

Test report

Customer:

Xylem Analytics Germany GmbH

Dr. Karl-Slevogt-Straße 1
83262 Weilheim
Tel.: +49 881 183-0
Fax: +49 881 183-420

EMC test report

170586-AU01+W10



Xylem Analytics Germany GmbH
Wireless charger for TLC750 system
IF 750

EMV **TESTHAUS** GmbH

Gustav-Hertz-Straße 35
94315 Straubing
Tel.: +49 9421 56868-0
Fax: +49 9421 56868-100
Email: info@emv-testhaus.com

Accreditation:



FCC test firm accreditation expiration date: 2021-05-30
MRA US-EU, FCC designation number: DE0010
FCC registration number: 97268
BnetzA-CAB-02/21-02/5 Valid until 2023-11-26

Location of Testing:

EMV **TESTHAUS** GmbH
Gustav-Hertz-Straße 35
94315 Straubing

The technical accuracy is guaranteed through the quality management of the
EMV **TESTHAUS** GmbH.

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1 Test regulations

Standard	Title
IEEE C95.3-2002 (R2008) Approved December 11, 2002 Reaffirmed June 12, 2008	IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz–300 GHz
KDB 680106 D01 April 9, 2018 (published by the Federal Communications Commission FCC)	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
47 CFR Part 1, Subpart I, Section 1.1310	Radiofrequency radiation exposure limits

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Summary of test results

Standard	Result	Remark
KDB 680106 D01 RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications	Passed	Requirements for devices designed for typical desktop applications

Note:

For exclusion from KDB inquiry see clause 5.

Straubing, November 27, 2019



Andreas Menacher
Test engineer
EMV **TESTHAUS** GmbH



Konrad Graßl
Head of Radio department
EMV **TESTHAUS** GmbH

3 Equipment under test (EUT)

Product type: Wireless charger for TLC750 system
Model Name: IF 750
Manufacturer: Xylem Analytics Germany GmbH
Serial number: DUT_7
FCC ID: VQ5-IF750
Application frequency band: ---
Frequency range: 112 kHz – 177 kHz
Operating frequency: 112 kHz – 177 kHz
Number of RF channels: 1
Modulation: ASK
Antenna types: PCB antenna
☐ detachable ☒ not detachable
Power supply: DC supply
nominal voltage: 5.00 V
nominal frequencies: ---
Type of device: ☐ Body-supported device
☐ Body-worn (or body-mount) radio
☐ Limb-Worn device
☒ other
Separation distance: ☐ ≤ 20 cm
☒ > 20 cm
Evaluated against exposure limits: ☒ General public use
☐ Controlled use
Duty cycle used in evaluation: Standby 14.5 %
Charging 100 %

4 Photographs of EUT

For photographs of EUT see Annexes B and C to test report no. 170586-AU01+W04.

5 Exclusion from KDB inquiry

According to section 5 b) of KDB 680106 D01, **inductive wireless power transfer applications with supporting field strength results and meeting all of the following requirements are not required to submit a KDB inquiry for devices approved using SDoC (Supplier's Declaration of Conformity) or a PAG (Pre-Approval Guidance) for equipment approved using certification to address RF exposure compliance.** However, the responsible party is required to keep a copy of the test report in accordance with KDB 865664 D02. A copy of the test report is to be submitted with the application if the device is approved using certification.

Except for point (6), the following statements are referring to data and calculations supplied by the manufacturer.

