



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*  
**FM Microphone**

**MODEL No.: KSAI-306,KS-306,306,MI**

**BRAND NAME: American Idol , ELECKING  
WELL PIONEER**

**FCC ID: Q2H5703060138**

**REPORT NO: 030015-RF-ID**

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## 1. GENERAL INFORMATION

### 1.1 Product Description

Smart Crown Development Ltd. Model: KSAI-306, KS-306, 306, MI (referred to as the EUT in this report), The EUT is an short range, lower power, FM Microphone designed as an " Input Device. It is designed by way of utilizing the FM modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 100.2MHz, one channel.
- B). Modulation: Frequency Modulation
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: 3 Vdc by AAA \*2 battery

### 1.2 Related Submittal(s) / Grant (s)

This submittal(s)(test report) is intended for FCC ID: Q2H5703060138 filing to comply with Section 15.239 of the FCC Part 15, Subpart C Rules.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2<sup>nd</sup> Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.

### 1.5 Special Accessories

Not available for this EUT intended for grant.

### 1.6 Equipment Modifications

Not available for this EUT intended for grant.



## **2. System Test Configuration**

### **2.1 EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### **2.2 EUT Exercise**

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

### **2.3 Test Procedure**

#### **2.3.1 Conducted Emissions(Not apply in the report)**

The EUT is placed on a turntable which is 0.8m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak /Average detector mode.

#### **2.3.2 Radiated Emissions**

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

### **2.4 Limitation**

#### **(1) Conducted Emission**

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

## (2) Radiated Emission

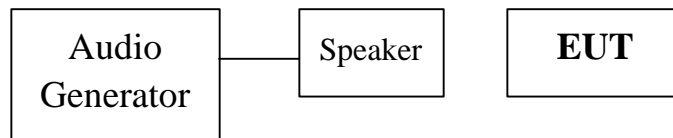
- The field strength of any emission within this band (section 15.239 frequency between 88 MHz –108MHz) shall not exceed 250 micro volts/meter at 3 meters. (47.958dBμV at 3m)  
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.
- The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength μV/m	Distance(m)	Field strength at 3m dBμV/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

- Remark: 1. Emission level in dBuV/m=20 log (uV/m)  
 2.Measurement was performed at an antenna to the closed point of EUT distance of meters.  
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205  
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of §15.205, then the general radiated emission limits in § 15.209 apply.

## 2.5 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**

**Table 2-1 Equipment Used in Tested System**

Equipment	Mfr/Brand	Model/Type No.	FCCID	Series No.	Note
Speaker	Polkcaudio	Speaker L	N/A	000485	
Sound Level Meter	TES	TES 1350A	N/A	020705829	
Audio Generator	GW	GAG-809	N/A	A630525	

### 3. Summary Of Test Results

FCC Rules	Description Of Test	Result
15.207	Conducted Emission	N/A
15.239	Radiated Emission	Compliant
15.239	Occupied Bandwidth	Compliant

### 4. Description of test modes

The EUT (FM Microphone) has been tested under normal operating condition, 1KHz, 100dB SPL audio signal source is located 10 cm away from the EUT.

The EUT stay in continuous transmitting mode. The Frequency 100.20MHz is chosen for testing.

