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Test report

2015_284164_FCC_IC_AUS

Date of issue: June 9, 2015

Applicant: HME Wireless, Inc.
1400 Northbrook Parkway, #320
Suwanee, GA 30024 USA

Product: RFID tag module

Model: RTAG Model variant: None

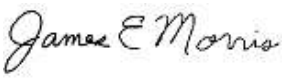
FCC ID: WDC-RTAG IC Registration number: 7752A-RTAG

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.249
  Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz and 24.0–24.25 GHz
- RSS-210, Issue 8, December 2010, Annex 8
  Frequency Hopping and Digital Modulation Systems Operating in the Bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz
- AS/NZS 4268:2012, Table 1, Row 18
  Operation in the 915–928 MHz band

Test location

Company name:	Nemko USA Inc.
Address:	2210 Faraday Ave., Suite 150
City:	Carlsbad
Province:	California
Postal code:	92008
Country:	USA
Telephone:	+1 760-444-3401
Website:	www.nemko.com
Site number:	FCC: US5058; IC: 2040B

Tested by:	David Light
Reviewed by:	James Morris
Date:	June 9, 2015
Signature:	

Limits of responsibility

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

1.1 Applicant

HME Wireless, Inc.
1400 Northbrook Parkway, #320
Suwanee, GA 30024 USA

1.2 Manufacturer

HME Wireless, Inc.
1400 Northbrook Parkway, #320
Suwanee, GA 30024 USA

1.3 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.249	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz and 24.0–24.25 GHz band
RSS-210, Issue 8 Annex 12	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz and 24.0–24.25 GHz band
AS/NZS 4268:2012, Table 1, Row 18	Operation in the 915 – 928 MHz band

1.4 Statement of compliance

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

None

1.6 Test report revision history

Revision #	Date	Details of changes made to test report
-	5/1/15	Original report issued

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	Not applicable[1]
§15.215(c)	20 dB bandwidth	Pass

Notes: [1]The device is battery powered

2.2 FCC Part 15 Subpart C – Intentional Radiators, test results

Part	Test description	Verdict
§15.249(a)	Radiated emissions not in restricted bands	Pass
§15.249(b)	Fixed Point-to-Point operation in the 24.0–24.25 GHz band	Not applicable[1]
§15.249(d)	Spurious emissions (except harmonics)	Pass

Notes: [1]This device is not fixed point-to-point in the 24.0 24.25 GHz band

2.3 IC RSS-GEN, Issue 3, test results

Part	Test description	Verdict
§4.6.1	Occupied bandwidth	Pass
§7.2.4	AC power lines conducted emission limits	Not applicable[1]

Notes: [1]The device is battery powered

2.4 RSS-210, Issue 8, test results

Part	Test description	Verdict
§A2.9a	Radiated emissions not in restricted bands	Pass
§A2.9b	Spurious emissions (except harmonics)	Pass

Notes: None

2.5 AS/NZS 4268:2012, test results

Part	Test description	Verdict
§Table 1, Row 18	Equivalent Isotropically Radiated Power	Pass
§Table 1, Row 18	Spurious emissions	Pass

Notes: None

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 1, 2015
Nemko sample ID number	Samples #1, #2, #3

3.2 EUT information

Product name	RFID Module
Model	RTAG
Model variant	None
Serial number	None

3.3 Technical information

Operating band	902 – 928 MHz
Operating frequency	902.579 MHz – 927.356 MHz (In Australia and New Zealand the band is restricted to 915.767 – 927.356 MHz)
Modulation type	FM
Occupied bandwidth (99 %)	108 kHz
Emission designator	F1D
Power requirements	Battery supply
Antenna information	Integral antenna, 0 dBi The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

3.4 Product description and theory of operation

The radio is an active rfid tag. The transmitted waveform is a narrowband frequency-modulated rf carrier.

3.5 EUT exercise details

The device was operated with continuous modulated carrier for testing.

3.6 EUT setup Figure

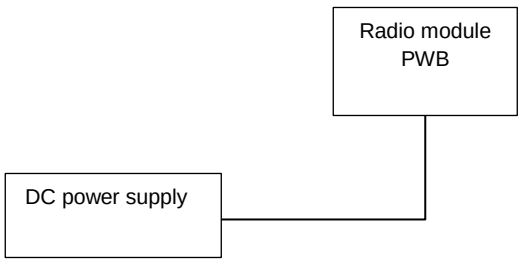


Figure 3.6-1: Setup Figure

3.7 EUT sub assemblies

NONE

Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

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

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 ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Test equipment

7.1 Test equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Test receiver/Spectrum analyser	**Rohde & Schwarz**	**ESI**	**1767**	**1 yr.**	**11/4/15**
Spectrum analyzer	Rohde & Schwarz	FSEK	1036	3 yr.	7/9/15
Bi-log antenna	Schaffner	CBL6111C	1480	1 yr.	4/2/16
Horn antenna	AH Systems	SAS-571	00877	2 yr.	11/25/16
DC power supply	Xantrex	XT 30-2	E00104978	N/A	N/A
Multimeter	Fluke	115	4043	1 yr.	1/20/16

Note: N/A - not applicable

Section 8 Testing data

8.1 Clause 15.215(c) Emission bandwidth RSS Gen 4.6.1 Occupied bandwidth

8.1.1 Definitions and limits

Part 15.215(c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80 % of the permitted band in order to minimize the possibility of out-of-band operation.

RSS-Gen Clause 4.6.1 Occupied bandwidth

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 percent emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1 percent of the selected span as is possible without being below 1 percent. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 percent of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

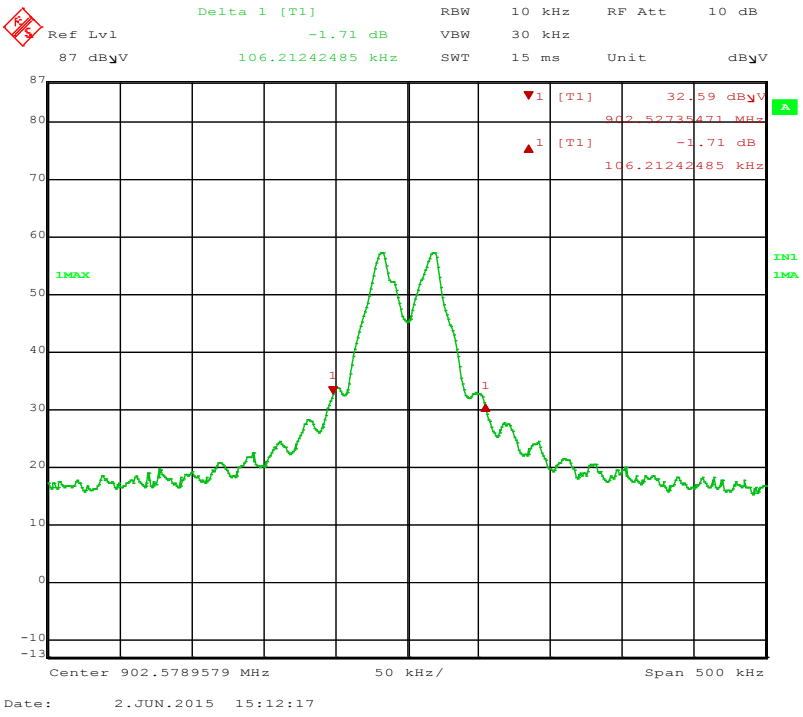
8.1.2 Test summary

Test date:	June 2, 2015	Temperature:	22 °C
Test engineer:	David Light	Air pressure:	1005 mbar
Verdict:	Pass	Relative humidity:	35 %

