

# Test report

323348-1R2TRFWL

Date of issue: September 11, 2017

Applicant: Encinitas Labs, Inc.

Product: Retail Sensor Platform

Model: RSP9800

Model variant: RSP9003

FCC ID: 2ALVR-9271

IC Registration number: 22664-9271

Specifications:

◆ **FCC 47 CFR Part 15 Subpart C, §15.247**

Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz

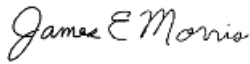
◆ **RSS-247, Issue 2, February 2017**

Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

#### Test location

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Company name	Nemko USA, Inc.
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State	California
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Country	USA
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Website	www.nemko.com
Site number	FCC: US5058; IC: 2040B

Tested by	Mark Phillips
Reviewed by	James Morris
Review date	September 12, 2017
Reviewer signature	

#### Limits of responsibility

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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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## Section 1. Report summary

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### 1.1 Applicant and manufacturer

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Company name	Encinitas Labs, Inc.
Address	2386 Faraday Ave, Suite 140
City	Carlsbad
State	CA
Postal/Zip code	92008
Country	U.S.A.

### 1.2 Test specifications

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FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz
RSS-247, Issue 2, February 2017	Digital Transmission Systems (DTs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

### 1.3 Test methods

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ANSI C64.3-2014	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

### 1.4 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

### 1.5 Exclusions

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None

### 1.6 Test report revision history

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Revision #	Details of changes made to test report
TRF	Original report issued
R1TRF	Updated according to review comment
R2TRF	Corrected setup description

## Section 2. Summary of test results

### 2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§15.31(e)	Variation of power source	Not tested
§15.203	Antenna requirement	Pass <sup>2</sup>
§15.205	Restricted bands of operation	Pass

Notes: <sup>1</sup> Test also performed with fully charged batteries in addition of AC supply voltage variation.

<sup>2</sup> The Antennas for model 9003 are located within the protective cover of EUT.

### 2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.247(a)(1)	20 dB bandwidth of the hopping channel	Pass
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Pass
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	Not applicable
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Pass
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Not applicable
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	Not applicable
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

### 2.3 IC RSS-GEN, Issue 4, test results

Part	Test description	Verdict
7.1.2	Receiver radiated emission limits	Not applicable
7.1.3	Receiver conducted emission limits	Not applicable
8.8	Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus	Pass
8.10	Restricted Frequency Bands	Pass

Notes: <sup>1</sup> According to sections 5.2 and 5.3 of RSS-Gen, Issue 4 the EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.

## 2.4 IC RSS-247, Issue 2, test results

Part	Test description	Verdict
5.1	Frequency hopping systems (FHSS)	
5.1 (1)	Bandwidth of a frequency hopping channel	Pass
5.1 (2)	Minimum channel spacing for frequency hopping systems	Pass
5.1 (3)	Frequency hopping systems operating in the 902–928 MHz band	Pass
5.1 (4)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.1 (5)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
5.2	Digital modulation systems	
5.2 (1)	Minimum 6 dB bandwidth	Not applicable
5.2 (2)	Maximum power spectral density	Not applicable
5.3	Hybrid systems	
5.3 (1)	Digital modulation turned off	Not applicable
5.3 (2)	Frequency hopping turned off	Not applicable
5.4	Transmitter output power and e.i.r.p. requirements	
5.4 (1)	Frequency hopping systems operating in the 902–928 MHz band	Pass
5.4 (2)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.4 (3)	Frequency hopping systems operating in the 5725–5850 MHz	Not applicable
5.4 (4)	Systems employing digital modulation techniques	Not applicable
5.4 (5)	Point-to-point systems in 2400–2483.5 MHz and 5725–5850 MHz band	Not applicable
5.4 (6)	Transmitters which operate in the 2400–2483.5 MHz band with multiple directional beams	Not applicable
5.5	Unwanted Emissions	Pass

Notes: EUT is FHSS in the 902-928 MHz band

## Section 3. Equipment under test (EUT) details

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### 3.1 Sample information

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Receipt date	March 13, 2017
Nemko sample ID number	323348#1

### 3.2 EUT information

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Product name	Retail RFID Sensor Platform
Model	RSP9800
Model variant	RSP9003
Serial number	RSP-edab22 (RSP9800), RSP-ed7967 (RSP9003)

### 3.3 Technical information

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Applicant IC company number	22664
IC UPN number	RSP9800
All used IC test site(s) Reg. number	2040B-3
RSS number and Issue number	RSS-247, Issue 2
Frequency band	902-928 MHz
Frequency Min (MHz)	902.75
Frequency Max (MHz)	927.25
RF power Min (W), Conducted/ERP/EIRP	N/A
RF power Max (W), Conducted/ERP/EIRP	0.91 W
Field strength, Units @ distance	N/A
Measured BW (kHz) (20 dB)	400.8 kHz
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	ASK
Emission classification (F1D, G1D, D1D)	A2D
Transmitter spurious, Units @ distance	61.5 dBuV/m Pk, 56.21 dBuV/m Avg at 3m
Power requirements	Power over Ethernet (37 – 57 VDC)
Antenna information	The EUT is professionally installed.
Antennas	6dBi (RSP9003, Internal, Linear Polarization) 7dBi (RSP9800, External, Dual Linear Polarization) 9dBi (RSP9800, External, Circular Polarization) RF Output Power Reduced same amount for Higher Gain Antenna over 6dBi.

### 3.4 Product description and theory of operation

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The RSP9003 is an integrated UHF RFID reader and antenna. The RSP9800 is a variant of the RSP9003 with an external antenna. It uses RFID to track retail inventory. It uses ASK modulation and operates in the 902 – 928 MHz band.

### 3.5 EUT exercise details

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Depends on test cases, the EUT is set either to fixed channel (L/M/H) or frequency hopping mode, using test mode. The RSP9003 was tested with a 6dBi dual linear internal antenna. The RSP9800 was tested with both 9dBi circular and a 7dBi linear external antenna.

### 3.6 EUT setup diagram

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Please refer to separate photo exhibit for details.

### 3.7 EUT sub assemblies

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Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Antenna (6dBi Dual Linear Internal)	Encinitas Labs	9005	ENG01
Antenna (9dBi Circular external)	MTI Wireless Edge	MT-262006	101731
Antenna (7dBi Linear external)	Times-7	A8060	160826125



## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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Conductive coating applied to interior of RSP9800 chassis to pass Radiated Spurious Emissions.

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5. Test conditions

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### 5.1 Atmospheric conditions

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Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

### 5.2 Power supply range

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The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of  $K = 2$  with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

## Section 7. Test equipment

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### 7.1 Test equipment list

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Table 7.1-1: Equipment list

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
752	Antenna, DRWG	EMCO	3115	9609-4943	04-May-2016	04-May-2017
E1019	Two Line V-Network	Rohde & Schwarz	ENV216	101045	15-Jun-2016	15-Jun-2017
E1026	EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESCI 7	100800	17-Mar-2016	17-Apr-2017
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572	21-Jul-2016	21-Jul-2017
E1120	Signal and Spectrum Analyzer	Rohde & Schwarz	FSV40	101395	25-May-2016	25-May-2017
E1121	EMI Test Receiver	Rohde & Schwarz	ESU 40	100064	28-Apr-2016	28-Apr-2017

Note: NCR - no calibration required, VOU - verify on use

## Section 8. Testing data

### 8.1 FCC 15.247(a) (1) and RSS-247 5.1(1) 20 dB bandwidth of the hopping channel

#### 8.1.1 Definitions and limits

**FCC and IC:**

- (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
- (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
- (i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

#### 8.1.2 Test summary

Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	60%

#### 8.1.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	1–5 % of Channel BW (no wider than 100 kHz)
Video bandwidth	≥3 × RBW
Frequency span	2 – 5 times OBW
Detector mode	Peak
Trace mode	Max Hold

Tested with RF Test Board.

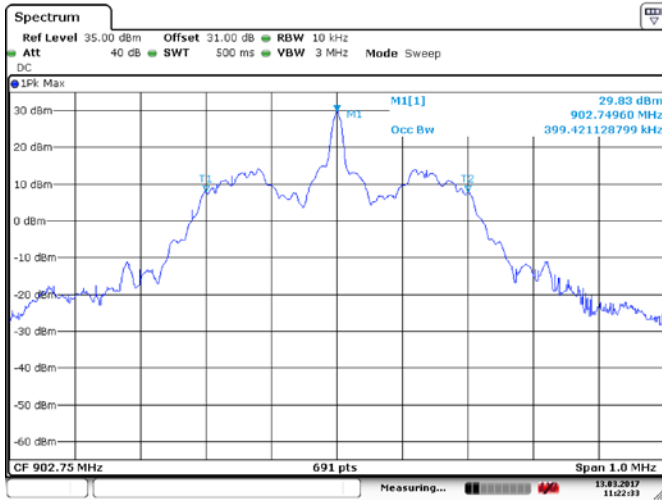
#### 8.1.4 Test data

Table 8.1-1: 20 dB bandwidth results

Modulation	Frequency, MHz	20 dB bandwidth, kHz	Channel Bandwidth, kHz	Margin, kHz
ASK	902.75	399.4	500	100.6
	914.75	400.8	500	99.2
	927.25	399.4	500	100.6

