FCC DoC
TEST REPORT

for

900MHz Wireless Outdoor / Indoor Speaker System
Brand: ARKON

Model: SP2890

Test Report Number: SZ080402B02-EF
Issued Date: April 21, 2008

Issued for

Uni-Art Precise Products Ltd
11-12/F, Yue Xiu Industrial Building,
87 Hung To Road, Kowloon, Hong Kong

Issued by:

Compliance Certification Services (LinKou) Inc.
No. 81-1, Lane 210, Bade 2nd Rd., Lujhu
Township Taoyuan County, Taiwan
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Revision History

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	SZ080402B02	Initial Issue	ALL	Clinton Kao

CCS Report Format Version 2.0

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1 TEST RESULT CERTIFICATION

Product:	900MHz Wireless Outdoor / Indoor Speaker System
Model:	SP2890
Brand:	ARKON
Applicant:	**Uni-Art Precise Products Ltd** 11-12/F, Yue Xiu Industrial Building, 87 Hung To Road,Kowloon, Hong Kong
Manufacturer:	**Uni-Art Precise Products Ltd** 11-12/F, Yue Xiu Industrial Building, 87 Hung To Road,Kowloon, Hong Kong
Tested Date:	April 02-21, 2008
Test Voltage:	DC9V powered by the battery Or DC9V powered by the adapter Adapter manufacturer/model name SIL / SSA-12W-09 US 090120F DC output cable: Un-shielded, 1.80m

EMISSION			
Standard	**Item**	**Result**	**Remarks**
FCC 47 CFR Part 15 Subpart B, ANSI C63.4-2003	Conducted (Main Port)	PASS	Meet Class B limit
	Radiated	PASS	Meet Class B limit

Note: 1. The test result judgment is decided by the limit of measurement standard
2. The information of measurement uncertainty is available upon the customer's request.

Deviation from Applicable Standard
None

The above equipment has been tested by Compliance Certification Services Inc., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved by:

Clinton Kao/ Manager
COMPLIANCE CERTIFICATION SERVICES INC.

Reviewed by:

Vincent Yao/ Assistant manager
COMPLIANCE CERTIFICATION SERVICES INC.

2 EUT DESCRIPTION

Product	900MHz Wireless Outdoor / Indoor Speaker System
Brand Name	ARKON
Model	SP2890
Applicant	Uni-Art Precise Products Ltd.
Housing material	Plastic
Serial Number	N/A
EUT Power Rating	DC9V powered by the battery Or DC9V powered by the adapter Adapter manufacturer/model name SIL / SSA-12W-09 US 090120F DC output cable: Un-shielded, 1.80m

Note: *The power supply are the same for L, R Speaker.*

Model Differences

Model Name	Difference	Tested (Checked)
SP2890	Original	☒

I/O PORT

ITEM	I/O PORT TYPES	Q'TY	TESTED WITH
1) L Speaker	DC IN	1	1
2) R Speaker	DC IN	1	1

3 TEST METHODOLOGY

3.1. DECISION OF FINAL TEST MODE

The EUT was tested together with the above additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.

The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode		
Emission	Conducted Emission	**Mode 1:** Normal with power by the adapter
	Radiated Emission	**Mode 1:** Normal with power by the adapter **Mode 2:** Normal with power by the battery

After the preliminary scan, the following test mode was found to produce the highest emission level.

Final Test Mode		
Emission	Conducted Emission	**Mode 1**
	Radiated Emission	**Mode 1**

Then, the EUT configuration and cable configuration of the above highest emission mode was chosen for all final test items.

