



# TEST REPORT

## No. I19Z60710-EMC01

for

**TCL Communication Ltd.**

**LTE/UMTS/GSM mobile phone**

**5005R**

with

**FCC ID: 2ACCJH103**

**Hardware Version: 04**

**Software Version: FY23UA30**

**Issued Date: 2019-06-11**



**Note:**

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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CTTL, Telecommunication Technology Labs, CAICT

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## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I19Z60710-EMC01	Rev.0	1 <sup>st</sup> edition	2019-05-30
I19Z60710-EMC01	Rev.1	2 <sup>nd</sup> edition	2019-06-11



## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>4</b>
<b>1.1. TESTING LOCATION .....</b>	<b>4</b>
<b>1.2. TESTING ENVIRONMENT .....</b>	<b>4</b>
<b>1.3. PROJECT DATA .....</b>	<b>4</b>
<b>1.4. SIGNATURE.....</b>	<b>4</b>
<b>2. CLIENT INFORMATION .....</b>	<b>5</b>
<b>2.1. APPLICANT INFORMATION.....</b>	<b>5</b>
<b>2.2. MANUFACTURER INFORMATION.....</b>	<b>5</b>
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>6</b>
<b>3.1. ABOUT EUT.....</b>	<b>6</b>
<b>3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....</b>	<b>6</b>
<b>3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....</b>	<b>6</b>
<b>3.4. EUT SET-UPS .....</b>	<b>8</b>
<b>4. REFERENCE DOCUMENTS.....</b>	<b>9</b>
<b>4.1. REFERENCE DOCUMENTS FOR TESTING.....</b>	<b>9</b>
<b>5. LABORATORY ENVIRONMENT.....</b>	<b>10</b>
<b>6. SUMMARY OF TEST RESULTS.....</b>	<b>11</b>
<b>7. TEST EQUIPMENTS UTILIZED.....</b>	<b>12</b>
<b>ANNEX A: MEASUREMENT RESULTS .....</b>	<b>13</b>
<b>ANNEX B: PERSONS INVOLVED IN THIS TESTING .....</b>	<b>23</b>

## **1. Test Laboratory**

### **1.1. Testing Location**

CTTL(yizhuang)

Address: No.18, Kangding Street, Beijing Economic-Technology  
Development Area, Beijing, P. R. China 100176

### **1.2. Testing Environment**

Normal Temperature: 15-35°C

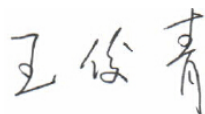
Relative Humidity: 20-75%

### **1.3. Project data**

Testing Start Date: 2019-05-15

Testing End Date: 2019-05-30

### **1.4. Signature**



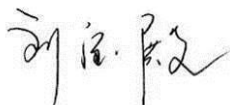
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**(Reviewed this test report)**



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**Deputy Director of the laboratory**  
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## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
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Country: China  
Telephone: 0086-755-36611722  
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### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
7/F, Block F4, TCL Communication Technology Building, TCL  
Address: International E City, Zhong Shan Yuan Road, Nanshan District,  
Shenzhen, Guangdong, P.R. China 518052  
City: Shenzhen  
Postal Code: 518052  
Country: China  
Telephone: 0086-755-36611722  
Fax: 0086-75536612000-81722

### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

#### **3.1. About EUT**

Description	LTE/UMTS/GSM mobile phone
Model Name	5005R
FCC ID	2ACCJH103
Extreme vol. Limits	3.5VDC to 4.4VDC (nominal: 3.8VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, CAICT.

#### **3.2. Internal Identification of EUT used during the test**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
EUT1	015462000204383	04	FY23UA30

\*EUT ID: is used to identify the test sample in the lab internally.

#### **3.3. Internal Identification of AE used during the test**

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>	<b>Remarks</b>
AE1	Battery	/	/
AE2	Charger	/	/
AE3	USB Cable	/	/
AE4	USB Cable	/	/
AE5	Headset	/	/

##### AE1

Model	CAB2110000C1
Manufacturer	BYD
Capacitance	/
Nominal voltage	/

##### AE2

Model	CBA0058AGHC5
Manufacturer	Puan
Length of cable	/

##### AE3

Model	CDA0000055C8
Manufacturer	PUAN
Length of cable	95cm

##### AE4

Model	CDA0000055C2
Manufacturer	SHENGHUA



Length of cable	95cm
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AE5

Model	/
Manufacturer	/
Length of cable	/

\*AE ID: is used to identify the test sample in the lab internally.

