



FCC TEST REPORT

FCC ID: 2ADD2TBGL1017A

On Behalf of

Tband srl

Android MiniPC Box

Model No.: TBGL1017A

Prepared for : Tband srl
Address : Via Battisti, 4, Mogliano Veneto (TV) TREVISO, 31021 Italy

Prepared By : Shenzhen Alpha Product Testing Co., Ltd.
Address : Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China

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Version Number : REV0

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TEST REPORT DECLARATION

Applicant : Tband srl
Address : Via Battisti, 4, Mogliano Veneto (TV) TREVISO, 31021 Italy
Manufacturer : Artway Technology International Ltd.
Address : 621, B3 Block, NO.168, Baoyuan Road, Bao'an D., Shenzhen, Guangdong, China
EUT Description : Android MiniPC Box
(A) Model No. : TBGL1017A
(B) Trademark : N/A

Measurement Standard Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247: 2016,
ANSI C63.10:2013**

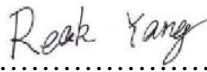
The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

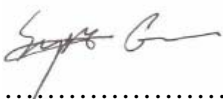
Tested by (name + signature).....:

Reak Yang
Project Engineer


.....

Approved by (name + signature).....:

Simple Guan
Project Manager


.....

Date of issue.....:

July 10, 2017

Revision History

Revision	Issue Date	Revisions	Revised By
00	July 10, 2017	Initial released Issue	Simple Guan

1. General Information

1.1. Description of Device (EUT)

EUT	:	Android MiniPC Box
Model No.	:	TBGL1017A
DIFF.	:	N/A
Trade mark	:	N/A
Power supply	:	DC 5V From USB Port
Radio Technology	:	Bluetooth 3.0
Operation frequency	:	2402-2480MHz
Modulation	:	GFSK, $\pi/4$ DQPSK, 8- DPSK
Antenna Type	:	PCB Antenna, max gain 3.2 dBi.

1.2. Accessories of device (EUT)

Accessories1 : Remote Control

Mode : N/A

1.3. Test Lab information

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China

FCC Registered No.: 203110

2. Summary of test

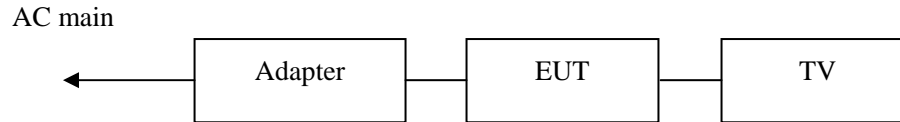
2.1. Summary of test result

Description of Test Item	Standard	Results
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.10 :2013	PASS
Bandwidth	FCC Part 15: 15.215 ANSI C63.10 :2013	PASS
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.10 :2013	PASS
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	PASS
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10 :2013	PASS
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10 :2013	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10 :2013	PASS
Antenna requirement	FCC Part 15: 15.203	PASS
Note: Test with the test procedure Blue tool.		

2.2. Assistant equipment used for test

Description 1	:	TV
Manufacturer	:	TCL
Model No.	:	L32F1510BN
Serial No.	:	2400109888
Description 2	:	Adapter
Model No.	:	LS-A01
Input	:	AC 100-240V, 50/60Hz, 0.5A
Output	:	DC 5V, 1000mA

2.3. Block Diagram



2.4. Test mode

The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode.

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
$\pi/4$ DQPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
8- DPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

2.5. Test Conditions

Temperature range	21-25℃
Humidity range	40-75%
Pressure range	86-106kPa

2.6. Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.71dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.90dB	Polarize: V
	3.92dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.28dB	Polarize: H
	4.26dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.16dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2016.09.29	1 Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2016.09.29	1 Year
Receiver	R&S	ESCI	1166.5950K03-1 011	2016.09.29	1 Year
Receiver	R&S	ESCI	101202	2016.09.29	1 Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2016.09.30	2 Year
Horn Antenna	EMCO	3115	640201028-06	2016.09.30	2 Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2016.09.30	2 Year
Cable	Resenberger	N/A	No.1	2016.09.29	1 Year
Cable	SCHWARZBECK	N/A	No.2	2016.09.29	1 Year
Cable	SCHWARZBECK	N/A	No.3	2016.09.29	1 Year
Pre-amplifier	Schwarzbeck	BBV9743	9743-019	2016.09.29	1 Year
Pre-amplifier	R&S	AFS33-18002650- 30-8P-44	SEL0080	2016.09.29	1 Year
Base station	Agilent	E5515C	GB44300243	2016.09.29	1 Year
Temperature controller	Terchy	MHQ	120	2016.09.29	1 Year
Power divider	Anritsu	K240C	020346	2016.09.29	1 Year
Signal Generator	HP	83732B	VS3449051	2016.09.29	1 Year
Power Meter	Anritsu	ML2487A	6K00001491	2016.09.29	1 Year
Power sensor	Anritsu	ML2491A	32516	2016.09.29	1 Year

L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2016.09.29	1 Year
L.I.S.N.#2	ROHDE&SCHWA RZ	ENV216	101043	2016.09.29	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2016.09.29	1 Year

3. Maximum Peak Output power

3.1. Limit

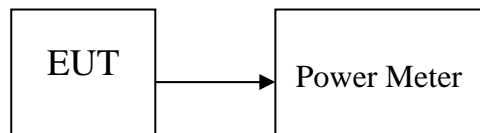
Please refer section 15.247.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

3.2. Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the peak power detection.

3.3. Test Setup



3.4. Test Result

EUT: Android MiniPC Box		M/N: TBGL1017A			
Test date: 2017-7-8		Test site: RF site		Tested by: Eric	
Mode	Freq (MHz)	PK Output Power (dBm)	PK Output Power (mW)	Limit (dBm)	Margin (dB)
GFSK	2402	5.769	3.775	30	24.231
	2441	5.316	3.401	30	24.684
	2480	3.965	2.492	30	26.035
$\pi/4$ DQPSK,	2402	4.115	2.579	21	16.885
	2441	4.093	2.566	21	16.907
	2480	3.044	2.016	21	17.956
8- DPSK	2402	4.097	2.569	21	16.903
	2441	4.089	2.564	21	16.911
	2480	3.027	2.008	21	17.973
Conclusion: PASS					

4. Bandwidth

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

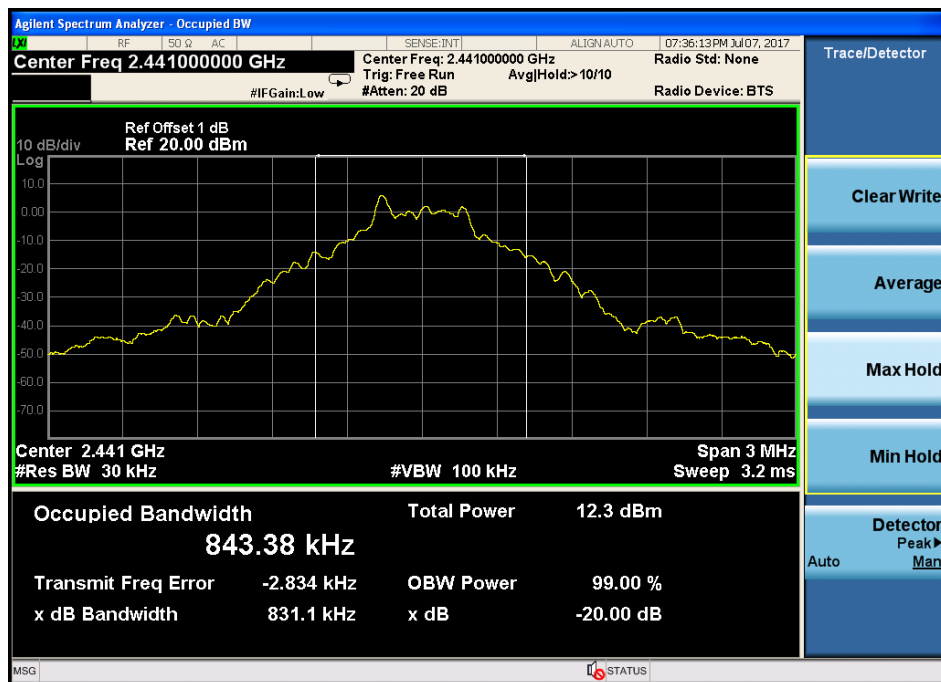
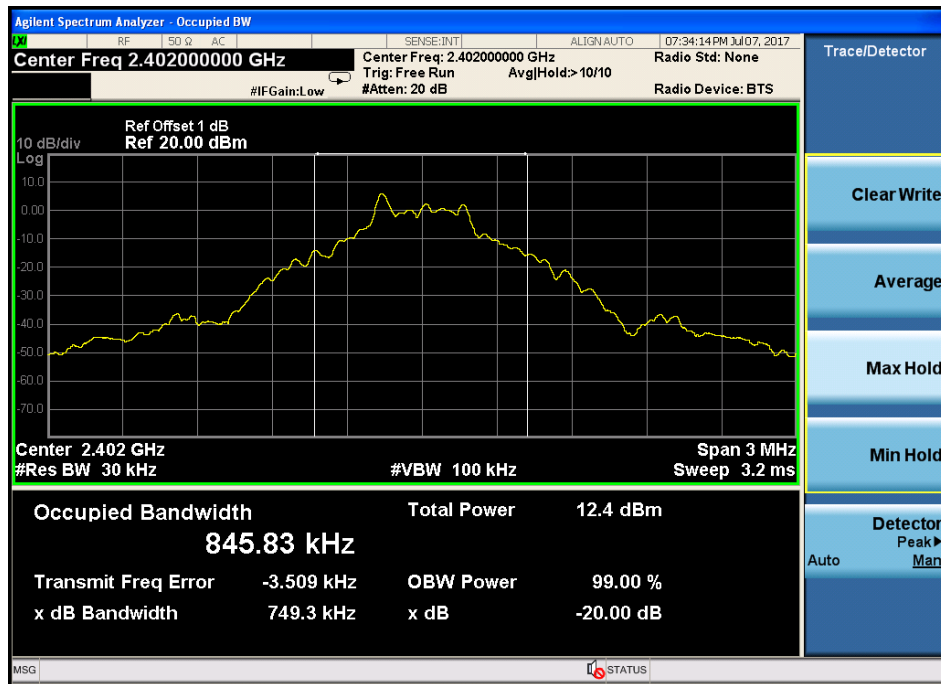
4.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

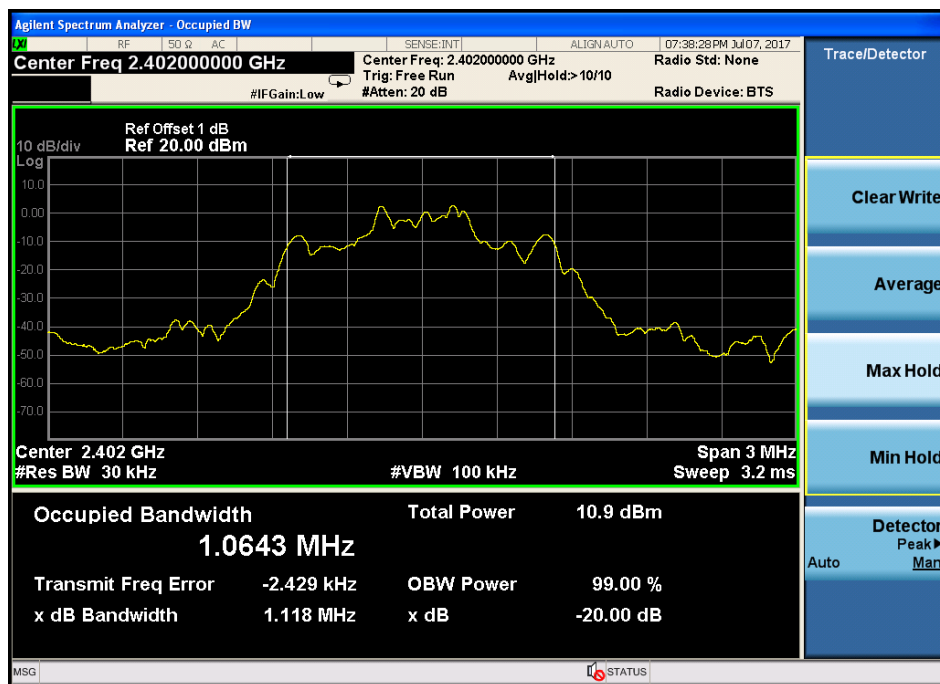
EUT: Android MiniPC Box		M/N: TBGL1017A		
Test date: 2017-7-7		Test site: RF site	Tested by: Eric	
Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
GFSK	2402	749.3	/	PASS
	2441	831.1	/	PASS
	2480	837.5	/	PASS
$\pi/4$ DQPSK	2402	1118.0	/	PASS
	2441	1118.0	/	PASS
	2480	1118.0	/	PASS
8- DPSK	2402	1165.0	/	PASS
	2441	1164.0	/	PASS
	2480	1161.0	/	PASS

