



**TEST REPORT  
FROM  
RFI GLOBAL SERVICES LTD**

Test of: Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)

To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band  
FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**Test Report Serial No:**  
RFI/RPTE4/RP49355JD02A

**Supersedes Test Report Serial No:**  
RFI/RPTE3/RP49355JD02A

<b>This Test Report Is Issued Under The Authority Of Michael Derby, Radio Performance Group, Service Leader:</b>	
	
pp Brian Watson	
<b>Checked By: Brian Watson</b> 	<b>Report Copy No: PDF01</b>
<b>Issue Date: 20 November 2009</b>	<b>Test Dates: 23 July 2007 to 24 August 2007</b>

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**RFI Global Services Ltd**

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**Test of: Airspan Communications Ltd.**

**SCRT (Single Channel Radio Transceiver)**

**To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
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## 1. Client Information

<b>Company Name:</b>	Airspan Communications Ltd.
<b>Address:</b>	Cambridge House Oxford Road Uxbridge UB8 1UN UK
<b>Contact Name:</b>	Charles Blackham

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## **2. Equipment Under Test (EUT)**

The following information (with the exception of the Date of Receipt) has been supplied by the client:

### **2.1. Identification of Equipment Under Test (EUT)**

<b>Description:</b>	Outdoor Unit, Transceiver
<b>Brand Name:</b>	Airspan Communications Ltd (Single Channel Radio Transceiver)
<b>Model Name or Number:</b>	SCR-1-365T-1
<b>Unique Type Identification:</b>	SCRT1202-900
<b>Serial Number:</b>	T1202900T0100710001630P
<b>Hardware Revision:</b>	1202-900 REV04
<b>FCC ID:</b>	O2J-365T
<b>Country of Manufacture:</b>	UK
<b>Date of Receipt:</b>	23 July 2007

### **2.2. Accessories**

The following accessory was used to exercise the EUT during testing:

<b>Description:</b>	Indoor Unit, SDR Base station
<b>Brand Name:</b>	Airspan Communications
<b>Model Name or Number:</b>	SDR-M-1-GPS
<b>Serial Number:</b>	S00044063T0623D
<b>Cable Length and Type:</b>	3m, fiber 1m, Cat5 UTP
<b>Connected to Port:</b>	SCRT OBSAI Ethernet Switch

### **2.3. Description of EUT**

The equipment under test is a broadband wireless access system base station, providing point-to-multipoint data communication.

### **2.4. Modifications Incorporated in the EUT**

During the course of testing the EUT was not modified.

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## 2.5. Additional Information Related to Testing

Power Supply Requirement:	DC Supply of 48 V
Intended Operating Environment:	Commercial and Light Industry
Equipment Category:	Fixed Point-to-Multipoint
Type of Unit:	Base Station (Fixed Use)
Channel Spacing:	5 MHz and 10 MHz
Highest Fundamental Frequency:	3697.5 MHz
Occupied Bandwidth:	5 MHz Channel: 4.8096MHz 10 MHz Channel: 9.2585 MHz

### For 5 MHz Channel Spacing:

Transmit Frequency Range:	3652.5 MHz to 3697.5 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	N/A	3652.5
	Centre	N/A	3675.0
	Top	N/A	3697.5

### For 10 MHz Channel Spacing:

Transmit Frequency Range:	3655.0 MHz to 3695 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	N/A	3655.0
	Centre	N/A	3675.0
	Top	N/A	3695.0

## 2.6. Port Identification

Port	Description
1	DC power (connected to 48 VDC power supply)
2	Antenna Port
3	OBSAI Port
4	Power Interface Port

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## 2.7. Support Equipment

<b>Description:</b>	Ethernet switch
<b>Brand Name:</b>	3Com
<b>Model Name or Number:</b>	Office Connect Dual Speed Switch 8
<b>Serial Number:</b>	0100/YJ9W630081573
<b>Cable Length and Type:</b>	1m, Cat5 UTP 1m, Cat5 UTP
<b>Connected to Port:</b>	SDR Laptop

<b>Description:</b>	Laptop
<b>Brand Name:</b>	Dell
<b>Model Name or Number:</b>	Latitude CPX
<b>Serial Number:</b>	AIRN004807
<b>Cable Length and Type:</b>	1m, Cat5 UTP
<b>Connected to Port:</b>	Ethernet Switch

<b>Description:</b>	Power supply – used for all testing except AC conducted emissions
<b>Brand Name:</b>	Thurlby Thandar
<b>Model Name or Number:</b>	PL320QMD
<b>Serial Number:</b>	036135
<b>Cable Length and Type:</b>	1m, 2 core
<b>Connected to Port:</b>	Port 1 (DC power)

<b>Description:</b>	Power supply – used for AC conducted emissions
<b>Brand Name:</b>	ISO-TECH
<b>Model Name or Number:</b>	IPS20302A
<b>Unique Type Identification:</b>	RFI Asset No. S0529
<b>Serial Number:</b>	504E005G2
<b>Country of Manufacture:</b>	China
<b>Note:</b>	This device was used for the AC conducted emissions test

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### **3. Test Specification, Methods and Procedures**

#### **3.1. Test Specifications**

<b>Reference:</b>	FCC Part 90: 2006
<b>Title:</b>	Code of Federal Regulations, Part 90 (47CFR290) Private Land Mobile Radio Services.

<b>Reference:</b>	FCC Test Plan Document Reference: 005-8300-013 27 June 2007 Draft
<b>Title:</b>	365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan

#### **3.2. Methods and Procedures**

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003

Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

#### **3.3. Definition of Measurement Equipment**

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

### **4. Deviations from the Test Specification**

There were no deviations from the test specification.



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## **5. Operation of the EUT During Testing**

### **5.1. Operating Modes**

The EUT was tested in the following operating modes, unless otherwise stated:

The EUT was in Commissioning mode and controlled from a laptop PC supplied by the client.

The EUT was set to transmit at 29 dBm for 5 MHz channel width and 32 dBm for 10 MHz channel width.

The EUT was set to transmit on the bottom, middle or top channel, using a 5 MHz or 10 MHz channel width, as required per each test case.

### **5.2. Configuration and Peripherals**

The EUT was tested in the following configuration:

The EUT was connected to an SDR basestation, Ethernet switch and DC power supply.

The SCRT was powered by a 48 V supply throughout testing, not powered by the SDR.

The EUT was connected via Ethernet to an Ethernet switch, then to the supporting laptop.

Conducted RF measurements were performed on the antenna port.

Radiated measurements were performed with the antenna port terminated into a 50 ohm load.

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## **6. Summary of Test Results**

<b>Range of Measurements</b>	<b>Specification Reference</b>	<b>Port Type</b>	<b>Compliance Status</b>
Transmitter AC Conducted Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2006 Section 15.207	AC Mains	Complied
Transmitter Carrier Output Power (ERP)	CFR. 47 FCC Part 90: 2006 Sections 90.1321/2.1046 TIA-603-B Section 2.2.1	Antenna Terminal	Complied
Transmitter Power Output Density	C.F.R. 47 FCC Part 90: 2006 Sections 90.1321/2.1046	Antenna Terminal	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 90: 2006 Sections 90.209/2.1049	Antenna Terminal	Complied
Transmitter Conducted Emissions Masks	C.F.R. 47 FCC Part 90: 2006 Sections 90.210(b)/90.210(n)/2.1051 TIA-603-B Section 2.2.13	Antenna Terminal	Complied
Transmitter Conducted Emissions	C.F.R. 47 FCC Part 90: 2006 Sections 90.1323/2.1051 TIA-603-B Section 2.2.13	Antenna Terminal	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 90: 2006 Sections 90.1323/2.1053 TIA-603-B Section 2.2.12	Enclosure	Complied
Transmitter Frequency Stability (Temperature & Voltage Variation)	CFR 47 FCC Part 90: 2006 Sections 90.213/2.1055 TIA-603-B Section 2.2.2	Antenna Terminal	Complied
Contention Based Protocol	CFR 47 FCC Part 90: 2006 Sections 90.203(m)	Antenna Terminal	Complied

### **6.1. Location of Tests**

All the measurements described in this report were performed at the premises of RFI Global Services Ltd., Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, UK.

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## **7. Measurements, Examinations and Derived Results**

### **7.1. General Comments**

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.1.3. All measurements were made in accordance with the test plan, Document Reference: 005-8300-013 Dated 27 June 2007 Rev.: Draft.

7.1.4. All testing was performed for compliance of the SCRT transceiver only.

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## 7.2. Transmitter AC Conducted Spurious Emissions: Section 15.207

### Results:

#### Quasi-Peak Detector Measurements on Live and Neutral Lines

##### Top Channel

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.154500	Live	59.9	79.0	19.1	Complied
0.177000	Live	58.1	79.0	20.9	Complied
0.199500	Live	56.1	79.0	22.9	Complied
0.226500	Live	47.7	79.0	31.3	Complied
0.523500	Neutral	39.0	73.0	34.0	Complied
0.546000	Neutral	40.0	73.0	33.0	Complied
15.918000	Live	33.1	73.0	39.9	Complied
17.106000	Live	37.4	73.0	35.6	Complied
17.389500	Live	33.6	73.0	39.4	Complied
19.932000	Live	20.6	73.0	52.4	Complied

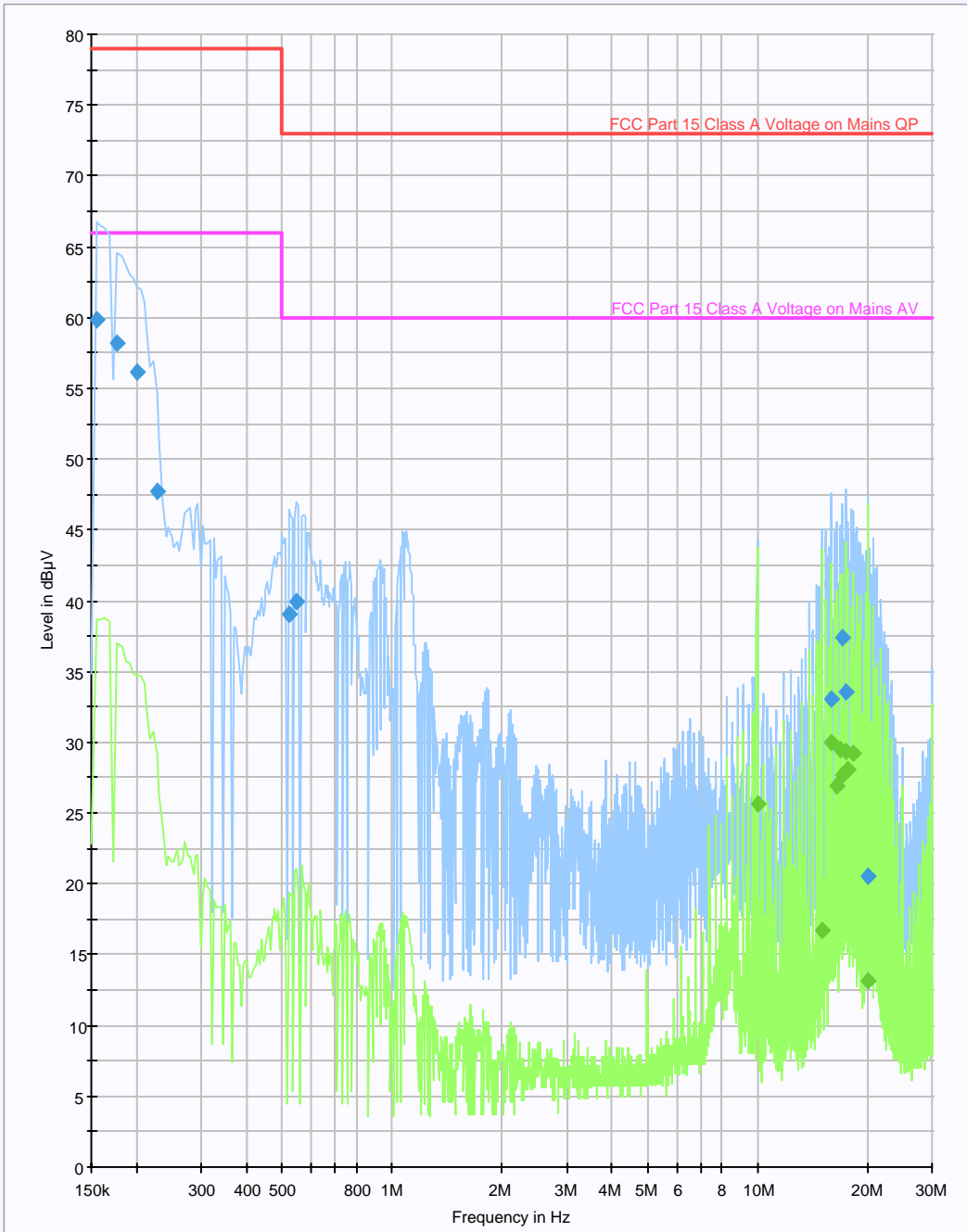
#### Average Detector Measurements on Live and Neutral Lines

##### Top Channel

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
9.964500	Live	25.7	60.0	34.3	Complied
14.946000	Live	16.8	60.0	43.2	Complied
15.936000	Live	30.0	60.0	30.0	Complied
16.525500	Live	26.9	60.0	33.1	Complied
16.818000	Live	29.5	60.0	30.5	Complied
17.115000	Live	27.7	60.0	32.3	Complied
17.407500	Live	29.3	60.0	30.7	Complied
17.704500	Live	28.1	60.0	31.9	Complied
18.294000	Live	29.3	60.0	30.7	Complied
19.932000	Live	13.2	60.0	46.8	Complied

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**Transmitter AC Conducted Spurious Emissions: Section 15.207 (Continued)**



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### 7.3. Transmitter Carrier Output Power (Conducted): Sections 90.1321/2.1046

#### 5 MHz Channel Bandwidth

Channel	Frequency (MHz)	Conducted O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	28.3	35.3	44.0	8.7	Complied
Centre	3675.0	28.9	35.9	44.0	8.1	Complied
Top	3697.5	29.1	36.1	44.0	7.9	Complied

#### 10 MHz Channel Bandwidth

Channel	Frequency (MHz)	Conducted O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	31.6	38.6	44.0	5.4	Complied
Centre	3675.0	30.9	37.9	44.0	6.1	Complied
Top	3695.0	30.8	37.8	44.0	6.2	Complied

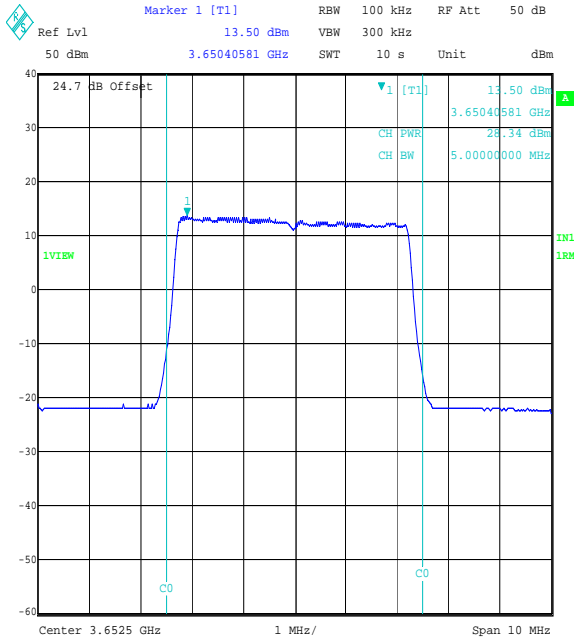
#### Note(s):

1. Measurements were performed on bottom, middle and top channels, 5 MHz and 10 MHz channel bandwidth, as specified within the test plan using the spectrum analyser channel power function.
2. The Client stated that the system is to be used with an omni-directional antenna with 7 dBi gain.

