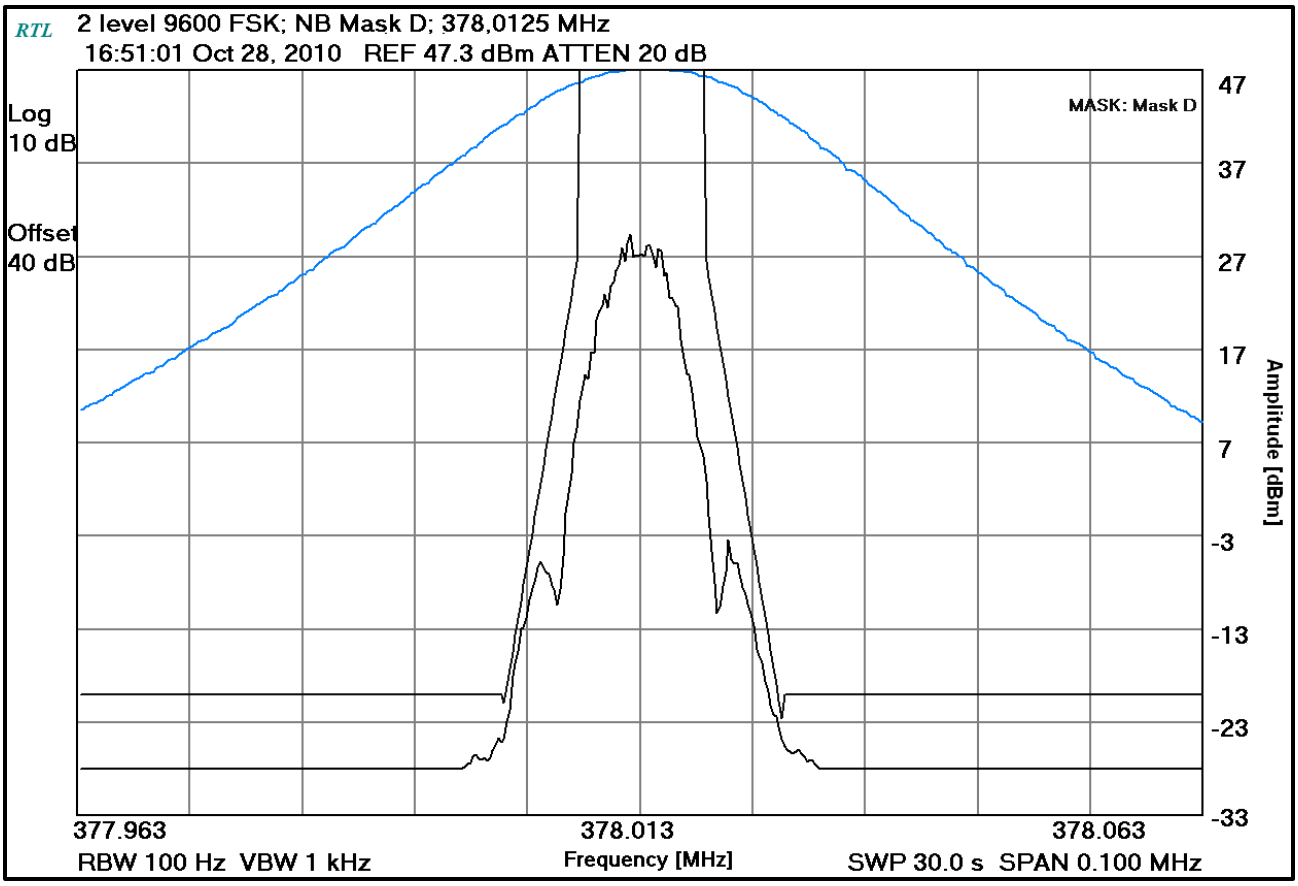
Plot 8-11: Occupied Bandwidth – 417.0125 MHz; 2-Level 9600 FSK WB (Mask C)



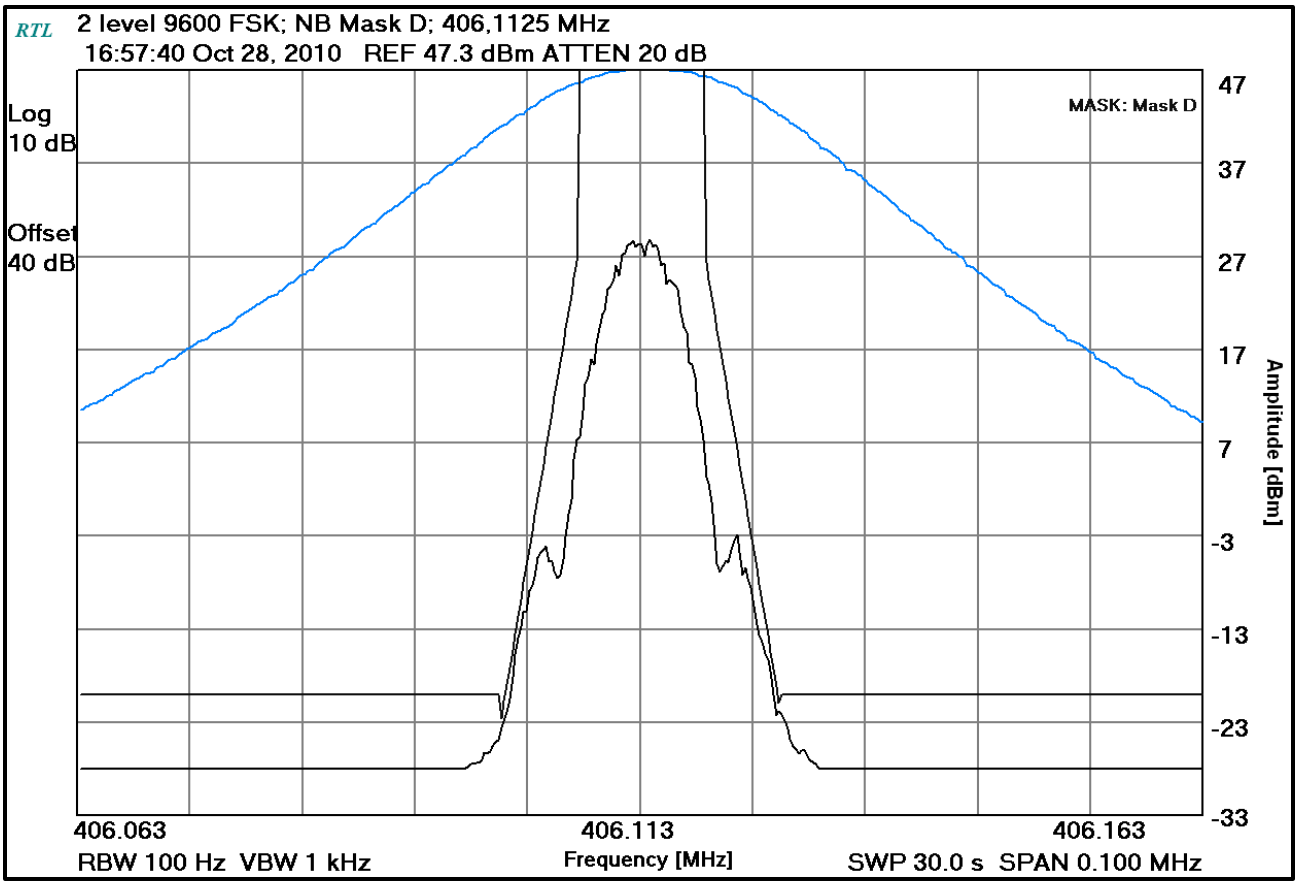
Plot 8-12: Occupied Bandwidth – 429.9875 MHz; 2-Level 9600 FSK WB (Mask C)



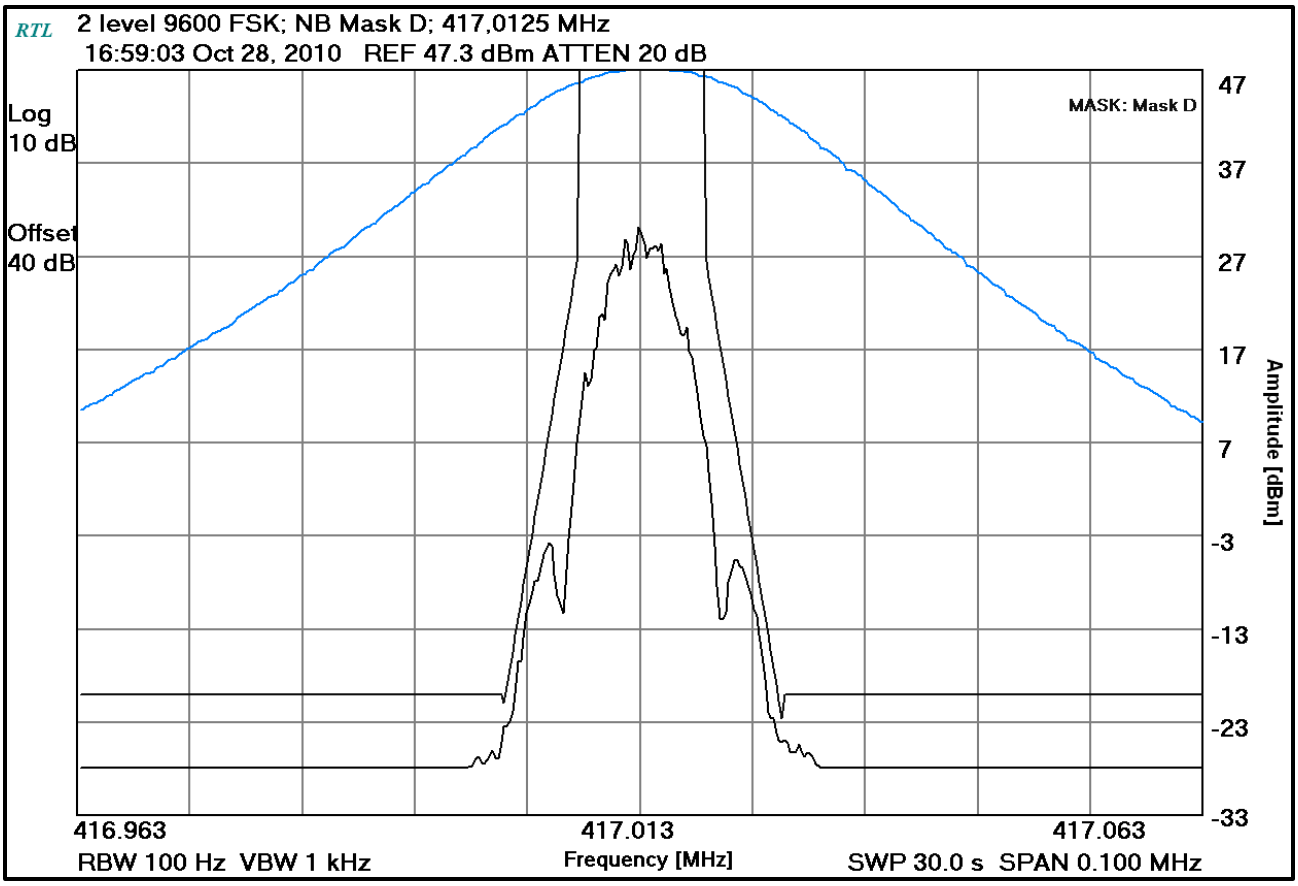
Plot 8-13: Occupied Bandwidth – 378.0125 MHz; 2-Level 9600 FSK NB (Mask D)



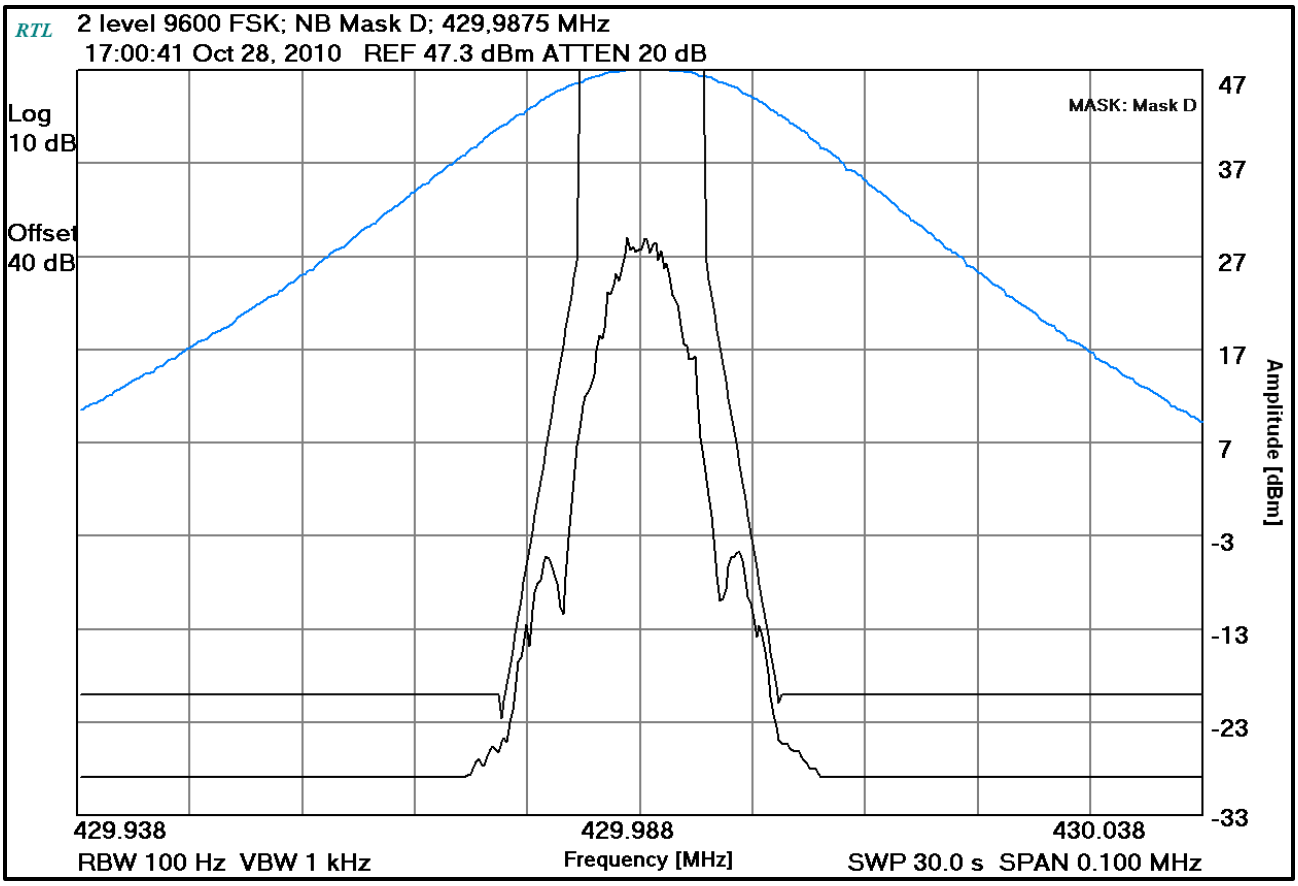
Plot 8-14: Occupied Bandwidth – 406.1125 MHz; 2-Level 9600 FSK NB (Mask D)