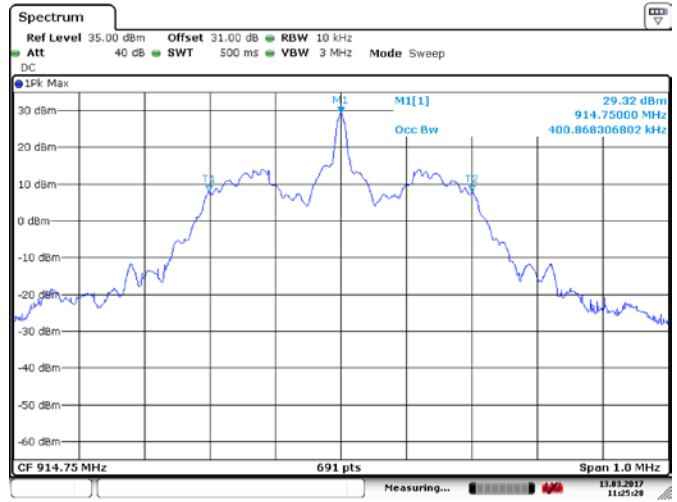
**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 15.247(a)(1) and RSS-247 5.1(1) 20 dB bandwidth of the hopping channel  
 FCC 15 Subpart C and RSS-247, Issue 1



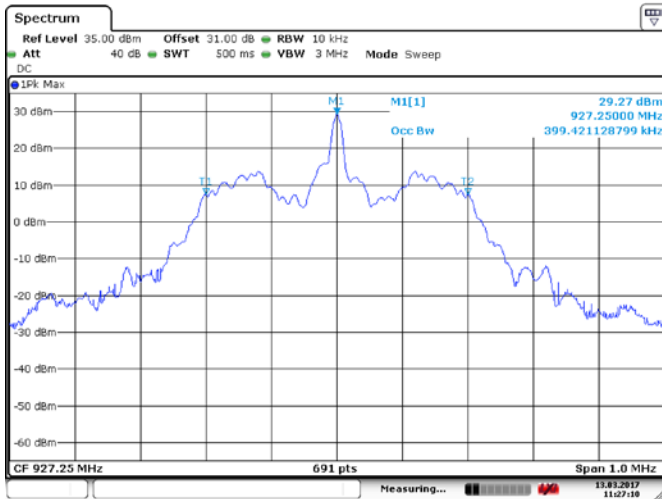
Date: 13.MAR.2017 11:22:33

Figure 8.1-1: 20 dB bandwidth, 902.75MHz



Date: 13.MAR.2017 11:25:28

Figure 8.1-2: 20 dB bandwidth, 914.75MHz



Date: 13.MAR.2017 11:27:11

Figure 8.1-3: 20 dB bandwidth, 927.25MHz

## 8.2 FCC 15.247(b) and RSS-247 5.4 (4) Transmitter output power and e.i.r.p. requirements

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### 8.2.1 Definitions and limits

---

**FCC:**

- (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
- (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
  - (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**IC:**

5.4 Transmitter Output Power and Equivalent Isotropically Radiated Power (E.I.R.P.) Requirements

- (1) For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

### 8.2.2 Test summary

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Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	60 %

### 8.2.3 Observations, settings and special notes

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Tested with RF Conducted, using 6dBi antenna setting as worst case - highest conducted power. RF Output Power Reduced same amount for Higher Gain Antenna over 6dBi by professional installation.

RF output from 1 port at a time, all 4 ports check to find the worst case (highest power).

8.2.4 Test data

Table 8.2-1: Output power measurements results – RF1

Power Source	Frequency, MHz	Conducted output power, dBm		Margin, dB	Max Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB
		Measured	Limit					
PoE	902.75	29.50	30	0.50	6	35.50	36	0.50
	914.75	29.58	30	0.42	6	35.58	36	0.42
	927.25	29.12	30	0.82	6	35.12	36	0.82

Table 8.2-2: Output power measurements results – RF3

Power Source	Frequency, MHz	Conducted output power, dBm		Margin, dB	Max Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB
		Measured	Limit					
PoE	902.75	28.42	30	1.58	6	34.42	36	1.58
	914.75	28.69	30	1.31	6	34.69	36	1.31
	927.25	29.02	30	0.98	6	35.02	36	0.98

Table 8.2-3: Output power measurements results – RF2

Power Source	Frequency, MHz	Conducted output power, dBm		Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB
		Measured	Limit					
PoE	902.75	29.89	30	0.11	6	35.89	36	0.11
	914.75	29.19	30	0.81	6	35.19	36	0.81
	927.25	28.92	30	0.08	6	28.69	36	0.08

Table 8.2-4: Output power measurements results – RF0

Power Source	Frequency, MHz	Conducted output power, dBm		Margin, dB	Antenna gain, dBi	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB
		Measured	Limit					
PoE	902.75	29.59	30	0.41	6	35.59	36	0.41
	914.75	29.39	30	0.61	6	35.39	36	0.61
	927.25	29.48	30	0.52	6	35.48	36	0.52



## 8.3 FCC 15.247(d) and RSS-247 5.5 Spurious (out-of-band) emissions

### 8.3.1 Definitions and limits

**FCC:**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

**IC:**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

(a) Fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands except for apparatus complying under RSS-287;

(b) Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and

(c) Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Table 8.3-1: FCC §15.209 and RSS-Gen – Radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	67.6 – 20 × log <sub>10</sub> (F)	300
0.490–1.705	24000/F	87.6 – 20 × log <sub>10</sub> (F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.

For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

Table 8.3-2: IC restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	12.51975–12.52025	399.9–410	5.35–5.46
2.1735–2.1905	12.57675–12.57725	608–614	7.25–7.75
3.020–3.026	13.36–13.41	960–1427	8.025–8.5
4.125–4.128	16.42–16.423	1435–1626.5	9.0–9.2
4.17725–4.17775	16.69475–16.69525	1645.5–1646.5	9.3–9.5
4.20725–4.20775	16.80425–16.80475	1660–1710	10.6–12.7
5.677–5.683	25.5–25.67	1718.8–1722.2	13.25–13.4
6.215–6.218	37.5–38.25	2200–2300	14.47–14.5
6.26775–6.26825	73–74.6	2310–2390	15.35–16.2
6.31175–6.31225	74.8–75.2	2655–2900	17.7–21.4
8.291–8.294	108–138	3260–3267	22.01–23.12
8.362–8.366	156.52475–156.52525	3332–3339	23.6–24.0
8.37625–8.38675	156.7–156.9	3345.8–3358	31.2–31.8
8.41425–8.41475	240–285	3500–4400	36.43–36.5
12.29–12.293	322–335.4	4500–5150	Above 38.6

Note: Certain frequency bands listed in Table 8.3-2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

Table 8.3-3: FCC restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

### 8.3.2 Test summary

Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1005 mbar
Verdict	Pass	Relative humidity	56 %

### 8.3.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10<sup>th</sup> harmonic.  
 EUT was set to transmit continuously.  
 Radiated measurements were performed at a distance of 3 m.  
 Since fundamental power was tested using average method, the spurious emissions limit is -30 dBc/100 kHz

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	10 Hz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for conducted spurious emissions measurements:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

8.3.4 Test data

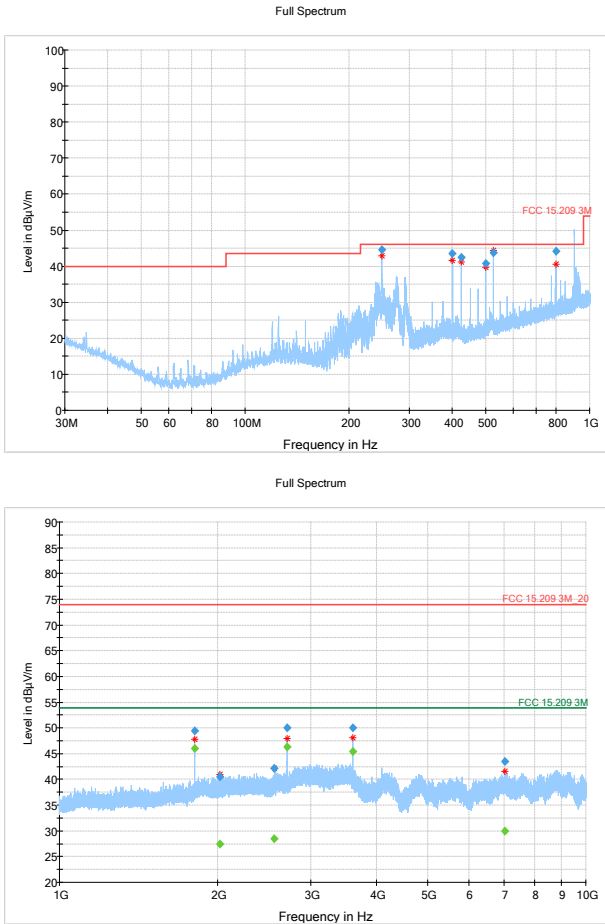


Figure 8.3.1: RSP 9800 Radiated spurious emissions, low channel, Dual Linear Antenna