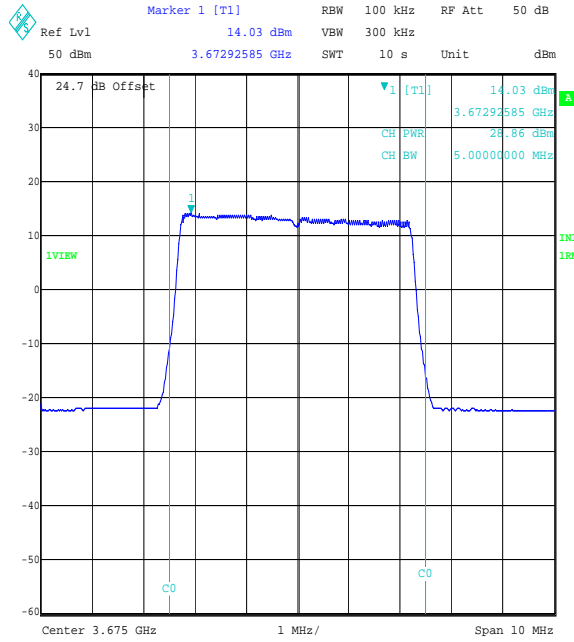
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**Transmitter Carrier Output Power (Conducted): (Continued)**

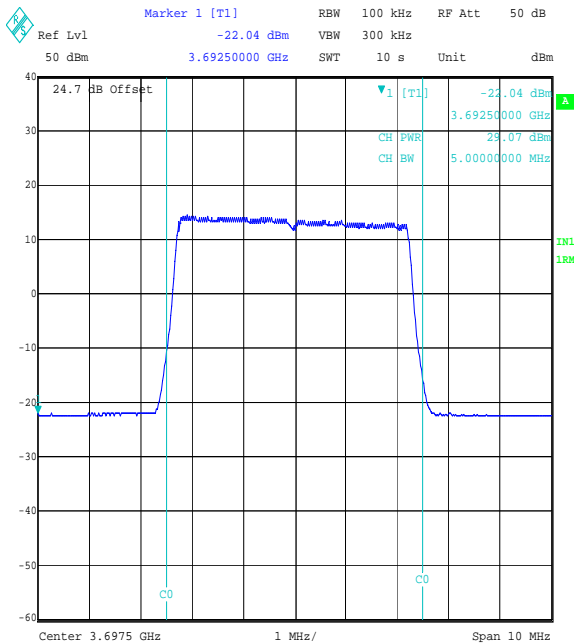
**5 MHz Channel Bandwidth**



Title: 49355JD02 FCC PART 90  
Comment A: RF OUTPUT POWER 5 MHz BOTTOM CHANNEL  
Date: 8.AUG.2007 14:32:11



Title: 49355JD02 FCC PART 90  
Comment A: RF OUTPUT POWER 5 MHz CENTRE CHANNEL  
Date: 8.AUG.2007 14:31:13

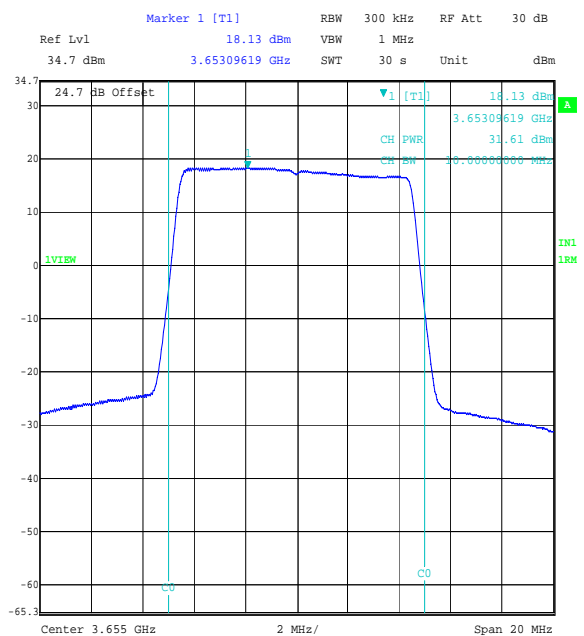


Title: 49355JD02 FCC PART 90  
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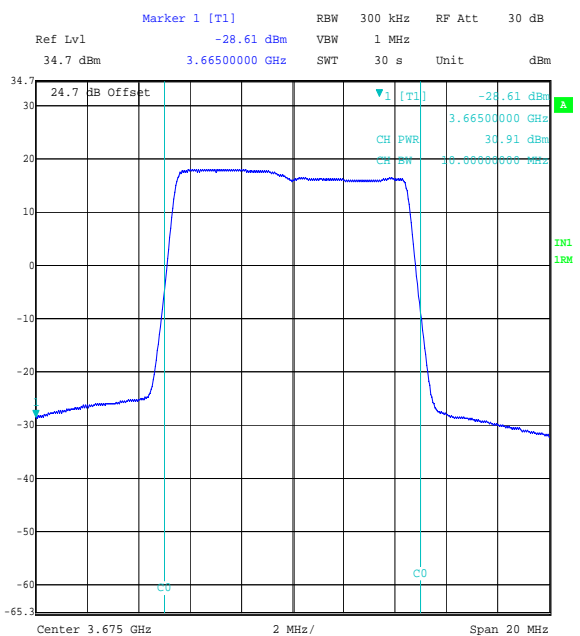
Test of: Airspan Communications Ltd.  
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**Transmitter Carrier Output Power (Conducted): (Continued)**

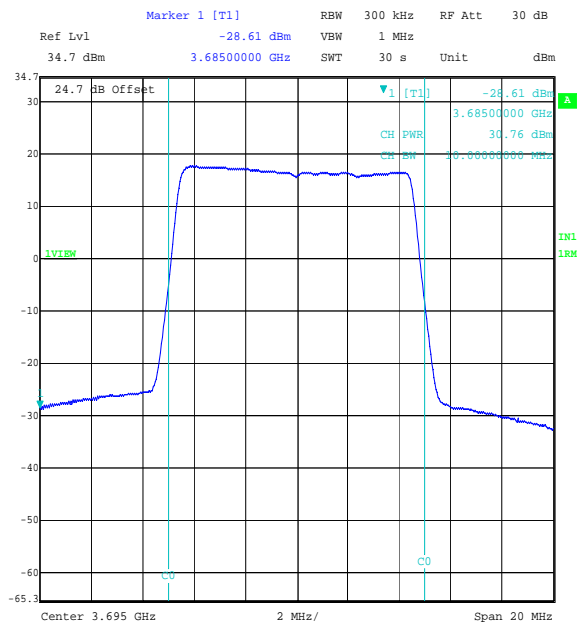
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Title: 49355JD02 FCC PART 90  
 Comment A: RF OUTPUT POWER 10 MHz CENTRE CHANNEL  
 Date: 27.JUL.2007 15:06:43



Title: 49355JD02 FCC PART 90  
 Comment A: RF OUTPUT POWER 10 MHz TOP CHANNEL  
 Date: 27.JUL.2007 15:08:55



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#### **7.4. Transmitter Peak Power Spectral Density (Conducted): Sections 90.1321/2.1046**

##### **Results:**

The highest peak level of the carrier emission found in a 1 MHz measurement bandwidth was measured.

##### **5 MHz Channel Bandwidth**

Channel	Frequency (MHz)	Conducted O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3652.5	22.4	29.4	30.0	0.6	Complied
Top	3697.5	22.9	29.9	30.0	0.1	Complied

##### **10 MHz Channel Bandwidth**

Channel	Frequency (MHz)	Conducted O/P Power (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	3655.0	22.8	29.2	30.0	0.2	Complied
Top	3695.0	22.8	29.2	30.0	0.2	Complied

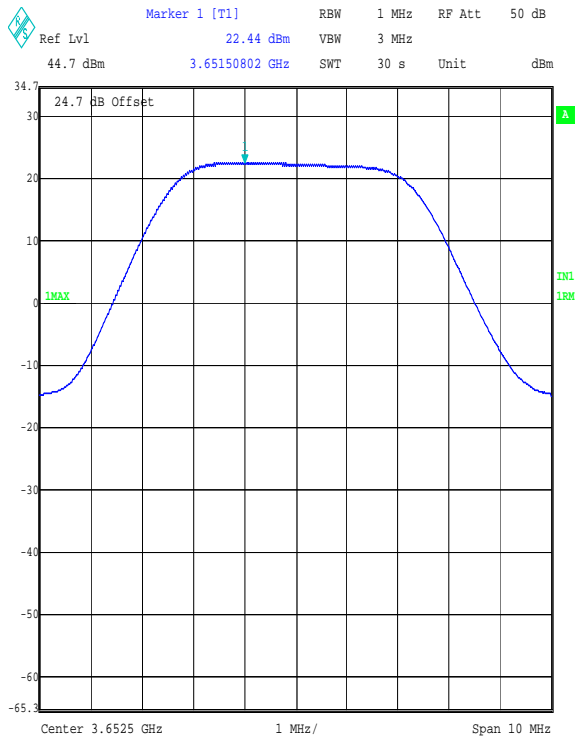
##### **Note(s):**

1. Measurements were performed on bottom and top channel, 5 MHz and 10 MHz channel bandwidth, as specified within the test plan.
2. The Client stated that the system is to be used with an omni-directional antenna with 7 dBi gain.

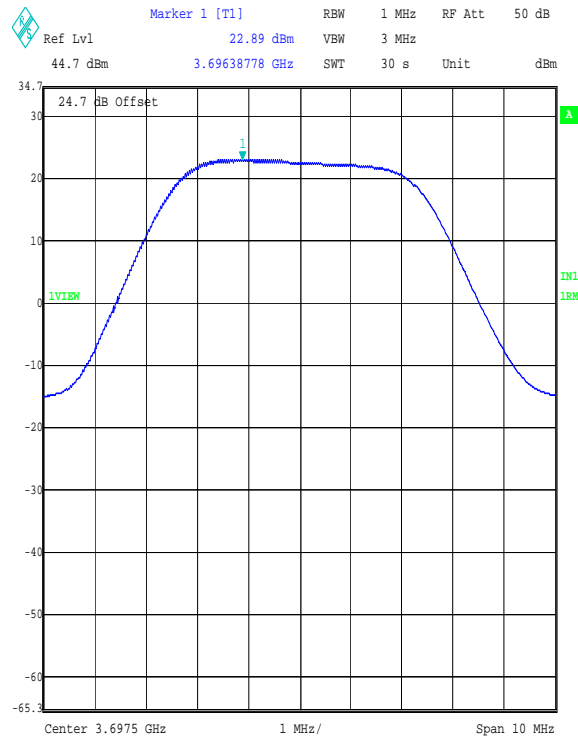
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**Transmitter Peak Power Spectral Density (Conducted): Sections 90.1321/2.1046 (Continued)**

**5 MHz Channel Bandwidth**



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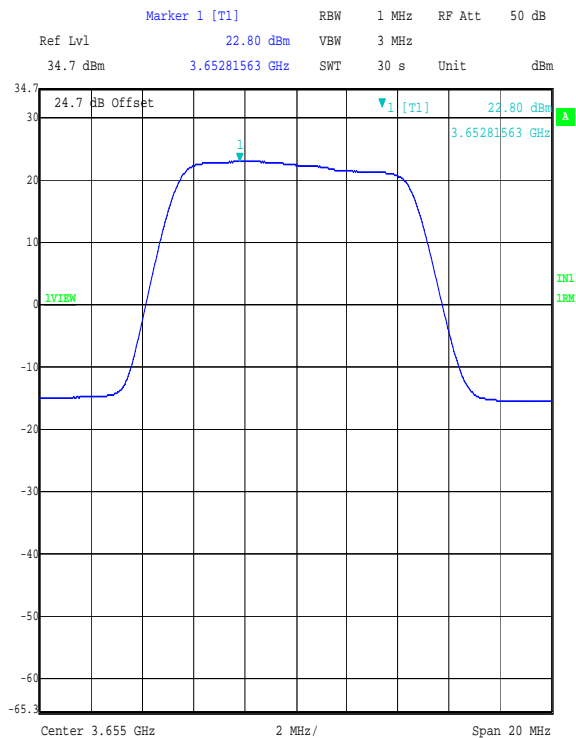


