

Test Report

Report No.: MTi230726003-05E2

Date of issue: 2023-08-08

Applicant: APTIV Services US LLC

Product: Keyless entry and tire pressure monitoring receiver

Model(s): FI3-TR433UDA

FCC ID: L2C0090TR

Shenzhen Microtest Co., Ltd.

<http://www.mtitest.com>



Instructions

1. This test report shall not be partially reproduced without the written consent of the laboratory.
2. The test results in this test report are only responsible for the samples submitted
3. This test report is invalid without the seal and signature of the laboratory.
4. This test report is invalid if transferred, altered, or tampered with in any form without authorization.
5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

Contents

1	General Description	5
1.1	Description of the EUT	5
1.2	Description of test modes	5
1.3	Description of support units	6
2	Measurement uncertainty	6
3	Test facilities and accreditations	7
3.1	Test laboratory	7
4	List of test equipment	8
5	Test result	9
5.2	Test setup	10
5.3	Test Procedures	10
5.4	Test results	11
	Photographs of the Test Setup	11
	Photographs of the EUT	11

Test Result Certification	
Applicant:	APTIV Services US LLC
Address:	113085 Hamilton Crossing Boulevard Carmel, Indiana, 46032
Manufacturer:	APTIV Services US LLC
Address:	113085 Hamilton Crossing Boulevard Carmel, Indiana, 46032
Factory:	APTIV Services US LLC
Address:	113085 Hamilton Crossing Boulevard Carmel, Indiana, 46032
Product description	
Product name:	Keyless entry and tire pressure monitoring receiver
Trademark:	Stellantis
Model name:	FI3-TR433UDA
Series Model:	N/A
Standards:	Part 2.1091 & part 1.1310. IEEE std C95.1-2019
Test method:	KDB 680106 v03r01
Date of Test	
Date of test:	2023-08-02 ~ 2023-08-08
Test result:	Pass

Test Engineer :

Letter Lan

(Letter Lan)

Reviewed By :

Leon Chen

(Leon Chen)

Approved By :

Tom Xue

(Tom Xue)

1 General Description

1.1 Description of the EUT

Product name:	Keyless entry and tire pressure monitoring receiver
Model name:	FI3-TR433UDA
Series Model:	N/A
Model difference:	There are two versions of the prototype, only the antenna is different, one is the external antenna, one is the internal antenna, the main test is the external antenna, the difference test is the internal antenna.
Electrical rating:	Input: DC 13V 2.5A
Accessories:	N/A
Hardware version:	PV_HW1.0
Software version:	HSW_10034542_RFHM_2023_21_01
Test sample(s) number:	MTi230726003-05S1001 MTi230726003-05S1002
RF specification:	
Operation frequency:	RX: 433.92MHz TX:125KHz
Modulation type:	ASK
Antenna type:	coil antenna(TX antenna) PCB antenna(external RX antenna) Metal shrapnel antenna (internal RX antenna)
Antenna(s) gain:	0 dBi

1.2 Description of test modes

All the test modes were carried out with the EUT in normal operation, the final test mode of the EUT was the worst test mode for emission test, which was shown in this report and defined as:

No.	Emission test modes
Mode1	433.92MHz RX with external antenna + RFID 125kHz with short LF transmitter antenna 1
Mode2	433.92MHz RX with external antenna + RFID 125kHz with short LF transmitter antenna 2
Mode3	433.92MHz RX with external antenna + RFID 125kHz with short LF transmitter antenna 3
Mode4	433.92MHz RX with interna antenna + RFID 125kHz with short LF transmitter antenna 1
Mode5	433.92MHz RX with interna antenna + RFID 125kHz with short LF transmitter antenna 2
Mode6	433.92MHz RX with interna antenna + RFID 125kHz with short LF transmitter antenna 3

external antenna worst test mode of : Mode 2

internal antenna worst test mode of: Mode 5

Note: All modes are pretested, and the worst mode is reported for the external antenna and the internal antenna.

