

# TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Test Report Serial No:**  
RFI/MPTE3/RP47795JD02A

**Supersedes Test Report Serial No:**  
RFI/MPTE2/RP47795JD02A

|                                                                                                                                                                                                 |                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>This Test Report Is Issued Under The Authority<br/>Of Andrew Brown, Operations Manager:</b><br><br><br>pp |                                                                                                                                    |
| <b>Tested By: Fara Razally</b><br><br><br>pp                                                                 | <b>Checked By: Michael Derby</b><br><br><br>pp |
| <b>Report Copy No: PDF01</b>                                                                                                                                                                    |                                                                                                                                    |
| <b>Issue Date: 21 June 2006</b>                                                                                                                                                                 | <b>Test Dates: 20 February 2006 to 09 March 2006<br/>and 20 June 2006</b>                                                          |

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This report may be copied in full. The results in this report apply only to the sample(s) tested.

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Registered in England and Wales. Company number: 2117901

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                  **SCRT (Transceiver)**

**To:**           **FCC Part 90 in accordance to MicroMAX-SDR & SCRT**  
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## **1. Client Information**

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| <b>Company Name:</b> | Airspan Communications Ltd.                           |
| <b>Address:</b>      | Cambridge House<br>Oxford Road<br>Uxbridge<br>UB8 1UN |
| <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)**

|                             |                                                               |
|-----------------------------|---------------------------------------------------------------|
| Brand Name:                 | Airspan Communications Ltd (Single Channel Radio Transceiver) |
| Model Name or Number:       | Single Channel Radio Transceiver                              |
| Unique Type Identification: | SCRT-1-4.9T-1                                                 |
| Serial Number:              | 35628                                                         |
| Hardware Revision:          | 605-0010-507                                                  |
| FCC ID                      | O2J-SCRT-1-49T                                                |
| Country of Manufacture:     | UK                                                            |
| Date of Receipt:            | 20 February 2006                                              |

### **2.2. Accessories**

The following accessories were supplied with the EUT:

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| Description:           | SDR                                                                            |
| Brand Name:            | Airspan Communications Ltd                                                     |
| Model Name or Number:  | SDR-M1                                                                         |
| Serial Number:         | 35764                                                                          |
| Hardware Revision:     | 503-0030-030                                                                   |
| Cable Length and Type: | 3m, Weatherproof Fibre Optic Proprietary Connection<br>3m 2-core DC power feed |
| Connected to Port:     | OBSAI Port and DC port                                                         |

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

The equipment under test is an IEE802.16-2004 WiMAX compliant 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 48V via the SDR, which is connected to the 115 V 60 Hz AC Mains supply. |
| 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 Unintentionally Generated Frequency: | 768 MHz                                                                              |
| Highest Fundamental Frequency:               | 4990.0 MHz                                                                           |
| Occupied Bandwidth:                          | 5 MHz Channel: 4.629 MHz<br>10 MHz Channel: 9.198 MHz                                |

### For 5 MHz Channel Spacing:

|                           |                          |                |                         |
|---------------------------|--------------------------|----------------|-------------------------|
| Transmit Frequency Range: | 4942.5 MHz to 4987.5 MHz |                |                         |
| Transmit Channels Tested: | Channel ID               | Channel Number | Channel Frequency (MHz) |
|                           | Bottom                   | 1              | 4942.5                  |
|                           | Top                      | 200            | 4987.5                  |

### For 10 MHz Channel Spacing:

|                           |                          |                |                         |
|---------------------------|--------------------------|----------------|-------------------------|
| Transmit Frequency Range: | 4940.0 MHz to 4990.0 MHz |                |                         |
| Transmit Channels Tested: | Channel ID               | Channel Number | Channel Frequency (MHz) |
|                           | Bottom                   | 1              | 4940.0                  |
|                           | Top                      | 200            | 4990.0                  |

## 2.6. Port Identification

| Port | Description          |
|------|----------------------|
| 1    | Mains Port           |
| 2    | Antenna Port         |
| 3    | OBSAI Port           |
| 4    | Power Interface Port |

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## **2.7. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

|                               |                           |
|-------------------------------|---------------------------|
| <b>Description:</b>           | Laptop                    |
| <b>Brand Name:</b>            | Dell                      |
| <b>Model Name or Number:</b>  | Latitude                  |
| <b>Serial Number:</b>         | AIR003412                 |
| <b>Cable Length and Type:</b> | 2m, Serial                |
| <b>Connected to Port:</b>     | Serial Header on 1186 PCB |

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

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

|            |                                                                                        |
|------------|----------------------------------------------------------------------------------------|
| Reference: | FCC Part 90                                                                            |
| Title:     | Code of Federal Regulations, Part 90 (47CFR290)<br>Private Land Mobile Radio Services. |

|            |                                                                        |
|------------|------------------------------------------------------------------------|
| Reference: | FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B |
| Title:     | MicroMAX SDR + SCRT 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.

DA00-705 (2000)

Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

#### **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.

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

None.

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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 set to transmit with maximum output power on the configured frequency using both 10 MHz channel width and 5 MHz channels width.

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

The EUT was tested in the following configuration:

Conducted 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**

| Range of Measurements                                             | Specification Reference                                                               | Port Type         | Compliance Status |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------|-------------------|
| Transmitter Carrier Output Power (ERP)                            | C.F.R. 47 FCC Part 90: 2004 Sections 90.205/90.1215/2.1046<br>TIA-603-B Section 2.2.1 | Antenna Terminals | Complied          |
| Transmitter Occupied Bandwidth (Bandwidth Limitations)            | C.F.R. 47 FCC Part 90: 2004 Sections 90.210(m)/2.1049                                 | Antenna Terminals | Complied          |
| Transmitter Conducted Emissions Masks                             | C.F.R. 47 FCC Part 90: 2004 Sections 90.210(m)/2.1051<br>TIA-603-B Section 2.2.13     | Antenna Terminals | Complied          |
| Transmitter Conducted Emissions (Out of Band) (9 kHz to 5 GHz)    | C.F.R. 47 FCC Part 90: 2004 Sections 90.210(m)/2.1051<br>TIA-603-B Section 2.2.13     | Antenna Terminals | Complied          |
| Transmitter Radiated Emissions Masks                              | C.F.R. 47 FCC Part 90: 2004 Sections 90.210(m)/2.1053<br>TIA-603-B Section 2.2.12     | Enclosure         | Complied          |
| Transmitter Radiated Emissions (Out of Band) (30 MHz to 5 GHz)    | C.F.R. 47 FCC Part 90: 2004 Sections 90.210(m)/2.1053<br>TIA-603-B Section 2.2.12     | Enclosure         | Complied          |
| Transmitter Frequency Stability (Temperature & Voltage Variation) | C.F.R. 47 FCC Part 90: 2004 Sections 90.213/2.1055<br>TIA-603-B Section 2.2.2         | Antenna Terminals | Complied          |

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

All the measurements described in this report were performed at the premises of RFI Global Services Ltd. The two locations used were Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ and Ashwood Park, Ashwood Way, Basingstoke, Hampshire, RG23 8BG.

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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: 005-8300-012 28 February 2006 Rev. B.

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

At the request of the manufacturer, no AC conducted emissions measurements were performed because the SCRT was not powered directly from the AC main supply.

7.1.4. It should be noted that part of this testing was performed on the 20 June 2006. All other tests were performed on the 20 February 2006 to 09 March 2006. Between these dates, the equipment under test was not under the control of RFI.

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## **7.2. Transmitter Carrier Output Power (Conducted): Sections 90.205/90.1215/2.1046**

### **Results:**

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

| Channel | Frequency (MHz) | Conducted RF O/P Power (dBm) | Limit (dBm)* | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------|-------------|----------|
| Bottom  | 4942.5          | 26.3                         | 27.0         | 0.7         | Complied |
| Top     | 4987.5          | 26.8                         | 27.0         | 0.2         | Complied |

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

| Channel | Frequency (MHz) | Conducted RF O/P Power (dBm) | Limit (dBm)* | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------|-------------|----------|
| Bottom  | 4940.0          | 27.7                         | 30.0         | 2.3         | Complied |
| Top     | 4990.0          | 28.4                         | 30.0         | 1.6         | Complied |

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

1. \* High power point-to-point or point-to-multipoint operation may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitter power or spectral density limit.
2. Measurements were performed on bottom and top channel, 5 MHz and 10 MHz channel bandwidth, as specified within the test plan.

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### **7.3. Transmitter Peak Power Spectral Density (Conducted):Sections**

#### **90.205/90.1215/2.1046**

#### **Results:**

The Measurement was performed with the EUT coupled to the spectrum analyser using suitable attenuation and cable.

The highest peak level of the carrier emission found using a 1 MHz measurement bandwidth was moved to the centre of the screen.

The channel power function of the spectrum analyser was used to measure the total integrated power within a 1 MHz span. The resolution bandwidth and video bandwidth was automatically set to 30 kHz and 100 kHz respectively for the measurement.

The calculated result is then displayed and tabulated in the provided tables below. The channel power indicated in the graphs is the true value and must be compared the limit line and not the trace.

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

| Channel | Frequency (MHz) | Conducted RF O/P Power (dBm) | Limit (dBm)* | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------|-------------|----------|
| Bottom  | 4942.1          | 18.0                         | 21.0         | 3.0         | Complied |
| Top     | 4987.4          | 18.9                         | 21.0         | 2.1         | Complied |

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

| Channel | Frequency (MHz) | Conducted RF O/P Power (dBm) | Limit (dBm)* | Margin (dB) | Result   |
|---------|-----------------|------------------------------|--------------|-------------|----------|
| Bottom  | 4940.0          | 18.0                         | 21.0         | 3.0         | Complied |
| Top     | 4990.0          | 14.6                         | 21.0         | 6.4         | Complied |

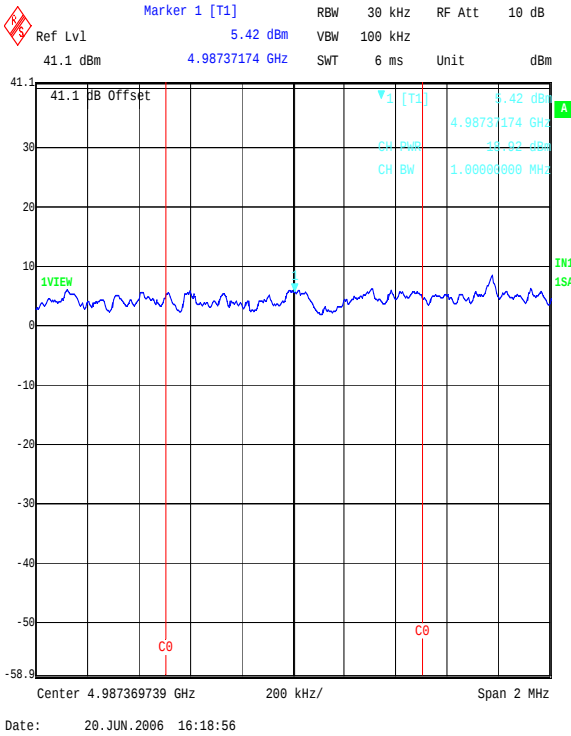
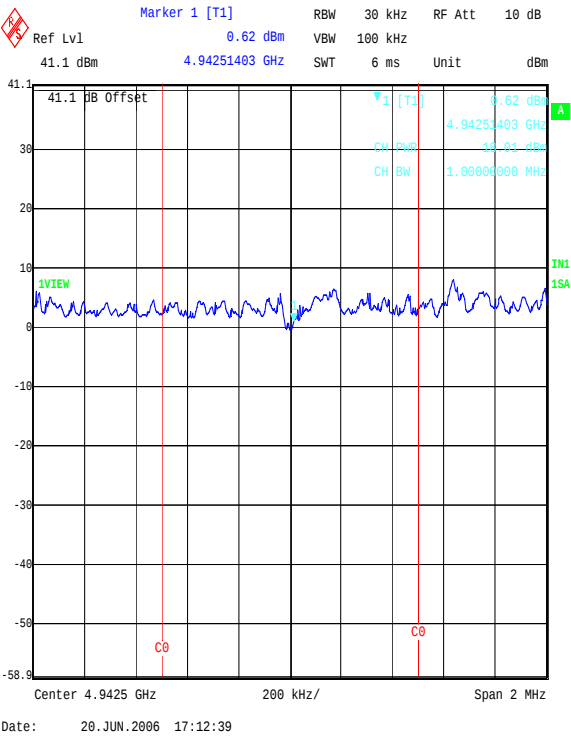
#### **Note(s):**

- \* High power point-to-point or point-to-multipoint operation may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitter power or spectral density limit.
- Measurements were performed on bottom and top channel, 5 MHz and 10 MHz channel bandwidth, as specified within the test plan.