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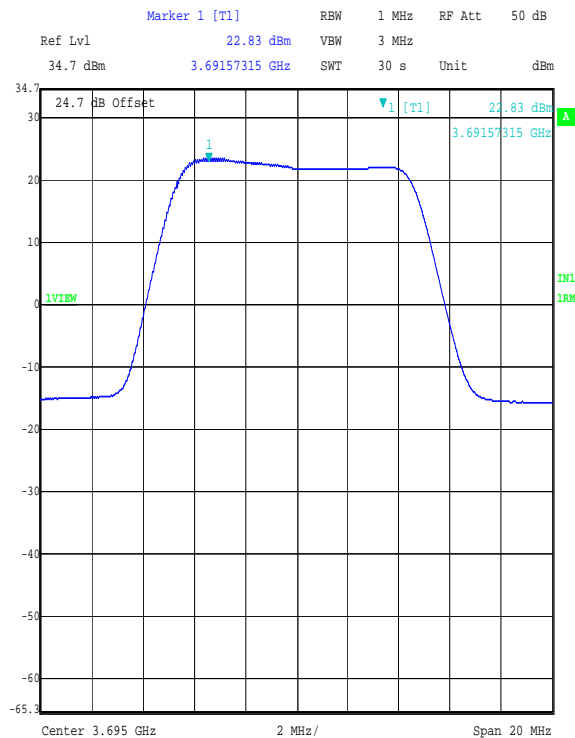
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**Transmitter Peak Power Spectral Density (Conducted): Sections 90.1321/2.1046 (Continued)**

**10 MHz Channel Bandwidth**



Title: 49355JD02 FCC PART 90  
 Comment A: RF POWER DENSITY 10 MHz BOTTOM CHANNEL  
 Date: 27.JUL.2007 14:23:35



Title: 49355JD02 FCC PART 90  
 Comment A: RF POWER DENSITY 10 MHz TOP CHANNEL  
 Date: 27.JUL.2007 14:08:03

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**7.5. Transmitter Occupied Bandwidth (Bandwidth Limitations):**  
**Sections 90.209/2.1049**

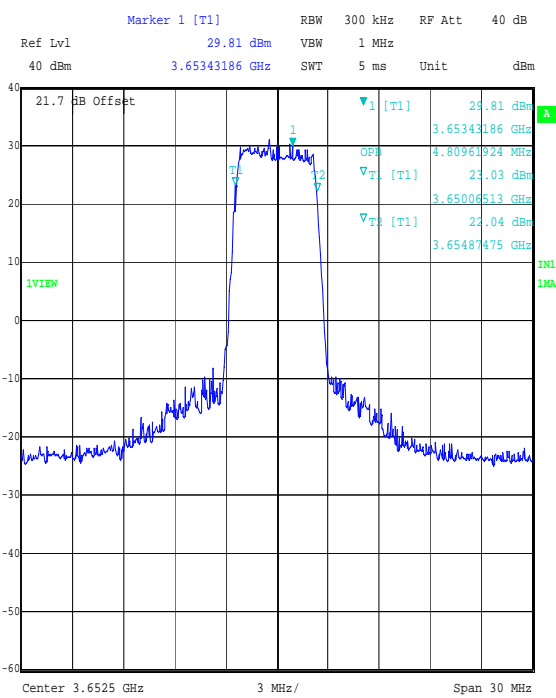
**Results:**

**5 MHz Channel Bandwidth**

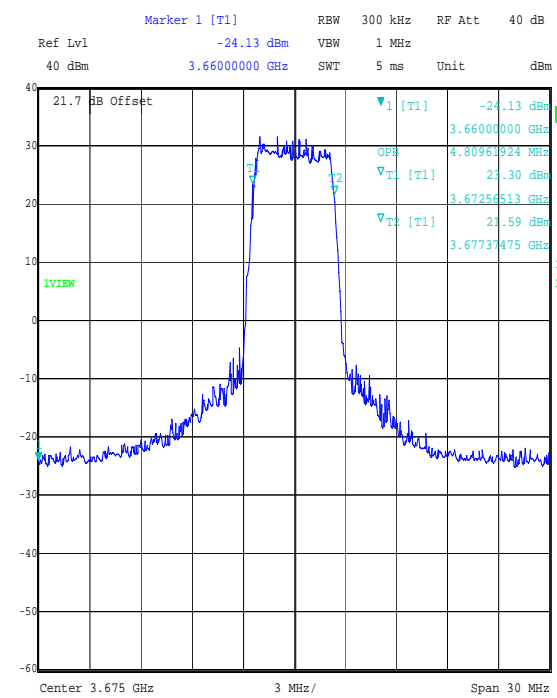
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (kHz)
Bottom	3652.5	300	1000	4809.6
Centre	3675.0	300	1000	4809.6
Top	3797.5	300	1000	4809.6

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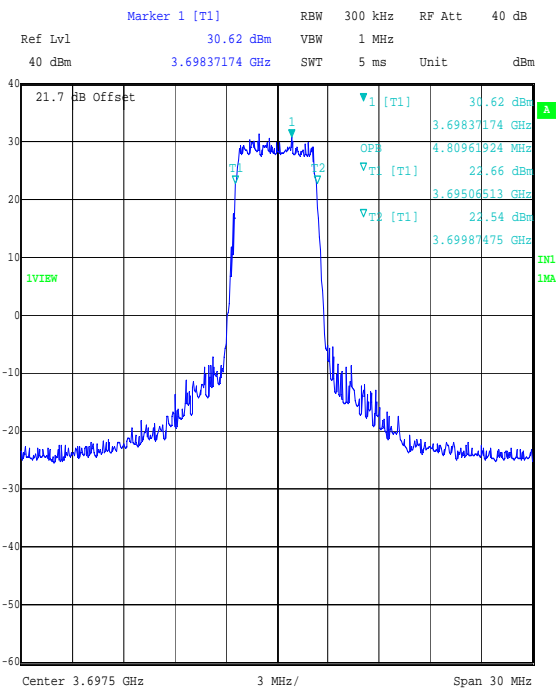
**Transmitter Occupied Bandwidth (Bandwidth Limitations): Sections 90.209/2.1049**



Title: 49355JD02 FCC PART 90  
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 Date: 24.JUL.2007 15:00:58



Title: 49355JD02 FCC PART 90  
 Comment A: OCCUPIED BANDWIDTH 5 MHz CENTRE CHANNEL  
 Date: 24.JUL.2007 15:01:46



Title: 49355JD02 FCC PART 90  
 Comment A: OCCUPIED BANDWIDTH 5 MHz TOP CHANNEL  
 Date: 24.JUL.2007 15:02:57

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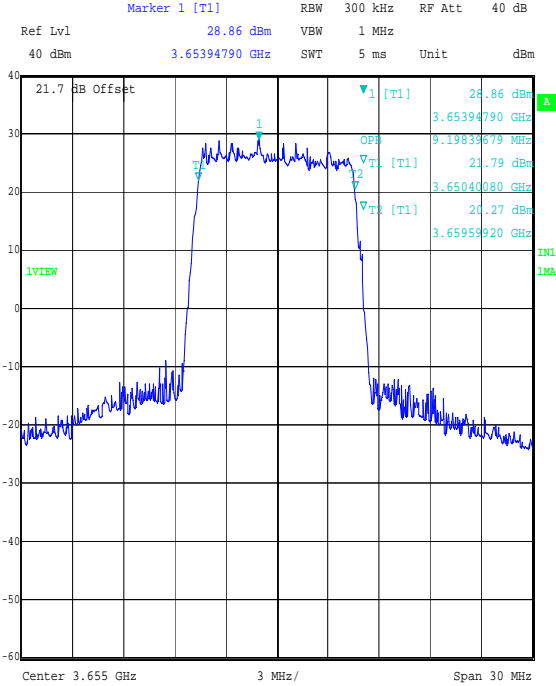
**Transmitter Occupied Bandwidth (Bandwidth Limitations): Sections 90.209/2.1049**

**10 MHz Channel Bandwidth**

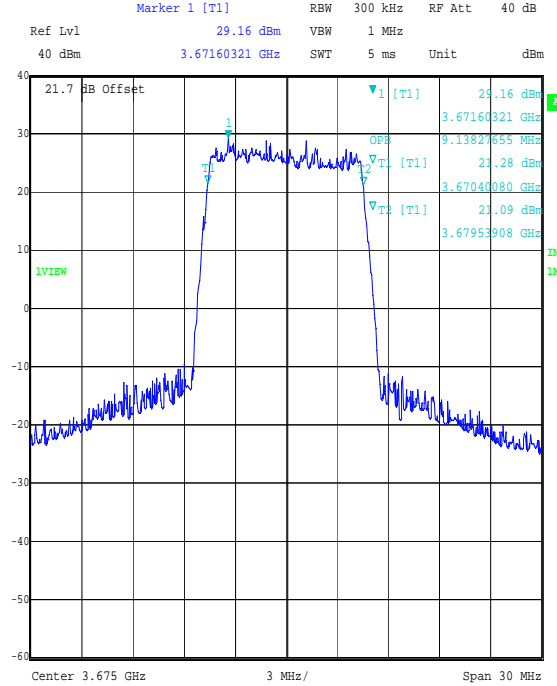
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (kHz)
Bottom	3655	300	1000	9198.396
Centre	3675	300	1000	9138.276
Top	3695	300	1000	9258.517

Test of: **Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)**  
 To: **FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
 2007**

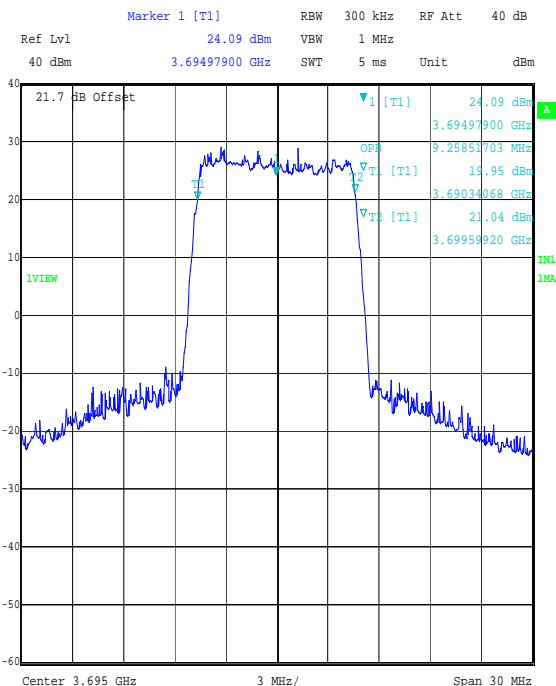
**Transmitter Occupied Bandwidth (Bandwidth Limitations):Sections 90.209/2.1049**



Title: 49355JD02 FCC PART 90  
 Comment A: OCCUPIED BANDWIDTH 10 MHz BOTTOM CHANNEL  
 Date: 24.JUL.2007 14:50:24



Title: 49355JD02 FCC PART 90  
 Comment A: OCCUPIED BANDWIDTH 10 MHz CENTRE CHANNEL  
 Date: 24.JUL.2007 14:48:58



Title: 49355JD02 FCC PART 90  
 Comment A: OCCUPIED BANDWIDTH 10 MHz TOP CHANNEL  
 Date: 24.JUL.2007 14:46:52

Test of: Airspan Communications Ltd.

SCRT (Single Channel Radio Transceiver)

To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

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## **7.6. Transmitter Conducted Emissions Mask: Sections 90.210(n)/ 90.210(b)/2.1051**

### **Results:**

The measurement was performed with the EUT antenna port coupled to a spectrum analyser via suitable attenuation and cable.

The power of the modulated signal was measured on a spectrum analyser using an RMS detector and 10 second sweep time, to give the full output power in the whole channel band. The spectrum analyser power measurements were verified using a calibrated power meter.

The limit mask was placed at the level of the peak of the carrier. The analyser resolution bandwidth was then changed to 1 MHz, to carry out the measurement according to the applicable Standard.

To eliminate the effects of measuring with a relatively wide resolution bandwidth, which caused the signal to cross the mask limit, the final measurements were performed with a 100 kHz resolution bandwidth and the mask limit was reduced by 10 dB to compensate.

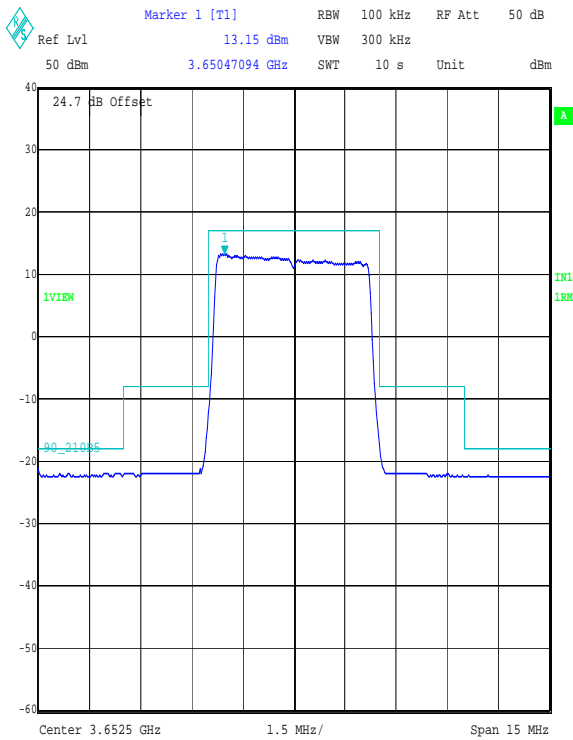
### **Note(s):**

1. *Measurements were performed on bottom and top channel, 5 MHz and 10 MHz channel bandwidth, as specified within the test plan.*

