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EMC TEST REPORT

Report Number: **102775613LEX-002.1**
Project Number: **G102775613**

Report Issue Date: **1/12/2017**

Product Name: **61080-P9**

Industry Canada Standards: **RSS-131 Issue 2**
RSS-Gen Issue 4
FCC Title 47 CFR Part 24 Subpart D
FCC Title 47 CFR Part 90

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

Client:
Westell Inc.
750 N Commons Dr
Aurora, IL 60504-7940

Report prepared by
Brian Lackey, Project Engineer

Report reviewed by
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TABLE OF CONTENTS

1 Introduction and Conclusion

The tests indicated in section 2 were performed on the product constructed as described in section 3. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test method, a list of the actual test equipment used, documentation photos, results and raw data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complied with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

2 Test Summary

Page	Test full name	FCC Reference	IC Reference	Result
7	Automatic Gain Control (AGC) Threshold	KDB 935210 D05 §§ 3.2, 4.2	-	Pass
8	Out-of-band Rejection, Passband Gain and Bandwidth	§ 2.1049 KDB 935210 D05 §§ 3.3, 4.3	RSS-131 § 4.2 RSS-131 § 6.1	Pass
10	Input-versus-output signal comparison (Non-Linearity)	§ 90.219(e)(4) KDB 935210 D05 §§ 3.4, 4.4	RSS-131 § 6.3	Pass
14	Mean Output Power and Booster Gain (FCC)	§ 2.1046 § 90.219(e)(1) KDB 935210 D05 §§ 3.5, 4.5	-	Pass
15	Mean Output Power (IC)	-	RSS-131 § 4.3.1 RSS-131 § 6.2 RSS-Gen § 6.12	Pass
17	Out-of-band Emissions (Conducted)	§ 24.133 § 90.219(e)(3) KDB 935210 D05 §§ 3.6.2, 4.7.2	-	Pass
21	Spurious Emissions (Conducted)	§ 2.1051 § 90.219(e)(3) KDB 935210 D05 §§ 3.6.3, 4.7.3	RSS-131 § 4.4.1 RSS-131 § 6.4	Pass
-	Frequency Stability of Band Translators	-	-	NA[1]
24	Spurious Emissions (Radiated)	§ 2.1053 § 24.133 § 90.219(e)(3) KDB 935210 D05 §§ 3.8, 4.9	RSS-131 § 4.4.1 RSS-131 § 6.4 RSS-Gen § 6.13	Pass
28	Noise Figure Measurements	§ 90.219(e)(2) KDB 935210 D05 § 4.6	-	Pass

[1] Test is not applicable. The EUT is not a band translator.

3 Description of Equipment Under Test

Equipment Under Test	
Manufacturer	Westell Inc.
Model Number	61080-P9
Serial Number	CGK63369
Receive Date	10/13/2016
Test Start Date	10/13/2016
Test End Date	11/23/2016
Device Received Condition	Good
Test Sample Type	Production
Frequency Band	929-930 MHz (B9B) 930-931 MHz (B2I)
Modulation Type	929-930 MHz: CW 930-931 MHz: 2-GFSK (45K3F1D)
Channel Frequencies	929-930 MHz: 929.0125 (low), 929.5 (mid), 929.9875 (high) 930-931 MHz: 930.025 (low), 930.5 (mid), 930.975 (high)
Duty Cycle	100%
Transmission Control	Front panel
Maximum Output Power	27.6 dBm
Antenna Gain	3 dBi
Maximum Permissible Antenna Gain [2]	3.88 dBi
Operating Voltage	120Vac 60Hz

Description of Equipment Under Test
Signal booster for paging operations.

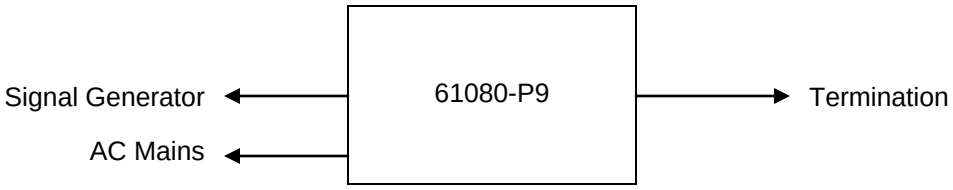
Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Booster amplifying downlink signal in paging band.

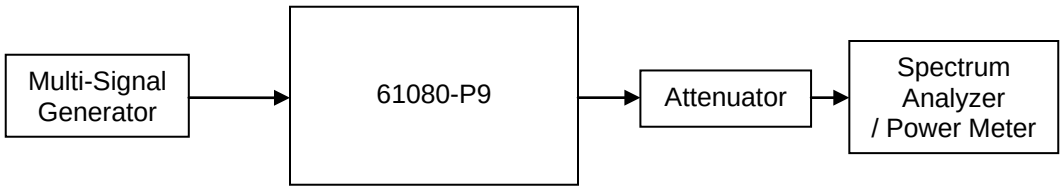
[2] Calculated from maximum conducted output power and FCC §1.1310 and RSS-102 exposure limits

4 System setup including cable interconnection details, support equipment and simplified block diagram

4.1 Radiated Testing Block Diagram



4.2 Conducted Testing Block Diagram



4.3 Cables

Cables					
Description	Length	Shielding	Ferrites	Connection	
				From	To
Power Cable	1m	No	No	EUT	AC Mains
Ethernet Cable	10m	No	No	EUT	Network

4.4 Path Loss

From	To	Path Loss (dB)
Signal Generator	EUT Input	0.4
EUT Output	Receiver	50.0

5 Automatic Gain Control (AGC) Threshold

5.1 Test Procedure

KDB Publication No. 935210 D05 v01r01: §§ 3.2, 4.2 Measuring AGC threshold level

5.2 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Wideband Power Sensor	1137.9009.02	Rohde&Schwarz	NRP-Z81	9/22/2016	9/22/2017

5.3 Test Results

Signal Type	Frequency (MHz)	Signal Generator Level (dBm)	Average Output Power (dBm)	AGC Threshold (dBm)
CW	929.5	-50.7	27.6	-51.1
2-GFSK (45K3F1D)	931.5	-51.8	27.2	-52.4

6 Out-of-band Rejection, Passband Gain and Bandwidth

6.1 Test Limits

RSS-131 Issue 2 §6.1: The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

6.2 Test Procedure

RSS-131 Issue 2 §4.2, Passband Gain and Bandwidth

KDB Publication No. 935210 D05 v01r01: §§ 3.3, 4.3 Out-of-band rejection

6.3 Test Equipment Used

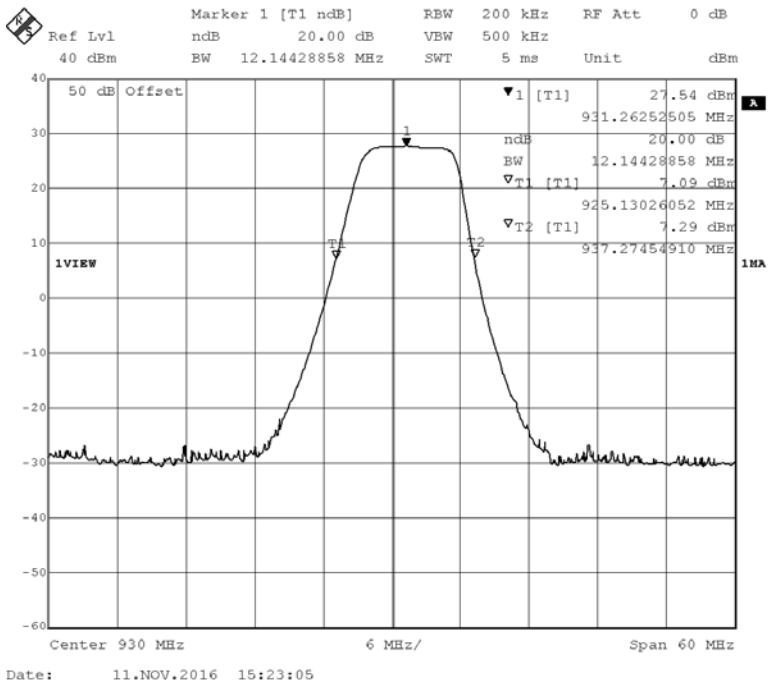
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Spectrum Analyzer	1088.3494.35	Rohde&Schwarz	FSEK30	9/20/2016	9/20/2017