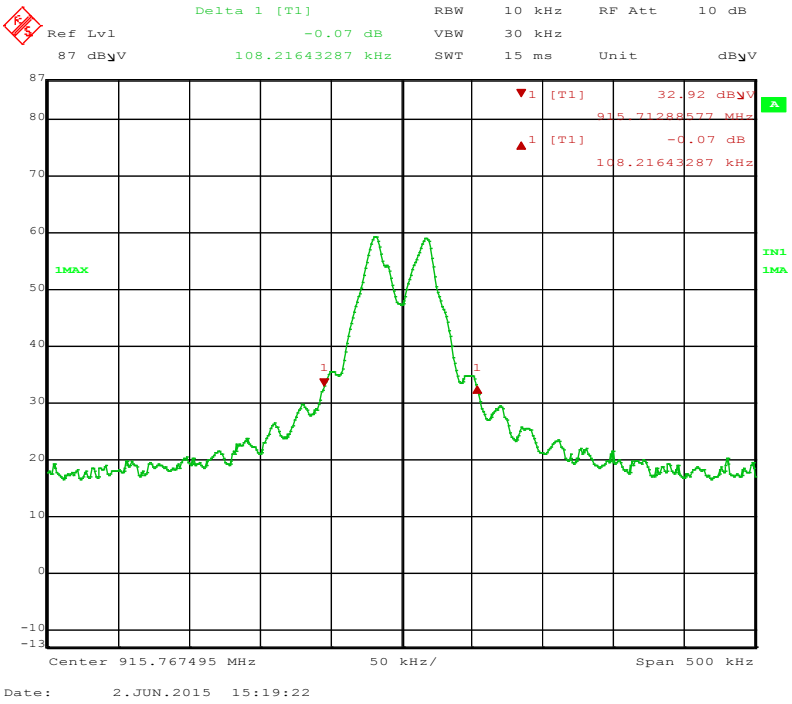
8.1.3 Observations/special notes

None

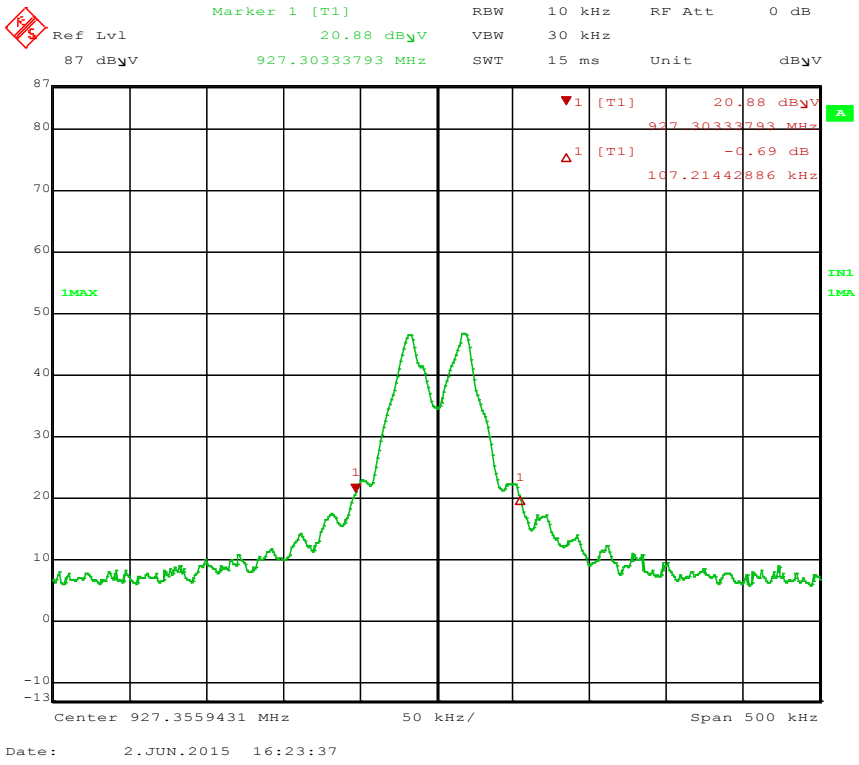
8.1.4 Test data



Plot 8.1-1: 20 dB bandwidth 902.579 MHz



Plot 8.2 2: 20 dB bandwidth 915.767 MHz



Plot 8.1-2: 20 dB bandwidth 927.356 MHz

Table 8.1-1: 99% bandwidth results

Frequency (MHz)	99 % bandwidth (MHz)
902.579	0.1062
915.767	0.1082
927.356	0.1072

8.2 Clause 15.249(a) RSS 210 A2.9(a) Field strength of emissions not in restricted bands

8.2.1 Definitions and limits

In addition to the provisions of §15.205 RSS Gen the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Table 8.2-1: Field strength limits

Fundamental frequency	Field strength of fundamental		Field strength of spurious emissions	
(MHz)	**(mV/m)**	**(dBµV/m)**	**(µV/m)**	**(dBµV/m)**
902–928	50	94	500	54
2400–2483.5	50	94	500	54
5725–5875	50	94	500	54
24.0–24.25	250	108	2500	68

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter (128 dBµV/m) at 3 meters along the antenna azimuth.

