

Test Report

Product : Smart Watch

Trade Name : UMIDIGI

Model Number : Uwatch · Uwatch2 · Uwatch3

Prepared for

Shenzhen Key Smart Limited
406-407 Jinqi Zhigu Building, 4F Tangling Road, Nanshan District,
Shenzhen City

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name: Shenzhen Key Smart Limited
Address: 406-407 Jinqi Zhigu Building, 4F Tangling Road, Nanshan District, Shenzhen City
Manufacturer's Name: Shenzhen Key Smart Limited
Address: 406-407 Jinqi Zhigu Building, 4F Tangling Road, Nanshan District, Shenzhen City

Product description

Product name: Smart Watch

Standards: EN 300 328 V2.1.1: 2016

This device described above has been tested by CTB, and the test results show that the equipment under test (EUT) is in compliance with Part the 2014\53\EU RED Directive requirement. And it is applicable only to the tested sample identified in the report. This report shall not be reproduced except in full, without the written approval of CTB, this document may be altered or revised by CTB, personal only, and shall be noted in the revision of the document.

Date of Test:

Date (s) of performance of tests: 10 November 2018~14 November 2018

Date of Issue: 14 November 2018

Test Result: **Pass**

Testing Engineer : _____

Mason Lai

Authorized Signatory : _____



Table of Contents

Page

1.	SUMMARY OF TEST RESULTS	5
	1.1 TEST FACILITY	6
	1.2 MEASUREMENT UNCERTAINTY	6
2.	GENERAL INFORMATION	7
	2.1 GENERAL DESCRIPTION OF EUT	7
	2.2 TEST CONDITIONS AND CHANNEL	8
	2.3 DESCRIPTION OF TEST CONDITIONS	9
	2.4 DESCRIPTION OF SUPPORT UNITS	10
	2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	11
3.	EFFECTIVE RADIATED POWER	12
	3.1 APPLIED PROCEDURES / LIMIT	12
	3.1.1 MEASURING INSTRUMENTS AND SETTING	12
	3.1.2 TEST PROCEDURES	12
	3.1.3 TEST SETUP LAYOUT	12
	3.1.4 EUT Operation during Test	12
	3.1.5 TEST RESULTS	13
4.	PEAK POWER DENSITY	15
	4.1 APPLIED PROCEDURES / LIMIT	15
	4.1.1 MEASURING INSTRUMENTS AND SETTING	15
	4.1.2 TEST PROCEDURES	15
	4.1.3 TEST SETUP LAYOUT	16
	4.1.4 EUT OPERATION DURING TEST	16
	4.1.5 TEST RESULTS	17
5.	FREQUENCY RANGE	25
	5.1 APPLIED PROCEDURES / LIMIT	25
	5.1.1 MEASURING INSTRUMENTS AND SETTING	25
	5.1.2 TEST PROCEDURES	26
	5.1.3 TEST SETUP LAYOUT	26
	5.1.4 EUT OPERATION DURING TEST	26
	5.1.5 TEST RESULTS	27
6.	SPURIOUS EMISSIONS – TRANSMITTER (30- 1000MHZ)	29
	6.1 APPLIED PROCEDURES / LIMIT	29
	6.1.1 MEASURING INSTRUMENTS AND SETTING	29
	6.1.2 TEST PROCEDURES	29
	6.1.3 TEST SETUP LAYOUT	30
	6.1.4 EUT OPERATION DURING TEST	30
	6.1.5 TEST RESULTS (30MHz ~ 1000MHz)	31

Table of Contents

Page

7.	SPURIOUS EMISSIONS – TRANSMITTER (ABOVE 1000MHZ)	32
	7.1 APPLIED PROCEDURES / LIMIT	32
	7.1.1 MEASURING INSTRUMENTS AND SETTING	33
	7.1.2 TEST PROCEDURES	33
	7.1.3 TEST SETUP LAYOUT	33
	7.1.4 EUT OPERATION DURING TEST	34
	7.1.5 TEST RESULTS	35
8.	SPURIOUS EMISSIONS – RECEIVER (30-1000MHZ)	37
	8.1.1 MEASURING INSTRUMENTS AND SETTING	37
	8.1.2 TEST PROCEDURES	37
	8.1.3 TEST SETUP LAYOUT	37
	8.1.4 EUT OPERATION DURING TEST	37
	8.1.5 TEST RESULTS (30MHz-1000MHz)	38
9.	MEDIUM ACCESS PROTOCOL	39
	9.1 APPLIED PROCEDURES / LIMIT	39
	9.1.1 TEST RESULTS	39

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

ETSI EN 300 328 V2.1.1				
Clause	Test Item	Limit	Frequency Range (MHz)	Applicable (Yes/No)
TRANSMITTER PARAMETERS				
4.2.1 4.3.4	Number of hopping channel	>=15	2400-2483.5	N
	Hopping channel carrier frequency separated	the 20dB bandwidth of the hopping channel		
	Average time of occupancy	< = 0.4 sec		
4.3.1	Effective radiated power	AV: -10 dBW(20 dBm)	2400-2483.5	Y
4.3.2	Peak power density	FHSS N/A	2400-2483.5	N
		DSSS/OFDM, Other modulation 10 mW/MHz	2400-2483.5	Y
4.3.3	Frequency range	FHSS / e.i.r.p. -80dBm/Hz	2400-2483.5	N
		Other modulation / e.i.r.p.-80dBm/Hz	2400-2483.5	Y
4.3.6	Spurious emissions (conducted)	Operating: -36dBm Standby: -57dBm	30-1000	N
		Operating: -30dBm Standby: -47dBm	1000-12750	
		Operating: -47dBm Standby: -47dBm	1800-1900 5150-5300	
4.3.6	Spurious emissions (radiated)	Operating: -36dBm Standby: -57dBm	30-1000	Y
		Operating: -30dBm Standby: -47dBm	1000-12750	
		Operating: -47dBm Standby: -47dBm	1800-1900 5150-5300	
		-47dBm	1000-12750	
4.3.5	MEDIUM ACCESS PROTOCOL			Y
RECEIVER PARAMETERS				
4.3.7	Spurious emissions (conducted)	-57dBm 30-1000		N
		-47dBm 1000-12750		
	Spurious emissions (radiated)	-57dBm 30-1000		Y

1 TEST FACILITY

Shenzhen CTB Testing Technology Co., Ltd.

Add.: Floor 1&2, Building E, No. 26 of Xinhe Road, Xinqiao Community, Xinqiao Street, Baoan District, Shenzhen, Guangdong, China.

