

# CERTIFICATION TEST REPORT

**FCC CFR47 Part 15 Subpart C**

Test Report File No.	12-IST-0588	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	August 27, 2012	Begin of test date	September 24, 2012
Date of Issue	October 11, 2012	End of test date	October 09, 2012
Kind of Product	Biometrics Fingerprint Reader		
Model (s)	KJ-3300		
FCC ID	PVRKJ-3300		
Applicant	KJ TECH		
Address	(Hogye-dong, HOGYEDONG, 3 <sup>RD</sup> FLOOR) 88-6, Anyangcheondong-ro Dong-an-gu Anyang-si, Gyeonggi-do, Korea		
Manufacturer	KJ TECH		
Address	(Hogye-dong, HOGYEDONG, 3 <sup>RD</sup> FLOOR) 88-6, Anyangcheondong-ro Dong-an-gu Anyang-si, Gyeonggi-do, Korea		

**Test Result**

☒ **Positive**

☐ **Negative**

Tested By

Reviewed By



B.O. KO.



S.J. CHO

**Comment (s)**

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart C.
- The test report is consists of 14 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST Co., Ltd.
- This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4
- I assume full responsibility for accuracy and completeness of these data.

## TABLE OF CONTENTS

Table of contents	2
Information of test laboratory, Product information	3
Descriptions of Test	4
- Conducted Emission(Not Applicable)	-
- Radiated Emission	4
- Radiated Emission, 9KHz to 30MHz(Magnetic Field Test)	5
Measurement Uncertainty Calculations	6
Equipment Under Test	7
Summary	8
- Radiated Emission-15.225(a)	10
- Radiated Electric Field Emission-15.225(b)(c)	11
- Radiated Electric Field Emission-15.109, 15.209&15.225(d)	12
- Frequency Stability -15.225(e)	13
- Antenna requirements	14

Note:

## INFORMATIONS OF TEST LABORATORY

IST Co., Ltd.  
400-19, Singal-dong, Giheung-gu, Yongin-si,  
Gyeonggi-do, 446-599, Korea  
TEL : +82 31 326 6700 FAX : +82 31 326 6797

**KOLAS Testing No. : 118**  
**RRA Designation No. : KR0018**  
**FCC Registration No. : 400603**  
**VCCI Member No. : 1739**



## Product Information

Portable Music Player

CPU	32bit CPU
Display	2.8" TFT Color LCD
Sensor	500 dpi Optical sensor Multi Spectra image sensor (option)
RF Reader	13.56 MHz
Communication type	TCP/IP, RS-485
External Interface	Wiegand, USB Memory Card
Fingerprint Capacity	2K, 5K, 10K, 30K 50K
FAR / FRR	0.00001 / 0.1(%)
Event log	Maximum 500,000 events
Operation Mode	Password/Fingerprint/card mixture
Inputs & Outputs	4In / 2Out
Power	12V DC 500mA
Product size	115(H) x 165(W) x 49(D)mm
Certification	CE,FCC Certified
Other	Firmwave upgrade available Error search function available

