RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Certification Report

Harris Corporation
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Model: P5300/P5500 800 MHz
Portable Radio Family

FCC ID: OWDTR-0066-E
IC: 3636B-0066

August 30, 2011

Standards Referenced for this Report	
Part 2: 2010	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 90: 2010	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 11	Land Mobile and Fixed Radio Transmitters and Receivers 27.41 to 960.0 MHz

Report Prepared By: Richard B. McMurray, P.E.

Document Number: 2011067

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 Transmit Power (W) (Conducted)	Frequency Tolerance (ppm)	Transmit Mode	Emission Designator
806 - 824	3.0	0.21	Analog FM	16K0F3E
806 - 824	3.0	0.21	Analog FM	14K0F3E
806 - 824	3.0	0.21	2-level FSK, digitized data, EDACS	14K2F1D
806 - 824	3.0	0.21	2-level FSK, digitized voice, EDACS	14K2F1E
806 - 824	3.0	0.21	2-level FSK, digitized data, EDACS	11K9F1D
806 - 824	3.0	0.21	2-level FSK, digitized voice, EDACS	11K9F1E
806 - 824	3.0	0.21	4-level FSK, digitized data, P25 Phase 1	8K40F1D
806 - 824	3.0	0.21	4-level FSK, digitized voice, P25 Phase 1	8K40F1E
806 - 824	3.0	0.21	4-level FSK, digitized data, OTP	17K6F1D
806 - 824	3.0	0.21	4-level FSK, digitized voice, OTP	17K6F1E
806 - 824	3.0	0.21	4-level FSK, digitized data, OTP	17K1F1D
806 - 824	3.0	0.21	4-level FSK, digitized voice, OTP	17K1F1E
851 - 869	3.0	0.21	Analog FM	16K0F3E
851 - 869	3.0	0.21	Analog FM	14K0F3E
851 - 869	3.0	0.21	2-level FSK, digitized data, EDACS	14K2F1D
851 - 869	3.0	0.21	2-level FSK, digitized voice, EDACS	14K2F1E
851 - 869	3.0	0.21	2-level FSK, digitized data, EDACS	11K9F1D
851 - 869	3.0	0.21	2-level FSK, digitized voice, EDACS	11K9F1E
851 - 869	3.0	0.21	4-level FSK, digitized data, P25 Phase 1	8K40F1D
851 - 869	3.0	0.21	4-level FSK, digitized voice, P25 Phase 1	8K40F1E

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1 Test Result Summary

Test	FCC Reference	IC Reference	Result
RF Power Output	2.1046(a), 90.635	5.4	Complies
Spurious Emissions at Antenna Terminals	2.1051	5.5, 5.8	Complies
Field Strength of Spurious Radiation	2.1053(a), 90.210	5.5, 5.8	Complies
Occupied Bandwidth/ Emission Masks	2.1049(c)(1), 90.210	5.5, 5.8	Complies
Frequency Stability vs. Temperature and Voltage	2.1055, 90.213	5.9	Complies
Modulation Characteristics	2.1047(a)(b)	N/A	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 **P5300/P5500 800 MHz Radio; FCC ID: OWDTR-0066-E, IC: 3636B-0066.**

All measurements contained in this application were conducted in accordance with FCC Rules and Regulations CFR 47 Parts 2 and 90. 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 P5500/5300 800 MHz portable radio family includes the following model numbers: P5570, EX55-PF78B, EX55-PB78B, EX53-PF78B, EX53-PB78B.

2.3 Grant Notes

RF power is switchable from 0.5 W to rated power (3 W).

2.4 Tested System Details

The test sample was received on May 5, 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 EUT was programmed for multiple modes of operation and modulation types. The EUT has four product variants: a Scan version and a System version, with two enclosure colors. The System version adds a DTMF keypad; the System version was used in testing, as it was deemed to represent the potential for worst-case emissions.

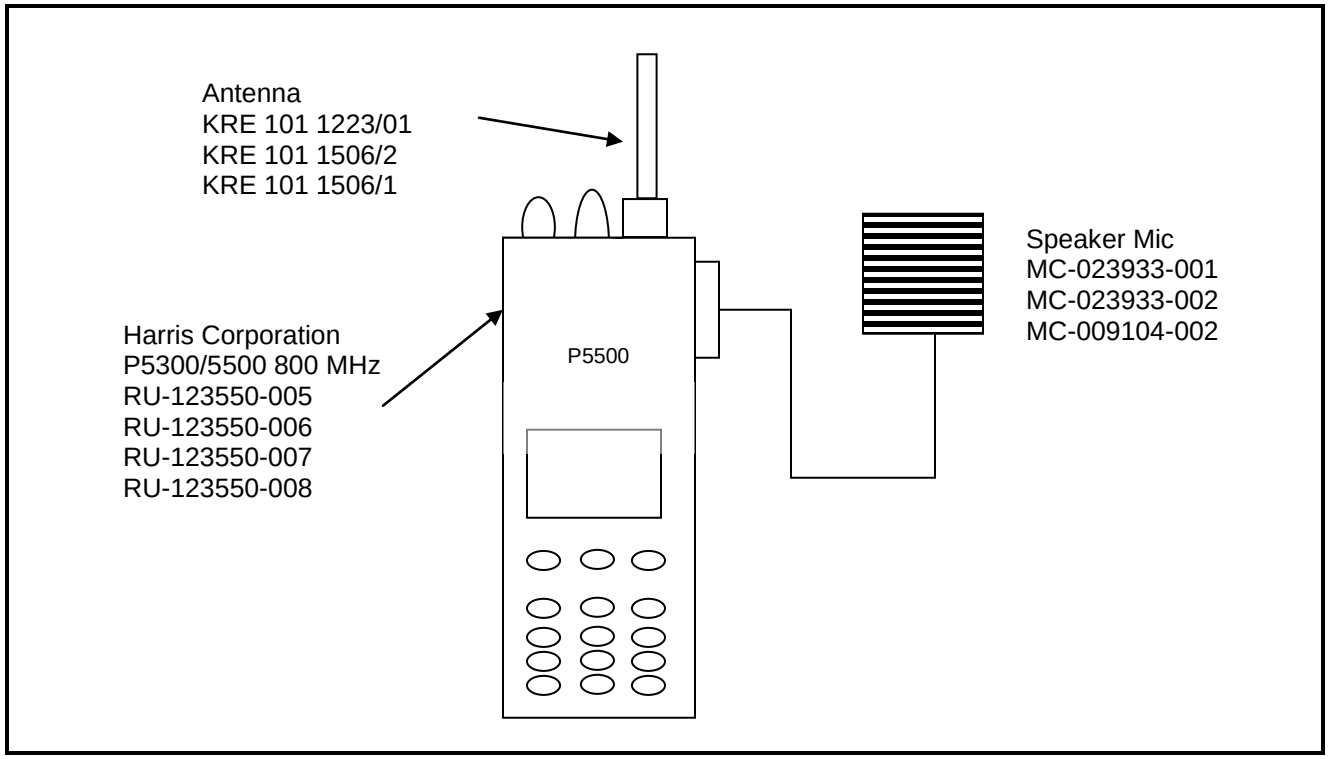
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model Number	P/N	FCC ID	RTL Bar Code
P5500 800 MHz Portable System Radio	Harris Corporation	P5570	RU-123550-006	OWDTR-0066-E	20143
7.5 NiCd Battery	Harris Corporation	N/A	BT-023406-001 REV D	N/A	20166

Table 2-2: Other Models Represented by This Testing

Part	Manufacturer	Model Number	P/N	FCC ID
P5500 800 MHz Portable System Radio	Harris Corporation	EX55-PF78B	RU-123550-006	OWDTR-0066-E
P5500 800 MHz Portable Scan Radio	Harris Corporation	EX55-PB78B	RU-123550-005	OWDTR-0066-E
P5300 800 MHz Portable System Radio	Harris Corporation	EX53-PF78B	RU-123550-007	OWDTR-0066-E
P5300 800 MHz Portable Scan Radio	Harris Corporation	EX53-PB78B	RU-123550-008	OWDTR-0066-E

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 V / 2.5 A

4 FCC Rules and Regulations Part 2.1046(a): RF Power Output: Conducted, Part 90.635; RSS-119 4.1: Transmitter Output Power

4.1 Test Procedure

ANSI/TIA-603-C-2004, section 2.2.1

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

Manufacturer's rated power: 3W

Conducted power is continuously variable from 0.5 to 3 W.

4.2 Test Data

Table 4-1: RF Conducted Output Power – High Power

Frequency (MHz)	Power Measured (dBm)	Power Measured (Watts)
806.0125	34.9	3.1
815.0125	34.9	3.1
823.9875	34.9	3.1
851.0125	34.9	3.1
860.0125	34.9	3.1
868.9875	34.9	3.1

Table 4-2: RF Conducted Output Power – Low Power

Frequency (MHz)	Power Measured (dBm)	Power Measured (Watts)
806.0125	26.9	0.5
815.0125	26.9	0.5
823.9875	27.0	0.5
851.0125	26.9	0.5
860.0125	27.0	0.5
868.9875	26.9	0.5

Table 4-3: Test Equipment Used For Testing RF Power Output - Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	4/08/12

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	June 14, 2011
Test Engineer	Signature	Date of Test

5 FCC Rules and Regulations Part 2.1051: Spurious Emissions at Antenna Terminals; 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 – 9,600 bps for OTP mode.

5.2 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 (in MHz) and all modes were investigated: 806.0125, 815.0125, 823.987, 851.0125, 860.0125 and 868.9875 MHz.

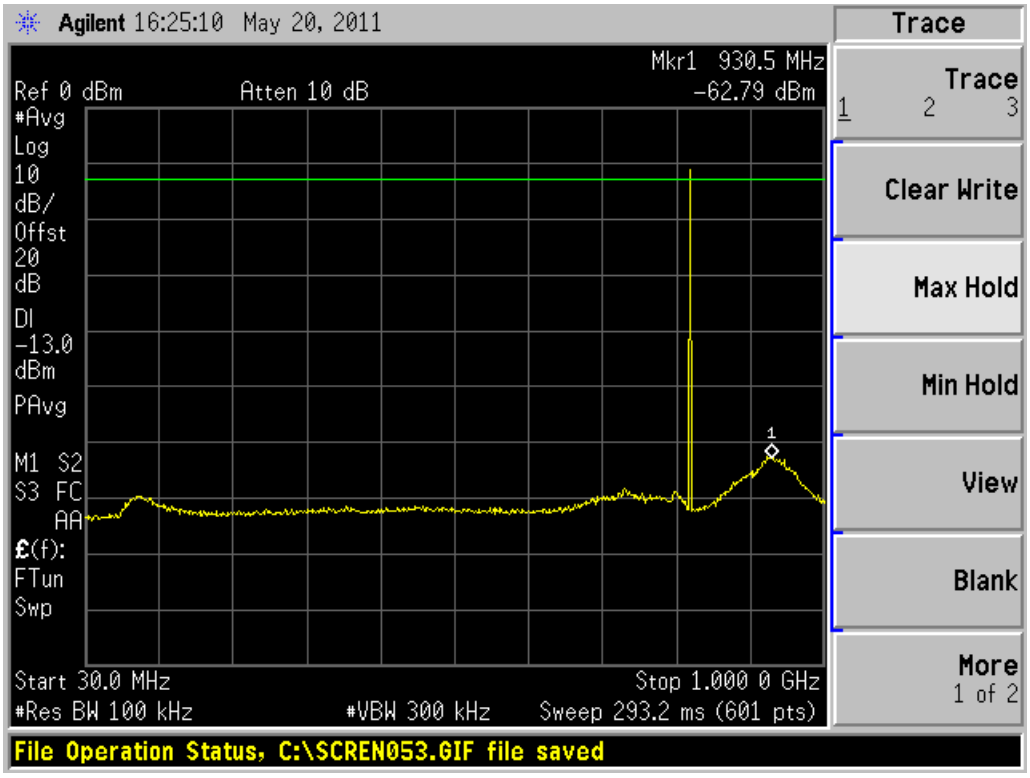
No emissions were found within 20 dB of the limit; per 2.1057(c) no data is being reported. The following plots are presented to show the noise floor.

