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Report On

FCC Testing of the
ASH Wireless Electronics Ltd SWB BASE
In accordance with FCC 47 CFR Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2AF3J-XOBASE001

Document 75932139 Report 03 Issue 1 November 2015

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REPORT ON

FCC Testing of the
ASH Wireless Electronics Ltd SWB BASE
In accordance with FCC 47 CFR Part 15B

Document 75932139 Report 03 Issue 1

November 2015

PREPARED FOR

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APPROVED BY

Matthew Russell
Authorised Signatory

DATED 26 November 2015

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15B. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler

UKAS TESTING 0141

Product Service

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SECTION 1

REPORT SUMMARY

FCC Testing of the
ASH Wireless Electronics Ltd SWB BASE
In accordance with FCC 47 CFR Part 15B

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC Testing of the ASH Wireless Electronics Ltd SWB BASE to the requirements of FCC 47 CFR Part 15B.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	ASH Wireless Electronics Ltd
Model Number(s)	AC22-P0004
Serial Number(s)	SN08
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B (2014)
Incoming Release Date	Application Form 25 September 2015
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	PO-000129 24 September 2015
Start of Test	10 November 2015
Finish of Test	10 November 2015
Name of Engineer(s)	G Lawler
Related Document(s)	ANSI C63.4 (2014)

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15B is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Idle Mode				
2.1	15.107	AC Line Conducted Emissions	Pass	
2.2	15.109	Radiated Emissions	Pass	

Product Service

1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION		
Model Name/Number	SWB BASE	
Part Number	AC22-P0004	
Hardware Version	Rev A	
Software Version	2.0	
FCC ID (if applicable)		2AF3J-XOBASE001
Industry Canada ID (if applicable)		N/A
Technical Description (Please provide a brief description of the intended use of the equipment)		This is a mains powered base station used to send configuration commands to the wristbands with which it communicates wirelessly over the ISM band.

POWER SOURCE					
☒	AC mains		State voltage 110V		
AC supply frequency	60	(Hz)			
110	VAC				
	Max Current				
60	Hz				
☒	Single phase		☐	Three phase	
And / Or					
☐	External DC supply				
	Nominal voltage		V	Max Current	A
	Extreme upper voltage		V		
	Extreme lower voltage		V		
Battery					
☐	Nickel Cadmium		☐	Lead acid (Vehicle regulated)	
☐	Alkaline		☐	Leclanche	
☐	Lithium		☐	Other Details :	
	Volts nominal.				
End point voltage as quoted by equipment manufacturer			V		

Product Service

FREQUENCY INFORMATION						
Frequency Range	2445 to2460		MHz			
Channel Spacing (where applicable)						
Receiver Frequency Range (if different)	to		MHz			
Channel Spacing (if different)						
Test Frequencies*	Bottom	2445	MHz	Channel Number (if applicable)	19	
	Middle		MHz	Channel Number (if applicable)		
	Top	2460	MHz	Channel Number (if applicable)	22	
Intermediate Frequencies			MHz			
Highest Internally Generated Frequency :			2460 MHz			

POWER CHARACTERISTICS				
Maximum TX power	0.01	W		
Minimum TX power	fixed	W (if variable)		
Is transmitter intended for :				
Continuous duty			☐ Yes	☐ No
Intermittent duty			☒ Yes	☐ No
If intermittent state DUTY CYCLE				
Transmitter ON	700 micro seconds			
Transmitter OFF	500 micro seconds			

ANTENNA CHARACTERISTICS						
☐	Antenna connector			State impedance		Ohm
☐	Temporary antenna connector			State impedance		Ohm
☒	Integral antenna	Type	PCB	State impedance	2	dBi
☐	External antenna	Type		State impedance		dBi

MODULATION CHARACTERISTICS			
☐	Amplitude	☐	Frequency
☒	Phase	☐	Other (please provide details):
Can the transmitter operate un-modulated?		☐ Yes	☒ No

CLASS OF EMISSION USED
ITU designation or Class of Emission:
1 2G445G2D / 2G460G2D
(if applicable) 2
(if applicable) 3
If more than three classes of emission, list separately:

BATTERY POWER SUPPLY	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

ANCILLARIES (If applicable)	
Model name/number	Identification/Part number
Manufacturer	Country of Origin

EXTREME CONDITIONS					
Extreme test voltages (Max)	15	V	Extreme test voltages (Mix)	8	V
Nominal DC Voltage	12	V	DC Maximum Current	400mA	A
Maximum temperature	50	°C	Minimum temperature	0	°C

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Name: Steve Williams

Position held: Technical Director Date: 25/09/2015

Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a ASH Wireless Electronics Ltd SWB BASE. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 110 V AC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

