



# Atlas Compliance & Engineering, Inc.

## FCC Test Report

**FCC CFR 47 Part 15.207(c) and 15.249 COMPLIANCE**

• • • • • • • • • •  
*IVL Technologies Ltd  
6710 Bertram Place  
Central Saanich, BC Canada V8M 1Z6*

*Product:  
Karaoke Wireless Microphone  
Model:  
OKV01*

FCC ID: FEE-OKV01-915  
IC: 5307A-OKV01915  
Test Report Number: 0435IVLbpxmtr\_249  
Date of Report: August 23, 2004

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## General Information

Test Report Number: 0435IVLbpxmtr\_249

Date Product Tested: August 13-18, 2004

Date of Report: August 23, 2004

Applicant: IVL Technologies Ltd  
6710 Bertram Place  
Central Saanich, BC Canada V8M 1Z6

Contact Person: David Anderson

Equipment Tested: Karaoke Wireless Microphone

Trade Name: On-Key Karaoke Videomaker Belt Pack

Model: OKV01

Purpose Of Test: To demonstrate the compliance of the Karaoke Wireless Microphone, OKV01, with the requirements of FCC CFR 47 Part 15 Rules and Regulations to the limits of Subpart C 15.207(d) and 15.249 using the procedure stated in ANSI C63.4-1992.

Frequency Range Investigated: 9 kHz to 10 GHz

FCC ID: FEE-OKV01-915

IC: 5307A-OKV01915

Test Site Locations: Field Strength Measurement Facility:  
Atlas Compliance & Engineering, Inc.  
726 Hidden Valley Road  
Royal Oaks, California 95076  
Conducted Interference Measurement Facility:  
Atlas Compliance & Engineering, Inc.  
1792 Little Orchard Street  
San Jose, California 95125

FCC Site Registration Number: 90452

Industry Canada File Number: IC 4929

Test Personnel: Bruce Smith  
EMC Engineer



## Test Equipment

The following list contains the test equipment that was utilized in making the measurements in this report.

Description	Model	Serial	Manufacturer	Calibration Due
Active Loop Antenna	6502	9108-2669	EMCO	9/26/04
BiLog Antenna	CBL6112B	2783	Schaffner	9/15/04
Horn Antenna	3115	9003-3340	EMCO	9/29/04
Pre amp 9 kHz – 2 GHz	CPA9231A	3259	Schaffner	11/26/04
Pre amp 1 – 26.5 GHz	8449B	3008A00910	HP	11/26/04
EMI Test Receiver 9 kHz - 2500 MHz	ESPC	DE14459	Rohde & Schwarz	1/12/05
EMI Receiver 100 Hz – 22 GHz	8566B	2542A13058 (IF) 2637A03426 (RF)	HP	9/28/04



## Test Configuration

Customer:	IVL Technologies Ltd
Test Date:	August 13-18, 2004
Specification:	FCC CRF 47 Part 15.249 Limits, ANSI C63.4-1992 Methods

### EUT Description / Note:

The EUT, OKV01, a Karaoke Wireless Microphone, was powered up with new batteries and in a continuous transmitting mode. The EUT is battery powered therefore no conducted emissions testing was performed. EUT frequencies of operation are 917, 919, 921, 923 and 925 MHz.

### EUT Support Program

The EUT was constantly at 925 MHz. The other frequencies between 917 MHz and 925 MHz were tested to find maximum emissions, 925 MHz was where the maximum emission level was observed.

### EUT Modifications for Compliance

There were no modifications performed on the EUT. The test results state the emission levels of the EUT in the condition as it was received on August 13, 2004.



## EUT Support Devices

*Table 1 - Support Equipment Used For Test*

<b>Model:</b>	<b>Description:</b>	<b>S/N</b>	<b>FCC ID#</b>
N/A			

## I/O Ports and Cables

*Table 2 - EUT Port Termination's*

<b>I/O Port</b>	<b>Cable Type</b>	<b>Length</b>	<b>Connector</b>	<b>Termination</b>
Mic	Non-Shielded	1.8 M	Stereo Phone Jack	Headset
Battery	N/A	N/A	N/A	New Batteries (3-AA)

*Table 3 - Host Port Termination's*

<b>I/O Port</b>	<b>Cable Type</b>	<b>Length</b>	<b>Connector</b>	<b>Termination</b>
N/A				



## Equipment Under Test

The photographs below show the condition of the EUT for test.



