

The following table is the setting of spectrum analyzer and receiver.

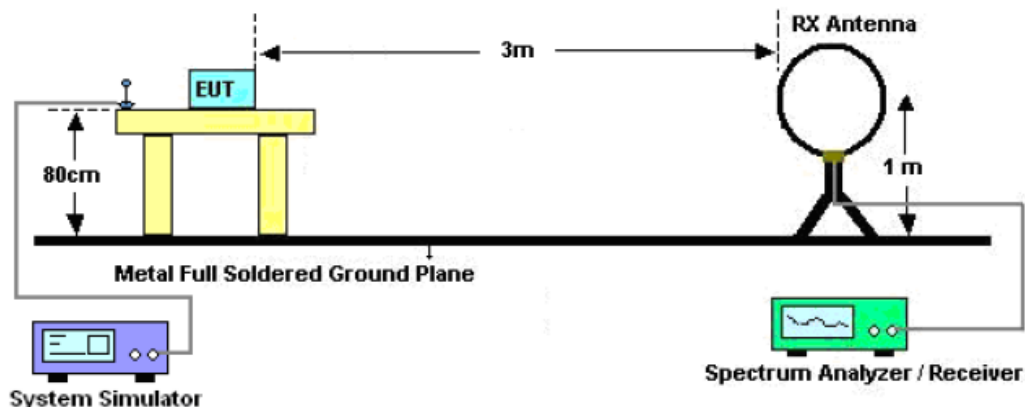
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

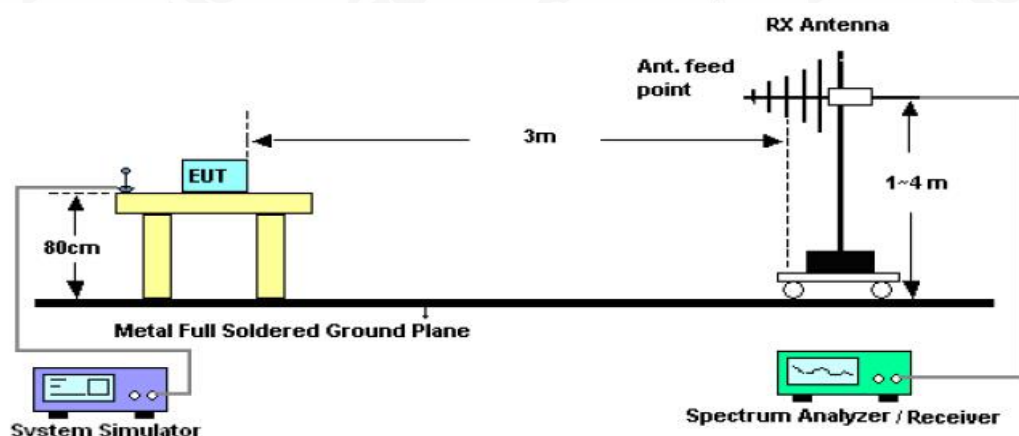


10.2. TEST SETUP

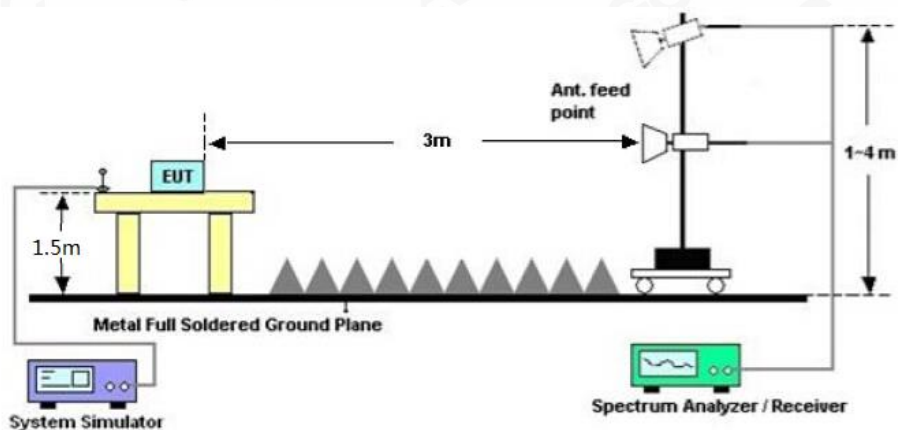
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested For restricted band radiated emission, the test records reported below are the worst result compared to other modes.

10.4. TEST RESULT

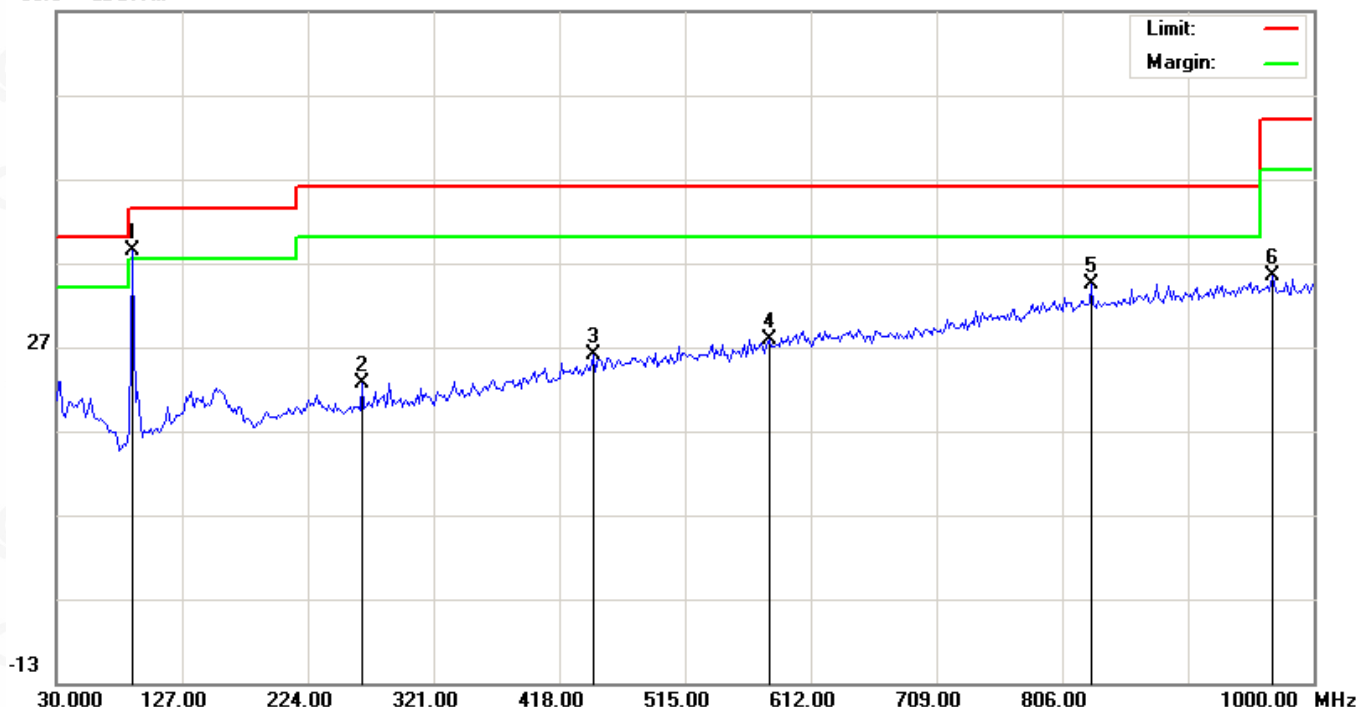
RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ

EUT	Wireless hands free car kit	Model Name	BTM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