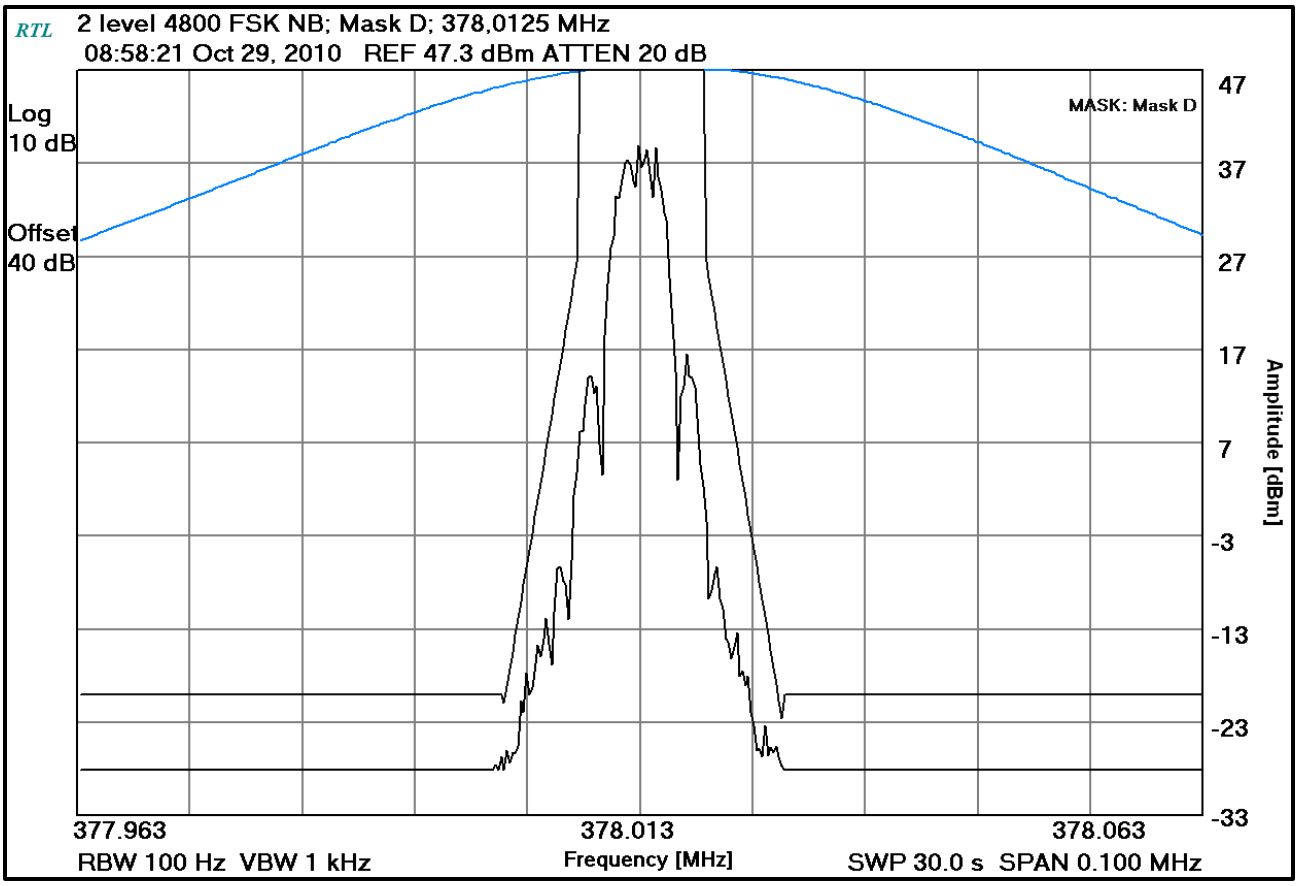
Plot 8-15: Occupied Bandwidth – 417.0125 MHz; 2-Level 9600 FSK NB (Mask D)



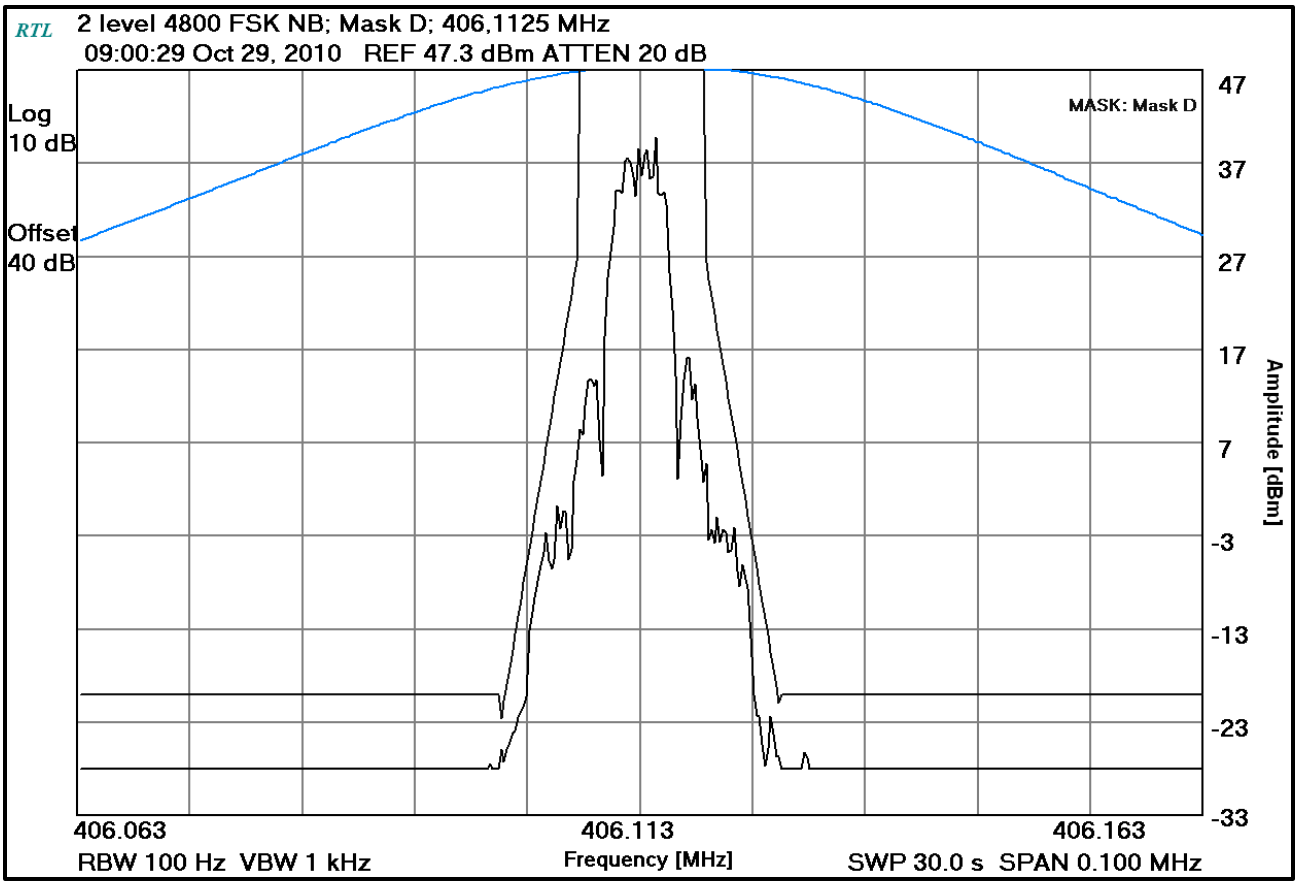
Plot 8-16: Occupied Bandwidth – 429.9875 MHz; 2-Level 9600 FSK NB (Mask D)



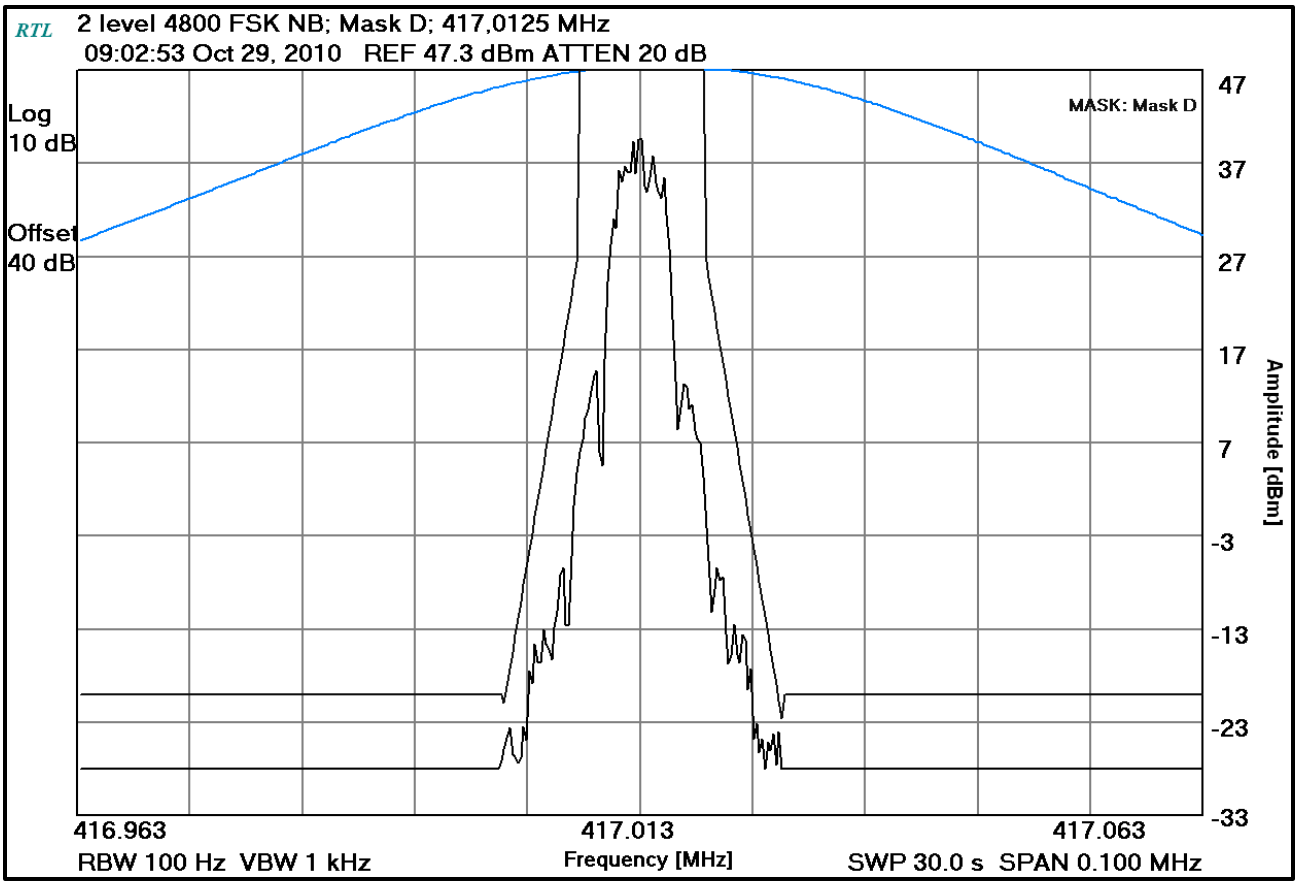
Plot 8-17: Occupied Bandwidth – 378.0125 MHz; 2-Level 4800 FSK; (Mask D)



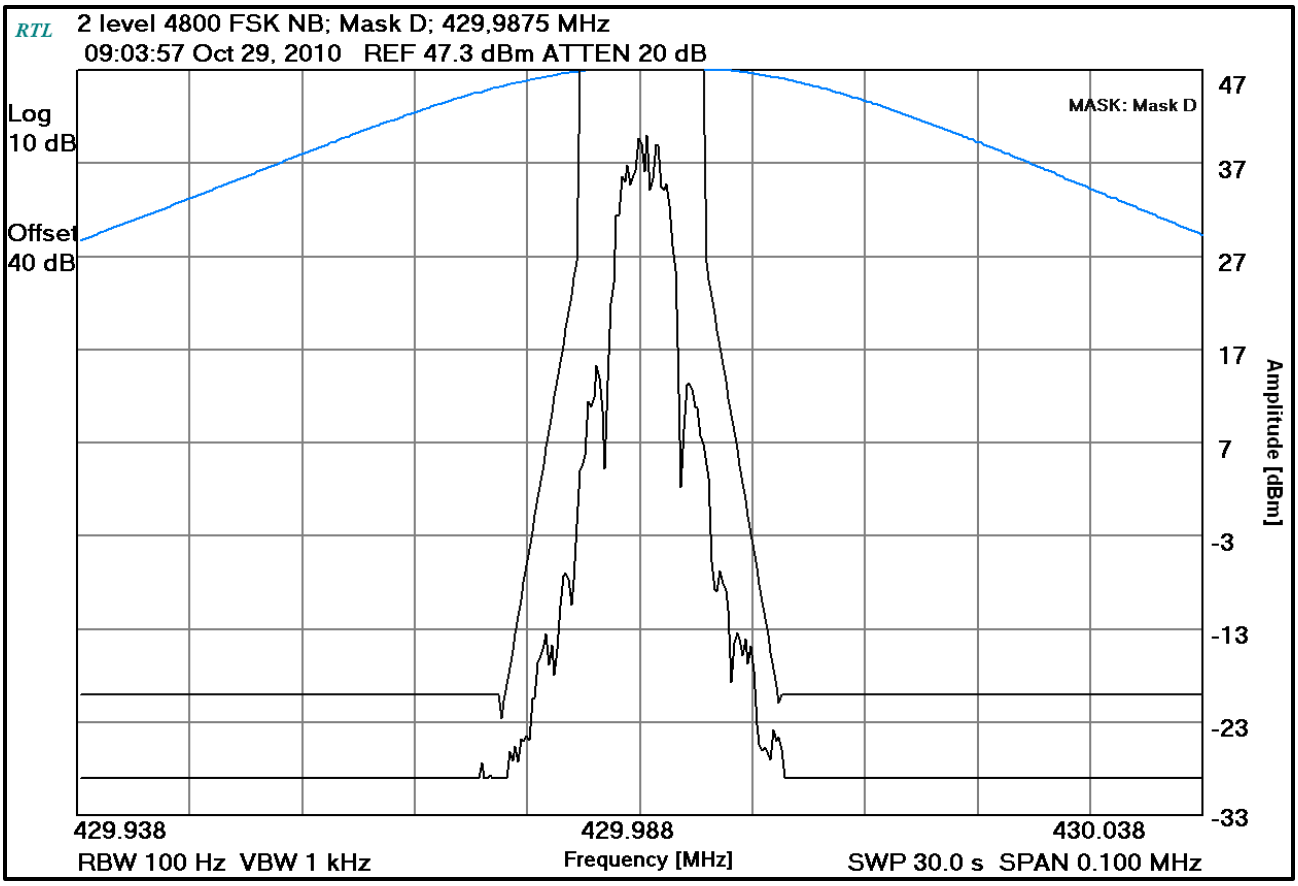
Plot 8-18: Occupied Bandwidth – 406.1125 MHz; 2-Level 4800 FSK; (Mask D)