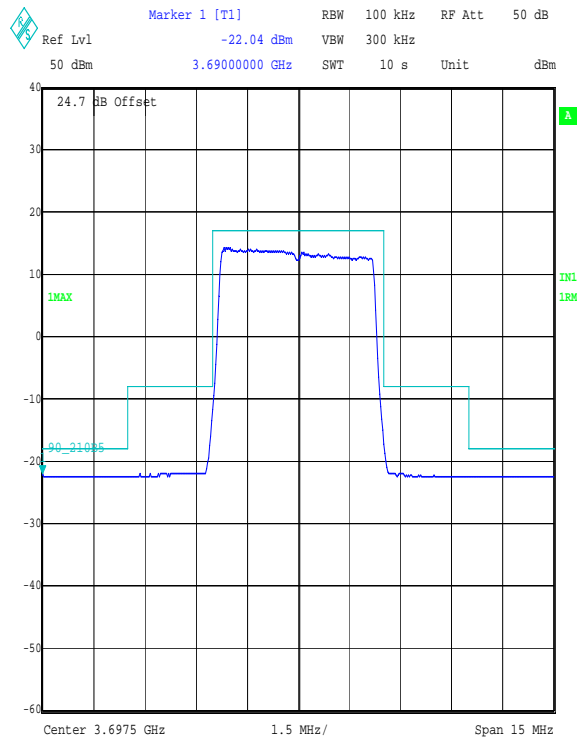


Test of: Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)  
To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**Transmitter Conducted Emissions Mask: Sections 90.210(n)/ 90.210(b)/2.1051 (Continued)**  
**5 MHz Channel Width**



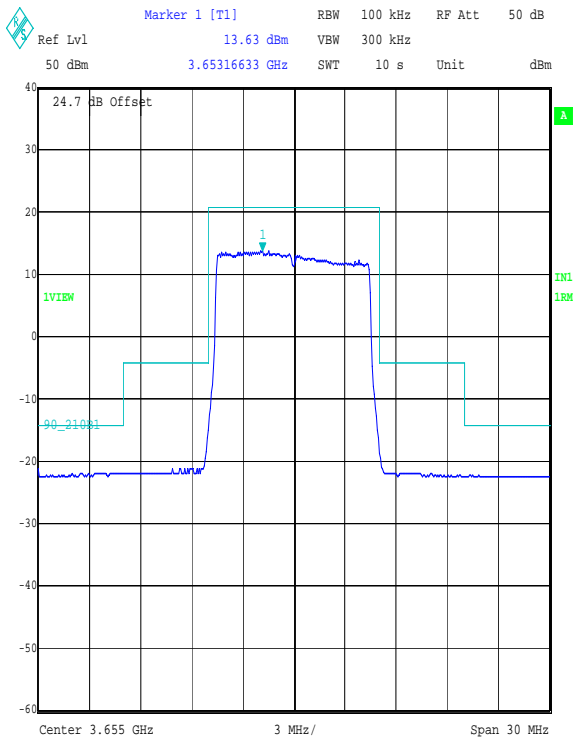
Title: 49355JD02 FCC PART 90  
Comment A: SPECTRUM MASK 5 MHz BOTTOM CHANNEL  
Date: 8.AUG.2007 13:57:48



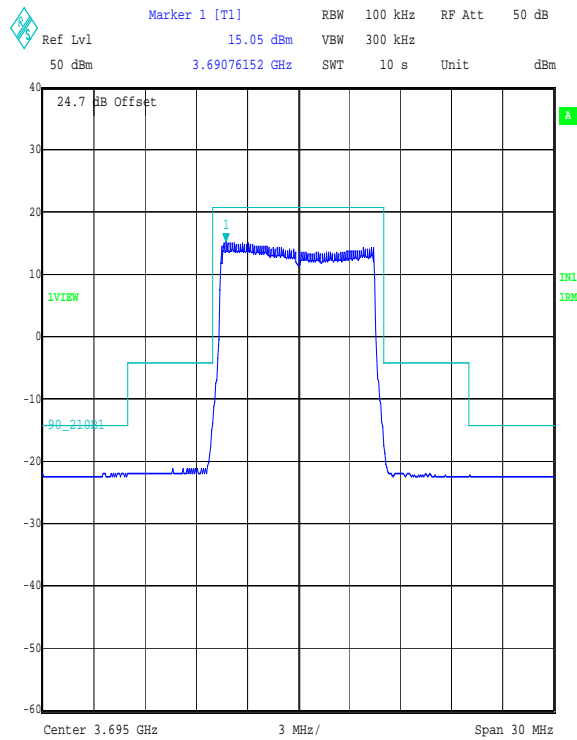
Title: 49355JD02 FCC PART 90  
Comment A: SPECTRUM MASK 5 MHz TOP CHANNEL  
Date: 8.AUG.2007 14:00:03

Test of: Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)  
To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**Transmitter Conducted Emissions Mask: Sections 90.210(n)/ 90.210(b)/2.1051 (Continued)**  
**10 MHz Channel Width**



Title: 49355JD02 FCC PART 90  
Comment A: SPECTRUM MASK 10 MHz BOTTOM CHANNEL  
Date: 8.AUG.2007 13:44:56



Title: 49355JD02 FCC PART 90  
Comment A: SPECTRUM MASK 10 MHz TOP CHANNEL  
Date: 8.AUG.2007 13:39:43

Test of: Airspan Communications Ltd.

SCRT (Single Channel Radio Transceiver)

To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

### 7.7. Transmitter Conducted Emissions: Section 90.1323/2.1051

Measurements were made at the antenna connector.

#### 5 MHz Channel Bandwidth

##### Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
<i>Note 1</i>					

##### Top Channel

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
<i>Note 1</i>					

#### 10 MHz Channel Bandwidth

##### Bottom Channel

Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
<i>Note 1</i>					

##### Top Channel

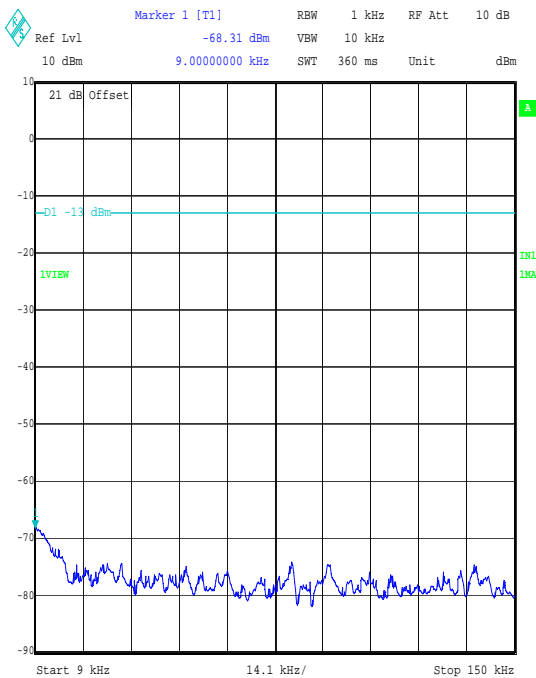
Frequency (MHz)	Peak Emission Level (dBm)	Peak Emission Level (dBc)	Limit (dBc)	Margin (dB)	Result
<i>Note 1</i>					

#### Note(s):

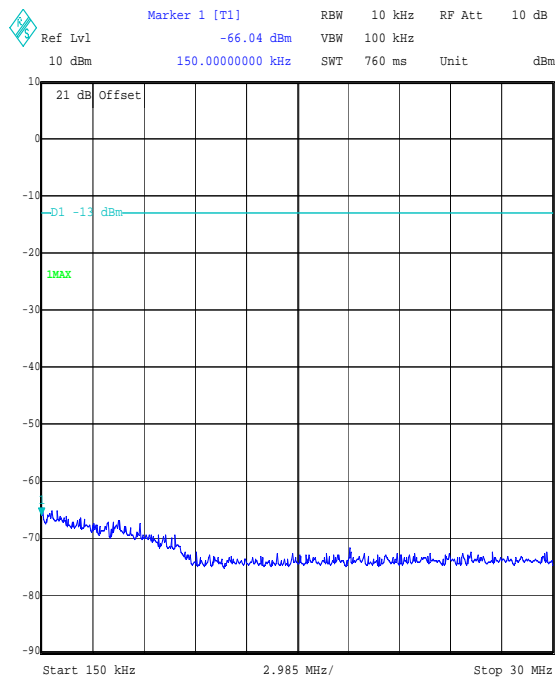
1. No spurious emissions were detected above the noise floor of the measuring receiver. Where possible, the noise floor was at least 20 dB below the specified limit. In cases where the noise floor was not 20 dB below the limit, the highest peak level of noise floor observed was -31.9 dBm at 3.322 GHz.
2. Measurements were performed on bottom and top channel, with 5 MHz and 10 MHz channel bandwidths. Since the results were similar, only the plots from the 10 MHz top channel are shown in this report

**Test of:** Airspan Communications Ltd.  
**SCRT (Single Channel Radio Transceiver)**  
**To:** FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

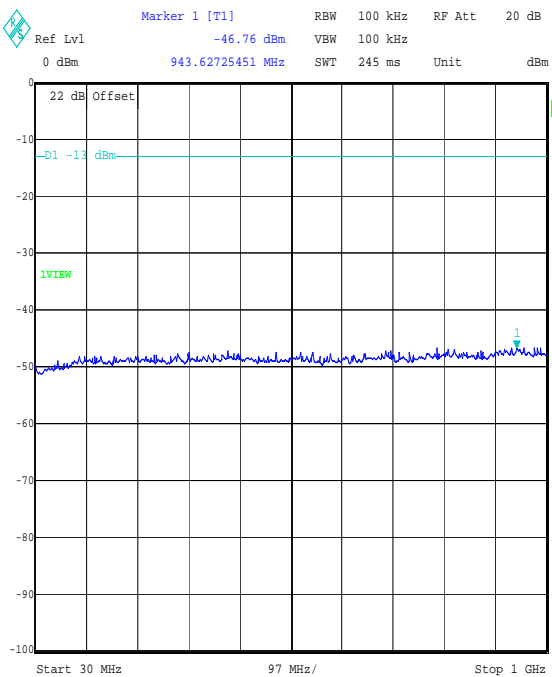
**Transmitter Conducted Emissions: Section 90.1323/2.1051 – 10 MHz, Top Channel**



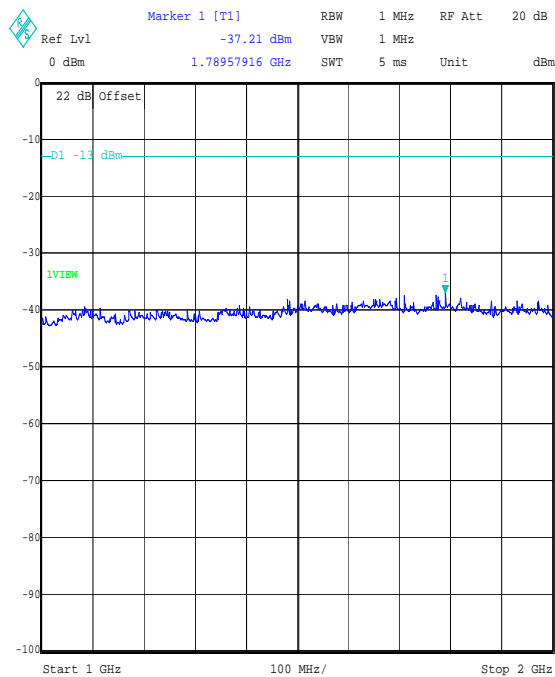
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 8.AUG.2007 08:59:02



Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 8.AUG.2007 09:01:37



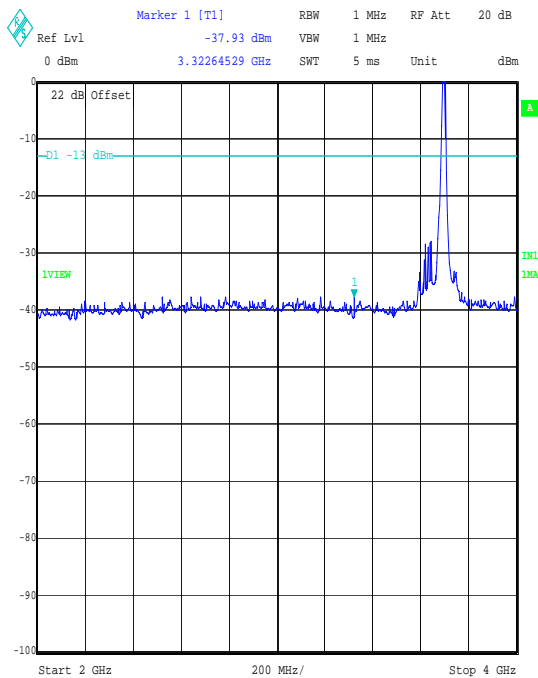
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:11:53



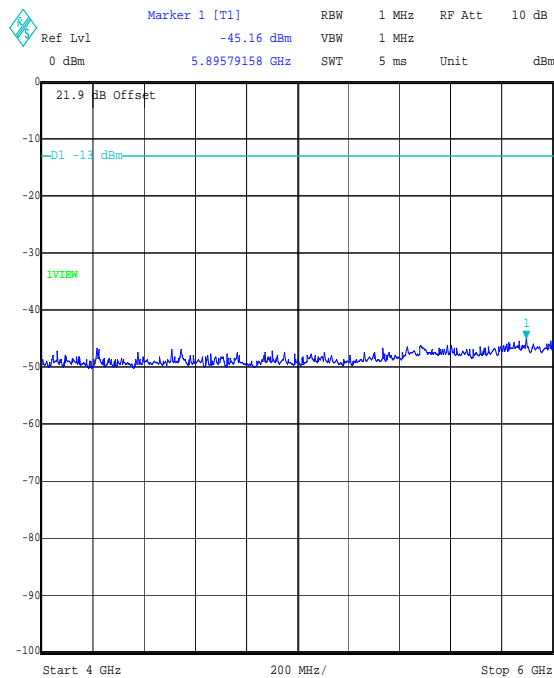
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:14:41

Test of: **Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)**  
 To: **FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
 2007**

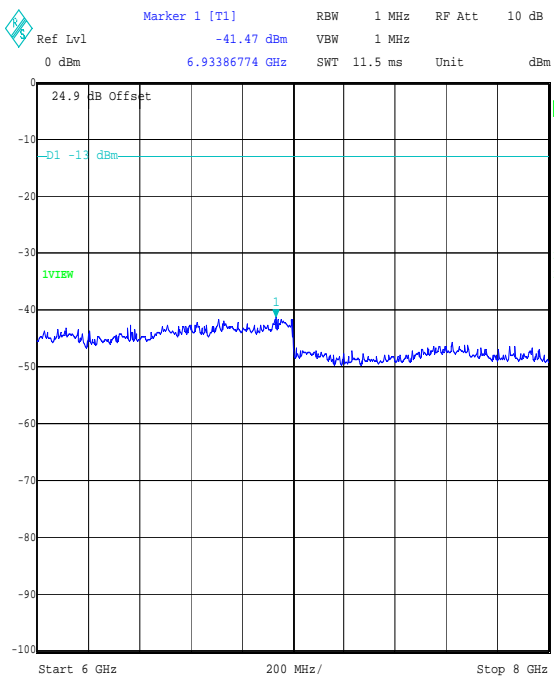
**Transmitter Conducted Emissions: Section 90.1323/2.1051 – 10 MHz, Top Channel**