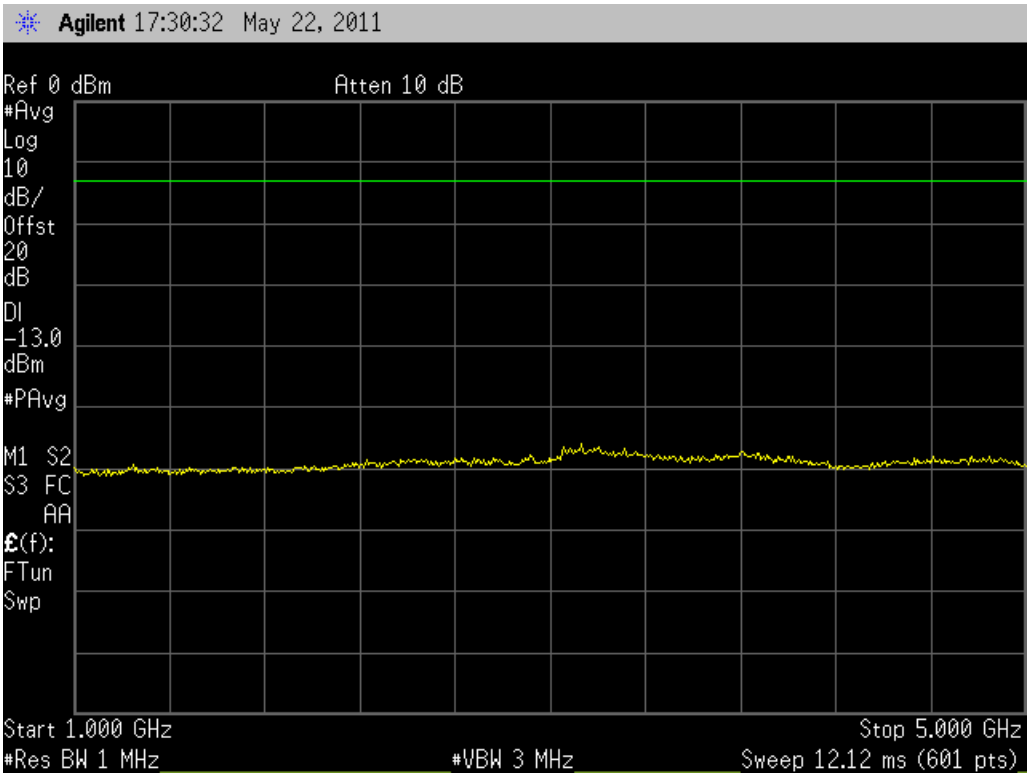
Table 5-1: Test Equipment Used For Testing Spurious Emissions

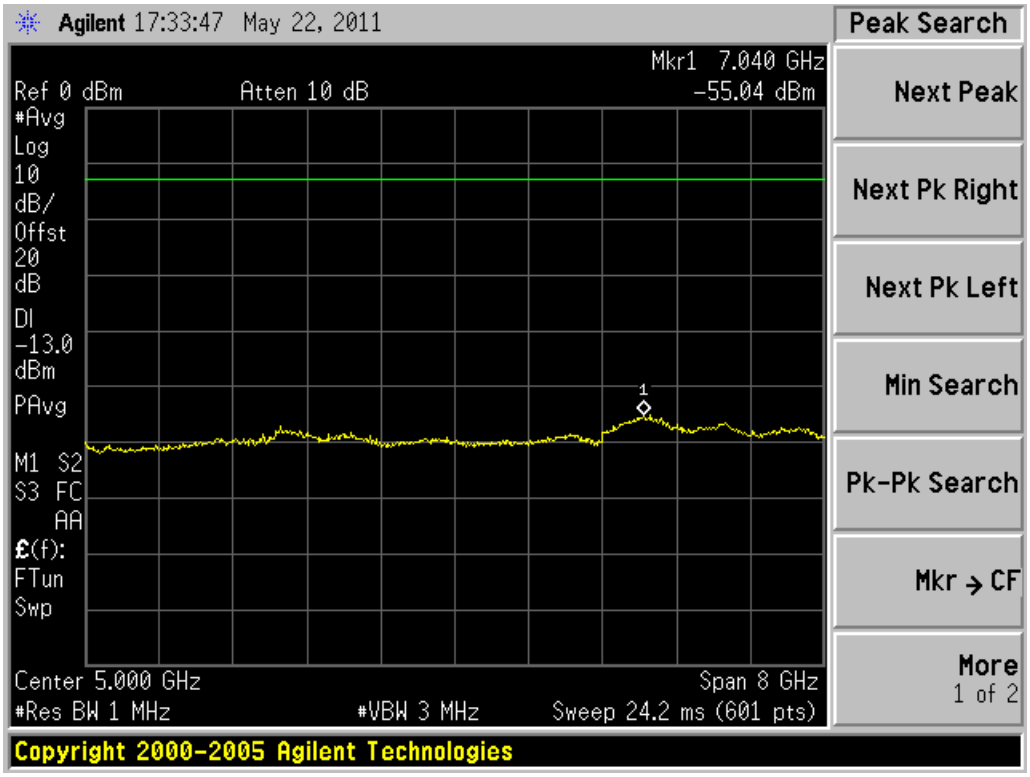
RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	4/08/12

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	May 20 and 22, 2011
Test Engineer	Signature	Dates of Test


Agilent 16:25:10 May 20, 2011
Trace
Mkr1 930.5 MHz
Ref 0 dBm
Atten 10 dB
-62.79 dBm
#Avg
Log
10
dB/
Offst
20
dB
Dl
-13.0
dBm
PAvg
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
More
1 of 2
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 293.2 ms (601 pts)
File Operation Status, C:\SCREN053.GIF file saved


Agilent 17:30:32 May 22, 2011
Ref 0 dBm
Atten 10 dB
#Avg
Log
10
dB/
Offst
20
dB
Dl
-13.0
dBm
#PAvg
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 12.12 ms (601 pts)


Agilent 17:33:47 May 22, 2011
Peak Search
Mkr1 7.040 GHz
Ref 0 dBm
Atten 10 dB
-55.04 dBm
Next Peak
#Avg
Log
10
dB/
Offst
20
dB
Next Pk Right
Dl
-13.0
dBm
Next Pk Left
PAvg
Min Search
M1 S2
S3 FC
AA
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Center 5.000 GHz
Span 8 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 24.2 ms (601 pts)
Copyright 2000-2005 Agilent Technologies

6 FCC Rules and Regulations Part 2.1049(c)(1): Occupied Bandwidth; Part 90.210; RSS-119 5.5: Channel Spacing, Authorized Bandwidth, Occupied Bandwidth and Spectrum Masks

Occupied Bandwidth - Compliance with the Emission Masks

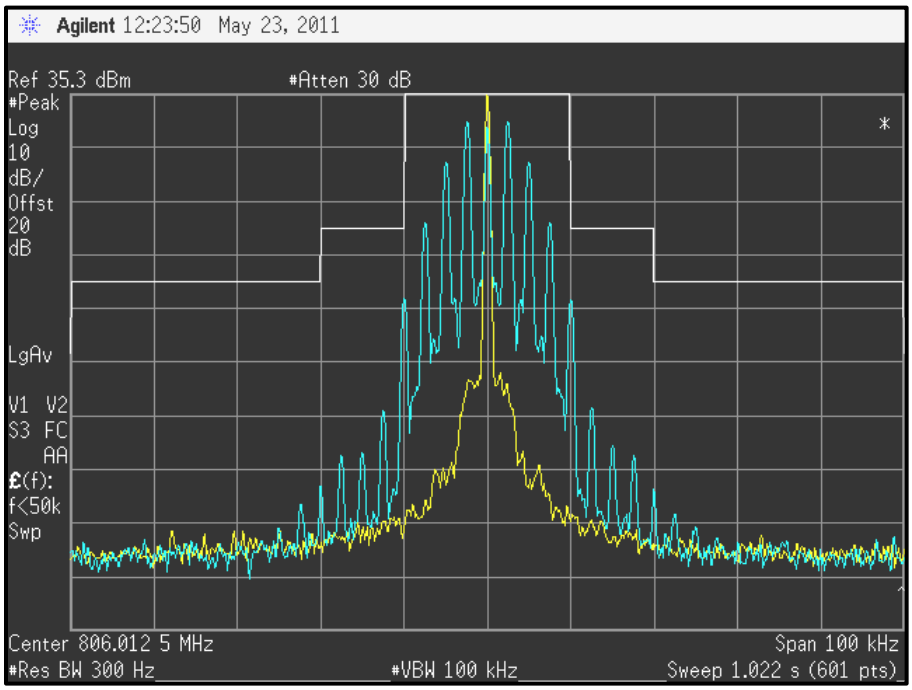
6.1 Test Procedure

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

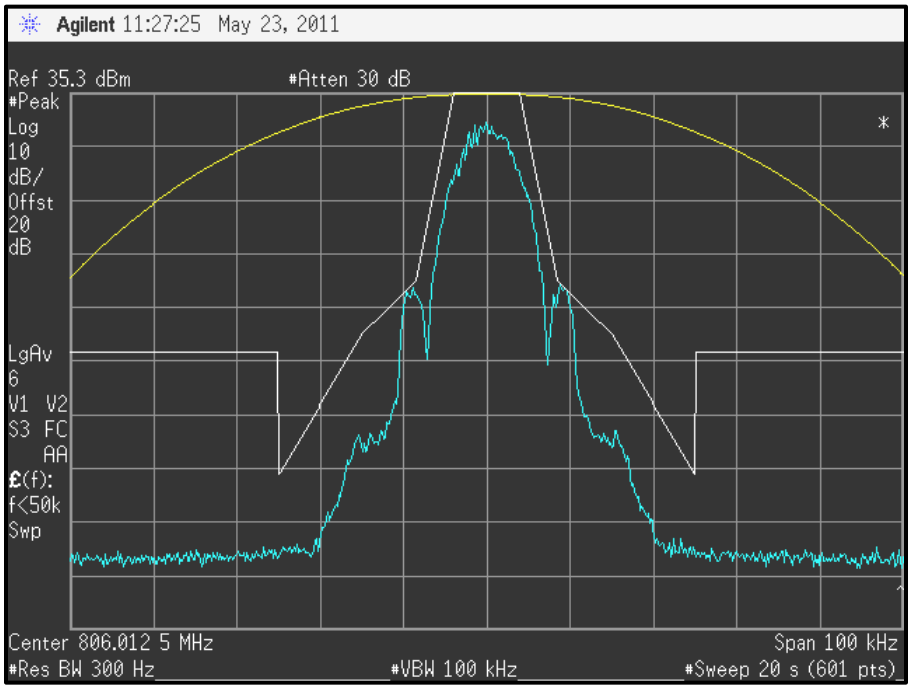
Device with digital modulation: Modulated to its maximum extent using a pseudo-random data sequence – 9,600 baud for all digital modes except OPT NPS, 19,200 baud for OTP NPS.

