APPLICATION CERTIFICATION FCC Part 15C&RSS-247
On Behalf of
Chuango Security Technology Corporation

UFO Panoramic WiFi HD Camera
Model No.: UFO, PT-180, PT-180H

FCC ID: RJY-UFO
IC: 20008-UFO

Prepared for	:	Chuango Security Technology Corporation.
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China.
Prepared by	:	ACCURATE TECHNOLOGY CO., LTD
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Report No.	:	ATE20170447
Date of Test	:	Apr. 01, 2017-May 14, 2017
Date of Report	:	May 15, 2017

TABLE OF CONTENTS

Description Page

Test Report Certification

Applicant	:	Chuango Security Technology Corporation.
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China
Manufacturer	:	Chuango Security Technology Corporation
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China
Product	:	UFO Panoramic WiFi HD Camera
Model No.	:	UFO, PT-180, PT-180H
Trade name	:	smanos

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.407:2016
ANSI C63.10: 2013
KDB 789033 D02 General UNII Test Procedures New Rules v01r04
KDB 558074 D01 DTS Meas Guidance v04
RSS-247 Issue 2 February 2017
RSS-Gen Issue 4 November 2014

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.407 and RSS-247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Apr. 01, 2017-May 14, 2017

Date of Report : May 15, 2017

Prepared by :

(Tim[illegible]g Engineer)

Approved & Authorized Signer :

(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	UFO Panoramic WiFi HD Camera
Model Number	:	UFO, PT-180, PT-180H Note: These three models are used only for FCC certification, Only model PT-180H is used for IC certification.
IEEE 802.11 WLAN	:	802.11a (20 MHz channel bandwidth) , 802.11n (20 MHz channel bandwidth), 802.11n (40 MHz channel bandwidth), 802.11ac (20 MHz channel bandwidth), 802.11ac (40 MHz channel bandwidth) 802.11ac (80 MHz channel bandwidth)
Frequency Range	:	U-NII(5150-5250, 5250-5350, 5470-5725, 5725-5850MHz) Note: The device for operation in the band 5150-5250MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems
Number of Channels	:	fc = 5000 MHz + N * 5 MHz, where: - fc = "Operating Frequency" in MHz, - N = "Channel Number". 5150-5250 MHz: N = 36 to 48 with step of 4 for the 20 MHz channel bandwidth. N = 38 to 46 with step of 4 for the 40 MHz channel bandwidth. N = 42 for the 80 MHz channel bandwidth. 5250-5350 MHz: N = 52 to 64 with step of 4 for the 20 MHz channel bandwidth. N = 54 to 62 with step of 4 for the 40 MHz channel bandwidth. N = 58 for the 80 MHz channel bandwidth. 5470-5600 MHz: N = 100 to 116 with step of 4 for the 20 MHz channel bandwidth. N = 102 to 110 with step of 4 for the 40 MHz channel

bandwidth.
N = 106 for the 80 MHz channel bandwidth.

5650-5725 MHz:
N = 132 to 140 with step of 4 for the 20 MHz channel bandwidth.
N = 134 for the 40 MHz channel bandwidth.

5725-5850 MHz:
N = 149 to 165 with step of 4 for the 20 MHz channel bandwidth.
N = 151 to 159 with step of 4 for the 40 MHz channel bandwidth.
N = 155 for the 80 MHz channel bandwidth.

$G_{ANT\ MAX}$	:	2 dBi
Type of Antenna	:	SISO antenna
Power Supply	:	DC 5V(Powered by Adapter)
Adapter information	:	Model: SA-US5V Input: AC 100-240V～60Hz 0.3A Output: DC 5.0V 1.0A
Modulation Type	:	BPSK/QPSK/16QAM/64QAM (OFDM)
TPC	:	Not Supported
RF power setting in TEST	:	Max power
EUT Hardware Version	:	F11AUUM13-W2
EUT Software Version	:	V41
Test Software Version	:	V41
Radio Software Version	:	V41
Radio Hardware Version	:	F11AUUM13-W2
Applicant	:	Chuango Security Technology Corporation
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China.
Manufacturer	:	Chuango Security Technology Corporation
Address	:	Room 6-17, Overseas Students Pioneer Park, No.108, Jiangbin East Road, Economic & Technological Development Zone, Fuzhou 350015, China.

Date of sample received : Apr. 01, 2017
Date of Test : Apr. 01, 2017-May 14, 2017

1.2.Description of Test Facility

EMC Lab	:	Listed by Federal Communications Commission (FCC) The Registration Number is 752051 Listed by Innovation, Science and Economic Development Canada (ISEDC) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

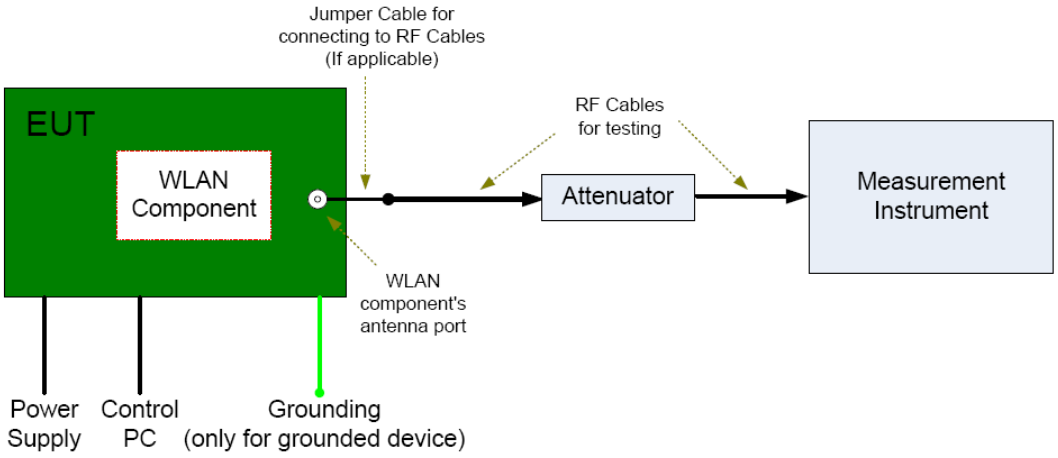
2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 07, 2017	Jan. 06, 2018
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 07, 2017	Jan. 06, 2018
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan. 07, 2017	Jan. 06, 2018
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 07, 2017	Jan. 06, 2018
Open Switch and Control Unit	Rohde&Schwarz	OSP120 + OSP-B157	101244 + 100866	Jan. 07, 2017	Jan. 06, 2018
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 13, 2017	Jan. 12, 2018
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 13, 2017	Jan. 12, 2018
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 13, 2017	Jan. 12, 2018
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 13, 2017	Jan. 12, 2018
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 07, 2017	Jan. 06, 2018
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 07, 2017	Jan. 06, 2018
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 07, 2017	Jan. 06, 2018
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 07, 2017	Jan. 06, 2018

