RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC & IC Class 2 Permissive Change Report

Harris Corporation
221 Jefferson Ridge Parkway
Lynchburg, VA 24501

Model: XG-25M VHF Mobile Radio

FCC ID: OWDTR-0075-E
IC: 3636B-0075

April 9, 2013

Standards Referenced for this Report	
Part 2: 2012	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Part 22: 2012	Public Mobile Services
Part 90: 2012	Private Land Mobile Radio Services
TIA-102.CCAA August 2011	Two-Slot Time Division Multiple Access Transceiver Measurement Methods
TIA-102.CCAB October 2011	Two - Slot Time Division Multiple Access Transceiver Performance Recommendations
SRSP-500	Technical Requirements for Land Mobile and Fixed Radio Services Operating in the Bands 138-143.9875 MHz and 148.0125-174 MHz
RSS-119, Issue 11; June 2011	Radio Transmitters and Receivers Operating in the Land Mobile and Fixed Services in the Frequency Range 27.41-960 MHz
TIA-EIA-603-C August 2004	Land Mobile FM or PM Communications Equipment – Measurement and Performance Standards

Report Prepared By: Daniel Baltzell

Document Number: 2013008

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)	Mode	Emission Designator
136 – 174 (Federal, FCC Part 22, 80) 138 – 174 (IC)	50.0	2.5	Voice	16K0F3E
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	Voice	11K0F3E
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	2 level NB 9600 FSK	9K90F1D
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	2 level NB 9600 FSK	9K90F1E
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	2 level NB 4800	7K10F1D
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	2 level NB 4800	7K10F1E
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	P25	8K40F1D
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	P25	8K40F1E
136 – 174 (Federal, FCC Part 22, 80, 90) 138 – 174 (IC)	50.0	2.5	H-CPM TDMA	8K10DXW

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1 Test Result Summary

Test	FCC Reference	IC Reference	Result
RF Power Output	2.1046(a), 90.541(b), 90.542(a)(6); 22.659	RSS-119 5.4	Complies
Spurious Emissions at Antenna Terminals	2.1046(a), 90.541(b), 90.542(a)(6); 22.359	RSS-119 5.4	Complies
Occupied Bandwidth/Emission Masks	2.1049(c)(1), 90.543(d); 22.359(b)	RSS-119 5.5, 5.8	Complies

2 General Information

The following Class 2 Permissive Change 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 XG-25M VHF Radio; FCC ID: OWDTR-0075-E, IC: 3636B-0075.

The purpose of this Class 2 Permissive Change is to add emission designator 8K10DXW (H-CPM), and Part 22 operations.

All measurements contained in this application were conducted in accordance with the applicable sections of 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)

The original FCC and IC certifications were granted July 12, 2012. The model name certified with IC is DM-MV1B.

2.3 Grant Notes

Power is continuously variable from 10 - 50 W. The grant listed power is rated power and actual measured power is shown in the test report. For Part 80 maritime operation, 50 W operation limited to fixed/coast stations; when used as a ship station, conducted power must not exceed 25 W.

2.4 Tested System Details

The test sample was received on February 15, 2013. 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 test patterns using the H-CPM TDMA mode. All test patterns were investigated and found to be nearly identical from an emissions perspective. Modes for Part 22 operation were also provided.

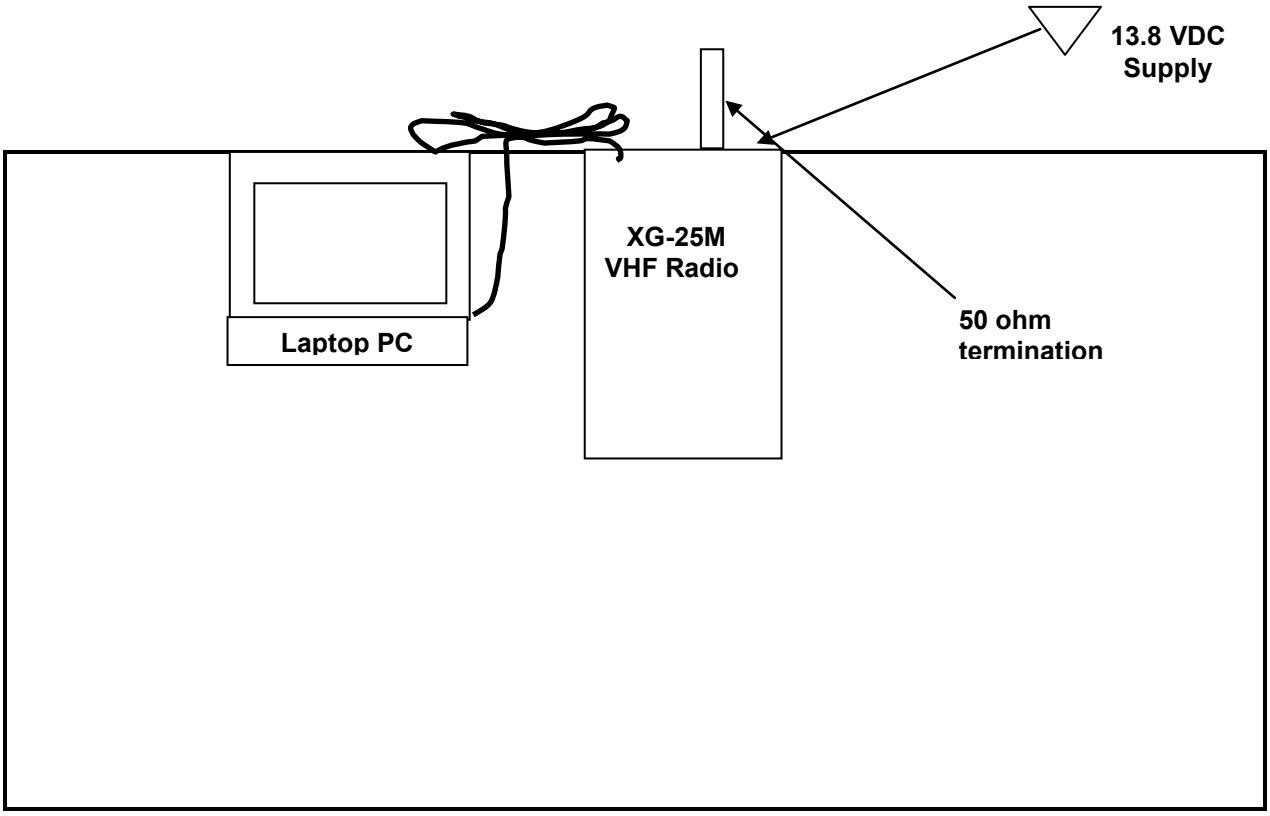
Table 2-1: Equipment Under Test (EUT)

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
XG-25M VHF Mobile Radio	Harris Corporation	DM-MV1B	14015-0010	OWDTR-0075-E	20867

Table 2-2: Auxiliary Equipment

Part	Manufacturer	Model	PN/SN	FCC ID	RTL Bar Code
13.8 VDC Power Supply	Samlex America, Inc.	SEC 1223	03061-3J04-00763	DoC	17707
Power Cable	Harris	CA-012365-001	N/A	N/A	N/A
Attenuator with Termination	Weinschel Corp.	48-20-34	BK5859	N/A	901139
Laptop	Sony	PCG-71314L	N/A	N/A	N/A

Figure 2-1: Configuration of Tested System



3 FCC §2.1046(a); § 22.659; §90.1215(a); IC RSS-119 §5.4: Peak Output Power

3.1 Test Procedure

TIA-102.CCAA August 2011, section 2.2.1, TIA-102.CCAB October 2011, section 3.2.1

The EUT was connected via an appropriate 50 ohm attenuator to a signal analyzer. An offset was used to account for any attenuation.

3.2 Test Data

Table 3-1: RF Power Output: Modulated Carrier Output Power

Frequency (MHz)	High Power (dBm)	High Power (W)	Low Power (dBm)	Low Power (W)
136.0125	47.3	53.7	40.6	11.5
150.0125	47.1	51.3	40.4	11.0
154.0250	47.0	50.1	40.3	10.7
158.6700	46.8	47.9	40.5	11.2
162.0000	46.9	49.0	40.3	10.7
173.9875	47.0	50.1	40.3	10.7

Table 3-2: RF Power Output (Rated Power)

Frequency (MHz)	High Power Rated (W)
136-174	50

Table 3-3: Test Equipment Used for Testing RF Power Output – Conducted

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901583	Agilent Technologies	N9010A	EXA Signal Analyzer (10 Hz - 26.5 GHz)	MY51250846	3/13/13
901537	Aeroflex	48-40-34	40 dB Attenuator	CB6628	12/14/13

Test Personnel:

Daniel Baltzell		March 1, 2013
EMC Test Engineer	Signature	Date of Test

4 FCC §2.1051: Conducted Spurious Emissions; §22.359: Emissions Limitations

4.1 Test Procedure

TIA-102.CCAA August 2011, section 2.2.7, TIA-102.CCAB October 2011, section 3.2.7

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

4.2 Test Data

Frequency range of measurement per Part 2.1057: 9 kHz to 10xFc.

Limit = 43 + 10 Log (P) dB or 70 dB, whichever is greater. (Part 22)

Limit: P(dBm) – (50 + 10xLOG P(W))

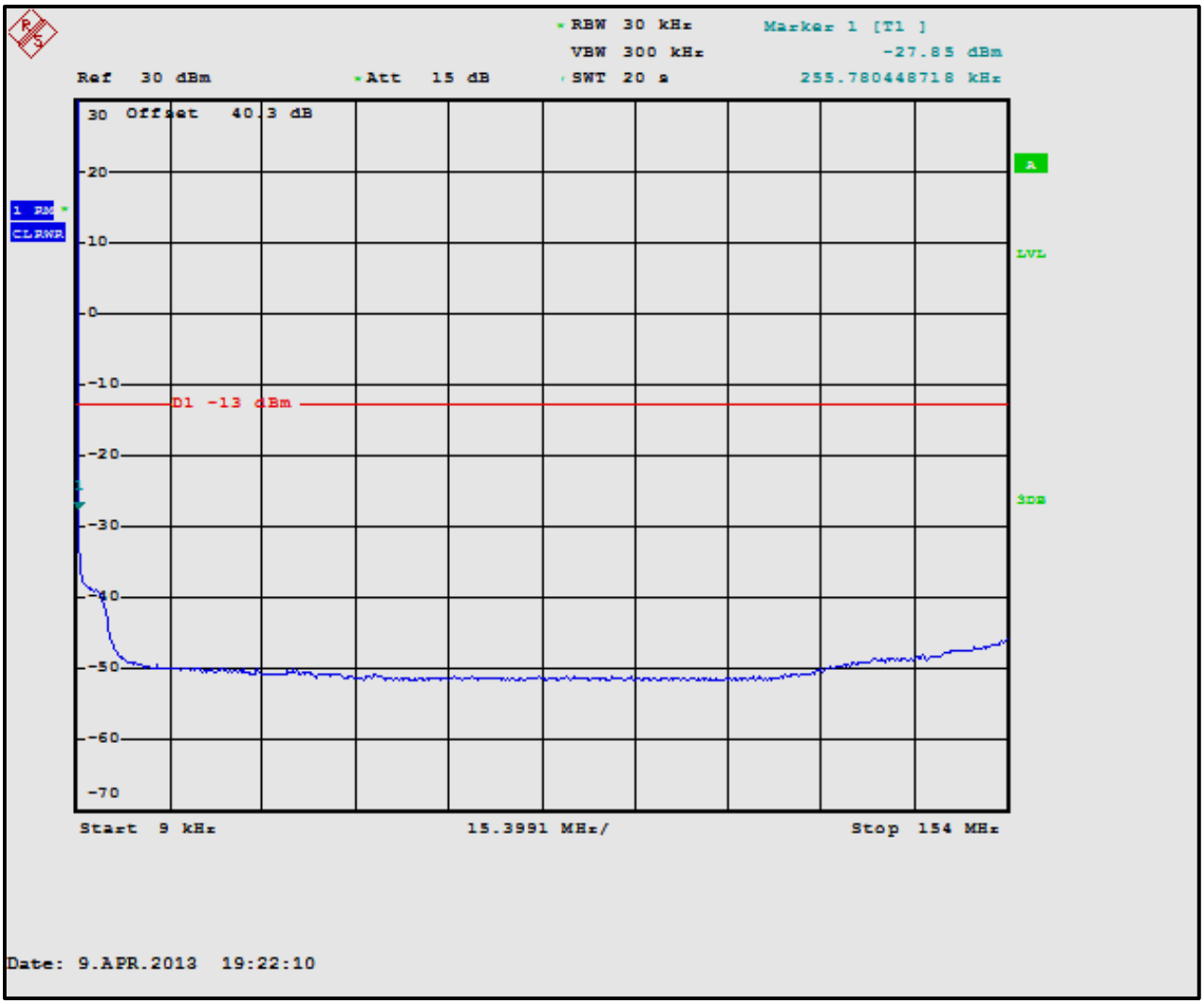
ANSI TIA-603-C-2004, Section 2.2.13.

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator. The transmitter was operated at maximum power. Attenuator losses were accounted for.

