

RADIO TEST REPORT – 484934-1TRFWL

Type of assessment:

Final product testing

Applicant:

MedRx Inc.

Model/HVIN:

MedRx Charger

FCC identifier:

FCC ID: 2A6UNMEDRXCHARGE

Description of product:

Qi Wireless Charger

Product marketing name (PMN):

MedRx Charger

ISED certification number:

IC: 28531-MEDRXCHARGE

Specifications:

- ◆ **FCC 47 CFR Part 15 Subpart C**
- ◆ **RSS-216, Issue 2, Jan 2016**

Date of issue: **October 13, 2022**

Tarek Elkholy, EMC/RF Specialist

Tested by



Signature



Signature

Moustapha Salah Toubeh, Wireless/EMC Specialist

Reviewed by

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SCC File Number: 15064 (Ottawa/Almonte); 151100 (Montreal); 151097 (Cambridge)

FCC 15 C and RSS-216; Date: October 2022

www.nemko.com



Lab locations

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Test site identifier	Organization FCC: ISED:	Ottawa/Almonte CA2040 2040A-4	Montreal CA2041 2040G-5	Cambridge CA0101 24676
Website	www.nemko.com			

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 contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Table of Contents

Table of Contents	3
Section 1 Report summary	4
1.1 Test specifications	4
1.2 Test methods	4
1.3 Exclusions	4
1.4 Statement of compliance	4
1.5 Test report revision history	4
Section 2 Engineering considerations	5
2.1 Modifications incorporated in the EUT for compliance	5
2.2 Technical judgment	5
2.3 Model variant declaration	5
2.4 Deviations from laboratory tests procedures	5
Section 3 Test conditions	6
3.1 Atmospheric conditions	6
3.2 Power supply range	6
Section 4 Measurement uncertainty	7
4.1 Uncertainty of measurement	7
Section 5 Information provided by the applicant	8
5.1 Disclaimer	8
5.2 Applicant / Manufacturer	8
5.3 EUT information	8
5.4 Radio technical information	8
5.5 EUT setup details	8
Section 6 Summary of test results	10
6.1 Testing location	10
6.2 Testing period	10
6.3 Sample information	10
6.4 FCC test results	10
6.5 ISED test results	10
Section 7 Test equipment	11
7.1 Test equipment list	11
Section 8 Testing data	12
8.1 AC power line conducted emissions limits	12
8.2 Occupied bandwidth	16
8.3 Radiated emissions	18
Section 9 Test setup diagrams	23
9.1 Radiated emissions set-up for frequencies below 1 GHz	23
9.2 AC mains conducted emissions set-up	23

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart C	Intentional Radiators
RSS-216, Issue 2, Jan 2016	Wireless Power Transfer Devices

1.2 Test methods

RSS-Gen, Issue 5, April 2018	General Requirements for Compliance of Radio Apparatus
ICES-001, Issue 5, July 2020	Industrial, Scientific and Medical (ISM) Equipment
ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.3 Exclusions

None

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.3 above. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

Determining compliance is based on the results of the compliance measurement, not taking into account measurement uncertainty, in accordance with section 1.3 of ANSI C63.10 v2013.

See "Summary of test results" for full details.

1.5 Test report revision history

Table 1.5-1: Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	October 13, 2022	Original report issued

Section 2 Engineering considerations

2.1 Modifications incorporated in the EUT for compliance

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

2.2 Technical judgment

None

2.3 Model variant declaration

There were no model variants declared by the applicant.

2.4 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 3 Test conditions

3.1 Atmospheric conditions

Temperature	15 °C – 35 °C
Relative humidity	20 % – 75 %
Air pressure	86 kPa (860 mbar) – 106 kPa (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.

3.2 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 $\pm 5\%$, for which the equipment was designed.

Section 4 Measurement uncertainty

4.1 Uncertainty of measurement

UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

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

Table 4.1-1: Measurement uncertainty calculations

Test name	Measurement uncertainty, \pm dB
All antenna port measurements	0.55
Occupied bandwidth	4.45
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 5 Information provided by the applicant

5.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

5.2 Applicant / Manufacturer

Applicant name	MedRx Inc.
Applicant address	1200 Starkey Rd #105, Largo, FL 33771, United States.
Manufacturer name	Same as applicant
Manufacturer address	Same as applicant

5.3 EUT information

Product description	Qi Wireless Charger
Model / HVIN	MedRx Charger
Serial number	CH-001
Part number	8534043
Power supply requirements	DC: 15 V from external 100–240 V(AC) power adapter
Hardware revision	Rev 201
Software details	Built in controller detects if a probe is inserted and power up the Qi system.
Product description and theory of operation	The equipment is a Qi Charger. It charges the AWRC probes through Qi technology. The charger is powered by USB-C or 15v Power Supply.

5.4 Radio technical information

WPT subassembly type	Source subassembly Type 3 (Category I Radio Apparatus)
Frequency band	130–160 kHz
Measured BW (Hz), 99% OBW	456.2 Hz
Type of modulation	Qi, Resonant inductive coupling
Transmitter spurious, dB μ V/m @ 3 m	36.0 dB μ V/m quasi-peak at 32.422 MHz
Antenna information	Type: Coil with ferrite; Manufacturer: Annter Technology Group Co., Ltd; MN: AWCCA-20NA0H20-C01-B

5.5 EUT setup details

5.5.1 Radio exercise details

Operating conditions	The MedRx Charger should blink when the MedRx Wireless Probes are placed on the charger. The Qi Coils activate and begin charging the MedRx Wireless probes and the LED lights are blinking.
Transmitter state	Transmitter set into continuous mode.

