

TEST REPORT

Report No.: SHE21030014-02IE

Date: 2021-04-06

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Applicant : Shanghai XiaoYi Technology Co., Ltd
Address of Applicant : Building 18, Lane 55, Chuanhe Road, China(Shanghai)
Pilot Free Trade Zone, Shanghai, China , 201203

Product Name : Kami Doorbell Camera
Model No. : YDS.20120
Sample No. : E21030014-01 #01
E21030014-01 #16
FCC ID : 2AFIB-YDS20121
ISED Number : 20436-YDS20121

Standards : FCC CFR47 Part 15, Subpart E
RSS-Gen (Issue 5, March 2019)
RSS-247 (Issue 2, February 2017)

Date of Receipt : 2021-03-19
Date of Test : 2021-03-19 ~ 2021-04-02
Date of Issue : 2021-04-06

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Guoyou Chi

(Authorized signatory: Guoyou Chi)

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298 Pingan Rd, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	Shanghai XiaoYi Technology Co., Ltd
Address	Building 18, Lane 55, Chuanhe Road, China(Shanghai) Pilot Free Trade Zone, Shanghai, China , 201203
Contact Person	Jackie Han
Telephone	18017858789
Email	han.guangbao@xiaoyi.com
Manufacturer Company Name	Kami Vision Incorporated
Address	182 South Murphy Ave, Floor #2, Sunnyvale CA 94086, United States

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1.3 Details of EUT

Product Name	Kami Doorbell Camera
Brand Name	Kami
Test Model No.	YDS.20120
FCC ID	2AFIB-YDS20121
ISED Number	20436-YDS20121
Mode of Operation	WLAN 802.11a/n(HT20)
Frequency Range	Band I: 5150 MHz ~ 5250 MHz Band IV: 5725 MHz ~ 5850 MHz
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK
Channel Bandwidth	802.11a: 20MHz 802.11n: 20MHz
Antenna Type	FPC Antenna
Antenna Gain	3.15dBi
Extreme Temperature Range	-10℃~ +40℃
Test Voltage	DC 3.7V
Extreme Voltage	Low Voltage: DC 3.6V High Voltage: DC 4.2V
Product Type	Mobile and portable for FCC standard Indoor for IC standard
Hardware version	D201 _MB_V2.2
Software version	9.2.00.32
Test SW Version	BL410_R;BL410_E
RF power setting in TEST SW	SecureCRT

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 789033 D02 v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
RSS-Gen (Issue 5, March 2019)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s): All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Due Date
Spectrum Analyzer	Keysight	N9020A	MY59260184	2021-08-23
Spectrum Analyzer	Keysight	N9020B	MY59260184	2021-08-18
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2021-06-08
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2021-06-08
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2021-06-08
DC Power Supply	ACPOWER	ADC-0800025-15	D215010003	2022-03-19
Temperature Chamber	SHKTEST	SHK-B101	20190819001	2021-12-22
V-network	SCHWARZBECK	NSLK 8127	8127-902	2021-07-28
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2021-07-28
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2021-11-22
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-07-26
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2023-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2021-06-08
Test Software	BL	BL410_E	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software was control EUT work in continuous transmitter and receiver mode. Select test channel as below:
For 802.11a/n(HT20)

Band I (5150 – 5250 MHz)		Band IV (5725 – 5850 MHz)	
Channel	Frequency	Channel	Frequency
The lowest channel(CH36)	5180MHz	The lowest channel(CH149)	5745MHz
The middle channel(CH44)	5220MHz	The middle channel(CH157)	5785MHz
The highest channel(CH48)	5240MHz	The highest channel(CH165)	5825MHz

Through Pre-scan under all rate at lowest channel, the data rate as below table described is the worst case, so we choose these data rate for test.

Band I

Type	Data rate
802.11a	54Mbps
802.11n(HT20)	MCS7

Band IV

Type	Data rate
802.11a	6Mbps
802.11n(HT20)	MCS0

The basic operation modes are:

- A. On
 - 1. WLAN mode
 - a. Transmitting
 - b. Receiving
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	SecureCRT

