Test Report

Product name	:	Wireless Subwoofer
Trademark	:	TCL, FFALCON
Model no.	:	Q65K-SW
Series Model(s).	:	See section 2.1 for details
FCC ID	:	2BEHEQ65HSW
Report No	:	C241201004-RF07
Test Standards	:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-247 Issue 3 RSS-Gen Issue 5
Applicant	:	TCL OVERSEAS MARKETING LTD
Address of applicant	:	5/F. Building 22E, 23 Science Park East Avenue Science Park Shatin Hong Kong China
Manufacturer	:	TCL OVERSEAS MARKETING LTD
Manufacturer Address	:	5/F. Building 22E, 23 Science Park East Avenue Science Park Shatin Hong Kong China
Date of Test Date	:	Dec 4, 2024 to Dec 17, 2024
Date of issue.	:	Jan 16, 2025
Test result	:	Compliance

Prepared By : Adil Yang/Engineer

Reviewed By : Greg Zhang/Engineer

Approved By : Tom Gan/Manager

The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of preparer, reviewer and approver. Any objections must be raised to CSIC within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	Jan 16, 2025	Initial Issue	ALL	Adil Yang

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1. TEST SUMMARY

1.1. TEST DESCRIPTION

Test procedures according to the technical standards:

Item	Clause	Result	Note
Conducted Emission on AC Mains	Part 15.207(a) RSS-Gen 8.8	PASS	
Maximum Conducted Output Power	Part 15.247(b)(3) RSS-247 5.4(d)	PASS	
Radiated Spurious Emission	Part 15.247(c) Part 15.205 RSS-247 3.3	PASS	
Conducted Spurious Emissions Measured in 100 kHz Bandwidth	Part 15.247(d) RSS-247 5.5	PASS	
Carrier Frequency Separation	Part 15.247(a)(1) RSS-247 5.1(b)	PASS	
Number of Hopping Frequency	Part 15.247(a)(1)(iii) RSS-247 5.1(d)	PASS	
Time of Occupancy	Part 15.247(a)(1)(iii) RSS-247 5.1(d)	PASS	
20dB Bandwidth	Part 15.247(a)(1) RSS-247 5.1	PASS	
99% Bandwidth	RSS-Gen 6.7	PASS	
Antenna Requirement	Part 15.247(b)(4) Part 15.203	PASS	

Note:
1) “N/A” denotes test is not applicable in this Test Report.
2) All tests are according to ANSI C63.10-2013.
3) The statements of test result on the above are decided by the request of test standard only; the measurement uncertainties are not factored into this compliance determination.
4) The information of measurement uncertainty is available upon the customer’s request.

1.2. TEST FACILITY

Shenzhen Central Standard International Center Co., Ltd. (CSIC)

Room 201, Building 1, Mogen Fashion Industrial Park, No. 10, Shilongzai Road, Xinshi Community, Dalang Street, Longhua District, Shenzhen.

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

CNAS	Registration No.: L11671	
FCC	Registration No.: 0031378433	Designation Number: CN1317
IC	CAB identifier: CN0051	
A2LA	Lab Cert. No.: 6426.01	

1.3. MEASUREMENT UNCERTAINTY

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Below is the best measurement capability for Shenzhen Central Standard International Center Co., Ltd.

Test Items	Measurement Uncertainty	Notes
RF output power, conducted	±1.04dB	(1)
Unwanted Emissions, conducted	±1.38dB	(1)
All emissions, radiated 9KHz-30MHz	±4.44dB	(1)
All emissions, radiated 30-1GHz	±4.56dB	(1)
All emissions, radiated 1G-6GHz	±4.84dB	(1)
All emissions, radiated>6G	±4.84dB	(1)
Conducted Emission (9KHz-150KHz)	±3.22dB	(1)
Conducted Emission (150KHz-30MHz)	±3.24dB	(1)

Note(1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. GENERAL DESCRIPTION OF EUT

EUT(Product Specifications)	
Product Name:	Wireless Subwoofer
Model:	Q65K-SW
Series Model(s):	Q65K-SW, Q60K-SW, Q6BK-SW, Q65K5-SW, Q6*****-SW, R40C-SW, R45C-SW, R48C-SW, R40D-SW, R45D-SW, R48D-SW, R4***-SW,Q65H-SW,Q60H-SW,Q68H-SW,Q69H-SW,Q6*****-SW (*can be any numerica number"0~9" or alphebtical number "A~Z")
Power supply:	AC 100-240V~50/60Hz
Hardware version:	V03
Software version:	V17
Technical Specification of Bluetooth	
Operating Frequency	2402 - 2480 MHz
Type of Modulation	GFSK, π/4DQPSK, 8DPSK
Channel Number	79 channels
Channel Separation	1MHz
Bluetooth Version	Bluetooth 5.3
Antenna Type	PIFA Antenna
Max. Antenna Gain	2.50 dBi.

