
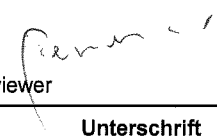


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Prüfbericht - Nr.: <i>Test Report No.:</i>		12023293 001		Seite 1 von 22 <i>Page 1 of 22</i>	
Auftraggeber: <i>Client:</i>		Panasonic Healthcare Co., Ltd. Hearing Instruments Business Unit 600 Saedo-cho, Tsuzuki-ku, Yokohama, Kanagawa 224-8539, Japan			
Gegenstand der Prüfung: <i>Test Item:</i>		Hearing Aid			
Bezeichnung: <i>Identification:</i>		WH-R17C, WH-R15C, WH-R13C	Serien-Nr.: <i>Serial No.:</i>		Refer to Section 3.2
Wareneingangs-Nr.: <i>Receipt No.:</i>		214011446	Eingangsdatum: <i>Date of Receipt:</i>		2011-04-12
Prüfört: <i>Testing Location:</i>		TÜV Rheinland Japan Ltd. – Global Technology Assessment Center 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
Prüfgrundlage: <i>Test Specification:</i>		FCC 47 CFR Part 15, Subpart C, Section 15.209 (October 1, 2010) ANSI C63.4-2003			
Prüfergebnis: <i>Test Result:</i>		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>			
Prüflaboratorium: <i>Testing Laboratory:</i>		TÜV Rheinland Japan Ltd. – Global Technology Assessment Center 4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan			
geprüft/ tested by:		kontrolliert/ reviewed by:			
 2011-05-16 T. Sauter / Inspector		 2011-05-16 T. Cheung / Reviewer			
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other Aspects:					
This test report deals only with the intentional radiator portion of the tested product. Unintentional radiator aspects are covered by test report 12023293 002.					
Abkürzungen:		Abbreviations:			
P(ass) = entspricht Prüfgrundlage		P(ass) = passed			
F(ail) = entspricht nicht Prüfgrundlage		F(ail) = failed			
N/A = nicht anwendbar		N/A = not applicable			
N/T = nicht getestet		N/T = not tested			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

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TEST SUMMARY

5.1.1 VOLTAGE REQUIREMENTS

RESULT: PASS

5.1.2 ANTENNA REQUIREMENTS

RESULT: PASS

5.1.3 RESTRICTED BANDS OF OPERATION

RESULT: PASS

5.2.1 RADIATED EMISSION OF TRANSMITTER

RESULT: PASS

5.3.1 AC POWER LINE CONDUCTED EMISSION OF TRANSMITTER

RESULT: N/A

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1. General Remarks

The three models WH-R17C, WH-R15C and WH-R13C are identical, except for the internal software. The software difference only concerns the treatment of sound signals and does not have any impact on the electrical or radio properties of the equipment. The model **WH-R17C** was used as representative sample for testing.

The equipment can be used with two types of earphone units, identified as “Standard Receiver” and “Power Receiver”, connected to the main unit by a short cable. The only difference between the earphone unit types is the size of the enclosure (Power Receiver is bigger than Standard Receiver). Each earphone unit can have 4 different cable lengths, as shown in the table here below. Testing was performed for both types of earphone unit with the longest cable length available (models **S3** and **P3**).

Earphone unit model names:

Cable	Standard Receiver	Power Receiver
Short ↑ ↓ Long	S0	P0
	S1	P1
	S2	P2
	S3	P3

1.1 Complementary Materials

There is no attachment to this test report.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland Japan Ltd. – Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

The used test equipment is in accordance with CISPR 16 for measurement of radio interference.

The Federal Communications Commission has reviewed the technical characteristics of the radiated and conducted emission facilities and has found these test sites to be in compliance with the requirements of section 2.948 of the FCC rules. The description of the test facility is listed under FCC registration number 299054.

The test facility is accredited by VLAC (member of ILAC) under number VLAC-017 according to ISO/IEC 17025:2005.



TÜV Rheinland Japan Ltd. is accredited by the Federal Communications Commission as a Conformity Assessment Body under Designation Number JP0017 and Test Firm Registration Number 386498.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equipment ID	Calibrated until
For Radiated Emission					
Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	2012-02
RF Selector (10m)	Toyo Corporation	NS4900	0703-182	RF-0029	2011-05
Loop Antenna with power supply, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	2012-02
Trilog Antenna, 30-1000MHz	Schwarzbeck	VULB9168	0245	RF-0019	2012-03
3dB Attenuator 50Ohm	Tamagawa Electronics Co., Ltd.	CFA-01	-	RF-0265	2011-05
Low Noise Pre-Amplifier, 9kHz-1GHz	TSJ	MLA-10K01-B01-35	1370750	RF-0253	2011-05

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025:2005 has been confirmed before testing.