66.9 dBuV/m

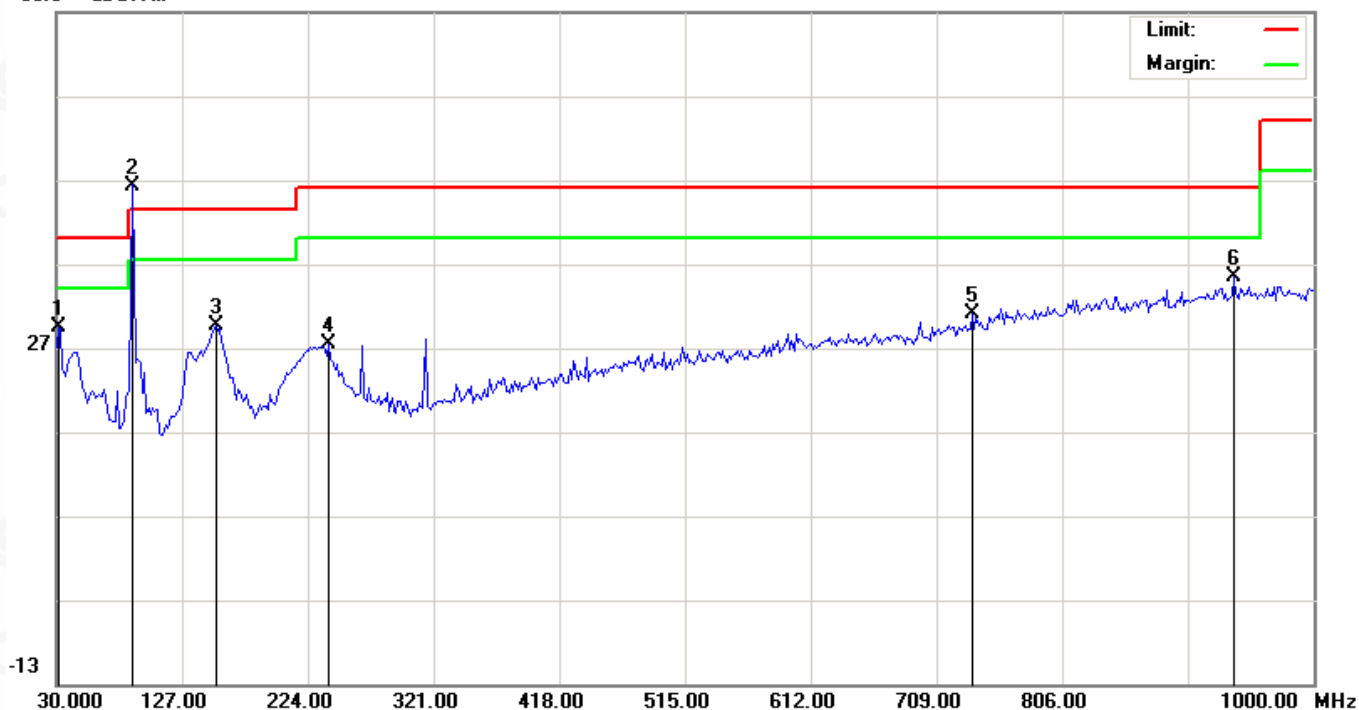


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	88.2000	23.44	14.97	38.41	43.50	-5.09	peak			
2		266.0333	3.74	18.80	22.54	46.00	-23.46	peak			
3		443.8667	2.22	23.86	26.08	46.00	-19.92	peak			
4		579.6667	1.18	26.55	27.73	46.00	-18.27	peak			
5		828.6332	3.64	30.78	34.42	46.00	-11.58	peak			
6		967.6667	3.19	32.28	35.47	54.00	-18.53	peak			

RESULT: PASS

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Vertical

66.9 dBuV/m



No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		31.6167	11.14	18.22	29.36	40.00	-10.64	peak			
2	*	88.2000	31.33	14.97	46.30	43.50	2.80	peak			
3		152.8667	10.37	19.20	29.57	43.50	-13.93	peak			
4		240.1667	8.73	18.66	27.39	46.00	-18.61	peak			
5		736.4833	2.00	28.97	30.97	46.00	-15.03	peak			
6		938.5667	3.30	32.03	35.33	46.00	-10.67	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 5 is the worst case and recorded in the report.

3. This 88.2MHz is the main frequency of FM.

RADIATED EMISSION ABOVE 1GHZ

EUT	Wireless hands free car kit	Model Name	BTfM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	51.68	0.08	51.76	74	-22.24	peak
4804.000	48.21	0.08	48.29	54	-5.71	AVG
7206.000	45.82	2.21	48.03	74	-25.97	peak
7206.000	42.65	2.21	44.86	54	-9.14	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wireless hands free car kit	Model Name	BTfM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4804.000	52.63	0.08	52.71	74	-21.29	peak
4804.000	47.25	0.08	47.33	54	-6.67	AVG
7206.000	46.47	2.21	48.68	74	-25.32	peak
7206.000	41.7	2.21	43.91	54	-10.09	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	52.33	0.14	52.47	74	-21.53	peak
4882.000	45.93	0.14	46.07	54	-7.93	AVG
7323.000	46.69	2.36	49.05	74	-24.95	peak
7323.000	40.34	2.36	42.7	54	-11.3	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 5	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4882.000	53.82	0.14	53.96	74	-20.04	peak
4882.000	46.21	0.14	46.35	54	-7.65	AVG
7323.000	46.97	2.36	49.33	74	-24.67	peak
7323.000	40.52	2.36	42.88	54	-11.12	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	50.39	0.22	50.61	74	-23.39	peak
4960.000	44.58	0.22	44.8	54	-9.2	AVG
7440.000	45.72	2.64	48.36	74	-25.64	peak
7440.000	39.42	2.64	42.06	54	-11.94	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4960.000	51.55	0.22	51.77	74	-22.23	peak
4960.000	46.57	0.22	46.79	54	-7.21	AVG
7440.000	45.19	2.64	47.83	74	-26.17	peak
7440.000	10.44	2.64	13.08	54	-40.92	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note: Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report.
Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

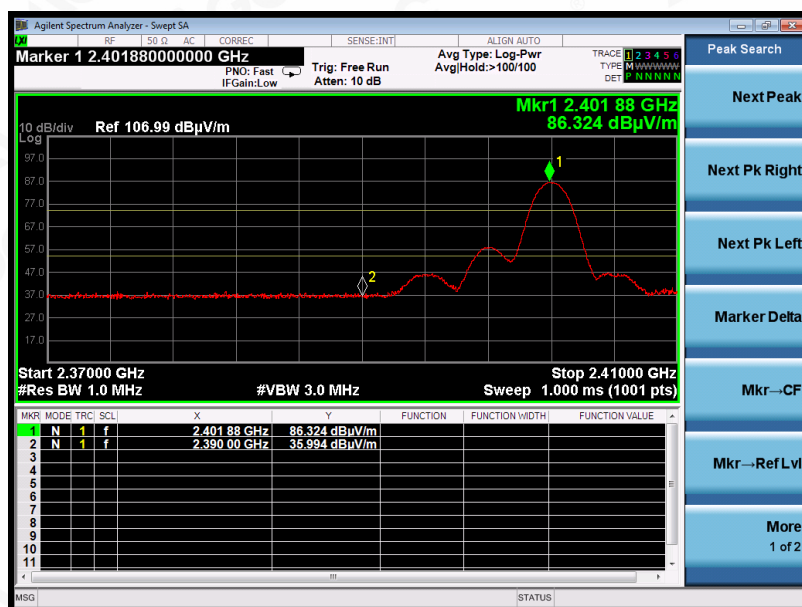
The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been tested. The $\pi/4$ -DQPSK modulation is the worst case and recorded in the report.