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**Transmitter Peak Power Spectral Density (Conducted): Sections 90.205/90.1215/2.1046 (Continued)**

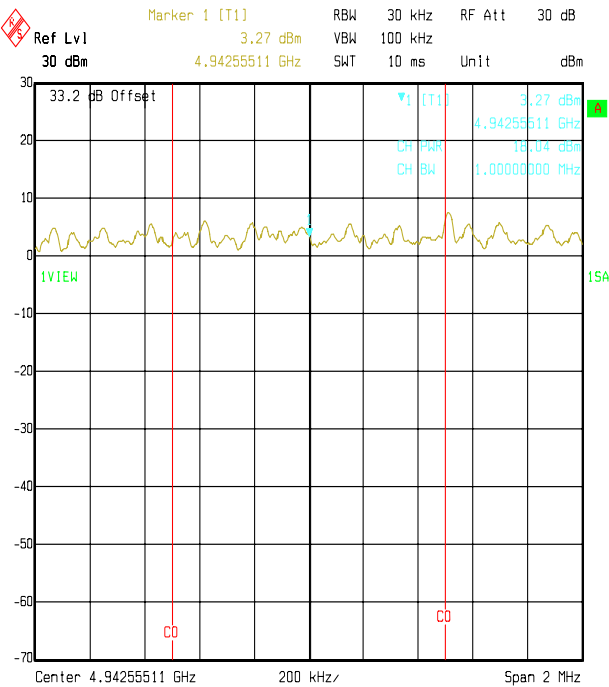
**5 MHz Channel Bandwidth**



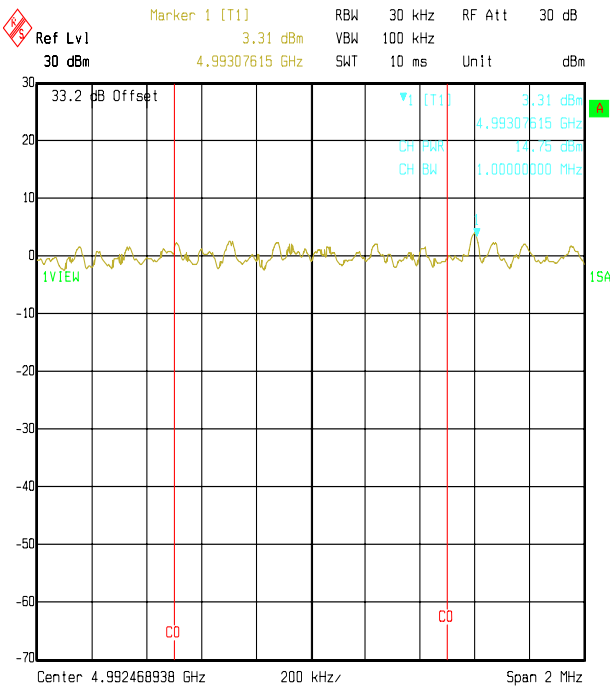
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**Transmitter Peak Power Spectral Density (Conducted): Sections 90.205/90.1215/2.1046  
(Continued)**

**10 MHz Channel Bandwidth**



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: BOTTOM CHANNEL WITH 1 MHZ CHANNEL WIDTH SPECTRAL POWER  
Date: 22.FEB.2006 12:25:43



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 1 MHZ CHANNEL WIDTH SPECTRAL POWER  
Date: 22.FEB.2006 12:30:07

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FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

#### 7.4. Transmitter Occupied Bandwidth (Bandwidth Limitations): Sections 90.209/90.267/2.1049

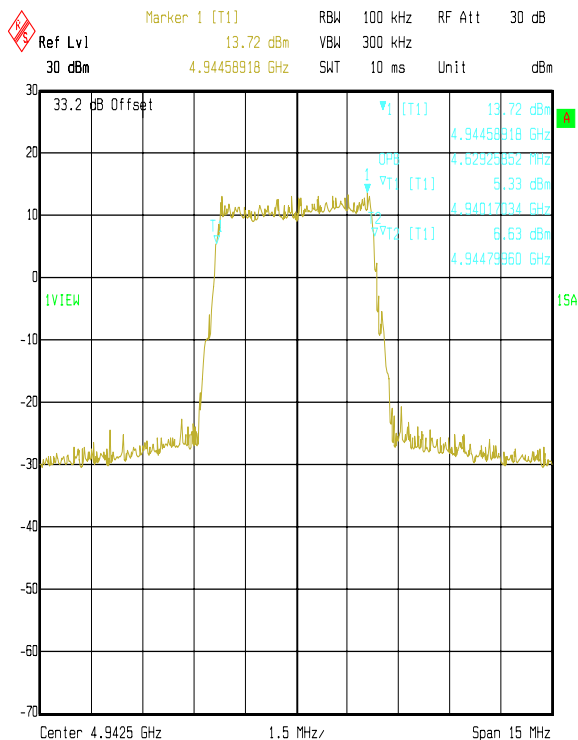
#### Results:

##### 5 MHz Channel Bandwidth

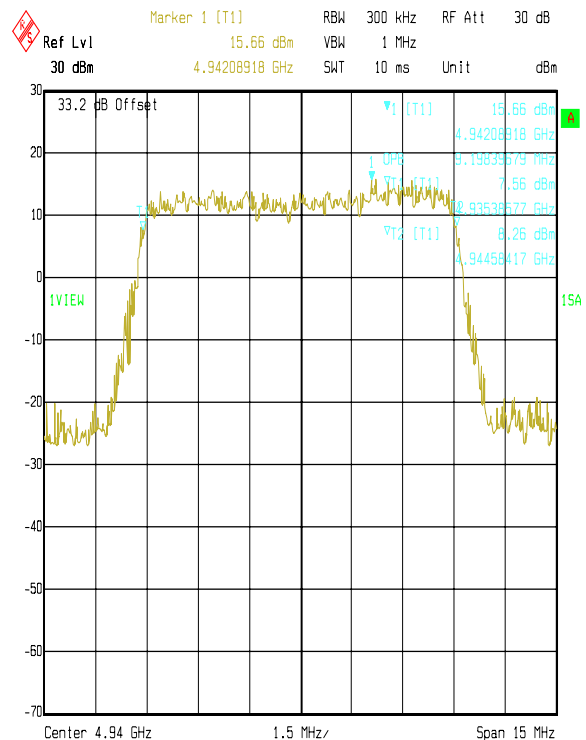
| Channel | Frequency (MHz) | RBW (kHz) | VBW (kHz) | Occupied Bandwidth (kHz) |
|---------|-----------------|-----------|-----------|--------------------------|
| Bottom  | 4942.5          | 100       | 300       | 4629.259                 |

##### 10 MHz Channel Bandwidth

| Channel | Frequency (MHz) | RBW (kHz) | VBW (kHz) | Occupied Bandwidth (kHz) |
|---------|-----------------|-----------|-----------|--------------------------|
| Bottom  | 4940.0          | 300       | 1000      | 9198.397                 |



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: BOTTOM CHANNEL WITH 5 MHZ CHANNEL WIDTH OCCUPIED BANDWIDTH  
Date: 22.FEB.2006 12:48:07



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: BOTTOM CHANNEL WITH 10 MHZ CHANNEL WIDTH OCCUPIED BANDWIDTH  
Date: 22.FEB.2006 12:50:36

#### Note(s):

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

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## **7.5. Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051**

### **Results:**

The measurement was performed with the EUT antenna port coupled to a spectrum analyser via suitable attenuation and cable. The spectrum analyser was set to trace max hold using a peak detector.

The mask limit was applied in respect to the conducted RF output power measured with an RMS detector, as specified in section 7.2 'Transmitter Carrier Output Power (Conducted)' of this report instead of an unmodulated carrier. As it was not possible for the EUT to transmit the fundamental carrier at the desired output power with no modulation applied.

In order to get a more accurate more accurate representation of the EUT signal relative to the mask where by influence from the analyser resolution bandwidth is minimised, the resolution bandwidth was reduced to 100 kHz where required and the mask was corrected by 10 dB outside the authorised bandwidths to account for the reduced amplitude. It can be seen from some of the plots that the power envelope still intersects the spectrum mask, albeit not as great. Where this occurred, the internal channel power function of the spectrum analyser was used to integrate the power across the points of incursion. The plots for the additional channel power measurements can be seen below along with the tabulated channel power. It should be noted that the resolution bandwidths of these plots does not reflect the measurement bandwidth as one would expect as the analyser automatically sets these as appropriate to compute the correct, integrated, channel power. The trace on these plots does not represent the actual level as it would occur if measured within a 1 MHz bandwidth. The observer must compare the indicated channel power values against the displayed limit line to obtain the pass margin or refer to the accompanying table.

It is not possible to manually calculate the integrated channel power based on the displayed settings.

Some of the following plots also show the fundamental carrier power as exceeding the top of the spectrum mask "0 dBc line". This is due to the fact that the spectrum analyser is comparing a level using a peak detector against a 0 dBc line relative to the carrier power as measured using an RMS detector.

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

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

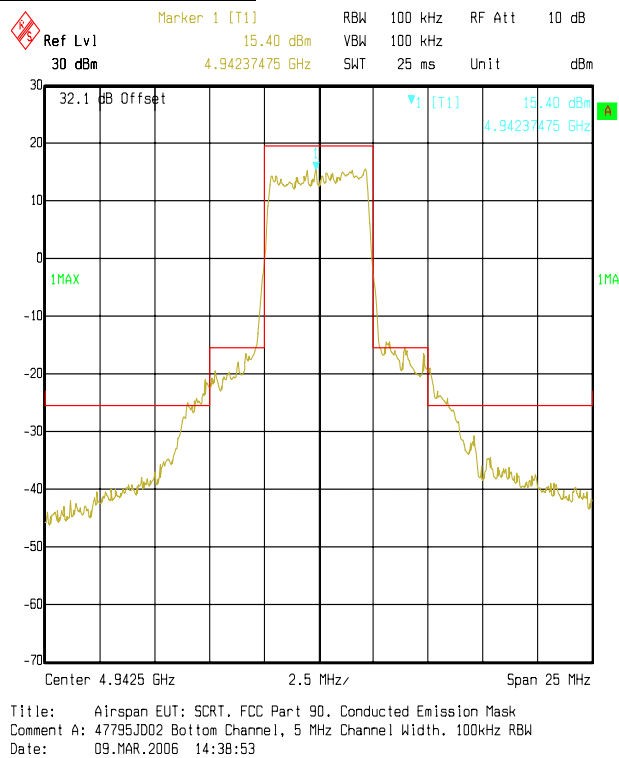
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### Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

#### 5 MHz Channel Width, Bottom Channel



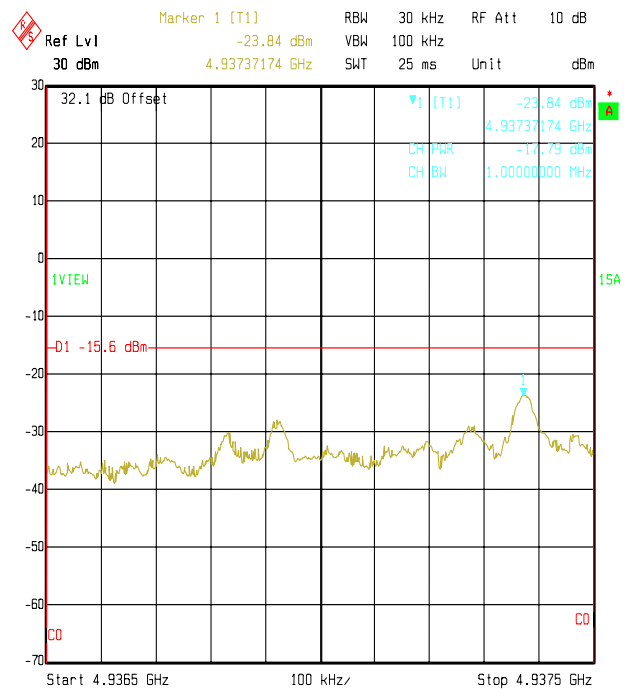
The above plot shows the emission mask measurement performed using a resolution bandwidth of 100 kHz.  
The mask limit is reduced to take into account of using a smaller (x10) resolution bandwidth.