Note:

1. For a more detailed features description, please refer to the manufacture’s specifications or the user’s manual.
2. Full tests were applied to the sample C241201004-Y01/01 only in this document.

2.2. DESCRIPTION OF TEST MODES AND TEST FREQUENCY

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting mode for testing.

Operation Frequency List for Bluetooth：

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	**2402.00**	20	2422.00
01	2403.00	21	2423.00
02	2404.00	22	2424.00
03	2405.00	23	2425.00
04	2406.00	24	2426.00
05	2407.00	25	2427.00
06	2408.00	26	2428.00
07	2409.00	27	2429.00
08	2410.00	28	2430.00
09	2411.00	29	2431.00
10	2412.00	30	2432.00
11	2413.00	31	2433.00
12	2414.00	32	2434.00
13	2415.00	33	2435.00
14	2416.00	34	2436.00
15	2417.00	35	2437.00
16	2418.00	36	2438.00
17	2419.00	37	2439.00
18	2420.00	38	2440.00
19	2421.00	**39**	**2441.00**
40	2442.00	60	2462.00
41	2443.00	61	2463.00
42	2444.00	62	2464.00
43	2445.00	63	2465.00
44	2446.00	64	2466.00
45	2447.00	65	2467.00
46	2448.00	66	2468.00
47	2449.00	67	2469.00
48	2450.00	68	2470.00
49	2451.00	69	2471.00
50	2452.00	70	2472.00
51	2453.00	71	2473.00
52	2454.00	72	2474.00
53	2455.00	73	2475.00

54	2456.00	74	2476.00
55	2457.00	75	2477.00
56	2458.00	76	2478.00
57	2459.00	77	2479.00
58	2460.00	**78**	**2480.00**
59	2461.00	--	--

GFSK, π/4DQPSK, 8DPSK		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	2402
middle	CH39	2441
highest	CH78	2480

2.3. MEASUREMENT INSTRUMENTS LIST

RF Connected Test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY50200391	May. 26, 2025
2	Power sensor	KEYSIGHT	U2021XA	MY55080015	May. 26, 2025
3	Power sensor	KEYSIGHT	U2021XA	MY54250016	May. 26, 2025
4	Power sensor	KEYSIGHT	U2021XA	MY54250020	May. 26, 2025
5	Power sensor	KEYSIGHT	U2021XA	MY54210030	May. 26, 2025
6	Vector Signal Generator	Agilent	N5182A	MY50140130	May. 26, 2025
7	Signal generator	Agilent	SML03	100925	May. 26, 2025
8	Power sensor Box	MWRFtest	N/A	N/A	N/A
9	RF Switch Box	MWRFtest	MW100-RFCB	N/A	N/A
10	MTS 8310	MWRFtest	V：2.0.0.0		

Radiation Test equipment					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSV40	101401	Mar. 06, 2025
2	Amplifier	EMCO	EM330	980204	May. 26, 2025
3	Amplifier	MW	DPA8-1000-18000-1012	8220837	Mar. 06, 2025
4	Amplifier	SKET	LNPA_1840-50	SK201801801	Mar. 05, 2025
5	Loop Antenna	SCHNARZBECK	FMZB1519B	00023	Nov. 12, 2025
6	Bilog Antenna	Sunol Sciences	JB1	n.a.	Jul. 01, 2025
7	Horn Antenna	COMMW	ZAB-1-18G-50	20171109	Jul. 01, 2025
8	Horn Antenna	COM-MW	ZLB7-18-40G-777	3231081	Mar. 26, 2025
9	3M Chamber	Maor	9*6*6	--	Mar. 01, 2026
10	EZ-EMC	Farad	V3.1		

Mains Terminal Disturbance Voltage Test equipment					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESRP3	101936	May. 26, 2025
2	LISN	R&S	ENV216	100002	May. 26, 2025
3	LISN	MEB	NNB 42	--	May. 26, 2025
4	Shelding Room	Maor	8*4*3	--	Mar. 01, 2025
8	EZ-EMC	Fara	V3.1		

Note:

1) The cable loss has calculated in test result which connection between each test instruments.