6.4 Results

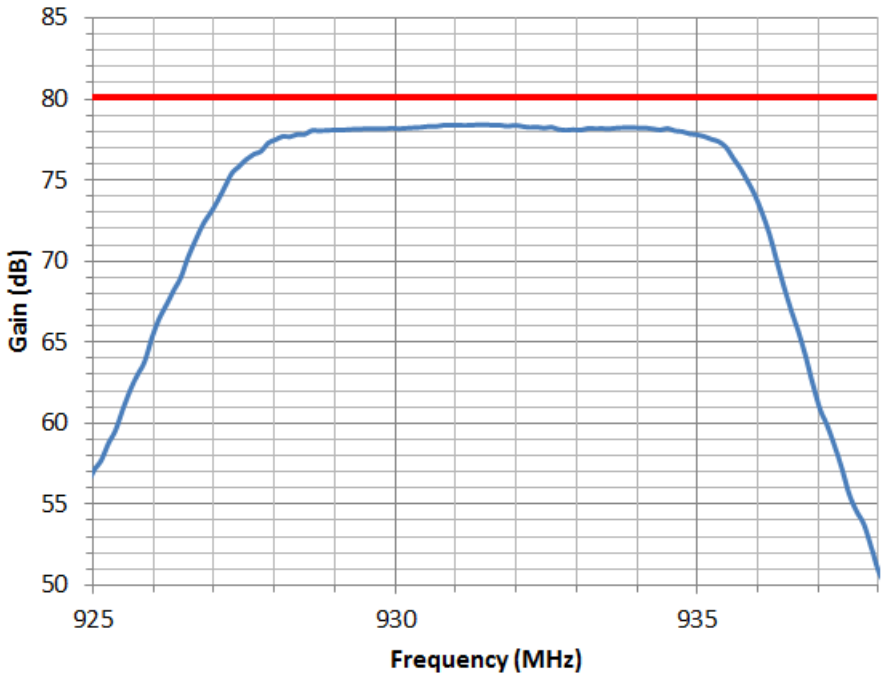
The device was found to be compliant. The measured passband gain did not exceed the declared gain by more than 1.0 dB. The measured 20 dB bandwidth did not exceed the declared bandwidth. Outside of the 20 dB bandwidth, the measured gain did not exceed the gain at the 20 dB point.

6.5 Test Data

Frequency Band	Frequency Range (MHz)	Declared Nominal Gain (dB)	Measured Peak Gain (dB)	Measured 20dB Bandwidth (MHz)
Downlink	929-931	80.0	78.4	12.144



20dB Bandwidth



Gain vs. Frequency

7 Input-versus-output signal comparison (Non-Linearity)

7.1 Test Procedure

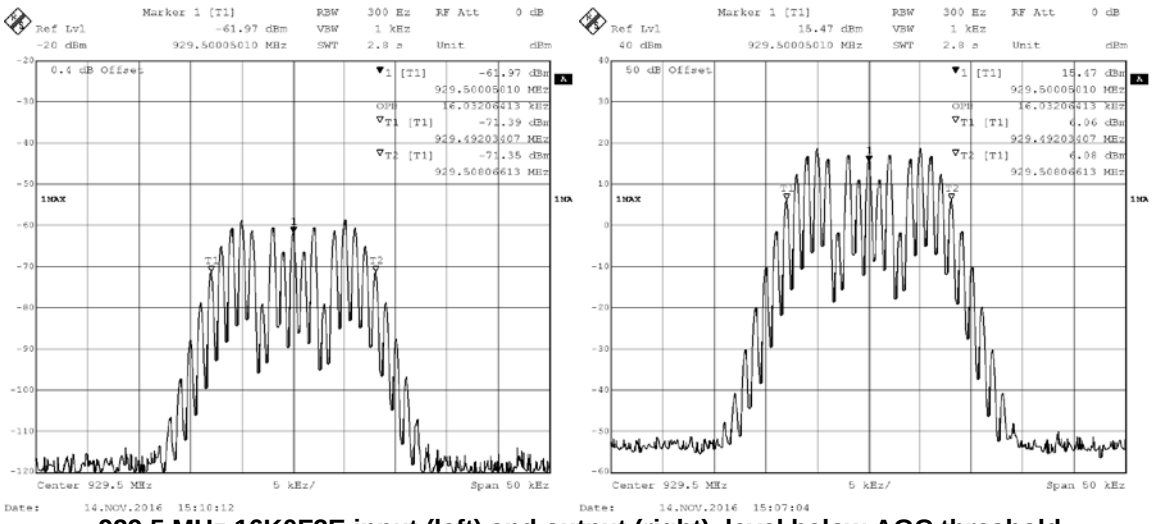
KDB Publication No. 935210 D05 v01r01: §§ 3.4, 4.4 Input-versus-output signal comparison

7.2 Test Equipment Used

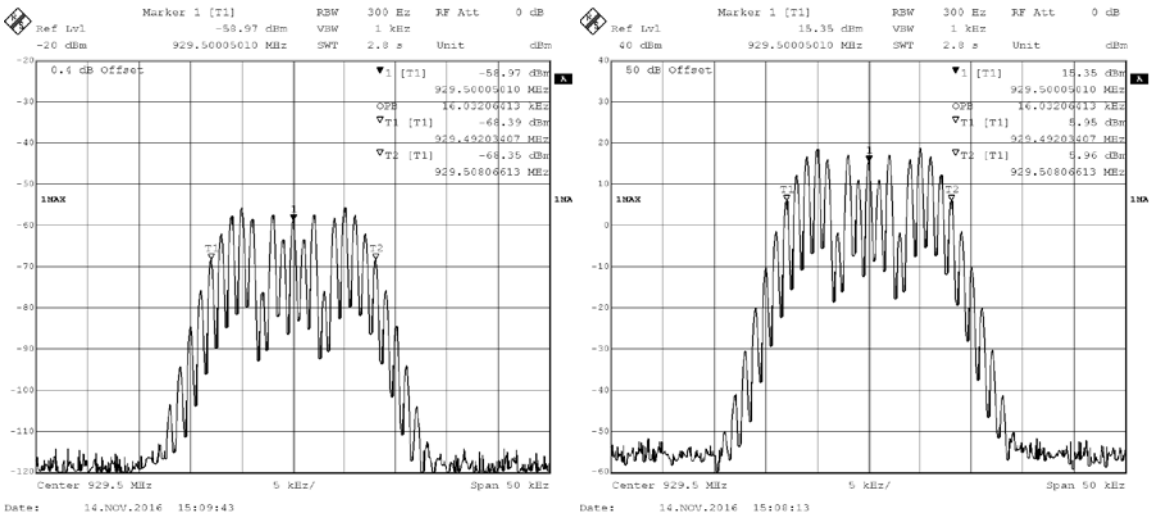
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Spectrum Analyzer	1088.3494.35	Rohde&Schwarz	FSEK30	9/20/2016	9/20/2017

