# TEST REPORT

# No. I18Z60538-IOT04

**for**

**TCL Communication Ltd.**

**GSM Quad-band/HSPA-UMTS Six-band/LTE 19 band mobile phone**

**MODEL NAME: BBB100-5**

**FCC ID: 2ACCJN027**

**with**

**Hardware Version: 05**

**Software Version: AAW880**

**Issued Date: 2018-04-12**

TESTING
NVLAP LAB CODE 600118-0

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

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.

**Test Laboratory:**

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

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# REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| I18Z60538-IOT04 | Rev.0 | 1st edition | 2018-04-12 |

# CONTENTS

# 1. Test Laboratory

## 1.1. Testing Location

Location 1: CTTL (Hua yuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

Location 2: CTTL(Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China 100191

## 1.2. Testing Environment

Normal Temperature: 15 ~ 25 ℃

Extreme Temperature: 30 ~ 60 %

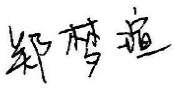
Relative Humidity: 860 ~ 1060 mbar

## 1.3. Project data

Testing Start Date: 2017-01-03

Testing End Date: 2017-02-24

## 1.4. Signature

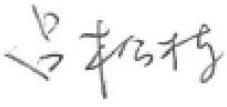


**Zheng Mengxuan**

**(Prepared this test report)**

**Zhu Liang**

**( Reviewed this test report)**



**Lv Songdong**

**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | TCL Communication Ltd. |
| Address: | 7/F, Block F4, TCL International E City, Zhong Shan Yuan Road, Nanshan District, Shenzhen, Guangdong, P.R. China 518052 |
| Country: | China |
| Contact: | Gong Zhizhou |
| Email: | zhizhou.gong@tcl.com |
| Telephone: | 0086-755-36611722 |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | TCL Communication Ltd. |
| Address: | 7/F, Block F4, TCL International E City, Zhong Shan Yuan Road, Nanshan District, Shenzhen, Guangdong, P.R. China 518052 |
| Country: | China |
| Contact: | Gong Zhizhou |
| Email: | zhizhou.gong@tcl.com |
| Telephone: | 0086-755-36611722 |

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

## 3.1. About EUT

| | |
|---|---|
| Description: | GSM Quad-band/CDMA/EVDO One-band/LTE 19 band mobile phone |
| FCC ID | 2ACCJN027 |
| With NFC Function: | Yes |
| Frequency: | 13.56 MHz |
| Antenna: | Internal |
| Operation Voltage: | 3.8VDC |

Note： High and low voltage values of extreme conditions are given by the manufacturer.

## 3.2. Internal Identification of EUT Used during the Test

**Mobile phone identification**

| EUT ID* | IMEI | HW Version | SW Version |
|---|---|---|---|
| EUT10a | 004402243183229 | 05 | AAW880 |

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

## 3.3. Internal Identification of AE Used during the Test

| AE ID* | Description | SN | Reversion |
|---|---|---|---|
| AE1 | battery | / | / |
| AE2 | battery | / | / |
| AE3 | Travel charger | / | 16TCT-CH-1886 |
| AE4 | Travel charger | / | 16TCT-CH-1872 |
| AE5 | Travel charger | / | 16TCT-CH-0005 |
| AE6 | USB Cable | / | / |
| AE7 | USB Cable | / | / |
| AE60 | NFC Card | / | / |
| AE10 | Travel charger | / | / |
| AE11 | Travel charger | / | / |

AE1

| | |
|---|---|
| Model | BAT-63108-003 |
| Manufacturer | ATL |
| Capacitance | 3440 mAh |
| Nominal voltage | 3.85V |

AE2

| | |
|---|---|
| Model | TLp034E1 |
| Manufacturer | BYD |
| Capacitance | 3440 mAh |
| Nominal voltage | 3.85V |

AE3

| | |
|---|---|
| Name | CBA0060AGHC1 |
| Model | QC10US |
| Manufacturer | BYD |
| Length of cable | / |

AE4

| | |
|---|---|
| Name | CBA0060ACHC1 |
| Model | QC10AU |
| Manufacturer | BYD |
| Length of cable | / |

AE5

| | |
|---|---|
| Name | CBA0060AJHC1 |
| Model | QC10IN |
| Manufacturer | BYD |
| Length of cable | / |

AE6

| | |
|---|---|
| Model | CDA0000078CF |
| Manufacturer | / |
| Length of cable | 99cm |

AE7

| | |
|---|---|
| Model | CDA0000078C2 |
| Manufacturer | / |
| Length of cable | 99cm |

AE60

| | |
|---|---|
| Model | / |
| Manufacturer | / |

AE10

| | |
|---|---|
| Name | CBA0060AAHC1 |
| Model | QC10EU |
| Manufacturer | BYD |
| Length of cable | / |

AE11

| | |
|---|---|
| Name | CBA0060ABHC1 |
| Model | QC10UK |
| Manufacturer | BYD |
| Length of cable | / |

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

## 3.4. General Description

This is a product supporting GSM Quad-band/CDMA/EVDO One-band/LTE 19 band mobile phone with 2.4G/5G technologies.

Manuals and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

Manufacturer's declaration: NFC work does not depend on other access methods, such as WLAN, GPRS, etc.

## 3.5. EUT Set-ups

| EUT Set-up No. | Combination of EUT and AE | Remarks |
|---|---|---|
| Set. NFC01_1 | EUT10 + AE1 + AE6 + AE3 + AE60 | -- |
| Set. NFC01_2 | EUT10 + AE1 + AE6 + AE4 + AE60 | |
| Set. NFC01_3 | EUT10 + AE1 + AE6 + AE5 + AE60 | |
| Set. NFC02 | EUT1 | -- |
| Set. NFC03 | EUT10 + AE60 | |

The Transmit State of NFC: the NFC function is on. The EUT will transmit the NFC data and command continuously during the test.

The Transmit State of without modulation: The EUT will transmit the CW signal at the operating frequency.

# 4. Reference Documents

## 4.1. Documents Supplied by the Applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

## 4.2. Regulations and Standards

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

| Reference | Title | Version |
|---|---|---|
| CFR 47 Part 2 | Part 2 — Frequency Allocations and Radio Treaty Matters; General Rules and Regulations. | 2015 |
| CFR 47 Part 15 | Part 15 — Radio Frequency Devices.<br>Subpart C — Intentional RadiatorsH.<br>§ 15.35 Measurement detector functions and bandwidths.<br>§ 15.207 Conducted limits.<br>§ 15.209 Radiated emission limits, general requirements.<br>§ 15.215 Additional provisions to the general radiated emission limitations.<br>§ 15.225 Operation within the band 13.110–14.010 MHz. | 2016 |
| ANSI C63.10 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices | 2013 |

# 5. LABORATORY ENVIRONMENT

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

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 35 ℃ |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4Ω |
| Normalised site attenuation (NSA) | < ± 4 dB, 3m/10m distance,<br>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 |

**Fully-Anechoic Chamber FAC-3** (8.6m×6.1m×3.85m) did not exceed following limits along the testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 25 ℃ |
| Relative humidity | Min. = 30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 1 Ω |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1 to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 4000 MHz |

**Conducted Chamber** did not exceed following limits along the testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 25 ℃ |
| Relative humidity | Min. = 30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 0.5 Ω |

**Control Room** did not exceed following limits along the testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 25 ℃ |
| Relative humidity | Min. =30 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 0.5 Ω |

