

FCC PART 15.239
MEASUREMENT AND TEST REPORT

For

Zhongshan K-mate General Electronics Co., Ltd

Fuwan Industrial Zone, Fuwan South Road, Sunwen East Road, East District, Zhongshan, China

FCC ID: WAD-BTC020

Report Type: Original Report	Product Type: Bluetooth FM Transmitter
Test Engineer:	Leon Chen
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Reviewed By:	Ivan Cao RF Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The Zhongshan K-mate General Electronics Co., Ltd.'s product, model number: *BTC020* (FCC ID: *WAD-BTC020*) or ("EUT") in this report is a *Bluetooth FM Transmitter*, which was measured approximately: 9.0 cm (L) x 6.5 cm (W) x 20.5 cm (H), rated input voltage: DC 12.0V-24.0V from battery.

Technical Specification:

FM Transmitter		
1	Operating Frequency Band	88.1~107.9 MHz
2	Channel Step	200kHz
3	Output power	47.15dBμV@3m
4	Antenna	Wire Antenna

* All measurement and test data in this report was gathered from production sample serial number: 121204002 (Assigned by BACL, Dongguan). The EUT was received on 2012-12-05.

Objective

This report is prepared on behalf of *Zhongshan K-mate General Electronics Co., Ltd.* in accordance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, and 15.239 rules.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: *WAD-BTC020* for Bluetooth.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industrial Zone, Tangxia, Dongguan, Guangdong, China

Test site at Bay Area Compliance Laboratories Corp. (Dongguan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No software was used in the test.

Equipment Modifications

No modification was made to the unit tested.

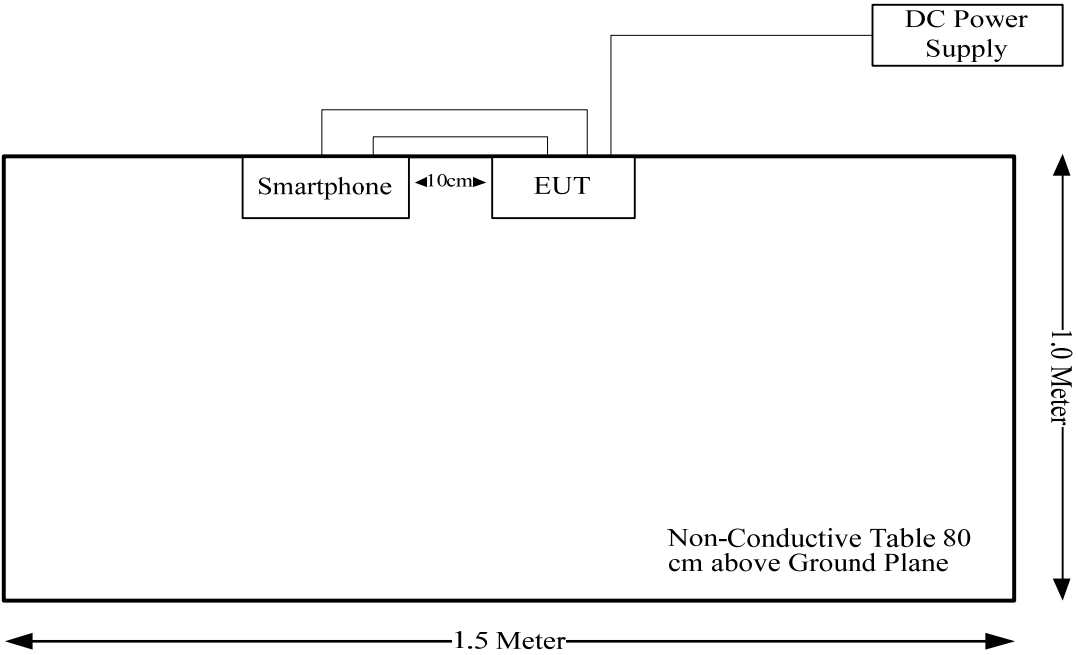
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Hisense	Smartphone	HS-U909	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
Shielded Detachable USB cable	1.2	EUT	Smartphone
Shielded Detachable Audio cable	0.9	EUT	Smartphone

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Test Result
§15.203	Antenna Requirement	Compliance
§15.207	Conducted Emissions	Not Applicable*
§15.205, §15.209, §15.239	Radiated Emissions	Compliance
§15.239 (a)	Emission Bandwidth	Compliance

Not Applicable*: the EUT was powered by DC battery from Vehicle.

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Antenna Connector Construction

The EUT has a wire antenna permanently soldering on the printed circuit boards, which complied with 15.203, Please refer to the internal photos.

Result: Compliance.

