

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

OF

Speaker Tiro

Model No.: HL2737

Trade Mark: 

FCC ID: PXX-HL2737

Report No.: KAD140613058E

Issue Date: July 28, 2014

Prepared for

ECORE TECHNOLOGY COMPANY LIMITED

**North of Bingang East Road, Huahu Development Zone, Ezhou city, Hubei
Province, China**

Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	ECORE TECHNOLOGY COMPANY LIMITED North of Bingang East Road, Huahu Development Zone, Ezhou city, Hubei Province, China
Manufacturer	ECORE TECHNOLOGY COMPANY LIMITED North of Bingang East Road, Huahu Development Zone, Ezhou city, Hubei Province, China
Product Description:	Speaker Tiro
Trade Mark:	
Model Number:	HL2737
File Number:	KAD140613058E
Date of Test:	March 25, 2014 to July 28, 2014

We hereby certify that:

The above equipment was tested by DONGGUAN EMTEK CO., LTD and SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.249(2013).

The test results of this report relate only to the tested sample identified in this report.

Approved By



**Sam Lv / Q.A. Manager
DONGGUAN EMTEK CO., LTD.**

Modified Information

Version	Summary	Revision Date	Report No.
Ver.1.0	Original Report	/	KAD140613058E

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Appendix I (Photos of EUT) (3 Pages)

1. General Information

1.1 Product Description

The ECORE TECHNOLOGY COMPANY LIMITED, Model: HL2737 (referred to as the EUT in this report) The EUT is an short range, lower power, Speaker Tiro designed as an Input Device. It is designed by way of utilizing the GFSK modulation achieves the system operating.

The EUT has two RF modules, a major technical descriptions of EUT are described as following:

Technical Specifications	BT Module	5.8G Module
Operation Frequency	2402-2480MHz	5.730-5.805GHz
Modulation	GFSK, $\pi/4$ -DQPSK, 8DPSK	GFSK
Number of Channel	79	10
Antenna Type	Internal PCB antenna	
Antenna GAIN	1.0 dBi	
Input Rating	DC 5.0V Come from Adapter	
information of Adapter	Model: PSED050240U W Input: AC 100-240V, 50/60Hz, 0.6A Output: DC 5.0V, 2.4A	
Remark: This report only considers 5.8G Module.		

The channels are as follows:

Channel No.	Frequency	Channel No.	Frequency
1	5730MHz	6	5765MHz
2	5735MHz	7	5775MHz
3	5745MHz	8	5801MHz
4	5761MHz	9	5804MHz
5	5763MHz	10	5805MHz

EUT was tested with Channel 5730MHz, 5765MHz and 5805MHz.

The following EUT information was declared by the manufacturer and for more detailed feature description, please refer to the manufacturer's specifications or Users Manual.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: PXX-HL2737 filing to comply with Section 15.249 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 (2009). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Special Accessories

Not available for this EUT intended for grant.

1.5 Equipment Modifications

Not available for this EUT intended for grant.

1.6 Test Facility

Site Description
EMC Lab.

: Accredited by FCC, June 18, 2014
The Certificate Registration Number is 247565.

Accredited by Industry Canada, February 19, 2014
The Certificate Number is 9444A.

Name of Firm
Site Location

: DONGGUAN EMTEK CO., LTD.
: No.281, Guantai Road, Nancheng District,
Dongguan, Guangdong, China

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

The EUT is placed on a turn table which is 0.8 m above ground plane.

According to the requirements in Section 13.1.4.1 of ANSI

C63.4-2009. Conducted emissions from the EUT measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and 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 C63.4-2009.

2.4 Limitation

(1) Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

(2) Radiated Emissions FCC Rule: 15.249(a)

FCC Part 15, Subpart C Section 15.249. The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequency(MHz)	Filed Strength of Fundamental(at 3m)		Filed Strength of Harmonics(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
902-928	114	94	74.0	54.0
2400-2483.5	114	94	74.0	54.0
5725-5875	114	94	74.0	54.0
24000-24250	128	108	88.0	68.0

Radiated Emissions

FCC Rule: 15.249(d)(e)

FCC Part 15, Subpart C Section 15.209 limit of radiated emission for frequency below 1000GHz. The emissions from an intentional radiator shall not exceed the field strength level specified in the following table:

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance(m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
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 $\text{dB}\mu\text{V/m}=20 \log (\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

FCC Part 15, Section 15.35(b) limit of radiated emission for frequency above 1000MHz

Frequency(MHz)	Class A($\text{dB}\mu\text{V/m}$)(at 3m)		Class B($\text{dB}\mu\text{V/m}$)(at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

