



FCC Test Report

Brand:

APTIV Services US LLC

Model:

WCPMA-TX

Marketing Name

N/A

Product Description:

Vehicle wireless charger

FCC ID: L2C0093TR

Applied Rules and Standards:

47 CFR Parts: 18

REPORT #: EMC_APTIV_006_23001_FCC_18

DATE: 2024-03-12



A2LA Accredited

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3462B

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: contact@cetecom.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 18.

No deficiencies were ascertained.

Company	Description	Model #
APTIV Services US LLC	Vehicle wireless charger	WCPMA-TX

Report Reviewer:

Guangcheng Huang
(Senior EMC Test Engineer /
Technical Consultant)

2024-03-12 Compliance

Date	Section	Name	Signature
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Responsible for the Report:

Cheng Song
(EMC Engineer)

2024-03-12 Compliance

Date	Section	Name	Signature
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The test results of this test report relate exclusively to the test item specified in Section3. CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Senior EMC Test Engineer / Technical Consultant:	Guangcheng Huang
Responsible Project Leader:	Rami Saman

2.2 Identification of the Client

Client's Name:	APTIV Services US LLC
Street Address:	13085 Hamilton Crossing Blvd
City/Zip Code	Carmel IN 46032
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Aptiv / Luke Berry
Manufacturers Address:	5725 Innovation Drive
City/Zip Code	Troy MI 48098
Country	USA

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Brand	APTIV Services US LLC
FCC ID	L2C0093TR
Model Number	WCPMA-TX
Marketing Name	N/A
HW Version	PV1
SW Version	A3.0.2
Product Description	Vehicle wireless charger
Radio Information as declared	Qi
Antenna Information as declared	N/A
Max. declared Output Power:	15W
Modulation:	FSK
Frequency Range / number of channels (All Radios)	115-205 KHz Fixed 127.7 kHz
Power Supply/ Rated Operating Voltage Range	9 VDC – 16 VDC
Operating Temperature Range	Charging temp: -40°C – 55°C, Operating temp: -40°C – 85°C
Sample Revision	<input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-production
EUT Diameter	n < 60cm
Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant.	

3.2 EUT details

EUT #	Serial Number	HW Version	SW Version	Comments
1	S7345M2313510056	PV1	A3.0.2	

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Wireless power receiver with serial communications busses	Saint 2	DG Technologies	SZ2938

3.4 Test Setup Configurations

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1	

3.5 Mode of Operation details

Operating Mode	Description of Operating modes	Additional Information
Op. 1	Operating	The EUT was configured to wireless power transfer mode.

3.6 Justification for Worst Case Mode of Operation

During the testing process the EUT was set to operate at the wireless power transfer mode at the maximum power, as it is described in section 3.5 of this document; representing the worst case mode of operation.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in section 1.

4.1 Date of Testing:

2023-11-20

4.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=2.

Measurement System	EMC 1	EMC 2
Conducted emissions (mains port)	1.12 dB	0.46 dB
Radiated emissions (< 30 MHz)	3.66 dB	3.88 dB
(30 MHz – 1GHz)	3.17 dB	3.34 dB
(1 GHz – 3 GHz)	5.01 dB	4.45 dB
(>3 GHz)	4.0 dB	4.79 dB