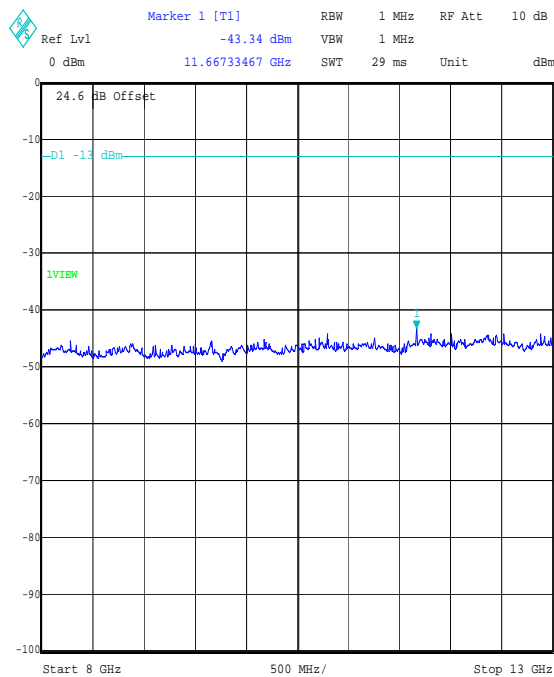
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:16:17



Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:18:01



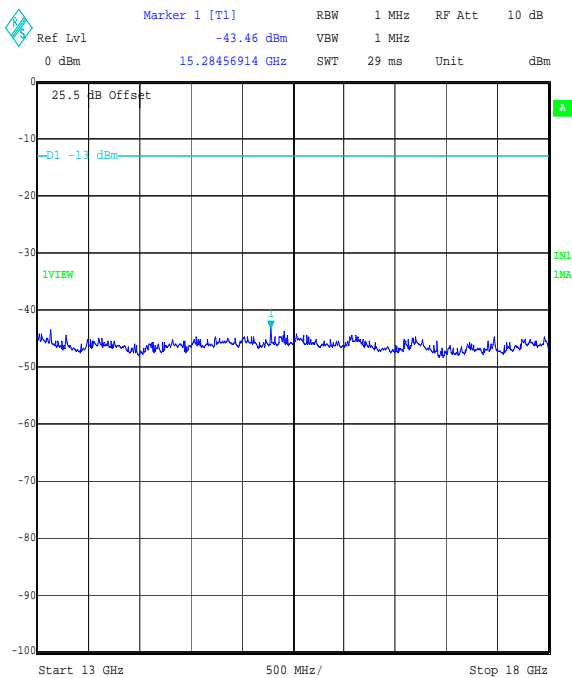
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:21:15



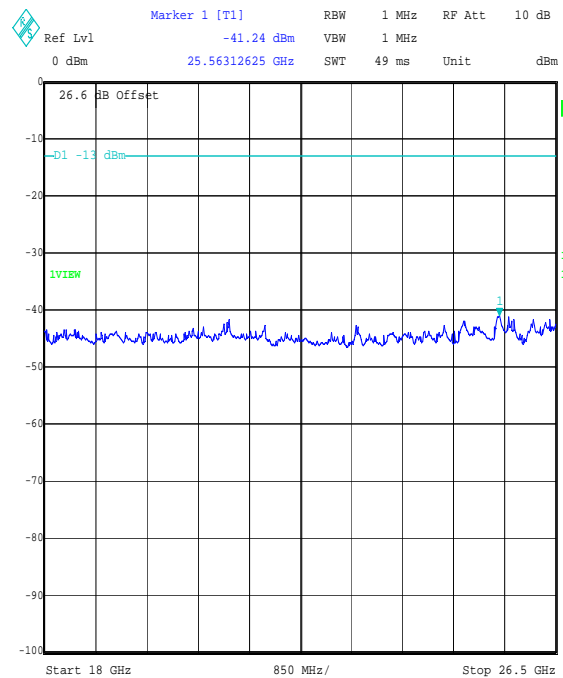
Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:22:32

Test of: **Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)**  
 To: **FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007**

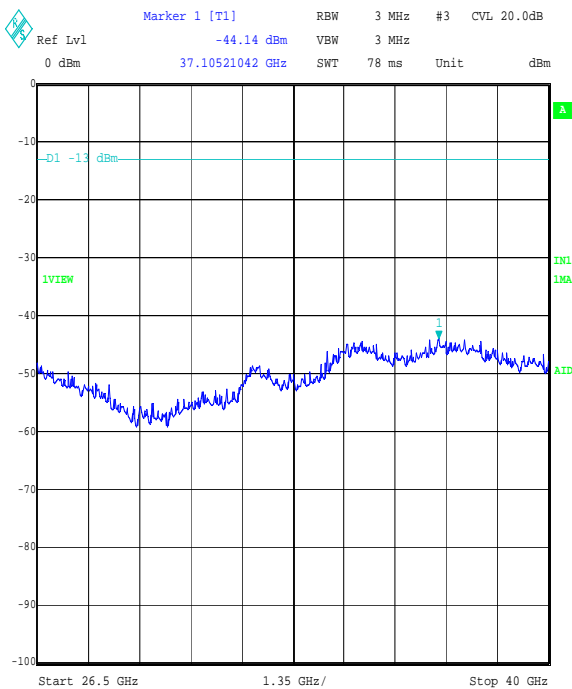
**Transmitter Conducted Emissions: Section 90.1323/2.1051 – 10 MHz, Top Channel**



Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:23:33



Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 15:24:52



Title: 49355JD02 FCC PART 90  
 Comment A: TX CONDUCTED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 8.AUG.2007 09:58:41

Test of: Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
 To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**7.8. Transmitter Band Edge Conducted Emissions: Section 90.1323/2.1051**

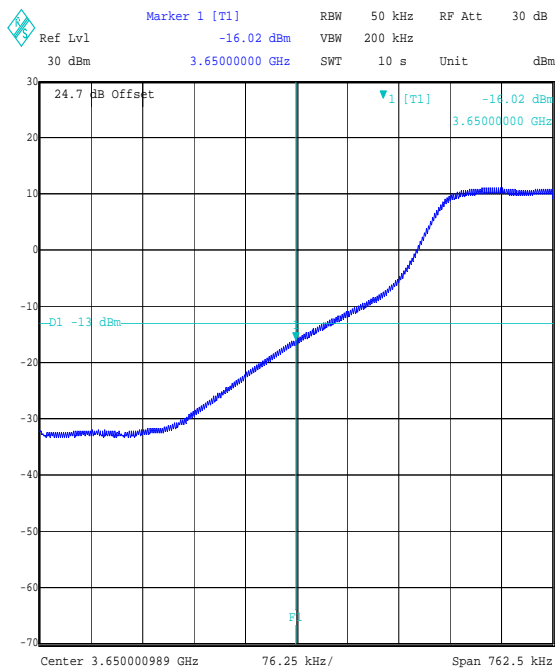
7.8.1. The EUT was configured for transmitter conducted emission measurements as described in Section 9 of this report.

7.8.2. Tests were performed to identify the maximum conducted band edge emission levels.

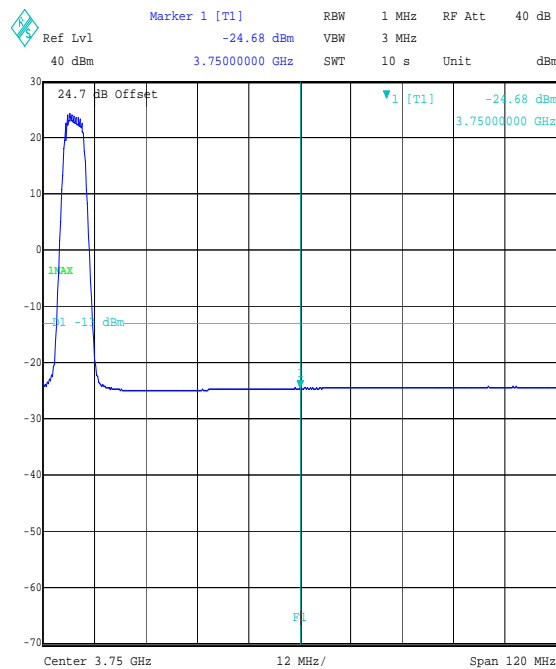
7.8.3. The tests were initially performed with a 1 MHz resolution bandwidth (RBW). Where the band edge limit was exceeded on the bottom channels with 1 MHz RBW, the EUT was retested using a RBW of more than 1% of the emission bandwidth in the first 1 MHz strip adjacent to the band edge.

**Results: 5 MHz channel width**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-16.0	-13.0	3.0	Complied
3750	-24.7	-13.0	11.7	Complied



Title: 49355JD02 FCC PART 90  
 Comment A: CONDUCTED EMISSIONS LOWER BAND EDGE 5 MHz BOTTOM CHANNEL  
 Date: 8.AUG.2007 15:22:45



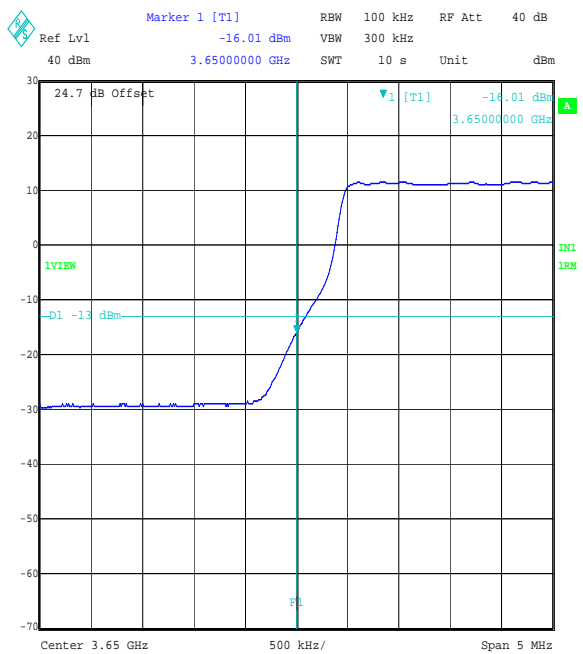
Title: 49355JD02 FCC PART 90  
 Comment A: CONDUCTED EMISSIONS UPPER BAND EDGE 5 MHz TOP CHANNEL  
 Date: 8.AUG.2007 15:27:09

Test of: Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
 To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

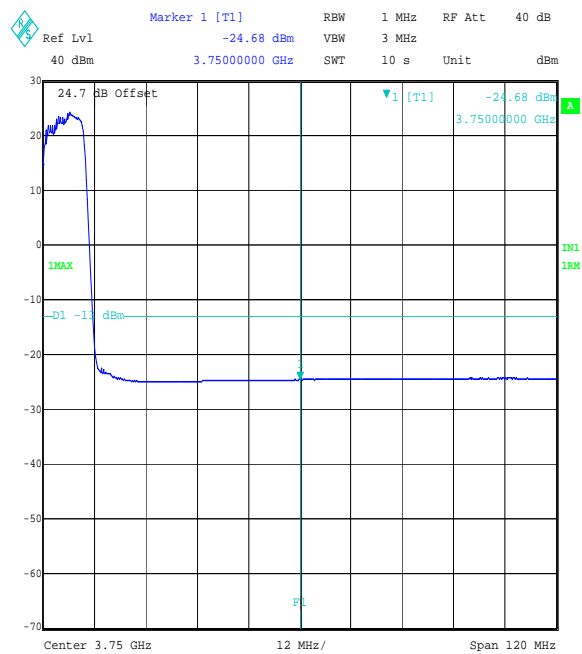
**7.8.4. Transmitter Band Edge Conducted Emissions: Section 90.1323/2.1051 (Continued)**

**Results: 10 MHz channel width**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-16.0	-13.0	3.0	Complied
3750	-24.7	-13.0	11.7	Complied



Title: 49355JD02 FCC PART 90  
 Comment A: CONDUCTED EMISSIONS LOWER BAND EDGE 10 MHz BOTTOM CHANNEL  
 Date: 8.AUG.2007 15:35:22



Title: 49355JD02 FCC PART 90  
 Comment A: CONDUCTED EMISSIONS UPPER BAND EDGE 10 MHz TOP CHANNEL  
 Date: 8.AUG.2007 15:30:08



Test of: Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)  
To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
2007

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### 7.9. Transmitter Radiated Emissions: Section 90.1323/2.1053

#### Results:

#### 10 MHz Channel Bandwidth

#### Top Channel

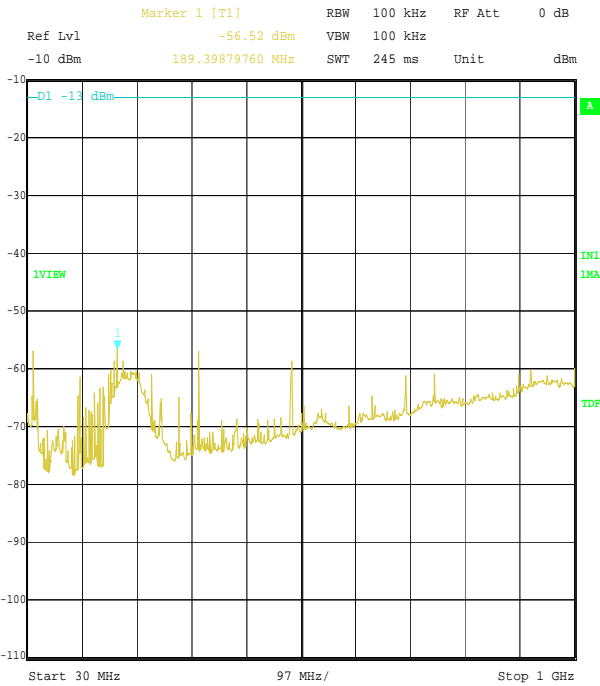
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
6.428857	-47.8	-13.0	34.8	Complied

#### Note(s):

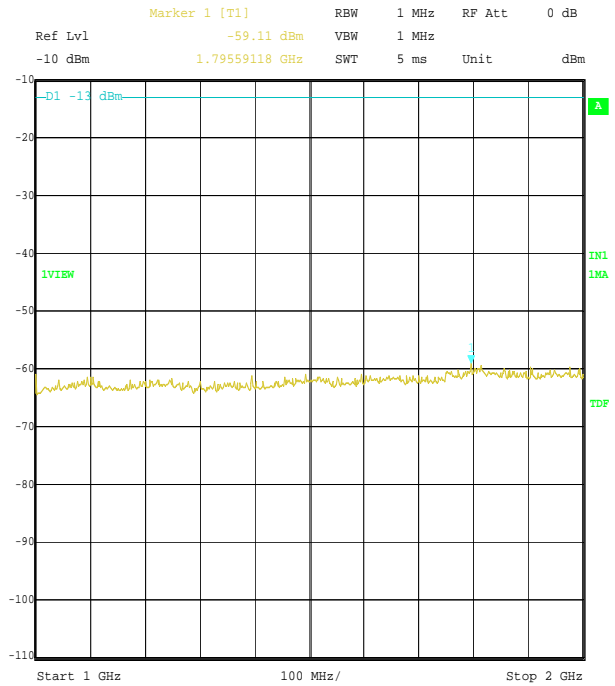
1. The highest emission level was recorded in the table above. All other emissions were below the limit by a margin of more than 35 dB.
2. Measurements were only performed on the top channel with 10 MHz channel bandwidth, as specified within the test plan.