# 6. SUMMARY OF TEST RESULTS

## 6.1. Summary of Test Results

| No | Test Cases | Clause in Regulation | Section in This Report | Verdict |
|---|---|---|---|---|
| 1 | Electric Field Strength of Fundamental Emissions | CFR 47 § 15.225(a) | A.1 | P (Set. NFC03) |
| 2 | Electric Field Strength of Outside the Allocated Bands | CFR 47 § 15.225(b)<br>CFR 47 § 15.225(c) | | P (Set. NFC03) |
| 3 | Electric Field Radiated Emissions | CFR 47 § 15.209<br>CFR 47 § 15.225(d) | A.2 | P (Set. NFC01_1, NFC 01_2, NFC01_3) |
| | | | A.3 | P (Set. NFC01) |
| 4 | Frequency Tolerance | CFR 47 § 15.225(e) | A.4 | P (Set. NFC02) |
| 5 | 20dB Bandwidth | CFR 47 § 15.215(c) | A.5 | P (Set. NFC02, 03) |
| 6 | Conducted Emissions | CFR 47 § 15.207 | A.6 | P (Set. NFC01_1, NFC 01_2, NFC01_3) |
| The measurement is carried out according to ANSI C63.10. See **ANNEX A** for details. | | | | |

**Test Conditions:**

For this report, all the test cases listed above were tested under normal Temperature, Voltage, Humidity, and Air Pressure. The specific conditions are as following:

| | | |
|---|---|---|
| Temperature | T min | -10 ℃ |
| | T nom | 25 ℃ |
| | T max | 55 ℃ |
| Voltage | V min | 3.6 V |
| | V nom | 3.8 V |
| | V max | 4.2 V |
| Humidity | H nom | 44% |
| Air Pressure | A nom | 1010 mbar |

## 6.2. Terms Used in the Summary of Test Results

**Terms Used in Condition Column:**

| | |
|---|---|
| T nom | Normal Temperature |
| T min | Low Temperature |
| T max | High Temperature |
| V nom | Normal Voltage |
| V min | Low Voltage |
| V max | High voltage |
| H nom | Norm Humidity |
| A nom | Norm Air Pressure |

**Terms Used in Verdict Column:**

| | |
|---|---|
| P | Pass, The EUT complies with the essential requirements in the standard. |
| NP | Not Perform, The test was not performed by CTTL |
| NA | Not Applicable, The test was not applicable |
| F | Fail, The EUT does not comply with the essential requirements in the standard |

**Abbreviations:**

| | |
|---|---|
| AC | Alternating Current |
| AFH | Adaptive Frequency Hopping |
| BW | Band Width |
| E.I.R.P. | equivalent is tropical radiated power |
| ISM | Industrial, Scientific and Medical |
| RF | Radio Frequency |
| Tx | Transmitter |

## 6.3. Statements

The test cases listed in Section 6.1 of this report for the EUT specified in Section 3 were performed by CTTL according to the reference documents in Section 4.
The EUT meets all applicable requirements of the regulations and standards in Section 4.2.
This report only deals with the NFC function among the features described in section 3.

## 7. Test Equipments Utilized

| NO. | NAME | TYPE | SERIES NUMBER | PRODUCER | CAL. DUE DATE |
|---|---|---|---|---|---|
| 1. | Spectrum Analyzer | RSA3408A | B010277 | Tektronix | 2018-09-04 |
| 2. | Climatic chamber | SH242 | 93008658 | Key sight | 2018-11-27 |
| 3. | H-field Antenna | HFH2-Z2 | 829324/0007 | R&S | 2019-01-13 |
| 4. | EMI Antenna | VULB 9163 | 9163-235 | Schwarz beck | 2019-05-10 |
| 5. | Test Receiver | ESCI | 100344 | R&S | 2019-02-28 |
| 6. | Universal Radio Communication Tester | CMW500 | 143008 | R&S | 2018-12-26 |
| 7. | Universal Radio Communication Tester | CMW500 | 116588 | R&S | 2018-12-26 |
| 8. | Spectrum Analyzer | E4440A | MY48250642 | Agilent | 2019-03-31 |
| 9. | LISN | ESH2-Z5 | 829991/012 | R&S | 2018-05-10 |

# ANNEX A: MEASUREMENT RESULTS

## A.1. Electric Field Strength of Fundamental and Outside the Allocated bands

### A.1.1. Reference

See Clause 4, Clause 5 of ANSI C63.10-2013 generally.

### A.1.2. Measurement Methods

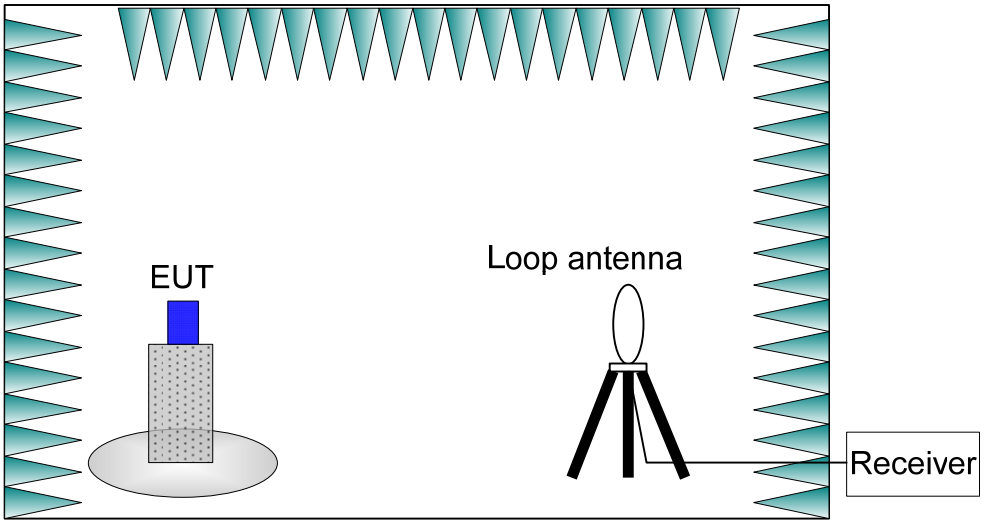
The transmitter carrier output levels (E-Field) from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The E-field is measured with a shielded loop antenna connected to a measurement receiver. Detected E-field was maximized by rotating the EUT through 360° and adjusting the receiving antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

The measurement bandwidth is:

| Frequency of Emission (MHz) | RBW/VBW |
|---|---|
| 12.56-14.56 | 10/30 kHz |

The E-field measured at 3m is calculated as:

E-field (dBμV/m) = Rx (dBμV) + Cable Loss (dB) + AF@3m (dB/m)




### A.1.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC (See 3.5).

The EUT is powered by a travel adapter.

During the measurements, the ambient temperature of the electromagnetic anechoic chamber is in the range of 15 ~ 25 ℃.

### A.1.4. Limits

| Frequency Range (MHz) | E-field Strength Limit @ 30 m (μV/m) | E-field Strength Limit @ 3 m (dBμV/m) |
|---|---|---|
| 13.560 ± 0.007 | +15,848 | 124 |
| 13.410 to 13.553<br>13.567 to 13.710 | +334 | 90 |
| 13.110 to 13.410<br>13.710 to 14.010 | +106 | 81 |
| Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:<br>$\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$ | | |

### A.1.5. Measurement Results

Measurement results of normal conditions see Figure A-1 for different set-ups of EUT. The result displayed take into account applicable antenna factors and cable losses.

