

<b>Prüfbericht - Nr.:</b> 16011972 001			<b>Seite 1 von 21</b>		
<i>Test Report No.:</i>			<i>Page 1 of 21</i>		
<b>Auftraggeber:</b> <i>Client:</i>		Uni-Art Precise Products Ltd. 11-12/F., YUE XIU IND'L BLDG. 87 HUNG TO ROAD, KWUN TONG, KOWLOON HONG KONG			
<b>Gegenstand der Prüfung:</b> Audio Transmitter <i>Test item:</i>					
<b>Bezeichnung:</b> <i>Identification:</i>		SP1491, SP1491A, SP1491B, SP2991		<b>FCC ID:</b> MVASP1491B – 001T <i>FCC ID</i>	
<b>Wareneingangs-Nr.:</b> <i>Receipt No.:</i>		173035549		<b>Eingangsdatum:</b> 18.02.2008 <i>Date of receipt:</i>	
<b>Prüfort:</b> <i>Testing location:</i>		TÜV Rheinland (Guangdong) Ltd. EMC Laboratory Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China		Listed test laboratory according to FCC rules section 2.948 for measuring devices under Parts 15	
<b>Prüfgrundlage:</b> <i>Test specification:</i>		ANSI C63.4: 2003 FCC Part 15: 20, Sep. 2007 Subpart C section 15.207, 15.209 and 15.249			
<b>Prüfergebnis:</b> <i>Test Result:</i>		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>			
<b>Prüflaboratorium:</b> <i>Testing Laboratory:</i>		TÜV Rheinland (Guangdong) Ltd.			
<b>geprüft/ tested by:</b>		<b>kontrolliert/ reviewed by:</b>			
18. Mar. 2008 Ricky Liu/Project Manager Datum Name/Stellung Unterschrift Date Name/Position Signature		18. Mar. 2008 Dave Xie/Project Manager Datum Name/Stellung Unterschrift Date Name/Position Signature			
<b>Sonstiges/ Other Aspects:</b>					
<b>Abkürzungen:</b> P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet			<b>Abbreviations:</b> P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested		
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>					

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 2 von 21**

*Page 2 of 21*

## TEST SUMMARY

### **5.1 CONDUCTED EMISSION FOR FCC PART 15 PER SECTION 15.207(A)**

*RESULT: Pass*

### **5.2 RADIATED EMISSION FOR FCC PART 15 PER SECTION 15.209(A)**

*RESULT: Pass*

### **5.3 FUNDAMENTAL AND HARMONICS RADIATED EMISSION FOR FCC PART 15 PER SECTION 15.249(A)**

*RESULT: Pass*

**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 3 von 21**  
*Page 3 of 21*

## Contents

<b>1</b>	<b>GENERAL REMARKS.....</b>	<b>4</b>
<b>1.1</b>	<b>COMPLEMENTARY MATERIALS .....</b>	<b>4</b>
<b>2</b>	<b>TEST SITES.....</b>	<b>4</b>
<b>2.1</b>	<b>TEST FACILITIES .....</b>	<b>4</b>
<b>2.2</b>	<b>LIST OF TEST AND MEASUREMENT INSTRUMENTS .....</b>	<b>5</b>
<b>2.3</b>	<b>TRACE ABILITY .....</b>	<b>5</b>
<b>2.4</b>	<b>CALIBRATION .....</b>	<b>6</b>
<b>2.5</b>	<b>MEASUREMENT UNCERTAINTY.....</b>	<b>6</b>
<b>2.6</b>	<b>LOCATION OF ORIGINAL DATA.....</b>	<b>6</b>
<b>2.7</b>	<b>STATUS OF FACILITY USED FOR TESTING.....</b>	<b>6</b>
<b>3</b>	<b>GENERAL PRODUCT INFORMATION.....</b>	<b>7</b>
<b>3.1</b>	<b>PRODUCT FUNCTION AND INTENDED USE .....</b>	<b>7</b>
<b>3.2</b>	<b>RATINGS AND SYSTEM DETAILS .....</b>	<b>7</b>
<b>3.3</b>	<b>INDEPENDENT OPERATION MODES .....</b>	<b>8</b>
<b>3.4</b>	<b>SUBMITTED DOCUMENTS .....</b>	<b>8</b>
<b>4</b>	<b>TEST SET-UP AND OPERATION MODE .....</b>	<b>9</b>
<b>4.1</b>	<b>PRINCIPLE OF CONFIGURATION SELECTION.....</b>	<b>9</b>
<b>4.2</b>	<b>TEST OPERATION AND TEST SOFTWARE.....</b>	<b>9</b>
<b>4.3</b>	<b>SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....</b>	<b>9</b>
<b>4.4</b>	<b>COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE .....</b>	<b>9</b>
<b>4.5</b>	<b>TEST SET-UP.....</b>	<b>10</b>
<b>5</b>	<b>TEST RESULTS EMISSION .....</b>	<b>12</b>
<b>5.1</b>	<b>CONDUCTED EMISSION FOR FCC PART 15 PER SECTION 15.207(A) .....</b>	<b>12</b>
<b>5.2</b>	<b>RADIATED EMISSION FOR FCC PART 15 PER SECTION 15.209(A).....</b>	<b>14</b>
<b>5.3</b>	<b>FUNDAMENTAL AND HARMONICS RADIATED EMISSION FOR FCC PART 15 PER SECTION 15.249(A).....</b>	<b>16</b>
<b>6</b>	<b>PHOTOGRAPHS OF THE TEST SET-UP.....</b>	<b>18</b>
<b>7</b>	<b>LIST OF TABLES.....</b>	<b>21</b>
<b>8</b>	<b>LIST OF PHOTOGRAPHS.....</b>	<b>21</b>

