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Test report

293621-2TRFWL

Date of issue: February 18, 2016

Applicant:

Leggett & Platt Automotive Group - North America

Product:

Triple Coil Wireless Charger

Model:

TC

FCC ID:

SFO-8409300

IC Registration number:

9304C-8409300

Specifications:

◆ **FCC 47 CFR Part 15 Subpart C, §15.209**

Unlicensed National Information Infrastructure Devices, Radiated emission limits; general requirements

◆ **RSS-210, Issue 8, December 2010**

Licence-Exempt Radio Apparatus

www.nemko.com

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

FCC 15.209 and RSS-Gen.docx; Date: August 2015



Test location

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Site number	FCC: 176392; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by	Andrey Adelberg, Senior Wireless/EMC Specialist
Reviewed by	Kevin Rose, Wireless/EMC Specialist
Review date	February 18, 2016
Reviewer 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 contained 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	Leggett & Platt Automotive Group - North America
Address	360 Silvercreek Industrial Dr.
City	Lakeshore
Province/State	Ontario
Postal/Zip code	N8N 4Y3
Country	Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.209 RSS-210, Issue 8, December 2010	Unlicensed National Information Infrastructure Devices, Radiated emission limits; general requirements Licence-Exempt Radio Apparatus
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1.3 Test methods

ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
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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 #	Details of changes made to test report
TRF	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.31(e)	Variation of power source	Pass ¹
§15.209	Radiated emission limits; general requirements.	Pass
§15.207	Conducted limits	Not applicable

Notes: ¹EUT was tested with fully charged battery

2.2 IC RSS-210, Issue 8, test results

Section	Test description	Verdict
2.5	General Field Strength Limits	Pass

Notes: None

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	August 26, 2015
Nemko sample ID number	133-000407

3.2 EUT information

Product name	Triple Coil Wireless Charger
Model	TC
Serial number	1108150523

3.3 Technical information

Applicant IC company number	9304C
IC UPN number	8409300
All used IC test site(s) Reg. number	2040A-4
RSS number and Issue number	RSS-210 Issue 8, December 2010
Frequency band	9 kHz to 30 MHz
Frequency Min (MHz)	110.9 kHz
Frequency Max (MHz)	110.9 kHz
RF power Min (W)	N/A
RF power Max (W)	N/A
Field strength, Units @ distance	73.81 dB μ V/m @ 3 m
Measured BW (kHz) (99% dB)	N/A
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	Analogue CW
Emission classification (F1D, G1D, D1D)	NON
Transmitter spurious, Units @ distance	None detected
Power requirements	12 V _{DC} from car battery
Antenna information	The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

3.4 Product description and theory of operation

EUT is a wireless power transfer device that is used as a wireless charger installed in vehicle.

3.5 EUT exercise details

EUT was powered and receiver was placed on the rubber mat. LED light was verified.

3.6 EUT setup diagram

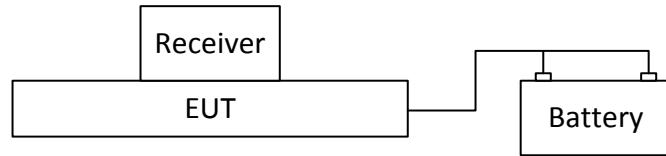


Figure 3.6-1: Setup diagram

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

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

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

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	FA002047	1 year	Feb. 25/16
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/16
Active loop antenna (0.01–30 MHz)	Com-Power	AL-130	FA002674	1 year	Jan. 13/16
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	Apr. 12/16

Note: NCR - no calibration required

Section 8. Testing data

8.1 FCC 15.209(a) and RSS-210 2.5 Radiated emissions

8.1.1 Definitions and limits

FCC:

(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.

IC:

RSS-Gen includes the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this standard.

Unwanted emissions of transmitters and receivers are permitted to fall within the restricted bands listed in RSS-Gen, and including the TV bands, but fundamental emissions are prohibited in the restricted bands.

RSS-Gen 8.9 Radiated emissions:

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 4 and Table 5 below. Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

RSS-Gen 8.10 Emissions falling within restricted frequency bands

Restricted bands, identified in Table 8.1-2, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

(a) fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of below;

(b) unwanted emissions falling into restricted bands of below shall comply with the limits specified in RSS-Gen;

(c) unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

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 (F in kHz)	67.6 – 20 × log ₁₀ (F) (F in kHz)	300
0.490–1.705	24000/F (F in kHz)	87.6 – 20 × log ₁₀ (F) (F in kHz)	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

8.1.1 Definitions and limits, continued

Table 8.1-2: 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 8.1-2 and above 38.6 GHz are designated for low-power license-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

Table 8.1-3: 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			

8.1.2 Test summary

Test date:	August 28, 2015	Temperature:	23 °C
Test engineer:	Andrey Adelberg	Air pressure:	1007 mbar
Verdict:	Pass	Relative humidity:	34 %

8.1.3 Observations, settings and special notes

The spectrum was searched from 10 kHz to 1 GHz.
Radiated measurements were performed at a distance of 3 m.