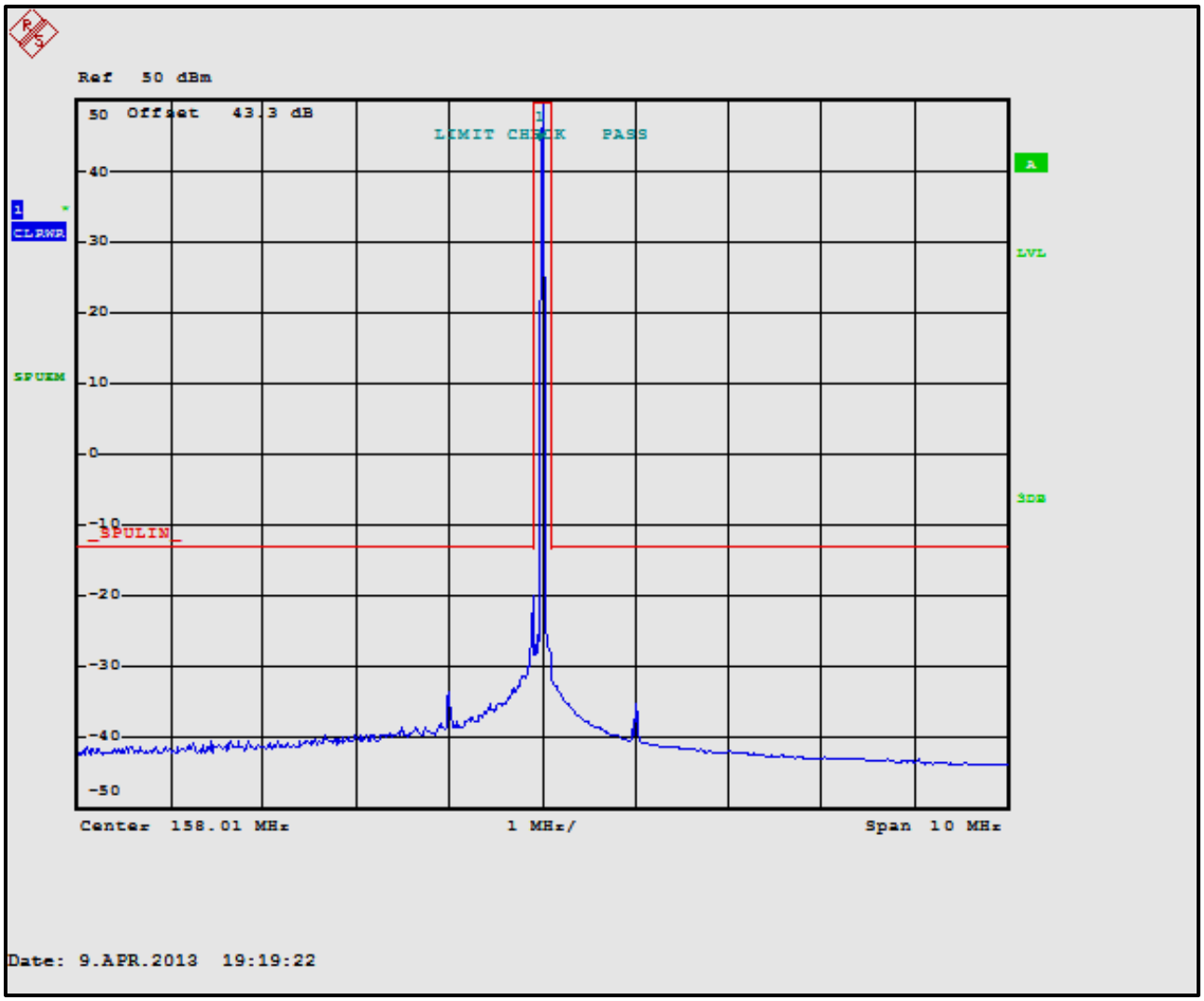
Analog Modulation: The transmitter is terminated with a 50 Ω load and is modulated with a 2,500 Hz sine wave at an input level 16 dB greater than that required to produce 50% of the rated system deviation at 1,000 Hz.

The worst case (unwanted emissions) channels are shown. Per FCC 2.1051, the magnitude of emissions attenuated more than 20 dB below the FCC limit need not be recorded.

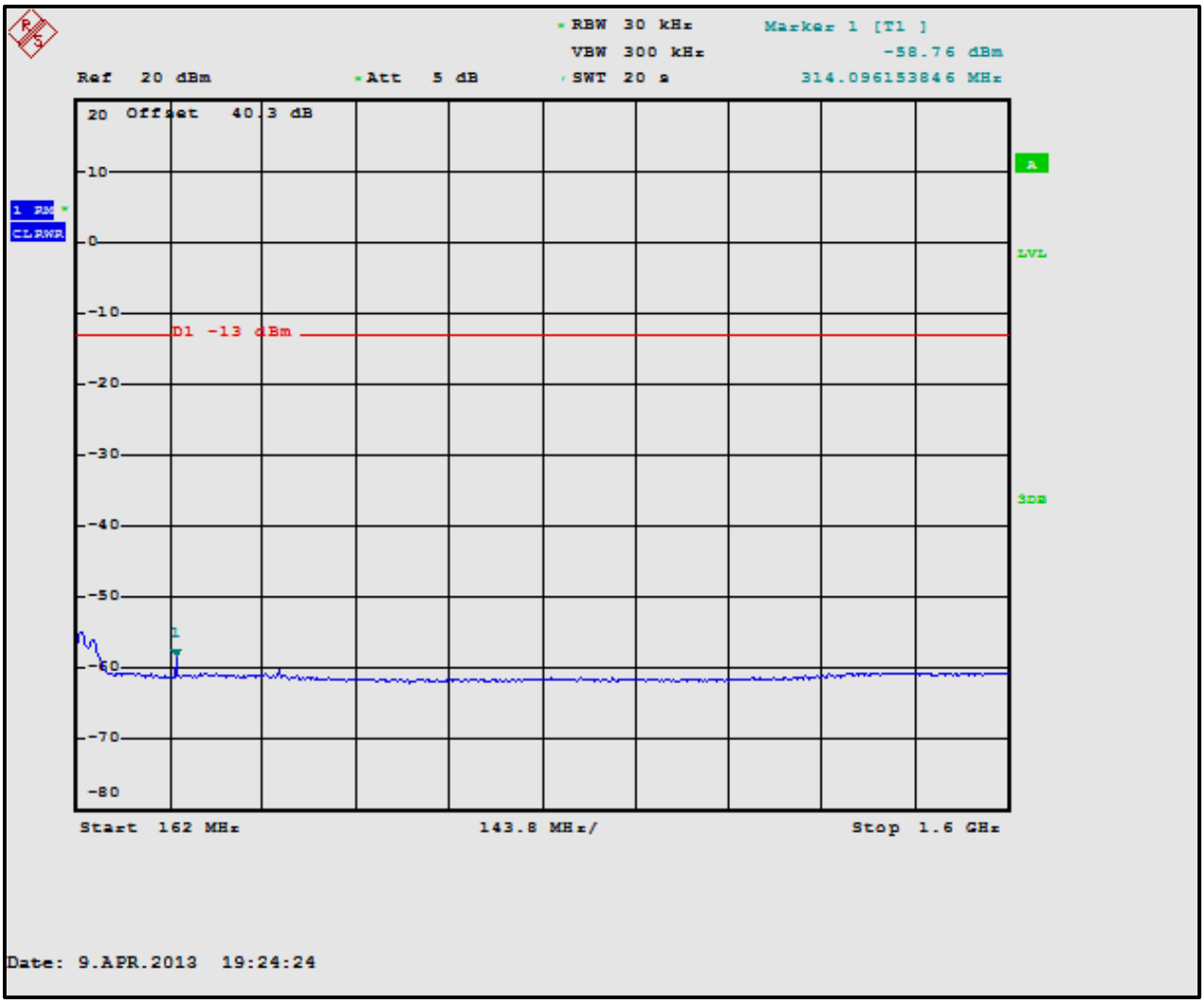
Plot 4-1: Conducted Spurious Emissions - 158.01 MHz; 9 kHz - 154 MHz



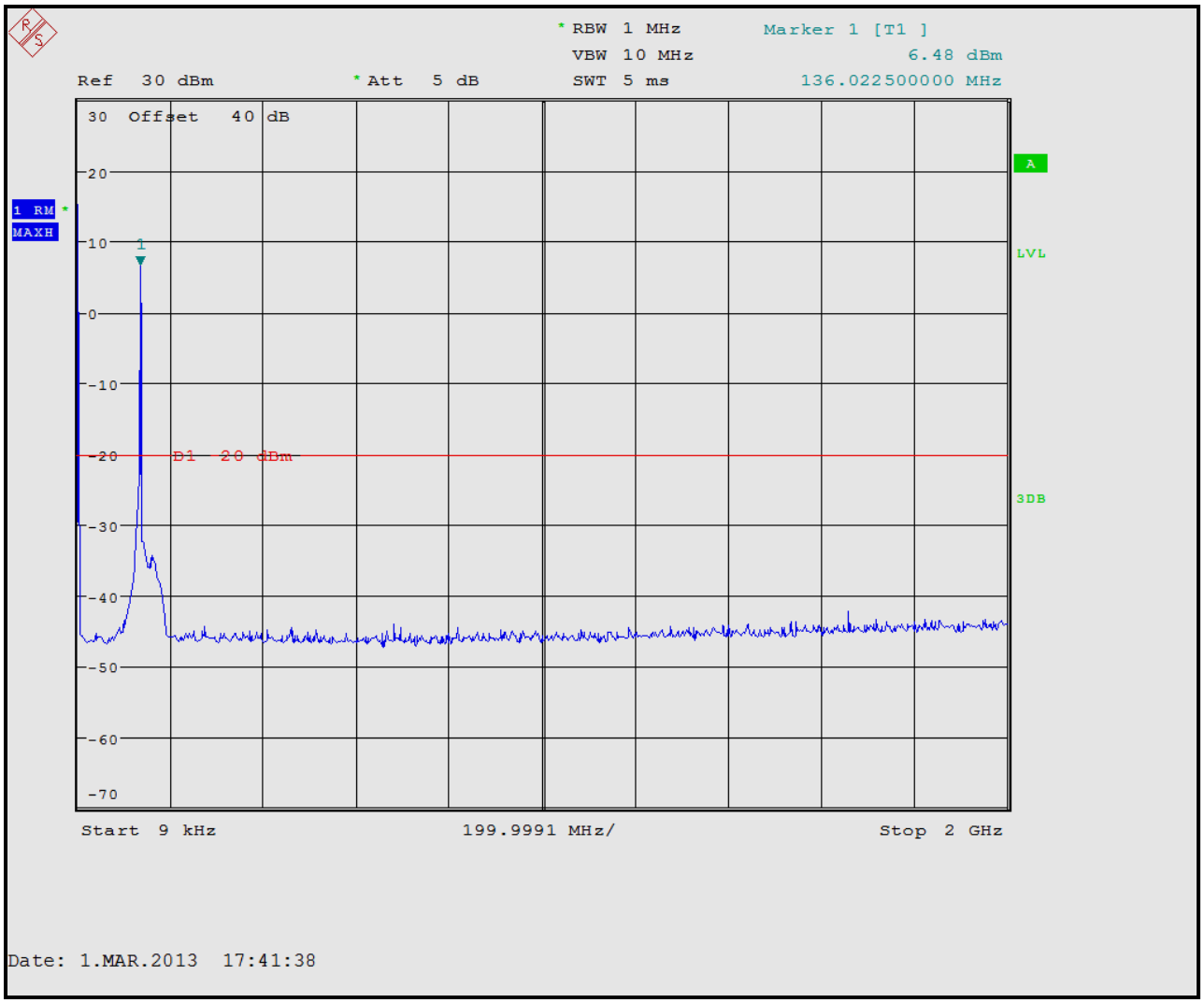
Plot 4-2: Conducted Spurious Emissions - 158.01 MHz; 10 MHz Span



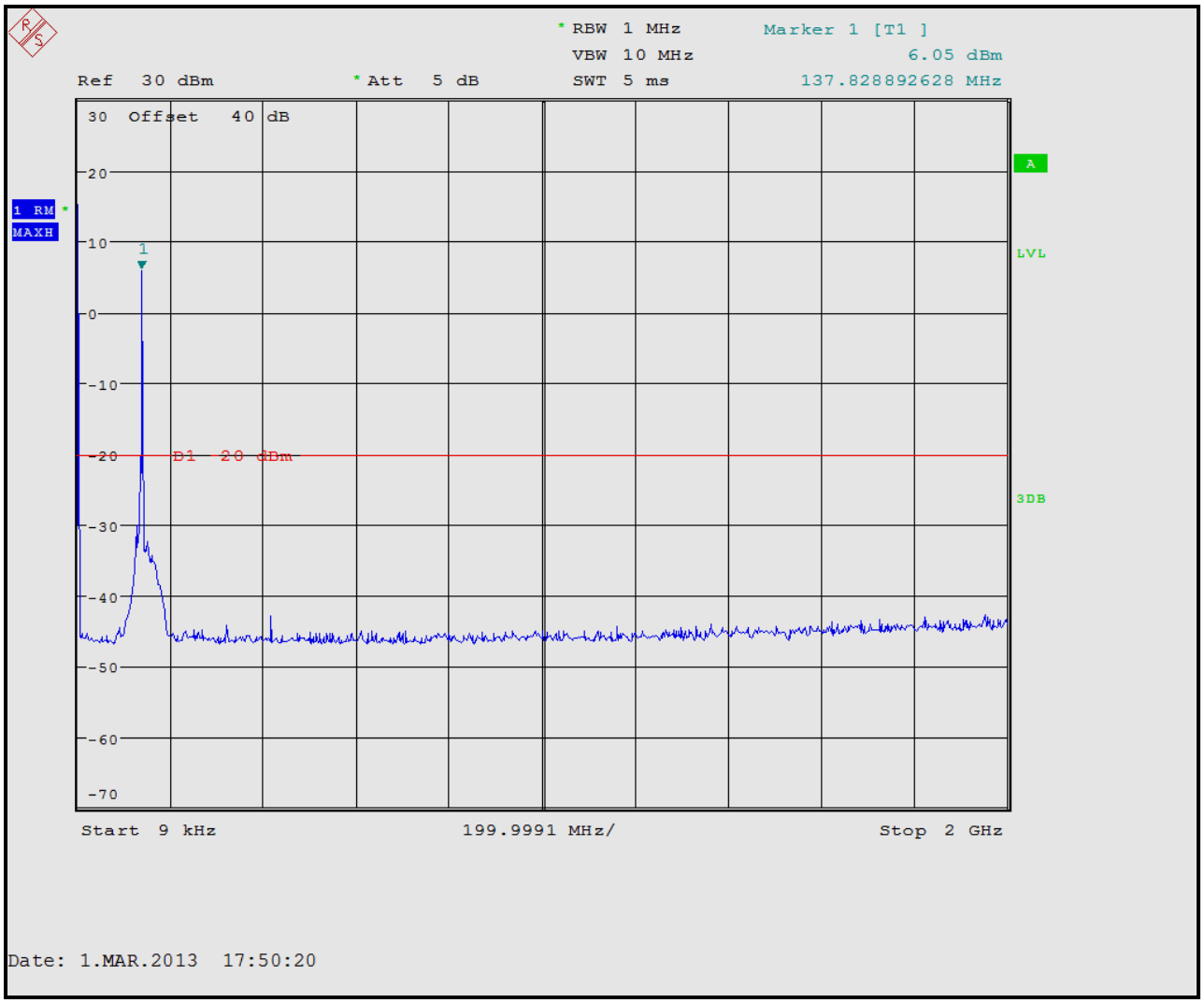
Plot 4-3: Conducted Spurious Emissions - 158.01 MHz; 162 MHz – 1.6 GHz