3. OPERATION OF EUT DURING TESTING

3.1.Test setups



3.2.Configuration and peripherals

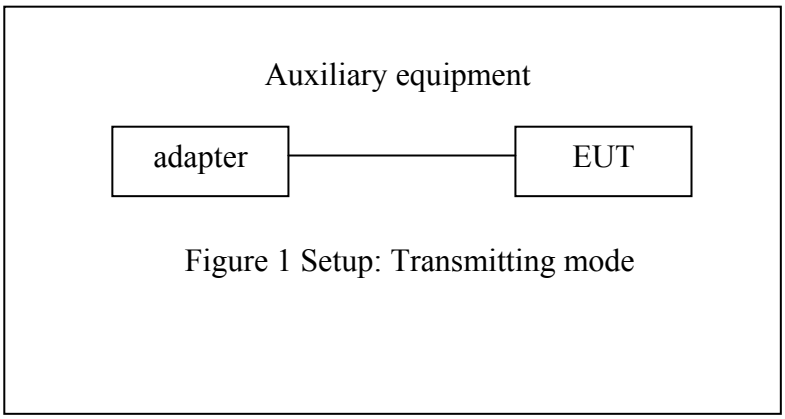


Figure 1 Setup: Transmitting mode

(EUT: UFO Panoramic WiFi HD Camera)

3.3.Test mode

Test Mode	Test Modes Description
11A	IEEE 802.11a with data rate of 6 Mbps using SISO mode.
11N20	IEEE 802.11n with data date of MCS0 and bandwidth of 20 MHz using SISO mode.
11N40	IEEE 802.11n with data date of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC20	IEEE 802.11ac with data date of MCS0 and bandwidth of 20 MHz using SISO mode.
11AC40	IEEE 802.11ac with data date of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC80	IEEE 802.11ac with data date of MCS0 and bandwidth of 80 MHz using SISO mode.

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

4. TEST PROCEDURES AND RESULTS

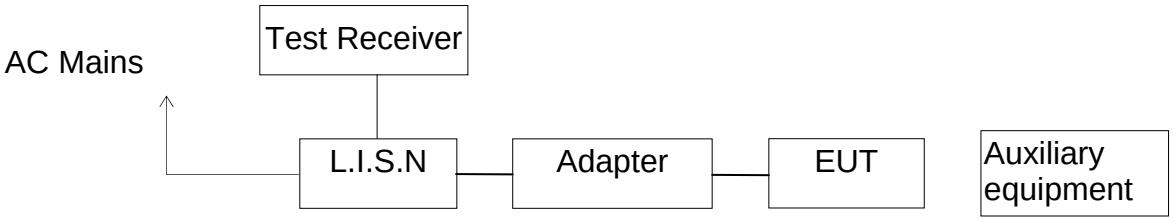
Description of Test	Band	FCC&IC Rules	Requirements	Result
AC power Line Conducted Emission Test	N/A	Section 15.207 RSS-Gen Section 8.8	Please refer to the standard limit	Compliant
Emission Bandwidth	5150-5250	15.403(i), 15.407(a)(1) RSS-247	No limit.	Compliant
	5250-5350	15.403(i), 15.407(a)(2) RSS-247	No limit.	
	5470-5725	15.403(i), 15.407(a)(2) RSS-247	No limit.	
	5725-5850	15.403(i), 15.407(e) RSS-247	⩾ 500 kHz.	
Occupied Bandwidth	5150-5250 5250-5350 5470-5725 5725-5850	KDB 789033 §D RSS-247	No limit	Compliant
Duty Cycle	--	--	No limit	Compliant
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4) RSS-247	FCC: < 250 mW IC: 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz	Compliant
	5250-5350	15.407(a)(2) 15.407(a)(4) RSS-247	< MIN {250mW, 11dBm+10 log10B} FCC: B is the 99% emission bandwidth in megahertz IC: B is the 26dB emission bandwidth in megahertz	
	5470-5725	15.407(a)(2) 15.407(a)(4) RSS-247	< MIN {250mW, 11dBm+10 log10B} FCC: B is the 99% emission bandwidth in megahertz IC: B is the 26dB emission bandwidth in megahertz	
	5725-5850	15.407(a)(3)	< 1W	

		RSS-247		
Peak Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4) RSS-247	FCC: For client devices in the 5.15-5.25 GHz band <11dBm/MHz IC: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band	Compliant
	5250-5350	15.407(a)(2) 15.407(a)(4) RSS-247	<11dBm/MHz	
	5470-5725	15.407(a)(2) 15.407(a)(4) RSS-247	<11dBm/MHz	
	5725-5850	15.407(a)(3) 15.407(a)(4) RSS-247	<30dBm/500KHz	
Unwanted Emissions	5150-5250	15.407(b)(1) 15.407(b)(6) 15.407(b)(7) 15.209 RSS-247	F<1GHz: § 15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F≥1GHz & in-restricted: § 15.209/§7.2.5 limit(AV&PK).	
	5250-5350	15.407(b)(2) 15.407(b)(6) 15.407(b)(7) 15.209 RSS-247	F<1GHz: § 15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.25-5.35 GHz). F≥1GHz & in-restricted: § 15.209/§7.2.5 limit(AV&PK).	
	5470-5725	15.407(b)(3) 15.407(b)(6) 15.407(b)(7) 15.209 RSS-247	F<1GHz: § 15.209/§7.2.5 limit (QP). F≥1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.47-5.725 GHz). F≥1GHz & in-restricted: § 15.209/§7.2.5 limit(AV&PK).	
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209 RSS-247	F<1GHz: § 15.209/§7.2.5 limit (QP). All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or	

			below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge F≥1GHz & in-restricted: § 15.209/§7.2.5 limit (AV&PK).	
Frequency Stability	5150-5250 5250-5350 5470-5725 5725-5850	15.407(g) RSS-247	FCC Part 15.407(g)	Compliant
Antenna Requirement	N/A	15.203, 15.204(b), 15.204(c), 15.212(a), 2.929(b) RSS-GEN	N/A	Compliant

5. POWER LINE CONDUCTED MEASUREMENT

5.1.Block Diagram of Test Setup



(EUT: UFO Panoramic WiFi HD Camera)

5.2.Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

5.3.Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in test mode and measure it.

5.5. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.
The bandwidth of test receiver (R & S ESCS30) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

5.6. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150kHz to 30MHz is checked.

Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.

