



FCC 15.247 Test Report

Model Name: H-08 /H-18 /H-28

Prepared for Guangzhou Wink Communication Technology Co., Ltd.

According to FCC Section 15.247 Hopping Frequency Spread Spectrum Device

Test Report #:GUA-0506-4691-FCCJob Number #:GUA-0506-1005-TCBPrepared by:Arcelia MaldonadoQC Manager:Tony Wang

Test Report Released by:

Tony Wang

Date

List of Attached Files

Exhibit Type	File Description	File Name
Test Report	Test Report	report.pdf
Operation Description	Technical Description	description.pdf
Test Report	Radiated Emissions Field Strength Plot	fds.pdf
Test Report	Band Edge Plots	be.pdf
Test Report	Out of Band Emissions Plots	obe.pdf
Test Report	2dB Bandwidth Plot	6dB.pdf
Test Report	Dwell Time Measurement	dcm.pdf
External Photos	External Photos	external-photos.pdf
Internal Photos	Internal Photos	internal-photos.pdf
Set-up Photos	Test Set-up Photos	setup-photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

Test Location

EMC Compliance Management Group is located at 670 National Ave., Mountain View, CA 94043, USA.

Accreditation Bodies

EMC Compliance Management Group is a fully accredited Test Laboratory for ITE, ISM and Telecommunications Products.

FC

In compliance with the site registration requirements of Section 2.948 of the FCC Rules to perform EMI measurements for the general public.

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Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code # 200068-0.

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ADMINISTRATIVE DATA

Test Sample	: Digital Transmission System
Model Name	: H-08/H-18/H-28
Model Tested	: H-08
Serial Number	: Engineering Sample
Date Tested	: June 12 th - 15 th , 2005
Applicant	: Guangzhou Wink Communication Technology Co., Ltd. No. 459 National Road, Dashi Town, Panyu District, Guangzhou, Guangdong, China 511430
Telephone	: 86 20-34792491
Fax	: 86 20-34785276
Manufacturer	: Guangzhou Wink Communication Technology Co., Ltd. No. 459 National Road, Dashi Town, Panyu District, Guangzhou, Guangdong, China 511430

EUT Description

Guangzhou Wink Communication Technology Co., Ltd., model tested H-08 (referred to as the EUT in this report) is a Digital Transmission System.

EUT Model Differences

Please refer to the difference letter.

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Test Summary

The Electromagnetic Compatibility requirements on tested model tested H-08 for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

The H-08 has been found to conform to the following parts of the 47 CFR FCC as detailed below:

Part 15	Requirement	Result Pass/Fail	Comments
15.15(b)	General technical requirements	Pass	The product contains no user accessible controls that increase transmission power above allowable levels.
15.19	Labeling requirement	Pass	The label is shown in the label exhibit.
15.21	Information to user	Pass	Information to the user is shown in the instruction manual exhibit.
15.27	Special accessories	Pass	No special accessories are required for compliance.
15.203	Antenna requirement	Pass	The antenna is soldered to the transmitter board, which is not used accessible, and there is no external antenna connection
15.205(a)	Radiated Emissions in Restricted Bands	Pass	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
15.209(a)	Radiated Emissions limits, general requirements	Pass	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
15.207(a)	AC conducted Emissions	Pass	The unit with a battery , no conducted emission test required.
15.247 (d)	Out of band & Band Edge measurements	Pass	The unit complies with the band edge emissions limits of 15.247.
15.247(a)(1)(iii)	20 dB Bandwidth	Pass	The unit complies with the 20dB bandwidth limits
15.247(b)(1)	Maximum peak Output Power	Pass	The unit complies with the peak power limits of 15.247.

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15.247(a)(1)	Hopping Channel Carrier Frequency Separation (>25 KHz)	Pass	The unit complies with Hopping Frequency Separation the limits of 15.247.
15.247(a)(1)(iii)	Number of the Hopping Frequency (channels)	Pass	The unit complies with the Number of the Hopping Frequency limits of 15.247.
15.247(a)(1)(iii)	Average Channel Occupancy Time (<0.4s)	Pass	The unit complies with Average Channel Occupancy Time (<0.4s) limits of 15.247.
15.247(e)	RF exposure	Pass	The unit complies with the limits of 1.1307.

This report an application for Certification of a Transmitter operation pursuant to FCC part 15.247, code of federal regulations 47. The product covered by this report is the H-08. This report is designed to demonstrate the compliance of this device with the requirements outlined in 47 CFR Part 15 using the methods in CFR 47 Part 2.