2.3 Measurement Uncertainty

Table 2: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
Radiated Emission	150kHz - 30MHz	±4.0dB
	30MHz - 1GHz	±4.7dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT (Equipment Under Test) is a hearing aid device. It incorporates a wireless transceiver and can receive signals from different kinds of accessories, like voice, music or operation commands. The transmitter function is used to send short commands from one hearing aid device to the other one (e.g. to indicate a change of the operation state).

3.2 System Details

Radio standard: Original Wireless Body Area Networking by NXP Semiconductors

Specified output power: < 20mW

Antenna gain: -71.2dBi

Antenna type: Coil Antenna

Antenna mounting type: Internal

Operation frequency: 10.597MHz

Number of channels: 1

Modulation type: FSK

FCC classification: DXX

Emission designator: F1D

Rated voltage: DC 1.4V via battery

Rated current: Max. 0.573mA

Protection class: III

Test voltage: DC 1.4V

Table 3: EUT Units used for Testing

No.	Unit	Model Name	Serial Number	Configuration
1.	Hearing Aid Main Unit	WH-R17C	KSJ0004	1
2.	Hearing Aid Main Unit	WH-R17C	KSJ0008	2
3.	Earphone Unit	Standard Receiver S3	-	1
4.	Earphone Unit	Power Receiver P3	-	2

Table 4: Interfaces present on the EUT

No.	Interface	Cable Length for Testing, Shielding	Interface Classification
1.	Earphone Unit Cable	5.5cm, un-shielded	Signal port
2.	Test Jig Cable (for testing purpose only)	8cm, un-shielded	Signal port

3.3 Clock Frequencies

The highest clock frequency generated by the EUT is 10.597MHz for the transmitter and 4.096MHz for the digital interface.

3.4 Noise Suppressing Parts

Refer to schematics.

4. Test Set-up and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205 and 15.209.

The test methods, which have been used, are based on ANSI C63.4-2003.

For details, see under each test item.

4.2 Operation Modes

The basic operation mode used for testing is:

- A. EUT transmits continuously (TX mode), with full power, at nominal operating channel (10.597MHz), a modulated signal streaming with highest duty cycle available (8.2%, averaged in 10s).

4.3 Physical Configuration for Testing

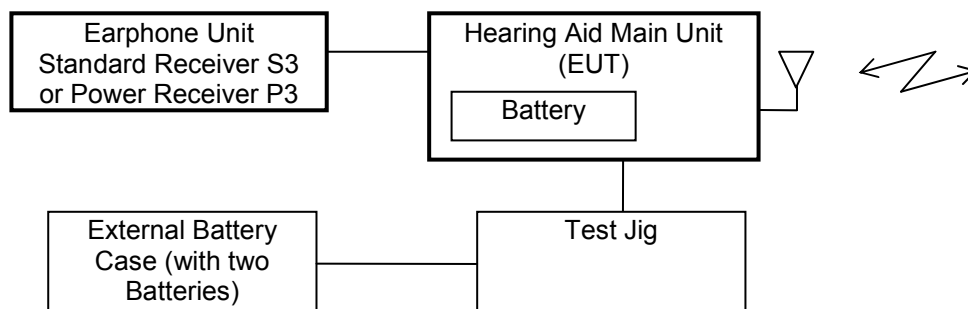
The test system was configured in a typical fashion (as a customer would normally use it). The EUT was attached to a test jig used to enable the required operation mode.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4:2003.

Testing was performed in the two following configurations:

1. EUT incorporates Standard Receiver S3
2. EUT incorporates Power Receiver P3

Figure 1: Block Diagram



For more details, refer to section: Photographs of the Test Set-Up.

4.4 Test Software

No special test software was used to operate the EUT.

4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessory:

1. Product: Test Jig with External Battery Case
Manufacturer: Panasonic
Model: N/A
Rated Voltage: DC 3V
Protection Class: III

4.6 Countermeasures to achieve EMC Compliance

No additional measures were employed to achieve compliance.

5. Test Results RADIO

5.1 Technical Requirements

5.1.1 Voltage Requirements

RESULT: **PASS**

Requirements:

FCC 15.31(e)

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Verdict:

The EUT is battery powered and has an internal voltage regulator to supply the RF circuit. Testing was done with a new battery. Hence the EUT complies with the power supply requirements.

5.1.2 Antenna Requirements

RESULT: **PASS**

Requirements:

FCC 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Verdict:

The EUT has an internal antenna which is not user accessible. Hence it complies with the requirements.

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5.1.3 Restricted Bands of Operation

RESULT:**PASS**

Requirements:

FCC 15.205

Only spurious emissions are permitted in any of the restricted frequency bands, unless otherwise specified.

Verdict:

The EUT nominal carrier frequency is 10.597MHz. It was verified during testing that the carrier is fully contained in the unrestricted frequency band 8.41475-12.29MHz. Therefore only spurious emissions are found in the restricted bands of operation and the EUT complies with the restricted frequency band requirement.

