RADIO TEST REPORT

Sample： Omega 2

Trade Name： N/A

Main Model： OM-O2P

Additional Model： OM-O2, OM-O2U

Report No.： UNIA21112923ER-02

Prepared for

Onion Corporation.

895 Don Mills Road, Tower-2, Suite 900, Toronto, Ontario, M3C 1W3, Canada

Prepared by

Shenzhen United Testing Technology Co., Ltd.

2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant	:	Onion Corporation.
Address	:	895 Don Mills Road, Tower-2, Suite 900, Toronto, Ontario, M3C 1W3, Canada
Manufacturer	:	Onion Corporation.
Address	:	895 Don Mills Road, Tower-2, Suite 900, Toronto, Ontario, M3C 1W3, Canada

Product description

Product	:	Omega 2
Trade Name	:	N/A
Model Name	:	OM-O2P, OM-O2, OM-O2U
Standard	:	ETSI EN 300 328 V2.2.2 (2019-07)

This equipment under test described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the EUT is in compliance with the 2014/53/EU RE Directive Art.3.2 requirements.

Date of Test

Date (s) of performance of tests	:	Dec. 1, 2021 ~ Dec. 15, 2021
Date of Issue	:	Dec. 17, 2021
Test Result	:	Pass

Prepared by: kahn.yang

Kahn yang /Editor

Reviewer: Sky dong

Sky dong/Supervisor

Approved & Authorized Signer: Liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST RESULTS

Test procedures according to the technical standards:
ETSI EN 300 328 V2.2.2 (2019-07)

	TRANSMITTER PARAMETERS			
No	Description	Limit	Frequency Range(MHz)	Applicable (Yes/No)
1	RF output power	Clause 4.3.2.2.3	2400-2483.5	Y
2	Power Spectral Density	Clause 4.3.2.3.3		Y
3	Duty Cycle, Tx-sequence, Tx-gap	Clause 4.3.2.4.3		N
4	Medium Utilisation (MU) factor	Clause 4.3.2.5.3		N
5	Adaptivity (non-FHSS)	Clause 4.3.2.6		N
6	Occupied Channel Bandwidth	Clause 4.3.2.7.3		Y
7	Transmitter unwanted emissions in the OOB domain	Clause 4.3.2.8.3	FL=2400-2BW FH=2483.5+2BW	Y
8	Transmitter unwanted emissions in the spurious domain(Conducted)	Clause 4.3.2.9.3	30-12750	N
9	Transmitter unwanted emissions in the spurious domain(Radiated)			Y
	RECEIVER PARAMETERS			
10	Spurious emissions (Conducted)	Clause 4.3.2.10.3	30-12750	N
11	Spurious emissions (Radiated)			Y
12	Receiver Blocking	Clause 4.3.2.11.4	2400-2483.5	Y
13	Geo-location capability	Clause 4.3.2.12.3	——	N

1.2 TEST LOCATION

Test Laboratory : Onion Corporation.

Address : 895 Don Mills Road, Tower-2, Suite 900, Toronto, Ontario, M3C 1W3, Canada

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k = 2, providing a level of confidence of approximately 95%.

No.	Item	Uncertainly (dB)
1	RF output power, conducted	0.42
2	Adjacent Channel Power, conducted	0.88
3	Unwanted Emissions, conducted	2.76
4	All emissions, radiated	5.20

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

The following information of EUT submitted and identified by applicant:

Product:	Omega 2
Trade Name:	N/A
Main Model:	OM-O2P
Additional Model:	OM-O2, OM-O2U
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: OM-O2P
Frequency Range:	WiFi 2.4G 802.11b/g/n(HT20): 2412~2472 MHz WiFi 2.4G 802.11n(HT40): 2422~2462 MHz
Number of Channels:	802.11b/g/n(HT20): 13CH 802.11n(HT40): 9CH
Modulation Type:	CCK, OFDM, DBPSK, DAPSK
Product Description:	The EUT is an Omega 2. Based on the application, features, or specification exhibited in User's Manual, more details of EUT technical specification, please refer to the User's Manual.

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List for 802.11b/g/n(20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452	13	2472
02	2417	06	2437	10	2457		
03	2422	07	2442	11	2462		
04	2427	08	2447	12	2467		

Channel List for 802.11n(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	06	2437	09	2452		
04	2427	07	2442	10	2457		
05	2432	08	2447	11	2462		

2.3 TEST MODE

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Low channel (Receiver Mode)
5	Middle channel (Receiver Mode)
6	High channel (Receiver Mode)

Note:

1. All modes have been tested and the worst mode test data recording in the test report, if no any other data.

2.4 DESCRIPTION OF THE TEST MODES

Test Condition	Temperature(°C)	Relative Humidity(%)
NT/NV	24	50
LT/NV	-10	/
HT/NV	55	/

Note:

1. The HT 55°C and LT -10°C was declared by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.
2. NV: Normal Voltage; NT: Normal Temperature.
3. LT: Low Extreme Test Temperature; HT: High Extreme Test Temperature.
4. The measurements are performed at the highest, middle, lowest available channels.

2.5 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Shielded Type	Ferrite Core	Length	Note
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Note:

1. The support equipment was authorized by Declaration of Confirmation.
2. For detachable type I/O cable should be specified the length in cm in『Length』column.
3. "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

2.6 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Horn Antenna	Sunol	DRH-118	A101415	2023.09.27
2	Broadband Hybrid Antenna	Sunol	JB1	A090215	2022.03.01
3	PREAMP	HP	8449B	3008A00160	2022.09.22
4	PREAMP	HP	8447D	2944A07999	2022.05.17
5	EMI Test Receiver	Rohde&Schwarz	ESR3	101891	2022.09.22
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2022.09.22
7	MXA Signal Analyzer	Agilent	N9020A	MY51110104	2022.09.22
8	RF Power Sensor	DARE	RPR3006W	15I00041SNO88	2022.05.17
9	RF Power Sensor	DARE	RPR3006W	15I00041SNO89	2022.05.17
10	RF Power Divider	Anritsu	K241B	992289	2022.09.22
11	Signal Generator	Agilent	E4421B	MY4335105	2022.09.22
12	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2022.09.22
13	Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	154987	2022.09.22
14	Active Loop Antenna	Com-Power	AL-130R	10160009	2022.07.25
15	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2022.05.23
16	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2022.09.27
17	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2022.05.28
18	Signal Generator	Agilent	N5183A	MY47420153	2022.05.28
19	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2022.05.28
20	Power Meter	KEYSIGHT	N1911A	MY50520168	2022.05.28
21	Frequency Meter	VICTOR	VC2000	997406086	2022.05.28
22	DC Power Source	HYELEC	HY5020E	055161818	2022.06.23

