RED-Radio Test Report

For

ASBISc Enterprises PLC

Kids Smartwatch

Model No.: CNE-KW51, CNE-KW51XX(XX could be A-Z)

Prepared For	:	ASBISc Enterprises PLC
Address	:	43 Kolonakiou street, Diamond Court, 4103, Ayios Athabasios, Limassol, Cyprius
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
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TEST REPORT

Applicant	:	ASBISc Enterprises PLC
Manufacturer	:	ASBISc Enterprises PLC
Product Name	:	Kids Smartwatch
Model No.	:	CNE-KW51, CNE-KW51XX(XX could be A-Z)
Trade Mark	:	Canyon
Rating(s)	:	Input: DC 5V, 300mA (with DC 3.7V, 420 mAh Battery inside)
Test Standard(s)	:	**ETSI EN 300 328 V2.2.0 (2017-11)**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the ETSI EN 300 328 V2.2.0 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test: Dec. 20, 2018~ Jan. 15, 2019

Prepared By

(Engineer / Oliay Yang)

Reviewer

(Supervisor / Snowy Meng)

Approved & Authorized Signer

(Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	ASBISc Enterprises PLC
Address	:	43 Kolonakiou street, Diamond Court, 4103, Ayios Athabasios, Limassol, Cyprius
Manufacturer	:	ASBISc Enterprises PLC
Address	:	43 Kolonakiou street, Diamond Court, 4103, Ayios Athabasios, Limassol, Cyprius
Factory	:	Jiangsu JinYiDa Energy Technology Co.,Ltd
Address	:	JingKou Industrial Park, JingKou District, Zhenjiang City

1.2. Description of Device (EUT)

Product Name	:	Kids Smartwatch	
Model No.	:	CNE-KW51, CNE-KW51XX(XX could be A-Z) (Note: All samples are the same except the appearance, so we prepare "CNE-KW51" for test only.)	
Trade Mark	:	Canyon	
Test Power Supply	:	DC 3.7V Battery inside	
Test Sample No.	:	S1(Normal Sample), S2(Engineering Sample)	
Product Description	:	Operation Frequency:	2412MHz ~ 2472MHz
		Transfer Rate:	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n: up to 150Mbps
		Number of Channel:	13 Channels
		Modulation Type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
		Antenna Type:	Monopole Antenna
		Antenna Gain(Peak):	1 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) This report is for Wifi 2.4GHz module.			

1.3. Auxiliary Equipment Used During Test

N/A	:	

1.4. Description of Test Modes

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

RF Output Power Test

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1.0
802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6.0
802.11n (HT20)	1 to 13	1, 7, 13	OFDM	BPSK	6.5

Power Spectral Density Test

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 13	1, 7, 13	DSSS	DBPSK	1.0
802.11g	1 to 13	1, 7, 13	OFDM	BPSK	6.0
802.11n (HT20)	1 to 13	1, 7, 13	OFDM	BPSK	6.5

Adaptivity Test:

Mode	Available Channel	Tested Channel	Modulation Technology
802.11b	1 to 13	1, 13	DSSS
802.11g	1 to 13	1, 13	OFDM
802.11n (HT20)	1 to 13	1, 13	OFDM

Occupied Channel Bandwidth Test

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 13	1, 13	DSSS	DBPSK	1.0
802.11g	1 to 13	1, 13	OFDM	BPSK	6.0
802.11n (HT20)	1 to 13	1, 13	OFDM	BPSK	6.5

Transmitter unwanted emission in the out-of-band domain Test

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 13	1, 13	DSSS	DBPSK	1.0
802.11g	1 to 13	1, 13	OFDM	BPSK	6.0
802.11n (HT20)	1 to 13	1, 13	OFDM	BPSK	6.5

Spurious Emissions Test

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11b	1 to 13	13	DSSS	DBPSK	1

Receiver Blocking Test

Mode	Available Channel	Tested Channel	Modulation Technology
802.11b	1 to 13	1, 13	DSSS
802.11g	1 to 13	1, 13	OFDM
802.11n (HT20)	1 to 13	1, 13	OFDM

1.5. List of channels

Thirteen channels are provided for 802.11b, 802.11g, 802.11n(HT20):

Channel	Frequency	Channel	Frequency
1	2412 MHz	8	2447 MHz
2	2417 MHz	9	2452 MHz
3	2422 MHz	10	2457 MHz
4	2427 MHz	11	2462 MHz
5	2432 MHz	12	2467 MHz
6	2437 MHz	13	2472 MHz
7	2442 MHz		

1.6. Test Conditions

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-10°C ~ 45°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 3.7V Battery inside	N/A
Note: (1) The HT 45°C and LT -10°C was declared by manufacturer.		