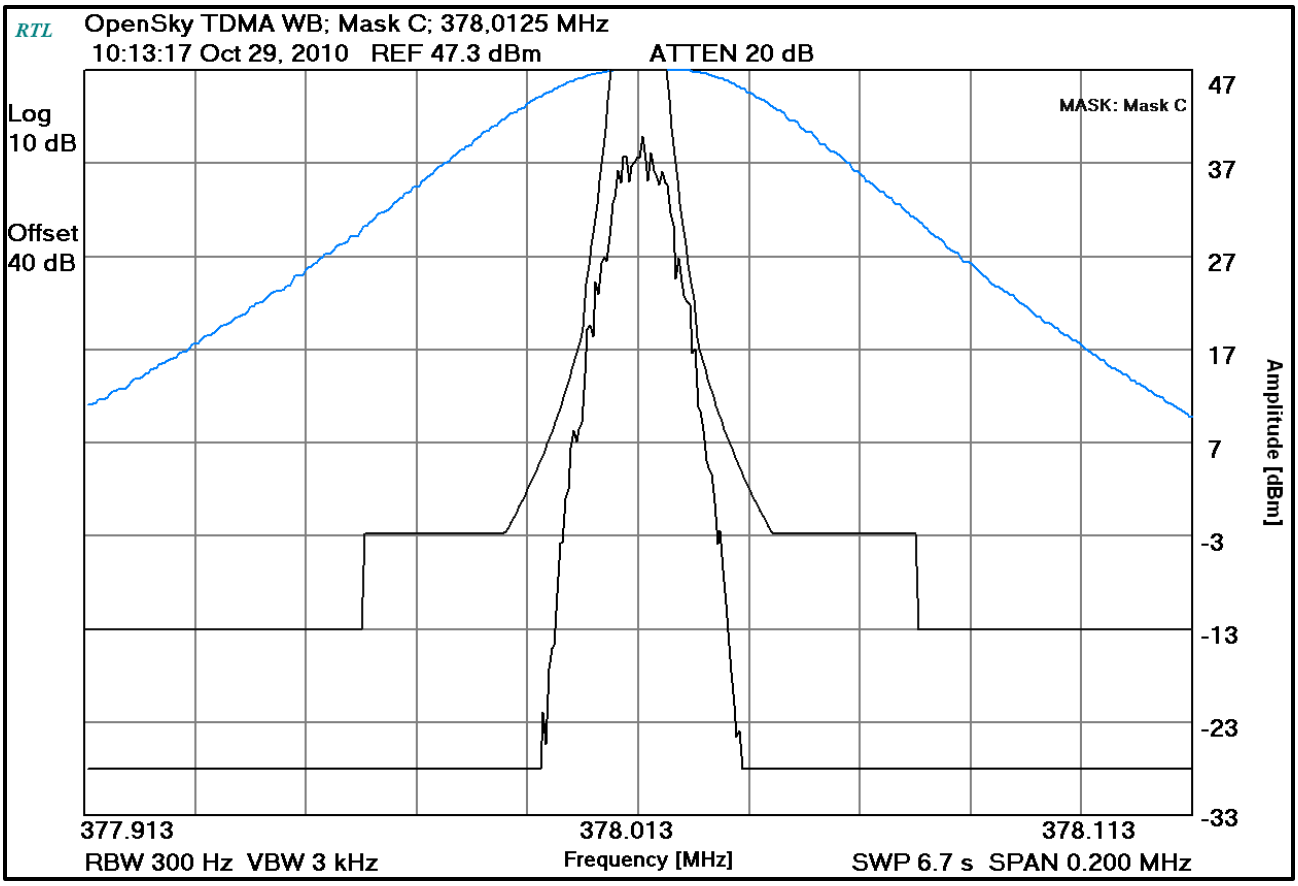
Plot 8-19: Occupied Bandwidth – 417.0125 MHz; 2-Level 4800 FSK; (Mask D)



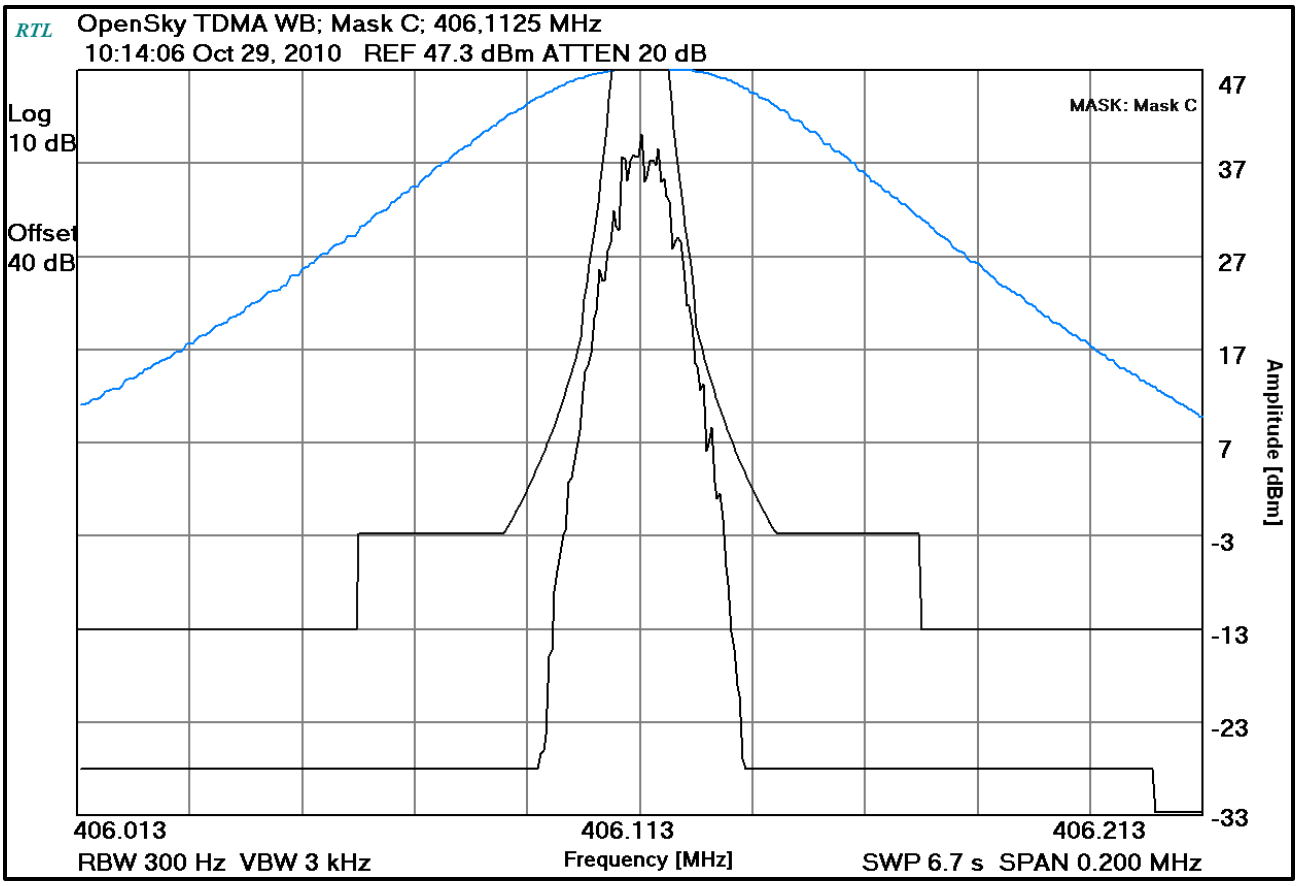
Plot 8-20: Occupied Bandwidth – 429.9875 MHz; 2-Level 4800 FSK; (Mask D)



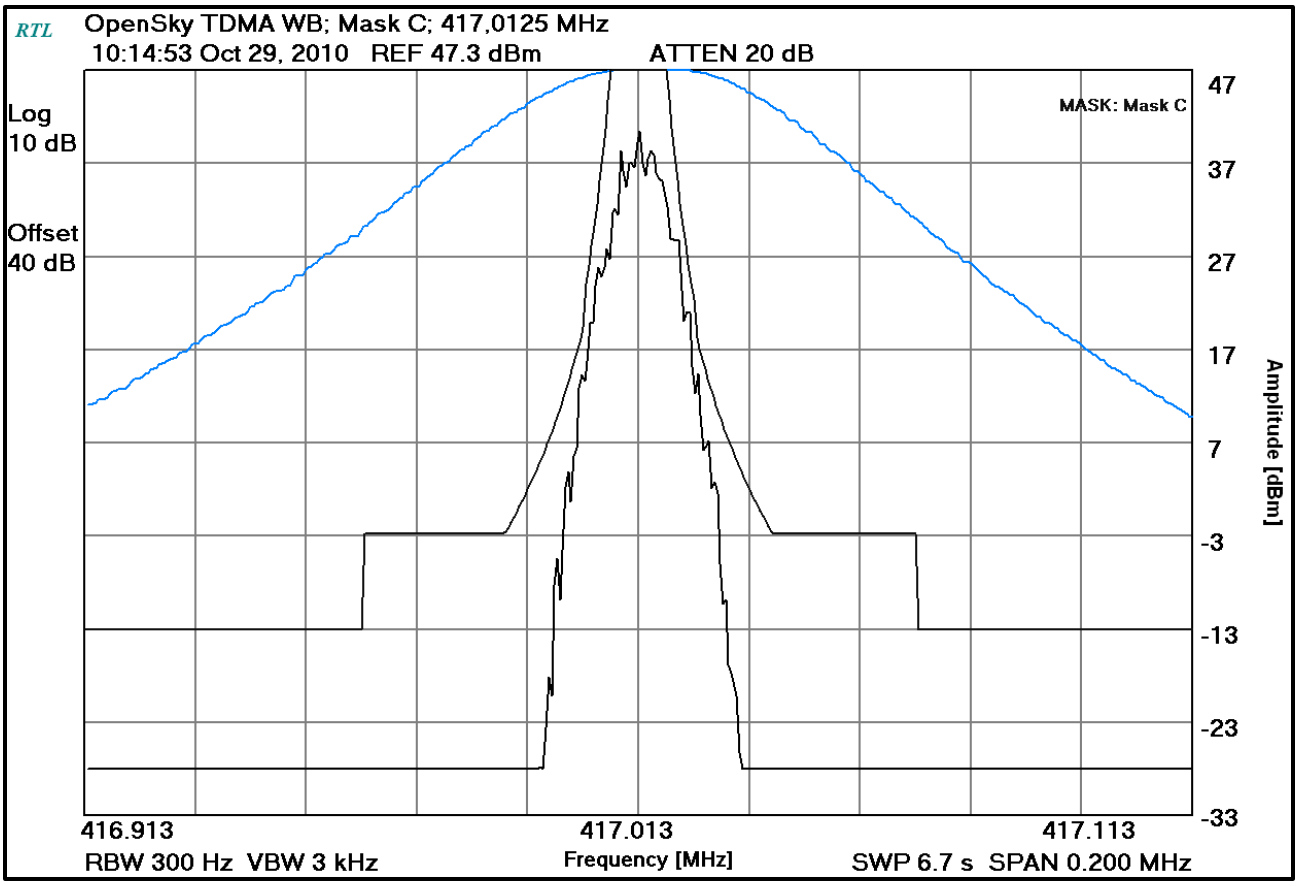
Plot 8-21: Occupied Bandwidth – 378.0125 MHz; TDMA WB; (Mask C)



