



SK TECH CO., LTD.

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Certificate of Compliance

Test Report No.:	STR-02001U		
NVLAP CODE :	200220-0		
Applicant:	Digiana Co., Ltd.		
Applicant Address:	B1, Seokyung Bldg., Seocho-dong, Seocho-ku, Seoul, 137-876, Korea		
Device Tested:	AudiaX wireless audio portable FM linker		
FCC ID:	QDNDG101	Model No.:	DG101
Receipt No.:	TEA-02-007	Date of receipt:	May 06, 2002
Date of Issue:	May 28, 2002		
Location of Testing:	SK TECH CO., LTD. 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Procedure:	ANSI C63.4 / 1992		
Test Specification:	FCC Title 47, Part 15 Subpart C		
Equipment Class:	Class B, DXX- Part 15 Low Power Communication Device Transmitter		
Test Result:	The above-mentioned device has been tested and passed.		

Tested & Reported by: Jong-Soo, Yoon

Approved by: Chun-An, Kwon

2002. 05. 29

2002. 05.29

Signature

Date

Signature

Date

Other Aspects:

Abbreviations:

- OK, Pass = passed • Fail = failed • N/A = not applicable

- This test report is not permitted to copy partly without our permission.
- This test result is dependent on only equipment to be used.
- This test result is based on a single evaluation of one sample of the above mentioned.
- This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.
- We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.

NVLAP Lab. Code: 200220-0

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1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by SK Tech Co., Ltd. and were made under Chief Engineer's supervision.

We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. Test Site

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2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

The test site is in compliance with ANSI C63.4/1992 for measurement of radio interference.



2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
EMI Test Receiver	Rohde&Schwarz	ESVS 10	825120/013	02. 2003
EMI Test Receiver	Rohde&Schwarz	ESVS 10	834468/008	10. 2002
Spectrum Analyzer	Advantest	R3361A	11730187	10. 2002
Amplifier	H.P	8447F	3113A05153	05.2002
Log Periodic Antenna	Schwarzbeck	UHALP9107	1819	02.2003
Biconical Antenna	Schwarzbeck	BBA9106	91031626	02.2003
Open Site Cable	N/A	N/A	N/A	N/A
Antenna Mast	TOKIN	5907	N/A	N/A
Antenna & Turntable controller	TOKIN	5906	N/A	N/A
Amp & Receiver connection cable	N/A	N/A	N/A	N/A
Amp & Spectrum connection cable	N/A	N/A	N/A	N/A
50 Switcher	Anritsu	MP59B	M93083	N/A

2.3 Test Date

Date of Application : May 06, 2002

Date of Test : May 22, 2002 ~ May 28, 2002

2.4 Test Environment

See each test item's description.



3. Description of the Equipment Under Test

The EUT is a wireless audio portable FM linker used to transmit any music source, i.e. tape, MP3, or CD player, to a radio receiver by frequency modulation. Audio signals could be received by any FM broadcast receiver.

3.1 Rating and Physical Characteristics

Power source	1.5V AAA battery
Consumption current	Max 80mA
Operating frequency	88 ~ 108MHz (0.1MHz step)
Operating temperature	-20 ~ +60
Etc	FM modulation

3.2 Submitted Documents

N/A



4. Measurement Conditions

4.1 Description of test configuration

The EUT was powered by one new 1.5V battery and set up in a tabletop configuration. A cassette player was connected to the EUT via earphone jack on the EUT in order to broadcast the signal, and then the cassette player was set to maximum operating condition. The final radiated data was taken in this mode of operation. All initial investigations were performed with EMI receiver in manual mode scanning the frequency range continuously. Photographs are included in Test set up photos.

4.2 List of Peripherals

Equipment Type	Manufacture	Model	Serial Number
Cassette Player	AIWA	HS-RX838	503CP02T0369

4.3 Type of Used Cables

Description	Length	Type of shield	Manufacturer
N/A			

4.4 Uncertainty

1) Radiated disturbance

U_c (Combined standard Uncertainty) = ± 1.9 dB

Expanded uncertainty $U = K_u c$

$K = 2$

$U = \pm 3.8$ dB

2) Conducted disturbance

$U_c = \pm 0.88$ dB

$U = K_u c = 2 \times U_c = \pm 1.8$ dB



5. Radiated Emission Measurements

5.1 Occupied bandwidth according to § 15.239(a)

This test was performed to demonstrate that the emissions from the EUT are confined within the band of 200KHz wide centered on the operating frequency. The 200KHz band shall lie wholly within the frequency range 88-108MHz.