Test of: **Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)**  
 To: **FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
 2007**

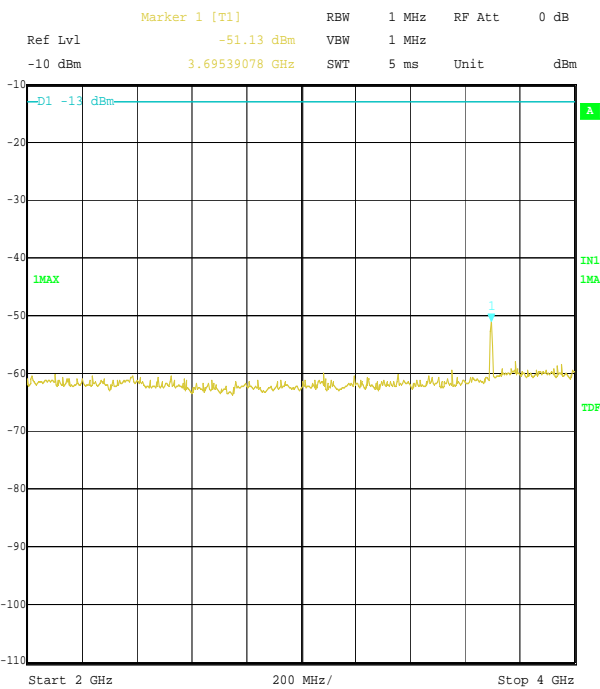
**Transmitter Radiated Emissions: Section 90.1323/2.1053, (continued)**



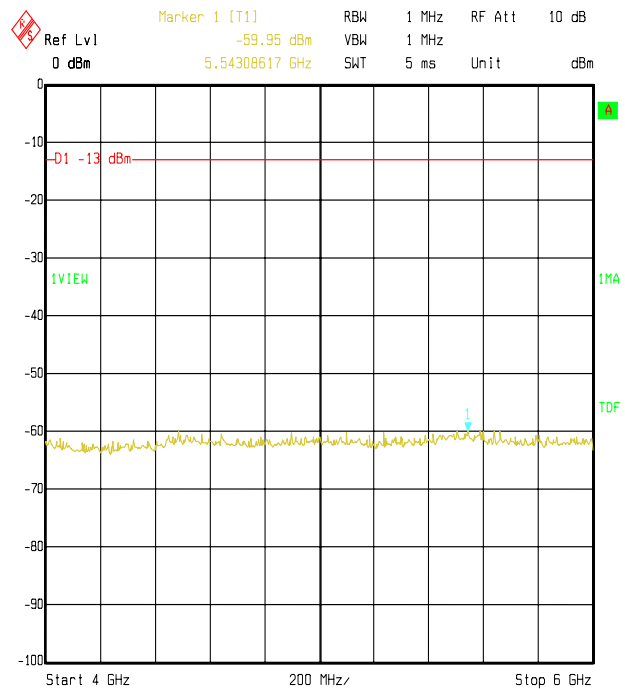
Title: 49355JD02 FCC PART 90  
 Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 08:50:49



Title: 49355JD02 FCC PART 90  
 Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 09:42:06



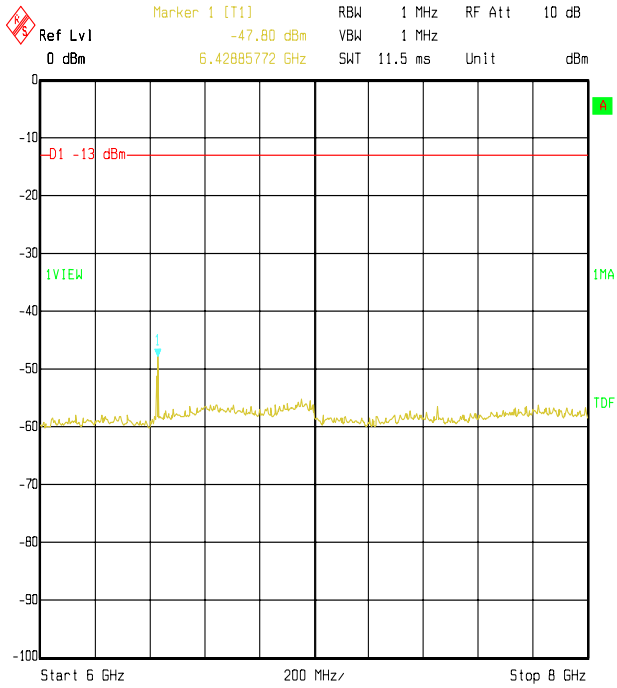
Title: 49355JD02 FCC PART 90  
 Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 6.AUG.2007 09:49:14



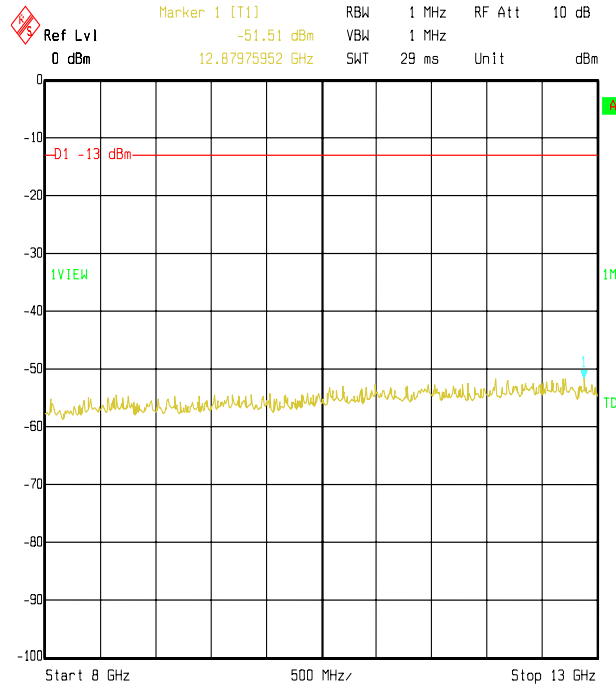
Title: 49355JD02 FCC PART 90  
 Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
 Date: 30.JUL.2007 09:23:28

Test of: **Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)**  
To: **FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
2007**

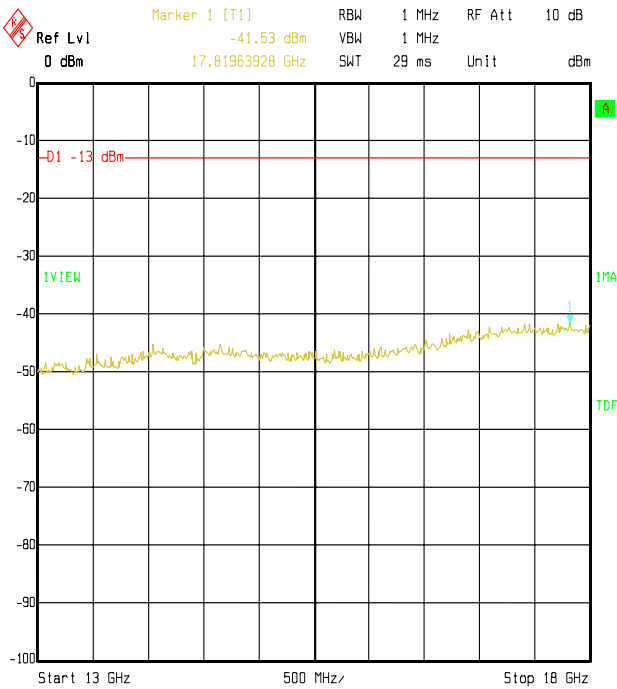
**Transmitter Radiated Emissions: Section 90.1323/2.1053, (Continued)**



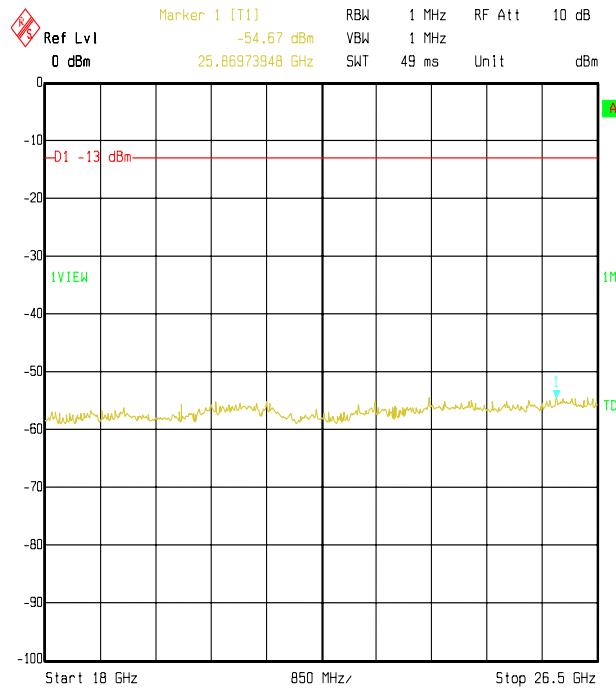
Title: 49355JD02 FCC PART 90  
Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
Date: 30.JUL.2007 09:30:27



Title: 49355JD02 FCC PART 90  
Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
Date: 30.JUL.2007 11:24:23



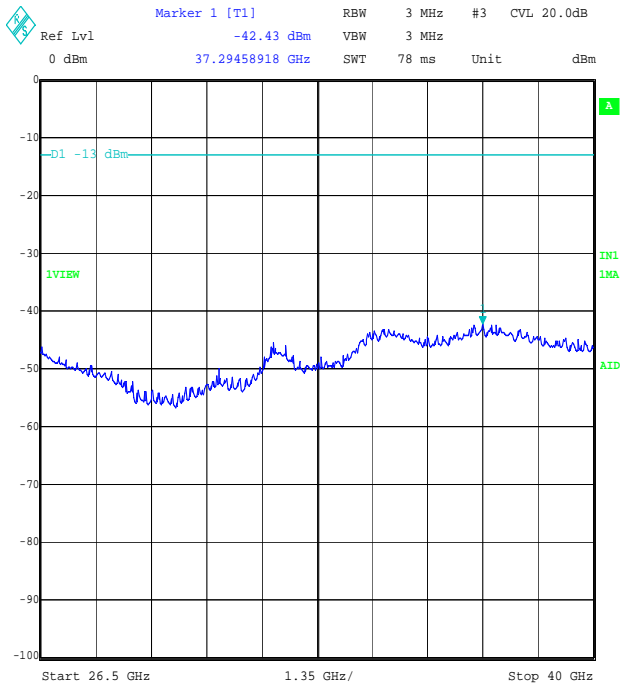
Title: 49355JD02 FCC PART 90  
Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
Date: 30.JUL.2007 10:11:01



Title: 49355JD02 FCC PART 90  
Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
Date: 30.JUL.2007 10:16:50

Test of: Airspan Communications Ltd.  
SCRT (Single Channel Radio Transceiver)  
To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**Transmitter Radiated Emissions: Section 90.1323/2.1053, (Continued)**



Title: 49355JD02 FCC PART 90  
Comment A: TX RADIATED EMISSIONS 10 MHz TOP CHANNEL  
Date: 8.AUG.2007 09:28:58

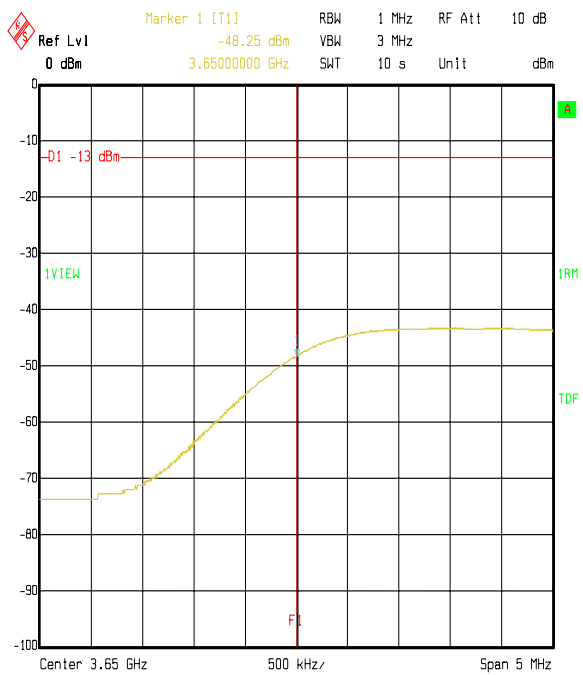
**Test of:** Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
**To:** FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

**7.10. Transmitter Band Edge Radiated Emissions: Section 90.1323/2.1053**

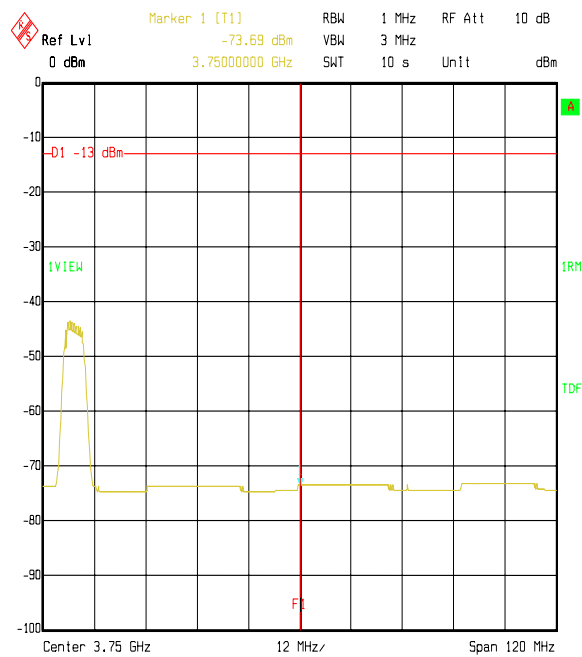
7.10.1. The EUT was configured for transmitter radiated emission measurements as described in Section 9 of this report.