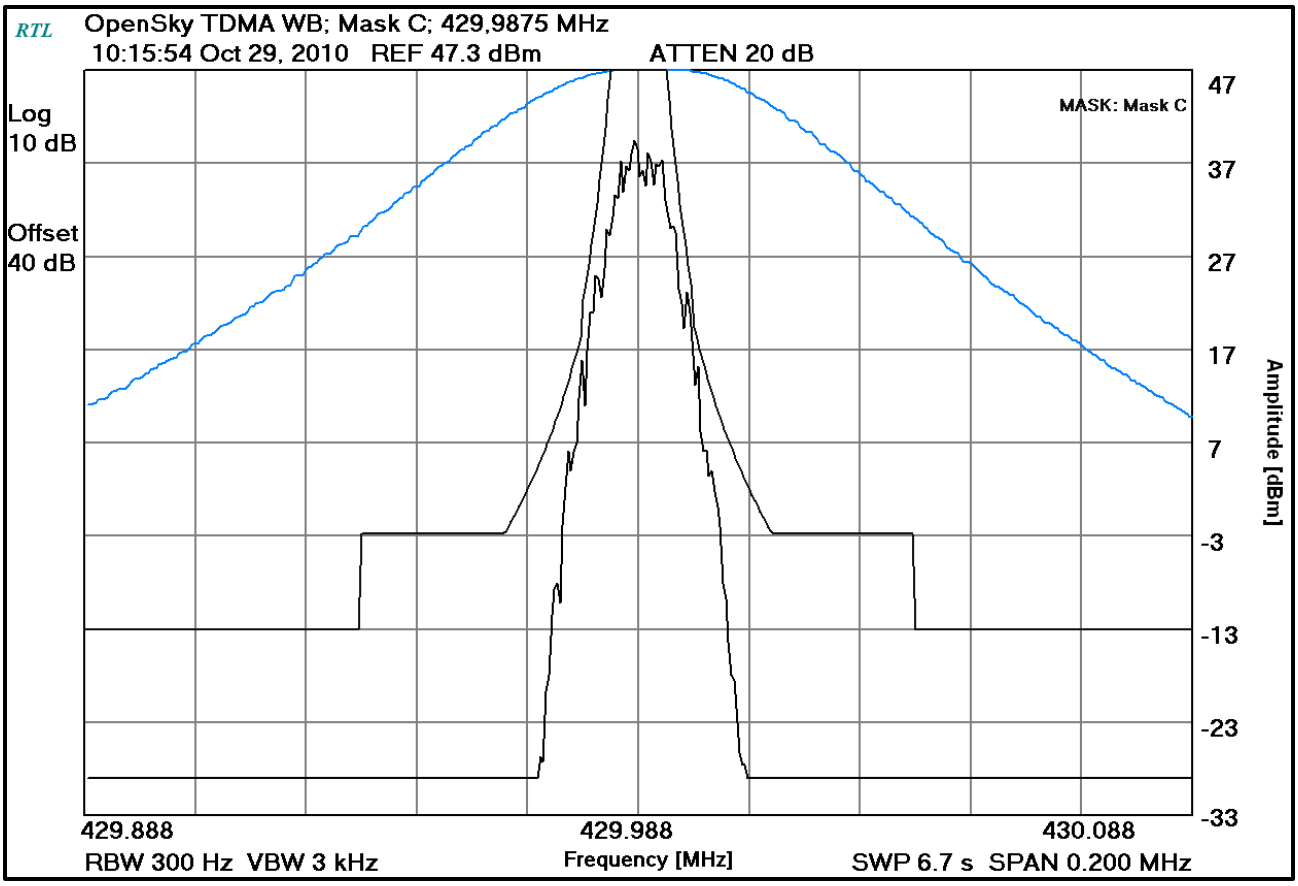
Plot 8-22: Occupied Bandwidth – 406.1125 MHz; TDMA WB; (Mask C)



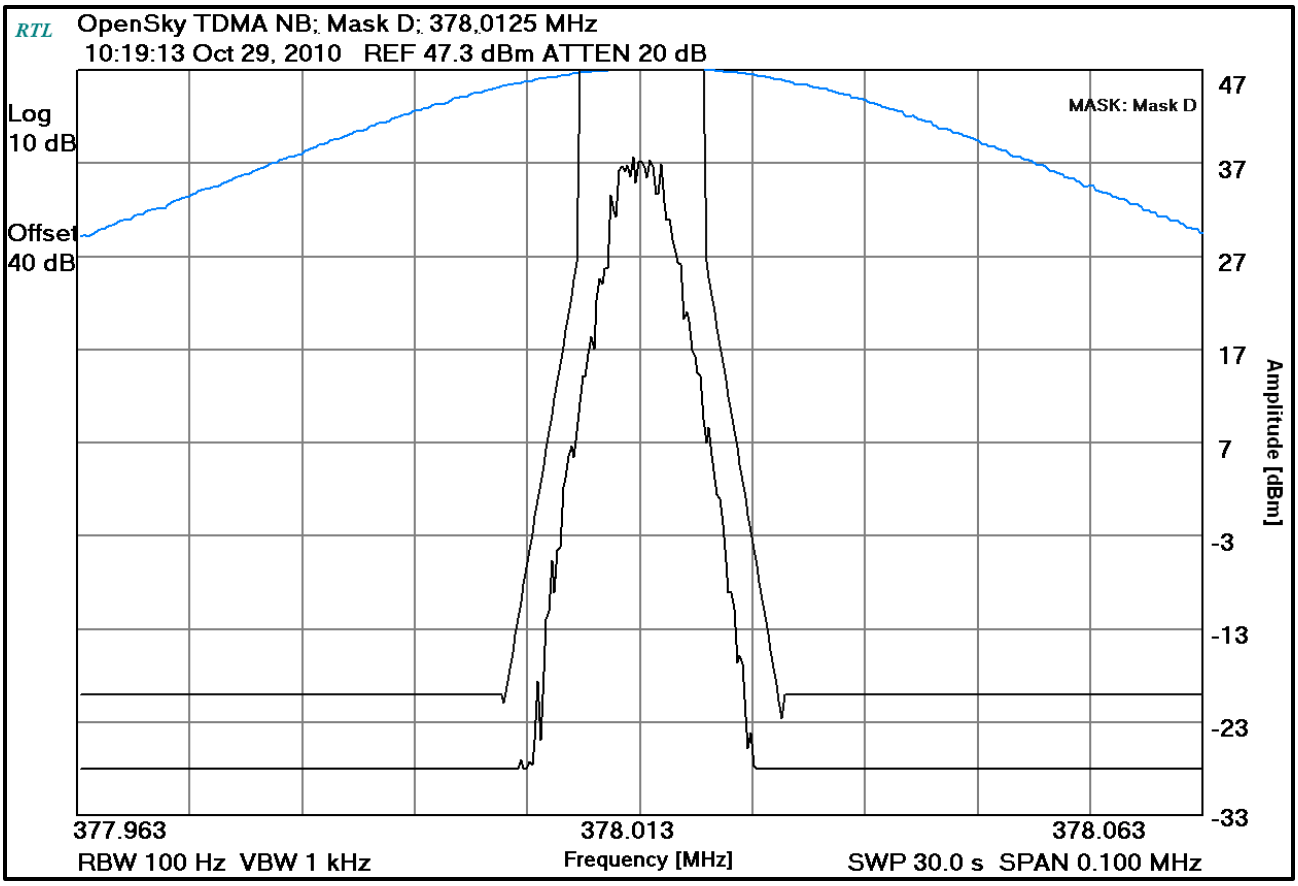
Plot 8-23: Occupied Bandwidth – 417.0125 MHz; TDMA WB; (Mask C)



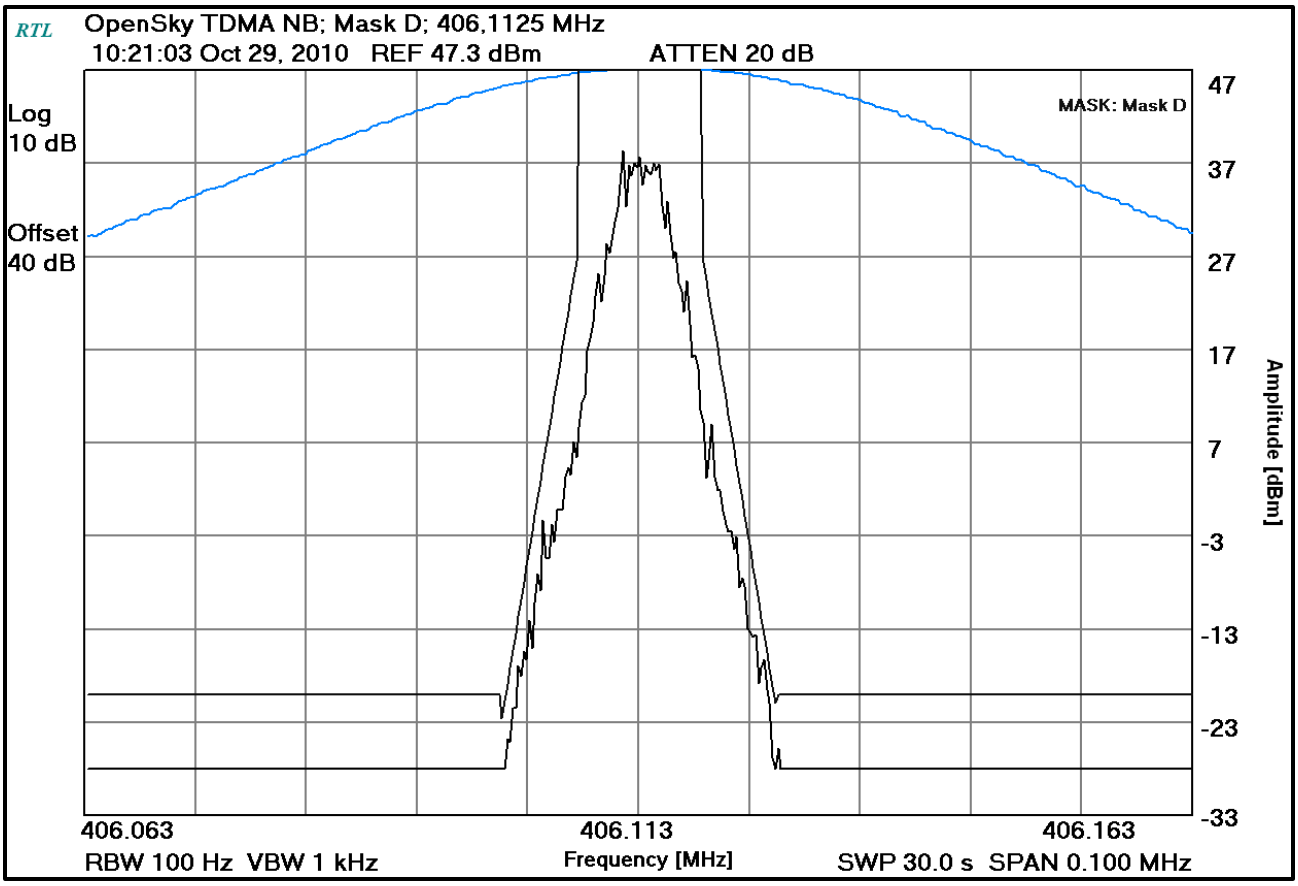
Plot 8-24: Occupied Bandwidth – 429.9875 MHz; TDMA WB; (Mask C)



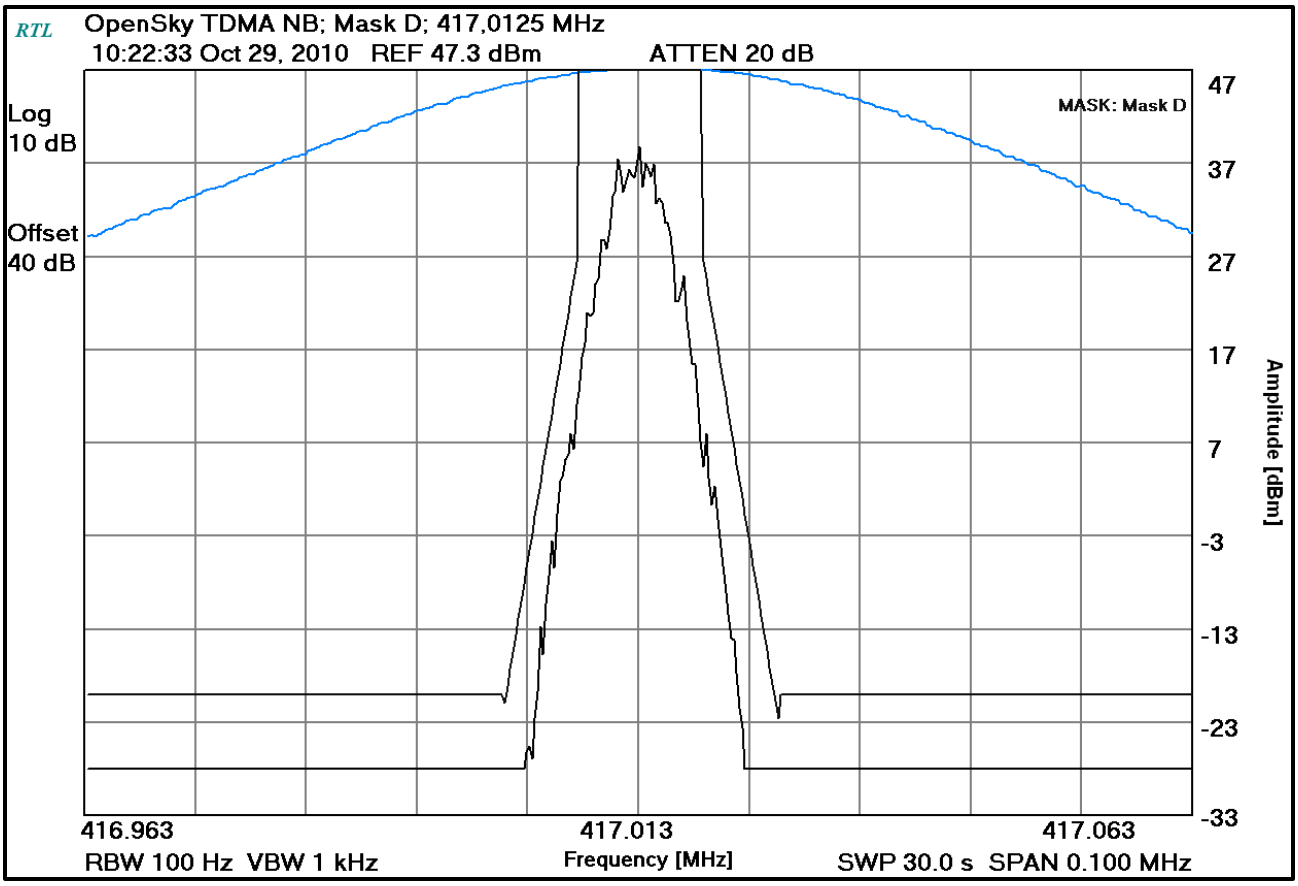
Plot 8-25: Occupied Bandwidth – 378.0125 MHz; TDMA NB; (Mask D)



