



Test Report No.: RF2303WDG0183-2



# TEST REPORT



Applicant	GUANGDONG SYMA MODEL AIRCRAFT INDUSTRIAL CO., LTD
Address	NO.2 West Xingye Road Laimei Industrial Area Chenghai Shantou Guangdong China

Manufacturer or Supplier	GUANGDONG SYMA MODEL AIRCRAFT INDUSTRIAL CO., LTD
Address	NO.2 West Xingye Road Laimei Industrial Area Chenghai Shantou Guangdong China
Product Name	DRONE
Brand Name	Syma
Model	X31
Additional Models & Model Difference	UK-F7MINI, DE-F7MINI, F11MINI2, F11MINI-3B, F11MINI-4B, UK-F11MINI, DE-F11MINI, W4; see items 2.1
Date of tests	May 25, 2023 ~ Jun. 20, 2023

The tests have been carried out according to the requirements of the following standard:

**FCC Part 15, Subpart E, Section 15.407**

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Eric Fang Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
	 Date: Aug. 08, 2023

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2303WDG0183-2	Original release.	Aug. 08, 2023



## 1. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407 UNDER NEW RULE)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emissions	N/A	Powered from battery
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

### 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.70dB
Radiated emissions	9KHz ~ 30MHz	2.80dB
	30MHz ~ 1GMHz	4.24dB
	1GHz ~ 18GHz	4.76dB
	18GHz ~ 40GHz	4.50dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	DRONE
<b>BRAND</b>	Syma
<b>MODEL NO.</b>	X31
<b>ADDITIONAL MODEL</b>	UK-F7MINI, DE-F7MINI, F11MINI2, F11MINI-3B, F11MINI-4B, UK-F11MINI, DE-F11MINI, W4
<b>FCC ID</b>	QV7-GC88752-95
<b>POWER SUPPLY</b>	Airplane: DC 7.6V from Battery
<b>MODULATION TYPE</b>	64QAM, 16QAM, QPSK, BPSK for OFDM
<b>MODULATION TECHNOLOGY</b>	OFDM
<b>TRANSFER RATE</b>	802.11n(HT20): up to 150Mbps
<b>OPERATING FREQUENCY</b>	5180MHz
<b>NUMBER OF CHANNEL</b>	1 channel for 802.11n(20MHz)
<b>CONDUCTED OUTPUT POWER</b>	30.409mW(Maximum AVG Power)
<b>ANTENNA TYPE</b>	External Antenna with 1dBi gain
<b>I/O PORTS</b>	Refer to user's manual
<b>CABLE SUPPLIED</b>	N/A

#### NOTES:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
2. Please refer to the EUT photo document (Reference No.: 2303WDG0183-3) for detailed product photo.
3. Additional models (see above table) are identical with the test model X31 except the color of the appearance and model name for trading purpose.
4. X31 and the additional models (See above table) are the model sold in combination with airplane and remote control, and EUT refers to airplane in this report.
5. The EUT incorporates a SISO function. Physically, the EUT provides 1 completed transmitter and 1 receiver.

MODULATION MODE	FUNCTION
802.11n (HT20)	1TX/1RX



## 2.2 DESCRIPTION OF TEST MODES

### FOR 5150 ~ 5250MHz

1 channel is provided for 802.11n (HT20)

CHANNEL	FREQUENCY
36	5180 MHz



### 2.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	-	√	DC 7.6V From Battery

Where **RE≥1G**: Radiated Emission above 1GHz      **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission      **APCM**: Antenna Port Conducted Measurement

**NOTE:**

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

**NOTE:** “-” means no effect.

#### **RADIATED EMISSION TEST (ABOVE 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (20MHz)	5150-5250	36	36	OFDM	BPSK	6.5

#### **RADIATED EMISSION TEST (BELOW 1GHz):**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (20MHz)	5150-5250	36	36	OFDM	BPSK	6.5

#### **ANTENNA PORT CONDUCTED MEASUREMENT:**

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (20MHz)	5150-5250	36	36	OFDM	BPSK	6.5