3 RF OUTPUT POWER

3.1 TEST LIMIT

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

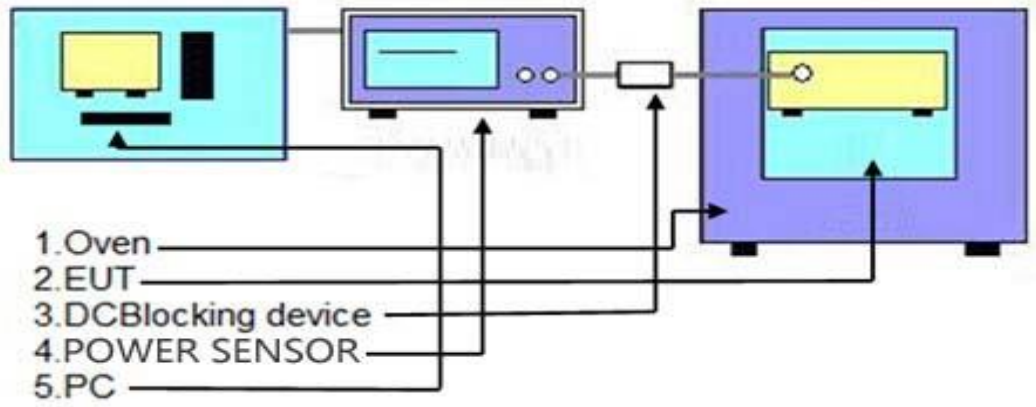
Limit
20 dBm

Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. Save these P_{burst} values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

3.2 TEST SETUP



3.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.2.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.2.2 for the measurement method.
   a. Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s.
      Use the following settings:
      - Sample speed 1 MS/s or faster.
      - The samples must represent the power of the signal.
      - Measurement duration: For non-adaptive equipment: equal to the observation period defined in b)
   b. Clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) is captured.
   c. Print the plots from power sensor by used power sensor on PC, select the max result and record it.

3.4 TEST RESULT

Test Mode	802.11b		
Test conditions	Average EIRP Power (dBm)		
	CH01	CH07	CH13
T nom (°C)	10.52	11.64	10.02
T min (°C)	10.52	11.63	10.01
T max (°C)	10.52	11.64	10.01
Max. E.I.R.P	11.64		
Limits	20dBm (-10dBW)		
Burst plot	> 10		
Result	PASS		

Note: Average EIRP Power = Burst power + the antenna gain value

Test Mode	802.11g		
Test conditions	Average EIRP Power (dBm)		
	CH01	CH07	CH13
T nom (°C)	8.32	9.51	7.68
T min (°C)	8.31	9.50	7.68
T max (°C)	8.31	9.51	7.67
Max. E.I.R.P	9.51		
Limits	20dBm (-10dBW)		
Burst plot	> 10		
Result	PASS		

Note: Average EIRP Power = Burst power + the antenna gain value

Test Mode	802.11n(HT20)		
Test conditions	Average EIRP Power (dBm)		
	CH01	CH07	CH13
T nom (°C)	5.94	6.92	5.36
T min (°C)	5.93	6.91	5.36
T max (°C)	5.94	6.92	5.35
Max. E.I.R.P	6.92		
Limits	20dBm (-10dBW)		
Burst plot	> 10		
Result	PASS		

Note: Average EIRP Power = Burst power + the antenna gain value

Test Mode	802.11n(HT40)		
Test conditions	Average EIRP Power (dBm)		
	CH03	CH07	CH11
T nom (°C)	5.23	6.65	5.14
T min (°C)	5.22	6.65	5.13
T max (°C)	5.23	6.65	5.13
Max. E.I.R.P	6.65		
Limits	20dBm (-10dBW)		
Burst plot	> 10		
Result	PASS		

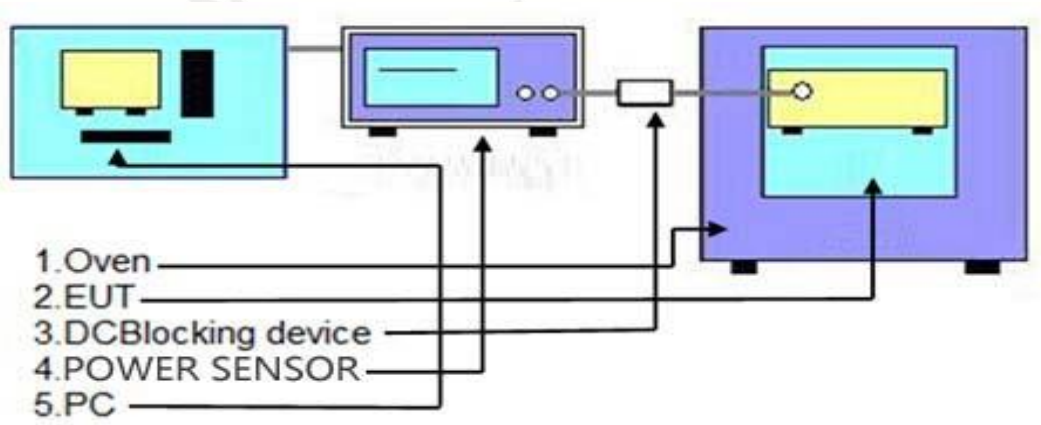
Note: Average EIRP Power = Burst power + the antenna gain value

4 POWER SPECTRAL DENSITY

4.1 TEST LIMIT

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

4.2 TEST SETUP



4.3 TEST PROCEDURE

The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range.