2.4. DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Worst Mode	Description	Data Rate
Mode 1	TX BDR CH00	1 Mbps
Mode 2	TX BDR CH39	1 Mbps
Mode 3	TX BDR CH78	1 Mbps
Mode 4	TX EDR CH00	2 Mbps
Mode 5	TX EDR CH39	2 Mbps
Mode 6	TX EDR CH78	2 Mbps
Mode 7	TX EDR CH00	3 Mbps
Mode 8	TX EDR CH39	3 Mbps
Mode 9	TX EDR CH78	3 Mbps

Note:

1) The measurements are performed at the high, middle, low available channels.
2) All the bit rate of transmitter have been tested and found the lowest rate is found to be the worst case and recorded.
3) This test was performed with EUT in X, Y, Z position and worst case was found when EUT in X position.
4) For radiated emission above 1 GHz test, 1GHz-25GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode10: Working

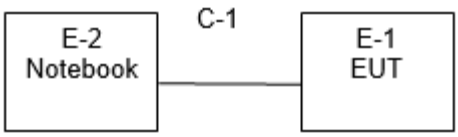
2.5. TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

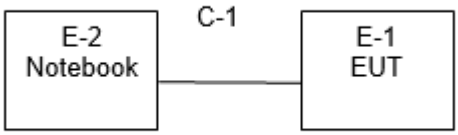
RF Function	Type	Mode Or Modulation type	Ant Gain(dBi)	Power Class	Software For Testing
Bluetooth	BT	GFSK	2.50	7	FCC_Test_Tools_V2.25
		π/4DQPSK		7	
		8DPSK		7	

2.6. BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

a. Radiated Spurious Emission Test



b. Conducted Emission Test



2.7. DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units					
Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-2	Notebook	DELL	Vostro 3400	N/A	N/A
E-3	Mobile Phone	XiaoMi	Redmi K70	C33018fb	N/A
E-4	5.1 Channel Dolby Atmos Sound Bar with Wireless Subwoofer	TCL	Q65K	N/A	N/A
C-1	USB Cable	N/A	100cm	N/A	N/A
C-2	Fiber OpticCable	N/A	150cm	N/A	N/A
C-3	HDMI Cable	N/A	150cm	N/A	N/A

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.

2.8. ENVIRONMENTAL CONDITIONS FOR TESTING

Test Item	Temperature (°C)	Relative Humidity (%)	Test Voltage	Tested by
Conducted Emission on AC Mains	24.2	56.0	1006	Rick Zou
Radiated Spurious Emission	24.5	51.0	1010	Rick Zou
Conducted Spurious Emissions Measured in 100 kHz Bandwidth	23.9	50.0	1011	Adil.Yang
Carrier Frequency Separation	23.9	50.0	1011	Adil.Yang
Number of Hopping Frequency	23.9	50.0	1011	Adil.Yang
Time of Occupancy	23.9	50.0	1011	Adil.Yang
99% Bandwidth	23.9	50.0	1011	Adil.Yang
20dB Bandwidth	23.9	50.0	1011	Adil.Yang
Maximum Conducted Output Power	23.9	50.0	1011	Adil.Yang

3. EMC TEST

3.1. Conducted Emission on AC Mains Measurement

Limit

Operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) and RSS-Gen 8.8 limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50

Note:

1) The tighter limit applies at the band edges.
2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

