



Product Name: Smart Phone	Report No: FCC022023-00288RF3
Product Model: V20Pro	Security Classification: Open
Version: V1.0	Total Page: 36

TIRT Testing Report

Prepared By:	Checked By:	Approved By:	
Stone Tang	Randy Lv	Daniel Chen	
Stone Tang	Randy Lv	Daniel chen	

RF TEST REPORT

FCC ID: 2AX4YV20PRO

According to

47 CFR FCC Part 15, Subpart C(Section 15.225)

ANSI C63.10:2013

Equipment : Smart Phone
Model No. : V20Pro
Trademark : DOOGEE
Applicant : Shenzhen DOOGEE Hengtong Technology CO.,LTD
B, 2/F, Building A4, Silicon Valley Power Digital Industrial Park, No. 22,
Dafu Industrial Zone, Guanlan Aobei Community, Guanlan Street,
Longhua New District, Shenzhen, Guangdong China

- The test result referred exclusively to the presented test model /sample.
- Without written approval of TIRT Inc. the test report shall not reproduced except in full.
- Test date: 2023/02/01~2023/02/14

Lab: Beijing TIRT Technology Service Co.,Ltd Shenzhen

Add: 101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street,
Pingshan District, Shenzhen, China

TEL: +86-0755-27087573

TABLE OF CONTENTS

Description	Page
1. General Information	5
1.1. Description of Device (EUT)	5
1.2. Accessories of Device (EUT)	6
1.3. Ancillary Equipment Details	6
1.4. Test Lab Information	6
2. Summary of test	7
2.1. Summary of test result	7
2.2. Block Diagram	7
2.3. Test mode	7
2.4. Test Conditions	7
2.5. Measurement Uncertainty	8
2.6. Test Equipment	9
3. Occupied bandwidth and 20dB Bandwidth	10
3.1. Limit	10
3.2. Test Procedure	10
3.3. Test Setup	10
3.4. Test Result	10
4. Radiated emissions	11
4.1. Limit	11
4.2. Block Diagram of Test setup	11
4.3. Test Procedure	12
4.4. Test Result	13
5. Frequency stability	19
5.1. Test limit	19
5.2. Test Procedure	19
5.3. Test Setup	19
5.4. Test Results	19
6. Power Line Conducted Emissions	21
6.1. Block Diagram of Test Setup	21
6.2. Limit	21
6.3. Test Procedure	21
6.4. Test Result	21
7. Antenna Requirements	24
7.1. Limit	24
7.2. Antenna Connected Construction	24
7.3. Results	24
8. Test setup photo	25
8.1. Photos of Radiated emission	25
8.2. Photos of Conducted Emission test	25

History of this test report

Original Report Issue Date: 2023.02.17

- No additional attachment
- Additional attachments were issued following record

Attachment No.	Issue Date	Description

1. General Information

1.1. Description of Device (EUT)

EUT Name : Smart Phone
Model No. : V20Pro
DIFF. : N/A
Power supply : DC 11V from adapter, DC 3.7V from battery

NFC

Operation frequency : 13.56MHz
Channel No. : 1 Channel
Modulation : ASK
Antenna Type : Internal antenna, Antenna gain 0dBi.

Software version : DOOGEE-V20Pro-EEA-Android12.0-20221209
Hardware version : A201_01

1.2. Accessories of Device (EUT)

Accessories : /
Manufacturer : /
Model : /
Ratings : /

1.3. Ancillary Equipment Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	N/A	N/A	N/A	N/A	N/A

1.4. Test Lab Information

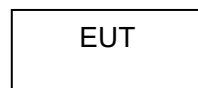
Company:	Beijing TIRT Technology Service Co.,Ltd Shenzhen
Address:	101, 3 # Factory Building, Gongjin Electronics Shatin Community, Kengzi Street, Pingshan District, Shenzhen, China
CNAS Registration Number:	CNAS L14158
A2LA Registration Number:	6049.01
FCC Designation Number:	CN1309
Test Firm Registration Number:	825524
Telephone:	+86-0755-27087573

2. Summary of test

2.1. Summary of test result

Description of Test Item	Standard	Results
Conducted Emission	15.207(a)	PASS
Radiated emissions	15.209(a)&15.225	PASS
Fundamental field strength limit	15.225(a)	PASS
Frequency stability	15.225(e)	PASS
Band edge compliance	15.225	PASS
Antenna Requirement	15.203	PASS

2.2. Block Diagram



2.3. Test mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
1	CH1	13.56
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.		