**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER(ADAPTER)	TESTED BY
RE<1G	24deg. C, 55%RH	DC 7.6V From Battery	Stalker
RE≥1G	24deg. C, 55%RH	DC 7.6V From Battery	Stalker
PLC	--	--	--
APCM	20deg. C, 55%RH	DC 7.6V From Battery	Yoyo

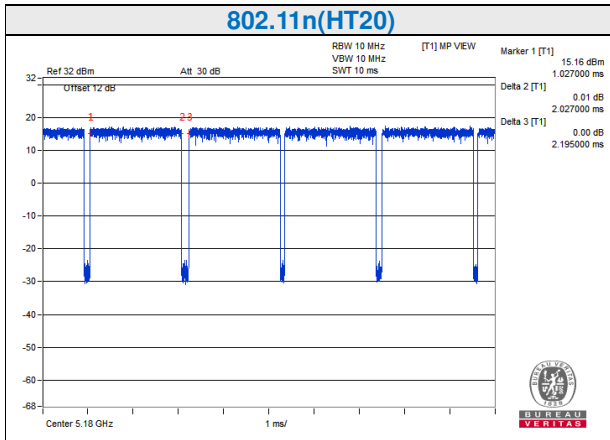


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### 2.3 DUTY CYCLE OF TEST SIGNAL

Test Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty factor (dB)	1/T Min. VBW (KHz)	VBW Setting
802.11n (HT20)	2.027	2.195	92.3	0.35	0.493	500Hz





## 2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together without any other necessary accessories or support units.

## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

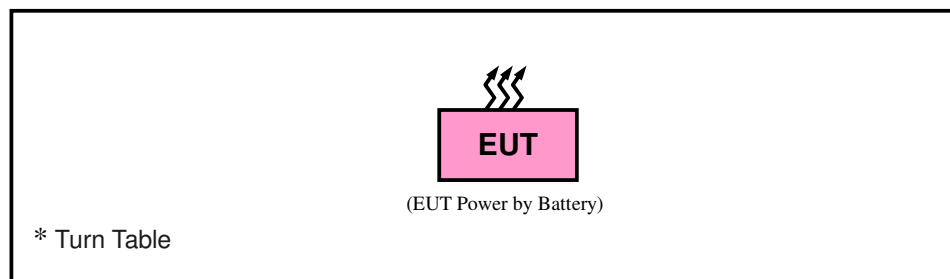
**FCC Part 15, Subpart E (15.407)**

**789033 D02 General UNII Test Procedures New Rules v02r01**

**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards.

## 2.6 CONFIGURATION OF SYSTEM UNDER TEST





### 3. TEST TYPES AND RESULTS

#### 3.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

##### 3.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT 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

**NOTES:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.



3.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedures New Rules v02r01	FIELD STRENGTH AT 3m	
	PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	Note	Note

NOTE: For transmitters operating in the 5.725-5.85 GHz band:

Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the alternative limit.

15.407(b)(4)(i) 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.

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

**3.1.3 TEST INSTRUMENTS**

<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Next Cal.</b>
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Jan. 10, 24
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	Apr. 05, 24
Active Loop Antenna (9KHz -30MHz)	SCHWARZBECK	FMZB 1519B	1519B-045	May. 09, 24
Amplifier (9KHz -1GHz)	Burgeon	BPA-530	100210	Mar. 06, 24
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	9168-554	Jan. 08, 24
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	Apr. 01, 24
Horn Antenna (18GHz -40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170147	Apr. 01, 24
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	May. 20, 24
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A
Broadband Preamplifier (1GHz~18GHz)	SCHWARZBECK	BBV9718	305	Apr. 24, 24
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Jan. 16, 24
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A

**NOTES:**

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
3. The FCC Site Registration No. is 749762.