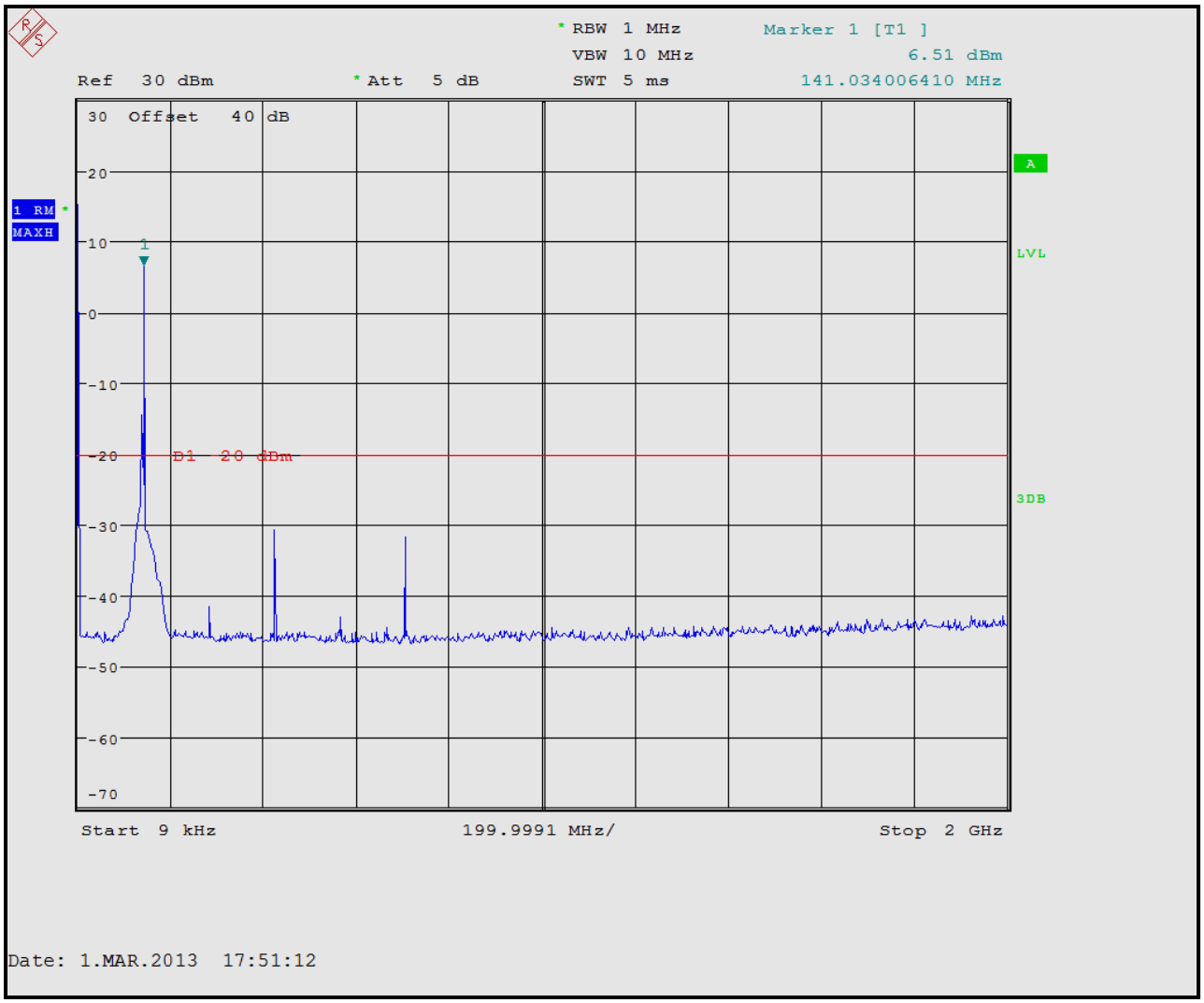
Plot 4-4: Conducted Spurious Emissions – H-CPM TDMA; 136.0125 MHz



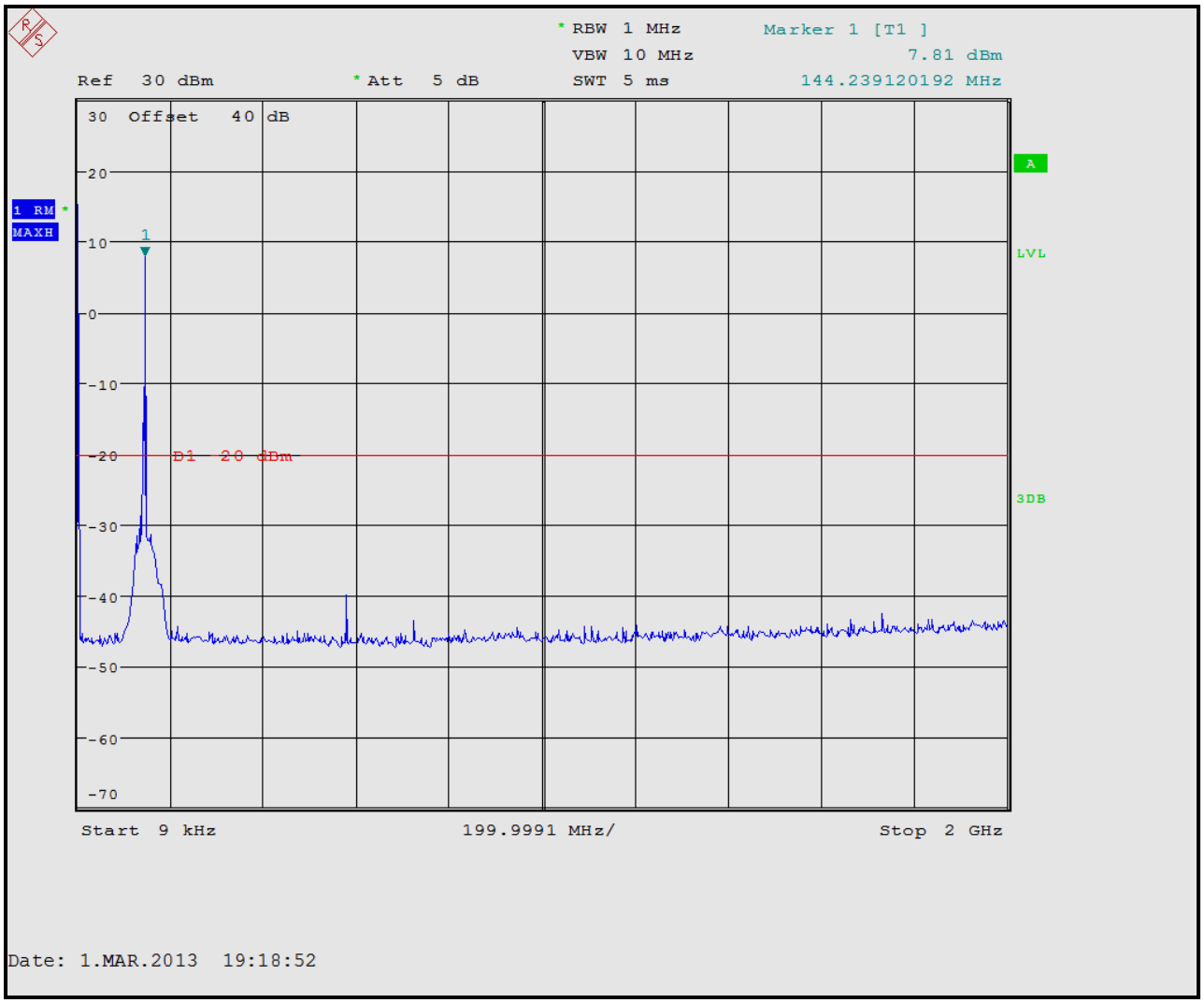
Plot 4-5: Conducted Spurious Emissions – H-CPM TDMA; 138.0125 MHz



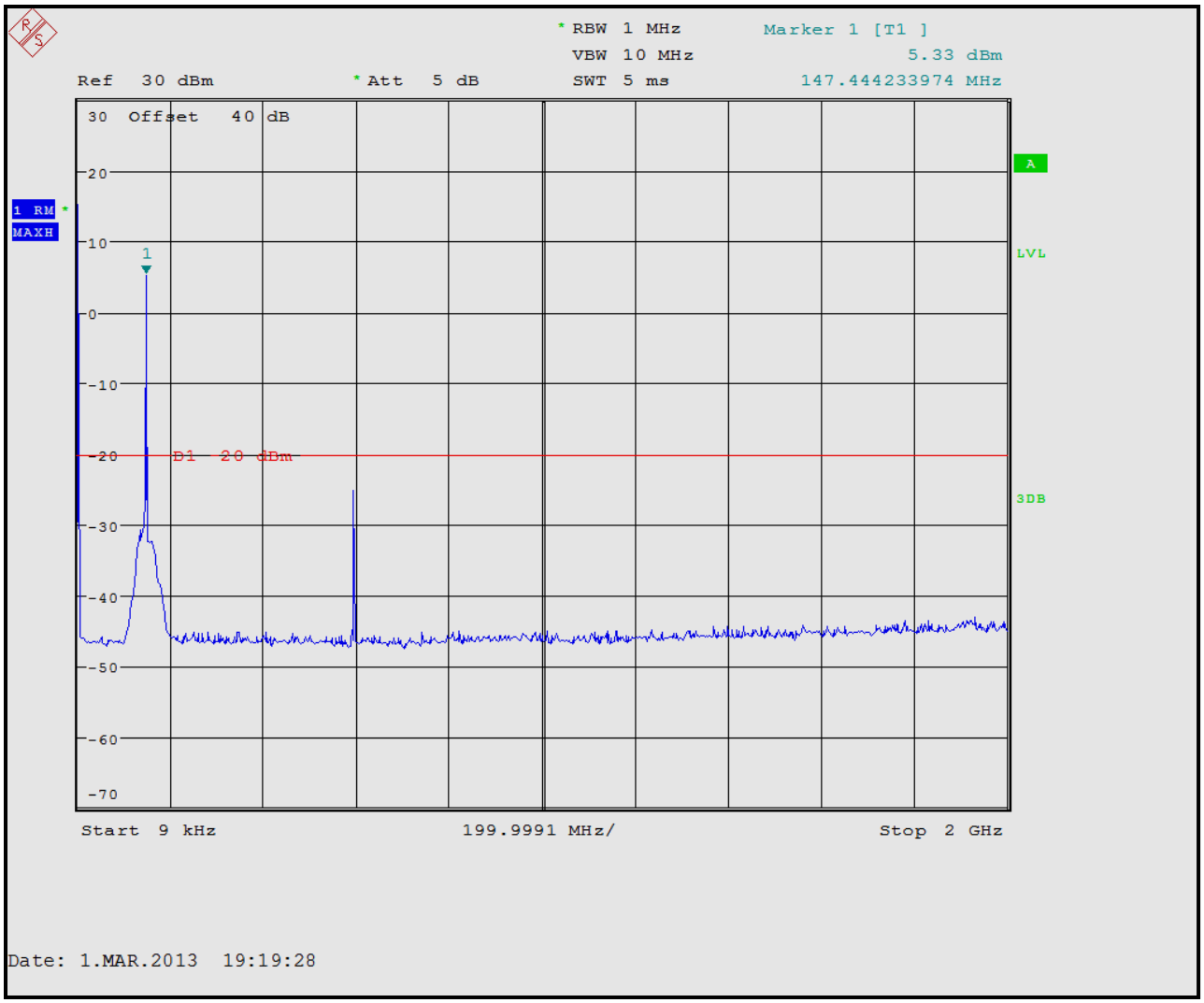
Plot 4-6: Conducted Spurious Emissions – H-CPM TDMA; 141.0000 MHz