2.4. Test Conditions

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

2.5. Measurement Uncertainty

Uncertainty	
Parameter	Uncertainty
Occupied Channel Bandwidth	± 142.12 KHz
RF power conducted	± 0.74 dB
RF power radiated	± 3.25 dB
Spurious emissions, conducted	± 1.78 dB
Spurious emissions, radiated (9KHz~30MHz)	± 2.56 dB
Spurious emissions, radiated (30MHz~ 1GHz)	± 4.6 dB
Spurious emissions, radiated (Above 1GHz)	± 4.9 dB
Conduction Emissions(150kHz~30MHz)	± 3.1 dB
Humidity	$\pm 4.6\%$
Temperature	$\pm 0.7^{\circ}\text{C}$
Time	$\pm 1.25\%$

2.6. Test Equipment

No.	Equipment	Manufacturer	Type No.	Serial No.	Cal. date (yyyy/mm/dd)	Cal. Due date (yyyy/mm/dd)
1	EMI Receiver	Rohde&Schwarz	ESCI	100718	2022/11/09	2023/11/10
2	AMN	Rohde&Schwarz	ENV216	100075	2022/11/09	2023/11/10
3	AMN	Schwarzbeck	NSLK8127	#829	2022/11/09	2023/11/10
4	ECSI RF IN RF Cable	Rohde&Schwarz	RP-X1	\	2022/11/17	2023/11/16
5	ECSI RF IN RF Cable	Rohde&Schwarz	Sapre sm	\	2022/11/09	2023/11/10
6	EMI Receiver	Rohde&Schwarz	ESR7	102013	2022/11/09	2023/11/10
7	Spectrum analyzer	Rohde&Schwarz	FSV30	103741	2022/11/09	2023/11/10
8	Spectrum analyzer	KEYSIGHT	N9010A	MY5144015 8	2022/11/09	2023/11/10
9	Integral Antenna	Schwarzbeck	VULB 9163	9163-868	2022/12/25	2023/12/24
10	Integral Antenna	Schwarzbeck	BBHA 9120D	BBHA 9120D 1201	2022/11/09	2023/11/10
11	Integral Antenna	Schwarzbeck	BBHA 9170	9170#685	2022/11/06	2023/11/10
12	Preamplifier	CD Systems Inc	PAP-0303 6-30	85060000	2022/11/09	2023/11/10
13	Preamplifier	Schwarzbeck	BBV9721	9721-019	2022/11/09	2023/11/10
14	Preamplifier	emci	EMC01264 5SE	980417	2022/11/09	2023/11/10
15	ECSI RF IN RF Cable	Rohde&Schwarz	AP-X1	\	2022/11/09	2023/11/10
16	Spectrum Analyzer	Agilent	N9010A	MY5222111 9	2022/11/09	2023/11/10
17	Power Collection Unit	Tonscend	JS0806-2	188060134	2022/09/12	2023/09/11
18	Tonscend Test System	Tonscend	2.6.77.051 8	NA	NA	NA
19	Power Sensor	Agilent	U2021XA	MY5541001 1	2022/09/12	2023/09/11
20	Power Sensor	Agilent	U2021XA	MY5541001 2	2022/09/12	2023/09/11
21	Power Sensor	Agilent	U2021XA	MY5541001 8	2022/09/12	2023/09/11
22	Power Sensor	Agilent	U2021XA	MY5541001 9	2022/09/12	2023/09/11
23	Temp&Humidity Recorder	Anymetre	JR900	NA	2022/11/03	2023/11/02
24	Temp&Humidity Chamber	ETOMA	NTH1100- 30A	16080628	2022/09/01	2023/08/30

3. Occupied bandwidth and 20dB Bandwidth

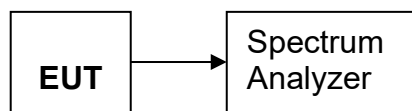
3.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in FCC part 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.

3.2. Test Procedure

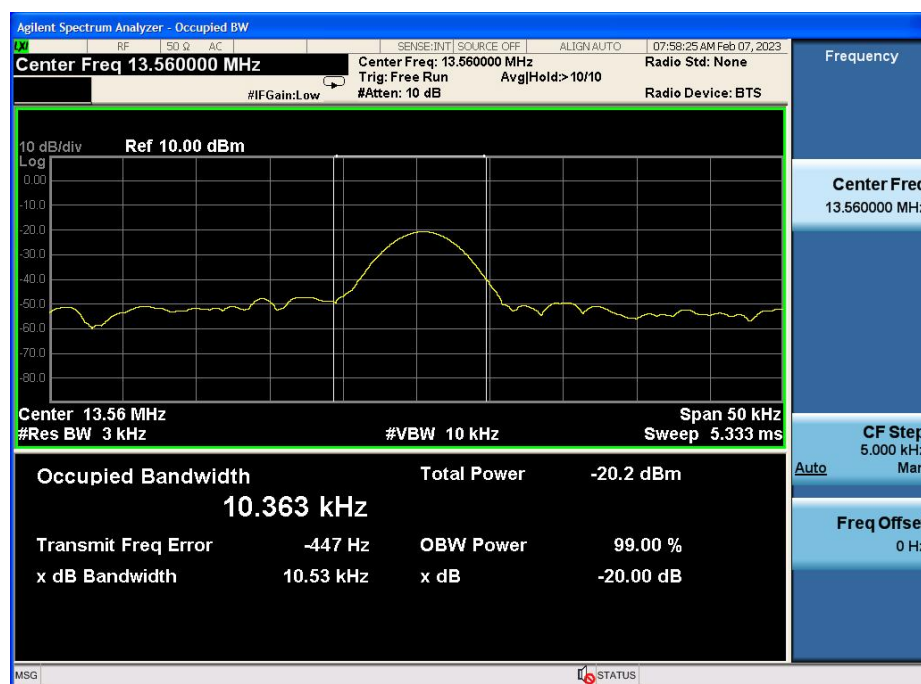
The transmitter output was directly connected to a spectrum analyzer with a 50Ω cable. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 3KHz RBW and 10kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