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.3.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.3.2 for the measurement method.

a. The equipment setup:

Frequency range:	2400MHz-2483.5MHz
RBW/VBW:	10KHz/30KHz
Sweep points:	>8350 (Set as 10000)
Sweep time:	For non-continuous transmissions: 2 × Channel Occupancy Time × number of sweep points
	For continuous transmissions: 10s; the sweep time may be increased further until a value where the sweep time has no further impact anymore on the RMS value of the signal.
Detector:	RMS
Trace:	Max hold

b. For conducted measurements on smart antenna systems using either operating mode 2 or 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

c. Add up the values for amplitude (power) for all the samples in the file.

d. Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.)

e. Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

f. Shift the start point of the samples added up in step 5 by 1 sample and repeat the procedure in step e (i.e. sample #2 to #101).

g. Repeat step 6 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments.
h. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

4.4 TEST RESULT

Test conditions	Test Mode	EIRP Spectral Power Density (dBm/MHz)		
		Low channel	Middle channel	High channel
T_{nom}(°C) V_{nom}(V)	802.11b	-6.73	-4.71	-6.67
	802.11g	-14.25	-11.91	-14.55
	802.11n(HT20)	-15.41	-16.36	-16.00
	802.11n(HT40)	-16.74	-23.27	-16.96
Limit		≤10dBm/MHz		
Result		PASS		

Note: Maximum spectral power density(EIRP) = power spectral density + the antenna gain value

5 ADAPTIVE (CHANNEL ACCESS MECHANISM)

5.1 TEST LIMIT

The frequency range of the equipment is determined by the lowest and highest.

Non-LBT based Detect and Avoid:

1. The channel shall remain unavailable for a minimum time equal to 1 s after which the channel may be considered again as an 'available' channel.
2. COT ≤ 40ms;
3. Idle Period = 5% of COT;
4. Detection threshold level = -70 dBm/MHz + (20 dBm - Pout e.i.r.p.)/1 MHz (Pout in dBm).

LBT based Detect and Avoid:

1. CCA observation time declared by the supplier:
   If 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 18 μs.
2. COT = 1~10 ms;
3. Idle Period = 5% of COT;
4. Detection threshold level = -70 dBm/MHz + (20 dBm - Pout e.i.r.p.)/1 MHz (Pout in dBm).

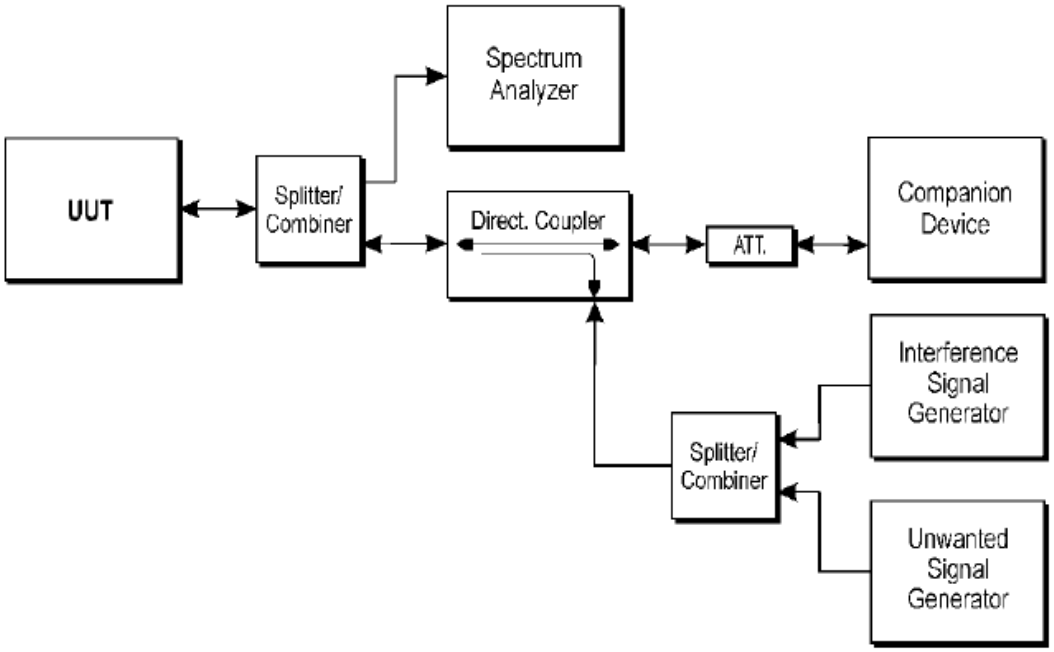
LBT based Detect and Avoid (Load Based Equipment):

1. CCA declared by the manufacturer:
   a. If 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 18 μs.
   b. 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 a random duration in the range between 18 μs and at least 160 μs.
2. COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms;
3. Detection threshold level = -70 dBm/MHz + (20 dBm - Pout e.i.r.p.)/1 MHz (Pout in dBm).

Short Control Signalling Transmissions:

Short Control Signalling Transmissions shall have a maximum duty cycle TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms.

5.2 TEST SETUP



Note:

1. WLAN is normal transmission.
2. Interference shall be injected -> WLAN shall stop transmission.
3. Blocking shall be injected -> WLAN does not resume any normal transmission.
4. Removing the interference signal.

5.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.6.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.6.2 for the measurement method.
3. The spectrum analyzer sweep was triggered by the start of the interfering signal, with the interfering signal present, a 100 % duty cycle CW signal is inserted as the blocking signal.
   - RBW: ≥ Occupied Channel Bandwidth (if the analyzer does not support this setting, the highest available setting shall be used)
   - RBW: use next available RBW setting below the measured Occupied Channel Bandwidth
   - Filter type: Channel Filter
   - RBW: 8M/VBW: 40M (50MHz is the MAX)
   - Detector Mode: RMS
   - Centre Frequency: Equal to the hopping frequency to be tested.
   - Span: 0 Hz
   - Sweep time: > Channel Occupancy Time of the UUT. If the Channel Occupancy Time is non-contiguous (non-LBT based equipment), the sweep time shall be sufficient to cover the period over which the Channel Occupancy Time is spread out
   - Trace Mode: Clear/Write
   - Trigger Mode: Video

5.4 TEST RESULT

Test Mode:	802.11b/2412MHz
AWGN Interference Level (dBm):	-66.23
Blocking Level (dBm):	-35
Interference Start Time (s):	5
Blocking Start Time (s):	65
Max COT (ms):	11.91
Idle Time (ms):	0.25
Duty Cycle (%):	0