6.2 Test Data

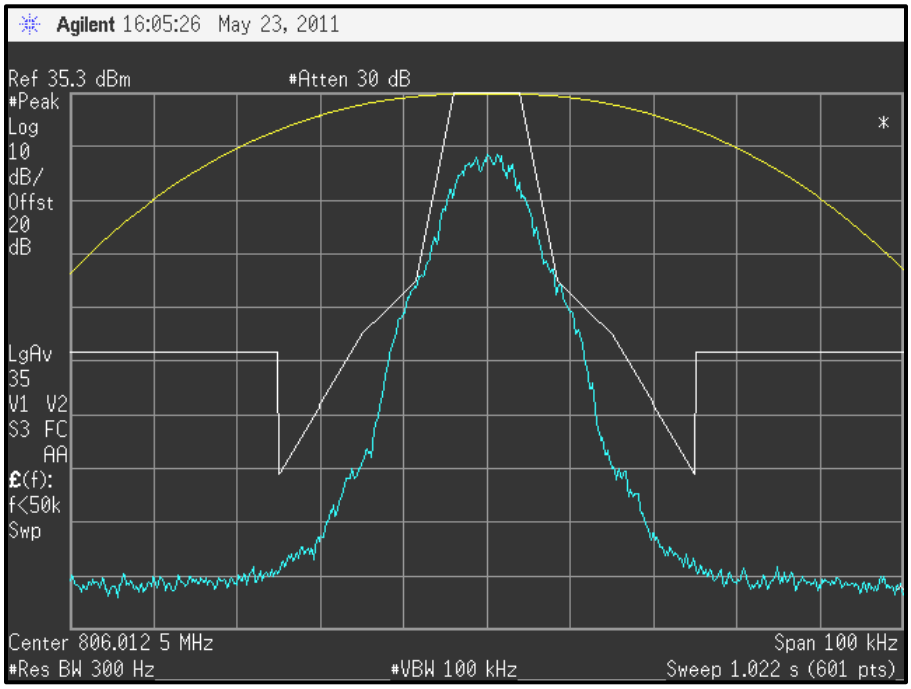
Plot 6-1: Occupied Bandwidth – Analog FM NPS 806.0125 MHz Mask B



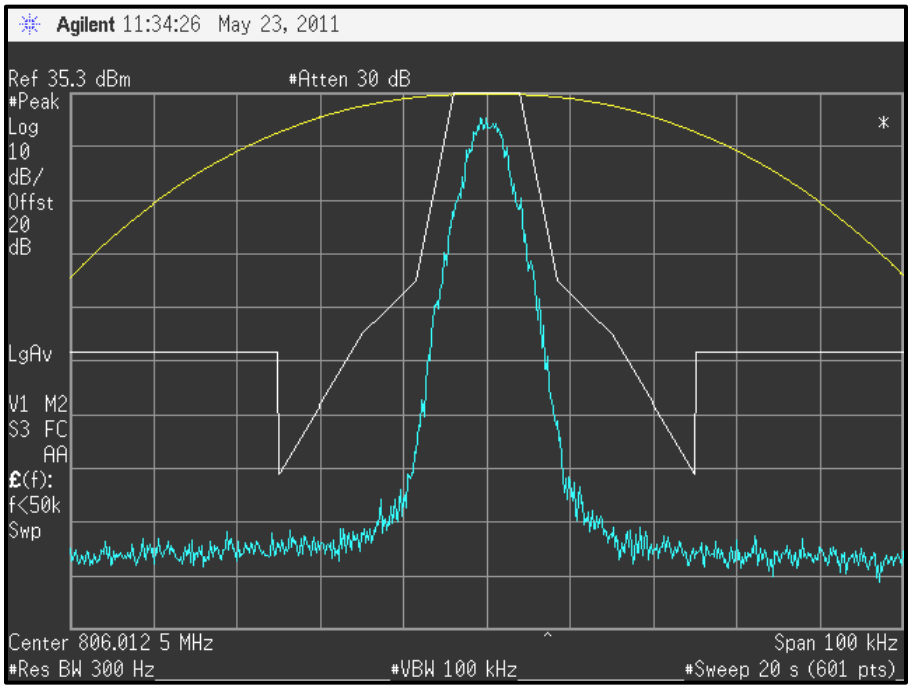
Plot 6-2: Occupied Bandwidth – 2-Level FSK NPS 806.0125 MHz Mask H



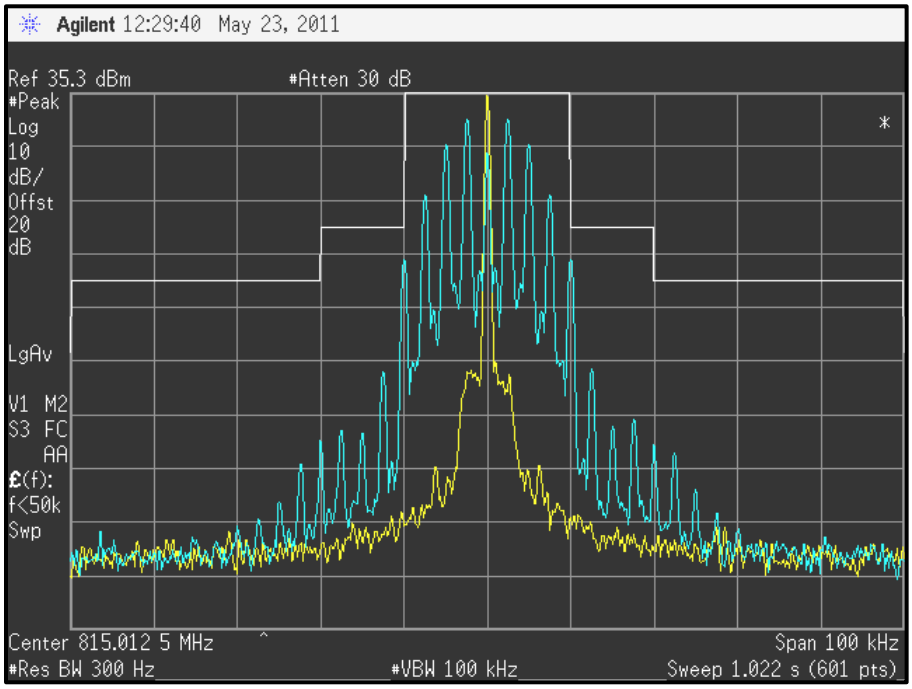
Plot 6-3: Occupied Bandwidth – OTP NPS 806.0125 MHz Mask H



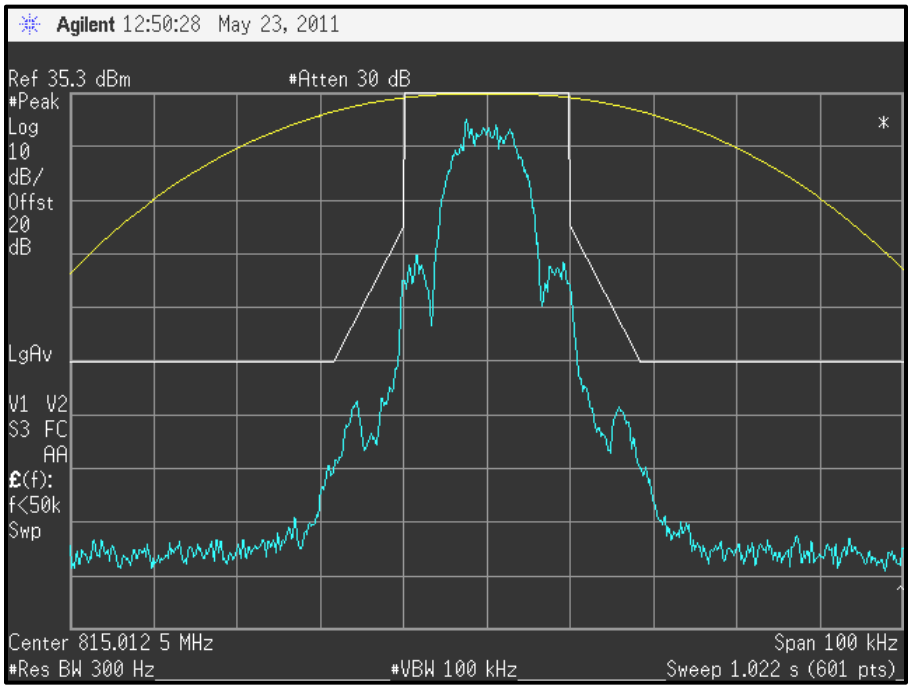
Plot 6-4: Occupied Bandwidth – P25 806.0125 MHz Mask H



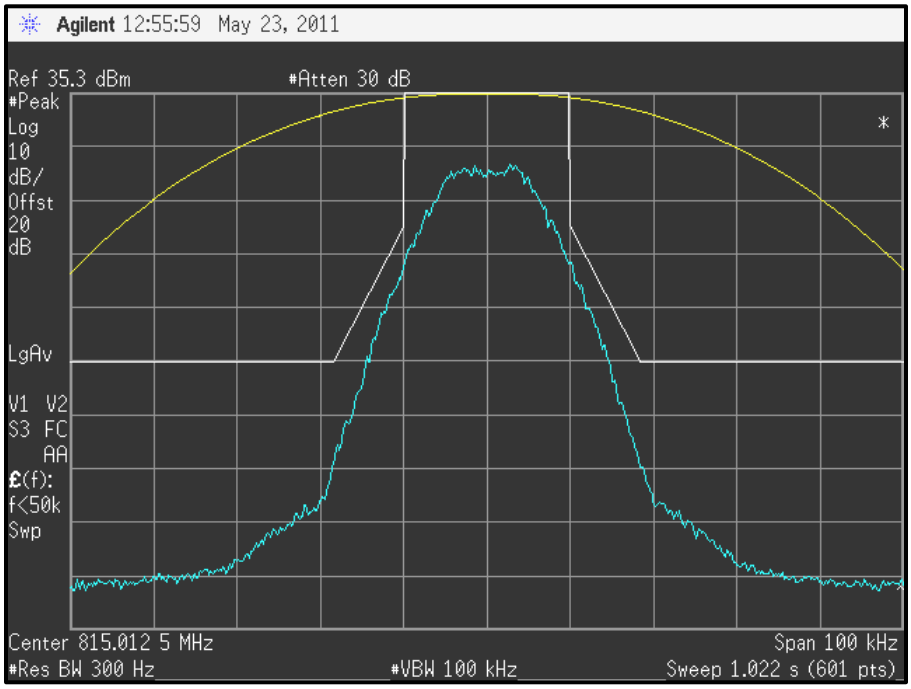
Plot 6-5: Occupied Bandwidth – Analog FM 815.0125 MHz Mask B



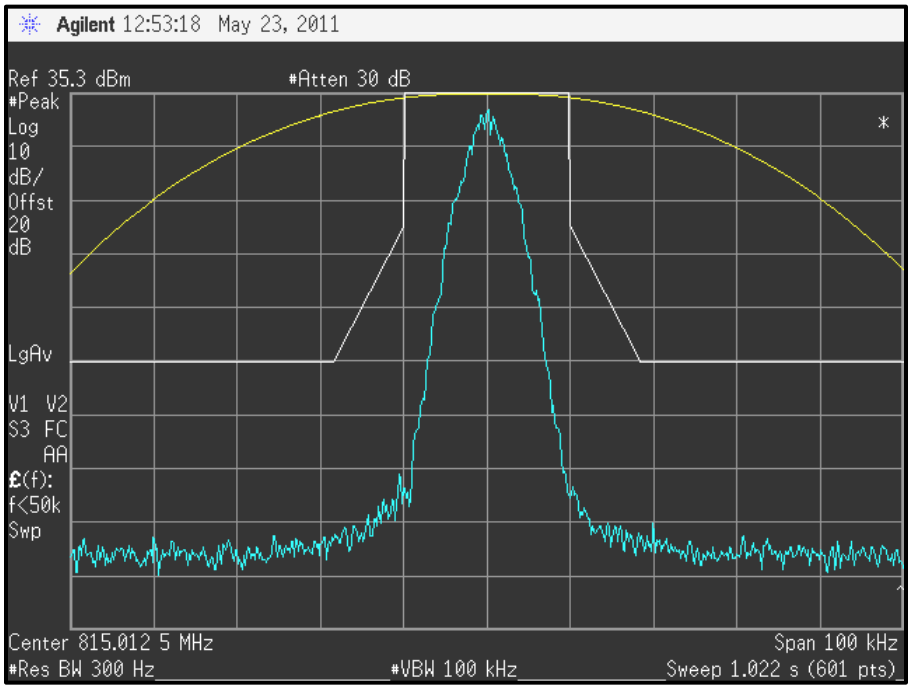
Plot 6-6: Occupied Bandwidth – 2-Level FSK 815.0125 MHz Mask G