3.2. EUT SYSTEM OPERATION

1. Set up the EUT with the auxiliary equipments.
2. Power on EUT, and make sure the EUT works normally during the test.

4 SETUP OF EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF SUPPORT UNITS

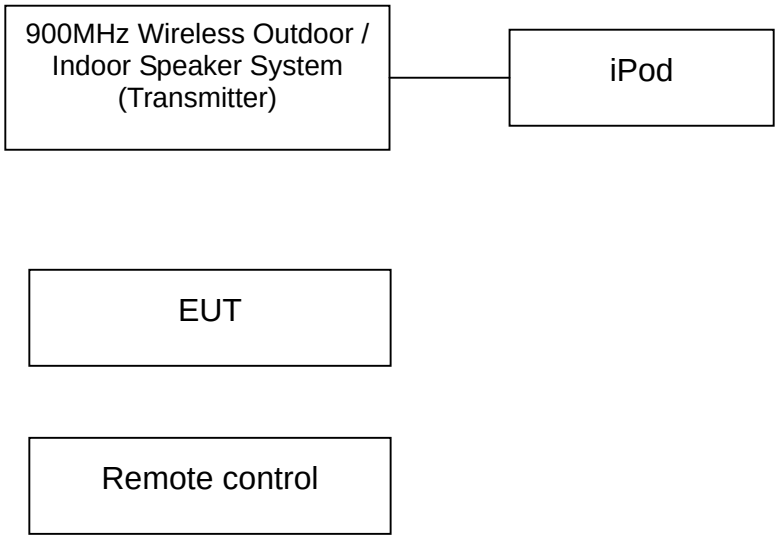
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1.	900MHz Wireless Outdoor / Indoor Speaker System (Transmitter)	SP2890	N/A	MVASP2890-001T	ARKON	Un-shielded 2.0m	Un-shielded1.85m
2.	iPod	A1136	N/A	4J6050URTXK	iPod	N/A	N/A
3.	Remote control	SP1883	N/A	N/A	ARKON	N/A	N/A

Note:

1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.2. CONFIGURATION OF SYSTEM UNDER TEST



5 FACILITIES AND ACCREDITATIONS

5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township Taoyuan County, Taiwan

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following accreditation body according to ISO/IEC 17025.

USA	**A2LA**
Taiwan	**TAF**

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

USA	**FCC**
Japan	**VCCI**
Canada	**INDUSTRY CANADA**
Taiwan	**BSMI**

Copies of granted accreditation certificates are available for downloading from our web site, http://www.ccsemc.com.tw

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency		Uncertainty
Conducted emissions	9kHz~30MHz		+/- 3.59dB
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6. CONDUCTED EMISSION MEASUREMENT

6.1. LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTE:

(1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
(3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

6.2. TEST INSTRUMENTS

Conducted Emission Test Site G				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100088	02/24/2009
LISN	EMCO	3825/2	1371	02/24/2009
LISN	EMCO	3825/2	8901-1459	02/24/2009

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. N.C.R = No Calibration Request.

6.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031)

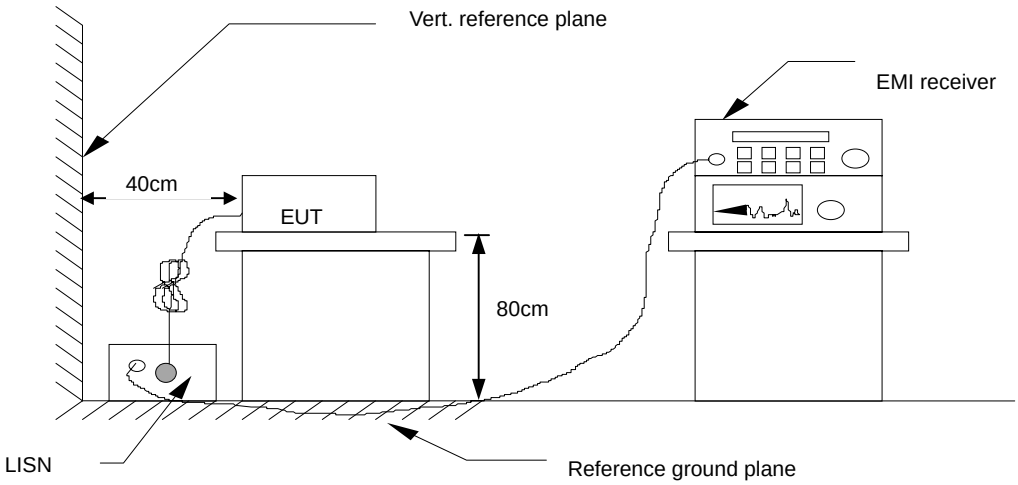
Procedure of Preliminary Test

- The EUT and Support equipment, if needed, was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor standing equipment, it is placed on the ground plane, which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
- The EUT received DC9V power from the adapter, and the adapter received AC120V/60Hz through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane.
- All support equipment power received from a second LISN.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The Receiver scanned from 150kHz to 30MHz for emissions in each of the test modes.
- During the above scans, the emissions were maximized by cable manipulation.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test.
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

- EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
- The test data of the worst-case condition(s) was recorded.
- ***For details, please refer to measurement standard or CCS SOP PA-031***

6.4. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

6.5. Data Sample:

Freq. (KHz)	Peak Amptd (dBuV)	QP Amptd (dBuV)	Avg Amptd (dBuV)	Q.P. Limit (dBuV)	Average Limit (dBuV)	Margin (dB)	Factor (dB)
x.xx	38.84	32.88	33.26	56.00	46.00	-12.74	10.69

Remark:

1. The measuring frequencies range between 0.15 MHz and 30 MHz.

2. The emissions measured in the frequency range between 0.15 MHz and 30MHz were made with an instrument using Quasi-peak detector and Average detector.

3. "---" denotes the emission level was or more than 2dB below the Average limit, and no re-check was made.

4. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10KHz. The IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9kHz.

Freq. = Emission frequency in KHz

Factor (dB) = cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER (The TRANSIENT LIMITER included 10 dB ATTENUATION)
Amptd dBuV= Uncorrected Analyzer/Receiver reading + cable loss + Insertion loss of LISN+ Insertion loss of TRANSIENT LIMITER, if it > 0.5 dB
Limit dBuV = Limit stated in standard
Margin dB = Reading in reference to limit
Q.P.: =Quasi-Peak

Calculation Formula

Margin (dB) = Amptd (dBuV) – Limit (dBuV)

6.6. TEST RESULTS

Model No.	SP2890	Test Mode	Mode 1
Environmental Conditions	25°C, 56% RH	6dB Bandwidth	10 KHz
Tested by	Tom Gan		

(The chart below shows the highest readings taken from the final data.)

R Speaker

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.157	48.57	---	---	65.79	55.79	---	-7.22	L1
0.365	38.64	---	---	59.86	49.86	---	-11.22	L1
0.824	41.08	---	---	56.00	46.00	---	-4.92	L1
1.436	33.36	---	---	56.00	46.00	---	-12.64	L1
5.607	36.71	---	---	60.00	50.00	---	-13.29	L1
10.537	43.14	---	---	60.00	50.00	---	-6.86	L1
0.164	47.20	---	---	65.58	55.58	---	-8.38	L2
0.353	38.25	---	---	60.17	50.17	---	-11.92	L2
0.832	38.52	---	---	56.00	46.00	---	-7.48	L2
1.314	33.29	---	---	56.00	46.00	---	-12.71	L2
4.557	37.96	---	---	56.00	46.00	---	-8.04	L2
8.212	42.79	---	---	60.00	50.00	---	-7.21	L2

L Speaker

FREQ MHz	PEAK RAW dBuV	Q.P. RAW dBuV	AVG RAW dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.183	42.96	---	---	65.05	55.05	---	-12.09	L1
0.390	38.44	---	---	59.11	49.11	---	-10.67	L1
0.828	38.61	---	---	56.00	46.00	---	-7.39	L1
8.436	40.94	---	---	60.00	50.00	---	-9.06	L1
9.414	44.36	---	---	60.00	50.00	---	-5.64	L1
14.817	40.89	---	---	60.00	50.00	---	-9.11	L1
0.161	46.50	---	---	65.68	55.68	---	-9.18	L2
0.390	36.72	---	---	59.11	49.11	---	-12.39	L2
0.828	37.58	---	---	56.00	46.00	---	-8.42	L2
3.306	34.40	---	---	56.00	46.00	---	-11.60	L2
5.438	38.50	---	---	60.00	50.00	---	-11.50	L2
8.517	41.26	---	---	60.00	50.00	---	-8.74	L2

NOTE: *1. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line).*
2. The emission level was or more than 2dB below the Average limit, so no re-check anymore.