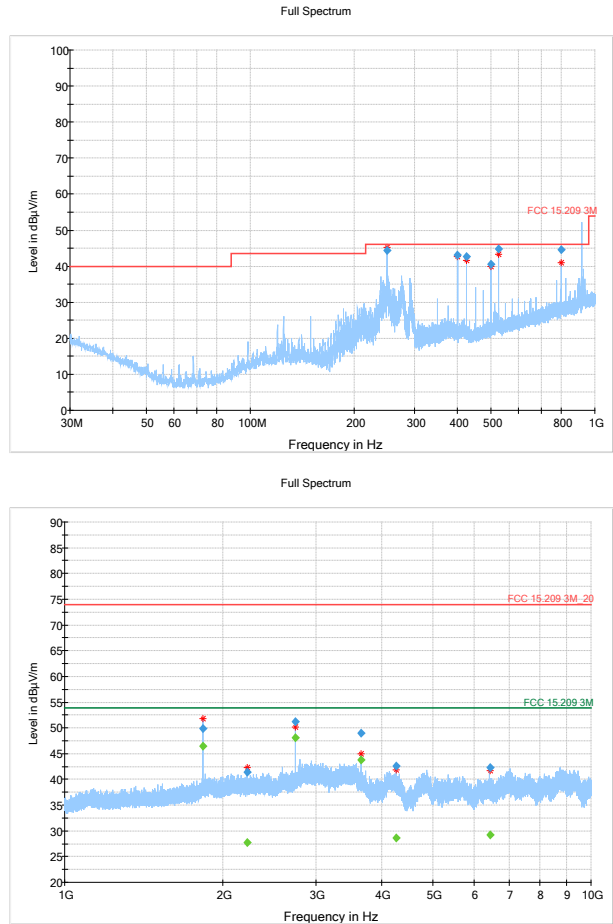


Figure 8.3.2: RSP 9800 Radiated spurious emissions, mid channel, Dual Linear Antenna

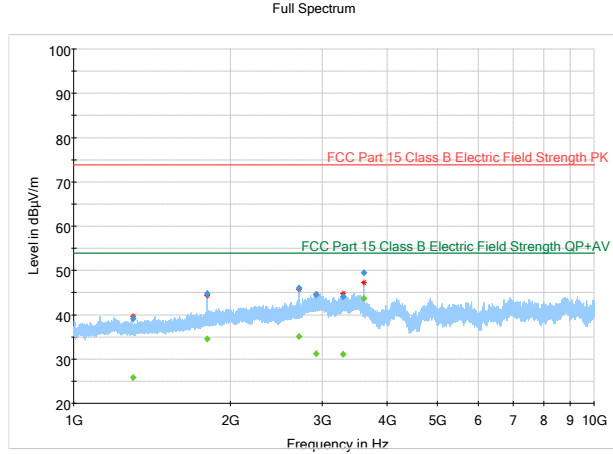
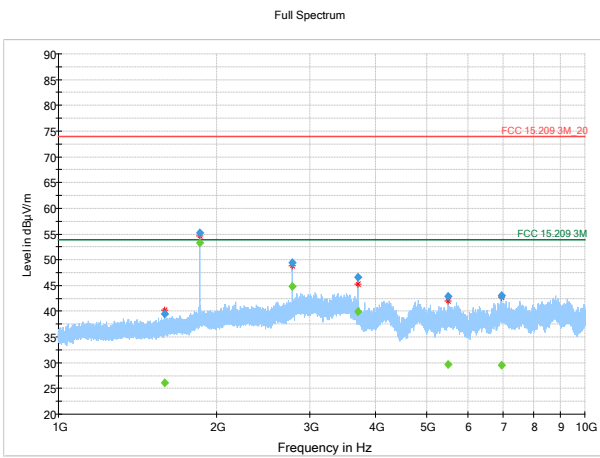
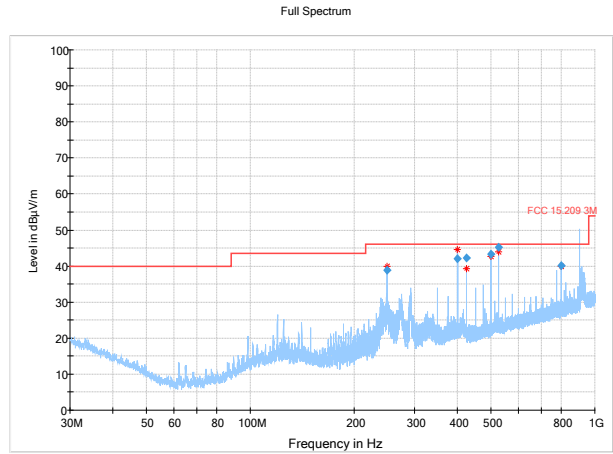
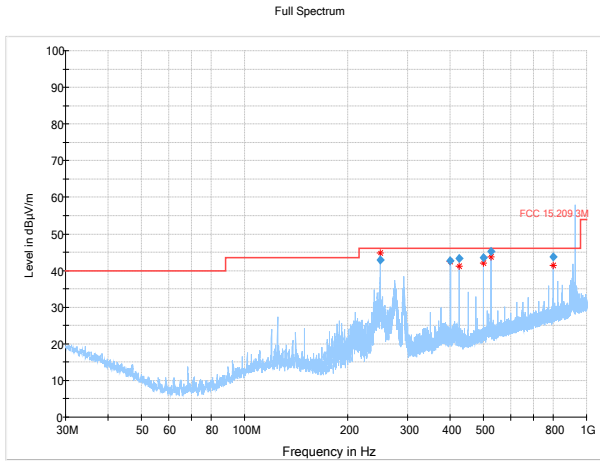


Figure 8.3.3: RSP 9800 Radiated spurious emissions, high channel, Dual Linear Antenna

Figure 8.3.4: RSP 9800 Radiated spurious emissions, low channel, Circular Antenna

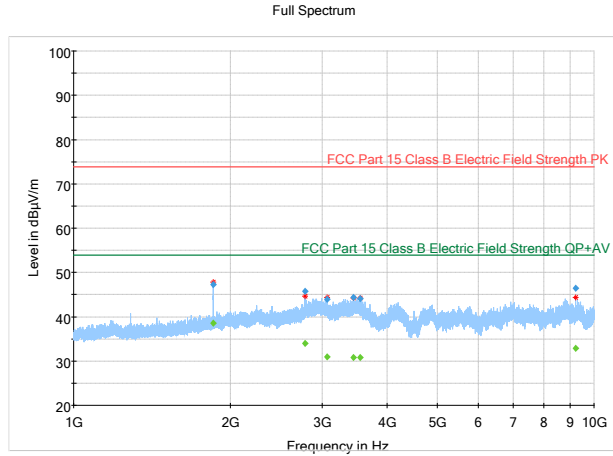
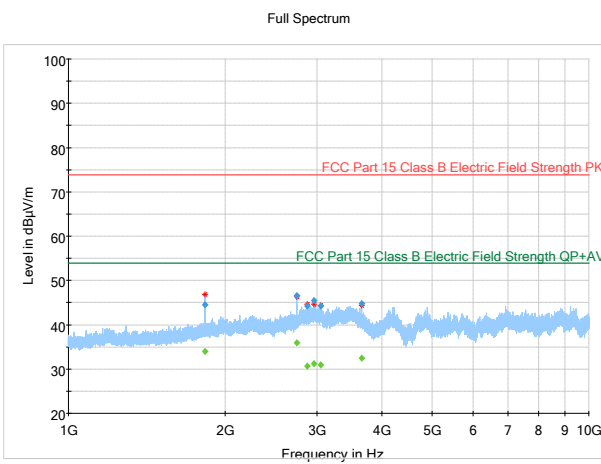
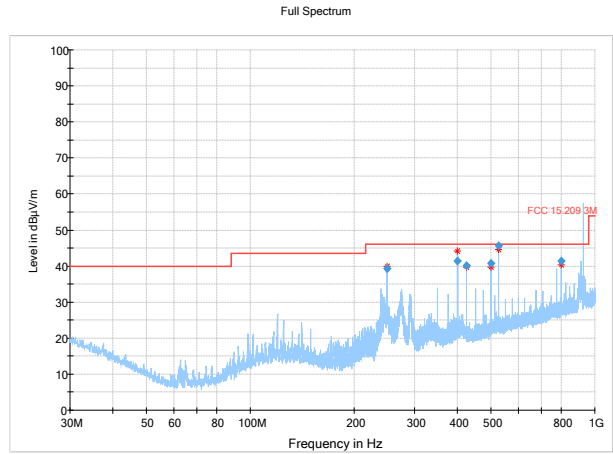
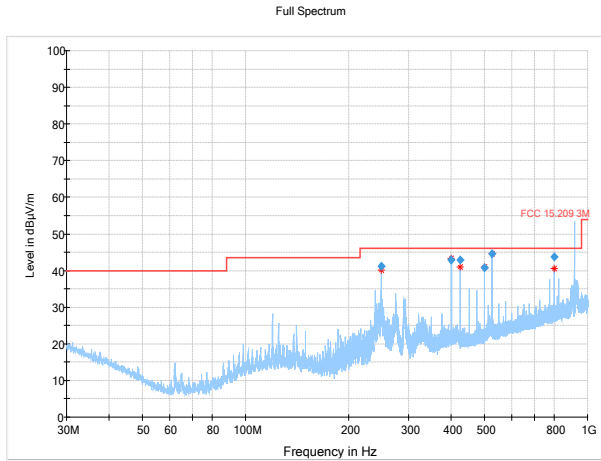