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Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

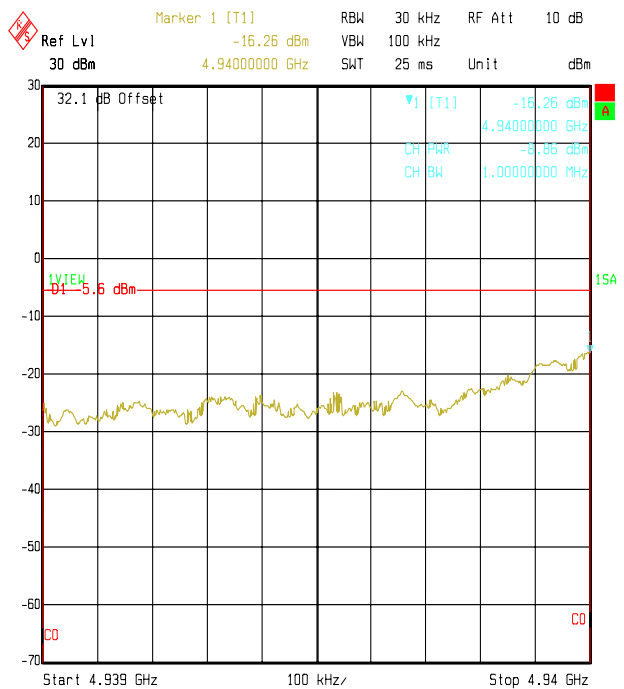
5 MHz Channel Width, Bottom Channel (Low Frequency Side Band)

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| -6.0 to -5.0                                          | 4936.5 to 4937.5      | -17.8                         | -15.6           | 2.2         | Complied |
| -3.5 to -2.5                                          | 4939.0 to 4940.0      | -8.9                          | -5.6            | 3.3         | Complied |



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Bottom Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 14:48:54

The above plot shows the display as indicated using the analysers channel power function where envelope incursion occurred.



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Bottom Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 14:50:44

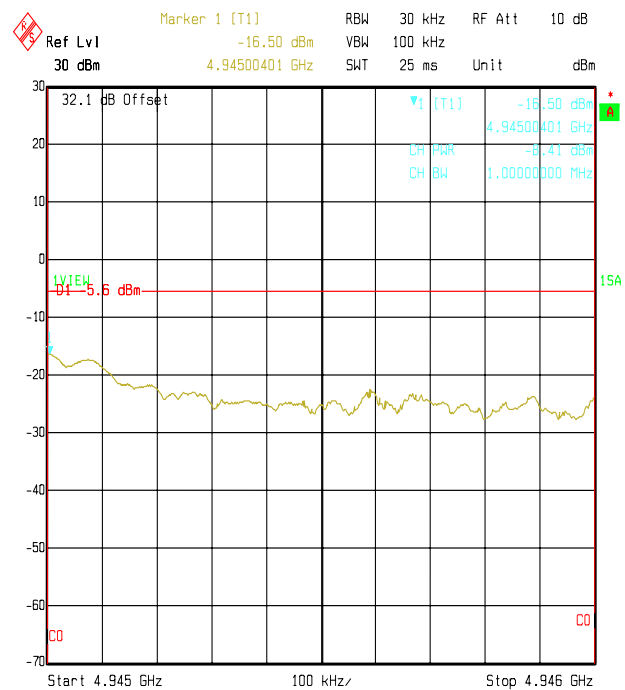
The above plot shows the display as indicated using the analysers channel power function where envelope incursion occurred.

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Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

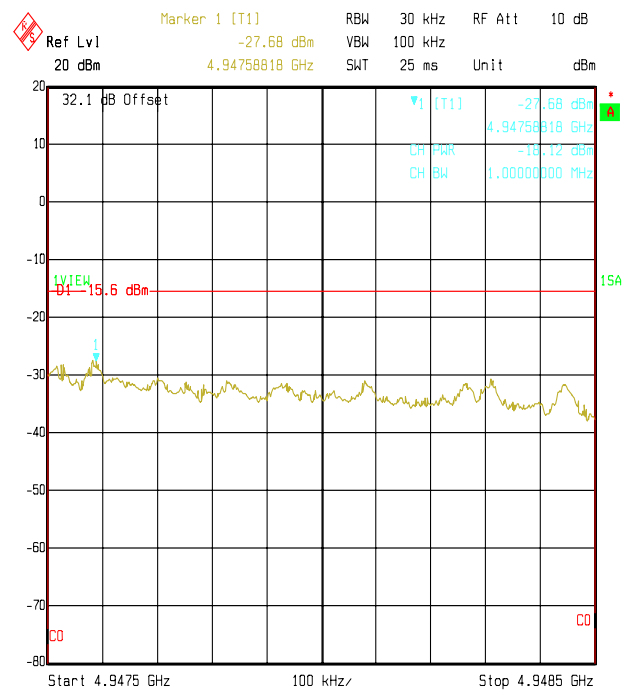
5 MHz Channel Width, Bottom Channel (High Frequency Side Band)

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| 2.5 to 3.5                                            | 4945.0 to 4946.0      | -8.4                          | -5.6            | 2.8         | Complied |
| 5.0 to 6.0                                            | 4947.5 to 4948.5      | -18.1                         | -15.6           | 2.5         | Complied |



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Bottom Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 14:53:03

The above plot shows the integration method used at offsets of 2.5 MHz above the fundamental centre frequency, where the 25 dBc limit is applied.



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Bottom Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 14:55:09

The above plot shows the integration method used at offsets of 5 MHz above the fundamental centre frequency, where the 35 dBc limit is applied.

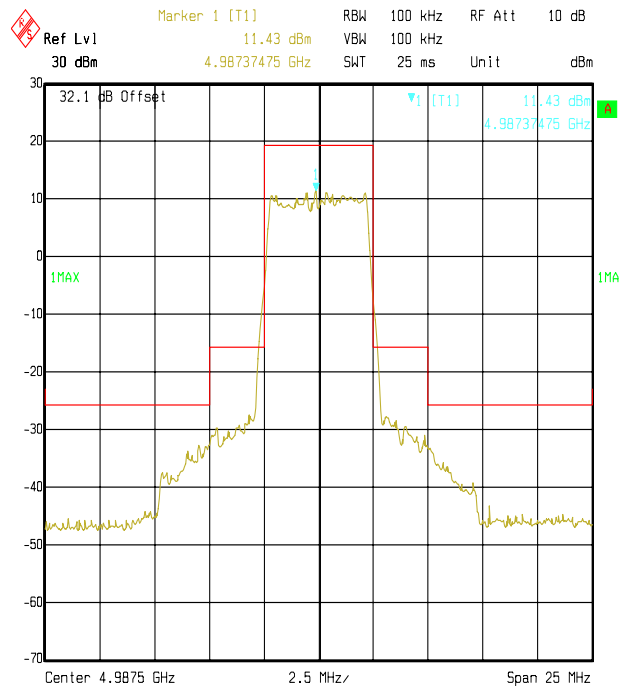
Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

#### 5 MHz Channel Width, Top Channel



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Top Channel, 5 MHz Channel Width, 100kHz RBW  
Date: 09.MAR.2006 15:04:04

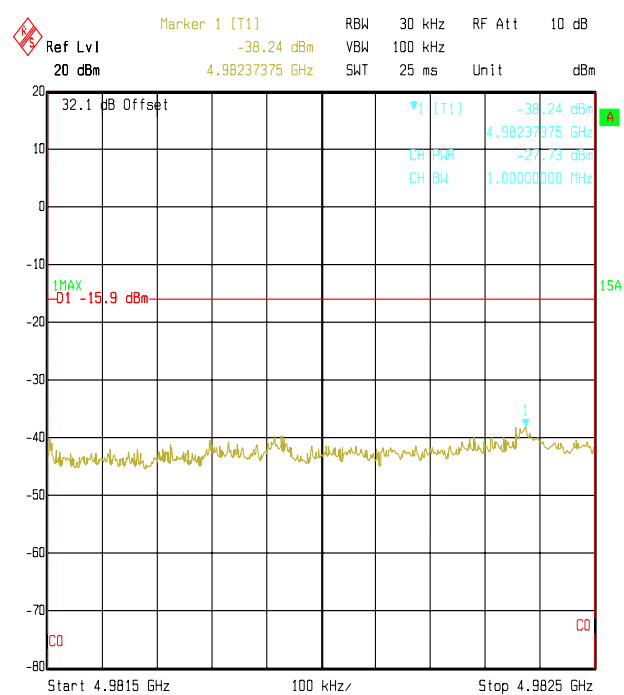
The above plot shows the emission mask measurement performed using a resolution bandwidth of 100 kHz.  
The mask limit is reduced to take into account of using a smaller (x10) resolution bandwidth.

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:           FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)**

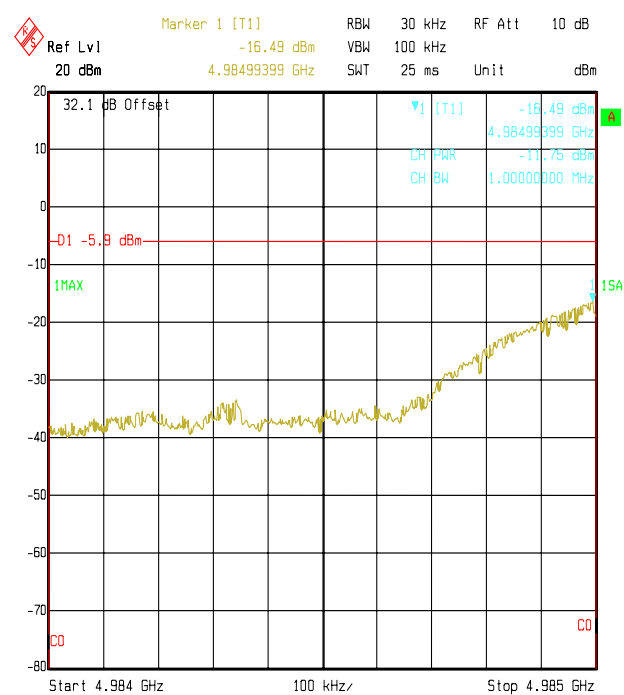
**5 MHz Channel Width, Top Channel (Low Frequency Side Band)**

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| -6.0 to -5.0                                          | 4981.5 to 4982.5      | -27.7                         | -15.9           | 11.8        | Complied |
| -3.5 to -2.5                                          | 4984.0 to 4985.0      | -11.8                         | -5.9            | 5.9         | Complied |



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Top Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 15:07:47

The above plot shows the integration method used at offsets of 5 MHz below the fundamental centre frequency, where the 35 dBc limit is applied.



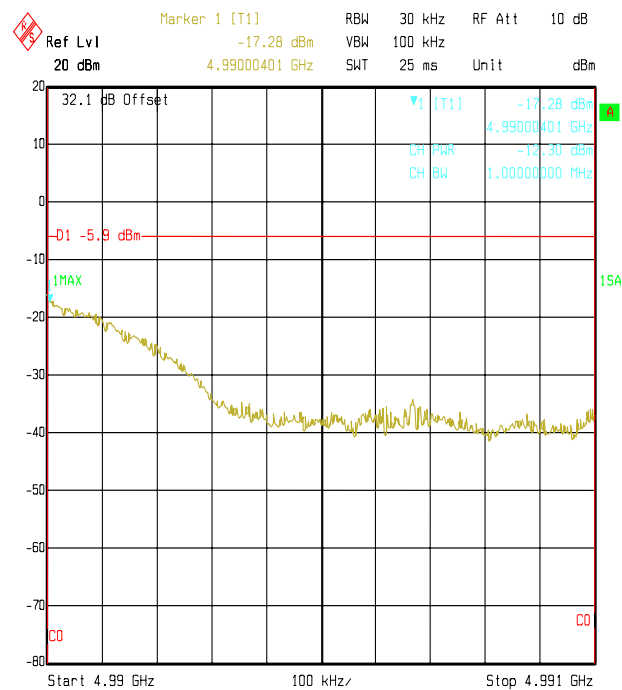
Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Top Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 15:09:46

The above plot shows the integration method used at offsets of 2.5 MHz below the fundamental centre frequency, where the 25 dBc limit is applied.

