APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Guangzhou Dingchang Electronic Co., Ltd.

Android motherboard
Model No.: DC_RK3288_GB_v6.13B

FCC ID: 2AWH8-DCRK3288GB

Prepared for	:	Guangzhou Dingchang Electronic Co., Ltd.
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Prepared by	:	Shenzhen Accurate Technology Co., Ltd.
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Report No.	:	ATE20200470
Date of Test	:	May 15-26, 2020
Date of Report	:	May 27, 2020

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Test Report Certification

Applicant	:	Guangzhou Dingchang Electronic Co., Ltd.
Manufacturer	:	Guangzhou Dingchang Electronic Co., Ltd.
EUT Description	:	Android motherboard
Model No.	:	DC_RK3288_GB_v6.13B

Measurement Procedure Used:

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

The EUT was tested according to DTS test procedure of August 24, 2018 KDB558074 D01 DTS Meas Guidance v05 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen Accurate Technology 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 Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test :	May 15-26, 2020
Date of Report :	May 27, 2020

Prepared by : _____
(Bob Zhang, Engineer)

Approved & Authorized Signer : _____
(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

Model Number	:	DC_RK3288_GB_v6.13B
Bluetooth version	:	V4.0
Trade Mark	:	定昌
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	40
Antenna Gain(Max)	:	4.0dBi
Antenna type	:	Integral Antenna
Modulation mode	:	GFSK
Power supply	:	DC 12V(Powered by adapter)
Trade Mark	:	n.a.
Applicant	:	Guangzhou Dingchang Electronic Co., Ltd.
Address	:	3 / F, building I, Kaida Industrial Park, xinshuikeng, Dalong street, Panyu District, Guangzhou City, Guangdong Province, China
Manufacturer	:	Guangzhou Dingchang Electronic Co., Ltd.
Address	:	3 / F, building I, Kaida Industrial Park, xinshuikeng, Dalong street, Panyu District, Guangzhou City, Guangdong Province, China

1.2.Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

1.3.Special Accessory and Auxiliary Equipment

Adapter	:	Model: SO-1202 Input: AC 120V; 60Hz Output: DC 12V; 2A
LCD Monitor (CE, FCC: DOC, VCCI)	:	Manufacturer: DELL M/N: 1704FPTt

1.4.Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358 Listed by Innovation, Science and Economic Development Canada (ISEDC) The Registration Number is 5077A-2 Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193 Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5.Measurement Uncertainty

Radiated emission expanded uncertainty (9kHz-30MHz)	:	U=2.66dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	:	U=4.28dB, k=2
Radiated emission expanded uncertainty (1G-18GHz)	:	U=4.98dB, k=2
Radiated emission expanded uncertainty (18G-26.5GHz)	:	U=5.06dB, k=2
Conduction Emission Expanded Uncertainty (Mains ports, 9kHz-30MHz)	:	U=2.72dB, k=2
Conduction Emission Expanded Uncertainty (Telecommunication ports, 150kHz-30MHz)	:	U=2.94dB, k=2
Power disturbance Expanded Uncertainty	:	U=2.92dB, k=2
Harmonic current expanded uncertainty	:	U=0.512%, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 04, 2020	One Year
EMI Test Receiver	Rohde&Schwarz	ESR	101817	Jan. 04, 2020	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 04, 2020	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 04, 2020	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 04, 2020	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 04, 2020	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 04, 2020	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 04, 2020	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 04, 2020	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10SS	N/A	Jan. 04, 2020	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2375/2510-60/11SS	N/A	Jan. 04, 2020	One Year
RF Coaxial Cable (Conducted Emission)	SUHNER	N-2m	No.2	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-12m	No.11	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-0.5m	No.12	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.13	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-0.5m	No.15	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.16	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-6m	No.17	Jan. 04, 2020	One Year
Conducted Emission Measurement Software: ES-K1 V1.71					
Radiated Emission Measurement Software: EZ_EMC V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2402MHz
Middle Channel: 2440MHz
High Channel: 2480MHz

Note: The equipment under test (EUT) was tested under new battery.
The Bluetooth has been tested under continuous transmission mode.
Its duty cycle setting is greater than 98%.

3.2.Configuration and peripherals

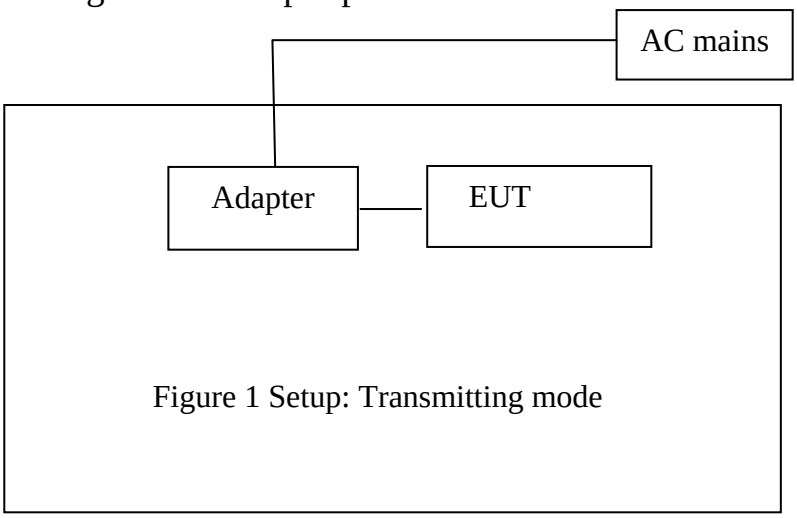


Figure 1 Setup: Transmitting mode

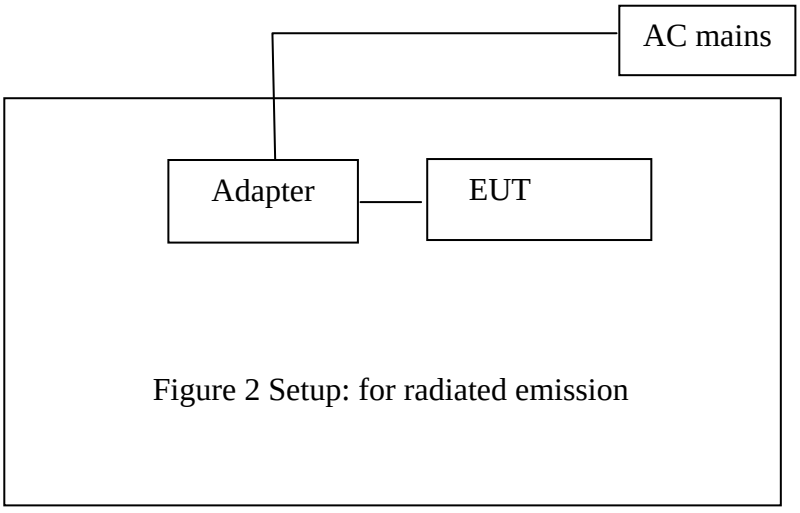


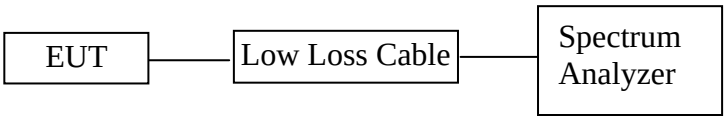
Figure 2 Setup: for radiated emission

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 6DB BANDWIDTH TEST

5.1.Block Diagram of Test Setup



5.2.The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3.EUT Configuration on Test

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4.Operating Condition of EUT

5.4.1.Setup the EUT and simulator as shown as Section 5.1.

5.4.2.Turn on the power of all equipment.

5.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

5.5.Test Procedure

5.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

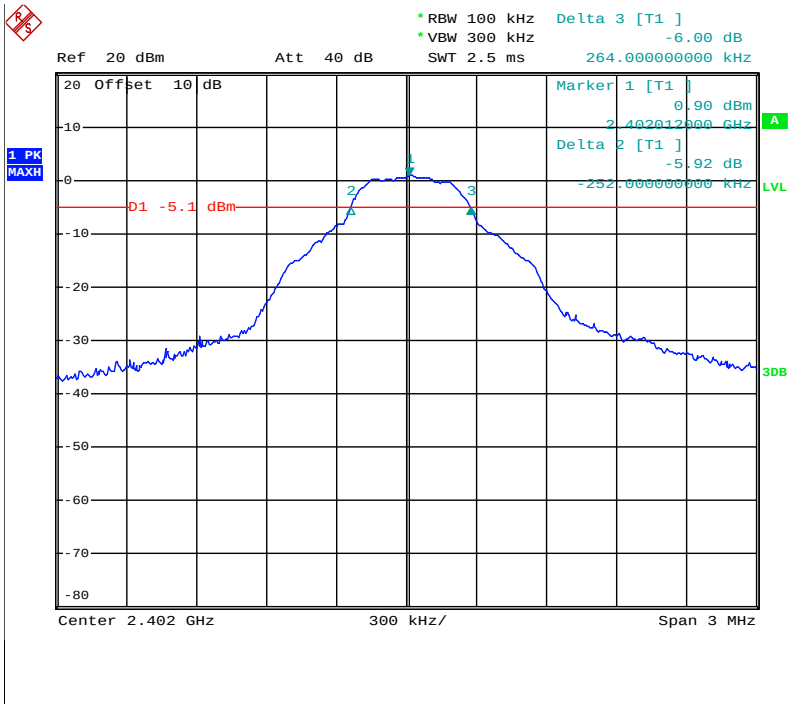
5.5.3.The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

5.6.Test Result

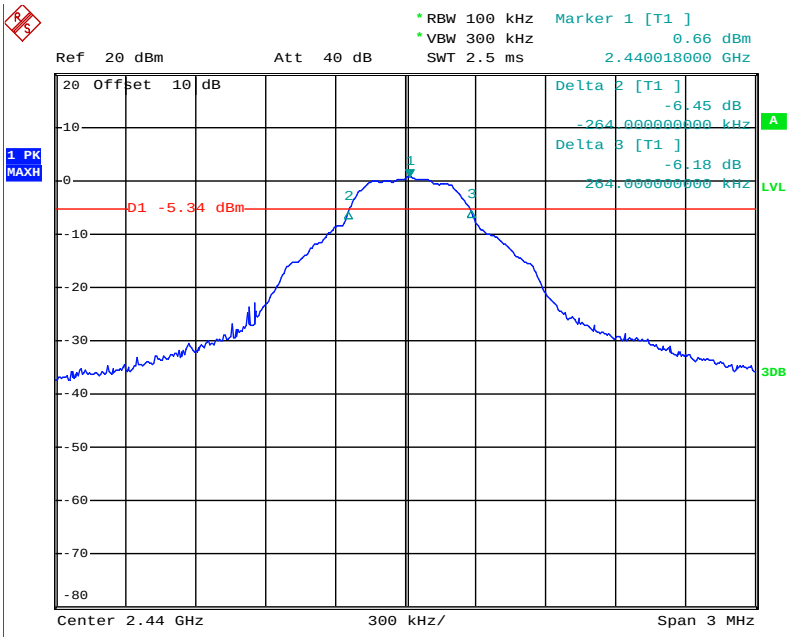
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit(MHz)	Result
0	2402	0.516	0.5	Pass
19	2440	0.528	0.5	Pass
39	2480	0.522	0.5	Pass

The spectrum analyzer plots are attached as below.