Figure 8.3.5: RSP 9800 Radiated spurious emissions, mid channel, Circular Antenna

Figure 8.3.6: RSP 9800 Radiated spurious emissions, high channel, Circular Antenna

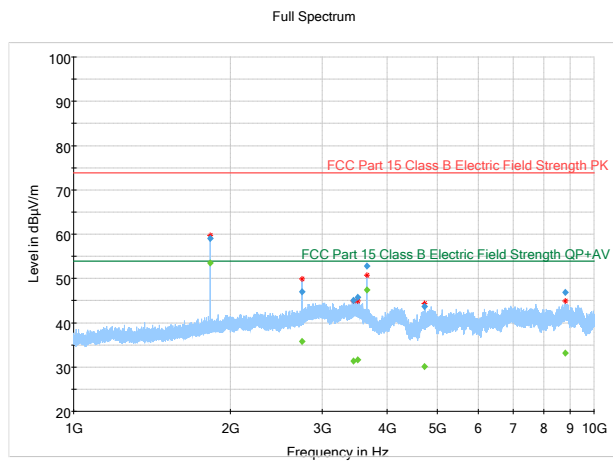
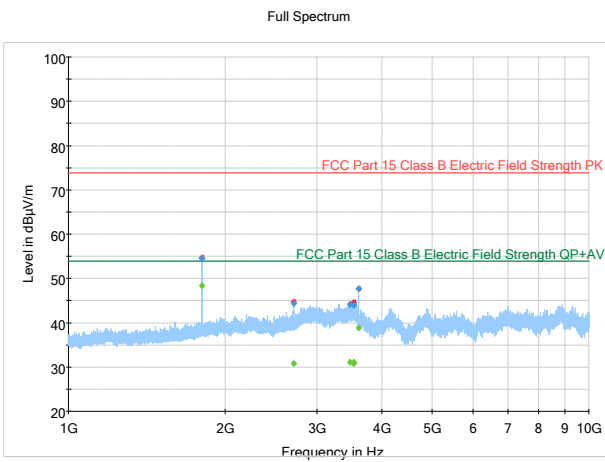
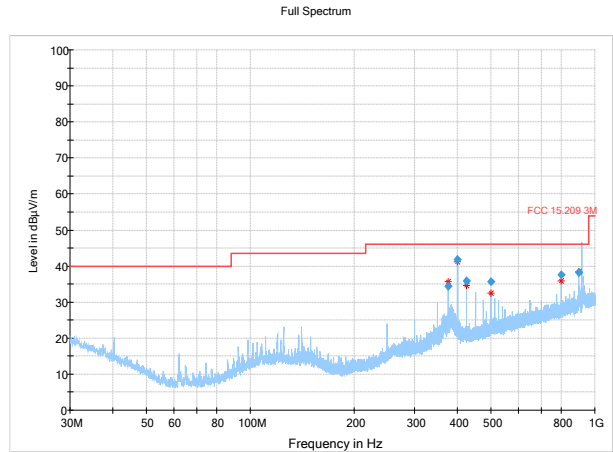
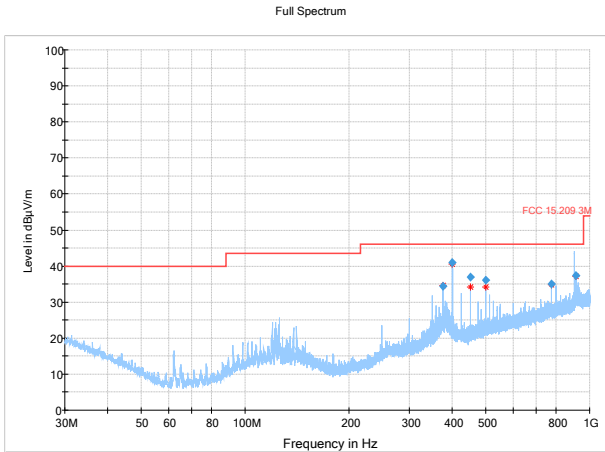


Figure 8.3.7: RSP 9003 Radiated spurious emissions, Low channel

Figure 8.3.8: RSP 9003 Radiated spurious emissions, Mid channel

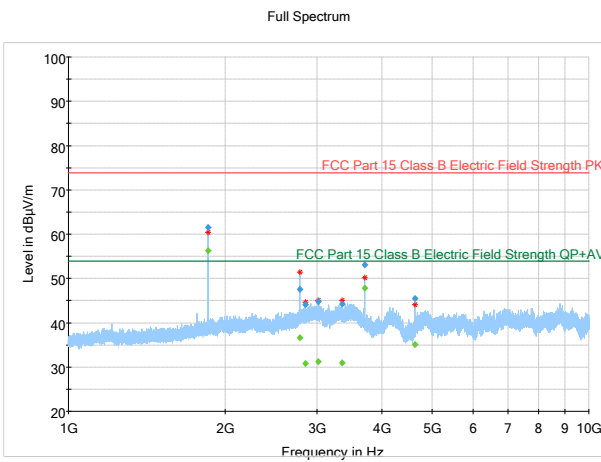
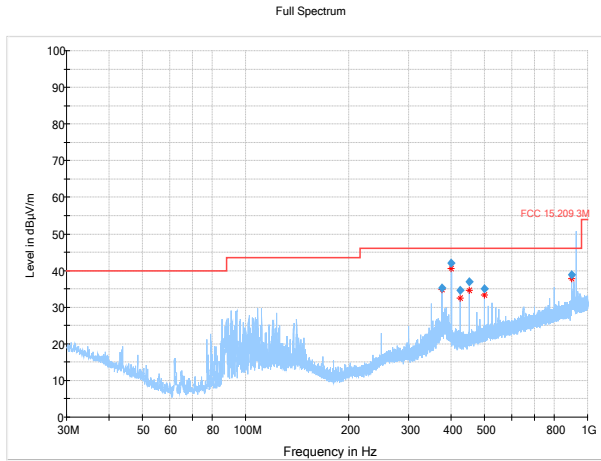


Figure 8.3.9: RSP 9003 Radiated spurious emissions, High channel

Peaks within 902-928MHz are transmitter fundamentals.

Table 8.3-4: RSP 9800 Radiated field strength measurement results for low channel, Dual Linear Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.007500	44.64	46.00	1.36	5000.0	120.000	103.1	H	13.0
399.995000	43.43	46.00	2.57	5000.0	120.000	112.8	V	250.0
425.012500	42.50	46.00	3.50	5000.0	120.000	126.8	V	25.0
499.993500	40.74	46.00	5.26	5000.0	120.000	300.7	H	25.0
525.019500	43.82	46.00	2.18	5000.0	120.000	112.8	V	320.0
800.014500	44.16	46.00	1.84	5000.0	120.000	112.7	H	40.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1805.593333	---	46.02	53.90	7.88	5000.0	1000.000	274.9	V	92.0
1805.593333	49.41	---	73.90	24.49	5000.0	1000.000	274.9	V	92.0
2018.340000	---	27.47	53.90	26.43	5000.0	1000.000	196.0	V	132.0
2018.340000	40.54	---	73.90	33.36	5000.0	1000.000	196.0	V	132.0
2560.373333	42.18	---	73.90	31.72	5000.0	1000.000	227.4	V	133.0
2560.373333	---	28.54	53.90	25.36	5000.0	1000.000	227.4	V	133.0
2708.173333	---	46.28	53.90	7.62	5000.0	1000.000	156.1	H	45.0
2708.173333	50.09	---	73.90	23.81	5000.0	1000.000	156.1	H	45.0
3611.080000	---	45.36	53.90	8.54	5000.0	1000.000	230.4	H	39.0
3611.080000	50.04	---	73.90	23.86	5000.0	1000.000	230.4	H	39.0
7018.946667	43.50	---	73.90	30.40	5000.0	1000.000	247.5	H	177.0
7018.946667	---	29.90	53.90	24.00	5000.0	1000.000	247.5	H	177.0

Table 8.3-5: RSP 9800 Radiated field strength measurement results for Mid channel, Dual Linear Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.007500	44.41	46.00	1.59	5000.0	120.000	107.2	H	10.0
399.986500	43.07	46.00	2.93	5000.0	120.000	129.8	V	261.0
425.012500	42.69	46.00	3.31	5000.0	120.000	119.0	V	44.0
499.993500	40.62	46.00	5.38	5000.0	120.000	247.3	H	331.0
525.019500	44.71	46.00	1.29	5000.0	120.000	101.8	V	314.0
800.014500	44.56	46.00	1.44	5000.0	120.000	100.0	H	50.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1829.373333	49.87	---	73.90	24.03	5000.0	1000.000	131.5	H	67.0
1829.373333	---	46.45	53.90	7.45	5000.0	1000.000	131.5	H	67.0
2221.413333	---	27.76	53.90	26.14	5000.0	1000.000	138.6	V	205.0
2221.413333	41.41	---	73.90	32.49	5000.0	1000.000	138.6	V	205.0
2744.453333	51.28	---	73.90	22.62	5000.0	1000.000	128.8	H	50.0
2744.453333	---	48.05	53.90	5.85	5000.0	1000.000	128.8	H	50.0
3658.866667	---	43.79	53.90	10.11	5000.0	1000.000	229.2	H	40.0
3658.866667	48.94	---	73.90	24.96	5000.0	1000.000	229.2	H	40.0
4265.640000	42.57	---	73.90	31.33	5000.0	1000.000	191.5	V	92.0
4265.640000	---	28.62	53.90	25.28	5000.0	1000.000	191.5	V	92.0
6423.986667	42.24	---	73.90	31.66	5000.0	1000.000	135.2	H	32.0
6423.986667	---	29.27	53.90	24.63	5000.0	1000.000	135.2	H	32.0



