

#### 8.OUT OF BAND EMISSIONS

#### 8.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

### (2)

(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.

#### 8.2 TEST PROCEDURE

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

	8.	3	DE\	/IAT	ION	FROM	STA	AND/	ARD
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No deviation.

8.4 TEST SETUP

EUT	SPECTRUM
	ANALYZER





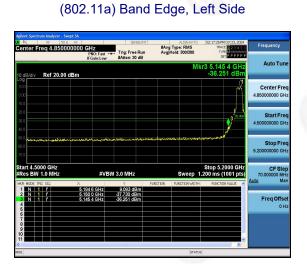
### 8.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 8.6 TEST RESULTS

Temperature :	<b>26</b> ℃	Relative Humidity :	54%
Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz

# 5.180~5.240 GHz



#### (802.11a) Band Edge, Right Side





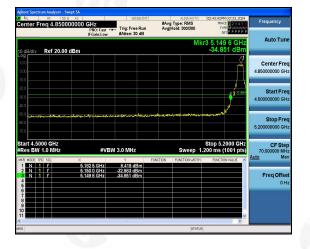




# 5.180~5.240 GHz

### (802.11n20) Band Edge, Left Side





(802.11 n20) Band Edge, Right Side

	RF 50 g		SENSE:INT	ALIGNAUTO	03:02:58 PM Oct 23, 2024	-
enter F	req 4.85000	10000 GHz PNO: Fast IFGain:Low		#Avg Type: RMS Avg[Hold: 300/300	TRACE 123456 TYPE MUMMUMUM DET PPPPP	Frequency
0 dB/div	Ref 20.00 c	jBm		Mk	r3 5.149 6 GHz -33.472 dBm	Auto Tun
. <b>og</b> 10.0 0.00						Center Fre 4.850000000 GH
10.0 20.0 30.0					<b>3</b> 20.681	Start Fre 4.500000000 GH
	honisasika kutosa ku	likuran Shihat Arrityo	militer allowed and	สตร์การการการการการการการการการการการการการก	and show the second	Stop Fre 5.200000000 GH
	000 GHz / 1.0 MHz		BW 3.0 MHz		Stop 5.2000 GHz .200 ms (1001 pts)	CF Ste 70.000000 MH Auto Ma
			YF	UNCTION FUNCTION WIDTH	FUNCTION VALUE	ridito mila
KR HODE T	TRC SOL 1 F 1 F 1 F	× 5.177 6 GHz 5.150 0 GHz 5.149 6 GHz	5.734 dBm -31.233 dBm -33.472 dBm			
KR HODE T	1 1	5.177 6 GHz 5.150 0 GHz	-31.233 dBm			Freq Offs 0 F