8.2.2 Test summary

Test date:	June 3, 2015	Temperature:	23 °C
Test engineer:	David Light	Air pressure:	1005 mbar
Verdict:	Pass	Relative humidity:	35 %

8.2.3 Observations/special notes

Table 8.2-2: §15.209 RSS Gen 7.2.5 – Radiated emission limits

Frequency (MHz)	Field strength		Measurement distance (m)
	(µV/m)	**(dBµV/m)**	
0.009–0.490	2400/F	67.6−20×log$_{10}$(F)	300
0.490–1.705	24000/F	87.6−20×log$_{10}$(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

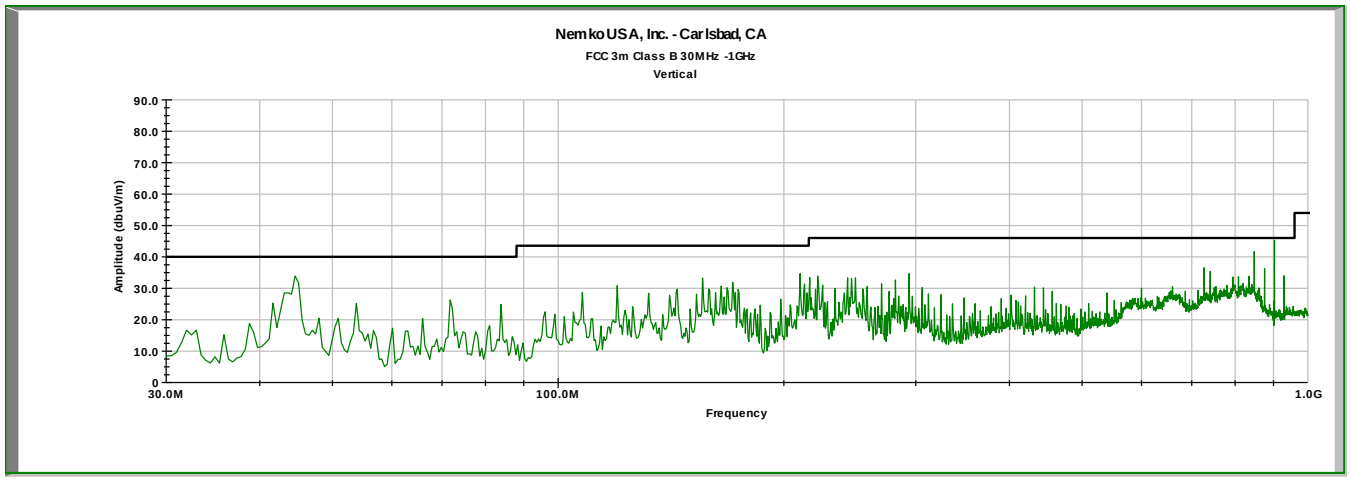
- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
- below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
- within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
- above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
- and using peak detector with 1 MHz/10 Hz RBW/VBW for average results.

Transmit output power was measured while supply voltage was varied from 2.04 VDC to 2.76 VDC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.

8.2.4 Test data, continued

Table 8.2-3: Field strength measurement results

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
902.6	H	0	65.2	22.5	3.7	0.0	91.4	94.0	-2.6	Pass	
902.6	V	0	50.6	22.5	3.7	0.0	76.8	94.0	-17.2	Pass	
915.8	H	0	64.9	22.5	3.7	0.0	91.1	94.0	-2.9	Pass	
915.8	V	0	49.4	22.5	3.7	0.0	75.6	94.0	-18.4	Pass	
927.4	H	0	62.8	22.5	3.7	0.0	89.0	94.0	-5.0	Pass	
927.4	V	0	48.3	22.5	3.7	0.0	74.5	94.0	-19.5	Pass	