### 3.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

#### NOTES:

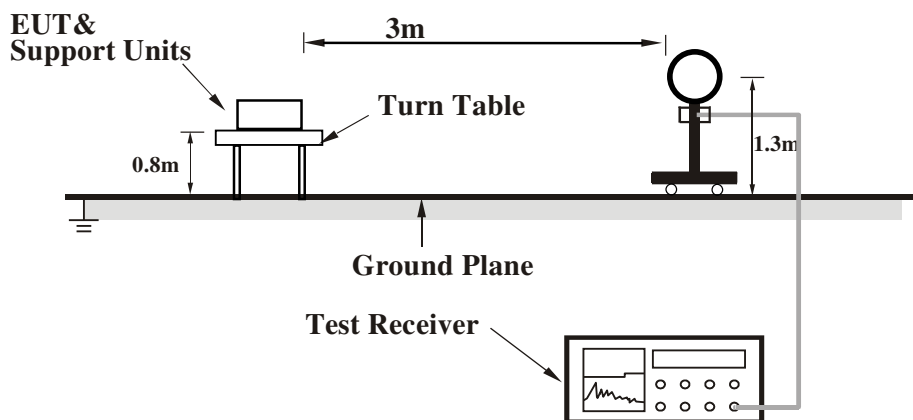
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 3.1.5 DEVIATION FROM TEST STANDARD

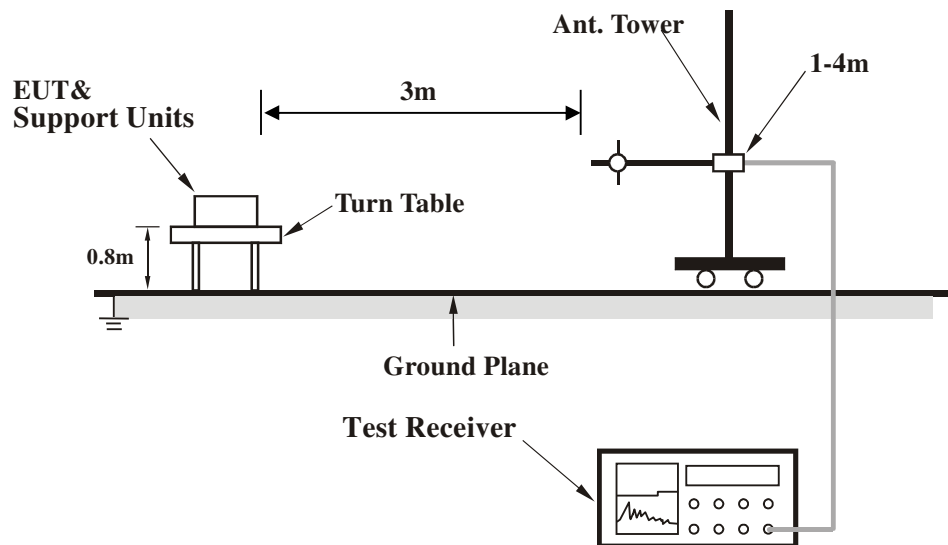
No deviation.