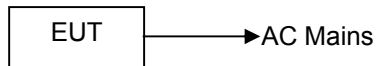


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	Speaker Tiro		HL2737	PXK-HL2737	N/A	<i>EUT</i>

Note:

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	Compliant
§15.249 (a),(b),(d),(e) §15.209	Radiated Emission	Compliant
§15.249	Band Edge	Compliant
§15.203	Antenna Requirement	Compliant

4. Description of test modes

The basic operation modes are:

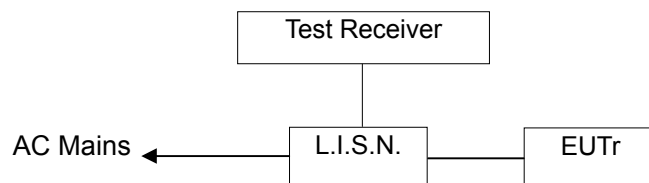
1. Low Channel: TX 5730MHz
2. Middle Channel: TX 5765MHz
3. High Channel: TX 5805MHz

5. Conducted Emissions Test

5.1 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 was complete.

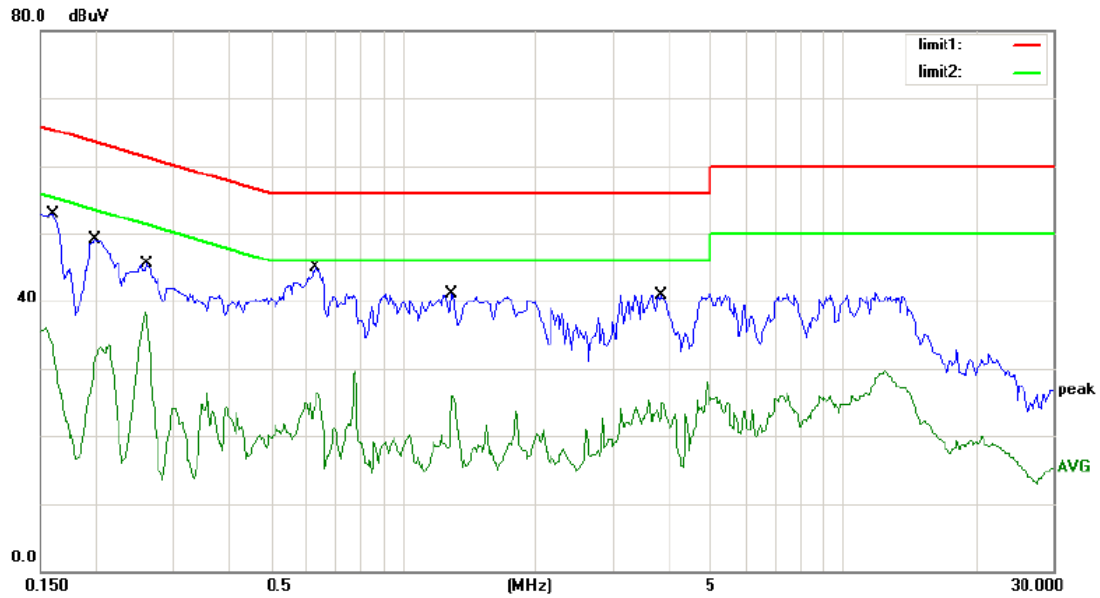
5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/16/2014	05/15/2015
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/16/2014	05/15/2015
50ΩCoaxial Switch	Anritsu	MP59B	M20531	05/16/2014	05/15/2015