**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 4 von 21**  
*Page 4 of 21*

## **1 General Remarks**

### **1.1 Complementary Materials**

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test result

## **2 Test Sites**

### **2.1 Test Facilities**

**TÜV Rheinland (Guangdong) Ltd. EMC Laboratory**

Guangzhou Auto Market, Yuan Gang Section of Guangshan Road  
Guangzhou 510650

P. R. China

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 5 von 21**

*Page 5 of 21*

## 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Kind of Equipment	Type	Manufacturer	S/N	Calibrated until	Calibrated Interval
EMI Test Receiver	ESCI-3	Rohde & Schwarz	100216	26.Nov.2008	1 year
Spectrum Analyzer	FSP30	Rohde & Schwarz	100286	24.Aug.2008	1 year
Trilog-Broadband Antenna	VULB9168	SCHWARZBECK MESS-ELEKTRONIK	210	08.May.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100385	18.Jul.2009	2 year
Double-Ridged Waveguide Horn Antenna	HF906	Rohde & Schwarz	100407	08.May.2009	2 year
Pre-amplifier	AFS42- 00101800- 25-S-42	MITEQ	1101599	31.Jul.2009	2 year
Band Reject Filter	BRM50702	Micro-Tronics	023	15.Feb.2010	2 year
Standard Gain Horn Antenna	3160-09	EMCO	21642	N/A	2 year
Standard Gain Horn Antenna	3160-09	EMCO	21645	N/A	2 year
Pre-amplifier	AFS33- 18002650- 30-8P-44	MITEQ	1108282	31.Jul.2009	2 year
3m Anechoic Chamber	N/A	Albatross Project GmbH	N/A	16.Apr.2008	2 year
EMI Test Receiver	ESCS30	Rohde & Schwarz	100316	02.Apr.2008	1 year
Two-Line V-Network	ESH3-Z5	Rohde & Schwarz	100308	02.Apr. 2008	1 year
Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100701	01.Mar.2009	1 year

## 2.3 Trace ability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 6 von 21**  
*Page 6 of 21*

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

Uncertainty for conducted emissions measurements is  $\pm 2.51\text{dB}$ .

Uncertainty for radiated emissions measurements is  $\pm 4.9\text{dB}$  (30MHz-1GHz),  $\pm 4.84\text{dB}$  (>1GHz).

The reported expanded uncertainty is based on a standard uncertainty multiply by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%.

## 2.6 Location of original data

The original copies of all test data taken during actual testing were attached at Appendix 1 of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangzhou) file for certification follow-up purposes.

## 2.7 Status of facility used for testing

TÜV Rheinland (Guangdong) Ltd. EMC Laboratory; Guangzhou Auto Market, Yuan Gang Section of Guangshan Road, Guangzhou 510650, P. R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements, the register no. 833845

### 3 General Product Information

Brief description of the test samples:

The submitted samples SP1491, SP1491A, SP1491B and SP2991 are 900MHz transmitters for wireless speaker system with 2 channels available. Stereo audio signal input to the audio-in port of the sample and modulated as a FM signal for transmission. 19 kHz pilot signal is also included in the RF signal as complete FM transmission. The antenna type is integrated.

All the 4 models have identical circuit design, PCB layout and electronic component.

SP1491A differs with SP1491 in the shape of the bottom enclosure only.

SP1491B differs with SP1491 in the colour of the LED only.

SP2991 is identical to SP1491B except the model name.

Based on above-mentioned information, all necessary tests are performed on SP1491B only.

#### 3.1 Product Function and Intended Use

For details, refer to technical documentation and the user manual.

