Sulis Consultants
CE Marking and Product Approvals

FCC RSE Test Report:

Airspan AU545

SC_TR_265_A

Prepared for:

Airspan Communication Ltd
Capital Point,
33 Bath Road
Slough,
Berkshire
SL1 3UF

Sulis Consultants Limited
Mead House, Longwater Road, Eversley, Hampshire, RG27 0NW, UK
Registered in England & Wales, number 05466247
http://www.sulisconsultants.com

Contents

Tables

Figures

1 Revision History

Revision	Originator	Date	Comment
A	C Blackham	07 July 2017	1st release

2 Purpose

This document provides additional supporting documentation to show that the design of the AU545 and the method of integrating the modules does not generate any unwanted spurious emissions or intermodulation products.

3 Reference Documents

[Ref 1]	47CFR2	Title 47 Code of Federal Regulations Part 2: frequency allocations and radio treaty matters; general rules and regulations
[Ref 2]	47 CRF27	Title 47 Code of Federal Regulations Part 27: Miscellaneous Communications Services
[Ref 3]	TIA-603-E	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards
[Ref 4]	KDB971168 DO1 v02r02	Federal Communications Commission Office of Engineering and Technology Laboratory Division; Measurement guidance for certification of licensed digital transmitters.
[Ref 5]	KDB 442401	Radiated emission measurements for licensed radio service equipment

4 Test Information

4.1 Client

Airspan Communications Ltd

Capital Point,

33 Bath Road

Slough,

Berkshire

SL1 3UF

4.2 Test personnel

Testing was performed by Charlie Blackham of Sulis Consultants Ltd at Roke Manor Research Ltd, Old Salisbury Lane, Romsey, SO51 0ZN, on 4th July 2017.

4.3 Test sample

The results herein only refer to sample detailed in section 6

5 Product Description

The AU545 contains three radio modules that have been integrated into a single unit.

As part of the integration a number of filters have been incorporated into the RF paths between the modules and the various antennas to optimise product performance. Further detail on this is contained in the Operational Description.

6 Test Configuration

6.1 Test sample and Operating mode

The equipment under test (EUT) was:

Manufacturer	Name	Model Number	Serial Number
Airspan	AU545	908-63-412SP	D3BB143F4DB6

Table 1: Equipment under test

The AU545 was configured with the modules transmitting on the following channels:

Module function	Test Frequency	Test channel bandwidth
UE Relay	2680 MHz	20MHz
eNB	2560 MHz	20 MHz
WiFi	2410 MHz 5200 MHz	20 MHz 20 MHz

Table 2: Test frequencies and bandwidths

6.2 Equipment set-up

Equipment was configured as per figure 1:

- Each module was set to transmit at maximum power.

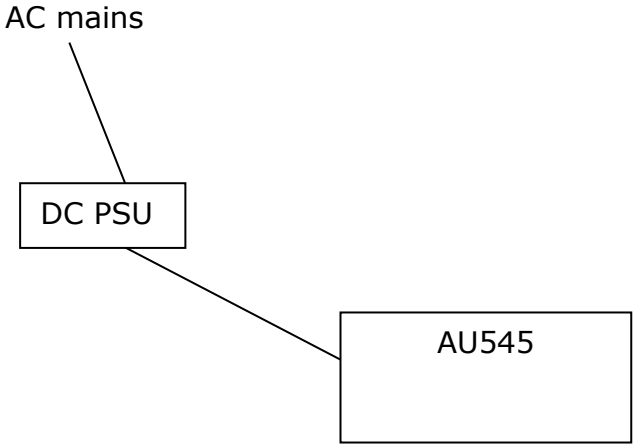


Figure 1: Configuration for test

7 Summary of Tests performed

Test	47 CFR Part	Limit	Result	Section
Radiated Spurious Emissions	27.53(h) / 2.1053	-13 dBm	Pass	8

Table 3: Summary of tests performed

8 Radiated Spurious Emissions

These confidence emissions measurements were made up to 18 GHz at 3m distance in a fully anechoic chamber.