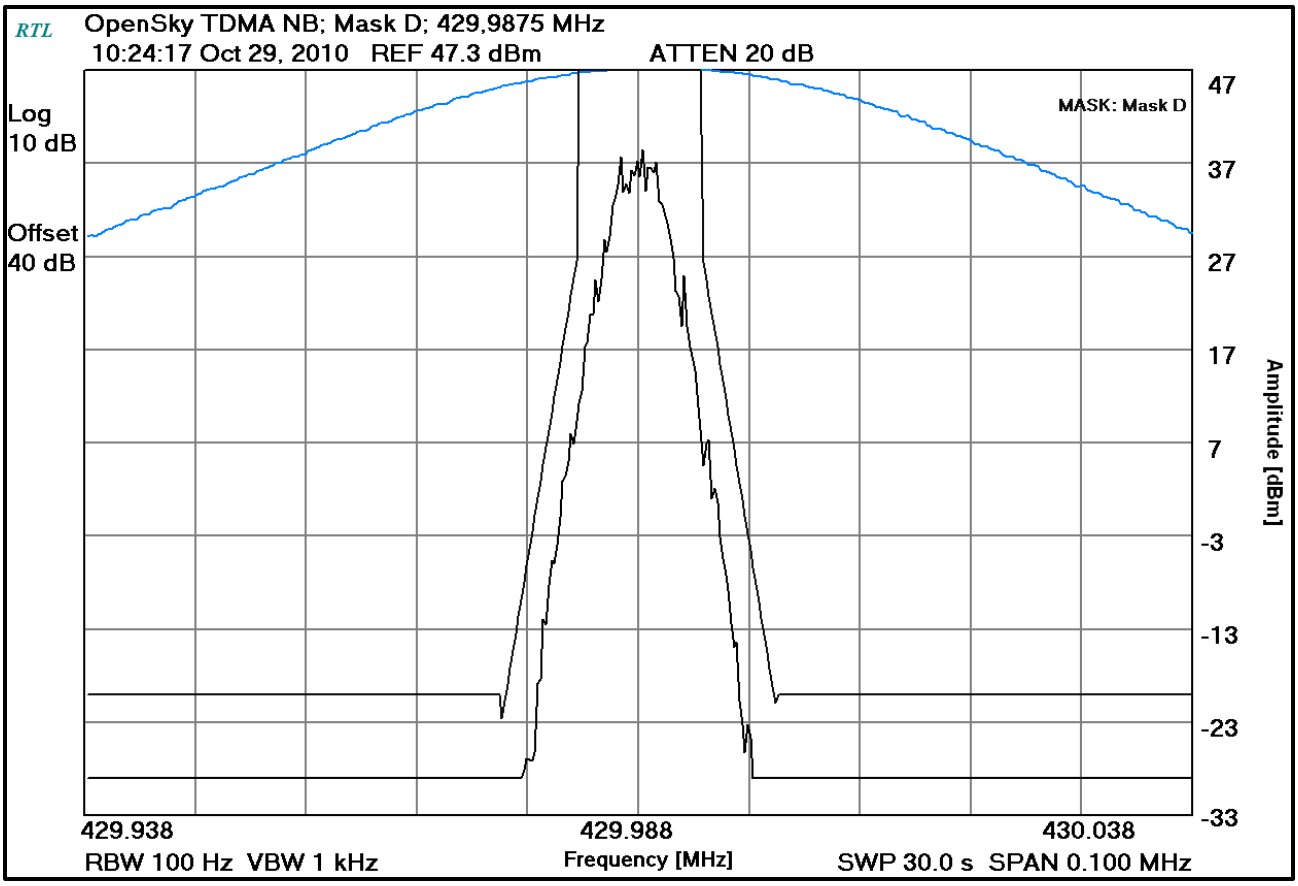
Plot 8-26: Occupied Bandwidth – 406.1125 MHz; TDMA NB; (Mask D)



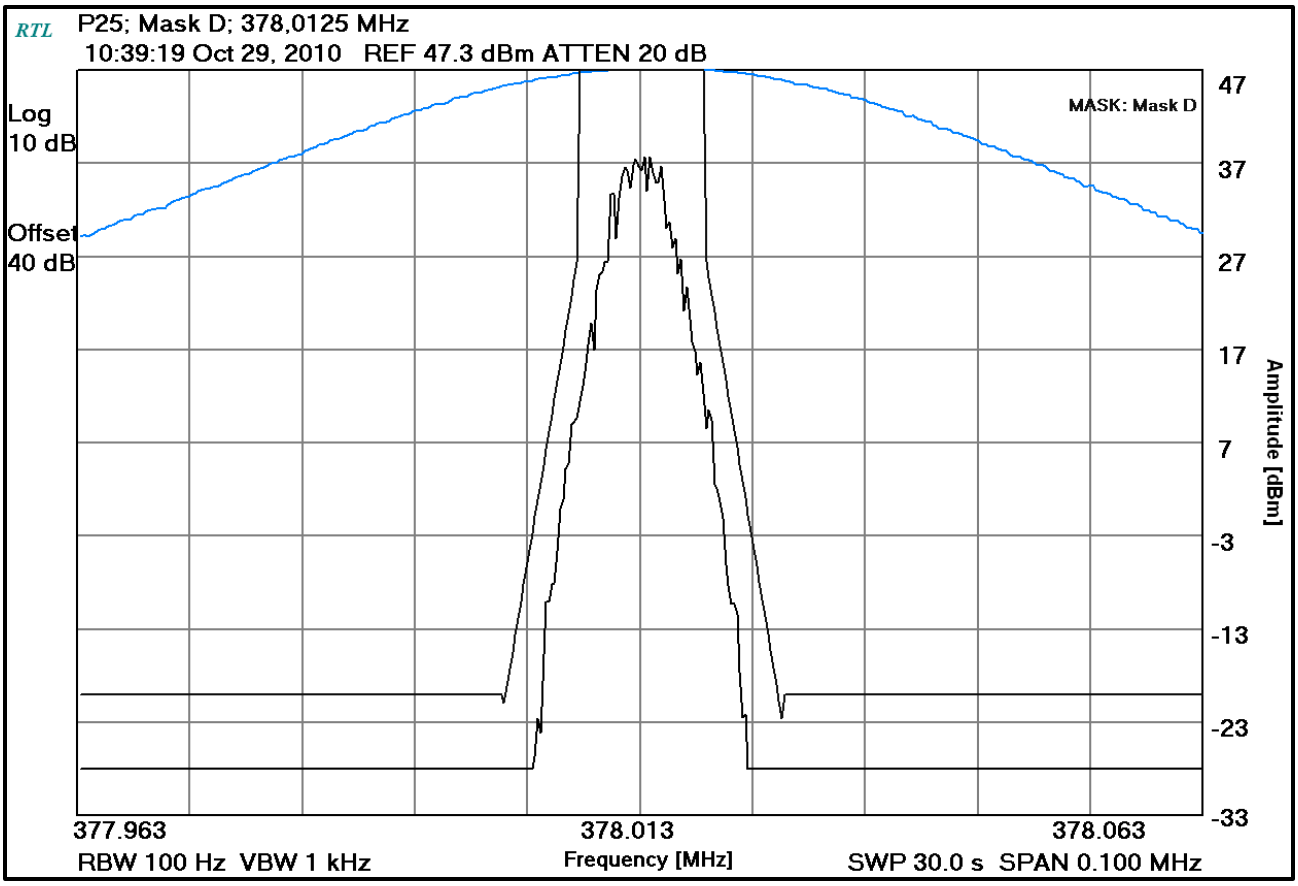
Plot 8-27: Occupied Bandwidth – 417.0125 MHz; TDMA NB; (Mask D)



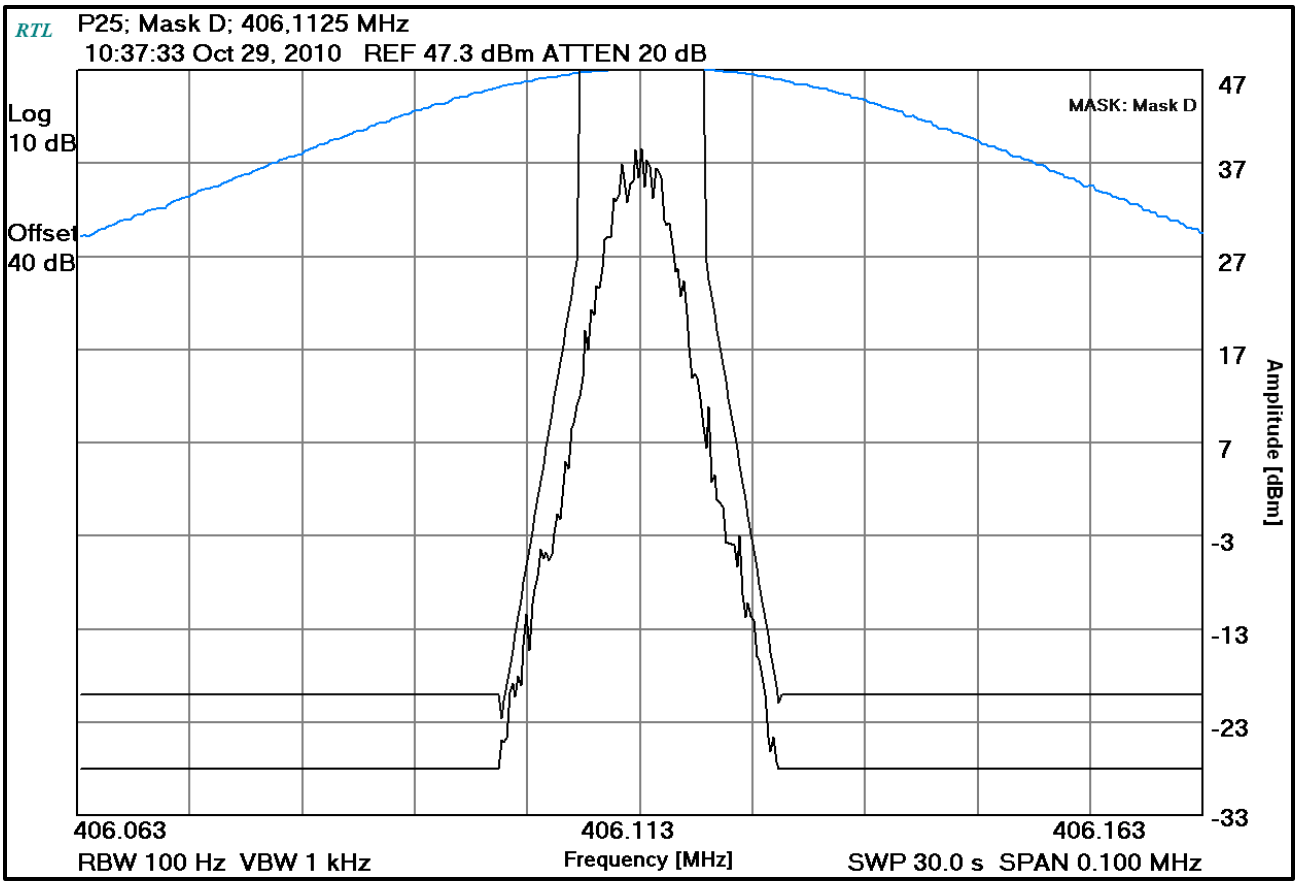
Plot 8-28: Occupied Bandwidth – 429.9875 MHz; TDMA NB; (Mask D)



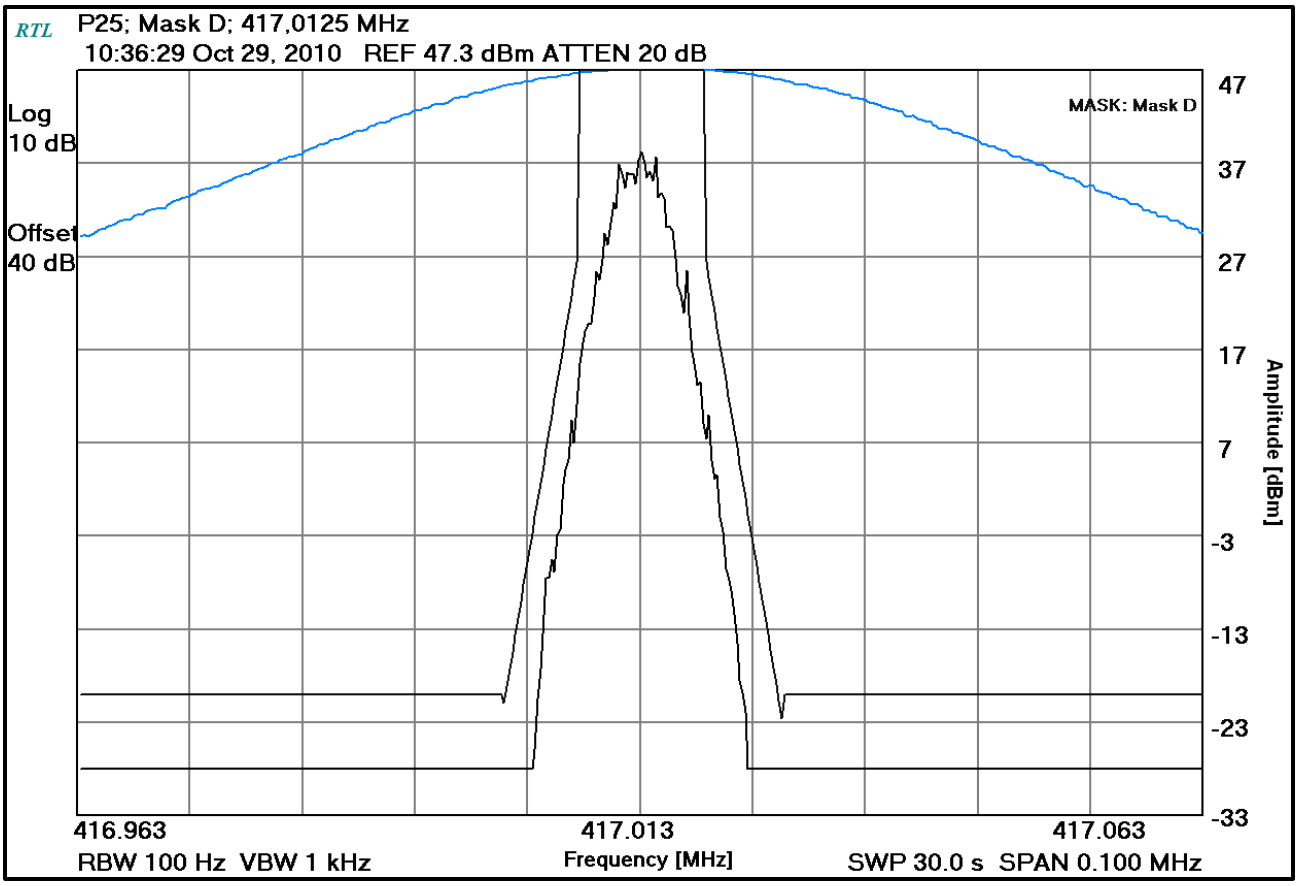
Plot 8-29: Occupied Bandwidth – 378.0125 MHz; P25; (Mask D)