#### 3.2 Ratings and System Details

Type designation	:	SP1491, SP1491A, SP1491B, SP2991
Frequency range	:	912.00MHz, 913.00MHz
Number of channels	:	2 channels
Type of antenna	:	Integral antenna
FCC ID	:	MVASP1491B – 001T
Power supply	:	AC/DC adaptor input
Ports	:	Audio input 12V DC input
RF Power level	:	<50 mV/m
Protection Class	:	III

Refer to the technical documentation for further information

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 8 von 21**

*Page 8 of 21*

### **3.3 Independent Operation Modes**

The basic operation modes are:

Transmitting and standby

For further information refer to User Manual

### **3.4 Submitted Documents**

Block Diagram  
Circuit Diagram  
Components List  
PCB layout  
FCC label  
User Manual  
Photo document



## **4 Test Set-up and Operation Mode**

### **4.1 Principle of Configuration Selection**

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

### **4.2 Test Operation and Test Software**

Refer to Test set-up in chapter 5.

### **4.3 Special Accessories and Auxiliary Equipment**

The product has been tested together with the following Linear AC/DC Adaptor:

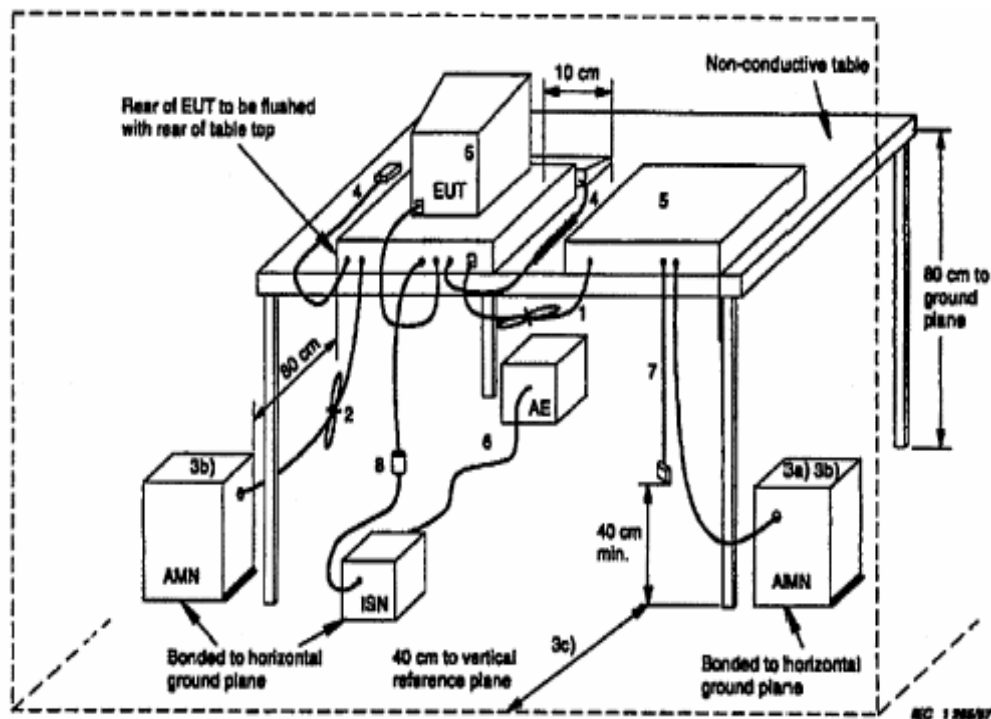
Input	: AC 120V 60Hz
Output	: DC 12V / 200mA
Protection class	: II

### **4.4 Countermeasures to achieve EMC Compliance**

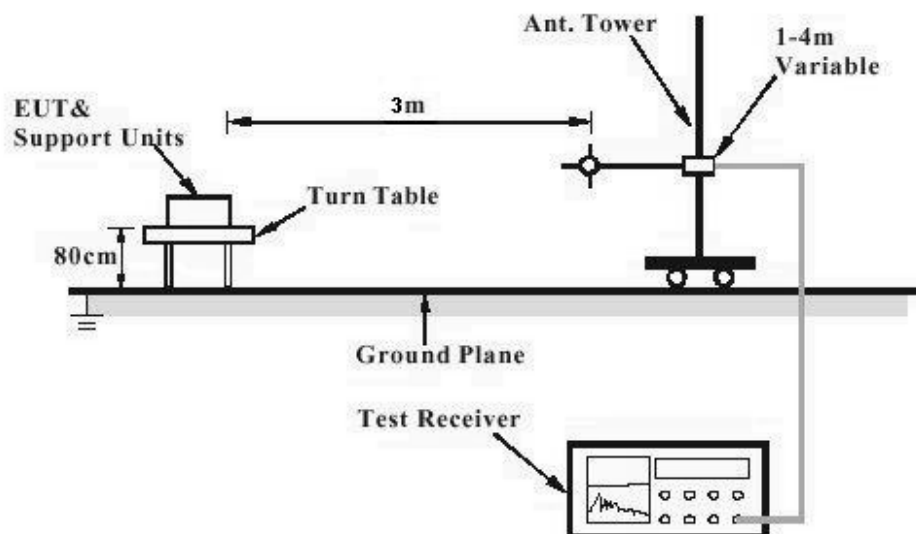
The test sample, which has been tested, contained the noise suppression parts as described in the technical document. No additional measures were employed to achieve compliance.

