

Produkte
Products

Prüfbericht - Nr.: 14036228 001

Seite 1 von 13

Test Report No.:

Page 1 of 13

Auftraggeber: Remotec Technology Ltd.
Client: Room 2907 – 2908, Skyline Tower, 39 Wang Kwong Road,
Kowloon Bay, Kowloon, Hong Kong

Gegenstand der Prüfung: Z-Wave to AC IR Extender
Test Item:

Bezeichnung: BW8377US **Serien-Nr.:** Engineering sample
Identification: *Serial No.:*

Wareneingangs-Nr.: A000071136-001, **Eingangsdatum:** 07.06.2014
Receipt No.: A000071136-002 *Date of Receipt:*

Zustand des Prüfgegenstandes bei Anlieferung: Test sample(s) is/are not damaged and
Condition of test item at delivery: suitable for testing.

Prüfört: Global United Technology Services Co., Ltd.
Testing Location: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road, Baoan District,
Shenzhen, China

Prüfgrundlage: FCC Part 15 Subpart C
Test Specification: FCC Part 15 Subpart B
ANSI C63.4-2003

Prüfergebnis: Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben
Test Results: genannter Prüfgrundlage.
The above mentioned product was tested and passed.

Prüflaboratorium: TÜV Rheinland Hong Kong Ltd.
Testing Laboratory: 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay,
Kowloon, Hong Kong

geprüft/ tested by:

kontrolliert/ reviewed by:

27.06.2014 Benny Lau
Project Manager

27.06.2014 Hugo Wan
Senior Project Manager

Datum **Name/Stellung** **Unterschrift**
Date *Name/Position* *Signature*

Datum **Name/Stellung** **Unterschrift**
Date *Name/Position* *Signature*

Sonstiges: FCC ID: M7N-BW8377
Other Aspects

Abkürzungen: P(ass) = entspricht Prüfgrundlage
F(ail) = entspricht nicht Prüfgrundlage
N/A = nicht anwendbar
N/T = nicht getestet

Abbreviations: P(ass) = passed
F(ail) = failed
N/A = not applicable
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.

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.

Table of Content

	Page
Cover Page	1
Table of Content	2
Test Summary	4
Product information.....	5
Manufacturers declarations	5
Product function and intended use	5
Submitted documents.....	5
Independent Operation Modes	5
Related Submittal(s) Grants	5
Remark	5
Test Set-up and Operation Mode.....	6
Principle of Configuration Selection	6
Test Operation and Test Software.....	6
Special Accessories and Auxiliary Equipment.....	6
Countermeasures to achieve EMC Compliance.....	6
Test Methodology	7
Radiated Emission	7
Field Strength Calculation.....	7
List of Test and Measurement Instruments.....	8
Results FCC Part 15 – Subpart C	9
Subclause 15.203 – Antenna Information	Pass..... 9
Subclause 15.207 – Conducted Emission on AC Mains.....	Pass..... 9
Subclause 15.215 (c) – 20 dB Bandwidth.....	Pass..... 10
Subclause 15.249 (a) – Radiated Emission (Fundamental and Harmonics).....	Pass..... 10
Subclause 15.205, 15.249 (d) – Spurious Radiated Emissions	Pass..... 11
Results FCC Part 15 – Subpart B	12
Subclause 15.107 – Conducted Emission on AC Mains.....	Pass..... 12
Subclause 15.109 – Spurious Radiated Emissions	Pass..... 13
Appendix 1 – Test Results.....	15 pages
Appendix 2 – Test Setup Photos.....	3 pages

Appendix 3 – EUT External Photos	4 pages
Appendix 4 – EUT Internal Photos	3 pages
Appendix 5 – Label, Operational Description, Block, Schematics and User Manual	35 pages

Test Summary

Conducted Emissions

Result: Pass

20dB bandwidth

Result: Pass

Radiated Emission of Carrier Frequency

Result: Pass

Spurious Radiated Emissions

Result: Pass

Product information

Manufacturers declarations

	Transceiver
Operating frequency range	908.42 MHz
Type of modulation	GFSK
Number of channels	1
Type of antenna	Integral
Power level	fix
Connection to public utility power line	No
Nominal voltage	V _{nor} : 5.0 Vdc (USB) and/ or 4.5Vdc (3 x 1.5V AAA)

Product function and intended use

The equipment under test (EUT) is a Z-wave transceiver operating at 908.42 MHz. It is powered by 5.0 Vdc (USB) and/ or 4.5Vdc (3 x 1.5V AAA batteries). The USB port is used for power supply only.

