

# Test report

## FCC Permissive Change Test Report 2015\_1028177

Date of issue: November 16, 2015

Applicant: HID Global Corporation

Product: Logical Access RFID Reader

Model: OMNIKEY 5127CK      Model variant: N/A  
Mini

FCC ID: JQ6-OK5127CKMINI      IC Registration number: 2236B-OK5127MINI

Specifications:

- ◆ **FCC 47 CFR Part 15 Subpart C**

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

- §15.225 Operation within the band 13.110–14.010 MHz

- §15.209 Radiated emission limits; general requirements

- ◆ **RSS-247, Issue 1, May 2015**

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

- ◆ **RSS-210 , Issue 8, A2.6**

- Band 13.110–14.010 MHz

- ◆ **RSS-Gen, Issue 4, 8.9**

- Transmitter Emission Limits for Licence-Exempt Radio Apparatus

#### Test location

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Company name	Nemko USA, Inc.
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City	Carlsbad
Province	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
Site number	FCC: US5058; IC: 2040B

Tested by	Feng You, Sr. Wireless Engineer
Reviewed by	James Morris
Review date	November 16, 2015
Reviewer signature	<i>James E Morris</i>

#### 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 Canada's ISO/IEC 17025 accreditation.

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## Section 1. Report summary

### 1.1 Applicant and manufacturer

Company name	HID Global Corporation
Address	10385 Westmoor Drive, Suite 300
City	Westminster
Province/State	CO
Postal/Zip code	80021
Country	U.S.A.

### 1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz
FCC 47 CFR Part 15, Subpart C, Clause 15.225	Operation within the band 13.110-14.010 MHz
FCC 47 CFR Part 15, Subpart C, Clause 15.209	Radiated emission limits; general requirements
RSS-247, Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-210, Issue 8, A2.6	Band 13.110-14.010 MHz
RSS-Gen, Issue 4, 8.9	Transmitter Emission Limits for Licence-Exempt Radio Apparatus

### 1.3 Test methods

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

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard based on the modification from original approved EUT. 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 #	Details of changes made to test report
1	Original report issued
2	Added peak measurement results above 1GHz

## Section 2. Summary of test results

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

Part	Test description	Verdict
§15.209	Radiated emission limits; general requirements.	Pass

Notes: For 125kHz RFID radio.

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

Part	Test description	Verdict
§15.225(a)	Field strength within 13.553–13.567 MHz band	Pass <sup>1</sup>
§15.225(b)	Field strength within 13.410–13.553 MHz and 13.567–13.710 MHz bands	Pass <sup>1</sup>
§15.225(c)	Field strength within 13.110–13.410 MHz and 13.710–14.010 MHz bands	Pass <sup>1</sup>
§15.225 (d)	Field strength of any emissions appearing outside of the 13.110–14.010 MHz band	Pass <sup>1</sup>
§15.247(d)	Spurious emissions	Pass <sup>2</sup>

Notes: <sup>1</sup> 13,56MHz RFID radio.

<sup>2</sup> 2400–2483.5MHz BLE radio.

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

Part	Test description	Verdict
8.9	Transmitter Emission Limits for Licence-Exempt Radio Apparatus	Pass

Notes: For 125kHz RFID radio.

### 2.4 IC RSS-210, Issue 8, test results

Part	Test description	Verdict
A2.6 (a)	The field strength within the band 13.553–13.567 MHz.	Pass
A2.6 (b)	The field strength within the bands 13.410–13.553 MHz and 13.567–13.710 MHz	Pass
A2.6 (c)	The field strength within the bands 13.110–13.410 MHz and 13.710–14.010 MHz.	Pass
A2.6 (d)	Spurious emissions	Pass

Notes: For 13,56MHz RFID radio.

### 2.5 IC RSS-247, Issue 1, test results

Part	Test description	Verdict
5.5	Unwanted Emissions	Pass

Notes: For 2400–2483.5MHz BLE radio.

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

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### 3.1 Sample information

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Receipt date	October 21, 2015
Nemko sample ID number	001 and 002

### 3.2 EUT information

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Product name	Logical Access RFID Reader
Model	OMNIKEY 5127CK Mini
Model variant	N/A
Serial number	N/A

### 3.3 Technical information

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Frequency band 1 (BLE)	2400–2483.5 MHz
Frequency Min (MHz)	2402
Frequency Max (MHz)	2480
Frequency band 2 (HF)	13.110-14.010 MHz
Frequency (MHz)	13.56
Frequency band 3 (LF)	125kHz
Frequency (MHz)	0.125
Power requirements	USB powered.
Antenna information	Antenna on PCB. The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.
Permissive Change	Addition of a buzzer (the circuitry had already existed on the PCB during the initial qualification test); Minor filtering capacitor values were slightly changed on the HF radio (13.56MHz); The addition of a plastic enclosure.

### 3.4 Product description and theory of operation

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EUT is Logical Access RFID Reader module with BT LE, 125kHz LF RFID, 13.56MHz HF RFID radio interfaces.