**Conclusions:** Set. NFC03, **PASS**.

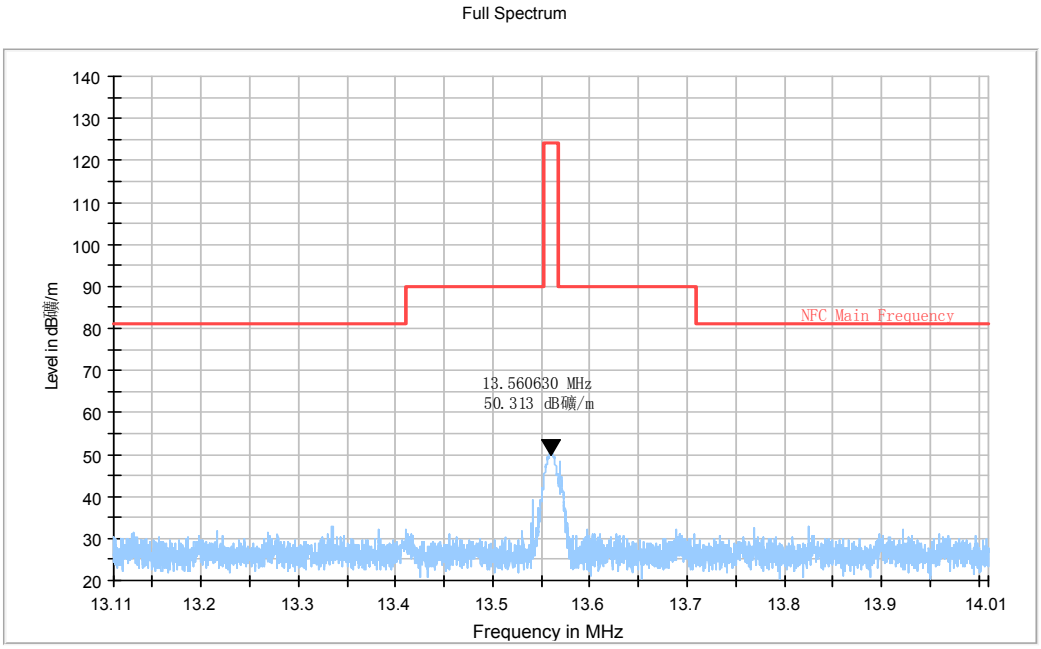



**Figure A-1: Set. NFC03**

### A.1.6. Measurement Uncertainty

Measurement uncertainty: *U* = 3.94 dB, k=2.

## A.2. Electric Field Radiated Emissions (< 30MHz)

### A.2.1. Reference

See Clause 6.4 of ANSI C63.10-2013 specifically.
See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

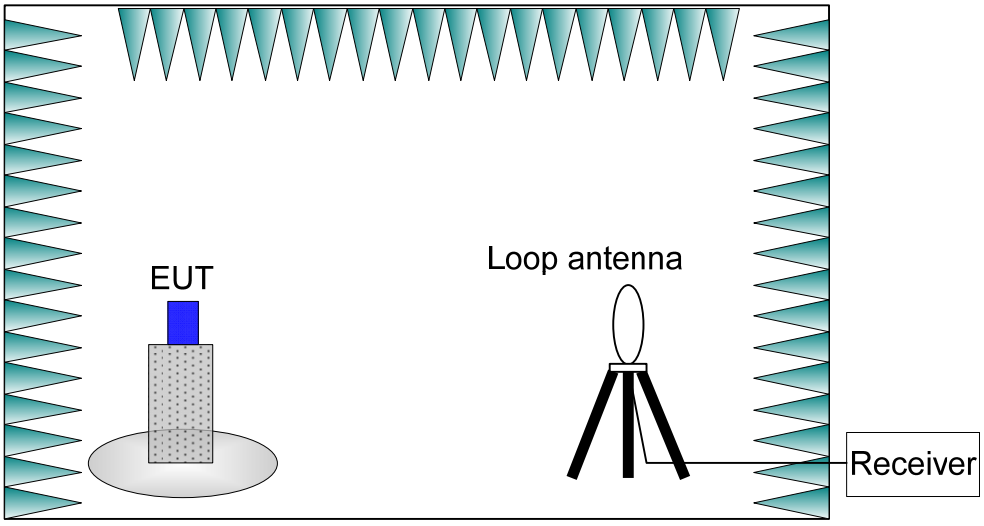
### A.2.2. Measurement Methods

The transmitter carrier output levels (E-Field) from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The E-field is measured with a shielded loop antenna connected to a measurement receiver. Detected E-field was maximized by rotating the EUT through 360° and adjusting the receiving antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.

The measurement bandwidth is:

| Frequency of Emission (MHz) | RBW/VBW |
|---|---|
| 0.009-0.15 | 100/300 Hz |
| 0.15-30 | 10/30 kHz |

The E-field measured at 3m is calculated as:
E-field (dBμV/m) = Rx (dBμV) + Cable Loss (dB) + AF@3m (dB/m)




### A.2.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC (See 3.5).
The EUT is powered by a travel adapter.
During the measurements, the ambient temperature of the electromagnetic anechoic chamber is in the range of 15 ~ 25 ℃.

### A.2.4. Limits

| Frequency Range (MHz) | E-field Strength Limit @ 30m (mV/m) | E-field Strength Limit @ 3m (dBμV/m) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 129-94 |
| 0.490-1.705 | 24000/F(kHz) | 74-63 |
| 1.705-30 | 30 | 70 |
| Note: Where the limits have been defined at one distance, and a signal level measured at another, the limits have been extrapolated using the following formula:<br>$\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$ | | |

### A.2.5. Measurement Results

Measurement results of normal conditions see Figure A-2 for different set-ups of EUT. The result displayed take into account applicable antenna factors and cable losses.