### 3.1.6 TEST SETUP

#### Below 30MHz test setup



#### Below 1GHz test setup

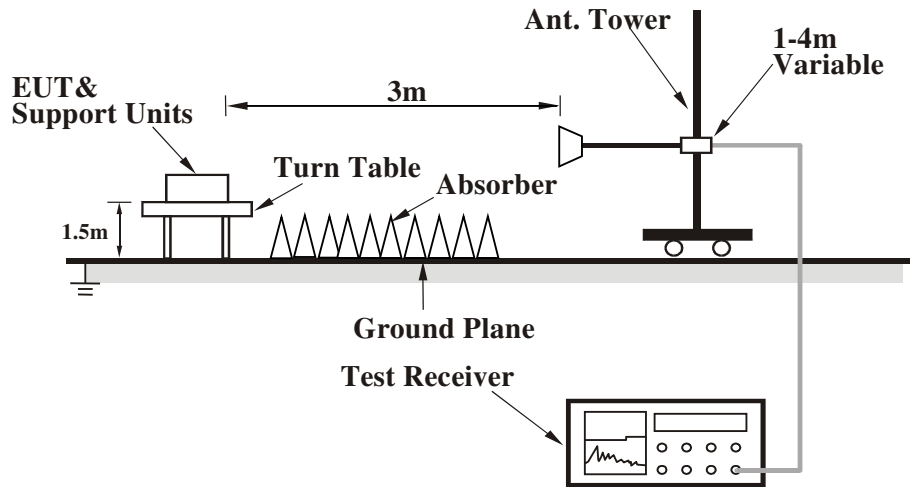


**Note:** For the actual test configuration, please refer to the attached file (Test Setup Photo).





### Above 1GHz test setup



**Note:** For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 3.1.7 EUT OPERATING CONDITION

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



**3.1.8 TEST RESULTS**

**BELOW 1GHz WORST-CASE DATA**

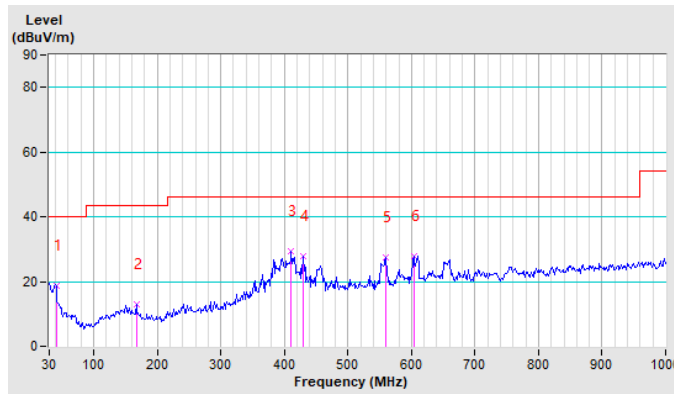
**802.11a**

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>								
<b>NO.</b>	<b>FREQ. (MHz)</b>	<b>EMISSION LEVEL (dBuV/m)</b>	<b>LIMIT (dBuV/m)</b>	<b>MARGIN (dB)</b>	<b>ANTENNA HEIGHT (m)</b>	<b>TABLE ANGLE (Degree)</b>	<b>RAW VALUE (dBuV)</b>	<b>CORRECTION FACTOR (dB/m)</b>
1	40.88	18.52QP	40.00	-21.48	163	113	34.94	-16.42
2	166.79	12.90QP	43.50	-30.60	178	128	29.39	-16.49
3	410.85	29.21QP	46.00	-16.79	211	160	40.38	-11.17
4	429.50	27.98QP	46.00	-18.02	195	145	38.64	-10.66
5	560.08	27.60QP	46.00	-18.40	241	191	35.07	-7.47
6	603.61	27.72QP	46.00	-18.28	226	175	34.39	-6.67

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.

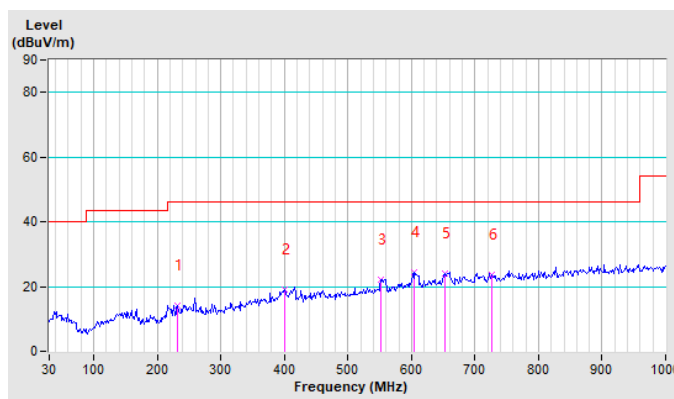


<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	232.08	13.93QP	46.00	-32.07	100	168	30.91	-16.98
2	399.97	19.09QP	46.00	-26.91	171	262	30.56	-11.47
3	552.31	22.11QP	46.00	-23.89	154	246	29.71	-7.60
4	603.61	24.24QP	46.00	-21.76	139	231	30.91	-6.67
5	651.79	23.97QP	46.00	-22.03	125	217	29.44	-5.47
6	726.41	23.68QP	46.00	-22.32	111	203	27.97	-4.29

**REMARKS:**

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.