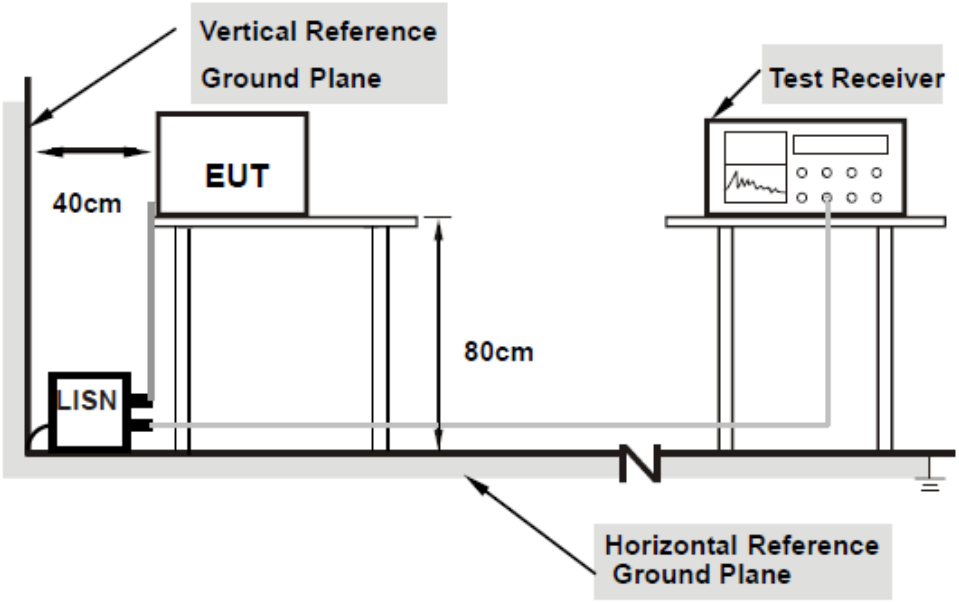
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
RBW	9 kHz

Test Procedure

a) The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment's powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d) LISN at least 80 cm from nearest part of EUT chassis.
e) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Test Setup



Note:

1) Support units were connected to the second LISN.
2) Both LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it).
The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

Test Results

Pass

Please refer to Appendix A.

3.2. Radiated Spurious Emission Measurement

Limit

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) and RSS-247 3.3 limit in the table and according to ANSI C63.10-2013 and RSS-Gen below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies (MHz)	Field Strength (microvolt/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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:
1) The limit for radiated test was performed according to FCC PART 15C.
2) The tighter limit applies at the band edges.
3) Emission level (dBuV/m)=20log Emission level (uV/m).

LIMITS OF RESTRICTED FREQUENCY BANDS

For FCC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

For IC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	13.36-13.41	960-1427	9.0-9.2
0.495-0.505	16.42-16.423	1435-1626.5	9.3-9.5
2.1735-2.1905	16.69475-16.69525	1645.5-1646.5	10.6-12.7
3.020-3.026	16.80425-16.80475	1660-1710	13.25-13.4
4.125-4.128	25.5-25.67	1718.8-1722.2	14.47-14.5
4.17725-4.17775	37.5-38.25	2200-2300	15.35-16.2
4.20725-4.20775	73-74.6	2310-2390	17.7-21.4
5.677-5.683	74.8-75.2	2483.5-2500	22.01-23.12
6.215-6.218	108-138	2655-2900	23.6-24.0
6.26775-6.26825	149.9-150.05	3260-3267	31.2-31.8
6.31175-6.31225	156.52475-156.52525	3332-3339	36.43-36.5
8.291-8.294	156.7-156.9	3345.8-3358	Above 38.6
8.362-8.366	162.0125-167.17	3500-4400	--
8.37625-8.38675	167.72-173.2	4500-5150	--
8.41425-8.41475	240-285	5350-5460	--
12.29-12.293	322-335.4	7250-7750	--
12.51975-12.52025	399.9-410	8025-8500	--
12.57675-12.57725	608-614	--	--

For Radiated Emission	
Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AVG
Start Frequency	9 KHz/150KHz(Peak/QP/AVG)
Stop Frequency	150KHz/30MHz(Peak/QP/AVG)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz);
	200Hz (From 9kHz to 0.15MHz)/
	9KHz (From 0.15MHz to 30MHz)
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 kHz / 300kHz
Attenuation	Auto
Detector	Peak/AVG
Start Frequency	1000 MHz(Peak/AVG)
Stop Frequency	10th carrier hamonic(Peak/AVG)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)

For Restricted band	
Spectrum Parameter	Setting
Detector	Peak/AVG
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz
	Upper Band Edge: 2476 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak)
	1 MHz/1/T MHz(AVG)
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for Peak & AVG
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Test Procedure

a) The measuring distance of 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz,and above 1GHz.
b) The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3-meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c) The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
d) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
e) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement is performed.
f) For the actual test configuration, please refer to the related Item –EUT Test Photos.