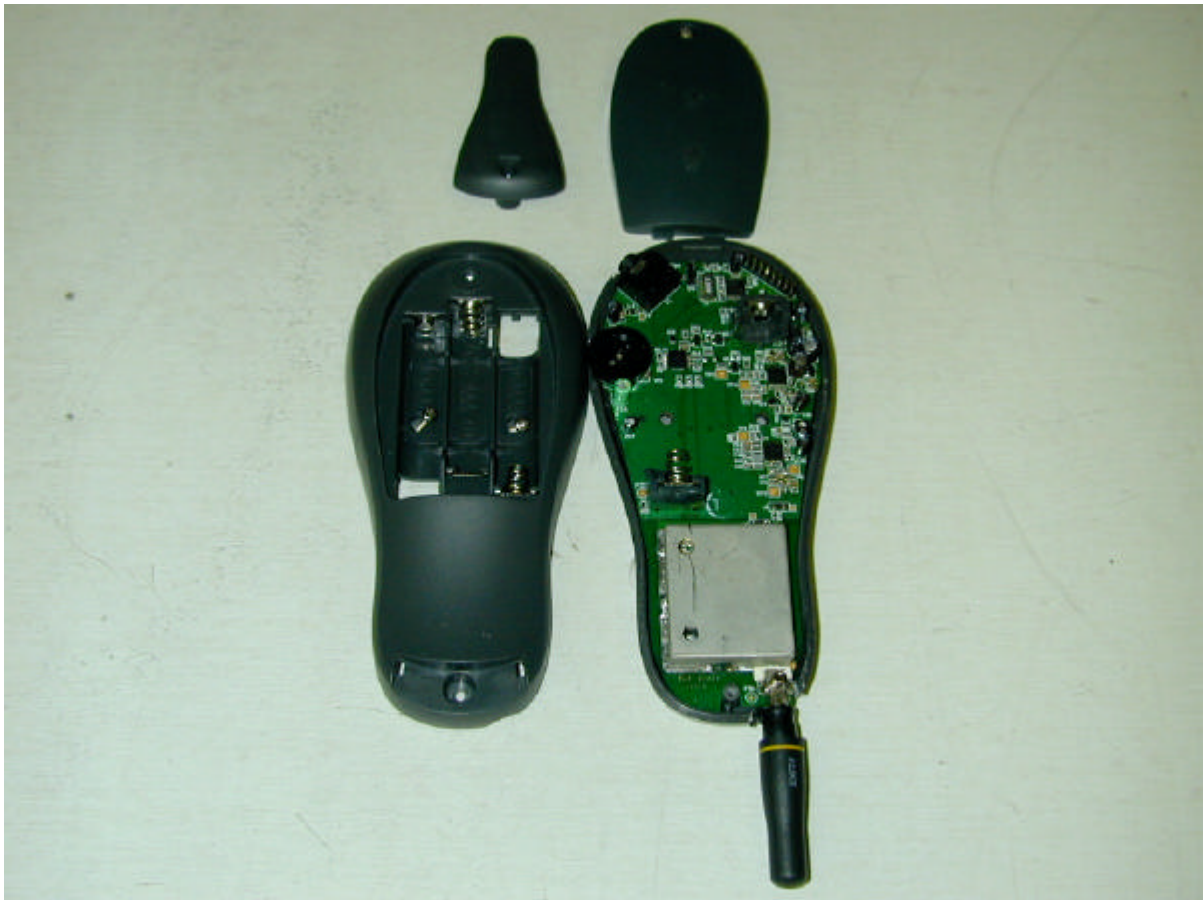






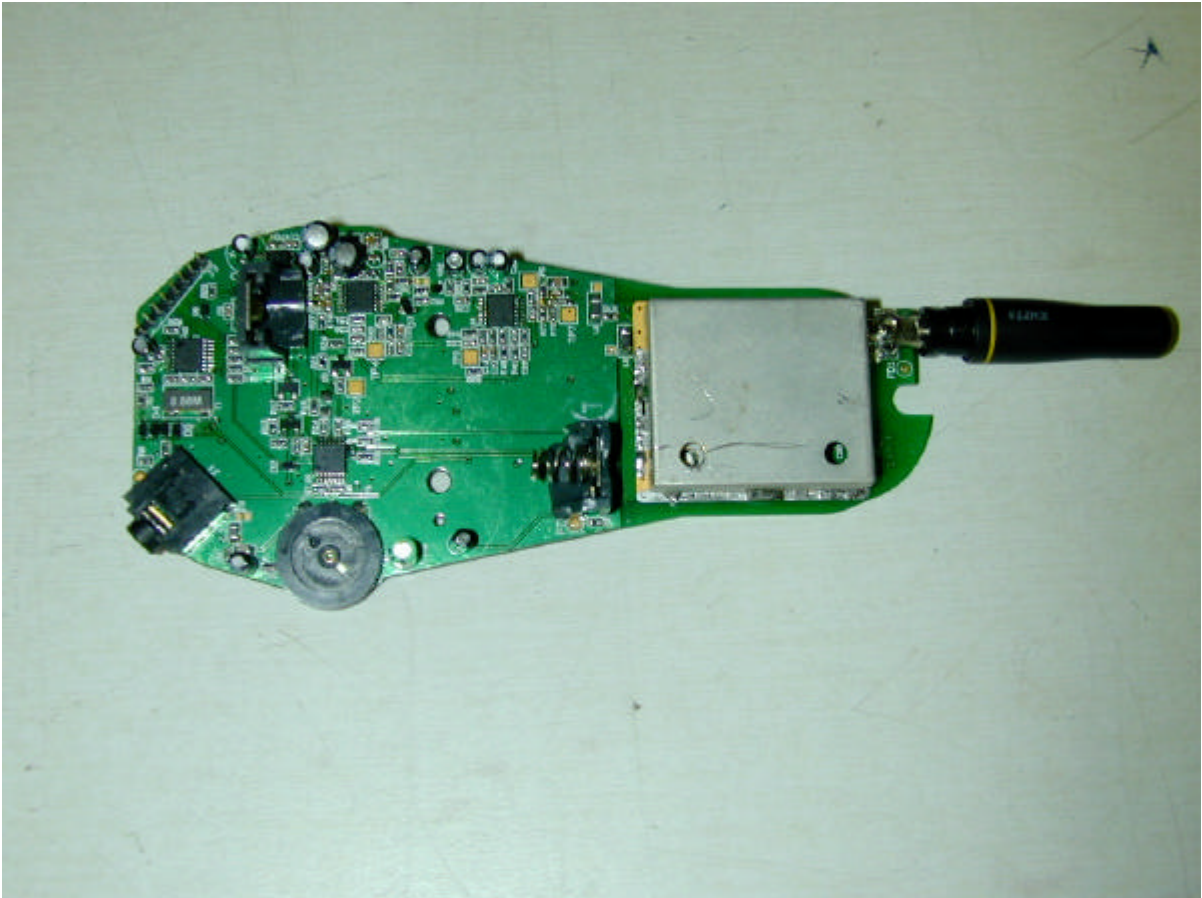


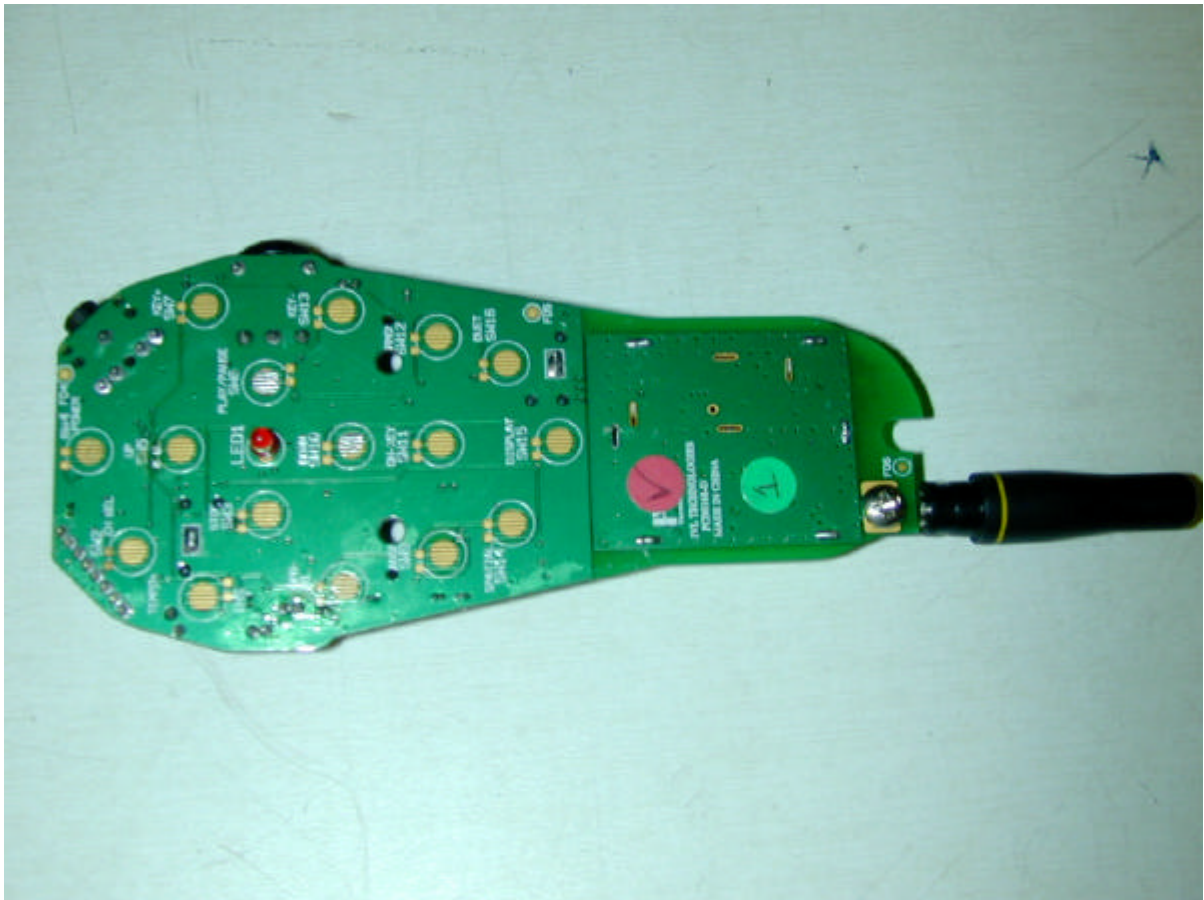