Table 8.3-6: RSP 9800 Radiated field strength measurement results for High channel, Dual Linear Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.016000	42.86	46.00	3.14	5000.0	120.000	120.5	H	265.0
399.986500	42.77	46.00	3.23	5000.0	120.000	112.7	V	14.0
425.004000	43.34	46.00	2.66	5000.0	120.000	116.6	V	31.0
499.993500	43.46	46.00	2.54	5000.0	120.000	106.0	V	309.0
525.011000	45.13	46.00	0.87	5000.0	120.000	104.2	V	318.0
799.974500	43.78	46.00	2.22	5000.0	120.000	106.7	H	45.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1592.513333	39.49	---	73.90	34.41	5000.0	1000.000	136.6	H	4.0
1592.513333	---	26.08	53.90	27.82	5000.0	1000.000	136.6	H	4.0
1854.646667	---	53.33	53.90	0.57	5000.0	1000.000	156.1	V	5.0
1854.646667	55.17	---	73.90	18.73	5000.0	1000.000	156.1	V	5.0
2781.893333	49.46	---	73.90	24.44	5000.0	1000.000	138.3	V	53.0
2781.893333	---	44.85	53.90	9.05	5000.0	1000.000	138.3	V	53.0
3709.213333	---	39.94	53.90	13.96	5000.0	1000.000	101.7	V	73.0
3709.213333	46.61	---	73.90	27.29	5000.0	1000.000	101.7	V	73.0
5500.253333	42.83	---	73.90	31.07	5000.0	1000.000	146.5	H	62.0
5500.253333	---	29.71	53.90	24.19	5000.0	1000.000	146.5	H	62.0
6938.306667	42.99	---	73.90	30.91	5000.0	1000.000	114.0	H	5.0
6938.306667	---	29.53	53.90	24.37	5000.0	1000.000	114.0	H	5.0

Table 8.3-7: RSP 9800 Radiated field strength measurement results for low channel, Circular Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.016000	38.86	46.00	7.14	5000.0	120.000	110.8	H	223.0
399.986500	42.12	46.00	3.88	5000.0	120.000	104.4	H	0.0
425.004000	42.22	46.00	3.78	5000.0	120.000	99.0	H	0.0
499.993500	43.28	46.00	2.72	5000.0	120.000	102.0	V	247.0
525.019500	45.26	46.00	0.74	5000.0	120.000	107.3	V	234.0
799.974500	40.07	46.00	5.93	5000.0	120.000	107.6	H	304.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1299.840000	39.09	---	73.90	34.81	5000.0	1000.000	342.5	H	100.0
1299.840000	---	25.82	53.90	28.08	5000.0	1000.000	342.5	H	100.0
1805.280000	44.75	---	73.90	29.15	5000.0	1000.000	197.0	V	341.0
1805.280000	---	34.59	53.90	19.31	5000.0	1000.000	197.0	V	341.0
2708.086667	---	35.02	53.90	18.88	5000.0	1000.000	168.3	V	261.0
2708.086667	45.97	---	73.90	27.93	5000.0	1000.000	168.3	V	261.0
2924.360000	---	31.28	53.90	22.62	5000.0	1000.000	401.3	H	259.0
2924.360000	44.45	---	73.90	29.45	5000.0	1000.000	401.3	H	259.0
3294.766667	44.15	---	73.90	29.75	5000.0	1000.000	219.4	H	324.0
3294.766667	---	31.02	53.90	22.88	5000.0	1000.000	219.4	H	324.0
3611.080000	49.54	---	73.90	24.36	5000.0	1000.000	139.6	H	101.0
3611.080000	---	43.67	53.90	10.23	5000.0	1000.000	139.6	H	101.0

Table 8.3-8: RSP 9800 Radiated field strength measurement results for Mid channel, Circular Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
250.016000	41.13	46.00	4.87	5000.0	120.000	102.0	H	206.0
399.986500	42.98	46.00	3.02	5000.0	120.000	124.4	V	245.0
425.012500	42.92	46.00	3.08	5000.0	120.000	119.3	V	244.0
499.993500	40.74	46.00	5.26	5000.0	120.000	107.8	V	152.0
525.011000	44.54	46.00	1.46	5000.0	120.000	112.2	V	144.0
800.014500	43.77	46.00	2.23	5000.0	120.000	106.6	H	40.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1829.686667	44.53	---	73.90	29.37	5000.0	1000.000	333.1	H	201.0
1829.686667	---	33.94	53.90	19.96	5000.0	1000.000	333.1	H	201.0
2744.366667	---	35.91	53.90	17.99	5000.0	1000.000	185.0	V	0.0
2744.366667	46.58	---	73.90	27.32	5000.0	1000.000	185.0	V	0.0
2879.686667	44.25	---	73.90	29.65	5000.0	1000.000	310.0	V	101.0
2879.686667	---	30.64	53.90	23.26	5000.0	1000.000	310.0	V	101.0
2962.073333	---	31.17	53.90	22.73	5000.0	1000.000	342.7	H	41.0
2962.073333	45.53	---	73.90	28.37	5000.0	1000.000	342.7	H	41.0
3052.620000	---	30.99	53.90	22.91	5000.0	1000.000	370.9	H	162.0
3052.620000	44.29	---	73.90	29.61	5000.0	1000.000	370.9	H	162.0
3658.893333	---	32.47	53.90	21.43	5000.0	1000.000	385.3	H	82.0
3658.893333	44.72	---	73.90	29.18	5000.0	1000.000	385.3	H	82.0

Table 8.3-9: RSP 9800 Radiated field strength measurement results for High channel, Circular Antenna

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
249.976000	39.18	46.00	6.82	5000.0	120.000	131.3	H	212.0
399.986500	41.45	46.00	4.55	5000.0	120.000	103.0	H	0.0
425.004000	40.05	46.00	5.95	5000.0	120.000	100.0	H	0.0
499.993500	40.86	46.00	5.14	5000.0	120.000	250.2	H	294.0
525.011000	45.62	46.00	0.38	5000.0	120.000	106.8	V	244.0
799.974500	41.48	46.00	4.52	5000.0	120.000	99.0	H	288.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1854.560000	---	38.48	53.90	15.42	5000.0	1000.000	121.5	H	16.0
1854.560000	47.26	---	73.90	26.64	5000.0	1000.000	121.5	H	16.0
2781.806667	45.72	---	73.90	28.18	5000.0	1000.000	103.8	V	264.0
2781.806667	---	33.91	53.90	19.99	5000.0	1000.000	103.8	V	264.0
3067.706667	---	30.87	53.90	23.03	5000.0	1000.000	401.0	H	183.0
3067.706667	43.94	---	73.90	29.96	5000.0	1000.000	401.0	H	183.0
3444.206667	---	30.75	53.90	23.15	5000.0	1000.000	273.6	V	302.0
3444.206667	44.40	---	73.90	29.50	5000.0	1000.000	273.6	V	302.0
3550.426667	---	30.80	53.90	23.10	5000.0	1000.000	315.2	H	343.0
3550.426667	44.12	---	73.90	29.78	5000.0	1000.000	315.2	H	343.0
9220.813333	46.45	---	73.90	27.45	5000.0	1000.000	401.0	V	243.0
9220.813333	---	32.86	53.90	21.04	5000.0	1000.000	401.0	V	243.0

Table 8.3-10: RSP 9003 Radiated field strength measurement results for Low Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
375.009000	34.46	46.00	11.54	5000.0	120.000	107.2	H	305.0
400.026500	41.05	46.00	4.95	5000.0	120.000	118.5	V	26.0
450.030000	36.97	46.00	9.03	5000.0	120.000	178.7	H	309.0
499.993500	36.00	46.00	10.00	5000.0	120.000	103.5	V	66.0
775.077000	35.11	46.00	10.89	5000.0	120.000	298.3	H	218.0
912.557500	37.27	46.00	8.73	5000.0	120.000	132.7	H	138.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1805.680000	---	48.43	53.90	5.47	5000.0	1000.000	278.0	H	42.0
1805.680000	54.46	---	73.90	19.44	5000.0	1000.000	278.0	H	42.0
2708.313333	44.32	---	73.90	29.58	5000.0	1000.000	102.8	H	16.0
2708.313333	---	30.73	53.90	23.17	5000.0	1000.000	102.8	H	16.0
3477.353333	44.07	---	73.90	29.83	5000.0	1000.000	336.0	H	162.0
3477.353333	---	31.04	53.90	22.86	5000.0	1000.000	336.0	H	162.0
3532.546667	44.09	---	73.90	29.81	5000.0	1000.000	299.0	H	0.0
3532.546667	---	30.83	53.90	23.07	5000.0	1000.000	299.0	H	0.0
3538.126667	43.89	---	73.90	30.01	5000.0	1000.000	364.2	H	342.0
3538.126667	---	31.05	53.90	22.85	5000.0	1000.000	364.2	H	342.0
3610.866667	---	38.89	53.90	15.01	5000.0	1000.000	283.1	H	321.0
3610.866667	47.71	---	73.90	26.19	5000.0	1000.000	283.1	H	321.0