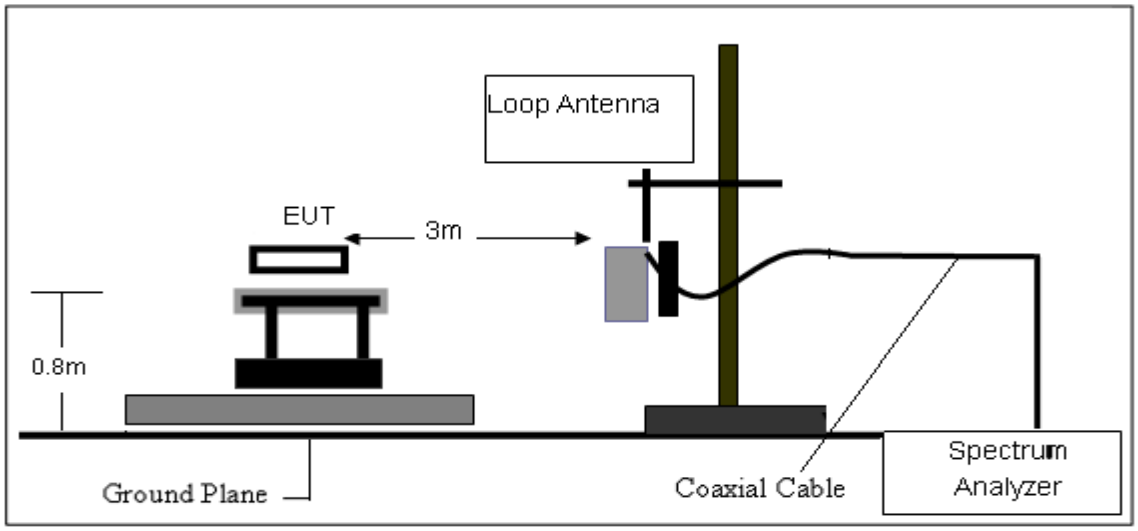
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axes. The worst-case emissions were reported.

DEVIATION FROM TEST STANDARD

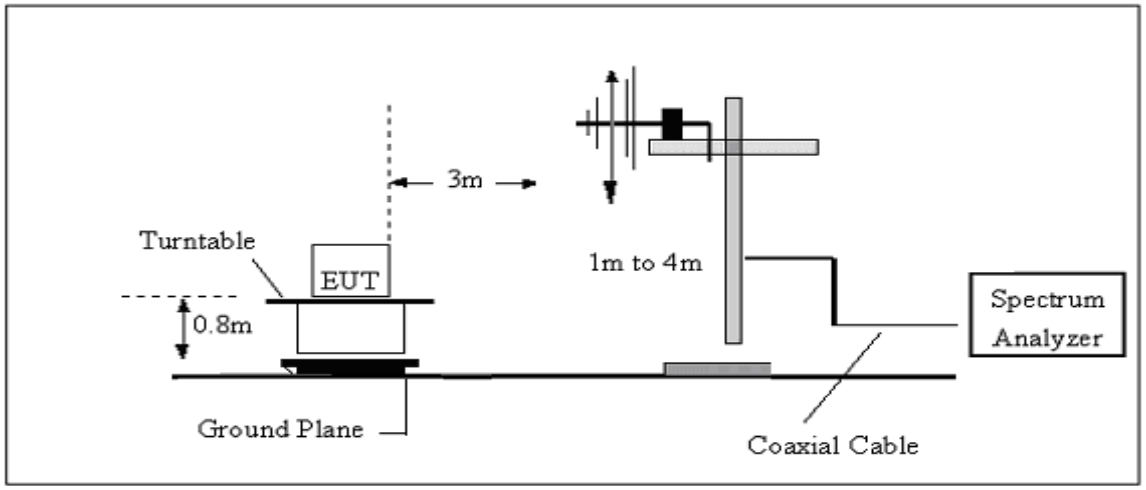
No deviation.