1.3 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list			
Description	Model	Serial No.	Manufacturer
ACCUMULATOR	55D23LX	/	CAMEL
Support cable list			
Description	Length (m)	From	To
/	/	/	/

2 Measurement uncertainty

Parameter	Expanded Uncertainty
Magnetic field measurement (9kHz~30MHz)	$\pm 7.8\%$
Electric field measurements (9kHz~30MHz)	$\pm 7.8\%$

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

3 Test facilities and accreditations

3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573

4 List of test equipment

No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
MTI-E115	Electric and Magnetic Field Probe – Analyzer	Narda	EHP-200A	101166	2022/08/15	2023/08/14

5 Test result

5.1.1 Requirement

IEEE Std C95.1-2019
 IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields,
 0 Hz to 300 GHz

lack of compliance with the DRLs, but rather to demonstrate compliance, it shall then be necessary to perform additional evaluations to determine whether the DRLs have been met. If the DRLs given earlier are not exceeded, the ERLs in Table 7 and Table 8 may be exceeded. Consequently, it is sufficient to demonstrate compliance with either the whole-body DRLs in Table 5 (see 4.3.1) or the whole-body ERLs in Table 7 or Table 8. Note that between 6 GHz and 300 GHz, the ERLs in Table 7 and Table 8 are in terms of field strength and power density, and whole-body average SAR does not apply.

**Table 7—ERLs for whole-body exposure of persons in unrestricted environments
 (100 kHz to 300 GHz) [see Figure 3 for graphical representation]**

Frequency range (MHz)	Electric field strength (E) ^{a,b,c} (V/m)	Magnetic field strength (H) ^{a,b,c} (A/m)	Power density (S) ^{a,b,c} (W/m ²)		Averaging time (min)
			S_E	S_H	
0.1 to 1.34	614	$16.3 / f_M$	1000	$100\,000 / f_M^2$	30
1.34 to 30	$823.8 / f_M$	$16.3 / f_M$	$1800 / f_M^2$	$100\,000 / f_M^2$	30
30 to 100	27.5	$158.3 / f_M^{1.568}$	2	$9\,400\,000 / f_M^{3.336}$	30
100 to 400	27.5	0.0729	2		30
400 to 2000	—	—	$f_M / 200$		30
2000 to 300 000	—	—	10		30

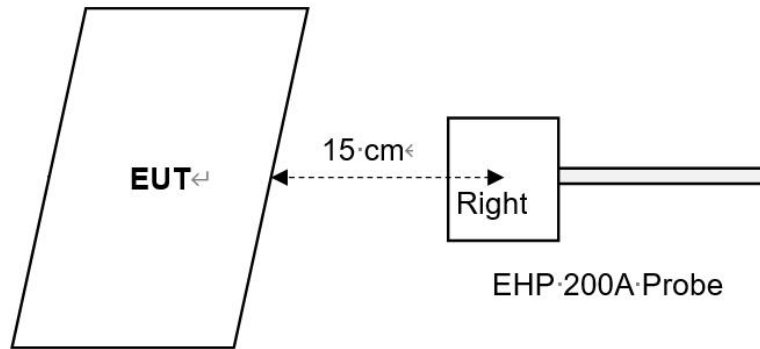
NOTE— S_E and S_H are plane-wave-equivalent power density values, based on electric or magnetic field strength respectively, and are commonly used as a convenient comparison with ERLs at higher frequencies and are sometimes displayed on commonly used instruments.

^a For exposures that are uniform over the dimensions of the body, such as certain far-field plane-wave exposures, the exposure field strengths and power densities are compared with the ERLs in Table 7. For more typical nonuniform exposures, the mean values of the exposure fields, as obtained by spatially averaging the plane-wave-equivalent power densities or the squares of the field strengths, are compared with the ERLs in Table 7. (See notes to Table 7 through Table 11 in 4.3.5.)

^b f_M is the frequency in MHz.

^c The E , H , and S values are those rms values unperturbed by the presence of the body.

5.2 Test setup



5.3 Test Procedures

- a. The RF exposure test was performed in anechoic chamber.
- b. E and H-field measurements should be made with the center of the probe at a distance of 15 cm surrounding the device and 20 cm above the top surface of the primary/client pair.
- c. The highest emission level was recorded and compared with limit.
- d. The EUT was measured according to the dictates of KDB 680106 v03r01.

5.4 Test results

Note: All modes of the EUT have been tested, only the worst-case results reported.