2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$ · where expanded 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	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power, conducted	$\pm 0.16\text{dB}$
3	Spurious emissions, conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	Smart Watch	
Brand Name	UMIDIGI	
Model Name	Uwatch · Uwatch2 · Uwatch3	
Product Description	The EUT is Smart Watch	
	Operation Frequency:	2412MHz~2462MHz
	Modulation Type:	DSSS/OFDM
	Number Of Channel	11CH
	Bit Rate of Transmitter	802.11b:11/5.5/2/1Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20M):54/48/36/24/18/12/9/6Mbps 802.11n(40M):300/270/240/180/150/120/108/90Mbps
	Antenna Designation:	External antenna
	Antenna Gain(Peak)	1.0dBi
	Power Rating	5V/1A, capacity: 180mA
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.	
Channel List	Refer to below	
Adapter	N/A	
Hardware Version	N/A	

Note : 1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	05	2432	09	2452		
02	2417	06	2437	10	2457		
03	2400	07	2442	11	2462		
04	2427	08	2447				

2.2 TEST CONDITIONS AND CHANNEL

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-20°C ~ 55°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 12V	DC 14.5V – DC 16.5V Note: (2)

11B/11G/11N(20M)

Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2412
middle	CH06	2437
highest	CH11	2462

11B/11G/11N(40M)

Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	2412
middle	CH06	2437
highest	CH11	2462

Note:

- (1) The HT 55°C and LT -20°C was declared by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.
- (2) The High Voltage 2.2V and Low Voltage 12V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.
- (3) The measurements are performed at the highest, middle, lowest available channels.

2.3 DESCRIPTION OF TEST CONDITIONS

Mode 1:

E-1
EUT

2.4 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	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	EUT	N/A		N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	80CM	

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.

2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101313	Jul. 06, 2019
2	LISN	EMCO	3816/2	00042990	Jul. 06, 2019
3	50Ω Switch	ANRITSU CORP	MP59B	6200983704	Jul. 06, 2019
4	Test Cable	N/A	C01	N/A	Jul. 06, 2019
5	Test Cable	N/A	C02	N/A	Jul. 06, 2019
6	Test Cable	N/A	C03	N/A	Jul. 06, 2019
7	EMI Test Receiver	R&S	ESCI	101160	Jul. 06, 2019
8	Passive Voltage Probe	ESH2-Z3	R&S	100196	Jul. 06, 2019
9	Triple-Loop Antenna	EVERFINE	LIA-2	11020003	Jul. 06, 2019
10	Absorbing Clamp	R&S	MDS-21	100423	Jul. 08, 2019

2.5.2 RADIATED TEST SITE

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Bilog Antenna	TESEQ	CBL6111D	31216	Jul. 06, 2019
2	Test Cable	N/A	R-01	N/A	Jul. 06, 2019
3	Test Cable	N/A	R-02	N/A	Jul. 06, 2019
4	EMI Test Receiver	R&S	ESCI-7	101318	Jul. 06, 2019
5	Antenna Mast	EM	SC100_1	N/A	N/A
6	Turn Table	EM	SC100	060531	N/A
7	50Ω Switch	Anritsu Corp	MP59B	6200983705	Jul. 06, 2019
8	Spectrum Analyzer	Aglient	E4407B	MY45108040	Jul. 06. 2019
9	Horn Antenna	EM	EM-AH-10180	2011071402	Jul. 06. 2019
10	Amplifier	EM	EM-30180	060538	Jul. 06. 2019

3. EFFECTIVE RADIATED POWER

3.1 APPLIED PROCEDURES / LIMIT

Clause	Test Item	Limit
4.3.1	Effective radiated power	AV: -10 dBW (20 dBm)

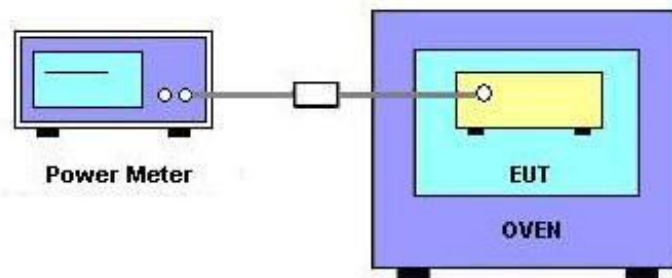
3.1.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 4.1.1 in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Filter No.	Auto
Measurement time	0.135 s ~ 26 s
Used Average Sensor	URV5-Z4

- Since a temporary antenna connector can be attached on the RF output port, so conducted measurement method was used in this case.
- A wide band power meter with a matched thermocouple detector was used to directly measure the output power from the RF output port of the EUT in continuously transmitting mode.
- The EIRP = $A + G + 10 \cdot \log(1/x)$, where A is the power measured in (1), G is the gain of the antenna of the EUT in dBi and x is the duty cycle of the EUT in continuously transmitting mode.
- The measurement shall be repeated at the lowest, the Wireless AP die, and the highest channel of the stated frequency range. These measurements shall also be performed at normal and extreme test conditions.

3.1.3 TEST SETUP LAYOUT



3.1.4 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.1.5 TEST RESULTS

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11B Mode CH1 / CH6 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)		
				CH1	CH6	CH11
T nom (°C)	20	V nom	5	15.66	15.66	15.26
T min (°C)	-20	V max	5.5	15.57	15.17	15.38
		V min	4.5	15.49	15.43	15.29
T max (°C)	55	V max	5.5	15.34	15.42	15.41
		V min	4.5	15.42	15.51	15.25
Max Peak Power				15.66dBm		
Limits				20dBm (-10dBW)		
Result				Complies		

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11B Mode CH1 / CH6 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)		
				CH1	CH6	CH11
T nom (°C)	20	V nom	5	14.49	14.62	14.26
T min (°C)	-20	V max	5.5	14.52	14.17	14.34
		V min	4.5	14.49	14.43	14.29
T max (°C)	55	V max	5.5	14.34	14.42	14.74
		V min	4.5	14.42	14.53	14.25
Max Peak Power				14.62 dBm		
Limits				20dBm (-10dBW)		
Result				Complies		

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11N Mode CH1 / CH6 / CH11/20MHz		

TEST CONDITIONS				Average EIRP Power (dBm)		
				CH1	CH6	CH11
T nom (°C)	20	V nom	5	13.46	13.68	13.27
T min (°C)	-20	V max	5.5	13.53	13.17	13.32
		V min	4.5	13.44	13.43	13.29
T max (°C)	55	V max	5.5	13.34	13.42	13.73
		V min	4.5	13.42	13.51	13.39
Max Peak Power				13.73dBm		
Limits				20dBm (-10dBW)		
Result				Complies		

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11N Mode CH1 / CH6 / CH11/40MHz		

TEST CONDITIONS				Average EIRP Power (dBm)		
				CH1	CH6	CH11
T nom (°C)	20	V nom	5	11.43	11.81	11.47
T min (°C)	-20	V max	5.5	11.36	11.17	11.31
		V min	4.5	11.52	11.43	11.25
T max (°C)	55	V max	5.5	11.34	11.42	11.74
		V min	4.5	11.41	11.56	11.33
Max Peak Power				11.81dBm		
Limits				20dBm (-10dBW)		
Result				Complies		

4. PEAK POWER DENSITY

4.1 APPLIED PROCEDURES / LIMIT

Clause	Test Item	Limit
4.3.2	Peak power density	FHSS N/A
		DSSS/OFDM, Other modulation 10 mW/MHz

4.1.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5.1.1 in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Filter No.	Auto
Measurement time	0.135 s ~ 26 s
Used Average Sensor	URV5-Z4

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

Centre Frequency: The centre frequency of the channel under test.

Resolution BW: 1 MHz.

Video BW: 1 MHz.

Span: Wide enough to cover the complete power envelope of the signal of the UUT.

Detector: Peak.

Trace Mode: Max Hold.

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

Centre Frequency: Equal to the frequency recorded in step 2.

Span: 3 MHz.

Resolution BW: 1 MHz.