3.3. Test Setup



3.4. Test Result

Mode	Freq (MHz)	20dB Bandwidth (KHz)	99% Bandwidth	Limit (kHz)	Conclusion
Tx Mode	13.56	10.53	10.363	/	PASS



4. Radiated emissions

4.1. Limit

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note:

- a) The tighter limit applies at the band edges.

For example: F.S limit at 88MHz is 100uV/m

- b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)^2$.

For example:

F.S Limit at 30m(d_2) distance is 30uV/m(L_{d2}), then F.S Limit at 3m(d_1) distance is

$$L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m} = 69.54 \text{ dBuV/m}$$

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

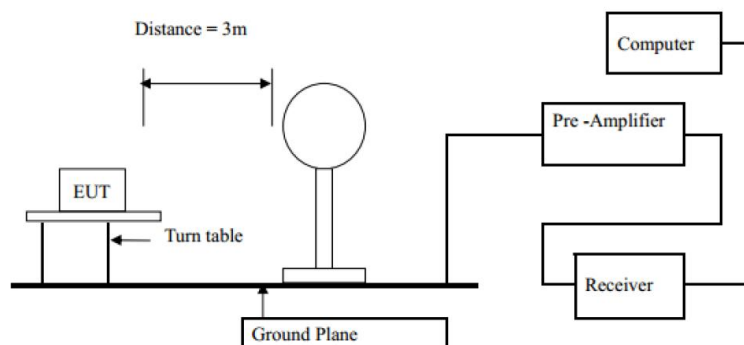
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

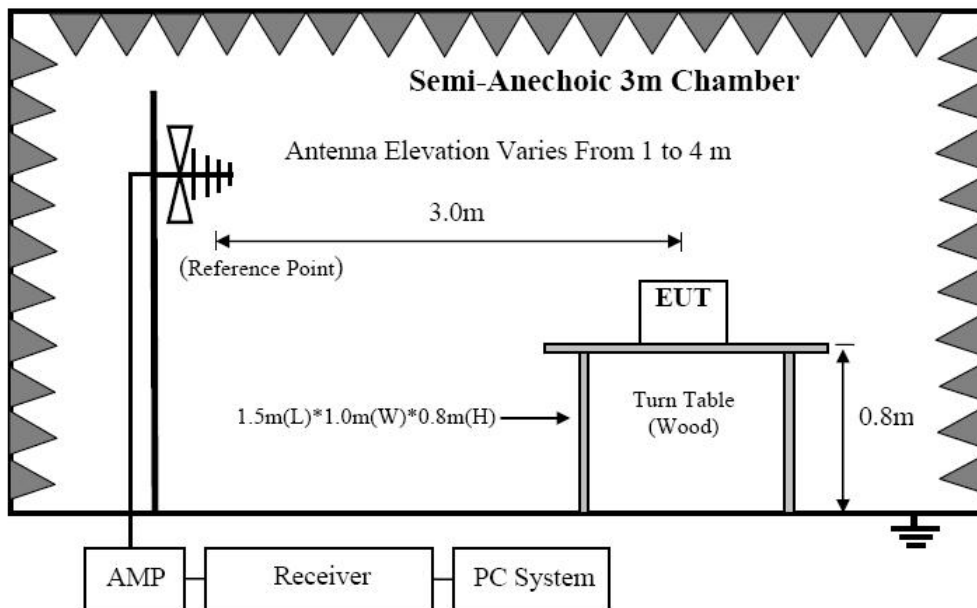
- (d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

4.2. Block Diagram of Test setup

In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



In 3m Anechoic Chamber Test Setup Diagram for frequency 30MHz-1GHz



4.3. Test Procedure

Procedure of Preliminary Test

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 4.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.

Mains cables, telephone lines or other connections to auxiliary equipment located outside the test are shall drape to the floor, be fitted with ferrite clamps or ferrite tubes placed on the floor at the point where the cable reaches the floor and then routed to the place where they leave the turntable. No extension cords shall be used to mains receptacle.

The antenna was placed at 3 meter away from the EUT as stated in ANSI C63.10:2013. The antenna connected to the Spectrum Analyzer via a cable and at times a pre-amplifier would be used.

The Receiver quickly scanned from 9KHz to 30MHz and 30MHz to 1GHz The EUT test program was started. Emissions were scanned and measured rotating the EUT to 360 degrees and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level.

