

EMI – TEST REPORT

- Human Exposure -

Type / Model Name : FI-3000

Product Description : Wireless MPO inspection probe

Applicant : Fluke Electronics Corporation

Address : 6920 Seaway Blvd.

EVERETT, WA 98203, USA

Manufacturer : UAB Lifodas

Address : Naugarduko g. 41

LT-03227 VILNIUS, LITHUANIA

Licence holder : Fluke Electronics Corporation

Address : 6920 Seaway Blvd.

EVERETT, WA 98203, USA

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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Test Report No. : T43966-00-04HS	13. June 2018 <hr/> Date of issue
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Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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ATTACHMENT A as separate supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310 Radiofrequency radiation exposure limits

Part 1, Subpart 2, Section 2.1091 Radiofrequency radiation exposure evaluation: **mobile devices**.

Part 1, Subpart 2, Section 2.1093 Radiofrequency radiation exposure evaluation: **portable devices**.

OET Bulletin 65, 65A, 65B Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

KDB 447498 D01 v06 Mobile and portable devices RF Exposure procedures and equipment authorisation policies, October 23, 2015.

KDB 865664 D01 v01r04 SAR Measurement Requirements for 100 MHz to 6 GHz, August 7, 2015.

ANSI C95.1: 2005 IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

ETSI TR 100 028 V1.3.1: 2001-03, Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – See ATTACHMENT A

2.2 Equipment type, category

WLAN - AP, portable equipment.

2.3 Short description of the equipment under test (EUT)

The EUT is a WLAN-AP provides connectivity to iOS and Android based devices. A probe, connected through Wi-Fi to Android device, communicates with a Tesla mobile application. The probe will also contain a USB port to allow wired connectivity to Fluke Network Versiv platform (Linux) or Windows PC. The primary use is for multi-fibre connector's end-face inspection in fibre optic networks of data centres.

Number of tested samples: 1
 Serial number: 108013
 Firmware version: V3.6.0.3

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

2.1 Variants of the EUT

There are no variants.

2.2 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan WLAN Standard 802.11b/g/n, HT20:

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

Note: The marked frequencies are determined for final testing. The firmware supports no HT 40 mode.

2.3 Transmit operating modes

The EUT use DSSS or OFDM modulation and may operate under operating mode 2 and provide following data rates with auto-fall-back:

- 802.11b mode 11, 5.5, 2, 1 Mbps (Mbps = *megabits per second*)
- 802.11g mode 54, 48, 36, 24, 18, 12, 9, 6 Mbps (Mbps = *megabits per second*)
- 802.11n HT20, MCS 0 - 15

2.4 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (GHz)	Gain (dBi)	Cable loss (dB)	Effective gain (dBi)
1	Omni	AF 216M245001 (chip)	-	2.4	1.6	0.0	1.6

2.5 Power supply system utilised

- Power supply voltage, V_{nom} : 3.6 VDC (Li-ion battery)
- Power supply voltage (alternative) for : Input: 100 - 240 VAC, 50 - 60 Hz, 0.4 A
- charging only : Output: 5.0 VDC

3 TEST RESULT SUMMARY

WLAN device using digital modulation:

Operating in the 2400 MHz – 2483.5 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.247(i)	RSS 102, 2.5.2	MPE	not applicable
KDB 447498	RSS 102, 2.5.1	SAR exclusion consideration	passed
OET Bulletin 65	RSS102, 3.2	Co-location, Co-transmission	not applicable

The mentioned RSS Rule Parts in the above table are related to:
RSS 102, Issue 5, March 2015

3.1 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 08 May 2018

Testing concluded on : 08 May 2018

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Hermann Smetana
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 °C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 % The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	$\pm 2.5 \times 10^{-7}$
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

5 HUMAN EXPOSURE

5.1 Maximum permissible exposure (MPE)

For test instruments and accessories used see section 6 Part **CPC 3**.

5.1.1 Description of the test location

Test location: NONE

5.1.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

Remarks: Not applicable, the EUT is portable equipment.