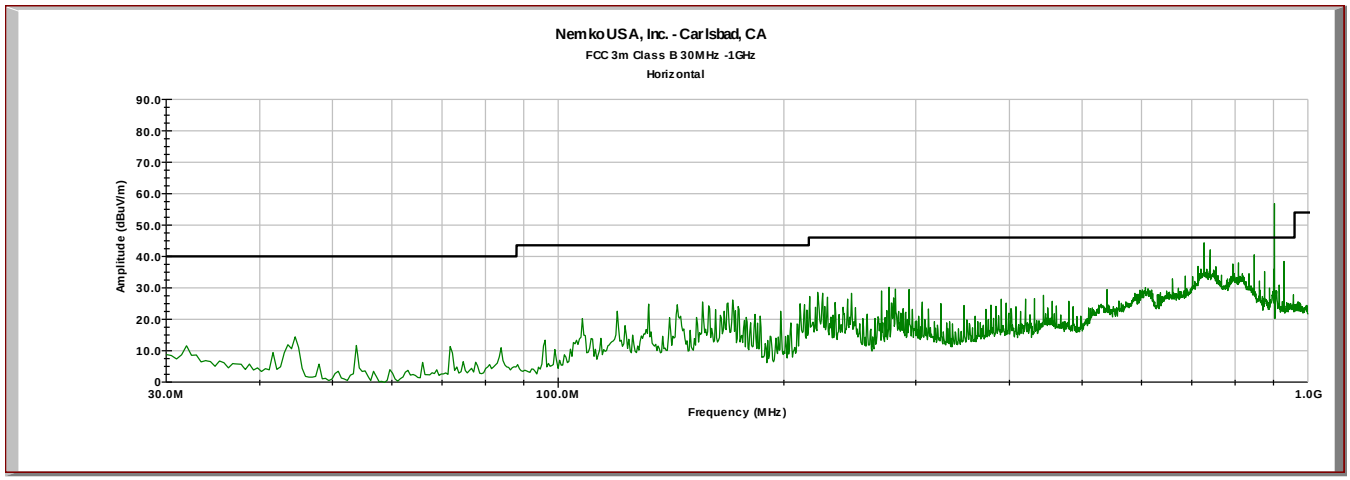
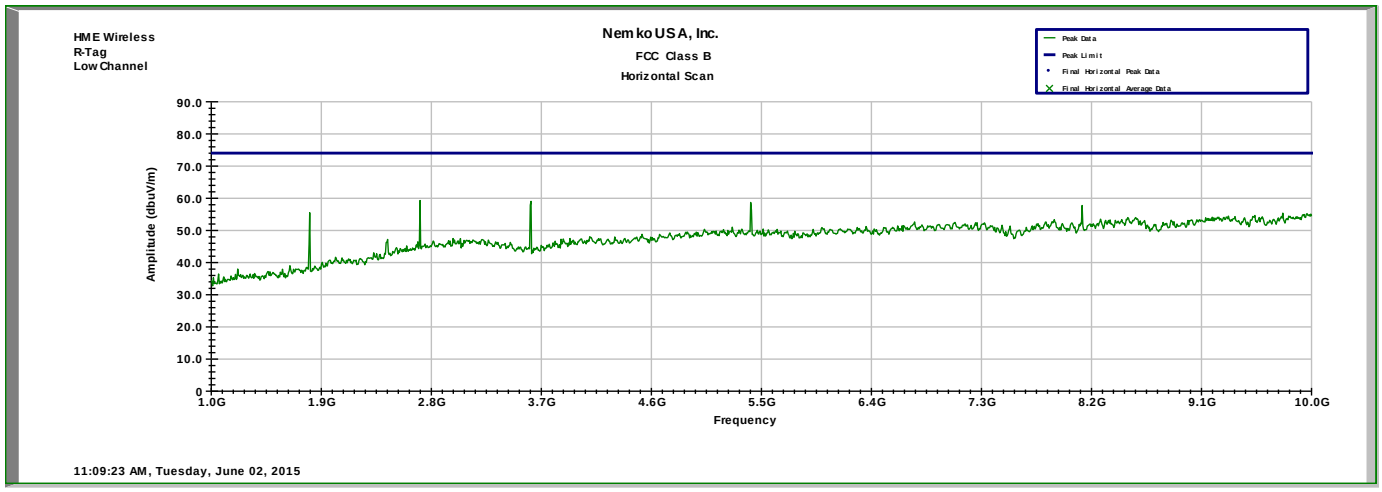
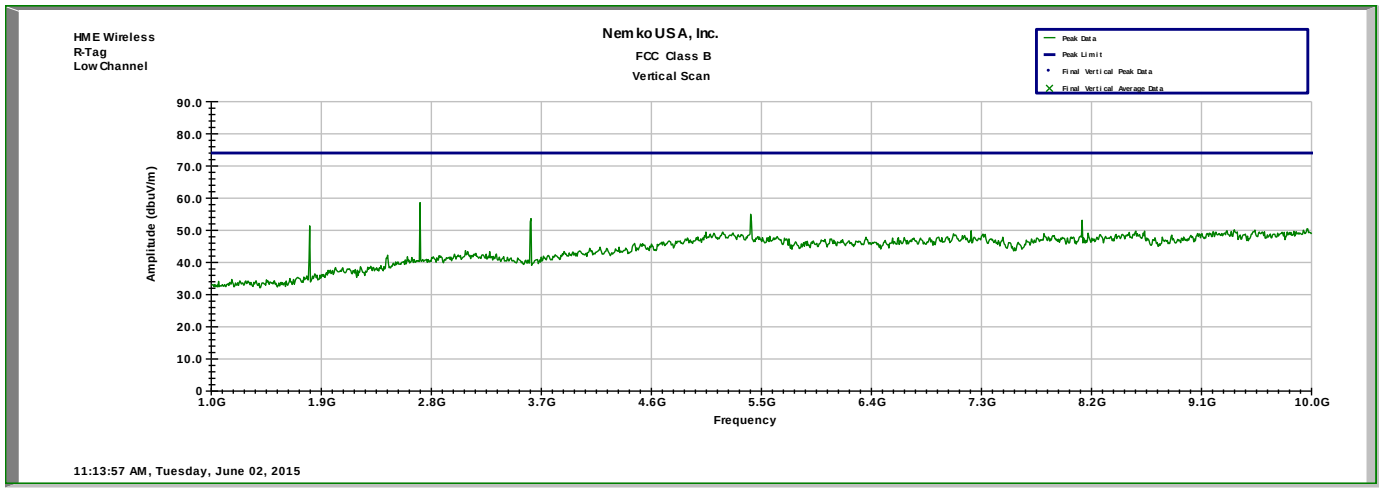
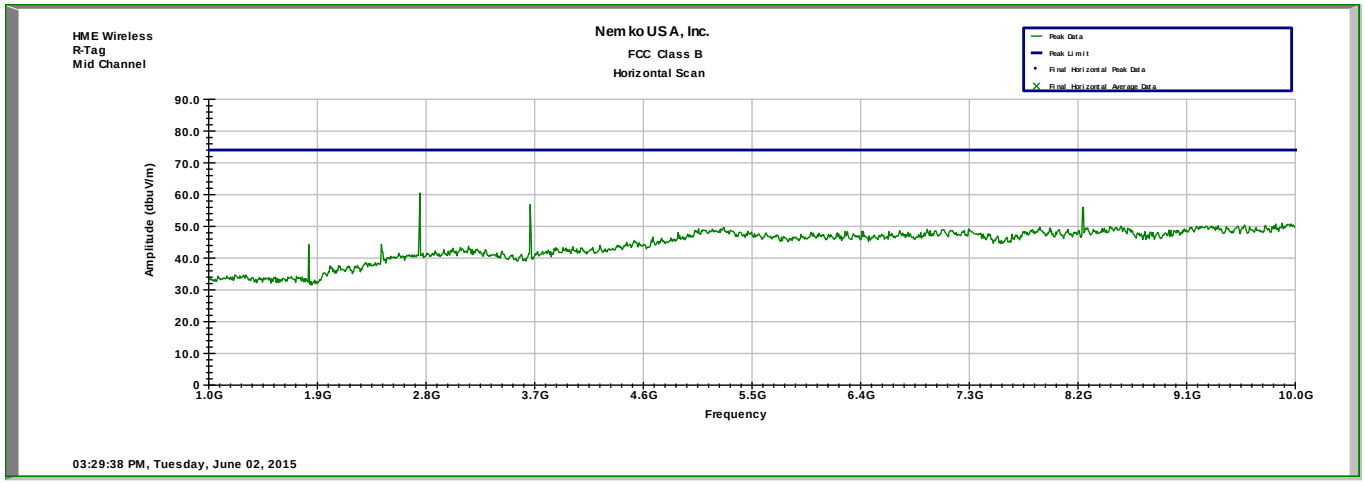