Test Setup

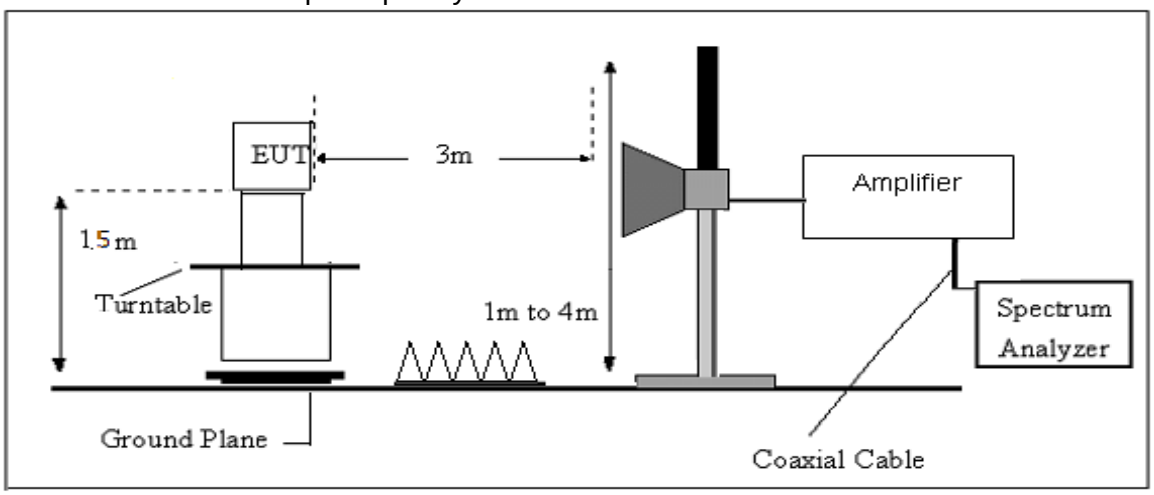
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Result

Pass

Please refer to Appendix A.

3.3. Conducted Spurious Emissions Measured in 100 kHz Bandwidth Measurement

Limit

According to FCC section 15.247(d) and RSS-247 5.5, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Test Procedure

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold
For Band edge	
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2327 – 2427 MHz
	Upper Band Edge: 2447 – 2547 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

Test Configuration

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass
Please refer to Appendix A.

3.4. Carrier Frequency Separation Measurement

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RBW	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VBW	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

Test Procedure

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.

c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

TEST SETUP

EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass

Please refer to Appendix A.

3.5. Number of Hopping Frequency Measurement

Limits

Frequency Range (MHz)	Limit
2400-2483.5	≥15

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RBW	300KHz
VBW	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

Test Procedure

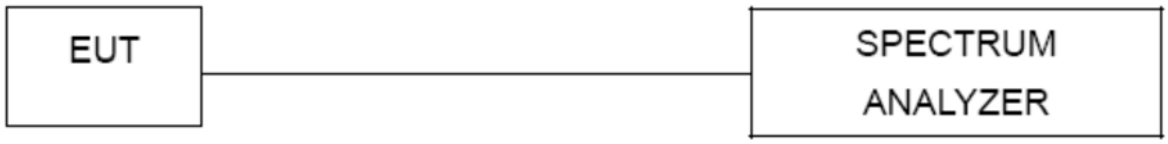
a. The EUT was directly connected to the spectrum analyzer and antenna output port as

show in

the block diagram below.

b. Spectrum Setting: RBW= 300KHz, VBW=300KHz, Sweep time = Auto.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass
Please refer to Appendix A.

3.6. Time of Occupancy Measurement

Limits

Frequency Range (MHz)	Limit
2400-2483.5	0.4sec

Test Procedure

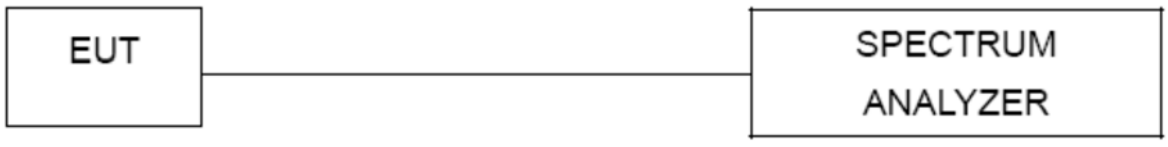
a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW =1MHz/VBW =3MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e.Set the center frequency on any frequency would be measure and set the frequency span to zero span.

f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). Sothe dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.

j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). Sothe dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.

k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass
Please refer to Appendix A.

3.7. 20dB BANDWIDTH Measurement

Limits

Frequency Range (MHz)	Limit
2400-2483.5	/

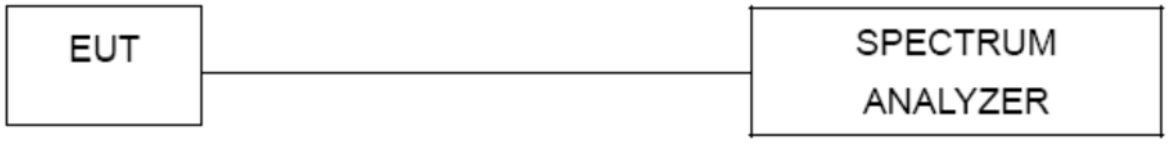
Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VBW	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

Test Procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass
Please refer to Appendix A.