The Measurements were performed at three channels: low (88.3MHz), middle (97.7MHz) and high (107.5MHz). The spectrum trace data around transmitter fundamental frequency was obtained with the spectrum analyzer in “Max Hold” mode. The bandwidth value was determined between two points 26 dB down from the center frequency. The measured results are less than 200KHz. The measured spectrum of the signal is shown in Figure 1. From the plot we see that in the worst case, the bandwidth is 141.5 KHz at 107.5 MHz.

Table 2: Occupied bandwidth measurement results

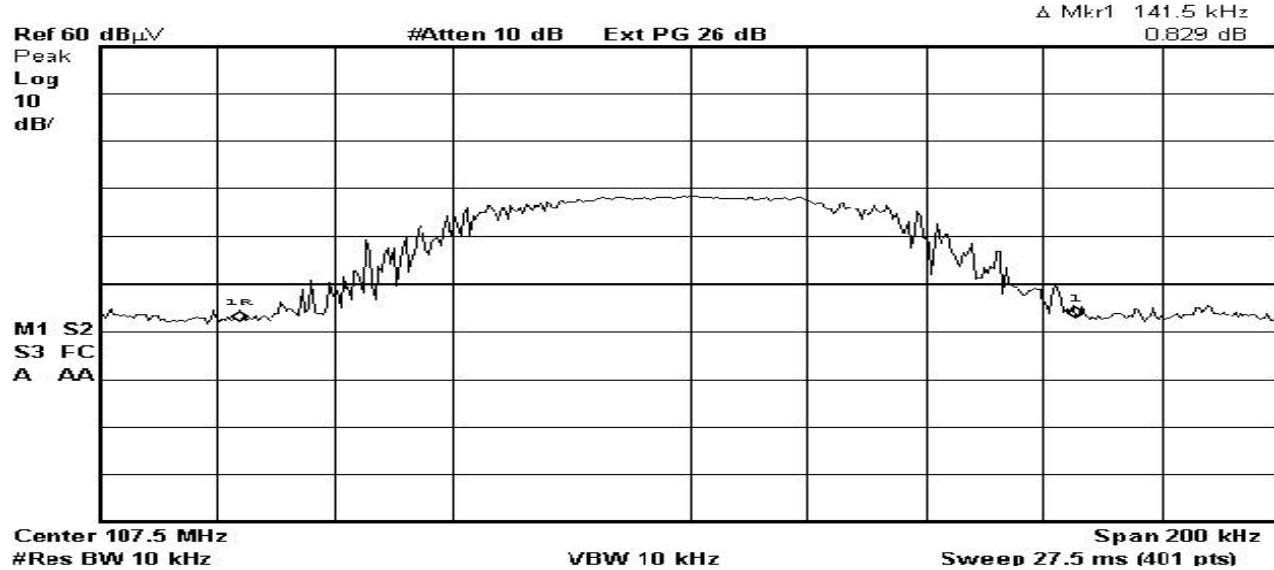
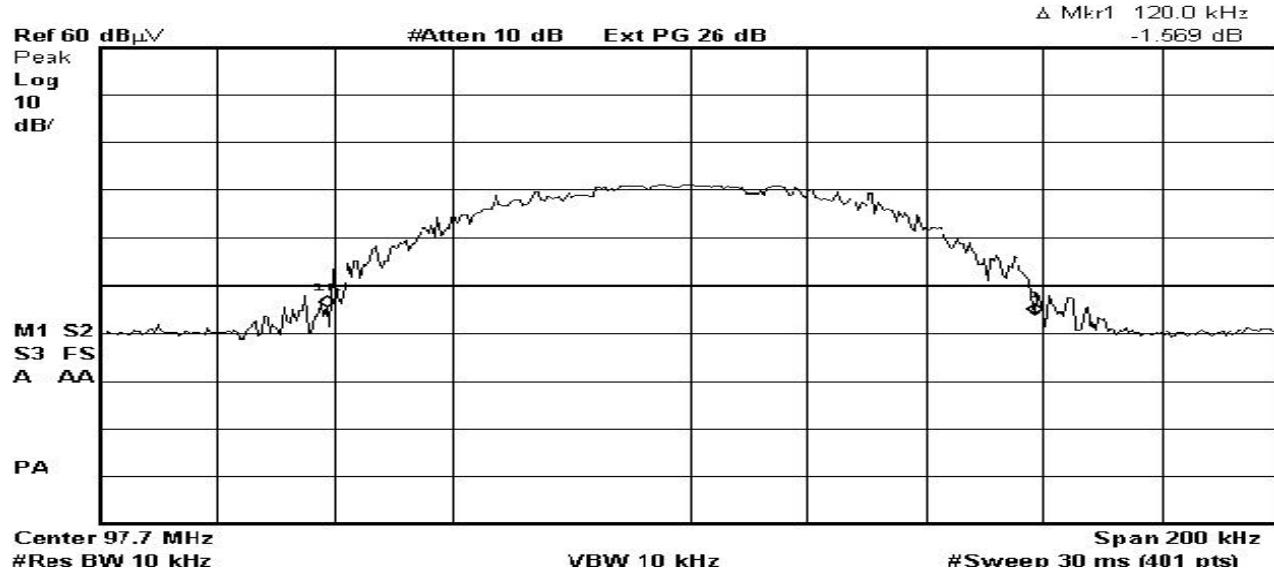
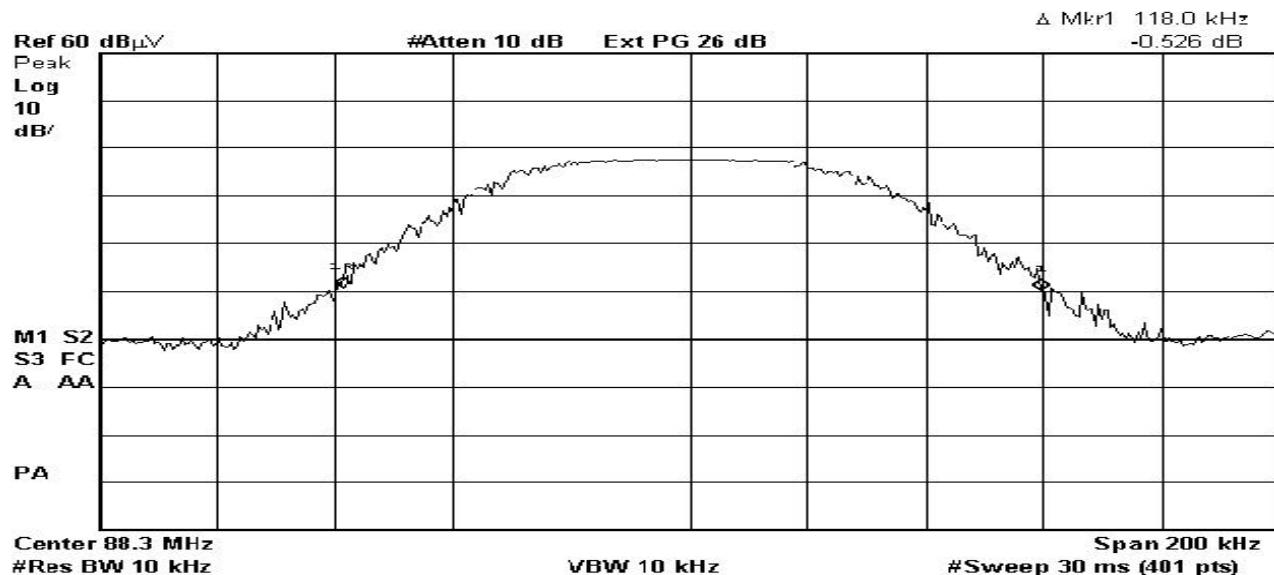
Center frequency (MHz)	Measured occupied bandwidth (KHz)	Pass/Fail
88.3	118.0	Pass
97.7	120.0	Pass
107.5	141.5	Pass