Original Test data For 20dB bandwidth
GFSK:



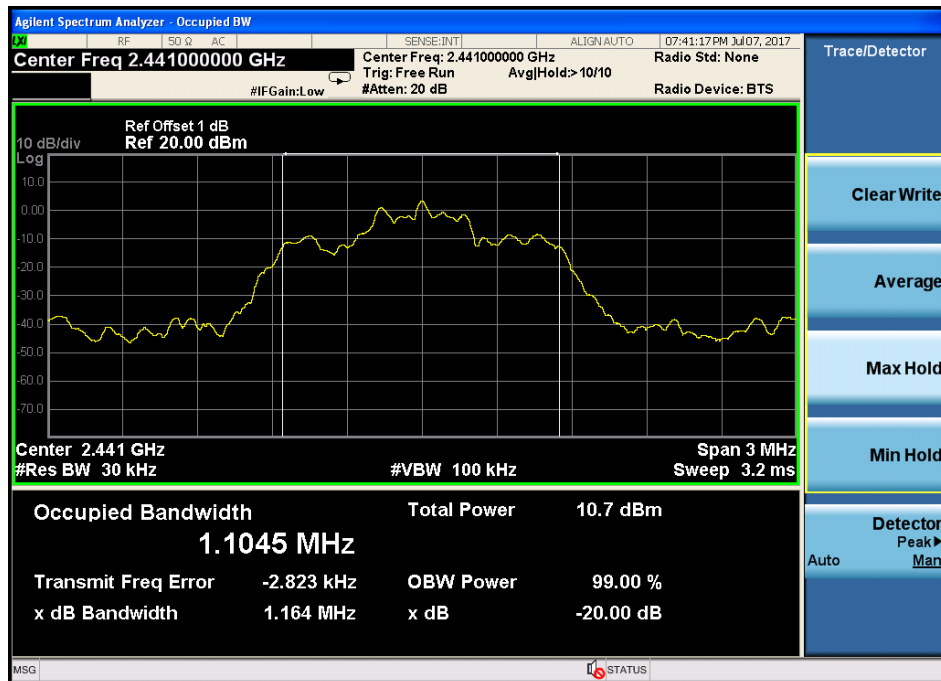
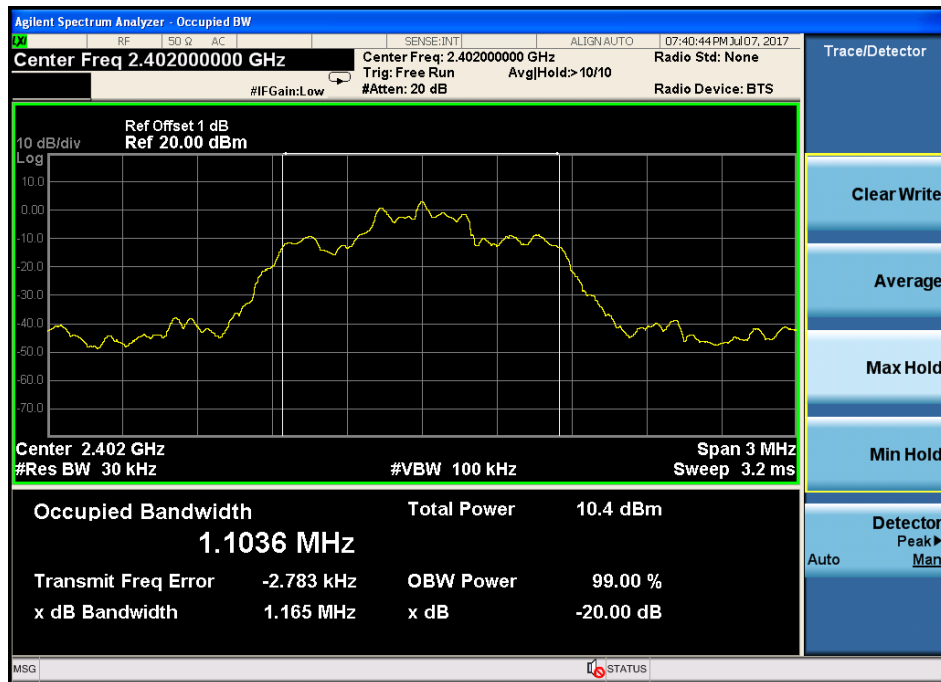


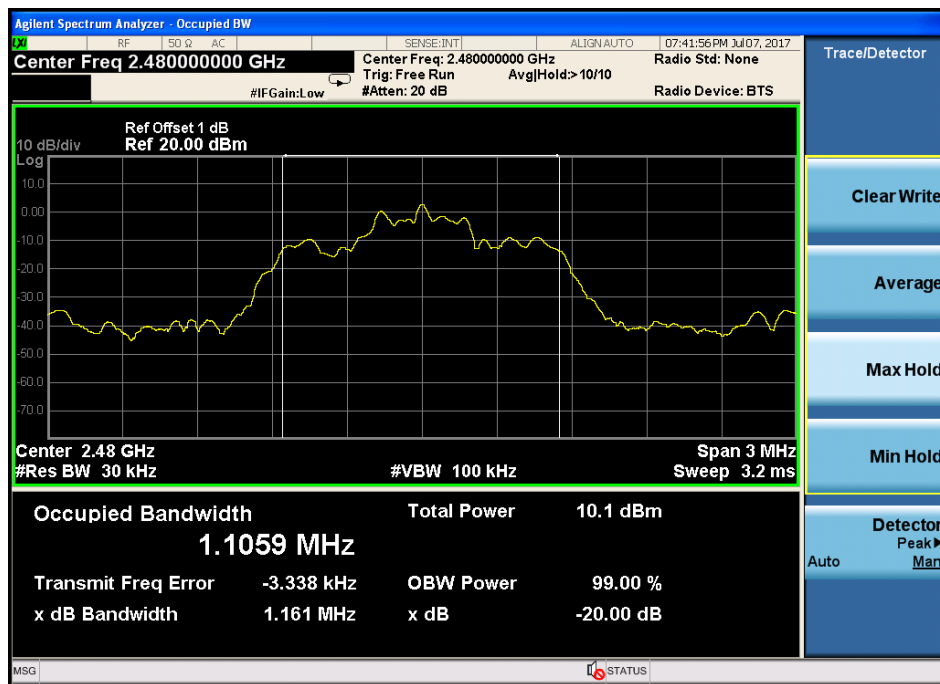
$\pi/4$ DQPSK:





8- DPSK:





5. Carrier Frequency Separation

5.1. Limit

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

5.2. Test Procedure

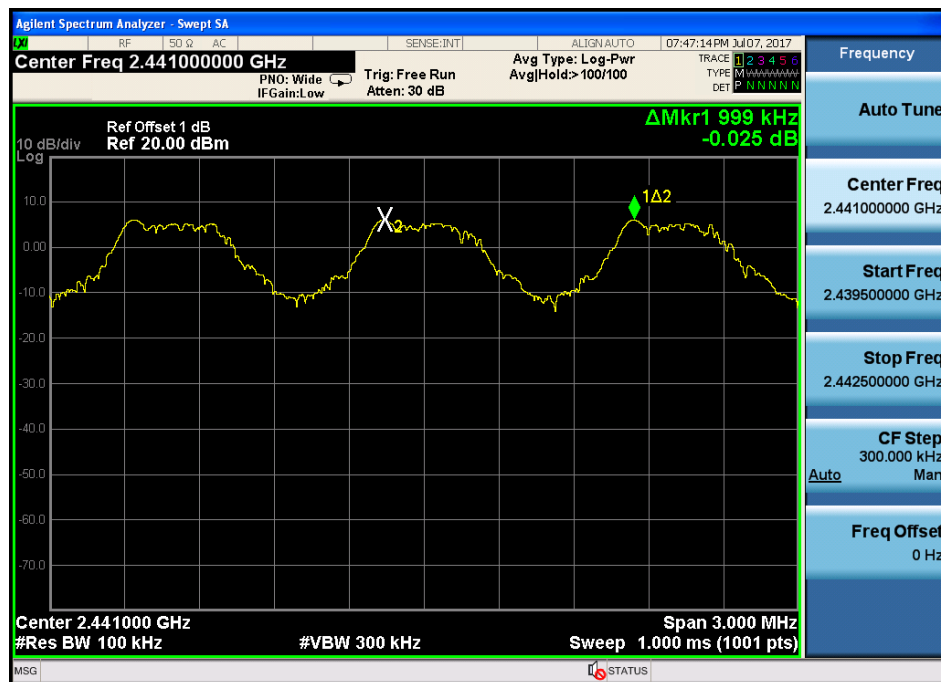
The transmitter output was coupled to a spectrum analyzer via a antenna. The carrier frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW.

5.3. Test Result

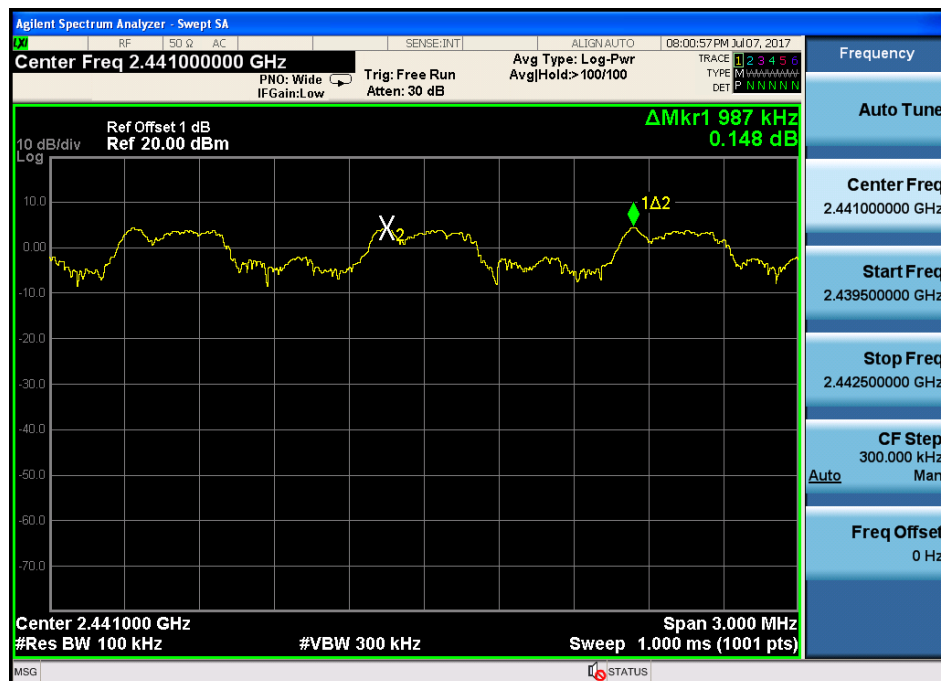
EUT: Android MiniPC Box M/N: TBGL1017A				
Test date: 2017-7-7		Test site: RF site		Tested by: Eric
Mode/Channel	Channel separation (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Conclusion
GFSK	0.999	837.5	837.5	PASS
$\pi/4$ DQPSK	0.987	1118.0	745.3	PASS
8- DPSK	0.987	1165.0	776.7	PASS