7.3 Test Data

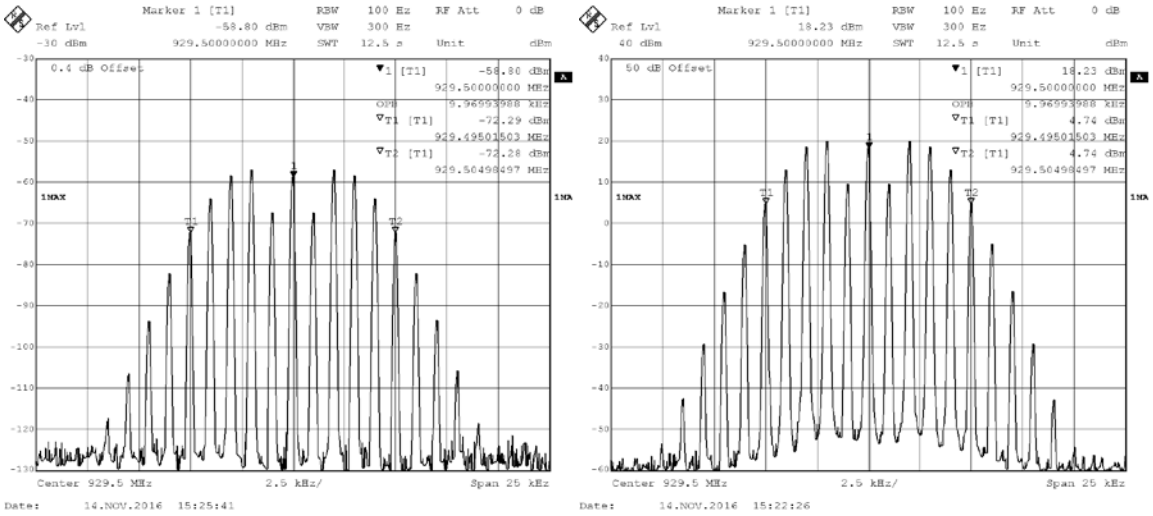
Signal	Input Level (dBm)	Frequency (MHz)	Input Bandwidth (kHz)	Output Bandwidth (kHz)
16K0F3E	-50.9	929.5	16.032	16.032
16K0F3E	-47.9	929.5	16.032	16.032
11K3F3E	-50.9	929.5	9.970	9.970
11K3F3E	-47.9	929.5	9.970	9.970
4K00F1E	-50.9	929.5	4.048	4.048
4K00F1E	-47.9	929.5	4.048	4.048
2-GFSK (45K3F1D)	-52.4	930.5	45.291	45.291
2-GFSK (45K3F1D)	-49.4	930.5	45.291	45.291



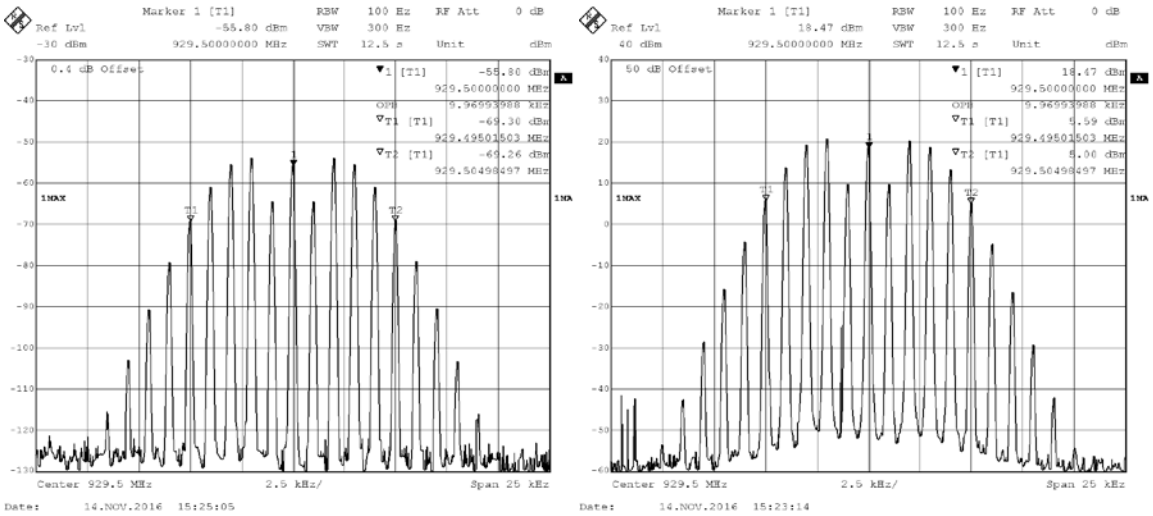
929.5 MHz 16K0F3E input (left) and output (right), level below AGC threshold



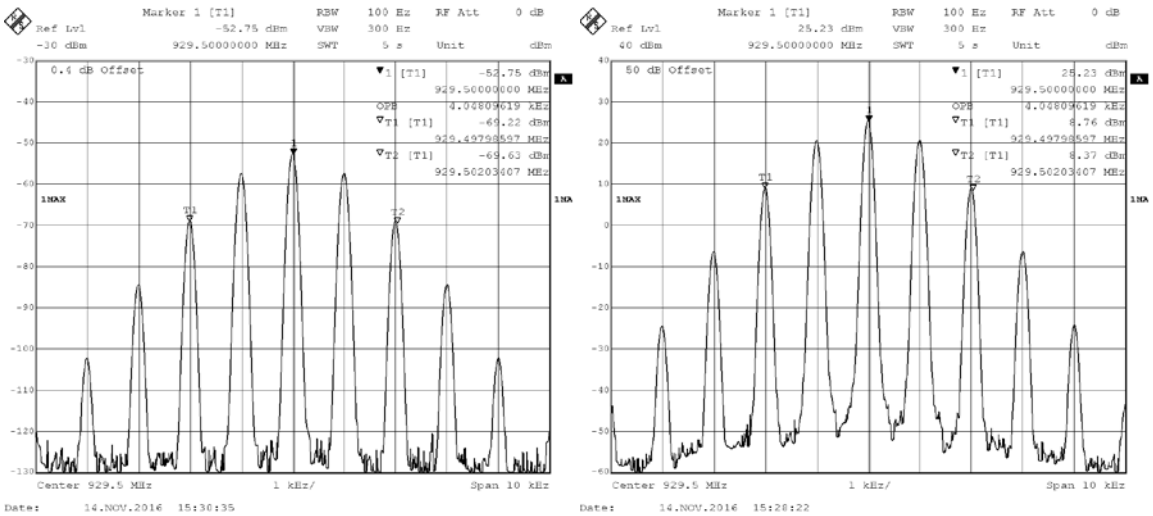
929.5 MHz 16K0F3E input (left) and output (right), level above AGC threshold



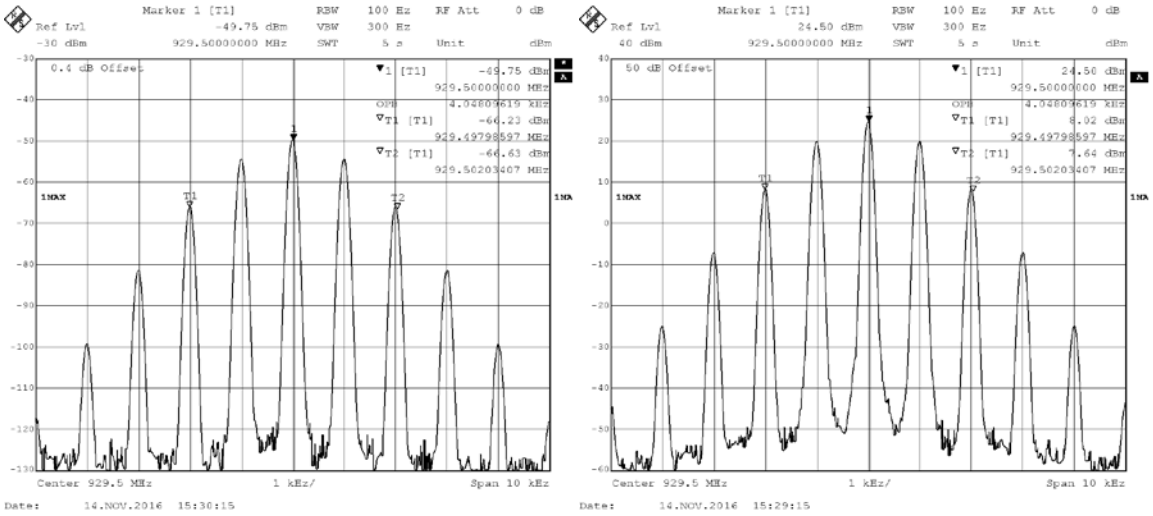
929.5 MHz 11K3F3E input (left) and output (right), level below AGC threshold