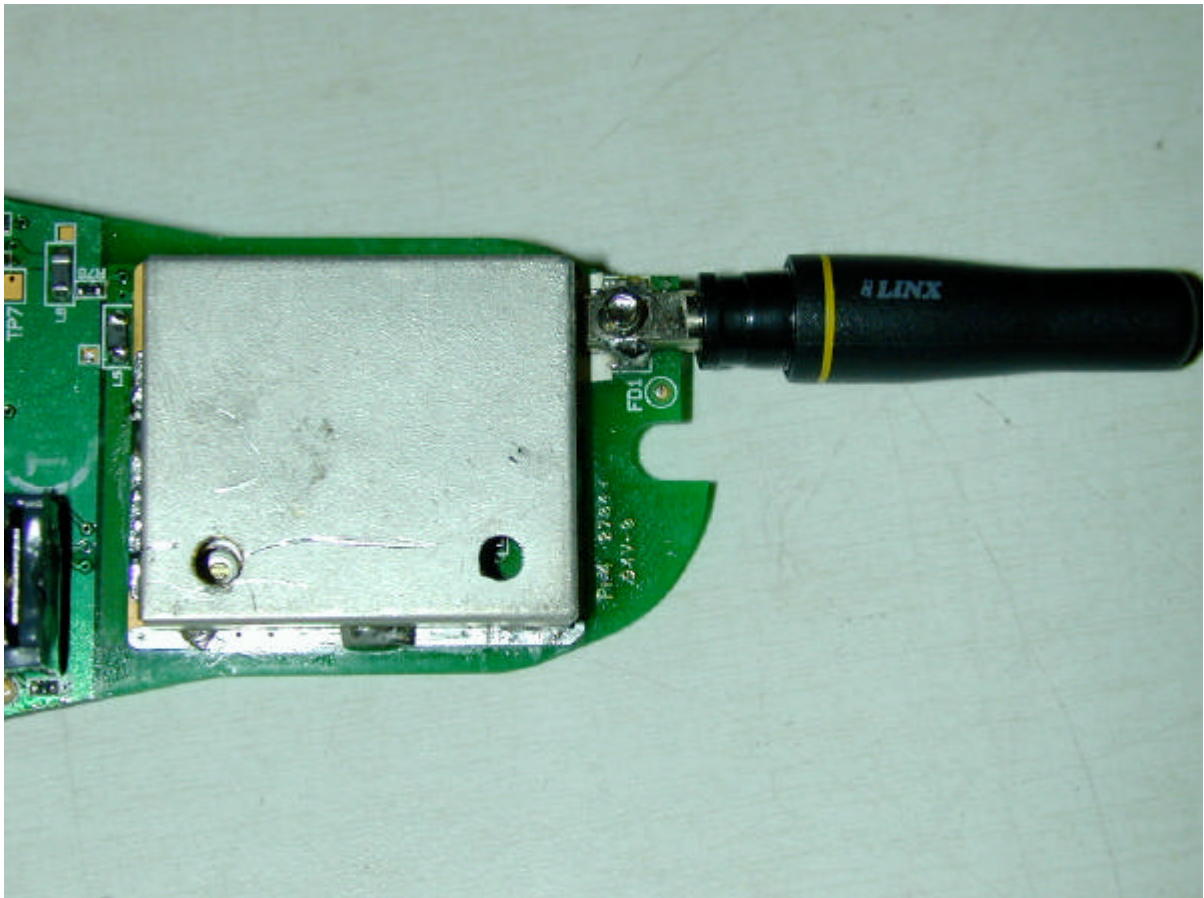




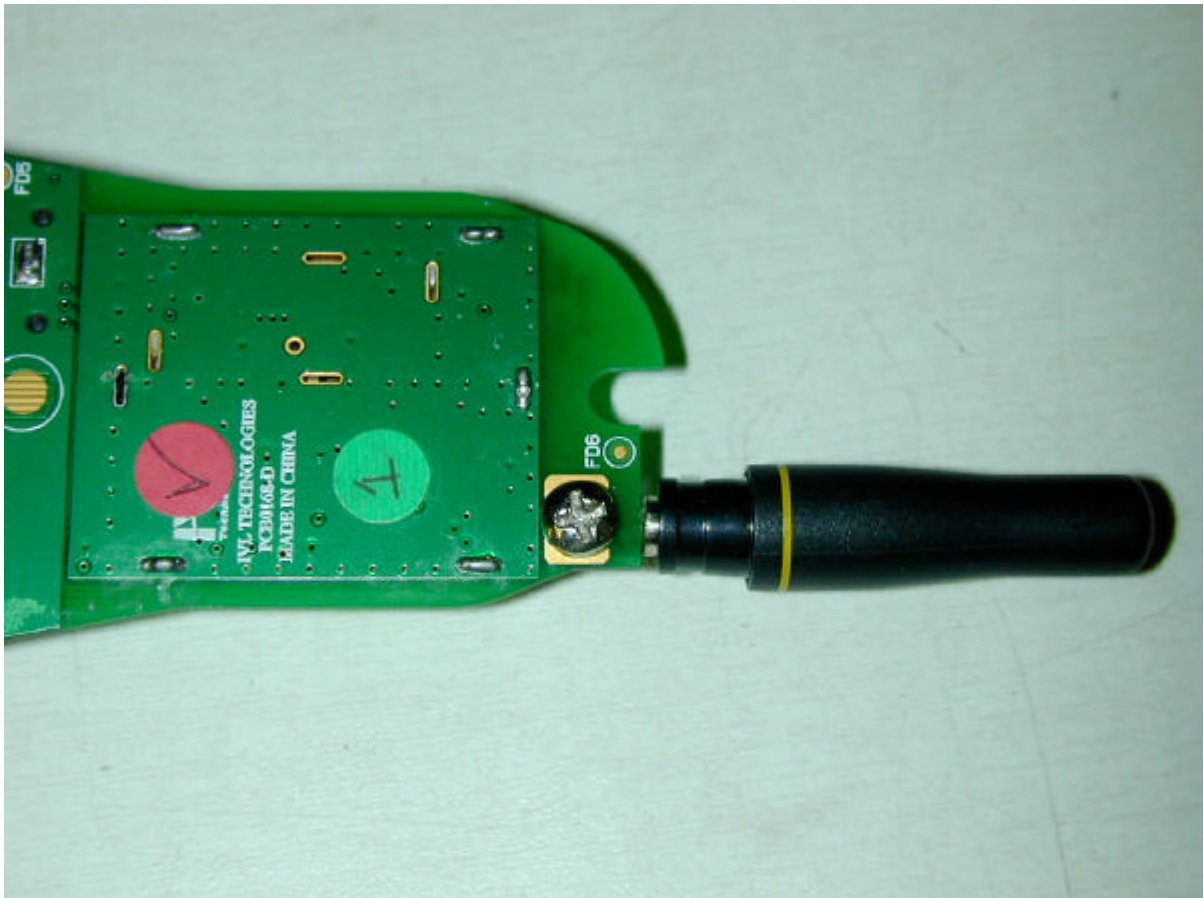