The test mode(s) described in clause 2.4 were scanned during the preliminary test:

After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test.

The Receiver scanned from 9KHz to 30MHz and 30MHz to 1GHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal

polarization, to maximize the emission reading level.

Recorded at least the six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only Q.P. reading is presented.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 200Hz for 9 KHz to 150 KHz measure, 10 KHz for 150 KHz to 30MHz measure and 120 KHz for 30 MHz to 1GHz measure .

4.4. Test Result

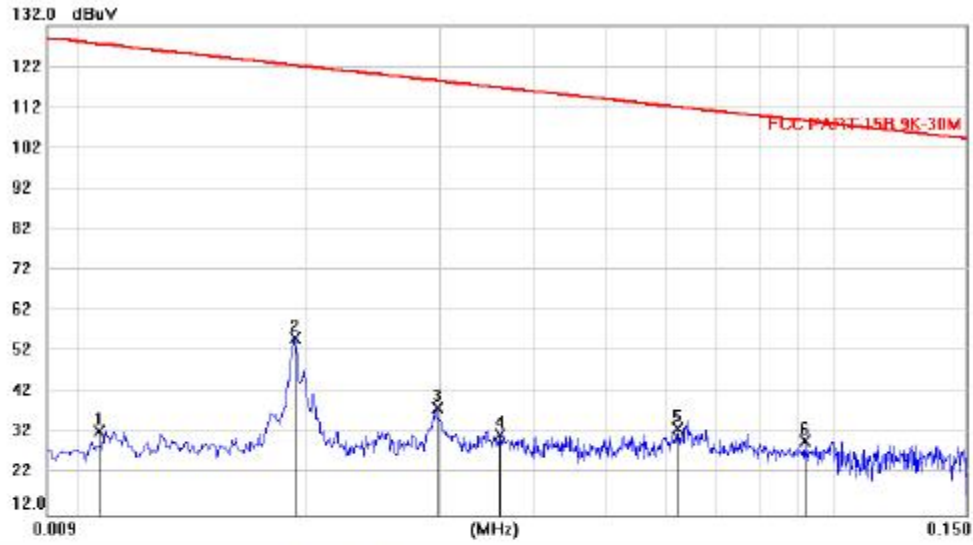
PASS. (See below detailed test result)

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Frequency Range	: 9KHz~30MHz
Test Mode	: TX: 13.56MHz
Test Results	: PASS
Note:	1. The test results are listed in next pages. 2. This mode is worst case mode, so this report only reflected the worst mode. 3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the quasi-peak detector need not be carried out.