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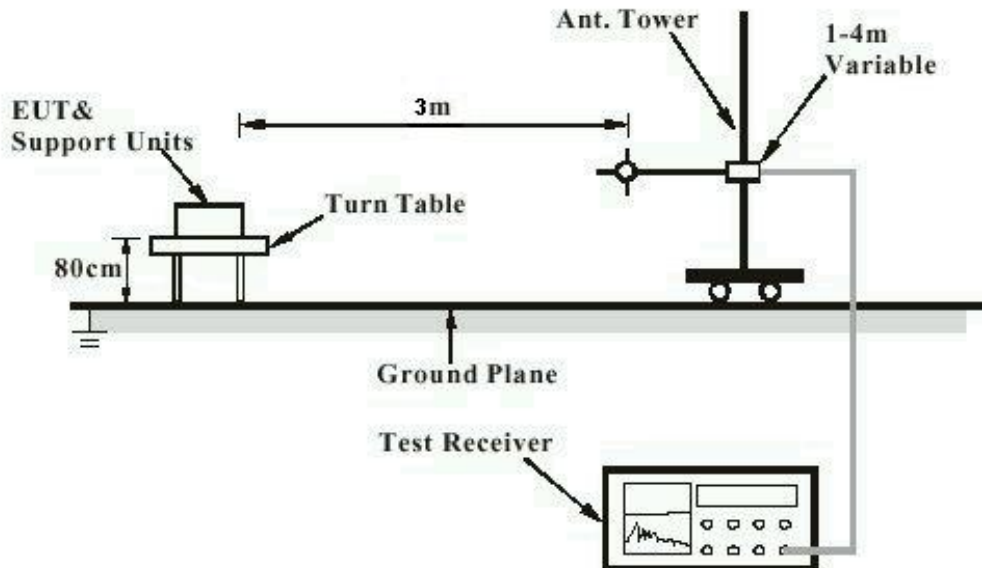
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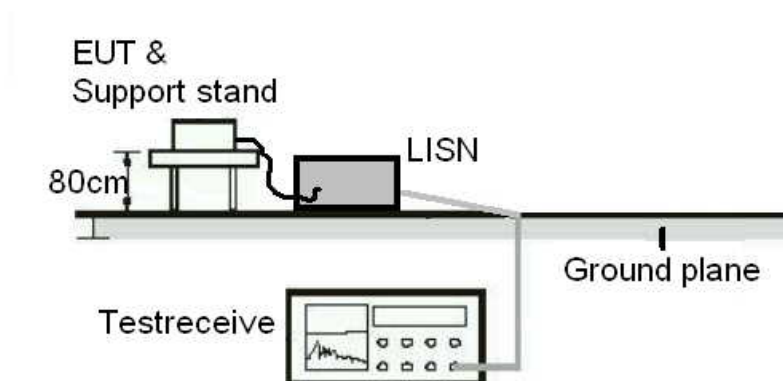
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



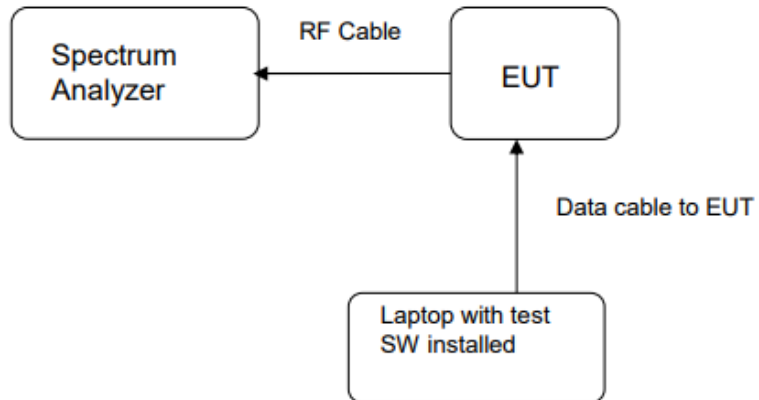
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Diagram of Measurement Equipment Configuration for Transmitter Measurement



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard : FCC Part 15.407(a), 15.203
RSS-247 6.2

Requirement : The use of approved antennas only with directional
gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 3.15dBi. The antenna is an FPC antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Peak Output Power and E.I.R.P

RESULT:

PASS

Test standard : FCC Part 15.407(a)
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 1: Peak Output Power

Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	Measured Peak Output Power		FCC Limit (mW)
		(dBm)	(mW)	
802.11a	5180	8.30	6.76	250
	5220	8.52	7.11	
	5240	8.78	7.55	
802.11n(HT20)	5180	7.43	5.53	
	5220	7.68	5.86	
	5240	8.30	6.76	

Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	Measured Peak Output Power		FCC/IC Limit (W)
		(dBm)	(mW)	
802.11a	5745	8.12	6.49	1
	5785	9.88	9.73	
	5825	11.42	13.87	
802.11n(HT20)	5745	8.02	6.34	
	5785	9.80	9.55	
	5825	11.43	13.90	

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Table 2: E.I.R.P
Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	E.I.R.P		IC Limit (mW)
		(dBm)	(mW)	
802.11a	5180	11.45	13.96	200 mW or 10 dBm + 10log B, which is less
	5220	11.67	14.69	
	5240	11.93	15.60	
802.11n(HT20)	5180	10.58	11.43	
	5220	10.83	12.11	
	5240	11.45	13.96	

Note: 5G antenna peak gain is 3.15dBi

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4.1.3 26dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(a)
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Notes

Test plots please refer to the annex document "SHE21030014-02IE DATA WIFI5G EXHIBIT A".

