RADIO TEST REPORT

For

Fitness Band

Test Model: DW-007FIT+

Additional Model NO.: DW-009Fit+, DW-010Fit+, DW-011Fit+, DW-012Fit +, DW-013Fit+

Prepared for	:	
Address	:	

Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
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Date of receipt of test sample	:	May 24, 2016
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	May 24, 2016 - June 15, 2016
Date of Report	:	June 15, 2016

CE

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RADIO TEST REPORT
ETSI EN 300 328 V1.9.1 (2015-02)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

Report Reference No.	**:**	**LCS1605191745E**
Date of Issue	:	June 15, 2016
Testing Laboratory Name	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	**:**	
Address	:	
Test Specification		
Standard	:	ETSI EN 300 328 V1.9.1 (2015-02)
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	:	Dated 2011-03

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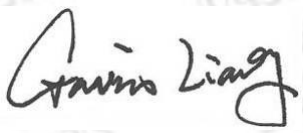
Test Item Description.	**:**	**Fitness Band**
Trade Mark.....	:	N/A
Test Model	:	DW-007FIT+
Ratings	:	DC 3.7V by Lithium ion polymer battery(100mAh) Recharge Voltage: 5V/120mA
Result …….....	**:**	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
		
Dick Su / File administrators	Glin Lu/ Technique principal	Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS1605191745E	June 15, 2016 Date of issue

Test Model.....	: DW-007FIT+
EUT.....	: Fitness Band
Applicant.....	**:**
Address.....	:
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**:**
Address.....	:
Telephone.....	: /
Fax.....	: /
Factory.....	**:**
Address.....	:
Telephone.....	: /
Fax.....	: /

Test Result:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	June 15, 2016	The First Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Product Description for Equipment Under Test (EUT)

EUT	:	Fitness Band
Test Model	:	DW-007FIT+
Power Supply	:	DC 3.7V by Lithium ion polymer battery(100mAh) Recharged by DC 5V/120mA Adapter
Hardware Version	:	V1.0
Software Version	:	V1.0
Bluetooth	:	
Frequency Range	:	2.402-2.480GHz
Channel Number	:	40 channels for Bluetooth V4.0 (DTS)
Channel Spacing	:	2MHz for Bluetooth V4.0 (DTS)
Modulation Type	:	GFSK for Bluetooth V4.0 (DTS)
Bluetooth Version	:	V4.0
Antenna Description	:	FPC Antenna, 2.41dBi(Max.)

Additional models No.			
DW-009Fit+	**DW-010Fit+**	**DW-011Fit+**	**DW-012Fit+**
DW-013Fit+	--	--	--
Remark: PCB board, structure and internal of these model(s) are the same, So no additional models were tested.			

1.2. Objective

This Type approval report is prepared on behalf of **DIGILINK GROUP CO.,LTD.** in accordance with ETSI EN 300 328 V1.9.1 (2015-02), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive.

The objective is to determine compliance with ETSI EN 300 328 V1.9.1 (2015-02).

1.3. Related Submittal(s)/Grant(s)

No Related Submittals.

1.4. Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 328 V1.9.1 (2015-02).

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1.5. Description of Test Facility

CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
VCCI Registration Number. is C-4260 and R-3804.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

1.6. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	-

1.7. External I/O

I/O Port Description	Quantity	Cable
--	--	--

1.8. List Of Measuring Equipment

Description	Manufacturer	Model	Serial Number	Cal. Date	Due Date
X-series USB Peak and Average Power Sensor Agilent	Agilent	U2021XA	MY54080022	2015/11/09	2016/11/08
4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	MY54080016	2015/11/09	2016/11/08
Test Software	Ascentest	AT890-SW	20141230	2015/12/30	2016/12/29
MXA Signal Analyzer	Agilent	N9020A	MY50510140	2015/10/27	2016/10/26
Vector Signal Generator	Agilent	E4438C	MY42081396	2015/11/28	2016/11/27
Vector Signal Generator	Agilent	N5182A	MY47071151	2015/11/28	2016/11/27
10dB Coaxial Coupler	Agilent	87300C	MY44300299	2016/03/27	2017/03/26
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2016/05/07	2017/05/06
Splitter /Combiner (Qty: 2)	Mini-Circuits	ZAPD-50W 4.2-6.0 GHz	NN256400424	2016/03/27	2017/03/26
Splitter/Combine (Qty: 2)	MCLI	PS3-7	4463/4464	2016/03/27	2017/03/26
ATT (Qty: 1)	Mini-Circuits	VAT-30+	30912	2016/03/27	2017/03/26
RF Cable (Qty: 6)	Mini-Circuits	N/A	DFS-1~6	2016/03/27	2017/03/26
DC Power Supply	IDRC	CD-035-020PR	977272	2015/09/15	2016/09/14
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2015/06/18	2016/06/17
Amplifier	SCHAFFNER	COA9231A	18667	2015/06/18	2016/06/17
Amplifier	Agilent	8449B	3008A02120	2015/06/16	2016/06/15
Amplifier	MITEQ	AMF-6F-260400	9121372	2015/06/16	2016/06/15
Spectrum Analyzer	Agilent	E4407B	MY41440292	2015/06/16	2016/06/15
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2015/06/16	2016/06/15
Loop Antenna	R&S	HFH2-Z2	860004/001	2015/06/18	2016/06/17
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2016/06/10	2017/06/09
Horn Antenna	EMCO	3115	6741	2016/06/10	2017/06/09
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2016/06/10	2017/06/09
RF Cable-R03m	Jye Bao	RG142	CB021	2015/06/18	2016/06/17
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2015/06/18	2016/06/17
Signal Generator	R&S	SMR40	10016	2015/06/16	2016/06/15

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1.9. Measurement Uncertainty

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

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 ℃
Humidity	5 %
DC and low frequency voltages	3 %
Time	5 %
Duty Cycle	5 %

1.9. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

1.10. Description Of Test Modes

LCS has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode1: Transmit by BLE
Mode2: Receive by BLE

Note:

(1) For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

(2) Regard to the frequency band operation for systems using Wide Band modulation: the lowest, middle, highest frequency channel for conducted test, and the lowest, highest frequency channel for radiation spurious test.

(3) The extreme test condition for voltage and temperature were declared by the manufacturer.

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2. SYSTEM TEST CONFIGURATION

2.1. Justification

The system was configured for testing in engineering mode.

2.2. EUT Exercise Software

N/A.

2.3. Special Accessories

N/A.

2.4. Block Diagram/Schematics

Please refer to the related document.

2.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

2.6. Configuration of Test Setup

Please refer to the test setup photo.

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3. SUMMARY OF TEST RESULT

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

Technical requirements for the equipment using wide band modulations other than FHSS:

Performed Test Item	Normative References	Test Performed	Deviation
RF Output Power	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Power Spectral Density	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Duty cycle, Tx-Sequence, Tx-gap	ETSI EN 300 328 V1.9.1 (2015-02)	N/A	N/A
Medium Utilisation (MU) factor	ETSI EN 300 328 V1.9.1 (2015-02)	N/A	N/A
Adaptivity	ETSI EN 300 328 V1.9.1 (2015-02)	N/A	N/A
Occupied Channel Bandwidth	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Receiver Spurious Emissions	ETSI EN 300 328 V1.9.1 (2015-02)	Yes	No
Receiver Blocking	ETSI EN 300 328 V1.9.1 (2015-02)	N/A	N/A

Note: The EUT can operate in an adaptive mode, and can’t operate in a non-adaptive mode which is stated by the supplier.

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4. RF OUTPUT POWER

4.1. Limit

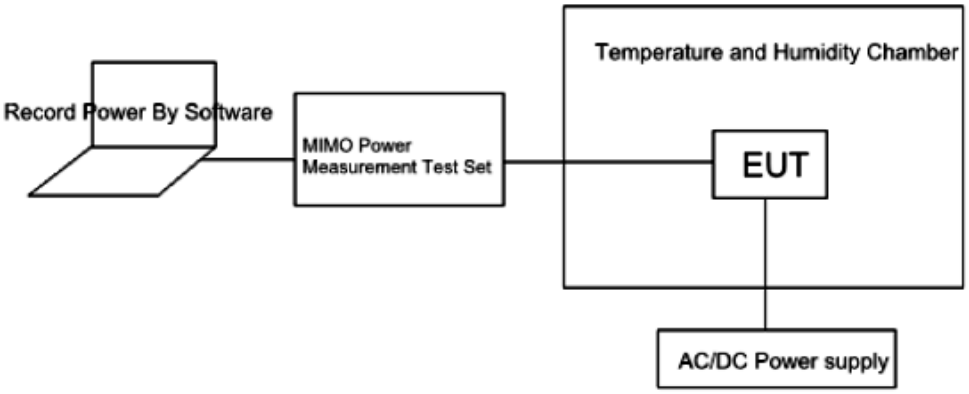
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

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

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

4.2. Test Setup

For Conducted Measurement



4.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2

Step 1:

• The fast power sensor use the following setting: Sample speed 1 MS/s.

Step 2:

• Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.

• If applicable, add the additional beamforming gain "Y" in dB.

