

TEST REPORT

Verified code: 603826

Report No.:	E202002244903-2	Application No.:	E202002244903
Client:	Winstars Technology Limited		
Address:	1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen China		
Sample Description:	Wireless AC750 Dual-Band Range Extender		
Model:	WS-WN576A2		
Serial Model NO.:	WL-WN576A2, SWV 733 B3 (IAN: 324886)		
Test Location:	Guangzhou GRG Metrology & Test Co., Ltd.		
Test Specification:	ETSI EN 300 328 V2.2.2 (2019-07) Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum		
Issue Date:	2020/05/27		
Test Result:	Pass		
Prepared By: Test Engineer <i>Wu Haoting</i>	Reviewed By: Technical Manager <i>Wu Chengrong</i>	Approved By: Manager <i>Zhu Yan</i>	
Other Aspects:			
Note: /			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			



DIRECTIONS OF TEST

1. This company carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.
2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.
3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.

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1. TEST RESULT SUMMARY

Transmitter Part				
Standard	Item	Standard Clause	Limit	Result
EN300 328:2016 V2.2.2	Maximum Transmit Power	4.3.2.2	20dBm	Complied
	Maximum E.I.R.P Spectral Density	4.3.2.3	10dBm/MHz	Complied
	Duty Cycle, Tx-sequence, Tx-gap	4.3.2.4	Clause 4.3.2.4.3	N/A ^[1]
	Medium Utilisation (MU) factor	4.3.2.5	$MU \leq 10\%$	N/A ^[1]
	Adaptivity	4.3.2.6	IEEE 802.11	Complied
	Occupied Channel Bandwidth	4.3.2.7	2400~2483.5M Hz	Complied
	Transmitter unwanted emissions in the out-of-band domain	4.3.2.8	EN 300 328 Figure 3	Complied
	Transmitter unwanted emissions in the spurious domain	4.3.2.9	EN 300 328 Table 12	Complied

Receiver Part				
Standard	Item	Standard Clause	Limit	Result
EN300 328:2016 V2.2.2	Receiver spurious emissions	4.3.2.10	EN 300 328 Table 13	Complied
	Receiver Blocking	4.3.2.11	Table 14	Complied

Note: [1]: adaptive equipment does not apply.

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Winstars Technology Limited
Address: 1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen, China

2.2 MANUFACTURER

Name: Winstars Technology Limited
Address: 1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen, China

2.3 FACTORY

Name: Winstars Technology Limited
Address: 1-5F, NO.5, Taisong Industrial Zone, Dalang Community, Dalang Street, Longhua District, Shenzhen, China

2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Wireless AC750 Dual-Band Range Extender
Model: WS-WN576A2
Adding Model: WL-WN576A2, SWV 733B3
Model discrepancy: The models are identical to each other except the model name different.
Trade Name: /
Power Supply: AC 100-240V; 50/60Hz; 0.3A
Adapter specification: /
Frequency Range: 2412MHz~2472MHz: 802.11b; 802.11g; 802.11n(HT20)
2422MHz~2462MHz: 802.11n(HT40);
Transmit Power: antenna 0:
17.71dBm for 802.11b mode
18.06dBm for 802.11g mode
antenna 1:
18.29dBm for 802.11b mode
17.94dBm for 802.11g mode
combine with antenna 0 and antenna 1:
17.74dBm for 802.11n HT20 mode
17.34dBm for 802.11n HT40 mode

Modulation type: DSSS for 802.11b mode;
OFDM for 802.11g mode;
OFDM for 802.11n mode.

Channel space: 5MHz

Antenna Specification: Internal antenna 0 with 3.99dBi gain (Max.)
Internal antenna 1 with 4.01dBi gain (Max)

Temperature Range: 0 °C ~+40 °C

Hardware Version: WS-WN578A2-A-V1.2

Software Version: RT76A2.V4330.200519-EU

Note: /

2.5 DESCRIPTION OF ADAPTIVE EQUIPMENT

The type of modulation used by the equipment	<input type="checkbox"/> FHSS	<input checked="" type="checkbox"/> other forms of modulation		
Adaptive / non-adaptive equipment	<input type="checkbox"/> non-adaptive Equipment	<input checked="" type="checkbox"/> adaptive Equipment without the possibility to switch to a non-adaptive mode	<input type="checkbox"/> adaptive Equipment which can also operate in a non-adaptive mode	
The equipment has implemented an	<input type="checkbox"/> Frame Based equipment	<input checked="" type="checkbox"/> Load Based equipment	<input type="checkbox"/> non-LBT based DAA mechanism	<input type="checkbox"/> other
Device Class	<input checked="" type="checkbox"/> WIFI	<input type="checkbox"/> BT 2.1/3.0	<input type="checkbox"/> BT 4.0	<input type="checkbox"/> other
WIFI Channel Bandwidth	<input checked="" type="checkbox"/> 20MHz	<input checked="" type="checkbox"/> 40MHz	<input type="checkbox"/> 80MHz	<input type="checkbox"/> 160MHz
Antenna Gain	<input checked="" type="checkbox"/> Antenna 0 3 dBi	<input type="checkbox"/> Antenna 1 3 dBi	<input type="checkbox"/> Antenna 2 ___ dBi	<input type="checkbox"/> Antenna 3 dBi
Beamforming Gain	<input type="checkbox"/> Yes, ___ dBi	<input checked="" type="checkbox"/> No		
Extreme operating conditions	<input checked="" type="checkbox"/> Operating temperature range:	Min <u>-20</u> °C	Max <u>+40</u> °C	
Blocking	<input checked="" type="checkbox"/> PER	<input type="checkbox"/> The manufacturer may declare alternative performance criteria		
Geo-location capability supported by the equipment	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		

2.6 TEST OPERATION MODES

Test mode: TX mode: EUT continue transmitting in lowest, middle and highest channels.
RX mode: EUT is receiving in lowest and highest channels.

2.7 LOCAL SUPPORTIVE

Instruments:

Name of Equipment	Manufacturer	Model	Serial Number
Notebook	acer	MS2392	NXMPGCN01550311F8C6600

Note :The notebook is just used to produce fixed frequency transmitting.

Test software:

Software version	Test level
QA	802.11b 2412MHz:1C 802.11b 2442MHz:19 802.11b 2472MHz:19 802.11g 2412MHz:1B 802.11g 2442MHz:1C 802.11g 2472MHz:17 802.11n20 2412MHz:19 802.11n20 2442MHz:15 802.11n20 2472MHz:15 802.11n40 2422MHz:1A 802.11n40 2442MHz:18 802.11n40 2462MHz:18

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add. : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China

P.C. : 518000

Telephone : 0755-61180008

Fax : 0755-61180008

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies.

A2LA	Certificate Number 2861.01
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3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT

Measurement	Uncertainty
RF frequency	$\pm 6.0 \times 10^{-6}$
RF power conducted	± 0.78 dB
Occupied channel bandwidth	± 0.4 %
Unwanted emission, conducted	± 0.68 dB
Humidity	± 6 %
Temperature	± 2 °C

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB
	Vertical	30MHz~1000MHz	4.3dB
		1GHz~18GHz	5.6dB

This uncertainty represents an expanded uncertainty factor of $k=2$.

3.4 LIST OF USED TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Maximum transmit power&Maximum e.i.r.p. spectral density & occupied channel bandwidth& Transmitter unwanted emissions in the out-of-band domain				
Simultaneous sampling DAQ	Tonscend	JS0806-2	186060020	2020-11-28
Spectrum Analyzer	Agilent	N9020A	MY50510140	2020-10-24
Temperature& humidity chamber	HOSON	HS01060SDF	1910008401	2020-11-28
Test SW	tonscend	Js1120-2		
Transmitter unwanted emissions in the spurious domain & Receiver spurious emissions				
EMI TEST Receiver	ROHDE&SCHWARZ	ESU26	EMC26-G260	2020-07-16
EXA signal analyzer	Agilent	N9010A	MY52221469	2020-11-18
Bilog Antenna	Schwarzbeck	VULB9160	VULB9160-3401	2020-11-27
Horn Antenna	Schwarzbeck	BBHA9120	D286	2020-11-27
Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170-497	2020-11-30
Amplifier	tonscend	TAP0101848	AP19L80604	/
Amplifier	tonscend	TAP0106030	AP20B806055	/
High Noise Amplifier	Agilent	8449B	3008A02060	2020-11-18
Test SW	tonscend	Js1120-2		
Adaptivity				
Spectrum Analyzer	Agilent	N9020A	MY50510140	2020-10-24
Vector Signal Generator	Agilent	N5182A	MY50142870	2020-11-28
Signal Generator	Anritsu	MG3694A	#050125	2020-11-22
Test SW	tonscend	Js1120-2		
Receiver Blocking				
Signal Generator	Anritsu	MG3694A	#050125	2020-11-22
Wideband radio Communication Tester	R&S	CMW500	144611-nC	2020-08-20
Test SW	tonscend	Js1120-2		

4. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

4.1 MAXIMUM TRANSMIT POWER

4.1.1 LIMITS

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

4.1.2 TEST METHOD

Test channel: 802.11b/g/n20/n40
 Lowest channel: (2412MHz,2422MHz),
 Middle channel: (2442MHz),
 Highest channel: (2472MHz, 2462MHz)

Test condition: Normal and extremes test conditions.

Test condition	Temperature(°C)
Normal condition	+25
Extreme condition	-20
	+40

Test procedure:

1. The EUT was connected to the power meter directly and the power meter has a sample speed faster than 1MS/s. Keep EUT on transmitting mode by the software provided by manufacturer and test in lowest, middle, highest channels.
2. The test procedure refer to EN 300 328 clause 5.4.2.2.1 for conducted measurement.
3. $EIRP = \text{Conducted Power} + \text{Antenna Gain}$.

Remark: Pre-scan all the rate, found that:
 11Mbps of rate is the worst case of 802.11b;
 54Mbps of rate is the worst case of 802.11g ;
 130Mbps of rate is the worst case of 802.11n20 ;
 270Mbps of rate is the worst case of 802.11n40;

4.1.3 TEST SETUP



4.1.4 TEST RESULTS

802.11 b mode (antenna 0):			
Low channel 2412			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.23	17.23	20
0	14.47	17.47	20
+40	14.48	17.48	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.50	17.50	20
0	14.62	17.62	20
+40	14.65	17.65	20
High channel 2472			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.59	17.59	20
0	14.83	17.83	20
+40	14.75	17.75	20
TEST RESULTS: The EUT meets the requirements.			

802.11 b mode (antenna 1):			
Low channel 2412			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.18	17.18	20
0	14.36	17.36	20
+40	14.53	17.53	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	15.05	18.05	20
0	15.30	18.30	20
+40	15.24	18.24	20
High channel 2472			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	15.10	18.10	20
0	15.20	18.20	20
+40	15.25	18.25	20
TEST RESULTS: The EUT meets the requirements.			

802.11g mode (antenna 0):			
Low channel 2412			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.59	17.59	20
0	14.63	17.63	20
+40	14.62	17.62	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.85	17.85	20
0	14.90	17.90	20
+40	15.04	18.04	20
High channel 2472			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.68	17.68	20
0	14.80	17.80	20
+40	14.96	17.96	20
TEST RESULTS: The EUT compliant the requirements.			

802.11g mode (antenna 1):			
Low channel 2412			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	12.78	15.78	20
0	12.80	15.80	20
+40	12.89	15.89	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.89	17.89	20
0	15.12	18.12	20
+40	15.06	18.06	20
High channel 2472			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	12.87	15.87	20
0	12.98	15.98	20
+40	13.21	16.21	20
TEST RESULTS: The EUT compliant the requirements.			

802.11n20 mode (combine with antenna 0 and antenna 1):			
Low channel 2412			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.44	17.44	20
0	14.61	17.61	20
+40	14.72	17.72	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.14	17.14	20
0	14.21	17.21	20
+40	14.22	17.22	20
High channel 2472			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.58	17.58	20
0	14.67	17.67	20
+40	17.75	17.75	20
TEST RESULTS: The EUT compliant the requirements.			

802.11n40 mode (combine with antenna 0 and antenna 1):			
Low channel 2422			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	13.89	16.89	20
0	14.09	17.09	20
+40	14.17	17.17	20
Middle channel 2442			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.23	17.23	20
0	14.35	17.35	20
+40	14.24	17.24	20
High channel 2462			
Measurement Conditions	Conducted Power (dBm)	e.i.r.p. (dBm)	Limit (dBm)
Temperature(°C)			
+25	14.17	17.17	20
0	14.30	17.30	20
+40	14.41	17.41	20
TEST RESULTS: The EUT compliant the requirements.			

4.2 MAXIMUM E.I.R.P. SPECTRAL DENSITY

4.2.1 LIMITS

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

4.2.2 TEST METHOD

Test channel: 802.11b/g/n20/n40
Lowest channel: (2412MHz,2422MHz),Middle channel: (2442MHz),
Highest channel: (2462MHz,2472MHz)

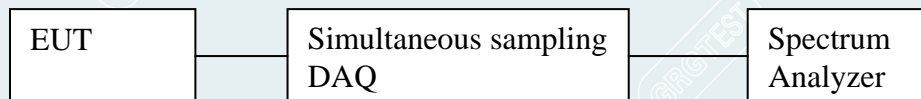
Test condition: Normal test conditions.

Test procedure:

1. Connect a low attenuation cable from the antenna port to the spectrum.
2. Set spectrum analyzer according 5.4.3.2.1
3. Find the peak value of the power envelope. Save the trace.

Remark: Pre-scan all the rate, found that:
11Mbps of rate is the worst case of 802.11b;
54Mbps of rate is the worst case of 802.11g ;
130Mbps of rate is the worst case of 802.11n20;
270Mbps of rate is the worst case of 802.11n40;

4.2.3 TEST SETUP



4.2.4 TEST RESULTS

802.11b mode (antenna 0):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	8.70	10dBm/MHz
Middle	9.10	10dBm/MHz
Highest	9.13	10dBm/MHz

802.11 b mode (antenna 1):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	8.71	10dBm/MHz
Middle	9.48	10dBm/MHz
Highest	9.62	10dBm/MHz

802.11 g mode (antenna 0):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	9.42	10dBm/MHz
Middle	9.66	10dBm/MHz
Highest	9.57	10dBm/MHz

802.11 g mode (antenna 1):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	4.90	10dBm/MHz
Middle	7.51	10dBm/MHz
Highest	4.94	10dBm/MHz

TEST RESULTS: The EUT meets the requirements.

802.11 n20 mode (combine with antenna 0 and antenna 1):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	6.95	10dBm/MHz
Middle	7.42	10dBm/MHz
Highest	7.56	10dBm/MHz

802.11n40 mode (combine with antenna 0 and antenna 1):

Channel	Power density (dBm/MHz)	Limit (dBm/MHz)
Lowest	4.07	10dBm/MHz
Middle	3.82	10dBm/MHz
Highest	3.78	10dBm/MHz

TEST RESULTS: The EUT meets the requirements.

4.3 ADAPTIVITY

4.3.1 DEFINITION

Adaptive Frequency Hopping using LBT based DAA is a mechanism by which a given hopping frequency is made unavailable because signal was detected before any transmission on that frequency.

The different steps below define the procedure to verify the efficiency of the LBT based adaptive mechanism of equipment using wide band modulations other than FHSS. This method can be applied on Load Based Equipment and Frame Based Equipment.

Load based equipment:

- 1) Before a transmission or a burst of transmissions, the equipment shall perform a Clear Channel Assessment (CCA) check using energy detect. The equipment shall observe the operating channel for the duration of the CCA observation time which shall be not less than 20 μ s. The channel shall be considered occupied if the energy level in the channel exceeds the threshold given in step 5 below. If the equipment finds the channel to be clear, it may transmit immediately. The CCA time used by the equipment shall be declared by the supplier.
- 2) If the equipment finds the channel occupied, it shall not transmit on this channel. The equipment shall perform an Extended CCA check in which the channel is observed for the duration of a random factor R multiplied by the CCA observation time. R defines the number of clear idle slots resulting in a total idle period that needs to be observed before initiation of the transmission. The value of R shall be randomly selected in the range 1...q every time an extended CCA is required and the value stored in a counter. The value of q is selected by the manufacturer in the range 4.32. This selected value shall be declared by the manufacturer. The counter is decremented every time a CCA slot is considered to be "unoccupied". When the counter reaches zero, the equipment may transmit.
- 3) The total time that an equipment makes use of a RF channel is defined as the Channel Occupancy Time. This Channel Occupancy Time shall be less than $(13/32)*q$ ms, with q as defined in 2) above, after which the device shall perform the Extended CCA described in 1) above.
- 4) The equipment, upon correct reception of a packet which was intended for this equipment can skip CCA and immediately proceed with the transmission of management and control frames. A consecutive sequence of transmissions by the equipment without a new CCA shall not exceed the maximum channel occupancy time as defined in 3) above.
- 5) The detection threshold shall be proportional to the transmit power of the transmitter: for a 20 dBm e.i.r.p. transmitter the detection threshold level (TL) shall be equal or lower than -70 dBm/MHz at the input to the receiver (assuming a 0 dBi receive antenna). For power levels below 20 dBm e.i.r.p., the detection threshold level may be relaxed to $TL = -70 \text{ dBm/MHz} + 20 - P_{out} \text{ e.i.r.p.}$ (P_{out} in dBm) Channel Occupancy Time.