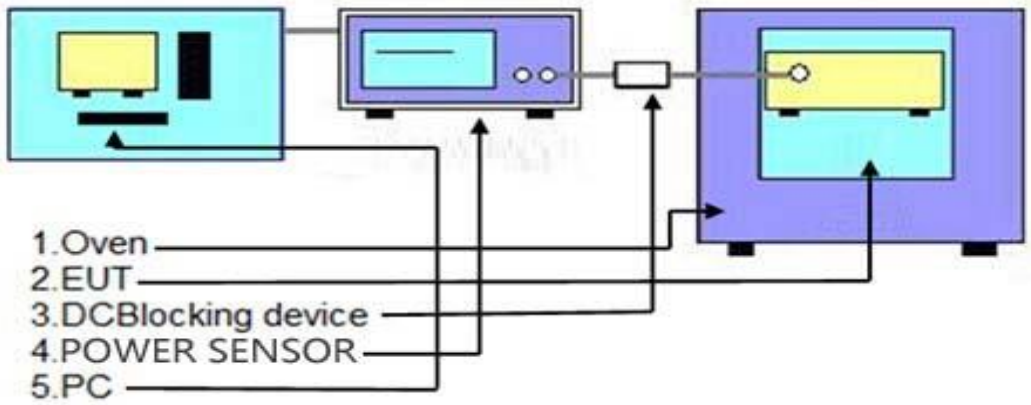
Test Mode:	802.11b/2472MHz
AWGN Interference Level (dBm):	-66.88
Blocking Level (dBm):	-35
Interference Start Time (s):	5
Blocking Start Time (s):	65
Max COT (ms):	11.82
Idle Time (ms):	0.28
Duty Cycle (%):	0

6 OCCUPIED CHANNEL BANDWIDTH

6.1 TEST LIMIT

The Occupied Channel Bandwidth shall fall completely within the band given in 2 400 MHz to 2 483,5 MHz. In addition, for non-adaptive equipment 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.

6.2 TEST SETUP



6.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.7.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.7.2 for the measurement method.
   - Centre Frequency: The centre frequency of the channel under test
   - Resolution BW: ~ 1 % of the span without going below 1 %
     (430KHz for 20 MHz channel,820KHz for 40MHz)
   - Video BW: (1.3MHz for 20 MHz channel,2.7MHz for 40MHz)
   - Frequency Span for frequency hopping equipment: Lowest frequency separation that is used within the hopping sequence)
   - Frequency Span for other types of equipment: 2 × Nominal Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel, 80 MHz for a 40 MHz channel)
   - Detector Mode: RMS
   - Trace Mode: Max Hold
   - Sweep time: 1S

6.4 TEST RESULT

Test Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	FL/FH(MHz)	Limit	Result
802.11b	01	2412	12.430	2405.780	FL > 2400 MHz and FH < 2483.5 MHz	PASS
	13	2472	13.244	2478.627		PASS
802.11g	01	2412	16.526	2403.732		PASS
	13	2472	16.729	2480.369		PASS
802.11n(HT20)	01	2412	17.807	2403.092		PASS
	13	2472	17.963	2480.987		PASS
802.11n(HT40)	03	2422	35.220	2404.385		PASS
	11	2462	35.660	2479.835		PASS

Note: FL is the lowest frequency of the 99% occupied bandwidth of power envelope.
FH is the highest frequency of the 99% occupied bandwidth of power envelope.

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

7.1 TEST LIMIT

Clause	Frequency	Limit
4.3.2.8.3	2400-BW~2400 2483.5~2483.5+BW	-10dBm/MHz
	2400-2BW~2400-BW 2483.5+BW~2483.5+2BW	-20dBm/MHz
	<2400-2BW >2483.5+2BW	-30dBm/MHz

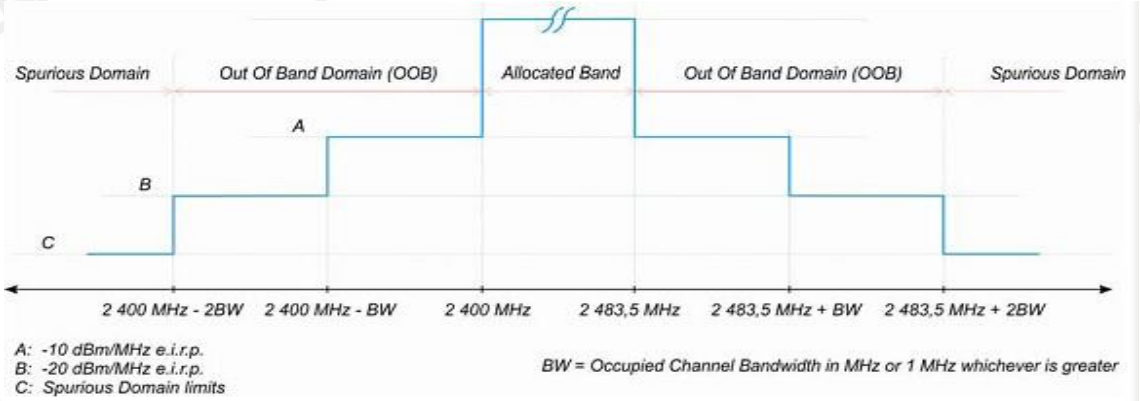
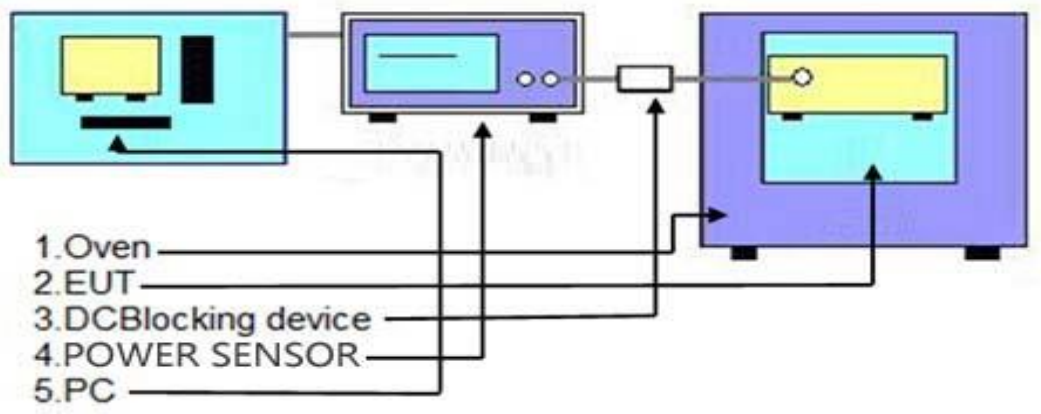