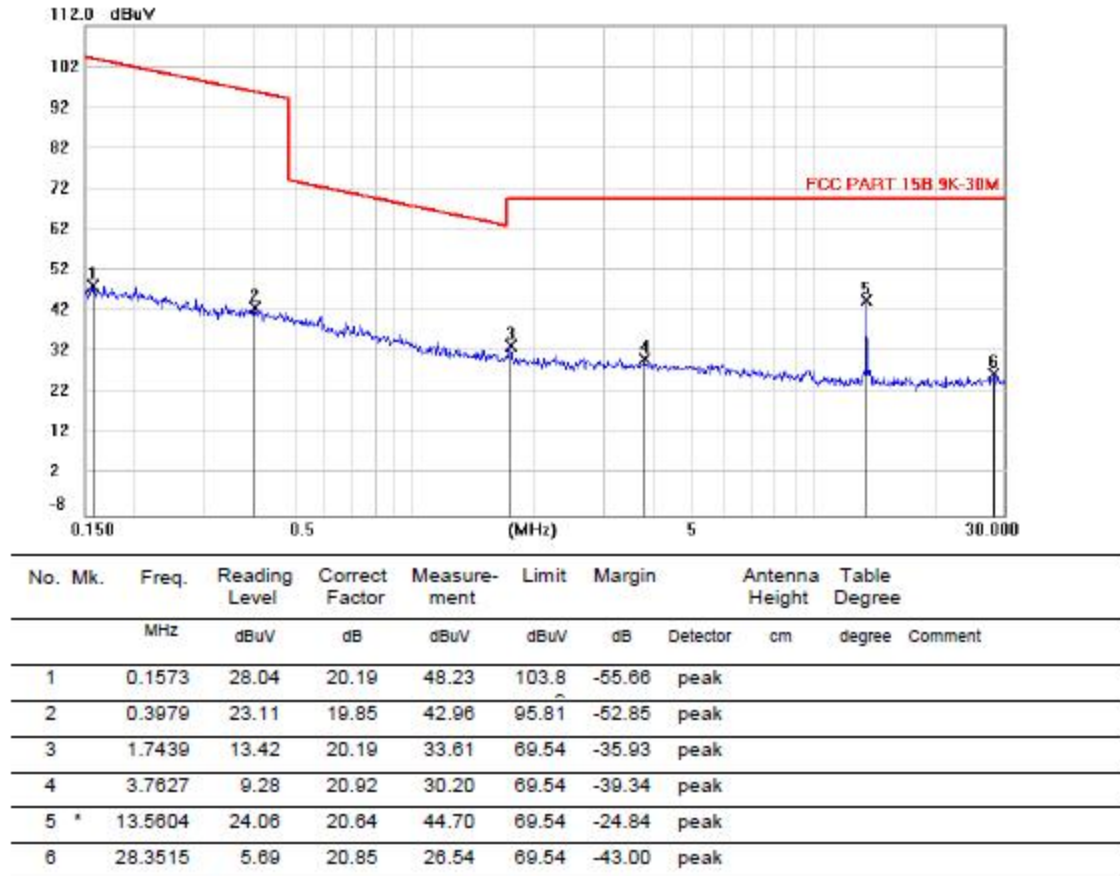
X



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV	dBuV	dB	Detector	cm	degree
1		0.0106	10.93	21.48	32.41	127.3	-94.97	peak		
2	*	0.0190	34.00	21.27	55.27	122.3	-67.03	peak		
3		0.0297	17.23	21.00	38.23	118.4	-80.18	peak		
4		0.0359	10.92	20.67	31.59	116.7	-85.17	peak		
5		0.0621	13.01	20.08	33.09	111.9	-78.90	peak		
6		0.0916	10.14	19.88	30.02	108.6	-78.58	peak		

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

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



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

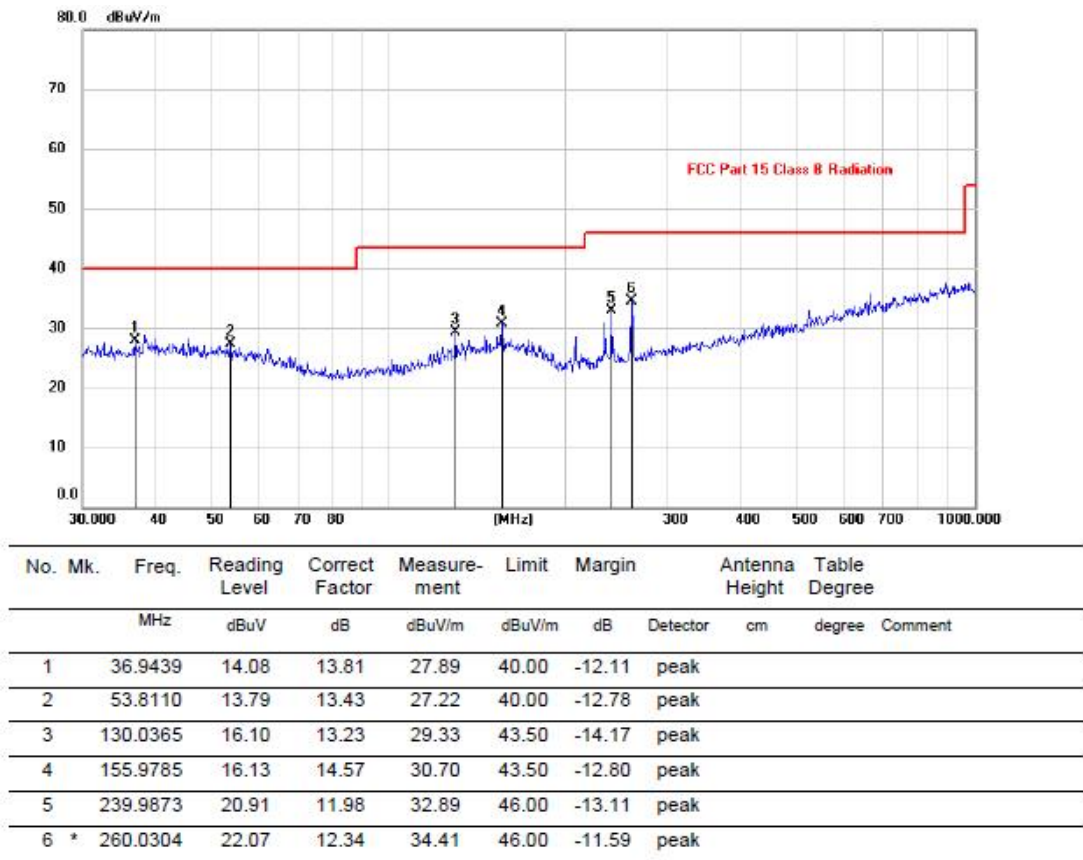
2. Measurement = Reading Level + Correct Factor; Correct Factor = Antenna Factor + Cable Loss.