Table 3: 26dB Bandwidth and 99% Bandwidth

Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	21.372	16.671
	5220	20.831	16.754
	5240	21.012	16.689
802.11n(HT20)	5180	21.304	17.753
	5220	21.064	17.820
	5240	20.973	17.817

Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5745	22.420	16.840
	5785	24.187	16.913
	5825	24.295	16.842
802.11n(HT20)	5745	26.390	18.081
	5785	29.692	18.110
	5825	26.718	18.098

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4.1.4 6dB Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.407(e)
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Table 4: 6dB Bandwidth
Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
802.11a	5745	16.41	≥ 0.5
	5785	16.40	
	5825	16.44	
802.11n(HT20)	5745	17.58	
	5785	17.63	
	5825	17.62	

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Figure 1: 6dB Bandwidth, 802.11a, 5745MHz

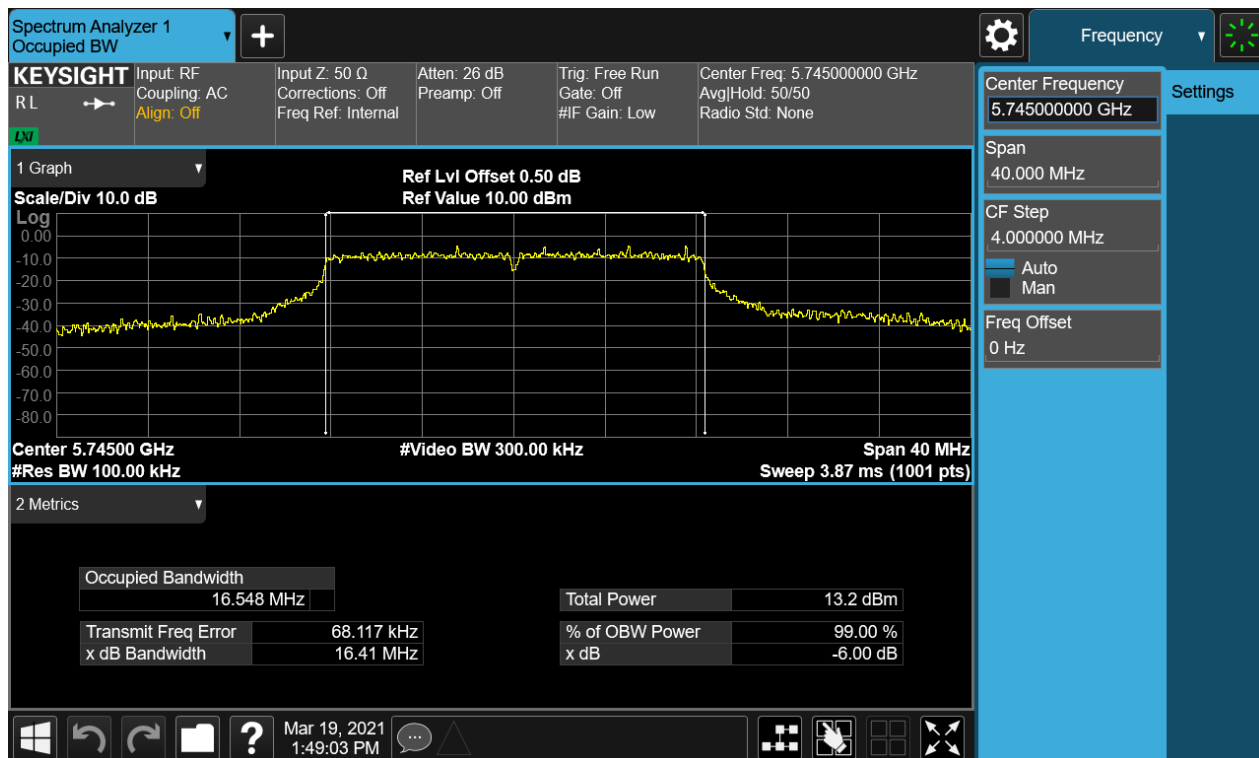
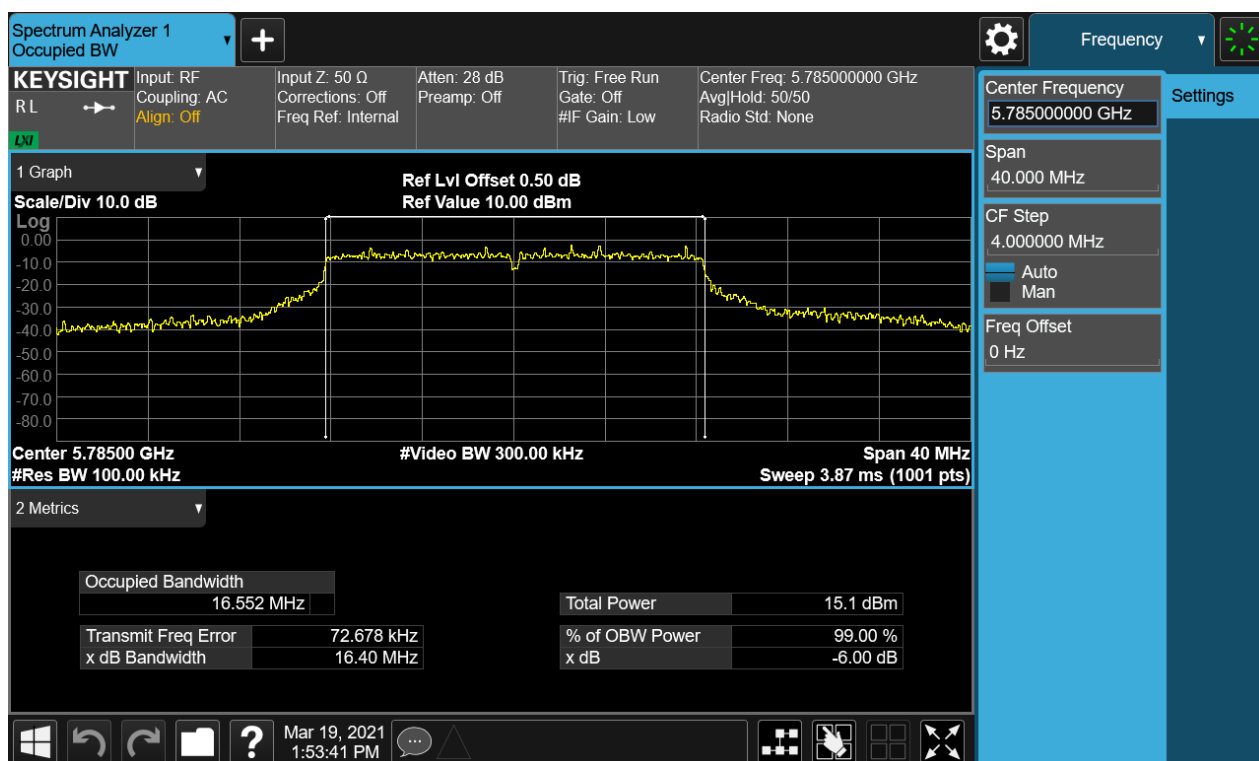


Figure 2: 6dB Bandwidth, 802.11a, 5785MHz



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Figure 3: 6dB Bandwidth, 802.11a, 5825MHz