Video BW: 1 MHz.

Sweep time: 1 minute.

Detector: Average (see note). Trace Mode: Max Hold.

Note: The detector mode "Average" is often referred to as "RMS Average" or "Sample" but do not use Video Average.

Step 4:

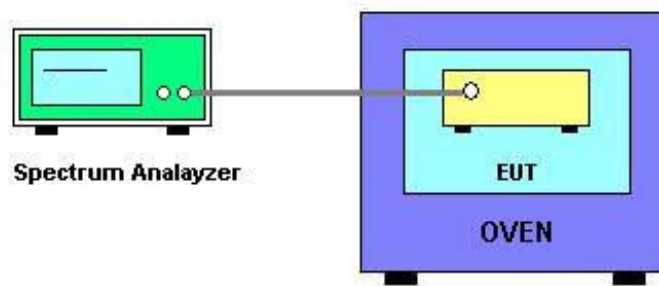
When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (spectral power density) D in a 1 MHz band. Alternatively, where a spectrum analyser is equipped with a facility to measure spectral power density, this facility may be used to display the spectral power density D in dBm/MHz.

Step 5:

The maximum e.i.r.p. spectral density is calculated from the above measured power density (D), the observed duty cycle x (see clause 5.7.2.2, step 1), and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

$$PD = D + G + 10 \log (1/x);$$

PD shall be recorded in the test report.

4.1.3 TEST SETUP LAYOUT**4.1.4 EUT OPERATION DURING TEST**

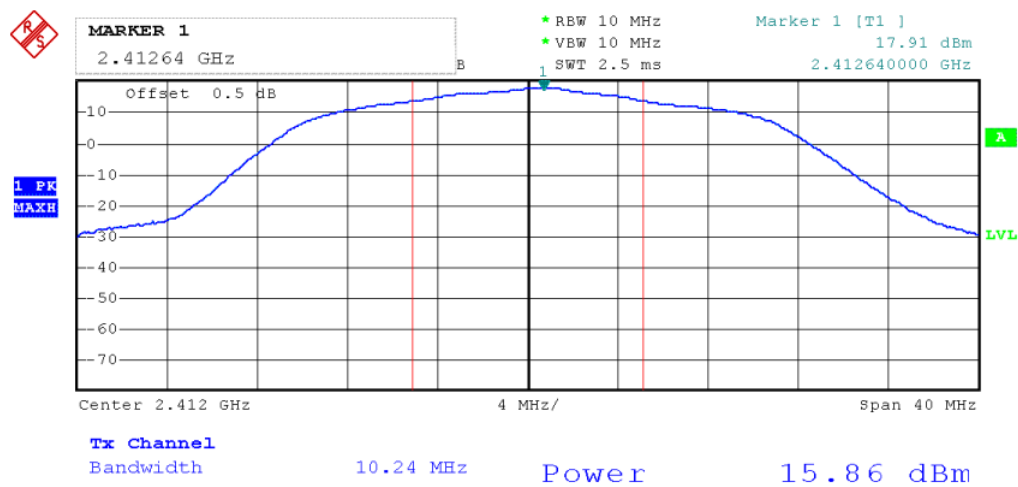
The EUT was programmed to be in continuously transmitting mode.

4.1.5 TEST RESULTS

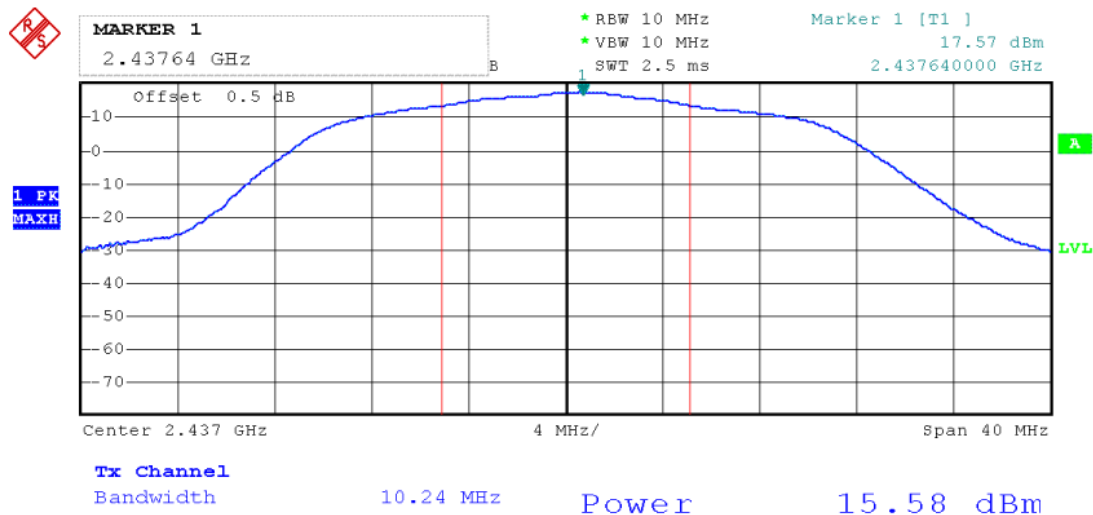
EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V
Test Mode	TX 11B Mode CH1 / CH6 / CH11		

$10 \log (1/x) = 0$, $X = \text{duty cycle} = T_{\text{on}}/T_{\text{p}}$, $T_{\text{on}} = 100 \text{ ms}$, $T_{\text{p}} = 100 \text{ ms}$