5.2 Co-location and Co-transmission

Applicable standard:

OET Bulletin 65, Edition 97-01, Section 2: Multiple-transmitter sites and Complex Environments

The FCC's MPE limits vary with frequency. Therefore, in mixed or broadband RF fields where several sources and frequencies are involved, the fraction of the recommended limit (in terms of power density or square of the electric or magnetic field strength) incurred within each frequency interval should be determined, and the sum of all fractional contributions should not exceed 1.0, or 100 % in terms of percentage.

Remarks: Not applicable, the EUT has one transmitter only.

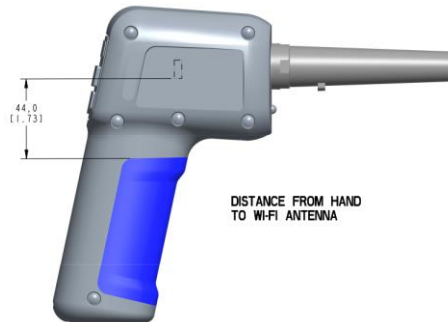
5.3 SAR test exclusion considerations

5.3.1 Applicable standard

According to RF exposure guidance:

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

5.3.2 Determination of the standalone SAR test exclusion threshold



The minimum separation distance results from the application of the EUT which is handled by hand. This distance is assumed to ≤ 50 mm from antenna to the hand of the user.

The hand of the user is the nearest extremity of a human being therefore the threshold for 10-g is determined.

The formula under 4.3.1 1) for 100 MHz to 6 GHz for standalone equipment is used:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 7.5;$$

The max conducted average power is according the equipment (WLAN module):

Rated average output power:	17.0 dBm	50.0 mW
Tune-up tolerance:	0.20 dB	
Maximum output power:	17.2 dBm	52.4 mW
Antenna gain max:	1.6 dBi	
Maximum EIRP:	18.8 dBm	75.7 mW
Minimum distance r:	44.0 mm	

Channel frequency (MHz)	A (mW)	Threshold level	Limit 1g	Limit 10g	Margin 1g	Margin 10g
2412	52.4	1.85	3.0	7.5	-1.2	-5.7
2437	52.4	1.86	3.0	7.5	-1.1	-5.6
2462	52.4	1.87	3.0	7.5	-1.1	-5.6

Conclusion: The Threshold level is lower than the limit, SAR measurement is NOT necessary.

The requirements are **FULFILLED**.

Remarks: _____

5.4 Exemption limits for routine evaluation - SAR evaluation

5.4.1 Applicable standard

According to RSS-102, item 2.5.1:

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance 4, 5

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤ 5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤ 300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥ 50 mm
≤ 300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	88 mW	195 mW	213 mW
835	80 mW	92 mW	177 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

4 The exemption limits in Table 1 are based on measurements and simulations of half-wave dipole antennas at separation distances of 5 mm to 25 mm from a flat phantom, providing a SAR value of approximately 0.4 W/kg for 1 g of tissue. For low frequencies (300 MHz to 835 MHz), the exemption limits are derived from a linear fit. For high frequencies (1900 MHz and above), the exemption limits are derived from a third order polynomial fit.

5 Transmitters operating between 0.003-10 MHz, meeting the exemption from routine SAR evaluation, shall demonstrate compliance to the instantaneous limits in Section 4.

The max conducted average power is according the equipment (WLAN module):

Rated average output power:	17.0 dBm	50.0 mW
Tune-up tolerance:	0.20 dB	
Maximum output power:	17.2 dBm	52.4 mW
Antenna gain max:	1.6 dBi	
Maximum EIRP:	18.8 dBm	75.7 mW
Minimum distance r:	44.0 mm	

5.4.2 Conclusion according RSS-102.

Maximum output power at 2450 MHz, **75.7 mW** is < 173 mW;

For the EUT is SAR measurement is NOT necessary

The requirements are **FULFILLED**.

Remarks:

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
-	-	-	-	-	-	-