4.3.2 TEST METHOD

Test condition:

Keep the EUT on a normal channel working mode.

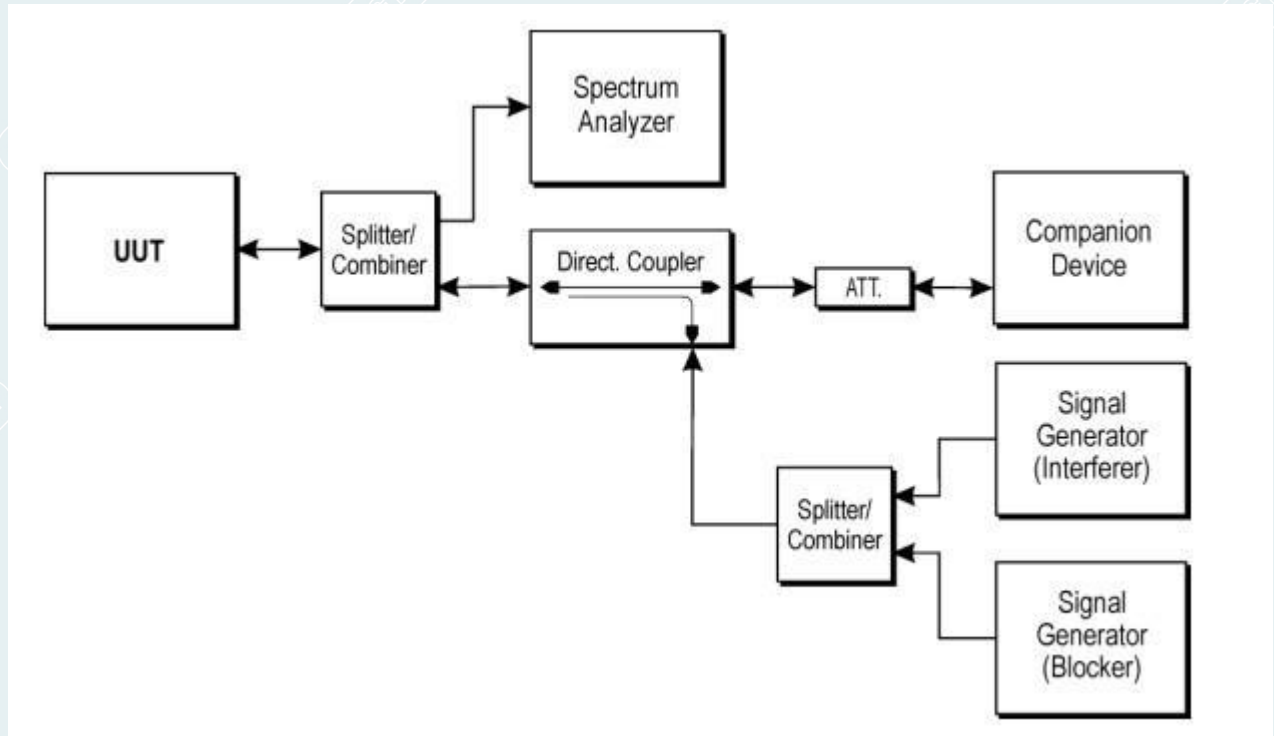
Test procedure:

The test procedure refer to EN 300 328 clause 5.4.6.2.1 for conducted measurement.

Remark:

/

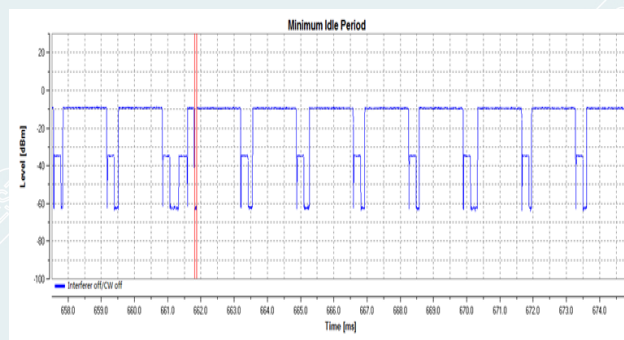
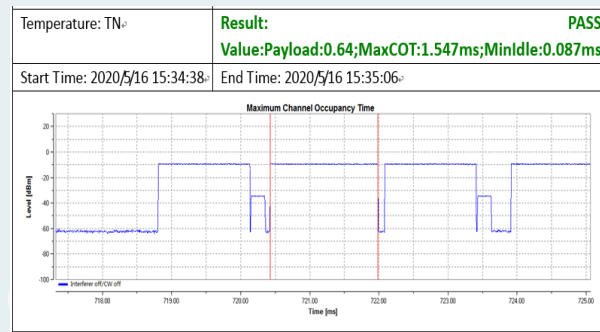
4.3.3 TEST SETUP



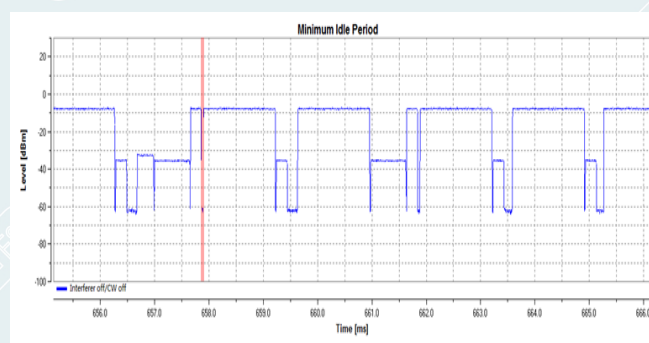
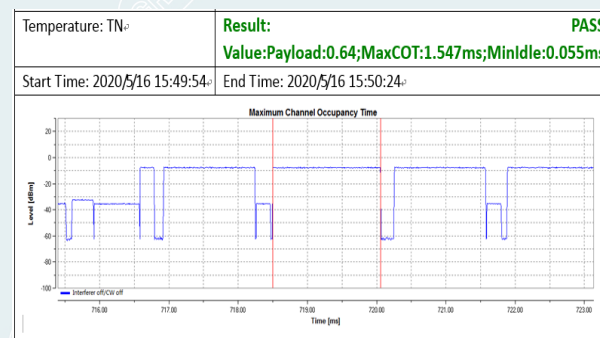
4.3.4 TEST RESULTS

Channel Occupancy Time and Clear Channel Assessment Measured Results			
Mode	Freq. (MHz)	Channel Occupancy Time (ms)	Clear Channel Assessment (us)
802.11b mode	2412	1.547	87
	2472	1.547	55
802.11g mode	2412	1.648	71
	2472	1.648	71
802.11n 20MHz mode	2412	4.037	61
	2472	4.037	71
802.11n 40MHz mode	2422	2.443	71
	2462	2.443	71
Limit		13	18-160

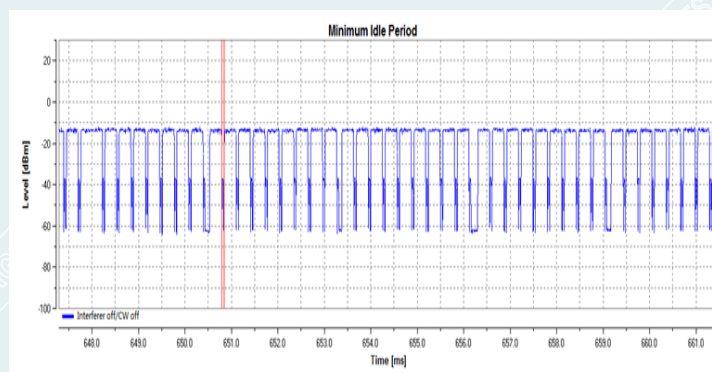
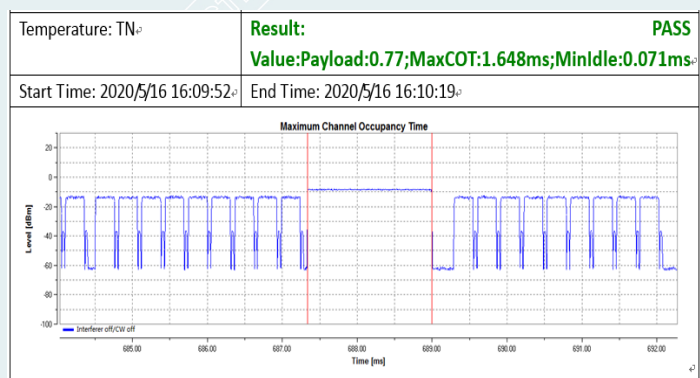
Adaptivity Test schematic graphic
802.11b mode:
Channel 2412MHz:



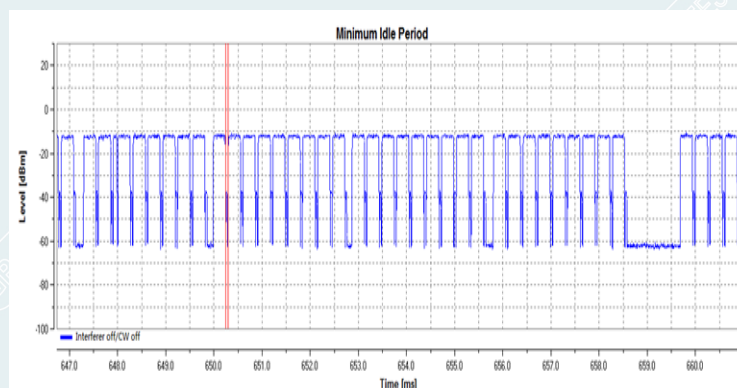
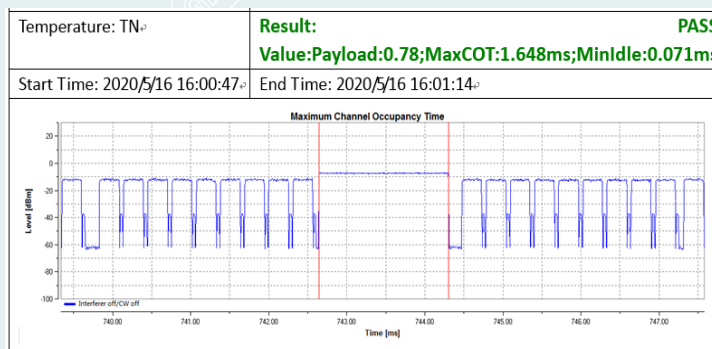
802.11b mode:
Channel 2472MHz:



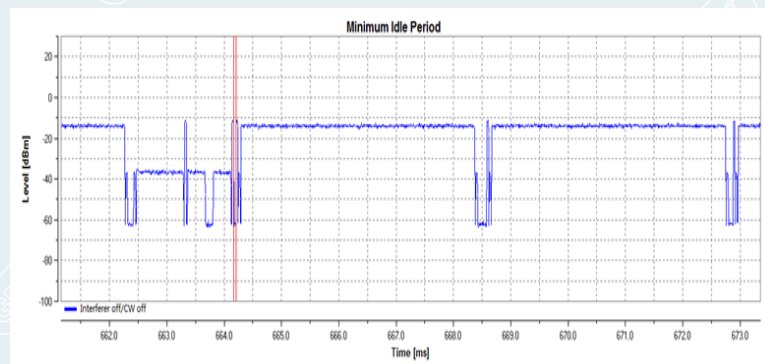
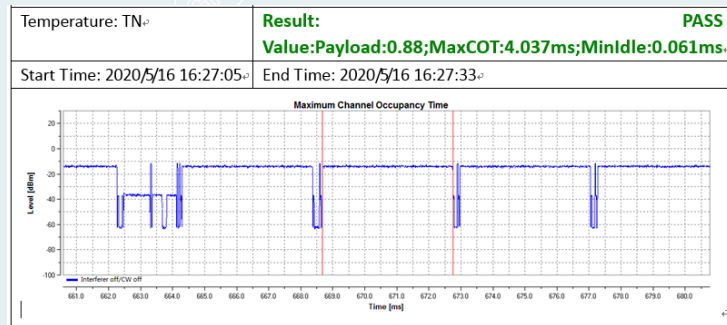
802.11g mode:
Channel 2412MHz:



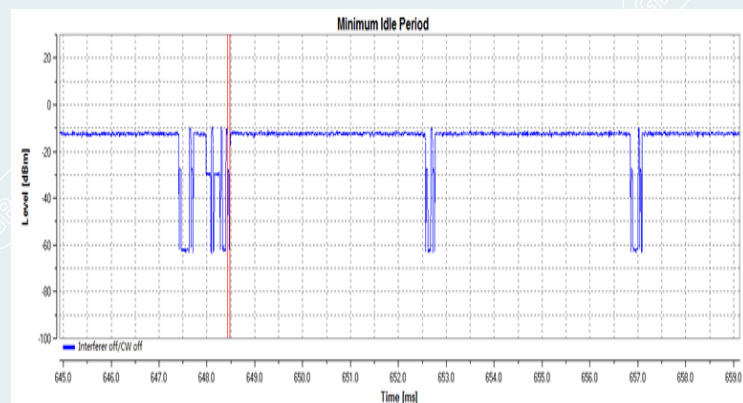
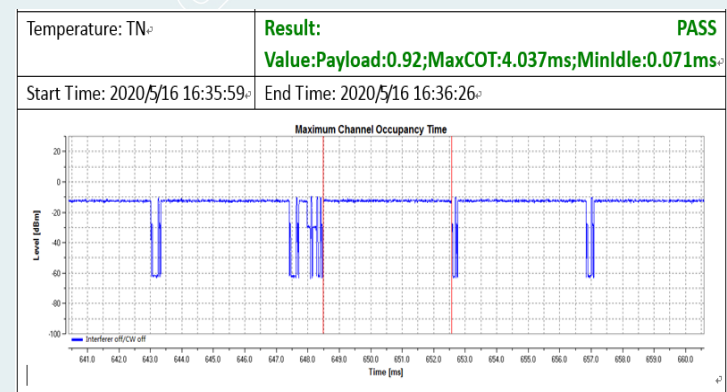
802.11g mode:
Channel 2472MHz:



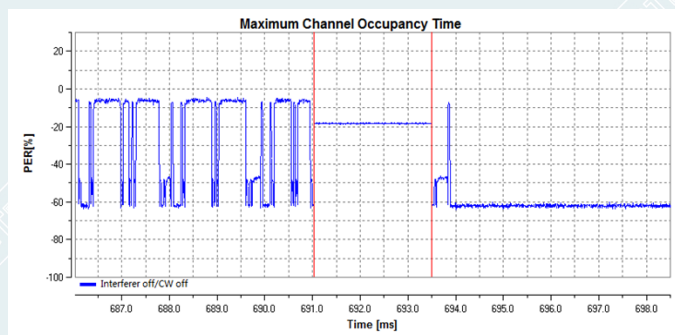
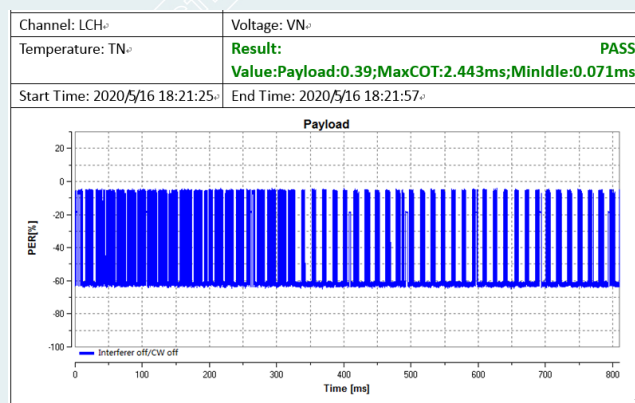
802.11n20 mode:
Channel 2412MHz:



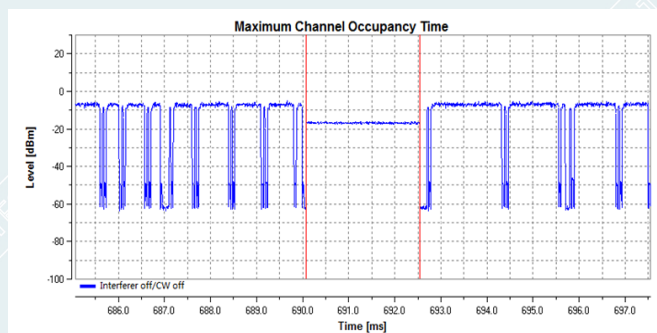
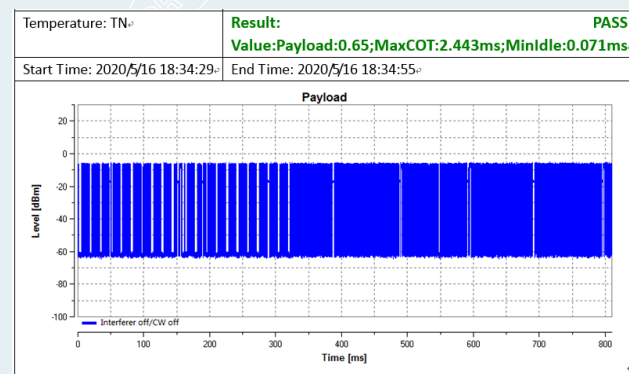
802.11n20 mode:
Channel 2472MHz:



802.11n40 mode:
Channel 2422MHz:



802.11n40 mode:
Channel 2462MHz:

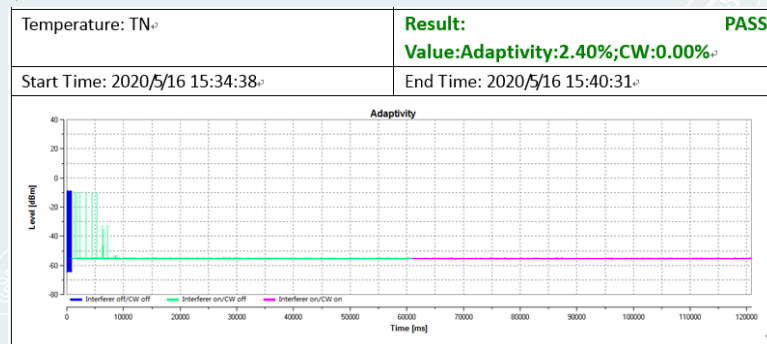


Mode	Stop time after interfering signal(s)		unwanted Signal Power (dBm)	
	Low	High	Low	High
802.11b mode	Pass	Pass	-35	-35
802.11g mode	Pass	Pass	-35	-35
802.11n HT20 mode	Pass	Pass	-35	-35
802.11n HT40 mode	Pass	Pass	-35	-35

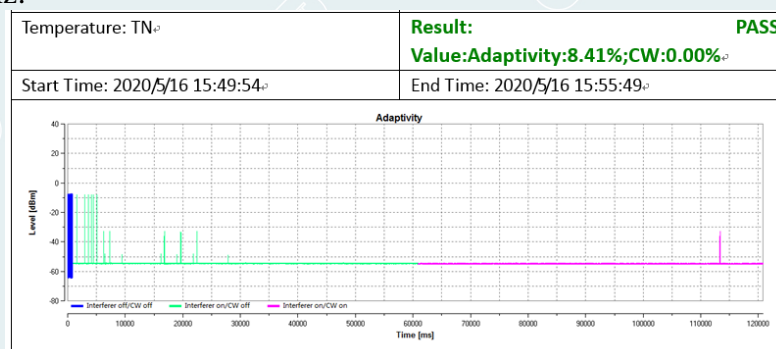
Adaptivity Test schematic graphic

802.11b mode:

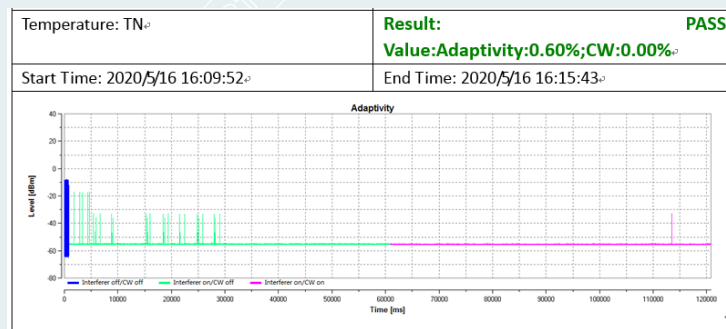
Channel 2412MHz:



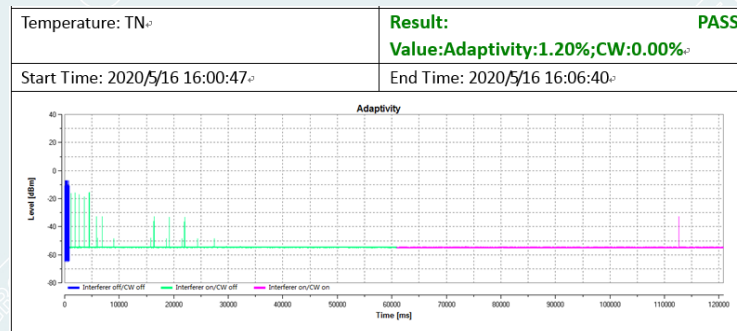
Channel 2472MHz:



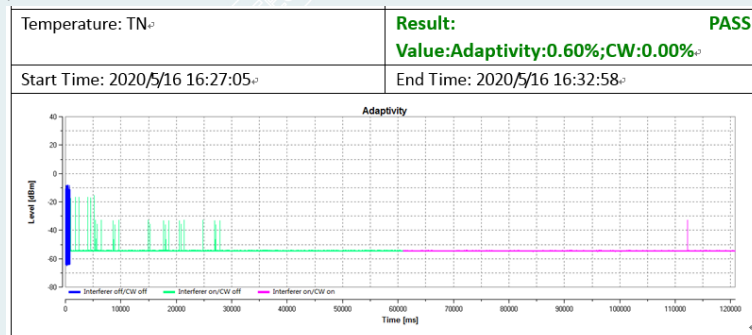
802.11g mode:
Channel 2412MHz:



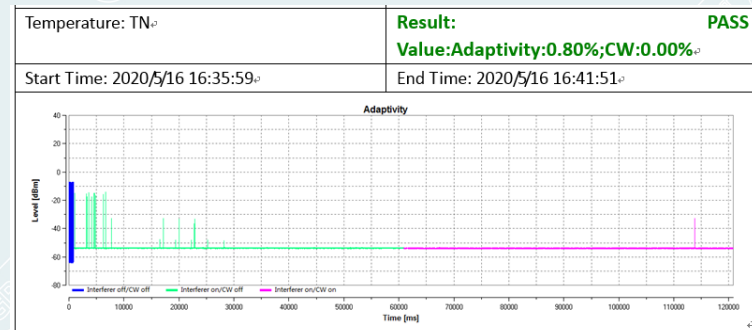
Channel 2472MHz:



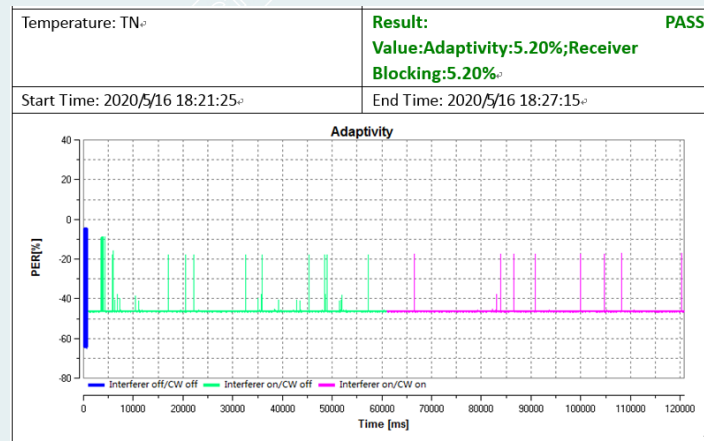
802.11n20 mode:
Channel 2412MHz:



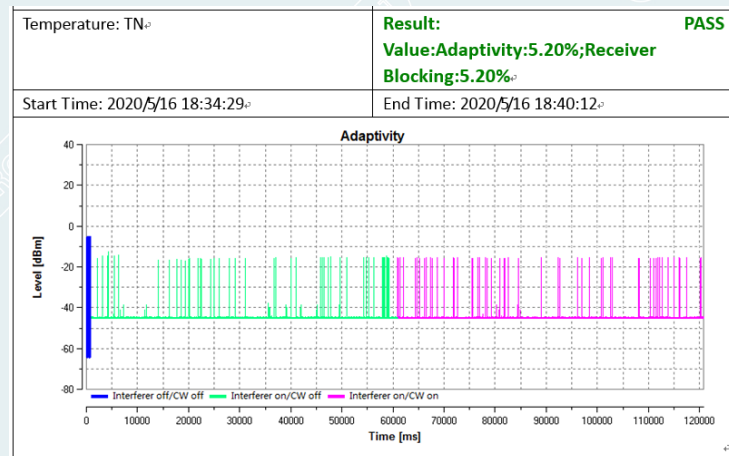
Channel 2472MHz:



802.11n40 mode:
Channel 2422MHz:



Channel 2462MHz:



Short Control Signalling Transmissions

Mode	Maximum duty cycle (%)		Limit
	2412	2472	
802.11b mode	2.4	8.41	10%
802.11g mode	0.6	1.2	10%
802.11n HT20 mode	0.6	0.8	10%

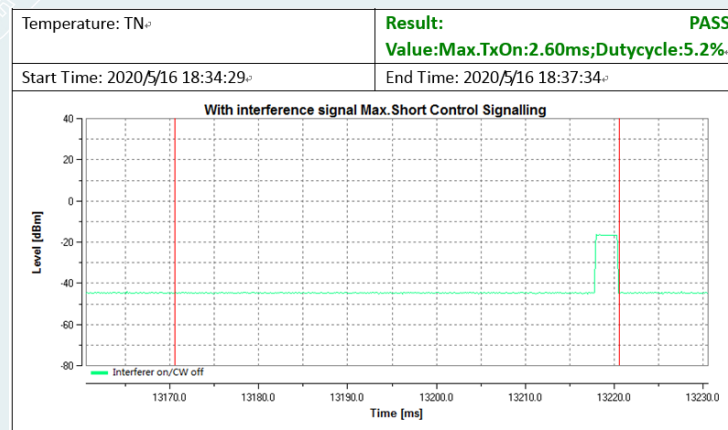
Mode	Maximum duty cycle (%)		Limit
	2422	2462	
802.11n HT40 mode	5.2	5.2	10%

Remark: Short Control Signalling Transmissions of adaptive equipment using wide band modulations other than FHSS shall have a maximum duty cycle of 10 % within an observation period of 50 ms.

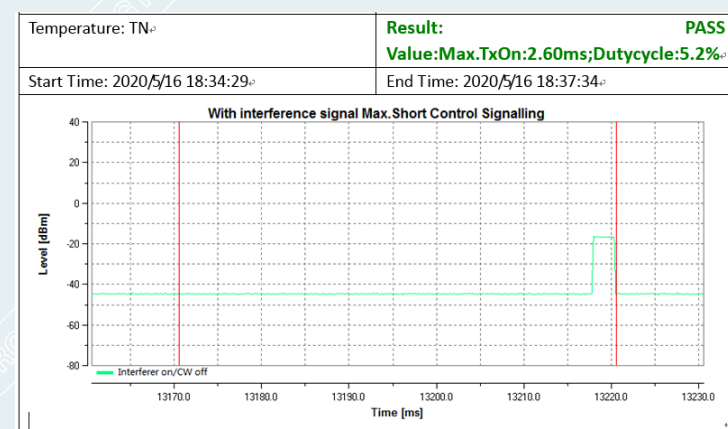
Adaptivity Test schematic graphic

802.11n40 mode:

Channel 2422MHz:



Channel 2462MHz:



4.4 OCCUPIED CHANNEL BANDWIDTH

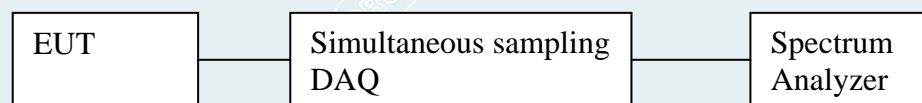
4.4.1 LIMITS

The Occupied Channel Bandwidth shall fall completely within the band given in clause 1. In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

4.4.2 TEST METHOD

- Test channel: 802.11b/g/n20/n40
Lowest channel: (2412MHz,2422MHz);
Highest channel: (2462MHz,2472MHz)
- Test condition: Normal test conditions.
- Test procedure:
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
 2. Set the spectrum analyzer: Span = $2 \times$ Occupied Channel Bandwidth (set 802.11b/g/n), centered on a channel;
 3. Set the spectrum analyzer: RBW $\geq 1\%$ of the Span. VBW = $3 \times$ RBW. Sweep = auto; Detector Function = RMS Trace = Max Hold.
 4. Mark the peak frequency 99% bandwidth.
- Remark:
- Pre-scan all the rate, found that:
11Mbps of rate is the worst case of 802.11b;
54Mbps of rate is the worst case of 802.11g ;
130Mbps of rate is the worst case of 802.11n20;
270Mbps of rate is the worst case of 802.11n40;

4.4.3 TEST SETUP

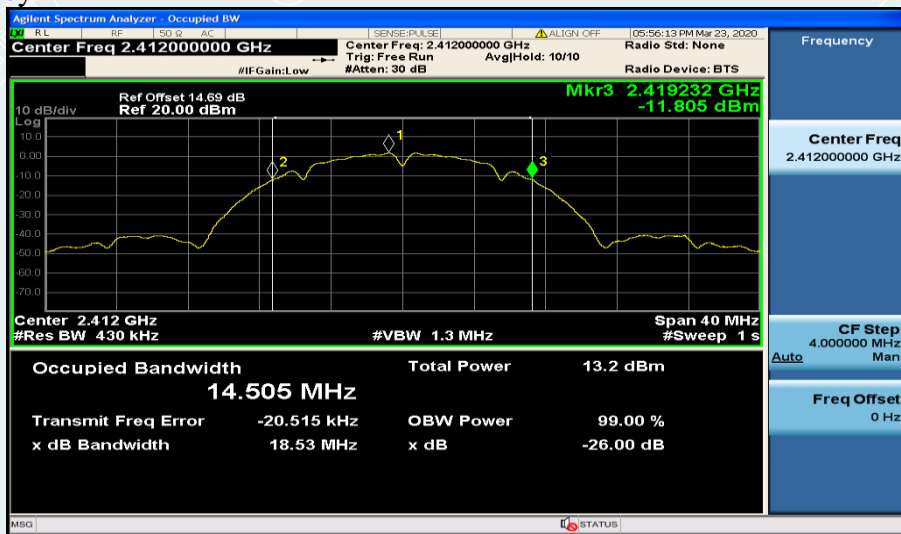
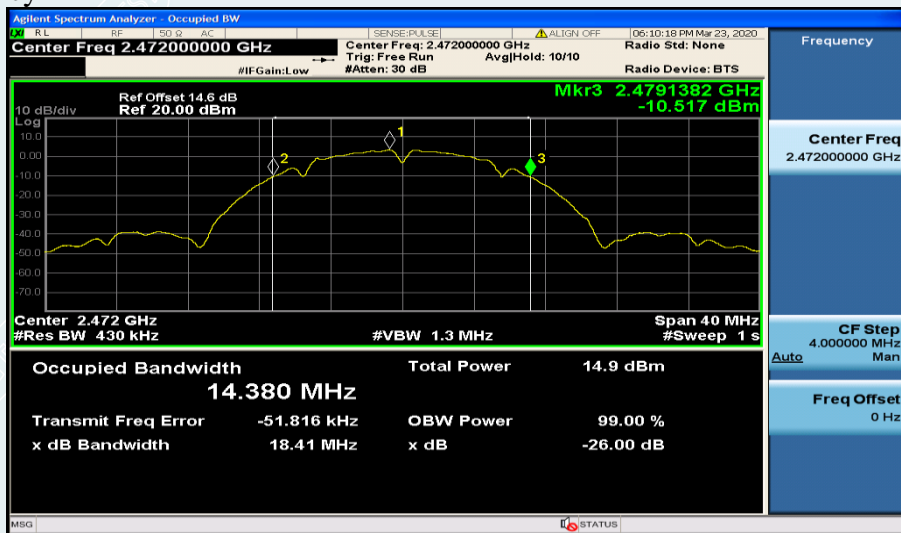


4.4.4 TEST RESULTS

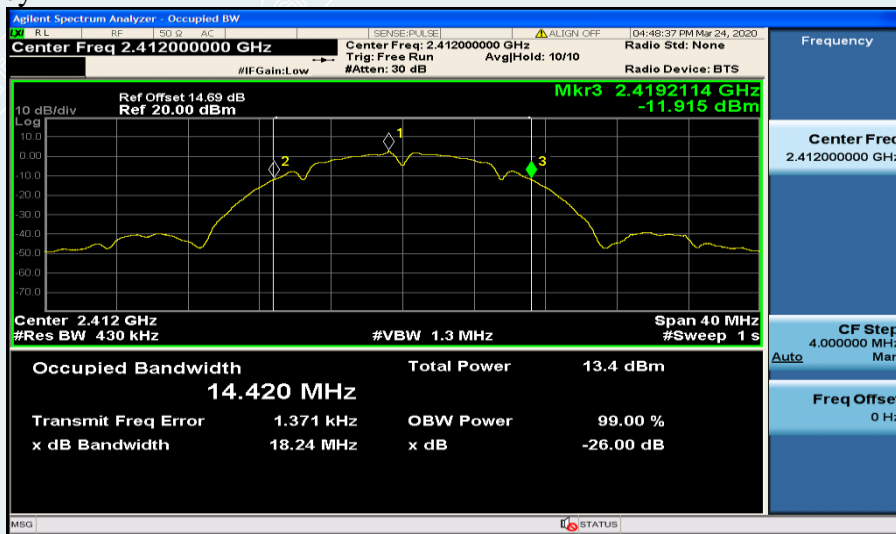
Frequency (MHz)	99% OBW (MHz)	Measured frequencies (MHz)	Limit (MHz)	Pass/Fail
For 802.11b(antenna 0)				
2412	14.505	2404.7270	FL>2400.0 FH< 2483.5	Pass
2472	14.380	2479.1382		Pass
For 802.11 b(antenna 1)				
2412	14.420	2404.7914	FL>2400.0 FH< 2483.5	Pass
2472	14.488	2479.1798		Pass
For 802.11g(antenna 0)				
2412	16.443	2403.7593	FL>2400.0 FH< 2483.5	Pass
2472	16.414	2480.1847		Pass
For 802.11g(antenna 1)				
2412	16.578	2403.6933	FL>2400.0 FH< 2483.5	Pass
2472	16.479	2480.2084		Pass
TEST RESULTS: The EUT meets the requirement.				