(802.11n40) Band Edge, Right Side



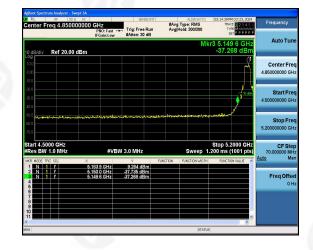




# 5.180~5.240 GHz

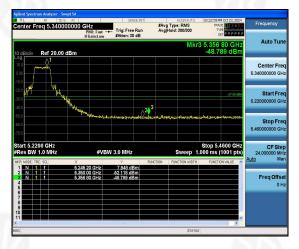
# (802.1ac20) Band Edge, Left Side

# (802.11ac40) Band Edge, Left Side



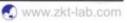
(802.11ac20) Band Edge, Right Side

RL enter Fre	RF 50 9 AC	GHz	SENSE:0	#Avg	ALIGNAUTO Type: RMS	03:27:24 PM Oct 23, 2024 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast - IFGain:Low	#Atten: 30 dB	n Avg	Hold: 300/300	DET PPPPP	
0 dB/div	Ref 20.00 dBm				Mk	r3 5.148 9 GHz -32.089 dBm	Auto Tun
<b>og</b> 10.0							Center Fre
100						<b>/***/</b> *	4.850000000 GH
20.0							Start Fre
10.0						3 00 dBN	4.500000000 GH
10.0 50.0	and the state of the state					and the second second	
0.0	and the debenders and some	white out a	a na hana na mana na m Na mana na mana n				Stop Fre 5.20000000 GH
0.0							0.2000000000
tart 4.5000 Res BW 1.		#VB	W 3.0 MHz		Sweep 1	Stop 5.2000 GHz 200 ms (1001 pts)	CF Ste 70.000000 MH
KR MODE TRC			Y	FUNCTION	FUNCTION WIDTH	FUNCTION WALUE	<u>Auto</u> Ma
1 N 1 2 N 1 3 N 1	f 6	174 1 GHz 150 0 GHz 148 9 GHz	6.129 dBm -33.670 dBm -32.089 dBm				Freq Offse
4		140 2 0112	-02.005 dbm			_	0 H
6							
9							
1						× >	
a					STATUS		



(802.11ac40) Band Edge, Right Side

RL RF 50.9 AC		SENSE:INT	ALIGNAUTO	03:31:40 PM Oct 23, 2024	Frequency
enter Freq 5.33000000	IO GHZ PNO: Fast → IFGain:Low	Trig: Free Run #Atten: 30 dB	#Avg Type: RMS Avg Hold: 300/300	TYPE MUMMUMUM DET PPPPP	Frequency
dB/div Ref 20.00 dBm			Mkr	3 5.357 56 GHz -49.114 dBm	Auto Tun
					Center Free 5.330000000 GH
	- Aug		263	-27.00 dBm	Start Fre 5.200000000 GH
a, a , a , a , a		the and the second s	han and the second s	Nadara (Mining Carlor College	Stop Fre 5.460000000 GH
art 5.2000 GHz Res BW 1.0 MHz		V 3.0 MHz		Stop 5.4600 GHz .000 ms (1001 pts)	CF Stej 26.000000 MH Auto Ma
2 N 1 f 5 3 N 1 f 5 4 5 6 6	213 25 GHz 350 00 GHz 357 56 GHz	4.920 dBm -51.722 dBm -49.114 dBm	INCTION FUNCTION WIDTH	FUNCTION WALLE	Freq Offse
7				~	
			STATU		





# (802.11ac80) Band Edge

### (802.11ac80) Band Edge, Left Side



### (802.11ac80) Band Edge, Right Side







### 9.SPURIOUS RF CONDUCTED EMISSIONS

#### 9.1 CONFORMANCE LIMIT

5	
Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p27 dBm
5725 - 5850	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.

#### 9.2 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

#### 9.3 TEST SETUP



#### 9.4 TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=1MHz and VBW= 3MHz to measure the peak field strength, and measure frequency range from 30MHz to 26.5GHz.

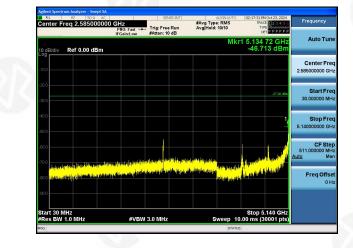
#### 9.5 TEST RESULTS

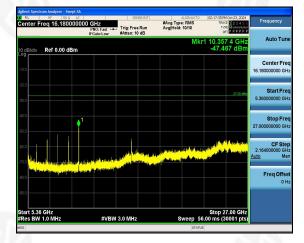
Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. And above 26.5GHz of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.



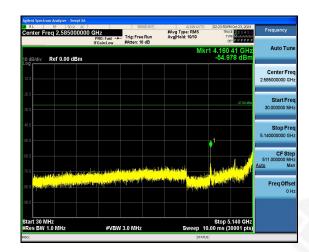


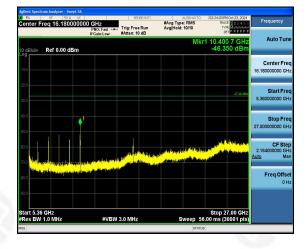
# 802.11a on channel 36





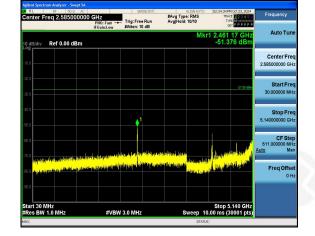
### 802.11a on channel 40







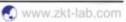
### 802.11a on channel 48





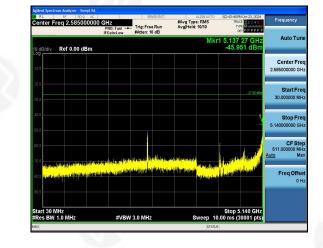
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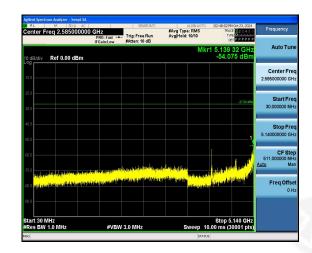


