



TEST REPORT Nr. R20176601

Federal Communication Commission (FCC)

Report Reference No.	R20176601
Date of issue:	25.11.2020
Total number pages:	15
Applicant's name	Xylem Service Italia S.r.l.
Address	Via Lombardi, 14 – 36075 Montecchio Maggiore (VI) – Italy
Test specification:	
Standards	KDB 447498 D01 General RF Exposure Guidance v06
Non-standard test method	N/A
Test Report Form No.	SAR_FCCCMC
Test Report Form(s) Originator ..	CMC Centro Misure Compatibilità S.r.l.
Master TRF	2020-09
General disclaimer:	
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of CMC Centro Misure Compatibilità S.r.l.	
Test item description	Circulators with Bluetooth® wireless technology
Trademark	Xylem
Manufacturer	Xylem Service Italia S.r.l.
Model / Type reference	ECOCIRC+ 20-18F
FCC ID	2AYCGXSI01
Rating(s)	120 V ~ 60 Hz single-phase
Report	
Tested by (name + signature)	M. Segalla
Approved by (name + signature)	R. Beghetto



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2 Reference standard	
KDB 447498 D01 General RF Exposure Guidance v06	RF exposure procedures and equipment authorization policies for mobile and portable devices
3 List of attachments	
Attachment 1: Instruments list, measurement uncertainty, judgement of compliance and quality manual references	
4 Deviation(s) from test specification	
None	
5 Testing location	
CMC Centro Misure Compatibilità S.r.l. Via della Fisica, 20 – 36016 Thiene (VI) – Italy Test site facility's FCC registration number: 182474	

Revision index	Date	Change history
1.0	25.11.2020	--



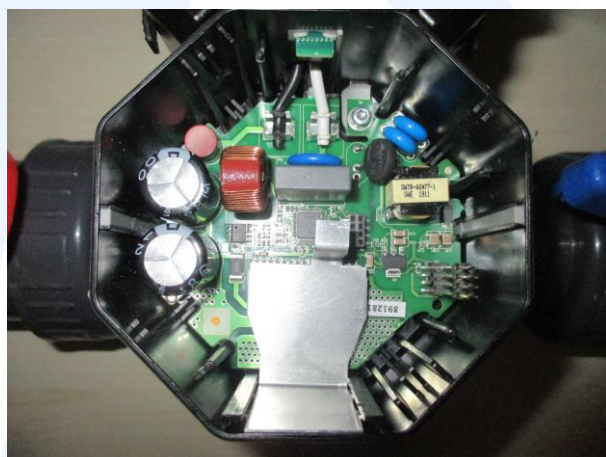
Testing and sampling:	
Date of receipt of test item.....	29.09.2020
Testing start date	25.11.2020
Testing end date	25.11.2020
Sampling procedure.....	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion. The results relate to the sample as it has been received.
Internal identification.....	Adhesive label with the product number P200960
General remarks:	
This report shall not be reproduced, except in full, without the written approval of CMC. The test results presented in this report relate only to the object tested. “(see appended table)”: refers to a table appended to the report. Throughout this report a comma is used as the decimal separator.	
Possible test case verdicts:	
Test case does not apply to the test object:	N/A (Not Applicable)
Test object does meet the requirement:	P (Pass)
Test object does not meet the requirement:	F (Fail)
Test object does not performed:	N/E (Not Executed)
Definition of symbols used in this test report:	
☒ Indicates that the listed condition, standard or equipment is applicable for this report. ☐ Indicates that the listed condition, standard or equipment is not applicable for this report.	