5.5.2 EUT setup configuration
Table 5.5-1: EUT interface ports

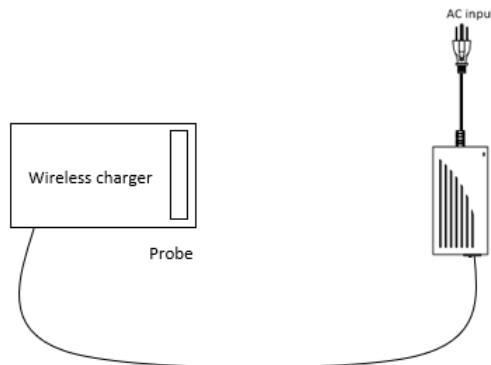
Description	Qty.
DC power input, barrel connector	1
USB-C power port	1

Table 5.5-2: Support equipment

Description	Brand name	Model, Part number, Serial number, Revision level
MedRx Wireless Probe	MedRx	MN: MedRx Wireless REM probe, SN: PR-002

Table 5.5-3: Inter-connection cables

Cable description	From	To	Length (m)
Power cable	AC/DC converter	Wireless charger	1


Figure 5.5-1: Radiated testing block diagram

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Cambridge
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6.2 Testing period

Test start date	September 30, 2022	Test end date	October 4, 2022
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6.3 Sample information

Receipt date	April 20, 2022	Nemko sample ID number(s)	8
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6.4 FCC test results

Table 6.4-1: FCC requirements results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§§15.205, 15.209	Radiated emissions	Pass
§15.215(c)	Occupied bandwidth	Pass

Notes: None

6.5 ISED test results

Table 6.5-1: ISED requirements results

RSS-Gen Part	RSS-216 Part	Test description	Verdict
8.9	6.2.2.2, 6.2.3	Radiated emission limits	Pass
–	6.2.2.1	AC powerline conducted emissions	Pass
6.7	–	Occupied bandwidth	Pass

Notes: None

Section 7 Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	Feb 7, 2023
Flush mount turntable	SUNAR	FM2022	FA003006	-	NCR
Controller	SUNAR	SC110V	FA002976	-	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	Nov 30, 2022
Bilog antenna (30–2000 MHz)	SUNAR	JB1	FA003009	1 year	Jan 31, 2023
Active loop antenna (0.01–30 MHz)	Com-Power	AL-130R	FA003002	1 year	April 18, 2023
Two-line v-network	Rohde & Schwarz	ENV216	FA002965	1 year	November 30, 2022
50 Ω coax cable	Rohde & Schwarz	None	FA003074	1 year	July 13, 2023
50 Ω coax cable	Huber + Suhner	None	FA003047	1 year	July 13, 2023
50 Ω coax cable	Huber + Suhner	None	FA003043	1 year	July 13, 2023

Notes: NCR - no calibration required

Section 8 Testing data

8.1 AC power line conducted emissions limits

8.1.1 References, definitions and limits

FCC §15.207:

(a) 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 μ H/50 Ω 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.

ANSI C63.10, Clause 6.2:

If the EUT normally receives power from another device that in turn connects to the public utility ac power lines, measurements shall be made on that device with the EUT in operation to demonstrate that the device continues to comply with the appropriate limits while providing the EUT with power. If the EUT is operated only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines (600 VAC or less) to operate the EUT (such as an adapter), then ac power-line conducted measurements are not required. For direct current (dc) powered devices where the ac power adapter is not supplied with the device, an "off-the-shelf" unmodified ac power adapter shall be used. If the device is supposed to be installed in a host (e.g., the device is a module or PC card), then it is tested in a typical compliant host.

RSS-216, Clause 6.2.2.1:

WPT subassemblies of WPT source devices shall comply with the mains terminals disturbance voltage limits for induction cooking equipment, as set out in ICES-001.

ICES-001, Clause 3.3.3:

The limits for the mains terminal disturbance voltages applicable to induction cooking appliances are presented in table below. The induction cooking appliance shall comply with both the quasi-peak and the average limits.

Table 8.1-1: ICES-001 Conducted emission limits for induction cooking appliances (AC mains terminals)

Frequency range, MHz	Appliances rated 120 V, without an earth connection, dB μ V		All other appliances, dB μ V	
	Quasi-peak	Average	Quasi-peak	Average
0.009–0.05	122	—	110	—
0.05–0.15	102 to 92*	—	90 to 80*	—
0.15–0.5	72 to 62*	62 to 52*	66 to 56*	56 to 46*
0.5–5	56	46	56	46
5–30	60	50	60	50

Notes: * - The limit level in dB μ A decreases linearly with the logarithm of frequency.

Table 8.1-2: FCC Conducted emissions limit

Frequency of emission, MHz	Conducted emissions limit, dB μ V	
	Quasi-peak	Average**
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Notes: * - The level decreases linearly with the logarithm of the frequency.