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

EUT	Wireless hands free car kit	Model Name	BTM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal

PK



AV



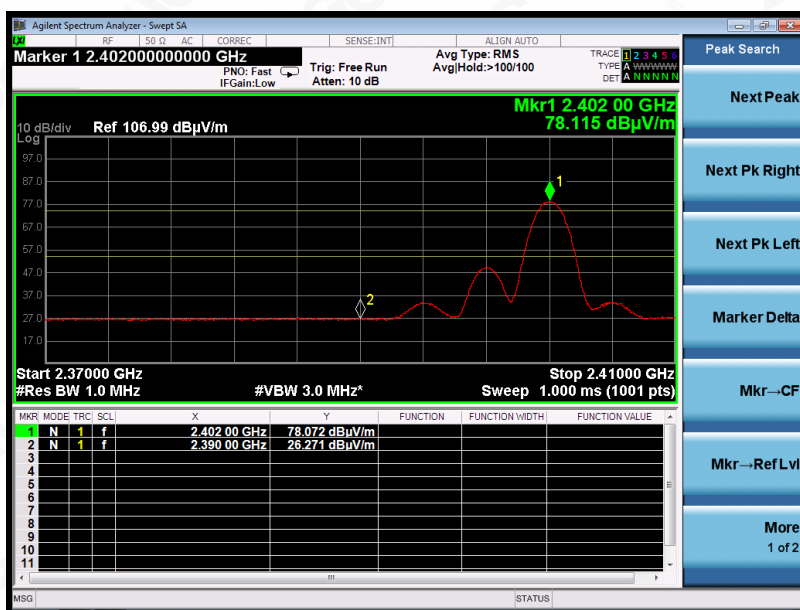
RESULT: PASS

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical

PK



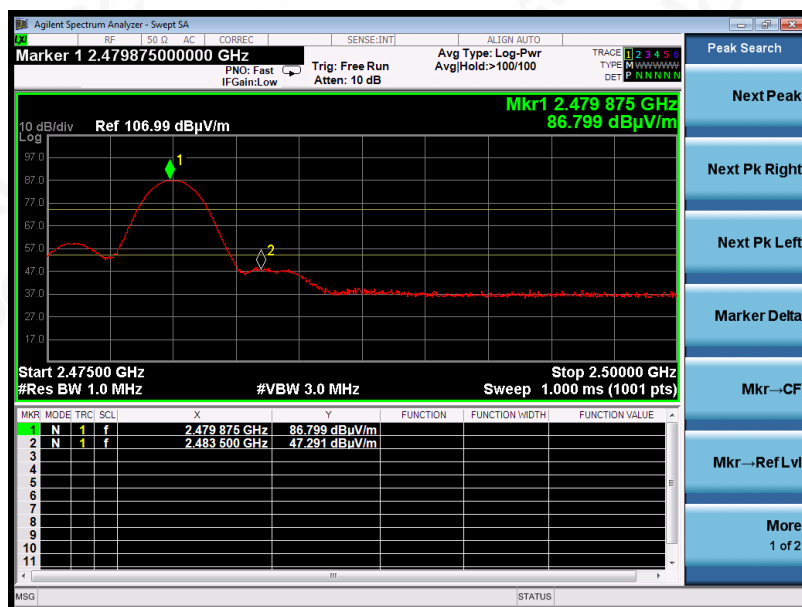
AV



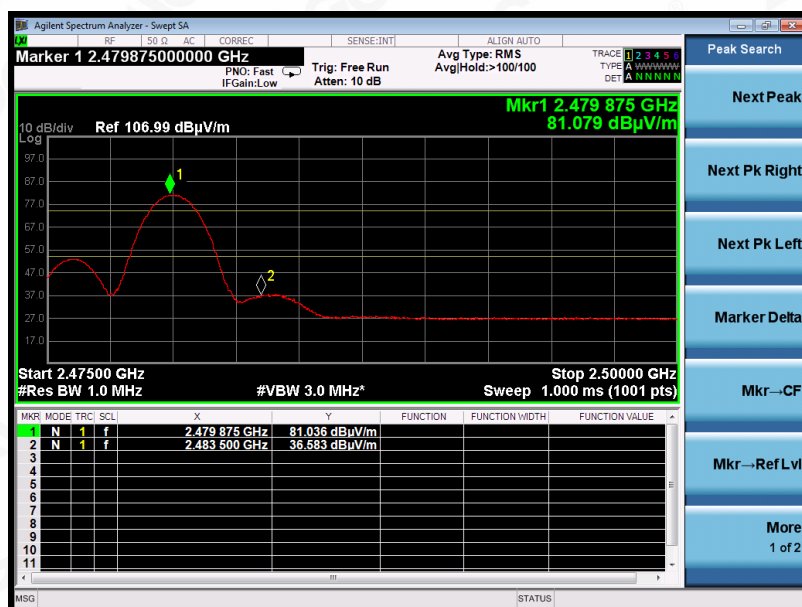
RESULT: PASS

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Horizontal

PK



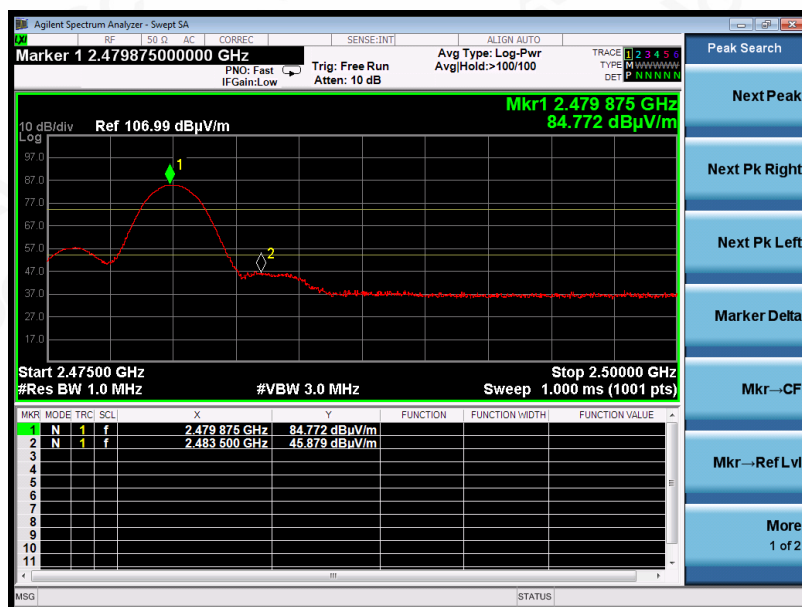
AV



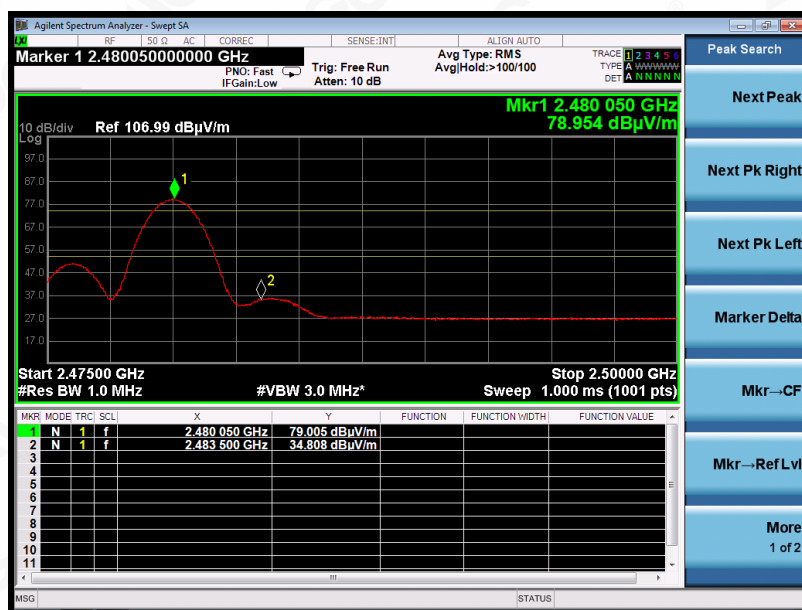
RESULT: PASS

EUT	Wireless hands free car kit	Model Name	BTFM4PD
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 6	Antenna	Vertical

PK



AV



RESULT: PASS

Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F. All test modes had been pre-tested. The $\pi/4$ -DQPSK modulation is the worst case and recorded in the report.