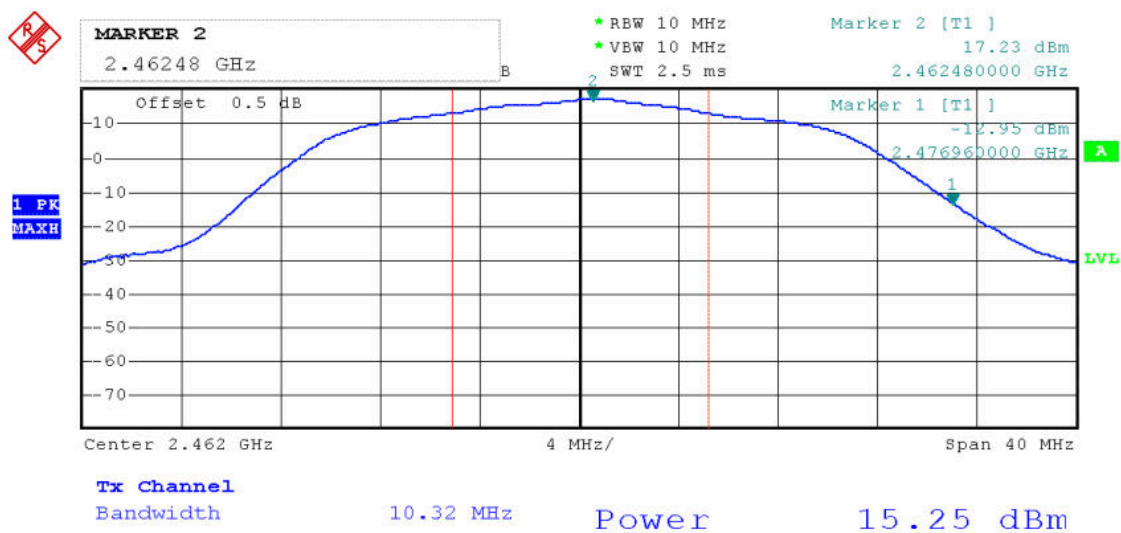
Low Channel



Middle Channel



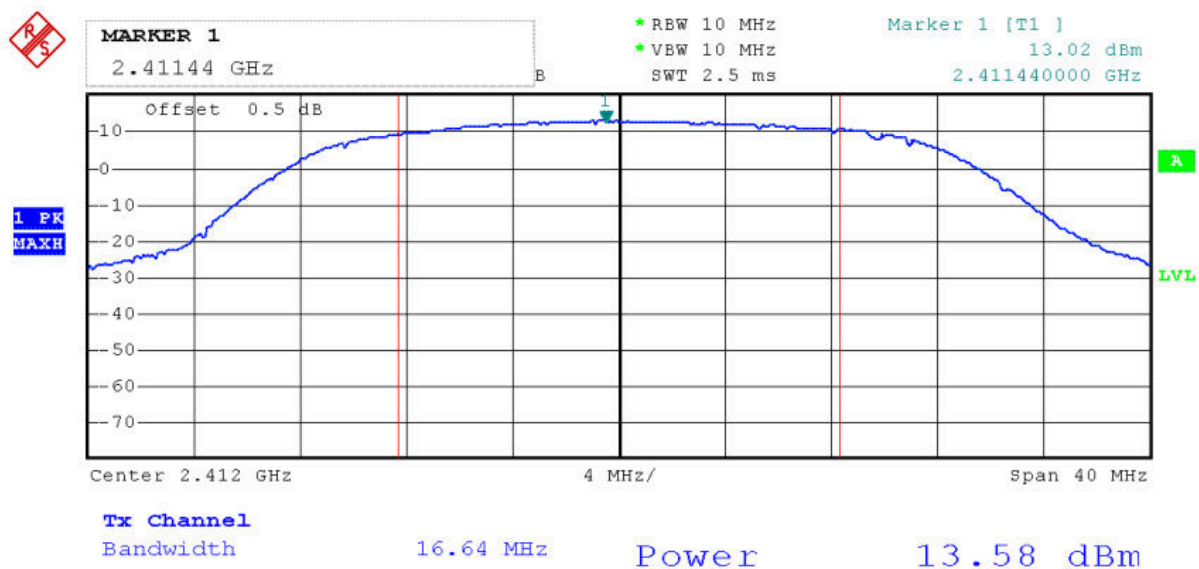
High Channel



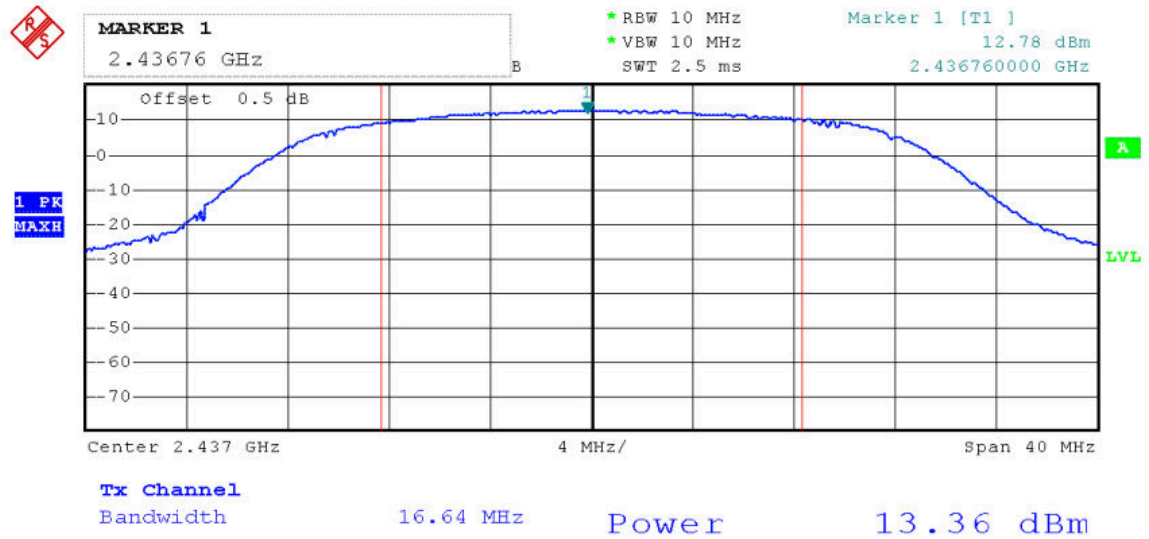
EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11G Mode CH1 / CH6 / CH11		