Note: The USB cables are shielded.



### 3.4. EUT set-ups

<b>EUT set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
Set.3	EUT1+ AE1+ AE3/AE4+ AE5	Charger Headset (including FM function)
Set.6	EUT1+ AE1+ AE3/AE4	USB mode





## **4. Reference Documents**

### **4.1. Reference Documents for testing**

The following documents listed in this section are referred for testing.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	2016
ANSI C63.4	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber SAC-1** (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 10 m distance
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 6GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

**Semi-anechoic chamber SAC-2** (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio ( $S_{VSWR}$ )	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

**Shielded room** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz—1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω



## 6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	P	CTTL(yizhuang)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(yizhuang)



## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCi7	100948	R&S	2019-06-27	1 Year
2	Universal Radio Communication Tester	CMW500	143008	R&S	2019-11-26	1 year
3	LISN	ENV216	101200	R&S	2020-03-14	1 year
4	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2019-08-21	1 year
5	EMI Antenna	3115	00167250	ETS-Lindgren	2019-06-17	1 year
6	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
7	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
8	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
9	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 Radiated Emission**

#### **Reference**

FCC: CFR Part 15.109(a).

#### **A.1.1 Method of measurement**

The field strength of radiated emissions from the unintentional radiator (USB mode of EUT and charging mode of EUT) at distances of 10 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 8.3. The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

#### **A.1.2 EUT Operating Mode**

The EUT is operating in the USB mode and charging mode. During the test EUT is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. And during the charging mode the FM application is started up. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to EUT, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

#### **A.1.3 Measurement Limit**

Frequency range (MHz)	Field strength limit ( $\mu\text{V}/\text{m}$ )		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

#### **A.1.4 Test Condition**

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/1MHz	15	Peak, Average

### A.1.5 Measurement Results

A "reference path loss" is established and the  $A_{Rpl}$  is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

$$\text{Result} = P_{\text{Mea}} + A_{\text{Rpl}} = P_{\text{Mea}} + G_A + G_{\text{PL}}$$

Where

$G_A$ : Antenna factor of receive antenna

$G_{\text{PL}}$ : Path Loss

$P_{\text{Mea}}$ : Measurement result on receiver.

Measurement uncertainty (worst case):  $U = 5.44 \text{ dB}$ ,  $k=2$ .

#### Measurement results for Set.3:

##### Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17105.500	39.08	-26.0	41.6	23.52	V
17107.000	38.99	-26.0	41.6	23.41	V
17103.000	38.97	-26.0	41.6	23.42	V
17112.500	38.97	-26.0	41.6	23.36	H
17108.000	38.97	-26.0	41.6	23.39	H
17088.500	38.93	-26.1	41.6	23.46	V

##### Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17959.500	52.3	-25.9	41.3	36.98	V
17989.500	51.8	-25.8	41.3	36.30	H
16859.500	51.5	-26.9	41.6	36.79	V
17098.000	51.4	-26.1	41.6	35.89	H
16515.500	51.2	-26.9	41.3	36.86	H
17108.000	51.2	-26.0	41.6	35.61	H

**Measurement results for Set.6:**

**USB Mode/Average detector**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17095.500	39.13	-26.1	41.6	23.62	H
17088.500	39.10	-26.1	41.6	23.62	V
17107.000	39.08	-26.0	41.6	23.50	H
17090.500	39.04	-26.1	41.6	23.55	H
17108.000	39.00	-26.0	41.6	23.42	V
17098.500	38.99	-26.1	41.6	23.47	V