**Note: All the testing were performed according to the procedures in  
FCC CFR47 PART 15 SUBPART C**

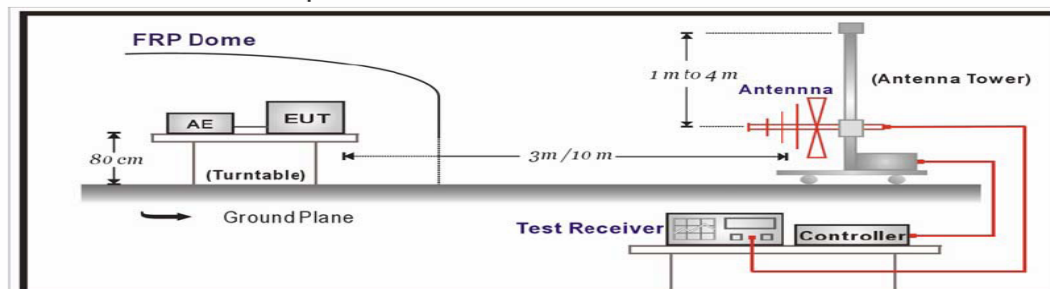
## Description of Test

### Radiated Emissions:

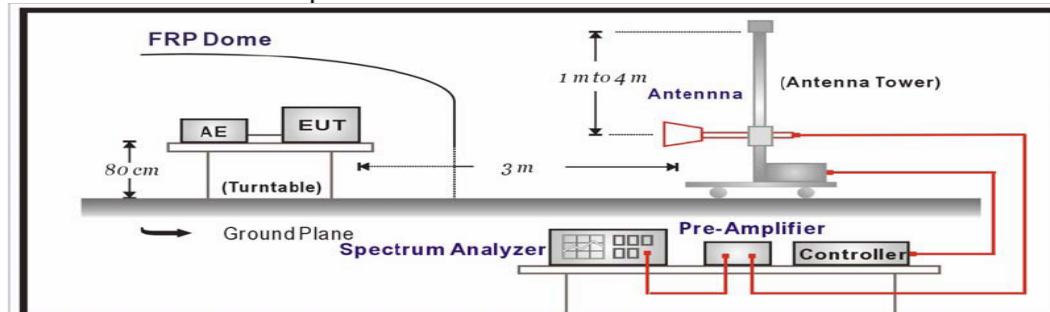
The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120kHz. Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission. (The bandwidth below 1GHz setting on the field strength meter is 120KHz and above 1GHz is 1MHz.)

Under 1GHz Test Setup:



Above 1GHz Test Setup:



## **Radiated Emissions Test, 9 kHz to 30 MHz(Magnetic Field Test)**

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 3 meters according to Section 15.31(f)(2).
2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table.
3. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
4. To obtain the final measurement data, each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector with specified bandwidth.

## Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

TYPE	Contribution	Probability Distribution	Uncertainty	Remark
B	<b>AMN</b>			
	Impedance	Triangular	+2.6/-2.7 dB	CISPR
	Voltage Division Factor	normal (k=2)	±0.2	
	Attenuation : AMN to Receiver	normal (k=2)	±0.1	
	<b>Receiver (ESCI (S/N:100374))</b>			
	Sine-Wave Voltage Accuracy	normal (k=2)	±1.0 dB	CISPR
	Pulse Amplitude Response	Rectangular	±1.5 dB	
	Pulse Repetition Rate Response	Rectangular	±1.5 dB	
	Mismatch AMN to Receiver	U-Shaped	+0.7/-0.8 dB	CISPR
	Reading	normal (k=1)	±0.1	
Combined Standard Uncertainty		normal	± 1.8 dB	
Expanded Uncertainty U		normal (k=2)	± 3.6 dB	95 %

$U = -3.70 / +3.42$  (k=2, 95.45% confidence level)

T Y P E	Contribution	Probability Distribution	Uncertainty	Remark
B	<b>Antenna</b>			
	AF factor	Normal (k=2)	±0.56	CAL.
	AF frequency interpolation	Rectangular	±0.30 dB	CISPR
	AF height deviations	Rectangular	±0.50 dB	CISPR
	directivity difference	Rectangular	±0.30 dB	CISPR
	phase center location (3 m)	Rectangular	+1.0/-0.0 dB	CISPR
	phase center location (10 m)	Rectangular	±1.0 dB	CISPR
	<b>Receiver</b>			
	Sine Wave Voltage Accuracy	Normal (k=2)	±0.20 dB	CAL.
	Pulse Amplitude Sensibility	Normal (k=2)	±0.40 dB	CAL.
	Pulse Frequency Response	Normal (k=2)	±0.57 dB	CAL.
	Random Noise	Normal (k=2)	±0.35 dB	CAL.
	Mismatch : Antenna - receiver	U-Shaped	+0.9/-1.0 dB	CISPR
	Table height	Normal (k=2)	±0.01 dB	CISPR
	Separation distance (3 m ) Separation distance (10 m )	Rectangular	±0.30 dB ±0.10 dB	CISPR
Combined standard Uncertainty		Normal	± 1.13	
Expanded Uncertainty U		Normal (k=2)	± 2.26 dB	95 %