8.1 test method

Whilst the transmitters within the AU545 can all be turned on to transmit at the required maximum power level, none could be configured to operate with 100 % duty cycle.

As the relative on-times of the various transmitters could not be determined to allow gated measurements, guidance was taken from KDB971168DO1 section 5.2.2.2 and the measurement was performed as follows:

- Set RBW to 1 MHz
- Set VBW to 3 MHz
- Set the number of point in sweep ≥ 2x span/RBW
- Sweep time = auto
- Detector = RMS
- Trace mode = max hold
- Rotate the device slowly allowing >> 1000 sweeps to be taken during the 360° rotation of the EUT

> 27.53(h) AWS emission limits—(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

Attenuation of 43+10log(P) dBm equates to an absolute limit of -13dBm.

The cabinet radiation was performed while all antennas were connected.

Scans from 30-4000 MHz were performed against a -13dBm limit determined during chamber calibration.

Scans above 4 GHz were performed against a field strength limit determined by:

E = EIRP – 20log D + 104.8

Any harmonics that needed investigation were then measured by substitution method.

8.2 Frequencies of concern and limit to be applied

In particular, the test was looking for spurious emissions or intermodulation products, particularly: 2F1-F2; F2-F1 and harmonics of the fundamental.

The following tables show the frequencies of possible harmonics in MHz:

2F1 – F2	WiFi	eNB	UE	WiFi
	2410	2560	2680	5200
2410	-	2710	2950	7990
2560	2260	-	2800	7840
2680	2140	2440	-	7720
5200	-380	-80	160	-

Table 4: Table of possible 2F1-F2 harmonics

F2 – F1	WiFi	eNB	UE	WiFi
	2410	2560	2680	5200
2410	-	150	270	2790
2560	-150	-	120	2640
2680	-270	-120	-	2520
5200	-2790	-2640	-2520	-

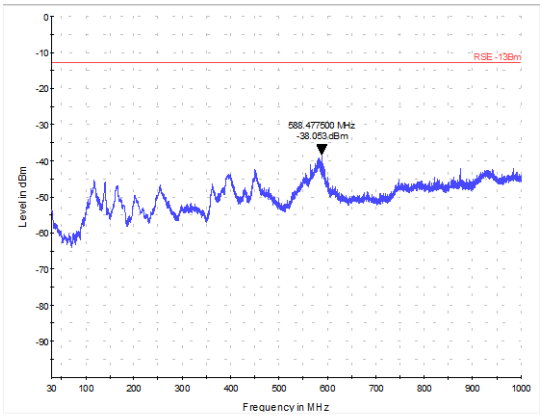
Table 5: Table of possible F2-F1 harmonics

Fundamental	2nd	3rd	4th	5th
2410	4820	7230	9640	12050
2560	5120	7680	10240	12800
2680	5360	8040	10720	13400
5200	10400	15600	20800	26000