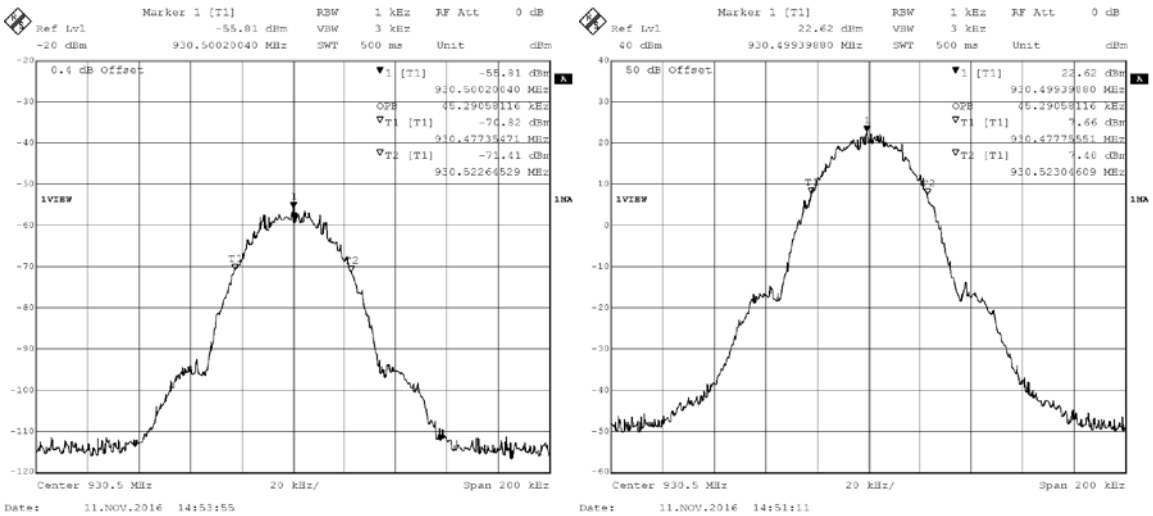
929.5 MHz 11K3F3E input (left) and output (right), level above AGC threshold



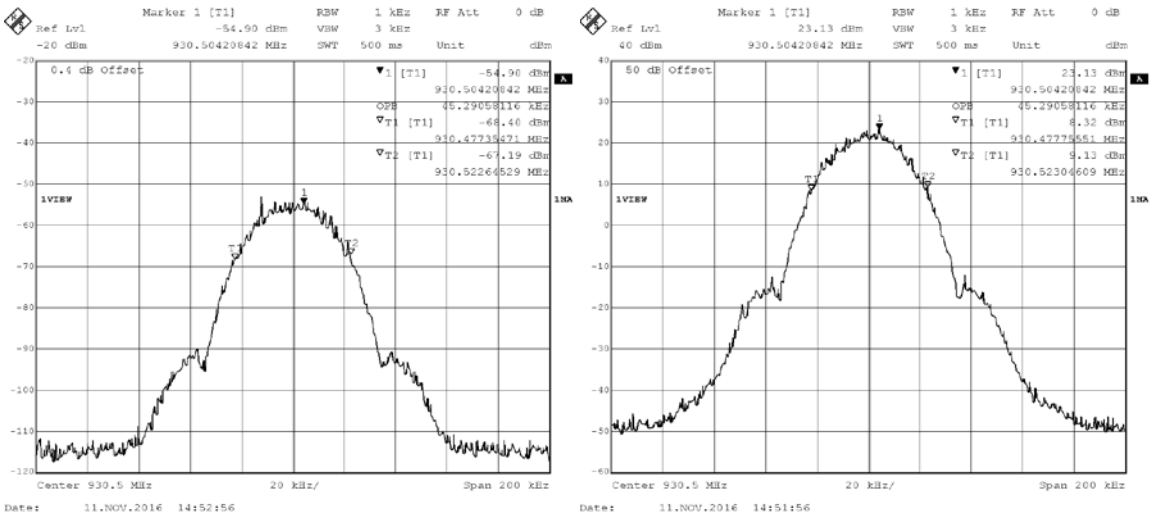
929.5 MHz 4K00F3E input (left) and output (right), level below AGC threshold



929.5 MHz 4K00F3E input (left) and output (right), level above AGC threshold



930.5 MHz 2-GFSK input (left) and output (right), level below AGC threshold



930.5 MHz 2-GFSK input (left) and output (right), level above AGC threshold

8 Mean Output Power and Booster Gain (FCC)

8.1 Test Procedure

KDB Publication No. 935210 D05 v01r01: §§ 3.5, 4.5 Mean output power and amplifier booster/gain

8.2 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Wideband Power Sensor	1137.9009.02	Rohde&Schwarz	NRP-Z81	9/22/2016	9/22/2017

8.3 Test Data

Signal Type	Frequency (MHz)	Signal Generator Level (dBm)	Average Output Power (dBm)	Average Input Power (dBm)	Measured Gain (dB)
CW	929.5	-51.0	27.3	-51.4	78.7
CW	929.5	-48.0	26.5	-48.4	74.9
2-GFSK (45K3F1D)	930.5	-52.0	26.3	-52.4	78.7
2-GFSK (45K3F1D)	930.5	-49.0	27.2	-49.4	76.6

9 Mean Output Power (IC)

9.1 Test Procedure

RSS-131 Issue 6 § 4.3.1 Mean Output Power, Multi-channel Enhancer

9.2 Test Equipment Used

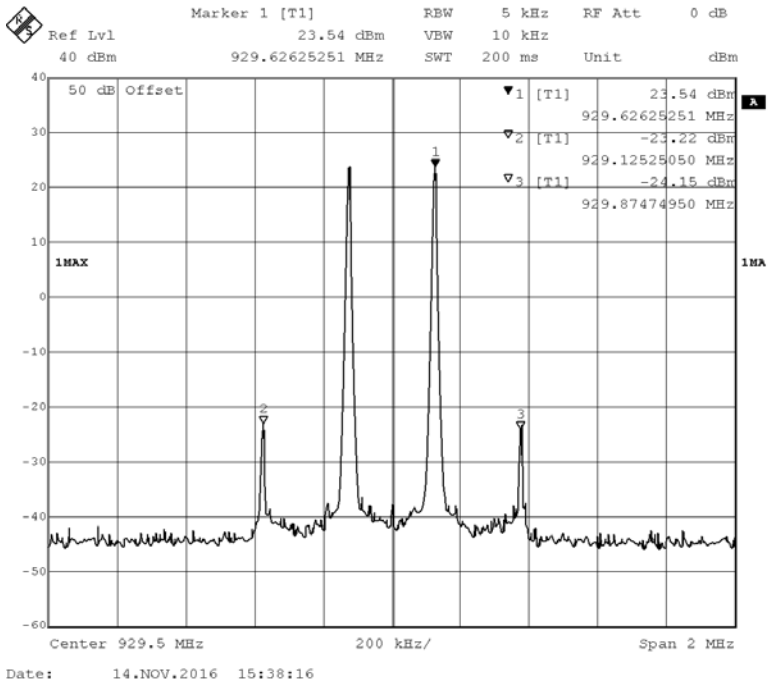
Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Wideband Power Sensor	1137.9009.02	Rohde&Schwarz	NRP-Z81	9/22/2016	9/22/2017

9.3 Results

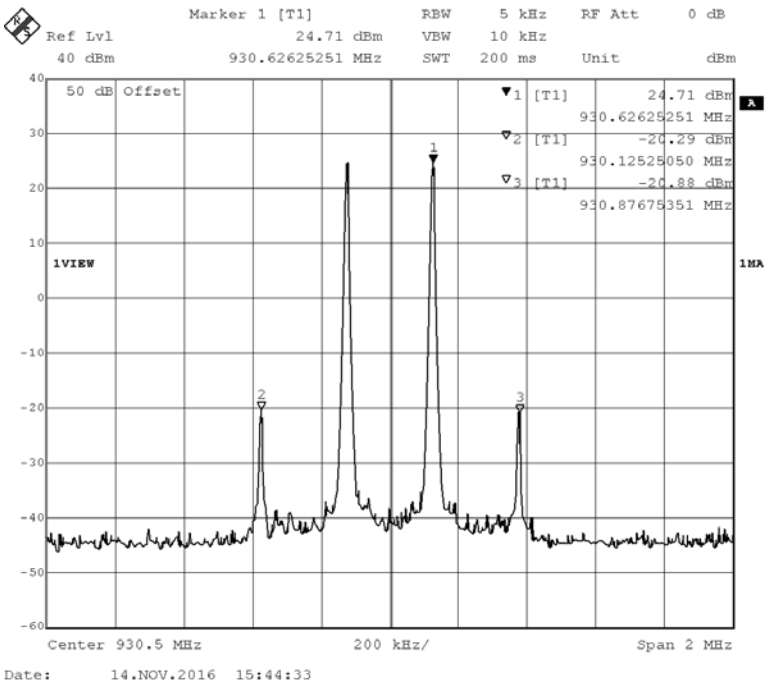
The device was found to be compliant. Due to the AGC circuitry, the input level could not be raised high enough such that the intermodulation product levels P_{O3} and P_{O4} equaled -43 dBW. As such, the input level was raised until the greatest value of P_{O3} and P_{O4} was obtained, and the level of P_{O1} was recorded at that point.