Frequency (MHz)	99% OBW (MHz)	Measured frequencies (MHz)	Limit (MHz)	Pass/Fail
For 802.11n20 (antenna 0)				
2412	17.638	2403.1801	FL>2400.0 FH< 2483.5	Pass
2472	17.608	2480.7953		Pass
For 802.11n20 (antenna 1)				
2412	17.586	2403.1931	FL>2400.0 FH< 2483.5	Pass
2472	17.580	2480.7628		Pass
For 802.11n40 (antenna 0)				
2422	36.071	2403.9837	FL>2400.0 FH< 2483.5	Pass
2462	35.988	2479.9503		Pass
For 802.11n40 (antenna 1)				
2422	35.973	2403.9864	FL>2400.0 FH< 2483.5	Pass
2462	35.943	2479.9358		Pass
TEST RESULTS: The EUT meets the requirement.				

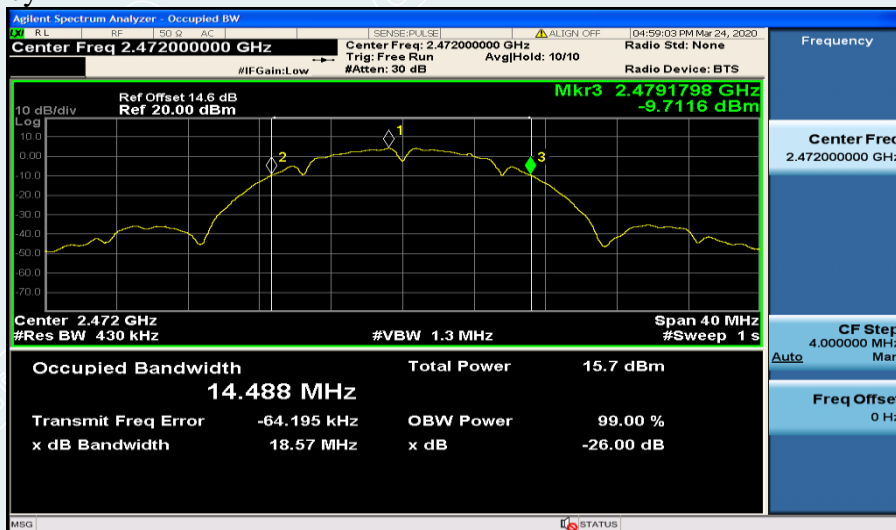
The test slots as below:

802.11b (antenna 0):**Low Frequency****High Frequency**

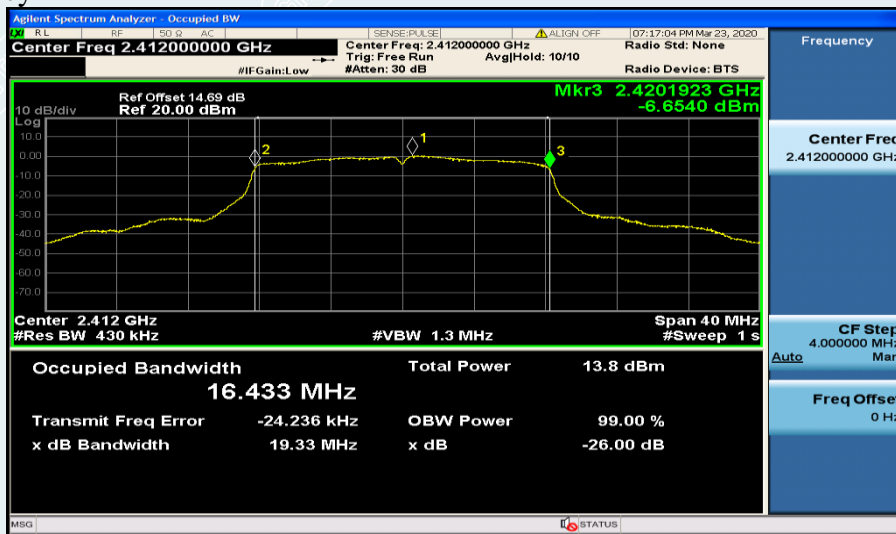
802.11b (antenna 1): Low Frequency



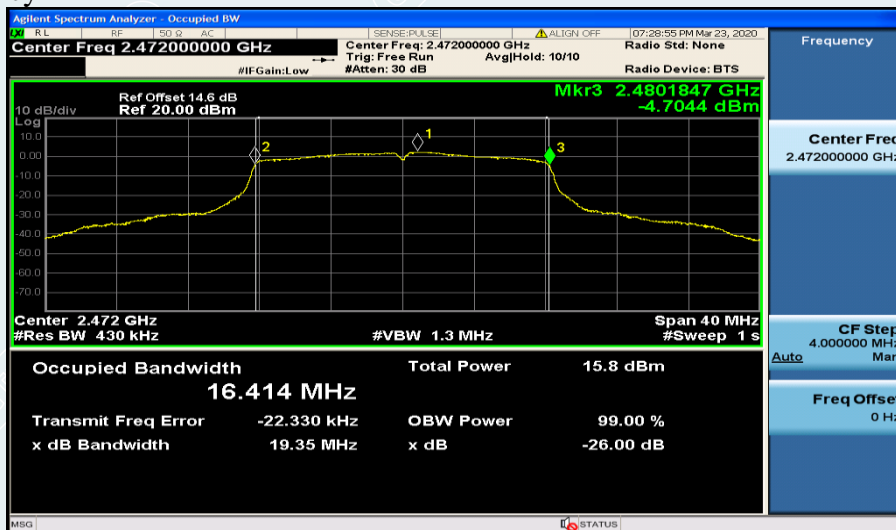
High Frequency

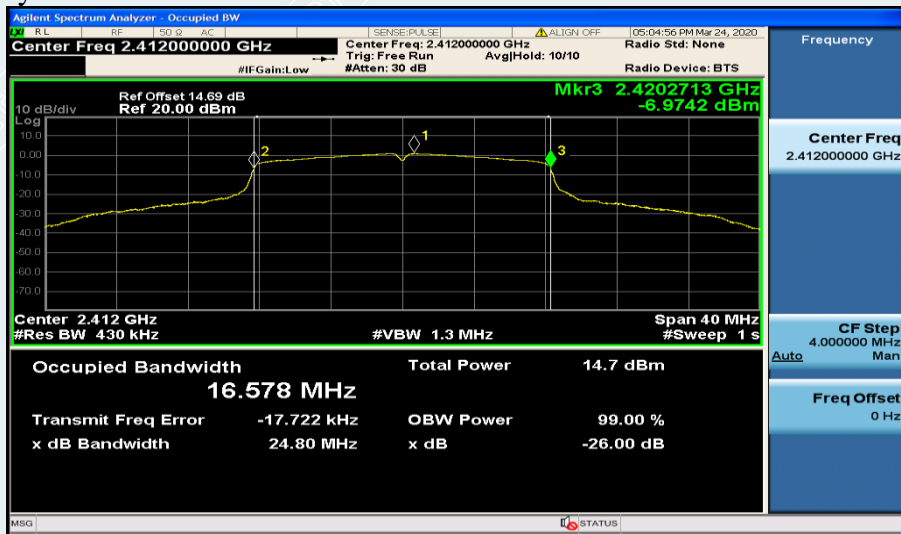
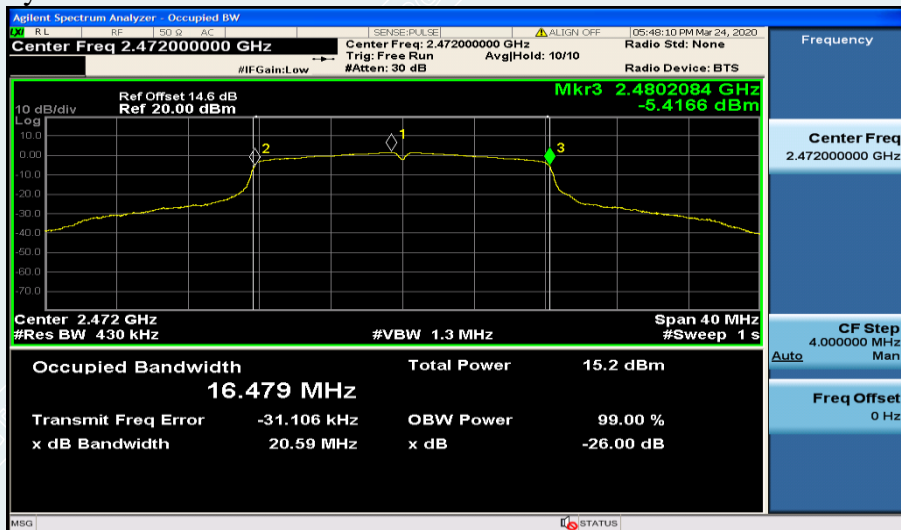


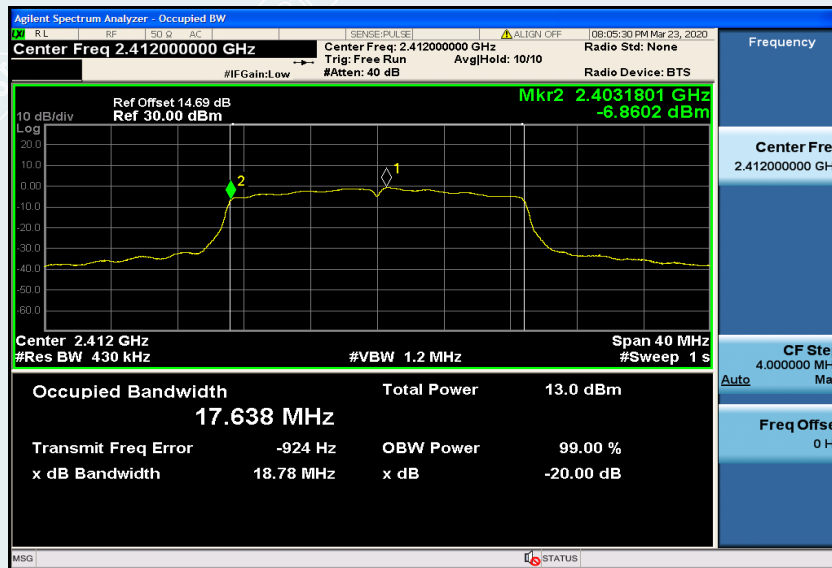
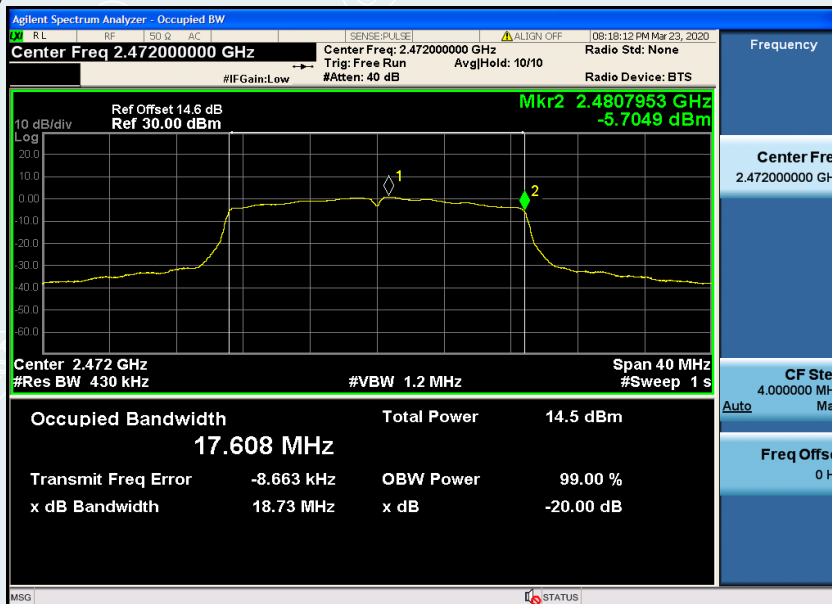
802.11g (antenna 0): Low Frequency

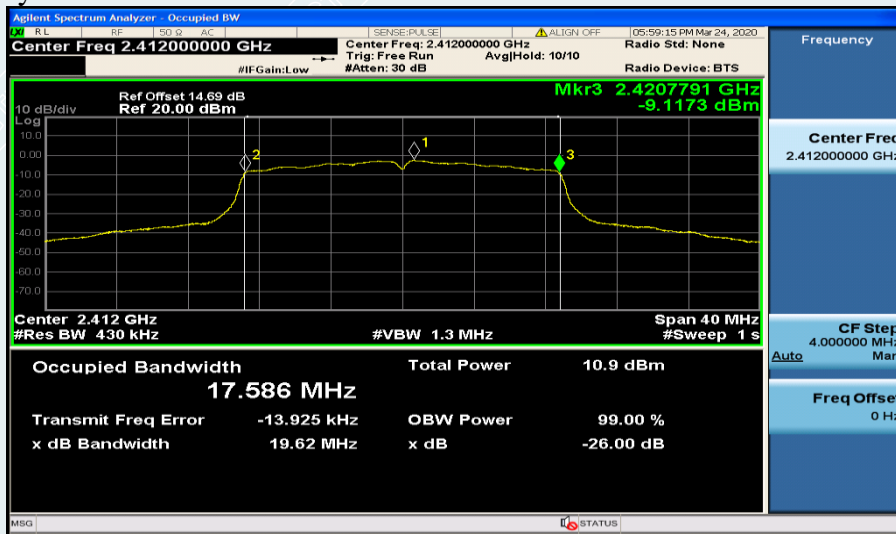
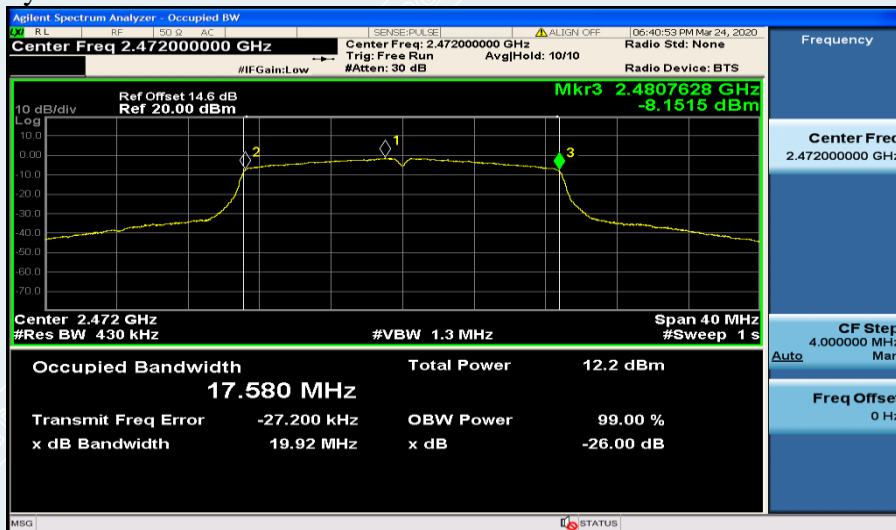


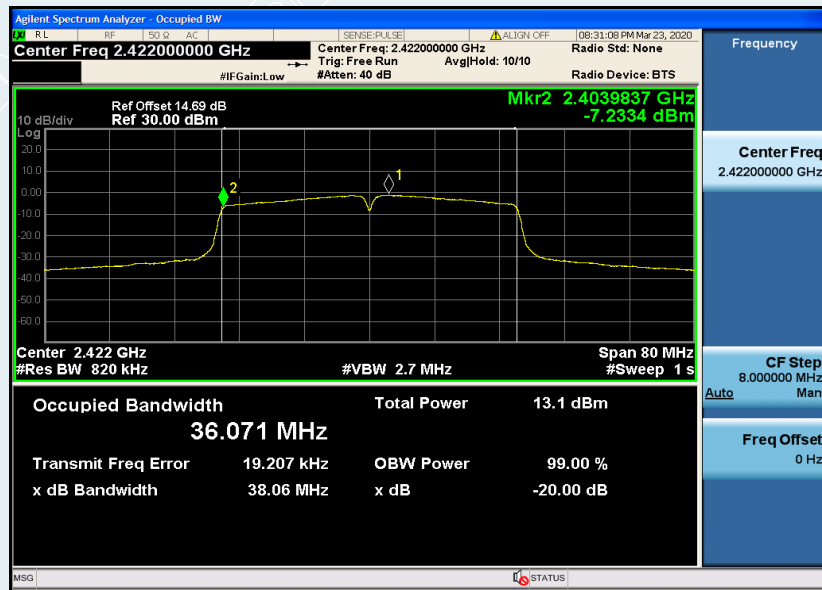
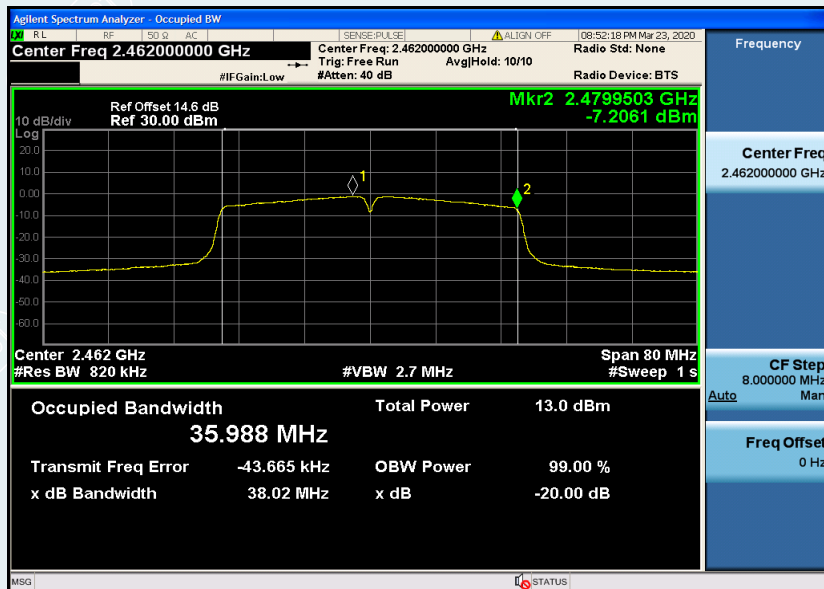
High Frequency