1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 05, 2018	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI3	101604	Nov. 05, 2018	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 05, 2018	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 05, 2018	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 05, 2018	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 05, 2018	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Dec. 20, 2018	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Dec. 20, 2018	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Dec. 20, 2018	1 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 20, 2018	1 Year
11.	Pre-amplifier	SONOMA	310N	186860	Nov. 05, 2018	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 05, 2018	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 05, 2018	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 05, 2018	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 05, 2018	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 05, 2018	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 05, 2018	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Apr. 02, 2018	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80B	N/A	Nov. 01, 2018	1 Year

1.8. Measurement Uncertainty

For the test methods, according to ETSI EN 300 328 standard, the measurement uncertainty figures shall be calculated in accordance with ETR 100 028-1 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time	±5 %
Duty Cycle	±5 %

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

List of Measurements			
No	Test Items	Clause No.	Results
Transmitter Items			
1	RF Output Power	4.3.2.2	Complies
2	Power Spectral Density	4.3.2.3	Complies
3	Duty Cycle, TX-Sequence, TX-gap	4.3.2.4	N/A Note (2)(3)
4	Medium Utilization (MU) factor	4.3.2.5	N/A Note (2)(3)
5	Adaptivity	4.3.2.6	Complies
6	Occupied Channel Bandwidth	4.3.2.7	Complies
7	Transmitter Unwanted Emissions in the Out-Of-Band Domain	4.3.2.8	Complies
8	Transmitter Unwanted Emissions in the Spurious Domain	4.3.2.9	Complies
Receiver Items			
9	Receiver spurious emissions	4.3.1.11	Complies
10	Receiver Blocking	4.3.2.12	Complies

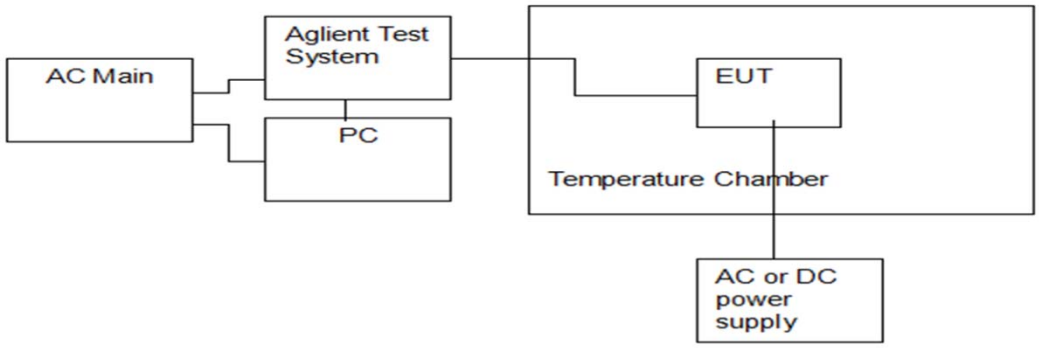
Note:
(1) “N/A”: indicates test is not applicable in this Test Report.
(2) This requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.
(3) This requirement applies to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.
(4) This requirement does not apply to adaptive equipment unless operating in non-adaptive mode.

3. RF Output Power

3.1. RF Output Power Limit

Condition	Limit
☐ Non-adaptive frequency hopping systems	Equal to or less than the value declared by the manufacturer. This declared value shall be equal to or less than 20 dBm.
☒ Adaptive frequency hopping systems	20dBm

3.2. Test Setup



3.3. Test Procedure

Refer to chapter 5.4.2.2.1 of EN 300 328 V2.2.0.

1. Run a test program to control EUT transmitting at specific channel
2. Connect the power sensor to the transmit port
3. Power Meter was setting as below:

Sample speed: 1 MS/s

Number of bursts: at least 10bursts

Detector: RMS

4. A power meter was used to read the response of the power sensor
5. Define Start time and Stop time of a burst by 30dB below the highest value of the stores samples.
6. Find the highest burst value
7. Record the power level
8. EIRP = antenna gain + power level of step 7.

3.4. Test Data

Please to see the following pages

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Test Mode:		TX(CH01/CH07/CH13)-802.11b				
TEST CONDITIONS				Total e.i.r.p (dBm)		
				CH01	CH07	CH13
T nom (°C)	20.00	V nom (V)	DC 3.7V	16.14	15.85	15.65
T min (°C)	-10.00	V nom (V)	DC 3.7V	15.18	15.41	15.71
T max (°C)	45.00	V nom (V)	DC 3.7V	15.11	15.42	15.67
Max RF Power				16.14		
Limits				20dBm		
Result				Complies		
Note: Power measurement, actual measurement for 16 Burst power.						