### 3.5 EUT exercise details

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Depends on test cases:

EUT 001 - all radio polling (transmit periodically).

EUT 002 – Only BLE radio enable, controlled by PC SW (putty) to set channel/modulation.

### 3.6 EUT setup diagram



Figure 3.6-1: Setup diagram

### 3.7 EUT sub assemblies

Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Logical Access RFID Reader	HID Global	OMNIKEY 5127CK Mini	001
Logical Access RFID Reader (BLE Control)	HID Global	OMNIKEY 5127CK Mini	002
Laptop	Dell	Latitude E6410	N/A
USB to Micro USB Cable	N/A	N/A	N/A
USB to TTL Serial Cable	FTDI Chip	TTL-232R-3V3	N/A

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT

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

Modification after original approval:

1. Addition of a buzzer (the circuitry had already existed on the PCB during the initial qualification test);
2. Minor filtering capacitor values were slightly changed on the HF radio (13.56MHz);
3. The addition of a plastic enclosure.

### 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.

USB powered.

## 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 #	Next Cal
529	Antenna, DRWG	EMCO	3115	2505	08-Dec-2016
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572	18-May-2016
1767	Receiver, EMI Test 20Hz - 26.5 GHz - 150 - +30 dBm LCD	Rohde & Schwartz	ESIB26	837491/0002	04-Nov-2015

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

## Section 8. Testing data

### 8.1 FCC 15.209 and RSS-Gen 8.9 Radiated emissions limits (125kHz Radio)

#### 8.1.1 Definitions and limits

**FCC:**

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

**IC:**

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

**Table 8.1-1: 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	$67.6 - 20 \times \log_{10}(F)$	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: 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

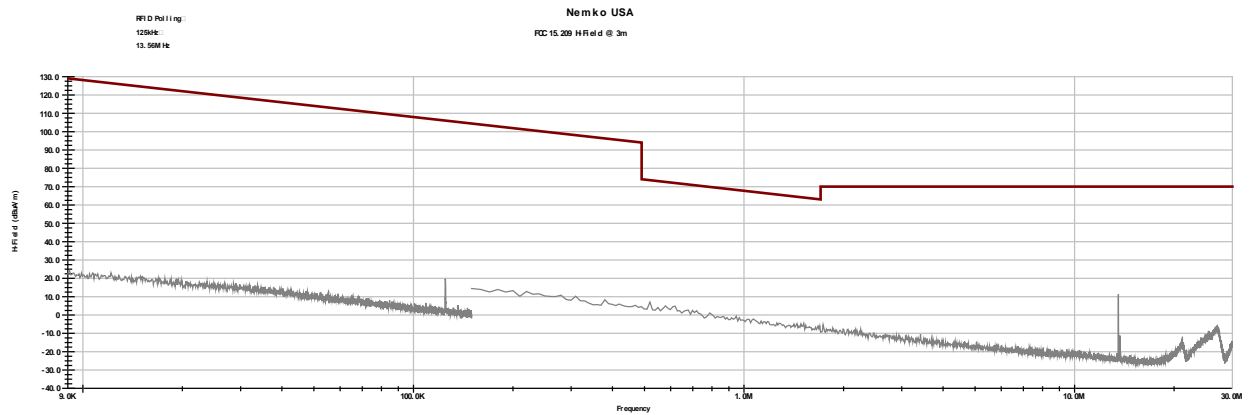
#### 8.1.2 Test summary

Test date	October 21, 2015	Temperature	23 °C
Test engineer	Feng You	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	62 %

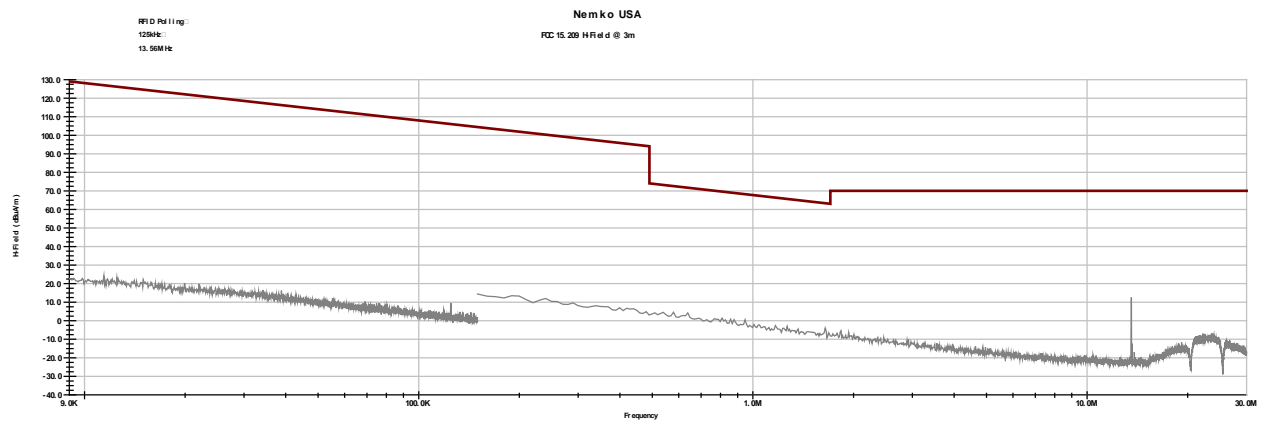
#### 8.1.3 Observations, settings and special notes

The EUT 001 was set up as tabletop configuration.