Figure 1: Transmit mask

7.2 TEST SETUP



7.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.8.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.8.2 for the measurement method.
   Connect the UUT to the spectrum analyzer and use the following settings:
   - Centre Frequency: 2484 MHz
   - Span: 0 Hz
   - Resolution BW: 1 MHz
   - Filter mode: Channel filter
   - Video BW: 3 MHz
   - Detector Mode: RMS
   - Trace Mode: Max Hold
   - Sweep Mode: Continuous
   - Sweep Points: Sweep Time [s] / (1 µs) or 5 000 whichever is greater
   - Trigger Mode: Video trigger; in case video triggering is not possible, an external trigger source may be used
   - Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

7.4 TEST RESULT

Test Condition	Test Mode	2412MHz		2472MHz	
		OOB EMISSION		OOB EMISSION	
		Segment A	Segment B	Segment A	Segment B
		Maximum power	Maximum power	Maximum power	Maximum power
		dBm/MHz	dBm/MHz	dBm/MHz	dBm/MHz
Nom(°c) Nom(V)	802.11b	-49.26	-59.10	-46.69	-59.15
Limit (dBm)		-10.00	-20.00	-10.00	-20.00
Result		PASS	PASS	PASS	PASS

Test Condition	Test Mode	2412MHz		2472MHz	
		OOB EMISSION		OOB EMISSION	
		Segment A	Segment B	Segment A	Segment B
		Maximum power	Maximum power	Maximum power	Maximum power
		dBm/MHz	dBm/MHz	dBm/MHz	dBm/MHz
Nom(°c) Nom(V)	802.11g	-48.22	-59.03	-42.79	-59.08
Limit (dBm)		-10.00	-20.00	-10.00	-20.00
Result		PASS	PASS	PASS	PASS

Test Condition	Test Mode	2412MHz		2472MHz	
		OOB EMISSION		OOB EMISSION	
		Segment A	Segment B	Segment A	Segment B
		Maximum power	Maximum power	Maximum power	Maximum power
		dBm/MHz	dBm/MHz	dBm/MHz	dBm/MHz
Nom(°c) Nom(V)	802.11n(HT20)	-49.84	-59.23	-43.21	-59.07
Limit (dBm)		-10.00	-20.00	-10.00	-20.00
Result		PASS	PASS	PASS	PASS

Test Condition	Test Mode	2422MHz		2462MHz	
		OOB EMISSION		OOB EMISSION	
		Segment A	Segment B	Segment A	Segment B
		Maximum power	Maximum power	Maximum power	Maximum power
		dBm/MHz	dBm/MHz	dBm/MHz	dBm/MHz
Nom(°c) Nom(V)	802.11n(HT40)	-53.62	-59.92	-46.92	-58.91
Limit (dBm)		-10.00	-20.00	-10.00	-20.00
Result		PASS	PASS	PASS	PASS

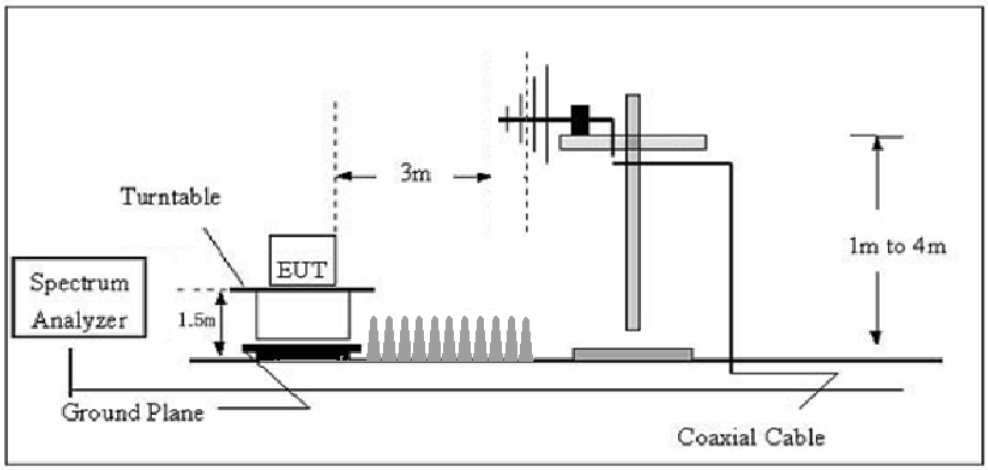
8 SPURIOUS EMISSIONS – TRANSMITTER

8.1 TEST LIMIT

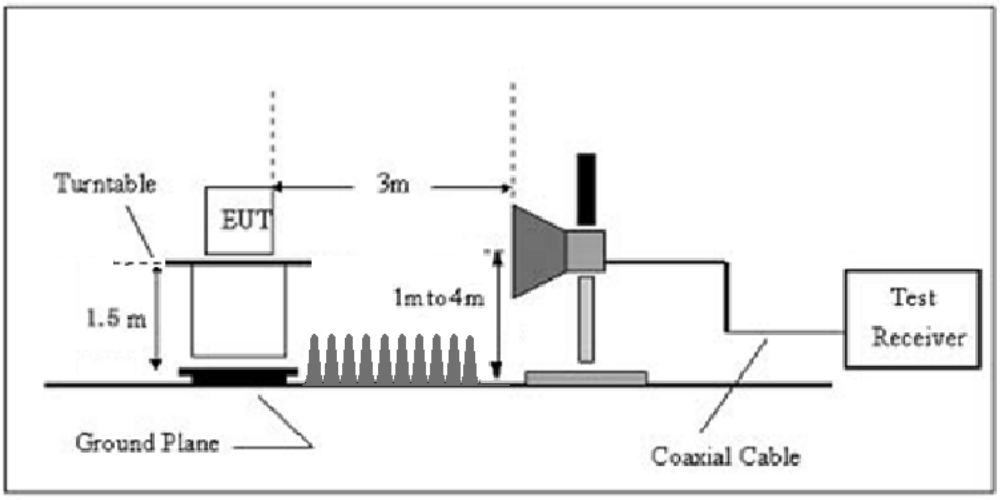
Frequency range	Maximum power, e.r.p(≤1 GHz) e.i.r.p(> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 KHz
47 MHz to 74 MHz	-54 dBm	100 KHz
74 MHz to 87.5 MHz	-36 dBm	100 KHz
87.5 MHz to 118 MHz	-54 dBm	100 KHz
118 MHz to 174 MHz	-36 dBm	100 KHz
174 MHz to 230 MHz	-54 dBm	100 KHz
230 MHz to 470 MHz	-36 dBm	100 KHz
470 MHz to 862 MHz	-54 dBm	100 KHz
862 MHz to 1 GHz	-36 dBm	100 KHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz

8.2 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



8.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.9.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.9.2 for the measurement method.
   The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting	
Frequency Start to Stop	30 MHz to 1000 MHz	1000 MHz to 12750MHz
Resolution bandwidth	100 kHz	1 MHz
Video bandwidth	300 kHz	3 MHz
Filter type	3 dB (Gaussian)	
Detector mode	Peak	
Trace Mode	Max Hold	
Sweep Points	≥ 19 400 (Set as 20000)	≥ 23 500 (Set as 24000)
Sweep Time	For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long,Below 1GHz such that for each 100 kHz frequency step, Above 1GHz such that for each 1MHz frequency step the measurement time is greater than two transmissions of the UUT, on any channel	

a. The EUT was placed on the top of the turntable in Semi Anechoic Room.
b. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
c. This measurement shall be repeated with the transmitter in standby mode where applicable.
d. For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
e. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
f. Replace the EUT by standard antenna and feed the RF port by signal generator.
g. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
h. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
i. The level of the spurious emission is the power level of (8) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
j. If the level calculated in (9) is higher than limit by more than 6dB, then lower the RBW of the spectrum analyzer to 30KHz. If the level of this emission does not change by more than 2dB, then it is taken as narrowband emission, otherwise, wideband emission.
k. The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.
l. EUT Orthogonal Axis:
"X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand.

3. EUT OPERATION DURING TEST
a. The EUT was programmed to be in continuously transmitting mode.
b. For the initial investigation on the highest, lowest frequency, no significant differences in spurious emissions were observed between these 2 channels. The worst test data was shown
c. There is a filter used during the test, the fundamental signals will be not shown in the plot.
d. The EUT is connected with the GSM base station when the BT is transmiting.

8.4 TEST RESULT

Remark: The all data rate modes had been test, but only worse test data was recorded in the test report.

Frequency (MHz)	Antenna	TX/RX	Measured (dBm)	Limits (dBm)	Margin	Result
802.11b: 2412MHz						
260.82	H	TX	-59.73	-36	-23.73	PASS
645.25	H	TX	-67.73	-54	-13.73	PASS
1824.82	H	TX	-45.49	-30	-15.49	PASS
4804.18	H	TX	-40.25	-30	-10.25	PASS
260.82	V	TX	-58.3	-36	-22.3	PASS
645.25	V	TX	-68.01	-54	-14.01	PASS
1824.82	V	TX	-45.13	-30	-15.13	PASS
4804.18	V	TX	-39.82	-30	-9.82	PASS
802.11b: 2472MHz						
260.66	H	TX	-58.64	-36	-22.64	PASS
645.17	H	TX	-67.91	-54	-13.91	PASS
1824.65	H	TX	-44.11	-30	-14.11	PASS
4804.28	H	TX	-38.00	-30	-8.00	PASS
260.66	V	TX	-58.65	-36	-22.65	PASS
645.17	V	TX	-65.55	-54	-11.55	PASS
1824.65	V	TX	-44.35	-30	-14.35	PASS
4804.28	V	TX	-39.17	-30	-9.17	PASS

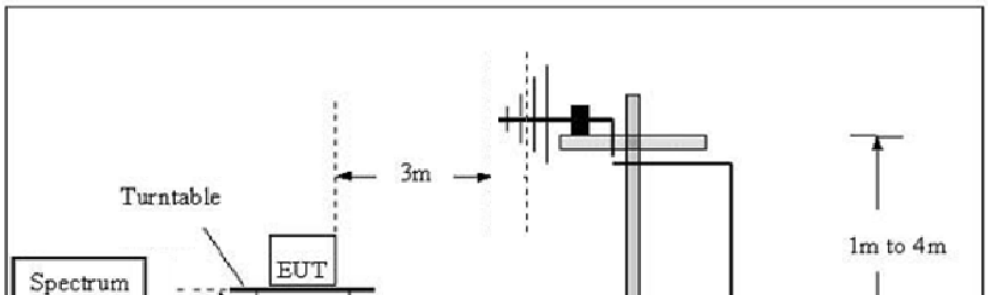
9 SPURIOUS EMISSIONS – RECEIVER

9.1 TEST LIMIT

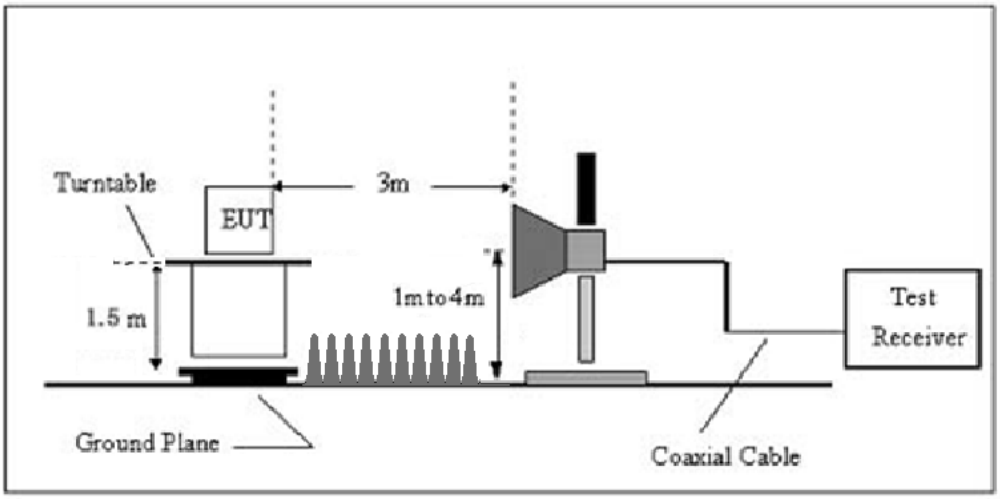
Clause	Test Item	Frequency(MHz)	Limit
4.3.2.10.3	Spurious emissions (Radiated)	30-1000	-57dBm
		1000-12750	-47dBm