Plot 8-30: Occupied Bandwidth – 406.1125 MHz; P25; (Mask D)



Plot 8-31: Occupied Bandwidth – 417.0125 MHz; P25; (Mask D)



Plot 8-32: Occupied Bandwidth – 429.9875 MHz; P25; (Mask D)

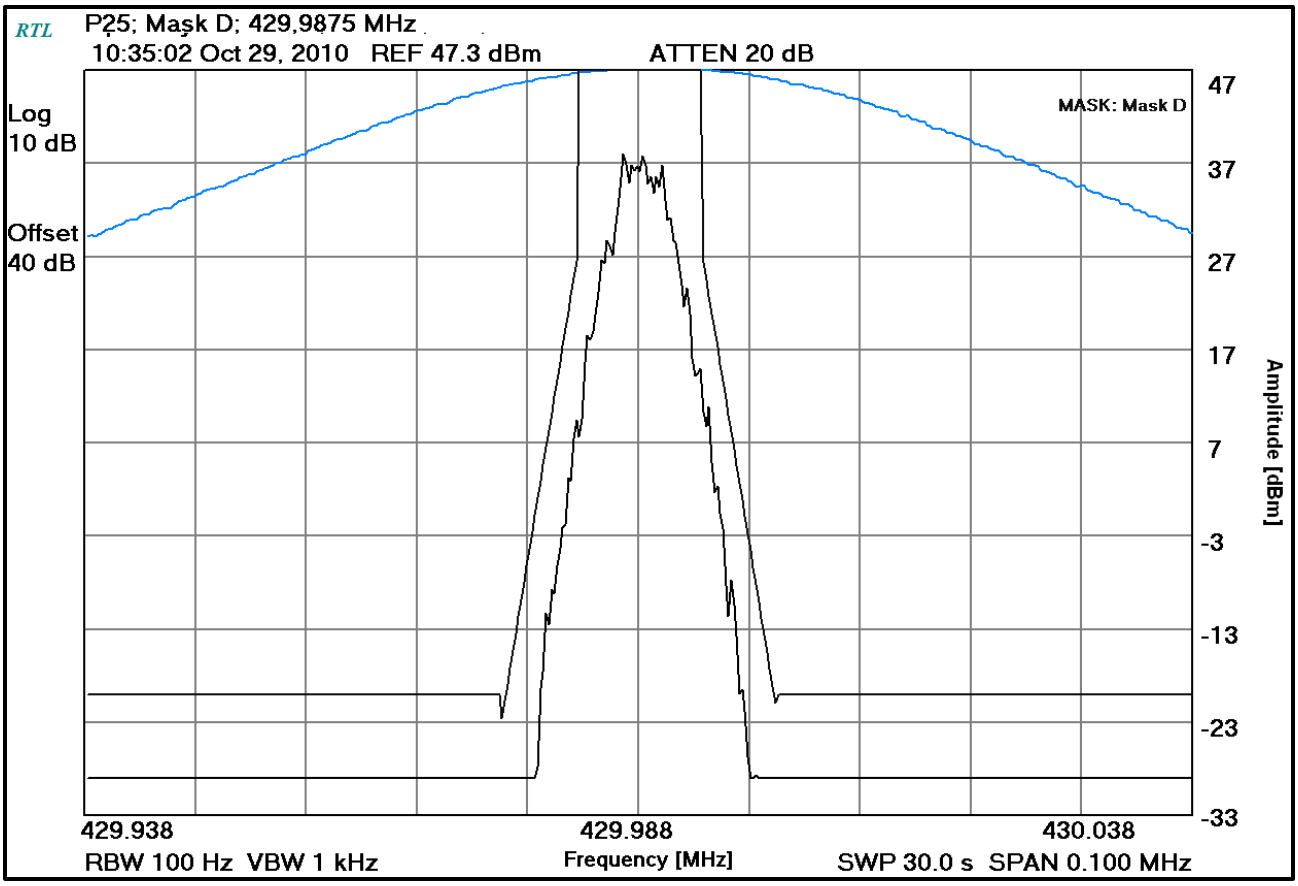


Table 8-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	11/23/10
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/11

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	October 28-29, 2010
Test Engineer	Signature	Dates Of Test

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

9.1 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: 20 kHz Authorized Bandwidth (ABW) or 25 kHz Channel Bandwidth (CBW) = 5ppm; 11.25 kHz ABW or 12.5 kHz CBW = 2.5 ppm; and 6.25 kHz ABW or CBW = 1 ppm for mobile > 2W

9.2 Test Data

Table 9-1: Temperature Frequency Stability – 378.0125 MHz

Temperature (°C)	Normalized Frequency (Hz)	ppm
-30	378.012664	-0.43
-20	378.012669	-0.45
-10	378.012663	-0.43
0	378.012605	-0.28
10	378.012576	-0.20
20	378.012500	0.00
30	378.012539	-0.10
40	378.012526	-0.07
50	378.012510	-0.03
60	378.012489	0.03

Table 9-2: Voltage Frequency Stability – 378.0125 MHz

Voltage (VDC)	Normalized Frequency (MHz)	ppm
11.73	378.012554	-0.14
13.80	378.012500	0.00
15.87	378.012543	-0.11

Table 9-3: Temperature Frequency Stability – 406.1125 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	406.112619	-0.29
-20	406.112625	-0.31
-10	406.112617	-0.29
0	406.112551	-0.13
10	406.112521	-0.05
20	406.112500	0.00
30	406.112476	0.06
40	406.112467	0.08
50	406.112448	0.13
60	406.112434	0.16

Table 9-4: Voltage Frequency Stability – 406.1125 MHz

Voltage (VDC)	Normalized Frequency (MHz)	ppm
11.73	406.112496	0.01
13.80	406.112500	0.00
15.87	406.112486	0.03

Table 9-5: Temperature Frequency Stability – 417.0125 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	417.012618	-0.28
-20	417.012623	-0.29
-10	417.012614	-0.27
0	417.012552	-0.12
10	417.012522	-0.05
20	417.012500	0.00
30	417.012473	0.06
40	417.012466	0.08
50	417.012445	0.13
60	417.012432	0.16

Table 9-6: Voltage Frequency Stability – 417.0125 MHz

Voltage (VDC)	Normalized Frequency (MHz)	ppm
11.73	417.012496	0.01
13.80	417.012500	0.00
15.87	417.012486	0.03

Table 9-7: Temperature Frequency Stability – 429.9875 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	429.987622	-0.28
-20	429.987628	-0.30
-10	429.987616	-0.27
0	429.987552	-0.12
10	429.987523	-0.05
20	429.987500	0.00
30	429.987472	0.07
40	429.987466	0.08
50	429.987442	0.13
60	429.987431	0.16

Table 9-8: Voltage Frequency Stability – 429.9875 MHz

Voltage (VDC)	Normalized Frequency (MHz)	ppm
11.73	429.987496	0.01
13.80	429.987500	0.00
15.87	429.987487	0.03

The worst-case deviation was found to be 0.6 ppm.

Result: The EUT is compliant.

Table 9-9: 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	7/23/11
901300	Agilent Technologies	53131A	Frequency Counter	MY40001345	7/29/11
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/11
901350	Meterman	33XR	Multimeter	040402802	11/23/10

Test Personnel:

Daniel Baltzell		October 27, 2010
EMC Test Engineer	Signature	Date Of Test

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

10.1 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)

10.2 Test Data

Plot 10-1: Modulation Characteristics - Audio Frequency Response

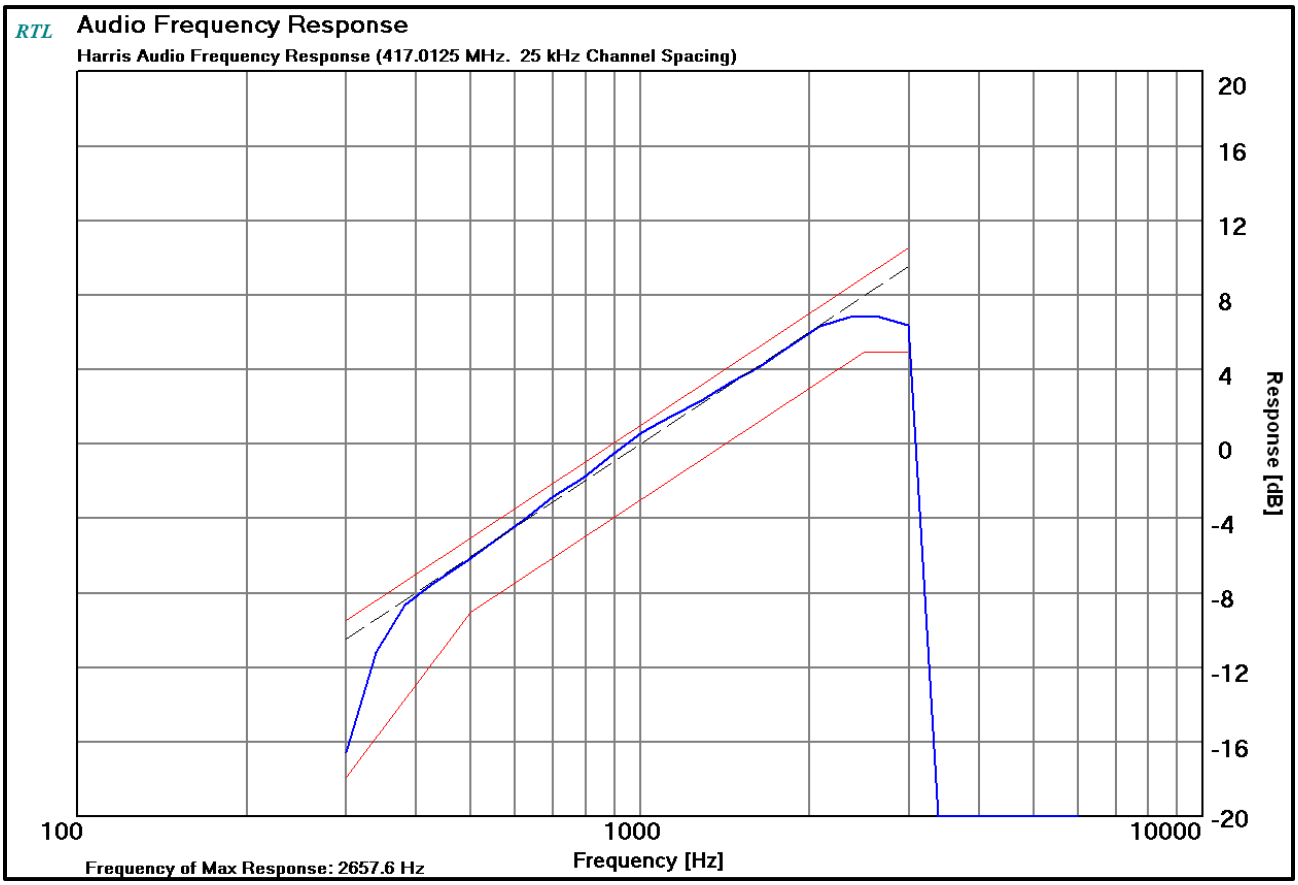


Table 10-1: Test Equipment Used For Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/11
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	2/17/11

Test Personnel:

Daniel Baltzell		October 28, 2010
Test Engineer	Signature	Date Of Test

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

11.1 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.

11.2 Test Data

Plot 11-1: Modulation Characteristics – Audio Low Pass Filter

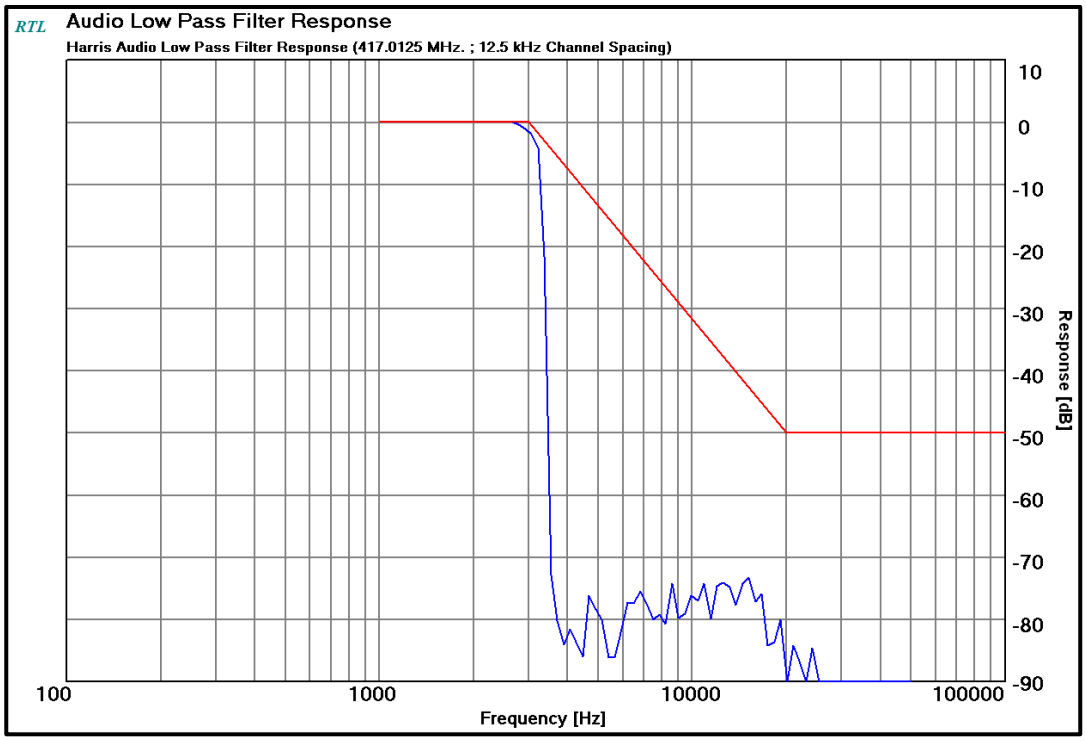


Table 11-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/11
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/7/11
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	12/5/10
901139	Weinschel Corp.	48-20-34 DC-18GHz	Attenuator, 100W 40dB	BK5859	2/17/11

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	October 28, 2010
Test Engineer	Signature	Date Of Test