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11. NUMBER OF HOPPING FREQUENCY

11.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. VBW $\geq$ RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.
4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

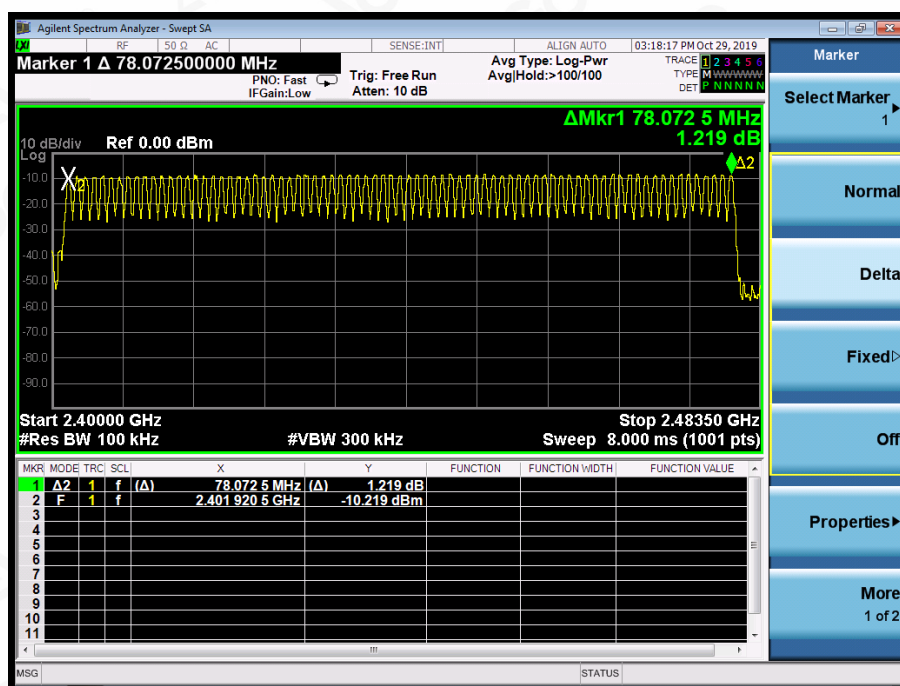
11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

TOTAL NO. OF HOPPING CHANNEL	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
	≥ 15	79	PASS

TEST PLOT FOR NO. OF TOTAL CHANNELS



Note: The GFSK modulation is the worst case and recorded in the report.

12. TIME OF OCCUPANCY (DWELL TIME)

12.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.
2. RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1/T$, where T is the expected dwell time per channel.
3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
4. Detector function: Peak. Trace: Max hold.
5. Use the marker-delta function to determine the transmit time per hop.
6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) $\times$ (period specified in the requirements / analyzer sweep time)
7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

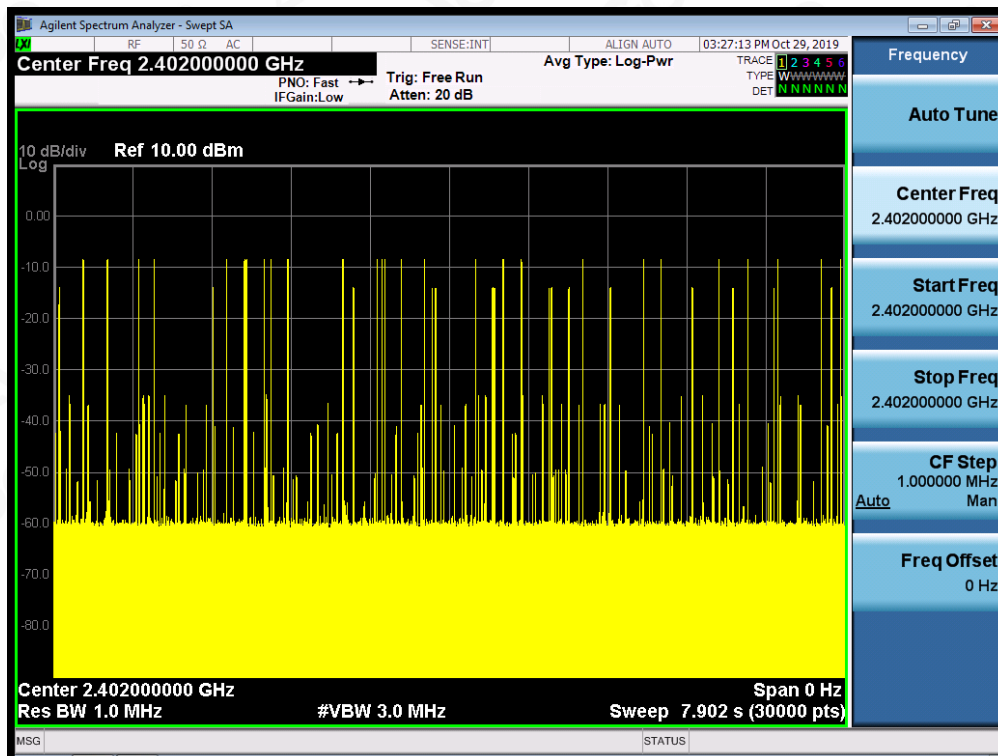
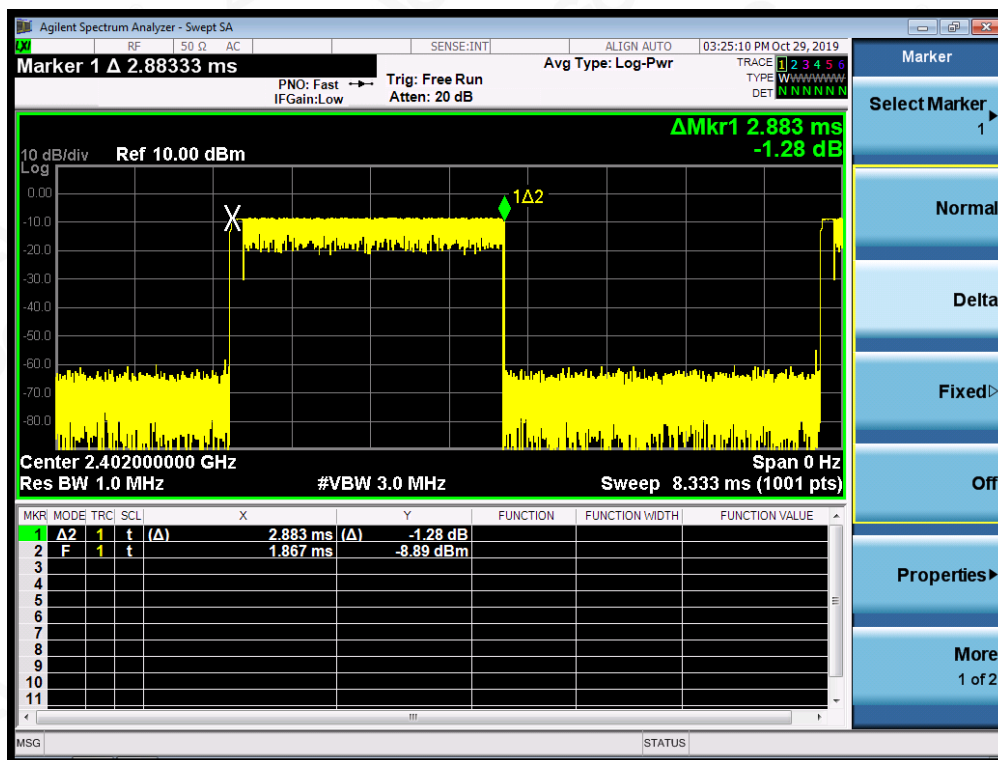
The same as described in section 6