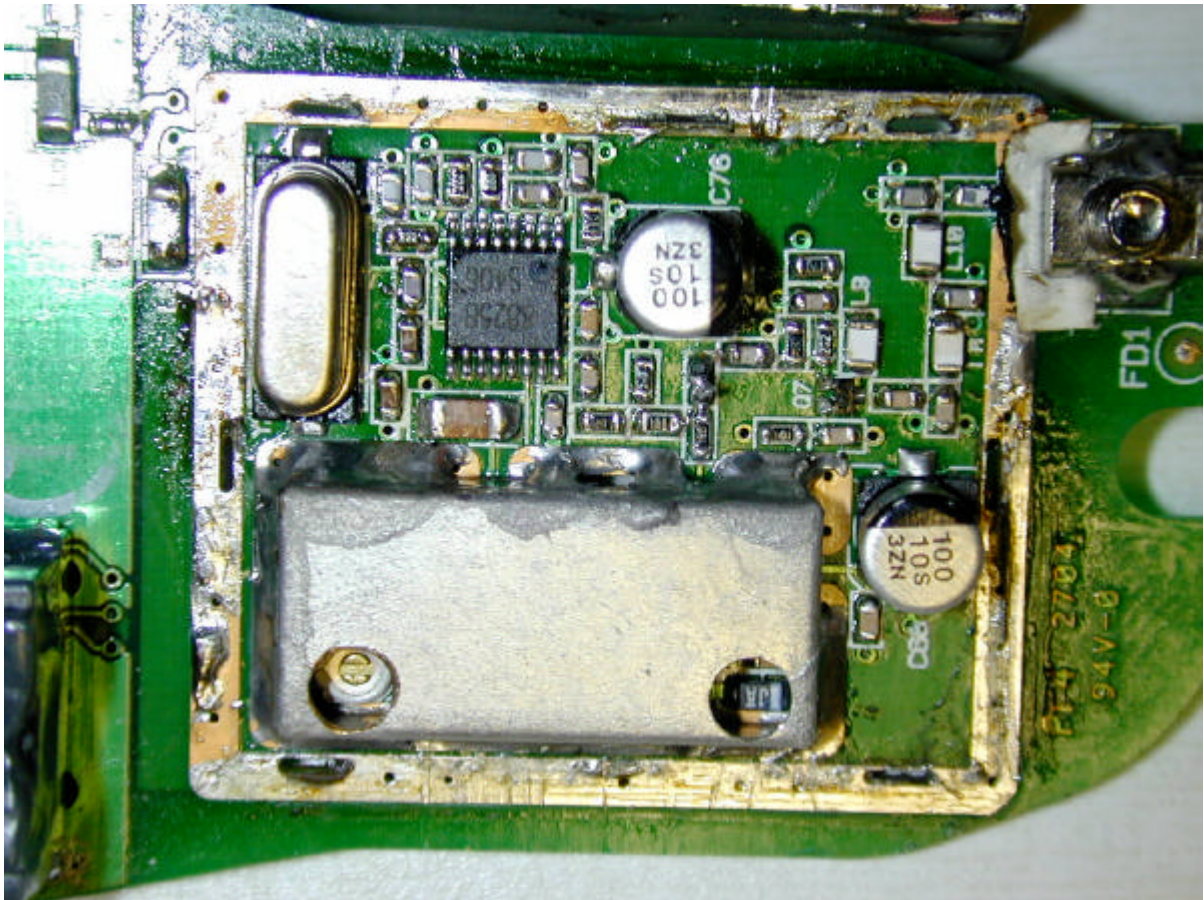










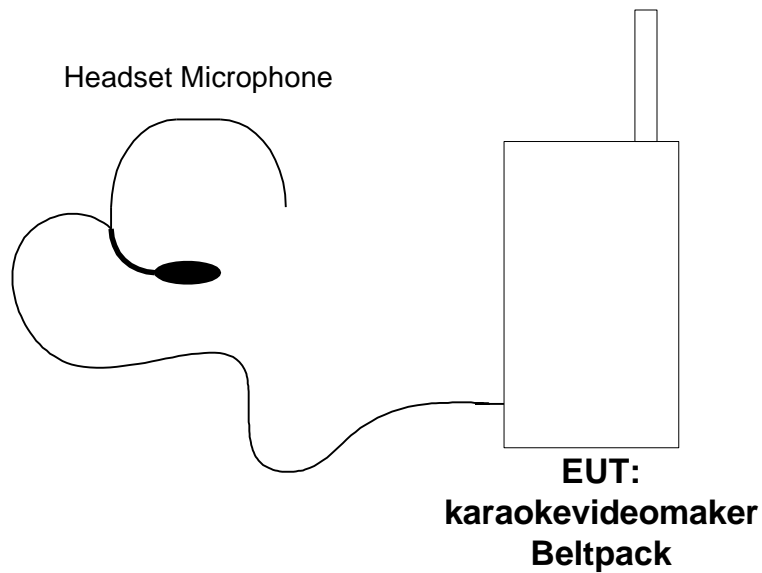




## Equipment Block Diagram

Following is the block diagram of the test setup. Refer to TEST CONFIGURATION pages for port connections and information.