$U = \pm 2.26$  (k=2, 95% confidence level)

## Equipment Under Test

### EUT Type :

- ☒ Table-Top. ☐ Floor-Standing.
- ☐ Table-Top and Floor-Standing (Combination).
- ☐ Built-in

### Operation - mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- ☐ Standby Mode
- ☒ Operational Condition : Continue Transmitting

## SUMMARY

### Test Descriptions

<input type="checkbox"/> Conducted Emission	-
- Conducted Emission Result	
■ Radiated Emission-15.225(a)	PASS
- Radiated Emission Result	
■ Radiated Electric Field Emission-15.225(b)(c)	PASS
- Test result	
■ Radiated Electric Field Emission-15.109, 15.225(d)	PASS
- Test result	
■ Frequency Stability -15.225(e)	PASS
Test Result	

### Note :

- ■ means that the test is applicable,
- □ means that the test is not applicable.

### Radiated Spurious Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	EMI Receiver	Rohde & Schwarz	May. 10, 2012	100171
SPECTRUM ANALYZER	R3273	ADVANTEST	May 10, 2012	110600587
Loop Antenna	HFH2-Z2	Rohde & Schwarz	Oct. 29, 2010	8620771017
Log-bicon Antenna	VULB9161SE	Schwarz beck	Nov. 22, 2011	4089

*Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRA, KRISS, KTL and HCT.*

*2. The calibration interval of horn ant, and loop ant. is 24 months*

#### Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$\text{Peak} = \text{Reading} + \text{Corrected Factor}$$

Where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

Limit

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

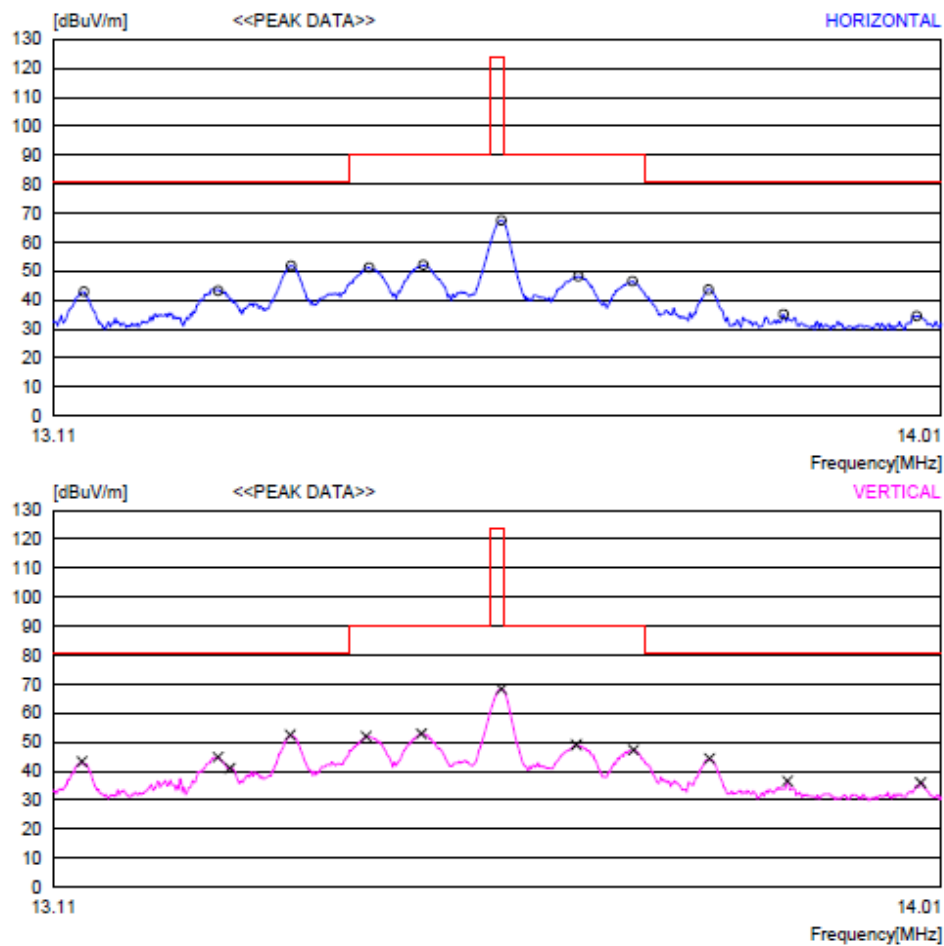
Frequencies(MHz)	Field Strength(microvolt/meter)	Measurement Distance(meter)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.750	24000/F(kHz)	30
1.750 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