Table 8.2-4: Field strength measurement results – Peak Measurements



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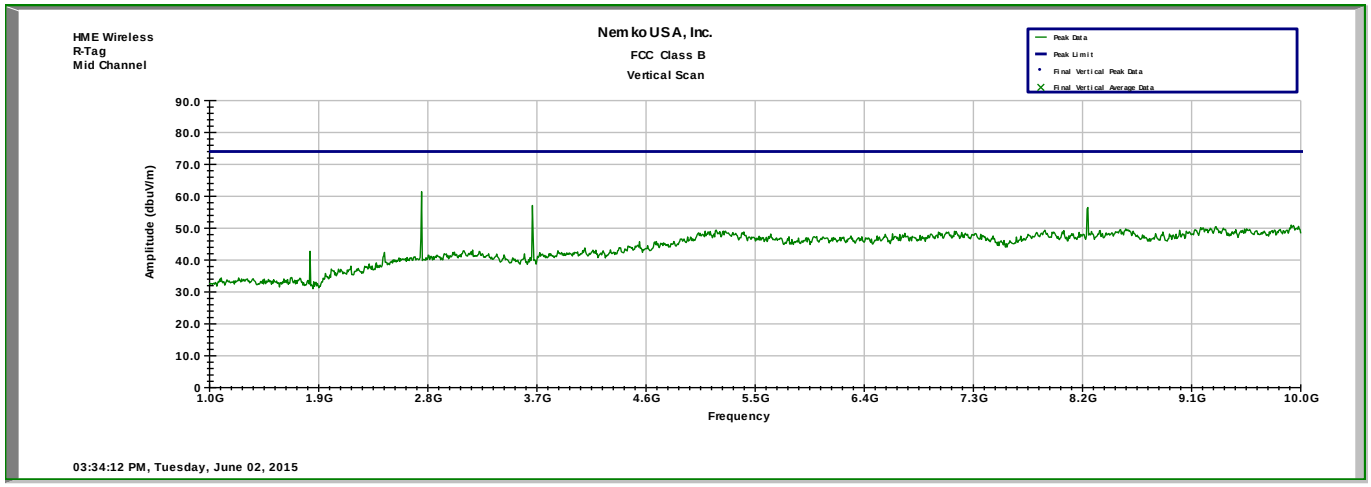
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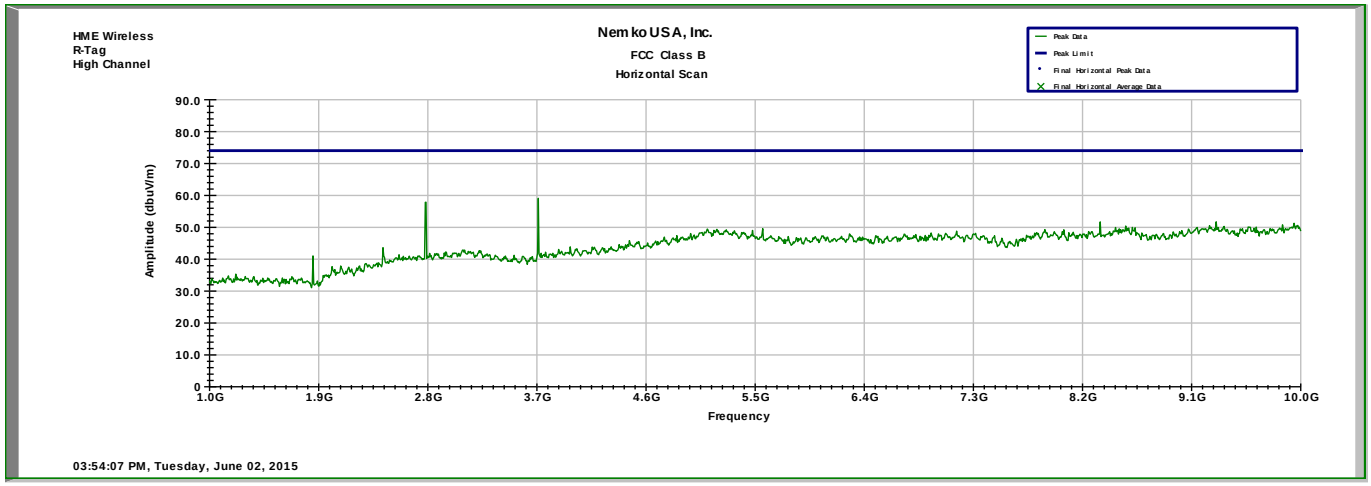