**Results: 5 MHz channel width**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-48.3	-13.0	35.3	Complied
3750	-73.7	-13.0	60.7	Complied



Title: 49355JD02 FCC PART 90  
 Comment A: RADIATED EMISSIONS LOWER BAND EDGE 5 MHz BOTTOM CHANNEL  
 Date: 30.JUL.2007 12:29:33



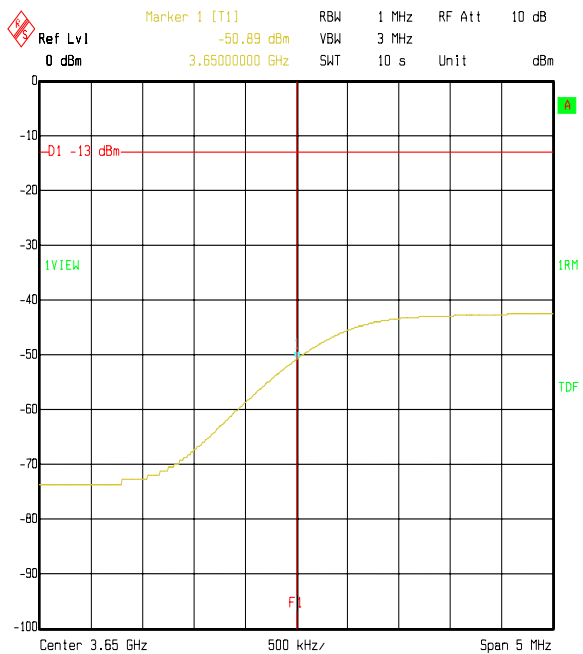
Title: 49355JD02 FCC PART 90  
 Comment A: RADIATED EMISSIONS UPPER BAND EDGE 5 MHz TOP CHANNEL  
 Date: 30.JUL.2007 12:34:29

Test of: Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
 To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

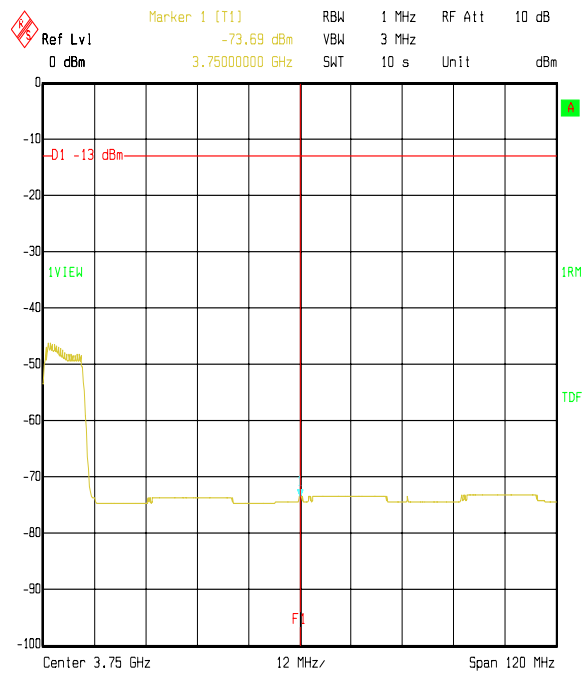
**7.10.2. Transmitter Band Edge Conducted Emissions: Section 90.1323/2.1051 (Continued)**

**Results: 10 MHz channel width**

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
3650	-50.9	-13.0	37.9	Complied
3750	-73.7	-13.0	60.7	Complied



Title: 49355JD02 FCC PART 90  
 Comment A: RADIATED EMISSIONS LOWER BAND EDGE 10 MHz BOTTOM CHANNEL  
 Date: 30.JUL.2007 12:43:31



Title: 49355JD02 FCC PART 90  
 Comment A: RADIATED EMISSIONS UPPER BAND EDGE 10 MHz TOP CHANNEL  
 Date: 30.JUL.2007 12:37:42

Test of: Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
 To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to  
 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June  
 2007

### 7.11. Transmitter Frequency Stability: Section 90.213/2.1055(a)(1)

#### Temperature Variation

#### Results:

#### 5 MHz Channel Bandwidth, Top Channel (3697.5 MHz)

Temp (°C)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	3697.580161	80.161
-20	3697.505010	5.010
-10	3697.520041	20.041
0	3697.545091	45.091
10	3697.500001	0.001
20	3697.500001	0.001
30	3697.469941	-30.059
40	3697.500000	0.000
50	3697.467481	-32.519

#### 10 MHz Channel Bandwidth, Top Channel (3695.0 MHz)

Temp (°C)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	3695.004504	4.504
-20	3695.065040	65.040
-10	3695.015031	15.031
0	3695.020041	20.041
10	3695.000000	0.000
20	3695.000000	0.000
30	3695.010020	10.020
40	3695.000001	0.001
50	3694.974950	-25.050

Test of: Airspan Communications Ltd.  
 SCRT (Single Channel Radio Transceiver)  
 To: FCC Part 90 in accordance with FCC Test Plan 365TDD SCRT Certification 3650 to 3700 MHz band FCC Test Plan Document Reference: 005-8300-013 Dated 27 June 2007

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**Transmitter Frequency Stability: Sections 90.213/2.1055 (Continued)**

**Voltage Variation**

**Results:**

**5 MHz Channel Bandwidth, Top Channel (3697.5 MHz)**

DC Voltage	Measured Frequency (MHz)	Frequency Error (kHz)
40.8	3697.474951	-25.049
48.0	3697.500001	0.000
55.2	3697.474950	-25.050

**10 MHz Channel Bandwidth, Top Channel (3695.0 MHz)**

DC Voltage	Measured Frequency (MHz)	Frequency Error (kHz)
40.8	3694.979961	-20.039
48	3695.000000	0.000
55.2	3694.969941	-30.059

**Note(s):**

1. No limit has been specified for equipment operating in this frequency range. These results are provided for information purpose only.
2. Measurements were only performed on the top channel with 5 and 10 MHz channel bandwidth, as specified within Airspan Test plan 005-8300-013\_A.



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### 7.12. Transmitter Unrestricted Contention Based Protocol Test - Sections 90.203(m)

See Section 9 of this report for further details of the test method.

#### Results:

Test No.	EUT Channel Frequency (MHz)	EUT Channel Bandwidth (MHz)	EUT RSL Turn-Off Level (dBm)	Interferer Frequency relative to EUT (MHz)	Interferer Level at EUT (dBm)	EUT Tx-Off (Y/N)	Result
1	3655	10	-60	-5	-60	Y	Pass
2	3655	10	-60	-5	-65	N	Pass
3	3655	10	-65	0	-65	Y	Pass
4	3655	10	-65	0	-70	N	Pass
5	3655	10	-70	+5	-70	Y	Pass
6	3655	10	-70	+5	-75	N	Pass
7	3695	10	-60	+5	-60	Y	Pass
8	3695	10	-60	+5	-65	N	Pass
9	3652.5	5	-60	-2.5	-60	Y	Pass
10	3652.5	5	-60	-2.5	-65	N	Pass
11	3652.5	5	-65	0	-65	Y	Pass
12	3652.5	5	-65	0	-70	N	Pass
13	3652.5	5	-70	+2.5	-70	Y	Pass
14	3652.5	5	-70	+2.5	-75	N	Pass
15	3652.5	5	-70	-5	-45	N	Pass
16	3652.5	5	-70	+5	-45	N	Pass

#### Note(s):

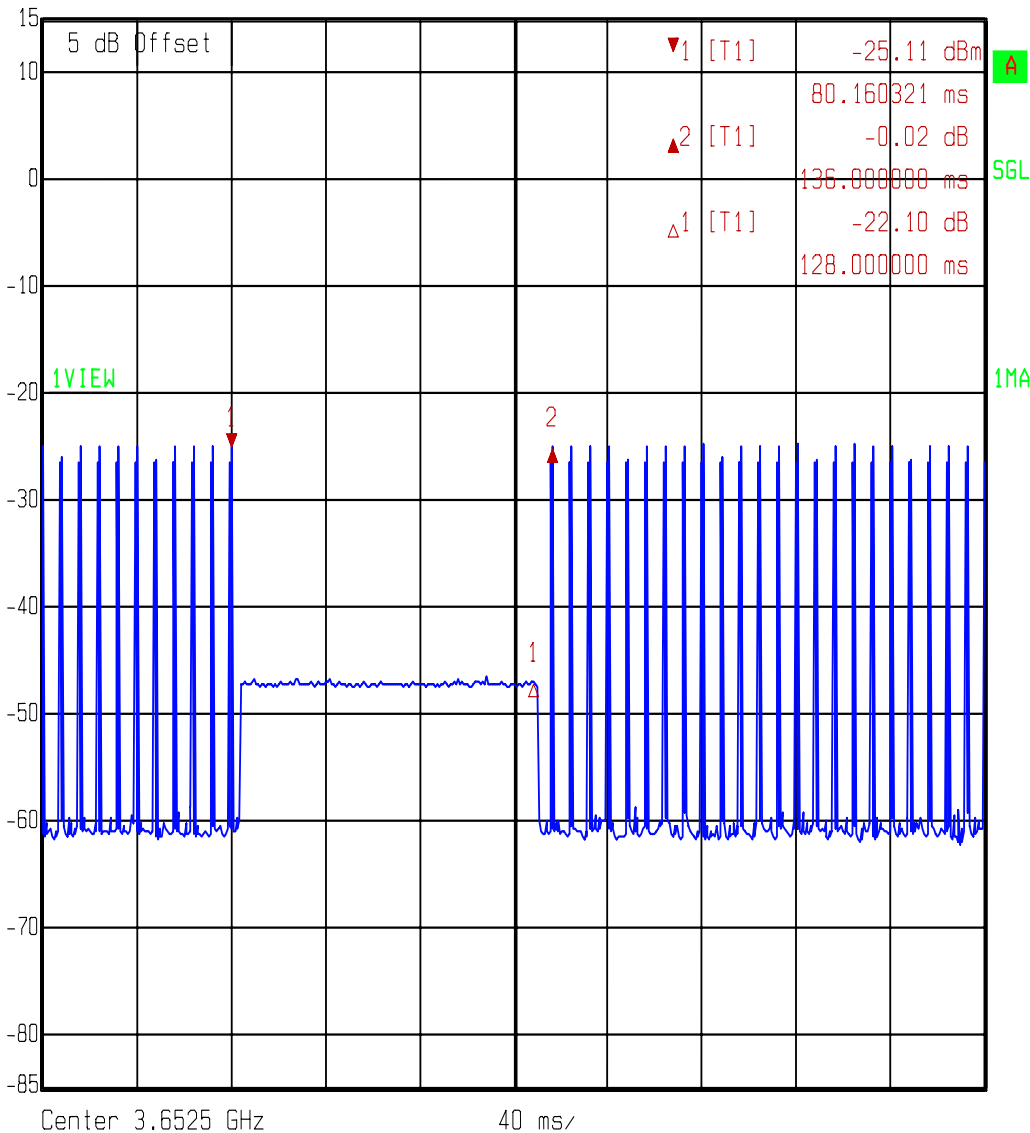
1. The table shows the manufacturer-set interferer receiver signal level (RSL) Turn-Off level and the actual RSL at which the EUT transmitter switches off.
2. Tests were performed at co-channel, adjacent channel and adjacent half-channel spacing by applying a carrier wave interferer signal.
3. As demonstrated by tests 3, 4, 11 and 12, the EUT ceases to transmit with an interferer at the EUT set Turn-Off RSL (-65 dBm). The EUT does not turn off at a lower level of RSL (-70 dBm).
4. As demonstrated by tests 1, 2, 5, 6, 7, 8, 9, 10, 13 and 14, the EUT ceases to transmit upon detection of a signal spaced half-channel away, with an RSL of the set Turn-Off level.
5. As demonstrated by tests 15 and 16, the EUT does not cease to transmit in the presence of an adjacent channel signal, even when considerably higher than the set EUT Turn-Off level.

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Delta 2 [T1] RBW 1 MHz RF Att 20 dB  
 Ref Lvl -0.02 dB VBW 1 MHz  
 15 dBm 136.000000 ms SWT 400 ms Unit dBm



Title: 49355JD02 FCC PART 90  
 Comment A: UNRESTRICTED CONTENTION BASED PROTOCOL WITH INTERFERER  
 Date: 24.AUG.2007 10:43:09

The above plot shows the EUT turning off when an interferer is applied; then on again when interferer is turned off

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## 8. Measurement Uncertainty

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	±5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	±2.94 dB
Conducted Carrier Output Power	9 kHz to 26.5 GHz	95%	±0.28 dB
Carrier Output Power (EIRP)	30 MHz to 26.5 GHz	95%	±2.94 dB
Occupied Bandwidth	N/A	95%	±0.12%
Conducted Emissions Antenna Port	9 kHz to 40 GHz	95%	±2.62 dB
Frequency Stability	Not applicable	95%	±11.37 ppm

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

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## **9. Measurement Methods**

### **9.1. AC Mains Conducted Emissions**

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT was powered by 48VDC. The EUT was connected to a 48 VDC bench power supply with an input of 110VAC 60Hz, via a Line Impedance Stabilisation Network (LISN).