10 log (1/x) = 0, X=duty cycle=Ton/Tp, Ton= 100 ms, Tp= 100 ms

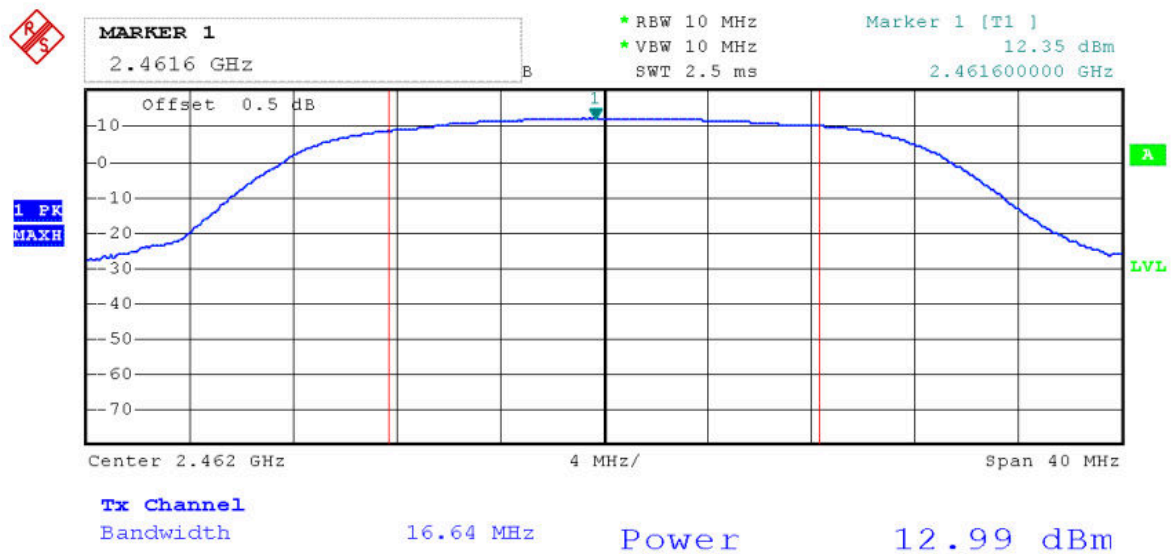
Low Channel



Middle Channel



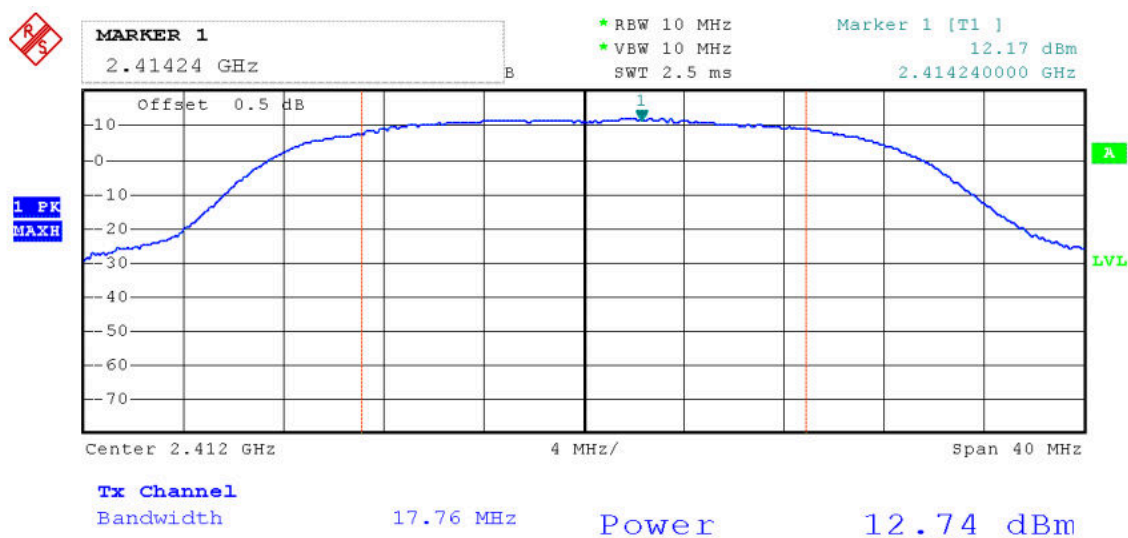
High Channel



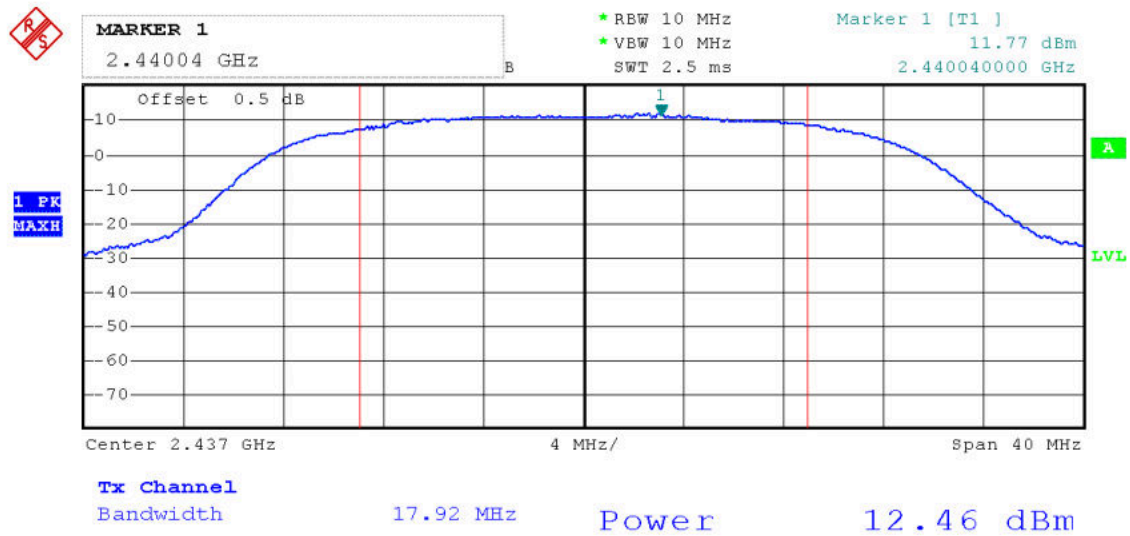
EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V
Test Mode	TX 11N Mode CH1 / CH6 / CH11/20MHz		

10 log (1/x) = 0, X=duty cycle=Ton/Tp, Ton= 100 ms, Tp= 100 ms

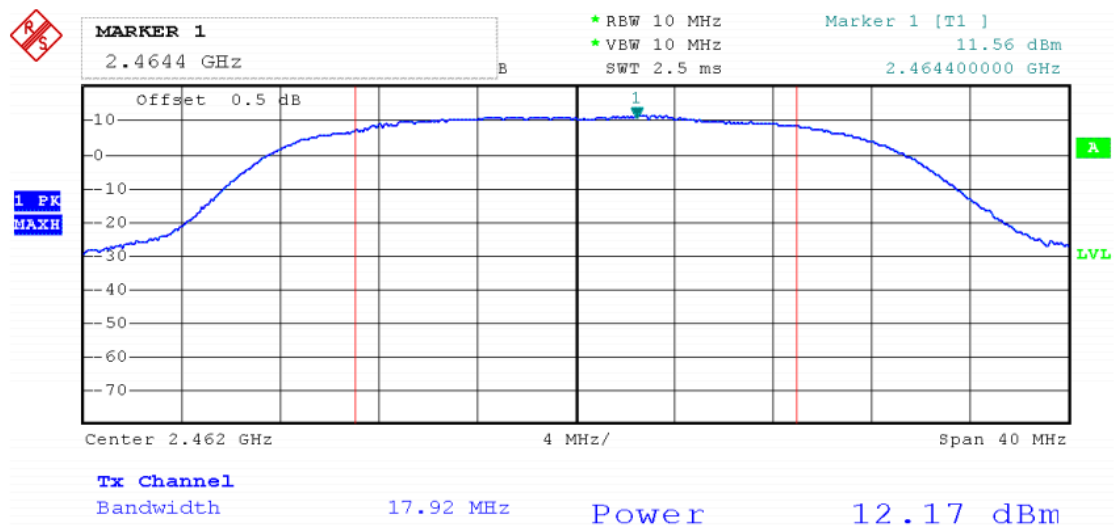
Low Channel



Middle Channel



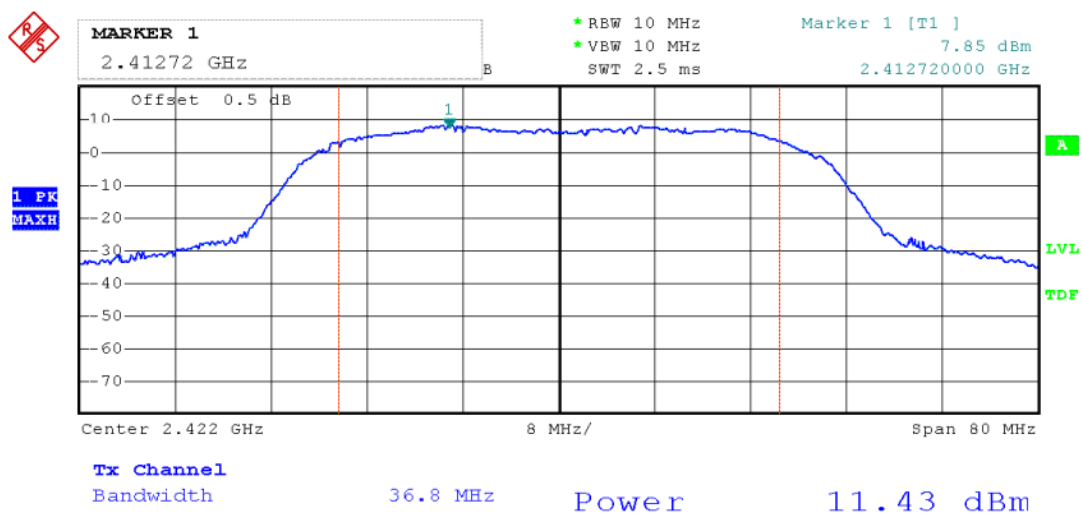
High Channel



EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V
Test Mode	TX 11N Mode CH1 / CH6 / CH11/40MHz		