Band 1 (5150-5250MHz): ABOVE 1GHz DATA

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5144.87	68.90 PK	74.00	-5.10	2.3 H	38	60.21	8.69
2	5144.87	47.11 AV	54.00	-6.89	2.3 H	38	38.42	8.69
3	5150.00	69.31 PK	74.00	-4.69	2.3 H	38	60.65	8.66
4	5150.00	50.93 AV	54.00	-3.07	2.3 H	38	42.27	8.66
5	*5180.00	108.67 PK			2.3 H	38	100.19	8.48
6	*5180.00	99.69 AV			2.3 H	38	91.21	8.48
7	#10360.00	55.19 PK	68.20	-13.01	1.6 H	80	40.82	14.37
8	15540.00	62.21 PK	74.00	-11.79	1.0 H	80	40.26	21.95
9	15540.00	50.51 AV	54.00	-3.49	1.0 H	80	28.56	21.95

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

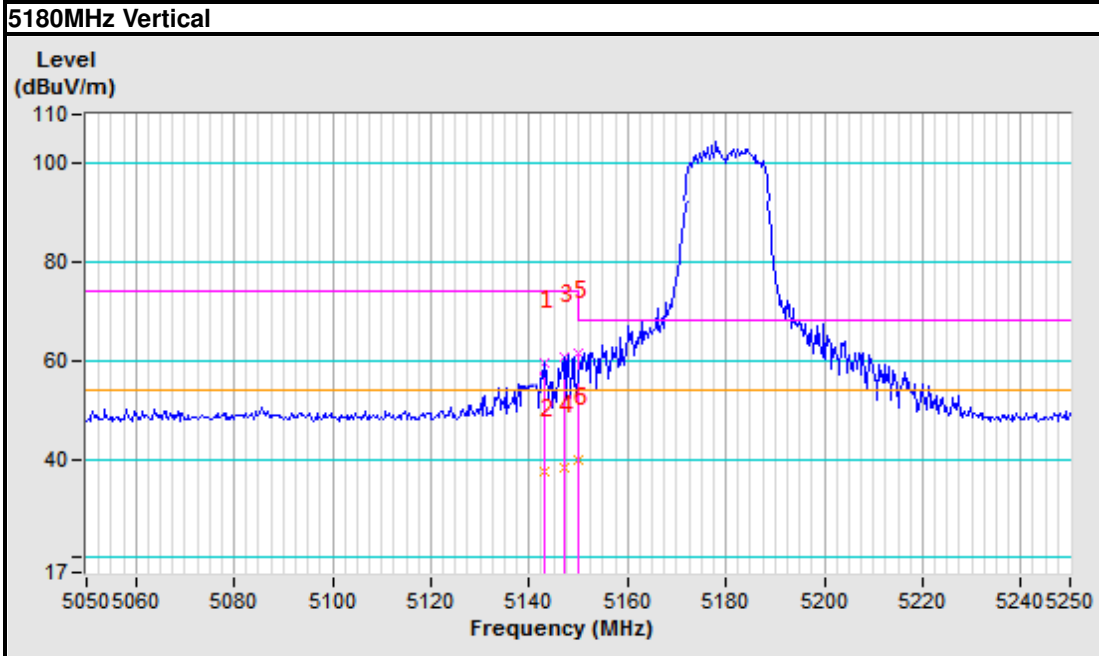
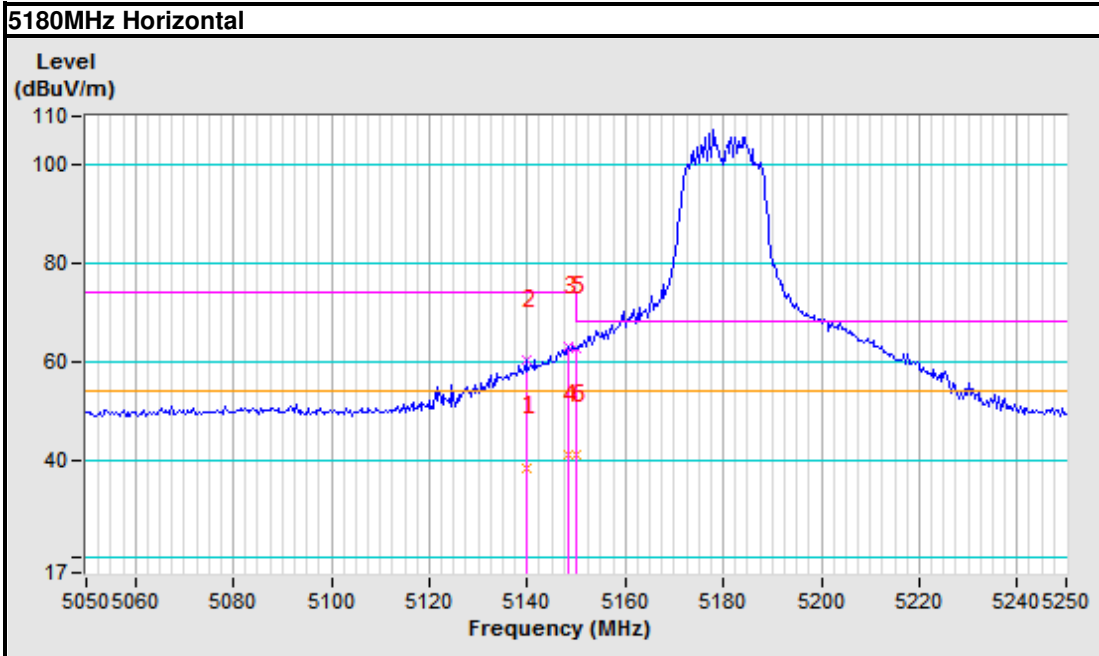
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5144.87	63.20 PK	74.00	-10.80	2.8 V	80	54.51	8.69
2	5144.87	43.01 AV	54.00	-10.99	2.8 V	80	34.32	8.69
3	5150.00	62.88 PK	74.00	-11.12	2.8 V	80	54.22	8.66
4	5150.00	45.89 AV	54.00	-8.11	2.8 V	80	37.23	8.66
5	*5180.00	103.89 PK			2.8 V	80	95.41	8.48
6	*5180.00	92.68 AV			2.8 V	80	84.20	8.48
7	#10360.00	56.39 PK	68.20	-11.81	1.00 V	31	42.02	14.37
8	15540.00	60.31 PK	74.00	-13.69	1.7 V	80	38.36	21.95
9	15540.00	50.53 AV	54.00	-3.47	1.7 V	80	28.58	21.95