§15.205, §15.209, §15.239 - RADIATED EMISSIONS

Applicable Standard

FCC §15.239(a)(b)(c); §15.209; §15.205;

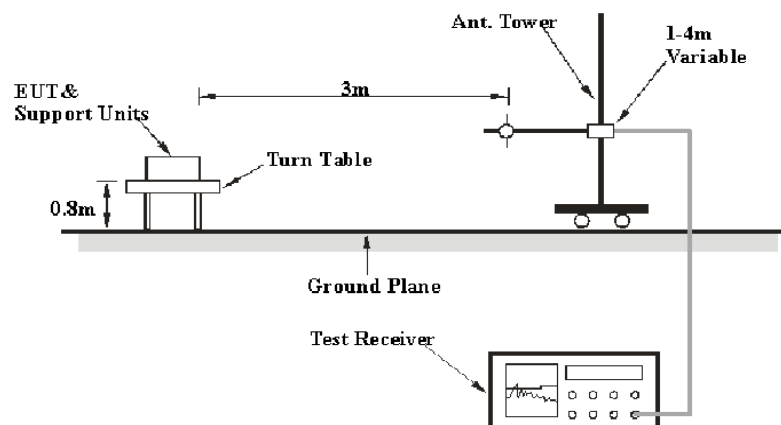
Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

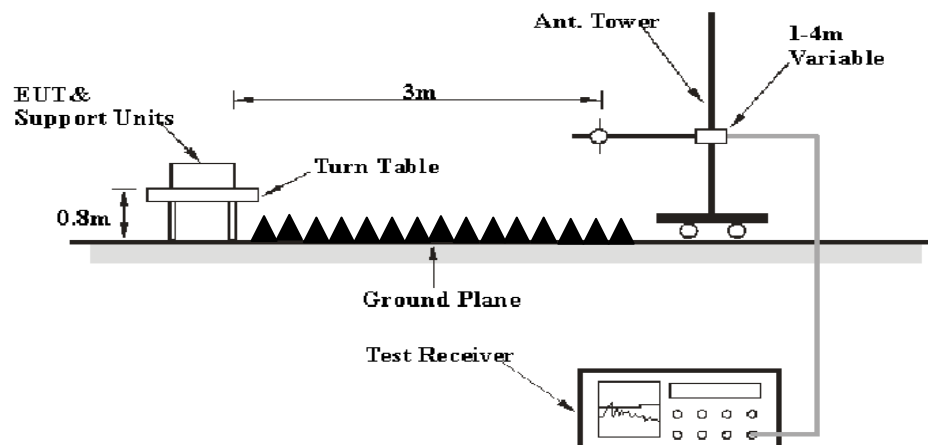
Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Dongguan) is ± 4.0 dB, and the uncertainty will not be taken into consideration for all the test data recorded in the report.

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC Part 15.209 and FCC Part 15.239.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 2000 MHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video BW</i>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
Above 1000MHz	1 MHz	3 MHz	PK
Above 1000MHz	1 MHz	10 Hz	Ave.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2012-05-14	2013-05-13
Sunol Sciences	Hybrid Antennas	JB3	A060611-1	2011-09-06	2013-09-05
HP	Pre-amplifier	8447E	2434A02181	2012-10-08	2013-10-07
R&S	Spectrum Analyzer	FSEM 30	DE31388	2012-03-15	2013-03-14
ETS-LINDGREN	Horn Antenna	3115	000 527 35	2012-09-06	2014-09-05
Mini-Circuits	Wideband Amplifier	ZVA-183-S+	96901149	N/A	N/A

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Loss} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8dB means the emission is 5.8dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 and 15.239, with the worst margin reading of:

0.81 dB at 107.9 MHz in the Vertical polarization

Test Data

Environmental Conditions

Temperature:	22.8°C
Relative Humidity:	54%
ATM Pressure:	100.9kPa

The testing was performed by Leon Chen on 2012-12-10.