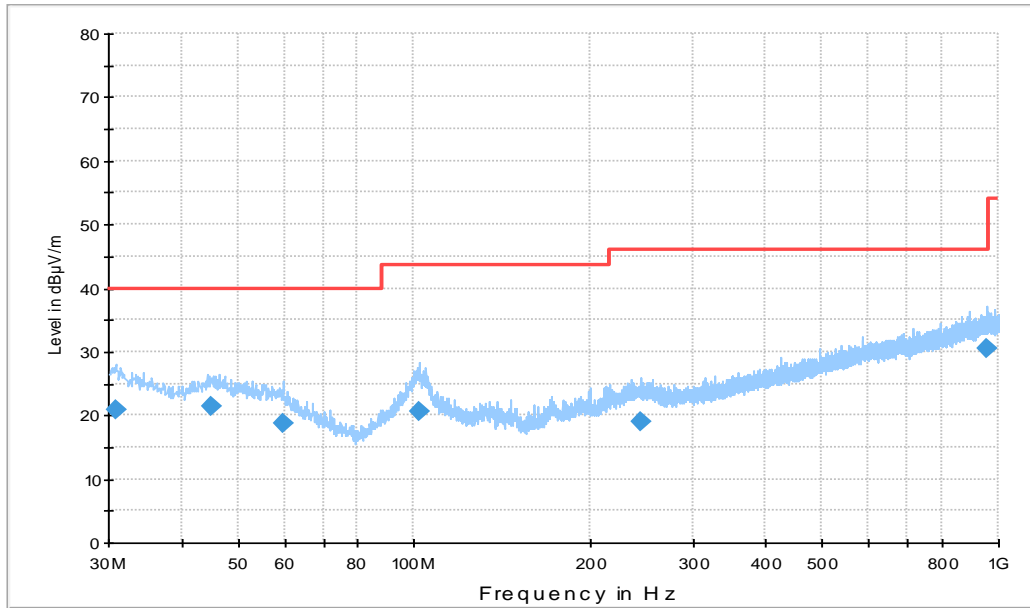
**USB Mode/ Peak detector**

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
3587.500	57.23	-35.2	33.2	59.25	H
3595.500	52.59	-35.3	33.2	54.69	H
17053.500	51.79	-26.4	41.6	36.51	H
16533.500	51.55	-26.9	41.3	37.09	H
17119.000	51.43	-26.0	41.6	35.85	H
17050.500	51.38	-26.4	41.6	36.11	H

Note: The measurement results of Set.3 and Set.6 showed here are worst cases of the combinations of different batteries and USB cables.

**Charging Mode, Set.3:**

15B RE 30MHz-1GHz



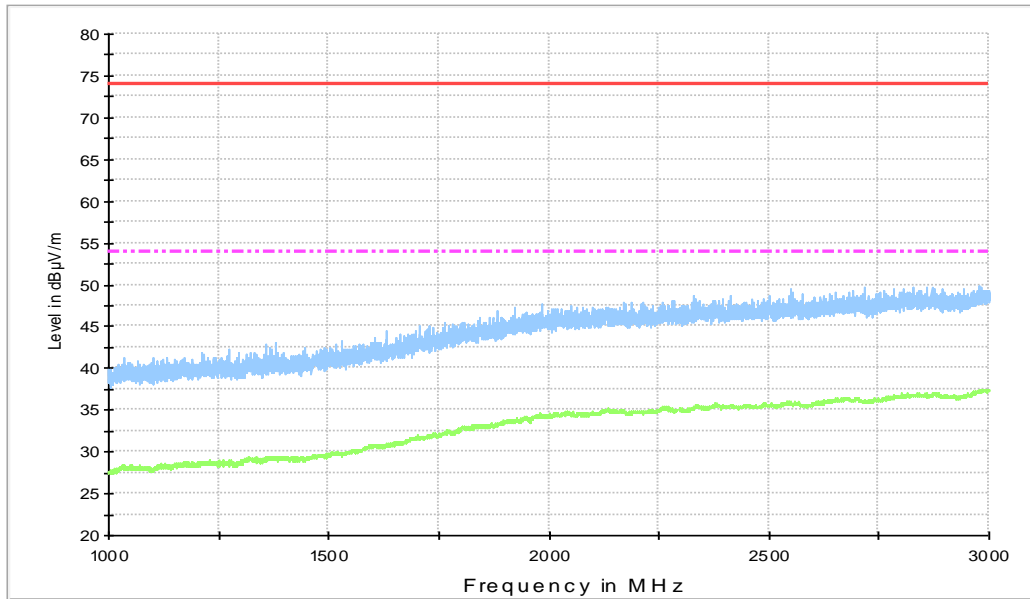
**Fig A.1 Radiated Emission from 30MHz to 1GHz**