9.4 Test Data

Frequency Range (MHz)	Max P_{O3}, P_{O4} (dBm)	Max P_{O1}, P_{O2} (dBm)	P_{MEAN} (dBm)
929 – 930	-23.22	23.54	26.54
930 – 931	-20.29	24.71	27.71



929-930 MHz Mean Output Power



930-931 MHz Mean Output Power

10 Out-of-band Emissions (conducted)

10.1 Test Limits

§ 24.133(a)(1)
§ 90.210(g)

10.2 Test Procedure

KDB Publication No. 935210 D05 v01r01: § 3.6.2, 4.7.2 Out-of-band/out-of-block emissions conducted measurements

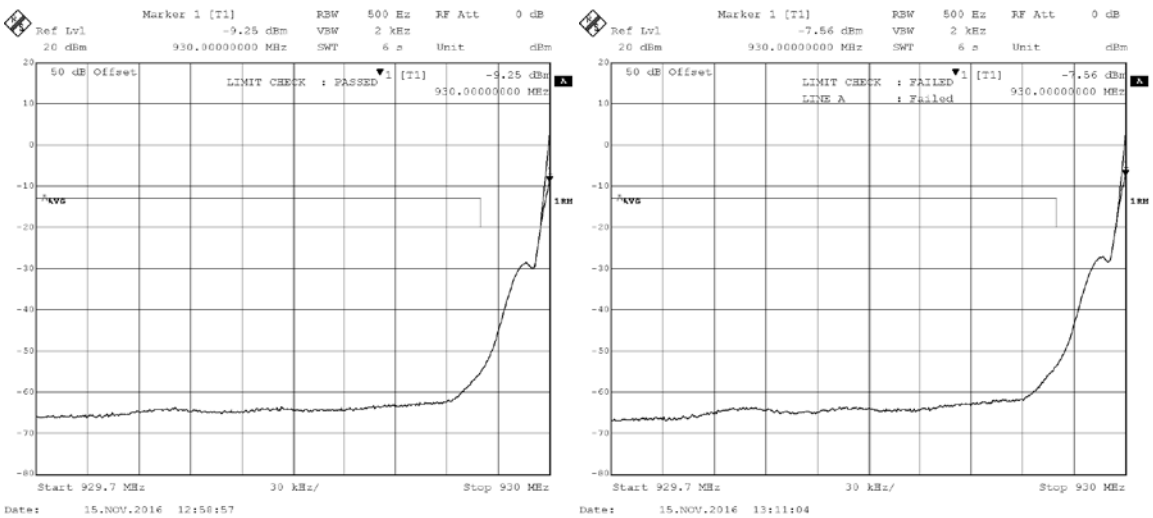
10.3 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Spectrum Analyzer	1164.4391.07	Rohde&Schwarz	FSP	9/20/2016	9/20/2017

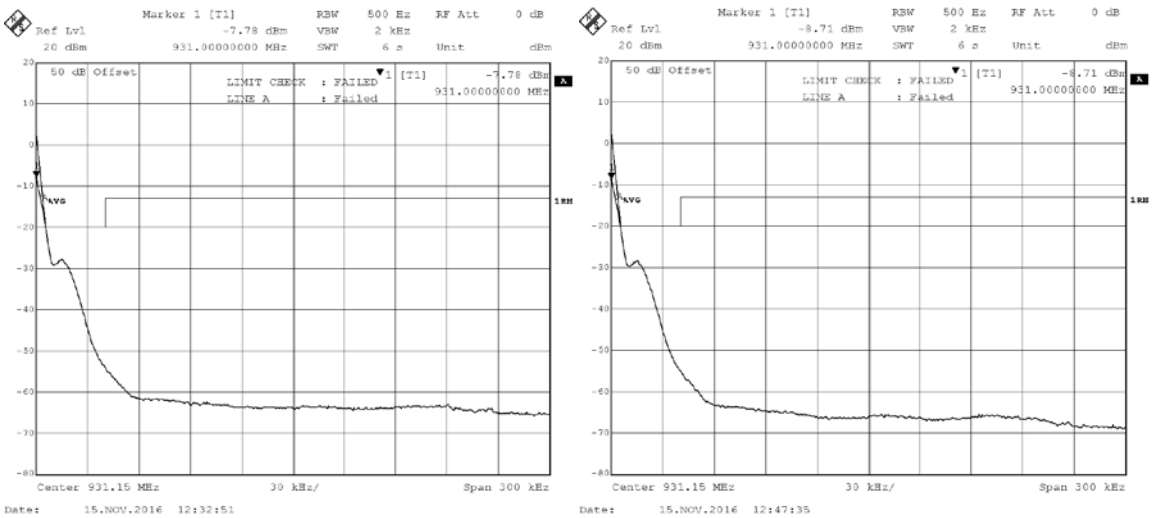
10.4 Results

The device was found to be compliant. All intermodulation products were suitably attenuated below the test tones.

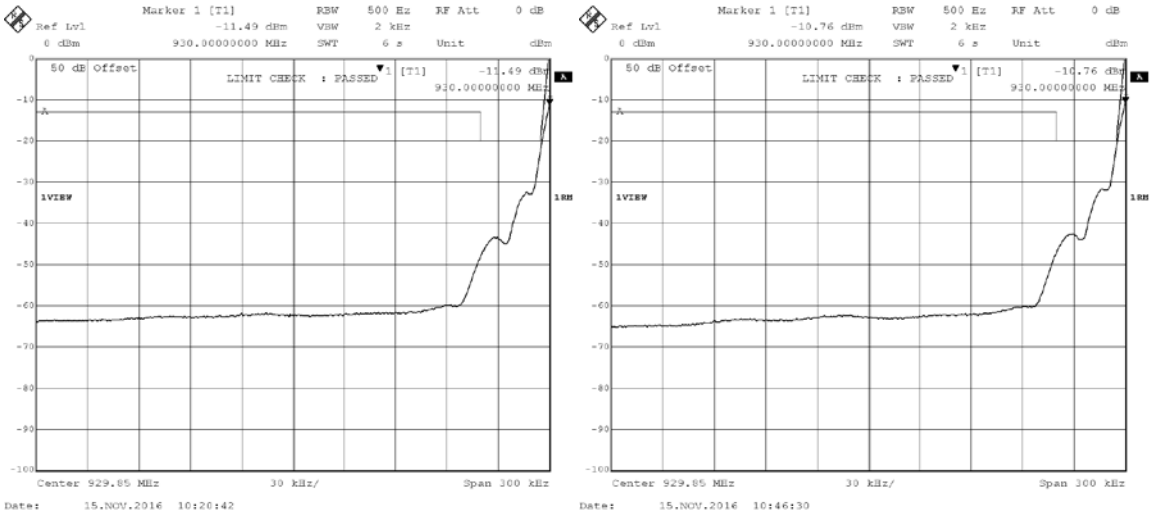
10.5 Test Data



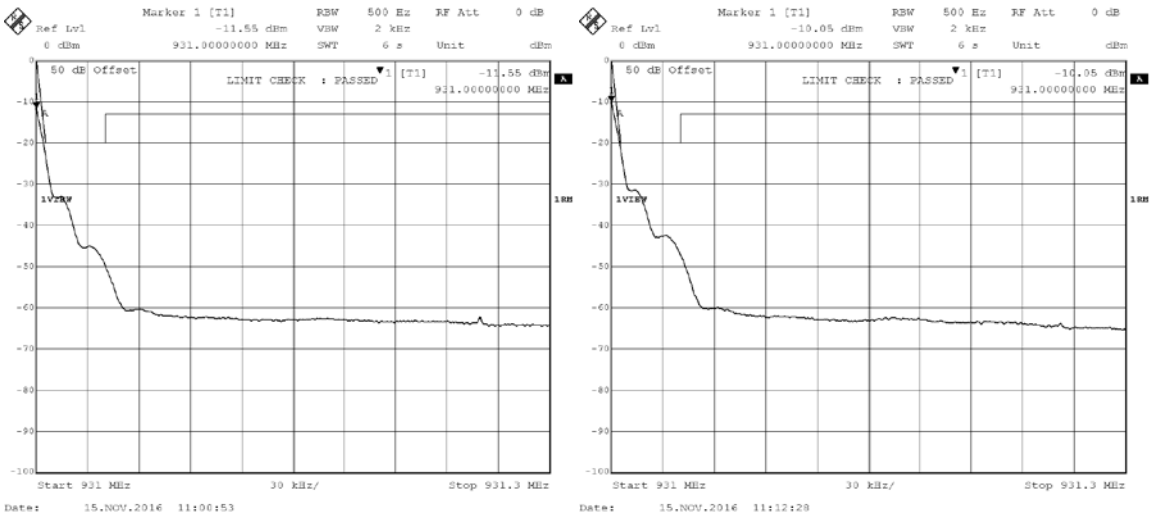
930-931 MHz low band edge emissions, single test signal, input level below (left) and above (right) AGC threshold