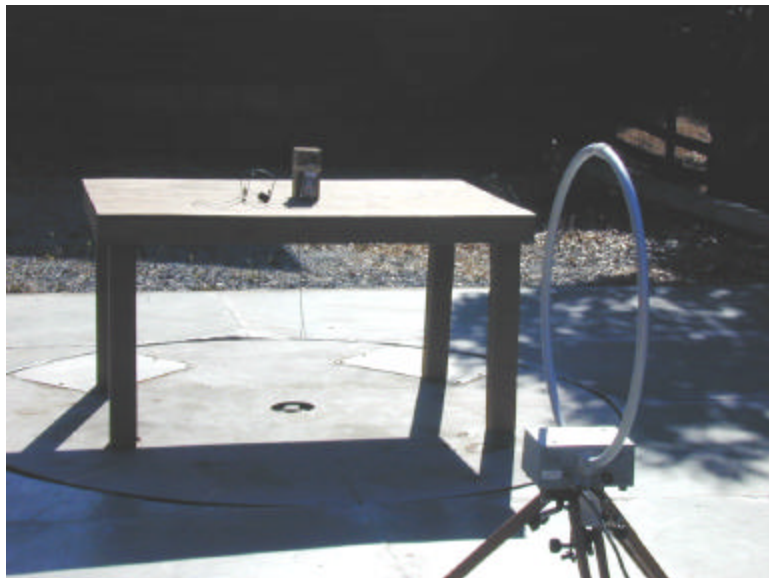
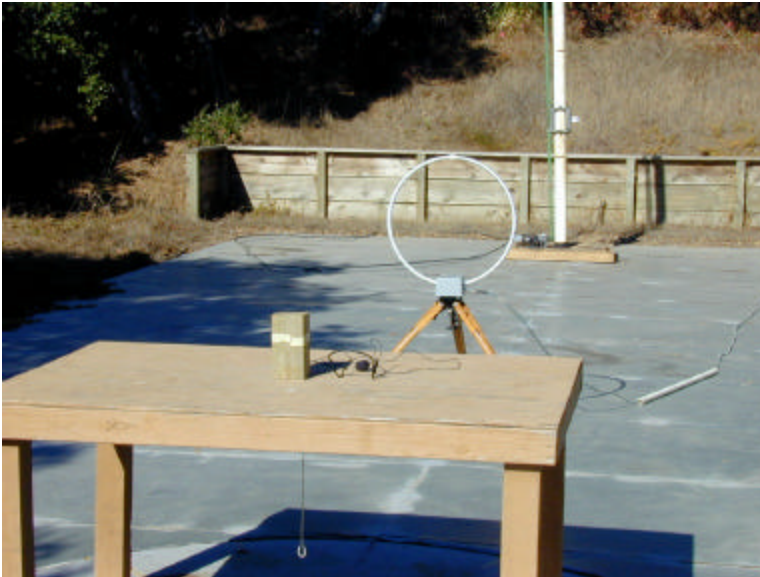
*Figure 1 - Test Setup Diagram*





## Test Setup (Radiated Emissions)

The photographs below show the test setup for radiated emission testing at 3-meter distance with Loop antenna.

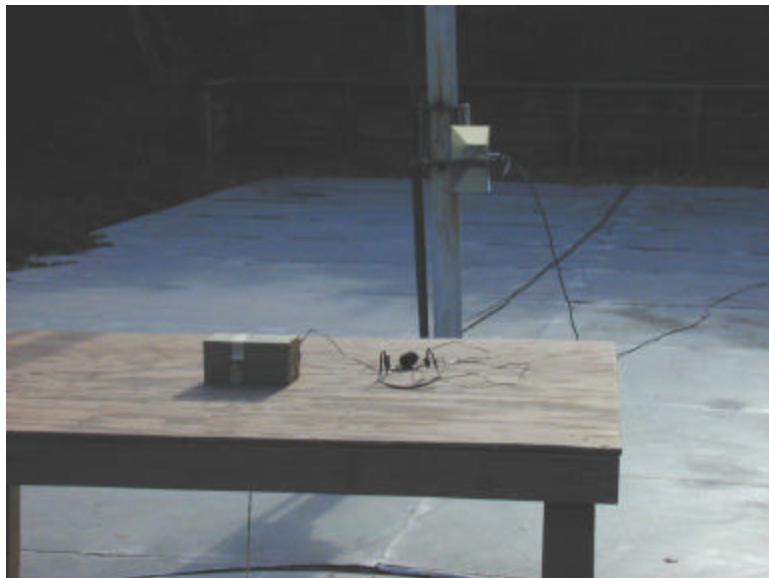
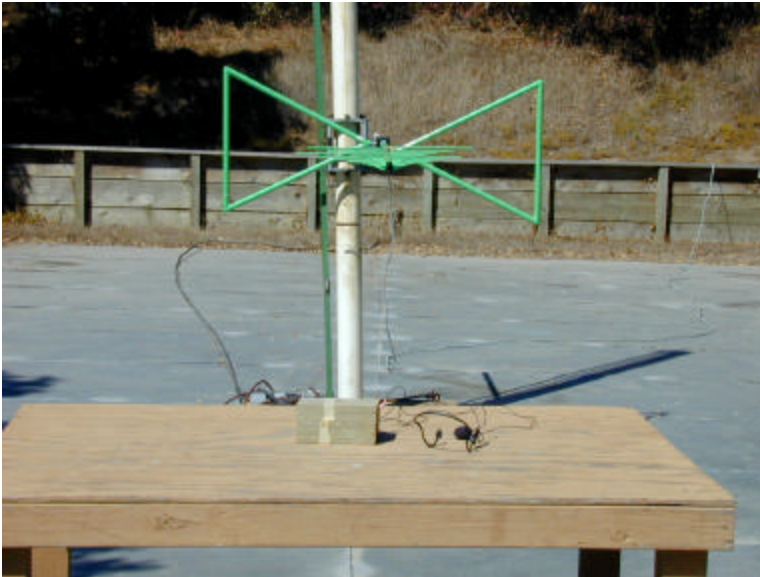