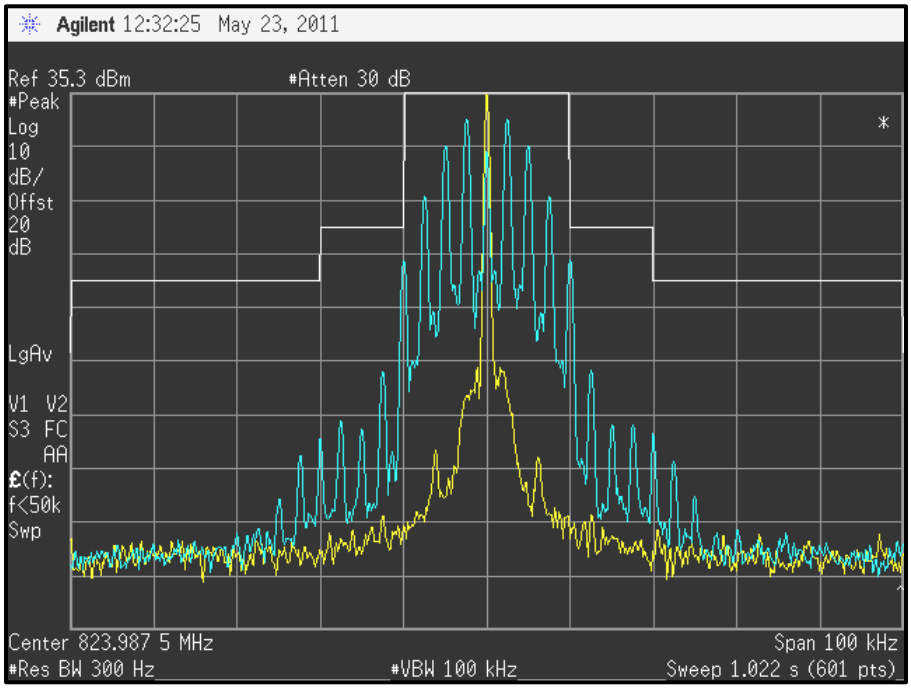
Plot 6-7: Occupied Bandwidth – OTP SMR 815.0125 MHz Mask G



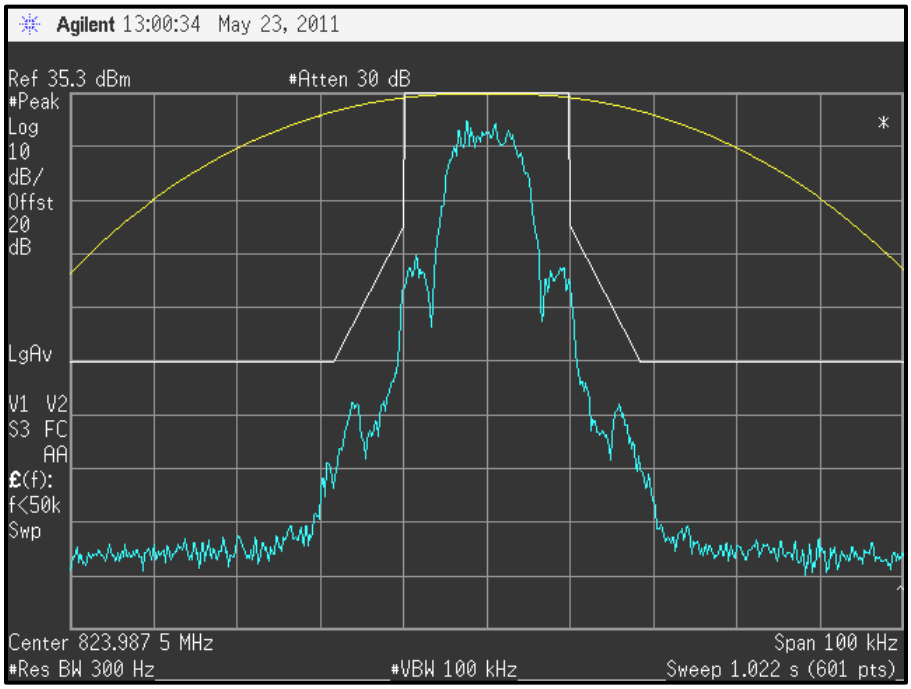
Plot 6-8: Occupied Bandwidth – P25 815.0125 MHz Mask G



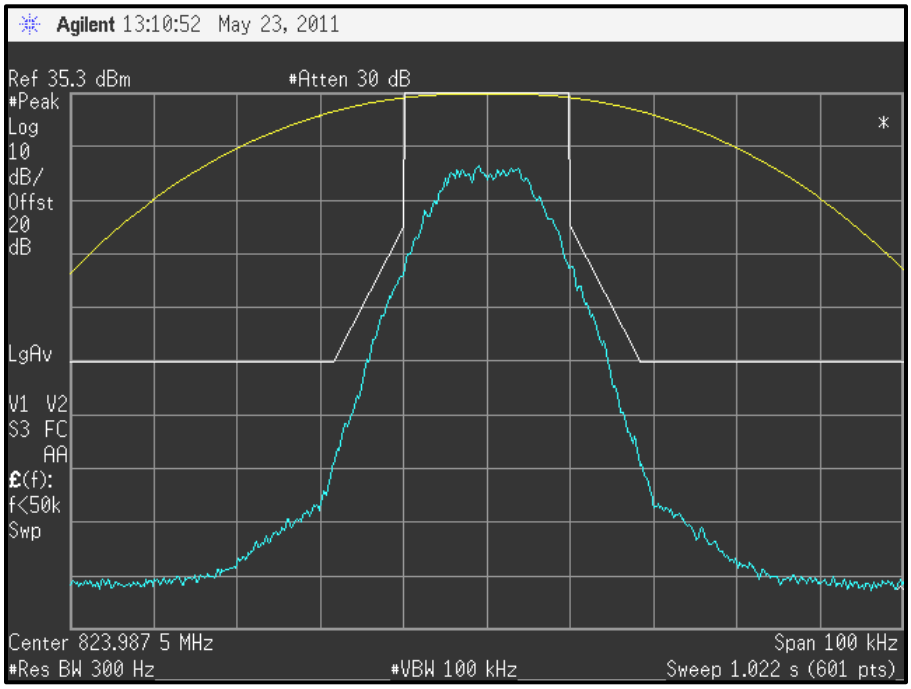
Plot 6-9: Occupied Bandwidth – Analog FM 823.9875 MHz Mask B



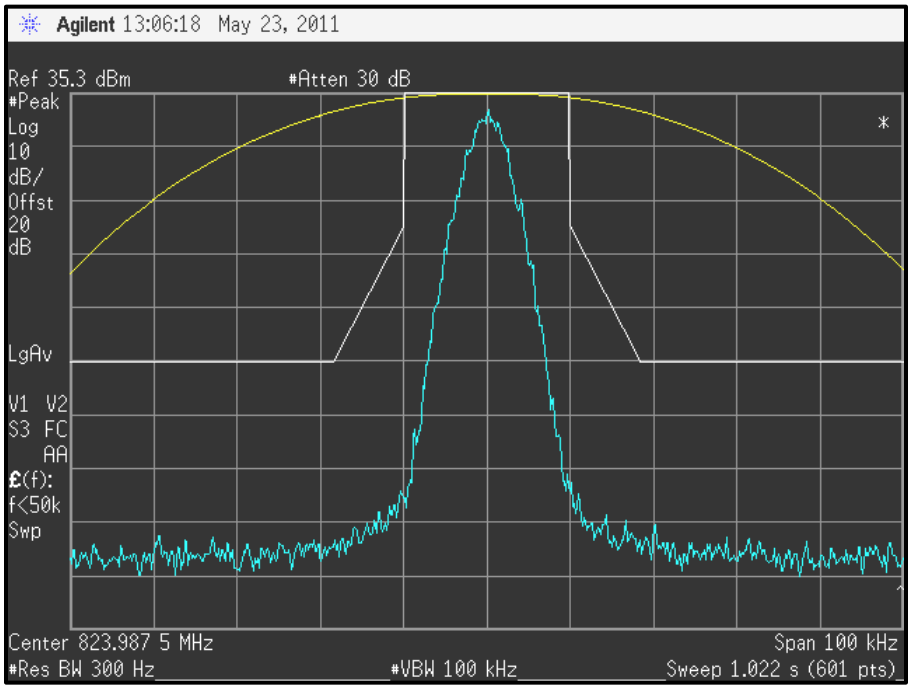
Plot 6-10: Occupied Bandwidth – 2-Level FSK 823.9875 MHz Mask G



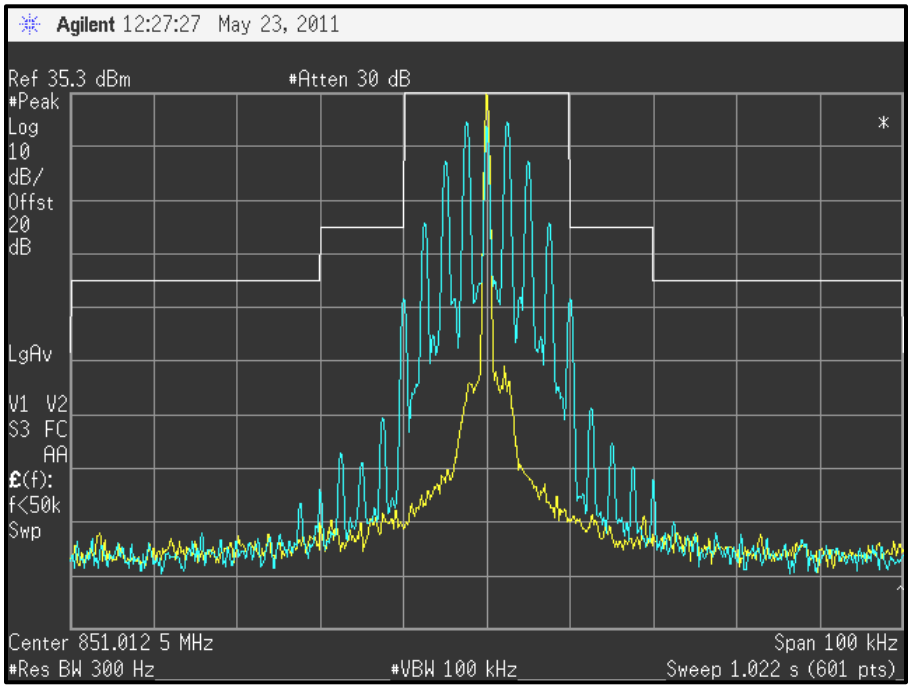
Plot 6-11: Occupied Bandwidth – OTP SMR 823.9875 MHz Mask G