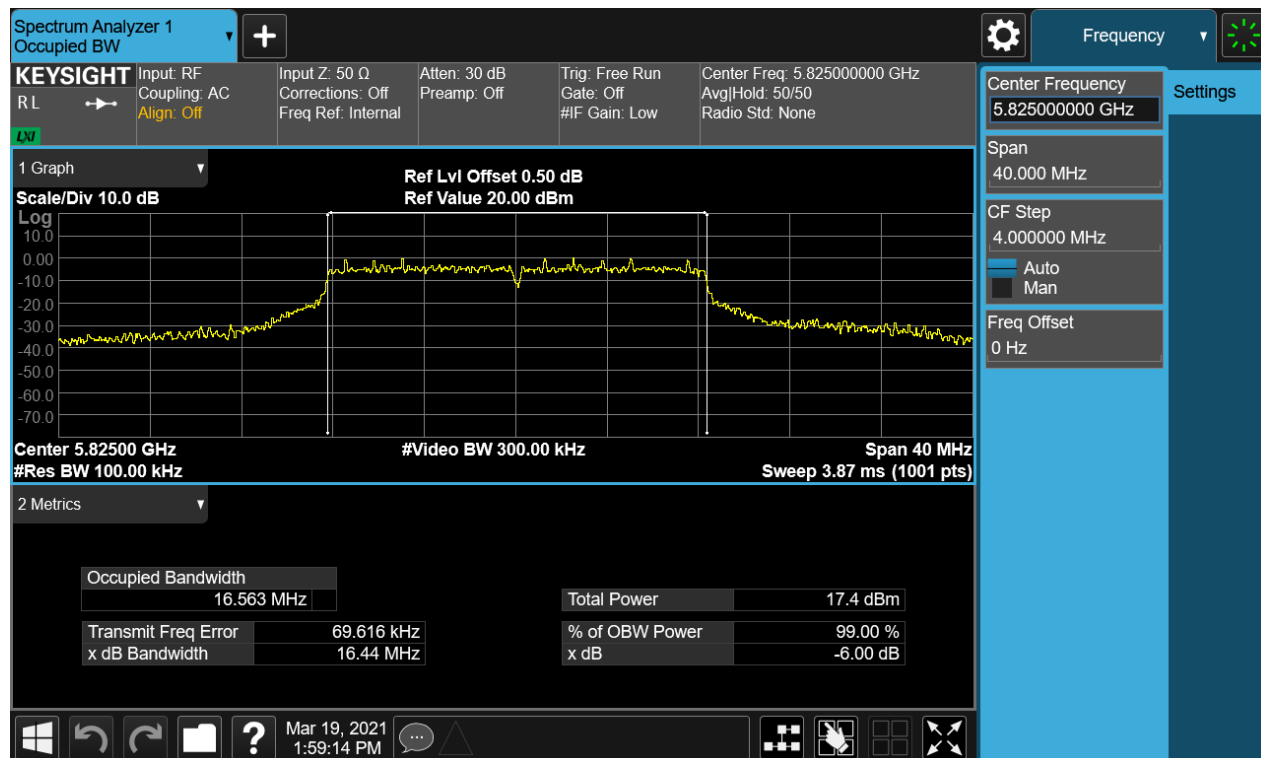
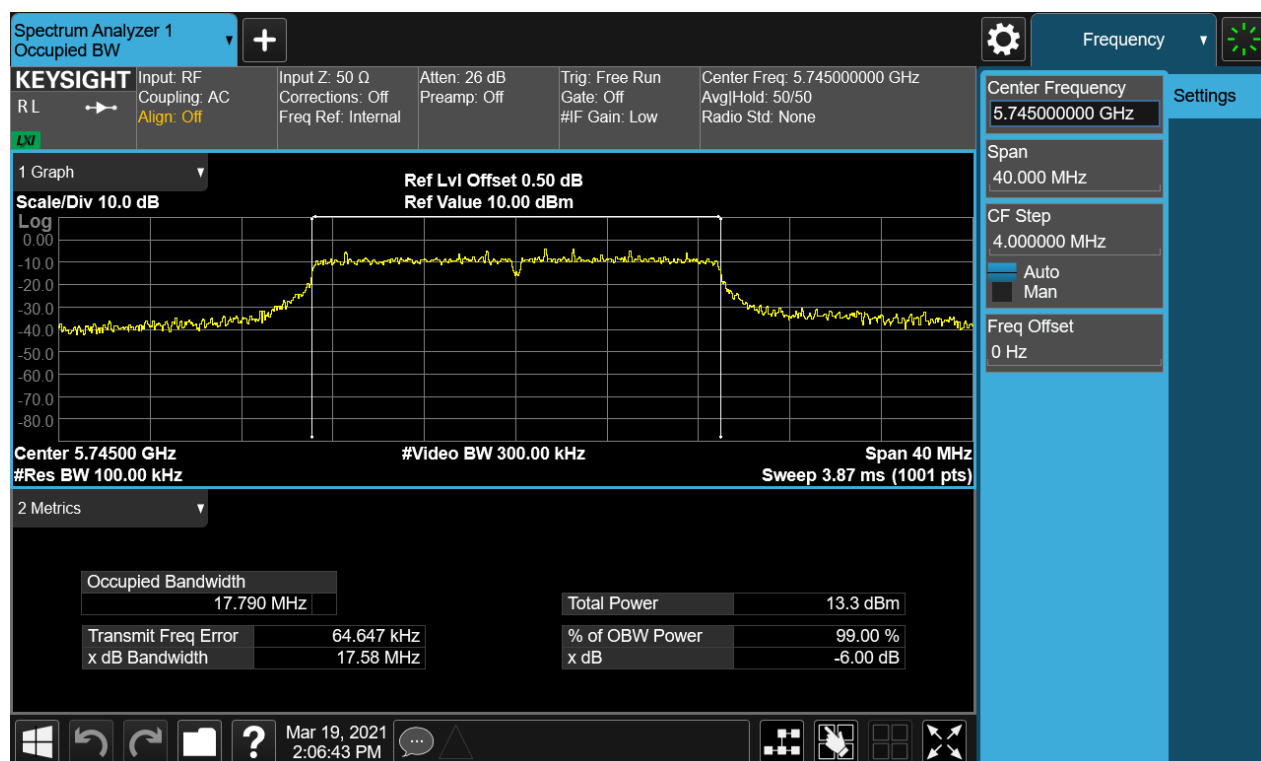