Test Mode:		TX(CH01/CH07/CH13)-802.11g				
TEST CONDITIONS				Total e.i.r.p (dBm)		
				CH01	CH07	CH13
T nom (°C)	20.00	V nom (V)	DC 3.7V	13.49	13.93	14.74
T min (°C)	-10.00	V nom (V)	DC 3.7V	14.59	13.77	15.05
T max (°C)	45.00	V nom (V)	DC 3.7V	14.56	14.94	14.85
Max RF Power				15.05		
Limits				20dBm		
Result				Complies		
Note: Power measurement, actual measurement for 16 Burst power.						

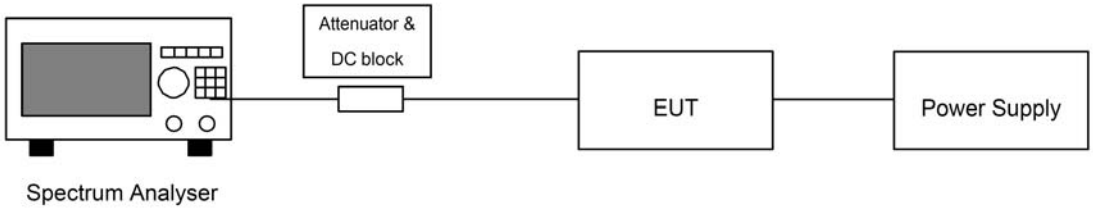
Test Mode:		TX(CH01/CH7/CH13)-802.11n(HT20)				
TEST CONDITIONS				Total e.i.r.p (dBm)		
				CH01	CH07	CH13
T nom (°C)	20.00	V nom (V)	DC 3.7V	12.55	13.19	12.96
T min (°C)	-10.00	V nom (V)	DC 3.7V	13.12	12.95	12.25
T max (°C)	45.00	V nom (V)	DC 3.7V	12.13	12.87	13.13
Max RF Power				13.19		
Limits				20dBm		
Result				Complies		
Note: Power measurement, actual measurement for 16 Burst power.						

4. Power Spectral Density

4.1. Test Limit

Condition	Frequency BAND	Limit (e.i.r.p.)
Under normal conditions	2400 ~ 2483.5 MHz	10dBm / 1MHz

4.2. Test Setup



4.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.0 (2017-11) Clause 5.4.3.

Connect the UUT to the spectrum analyzer and use the following settings:

Frequency range	2400MHz-2483.5MHz
RBW/VBW	10kHz/30kHz
Sweep points/time	>8350 / 10S
Detector	RMS
Trace	Max hold

4.4. Test Data

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (E.I.R.P)	Limit (dBm/1MHz) (E.I.R.P)	Test Result
802.11b				
01	2412.00	-6.658	10	PASS
07	2442.00	-5.270	10	PASS
13	2472.00	-7.180	10	PASS
802.11g				
01	2412.00	-5.728	10	PASS
07	2442.00	-6.904	10	PASS
13	2472.00	6.860	10	PASS

Channel	Channel Frequency (MHz)	Power Density (dBm/1MHz) (E.I.R.P)	Limit (dBm/1MHz) (E.I.R.P)	Test Result
802.11n(HT20)				
01	2412.00	-6.050	10	PASS
07	2442.00	-5.913	10	PASS
13	2472.00	-5.909	10	PASS

5. Adaptivity

5.1. Test Limit

See clause 5.1 of ETSI EN 300 328 V2.2.0(2017-11) for the test conditions. These measurements shall only be performed at normal test conditions.