- (1) *Power transfer frequency is less than 1 MHz:* ☒ yes ☐ no
 See frequency range in clause 3.
 Note: In addition, according to section 3 c) of KDB 680106 D01, a KDB inquiry is required to determine the applicable exposure limits below 100 kHz if the power transfer frequency is less than 100 kHz.
- (2) *Output power from each primary coil is less than or equal to 15 watts:* ☒ yes ☐ no
 The device to be charged requests a maximum charging current of 120 mA from the Wireless Power Transfer (WPT) controller (IC40).
 According to the data sheet of the WPT controller, the efficiency of the power transfer at nominal power is 55%.
 This corresponds to an input current of about 220 mA. So the maximum power transferred in the standard operating mode is:
 $5 \text{ volts} * 220 \text{ mA} = \mathbf{1.100 \text{ W}}$.
 In the event of a fault, the total power current is limited to 500 mA by the current limiting module (IC21). In this case, the maximum transferred power cannot be higher than:
 $5 \text{ volts} * 500 \text{ mA} = \mathbf{2.500 \text{ W}}$.
- (3) *The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils:* ☒ yes ☐ no
 EUT has one single primary coil, only.
- (4) *Client device is placed directly in contact with the transmitter:* ☒ yes ☐ no
 There is no separation distance between power transmitter and power receiver during charging process.
- (5) *Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion):* ☒ yes ☐ no
 EUT is a mobile device (separation distance > 20 cm)
- (6) *The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit:* ☒ yes ☐ no
 For test results see clause 6.1.8.

When all requirements above are met (indicated by “yes” in each line), equipment approval may be processed according to normal procedures by a TCB, if certification is required, or a Supplier’s Declaration of Conformity (SDoC) when allowed.

In all other cases, an RF exposure evaluation report must be reviewed and accepted through a KDB inquiry to enable authorization of the equipment.

6 Test results

This clause gives details about the test results as collected on page 6.

The climatic conditions are recorded during the tests. It is ensured that the climatic conditions are within the following ranges:

<i>Ambient temperature</i>	<i>Ambient humidity</i>	<i>Ambient pressure</i>
15°C to 35°C	30 % to 75 %	86 kPa to 106 kPa

6.1 Wireless power transfer

Reference(s): KDB 680106 D01

Test procedure(s): IEEE C95.3

Performed by: Andreas Menacher Date of test: June 26, 2019

Result: ☒ Limits kept ☐ Limits not kept

6.1.1 Data of equipment under test (EUT)

Note: The data for the RF technology is taken out of the Test report 170586-AU01+ W04 of the test laboratory EMV Testhaus GmbH

RF technology:

Antenna connector: none

Antenna detachable: No

Operation frequency range: 112 kHz – 177 kHz

6.1.2 Test configuration

EUT			
Device	Type designation	Serial or inventory no.	Manufacturer
Wireless charger for TLC 750 system	IF 750	DUT_7	Xylem Analytics Germany GmbH
Peripheral devices			
Device	Type designation	Serial or inventory no.	Manufacturer
WPT receiver dummy	TLC 750 NFC	MUSTER	Xylem Analytics Germany GmbH

Table 1: Devices used for testing

6.1.3 Mode of operation

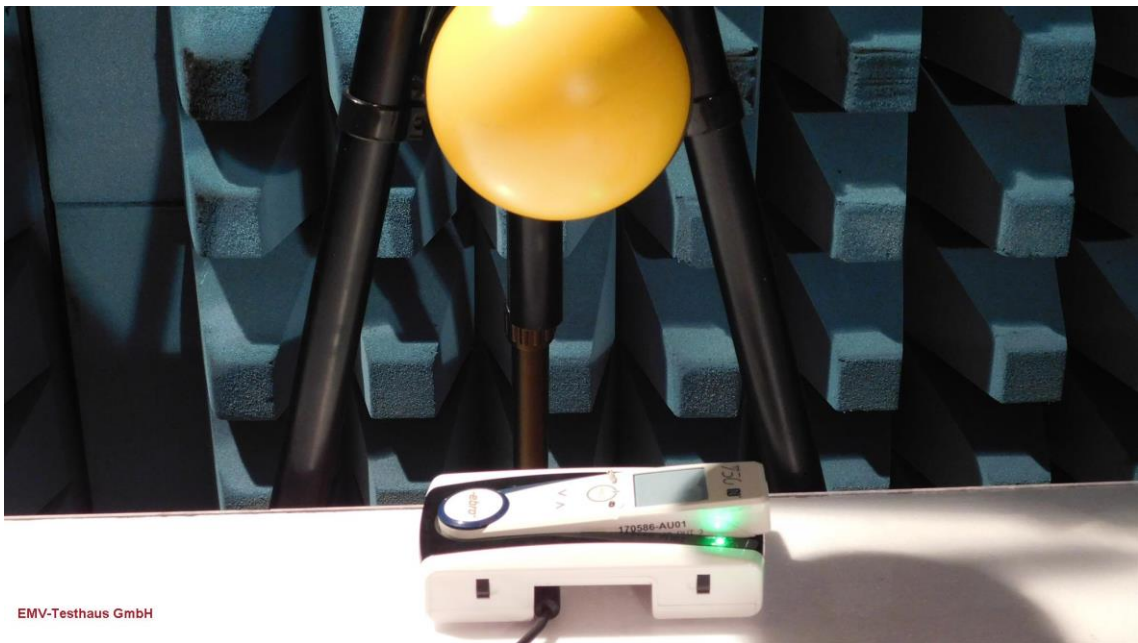
The EUT is a Wireless Power Transmission System operating in the frequency range 112 kHz to 177 kHz.