#### 8.1.4 Test data



Plot 8.1-1: Radiated emissions - Loop Antenna 0 degree



Plot 8.1-1: Radiated emissions - Loop Antenna 90 degree

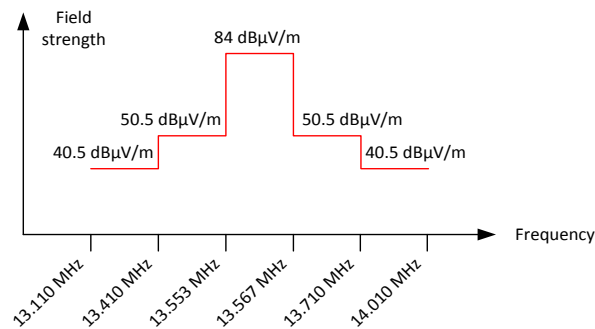
All emissions are at least 40dB below limit. Peaks at 125 kHz and 13.56 MHz are fundamentals of RFID transmitter.

## 8.2 FCC 15.225(a–c) and RSS-210 A2.6 (a–c) Field strength within the 13.110–14.010 MHz band

### 8.2.1 Definitions and limits

**FCC and IC:**

- The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15848  $\mu\text{V/m}$  (84 dB $\mu\text{V/m}$ ) at 30 m.
- Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334  $\mu\text{V/m}$  (50.5 dB $\mu\text{V/m}$ ) at 30 m.
- Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106  $\mu\text{V/m}$  (40.5 dB $\mu\text{V/m}$ ) at 30 m.



**Figure 8.2-1:** In-band spurious emissions limit

### 8.2.2 Test summary

Test date	October 21, 2015	Temperature	23 °C
Test engineer	Feng You	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	62 %

### 8.2.3 Observations, settings and special notes

The EUT 001 was set up as tabletop configuration.

The measurements were performed at the distance of 3 m. 40 dB distance correction factor\* was applied to the measurement result in order to comply with 30 m limits.

\* 30 m to 3 m distance correction factor calculation (for 13 MHz band):

$$40 \times \log_{10} (3 \text{ m}/30 \text{ m}) = 40 \times \log_{10} (0.1) = -40 \text{ dB}$$

Spectrum analyser settings:

Detector mode	Peak
Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Trace mode	Max Hold

8.2.4 Test data

Table 8.2-1: Field strength measurements results

Frequency range, MHz	Frequency, MHz	Field strength at 3 m, dBμV/m	Calculated field strength at 30 m, dBμV/m	Limit, dBμV/m	Margin, dB
13.553–13.567	13.561	64	24	84.00	60
13.410–13.553	13.489	28.8	-11.2	50.50	61.7
13.567–13.710	13.661	27.8	-12.2	50.50	62.7
13.110–13.410	13.124	28.5	-11.5	40.50	52
13.710–14.010	13.938	28.7	-11.3	40.50	51.8

Note: Calculated field strength at 30 m = Measured field strength at 3 m – 40 dB

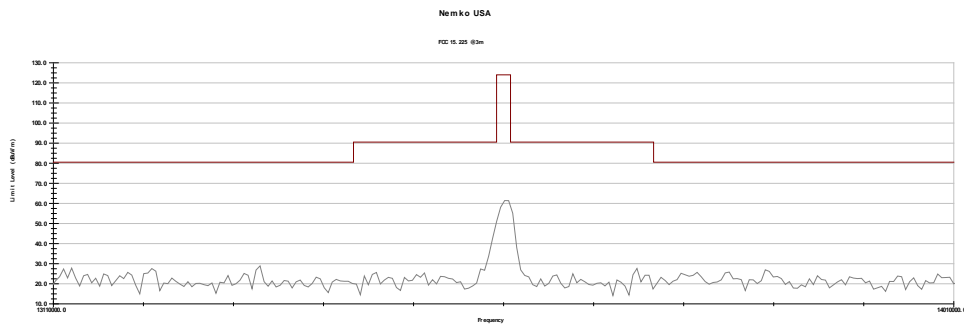


Figure 8.2-2: Field strength within 13.11–14.010 MHz band @3m, Loop Antenna 0 degree