** - A linear average detector is required.



8.1.2 Test summary

Verdict	Pass
Tested by	Tarek Elkholy

8.1.3 Observations, settings and special notes

Port under test – Coupling device	AC/DC adapter AC power input – Artificial Mains Network (AMN)
EUT power input during test	120 V _{AC} , 60 Hz
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 10 dB or above the limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.
Additional notes:	<ul style="list-style-type: none">– The EUT was set up as tabletop configuration per ANSI C63.10-2013 measurement procedure.– The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance. Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB)– Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

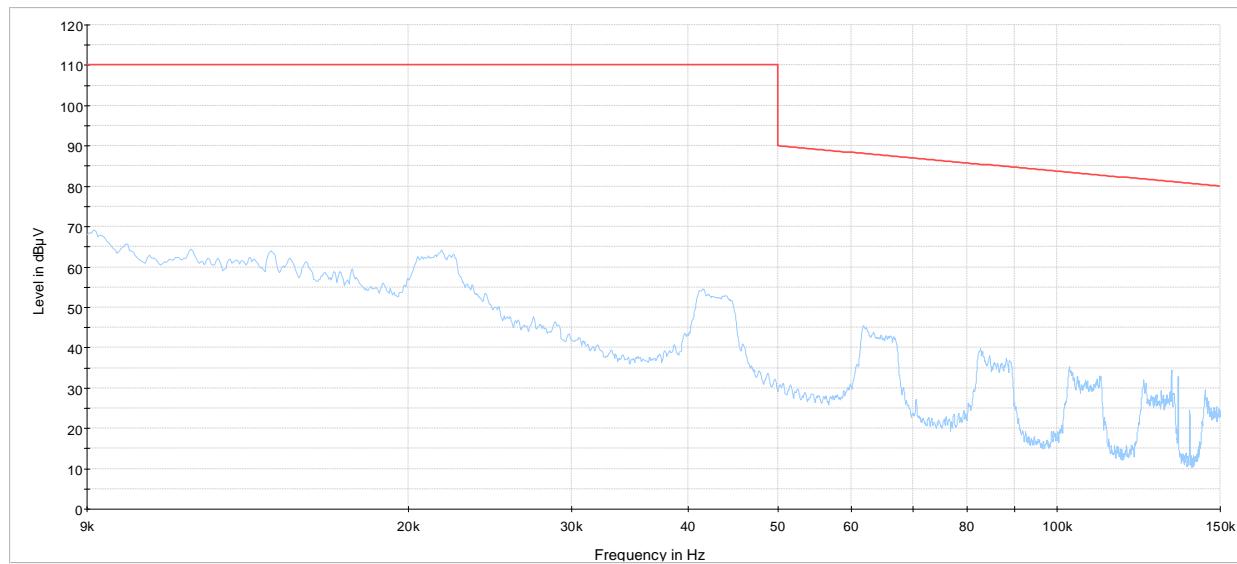
Receiver settings:9 – 150 kHz

Resolution bandwidth	200 Hz
Video bandwidth	1 kHz
Detector mode	Peak and Average (Preview), Quasi-peak (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 160 ms (Final)

Receiver settings:150 kHz – 30 MHz

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	Peak and Average (Preview), Quasi-peak and CAverage (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 160 ms (Final)