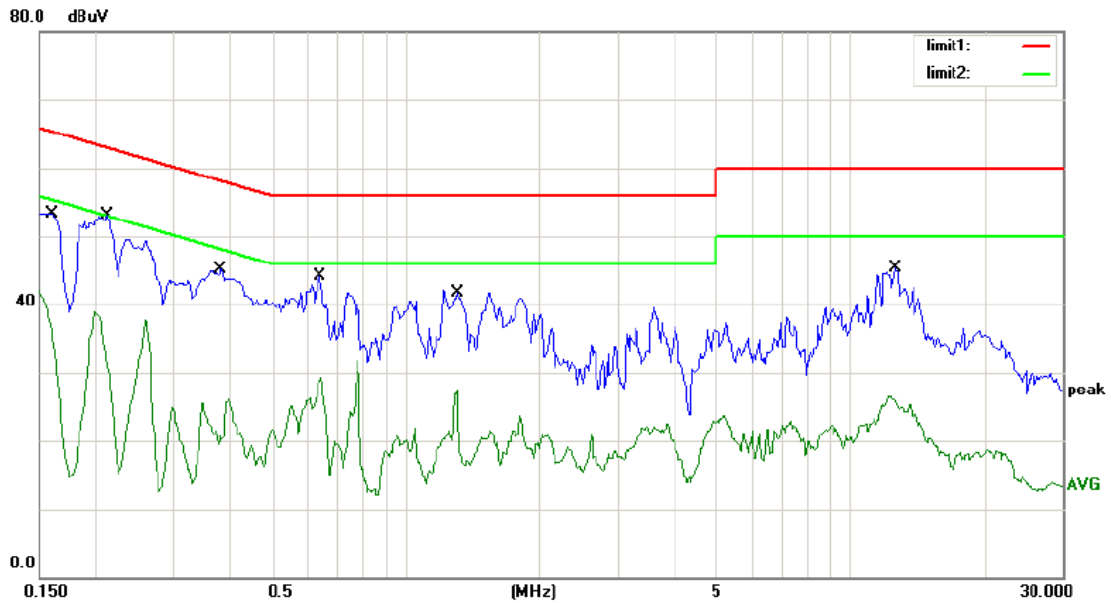
5.4 Measurement Result:



Site site #1 Phase: **L1** Temperature: 24
Limit: (CE)FCC PART 15 class C_QP Power: AC 120V/60Hz Humidity: 55 %
Mode: 5G Link
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	49.10	0.00	49.10	65.46	-16.36	QP	
2		0.1600	36.03	0.00	36.03	55.46	-19.43	AVG	
3		0.2000	46.50	0.00	46.50	63.61	-17.11	QP	
4		0.2000	33.50	0.00	33.50	53.61	-20.11	AVG	
5		0.2600	42.70	0.00	42.70	61.43	-18.73	QP	
6	*	0.2600	38.30	0.00	38.30	51.43	-13.13	AVG	
7		0.6301	41.30	0.00	41.30	56.00	-14.70	QP	
8		0.6301	26.26	0.00	26.26	46.00	-19.74	AVG	
9		1.2950	38.60	0.00	38.60	56.00	-17.40	QP	
10		1.2950	25.87	0.00	25.87	46.00	-20.13	AVG	
11		3.8400	37.90	0.00	37.90	56.00	-18.10	QP	
12		3.8400	25.36	0.00	25.36	46.00	-20.64	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.



Site site #1 Phase: **N** Temperature: 24
Limit: (CE)FCC PART 15 class C_QP Power: AC 120V/60Hz Humidity: 55 %
Mode: 5G Link
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1600	49.00	0.00	49.00	65.46	-16.46	QP	
2		0.1600	42.03	0.00	42.03	55.46	-13.43	AVG	
3	*	0.2127	50.30	0.00	50.30	63.10	-12.80	QP	
4		0.2127	38.82	0.00	38.82	53.10	-14.28	AVG	
5		0.3850	42.70	0.00	42.70	58.17	-15.47	QP	
6		0.3850	26.09	0.00	26.09	48.17	-22.08	AVG	
7		0.6401	41.20	0.00	41.20	56.00	-14.80	QP	
8		0.6401	29.26	0.00	29.26	46.00	-16.74	AVG	
9		1.3050	38.70	0.00	38.70	56.00	-17.30	QP	
10		1.3050	27.55	0.00	27.55	46.00	-18.45	AVG	
11		12.6000	42.50	0.00	42.50	60.00	-17.50	QP	
12		12.6000	26.59	0.00	26.59	50.00	-23.41	AVG	

*:Maximum data x:Over limit !:over margin Comment: Factor build in receiver.

5.5 Conducted Measurement Photos:



6. Radiated Emission Test

6.1 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. The following table is the setting of spectrum analyzer:

When spectrum scanned from 30MHz to 1GHz setting resolution bandwidth 120KHz and video bandwidth 300KHz:

EMI Test Receiver	Setting
Attenuation	Auto
RB	120KHz
VB	300KHz
Detector	QP
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 3MHz:

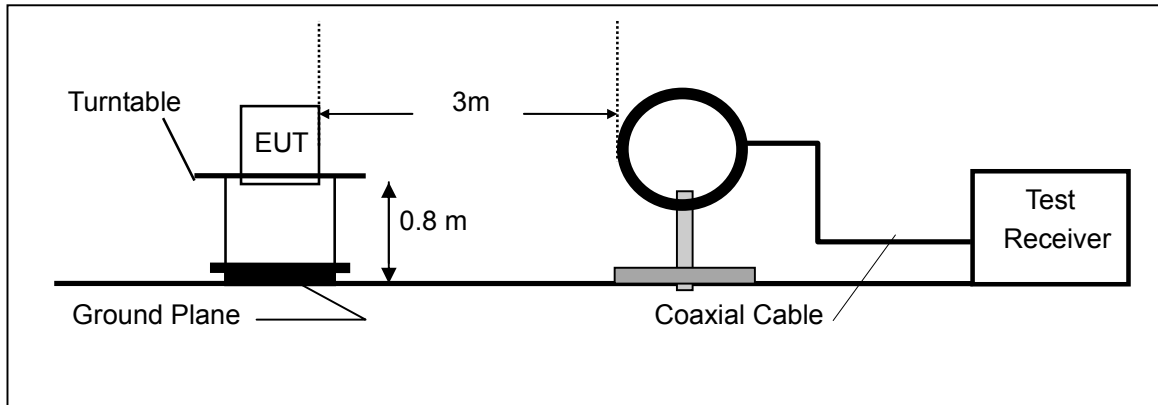
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	3MHz
Detector	Peak
Trace	Max hold

When spectrum scanned above 1GHz setting resolution bandwidth 1MHz, video bandwidth 10Hz:

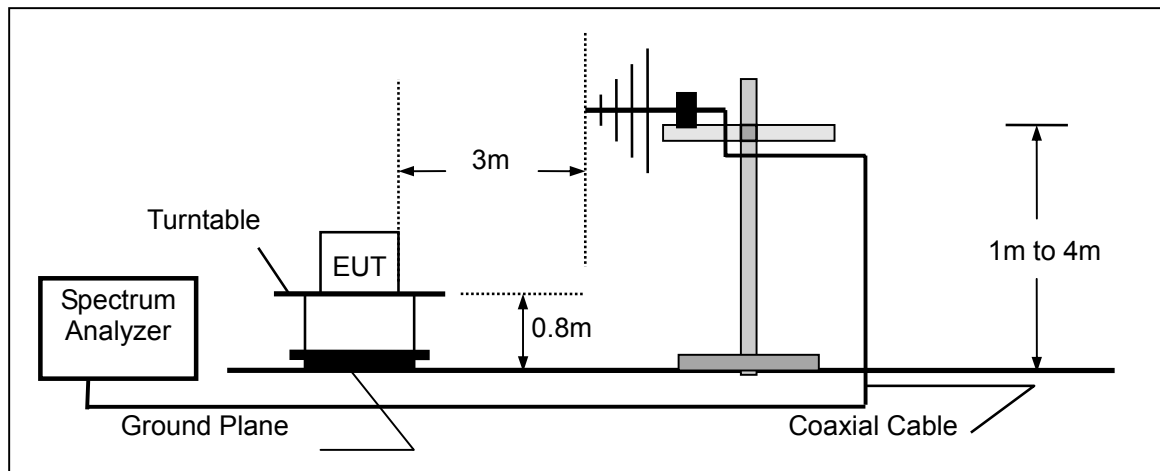
EMI Test Receiver	Setting
Attenuation	Auto
RB	1MHz
VB	10Hz
Detector	AVG
Trace	Max hold

6.2 Test SET-UP (Block Diagram of Configuration)

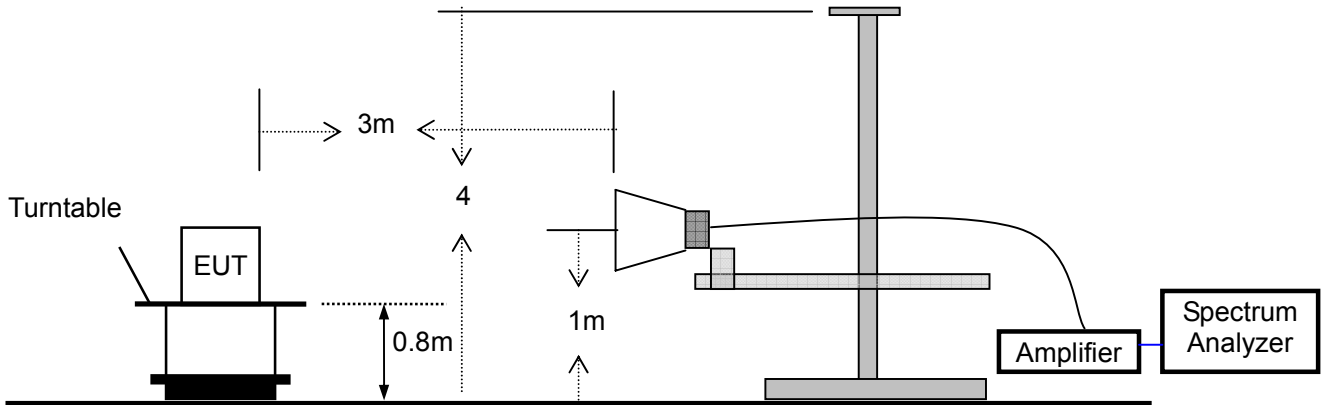
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