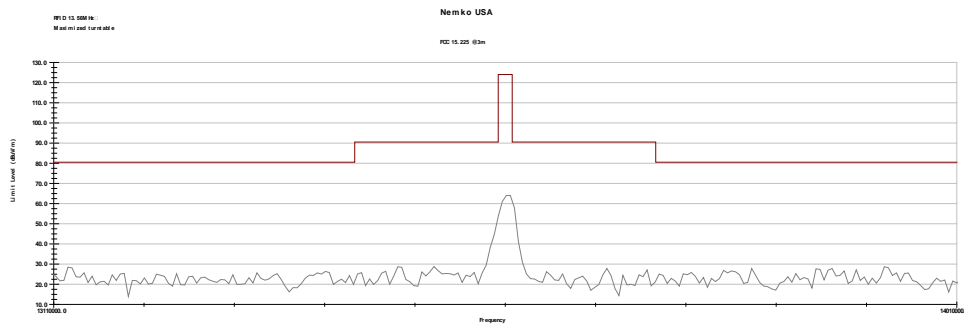


Figure 8.2-3: Field strength within 13.11–14.010 MHz band @3m, Loop Antenna 90 degree

## 8.3 FCC 15.225(d) and RSS-210 A2.6(d) Field strength of emissions outside 13.110–14.010 MHz band

### 8.3.1 Definitions and limits

**FCC:**

The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209. The field strength of emissions appearing within restricted bands (as specified in §15.205) shall not exceed the limits from §15.209.

**IC:**

The field strength of any emission outside the band 13.110–14.010 MHz shall not exceed the 30 µV/m (29.5 dBµV/m) limit.

**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	$67.6 - 20 \times \log_{10}(F)$	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: 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: 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	October 21, 2015	Temperature	23 °C
Test engineer	Feng You	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	62 %

### 8.3.3 Observations, settings and special notes

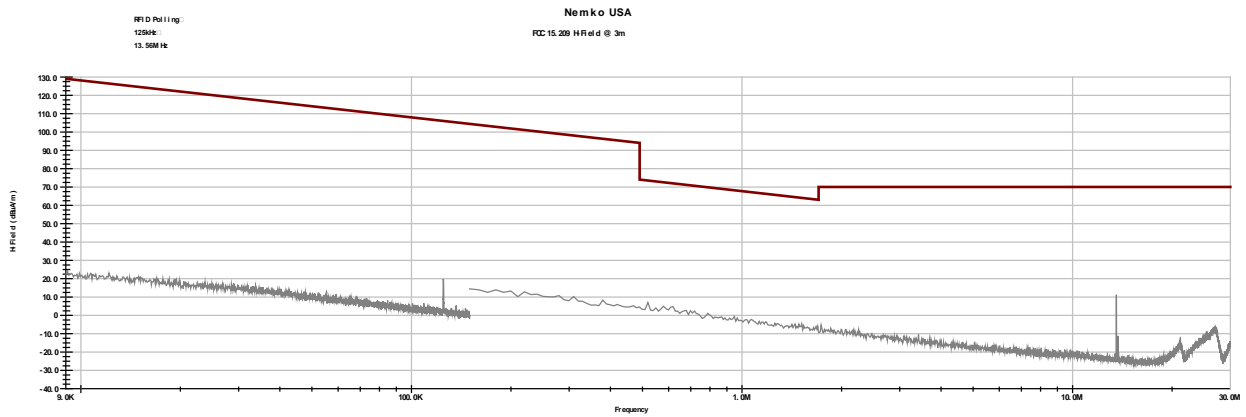
The EUT 001 was set up as tabletop configuration.

The spectrum was searched from 9 kHz to 1 GHz.

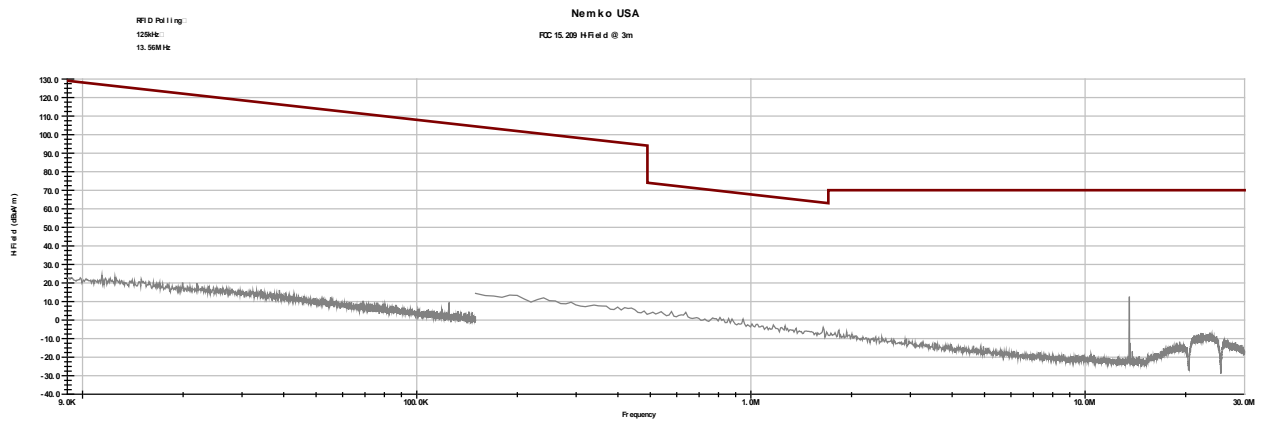
Radiated measurements were performed at a distance of 3 m.