930-931 MHz high band edge emissions, single test signal, input level below (left) and above (right) AGC threshold

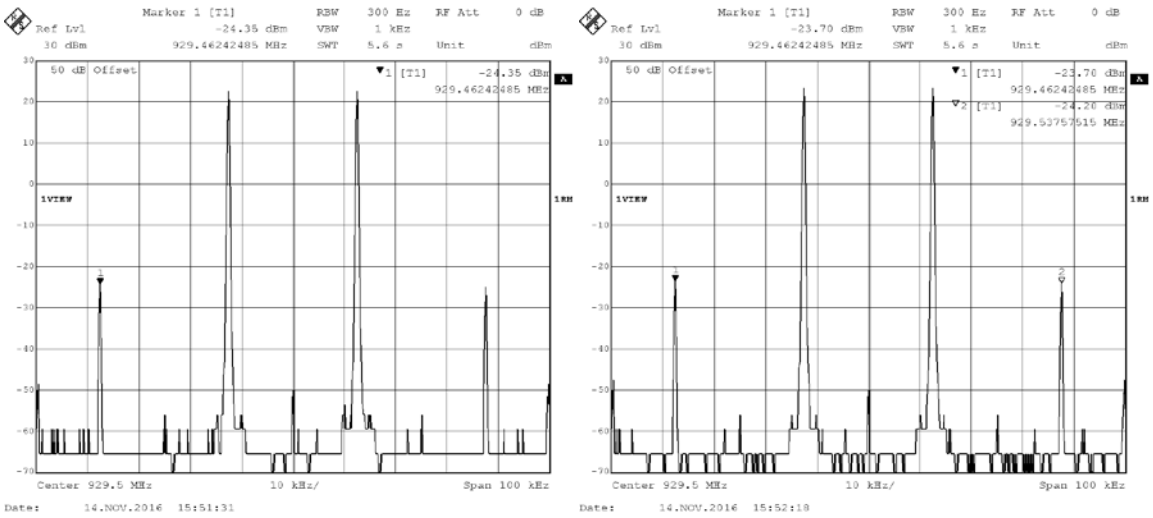


930-931 MHz low band edge emissions, two adjacent test signals, input level below (left) and above (right) AGC threshold

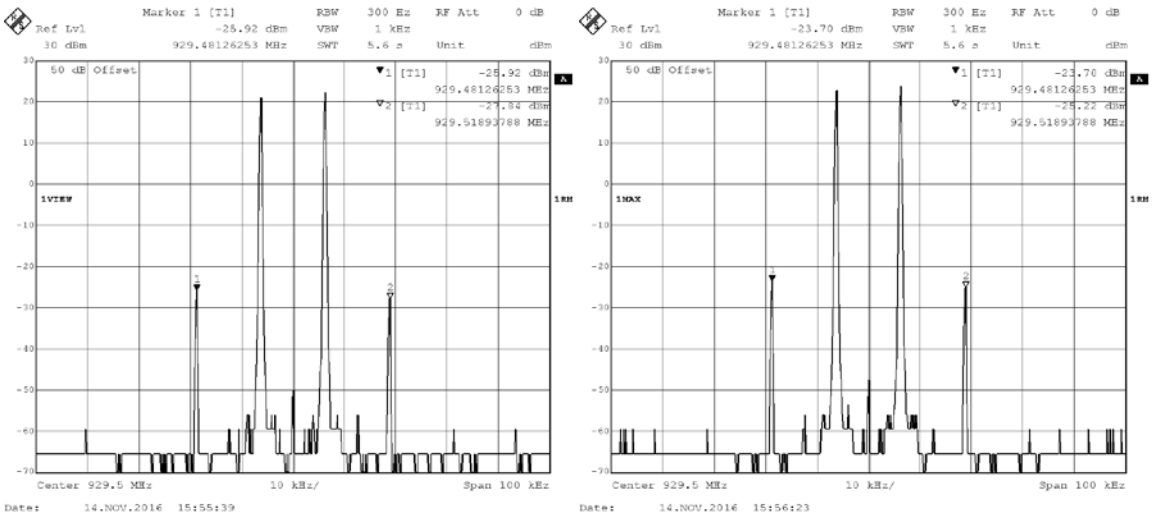


930-931 MHz high band edge emissions, two adjacent test signals, input level below (left) and above (right) AGC threshold

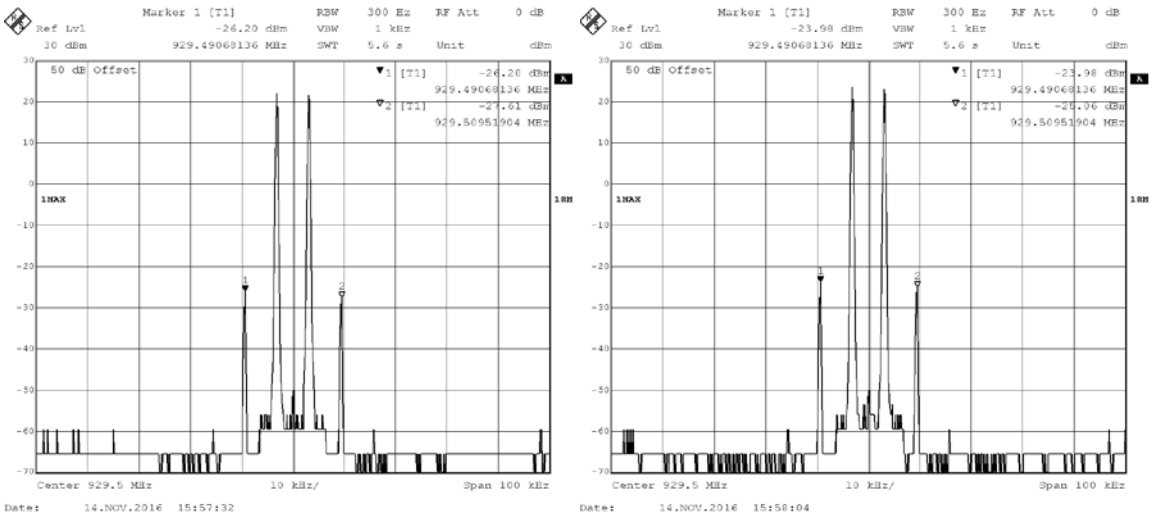
Frequency Range (MHz)	Channel Spacing (kHz)	Input Level (dBm)	Peak Intermodulation Product (dBm)
929 – 930	25	-52.4	-24.35
929 – 930	25	-49.4	-23.70
929 – 930	12.5	-52.4	-25.92
929 – 930	12.5	-49.4	-23.70
929 – 930	6.25	-52.4	-26.20
929 – 930	6.25	-49.4	-23.98



929-930MHz Out-of-band Emissions with 25kHz channel spacing, level below AGC (left) and above AGC (right)



929-930MHz Out-of-band Emissions with 12.5kHz channel spacing, level below AGC (left) and above AGC (right)



929-930MHz Out-of-band Emissions with 6.25kHz channel spacing, level below AGC (left) and above AGC (right)

11 Spurious Emissions (Conducted)

11.1 Test Limits

RSS-131 §4.4.1: Spurious emissions shall be attenuated below the rated power of the enhancer by at least:

43 + 10 Log10(Prated in watts), or 70 dB, whichever is less stringent.