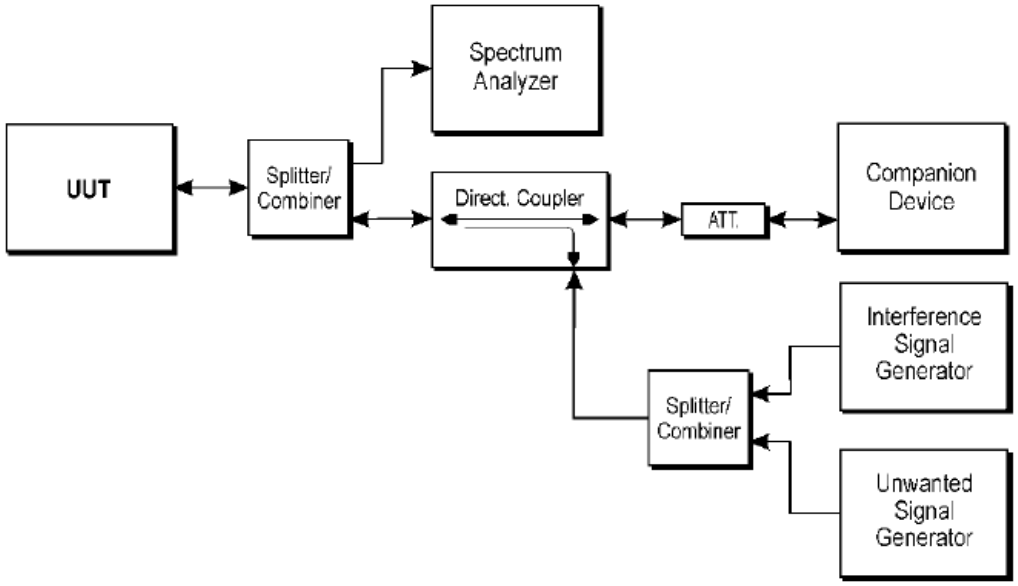
When supported by the operating frequency range of the equipment, this test shall be performed on two operating (hopping) frequencies randomly selected from the operating frequencies used by the equipment. The first (lower) frequency shall be randomly selected within the range 2 400 MHz to 2 442 MHz while the second (higher) frequency shall be randomly selected within the range 2 442 MHz to 2 483,5 MHz. The equipment shall be in a normal operating (hopping) mode.

For equipment which can operate in an adaptive and a non-adaptive mode, it shall be verified that prior to the test, the equipment is operating in the adaptive mode.

The equipment shall be configured in a mode that results in the longest Channel Occupancy Time.

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 ≤ 40 ms; 3 Idle Period shall be minimum 5% of COT with a minimum of 100us; 4 Detection threshold level = -70dBm/MHz +10*log(100mW/Pout)(Pout in mW E.I.R.P)
LBT based Detect and Avoid (Frame Based Equipment): 1 The CCA observation time shall be not less than 18 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period ≥ 5% of COT; 5 Detection threshold level = -70dBm/MHz +10*log(100mW/Pout)(Pout in mW E.I.R.P)
LBT based Detect and Avoid (Load Based Equipment): 1 The CCA observation time shall be not less than 18 us; 2 CCA declared by the manufacturer; 3 COT ≤ 13 ms; 4 Detection threshold level =-70dBm/MHz +10*log(100mW/Pout)(Pout in mW E.I.R.P)
Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms or within an observation period equal to the dwell time, whichever is less.

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.0 (2017-11) Clause 5.4.6

5.4. Test Data

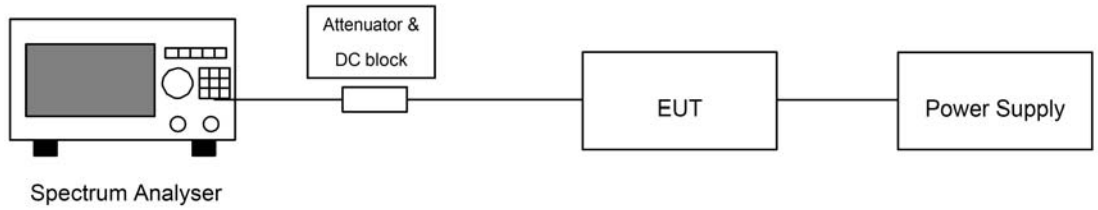
Test Mode	Test Channel	Interference Signal Level(dBm)	Unwanted Signal Level(dBm)	Max. COT (ms)	Idle Time (ms)	Conclusion
802.11b	Lowest	-66.14	-35	3.13	2.12	Pass
	Highest	-66.14	-35	3.24	2.25	Pass
802.11g	Lowest	-65.05	-35	2.74	3.05	Pass
	Highest	-65.05	-35	2.96	2.26	Pass
802.11n(HT20)	Lowest	-63.19	-35	2.31	2.41	Pass
	Highest	-63.19	-35	2.85	2.25	Pass

6. Occupied Channel Bandwidth

6.1. Test Limit

Condition		Limit
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz.
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p >10dBm.	Less than 20MHz
	For non-adaptive Frequency Hopping system and e.i.r.p >10dBm.	Less than 5MHz

6.2. Test Setup



6.3. Test Procedure

Refer to EN 300 328, clause 5.4.7 for the test conditions and the measurement method.