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

<b>Receiver Function</b>	<b>Initial Scan</b>	<b>Final Measurements</b>
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

### **9.2. Transmitter Carrier Output Power (Conducted)**

The EUT was connected to a spectrum analyser. The spectrum analyser was connected to the antenna port of the EUT via a suitable cable and attenuator. The cable and attenuator were calibrated for loss at the required frequencies and the level of loss was added to the indicated result.

To determine the transmitter output power, the EUT was operated at maximum power and the level was measured with a spectrum analyser, using an RMS Detector. These measurements were then verified using an average power meter.

The spectrum analyser offset used incorporated an additional 3 dB for the 50% duty cycle of the EUT.

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**9.3. Transmitter Conducted Emissions**

Spurious emission measurements at the antenna port were performed up to 10 times the highest EUT fundamental frequency.

A spectrum analyser was connected to the antenna port of the EUT via a suitable cable and RF attenuator. The total loss of both the cable and the attenuator was measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The frequency band described above was investigated with the transmitter operating at full power on the bottom, middle and top channels. Any spurious emissions noted were then measured.

The recorded emission level was then calculated as a spurious attenuation level using the following formula as described in TIA-603-B.

$$dB = 10 \log_{10} \left( \frac{TX \text{ power in watts}}{0.001} \right) - \text{spurious level (dBm)}$$

For frequencies further than 250% of the authorized bandwidth from the centre of the assigned frequency (fc) the emissions shall be attenuated by at least 43 + 10 log (P in Watts) dB relative to the transmitter unmodulated carrier output power level measured for the channel under test. The tabulated results in the results section of this report show the spurious emission in dBm and as attenuation relative to the carrier in dBc.

For the frequency ranges close to and including the fundamental frequency, plots of the spectral distribution (emission masks) were recorded using a spectrum analyser for the EUT transmitting on top channel. The method used was in accordance with the methods detailed in FCC Part 90.210.

FCC Part 90.210 states the appropriate emission mask that shall be used. Measurements were performed using the appropriate emission mask.

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Settings
Detector Type	Peak
Mode	Max Hold
Bandwidth	As per Part 90.210 <50 kHz away from fc
Bandwidth	1 MHz >1 GHz
Bandwidth	10 kHz <1 GHz
Amplitude Range	100 dB
Sweep Time	Coupled

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#### **9.4. Transmitter Conducted Emissions Mask**

The EUT and spectrum analyser were configured for conducted antenna port emissions measurements.

To determine emissions mask compliance, the analyser resolution bandwidth was set to 1 MHz and the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

The following limits were applied for the emission mask test:

For frequencies further than 50% of the authorized bandwidth to 100% of the authorized bandwidth from the centre of the assigned frequency ( $f_c$ ), the emissions shall be attenuated by at least 25 dB relative to the transmitter carrier output power level measured for the channel under test.

For frequencies further than 100% of the authorized bandwidth to 250% of the authorized bandwidth from the centre of the assigned frequency ( $f_c$ ), the emissions shall be attenuated by at least 35 dB relative to the transmitter carrier output power level measured for the channel under test.

The tabulated results in the results section of this report show the spurious emission in dBm and as attenuation relative to the carrier in dBc.

For authorised bandwidth of  $\leq 5$  MHz, the measurement is performed using a 100 kHz resolution bandwidth on the spectrum analyser. The emission mask limit applied is corrected to take into account of using a resolution bandwidth less than 1 MHz. The corrected factor (dB) is derived by using the following equation:

$$\text{Corrected Factor (dB)} = 10 \text{Log}_{10}(\text{Resolution Bandwidth Used (KHz)} / 1000)$$

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### **9.5. Transmitter Radiated Emissions**

The EUT and spectrum analyser were configured as per ANSI TIA-603-B, Land Mobile FM or PM Communications Equipment; Measurement and Performance Standards.

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency were performed in order to identify frequencies on which the EUT was generating spurious emissions. This determined the frequencies from the EUT that required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m, below 4 GHz; above 4 GHz a 1 m measurement distance was used. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

For the final measurements the EUT was arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2003 Clause 5.4.

An open area test site using the appropriate test distance and spectrum analyser with an peak detector was used for final measurements. All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

Once the final amplitude (maximised) had been obtained and noted, the EUT was replaced by a substitution antenna, and a substitution method applied. The substitution antennas used were a horn antenna for measurements greater than or equal to 1 GHz and a dipole for measurements below 1 GHz. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

$$\text{ERP} = \text{Signal Generator Level} - \text{Cable Loss} + \text{Antenna Gain}$$

Once the ERP was obtained, the difference between it and the level of the fundamental emission for the ERP of the channel under test was noted at the spurious attenuation level in dBc. The following formula was used as described in TIA-603-B.

$$\text{dB} = 10 \log_{10} \left( \frac{\text{TX power in watts}}{0.001} \right) - \text{spurious level (dBm)}$$

For the frequency ranges close to and including the fundamental frequency, plots of the spectral distribution (emission masks) were recorded using a spectrum analyser for the EUT transmitting on top channel. The method used was in accordance with the methods detailed in FCC Part 90.210.

The antenna port was terminated with a 50 Ohm load during the tests as the Client did not supply an antenna.

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### **9.6. Transmitter Radiated Emissions Mask**

The EUT and spectrum analyser were configured as for radiated measurements.

To determine emissions mask compliance, the analyser resolution bandwidth was set to 1 MHz and the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

The following limits were applied for the emission mask test:

For frequencies further than 50% of the authorized bandwidth to 100% of the authorized bandwidth from the centre of the assigned frequency (fc), the emissions shall be attenuated by at least 25 dB relative to the transmitter carrier output power level measured for the channel under test.

For frequencies further than 100% of the authorized bandwidth to 250% of the authorized bandwidth from the centre of the assigned frequency (fc), the emissions shall be attenuated by at least 35 dB relative to the transmitter carrier output power level measured for the channel under test.

The tabulated results in the results section of this report show the spurious emission in dBm and as attenuation relative to the carrier in dBc.

For authorised bandwidth of  $\leq 5$  MHz, the measurement is performed using a 100 kHz resolution bandwidth on the spectrum analyser. The emission mask limit applied is corrected to take into account of using a resolution bandwidth less than 1 MHz. The corrected factor (dB) is derived by using the following equation:

$$\text{Corrected Factor (dB)} = 10 \text{ Log}_{10} (\text{Resolution Bandwidth Used (KHz)} / 1000)$$

For measurements showing incursion of the power envelope through the emission mask when using a 1 MHz resolution bandwidth. The integration method is used at the appropriate offset(s) from the fundamental centre frequency with the spectrum analyser using the channel power function with a 30 kHz resolution bandwidth.



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### **9.7. Transmitter Frequency Stability**

The test was performed in a laboratory environment.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions

The EUT was situated within an environmental test chamber and connected via cables and attenuator(s) to the spectrum analyser.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30°C to +50°C. Temperature was monitored over the required range using a calibrated thermometer.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the requirements of the specification.

Measurements were also performed at voltage extremes as stated in the specification. Voltage was monitored over the required range using a calibrated multimeter.

Measurements were made on the top, middle and bottom channels using a spectrum analyser.

The channel centre frequency was taken to be the mid-point between the -3 dBc points above and below the carrier

In order to show compliance, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorised band of operation.

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### **9.8. Contention Based Protocol**

The test was performed in a laboratory environment on a test bench, using conducted methods of coupling and measurement.

The requirement of the test is to prove that the EUT stops transmitting in the presence of an interferer on the same channel.

The EUT was set to transmit on 5 MHz and 10 MHz channels.

A calibrated interfering signal was introduced at a level and frequency decided by Airspan. The level is shown on the results table as the EUT RSL Turn-Off Level.

The EUT RF output was monitored on a spectrum analyser.

Tests were performed with a co-channel interferer, at the set RSL. Once it was determined that the EUT ceased to transmit, the RSL of the interferer was reduced and the test repeated, to confirm that the EUT did not cease to transmit.

The test was repeated with half-adjacent and fully-adjacent channel spacing.

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### Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A027	Horn Antenna	Eaton	9188-2	A027	08 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	A031	08 Jun 2006	36
A1392	Attenuator	HUBER + SUHNER AG	757456	A1392	Cal before use	-
A1396	Attenuator	HUBER + SUHNER AG	757987	A1396	Cal before use	-
A1536	Variable Attenuators	Hwelett Packard	9494B & 9496B	A1536	Cal before use	-
A254	Horn Antenna	Flann Microwave	14240-20	A254	17 Nov 2006	36
A428	Horn Antenna	Flann	12240-20	A428	17 Nov 2006	36
A429	Horn Antenna	Flann	16240-20	A429	17 Nov 2006	36
A430	Horn Antenna	Flann	18240-20	A430	17 Nov 2006	36
A436	Horn Antenna	Flann	20240-20	A436	24 Apr 2006	36
A553	Bi-log Antenna	Chase	CBL6111A	A553	01 Nov 2006	12
L0799	AC Power Supply	Kikusui	PCR 1000LA	L0799	Cal before use	-
L0802	Environmental Chamber	Gallenkamp Industrial	FE300.T.R75	L0802	Cal before use	-
M069	Analyser/Receiver	Rohde & Schwarz	ESMI	M069	29 Nov 2005	12
M076	Harmonic Mixer set	Rohde & Schwarz	FS-Z16	M076	23 Mar 2001	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	M1124	20 Dec 2006	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	M1242	08 Sep 2006	12
M1269	Multimeter	Fluke	179	M1269	05 Mar 2007	12
S202	Open Area Site	RFI	2	S202	17 Nov 2006	12
S215	Screened room	RFI	15	S215	Not Calibrated	-

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule. At the time of the test, all equipment was within calibration.

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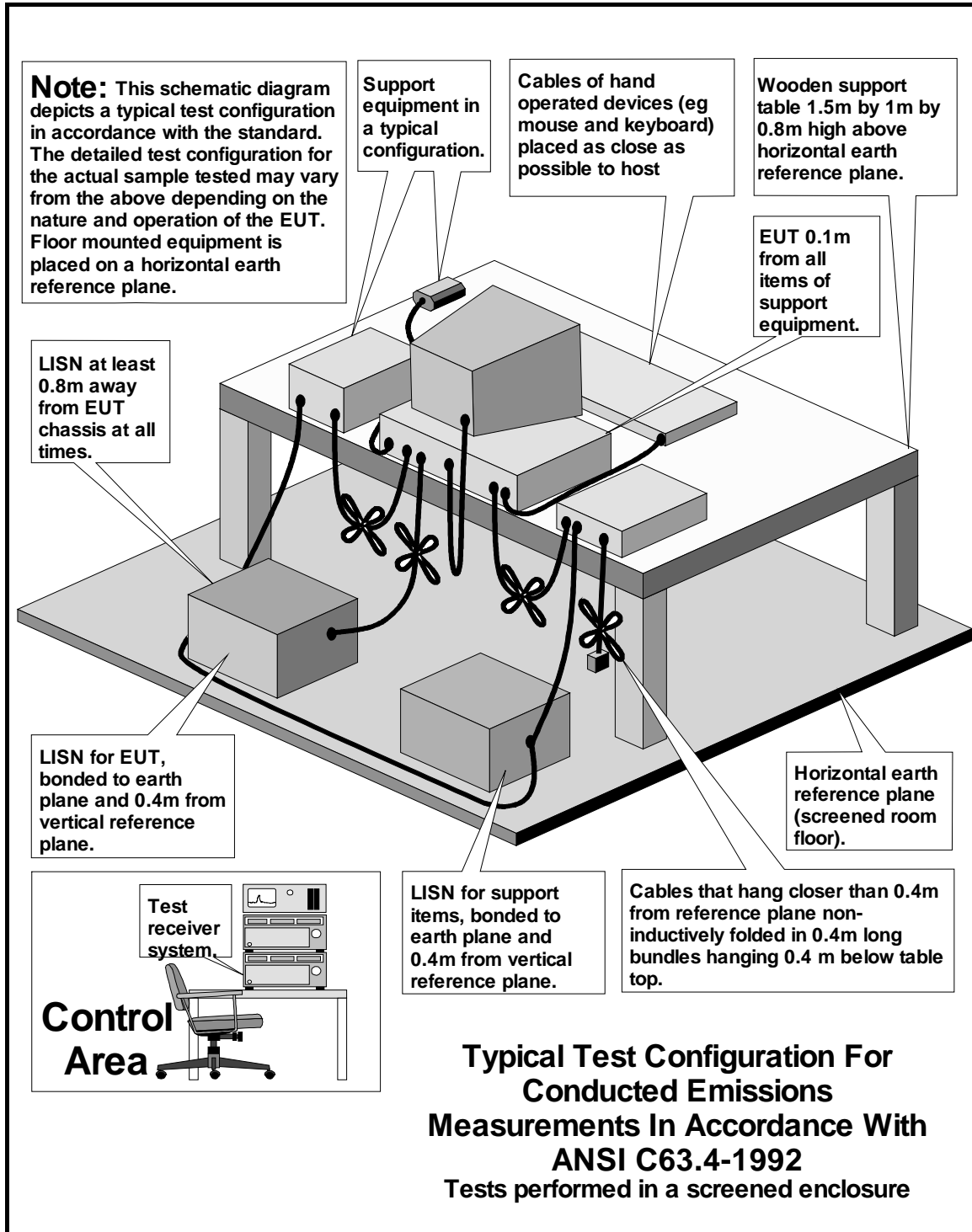
## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

<b>Drawing Reference Number</b>	<b>Title</b>
DRG\49355JD02\EMICON	Test configuration for measurement of conducted emissions.
DRG\49355JD02\EMIRAD	Test configuration for measurement of radiated emissions.

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DRG\49355JD02\EMICON



This diagram is also valid for the latest version of ANSI C63.4-2003.

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DRG\49355JD02\EMIRAD