12.4. LIMITS AND MEASUREMENT RESULT

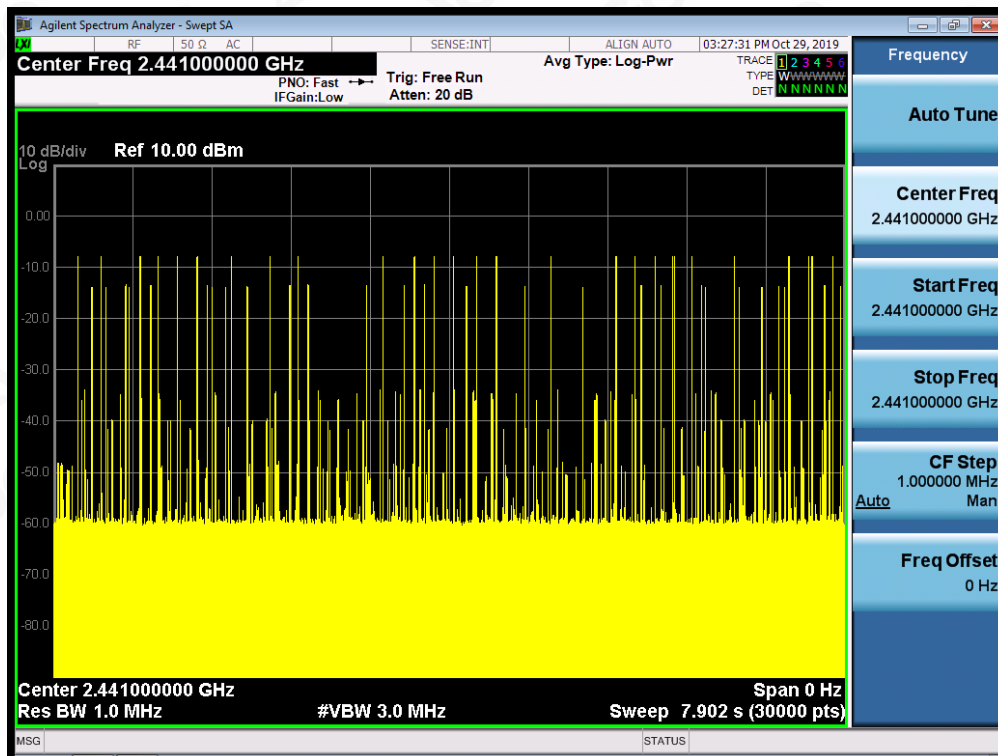
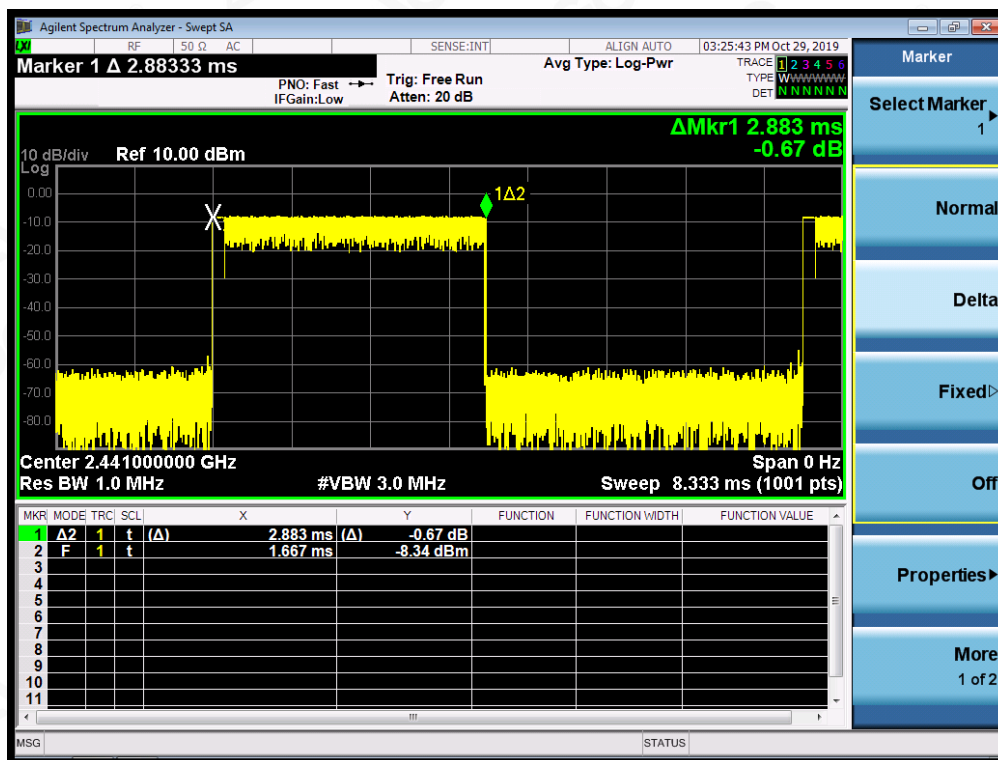
Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)
Low	2.883	26*4	299.832	400
Middle	2.883	27*4	311.364	400
High	2.883	25*4	288.300	400

Note: The $\pi/4$ -DQPSK modulation is the worst case and recorded in the report.