The setting of the Spectrum Analyzer

Center Frequency	The centre frequency of the channel under test
Frequency Span	2 × Nominal Channel Bandwidth (e.g. 2MHz for BT)
Detector	RMS
RBW	~ 1 % of the span without going below 1 %
VBW	3 × RBW
Trace	Max hold
Sweep time	1S

6.4. Test Data

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

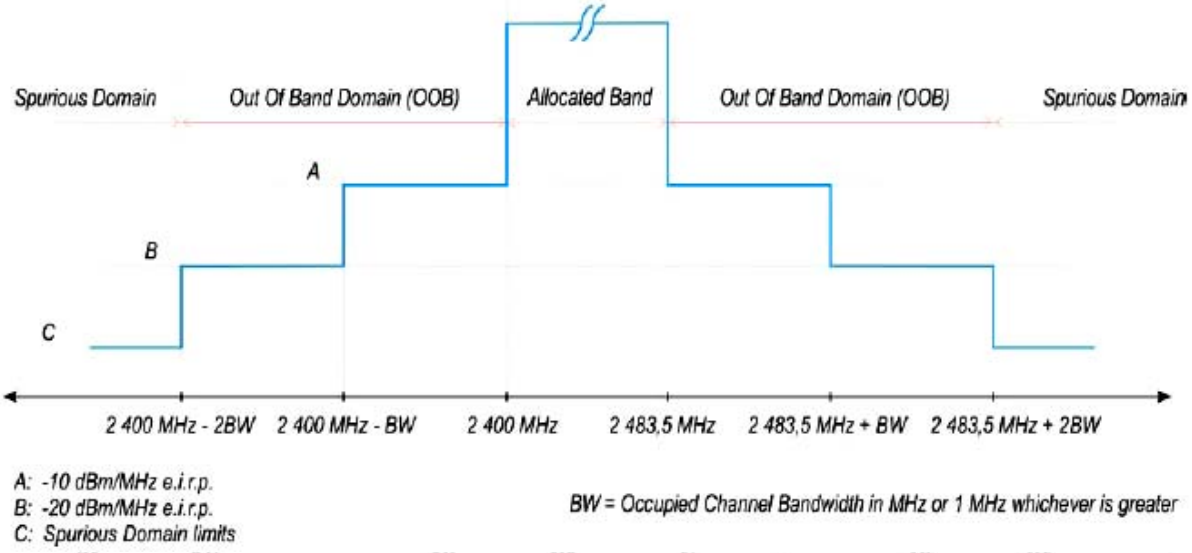
Test Channel	99% Bandwidth (MHz)	FL/FH (MHz)	Limit	Result
802.11b				
Lowest	12.784	2406.33	2400MHz ~ 2483.5MHz	PASS
Highest	12.276	2478.86		PASS
802.11g				
Lowest	16.762	2404.23	2400MHz ~ 2483.5MHz	PASS
Highest	16.671	2480.32		PASS
802.11n(HT20)				
Lowest	17.849	2403.46	2400MHz ~ 2483.5MHz	PASS
Highest	17.863	2481.66		PASS

7. Transmitter Unwanted Emissions in the out-of-band Domain

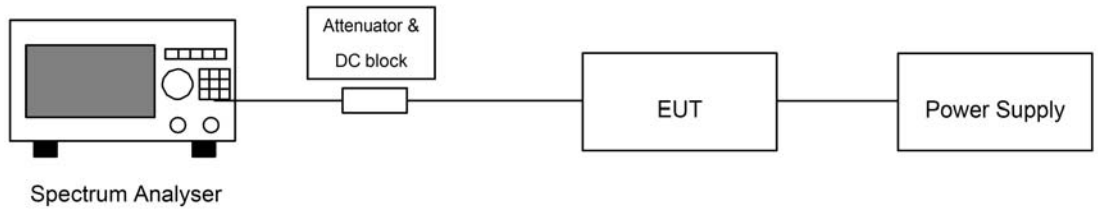
7.1. Test Limit

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 figure as below.

Note: Within the 2400MHz to 2483.5MHz band, the Out-of band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.6.



7.2. Test Setup



7.3. Test Procedure

Refer as EN 300 328, clause 5.4.8 for the test conditions and the measurement method.

The setting of the Spectrum Analyzer

RBW/ VBW	1MHz/3MHz
Span	0Hz
Filter mode	Channel filter
Sweep mode	Continuous
Sweep Points	Sweep Time[s]/(1us) or 5000 points, whichever is greater
Detector	RMS
Trace mode	Max Hold
Trigger Mode	Video trigger

7.4. Test Data

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Mode: 802.11b

Channel frequency		2412MHz		2472MHz	
Test condition		OOB Emission(MHz)		OOB Emission(MHz)	
		2400-BW ~2400	2400-2BW ~2400-BW	2483.5 ~ 2483.5+BW	2483.5+BW ~ 2483.5+2BW
		Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
V nom (V)	DC 3.7V	-35.54	-58.36	-33.77	-56.94
Limits		-10.00	-20.00	-10.00	-20.00
PASS/FAIL		PASS	PASS	PASS	PASS