FCC ID: M7N-BW8377

Models	Product description
BW8377US	Z-wave transceiver

Submitted documents

Circuit Diagram
Block Diagram
Bill of material
User manual
Rating Label

Independent Operation Modes

The basic operation modes are:

- Z-wave communication link maintained with data transfer.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.
The receiving portion is authorized under the verification procedure.

Remark

- None.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- There was no special software to exercise the device.

Special Accessories and Auxiliary Equipment

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

- none

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2003.

The equipment under test (EUT) was placed at the middle of the 80 cm height turntable, and the turntable is 3 meters far from the measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 °, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

List of Test and Measurement Instruments

Global United Technology Services Co., Ltd. (Registration number: 600491)

Radiated Emission				
Equipment	Manufacturer	Type	Cal. Date	Cal. Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)*6.0(H)	April. 6 2013	April. 5 2015
Control Room	ZhongYu Electron	6.2(L)*2.5(W)*2.4(H)	N/A	N/A
ESU EMI Test Receiver	Rohde & Schwarz	ESU26	June. 29 2013	June. 28 2014
Loop Antenna	Zhinan	ZN30900A	June. 29 2013	June. 28 2014
Bi-log Hybrid Antenna	SCHWARZBECK	VULB9163	Mar. 09 2014	Mar. 08 2015
Double-ridged horn antenna	SCHWARZBECK	9120D	Mar. 09 2014	Mar. 08 2015
Horn Antenna	ETS-LINDGREN	3160-09	Mar. 09 2014	Mar. 08 2015
RF Amplifier	HP	8347A	June. 29 2013	June. 28 2014
RF Amplifier	HP	8349B	June. 29 2013	June. 28 2014
EMI Test Software	AUDIX	E3	N/A	N/A
Coaxial cable	GTS	N/A	April. 6 2013	April. 5 2015
Coaxial Cable	GTS	N/A	N/A	N/A
Thermo meter	N/A	N/A	June. 29 2013	June. 28 2014
Spectrum Analyzer	Rohde & Schwarz	FSP30	Dec 03 2012	Dec 03 2014

Conducted Emission				
Equipment	Manufacturer	Type	Cal. Date	Cal. Due date
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	Sep. 08 2013	Sep. 07 2015
EMI Test Receiver	R&S	ESCS30	June. 29 2013	June. 28 2014
Pulse Limiter	R&S	ESH3-Z2	June. 29 2013	June. 28 2014
Coaxial Switch	ANRITSU CORP	MP59B	June. 29 2013	June. 28 2014
Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	June. 29 2013	June. 28 2014
Coaxial Cable	GTS	N/A	Jul. 07 2013	Jul. 06 2014
EMI Test Software	AUDIX	E3	N/A	N/A
Thermo meter	KTJ	TA328	July. 1 2013	June. 30 2014

Bandwidth				
Equipment	Manufacturer	Type	Cal. Date	Cal Due Date
Spectrum Analyzer	Rohde& Schwarz	FSP30	Dec. 02 2012	Dec. 03 2014

Results FCC Part 15 – Subpart C

Subclause 15.203 – Antenna Information		Pass
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	Permanent attached antenna	
Verdict:	Pass	

Subclause 15.207 – Conducted Emission on AC Mains						Pass
Test Specification : ANSI C63.4 – 2003 Mode of operation : Tx mode Port of testing : AC Mains input port of PC Detector : Quasi-peak and Average RBW : 9 kHz Supply voltage : 120Vac 60Hz Temperature : 23°C Humidity : 50%						
Requirement:		15.207(a)				
Results:		Pass				
Live measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	No peak found	---	---	66 - 56	56 - 46	Pass
> 0,5 - 5	0.683	38.36	33.96	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass
Neutral measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	No peak found	---	---	66 - 56	56 - 46	Pass
> 0,5 - 5	0.675	37.45	32.39	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass
Results:		Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2-3.				