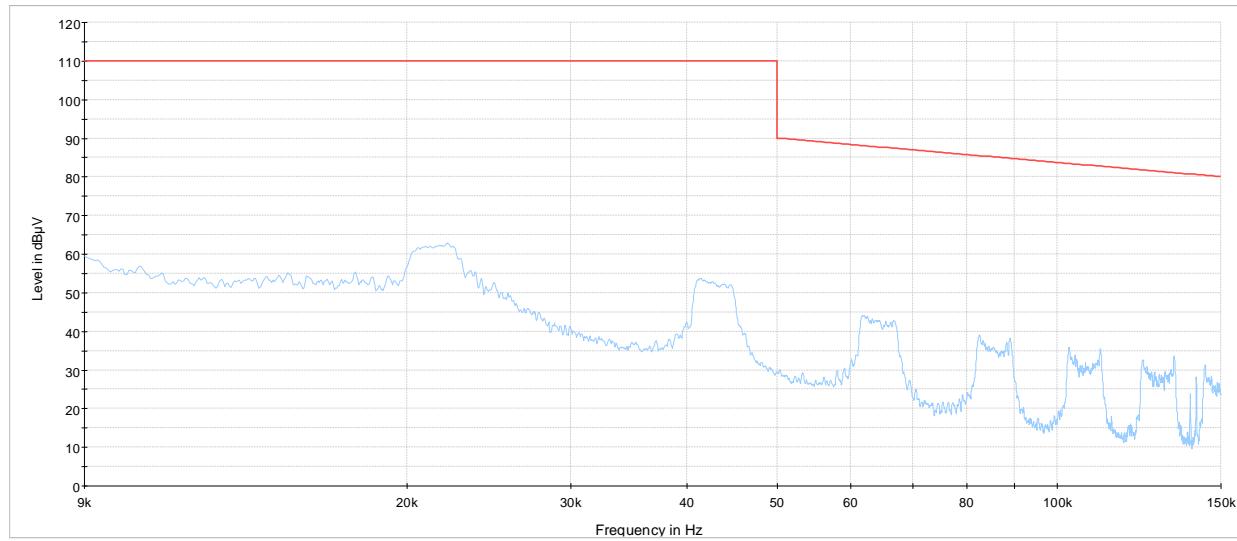
8.1.4 Test data



NEX-484934 Conducted Emissions 9-150 kHz, Phase, 120 V 60 Hz

Preview Result 1-PK+
ICES-001 other appliances

Plot 8.1-1: Conducted emissions 9 – 150 kHz, on phase line

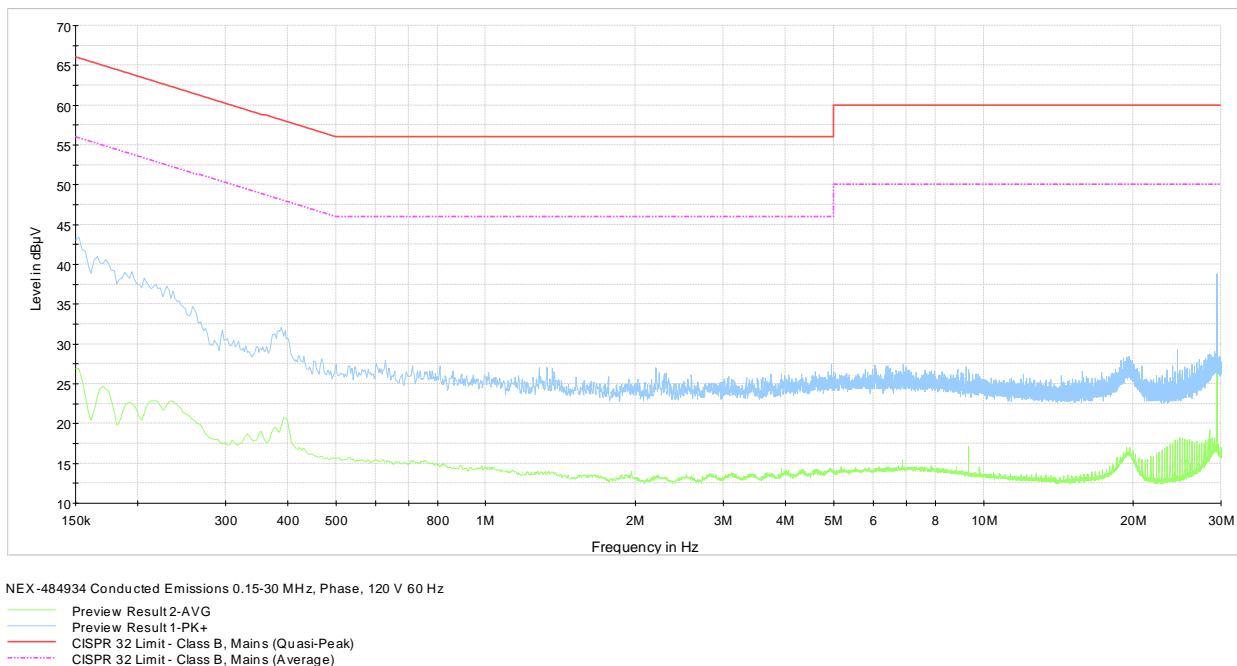


NEX-484934 Conducted Emissions 9-150 kHz, Neutral, 120 V 60 Hz

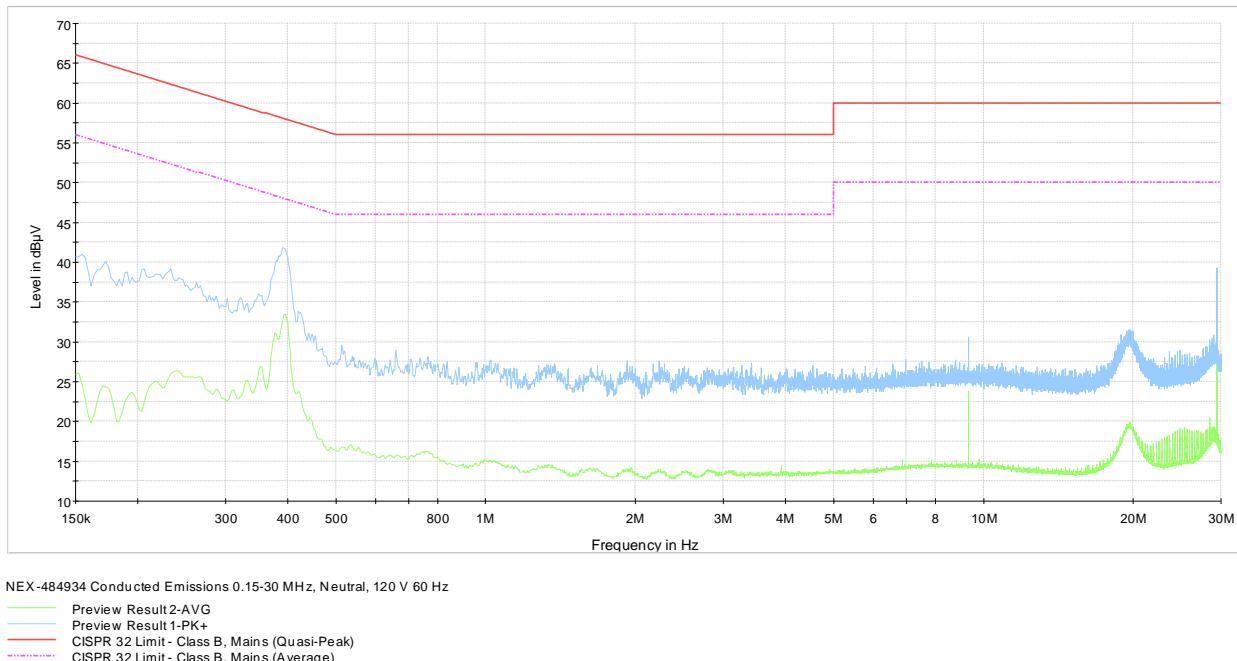
Preview Result 1-PK+
ICES-001 other appliances