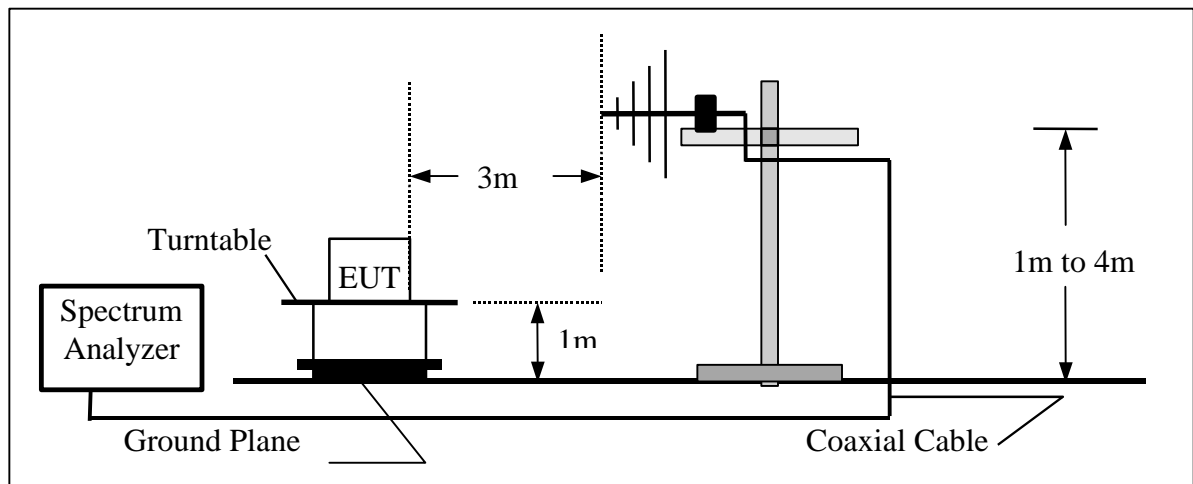
## 5. Radiated Emission Test

### 5.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz





### 5.3 Measurement Equipment Used:

Open Area Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3132	91700456	N/A	N/A
EMI Test Receiver	R&S	ESVS10	846285/016	04/18/2002	04/17/2003
Bilog Antenna	CHASE	CBL 6112B	2462	01/11/2003	01/10/2004
Turn Table	Chance most	N/A	N/A	N.C.R	N.C.R
Antenna Tower	Chance most	N/A	N/A	N.C.R	N.C.R
Controller	Chance most	N/A	N/A	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M51067	N.C.R	N.C.R
Site NSA	C&C Lab.	N/A	N/A	08/17/2002	08/16/2003
Thermo-Hygro Meter	SATO	N/A	SITE4	05/06/2002	05/05/2003

### 5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	





### 5.5 Measurement Result

Operation Mode: TX-X  
 Fundamental Frequency: 100.2MHz  
 Temperature : 26  
 Humidity : 68 %

Test Date : Mar. 27, 2003  
 Test By: Robin  
 Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margir (dB)	Note
100.200	V	Peak	7.18	14.10	21.28	47.90	-26.62	F
200.400	V	Peak	--			43.50	--	H
300.600	V	Peak	--			46.00	--	H
400.800	V	Peak	--			46.00	--	H
501.000	V	Peak	--			46.00	--	H
601.200	V	Peak	--			46.00	--	H
701.400	V	Peak	--			46.00	--	H
801.600	V	Peak	--			46.00	--	H
901.800	V	Peak	--			46.00	--	H

#### Remark

- (1) Measuring frequencies from 30 MHz to the 1GHz
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Datas of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of 30MHz to 1GHz was 100KHz.
- (6) X Mode means the EUT in lie down position; Y Mode means the EUT in stand-up position



Operation Mode: TX-X  
 Fundamental Frequency: 100.2MHz  
 Temperature : 26  
 Humidity : 68 %

Test Date : Mar. 27, 2003  
 Test By: Robin  
 Pol: Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margir (dB)	Note
100.200	H	Peak	25.36	14.10	39.46	47.90	-8.44	F
200.400	H	Peak	--			43.50	--	H
300.600	H	Peak	--			46.00	--	H
400.800	H	Peak	--			46.00	--	H
501.000	H	Peak	--			46.00	--	H
601.200	H	Peak	--			46.00	--	H
701.400	H	Peak	--			46.00	--	H
801.600	H	Peak	--			46.00	--	H
901.800	H	Peak	--			46.00	--	H

#### Remark

- (1) Measuring frequencies from 30 MHz to the 1GHz
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Datas of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of 30MHz to 1GHz was 100KHz.
- (6) X Mode means the EUT in lie down position; Y Mode means the EUT in stand-up position



Operation Mode: TX-Y  
 Fundamental Frequency: 100.2MHz  
 Temperature : 26  
 Humidity : 68 %

Test Date : Mar. 27, 2003  
 Test By: Robin  
 Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margir (dB)	Note
100.200	V	Peak	21.60	14.10	35.70	47.90	-12.20	F
200.400	V	Peak	--			43.50	--	H
300.600	V	Peak	--			46.00	--	H
400.800	V	Peak	--			46.00	--	H
501.000	V	Peak	--			46.00	--	H
601.200	V	Peak	--			46.00	--	H
701.400	V	Peak	--			46.00	--	H
801.600	V	Peak	--			46.00	--	H
901.800	V	Peak	--			46.00	--	H

#### Remark

- (1) Measuring frequencies from 30 MHz to the 1GHz
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
- (4) Datas of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (5) The IF bandwidth of 30MHz to 1GHz was 100KHz.
- (6) X Mode means the EUT in lie down position; Y Mode means the EUT in stand-up position



Operation Mode: TX-Y  
 Fundamental Frequency: 100.2MHz  
 Temperature : 26  
 Humidity : 68 %

Test Date : Mar. 27, 2003  
 Test By: Robin  
 Pol: Horizontal

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margir (dB)	Note
100.200	H	Peak	20.51	14.10	34.61	47.90	-13.29	F
200.400	H	Peak	--			43.50	--	H
300.600	H	Peak	--			46.00	--	H
400.800	H	Peak	--			46.00	--	H
501.000	H	Peak	--			46.00	--	H
601.200	H	Peak	--			46.00	--	H
701.400	H	Peak	--			46.00	--	H
801.600	H	Peak	--			46.00	--	H
901.800	H	Peak	--			46.00	--	H

#### Remark

- (1) Measuring frequencies from 30 MHz to the 1GHz
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- (3) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
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- (5) The IF bandwidth of 30MHz to 1GHz was 100KHz.
- (6) X Mode means the EUT in lie down position; Y Mode means the EUT in stand-up position



## 6. AC POWER LINE CONDUCTED EMISSION TEST

### 6.1 Standard Applicable

According to 15.207 frequency within 150KHz to 30MHz shall not exceed

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

### 6.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was plug-in the host PC via USB port. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host PC system was connected with 110Vac/60Hz power source.