**Conclusions:** Set. NFC01, **PASS**.

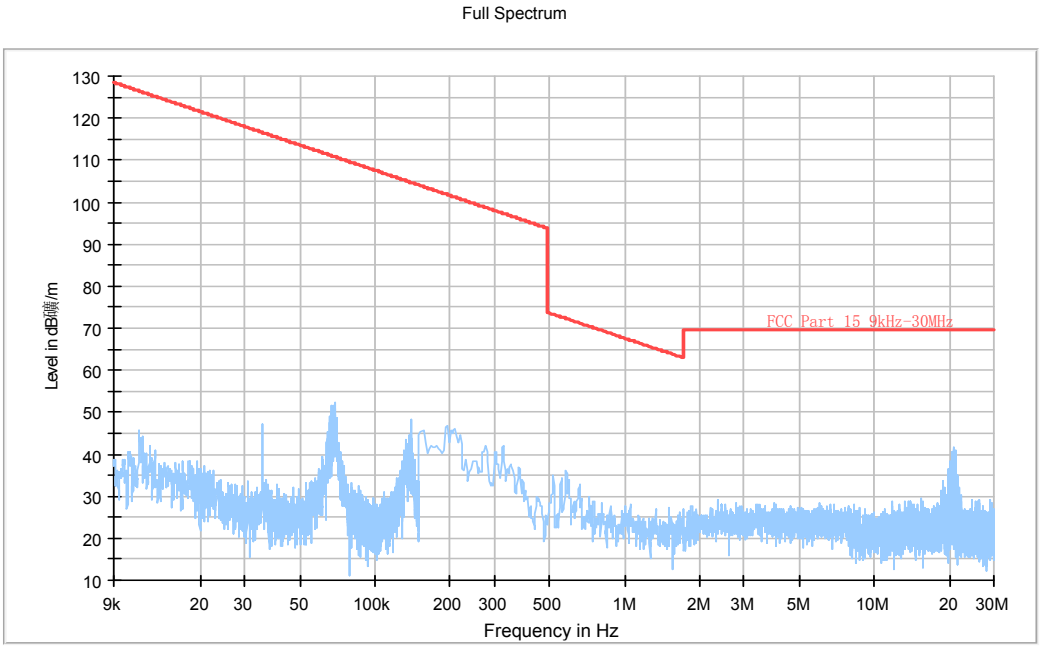



**Figure A-2: Set. NFC01_1**

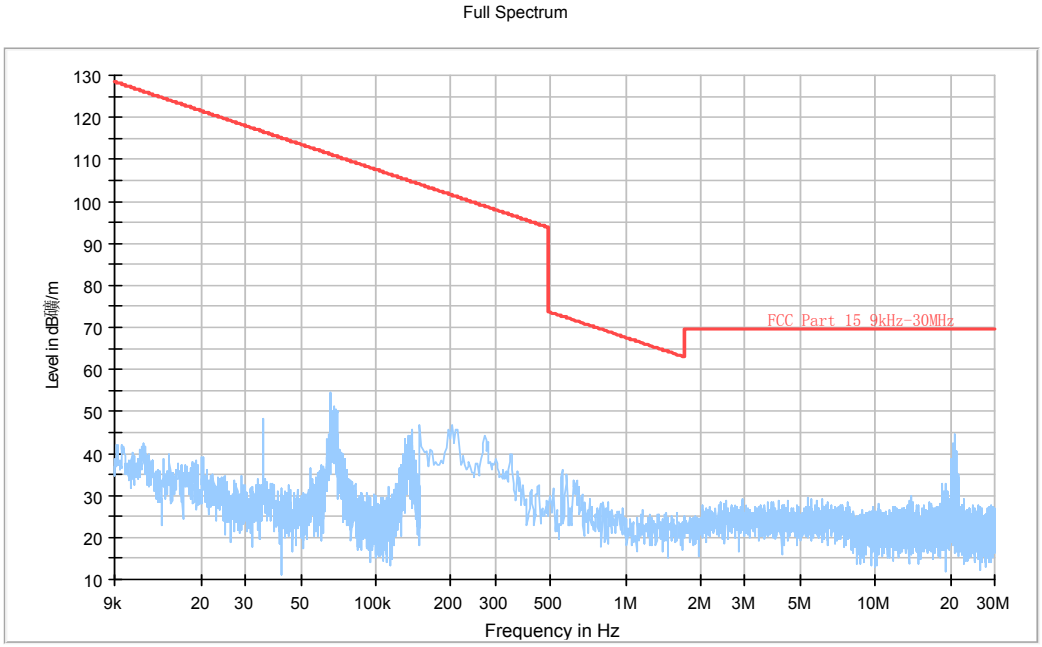



**Figure A-3: Set. NFC01_2**

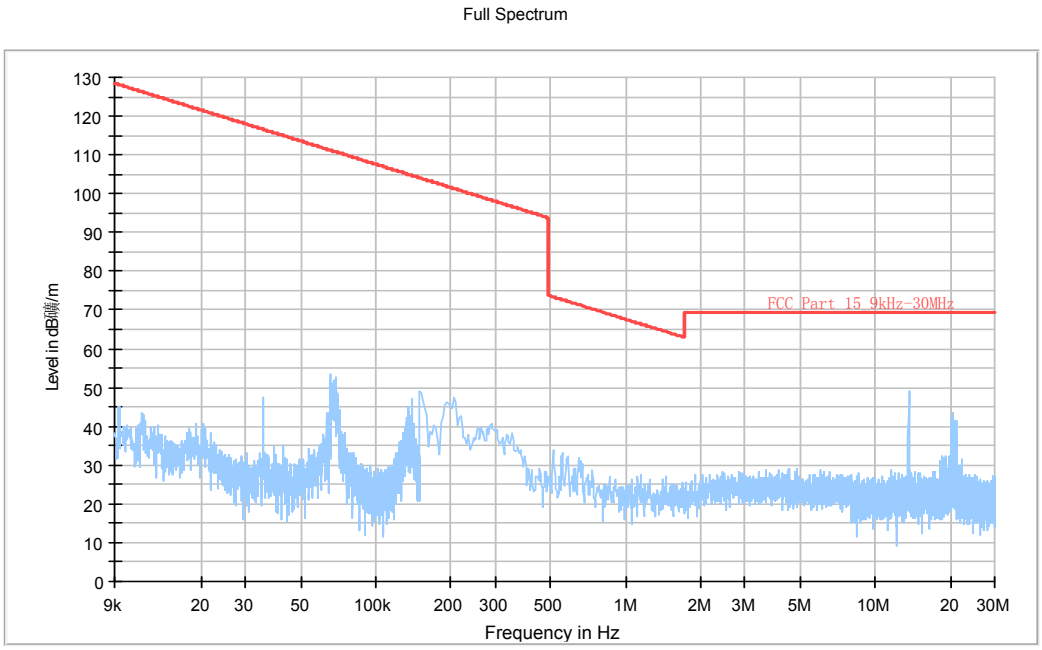



**Figure A-4: Set. NFC01_3**

### A.2.6. Measurement Uncertainty

Measurement uncertainty: *U* = 3.94 dB, k=2.

## A.3. Electric Field Radiated Emissions (≥30MHz)

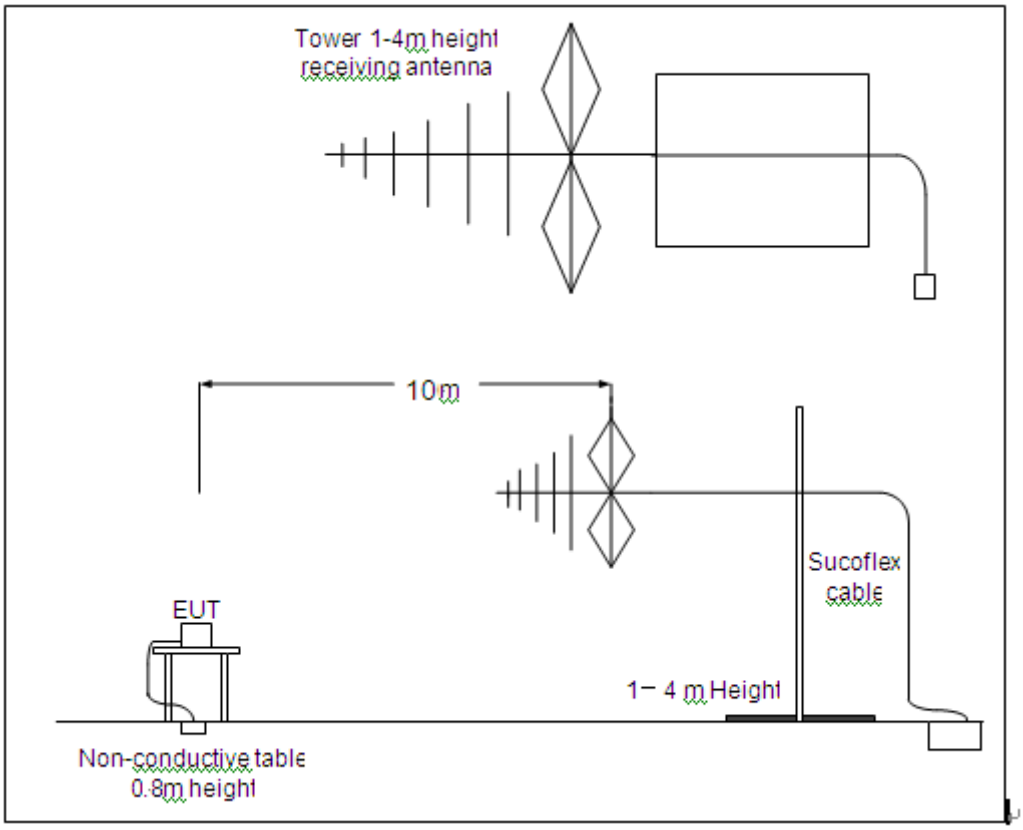
### A.3.1. Reference

See Clause 6.5 of ANSI C63.10-2013 specifically.
See Clause 4 and Clause 5 of ANSI C63.10-2013 generally.