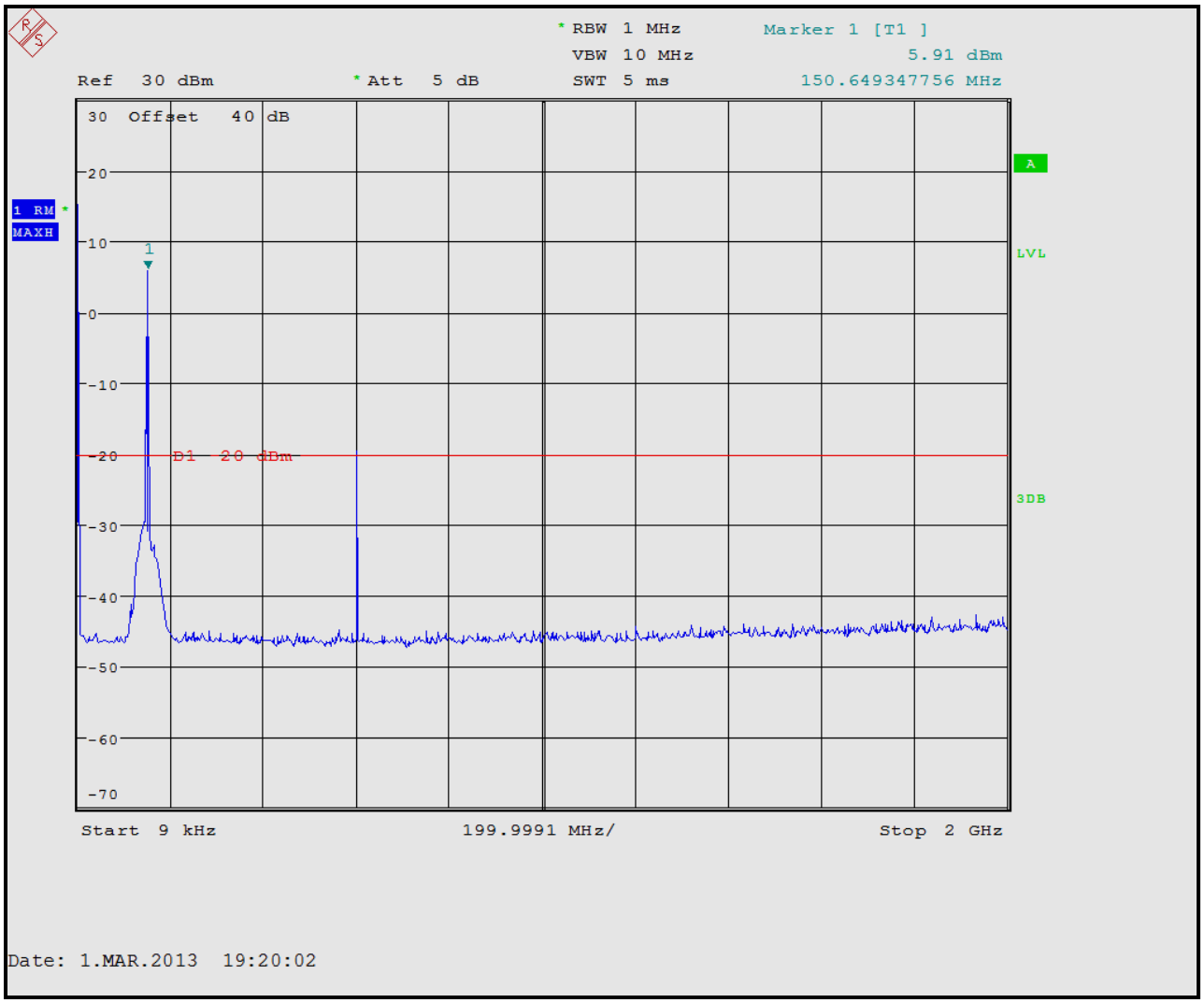
Plot 4-7: Conducted Spurious Emissions – H-CPM TDMA; 143.9875 MHz



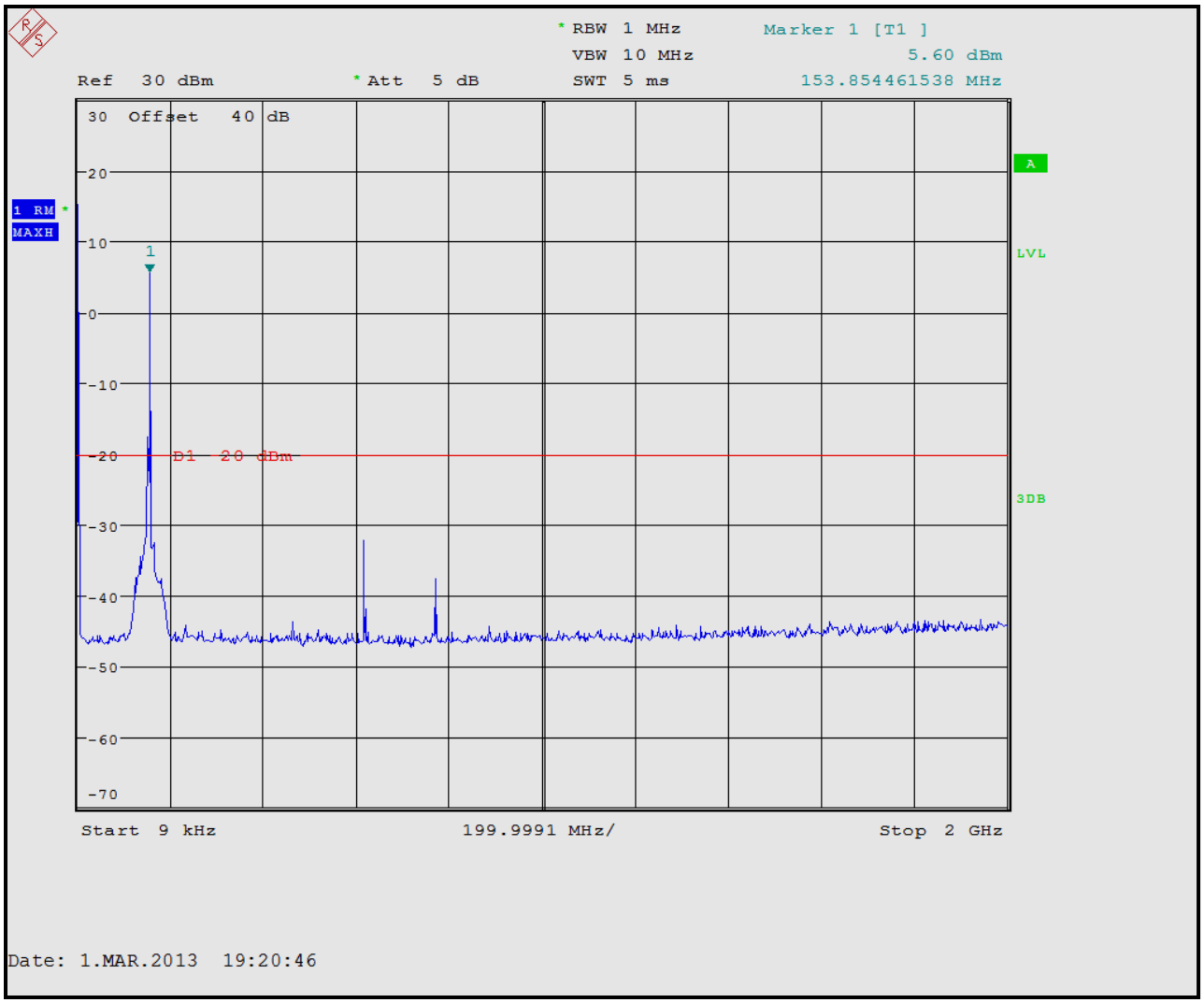
Plot 4-8: Conducted Spurious Emissions – H-CPM TDMA; 148.0125 MHz



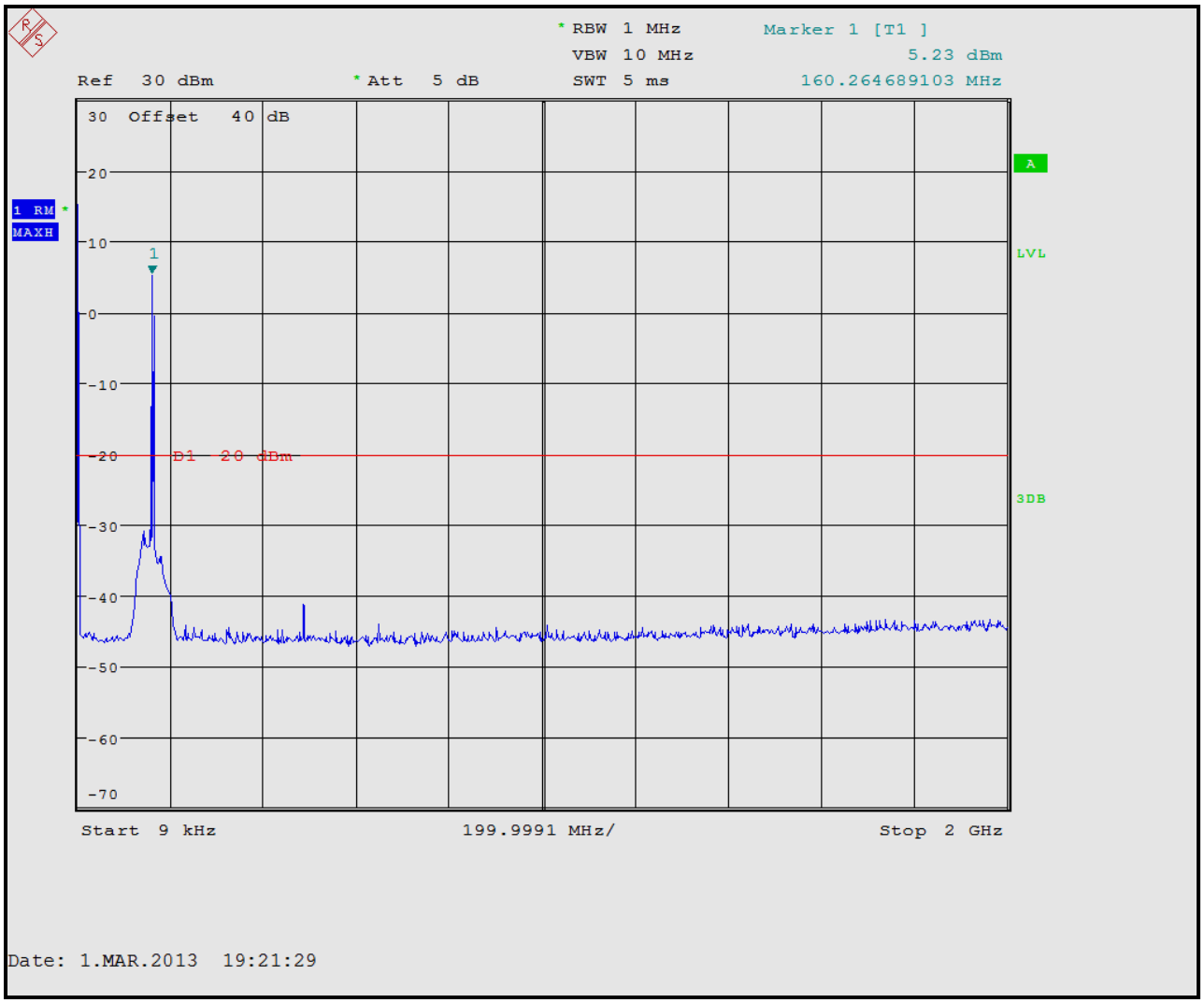
Plot 4-9: Conducted Spurious Emissions – H-CPM TDMA; 150.0125 MHz



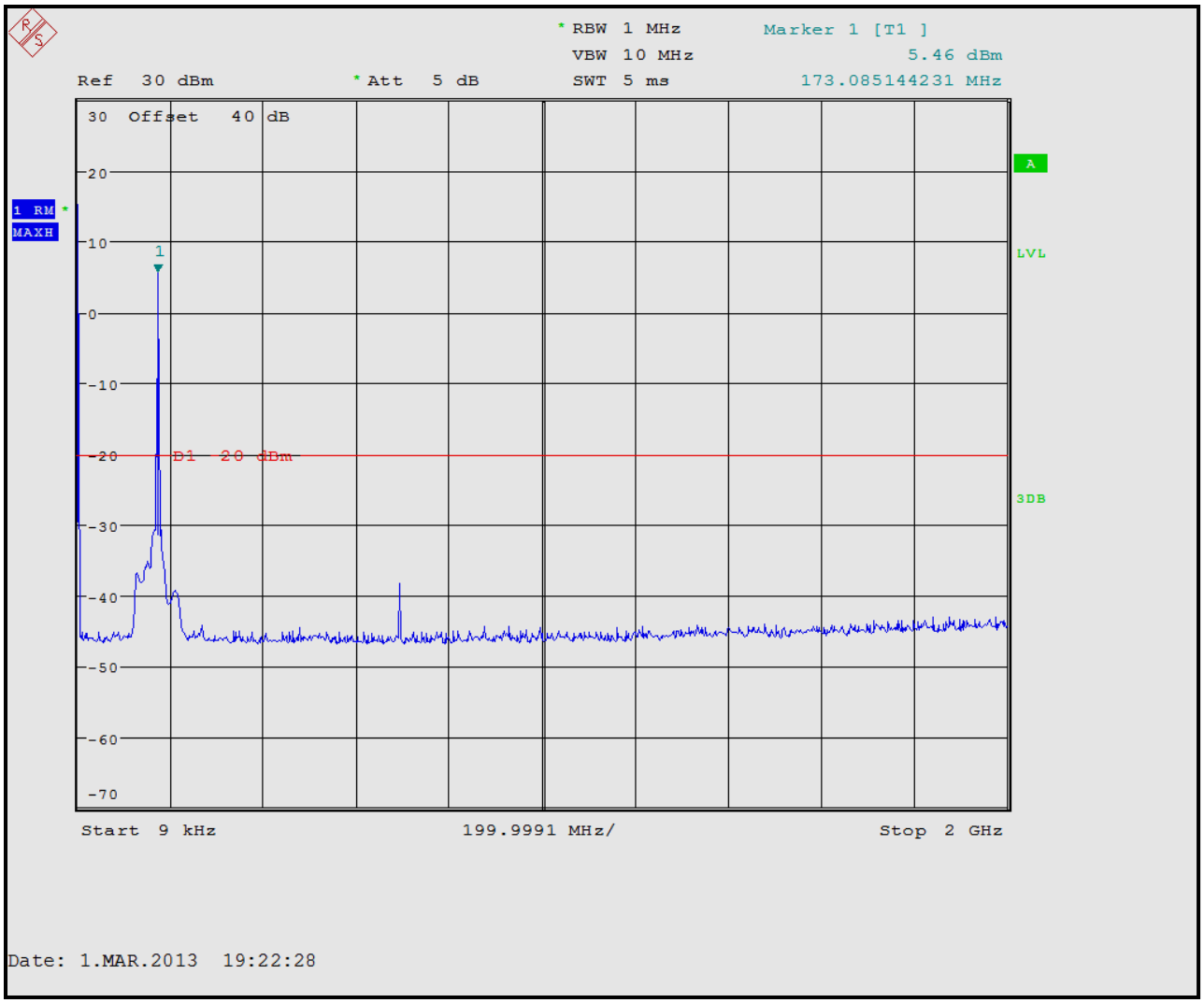
Plot 4-10: Conducted Spurious Emissions – H-CPM TDMA; 154.0250 MHz