ACCURATE TECHNOLOGY CO.,LTD

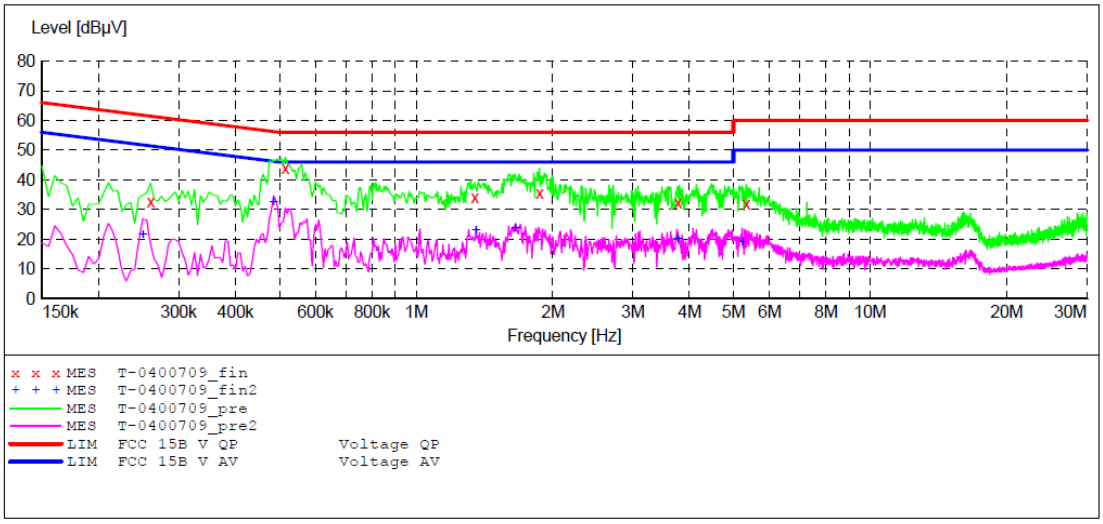
CONDUCTED EMISSION STANDARD FCC PART 15B

```
EUT:                  UFO Panoramic WiFi HD Camera   M/N:PT-180H
Manufacturer:         Chuango
Operating Condition:  WiFi operation
Test Site:            1#Shielding Room
Operator:             STAR
Test Specification:   L 120V/60Hz
Comment:              Report No.:ATE20170447
Start of Test:        4/6/2017 / 4:10:44PM
```

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0400709_fin"

4/6/2017 4:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.260000	32.60	10.6	61.4	28.8	QP	L1	GND
0.515000	43.90	10.7	56	12.1	QP	L1	GND
1.345000	34.00	10.9	56	22.0	QP	L1	GND
1.870000	35.50	11.0	56	20.5	QP	L1	GND
3.770000	32.10	11.1	56	23.9	QP	L1	GND
5.330000	31.70	11.2	60	28.3	QP	L1	GND

MEASUREMENT RESULT: "T-0400709_fin2"

4/6/2017 4:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.250000	21.80	10.6	51.8	30.0	AV	L1	GND
0.485000	32.40	10.7	46.1	13.9	AV	L1	GND
1.355000	23.00	10.9	46	23.0	AV	L1	GND
1.655000	23.80	10.9	46	22.2	AV	L1	GND
3.770000	20.10	11.1	46	25.9	AV	L1	GND
5.230000	19.00	11.2	50	31.0	AV	L1	GND

ACCURATE TECHNOLOGY CO.,LTD

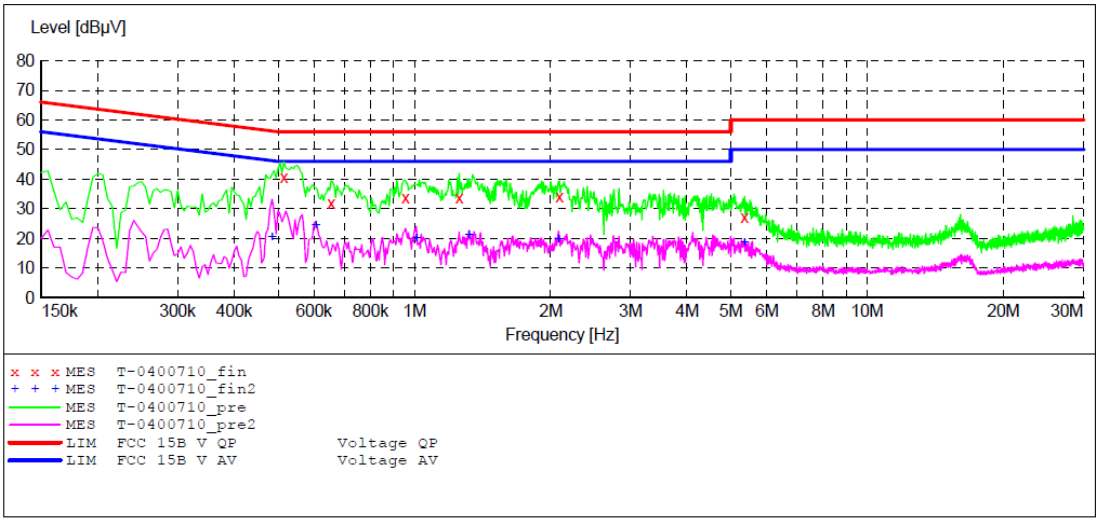
CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: UFO Panoramic WiFi HD Camera M/N:PT-180H
Manufacturer: Chuango
Operating Condition: WiFi operation
Test Site: 1#Shielding Room
Operator: STAR
Test Specification: N 120V/60Hz
Comment: Report No.:ATE20170447
Start of Test: 4/6/2017 / 4:12:32PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0400710_fin"

4/6/2017 4:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.515000	40.40	10.7	56	15.6	QP	N	GND
0.655000	32.00	10.8	56	24.0	QP	N	GND
0.955000	33.60	10.8	56	22.4	QP	N	GND
1.255000	33.50	10.9	56	22.5	QP	N	GND
2.090000	34.20	11.0	56	21.8	QP	N	GND
5.360000	27.10	11.2	60	32.9	QP	N	GND

MEASUREMENT RESULT: "T-0400710_fin2"

4/6/2017 4:16PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.485000	20.70	10.7	46.3	25.6	AV	N	GND
0.605000	24.40	10.7	46	21.6	AV	N	GND
1.010000	20.20	10.8	46	25.8	AV	N	GND
1.320000	21.20	10.9	46	24.8	AV	N	GND
2.080000	19.80	11.0	46	26.2	AV	N	GND
5.360000	18.60	11.2	50	31.4	AV	N	GND