**Final\_Result**

Frequency (MHz)	QuasiPeak (dBµ/m)	Limit (dBµ/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.873000	20.9	40.0	19.1	100.0	V	135.0
45.132000	21.4	40.0	18.6	100.0	V	166.0
59.682000	18.8	40.0	21.2	125.0	V	138.0
102.071000	20.6	43.5	22.9	119.0	V	139.0
244.758000	19.1	46.0	26.9	110.0	V	-7.0
953.052000	30.5	46.0	15.5	100.0	V	21.0

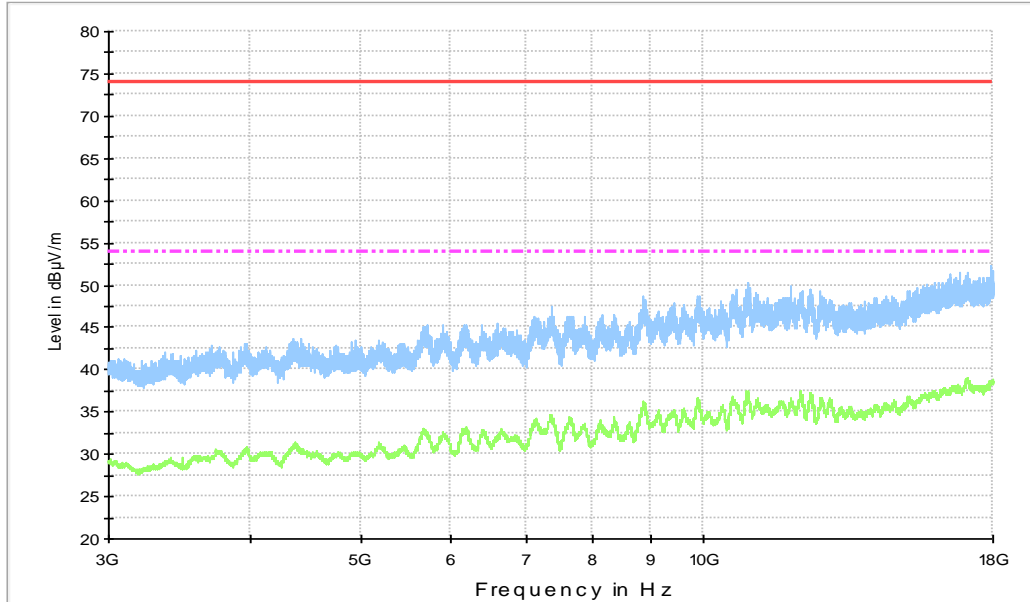


15B RE - 1GHz-3GHz



**Fig A.2 Radiated Emission from 1GHz to 3GHz**

15b RE - 3GHz-18GHz



**Fig A.3 Radiated Emission from 3GHz to 18GHz**

USB Mode, Set.6

15B RE 30MHz-1GHz

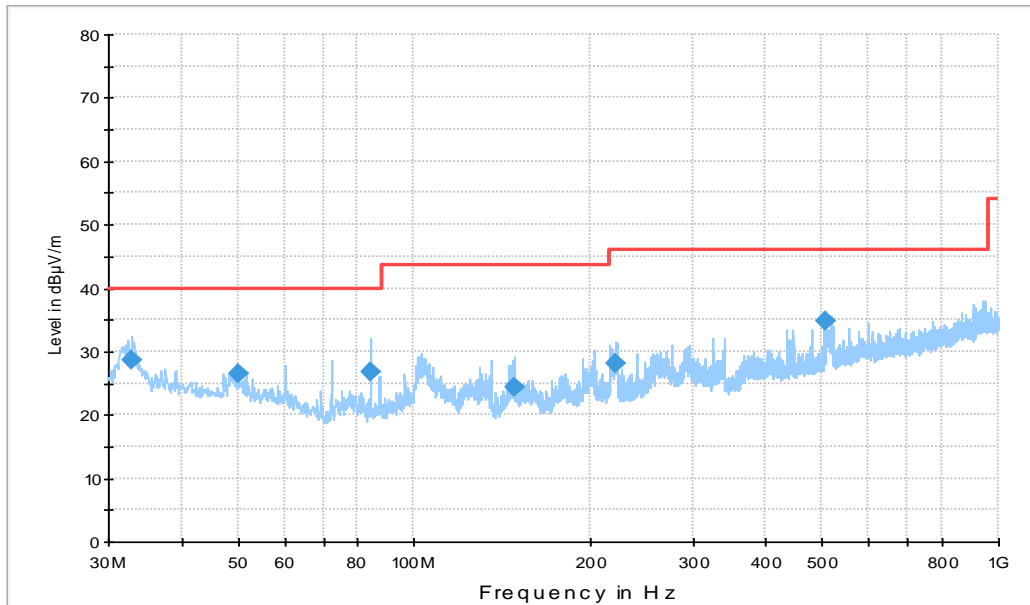


Fig A.4 Radiated Emission from 30MHz to 1GHz

Final\_Result

Frequency (MHz)	QuasiPeak (dBµ/m)	Limit (dBµ/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
32.910000	28.6	40.0	11.4	100.0	V	-45.0
49.982000	26.4	40.0	13.6	110.0	V	232.0
84.223000	26.7	40.0	13.3	119.0	V	-14.0
148.534000	24.5	43.5	19.0	125.0	H	297.0
222.060000	28.0	46.0	18.0	110.0	H	-21.0
506.464000	34.9	46.0	11.1	100.0	V	-42.0