The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y

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4.4. Test Result

Pass

***Note: 20 bursts had been captured for power measurement.

Product	:	Fitness Band
Test Item	:	RF Output Power
Test Mode	:	Mode 1: Transmit by BLE

Test Conditions		Frequency (MHz)	RF Output Power EIRP (dBm)	Limit (dBm)
Tnom (25℃)	Vnom (DC 3.7V)	2402	0.35	20
		2440	0.47	
		2480	0.59	
Tmax (40℃)	Vmax (DC 4.1V)	2402	0.18	20
		2440	0.28	
		2480	0.40	
Tmax (40℃)	Vmin (DC 3.3V)	2402	0.13	20
		2440	0.28	
		2480	0.41	
Tmin (-20℃)	Vmax (DC 4.1V)	2402	0.17	20
		2440	0.24	
		2480	0.38	
Tmin (-20℃)	Vmin (DC 3.3V)	2402	0.16	20
		2440	0.30	
		2480	0.41	

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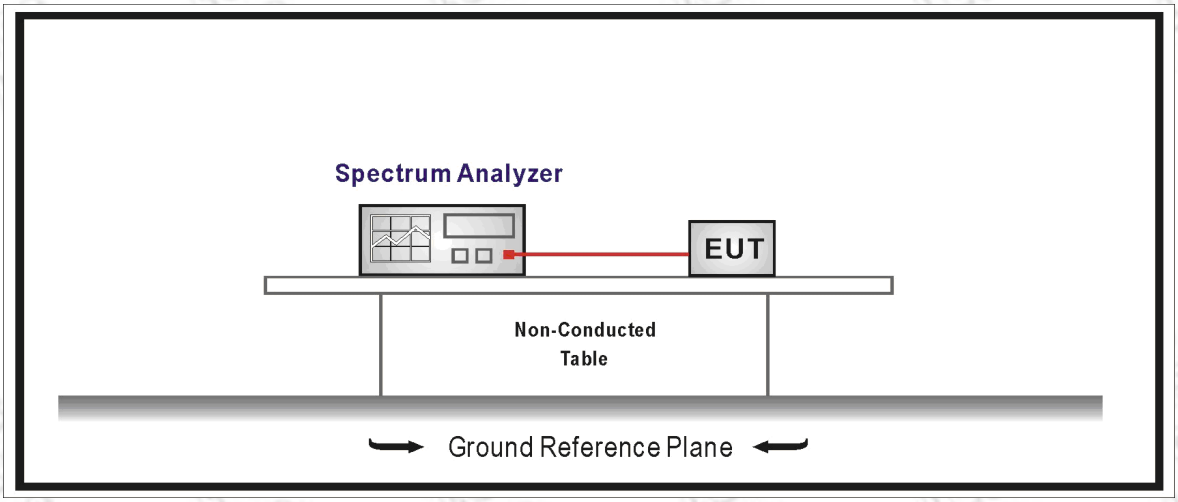
5. POWER SPECTRAL DENSITY

5.1. Limit

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

5.2. Test Setup



5.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.3

Step 1:

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

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350
- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: Auto

For non-continuous signals, wait for the trace to be completed. Save the (trace) data set to a file.

Step 2:

For each frequency point, add up the amplitude (power) values for the different transmit chains and use this as the new data set.

Step 3:

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

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Step 4:

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

Step 5:

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.

Step 6:

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

Step 7:

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. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT.

5.5. Test Result

Product	:	Fitness Band
Test Item	:	Maximum Spectral Power Density
Test Mode	:	Mode 1: Transmit by BLE

Frequency (MHz)	Total Power Density (dBm/MHz)	Limit (dBm/MHz)
2402	-13.83	10.00
2440	-13.56	10.00
2480	-13.44	10.00

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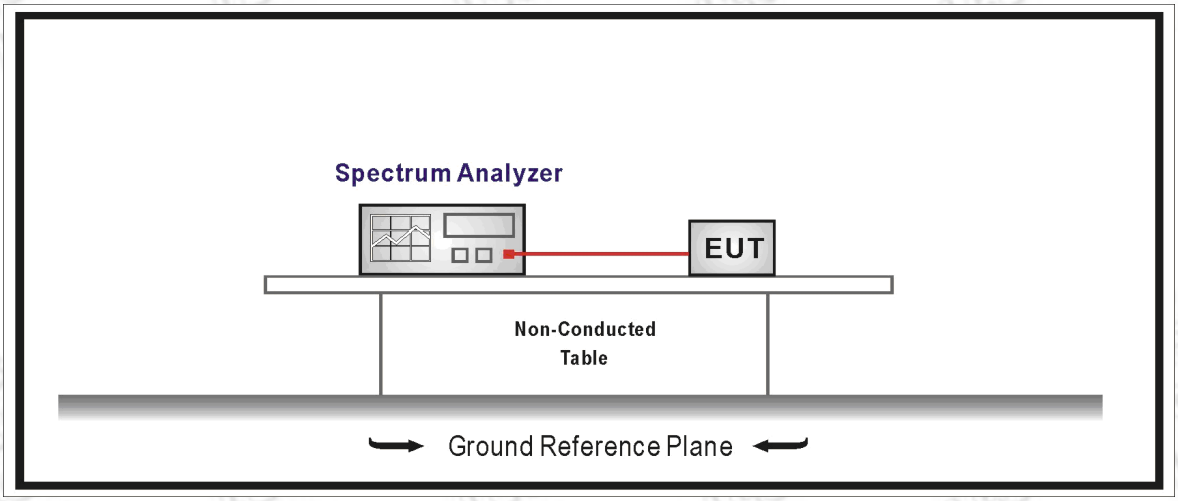
6. DUTY CYCLE, TX-SEQUENCE, TX-GAP

6.1. Limit

The Duty Cycle shall be equal to or less than the maximum value declared by the supplier.
The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3,5 ms.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2

6.4. Test Result

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. The equipment is using wide band modulations other than FHSS.
These requirements do not apply for equipment with a maximum declared RF Output power of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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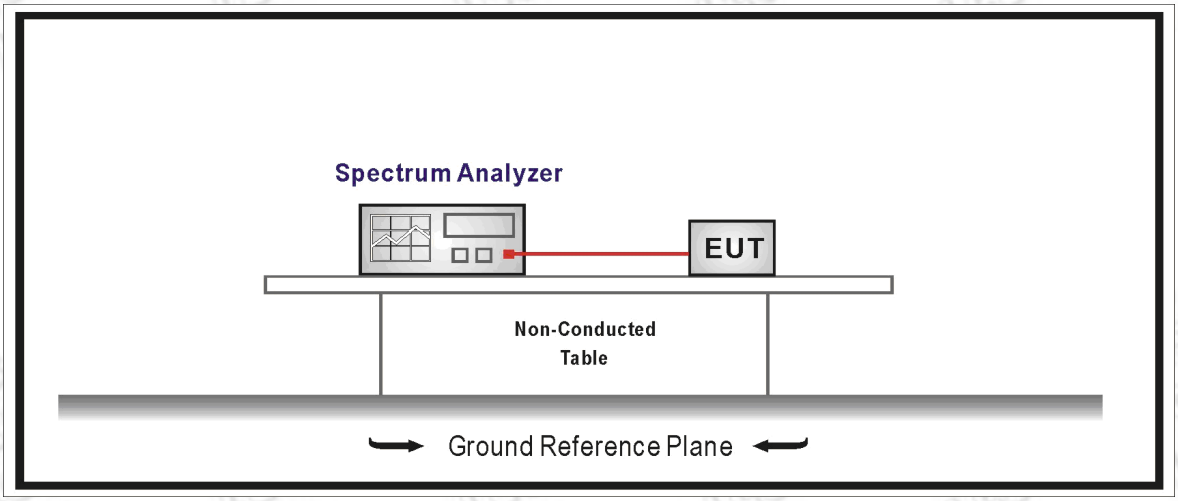
7. MEDIUM UTILISATION (MU) FACTOR

7.1. Limit

For non-adaptive equipment

For non-adaptive equipment using wide band modulations other than FHSS, the maximum Medium Utilization factor shall be 10 %.

7.2. Test Setup



7.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.2

7.4. Test Result

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.
No applicable.

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8. ADAPTIVITY (ADAPTIVE EQUIPMENT USING MODULATIONS OTHER THAN FHSS)

8.1. Limit

Adaptivity Limit
☒ Non-LBT based Detect and Avoid --- 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; --- COT ≤ 40 ms; --- Idle Period shall be minimum 5% of COT with a minimum of 100us; --- Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm);
☐ LBT based Detect and Avoid(Frame Based Equipment) --- The CCA observation time shall be not less than 18 us; --- COT = 1-10 ms; --- Idle Period = 5% of COT; --- Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm);
☐ LBT based Detect and Avoid(Load Based Equipment) --- The CCA observation time shall be not less than 18 us; --- COT ≤ 13 ms; --- Detection threshold level = -70dBm/MHz + (20dBm – Pout e.i.r.p)/1MHz (Pout in dBm);
☐ Short Control Signalling Transmissions: --- Short Control Signalling Transmissions shall have have a maximum TxOn / (TxOn + TxOff) ratio of 10 % within any observation period of 50 ms.

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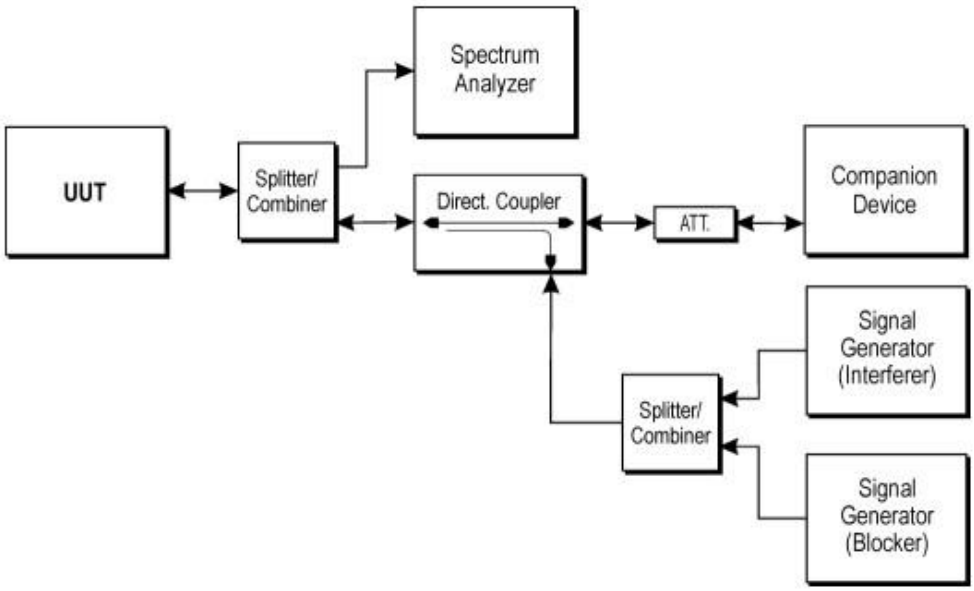
8.2. Test Setup

Conducted measurements



8.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.7

8.4. Test Result

This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.