Mode: 802.11g

Channel frequency		2412MHz		2472MHz	
Test condition		OOB Emission(MHz)		OOB Emission(MHz)	
		2400-BW ~2400	2400-2BW ~2400-BW	2483.5 ~ 2483.5+BW	2483.5+BW ~ 2483.5+2BW
		Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
V nom (V)	DC 3.7V	-39.20	-58.43	-39.57	-59.48
Limits		-10.00	-20.00	-10.00	-20.00
PASS/FAIL		PASS	PASS	PASS	PASS

Mode: 802.11n(HT20)

Channel frequency		2412MHz		2472MHz	
Test condition		OOB Emission(MHz)		OOB Emission(MHz)	
		2400-BW ~2400	2400-2BW ~2400-BW	2483.5 ~ 2483.5+BW	2483.5+BW ~ 2483.5+2BW
		Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
V nom (V)	DC 3.7V	-20.17	-44.61	-38.01	-59.71
Limits		-10.00	-20.00	-10.00	-20.00
PASS/FAIL		PASS	PASS	PASS	PASS

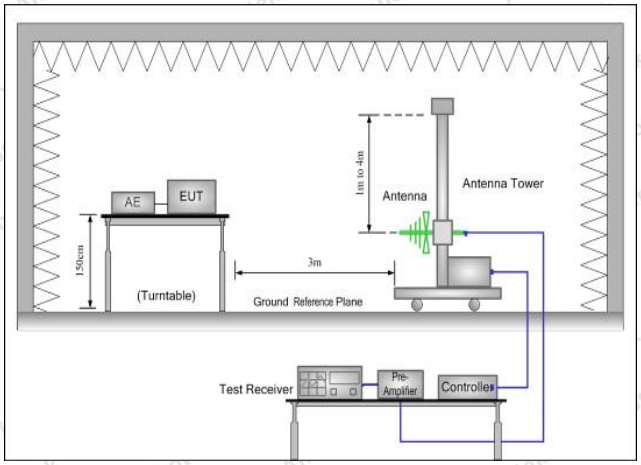
8. Transmitter Unwanted Emissions in the Spurious Domain

8.1. Test Limit

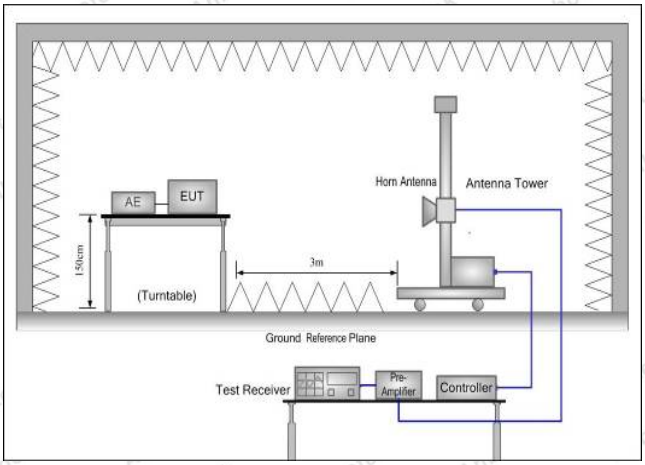
Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36dBm	100kHz
47 MHz to 74 MHz	-54dBm	100kHz
74 MHz to 87,5 MHz	-36dBm	100kHz
87,5 MHz to 118 MHz	-54dBm	100kHz
118 MHz to 174 MHz	-36dBm	100kHz
174 MHz to 230 MHz	-54dBm	100kHz
230 MHz to 470 MHz	-36dBm	100kHz
470 MHz to 862 MHz	-54dBm	100kHz
862 MHz to 1 GHz	-36dBm	100kHz
1GHz ~ 12.75GHz	-30dBm	1MHz

8.2. Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.



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



8.3. Test Procedure

Refer to chapter 5.4.9.2.2 of EN 300 328 V2.2.0 for radiated measurement.