15B RE - 1GHz-3GHz

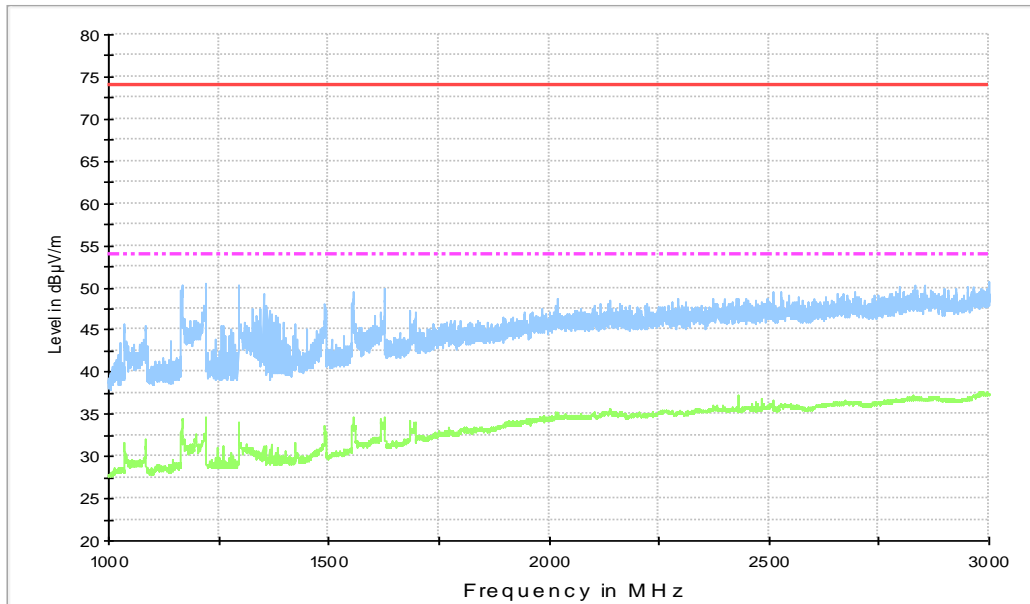


Fig A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

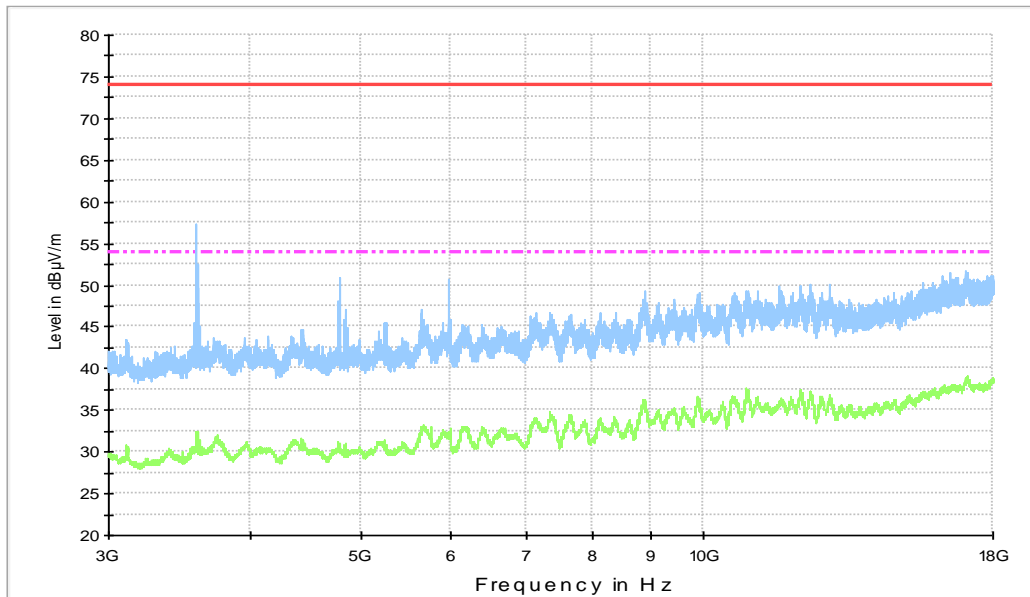


Fig A.6 Radiated Emission from 3GHz to 18GHz

## A.2 Conducted Emission

### Reference

FCC: CFR Part 15.107(a).

### A.2.1 Method of measurement

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 – 2014, section 7.3.

### A.2.2 EUT Operating Mode

The EUT is operating in the USB mode and charging mode. During the test EUT is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. And during the test, FM, Camera recording are turned on for each mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to EUT, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