No applicable.

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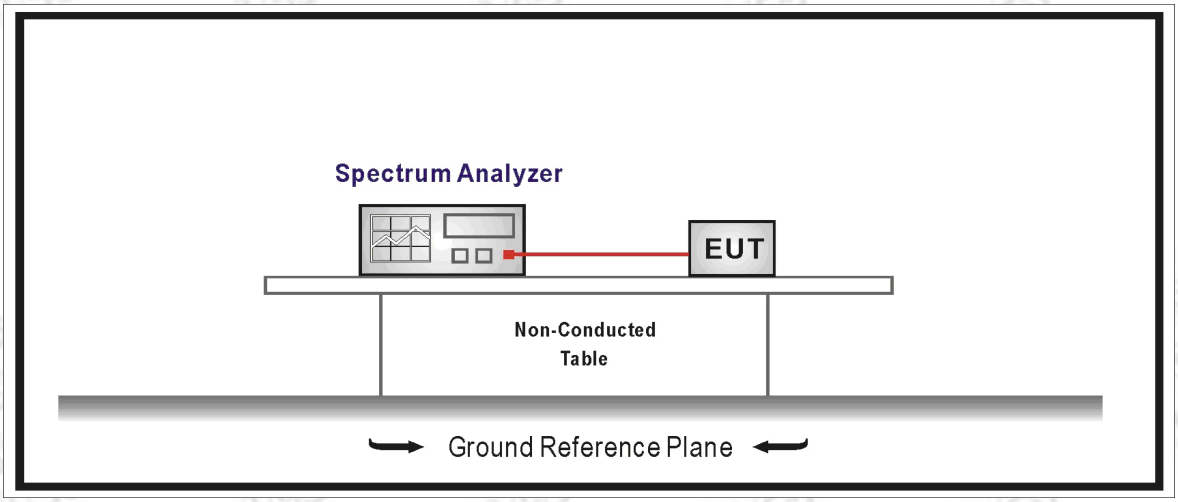
9. OCCUPIED CHANNEL BANDWIDTH

9.1. Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.

In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

9.2. Test Setup



9.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.8

Step 1:

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 % of the span without going below 1 % (We set RBW= 20KHz)
- Video BW: 3 × RBW (We set RBW= 62KHz)
- Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 2:

Wait until the trace is completed. Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

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9.4. Test Result

Product	:	Fitness Band
Test Item	:	Occupied Channel Bandwidth
Test Mode	:	Mode 1: Transmit by BLE
Test Result	:	Pass

Channel No.	Frequency (MHz)	99% Bandwidth (MHz)	Limit
00	2402	1.02	Within the band 2400.0MHz~2483.5MHz
39	2480	1.03	

10. TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

10.1. 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 3.

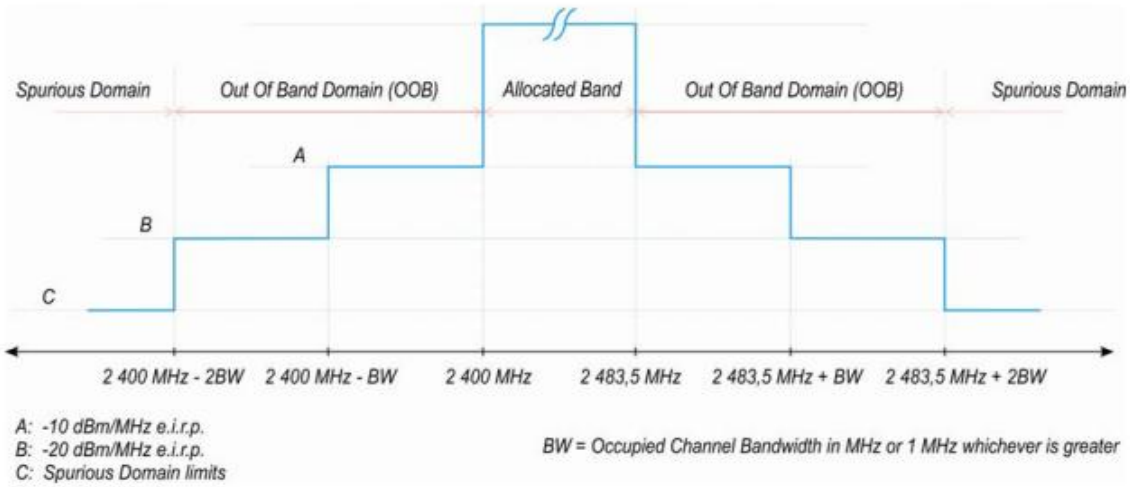
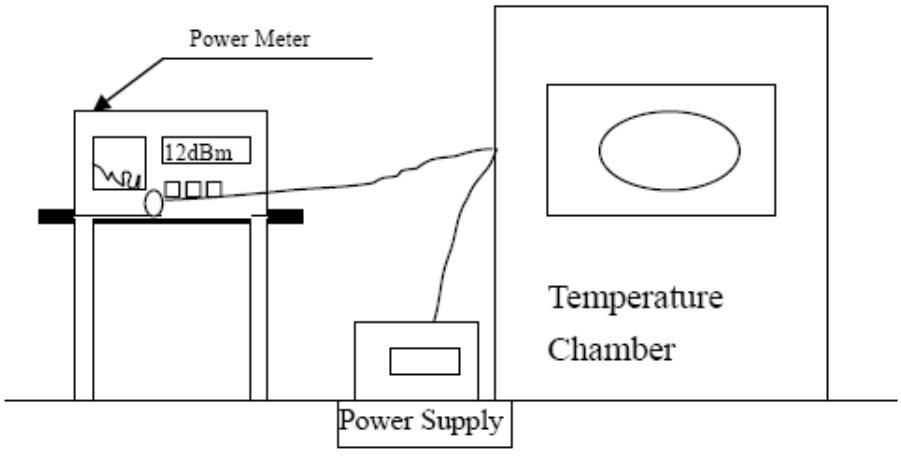


Figure 3: Transmit mask

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2. Test Setup

For Conducted Measurement



10.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.9

Step 1:

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

- Centre Frequency: 2 484 MHz
- Span: 0 Hz
- Resolution BW: 1 MHz
- Filter mode: Channel filter
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Sweep Points: Sweep Time [s] / (1 μs) or 5 000 whichever is greater
- Trigger Mode: Video trigger

NOTE 1: 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

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

• Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

• Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

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Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

• Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
- Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

It shall be recorded whether the equipment complies with the mask provided in figures 1 or 3.

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10.4. Test Result

Product	:	Fitness Band
Test Item	:	Transmitter unwanted emissions in the out-of-band domain
Test Mode	:	Mode 1: Transmit by BLE

Frequency (MHz)	Test Conditions (℃)	Max measured Values (dBm/MHz)	Limit (dBm/MHz)
2400–2BW~ 2400-BW	25	-68.54	-20
2400–BW~2400	25	-68.84	-10
2483.5~ 2483.5+BW	25	-66.59	-10
2483.5+BW~ 2483.5+2BW	25	-68.32	-20
2400–2BW~ 2400-BW	-20	-68.64	-20
2400–BW~2400	-20	-68.42	-10
2483.5~ 2483.5+BW	-20	-68.40	-10
2483.5+BW~ 2483.5+2BW	-20	-67.89	-20
2400–2BW~ 2400-BW	40	-68.75	-20
2400–BW~2400	40	-68.17	-10
2483.5~ 2483.5+BW	40	-67.49	-10
2483.5+BW~ 2483.5+2BW	40	-68.79	-20

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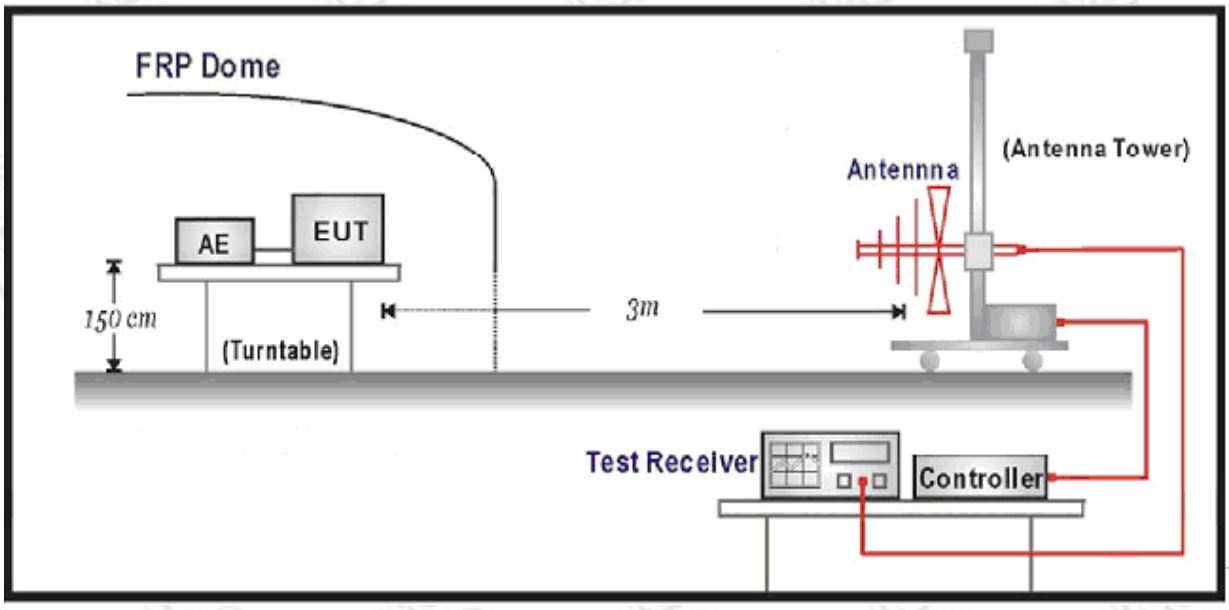
11. TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

11.1. Limit

Transmitter Limits for Spurious Emissions		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	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

11.2. Test Setup

For Radiated Measurement



11.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.10

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 1 or 4.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 100 kHz

• Video bandwidth: 300 kHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 19400

NOTE 1: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT. For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.10.2.1.3 and compared to the limits given in tables 1 or 4.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

• Resolution bandwidth: 1 MHz

• Video bandwidth: 3 MHz

• Detector mode: Peak

• Trace Mode: Max Hold

• Sweep Points: ≥ 23500

NOTE 2: For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented.

• Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.

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11.4. Test Result

Product	:	Fitness Band
Test Item	:	Transmitter spurious emissions
Test Mode	:	Mode 1: Transmit by BLE

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 0 (2402MHz)					
165.2	H	-85.0	-36	-49.0	PK
60.7	V	-79.9	-54	-25.9	PK
919.9	H	-73.9	-36	-37.9	PK
912.6	V	-68.2	-36	-32.2	PK
4806.4	H	-51.7	-30	-21.7	PK
4806.1	V	-63.3	-30	-33.3	PK
7203.6	H	-57.3	-30	-27.3	PK
7201.2	V	-58.4	-30	-28.4	PK
Channel 39 (2480MHz)					
164.7	H	-82.0	-36	-46.0	PK
62.1	V	-83.3	-54	-29.3	PK
920.4	H	-73.3	-36	-37.3	PK
912.5	V	-71.1	-36	-35.1	PK
4956.8	H	-53.5	-30	-23.5	PK
4963.1	V	-64.3	-30	-34.3	PK
7442.1	H	-56.7	-30	-26.7	PK
7435.8	V	-52.7	-30	-22.7	PK

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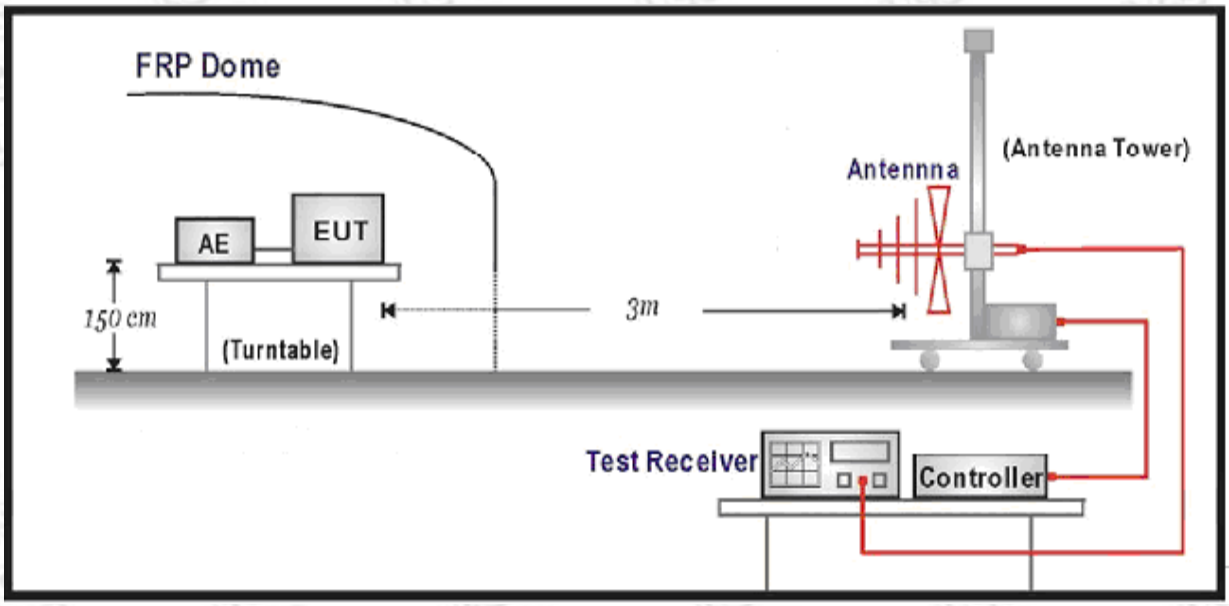
12. RECEIVER SPURIOUS EMISSIONS

12.1. Limit

Spurious emissions limits for receivers		
Frequency Range	Maximum power E.R.P. (≤ 1GHz) E.I.R.P. (> 1GHz)	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12.75 GHz	-47 dBm	1 MHz

12.2. Test Setup

For Radiated Measurement



12.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.11

Step 1:

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 2 or 5.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 100 kHz
- Video bandwidth: 300 kHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: ≥ 19400
- Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.3 and compared to the limits given in tables 2 or 5.

Step 3:

The emissions over the range 1 GHz to 12,75 GHz shall be identified.

Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 3 MHz
- Detector mode: Peak
- Trace Mode: Max Hold
- Sweep Points: ≥ 23500
- Sweep time: Auto

Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.3.11.2.1.3 and compared to the limits given in tables 2 or 5. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.3.11.2.1.3.

Step 4:

- In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), the steps 2 and 3 need to be repeated for each of the active receive chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

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12.4. Test Result

Product	:	Fitness Band
Test Item	:	Receiver spurious emissions
Test Mode	:	Mode 2: Receive by BLE

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
Channel 0 (2402MHz)					
164.8	H	-84.0	-57	-27.0	PK
62.2	V	-82.6	-57	-25.6	PK
921.1	H	-74.8	-57	-17.8	PK
911.7	V	-68.4	-57	-11.4	PK
1251.9	H	-73.7	-47	-26.7	PK
1165.6	V	-68.1	-47	-21.1	PK
2339.8	H	-64.0	-47	-17.0	PK
2116.9	V	-66.1	-47	-19.1	PK
Channel 39 (2480MHz)					
164.4	H	-81.9	-57	-24.9	PK
61.7	V	-85.1	-57	-28.1	PK
919.6	H	-74.7	-57	-17.7	PK
913.4	V	-70.4	-57	-13.4	PK
1262.4	H	-72.0	-47	-25.0	PK
1211.7	V	-69.5	-47	-22.5	PK
2084.4	H	-64.8	-47	-17.8	PK
2154.1	V	-67.2	-47	-20.2	PK

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13. RECEIVER BLOCKING

13.1. Limit

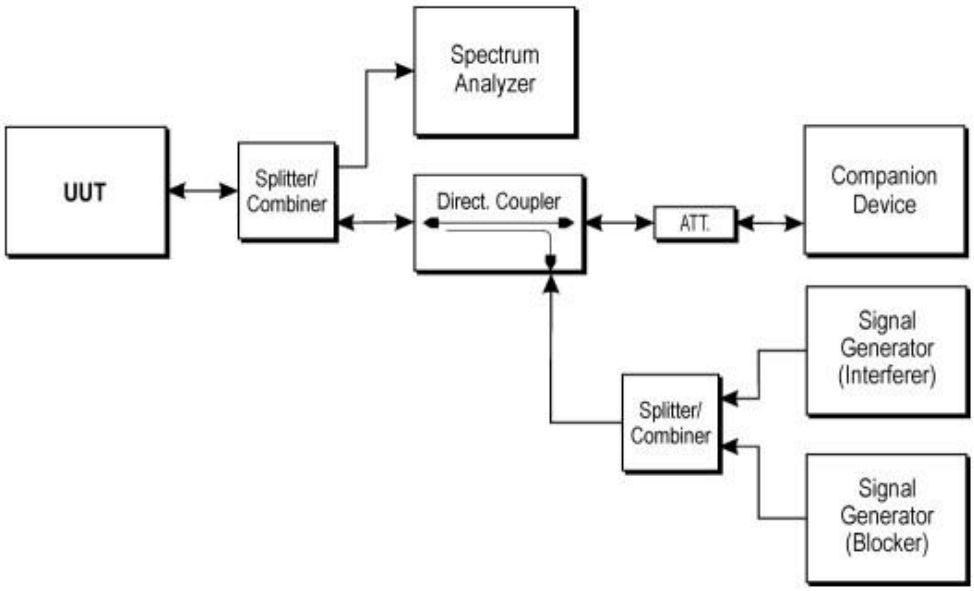
Adaptive equipment using wide band modulations other than FHSS, shall comply with the requirements defined in clause 4.3.2.6.2 (non-LBT based DAA) or clause 4.3.2.6.3 (LBT based DAA) in the presence of a blocking signal with characteristics as provided in table 6.

Table 6: Receiver Blocking parameters

Equipment Type (LBT / non- LBT)	Wanted signal mean power from companion device	Blocking signal frequency [MHz]	Blocking signal power [dBm]	Type of interfering signal
LBT	sufficient to maintain the link (see note 2)	2 395 or 2 488,5 (see note 1)	-35	CW
Non-LBT	-30 dBm			
NOTE 1: The highest blocking frequency shall be used for testing operating channels within the range 2 400 MHz to 2 442 MHz, while the lowest blocking frequency shall be used for testing operating channels within the range 2 442 MHz to 2 483,5 MHz. See clause 5.3.7.1.				
NOTE 2: A typical value which can be used in most cases is -50 dBm/MHz.				

13.2. Test Setup

Conducted measurements



13.3. Test Procedure

Refer to ETSI EN 300 328 V1.9.1 (2015-02) Clause 5.3.7

13.4. Test Result

This requirement does not apply for equipment with a maximum declared RF Output power level of less than 10dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10dBm E.I.R.P.

The RF Output power level of this equipment is less than 10dBm, so this item does not need to test.

No applicable.