Test Mode Justification

The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

For emission testing, the unit was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

Equipment Modification

Any modifications installed previous to testing by Guangzhou Wink Communication Technology Co., Ltd. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by EMC Compliance Management Group.

Test System Details

EUT					
Model Name: H-08/H-18/H28					
Tested Model N	ame:	H-08			
Serial Number:		Engineer	ring Sample		
Description:		Digital T	ransmission Sys	stem	
Manufacturer:		Guangzh Ltd.	ou Wink Comm	unication Techi	nology Co.,
		S	upport Equipment		
Description	Mode	l Number	Serial Number	Manufacturer	Power Cable Description
PC	N/A		N/A	N/A	Unshielded 1.5m
Monitor	E655		EX03103189	Viewsonic	Unshielded 1.5m
Keyboard	КВ99	10	0518242	IBM	N/A
Mouse	мооэ	νĸ	23-122842	IBM	N/A
DC Power Supply	30031	8	9800575	Protek	Unshielded 1.5m
		C	able Description	1	
From		То	Length (Meters)	Shielded (Y/N)	Ferrite Loaded (Y/N)
EUT	РС		1.5	N	N
Monitor	РС		1.5	N	N
Keyboard	РС		1.0	Ν	Ν
Mouse	РС		1.0	N	N

Test Methodology

Testing was performed according to the measurement guidelines specified in FCC Public Notice DA00-705.

Radiated emissions testing are performed according to the procedures specified in ANSI C63.4-2001.

Frequency Range investigated:	30 MHz to 24 GHz
Measurement Distance:	3 meter at 30 MHz to 2 GHz 3 Meter and 1 Meter at 2 GHz to 25 GHz
EUT Power Source:	Fresh Battery and DC Power Supply
Emission Maximization:	Antenna (1m to 4m) height and Horizontal/Vertical polarization 360-degree turntable rotated and EUT rotated three orthogonal axes.
Temperature:	23°C
Humidity:	41%
Air Pressure:	1020 hpa

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1. FCC 15.247 (b) (1) Maximum Peak Output Power

Peak Out put Power Limit:

Frequency MHz	Channels	Types of Devices	Power
2400-2483.5	>= 75	Hopping	1 Watt

Test Procedure:

Remove the antenna from the EUT and then connect the transmitter output to the power meter via a suitable attenuator. Set the EUT transmitting continuously to each of low, middle, and high frequency.

Test Data:

Channel	Frequency (MHz)	Reading (dBm)	Attenuation Factor (dB)	Corrected Reading (dBm)	Limit	Result
Low	2402	-28.9	30	1.1	1 W (30dBm)	Pass
Middle	2441	-28.7	30	1.3	1 W (30dBm)	Pass
High	2480	-29.1	30	0.9	1 W (30dBm)	Pass

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Power Meter	НР	436A	2347A17569	05/25/05	05/25/06
Power Sensor	HP	8484A	1635A01630	05/25/04	05/25/06
Attenuator	MFR	M3933/10-5	N/A	N/A	N/A

Test Result: EUT Pass, Meets Requirement.

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EUT Model Tested: H-08



Measurement Set-up

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2. FCC 15.247 (a) (1) Hopping Channel 20 dB Bandwidth

Test Procedure:

- *a.* The center frequency of the analyzer was set to the hopping channel under investigation.
- b. The antenna port of the EUT was connected to the input of a spectrum analyzer.
- c. Analyzer RBW> 1% of the 20dB bandwidth. VBW >RBW or VBW = RBW
- *d.* Span > 3 times the 20dB bandwidth.
- e. Max hold, peak detection.

Test Results:

Channel	Frequency (MHz)	20 dB Bandwidth
Low	2402	1.12 MHz
Mid	2441	1.28 MHz
High	2480	1.26 MHz

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/05
Plotter	НР	7470A	2308A27405	No Cal required	No Cal required

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Plots of 20dB Bandwidth

Low Channel:









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3. FCC 15.247 (a) (1) (iii) Hopping Channel Carrier Frequency Separation

Carrier Frequency Separation Limit:

According to 15.247(a)(1), frequency hopping systems operating in the 2400 – 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or 2/3 of the 20dB bandwidth, whichever is greater, provided the systems operate with an output power no greater than 125mW (21 dBm).

Test Procedures:

- *a.* Enable the hopping function for the EUT.
- b. Set analyzer's span wide enough to capture the peaks of two adjacent channels.
- c. Set RBW > 1% of the span, VBW = RBW, Max peak hold.
- *d.* Using the Delta Marker function to determine the separation between the peaks of the adjacent channels.