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

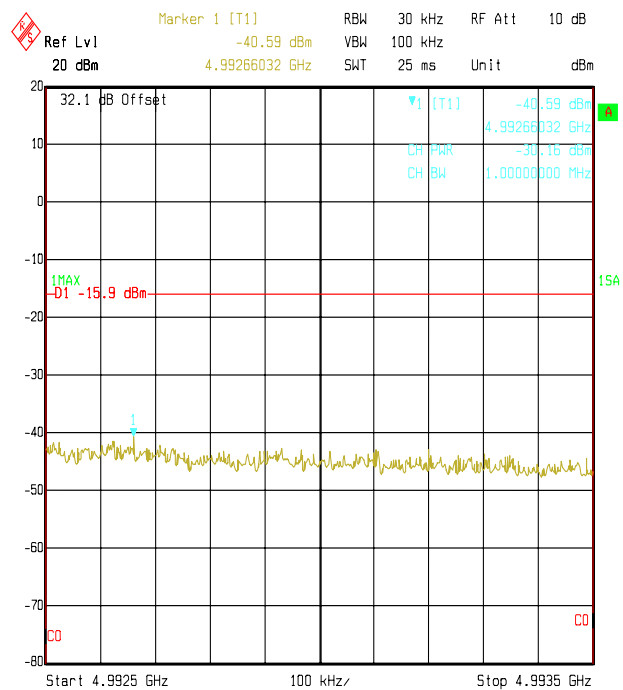
**Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)**  
**5 MHz Channel Width, Top Channel (High Frequency Side Band)**

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| 2.5 to 3.5                                            | 4990.0 to 4991.0      | -12.3                         | -5.9            | 6.4         | Complied |
| 5.0 to 6.0                                            | 4992.5 to 4993.5      | -30.2                         | -15.9           | 14.3        | Complied |



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Top Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 15:11:11

The above plot shows the integration method used at offsets of 2.5 MHz above the fundamental centre frequency, where the 25 dBc limit is applied.



Title: Airspan EUT: SCRT, FCC Part 90, Conducted Emission Mask  
Comment A: 47795JD02 Top Channel, 5 MHz Channel Width, Integration  
Date: 09.MAR.2006 15:12:40

The above plot shows the integration method used at offsets of 5 MHz above the fundamental centre frequency, where the 35 dBc limit is applied.

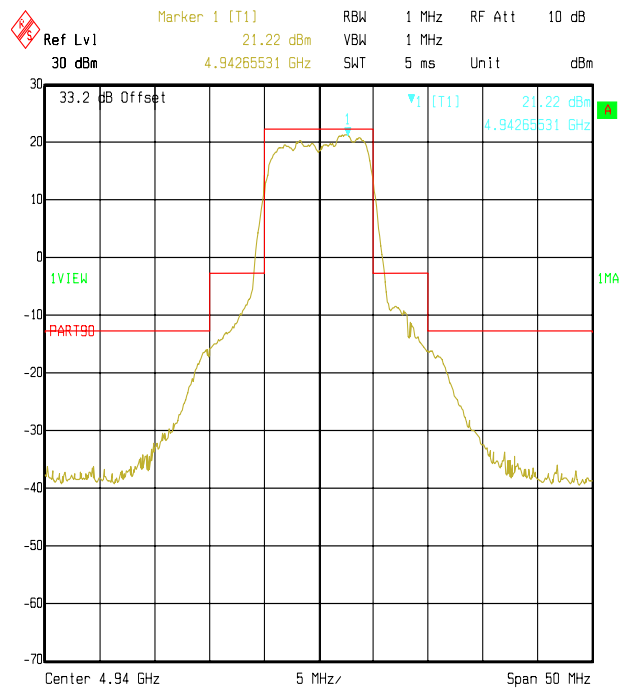
Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

#### 10 MHz Channel Width, Bottom Channel



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: BOTTOM CHANNEL WITH 10 MHz CHANNEL WIDTH EMISSION MASKS  
Date: 22.FEB.2006 14:05:23

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

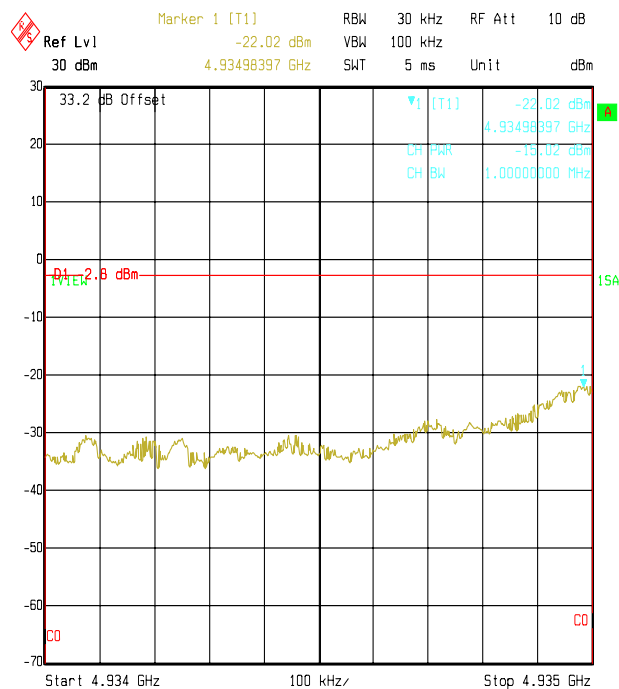
To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

#### 10 MHz Channel Width, Bottom Channel (Low Frequency Side Band)

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| -6.0 to -5.0                                          | 4934.0 to 4935.0      | -15.0                         | -2.8            | 12.2        | Complied |



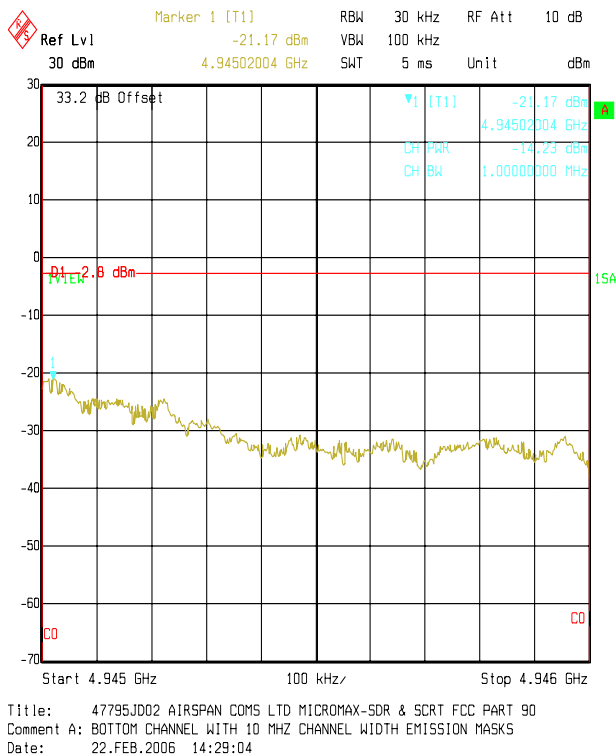
Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: BOTTOM CHANNEL WITH 10 MHz CHANNEL WIDTH EMISSION MASKS  
Date: 22.FEB.2006 14:27:07

*The above plot shows the integration method used at offsets of 5 MHz below the fundamental centre frequency, where the 25 dBc limit is applied.*

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)**  
**10 MHz Channel Width, Bottom Channel (High Frequency Side Band)**

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| 5.0 to 6.0                                            | 4945.0 to 4946.0      | -14.2                         | -2.9            | 11.3        | Complied |



The above plot shows the integration method used at offsets of 5 MHz above the fundamental centre frequency, where the 25 dBc limit is applied.

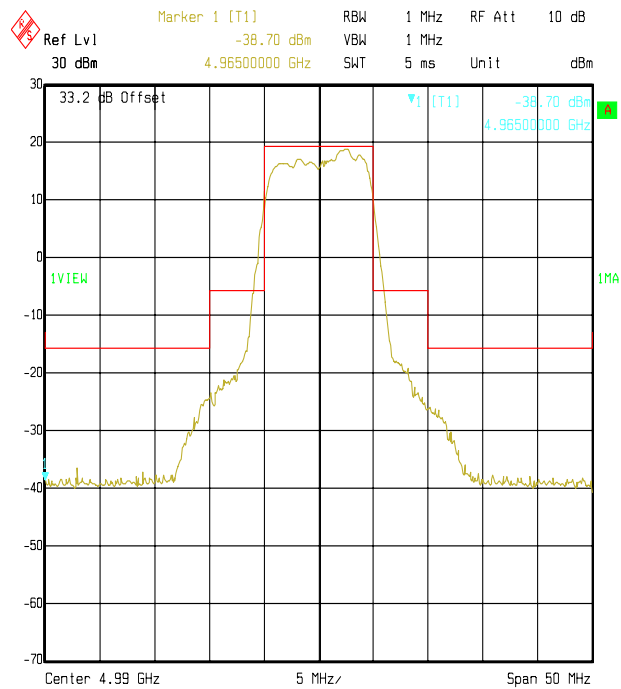
Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)

#### 10 MHz Channel Width, Top Channel

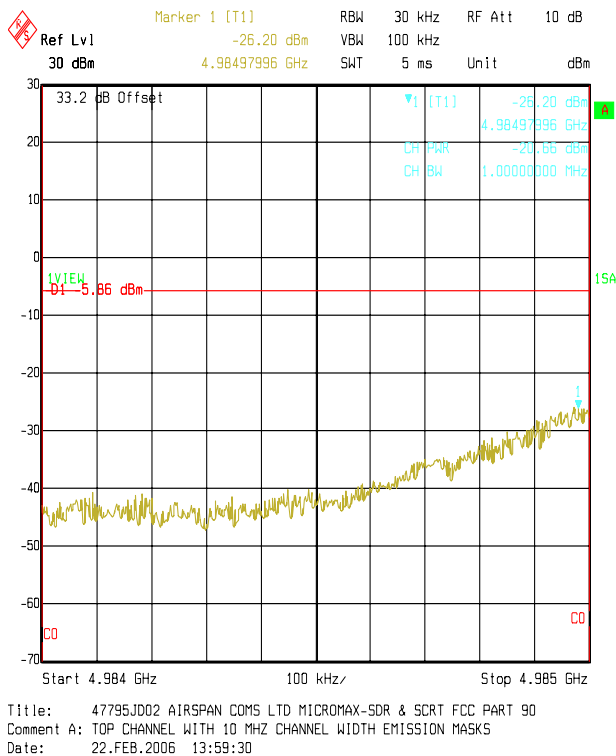


Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH EMISSION MASKS  
Date: 22.FEB.2006 13:34:12

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)**  
**10 MHz Channel Width, Top Channel (Low Frequency Side Band)**

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| -6.0 to -5.0                                          | 4984 to 4985          | -20.7                         | -5.9            | 14.8        | Complied |

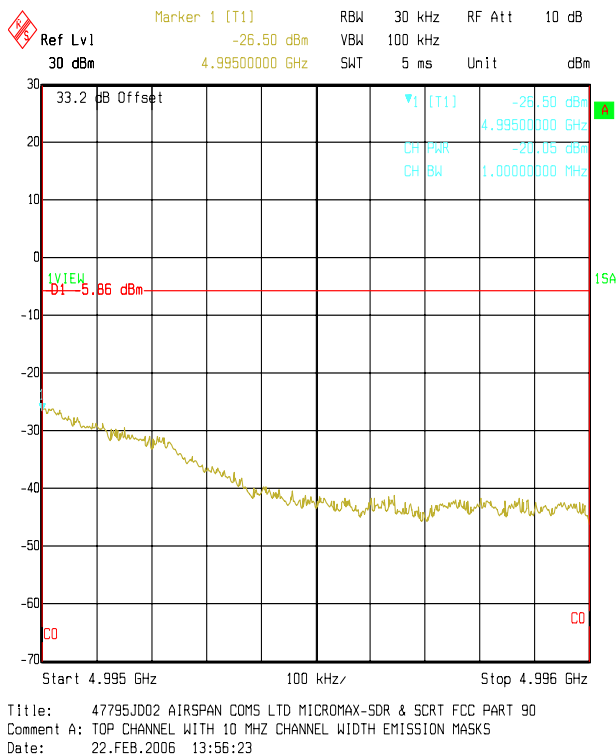


*The above plot shows the integration method used at offsets of 5 MHz below the fundamental centre frequency, where the 25 dBc limit is applied.*

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Conducted Emissions Mask: Sections 90.210(m)/2.1051 (Continued)**  
**10 MHz Channel Width, Bottom Channel (High Frequency Side Band)**

| Frequency offsets from carrier centre frequency (MHz) | Frequency Range (MHz) | Channel Power Level (dBm/MHz) | Limit (dBm/MHz) | Margin (dB) | Result   |
|-------------------------------------------------------|-----------------------|-------------------------------|-----------------|-------------|----------|
| 5.0 to 6.0                                            | 4995.0 to 4996.0      | -20.1                         | -5.9            | 14.2        | Complied |



The above plot shows the integration method used at offsets of 5 MHz above the fundamental centre frequency, where the 25 dBc limit is applied.