Table 8.3-11: RSP 9003 Radiated field strength measurement results for Mid Channel

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
375.009000	34.39	46.00	11.61	5000.0	120.000	227.7	H	289.0	19.3
399.986500	41.72	46.00	4.28	5000.0	120.000	129.4	V	18.0	19.9
425.012500	35.78	46.00	10.22	5000.0	120.000	117.0	V	56.0	20.6
499.993500	35.63	46.00	10.37	5000.0	120.000	114.3	V	58.0	22.1
800.014500	37.66	46.00	8.34	5000.0	120.000	110.0	H	317.0	27.1
898.478000	38.28	46.00	7.72	5000.0	120.000	270.3	H	337.0	28.3

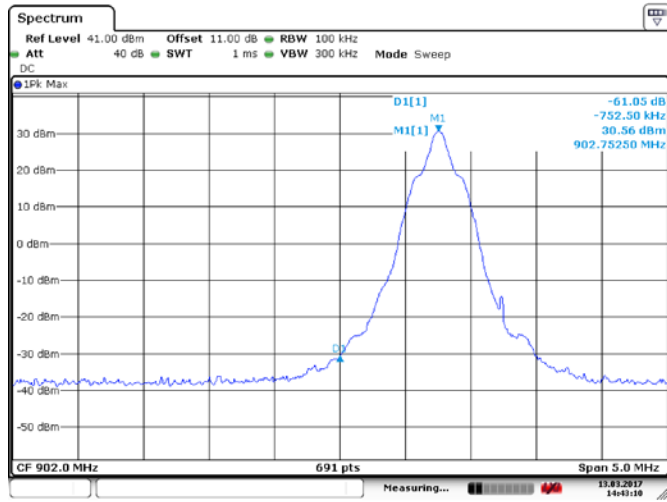
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1829.686667	---	53.48	53.90	0.42	5000.0	1000.000	297.7	H	40.0
1829.686667	59.01	---	73.90	14.89	5000.0	1000.000	297.7	H	40.0
2744.140000	46.94	---	73.90	26.96	5000.0	1000.000	99.0	H	15.0
2744.140000	---	35.74	53.90	18.16	5000.0	1000.000	99.0	H	15.0
3446.880000	45.04	---	73.90	28.86	5000.0	1000.000	401.0	H	302.0
3446.880000	---	31.37	53.90	22.53	5000.0	1000.000	401.0	H	302.0
3510.533333	45.79	---	73.90	28.11	5000.0	1000.000	393.3	V	122.0
3510.533333	---	31.60	53.90	22.30	5000.0	1000.000	393.3	V	122.0
3659.080000	52.79	---	73.90	21.11	5000.0	1000.000	200.1	H	82.0
3659.080000	---	47.39	53.90	6.51	5000.0	1000.000	200.1	H	82.0
4722.546667	43.63	---	73.90	30.27	5000.0	1000.000	355.5	H	282.0
4722.546667	---	30.16	53.90	23.74	5000.0	1000.000	355.5	H	282.0
8805.426667	46.81	---	73.90	27.09	5000.0	1000.000	338.8	V	61.0
8805.426667	---	33.19	53.90	20.71	5000.0	1000.000	338.8	V	61.0



Table 8.3-12: RSP 9003 Radiated field strength measurement results for High channel

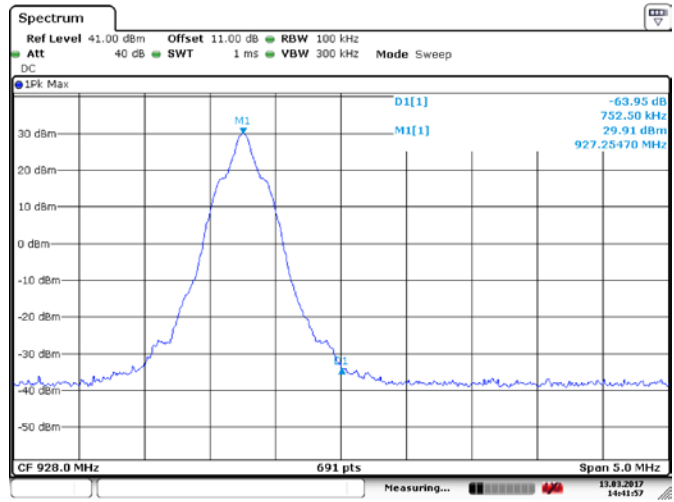
Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
375.009000	35.29	46.00	10.71	5000.0	120.000	124.0	V	0.0
399.986500	42.14	46.00	3.86	5000.0	120.000	129.7	V	356.0
425.012500	34.69	46.00	11.31	5000.0	120.000	130.5	V	50.0
450.030000	37.00	46.00	9.00	5000.0	120.000	173.3	H	294.0
500.033500	35.12	46.00	10.88	5000.0	120.000	103.4	V	78.0
898.606500	38.79	46.00	7.21	5000.0	120.000	187.3	H	180.0

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Comment
1854.560000	61.50	---	73.90	12.40	5000.0	1000.000	284.1	H	42.0	
1854.560000	---	56.21	53.90	-2.31	5000.0	1000.000	284.1	H	42.0	Not In Restricted Band
2781.806667	---	36.65	53.90	17.25	5000.0	1000.000	99.0	H	16.0	
2781.806667	47.48	---	73.90	26.43	5000.0	1000.000	99.0	H	16.0	
2851.040000	---	30.85	53.90	23.05	5000.0	1000.000	287.1	H	280.0	
2851.040000	44.10	---	73.90	29.80	5000.0	1000.000	287.1	H	280.0	
3016.633333	44.75	---	73.90	29.15	5000.0	1000.000	310.7	H	0.0	
3016.633333	---	31.28	53.90	22.62	5000.0	1000.000	310.7	H	0.0	
3351.946667	---	30.94	53.90	22.96	5000.0	1000.000	320.9	V	281.0	
3351.946667	44.20	---	73.90	29.70	5000.0	1000.000	320.9	V	281.0	
3709.000000	53.13	---	73.90	20.77	5000.0	1000.000	211.7	H	41.0	
3709.000000	---	47.89	53.90	6.01	5000.0	1000.000	211.7	H	41.0	
4636.360000	45.50	---	73.90	28.40	5000.0	1000.000	163.6	H	222.0	
4636.360000	---	35.03	53.90	18.87	5000.0	1000.000	163.6	H	222.0	



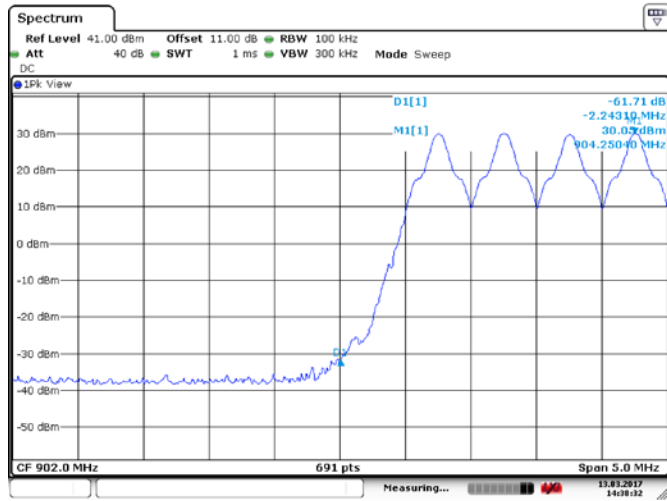
Date: 13.MAR.2017 14:43:10

Figure 8.3.10: Low Bandedge Measurement



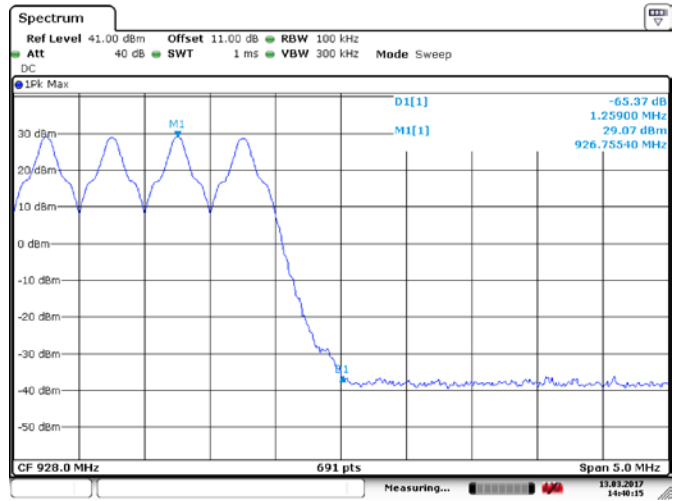
Date: 13.MAR.2017 14:41:57

Figure 8.3.11: High Bandedge Measurement



Date: 13.MAR.2017 14:38:32

Figure 8.3.12: Low Bandedge Measurement, hopping



Date: 13.MAR.2017 14:40:16

Figure 8.3.13: High Bandedge Measurement, hopping

**Section 8**  
**Test name**  
**Specification**

Testing data  
 FCC 15.247(d) and RSS-247 5.5 Spurious (out-of-band) emissions  
 FCC Part 15 Subpart C and RSS-247, Issue 1