### A.3.2. Measurement Methods

The electric field radiated emissions from the EUT are measured in a semi-anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 10m from the receiving antenna. The receiving antennas connected to a measurement receiver comply with Clause 15 of ANSI C63.2-1996 and Clause 4.1.5 of ANSI C63.4-2009. In order to search for maximum field strength emitted from the EUT, the receiving antenna can be moved between the height of 1.0 m to 4.0 m. Detected E-field was maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna positions for both vertical and horizontal antenna polarizations. The maximization processes were repeated with the EUT positioned respectively in its three orthogonal axes. The measurements were performed with the peak detector and if required, the quasi-peak detector.
The measurement bandwidth is:

| Frequency of Emission (MHz) | RBW/VBW |
|---|---|
| 30-1000 | 120kHz |



### A.3.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC (See 3.5).
EUT1 had been connected to a travel adapter.
During the measurements, the ambient temperature of the electromagnetic anechoic chamber is in the range of 15 ~ 25 ℃.

### A.3.4. Limits

| Frequency Range (MHz) | E-field Strength Limit @ 3m (mV/m) | E-field Strength Limit @ 3m (dBμV/m) | E-field Strength Limit @ 10m (dBμV/m) |
|---|---|---|---|
| 30-88 | 100 | 40 | 30 |
| 88-216 | 150 | 43.5 | 33.5 |
| 216-960 | 200 | 46 | 36 |
| 960-1000 | 500 | 54 | 44 |

### A.3.5. Measurement Results

Measurement results of normal conditions see Figure A-3 for different set-ups of EUT. The result displayed take into account applicable antenna factors and cable losses.
**Conclusions:** Set. NFC01, **PASS**.

### A.3.6. Measurement Uncertainty

Measurement uncertainty: *U* =3.9 dB, k=2

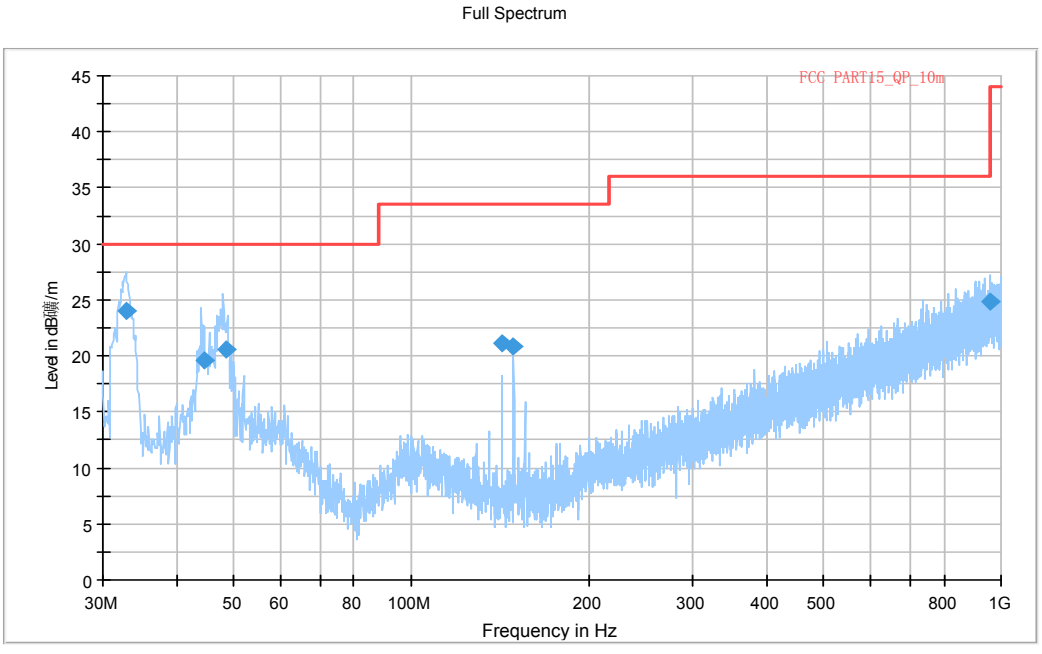



**Figure A-5: Set. NFC01**

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|
| 32.790000 | 23.95 | 30.00 | 6.05 | 1000.0 | 120.000 | 119.0 | V | 68.0 |
| 44.605000 | 19.64 | 30.00 | 10.36 | 1000.0 | 120.000 | 185.0 | V | 169.0 |
| 48.462000 | 20.52 | 30.00 | 9.48 | 1000.0 | 120.000 | 210.0 | V | 201.0 |
| 142.326000 | 21.07 | 33.50 | 12.45 | 1000.0 | 120.000 | 125.0 | V | 61.0 |
| 149.116000 | 20.86 | 33.50 | 12.66 | 1000.0 | 120.000 | 119.0 | V | 60.0 |
| 957.602000 | 24.83 | 36.00 | 11.19 | 1000.0 | 120.000 | 216.0 | V | 107.0 |

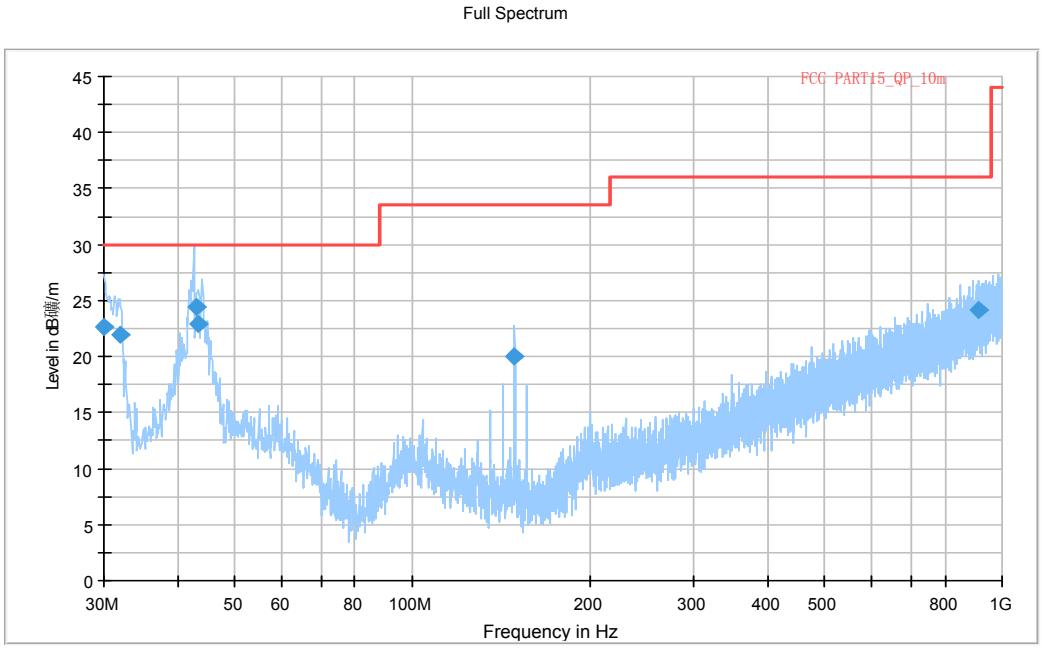



**Figure A-6: Set. NFC01_2**

**Final_Result**

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|
| 30.000000 | 22.68 | 30.00 | 7.32 | 1000.0 | 120.000 | 225.0 | V | 106.0 |
| 31.880000 | 21.98 | 30.00 | 8.02 | 1000.0 | 120.000 | 193.0 | V | 60.0 |
| 43.030000 | 24.49 | 30.00 | 5.51 | 1000.0 | 120.000 | 175.0 | V | 173.0 |
| 43.465000 | 22.93 | 30.00 | 7.07 | 1000.0 | 120.000 | 290.0 | V | 184.0 |
| 149.153000 | 19.95 | 33.50 | 13.57 | 1000.0 | 120.000 | 283.0 | V | 150.0 |
| 910.848000 | 24.14 | 36.00 | 11.88 | 1000.0 | 120.000 | 112.0 | V | 175.0 |