Test Mode: Transmitting

Frequency	Receiver		Rx Antenna		Cable	Amplifier	Corrected	FCC 15.239	
(MHz)	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel: 88.1 MHz									
88.1	55.32	AV	V	7.68	1.21	21.40	42.80	48.00	5.20
88.1	46.75	AV	H	7.68	1.21	21.40	34.23	48.00	13.77
440.5	34.1	QP	H	17.00	2.51	21.87	31.74	46.00	14.26
352.4	33.9	QP	H	15.30	2.26	21.65	29.81	46.00	16.19
440.5	32.1	QP	V	17.00	2.51	21.87	29.74	46.00	16.26
264.3	34.2	QP	H	13.31	1.95	21.50	27.96	46.00	18.04
352.4	31.4	QP	V	15.30	2.26	21.65	27.31	46.00	18.69
264.3	32.6	QP	V	13.31	1.95	21.50	26.36	46.00	19.64
176.2	33.5	QP	H	11.43	1.60	21.45	25.09	43.5	18.41
176.2	30.9	QP	V	11.43	1.60	21.45	22.49	43.5	21.01
88.1	55.97	PK	V	7.68	1.21	21.40	43.45	68.00	24.55
88.1	52.27	PK	H	7.68	1.21	21.40	39.75	68.00	28.25
88.0	30.17	QP	V	7.67	1.21	21.40	17.65	40.00	22.35
88.0	28.14	QP	H	7.67	1.21	21.40	15.62	40.00	24.38
Middle Channel: 98.1 MHz									
98.1	56.54	AV	V	9.99	1.24	21.40	46.37	48.00	1.63*
98.1	51.72	AV	H	9.99	1.24	21.40	41.55	48.00	6.45
588.6	35.6	QP	V	19.31	2.93	22.24	35.61	46.00	10.39
490.5	36.1	QP	H	18.09	2.70	22.00	34.89	46.00	11.11
588.6	34.2	QP	H	19.31	2.93	22.24	34.21	46.00	11.79
490.5	35.2	QP	V	18.09	2.70	22.00	33.99	46.00	12.01
392.4	36.8	QP	H	15.96	2.39	21.75	33.40	46.00	12.60
294.3	37.5	QP	H	13.94	2.07	21.52	32.00	46.00	14.00
392.4	34.9	QP	V	15.96	2.39	21.75	31.50	46.00	14.50
294.3	35.2	QP	V	13.94	2.07	21.52	29.70	46.00	16.30
196.2	36.8	QP	H	12.12	1.68	21.46	29.14	43.5	14.36
196.2	35	QP	V	12.12	1.68	21.46	27.34	43.5	16.16
98.1	57.12	PK	V	9.99	1.24	21.40	46.95	68.00	21.05
98.1	52.83	PK	H	9.99	1.24	21.40	42.66	68.00	25.34
High Channel: 107.9 MHz									
107.9	54.84	AV	V	12.50	1.26	21.40	47.19	48.00	0.81*
107.9	51.94	AV	H	12.50	1.26	21.40	44.29	48.00	3.71*
539.5	36.7	QP	H	18.49	2.80	22.12	35.87	46.00	10.13
431.6	37.5	QP	H	16.78	2.50	21.85	34.93	46.00	11.07
539.5	33.6	QP	V	18.49	2.80	22.12	32.77	46.00	13.23
323.7	37.2	QP	H	14.59	2.16	21.58	32.38	46.00	13.62
431.6	34.2	QP	V	16.78	2.50	21.85	31.63	46.00	14.37
215.8	36.5	QP	H	11.40	1.78	21.47	28.21	43.5	15.29
323.7	32.4	QP	V	14.59	2.16	21.58	27.58	46.00	18.42
107.9	55.33	PK	V	12.50	1.26	21.40	47.68	68.00	20.32
215.8	33.2	QP	V	11.40	1.78	21.47	24.91	43.5	18.59
107.9	53.43	PK	H	12.50	1.26	21.40	45.78	68.00	22.22
108.0	32.59	QP	V	12.52	1.26	21.40	24.97	43.50	18.53
108.0	30.19	QP	H	12.52	1.26	21.40	22.57	43.50	20.93

Note: no emissions were detected at above 1GHz.

*Within measurement uncertainty!

§15.239(A) – EMISSION BANDWIDTH**Standard applicable**

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88–108 MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP38	100478	2012-5-14	2013-5-13

Test Procedure

With the EUT's antenna attached, the EUT's radiated emission power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

Test Data**Environmental Conditions**

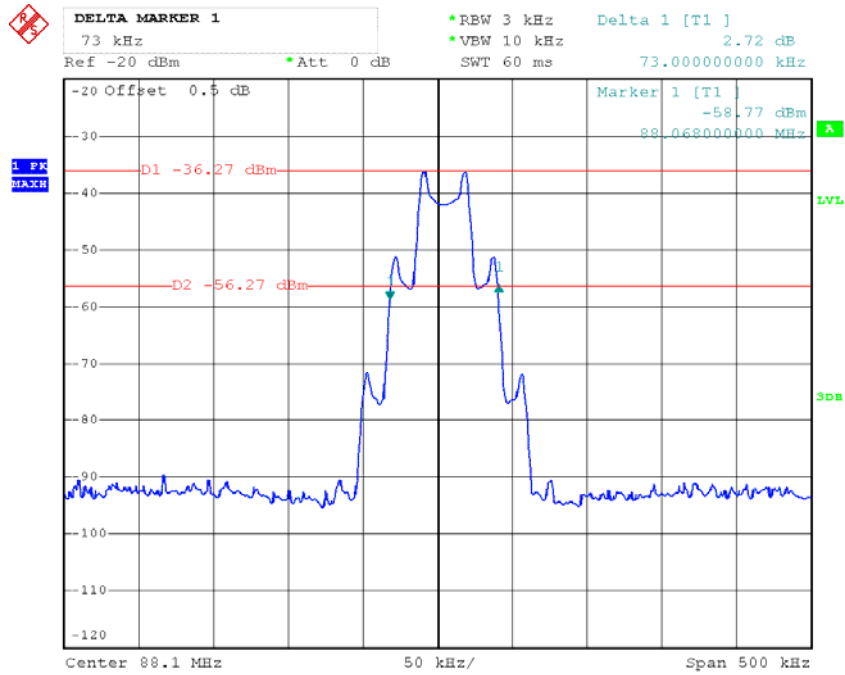
Temperature:	23.9 ° C
Relative Humidity:	54%
ATM Pressure:	101.2 kPa