### 8.3.4 Test data



**Plot 8.3-1: Radiated emissions - Loop Antenna 0 degree**



**Plot 8.3-1: Radiated emissions - Loop Antenna 90 degree**

All emissions are at least 40dB below limit. Peaks at 125 kHz and 13.56 MHz are fundamentals of RFID transmitter.

### 8.3.4 Test data, continued

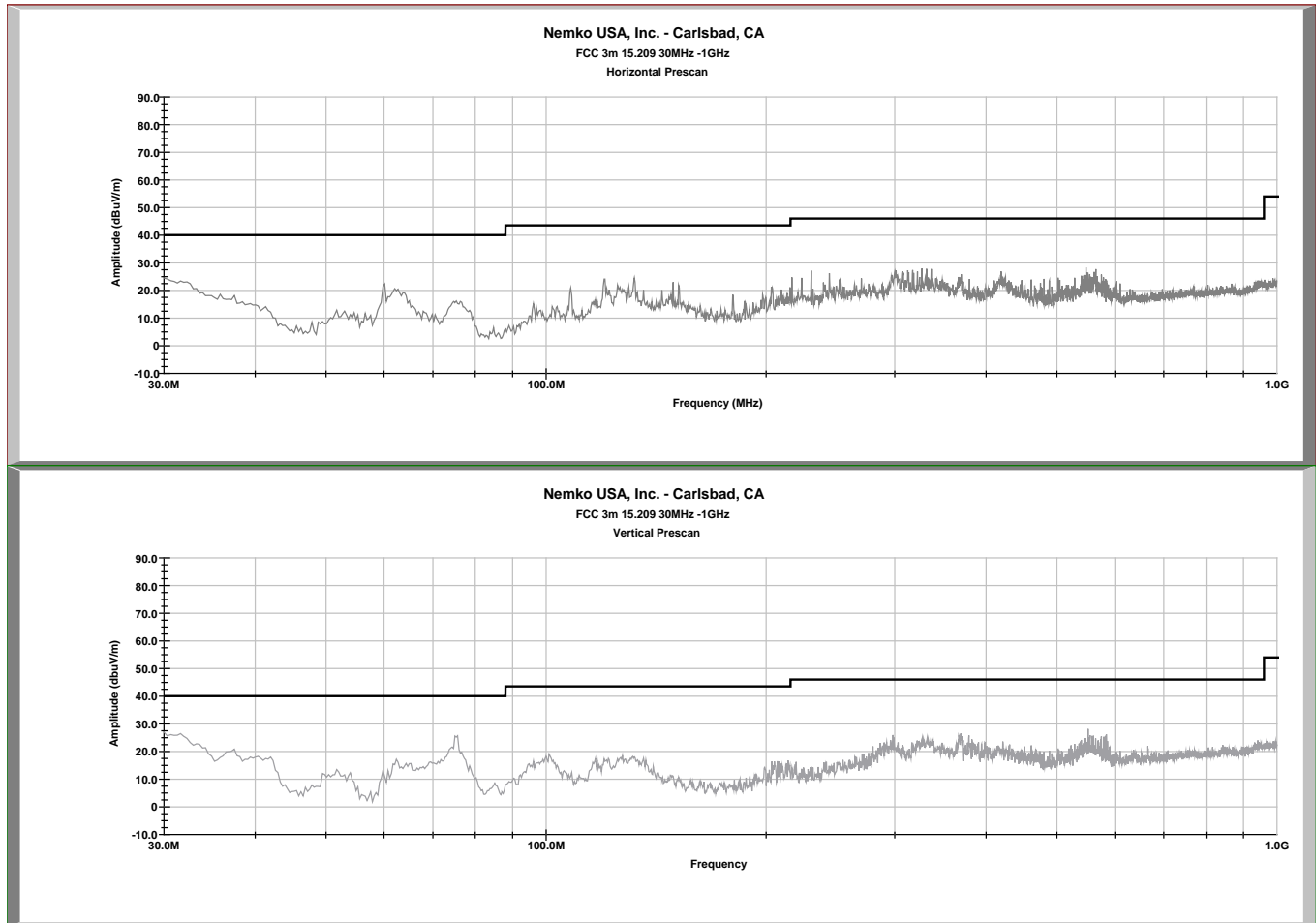


Figure 8.4-2: Field strength of spurious emissions 30-1000 MHz

Table 8.3-3: QP Measurement Results 30-1000MHz

Frequency MHz	Corrected QP dBuV/m	QP Limit dBuV/m	QP Margin dB	Polarity H/V
30.0311	16.78	40	23.22	H
60.0867	16.99	40	23.01	H
120.414	24.94	43.5	18.56	H
131.953	27.24	43.5	16.26	H
149.213	21.89	43.5	21.61	H
230.454	28.16	46	17.84	H
301.099	28.64	46	17.36	H
547.99	19.31	46	26.69	H
31.602	19.13	40	20.87	V
75.025	21.48	40	18.52	V
298.322	23.23	46	22.77	V
369.18	27.98	46	18.02	V
551.635	21.26	46	24.74	V