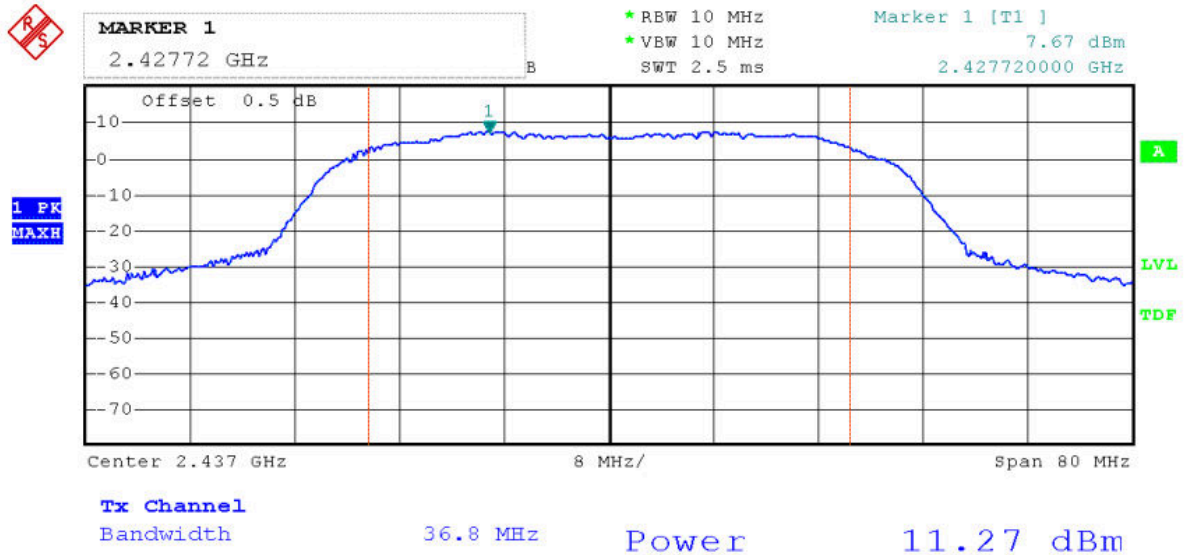
10 log (1/x) = 0, X=duty cycle=Ton/Tp, Ton= 100 ms, Tp= 100 ms

Low Channel



Middle Channel

(802.11nHT40 MODE CH Mid)



High Channel

(802.11nHT40 MODE CH High)



5. FREQUENCY RANGE

5.1 APPLIED PROCEDURES / LIMIT

Clause	Test Item	Limit
4.3.3	Frequency range	-80dBm/Hz

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope. f_H is the highest frequency of the power envelope: it is the frequency furthest above the frequency of maximum power where the output power drops below the level of -80 dBm/Hz e.i.r.p. spectral power density (-30 dBm if measured in a 100 kHz bandwidth). f_L is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level equivalent to -80 dBm/Hz e.i.r.p. spectral power density (or -30 dBm if measured in a 100 kHz bandwidth). The frequency range is determined by the lowest value of f_L and the highest value of f_H resulting from the adjustment of the equipment to the lowest and highest operating frequencies. For all equipment, the frequency range shall lie within the band 2.4 GHz to 2,4835 GHz ($f_L > 2.4$ GHz and $f_H < 2.4835$ GHz).

5.1.1 MEASURING INSTRUMENTS AND SETTING

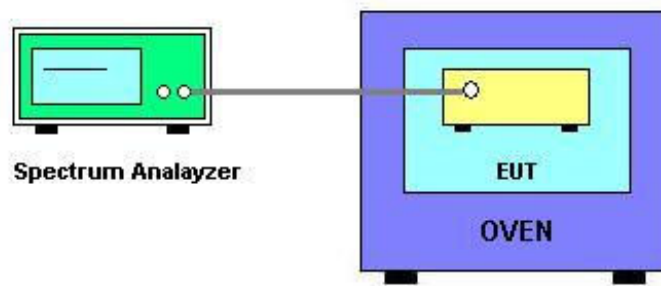
Please refer to section 6.1.1 in this report. The following table is the setting of Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation 20~30dB	Auto
Span Frequency	40MHz
RB 100	0.135 s ~ 26 s
VB 100	URV5-Z4
Detector	Average
Sweep time	$\geq 60s$
Trace	Average 50 sweeps

5.1.2 TEST PROCEDURES

- a. The transmitter output (antenna port) was connected to the spectrum analyzer.
- b. Added [x] dBi of antenna gain was on the spectrum analyzer.
- c. Place the spectrum analyzer in detector averaging mode with a minimum of 50 sweeps selected and activate transmitter with modulation applied.
- d. Select lowest operating frequency of the equipment under test.
- e. Find lowest frequency below the operating frequency at which spectral power density drops below -80 dBm/Hz e.i.r.p. (-30 dBm if measured in a 100 kHz bandwidth). This frequency shall be recorded (fL).
- f. Select the highest operating frequency of the equipment under test.
- g. Find the highest frequency at which the spectral power density drops below -80 dBm/Hz e.i.r.p. (-30 dBm if measured in a 100 kHz bandwidth). This frequency shall be recorded (fH).
- h. These measurements shall also be performed at normal and extreme test conditions.

5.1.3 TEST SETUP LAYOUT



5.1.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

5.1.5 TEST RESULTS

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11B Mode CH1 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)	
				f _L CH1	f _H CH11
T nom (°C)	20	V nom	5	2401.4341	2401.5634
T min (°C)	-20	V max	5.5	2401.3458	2401.5441
		V min	4.5	2401.4554	2401.5627
T max (°C)	55	V max	5.5	2401.5642	2401.5642
		V min	4.5	2401.6542	2401.5678
Min. f _L / Max. f _H Band Edges				2401.3217	2401.4454
EU / Australia / NZ Limits				f _L > 2400.0 MHz	f _H < 2483.5 MHz
Result				Complies	

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11G Mode CH1 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)	
				f _L CH3	f _H CH11
T nom (°C)	20	V nom	5	2401.4341	2401.5634
T min (°C)	-20	V max	5.5	2401.3458	2401.5441
		V min	4.5	2401.4554	2401.5627
T max (°C)	55	V max	5.5	2401.5642	2401.5642
		V min	4.5	2401.6542	2401.5678
Min. f _L / Max. f _H Band Edges				2401.3464	2401.2865
EU / Australia / NZ Limits				f _L > 2400.0 MHz	f _H < 2483.5 MHz
Result				Complies	