Plot 4-11: Conducted Spurious Emissions – H-CPM TDMA; 162.0000 MHz



Plot 4-12: Conducted Spurious Emissions – H-CPM TDMA; 173.1750 MHz



Plot 4-13: Conducted Spurious Emissions – H-CPM TDMA; 173.9875 MHz

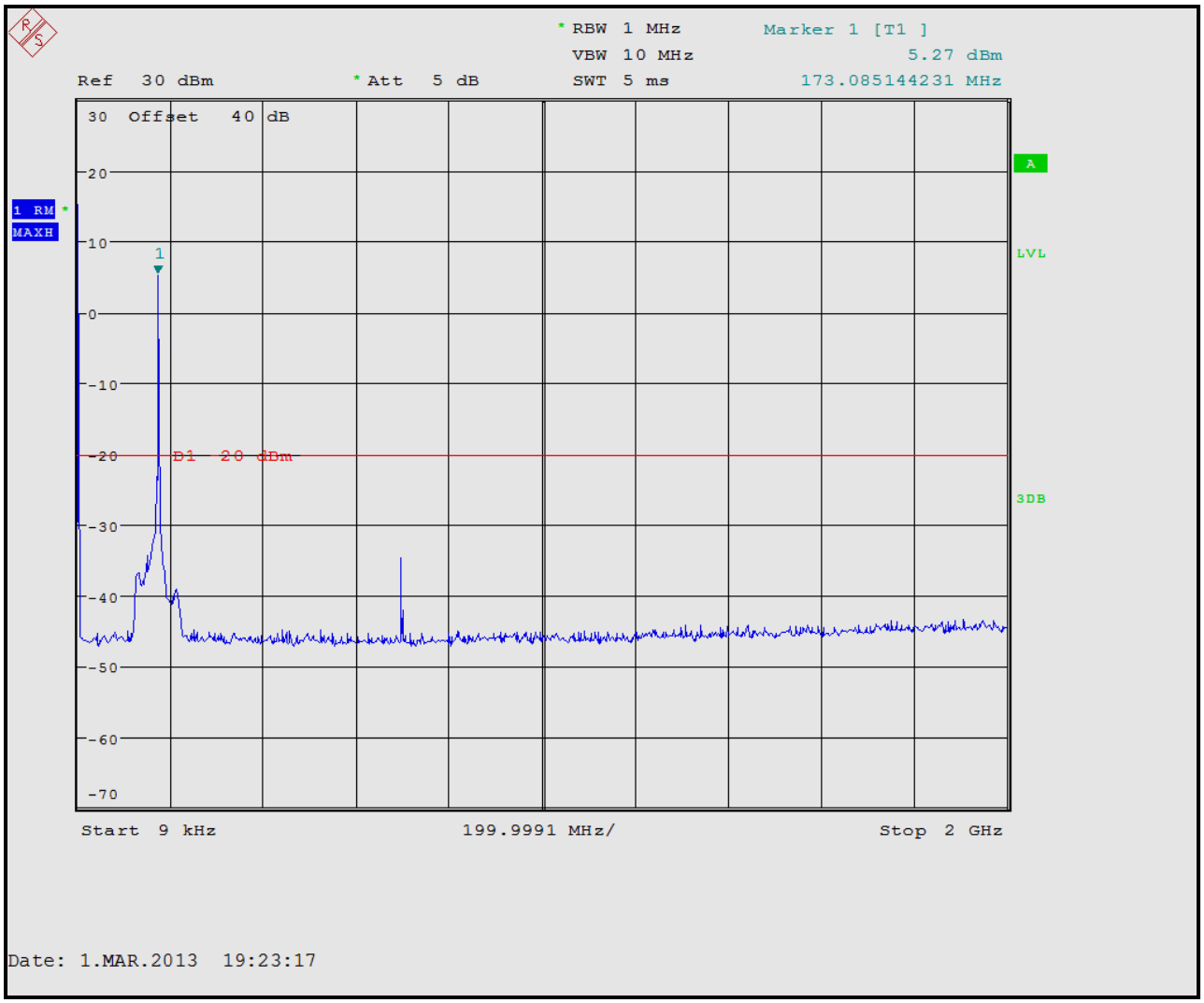


Table 4-1: Test Equipment Used for Testing Spurious Emissions

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901537	Weinschel Corp	48-40-34	Attenuator, 40 dB, 100W	CB66628	12/14/13
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	2/28/14

Test Personnel:

Daniel Baltzell		March 1 & April 9, 2013
EMC Test Engineer	Signature	Dates of Test

5 FCC §2.1049(c)(1); §90.210; §22.359(b): Emission Limitations; IC RSS-119 §5.8: Occupied Bandwidth

5.1 Test Procedure

ANSI TIA-603-C-2004, Section 2.2.11.

The transmitter was interfaced with a spectrum analyzer through an appropriate 50 ohm attenuator and a notch filter. The transmitter was operated at maximum power. Attenuator losses were accounted for.

§22.359(a) *Out of band emissions:* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

(b) Measurement procedure: In the 60 kHz bands immediately outside and adjacent to the authorized frequency range or channel, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 30 kHz or 1 percent of emission bandwidth, as spe cified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

TIA-102.CCAA August 2011, section 2.2.5, TIA-102.CCAB October 2011, section 3.2.5

Notes: FCC 90.210 specifies mask D for equipment without an audio low pass filter in the VHF band; IC RSS-119 and TIA-102.CCAB October 2011 section 3.2.5.1 specify mask D as well; data is presented on the following pages.

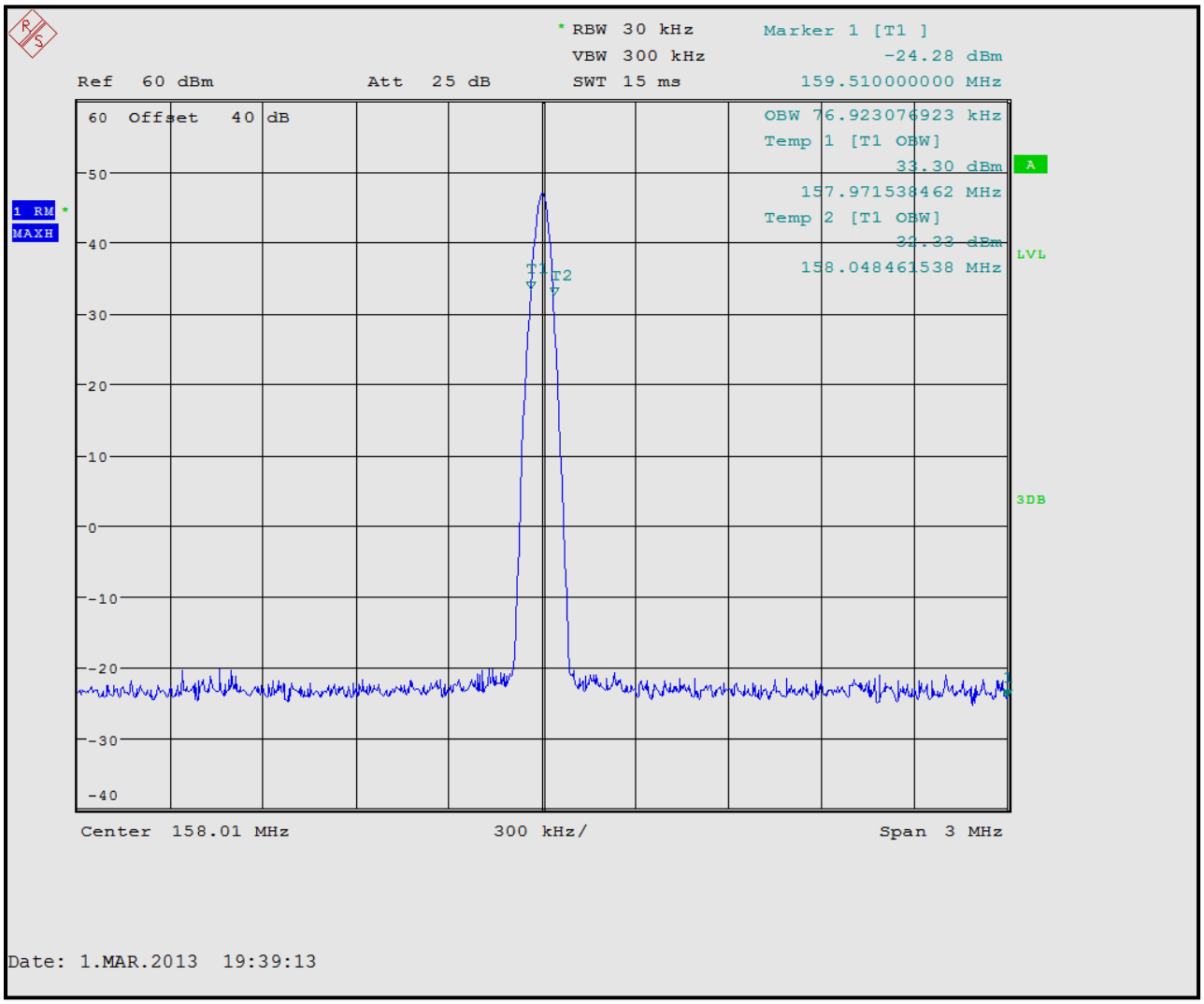
FCC §90.210

Applicable Emission Masks		
Frequency Band (MHz)	**Mask for Equipment with Audio Low Pass Filter**	**Mask for Equipment without Audio Low Pass Filter**
Below 25 [1]	A or B	A or C
25–50	B	C
72–76	B	C
150–174 [2]	B, D, or E	C, D, or E
150 Paging-only	B	C
220–222	F	F
421–512 [2]	B, D, or E	C, D, or E
450 Paging-only	B	G
806–809/851–854	B	H
809–824/854–869 [3]	B	G
896–901/935–940	I	J
902–928	K	K
929–930	B	G
4940–4990 MHz	L or M	L or M
5850–5925 [4]		
All other bands	B	C

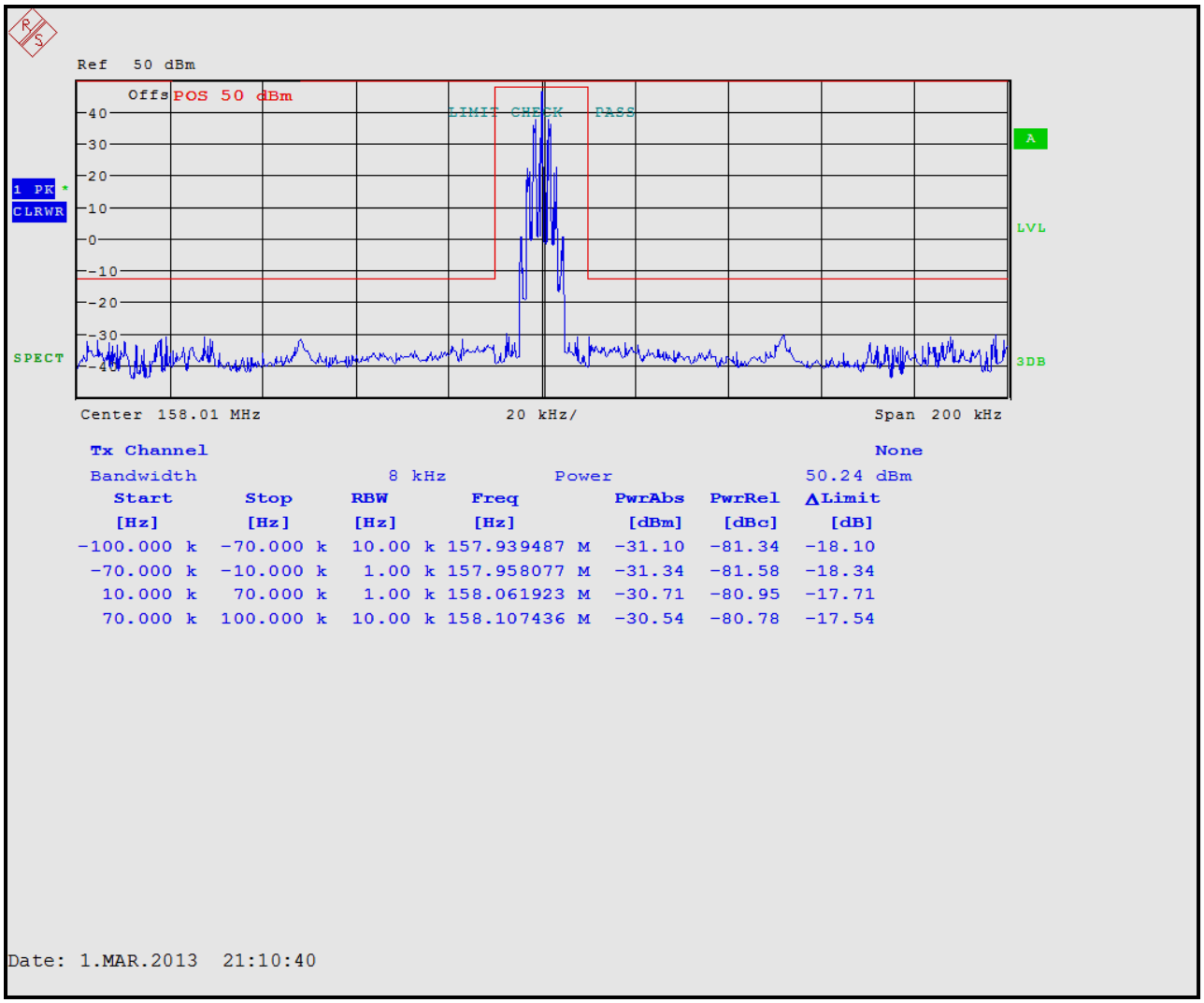
[1] Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.
[2] Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.
[3] Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691.
[4] DSRCS Roadside Unit equipment in the 5850–5925 MHz band is governed under subpart M of this part.