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14. PHOTOGRAPHS OF TEST SETUP

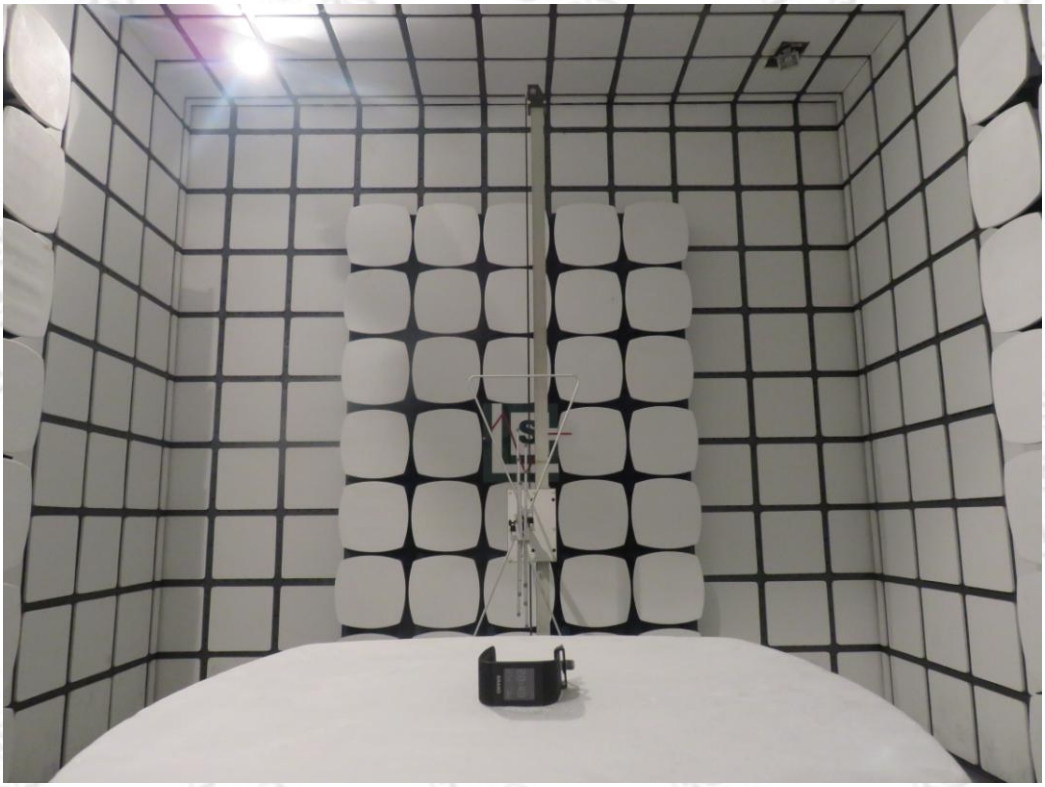

Fig.1

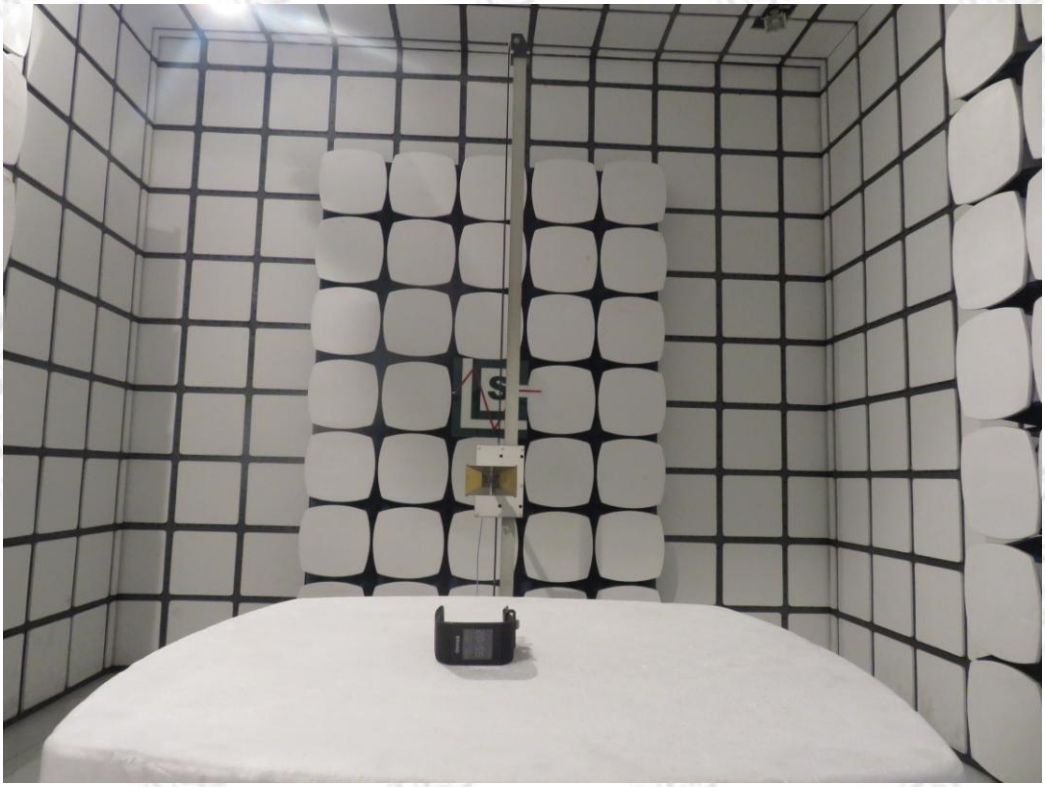

Fig.2

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15.EUT PHOTOGRAPHS