Plot 8.1-2: Conducted emissions 9 – 150 kHz, on neutral line

Test data, continued



Plot 8.1-3: Conducted emissions 0.15 – 30 MHz, on phase line



Plot 8.1-4: Conducted emissions 0.15 – 30 MHz, on neutral line



8.2 Occupied bandwidth

8.2.1 References, definitions and limits

FCC 15.215(c):

Intentional radiators operating under the alternative provisions to the general emission limits 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.

RSS-Gen, Clause 6.7:

6 dB bandwidth is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 6 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

8.2.2 Test summary

Verdict	Pass
Tested by	Tarek Elkholy

Test date

September 30, 2022

8.2.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	200 Hz
Video bandwidth	$\geq 3 \times$ RBW
Frequency span	5 kHz
Detector mode	Peak
Trace mode	Max Hold

8.2.4 Test data

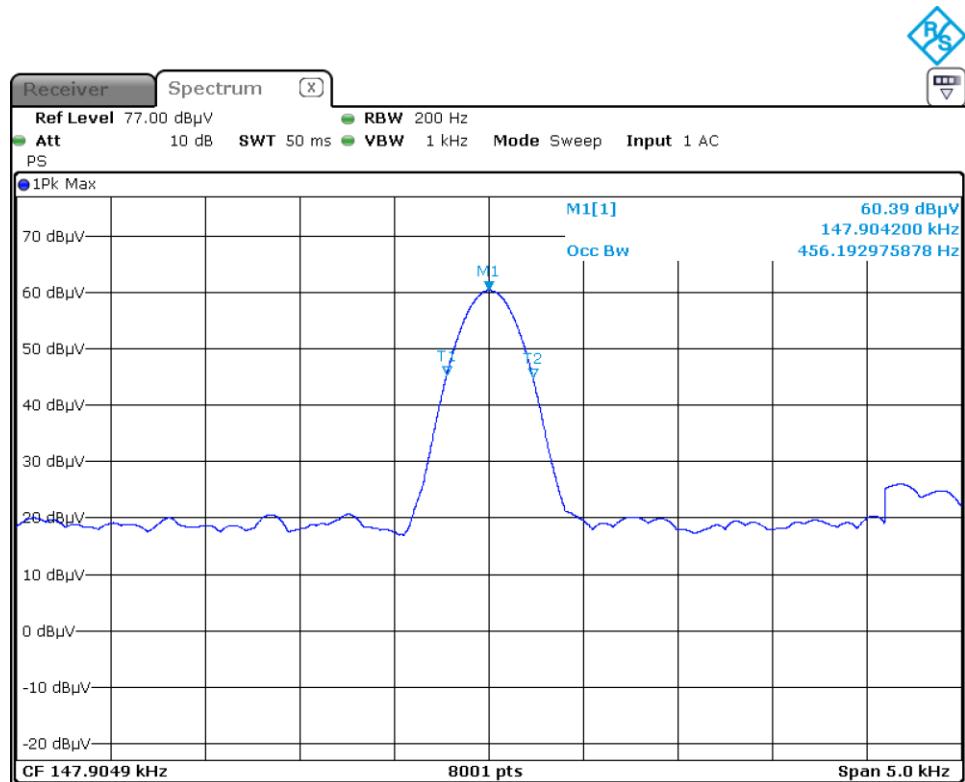


Figure 8.2-1: Occupied bandwidth

8.3 Radiated emissions

8.3.1 References, definitions and limits

FCC §15.209:

(a) 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:

RSS-216, Clause 6.2.2.2:

The magnetic field radiated emissions within 9 kHz – 30 MHz from the WPT subassembly of WPT source and client devices and WPT systems shall comply with the limits applicable to induction cooking equipment, as set out in ICES-001. The preferred test method for WPT devices that may be used in residential environments and that have a maximum dimension of less than or equal to 1.6 m is the test method using the van Veen loop antenna system, as per ICES-001. However, it is acceptable to use the alternate 60 cm loop test method and corresponding limit for these small residential WPT devices (the same as for commercial/industrial and large residential devices).

The electric field radiated emissions within 30 – 1000 MHz from the WPT subassembly of WPT source and client devices and WPT systems shall comply with the limits applicable to induction cooking equipment, as set out in ICES-001.