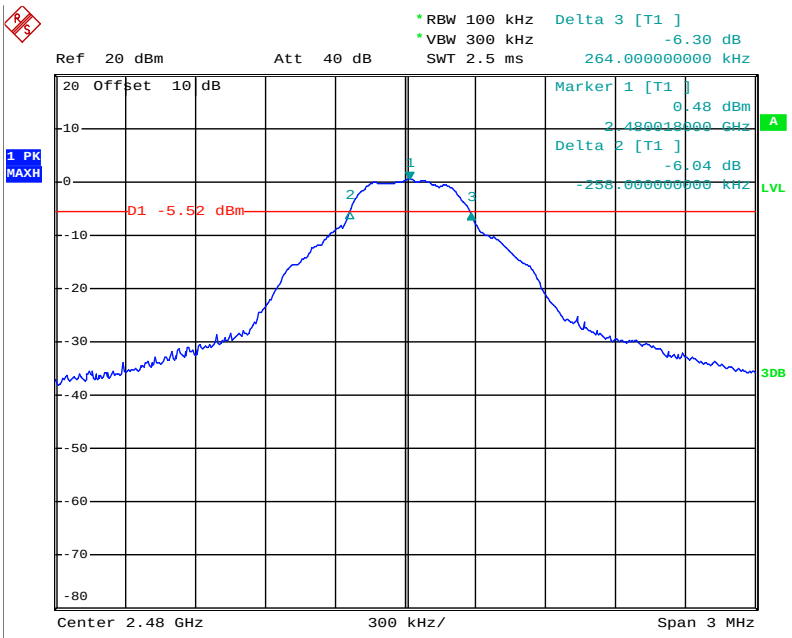
channel 0



channel 19

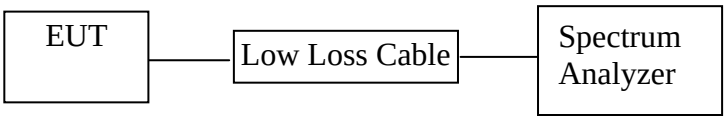


channel 39



6. MAXIMUM PEAK OUTPUT POWER TEST

6.1.Block Diagram of Test Setup



6.2.The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

6.3.EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4.Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 6.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

6.5.Test Procedure

6.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2.Set RBW of spectrum analyzer to 1 MHz and VBW to 3MHz.

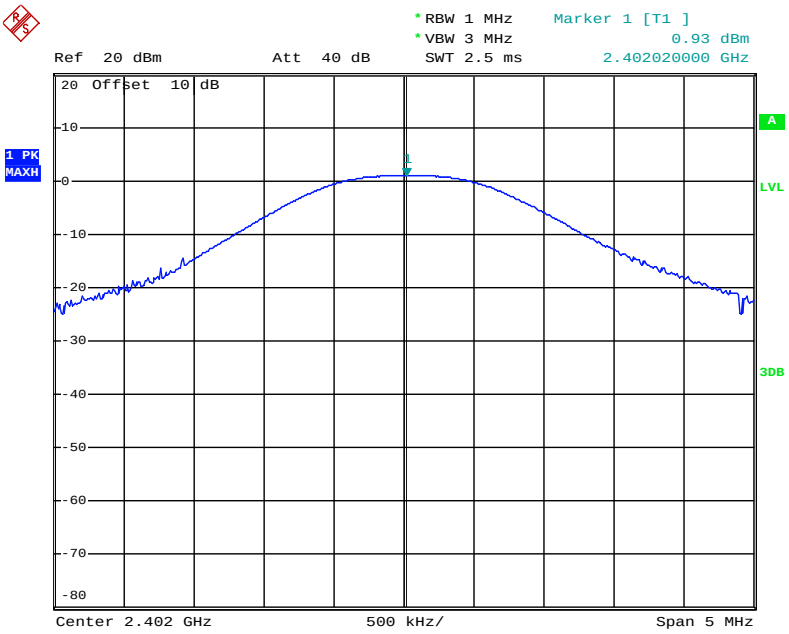
6.5.3.Measurement the maximum peak output power.

6.6.Test Result

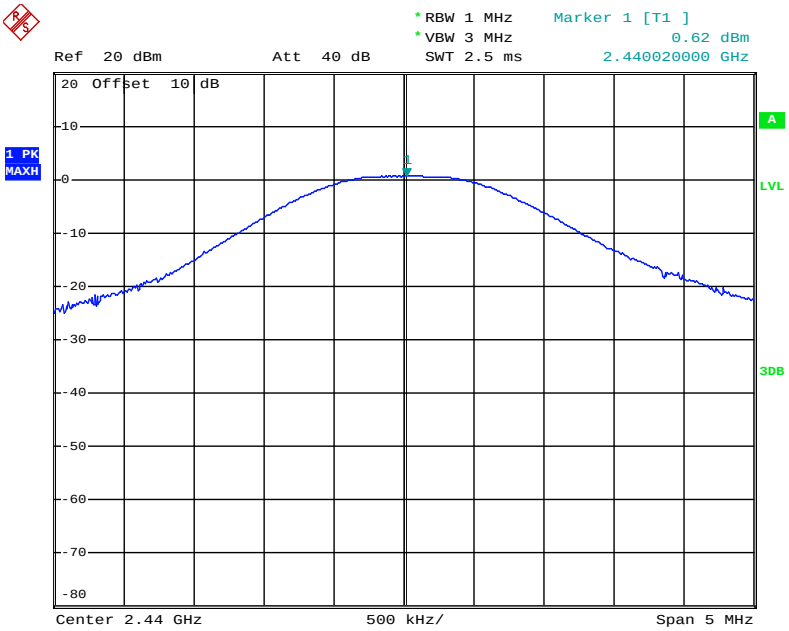
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Result
0	2402	0.93	30	Pass
19	2440	0.62	30	Pass
39	2480	0.46	30	Pass

The spectrum analyzer plots are attached as below.

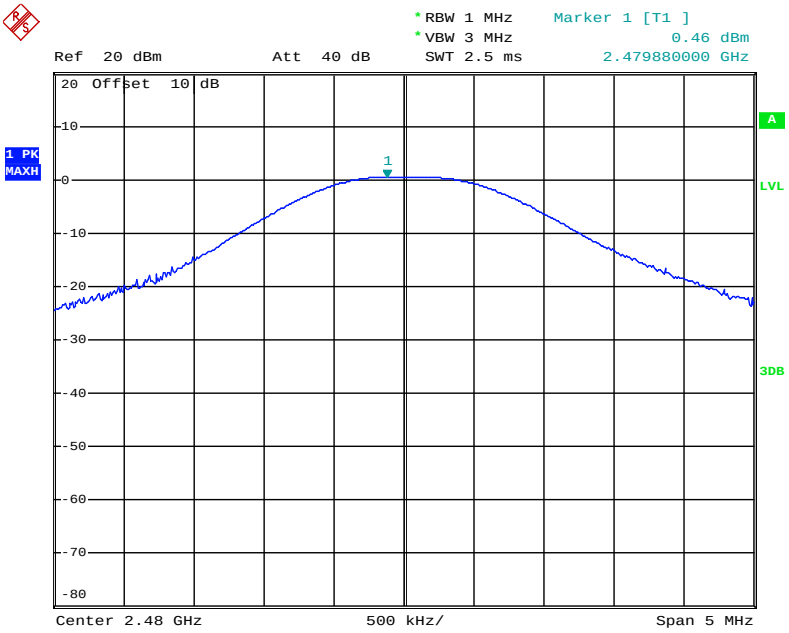
channel 0



channel 19

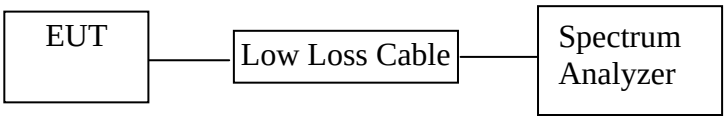


channel 39



7. POWER SPECTRAL DENSITY TEST

7.1.Block Diagram of Test Setup



7.2.The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.3.EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4.Operating Condition of EUT

7.4.1.Setup the EUT and simulator as shown as Section 7.1.

7.4.2.Turn on the power of all equipment.

7.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

7.5.Test Procedure

7.5.1.The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2.Measurement Procedure PKPSD:

7.5.3.This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

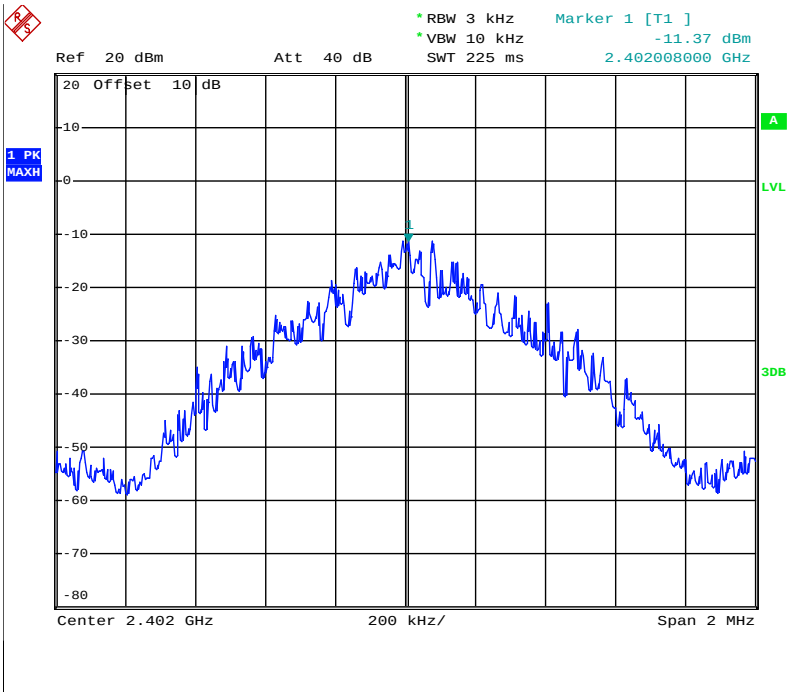
7.5.4.Measurement the maximum power spectral density.

7.6.Test Result

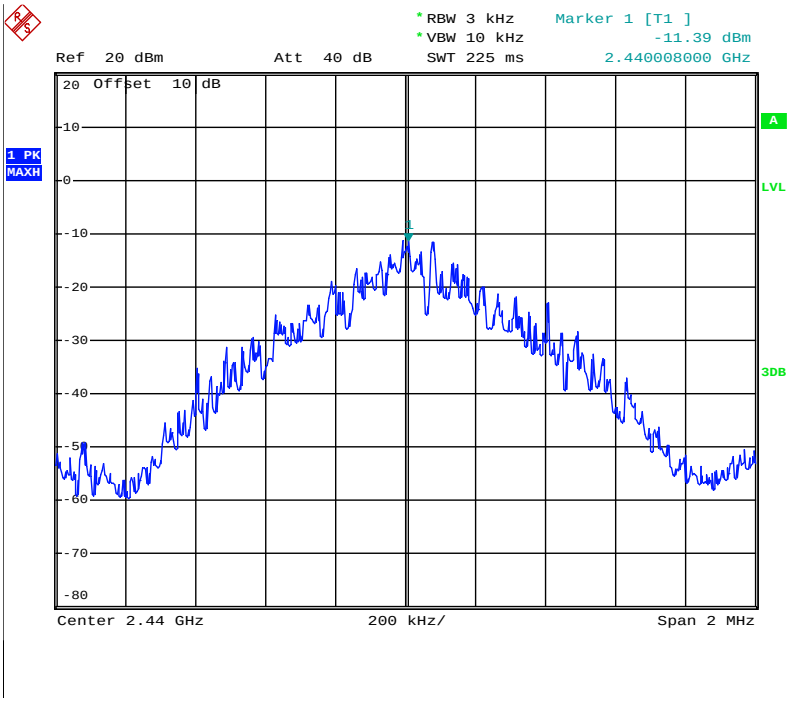
Channel	Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
0	2402	-11.37	8	Pass
19	2440	-11.39	8	Pass
39	2480	-11.65	8	Pass

The spectrum analyzer plots are attached as below.

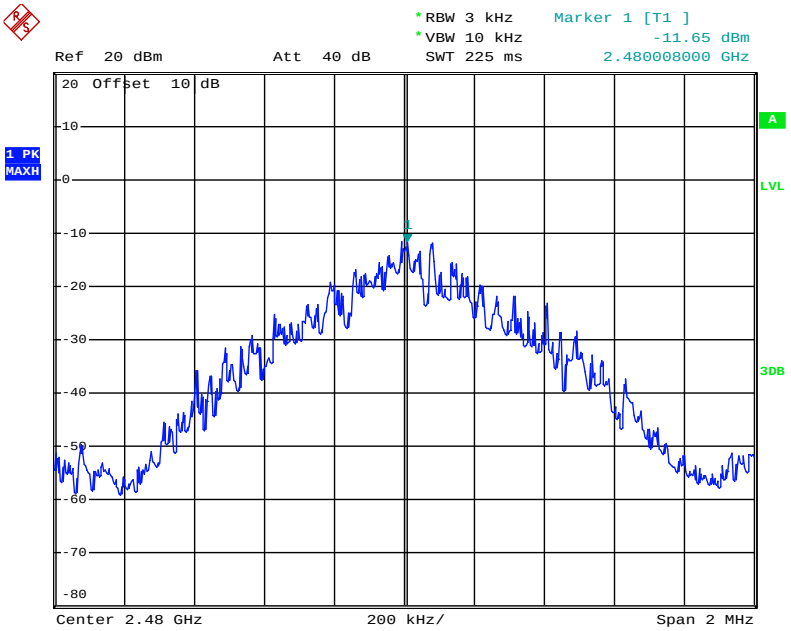
channel 0



channel 19

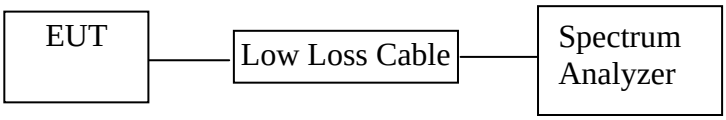


channel 39


RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-11.65 dBm
2.480008000 GHz
Ref 20 dBm
Att 40 dB
Offset 10 dB
1 PK
MAXH
A
LVL
3DB
Center 2.48 GHz
200 kHz/
Span 2 MHz

8. BAND EDGE COMPLIANCE TEST

8.1.Block Diagram of Test Setup



8.2.The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

8.3.EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4.Operating Condition of EUT

8.4.1.Setup the EUT and simulator as shown as Section 8.1.