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

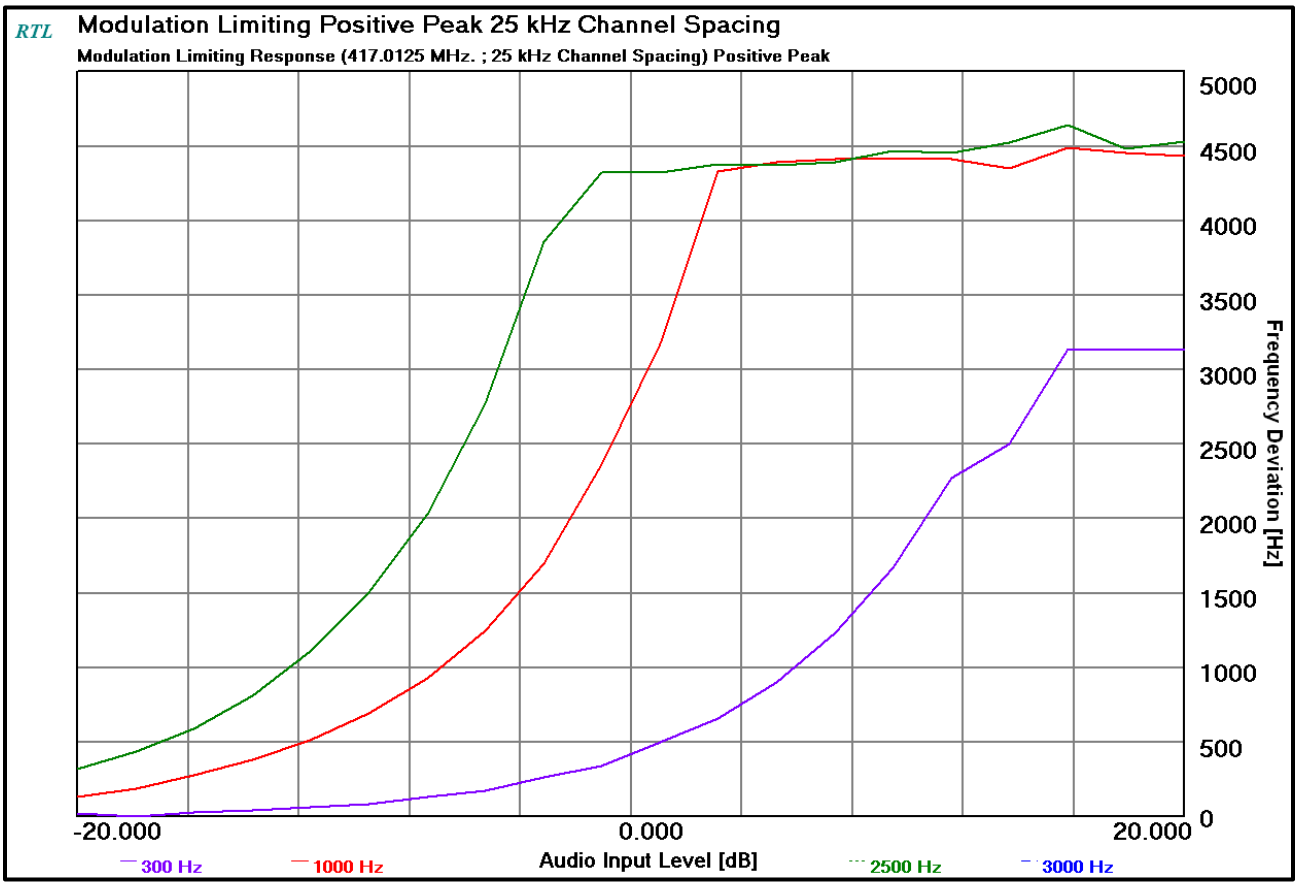
12.1 Test Procedure

ANSI/TIA-603-C-2004 Section 2.2.3

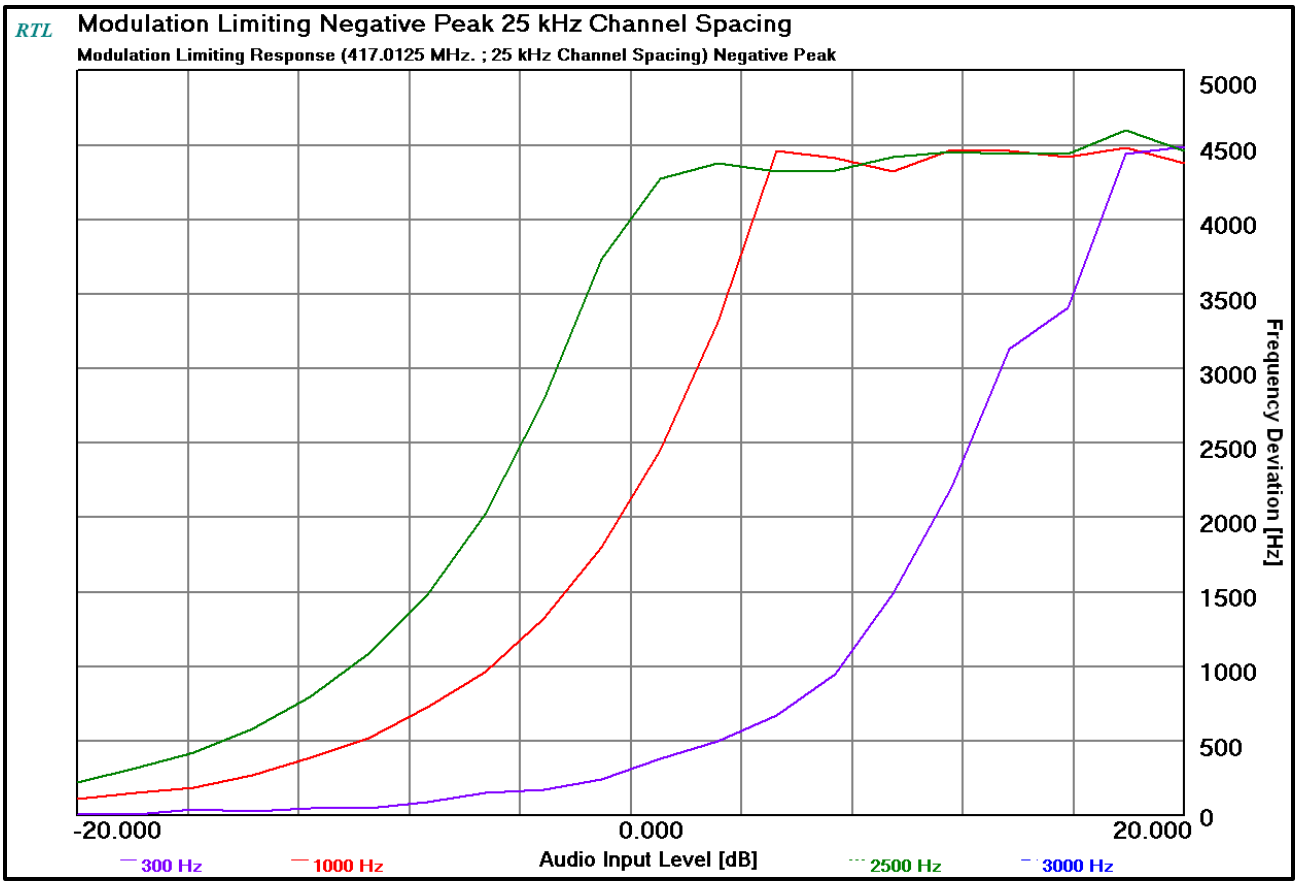
The transmitter was adjusted for full rated system deviation. The audio input level was adjusted for 60% of rated system deviation at 1000 Hz. Using this level (0 dB) as a reference, the audio input level was varied from the reference +/-20 dB for modulation frequencies of 300 Hz, 1,000 Hz, and 2,500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

12.2 Test Data

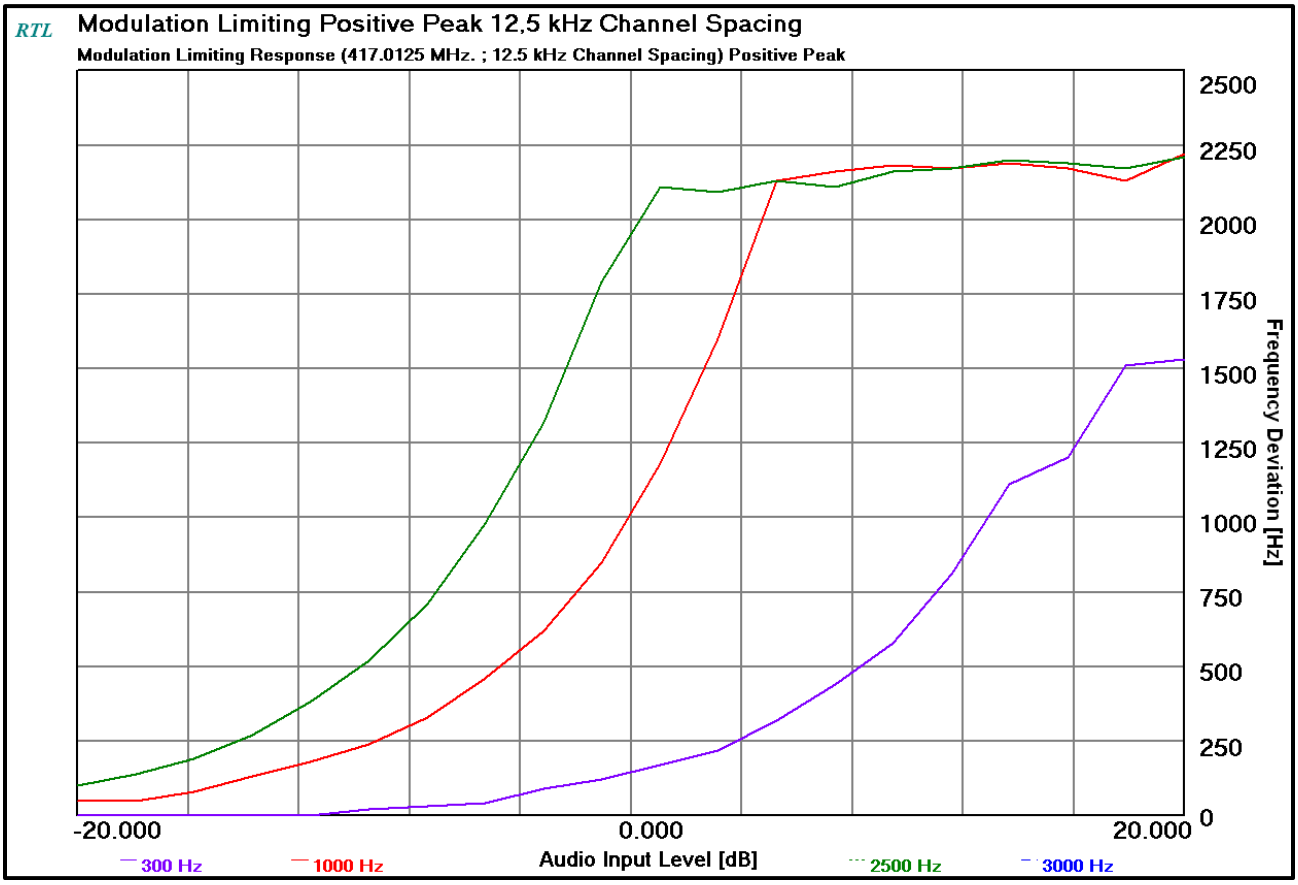
Plot 12-1: Modulation Characteristics – Modulation Limiting; Positive Peak; Wideband



Plot 12-2: Modulation Characteristics – Modulation Limiting; Negative Peak; Wideband



Plot 12-3: Modulation Characteristics – Modulation Limiting; Positive Peak; Narrowband



Plot 12-4: Modulation Characteristics – Modulation Limiting; Negative Peak; Narrowband

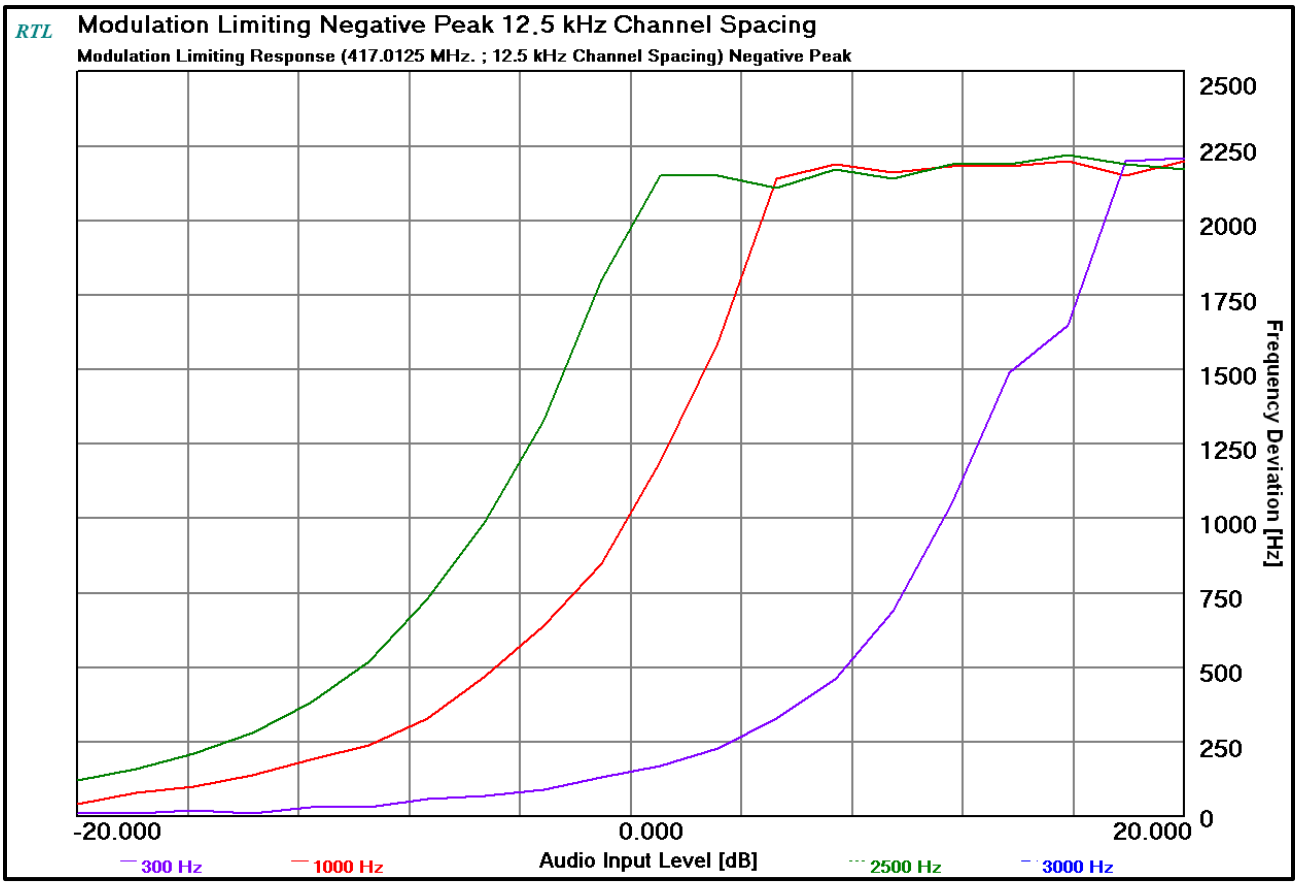


Table 12-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/4/11
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	2/17/11