ACCURATE TECHNOLOGY CO.,LTD

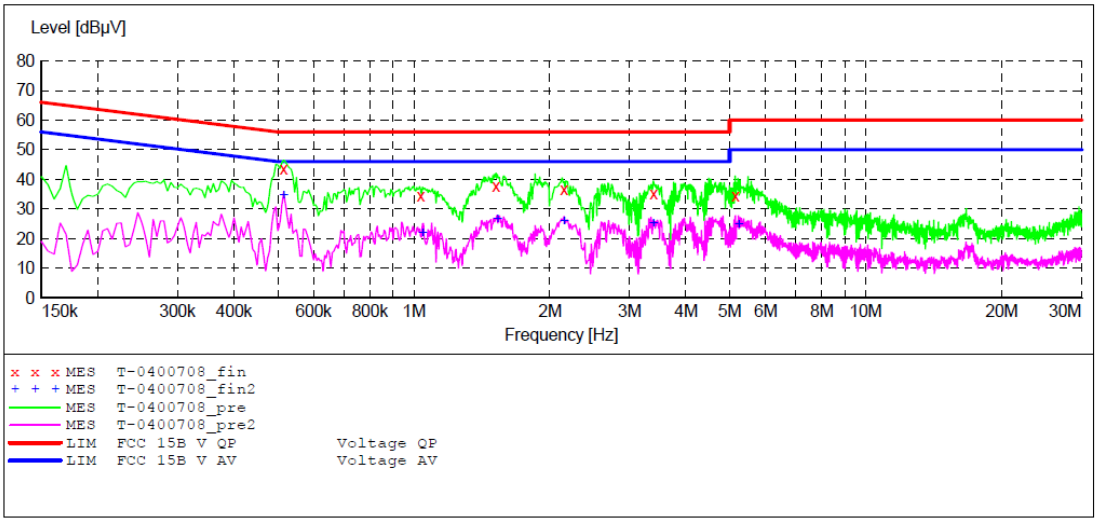
CONDUCTED EMISSION STANDARD FCC PART 15B

```
EUT:                  UFO Panoramic WiFi HD Camera   M/N:PT-180H
Manufacturer:         Chuango
Operating Condition:  WiFi operation
Test Site:            1#Shielding Room
Operator:             STAR
Test Specification:   L 240V/60Hz
Comment:              Report No.:ATE20170447
Start of Test:        4/6/2017 / 4:02:00PM
```

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0400708_fin"

4/6/2017 4:05PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.515000	43.50	10.7	56	12.5	QP	L1	GND
1.035000	34.40	10.9	56	21.6	QP	L1	GND
1.520000	37.60	10.9	56	18.4	QP	L1	GND
2.150000	36.60	11.0	56	19.4	QP	L1	GND
3.390000	35.20	11.1	56	20.8	QP	L1	GND
5.140000	34.40	11.2	60	25.6	QP	L1	GND

MEASUREMENT RESULT: "T-0400708_fin2"

4/6/2017 4:05PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.515000	34.80	10.7	46	11.2	AV	L1	GND
1.045000	21.90	10.9	46	24.1	AV	L1	GND
1.530000	26.80	10.9	46	19.2	AV	L1	GND
2.150000	26.10	11.0	46	19.9	AV	L1	GND
3.390000	25.40	11.1	46	20.6	AV	L1	GND
5.230000	24.80	11.2	50	25.2	AV	L1	GND

ACCURATE TECHNOLOGY CO.,LTD

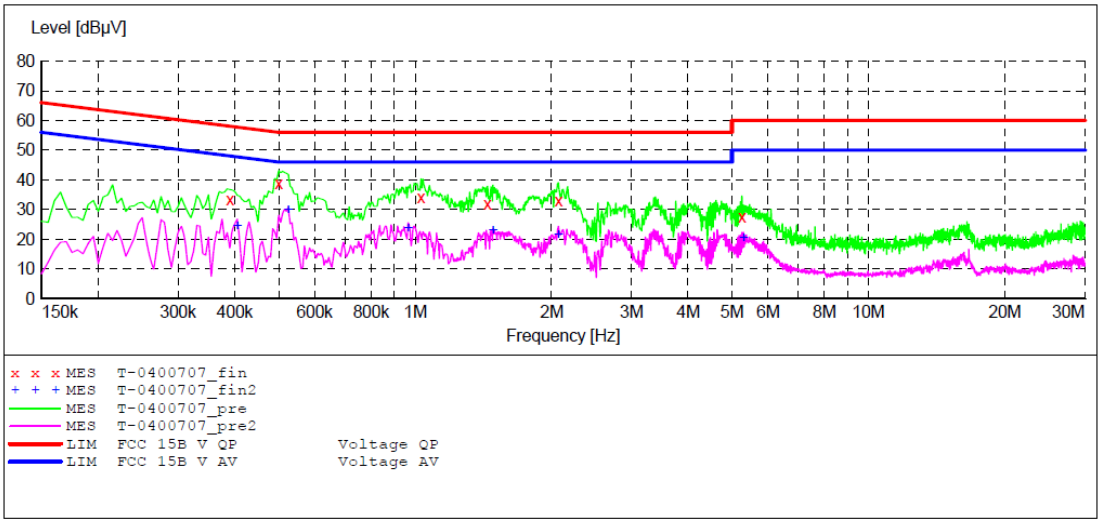
CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: UFO Panoramic WiFi HD Camera M/N:PT-180H
Manufacturer: Chuango
Operating Condition: WiFi operation
Test Site: 1#Shielding Room
Operator: STAR
Test Specification: N 240V/60Hz
Comment: Report No.:ATE20170447
Start of Test: 4/6/2017 / 3:57:31PM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: SUB STD VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "T-0400707_fin"

4/6/2017 4:01PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.390000	33.40	10.7	58.1	24.7	QP	N	GND
0.500000	38.60	10.7	56	17.4	QP	N	GND
1.030000	33.90	10.8	56	22.1	QP	N	GND
1.445000	31.80	10.9	56	24.2	QP	N	GND
2.070000	33.10	11.0	56	22.9	QP	N	GND
5.260000	27.50	11.2	60	32.5	QP	N	GND

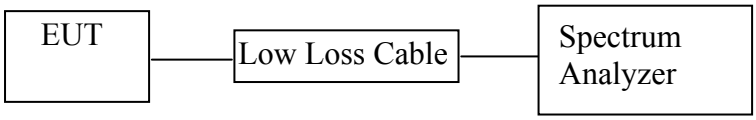
MEASUREMENT RESULT: "T-0400707_fin2"

4/6/2017 4:01PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.405000	24.50	10.7	47.8	23.3	AV	N	GND
0.525000	30.10	10.7	46	15.9	AV	N	GND
0.965000	23.70	10.8	46	22.3	AV	N	GND
1.485000	23.00	10.9	46	23.0	AV	N	GND
2.070000	21.80	11.0	46	24.2	AV	N	GND
5.300000	20.40	11.2	50	29.6	AV	N	GND

6. 6DB OCCUPIED BANDWIDTH TEST

6.1.Block Diagram of Test Setup



(EUT: UFO Panoramic WiFi HD Camera)

6.2.EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

Section 15.407(e) and RSS-247 section 5.2 specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725-5.85 GHz

6.3.Operating Condition of EUT

6.3.1.Setup the EUT and simulator as shown as Section 6.1.

6.3.2.Turn on the power of all equipment.

6.3.3.Let the EUT work in TX modes measure it. The transmit frequency are 5725-5850MHz.

6.4.Test Procedure

6.4.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.4.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

6.4.3.The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

6.5.Test Result

For detailed test plots, please refer to the report ATE20170447 part 4.