## 4.5 Test set-up

**Diagram 1 of Measurement Equipment Configuration for Testing Conducted Emission**



**Diagram 2 of Measurement Equipment Configuration for Testing Radiated Emission**



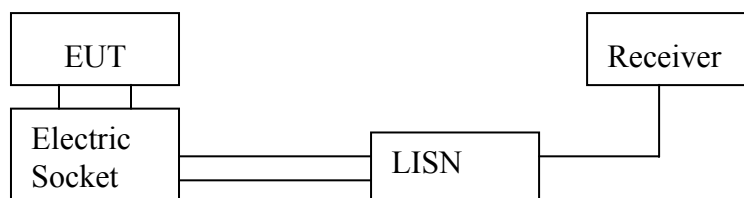
**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

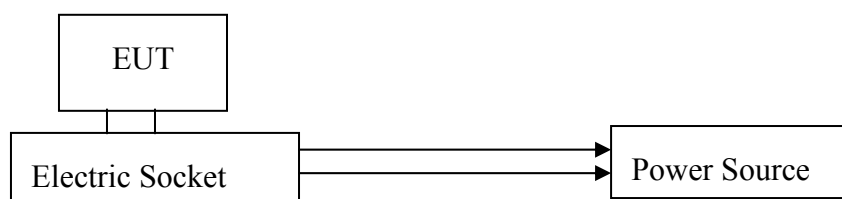
**Seite 11 von 21**

*Page 11 of 21*

**Diagram 3 of Equipment Configuration for Testing Conducted Emission**



**Diagram 4 of Equipment Configuration for Testing Radiated Emission**



**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 12 von 21**  
*Page 12 of 21*

## 5 Test Results EMISSION

### 5.1 Conducted Emission for FCC Part 15 Per Section 15.207(a)

**RESULT:**

**Pass**

Date of testing	:	22.02.2008
Test specification	:	FCC Part 15 Per Section 15.207(a)
Limits	:	FCC Part 15 Per Section 15.207(a)
Test procedure	:	Procedure specified in ANSI C63.4 were followed
Deviations from Standard Test procedures	:	None
Kind of test site	:	Shielded room
Operation mode	:	Transmitting
Temperature	:	20°C
Humidity	:	45%

**Test procedure:**

1. Place the EUT as specified in ANSI C63.4 Clause 7.2.1
2. Plug the LISN to a correct power source (pay attention to: AC/DC, voltage, frequency).
4. Connect the EUT to LISN and choose N or L1 on the LISN.
5. Connect ESCS30 and LISN via a 50-ohm coaxial cable and a pulse limiter then begin exploratory measurement as specified in ANSI C63.4 Clause 7.2.3
6. Make final measurement as specified in ANSI C63.4 Clause 7.2.4
7. Switch to the other line on the LISN and repeat step 4 to 6.

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 13 von 21**

*Page 13 of 21*

**Table 2: Disturbance Voltage on AC Mains**

Frequency [MHz]	Line	QP [dB $\mu$ V]	AV [dB $\mu$ V]	Quasi Peak Limit [dB $\mu$ V]	Average Limit [dB $\mu$ V]
*					

\*) The disturbance measured is far below the limit and therefore, no final measurement was performed.

If the result of the measurement with the Quasi Peak detector is below the Average limit, the measurement with Average Detector may be omitted.

The spectral diagrams in Appendix 1 display the exploratory measurement of un-weighted peak values and average values.

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 14 von 21**

*Page 14 of 21*

## **5.2 Radiated Emission for FCC Part 15 Per Section 15.209(a)**

### **RESULT:**

**Pass**

Date of testing	:	21.02.2008
Test specification	:	FCC Part 15 Per Section 15.209(a)
Limits	:	FCC Part 15 Per Section 15.209(a)
Test procedure	:	Procedure specified in ANSI C63.4 were followed

Deviations from Standard Test procedures

Deviations from Standard Test procedures	:	None
Kind of test site	:	3m Semi-anechoic chamber
Operation mode	:	Transmitting
Temperature	:	23°C
Humidity	:	48%

### **Test procedure:**

1. The EUT was placed on the top of a rotatable table 0.8 meters above the ground with 3-orthogonal direction and be kept close enough to the receiving antenna. The table was rotated 360 degrees to determine the suspected emission frequency and the position of the worst radiation case with both horizontal and vertical antenna polarization.
2. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.
3. For each suspected emission frequency recorded in step 1, the EUT was arranged to its worst case that the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to read the maximum emission.