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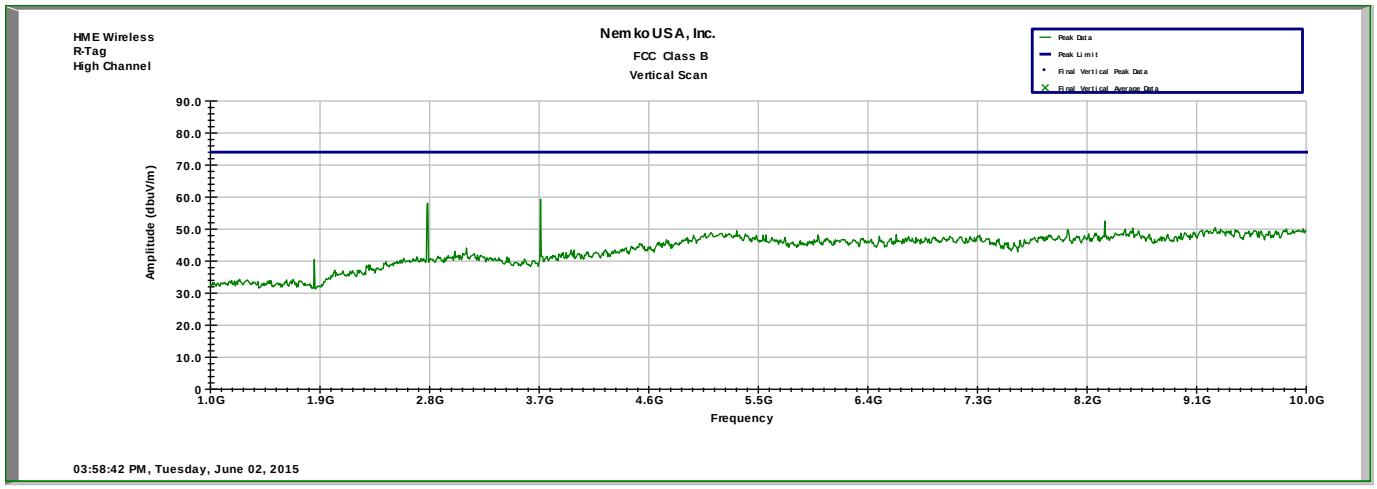
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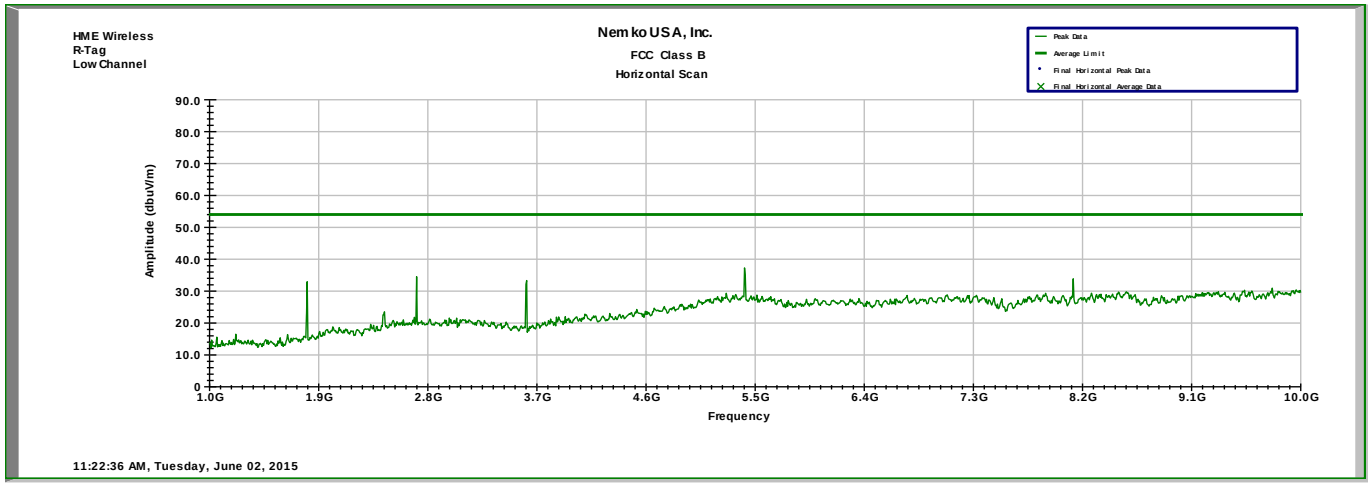
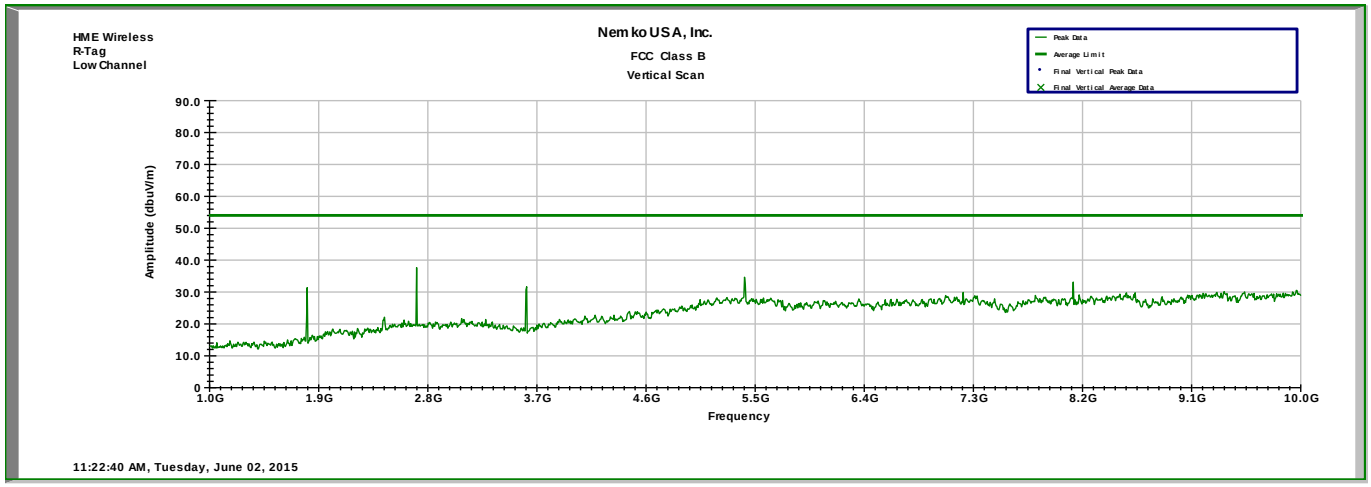
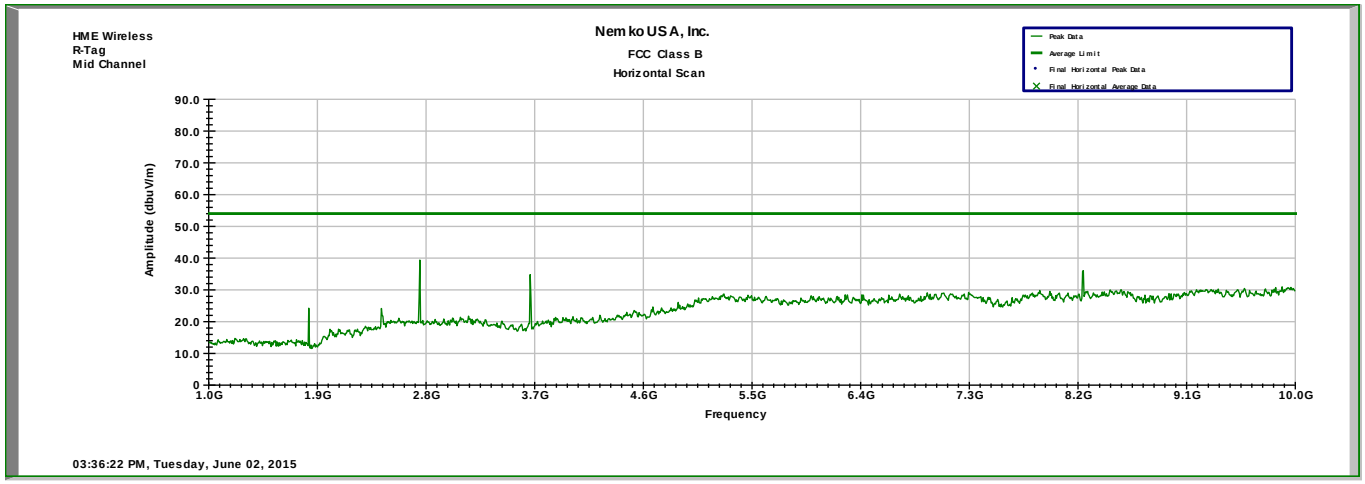
Table 8.2-5: Field strength measurement results – Average Measurements