ICES-001, Clause 3.3.4.1:

Induction cooking appliances that fit within a sphere having a diagonal of 1.6 m shall comply with either:

- the limits in table 2, in terms of magnetic field strength measured at a distance of 3 m from the EUT's boundary; or
- the limits in table 3, in terms of induced current measured with a 2 m LLAS.

The limits in table 2 shall not be used for LLAS measurements (i.e. by applying the conversion factor from Annex C of CISPR 16-1-4 for converting from induced current to equivalent magnetic field strength at 3 m distance). When measurements are performed using the LLAS, the limits in table 3 shall be applied.

Larger induction cooking appliances, which do not fit within a sphere having a diagonal of 1.6 m, shall comply with the limits in table 2, in terms of magnetic field strength measured at a distance of 3 m from the EUT's boundary.

RSS-216, Clause 6.3:

Fundamental frequencies and modulation components of Type 2 and Type 3 WPT source subassemblies shall not fall within the restricted bands specified in RSS-Gen.

RSS-Gen:

8.9 Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table below.

8.10 Restricted frequency bands are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. The following conditions related to the restricted frequency bands apply:

- a The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands.
- b Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table below.
- 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 table below.

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

Field strength of emissions			
Frequency, MHz	µV/m	dBµV/m	Measurement distance, 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

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.

References, definitions and limits, continued

Table 8.3-2: ICES-001 Table 2: Magnetic field strength radiated emission limits for induction cooking appliances

Frequency, MHz	Quasi-peak, at 3 m distance (dB μ A/m)
0.009–0.07	69
0.07–0.15	69 to 39*
0.15–30	39 to 7*

Notes: * - The limit level in dB μ A decreases linearly with the logarithm of frequency.

Table 8.3-3: ICES-001 Table 3: Induced current radiated emission limits for induction cooking appliances

Frequency, MHz	Horizontal* Quasi-peak (dB μ A)	Vertical* Quasi-peak (dB μ A)
0.009–0.07	88	106
0.07–0.15	88 to 58**	106 to 76**
0.15–30	58 to 22**	76 to 40**

Notes: * - The horizontal limit applies to the horizontally-polarized magnetic field, as measured with each of the two vertically positioned large loop antennas of the LLAS. The vertical limit applies to induced currents measured with the horizontally positioned large loop of the LLAS.

** - The limit level in dB μ A decreases linearly with the logarithm of frequency.

Table 8.3-4: ISED restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	12.57675–12.57725	399.9–410	7.25–7.75
0.495–0.505	13.36–13.41	608–614	8.025–8.5
2.1735–2.1905	16.42–16.423	960–1427	9.0–9.2
3.020–3.026	16.69475–16.69525	1435–1626.5	9.3–9.5
4.125–4.128	16.80425–16.80475	1645.5–1646.5	10.6–12.7
4.17725–4.17775	25.5–25.67	1660–1710	13.25–13.4
4.20725–4.20775	37.5–38.25	1718.8–1722.2	14.47–14.5
5.677–5.683	73–74.6	2200–2300	15.35–16.2
6.215–6.218	74.8–75.2	2310–2390	17.7–21.4
6.26775–6.26825	108–138	2483.5–2500	22.01–23.12
6.31175–6.31225	149.9–150.05	2655–2900	23.6–24.0
8.291–8.294	156.52475–156.52525	3260–3267	31.2–31.8
8.362–8.366	156.7–156.9	3332–3339	36.43–36.5
8.37625–8.38675	162.0125–167.17	3345.8–3358	
8.41425–8.41475	167.72–173.2	3500–4400	Above 38.6
12.29–12.293	240–285	4500–5150	
12.51975–12.52025	322–335.4	5350–5460	

Note: Certain frequency bands listed in Table 8.3-4 and above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

References, definitions and limits, continued

Table 8.3-5: 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
6.2125–6.2128	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

Verdict	Pass		
Tested by	Tarek Elkholy	Test date	September 30, 2022

8.3.3 Observations, settings and special notes

- Radiated measurements were performed at a distance of 3 m.
- From Table 8.3.2 and using Linear interpolation method the limit at 147.6 kHz is 39.9 dB μ A/m, the fundamental signal field strength = 76.4 dB μ V/m
- Fundamental signal magnetic field strength = 76.4 dB μ V/m – 51.5 dB = 24.9 dB μ A/m < 39.9 dB μ A/m

Spectrum analyser settings for radiated measurements within restricted bands 9 – 150 kHz

Resolution bandwidth:	200 Hz
Video bandwidth:	1 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for peak radiated measurements within restricted bands 150 kHz – 30 MHz

Resolution bandwidth:	9 kHz
Video bandwidth:	1 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements within restricted bands 30 – 1000 MHz