The test was performed with 802.11a			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
149	5745	16.447	> 0.5MHz
165	5825	16.555	> 0.5MHz

The test was performed with 802.11n20			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
149	5745	17.655	> 0.5MHz
165	5825	17.713	> 0.5MHz

The test was performed with 802.11ac20			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
149	5745	17.655	> 0.5MHz
165	5825	17.713	> 0.5MHz

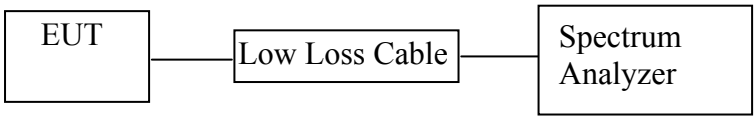
The test was performed with 802.11n40			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
151	5755	35.960	> 0.5MHz
159	5795	35.920	> 0.5MHz

The test was performed with 802.11ac40			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
151	5755	35.950	> 0.5MHz
159	5795	36.190	> 0.5MHz

The test was performed with 802.11ac80			
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	Limit (MHz)
155	5775	75.100	> 0.5MHz

7. 26DB OCCUPIED BANDWIDTH TEST

7.1. Block Diagram of Test Setup



(EUT: UFO Panoramic WiFi HD Camera)

7.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.3. Operating Condition of EUT

7.3.1. Setup the EUT and simulator as shown as Section 7.1.

7.3.2. Turn on the power of all equipment.

7.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250MHz, 5250-5350MHz, 5470-5725MHz.

7.4. Test Procedure

7.4.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.4.2. Set Set RBW = approximately 1% of the emission bandwidth.

7.4.3. Set the VBW > RBW.

7.4.4. Detector = Peak.

7.4.5. Trace mode = max hold.

7.4.6. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

7.5.Test Result

For detailed test plots, please refer to the report ATE20170447 part 4.

The test was performed with 802.11a			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
36	5180	19.623	> 0.5MHz
48	5240	19.508	> 0.5MHz
52	5260	19.652	> 0.5MHz
64	5320	19.219	> 0.5MHz
100	5500	19.045	> 0.5MHz
140	5700	19.681	> 0.5MHz

The test was performed with 802.11n20			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
36	5180	19.624	> 0.5MHz
48	5240	20.029	> 0.5MHz
52	5260	19.825	> 0.5MHz
64	5320	19.740	> 0.5MHz
100	5500	19.740	> 0.5MHz
140	5700	19.682	> 0.5MHz

The test was performed with 802.11ac20			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
36	5180	19.914	> 0.5MHz
48	5240	19.798	> 0.5MHz
52	5260	19.769	> 0.5MHz
64	5320	19.798	> 0.5MHz
100	5500	19.797	> 0.5MHz
140	5700	19.797	> 0.5MHz

The test was performed with 802.11n40			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
38	5190	40.05	> 0.5MHz
46	5230	40.23	> 0.5MHz
54	5270	39.71	> 0.5MHz
62	5310	40.22	> 0.5MHz
102	5510	40.29	> 0.5MHz
134	5670	40.40	> 0.5MHz

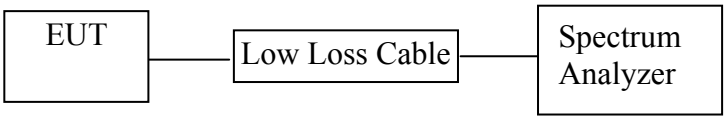
The test was performed with 802.11ac40			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
38	5190	40.29	> 0.5MHz
46	5230	40.00	> 0.5MHz
54	5270	39.94	> 0.5MHz
62	5310	40.23	> 0.5MHz
102	5510	40.29	> 0.5MHz
134	5670	40.29	> 0.5MHz

The test was performed with 802.11ac80			
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)
42	5210	80.81	> 0.5MHz
58	5290	80.82	> 0.5MHz
106	5530	81.09	> 0.5MHz

The spectrum analyzer plots are attached as below.

8. 99% BANDWIDTH MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.407

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5850MHz.

8.5. Test Procedure

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW. Set VBW $\geqslant$ 3 * RBW
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
5. Use the 99 % power bandwidth function of the instrument.

6. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.6. Test Result

For detailed test plots, please refer to the report ATE20170447 part 4.

The test was performed with 802.11a			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
36	5180	16.498	PASS
48	5240	16.671	PASS
52	5260	16.556	PASS
64	5320	16.671	PASS
100	5500	16.556	PASS
140	5700	16.556	PASS
149	5745	16.729	PASS
165	5825	16.671	PASS

The test was performed with 802.11n20			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
36	5180	17.829	PASS
48	5240	17.887	PASS
52	5260	17.829	PASS
64	5320	17.829	PASS
100	5500	17.829	PASS
140	5700	17.771	PASS
149	5745	17.887	PASS
165	5825	17.829	PASS

The test was performed with 802.11ac20			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
36	5180	17.829	PASS
48	5240	17.887	PASS
52	5260	17.887	PASS
64	5320	17.829	PASS
100	5500	17.829	PASS
140	5700	17.887	PASS
149	5745	17.829	PASS
165	5825	17.829	PASS

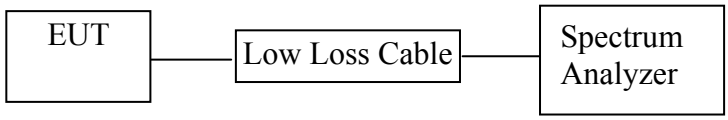
The test was performed with 802.11 n40			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
38	5190	36.816	PASS
46	5230	36.700	PASS
54	5270	36.700	PASS
62	5310	36.700	PASS
102	5510	36.700	PASS
134	5670	36.585	PASS
151	5755	36.700	PASS
159	5795	36.700	PASS

The test was performed with 802.11 ac40			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
38	5190	36.700	PASS
46	5230	36.700	PASS
54	5270	36.700	PASS
62	5310	36.700	PASS
102	5510	36.700	PASS
134	5670	36.700	PASS
151	5755	36.700	PASS
159	5795	36.700	PASS

The test was performed with 802.11 ac80			
Channel	Frequency (MHz)	99% Bandwidth (MHz)	Verdict
42	5210	75.022	PASS
58	5290	75.195	PASS
106	5530	75.195	PASS
155	5775	75.022	PASS

9. DUTY CYCLE MEASUREMENT

9.1. Block Diagram of Test Setup



9.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.3. Operating Condition of EUT

9.3.1. Setup the EUT and simulator as shown as Section 9.1.

9.3.2. Turn on the power of all equipment.

9.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5850MHz.

9.4. Test Procedure

Measurements of duty cycle and transmission duration shall be performed using one of the following techniques:
1. A diode detector and an oscilloscope that together have sufficiently short response time to permit accurate measurements of the on- and off-times of the transmitted signal.
2. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on- and off-times of the transmitted signal
a. Set the center frequency of the instrument to the centre frequency of the transmission
b. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value(10MHz).
c. Set detector = Peak or average.
d. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100.
(For example, if VBW and/or RBW are limited to 3MHz, then the zero-span method of measuring duty cycle shall not be used if T≤16.7 microseconds.)