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

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

From 30MHz to 1GHz: Conclusion: PASS

Vertical:



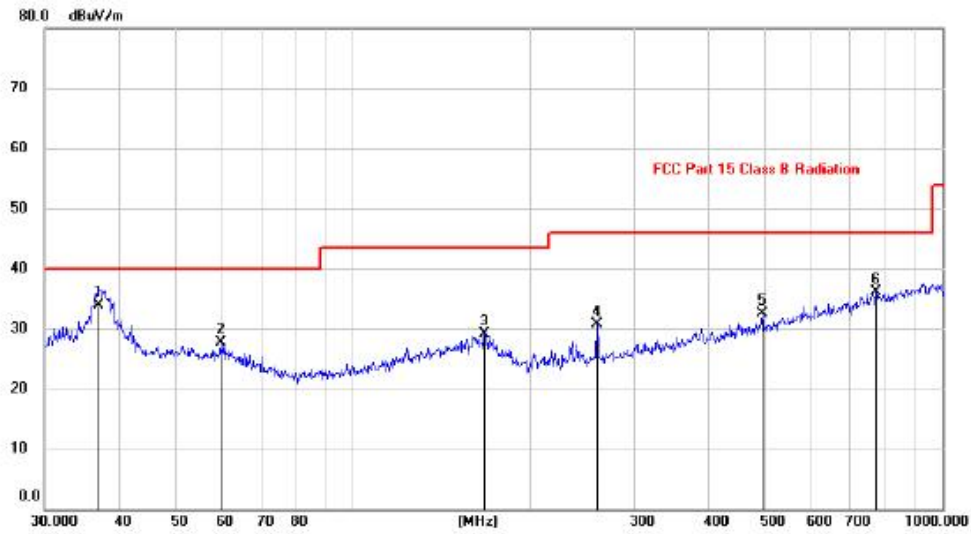
Note: 1. *:Maximum data; x:Over limit; !:over margin.

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

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

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

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	37.1713	20.04	13.83	33.87	40.00	-6.13	QP		
2		59.7016	14.76	13.01	27.77	40.00	-12.23	peak		
3		167.6037	15.24	13.96	29.20	43.50	-14.30	peak		
4		260.0304	18.44	12.34	30.78	46.00	-15.22	peak		
5		495.4999	15.22	17.29	32.51	46.00	-13.49	peak		
6		773.4801	14.33	21.77	36.10	46.00	-9.90	peak		

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

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

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

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

Field Strength Emissions Result

Temperature		24°C			Relative Humidity		56%
Pressure		960hPa			Distance		3m
Test Mode		TX					
Freq. (MHz)	Position H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
13.560	H	Peak	58.88	-13.94	44.94	124	-79.06
13.560	H	AV	50.84	-13.94	36.90	104	-67.10
13.110	H	Peak	50.68	-13.94	36.74	80.5	-43.76
13.410	H	Peak	49.94	-13.94	36.00	90.5	-54.50
13.553	H	Peak	49.06	-13.94	35.12	90.5	-55.38
13.567	H	Peak	47.12	-13.93	33.19	90.5	-57.31
13.710	H	Peak	44.24	-13.93	30.31	80.5	-50.19
14.010	H	Peak	44.38	-13.93	30.45	80.5	-50.05
Freq. (MHz)	Position H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limits 3m (dBuV/m)	Margin (dBuV/m)
13.560	V	Peak	58.74	-13.94	44.80	124	-79.20
13.560	V	AV	50.23	-13.94	36.29	104	-67.71
13.110	V	Peak	50.38	-13.94	36.44	80.5	-44.06
13.410	V	Peak	51.52	-13.94	37.58	90.5	-52.92
13.553	V	Peak	48.03	-13.94	34.09	90.5	-56.41
13.567	V	Peak	47.04	-13.93	33.11	90.5	-57.39
13.710	V	Peak	44.45	-13.93	30.52	80.5	-49.98
14.010	V	Peak	43.81	-13.93	29.88	80.5	-50.62
Note: 1: 30m to 3m correction factor calculation: $40 * \log(30m/3m) = 40$ 2: --Means other frequency and mode comply with standard requirements and at least have 20dB margin. 3: Correct Factor=Cable Loss+ Antenna Factor- Amplifier Gain Measurement Result=Reading + Correct Factor Margin=Measurement Result-Limit							

5. Frequency stability

5.1. Test limit

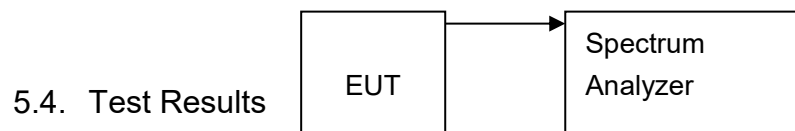
Please refer section RSS-Gen & 15.225e.

Regulation 15.225(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ (± 100 ppm) of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.2. Test Procedure

The following 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.