### Radiated Field Emission-15.225(a)

Frequency(MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.553 - 13.567	15,848	83.9	123.9

**[Applicable]**

Freq. [MHz]	Reading [dBuV]	Height [m]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.5610	44.3	1	22.7	0.5	H	67.5	123.9	56.4
13.5610	45.2	1	22.7	0.5	V	68.4	123.9	55.5



Note :

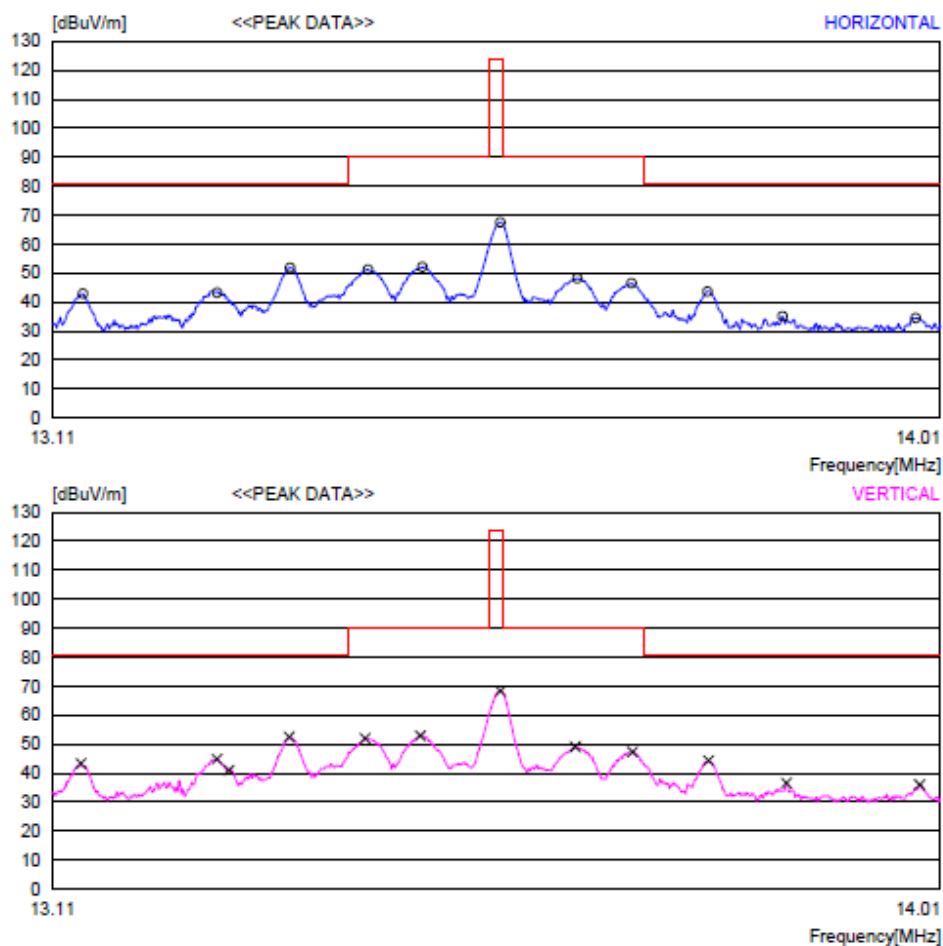
### Radiated Electric Field Emission-15.225(b)(c)