7 RADIATED EMISSION MEASUREMENT

7.1. LIMITS OF RADIATED EMISSION MEASUREMENT

Maximum permissible level of Radiated Emission measured at 3 meter

Ranges of frequency are from 30MHZ to 1000MHz

FREQUENCY (MHz)	dBuV/m (At 3m)	
	Class A	Class B
30 ~ 88	39.00	40.00
88 ~ 216	43.50	43.50
216 ~ 960	46.00	46.00
960 ~ 1000	49.50	54.00

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

Ranges of frequency are above 1000MHz

Frequency (MHz)	Distance (m)	Maximum Field Strength Limit (dBu V/m/ Peak)	Maximum Field Strength Limit (dBu V/m/Avg)
Above 1000	3	74	54

7.2. TEST INSTRUMENTS

Open Area Test Site G				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100145	02/24/2009
Amplifier	H.P.	8447D	2944A07999	10/06/2008
Bi-log Antenna	SCHAFFNER	CBL6143	5082	06/09/2008
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	06/09/2008
System-Controller	CT	SC100	N/A	N/A
Turn Table	EMCO	2081-1.21	N/A	N/A
Antenna Tower	CT	N/A	N/A	N/A

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. N.C.R = No Calibration Request.

7.3. TEST PROCEDURES (please refer to measurement standard or CCS SOP PA-031)

Procedure of Preliminary Test

- The equipment was set up as per the test configuration to simulate typical usage per the user's manual. When the EUT is a tabletop system, a wooden turntable with a height of 0.8 meters is used which is placed on the ground plane. When the EUT is a floor standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- Support equipment, if needed, was placed as per ANSI C63.4.
- All I/O cables were positioned to simulate typical usage as per ANSI C63.4.
- The EUT received DC9V power from the battery or the adapter, and the adapter received AC120V/60Hz through the outlet socket under the turntable. All support equipment power received from another socket under the turntable.
- Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.
- The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.4. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.
- The Analyzer / Receiver quickly scanned from 30MHz to 1000MHz. The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- The test mode(s) described in Item 3.1 were scanned during the preliminary test:
- After the preliminary scan, we found the test mode described in Item 3.1 producing the highest emission level.
- The EUT and worse cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

When measuring emissions above 1GHz, the frequencies of maximum emission shall be determined by manually positioning the antenna close to the EUT and by moving the antenna over all sides of the EUT while observing a spectral display. It will be advantageous to have prior knowledge of the frequencies of emissions above 1GHz.If the EUT is a device with dimensions approximately equal to that of the measurement antenna beam width, the measurement antenna shall be aligned with the EUT.

Procedure of Final Test

- EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.
- The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.
- Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

For the measurement above 1GHz, use the cable, EUT arrangement, and mode of operation determined in the exploratory testing to produce the emission that has the highest amplitude relative to the limit.

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the antenna in the “cone of radiation” from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.

The antenna may have to be higher or lower than the EUT, depending on the EUT’s size and mounting height, but the antenna should be restricted to a range of height of from 1m to 4m above the ground or reference ground plane.