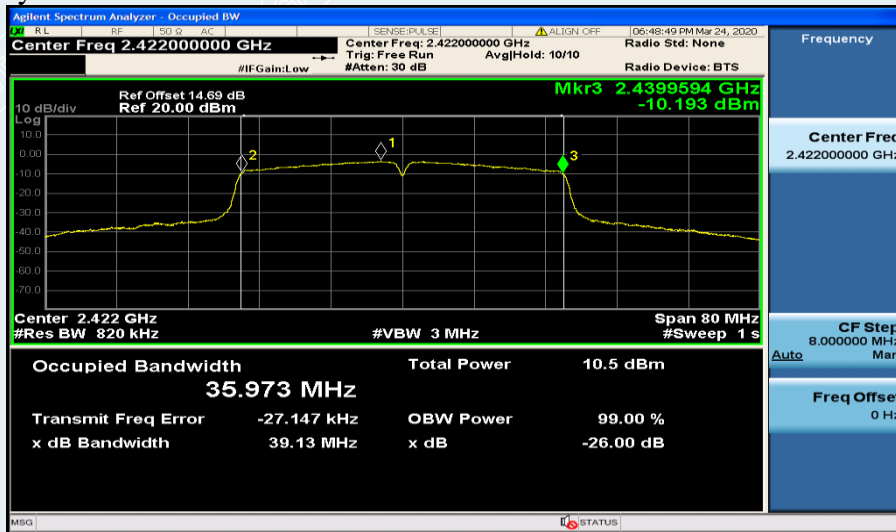


802.11g (antenna 1):**Low Frequency****High Frequency**

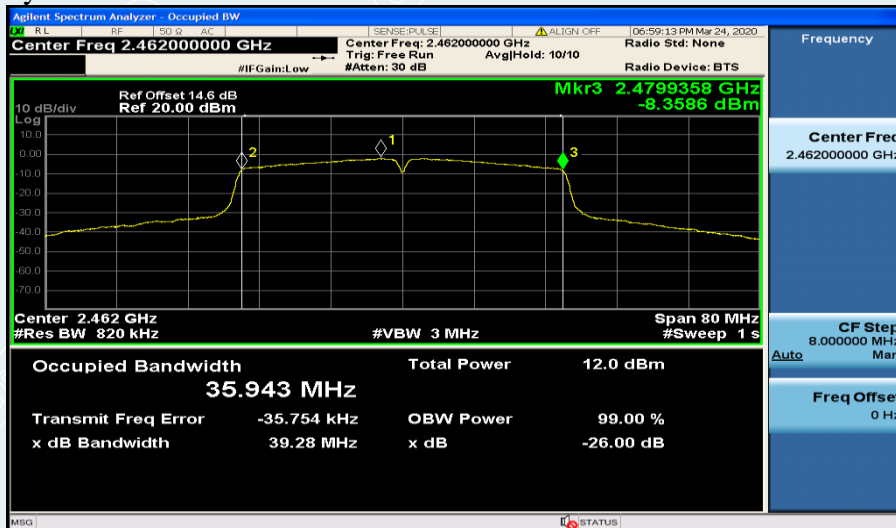
802.11n20 (antenna 0):**Low Frequency****High Frequency**

802.11n20 (antenna 1):**Low Frequency****High Frequency**

802.11n40(antenna 0):**Low Frequency****High Frequency**

802.11n40(antenna 1):
Low Frequency

High Frequency

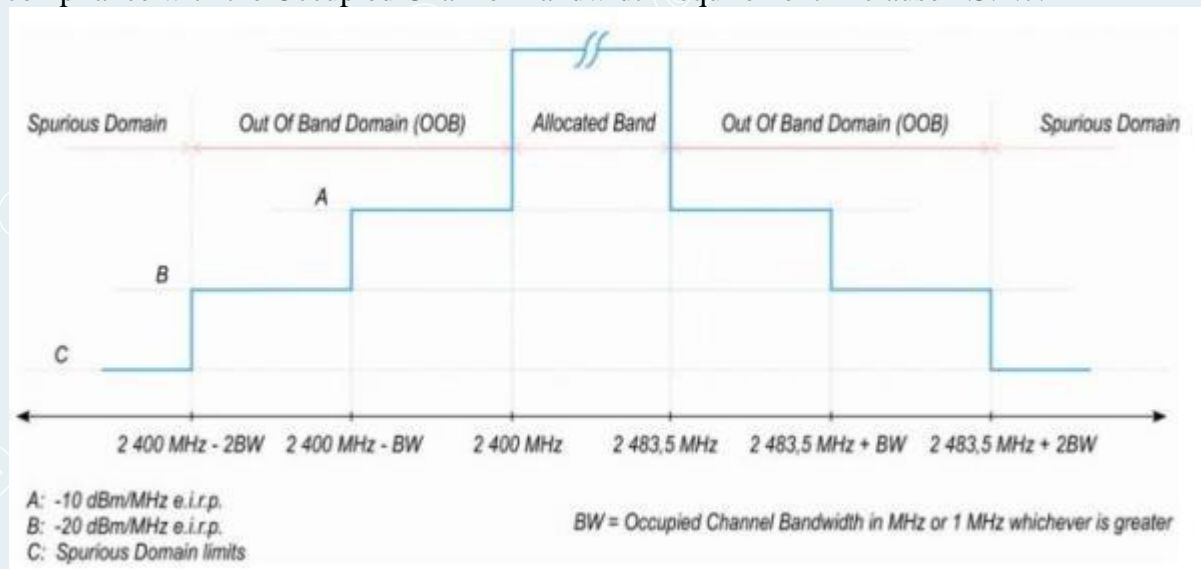


4.5 TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

4.5.1 LIMITS

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in follow figure.

NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.



4.5.2 TEST METHOD

Test channel:

802.11b/g/n20/n40

Lowest channel: (2412MHz,2422MHz);

Highest channel: (2462MHz,2472MHz)

Test condition:

Normal test conditions.

Test procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Test procedure is according to 5.4.8.2.1

Remark:

Pre-scan all the rate, found that:

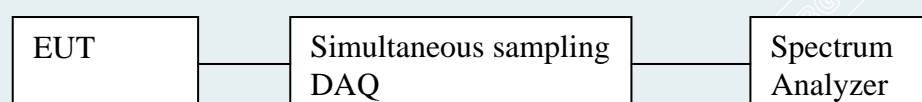
11Mbps of rate is the worst case of 802.11b;

54Mbps of rate is the worst case of 802.11g ;

130Mbps of rate is the worst case of 802.11n20;

270Mbps of rate is the worst case of 802.11n40;

4.5.3 TEST SETUP



4.5.4 TEST RESULTS

802.11b mode:

Channel	Result	Remark
Lowest	Pass	Test slots as below
Highest	Pass	Test slots as below

802.11g mode:

Channel	Result	Remark
Lowest	Pass	Test slots as below
Highest	Pass	Test slots as below

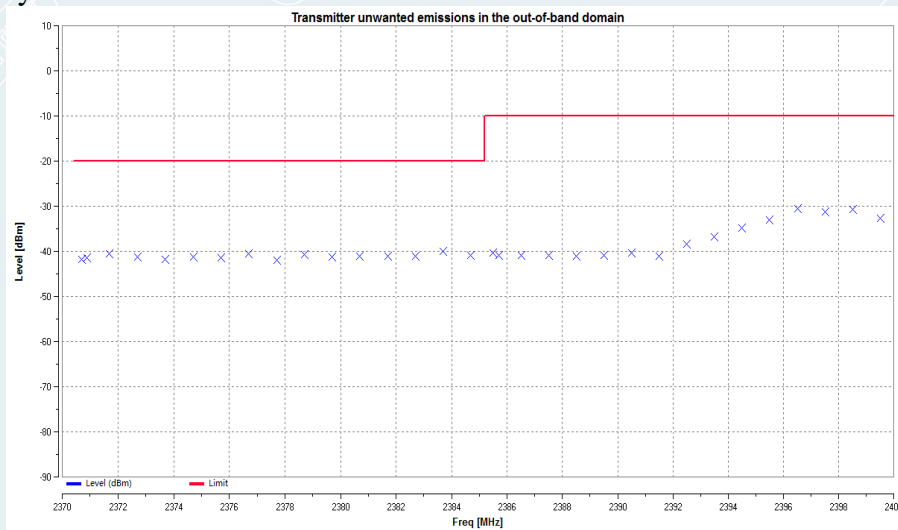
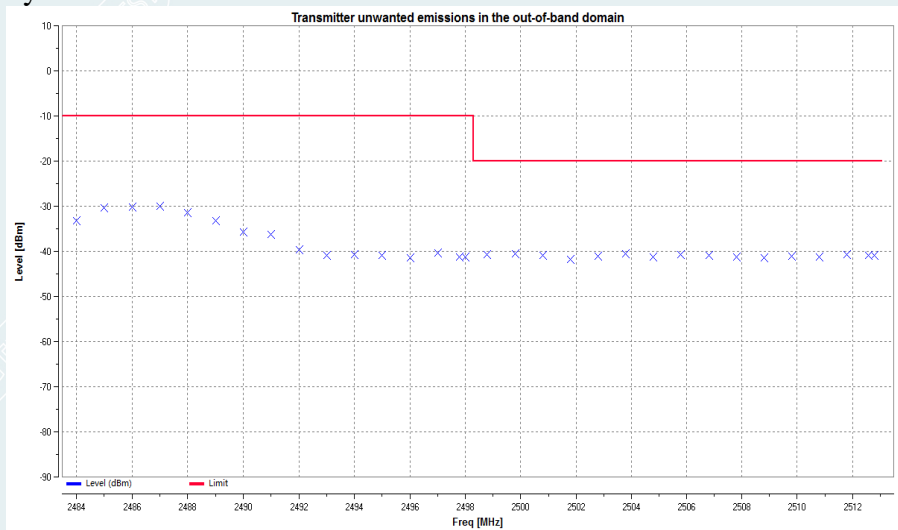
802.11n20 mode:

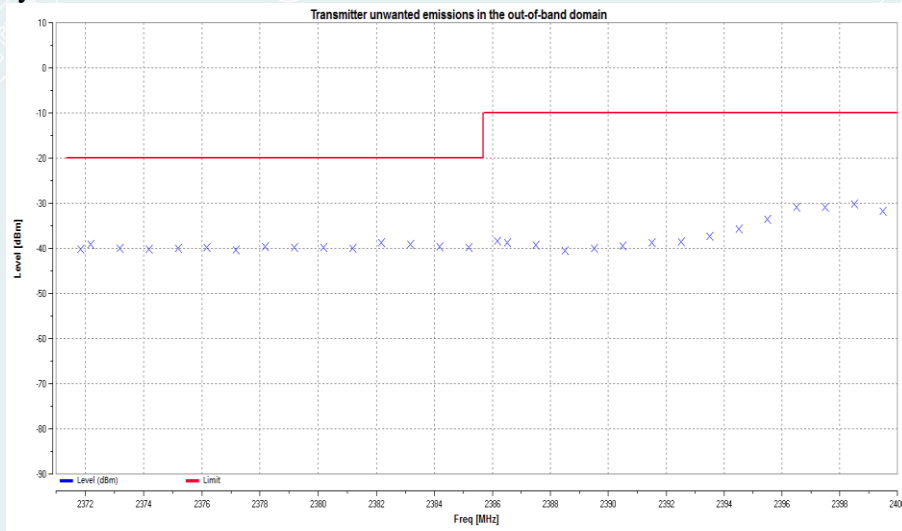
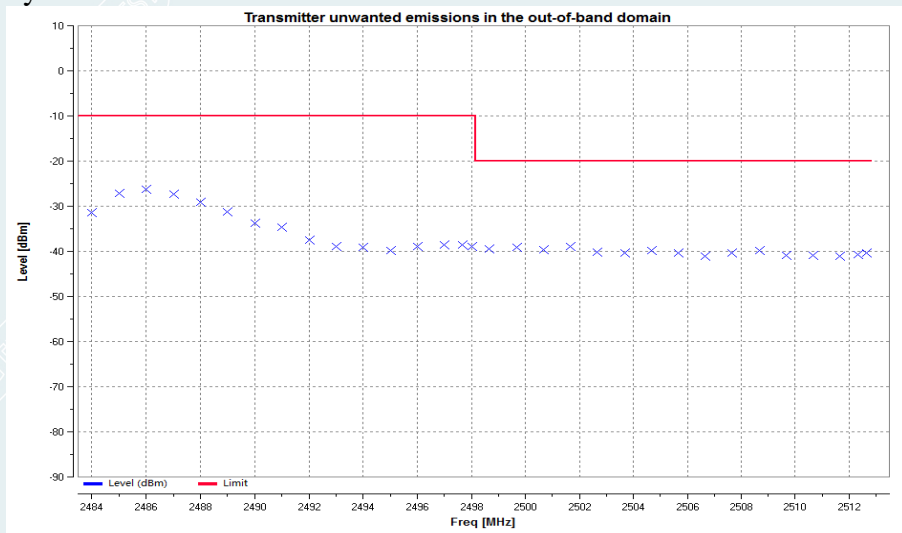
Channel	Result	Remark
Lowest	Pass	Test slots as below
Highest	Pass	Test slots as below

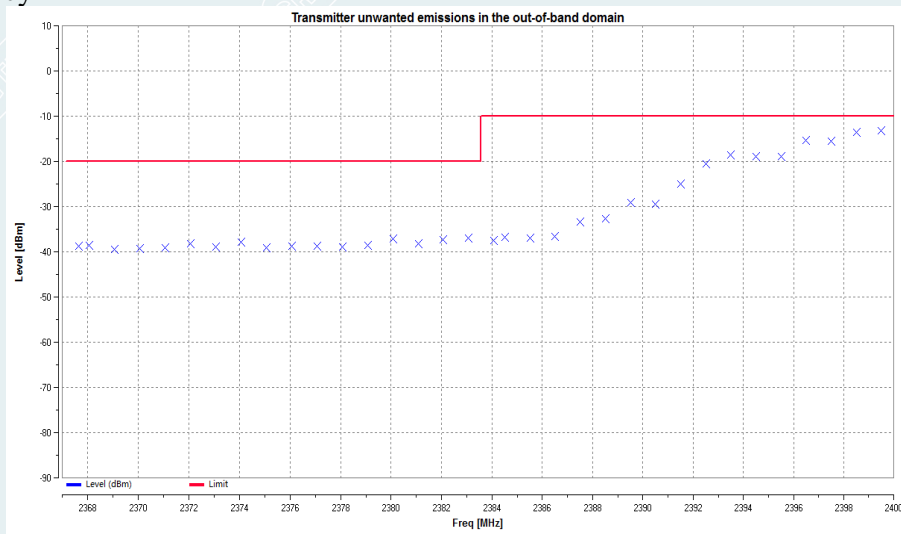
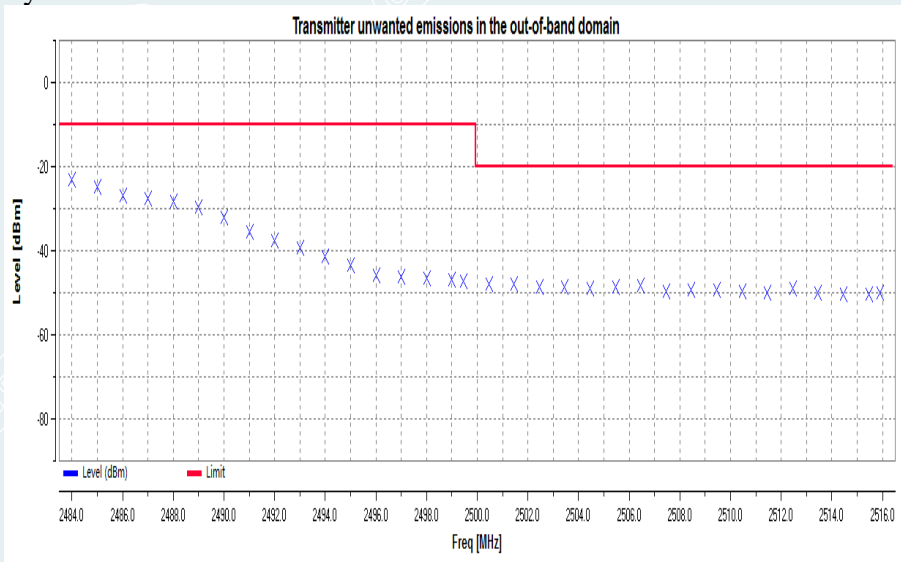
802.11n40 mode:

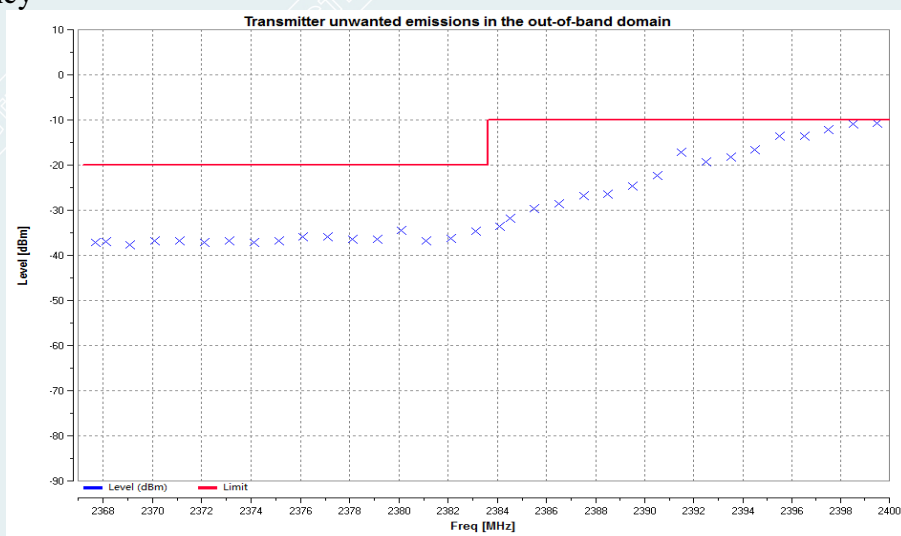
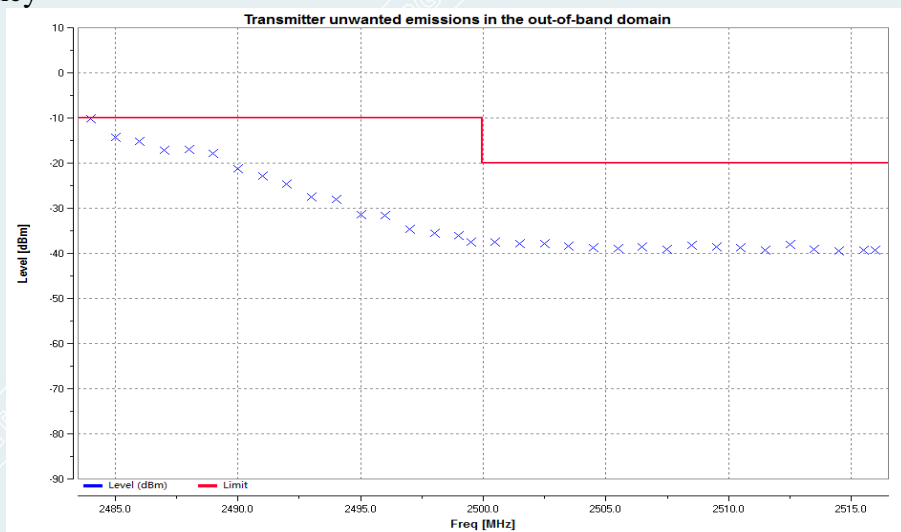
Channel	Result	Remark
Lowest	Pass	Test slots as below
Highest	Pass	Test slots as below

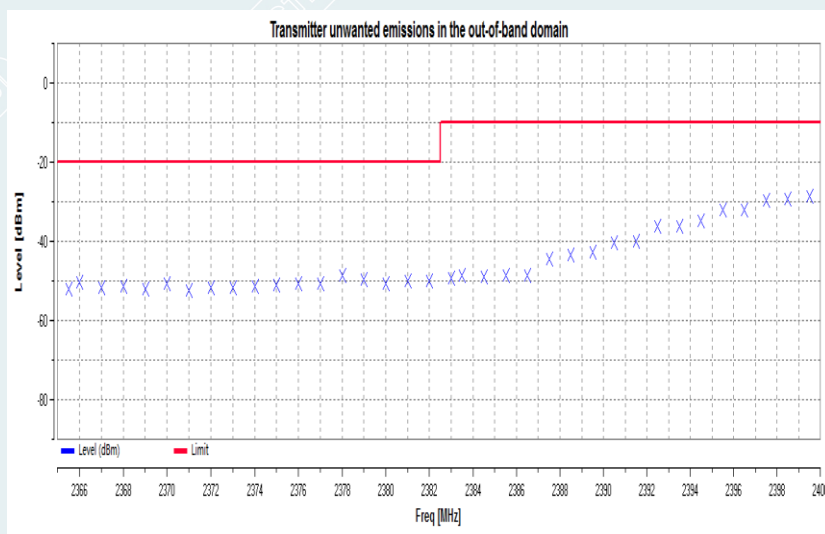
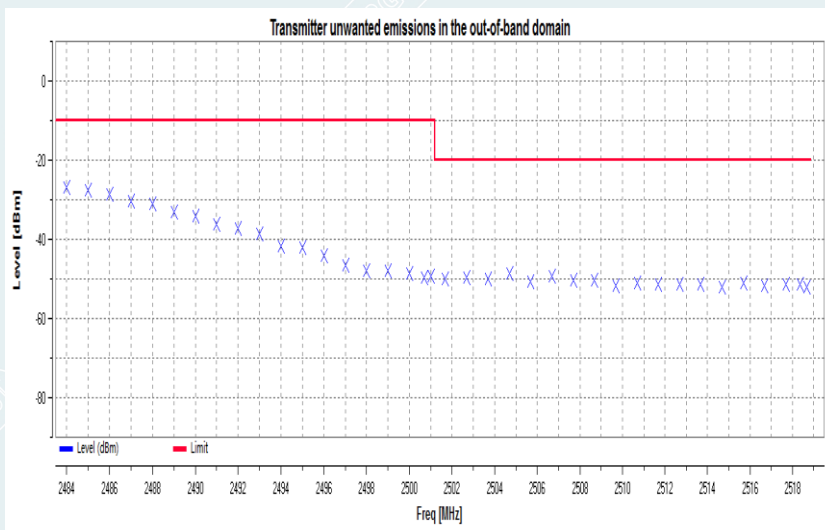
TEST RESULTS: The EUT meets the requirements.

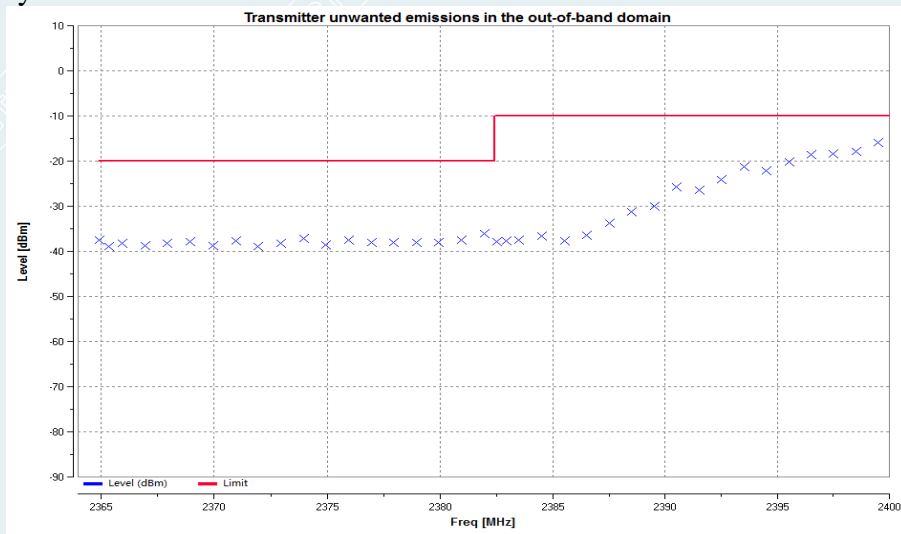
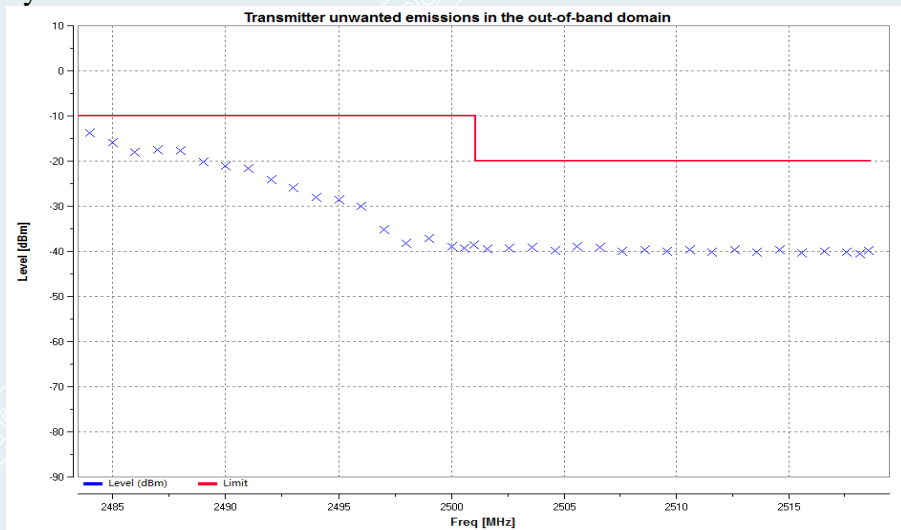
802.11b (antenna 0):**Low Frequency****High Frequency**

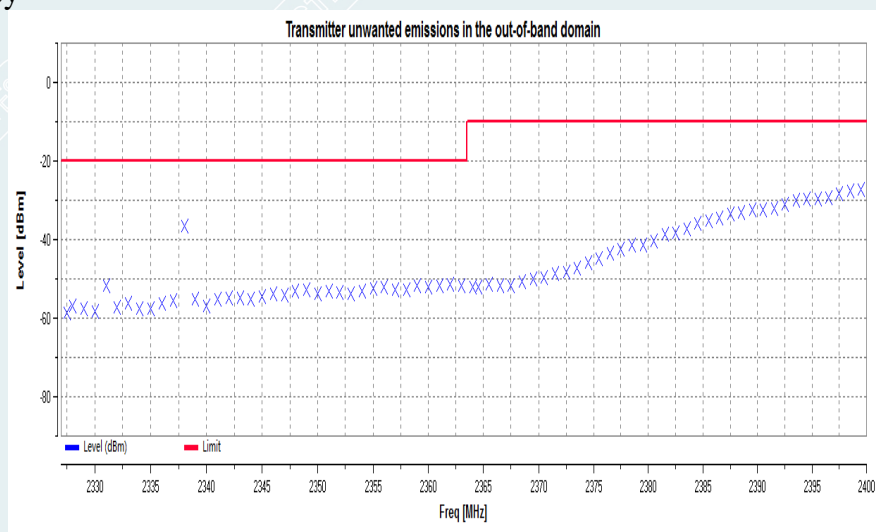
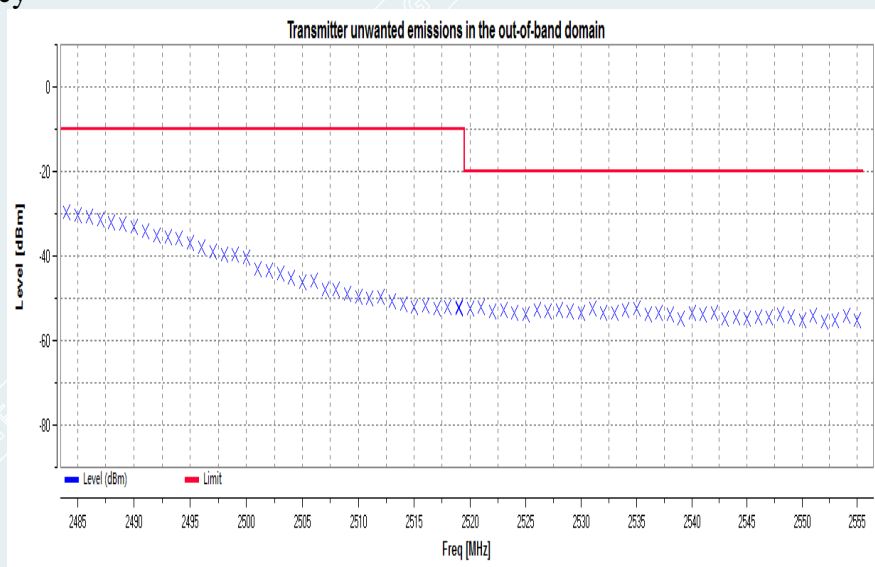
802.11b (antenna 1):**Low Frequency****High Frequency**

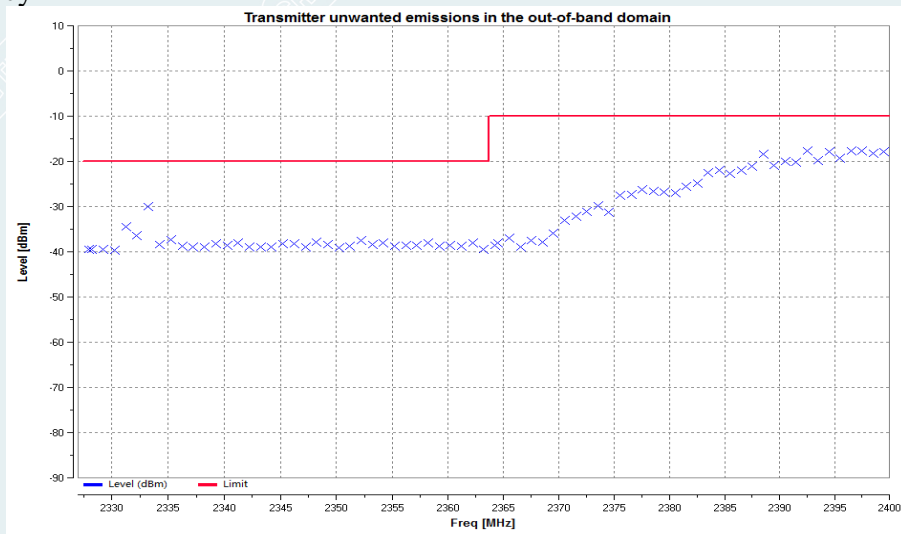
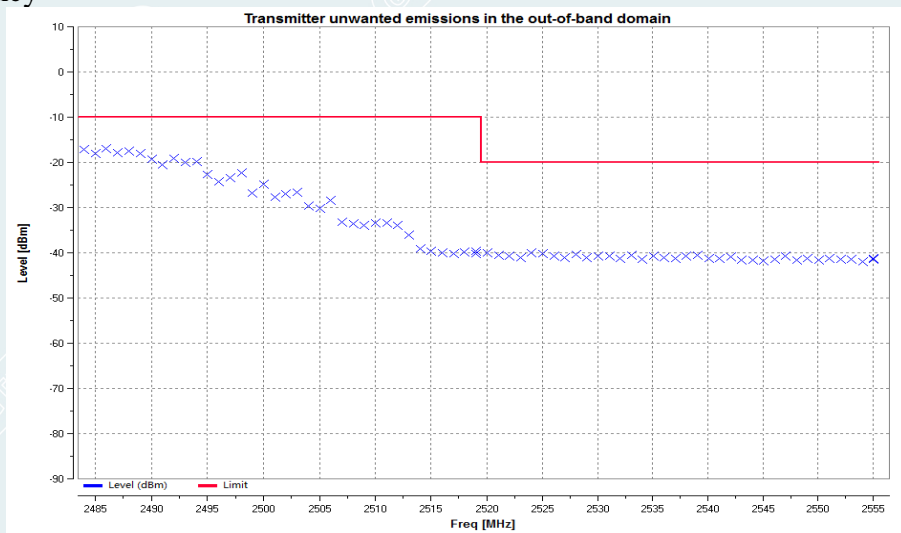
802.11g (antenna 0):**Low Frequency****High Frequency**