5.2 Test Data

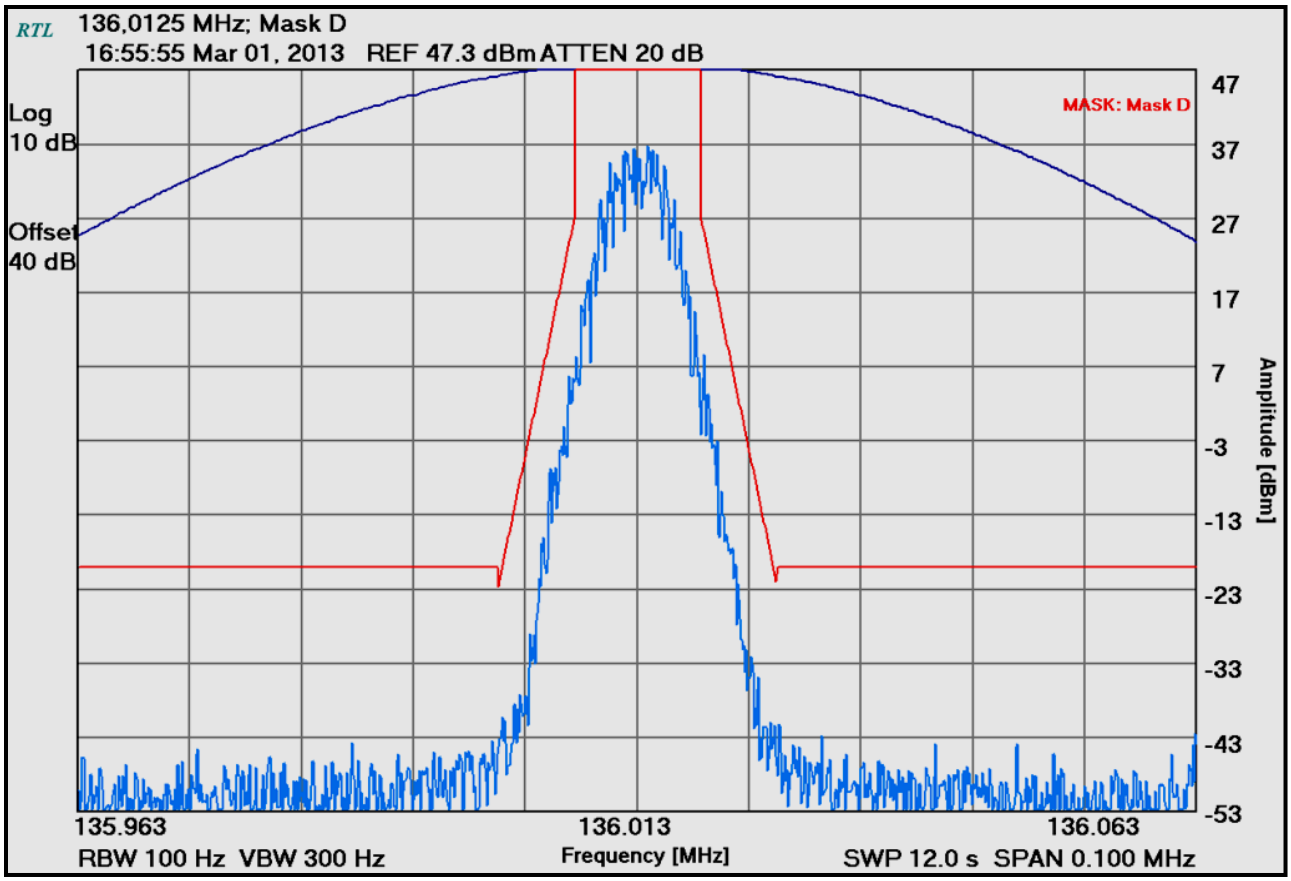
Plot 5-1: Occupied Bandwidth – 158.01 MHz; Analog (FCC Part 22)



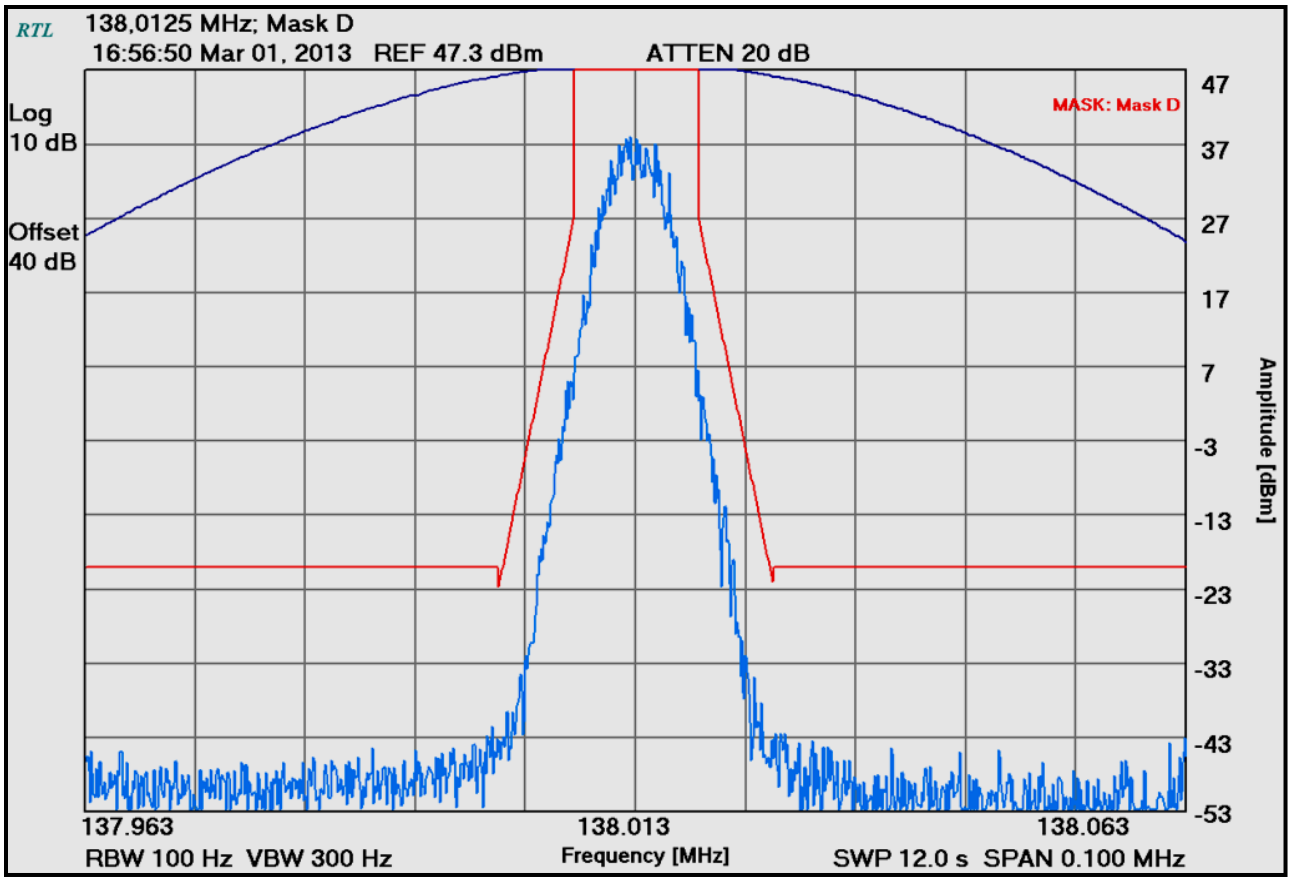
Plot 5-2: Occupied Bandwidth – 158.01 MHz; Mask; (FCC Part 22)



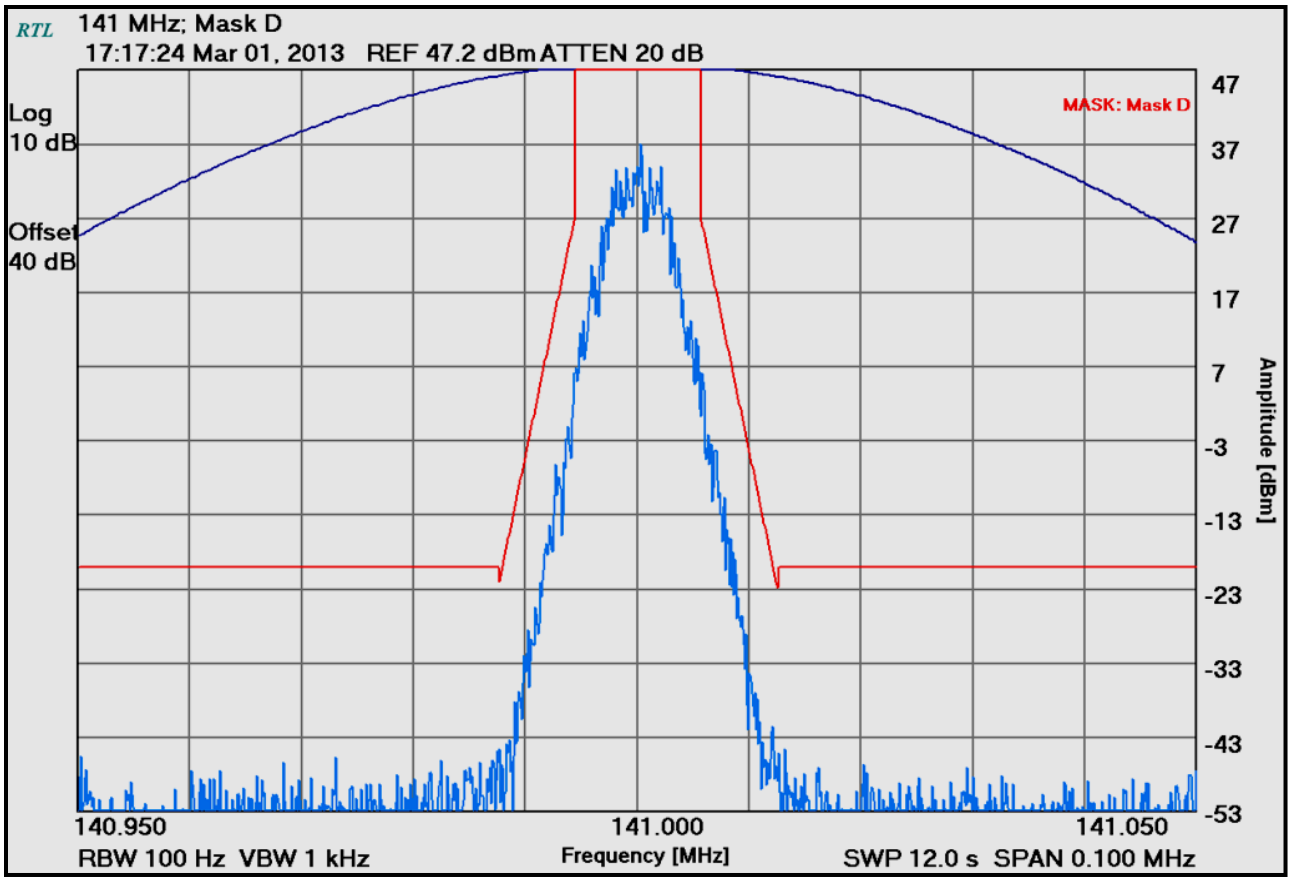
Plot 5-3: Occupied Bandwidth – H-CPM TDMA; 136.0125 MHz; Mask D



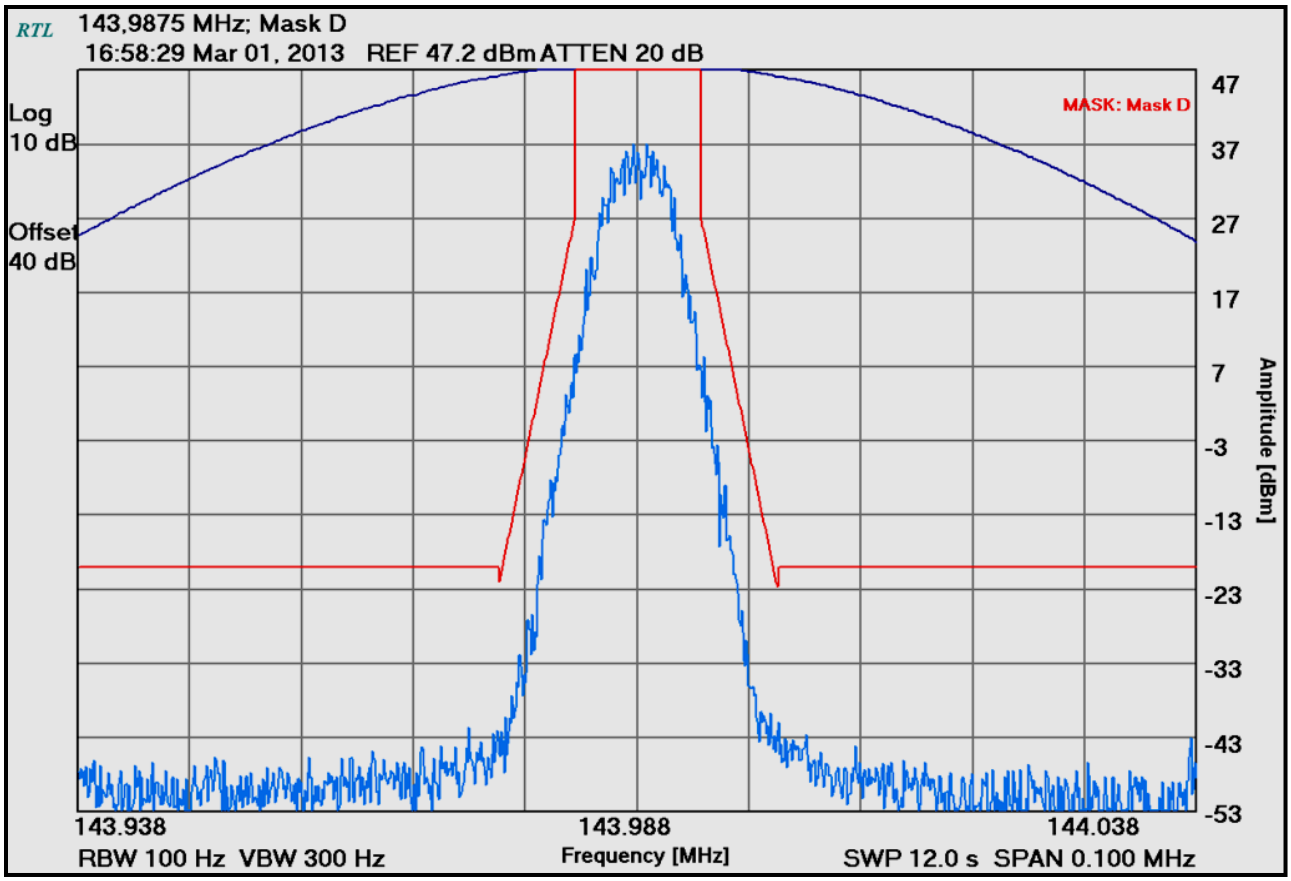
Plot 5-4: Occupied Bandwidth – H-CPM TDMA; 138.0125 MHz; Mask D