### 6.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



#### 6.4 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESHS30	828144/003	08/08/2002	08/07/2003
LISN	R&S	ESH2-Z5	843285/010	10/17/2002	10/16/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003
Spectrum Analyzer	ADVANTEST	R3261A	91720031	N/A	N/A
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2002	06/19/2003
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2002	06/19/2003

#### 6.5 Measurement Result

N/A, This device is powered from 3Vdc.

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.



## **7. Occupied Bandwidth**

### **7.1 Measurement Procedure**

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPACenterFrequency=fundamental frequency, RBW, VBW=10KHz, Span=100KHz.
4. Set SPA Max hold. Mark peak, -26dB.

### **7.2 Test SET-UP (Block Diagram of Configuration)**

Same as 4.2 Radiated Emission Measurement.

### **7.3 Measurement Equipment Used:**

Same as 4.2 Radiated Emission Measurement.

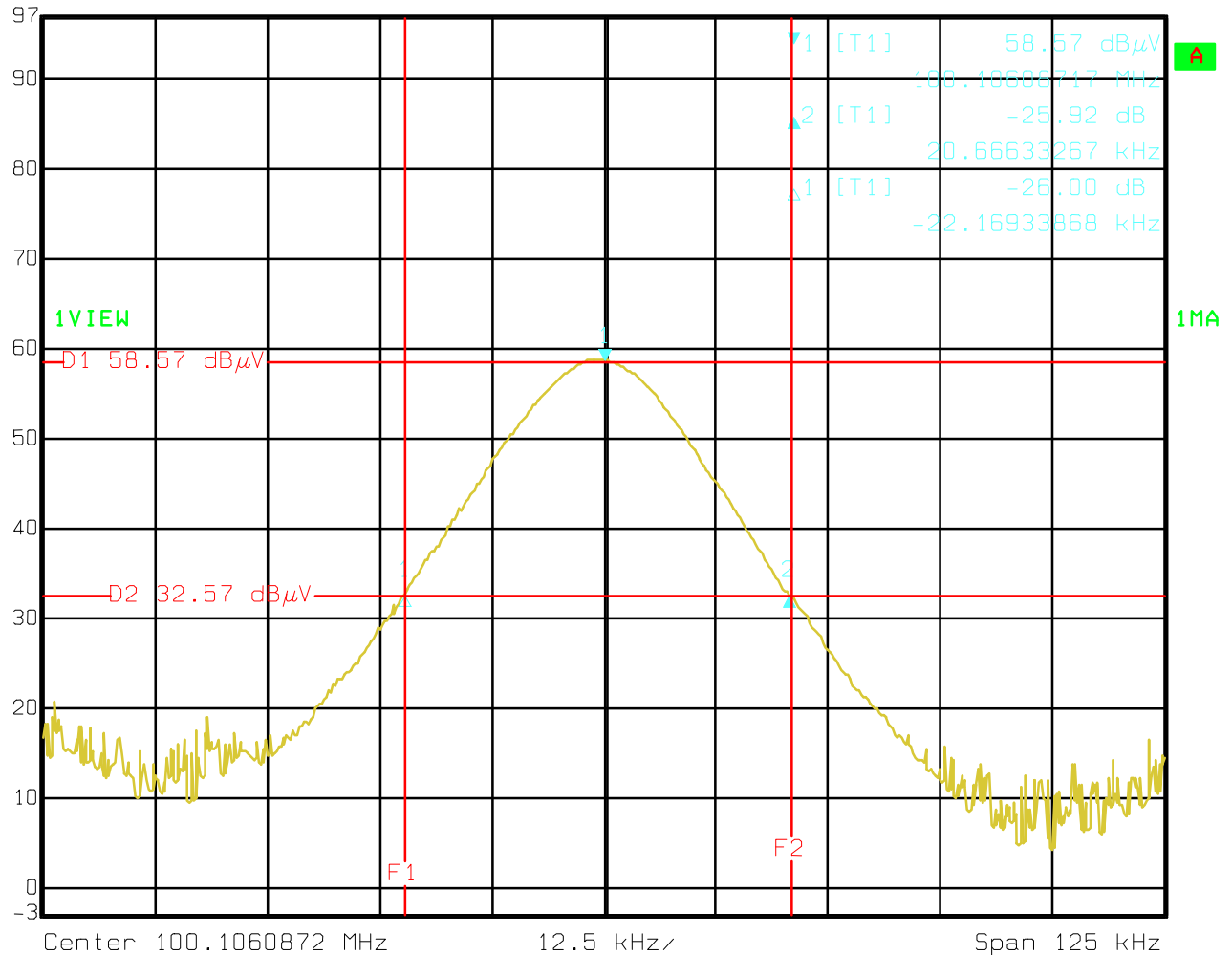
### **7.4 Measurement Results:**

26dB bandwidth = 30.8KHz

Refer to attached data chart.

**26dB Band Width Test Data**

 Ref Lvl 97 dB $\mu$ V Delta 2 [T1] -25.92 dB RBW 10 kHz RF Att 0 dB  
20.66633267 kHz VBW 10 kHz Unit dB $\mu$ V  
SWT 100 ms



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