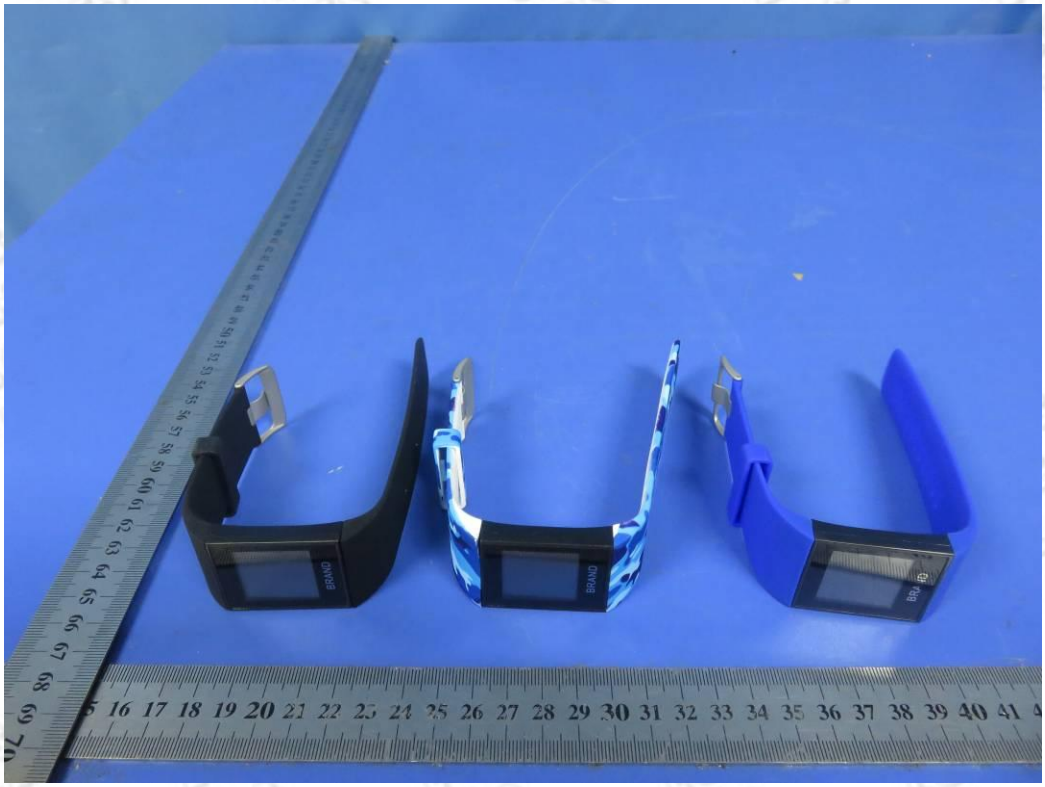

Fig.1

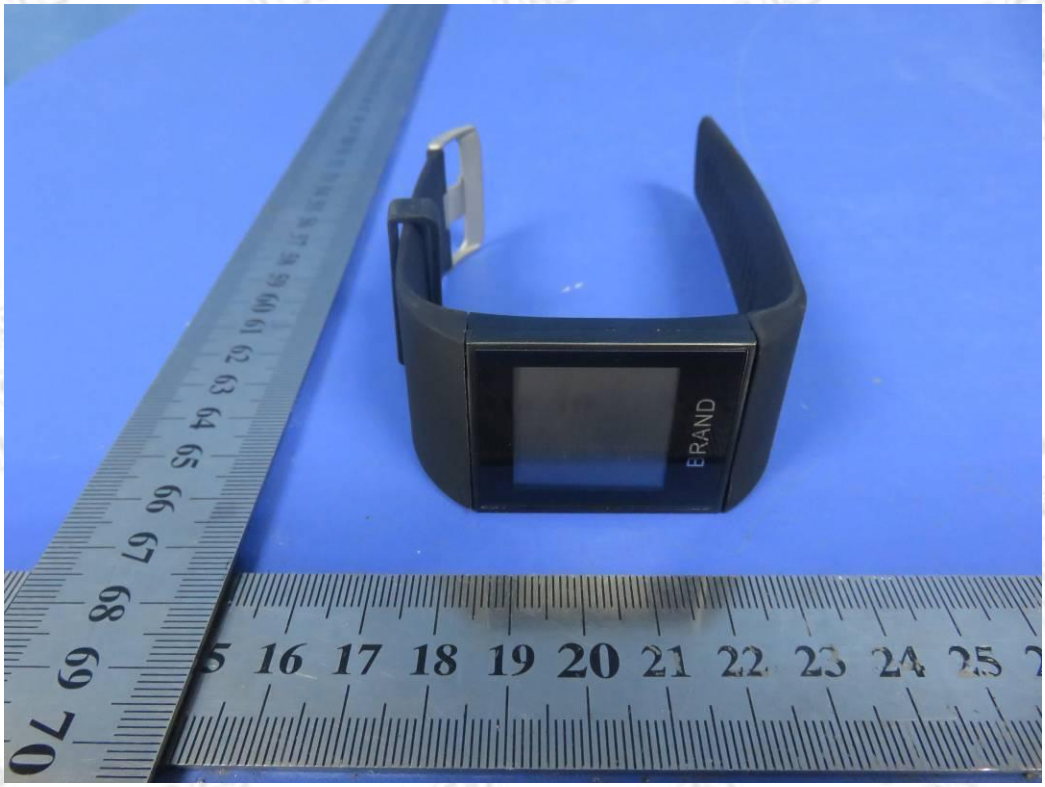

Fig.2

Fig.3

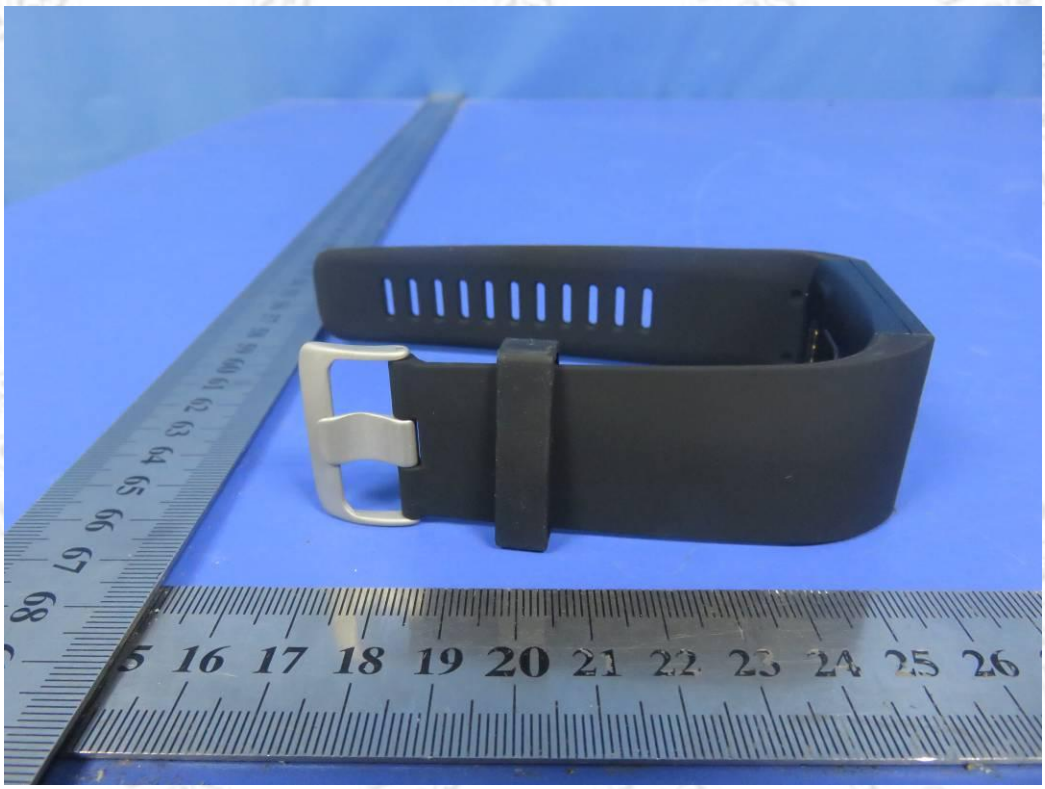

Fig.4

Fig.5

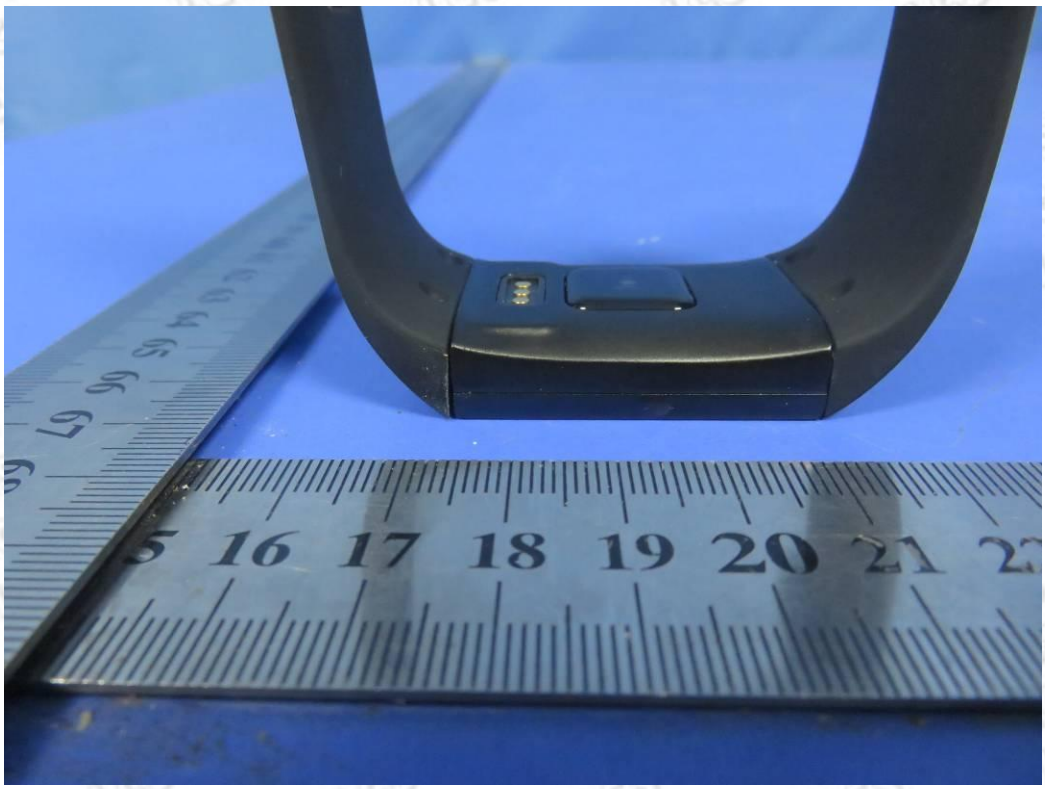

Fig.6

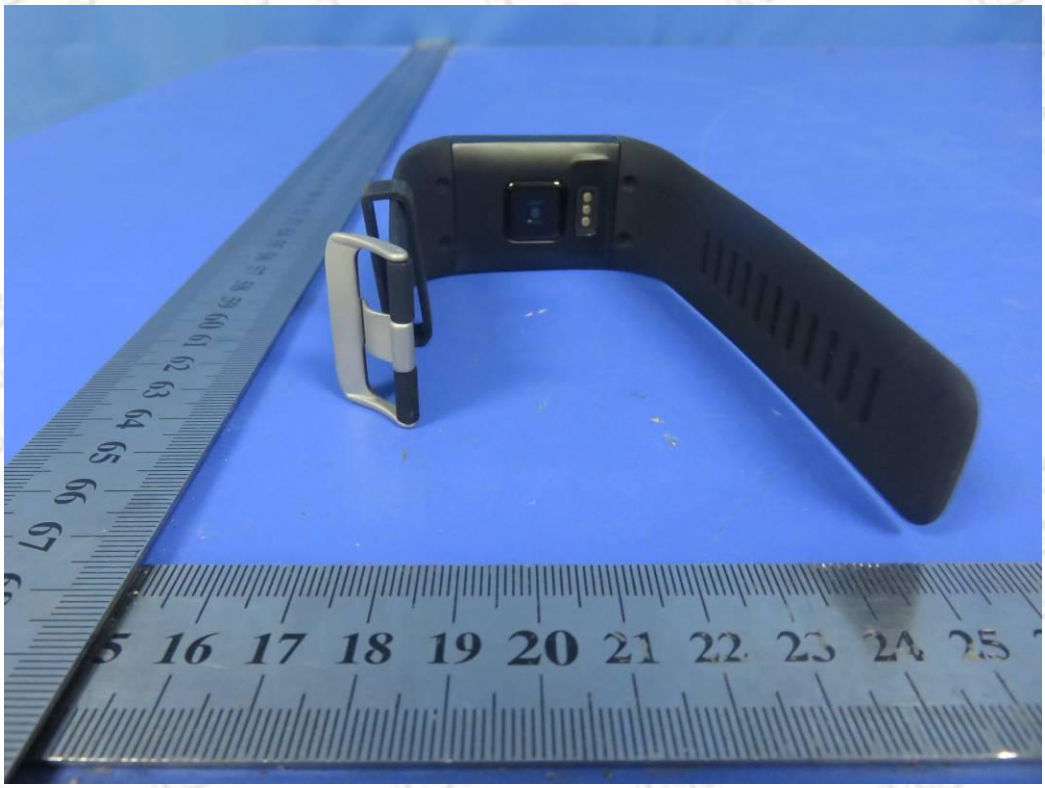