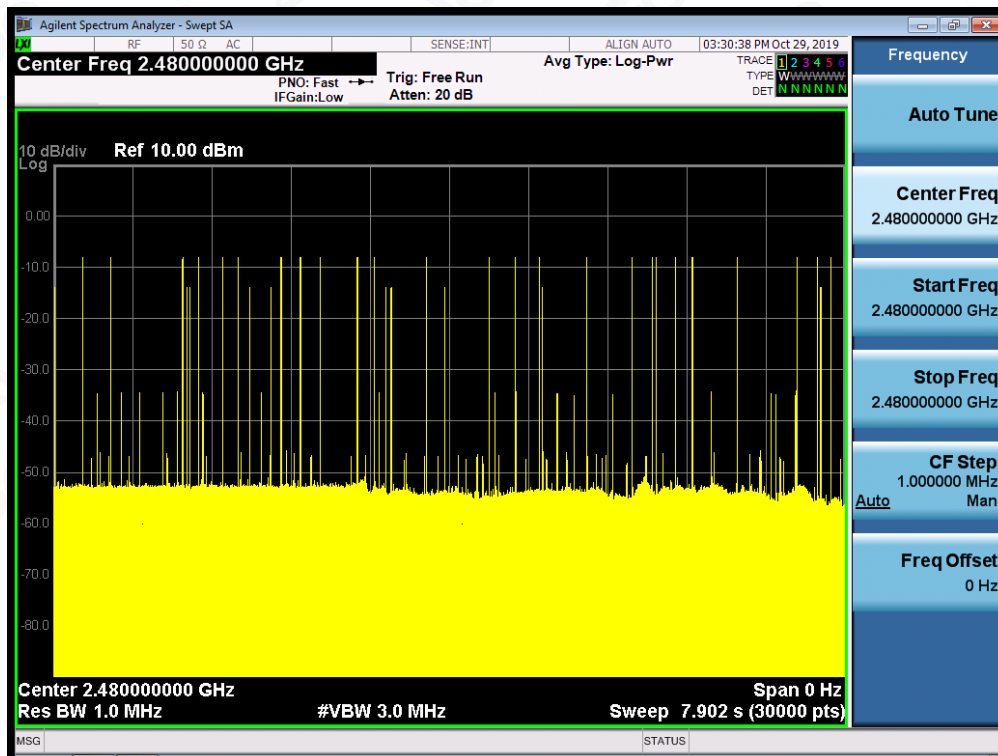
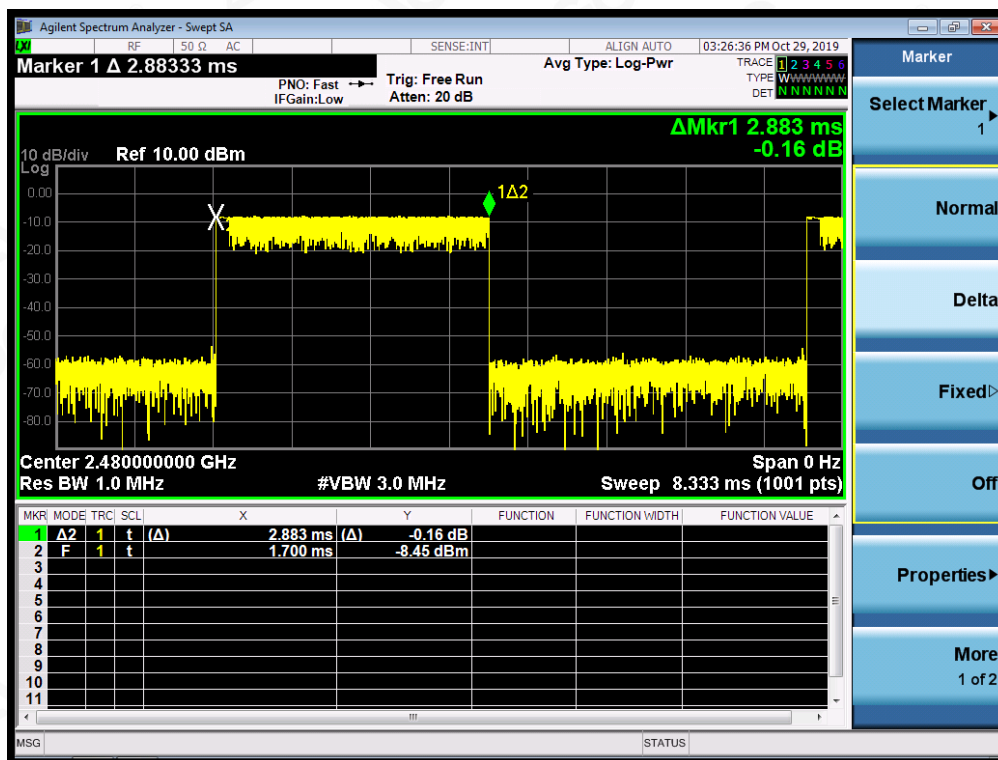
TEST PLOT OF LOW CHANNEL



TEST PLOT OF MIDDLE CHANNEL



TEST PLOT OF HIGH CHANNEL



13. FREQUENCY SEPARATION

13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.
 2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
 3. Video (or average) bandwidth (VBW) $\geq$ RBW.
 4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize.
- Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

13.4. LIMITS AND MEASUREMENT RESULT

CHANNEL	CHANNEL SEPARATION KHz	LIMIT (KHz)	RESULT
CH01-CH02	1005	≥ 25 KHz or 2/3 20 dB BW	PASS

TEST PLOT FOR FREQUENCY SEPARATION



Note: The π /4-QPSK modulation is the worst case and recorded in the report.

14. FCC LINE CONDUCTED EMISSION TEST

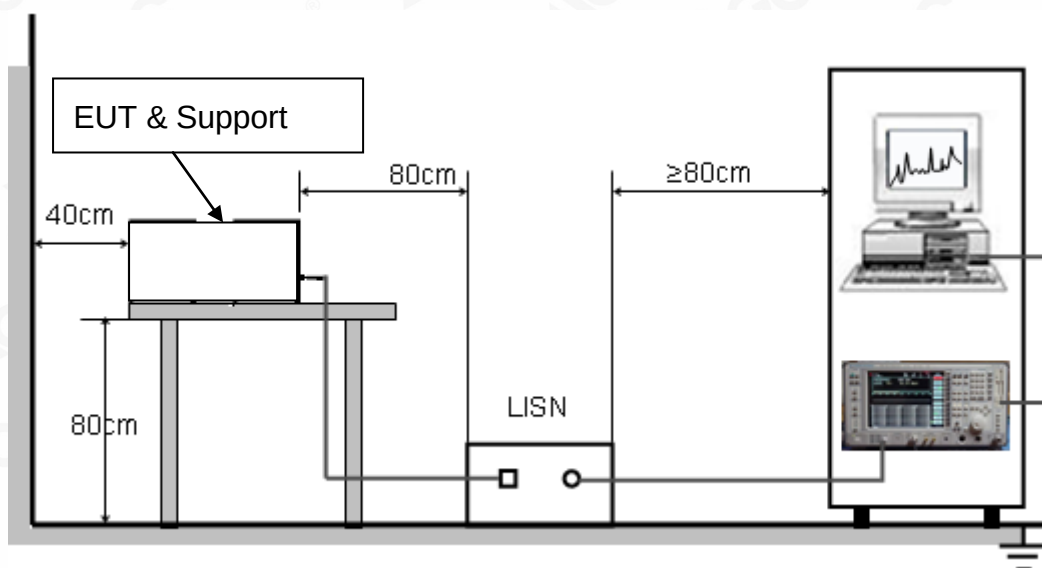
14.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by adapter which received AC120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

Note: The EUT was supplied by Car battery.