Figure 4: 6dB Bandwidth, 802.11n(HT20), 5745MHz



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Figure 5: 6dB Bandwidth, 802.11n(HT20), 5785MHz

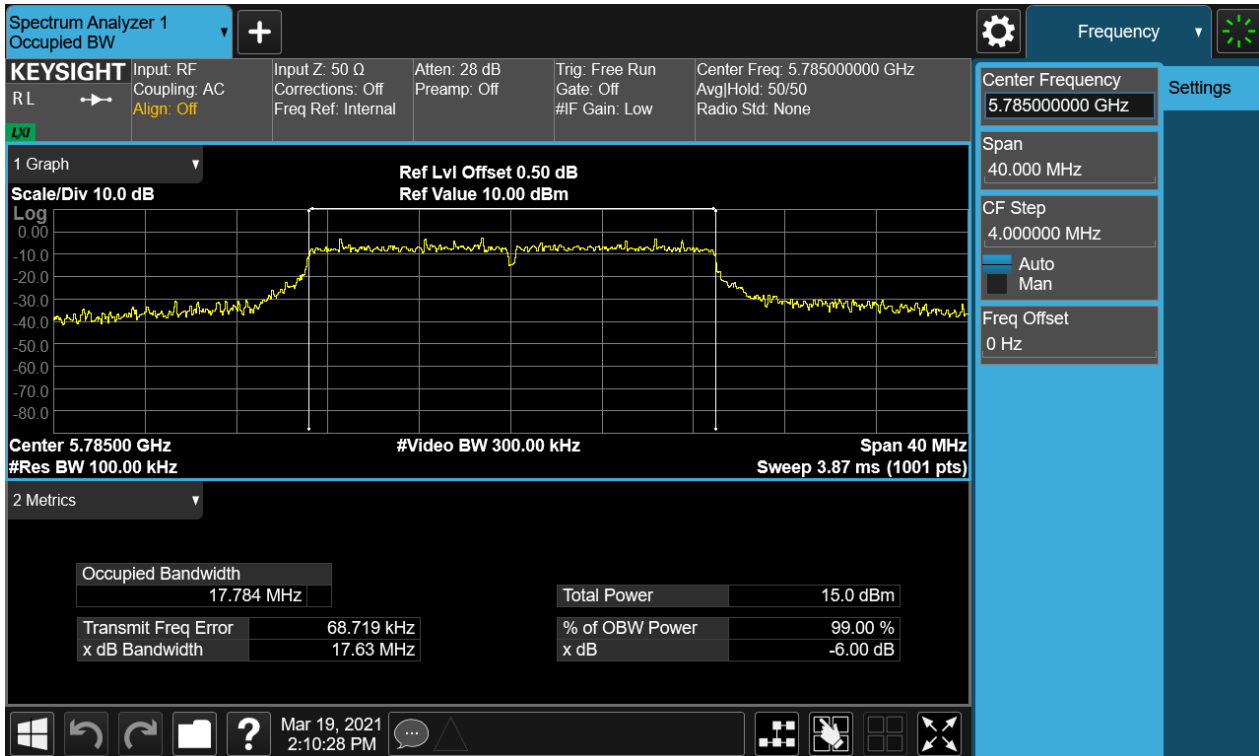
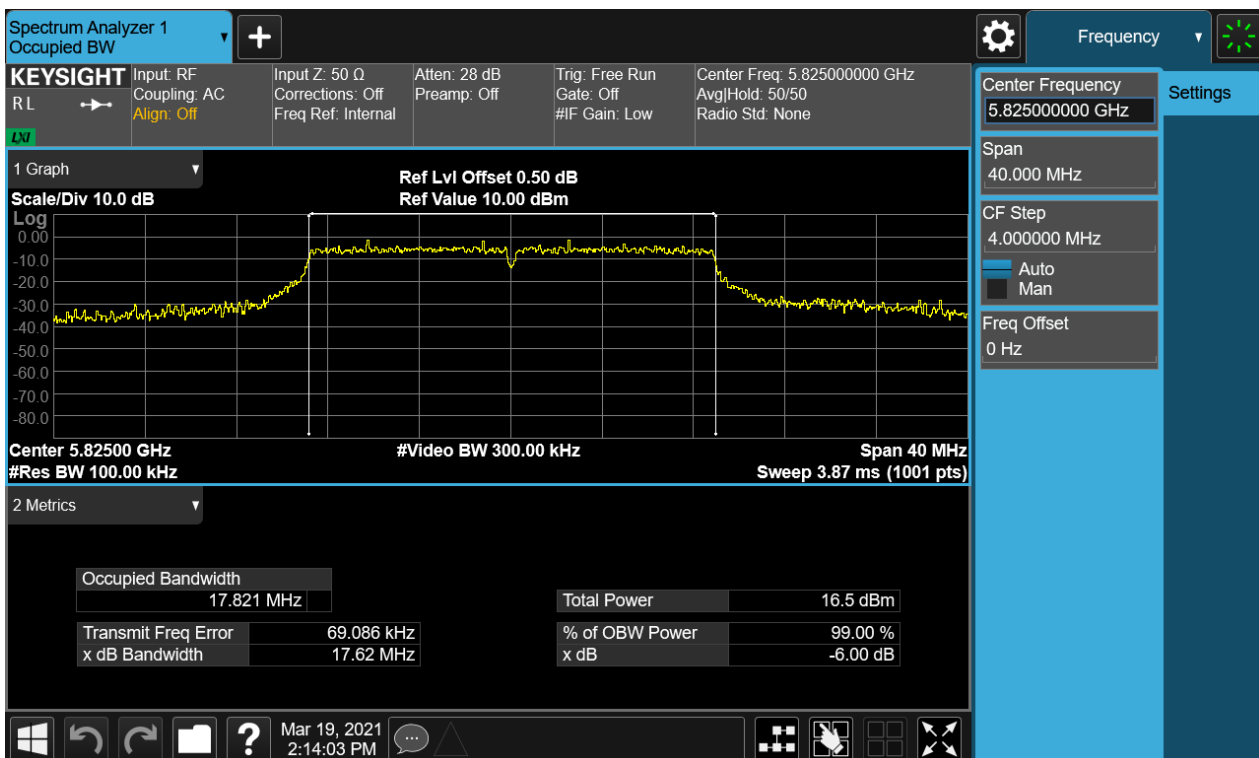