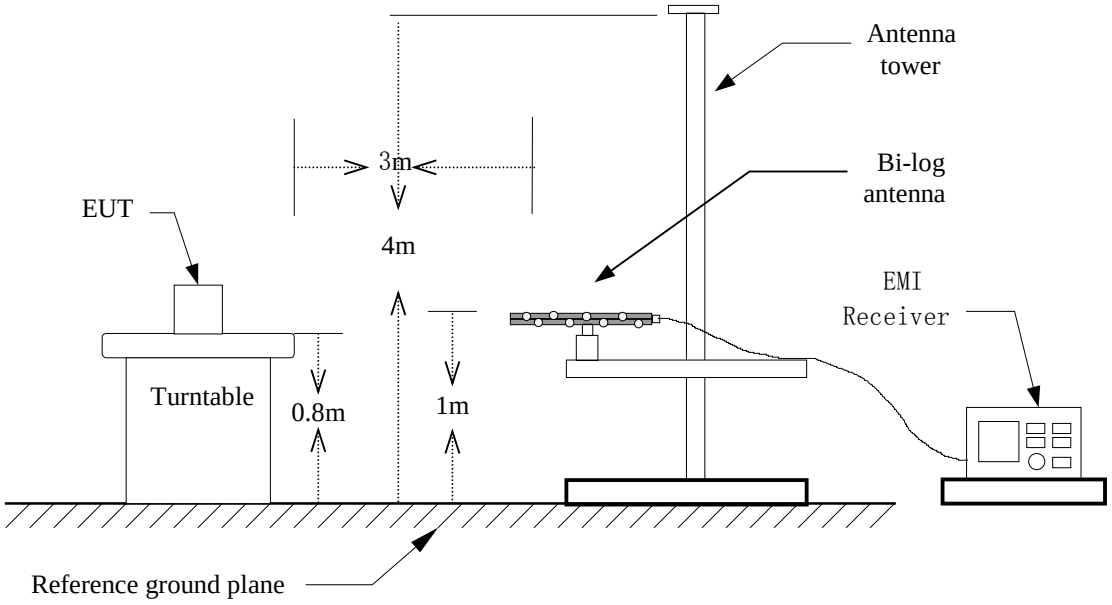
If the transmission line for the measurement antenna restricts its range of height and polarization, the steps needed to ensure the correct measurement of the maximum emissions, shall be described in detail in the report of the measurements.

1) using the procedures above to measure with peak detector function, if the result comply with the average limit specified by the appropriate regulation, record the EUT arrangement, mode of operation, and cable positions used for final radiated emission measurement , this can be done with either diagrams or photographs.

2) Set the detector function of the measuring instrument to average mode, using the procedures above and remeasure only those emissions that complied with the peak limits but exceeded the average limits.

Recorded at least the six highest emissions.

7.4. TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.5. Data Sample

Freq. (MHz)	Pk (dBuV/m)	Q.P. (dBuV/m)	Pk Margin (dB)	Q.P. Margin (dB)	Limit (dBuV/m)	Read (dBuV)	C.F (dB)	Height	Deg	Remark
xx.xx	40.57	---	-5.43	---	46.00	34.43	6.14	100	0	

Freq. = Emission frequency in MHz
Read =Uncorrected Analyzer / Receiver Reading
Corr. Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
Emiss. Level (dBuV/m) = Raw reading converted to dBuV/m and C.F added
Limit (dBuV/m) = Limit stated in standard
Margin (dB) = Reading in reference to limit
Pk = Peak Reading
Q.P. = Quasi-peak Reading

Calculation Formula

Margin (dB) = Emiss. Level (dBuV/m) – Limits (dBuV/m)

Emission Level (dBuV/m) = Raw Data (dBuV) + Corr. Factor (dB)

7.6. TEST RESULTS

Model No.	SP2890	**Test Mode**	Mode 1
Environmental Conditions	20°C, 56% RH	**6dB Bandwidth**	120 KHz
Antenna Pole	Vertical / Horizontal	**Antenna Distance**	3m
Detector Function	Peak / Quasi-peak	**Tested by**	Tom Gan

(The chart below shows the highest readings taken from the final data)

Frequency Range Investigated (30 MHz TO 1000 MHz)							
Freq. (MHz)	**Reading(RA) (dBuV)**	**Corr.Factor(CF) (dB)**	**Measured(FS) (dBuV/m)**	**Limits(QP) (dBuV/m)**	**Safe Margins (dBuV/m)**	**Ant. H/V**	**Mark**
53.850	44.96	-16.21	28.75	40.00	-11.25	V	P
73.650	47.07	-17.29	29.78	40.00	-10.22	V	P
178.500	46.10	-14.79	31.31	43.50	-12.19	V	P
276.150	45.36	-11.74	33.62	46.00	-12.38	V	P
420.166	47.23	-8.42	38.81	46.00	-7.19	V	P
683.833	38.57	-4.40	34.17	46.00	-11.83	V	P
100.200	49.30	-15.43	33.87	43.50	-9.63	H	P
140.700	52.03	-16.48	35.55	43.50	-7.95	H	P
174.900	54.48	-14.84	39.64	43.50	-3.86	H	P
275.250	46.47	-11.77	34.70	46.00	-11.30	H	P
420.166	47.09	-8.42	38.67	46.00	-7.33	H	P
660.500	39.37	-4.80	34.57	46.00	-11.43	H	P

REMARKS: *1. P= Peak Reading; Q= Quasi-peak Reading A= Average Reading.*
2. The other emission levels were very low against the limit.