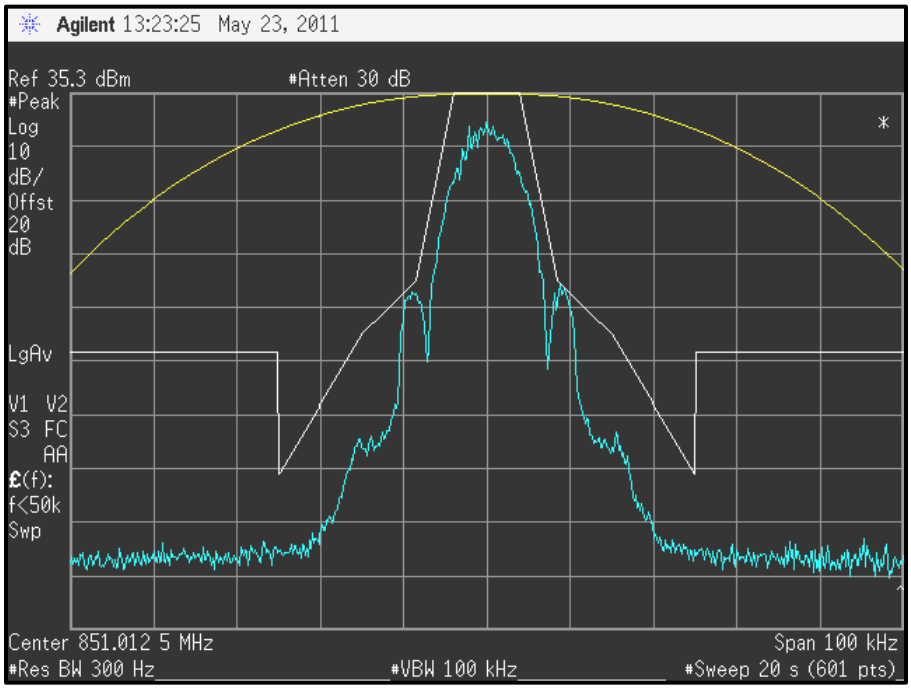
Plot 6-12: Occupied Bandwidth – P25 823.9875 MHz Mask G



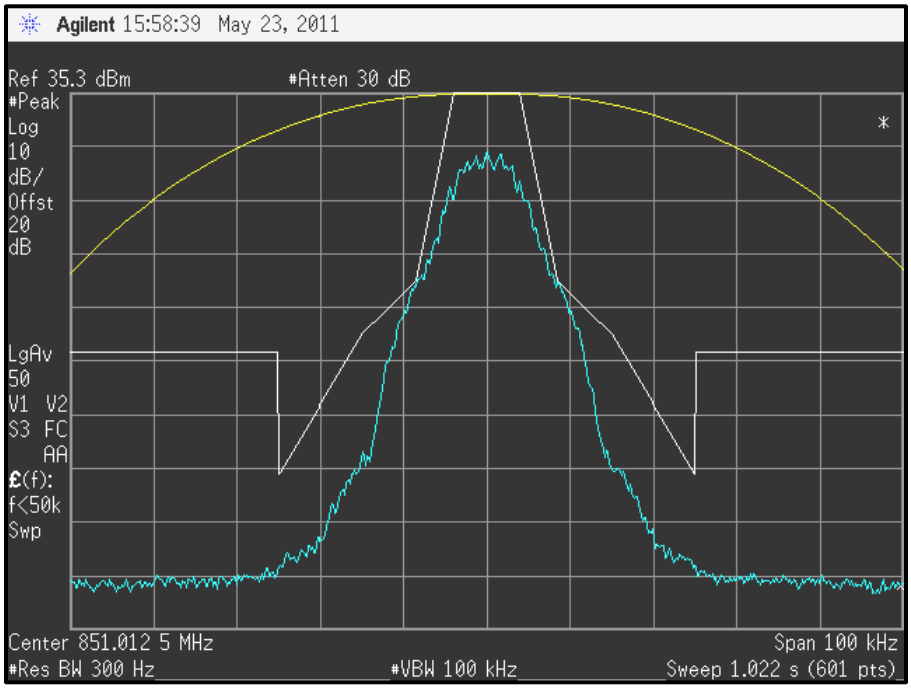
Plot 6-13: Occupied Bandwidth – Analog FM NPS 851.0125 MHz Mask B



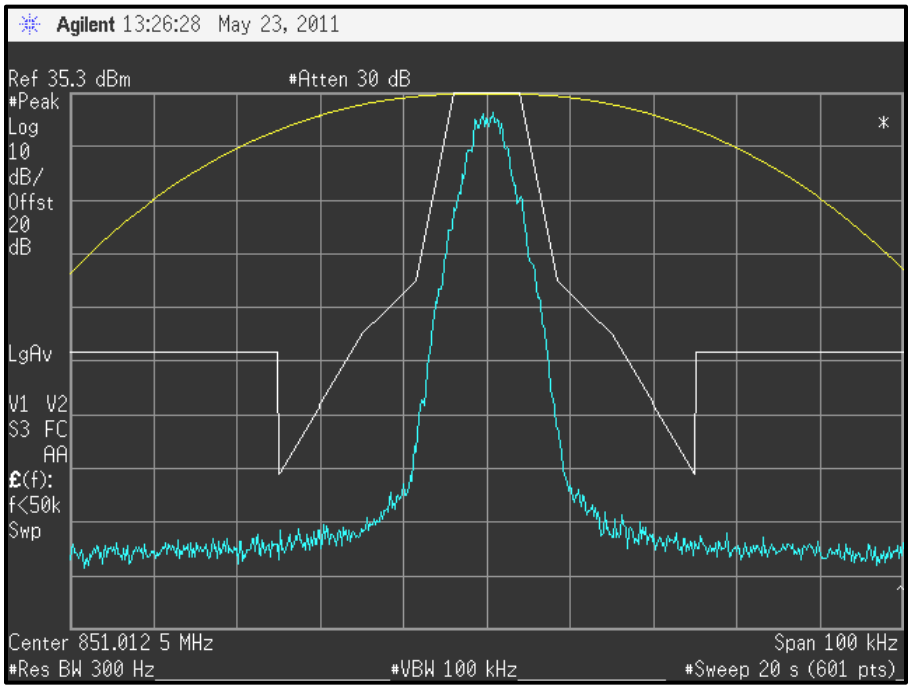
Plot 6-14: Occupied Bandwidth – 2-Level FSK NPS 851.0125 MHz Mask H



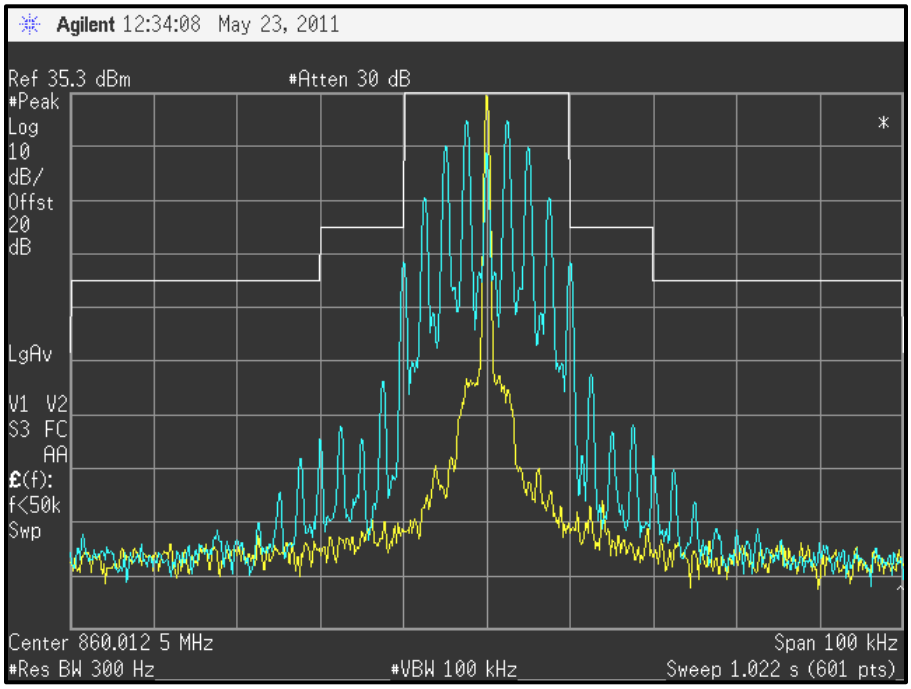
Plot 6-15: Occupied Bandwidth – OTP NPS 851.0125 MHz Mask H



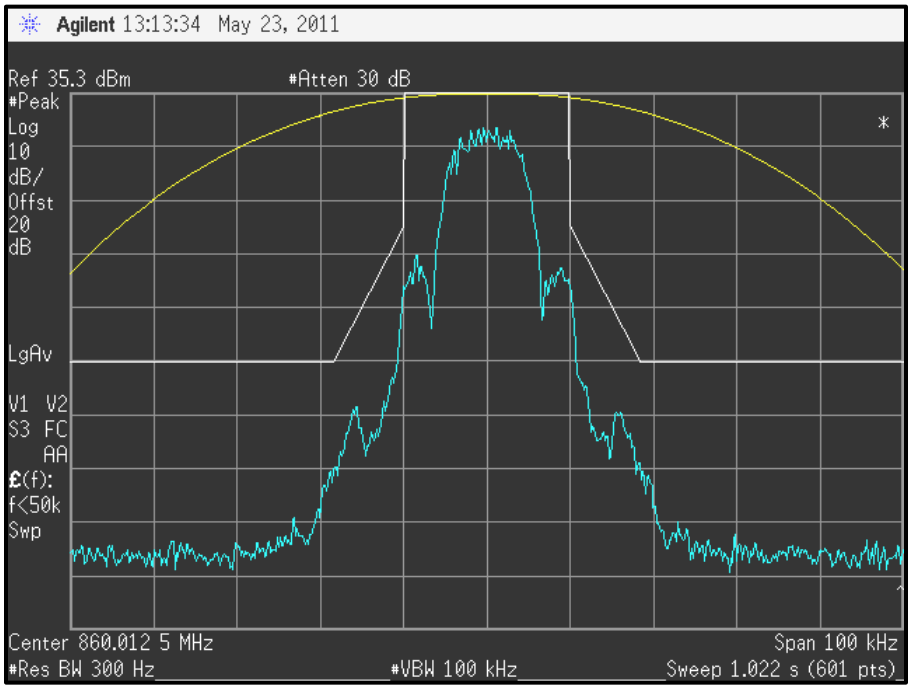
Plot 6-16: Occupied Bandwidth – P25 851.0125 MHz Mask H



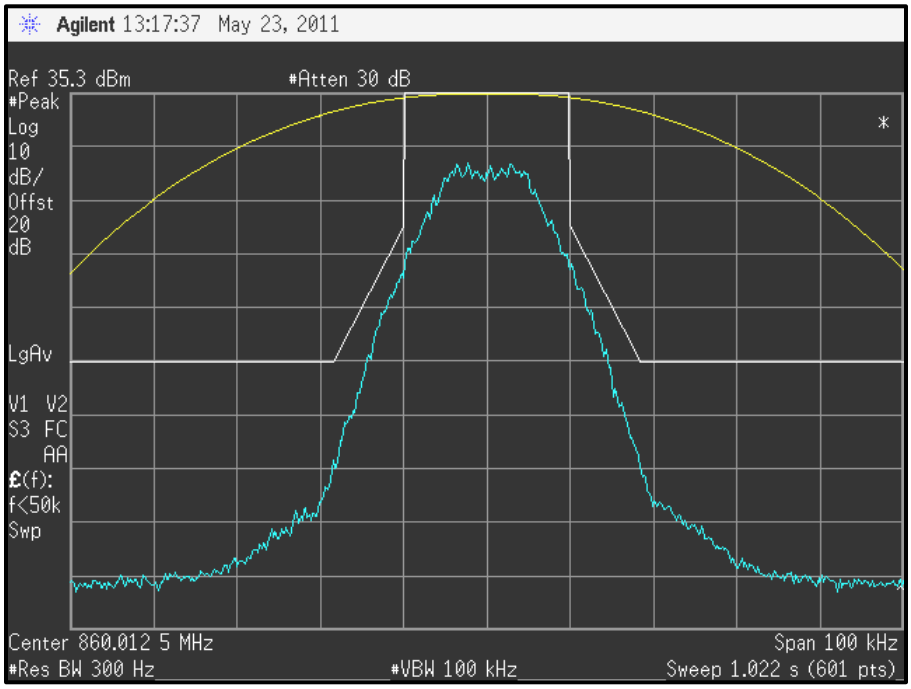
Plot 6-17: Occupied Bandwidth – Analog FM 860.0125 MHz Mask B