The Measurements were performed in standby and charging mode.
For establishing of the charging mode a power receiver dummy was used.

6.1.4 Test equipment

	Type	Designation	Manufacturer	Inventory no.
<input checked="" type="checkbox"/>	Exposure level tester with magnetic field probe 100 cm ²	ELT-400 with BN 2300/90.10	Narda Safety Test Solutions GmbH	E00276
<input checked="" type="checkbox"/>	Broadband field meter	NBM-550	Narda Safety Test Solutions GmbH	E00900
<input checked="" type="checkbox"/>	Electric field probe	EF0691	Narda Safety Test Solutions GmbH	E00902

6.1.5 Test setup



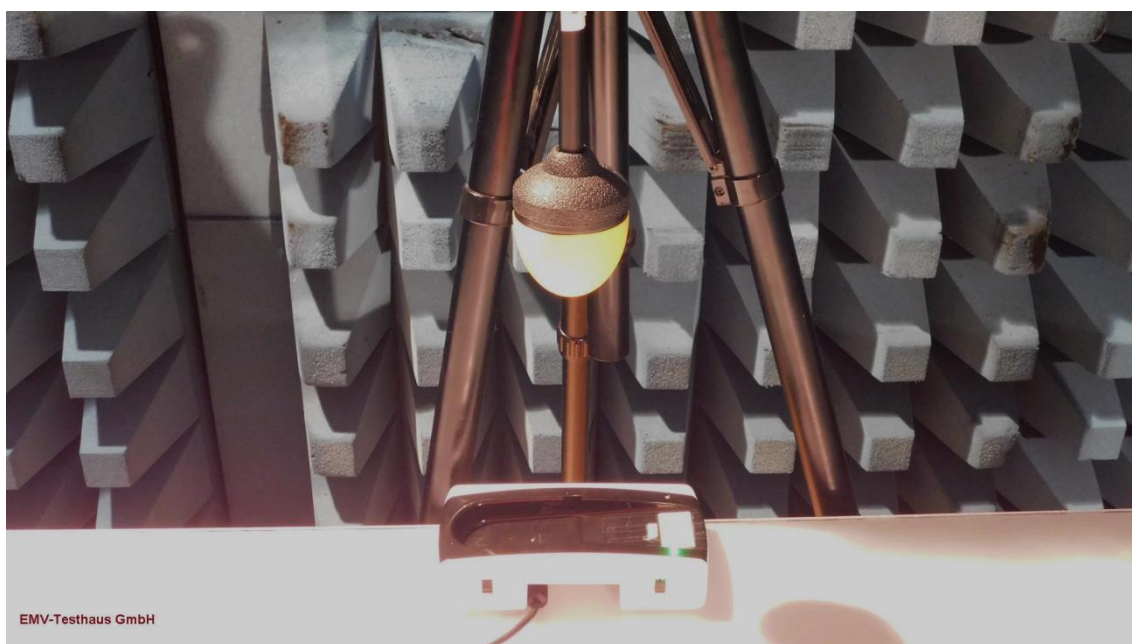
Picture 1: Setup of magnetic field test for charging mode