Figure 6: 6dB Bandwidth, 802.11n(HT20), 5825MHz



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4.1.5 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.407(a)
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Notes

Test plots please refer to the annex document "SHE21030014-02IE DATA WIFI5G PSD EXHIBIT A".

Table 5: Power Spectral Density

Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	PSD (dBm/MHz)	FCC Limit (dBm/MHz)
802.11a	5180	4.11	11
	5220	4.89	
	5240	4.79	
802.11n(HT20)	5180	3.06	
	5220	4.54	
	5240	5.10	

Band IV (5725 – 5850 MHz)

Test Mode	Test Channel (MHz)	PSD (dBm/500KHz)	FCC/IC Limit (dBm/500KHz)
802.11a	5745	1.40	30
	5785	3.13	
	5825	4.91	
802.11n(HT20)	5745	0.85	
	5785	2.96	
	5825	4.65	

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Band I (5150 – 5250 MHz)

Test Mode	Test Channel (MHz)	EIRP PSD (dBm/MHz)	IC Limit (dBm/MHz)
802.11a	5180	7.26	10
	5220	8.04	
	5240	7.94	
802.11n(HT20)	5180	6.21	
	5220	7.69	
	5240	8.25	

Note:5G antenna peak gain is 3.15dBi

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4.1.6 Undesirable Emission

RESULT:

PASS

Test standard : FCC Part 15.407(b), 15.209
RSS-247 6.2
Requirement : ANSI C63.10-2013, KDB 789033
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 52%

Notes:

Test plots please refer to the annex document "SHE21030014-02IE DATA WLAN 5GHz-TX CSE EXHIBIT A".

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4.1.7 Spurious Emission

RESULT:

PASS

Test standard	: FCC Part 15.407(b) RSS-247 6.2
Requirement	: ANSI C63.10-2013
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A
Ambient temperature	: 25°C
Relative humidity	: 52%

Notes:

Test plots please refer to the annex document "SHE21030014-02IE DATA WIFI5GHz-TX EXHIBIT A"

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.