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

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## **7.6. Transmitter Conducted Emissions (Out of Band): Section 90.210(m)/2.1051**

### **Results:**

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

##### **Top Channel**

| Frequency<br>(MHz) | Peak Emission<br>Level (dBm) | Peak Emission<br>Level (dBc) | Limit<br>(dBc) | Margin<br>(dB) | Result |
|--------------------|------------------------------|------------------------------|----------------|----------------|--------|
| *See note below    |                              |                              |                |                |        |

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

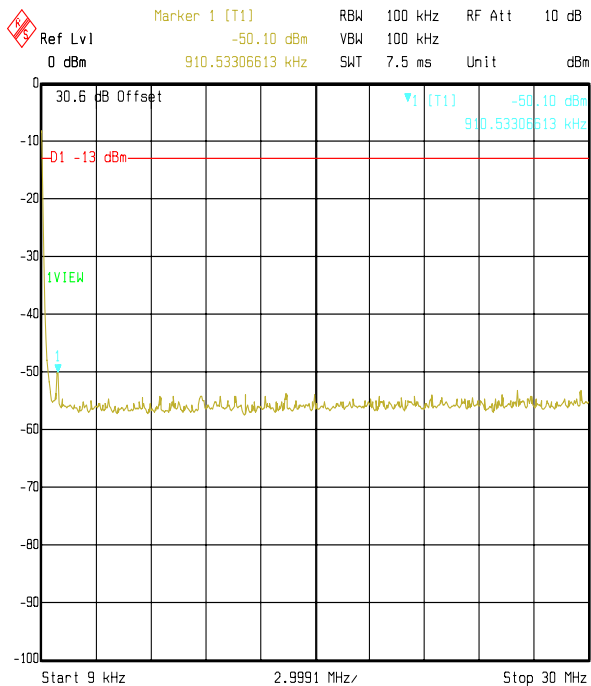
1. \* No spurious emissions were detected above the noise floor of the measuring receiver. Where possible, this was of a level 20 dB below the specified -13dBm limit; or better. However, in cases where the noise floor was not 20 dB below the limit, the highest peak level of noise floor observed was -26.2 dBm at 32.425 GHz.
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 (Transceiver)

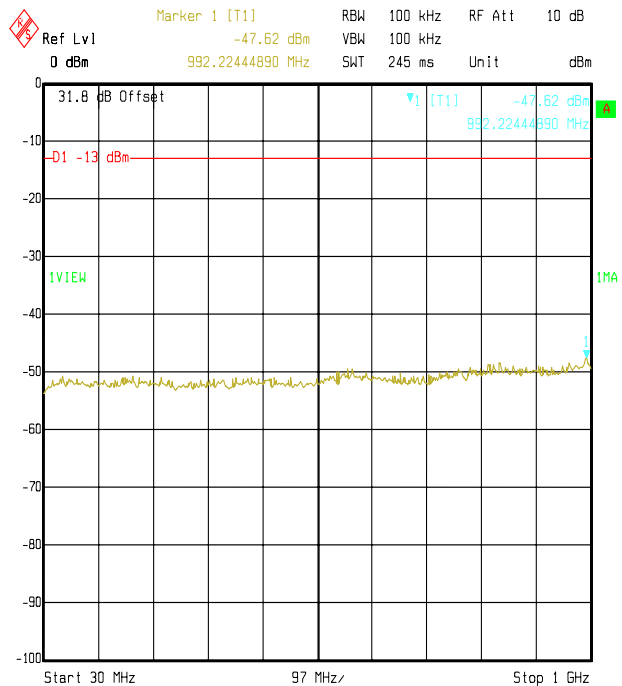
To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### 7.7. Transmitter Conducted Emissions (Out of Band): Section 90.210(m)/2.1051 – 10 MHz Channel Width, Top Channel



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:34:52

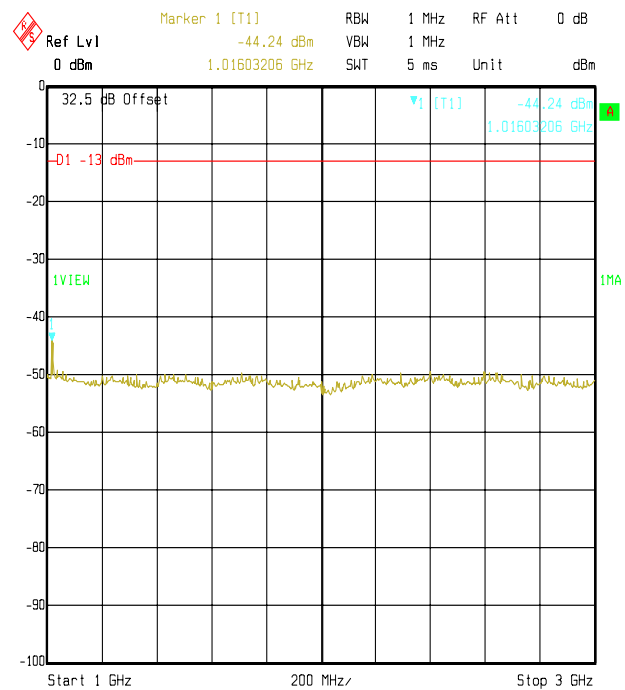


Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:36:54

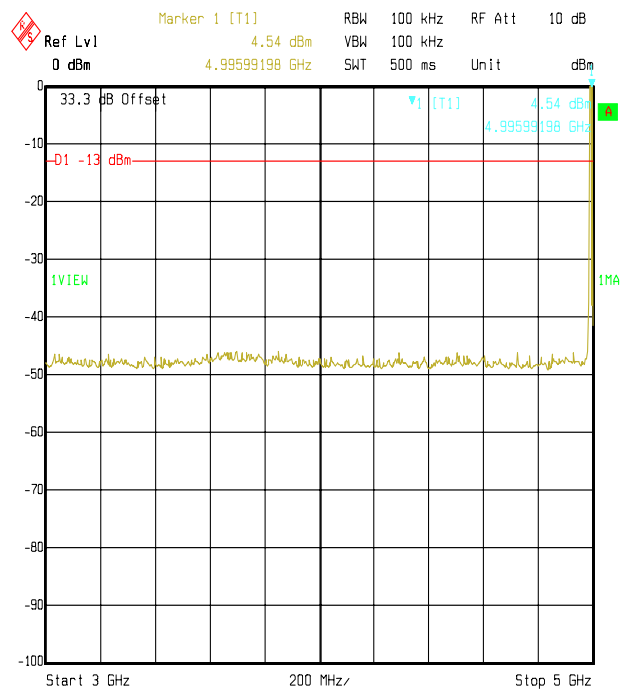
The plot above shows a high level emission occurring on the left hand side of the screen. This was the power envelope of the IF bandwidth of the spectrum analyser due to the high resolution bandwidth used. It was confirmed that no emissions were found 20 db below the specified -13dBm limit.

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Conducted Emissions (Out of Band): Section 90.210(m)/2.1051 – 10 MHz Channel Width, Top Channel (Continued)**



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHZ CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:13:55



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHZ CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 16:00:20

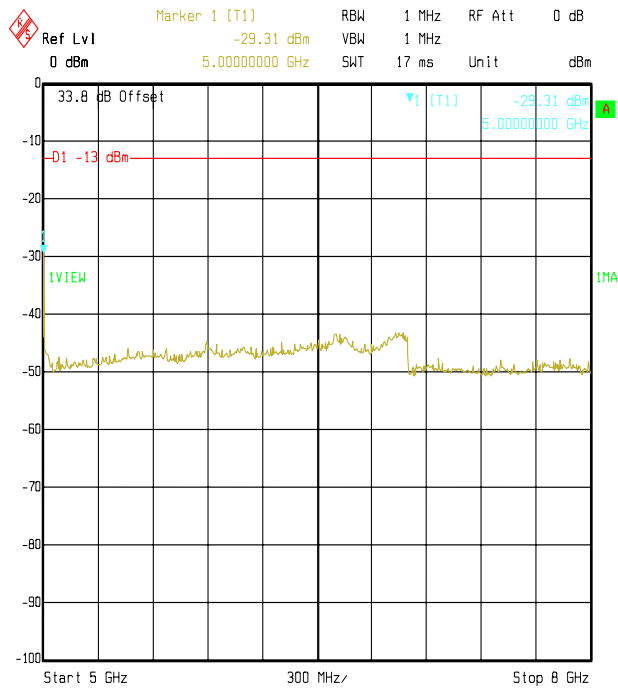
*The plot above shows a high level emission occurring on the right hand side of the screen. This was the fundamental carrier.*

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

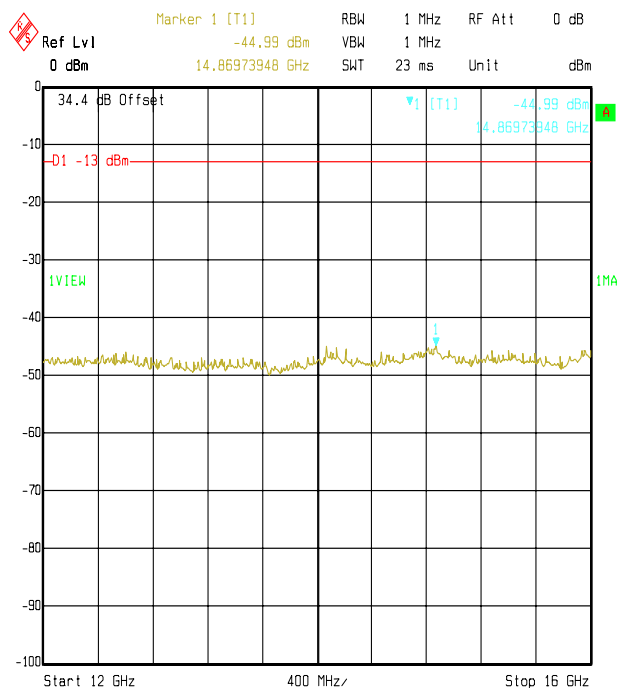
To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

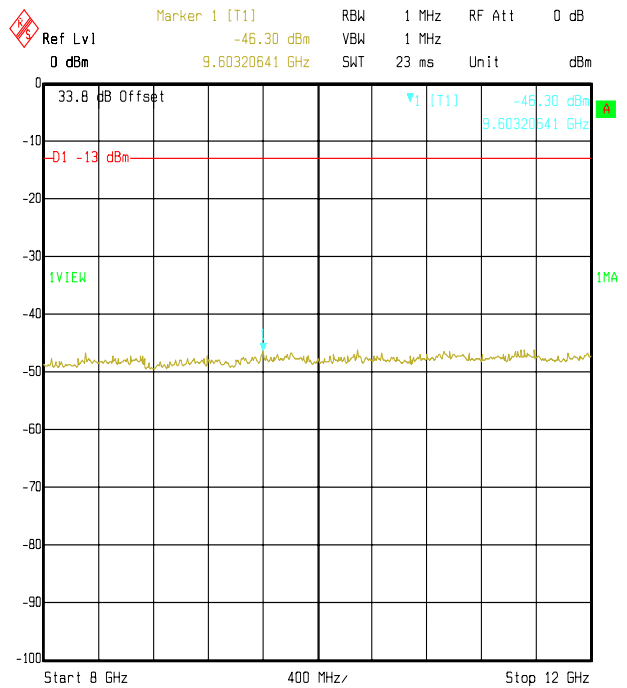
## 7.8. Transmitter Conducted Emissions (Out of Band): Section 90.210(m)/2.1051 – 10 MHz Channel Width, Top Channel