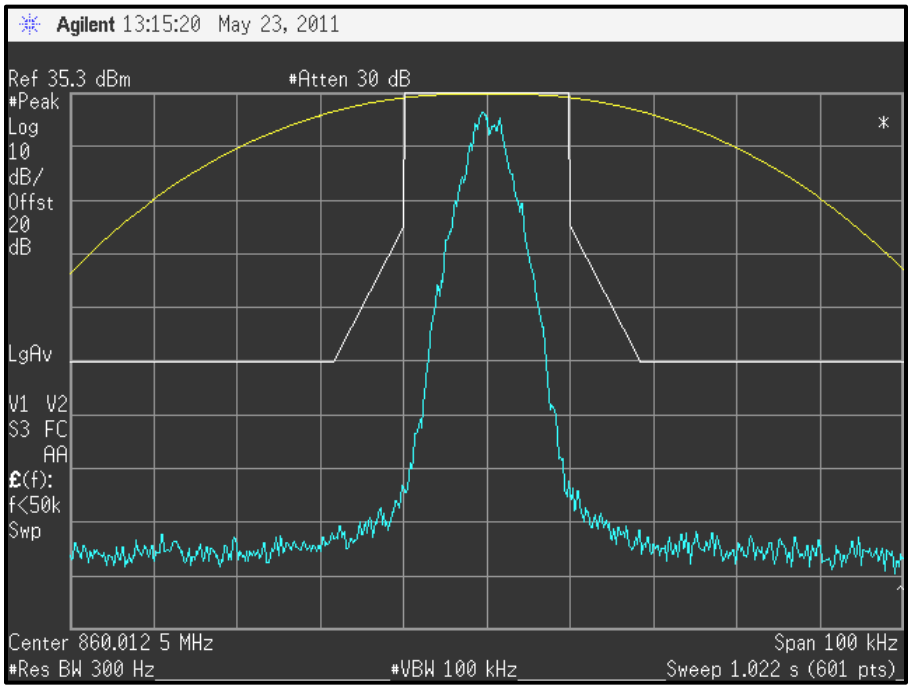
Plot 6-18: Occupied Bandwidth – 2-Level FSK 860.0125 MHz Mask G



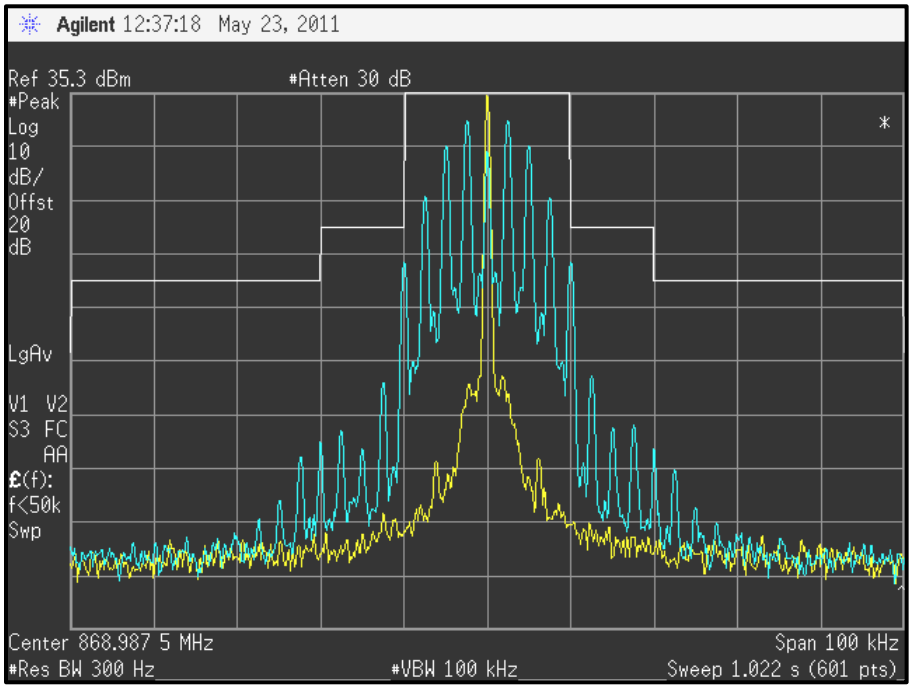
Plot 6-19: Occupied Bandwidth – OTP SMR 860.0125 MHz Mask G



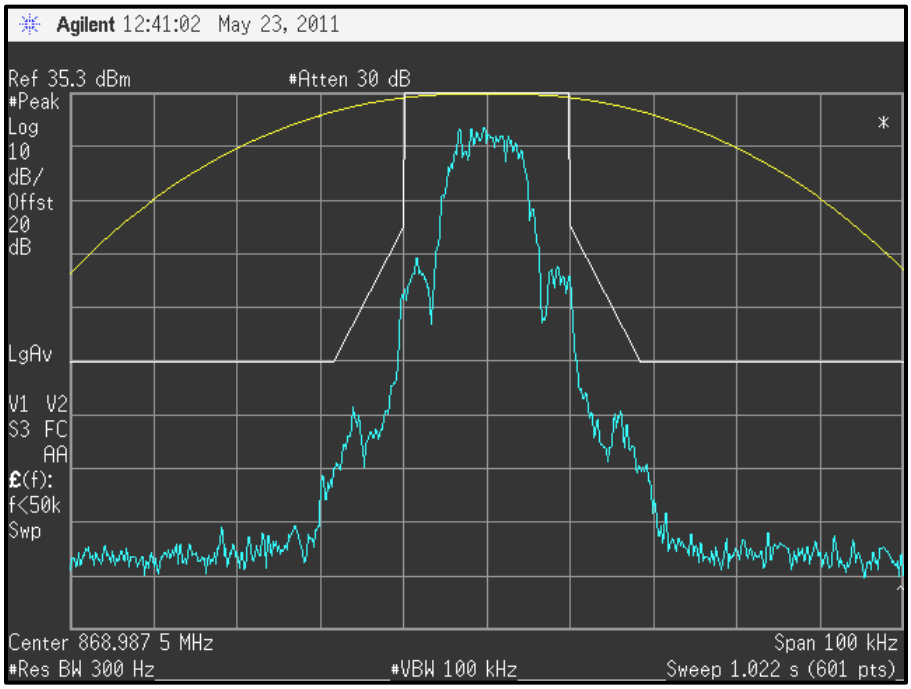
Plot 6-20: Occupied Bandwidth – P25 860.0125 MHz Mask G



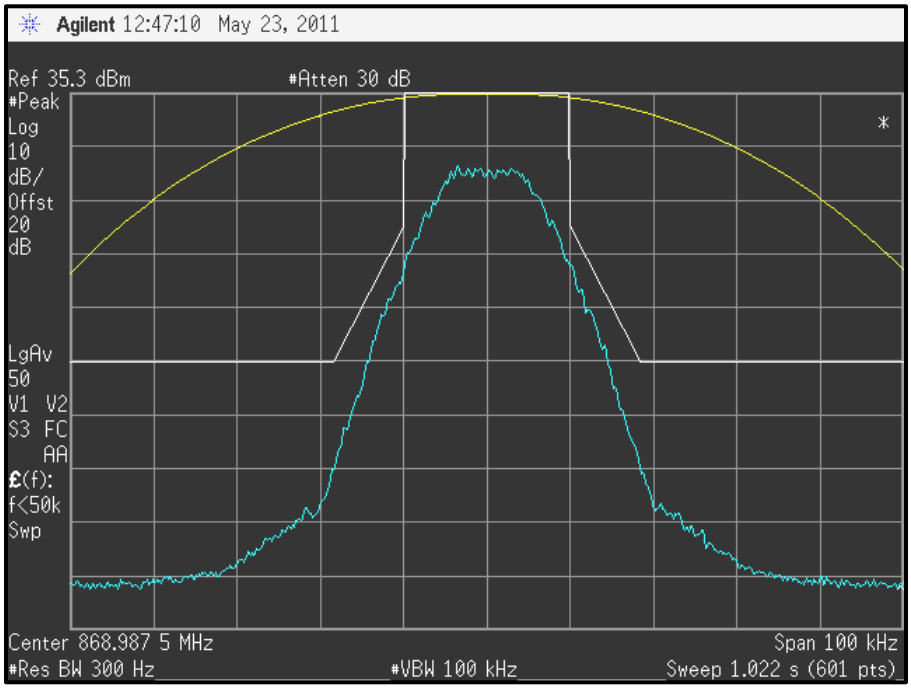
Plot 6-21: Occupied Bandwidth – Analog FM 868.9875 MHz Mask B



Plot 6-22: Occupied Bandwidth – 2-Level FSK 868.9875 MHz Mask G



Plot 6-23: Occupied Bandwidth – OTP SMR 868.9875 MHz Mask G



Plot 6-24: Occupied Bandwidth – P25 868.9875 MHz Mask G

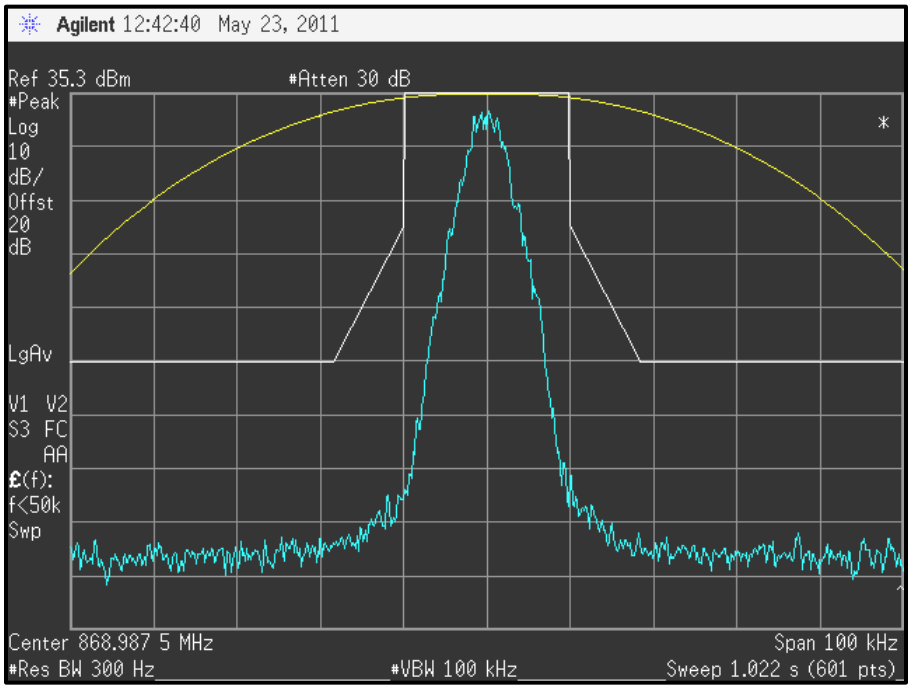


Table 6-1: Test Equipment Used For Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	4/08/12

Test Personnel:

Richard B. McMurray, P.E.	Richard B. McMurray	May 23, 2011
Test Engineer	Signature	Date of Test

7 FCC Rules and Regulations Part 90.213 and Part 2.1055: Frequency Stability; RSS-119 5.3: Transmitter Frequency Stability

7.1 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 an hour elapsed 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°C 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. Additionally, the power supply voltage of the EUT was varied +/-15% of nominal value.