## Test Setup (Radiated Emissions)

The photographs below show the test setup for radiated emission testing at 3-meter distance with BiLog and Horn antennas.





## Test Methods for Emissions

The test procedure stated in ANSI C63.4-1992 was used to collect the test data. The radiated emission data of the EUT was taken with the Rohde & Schwarz EMI Test Receiver or HP 8566B. Incorporating the application of correction factors programmed into the Test Receiver and verified for distance, antenna, cable loss, and amplifier gain, the data was reduced as shown in the Sample Calculations. These correction factors are available upon request. The corrected data was then compared to the emission limits to determine compliance.

During radiated emission testing, the EUT was placed on a nonconductive rotating table 0.8 meter above the conductive grid. The nonconductive table dimensions were 1 meter deep by 1.5 meters wide at 0.8 meter high. The EUT is centered on the tabletop and the measurement antenna was placed 3 meters from the EUT as noted in the test data. The EUT, being a hand-held device, was tested in 3 orthogonal axes to determine which attitude produced the highest emission.

For radiated emissions testing, scans in the frequency range of 9 kHz to 10 GHz were made. Each frequency between 9 kHz and 150 kHz was measured at a bandwidth of 200 Hz, between 150 kHz and 30 MHz was measured at a bandwidth of 10 kHz, between 30 MHz and 1000 MHz was measured at a bandwidth of 120 kHz and between 1000 MHz and above was measured at a bandwidth of 1 MHz. Measurements were made employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz, and above 1GHz which employed an average detector. All readings within 10 dB of the limits were recorded, and those emissions were then measured using the appropriate detector and bandwidth for a 2-second measurement time.

Measurements were made at a distance of 3 meters.

## Conducted Emission Testing

The EUT is a battery powered device therefore no conducted emission testing was performed.

Section 15.207 Conducted limits.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.



## Temperature and Humidity

The ambient temperature of the actual EUT was within the range of 10° to 40° C (50° to 104° F) unless the particular equipment requirements specify testing over a different temperature range. The humidity levels were within the range of 10% to 90% relative humidity unless the EUT operating requirements call for a different level.

## Sample Calculations

An example of how the EMI Test Receiver reading is converted using correction factors is given for the emissions recorded in Table 7. These correction factors are programmed into the EMI Test Receiver and verified. For radiated emissions in dB $\mu$ V/m, the EMI Test Receiver reading in dB $\mu$ V is corrected by using the following formula:

95.05	Meter Reading (dB $\mu$ V/m)
29.51	- Pre amp Gain (dB)
3.83	+ Cable Loss (dB)
21.85	+ Antenna Factor (dB)
91.22	= Corrected Reading (dB $\mu$ V/m)

This reading is then compared to the applicable specification limits and the difference will determine compliance.



## FCC Part 15 Subpart C 15.207 and 15.209 Limits

*Table 4 - Conducted Limits*

Frequency MHz	Limit Quasi-Peak dBmV	Limit Average dBmV
0.15-0.50	66-56	56-46
0.50-5	56	46
5-30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Both Quasi-Peak and Average limits for power line conducted testing must be met.
3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

*Table 5 - Radiated Emission Limits, General Requirements*

Frequency MHz	Field Strength mV/m	Measurement Distance Meters
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closest point of any part of the device or system.
3. The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission.
4. The emission limits shown are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.





## FCC Part 15 Subpart C 15.249 Limits

*Table 6 - Radiated Emission Limits,  
Operation within the bands 902 – 928 MHz, 2400 – 2483.5 MHz,  
5725 – 5875 MHz, and 24.0 – 24.25 GHz.*

Frequency MHz	Field Strength of fundamental millivolts/meter	Field Strength of harmonics microvolts/meter
902 – 928	50	500
2400 – 2483.5	50	500
5725 – 5875	50	500
24000 – 24250	250	2500

**NOTE:**

1. Field strength limits are specified at a distance of 3 meters..
2. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation.
3. As shown in 15.35(b), for frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



## Report of Measurements Radiated Data

Radiated emissions measurements were performed from 9 kHz to 30 MHz at 3-meter distance. The loop antenna was placed at 1-meter height and was rotated about its vertical axis. The EUT was also rotated 360 degrees in front of the antenna, all three orthogonal planes were scanned. No emissions were observed from the EUT in this frequency range.