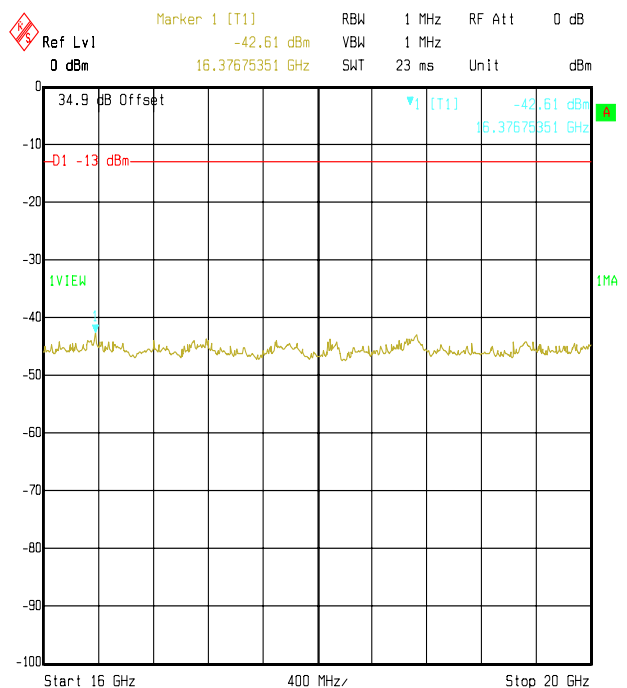
Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:21:09



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:27:30



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:25:45



Title: 47795JD02 AIRSPAN COMS LTD MICROMAX-SDR & SCRT FCC PART 90  
Comment A: TOP CHANNEL WITH 10 MHz CHANNEL WIDTH CONDUCTED EMISSION  
Date: 22.FEB.2006 15:29:15

**To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B**

[illegible]

47795j02 002

dBm

Trace 1  
-13 dBm

Start 26.5 GHz; Stop 40.0 GHz  
Ref -10 dBm; Ref Offset 52.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 60.0 mS  
Peak 32.425 GHz, -26.17 dBm  
Display Line: -13 dBm;  
24/02/2006 11:27:20

*Note: These plots are a pre-scan and for indication purposes only. For final measurements, see accompanying tables.*

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

### **7.10. Transmitter Radiated Emissions Marks: Sections 90.210(m)/2.1053**

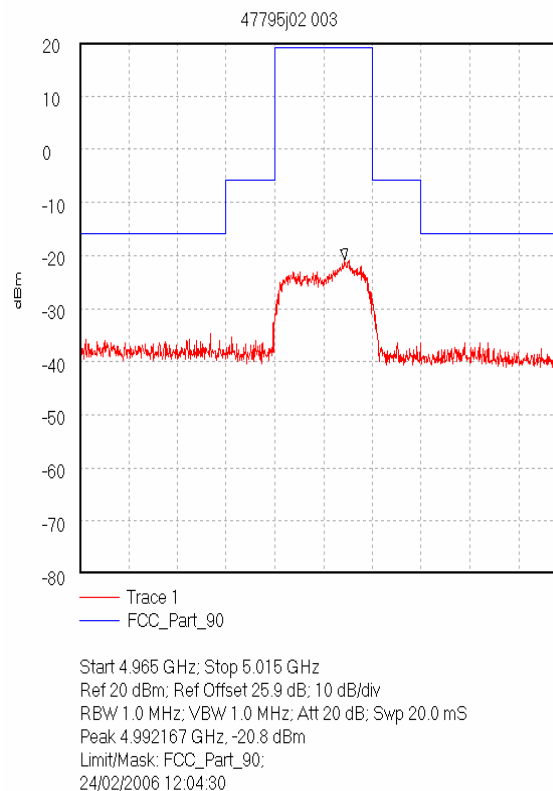
#### **Results:**

The measurement was performed with the EUT connected to a 50 Ohm termination at the antenna port, as the manufacturer did not supply an antenna for testing.

The mask limit indicated on the plot below was applied with respect to the conducted RF output power as measured with an RMS detector.

The carrier level as indicated in the plots is lower than the measured conducted power due to the fact the antenna port was terminated with a dummy load and the level indicated is that as radiated by the cabinet and load.

### **10 MHz Channel Width, Top Channel**



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

1. Measurements were only performed on the top channel with 10 MHz channel bandwidth, as specified within the client's test plan.

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

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### **7.11. Transmitter Radiated Emissions (Out of Band): Section 90.210(m)/2.1053**

#### **Results:**

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

#### **Top Channel**

| Frequency<br>(MHz) | Peak Emission<br>Level (dBm) | Peak Emission<br>Level (dBc) | Limit<br>(dBc) | Margin<br>(dB) | Result |
|--------------------|------------------------------|------------------------------|----------------|----------------|--------|
| *See note below    |                              |                              |                |                |        |

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

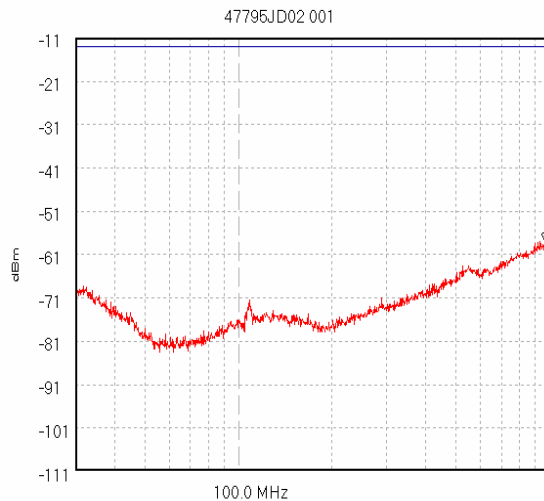
1. \* No spurious emissions were detected above the noise floor of the measuring receiver. Where possible, this was of a level 20 dB below the specified -13dBm limit; or better. However, in cases where the noise floor was not 20 dB below the limit, the highest peak level of noise floor observed was -21.8 dBm at 34.630 GHz.
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 (Transceiver)

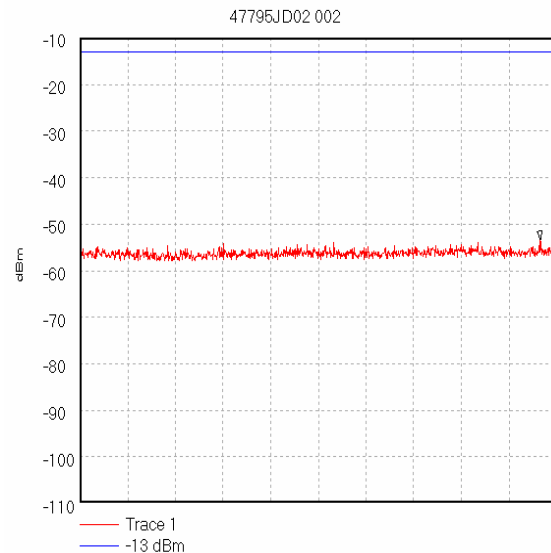
To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT

FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

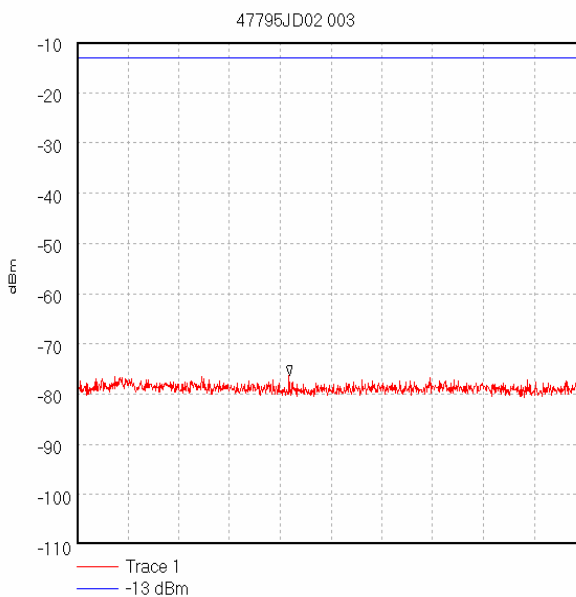
### 7.12. Transmitter Radiated Emissions (Out of Band): Section 90.210(m)/2.1053 – RSE Below 4 GHz



Start 30.0 MHz; Stop 1.0 GHz - Log Scale  
Ref -11 dBm; Ref Offset 0.0 dB; 10 dB/div  
RBW 120.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 380.0 mS  
Peak 965.542 MHz, -57.92 dBm  
Display Line: -13 dBm; Limit Test Passed  
Transducer Factors: A490  
20/02/2006 14:50:52



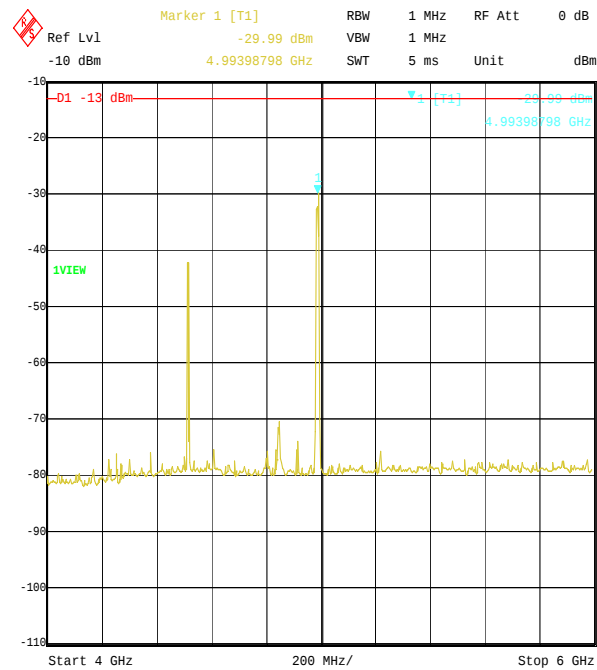
Start 1.0 GHz; Stop 2.0 GHz  
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 1.966 GHz, -53.34 dBm  
Display Line: -13 dBm;  
Transducer Factors: 1 to 2  
20/02/2006 15:10:35



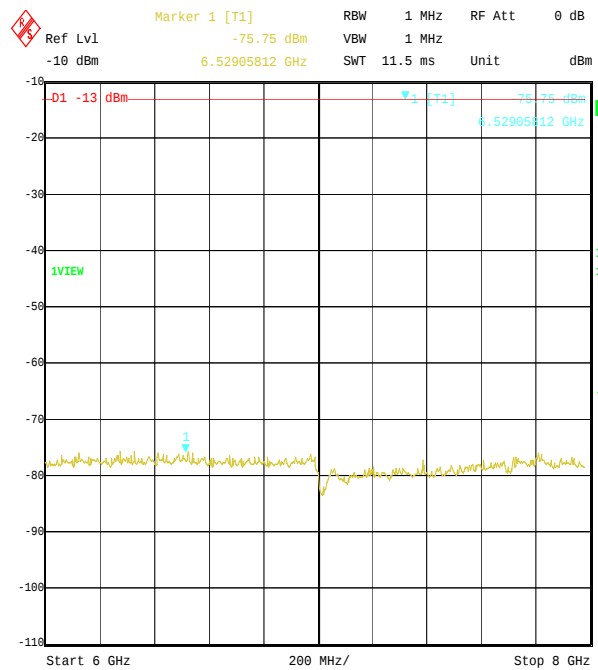
Start 2.0 GHz; Stop 4.0 GHz  
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS  
Peak 2.836 GHz, -76.25 dBm  
Display Line: -13 dBm;  
20/02/2006 15:18:59

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**7.13. Transmitter Radiated Emissions (Out of Band): Section 90.210(m)/2.1053 – RSE Above 4 GHz**



Title: 47795JD02 FCC PART 90 AIRSPAN COMMUNICATIONS LTD  
Comment A: RADIATED SPURIOUS EMISSIONS EUT TRANSMITTING ON TOP CHANNEL  
4990MHZ 10MHZ CHANNEL WIDTH  
Date: 21.FEB.2006 11:51:22