8.4.2.Turn on the power of all equipment.

8.4.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

8.5.Test Procedure

Conducted Band Edge:

8.5.1.The transmitter output was connected to the spectrum analyzer via a low loss cable.

8.5.2.Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

Radiate Band Edge:

8.5.3.The EUT is placed on a turntable, which is 0.1m above the ground plane and worked at highest radiated power.

8.5.4.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

8.5.5.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

8.5.6.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

8.5.7.RBW=1MHz, VBW=1MHz

8.5.8.The band edges was measured and recorded.

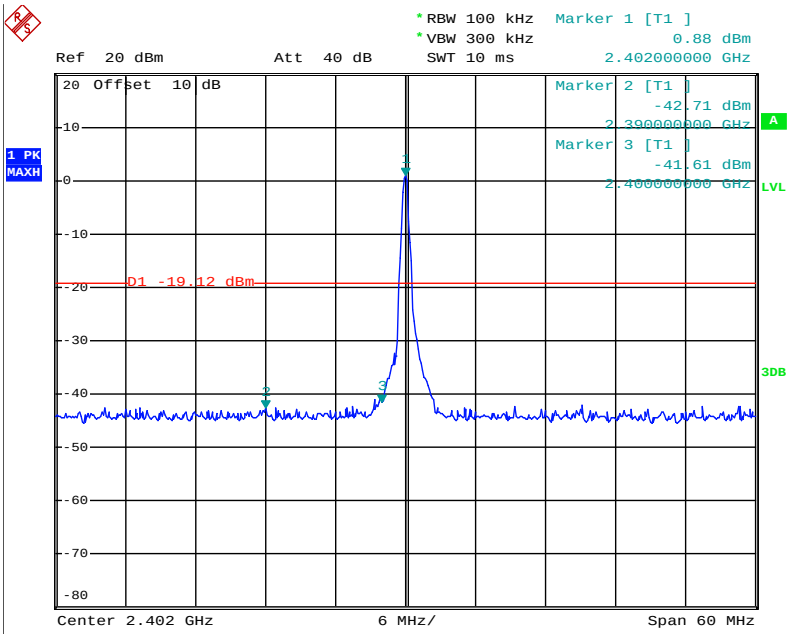
8.6.Test Result

Conducted Band Edge Result

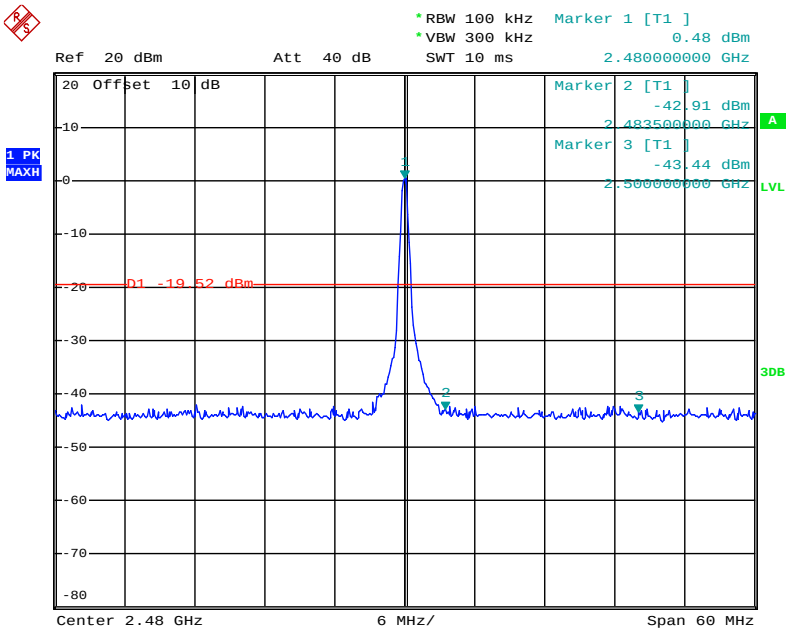
Channel	Frequency	Delta peak to band emission	Limit(dBc)	Result
0	2.402GHz	40.73	＞20	Pass
39	2.480GHz	42.43	＞20	Pass

The spectrum analyzer plots are attached as below.

channel 0



channel 39

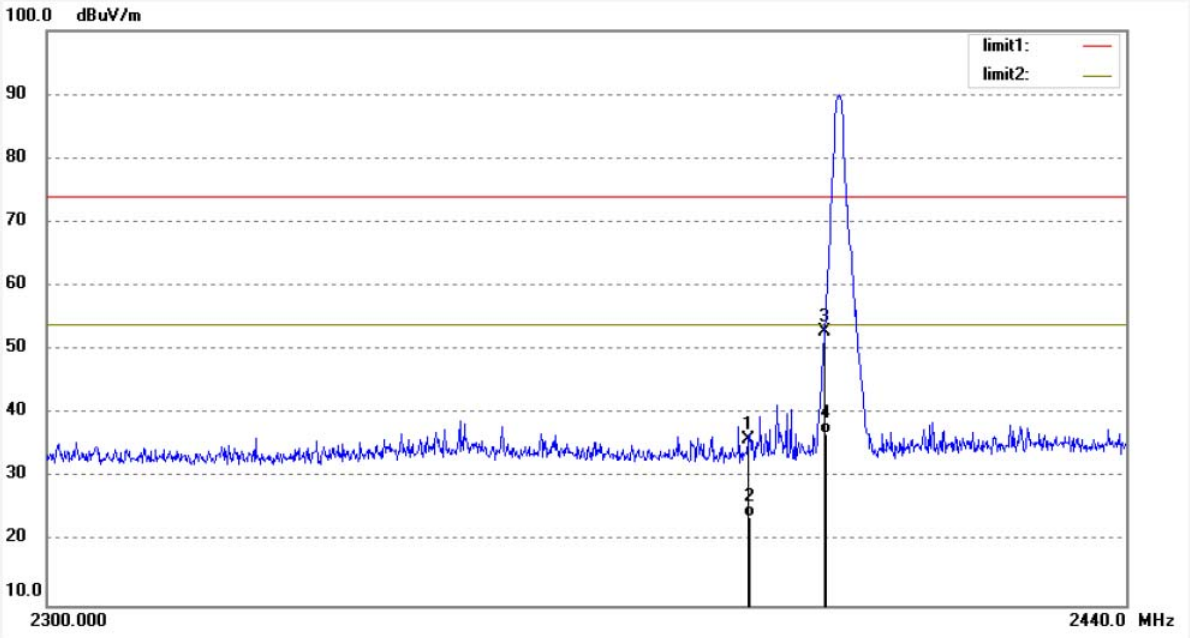


Radiated Band Edge Result

ACCURATE TECHNOLOGY CO., LTD.
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China
Site: 2# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: ac #74	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:58:16
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	42.21	-6.32	35.89	74.00	-38.11	peak	150	135	
2	2390.000	30.22	-6.32	23.90	54.00	-30.10	AVG	150	135	
3	2400.000	59.04	-6.27	52.77	74.00	-21.23	peak	150	196	
4	2400.000	43.07	-6.27	36.80	54.00	-17.20	AVG	150	196	

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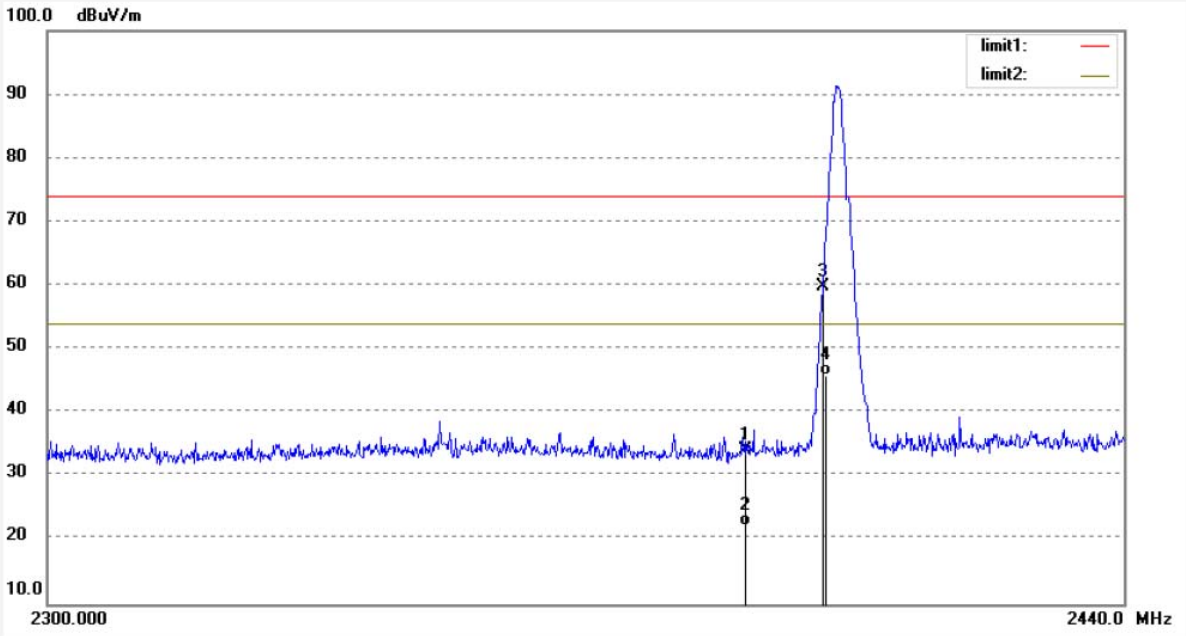
Job No.: ac #73	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:56:09
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	40.50	-6.32	34.18	74.00	-39.82	peak	250	156	
2	2390.000	28.52	-6.32	22.20	54.00	-31.80	AVG	250	156	
3	2400.000	66.09	-6.27	59.82	74.00	-14.18	peak	250	215	
4	2400.000	52.07	-6.27	45.80	54.00	-8.20	AVG	250	215	