4.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

4.4 Decision Rule:

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

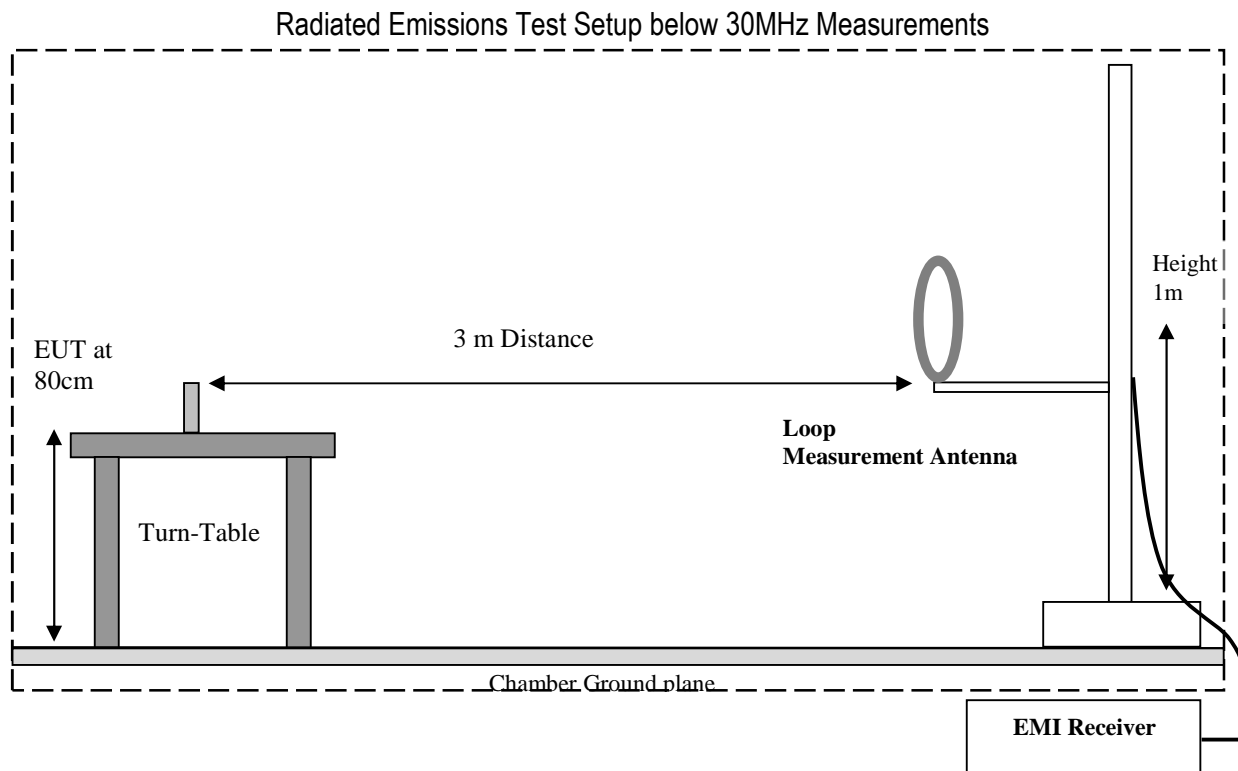
Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

5 Measurement Procedures

5.1 Radiated Measurement

The radiated measurement is performed according to FCC/OET MP-5, FCC Methods of Measurements of Radio Noise Emissions from ISM Equipment.

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.



5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBμV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

Frequency (MHz)	Measured SA (dBμV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBμV/m)
1000	80.5	3.5	14	98.0

5.3 Field Strength Correction based on Distance

To correct for distance when measuring at a distance other than the specification distance;

For measurements below 30 MHz – $40\log(\text{SpecDistance}/\text{TestDistance}) = \text{Distance Factor}$

For measurements above 30 MHz – $20\log(\text{SpecDistance}/\text{TestDistance}) = \text{Distance Factor}$

6 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
FCC §18.305	Radiated Emissions	Nominal	Op. 1	■	□	□	□	Complies
FCC §18.307	Conducted Emissions	Nominal	Op. 1	□	□	■	□	Note 1 Note 2

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: The EUT is not designed to be connected to the public utility (AC) power line.

7 Test Result Data

7.1 Radiated Emissions Measurement according to CFR 47 Part 18.305.

7.1.1 Measurement Procedure

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

7.1.2 Limits:

FCC §18.305 (b)

The field strength levels of emissions which lie outside the bands specified in § 18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25 × SQRT(power/500)	300 1300
	Any non-ISM frequency	Below 500 500 or more	15 15 × SQRT(power/500)	300 1300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1,600 (²)
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz) × SQRT(power/500)	300 3300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any Any	1,500 300	430 430