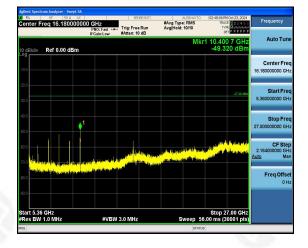
# 802.11n20 on channel 36



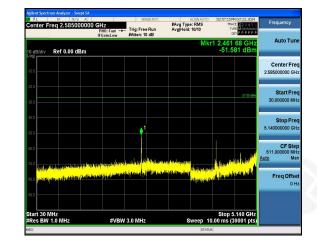


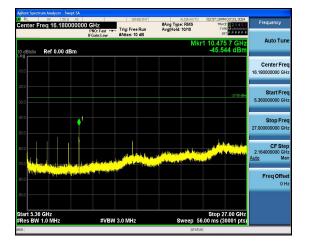
### 802.11n20 on channel 40





### 802.11n20 on channel 48





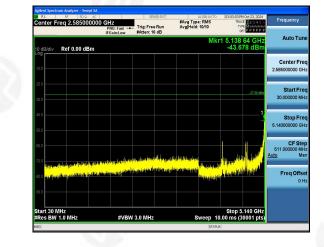
Shenzhen ZKT Technology Co., Ltd.

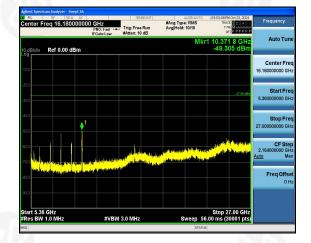
1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

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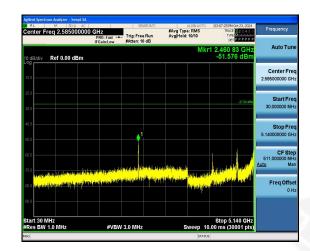


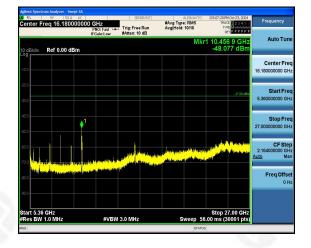
# 802.11n40 on channel 38





### 802.11n40 on channel 46





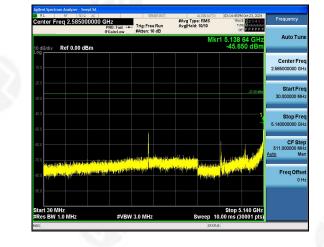
Shenzhen ZKT Technology Co., Ltd. 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

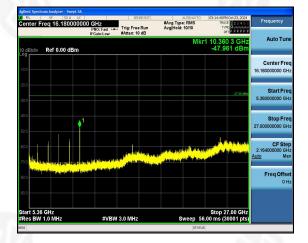
8



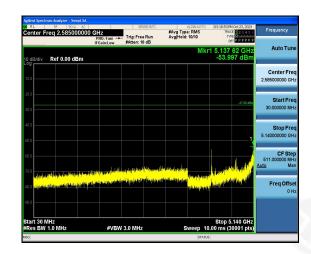


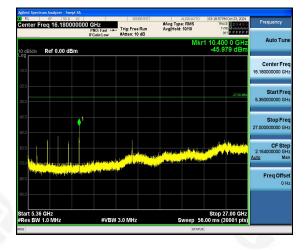
# 802.11ac20 on channel 36



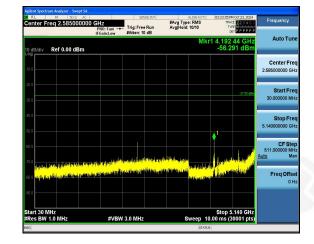


# 802.11ac20 on channel 40





# 802.11ac20 on channel 48





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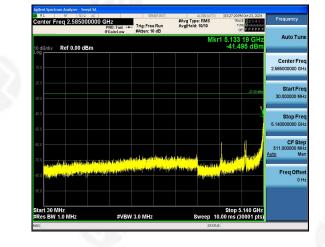
1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