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were greater than 20dB margin.
4. Margin value = Emission level – Limit value.
5. " \* ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.



### Band edge Plot



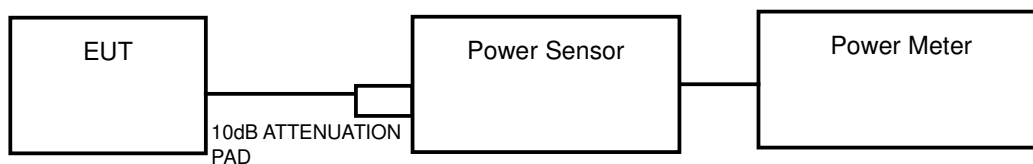
## 3.2 TRANSMIT POWER MEASUREMENT

### 3.2.1 LIMITS OF TRANSMIT POWER MEASUREMENT

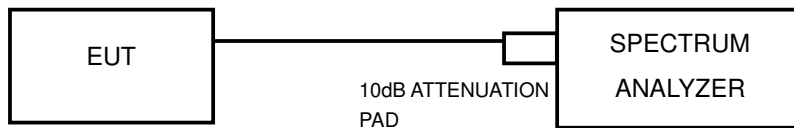
Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250mW (24 dBm)
U-NII-2A			250mW(24dBm) or 11 dBm+10LogB*
U-NII-2C			250mW(24dBm) or 11 dBm+10LogB*
U-NII-3			1 Watt (30 dBm)