Test Results:

Channel	Hopping Frequency Separation (MHz)	2/3 20 dB Bandwidth (MHz)	Result
Low	1.00	0.85	Pass
Mid.	1.00	0.85	Pass
High	0.99	0.85	Pass

Note: The EUT's output power is 1.3 dBm.

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/05
Plotter	HP	7470A	2308A27405	No Cal required	No Cal required

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Plots of Channel Separation:

Low Channel:



Mid Channel:



High Channel:



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4. FCC 15.247 (a) (1) (iii) Number of Hopping Frequencies

Limit for Number of Hopping Frequencies:

According 15.247(a)(1)(iii), frequency hopping systems in 2400 – 2483.5 MHz shall use at least 15 channels.

Test Procedures:

- *d.* Enable hopping function for the EUT.
- e. Set the analyzer's span = the half band of operation (2400 2441 MHz)
- f. Set RBW > 1% of the span, VBW = RBW, Max. peak hold.
- *g.* Repeat the above for the 2nd half band (2441 2483.5 MHz)

Test Data:

Frequency (MHz)	Number of hopping channels	Result
2402 -2480	79	pass

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/06
Plotter	HP	7470A	2308A27405	No Cal required	No Cal required

Plots of Number of Hopping Frequencies:



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5. FCC 15.247 (a) (1) (iii) Average Channel Occupancy Time

Limit of Average Channel Occupancy Time:

According to 15.247(a)(1)(iii), frequency hopping systems in the 2400 - 2483.5 MHz band, the average time of occupancy on any channel shall not be greater than 0.4 S within a period of 0.4 S multiplied by the number of hopping channels employed.

Test Procedures:

- a. Enable the hopping function for the EUT.
- b. Set analyzer's span = zero, and center on a channel, RBW=1MHz, VBW=RBW, Set the "sweep" to capture the entire dwell time per channel, Max peak hold.
- c. Use the mark-delta to determine the dwell time, and then calculate the average channel occupancy time.

Test Data:

0.4 sec x 79 channel= 31.6 sec Dwell time of one hopping = 0.015 second Time of occupancy on a channel = 0.06 second < 0.4 second (Please refer to the plots)

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/06
Plotter	HP	7470A	2308A27405	No Cal required	No Cal required

Test Equipment List:

Plots of Dwell Time:



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6. FCC 15.247(d) 100 KHz Bandwidth of the Band Edges (Conducted)

Limit of Band Edge Levels:

According to the 15.247(d), in any 100 KHz bandwidth outside the frequency band, the RF power that is produced by the radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power.

Test Procedures:

- a. Set the EUT operating at the lowest channel.
- b. Set RBW = VBW = 100 KHz
- c. Set analyzer START and STOP frequencies to coincide with band edges of operating band.
- d. Plot the graph.
- e. Repeat the above for the highest channel.

Test Result: Pass

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/06
Plotter	HP	7470A	2308A27405	No Cal required	No Cal required

Plots of Band Edges:

Lowest Channel



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7. FCC 15.247 (d) Spurious RF Conducted Emissions

Limit of Spurious RF Conducted Emissions:

According to the 15.247(d), in any 100 KHz bandwidth outside the frequency band, the RF power that is produced by the radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either a RF conducted or a radiated measurement.

Test Procedures:

- a. Set analyzer RBW = VBW = 100 KHz., Max peak hold.
- b. Set analyzer START and STOP frequencies to coincide with 30MHz up through the 10th harmonic.
- c. Plot the graph.
- d. Repeat the above at low, middle, and high channels.

Test Result: Pass

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Spectrum Analyzer	HP	8566B	2410A00224	06/02/05	06/02/06
Quasi Peak Adapter	HP	85650A	3145A01658	06/02/05	06/02/06
Plotter	HP	7470A	2308A27405	No Cal required	No Cal required

Test Equipment List:

Low Channel:



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Mid Channel:



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High Channel:



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8. FCC 15.247(d) & 15.205 (a) Spurious Radiated Emissions

Limit:

According to the 15.247(d), the RF power that is produced by the radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either a RF conducted or a radiated measurement.