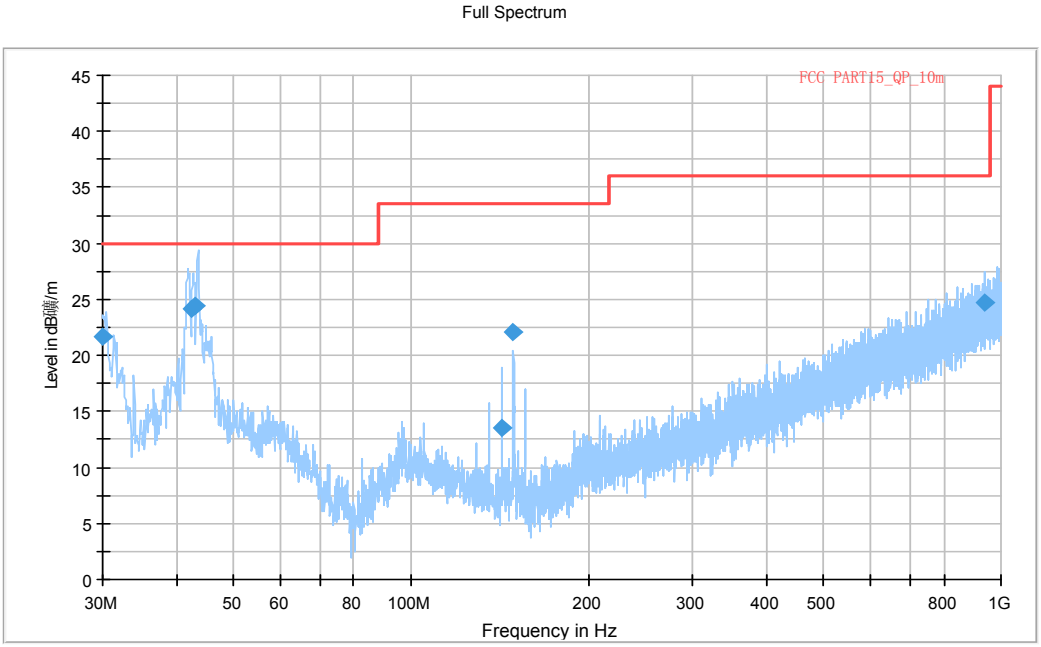



**Figure A-7: Set. NFC01_3**

**Final_Result**

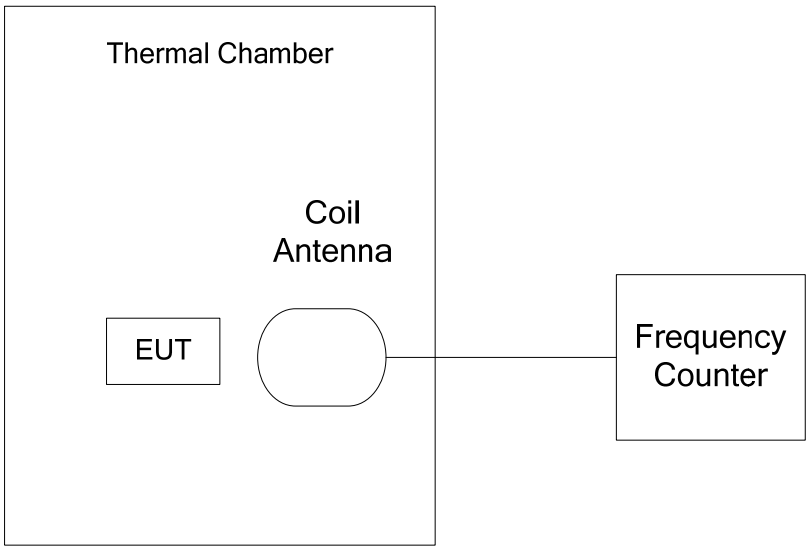
| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|---|---|---|---|---|---|---|---|---|
| 30.000000 | 21.74 | 30.00 | 8.26 | 1000.0 | 120.000 | 125.0 | V | 150.0 |
| 42.374000 | 24.22 | 30.00 | 5.78 | 1000.0 | 120.000 | 297.0 | V | 61.0 |
| 42.980000 | 24.39 | 30.00 | 5.61 | 1000.0 | 120.000 | 225.0 | V | 183.0 |
| 142.363000 | 13.58 | 33.50 | 19.94 | 1000.0 | 120.000 | 295.0 | V | 210.0 |
| 149.153000 | 22.13 | 33.50 | 11.39 | 1000.0 | 120.000 | 175.0 | V | 60.0 |
| 940.128000 | 24.68 | 36.00 | 11.34 | 1000.0 | 120.000 | 225.0 | V | 120.0 |

## A.4. Frequency Tolerance

### A.4.1. Reference

See Clause 13.6 of ANSI C63.10-2013 specifically.
See Clause 4, Clause 5, and Clause 6 of ANSI C63.10-2013 generally.

### A.4.2. Measurement Methods




The transmitter output signal was picked up by coil antenna connected to the frequency counter. The center frequency was measured with 30Hz RBW and 1kHz span.
During the test, the EUT was placed in a thermal chamber until thermal balance and lasting appropriate time.

### A.4.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of without modulation (See 3.5).
EUT1 had been not connected to a travel adapter.
Operation Temperature: T min, T nom, and T max with V nom.
Operation Voltage: V min and V max with T nom.

### A.4.4. Test Layouts

See A.4.2.

### A.4.5. Limits

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

### A.4.6. Measurement Results

Measurement results see Table A-1 for different test conditions.
**Conclusions:** Set. NFC02, **PASS**.

**Table A-1: Frequency Stability VS Temperature and Voltage**

| Temperature | Voltage | Frequency Error (MHz) | | | |
|---|---|---|---|---|---|
| | | Startup | 2 Min Later | 5 Min Later | 10 Min Later |
| T min | V nom | 13.5599938 | 13.5601488 | 13.5600350 | 13.5600970 |
| T max | V nom | 13.5600099 | 13.5600175 | 13.5599957 | 13.5600561 |
| T nom | V nom | 13.5599831 | 13.5599882 | 13.5599963 | 13.5599894 |
| T nom | V min | 13.5601113 | 13.5601790 | 13.5601080 | 13.5601235 |
| T nom | V max | 13.5599176 | 13.5601457 | 13.5601231 | 13.5601272 |

| Temperature | Voltage | Frequency Error (%) | | | |
|---|---|---|---|---|---|
| | | Startup | 2 Min Later | 5 Min Later | 10 Min Later |
| T min | V nom | 0.000 | 0.001 | 0.000 | 0.001 |
| T max | V nom | 0.000 | 0.000 | 0.000 | 0.000 |
| T nom | V nom | 0.000 | 0.000 | 0.000 | 0.000 |
| T nom | V min | 0.001 | 0.001 | 0.001 | 0.001 |
| T nom | V max | -0.001 | 0.001 | 0.001 | 0.001 |

### A.4.7. Measurement Uncertainty

Measurement uncertainty: *U* =77 Hz, k=2

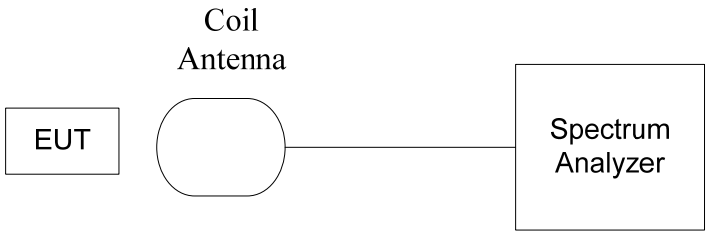
## A.5. 20dB Bandwidth

### A.5.1. Reference

See Clause 13.7 of ANSI C63.10-2013 specifically.
See Clause 4, Clause 5, and Clause 6 of ANSI C63.10-2013 generally.