1.7 MODIFICATION RECORD

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Serial Number: SN08			
0	As supplied by manufacturer.	N/A	N/A
1	Added low pass filter o the output, removed the 1.8nH inductor and replaced with 9.0nH in series with 0.5pF in the antenna feed line.	Steve Williams	13/10/2015
2	Screening can was fitted over the plug-in board.	Steve Williams	13/10/2015

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
ASH Wireless Electronics Ltd SWB BASE
In accordance with FCC 47 CFR Part 15B

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.107

2.1.2 Equipment Under Test and Modification State

AC22-P0004 S/N: SN08 - Modification State 2

2.1.3 Date of Test

10 November 2015

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with ANSI C63.4, Clause 7.

Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.107.

2.1.6 Environmental Conditions

Ambient Temperature	22.3°C
Relative Humidity	45.0%

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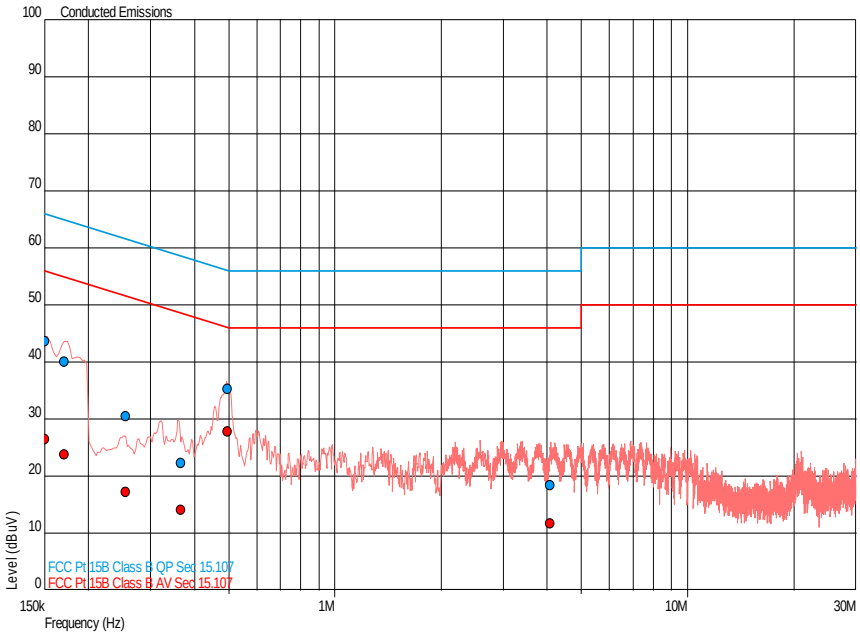
2.1.7 Test Results

Idle Mode, Live Line Results

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	43.6	66.0	-22.4	26.4	56.0	-29.6
0.171	40.0	64.9	-24.9	23.8	54.9	-31.1
0.255	30.5	61.6	-31.2	17.2	51.6	-34.4
0.365	22.3	58.6	-36.3	14.1	48.6	-34.5
0.497	35.4	56.1	-20.7	27.9	46.1	-18.2
4.063	18.4	56.0	-37.6	11.8	46.0	-34.2