9.2 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



9.3 TEST PROCEDURE

1. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.10.1 for the test conditions.
2. Please refer to ETSI EN 300 328 (V2.2.2) clause 5.4.10.2 for the measurement method.
   The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting	
Frequency Start to Stop	30 MHz to 1000 MHz	1000 MHz to 12750MHz
Resolution bandwidth	100 kHz	1 MHz
Video bandwidth	300 kHz	3 MHz
Filter type	3 dB (Gaussian)	
Detector mode	Peak	
Trace Mode	Max Hold	
Sweep Points	≥ 19 400 (Set as 20000)	≥ 23 500 (Set as 24000)
Sweep Time	For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long,Below 1GHz such that for each 100 kHz frequency step, Above 1GHz such that for each 1MHz frequency step the measurement time is greater than two transmissions of the UUT, on any channel	

a. The EUT was placed on the top of the turntable in Semi Anechoic Room.
b. The test shall be made in the receiving mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
c. For 30~12750MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable. .
d. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
e. Replace the EUT by standard antenna and feed the RF port by signal generator.
f. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
g. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
h. The level of the spurious emission is the power level of (7) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
i. The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.
j. EUT Orthogonal Axis:
"X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand.
k. EUT was programmed to be in continuously receiving mode.

9.4 TEST RESULT

Remark: All modes had been test, but only worse test data was recorded in the test report.

Frequency (MHz)	Antenna	TX/RX	Measured (dBm)	Limits (dBm)	Margin	Result
CH01: 2412MHz						
353.16	H	RX	-68.20	-57	-11.20	PASS
800.24	H	RX	-65.68	-57	-8.68	PASS
1205.46	H	RX	-55.80	-47	-8.80	PASS
2232.78	H	RX	-55.41	-47	-8.41	PASS
353.16	V	RX	-69.62	-57	-12.62	PASS
800.24	V	RX	-67.23	-57	-10.23	PASS
1205.46	V	RX	-55.64	-47	-8.64	PASS
2232.78	V	RX	-55.99	-47	-8.99	PASS
CH13: 2472MHz						
353.77	H	RX	-66.57	-57	-9.57	PASS
800.02	H	RX	-65.74	-57	-8.74	PASS
1205.35	H	RX	-56.6	-47	-9.6	PASS
2232.62	H	RX	-56.85	-47	-9.85	PASS
352.96	V	RX	-67.56	-57	-10.56	PASS
800.55	V	RX	-66.03	-57	-9.03	PASS
1205.76	V	RX	-56.25	-47	-9.25	PASS
2232.52	V	RX	-55.83	-47	-8.83	PASS

10 RECEIVER BLOCKING

10.1 TEST LIMIT

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 A, table B or table C.

Receiver Category 1:
Table A: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 20 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 2:
Table B: Receiver Blocking parameters for Receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

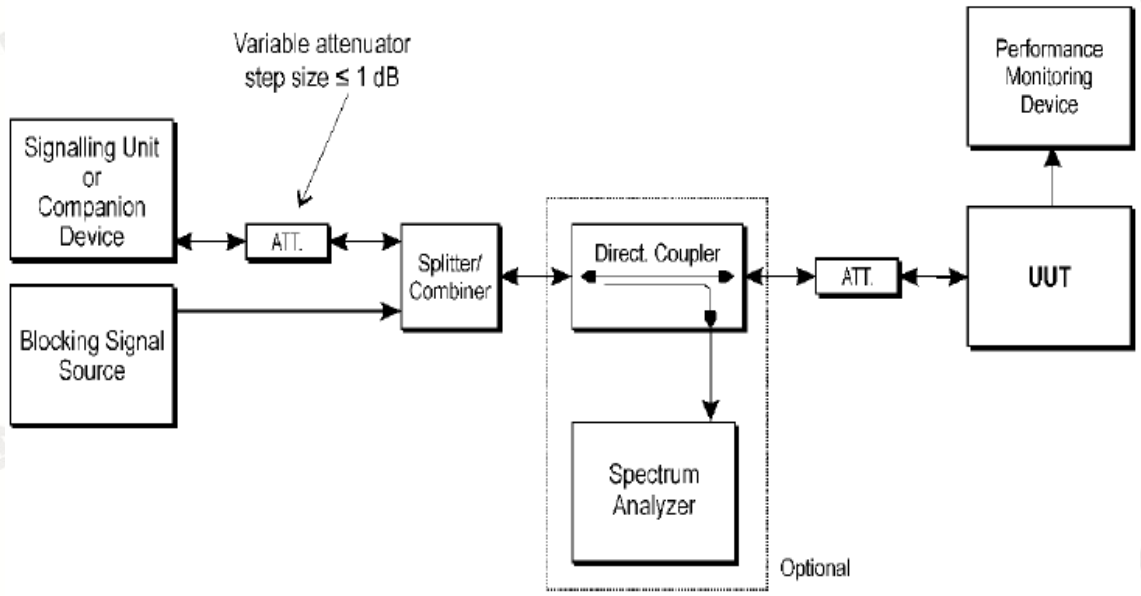
NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 26 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Category 3:
Table C: Receiver Blocking parameters for Receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × log10(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to Pmin + 30 dB where Pmin is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.
NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

10.2 TEST SETUP



10.3 TEST PROCEDURE

For non-FHSS equipment, having more than one operating channel, the operating channels on which the testing has to be performed shall be selected as follows:

- For testing blocking frequencies less than 2 400 MHz, the equipment shall operate on the lowest operating channel.
- For testing blocking frequencies greater than 2 500 MHz, the equipment shall operate on the highest operating channel.

The simplified conducted measure procedures are as follows:

1) For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed.

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.

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. The level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

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 is met.

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.

6)Repeat step 2 to step 5 with the UUT operating at the highest operating channel.

10.4 TEST RESULT

Remark: The power is more than 10dBm, belong to category 1.