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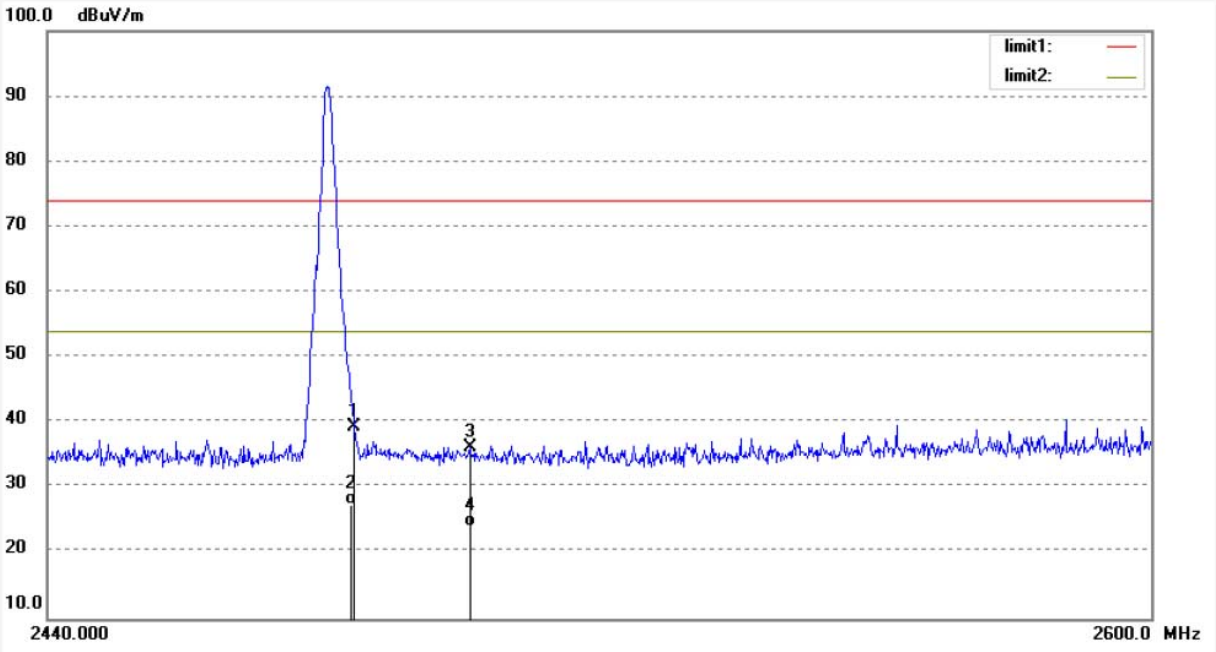
Job No.: ac #72	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:54:42
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	45.22	-5.89	39.33	74.00	-34.67	peak	150	145	
2	2483.500	33.29	-5.89	27.40	54.00	-26.60	AVG	150	145	
3	2500.000	41.97	-5.81	36.16	74.00	-37.84	peak	150	256	
4	2500.000	29.91	-5.81	24.10	54.00	-29.90	AVG	150	256	

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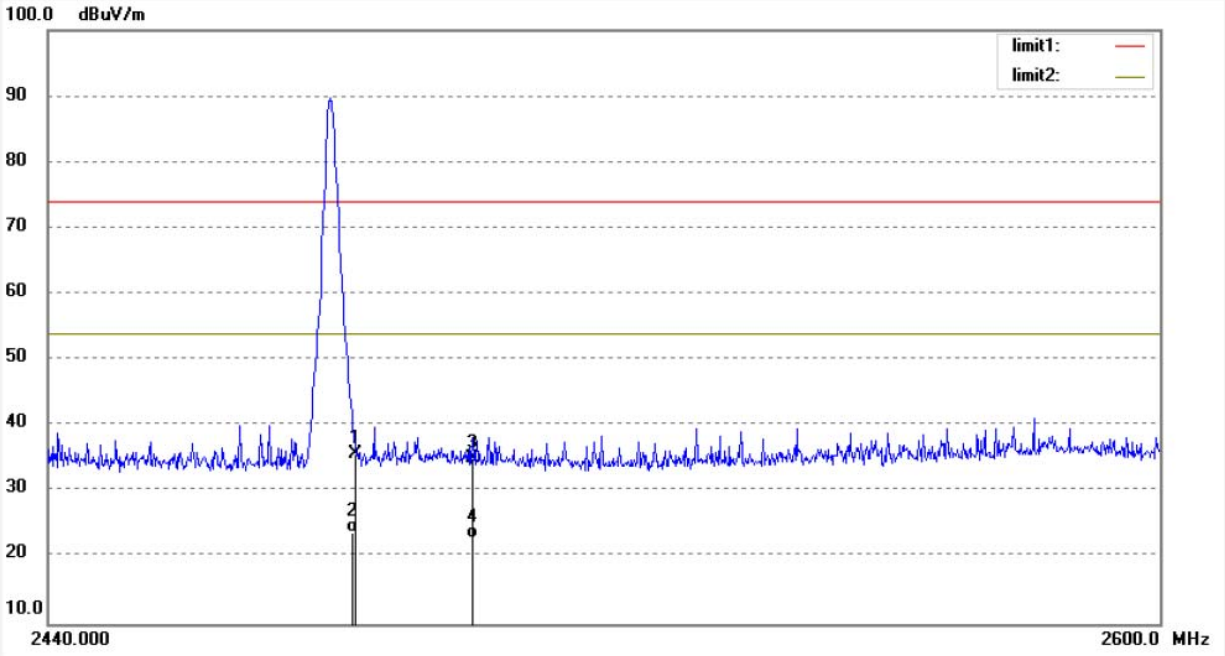
Job No.: ac #71	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:52:36
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.350	41.60	-5.89	35.71	74.00	-38.29	peak	250	125	
2	2483.350	29.69	-5.89	23.80	54.00	-30.20	AVG	250	125	
3	2500.000	40.83	-5.81	35.02	74.00	-38.98	peak	250	196	
4	2500.000	28.81	-5.81	23.00	54.00	-31.00	AVG	250	196	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

   Result = Reading + Corrected Factor

9. RADIATED SPURIOUS EMISSION TEST

9.1.Block Diagram of Test Setup

Block diagram of connection between the EUT and peripherals

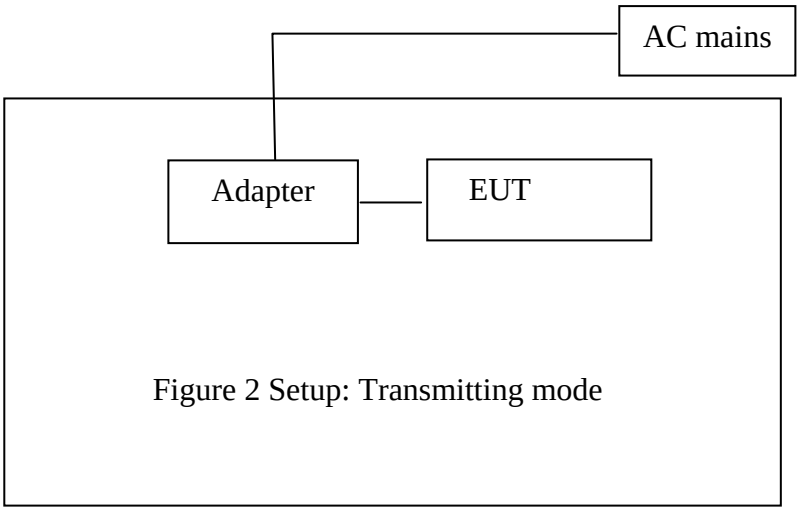
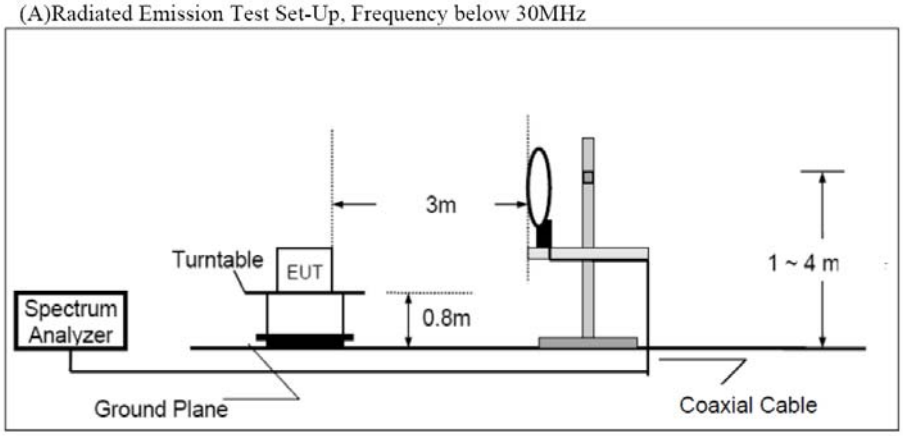


Figure 2 Setup: Transmitting mode

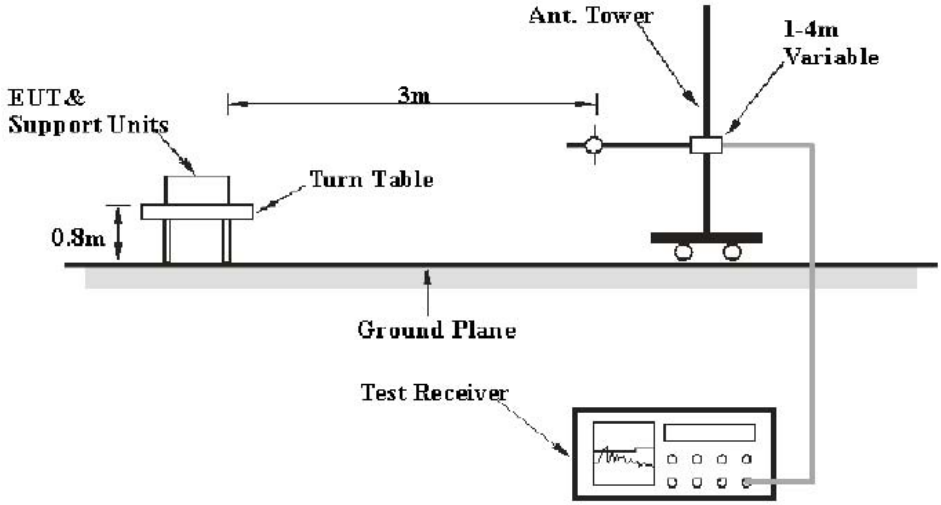
Setup: Transmitting mode

9.1.1.Semi-Anechoic Chamber Test Setup Diagram

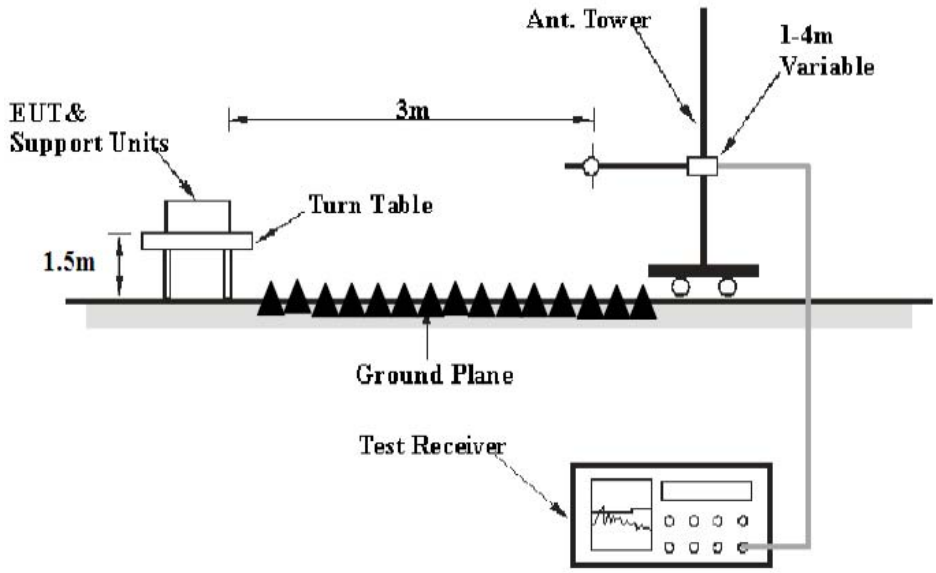
(A)Radiated Emission Test Set-Up, Frequency below 30MHz



(B)Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



9.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated

emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

9.3. Restricted bands of operation

9.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

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])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510
[2]Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

9.4.Configuration of EUT on Test

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.5. Operating Condition of EUT

9.5.1.Setup the EUT and simulator as shown as Section 9.1.

9.5.2.Turn on the power of all equipment.

9.5.3.Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

9.6.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground(Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading.

9.7.Data Sample

Frequency (MHz)	Reading (dBμv)	Factor (dB/m)	Result (dBμv/m)	Limit (dBμv/m)	Margin (dB)	Remark
X.XX	43.85	-22.22	21.63	43.5	-21.87	QP

Frequency(MHz) = Emission frequency in MHz
Reading(dBμv) = Uncorrected Analyzer/Receiver reading
Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain
Result(dBμv/m) = Reading(dBμv) + Factor(dB/m)
Limit (dBμv/m) = Limit stated in standard
Margin (dB) = Result(dBμv/m) - Limit (dBμv/m)
QP = Quasi-peak Reading

Calculation Formula:
Margin(dB) = Result (dBμV/m)–Limit(dBμV/m)
Result(dBμV/m)= Reading(dBμV)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

9.8.Test Result

Pass.

Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Below 1GHz

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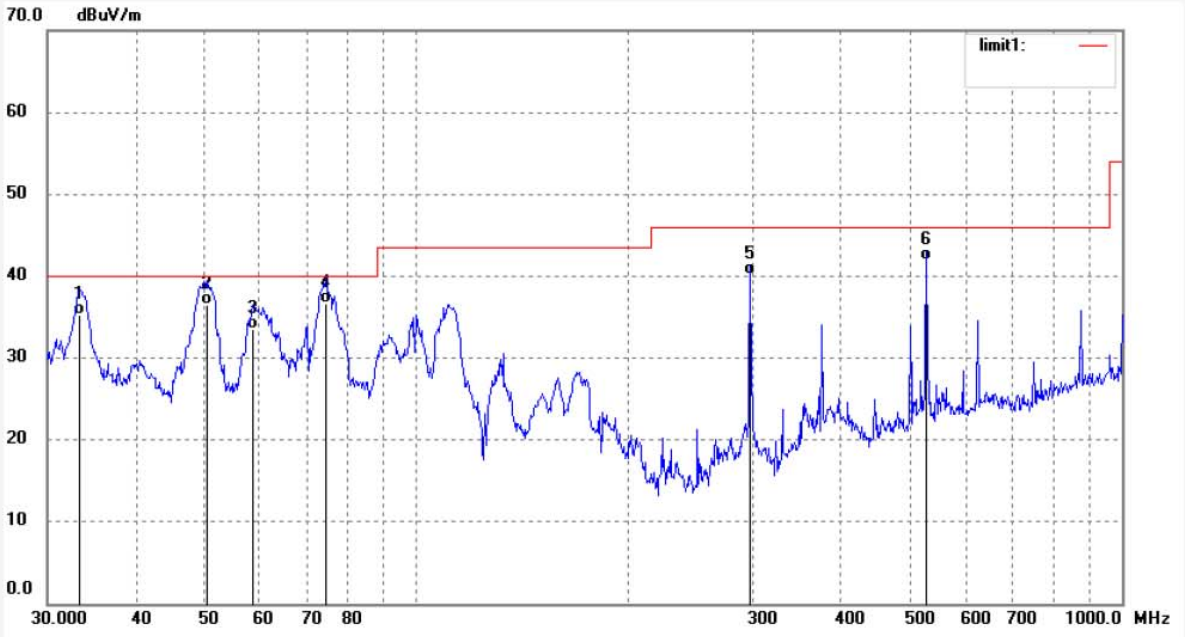
Job No.: jp2020 #120	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 20/05/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 8/26/56
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.3278	46.11	-10.91	35.20	40.00	-4.80	QP	100	95	
2	50.5859	50.14	-13.64	36.50	40.00	-3.50	QP	100	106	
3	58.6126	48.17	-14.67	33.50	40.00	-6.50	QP	100	136	
4	74.3953	54.28	-17.68	36.60	40.00	-3.40	QP	100	185	
5	297.2241	50.44	-10.34	40.10	46.00	-5.90	QP	100	196	
6	528.2458	47.22	-5.22	42.00	46.00	-4.00	QP	100	265	

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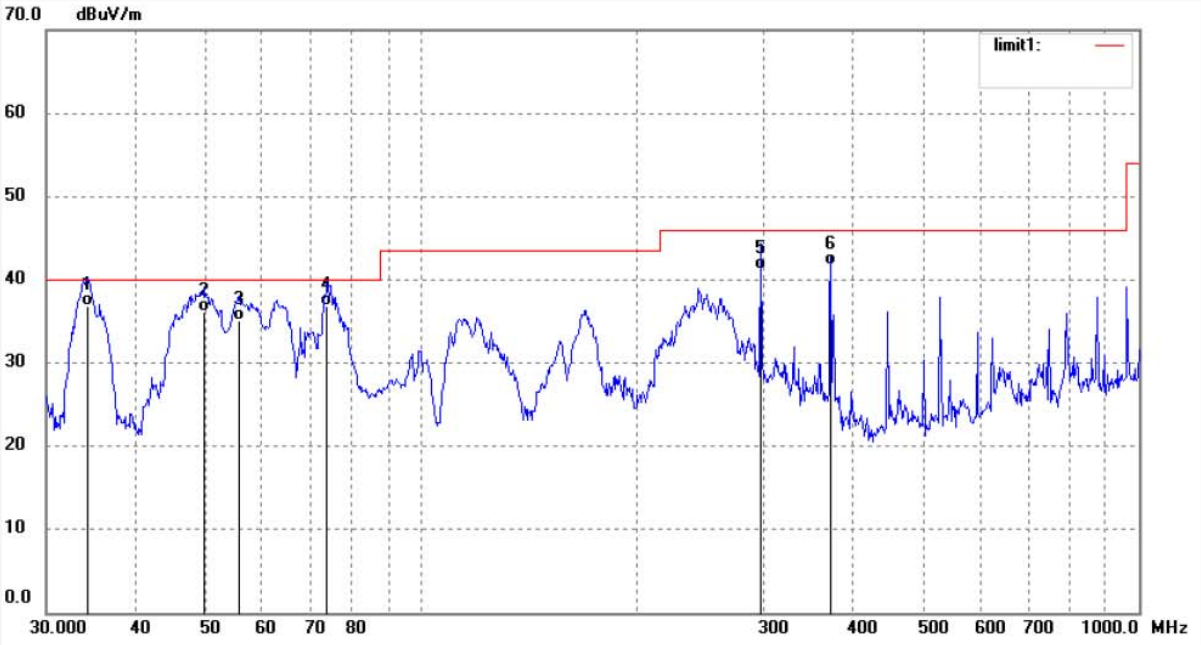
Job No.: jp2020 #121	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 20/05/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 8/27/26
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.2760	48.10	-11.20	36.90	40.00	-3.10	QP	200	85	
2	49.7068	49.71	-13.61	36.10	40.00	-3.90	QP	200	93	
3	55.8046	49.23	-14.13	35.10	40.00	-4.90	QP	200	106	
4	73.8756	54.51	-17.61	36.90	40.00	-3.10	QP	200	186	
5	297.2241	51.64	-10.34	41.30	46.00	-4.70	QP	200	196	
6	372.0045	50.28	-8.48	41.80	46.00	-4.20	QP	200	216	

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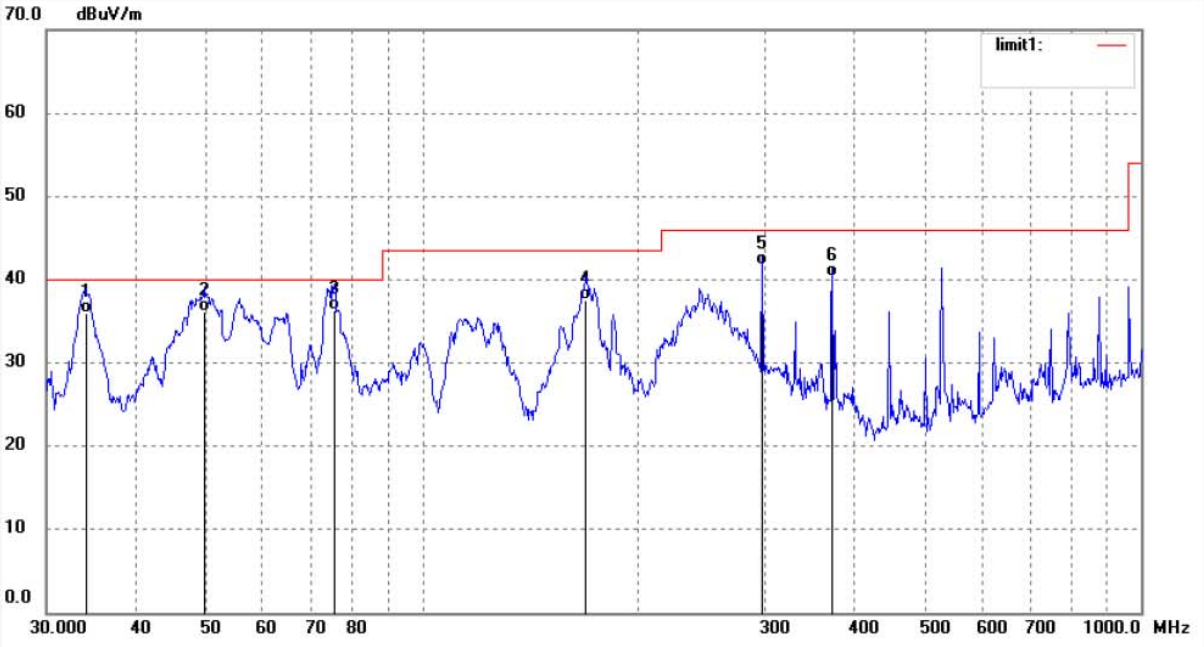
Job No.: jp2020 #122	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 20/05/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 8/27/52
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2440MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.0363	47.03	-11.13	35.90	40.00	-4.10	QP	200	85	
2	49.7068	49.81	-13.61	36.20	40.00	-3.80	QP	200	102	
3	75.4462	54.14	-17.74	36.40	40.00	-3.60	QP	200	163	
4	169.0054	52.34	-14.84	37.50	43.50	-6.00	QP	200	186	
5	297.2241	52.14	-10.34	41.80	46.00	-4.20	QP	200	202	
6	372.0045	48.78	-8.48	40.30	46.00	-5.70	QP	200	256	

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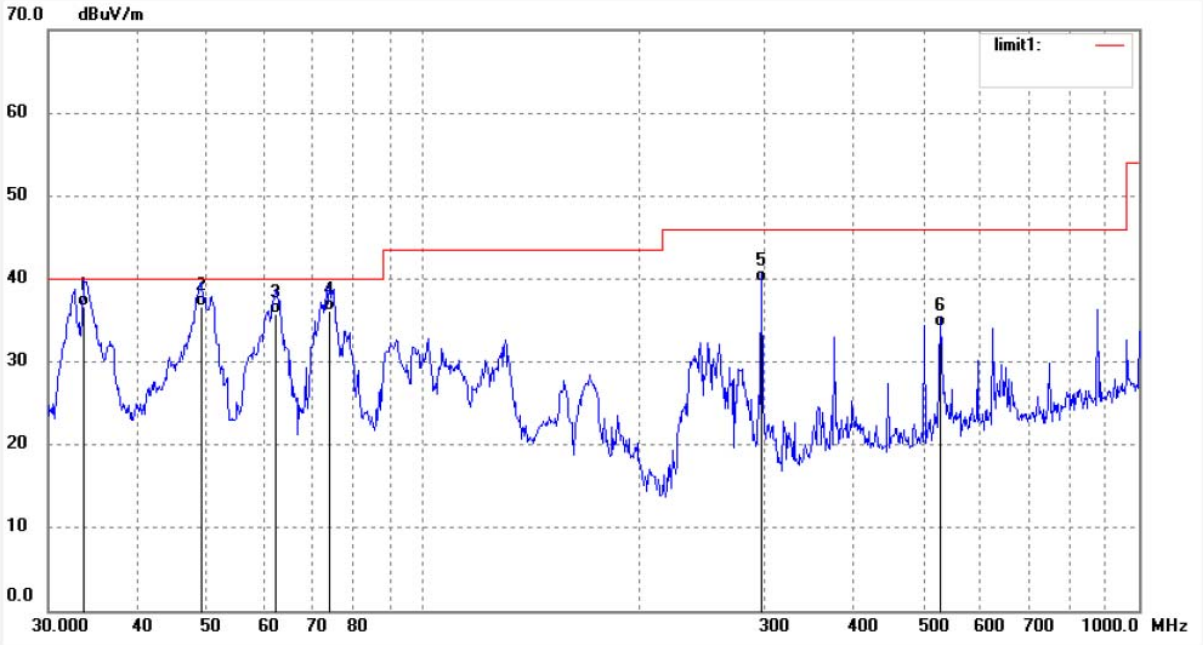
Job No.: jp2020 #123
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: Android motherboard
Mode: BLE TX 2440MHz
Model: DC_RK3288_GB_v6.13B
Manufacturer: Dingchang

Polarization: Vertical
Power Source: DC 12V
Date: 20/05/15/
Time: 8/28/13
Engineer Signature: Ben
Distance: 3m