Original test data for channel separation

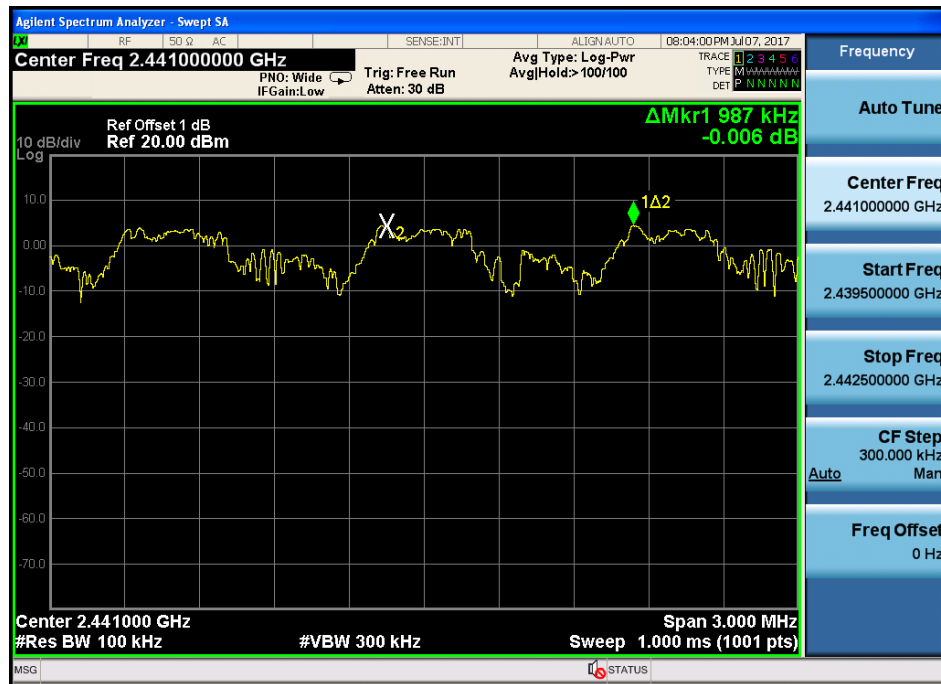
GFSK



$\pi/4$ DQPSK



8- DPSK:



6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

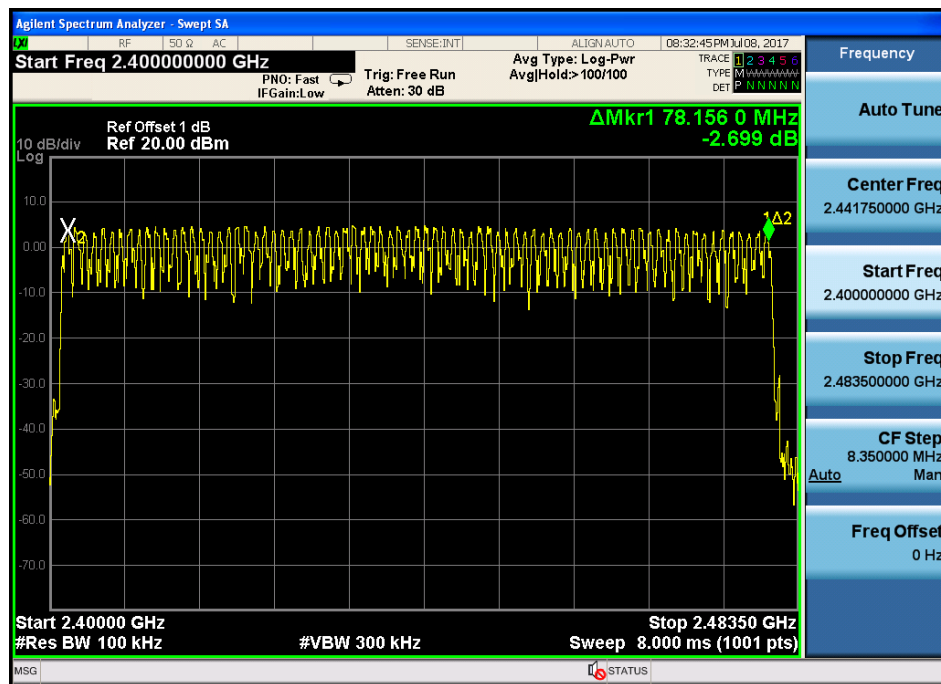
6.2. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The number of hopping channel was measured by spectrum analyzer with 100kHz RBW and 300KHz VBW.

6.3. Test Result

EUT: Android MiniPC Box M/N: TBGL1017A			
Test date: 2017-7-8		Test site: RF site	Tested by: Eric
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
$\pi/4$ DQPSK	79	>15	PASS
8- DPSK	79	>15	PASS

8- DPSK:



7. Dwell Time

7.1. Test limit

Please refer section 15.247

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 sec- onds multiplied by the number of hopping channel employed.

7.2. Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

7.3. Test Result

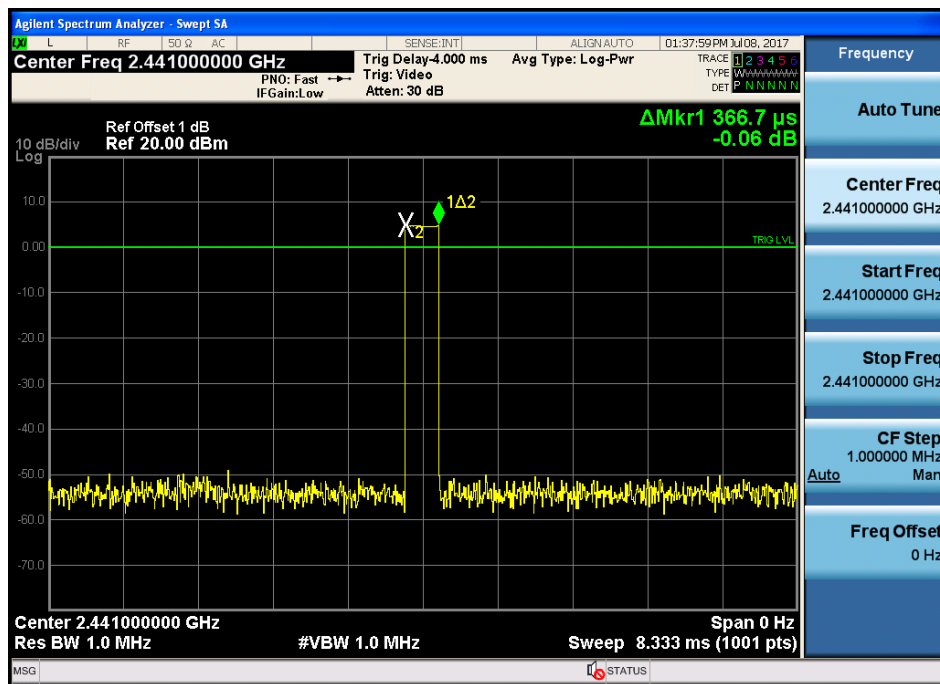
PASS.

Detailed information please see the following page.

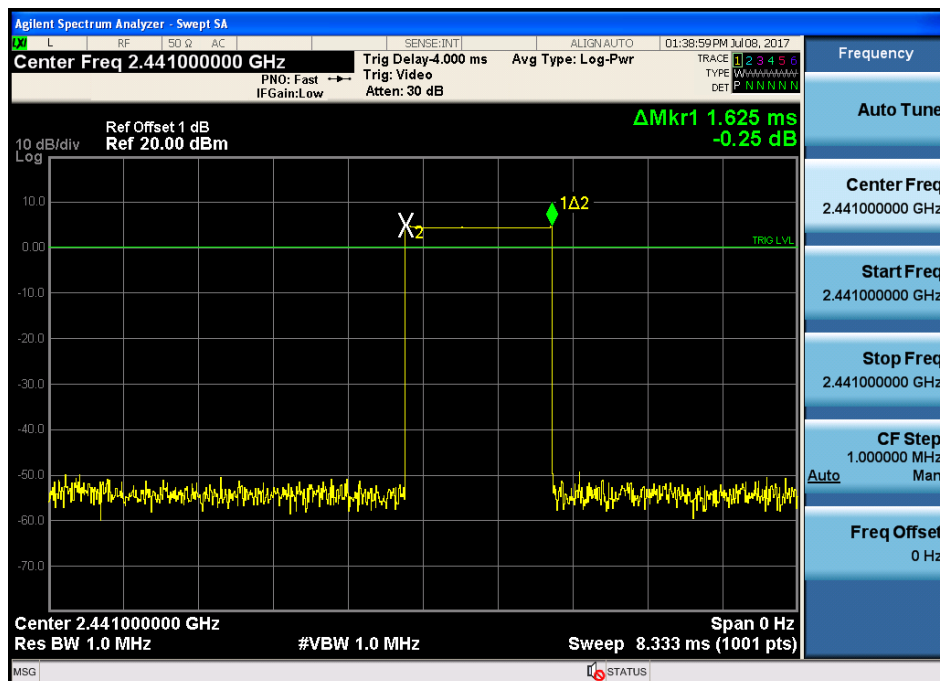
EUT: Android MiniPC Box M/N: TBGL1017A						
Test date: 2017-7-8		Test site: RF site		Tested by: Eric		
Mode	Data Packet	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limit (s)	Conclusion
GFSK	DH1	2441	0.367	0.117	<0.4	PASS
	DH3	2441	1.625	0.260	<0.4	PASS
	DH5	2441	2.875	0.307	<0.4	PASS
$\pi/4$ DQPSK	DH1	2441	0.358	0.115	<0.4	PASS
	DH3	2441	1.617	0.259	<0.4	PASS
	DH5	2441	2.867	0.306	<0.4	PASS
8- DPSK	DH1	2441	0.367	0.117	<0.4	PASS
	DH3	2441	1.617	0.259	<0.4	PASS
	DH5	2441	2.867	0.306	<0.4	PASS
<p>Note: 1 A period time = 0.4 (s) * 79 = 31.6(s)</p> <p>2 DH1 time slot = Pulse Duration * (1600/(2*79)) * A period time/1000</p> <p>DH3 time slot = Pulse Duration * (1600/(4*79)) * A period time/1000</p> <p>DH5 time slot = Pulse Duration * (1600/(6*79)) * A period time/1000</p>						

GFSK

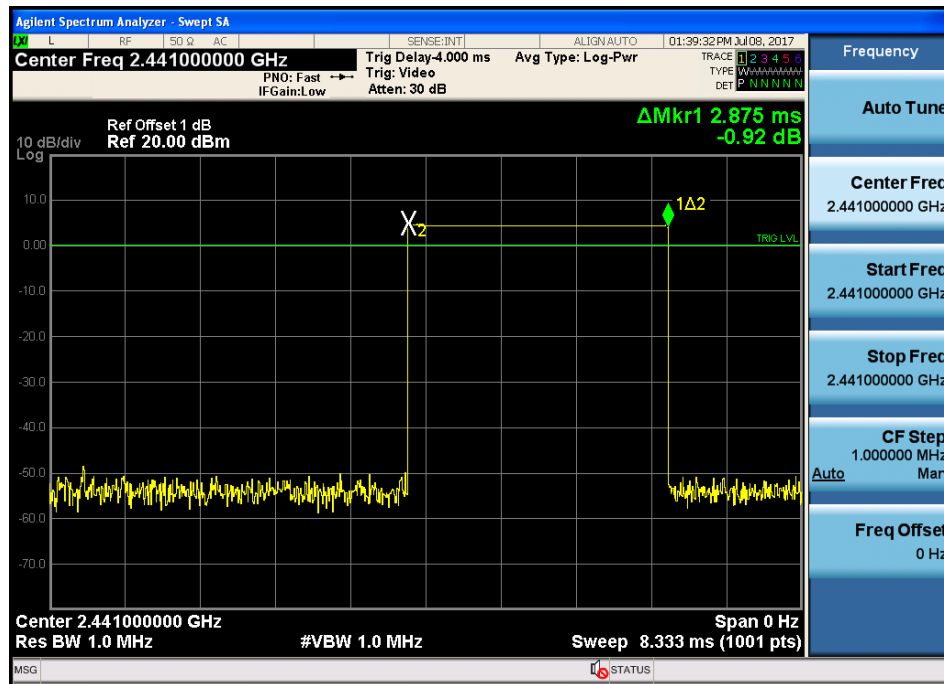
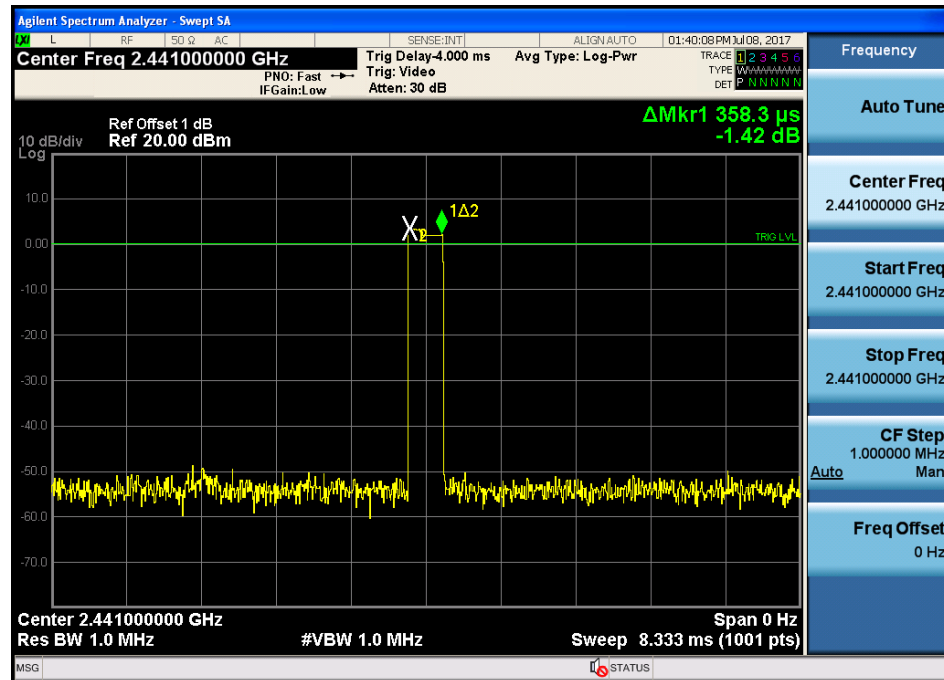
DH1:



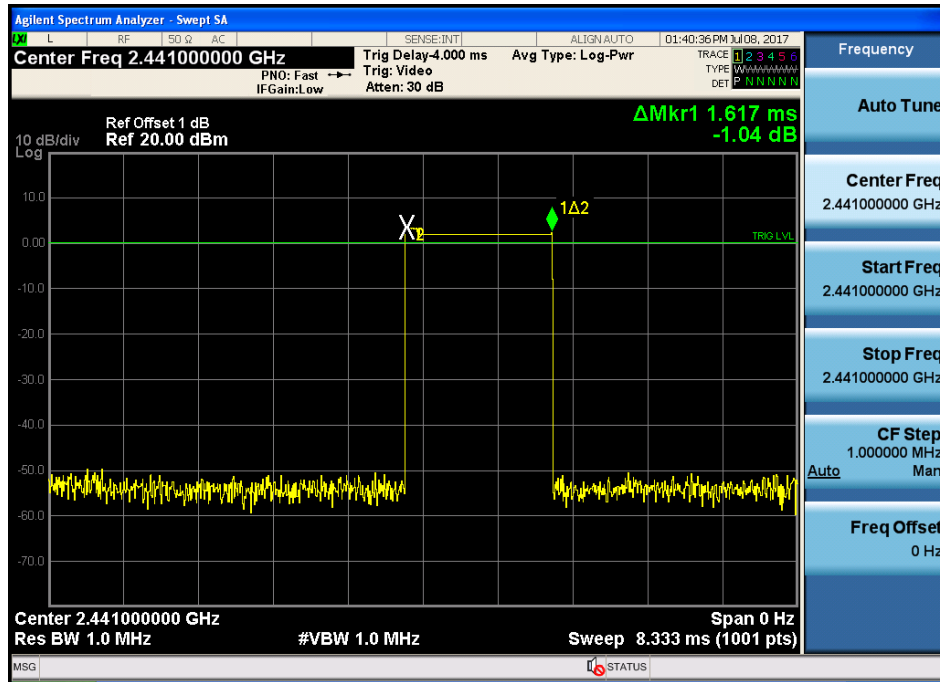
DH3:



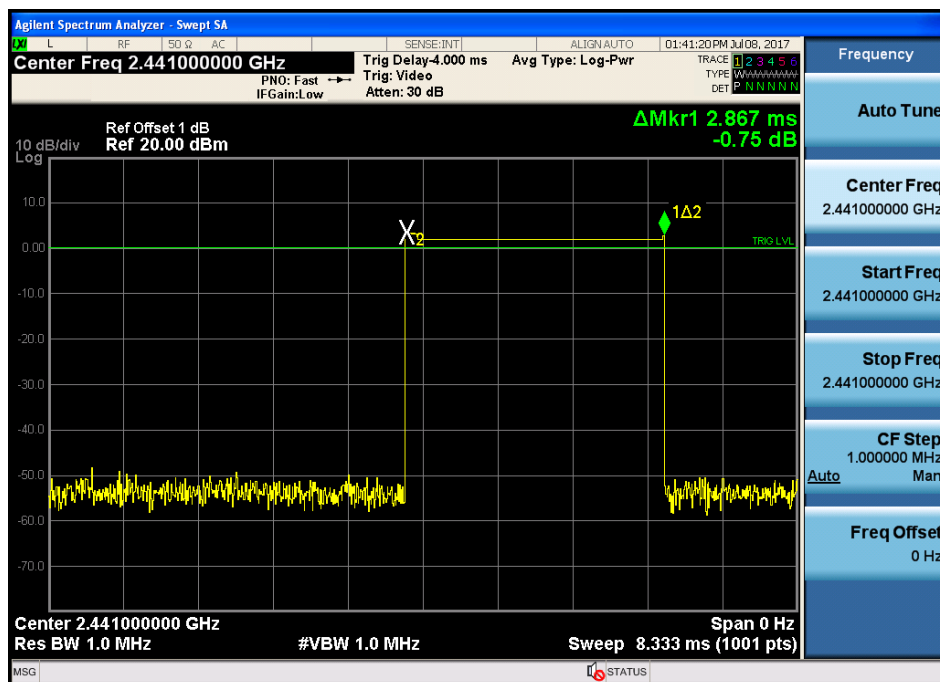
DH5


 $\pi/4$ DQPSK
DH1


DH3

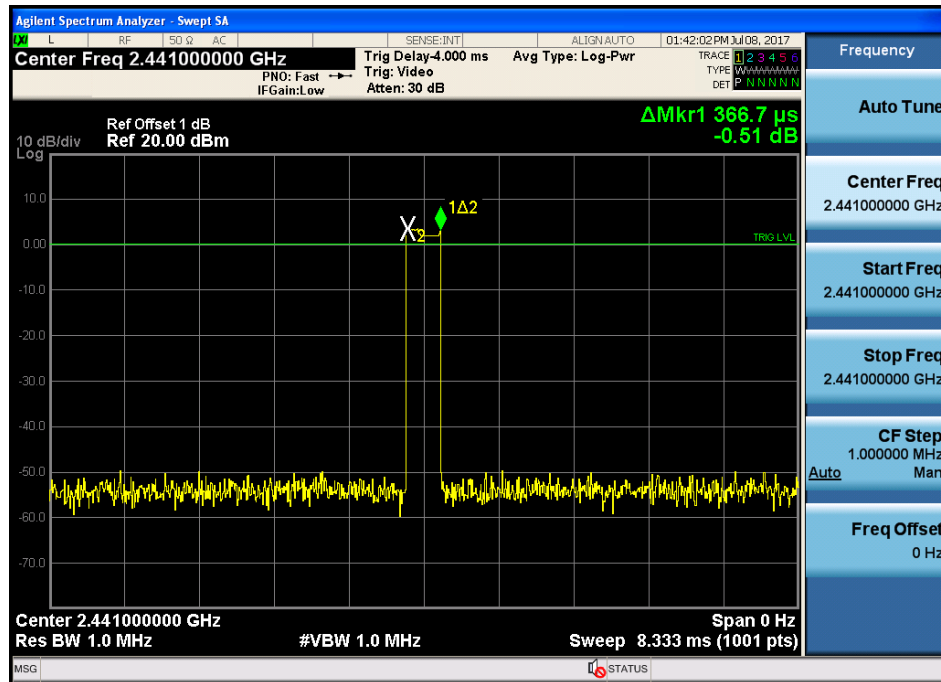


DH5

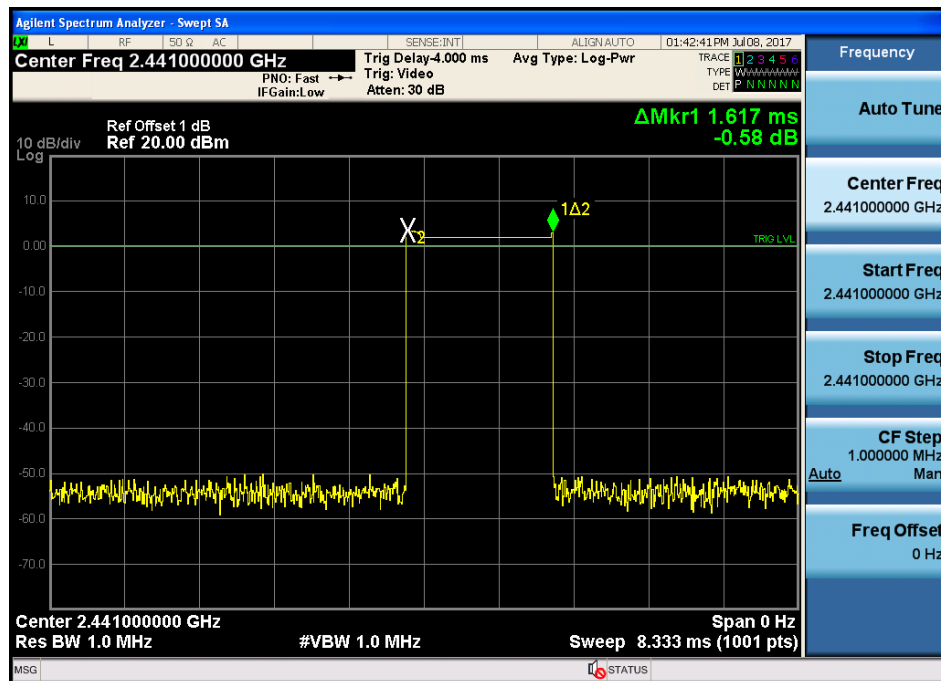


8- DPSK:

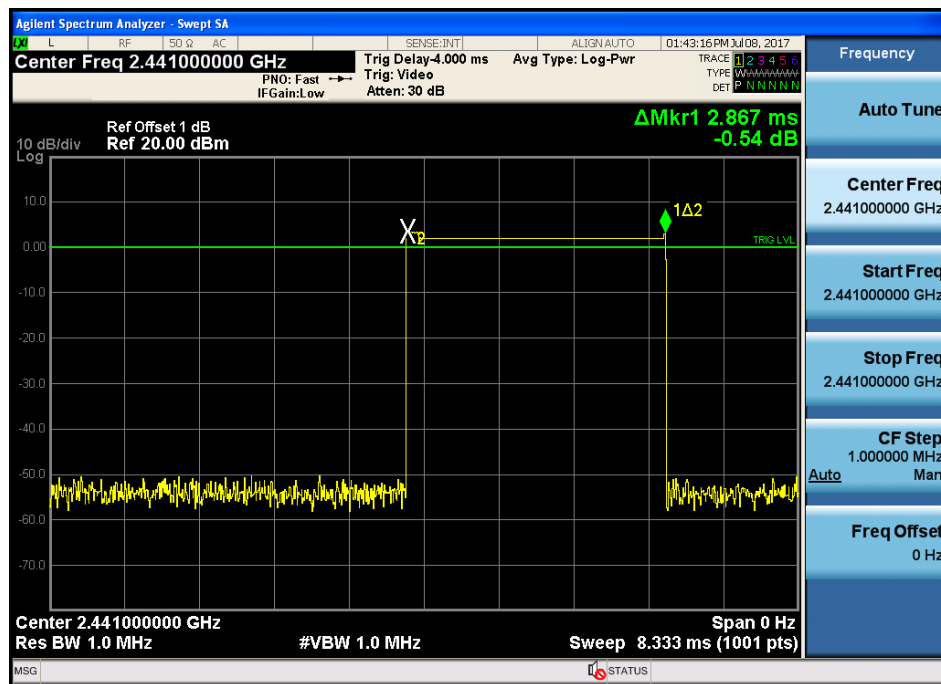
DH1:



DH3:



DH5:



8. Radiated emissions

8.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

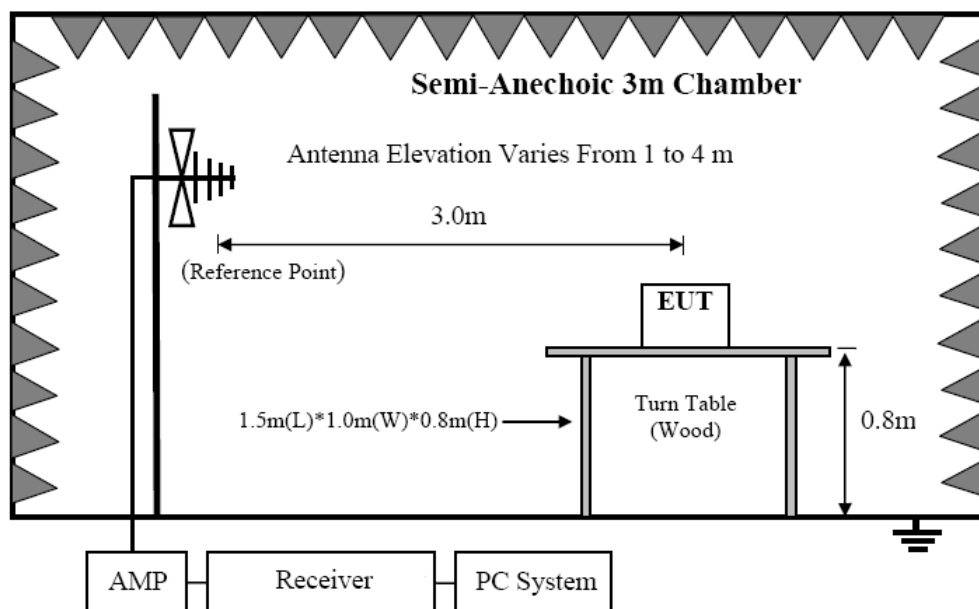
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 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	(²)

15.209 Limit

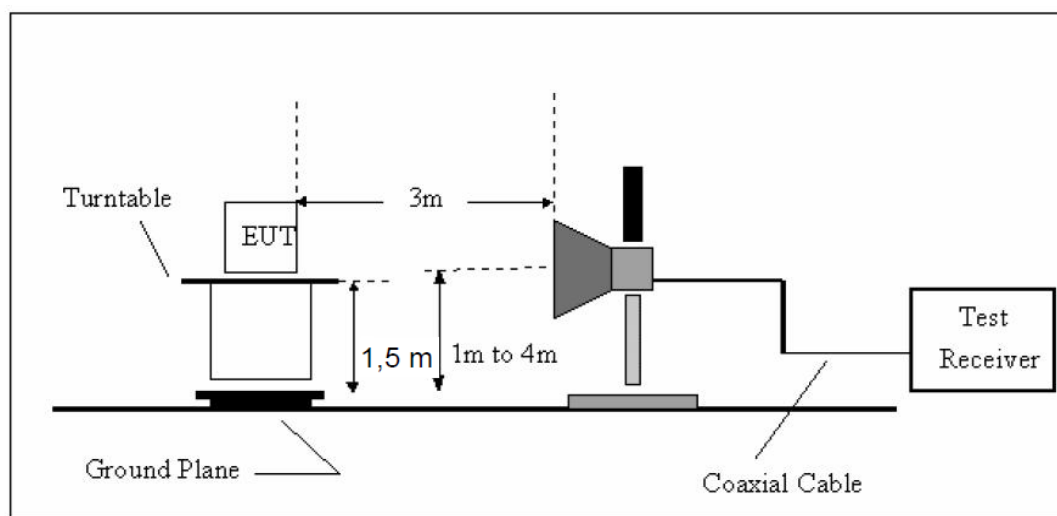
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2. Block Diagram of Test setup

8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and simulator as shown in section 1.4 and 6.1
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 :2013on Radiated Emission test.
- (6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

8.4. Test Result

We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency..
Detailed information please see the following page.

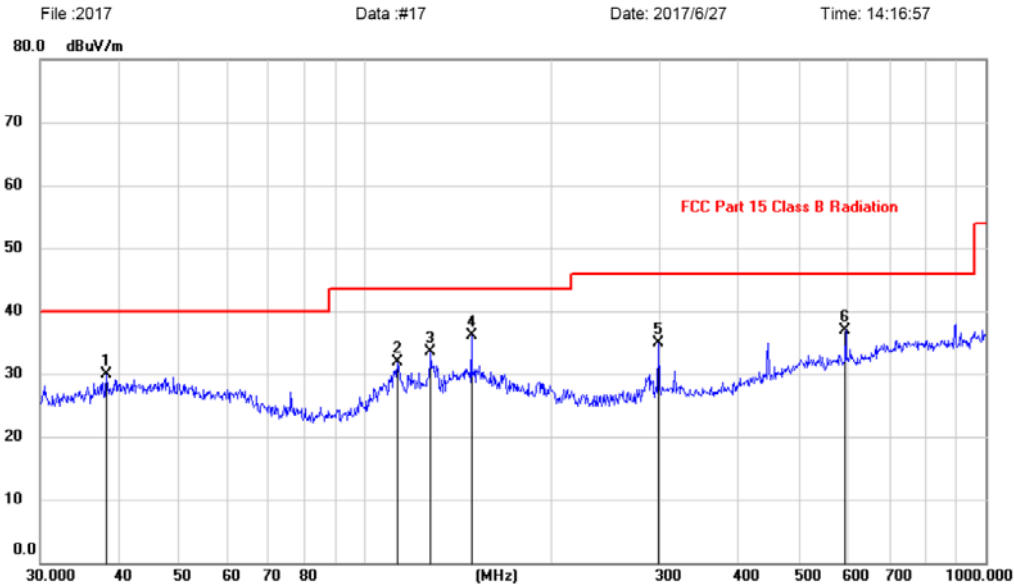
From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

From 30MHz to 1000MHz: Conclusion: PASS

Site LAB 966-2 Chamber	Polarization: Horizontal	Temperature: 23.8
Limit: FCC Part 15 Class B Radiation	Power: AC 120V/60Hz	Humidity: 56 %
EUT: Android MiniPC Box	Distance:	
M/N: TBGL1017A		
Mode:BT3.0		
Note:		
Engineer Signature:		

Radiated Emission Measurement



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	38.3462	15.95	13.95	29.90	40.00	-10.10	QP		
2	112.9196	20.01	11.82	31.83	43.50	-11.67	QP		
3	127.6645	20.40	13.08	33.48	43.50	-10.02	QP		
4 *	148.4410	21.66	14.44	36.10	43.50	-7.40	QP		
5	297.2241	21.52	13.39	34.91	46.00	-11.09	QP		
6	595.1326	17.66	19.17	36.83	46.00	-9.17	QP		

Note:1. *:Maximum data; x:Over limit; !:over margin.

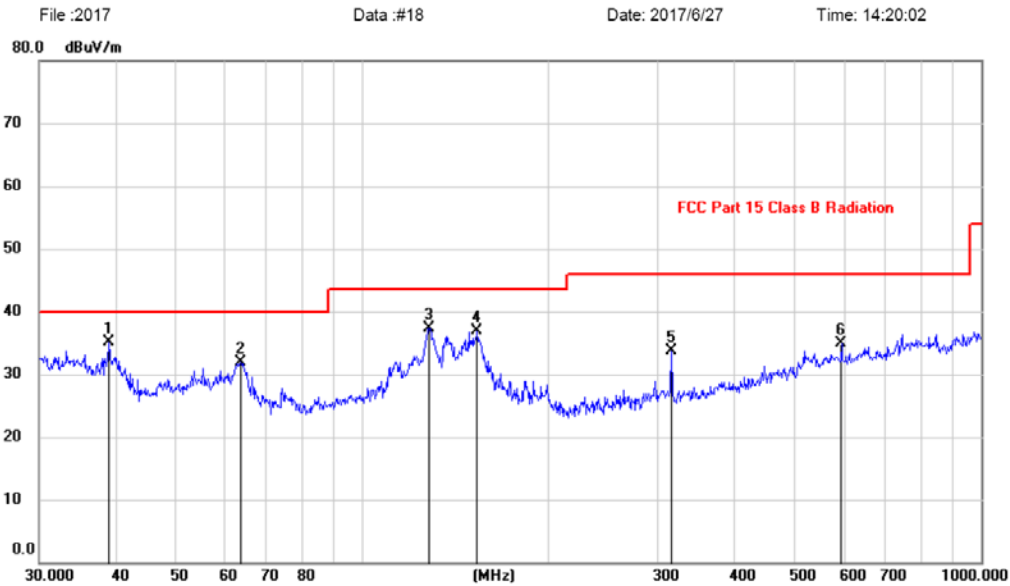
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Site LAB 966-2 Chamber
 Limit: FCC Part 15 Class B Radiation
 EUT: Android MiniPC Box
 M/N: TBGL1017A
 Mode:BT3.0
 Note:
 Engineer Signature:

Polarization: **Vertical**
 Power: AC 120V/60Hz
 Distance:

Temperature: 23.8
 Humidity: 56 %

Radiated Emission Measurement



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1	*	39.0242	20.82	14.20	35.02	40.00	-4.98	QP		
2		63.5356	19.73	12.21	31.94	40.00	-8.06	QP		
3		128.5629	24.24	13.14	37.38	43.50	-6.12	QP		
4		153.2004	22.28	14.56	36.84	43.50	-6.66	QP		
5		316.5889	19.82	13.79	33.61	46.00	-12.39	QP		
6		595.1326	15.76	19.17	34.93	46.00	-11.07	QP		

Note:1. *:Maximum data; x:Over limit; !:over margin.

2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Remark: All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz was listed in this report.

1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box			M/N: TBGL1017A						
Power: DC 5V From USB Port									
Test date: 2017-6-27 Test site: 3m Chamber Tested by: Eric									
Test mode: GFSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	43.50	33.95	10.18	34.26	53.37	74	20.63	PK
2	4804	34.08	33.95	10.18	34.26	43.95	54	10.05	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	43.39	33.95	10.18	34.26	53.26	74	20.74	PK
2	4804	34.17	33.95	10.18	34.26	44.04	54	9.96	AV
3	7206	/							
4	9608	/							
5	12010	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto. Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto. Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box					M/N: TBGL1017A				
Power: DC 5V From USB Port									
Test date: 2017-6-27 Test site: 3m Chamber Tested by: Eric									
Test mode: GFSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	41.89	33.93	10.2	34.29	51.73	74	22.27	PK
2	4882	32.62	33.93	10.2	34.29	42.46	54	11.54	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	41.46	33.93	10.2	34.29	51.30	74	22.70	PK
2	4882	32.52	33.93	10.2	34.29	42.36	54	11.64	AV
3	7323	/							
4	9764	/							
5	12205	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box			M/N: TBGL1017A						
Power: DC 5V From USB Port									
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric			
Test mode: GFSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	42.04	33.98	10.22	34.25	51.99	74	22.01	PK
2	4960	32.41	33.98	10.22	34.25	42.36	54	11.64	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	42.03	33.98	10.22	34.25	51.98	74	22.02	PK
2	4960	31.75	33.98	10.22	34.25	41.70	54	12.30	AV
3	7440	/							
4	9920	/							
5	12400	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result

EUT: Android MiniPC Box

M/N: TBGL1017A

Power: DC 5V From USB Port

Test date: 2017-6-27 Test site: 3m Chamber Tested by: Eric

Test mode: $\pi/4$ DQPSK Tx CH40 2441MHz

Antenna polarity: Vertical

No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/ m)	Margin (dB)	Remark
1	4882	43.77	33.98	10.2	34.25	53.70	74	20.30	PK
2	4882	31.34	33.98	10.2	34.25	41.27	54	12.73	AV
3	7323	/							
4	9764	/							
5	12205	/							

Antenna Polarity: Horizontal

1	4882	43.25	33.93	10.2	34.29	53.09	74	20.91	PK
2	4882	32.71	33.93	10.2	34.29	42.55	54	11.45	AV
3	7323	/							
4	9764	/							
5	12205	/							

Note:

1, Measuring frequency from 1GHz to 25GHz

2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto.
Detector: PK

2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto.
Detector: PK

3, Result = Read level + Antenna factor + cable loss-Amp factor

4, All the other emissions not reported were too low to read and deemed to comply with
FCC limit.