6.3 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Rohde & Schwarz	FSP7	839511/010	05/16/2014	05/15/2015
Spectrum Analyzer	HP	E4407B	839840481	05/16/2014	05/15/2015
EMI Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/16/2014	05/15/2015
Pre-Amplifier	HP	8447D	2944A07999	05/16/2014	05/15/2015
Bilog Antenna	Schwarzbeck	VULB9163	142	05/19/2014	05/18/2015
Loop Antenna	ARA	PLA-1030/B	1029	05/19/2014	05/18/2015
Horn Antenna	Electro-Metrics	EM-6961	103314	05/19/2014	05/18/2015
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/19/2014	05/18/2015

6.4 Out of Band Radiated Measurement Result

Operation Mode: TX Mode Test Date : June 25, 2014
Frequency Range: 30~1000MHz Temperature : 23 °C
Test Result: PASS Humidity : 59 %
Measured Distance: 3m Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBUV/m)	Limit 3m (dBUV/m)	Margin (dB)
127.9700	H	31.66	43.50	-11.84
381.1400	H	37.54	46.00	-8.46
405.3900	H	39.09	46.00	-6.91
528.5800	H	39.88	46.00	-6.12
552.8300	H	41.65	46.00	-4.35
922.4000	H	39.83	46.00	-6.17
61.0400	V	25.83	40.00	-14.17
405.3900	V	37.52	46.00	-8.48
423.8200	V	35.22	46.00	-10.78
552.8300	V	40.75	46.00	-5.25
578.0500	V	38.73	46.00	-7.27
872.9300	V	36.81	46.00	-9.19

Note:

- (1) Emission Level= Reading Level+Probe Factor +Cable Loss
- (2) The average measurement was not performed when the peak measured data under the limit of average detection.

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.209.

Operation Mode:	TX (5730MHz)	Test Date :	June 25, 2014
Frequency Range:	1-25GHz	Temperature :	25 °C
Test Result:	PASS	Humidity :	50 %
Measured Distance:	3m	Test By:	Andy

Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
5730	V	85.49	70.29	114	94	-28.51	-23.71
11460	V	64.85	41.22	74	54	-9.15	-12.78
17190	V	63.28	40.65	74	54	-10.72	-13.35
22920	V	62.18	39.23	74	54	-11.82	-14.77
5730	H	84.08	72.69	114	94	-32.92	-21.31
11460	H	63.18	42.19	74	54	-10.82	-11.81
17190	H	62.07	41.52	74	54	-11.93	-12.48
22920	H	61.94	40.28	74	54	-12.06	-13.72

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.

Note:

- (1) All Readings are Peak Value and AV.
- (2) Emission Level= Reading Level+Probe Factor +Cable Loss
- (3) The average measurement was not performed when the peak measured data under the limit of average detection.
- (4) These test result outsourced to SHENZHEN EMTEK CO., LTD.

Operation Mode: TX(5765MHz) Test Date : June 25, 2014
Frequency Range: 1-25GHz Temperature : 25 °C
Test Result: PASS Humidity : 50 %
Measured Distance: 3m Test By: Andy

Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
5765	V	82.56	76.95	114	94	-31.44	-17.05
11530	V	65.13	42.19	74	54	-8.87	-11.81
17295	V	64.58	41.22	74	54	-9.42	-12.78
23060	V	63.75	40.95	74	54	-10.25	-13.05
5765	H	86.59	75.18	114	94	-27.41	-18.82
11530	H	64.22	43.07	74	54	-9.78	-10.93
17295	H	63.18	42.95	74	54	-10.82	-11.05
23060	H	62.08	41.22	74	54	-11.92	-12.78

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) These test result outsourced to SHENZHEN EMTEK CO., LTD.