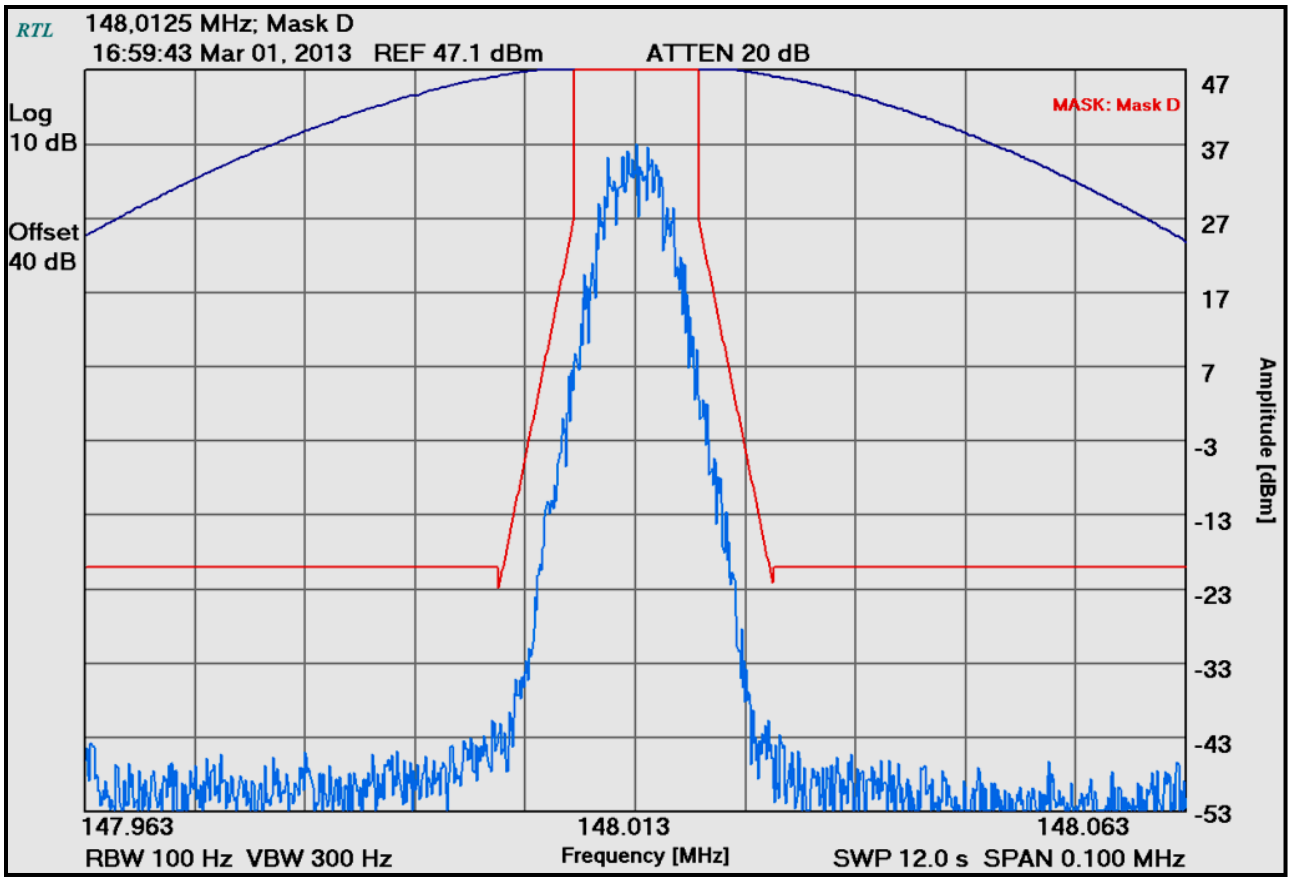
Plot 5-5: Occupied Bandwidth – H-CPM TDMA; 141.0000 MHz; Mask D



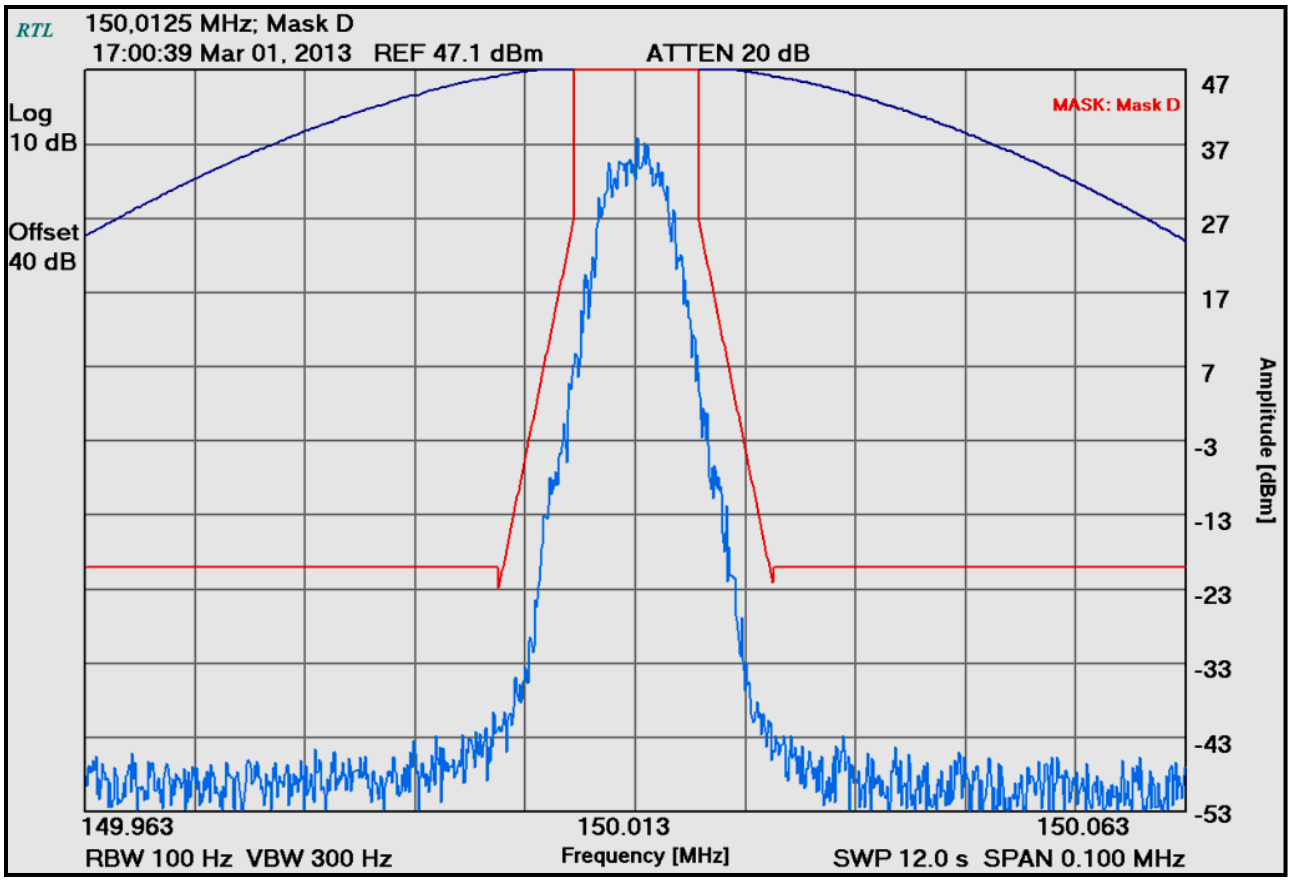
Plot 5-6: Occupied Bandwidth – H-CPM TDMA; 143.9875 MHz; Mask D



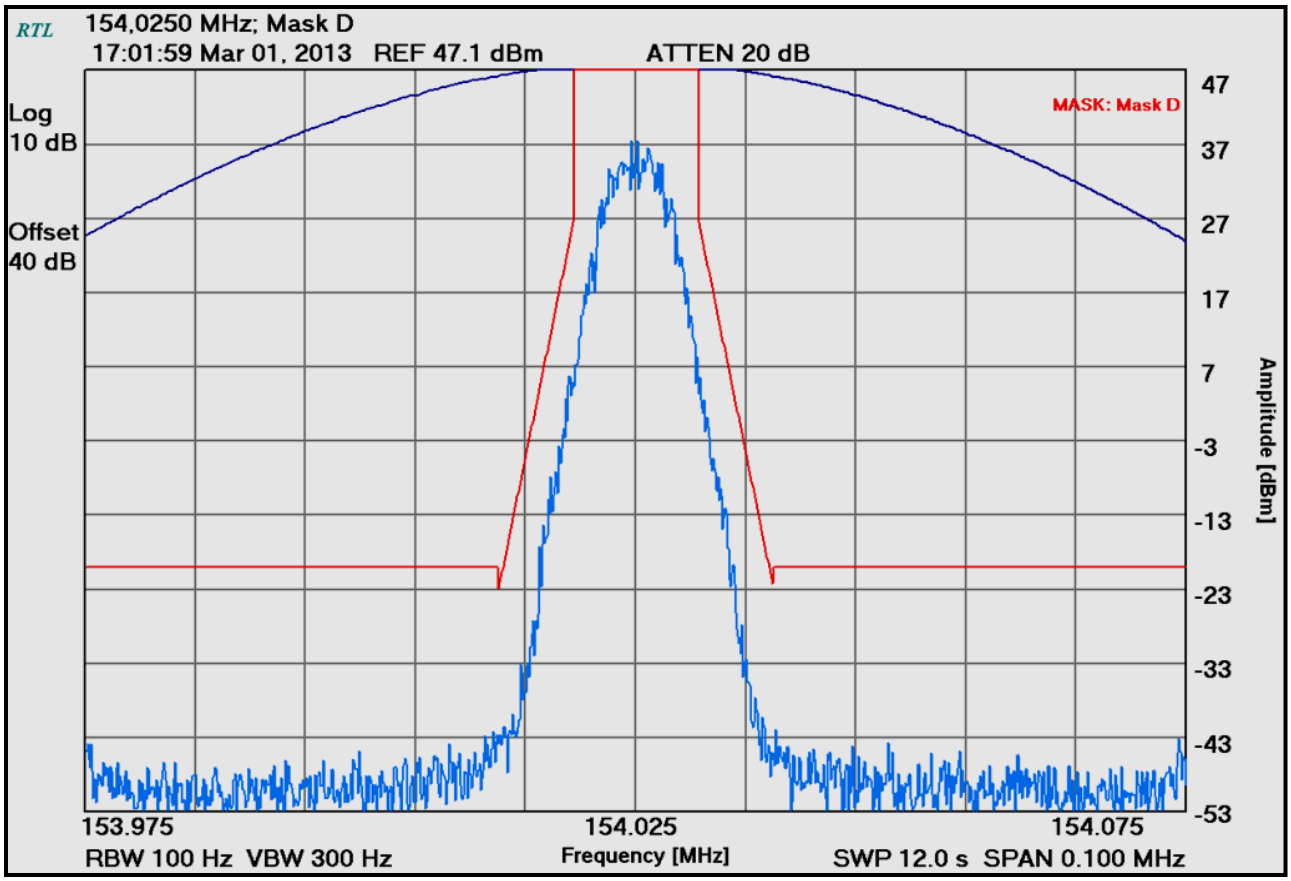
Plot 5-7: Occupied Bandwidth – H-CPM TDMA; 148.0125 MHz; Mask D