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

8.3.4 Test data

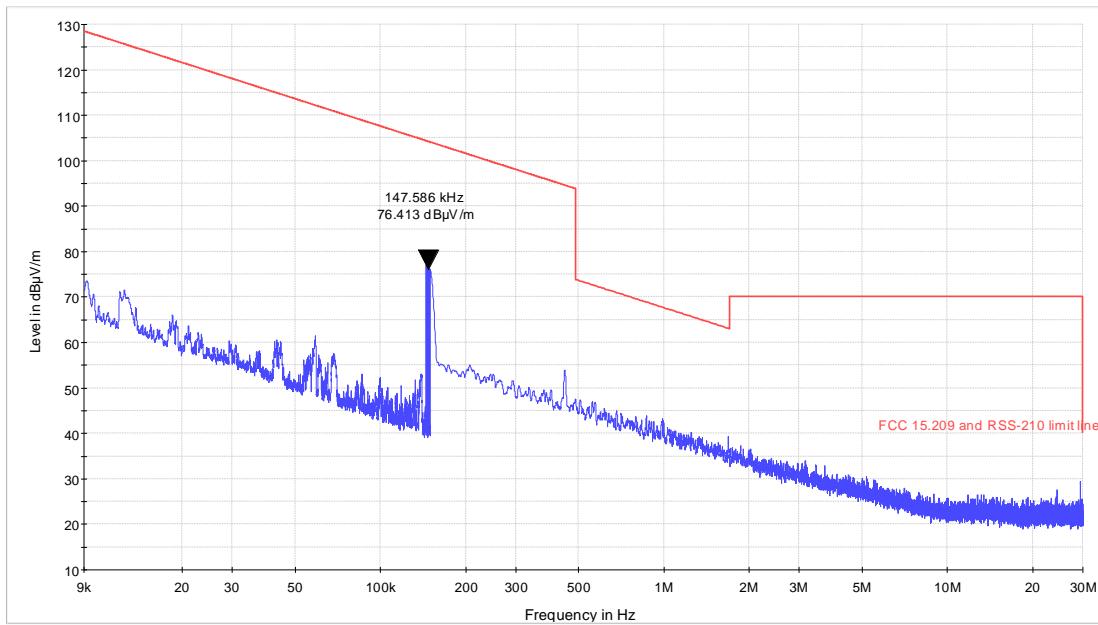


Figure 8.3-1: Radiated emissions, electric field strength 9 kHz – 30 MHz

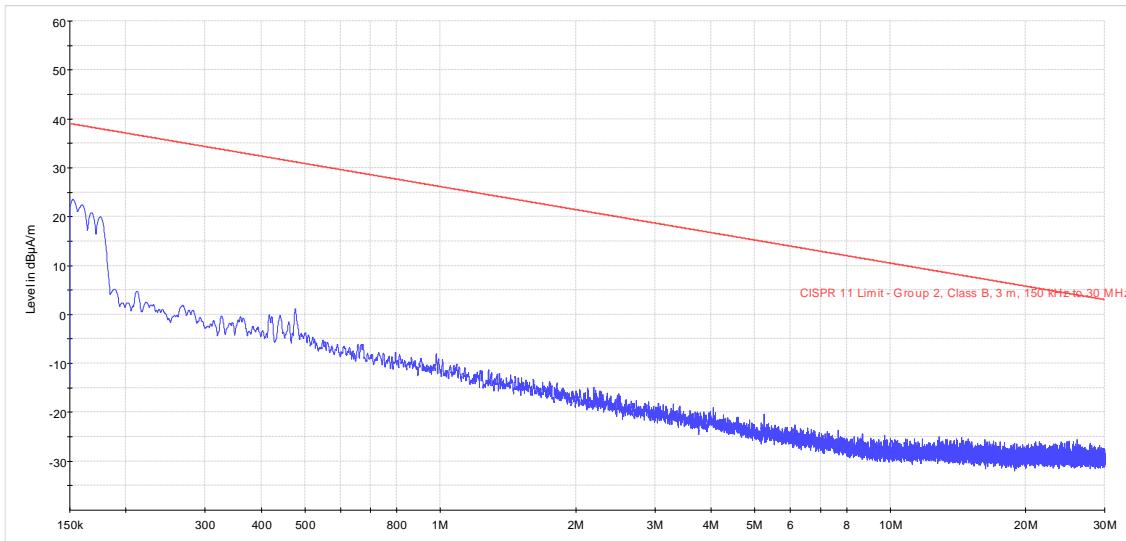
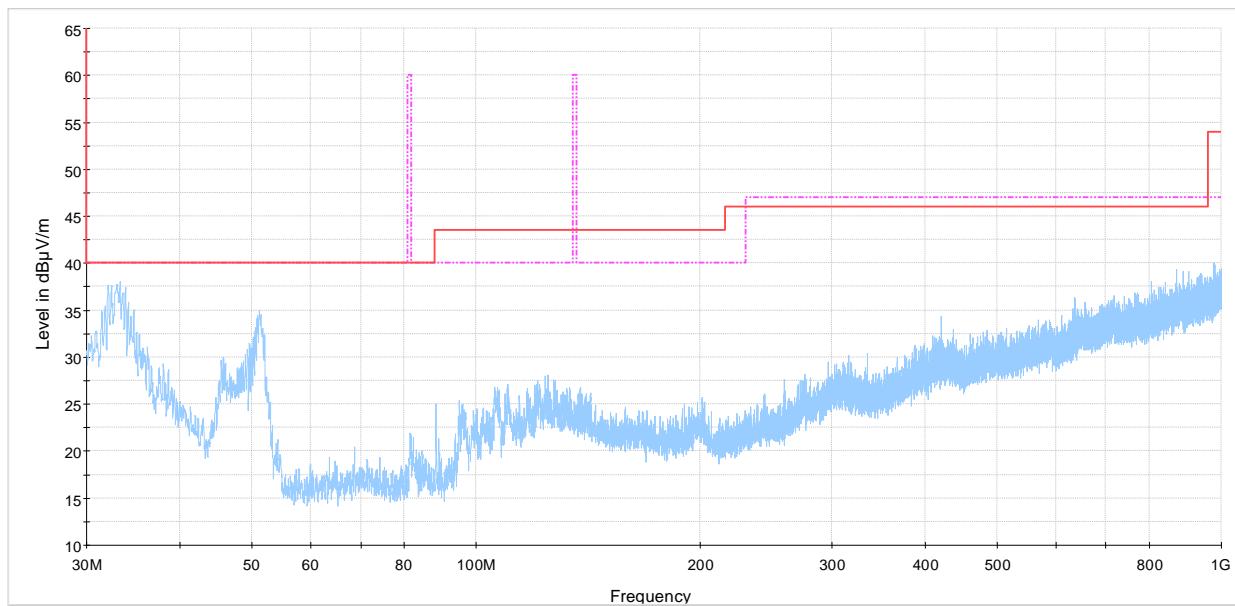