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

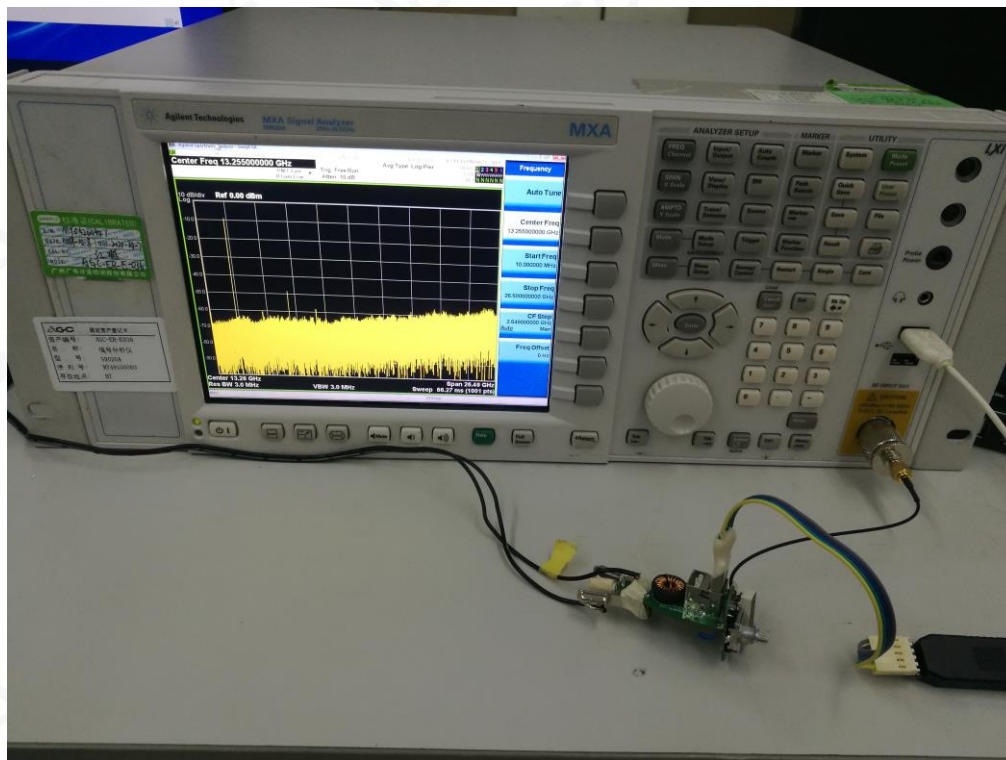
RADIATED EMISSION TEST SETUP BELOW 1GHZ



RADIATED EMISSION TEST SETUP ABOVE 1GHZ



CONDUCTED TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

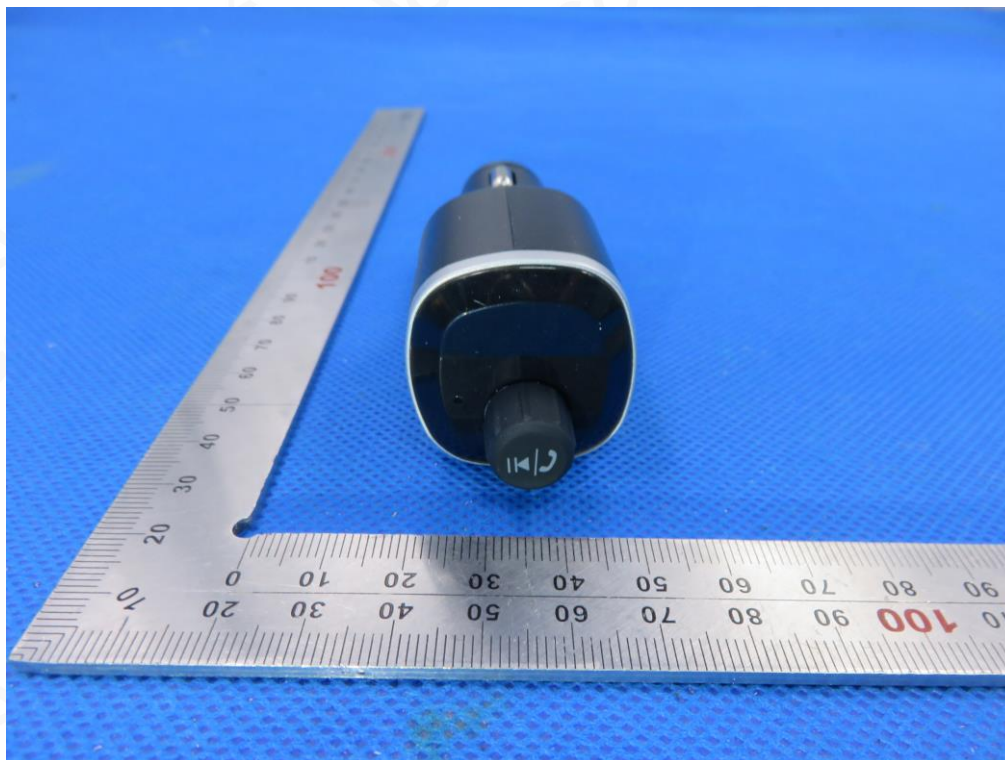
TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT



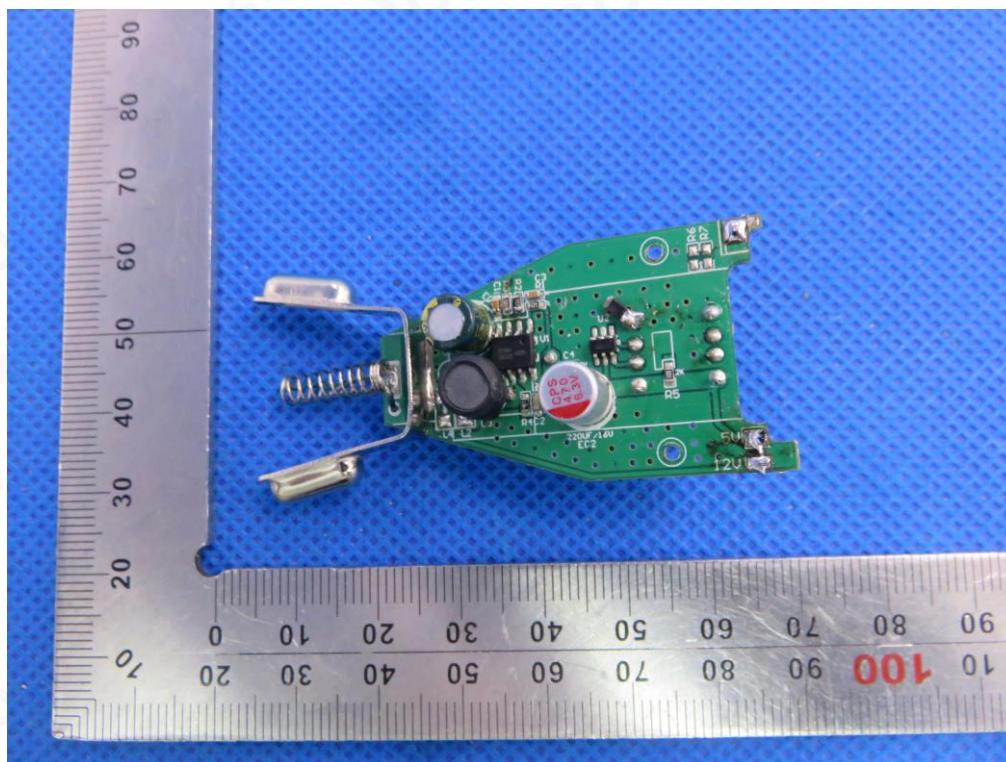
VIEW OF EUT(PORT)