Test Personnel:

Daniel Baltzell	Daniel W. Baltzell	October 28, 2010
Test Engineer	Signature	Date Of Test

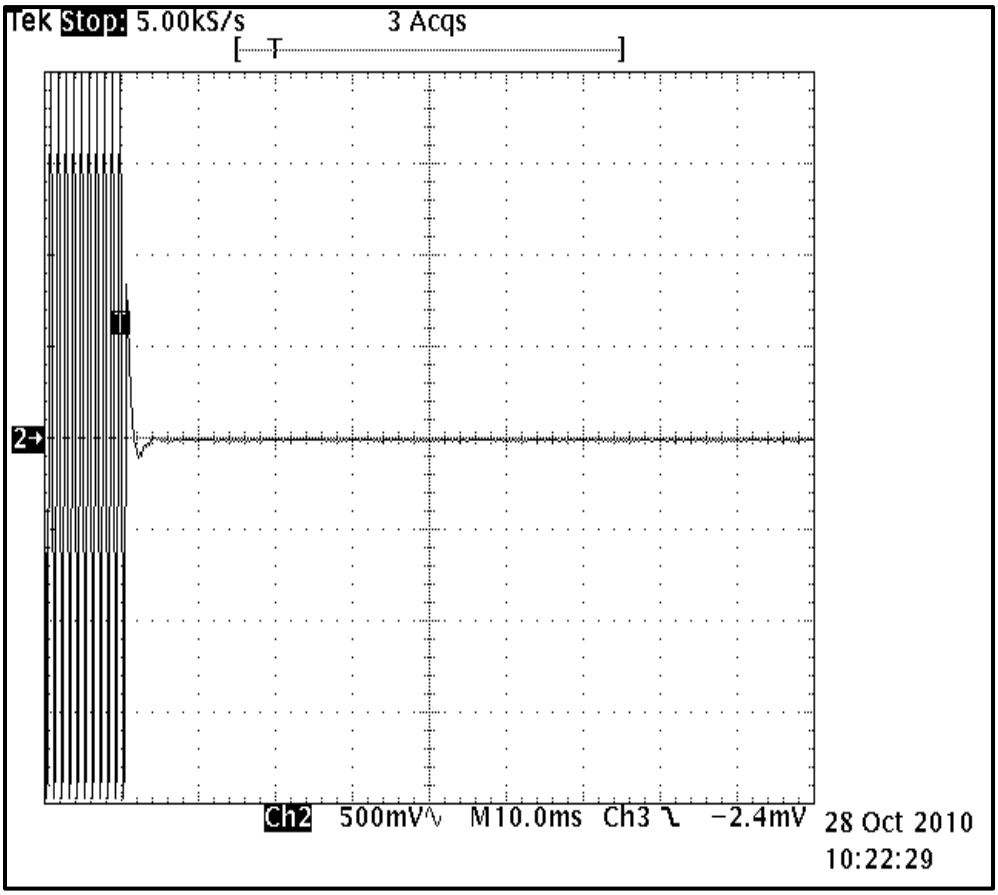
13 FCC Rules and Regulations Part §90.214; IC RSS-119 §5.9: Transient Frequency Response

13.1 Test Procedure

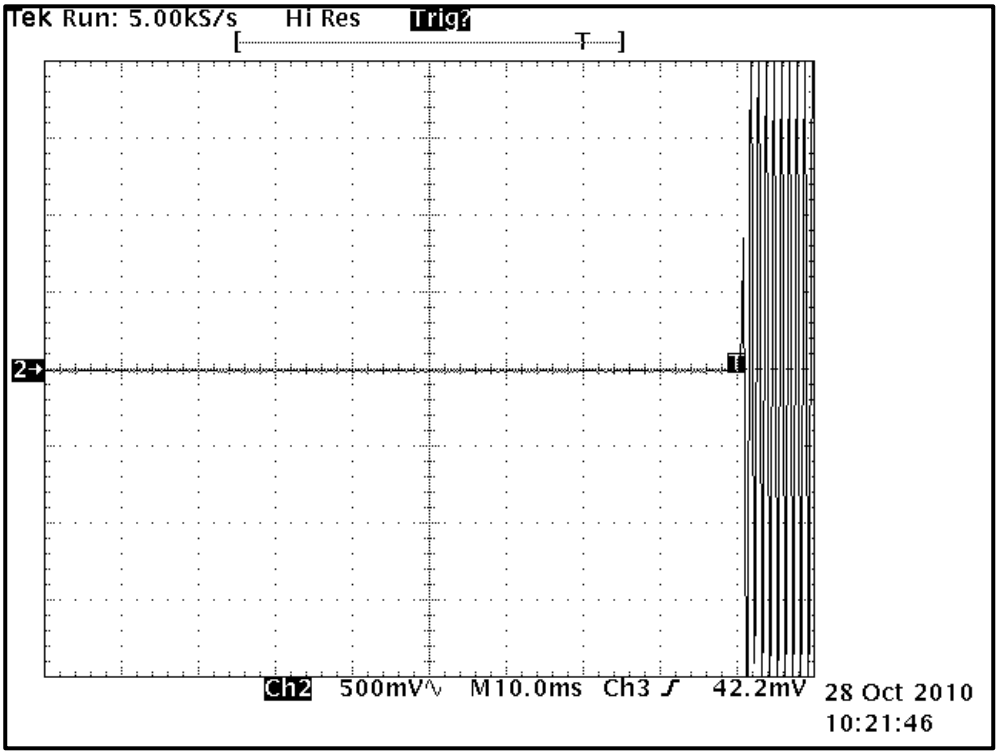
ANSI/TIA-603-C-2004 Section 2.2.3

13.2 Test Data

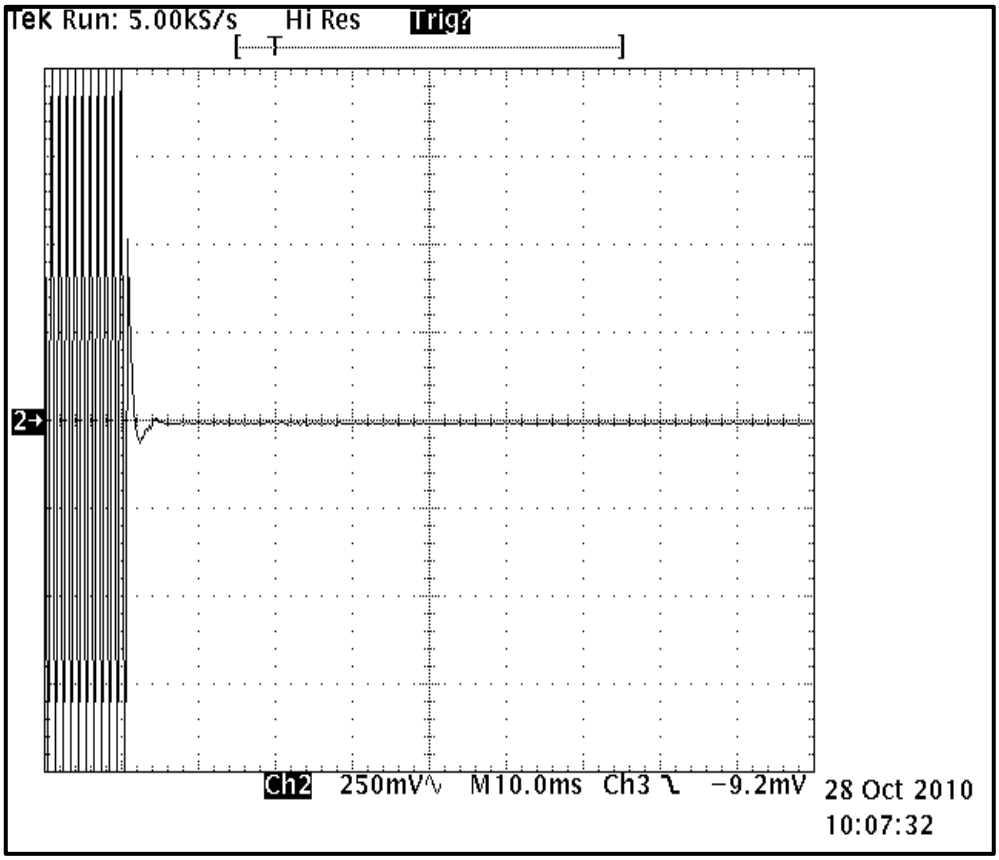
Plot 13-1: Transient Frequency Behavior – 429.9875 MHz; High Power; Wide Band; Carrier On Time



Plot 13-2: Transient Frequency Behavior – 429.9875 MHz; High Power; Wide Band; Carrier Off Time



Plot 13-3: Transient Frequency Behavior – 429.9875 MHz; High Power; Narrow Band; Carrier On Time



Plot 13-4: Transient Frequency Behavior – 429.9875 MHz; High Power; Narrow Band; Carrier Off Time

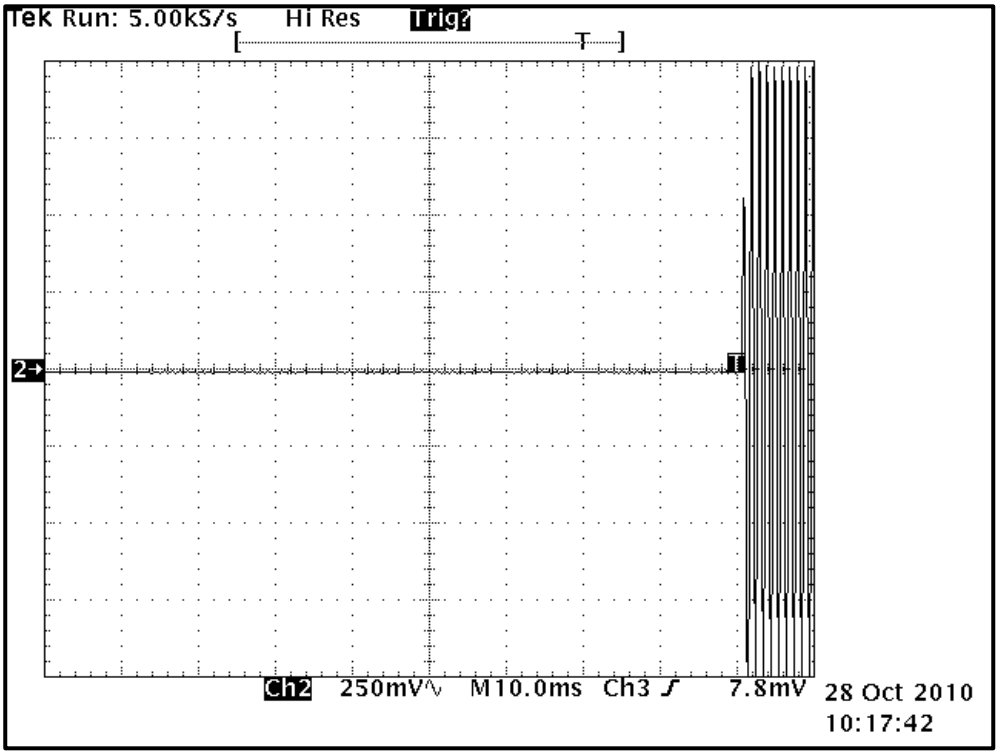


Table 13-1: Test Equipment Used For Testing Transient Frequency Behavior

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	11/12/10
900099	Marconi	52022-910E	Signal Generator, 10 KHz-1GHz	119044-189	11/18/10
900948	Weinschel	47-10-43	Attenuator DC-18 GHz 10 dB 50W	BH1487	2/17/11
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	2/18/11
901263	Agilent Technologies	.01-12 GHz	SMA Detector	2936A05505	N/A

Test Personnel:

Daniel Baltzell		October 28, 2010
Test Engineer	Signature	Date Of Test

14 FCC Rules and Regulations Part 2 §2.202: Necessary Bandwidth and Emission Bandwidth

Type of Emission: F3E, F1D, F1E

Voice – 25 kHz channel separation
Calculation:
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5
Constant factor (K): 1 (assumed)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

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 (9600W) – 25 kHz channel spacing
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 3000
2D/R = 0.625
Bn = 3.86D + 0.27R = 3.86(3000) + 0.27(9600) = 14.172 kHz
Emission designator: 14K2F1D, 14K2F1E

Digital Voice and Data (9600N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 9600
Peak deviation of carrier (D) = 1900
2D/R = 0.396
Bn = 3.86D + 0.27R = 3.86(1900) + 0.27(9600) = 9.926 kHz
Emission designator: 9K90F1D, 9K90F1E

Digital Voice and Data (4800N) – 12.5 kHz channel spacing
Calculation:
Data rate in bps (R) = 4800
Peak deviation of carrier (D) = 1500
2D/R = 0.625
Bn = 3.86D + 0.27R = 3.86(1500) + 0.27(4800) = 7.086 kHz
Emission designator: 7K10F1D, 7K10F1E

OpenSky TDMA Wideband
Calculation:
Data rate in bps (R) = 19200
Peak deviation of carrier (D) = 3750
Bn = $[19200/\log_2(4) + 2 (3750) (0.461)$ = 13.100 kHz
Emission designator: 13K1F9W

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

15 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **M7300,378-430MHz,50W Mobile Radio, FCC ID: OWDTR-0061-E, IC: 3636B-0061,** complies with all the applicable requirements of Parts 90, 15 and 2 of the FCC Rules, and Industry Canada RSS-119, Issue 10, 2010.