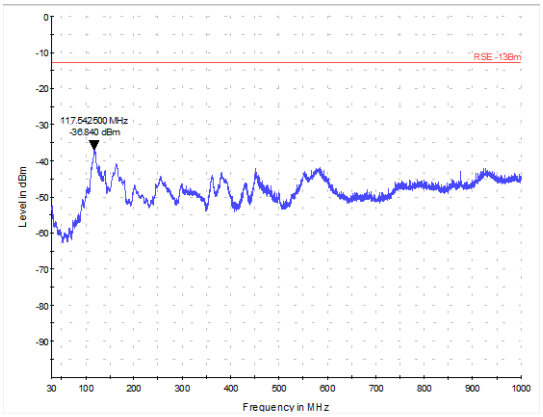
Table 6: Table of possible harmonics

8.3 Test results

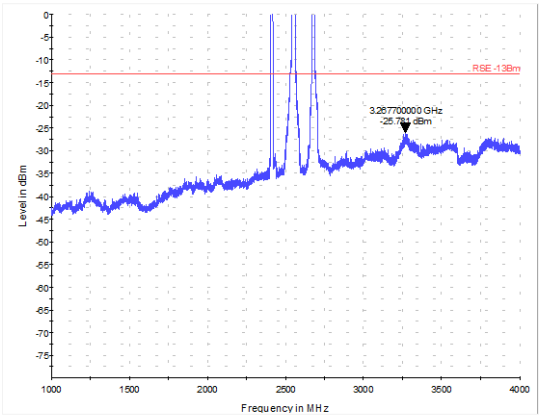
As shown in the plots below, no harmonic emissions were detected.