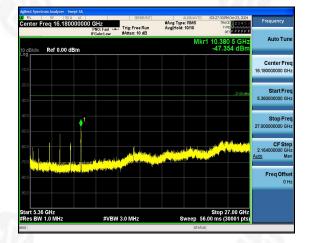
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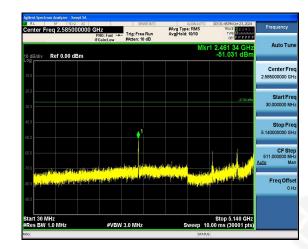


# 802.11ac40 on channel 38





### 802.11ac40 on channel 46



	RF 50.9 AC		SENSE:INT			31:49 PM Oct 23, 2024	Frequency
Center Fred	16.18000000	PNO: Fast Tri	g:FreeRun ten:10dB	#Avg Type: Avg Hold: 10		TRACE 1 2 3 4 5 6 TYPE MWWWWWWW DET P P P P P P	
10 dB/div R	ef 0.00 dBm	IFGain:Low #At	ten: 10 ab		Mkr1 1	0.459 8 GHz 49.902 dBm	Auto Tur
10.0							Center Fre 16.180000000 GF
30.0						-27.00 dBm	Start Fr 5.36000000 G
-40.0							Stop Fr 27.000000000 G
60.0 70.0		المتحد والمتعد والمراجع	halilini oli, kes			<mark>jen vistanska</mark>	CF Ste 2.164000000 GI <u>Auto</u> M
		in the second					Freq Offs 01
30.0 Start 5.36 GH					s	top 27.00 GHz	
Res BW 1.0	MHz	#VBW 3.0	MHz	Sw	eep 56.00	ms (30001 pts)	
ISG					STATUS		







# 802.11ac80 on channel 42









### **10.Frequency Stability Measurement**

#### 10.1 LIMIT

Manufactures 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's manual.

The transmitter center frequency tolerance shall be  $\pm$  20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

#### **10.2 TEST PROCEDURES**

1. The transmitter output (antenna port) was connected to the spectrum analyzer.

2. EUT have transmitted absence of modulation signal and fixed channelize.

- 3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
- 4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
- 5. fc is declaring of channel frequency. Then the frequency error formula is  $(fc-f)/fc \times 106$  ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
- 6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
- 7. Extreme temperature is -20°C~70°C.

#### 10.3 TEST SETUP LAYOUT

EUT	SPECTRUM
	ANALYZER

#### **10.4 EUT OPERATION DURING TEST**

The EUT was programmed to be in continuously un-modulation transmitting mode.

#### 10.5 TEST RESULTS

Т	emperature :	<b>26</b> ℃	Relative Humidity :	54%
F	Pressure :	1012 hPa	Test Voltage :	AC 120V/60Hz
Т	est Mode :	ТХ		









### 80<u>2.11a</u>

	Reference Frequency(Middle Channel): 5200MHz							
	Environment	Power Supplied	Frequency Measure with Time Elapsed					
	Temperature (°C)	(VAC)	MCF	Error (ppm)				
	50	120	0.06	11.538				
	40	120	0.04 0.05	7.692 9.615				
	30	120						
	20	120	0.06	11.538				
	10	120	0.05	9.615				
	0	120	0.07	13.462				
	-10	120	0.05	9.615				
	-20	120	0.04	7.692				
	-30	120	0.05	9.615				

### 802.11n\_HT20

Reference Frequency(Middle Channel): 5200MHz							
Environment	Power Supplied	Frequency Measure with Time Elapsed					
Temperature (°C)	(VAC)	MCF	Error (ppm)				
50	120	0.05	9.615				
40	120	0.06	11.538				
30	120	0.03	5.769				
20	120	0.06	11.538				
10	120	0.05	9.615				
0	120	0.07	13.462				
-10	120	0.06	11.538				
-20	120	0.05	9.615				
-30	120	0.04	7.692				