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(30m)	Field Strength of Fundamental dBuV/m(3m)
13.110 - 13.410	106	40.5	80.5
13.410 - 13.553	334	50.4	90.4
13.567 - 13.710	334	50.4	90.4
13.710 - 14.010	106	40.5	80.5

[Applicable]

Freq. [MHz]	Reading [dBuV]	Height [m]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
-	-	-	-	-	-	-	-	-

Note : Other emission don't exceed the level 20dB below the applicable limit.



**Radiated Electric Field Emission-15.109, 15.225(d)**

Frequency (MHz)	Field Strength of Fundamental uV/m	Field Strength of Fundamental dBuV/m(3m)
1.705 - 30.0	30	49.5
30 - 88	90	39.1
88 - 216	150	43.5
216 - 960	210	46.4
Above 960	300	49.5

[Applicable]

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
24.131	13.1	23.8	0.7	V	37.61	49.50	-11.89
26.418	13.4	23.7	0.7	V	37.82	49.50	-11.68
140.710	19.80	12.25	1.97	H	34.02	43.50	-9.48
249.300	22.80	11.06	2.68	H	36.54	46.40	-9.86
299.730	22.20	12.91	2.90	H	38.01	46.40	-8.39
350.150	19.90	14.07	3.12	V	37.09	46.40	-9.31
384.090	22.10	14.85	3.26	H	40.21	46.40	-6.19
416.090	19.50	15.66	3.41	V	38.57	46.40	-7.83
448.090	19.80	16.55	3.57	H	39.92	46.40	-6.48
549.900	14.60	18.76	4.10	H	37.46	46.40	-8.94

### Frequency Stability -15.225(e)

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
R3273	SPECTRUM ANALYZER	ADVANTEST	May 10, 2012	110600587
HY-LTH2	Temp&Humi Chamber	Hanyoung STE	May 11, 2012	A33-080910

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery

[Applicable]

Table 1 : Frequency Tolerance									
Reference Frequency : 13.5610 MHz, Limit : within $\pm 13561$ Hz									
Environment Temperature [°C]	Power Supplied [Vdc]	Carrier Frequency Measured with Time Elapsed							
		STARTUP		2 minutes		5 minutes		10 minutes	
		[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]
-20	12	13.561134	134	13.561135	135	13.561136	136	13.561136	136
-10	12	13.561136	136	13.561135	135	13.561134	134	13.561133	133
0	12	13.561134	134	13.561133	133	13.561131	131	13.561130	130
10	12	13.561117	117	13.561105	105	13.561100	100	13.561093	93
20	12	13.561088	88	13.561082	82	13.561072	72	13.561068	68
30	12	13.561069	69	13.561055	55	13.561040	40	13.561027	27
40	12	13.561014	14	13.560998	-2	13.560987	-13	13.560979	-21
50	12	13.560963	-37	13.560962	-38	13.560961	-39	13.560961	-39

Table 2 : Frequency Tolerance									
Reference Frequency : 13.5610 MHz, Limit : within $\pm 13561$ Hz									
Power Supplied [Vdc]	Carrier Frequency Measured with Time Elapsed								
	STARTUP		2 minutes		5 minutes		10 minutes		
	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]	[MHz]	Err[Hz]	
85%	13.561032	32	13.561021	21	13.561017	17	13.561012	12	
100%	13.561036	36	13.561023	23	13.561018	18	13.561012	12	
115%	13.561030	30	13.561020	20	13.561016	16	13.561011	11	

**Err[Hz] = Measured carrier frequency (MHz) – Reference Frequency (13.5610 MHz)**

### **Antenna requirements**

#### **According to FCC 47 CFR 15.203**

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

- \* the antenna of this EUT are permanently attached(PCB Loop Antenna).
- \* the EUT complies with the requirement of 15.203