### A.5.2. Measurement Methods

The transmitter output signal was picked up by coil antenna to the spectrum analyzer.
The transmitter output signal was picked up by coil antenna connected to the spectrum analyzer. The bandwidth of the center frequency was measured with 140Hz RBW, 420Hz VBW and 14kHz span.




### A.5.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC and without modulation (See 3.5).
EUT had been not connected to a travel adapter..

During the measurements, the ambient temperature is in the range of 15 ~ 25 ℃.

### A.5.4. Test Layouts

See A.5.2.

### A.5.5. Limits

The 20dB bandwidth shall be less than 80% of the permitted frequency band. For 13.56 MHz NFC, the permitted frequency band is 14kHz, so the limit is 11.2 kHz.

### A.5.6. Measurement Results

Measurement results see Figure A-4.
**Conclusions:** Set. NFC02 and NFC03, **PASS**.

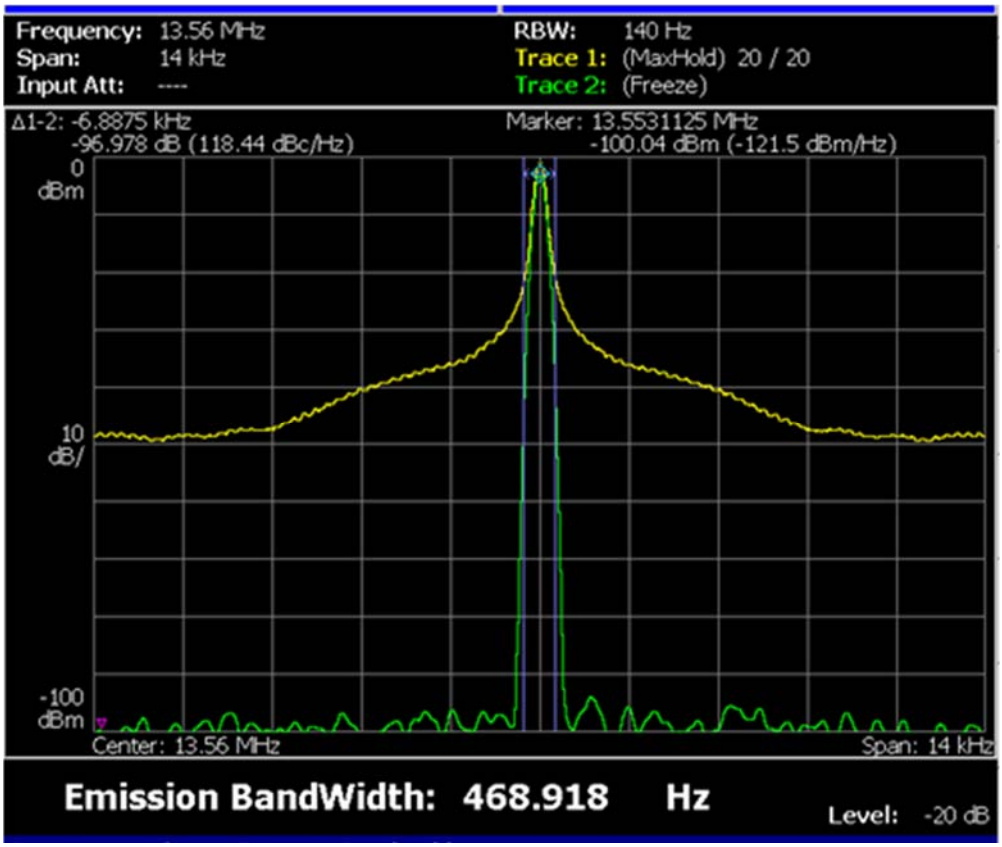



**Figure A-8: Test result of EUT1 at test set. NFC02**

### A.5.7. Measurement Uncertainty

Measurement uncertainty: *U* =77 Hz, k=2

## A.6. Conducted emission

### A.6.1. Reference

See Clause 6.2 of ANSI C63.10-2013 specifically.

See Clause 4 and Clause 5 of ANSI C63.10-2013 generally

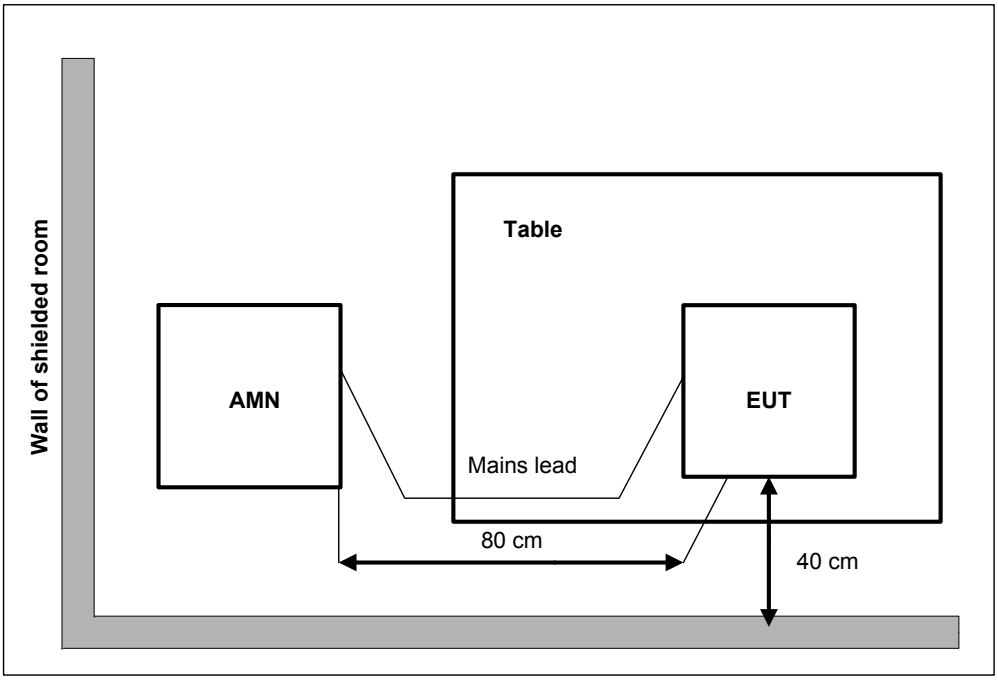
### A.6.2. Measurement Methods

The conducted emissions from the AC port of the EUT are measured in a shielding room. The EUT is connected to a Line Impedance Stabilization Network (LISN). An overview sweep with peak detection was performed. The measurements were performed with a quasi-peak detector and if required, an average detector.

The conducted emission measurements were made with the following detector of the test receiver: Quasi-Peak / Average Detector.

The measurement bandwidth is:

| Frequency of Emission (MHz) | RBW/VBW |
|---|---|
| 0.15-30 | 9kHz |




### A.6.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC (See 3.5).

The EUT is powered by a travel adapter.

During the measurements, the ambient temperature is in the range of 15 ~ 25 ℃.