802.11g (antenna 1):**Low Frequency****High Frequency**

802.11n20 (antenna 0):**Low Frequency****High Frequency**

802.11n20 (antenna 1):**Low Frequency****High Frequency**

802.11n40 (antenna 0):**Low Frequency****High Frequency**

802.11n40 (antenna 1):**Low Frequency****High Frequency**

4.6 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

4.6.1 LIMITS

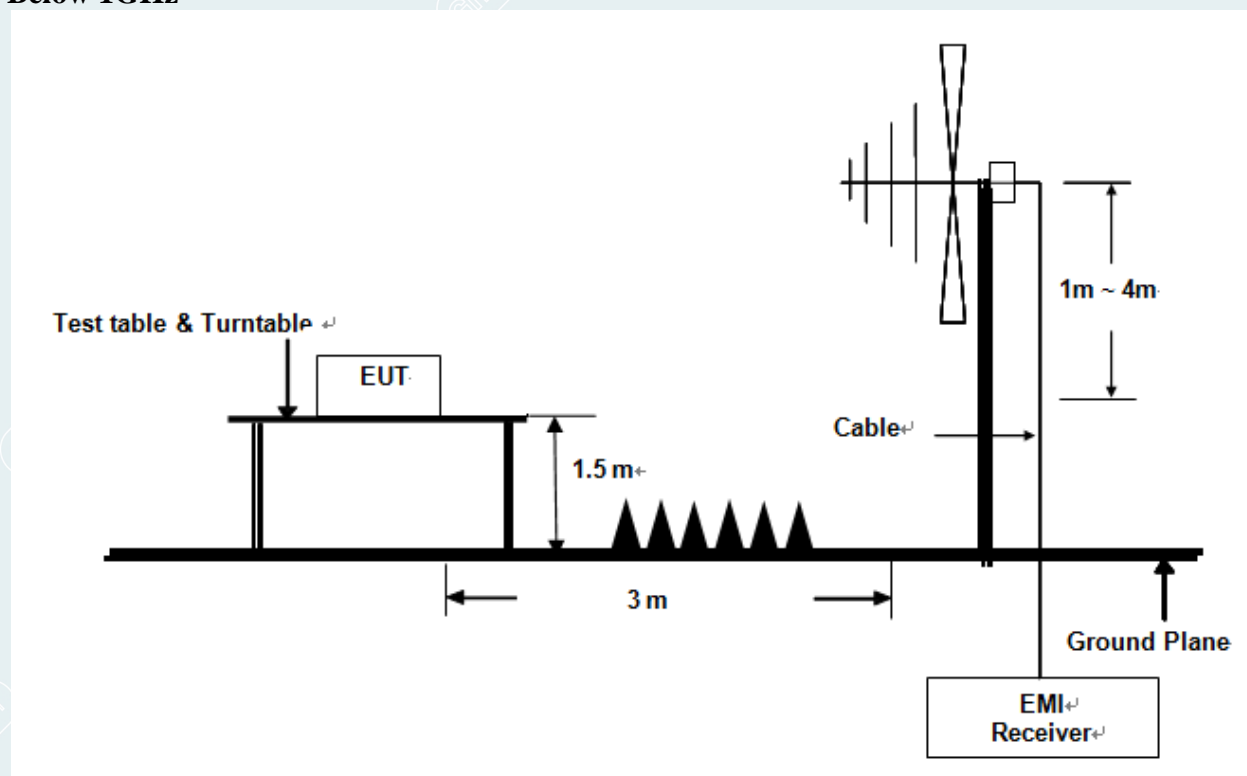
Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100kHz
47 MHz to 74 MHz	-54 dBm	100kHz
74 MHz to 87,5 MHz	-36 dBm	100kHz
87,5 MHz to 118 MHz	-54 dBm	100kHz
118 MHz to 174 MHz	-36 dBm	100kHz
174 MHz to 230 MHz	-54 dBm	100kHz
230 MHz to 470 MHz	-36 dBm	100kHz
470 MHz to 862 MHz	-54 dBm	100kHz
862 MHz to 1 GHz	-36 dBm	100kHz
1 GHz to 12,75 GHz	-30 dBm	1MHz

4.6.2 TEST METHOD

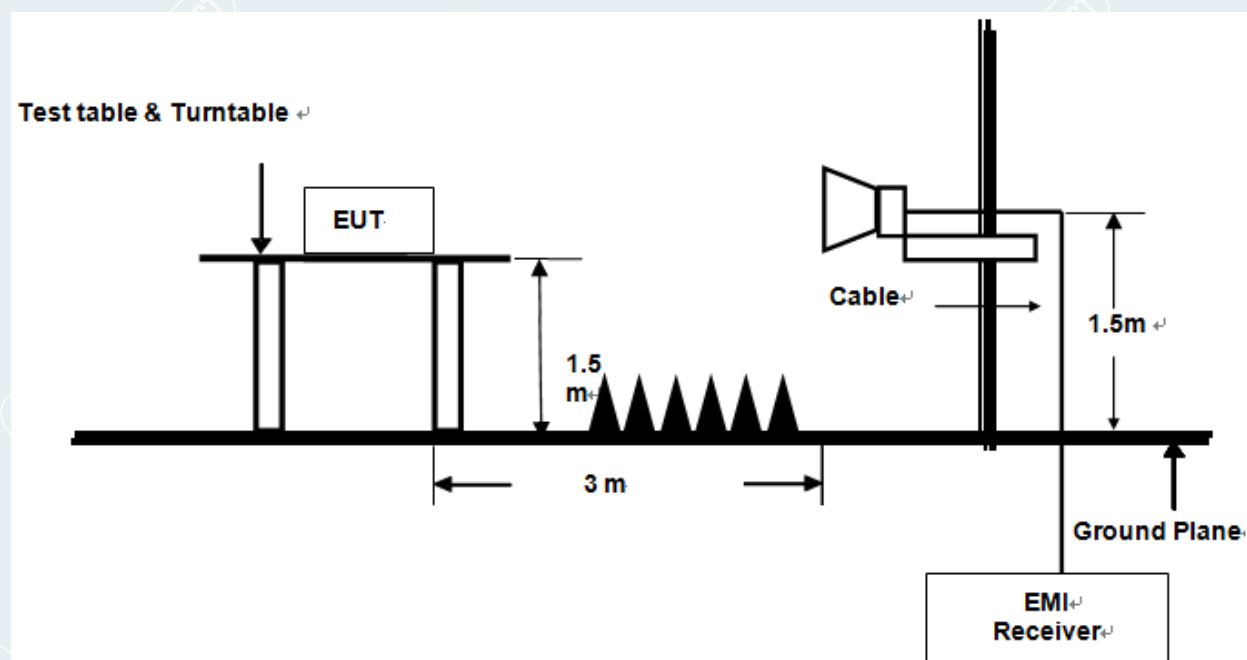
Test channel:	802.11b/g/n20 Lowest channel: (2412MHz), Highest channel: (2472MHz) 802.11n40 Lowest channel: (2422MHz), Highest channel: (2462MHz)
Test condition:	Normal test conditions.
Test procedure:	<ol style="list-style-type: none">1. The EUT shall be performed at the highest power level at which the transmitter is intended to operate. and Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. EUT shall be placed at the 1.5m support on the turntable.2. The test antenna at a horizontal distance of 3 m .It shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360 °in the horizontal plane, until the maximum signal level is detected by the measuring receiver. In both the vertical and the horizontal polarization. Record the reading level, antenna position, polarization and turntable position.3. Remove the transmitter and replace it with a substitution antenna.4. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by a cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.5. $ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$ $EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$ Where: Pg is the generator output power into the substitution antenna
Remark:	Pre-test the 802.11b/g/n20/ n40 to find 802.11n (HT40) is worst case, so only record 802.11n(HT40) test data.

4.6.3 TEST SETUP

Below 1GHz



Above 1GHz



4.6.4 TEST RESULTS

802.11n HT20 mode (combine with antenna 0 and antenna 1):

Lowest channel (2412 MHz)

Date: 2020-04-08

30MHz-1000MHz Spurious Emissions Measurement

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	38.9240	-45.06	-22.46	-67.52	-36.00	31.52	RMS	Vertical
2	49.0120	-46.71	-19.07	-65.78	-54.00	11.78	RMS	Vertical
3	58.7120	-51.69	-19.60	-71.29	-54.00	17.29	RMS	Vertical
4	68.2180	-51.61	-19.61	-71.22	-54.00	17.22	RMS	Vertical
5	98.3850	-53.63	-18.05	-71.68	-54.00	17.68	RMS	Vertical
6	193.2510	-60.55	-16.20	-76.75	-54.00	22.75	RMS	Vertical
7	38.9240	-59.06	-15.32	-74.38	-36.00	38.38	RMS	Horizontal
8	68.2180	-58.65	-19.72	-78.37	-54.00	24.37	RMS	Horizontal
9	79.1790	-52.60	-20.77	-73.37	-36.00	37.37	RMS	Horizontal
10	88.7820	-50.41	-22.24	-72.65	-54.00	18.65	RMS	Horizontal
11	98.3850	-44.53	-23.49	-68.02	-54.00	14.02	RMS	Horizontal
12	579.9900	-61.18	-6.16	-67.34	-54.00	13.34	RMS	Horizontal

1000MHz-12750MHz Spurious Emissions Measurement

Date: 2020-04-08

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	3421.9100	-42.24	-9.56	-51.80	-30.00	21.80	RMS	Vertical
2	3479.7200	-39.56	-8.97	-48.53	-30.00	18.53	RMS	Vertical
3	4314.9100	-48.40	-6.01	-54.41	-30.00	24.41	RMS	Vertical
4	6540.3600	-48.39	-0.16	-48.55	-30.00	18.55	RMS	Vertical
5	7363.3300	-46.71	2.51	-44.20	-30.00	14.20	RMS	Vertical
6	10018.3600	-48.80	8.55	-40.25	-30.00	10.25	RMS	Vertical
7	2237.9800	-49.68	-9.71	-59.39	-30.00	29.39	RMS	Horizontal
8	3442.5900	-41.04	-9.62	-50.66	-30.00	20.66	RMS	Horizontal
9	3600.0400	-48.18	-8.39	-56.57	-30.00	26.57	RMS	Horizontal
10	4697.4900	-47.89	-4.62	-52.51	-30.00	22.51	RMS	Horizontal
11	9299.2600	-47.80	6.34	-41.46	-30.00	11.46	RMS	Horizontal
12	10769.4200	-48.79	10.25	-38.54	-30.00	8.54	RMS	Horizontal

802.11n HT20 mode (combine with antenna 0 and antenna 1):

Highest channel (2472 MHz)

Date: 2020-04-08

30MHz-1000MHz Spurious Emissions Measurement

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	38.9240	-45.37	-22.46	-67.83	-36.00	31.83	RMS	Vertical
2	49.0120	-47.67	-19.07	-66.74	-54.00	12.74	RMS	Vertical
3	58.7120	-51.60	-19.60	-71.20	-54.00	17.20	RMS	Vertical
4	68.2180	-51.67	-19.61	-71.28	-54.00	17.28	RMS	Vertical
5	98.3850	-53.75	-18.05	-71.80	-54.00	17.80	RMS	Vertical
6	966.7290	-65.94	-0.71	-66.65	-36.00	30.65	RMS	Vertical
7	77.9180	-51.81	-20.77	-72.58	-36.00	36.58	RMS	Horizontal
8	88.7820	-51.12	-22.24	-73.36	-54.00	19.36	RMS	Horizontal
9	98.3850	-45.11	-23.49	-68.60	-54.00	14.60	RMS	Horizontal
10	106.7270	-51.43	-22.55	-73.98	-54.00	19.98	RMS	Horizontal
11	148.0490	-62.85	-15.81	-78.66	-36.00	42.66	RMS	Horizontal
12	585.7130	-64.63	-5.77	-70.40	-54.00	16.40	RMS	Horizontal

1000MHz-12750MHz Spurious Emissions Measurement

Date: 2020-04-08

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	3600.9800	-48.55	-8.19	-56.74	-30.00	26.74	RMS	Vertical
2	3841.1500	-48.60	-7.34	-55.94	-30.00	25.94	RMS	Vertical
3	5103.5700	-47.98	-2.02	-50.00	-30.00	20.00	RMS	Vertical
4	6624.9600	-48.19	0.03	-48.16	-30.00	18.16	RMS	Vertical
5	9384.3300	-47.98	5.91	-42.07	-30.00	12.07	RMS	Vertical
6	10477.5500	-47.64	8.32	-39.32	-30.00	9.32	RMS	Vertical
7	3600.5100	-49.07	-8.39	-57.46	-30.00	27.46	RMS	Horizontal
8	5083.3600	-48.99	-2.63	-51.62	-30.00	21.62	RMS	Horizontal
9	6004.0900	-48.50	-2.41	-50.91	-30.00	20.91	RMS	Horizontal
10	7360.9800	-46.99	2.78	-44.21	-30.00	14.21	RMS	Horizontal
11	8780.8500	-47.29	5.12	-42.17	-30.00	12.17	RMS	Horizontal
12	11488.5200	-50.17	12.45	-37.72	-30.00	7.72	RMS	Horizontal

4.7 RECEIVER SPURIOUS EMISSIONS

4.7.1 LIMITS

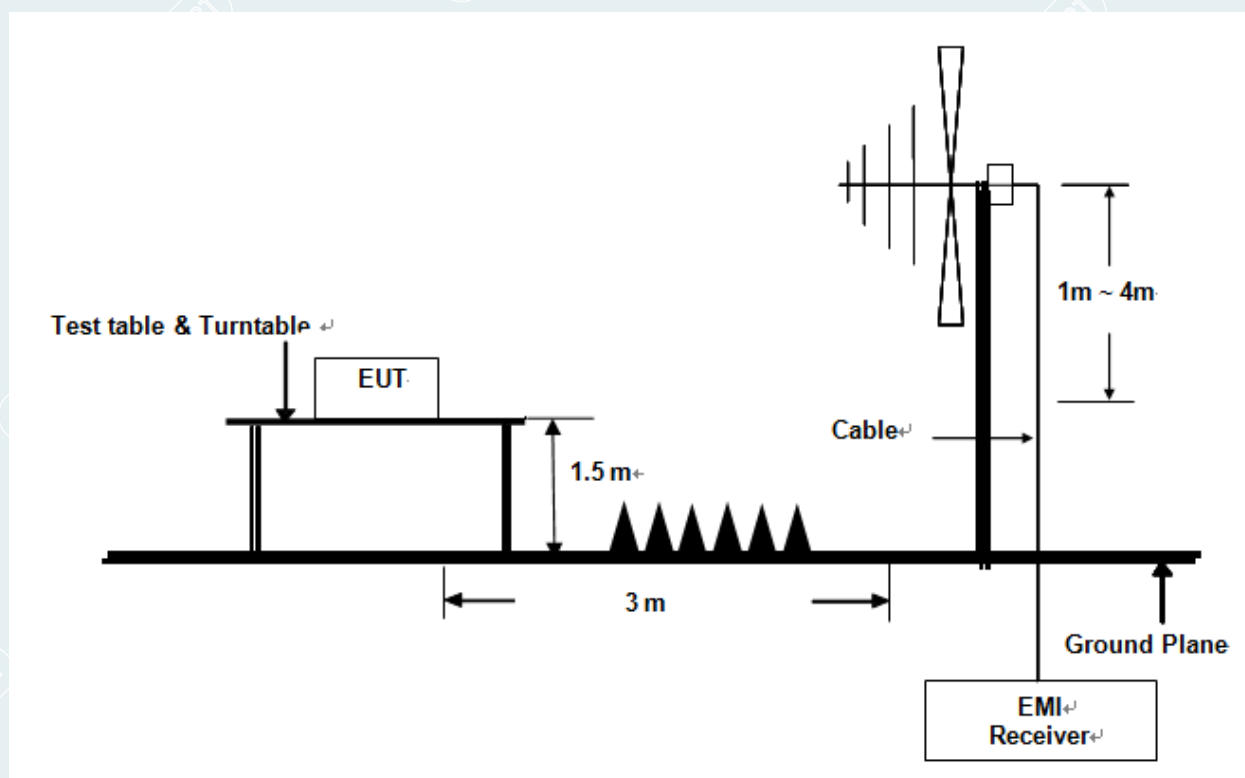
Frequency range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100kHz
above 1 GHz to 12,75 GHz	-47 dBm	1MHz

4.7.2 TEST METHOD

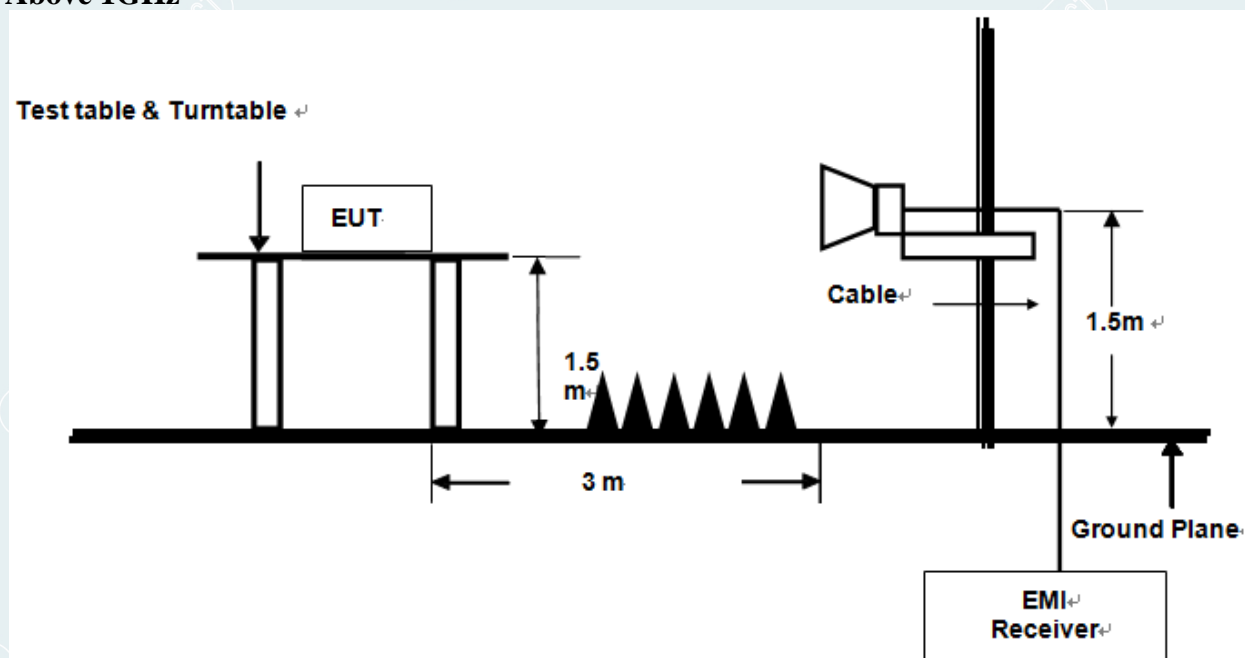
Test channel:	802.11b/g/n20 Lowest channel: (2412MHz), Highest channel: (2472MHz) 802.11n40 Lowest channel: (2422MHz), Highest channel: (2462MHz)
Test condition:	Normal test conditions.
Test procedure:	<ol style="list-style-type: none">1. The EUT shall be performed at the receiver mode and Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. EUT shall be placed at the 1.5m support on the turntable.2. The test antenna at a horizontal distance of 3 m .It shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360 °in the horizontal plane, until the maximum signal level is detected by the measuring receiver. In both the vertical and the horizontal polarization. Record the reading level, antenna position, polarization and turntable position.3. Remove the EUT and replace it with a substitution antenna.4. Feed the substitution antenna at the EUT end with a signal generator connected to the antenna by a cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.5. $ERP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBd)}$ $EIRP(dBm) = Pg(dBm) - \text{cable loss (dB)} + \text{antenna gain (dBi)}$ Where: Pg is the generator output power into the substitution antenna
Remark:	Pre-test the 802.11b/g/n20/ n40 to find 802.11n (HT40) is worst case, so only record 802.11n(HT40) test data.