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.6802	47.72	-11.02	36.70	40.00	-3.30	QP	100	84	
2	49.0144	50.21	-13.61	36.60	40.00	-3.40	QP	100	96	
3	62.4313	51.61	-15.81	35.80	40.00	-4.20	QP	100	105	
4	74.1350	53.84	-17.64	36.20	40.00	-3.80	QP	100	136	
5	297.2241	50.04	-10.34	39.70	46.00	-6.30	QP	100	185	
6	528.2458	39.52	-5.22	34.30	46.00	-11.70	QP	100	214	

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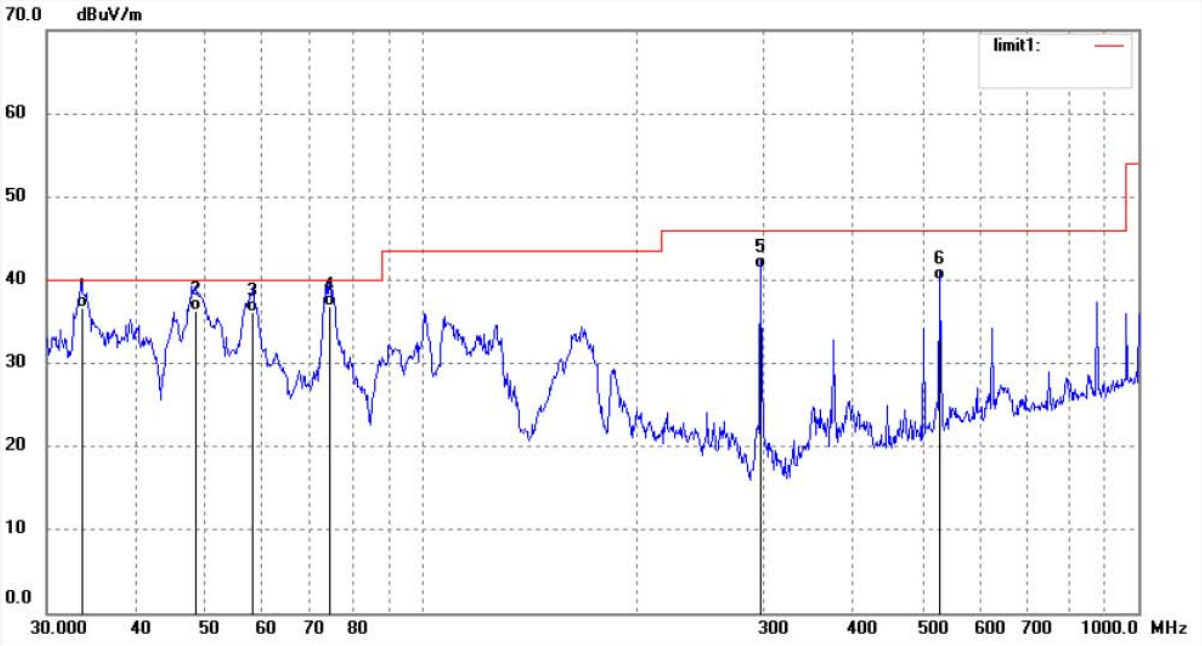
Job No.: jp2020 #124	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 20/05/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 8/28/28
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.5623	47.69	-10.99	36.70	40.00	-3.30	QP	100	84	
2	48.3318	49.92	-13.62	36.30	40.00	-3.70	QP	100	96	
3	58.2030	50.79	-14.59	36.20	40.00	-3.80	QP	100	106	
4	74.3953	54.51	-17.65	36.83	40.00	-3.20	QP	100	136	
5	297.2241	51.74	-10.34	41.40	46.00	-4.60	QP	100	196	
6	528.2458	45.22	-5.22	40.00	46.00	-6.00	QP	100	232	

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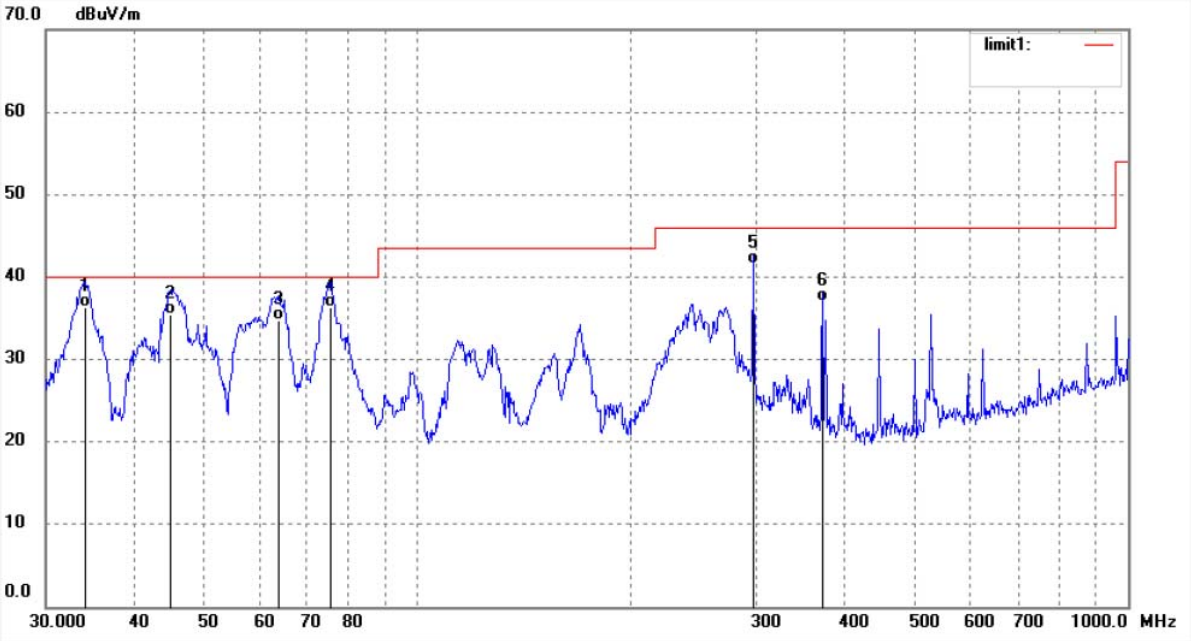
Job No.: jp2020 #125	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 12V
Test item: Radiation Test	Date: 20/05/15/
Temp.(C)/Hum.(%) 23 C / 48 %	Time: 8/28/46
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	34.0363	47.53	-11.13	36.40	40.00	-3.60	QP	200	89	
2	44.9004	49.02	-13.62	35.40	40.00	-4.60	QP	200	106	
3	63.7588	50.99	-16.29	34.70	40.00	-5.30	QP	200	136	
4	75.4462	54.14	-17.74	36.40	40.00	-3.60	QP	200	175	
5	297.2241	51.94	-10.34	41.60	46.00	-4.40	QP	200	196	
6	372.0045	45.58	-8.48	37.10	46.00	-8.90	QP	200	263	

Above 1GHz

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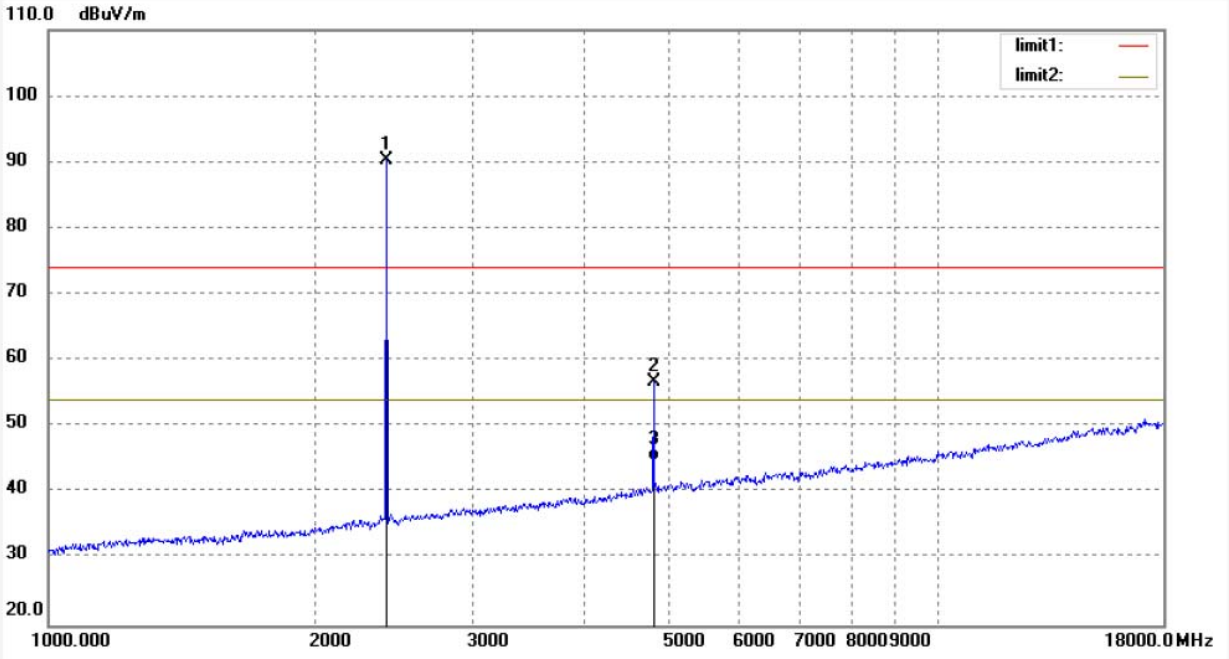
Job No.: ac #65	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:40:27
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	96.58	-6.27	90.31			peak	150	152	
2	4804.000	55.88	1.00	56.88	74.00	-17.12	peak	150	196	
3	4804.000	43.80	1.00	44.80	54.00	-9.20	AVG	150	196	

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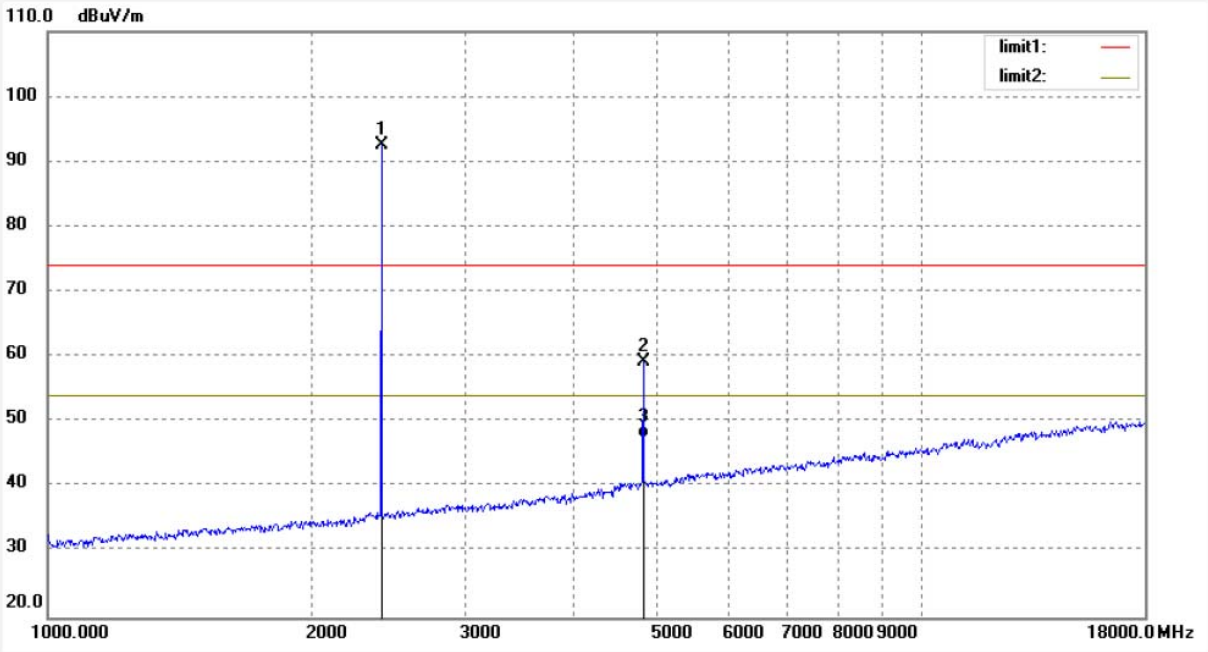
Job No.: ac #66	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:42:26
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2402MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2408.600	98.76	-6.24	92.52			peak	250	156	
2	4801.328	58.36	1.00	59.36	74.00	-14.64	peak	250	175	
3	4801.328	46.50	1.00	47.50	54.00	-6.50	AVG	250	175	