Operation Mode: TX(5805MHz)
Frequency Range: 1-25GHz
Test Result: PASS
Measured Distance: 3m

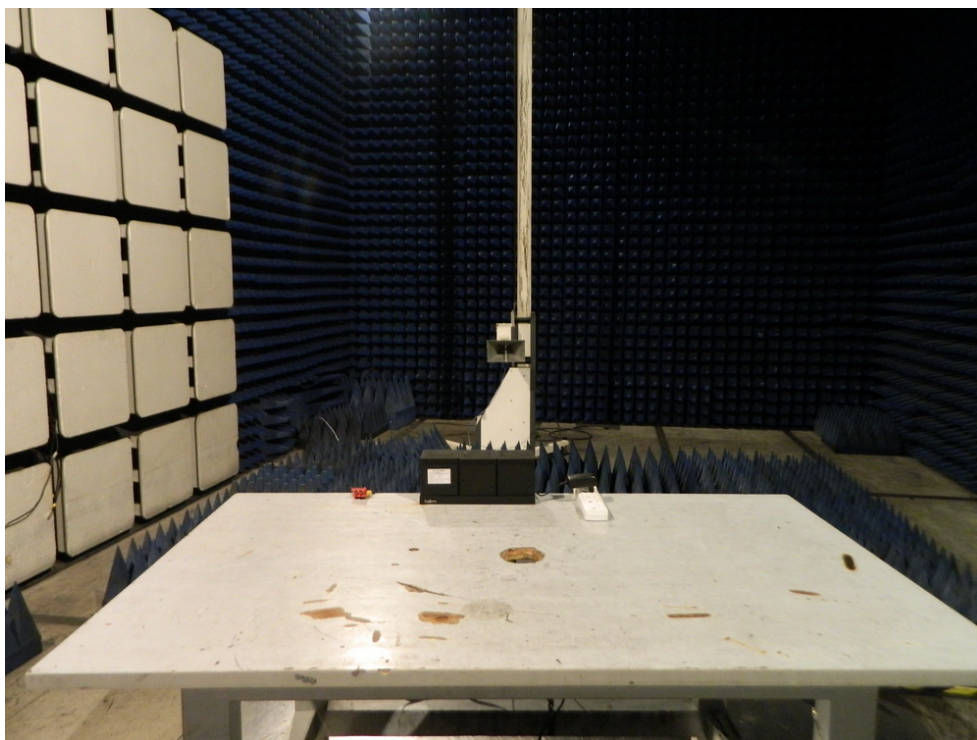
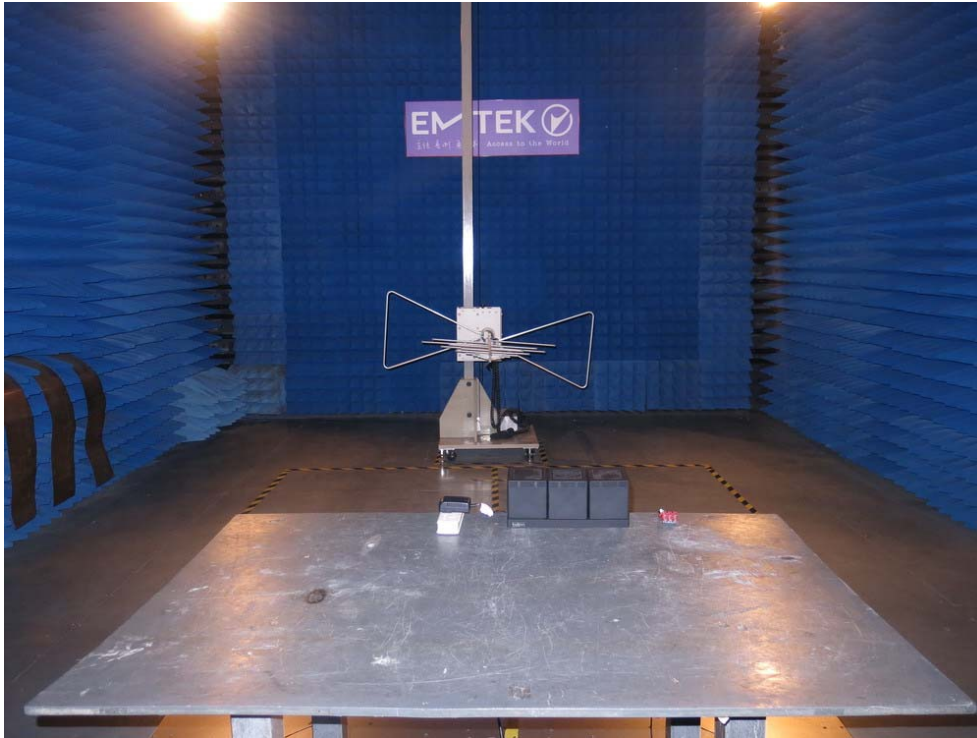
Test Date : June 25, 2014
Temperature : 25 °C
Humidity : 50 %
Test By: Andy