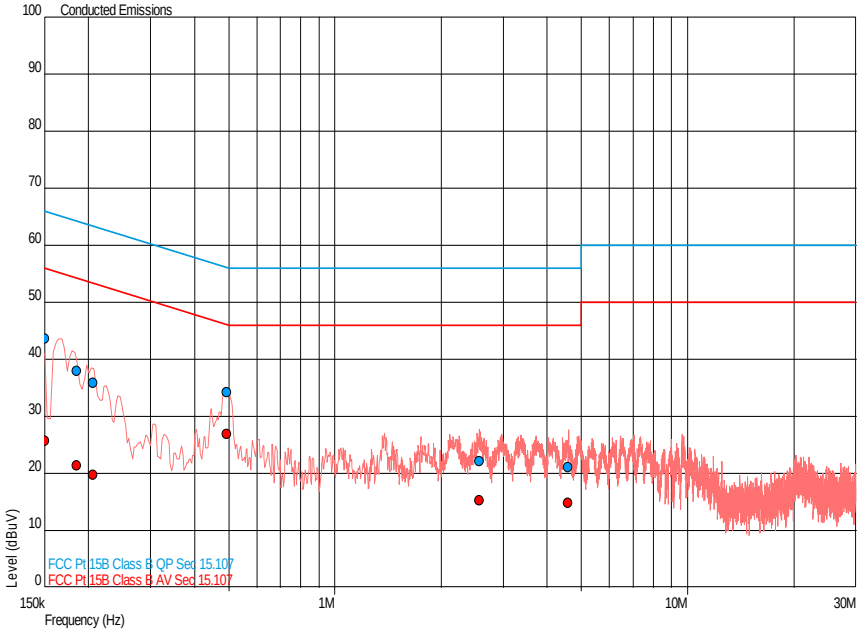
Idle Mode, Live Line Plot



Idle Mode, Neutral Line Results

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	43.6	66.0	-22.4	25.8	56.0	-30.2
0.185	38.0	64.3	-26.2	21.4	54.3	-32.8
0.206	35.9	63.4	-27.5	19.8	53.4	-33.6
0.493	34.3	56.1	-21.8	27.0	46.1	-19.1
2.568	22.1	56.0	-33.9	15.3	46.0	-30.7
4.587	21.1	56.0	-34.9	14.8	46.0	-31.2

Idle Mode, Neutral Line Plot



FCC 47 CFR Part 15, Limit Clause 15.107

Class B

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 15B, Clause 15.109

2.2.2 Equipment Under Test and Modification State

AC22-P0004 S/N: SN08 - Modification State 2

2.2.3 Date of Test

10 November 2015

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with ANSI C63.4, Clause 8.

Remarks

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.109.

2.2.6 Environmental Conditions

Ambient Temperature	22.3°C
Relative Humidity	45.0%

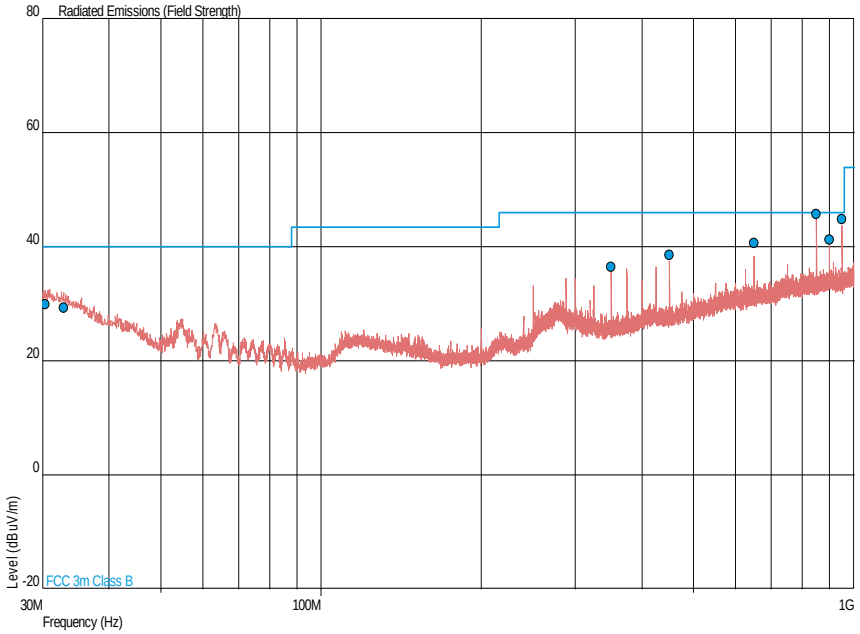
Product Service

2.2.7 Test Results

Idle Mode, 30 MHz to 1 GHz Results

Frequency (MHz)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Level (µV/m)	Quasi-Peak Margin (dµV/m)	Quasi-Peak Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.381	30.0	31.6	-10.0	-68.4	19	1.00	Vertical
32.940	29.4	29.5	-10.6	-70.5	248	1.00	Vertical
349.980	36.5	66.8	-9.5	-133.2	72	1.00	Horizontal
449.983	38.5	84.1	-7.5	-115.9	40	2.28	Horizontal
650.001	40.7	108.4	-5.3	-91.6	12	1.20	Horizontal
849.986	45.7	192.8	-0.3	-7.2	254	1.02	Horizontal
900.000	41.3	116.1	-4.7	-83.9	0	1.00	Horizontal
949.988	44.8	173.8	-1.2	-26.2	245	1.00	Horizontal