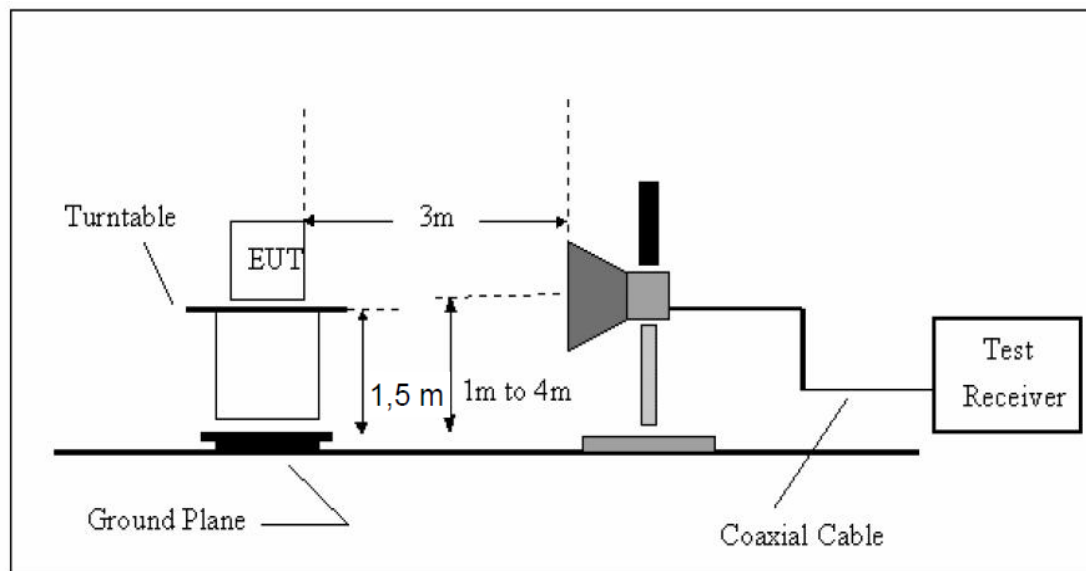
1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box			M/N: TBGL1017A						
Power: DC 5V From USB Port									
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric			
Test mode: 8- DQPSK Tx CH1 2402MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4804	41.75	33.95	10.18	34.26	51.62	74	22.38	PK
2	4804	31.44	33.95	10.18	34.26	41.31	54	12.69	AV
3	7206	/							
4	9608	/							
5	12010	/							
Antenna Polarity: Horizontal									
1	4804	40.39	33.95	10.18	34.26	50.26	74	23.74	PK
2	4804	32.16	33.95	10.18	34.26	42.03	54	11.97	AV
3	7206	/							
4	9608	/							
5	12010	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box					M/N: TBGL1017A				
Power: DC 5V From USB Port									
Test date: 2017-6-27 Test site: 3m Chamber Tested by: Eric									
Test mode: 8- DQPSK Tx CH40 2441MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4882	42.09	33.93	10.2	34.29	51.93	74	22.07	PK
2	4882	32.59	33.93	10.2	34.29	42.43	54	11.57	AV
3	7323	/							
4	9764	/							
5	12205	/							
Antenna Polarity: Horizontal									
1	4882	42.36	33.93	10.2	34.29	52.20	74	21.80	PK
2	4882	32.68	33.93	10.2	34.29	42.52	54	11.48	AV
3	7323	/							
4	9764	/							
5	12205	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

1GHz—25GHz Radiated emissison Test result									
EUT: Android MiniPC Box			M/N: TBGL1017A						
Power: DC 5V From USB Port									
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric			
Test mode: 8- DQPSK Tx CH79 2480MHz									
Antenna polarity: Vertical									
No	Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4960	41.75	33.98	10.22	34.25	51.70	74	22.30	PK
2	4960	32.71	33.98	10.22	34.25	42.66	54	11.34	AV
3	7440	/							
4	9920	/							
5	12400	/							
Antenna Polarity: Horizontal									
1	4960	41.89	33.98	10.22	34.25	51.84	74	22.16	PK
2	4960	33.40	33.98	10.22	34.25	43.35	54	10.65	AV
3	7440	/							
4	9920	/							
5	12400	/							
Note:									
1, Measuring frequency from 1GHz to 25GHz									
2, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK									
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK									
3, Result = Read level + Antenna factor + cable loss-Amp factor									
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.									

9. Band Edge Compliance

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

9.3. Test Procedure

All restriction band and non- restriction band have been tested , only worse case is reported.

9.4. Test Result

PASS. (See below detailed test data)

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27 Test site: 3m Chamber Tested by: Eric								
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	44.33	27.89	4	34.97	41.25	74	32.75	PK
Antenna Polarity: Horizontal								
2483.5	44.36	27.89	4	34.97	41.28	74	32.72	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

GFSK (Hopping Low)

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	44.58	27.62	3.92	34.97	41.15	74	32.85	PK
Antenna Polarity: Horizontal								
2390	44.59	27.62	3.92	34.97	41.16	74	32.84	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	43.66	27.62	3.92	34.97	40.23	74	33.77	PK
Antenna Polarity: Horizontal								
2390	44.33	27.62	3.92	34.97	40.90	74	33.10	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	43.81	27.89	4	34.97	40.73	74	33.27	PK
Antenna Polarity: Horizontal								
2483.5	44.18	27.89	4	34.97	41.10	74	32.90	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

$\pi/4$ DQPSK (Hopping High)

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	43.94	27.89	4	34.97	40.86	74	33.14	PK
Antenna Polarity: Horizontal								
2483.5	44.60	27.89	4	34.97	41.52	74	32.48	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx CH Low 2402MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	44.33	27.62	3.92	34.97	40.90	74	33.10	PK
Antenna Polarity: Horizontal								
2390	43.65	27.62	3.92	34.97	40.22	74	33.78	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx CH High 2480MHz								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	43.88	27.89	4	34.97	40.80	74	33.20	PK
Antenna Polarity: Horizontal								
2483.5	44.57	27.89	4	34.97	41.49	74	32.51	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27		Test site: 3m Chamber			Tested by: Eric			
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2390	44.17	27.62	3.92	34.97	40.74	74	33.26	PK
Antenna Polarity: Horizontal								
2390	44.55	27.62	3.92	34.97	41.12	74	32.88	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

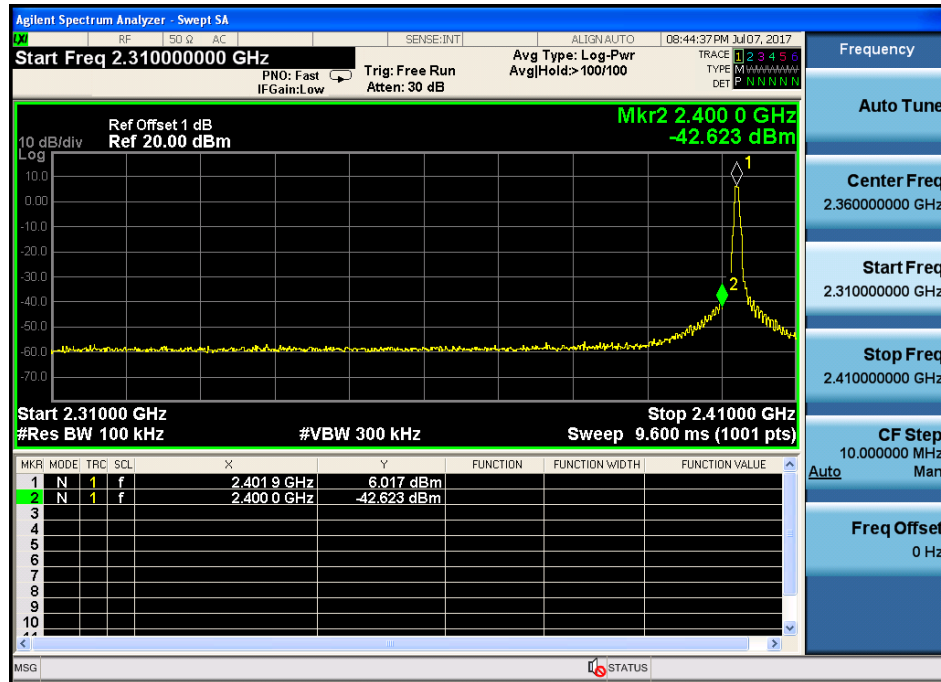
8- DPSK (Hopping High)

Band Edge Test result								
EUT: Android MiniPC Box			M/N: TBGL1017A					
Power: DC 5V From USB Port								
Test date: 2017-6-27			Test site: 3m Chamber			Tested by: Eric		
Test mode: Tx								
Antenna polarity: Vertical								
Freq (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable loss(d B)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2483.5	44.33	27.89	4	34.97	41.25	74	32.75	PK
Antenna Polarity: Horizontal								
2483.5	44.18	27.89	4	34.97	41.10	74	32.90	PK
Note:								
1, Spectrum Set for PK measure: RBW=1MHz, VBW=1MHz, Sweep time=Auto, Detector: PK								
2, Spectrum Set for AV measure: RBW=1MHz, VBW=10Hz, Sweep time=Auto, Detector: PK								
3, Result = Read level + Antenna factor + cable loss-Amp factor								
4, All the other emissions not reported were too low to read and deemed to comply with FCC limit.								

Conducted Method

GFSK

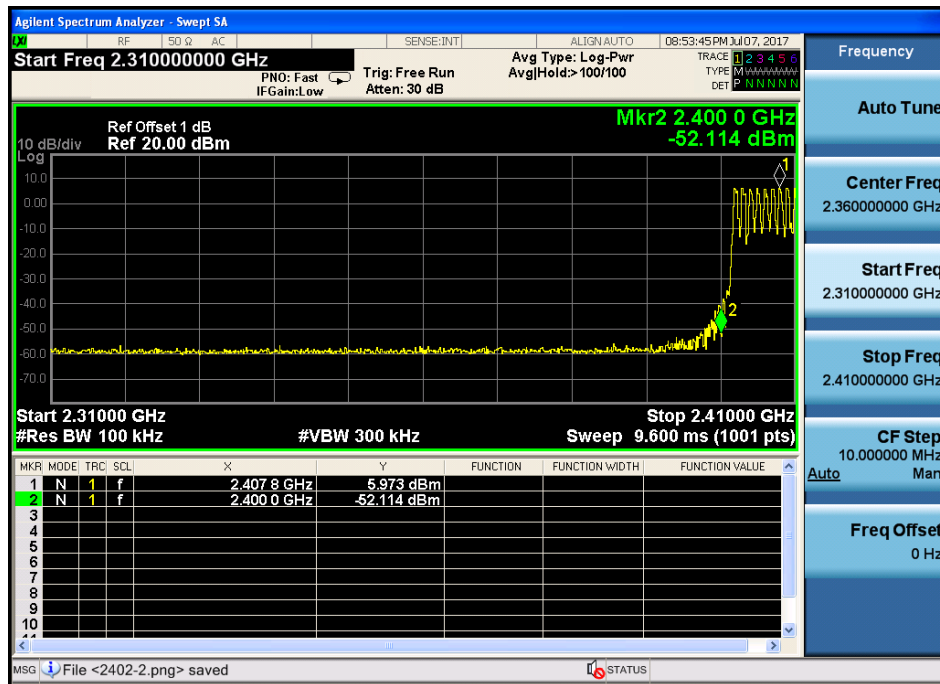
CH LOW :