Freq. (GHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Margin(dB)	
		PK	AV	PK	AV	PK	AV
5805	V	88.49	79.15	114	94	-25.51	-14.85
11610	V	64.85	42.18	74	54	-9.15	-11.82
17415	V	63.44	41.09	74	54	-10.56	-12.91
23220	V	62.18	40.28	74	54	-11.82	-13.72
5805	H	87.04	77.11	114	94	-26.96	-16.89
11610	H	64.08	42.16	74	54	-9.92	-11.84
17415	H	63.18	41.07	74	54	-10.82	-12.93
23220	H	62.75	40.85	74	54	-11.25	-13.15

No others harmonics emissions are higher than 20dB below the limits of 47 CFR Part 15.249.

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level+Probe Factor +Cable Loss
(3) The average measurement was not performed when the peak measured data under the limit of average detection.
(4) These test result outsourced to SHENZHEN EMTEK CO., LTD.

6.5 Radiated Measurement Photos:



7. Band Edge

7.1 Test limits

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 Section 15.209, whichever is the lesser attenuation.

7.2 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 SPA Center Frequency=Fundamental frequency, RBW=100KHz, VBW=300KHz.
4. Set SPA Max hold. Mark peak.

7.3 Test SET-UP(Block Diagram of Configuration)

Same as 5.2 Radiated Emission Set-up.

7.4 Measurement Equipment Used:

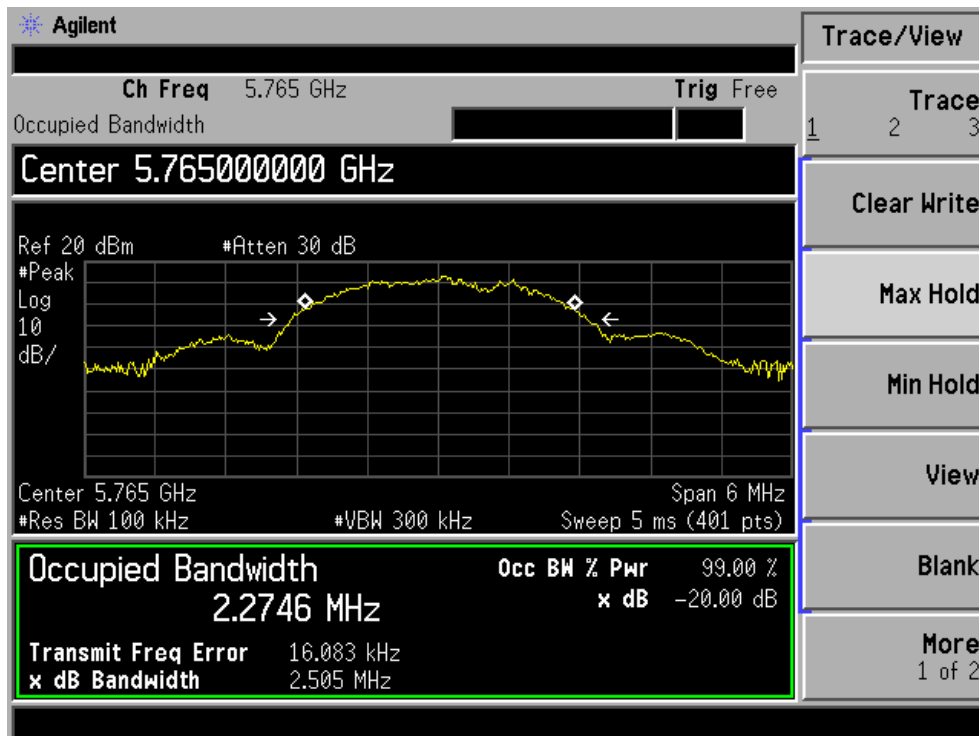
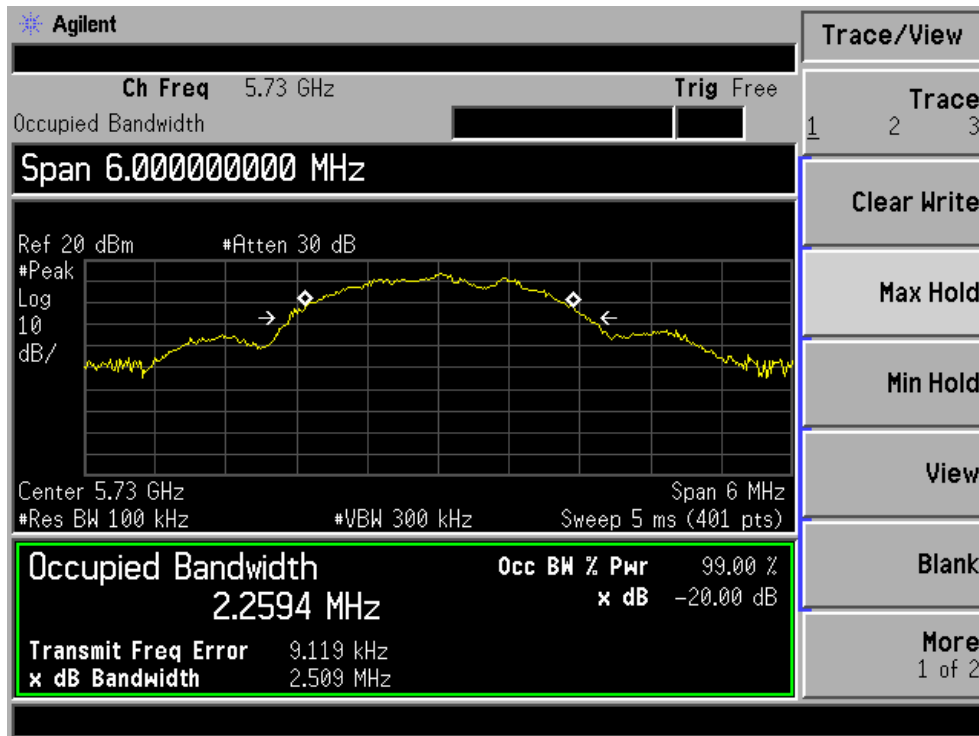
Same as 5.3 Radiated Emission Measurement.