3.8. 99% BANDWIDTH Measurement

Limits

Frequency Range (MHz)	Limit
2400-2483.5	/

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RBW	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VBW	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

Test Procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting: RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

TEST SETUP

EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

Pass
Please refer to Appendix A.

3.9. Maximum Conducted Output Power Measurement

Limits

Section	Test Item	Limit	Frequency Range (MHz)
15.247 (b)(3)	Output Power	1 watt or 30dBm	2400-2483.5
RSS-247 5.4(d) RSS-Gen 6.12	EIRP	36dBm	2400-2483.5

Test Procedure

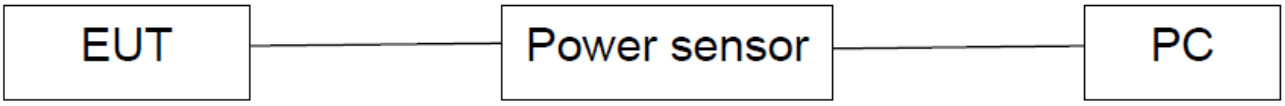
Some regulatory agencies permit the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for determining compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than to the DTS bandwidth (see 11.2 for definitions and 6.9.2 for measurement guidance).
When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span / RBW, to set a bin-to-bin spacing of ≤ RBW / 2 so that narrowband signals are not lost between frequency bins. If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see 11.6).
The intent is to test at 100% duty cycle; however, a small reduction in duty cycle (to no lower than 98%) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test laboratory to permit such continuous operation.
If continuous transmission (or at least 98% duty cycle) cannot be achieved because of hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

Measurement using a power meter (PM):
1. Method AVGPM:
Method AVGPM is a measurement using an RF average power meter, as follows:
a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

2. Method AVGPM-G:
Method AVGPM-G is a measurement using a gated RF average power meter.
Alternatively, measurements may be performed using a wideband gated RF power meter provided

that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Because the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

TEST SETUP



EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.5 Unless otherwise a special operating condition is specified in the follows during the testing.

Test Results

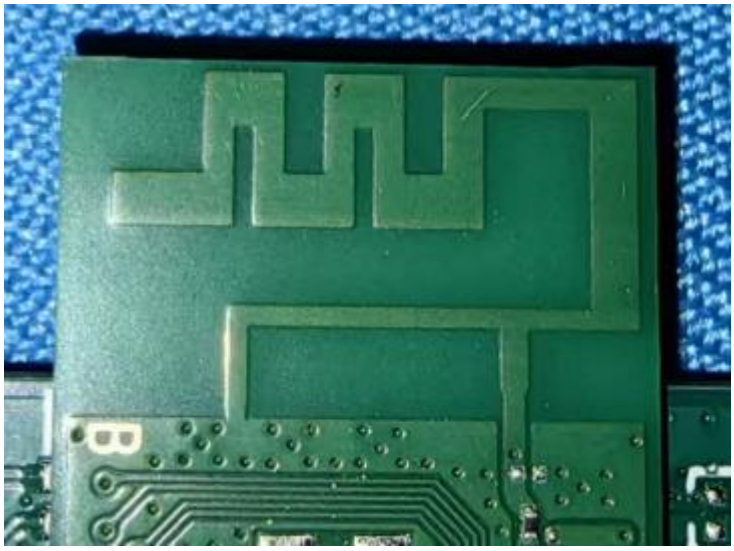
Pass
Please refer to Appendix A.

3.10. ANTENNA REQUIREMENT

According to the manufacturer declared, the EUT has PIFA Antenna, the directional gain of antenna is Bluetooth antenna Gain: 2.50 dBi;, and the antenna connector is designed with a reverse polarity socket and does not consider replacement. Therefore, the EUT is considered sufficient to comply with the provision.

EUT ANTENNA

The PIFA Antenna. It complies with the standard requirement.



4. TEST PHOTOS

Please refer to Appendix G Test Setup.

5. EUT PHOTOS

External Photos Please refer to Appendix E and Internal Photos Please refer to Appendix F.

**************************THE END**************************