Idle Mode, 30 MHz to 1 GHz Plot

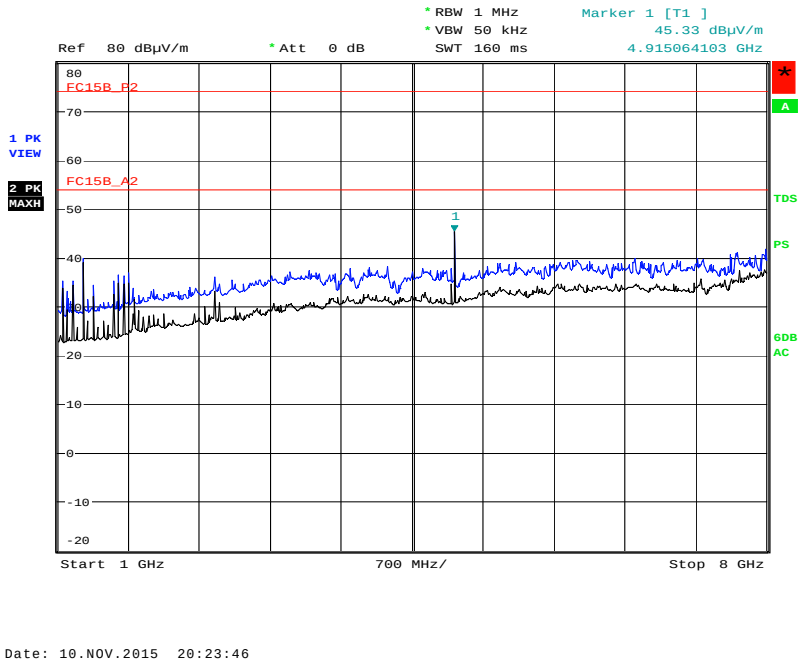


Idle Mode, 1 GHz to 13 GHz Results

Frequency (MHz)	Average Level (dBµV/m)	Peak Level (dBµV/m)	Average Level (µV/m)	Peak Level (µV/m)	Angle (deg)	Height (m)	Polarisation
4912.152	46.62	49.13	214.29	286.09	95	1.00	Horizontal

No other emissions were detected within 10 dB of the limit.

Idle Mode, 1 GHz to 8 GHz Plot



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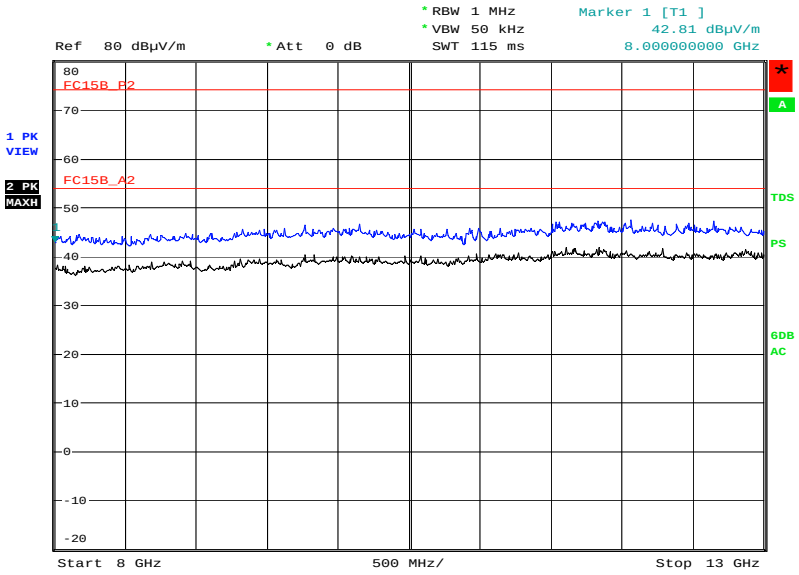
Idle Mode, 8 GHz to 13 GHz Plot



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FCC 47 CFR Part 15, Limit Clause 15.109

Class B

Frequency of Emission (MHz)	Field Strength (µV/m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 – AC Line Conducted Emissions					
Transient Limiter	Hewlett Packard	11947A	15	12	16-Dec-2015
LISN (1 Phase)	Chase	MN 2050	336	12	1-Apr-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Hygromer	Rotronic	A1	2138	12	3-Dec-2015
Multimeter	Iso-tech	IDM101	2417	12	29-Sep-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
7m Armoured RF Cable	SSI Cable Corp.	1501-13-13-7m WA(-)	3600	-	TU
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
Section 2.2 - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Antenna (Bilog)	Schaffner	CBL6143	287	24	3-Feb-2016
Pre-Amplifier	Phase One	PS04-0086	1533	12	30-Jul-2016
Screened Room (5)	Rainford	Rainford	1545	36	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Hygromer	Rotronic	A1	2138	12	3-Dec-2015
Antenna (Bilog)	Chase	CBL6143	2904	24	11-Jun-2017
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	2-Nov-2016
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Multimeter	Fluke	177	3833	12	16-Jun-2016
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	6-Oct-2016
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	TU
0.5m SMA Cable (Rx)	Scott Cables	SLSLL18-SMSM-00.50M	4528	6	19-Feb-2016

TU – Traceability Unscheduled

Product Service

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
AC Line Conducted Emissions	± 3.2 dB
Radiated Emissions	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB

Product Service

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Product Service

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

UKAS TESTING 0141

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).