Picture 2: Setup of electric field test for charging mode



Picture 3: Setup of magnetic field test for standby mode



Picture 4: Setup of electric field test for standby mode

6.1.6 Limits

In section 3, paragraph c) of KDB 680106 D01, the RF exposure requirements for devices designed for typical desktop applications, such as wireless charging pads, are specified. RF exposure evaluation should be conducted assuming a user separation distance of 15 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310 (614 V/m and 1.63 A/m, see table 2). A KDB inquiry is required to determine the applicable exposure limits below 100 kHz.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
<i>(A) Limits for Occupational/Controlled Exposure</i>				
0.3 - 3.0	614	1.63	*100	6
3.0 - 30	1842/f	4.89/f	*900/f ²	6
30 - 300	61.4	0.163	1.0	6
300 - 1,500			f/300	6
1,500-100,000			5	6
<i>(B) Limits for General Population/Uncontrolled Exposure</i>				
0.3 - 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f ²	30
30 - 300	27.5	0.073	0.2	30
300 - 1,500			f/1500	30
1,500 - 100,000			1.0	30
f = frequency in MHz * = Plane-wave equivalent power density				

Table 2: Limits for Maximum Permissible Exposure (MPE) to RF electromagnetic fields

6.1.7 Test procedure

The RF exposure test is performed by the direct measurement method using a Broadband probe.

To find the worst case emissions, the field probe is moved over all sides of the EUT at the separation distance of 15 cm, while observing the display of the field meter. At the worst case position, the final value is measured and recorded.

According to section 3 of KDB 680106 D01, the test distance is measured from the center of the probe(s) to the edge of the device.

6.1.8 Test results

<i>Electric field strength at a test distance of 15 cm</i>					
<i>Reference level frequency range</i>	<i>Frequency</i>	<i>Operation mode</i>	<i>Measured value</i>	<i>Limit</i>	<i>Result</i>
100 kHz - 300 kHz	177 kHz	Standby	0.42 V/m	614 V/m	Passed
100 kHz - 300 kHz	112 kHz – 177 kHz	Charging	0.50 V/m	614 V/m	Passed
<i>Magnetic field strength at a test distance of 15 cm</i>					
<i>Reference level frequency range</i>	<i>Frequency</i>	<i>Operation mode</i>	<i>Measured value</i>	<i>Limit</i>	<i>Result</i>
100 kHz - 300 kHz	177 kHz	Standby	0.58 A/m	1.63 A/m	Passed
100 kHz - 300 kHz	112 kHz – 177 kHz	Charging	0.57 A/m	1.63 A/m	Passed

Table 3: RF exposure test results according to KDB 680106 D01

7 Measurement uncertainty

The relative uncertainty is defined as the expanded uncertainty using a confidence interval of 95 % ($k = 2$). For evaluation of compliance, the measured value is compared directly to the applicable limit without any reduction.

Test	Equipment used	Expanded uncertainty	k
Magnetic field (H and B) 1 Hz – 400 kHz	ELT-400 with BN 2300/90.10	-28.07 % +28.07%	2
Electric field (E) 100 kHz to 6 GHz	NBM-550 with EF0691	-27.75 % +31.11 %	2

Table 4: Measurement uncertainties

8 Equipment calibration status

Description	Modell number(s)	Serial number(s)	Inventory number(s)	Last calibration	Next calibration
Exposure level tester with magnetic field probe 100 cm ²	ELT-400 with BN 2300/90.10	B-0087 B-0102	E00276	2018-10	2020-10
Broadband field meter with electric field probe	NBM-550 with EF0691	H-0015 H-0318	E00900 E00902	2019-03	2021-03

Table 5: Equipment calibration status

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Revision history

<i>Revision</i>	<i>Date</i>	<i>Issued by</i>	<i>Description of modifications</i>
0	2019-11-27	Andreas Menacher	First edition