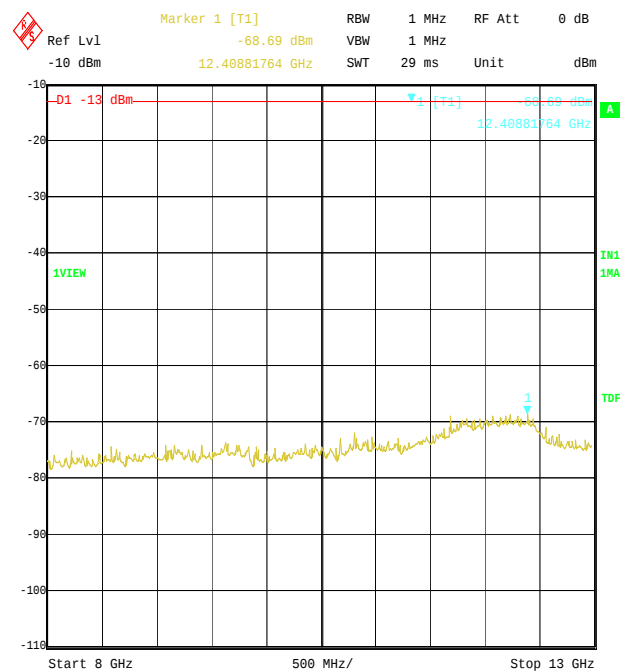


Title: 47795JD02 FCC PART 90 AIRSPAN COMMUNICATIONS LTD  
Comment A: RADIATED SPURIOUS EMISSIONS EUT TRANSMITTING ON TOP CHANNEL  
4990MHZ 10MHZ CHANNEL WIDTH  
Date: 21.FEB.2006 11:07:51

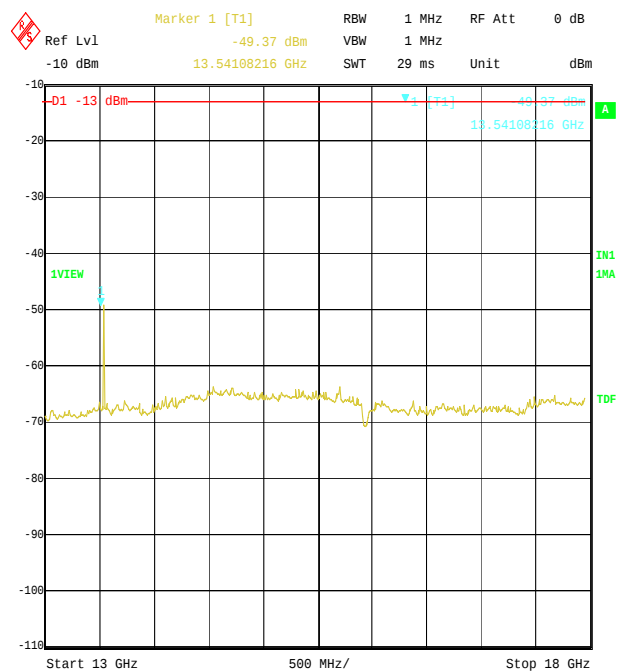
*The plot above shows a high level emission occurring  
at the centre of the screen.  
This is the fundamental carrier.*

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**Transmitter Radiated Emissions (Out of Band): Section 90.210(m)/2.1053 – RSE Above 4 GHz (Continued)**



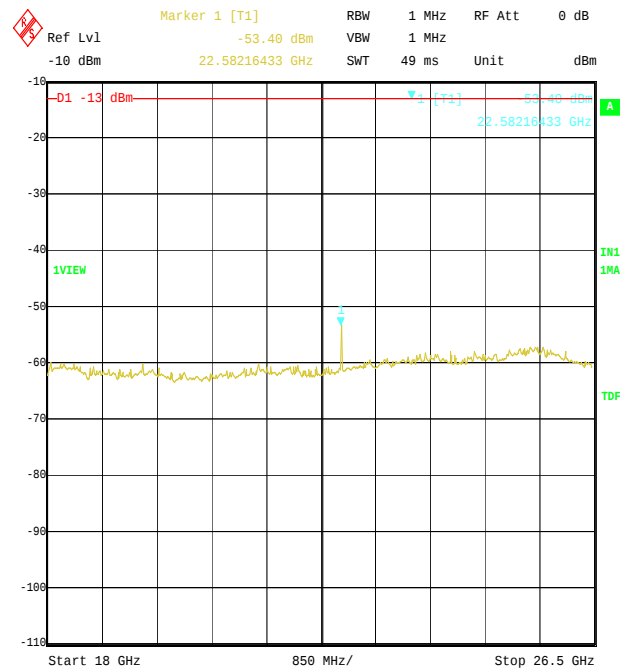
Title: 47795JD02 FCC PART 90 AIRSPAN COMMUNICATIONS LTD  
Comment A: RADIATED SPURIOUS EMISSIONS EUT TRANSMITTING ON TOP CHANNEL  
4990MHZ 10MHZ CHANNEL WIDTH  
Date: 21.FEB.2006 11:15:42



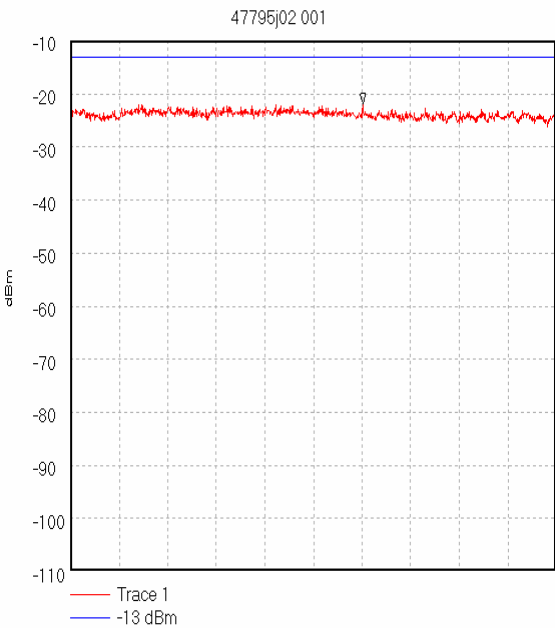
Title: 47795JD02 FCC PART 90 AIRSPAN COMMUNICATIONS LTD  
Comment A: RADIATED SPURIOUS EMISSIONS EUT TRANSMITTING ON TOP CHANNEL  
4990MHZ 10MHZ CHANNEL WIDTH  
Date: 21.FEB.2006 11:20:04

Test of:       Airspan Communications Ltd.  
              SCRT (Transceiver)  
To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
              FCC Test Plan Document Reference: 005-8300-012 28 February 2006 Rev. B

**7.14. Transmitter Radiated Emissions (Out of Band): Section 90.210(m)/2.1053 – RSE Above 4 GHz**



Title: 47795JD02 FCC PART 90 AIRSPAN COMMUNICATIONS LTD  
Comment A: RADIATED SPURIOUS EMISSIONS EUT TRANSMITTING ON TOP CHANNEL  
4990MHZ 10MHZ CHANNEL WIDTH  
Date: 21.FEB.2006 11:36:50



Start 26.5 GHz; Stop 40.0 GHz  
Ref -10 dBm; Ref Offset 59.0 dB; 10 dB/div  
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 60.0 mS  
Peak 34.63 GHz, -21.78 dBm  
Display Line: -13 dBm;  
24/02/2006 10:26:06

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

To: FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
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**7.15. Transmitter Frequency Stability (Temperature Variation): Sections 90.213/2.1055(a)(1)**

**Results:**

**10 MHz Channel Bandwidth**

**Top Channel (4990 MHz)**

| Temperature (°C) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (ppm) |
|------------------|--------------------------|----------------------|-----------------------|
| -30              | 4990.005378              | 5378                 | 1.078                 |
| -20              | 4990.005160              | 5160                 | 1.034                 |
| -10              | 4990.005190              | 5190                 | 1.040                 |
| 0                | 4990.005120              | 5120                 | 1.026                 |
| 10               | 4990.005050              | 5050                 | 1.012                 |
| 20               | 4990.005120              | 5120                 | 1.026                 |
| 30               | 4990.005050              | 5050                 | 1.012                 |
| 40               | 4990.005120              | 5120                 | 1.026                 |
| 50               | 4990.005160              | 5160                 | 1.034                 |

**Note(s):**

1. No limit has been specified for equipment operating at 2.450 GHz and above. The standard states: "frequency stability to be specified in the station authorization". Therefore, no compliance statement can be made for this test. These results are provided for information purpose only.
2. Due to the nature of the carrier signal, the Frequency Stability tests were performed using a single tone carrier. However, the client had advised that the tone has an offset of 100 kHz to the low side of the centre frequency. Therefore, the measured frequency was corrected by adding 100 kHz.
3. Measurements were only performed on the top channel with 10 MHz channel bandwidth, as specified within the test plan.

Test of: Airspan Communications Ltd.  
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#### **7.16. Transmitter Frequency Stability (Voltage Variation): Sections 90.213/2.1055**

##### **Results:**

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

##### **Top Channel (4990 MHz)**

| Supply Voltage (V) | Measured Frequency (MHz) | Frequency Error (Hz) | Frequency Error (ppm) |
|--------------------|--------------------------|----------------------|-----------------------|
| 110.0              | 4990.005120              | 5120                 | 1.026                 |
| 93.5               | 4990.005120              | 5120                 | 1.026                 |
| 126.5              | 4990.005120              | 5120                 | 1.026                 |

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

1. No limit has been specified for equipment operating at 2.450 GHz and above.  
The standard states: "frequency stability to be specified in the station authorization". Therefore, no compliance statement can be made for this test. These results are provided for information purpose only.
2. Due to the nature of the carrier signal, the Frequency Stability tests were performed using a single tone carrier. However, the client had advised that the tone has an offset of 100 kHz to the low side of the centre frequency. Therefore, the measured frequency was corrected by adding 100 kHz.
3. 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 (Transceiver)

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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**

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

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

A communications analyser was connected to the antenna port of the EUT via a suitable cable. Prior to testing being performed, the cable was calibrated for loss at the required frequency. For each frequency, the calibrated level of cable loss was noted and then added to the indicated result on the spectrum analyser to compensate for the losses in the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and the level was measured with the spectrum analyser using a peak detector and trace max hold.

Test of:       Airspar Communications Ltd.  
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### **Spectral Power Density**

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

Prior to testing being performed, a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency, the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

Prior to the measurement being taken, the spectrum analyser was tuned to the fundamental frequency of the EUT.

A resolution bandwidth of 1 MHz was selected and the analyser was set to a span of greater than the carrier's bandwidth. The trace was max hold and the frequency of the peak point was taken at of the trace.

The frequency of the highest emissions was then centred on the screen, the measurement were made using the channel power function of the spectrum analyser with a 30 kHz resolution bandwidth and a 100 kHz video bandwidth. The bandwidth for the measurement was automatically set by the spectrum analyser having enabled the channel power function.

The results are shown on the analyser display screen, adjacent to 'CH PWR'.

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### **Occupied (20 dB) Bandwidth**

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function via a direct connection (using suitable attenuation).

Measurements were performed to determine the Occupied Bandwidth in accordance with FCC Part 2.1049. The Occupied Bandwidth was measured from the fundamental emission at the bottom and top channels. The Occupied Bandwidth was measured in accordance with the requirements of FCC Part 2.1049, i.e. with the EUT modulated with a signal representing the maximum rated conditions under which it will operate (worst case)

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser automatically configures the measurement bandwidths to make an accurate measurement based on the channel bandwidth and channel spacing of the EUT.

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### **Transmitter Conducted 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.

Spurious emission measurements at the antenna port were performed from the lowest declared frequency 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.

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

For frequencies further than 250% of the authorized bandwidth from the centre of the assigned frequency ( $f_c$ ) the emissions shall be attenuated by at least  $43 + 10 \log (P \text{ in Watts})$  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 $f_c$ |
| Bandwidth         | 1 MHz >1 GHz                               |
| Bandwidth         | 10 kHz <1 GHz                              |
| Amplitude Range   | 100 dB                                     |
| Sweep Time        | Coupled                                    |

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                  SCRT (Transceiver)

To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT

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### **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 (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:

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

For measurements showing incursion of the power envelope through the emission mask when using a 1 MHz resolution bandwidth, the integration method was 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.