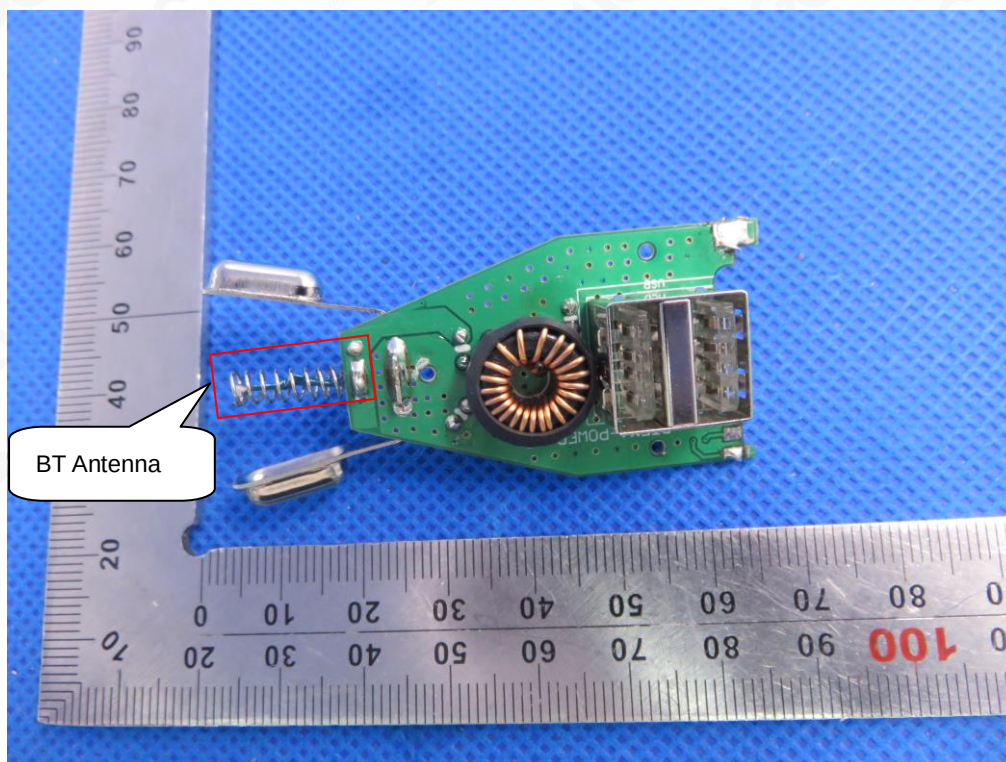
OPEN VIEW OF EUT



INTERNAL VIEW OF EUT-1

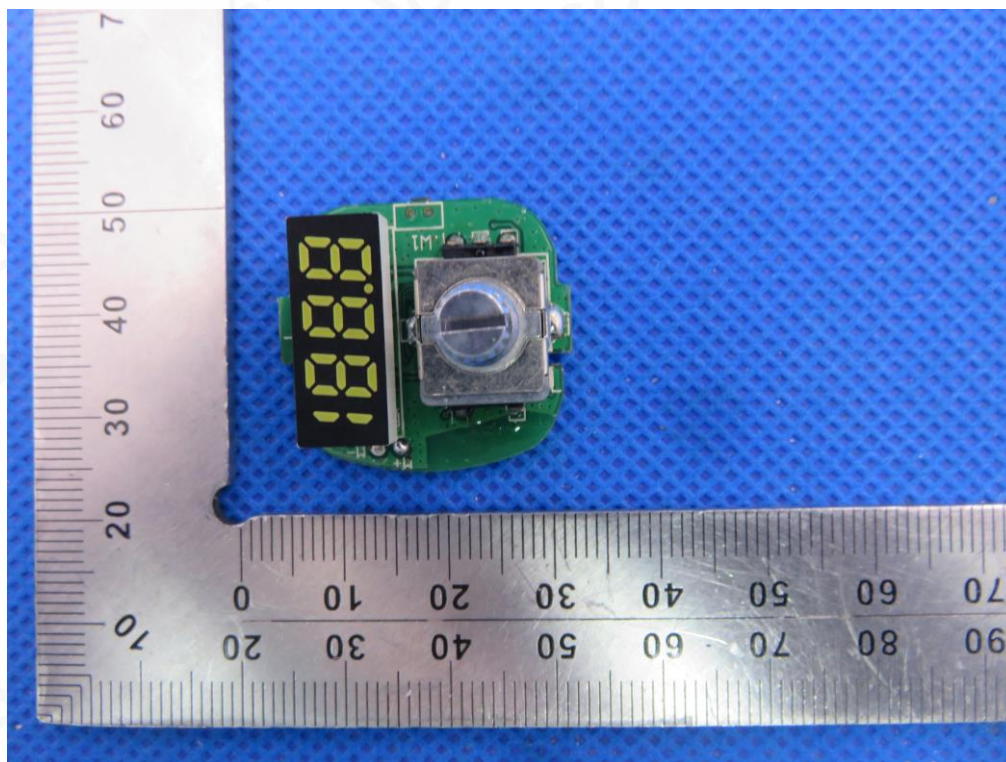


INTERNAL VIEW OF EUT-2

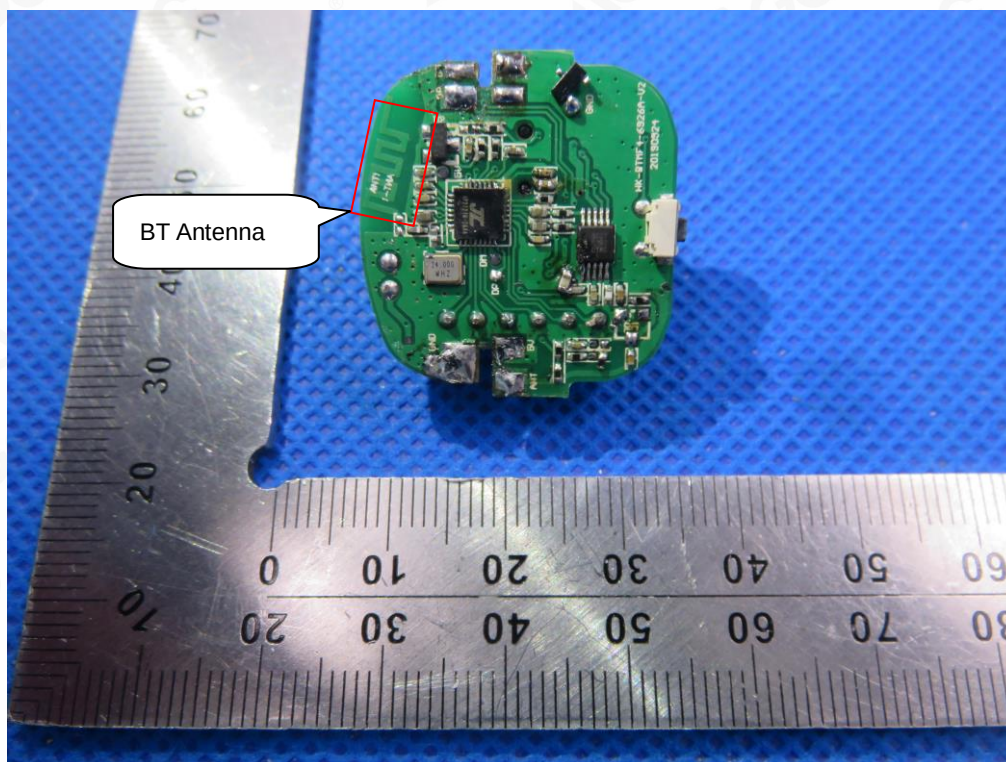


BT Antenna

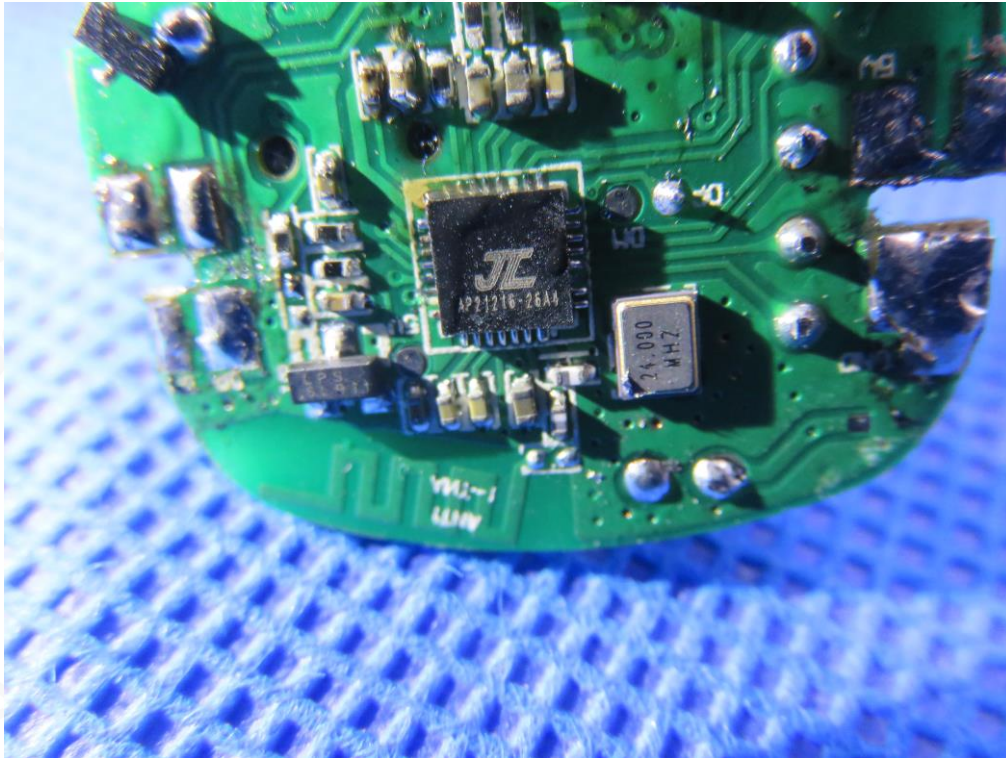
INTERNAL VIEW OF EUT-3



INTERNAL VIEW OF EUT-4



INTERNAL VIEW OF EUT-5



----END OF REPORT----



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