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 15 von 21**

*Page 15 of 21*

**Table 3: Radiated Emission (Transmitting at 912.0MHz)**

Frequency	QP	AV	PK	Corr. Factor	Polarity	Limit		
						QP	AV	PK
[MHz]	[dBμV/m]			(dB)	(H/V)	[dBμV/m]		
48.30	8.7	N/A	N/A	13.2	H	40	N/A	N/A
175.50	9.7	N/A	N/A	13.5	H	43.5	N/A	N/A
448.45	16.7	N/A	N/A	20.6	H	46	N/A	N/A
37.15	10.3	N/A	N/A	14.3	V	40	N/A	N/A
146.05	8.2	N/A	N/A	12.0	V	43.5	N/A	N/A
557.55	19.3	N/A	N/A	22.9	V	46	N/A	N/A
*)---								

\* ) Disturbances other than those mentioned above are small or not detectable.

The final measurement for frequencies below 1000MHz is performed with Quasi Peak detector; the final measurement for frequencies above 1000MHz is performed with Average and Peak detector.

The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz at frequency below 1GHz.

The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz at frequency above 1GHz.

**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 16 von 21**

*Page 16 of 21*

### **5.3 Fundamental and harmonics Radiated Emission for FCC Part 15 Per Section 15.249(a)**

**RESULT:**

**Pass**

Date of testing	:	21.02.2008
Test specification	:	FCC Part 15 Per Section 15.249(a)
Limits	:	FCC Part 15 Per Section 15.249(a)
Test procedure	:	Procedure specified in ANSI C63.4 were followed
Deviations from Standard Test procedures	:	None
Kind of test site	:	3m Semi-anechoic chamber
Operation mode	:	Transmitting
Temperature	:	23°C
Humidity	:	48%

**Test procedure:**

1. The EUT was placed on the top of a rotatable table 0.8 meters above the ground with 3-orthogonal direction and be kept close enough to the receiving antenna. The table was rotated 360 degrees to determine the suspected emission frequency and the position of the worst radiation case with both horizontal and vertical antenna polarization.
2. The EUT was then set 3 meters away from the receiving antenna, which was mounted on a variable-height antenna tower.
3. For each suspected emission frequency recorded in step 1, the EUT was arranged to its worst case that the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to read the maximum emission.



**Prüfbericht - Nr.: 16011972 001**

*Test Report No.:*

**Seite 17 von 21**

*Page 17 of 21*

**Table 4: Fundamental and harmonics Radiated Emission (Transmitting at 912.0MHz)**

Frequency	Harm. No.	QP	AV	PK	Corr. Factor	Polarity	Limit		
							QP	AV	PK
[MHz]		[dBμV/m]			(dB)	(H/V)	[dBμV/m]		
912.00	1st	90.1	N/A	N/A	28.8	H	94	N/A	N/A
912.00	1st	91.9	N/A	N/A	28.8	V	94	N/A	N/A
1824.00	2nd	N/A	38.1	45.1	-14.0	H	N/A	54	74
1824.00	2nd	N/A	37.2	44.7	-7.8	V	N/A	54	74
3648.00	4th	N/A	46.0	52.1	-14.0	H	N/A	54	74
3648.00	4th	N/A	45.4	52.0	-7.8	V	N/A	54	74
*)---									

\* ) Disturbances other than those mentioned above are small or not detectable.

The final measurement for frequencies below 1000MHz is performed with Quasi Peak detector; the final measurement for frequencies above 1000MHz is performed with Average and Peak detector.

The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz at frequency below 1GHz.