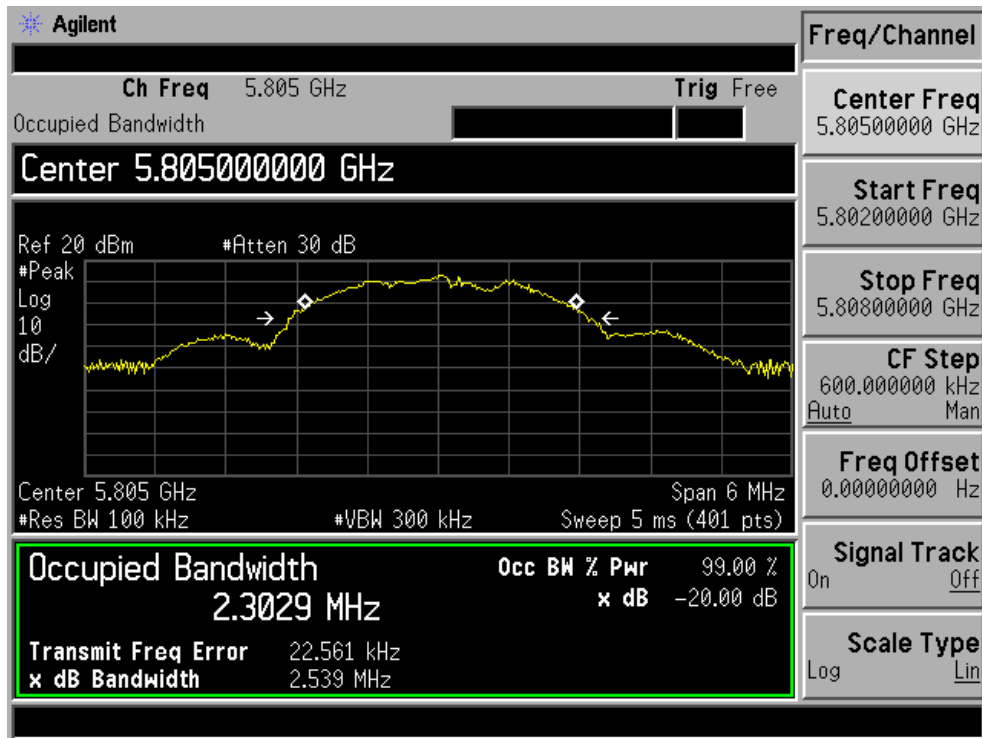
7.5 Measurement Results:

PASS.

The test plots as following:

Test Data:





8. Antenna Application

8.1 Antenna requirement

The EUT's antenna used a PCB antenna and integrated on PCB, The antenna's gain is 1.0 dBi and meets the requirement.

Appendix I (Photos of EUT)