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Figure 1: Occupied bandwidth measurement results





5.2 Field strength of emissions according to § 15.239(b)

According to §15.239(b), the field strength of emissions from intentional radiators operated under these frequency bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental at 3m distance	
	dB V/meter	dB ¹ V/meter
88 – 108	250	48

The test was performed in the anechoic chamber at 3-meter test distance. The EUT was placed on the top of the 0.8 meter high, 1 x 1.5 meter non-metallic table. The biconical antenna was used. To find the maximum radiation measuring antenna height was changed and the turntable was rotated 360°. The antenna polarization was changed from vertical to horizontal.

The EUT was operated in transmitting mode. The measurements were performed at three modulated carrier frequencies: 88.3MHz, 97.7MHz and 107.5MHz.

The average detection mode was used. The EUT has met the average emission requirements. The peak emission limitations (measured with peak detector) of § 15.35 have also met, the maximum difference between peak and average emission was 7.6 dB.

Photographs of the worst-case emission can be seen in photograph of radiated emission test. Each EME reported was calibrated using self-calibrating mode.

Table 3: Field strength of fundamental frequency

Frequency (MHz)	Pol.	Height (m)	Angle (°)	Reading (dB ¹ V)	AFCL (dB/m)	Actual (dB ¹ V/m)	Limit (dB ¹ V/m)	Margin (dB)	Pass /Fail
88.3	H	2.06	168	27.5 Av	9.3	36.8	48.0	11.2	Pass
88.3	H	2.06	168	28.9 Pk	9.3	38.2	68.0	29.8	Pass
97.7	H	2.06	0	18.1 Av	11.5	29.6	48.0	18.4	Pass
97.7	H	2.06	0	23.0 Pk	11.5	34.5	68.0	33.5	Pass
107.5	H	2.06	123	14.8 Av	13.0	27.8	48.0	20.2	Pass
107.5	H	2.06	123	22.4 Pk	13.0	35.4	68.0	32.6	Pass

NOTES:

1. All readings are calibrated by self-mode in receiver.
2. AFCL = Antenna factor and cable loss
3. Av = Average detection mode, Pk = Peak detection mode.
4. H = Horizontal, V = Vertical Polarization

$$\text{Margin (dB)} = \text{Limit} - \text{Actual}$$

$$[\text{Actual} = \text{Reading} + \text{AFCL}]$$



5.3 Out-of-band radiated emissions test according to § 15.239(b)

This test was performed to measure radiated emissions on frequencies outside of the specified 200KHz band and also to verify the EUT full compliance with § 15.209, as following:

Other Frequencies (MHz)	Field Strength of Fundamental at 3m distance	
	dB μ V/meter	dB μ V/meter
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