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
3. The equipment was configured to operate under its worst case situation with respect to output power.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

8.4. Test Data

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Test Result: 30-1000MHz

Test Mode: TX Mode			Test Channel: 802.11b		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
59.63	-68.59	-54.00	-14.59	H	PASS
146.04	-68.25	-36.00	-32.25	H	
319.81	-66.70	-36.00	-30.70	H	
775.54	-67.35	-54.00	-13.35	H	
704.14	-66.71	-54.00	-12.71	H	
952.89	-74.27	-36.00	-38.27	H	
62.54	-67.54	-54.00	-13.54	V	
139.14	-67.47	-36.00	-31.47	V	
439.59	-66.44	-36.00	-30.44	V	
784.55	-70.90	-54.00	-16.90	V	
744.82	-71.14	-54.00	-17.14	V	
939.82	-71.11	-36.00	-35.11	V	

Test Result: above 1000MHz

Test Mode: TX Mode			Test Channel: 802.11b CH01		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
4824.00	-41.45	-30.00	-11.45	H	PASS
7236.00	-48.63	-30.00	-18.63	H	
9648.00	-43.86	-30.00	-13.86	H	
4824.00	-45.36	-30.00	-15.36	V	
7236.00	-49.62	-30.00	-19.62	V	
9648.00	-43.08	-30.00	-13.08	V	

Test Mode: TX Mode			Test Channel: 802.11b CH13		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
4944.00	-45.19	-30.00	-15.19	H	PASS
7416.00	-45.84	-30.00	-15.84	H	
9888.00	-45.48	-30.00	-15.48	H	
4944.00	-50.82	-30.00	-20.82	V	
7416.00	-47.91	-30.00	-17.91	V	
9888.00	-43.73	-30.00	-13.73	V	

9. Receiver Spurious Emissions

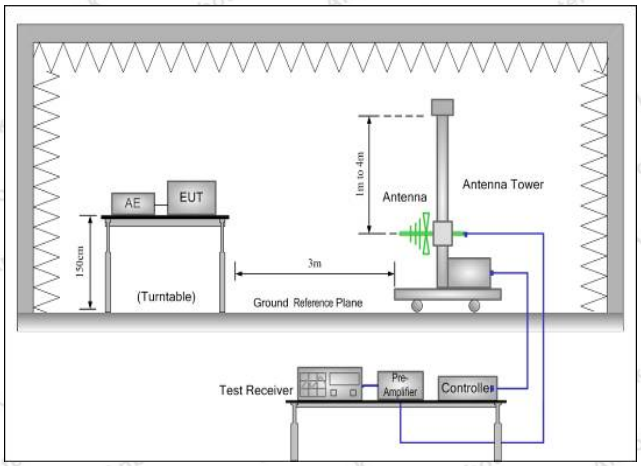
9.1. Test Limit

The spurious emissions of the receiver shall not exceed the values given in table.

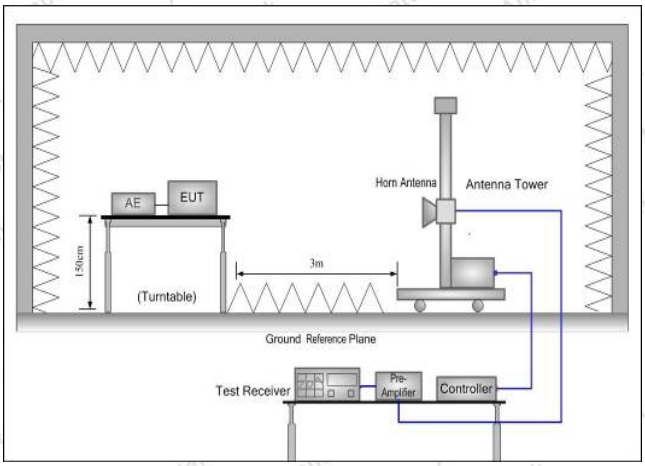
Frequency Range	Maximum Power
30MHz ~ 1GHz	-57dBm
1GHz ~ 12.75GHz	-47dBm

9.2. Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.



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



9.3. Test Procedure

Refer as EN 300 328, Refer to chapter 5.4.10.2.2 for radiated measurement.

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. Testing was performed when the equipment was in a receive-only mode.
3. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.

9.4. Test Data

Temperature:	25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Test Result: 30-1000MHz

Test Mode: RX Mode			Test Channel: 802.11 b		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
59.54	-64.14	-57.00	-7.14	H	PASS
103.59	-67.86	-57.00	-10.86	H	
125.80	-65.37	-57.00	-8.37	H	
204.45	-68.65	-57.00	-11.65	H	
296.83	-68.39	-57.00	-11.39	H	
793.52	-68.43	-57.00	-11.43	H	
72.72	-72.70	-57.00	-15.70	V	
101.12	-66.00	-57.00	-9.00	V	
163.88	-64.98	-57.00	-7.98	V	
211.98	-74.89	-57.00	-17.89	V	
368.76	-77.18	-57.00	-20.18	V	
610.90	-63.54	-57.00	-6.54	V	

Test Result: above 1000MHz

Test Mode: RX Mode			Test Channel: 802.11b CH01		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
4824.00	-64.62	-47.00	-17.62	H	PASS
7236.00	-68.55	-47.00	-21.55	H	
9648.00	-65.19	-47.00	-18.19	H	
4824.00	-64.38	-47.00	-17.38	V	
7236.00	-68.56	-47.00	-21.56	V	
9648.00	-64.37	-47.00	-17.37	V	