5.2 Radiated Measurements

5.2.1 Radiated Emission of Transmitter

RESULT: **PASS**

Date of testing: 2011-04-13, 2011-04-14, 2011-04-15

Ambient temperature: 21, 23, 25°C

Relative humidity: 24, 27, 37%

Atmospheric pressure: 1010, 1006, 1005hPa

Frequency range: 9kHz - 110MHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

Requirements:

FCC 15.209

Radiated emissions must comply with the limits specified in FCC 15.209(a).

Test procedure:

ANSI C63.4-2003

The EUT was placed on a nonconductive turntable 0.8m above the ground plane. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling and the EUT orientation (X, Y, Z) were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to the 10th harmonic (110MHz). Final radiated emission measurements were made at 3m distance.

For frequencies between 9kHz and 30MHz, measurements were performed with a loop antenna. At each frequency selected for final measurement, the EUT was rotated 360° and the measuring loop antenna was rotated around its vertical axis in order to determine the emission's maximum level.

For frequencies between 30 and 110MHz, measurements were performed with a trilog antenna. At each frequency where a spurious emission was found, the EUT was rotated 360° and the antenna was raised and lowered from 1 to 4m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations.

Final measurements were made with a receiver operating in the CISPR quasi-peak detection mode. For frequencies between 150kHz and 30MHz, the spectrum analyzer's 6 dB bandwidth was set to 9kHz. For frequencies between 30MHz and 110MHz, the spectrum analyzer's 6 dB bandwidth was set to 120kHz.

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The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable. The 30m limit below 30MHz was extrapolated to a 3m distance using a 40dB correction factor. Emissions other than those mentioned are small or not detectable.

No emission was found in the range 9kHz - 30MHz except the carrier.

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Table 5: Radiated Emission, Quasi Peak Data, 9kHz – 30MHz, Mode A (10.597MHz), Configuration 1

Freq. [MHz]	EUT Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Angle [°]	Remark
10.68200	Z	6.4	20.2	26.6	69.5	42.9	70	Carrier

Note: Level QP = Reading QP + Factor

Table 6: Radiated Emission, Quasi Peak Data, 30MHz – 110MHz, Horizontal and Vertical Antenna Orientations, Mode A (10.597MHz), Configuration 1

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
40.412	Z / V	36.6	-23.8	12.8	40.0	27.2	399	118
40.464	Z / H	35.2	-23.4	11.8	40.0	28.2	399	248
44.228	Z / V	40.4	-23.3	17.1	40.0	22.9	317	15
50.249	Z / H	37.1	-22.8	14.3	40.0	25.7	397	266
54.081	Z / V	41.0	-23.3	17.7	40.0	22.3	397	162
54.092	Z / H	40.9	-22.9	18.0	40.0	22.0	360	47
66.735	Z / V	37.8	-24.2	13.6	40.0	26.4	250	1
75.395	Z / H	35.6	-26.2	9.4	40.0	30.6	258	359
75.542	Z / V	32.2	-25.3	6.9	40.0	33.1	259	98

Note: Level QP = Reading QP + Factor

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Table 7: Radiated Emission, Quasi Peak Data, 9kHz-30MHz, Mode A (10.597MHz), Configuration 2

Freq. [MHz]	EUT Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Angle [°]	Remark
10.68200	Z	6.4	20.2	26.6	69.5	42.9	70	Carrier

Note: Level QP = Reading QP + Factor

Table 8: Radiated Emission, Quasi Peak Data, 30MHz – 110MHz, Horizontal and Vertical Antenna Orientations, Mode A (10.597MHz), Configuration 2

Freq. [MHz]	EUT / Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
44.242	X / V	40.7	-23.3	17.4	40.0	22.6	380	63
44.248	X / H	40.8	-22.8	18.0	40.0	22.0	101	28
49.658	X / H	35.5	-22.8	12.7	40.0	27.3	101	1
50.027	X / V	35.2	-23.2	12.0	40.0	28.0	249	179
54.107	X / H	39.4	-22.9	16.5	40.0	23.5	341	327
54.662	X / V	39.2	-23.4	15.8	40.0	24.2	399	273
66.757	X / V	38.0	-24.2	13.8	40.0	26.2	240	289
66.760	X / H	37.7	-24.3	13.4	40.0	26.6	220	52

Note: Level QP = Reading QP + Factor

5.3 AC Power Line Conducted Measurements

5.3.1 AC Power Line Conducted Emission of Transmitter

RESULT:**N/A**

Frequency range: 0.15 - 30MHz

Requirements:

FCC 15.207

The AC power line conducted emission on any frequency within the band 150 kHz to 30MHz shall not exceed the limits specified in FCC 15.207.

Test procedure:

ANSI C63.4-2003

The EUT is not intended to be connected to the AC power line network (it is battery powered only). Therefore this test is not applicable.

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