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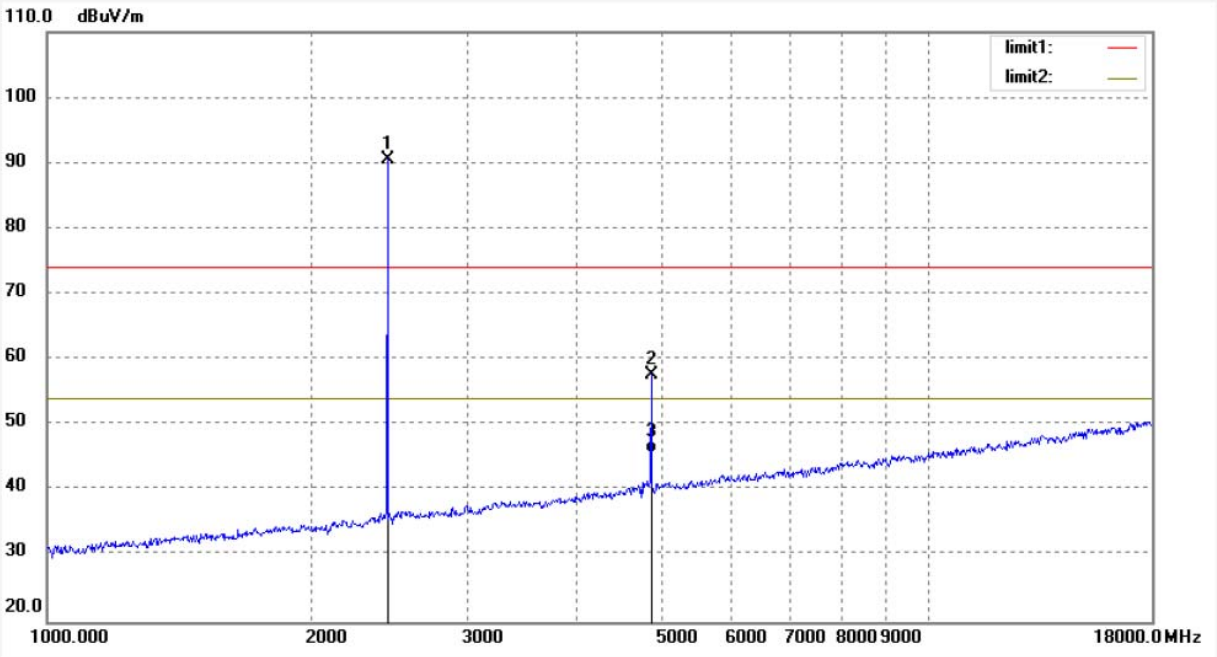
Job No.: ac #67	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:44:33
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2440MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.000	96.56	-6.10	90.46			peak	150	129	
2	4880.000	56.41	1.25	57.66	74.00	-16.34	peak	150	186	
3	4880.000	44.55	1.25	45.80	54.00	-8.20	AVG	150	186	

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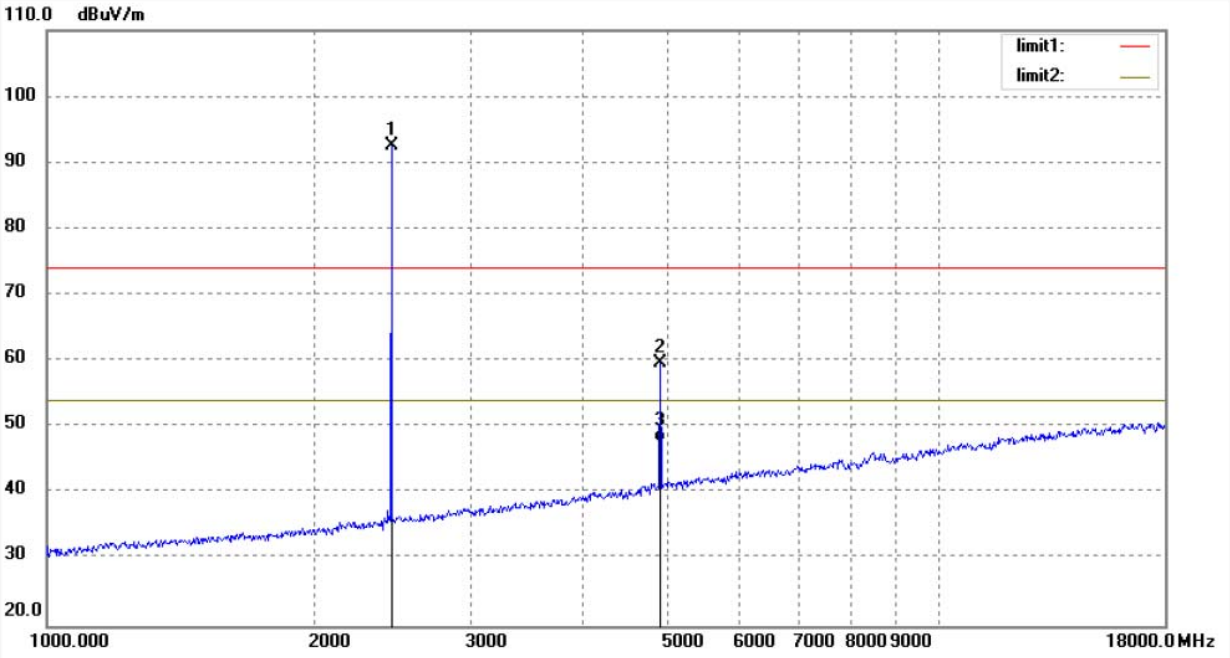
Job No.: ac #68	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:46:35
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2440MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.000	98.66	-6.10	92.56			peak	250	156	
2	4880.000	58.28	1.36	59.64	74.00	-14.36	peak	250	196	
3	4880.000	46.34	1.36	47.70	54.00	-6.30	AVG	250	196	

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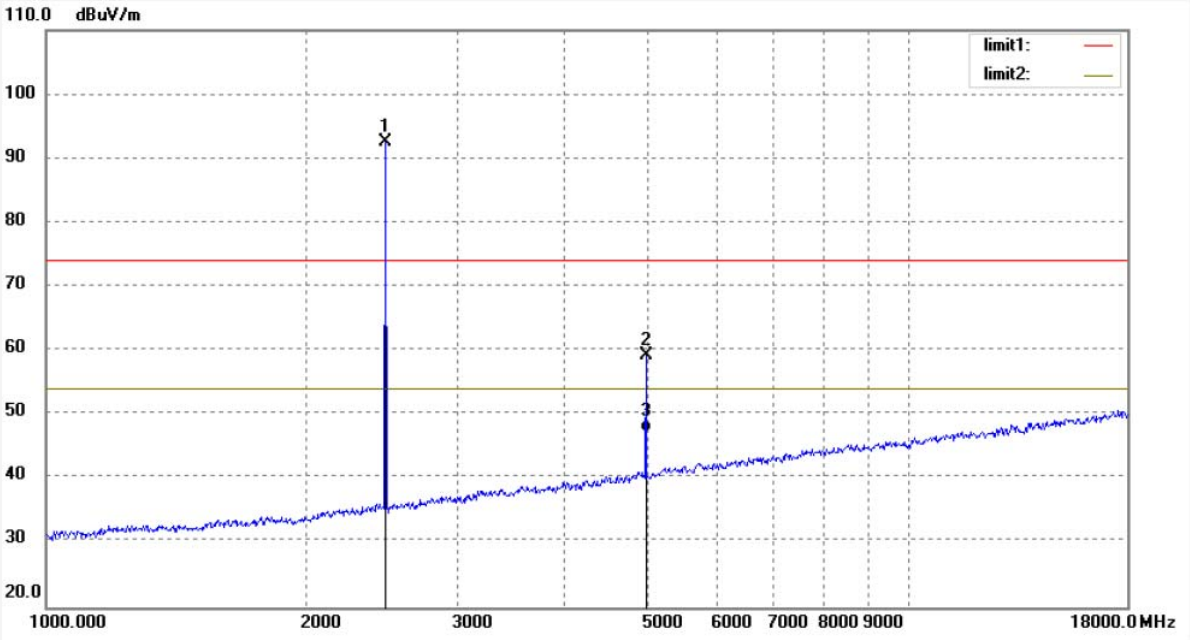
Job No.: ac #69	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:48:37
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

Note: Report NO.:ATE20200470



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	98.43	-5.90	92.53			peak	250	136	
2	4960.000	57.59	1.75	59.34	74.00	-14.66	peak	250	186	
3	4960.000	45.65	1.75	47.40	54.00	-6.60	AVG	250	186	

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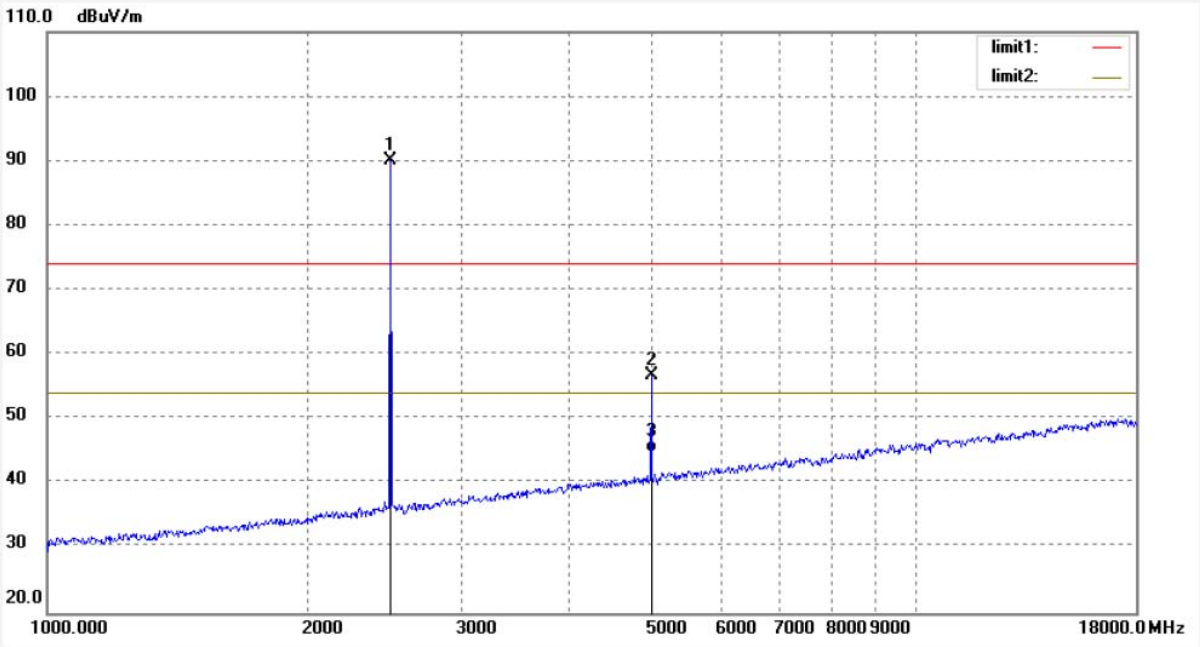
Job No.: ac #70	Polarization: Vertical
Standard: FCC PK	Power Source: DC 12V
Test item: Radiation Test	Date: 2020/05/25
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17:50:37
EUT: Android motherboard	Engineer Signature: Ben
Mode: BLE TX 2480MHz	Distance: 3m
Model: DC_RK3288_GB_v6.13B	
Manufacturer: Dingchang	