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4.1.8 Band Edge (Restricted-band band-edge)

RESULT:

PASS

Test standard	: FCC Part 15.407(b) RSS-247 6.2
Requirement	: ANSI C63.10-2013, KDB 789033
Kind of test site	: 3m Semi-Anechoic Chamber

Test setup

Test Channel	: Low/Middle/High
Operation Mode	: A.1
Ambient temperature	: 25°C
Relative humidity	: 52%

Notes:

Test plots please refer to the annex document "SHE21030014-02IE DATA WIFI5GHz-TX EXHIBIT A"

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4.1.9 Frequency Stability

RESULT:

PASS

Test standard : FCC Part 15.407(g)

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1

Ambient temperature : 25°C

Relative humidity : 52%

Table 6: Frequency Stability

Band I (5150 – 5250 MHz):

Voltage vs. Frequency Stability (5180MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
25	3.6V	5180.04615	8.909	± 20
	3.7V	5180.04653	8.983	
	4.2V	5180.04682	9.039	

Temperature vs. Frequency Stability (5180MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.7V	-30	--	--	± 20
	-20	--	--	
	-10	5180.05065	9.778	
	0	5180.04986	9.625	
	10	5180.04857	9.376	
	20	5180.05028	9.707	
	30	5180.05036	9.722	
	40	5180.05049	9.747	

Note:

The all configurations were tested respectively, but only the worst channel shown here.

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Band IV (5725 – 5850 MHz):

Voltage vs. Frequency Stability (5745MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Temp (°C)	Voltage (V)			
25	3.6V	5745.04316	7.513	± 20
	3.7V	5745.04278	7.446	
	4.2V	5745.04297	7.480	

Temperature vs. Frequency Stability (5745MHz)

Test Conditions		Frequency (MHz)	Max. Deviation (ppm)	Limit (ppm)
Voltage (V)	Temp (°C)			
3.7V	-30	--	--	± 20
	-20	--	--	
	-10	5745.04625	8.050	
	0	5745.04553	7.925	
	10	5745.04689	8.162	
	20	5745.04596	8.000	
	30	5745.04510	7.850	
	40	5745.04634	8.066	

Note:

The all configurations were tested respectively, but only the worst channel shown here.

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4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

N/A

Test standard	: FCC Part 15.207 RSS-Gen 8.8
Requirement	: ANSI C63.10-2013
Kind of test site	: Shielded room

Test setup

Input Voltage	: AC 120V, 60Hz; AC 240V, 50Hz
Operation Mode	: Normal Link
Earthing	: Not Connected
Ambient temperature	: 25°C
Relative humidity	: 52%

For details refer to following test plot.

Note: N/A means not applicable. The EUT is powered by battery, There is no direct or indirect supply to mains.

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5 Appendixes

5.1 Photographs of the Sample



Front of the sample



Rear of the sample

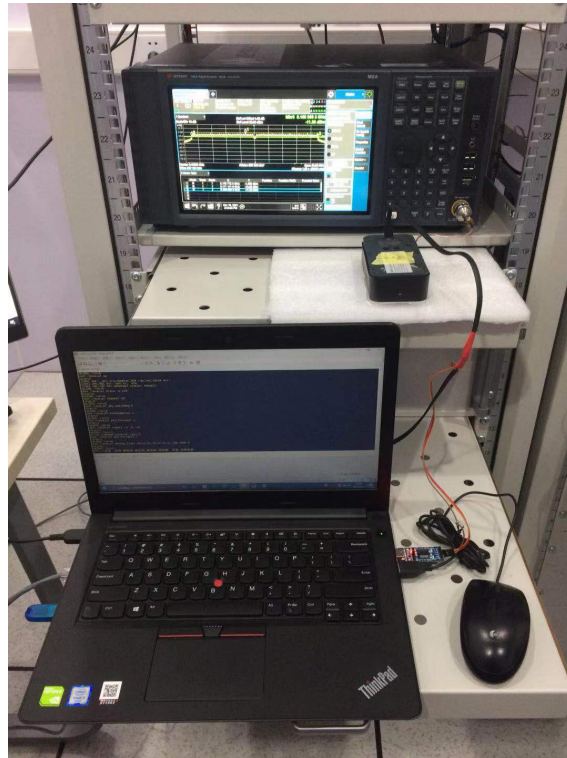
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5.2 Set-up for Conducted RF test at Antenna Port



5.3 Set-up for Spurious Emissions below 1GHz



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5.4 Set-up for Spurious Emissions above 1GHz



End of the report