11.2 Test Procedure

KDB Publication No. 935210 D05 v01r01: §§ 3.6.3, 4.7.3 Spurious emissions conducted measurements

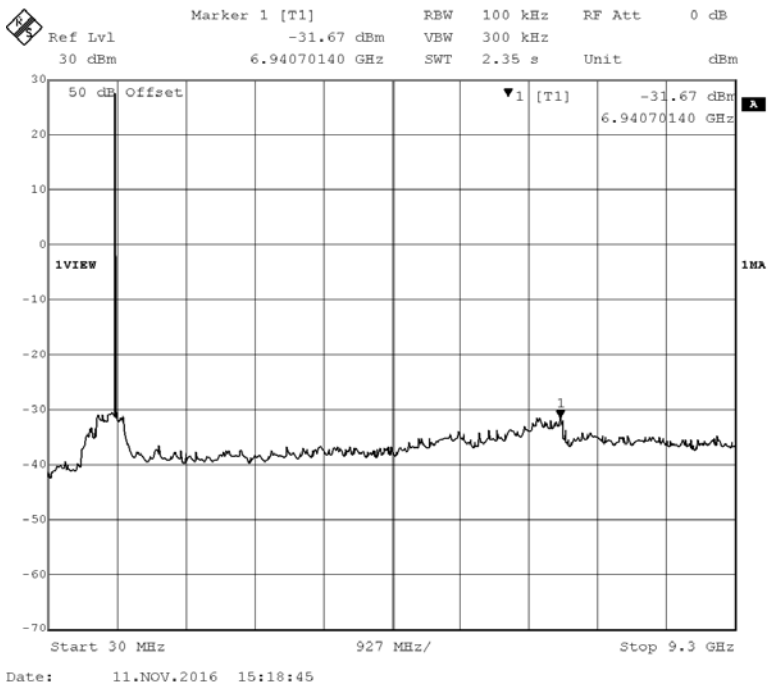
11.3 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Spectrum Analyzer	1088.3494.35	Rohde&Schwarz	FSEK30	9/20/2016	9/20/2017

11.4 Results

The device was found to be compliant. All spurious emissions were suitably attenuated below the test tones.

11.5 Test Data



929-930 MHz Conducted spurious emissions

930.025 MHz Spurious Emissions

Frequency (MHz)	Spurious Emissions (dBm)	Limit (dBm)	Margin (dB)
830.762	-34.32	-13.00	21.32
847.044	-32.09	-13.00	19.09
876.954	-31.82	-13.00	18.82
925.100	-31.89	-13.00	18.89
927.305	-32.93	-13.00	19.93
931.112	-30.84	-13.00	17.84
946.192	-30.01	-13.00	17.01
962.325	-31.15	-13.00	18.15
995.641	-32.81	-13.00	19.81
1005.511	-22.10	-13.00	9.10
6324.148	-27.93	-13.00	14.93
6631.263	-24.90	-13.00	11.90
6981.964	-26.29	-13.00	13.29
7320.641	-26.50	-13.00	13.50
7670.341	-27.47	-13.00	14.47
7761.022	-26.78	-13.00	13.78
8434.369	-28.30	-13.00	15.30
9023.547	-27.67	-13.00	14.67
9666.333	-27.64	-13.00	14.64

930.5 MHz Spurious Emissions

Frequency (MHz)	Spurious Emissions (dBm)	Limit (dBm)	Margin (dB)
860.571	-32.66	-13.00	19.66
870.341	-32.35	-13.00	19.35
882.014	-33.14	-13.00	20.14
926.553	-31.33	-13.00	18.33
929.309	-30.73	-13.00	17.73
932.365	-28.95	-13.00	15.95
933.467	-30.84	-13.00	17.84
962.826	-31.96	-13.00	18.96
995.040	-31.83	-13.00	18.83
1018.036	-21.50	-13.00	8.50
6656.814	-25.40	-13.00	12.40
6974.449	-26.02	-13.00	13.02
7196.393	-27.95	-13.00	14.95
7409.319	-27.00	-13.00	14.00
8061.122	-27.85	-13.00	14.85
8141.784	-27.28	-13.00	14.28
8227.956	-27.13	-13.00	14.13
9044.088	-27.99	-13.00	14.99
9063.627	-27.58	-13.00	14.58

930.975 MHz Spurious Emissions

Frequency (MHz)	Spurious Emissions (dBm)	Limit (dBm)	Margin (dB)
683.968	-35.15	-13.00	22.15
725.651	-34.10	-13.00	21.10
729.709	-34.99	-13.00	21.99
733.717	-33.54	-13.00	20.54
848.898	-32.08	-13.00	19.08
857.665	-33.62	-13.00	20.62
872.996	-31.65	-13.00	18.65
914.880	-29.15	-13.00	16.15
926.954	-30.93	-13.00	17.93
1010.521	-21.36	-13.00	8.36
6388.778	-28.40	-13.00	15.40
6698.397	-26.09	-13.00	13.09
7250.501	-26.99	-13.00	13.99
7839.178	-26.55	-13.00	13.55
7977.956	-27.80	-13.00	14.80
8052.605	-27.74	-13.00	14.74
8231.964	-26.31	-13.00	13.31
8362.725	-27.75	-13.00	14.75
8923.347	-27.35	-13.00	14.35

12 Spurious Emissions (Radiated)

12.1 Test Limits

RSS-131 §4.4.1: Spurious emissions shall be attenuated below the rated power of the enhancer by at least:

43 + 10 Log10(Prated in watts), or 70 dB, whichever is less stringent.

12.2 Test Procedure

KDB Publication No. 935210 D05 v01r01: §§ 3.8, 4.9 Spurious emissions radiated measurements

RSS-131 Issue 6 § 4.4.1 Spurious Emission, Multi-channel Enhancer

A substitution measurement was performed in accordance with TIA-603-E §2.2.12. The field strength of the unit under test was observed up to five times the fundamental frequency of a low, middle, and high channel of each band. A calibrated antenna, coaxial cable, and signal generator were then substituted for the unit under test. The level of the signal generator was increased until the measured field strength matched that of the unit under test. The signal generator level was then recorded. This procedure was repeated for each harmonic of the low, middle, and high channel of each band.

12.3 Example of Field Strength Calculation Method

The spurious emission level was calculated from the signal generator level and correction factors for the coaxial cable and antenna:

RP = SG - CF + AF
- RP = Radiated Power in dBm
- SG = Signal Generator level in dBm
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB

Example Calculation:
- SG = -62.32 dBm
- CF = 3.14 dB
- AF = 5.91 dB

RP = -62.32 dBm - 3.14 dB + 5.91 dB = -59.55 dBm
Level in mW = Common Antilogarithm [(-59.55 dBm)/10] = 1.11 nW

12.4 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
EMI Test Receiver	1302.6005.40	Rohde&Schwarz	ESU40	9/26/2016	9/26/2017
Preamplifier	122005	Rohde&Schwarz	TS-PR18	11/19/2015	11/19/2016
Bilog Antenna	51864	ETS	3142C	2/4/2016	2/4/2017
Biconnical Antenna	3958	ETS	3180B	3/8/2016	3/8/2017
Horn Antenna (Substitution)	00156319	ETS	3117	6/3/2016	6/3/2017
Horn Antenna (Measurement)	00154521	ETS	3117	Time of Use	Time of Use
System Controller	3957	Sunol Sciences	SC110V	Time of Use	Time of Use
High Pass Filter	25	Wainwright	WHKX12-1028.5-1100-15000-40SS	Time of Use	Time of Use
Signal Generator	3915	Rohde&Schwarz	SMB100A	9/20/2016	9/20/2017
EMC Software	Version 9.15.02	Rohde&Schwarz	EMC32	Time of Use	Time of Use

12.5 Results

The device was found to be compliant. All spurious emissions were suitably attenuated below the rated power of the enhancer.