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

### 8.4.1 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 of Table 8.4-1 except for apparatus complying under RSS-287;

(b) Unwanted emissions that fall into restricted bands of Table 6 shall comply with the limits specified in RSS-Gen; and

(c) Unwanted emissions that do not fall within the restricted frequency bands of Table 8.4-1 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

**Table 8.4-1: 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	$67.6 - 20 \times \log_{10}(F)$	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: 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 8.4-2: 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 8.4-2 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 8.4-3: 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			

#### 8.4.2 Test summary

Test date	October 26, 2015	Temperature	24 °C
Test engineer	Feng You	Air pressure	1002 mbar
Verdict	Pass	Relative humidity	60 %

#### 8.4.3 Observations, settings and special notes

The EUT 002 was set up as tabletop configuration.

The spectrum was searched from 30 MHz to the 25GHz. 3 orthogonal positions are checked for each channel tested to determine the worst case position.

EUT was set to transmit with 100 % duty cycle.

Radiated measurements were performed at a distance of 3 m.

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:	3 MHz
Detector mode:	AVG
Trace mode:	Max Hold

#### 8.4.4 Test data

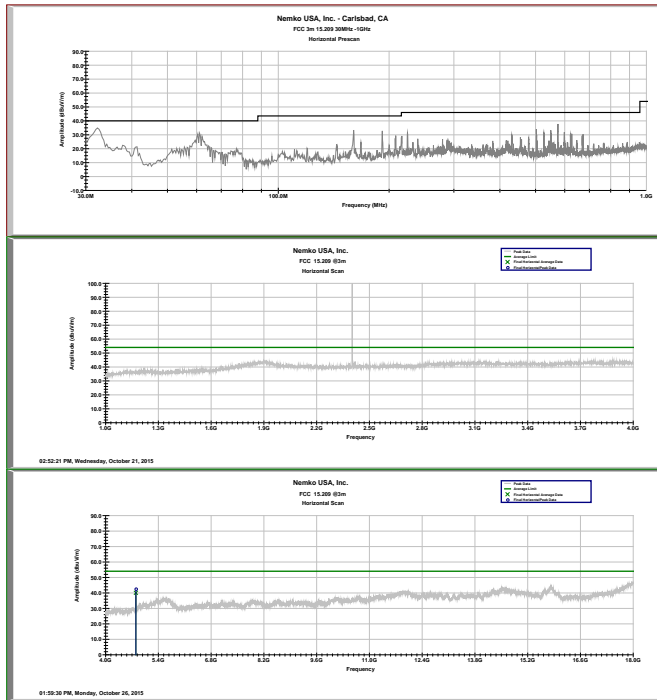


Figure 8.4-1: Radiated field strength Measurement, low channel Horizontal

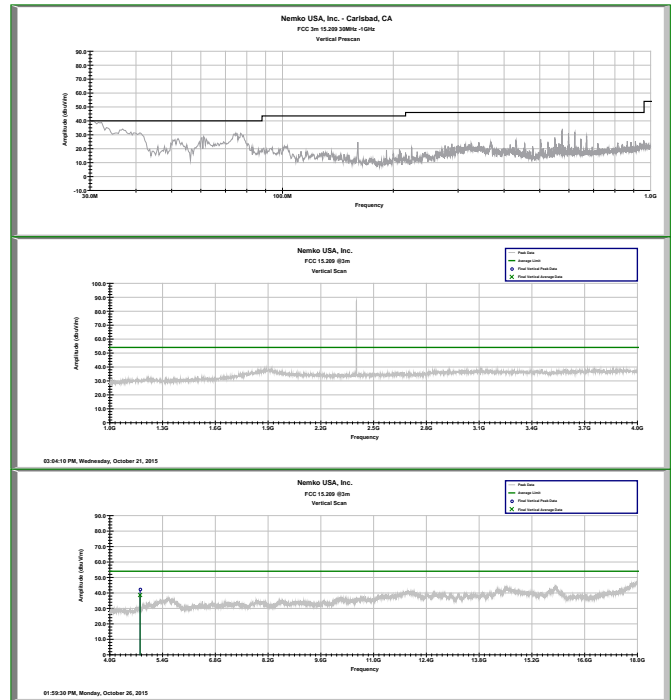


Figure 8.4-2: Radiated field strength Measurement, low channel Vertical

Table 8.4-4: Radiated field strength measurement results for low channel 2402MHz

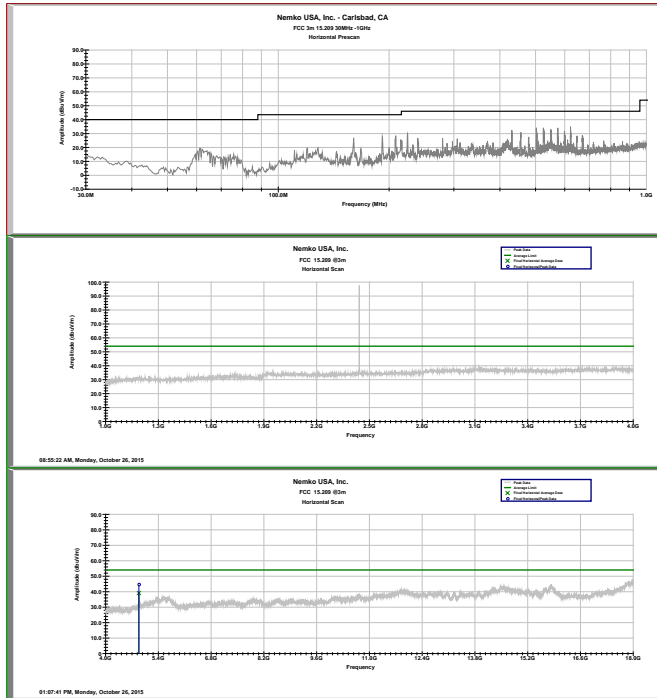
Frequency MHz	QP Field strength dBμV/m	Limit dBμV/m	Margin dB	Polarity H/V
32.6159	21.19	40	18.81	H
61.0765	19.69	40	20.31	H
160.237	18.91	43.5	24.59	H
191.717	29.09	43.5	14.41	H
224.448	19.9	46	26.1	H
502.446	35.25	46	10.75	H
525.96	31.99	46	14.01	H
549.957	28.9	46	17.1	H
575.252	37.35	46	8.65	H
598.583	32.61	46	13.39	H
627.073	23.38	46	22.62	H
672.793	19.34	46	26.66	H
30.253	20.92	40	19.08	V
74.652	20.48	40	19.52	V
160.449	10.74	43.5	32.76	V
575.95	19.74	46	26.26	V
622.947	30.63	46	15.37	V

Frequency MHz	AVG Field strength dBμV/m	Peak Field strength dBμV/m	AVG Limit dBμV/m	Peak Limit dBμV/m	AVG Margin dB	Peak Margin dB	Polarity H/V
4804.4	40.1	42.6	54	74	13.9	31.4	H
4803.76	38.7	42.4	54	74	15.3	31.6	V

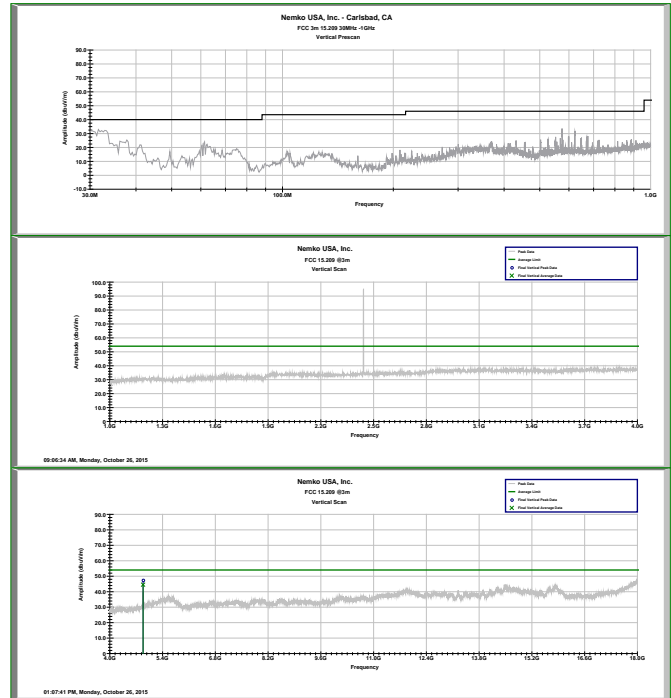
Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

**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 8.4-3: Radiated field strength Measurement, Mid channel Horizontal**