6 General description of test item(s)

Description	Circulators with Bluetooth® wireless technology						
Model Number	ECOCIRC+ 20-18F						
FCC ID	2AYCGXSI01						
Serial Number	--						
Brand name	Xylem						
Frequency band	2400 – 2483,5 MHz						
Nominal frequencies	F _L : 2402 MHz		F _M : 2440 MHz		F _H : 2480 MHz		
Rated power supply		Voltage and Frequency	Reference poles				
			N	L1	L2	L3	PE
	☒	AC: 120 V, 60 Hz	☒	☒	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☐	DC:					☐
Test configuration	☐	Table top equipment					
	☒	Floor standing equipment					
	☐	Hand-held equipment					
Type of equipment	☒	Transmitter unit					
	☒	Receiver unit					
Type of station	☒	Fixed station					
	☐	Portable station					
	☐	Mobile station					
Operating modes	No.	Operating mode of test item					
	1	EUT in continuous transmission at maximum power					

6.1 Photos of the test item





7 Verdict summary section

KDB 447498 D01 General RF Exposure Guidance v06			
Clause	Requirement – Test case	Basic standard	Verdict
cl. 4	RF Exposure analysis	KDB 447498 D01	P





Normative references	
Reference no.	Description
KDB 447498 D01 General RF Exposure Guidance v06	RF exposure procedures and equipment authorization policies for mobile and portable devices





8 Test conditions

8.1 General

Environmental reference conditions.....:	The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:		
	Temperature	Humidity	Atmospheric pressure
	15 °C – 35 °C	30 % - 60 %	800 hPa – 1060 hPa
	If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report.		
Measurement uncertainties	Attachment 1		



9 Test results

9.1 RF Exposure analysis

Tested by	M. Segalla
Test date	25.11.2020
Reference standards	KDB 447498 D01 cl. 4.3.1
Test specification	--

Acceptance limits

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. separation distance, mm})] \times (\sqrt{f(\text{GHz})}) \leq 3$ for 1-g SAR and $\leq 7,5$ for 10-g SAR

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

10-g Extremity SAR Test Exclusion Power Thresholds are 2,5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above.



Result

Transmission channel (MHz)	Measured level (dBμV/m)	Measured level including the tune-up tolerance (dBμV/m)	Peak Output Power (mW)
2402	100,44	102,44	5,836
2440	100,47	102,47	5,877
2480	100,08	102,08	5,372

Remarks:

Peak Output Power = $(E \times d)^2 / (30 \times G)$

Where:

E = the measured maximum fundamental field strength in V/m

G = the numeric gain of the transmitting antenna: 0,902 (-0,45 dBi)

d = the distance in meters from which the field strength was measured (3 m)

P = the power in watts

Standalone 1-g extremity

Using separation distance of 10 mm with the formula above results:

$$(5,877 \text{ mW} / 10 \text{ mm}) * \sqrt{2,440 \text{ GHz}} = 0,918 \leq 3$$

Thus for portable use the SAR exclusion condition is fulfilled and SAR evaluation is not required for separation distance of 10 mm or more.

Standalone 10-g extremity

Using separation distance of 10 mm with the formula above results:

$$(5,877 \text{ mW} / 10 \text{ mm}) * \sqrt{2,440 \text{ GHz}} = 0,918 \leq 7,5$$

Thus for portable use the SAR exclusion condition is fulfilled and SAR evaluation is not required for separation distance of 10 mm or more.



Attachment 1

Instruments list

<i>Id. number</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Serial number</i>	<i>Last calibration</i>	<i>Due date calibration</i>
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '20	January '21