Model No.	SP2890	**Test Mode**	Mode 1
Environmental Conditions	20°C, 56% RH	**6dB Bandwidth**	120 KHz
Antenna Pole	Vertical / Horizontal	**Antenna Distance**	3m
Detector Function	Peak / Quasi-peak	**Tested by**	Tom Gan

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1270.00	V	50.12	---	-10.69	39.43	---	74.00	54.00	-14.57	Peak
1556.67	V	48.93	---	-9.20	39.73	---	74.00	54.00	-14.27	Peak
1803.33	V	49.89	---	-8.23	41.66	---	74.00	54.00	-12.34	Peak
2010.00	V	47.92	---	-7.42	40.50	---	74.00	54.00	-13.50	Peak
2303.33	V	48.61	---	-6.26	42.35	---	74.00	54.00	-11.65	Peak
2546.67	V	48.28	---	-5.35	42.93	---	74.00	54.00	-11.07	Peak
1320.00	H	49.62	---	-10.41	39.21	---	74.00	54.00	-14.79	Peak
1480.00	H	48.81	---	-9.53	39.28	---	74.00	54.00	-14.72	Peak
1703.33	H	48.93	---	-8.62	40.31	---	74.00	54.00	-13.69	Peak
1956.67	H	48.96	---	-7.63	41.33	---	74.00	54.00	-12.67	Peak
2163.33	H	48.55	---	-6.81	41.74	---	74.00	54.00	-12.26	Peak
2530.00	H	47.90	---	-5.40	42.50	---	74.00	54.00	-11.50	Peak

REMARKS: *1. P= Peak Reading; Q= Quasi-peak Reading A= Average Reading.*
2. The other emission levels were very low against the limit.

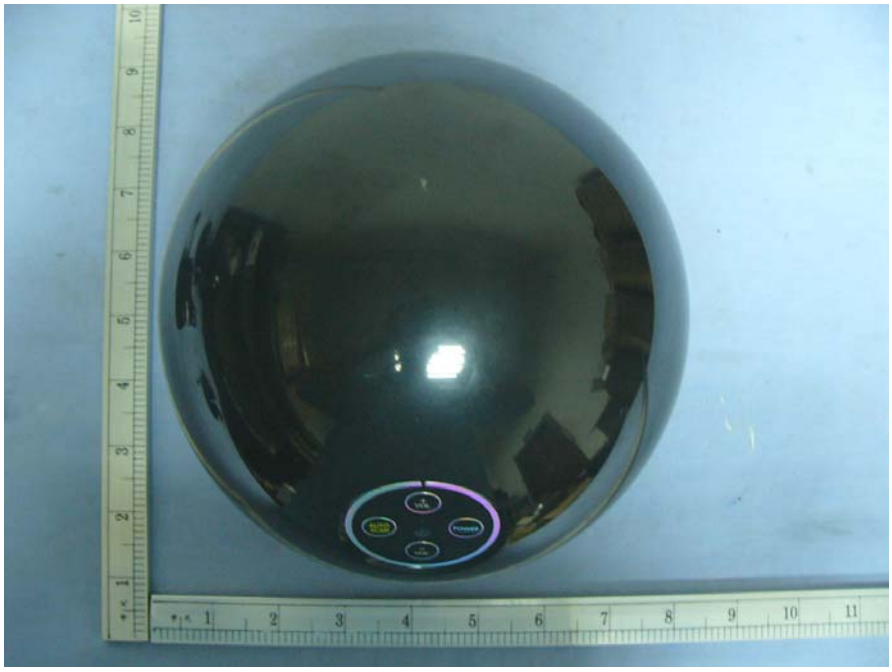
8 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

9 APPENDIX Ⅰ – PHOTOGRAPHS OF EUT

SP2890



SP2890