5.3. Test Setup

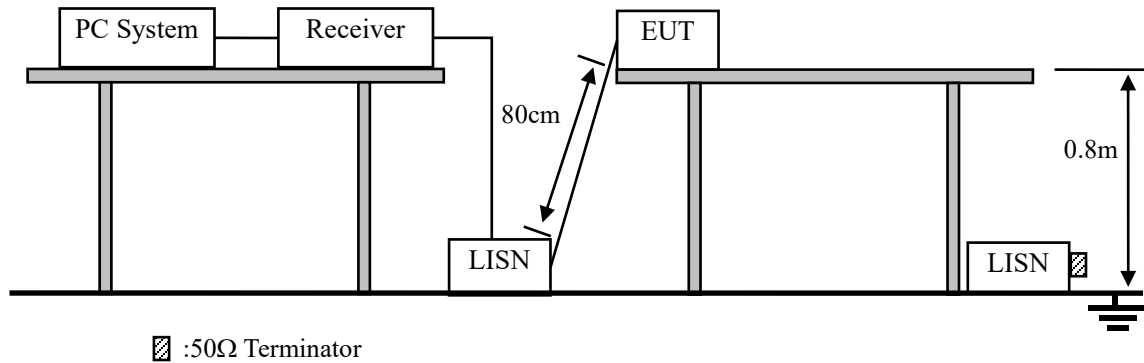


PASS.

Detailed information please see the following page.

Assigned Frequency(MHz): 13.56MHz				
Voltage	Temperature	Measured Frequency (MHz)	Frequency stability	Limit
Low DC 3.3V	+20°C	13.560427	0.000427	±100 ppm ±0.001356MHz
Normal DC 3.7	-10°C	13.560368	0.000368	
	-5°C	13.560753	0.000753	
	0°C	13.560583	0.000583	
	+10°C	13.560085	0.000085	
	+20°C	13.560391	0.000391	
	+30°C	13.560497	0.000497	
	+40°C	13.559651	-0.000349	
	+50°C	13.560479	0.000479	
	+60°C	13.560179	0.000179	
High DC 4.4V	+20°C	13.560427	0.000427	

6. Power Line Conducted Emissions



6.1. Block Diagram of Test Setup

6.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
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.

6.3. Test Procedure

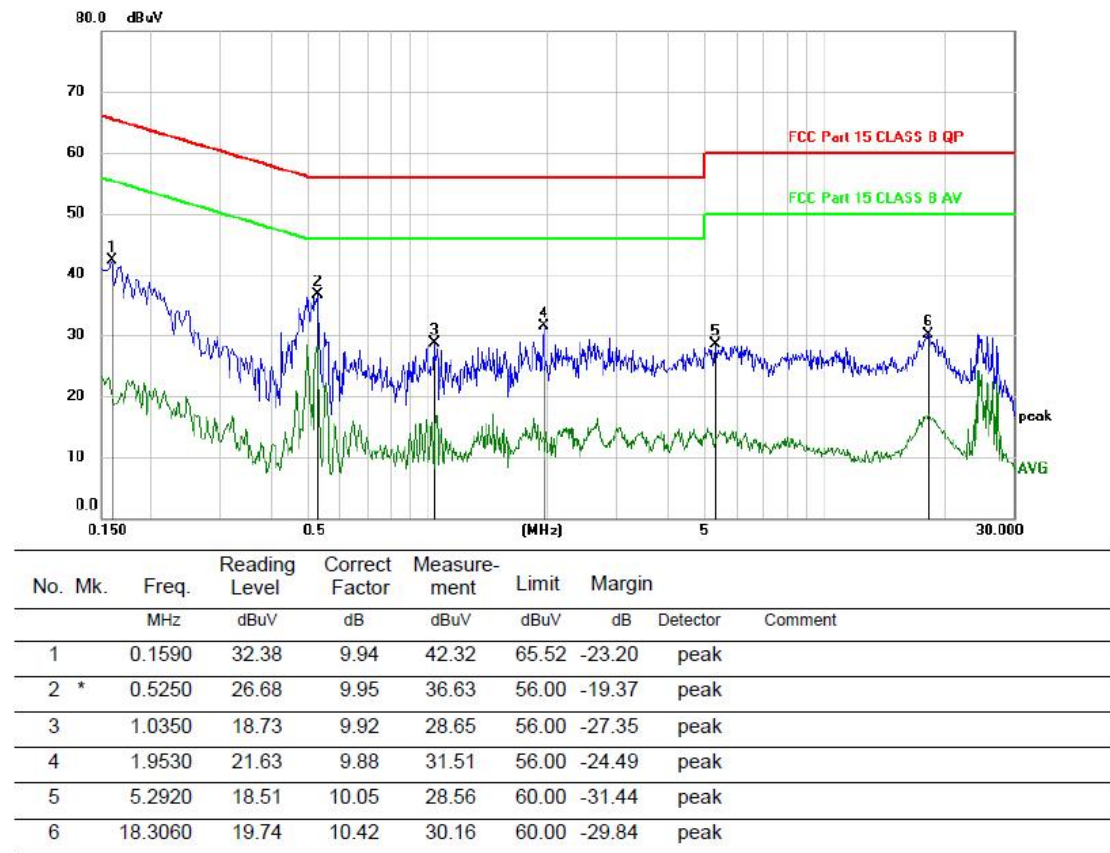
- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N1), 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 C64.10:2013 on conducted Emission test.
- (4) The bandwidth of test receiver is set at 10KHz.
- (5) The frequency range from 150 KHz to 30MHz is checked.