4.7.3 TEST SETUP

Below 1GHz



Above 1GHz



4.7.4 TEST RESULTS

802.11n HT20 mode:

Lowest channel (2412 MHz)

Date : 2020-04-08

30MHz-1000MHz Spurious Emissions Measurement

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	38.9240	-43.31	-22.46	-65.77	-57.00	8.77	RMS	Vertical
2	49.0120	-47.83	-19.07	-66.90	-57.00	9.90	RMS	Vertical
3	54.1530	-50.29	-19.13	-69.42	-57.00	12.42	RMS	Vertical
4	58.7120	-51.07	-19.60	-70.67	-57.00	13.67	RMS	Vertical
5	68.8970	-51.03	-19.60	-70.63	-57.00	13.63	RMS	Vertical
6	98.3850	-53.69	-18.05	-71.74	-57.00	14.74	RMS	Vertical
7	38.9240	-57.41	-15.32	-72.73	-57.00	15.73	RMS	Horizontal
8	48.4300	-61.24	-15.21	-76.45	-57.00	19.45	RMS	Horizontal
9	79.3730	-49.43	-20.77	-70.20	-57.00	13.20	RMS	Horizontal
10	98.3850	-44.32	-23.49	-67.81	-57.00	10.81	RMS	Horizontal
11	106.7270	-50.35	-22.55	-72.90	-57.00	15.90	RMS	Horizontal
12	579.9900	-66.14	-6.16	-72.30	-57.00	15.30	RMS	Horizontal

1000MHz-12750MHz Spurious Emissions Measurement

Date : 2020-04-08

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	1858.3804	-64.00	0.31	-63.69	-47.00	16.69	RMS	Vertical
2	1910.6705	-62.60	0.32	-62.28	-47.00	15.28	RMS	Vertical
3	2126.8813	-62.33	3.00	-59.33	-47.00	12.33	RMS	Vertical
4	2513.4757	-60.78	2.68	-58.10	-47.00	11.10	RMS	Vertical
5	2900.0700	-65.72	3.54	-62.18	-47.00	15.18	RMS	Vertical
6	3479.9615	-66.53	3.76	-62.77	-47.00	15.77	RMS	Vertical
7	1352.5176	-63.20	0.93	-62.27	-47.00	15.27	RMS	Horizontal
8	1908.9079	-58.90	0.23	-58.67	-47.00	11.67	RMS	Horizontal
9	2126.2938	-62.62	3.18	-59.44	-47.00	12.44	RMS	Horizontal
10	2513.4757	-60.99	2.76	-58.23	-47.00	11.23	RMS	Horizontal
11	2900.0700	-66.82	3.67	-63.15	-47.00	16.15	RMS	Horizontal
12	3866.5558	-67.23	5.31	-61.92	-47.00	14.92	RMS	Horizontal

802.11n HT20 mode:

Highest channel (2472 MHz)

Date : 2020-04-08

30MHz-1000MHz Spurious Emissions Measurement

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	38.9240	-43.10	-22.46	-65.56	-57.00	8.56	RMS	Vertical
2	49.0120	-47.11	-19.07	-66.18	-57.00	9.18	RMS	Vertical
3	54.1530	-50.88	-19.13	-70.01	-57.00	13.01	RMS	Vertical
4	98.3850	-52.66	-18.05	-70.71	-57.00	13.71	RMS	Vertical
5	579.9900	-61.37	-6.89	-68.26	-57.00	11.26	RMS	Vertical
6	966.6490	-59.35	-0.72	-60.07	-57.00	3.07	RMS	Vertical
7	38.9240	-57.64	-15.32	-72.96	-57.00	15.96	RMS	Horizontal
8	64.7260	-57.91	-17.61	-75.52	-57.00	18.52	RMS	Horizontal
9	79.1790	-48.08	-20.77	-68.85	-57.00	11.85	RMS	Horizontal
10	98.3850	-43.31	-23.49	-66.80	-57.00	9.80	RMS	Horizontal
11	249.9960	-67.20	-12.96	-80.16	-57.00	23.16	RMS	Horizontal
12	579.9900	-58.45	-6.16	-64.61	-57.00	7.61	RMS	Horizontal

1000MHz-12750MHz Spurious Emissions Measurement

Date : 2020-04-08

No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark	Pole
1	1299.0525	-63.76	1.75	-62.01	-47.00	15.01	RMS	Vertical
2	1353.1052	-63.26	0.92	-62.34	-47.00	15.34	RMS	Vertical
3	1932.9967	-58.24	0.40	-57.84	-47.00	10.84	RMS	Vertical
4	2126.2938	-63.27	3.18	-60.09	-47.00	13.09	RMS	Vertical
5	2512.8881	-63.10	2.76	-60.34	-47.00	13.34	RMS	Vertical
6	2630.3940	-55.95	3.04	-52.91	-47.00	5.91	RMS	Vertical
7	1836.6418	-62.91	0.35	-62.56	-47.00	15.56	RMS	Horizontal
8	1893.6322	-59.09	0.26	-58.83	-47.00	11.83	RMS	Horizontal
9	2121.0061	-65.15	2.92	-62.23	-47.00	15.23	RMS	Horizontal
10	2513.4757	-57.52	2.68	-54.84	-47.00	7.84	RMS	Horizontal
11	2900.0700	-66.29	3.54	-62.75	-47.00	15.75	RMS	Horizontal
12	3673.8462	-66.69	4.54	-62.15	-47.00	15.15	RMS	Horizontal

4.8 RECEIVER BLOCKING

4.8.1 LIMITS

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment (see clause 5.4.1.t)).

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
$P_{\min} + 6 \text{ dB}$	2 380 2 503,5	-53	CW
$P_{\min} + 6 \text{ dB}$	2 300 2 330 2 360	-47	CW
$P_{\min} + 6 \text{ dB}$	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{\min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.			
NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.			

4.8.2 TEST METHOD

Test condition: Keep the EUT on the lowest and highest channel working mode.

Test procedure: Step1:

For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

Step 2:

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance

criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min} . This signal level (P_{min}) is increased by the value provided in the table corresponding to the receiver category and type of equipment.

Step 4:

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

Repeat step 4 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 6:

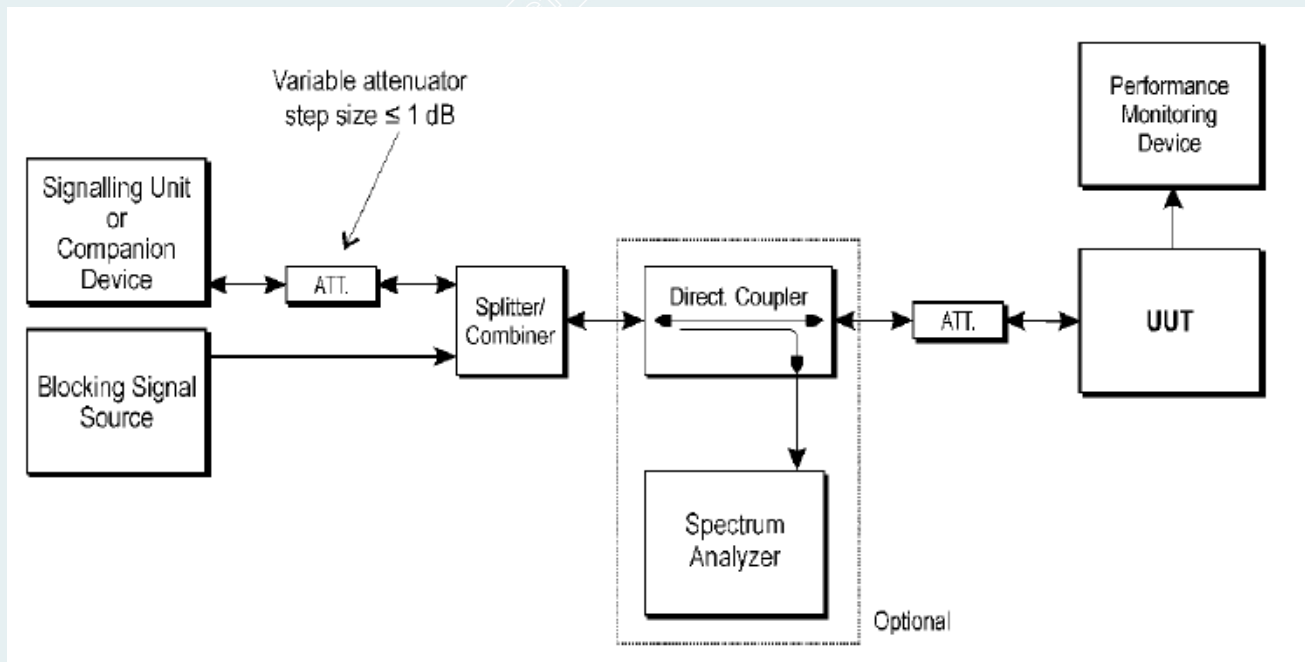
For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

Remark:

If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used.

Pre-test the lowest and highest channel, found that the lowest channel of 802.11b is the worst case.

4.8.3 TEST SETUP



4.8.4 TEST RESULTS

Mode: 11B	Ant: Ant1
Channel: LCH	Voltage: VN
Temperature: TN	Result: PASS Value:Pmin:-92
Result: PASS Value: 2300:0.30,2330:0.90,2360:0.10,2380:0.00	
Start Time: 2019/3/28 15:50:15	End Time: 2019/3/28 15:55:36

Receiver Blocking

Freq	Freq	2300	2330	2360	2380	Freq	2300	2330	2360	2380
PER		2.60	1.10	2.00	70.50		0.30	0.90	0.10	0.00

Mode: 11B	Ant: Ant1
Channel: HCH	Voltage: VN
Temperature: TN	Result: PASS Value: Pmin:-92
Start Time: 2019/3/28 16:01:24	End Time: 2019/3/28 16:06:35
Result: PASS Value: 2504:1.40,2524:2.60,2584:5.80,2674:4.00	

Receiver Blocking

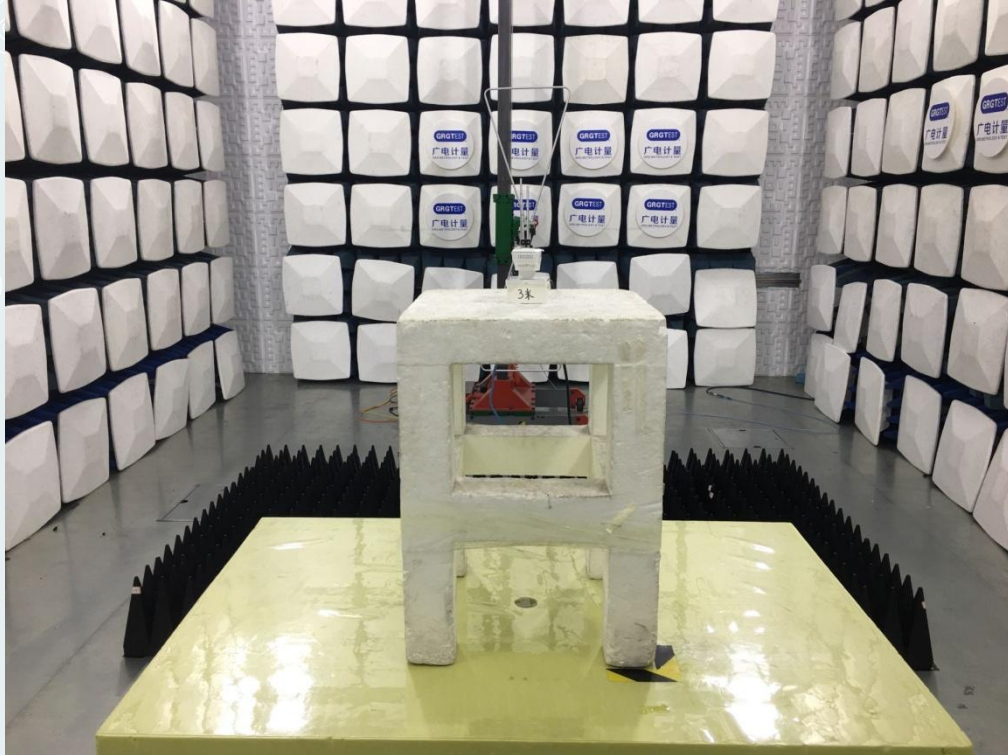
PER[%]

Frequency [MHz]

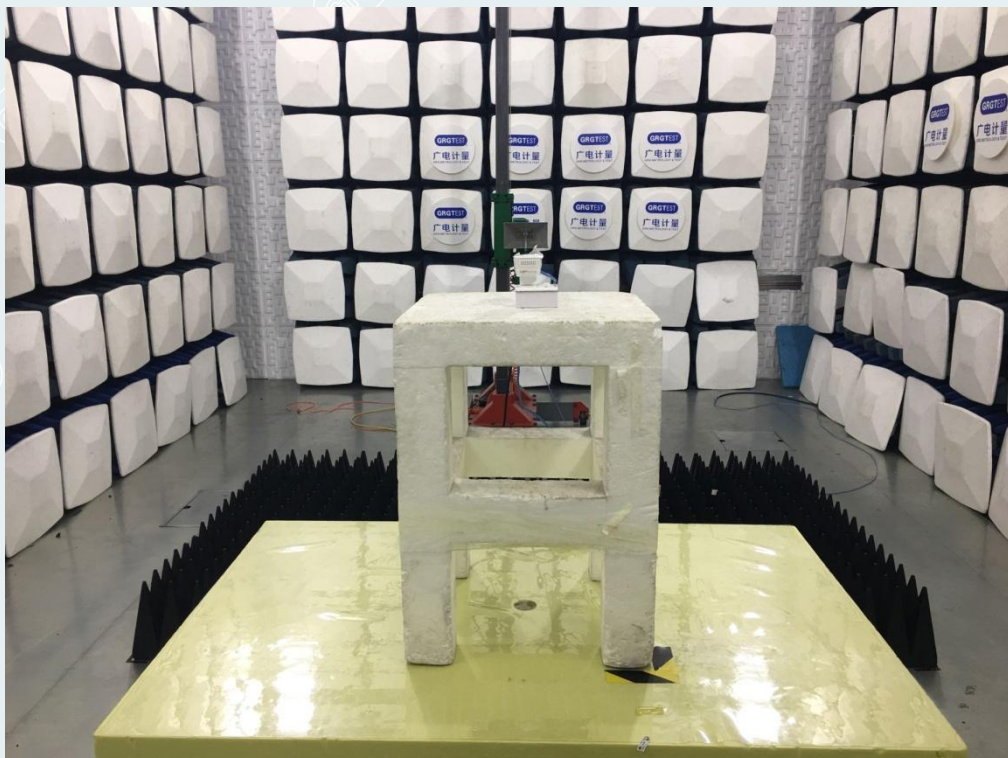
Freq	2504	2524	2584	2674
PER	1.40	2.60	5.80	4.00

APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

Spurious Emission Below 1GHz:



Above 1GHz:



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