9.5.Test Result

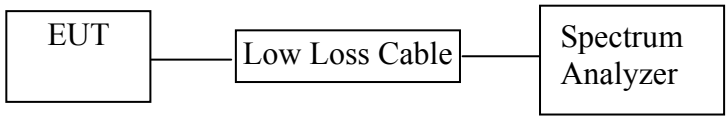
For detailed test plots, please refer to the report ATE20170447 part 4.

Test mode	Frequency (MHz)	Duty cycle(%)	10log(1/x)
802.11a20	5180	97.2	0.12
802.11n20	5180	97.0	0.13
802.11ac20	5180	97.0	0.13
802.11n40	5190	94.14	0.26
802.11ac40	5190	94.14	0.26
802.11ac80	5210	96.84	0.14

Note: Duty cycle=x

10.MAXIMUM POWER SPECTRAL DENSITY TEST

10.1.Block Diagram of Test Setup



10.2.The Requirement For Section 15.407&RSS-247

For the band 5.15–5.25GHz,
Section 15.407: the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band
Section RSS-247: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0MHz band.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands,
Section 15.407: the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.
Section RSS-247: The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;

For the band 5.725–5.825GHz,
Section 15.407: The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.
Section RSS-247: The output power spectral density shall not exceed 30 dBm in any 500 kHz band.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

10.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.4.Operating Condition of EUT

10.4.1.Setup the EUT and simulator as shown as Section 10.1.

10.4.2.Turn on the power of all equipment.

10.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5850MHz.

10.5.Test Procedure

10.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

10.5.2.Measurement Procedure PKPSD:

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5).
For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

1. Set RBW≥1/T, where T is defined in section II.B.l.a). Set VBW ≥ 3 RBW.
2. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log (500 kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
3. If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log (1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
4. Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
5. Detector = RMS.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

10.5.3.Measurement the maximum power spectral density.

10.6.Test Result

For detailed test plots, please refer to the report ATE20170447 part 4.

The test was performed with 802.11a					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
36	5180	-4.61	0.12	-4.49	FCC:11 IC:10
48	5240	-4.34	0.12	-4.22	FCC:11 IC:10
52	5260	-4.49	0.12	-4.37	11
64	5320	-3.65	0.12	-3.53	11
100	5500	-4.55	0.12	-4.43	11
140	5700	-5.29	0.12	-5.17	11
149	5745	-6.51	0.12	-6.39	30
165	5825	-7.31	0.12	-7.19	30

The test was performed with 802.11n20					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
36	5180	-6.61	0.13	-6.48	FCC:11 IC:10
48	5240	-6.38	0.13	-6.25	FCC:11 IC:10
52	5260	-6.96	0.13	-6.83	11
64	5320	-6.63	0.13	-6.50	11
100	5500	-6.61	0.13	-6.48	11
140	5700	-6.32	0.13	-6.19	11
149	5745	-8.78	0.13	-8.65	30
165	5825	-7.95	0.13	-7.82	30

The test was performed with 802.11ac20					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
36	5180	-6.95	0.13	-6.82	FCC:11 IC:10
48	5240	-6.93	0.13	-6.80	FCC:11 IC:10
52	5260	-7.23	0.13	-7.10	11
64	5320	-6.94	0.13	-6.81	11
100	5500	-7.21	0.13	-7.08	11
140	5700	-7.19	0.13	-7.06	11
149	5745	-8.15	0.13	-8.02	30
165	5825	-8.67	0.13	-8.54	30

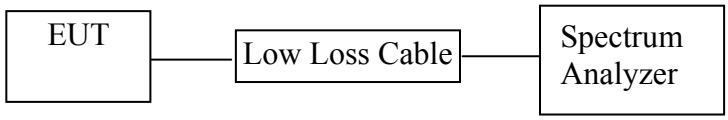
The test was performed with 802.11 n40					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
38	5190	-10.16	0.26	-9.90	FCC:11 IC:10
46	5230	-9.46	0.26	-9.20	FCC:11 IC:10
54	5270	-9.66	0.26	-9.40	11
62	5310	-9.88	0.26	-9.62	11
102	5510	-8.93	0.26	-8.67	11
134	5670	-10.22	0.26	-9.96	11
151	5755	-10.93	0.26	-10.67	30
159	5795	-11.67	0.26	-11.41	30

The test was performed with 802.11 ac40					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
38	5190	-10.17	0.26	-9.91	FCC:11 IC:10
46	5230	-9.34	0.26	-9.08	FCC:11 IC:10
54	5270	-9.64	0.26	-9.38	11
62	5310	-9.72	0.26	-9.46	11
102	5510	-9.90	0.26	-9.64	11
134	5670	-10.23	0.26	-9.97	11
151	5755	-11.26	0.26	-11.00	30
159	5795	-12.21	0.26	-11.95	30

The test was performed with 802.11 ac80					
Channel	Frequency (MHz)	Power Spectral Density (dBm)	10log(1/x)	Final Power Spectral Density (dBm)	Limits dBm/MHz
42	5210	-9.40	0.14	-9.26	FCC:11 IC:10
58	5290	-7.35	0.14	-7.21	11
106	5530	-7.46	0.14	-7.32	11
155	5775	-10.82	0.14	-10.68	30

11.MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

11.1.Block Diagram of Test Setup



11.2.The Requirement For Section 15.407

For the band 5.15–5.25 GHz,
Section 15.407: For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.
Section RSS-247: the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands,
Section 15.407: the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
Section RSS-247: The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, whichever power is less. B is the 99% emission bandwidth in megahertz.

For the band 5.725–5.825 GHz,
Section 15.407: the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
Section RSS-247: The maximum conducted output power shall not exceed 1 W.

11.3.EUT Configuration on Measurement

The equipment is installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4.Operating Condition of EUT

11.4.1.Setup the EUT and simulator as shown as Section 11.1.

11.4.2.Turn on the power of all equipment.

11.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5850MHz.

11.5.Test Procedure

11.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

11.5.2.Set RBW = 1-5% of the OBW, VBW ≥ 3 x RBW, Sweep time = auto, Set span to at least 1.5 times the OBW, Detector = RMS.

11.5.3.Measurement the Maximum conducted (average) output power.

11.6.Test Result

For detailed test plots, please refer to the report ATE20170447 part 4.