		/(Middle Channel): 5190MH	
Environment Temperature	Power Supplied	Frequency Measu	re with Time Elapsed
(°C)	(VAC)	MCF	Error (ppm)
50	120	0.06	11.561
40	120	0.05	9.634
30	120	0.05	9.634
20	120	0.07	13.487
10	120	0.05	9.634
0	120	0.06	11.561
-10	120	0.06	11.561
-20	120	0.06	11.561
-30	120	0.05	9.634

# 80<u>2.11 ac20</u>

Reference Frequency(Middle Channel): 5200 MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	MCF	Error (ppm)	
50	120	0.05	9.615	
40	120	0.06	11.538	
30	120	0.07	13.462	
20	120	0.06	11.538	
10	120	0.05	9.615	
0	120	0.05	9.615	
-10	120	0.06	11.538	
-20	120	0.06	11.538	
-30	120	0.05	9.615	
-20	120	0.06	11.538	





#### 802.11ac40

Reference Frequency(Middle Channel): 5190MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	MCF	Error (ppm)	
50	120	0.06	11.561	
40	120	0.06	11.561	
30	120	0.04	7.707	
20	120	0.06	11.561	
10	120	0.05	9.634	
0	120	0.06	11.561	
-10	120	0.05	9.634	
-20	120	0.06	11.561	
-30	120	0.05	9.634	

### 80<u>2.11ac80</u>

Reference Frequency(Middle Channel): 5210MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	MCF	Error (ppm)	
50	120	0.06	11.516	
40	120	0.07	13.436	
30	120	0.05	9.597	
20	120	0.06	11.516	
10	120	0.06	11.516	
0	120	0.05	9.597	
-10	120	0.06	11.516	
-20	120	0.04	7.678	
-30	120	0.05	9.597	



### So, Frequency Stability Versus Input Voltage is:

### 802.11a

	Reference Frequency(Middle Channel): 5200 MHz				
	Environment	Power Supplied	Frequency Measure with Time Elapsed		
	Temperature (°C)	(VAC)	Frequency	Error (ppm)	
B	20	120	0.06	11.538	
		120	0.05	9.615	
		120	0.07	13.462	

### 802.11n\_HT20

Reference Frequency(Middle Channel): 5200 MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	Frequency	Error (ppm)	
20	120	0.06	11.538	
	120	0.07	13.462	
	120	0.06	11.538	

### 802.11n HT40

0 <u>2.11n_HT40</u>	18 N.				
	Reference Frequency(Middle Channel): 5190 MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed			
Temperature (°C)	(VAC)	Frequency	Error (ppm)		
	120	0.05	9.634		
20	120	0.05	9.634		
	120	0.05	9.634		

### 802.11ac20

Reference Frequency(Middle Channel): 5200 MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	Frequency	Error (ppm)	
20	120	0.05	9.615	
	120	0.07	13.462	
	120	0.06	11.538	











### 80<u>2.11ac40</u>

Environment	Power Supplied	Frequency Measure	uency Measure with Time Elapsed	
Temperature (°C)	(VAC)	Frequency	Error (ppm)	
	120	0.06	11.561	
20	120	0.05	9.634	
	120	0.06	11.561	

### 802.11ac80

Reference Frequency(Middle Channel): 5210 MHz				
Environment	Power Supplied	Frequency Measure with Time Elapsed		
Temperature (°C)	(VAC)	Frequency	Error (ppm)	
	120	0.06	11.516	
20	120	0.07	13.436	
	120	0.06	11.516	







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### **11.ANTENNA REQUIREMENT**



# Standard requirement: FCC Part15 C Section 15.203

15.203 requirement:

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is FPCB Antenna, the best case gain of the antenna is 2.13dBi, reference to the appendix II for details

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#### **12. TEST SETUP PHOTO**

Reference to the appendix I for details.

### **13. EUT CONSTRUCTIONAL DETAILS**

Reference to the appendix II for details.

**\*\*\*\*\*\* END OF REPORT \*\*\*\*\*** 