**Figure 8.4-4: Radiated field strength Measurement, Mid channel Vertical**

**Table 8.4-5: Radiated field strength measurement results for mid channel 2442MHz**

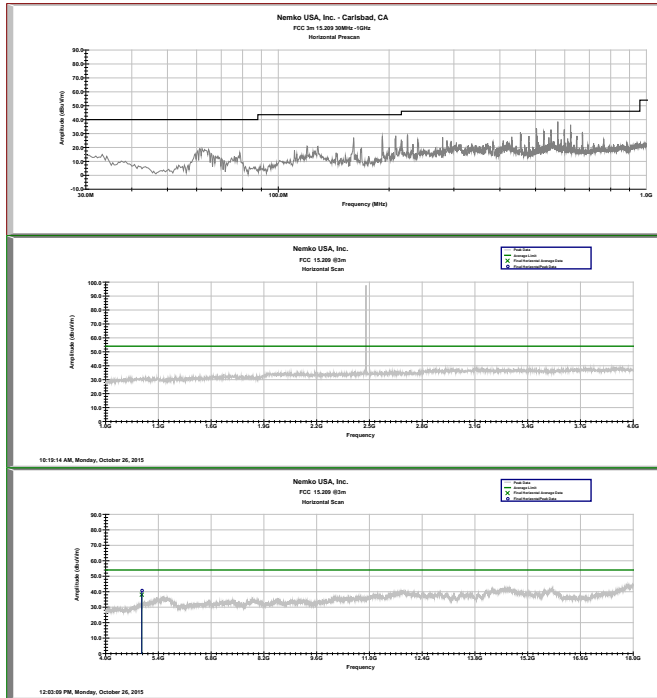
Frequency MHz	QP Field strength dBμV/m	Limit dBμV/m	Margin dB	Polarity H/V
61.3532	9.22	40	30.78	H
160.224	19.61	43.5	23.89	H
191.696	24.94	43.5	18.56	H
208.531	28.69	43.5	14.81	H
224.352	20	46	26	H
430.761	28.08	46	17.92	H
502.383	32.57	46	13.43	H
525.958	29.79	46	16.21	H
574.633	34.62	46	11.38	H
622.217	20.53	46	25.47	H
32.29	16.55	40	23.45	V
61.366	8.68	40	31.32	V
552.33	15.72	46	30.28	V
574.581	25.8	46	20.2	V
621.914	33.53	46	12.47	V

Frequency MHz	AVG Field strength dBμV/m	Peak Field strength dBμV/m	AVG Limit dBμV/m	Peak Limit dBμV/m	AVG Margin dB	Peak Margin dB	Polarity H/V
4883.87	39.1	44.8	54	74	14.9	29.2	H
4883.88	44.6	47.5	54	74	9.4	26.5	V

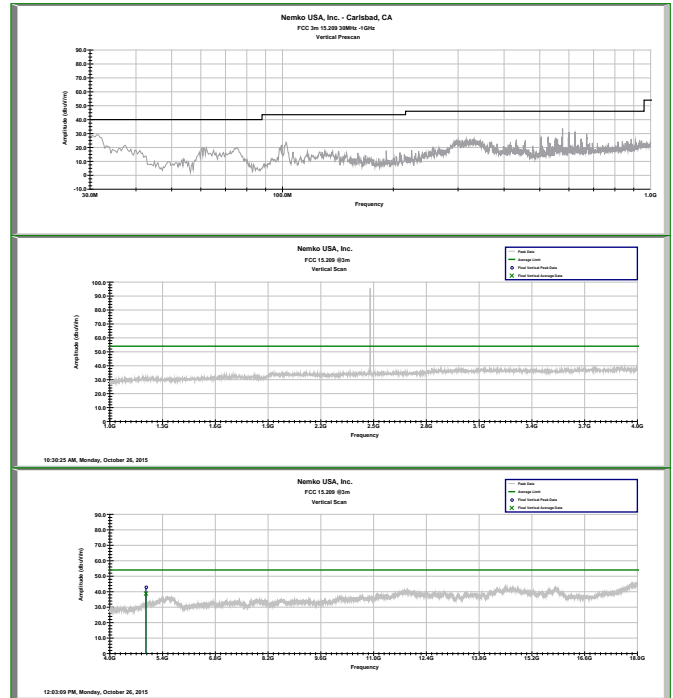
Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

**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 8.4-5: Radiated field strength Measurement, High channel Horizontal**



**Figure 8.4-6: Radiated field strength Measurement, High channel Vertical**

**Table 8.4-6: Radiated field strength measurement results for high channel 2480MHz**

Frequency MHz	Field strength dBμV/m	Limit dBμV/m	Margin dB	Polarity H/V
62.0779	19.34	40	20.66	H
160.228	20.83	43.5	22.67	H
191.721	28	43.5	15.5	H
208.542	28.4	43.5	15.1	H
224.354	21.2	46	24.8	H
502.428	17.39	46	28.61	H
574.65	28.19	46	17.81	H
622.621	24.24	46	21.76	H
31.645	16.14	40	23.86	V
102.179	13.84	43.5	29.66	V
576.872	29.95	46	16.05	V
600.189	29.76	46	16.24	V
622.193	18.22	46	27.78	V
670.242	15.71	46	30.29	V

Frequency MHz	AVG Field strength dBμV/m	Peak Field strength dBμV/m	AVG Limit dBμV/m	Peak Limit dBμV/m	AVG Margin dB	Peak Margin dB	Polarity H/V
4959.95	38.1	40.9	54	74	15.9	33.1	H
4959.99	38.8	43	54	74	15.2	31	V

Notes: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

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

### 9.1 Radiated emissions set-up