Antenna	Probe Position	E -field (V/m)			H-field (A/m)		
		Measurement	Limit	Max. Percentage (%)	Measurement	Limit	Max. Percentage (%)
external	/	2.9954	614	0.49%	0.3604	1.63	22.11%

Antenna	Probe Position	E -field (V/m)			H-field (A/m)		
		Measurement	Limit	Max. Percentage (%)	Measurement	Limit	Max. Percentage (%)
internal	/	2.7212	614	0.44%	0.3496	1.63	21.45%

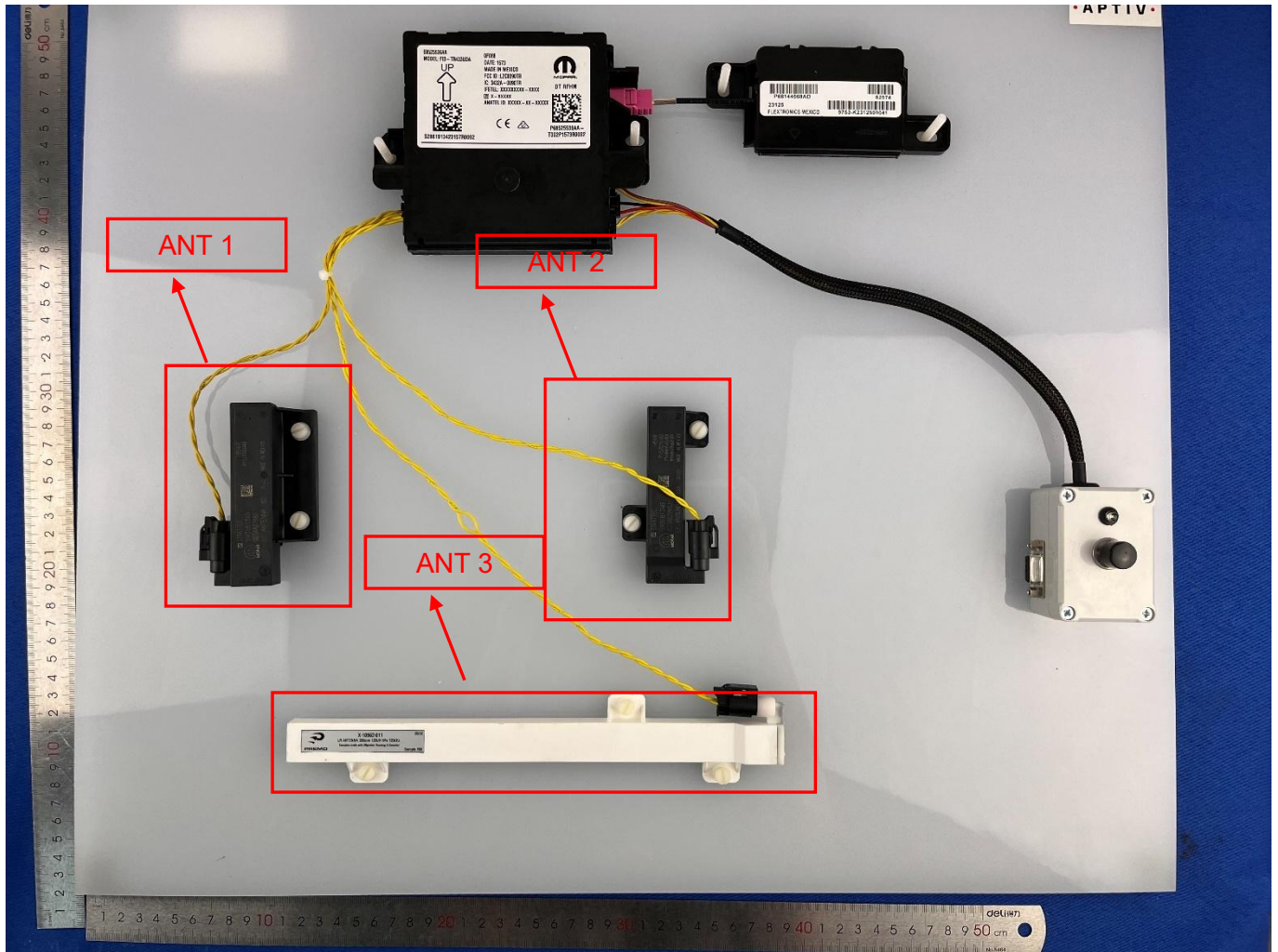
Photographs of the Test Setup

See the Appendix - Test Setup Photos.

Photographs of the EUT

See the Appendix - EUT Photos.

TX antenna position and differentiates



----End of Report----