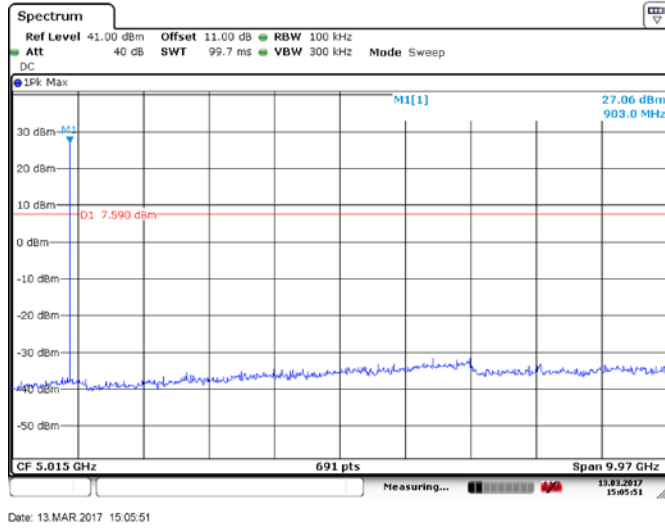


Figure 8.3.14: Conducted spurious emissions, low channel

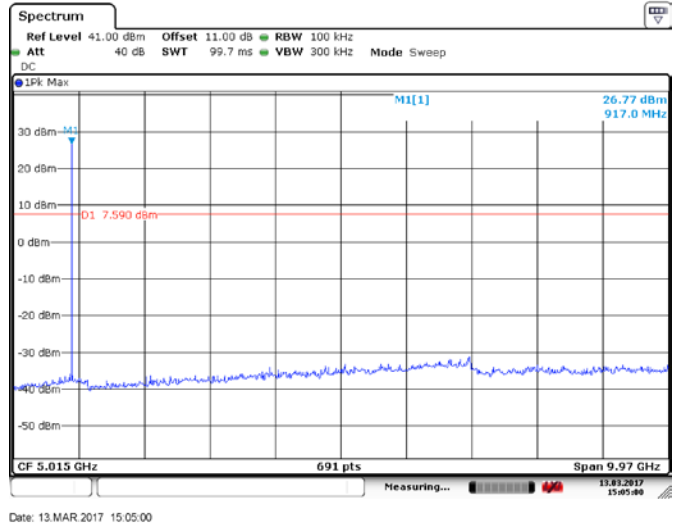


Figure 8.3.15: Conducted spurious emissions, mid channel

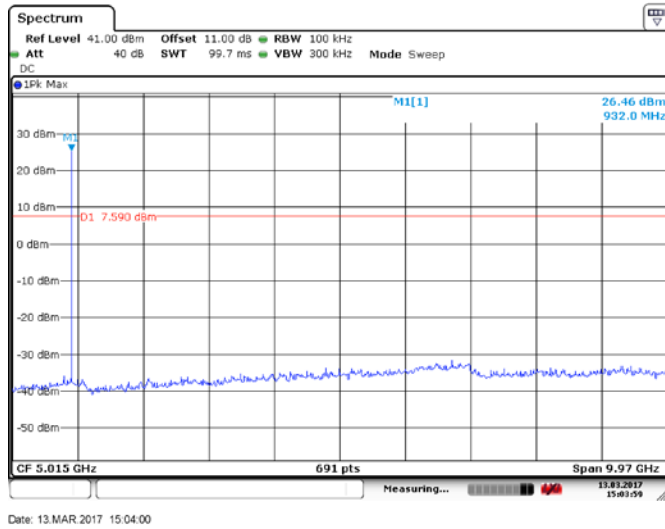


Figure 8.3.16: Conducted spurious emissions, high channel

Peaks within 902-928MHz are transmitter fundamentals.

## 8.4 FCC 15.247(a)(1)(i) and RSS-247 5.1(3) Frequency hopping systems in the 902-928MHz

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### 8.4.1 Definitions and limits

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**FCC:**

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz..

**IC:**

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

### 8.4.2 Test summary

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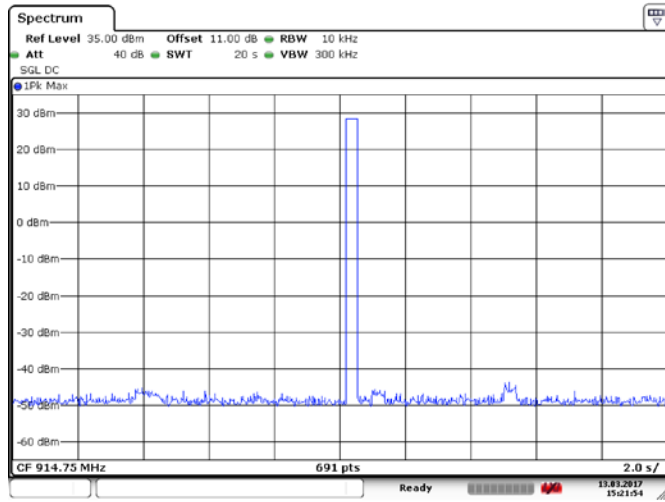
Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	56 %

### 8.4.3 Observations, settings and special notes

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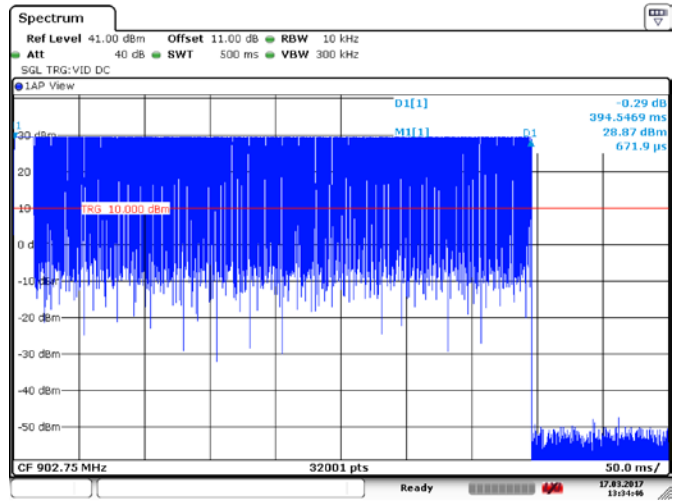
The test was performed using EUT set to normal hopping operation.

8.4.4 Test data



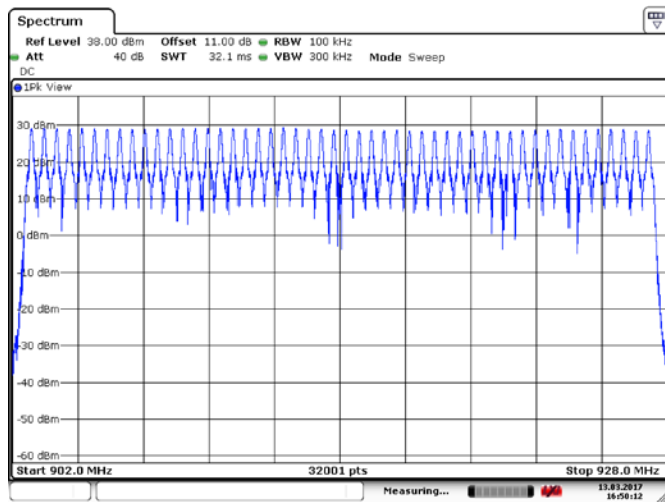
Date: 13.MAR.2017 15:21:54

Diagram 8.4-1: Pulse count in 10s, 914.75MHz



Date: 17.MAR.2017 13:34:46

Diagram 8.4-2: Pulse width, 914.75MHz



Date: 13.MAR.2017 16:50:12

Diagram 8.4-3: Hopping channels 50

Table 8.4-1: Time of occupancy

Frequency MHz	Pulse count in 10s	Pulse width (ms)	Time of occupancy Time (ms)	Limit (ms)	Margin (ms)
914.75	1	394.54	394.54	400	0.46

Table 8.4: Hopping Frequencies

Minimum Hopping Frequencies	Measured Hopping Frequencies	Result
25	50	Pass



## 8.5 FCC 15.247(a) (1) and RSS-247 5.1(2) Carrier frequency separation

### 8.5.1 Definitions and limits

**FCC and IC:**

- (a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:
- (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 8.5.2 Test summary

Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1003 mbar
Verdict	Pass	Relative humidity	55 %

### 8.5.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	100 kHz
Video bandwidth	≥ RBW
Frequency span	4 MHz
Detector mode	Peak
Trace mode	Max Hold

RF Conducted Test

### 8.5.4 Test data

Table 8.5-1: Hopping Frequency Separation

Modulation	Frequency, kHz	Minimum, kHz (20dB OBW)	Margin, kHz
ASK	500.0	400.8	99.2

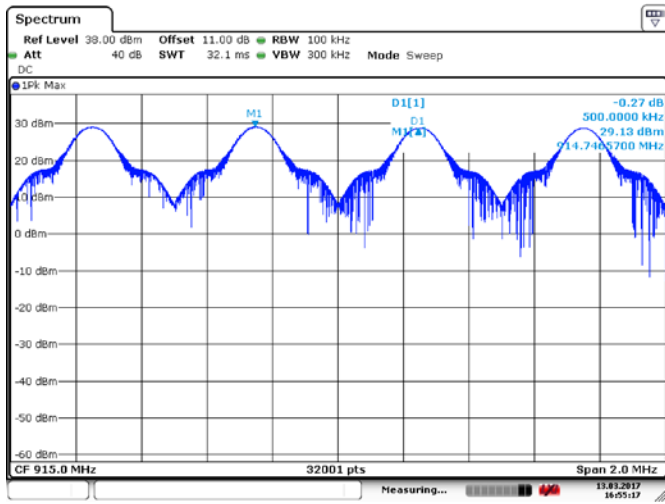


Figure 8.5-1: Hopping Frequency Separation

## 8.6 FCC 15.207(a) AC power line conducted emissions limits

### 8.6.1 Definitions and limits

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

The conducted emissions shall be measured with a 50  $\Omega$ /50  $\mu$ H line impedance stabilization network (LISN).