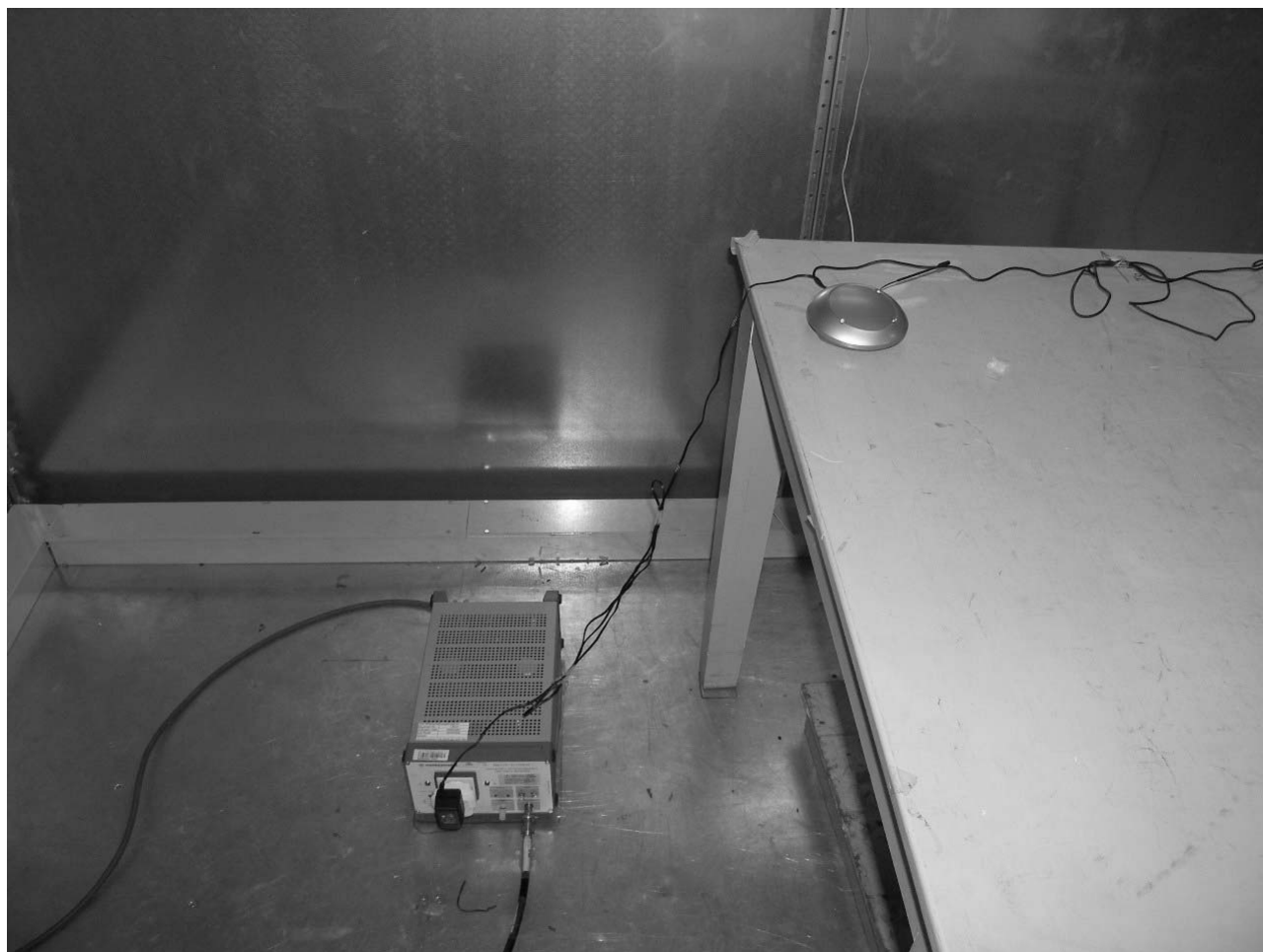
The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz at frequency above 1GHz.

**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 18 von 21**  
*Page 18 of 21*

## 6 Photographs of the Test Set-Up

**Photograph 1: Set-up for Conducted Emission on AC Mains**



**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 19 von 21**  
*Page 19 of 21*

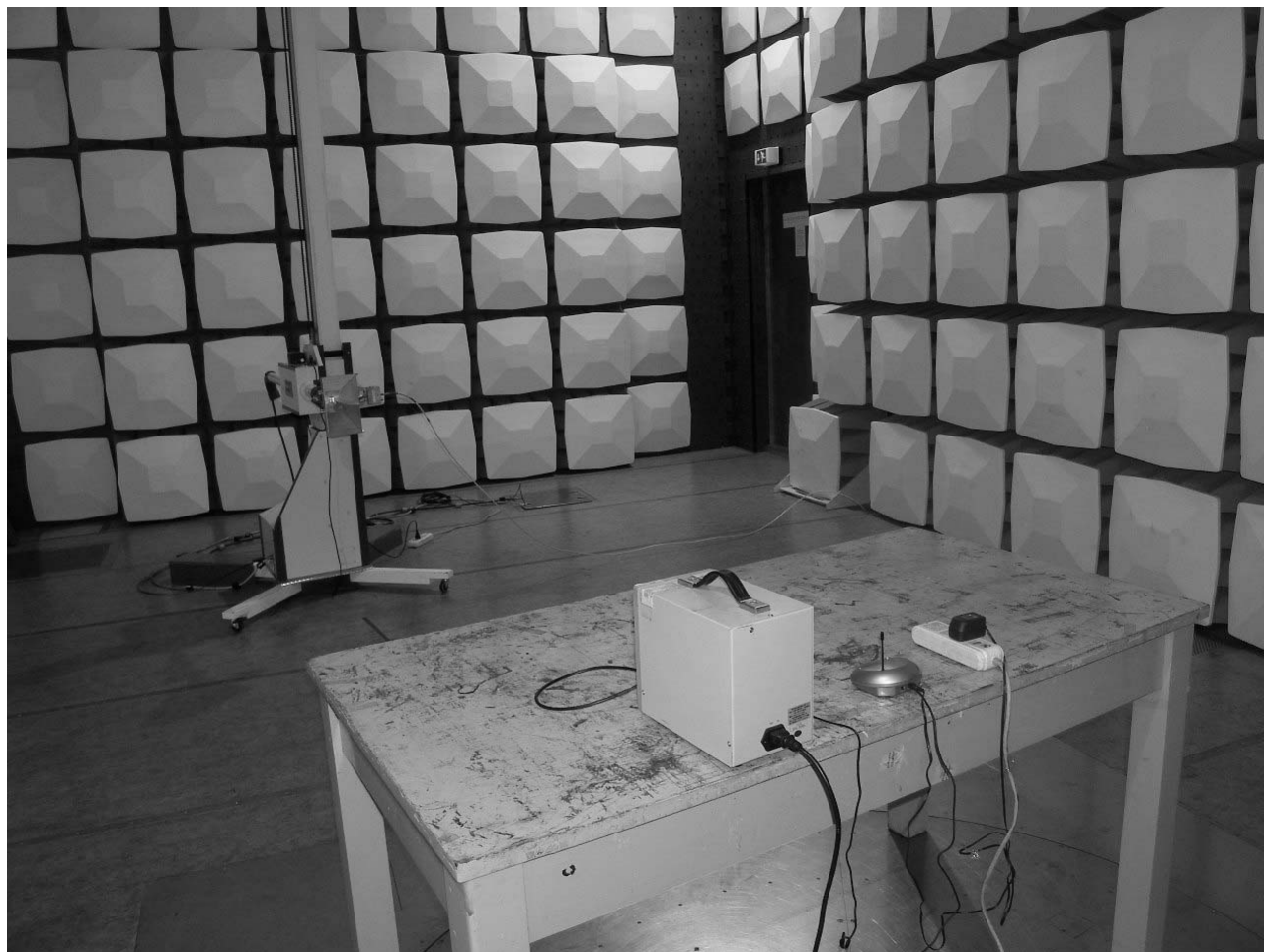
**Photograph 2: Set-up for Radiation Measurement Below 1GHz**