Fig.7

Fig.8

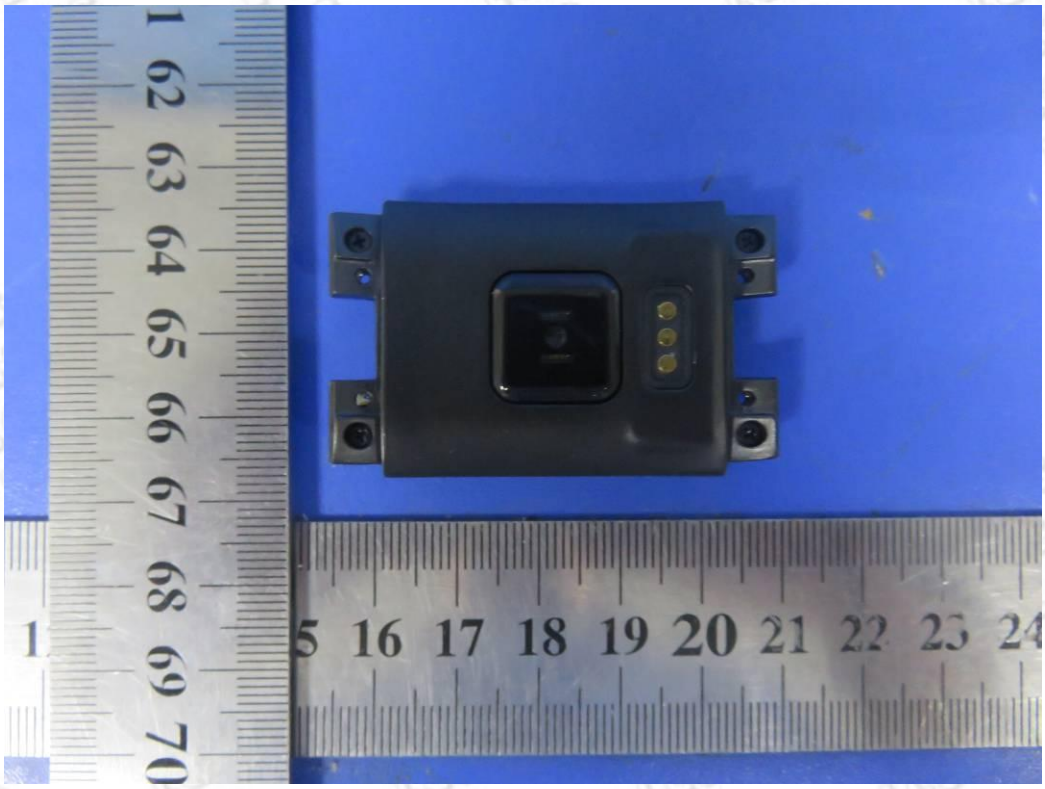

Fig.9

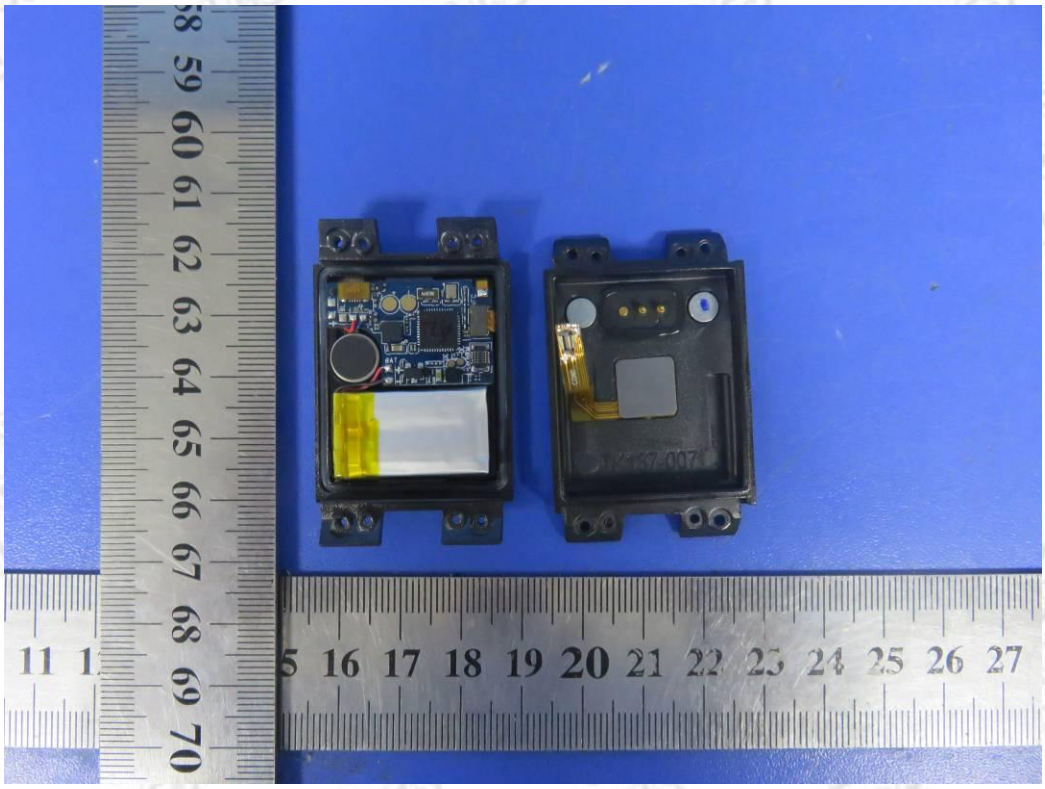

Fig.10

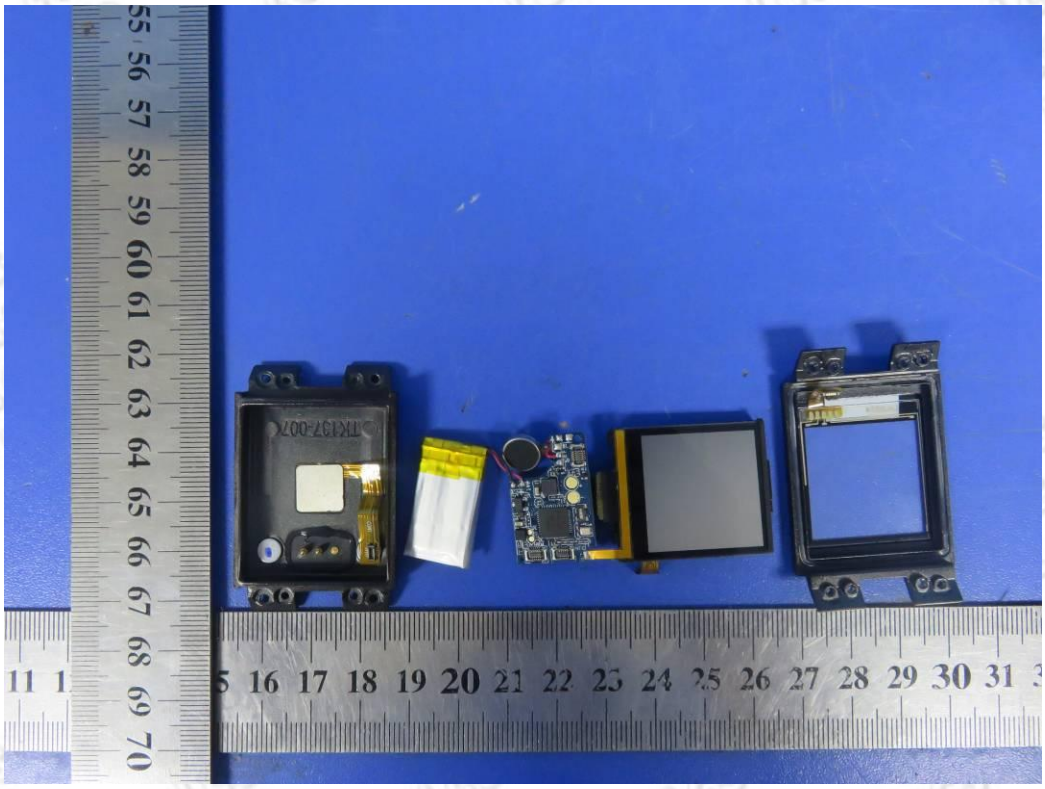

Fig.11

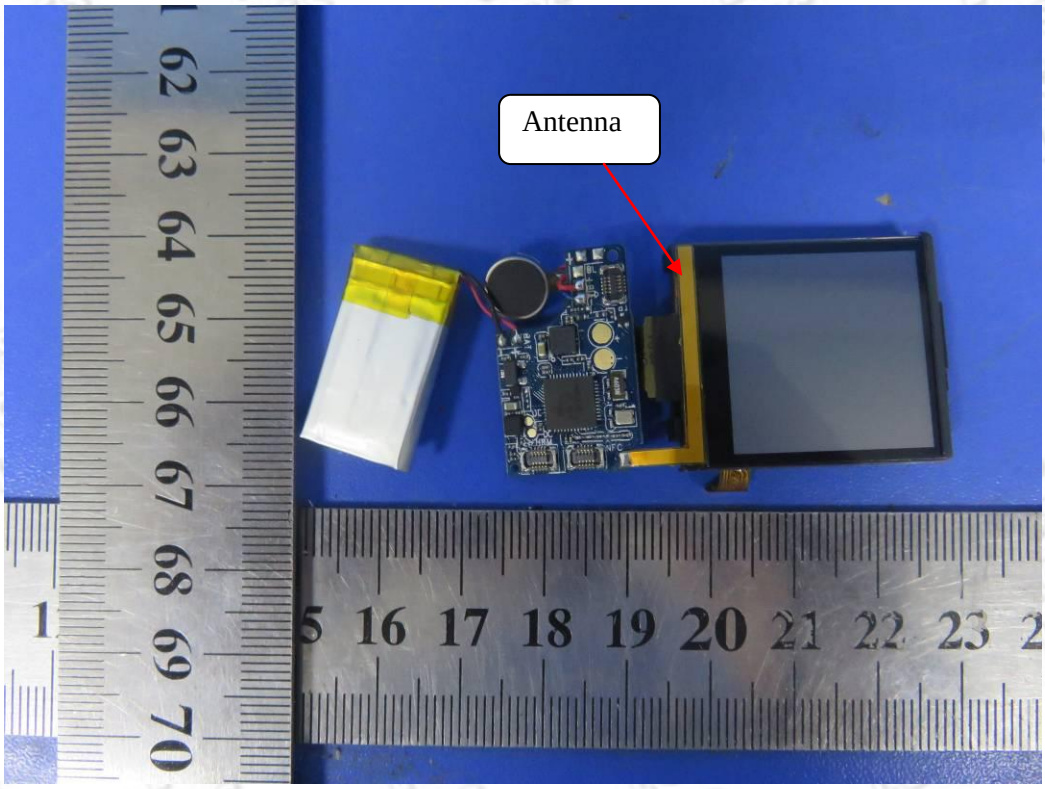

Fig.12

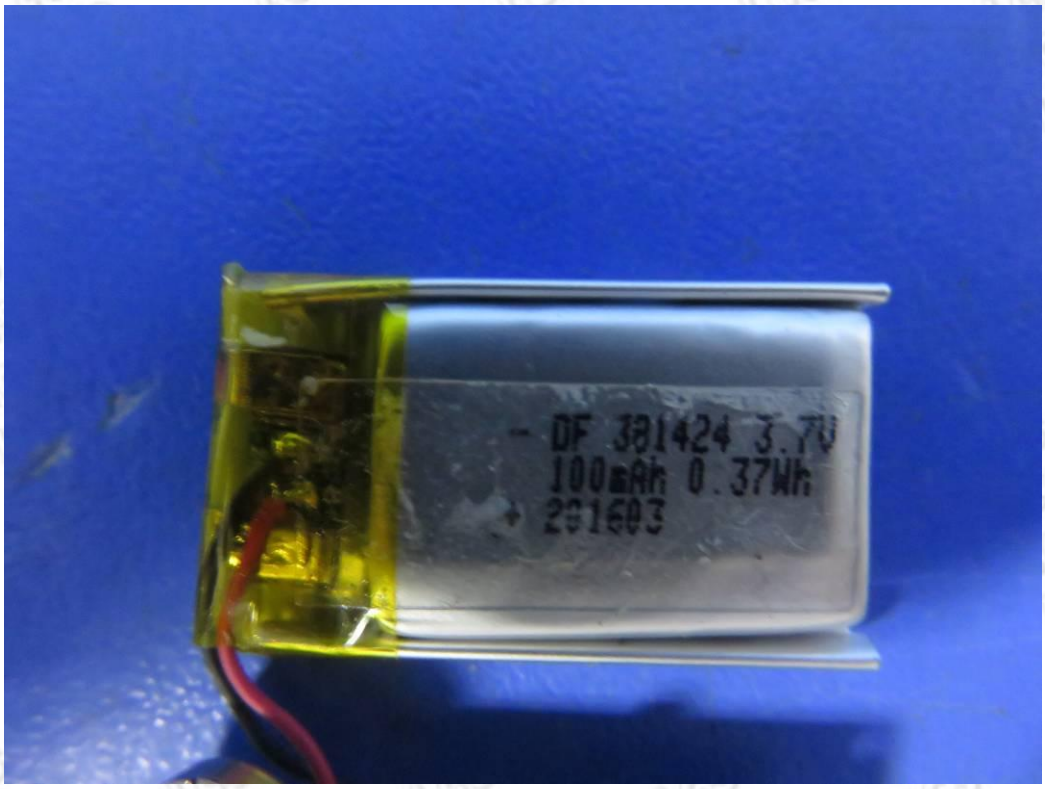