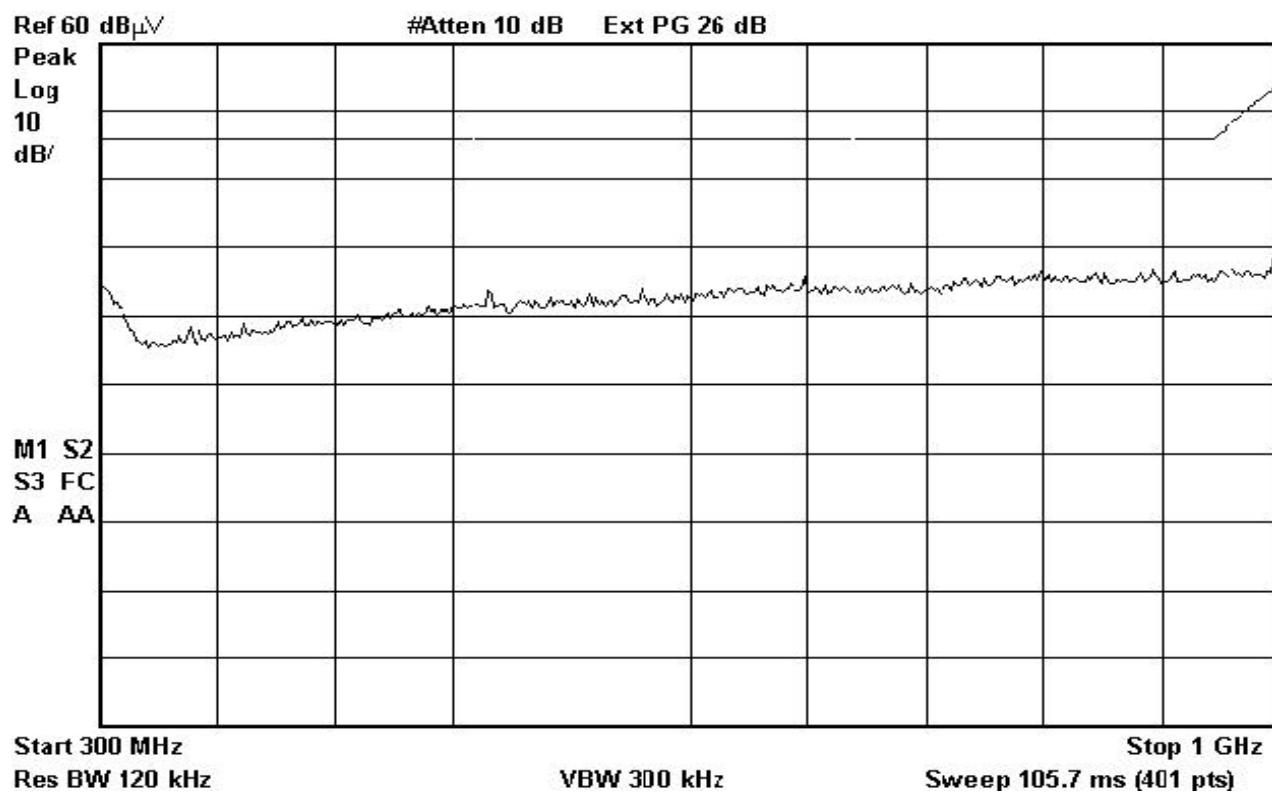
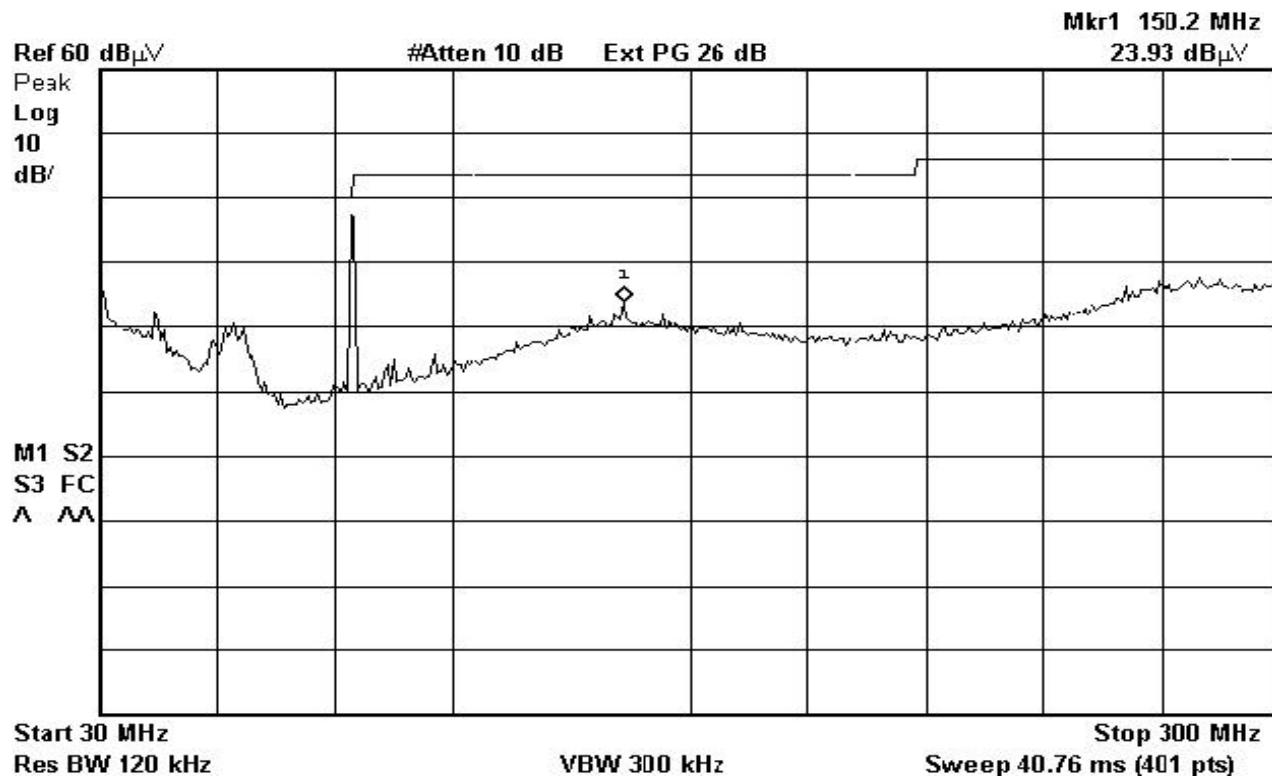
The radiated emissions measurements were performed in the anechoic chamber at 3 meters measuring distance in the frequency range of 30MHz to 1GHz. The EUT was placed on the top of the 0.8 meter high, 1 x 1.5 meter non-metallic table. The spectrum was scanned from 30 to 300 MHz using the biconical antenna and from 300 to 1000 MHz using the log-periodic antenna. To find the maximum radiation measuring antenna height was changed and the turntable was rotated 360°. The antenna polarization was changed from vertical to horizontal. The quasi-peak detector with resolution bandwidth of 120KHz was used. The measurements were performed in two modes of the EUT operation: transmitter 'ON' and transmitter 'OFF'. The results of measurements with transmitter 'ON' are in Figure 2. The maximum peak emission result was 23.93 dB μ V/m at 150.2 MHz.

The results of measurements with transmitter 'OFF' are in Figure 3. All the found emissions were at least 20 dB below specified limit.



Figure 2: Radiated emission measurement results (transmitter: ON)

The EUT was Operating at 88.3 MHz.



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Figure 3: Radiated emission measurement results (transmitter: OFF)