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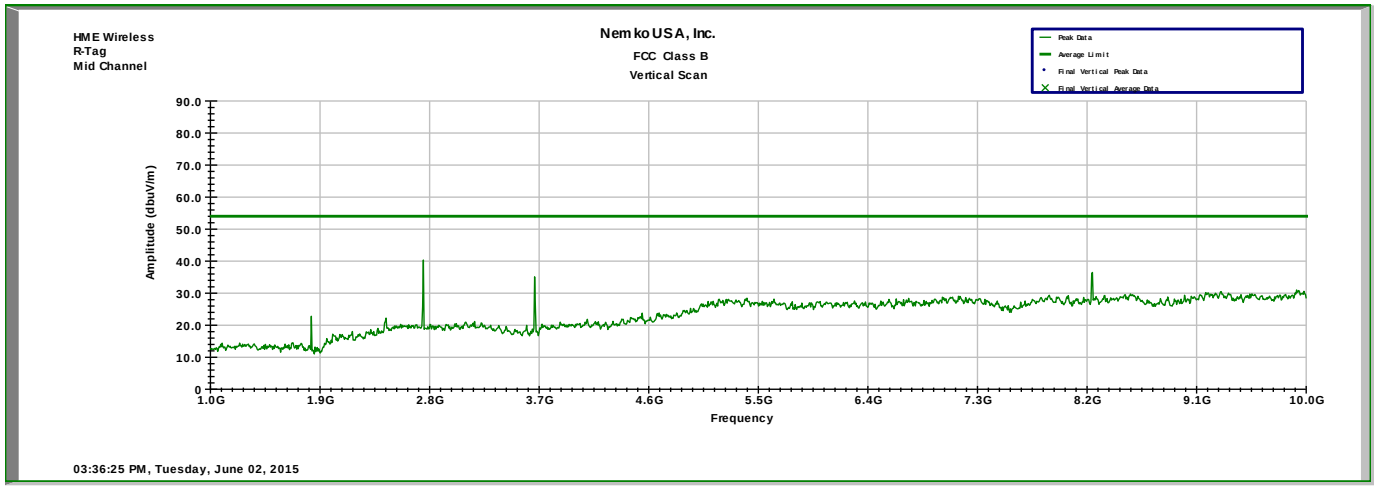
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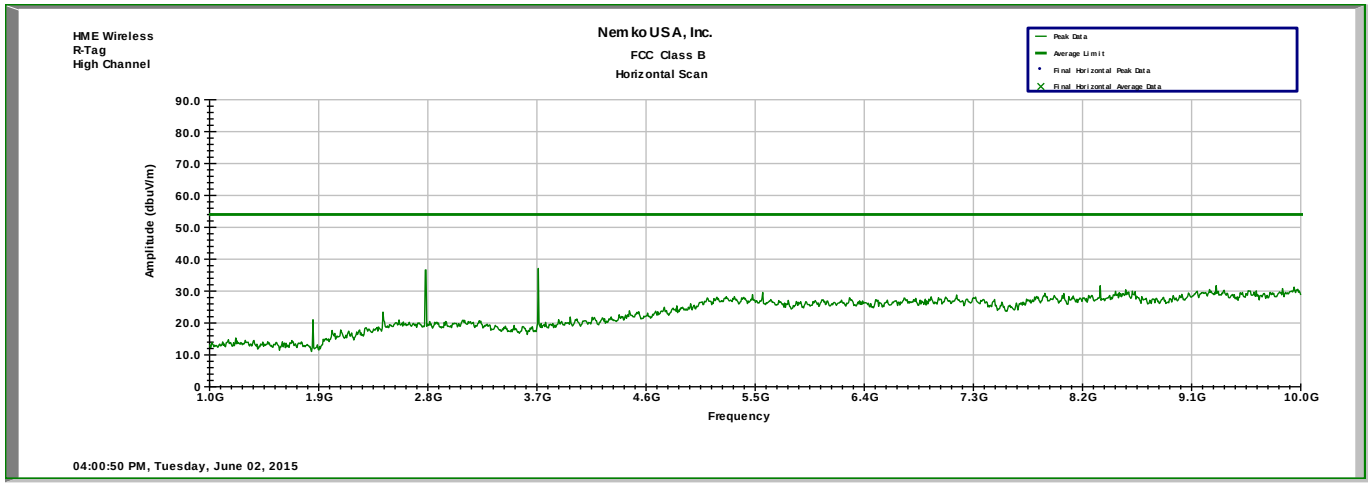
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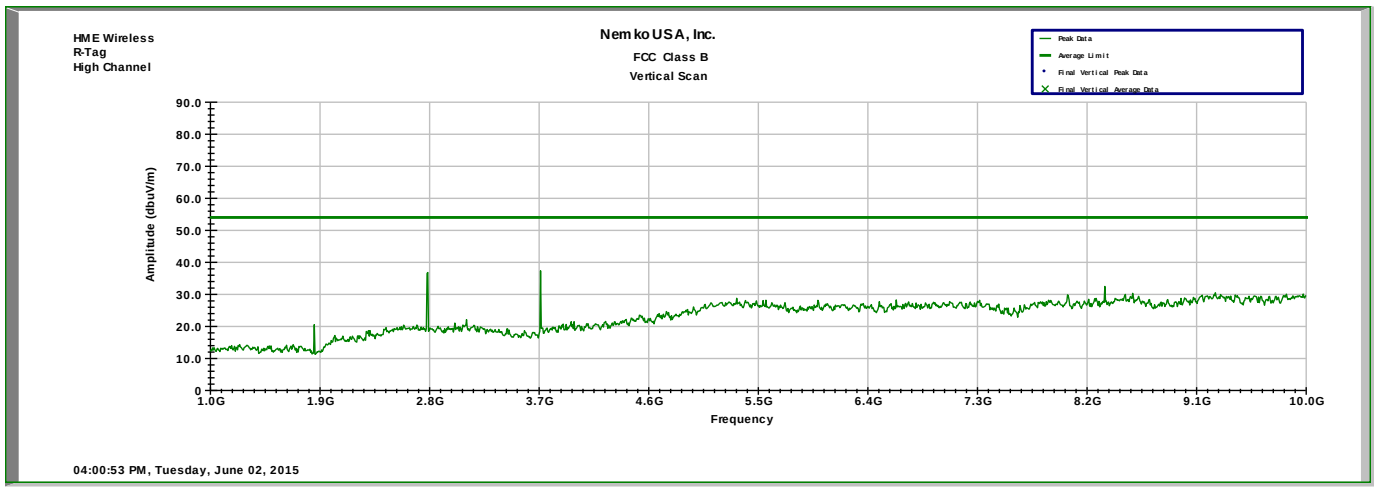
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8.3 AS/NZS 4268:2012, Table 1, Row 18