Attachment 1

Measurement uncertainty

Test	Test Setup	Expanded uncertainty	Note
Conducted emission CISPR 16 LISN 50uH 0,009-0,0150MHz	PE001_01	3,4 dB	1
Conducted emission CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_01	3,0 dB	1
Conducted emission CISPR 16 Voltage Probe 0,15-30MHz	PE001_02	2,9 dB	1
Conducted emission CISPR 16 Current Probe 0,15-30MHz	PE001_03	2,6 dB	1
Conducted emission CISPR 16 ISN 0,15-30MHz	PE001_04	4,7 dB	1
Clic CISPR 16 LISN 50uH 0,150-30,0MHz	PE001_05	3,1 dB	1
Disturbance Power 30-300 MHz	PE002_01	3,6 dB	1
Radiated Emission LAS 0,15-30MHz	PE003_01	2,0 dB	1
Radiated Emission CISPR 16 Loop Ant. 0,15-30MHz	PE004_01	4,0 dB	1
Radiated Emission CISPR 16 Bicon. Ant. 30-300MHz	PE004_02	3,9 dB	1
Radiated Emission CISPR 16 LogP. Ant. 300-1000MHz	PE004_03	3,8 dB	1
Radiated Emission CISPR 16 Horn Ant. 1-18GHz	PE004_04	4,2 dB	1
Human Exposure to electromagnetic fields	PE005_01	23,6 %	1
Harmonic current emissions test	PE006_01	10 mA + 2,6 %	1
Voltage fluctuation and flicker test	PE007_01	4,8 %	1
Radiated Immunity 80MHz-6GHz	PE102_XX	2,1 dB 0,82 V/m a 3V/m	1
Conducted Immunity 0,15-230MHz	PE105_XX	1,2 dB 0,44 V a 3V	1
AC Magnetic field	PE106_01	1,55 % 0,15 A/m a 10A/m	1
Pulse Magnetic field	PE107_01	6,25 % 18,7 A/m a 300A/m	1
Dumped Magnetic field	PE108_01	6,25 % 1,87 A/m a 30A/m	1
Common mode conducted immunity	PE112_01	2,21 % 0,22 V a 10V	1



Attachment 1

Test	Test Setup	Expanded uncertainty	Note
Power/Spurious 9kHz-30MHz	PR001_01	4,0 dB	1
Power/Spurious ERP 30-1000MHz d=10m	PR001_02+03	4,7 dB	1
Misura della potenza EIRP 1-18GHz d=3m	PR001_04	4,7 dB	1
Misura della potenza EIRP 18-40GHz d=3m	PR001_05	5,4 dB	1
Frequency error	PR002_01+02	$< 1 \times 10^{-7}$	1
Timing zero span (1001pts.)	PR002_01+02	0,2 % SWT	1
Modulation bandwidth	PR002_01+02	$< 1 \times 10^{-7}$	1
Conducted RF power and spurious emission	PR002_01+02	1,1 dB	1
Adjacent channel power	PR002_01+02	1,1 dB	1
Blocking	PR002_01+02	1,1 dB	1

Test	Test Setup	Expanded uncertainty	Note
Electrostatic discharge immunity test	PE101_0X		2
Electrical fast transients / burst immunity test	PE103_0X		2
Surge immunity test	PE104_0X		2
Short interruption immunity test	PE109_01		2
Rev_19_02 date 27/03/2019			

Note 1:

The expanded uncertainty reported according to the document EA-4-02 is based on a standard uncertainty multiplied by a coverage factor of $K=2$, providing a level of confidence of $p = 95\%$

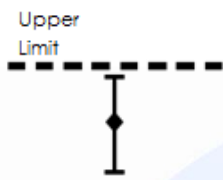
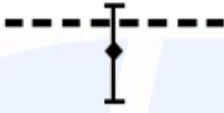
Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor $k = 2$



Attachment 1

Judgement of compliance

Case 1	Case 2	Case 3	Case 4
			
The sample complies with the requirements. The measurement results is within the specification limit when the measurement uncertainty is taken into account.	The sample complies with the requirements. It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	The sample does not comply with the requirements. It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.	The sample does not comply with the requirements. The measurement results is outside the specification limit when the measurement uncertainty is taken into account.

In agreement with ILAC-G8: 03/2009 Guidelines on the Reporting of Compliance with Specification

Quality manual references – Internal procedure

Internal Procedure PM001 rev. 3.0 (Quality Manual)	Measure procedure
Internal Procedure INC_M rev. 9.1 (Quality Manual)	Measurement uncertainty calculation