Radiated emissions, which fall in the restricted band, must comply with the radiated emission limits specified in 15.209(a)

Frequency (MHz)	Field strength (micro volts/meter)	Measure distance (meters)
0.009-0.490	2400 /F (KHz)	300
0.490-1.705	24000 /F (KHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Limited for Radiated Emissions (FCC 47 CFR 15.209):

Frequency (MHz)	Field Strength (uV/m)	QP (dBuV/m) (3m)
1.705 - 30	300	49.54
30 - 88	100	40.00
88 - 216	150	43.52
216 - 960	200	46.02
960 Above	500	53.98

* *dBuV/m=20* x *Log* (*uV/m*)

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Test Procedures:

- a. The EUT was tested for radiated emissions out of operating band, and in the restricted bands. The EUT was replaced on a nonconductive table at a height of 0.8 meter above the ground plane of a 3 meter test site. For each frequency investigated, the turntable was rotated 360 degrees. And the antenna was raised and lowered in both horizontal and vertical polarizations, in an attempt to maximize the received emissions.
- b. The EUT was also placed in the three orthogonal axes.
- c. For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at 3 meter separation distance to determine whether these emissions complied with the general radiated emissions requirement.
- d. High-pass filter may be used for measurement.

Frequency	RES BW	VID BW			
< 1 GHz	100 KHz	100 KHz	Peak		
> 1 GHz	1 MHZ	1 MHz	Peak		
> 1 GHz	1 MHZ	10 Hz	Ave.		

Instrument Setup:

Test E	iquipme	nt List:
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Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Receiver	R&S	ESMI-RF	849937/006	04/25/05	04/25/06
EMI Receiver	R&S	ESAI-D	825035/005	04/25/05	04/25/06
Bi-log Antenna	CHASE	CBL6112A	2257	06/14/05	07/14/06
Horn Antenna	ЕМСО	3115	001	06/04/05	06/04/06
Horn Antenna	ЕМСО	3160-09	20372	06/04/05	06/04/06
Pre-Amplifier	MITEQ	AFS44-00102650- 42-10P-44	969305	03/10/05	03/10/06
Pre-Amplifier	TEC	PA-102	44054	03/03/05	03/03/06
High Pass Filter	REACTEL	7HS-4/18 S11	942	No Cal required	No Cal required
High Pass Filter	Mini-circuits	NHP-900	1-9752	No Cal required	No Cal required

Radiated Emission Measurements:

Set-up/Configuration: ANSI C63.4: 2001, CISPR 16-1:1999

Frequency	Antenna	Raw	Correction	Corrected	3 Meters	Margin
	Polarization	Reading	Factor	Reading	Limit	
(MHz)	(V/H)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4803.98	V	49.31	-6.73	42.58	54	-11.42
4803.98	Н	48.08	-6.73	41.35	54	-12.65
7205.94	V	44.54	-4.91	39.63	54	-14.37
7205.94	Н	44.23	-4.91	39.32	54	-14.68
1200.13	V	39.52	-3.74	35.78	54	-18.22
1200.13	Н	39.43	-3.74	35.69	54	-18.31

Low Channel (2402MHz)

Mid Channel (2441MHz)

Frequency	Antenna	Raw	Correction	Corrected	3 Meters	Margin
	Polarization	Reading	Factor	Reading	Limit	
(MHz)	(V/H)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4881.79	V	49.66	-6.73	42.93	54	-11.07
4881.79	Н	48.41	-6.73	41.68	54	-12.32
7322.93	V	44.65	-4.91	39.74	54	-14.26
7322.93	Н	44.4	-4.91	39.49	54	-14.51
1220.04	V	39.61	-3.74	35.87	54	-18.13
1220.04	Н	39.48	-3.74	35.74	54	-18.26

High Channel (2480MHz)

Frequency	Antenna	Raw	Correction	Corrected	3 Meters	Margin
	Polarization	Reading	Factor	Reading	Limit	
(MHz)	(V / H)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
4959.68	V	49.2	-6.73	42.47	54	-11.53
4959.68	Н	47.97	-6.73	41.24	54	-12.76
7439.91	V	44.42	-4.91	39.51	54	-14.49
7439.91	Н	44.1	-4.91	39.19	54	-14.81
1240.05	V	39.4	-3.74	35.66	54	-18.34
1240.05	Н	39.32	-3.74	35.58	54	-18.42

Note: 1) *Measurement by peak detection.*

2) The levels of the frequencies above third harmonic are too low to be tested

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Frequency	Antenna Polarization	Raw Reading	Correction Factor	Corrected Reading	3 Meters Limit	Margin
(MHz)	(V/H)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
880.65	Н	34.4	-3.7	30.7	46	-15.3
343.61	V	27.5	-2.8	24.7	46	-21.3
355.34	V	27.3	-3.1	24.2	46	-21.8
420.43	Н	26.9	-3.3	23.6	46	-22.4

Unwanted Emissions from 30 - 1000MHz

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Radiated Test Set-up Front View



Radiated Test Set-up Rear View

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EUT Top View



EUT Bottom View

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EUT Battery and Housing View



EUT Board Top View

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EUT Board Bottom View



Battery Charger View

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