Spectrum analyser pre-scan measurements within 10–150 kHz:

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

Spectrum analyser pre-scan measurements within 150 kHz to 30 MHz:

Resolution bandwidth:	10 MHz
Video bandwidth:	30 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser pre-scan measurements within 30–1000 MHz:

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

Limit calculation for the fundamental frequency of 110.9 kHz:

Field strength limit_{110.9 kHz} = 67.6 – 20 × Log₁₀ (110.9) = 26.7 dB μ V/m @ 300 m.

Distance correction factor at frequencies below 30 MHz is according to the following formula:

Distance_{3 m} = 40 × Log₁₀ (300 / 3) = 80 dB

8.1.4 Test data

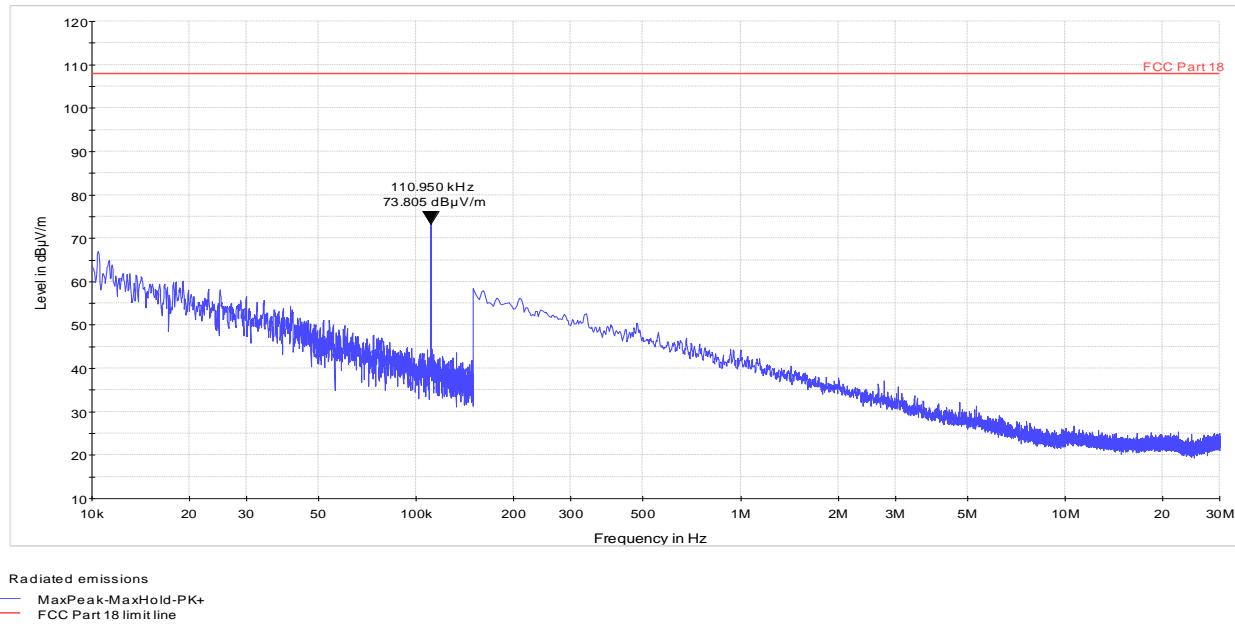


Figure 8.1-1: Radiated emissions below 30 MHz

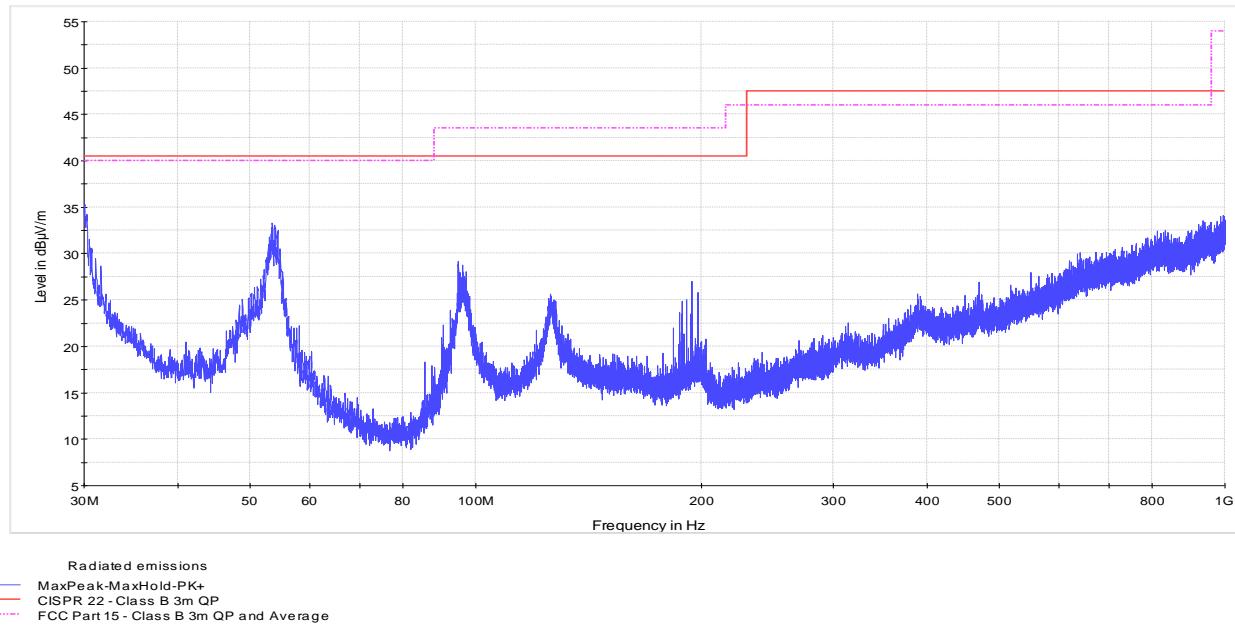


Figure 8.1-2: Radiated emissions above 30 MHz

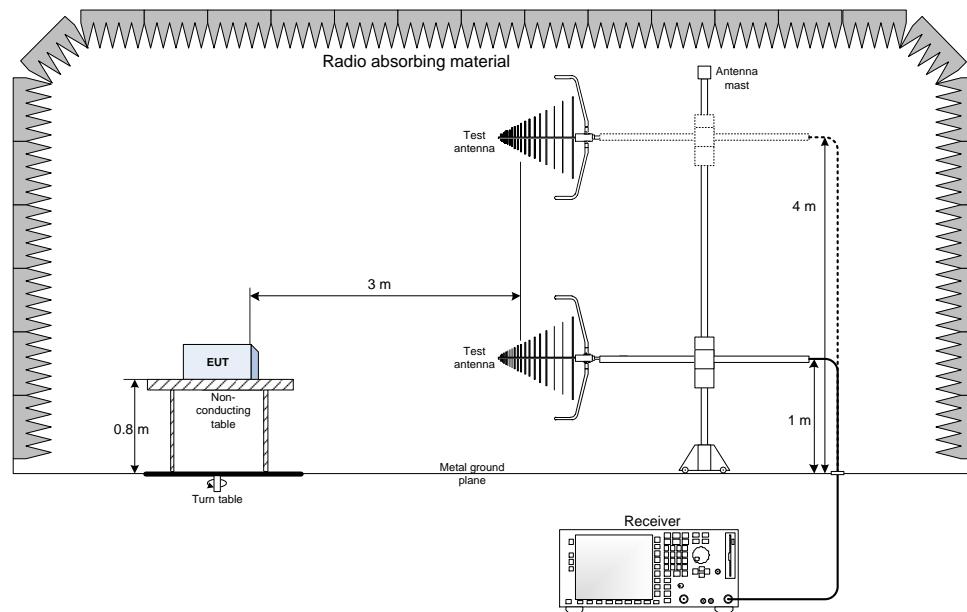
Table 8.1-4: Fundamental measurements results

Frequency, MHz	Field strength @ 3 m dB μ V/m	Field strength @ 300 m dB μ V/m	Limit @ 300 m, dB μ V/m	Margin, dB
110.9	73.81	-6.19	26.70	32.89

Note: Field strength at 300 m calculation = 73.81 dB μ V/m – 80 dB.

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions above 30 MHz set-up



9.2 Radiated emissions below 30 MHz set-up