### A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency

### A.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

### A.2.5 Measurement Results

Measurement uncertainty:  $U= 3.08 \text{ dB}$ ,  $k=2$ .

#### Charging Mode, Set.3

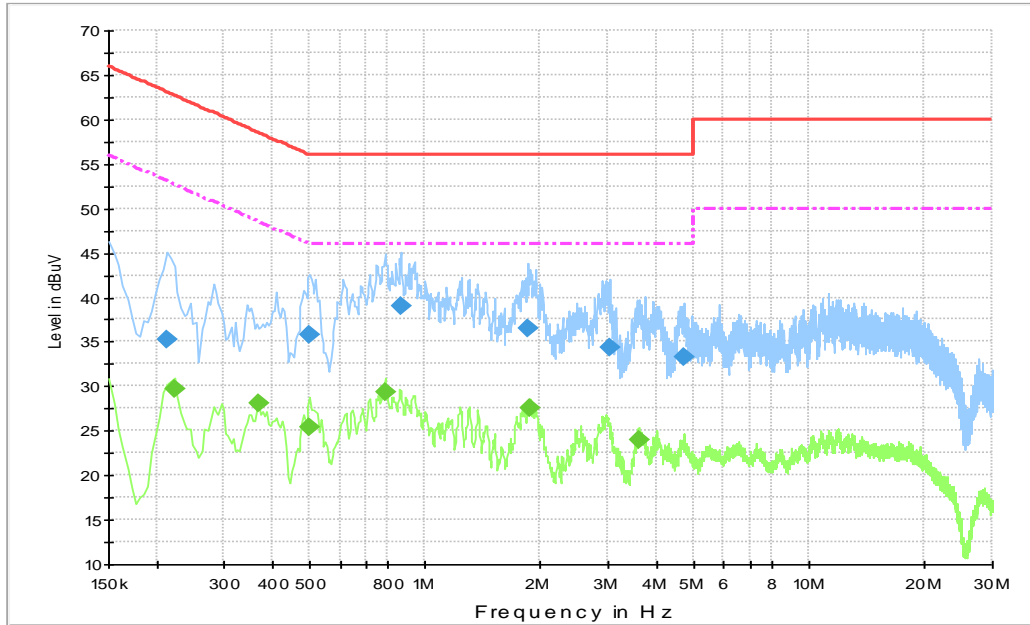


Fig A.7 Conducted Emission

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.213000	35.3	10000.0	9.000	N	10.3	27.8	63.1
0.501000	35.8	10000.0	9.000	L1	10.3	20.2	56.0
0.865500	39.1	10000.0	9.000	L1	10.3	16.9	56.0
1.855500	36.6	10000.0	9.000	L1	10.4	19.4	56.0
3.025500	34.3	10000.0	9.000	L1	10.5	21.7	56.0
4.708500	33.3	10000.0	9.000	L1	10.5	22.7	56.0

#### Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.222000	29.7	10000.0	9.000	N	10.3	23.1	52.7
0.370500	28.1	10000.0	9.000	N	10.3	20.4	48.5
0.501000	25.5	10000.0	9.000	L1	10.3	20.5	46.0
0.789000	29.4	10000.0	9.000	L1	10.4	16.6	46.0
1.887000	27.6	10000.0	9.000	L1	10.4	18.4	46.0
3.592500	23.9	10000.0	9.000	L1	10.4	22.1	46.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

USB Mode, Set.6

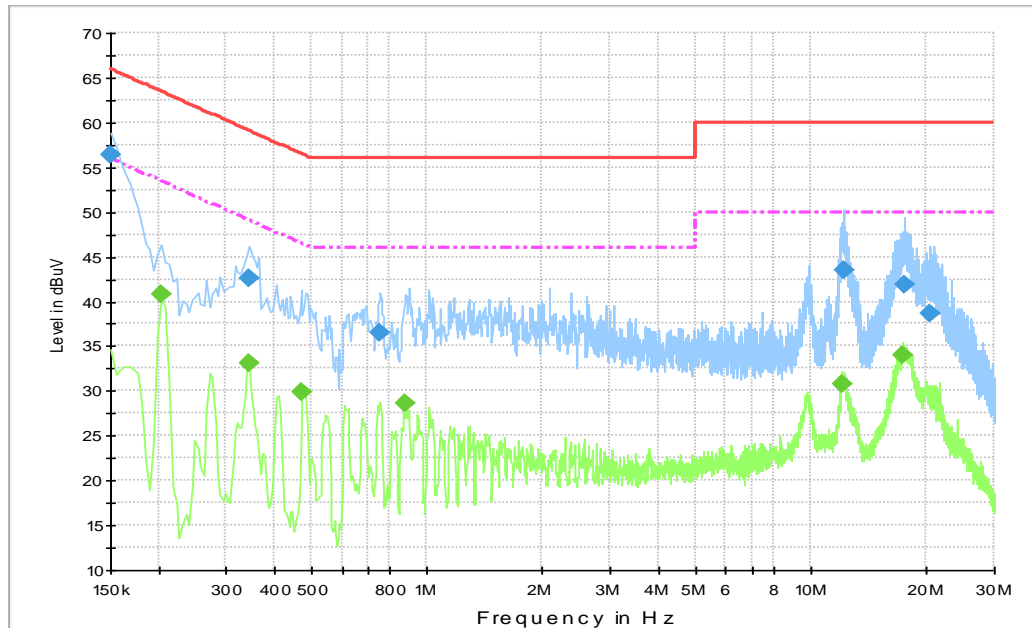


Fig A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.150000	56.3	10000.0	9.000	L1	10.2	9.7	66.0
0.343500	42.7	10000.0	9.000	L1	10.3	16.5	59.1
0.757500	36.5	10000.0	9.000	N	10.4	19.5	56.0
12.120000	43.4	10000.0	9.000	N	10.8	16.6	60.0
17.466000	41.8	10000.0	9.000	L1	11.3	18.2	60.0
20.364000	38.7	10000.0	9.000	N	11.2	21.3	60.0

Final Result 2

Frequency (MHz)	Average (dB $\mu$ V)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.204000	40.7	10000.0	9.000	N	10.3	12.7	53.4
0.343500	33.2	10000.0	9.000	N	10.3	15.9	49.1
0.474000	29.8	10000.0	9.000	N	10.3	16.6	46.4
0.879000	28.7	10000.0	9.000	N	10.3	17.3	46.0
12.043500	30.8	10000.0	9.000	N	10.8	19.2	50.0
17.380500	34.0	10000.0	9.000	L1	11.2	16.0	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.



**ANNEX B: PERSONS INVOLVED IN THIS TESTING**

<b>Test Item</b>	<b>Test Software and Version</b>	<b>Software Vendor</b>	<b>Test operator</b>
Conducted Emission	EMC32 V8.5.2	R&S	Zhao Wenhui
Radiated Emission	EMC32 V9.01.00	R&S	Li Zongliang

**\*\*\*END OF REPORT\*\*\***