Subclause 15.215 (c) – 20 dB Bandwidth		Pass		
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.			
Test Specification : ANSI C63.4 – 2003				
Mode of operation : Tx mode				
Port of testing : Enclosure				
RBW/VBW : 10 kHz/ 30 kHz				
Supply voltage : 5VDC (USB) and 4.5VDC (3x1.5V AAA new batteries)				
Temperature : 23°C				
Humidity : 50%				
Results:		Pass		
Frequency (MHz)	20 dB left (MHz)	Limit (MHz)	20 dB right (MHz)	Limit (MHz)
908.420	908.349	> 902.000	908.496	< 928.000

Subclause 15.249 (a) – Radiated Emission (Fundamental and Harmonics)		Pass
Test Specification : ANSI C63.4 – 2003 Mode of operation : Tx mode Port of testing : Enclosure RBW/VBW : 120 kHz for f < 1 GHz 1 MHz / 3 MHz for f > 1 GHz Supply voltage : 5VDC (USB) and 4.5VDC (3x1.5V AAA new batteries) Temperature : 23°C Humidity : 50%		
Requirement:	The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.	
Results:	Pass	
Fundamental Frequency		Vertical Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
908.400	83.97	94.0 / QP
Fundamental Frequency		Horizontal Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
908.400	77.38	94.0 / QP
Harmonics		Vertical Polarization
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
1816.700	44.10	74.0 / P
1816.700	30.32	54.0 / A
Harmonics		Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
1816.700	44.33	74.0 / P
1816.700	30.19	54.0 / A

Subclause 15.205, 15.249 (d) – Spurious Radiated Emissions**Pass**

Test Specification : ANSI C63.4 - 2003
 Mode of operation : Tx mode
 Port of testing : Enclosure
 Detector : Peak
 RBW/VBW : 120 kHz for $f < 1$ GHz
 1 MHz / 3 MHz for $f > 1$ GHz
 Supply voltage : 5VDC (USB) and 4.5VDC (3x1.5V AAA new batteries)
 Frequency range : 9kHz to tenth harmonic
 Temperature : 23°C
 Humidity : 50%

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Results: Pass

Transmit mode comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
364.260	32.35	46.0 / QP
400.432	32.47	46.0 / QP
459.114	32.09	46.0 / QP
501.179	33.35	46.0 / QP
902.000	34.51	46.0 / QP
928.000	35.18	46.0 / QP

Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
166.651	30.17	43.5 / QP
266.609	33.76	46.0 / QP
364.260	35.11	46.0 / QP
432.546	35.12	46.0 / QP
902.000	34.61	46.0 / QP
928.000	34.76	46.0 / QP

Results FCC Part 15 – Subpart B

Subclause 15.107 – Conducted Emission on AC Mains						Pass
Test Specification : ANSI C63.4 – 2003 Mode of operation : Rx mode Port of testing : AC Mains input port Detector : Quasi-peak and Average RBW : 9 kHz Supply voltage : 120Vac 60Hz Temperature : 23°C Humidity : 50%						
Requirement: 15.107(a)						
Results: Pass						
Live measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBμV	Average dBμV	Limit QP (dBμV)	Limit AV (dBμV)	Verdict
0,15 – 0,5	No peak found	---	---	66 - 56	56 - 46	Pass
> 0,5 - 5	0.675	37.71	33.52	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass
Neutral measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBμV	Average dBμV	Limit QP (dBμV)	Limit AV (dBμV)	Verdict
0,15 – 0,5	No peak found	---	---	66 - 56	56 - 46	Pass
> 0,5 - 5	0.683	37.45	32.39	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass
Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1, page 2-3.						

Subclause 15.109 – Spurious Radiated Emissions		Pass
Test Specification : ANSI C63.4 - 2003		
Mode of operation : Rx mode		
Port of testing : Enclosure		
Detector : Peak		
RBW/VBW : 120 kHz for f < 1 GHz		
1 MHz / 3 MHz for f > 1 GHz		
Supply voltage : 5VDC (USB) and 4.5VDC (3x1.5V AAA new batteries)		
Temperature : 23°C		
Humidity : 50%		
Requirement: 15.109(a)		
Results: Pass		
Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
84.999	29.95	40.0 / QP
166.068	30.80	43.5 / QP
547.098	32.94	46.0 / QP
Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
84.999	29.95	40.0 / QP
196.510	32.57	43.5 / QP
265.676	32.09	46.0 / QP