Fig.13

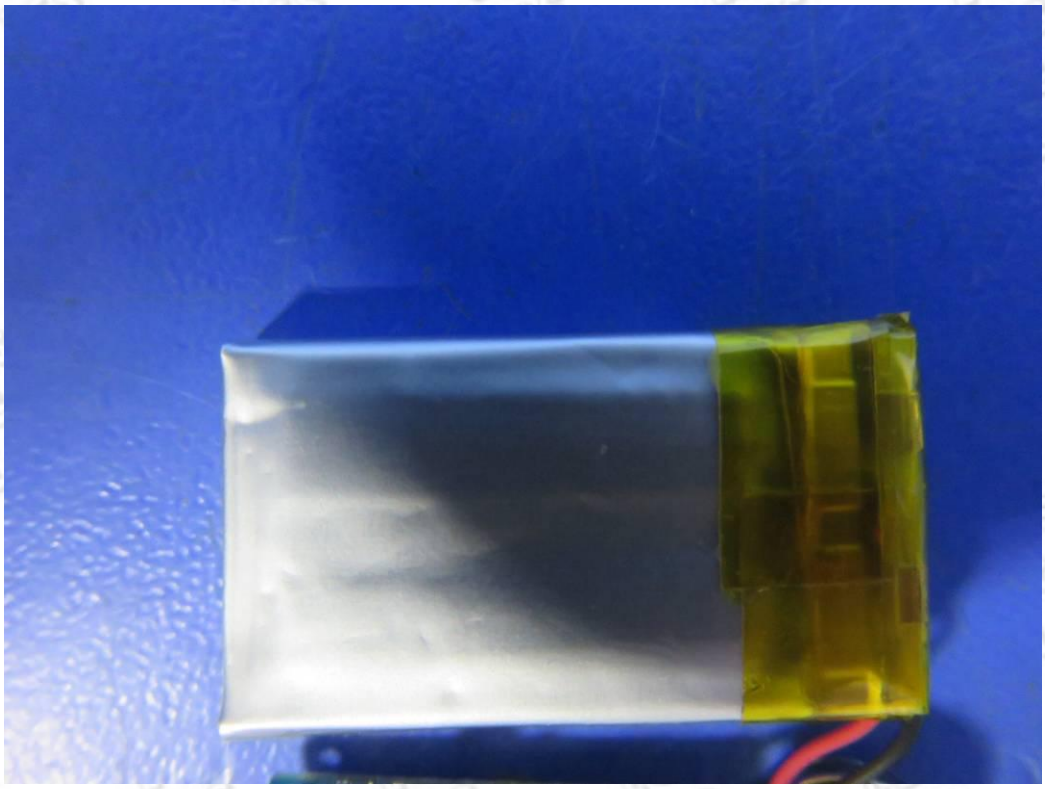

Fig.14

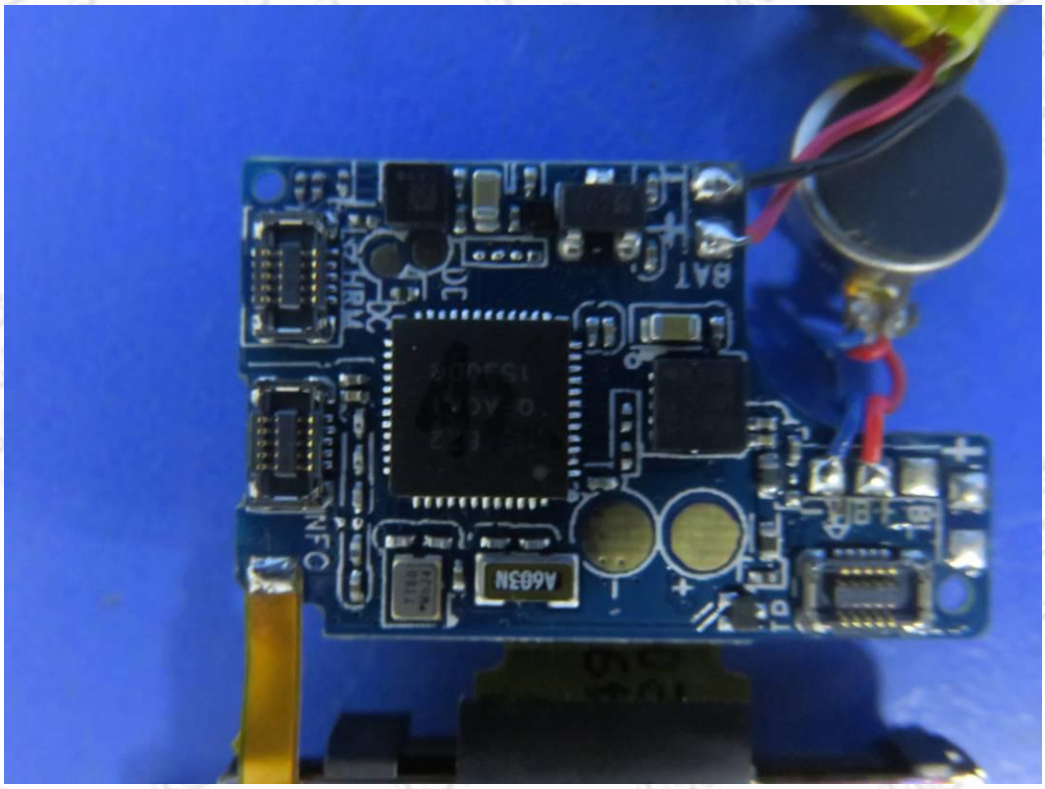

Fig.15

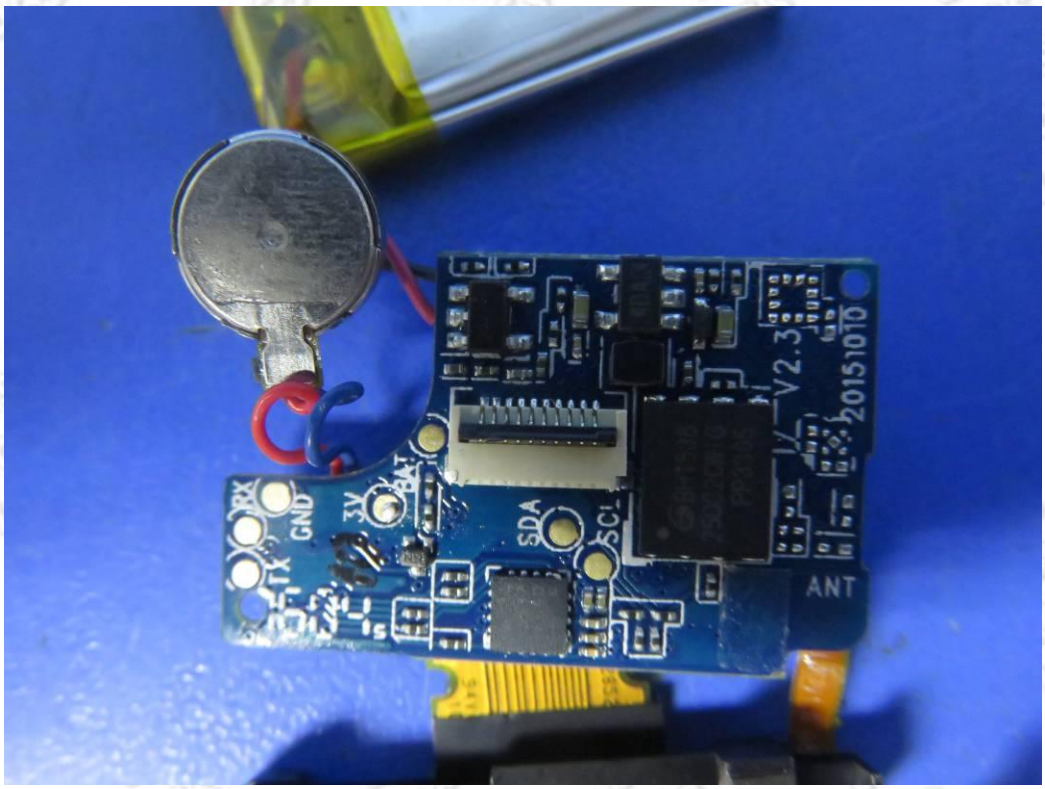

Fig.16

----------THE END OF REPORT----------

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