**Prüfbericht - Nr.: 16011972 001**  
*Test Report No.:*

**Seite 20 von 21**  
*Page 20 of 21*

**Photograph 3: Set-up for Radiation Measurement Above 1GHz**



**7 List of Tables**

Table 1: List of Test and Measurement Equipment.....5  
Table 2: Disturbance Voltage on AC Mains.....13  
Table 3: Radiated Emission (Transmitting at 912.0MHz).....15  
Table 4: Fundamental and harmonics Radiated Emission (Transmitting at 912.0MHz).....17

**8 List of Photographs**

Photograph 1: Set-up for Conducted Emission on AC Mains .....18  
Photograph 2: Set-up for Radiation Measurement Below 1GHz .....19  
Photograph 3: Set-up for Radiation Measurement Above 1GHz .....20

Prüfbericht - Nr.:

16011972 001

Test Report no.

Seite 1 von 3

Page 1 of 3

4/ 23

## EMC32 Report

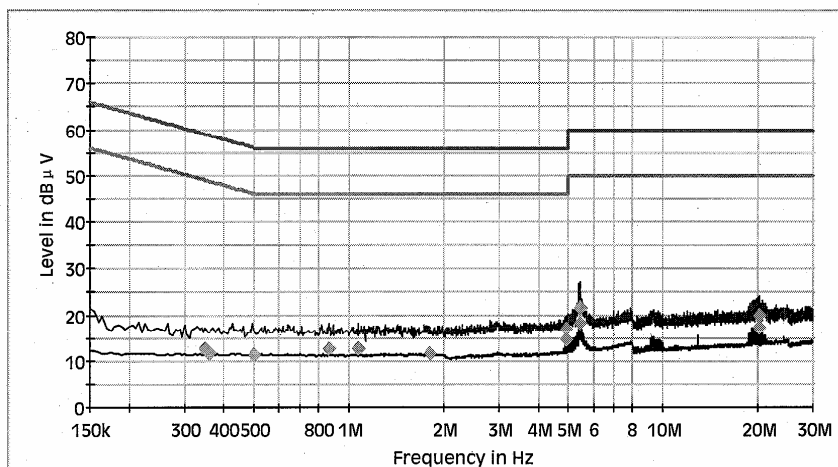
### Test Information

EUT Name: Wireless stereo panel speaker  
Model/Type: ~~SP299~~ SP1491B *Richyline* 2008. feb. 28  
Operating Conditions: Transmitting  
Comment: AC 120V, 60Hz; L1

Hardware Setup: 1phase LISN ESH3-Z5 to ESCS30  
Level Unit: dB  $\mu$  V

Subrange	Detectors	IF Bandwidth	Step Size	Meas. Time	Receiver
150kHz - 30MHz	Peak; Average	9kHz	4.5kHz	10ms	ESCS 30

### FCC part 15



2008-2-22

11:48:41

Prüfbericht - Nr.:

16011972 001

Test Report no.