7.2 Test Data

7.2.1 CFR 47 Part 90.213 Requirements

For portable stations over 2 W:

806 – 809, 851 – 854 MHz band: 1.5 ppm

809 – 824, 854 – 869 MHz band: 2.5 ppm

7.2.2 Frequency Stability/Temperature Variation

Table 7-1: Temperature Frequency Stability – 851.0125 MHz

Temperature (°C)	Measured Frequency (Hz)	ppm
-30	851012151	0.13
-20	851012136	0.11
-10	851011980	0.07
0	851011861	0.21
10	851011918	0.14
20 (reference)	851012040	0.00
30	851012064	0.03
40	851012093	0.06
50	851012094	0.06
60	851012214	0.20

7.2.3 Frequency Stability/Voltage Variation

Table 7-2: Frequency Stability/Voltage Variation – 851.0125 MHz

Voltage (VDC)	Measured Frequency (Hz)	ppm
5.878 (Battery End-Point)	851012034	0.02
6.375	851012046	0.01
7.5 (reference)	851012053	0.00
8.625	851012050	0.00

The worst-case deviation was found to be 0.21 ppm.

Result: The EUT is compliant.

Table 7-3: 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:

Richard B. McMurray, P.E.	Richard B. McMurray	May 22, 2011
Test Engineer	Signature	Date of Test

8 FCC Rules and Regulations Part 90.210 and Part 2.1053(a); RSS-119 5.8: Field Strength of Spurious Radiation

8.1 Test Procedure

ANSI/TIA-603-C-2004, Section 2.2.12.

The spurious emissions levels were measured with the EUT terminated with a 50 Ω load, 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.

8.2 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 (in MHz) were investigated: 806.0125, 815.0125, 823.9875, 851.0125, 860.0125 and 868.9875 MHz.

Table 8-1: Field Strength of Spurious Radiation – 806.0125 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
4030.0625	37.1	-65.5	2.4	7.6	95.7	-47.3
4836.0750	31.2	-71.6	2.6	8.8	100.8	-52.4
5642.0875	32.8	-70.2	2.8	9.0	99.4	-51.0
6448.1000	32.1	-70.2	2.8	9.7	98.7	-50.3
7254.1125	31.8	-71.7	2.8	9.0	100.9	-52.5
8060.1250	33.6	-63.6	2.7	9.2	92.5	-44.1

Table 8-2: Field Strength of Spurious Radiation – 815.0125 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
4075.0625	35.7	-63.52	2.4	7.9	93.5	-45.1
4890.0750	30.2	-68.31	2.6	8.8	97.6	-49.2
5705.0875	29.4	-69.61	2.8	9.2	98.6	-50.2
6520.1000	31.8	-67.61	2.8	9.7	96.1	-47.7
7335.1125	30.4	-69.6	2.8	8.8	99.1	-50.7
8150.1250	32	-69.6	2.7	9.2	98.5	-50.1

Table 8-3: Field Strength of Spurious Radiation – 823.9875 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
4119.9375	35	-70.6	2.4	8.2	100.3	-51.9
4943.9250	28.3	-76.7	2.6	8.8	105.9	-57.5
5767.9125	27.8	-76	2.8	9.2	105.0	-56.6
6591.9000	31.7	-71.9	2.8	9.6	100.5	-52.1
7415.8875	33.1	-70	2.8	8.8	99.4	-51.0
8239.8750	32	-67.4	2.7	9.3	96.2	-47.8

Table 8-4: Field Strength of Spurious Radiation – 851.0125 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
4255.0625	34.8	-67.8	2.5	8.6	97.0	-48.6
5106.0750	28.2	-71.8	2.7	8.6	101.2	-52.8
5957.0875	28.5	-69.3	2.8	9.2	98.3	-49.9
6808.1000	32.9	-65.5	2.8	9.5	94.3	-45.9
7659.1125	32	-69	2.8	9.3	97.9	-49.5
8510.1250	32.2	-65.4	2.6	9.2	94.3	-45.9

Table 8-5: Field Strength of Spurious Radiation – 860.0125 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
3440.0500	40	-73.1	2.0	7.6	102.9	-54.6
4300.0625	37.9	-66.1	2.5	8.7	95.2	-46.9
6020.0875	32.5	-69.19	2.8	9.1	98.2	-49.9
6880.1000	33.4	-60.71	2.8	9.5	89.3	-41.0
7740.1125	33.1	-69	2.8	9.4	97.7	-49.4
8600.1250	32.4	-63	2.6	9.3	91.7	-43.4

Table 8-6: Field Strength of Spurious Radiation – 868.9875 MHz

Frequency (MHz)	Spectrum Analyzer Level (dBuV/M)	Signal Generator Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Signal Generator (dBc)	Margin (dB)
3475.9500	43.1	-69.7	2.0	7.6	99.5	-51.2
4344.9375	38.5	-63.8	2.5	8.6	93.0	-44.7
6082.9125	32.3	-64	2.8	9.1	93.1	-44.8
6951.9000	33.2	-65.9	2.8	9.6	94.5	-46.2
7820.8875	32.8	-67.3	2.7	9.4	95.9	-47.6
8689.8750	31.3	-65.7	2.6	9.2	94.4	-46.1

Table 8-7: Test Equipment Used for Testing Field Strength of Spurious Radiation

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901364	Rhein Tech Laboratories	PR-1042	Preamplifier (1 - 26.5 GHz)	N/A	2/22/12
900878	Rhein Tech Laboratories	AM3-1197-0005	3 meter antenna mast, polarizing	OATS1	N/A
901516	Insulated Wire Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/19/11
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/19/11
901242	Rhein Tech Laboratories	WRT-000-0003	Wood rotating table	N/A	N/A
900724	ARA, Inc.	LPB-2520	LOG/Bicon Antenna (25 – 1000 MHz)	1037	7/17/12
900321	EMCO	3161-03	Horn Antennas (4 – 8 GHz)	9508-1020	6/14/11
900323	EMCO	3160-07	Horn Antennas (8.2 – 12 GHz)	9605-1054	6/14/11
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/11
901235	Insulated Wire Inc.	KPS-1503-360-KPS-09302008	RF cable 36"	NA	4/5/12
900928	Hewlett Packard	83752A	Synthesized Sweeper, 0.01 to 20 GHz	3610A00866	2/17/12

Test Personnel:

Daniel Baltzell		May 24, 2011
Test Engineer	Signature	Date of Tests

9 FCC Part 2.1047(a): Modulation Characteristics - Audio Frequency Response; RSS-119 5.8: Types of Modulation

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

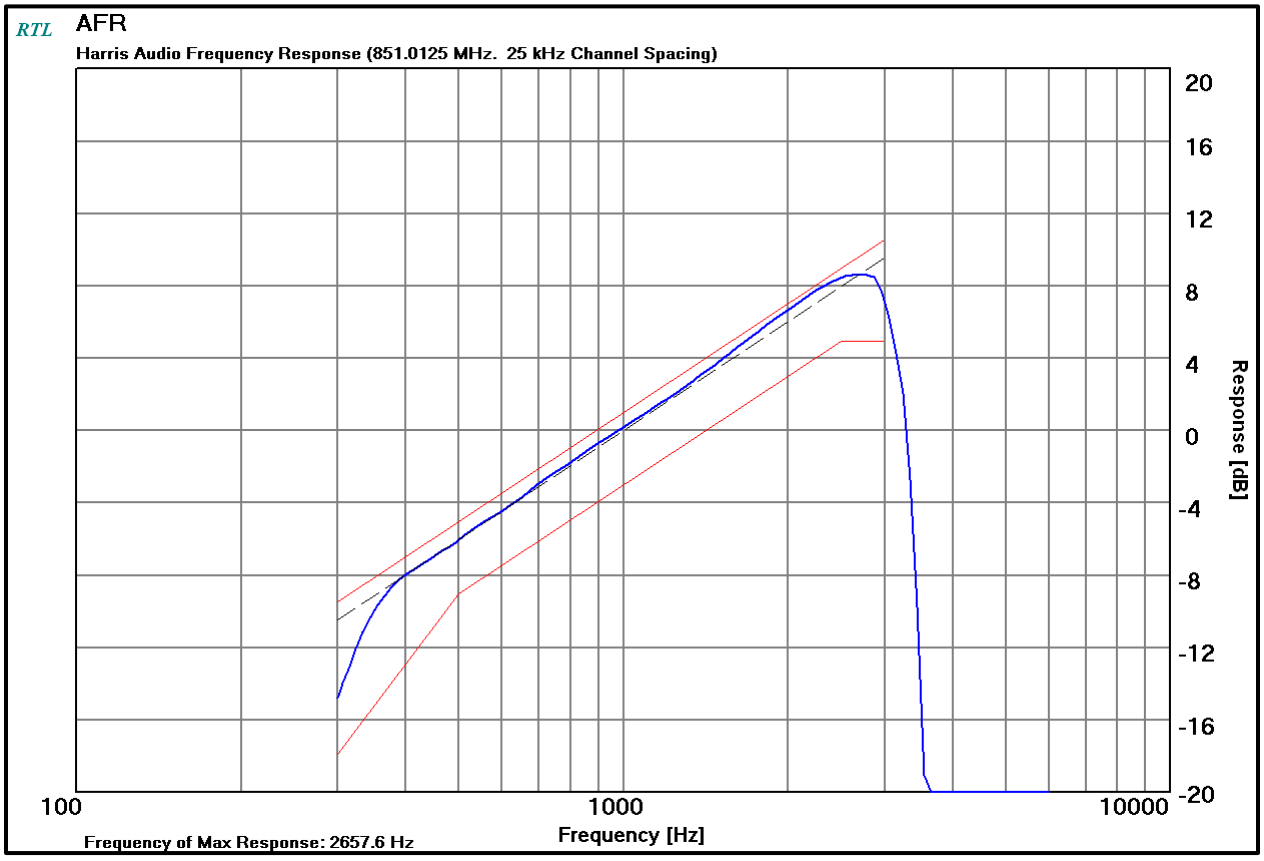


Table 9-1: Test Equipment Used For Testing Audio Frequency Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	3/04/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/07/12

Test Personnel:

Daniel Baltzell		May 23, 2011
Test Engineer	Signature	Date of Test

10 FCC Part 2.1047(a): Modulation Characteristics – Audio Low Pass Filter; RSS-119 5.8: Types of Modulation

10.1 Test Procedure

ANSI/TIA-603-C-2004, section, 2.2.15

The Audio Low Pass Filter Response is the frequency 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