The testing was performed by Leon Chen on 2012-12-13

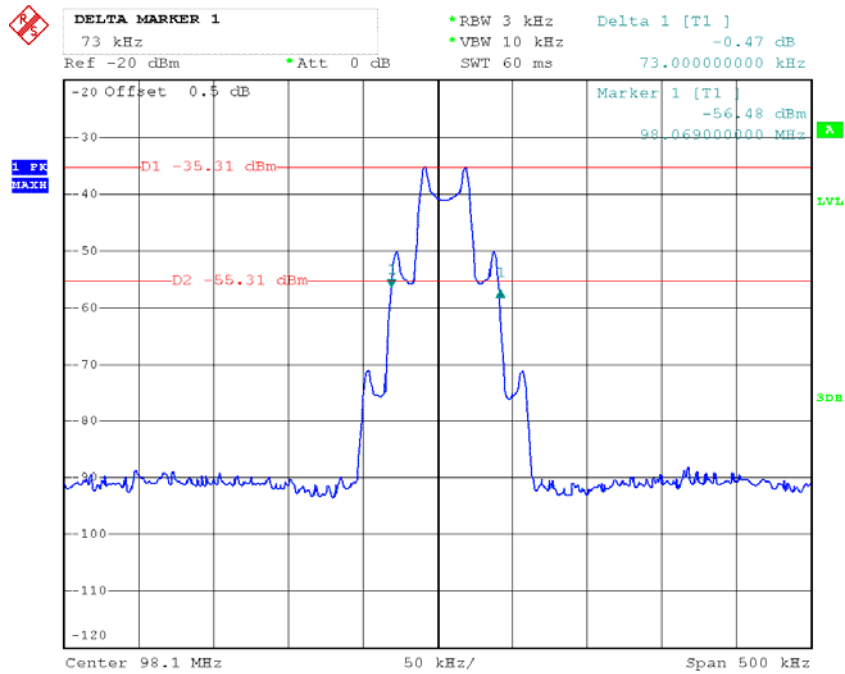
Please refer to the following table and plots.

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (kHz)
Low	88.1	73	200
Middle	98.1	73	200
High	107.9	72	200

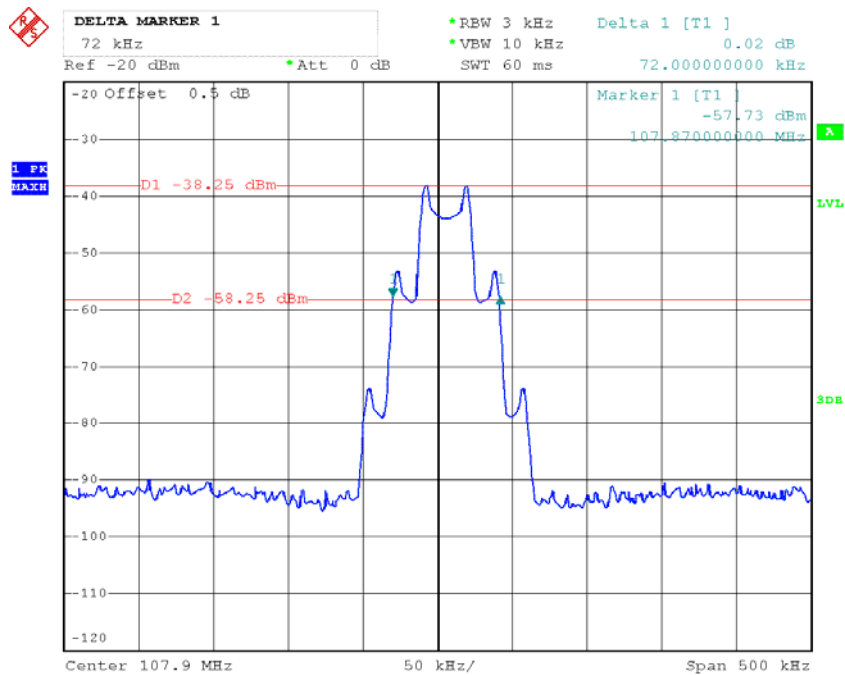
Low Channel



Middle Channel



High Channel



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