12.6 Test Data

Radiated Spurious Emissions Measurement								
Test Engineer:	Brian Lackey		**Start Date:**	11/18/2016		**End Date:**	11/18/2016	
Temperature:	23.2C		**Humidity:**	39.00%		**Pressure:**	988.5mBar	
RBW:	1MHz		**VBW:**	3MHz				
Notes:								
			A	**B**	**C**	**D**	**E**	**F**
Band/Channel	**Spurious Frequency (MHz)**	**Polarity**	**Device Reading (dBm)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Tx Antenna Gain (dBi)**	**Limit (dBm)**	**Radiated Spurious Emission Level (dBm)**
Low Channel (929.0125MHz)	1858.025	H	-80.97	-72.68	3.51	4.95	-13	-71.24
	1858.025	V	-80.4	-71.99	3.51	4.95	-13	-70.55
	2787.038	H	-82.91	-72.73	4.25	6.54	-13	-70.44
	2787.038	V	-83.22	-72.1	4.25	6.54	-13	-69.81
	3716.050	H	-79.92	-66.48	4.85	8.14	-13	-63.19
	3716.050	V	-79.52	-66.13	4.85	8.14	-13	-62.84
	4645.063	H	-80.59	-66.24	5.39	9.36	-13	-62.27
	4645.063	V	-81.03	-66.79	5.39	9.36	-13	-62.82
	5574.075	H	-79.63	-62.72	6.87	10.50	-13	-59.09
	5574.075	V	-81.12	-64.32	6.87	10.50	-13	-60.69
Mid Channel (929.5MHz)	1859.000	H	-81.72	-73.34	3.51	4.95	-13	-71.90
	1859.000	V	-80.69	-72.22	3.51	4.95	-13	-70.78
	2788.500	H	-83.33	-72.99	4.25	6.54	-13	-70.70
	2788.500	V	-83.44	-72.26	4.25	6.54	-13	-69.97
	3718.000	H	-80.16	-66.27	4.85	8.14	-13	-62.98
	3718.000	V	-79.99	-66.33	4.85	8.14	-13	-63.04
	4647.500	H	-80.33	-66.4	5.39	9.36	-13	-62.43
	4647.500	V	-79.86	-66.33	5.39	9.36	-13	-62.36
	5577.000	H	-81.23	-64.35	6.87	10.50	-13	-60.72
	5577.000	V	-81.18	-64.54	6.87	10.50	-13	-60.91
High Channel (929.9875MHz)	1859.975	H	-81.48	-72.77	3.51	4.95	-13	-71.33
	1859.975	V	-80.88	-72.16	3.51	4.95	-13	-70.72
	2789.963	H	-83.45	-73.01	4.25	6.54	-13	-70.72
	2789.963	V	-83.17	-71.71	4.25	6.54	-13	-69.42
	3719.950	H	-80.5	-66.49	4.85	8.14	-13	-63.20
	3719.950	V	-79.94	-66.06	4.85	8.14	-13	-62.77
	4649.938	H	-81.36	-67.35	5.39	9.36	-13	-63.38
	4649.938	V	-80.96	-67.2	5.39	9.36	-13	-63.23
	5579.925	H	-81.12	-64.55	6.87	10.50	-13	-60.92
	5579.925	V	-81.4	-65.04	6.87	10.50	-13	-61.41
								F=B-C+D

929-930 MHz Radiated Spurious Emissions

Radiated Spurious Emissions Measurement								
Test Engineer:	Brian Lackey		**Start Date:**	11/18/2016		**End Date:**	11/18/2016	
Temperature:	23.2C		**Humidity:**	39.00%		**Pressure:**	988.5mBar	
RBW:	1MHz		**VBW:**	3MHz				
Notes:								
			A	**B**	**C**	**D**	**E**	**F**
Band/Channel	**Spurious Frequency (MHz)**	**Polarity**	**Device Reading (dBm)**	**Signal Generator Level (dBm)**	**Cable Loss (dB)**	**Tx Antenna Gain (dBi)**	**Limit (dBm)**	**Radiated Spurious Emission Level (dBm)**
Low Channel (930.025MHz)	1860.050	H	-82.76	-74.74	3.51	4.95	-13	-73.30
	1860.050	V	-82.81	-74.57	3.51	4.95	-13	-73.13
	2790.075	H	-83.47	-73.35	4.25	6.54	-13	-71.06
	2790.075	V	-83.56	-72.35	4.25	6.54	-13	-70.06
	3720.100	H	-79.16	-65.81	4.85	8.14	-13	-62.52
	3720.100	V	-80.89	-67.51	4.85	8.14	-13	-64.22
	4650.125	H	-79.79	-65.09	5.39	9.47	-13	-61.01
	4650.125	V	-79.7	-65.23	5.39	9.47	-13	-61.15
	5580.150	H	-80.49	-62.6	6.87	10.50	-13	-58.97
	5580.150	V	-81.49	-63.68	6.87	10.50	-13	-60.05
Mid Channel (930.5MHz)	1861.000	H	-82.26	-73.67	3.51	4.95	-13	-72.23
	1861.000	V	-82.35	-73.64	3.51	4.95	-13	-72.20
	2791.500	H	-83	-72.81	4.25	6.54	-13	-70.52
	2791.500	V	-83.41	-72.14	4.25	6.54	-13	-69.85
	3722.000	H	-79.45	-65.9	4.85	8.14	-13	-62.61
	3722.000	V	-79.67	-66.01	4.85	8.14	-13	-62.72
	4652.500	H	-81.11	-67.33	5.39	9.47	-13	-63.25
	4652.500	V	-81.45	-68.08	5.39	9.47	-13	-64.00
	5583.000	H	-81.11	-63.86	6.87	10.50	-13	-60.23
	5583.000	V	-80.87	-63.83	6.87	10.50	-13	-60.20
High Channel (930.975MHz)	1861.950	H	-82.73	-73.47	3.51	4.95	-13	-72.03
	1861.950	V	-82.66	-73.37	3.51	4.95	-13	-71.93
	2792.925	H	-83.27	-72.72	4.25	6.54	-13	-70.43
	2792.925	V	-83.62	-72.01	4.25	6.54	-13	-69.72
	3723.900	H	-79.8	-65.8	5.06	8.14	-13	-62.72
	3723.900	V	-78.92	-64.91	5.06	8.14	-13	-61.83
	4654.875	H	-80.53	-66.61	5.39	9.47	-13	-62.53
	4654.875	V	-80.75	-67.15	5.39	9.47	-13	-63.07
	5585.850	H	-80.55	-64.13	6.87	10.50	-13	-60.50
	5585.850	V	-81.3	-64.96	6.87	10.50	-13	-61.33
								F=B-C+D

930-931 MHz Radiated Spurious Emissions

13 Noise Figure Measurements

13.1 Test Limits

§ 90.219(e)(2) The noise figure of a signal booster must not exceed 9 dB in either direction.

13.2 Test Procedure

KDB Publication No. 935210 D05 v01r01: § 4.6 Noise figure measurements

The methods of KDB Publication No. 935210 D05 v01r01 §§ 4.5.2 and 4.5.3 were used to determine the amplifier gain at each frequency. The spectrum analyzer was then configured to measure noise power, adjusted for the analyzer bandwidth. The noise figure 'F' was then calculated as followed:

F = (P - G) - (-174 dBm/Hz)
F = P - G + 174

F = Noise figure, dB
P = Measured noise power, dBm/Hz
G = Measured gain, dB

13.3 Test Equipment Used

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Vector Signal Generator	1407.6004K02	Rohde&Schwarz	SMBV100A	9/23/2016	9/23/2017
Spectrum Analyzer	1088.3494.35	Rohde&Schwarz	FSEK30	9/20/2016	9/20/2017

13.4 Results

Frequency (MHz)	Gain (dB)	Noise Power (dBm/Hz)	Noise Figure (dB)	Limit (dB)	Margin (dB)
929.0	78.7	-91.8	3.5	9.0	5.5
929.5	78.7	-91.7	3.6	9.0	5.4
930.0	78.7	-91.8	3.5	9.0	5.5

14 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements.

The measurement uncertainty figures were calculated and correspond to a coverage factor of k = 2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Measurement uncertainty Table

Parameter	Uncertainty	Notes
Radiated emissions, 30 to 1000 MHz	±3.9dB	
Radiated emissions, 1 to 18 GHz	±4.2dB	
Radiated emissions, 18 to 40 GHz	±4.3dB	
Power Port Conducted emissions, 150kHz to 30 MHz	±2.8dB	

15 Revision History

Revision Level	Date	Report Number	Notes
0	11/28/2016	102775613LEX-002	Original Issue
1	1/12/2017	102775613LEX-002.1	Fixed sample calculation for radiated spurious emissions.