**NOTE:** 1. Where B is the 26dB emission bandwidth in MHz.

### 3.2.2 TEST SETUP



#### FOR 6/26dB BANDWIDTH





### 3.2.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Power Sensor	Keysight	U2021XA	MY57320002	Jan. 11, 24
Power Meter	Anritsu	ML2495A	1139001	Aug. 22, 23
Power Sensor	Anritsu	MA2411B	1531155	Aug. 22, 23
Digital Multimeter	FLUKE	15B	A1220010DG	N/A
Humid & Temp Programmable Tester	Haida	HD-225T	110807201	Nov. 02, 23
Oscilloscope	Agilent	DSO9254A	MY51260160	Jul. 27, 23
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV40	101094	Jan. 11, 24
Signal Generator	Agilent	N5183A	MY50140980	Jul. 20, 23
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Jul. 20, 23
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	N/A
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A
DC Source	Keysight	E3642A	MY56146098	N/A
Test software	ADT	ADT_RF Test Software V6.6.5.3	N/A	N/A

**NOTES:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 3.2.4 TEST PROCEDURE

**FOR AVERAGE POWER MEASUREMENT**

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

**FOR 26dB BANDWIDTH**

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = RMS.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak 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%.



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### 3.2.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.





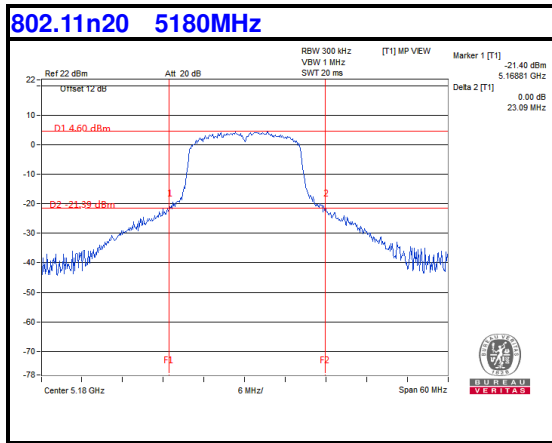
### 3.2.7 TEST RESULTS

#### OUTPUT POWER:

#### 802.11n (20MHz)

CHANNEL NUMBER	FREQ. (MHz)	AVG. CONDUCTED POWER (dBm)	AVG. CONDUCTED POWER (mW)	LIMIT (dBm)	PASS / FAIL
36	5180	14.83	30.409	24.00	PASS

#### 26dB bandwidth Test Plot For 5150-5250MHz

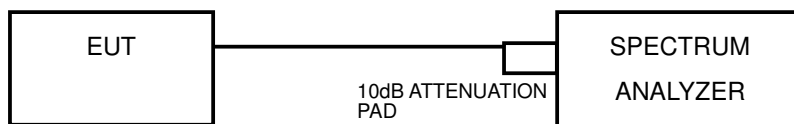


### 3.3 PEAK POWER SPECTRAL DENSITY MEASUREMENT

#### 3.3.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3			30dBm/ 500kHz

#### 3.3.2 TEST SETUP



#### 3.3.3 TEST INSTRUMENTS

Refer to section 3.2.3 to get information of above instrument.

#### 3.3.4 TEST PROCEDURES

##### For U-NII-1 band:

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1MHz, Set VBW =3 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to “free run”.
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle)



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### 3.3.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.3.6 EUT OPERATING CONDITIONS

Same as 3.3.6



### 3.3.7 TEST RESULTS

For U-NII-1:

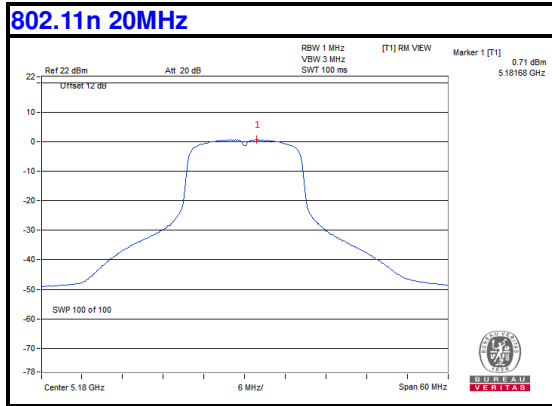
802.11n (20MHz)

Channel Number	Frequency (MHz)	RF Power Level in 1MHz BW (dBm)	MAX. Limit (dBm)	PASS / FAIL
36	5180	0.71	11.00	PASS

Note: Refer to section 2.3 for duty cycle spectrum plot.