Seite 2 von 3

Page 2 of 3

2/73

## EMC32 Report

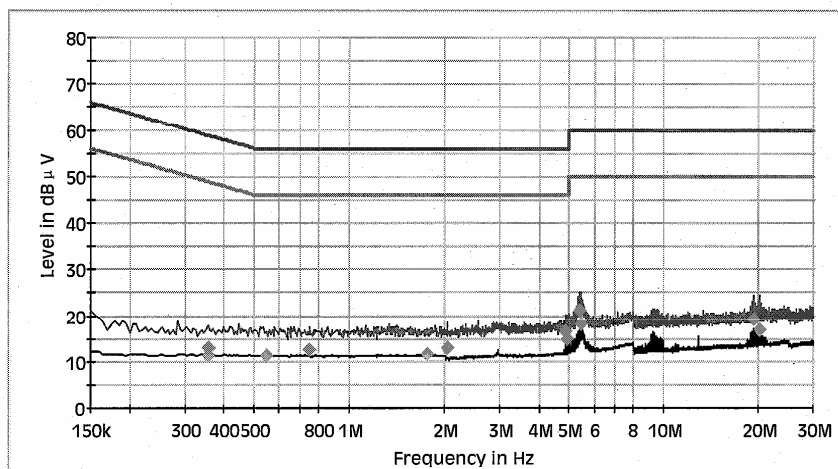
### Test Information

EUT Name: Wireless stereo panel speaker  
Model/Type: SP2994 SP1491B R:cky (i)u. 2008. Feb. 28  
Operating Conditions: Transmitting  
Comment: AC 120V, 60Hz; N

Hardware Setup: 1phase LISN ESH3-Z5 to ESCS30  
Level Unit: dB  $\mu$  V

Subrange	Detectors	IF Bandwidth	Step Size	Meas. Time	Receiver
150kHz - 30MHz	Peak; Average	9kHz	4.5kHz	10ms	ESCS 30

### FCC part 15



2008-2-22

17:46:04

Prüfbericht - Nr.:

16011972 001

Seite 3 von 3

Page 3 of 3

Test Report no.

## EMC Test Record



Reference:	Page: Of
Report:	Number of attached sheets:

-26dBc Bandwith

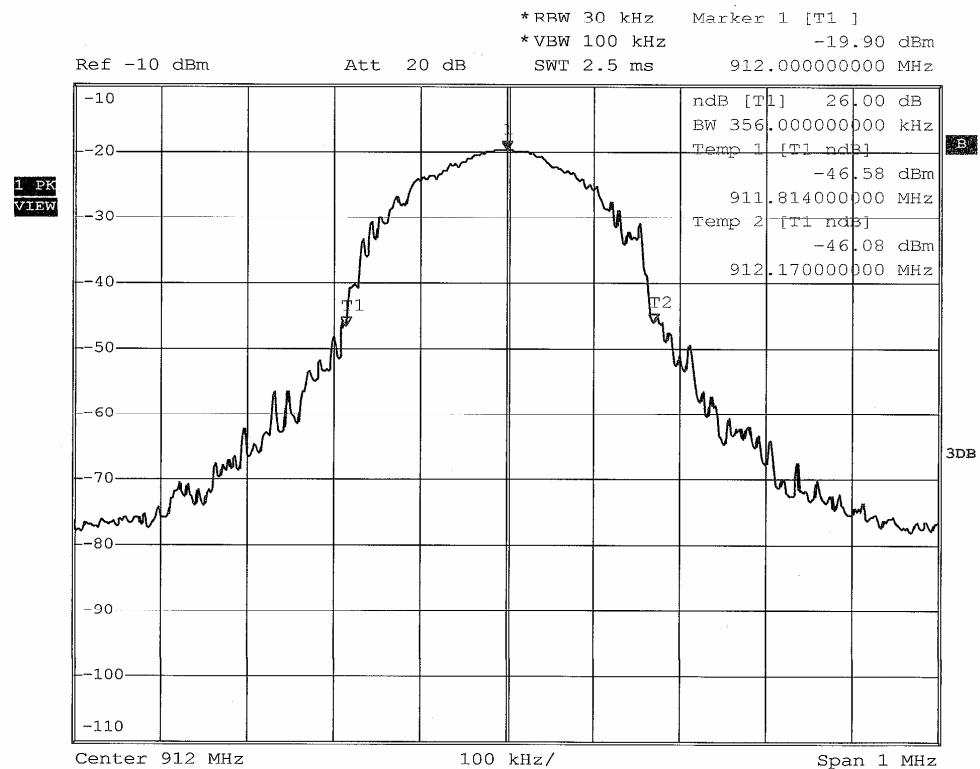
### Test Information

EUT Name:  
Model Number:  
Operating Conditions:  
Comment:

Wireless stereo panel speaker  
~~SPS2994~~ SP1491B of system SP2990  
Transmitting

*Ready for 2008. Feb. 28*

*20 °C, 45% RH, 10/ kPa*



Date: 28.FEB.2008 17:00:23

Tested by \_\_\_\_\_  
Reviewed by \_\_\_\_\_

Date: \_\_\_\_\_  
Date: \_\_\_\_\_