1 Field strength may not exceed 10 $\mu\text{V/m}$ at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

2 Reduced to the greatest extent possible.

3 Field strength may not exceed 10 $\mu\text{V/m}$ at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

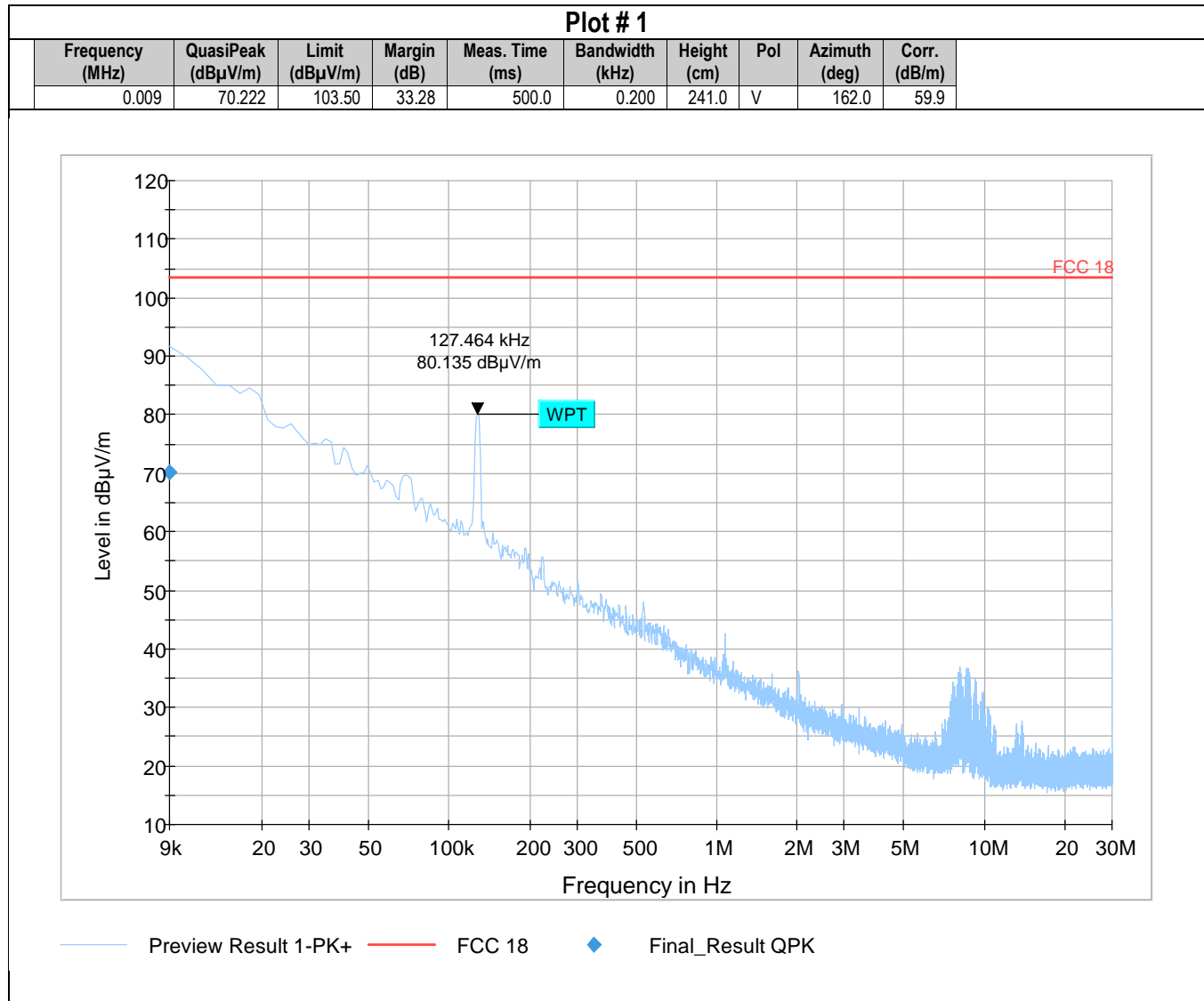
4 Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

7.1.3 Test Summary:

Environmental Conditions	
Ambient Temperature:	20.9°C
Relative Humidity:	32 %
Atmospheric Pressure:	1022 mbar

Test Results						
Plot #	EUT Set-Up #	EUT operating mode	Scan Frequency	Power Supply Input	Comments	Result
1	1	Op. 1	9 kHz – 30 MHz	13.5 VDC	-	Pass

7.1.4 Measurement Plots:



8 Test setup photos

Setup photos are included in supporting file name: "EMC_APTIV_006_23001_FCC_18_Setup_Photos"

9 Test Equipment and Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6512	00049838	3 YEARS	09/06/2023
TEST RECEIVER	R&S	ESU40	100251	3 YEARS	10/26/2023
DIGITAL THRMOMETER	CONTROL COMPANY	4410,90080-03	230713059	3 YEARS	10/18/2023

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Report Name	Changes to report	Prepared by
2024-03-11	EMC_APTIV_006_23001_FCC_18	Initial Version	Cheng Song

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