Table 8.6-1: Conducted emissions limit

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Note: \* - Decreases with the logarithm of the frequency.

### 8.6.2 Test summary

Test date	March 13, 2017	Temperature	20 °C
Test engineer	Mark Phillips	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	56 %

### 8.6.3 Observations, settings and special notes

This is tested with Low CH TX on.

The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance.

A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Test receiver settings:

Frequency span	150 kHz to 30 MHz
Detector mode	Peak and Average (preview mode); Quasi-Peak (final measurements)
Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Trace mode	Max Hold
Measurement time	1000 ms

8.6.4 Test data

Plot 8.6-1: RSP 9003 Conducted emissions

Full Spectrum

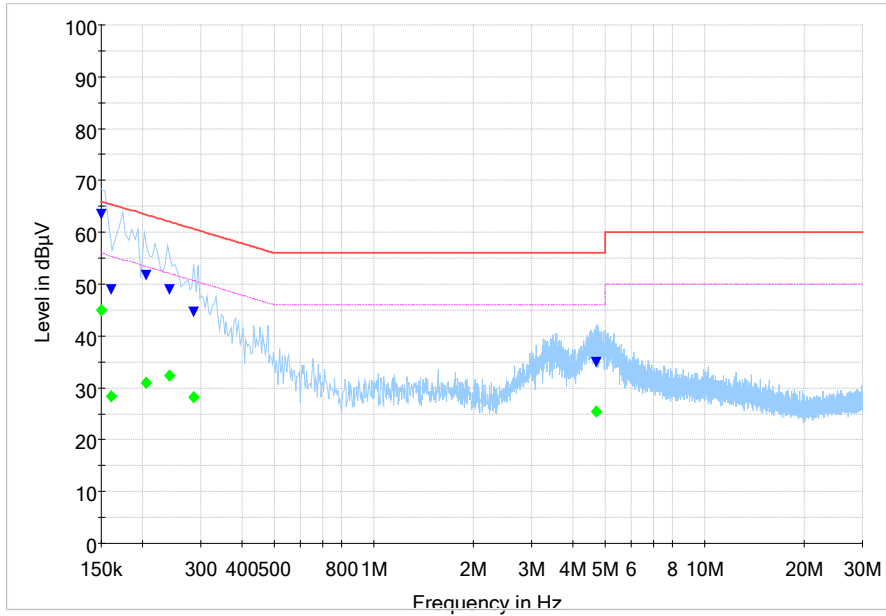
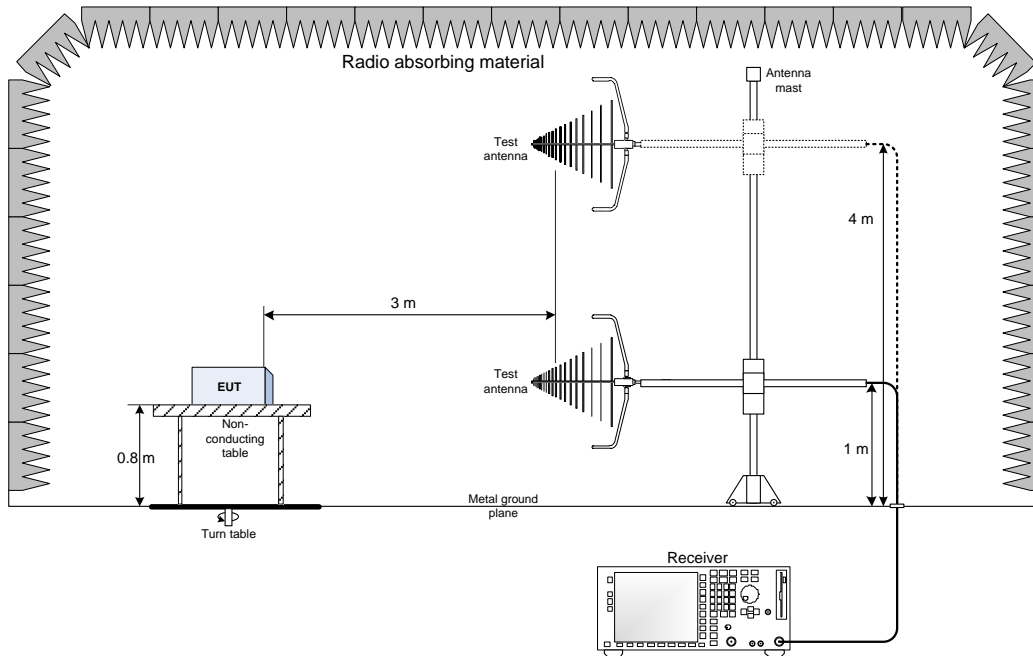


Table 8.6-2: RSP 9003 Quasi-Peak and Average conducted emissions results

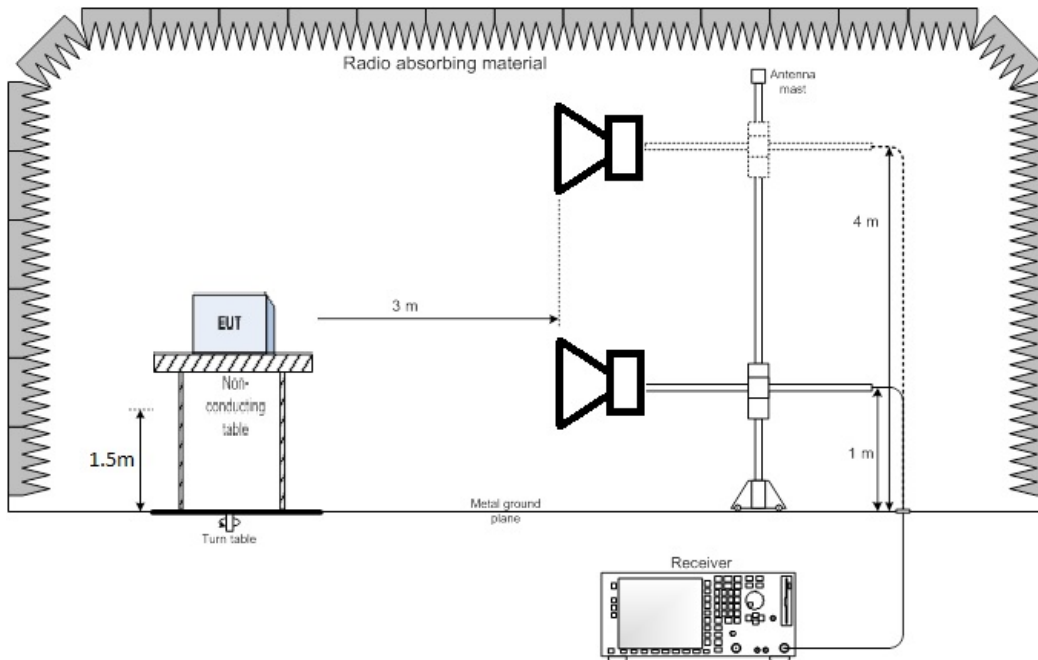
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter
0.150000	---	44.98	56.00	11.02	5000.0	9.000	L1	ON
0.150000	63.50	---	66.00	2.50	5000.0	9.000	L1	ON
0.160500	49.03	---	65.44	16.40	5000.0	9.000	N	ON
0.160500	---	28.44	55.44	27.00	5000.0	9.000	N	ON
0.204500	51.79	---	63.43	11.64	5000.0	9.000	N	ON
0.204500	---	31.00	53.43	22.43	5000.0	9.000	N	ON
0.240500	49.01	---	62.08	13.07	5000.0	9.000	N	ON
0.240500	---	32.35	52.08	19.72	5000.0	9.000	N	ON
0.284500	44.71	---	60.68	15.98	5000.0	9.000	N	ON
0.284500	---	28.22	50.68	22.47	5000.0	9.000	N	ON
4.696500	---	25.45	46.00	20.55	5000.0	9.000	L1	ON
4.696500	34.97	---	56.00	21.03	5000.0	9.000	L1	ON

## Section 9. Block diagrams of test set-ups

### 9.1 Radiated emissions set-up



**30-1000MHz Setup**



**Above 1GHz Setup**

# End of Report