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

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### **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 – 2001 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 frequencies further than 250% of the authorized bandwidth from the centre of the assigned frequency (fc), the emissions shall be attenuated by at least  $43 + 10 \log(P \text{ in Watts})$  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.

Test of: Airspan Communications Ltd.  
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### **Transmitter Radiated Emissions (continued)**

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.

| 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                            |
| Amplitude Range   | 100 dB                                  |
| Sweep Time        | Coupled                                 |

Test of:       Airspar Communications Ltd.  
                  SCRT (Transceiver)

To:            FCC Part 90 in accordance to MicroMAX-SDR & SCRT  
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### **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:

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

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.

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

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### **Transmitter Frequency Stability**

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

The EUT was situated within an environmental test chamber and monitored on the communications analyser via a direct connection.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30°C to 50°C.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

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

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 declared nominal operating frequency of the channel being tested.

The frequency error measured was converted to an error in ppm using the following formula as defined by TIA\_EIA\_603A :-

$$\text{ppm error} = \left( \frac{MCF_{\text{MHz}}}{ACF_{\text{MHz}}} - 1 \right) * 10^6$$

where  $MCF_{\text{MHz}}$  is the measured carrier frequency in MHz  
 $ACF_{\text{MHz}}$  is the assigned carrier frequency in MHz

The measured ppm is documented for information purpose only.

Test of: Airspan Communications Ltd.  
SCRT (Transceiver)

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## **Appendix 1. Test Equipment Used**

| RFI No. | Instrument                          | Manufacturer          | Type No.      | Serial No.                          |
|---------|-------------------------------------|-----------------------|---------------|-------------------------------------|
| A027    | Horn Antenna                        | Eaton                 | 9188-2        | 301                                 |
| A031    | 2 to 4 GHz Eaton Horn Antenna       | Eaton                 | 91889-2       | 557                                 |
| A1392   | 20 dB / 18 GHz / 50 ohms Attenuator | HUBER + SUHNER AG     | 757456        | 6820.17.B                           |
| A1396   | 10 dB / 18 GHz / 50 ohms Attenuator | HUBER + SUHNER AG     | 757987        | 6810.17.B                           |
| A1536   | Variable Attenuators                | Hwelett Packard       | 9494B & 9496B | 3308A30801 & 3308A19649             |
| A254    | WG 14 Microwave Horn                | Flann Microwave       | 14240-20      | 139                                 |
| A428    | WG 12 horn                          | Flann                 | 12240-20      | 134                                 |
| A429    | WG 16 horn                          | Flann                 | 16240-20      | 561                                 |
| A430    | WG 18 horn                          | Flann                 | 18240-20      | 425                                 |
| A436    | WG 20 horn                          | Flann                 | 20240-20      | 330                                 |
| A553    | Bi-log Antenna                      | Chase                 | CBL6111A      | 1593                                |
| L0796   | Swept Signal Generator              | Agilent               | 83630B        | 3844A00937                          |
| L0799   | AC Power Supply                     | Kikusui               | PCR 1000LA    | JA002944                            |
| L0802   | Environmental Chamber               | Gallenkamp Industrial | FE300.T.R75   | 6974                                |
| M069    | ESMI Spectrum Analyser / Receiver   | Rohde & Schwarz       | ESMI          | 829 808/007 (DU) / 827 063/008 (RU) |
| M076    | FSM Harmonic Mixer set              | Rohde & Schwarz       | FS-Z16        | 831 337/002                         |
| M1124   | ESIB Spectrum Analyser              | Rohde & Schwarz       | ESIB26        | 100046K                             |
| M1242   | FSEM30 Spectrum Analyser            | Rohde & Schwarz, Inc. | FSEM30        | 845986_022                          |
| M1243   | U3661 Spectrum Analyzer             | Advantest             | U3661         | 83140299                            |
| M1269   | True RMS Multimeter                 | Fluke                 | 179           | 90250210                            |
| S202    | Site 2                              | RFI                   | 2             | S202-15011990                       |
| S215    | Site 15                             | RFI                   | 15            |                                     |

**NB** In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Test of:       Airspan Communications Ltd.  
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## **Appendix 2. Test Configuration Drawings**

This appendix contains the following drawings:

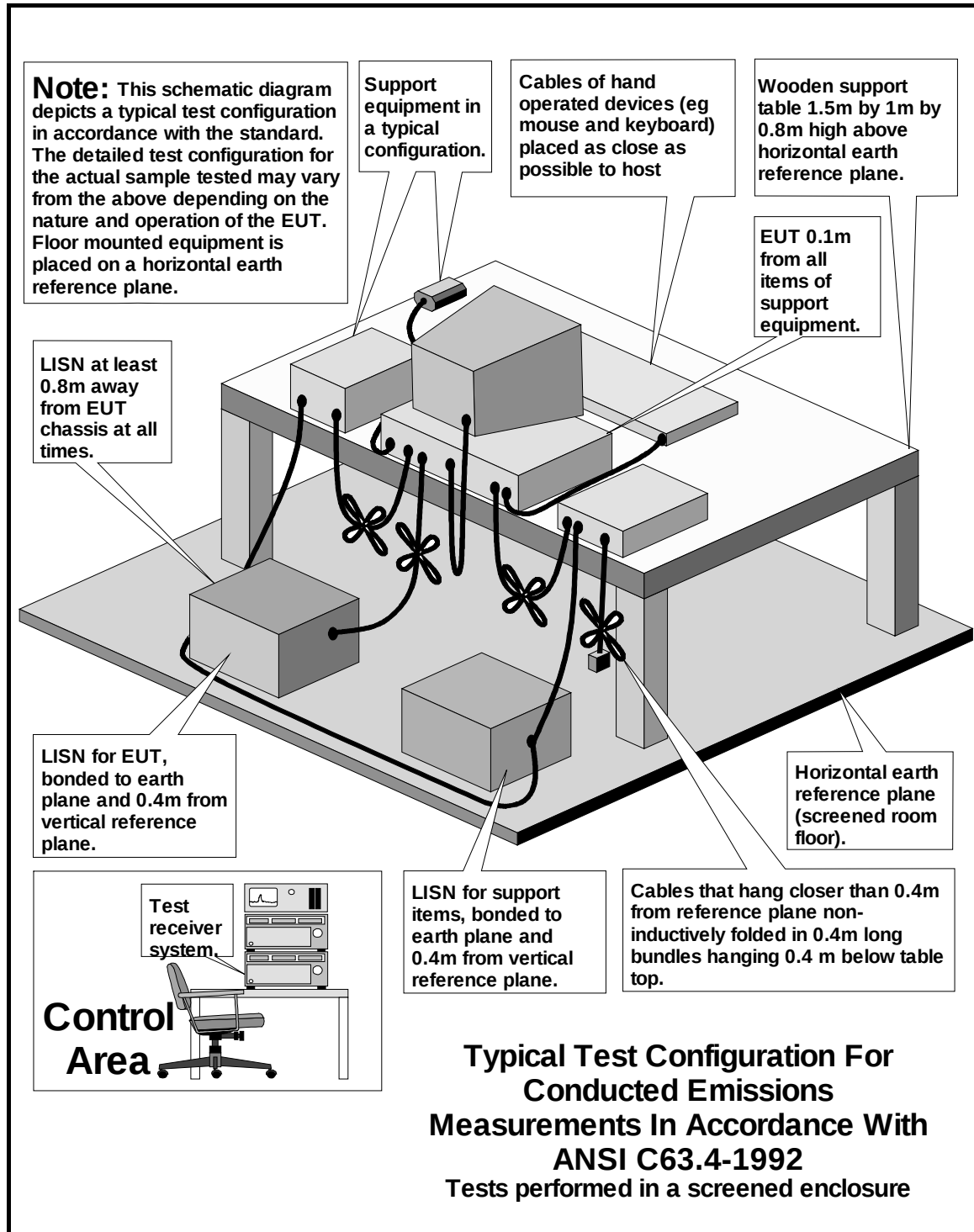
| Drawing Reference Number | Title                                                      |
|--------------------------|------------------------------------------------------------|
| DRG\47795JD02\EMICON     | Test configuration for measurement of conducted emissions. |
| DRG\47795JD02\EMIRAD     | Test configuration for measurement of radiated emissions.  |

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DRG\47795JD02\EMICON

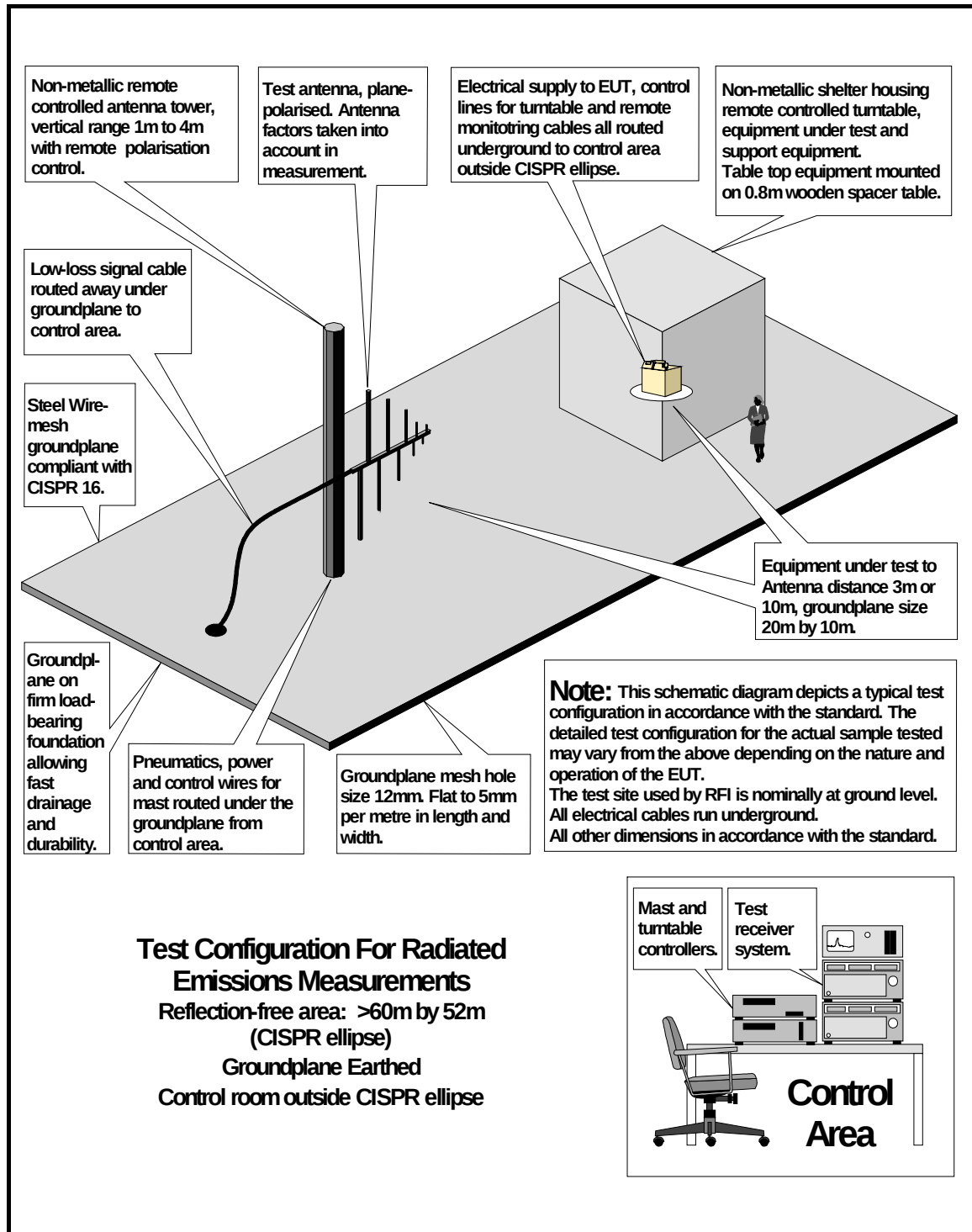


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DRG\47795JD02\EMIRAD



**Test of:**       **Airspan Communications Ltd.**  
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