Test Mode: RX Mode			Test Channel: 802.11b CH13		
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
4944.00	-59.05	-47.00	-12.05	H	PASS
7416.00	-66.73	-47.00	-19.73	H	
9888.00	-67.22	-47.00	-20.22	H	
4944.00	-67.28	-47.00	-20.28	V	
7416.00	-68.97	-47.00	-21.97	V	
9888.00	-67.62	-47.00	-20.62	V	

10. Receiver Blocking

10.1. Test Limit

This requirement applies to all receiver categories.

RECEIVER CATEGORY		
Category 1 ☑	Category 2 ☐	Category 3 ☐
Minimum performance criterion	PER ≦10 % ☑	
	Alternative performance criteria ☐	

Table 14: 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 5)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 503,5	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5		

NOTE 1: OCBW is in Hz.
NOTE 2: As an alternative the test may be performed using a wanted signal equal to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: As an alternative the test may be performed using a wanted signal equal to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.
NOTE 5: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.

Table 15: Receiver Blocking parameters 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 4)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10) or (-74 dBm + 10) whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	-34	CW

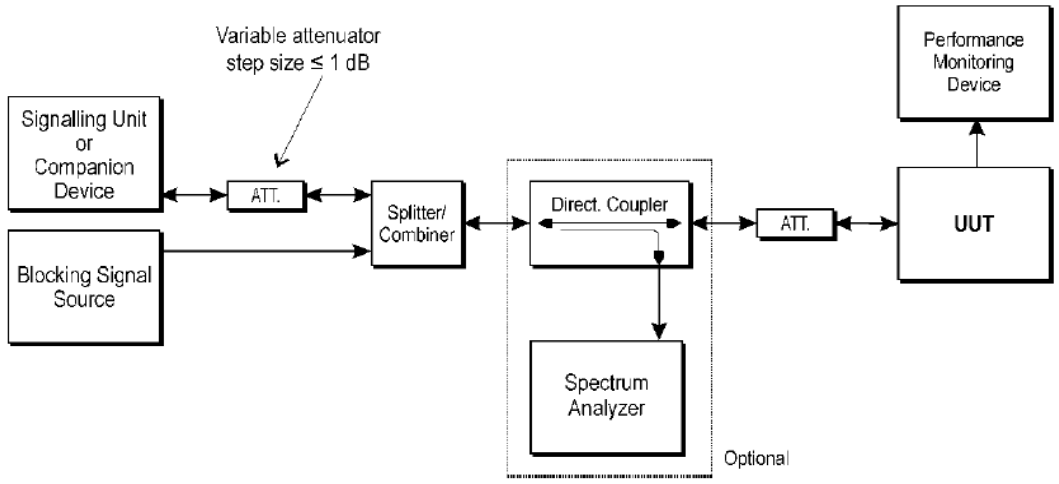
NOTE 1: OCBW is in Hz.
NOTE 2: As an alternative the test may be performed using a wanted signal equal to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.
NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.

Table 16: Receiver Blocking parameters 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 4)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20) or (-74 dBm + 20) whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	-34	CW

NOTE 1: OCBW is in Hz.
NOTE 2: As an alternative the test may be performed using a wanted signal equal to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.
NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.

10.2. Test Setup



10.3. Test Procedure

Refer to chapter 5.4.11.2.1 of EN 300 328 V2.2.0

10.4. Minimum Performance Declaration

	CH	Pmin (dBm)	PER (≦10%)
802.11b	01	-92	Pass
	13	-92	Pass
802.11g	01	-91	Pass
	13	-91	Pass
802.11n(HT20)	01	-93	Pass
	13	-93	Pass

Note: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria.

10.5. Test Data

Temperature:	25°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

802.11b: CH01

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

802.11b: CH13

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

802.11g: CH01

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

802.11g: CH13

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

802.11n20: CH01

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

802.11n20: CH13

Wanted Signal Mean Power from Companion Device (dBm/MHz)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm)	Type of Blocking Signal	Pass / Fail
Pmin+26dB	2380	-34	CW	PASS
	2503.5			PASS
Pmin+20dB	2300	-34	CW	PASS
	2330			PASS
	2360			PASS
	2523.5			PASS
	2553.5			PASS
	2583.5			PASS
	2613.5			PASS
	2643.5			PASS
	2673.5			PASS

Note: Antenna Gain(Peak) is 1 dBi, so the above table is given with the calculated levels.

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test

---------- End of Report ----------