### PSD Test Plot

BAND 1  
5150-5250MHz

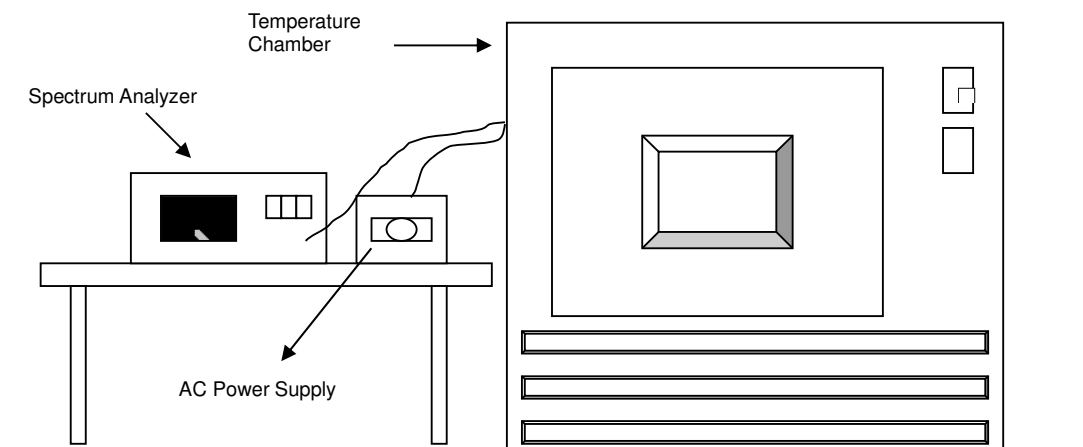


### 3.4 FREQUENCY STABILITY

#### 3.4.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency of the carrier signal shall be maintained within band of operation.

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST INSTRUMENTS

Refer to section 3.2.3 to get information of above instrument.



### 3.4.4 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

### 3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4.6 EUT OPERATING CONDITION

Set the EUT transmit at un-modulation mode to test frequency stability.



3.4.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift
50	120	5179.9838	-0.00031	5179.9843	-0.00030	5179.9858	-0.00027	5179.9876	-0.00024
40	120	5179.9932	-0.00013	5179.9913	-0.00017	5179.9917	-0.00016	5179.9917	-0.00016
30	120	5180.015	0.00029	5180.0144	0.00028	5180.0143	0.00028	5180.0172	0.00033
20	120	5179.9792	-0.00040	5179.9776	-0.00043	5179.9819	-0.00035	5179.9796	-0.00039
10	120	5180.0084	0.00016	5180.0052	0.00010	5180.0098	0.00019	5180.0054	0.00010
0	120	5179.9963	-0.00007	5179.9942	-0.00011	5179.9966	-0.00007	5179.9924	-0.00015
-10	120	5179.9855	-0.00028	5179.9875	-0.00024	5179.9862	-0.00027	5179.989	-0.00021
-20	120	5179.9943	-0.00011	5179.9917	-0.00016	5179.9953	-0.00009	5179.9959	-0.00008
-30	120	5179.977	-0.00044	5179.9769	-0.00045	5179.9771	-0.00044	5179.9762	-0.00046

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift	Measured Frequency (MHz)	Frequency Drift
20	138	5179.9792	-0.00040	5179.9786	-0.00041	5179.9821	-0.00035	5179.9797	-0.00039
	120	5179.9792	-0.00040	5179.9776	-0.00043	5179.9819	-0.00035	5179.9796	-0.00039
	102	5179.9802	-0.00038	5179.9779	-0.00043	5179.9814	-0.00036	5179.9786	-0.00041



**BUREAU  
VERITAS**

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#### **4. PHOTOGRAPHS OF THE TEST CONFIGURATION**

Please refer to the attached file (Test Setup Photo).





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## **5. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No modifications were made to the EUT by the lab during the test.

**---END---**