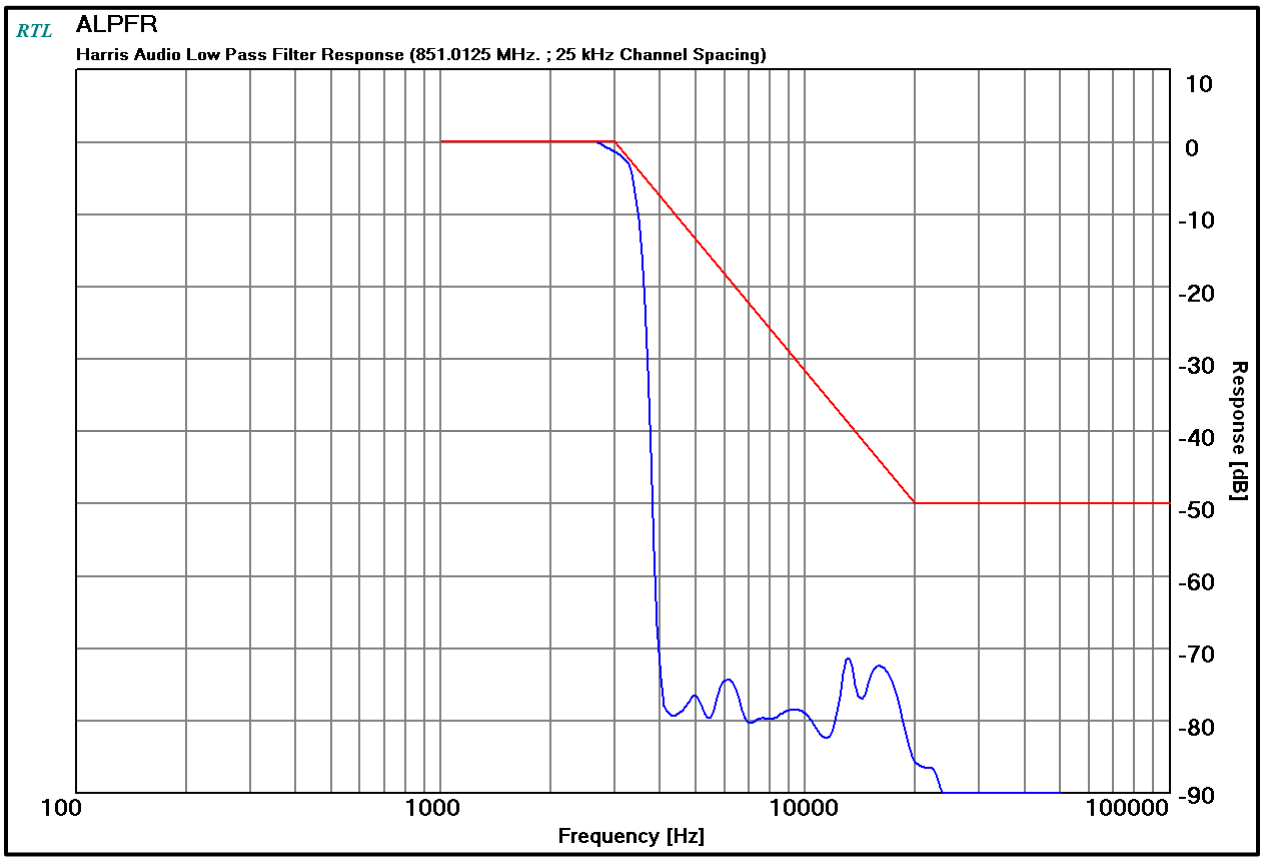


Table 10-1: Test Equipment Used For Testing Audio Low Pass Filter Response

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/ Level Generator	2514A02585	3/04/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/07/12
901054	Hewlett Packard	3586B	Selective Level Meter	1928A01892	3/23/12

Test Personnel:

Daniel Baltzell		May 23, 2011
Test Engineer	Signature	Date of Test

11 FCC Rules and Regulations Part 2.1047(b): Modulation Characteristics - Modulation Limiting; RSS-119 5.8: Types of Modulation

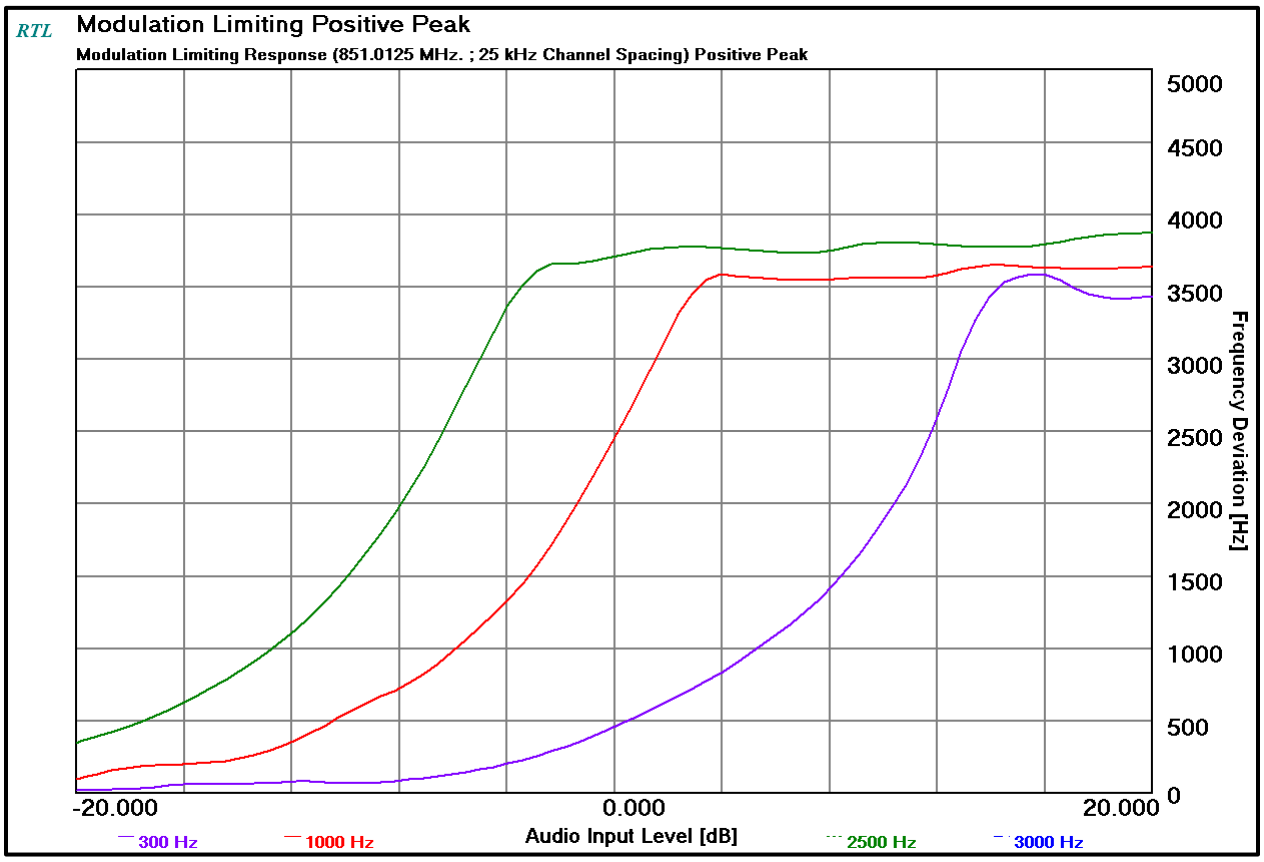
11.1 Test Procedure

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

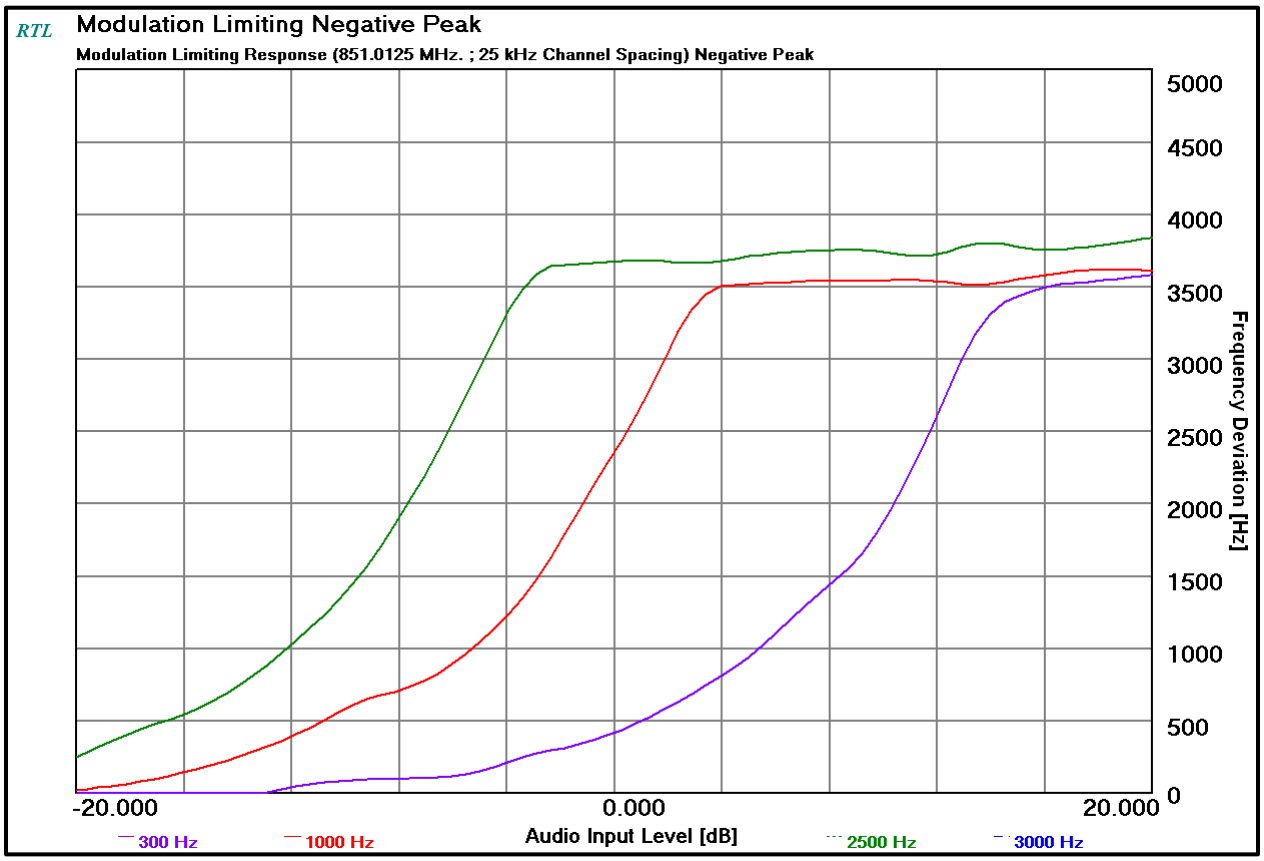


Table 11-1: Test Equipment Used For Testing Modulation Limiting

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901057	Hewlett Packard	3336B	Synthesizer/Level Generator	2514A02585	3/04/12
901118	Hewlett Packard	8901A Opt. 002-003	Modulation Analyzer	2406A00178	10/07/12

Test Personnel:

Daniel Baltzell		May 23, 2011
Test Engineer	Signature	Date of Test

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

Analog FM (WB)
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 5.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 16.0 kHz
Emission designator: 16K0F3E

Analog FM (NP)
Max modulation (M) in kHz: 3.0
Max deviation (D) in kHz: 4.0
Constant factor (K): 1 (default)
Bn = 2xM+2xDK = 14.0 kHz
Emission designator: 14K0F3E

2-Level FSK Voice/Data (WB)
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 3,000 Hz
K = 1
Bn = (3.86*D)+(0.027*RK) = 14,172 kHz
Emission designator: 14K2F1D, 14K2F1E

2-Level FSK Voice/Data (NP)
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 2,400 Hz
K = 1
Bn = (3.86*D)+(0.027*RK) = 11,856 kHz
Emission designator: 11K9F1D, 11K9F1E

4-Level FSK Voice/Data (NB)
Data rate in bps (R) = 9,600
Peak deviation of carrier (D) = 1,800 Hz
Number of state in each symbol (S) = 4
Bn = $[R/\log_2(4) + 2(D)(1)]$ = 8,400 kHz
Emission designator: 8K40F1D, 8K40F1E

4-Level FSK Voice/Data (WB)
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 4,000 Hz
Number of state in each symbol (S) = 4
K = 1
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 17.6 kHz
Emission designator: 17K6F1D, 17K6F1E

4-Level FSK Voice/Data (NP)
Data rate in bps (R) = 19,200
Peak deviation of carrier (D) = 3,750 Hz
Number of state in each symbol (S) = 4
K = 1
Bn = $[R/\log_2(4) + 2(D)(K)]$ = 17.1 kHz
Emission designator: 17K1F1D, 17K1F1E

13 Conclusion

The data in this measurement report shows that the **Harris Corporation** Model **P5300/5500 800 MHz Portable Radio, FCC ID: OWDTR-0066-E, IC: 3636B-0066,** complies with all the applicable requirements of Parts 90 and 2 of the FCC Rules and IC RSS-119.