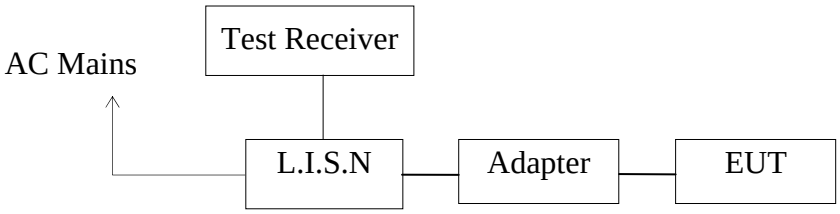
Note: Report NO.:ATE20200470



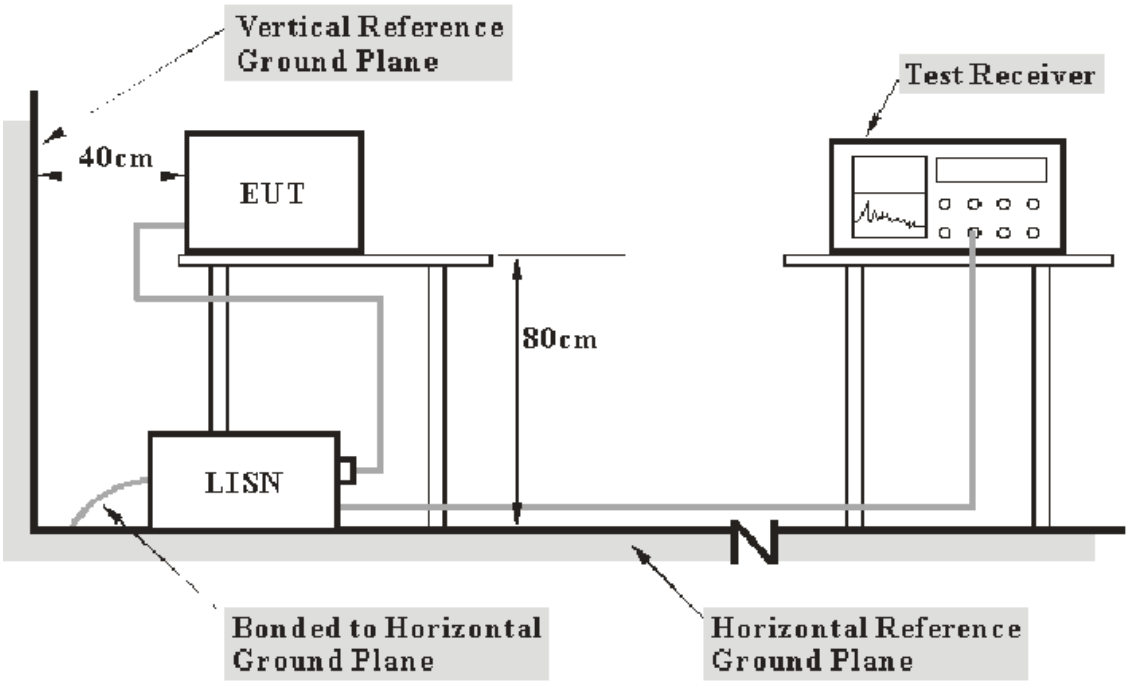
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	95.86	-5.87	89.99			peak	150	102	
2	4960.000	55.10	1.75	56.85	74.00	-17.15	peak	150	163	
3	4960.000	43.15	1.75	44.90	54.00	-9.10	AVG	150	163	

10.POWER LINE CONDUCTED EMISSION TEST

10.1.Block Diagram of Test Setup



10.2.Test System Setup



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

10.3.Test Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

10.4.Configuration of EUT on Test

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

10.5.Operating Condition of EUT

10.5.1.Setup the EUT and simulator as shown as Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in test mode and measure it.

10.6.Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

10.7.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz
Transducer value(dB) = Insertion loss of LISN + Cable Loss
Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value
Limit (dBμV) = Limit stated in standard

Calculation Formula:
Margin = Limit (dBμV) - Level (dBμV)

10.8.Test Result

Pass.

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

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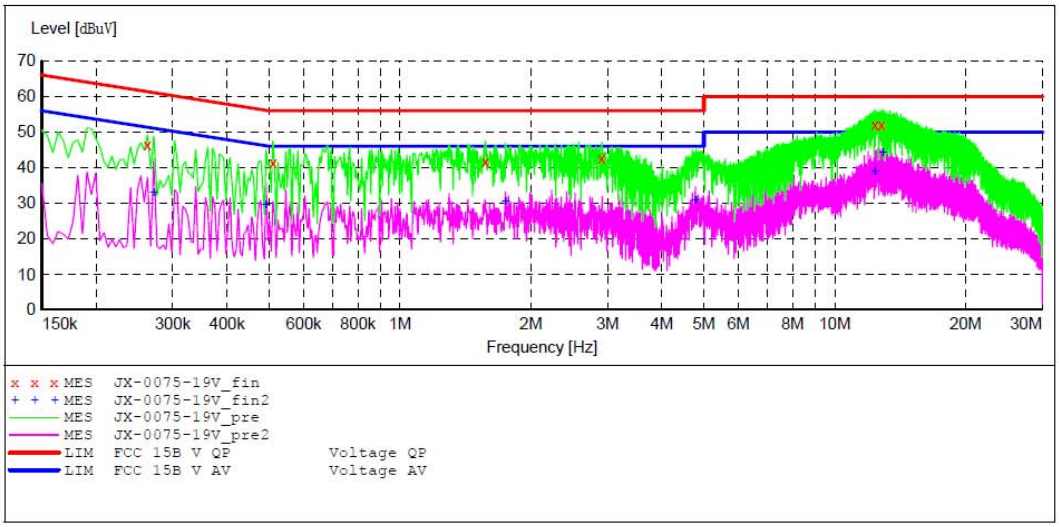
CONDUCTED EMISSION STANDARD FCC PART 15B

EUT:	Android motherboard M/N:DC_RK3288_GB_v6.13B
Manufacturer:	Dingchang
Operating Condition:	BT Communication
Test Site:	1#Shielding Room
Operator:	Ben
Test Specification:	N 120V/60Hz
Comment:	Report NO.:ATE20190470
Start of Test:	2020-5-20 / 9:42:26

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "JX-0075-19V_fin"

2020-5-20 9:44

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.262500	46.30	10.9	61	15.1	QP	N	GND
0.510000	41.40	11.0	56	14.6	QP	N	GND
1.572000	41.70	11.2	56	14.3	QP	N	GND
2.913000	42.50	11.3	56	13.5	QP	N	GND
12.390000	52.10	11.6	60	7.9	QP	N	GND
12.813000	52.10	11.6	60	7.9	QP	N	GND

MEASUREMENT RESULT: "JX-0075-19V_fin2"

2020-5-20 9:44

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.271500	32.90	10.9	51	18.2	AV	N	GND
0.492000	29.60	11.0	46	16.5	AV	N	GND
1.747500	30.50	11.2	46	15.5	AV	N	GND
4.776000	30.70	11.4	46	15.3	AV	N	GND
12.354000	38.90	11.6	50	11.1	AV	N	GND
12.898500	44.20	11.6	50	5.8	AV	N	GND

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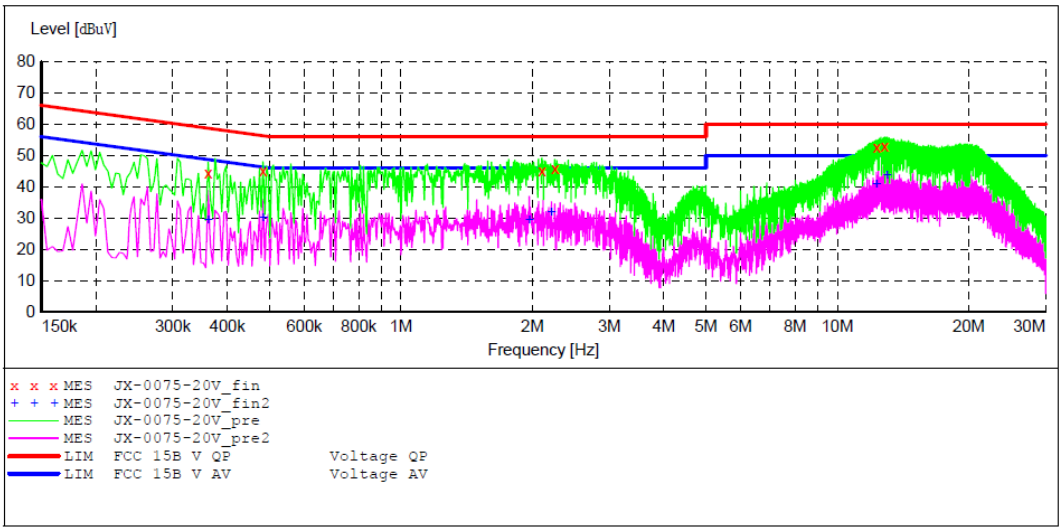
CONDUCTED EMISSION STANDARD FCC PART 15B

```
EUT:                  Android motherboard M/N:DC_RK3288_GB_v6.13B
Manufacturer:         Dingchang
Operating Condition:  BT Communication
Test Site:            1#Shielding Room
Operator:             Ben
Test Specification:   L  120V/60Hz
Comment:              Report NO.:ATE20190470
Start of Test:        2020-5-20 / 9:44:58
```

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "JX-0075-20V_fin"

2020-5-20 9:47

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.361500	44.30	10.9	59	14.4	QP	L1	GND
0.483000	45.20	11.0	56	11.1	QP	L1	GND
2.103000	45.30	11.3	56	10.7	QP	L1	GND
2.251500	45.70	11.3	56	10.3	QP	L1	GND
12.300000	52.60	11.6	60	7.4	QP	L1	GND
12.835500	53.10	11.6	60	6.9	QP	L1	GND

MEASUREMENT RESULT: "JX-0075-20V_fin2"

2020-5-20 9:47

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.361500	29.60	10.9	49	19.1	AV	L1	GND
0.483000	30.00	11.0	46	16.3	AV	L1	GND
1.968000	29.40	11.3	46	16.6	AV	L1	GND
2.211000	32.10	11.3	46	13.9	AV	L1	GND
12.300000	40.70	11.6	50	9.3	AV	L1	GND
13.020000	43.60	11.6	50	6.4	AV	L1	GND

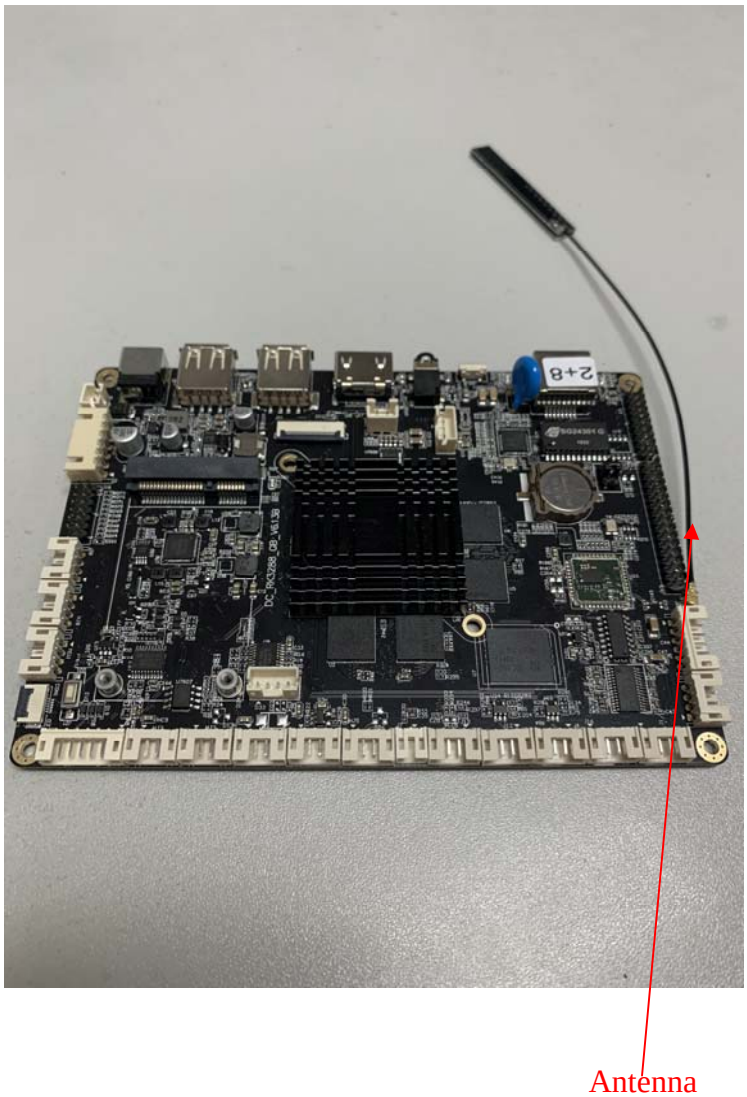
11. ANTENNA REQUIREMENT

11.1. The Requirement

According to 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.

11.2. Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 4.0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



******* End of Test Report *******