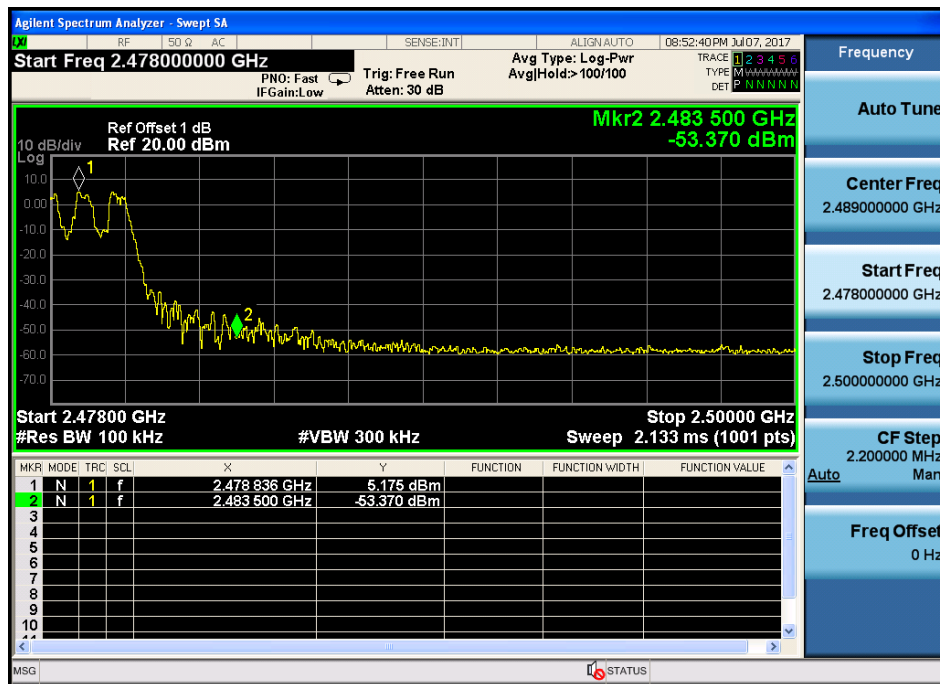
CH High :



Hopping
Low

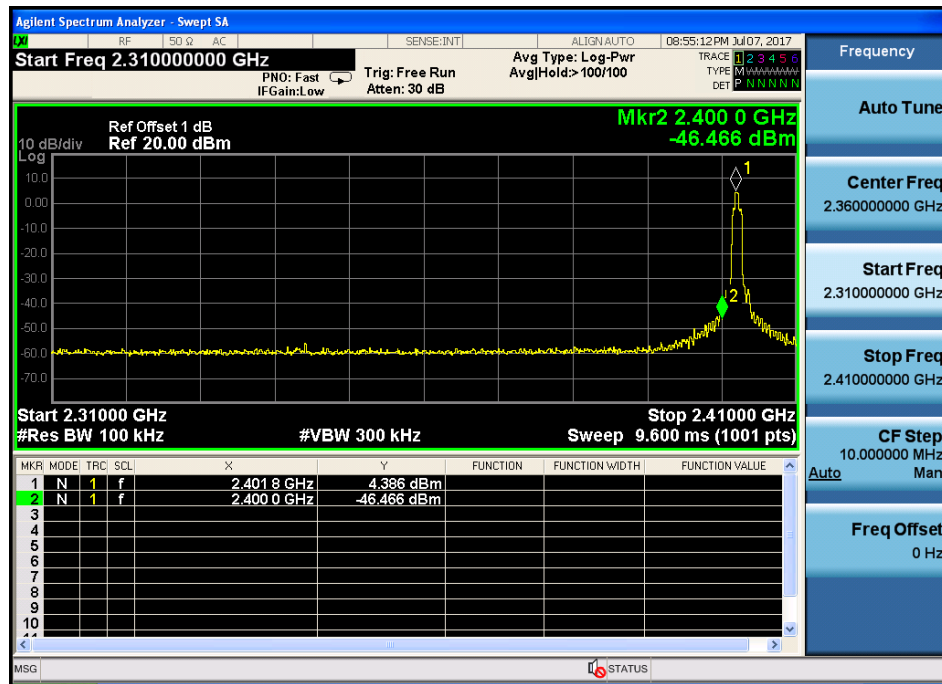


High



$\pi/4$ DQPSK

Low

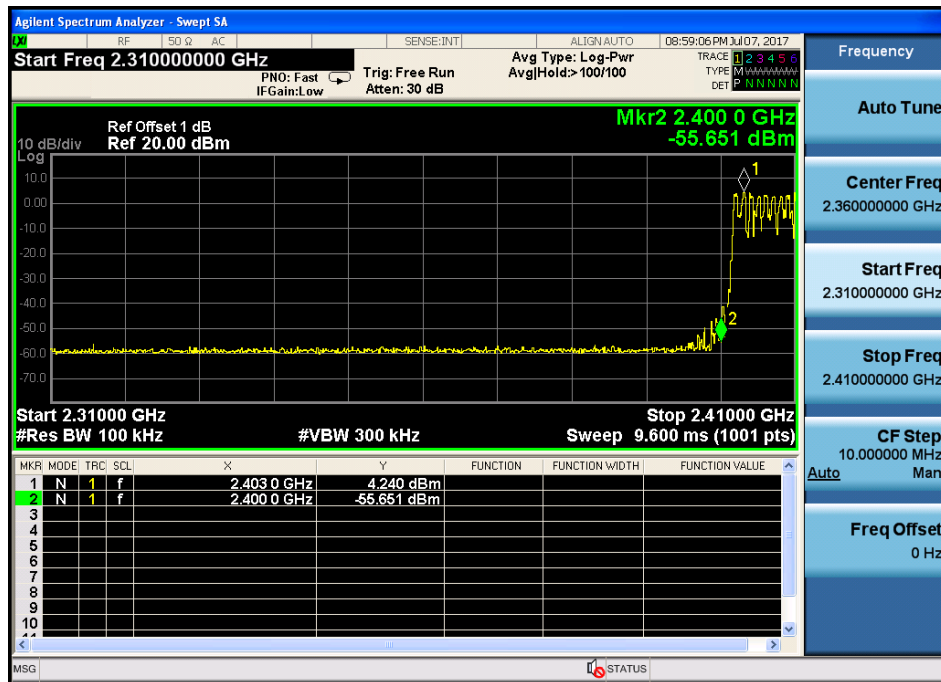


High

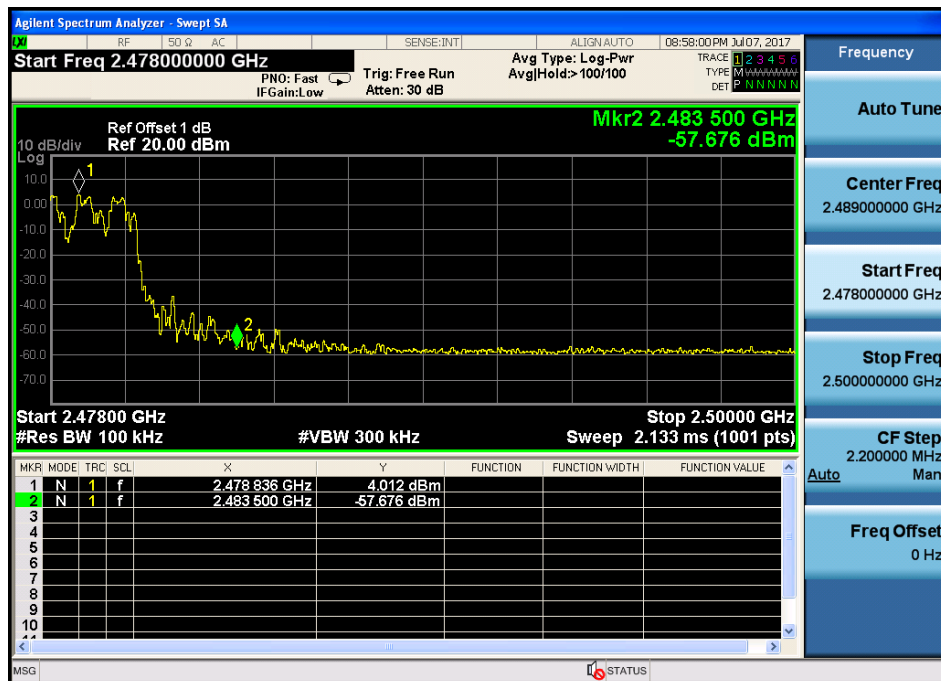


Hopping

Low

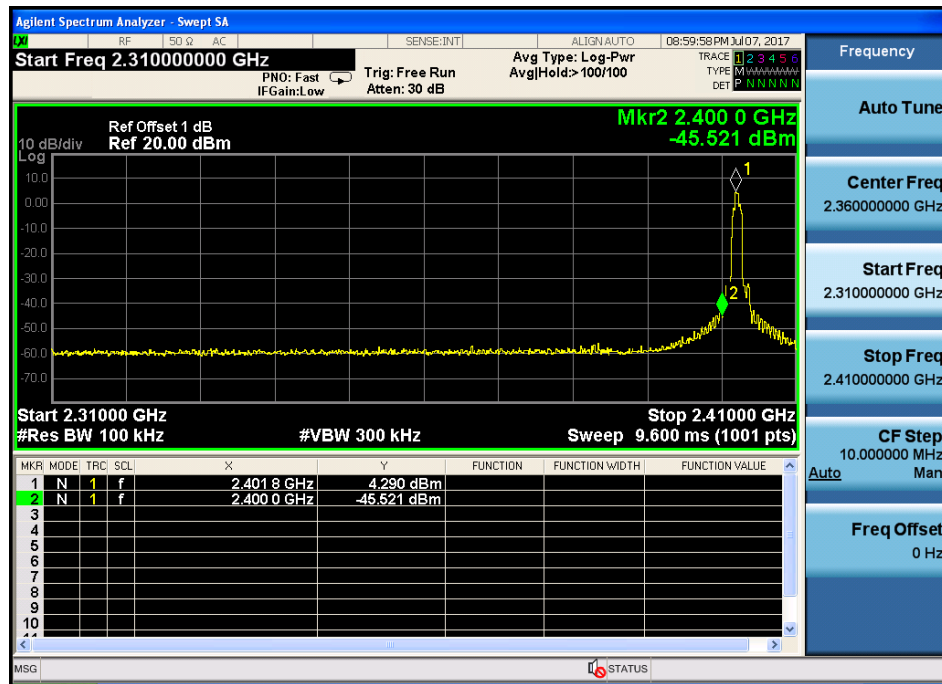


High



8- DPSK:

Low

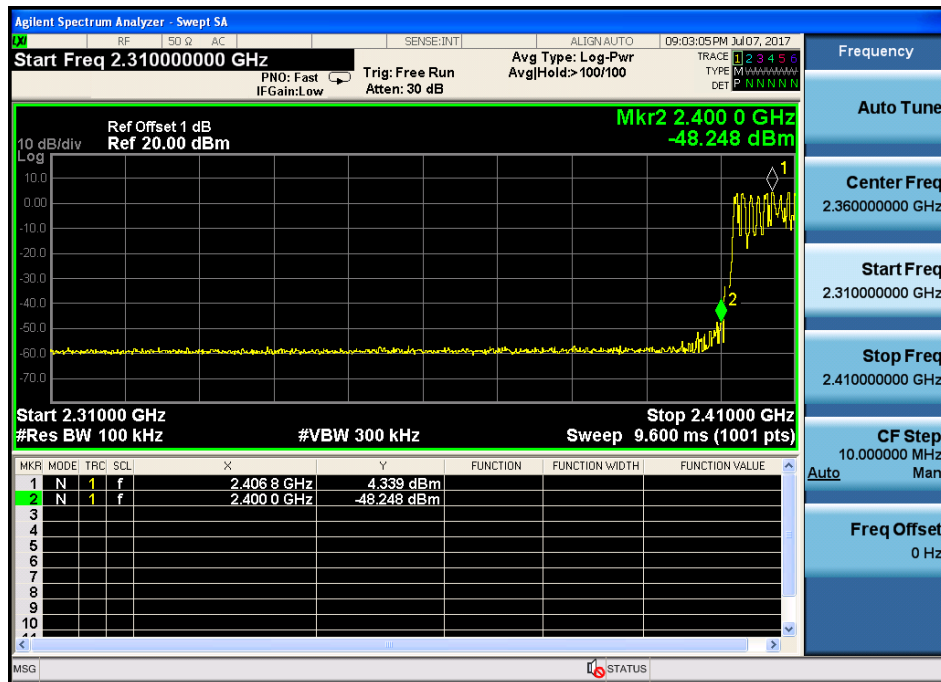


High

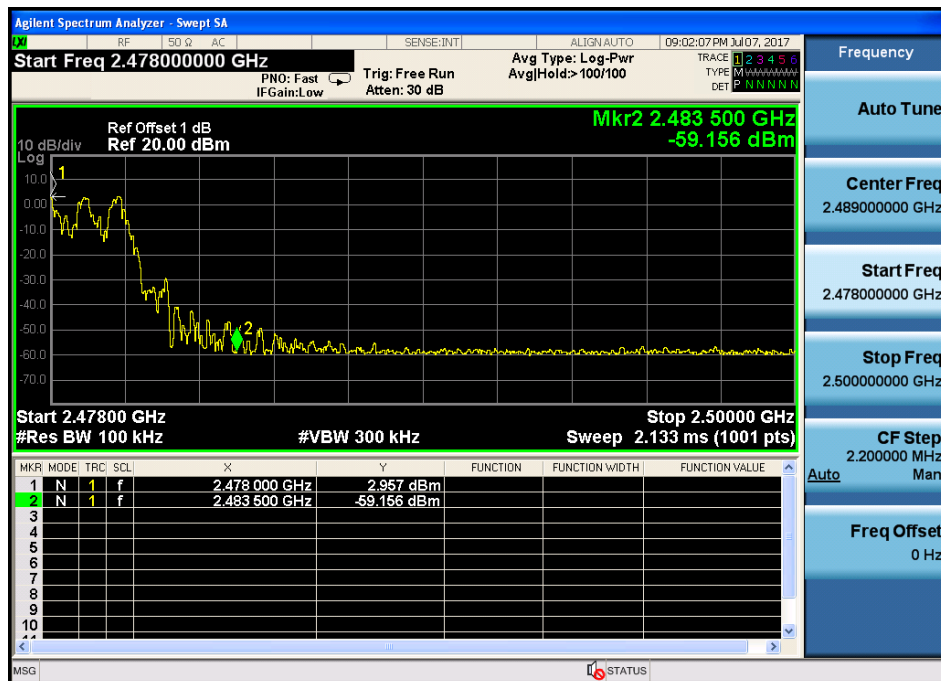


Hopping

Low

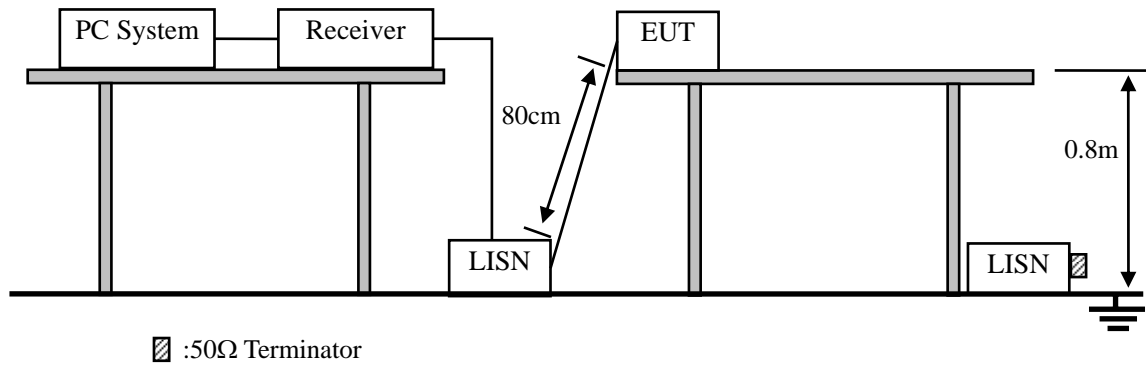


High



10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

10.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 :2013on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

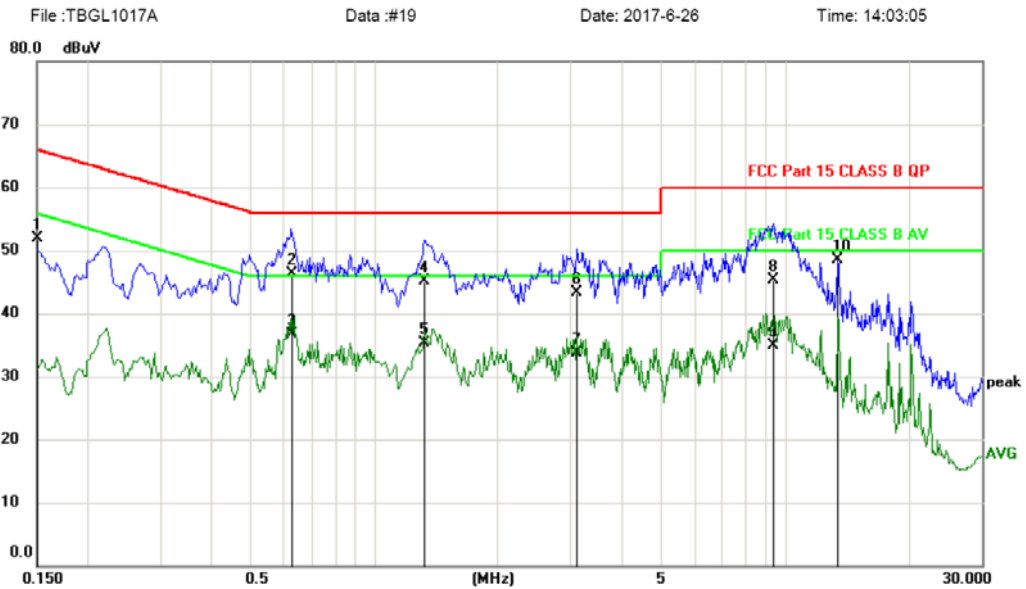
10.4. Test Result

PASS. (See below detailed test data)

Note: If QP Result comply with AV limit, AV Result is deemed to comply with AV limit

Site LAB	Phase: L1	Temperature: 24.2
Limit: FCC Part 15 CLASS B QP	Power: AC 120V/60Hz	Humidity: 53 %
EUT: Android MiniPC Box		
M/N: TBGL1017A		
Mode: BT3.0		
Note:		
Engineer Signature:		

Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1500	51.73	0.20	51.93	66.00	-14.07	peak	
2		0.6270	46.20	0.20	46.40	56.00	-9.60	QP	
3	*	0.6270	36.48	0.20	36.68	46.00	-9.32	AVG	
4		1.3204	44.90	0.20	45.10	56.00	-10.90	QP	
5		1.3204	35.10	0.20	35.30	46.00	-10.70	AVG	
6		3.1005	43.16	0.24	43.40	56.00	-12.60	QP	
7		3.1005	33.43	0.24	33.67	46.00	-12.33	AVG	
8		9.3405	44.92	0.38	45.30	60.00	-14.70	QP	
9		9.3405	34.51	0.38	34.89	50.00	-15.11	AVG	
10		13.3605	47.98	0.46	48.44	60.00	-11.56	peak	

*:Maximum data x:Over limit !:over margin

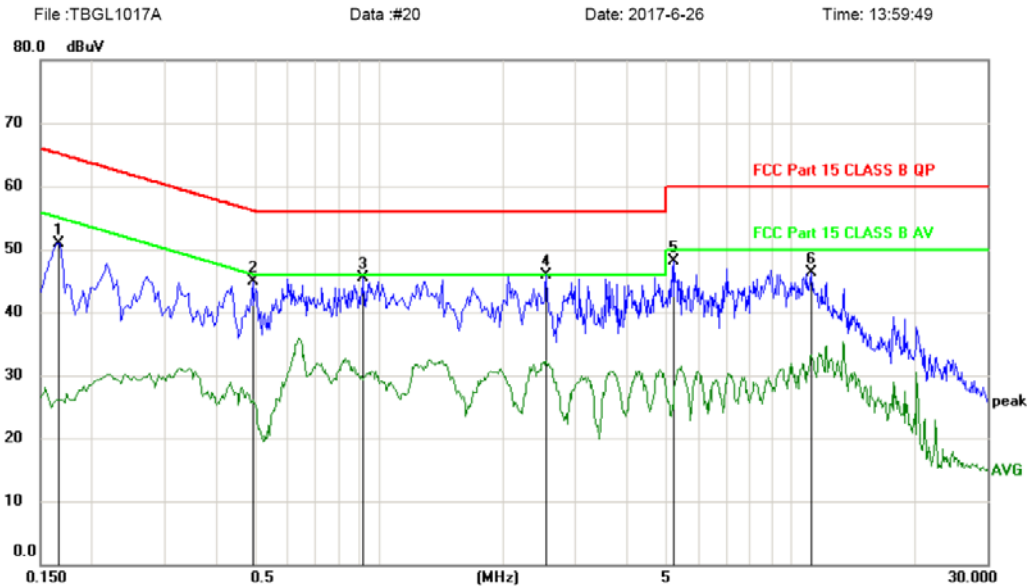
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Site LAB
 Limit: FCC Part 15 CLASS B QP
 EUT: Android MiniPC Box
 M/N: TBGL1017A
 Mode: BT3.0
 Note:
 Engineer Signature:

Phase: **N**
 Power: AC 120V/60Hz

Temperature: 24.2
 Humidity: 53 %

Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1658	50.66	0.20	50.86	65.17	-14.31	peak	
2		0.4919	44.64	0.20	44.84	56.14	-11.30	peak	
3		0.9149	45.31	0.20	45.51	56.00	-10.49	peak	
4	*	2.5402	45.73	0.22	45.95	56.00	-10.05	peak	
5		5.2202	47.83	0.26	48.09	60.00	-11.91	peak	
6		11.2202	45.82	0.44	46.26	60.00	-13.74	peak	

*:Maximum data x:Over limit !:over margin

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

11. Antenna Requirements

11.1. Limit

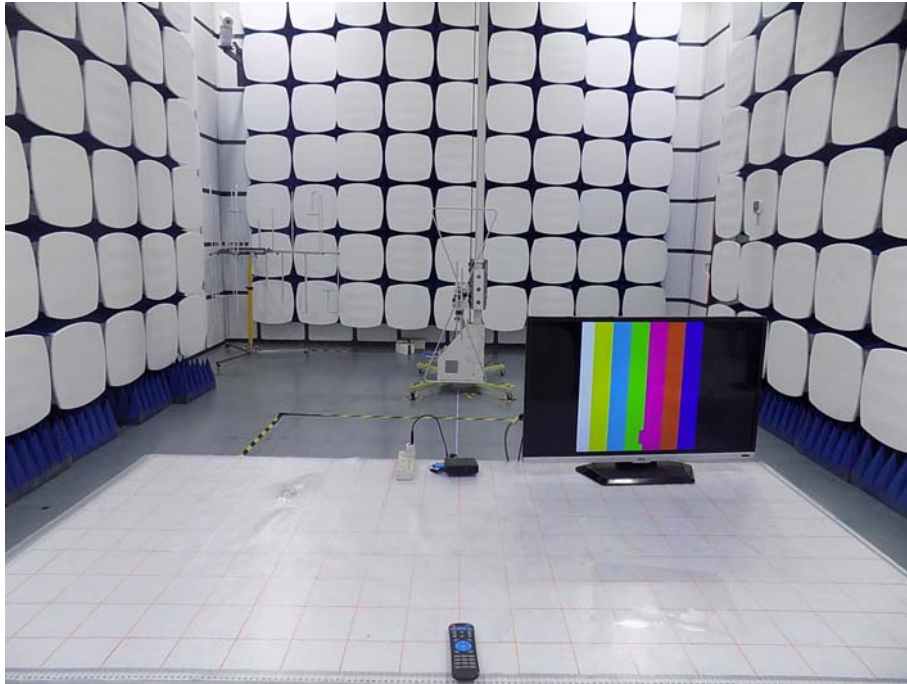
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

The antennas used for this product are PCB Antenna for Bluetooth, no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 3.2dBi for Bluetooth.

12. Test setup photo

12.1. Photos of Radiated emission



12.2.Photos of Conducted Emission test



13.Photos of EUT

Please refer to the report T1871484 05.

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