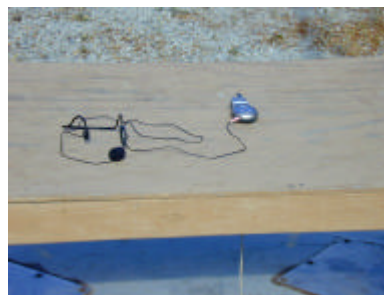
Measurements were performed in the frequency range of 30 MHz to 1 GHz at 3-meter distance. The Bilog antenna was searched from 1 to 4 meters in height in both horizontal and vertical orientation. The EUT was also rotated 360 degrees in front of the antenna, all three orthogonal planes were scanned. No emissions were observed within 15dB of the limit other than the fundamental transmitter frequencies.

Measurements were performed in the frequency range of 1 GHz to 10 GHz at 3-meter distance. The Horn antenna was searched from 1 to 4 meters in height in both horizontal and vertical orientation. The EUT was also rotated 360 degrees in front of the antenna, all three orthogonal planes were scanned. Only the second harmonic of the transmitter was observed. The third to tenth harmonics of the transmitter were measured and the levels recorded are the baseline of the noise floor.

Exploratory radiated emissions measurements of all five transmitter frequencies were made in all three orthogonal planes to determine the maximum transmit level of the EUT. The transmit frequencies of 917 MHz, 919 MHz, 921 MHz, 923 MHz and 925 MHz were measured and 925 MHz was determined to be the highest level. With the antenna in horizontal orientation and the EUT in the z-plane, as shown below, the highest level was recorded. With the antenna in the vertical orientation and the EUT in the x-plane, as shown below, the highest level was recorded.



X-Plane



Y-Plane



Z-Plane



## Report of Measurements Radiated Data

The following table reports the results of the radiated measurements for the Karaoke Wireless Microphone, OKV01.

*Table 7 - Radiated Emission Level*

15.249 Limit dB $\mu$ V/m	Fundamental Frequency MHz	Level dB $\mu$ V/m	Detector	Test Distance	Antenna	Polarity	Margin dB
94 @ 3 meters	925	90.92	QP	3	BiLog	H	3.08
		91.22	QP	3	BiLog	V	2.78

15.249 Limit dB $\mu$ V/m	Harmonic Frequency MHz	Level dB $\mu$ V	Detector	Test Distance	Antenna	Polarity	Margin dB
54 @ 3 meters	1850	36.83	AV	3	Horn	H	17.17
		33.33	AV	3	Horn	V	20.67
54 @ 3 meters	2775	30.91	AV	3	Horn	H	23.09
		30.51	AV	3	Horn	V	23.49
54 @ 3 meters	3700	32.85	AV	3	Horn	H	21.15
		33.15	AV	3	Horn	V	20.85
54 @ 3 meters	4625	33.91	AV	3	Horn	H	20.09
		35.21	AV	3	Horn	V	18.79
54 @ 3 meters	5550	36.63	AV	3	Horn	H	17.37
		35.73	AV	3	Horn	V	18.27
54 @ 3 meters	6475	37.87	AV	3	Horn	H	16.13
		38.57	AV	3	Horn	V	15.43
54 @ 3 meters	7400	39.79	AV	3	Horn	H	14.21
		41.69	AV	3	Horn	V	12.31
54 @ 3 meters	8325	41.32	AV	3	Horn	H	12.68
		41.92	AV	3	Horn	V	12.08
54 @ 3 meters	9250	42.58	AV	3	Horn	H	11.42
		43.78	AV	3	Horn	V	10.22

Test Method: ANSI C63.4-1992  
 Spec Limit: FCC 15.249  
 No other emissions were observed.

Note: QP = Quasi-Peak  
 AV = Average  
 H = Horizontal  
 V = Vertical

COMMENTS: System continuously running. Ambient temperature 68°F and relative humidity of 62%. Test distance of 3 meters. No emissions observed after the second harmonic, measurements taken are baseline measurements after the second harmonic.



## COMPLIANCE VERIFICATION REPORT

# TEST CERTIFICATE

APPLICANT: IVL Technologies Ltd  
6710 Bertram Place  
Central Saanich, BC Canada V8M 1Z6

Trade Name: Karaoke Wireless Microphone

Model: OKV01

### I HEREBY CERTIFY THAT:

The measurements shown in this report were made in accordance with the procedures indicated and that the energy emitted by this equipment, as received, was found to be within the FCC CFR 47 Part 15 Subpart C section 15.249 for Radiated emissions. Additionally, it should be noted that the results in this report apply only to the items tested, as identified herein.

### I FURTHER CERTIFY THAT:

On the basis of the measurements taken at the test site, the equipment tested is capable of operation in compliance with the requirements set forth in FCC CFR 47 Part 15.207(c) and 15.249 Rules and Regulations.

On this Date: August 23, 2004

Bruce Smith

Atlas Compliance & Engineering, Inc.

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

IVL Technologies Ltd Representative