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V(Normal)
Test Mode	TX 11N Mode CH1 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)	
				f _L CH1	f _H CH11
T nom (°C)	20	V nom	5	2401.5652	2401.5348
T min (°C)	-20	V max	5.5	2401.5221	2401.5440
		V min	4.5	2401.5414	2401.5147
T max (°C)	55	V max	5.5	2401.4537	2401.5669
		V min	4.5	2401.4514	2401.5147
Min. f _L / Max. f _H Band Edges				2401.3456	2401.1832
EU / Australia / NZ Limits				f _L > 2400.0 MHz	f _H < 2483.5 MHz
Result				Complies	

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Test Voltage :	DC5V
Test Mode	TX 11N Mode CH1 / CH11		

TEST CONDITIONS				Average EIRP Power (dBm)	
				f _L CH1	f _H CH11
T nom (°C)	20	V nom	5	2401.4575	2401.4211
T min (°C)	-20	V max	5.5	2401.5382	2401.5742
		V min	4.5	2401.5422	2401.5395
T max (°C)	55	V max	5.5	2401.5487	2401.5478
		V min	4.5	2401.6345	2401.4289
Min. f _L / Max. f _H Band Edges				2401.4521	2401.6692
EU / Australia / NZ Limits				f _L > 2400.0 MHz	f _H < 2483.5 MHz
Result				Complies	

6. SPURIOUS EMISSIONS – TRANSMITTER (30- 1000MHZ)

6.1 APPLIED PROCEDURES / LIMIT

Clause	Test Item	Frequency(MHz)	Limit	
4.3.6	Spurious emissions	30-1000	Operating	-36dBm
			Standby	-57dBm
	(radiated)	1000-12750	Operating	-30dBm
			Standby	-47dBm
		1800-1900	Operating	-47dBm
		5150-5300	Standby	-47dBm

6.1.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 7.1.1 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation 20~30dB	Auto
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Span	100 MHz
RB 100	100 KHz
VB 100	30KHz
Detector	Peak
Sweep time	1s

6.1.2 TEST PROCEDURES

- The EUT was placed on the top of the turntable in open test site area.
- The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- This measurement shall be repeated with the transmitter in standby mode where applicable.
- For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
- 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).
- Replace the EUT by standard antenna and feed the RF port by signal generator.
- Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
- Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
- 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.
- 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.
- The measurement shall be repeated at the lowest and the highest channel of the stated

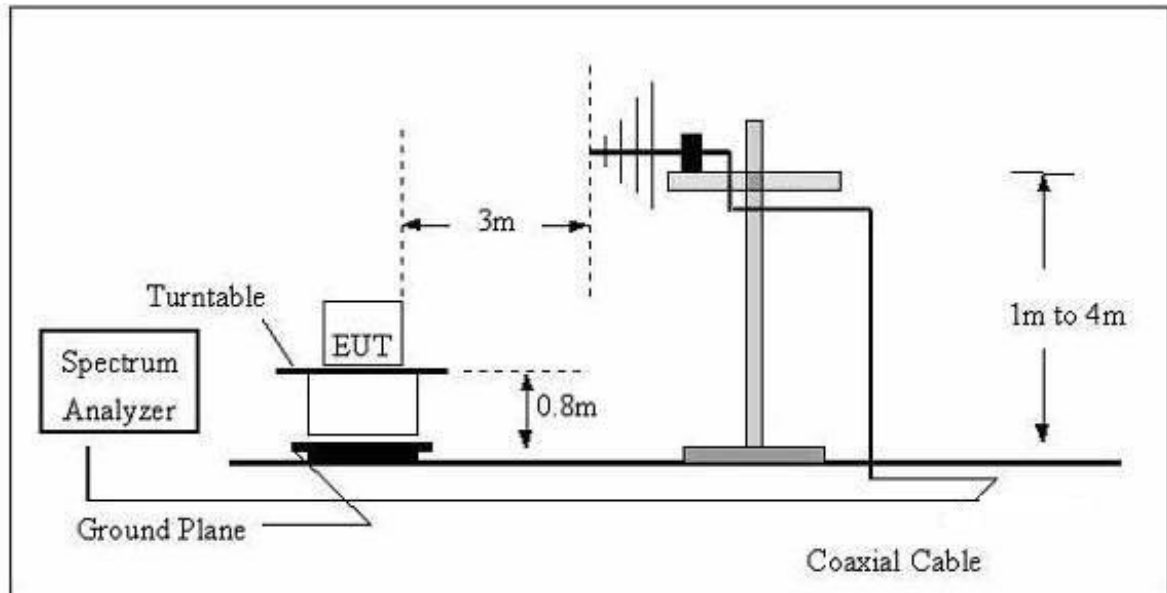
frequency range.

H. EUT Orthogonal Axis:

"X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand.

6.1.3 TEST SETUP LAYOUT

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



6.1.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

For the initial investigation on the highest, middle, lowest frequency in 30-1000MHz, no significant differences in spurious emissions were observed between these 3 modes. The worst test data was shown

6.1.5 TEST RESULTS (30MHz ~ 1000MHz)

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2018-11-10
Test Mode :	Running	Polarization :	Horizontal
Test Power :	TX		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
106.3850	6.12	11.06	17.18	40.00	-22.82	QP
533.8318	10.11	21.99	32.10	47.00	-14.90	QP
640.6109	10.50	21.76	32.26	47.00	-14.74	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2018-11-10
Test Mode :	Running	Polarization :	Vertical
Test Power :	TX		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
151.0663	6.40	11.65	18.05	40.00	-21.95	QP
552.8831	8.01	22.87	30.88	47.00	-16.12	QP
640.6109	14.51	21.78	36.29	47.00	-10.73	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit

7. SPURIOUS EMISSIONS – TRANSMITTER (ABOVE 1000MHZ)

7.1 APPLIED PROCEDURES / LIMIT

Clause	Test Item	Frequency(MHz)	Limit	
4.3.6	Spurious emissions	30-1000	Operating	-36dBm
			Standby	-57dBm
	(narrowband)	1000-12750	Operating	-30dBm
			Standby	-47dBm
		1800-1900	Operating	-47dBm
		5150-5300	Standby	-47dBm

7.1.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 7.1.1 in this report. The following table is the setting of the Spectrum Analyzer.