Figure 8.3-2: Radiated emissions, Magnetic field strength 150 kHz – 30 MHz

Test data, continued

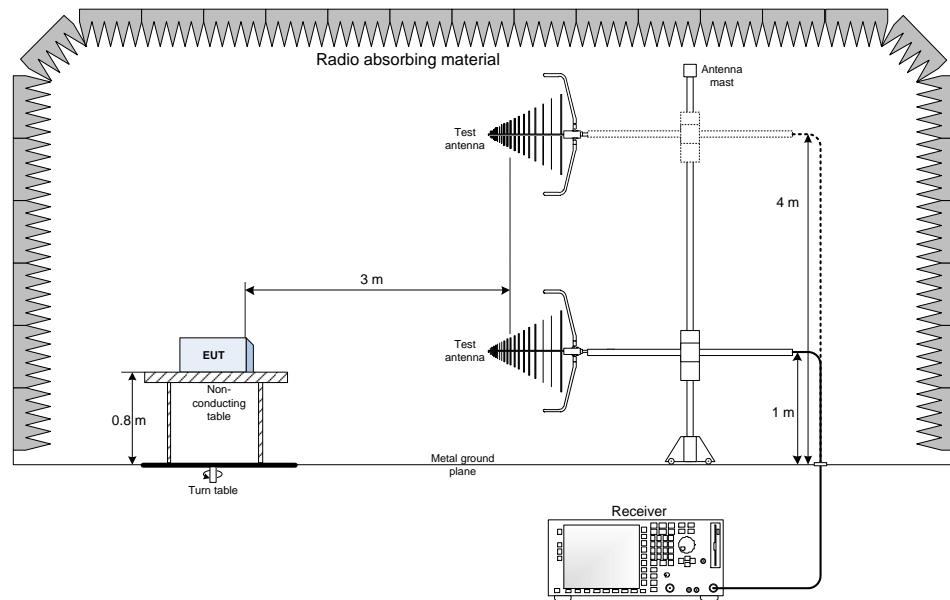


NEX-484934 Radiated Emissions 30-1000 MHz,
Preview Result 1-PK+
CISPR 11 Limit - Group 2, Class B, 3 m, 30 MHz to 1000 MHz
FCC 15.209 and RSS-Gen limit line

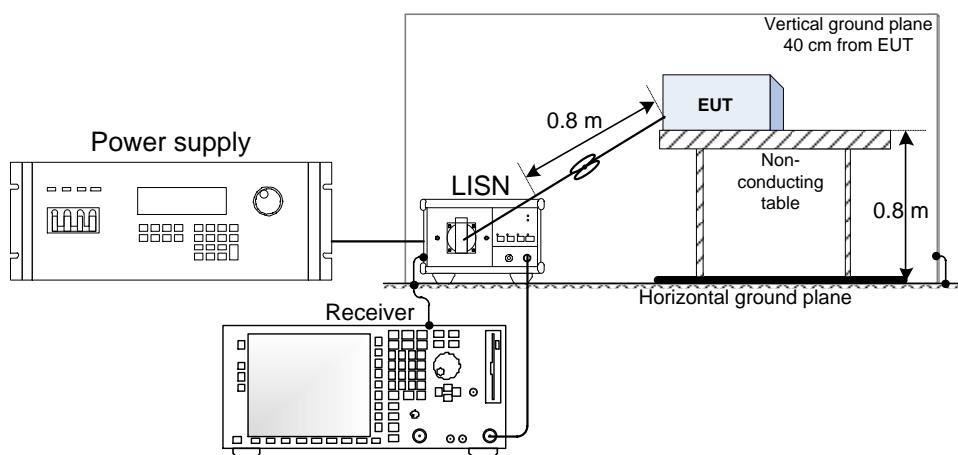
Figure 8.3-3: Radiated emissions, electric field strength 30 – 1000 MHz

Section 9 Test setup diagrams

9.1 Radiated emissions set-up for frequencies below 1 GHz



9.2 AC mains conducted emissions set-up



End of the test report