The test was performed with 802.11a					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
36	5180	10.76	0.12	10.88	FCC:24 IC:22
48	5240	11.37	0.12	11.49	FCC:24 IC:22
52	5260	11.02	0.12	11.14	FCC:24 IC:23
64	5320	11.52	0.12	11.64	FCC:24 IC:23
100	5500	11.53	0.12	11.65	FCC:24 IC:23
140	5700	11.41	0.12	11.53	FCC:24 IC:23
149	5745	11.02	0.12	11.14	30
165	5825	10.86	0.12	10.98	30

The test was performed with 802.11n20					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
36	5180	10.47	0.13	10.60	FCC:24 IC:23
48	5240	10.72	0.13	10.85	FCC:24 IC:23
52	5260	10.61	0.13	10.74	24
64	5320	10.74	0.13	10.87	24
100	5500	10.68	0.13	10.81	24
140	5700	10.83	0.13	10.96	24

149	5745	10.53	0.13	10.66	30
165	5825	10.39	0.13	10.52	30

The test was performed with 802.11ac20					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
36	5180	10.40	0.13	10.53	FCC:24 IC:23
48	5240	10.73	0.13	10.86	FCC:24 IC:23
52	5260	10.43	0.13	10.56	24
64	5320	10.76	0.13	10.89	24
100	5500	10.78	0.13	10.91	24
140	5700	10.74	0.13	10.87	24
149	5745	10.28	0.13	10.41	30
165	5825	10.41	0.13	10.54	30

The test was performed with 802.11 n40					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
38	5190	9.43	0.26	9.69	FCC:24 IC:23
46	5230	9.03	0.26	9.29	FCC:24 IC:23
54	5270	8.93	0.26	9.19	24
62	5310	8.97	0.26	9.23	24
102	5510	9.20	0.26	9.46	24
134	5670	9.02	0.26	9.28	24
151	5755	8.52	0.26	8.78	30
159	5795	8.58	0.26	8.84	30

The test was performed with 802.11 ac40					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
38	5190	9.42	0.26	9.68	FCC:24 IC:23
46	5230	9.39	0.26	9.65	FCC:24 IC:23
54	5270	9.24	0.26	9.50	24
62	5310	9.11	0.26	9.37	24
102	5510	8.99	0.26	9.25	24

134	5670	8.93	0.26	9.19	24
151	5755	8.27	0.26	8.53	30
159	5795	8.35	0.26	8.61	30

The test was performed with 802.11 ac80					
Channel	Frequency (MHz)	Ave output power (dBm)	10log(1/x)	Final output power (dBm)	Limits dBm / W
42	5210	8.63	0.14	8.77	FCC:24 IC:23
58	5290	9.33	0.14	9.47	24
106	5530	9.59	0.14	9.73	24
155	5775	9.57	0.14	9.71	30

Note: FCC:B is the 26–dB emission bandwidth in MHz
IC:B is the 99% emission bandwidth in MHz

12.RADIATED SPURIOUS EMISSION TEST

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and peripherals

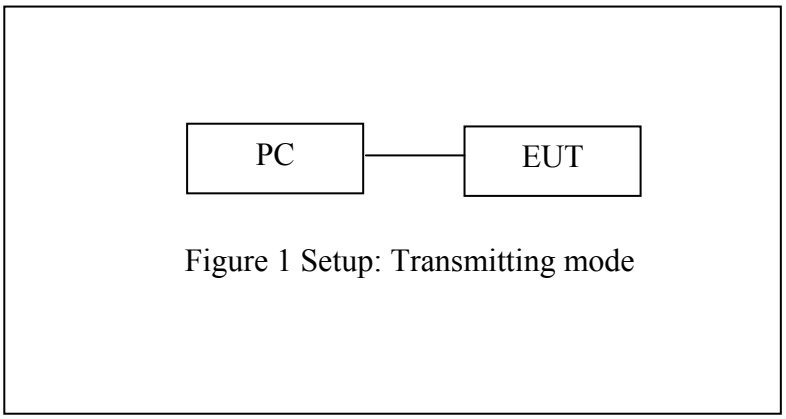
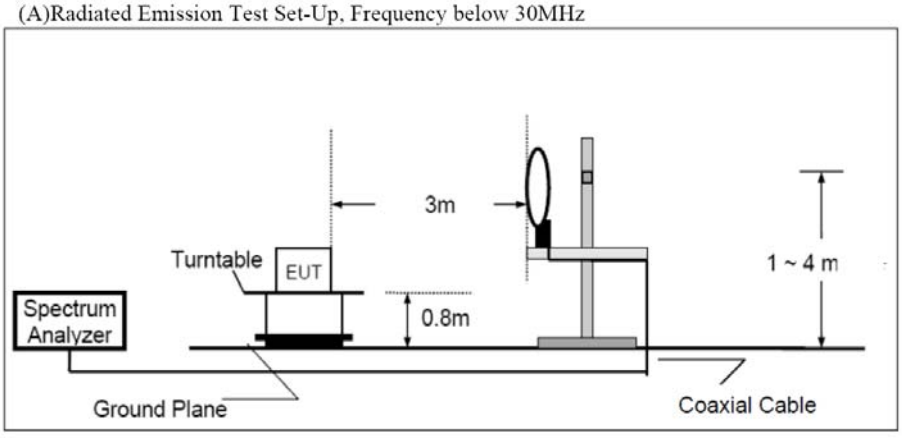