6.4. Test Result

PASS. (See below detailed test data)

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

Line:



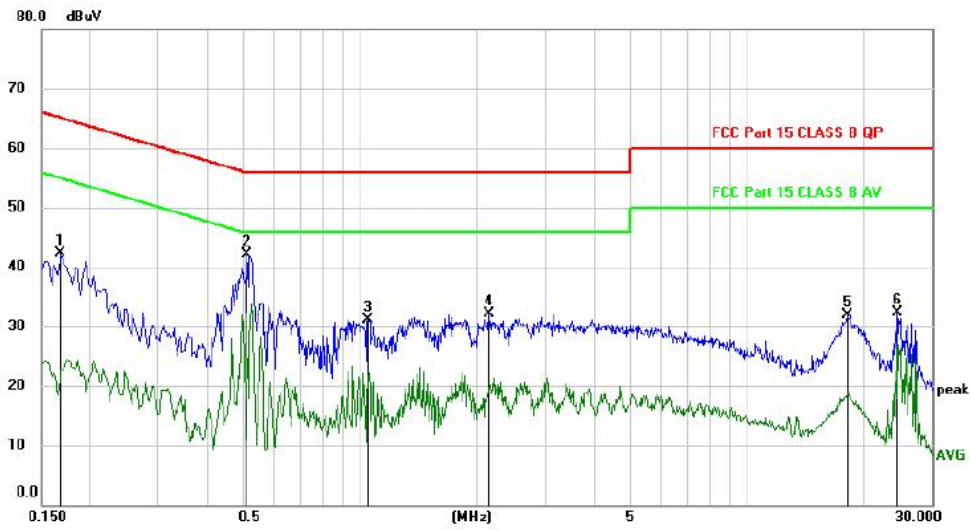
*:Maximum data x:Over limit !:over margin

(Reference Only)

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

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

Neutral:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1680	32.31	9.93	42.24	65.06	-22.82	peak	
2	*	0.5100	32.24	9.96	42.20	56.00	-13.80	peak	
3		1.0470	21.28	9.92	31.20	56.00	-24.80	peak	
4		2.1540	22.28	9.88	32.16	56.00	-23.84	peak	
5		18.1290	21.50	10.42	31.92	60.00	-28.08	peak	
6		24.3540	21.79	10.44	32.23	60.00	-27.77	peak	

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

(Reference Only)

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

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

7. Antenna Requirements

7.1. Limit

For intentional device, according to RSS-Gen Section 6.8 and 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 15.209, 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.

7.2. Antenna Connected Construction

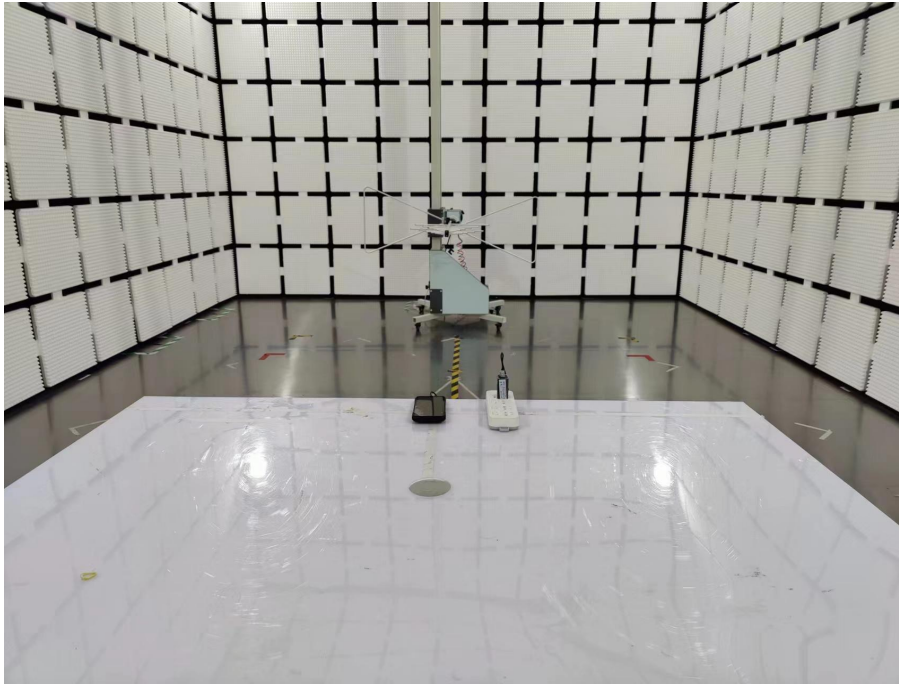
The antenna is internal antenna and no consideration of replacement. Please see EUT photo for details.

7.3. Results

The EUT antenna is Internal Antenna. It complies with the standard requirement.

8. Test setup photo

8.1. Photos of Radiated emission



8.2. Photos of Conducted Emission test



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