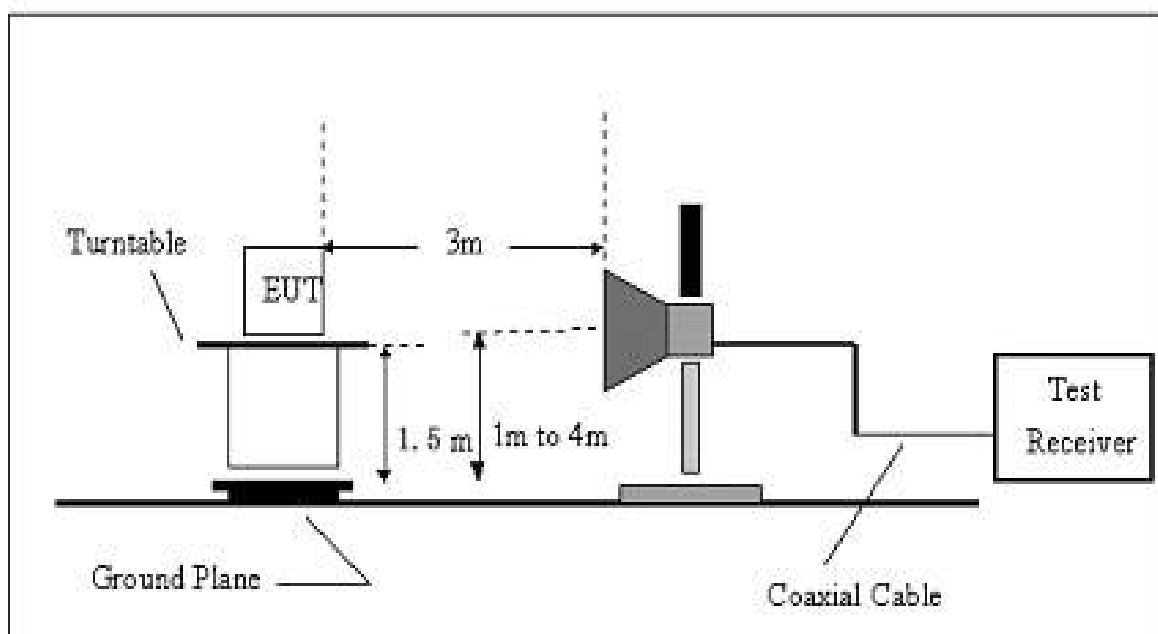
Spectrum Analyzer	Setting
Attenuation 20~30dB	Auto
Start Frequency	1000 MHz
Stop Frequency	1275 MHz
Span	100 MHz
RB 100	100 KHz
VB 100	30KHz
Detector	Peak
Sweep time	1s

7.1.2 TEST PROCEDURES

- a. The EUT was placed on the top of the turntable in open test site area.
 - 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.
- H. EUT Orthogonal Axis:
- "X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand.

7.1.3 TEST SETUP LAYOUT

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



7.1.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously transmitting mode.

7.1.5 TEST RESULTS

802.11b

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2412							
V	2414.629	-35.87	-1.32	-37.19	-30	-7.19	peak
V	3620.034	-41.05	3.02	-38.03	-30	-8.03	peak
V	4830.532	-48.7	8.54	-40.16	-30	-10.16	peak
H	1559.486	-39.47	-5.61	-45.08	-30	-15.08	peak
H	2410.307	-40.5	-1.31	-41.81	-30	-11.81	peak
H	3620.034	-44.23	3.02	-41.21	-30	-11.21	peak

802.11b

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2472							
V	1246.558	-43.37	-3.41	-46.78	-30	-16.78	peak
V	2462.692	-40.09	-1.32	-41.41	-30	-11.41	peak
V	4369.367	-46.81	6.74	-40.07	-30	-10.07	peak
H	2462.692	-39.8	-1.32	-41.12	-30	-11.12	peak
H	4369.367	-49.88	6.74	-43.14	-30	-13.14	peak

H	5625.198	-54.11	7.75	-46.36	-30	-16.36	peak
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802.11g

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2412							
V	1166.597	-36.19	-5.19	-41.38	-30	-11.38	peak
V	3239.42	-44.66	1.25	-43.41	-30	-13.41	peak
V	4059.89	-49.69	6.10	-43.59	-30	-13.59	peak
H	1080.091	-31.73	-7.29	-39.02	-30	-9.02	peak
H	3239.42	-44.66	1.25	-43.41	-30	-13.41	peak
H	4059.89	-49.69	6.10	-43.59	-30	-13.59	peak

802.11g

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2472							
V	1332	-49.35	-3.17	-52.52	-30	-22.52	peak
V	2188.024	-54.14	-0.39	-54.53	-30	-24.53	peak
V	3959.316	-53.82	5.59	-48.23	-30	-18.23	peak
H	1410.604	-46.72	-3.17	-49.89	-30	-18.89	peak
H	2414.629	-46.87	-1.32	-48.19	-30	-18.19	peak
H	4865.277	-57.43	8.52	-48.91	-30	-18.91	peak

802.11n/20MHz

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2412							
V	1162.424	-35.62	-5.38	-41.00	-30	-11.00	peak
V	3245.229	-49.63	1.27	-48.36	-30	-18.36	peak
V	4804.636	-56.27	8.47	-47.8	-30	-17.8	peak
H	1162.424	-35.62	-5.38	-41.00	-30	-11.00	peak
H	1996.946	-50.00	-1.00	-51.00	-30	-21.00	peak
H	3620.034	-52.98	3.02	-49.96	-30	-19.96	peak

802.11n/20MHz

Normal Voltage

Polar (H/V)	Frequency MHz	Meter Reading (dBm)	Factor (dB)	Emission Level (dBm)	Limits (dBm)	Margin (dB)	Detector Type
operation frequency:2472							
V	1625.096	-39.76	-5.38	-45.14	-30	-15.14	peak
V	3119.795	-51.14	0.66	-50.48	-30	-20.48	peak
V	4865.277	-56.75	8.52	-48.23	-30	-18.23	peak
H	1499.209	-40.62	-4.38	-45.00	-30	-15.00	peak
H	3620.034	-49.06	3.02	-46.04	-30	-16.04	peak
H	4865.277	-56.75	8.52	-48.23	-30	-18.23	peak

8. SPURIOUS EMISSIONS – RECEIVER (30-1000MHZ)**8.1 APPLIED PROCEDURES / LIMIT**

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

8.1.1 MEASURING INSTRUMENTS AND SETTING

Please refer to section 8.1.1 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation	Auto
Start Frequency	30MHz
Stop Frequency	1000 MHz
Span	100 MHz
RB 100	100 KHz
VB 100	30KHz
Detector	Peak
Sweep time	1s

8.1.2 TEST PROCEDURES

- The EUT was placed on the top of the turntable in open test site area.
- 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 30~1000MHz 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.
- H. EUT Orthogonal Axis:
 "X" - denotes Laid on Table; "Y" - denotes Vertical Stand; "Z" - denotes Side Stand.

8.1.3 TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 6.1.4

8.1.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously receiving mode.

8.1.5 TEST RESULTS (30MHz-1000MHz)

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2018-11-10
Test Mode :	Running	Polarization :	Horizontal
Test Power :	RX		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
106.3850	6.12	11.06	17.18	40.00	-22.82	QP
533.8318	10.11	21.99	32.10	47.00	-14.90	QP
640.6109	10.50	21.76	32.26	47.00	-14.74	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit

EUT :	Smart Watch	Model Name :	Uwatch
Temperature :	24 °C	Relative Humidity :	54%
Pressure :	1010 hPa	Test Date :	2018-11-10

Test Mode :	Running	Polarization :	Vertical
Test Power :	RX		

Freq. (MHz)	Reading (dBuV)	Factor (dBuV)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
52.7599	27.30	6.92	34.22	40.00	-5.78	QP
190.4050	21.46	8.74	30.20	40.00	-9.80	QP
346.8091	26.05	15.28	41.33	47.00	-5.67	QP

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Antenna Factor + Cable Loss.
3. N/A means All Data have pass Limit

9. MEDIUM ACCESS PROTOCOL

9.1 APPLIED PROCEDURES / LIMIT

A medium access protocol is a mechanism designed to facilitate spectrum sharing with other devices in a wireless network.

A medium access protocol shall be implemented by the equipment.

9.1.1 TEST RESULTS

The EUT is accord with medium access protocol.