(802.11 b mode 1Mbps)

Test channel	Blocking Signal Frequency(MHz)	Blocking Signal Power(dBm)	Wanted signal mean power from companion device(dBm)	Performance PER	Limit PER	Result
Low	2300	-32.00	-72.00	1.35%	10%	Pass
	2330		-72.00	1.17%		
	2360		-72.00	2.52%		
	2380		-66.00	1.91%		
High	2504		-66.00	0.57%		
	2524		-72.00	1.52%		
	2584		-72.00	0.81%		
	2674		-72.00	1.39%		

11 PHOTO OF EUT

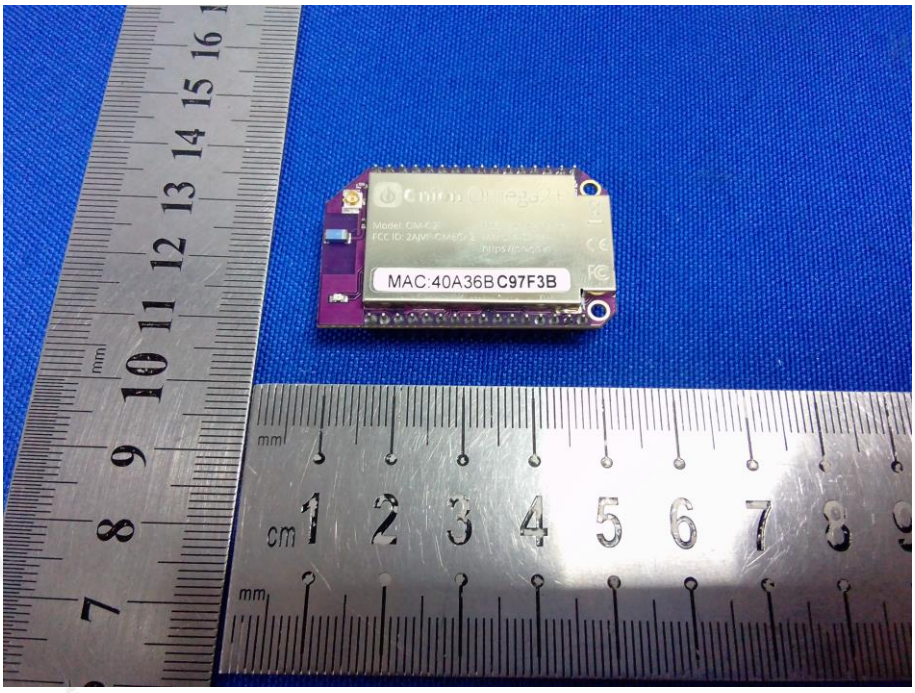


PHOTO 01

PHOTO 02

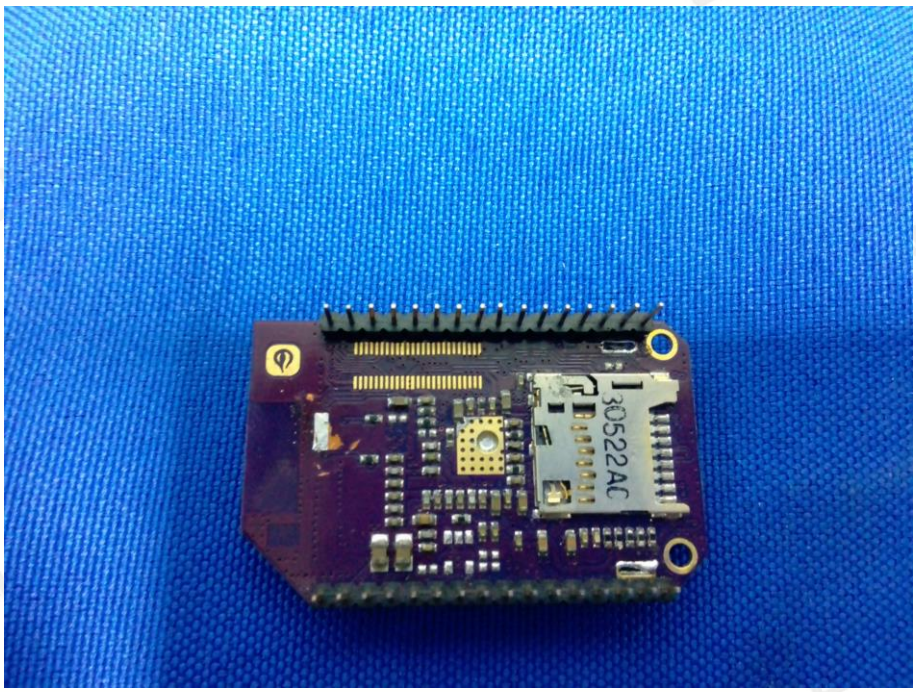


PHOTO 03

End of Report

Statement

1.This report must have the signature of the authorized signatory and the special seal of the report, otherwise it will be considered invalid. If there is no anti-counterfeiting electronic seal of the laboratory in the report in PDF format or it is displayed as "×", the report is invalid.

2.This report shall not be modified, added or deleted without authorization.

3.The results of this report are only valid for the EUT provided by Applicant to our laboratory for inspection (That is,EUT received by our laboratory.Without special explanation, it refers to the samples presented in the report " PHOTO OF EUT ").

4.If there is any objection to the test data and conclusions of this report, please submit it in writing within 10 working days after the date of issuance of the report.

5.Without the written consent of the laboratory, this report shall not be copied (except for full copy), nor shall it be used as publicity materials or advertising.

6.The cover of the report is for decoration only, not included in the body of the report.

7.The paper report issued by our laboratory has the same effect as the electronic report. In case of any difference between the two, the electronic report shall prevail.

8.The Chinese and English reports issued by our laboratory have the same effect. In case of any difference in understanding, the Chinese version shall prevail.

9.Please provide the complete report documents issued by our laboratory when inquiring the report.

10.For cases where compliance is determined based on test values, when relevant specifications, standards, documents, and customers have no relevant requirements and no other special instructions, the test report issued by this laboratory is carried out in full value and adopts ILAC-G8:09 /2019 "Simple Acceptance Rule" for judgment.

11.In the People's Republic of China, when there is no CMA Accredited Symbol in this report, the report is only for scientific research, teaching or internal quality control activities.