8.3.1 Definitions and limits

Table 8.3-1: EIRP limits

Fundamental frequency	EIRP of fundamental	Spurious EIRP
(MHz)	**(mW)**	**(µW)**
915 – 928	3	0.1

8.3.2 Test summary

Test date:	June 3, 2015	Temperature:	23 °C
Test engineer:	David Light	Air pressure:	1005 mbar
Verdict:	Pass	Relative humidity:	35 %

8.3.3 Observations/special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
- below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
- within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
- above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
- and using peak detector with 1 MHz/10 Hz RBW/VBW for average results.

Transmit output power was measured while supply voltage was varied from 2.04 VDC to 2.76 VDC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.

8.3.4 Test data

Frequency (MHz)	Meter Reading (dBm)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Conversion Factor	Corrected Reading (dBuV/m)	EIRP (mW)	EIRP (dBm)	Polarity	Comments
915.8	-42.1	22.5	3.7	0	107.0	91	0.3865	-4.13	H	
915.8	-57.6	22.5	3.7	0	107.0	76	0.0109	-19.63	V	
927.4	-44.2	22.5	3.7	0	107.0	89	0.2383	-6.23	H	
927.4	-58.7	22.5	3.7	0	107.0	75	0.0085	-20.73	V	
Notes:										

Frequency (MHz)	Meter Reading (dBm)				Conversion Factor	Corrected Reading (dBuV/m)	EIRP (mW)	EIRP (dBm)	Polarity	Comments
										TX High Channel
1854.8	-86.0				107.0	21.0	0.0000	-74.2	V	
2782.2	-70.4				107.0	36.6	0.0000	-58.6	V	
3709.6	-70.0				107.0	37.0	0.0000	-58.2	V	
1854.8	-86.4				107.0	20.6	0.0000	-74.6	H	
2782.2	-70.2				107.0	36.8	0.0000	-58.4	H	
3709.6	-69.6				107.0	37.4	0.0000	-57.8	H	
										TX Low Channel
1831.6	-82.8				107.0	24	0.0000	-71.03	V	
2747.4	-67				107.0	40	0.0000	-55.23	V	
3663.2	-72				107.0	35	0.0000	-60.23	V	
1831.6	-84				107.0	23	0.0000	-72.23	H	
2747.4	-66.6				107.0	40	0.0000	-54.83	H	
3663.2	-72				107.0	35	0.0000	-60.23	H	

Notes:

8.4 Clause 15.249(d) Spurious emissions (except for harmonics)

8.4.1 Definitions and limits

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Table 8.5-1: Field strength limits

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009–0.490	2400/F	$67.6-20\times\log_{10}(F)$	300
0.490–1.705	24000/F	$87.6-20\times\log_{10}(F)$	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:
- F = fundamental frequency in kHz
- 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.

8.4.2 Test summary

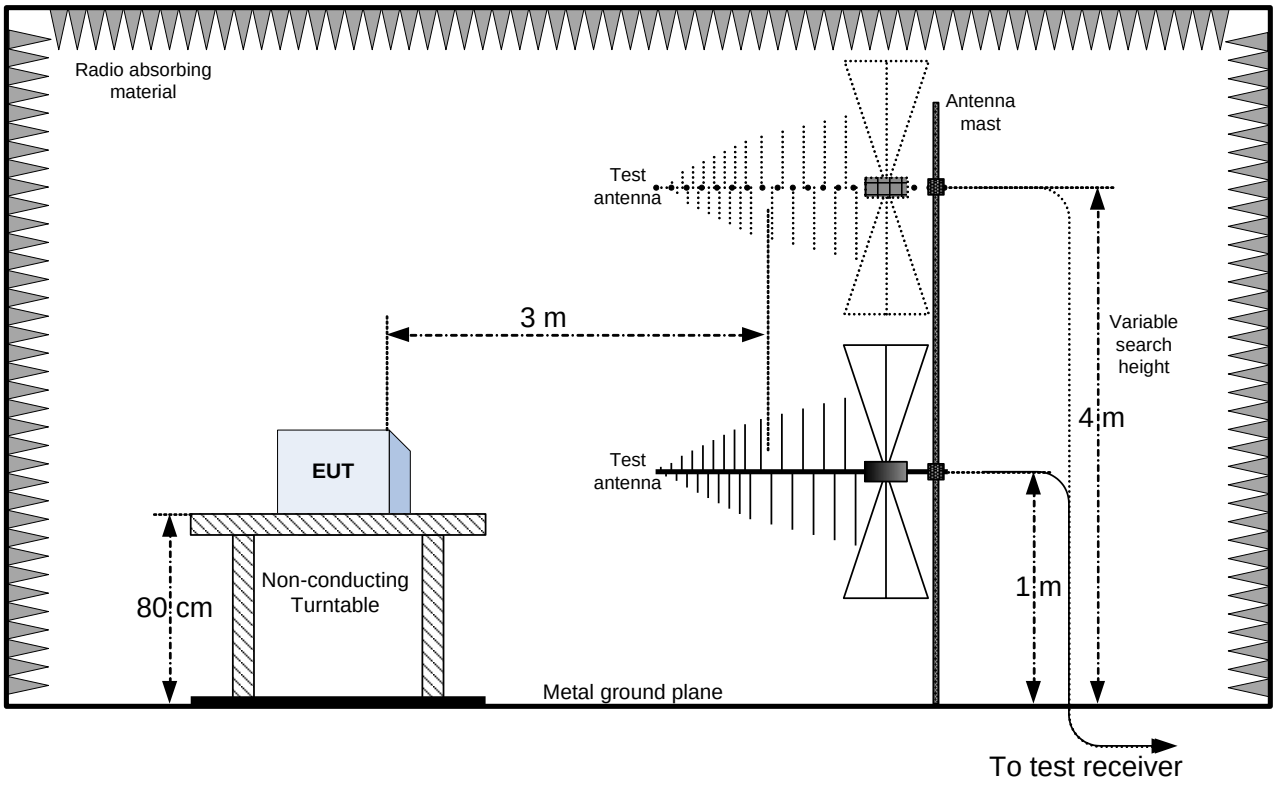
Test date:	June 3, 2015	Temperature:	23 °C
Test engineer:	David Light	Air pressure:	1005 mbar
Verdict:	Pass	Relative humidity:	35 %

8.4.3 Observations/special notes

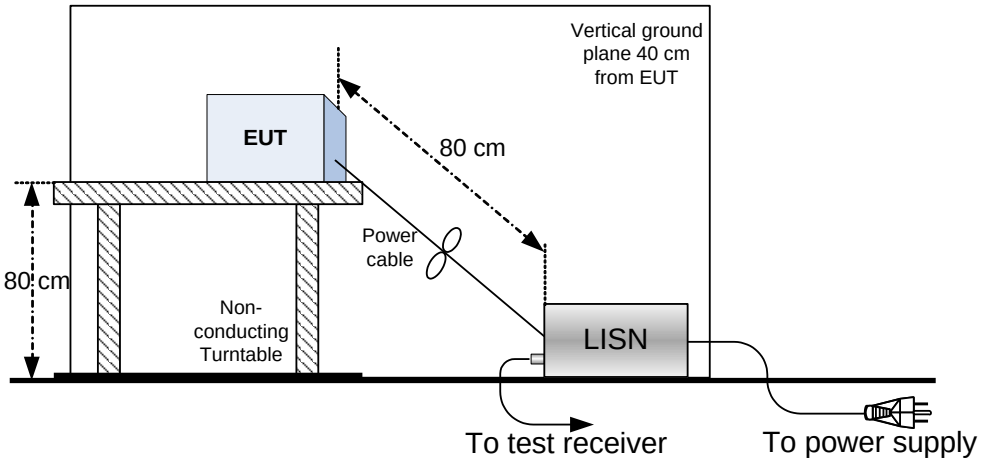
- The spectrum was searched from 30 MHz to the 10th harmonic.
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
- below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
- Choose an item.
- above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
- Choose an item.
- Transmit output power was measured while supply voltage was varied from 102 VAC to 138 VAC (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.

Section 9 Block Figures of test set-ups

9.1 Radiated emissions set-up



9.2 Conducted emissions set-up



Section 10 EUT photos

10.1 Test setup photos

10.1.1 EUT test setup

10.1.2 EUT test setup – cable arrangement