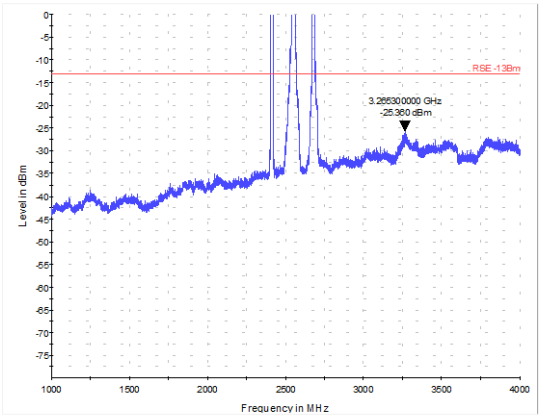
30-1000 MHz Horiz



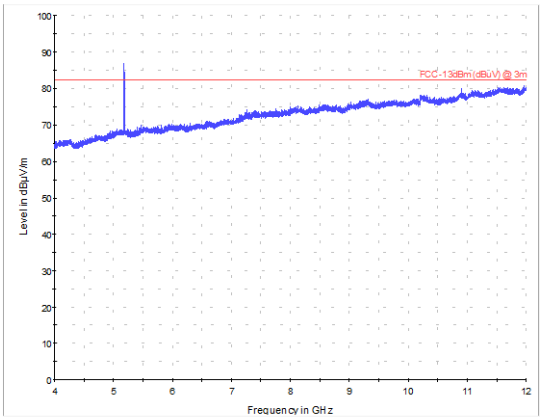
30-1000 MHz Vert



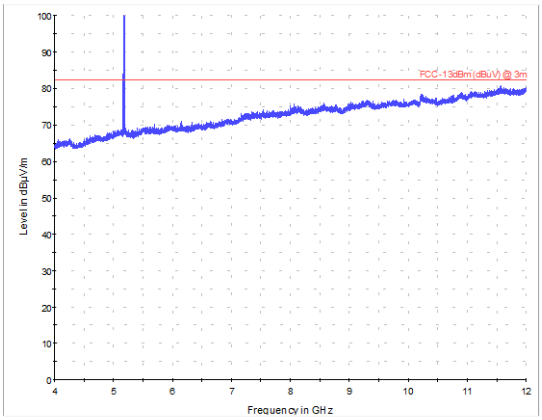
1-4 GHz Horizontal antenna



1-4 GHz Vertical antenna



4-12 GHz Horizontal antenna



4-12 GHz Vertical antenna

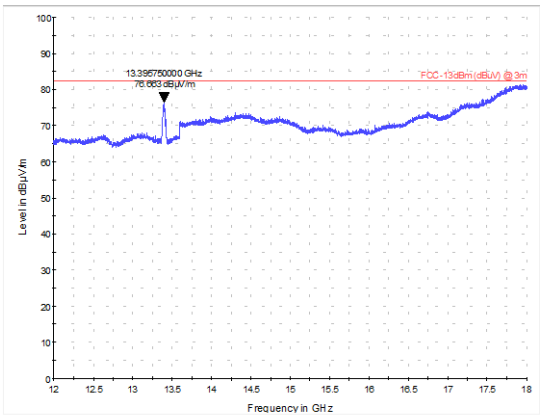
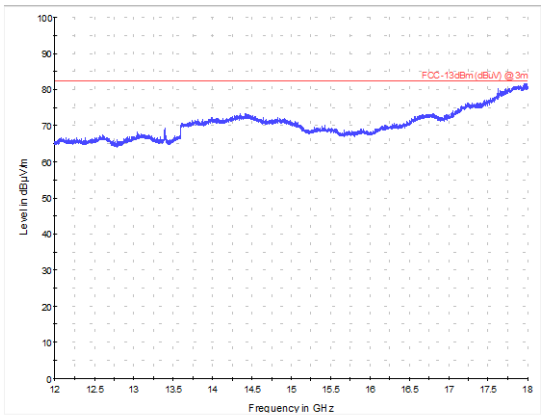
	
12-18 GHz Horizontal antenna	12-18 GHz Vertical antenna

Figure 2: RSE pre-scans

It was suspected that the emission at 13.395 GHz was generated in the pre-amplifier and did not originate from the EUT.

This was confirmed by performing the test with the spectrum analyser adjacent to the measurement antenna, connected via a short RF cable.

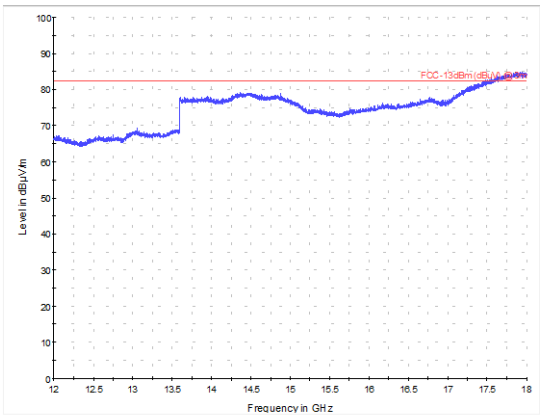
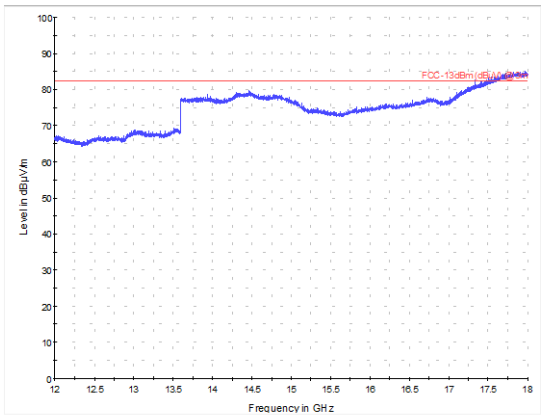
	
12-18 GHz Horizontal antenna	12-18 GHz Vertical antenna

Figure 3: RSE pre-scans, without pre-amp

9 Test equipment

Description	Manufacturer	Model number	Serial number	Calibration
Anechoic Chamber	Panashield	N/A	7961_0	N/A
Spectrum Analyser	Rohde & Schwarz	ESU8	100014	R&S 1400-53355 Due: 2017-12-05
Spectrum Analyser	Rohde & Schwarz	FSP30	100219	R&S 1400-58606 Due: 2018-04-24
Antenna	Schaffner	CBL6112D	22608	Roke[3]
Antenna	EMCO	3115	00034811	ETS Lindgren Cert 46931
Antenna	EMCO	3115	00444729	OKD EH-A222/06
Sig Gen	Agilent	E4433B	GB40051120	Keysight 1-7095339604-1 Due 2017-07-31
Pre-amp	Schwarzbeck	BBV 9718	9718-003	Roke
Cable	Sucoflex	Low loss	20796	Roke
Cables	Gore	0QQ01Q011180	05108145 05108147	Roke
RF test cable	Utiflex	BUA01G	FA210A0009M30309	ABEX UK. Ref: green bua01g Due 08 Oct 17

Table 7: Test Equipment