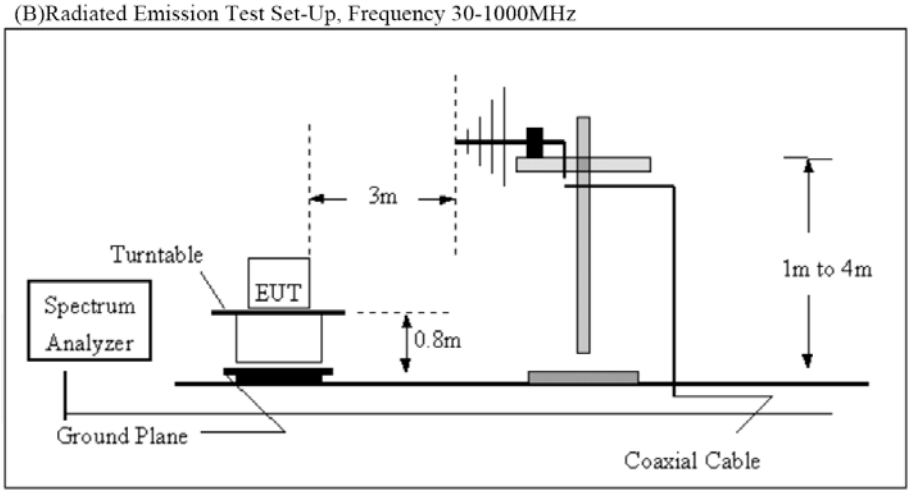
Figure 1 Setup: Transmitting mode

12.1.2.Semi-Anechoic Chamber Test Setup Diagram

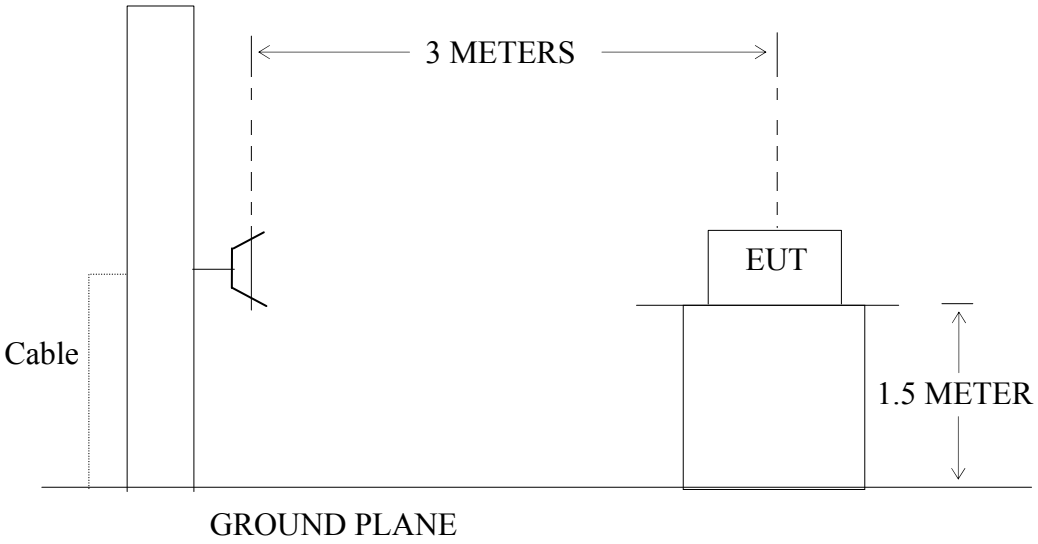
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(B)Radiated Emission Test Set-Up, Frequency 30-1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



12.2.Restricted bands of operation

12.2.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated

based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

12.3. Configuration of EUT on Measurement

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

12.4. The Limit For FCC 15.407&RSS-247

Section 15.407(b): For transmitters operating in the 5.15–5.25 GHz band: all emissions out-side of the 5.15–5.35 GHz band shall not exceed an EIRP of –27dBm/MHz.
For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27dBm/MHz. Devices operating in the 5.25–5.35 GHz band that generate emissions in the 5.15–5.25 GHz band must meet all applicable technical requirements for operation in the 5.15–5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of –27dBm/MHz in the 5.15–5.25 GHz band.
For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of –27dBm/MHz.
For transmitters operating in the 5.725–5.825 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Section RSS-247: For transmitters with operating frequencies in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Any unwanted emissions that fall into the band 5250-5350 MHz shall be attenuated below the channel power by at least 26 dB, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth (i.e. 99% bandwidth), above 5250 MHz. The 26 dB bandwidth may fall into the 5250-5350 MHz band; however, if the occupied bandwidth also falls within the 5250-5350 MHz band, the transmission is considered as intentional and the devices shall comply with all requirements in the band 5250-5350 MHz including implementing dynamic frequency selection (DFS) and TPC, on the portion of the emission that resides in the 5250-5350 MHz band.
Emissions outside the band 5470-5725 MHz shall not exceed -27dBm/MHz e.i.r.p. However, devices with bandwidth overlapping the band edge of 5725MHz can meet the emission limit of -27 dBm/MHz e.i.r.p. at 5850 MHz instead of 5725MHz.
Devices operating in the band 5725-5850MHz with antenna gain of 10dBi or less can have unwanted emissions that comply with either the limits in this section or in section 5.5 until April 1, 2018 for certification.

12.5.Operating Condition of EUT

12.5.1.Setup the EUT and simulator as shown as Section 11.1.

12.5.2.Turn on the power of all equipment.

12.5.3.Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5825MHz.

12.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The frequency range from 9KHz to 40000MHz is checked.
Result = Reading + Corrected Factor
Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

12.7.The Field Strength of Radiation Emission Measurement Results

Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. *: Denotes restricted band of operation.

3. The fundamental radiated emissions were reduced by Band Reject Filter in the attached plots.

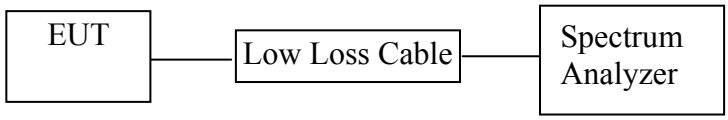
4. The EUT is tested radiation emission at each test mode (802.11a/ac/n) in three axes. The worst emissions are reflected in the following plots.

5. The average measurement was not performed when peak measured data under the limit of average detection.

For detailed test plots, please refer to the report ATE20170447 part 2.

13.BAND EDGE COMPLIANCE TEST

13.1.Block Diagram of Test Setup



13.2.The Requirement For Unwanted Emissions in the Restricted Bands

1. For all measurements, follow the requirements in section II.G.3., "General Requirements for Unwanted Emissions Measurements.
2. At frequencies below 1000 MHz, use the procedure described in section II.G.4., "Procedure for Unwanted Emissions Measurements Below 1000 MHz."
3. At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in sections II.G.5. and II.G.6, respectively, must satisfy the respective peak and average limits.
If all peak measurements satisfy the average limit, then average measurements are not required.
4. For conducted measurements above 1000 MHz, EIRP shall be computed as specified in section II.G.3.b) and then field strength shall be computed as follows (see KDB Publication 412172):
E[dBμV/m] = EIRP[dBm] - 20 log (d[meters]) + 104.77,
where E = field strength and d = distance at which field strength limit is specified in the rules;
E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

13.3.EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

13.4.Operating Condition of EUT

13.4.1.Setup the EUT and simulator as shown as Section 12.1.

13.4.2.Turn on the power of all equipment.

13.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5825MHz.

13.5.Test Procedure

Conducted Band Edge:

13.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

13.5.2.Set RBW of spectrum analyzer to 1000kHz and VBW to 3000kHz.

Radiate Band Edge:

13.5.3.The EUT is placed on a turntable, which is 1.5m above the ground plane and worked at highest radiated power.

13.5.4.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

13.5.5.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

13.5.6.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

13.5.7.RBW=1MHz, VBW=1MHz

13.5.8.The band edges was measured and recorded.

13.6.Test Result

PASS

Note:

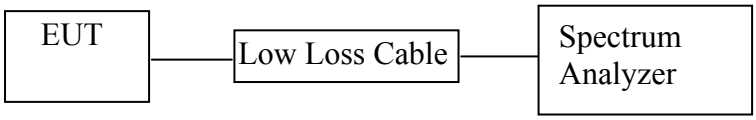
1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

   Result = Reading + Corrected Factor
3. Display the measurement of peak values.
4. The EUT is tested radiation emission at each test mode (802.11a/ac/n) in three axes. The worst emissions are reflected in the following plots.
5. The average measurement was not performed when peak measured data under the limit of average detection.

For detailed test plots, please refer to the report ATE20170447 part 3.

14.FREQUENCIES STABILITY

14.1.Block Diagram of Test Setup



(EUT: UFO Panoramic WiFi HD Camera)

14.2.EUT Configuration on Measurement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual.

14.3.Operating Condition of EUT

14.3.1.Setup the EUT and simulator as shown as Section 13.1.

14.3.2.Turn on the power of all equipment.

14.3.3.Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250, 5250-5350, 5470-5725 and 5725-5825MHz.

14.4.Test Result

PASS

For detailed test plots, please refer to the report ATE20170447 part 4.

15. ANTENNA REQUIREMENT

15.1. The Requirement

According to Section 15.203, 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.

15.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Antenna gain of EUT is 2dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.