### A.6.4. Limits

| Frequency range (MHz) | Quasi-peak Limit (dBμV) | Average Limit (dBμV) |
|---|---|---|
| 0.15 to 0.5 | 66 to 56 | 56 to 46 |
| 0.5 to 5 | 56 | 46 |

| | | |
|---|---|---|
| 5 to 30 | 60 | 50 |

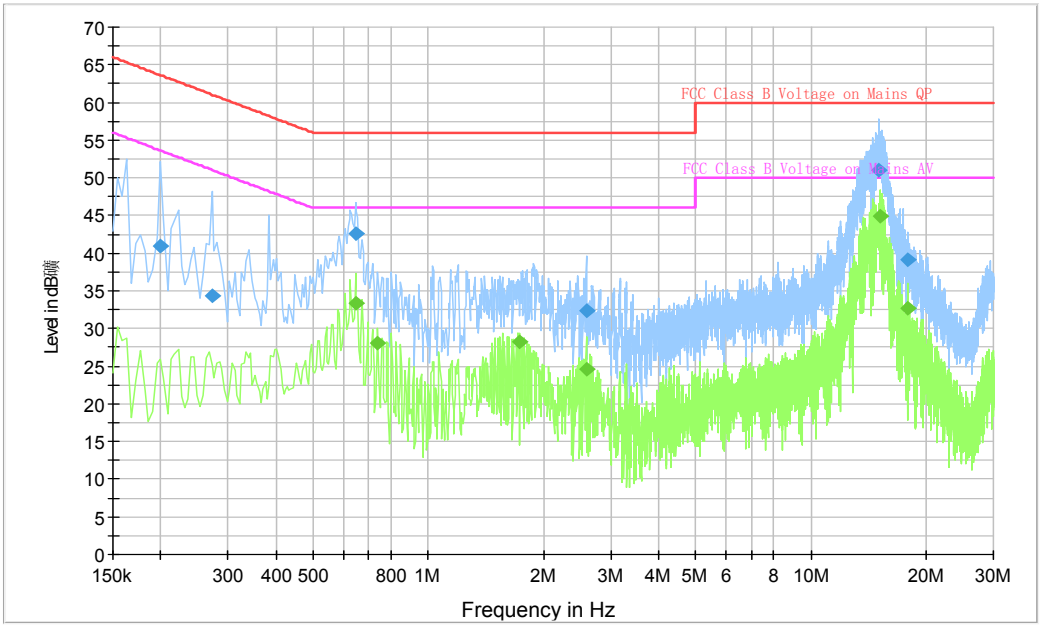
**A.6.5. Measurement Results**

Measurement results see Figure C-5.

**Conclusions:** Set. NFC01_1, **PASS**.

Note: The measurement result at 13.56MHz is the fundamental emission of NFC signal.

**CBA0060AGHC1(the worst case)**




**Final Result 1**

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.199500 | 40.9 | 2000.0 | 9.000 | On | L1 | 19.8 | 22.7 | 63.6 |
| 0.271500 | 34.4 | 2000.0 | 9.000 | On | L1 | 19.8 | 26.7 | 61.1 |
| 0.645000 | 42.7 | 2000.0 | 9.000 | On | L1 | 19.8 | 13.3 | 56.0 |
| 2.589000 | 32.4 | 2000.0 | 9.000 | On | N | 19.1 | 23.6 | 56.0 |
| 15.072000 | 50.9 | 2000.0 | 9.000 | On | L1 | 19.8 | 9.1 | 60.0 |
| 17.911500 | 39.2 | 2000.0 | 9.000 | On | N | 19.9 | 20.8 | 60.0 |

**Final Result 2**

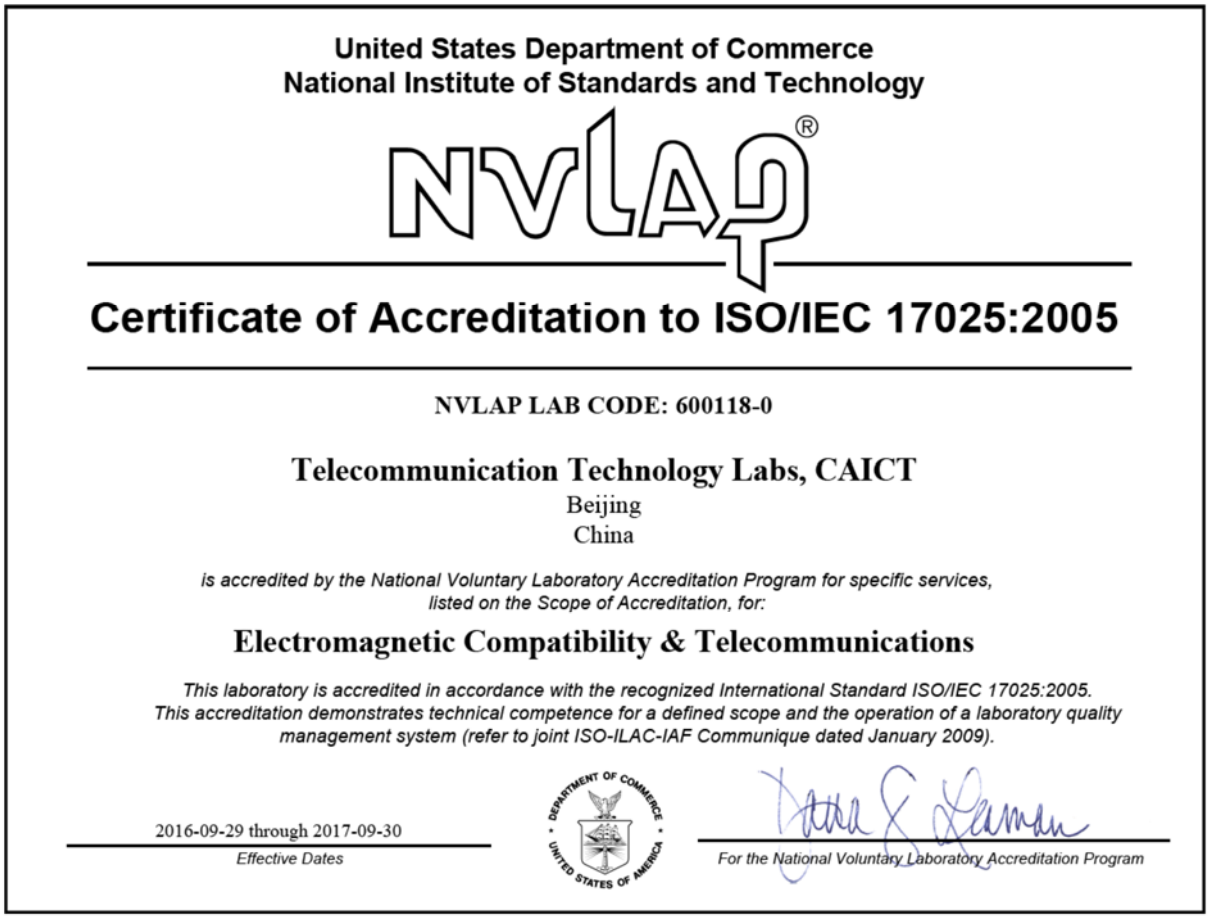
| Frequency (MHz) | Average (dBµV) | Meas. Time | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.645000 | 33.3 | 2000.0 | 9.000 | On | L1 | 19.8 | 12.7 | 46.0 |
| 0.739500 | 28.1 | 2000.0 | 9.000 | On | L1 | 19.8 | 17.9 | 46.0 |
| 1.738500 | 28.3 | 2000.0 | 9.000 | On | N | 19.7 | 17.7 | 46.0 |
| 2.589000 | 24.5 | 2000.0 | 9.000 | On | N | 19.1 | 21.5 | 46.0 |
| 15.189000 | 44.9 | 2000.0 | 9.000 | On | L1 | 19.8 | 5.1 | 50.0 |
| 17.911500 | 32.7 | 2000.0 | 9.000 | On | N | 19.9 | 17.3 | 50.0 |

**Figure A-9: Test result of EUT1 at test set. NFC01**

### A.6.6. Measurement Uncertainty

Measurement uncertainty: *U* = 3.38 dB, k=2

## ANNEX B: Accreditation Certificate



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*is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2016-09-29 through 2017-09-30
*Effective Dates*

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

*For the National Voluntary Laboratory Accreditation Program*

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