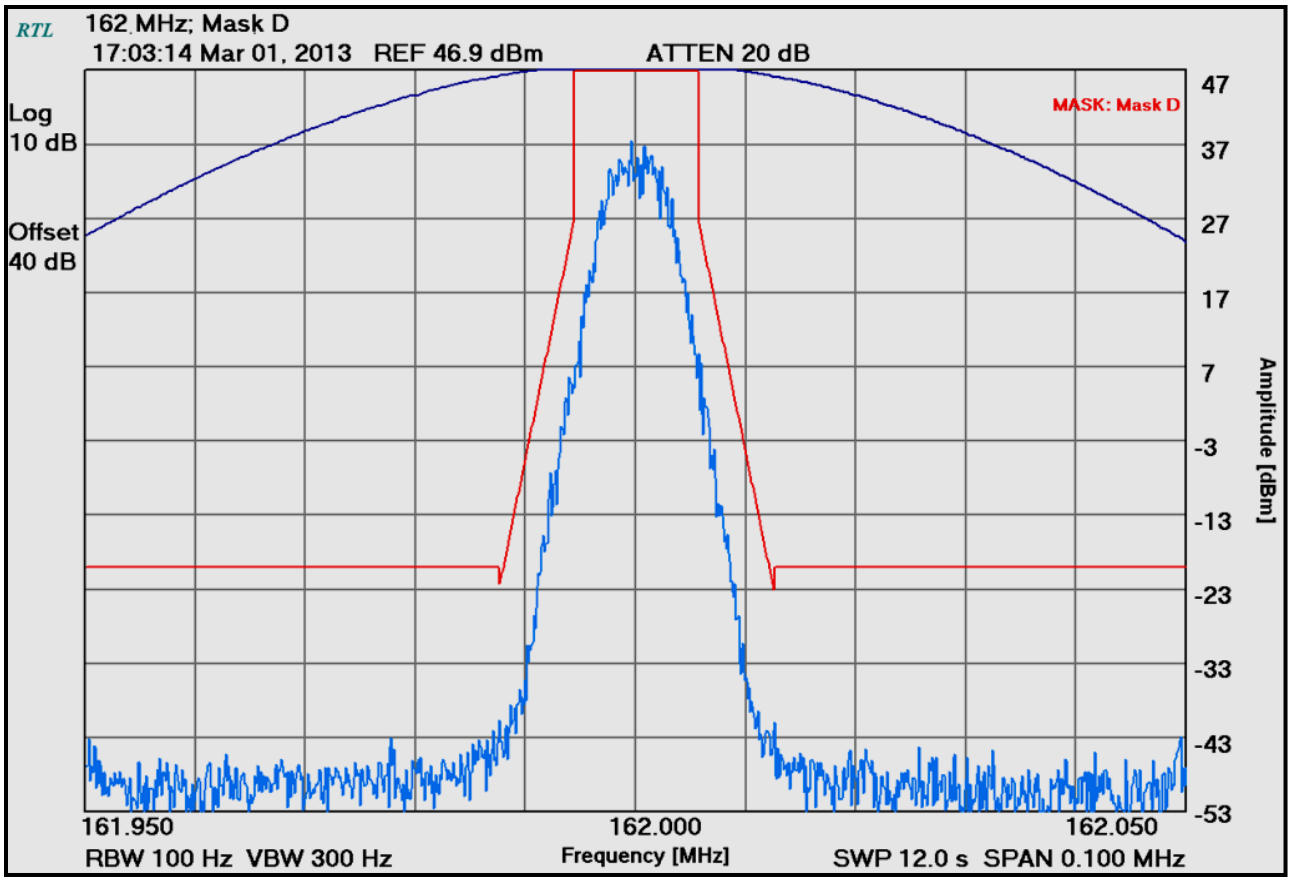
Plot 5-8: Occupied Bandwidth – H-CPM TDMA; 150.0125 MHz; Mask D



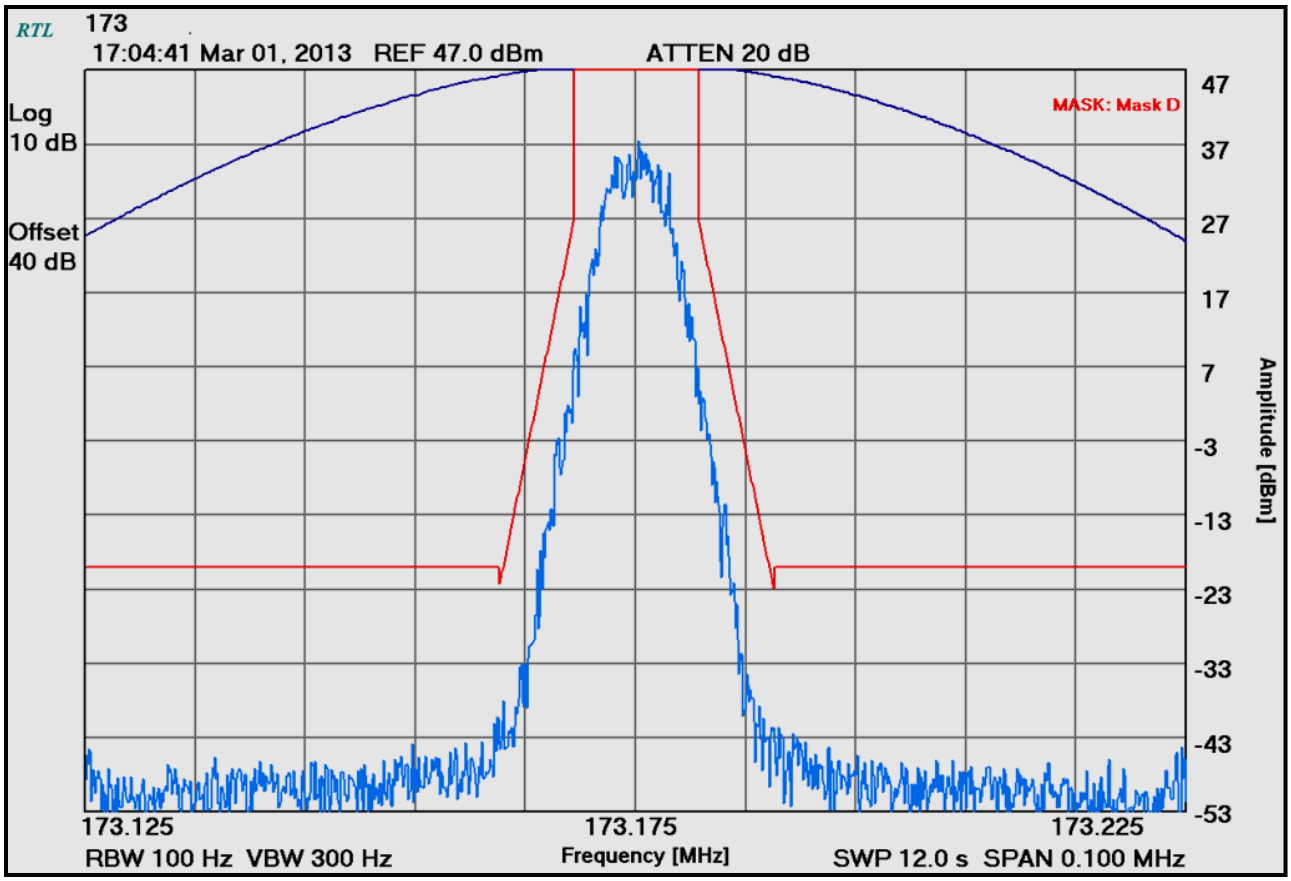
Plot 5-9: Occupied Bandwidth – H-CPM TDMA; 154.0250 MHz; Mask D



Plot 5-10: Occupied Bandwidth – H-CPM TDMA; 162.0000 MHz; Mask D



Plot 5-11: Occupied Bandwidth – H-CPM TDMA; 173.1750 MHz; Mask D



Plot 5-12: Occupied Bandwidth – H-CPM TDMA; 173.9875 MHz; Mask D

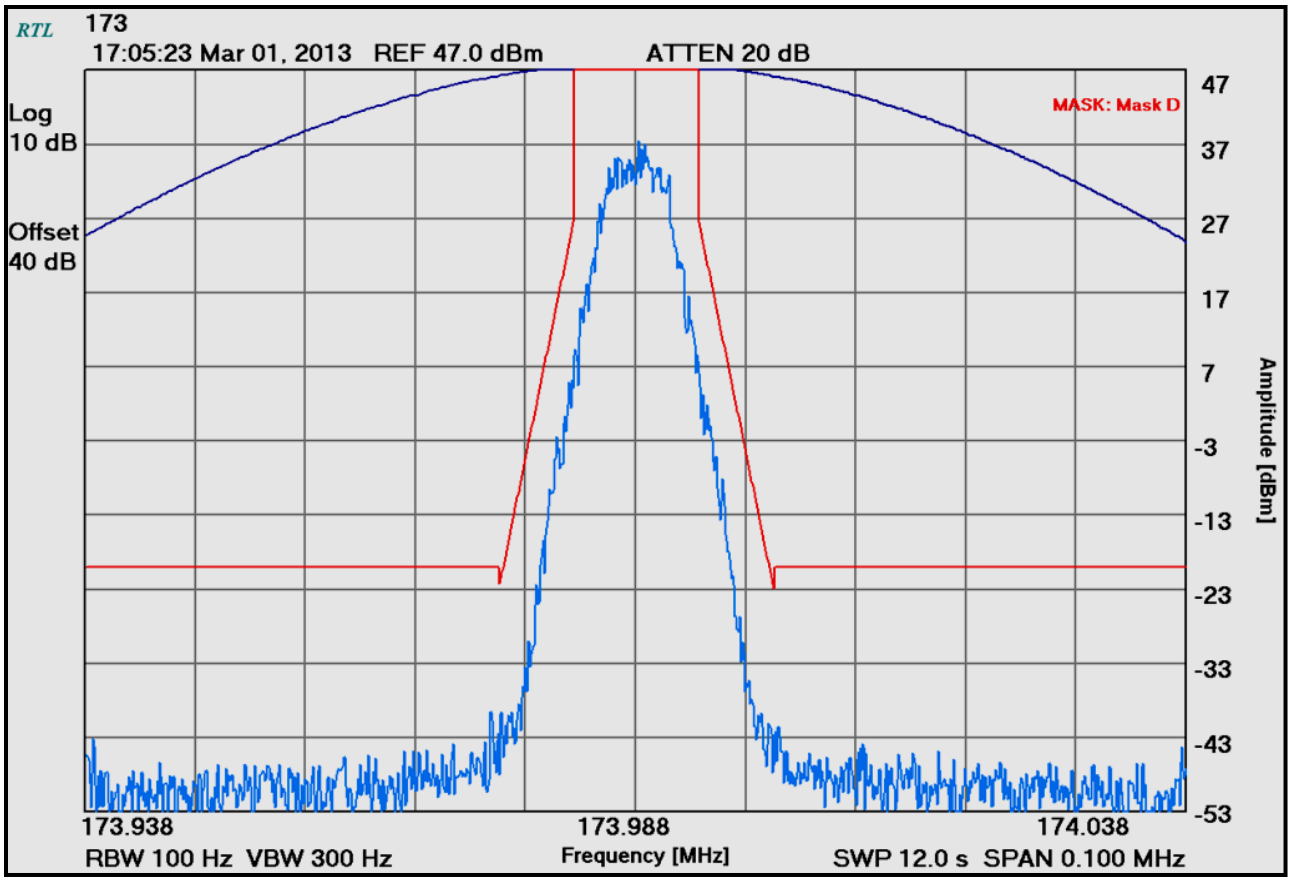


Table 5-1: Test Equipment Used for Testing Occupied Bandwidth

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Due Date
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
901537	Weinschel Corp	48-40-34	Attenuator, 40 dB, 100W	CB66628	12/14/13

Test Personnel:

Daniel Baltzell		March 1, 2013
Test Engineer	Signature	Date of Test

6 FCC §2.1053(a): Field Strength of Spurious Radiation; CFR 47 §22.359: Emissions Limitations

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.

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.

P_d(dBm) = P_g(dBm) – cable loss (dB) + antenna gain (dB)

where: P_d is the dipole equivalent power; P_g is the generator output power into the substitution antenna

6.2 Test Data

Limit = 43 + 10 Log (P) dB or 70 dB, whichever is greater. The worst case emissions test data are shown

The EUT transmitting at high power was determined to be the worst case emissions level and is reported in the following tables.

Table 6-1: Field Strength of Spurious Radiation – 158.01 MHz; Narrow Band; High Power

59.9 dBc = Limit

Frequency (MHz)	Measured Level (dBuv)	Signal Gen. Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd)	Corrected Level (dBc)	Margin (dB)
316.020	35.8	-44.7	0.2	-0.6	86.1	-26.2
474.030	24.2	-52.6	0.2	-0.5	89.1	-29.2
632.040	20.6	-52.9	0.2	-0.8	95.3	-35.4
790.050	15.9	-57.0	0.2	-1.5	95.3	-35.4
948.060	16.2	-55.5	0.3	-1.0	91.2	-31.3
1106.070	15.1	-55.1	0.3	2.9	89.3	-29.4
1264.080	17.0	-51.0	0.3	3.8	84.3	-24.4
1422.090	25.3	-42.1	0.3	4.9	70.6	-10.7
1580.100	14.7	-51.8	0.4	6.5	80.0	-20.1

**This insertion loss corresponds to the cable connecting the RF Signal Generator to the ½ wave dipole antenna.*

Table 6-2: Test Equipment for 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	1/31/14
901581	Rohde & Schwarz	1166.1660.50	Spectrum Analyzer	2001006	6/3/13
900905	Rhein Tech Laboratories	PR-1040	OATS 1 Preamplifier 40dB (30 MHz – 2 GHz)	1006	8/20/13
901158	Compliance Design, Inc.	Roberts Dipole Antenna	Adjustable Elements Dipole 25 - 1000 MHz Antennas	00401	3/6/14
901288	Signa Wave	4LC-NANA-0360	Cables, 10 and 3 meters OATS 1	NA	4/13/13
901129	Par Electronics	188-174 (25W)	VHF Notch Filters	N/A	2/28/14
901262	ETS	3160-9	Double ridged Guide Antenna (1 - 18 GHz)	6748	5/11/14
901582	Rohde & Schwarz	1167.0000.02	Signal Generator	101903	4/23/13
901592	Insulated Wire Inc.	KPS-1503-3600-KPR	SMK RF Cables 20'	NA	8/16/13
901593	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/16/13
901594	Insulated Wire Inc.	KPS-1503-360-KPR	SMK RF Cables 36"	NA	8/16/13

Test Personnel:

Daniel Baltzell		March 5, 2013
Test Engineer	Signature	Date of Test

7 Conclusion

The data in this Class 2 measurement report shows that the Harris Corporation Model XG-25M VHF; FCC ID: OWDTR-0075-E, IC: 3636B-0075, complies with all the applicable requirements of FCC Parts 2, 22 and 90, and Industry Canada RSS-119 for a Class 2 permissive change.